Monitoring Application Servers

eG Enterprise v6.0

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1

Introduction

To achieve scalability and performance, most Internet application deployments have evolved into multi-tier infrastructures where the web server tier serves as the web front-end, the business logic is executed on middleware application servers, and the backend storage and access is provided via database servers. While multi-tier infrastructures offer a variety of scalability and extensibility benefits, they are also more difficult to operate and manage. When a problem occurs (e.g., a slowdown), an administrator often has difficulty in figuring out which application(s) in the multi-tier infrastructure could be the cause of the problem - i.e., is it the network? Or the database? Or the WebLogic server? Or the middleware? Or the web server? Comprehensive, routine monitoring of every infrastructure application and network device is essential to be able to troubleshoot effectively when problems occur.

The application server middleware that hosts and supports the business logic components is often the most complex of the multi-tier infrastructure. To offer peak performance, an application server provides a host of complex functions and features including database connection pooling, thread pooling, database result caching, session management, bean caching and management etc. To ensure that the application server is functioning effectively at all times, all of these functions have to be monitored and tracked proactively and constantly.

eG Enterprise offers specialized monitoring models for each of the most popular application servers such as WebLogic, WebSphere, ColdFusion, Oracle 9i/10G, etc. A plethora of metrics relating to the health of the application servers can be monitored in real-time and alerts can be generated based on user-defined thresholds or auto-computed baselines. These metrics enable administrators to quickly and accurately determine server availability and responsiveness, resource usage at the host-level and at the application server level, how well the application server processes requests, how quickly the server completes transactions, overall server security, etc.

This document engages you in an elaborate discussion on how eG Enterprise monitors each of the popular web application servers in the market.

Chapter 2

Monitoring WebLogic Application Servers

BEA WebLogic Server is a fully-featured, standards-based application server providing the foundation on which an enterprise can build reliable, scalable, and manageable applications. With its comprehensive set of features, compliance with open standards, multi-tiered architecture, and support for component-based development, WebLogic Server provides the underlying core functionality necessary for the development and deployment of business-driven applications. Any issue with the functioning of the WebLogic server, if not troubleshooted on time, can rupture the very core of these business-critical applications, causing infrastructure downtime and huge revenue losses. This justifies the need for continuously monitoring the external availability and internal operations of the WebLogic server.

eG Enterprise provides two distinct models for monitoring WebLogic servers - the *WebLogic* model and the *WebLogic (6/7/8)* model. As the names suggest, the *WebLogic 6/7/8* model can be used to monitor the WebLogic server version 6, 7, and 8, and the *WebLogic* model can be used for monitoring WebLogic 9.0 (and above).

Regardless of the model used, the metrics obtained enable administrators to find answers to the following persistent performance questions:

Server monitoring	▪ Is the WebLogic process running? ▪ Is the memory usage of the server increasing over time? ▪ Is the server's request processing rate unusually high?
JVM monitoring	▪ Is the JVM heap size adequate? ▪ Is the garbage collection tuned well or is the JVM spending too much time in garbage collection?
Thread monitoring	▪ Are the WebLogic servers execute queues adequately sized? ▪ Are there too many threads waiting to be serviced, thereby causing slow response time?
Security monitoring	▪ How many invalid login attempts have been made to the WebLogic server? ▪ Are these attempts recurring?

JMS monitoring	▪ Are there many pending messages in the messaging server? ▪ Is the message traffic unusually high?
Connector monitoring	▪ What is the usage pattern of connections in a connector pool?
Cluster monitoring	▪ Are all the WebLogic servers in the cluster currently available? ▪ Is the load being balanced across the cluster?
Transaction monitoring	▪ How many user transactions are happening? ▪ Are there too many rollbacks occurring?
Servlet monitoring	▪ Which servlet(s) are being extensively accessed? ▪ What is the average invocation time for each servlet?
EJB Pool monitoring	▪ Are there adequate numbers of beans in a bean pool? ▪ How many beans are in use? Are there any clients waiting for a bean?
EJB Cache monitoring	▪ Is the cache adequately sized or are there too many cache misses? ▪ What is the rate of EJB activations and passivations?
EJB Lock monitoring	▪ Is there contention for locks? ▪ How many beans are locked? ▪ How many attempts have been made to acquire a lock for each bean?
JDBC Connection monitoring	▪ Are all the JDBC pools available? ▪ Is each pool adequately sized? ▪ What are the peak usage times and values? ▪ How many connection leaks have occurred?
JDBC call monitoring	▪ How many JDBC calls have been made? ▪ What was average response time of those calls? ▪ What are the queries that take a long time to execute?

The sections that will follow discuss each of these models in great detail.

2.1 Monitoring the WebLogic Server Ver. 9.0 (and above)

The special *WebLogic* monitoring model (see Figure 2.1) that eG Enterprise offers provides uses JMX (Java Management extension), the new standard for managing java components, for monitoring the WebLogic server 9.0 (and above). JMX allows users to instrument their applications and control or monitor them using a management console. Using this mechanism, over a hundred critical metrics relating to a WebLogic server instance can be monitored in real-time and alerts can be generated based on user-defined thresholds or auto-computed baselines.

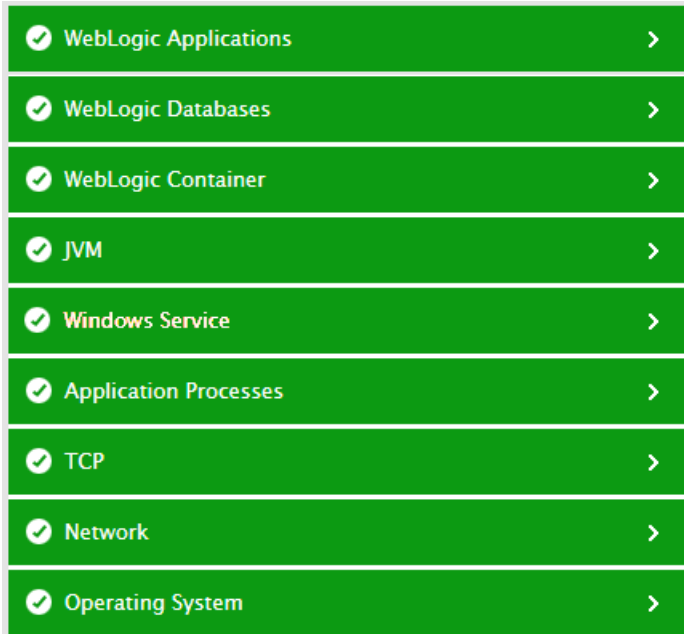


Figure 2.1: Layer model of the WebLogic Application server

The sections that will follow discuss the top 4 layers of Figure 2.1, and the metrics they report. In addition, the **Application Processes** layer will also be touched upon, as it includes an additional test for WebLogic servers called the **Windows Service Resources** test.

The remaining layers have been extensively dealt with in the *Monitoring Unix and Window Servers* document.

2.1.1 The Application Processes Layer

The default **Processes** test mapped to this layer reports the availability and resource usage of the processes that are critical to the functioning of the WebLogic server. For more details about the **Processes** test, refer to the *Monitoring Unix and Windows Servers* document.

If the WebLogic server is operating on a Windows host, then, optionally, you can configure a **Windows Service Resources** test for the server. This test reports the availability and resource usage of a configured service.

Figure 2.2: The tests mapped to the Application Processes layer of the WebLogic server

2.1.1.1 Windows Service Resources Test

For a configured service, this test reports whether that service is up and running or not. In addition, the test automatically determines the ID and name of the process that corresponds to the configured service, and measures the CPU and memory usage of that process and the I/O load imposed by the process. **This test executes only on Windows hosts**.

This test is disabled by default. **Enable this test only if the WebLogic server is operating on a Windows host**. To enable the test, go to the **ENABLE / DISABLE TESTS** page using the menu sequence : Agents -> Tests -> Enable/Disable, pick *WebLogic* as the **Component type**, *Performance* as the **Test type**, choose this test from the **DISABLED TESTS** list, and click on the **<<** button to move the test to the **ENABLED TESTS** list. Finally, click the **Update** button.

Purpose	Reports whether the configured service is available or not, automatically determines the ID and name of the process that corresponds to the configured service, and measures the CPU and memory usage of that process and the I/O load imposed by the process		
Target of the test	A WebLogic application server		
Agent deploying the test	An internal agent		
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebLogic server 3. **PORT** – The port number of the WebLogic server 4. **SERVICENAME** - Specify the exact name of the service to be monitored. For eg., to monitor the World Wide Web Publishing service, the **SERVICENAME** should be: *W3SVC*. If your service name embeds white spaces, then specify the service name within "double-quotes".		
Outputs of the test	One set of results for the **SERVICENAME** configured		
Measurements made by the	**Measurement**	**Measurement Unit**	**Interpretation**

test	**Service availability:** Indicates whether the configured service is available or not.	Percent	If the service exists on the target host and is currently running, then this measure will report the value *100*. On the other hand, if the service exists but is not running, then this measure will report the value *0*. If the service does not exist, then the test will report the value *Unknown*.
	CPU utiization: Indicates the percentage of CPU utilized by the process that corresponds to the configured **SERVICENAME**	Percent	A very high value could indicate that the service is consuming excessive CPU resources.
	Memory utilization: For the process corresponding to the specified **SERVICENAME**, this value represents the ratio of the resident set size of the process to the physical memory of the host system, expressed as a percentage.	Percent	A sudden increase in memory utilization for a process may be indicative of memory leaks in the application.
	Handle count: Indicates the number of handles opened by the process mapped to the configured **SERVICENAME**.	Number	An increasing trend in this measure is indicative of a memory leak in the service.
	Number of threads: Indicates the number of threads that are used by the process that corresponds to the configured **SERVICENAME**.	Number	
	Virtual memory used: Indicates the amount of virtual memory that is being used by the process that corresponds to the configured **SERVICENAME**.	MB	

	I/O data rate: Indicates the rate at which the process mapped to the configured **SERVICENAME** is reading and writing bytes in I/O operations.	Kbytes/Sec	This value counts all I/O activity generated by a process and includes file, network and device I/Os.
	I/O data operations: Indicates the rate at which the process corresponding to the specified **SERVICENAME** is issuing read and write data to file, network and device I/O operations.	Operations/Sec	
	I/O read data rate: Indicates the rate at which the process that corresponds to the configured **SERVICE NAME** is reading data from file, network and device I/O operations.	Kbytes/Sec	
	I/O write data rate: Indicates the rate at which the process (that corresponds to the configured **SERVICENAME**) is writing data to file, network and device I/O operations.	Kbytes/Sec	
	Page fault rate: Indicates the total rate at which page faults are occurring for the threads of the process that maps to the configured **SERVICENAME**.	Faults/Sec	A page fault occurs when a thread refers to a virtual memory page that is not in its working set in main memory. This may not cause the page to be fetched from disk if it is on the standby list and hence already in main memory, or if it is in use by another process with whom the page is shared.

	Memory working set: Indicates the current size of the working set of the process that maps to the configured **SERVICENAME**.	MB	The Working Set is the set of memory pages touched recently by the threads in the process. If free memory in the computer is above a threshold, pages are left in the Working Set of a process even if they are not in use. When free memory falls below a threshold, pages are trimmed from Working Sets. If they are needed they will then be soft-faulted back into the Working Set before leaving main memory. By tracking the working set of a process over time, you can determine if the application has a memory leak or not.

2.1.2 The JVM Layer

A Java virtual machine (JVM), an implementation of the Java Virtual Machine Specification, interprets compiled java binary code for a computer's processor (or "hardware platform") so that it can perform a Java program's instructions. The Java Virtual Machine Specification defines an abstract -- rather than a real -- machine or processor. The Specification specifies an instruction set, a set of registers, a stack, a garbage heap, and a method area.

The tests associated with the **JVM** layer of WebLogic enables administrators to perform the following functions:

- Assess the effectiveness of the garbage collection activity performed on the JVM heap
- Monitor WebLogic thread usage
- Evaluate the performance of the BEA JRockit JVM

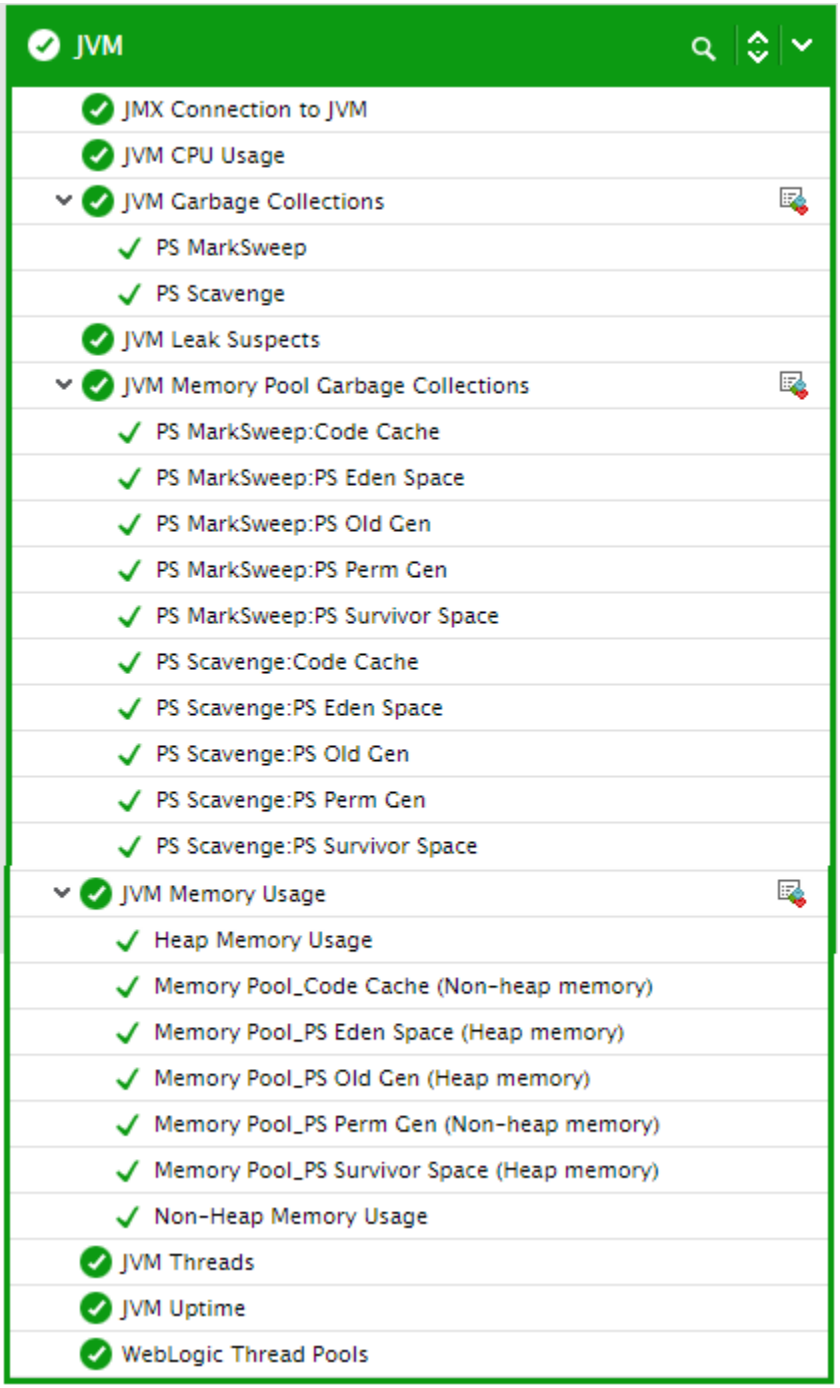


Figure 2.3: The tests associated with the JVM layer

2.1.2.1 WebLogic Rockit JVM Test

This test exposes runtime data about the JRockit Virtual Machine (VM) that is running the current WebLogic Server instance.

The WebLogic Rockit JVM test will work only if the following conditions are fulfilled:

- The Weblogic Server must be launched on the JRockit JVM
- The *managementapi.jar* should be on the Weblogic server's startup classpath

Purpose	To report runtime data about the JRockit Virtual Machine (VM) that is running the current WebLogic Server instance
Target of the test	A WebLogic application server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebLogic server 3. **PORT** – The port number of the WebLogic server 4. **USER** – The admin user name of the WebLogic server being monitored. 5. **PASSWORD** – The password of the specified admin user 6. **CONFIRM PASSWORD** – Confirm the password by retyping it here. 7. **ENCRYPTPASS** - If the specified password needs to be encrypted, set the **ENCRYPTPASS** flag to **YES**. Otherwise, set it to **NO**. By default, the **YES** option will be selected. **Note:** If the **USEWARFILE** flag is set to **No**, then make sure that the **ENCRYPTPASS** flag is also set to **No**. 8. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebLogic server. 9. **SERVER** - The name of the specific server instance to be monitored for a WebLogic server (the default value is "localhome") 10. **URL** – The URL to be accessed to collect metrics pertaining to the WebLogic server. By default, this test connects to a managed WebLogic server and attempts to obtain the metrics of interest by accessing the local Mbeans of the server. This parameter can be changed to a value of `http://<adminserverIP>:<adminserverPort>`. In this case, the test connects to the WebLogic admin server to collect metrics pertaining to the managed server (specified by the **HOST** and **PORT**). The **URL** setting provides the administrator with the flexibility of determining the WebLogic monitoring configuration to use. **Note:** If the admin server is to be used for collecting measures for all the managed WebLogic servers, then it is mandatory that the egurkha war file is deployed to the admin server, and it is up and running. 11. **VERSION** - The **VERSION** textbox indicates the version of the Weblogic server to be managed. The default value is "none", in which case the test auto-discovers the weblogic version. If the value of this parameter is not "none", the test uses the value provided (e.g., 7.0) as the weblogic version (i.e., it does not auto-discover the weblogic server version). This parameter has been added to address cases when the eG agent is not able to discover the WebLogic server version. 12. **USEWARFILE** - This flag indicates whether/not monitoring is to be done using a Web archive file deployed on the WebLogic server (in which case, HTTP/HTTPS is used by the server to connect to the server). If this flag is set to **No**, the agent directly connects to the WebLogic server using the T3 protocol (no other file needs to be deployed on the WebLogic server for this to work). **Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.** Also, if the **USEWARFILE** parameter is set to **No**, make sure that the **ENCRYPTPASS** parameter is set to **No** as well.

<table>
<tr><td></td><td colspan="3">When monitoring a WebLogic server deployed on a Unix platform particularly, if the USEWARFILE parameter is set to No, you have to make sure that the eG agent install user is added to the WebLogic users group.

13. WEBLOGICJARLOCATION - Specify the location of the WebLogic server's java archive (Jar) file. If the USEWARFILE flag is set to No, then the weblogic.jar file specified here is used to connect to the corresponding WebLogic server using the T3 protocol. Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for every WebLogic server being monitored.</td></tr>
<tr><td rowspan="6">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Total heap:
Indicates the amount of memory currently allocated to the Virtual Machine's Java heap.</td><td>MB</td><td></td></tr>
<tr><td>Used heap:
Indicates the amount of Java heap memory that is currently being used by the Virtual Machine.</td><td>MB</td><td>If the value of this measure increases consistently, it is indicative of heavy load on the Virtual Machine.</td></tr>
<tr><td>Free heap:
Indicates the amount of Java heap memory that is currently free in the Virtual Machine.</td><td>MB</td><td>A very low value of this measure is a cause of concern, as it indicates a heavy utilization of the JVM heap. Consider increasing the JVM heap size under such circumstances.</td></tr>
<tr><td>Total nursery:
Indicates the amount of memory that is currently allocated to the nursery.</td><td>MB</td><td></td></tr>
<tr><td>GC count:
Indicates the number of garbage collection runs that have occurred since the Virtual Machine was started.</td><td>Number</td><td rowspan="2">If GC has run too many times during a short interval, it indicates that the JVM is in dire need of free heap for normal functioning. Moreover, frequent GC executions could cause application performance to deteriorate. In order to avoid this, it is recommended that you increase the heap size or alter the GC frequency.</td></tr>
<tr><td>GC time:
Indicates the time that the Virtual Machine has spent on all garbage collection runs since the VM was started.</td><td>Secs</td></tr>
</table>

	Total load: Indicates the percentage of load that the Virtual Machine is placing on all processors in the host computer.	Percent	
	Percent heap used: Indicates the percentage of the total Java heap memory that is currently being used by the Virtual Machine.	Percent	

2.1.2.2 WebLogic Thread Pools Test

Starting from WebLogic server release 9.0, every server instance uses a self-tuned thread-pool. All requests, whether related to system administration or application activity—are processed by this single thread pool. The self-tuning thread pool would also adjust its pool size automatically based on the throughput history that WLS gathers every 2 seconds and based on queue size.

This test monitors how the self-tuning thread pool is being used, and in the process reports whether there are adequate idle threads in the pool to handle additional workload that may be imposed on the WebLogic server. The test also turns the spot light on the request (if any) that is hogging threads, and enables you to quickly capture a sudden/consistent increase in queue size, which in turn might impact the pool size.

Purpose	Monitors how the self-tuning thread pool is being used, and in the process reports whether there are adequate idle threads in the pool to handle additional workload that may be imposed on the WebLogic server
Target of the test	A WebLogic application server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebLogic server 3. **PORT** – The port number of the WebLogic server 4. **USER** – The admin user name of the WebLogic server being monitored. 5. **PASSWORD** – The password of the specified admin user 6. **CONFIRM PASSWORD** – Confirm the password by retyping it here. 7. **ENCRYPTPASS** - If the specified password needs to be encrypted, set the **ENCRYPTPASS** flag to **YES**. Otherwise, set it to **NO**. By default, the **YES** option will be selected. **Note:** If the **USEWARFILE** flag is set to **No**, then make sure that the **ENCRYPTPASS** flag is also set to **No**. 8. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebLogic server. 9. **SERVER** - The name of the specific server instance to be monitored for a WebLogic server (the default value is "localhome") 10. **URL** – The URL to be accessed to collect metrics pertaining to the WebLogic server. By default, this test connects to a managed WebLogic server and attempts to obtain the metrics of interest by accessing the local Mbeans of the server. This parameter can be changed to a value of `http://<adminserverIP>:<adminserverPort>`. In this case, the test connects to the WebLogic admin server to collect metrics pertaining to the managed server (specified by the **HOST** and **PORT**). The **URL** setting provides the administrator with the flexibility of determining the WebLogic monitoring configuration to use. **Note:** If the admin server is to be used for collecting measures for all the managed WebLogic servers, then it is mandatory that the egurkha war file is deployed to the admin server, and it is up and running. 11. **VERSION** - The **VERSION** textbox indicates the version of the Weblogic server to be managed. The default value is "none", in which case the test auto-discovers the weblogic version. If the value of this parameter is not "none", the test uses the value provided (e.g., 7.0) as the weblogic version (i.e., it does not auto-discover the weblogic server version). This parameter has been added to address cases when the eG agent is not able to discover the WebLogic server version. 12. **USEWARFILE** - This flag indicates whether/not monitoring is to be done using a Web archive file deployed on the WebLogic server (in which case, HTTP/HTTPS is used by the server to connect to the server). If this flag is set to **No**, the agent directly connects to the WebLogic server using the T3 protocol (no other file needs to be deployed on the WebLogic server for this to work). **Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.** Also, if the **USEWARFILE** parameter is set to **No**, make sure that the **ENCRYPTPASS** parameter is set to **No** as well.

<table>
<tr><td></td><td colspan="3">13. When monitoring a WebLogic server deployed on a Unix platform particularly, if the USEWARFILE parameter is set to No, you have to make sure that the eG agent install user is added to the WebLogic users group.

14. WEBLOGICJARLOCATION - Specify the location of the WebLogic server's java archive (Jar) file. If the USEWARFILE flag is set to No, then the weblogic.jar file specified here is used to connect to the corresponding WebLogic server using the T3 protocol. Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for the self-tuning thread pool on the WebLogic server being monitored.</td></tr>
<tr><td rowspan="2">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Active threads:
Indicates the total number of active threads in this pool.</td><td>Number</td><td>A high value for this measure is indicative of a high load on the applications deployed on the WebLogic server.

This measure is also useful for determining usage trends. For example, it can show the time of day and the day of the week in which you usually reach peak thread count. In addition, the creation of too many threads can result in out of memory errors or thrashing. By watching this metric, you can reduce excessive memory consumption before it’s too late.</td></tr>
</table>

	Hogging threads: Indicates the number of threads that are currently hogged by a request.	Number	Ideally, the value of this measure should be low. A very high value indicates that a request is using up too many threads. Hogging threads will either be declared as stuck after the configured timeout or will return to the pool before that. The self-tuning mechanism will backfill if necessary. WebLogic Server automatically detects when a thread in a pool becomes "stuck." Because a stuck thread cannot complete its current work or accept new work, the server logs a message each time it diagnoses a stuck thread. WebLogic Server diagnoses a thread as stuck if it is continually working (not idle) for a set period of time. You can tune a server's thread detection behavior by changing the length of time before a thread is diagnosed as stuck, and by changing the frequency with which the server checks for stuck threads. Although you can change the criteria WebLogic Server uses to determine whether a thread is stuck, you cannot change the default behavior of setting the "warning" and "critical" health states when all threads in a particular execute queue become stuck.
	Idle threads: Indicates the number of idle threads (i.e., the threads that are ready to process a new job as and when it arrives) in the pool.	Number	A high value is desired for this measure.
	Queue length: Indicates the number of pending requests in the priority queue.	Number	This measure comprises of both the internal system requests and requests made by the user. A low value is desired for this measure. A high value or a sudden increase in this value may indicate a sudden slowdown in responsiveness or a performance bottleneck.
	Standby threads: Indicates the number of threads that are currently in the standby pool.	Number	Threads that are not needed to handle the present work load are designated as standby and are added to the standby pool. These threads are activated when more threads are needed.

	Throughput: Indicates the number of requests in the priority queue that are completed.	Number	The queue monitors throughput over time and based on history, determines whether to adjust the thread count or not. For example, if historical throughput statistics indicate that a higher thread count increased throughput, the server increases it. Similarly, if statistics indicate that fewer threads did not reduce throughput, the count will be reduced.
	Total threads: Indicates the total number of threads in this pool.	Number	

2.1.2.3 Tests Disabled by Default for the JVM Layer

The tests discussed above are enabled by default for a WebLogic server. Besides these tests, the eG agent can be optionally configured to execute a few other tests on the WebLogic server's JVM so as to report critical statistics related to the Java transactions, classes loaded/unloaded, threads used, CPU and memory resources used, garbage collection activity, uptime of the JVM, etc. These additional tests are disabled by default for the WebLogic server. To enable one/more tests, go to the **ENABLE / DISABLE TESTS** page using the menu sequence : Agents -> Tests -> Enable/Disable, pick *WebLogic* as the **Component type**, *Performance* as the **Test type**, choose the tests from the **DISABLED TESTS** list, and click on the **>>** button to move the tests to the **ENABLED TESTS** list. Finally, click the **Update** button.

These JVM tests have been discussed below.

When a user initiates a transaction to a Java-based web application, the transaction typically travels via many Java components before completing execution and sending out a response to the user.

Figure 2.4 reveals some of the Java components that a web transaction/web request visits during its journey.

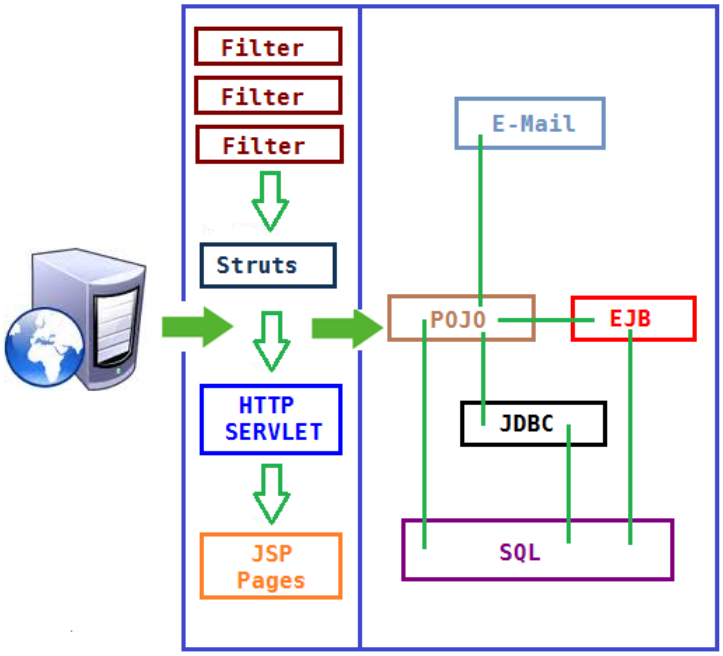


Figure 2.4: The layers through which a Java transaction passes

The key Java components depicted by Figure 2.4 have been briefly described below:

a. **Filter:** A filter is a program that runs on the server before the servlet or JSP page with which it is associated. All filters must implement **javax.servlet.Filter**. This interface comprises three methods: **init, doFilter, and destroy.**

b. **Servlet:** A servlet acts as an intermediary between the client and the server. As servlet modules run on the server, they can receive and respond to requests made by the client. If a servlet is designed to handle HTTP requests, it is called an **HTTP Servlet**.

c. **JSP:** Java Server Pages are an extension to the Java servlet technology. A JSP is translated into Java servlet before being run, and it processes HTTP requests and generates responses like any servlet. Translation occurs the first time the application is run.

d. **Struts:** The Struts Framework is a standard for developing well-architected Web applications. Based on the Model-View-Controller (MVC) design paradigm, it distinctly separates all three levels (Model, View, and Control).

A delay experienced by any of the aforesaid Java components can adversely impact the total response time of the transaction, thereby scarring the user experience with the web application. In addition, delays in JDBC connectivity and slowdowns in SQL query executions (if the application interacts with a database), bottlenecks in delivery of mails via the Java Mail API (if used), and any slow method calls, can also cause insufferable damage to the 'user-perceived' health of a web application.

The challenge here for administrators is to not just isolate the slow transactions, but to also accurately identify where the transaction slowed down and why - is it owing to inefficent JSPs? poorly written servlets or struts? poor or the lack of any JDBC connectivity to the database? long running queries? inefficient API calls? or delays in accessing the POJO methods? The **eG JTM Monitor** provides administrators with answers to these questions!

With the help of the **Java Transactions** test, the **eG JTM Monitor** traces the route a configured web transaction takes, and captures live the total responsiveness of the transaction and the response time of each Java component it visits en route. This way, the solution proactively detects transaction slowdowns, and also precisely points you to the Java components causing it - is it the Filters? JSPs? Servlets? Struts? JDBC? SQL query? Java Mail API? or the POJO? In

addition to revealing where (i.e., at which Java component) a transaction slowed down, the solution also provides the following intelligent insights, on demand, making root-cause identification and resolution easier:

- A look at the methods that took too long to execute, thus leading you to those methods that may have contributed to the slowdown;
- Single-click access to each invocation of a chosen method, which provides pointers to when and where a method spent longer than desired;
- A quick glance at SQL queries and Java errors that may have impacted the responsiveness of the transaction;

Using these interesting pointers provided by the **eG JTM Monitor**, administrators can diagnose the root-cause of transaction slowdowns within minutes, rapidly plug the holes, and thus ensure that their critical web applications perform at peak capacity at all times!

Before attempting to monitor Java transactions using the **eG JTM Monitor**, the following configurations will have to be performed:

1. In the **<EG_INSTALL_DIR>\lib** directory (on Windows; on Unix, this will be **/opt/egurkha/lib**) of the eG agent, you will find the following files:
   - **eg_jtm.jar**
   - **aspectjrt.jar**
   - **aspectjweaver.jar**
   - **jtmConn.props**
   - **jtmLogging.props**
   - **jtmOther.props**
2. Login to the system hosting the Java application to be monitored.
3. If the eG agent will be 'remotely monitoring' the target Java application (i.e., if the Java application is to be monitored in an 'agentless manner'), then, copy all the files mentioned above from the **<EG_INSTALL_DIR>\lib** directory (on Windows; on Unix, this will be **/opt/egurkha/lib**) of the eG agent to any location on the Java application host.
4. Then, proceed to edit the start-up script of the Java application being monitored, and append the following lines to it:

```
set JTM_HOME=<<PATH OF THE LOCAL FOLDER CONTAINING THE JAR FILES AND PROPERTY FILES
LISTED ABOVE>>
"-javaagent:%JTM_HOME%\aspectjweaver.jar"
"-DEG_JTM_HOME=%JTM_HOME%"
```

Note that the above lines will change based on the operating system and the web/web application server being monitored.

Then, add the **eg_jtm.jar**, **aspectjrt.jar**, and **aspectjweaver.jar** files to the **CLASSPATH** of the Java application being monitored.

Finally, save the file. Once this is done, then, the next time the Java application starts, the **eG JTM Monitor** scans the web requests to the application for configured URL patterns. When a match is found, the **eG JTM Monitor** collects the desired metrics and stores them in memory.

Then, every time the eG agent runs the **Java Transactions** test, the agent will poll the **eG JTM Monitor** (on the target application) for the required metrics, extract the same from the application's memory, and report them to the eG manager.

5. Next, edit the **jtmConn.props** file. You will find the following lines in the file:

```
#Contains the connection properties of eGurkha Java Transaction Monitor
JTM_Port=13631
Designated_Agent=
```

By default, the **JTM_Port** parameter is set to 13631. If the Java application being monitored listens on a different JTM port, then specify the same here. In this case, when managing a **Java Application** using the eG administrative interface, specify the **JTM_Port** that you set in the **jtmConn.props** file as the **Port** of the Java application.

Also, against the **Designated_Agent** parameter, specify the IP address of the eG agent which will poll the **eG JTM Monitor** for metrics. If no IP address is provided here, then the **eG JTM Monitor** will treat the host from which the very first 'measure request' comes in as the **Designated_Agent**.

> **Note:**
>
> In case a specific **Designated_Agent** is not provided, and the **eG JTM Monitor** treats the host from which the very first 'measure request' comes in as the **Designated_Agent**, then if such a **Designated_Agent** is stopped or uninstalled for any reason, the **eG JTM Monitor** will wait for a maximum of 10 measure periods for that 'deemed' **Designated_Agent** to request for metrics. If no requests come in for 10 consecutive measure periods, then the **eG JTM Monitor** will begin responding to 'measure requests' coming in from any other eG agent.

6. Finally, save the **jtmConn.props** file.

Then, proceed to configure the **Java Transactions** test as discussed below.

Purpose	Traces the route a configured web transaction takes, and captures live the total responsiveness of the transaction and the response time of each component it visits en route. This way, the solution proactively detects transaction slowdowns, and also precisely points you to the Java component causing it - is it the Filters? JSPs? Servlets? Struts? JDBC? SQL query? Java Mail API? or the POJO?
Target of the test	A Java application/web application server
Agent deploying the test	An internal/remote agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port number at which the specified **HOST** listens; if **Java Transaction Monitoring** is enabled for the target Java application, then the **JTM PORT** has to be specified here 4. **JTM PORT** – Specify the port number configured as the **JTM_Port** in the **jtmConn.props** file described in the procedure outlined above. 5. **URL PATTERNS** - Provide a comma-separated list of the URL patterns of web requests/transactions to be monitored. The format of your specification should be as follows: *<DisplayName_of_Pattern>:<Transaction_Pattern>*. For instance, your specification can be: *login:*log*,ALL:*,pay:*pay** 6. **FILTERED URL PATTERNS** - Provide a comma-separated list of the URL patterns of transactions/web requests to be excluded from the monitoring scope of this test. For example, **blog*,*paycheque** 7. **SLOW URL THRESHOLD** - The *Slow transactions* measure of this test will report the number of transactions (of the configured patterns) for which the response time is higher than the value (in seconds) specified here. 8. **METHOD EXEC CUTOFF** - The detailed diagnosis of the *Slow transactions* measure allows you to drill down to a **URL tree**, where the methods invoked by a chosen transaction are listed in the descending order of their execution time. By configuring an execution duration (in seconds) here, you can have the **URL Tree** list only those methods that have been executing for a duration greater the specified value. For instance, if you specify *5* here, the URL tree for a transaction will list only those methods that have been executing for over 5 seconds, thus shedding light on the slow method calls alone. 9. **MAX SLOW URLS PER TEST PERIOD** - Specify the number of top-n transactions (of a configured pattern) that should be listed in the detailed diagnosis of the *Slow transactions* measure, every time the test runs. By default, this is set to *10*, indicating that the detailed diagnosis of the *Slow transactions* measure will by default list the top-10 transactions, arranged in the descending order of their response times. 10. **MAX ERROR URLS PER TEST PERIOD** - Specify the number of top-n transactions (of a configured pattern) that should be listed in the detailed diagnosis of the *Error transactions* measure, every time the test runs. By default, this is set to *10*, indicating that the detailed diagnosis of the *Error transactions* measure will by default list the top-10 transactions, in terms of the number of errors they encountered.

<table>
<tr><td></td><td colspan="3">11. DD FREQUENCY - Refers to the frequency with which detailed diagnosis measures are to be generated for this test. The default is 1:1. This indicates that, by default, detailed measures will be generated every time this test runs, and also every time the test detects a problem. You can modify this frequency, if you so desire. Also, if you intend to disable the detailed diagnosis capability for this test, you can do so by specifying none against DD FREQUENCY.
12. DETAILED DIAGNOSIS - To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the On option. To disable the capability, click on the Off option.
The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled:
e. The eG manager license should allow the detailed diagnosis capability
F. Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for each configured URL pattern</td></tr>
<tr><td rowspan="4">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Total transactions:
Indicates the total number of transactions of this pattern that the target application handled during the last measurement period.</td><td>Number</td><td></td></tr>
<tr><td>Avg. response time:
Indicates the average time taken by the transactions of this pattern to complete execution.</td><td>Secs</td><td>Compare the value of this measure across patterns to isolate the type of transactions that were taking too long to execute.
You can then take a look at the values of the other measures to figure out where the transaction is spending too much time.</td></tr>
<tr><td>Slow transactions:
Indicates the number of transactions of this pattern that were slow during the last measurement period.</td><td>Number</td><td>This measure will report the number of transactions with a response time higher than the configured SLOW URL THRESHOLD.
A high value is a cause for concern, as too many slow transactions to an application can significantly damage the user experience with that application.
Use the detailed diagnosis of this measure to know which transactions are slow.</td></tr>
</table>

	Slow transactions response time: Indicates the average time taken by the slow transactions of this pattern to execute.	Secs	
	Error transactions: Indicates the number of transactions of this pattern that experienced errors during the last measurement period.	Number	A high value is a cause for concern, as too many error-prone transactions to an application can significantly damage the user experience with that application. Use the detailed diagnosis of this measure to isolate the error transactions.
	Error transactions response time: Indicates the average duration for which the transactions of this pattern were processed before an error condition was detected.	Secs	
	Filters: Indicates the number of filters that were accessed by the transactions of this pattern during the last measurement period.	Number	A filter is a program that runs on the server before the servlet or JSP page with which it is associated.
	Filters response time: Indicates the average time spent by the transactions of this pattern at the **Filters** layer.	Secs	Typically, the **init, doFilter, and destroy** methods are called at the **Filters** layer. Issues in these method invocations can increase the time spent by a transaction in the **Filters** Java component. Compare the value of this measure across patterns to identify the transaction pattern that spent the maximum time with the **Filters** component. If one/more transactions of a pattern are found to be slow, then, you can compare the value of this measure with the other response time values reported by this test to determine where the slowdown actually occurred - in the filters, in JSPs, in servlets, in struts, in exception handling, when executing JDBC/SQL queries, when sending Java mails, or when accessing POJOs.

	JSPs accessed: Indicates the number of JSPs accessed by the transactions of this pattern during the last measurement period.	Number	
	JSPs response time: Indicates the average time spent by the transactions of this pattern at the **JSP** layer.	Secs	Compare the value of this measure across patterns to identify the transaction pattern that spent the maximum time in **JSPs**. If one/more transactions of a pattern are found to be slow, then, you can compare the value of this measure with the other response time values reported by this test to determine where the slowdown actually occurred - in the filters, in JSPs, in servlets, in struts, in exception handling, when executing JDBC/SQL queries, when sending Java mails, or when accessing POJOs..
	HTTP Servlets Accessed: Indicates the number of HTTP servlets that were accessed by the transactions of this pattern during the last measurement period.	Number	
	HTTP servlets response time: Indicates the average time taken by the HTTP servlets for processing the HTTP requests of this pattern.	Secs	Badly written servlets can take too long to execute, and can hence obstruct the smooth execution of the dependent transactions. By comparing the value of this measure across patterns, you can figure out which transaction pattern is spending the maximum time in **Servlets**. If one/more transactions of a pattern are found to be slow, then, you can compare the value of this measure with the other response time values reported by this test to determine where the slowdown actually occurred - in the filters, in JSPs, in servlets, in struts, in exception handling, when executing JDBC/SQL queries, when sending Java mails, or when accessing POJOs.

	Generic servlets accessed: Indicates the number of generic (non-HTTP) servlets that were accessed by the transactions of this pattern during the last measurement period.	Number	
	Generic servlets response time: Indicates the average time taken by the generic (non-HTTP) servlets for processing transactions of this pattern.	Secs	Badly written servlets can take too long to execute, and can hence obstruct the smooth execution of the dependent transactions. By comparing the value of this measure across patterns, you can figure out which transaction pattern is spending the maximum time in **Servlets**. If one/more transactions of a pattern are found to be slow, then, you can compare the value of this measure with the other response time values reported by this test to determine where the slowdown actually occurred - in the filters, in JSPs, in servlets, in struts, in exception handling, when executing JDBC/SQL queries, when sending Java mails, or when accessing POJOs.
	JDBC queries: Indicates the number of JDBC statements that were executed by the transactions of this pattern during the last measurement period.	Number	The methods captured by the **eG JTM Monitor** from the Java class for the JDBC sub-component include: `Commit()`, `rollback(..)`, `close()`,`GetResultSet()`, `executeBatch()`, `cancel()`, `connect(String, Properties)`, `getConnection(..)`,`getPooledConnection(..)`

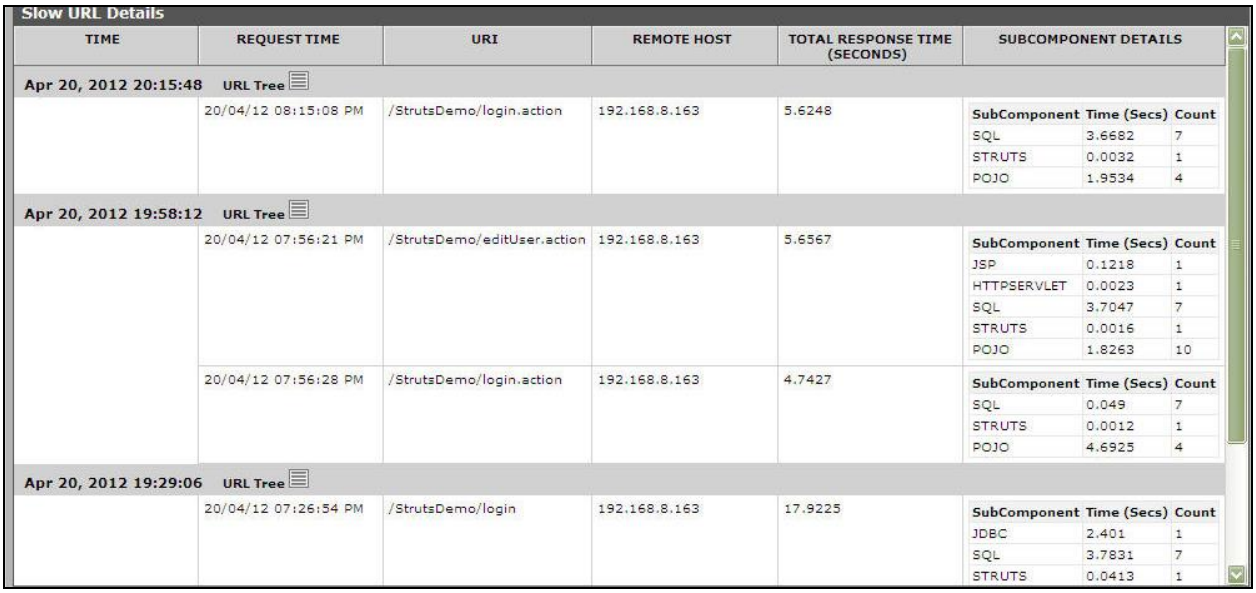
	JDBC response time: Indicates the average time taken by the transactions of this pattern to execute JDBC statements.	Secs	By comparing the value of this measure across patterns, you can figure out which transaction pattern is taking the most time to execute JDBC queries. If one/more transactions of a pattern are found to be slow, then, you can compare the value of this measure with the other response time values reported by this test to determine where the slowdown actually occurred - in the filters, in JSPs, in servlets, in struts, in exception handling, when executing JDBC/SQL queries, when sending Java mails, or when accessing POJOs.
	SQL statements executed: Indicates the number of SQL queries executed by the transactions of this pattern during the last measurement period.	Number	
	SQL statement time avg.: Indicates the average time taken by the transactions of this pattern to execute SQL queries.	Secs	Inefficient queries can take too long to execute on the database, thereby significantly delaying the responsiveness of the dependent transactions. To know which transactions have been most impacted by such queries, compare the value of this measure across the transaction patterns. If one/more transactions of a pattern are found to be slow, then, you can compare the value of this measure with the other response time values reported by this test to determine where the slowdown actually occurred - at the filters layer, JSPs layer, servlets layer, struts layer, in exception handling, when executing JDBC/SQL queries, when sending Java mails, or when accessing POJOs.
	Exceptions seen: Indicates the number of exceptions encountered by the transactions of this pattern during the last measurement period.	Number	Ideally, the value of this measure should be 0.

	Exceptions response time: Indicates the average time which the transactions of this pattern spent in handling exceptions.	Secs	If one/more transactions of a pattern are found to be slow, then, you can compare the value of this measure with the other response time values reported by this test to determine where the slowdown actually occurred - at the filters layer, JSPs layer, servlets layer, struts layer, in exception handling, when executing JDBC/SQL queries, when sending Java mails, or when accessing POJOs.
	Struts accessed: Indicates the number of struts accessed by the transactions of this pattern during the last meaurement period.	Number	The **Struts** framework is a standard for developing well-architected Web applications.
	Struts response time: Indicates the average time spent by the transactions of this pattern at the **Struts** layer.	Secs	If you compare the value of this measure across patterns, you can figure out which transaction pattern spent the maximum time in **Struts**. If one/more transactions of a pattern are found to be slow, then, you can compare the value of this measure with the other response time values reported by this test to determine where the slowdown actually occurred - in the filters, in JSPs, in servlets, in struts, in exception handling, when executing JDBC/SQL queries, when sending Java mails, or when accessing POJOs.
	Java mails: Indicates the number of mails sent by the transactions of this pattern during the last measurement period, using the Java mail API.	Number	The **eG JTM Monitor** captures any mail that has been sent from the monitored application using Java Mail API. Mails sent using other APIs are ignored by the **eG JTM Monitor**.
	Java mail API time: Indicates the average time taken by the transactions of this pattern to send mails using the Java mail API.	Secs	If one/more transactions of a pattern are found to be slow, then, you can compare the value of this measure with the other response time values reported by this test to determine where the slowdown actually occurred - in the filters, in JSPs, in servlets, in struts, in exception handling, when executing JDBC/SQL queries, when sending Java mails, or when accessing POJOs.

	POJOs: Indicates the number of transactions of this pattern that accessed POJOs during the last measurement period.	Number	Plain Old Java Object (POJO) refers to a 'generic' method in JAVA Language. All methods that are not covered by any of the Java components (eg., JSPs, Struts, Servlets, Filters, Exceptions, Queries, etc.) discussed above will be automatically included under POJO. When reporting the number of POJO methods, the eG agent will consider only those methods with a response time value that is higher than the threshold limit configured against the **METHOD EXEC CUTOFF** parameter.
	POJO avg. access time: Indicates the average time taken by the transactions of this pattern to access POJOs.	Secs	If one/more transactions of a pattern are found to be slow, then, you can compare the value of this measure with the other response time values reported by this test to determine where the slowdown actually occurred - in the filters, in JSPs, in servlets, in struts, in exception handling, when executing JDBC/SQL queries, when sending Java mails, or when accessing POJOs.

The detailed diagnosis of the *Slow transactions* measure lists the top-10 (by default) transactions of a configured pattern that have violated the response time threshold set using the **SLOW URL THRESHOLD** parameter of this test. Against each transaction, the date/time at which the transaction was initiated/requested will be displayed. Besides the request date/time, the remote host from which the transaction request was received and the total response time of the transaction will also be reported. This response time is the sum total of the response times of each of the top methods (in terms of time taken for execution) invoked by that transaction. To compute this sum total, the test considers only those methods with a response time value that is higher than the threshold limit configured against the **METHOD EXEC CUTOFF** parameter.

In the detailed diagnosis, the transactions will typically be arranged in the descending order of the total response time; this way, you would be able to easily spot the slowest transaction. To know what caused the transaction to be slow, you can take a look at the **SUBCOMPONENT DETAILS** column of the detailed diagnosis. Here, the time spent by the transaction in each of the Java components (**FILTER**, **STRUTS**, **SERVLETS**, **JSPS**, **POJOS**, **SQL**, **JDBC**, etc.) will be listed, thus leading you to the exact Java component where the slowdown occurred.



Slow URL Details

TIME	REQUEST TIME	URI	REMOTE HOST	TOTAL RESPONSE TIME (SECONDS)	SUBCOMPONENT DETAILS
Apr 20, 2012 20:15:48 URL Tree					
	20/04/12 08:15:08 PM	/StrutsDemo/login.action	192.168.8.163	5.6248	SubComponent / Time (Secs) / Count SQL 3.6682 7 STRUTS 0.0032 1 POJO 1.9534 4
Apr 20, 2012 19:58:12 URL Tree					
	20/04/12 07:56:21 PM	/StrutsDemo/editUser.action	192.168.8.163	5.6567	SubComponent / Time (Secs) / Count JSP 0.1218 1 HTTPSERVLET 0.0023 1 SQL 3.7047 7 STRUTS 0.0016 1 POJO 1.8263 10
	20/04/12 07:56:28 PM	/StrutsDemo/login.action	192.168.8.163	4.7427	SubComponent / Time (Secs) / Count SQL 0.049 7 STRUTS 0.0012 1 POJO 4.6925 4
Apr 20, 2012 19:29:06 URL Tree					
	20/04/12 07:26:54 PM	/StrutsDemo/login	192.168.8.163	17.9225	SubComponent / Time (Secs) / Count JDBC 2.401 1 SQL 3.7831 7 STRUTS 0.0413 1

Figure 2.5: The detailed diagnosis of the Slow transactions measure

You can even perform detailed method-level analysis to isolate the methods taking too long to execute. For this, click on the **URL Tree** link. Figure 2.6 will then appear. In the left panel of Figure 2.6, you will find the list of transactions that match a configured pattern; these transactions will be sorted in the descending order of their *Total Response Time* (by default). This is indicated by the **Total Response Time** option chosen by default from the **Sort by** list in Figure 2.6. If you select a transaction from the left panel, an **At-A-Glance** tab page will open by default in the right panel, providing quick, yet deep insights into the performance of the chosen transaction and the reasons for its slowness. This tab page begins by displaying the **URL** of the chosen transaction, the total **Response time** of the transaction, the time at which the transaction was last requested, and the **Remote Host** from which the request was received.

If the **Response time** appears to be very high, then you can take a look at the **Method Level Breakup** section to figure out which method called by which Java component (such as **FILTER**, **STRUTS**, **SERVLETS**, **JSPS**, **POJOS**, **SQL**, **JDBC**, etc.) could have caused the slowdown. This section provides a horizontal bar graph, which reveals the percentage of time for which the chosen transaction spent executing each of the top methods (in terms of execution time) invoked by it. The legend below clearly indicates the top methods and the layer/sub-component that invoked each method. Against every method, the number of times that method was invoked in the **Measurement Time**, the **Duration** (in Secs) for which the method executed, and the percentage of the total execution time of the transaction for which the method was in execution will be displayed, thus quickly pointing you to those methods that may have contributed to the slowdown. The methods displayed here and featured in the bar graph depend upon the **METHOD EXEC CUTOFF** configuration of this test - in other words, only those methods with an execution duration that exceeds the threshold limit configured against **METHOD EXEC CUTOFF** will be displayed in the **Method Level Breakup** section.

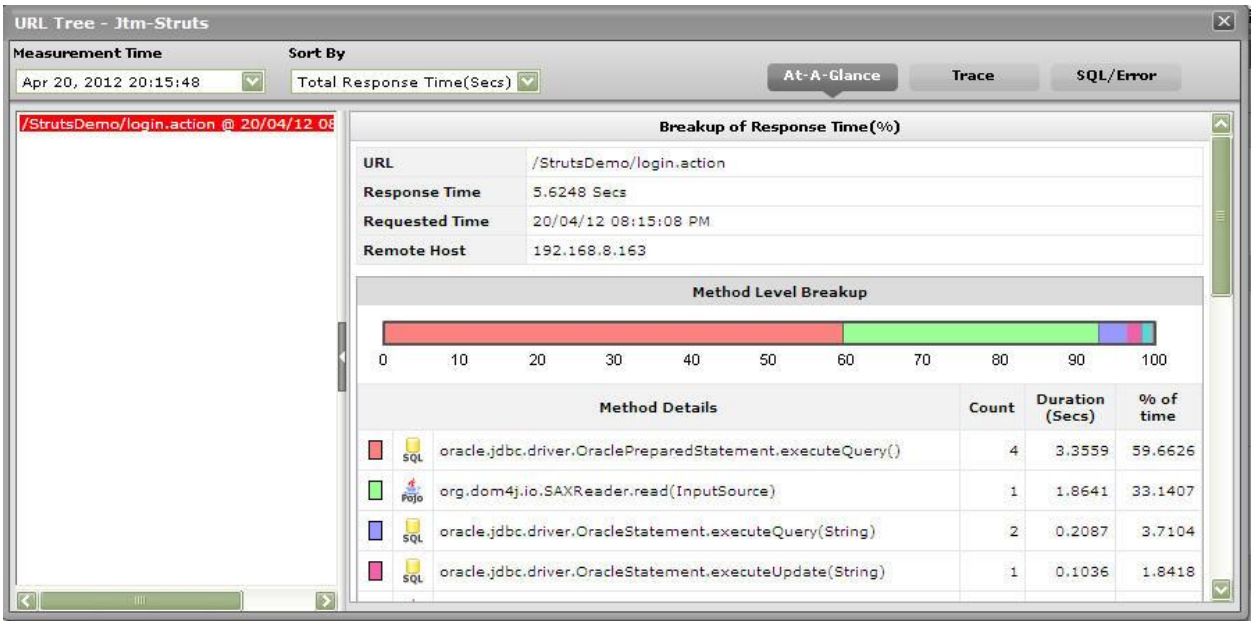


Figure 2.6: The Method Level Breakup section in the At-A-Glance tab page

While the **Method Level Breakup** section provides method-level insights into responsiveness, for a sub-component or layer level breakup of responsiveness scroll down the **At-A-Glance** tab to view the **Component Level Breakup** section (see Figure 2.7). Using this horizontal bar graph, you can quickly tell where - i.e., in which Java component - the transaction spent the maximum time. A quick glance at the graph's legend will reveal the Java components the transaction visited, the number of methods invoked by Java component, the **Duration (Secs)** for which the transaction was processed by the Java component, and what **Percentage** of the total transaction response time was spent in the Java component.

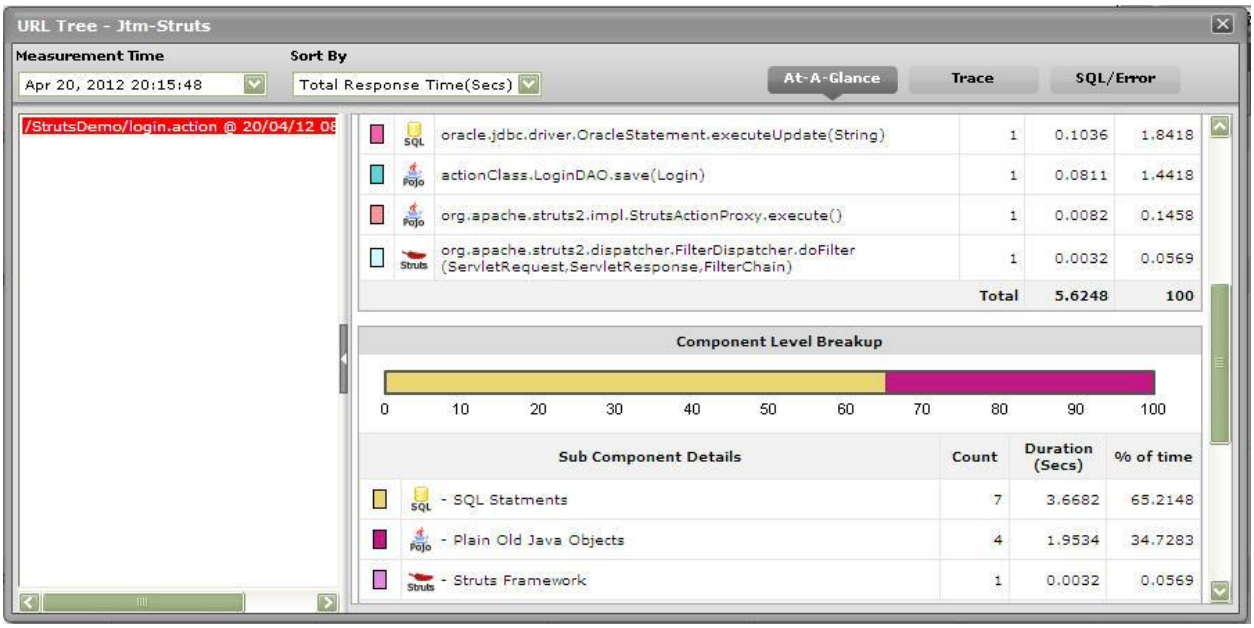


Figure 2.7: The Component Level Breakup section in the At-A-Glance tab page

Besides Java methods, where the target Java application interacts with the database, long-running SQL queries can also contribute to the poor responsiveness of a transaction. You can use the **At-A-Glance** tab page to determine whether the transaction interacts with the database or not, and if so, how healthy that interaction is. For this, scroll down the **At-A-Glance** tab page.

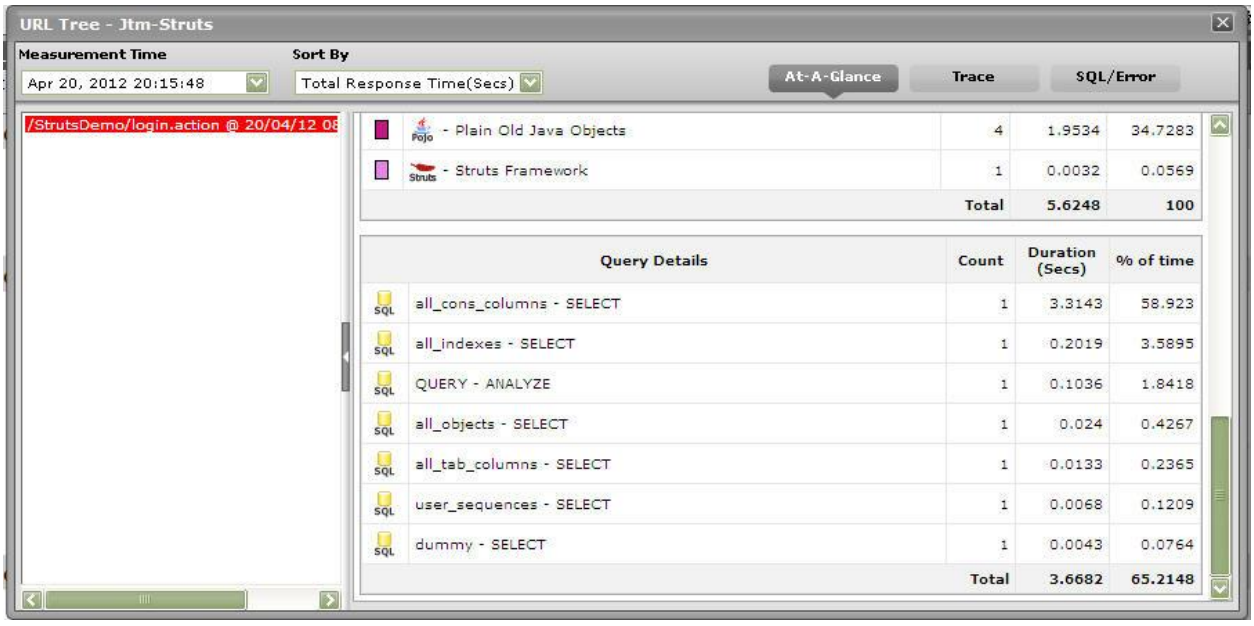


Figure 2.8: Query Details in the At-A-Glance tab page

Upon scrolling, you will find query details below the **Component Level Breakup** section. All the SQL queries that the chosen transaction executes on the backend database will be listed here in the descending order of their **Duration**. Corresponding to each query, you will be able to view the number of times that query was executed, the **Duration** for which it executed, and what percentage of the total transaction response time was spent in executing that query. A quick look at this tabulation would suffice to identify the query which executed for an abnormally long time on the database, causing the transaction's responsiveness to suffer. For a detailed query description, click on the query. Figure 2.9 will then pop up displaying the complete query and its execution duration.

Figure 2.9: Detailed description of the query clicked on

This way, the **At-A-Glance** tab page allows you to analyze, at-a-glance, all the factors that can influence transaction response time - be it Java methods, Java components, and SQL queries - and enables you to quickly diagnose the source of a transaction slowdown. If, for instance, you figure out that a particular Java method is responsible for the slowdown, you can zoom into the performance of the 'suspect method' by clicking on that method in the **Method Level Breakup** section of the **At-A-Glance** tab page. This will automatically lead you to the **Trace** tab page, where all invocations of the chosen method will be highlighted (see Figure 2.10).

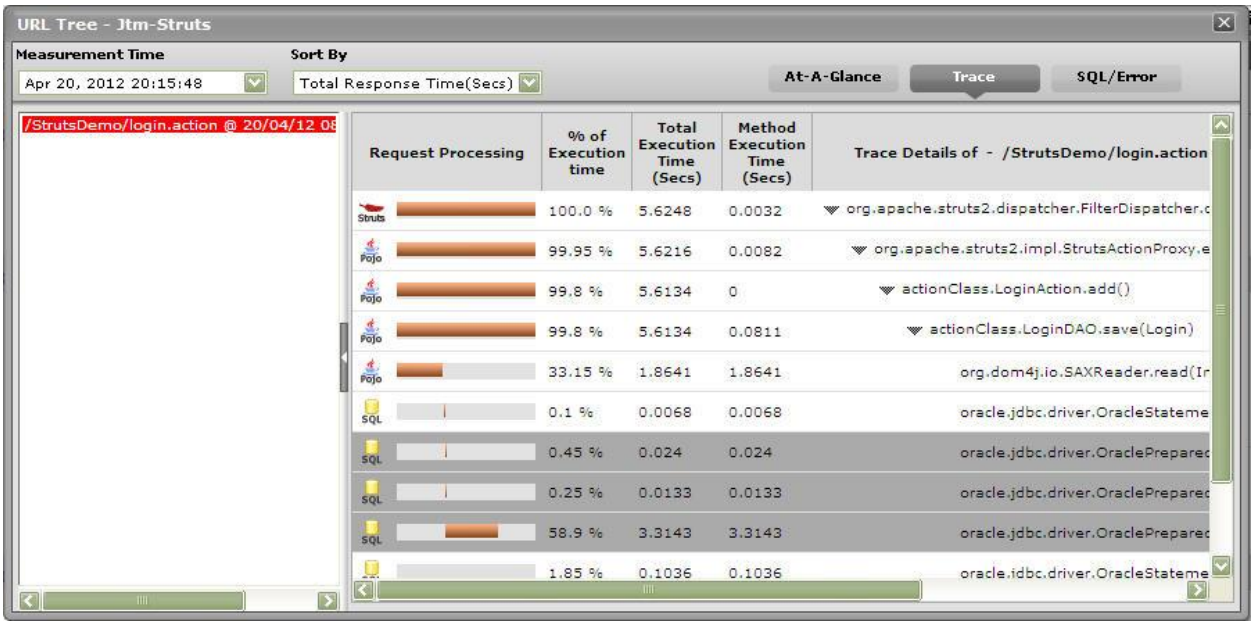


Figure 2.10: The Trace tab page displaying all invocations of the method chosen from the Method Level Breakup section

Typically, clicking on the **Trace** tab page will list all the methods invoked by the chosen transaction, starting with the very first method. Methods and sub-methods (a method invoked within a method) are arranged in a tree-structure, which can be expanded or collapsed at will. To view the sub-methods within a method, click on the **arrow icon** that precedes that method in the **Trace** tab page. Likewise, to collapse a tree, click once again on the **arrow icon**. Using the tree-structure, you can easily trace the sequence in which methods are invoked by a transaction.

If a method is chosen for analysis from the **Method Level Breakup** section of the **At-A-Glance** tab page, the **Trace** tab page will automatically bring your attention to all invocations of that method by highlighting them (as shown by Figure 2.10). Likewise, if a Java component is clicked in the **Component Level Breakup** section of the **At-A-Glance** section, the **Trace** tab page will automatically appear, displaying all the methods invoked from the chosen Java component (as shown by Figure 2.11).

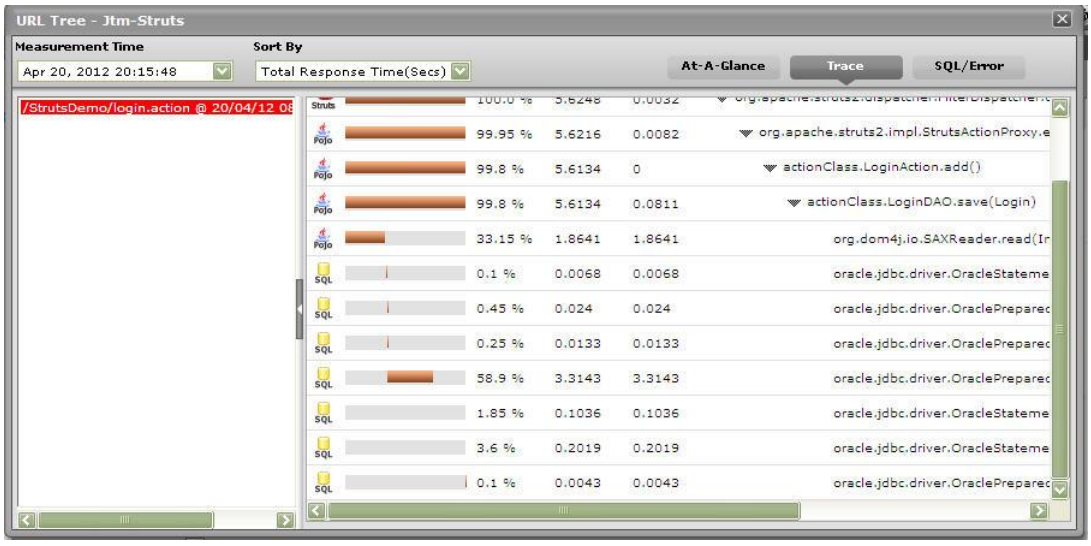


Figure 2.11: The Trace tab page displaying all methods invoked at the Java layer/sub-component chosen from the Component Level Breakup section

For every method, the **Trace** tab page displays a **Request Processing** bar, which will accurately indicate when, in the sequence of method invocations, the said method began execution and when it ended; with the help of this progress bar, you will be able to fairly judge the duration of the method, and also quickly tell whether any methods were called prior to the method in question. In addition, the **Trace** tab page will also display the time taken for a method to execute (**Method Execution Time**) and the percentage of the time the transaction spent in executing that method. The most time-consuming methods can thus be instantly isolated.

The **Trace** tab page also displays the **Total Execution Time** for each method - this value will be the same as the **Method Execution Time** for 'stand-alone' methods - i.e., methods without any sub-methods. In the case of methods with sub-methods however, the **Total Execution Time** will be the sum total of the **Method Execution Time** of each sub-method invoked within. This is because, a 'parent' method completes execution only when all its child/sub-methods finish executing.

With the help of the **Trace** tab page therefore, you can accurately trace the method that takes the longest to execute, when that method began execution, and which 'parent method' (if any) invoked the method.

Next, click on the **SQL/Errors** tab page. This tab page lists all the SQL queries the transaction executes on its backend database, and/or all the errors detected in the transaction's Java code. The query list (see Figure 2.12) is typically arranged in the descending order of the query execution **Duration**, and thus leads you to the long-running queries right away! You can even scrutinize the time-consuming query on-the-fly, and suggest improvements to your administrator instantly.

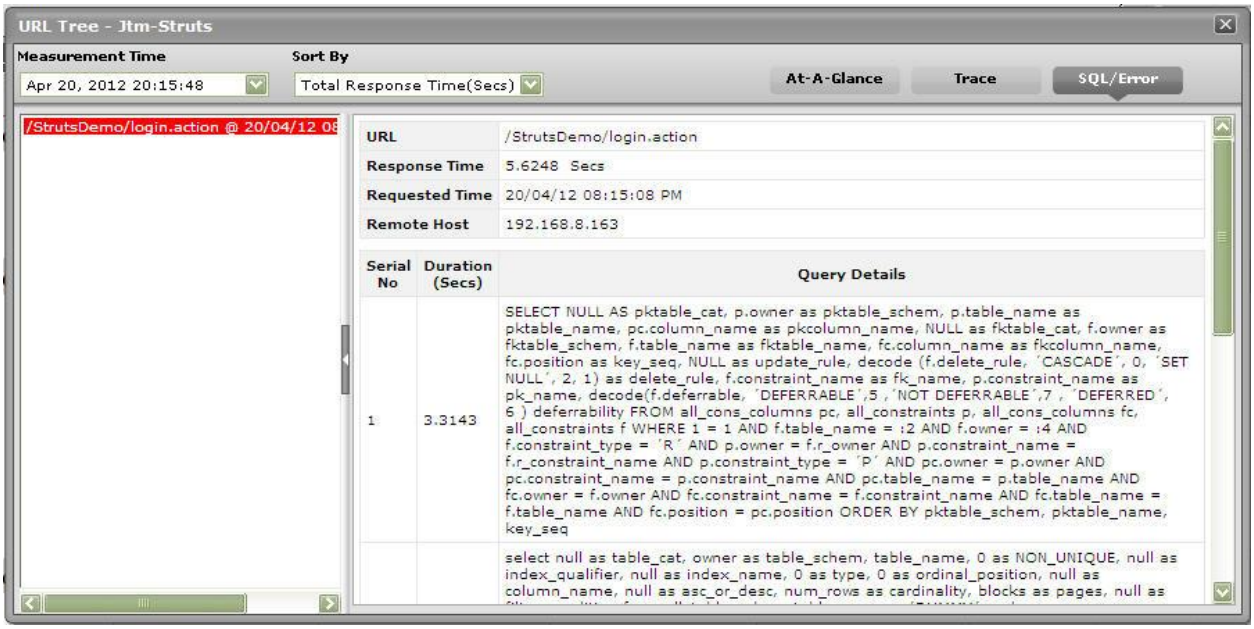


Figure 2.12: Queries displayed in the SQL/Error tab page

When displaying errors, the **SQL/Error** tab page does not display the error message alone, but displays the complete code block that could have caused the error to occur. By carefully scrutinizing the block, you can easily zero-in on the 'exact line of code' that could have forced the error - this means that besides pointing you to bugs in your code, the **SQL/Error** tab page also helps you initiate measures to fix the same.

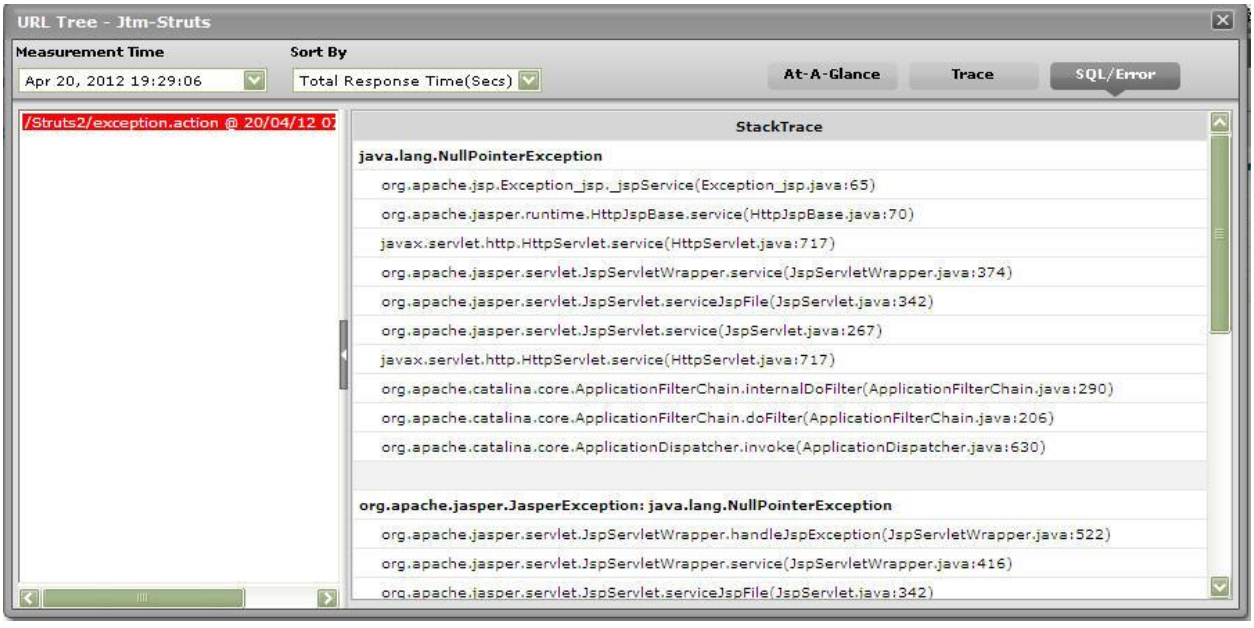


Figure 2.13: Errors displayed in the SQL/Error tab page

This way, with the help of the three tab pages - **At-A-Glance**, **Trace**, and **SQL/Error** - you can effectively analyze and accurately diagnose the root-cause of slowdowns in transactions to your Java applications.

The detailed diagnosis of the *Error transactions* measure reveals the top-10 (by default) transactions, in terms of **TOTAL RESPONSE TIME**, that have encountered errors. To know the nature of the errors that occurred, click on the **URL Tree** icon in Figure 2.14. This will lead you to the **URL Tree** window, which has already been elaborately discussed.

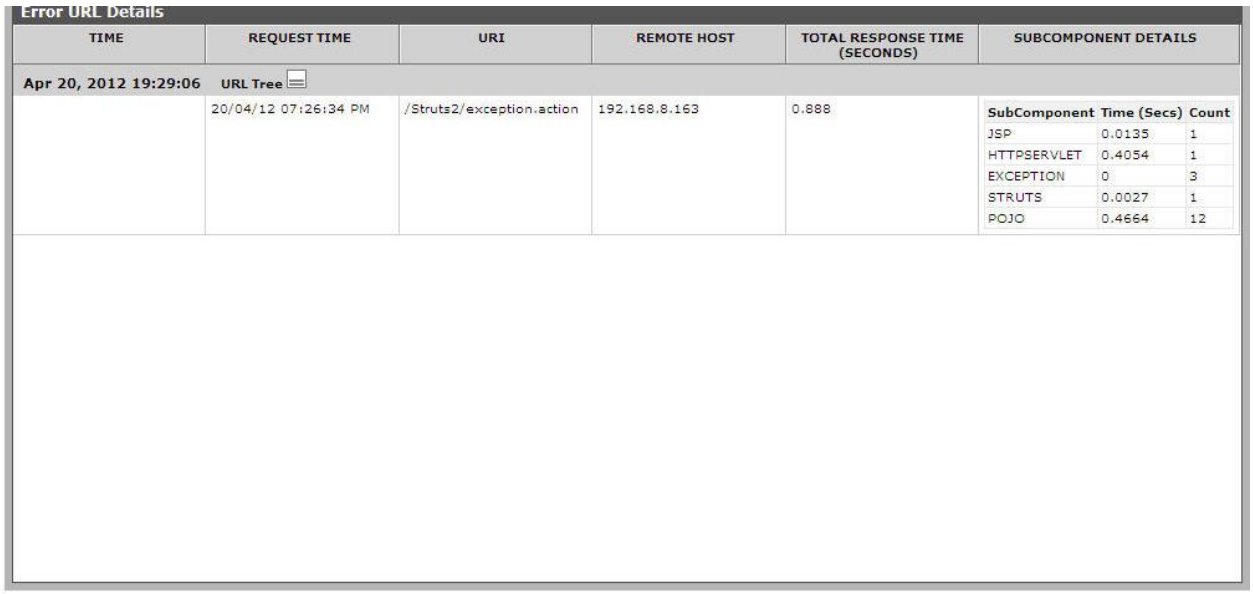


Figure 2.14: The detailed diagnosis of the Error transactions measure

2.1.2.3.1 JVM GC Test

Manual memory management is time consuming, and error prone. Most programs still contain leaks. This is all doubly true with programs using exception-handling and/or threads. Garbage collection (GC) is a part of WebLogic's JVM that automatically determines what memory a program is no longer using, and recycles it for other use. It is also known as "automatic storage (or memory) reclamation". The JVMGCTest reports the performance statistics pertaining to the JVM's garbage collection.

Purpose	Reports the performance statistics pertaining to the JVM's garbage collection
Target of the test	A WebLogic application server
Agent deploying the test	An internal agent

<table>
<tr><td>Configurable parameters for the test</td><td colspan="3">1. TEST PERIOD - How often should the test be executed
2. HOST – The IP address of the WebLogic server
3. PORT – The port number of the WebLogic server
4. JREHOME – The path to the directory in which the JVM to be monitored exists
5. LOGFILENAME – The full path to the log file which stores the GC output.
6. DETAILED DIAGNOSIS - To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the On option. To disable the capability, click on the Off option.
The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled:
➢ The eG manager license should allow the detailed diagnosis capability
➢ Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for every GC</td></tr>
<tr><td rowspan="2">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Number of GC:
The number of times garbage collection has happened.</td><td>Number</td><td>If adequate memory is not allotted to the JVM, then the value of this measure would be very high. A high value of this measure is indicative of a high frequency of GC. This is not a good sign, as GC, during its execution, has the tendency of suspending an application, and a high frequency of GC would only adversely impact the application's performance. To avoid this, it is recommended that you allot sufficient memory to the JVM.
The detailed diagnosis of the Number of GC measure, if enabled, provides details such as the heap size before GC was performed, the heap size after GC was performed, and the total time spent by the JVM in garbage collection. The difference between the heap sizes will help administrators figure out how effective GC is. The total GC time will help administrators gauge how severely GC has impacted application performance</td></tr>
</table>

	Total GC time: The sum of the time taken by all garbage collections.	Secs	If adequate memory is not allotted to the JVM, then the value of this measure would be very high. This is not a good sign, as GC, during its execution, has the tendency of suspending an application, and a high value of this measure would only adversely impact the application's performance. To avoid this, it is recommended that you allot sufficient memory to the JVM.
	Avg GC frequency: The frequency with which the JVM performed GC.	Sec	If adequate memory is not allotted to the JVM, then the value of this measure would be very low. A low value of this measure is indicative of a high frequency of GC. This is not a good sign, as GC, during its execution, has the tendency of suspending an application, and a high frequency of GC would only adversely impact the application's performance. To avoid this, it is recommended that you allot sufficient memory to the JVM.
	Avg GC pause: The average time the application is suspended while garbage collection is in progress.	Secs	If the garbage collection takes more time to complete, then it indicates a very high memory allocation to the JVM. This again hinders application performance.
	Avg GC overhead: The percentage of time utilized by the JVM for garbage collection	Percent	By carefully examining the application behavior in terms of memory utilization, you should arrive at an optimal ratio of the number of times the GC needs to run and how long it should take to complete. Accordingly, memory allocation to the JVM can be performed.
	Max GC pause: The maximum time spent by the JVM on garbage collection, during the last measurement period	Secs	
	Avg heap before GC: The average heap size prior to garbage collection	KB	
	Avg heap after GC: The average heap size after garbage collection	KB	The difference between the value of this measure and the *Avg heap before GC* measure provides the amount of memory that has been released by GC. This value is a good indicator of the effectiveness of GC.

2.1.2.3.2 Java Classes Test

This test reports the number of classes loaded/unloaded from the memory.

Purpose	Reports the number of classes loaded/unloaded from the memory
Target of the test	A WebLogic server
Agent deploying the test	An internal/remote agent
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port number at which the specified **HOST** listens 4. **MODE** – This test can extract metrics from the Java application using either of the following mechanisms: • Using SNMP-based access to the Java runtime MIB statistics; • By contacting the Java runtime (JRE) of the application via JMX **TO CONFIGURE THE TEST TO USE SNMP, SELECT THE SNMP** option. On the other hand, choose the **JMX** option to configure the test to use JMX instead. By default, the **JMX** option is chosen here. 5. **JMX REMOTE PORT** – This parameter appears only if the **MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (refer to the *Monitoring Java Applications*). 6. **USER**, **PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **USER** and **PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to the *Monitoring Java Applications* document. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 7. **JNDINAME** – This parameter appears only if the **MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same. 8. **SNMPPORT** – This parameter appears only if the **MODE** is set to **SNMP**. Here specify the port number through which the server exposes its SNMP MIB. Ensure that you specify the same port you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (see page 13). 9. **SNMPVERSION** – This parameter appears only if the **MODE** is set to **SNMP**. The default selection in the **SNMPVERSION** list is **v1**. However, for this test to work, you have to select SNMP **v2** or **v3** from this list, depending upon which version of SNMP is in use in the target environment. 10. **SNMPCOMMUNITY** – This parameter appears only if the **MODE** is set to **SNMP**. Here, specify the SNMP community name that the test uses to communicate with the mail server. The default is public. This parameter is specific to SNMP **v1** and **v2** only. Therefore, if the **SNMPVERSION** chosen is **v3**, then this parameter will not appear.

	11. **USERNAME** – This parameter appears only when **v3** is selected as the **SNMPVERSION**. SNMP version 3 (SNMPv3) is an extensible SNMP Framework which supplements the SNMPv2 Framework, by additionally supporting message security, access control, and remote SNMP configuration capabilities. To extract performance statistics from the MIB using the highly secure SNMP v3 protocol, the eG agent has to be configured with the required access privileges – in other words, the eG agent should connect to the MIB using the credentials of a user with access permissions to be MIB. Therefore, specify the name of such a user against the **USERNAME** parameter. 12. **AUTHTYPE** – This parameter too appears only if **v3** is selected as the **SNMPVERSION**. From the **AUTHTYPE** list box, choose the authentication algorithm using which SNMP v3 converts the specified **USERNAME** and **PASSWORD** into a 32-bit format to ensure security of SNMP transactions. You can choose between the following options: ➢ **MD5** – Message Digest Algorithm ➢ **SHA** – Secure Hash Algorithm 13. **ENCRYPTFLAG** – This flag appears only when **v3** is selected as the **SNMPVERSION**. By default, the eG agent does not encrypt SNMP requests. Accordingly, the **ENCRYPTFLAG** is set to **NO** by default. To ensure that SNMP requests sent by the eG agent are encrypted, select the **YES** option. 14. **ENCRYPTTYPE** – If the **ENCRYPTFLAG** is set to **YES**, then you will have to mention the encryption type by selecting an option from the **ENCRYPTTYPE** list. SNMP v3 supports the following encryption types: ➢ **DES** – Data Encryption Standard ➢ **AES** – Advanced Encryption Standard 15. **ENCRYPTPASSWORD** – Specify the encryption password here. 16. **CONFIRM PASSWORD** – Confirm the encryption password by retyping it here. 17. **TIMEOUT** - This parameter appears only if the **MODE** is set to **SNMP**. Here, specify the duration (in seconds) within which the SNMP query executed by this test should time out in the **TIMEOUT** text box. The default is 10 seconds.		
Outputs of the test	One set of results for the server being monitored		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Classes loaded: Indicates the number of classes currently loaded into memory.	Number	Classes are fundamental to the design of Java programming language. Typically, Java applications install a

	Classes unloaded: Indicates the number of classes currently unloaded from memory.	Number	variety of class loaders (that is, classes that implement java.lang.ClassLoader) to allow different portions of the container, and the applications running on the container, to have access to different repositories of available classes and resources. A consistent decrease in the number of classes loaded and unloaded could indicate a road-block in the loading/unloading of classes by the class loader. If left unchecked, critical resources/classes could be rendered inaccessible to the application, thereby severely affecting its performance.
	Total classes loaded: Indicates the total number of classes loaded into memory since the JVM started, including those subsequently unloaded.	Number	

2.1.2.3.3 JVM Threads Test

This test reports the status of threads on the JVM, and also reveals resource-hungry threads, so that threads that are unnecessarily consuming CPU resources can be killed.

Purpose	Reports the status of threads on the JVM, and also reveals resource-hungry threads, so that threads that are unnecessarily consuming CPU resources can be killed
Target of the test	A WebLogic server
Agent deploying the test	An internal/remote agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port number at which the specified **HOST** listens 4. **MODE** – This test can extract metrics from the Java application using either of the following mechanisms: • **USING SNMP-BASED ACCESS TO THE JAVA RUNTIME MIB STATISTICS;** • **BY CONTACTING THE JAVA RUNTIME (JRE) OF THE APPLICATION VIA JMX** **TO CONFIGURE THE TEST TO USE SNMP, SELECT THE SNMP** option. On the other hand, choose the **JMX** option to configure the test to use JMX instead. By default, the **JMX** option is chosen here. 5. **JMX REMOTE PORT** – This parameter appears only if the **MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (refer to the *Monitoring Java Applications* document). 6. **USER**, **PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **USER** and **PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to the *Monitoring Java Applications* document. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 7. **JNDINAME** – This parameter appears only if the **MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same. 8. **SNMPPORT** – This parameter appears only if the **MODE** is set to **SNMP**. Here specify the port number through which the server exposes its SNMP MIB. Ensure that you specify the same port you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (refer to the *Monitoring Java Applications* document). 9. **SNMPVERSION** – This parameter appears only if the **MODE** is set to **SNMP**. The default selection in the **SNMPVERSION** list is **v1**. However, for this test to work, you have to select SNMP **v2** or **v3** from this list, depending upon which version of SNMP is in use in the target environment. 10. **SNMPCOMMUNITY** – This parameter appears only if the **MODE** is set to **SNMP**. Here, specify the SNMP community name that the test uses to communicate with the mail server. The default is public. This parameter is specific to SNMP **v1** and **v2** only. Therefore, if the **SNMPVERSION** chosen is **v3**, then this parameter will not appear.

11. **USERNAME** – This parameter appears only when **v3** is selected as the **SNMPVERSION**. SNMP version 3 (SNMPv3) is an extensible SNMP Framework which supplements the SNMPv2 Framework, by additionally supporting message security, access control, and remote SNMP configuration capabilities. To extract performance statistics from the MIB using the highly secure SNMP v3 protocol, the eG agent has to be configured with the required access privileges – in other words, the eG agent should connect to the MIB using the credentials of a user with access permissions to be MIB. Therefore, specify the name of such a user against the **USERNAME** parameter.
12. **AUTHTYPE** – This parameter too appears only if **v3** is selected as the **SNMPVERSION**. From the **AUTHTYPE** list box, choose the authentication algorithm using which SNMP v3 converts the specified **USERNAME** and **PASSWORD** into a 32-bit format to ensure security of SNMP transactions. You can choose between the following options:
    - **MD5** – Message Digest Algorithm
    - **SHA** – Secure Hash Algorithm
13. **ENCRYPTFLAG** – This flag appears only when **v3** is selected as the **SNMPVERSION**. By default, the eG agent does not encrypt SNMP requests. Accordingly, the **ENCRYPTFLAG** is set to **NO** by default. To ensure that SNMP requests sent by the eG agent are encrypted, select the **YES** option.
14. **ENCRYPTTYPE** – If the **ENCRYPTFLAG** is set to **YES**, then you will have to mention the encryption type by selecting an option from the **ENCRYPTTYPE** list. SNMP v3 supports the following encryption types:
    - **DES** – Data Encryption Standard
    - **AES** – Advanced Encryption Standard
15. **ENCRYPTPASSWORD** – Specify the encryption password here.
16. **CONFIRM PASSWORD** – Confirm the encryption password by retyping it here.
17. **TIMEOUT** - This parameter appears only if the **MODE** is set to **SNMP**. Here, specify the duration (in seconds) within which the SNMP query executed by this test should time out in the **TIMEOUT** text box. The default is 10 seconds.
18. **PCT LOW CPU UTIL THREADS** – This test reports the number of threads in the JVM that are consuming low CPU. This thread count will include only those threads for which the CPU usage is equal to or lesser than the value specified in the **PCT LOW CPU UTIL THREADS** text box. The default value displayed here is 30.
19. **PCT MEDIUM CPU UTIL THREADS** - This test reports the number of threads in the JVM that are consuming CPU to a medium extent. This thread count will include only those threads for which the CPU usage is higher than the **PCT LOW CPU UTIL THREADS** configuration and is lower than or equal to the value specified in the **PCT MEDIUM CPU UTIL THREADS** text box. The default value displayed here is 50.

<table>
<tr><td></td><td colspan="3">20. PCT HIGH CPU UTIL THREADS - This test reports the number of threads in the JVM that are consuming high CPU. This thread count will include only those threads for which the CPU usage is either greater than the PCT MEDIUM CPU UTIL THREADS configuration, or is equal to or greater than the value specified in the PCT HIGH CPU UTIL THREADS text box. The default value displayed here is 70.
21. DD FREQUENCY - Refers to the frequency with which detailed diagnosis measures are to be generated for this test. The default is 1:1. This indicates that, by default, detailed measures will be generated every time this test runs, and also every time the test detects a problem. You can modify this frequency, if you so desire. Also, if you intend to disable the detailed diagnosis capability for this test, you can do so by specifying none against DD FREQUENCY.
22. DETAILED DIAGNOSIS - To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the On option. To disable the capability, click on the Off option.
The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled:
• The eG manager license should allow the detailed diagnosis capability
• Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for the server being monitored</td></tr>
<tr><td rowspan="3">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Total threads:
Indicates the total number of threads (including daemon and non-daemon threads).</td><td>Number</td><td></td></tr>
<tr><td>Runnable threads:
Indicates the current number of threads in a runnable state.</td><td>Number</td><td>The detailed diagnosis of this measure, if enabled, provides the name of the threads, the CPU usage by the threads, the time for which the thread was in a blocked state, waiting state, etc.</td></tr>
</table>

	Blocked threads: Indicates the number of threads that are currently in a blocked state.	Number	If a thread is trying to take a lock (to enter a synchronized block), but the lock is already held by another thread, then such a thread is called a blocked thread. The detailed diagnosis of this measure, if enabled, provides in-depth information related to the blocked threads.
	Waiting threads: Indicates the number of threads that are currently in a waiting state.	Number	A thread is said to be in a Waiting state if the thread enters a synchronized block, tries to take a lock that is already held by another thread, and hence, waits till the other thread notifies that it has released the lock. Ideally, the value of this measure should be low. A very high value could be indicative of excessive waiting activity on the JVM. You can use the detailed diagnosis of this measure, if enabled, to figure out which threads are currently in the waiting state. While waiting, the Java application program does no productive work and its ability to complete the task-at-hand is degraded. A certain amount of waiting may be acceptable for Java application programs. However, when the amount of time spent waiting becomes excessive or if the number of times that waits occur exceeds a reasonable amount, the Java application program may not be programmed correctly to take advantage of the available resources. When this happens, the delay caused by the waiting Java application programs elongates the response time experienced by an end user. An enterprise may use Java application programs to perform various functions. Delays based on abnormal degradation consume employee time and may be costly to corporations.

	Timed waiting threads: Indicates the number of threads in a TIMED_WAITING state.	Number	When a thread is in the TIMED_WAITING state, it implies that the thread is waiting for another thread to do something, but will give up after a specified time out period. To view the details of threads in the TIMED_WAITING state, use the detailed diagnosis of this measure, if enabled.
	Low CPU threads: Indicates the number of threads that are currently consuming CPU lower than the value configured in the **PCT LOW CPU UTIL THREADS** text box.	Number	
	Medium CPU threads: Indicates the number of threads that are currently consuming CPU that is higher than the value configured in the **PCT LOW CPU UTIL THREADS** text box and is lower than or equal to the value specified in the **PCT MEDIUM CPU UTIL THREADS** text box.	Number	
	High CPU threads: Indicates the number of threads that are currently consuming CPU that is either greater than the percentage configured in the **PCT MEDIUM CPU UTIL THREADS** or lesser than or equal to the value configured in the **PCT HIGH CPU UTIL THREADS** text box.	Number	Ideally, the value of this measure should be very low. A high value is indicative of a resource contention at the JVM. Under such circumstances, you might want to identify the resource-hungry threads and kill them, so that application performance is not hampered. To know which threads are consuming excessive CPU, use the detailed diagnosis of this measure.
`	**Peak threads:** Indicates the highest number of live threads since JVM started.	Number	
	Started threads: Indicates the the total number of threads started (including daemon, non-daemon, and terminated) since JVM started.	Number	
	Daemon threads: Indicates the current number of live daemon threads.	Number	

	Deadlock threads: Indicates the current number of deadlocked threads.	Number	Ideally, this value should be 0. A high value is a cause for concern, as it indicates that many threads are blocking one another causing the application performance to suffer. The detailed diagnosis of this measure, if enabled, lists the deadlocked threads and their resource usage.

Note:

If the **MODE** for the **JVM Threads** test is set to **SNMP**, then the detailed diagnosis of this test will not display the **Blocked Time** and **Waited Time** for the threads. To make sure that detailed diagnosis reports these details also, do the following:

a. Login to the server host.

b. Go to the **<JAVA_HOME>\jre\lib\management** folder used by the WebLogic server, and edit the *management.properties* file in that folder.

c. Append the following line to the file:

```
com.sun.management.enableThreadContentionMonitoring
```

Note:

While viewing the measures reported by the **JVM Thread** test, you can also view the resource usage details and the **stack trace** information for all the threads, by clicking on the **STACK TRACE** link in the **Measurements** panel.

A **stack trace** (also called **stack backtrace** or **stack traceback**) is a report of the active stack frames instantiated by the execution of a program. It is commonly used to determine what threads are currently active in the JVM, and which threads are in each of the different states – i.e., alive, blocked, waiting, timed waiting, etc.

Typically, when the JVM begins exhibiting erratic resource usage patterns, it often takes administrators hours, even days to figure out what is causing this anomaly – could it be owing to one/more resource-intensive threads being executed by the WebLogic server? If so, what is causing the thread to erode resources? Is it an inefficient piece of code? In which case, which line of code could be the most likely cause for the spike in resource usage? To be able to answer these questions accurately, administrators need to know the complete list of threads that are executing on the JVM, view the **stack trace** of each thread, analyze each stack trace in a top-down manner, and trace where the problem originated.

2.1.2.3.4 JVM Cpu Usage Test

This test measures the CPU utilization of the JVM. If the JVM experiences abnormal CPU usage levels, you can use this test to instantly drill down to the classes and the methods within the classes that contributing to the resource contention at the JVM.

Purpose	Reports the status of threads on the JVM, and also reveals resource-hungry threads, so that threads that are unnecessarily consuming CPU resources can be killed
Target of the test	A WebLogic server
Agent deploying the test	An internal/remote agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port number at which the specified **HOST** listens 4. **MODE** – This test can extract metrics from the Java application using either of the following mechanisms: • **USING SNMP-BASED ACCESS TO THE JAVA RUNTIME MIB STATISTICS;** • **BY CONTACTING THE JAVA RUNTIME (JRE) OF THE APPLICATION VIA JMX** **TO CONFIGURE THE TEST TO USE SNMP, SELECT THE SNMP** option. On the other hand, choose the **JMX** option to configure the test to use JMX instead. By default, the **JMX** option is chosen here. 5. **JMX REMOTE PORT** – This parameter appears only if the **MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (see refer to the *Monitoring Java Applications* document). 6. **USER**, **PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **USER** and **PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to refer to the *Monitoring Java Applications* document. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 7. **JNDINAME** – This parameter appears only if the **MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same. 8. **SNMPPORT** – This parameter appears only if the **MODE** is set to **SNMP**. Here specify the port number through which the server exposes its SNMP MIB. Ensure that you specify the same port you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (refer to the *Monitoring Java Applications* document). 9. **SNMPVERSION** – This parameter appears only if the **MODE** is set to **SNMP**. The default selection in the **SNMPVERSION** list is **v1**. However, for this test to work, you have to select SNMP **v2** or **v3** from this list, depending upon which version of SNMP is in use in the target environment. 10. **SNMPCOMMUNITY** – This parameter appears only if the **MODE** is set to **SNMP**. Here, specify the SNMP community name that the test uses to communicate with the mail server. The default is public. This parameter is specific to SNMP **v1** and **v2** only. Therefore, if the **SNMPVERSION** chosen is **v3**, then this parameter will not appear.

11. **USERNAME** – This parameter appears only when **v3** is selected as the **SNMPVERSION**. SNMP version 3 (SNMPv3) is an extensible SNMP Framework which supplements the SNMPv2 Framework, by additionally supporting message security, access control, and remote SNMP configuration capabilities. To extract performance statistics from the MIB using the highly secure SNMP v3 protocol, the eG agent has to be configured with the required access privileges – in other words, the eG agent should connect to the MIB using the credentials of a user with access permissions to be MIB. Therefore, specify the name of such a user against the **USERNAME** parameter.
12. **AUTHTYPE** – This parameter too appears only if **v3** is selected as the **SNMPVERSION**. From the **AUTHTYPE** list box, choose the authentication algorithm using which SNMP v3 converts the specified **USERNAME** and **PASSWORD** into a 32-bit format to ensure security of SNMP transactions. You can choose between the following options:
    - **MD5** – Message Digest Algorithm
    - **SHA** – Secure Hash Algorithm
13. **ENCRYPTFLAG** – This flag appears only when **v3** is selected as the **SNMPVERSION**. By default, the eG agent does not encrypt SNMP requests. Accordingly, the **ENCRYPTFLAG** is set to **NO** by default. To ensure that SNMP requests sent by the eG agent are encrypted, select the **YES** option.
14. **ENCRYPTTYPE** – If the **ENCRYPTFLAG** is set to **YES**, then you will have to mention the encryption type by selecting an option from the **ENCRYPTTYPE** list. SNMP v3 supports the following encryption types:
    - **DES** – Data Encryption Standard
    - **AES** – Advanced Encryption Standard
15. **ENCRYPTPASSWORD** – Specify the encryption password here.
16. **CONFIRM PASSWORD** – Confirm the encryption password by retyping it here.
17. **TIMEOUT** - This parameter appears only if the **MODE** is set to **SNMP**. Here, specify the duration (in seconds) within which the SNMP query executed by this test should time out in the **TIMEOUT** text box. The default is 10 seconds.
18. **PROFILER HOME** – JIP (Java Interactive Profiler) is a high performance, low overhead profiler that is written entirely in Java and used extensively to gather performance data pertaining to a JVM. The eG agent comes bundled with JIP, and takes the help of JIP to provide detailed diagnosis information related to the CPU usage of the JVM. To make sure that this test contacts JIP for detailed resource usage metrics, you need to indicate the location of the JIP in the **PROFILER HOME** text box.

	Typically, the files related to this profiler are available in **<EG_INSTALL_DIR>\lib\jip** directory (in Windows; in Unix, this will be: **/opt/egurkha/lib/jip**). If only a single Java application on a host is being monitored, then the **jip** folder can remain in the same location. The **PROFILER HOME** parameter should then be configured with **/opt/egurkha/lib/jip** or **<EG_INSTALL_DIR>\lib\jip**, as the case may be. However, if more than one Java application on a single host is to be monitored, then first ensure that the **jip** folder is copied to two different locations on the same host. The **PROFILER HOME** parameter should in this case be configured with the location of the **jip** folder that corresponds to the Java application for which this test is being currently configured. For instance, say *japp1* and *japp2* are 2 Java applications that are being managed by the eG Enterprise system. Assume that the **jip** folder has been copied to the *C:\japp1* and *D:\japp2* folders. Now, while configuring this test for the *japp1* application, specify *C:\japp\jip* in **PROFILER HOME**. Similarly, when configuring this test for the *japp2* application, enter *D:\japp2\jip* in **PROFILER HOME**. 19. **PROFILER** – The JIP can be turned on or off while the JVM is still running. For the eG agent to be able to report detailed diagnosis of the CPU usage metric, the profiler should be turned on. Accordingly, the **PROFILER** flag is set to **On** by default. If you do not want detailed diagnosis, then you can set the **PROFILER** flag to **Off**. 20. **DD FREQUENCY** - Refers to the frequency with which detailed diagnosis measures are to be generated for this test. The default is *1:1*. This indicates that, by default, detailed measures will be generated every time this test runs, and also every time the test detects a problem. You can modify this frequency, if you so desire. Also, if you intend to disable the detailed diagnosis capability for this test, you can do so by specifying *none* against **DD FREQUENCY**. 21. **DETAILED DIAGNOSIS** - To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the **On** option. To disable the capability, click on the **Off** option. The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled: • The eG manager license should allow the detailed diagnosis capability • Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.		
Outputs of the test	One set of results for the server being monitored		
Measurements made by the	**Measurement**	**Measurement Unit**	**Interpretation**

test	**CPU utilization of JVM:** Indicates the percentage of CPU currently utilized by the JVM.	Percent	Ideally, this value should be low. An unusually high value or a consistent increase in this value is indicative of abnormal CPU usage, and could warrant further investigation. In such a situation, you can use the detailed diagnosis of this measure, if enabled, to determine which methods invoked by which classes are causing the steady/sporadic spikes in CPU usage.

2.1.2.3.5 JVM Memory Usage Test

This test monitors every memory type on the JVM and reports how efficiently the JVM utilizes the memory resources of each type.

Purpose	Monitors every memory type on the JVM and reports how efficiently the JVM utilizes the memory resources of each type
Target of the test	A WebLogic server
Agent deploying the test	An internal/remote agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port number at which the specified **HOST** listens 4. **MODE** – This test can extract metrics from the Java application using either of the following mechanisms: • **USING SNMP-BASED ACCESS TO THE JAVA RUNTIME MIB STATISTICS;** • **BY CONTACTING THE JAVA RUNTIME (JRE) OF THE APPLICATION VIA JMX** To configure the test to use SNMP, select the snmp option. On the other hand, choose the jmx option to configure the test to use JMX instead. By default, the jmx option is chosen here. 5. **JMX REMOTE PORT** – This parameter appears only if the **MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (see refer to the *Monitoring Java Applications* document). 6. **USER**, **PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **USER** and **PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to refer to the *Monitoring Java Applications* document. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 7. **JNDINAME** – This parameter appears only if the **MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same. 8. **SNMPPORT** – This parameter appears only if the **MODE** is set to **SNMP**. Here specify the port number through which the server exposes its SNMP MIB. Ensure that you specify the same port you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (refer to the *Monitoring Java Applications* document). 9. **SNMPVERSION** – This parameter appears only if the **MODE** is set to **SNMP**. The default selection in the **SNMPVERSION** list is **v1**. However, for this test to work, you have to select SNMP **v2** or **v3** from this list, depending upon which version of SNMP is in use in the target environment. 10. **SNMPCOMMUNITY** – This parameter appears only if the **MODE** is set to **SNMP**. Here, specify the SNMP community name that the test uses to communicate with the mail server. The default is public. This parameter is specific to SNMP **v1** and **v2** only. Therefore, if the **SNMPVERSION** chosen is **v3**, then this parameter will not appear.

<table>
<tr><td></td><td colspan="3">
11. USERNAME – This parameter appears only when v3 is selected as the SNMPVERSION. SNMP version 3 (SNMPv3) is an extensible SNMP Framework which supplements the SNMPv2 Framework, by additionally supporting message security, access control, and remote SNMP configuration capabilities. To extract performance statistics from the MIB using the highly secure SNMP v3 protocol, the eG agent has to be configured with the required access privileges – in other words, the eG agent should connect to the MIB using the credentials of a user with access permissions to be MIB. Therefore, specify the name of such a user against the USERNAME parameter.
12. AUTHPASS – Specify the password that corresponds to the above-mentioned USERNAME. This parameter once again appears only if the SNMPVERSION selected is v3.
13. CONFIRM PASSWORD – Confirm the AUTHPASS by retyping it here.
14. AUTHTYPE – This parameter too appears only if v3 is selected as the SNMPVERSION. From the AUTHTYPE list box, choose the authentication algorithm using which SNMP v3 converts the specified USERNAME and PASSWORD into a 32-bit format to ensure security of SNMP transactions. You can choose between the following options:
➢ MD5 – Message Digest Algorithm
➢ SHA – Secure Hash Algorithm
15. ENCRYPTFLAG – This flag appears only when v3 is selected as the SNMPVERSION. By default, the eG agent does not encrypt SNMP requests. Accordingly, the ENCRYPTFLAG is set to NO by default. To ensure that SNMP requests sent by the eG agent are encrypted, select the YES option.
16. ENCRYPTTYPE – If the ENCRYPTFLAG is set to YES, then you will have to mention the encryption type by selecting an option from the ENCRYPTTYPE list. SNMP v3 supports the following encryption types:
➢ DES – Data Encryption Standard
➢ AES – Advanced Encryption Standard
17. ENCRYPTPASSWORD – Specify the encryption password here.
18. CONFIRM PASSWORD – Confirm the encryption password by retyping it here.
19. TIMEOUT - This parameter appears only if the MODE is set to SNMP. Here, specify the duration (in seconds) within which the SNMP query executed by this test should time out in the TIMEOUT text box. The default is 10 seconds.
</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for every memory type on the JVM being monitored</td></tr>
<tr><td>Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td></td><td>Initial memory:
Indicates the amount of memory initially allocated at startup.</td><td>MB</td><td>The detailed diagnosis of this measure, when enabled, reveals the memory pools on the JVM, the memory type of every pool, and the memory manager managing the pool.</td></tr>
</table>

	Used memory: Indicates the amount of memory currently used.	MB	It includes the memory occupied by all objects including both reachable and unreachable objects.
	Available memory: Indicates the amount of memory guaranteed to be available for use by the JVM.	MB	The amount of **Available memory** may change over time. The Java virtual machine may release memory to the system and committed memory could be less than the amount of memory initially allocated at startup. Committed will always be greater than or equal to used memory.
	Free memory: Indicates the amount of memory currently available for use by the JVM.	MB	This is the difference between **Available memory** and **Used memory**. Ideally, the value of this measure should be high.
	Max free memory: Indicates the maximum amount of memory allocated for the JVM.	MB	
	Used percentage: Indicates the percentage of used memory.	Percent	Ideally, the value of this measure should be low. A very high value of this measure could indicate excessive memory consumption by the JVM, which in turn, could warrant further investigation.

2.1.2.3.6 JVM Uptime Test

This test helps track whether a scheduled reboot of the JVM has occurred or not.

Purpose	Helps track whether a scheduled reboot of the JVM has occurred or not
Target of the test	A WebLogic server
Agent deploying the test	An internal/remote agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port number at which the specified **HOST** listens 4. **MODE** – This test can extract metrics from the Java application using either of the following mechanisms: • **USING SNMP-BASED ACCESS TO THE JAVA RUNTIME MIB STATISTICS;** • **BY CONTACTING THE JAVA RUNTIME (JRE) OF THE APPLICATION VIA JMX** To configure the test to use SNMP, select the snmp option. On the other hand, choose the jmx option to configure the test to use JMX instead. By default, the jmx option is chosen here. 5. **JMX REMOTE PORT** – This parameter appears only if the **MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (see refer to the *Monitoring Java Applications* document). 6. **USER**, **PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **USER** and **PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to the *Monitoring Java Applications* document. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 7. **JNDINAME** – This parameter appears only if the **MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same. 8. **SNMPPORT** – This parameter appears only if the **MODE** is set to **SNMP**. Here specify the port number through which the server exposes its SNMP MIB. Ensure that you specify the same port you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (refer to the *Monitoring Java Applications* document). 9. **SNMPVERSION** – This parameter appears only if the **MODE** is set to **SNMP**. The default selection in the **SNMPVERSION** list is **v1**. However, for this test to work, you have to select SNMP **v2** or **v3** from this list, depending upon which version of SNMP is in use in the target environment. 10. **SNMPCOMMUNITY** – This parameter appears only if the **MODE** is set to **SNMP**. Here, specify the SNMP community name that the test uses to communicate with the mail server. The default is public. This parameter is specific to SNMP **v1** and **v2** only. Therefore, if the **SNMPVERSION** chosen is **v3**, then this parameter will not appear.

	11. **USERNAME** – This parameter appears only when **v3** is selected as the **SNMPVERSION**. SNMP version 3 (SNMPv3) is an extensible SNMP Framework which supplements the SNMPv2 Framework, by additionally supporting message security, access control, and remote SNMP configuration capabilities. To extract performance statistics from the MIB using the highly secure SNMP v3 protocol, the eG agent has to be configured with the required access privileges – in other words, the eG agent should connect to the MIB using the credentials of a user with access permissions to be MIB. Therefore, specify the name of such a user against the **USERNAME** parameter. 12. **AUTHPASS** – Specify the password that corresponds to the above-mentioned **USERNAME**. This parameter once again appears only if the **SNMPVERSION** selected is **v3**. 13. **CONFIRM PASSWORD** – Confirm the **AUTHPASS** by retyping it here. 14. **AUTHTYPE** – This parameter too appears only if **v3** is selected as the **SNMPVERSION**. From the **AUTHTYPE** list box, choose the authentication algorithm using which SNMP v3 converts the specified **USERNAME** and **PASSWORD** into a 32-bit format to ensure security of SNMP transactions. You can choose between the following options: ➢ **MD5** – Message Digest Algorithm ➢ **SHA** – Secure Hash Algorithm 15. **ENCRYPTFLAG** – This flag appears only when **v3** is selected as the **SNMPVERSION**. By default, the eG agent does not encrypt SNMP requests. Accordingly, the **ENCRYPTFLAG** is set to **NO** by default. To ensure that SNMP requests sent by the eG agent are encrypted, select the **YES** option. 16. **ENCRYPTTYPE** – If the **ENCRYPTFLAG** is set to **YES**, then you will have to mention the encryption type by selecting an option from the **ENCRYPTTYPE** list. SNMP v3 supports the following encryption types: ➢ **DES** – Data Encryption Standard ➢ **AES** – Advanced Encryption Standard 17. **ENCRYPTPASSWORD** – Specify the encryption password here. 18. **CONFIRM PASSWORD** – Confirm the encryption password by retyping it here. 19. **TIMEOUT** - This parameter appears only if the **MODE** is set to **SNMP**. Here, specify the duration (in seconds) within which the SNMP query executed by this test should time out in the **TIMEOUT** text box. The default is 10 seconds.		
Outputs of the test	One set of results for the server being monitored		
Measurements made by the	**Measurement**	**Measurement Unit**	**Interpretation**

<table>
<tr>
<td>test</td>
<td>Has JVM been restarted?:
Indicates whether or not the JVM has restarted during the last measurement period.</td>
<td></td>
<td>If the value of this measure is No, it indicates that the JVM has not restarted. The value Yes on the other hand implies that the JVM has indeed restarted.
The numeric values that correspond to the reboot states discussed above are listed in the table below:
<table>
<tr><th>State</th><th>Value</th></tr>
<tr><td>Yes</td><td>1</td></tr>
<tr><td>No</td><td>0</td></tr>
</table>
Note:
By default, this measure reports the value Yes or No to indicate whether a JVM has restarted. The graph of this measure however, represents the same using the numeric equivalents – 0 or 1.</td>
</tr>
<tr>
<td></td>
<td>Uptime during the last measure period:
Indicates the time period that the JVM has been up since the last time this test ran.</td>
<td>Secs</td>
<td>If the JVM has not been restarted during the last measurement period and the agent has been running continuously, this value will be equal to the measurement period. If the JVM was restarted during the last measurement period, this value will be less than the measurement period of the test. For example, if the measurement period is 300 secs, and if the JVM was restarted 120 secs back, this metric will report a value of 120 seconds. The accuracy of this metric is dependent on the measurement period – the smaller the measurement period, greater the accuracy.</td>
</tr>
<tr>
<td></td>
<td>Total uptime of the JVM:
Indicates the total time that the JVM has been up since its last reboot.</td>
<td>Secs</td>
<td>Administrators may wish to be alerted if a JVM has been running without a reboot for a very long period. Setting a threshold for this metric allows administrators to determine such conditions.</td>
</tr>
</table>

2.1.2.3.7 JVM Garbage Collections Test

Manual memory management is time consuming, and error prone. Most programs still contain leaks. This is all doubly true with programs using exception-handling and/or threads. Garbage collection (GC) is a part of a Java

application's JVM that automatically determines what memory a program is no longer using, and recycles it for other use. It is also known as "automatic storage (or memory) reclamation". The JvmGarbageCollection test reports the performance statistics pertaining to the JVM's garbage collection.

Purpose	Reports the performance statistics pertaining to the JVM's garbage collection
Target of the test	A WebSphere server
Agent deploying the test	An internal/remote agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port number at which the specified **HOST** listens 4. **MODE** – This test can extract metrics from the Java application using either of the following mechanisms: • Using SNMP-based access to the Java runtime MIB statistics; • By contacting the Java runtime (JRE) of the application via JMX To configure the test to use SNMP, select the snmp option. On the other hand, choose the jmx option to configure the test to use JMX instead. By default, the **JMX** option is chosen here. 5. **JMX REMOTE PORT** – This parameter appears only if the **MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (refer to the *Monitoring Java Applications* document). 6. **USER**, **PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **USER** and **PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to the *Monitoring Java Applications* document. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 7. **JNDINAME** – This parameter appears only if the **MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same. 8. **SNMPPORT** – This parameter appears only if the **MODE** is set to **SNMP**. Here specify the port number through which the server exposes its SNMP MIB. Ensure that you specify the same port you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (refer to the *Monitoring Java Applications* document). 9. **SNMPVERSION** – This parameter appears only if the **MODE** is set to **SNMP**. The default selection in the **SNMPVERSION** list is **v1**. However, for this test to work, you have to select SNMP **v2** or **v3** from this list, depending upon which version of SNMP is in use in the target environment. 10. **SNMPCOMMUNITY** – This parameter appears only if the **MODE** is set to **SNMP**. Here, specify the SNMP community name that the test uses to communicate with the mail server. The default is public. This parameter is specific to SNMP **v1** and **v2** only. Therefore, if the **SNMPVERSION** chosen is **v3**, then this parameter will not appear.

	11. **USERNAME** – This parameter appears only when **v3** is selected as the **SNMPVERSION**. SNMP version 3 (SNMPv3) is an extensible SNMP Framework which supplements the SNMPv2 Framework, by additionally supporting message security, access control, and remote SNMP configuration capabilities. To extract performance statistics from the MIB using the highly secure SNMP v3 protocol, the eG agent has to be configured with the required access privileges – in other words, the eG agent should connect to the MIB using the credentials of a user with access permissions to be MIB. Therefore, specify the name of such a user against the **USERNAME** parameter. 12. **AUTHPASS** – Specify the password that corresponds to the above-mentioned **USERNAME**. This parameter once again appears only if the **SNMPVERSION** selected is **v3**. 13. **CONFIRM PASSWORD** – Confirm the **AUTHPASS** by retyping it here. 14. **AUTHTYPE** – This parameter too appears only if **v3** is selected as the **SNMPVERSION**. From the **AUTHTYPE** list box, choose the authentication algorithm using which SNMP v3 converts the specified **USERNAME** and **PASSWORD** into a 32-bit format to ensure security of SNMP transactions. You can choose between the following options: ➢ **MD5** – Message Digest Algorithm ➢ **SHA** – Secure Hash Algorithm 15. **ENCRYPTFLAG** – This flag appears only when **v3** is selected as the **SNMPVERSION**. By default, the eG agent does not encrypt SNMP requests. Accordingly, the **ENCRYPTFLAG** is set to **NO** by default. To ensure that SNMP requests sent by the eG agent are encrypted, select the **YES** option. 16. **ENCRYPTTYPE** – If the **ENCRYPTFLAG** is set to **YES**, then you will have to mention the encryption type by selecting an option from the **ENCRYPTTYPE** list. SNMP v3 supports the following encryption types: ➢ **DES** – Data Encryption Standard ➢ **AES** – Advanced Encryption Standard 17. **ENCRYPTPASSWORD** – Specify the encryption password here. 18. **CONFIRM PASSWORD** – Confirm the encryption password by retyping it here. 19. **TIMEOUT** - This parameter appears only if the **MODE** is set to **SNMP**. Here, specify the duration (in seconds) within which the SNMP query executed by this test should time out in the **TIMEOUT** text box. The default is 10 seconds.		
Outputs of the test	One set of results for every garbage collector configured on the WebSphere server being monitored		
Measurements made by the	**Measurement**	**Measurement Unit**	**Interpretation**

test	**No of garbage collections started:** Indicates the number of times garbage collection started to release dead objects form memory.	Number	
	Time taken for garbage collection: Indicates the time taken to perform the current garbage collection operation.	Secs	Ideally, the value of both these measures should be low. This is because, the garbage collection (GC) activity tends to suspend the operations of the application until such time that GC ends. Longer the GC time, longer it would take for the application to resume its functions. To minimize the impact of GC on application performance, it is best to ensure that GC activity does not take too long to complete.
	Percent of time spent by JVM for garbage collection: Indicates the percentage of time spent by JVM in garbage collection.	Percent	

2.1.2.3.8 JVM Memory Pool Garbage Collections Test

While the **JVM Garbage Collections** test reports statistics indicating how well each collector on the JVM performs garbage collection, the measures reported by the **JVM Memory Pool Garbage Collections** test help assess the impact of the garbage collection activity on the availability and usage of memory in each memory pool of the JVM. Besides revealing the count of garbage collections per collector and the time taken by each collector to perform garbage collection on the individual memory pools, the test also compares the amount of memory used and available for use pre and post garbage collection in each of the memory pools. This way, the test enables administrators to guage the effectiveness of the garbage collection activity on the memory pools, and helps them accurately identify those memory pools where enough memory could not reclaimed or where the garbage collectors spent too much time.

Purpose	Helps assess the impact of the garbage collection activity on the availability and usage of memory in each memory pool of the JVM
Target of the test	A WebSphere Application Server
Agent deploying the test	An internal/remote agent

<table>
<tr><td>Configurable parameters for the test</td><td colspan="3">1. TEST PERIOD - How often should the test be executed
2. HOST - The host for which the test is to be configured
3. PORT - The port number at which the specified HOST listens
4. MEASURE MODE - This test allows you the option to collect the desired metrics using one of the following methodologies:
• By contacting the Java runtime (JRE) of the application via JMX
• Using GC logs
To use JMX for metrics collections, set the measure mode to jmx.
On the other hand, if you intend to use the GC log files for collecting the required metrics, set the MEASURE MODE to Log File. In this case, you would be required to enable GC logging. The procedure for this has been detailed in the Monitoring Java Applications document.
5. JMX REMOTE PORT – This parameter appears only if the MODE is set to JMX. Here, specify the port at which the JMX listens for requests from remote hosts. Ensure that you specify the same port that you configured in the management.properties file in the <JAVA_HOME>\jre\lib\management folder used by the target application (refer to the Monitoring Java Applications document).
6. USER, PASSWORD, and CONFIRM PASSWORD – These parameters appear only if the MODE is set to JMX. If JMX requires authentication only (but no security), then ensure that the USER and PASSWORD parameters are configured with the credentials of a user with read-write access to JMX. To know how to create this user, refer to the Monitoring Java Applications document. Confirm the password by retyping it in the CONFIRM PASSWORD text box.
7. JNDINAME – This parameter appears only if the MODE is set to JMX. The JNDINAME is a lookup name for connecting to the JMX connector. By default, this is jmxrmi. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same.
8. JREHOME - This parameter will be available only if the MEASURE MODE is set to Log File. Specify the full path to the Java Runtime Environment (JRE) used by the target application.
9. LOGFILENAME - This parameter will be available only if the MEASURE MODE is set to Log File. Specify the full path to the GC log file to be used for metrics collection.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for every GarbageCollector:MemoryPool pair on the JVM of the server being monitored</td></tr>
<tr><td rowspan="2">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Has garbage collection happened?:
Indicates whether garbage collection occurred on this memory pool in the last measurement period.</td><td></td><td>This measure reports the value Yes if garbage collection took place or No if it did not take place on the memory pool.
The numeric values that correspond to the measure values of Yes and No are listed below:</td></tr>
</table>

			<table><tr><th>State</th><th>Value</th></tr><tr><td>Yes</td><td>1</td></tr><tr><td>No</td><td>0</td></tr></table> **Note:** By default, this measure reports the value *Yes* or *No* to indicate whether a GC occurred on a memory pool or not. The graph of this measure however, represents the same using the numeric equivalents – *0* or *1*.
	Collection count: Indicates the number of time in the last measurement pool garbage collection was started on this memory pool.	Number	
	Initial memory before GC: Indicates the initial amount of memory (in MB) that this memory pool requests from the operating system for memory management during startup, before GC process.	MB	Comparing the value of these two measures for a memory pool will give you a fair idea of the effectiveness of the garbage collection activity. If garbage collection reclaims a large amount of memory from the memory pool, then the *Initial memory after GC* will drop. On the other hand, if the garbage collector does not reclaim much memory from a memory pool, or if the Java application suddenly runs a memory-intensive process when GC is being performed, then the *Initial memory after GC* may be higher than the *Initial memory before GC*.
	Initial memory after GC: Indicates the initial amount of memory (in MB) that this memory pool requests from the operating system for memory management during startup, after GC process	MB	

	Max memory before GC: Indicates the maximum amount of memory that can be used for memory management by this memory pool, before GC process.	MB	Comparing the value of these two measures for a memory pool will provide you with insights into the effectiveness of the garbage collection activity. If garbage collection reclaims a large amount of memory from the memory pool, then the *Max memory after GC* will drop. On the other hand, if the garbage collector does not reclaim much memory from a memory pool, or if the Java application suddenly runs a memory-intensive process when GC is being performed, then the *Max memory after GC* value may exceed the *Max memory before GC*.
	Max memory after GC: Indicates the maximum amount of memory (in MB) that can be used for memory management by this pool, after the GC process.	MB	
	Committed memory before GC: Indicates the amount of memory that is guaranteed to be available for use by this memory pool, before the GC process.	MB	
	Committed memory after GC: Indicates the amount of memory that is guaranteed to be available for use by this memory pool, after the GC process.	MB	
	Used memory before GC: Indicates the amount of memory used by this memory pool before GC.	MB	Comparing the value of these two measures for a memory pool will provide you with insights into the effectiveness of the garbage collection activity. If garbage collection reclaims a large amount of memory from the memory pool, then the *Used memory after GC* may drop lower than the *Used memory before GC*. On the other hand, if the garbage collector does not reclaim much memory from a memory pool, or if the Java application suddenly runs a memory-intensive process when GC is being performed, then the *Used memory after GC* value may exceed the *Used memory before GC*.
	Used memory after GC: Indicates the amount of memory used by this memory pool after GC.	MB	

	Percentage memory collected: Indicates the percentage of memory collected from this pool by the GC activity.	Percent	A high value for this measure is indicative of a large amount of unused memory in the pool. A low value on the other hand indicates that the memory pool has been over-utilized. Compare the value of this measure across pools to identify the pools that have very little free memory. If too many pools appear to be running short of memory, it could indicate that the target application is consuming too much memory, which in the long run, can slow down the application significantly.
	Collection duration: Indicates the time taken by this garbage collector for collecting unused memory from this pool.	Mins	Ideally, the value of this measure should be low. This is because, the garbage collection (GC) activity tends to suspend the operations of the application until such time that GC ends. Longer the GC time, longer it would take for the application to resume its functions. To minimize the impact of GC on application performance, it is best to ensure that GC activity does not take too long to complete.

2.1.2.3.9 JMX Connection to JVM

This test reports the availability of the target Java application, and also indicates whether JMX is enabled on the application or not. In addition, the test promptly alerts you to slowdowns experienced by the application, and also reveals whether the application was recently restarted or not.

Purpose	Reports the availability of the target Java application, and also indicates whether JMX is enabled on the application or not. In addition, the test promptly alerts you to slowdowns experienced by the application, and also reveals whether the application was recently restarted or not
Target of the test	A Java application
Agent deploying the test	An internal/remote agent

<table>
<tr><td>Configurable parameters for the test</td><td colspan="3">1. TEST PERIOD - How often should the test be executed
2. HOST - The host for which the test is to be configured
3. PORT - The port number at which the specified HOST listens
4. JMX REMOTE PORT – Here, specify the port at which the JMX listens for requests from remote hosts. Ensure that you specify the same port that you configured in the management.properties file in the <JAVA_HOME>\jre\lib\management folder used by the target application (refer to the Monitoring Java Applications document).
5. USER, PASSWORD, and CONFIRM PASSWORD – If JMX requires authentication only (but no security), then ensure that the USER and PASSWORD parameters are configured with the credentials of a user with read-write access to JMX. To know how to create this user, refer to the Monitoring Java Applications document. Confirm the password by retyping it in the CONFIRM PASSWORD text box.
6. JNDINAME – The JNDINAME is a lookup name for connecting to the JMX connector. By default, this is jmxrmi. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for the Java application being monitored</td></tr>
<tr><td rowspan="3">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>JMX availability:
Indicates whether the target application is available or not and whether JMX is enabled or not on the application.</td><td>Percent</td><td>If the value of this measure is 100%, it indicates that the Java application is available with JMX enabled. The value 0 on the other hand, could indicate one/both the following:
g. The Java application is unavailable;
h. The Java application is available, but JMX is not enabled;</td></tr>
<tr><td>JMX response time:
Indicates the time taken to connect to the JMX agent of the Java application.</td><td>Secs</td><td>A high value could indicate a connection bottleneck.</td></tr>
<tr><td></td><td>Has the PID changed?
Indicates whether/not the process ID that corresponds to the Java application has changed.</td><td></td><td>This measure will report the value Yes if the PID of the target application has changed; such a change is indicative of an application restart. If the application has not restarted - i.e., if the PID has not changed - then this measure will return the value No.</td></tr>
</table>

2.1.2.3.10 JVM File Descriptors Test

This test reports useful statistics pertaining to file descriptors.

Purpose	Reports useful statistics pertaining to file descriptors		
Target of the test	A Java application		
Agent deploying the test	An internal/remote agent		
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port number at which the specified **HOST** listens 4. **JMX REMOTE PORT** – Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (refer to the *Monitoring Java Applications* document). 5. **USER**, **PASSWORD**, and **CONFIRM PASSWORD** – If JMX requires **authentication only** (but no security), then ensure that the **USER** and **PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to the *Monitoring Java Applications* document. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 6. **JNDINAME** – The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same.		
Outputs of the test	One set of results for the Java application being monitored		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Open file descriptors in JVM: Indicates the number of file descriptors currently open for the application.	Number	
	Maximum file descriptors in JVM: Indicates the maximum number of file descriptors allowed for the application.	Number	
	File descriptor usage by JVM: Indicates the file descriptor usage in percentage.	Percent	

2.1.3 The WebLogic Container Layer

The tests mapped to this layer measure the health of the WebLogic Container. In the process, the layer reveals:

- Processing bottlenecks in the WebLogic server;

- Excessive usage of threads by the execute queues/work managers on the WebLogic server;
- Work managers that are slow in processing requests;
- The availability and responsiveness of the Web server component of WebLogic;
- Security violations on the WebLogic server and the number of users who were locked out as a result;
- The transaction load on the WebLogic server and how well the server handles the load;
- Whether the JMS queues and topics on the WebLogic server have been sized right to handle the load on them.

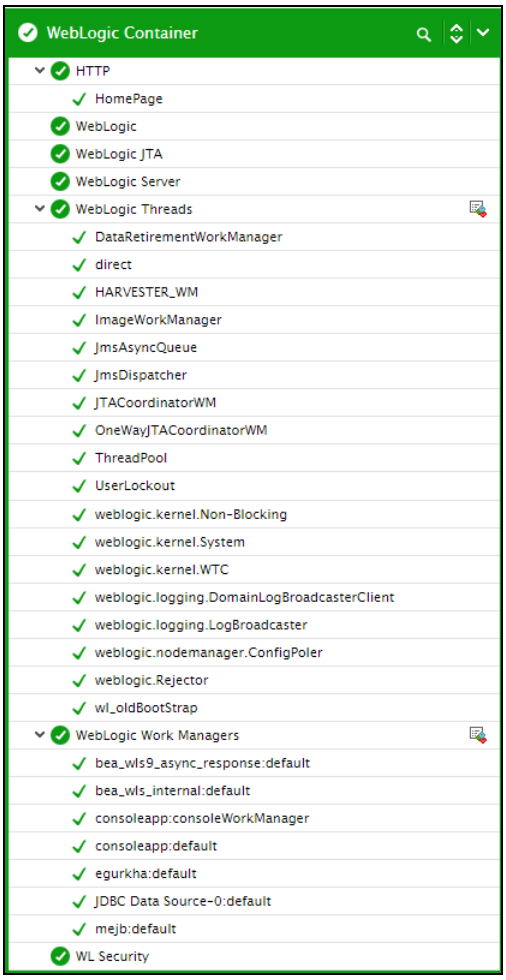


Figure 2.15: The tests mapped to the WebLogic Container layer

2.1.3.1 WebLogic Test

This test monitors the performance of a WebLogic server by tracking the rate of requests processed by the server, the number of requests waiting for processing, and the percentage of heap usage by the server. While the rate of

requests processed and the number of queued requests can be indicative of performance problems with the WebLogic server, the percentage heap usage can be indicative of the reason for the problem.

The heap size determines how often, and for how long garbage collection is performed by the Java Virtual Machine (JVM) that hosts the WebLogic server. The Java heap is a repository for live objects, dead objects, and free memory. When the JVM runs out of memory in the heap, all execution in the JVM stops while a Garbage Collection (GC) algorithm goes through memory and frees space that is no longer required by an application. This is an obvious performance hit because users accessing a WebLogic server must wait while GC happens. No server-side work can be done during GC. Consequently, the heap size must be tuned to minimize the amount of time that the JVM spends in garbage collection, while at the same time maximizing the number of clients that the server can handle at a given time. For Java 2 environments, it is recommended that the heap size be set to be as possible without causing the host system to "swap" pages to disk (use the output of eG Enterprise's SystemTest to gauge the amount of swapping being performed by the operating system).

Purpose	To measure statistics pertaining to a WebLogic application server
Target of the test	A WebLogic application server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebLogic server 3. **PORT** – The port number of the WebLogic server 4. **SNMPPORT** – The port number on which the WebLogic server is exposing its SNMP MIB (relevant to WebLogic server 5.1 only). For version 6.0 and above, enter "none" in this text box. 5. **SNMPVERSION** – By default, the eG agent supports SNMP version 1. Accordingly, the default selection in the **SNMPVERSION** list is **v1**. However, if a different SNMP framework is in use in your environment, say SNMP **v2** or **v3**, then select the corresponding option from this list. 6. **SNMPCOMMUNITY** – The SNMP community string to be used with the SNMP query to access the WebLogic server's MIB (relevant to WebLogic server 5.1 only). For version 6.0 and above, enter "none" in this text box. 7. **USERNAME** – This parameter appears only when **v3** is selected as the **SNMPVERSION**. SNMP version 3 (SNMPv3) is an extensible SNMP Framework which supplements the SNMPv2 Framework, by additionally supporting message security, access control, and remote SNMP configuration capabilities. To extract performance statistics from the MIB using the highly secure SNMP v3 protocol, the eG agent has to be configured with the required access privileges – in other words, the eG agent should connect to the MIB using the credentials of a user with access permissions to be MIB. Therefore, specify the name of such a user against the **USERNAME** parameter. 8. **AUTHPASS** – Specify the password that corresponds to the above-mentioned **USERNAME**. This parameter once again appears only if the **SNMPVERSION** selected is **v3**. 9. **CONFIRM PASSWORD** – Confirm the **AUTHPASS** by retyping it here. 10. **AUTHTYPE** – This parameter too appears only if **v3** is selected as the **SNMPVERSION**. From the **AUTHTYPE** list box, choose the authentication algorithm using which SNMP v3 converts the specified **USERNAME** and **PASSWORD** into a 32-bit format to ensure security of SNMP transactions. You can choose between the following options: ➢ **MD5** – Message Digest Algorithm ➢ **SHA** – Secure Hash Algorithm 11. **ENCRYPTFLAG** – This flag appears only when **v3** is selected as the **SNMPVERSION**. By default, the eG agent does not encrypt SNMP requests. Accordingly, the **ENCRYPTFLAG** is set to **NO** by default. To ensure that SNMP requests sent by the eG agent are encrypted, select the **YES** option.

12. **ENCRYPTTYPE** – If the **ENCRYPTFLAG** is set to **YES**, then you will have to mention the encryption type by selecting an option from the **ENCRYPTTYPE** list. SNMP v3 supports the following encryption types:
    - **DES** – Data Encryption Standard
    - **AES** – Advanced Encryption Standard
13. **ENCRYPTPASSWORD** – Specify the encryption password here.
14. **CONFIRM PASSWORD** – Confirm the encryption password by retyping it here.
15. **USER** – The admin user name of the WebLogic server being monitored.
16. **PASSWORD** – The password of the specified admin user
17. **CONFIRM PASSWORD** – Confirm the password by retyping it here.
18. **ENCRYPTPASS** - If the specified password needs to be encrypted, set the **ENCRYPTPASS** flag to **YES**. Otherwise, set it to **NO**. By default, the **YES** option will be selected.

    Note:

    If the **USEWARFILE** flag is set to **No**, then make sure that the **ENCRYPTPASS** flag is also set to **No**.
19. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebLogic server.
20. **SERVER** - The name of the specific server instance to be monitored for a WebLogic server (the default value is "localhome")
21. **URL** – The URL to be accessed to collect metrics pertaining to the WebLogic server. By default, this test connects to a managed WebLogic server and attempts to obtain the metrics of interest by accessing the local Mbeans of the server. This parameter can be changed to a value of `http://<adminserverIP>:<adminserverPort>`. In this case, the test connects to the WebLogic admin server to collect metrics pertaining to the managed server (specified by the **HOST** and **PORT**). The **URL** setting provides the administrator with the flexibility of determining the WebLogic monitoring configuration to use.

    Note:

    If the admin server is to be used for collecting measures for all the managed WebLogic servers, then it is mandatory that the egurkha war file is deployed to the admin server, and it is up and running.
22. **VERSION** - The **VERSION** textbox indicates the version of the Weblogic server to be managed. The default value is "none", in which case the test auto-discovers the weblogic version. If the value of this parameter is not "none", the test uses the value provided (e.g., 7.0) as the weblogic version (i.e., it does not auto-discover the weblogic server version). This parameter has been added to address cases when the eG agent is not able to discover the WebLogic server version.

<table>
<tr><td></td><td colspan="3">23. USEWARFILE - This flag indicates whether/not monitoring is to be done using a Web archive file deployed on the WebLogic server (in which case, HTTP/HTTPS is used by the server to connect to the server). If this flag is set to No, the agent directly connects to the WebLogic server using the T3 protocol (no other file needs to be deployed on the WebLogic server for this to work). Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only. Also, if the USEWARFILE parameter is set to No, make sure that the ENCRYPTPASS parameter is set to No as well.

When monitoring a WebLogic server deployed on a Unix platform particularly, if the USEWARFILE parameter is set to No, you have to make sure that the eG agent install user is added to the WebLogic users group.

24. WEBLOGICJARLOCATION - Specify the location of the WebLogic server's java archive (Jar) file. If the USEWARFILE flag is set to No, then the weblogic.jar file specified here is used to connect to the corresponding WebLogic server using the T3 protocol. Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.

25. TIMEOUT - Specify the duration (in seconds) within which the SNMP query executed by this test should time out in the TIMEOUT text box. The default is 10 seconds.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for each WebLogic application server.</td></tr>
<tr><td rowspan="4">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Throughput:
Rate of requests processed by the WebLogic server.</td><td>Reqs/Sec</td><td>A high request rate is an indicator of server overload. By comparing the request rates across application servers, an operator can gauge the effectiveness of load balancers (if any) that are in use.</td></tr>
<tr><td>Heap usage percent:
Percentage of heap space currently in use by the WebLogic server.</td><td>Percent</td><td>When the heap used percent reaches 100%, the server will start garbage collection rather than processing requests. Hence, a very high percentage of heap usage (close to 100%) will dramatically lower performance. In such a case, consider increasing the heap size to be used.</td></tr>
<tr><td>Requests queued:
Number of requests currently waiting to be processed by the server.</td><td>Number</td><td>An increase in number of queued requests can indicate a bottleneck on the WebLogic server. One of the reasons for this could be a bottleneck at the server or due one or more of the applications hosted on the server.</td></tr>
<tr><td></td><td>Total heap size:
Current heap size of the WebLogic server's Java Virtual Machine</td><td>MB</td><td></td></tr>
</table>

	Free heap size: The currently unused portion of the WebLogic server's Java Virtual Machine	MB	

2.1.3.2 WebLogic Threads Test

A WebLogic server (prior to version 9.x) may be configured with different execute queues. By default, a WebLogic server is configured with one thread queue that is used for execution by all applications running on a server instance. A common way of improving a WebLogic server's performance is by configuring multiple thread execute queues. For eg., a mission-critical application can be assigned to a specific thread execute queue, thereby guaranteeing it a fixed number of execute threads. Other, less critical applications may compete for threads in the default execute queue. While using different thread execute queues can significantly improve performance, if the thread execute queues are not properly configured or maintained, this could result in less than optimal performance. For eg., you may find that while one thread queue has a number of idle threads, applications in another thread execute queue could be waiting for execute threads to become available. In case of the WebLogic server prior to version 9.x, the WebLogic Threads test monitors the different thread execute queues configured for the server.

From WebLogic server 9.x onwards however, execute queues are replaced by 'work managers'. Therefore, while monitoring WebLogic server 9.x or above, the WebLogic Threads test will report one set of metrics for every 'work manager' configured for the server. Also, the test will take an additional *ThreadPool* descriptor, which will report the extent of usage of the thread pool.

Purpose	To report performance statistics pertaining to the thread execute queues of a WebLogic server instance
Target of the test	A WebLogic application server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebLogic server 3. **PORT** – The port number of the WebLogic server 4. **USER** – The admin user name of the WebLogic server being monitored. 5. **PASSWORD** – The password of the specified admin user 6. **CONFIRM PASSWORD** – Confirm the password by retyping it here. 7. **ENCRYPTPASS** - If the specified password needs to be encrypted, set the **ENCRYPTPASS** flag to **YES**. Otherwise, set it to **NO**. By default, the **YES** option will be selected. **Note:** If the **USEWARFILE** flag is set to **No**, then make sure that the **ENCRYPTPASS** flag is also set to **No**. 8. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebLogic server. 9. **SERVER** - The name of the specific server instance to be monitored for a WebLogic server (the default value is "localhome") 10. **URL** – The URL to be accessed to collect metrics pertaining to the WebLogic server. By default, this test connects to a managed WebLogic server and attempts to obtain the metrics of interest by accessing the local Mbeans of the server. This parameter can be changed to a value of `http://<adminserverIP>:<adminserverPort>`. In this case, the test connects to the WebLogic admin server to collect metrics pertaining to the managed server (specified by the **HOST** and **PORT**). The **URL** setting provides the administrator with the flexibility of determining the WebLogic monitoring configuration to use. **Note:** If the admin server is to be used for collecting measures for all the managed WebLogic servers, then it is mandatory that the egurkha war file is deployed to the admin server, and it is up and running. 11. **VERSION** - The **VERSION** textbox indicates the version of the Weblogic server to be managed. The default value is "none", in which case the test auto-discovers the weblogic version. If the value of this parameter is not "none", the test uses the value provided (e.g., 7.0) as the weblogic version (i.e., it does not auto-discover the weblogic server version). This parameter has been added to address cases when the eG agent is not able to discover the WebLogic server version. 12. **USEWARFILE** - This flag indicates whether/not monitoring is to be done using a Web archive file deployed on the WebLogic server (in which case, HTTP/HTTPS is used by the server to connect to the server). If this flag is set to **No**, the agent directly connects to the WebLogic server using the T3 protocol (no other file needs to be deployed on the WebLogic server for this to work). **Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.** Also, if the **USEWARFILE** parameter is set to **No**, make sure that the **ENCRYPTPASS** parameter is set to **No** as well.

	When monitoring a WebLogic server deployed on a Unix platform particularly, if the **USEWARFILE** parameter is set to **No**, you have to make sure that the eG agent install user is added to the WebLogic users group. 13. **WEBLOGICJARLOCATION** - Specify the location of the WebLogic server's java archive (Jar) file. If the **USEWARFILE** flag is set to **No**, then the weblogic.jar file specified here is used to connect to the corresponding WebLogic server using the T3 protocol. **Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.**
Outputs of the test	One set of results for each thread execute queue of a WebLogic application server.

Measurements made by the test	Measurement	Measurement Unit	Interpretation
	Idle threads: Indicates the number of idle threads assigned to a queue.	Number	If the value of this measure is close to 0, it indicates a probable delay in the processing of subsequent requests. **In case of WebLogic 9.x or higher, this measure will be available for the ThreadPool descriptor only, and not the individual work managers.**
	Thread utilization: Indicates the percentage of threads utilized in a queue	Percent	When this value becomes 100 %, it indicates a heavy load on the server and that it cannot process further requests until a few threads become idle. Typically, this value should be less than 90%. **In case of WebLogic 9.x or higher, this measure will be available for the ThreadPool descriptor only, and not the individual work managers.**
	Pending requests: Indicates the number of requests waiting in the queue	Number	A high value of this measure can result in significant request processing delays.
	Requests: Indicates the number of requests that are processed by the server per second	Reqs/sec	While a high value of this measure is indicative of the good health of the server, a low value indicates a processing bottleneck.

2.1.3.3 WebLogic Work Managers Test

The WebLogic Server allows you to configure how your application prioitizes the execution of its work based on rules you define and by monitoring actual runtime performance. You define the rules and constraints for your application by defining a Work Manager and applying it either globally to WebLogic Server domain or to a specific application component.

This test monitors the requests to applications, and helps analyze how the work manager mapped to each application is managing the requests. By closely observing the variations to the measures reported by this test, you can quickly identify current/potential application slowdowns, and figure out whether changes in the corresponding work manager

specification can improve application performance.

Purpose	Monitors the requests to applications, and helps analyze how the work manager mapped to each application is managing the requests
Target of the test	A WebLogic application server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebLogic server 3. **PORT** – The port number of the WebLogic server 4. **USER** – The admin user name of the WebLogic server being monitored. 5. **PASSWORD** – The password of the specified admin user 6. **CONFIRM PASSWORD** – Confirm the password by retyping it here. 7. **ENCRYPTPASS** - If the specified password needs to be encrypted, set the **ENCRYPTPASS** flag to **YES**. Otherwise, set it to **NO**. By default, the **YES** option will be selected. **Note:** If the **USEWARFILE** flag is set to **No**, then make sure that the **ENCRYPTPASS** flag is also set to **No**. 8. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebLogic server. 9. **SERVER** - The name of the specific server instance to be monitored for a WebLogic server (the default value is "localhome") 10. **URL** – The URL to be accessed to collect metrics pertaining to the WebLogic server. By default, this test connects to a managed WebLogic server and attempts to obtain the metrics of interest by accessing the local Mbeans of the server. This parameter can be changed to a value of `http://<adminserverIP>:<adminserverPort>`. In this case, the test connects to the WebLogic admin server to collect metrics pertaining to the managed server (specified by the **HOST** and **PORT**). The **URL** setting provides the administrator with the flexibility of determining the WebLogic monitoring configuration to use. **Note:** If the admin server is to be used for collecting measures for all the managed WebLogic servers, then it is mandatory that the egurkha war file is deployed to the admin server, and it is up and running. 11. **VERSION** - The **VERSION** textbox indicates the version of the Weblogic server to be managed. The default value is "none", in which case the test auto-discovers the weblogic version. If the value of this parameter is not "none", the test uses the value provided (e.g., 7.0) as the weblogic version (i.e., it does not auto-discover the weblogic server version). This parameter has been added to address cases when the eG agent is not able to discover the WebLogic server version. 12. **USEWARFILE** - This flag indicates whether/not monitoring is to be done using a Web archive file deployed on the WebLogic server (in which case, HTTP/HTTPS is used by the server to connect to the server). If this flag is set to **No**, the agent directly connects to the WebLogic server using the T3 protocol (no other file needs to be deployed on the WebLogic server for this to work). **Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.** Also, if the **USEWARFILE** parameter is set to **No**, make sure that the **ENCRYPTPASS** parameter is set to **No** as well.

<table>
<tr><td></td><td colspan="3">13. When monitoring a WebLogic server deployed on a Unix platform particularly, if the USEWARFILE parameter is set to No, you have to make sure that the eG agent install user is added to the WebLogic users group.
14. WEBLOGICJARLOCATION - Specify the location of the WebLogic server's java archive (Jar) file. If the USEWARFILE flag is set to No, then the weblogic.jar file specified here is used to connect to the corresponding WebLogic server using the T3 protocol. Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for every work manager on the WebLogic server being monitored.</td></tr>
<tr><td rowspan="2">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Completed requests:
Indicates the number of requests that were successfully serviced by the work manager mapped to this application.</td><td>Number</td><td></td></tr>
</table>

	Pending requests: Indicates the number of requests to this application that are waiting in the queue.	Number	A large number of pending requests to an application could indicate a bottleneck in the request processing ability of that application. If too many applications on the server support long-winding request queues, it can ultimately overload the server, and eventually choke its performance. It is therefore essential to quickly isolate those applications that could be experiencing issues with request processing, and then initiate the relevant remedial action on them. Comparing the value of this measure across applications will enable you to accurately identify which application has the maximum number of pending requests. Once the application is spotted, you may want to observe the variations in the pending requests count over time for that application. If you find that the value of this measure keeps increasing with time for that application, further investigation may be necessary to determine the reasons for the same. One of the possible reasons for this could be the lack of sufficient threads. Incoming requests to an application cannot be processed if adequate threads are unavailable; such requests will hence be in queue until such time that the server allocates more threads to the application.

			As already stated, the WebLogic server prioritizes work and allocates threads to an application based on the rules and constraints defined within the work manager that is either defined globally or mapped specifically to that application. Therefore, in the event of a slow down in the request processing rate of an application, you can consider fine-tuning its associated work manager definition, so as to ensure the uninterrupted processing of requests. A typical work manager definition should include one request class and one/more thread constraints. A request class expresses a scheduling guideline that WebLogic Server uses to allocate threads to requests. Request classes help ensure that high priority work is scheduled before less important work, even if the high priority work is submitted after the lower priority work. A work manager can specify any one of the below-mentioned request classes: • Fair share request class: This specifies the average thread-use time required to process requests. For example, assume that WebLogic Server is running two modules. The Work Manager for ModuleA specifies a fair-share-request-class of 80 and the Work Manager for ModuleB specifies a fair-share-request-class of 20. During a period of sufficient demand, with a steady stream of requests for each module such that the number requests exceed the number of threads, WebLogic Server will allocate 80% and 20% of the thread-usage time to ModuleA and ModuleB, respectively.

			• Response time request class: This type of request class specifies a response time goal in milliseconds. Response time goals are not applied to individual requests. Instead, WebLogic Server computes a tolerable waiting time for requests with that class by subtracting the observed average thread use time from the response time goal, and schedules requests so that the average wait for requests with the class is proportional to its tolerable waiting time. • Context request class: This type of request class assigns request classes to requests based on context information, such as the current user or the current user's group. A constraint defines minimum and maximum numbers of threads allocated to execute requests and the total number of requests that can be queued or executing before WebLogic Server begins rejecting requests. You can define the following types of constraints: • *max-threads-constraint*—This constraint limits the number of concurrent threads executing requests from the constrained work set. The default is unlimited. For example, consider a constraint defined with maximum threads of 10 and shared by 3 entry points. The scheduling logic ensures that not more than 10 threads are executing requests from the three entry points combined. • *min-threads-constraint*—This constraint guarantees a number of threads the server will allocate to affected requests to avoid deadlocks. The default is zero.

			A min-threads-constraint value of one is useful, for example, for a replication update request, which is called synchronously from a peer. • *capacity*—This constraint causes the server to reject requests only when it has reached its capacity. The default is -1. Note that the capacity includes all requests, queued or executing, from the constrained work set. Work is rejected either when an individual capacity threshold is exceeded or if the global capacity is exceeded. This constraint is independent of the global queue threshold.
	Stuck threads: Indicates the number of threads that are considered to be stuck on the basis of any thread constraints.	Number	WebLogic Server diagnoses a thread as stuck if it is continually working (not idle) for a set period of time. You can tune a server's thread detection behavior by changing the length of time before a thread is diagnosed as stuck, and by changing the frequency with which the server checks for stuck threads. In response to stuck threads, you can define a Stuck Thread Work Manager component that can shut down the Work Manager, move the application into admin mode, or mark the server instance as failed.

2.1.3.4 HTTP Test

The details of the HTTP test that emulates a user accessing the web server component of a WebLogic server, are provided below. Since this test can be executed from a location external to the WebLogic server, this test presents an unbiased external perspective of the state of the web server component. This test uses the GET command to submit its parameters.

Purpose	This test measures the state of the web server component of a WebLogic server
Target	A WebLogic server
Agent deploying this test	An external agent executing on an eG server
Configurable parameters for this test	1. **TEST PERIOD** – How often should the test be executed 2. **URL** – The web page being accessed. While multiple URLs (separated by commas) can be provided, each URL should be of the format **URL name:URL value**. **URL name** is a unique name assigned to the URL, and the **URL value** is the value of the URL. For example, a URL can be specified as **HomePage:http://192.168.10.12:7077/**, where

HomePage is the **URL name** and http://192.168.10.12:7077/ is the **URL value**.

3. **HOST** - The host for which the test is to be configured.
4. **PORT** - The port to which the specified **HOST** listens
5. **COOKIEFILE** – Whether any cookies being returned by the web server need to be saved locally and returned with subsequent requests
6. **PROXYHOST** – The host on which a web proxy server is running (in case a proxy server is to be used)
7. **PROXYPORT** – The port number on which the web proxy server is listening
8. **PROXYUSERNAME** – The user name of the proxy server
9. **PROXYPASSWORD** – The password of the proxy server
10. **CONFIRM PASSWORD** – Confirm the password by retyping it here.
11. **CONTENT – I**s a set of instruction:value pairs that are used to validate the content being returned by the test. If the **CONTENT** value is *none:none*, no validation is performed. The number of pairs specified in this text box, must be equal to the number of URLs being monitored. The instruction should be one of *Inc* or *Exc*. *Inc* tells the test that for the content returned by the web server to be valid, the content must include the specified value (a simple string search is done in this case). An instruction of *Exc* instructs the test that the server's output is valid if it does not contain the specified value. In both cases, the content specification can include wild card patterns. For example, an Inc instruction can be *Inc:*Home page**. An Inc and an Exc instruction can be provided in quick succession in the following format: *Inc:*Home Page*,Exc:*home*.
12. **CREDENTIALS** – The HttpTest supports HTTP authentication. The **CREDENTIALS** parameter is to be set if a specific user name / password has to be specified to login to a page. Against this parameter, the **URLname** of every configured **URL** will be displayed; corresponding to each listed **URLname**, a **Username** text box and a **Password** text box will be made available. If the web server on which HttpTest executes supports 'Anonymous user access', then this parameter will take either of the following values:
    - a valid **Username** and **Password** for every configured **URLname**
    - *none* in both the **Username** and **Password** text boxes of all configured **URLnames** (the default setting), if no user authorization is required

    Some IIS web servers however, support NTLM (Integrated Windows) authentication, where valid **CREDENTIALS** are mandatory. In other words, a *none* specification will not be supported by such IIS web servers. Therefore, in this case, against each configured **URLname**, you will have to provide a valid **Username** in the format: *domainname*|*username,* followed by a valid **Password**.

    Please be sure to check if your web site requires HTTP authentication while configuring this parameter. HTTP authentication typically involves a separate pop-up window when you try to access the page. Many sites use HTTP POST for obtaining the user name and password and validating the user login. In such cases, the username and password have to be provided as part of the POST information and NOT as part of the **CREDENTIALS** specification for the HTTP test.

13. **TIMEOUT** - Here, specify the maximum duration (in seconds) for which the test will wait for a response from the server. The default **TIMEOUT** period is 30 seconds.

Outputs of the test	One set of outputs for every URL being monitored		
Measurements of the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Availability: This measurement indicates whether the server was able to respond successfully to the query made by the test.	Percent	Availability failures could be caused by several factors such as the web server process(es) being down, the web server being misconfigured, a network failure, etc. Temporary unavailability may also occur if the web server is overloaded. Availability is determined based on the response code returned by the server. A response code between 200 to 300 indicates that the server is available.
	Total response time: This measurement indicates the time taken by the server to respond to the requests it receives.	Secs	Response time being high denotes a problem. Poor response times may be due to the server being overloaded or misconfigured. If the URL accessed involves the generation of dynamic content by the server, backend problems (e.g., an overload at the application server or a database failure) can also result in an increase in response time.
	Tcp connection availability: This measure indicates whether the test managed to establish a TCP connection to the server.	Percent	Failure to establish a TCP connection may imply that either the web server process is not up, or that the process is not operating correctly. In some cases of extreme overload, the failure to establish a TCP connection may be a transient condition. As the load subsides, the server may start functioning properly again.
	Tcp connect time: This measure quantifies the time for establishing a TCP connection to the web server host.	Secs	Typically, the TCP connection establishment must be very small (of the order of a few milliseconds). Since TCP connection establishment is handled at the OS-level, rather than by the application, an increase in this value signifies a system-level bottleneck on the host that supports the web server.
	Server response time: This measure indicates the time period between when the connection was established and when the server sent back a HTTP response header to the client.	Secs	While the total response time may depend on several factors, the server response time is typically, a very good indicator of a server bottleneck (e.g., because all the available server threads or processes are in use).

	Response code: The response code returned by the server for the simulated request	Number	A value between 200 and 300 indicates a good response. A 4xx value indicates a problem with the requested content (eg., page not found). A 5xx value indicates a server error.
	Content length: The size of the content returned by the server	Kbytes	Typically the content length returned by the server for a specific URL should be the same across time. Any change in this metric may indicate the need for further investigation on the server side.
	Content validity: This measure validates whether the server was successful in executing the request made to it.	Percent	A value of 100% indicates that the content returned by the test is valid. A value of 0% indicates that the content may not be valid. This capability for content validation is especially important for multi-tier web applications. For example, a user may not be able to login to the web site but the server may reply back with a valid HTML page where in the error message, say, "Invalid Login" is reported. In this case, the availability will be 100 % (since we got a valid HTML response). If the test is configured such that the content parameter should exclude the string "Invalid Login," in the above scenario content validity would have a value 0.

2.1.3.5 WL Security Test

This test reports security-related statistics for a WebLogic server. This test will work on WebLogic 7.x and above only. While monitoring WebLogic 6.0, all the measures of this test will return 0.

Purpose	Measures security statistics for a WebLogic server
Target of the test	Any WebLogic managed server
Agent deploying the test	An internal agent

<table>
<tr><td>Configurable parameters for the test</td><td colspan="3">1. TEST PERIOD - How often should the test be executed
2. HOST – The IP address of the WebLogic server
3. PORT – The port number of the WebLogic server
4. USER – The admin user name of the WebLogic server being monitored.
5. PASSWORD – The password of the specified admin user
6. CONFIRM PASSWORD – Confirm the password by retyping it here.
7. ENCRYPTPASS - If the specified password needs to be encrypted, set the ENCRYPTPASS flag to YES. Otherwise, set it to NO. By default, the YES option will be selected.
8. SSL – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebLogic server.
9. SERVER - The name of the specific server instance to be monitored for a WebLogic server (the default value is "localhome")
10. URL – The URL to be accessed to collect metrics pertaining to the WebLogic server. By default, this test connects to a managed WebLogic server and attempts to obtain the metrics of interest by accessing the local Mbeans of the server. This parameter can be changed to a value of <code>http://<adminserverIP>:<adminserverPort></code>. In this case, the test connects to the WebLogic admin server to collect metrics pertaining to the managed server (specified by the HOST and PORT). The URL setting provides the administrator with the flexibility of determining the WebLogic monitoring configuration to use.
Note:
If the admin server is to be used for collecting measures for all the managed WebLogic servers, then it is mandatory that the egurkha war file is deployed to the admin server, and it is up and running.
11. VERSION - The VERSION textbox indicates the version of the Weblogic server to be managed. The default value is "none", in which case the test auto-discovers the weblogic version. If the value of this parameter is not "none", the test uses the value provided (e.g., 7.0) as the weblogic version (i.e., it does not auto-discover the weblogic server version). This parameter has been added to address cases when the eG agent is not able to discover the WebLogic server version.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for every WebLogic server instance being monitored</td></tr>
<tr><td rowspan="2">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Invalid login attempts:
Returns the cumulative number of invalid logins attempted on this server.</td><td>Attempts / Sec</td><td>Look for an unusual number of invalid logins.</td></tr>
</table>

	Invalid users count high water mark: Returns the high water mark of the number of users with outstanding invalid login attempts for this server.	Number	
	Current locked users: Returns the number of currently locked users on this server.	Number	Locked users cannot login to the server. Hence, configure the thresholds, so as to be alerted when this value is greater than 0.
	Locked user logins: Returns the cumulative number of invalid logins attempted during the last measurement period on this server while the user was locked.	Number	
	Unlocked users: Returns the number of times a user has been unlocked on this server during the last measurement period.	Number	
	Users lockedout: Returns the cumulative number of user lockouts done on this server during the last measurement period.	Number	

2.1.3.6 WebLogic JTA Test

This test reports transaction-related statistics for a WebLogic server.

Purpose	Reports transaction-related statistics for a WebLogic server
Target of the test	Any managed WebLogic server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebLogic server 3. **PORT** – The port number of the WebLogic server 4. **USER** – The admin user name of the WebLogic server being monitored. 5. **PASSWORD** – The password of the specified admin user 6. **CONFIRM PASSWORD** – Confirm the password by retyping it here. 7. **ENCRYPTPASS** - If the specified password needs to be encrypted, set the **ENCRYPTPASS** flag to **YES**. Otherwise, set it to **NO**. By default, the **YES** option will be selected. **Note:** If the **USEWARFILE** flag is set to **No**, then make sure that the **ENCRYPTPASS** flag is also set to **No**. 8. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebLogic server. 9. **SERVER** - The name of the specific server instance to be monitored for a WebLogic server (the default value is "localhome") 10. **URL** – The URL to be accessed to collect metrics pertaining to the WebLogic server. By default, this test connects to a managed WebLogic server and attempts to obtain the metrics of interest by accessing the local Mbeans of the server. This parameter can be changed to a value of **`http://<adminserverIP>:<adminserverPort>`**. In this case, the test connects to the WebLogic admin server to collect metrics pertaining to the managed server (specified by the **HOST** and **PORT**). The **URL** setting provides the administrator with the flexibility of determining the WebLogic monitoring configuration to use. **Note:** If the admin server is to be used for collecting measures for all the managed WebLogic servers, then it is mandatory that the egurkha war file is deployed to the admin server, and it is up and running. 11. **VERSION** - The **VERSION** textbox indicates the version of the Weblogic server to be managed. The default value is "none", in which case the test auto-discovers the weblogic version. If the value of this parameter is not "none", the test uses the value provided (e.g., 7.0) as the weblogic version (i.e., it does not auto-discover the weblogic server version). This parameter has been added to address cases when the eG agent is not able to discover the WebLogic server version. 12. **USEWARFILE** - This flag indicates whether/not monitoring is to be done using a Web archive file deployed on the WebLogic server (in which case, HTTP/HTTPS is used by the server to connect to the server). If this flag is set to **No**, the agent directly connects to the WebLogic server using the T3 protocol (no other file needs to be deployed on the WebLogic server for this to work). **Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.** Also, if the **USEWARFILE** parameter is set to **No**, make sure that the **ENCRYPTPASS** parameter is set to **No** as well.

<table>
<tr><td></td><td colspan="3">When monitoring a WebLogic server deployed on a Unix platform particularly, if the USEWARFILE parameter is set to No, you have to make sure that the eG agent install user is added to the WebLogic users group.

13. WEBLOGICJARLOCATION - Specify the location of the WebLogic server's java archive (Jar) file. If the USEWARFILE flag is set to No, then the weblogic.jar file specified here is used to connect to the corresponding WebLogic server using the T3 protocol. Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for every WebLogic server monitored</td></tr>
<tr><td rowspan="7">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Total active transactions:
Returns the number of active transactions on the server</td><td>Number</td><td>This metric gives an idea of the server load.</td></tr>
<tr><td>Transaction aborts:
Returns the rate of transactions that were abandoned</td><td>Trans/Sec</td><td>Typically, the abandoned transaction rate should be low.</td></tr>
<tr><td>Application rollbacks:
Returns the rate of transactions that were rolled back due to an application error</td><td>Trans/Sec</td><td>Rollbacks can occur due to various reasons. Correlate the rollbacks on the application server with that on the database to isolate the cause of the rollbacks.</td></tr>
<tr><td>Resource rollbacks:
Returns the rate of transactions that were rolled back due to a resource error</td><td>Trans/Sec</td><td></td></tr>
<tr><td>System rollbacks:
Returns the rate of transactions that were rolled back due to an internal system error</td><td>Trans/Sec</td><td></td></tr>
<tr><td>Rollback timeouts:
Returns the rate of transactions that were rolled back due to a timeout expiration</td><td>Trans/Sec</td><td></td></tr>
</table>

	Commits: Returns the rate of committed transactions	Trans/Sec	
	Heuristic transactions: Returns the rate of transactions that completed with a heuristic status	Trans/Sec	
	Total rollbacks: Returns the rate of transactions that were rolled back	Trans/Sec	A high value (rate) here would mean that more number of transactions are being rolled back.
	Total transactions: Returns the total rate of transactions processed. This total includes all committed, rolled back and heuristic transaction completions	Trans/Sec	

2.1.3.7 WebLogic Server Test

This test reports key run-time statistics pertaining to the instances of a WebLogic server.

Purpose	Reports key run-time statistics pertaining to the instances of a WebLogic server
Target of the test	Any managed WebLogic server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TESTPERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebLogic server 3. **PORT** – The port number of the WebLogic server 4. **USER** – The admin user name of the WebLogic server being monitored. 5. **PASSWORD** – The password of the specified admin user 6. **CONFIRM PASSWORD** – Confirm the password by retyping it here. 7. **ENCRYPTPASS** - If the specified password needs to be encrypted, set the **ENCRYPTPASS** flag to **YES**. Otherwise, set it to **NO**. By default, the **YES** option will be selected. **Note:** If the **USEWARFILE** flag is set to **No**, then make sure that the **ENCRYPTPASS** flag is also set to **No**. 8. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebLogic server. 9. **SERVER** - The name of the specific server instance to be monitored for a WebLogic server (the default value is "localhome") 10. **URL** – The URL to be accessed to collect metrics pertaining to the WebLogic server. By default, this test connects to a managed WebLogic server and attempts to obtain the metrics of interest by accessing the local Mbeans of the server. This parameter can be changed to a value of **`http://<adminserverIP>:<adminserverPort>`**. In this case, the test connects to the WebLogic admin server to collect metrics pertaining to the managed server (specified by the **HOST** and **PORT**). The **URL** setting provides the administrator with the flexibility of determining the WebLogic monitoring configuration to use. **Note:** If the admin server is to be used for collecting measures for all the managed WebLogic servers, then it is mandatory that the egurkha war file is deployed to the admin server, and it is up and running. 11. **VERSION** - The **VERSION** textbox indicates the version of the Weblogic server to be managed. The default value is "none", in which case the test auto-discovers the weblogic version. If the value of this parameter is not "none", the test uses the value provided (e.g., 7.0) as the weblogic version (i.e., it does not auto-discover the weblogic server version). This parameter has been added to address cases when the eG agent is not able to discover the WebLogic server version. 12. **USEWARFILE** - This flag indicates whether/not monitoring is to be done using a Web archive file deployed on the WebLogic server (in which case, HTTP/HTTPS is used by the server to connect to the server). If this flag is set to **No**, the agent directly connects to the WebLogic server using the T3 protocol (no other file needs to be deployed on the WebLogic server for this to work). **Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.** Also, if the **USEWARFILE** parameter is set to **No**, make sure that the **ENCRYPTPASS** parameter is set to **No** as well.

<table>
<tr><td></td><td colspan="3">When monitoring a WebLogic server deployed on a Unix platform particularly, if the USEWARFILE parameter is set to No, you have to make sure that the eG agent install user is added to the WebLogic users group.

13. WEBLOGICJARLOCATION - Specify the location of the WebLogic server's java archive (Jar) file. If the USEWARFILE flag is set to No, then the weblogic.jar file specified here is used to connect to the corresponding WebLogic server using the T3 protocol. Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for every WebLogic server being monitored</td></tr>
<tr><td rowspan="6">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td colspan="2">Interpretation</td></tr>
<tr><td rowspan="5">Server availability:

Indicates the state of the WebLogic server instance.</td><td rowspan="5">Percent</td><td colspan="2">A server instance can assume any of the following states:</td></tr>
<tr><td>State</td><td>Description</td></tr>
<tr><td>ACTIVE_LATER</td><td>Indicates that MaxRestart restart attempts have been made in current RestartInterval, and Node Manager will attempt additional restarts</td></tr>
<tr><td>FAILED</td><td>A critical subsystem is not functioning</td></tr>
<tr><td>FAILED_NOT_RESTARTABLE</td><td>Indicates that the Managed Server has failed or was killed by Node Manager as a result of the Managed Server's AutoKillIfFailed attribute being set to True, but Node Manager cannot restart the Managed Server because its AutoRestart attribute is set to False.</td></tr>
</table>

			FAILED_RESTARTING	Indicates that Node Manager is currently restarting a failed Managed Server

			RESUMING	The server is transitioning from the STANDBY state to RUNNING.
			RUNNING	The server can receive and process requests from external clients as well as administrative requests.
			SHUTDOWN	The server is configured but inactive.
			SHUTDOWN_IN_PROCESS	Indicates that the shutdown is in progress
			SHUTDOWN_PENDING	Indicates that a shutdown request has been sent, but the actual shutdown process is yet to begin
			SHUTTING_DOWN	The server is transitioning from either the RUNNING or STANDBY state to SHUTDOWN.
			STANDBY	The server can receive and process only administrative requests.
			STARTING	The server is initializing all it's subsystems.
			SUSPENDING	The server is transitioning from either the SHUTDOWN or RUNNING state to STANDBY.

			UNKNOWN	The state of the server cannot be determined, perhaps because it cannot be contacted.
			If the state of the server instance is STARTING, RUNNING, or RESUMING, then the value of this measure will be 100. For any other state, the value of this measure will be 0.	
	Current sockets count: Indicates the number of sockets registered for socket muxing on this server instance.	Number		
	Sockets opened: Indicates the total number of registrations for socket muxing on this server.	Number		

2.1.3.8 WebLogic Topics Test

The publish/subscribe (pub/sub) messaging model enables an application to send a message to multiple applications. Pub/sub messaging applications send and receive messages by subscribing to a topic. A topic publisher (producer) sends messages to a specific topic. A topic subscriber (consumer) retrieves messages from a specific topic.

This test auto-discovers the topics on a WebLogic server, and monitors each topic for the size, number, and type of messages it holds, so that impending overloads and probable delivery bottlenecks can be proactively isolated and corrected.

Purpose	Auto-discovers the topics on a WebLogic server, and monitors each topic for the size, number, and type of messages it holds, so that impending overloads and probable delivery bottlenecks can be proactively isolated and corrected
Target of the test	Any managed WebLogic server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebLogic server 3. **PORT** – The port number of the WebLogic server 4. **USER** – The admin user name of the WebLogic server being monitored. 5. **PASSWORD** – The password of the specified admin user 6. **CONFIRM PASSWORD** – Confirm the password by retyping it here. 7. **ENCRYPTPASS** - If the specified password needs to be encrypted, set the **ENCRYPTPASS** flag to **YES**. Otherwise, set it to **NO**. By default, the **YES** option will be selected. **Note:** If the **USEWARFILE** flag is set to **No**, then make sure that the **ENCRYPTPASS** flag is also set to **No**. 8. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebLogic server. 9. **SERVER** - The name of the specific server instance to be monitored for a WebLogic server (the default value is "localhome") 10. **URL** – The URL to be accessed to collect metrics pertaining to the WebLogic server. By default, this test connects to a managed WebLogic server and attempts to obtain the metrics of interest by accessing the local Mbeans of the server. This parameter can be changed to a value of **`http://<adminserverIP>:<adminserverPort>`**. In this case, the test connects to the WebLogic admin server to collect metrics pertaining to the managed server (specified by the **HOST** and **PORT**). The **URL** setting provides the administrator with the flexibility of determining the WebLogic monitoring configuration to use. Note: If the admin server is to be used for collecting measures for all the managed WebLogic servers, then it is mandatory that the egurkha war file is deployed to the admin server, and it is up and running. 11. **VERSION** - The **VERSION** textbox indicates the version of the Weblogic server to be managed. The default value is "none", in which case the test auto-discovers the weblogic version. If the value of this parameter is not "none", the test uses the value provided (e.g., 7.0) as the weblogic version (i.e., it does not auto-discover the weblogic server version). This parameter has been added to address cases when the eG agent is not able to discover the WebLogic server version. 12. **USEWARFILE** - This flag indicates whether/not monitoring is to be done using a Web archive file deployed on the WebLogic server (in which case, HTTP/HTTPS is used by the server to connect to the server). If this flag is set to **No**, the agent directly connects to the WebLogic server using the T3 protocol (no other file needs to be deployed on the WebLogic server for this to work). **Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.** Also, if the **USEWARFILE** parameter is set to **No**, make sure that the **ENCRYPTPASS** parameter is set to **No** as well.

<table>
<tr><td></td><td colspan="3">When monitoring a WebLogic server deployed on a Unix platform particularly, if the USEWARFILE parameter is set to No, you have to make sure that the eG agent install user is added to the WebLogic users group.

13. WEBLOGICJARLOCATION - Specify the location of the WebLogic server's java archive (Jar) file. If the USEWARFILE flag is set to No, then the weblogic.jar file specified here is used to connect to the corresponding WebLogic server using the T3 protocol. Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for every topic auto-discovered on the monitored WebLogic server</td></tr>
<tr><td rowspan="3">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Messages count:

Indicates the current number of messages in this topic.</td><td>Number</td><td>This count does not include the messages that are pending.</td></tr>
<tr><td>Messages pending count:

Indicates the number of pending messages in this topic.</td><td>Number</td><td>While momentary spikes in the number of pending messages in a topic is normal, if the number is allowed to grow consistently over time, it is bound to increase the total number of messages in the topic. Typically, the sum of the values of the MessagesCurrentCount and the MessagesPendingCount measures equals the total number of messages in the topic. If this sum is equal to or is very close to the Messages Maximum setting for the quota resource that is mapped to this topic, it implies that the topic has filled up or is rapidly filling up with messages and cannot handle any more. When this happens, JMS prevents further sends with a ResourceAllocationException.

Furthermore, such quota failures will force multiple producers to contend for space in the topic, thereby degrading application performance. To avoid this, you can do one/more of the following:</td></tr>
</table>

			• Increase the *Messages Maximum* setting of the quota resource mapped to the topic;
			• If a quota has not been configured for the topic, then increase the quota of the JMS server where the topic is deployed;
			• Regulate the flow of messages into the topic using one/more of the following configurations:
			  ○ Blocking senders during quota conditions: The Send Timeout feature provides more control over message send operations by giving message producers the option of waiting a specified length of time until space becomes available on a destination.
			  ○ Specifying a Blocking Send Policy on JMS Servers : The Blocking Send policies enable you to define the JMS server's blocking behavior on whether to deliver smaller messages before larger ones when multiple message producers are competing for space on a destination that has exceeded its message quota.

			○ Using the Flow Control feature: With the Flow Control feature, you can direct a JMS server or destination to slow down message producers when it determines that it is becoming overloaded. Specifically, when either a JMS server or it's destinations exceeds its specified byte or message threshold, it becomes armed and instructs producers to limit their message flow (messages per second). Producers will limit their production rate based on a set of flow control attributes configured for producers via the JMS connection factory. Starting at a specified flow maximum number of messages, a producer evaluates whether the server/destination is still armed at prescribed intervals (for example, every 10 seconds for 60 seconds). If at each interval, the server/destination is still armed, then the producer continues to move its rate down to its prescribed flow minimum amount.

			As producers slow themselves down, the threshold condition gradually corrects itself until the server/destination is unarmed. At this point, a producer is allowed to increase its production rate, but not necessarily to the maximum possible rate. In fact, its message flow continues to be controlled (even though the server/destination is no longer armed) until it reaches its prescribed flow maximum, at which point it is no longer flow controlled. By tuning Message Performance Preference: The Messaging Performance Preference tuning option on JMS destinations enables you to control how long a destination should wait (if at all) before creating full batches of available messages for delivery to consumers. At the minimum value, batching is disabled. Tuning above the default value increases the amount of time a destination is willing to wait before batching available messages. The maximum message count of a full batch is controlled by the JMS connection factory's Messages Maximum per Session setting.

			It may take some experimentation to find out which value works best for your system. For example, if you have a topic with many concurrent message consumers, by selecting the Administration Console's Do Not Batch Messages value (or specifying "0" on the DestinationBean MBean), the topic will make every effort to promptly push messages out to its consumers as soon as they are available. Conversely, if you have a topic with only one message consumer that does not require fast response times, by selecting the console's High Waiting Threshold for Message Batching value (or specifying "100" on the DestinationBean MBean), you can ensure that the topic only pushes messages to that consumer in batches.
	Messages moved count: Indicates the number of messages that have been moved from this topic destination to another.	Number	
	Bytes count: Indicates the current size of the message that is stored in the topic destination in bytes.	KB	This count does not include the pending bytes.

	Bytes pending count: Indicates the current size of the pending message that is stored in the topic destination in bytes.	KB	While momentary spikes in the size of pending messages in a topic is acceptable, if the size is allowed to grow consistently over time, it is bound to increase the total size of all messages in the topic. Typically, the sum of the values of the *BytesCurrentCount* and the *BytesPendingCount* measures indicates the total size of all messages in the topic. If this sum is equal to or is very close to the *Bytes Maximum* setting for the quota resource that is mapped to this topic, it implies that the topic has filled up or is rapidly filling up with messages and cannot handle any more. When this happens, JMS prevents further sends with a *ResourceAllocationException*. Furthermore, such quota failures will force multiple producers to contend for space in the topic, thereby degrading application performance. To avoid this, you can do one/more of the following: • Increase the *Bytes Maximum* setting of the quota resource mapped to the topic; • If a quota has not been configured for the topic, then increase the quota of the JMS server where the topic is deployed; • Regulate the flow of messages into the topic using one/more of the following configurations:

			○ Blocking senders during quota conditions: The Send Timeout feature provides more control over message send operations by giving message producers the option of waiting a specified length of time until space becomes available on a destination. ○ Specifying a Blocking Send Policy on JMS Servers : The Blocking Send policies enable you to define the JMS server's blocking behavior on whether to deliver smaller messages before larger ones when multiple message producers are competing for space on a destination that has exceeded its message quota. ○ Using the Flow Control feature: With the Flow Control feature, you can direct a JMS server or destination to slow down message producers when it determines that it is becoming overloaded.

			Specifically, when either a JMS server or it's destinations exceeds its specified byte or message threshold, it becomes armed and instructs producers to limit their message flow (messages per second). Producers will limit their production rate based on a set of flow control attributes configured for producers via the JMS connection factory. Starting at a specified flow maximum number of messages, a producer evaluates whether the server/destination is still armed at prescribed intervals (for example, every 10 seconds for 60 seconds). If at each interval, the server/destination is still armed, then the producer continues to move its rate down to its prescribed flow minimum amount. As producers slow themselves down, the threshold condition gradually corrects itself until the server/destination is unarmed. At this point, a producer is allowed to increase its production rate, but not necessarily to the maximum possible rate. In fact, its message flow continues to be controlled (even though the server/destination is no longer armed) until it reaches its prescribed flow maximum, at which point it is no longer flow controlled.

			○ By Tuning the MessageMaximum configuration: WebLogic JMS pipelines messages that are delivered to asynchronous consumers (otherwise known as message listeners) or prefetch-enabled synchronous consumers. The messages backlog (the size of the pipeline) between the JMS server and the client is tunable by configuring the MessagesMaximum setting on the connection factory. In some circumstances, tuning this setting may improve performance dramatically, such as when the JMS application defers acknowledges or commits. In this case, BEA suggests setting the MessagesMaximum value to: 2 * (ack or commit interval) + 1. For example, if the JMS application acknowledges 50 messages at a time, set the MessagesMaximum value to 101. You may also need to configure WebLogic clients in addition to the WebLogic Server instance, when sending and receiving large messages.

			○ By compressing messages: You may improve the performance of sending large messages traveling across JVM boundaries and help conserve disk space by specifying the automatic compression of any messages that exceed a user-specified threshold size. Message compression can help reduce network bottlenecks by automatically reducing the size of messages sent across network wires. Compressing messages can also conserve disk space when storing persistent messages in file stores or databases. ○ By paging out messages: With the message paging feature, JMS servers automatically attempt to free up virtual memory during peak message load periods. This feature can greatly benefit applications with large message spaces.

			○ By tuning the Message Buffer Size: The Message Buffer Size option specifies the amount of memory that will be used to store message bodies in memory before they are paged out to disk. The default value of Message Buffer Size is approximately one-third of the maximum heap size for the JVM, or a maximum of 512 megabytes. The larger this parameter is set, the more memory JMS will consume when many messages are waiting on topics or topics. Once this threshold is crossed, JMS may write message bodies to the directory specified by the Paging Directory option in an effort to reduce memory usage below this threshold.
	Consumers count: Indicates the current number of consumers accessing the topic destination.	Number	
	Messages deleted count: Indicates the number of messages that have been deleted from the topic destination.	Number	While you can design a QueueBrowser on your JMS server to view and delete specific queue messages, some messages are automatically deleted by the server. For instance, one-way messages that exceed quota are silently deleted without immediately throwing exceptions back to the client.

2.1.3.9 WebLogic JMS Test

This test extracts performance statistics pertaining to the Java Message Service (JMS) provided by the WebLogic server. This test is disabled by default. To enable the test, go to the **ENABLE / DISABLE TESTS** page using the menu sequence : Agents -> Tests -> Enable/Disable, pick *WebLogic* as the **Component type**, *Performance* as the **Test type**, choose this test from the **DISABLED TESTS** list, and click on the **>>** button to move the test to the **ENABLED TESTS** list. Finally, click the **Update** button.

Purpose	Generates performance statistics pertaining to the Java Message Service (JMS) provided by the WebLogic server
Target of the test	Any managed WebLogic server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebLogic server 3. **PORT** – The port number of the WebLogic server 4. **USER** – The admin user name of the WebLogic server being monitored. 5. **PASSWORD** – The password of the specified admin user 6. **CONFIRM PASSWORD** – Confirm the password by retyping it here. 7. **ENCRYPTPASS** - If the specified password needs to be encrypted, set the **ENCRYPTPASS** flag to **YES**. Otherwise, set it to **NO**. By default, the **YES** option will be selected. **Note:** If the **USEWARFILE** flag is set to **No**, then make sure that the **ENCRYPTPASS** flag is also set to **No**. 8. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebLogic server. 9. **SERVER** - The name of the specific server instance to be monitored for a WebLogic server (the default value is "localhome") 10. **URL** – The URL to be accessed to collect metrics pertaining to the WebLogic server. By default, this test connects to a managed WebLogic server and attempts to obtain the metrics of interest by accessing the local Mbeans of the server. This parameter can be changed to a value of **`http://<adminserverIP>:<adminserverPort>`**. In this case, the test connects to the WebLogic admin server to collect metrics pertaining to the managed server (specified by the **HOST** and **PORT**). The **URL** setting provides the administrator with the flexibility of determining the WebLogic monitoring configuration to use. **Note:** If the admin server is to be used for collecting measures for all the managed WebLogic servers, then it is mandatory that the egurkha war file is deployed to the admin server, and it is up and running. 11. **VERSION** - The **VERSION** textbox indicates the version of the Weblogic server to be managed. The default value is "none", in which case the test auto-discovers the weblogic version. If the value of this parameter is not "none", the test uses the value provided (e.g., 7.0) as the weblogic version (i.e., it does not auto-discover the weblogic server version). This parameter has been added to address cases when the eG agent is not able to discover the WebLogic server version. 12. **USEWARFILE** - This flag indicates whether/not monitoring is to be done using a Web archive file deployed on the WebLogic server (in which case, HTTP/HTTPS is used by the server to connect to the server). If this flag is set to **No**, the agent directly connects to the WebLogic server using the T3 protocol (no other file needs to be deployed on the WebLogic server for this to work). **Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.** Also, if the **USEWARFILE** parameter is set to **No**, make sure that the **ENCRYPTPASS** parameter is set to **No** as well.

	When monitoring a WebLogic server deployed on a Unix platform particularly, if the **USEWARFILE** parameter is set to **No**, you have to make sure that the eG agent install user is added to the WebLogic users group. 13. **WEBLOGICJARLOCATION** - Specify the location of the WebLogic server's java archive (Jar) file. If the **USEWARFILE** flag is set to **No**, then the weblogic.jar file specified here is used to connect to the corresponding WebLogic server using the T3 protocol. **Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.**		
Outputs of the test	One set of results for every WebLogic server being monitored		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Data received: Returns the number of bytes received on this JMS server since the last reset	KB/Sec	This is an indicator of the workload on the JMS server.
	Destination count high water mark: Returns the peak number of destinations on this JMS server since the last reset	Number	
	Session pool count: Returns the current number of session pools instantiated on this JMS server	Number	
	Session pool count high water mark: Returns the peak number of session pools instantiated on this JMS server since the last reset	Number	
	Message received: Returns the number of messages received on this destination since the last reset	Msgs/Sec	
	Current data count: Returns the current number of bytes stored on this JMS server. This does not include the pending bytes.	KB	

	Data pending count: Returns the current number of bytes pending (unacknowledged or uncommitted) stored on this JMS server. Pending bytes are over and above the current number of bytes.	KB	
	Data count high water mark: Returns the peak number of bytes stored in the JMS server since the last reset	KB	
	Current messages: Returns the current number of messages stored on this JMS server. This does not include the pending messages.	Number	
	Pending messages: Returns the current number of messages pending (unacknowledged or uncommitted) stored on this JMS server. Pending messages are over and above the current number of messages.	Number	Ideally, the count of pending messages should be low.
	Messages count high water mark: Returns the peak number of messages stored in the JMS server since the last reset	Number	
	Destination current count: Returns the current number of destinations for this JMS server	Number	

2.1.3.10 WebLogic Queues Test

A JMS queue represents the point-to-point (PTP) messaging model, which enables one application to send a message to another. PTP messaging applications send and receive messages using named queues. A queue sender (producer) sends a message to a specific queue. A queue receiver (consumer) receives messages from a specific queue.

This test auto-discovers the queues on a WebLogic server, and monitors each queue for the size, number, and type of messages it holds, so that impending overloads and probable delivery bottlenecks can be proactively isolated and corrected.

Purpose	Auto-discovers the queues on a WebLogic server, and monitors each queue for the size, number, and type of messages it holds, so that impending overloads and probable delivery bottlenecks can be proactively isolated and corrected
Target of the test	Any managed WebLogic server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebLogic server 3. **PORT** – The port number of the WebLogic server 4. **USER** – The admin user name of the WebLogic server being monitored. 5. **PASSWORD** – The password of the specified admin user 6. **CONFIRM PASSWORD** – Confirm the password by retyping it here. 7. **ENCRYPTPASS** - If the specified password needs to be encrypted, set the **ENCRYPTPASS** flag to **YES**. Otherwise, set it to **NO**. By default, the **YES** option will be selected. **Note:** If the **USEWARFILE** flag is set to **No**, then make sure that the **ENCRYPTPASS** flag is also set to **No**. 8. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebLogic server. 9. **SERVER** - The name of the specific server instance to be monitored for a WebLogic server (the default value is "localhome") 10. **URL** – The URL to be accessed to collect metrics pertaining to the WebLogic server. By default, this test connects to a managed WebLogic server and attempts to obtain the metrics of interest by accessing the local Mbeans of the server. This parameter can be changed to a value of **`http://<adminserverIP>:<adminserverPort>`**. In this case, the test connects to the WebLogic admin server to collect metrics pertaining to the managed server (specified by the **HOST** and **PORT**). The **URL** setting provides the administrator with the flexibility of determining the WebLogic monitoring configuration to use. **Note**: If the admin server is to be used for collecting measures for all the managed WebLogic servers, then it is mandatory that the egurkha war file is deployed to the admin server, and it is up and running. 11. **VERSION** - The **VERSION** textbox indicates the version of the Weblogic server to be managed. The default value is "none", in which case the test auto-discovers the weblogic version. If the value of this parameter is not "none", the test uses the value provided (e.g., 7.0) as the weblogic version (i.e., it does not auto-discover the weblogic server version). This parameter has been added to address cases when the eG agent is not able to discover the WebLogic server version. 12. **USEWARFILE** - This flag indicates whether/not monitoring is to be done using a Web archive file deployed on the WebLogic server (in which case, HTTP/HTTPS is used by the server to connect to the server). If this flag is set to **No**, the agent directly connects to the WebLogic server using the T3 protocol (no other file needs to be deployed on the WebLogic server for this to work). **Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.** Also, if the **USEWARFILE** parameter is set to **No**, make sure that the **ENCRYPTPASS** parameter is set to **No** as well.

<table>
<tr><td></td><td colspan="3">When monitoring a WebLogic server deployed on a Unix platform particularly, if the USEWARFILE parameter is set to No, you have to make sure that the eG agent install user is added to the WebLogic users group.

13. WEBLOGICJARLOCATION - Specify the location of the WebLogic server's java archive (Jar) file. If the USEWARFILE flag is set to No, then the weblogic.jar file specified here is used to connect to the corresponding WebLogic server using the T3 protocol. Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for every queue auto-discovered on the monitored WebLogic server</td></tr>
<tr><td rowspan="3">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Messages count:

Indicates the current number of messages in this queue.</td><td>Number</td><td>This count does not include the messages that are pending.</td></tr>
<tr><td>Messages pending count:

Indicates the number of pending messages in this queue.</td><td>Number</td><td>A message is considered to be in pending state when it is:

• sent in a transaction but not committed.

• received and not acknowledged

• received and not committed

• subject to a redelivery delay (as of WebLogic JMS 6.1 or later)

• subject to a delivery time (as of WebLogic JMS 6.1 or later)</td></tr>
</table>

			While momentary spikes in the number of pending messages in a queue is normal, if the number is allowed to grow consistently over time, it is bound to increase the total number of messages in the queue. Typically, the sum of the values of the *Messages count* and the *Messages pending count* measures equals the total number of messages in the queue. If this sum is equal to or is very close to the *Messages Maximum* setting for the quota resource that is mapped to this queue, it implies that the queue has filled up or is rapidly filling up with messages and cannot handle any more. When this happens, JMS prevents further sends with a *ResourceAllocationException*. Furthermore, such quota failures will force multiple producers to contend for space in the queue, thereby degrading application performance. To avoid this, you can do one/more of the following: • Increase the *Messages Maximum* setting of the quota resource mapped to the queue; • If a quota has not been configured for the queue, then increase the quota of the JMS server where the queue is deployed;

			• Regulate the flow of messages into the queue using one/more of the following configurations: ○ Blocking senders during quota conditions: The Send Timeout feature provides more control over message send operations by giving message producers the option of waiting a specified length of time until space becomes available on a destination. ○ Specifying a Blocking Send Policy on JMS Servers : The Blocking Send policies enable you to define the JMS server's blocking behavior on whether to deliver smaller messages before larger ones when multiple message producers are competing for space on a destination that has exceeded its message quota.

			○ Using the Flow Control feature: With the Flow Control feature, you can direct a JMS server or destination to slow down message producers when it determines that it is becoming overloaded. Specifically, when either a JMS server or it's destinations exceeds its specified byte or message threshold, it becomes armed and instructs producers to limit their message flow (messages per second). Producers will limit their production rate based on a set of flow control attributes configured for producers via the JMS connection factory. Starting at a specified flow maximum number of messages, a producer evaluates whether the server/destination is still armed at prescribed intervals (for example, every 10 seconds for 60 seconds).

			If at each interval, the server/destination is still armed, then the producer continues to move its rate down to its prescribed flow minimum amount. As producers slow themselves down, the threshold condition gradually corrects itself until the server/destination is unarmed. At this point, a producer is allowed to increase its production rate, but not necessarily to the maximum possible rate. In fact, its message flow continues to be controlled (even though the server/destination is no longer armed) until it reaches its prescribed flow maximum, at which point it is no longer flow controlled. ○ By tuning Message Performance Preference: The Messaging Performance Preference tuning option on JMS destinations enables you to control how long a destination should wait (if at all) before creating full batches of available messages for delivery to consumers.

			At the minimum value, batching is disabled. Tuning above the default value increases the amount of time a destination is willing to wait before batching available messages. The maximum message count of a full batch is controlled by the JMS connection factory's Messages Maximum per Session setting. It may take some experimentation to find out which value works best for your system. For example, if you have a queue with many concurrent message consumers, by selecting the Administration Console's Do Not Batch Messages value (or specifying "0" on the DestinationBean MBean), the queue will make every effort to promptly push messages out to its consumers as soon as they are available.

			Conversely, if you have a queue with only one message consumer that does not require fast response times, by selecting the console's High Waiting Threshold for Message Batc hing value (or specifying "100" on the DestinationBean MBean), you can ensure that the queue only pushes messages to that consumer in batches.
	Bytes count: Indicates the current size of the message that is stored in the queue destination in bytes.	KB	This count does not include the pending bytes.

	Bytes pending count: Indicates the current size of the pending message that is stored in the queue destination in bytes.	KB	While momentary spikes in the size of pending messages in a queue is acceptable, if the size is allowed to grow consistently over time, it is bound to increase the total size of all messages in the queue. Typically, the sum of the values of the *BytesCurrentCount* and the *BytesPendingCount* measures indicates the total size of all messages in the queue. If this sum is equal to or is very close to the *Bytes Maximum* setting for the quota resource that is mapped to this queue, it implies that the queue has filled up or is rapidly filling up with messages and cannot handle any more. When this happens, JMS prevents further sends with a *ResourceAllocationException*. Furthermore, such quota failures will force multiple producers to contend for space in the queue, thereby degrading application performance. To avoid this, you can do one/more of the following:

			• Increase the *Bytes Maximum* setting of the quota resource mapped to the queue;
			• If a quota has not been configured for the queue, then increase the quota of the JMS server where the queue is deployed;
			• Regulate the flow of messages into the queue using one/more of the following configurations:
			  ○ Blocking senders during quota conditions: The Send Timeout feature provides more control over message send operations by giving message producers the option of waiting a specified length of time until space becomes available on a destination.
			  ○ Specifying a Blocking Send Policy on JMS Servers : The Blocking Send policies enable you to define the JMS server's blocking behavior on whether to deliver smaller messages before larger ones when multiple message producers are competing for space on a destination that has exceeded its message quota.

			○ Using the Flow Control feature: ○ With the Flow Control feature, you can direct a JMS server or destination to slow down message producers when it determines that it is becoming overloaded. Specifically, when either a JMS server or it's destinations exceeds its specified byte or message threshold, it becomes armed and instructs producers to limit their message flow (messages per second). Producers will limit their production rate based on a set of flow control attributes configured for producers via the JMS connection factory. Starting at a specified flow maximum number of messages, a producer evaluates whether the server/destination is still armed at prescribed intervals (for example, every 10 seconds for 60 seconds).

			If at each interval, the server/des tination is still armed, then the producer continues to move its rate down to its prescribed flow minimum amount. As producers slow themselves down, the threshold condition gradually corrects itself until the server/destination is unarmed. At this point, a producer is allowed t o increase its production rate, but not necessarily to the maximum possible rate. In fact, its message flow continues to be controlled (even though the server/destination is no longer armed) until it reaches its prescribed flow maximum, at which point it is no longer flow controlled. ○ By Tuning the MessageMaximum configuration: WebLogic JMS pipelines messages that are delivered to asynchronous consumers (otherwise known as message listeners) or prefetch-enabled synchronous consumers.

			The messages backlog (the size of the pipeline) between the JMS server and the client is tunable by configuring the *MessagesMaximum* setting on the connection factory. In some circumstances, tuning this setting may improve performance dramatically, such as when the JMS application defers acknowledges or commits. In this case, BEA suggests setting the MessagesMaximum value to: *2 * (ack or commit interval) + 1*. For example, if the JMS application acknowledges 50 messages at a time, set the *MessagesMaximum* value to 101. You may also need to configure WebLogic clients in addition to the WebLogic Server instance, when sending and receiving large messages. By compressing messages: You may improve the performance of sending large messages traveling across JVM boundaries and help conserve disk space by specifying the automatic

			compression of any messages that exceed a user-specified threshold size. Message compression can help reduce network bottlenecks by automatically reducing the size of messages sent across network wires. Compressing messages can also conserve disk space when storing persistent messages in file stores or databases. ○ By paging out messages: With the message paging feature, JMS servers automatically attempt to free up virtual memory during peak message load periods. This feature can greatly benefit applications with large message spaces. By tuning the Message Buffer Size: The Message Buffer Size option specifies the amount of memory that will be used to store message bodies in memory before they are paged out to disk.

			The default value of Message Buffer Size is approximately one-third of the maximum heap size for the JVM, or a maximum of 512 megabytes. The larger this parameter is set, the more memory JMS will consume when many messages are waiting on queues or topics. Once this threshold is crossed, JMS may write message bodies to the directory specified by the Paging Directory option in an effort to reduce memory usage below this threshold.
	Messages deleted count: Indicates the number of messages that have been deleted from this queue.	Number	While you can design a QueueBrowser on your JMS server to view and delete specific queue messages, some messages are automatically deleted by the server. For instance, one-way messages that exceed quota are silently deleted without immediately throwing exceptions back to the client.
	Messages moved count: Indicates the number of messages that have been moved from one queue destination to the other.	Number	
	Consumers count: Indicates the current number of consumers accessing the queue destination.	Number	

2.1.3.11 WebLogic Clusters Test

This test extracts cluster related statistics from a managed WebLogic server that is part of a cluster. Server instances in a cluster communicate with each other using multicast—multicasts help the server instances in a cluster announce their services, and issue periodic heartbeats that indicate continued availability. This test is disabled by default. To enable the test, go to the **ENABLE / DISABLE TESTS** page using the menu sequence : Agents -> Tests -> Enable/Disable, pick *WebLogic* as the **Component type**, *Performance* as the **Test type**, choose this test from the **DISABLED TESTS** list, and click on the **>>** button to move the test to the **ENABLED TESTS** list. Finally, click the **Update** button.

Purpose	To generate cluster-related measures from a managed WebLogic server that is part of a cluster
Target of the test	Any managed WebLogic server that is part of a cluster
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebLogic server 3. **PORT** – The port number of the WebLogic server 4. **USER** – The admin user name of the WebLogic server being monitored. 5. **PASSWORD** – The password of the specified admin user 6. **CONFIRM PASSWORD** – Confirm the password by retyping it here. 7. **ENCRYPTPASS** - If the specified password needs to be encrypted, set the **ENCRYPTPASS** flag to **YES**. Otherwise, set it to **NO**. By default, the **YES** option will be selected. **Note:** If the **USEWARFILE** flag is set to **No**, then make sure that the **ENCRYPTPASS** flag is also set to **No**. 8. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebLogic server. 9. **SERVER** - The name of the specific server instance to be monitored for a WebLogic server (the default value is "localhome") 10. **URL** – The URL to be accessed to collect metrics pertaining to the WebLogic server. By default, this test connects to a managed WebLogic server and attempts to obtain the metrics of interest by accessing the local Mbeans of the server. This parameter can be changed to a value of **`http://<adminserverIP>:<adminserverPort>`**. In this case, the test connects to the WebLogic admin server to collect metrics pertaining to the managed server (specified by the **HOST** and **PORT**). The **URL** setting provides the administrator with the flexibility of determining the WebLogic monitoring configuration to use. **Note:** If the admin server is to be used for collecting measures for all the managed WebLogic servers, then it is mandatory that the egurkha war file is deployed to the admin server, and it is up and running. 11. **VERSION** - The **VERSION** textbox indicates the version of the Weblogic server to be managed. The default value is "none", in which case the test auto-discovers the weblogic version. If the value of this parameter is not "none", the test uses the value provided (e.g., 7.0) as the weblogic version (i.e., it does not auto-discover the weblogic server version). This parameter has been added to address cases when the eG agent is not able to discover the WebLogic server version. 12. **USEWARFILE** - This flag indicates whether/not monitoring is to be done using a Web archive file deployed on the WebLogic server (in which case, HTTP/HTTPS is used by the server to connect to the server). If this flag is set to **No**, the agent directly connects to the WebLogic server using the T3 protocol (no other file needs to be deployed on the WebLogic server for this to work). **Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.** Also, if the **USEWARFILE** parameter is set to **No**, make sure that the **ENCRYPTPASS** parameter is set to **No** as well.

<table>
<tr><td></td><td colspan="3">When monitoring a WebLogic server deployed on a Unix platform particularly, if the USEWARFILE parameter is set to No, you have to make sure that the eG agent install user is added to the WebLogic users group.

13. WEBLOGICJARLOCATION - Specify the location of the WebLogic server's java archive (Jar) file. If the USEWARFILE flag is set to No, then the weblogic.jar file specified here is used to connect to the corresponding WebLogic server using the T3 protocol. Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for every WebLogic server monitored</td></tr>
<tr><td rowspan="6">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Alive servers:
Number of servers in the clusters that are running currently</td><td>Number</td><td>Ideally this number must be equal to the actual number of servers in the cluster.</td></tr>
<tr><td>Fragments sent:
The rate of multicast fragments sent from this server into the cluster</td><td>Fragments/Sec</td><td></td></tr>
<tr><td>Fragments received:
Returns the rate of multicast messages received on this server from the cluster</td><td>Fragments/Sec</td><td></td></tr>
<tr><td>Fragments dropped:
Indicates the rate of fragments that originated in foreign domains/clusters that use the same multicast address</td><td>Fragments/Sec</td><td></td></tr>
<tr><td>Messages lost:
Returns the rate at which incoming multicast messages that were lost</td><td>Msgs/Sec</td><td></td></tr>
<tr><td></td><td>Request resends:
Returns the rate of state-delta messages that had to be resent because a receiving server in the cluster missed a message</td><td>Reqs/sec</td><td></td></tr>
</table>

	Primary count: Returns the number of objects that the local server hosts as primaries	Number	

2.1.3.12 File Descriptors Test

A file descriptor is a handle created by a process when a file is opened. A new descriptor is created each time the file is opened. The File Descriptor test monitors the descriptors created by an application. This test is disabled by default. To enable the test, go to the **ENABLE / DISABLE TESTS** page using the menu sequence : Agents -> Tests -> Enable/Disable, pick *WebLogic* as the **Component type**, *Performance* as the **Test type**, choose the test from the **DISABLED TESTS** list, and click on the **>>** button to move the test to the **ENABLED TESTS** list. Finally, click the **Update** button. **only**.

Purpose	Monitors the descriptors created by an application		
Target of the test	Any managed WebLogic server		
Agent deploying the test	An internal agent		
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebLogic server 3. **PORT** – The port number of the WebLogic server 4. **PSPATH** – Specify the path to the **ps** command (The default location is /usr/ucb). The eG user must be vested with execute permissions in order to execute the **ps** command. 5. **PFILESPATH** - Specify the path to the **pfiles** command (The default is /usr/ucb). 6. **PROCESS** – Takes a process name and process pattern in the format: *processName:processPattern*. While the *processName* is a display name, the *processPattern* should uniquely identify the application's process ID (PID of the application). The *processPattern* can be of the form - *expr* or expr or *expr or expr* or *expr1*expr2*... or expr1*expr2, etc. A leading '*' signifies any number of leading characters, while a trailing '*' signifies any number of trailing characters. For instance, the **PROCESS** parameter can be configured as: *iplanet:*Xms**, where *iplanet* is the name that will be displayed in the eG monitor interface, and **Xms** is the process pattern that needs to be monitored. **Xms** will monitor only those processes which contain the string "Xms". Multiple processes can be defined as a comma-separated list.		
Outputs of the test	One set of results for every descriptor monitored		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**

	Rlimit fd current: The current limit of file descriptors associated with a particular application. Each application has a limit on the number of file descriptors which it can use. The default is 256.	Number	
	Number of file descriptors open: The number of file descriptors which are open at present	Number	A consistent increase in the value of this measure over a period of time could indicate that file handles are not being released properly. If the problem is not addressed soon, it could seriously hamper application performance.
	Usage of file descriptors: The percentage usage of the file descriptors for the application	Percent	

2.1.3.13 WebLogic Connectors Test

This test extracts connector related statistics from a managed WebLogic server. This test is not available by default. To enable the test, go to the **ENABLE / DISABLE TESTS** page using the menu sequence : Agents -> Tests -> Enable/Disable, pick *WebLogic* as the **Component type**, *Performance* as the **Test type**, choose the test from the **DISABLED TESTS** list, and click on the **>>** button to move the test to the **ENABLED TESTS** list. Finally, click the **Update** button.

Purpose	Generates connector-related statistics from a managed WebLogic server
Target of the test	Any managed WebLogic server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TESTPERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebLogic server 3. **PORT** – The port number of the WebLogic server 4. **USER** – The admin user name of the WebLogic server being monitored. 5. **PASSWORD** – The password of the specified admin user 6. **CONFIRM PASSWORD** – Confirm the password by retyping it here. 7. **ENCRYPTPASS** - If the specified password needs to be encrypted, set the **ENCRYPTPASS** flag to **YES**. Otherwise, set it to **NO**. By default, the **YES** option will be selected. **Note:** If the **USEWARFILE** flag is set to **No**, then make sure that the **ENCRYPTPASS** flag is also set to **No**. 8. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebLogic server. 9. **SERVER** - The name of the specific server instance to be monitored for a WebLogic server (the default value is "localhome") 10. **URL** – The URL to be accessed to collect metrics pertaining to the WebLogic server. By default, this test connects to a managed WebLogic server and attempts to obtain the metrics of interest by accessing the local Mbeans of the server. This parameter can be changed to a value of **`http://<adminserverIP>:<adminserverPort>`**. In this case, the test connects to the WebLogic admin server to collect metrics pertaining to the managed server (specified by the **HOST** and **PORT**). The **URL** setting provides the administrator with the flexibility of determining the WebLogic monitoring configuration to use. **Note:** If the admin server is to be used for collecting measures for all the managed WebLogic servers, then it is mandatory that the egurkha war file is deployed to the admin server, and it is up and running. 11. **VERSION** - The **VERSION** textbox indicates the version of the Weblogic server to be managed. The default value is "none", in which case the test auto-discovers the weblogic version. If the value of this parameter is not "none", the test uses the value provided (e.g., 7.0) as the weblogic version (i.e., it does not auto-discover the weblogic server version). This parameter has been added to address cases when the eG agent is not able to discover the WebLogic server version. 12. **USEWARFILE** - This flag indicates whether/not monitoring is to be done using a Web archive file deployed on the WebLogic server (in which case, HTTP/HTTPS is used by the server to connect to the server). If this flag is set to **No**, the agent directly connects to the WebLogic server using the T3 protocol (no other file needs to be deployed on the WebLogic server for this to work). **Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.** Also, if the **USEWARFILE** parameter is set to **No**, make sure that the **ENCRYPTPASS** parameter is set to **No** as well.

<table>
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13. WEBLOGICJARLOCATION - Specify the location of the WebLogic server's java archive (Jar) file. If the USEWARFILE flag is set to No, then the weblogic.jar file specified here is used to connect to the corresponding WebLogic server using the T3 protocol. Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for every WebLogic server being monitored</td></tr>
<tr><td rowspan="6">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Connection created:
Returns the total number of connector connections created in this connector pool since the pool was instantiated</td><td>Conns/sec</td><td></td></tr>
<tr><td>Connections destroyed:
Returns the total number of connector connections destroyed in this connector pool since the pool was instantiated</td><td>Conns/sec</td><td></td></tr>
<tr><td>Connections matched:
Returns the total number of times a request for a connector connection was satisfied via the use of an existing created connection, since the pool was instantiated</td><td>Conns/Sec</td><td></td></tr>
<tr><td>Connection rejects:
Returns the total number of rejected requests for a connector connection in this connector pool since the pool was instantiated</td><td>Conns/Sec</td><td></td></tr>
<tr><td>Connections recycled:
Returns the total number of connector connections that have been recycled in this connector pool since the pool was instantiated</td><td>Conns/Sec</td><td></td></tr>
</table>

	Current active connections: Returns the current total number of active connections	Number	
	Active connections high water mark: Returns the high water mark of active connections in this connector pool since the pool was instantiated	Number	
	Current free connections: Returns the current total free connections	Number	
	Free connections high water mark: Returns the high water mark of free connections in this connector pool since the pool was instantiated	Number	
	Max capacity: Returns the maximum capacity configured for this connector connection pool	Number	

2.1.4 The WebLogic Databases Layer

The status of the database connectivity from the WebLogic server to one or more backend database servers is assessed by the **WebLogic Databases** layer. The status of the **WebLogic Databases** layer is determined based on the results of a WebLogicJdbc test that is shown in Figure 2.16.

Figure 2.16: Tests mapping to the WebLogic Databases layer

2.1.4.1 WebLogic JDBC Test

The WebLogic JDBC test collects measures related to JDBC pools created on the WebLogic server.

Purpose	Collects measures related to JDBC pools created on the WebLogic server
Target of the test	A WebLogic application server

Agent deploying the test	An internal agent
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebLogic server 3. **PORT** – The port number of the WebLogic server 4. **SNMPPORT** – The port number on which the WebLogic server is exposing its SNMP MIB (relevant to WebLogic server 5.1 only). For version 6.0 and above, enter "none" in this text box. 5. **SNMPCOMMUNITY** – The SNMP community string to be used with the SNMP query to access the WebLogic server's MIB (relevant to WebLogic server 5.1 only). For version 6.0 and above, enter "none" in this text box. 6. **SNMPVERSION** – By default, the eG agent supports SNMP version 1. Accordingly, the default selection in the **SNMPVERSION** list is **v1**. However, if a different SNMP framework is in use in your environment, say SNMP **v2** or **v3**, then select the corresponding option from this list. 7. **USERNAME** – This parameter appears only when **v3** is selected as the **SNMPVERSION**. SNMP version 3 (SNMPv3) is an extensible SNMP Framework which supplements the SNMPv2 Framework, by additionally supporting message security, access control, and remote SNMP configuration capabilities. To extract performance statistics from the MIB using the highly secure SNMP v3 protocol, the eG agent has to be configured with the required access privileges – in other words, the eG agent should connect to the MIB using the credentials of a user with access permissions to be MIB. Therefore, specify the name of such a user against the **USERNAME** parameter. 8. **AUTHPASS** – Specify the password that corresponds to the above-mentioned **USERNAME**. This parameter once again appears only if the **SNMPVERSION** selected is **v3**. 9. **CONFIRM PASSWORD** – Confirm the **AUTHPASS** by retyping it here. 10. **AUTHTYPE** – This parameter too appears only if **v3** is selected as the **SNMPVERSION**. From the **AUTHTYPE** list box, choose the authentication algorithm using which SNMP v3 converts the specified **USERNAME** and **PASSWORD** into a 32-bit format to ensure security of SNMP transactions. You can choose between the following options: • **MD5** – Message Digest Algorithm • **SHA** – Secure Hash Algorithm 11. **ENCRYPTFLAG** – This flag appears only when **v3** is selected as the **SNMPVERSION**. By default, the eG agent does not encrypt SNMP requests. Accordingly, the **ENCRYPTFLAG** is set to **NO** by default. To ensure that SNMP requests sent by the eG agent are encrypted, select the **YES** option.

12. **ENCRYPTTYPE** – If the **ENCRYPTFLAG** is set to **YES**, then you will have to mention the encryption type by selecting an option from the **ENCRYPTTYPE** list. SNMP v3 supports the following encryption types:
    i. **DES** – Data Encryption Standard
    j. **AES** – Advanced Encryption Standard
13. **ENCRYPTPASSWORD** – Specify the encryption password here.
14. **CONFIRM PASSWORD** – Confirm the encryption password by retyping it here.
15. **USER** – The admin user name of the WebLogic server being monitored.
16. **PASSWORD** – The password of the specified admin user
17. **CONFIRM PASSWORD** – Confirm the password by retyping it here.
18. **ENCRYPTPASS** - If the specified password needs to be encrypted, set the **ENCRYPTPASS** flag to **YES**. Otherwise, set it to **NO**. By default, the **YES** option will be selected.

    Note:

    If the **USEWARFILE** flag is set to **No**, then make sure that the **ENCRYPTPASS** flag is also set to **No**.
19. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebLogic server.
20. **SERVER** - The name of the specific server instance to be monitored for a WebLogic server (the default value is "localhome")
21. **URL** – The URL to be accessed to collect metrics pertaining to the WebLogic server. By default, this test connects to a managed WebLogic server and attempts to obtain the metrics of interest by accessing the local Mbeans of the server. This parameter can be changed to a value of `http://<adminserverIP>:<adminserverPort>`. In this case, the test connects to the WebLogic admin server to collect metrics pertaining to the managed server (specified by the **HOST** and **PORT**). The **URL** setting provides the administrator with the flexibility of determining the WebLogic monitoring configuration to use.

    Note:

    If the admin server is to be used for collecting measures for all the managed WebLogic servers, then it is mandatory that the egurkha war file is deployed to the admin server, and it is up and running.
22. **VERSION** - The **VERSION** textbox indicates the version of the Weblogic server to be managed. The default value is "none", in which case the test auto-discovers the weblogic version. If the value of this parameter is not "none", the test uses the value provided (e.g., 7.0) as the weblogic version (i.e., it does not auto-discover the weblogic server version). This parameter has been added to address cases when the eG agent is not able to discover the WebLogic server version.

<table>
<tr><td></td><td colspan="3">23. USEWARFILE - This flag indicates whether/not monitoring is to be done using a Web archive file deployed on the WebLogic server (in which case, HTTP/HTTPS is used by the server to connect to the server). If this flag is set to No, the agent directly connects to the WebLogic server using the T3 protocol (no other file needs to be deployed on the WebLogic server for this to work). Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only. Also, if the USEWARFILE parameter is set to No, make sure that the ENCRYPTPASS parameter is set to No as well.

When monitoring a WebLogic server deployed on a Unix platform particularly, if the USEWARFILE parameter is set to No, you have to make sure that the eG agent install user is added to the WebLogic users group.

24. WEBLOGICJARLOCATION - Specify the location of the WebLogic server's java archive (Jar) file. If the USEWARFILE flag is set to No, then the weblogic.jar file specified here is used to connect to the corresponding WebLogic server using the T3 protocol. Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.

25. TIMEOUT - Specify the duration (in seconds) within which the SNMP query executed by this test should time out in the TIMEOUT text box. The default is 10 seconds.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for each connection pool used by a WebLogic application server.</td></tr>
<tr><td rowspan="4">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Pool availability:
The current state of a database connection pool – whether it is available or not</td><td>Percent</td><td>A value of 100 denotes that the pool is available; a value of 0 denotes unavailability.</td></tr>
<tr><td>Percent of connections used:
Percentage of database connection allocated to a connection pool that are in use</td><td>Percent</td><td>When this value reaches 100%, connections to the database will either have to wait for access or will time out. Consider increasing the size of the connection pool in this case. A very high percentage of use can also result if one or more of the applications that use the connection pool are not releasing the connections after their use.</td></tr>
<tr><td>Max capacity:
The maximum number of connections configured for a JDBC connection pool</td><td>Number</td><td></td></tr>
<tr><td></td><td>Active connections current:
The number of connections currently in use for a JDBC connection pool</td><td>Number</td><td></td></tr>
</table>

	Waiting for connections: The number of requests for connections to the database that are currently pending	Number	A high value of pending connections is indicative of a bottleneck during database access. Reasons for this could either be that the connection pool capacity is insufficient, or that the database server has slowed down, causing requests to take longer to execute their queries.
	Active connections max: The high water mark of active connections in a pool	Number	Note the changes in the high water mark. This can give you an idea about the times when the JDBC pool was most heavily used.
	Waiting for connections max: The high water mark of number of waiters for a connection from the pool	Number	Note the changes in the high water mark. This indicates periods when the database connection pool could have been a bottleneck.
	Connections added to pool: The number of JDBC connections added to the pool in the last measurement period	Number	
	Leaked connections: The number of connections tagged as a leaked connection during the last measurement period. A leaked connection is a connection that was checked out from the connection pool but was not returned to the pool by calling close().	Number	A non-zero value indicates that the application may not be releasing connections after use. This can result in inefficient management of the database connections in the pool.
	Failures to reconnect: The number of cases during the last measurement period when a connection pool attempted to refresh a connection to the database and failed.	Number	Failures could happen if the database is unavailable, or, the connection was terminated.
	Connection delay time: Avg. time taken to get a connection from the database (in seconds)	Secs	An increase in this metric could indicate a bottleneck in the database tier.
	Max wait to get connection: The high water mark of the time a thread had to wait in order to get a connection from the pool	Secs	

2.1.4.2 WL JDBC Test

This test also measures statistics pertaining to the JDBC database connection pools in use by the WebLogic server.

This test is disabled by default and is included for backward compatibility only. This test is disabled by default. To enable the test, go to the **ENABLE / DISABLE TESTS** page using the menu sequence : Agents -> Tests -> Enable/Disable, pick *WebLogic* as the **Component type**, *Performance* as the **Test type**, choose this test from the **DISABLED TESTS** list, and click on the **>>** button to move the test to the **ENABLED TESTS** list. Finally, click the **Update** button.

Purpose	To measure statistics pertaining to the database connection pool usage of a WebLogic application server
Target of the test	A WebLogic application server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebLogic server 3. **PORT** – The port number of the WebLogic server 4. **SNMPPORT** – The port number on which the WebLogic server is exposing its SNMP MIB (relevant to WebLogic server 5.1 only). For version 6.0 and above, enter "none" in this text box. 5. **SNMPCOMMUNITY** – The SNMP community string to be used with the SNMP query to access the WebLogic server's MIB (relevant to WebLogic server 5.1 only). For version 6.0 and above, enter "none" in this text box. 6. **SNMPVERSION** – By default, the eG agent supports SNMP version 1. Accordingly, the default selection in the **SNMPVERSION** list is **v1**. However, if a different SNMP framework is in use in your environment, say SNMP **v2** or **v3**, then select the corresponding option from this list. 7. **USERNAME** – This parameter appears only when **v3** is selected as the **SNMPVERSION**. SNMP version 3 (SNMPv3) is an extensible SNMP Framework which supplements the SNMPv2 Framework, by additionally supporting message security, access control, and remote SNMP configuration capabilities. To extract performance statistics from the MIB using the highly secure SNMP v3 protocol, the eG agent has to be configured with the required access privileges – in other words, the eG agent should connect to the MIB using the credentials of a user with access permissions to be MIB. Therefore, specify the name of such a user against the **USERNAME** parameter. 8. **AUTHPASS** – Specify the password that corresponds to the above-mentioned **USERNAME**. This parameter once again appears only if the **SNMPVERSION** selected is **v3**. 9. **CONFIRM PASSWORD** – Confirm the **AUTHPASS** by retyping it here. 10. **AUTHTYPE** – This parameter too appears only if **v3** is selected as the **SNMPVERSION**. From the **AUTHTYPE** list box, choose the authentication algorithm using which SNMP v3 converts the specified **USERNAME** and **PASSWORD** into a 32-bit format to ensure security of SNMP transactions. You can choose between the following options: • **MD5** – Message Digest Algorithm • **SHA** – Secure Hash Algorithm 11. **ENCRYPTFLAG** – This flag appears only when **v3** is selected as the **SNMPVERSION**. By default, the eG agent does not encrypt SNMP requests. Accordingly, the **ENCRYPTFLAG** is set to **NO** by default. To ensure that SNMP requests sent by the eG agent are encrypted, select the **YES** option.

12. **ENCRYPTTYPE** – If the **ENCRYPTFLAG** is set to **YES**, then you will have to mention the encryption type by selecting an option from the **ENCRYPTTYPE** list. SNMP v3 supports the following encryption types:
    - **DES** – Data Encryption Standard
    - **AES** – Advanced Encryption Standard
13. **ENCRYPTPASSWORD** – Specify the encryption password here.
14. **CONFIRM PASSWORD** – Confirm the encryption password by retyping it here.
15. **USER** – The admin user name of the WebLogic server being monitored.
16. **PASSWORD** – The password of the specified admin user
17. **CONFIRM PASSWORD** – Confirm the password by retyping it here.
18. **ENCRYPTPASS** - If the specified password needs to be encrypted, set the **ENCRYPTPASS** flag to **YES**. Otherwise, set it to **NO**. By default, the **YES** option will be selected.

    Note:

    If the **USEWARFILE** flag is set to **No**, then make sure that the **ENCRYPTPASS** flag is also set to **No**.
19. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebLogic server.
20. **SERVER** - The name of the specific server instance to be monitored for a WebLogic server (the default value is "localhome")
21. **URL** – The URL to be accessed to collect metrics pertaining to the WebLogic server. By default, this test connects to a managed WebLogic server and attempts to obtain the metrics of interest by accessing the local Mbeans of the server. This parameter can be changed to a value of `http://<adminserverIP>:<adminserverPort>`. In this case, the test connects to the WebLogic admin server to collect metrics pertaining to the managed server (specified by the **HOST** and **PORT**). The **URL** setting provides the administrator with the flexibility of determining the WebLogic monitoring configuration to use.

    Note:

    If the admin server is to be used for collecting measures for all the managed WebLogic servers, then it is mandatory that the egurkha war file is deployed to the admin server, and it is up and running.

<table>
<tr><td></td><td colspan="3">22. USEWARFILE - This flag indicates whether/not monitoring is to be done using a Web archive file deployed on the WebLogic server (in which case, HTTP/HTTPS is used by the server to connect to the server). If this flag is set to No, the agent directly connects to the WebLogic server using the T3 protocol (no other file needs to be deployed on the WebLogic server for this to work). Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only. Also, if the USEWARFILE parameter is set to No, make sure that the ENCRYPTPASS parameter is set to No as well.

When monitoring a WebLogic server deployed on a Unix platform particularly, if the USEWARFILE parameter is set to No, you have to make sure that the eG agent install user is added to the WebLogic users group.

23. WEBLOGICJARLOCATION - Specify the location of the WebLogic server's java archive (Jar) file. If the USEWARFILE flag is set to No, then the weblogic.jar file specified here is used to connect to the corresponding WebLogic server using the T3 protocol. Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.

24. VERSION - The VERSION textbox indicates the version of the Weblogic server to be managed. The default value is "none", in which case the test auto-discovers the weblogic version. If the value of this parameter is not "none", the test uses the value provided (e.g., 7.0) as the weblogic version (i.e., it does not auto-discover the weblogic server version). This parameter has been added to address cases when the eG agent is not able to discover the WebLogic server version.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for each connection pool used by a WebLogic application server.</td></tr>
<tr><td rowspan="3">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Connection usage percent:
Percentage of database connections allocated to a connection pool that is in use</td><td>Percent</td><td>When this value reaches 100%, connections to the database will either have to wait for access or will time out. Consider increasing the size of the connection pool in this case. A very high percentage of use can also result if one or more of the applications that use the connection pool are not releasing the connections after their use.</td></tr>
<tr><td>Pending connections:
Number of requests for connections to the database that are currently pending</td><td>Number</td><td>A high value of pending connections is indicative of a bottleneck during database access. Reasons for this could either be that the connection pool capacity is insufficient, or that the database server has slowed down, causing requests to take longer to execute their queries.</td></tr>
<tr><td></td><td>Max connections:
The maximum number of connections configured for a JDBC connection pool</td><td>Number</td><td></td></tr>
</table>

	Current connections: The current number of connections in use for a JDBC connection pool	Number	
	Pool availability: The current state of a database connection pool – whether it is available or not	Percent	A value of 100 denotes that the pool is available; a value of 0 denotes unavailability.
	Failed reconnects: The number of cases during the last measurement period when a connection pool attempted to refresh a connection to the database and failed	Number	Failures could happen if the database is unavailable, or, the connection was terminated.
	Connections to pool: The number of JDBC connections added to the pool in the last measurement period	Number	
	Avg connection delay: Avg. time taken to get a connection from the database (in seconds)	Secs	An increase in this metric could indicate a bottleneck in the database tier.
	Leaked connections: Number of connections tagged as a leaked connection during the last measurement period. A leaked connection is a connection that was checked out from the connection pool but was not returned to the pool by calling close().	Number	A non-zero value indicates that the application may not be releasing connections after use. This can result in inefficient management of the database connections in the pool.
	Active connections high mark: The high water mark of active connections in a pool	Number	Note the changes in the high water mark. This can provide an idea of the times when the JDBC pool was most heavily used.
	Waiting connections high mark: The high water mark of number of waiters for a connection from the pool	Number	Note the changes in the high water mark. This indicates periods when the database connection pool could have been a bottleneck.

Note:

The **Failed reconnects**, **Avg connection delay** and **Leaked connections** measures will always report **0** for WebLogic 6.0 with Service Pack 2.0.

2.1.4.3 Jdbc Stats Test

The JdbcStats test collects measures like how many JDBC queries have been executed, how long those queries took to execute and what those statements are. This test is key to determining whether the database/database queries are the cause of any slowdowns with applications executing on the WebLogic server. This test is disabled by default. To enable the test, go to the **ENABLE / DISABLE TESTS** page using the menu sequence : Agents -> Tests -> Enable/Disable, pick *WebLogic* as the **Component type**, *Performance* as the **Test type**, choose this test from the **DISABLED TESTS** list, and click on the **>>** button to move the test to the **ENABLED TESTS** list. Finally, click the **Update** button.

Purpose	Collects measures like how many JDBC queries have been executed, how long those queries took to execute and what those statements are
Target of the test	A WebLogic application server
Agent deploying the test	An internal agent

<table>
<tr><td>Configurable parameters for the test</td><td colspan="3">1. TEST PERIOD - How often should the test be executed
2. HOST – The IP address of the WebLogic server
3. PORT – The port number of the WebLogic server
4. URL – The URL to be accessed to collect metrics pertaining to the WebLogic server. By default, this test connects to a managed WebLogic server and attempts to obtain the metrics of interest by accessing the local Mbeans of the server. This parameter can be changed to a value of <code>http://<adminserverIP>:<adminserverPort></code>. In this case, the test connects to the WebLogic admin server to collect metrics pertaining to the managed server (specified by the HOST and PORT). The URL setting provides the administrator with the flexibility of determining the WebLogic monitoring configuration to use.
Note:
If the admin server is to be used for collecting measures for all the managed WebLogic servers, then it is mandatory that the egurkha war file is deployed to the admin server, and it is up and running.
5. DETAILED DIAGNOSIS - To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the On option. To disable the capability, click on the Off option.
The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled:
➢ The eG manager license should allow the detailed diagnosis capability
➢ Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for a WebLogic application server</td></tr>
<tr><td rowspan="3">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Total query rate:
The rate of JDBC queries that have been executed on the database, using the pools that have been configured to use the P6Spy driver</td><td>Queries/Sec</td><td>This is an indicator of the JDBC workload.</td></tr>
<tr><td>Avg query time:
The average time taken by the queries to execute on the database, using the pools that have been configured to use the P6Spy driver</td><td>Secs</td><td>A higher average query time signifies a performance bottleneck at the data abase tier.</td></tr>
<tr><td></td><td>Select query rate:
The rate of select queries executed on the database, using the pools that have been configured to use the P6Spy driver</td><td>Queries/Sec</td><td>Comparing the types of queries to the database provides an idea about the nature of workload on the database</td></tr>
</table>

	Avg Select query time: The average time taken by the select queries for executing on the database, by using the pools that have been configured to use the P6Spy driver	Secs	Unexpectedly large query times can indicate that there is sufficient scope to optimize database access using better indexes.
	Insert query rate: The rate of insert queries executed on the database, using the pools that have been configured to use the P6Spy driver	Queries/Sec	
	Avg insert query time: The average time taken for executing the insert queries on the database, using the pools that have been configured to use the P6Spy driver	Secs	
	Update query rate: The rate of update queries executed on the database, using the pools that have been configured to use the P6Spy driver	Queries/Sec	
	Avg update query time: The average time taken for executing the update queries on the database, using the pools that have been configured to use the P6Spy driver	Secs	
	Delete query rate: The rate of delete queries executed on the database, using the pools that have been configured to use the P6Spy driver	Queries/Sec	
	Avg delete query time: The average time taken by the delete queries to execute on the database, using the pools that have been configured to use the P6Spy driver	Secs	
	Commit queries rate: The rate of commit queries executed on the database, using the pools that have been configured to use the P6Spy driver	Queries/Sec	

	Avg commit query time: The average time taken by the commit queries to execute on the database, using the pools that have been configured to use the P6Spy driver	Secs	
	Rollback queries rate: The rate of rollback queries executed on the database, using the pools that have been configured to use the P6Spy driver	Queries/Sec	Typically, the rate of rollbacks should be low.
	Avg rollback query time: The average time taken by the rollback queries to execute on the database, using the pools that have been configured to use the P6Spy driver	Secs	
	Jdbc query error rate: The rate of queries that have resulted in an error	Errors/Sec	

2.1.5 WebLogic Applications Test

Using the tests mapped to this layer, administrators can identify the web applications that are running on the WebLogic server, and the current session load on each web application. Additionally, the layer also monitors the EJB activity on the server and even measures the how quickly the servlets are processing requests they receive.

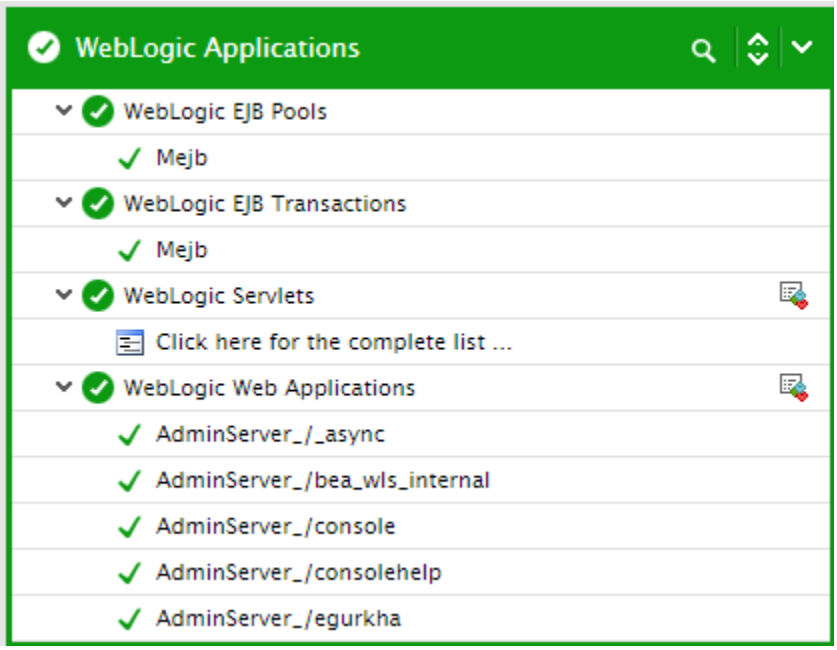


Figure 2.17: The tests mapped to the WebLogic Applications layer

2.1.5.1 WebLogic Servlets Test

This test periodically tracks the servlets invoked and reloaded, and measures the minimum, maximum, and average response times of a specific server instance. Use the **Click here** hyperlink in the test configuration page to configure the servlet groups that need to be monitored by the eG Enterprise suite. **By default, eG Enterprise system monitors only those servlets that are part of a group.**

Purpose	To periodically track the servlets invoked and reloaded, and measure the minimum, maximum, and average response times of a specific server instance
Target of the test	Any managed WebLogic server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebLogic server 3. **PORT** – The port number of the WebLogic server 4. **USER** – The admin user name of the WebLogic server being monitored. 5. **PASSWORD** – The password of the specified admin user 6. **CONFIRM PASSWORD** – Confirm the password by retyping it here. 7. **ENCRYPTPASS** - If the specified password needs to be encrypted, set the **ENCRYPTPASS** flag to **YES**. Otherwise, set it to **NO**. By default, the **YES** option will be selected. **Note:** If the **USEWARFILE** flag is set to **No**, then make sure that the **ENCRYPTPASS** flag is also set to **No**. 8. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebLogic server. 9. **SERVER** - The name of the specific server instance to be monitored for a WebLogic server (the default value is "localhome") 10. **URL** – The URL to be accessed to collect metrics pertaining to the WebLogic server. By default, this test connects to a managed WebLogic server and attempts to obtain the metrics of interest by accessing the local Mbeans of the server. This parameter can be changed to a value of **`http://<adminserverIP>:<adminserverPort>`**. In this case, the test connects to the WebLogic admin server to collect metrics pertaining to the managed server (specified by the **HOST** and **PORT**). The **URL** setting provides the administrator with the flexibility of determining the WebLogic monitoring configuration to use. **Note:** If the admin server is to be used for collecting measures for all the managed WebLogic servers, then it is mandatory that the egurkha war file is deployed to the admin server, and it is up and running. 11. **AUTODISCOVERY** – By default, the eG suite allows administrators to configure servlet groups using the eG administrative interface, and reports metrics pertaining to every group so created. Accordingly, by default, **AUTODISCOVERY** is set to **NO**. If you want servlets to be discovered and monitored automatically, then select the **YES** option against **AUTODISCOVERY**. When this is done, the eG agent automatically discovers all the servlets on the WebLogic server, and reports one set of measures for every servlet hosted on the server. 12. **VERSION** - The **VERSION** textbox indicates the version of the Weblogic server to be managed. The default value is "none", in which case the test auto-discovers the weblogic version. If the value of this parameter is not "none", the test uses the value provided (e.g., 7.0) as the weblogic version (i.e., it does not auto-discover the weblogic server version). This parameter has been added to address cases when the eG agent is not able to discover the WebLogic server version.

<table>
<tr><td></td><td colspan="3">13. USEWARFILE - This flag indicates whether/not monitoring is to be done using a Web archive file deployed on the WebLogic server (in which case, HTTP/HTTPS is used by the server to connect to the server). If this flag is set to No, the agent directly connects to the WebLogic server using the T3 protocol (no other file needs to be deployed on the WebLogic server for this to work). Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only. Also, if the USEWARFILE parameter is set to No, make sure that the ENCRYPTPASS parameter is set to No as well.

When monitoring a WebLogic server deployed on a Unix platform particularly, if the USEWARFILE parameter is set to No, you have to make sure that the eG agent install user is added to the WebLogic users group.

14. WEBLOGICJARLOCATION - Specify the location of the WebLogic server's java archive (Jar) file. If the USEWARFILE flag is set to No, then the weblogic.jar file specified here is used to connect to the corresponding WebLogic server using the T3 protocol. Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.

15. DETAILED DIAGNOSIS - To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the On option. To disable the capability, click on the Off option.

The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled:

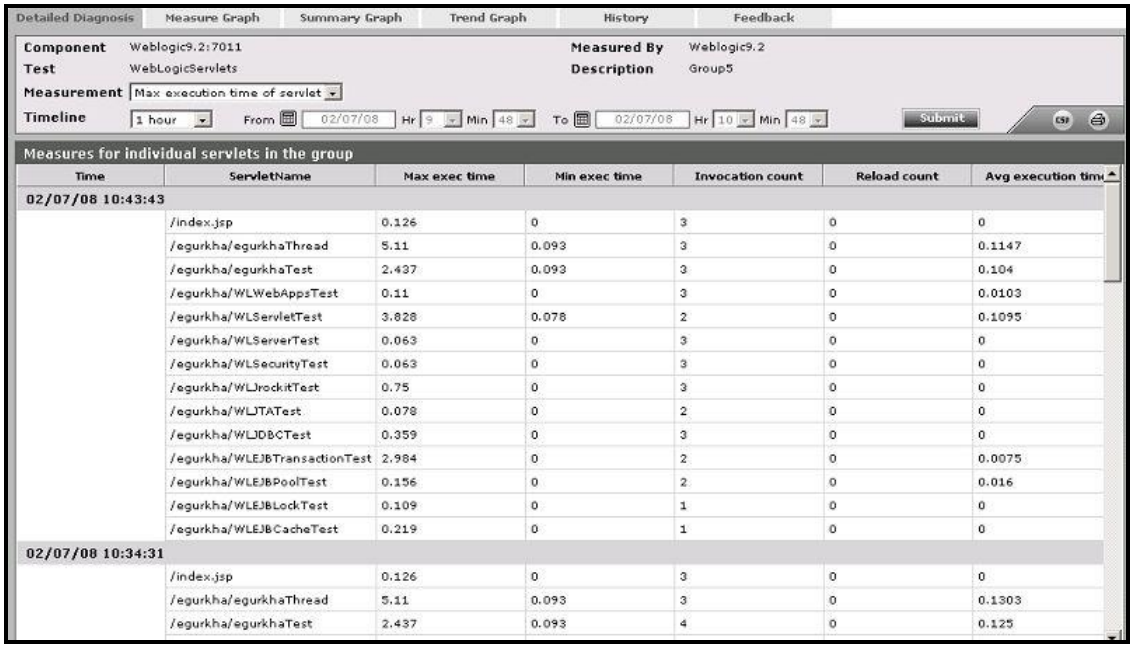
➢ The eG manager license should allow the detailed diagnosis capability

➢ Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for every servlet group configured</td></tr>
<tr><td>Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td></td><td>Max execution time of servlet:

The average duration for which the single longest invocation of all the servlets within a servlet group executed since creation</td><td>Number</td><td></td></tr>
</table>

	Min execution time of servlet: The average duration for which the single shortest invocation of all the servlets in a servlet group executed since creation	Secs	
	Invocation count of servlet: The total number of times the servlets within a servlet group were invoked	Number	Comparing this value across servlets can provide an indication of the relative popularity of the servlets. An administrator can use information about invocations to determine the servlet(s), by tuning which the performance of the service can be significantly improved.
	Reloads of servlet: The total number of times for which the servlets within a servlet group were reloaded	Number	
	Avg execution of servlet: The average of response time of the servlets in a servlet group	Secs	This measure indicates which servlet(s) are providing slow response. An increased execution time can be attributed to poor design of the servlet code, slow database access or non-optimal queries.

The detailed diagnosis of the all the above measures, if enabled, reveals the maximum execution time, minimum execution time, invocation count, reload count, and average execution time for every servlet in the configured servlet groups. **Note that the detailed diagnosis information will not be available if the AUTODISCOVERY parameter is set to 'Yes'.**



Time	ServletName	Max exec time	Min exec time	Invocation count	Reload count	Avg execution time
02/07/08 10:43:43						
	/index.jsp	0.126	0	3	0	0
	/egurkha/egurkhaThread	5.11	0.093	3	0	0.1147
	/egurkha/egurkhaTest	2.437	0.093	3	0	0.104
	/egurkha/WLWebAppsTest	0.11	0	3	0	0.0103
	/egurkha/WLServletTest	3.828	0.078	2	0	0.1095
	/egurkha/WLServerTest	0.063	0	3	0	0
	/egurkha/WLSecurityTest	0.063	0	3	0	0
	/egurkha/WLJrockitTest	0.75	0	3	0	0
	/egurkha/WLJTATest	0.078	0	2	0	0
	/egurkha/WLJDBCTest	0.359	0	3	0	0
	/egurkha/WLEJBTransactionTest	2.984	0	2	0	0.0075
	/egurkha/WLEJBPoolTest	0.156	0	2	0	0.016
	/egurkha/WLEJBLockTest	0.109	0	1	0	0
	/egurkha/WLEJBCacheTest	0.219	0	1	0	0
02/07/08 10:34:31						
	/index.jsp	0.126	0	3	0	0
	/egurkha/egurkhaThread	5.11	0.093	3	0	0.1303
	/egurkha/egurkhaTest	2.437	0.093	4	0	0.125

Figure 2.18: The detailed diagnosis of the Max execution time measure

2.1.5.2 WebLogic Web Applications Test

This test automatically discovers all the Web application components deployed on the WebLogic server, and reports real-time performance data pertaining to each of the components.

Purpose	Reports real-time performance data pertaining to each of the Web application components
Target of the test	Any managed WebLogic server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebLogic server 3. **PORT** – The port number of the WebLogic server 4. **USER** – The admin user name of the WebLogic server being monitored. 5. **PASSWORD** – The password of the specified admin user 6. **CONFIRM PASSWORD** – Confirm the password by retyping it here. 7. **ENCRYPTPASS** - If the specified password needs to be encrypted, set the **ENCRYPTPASS** flag to **YES**. Otherwise, set it to **NO**. By default, the **YES** option will be selected. **Note:** If the **USEWARFILE** flag is set to **No**, then make sure that the **ENCRYPTPASS** flag is also set to **No**. 8. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebLogic server. 9. **SERVER** - The name of the specific server instance to be monitored for a WebLogic server (the default value is "localhome") 10. **URL** – The URL to be accessed to collect metrics pertaining to the WebLogic server. By default, this test connects to a managed WebLogic server and attempts to obtain the metrics of interest by accessing the local Mbeans of the server. This parameter can be changed to a value of **`http://<adminserverIP>:<adminserverPort>`**. In this case, the test connects to the WebLogic admin server to collect metrics pertaining to the managed server (specified by the **HOST** and **PORT**). The **URL** setting provides the administrator with the flexibility of determining the WebLogic monitoring configuration to use. **Note**: If the admin server is to be used for collecting measures for all the managed WebLogic servers, then it is mandatory that the egurkha war file is deployed to the admin server, and it is up and running. 11. **VERSION** - The **VERSION** textbox indicates the version of the Weblogic server to be managed. The default value is "none", in which case the test auto-discovers the weblogic version. If the value of this parameter is not "none", the test uses the value provided (e.g., 7.0) as the weblogic version (i.e., it does not auto-discover the weblogic server version). This parameter has been added to address cases when the eG agent is not able to discover the WebLogic server version. 12. **USEWARFILE** - This flag indicates whether/not monitoring is to be done using a Web archive file deployed on the WebLogic server (in which case, HTTP/HTTPS is used by the server to connect to the server). If this flag is set to **No**, the agent directly connects to the WebLogic server using the T3 protocol (no other file needs to be deployed on the WebLogic server for this to work). **Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.** Also, if the **USEWARFILE** parameter is set to **No**, make sure that the **ENCRYPTPASS** parameter is set to **No** as well.

	When monitoring a WebLogic server deployed on a Unix platform particularly, if the **USEWARFILE** parameter is set to **No**, you have to make sure that the eG agent install user is added to the WebLogic users group. 13. **WEBLOGICJARLOCATION** - Specify the location of the WebLogic server's java archive (Jar) file. If the **USEWARFILE** flag is set to **No**, then the weblogic.jar file specified here is used to connect to the corresponding WebLogic server using the T3 protocol. **Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.**		
Outputs of the test	One set of results for every Web application discovered on the WebLogic server being monitored		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Sessions open current: Indicates the total number of open sessions in this component currently.	Number	
	Sessions open high water mark: Returns the high water mark of the total number of open sessions in this component.	Number	
	Sessions open total: Returns the total number of open sessions in this component since the last measurement period.	Number	This measure is indicative of the workload on the application component. By observing the variations to this measure over time, you can determine usage trends such as the time of day when an application is getting the most amount of traffic.
	Sessions invalid time: Returns the invalidation check timer interval configured for http sessions.	Secs	

2.1.5.3 WebLogic EJB Locks Test

The WebLogic EJB Lock test monitors the EJB locking activity performed by the WebLogic server. Use the **Click here** hyperlink in the test configuration page to configure the EJB groups that need to be monitored by the eG Enterprise suite. **By default, the eG Enterprise system will monitor only those EJBs that are part of a group.**

Purpose	Monitors the EJB locking activity performed by the WebLogic server
Target of the	A WebLogic application server

test	
Agent deploying the test	An internal agent
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebLogic server 3. **PORT** – The port number of the WebLogic server 4. **USER** – The admin user name of the WebLogic server being monitored. 5. **PASSWORD** – The password of the specified admin user 6. **CONFIRM PASSWORD** – Confirm the password by retyping it here. 7. **ENCRYPTPASS** - If the specified password needs to be encrypted, set the **ENCRYPTPASS** flag to **YES**. Otherwise, set it to **NO**. By default, the **YES** option will be selected. **Note:** If the **USEWARFILE** flag is set to **No**, then make sure that the **ENCRYPTPASS** flag is also set to **No**. 8. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebLogic server. 9. **SERVER** - The name of the specific server instance to be monitored for a WebLogic server (the default value is "localhome") 10. **AUTODISCOVERY** – By default, eG Enterprise allows administrators to configure EJB groups using the eG administrative interface, and reports metrics pertaining to every group so created. Accordingly, by default, **AUTODISCOVERY** is set to **NO**. If you want EJBs to be discovered and monitored automatically, then select the **YES** option against **AUTODISCOVERY**. When this is done, the eG agent automatically discovers all the EJBs on the WebLogic server, and reports one set of measures for every EJB so discovered. 11. **SHOWSERVERNAME** - WebLogic version 8.0 and above prefixes the names of the EJBs it hosts, with the server name specified in the **SERVER** text box. For example, if the **SERVER** text box contains *MedRecServer*, then an EJB named MedRecEAR_EntityEJB_PatientEJB on that server will be renamed by WebLogic as MedRecServer_MedRecEAR_EntityEJB_PatientEJB. This could pose a challenge while applying EJB groups configured (using eG) on a particular WebLogic server to another server. This is because, when the eG Enterprise suite lists the EJBs available for grouping, each of the displayed EJBs will be prefixed by the corresponding **SERVER** name. When such EJBs are grouped and the group is then applied to another WebLogic server, the eG Enterprise system will not be able to extract metrics for the EJB grouping applied to the new server due to the server name mismatch. Therefore, by default, the eG Enterprise system sets the **SHOWSERVERNAME** flag to **No**. This ensures that the server name specified in the **SERVER** text box does not prefix the EJB listing during EJB group configuration. To enable the prefix, select the **Yes** option against **SHOWSERVERNAME**. **Note:** If you modify the SHOWSERVERNAME setting after configuring the EJB groups, then wait for the test to run once so that the eG agent rediscovers the EJBs on that server. Then, delete the existing EJB groups, and repeat the group configuration.

	12. **URL** – The URL to be accessed to collect metrics pertaining to the WebLogic server. By default, this test connects to a managed WebLogic server and attempts to obtain the metrics of interest by accessing the local Mbeans of the server. This parameter can be changed to a value of `http://<adminserverIP>:<adminserverPort>`. In this case, the test connects to the WebLogic admin server to collect metrics pertaining to the managed server (specified by the **HOST** and **PORT**). The **URL** setting provides the administrator with the flexibility of determining the WebLogic monitoring configuration to use. **Note:** If the admin server is to be used for collecting measures for all the managed WebLogic servers, then it is mandatory that the egurkha war file is deployed to the admin server, and it is up and running. 13. **VERSION** - The **VERSION** textbox indicates the version of the Weblogic server to be managed. The default value is "none", in which case the test auto-discovers the weblogic version. If the value of this parameter is not "none", the test uses the value provided (e.g., 7.0) as the weblogic version (i.e., it does not auto-discover the weblogic server version). This parameter has been added to address cases when the eG agent is not able to discover the WebLogic server version. 14. **USEWARFILE** - This flag indicates whether/not monitoring is to be done using a Web archive file deployed on the WebLogic server (in which case, HTTP/HTTPS is used by the server to connect to the server). If this flag is set to **No**, the agent directly connects to the WebLogic server using the T3 protocol (no other file needs to be deployed on the WebLogic server for this to work). **Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.** Also, if the **USEWARFILE** parameter is set to **No**, make sure that the **ENCRYPTPASS** parameter is set to **No** as well. When monitoring a WebLogic server deployed on a Unix platform particularly, if the **USEWARFILE** parameter is set to **No**, you have to make sure that the eG agent install user is added to the WebLogic users group. 15. **WEBLOGICJARLOCATION** - Specify the location of the WebLogic server's java archive (Jar) file. If the **USEWARFILE** flag is set to **No**, then the weblogic.jar file specified here is used to connect to the corresponding WebLogic server using the T3 protocol. **Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.** 16. **DETAILED DIAGNOSIS** - To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the **On** option. To disable the capability, click on the **Off** option. The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled: ➢ The eG manager license should allow the detailed diagnosis capability ➢ Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.
Outputs of the test	One set of results for every EJB group configured using the eG administrative interface

Measurements made by the	Measurement	Measurement Unit	Interpretation

test	**Locked beans count:** The sum total of the beans from within an EJB group that are currently locked	Number	
	Attempts to lock rate: The sum total of the rate at which attempts were made to obtain a lock on every bean within an EJB group	Attempts/Sec	
	Timeout rate: The sum total of the rate at which threads have timed out waiting for a lock on every bean within an EJB group	Timeouts/Sec	
	Threads waiting rate: The sum total of the rate at which threads have been waiting for a lock on every bean in an EJB group	Threads/Sec	The detailed diagnosis of this measure, if enabled, provides locking information pertaining to the individual beans in the monitored EJB group. The details displayed include: The Bean name, the number of locked beans, the number of attempts made to lock, the timeout rate, and the threads waiting rate of the bean. **Note that the detailed diagnosis information will not be available if the AUTODISCOVERY parameter is set to 'Yes'.**

2.1.5.4 WebLogic EJB Cache Test

To improve the performance and the scalability of the EJB container, WebLogic server caches EJBs. The WebLogicEJBCache test collects measures related to EJB caching activity by the WebLogic server. Use the **Click here** hyperlink in the test configuration page to configure the EJB groups that need to be monitored by the eG Enterprise suite. **By default, the eG Enterprise system will monitor only those EJBs that are part of a group.**

Purpose	Collects measures related to EJB caching activity by the WebLogic server
Target of the test	A WebLogic application server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebLogic server 3. **PORT** – The port number of the WebLogic server 4. **USER** – The admin user name of the WebLogic server being monitored. 5. **PASSWORD** – The password of the specified admin user 6. **CONFIRM PASSWORD** – Confirm the password by retyping it here. 7. **ENCRYPTPASS** - If the specified password needs to be encrypted, set the **ENCRYPTPASS** flag to **YES**. Otherwise, set it to **NO**. By default, the **YES** option will be selected. **Note:** If the **USEWARFILE** flag is set to **No**, then make sure that the **ENCRYPTPASS** flag is also set to **No**. 8. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebLogic server. 9. **SERVER** - The name of the specific server instance to be monitored for a WebLogic server (the default value is "localhome") 10. **AUTODISCOVERY** – By default, eG Enterprise allows administrators to configure EJB groups using the eG administrative interface, and reports metrics pertaining to every group so created. Accordingly, by default, **AUTODISCOVERY** is set to **NO**. If you want EJBs to be discovered and monitored automatically, then select the **YES** option against **AUTODISCOVERY**. When this is done, the eG agent automatically discovers all the EJBs on the WebLogic server, and reports one set of measures for every EJB so discovered. 11. **SHOWSERVERNAME** - WebLogic version 8.0 and above prefixes the names of the EJBs it hosts, with the server name specified in the **SERVER** text box. For example, if the **SERVER** text box contains *MedRecServer*, then an EJB named MedRecEAR_EntityEJB_PatientEJB on that server will be renamed by WebLogic as MedRecServer_MedRecEAR_EntityEJB_PatientEJB. This could pose a challenge while applying EJB groups configured (using eG) on a particular WebLogic server to another server. This is because, when the eG Enterprise suite lists the EJBs available for grouping, each of the displayed EJBs will be prefixed by the corresponding **SERVER** name. When such EJBs are grouped and the group is then applied to another WebLogic server, the eG Enterprise system will not be able to extract metrics for the EJB grouping applied to the new server due to the server name mismatch. Therefore, by default, the eG Enterprise system sets the **SHOWSERVERNAME** flag to **No**. This ensures that the server name specified in the **SERVER** text box does not prefix the EJB listing during EJB group configuration. To enable the prefix, select the **Yes** option against **SHOWSERVERNAME**. Note: If you modify the **SHOWSERVERNAME** setting after configuring the EJB groups, then wait for the test to run once so that the eG agent rediscovers the EJBs on that server. Then, delete the existing EJB groups, and repeat the group configuration.

	12. **URL** – The URL to be accessed to collect metrics pertaining to the WebLogic server. By default, this test connects to a managed WebLogic server and attempts to obtain the metrics of interest by accessing the local Mbeans of the server. This parameter can be changed to a value of **`http://<adminserverIP>:<adminserverPort>`**. In this case, the test connects to the WebLogic admin server to collect metrics pertaining to the managed server (specified by the **HOST** and **PORT**). The **URL** setting provides the administrator with the flexibility of determining the WebLogic monitoring configuration to use. **Note:** If the admin server is to be used for collecting measures for all the managed WebLogic servers, then it is mandatory that the egurkha war file is deployed to the admin server, and it is up and running. 13. **VERSION** - The **VERSION** textbox indicates the version of the Weblogic server to be managed. The default value is "none", in which case the test auto-discovers the weblogic version. If the value of this parameter is not "none", the test uses the value provided (e.g., 7.0) as the weblogic version (i.e., it does not auto-discover the weblogic server version). This parameter has been added to address cases when the eG agent is not able to discover the WebLogic server version. 14. **USEWARFILE** - This flag indicates whether/not monitoring is to be done using a Web archive file deployed on the WebLogic server (in which case, HTTP/HTTPS is used by the server to connect to the server). If this flag is set to **No**, the agent directly connects to the WebLogic server using the T3 protocol (no other file needs to be deployed on the WebLogic server for this to work). **Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.** Also, if the **USEWARFILE** parameter is set to **No**, make sure that the **ENCRYPTPASS** parameter is set to **No** as well. When monitoring a WebLogic server deployed on a Unix platform particularly, if the **USEWARFILE** parameter is set to **No**, you have to make sure that the eG agent install user is added to the WebLogic users group. 15. **WEBLOGICJARLOCATION** - Specify the location of the WebLogic server's java archive (Jar) file. If the **USEWARFILE** flag is set to **No**, then the weblogic.jar file specified here is used to connect to the corresponding WebLogic server using the T3 protocol. **Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.** 16. **DETAILED DIAGNOSIS** - To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the **On** option. To disable the capability, click on the **Off** option. The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled: ➢ The eG manager license should allow the detailed diagnosis capability ➢ Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.
Outputs of the test	One set of results for every EJB group configured using the eG administrative interface

Measurements made by the test	Measurement	Measurement Unit	Interpretation
	Activation rate: The sum total of the rate at which every bean from a particular EJB group have been activated	Beans/Sec	
	Passivation rate: The sum total of the rate at which the every bean from a specific EJB group have been passivated	Beans/Sec	
	Cache hit rate: The sum total of the rate at which attempts to access every bean within an EJB group, from the cache succeeded	Hits/Sec	
	Cache miss rate: The sum total of the rate at which attempts to access every bean within an EJB group, from the cache failed	Misses/Sec	
	Cache hit ratio: The average of the percentage of time every bean in an EJB group was successfully accessed from the cache	Percent	
	Beans in cache: The number of beans in the cache	Number	

The detailed diagnosis of the *Cache hit ratio* measure, provides the details pertaining to the EJB caching activity of the individual beans in the EJB group being monitored (see Figure 2.19). This information enables administrators to assess the effectiveness of the caching activity performed by the WebLogic server. **Note that the detailed diagnosis information will not be available if the AUTODISCOVERY parameter is set to 'Yes'.**

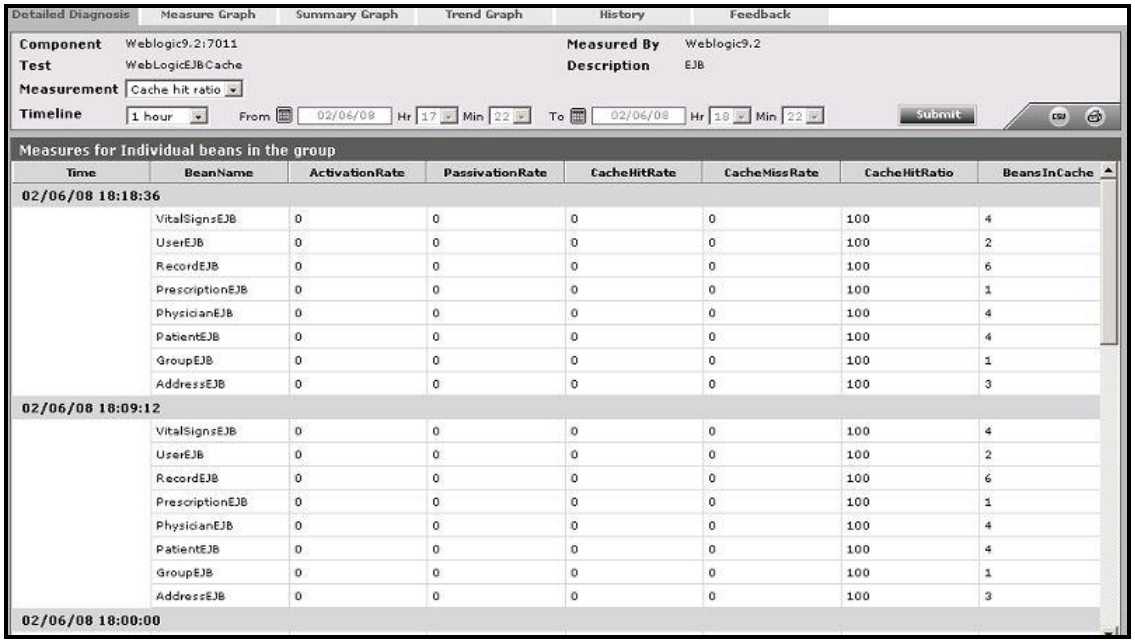


Figure 2.19: The detailed diagnosis of the Cache hit ratio measure

2.1.5.5 WebLogic EJB Pools Test

Following are three different kinds of EJB components that can be hosted on a WebLogic server:

a. A stateful session bean is an enterprise bean that acts as a server-side extension of the client that uses it. The stateful session bean is created by a client and will work for only that client until the client connection is dropped or the bean is explicitly removed.

b. A stateless session bean is an enterprise bean that provides a stateless service to the client

c. An entity bean represents a business object in a persistent storage mechanism such as a database. For example, an entity bean could represent a customer, which might be stored as a row in the customer table of a relational database

This test collects measures related to the bean pooling activity performed by the WebLogic server. Use the **Click here** hyperlink in the test configuration page to configure the EJB groups that need to be monitored by the eG Enterprise suite. **By default, the eG Enterprise system monitors only those EJBs that are part of a group.**

Purpose	Collects measures related to the bean pooling activity performed by the WebLogic server
Target of the test	A WebLogic application server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebLogic server 3. **PORT** – The port number of the WebLogic server 4. **USER** – The admin user name of the WebLogic server being monitored. 5. **PASSWORD** – The password of the specified admin user 6. **CONFIRM PASSWORD** – Confirm the password by retyping it here. 7. **ENCRYPTPASS** - If the specified password needs to be encrypted, set the **ENCRYPTPASS** flag to **YES**. Otherwise, set it to **NO**. By default, the **YES** option will be selected. **Note:** If the **USEWARFILE** flag is set to **No**, then make sure that the **ENCRYPTPASS** flag is also set to **No**. 8. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebLogic server. 9. **SERVER** - The name of the specific server instance to be monitored for a WebLogic server (the default value is "localhome") 10. **AUTODISCOVERY** – By default, eG Enterprise allows administrators to configure EJB groups using the eG administrative interface, and reports metrics pertaining to every group so created. Accordingly, by default, **AUTODISCOVERY** is set to **NO**. If you want EJBs to be discovered and monitored automatically, then select the **YES** option against **AUTODISCOVERY**. When this is done, the eG agent automatically discovers all the EJBs on the WebLogic server, and reports one set of measures for every EJB so discovered. 11. **SHOWSERVERNAME** - WebLogic version 8.0 and above prefixes the names of the EJBs it hosts, with the server name specified in the **SERVER** text box. For example, if the **SERVER** text box contains *MedRecServer*, then an EJB named MedRecEAR_EntityEJB_PatientEJB on that server will be renamed by WebLogic as MedRecServer_MedRecEAR_EntityEJB_PatientEJB. This could pose a challenge while applying EJB groups configured (using eG) on a particular WebLogic server to another server. This is because, when the eG Enterprise suite lists the EJBs available for grouping, each of the displayed EJBs will be prefixed by the corresponding **SERVER** name. When such EJBs are grouped and the group is then applied to another WebLogic server, the eG Enterprise system will not be able to extract metrics for the EJB grouping applied to the new server due to the server name mismatch. Therefore, by default, the eG Enterprise system sets the **SHOWSERVERNAME** flag to **No**. This ensures that the server name specified in the **SERVER** text box does not prefix the EJB listing during EJB group configuration. To enable the prefix, select the **Yes** option against **SHOWSERVERNAME**. **Note:** If you modify the **SHOWSERVERNAME** setting after configuring the EJB groups, then wait for the test to run once so that the eG agent rediscovers the EJBs on that server. Then, delete the existing EJB groups, and repeat the group configuration.

	12. **URL** – The URL to be accessed to collect metrics pertaining to the WebLogic server. By default, this test connects to a managed WebLogic server and attempts to obtain the metrics of interest by accessing the local Mbeans of the server. This parameter can be changed to a value of **`http://<adminserverIP>:<adminserverPort>`**. In this case, the test connects to the WebLogic admin server to collect metrics pertaining to the managed server (specified by the **HOST** and **PORT**). The **URL** setting provides the administrator with the flexibility of determining the WebLogic monitoring configuration to use. **Note:** If the admin server is to be used for collecting measures for all the managed WebLogic servers, then it is mandatory that the egurkha war file is deployed to the admin server, and it is up and running. 13. **VERSION** - The **VERSION** textbox indicates the version of the Weblogic server to be managed. The default value is "none", in which case the test auto-discovers the weblogic version. If the value of this parameter is not "none", the test uses the value provided (e.g., 7.0) as the weblogic version (i.e., it does not auto-discover the weblogic server version). This parameter has been added to address cases when the eG agent is not able to discover the WebLogic server version. 14. **USEWARFILE** - This flag indicates whether/not monitoring is to be done using a Web archive file deployed on the WebLogic server (in which case, HTTP/HTTPS is used by the server to connect to the server). If this flag is set to **No**, the agent directly connects to the WebLogic server using the T3 protocol (no other file needs to be deployed on the WebLogic server for this to work). **Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.** Also, if the **USEWARFILE** parameter is set to **No**, make sure that the **ENCRYPTPASS** parameter is set to **No** as well. When monitoring a WebLogic server deployed on a Unix platform particularly, if the **USEWARFILE** parameter is set to **No**, you have to make sure that the eG agent install user is added to the WebLogic users group. 15. **WEBLOGICJARLOCATION** - Specify the location of the WebLogic server's java archive (Jar) file. If the **USEWARFILE** flag is set to **No**, then the weblogic.jar file specified here is used to connect to the corresponding WebLogic server using the T3 protocol. **Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.** 16. **DETAILED DIAGNOSIS** - To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the **On** option. To disable the capability, click on the **Off** option. The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled: • The eG manager license should allow the detailed diagnosis capability • Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.
Outputs of the test	One set of results for every EJB group configured using the eG administrative interface

Measurements made by the test	Measurement	Measurement Unit	Interpretation
	Beans in use: The sum total of instances of every bean in an EJB group that are currently being used from the free pool	Number	
	Idle beans: The sum total of the instances of every bean within an EJB group that are currently available in the free pool	Number	
	Waiting threads: The sum total of threads currently waiting for every available bean instance in an EJB group	Number	
	Thread timeouts: The sum total of the number of threads that have timed out waiting for an available instance of every bean in an EJB group	Threads/Sec	
	Access attempts: An access attempt is an attempt made to get an instance of a bean from the free pool. The Access_attempts measure reports the sum total of all such attempts made for every bean in an EJB group.	Number	This measure will be available on WebLogic servers 8.0 and above only.
	Missed attempts: A missed attempt is a failed attempt made to get an instance of a bean from the free pool. The Missed_attempts measure reports the sum total of all such failed attempts made for every bean in an EJB group.	Number	This measure will be available on WebLogic servers 8.0 and above only.
	Destroyed beans: If an instance of a bean (in an EJB group) from a pool was destroyed due to a non-application Exception being thrown from it, then the bean is deemed destroyed. The Destroyed_beans measure reports the sum total of all the beans in an EJB group that threw a non-application Exception.	Number	This measure will be available on WebLogic servers 8.0 and above only.

The detailed diagnosis of the *Waiting threads* (see Figure 2.20) and the *Thread timeouts* measures provides the details related to the usage of the individual beans present in the EJB group being monitored. This information enables administrators to evaluate the effectiveness of the bean pooling activity of the WebLogic server. **Note that the detailed diagnosis information will not be available if the AUTODISCOVERY parameter is set to 'Yes'.**

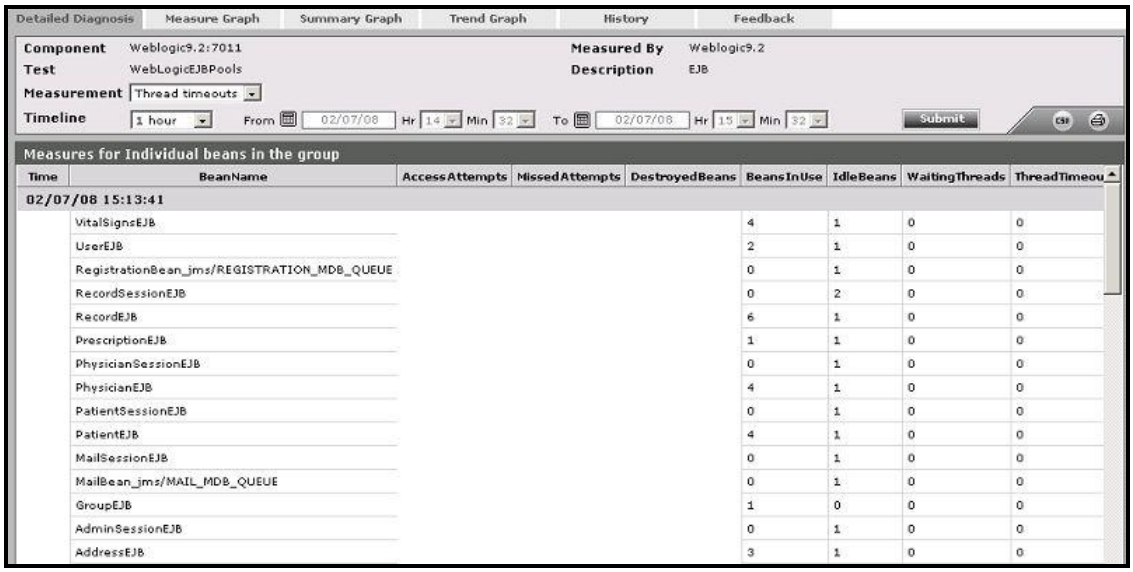


Figure 2.20: The detailed diagnosis of the Threads timeout measure

2.1.5.6 WebLogic EJB Pool Test

The WebLogic EJB PoolTest collects measures related to the bean pooling activity performed by the WebLogic server. This test will be disabled by default. You can enable this test by clicking on the check box corresponding to the test in the **AGENTS – TESTS CONFIGURATION** page, and then clicking on the **Update** button. Use the **Click here** hyperlink in the test configuration page to configure the EJB groups that need to be monitored by the eG Enterprise suite. **By default, the eG Enterprise system monitors only those EJBs that are part of a group.**

Purpose	Collects measures related to the bean pooling activity performed by the WebLogic server
Target of the test	A WebLogic application server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebLogic server 3. **PORT** – The port number of the WebLogic server 4. **USER** – The admin user name of the WebLogic server being monitored. 5. **PASSWORD** – The password of the specified admin user 6. **CONFIRM PASSWORD** – Confirm the password by retyping it here. 7. **ENCRYPTPASS** - If the specified password needs to be encrypted, set the **ENCRYPTPASS** flag to **YES**. Otherwise, set it to **NO**. By default, the **YES** option will be selected. **Note:** If the **USEWARFILE** flag is set to **No**, then make sure that the **ENCRYPTPASS** flag is also set to **No**. 8. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebLogic server. 9. **SERVER** - The name of the specific server instance to be monitored for a WebLogic server (the default value is "localhome") 10. **AUTODISCOVERY** – By default, eG Enterprise allows administrators to configure EJB groups using the eG administrative interface, and reports metrics pertaining to every group so created. Accordingly, by default, **AUTODISCOVERY** is set to **NO**. If you want EJBs to be discovered and monitored automatically, then select the **YES** option against **AUTODISCOVERY**. When this is done, the eG agent automatically discovers all the EJBs on the WebLogic server, and reports one set of measures for every EJB so discovered. 11. **SHOWSERVERNAME** - WebLogic version 8.0 and above prefixes the names of the EJBs it hosts, with the server name specified in the **SERVER** text box. For example, if the **SERVER** text box contains *MedRecServer*, then an EJB named MedRecEAR_EntityEJB_PatientEJB on that server will be renamed by WebLogic as MedRecServer_MedRecEAR_EntityEJB_PatientEJB. This could pose a challenge while applying EJB groups configured (using eG) on a particular WebLogic server to another server. This is because, when the eG Enterprise suite lists the EJBs available for grouping, each of the displayed EJBs will be prefixed by the corresponding **SERVER** name. When such EJBs are grouped and the group is then applied to another WebLogic server, the eG Enterprise system will not be able to extract metrics for the EJB grouping applied to the new server due to the server name mismatch. Therefore, by default, the eG Enterprise system sets the **SHOWSERVERNAME** flag to **No**. This ensures that the server name specified in the **SERVER** text box does not prefix the EJB listing during EJB group configuration. To enable the prefix, select the **Yes** option against **SHOWSERVERNAME**. **Note:** If you modify the **SHOWSERVERNAME** setting after configuring the EJB groups, then wait for the test to run once so that the eG agent rediscovers the EJBs on that server. Then, delete the existing EJB groups, and repeat the group configuration.

	12. **URL** – The URL to be accessed to collect metrics pertaining to the WebLogic server. By default, this test connects to a managed WebLogic server and attempts to obtain the metrics of interest by accessing the local Mbeans of the server. This parameter can be changed to a value of `http://<adminserverIP>:<adminserverPort>`. In this case, the test connects to the WebLogic admin server to collect metrics pertaining to the managed server (specified by the **HOST** and **PORT**). The **URL** setting provides the administrator with the flexibility of determining the WebLogic monitoring configuration to use. **Note:** If the admin server is to be used for collecting measures for all the managed WebLogic servers, then it is mandatory that the egurkha war file is deployed to the admin server, and it is up and running. 13. **VERSION** - The **VERSION** textbox indicates the version of the Weblogic server to be managed. The default value is "none", in which case the test auto-discovers the weblogic version. If the value of this parameter is not "none", the test uses the value provided (e.g., 7.0) as the weblogic version (i.e., it does not auto-discover the weblogic server version). This parameter has been added to address cases when the eG agent is not able to discover the WebLogic server version. 14. **USEWARFILE** - This flag indicates whether/not monitoring is to be done using a Web archive file deployed on the WebLogic server (in which case, HTTP/HTTPS is used by the server to connect to the server). If this flag is set to **No**, the agent directly connects to the WebLogic server using the T3 protocol (no other file needs to be deployed on the WebLogic server for this to work). **Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.** Also, if the **USEWARFILE** parameter is set to **No**, make sure that the **ENCRYPTPASS** parameter is set to **No** as well. When monitoring a WebLogic server deployed on a Unix platform particularly, if the **USEWARFILE** parameter is set to **No**, you have to make sure that the eG agent install user is added to the WebLogic users group. 15. **WEBLOGICJARLOCATION** - Specify the location of the WebLogic server's java archive (Jar) file. If the **USEWARFILE** flag is set to **No**, then the weblogic.jar file specified here is used to connect to the corresponding WebLogic server using the T3 protocol. **Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.** 16. **DETAILED DIAGNOSIS** - To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the **On** option. To disable the capability, click on the **Off** option. The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled: ➢ The eG manager license should allow the detailed diagnosis capability ➢ Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.
Outputs of the test	One set of results for every EJB group configured using the eG administrative interface

Measurements made by the test	Measurement	Measurement Unit	Interpretation
	Beans in use: The sum total of instances of every bean in an EJB group that are currently being used from the free pool	Number	
	Idle beans: The sum total of the instances of every bean within an EJB group that are currently available in the free pool	Number	
	Waiting threads: The sum total of threads currently waiting for every available bean instance in an EJB group	Number	
	Threads timeout rate: The sum total of the rate at which threads have timed out waiting for an available instance of every bean in an EJB group	Threads/Sec	

2.1.5.7 WebLogic EJB Transactions Test

This test collects measures related to the EJB transaction activity performed by the WebLogic server. Use the **Click here** hyperlink in the test configuration page to configure the EJB groups that need to be monitored by the eG Enterprise suite. **By default, the eG Enterprise system monitors only those EJBs that are part of a group.**

Purpose	Collects measures related to the EJB transaction activity performed by the WebLogic server
Target of the test	A WebLogic application server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebLogic server 3. **PORT** – The port number of the WebLogic server 4. **USER** – The admin user name of the WebLogic server being monitored. 5. **PASSWORD** – The password of the specified admin user 6. **CONFIRM PASSWORD** – Confirm the password by retyping it here. 7. **ENCRYPTPASS** - If the specified password needs to be encrypted, set the **ENCRYPTPASS** flag to **YES**. Otherwise, set it to **NO**. By default, the **YES** option will be selected. **Note:** If the **USEWARFILE** flag is set to **No**, then make sure that the **ENCRYPTPASS** flag is also set to **No**. 8. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebLogic server. 9. **SERVER** - The name of the specific server instance to be monitored for a WebLogic server (the default value is "localhome") 10. **AUTODISCOVERY** – By default, eG Enterprise allows administrators to configure EJB groups using the eG administrative interface, and reports metrics pertaining to every group so created. Accordingly, by default, **AUTODISCOVERY** is set to **NO**. If you want EJBs to be discovered and monitored automatically, then select the **YES** option against **AUTODISCOVERY**. When this is done, the eG agent automatically discovers all the EJBs on the WebLogic server, and reports one set of measures for every EJB so discovered. 11. **SHOWSERVERNAME** - WebLogic version 8.0 and above prefixes the names of the EJBs it hosts, with the server name specified in the **SERVER** text box. For example, if the **SERVER** text box contains *MedRecServer*, then an EJB named MedRecEAR_EntityEJB_PatientEJB on that server will be renamed by WebLogic as MedRecServer_MedRecEAR_EntityEJB_PatientEJB. This could pose a challenge while applying EJB groups configured (using eG) on a particular WebLogic server to another server. This is because, when the eG Enterprise suite lists the EJBs available for grouping, each of the displayed EJBs will be prefixed by the corresponding **SERVER** name. When such EJBs are grouped and the group is then applied to another WebLogic server, the eG Enterprise system will not be able to extract metrics for the EJB grouping applied to the new server due to the server name mismatch. Therefore, by default, the eG Enterprise system sets the **SHOWSERVERNAME** flag to **No**. This ensures that the server name specified in the **SERVER** text box does not prefix the EJB listing during EJB group configuration. To enable the prefix, select the **Yes** option against **SHOWSERVERNAME**. **Note:** If you modify the **SHOWSERVERNAME** setting after configuring the EJB groups, then wait for the test to run once so that the eG agent rediscovers the EJBs on that server. Then, delete the existing EJB groups, and repeat the group configuration.

	12. **URL** – The URL to be accessed to collect metrics pertaining to the WebLogic server. By default, this test connects to a managed WebLogic server and attempts to obtain the metrics of interest by accessing the local Mbeans of the server. This parameter can be changed to a value of **`http://<adminserverIP>:<adminserverPort>`**. In this case, the test connects to the WebLogic admin server to collect metrics pertaining to the managed server (specified by the **HOST** and **PORT**). The **URL** setting provides the administrator with the flexibility of determining the WebLogic monitoring configuration to use. **Note:** If the admin server is to be used for collecting measures for all the managed WebLogic servers, then it is mandatory that the egurkha war file is deployed to the admin server, and it is up and running. 13. **VERSION** - The **VERSION** textbox indicates the version of the Weblogic server to be managed. The default value is "none", in which case the test auto-discovers the weblogic version. If the value of this parameter is not "none", the test uses the value provided (e.g., 7.0) as the weblogic version (i.e., it does not auto-discover the weblogic server version). This parameter has been added to address cases when the eG agent is not able to discover the WebLogic server version. 14. **USEWARFILE** - This flag indicates whether/not monitoring is to be done using a Web archive file deployed on the WebLogic server (in which case, HTTP/HTTPS is used by the server to connect to the server). If this flag is set to **No**, the agent directly connects to the WebLogic server using the T3 protocol (no other file needs to be deployed on the WebLogic server for this to work). **Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.** Also, if the **USEWARFILE** parameter is set to **No**, make sure that the **ENCRYPTPASS** parameter is set to **No** as well. When monitoring a WebLogic server deployed on a Unix platform particularly, if the **USEWARFILE** parameter is set to **No**, you have to make sure that the eG agent install user is added to the WebLogic users group. 15. **WEBLOGICJARLOCATION** - Specify the location of the WebLogic server's java archive (Jar) file. If the **USEWARFILE** flag is set to **No**, then the weblogic.jar file specified here is used to connect to the corresponding WebLogic server using the T3 protocol. **Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.** 16. **DETAILED DIAGNOSIS** - To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the **On** option. To disable the capability, click on the **Off** option. The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled: • The eG manager license should allow the detailed diagnosis capability • Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.
Outputs of the test	One set of results for every EJB group configured using the eG administrative interface

Measurements made by the test	Measurement	Measurement Unit	Interpretation
	Transaction commits: Commit rate is the rate at which transactions are committed for a particular bean. Tx_commit_rate reveals the sum total of the commit rates of the individual beans in an EJB group.	Trans/Sec	Comparing this value across all the deployed groups can give an idea of the relative importance of the beans within the groups, in supporting user accesses. A sudden change in user access patterns can be indicative of a change in the user workload.
	Transaction rollbacks: Rollback rate is the rate at which the transactions are rolled back for a particular bean. Tx_rollback_rate reveals the sum total of the rollback rates of the individual beans in an EJB group.	Trans/Sec	A high rollback rate indicates a problem with specific beans within a group. Possible reasons for this could be problems with the design and implementation of the specific bean or problems with any of the dependent servers of the bean (e.g., database server).
	Transaction timeouts: The timeout rate is the rate at which the transactions are timed out by the bean. Tx_timeout_rate reveals the sum total of the timeout rates of the individual beans in an EJB group.	Trans/Sec	A significantly high value may denote a load on the specific bean. This may indicate that specific transactions are taking too long to process requests. The detailed diagnosis of the *Transaction rollbacks* and *Transaction timeouts* measures, if enabled, provides the commit rate, rollback rate, and timeout rate of the transactions conducted by each of the beans within the EJB group being monitored. **Note that the detailed diagnosis information will not be available if the AUTODISCOVERY parameter is set to 'Yes'.**

2.1.5.8 WebLogic Ejbs Test

This test monitors the state of EJB component groups hosted on a WebLogic server 6.0 or higher using JMX. By default, this test appears disabled in the eG administrative interface (the **CONFIGURE TESTS** page) and is included for backward compatibility with earlier eG versions only. To enable the test, go to the **ENABLE / DISABLE TESTS** page using the menu sequence : Agents -> Tests -> Enable/Disable, pick *WebLogic* as the **Component type**, *Performance* as the **Test type**, choose this test from the **DISABLED TESTS** list, and click on the < button to move the test to the **ENABLED TESTS** list. Finally, click the **Update** button.

Use the **Click here** hyperlink in the test configuration page to configure the EJB groups that need to be monitored by the eG Enterprise suite. **Note that the eG Enterprise system monitors only those EJBs that are part of a group.**

Purpose	To measure statistics pertaining to EJB groups configured on a WebLogic application server 6.0 or higher
Target of the test	An EJB component hosted on the WebLogic application server version 6.0 or higher
Agent	An internal agent

deploying the test	

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebLogic server 3. **PORT** – The port number of the WebLogic server 4. **USER** – The admin user name of the WebLogic server being monitored. 5. **PASSWORD** – The password of the specified admin user 6. **CONFIRM PASSWORD** – Confirm the password by retyping it here. 7. **ENCRYPTPASS** - If the specified password needs to be encrypted, set the **ENCRYPTPASS** flag to **YES**. Otherwise, set it to **NO**. By default, the **YES** option will be selected. **Note:** If the **USEWARFILE** flag is set to **No**, then make sure that the **ENCRYPTPASS** flag is also set to **No**. 8. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebLogic server. 9. **SERVER** - The name of the specific server instance to be monitored for a WebLogic server (the default value is "localhome") 10. **URL** – The URL to be accessed to collect metrics pertaining to the WebLogic server. By default, this test connects to a managed WebLogic server and attempts to obtain the metrics of interest by accessing the local Mbeans of the server. This parameter can be changed to a value of `http://<adminserverIP>:<adminserverPort>`. In this case, the test connects to the WebLogic admin server to collect metrics pertaining to the managed server (specified by the **HOST** and **PORT**). The **URL** setting provides the administrator with the flexibility of determining the WebLogic monitoring configuration to use. **Note:** If the admin server is to be used for collecting measures for all the managed WebLogic servers, then it is mandatory that the egurkha war file is deployed to the admin server, and it is up and running. 11. **VERSION** - The **VERSION** textbox indicates the version of the Weblogic server to be managed. The default value is "none", in which case the test auto-discovers the weblogic version. If the value of this parameter is not "none", the test uses the value provided (e.g., 7.0) as the weblogic version (i.e., it does not auto-discover the weblogic server version). This parameter has been added to address cases when the eG agent is not able to discover the WebLogic server version. 12. **USEWARFILE** - This flag indicates whether/not monitoring is to be done using a Web archive file deployed on the WebLogic server (in which case, HTTP/HTTPS is used by the server to connect to the server). If this flag is set to **No**, the agent directly connects to the WebLogic server using the T3 protocol (no other file needs to be deployed on the WebLogic server for this to work). **Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.** Also, if the **USEWARFILE** parameter is set to **No**, make sure that the **ENCRYPTPASS** parameter is set to **No** as well.

<table>
<tr><td></td><td colspan="3">When monitoring a WebLogic server deployed on a Unix platform particularly, if the USEWARFILE parameter is set to No, you have to make sure that the eG agent install user is added to the WebLogic users group.

13. WEBLOGICJARLOCATION - Specify the location of the WebLogic server's java archive (Jar) file. If the USEWARFILE flag is set to No, then the weblogic.jar file specified here is used to connect to the corresponding WebLogic server using the T3 protocol. Note that the T3 protocol-based support is available for WebLogic servers ver.9 and ver. 10 only.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for every EJB group configured</td></tr>
<tr><td rowspan="6">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Transaction commit rate:

Indicates the rate at which transactions are committed for a particular bean.</td><td>Trans/Sec</td><td>Comparing this value across all the deployed beans can give an idea of the relative importance of the beans in supporting user accesses. A sudden change in user access patterns can be indicative of a change in the user workload.</td></tr>
<tr><td>Transaction rollback rate:

Indicates the rate at which the transactions are rolled back for a particular bean.</td><td>Trans/Sec</td><td>A high rollback rate indicates a problem with specific beans. Possible reasons for this could be problems with the design and implementation of the specific bean or problems with any of the dependent servers of the bean (e.g., database server).</td></tr>
<tr><td>Transactions inflight:

Number of transactions currently in progress through a particular bean.</td><td>Number</td><td>A significantly high value may denote a load on the specific bean. This may indicate that specific transactions are taking too long to process requests.</td></tr>
<tr><td>Num waiting rate:

This measure corresponds to only stateless session bean. This indicates the rate at which connections are established by the client with the instances of the bean.</td><td>Conns/Sec</td><td>A high value signifies that it is taking more time for the clients to access an instance of the bean from the pool.</td></tr>
<tr><td>Timeout rate:

This measure also corresponds to the stateless session beans. The measure indicates the rate at which instances are timed out by the bean.</td><td>Conns/Sec</td><td>A high value indicates a problem with a specific bean. Again, the problem can be specific to the bean implementation or with any of the dependent servers of the bean.</td></tr>
</table>

	Idle bean percent: The percentage of beans those are idle in the cache.	Percent	A high percentage indicates a memory bottleneck. The timeout of the session beans could be one of the possible reasons.

2.2 Monitoring the WebLogic Server Ver. 6/7/8

The special *WebLogic (6/7/8)* monitoring model (see Figure 2.1) that eG Enterprise offers uses JMX (Java Management extension), the new standard for managing java components, for monitoring version 6, 7, and 8 of the WebLogic server. JMX allows users to instrument their applications and control or monitor them using a management console.

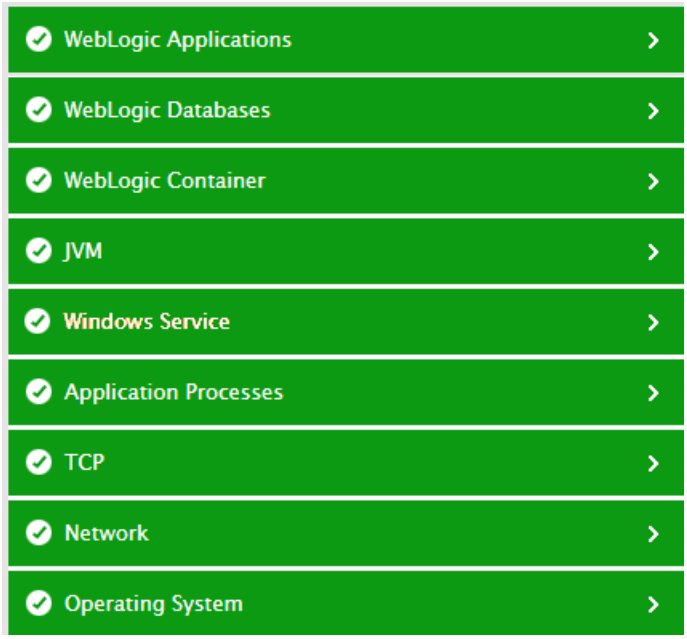


Figure 2.21: Layer model of the WebLogic Application server

The sections that will follow discuss the top 4 layers of Figure 2.1, and the metrics they report. The remaining layers have been extensively dealt with in the *Monitoring Unix and Windows Servers* document.

2.2.1 The JVM Layer

A Java virtual machine (JVM), an implementation of the Java Virtual Machine Specification, interprets compiled java binary code for a computer's processor (or "hardware platform") so that it can perform a Java program's instructions. The Java Virtual Machine Specification defines an abstract -- rather than a real -- machine or processor. The Specification specifies an instruction set, a set of registers, a stack, a garbage heap, and a method area.

The tests associated with the **JVM** layer of WebLogic enables administrators to perform the following functions:

- Assess the effectiveness of the garbage collection activity performed on the JVM heap

- Monitor WebLogic thread usage
- Evaluate the performance of the BEA JRockit JVM

Figure 2.22: The tests associated with the JVM layer

Note that the **WebLogic Work Manager** test is not mapped to this layer, indicating that this test is not available for WebLogic versions 6, 7, and 8.

All the tests listed in Figure 2.2 above have been discussed in Section 2.1.1 of this document. Therefore, let us proceed to the next layer.

2.2.2 The WebLogic Container Layer

The **WebLogic Container** layer tracks the health of the WebLogic service. The status of the **WebLogic Container** layer is determined by the results of the tests shown in **Error! Reference source not found.**.

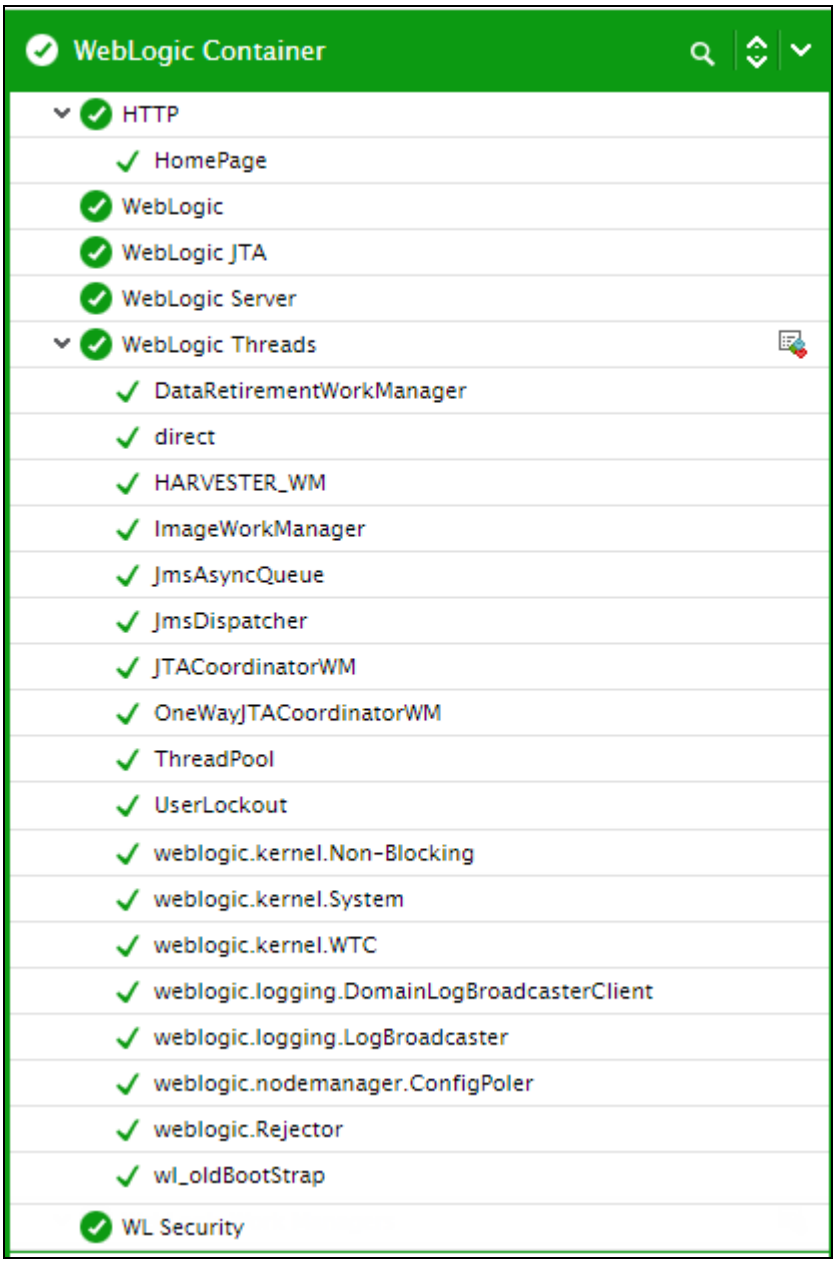


Figure 2.23: Tests mapped to the WebLogic Container layer

Note that the **WebLogic Work Managers**, **WebLogic Queues** and **WebLogic Topics** tests are not mapped to this layer, indicating that these tests are not available for WebLogic versions 6, 7, and 8. All other tests depicted by Figure 2.11 have already been discussed in Section 2.1.2.3.7 of this document.

2.2.3 The WebLogic Databases Layer

The status of the database connectivity from the WebLogic server to one or more backend database servers is assessed by the **WebLogic Databases** layer. The status of the **WebLogic Databases** layer is determined based on the results of a WebLogicJdbc test that is shown in Figure 2.16.

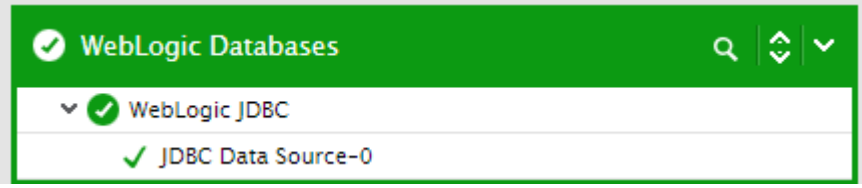


Figure 2.24: Tests mapping to the WebLogic Databases layer

The **WebLogicJDBC** test mapped to this layer has already been discussed in Section 2.1.4.1 of this document. Therefore, let us move on to the next layer.

2.2.4 The WebLogic Applications Layer

Using the tests mapped to this layer, administrators can identify the web applications that are running on the WebLogic server, and the current session load on each web application. Additionally, the layer also monitors the EJB activity on the server and even measures the how quickly the servlets are processing requests they receive.

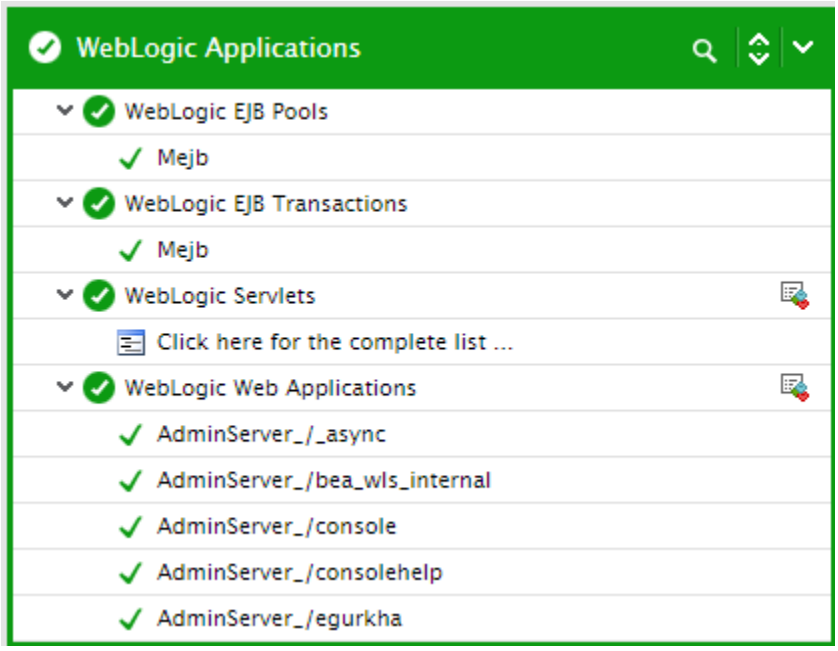


Figure 2.25: Tests mapping to the WebLogic Applications layer

These tests, once again, have already been discussed in Section **Error! Reference source not found.** of this document.

Chapter 3

Monitoring WebSphere Application Servers

IBM WebSphere Application Server, a software application server, is the flagship product within IBM's WebSphere brand. WAS is built using open standards such as J2EE, XML, and Web Services. It works with a number of web servers including Apache HTTP Server, Netscape Enterprise Server, Microsoft Internet Information Services (IIS), IBM HTTP Server for i5/OS, IBM HTTP Server for z/OS, and IBM HTTP Server for AIX/Linux/Microsoft Windows/Solaris. It delivers the secure, scalable, resilient application infrastructure you need for a Service Oriented Architecture (SOA).

Like any other application server, performance setbacks suffered by the WebSphere application server too can affect the availability of critical services it supports. To avoid such an eventuality, you need to continuously monitor the performance of the WebSphere application server.

The eG Enterprise suite facilitates 24x7 monitoring of the WebSphere application server and proactive alerting of probable error conditions detected on the server. Since different versions of the WebSphere application server vary in both capabilities and architecture, eG Enterprise employs different mechanisms to monitor the various versions. This is why, eG Enterprise provides two separate monitoring models for WebSphere Application server – one for version 4.0 (or 5.1) of the server, and another for version 6.0 and above. While it uses the component-type *WebSphere Application – 4/5.x* to monitor the former, the component-type *WebSphere Application* is used for monitoring the latter. This chapter discusses both these models in great detail.

3.1 Monitoring the WebSphere Application Server Version 4/5.x

To obtain statistics specific to a WebSphere Application Server 4/5.x, an eG agent relies on the Performance Monitoring Interface (PMI) API supported by the WebSphere server. Through eG Enterprise's administrative interface, the webserver port number through which the WebSphere servers' applications can be accessed should be specified.

The layer model that the eG Enterprise suite uses for monitoring this WebSphere server is shown in Figure 3.1.

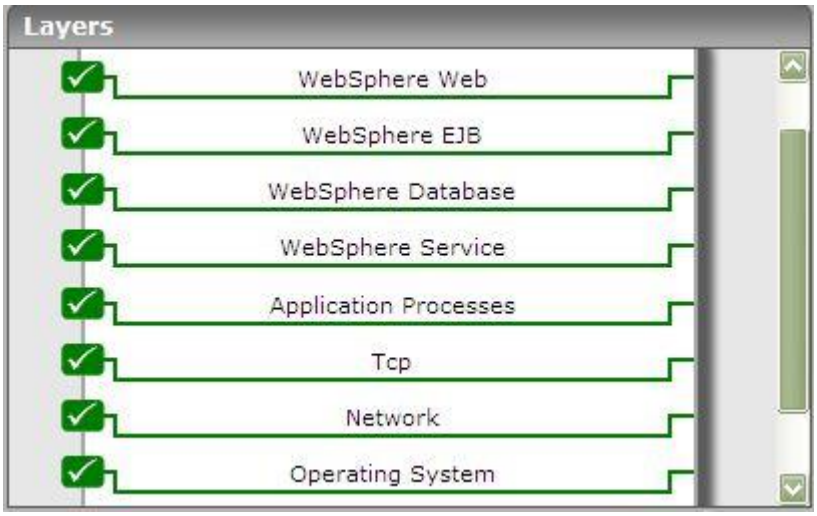


Figure 3.1: Layer model for a WebSphere application server – 4/5.x

The details pertaining to the **Operating System**, **Network**, **Tcp**, and **Application Processes** layer have been discussed in the *Monitoring Unix and Windows Servers* document. Above the **Application Processes** layer is the **WebSphere Service** layer.

Note:

The WebSphere application server uses a specific Java-based application process to execute the class **`com.ibm.ejs.sm.server.AdminServer`**. The Processes test parameters for WebSphere application servers should be configured to monitor this process.

3.1.1 The WebSphere Service Layer

This layer tracks the health of the WebSphere service. The status of the **WebSphere Service** layer is determined by the results of the tests depicted by Figure 3.2.

Figure 3.2: Tests mapping to the WebSphere Service layer

3.1.1.1 WebSphere Jvm Test

This test monitors the usage of the WebSphere JVM heap.

Purpose	To monitor the usage of the WebSphere JVM heap
Target of the test	A WebSphere application server
Agent deploying the test	An internal agent
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebSphere application server 3. **PORT** – The port number of the WebSphere application server 4. **WEBSERVERPORT** – The port number through which the WebSphere applications can be accessed (For IBMHTTPServer this information can be found in the **`httpd.conf`** file located in **`$<INSTALLDIR>/conf`** directory.) 5. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebSphere server. 6. **SERVERHOSTNAME** - Specify the node name of the server instance being monitored. To know the node name, do the following ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the node name that corresponds to the application server instance being monitored, and specify that name against the **SERVERHOSTNAME** parameter. 7. **NDMANAGER** - The **NDMANAGER** parameter is applicable only under the following circumstances: a. If the WebSphere server being monitored belongs to a cluster, or, b. If the WebSphere server being monitored is one of many instances of the server running on the same host In the case of situation (a), in the **NDMANAGER** text box, provide the host name of the **NODE MANAGER** that manages the application servers in the cluster. To know the name of the **NODE MANAGER**, do the following: ➢ Login to the Administrative Console of the node manager using the URL http://<IPoftheWebSphereAppServer'sNodeManager>:<Adminport>/admin/. ➢ Using the tree-structure in the left pane of the Administrative Console that appears, drill down to the **Deployment Manager** node within **System Administration**. ➢ Select the **Configuration** tab that appears in the right pane, and scroll down to the **End Points** link in the **Additional Properties** section. ➢ Once you locate the **End Points** link, click on it, and in the page that appears, click on the **SOAP_CONNECTOR_ADDRESS** link. ➢ In the subsequent page, a fully qualified domain name will be displayed against **Host**. This is the name that should be specified as the host name of the node manager in the **NDMANAGER** text box. In the case of situation (b), enter the **SERVERHOSTNAME** itself as the **NDMANAGER**. If both conditions (a) and (b) do not apply, then specify *none* here.

8. **CONNECTORPORT** - The **CONNECTORPORT** parameter is applicable only under the following circumstances:

    a. If the WebSphere server being monitored belongs to a cluster, or,

    b. If the WebSphere server being monitored is one of many instances of the server running on the same host

    In case of situation (a), the **CONNECTORPORT** parameter will take the port number using which the node manager communicates with the WebSphere servers in the cluster. The connector port can be a SOAP port or an RMI port. To know the port number, do the following:

    - From the Node manager's host, open the **<WEBSPHERE_INSTALL_DIR>\DeploymentManager\properties\wsadmin.properties** file.
    - Two entries that read as follows will be present in the wsadmin.properties file:

        com.ibm.ws.scripting.port=<port_number>

        #com.ibm.ws.scripting.port=<port_number>

      Both the entries will have port numbers against them. However, the uncommented entry (the entry without the #) is the one that denotes an active port. Therefore, specify the corresponding port number as the **CONNECTORPORT**.

    In case of situation (b), do the following to know the **CONNECTORPORT**:

    - Login to the WebSphere Administrative Console.
    - Expand the **Servers** node in the tree-structure in the left pane of the console, and click on the **Application Servers** link. A list of application server instances will then appear in the right pane.
    - Click on the server instance being monitored. Doing so invokes the **Configuration** of the chosen server instance appears.
    - Scroll down the **Configuration** to view the **End Points** link. Once you locate the **End Points** link, click on it.
    - In the page that appears next, click on the **SOAP_CONNECTOR_ADDRESS** link.
    - The **Port** displayed in that page should be used as the **CONNECTORPORT** in situation (b), as

    If both (a) and (b) do not apply, specify *none* against **CONNECTORPORT**.

9. **USER** - If security has been enabled for the WebSphere server being monitored, then provide a valid **USER** name to login to the WebSphere server. If the WebSphere server does not require any authentication, then the **USER** text box should contain the default value 'none'.

	10. **PASSWORD** – If security has been enabled for the WebSphere server being monitored, then provide the **PASSWORD** that corresponds to the specified **USER** name. If the WebSphere server does not require any authentication, then leave the **PASSWORD** text box with its default setting. 11. **CONFIRM PASSWORD** - If security has been enabled, confirm the specified **PASSWORD** by retyping it in the **CONFIRM PASSWORD** text box. If the WebSphere server does not require any authentication, then leave the **CONFIRM PASSWORD** text box with its default setting. 12. **ENCRYPTPASS** – By default, this flag is set to **YES**, indicating that the **PASSWORD** of the WebSphere server is encrypted by default. To disable password encryption, select the **NO** option. 13. **SERVERNAME** – Specify the name of the WebSphere server instance to be monitored. To know the instances of a WebSphere server currently available, first, connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**. Then, login to the administrative console and expand the **Servers** node in the left pane of the console. Next, click on the **Application Servers** sub-node under the **Servers** node. A list of server instance **Names** and their corresponding **Node** values will then be displayed in the right pane. One of the displayed server instances can be specified as the value of the **SERVERNAME** parameter. 14. **TIMEOUT** - In the **TIMEOUT** text box, specify the maximum duration (in seconds) for which the test will wait for a response from the application server. The default **TIMEOUT** period is 60 seconds.
Outputs of the test	One set of results for each WebSphere application server.

Measurements made by the test	Measurement	Measurement Unit	Interpretation
	JVM total memory: Indicates the total heap size of the JVM.	MB	
	JVM used memory: Indicates the amount of memory that has been utilized by the JVM	MB	A high value of this measure indicates a heavy workload on the WebSphere application server. In such a case, you might want to consider increasing the JVM heap size.
	JVM free memory: Indicates the amount of memory currently available in the JVM.	MB	A very low value of this measure is indicative of excessive memory utilization in the JVM.

3.1.1.2 WebSphere Test

Since the WebSphere application server uses Java extensively, the performance of the Java Virtual Memory (JVM) can impact the WebSphere server's performance. This test measures the status of the JVM and the server's availability.

Purpose	To measure the JVM statistics and availability of a WebSphere application server
Target of the test	A WebSphere application server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebSphere application server 3. **PORT** – The port number of the WebSphere application server 4. **WEBSERVERPORT** – The port number through which the WebSphere applications can be accessed (For IBMHTTPServer this information can be found in the **`httpd.conf`** file located in **`$<INSTALLDIR>/conf`** directory.) 5. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebSphere server. 6. **SERVERHOSTNAME** - Specify the node name of the server instance being monitored. To know the node name, do the following ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the node name that corresponds to the application server instance being monitored, and specify that name against the **SERVERHOSTNAME** parameter. 7. **NDMANAGER** - The **NDMANAGER** parameter is applicable only under the following circumstances: a. If the WebSphere server being monitored belongs to a cluster, or, b. If the WebSphere server being monitored is one of many instances of the server running on the same host In the case of situation (a), in the **NDMANAGER** text box, provide the host name of the **NODE MANAGER** that manages the application servers in the cluster. To know the name of the **NODE MANAGER**, do the following: ➢ Login to the Administrative Console of the node manager using the URL http://<IPoftheWebSphereAppServer'sNodeManager>:<Adminport>/admin/. ➢ Using the tree-structure in the left pane of the Administrative Console that appears, drill down to the **Deployment Manager** node within **System Administration**. ➢ Select the **Configuration** tab that appears in the right pane, and scroll down to the **End Points** link in the **Additional Properties** section. ➢ Once you locate the **End Points** link, click on it, and in the page that appears, click on the **SOAP_CONNECTOR_ADDRESS** link.

- In the subsequent page, a fully qualified domain name will be displayed against **Host**. This is the name that should be specified as the host name of the node manager in the **NDMANAGER** text box.

In the case of situation (b), enter the **SERVERHOSTNAME** itself as the **NDMANAGER**. If both conditions (a) and (b) do not apply, then specify *none* here.

8. **CONNECTORPORT** - The **CONNECTORPORT** parameter is applicable only under the following circumstances:

   a. If the WebSphere server being monitored belongs to a cluster, or,

   b. If the WebSphere server being monitored is one of many instances of the server running on the same host

   In case of situation (a), the **CONNECTORPORT** parameter will take the port number using which the node manager communicates with the WebSphere servers in the cluster. The connector port can be a SOAP port or an RMI port. To know the port number, do the following:

   - From the Node manager's host, open the **<WEBSPHERE_INSTALL_DIR>\DeploymentManager\properties\wsadmin.properties** file.
   - Two entries that read as follows will be present in the wsadmin.properties file:

     com.ibm.ws.scripting.port=<port_number>

     #com.ibm.ws.scripting.port=<port_number>

     Both the entries will have port numbers against them. However, the uncommented entry (the entry without the #) is the one that denotes an active port. Therefore, specify the corresponding port number as the **CONNECTORPORT**.

   In case of situation (b), do the following to know the **CONNECTORPORT**:

   - Login to the WebSphere Administrative Console.
   - Expand the **Servers** node in the tree-structure in the left pane of the console, and click on the **Application Servers** link. A list of application server instances will then appear in the right pane.
   - Click on the server instance being monitored. Doing so invokes the **Configuration** of the chosen server instance appears.
   - Scroll down the **Configuration** to view the **End Points** link. Once you locate the **End Points** link, click on it.
   - In the page that appears next, click on the **SOAP_CONNECTOR_ADDRESS** link.
   - The **Port** displayed in that page should be used as the **CONNECTORPORT** in situation (b).

   If both (a) and (b) do not apply, specify *none* against **CONNECTORPORT**.

Outputs of the test	9. **USER** - If security has been enabled for the WebSphere server being monitored, then provide a valid **USER** name to login to the WebSphere server. If the WebSphere server does not require any authentication, then the **USER** text box should contain the default value 'none'. 10. **PASSWORD** – If security has been enabled for the WebSphere server being monitored, then provide the **PASSWORD** that corresponds to the specified **USER** name. If the WebSphere server does not require any authentication, then leave the **PASSWORD** text box with its default setting. 11. **CONFIRM PASSWORD** - If security has been enabled, confirm the specified **PASSWORD** by retyping it in the **CONFIRM PASSWORD** text box. If the WebSphere server does not require any authentication, then leave the **CONFIRM PASSWORD** text box with its default setting. 12. **ENCRYPTPASS** - If the specified password needs to be encrypted, set the **ENCRYPTPASS** flag to **YES**. Otherwise, set it to **NO**. By default, the **YES** option will be selected. 13. **SERVERNAME** – Specify the name of the WebSphere server instance to be monitored. To know the instances of a WebSphere server currently available, first, connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**. Then, login to the administrative console and expand the **Servers** node in the left pane of the console. Next, click on the **Application Servers** sub-node under the **Servers** node. A list of server instance **Names** and their corresponding **Node** values will then be displayed in the right pane. One of the displayed server instances can be specified as the value of the **SERVERNAME** parameter. 14. **TIMEOUT** - In the **TIMEOUT** text box, specify the maximum duration (in seconds) for which the test will wait for a response from the application server. The default **TIMEOUT** period is 60 seconds.

Measurements made by the test	Measurement	Measurement Unit	Interpretation
	Heap usage: Indicates the total JVM heap used.	Percent	A high percentage of the heap usage indicates either the applications running on this server might be utilizing/leaking too much memory or the server has reached the maximum memory capacity.
	Availability: Indicates the availability of the server.	Percent	A value of 100 for this measure indicates that the server is available. Any other value indicates that the server is not running.

3.1.1.3 WebSphere Thread Pools Test

To optimize performance and at the same time to support concurrent accesses from users, the application server uses thread pools. It is critical to monitor a WebSphere server's thread pools on an ongoing basis. This test does just that.

Purpose	To measure the statistics pertaining to the thread pools that exist in the WebSphere application server

Target of the test	A WebSphere application server
Agent deploying the test	An internal agent
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebSphere application server 3. **PORT** – The port number of the WebSphere application server 4. **WEBSERVERPORT** – The port number through which the WebSphere applications can be accessed (For IBMHTTPServer this information can be found in the **`httpd.conf`** file located in **`$<INSTALLDIR>/conf`** directory.) 5. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebSphere server. 6. **SERVERHOSTNAME** - Specify the node name of the server instance being monitored. To know the node name, do the following ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the node name that corresponds to the application server instance being monitored, and specify that name against the **SERVERHOSTNAME** parameter. 7. **NDMANAGER** - The **NDMANAGER** parameter is applicable only under the following circumstances: a. If the WebSphere server being monitored belongs to a cluster, or, b. If the WebSphere server being monitored is one of many instances of the server running on the same host In the case of situation (a), in the **NDMANAGER** text box, provide the host name of the **NODE MANAGER** that manages the application servers in the cluster. To know the name of the **NODE MANAGER**, do the following: ➢ Login to the Administrative Console of the node manager using the URL http://<IPoftheWebSphereAppServer'sNodeManager>:<Adminport>/admin/. ➢ Using the tree-structure in the left pane of the Administrative Console that appears, drill down to the **Deployment Manager** node within **System Administration**. ➢ Select the **Configuration** tab that appears in the right pane, and scroll down to the **End Points** link in the **Additional Properties** section. ➢ Once you locate the **End Points** link, click on it, and in the page that appears, click on the **SOAP_CONNECTOR_ADDRESS** link. ➢ In the subsequent page, a fully qualified domain name will be displayed against **Host**. This is the name that should be specified as the host name of the node manager in the **NDMANAGER** text box.

In the case of situation (b), enter the **SERVERHOSTNAME** itself as the **NDMANAGER**. If both conditions (a) and (b) do not apply, then specify *none* here.

8. **CONNECTORPORT** - The **CONNECTORPORT** parameter is applicable only under the following circumstances:

    a. If the WebSphere server being monitored belongs to a cluster, or,

    b. If the WebSphere server being monitored is one of many instances of the server running on the same host

    In case of situation (a), the **CONNECTORPORT** parameter will take the port number using which the node manager communicates with the WebSphere servers in the cluster. The connector port can be a SOAP port or an RMI port. To know the port number, do the following:

    - From the Node manager's host, open the **<WEBSPHERE_INSTALL_DIR>\DeploymentManager\properties\wsadmin.properties** file.
    - Two entries that read as follows will be present in the wsadmin.properties file:

        com.ibm.ws.scripting.port=<port_number>

        #com.ibm.ws.scripting.port=<port_number>

      Both the entries will have port numbers against them. However, the uncommented entry (the entry without the #) is the one that denotes an active port. Therefore, specify the corresponding port number as the **CONNECTORPORT**.

    In case of situation (b), do the following to know the **CONNECTORPORT**:

    - Login to the WebSphere Administrative Console.
    - Expand the **Servers** node in the tree-structure in the left pane of the console, and click on the **Application Servers** link. A list of application server instances will then appear in the right pane.
    - Click on the server instance being monitored. Doing so invokes the **Configuration** of the chosen server instance appears.
    - Scroll down the **Configuration** to view the **End Points** link. Once you locate the **End Points** link, click on it.
    - In the page that appears next, click on the **SOAP_CONNECTOR_ADDRESS** link.
    - The **Port** displayed in that page should be used as the **CONNECTORPORT** in situation (b).

    If both (a) and (b) do not apply, specify *none* against **CONNECTORPORT**.

	9. **USER** - If security has been enabled for the WebSphere server being monitored, then provide a valid **USER** name to login to the WebSphere server. If the WebSphere server does not require any authentication, then the **USER** text box should contain the default value 'none'. 10. **PASSWORD** – If security has been enabled for the WebSphere server being monitored, then provide the **PASSWORD** that corresponds to the specified **USER** name. If the WebSphere server does not require any authentication, then leave the **PASSWORD** text box with its default setting. 11. **CONFIRM PASSWORD** - If security has been enabled, confirm the specified **PASSWORD** by retyping it in the **CONFIRM PASSWORD** text box. If the WebSphere server does not require any authentication, then leave the **CONFIRM PASSWORD** text box with its default setting. 12. **ENCRYPTPASS** – By default, this flag is set to **YES**, indicating that the **PASSWORD** of the WebSphere server is encrypted by default. To disable password encryption, select the **NO** option. 14. **SERVERNAME** – Specify the name of the WebSphere server instance to be monitored. To know the instances of a WebSphere server currently available, first, connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**. Then, login to the administrative console and expand the **Servers** node in the left pane of the console. Next, click on the **Application Servers** sub-node under the **Servers** node. A list of server instance **Names** and their corresponding **Node** values will then be displayed in the right pane. One of the displayed server instances can be specified as the value of the **SERVERNAME** parameter. 15. **TIMEOUT** - In the **TIMEOUT** text box, specify the maximum duration (in seconds) for which the test will wait for a response from the application server. The default **TIMEOUT** period is 60 seconds.
http://Ttp://IPOutputs of the test	One set of results for each thread pool that exists on a WebSphere application server.

Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Threads created: This measure indicates the rate at which the threads are being created in the pool.	Threads/Sec	A sudden increase in the value of this measure directly relates to an increase in the activity happening in this application.
	Threads destroyed: This measure indicates the rate at which the threads are being destroyed in the pool.	Threads/Sec	A decrease in the value of this measure indicates that the threads are being active for a long period of time, which might indicate anomalies within the application.

	Active threads: Indicates the average number of active threads in the pool.	Number	A high value for this measure is indicative of a high load on this application and combined with the creation and destroy rates might give insights of the application pattern. This measure is also useful for determining usage trends. For example, it can show the time of day and the day of the week in which you usually reach peak thread count. In addition, the creation of too many threads can result in out of memory errors or thrashing. By watching this metric, you can reduce excessive memory consumption before it's too late.
	Pool size: Indicates the average number of threads in the pool.	Number	If the pool size is high and the number of active threads is low, it signifies that the threads are not being destroyed immediately after use.
	Percent maxed: This indicates the average percent of time the number of threads in the pool reached or exceeded the configured maximum number.	Percent	A high value for this measure indicates that the number of threads in the pool needs to be increased for effective operation of this application. Alternatively, you may also consider changing the maximum number of threads that a pool can contain However, exercise caution when altering the maximum thread count, as a very high thread count can cause the app to slowdown from excessive memory usage. Likewise, if the maximum thread count is set too low, it will cause requests to block or timeout. You can use this measure to see how often you are reaching the maximum thread count in a pool. This can be used to tune other properties – such as the amount of time before an idle thread is destroyed and the frequency of when new threads are created.

3.1.2 The WebSphere Database Layer

This layer tracks the statistics of the database access (connection pools) of the applications hosted on a WebSphere application server with the help of the WebSphereJdbc test (see Figure 3.3).

Figure 3.3: Tests mapping to the WebSphere Database layer

3.1.2.1 WebSphere JDBC Test

Rather than opening and closing connections for individual database accesses, the WebSphere application server creates pools of database connections that are reused. To understand the performance of a WebSphere application server, it is critical to monitor the usage of the connection pools by the server.

Purpose	To measure the statistics pertaining to the database connection pools that exist in the WebSphere application server
Target of the test	A WebSphere application server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebSphere application server 3. **PORT** – The port number of the WebSphere application server 4. **WEBSERVERPORT** – The port number through which the WebSphere applications can be accessed. 5. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebSphere server. 6. **SERVERHOSTNAME** - Specify the node name of the server instance being monitored. To know the node name, do the following: ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the node name that corresponds to the application server instance being monitored, and specify that name against the **SERVERHOSTNAME** parameter. 7. **NDMANAGER** - The **NDMANAGER** parameter is applicable only under the following circumstances: a. If the WebSphere server being monitored belongs to a cluster, or, b. If the WebSphere server being monitored is one of many instances of the server running on the same host In the case of situation (a), in the **NDMANAGER** text box, provide the host name of the **NODE MANAGER** that manages the application servers in the cluster. To know the name of the **NODE MANAGER**, do the following: ➢ Login to the Administrative Console of the node manager using the URL http://<IPoftheWebSphereAppServer'sNodeManager>:<Adminport>/admin/. ➢ Using the tree-structure in the left pane of the Administrative Console that appears, drill down to the **Deployment Manager** node within **System Administration**. ➢ Select the **Configuration** tab that appears in the right pane, and scroll down to the **End Points** link in the **Additional Properties** section. ➢ Once you locate the **End Points** link, click on it, and in the page that appears, click on the **SOAP_CONNECTOR_ADDRESS** link. ➢ In the subsequent page, a fully qualified domain name will be displayed against **Host**. This is the name that should be specified as the host name of the node manager in the **NDMANAGER** text box. In the case of situation (b), enter the **SERVERHOSTNAME** itself as the **NDMANAGER**. If both conditions (a) and (b) do not apply, then specify *none* here.

8. **CONNECTORPORT** - The **CONNECTORPORT** parameter is applicable only under the following circumstances:

    a. If the WebSphere server being monitored belongs to a cluster, or,

    b. If the WebSphere server being monitored is one of many instances of the server running on the same host

    In case of situation (a), the **CONNECTORPORT** parameter will take the port number using which the node manager communicates with the WebSphere servers in the cluster. The connector port can be a SOAP port or an RMI port. To know the port number, do the following:

    - From the Node manager's host, open the **<WEBSPHERE_INSTALL_DIR>\DeploymentManager\properties\wsadmin.properties** file.
    - Two entries that read as follows will be present in the wsadmin.properties file:

        com.ibm.ws.scripting.port=<port_number>

        #com.ibm.ws.scripting.port=<port_number>

        Both the entries will have port numbers against them. However, the uncommented entry (the entry without the #) is the one that denotes an active port. Therefore, specify the corresponding port number as the **CONNECTORPORT**.

    In case of situation (b), do the following to know the **CONNECTORPORT**:

    - Login to the WebSphere Administrative Console.
    - Expand the **Servers** node in the tree-structure in the left pane of the console, and click on the **Application Servers** link. A list of application server instances will then appear in the right pane.
    - Click on the server instance being monitored. Doing so invokes the **Configuration** of the chosen server instance appears.
    - Scroll down the **Configuration** to view the **End Points** link. Once you locate the **End Points** link, click on it.
    - In the page that appears next, click on the **SOAP_CONNECTOR_ADDRESS** link.
    - The **Port** displayed in that page should be used as the **CONNECTORPORT** in situation (b).

    If both (a) and (b) do not apply, specify *none* against **CONNECTORPORT**.

9. **USER** - If security has been enabled for the WebSphere server being monitored, then provide a valid **USER** name to login to the WebSphere server. If the WebSphere server does not require any authentication, then the **USER** text box should contain the default value 'none'.

10. **PASSWORD** – If security has been enabled for the WebSphere server being monitored, then provide the **PASSWORD** that corresponds to the specified **USER** name. If the WebSphere server does not require any authentication, then leave the **PASSWORD** text box with its default setting.

	11. **CONFIRM PASSWORD** - If security has been enabled, confirm the specified **PASSWORD** by retyping it in the **CONFIRM PASSWORD** text box. If the WebSphere server does not require any authentication, then leave the **CONFIRM PASSWORD** text box with its default setting. 12. **ENCRYPTPASS** – By default, this flag is set to **YES**, indicating that the **PASSWORD** of the WebSphere server is encrypted by default. To disable password encryption, select the **NO** option. 13. **SERVERNAME** – Specify the name of the WebSphere server instance to be monitored. To know the instances of a WebSphere server currently available, first, connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**. Then, login to the administrative console and expand the **Servers** node in the left pane of the console. Next, click on the **Application Servers** sub-node under the **Servers** node. A list of server instance **Names** and their corresponding **Node** values will then be displayed in the right pane. One of the displayed server instances can be specified as the value of the **SERVERNAME** parameter. 14. **TIMEOUT** - In the **TIMEOUT** text box, specify the maximum duration (in seconds) for which the test will wait for a response from the application server. The default **TIMEOUT** period is 60 seconds.
Outputs of the test	One set of results for each database connection pool that exists on the WebSphere application server being monitored.

Measurements made by the test	Measurement	Measurement Unit	Interpretation
	Database connection rate: Indicates the rate at which the connections are created in the pool.	Conns/Sec	A sudden increase in the value of this measure directly relates to an increase in the database activity happening in this application.
	Connection destroy rate: Indicates the rate at which the connections are released from the pool.	Conns/Sec	A decrease in the value of this measure points to an unusual performance of the application. The application might not be releasing the connections.
	Connection return rate: This measure indicates the rate at which the connections are being returned to the pool.	Conns/Sec	A low value of this measure might be due to some applications that are not releasing the connections to the pool.
	Allocate rate: Indicates the rate at which the connections are allocated from the pool.	Conns/Sec	A high value for this measure indicates more activity happening on the server. An unusually high value for this measure might result in the pool running out of connections, if the Return_rate is not concurrent.

	Pool size: Indicates the number of connections in the pool. It indicates the active pool size.	Number	A growing pool size may be due to some of the applications not releasing connections to the pool.
	Concurrent waiters: Indicates the average number of threads waiting for a connection.	Number	A high value indicates a bottleneck on the application server. This may be caused due to unreleased connections.
	Avg wait time: Indicates the average time that a client waited to be granted a connection.	Secs	An increase in this measure reflects a server bottleneck.
	Faults: Indicates the rate at which connection pool timeouts occur.	Faults/Sec	A high value is indicative of a bottleneck on the server.
	Usage: Indicates the average percentage of connections of the pool in use	Percent	This measure should not reach the maximum of 100% for optimal performance of the application server. To reduce this value, try increasing the pool size.
	Percent maxed: Average percentage of the time that all connections are in use.	Percent	A high value indicates that the pool size needs to be increased for effective operation of this application.
	Prepared statement cache discard rate: Indicates the rate at which the prepared statements are discarded from the cache.	Stmts/Sec	A high value indicates a bottleneck in the application. It is a sign of inefficient performance of the application.

3.1.3 The WebSphere EJB Layer

The WsBeans test shown in Figure 3.4 determines the status of the **WebSphere EJB** layer. This layer determines the status of specific Enterprise Java Bean (abbreviated as EJB in this manual) components hosted on a WebSphere server. The details of these tests are provided below:

Figure 3.4: Tests mapping to the WebSphere EJB layer

3.1.3.1.1 Ws Beans Test

Enterprise Java Beans (EJB) forms the critical components of any business application. WebSphere application server creates instances corresponding to the EJB. This test reports the performance metrics that determines the functioning of the EJB groups. Use the **Click here** hyperlink in the test configuration page to configure the EJB groups that need to be monitored by the eG Enterprise suite. **By default, the eG Enterprise system monitors only those EJBs that are part of a group.**

Purpose	To measure the statistics pertaining to the Enterprise Java Bean groups configured on the WebSphere application server.
Target of the test	A WebSphere application server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebSphere application server 3. **PORT** – The port number of the WebSphere application server 4. **WEBSERVERPORT** – The port number through which the WebSphere applications can be accessed. 5. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebSphere server. 6. **SERVERHOSTNAME** - Specify the node name of the server instance being monitored. To know the node name, do the following ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the node name that corresponds to the application server instance being monitored, and specify that name against the **SERVERHOSTNAME** parameter. 7. **NDMANAGER** - The **NDMANAGER** parameter is applicable only under the following circumstances: a. If the WebSphere server being monitored belongs to a cluster, or, b. If the WebSphere server being monitored is one of many instances of the server running on the same host In the case of situation (a), in the **NDMANAGER** text box, provide the host name of the **NODE MANAGER** that manages the application servers in the cluster. To know the name of the **NODE MANAGER**, do the following: ➢ Login to the Administrative Console of the node manager using the URL http://<IPoftheWebSphereAppServer'sNodeManager>:<Adminport>/admin/. ➢ Using the tree-structure in the left pane of the Administrative Console that appears, drill down to the **Deployment Manager** node within **System Administration**. ➢ Select the **Configuration** tab that appears in the right pane, and scroll down to the **End Points** link in the **Additional Properties** section. ➢ Once you locate the **End Points** link, click on it, and in the page that appears, click on the **SOAP_CONNECTOR_ADDRESS** link. ➢ In the subsequent page, a fully qualified domain name will be displayed against **Host**. This is the name that should be specified as the host name of the node manager in the **NDMANAGER** text box. In the case of situation (b), enter the **SERVERHOSTNAME** itself as the **NDMANAGER**. If both conditions (a) and (b) do not apply, then specify *none* here.

8. **CONNECTORPORT** - The **CONNECTORPORT** parameter is applicable only under the following circumstances:

    a. If the WebSphere server being monitored belongs to a cluster, or,

    b. If the WebSphere server being monitored is one of many instances of the server running on the same host

    In case of situation (a), the **CONNECTORPORT** parameter will take the port number using which the node manager communicates with the WebSphere servers in the cluster. The connector port can be a SOAP port or an RMI port. To know the port number, do the following:

    - From the Node manager's host, open the **<WEBSPHERE_INSTALL_DIR>\DeploymentManager\properties\wsadmin.properties** file.
    - Two entries that read as follows will be present in the wsadmin.properties file:

        com.ibm.ws.scripting.port=<port_number>

        #com.ibm.ws.scripting.port=<port_number>

        Both the entries will have port numbers against them. However, the uncommented entry (the entry without the #) is the one that denotes an active port. Therefore, specify the corresponding port number as the **CONNECTORPORT**.

    In case of situation (b), do the following to know the **CONNECTORPORT**:

    - Login to the WebSphere Administrative Console.
    - Expand the **Servers** node in the tree-structure in the left pane of the console, and click on the **Application Servers** link. A list of application server instances will then appear in the right pane.
    - Click on the server instance being monitored. Doing so invokes the **Configuration** of the chosen server instance appears.
    - Scroll down the **Configuration** to view the **End Points** link. Once you locate the **End Points** link, click on it.
    - In the page that appears next, click on the **SOAP_CONNECTOR_ADDRESS** link.
    - The **Port** displayed in that page should be used as the **CONNECTORPORT** in situation (b).

    If both (a) and (b) do not apply, specify *none* against **CONNECTORPORT**.

9. **USER** - If security has been enabled for the WebSphere server being monitored, then provide a valid **USER** name to login to the WebSphere server. If the WebSphere server does not require any authentication, then the **USER** text box should contain the default value 'none'.

10. **PASSWORD** – If security has been enabled for the WebSphere server being monitored, then provide the **PASSWORD** that corresponds to the specified **USER** name. If the WebSphere server does not require any authentication, then leave the **PASSWORD** text box with its default setting.

	11. **CONFIRM PASSWORD** - If security has been enabled, confirm the specified **PASSWORD** by retyping it in the **CONFIRM PASSWORD** text box. If the WebSphere server does not require any authentication, then leave the **CONFIRM PASSWORD** text box with its default setting. 12. **ENCRYPTPASS** – By default, this flag is set to **YES**, indicating that the **PASSWORD** of the WebSphere server is encrypted by default. To disable password encryption, select the **NO** option. 13. **AUTODISCOVERY** – By default, the eG suite allows administrators to configure EJB groups using the eG administrative interface, and reports metrics pertaining to every group so created. Accordingly, by default, **AUTODISCOVERY** is set to **NO**. If you want EJBs to be discovered and monitored automatically, then select the **YES** option against **AUTODISCOVERY**. When this is done, the eG agent automatically discovers all the EJBs on the WebSphere server, and reports one set of measures for every EJB hosted on the server. 14. **SERVERNAME** – Specify the name of the WebSphere server instance to be monitored. To know the instances of a WebSphere server currently available, first, connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**. Then, login to the administrative console and expand the **Servers** node in the left pane of the console. Next, click on the **Application Servers** sub-node under the **Servers** node. A list of server instance **Names** and their corresponding **Node** values will then be displayed in the right pane. One of the displayed server instances can be specified as the value of the **SERVERNAME** parameter. 15. **TIMEOUT** - In the **TIMEOUT** text box, specify the maximum duration (in seconds) for which the test will wait for a response from the application server. The default **TIMEOUT** period is 60 seconds. 16. **DETAILED DIAGNOSIS** - To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the **On** option. To disable the capability, click on the **Off** option. The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled: ➢ The eG manager license should allow the detailed diagnosis capability ➢ Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.		
Outputs of the test	One set of results for every EJB group configured		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**

	Bean instantiations: This measure indicates the rate at which the bean objects are instantiated.	Instances/Sec	A sudden increase in the rate of instantiations indicates a bottleneck on the server. It may be due to greater load on the server or there might be a loophole in the application.
	Bean destroys: Indicates the rate at which the bean objects are destroyed.	Instances/Sec	A very low value indicates a bottleneck on the server. This might affect the performance of the application.
	Bean method calls: This measure indicates the rate at which the methods are being processed by the server.	Methods/Sec	A high value indicates that the server is busy.
	Avg method rate: This measure indicates the average response time of all methods of the remote interface for this bean.	Secs	A sudden increase in the value of this measure is a sign of overload on the server.
	Avg bean creation time: Indicates the average method response time for creates.	Secs	This value should be low for optimal performance of the application server. The value may go high, if there are more objects in the pool, which is a sign of overload. This measure will not be available if the instrumentation level is set to H, instead of X.
	Bean pool size: Indicates the average number of objects in the pool.	Number	A large pool size signifies that some of the objects are not being released by the application.

3.1.4 The WebSphere Web Layer

This layer tracks the health of all web applications and transactions that exist on the server. Figure 3.5 depicts the tests that map to this layer.

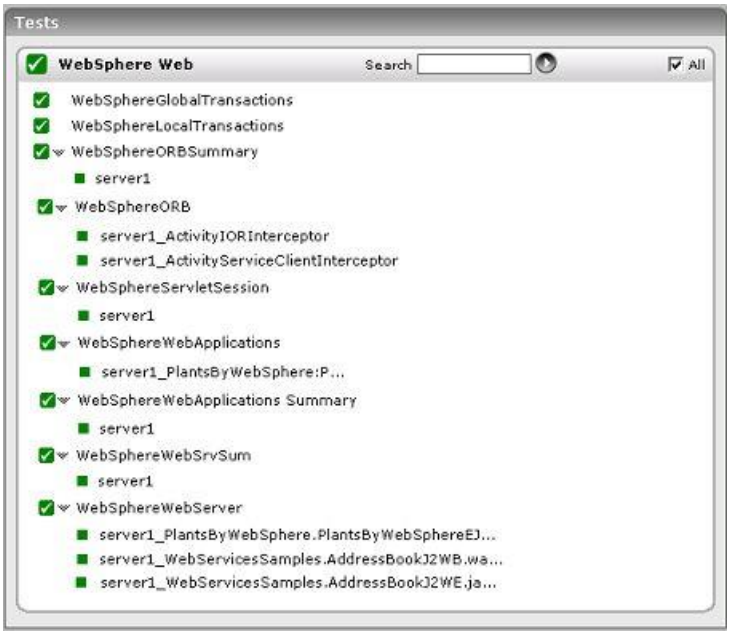


Figure 3.5: Tests mapping to the WebSphere Web layer

3.1.4.1 WebSphereGlobalTransactions Test

Transactions are the key functionality of the WebSphere application server. Global transactions are those that take place in more than one server. This test monitors the global transactions that are happening on different servers.

Purpose	To measure the statistics pertaining to the global transactions that take place in a WebSphere application server
Target of the test	A WebSphere application server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebSphere application server 3. **PORT** – The port number of the WebSphere application server 4. **WEBSERVERPORT** – The port number through which the WebSphere applications can be accessed. 5. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebSphere server. 6. **SERVERHOSTNAME** - Specify the node name of the server instance being monitored. To know the node name, do the following ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the node name that corresponds to the application server instance being monitored, and specify that name against the **SERVERHOSTNAME** parameter. 7. **NDMANAGER** - The **NDMANAGER** parameter is applicable only under the following circumstances: a. If the WebSphere server being monitored belongs to a cluster, or, b. If the WebSphere server being monitored is one of many instances of the server running on the same host In the case of situation (a), in the **NDMANAGER** text box, provide the host name of the **NODE MANAGER** that manages the application servers in the cluster. To know the name of the **NODE MANAGER**, do the following: ➢ Login to the Administrative Console of the node manager using the URL http://<IPoftheWebSphereAppServer'sNodeManager>:<Adminport>/admin/. ➢ Using the tree-structure in the left pane of the Administrative Console that appears, drill down to the **Deployment Manager** node within **System Administration**. ➢ Select the **Configuration** tab that appears in the right pane, and scroll down to the **End Points** link in the **Additional Properties** section. ➢ Once you locate the **End Points** link, click on it, and in the page that appears, click on the **SOAP_CONNECTOR_ADDRESS** link. ➢ In the subsequent page, a fully qualified domain name will be displayed against **Host**. This is the name that should be specified as the host name of the node manager in the **NDMANAGER** text box. In the case of situation (b), enter the **SERVERHOSTNAME** itself as the **NDMANAGER**. If both conditions (a) and (b) do not apply, then specify *none* here.

8. **CONNECTORPORT** - The **CONNECTORPORT** parameter is applicable only under the following circumstances:

    a. If the WebSphere server being monitored belongs to a cluster, or,

    b. If the WebSphere server being monitored is one of many instances of the server running on the same host

    In case of situation (a), the **CONNECTORPORT** parameter will take the port number using which the node manager communicates with the WebSphere servers in the cluster. The connector port can be a SOAP port or an RMI port. To know the port number, do the following:

    - From the Node manager's host, open the **<WEBSPHERE_INSTALL_DIR>\DeploymentManager\properties\wsadmin.properties** file.
    - Two entries that read as follows will be present in the wsadmin.properties file:

        com.ibm.ws.scripting.port=<port_number>

        #com.ibm.ws.scripting.port=<port_number>

        Both the entries will have port numbers against them. However, the uncommented entry (the entry without the #) is the one that denotes an active port. Therefore, specify the corresponding port number as the **CONNECTORPORT**.

    In case of situation (b), do the following to know the **CONNECTORPORT**:

    - Login to the WebSphere Administrative Console.
    - Expand the **Servers** node in the tree-structure in the left pane of the console, and click on the **Application Servers** link. A list of application server instances will then appear in the right pane.
    - Click on the server instance being monitored. Doing so invokes the **Configuration** of the chosen server instance appears.
    - Scroll down the **Configuration** to view the **End Points** link. Once you locate the **End Points** link, click on it.
    - In the page that appears next, click on the **SOAP_CONNECTOR_ADDRESS** link.
    - The **Port** displayed in that page should be used as the **CONNECTORPORT** in situation (b).

    If both (a) and (b) do not apply, specify *none* against **CONNECTORPORT**.

9. **USER** - If security has been enabled for the WebSphere server being monitored, then provide a valid **USER** name to login to the WebSphere server. If the WebSphere server does not require any authentication, then the **USER** text box should contain the default value 'none'.

10. **PASSWORD** – If security has been enabled for the WebSphere server being monitored, then provide the **PASSWORD** that corresponds to the specified **USER** name. If the WebSphere server does not require any authentication, then leave the **PASSWORD** text box with its default setting.

<table>
<tr><td></td><td colspan="3">11. CONFIRM PASSWORD - If security has been enabled, confirm the specified PASSWORD by retyping it in the CONFIRM PASSWORD text box. If the WebSphere server does not require any authentication, then leave the CONFIRM PASSWORD text box with its default setting.
12. ENCRYPTPASS – By default, this flag is set to YES, indicating that the PASSWORD of the WebSphere server is encrypted by default. To disable password encryption, select the NO option.
13. SERVERNAME – Specify the name of the WebSphere server instance to be monitored. To know the instances of a WebSphere server currently available, first, connect to the WebSphere Administrative console using the URL: http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin. Then, login to the administrative console and expand the Servers node in the left pane of the console. Next, click on the Application Servers sub-node under the Servers node. A list of server instance Names and their corresponding Node values will then be displayed in the right pane. One of the displayed server instances can be specified as the value of the SERVERNAME parameter.
14. TIMEOUT - In the TIMEOUT text box, specify the maximum duration (in seconds) for which the test will wait for a response from the application server. The default TIMEOUT period is 60 seconds.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for each WebSphere application server being monitored.</td></tr>
<tr><td rowspan="5">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Global transactions begun:
Indicates the rate at which global transactions are beginning to occur at the server.</td><td>Trans/Sec</td><td>A high value indicates an overload on the server.</td></tr>
<tr><td>Active global transactions:
Indicates the average number of concurrently active global transactions.</td><td>Number</td><td>If the value of this measure is high, it signifies greater load on the server. This might increase the number of waiting local transactions.</td></tr>
<tr><td>Global transaction duration:
Indicates the average duration of global transactions.</td><td>Secs</td><td>A high transaction duration value indicates increased load on the server.</td></tr>
<tr><td>Global commit duration:
Indicates the average duration of commit for global transactions.</td><td>Secs</td><td>If the total time taken for committing a global transaction is high, then it indicates a bottleneck on the server.</td></tr>
</table>

	Optimization rate: Indicates the rate at which global transactions being converted to single phase for optimization.	Trans/Sec	A sudden increase in this value might be caused due to one of the following reasons. a. There might be more number of requests for the application. b. There might be a bottleneck on the application.
	Global transaction commits: Indicates the rate at which global transactions are being committed.	Transactions/Sec	If the rate of transactions that are being committed is very high, it signifies load on the server. It might be caused when some locked transactions are released suddenly.
	Global transaction rollbacks: Indicates the rate at which the global transactions are being rolled back.	Trans/Sec	A high value indicates a problem with the application. Possible reasons could be the problem with the application or with some other dependent server (e.g. Database).
	Global transaction timeouts: Indicates the rate at which the global transactions are being timed out.	Trans/Sec	Again, a rise in the value could be due to the problem with the application or with some other dependent server like the database.
	Global transactions involved: Indicates the total number of global transactions involved at the server.	Number	A sudden increase in the value might be caused if the commit duration of a transaction goes low.
	Global prepare duration: This measure indicates the average duration of prepare for the global transactions.	Secs	A high value indicates a bottleneck on the server.

3.1.4.2 WebSphere Local Transactions Test

Local transactions are those transactions that occur within the server. This test reports all the performance metrics associated with the local transactions.

Purpose	To measure the statistics pertaining to the local transactions that take place in a WebSphere application server
Target of the test	A WebSphere application server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebSphere application server 3. **PORT** – The port number of the WebSphere application server 4. **WEBSERVERPORT** – The port number through which the WebSphere applications can be accessed. 5. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebSphere server. 6. **SERVERHOSTNAME** - Specify the node name of the server instance being monitored. To know the node name, do the following ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the node name that corresponds to the application server instance being monitored, and specify that name against the **SERVERHOSTNAME** parameter. 7. **NDMANAGER** - The **NDMANAGER** parameter is applicable only under the following circumstances: a. If the WebSphere server being monitored belongs to a cluster, or, b. If the WebSphere server being monitored is one of many instances of the server running on the same host In the case of situation (a), in the **NDMANAGER** text box, provide the host name of the **NODE MANAGER** that manages the application servers in the cluster. To know the name of the **NODE MANAGER**, do the following: ➢ Login to the Administrative Console of the node manager using the URL http://<IPoftheWebSphereAppServer'sNodeManager>:<Adminport>/admin/. ➢ Using the tree-structure in the left pane of the Administrative Console that appears, drill down to the **Deployment Manager** node within **System Administration**. ➢ Select the **Configuration** tab that appears in the right pane, and scroll down to the **End Points** link in the **Additional Properties** section. ➢ Once you locate the **End Points** link, click on it, and in the page that appears, click on the **SOAP_CONNECTOR_ADDRESS** link. ➢ In the subsequent page, a fully qualified domain name will be displayed against **Host**. This is the name that should be specified as the host name of the node manager in the **NDMANAGER** text box. In the case of situation (b), enter the **SERVERHOSTNAME** itself as the **NDMANAGER**. If both conditions (a) and (b) do not apply, then specify *none* here.

8. **CONNECTORPORT** - The **CONNECTORPORT** parameter is applicable only under the following circumstances:

    a. If the WebSphere server being monitored belongs to a cluster, or,

    b. If the WebSphere server being monitored is one of many instances of the server running on the same host

    In case of situation (a), the **CONNECTORPORT** parameter will take the port number using which the node manager communicates with the WebSphere servers in the cluster. The connector port can be a SOAP port or an RMI port. To know the port number, do the following:

    - From the Node manager's host, open the **<WEBSPHERE_INSTALL_DIR>\DeploymentManager\properties\wsadmin.properties** file.
    - Two entries that read as follows will be present in the wsadmin.properties file:

        com.ibm.ws.scripting.port=<port_number>

        #com.ibm.ws.scripting.port=<port_number>

        Both the entries will have port numbers against them. However, the uncommented entry (the entry without the #) is the one that denotes an active port. Therefore, specify the corresponding port number as the **CONNECTORPORT**.

    In case of situation (b), do the following to know the **CONNECTORPORT**:

    - Login to the WebSphere Administrative Console.
    - Expand the **Servers** node in the tree-structure in the left pane of the console, and click on the **Application Servers** link. A list of application server instances will then appear in the right pane.
    - Click on the server instance being monitored. Doing so invokes the **Configuration** of the chosen server instance appears.
    - Scroll down the **Configuration** to view the **End Points** link. Once you locate the **End Points** link, click on it.
    - In the page that appears next, click on the **SOAP_CONNECTOR_ADDRESS** link.
    - The **Port** displayed in that page should be used as the **CONNECTORPORT** in situation (b).

    If both (a) and (b) do not apply, specify *none* against **CONNECTORPORT**.

9. **USER** - If security has been enabled for the WebSphere server being monitored, then provide a valid **USER** name to login to the WebSphere server. If the WebSphere server does not require any authentication, then the **USER** text box should contain the default value 'none'.

10. **PASSWORD** – If security has been enabled for the WebSphere server being monitored, then provide the **PASSWORD** that corresponds to the specified **USER** name. If the WebSphere server does not require any authentication, then leave the **PASSWORD** text box with its default setting.

<table>
<tr><td></td><td colspan="3">11. CONFIRM PASSWORD - If security has been enabled, confirm the specified PASSWORD by retyping it in the CONFIRM PASSWORD text box. If the WebSphere server does not require any authentication, then leave the CONFIRM PASSWORD text box with its default setting.
12. ENCRYPTPASS – By default, this flag is set to YES, indicating that the PASSWORD of the WebSphere server is encrypted by default. To disable password encryption, select the NO option.
13. SERVERNAME – Specify the name of the WebSphere server instance to be monitored. To know the instances of a WebSphere server currently available, first, connect to the WebSphere Administrative console using the URL: http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin. Then, login to the administrative console and expand the Servers node in the left pane of the console. Next, click on the Application Servers sub-node under the Servers node. A list of server instance Names and their corresponding Node values will then be displayed in the right pane. One of the displayed server instances can be specified as the value of the SERVERNAME parameter.
14. TIMEOUT - In the TIMEOUT text box, specify the maximum duration (in seconds) for which the test will wait for a response from the application server. The default TIMEOUT period is 60 seconds.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for each WebSphere application server being monitored.</td></tr>
<tr><td rowspan="6">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Local transaction begin rate:
Indicates the rate at which the local transactions begin at the server.</td><td>Transactions/Sec</td><td>A high value indicates an increased overload on the server.</td></tr>
<tr><td>Active local transactions:
Indicates the average number of concurrently active local transactions.</td><td>Number</td><td>If the value of this measure is high, it signifies greater load on the server. This might increase the number of waiting local transactions.</td></tr>
<tr><td>Local transaction duration:
Indicates the average duration of the local transactions.</td><td>Secs</td><td>A high transaction duration value indicates increased load on the server.</td></tr>
<tr><td>Local commit duration:
Indicates the average duration of commit for local transactions.</td><td>Secs</td><td>If the total time taken for committing a local transaction is high, then it indicates a bottleneck on the server.</td></tr>
<tr><td>Local transaction commits:
Indicates the rate at which the local transactions are being committed.</td><td>Trans/Sec</td><td>If the rate of transactions that are being committed is very high, it signifies load on the server. It might be caused when some locked transactions are released suddenly.</td></tr>
</table>

	Local transaction rollbacks: Indicates the rate at which the local transactions are being rolled back.	Trans/Sec	A high value indicates a problem with the application. Possible reasons could be the problem with application or with some other dependent server (e.g. Database).
	Local transaction timeouts: Indicates the rate at which the local transactions are being timed out.	Trans/Sec	Again, a rise in the value could be due to the problem with the application or with some other dependent server like the database.

3.1.4.3 WebSphere Servlet Sessions Test

Http sessions form a part of any business application. This test monitors the http sessions on the WebSphere application server.

Purpose	To measure the statistics pertaining to the servlet sessions in a WebSphere application server
Target of the test	A WebSphere application server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebSphere application server 3. **PORT** – The port number of the WebSphere application server 4. **WEBSERVERPORT** – The port number through which the WebSphere applications can be accessed. 5. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebSphere server. 6. **SERVERHOSTNAME** - Specify the node name of the server instance being monitored. To know the node name, do the following ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the node name that corresponds to the application server instance being monitored, and specify that name against the **SERVERHOSTNAME** parameter. 7. **NDMANAGER** - The **NDMANAGER** parameter is applicable only under the following circumstances: a. If the WebSphere server being monitored belongs to a cluster, or, b. If the WebSphere server being monitored is one of many instances of the server running on the same host In the case of situation (a), in the **NDMANAGER** text box, provide the host name of the **NODE MANAGER** that manages the application servers in the cluster. To know the name of the **NODE MANAGER**, do the following: ➢ Login to the Administrative Console of the node manager using the URL http://<IPoftheWebSphereAppServer'sNodeManager>:<Adminport>/admin/. ➢ Using the tree-structure in the left pane of the Administrative Console that appears, drill down to the **Deployment Manager** node within **System Administration**. ➢ Select the **Configuration** tab that appears in the right pane, and scroll down to the **End Points** link in the **Additional Properties** section. ➢ Once you locate the **End Points** link, click on it, and in the page that appears, click on the **SOAP_CONNECTOR_ADDRESS** link. ➢ In the subsequent page, a fully qualified domain name will be displayed against **Host**. This is the name that should be specified as the host name of the node manager in the **NDMANAGER** text box. In the case of situation (b), enter the **SERVERHOSTNAME** itself as the **NDMANAGER**. If both conditions (a) and (b) do not apply, then specify *none* here.

8. **CONNECTORPORT** - The **CONNECTORPORT** parameter is applicable only under the following circumstances:

    a. If the WebSphere server being monitored belongs to a cluster, or,

    b. If the WebSphere server being monitored is one of many instances of the server running on the same host

    In case of situation (a), the **CONNECTORPORT** parameter will take the port number using which the node manager communicates with the WebSphere servers in the cluster. The connector port can be a SOAP port or an RMI port. To know the port number, do the following:

    - From the Node manager's host, open the **<WEBSPHERE_INSTALL_DIR>\DeploymentManager\properties\wsadmin.properties** file.
    - Two entries that read as follows will be present in the wsadmin.properties file:

        com.ibm.ws.scripting.port=<port_number>

        #com.ibm.ws.scripting.port=<port_number>

        Both the entries will have port numbers against them. However, the uncommented entry (the entry without the #) is the one that denotes an active port. Therefore, specify the corresponding port number as the **CONNECTORPORT**.

    In case of situation (b), do the following to know the **CONNECTORPORT**:

    - Login to the WebSphere Administrative Console.
    - Expand the **Servers** node in the tree-structure in the left pane of the console, and click on the **Application Servers** link. A list of application server instances will then appear in the right pane.
    - Click on the server instance being monitored. Doing so invokes the **Configuration** of the chosen server instance appears.
    - Scroll down the **Configuration** to view the **End Points** link. Once you locate the **End Points** link, click on it.
    - In the page that appears next, click on the **SOAP_CONNECTOR_ADDRESS** link.
    - The **Port** displayed in that page should be used as the **CONNECTORPORT** in situation (b).

    If both (a) and (b) do not apply, specify *none* against **CONNECTORPORT**.

9. **USER** - If security has been enabled for the WebSphere server being monitored, then provide a valid **USER** name to login to the WebSphere server. If the WebSphere server does not require any authentication, then the **USER** text box should contain the default value 'none'.

10. **PASSWORD** – If security has been enabled for the WebSphere server being monitored, then provide the **PASSWORD** that corresponds to the specified **USER** name. If the WebSphere server does not require any authentication, then leave the **PASSWORD** text box with its default setting.

<table>
<tr><td></td><td colspan="3">11. CONFIRM PASSWORD - If security has been enabled, confirm the specified PASSWORD by retyping it in the CONFIRM PASSWORD text box. If the WebSphere server does not require any authentication, then leave the CONFIRM PASSWORD text box with its default setting.
12. ENCRYPTPASS – By default, this flag is set to YES, indicating that the PASSWORD of the WebSphere server is encrypted by default. To disable password encryption, select the NO option.
13. SERVERNAME – Specify the name of the WebSphere server instance to be monitored. To know the instances of a WebSphere server currently available, first, connect to the WebSphere Administrative console using the URL: http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin. Then, login to the administrative console and expand the Servers node in the left pane of the console. Next, click on the Application Servers sub-node under the Servers node. A list of server instance Names and their corresponding Node values will then be displayed in the right pane. One of the displayed server instances can be specified as the value of the SERVERNAME parameter.
14. TIMEOUT - In the TIMEOUT text box, specify the maximum duration (in seconds) for which the test will wait for a response from the application server. The default TIMEOUT period is 60 seconds.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for each WebSphere application server being monitored.</td></tr>
<tr><td rowspan="4">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Session creation rate:
Indicates the rate at which the sessions are created in the server.</td><td>Sessions/Sec</td><td>A high value indicates a high level of activity in this application. By observing the variations to this measure over time, you can determine usage trends such as the time of day when an application is getting the most amount of traffic.</td></tr>
<tr><td>Invalidated sessions:
Indicates the number of sessions that were invalidated.</td><td>Number</td><td>This message is indicative of the session usage pattern of this application.</td></tr>
<tr><td>Session life time:
This measure indicates the average lifetime of a session.</td><td>Secs</td><td>A long session lifetime may occur due to one of the following reasons:
a. The application may not timeout the sessions after a fixed interval of time.
b. The sessions in the application might be active for a very long time.</td></tr>
</table>

	Active sessions: This measure indicates the total number of sessions that currently are being accessed by the requests.	Number	A high value indicates an increased workload on the server.
	Live sessions: Indicates the total number of valid sessions on the server.	Number	A high value indicates an increased workload on the server.

3.1.4.4 WebSphere Web Applications Test

A web application is a collection of different web components such as servlets, JSPs etc. This test tracks the statistics pertaining to the web applications hosted on the WebSphere application server.

Purpose	To measure the statistics pertaining to the web applications that exist in the WebSphere application server
Target of the test	A WebSphere application server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebSphere application server 3. **PORT** – The port number of the WebSphere application server 4. **WEBSERVERPORT** – The port number through which the WebSphere applications can be accessed. 5. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebSphere server. 6. **SERVERHOSTNAME** - Specify the node name of the server instance being monitored. To know the node name, do the following ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the node name that corresponds to the application server instance being monitored, and specify that name against the **SERVERHOSTNAME** parameter. 7. **NDMANAGER** - The **NDMANAGER** parameter is applicable only under the following circumstances: a. If the WebSphere server being monitored belongs to a cluster, or, b. If the WebSphere server being monitored is one of many instances of the server running on the same host In the case of situation (a), in the **NDMANAGER** text box, provide the host name of the **NODE MANAGER** that manages the application servers in the cluster. To know the name of the **NODE MANAGER**, do the following: ➢ Login to the Administrative Console of the node manager using the URL http://<IPoftheWebSphereAppServer'sNodeManager>:<Adminport>/admin/. ➢ Using the tree-structure in the left pane of the Administrative Console that appears, drill down to the **Deployment Manager** node within **System Administration**. ➢ Select the **Configuration** tab that appears in the right pane, and scroll down to the **End Points** link in the **Additional Properties** section. ➢ Once you locate the **End Points** link, click on it, and in the page that appears, click on the **SOAP_CONNECTOR_ADDRESS** link. ➢ In the subsequent page, a fully qualified domain name will be displayed against **Host**. This is the name that should be specified as the host name of the node manager in the **NDMANAGER** text box. In the case of situation (b), enter the **SERVERHOSTNAME** itself as the **NDMANAGER**. If both conditions (a) and (b) do not apply, then specify *none* here.

8. **CONNECTORPORT** - The **CONNECTORPORT** parameter is applicable only under the following circumstances:

    a. If the WebSphere server being monitored belongs to a cluster, or,

    b. If the WebSphere server being monitored is one of many instances of the server running on the same host

    In case of situation (a), the **CONNECTORPORT** parameter will take the port number using which the node manager communicates with the WebSphere servers in the cluster. The connector port can be a SOAP port or an RMI port. To know the port number, do the following:

    - From the Node manager's host, open the **<WEBSPHERE_INSTALL_DIR>\DeploymentManager\properties\wsadmin.properties** file.
    - Two entries that read as follows will be present in the wsadmin.properties file:

        com.ibm.ws.scripting.port=<port_number>

        #com.ibm.ws.scripting.port=<port_number>

        Both the entries will have port numbers against them. However, the uncommented entry (the entry without the #) is the one that denotes an active port. Therefore, specify the corresponding port number as the **CONNECTORPORT**.

    In case of situation (b), do the following to know the **CONNECTORPORT**:

    - Login to the WebSphere Administrative Console.
    - Expand the **Servers** node in the tree-structure in the left pane of the console, and click on the **Application Servers** link. A list of application server instances will then appear in the right pane.
    - Click on the server instance being monitored. Doing so invokes the **Configuration** of the chosen server instance appears.
    - Scroll down the **Configuration** to view the **End Points** link. Once you locate the **End Points** link, click on it.
    - In the page that appears next, click on the **SOAP_CONNECTOR_ADDRESS** link.
    - The **Port** displayed in that page should be used as the **CONNECTORPORT** in situation (b).

    If both (a) and (b) do not apply, specify *none* against **CONNECTORPORT**.

9. **USER** - If security has been enabled for the WebSphere server being monitored, then provide a valid **USER** name to login to the WebSphere server. If the WebSphere server does not require any authentication, then the **USER** text box should contain the default value 'none'.

10. **PASSWORD** – If security has been enabled for the WebSphere server being monitored, then provide the **PASSWORD** that corresponds to the specified **USER** name. If the WebSphere server does not require any authentication, then leave the **PASSWORD** text box with its default setting.

	11. **CONFIRM PASSWORD** - If security has been enabled, confirm the specified **PASSWORD** by retyping it in the **CONFIRM PASSWORD** text box. If the WebSphere server does not require any authentication, then leave the **CONFIRM PASSWORD** text box with its default setting. 12. **ENCRYPTPASS** – By default, this flag is set to **YES**, indicating that the **PASSWORD** of the WebSphere server is encrypted by default. To disable password encryption, select the **NO** option. 13. **SERVERNAME** – Specify the name of the WebSphere server instance to be monitored. To know the instances of a WebSphere server currently available, first, connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**. Then, login to the administrative console and expand the **Servers** node in the left pane of the console. Next, click on the **Application Servers** sub-node under the **Servers** node. A list of server instance **Names** and their corresponding **Node** values will then be displayed in the right pane. One of the displayed server instances can be specified as the value of the **SERVERNAME** parameter. 14. **TIMEOUT** - In the **TIMEOUT** text box, specify the maximum duration (in seconds) for which the test will wait for a response from the application server. The default **TIMEOUT** period is 60 seconds.
Outputs of the test	One set of results for each web application that is deployed in the WebSphere application server being monitored.

Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Loaded servlets: Indicates the current number of loaded servlets.	Number	A sudden increase in the number of loaded servlets indicates an increase in the load on the server or for that particular application.
	Reloads: Indicates the number of times the servlet is being reloaded.	Number	It is preferable to have minimum reloads for optimal performance of the application.
	Requests: Indicates the total number of requests for the servlets.	Reqs/Sec	An increase in the request rate indicates an increase in the server load.
	Concurrent requests: Number of requests that are concurrently being processed.	Number	An increase in the value of this measure indicates an increase in the user workload. It may also increase due to the overload on the server.

	Avg response time: Indicates the time taken for the completion of the requests.	Secs	An increasing value indicates a bottleneck on the server. This may arise due to one of the following reasons: 1.The server might be running out of resources. 2. The server may be overloaded with requests. 3. Some problem with the available bandwidth on the network.
	Errors: Indicates the rate at which errors or exceptions are occurring in the servlets.	Errors/Sec	A high rate of errors might occur due to too many requests on the application or there might be a bottleneck on the application.

3.1.4.5 WebSphere ORB Summary Test

This test reports statistics pertaining to the ORBs (Object Request Broker) on a WebSphere server.

Purpose	To report statistics pertaining to the ORBs (Object Request Broker) on a WebSphere server
Target of the test	A WebSphere application server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebSphere application server 3. **PORT** – The port number of the WebSphere application server 4. **WEBSERVERPORT** – The port number through which the WebSphere applications can be accessed. 5. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebSphere server. 6. **SERVERHOSTNAME** - Specify the node name of the server instance being monitored. To know the node name, do the following ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the node name that corresponds to the application server instance being monitored, and specify that name against the **SERVERHOSTNAME** parameter. 7. **NDMANAGER** - The **NDMANAGER** parameter is applicable only under the following circumstances: a. If the WebSphere server being monitored belongs to a cluster, or, b. If the WebSphere server being monitored is one of many instances of the server running on the same host In the case of situation (a), in the **NDMANAGER** text box, provide the host name of the **NODE MANAGER** that manages the application servers in the cluster. To know the name of the **NODE MANAGER**, do the following: ➢ Login to the Administrative Console of the node manager using the URL http://<IPoftheWebSphereAppServer'sNodeManager>:<Adminport>/admin/. ➢ Using the tree-structure in the left pane of the Administrative Console that appears, drill down to the **Deployment Manager** node within **System Administration**. ➢ Select the **Configuration** tab that appears in the right pane, and scroll down to the **End Points** link in the **Additional Properties** section. ➢ Once you locate the **End Points** link, click on it, and in the page that appears, click on the **SOAP_CONNECTOR_ADDRESS** link. ➢ In the subsequent page, a fully qualified domain name will be displayed against **Host**. This is the name that should be specified as the host name of the node manager in the **NDMANAGER** text box. In the case of situation (b), enter the **SERVERHOSTNAME** itself as the **NDMANAGER**. If both conditions (a) and (b) do not apply, then specify *none* here.

8. **CONNECTORPORT** - The **CONNECTORPORT** parameter is applicable only under the following circumstances:

    a. If the WebSphere server being monitored belongs to a cluster, or,

    b. If the WebSphere server being monitored is one of many instances of the server running on the same host

    In case of situation (a), the **CONNECTORPORT** parameter will take the port number using which the node manager communicates with the WebSphere servers in the cluster. The connector port can be a SOAP port or an RMI port. To know the port number, do the following:

    - From the Node manager's host, open the **<WEBSPHERE_INSTALL_DIR>\DeploymentManager\properties\wsadmin.properties** file.
    - Two entries that read as follows will be present in the wsadmin.properties file:

        com.ibm.ws.scripting.port=<port_number>

        #com.ibm.ws.scripting.port=<port_number>

        Both the entries will have port numbers against them. However, the uncommented entry (the entry without the #) is the one that denotes an active port. Therefore, specify the corresponding port number as the **CONNECTORPORT**.

    In case of situation (b), do the following to know the **CONNECTORPORT**:

    - Login to the WebSphere Administrative Console.
    - Expand the **Servers** node in the tree-structure in the left pane of the console, and click on the **Application Servers** link. A list of application server instances will then appear in the right pane.
    - Click on the server instance being monitored. Doing so invokes the **Configuration** of the chosen server instance appears.
    - Scroll down the **Configuration** to view the **End Points** link. Once you locate the **End Points** link, click on it.
    - In the page that appears next, click on the **SOAP_CONNECTOR_ADDRESS** link.
    - The **Port** displayed in that page should be used as the **CONNECTORPORT** in situation (b).

    If both (a) and (b) do not apply, specify *none* against **CONNECTORPORT**.

9. **USER** - If security has been enabled for the WebSphere server being monitored, then provide a valid **USER** name to login to the WebSphere server. If the WebSphere server does not require any authentication, then the **USER** text box should contain the default value 'none'.

10. **PASSWORD** – If security has been enabled for the WebSphere server being monitored, then provide the **PASSWORD** that corresponds to the specified **USER** name. If the WebSphere server does not require any authentication, then leave the **PASSWORD** text box with its default setting.

<table>
<tr><td></td><td colspan="3">11. CONFIRM PASSWORD - If security has been enabled, confirm the specified PASSWORD by retyping it in the CONFIRM PASSWORD text box. If the WebSphere server does not require any authentication, then leave the CONFIRM PASSWORD text box with its default setting.
12. ENCRYPTPASS – By default, this flag is set to YES, indicating that the PASSWORD of the WebSphere server is encrypted by default. To disable password encryption, select the NO option.
13. SERVERNAME – Specify the name of the WebSphere server instance to be monitored. To know the instances of a WebSphere server currently available, first, connect to the WebSphere Administrative console using the URL: http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin. Then, login to the administrative console and expand the Servers node in the left pane of the console. Next, click on the Application Servers sub-node under the Servers node. A list of server instance Names and their corresponding Node values will then be displayed in the right pane. One of the displayed server instances can be specified as the value of the SERVERNAME parameter.
14. TIMEOUT - In the TIMEOUT text box, specify the maximum duration (in seconds) for which the test will wait for a response from the application server. The default TIMEOUT period is 60 seconds.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for each server instance being monitored</td></tr>
<tr><td rowspan="5">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Reference lookup time:
The amount of time taken to lookup an object reference before method dispatch can be carried out.</td><td>Secs</td><td>An excessively long time may indicate an EJB container lookup problem.</td></tr>
<tr><td>Total requests:
Indicates the total number of requests sent to the ORB.</td><td>Number</td><td></td></tr>
<tr><td>Concurrent requests:
Indicates the number of requests that are concurrently processed by the ORB.</td><td>Number</td><td></td></tr>
<tr><td>Avg processing time:
Indicates the time it takes a registered portable interceptor to run.</td><td>Secs</td><td></td></tr>
</table>

3.1.4.6 WebSphere Web Applications Summary Test

This tes t reports statistics pertaining to the web applications deployed on a WebSphere server.

Purpose	To report statistics pertaining to the web applications deployed on a WebSphere server
Target of the test	A WebSphere application server
Agent deploying the test	An internal agent
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebSphere application server 3. **PORT** – The port number of the WebSphere application server 4. **WEBSERVERPORT** – The port number through which the WebSphere applications can be accessed. 5. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebSphere server. 6. **SERVERHOSTNAME** - Specify the node name of the server instance being monitored. To know the node name, do the following ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the node name that corresponds to the application server instance being monitored, and specify that name against the **SERVERHOSTNAME** parameter. 7. **NDMANAGER** - The **NDMANAGER** parameter is applicable only under the following circumstances: a. If the WebSphere server being monitored belongs to a cluster, or, b. If the WebSphere server being monitored is one of many instances of the server running on the same host In the case of situation (a), in the **NDMANAGER** text box, provide the host name of the **NODE MANAGER** that manages the application servers in the cluster. To know the name of the **NODE MANAGER**, do the following: ➢ Login to the Administrative Console of the node manager using the URL http://<IPoftheWebSphereAppServer'sNodeManager>:<Adminport>/admin/. ➢ Using the tree-structure in the left pane of the Administrative Console that appears, drill down to the **Deployment Manager** node within **System Administration**. ➢ Select the **Configuration** tab that appears in the right pane, and scroll down to the **End Points** link in the **Additional Properties** section. ➢ Once you locate the **End Points** link, click on it, and in the page that appears, click on the **SOAP_CONNECTOR_ADDRESS** link.

- In the subsequent page, a fully qualified domain name will be displayed against **Host**. This is the name that should be specified as the host name of the node manager in the **NDMANAGER** text box.

8. In the case of situation (b), enter the **SERVERHOSTNAME** itself as the **NDMANAGER**. If both conditions (a) and (b) do not apply, then specify *none* here.

9. **CONNECTORPORT** - The **CONNECTORPORT** parameter is applicable only under the following circumstances:

    a. If the WebSphere server being monitored belongs to a cluster, or,

    b. If the WebSphere server being monitored is one of many instances of the server running on the same host

    In case of situation (a), the **CONNECTORPORT** parameter will take the port number using which the node manager communicates with the WebSphere servers in the cluster. The connector port can be a SOAP port or an RMI port. To know the port number, do the following:

    - From the Node manager's host, open the **<WEBSPHERE_INSTALL_DIR>\DeploymentManager\properties\wsadmin.properties** file.
    - Two entries that read as follows will be present in the wsadmin.properties file:

        com.ibm.ws.scripting.port=<port_number>

        #com.ibm.ws.scripting.port=<port_number>

      Both the entries will have port numbers against them. However, the uncommented entry (the entry without the #) is the one that denotes an active port. Therefore, specify the corresponding port number as the **CONNECTORPORT**.

    In case of situation (b), do the following to know the **CONNECTORPORT**:

    - Login to the WebSphere Administrative Console.
    - Expand the **Servers** node in the tree-structure in the left pane of the console, and click on the **Application Servers** link. A list of application server instances will then appear in the right pane.
    - Click on the server instance being monitored. Doing so invokes the **Configuration** of the chosen server instance appears.
    - Scroll down the **Configuration** to view the **End Points** link. Once you locate the **End Points** link, click on it.
    - In the page that appears next, click on the **SOAP_CONNECTOR_ADDRESS** link.
    - The **Port** displayed in that page should be used as the **CONNECTORPORT** in situation (b).

    If both (a) and (b) do not apply, specify *none* against **CONNECTORPORT**.

	10. **USER** - If security has been enabled for the WebSphere server being monitored, then provide a valid **USER** name to login to the WebSphere server. If the WebSphere server does not require any authentication, then the **USER** text box should contain the default value 'none'. 11. **PASSWORD** – If security has been enabled for the WebSphere server being monitored, then provide the **PASSWORD** that corresponds to the specified **USER** name. If the WebSphere server does not require any authentication, then leave the **PASSWORD** text box with its default setting. 12. **CONFIRM PASSWORD** - If security has been enabled, confirm the specified **PASSWORD** by retyping it in the **CONFIRM PASSWORD** text box. If the WebSphere server does not require any authentication, then leave the **CONFIRM PASSWORD** text box with its default setting. 13. **ENCRYPTPASS** – By default, this flag is set to **YES**, indicating that the **PASSWORD** of the WebSphere server is encrypted by default. To disable password encryption, select the **NO** option. 14. **SERVERNAME** – Specify the name of the WebSphere server instance to be monitored. To know the instances of a WebSphere server currently available, first, connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**. Then, login to the administrative console and expand the **Servers** node in the left pane of the console. Next, click on the **Application Servers** sub-node under the **Servers** node. A list of server instance **Names** and their corresponding **Node** values will then be displayed in the right pane. One of the displayed server instances can be specified as the value of the **SERVERNAME** parameter. 15. **TIMEOUT** - In the **TIMEOUT** text box, specify the maximum duration (in seconds) for which the test will wait for a response from the application server. The default **TIMEOUT** period is 60 seconds.
Outputs of the test	One set of results for each server instance being monitored

Measurements made by the test	Measurement	Measurement Unit	Interpretation
	Loaded servlets: Indicates the number of servlets that were loaded.	Number	
	Reloads: Indicates the number of servlets that were reloaded.	Number	
	Total requests: Indicates the number of requests that the servlets have processed.	Number	
	Concurrent requests: Indicates the number of requests that the servlets have concurrently processed.	Number	

	Avg response time: Indicates the time it takes for a servlet request to be serviced.	Secs	
	Total errors: Indicates the total number of errors in the servlet/JSP.	Number	

3.1.4.7 WebSphere Web Server Summary Test

This test reports statistics pertaining to the web services mounted on a WebSphere server.

Purpose	To report statistics pertaining to the web services mounted on a WebSphere server
Target of the test	A WebSphere application server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebSphere application server 3. **PORT** – The port number of the WebSphere application server 4. **WEBSERVERPORT** – The port number through which the WebSphere applications can be accessed. 5. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebSphere server. 6. **SERVERHOSTNAME** - Specify the node name of the server instance being monitored. To know the node name, do the following ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the node name that corresponds to the application server instance being monitored, and specify that name against the **SERVERHOSTNAME** parameter. 7. **NDMANAGER** - The **NDMANAGER** parameter is applicable only under the following circumstances: a. If the WebSphere server being monitored belongs to a cluster, or, b. If the WebSphere server being monitored is one of many instances of the server running on the same host In the case of situation (a), in the **NDMANAGER** text box, provide the host name of the **NODE MANAGER** that manages the application servers in the cluster. To know the name of the **NODE MANAGER**, do the following: ➢ Login to the Administrative Console of the node manager using the URL http://<IPoftheWebSphereAppServer'sNodeManager>:<Adminport>/admin/. ➢ Using the tree-structure in the left pane of the Administrative Console that appears, drill down to the **Deployment Manager** node within **System Administration**. ➢ Select the **Configuration** tab that appears in the right pane, and scroll down to the **End Points** link in the **Additional Properties** section. ➢ Once you locate the **End Points** link, click on it, and in the page that appears, click on the **SOAP_CONNECTOR_ADDRESS** link. ➢ In the subsequent page, a fully qualified domain name will be displayed against **Host**. This is the name that should be specified as the host name of the node manager in the **NDMANAGER** text box. ➢ In the case of situation (b), enter the **SERVERHOSTNAME** itself as the **NDMANAGER**. If both conditions (a) and (b) do not apply, then specify *none* here.

8. **CONNECTORPORT** - The **CONNECTORPORT** parameter is applicable only under the following circumstances:

    a. If the WebSphere server being monitored belongs to a cluster, or,

    b. If the WebSphere server being monitored is one of many instances of the server running on the same host

    In case of situation (a), the **CONNECTORPORT** parameter will take the port number using which the node manager communicates with the WebSphere servers in the cluster. The connector port can be a SOAP port or an RMI port. To know the port number, do the following:

    - From the Node manager's host, open the **<WEBSPHERE_INSTALL_DIR>\DeploymentManager\properties\wsadmin.properties** file.
    - Two entries that read as follows will be present in the wsadmin.properties file:

        com.ibm.ws.scripting.port=<port_number>

        #com.ibm.ws.scripting.port=<port_number>

        Both the entries will have port numbers against them. However, the uncommented entry (the entry without the #) is the one that denotes an active port. Therefore, specify the corresponding port number as the **CONNECTORPORT**.

    In case of situation (b), do the following to know the **CONNECTORPORT**:

    - Login to the WebSphere Administrative Console.
    - Expand the **Servers** node in the tree-structure in the left pane of the console, and click on the **Application Servers** link. A list of application server instances will then appear in the right pane.
    - Click on the server instance being monitored. Doing so invokes the **Configuration** of the chosen server instance appears.
    - Scroll down the **Configuration** to view the **End Points** link. Once you locate the **End Points** link, click on it.
    - In the page that appears next, click on the **SOAP_CONNECTOR_ADDRESS** link.
    - The **Port** displayed in that page should be used as the **CONNECTORPORT** in situation (b).

    If both (a) and (b) do not apply, specify *none* against **CONNECTORPORT**.

9. **USER** - If security has been enabled for the WebSphere server being monitored, then provide a valid **USER** name to login to the WebSphere server. If the WebSphere server does not require any authentication, then the **USER** text box should contain the default value 'none'.

10. **PASSWORD** – If security has been enabled for the WebSphere server being monitored, then provide the **PASSWORD** that corresponds to the specified **USER** name. If the WebSphere server does not require any authentication, then leave the **PASSWORD** text box with its default setting.

	11. **CONFIRM PASSWORD** - If security has been enabled, confirm the specified **PASSWORD** by retyping it in the **CONFIRM PASSWORD** text box. If the WebSphere server does not require any authentication, then leave the **CONFIRM PASSWORD** text box with its default setting. 12. **ENCRYPTPASS** – By default, this flag is set to **YES**, indicating that the **PASSWORD** of the WebSphere server is encrypted by default. To disable password encryption, select the **NO** option. 13. **SERVERNAME** – Specify the name of the WebSphere server instance to be monitored. To know the instances of a WebSphere server currently available, first, connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**. Then, login to the administrative console and expand the **Servers** node in the left pane of the console. Next, click on the **Application Servers** sub-node under the **Servers** node. A list of server instance **Names** and their corresponding **Node** values will then be displayed in the right pane. One of the displayed server instances can be specified as the value of the **SERVERNAME** parameter. 14. **TIMEOUT** - In the **TIMEOUT** text box, specify the maximum duration (in seconds) for which the test will wait for a response from the application server. The default **TIMEOUT** period is 60 seconds.		
Outputs of the test	One set of results for each server instance being monitored		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Loaded services: Indicates the number of web services loaded by the application server.	Number	
	Requests received: Indicates the number of requests received by the web services.	Number	
	Requests dispatched: Indicates the number of requests dispatched by the service to a target code.	Number	
	Requests successful: Indicates the number of requests that were successfully responded to.	Number	
	Avg response time: Indicates the average time between receipt of a request and the dispatch of a response.	Secs	

3.1.4.8 WebSphere ORB Test

This test reports statistics pertaining to each of the ORBs (Object Request Broker) on a WebSphere server.

Purpose	To report statistics pertaining to each of the ORBs (Object Request Broker) on a WebSphere server
Target of the test	A WebSphere application server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TESTPERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebSphere application server 3. **PORT** – The port number of the WebSphere application server 4. **WEBSERVERPORT** – The port number through which the WebSphere applications can be accessed. 5. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebSphere server. 6. **SERVERHOSTNAME** - Specify the node name of the server instance being monitored. To know the node name, do the following: ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the node name that corresponds to the application server instance being monitored, and specify that name against the **SERVERHOSTNAME** parameter. 7. **NDMANAGER** - The **NDMANAGER** and **CONNECTORPORT** parameters will be applicable only if the WebSphere application server being monitored is part of a cluster. If so, then, in the **NDMANAGER** text box, provide the host name of the node manager that manages the application servers in the cluster. If the WebSphere server being monitored does not belong to a cluster, then specify *none* in this text box. To know the name of the node manager, do the following: ➢ Login to the Administrative Console of the node manager using the URL http://<IPoftheWebSphereAppServer'sNodeManager>:<Adminport>/admin/. ➢ Using the tree-structure in the left pane of the Administrative Console that appears, drill down to the **Deployment Manager** node within **System Administration**. ➢ Select the **Configuration** tab that appears in the right pane, and scroll down to the **End Points** link in the **Additional Properties** section. ➢ Once you locate the **End Points** link, click on it, and in the page that appears, click on the **SOAP_CONNECTOR_ADDRESS** link. ➢ In the subsequent page, a fully qualified domain name will be displayed against **Host**. This is the name that should be specified as the host name of the node manager in the **NDMANAGER** text box.

	8. **CONNECTORPORT** - The port using which the node manager communicates with the WebSphere servers in the cluster will have to be specified in the **CONNECTORPORT** text box. If the server being monitored is not part of a cluster, then specify *none* here. The connector port can be a SOAP port or an RMI port. To know the port number, do the following: ➢ From the Node manager's host, open the **<WEBSPHERE_INSTALL_DIR>\DeploymentManager\properties\wsadmin.properties** file. ➢ Two entries that read as follows will be present in the wsadmin.properties file: *com.ibm.ws.scripting.port=<port_number>* *#com.ibm.ws.scripting.port=<port_number>* Both the entries will have port numbers against them. However, the uncommented entry (the entry without the #) is the one that denotes an active port. Therefore, specify the corresponding port number as the **CONNECTORPORT**. 9. **USER** - If security has been enabled for the WebSphere server being monitored, then provide a valid **USER** name to login to the WebSphere server. If the WebSphere server does not require any authentication, then the **USER** text box should contain the default value 'none'. 10. **PASSWORD** – If security has been enabled for the WebSphere server being monitored, then provide the **PASSWORD** that corresponds to the specified **USER** name. If the WebSphere server does not require any authentication, then leave the **PASSWORD** text box with its default setting. 11. **CONFIRM PASSWORD** - If security has been confirm the specified **PASSWORD** by retyping it in the **CONFIRM PASSWORD** text box. If the WebSphere server does not require any authentication, then leave the **CONFIRM PASSWORD** text box with its default setting. 12. **ENCRYPTPASS** – By default, this flag is set to **YES**, indicating that the **PASSWORD** of the WebSphere server is encrypted by default. To disable password encryption, select the **NO** option. 13. **SERVERNAME** – Specify the name of the WebSphere server instance to be monitored. To know the instances of a WebSphere server currently available, first, connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**. Then, login to the administrative console and expand the **Servers** node in the left pane of the console. Next, click on the **Application Servers** sub-node under the **Servers** node. A list of server instance **Names** and their corresponding **Node** values will then be displayed in the right pane. One of the displayed server instances can be specified as the value of the **SERVERNAME** parameter. 14. **TIMEOUT** - In the **TIMEOUT** text box, specify the maximum duration (in seconds) for which the test will wait for a response from the application server. The default **TIMEOUT** period is 60 seconds.
Outputs of the test	One set of results for each server instance being monitored

Measurements made by the test	Measurement	Measurement Unit	Interpretation
	Avg processing time: Indicates the time this registered portable interceptor takes to run.	Secs	A high processing time is indicative of a performance bottleneck.

3.1.4.9 WebSphere Web Server Test

This test reports statistics pertaining to each of the web services mounted on a WebSphere server.

Purpose	To report statistics pertaining to each of the web services mounted on a WebSphere server
Target of the test	A WebSphere application server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TESTPERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebSphere application server 3. **PORT** – The port number of the WebSphere application server 4. **WEBSERVERPORT** – The port number through which the WebSphere applications can be accessed. 5. **SSL** – Indicate whether the SSL (Secured Socket Layer) is to be used to connect to the WebSphere server. 6. **SERVERHOSTNAME** - Specify the node name of the server instance being monitored. To know the node name, do the following ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the node name that corresponds to the application server instance being monitored, and specify that name against the **SERVERHOSTNAME** parameter. 7. **NDMANAGER** - The **NDMANAGER** and **CONNECTORPORT** parameters will be applicable only if the WebSphere application server being monitored is part of a cluster. If so, then, in the **NDMANAGER** text box, provide the host name of the node manager that manages the application servers in the cluster. If the WebSphere server being monitored does not belong to a cluster, then specify *none* in this text box. To know the name of the node manager, do the following: ➢ Login to the Administrative Console of the node manager using the URL http://<IPoftheWebSphereAppServer'sNodeManager>:<Adminport>/admin/. ➢ Using the tree-structure in the left pane of the Administrative Console that appears, drill down to the **Deployment Manager** node within **System Administration**. ➢ Select the **Configuration** tab that appears in the right pane, and scroll down to the **End Points** link in the **Additional Properties** section. ➢ Once you locate the **End Points** link, click on it, and in the page that appears, click on the **SOAP_CONNECTOR_ADDRESS** link. ➢ In the subsequent page, a fully qualified domain name will be displayed against **Host**. This is the name that should be specified as the host name of the node manager in the **NDMANAGER** text box.

	8. **CONNECTORPORT** - The port using which the node manager communicates with the WebSphere servers in the cluster will have to be specified in the **CONNECTORPORT** text box. If the server being monitored is not part of a cluster, then specify *none* here. The connector port can be a SOAP port or an RMI port. To know the port number, do the following: ➢ From the Node manager's host, open the **<WEBSPHERE_INSTALL_DIR>\DeploymentManager\properties\wsadmin.properties** file. ➢ Two entries that read as follows will be present in the wsadmin.properties file: *com.ibm.ws.scripting.port=<port_number>* *#com.ibm.ws.scripting.port=<port_number>* Both the entries will have port numbers against them. However, the uncommented entry (the entry without the #) is the one that denotes an active port. Therefore, specify the corresponding port number as the **CONNECTORPORT**. 9. **USER** - If security has been enabled for the WebSphere server being monitored, then provide a valid **USER** name to login to the WebSphere server. If the WebSphere server does not require any authentication, then the **USER** text box should contain the default value 'none'. 10. **PASSWORD** – If security has been enabled for the WebSphere server being monitored, then provide the **PASSWORD** that corresponds to the specified **USER** name. If the WebSphere server does not require any authentication, then leave the **PASSWORD** text box with its default setting. 11. **CONFIRM PASSWORD** - If security has been confirm the specified **PASSWORD** by retyping it in the **CONFIRM PASSWORD** text box. If the WebSphere server does not require any authentication, then leave the **CONFIRM PASSWORD** text box with its default setting. 12. **ENCRYPTPASS** – By default, this flag is set to **YES**, indicating that the **PASSWORD** of the WebSphere server is encrypted by default. To disable password encryption, select the **NO** option. 13. **SERVERNAME** – Specify the name of the WebSphere server instance to be monitored. To know the instances of a WebSphere server currently available, first, connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**. Then, login to the administrative console and expand the **Servers** node in the left pane of the console. Next, click on the **Application Servers** sub-node under the **Servers** node. A list of server instance **Names** and their corresponding **Node** values will then be displayed in the right pane. One of the displayed server instances can be specified as the value of the **SERVERNAME** parameter. 14. **TIMEOUT** - In the **TIMEOUT** text box, specify the maximum duration (in seconds) for which the test will wait for a response from the application server. The default **TIMEOUT** period is 60 seconds.
Outputs of the test	One set of results for each web service on the monitored WebSphere server instance

Measurements made by the test	Measurement	Measurement Unit	Interpretation
	Loaded services: Indicates the number of instances of this web service that have been loaded by the application server.	Number	
	Requests received: Indicates the number of requests received by this web service.	Number	
	Requests dispatched: Indicates the number of requests dispatched by this web service to a target code.	Number	
	Requests successful: Indicates the number of requests that were succesfully responded to by this web service.	Number	
	Avg response time: Indicates the average time between receipt of a request and the dispatch of a response by this web service.	Secs	

3.2 Monitoring the WebSphere Application Server 6.0 (and above)

As the WebSphere server 6.0 (and above) supports different capabilities and interfaces than the earlier versions, the eG Enterprise suite offers a different monitoring model for WebSphere 6.0 (and above). In the case of the WebSphere application server version 6.0 and above, the eG agent uses the JMX architecture supported by the WebSphere server to gather the required metrics.

To monitor a WebSphere Application server 6.0 (and above), a specific WebSphere monitoring eG component has to be installed on it. If the WebSphere server to be monitored uses a SOAP connector port for its internal communications, then the **egurkha6.ear** application (in the **/opt/egurkha/lib** or the **<EG_INSTALL_DIR>\lib** directory) will have to be installed on the server. On the other hand, if the target WebSphere server uses an RMI port for communicating internally, then the **egurkha6rmi.ear** application should be installed on the server. The procedure for installing the 'ear' file has been discussed in detail in the *eG Implementer's Guide*.

The measures extracted by **egurkha6.ear** or **egurkha6rmi.ear** (as the case may be) are captured and displayed by the unique monitoring model that eG Enterprise prescribes for the WebSphere Appolication server 6.0 (and above) (see Figure 3.6).

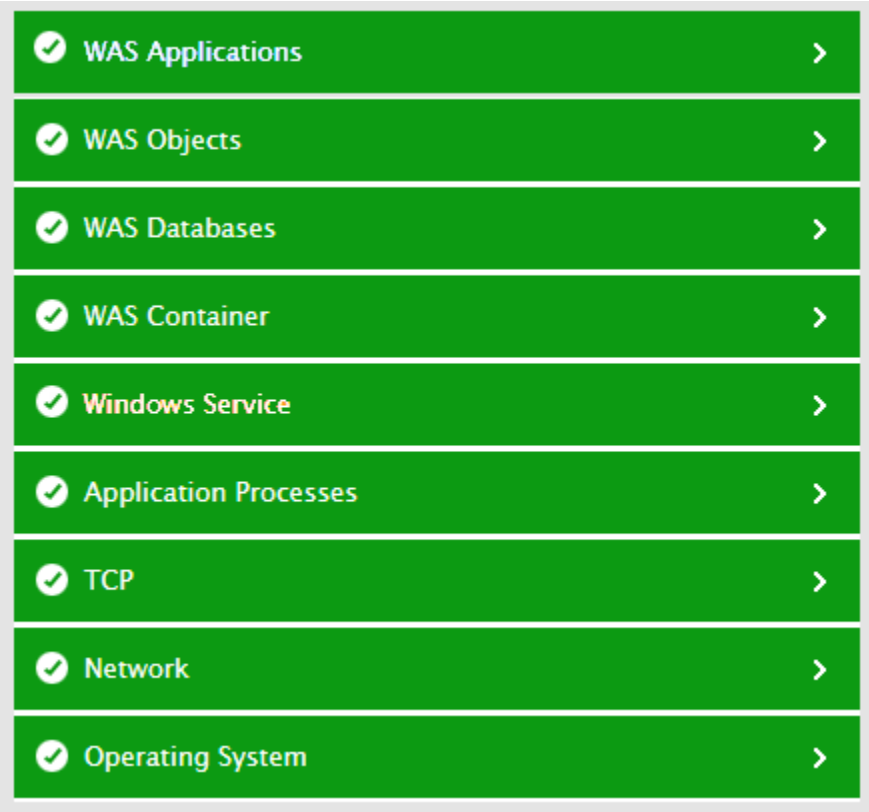


Figure 3.6: Layer model of the WebSphere Application server 6.0 (or above)

The tests executing on each of the layers depicted by Figure 3.6 extract a wealth of performance data from the WebSphere application server, that enable WebSphere administrators to determine the following:

- Does EJB creation take too long?
- Was the WebSphere cache adequately sized, or were there too many cache misses?
- Is sufficient memory allotted to the WebSphere JVM?
- Is the thread pool adequately sized?
- Did too many connections in the database connection pool timeout?
- Are transaction rollbacks happening too frequently on the server?
- Are transactions taking too long to complete?
- How many synchronous/asynchronous requests were processed by the WebSphere gateway?
- How well does the ORB (Object Request Broker) handle requests for objects received by it?
- Were any errors detected during JSP/servlet processing?
- Are the web services executing on the WebSphere server too slow in responding to requests received by it?

The sections to come will elaborate on the tests associated with the top 5 layers only.

3.2.1 The JVM Layer

By default, no tests are mapped to the **JVM** layer of the WebSphere Application server 6.0 (or above). This is because, all tests reporting critical JVM-related metrics are disabled by default for the WebSphere server. To enable one/more of these tests, open the **AGENTS – TESTS CONFIGURATION** page using the Agents -> Tests -> Configure menu sequence, select **WebSphere Application** from the **Component type** list, scroll down the test list that appears to view the **DISABLED TESTS** section, select the check box corresponding to the JVM test of interest to you, and then, click the **Update** button.

If all the JVM tests are enabled, then clicking on the **JVM** layer will display the test list depicted by Figure 3.7 below.

Figure 3.7: The tests mapped to the JVM layer

These tests collectively report the resource usage and overall health of the WebSphere JVM. The JvmGarbageCollection test has been elaborately discussed in Section 3.1.1 above, and all the other tests have been dealt with in Chapter 0 of this document.

3.2.2 The WAS Container Layer

Using the tests associated with the **WAS Container** layer, the eG agents can closely observe the performance of the following critical services executing on the *WebSphere Application* server:

- Cache management
- Object pools
- Garbage collection (GC)
- Thread pools

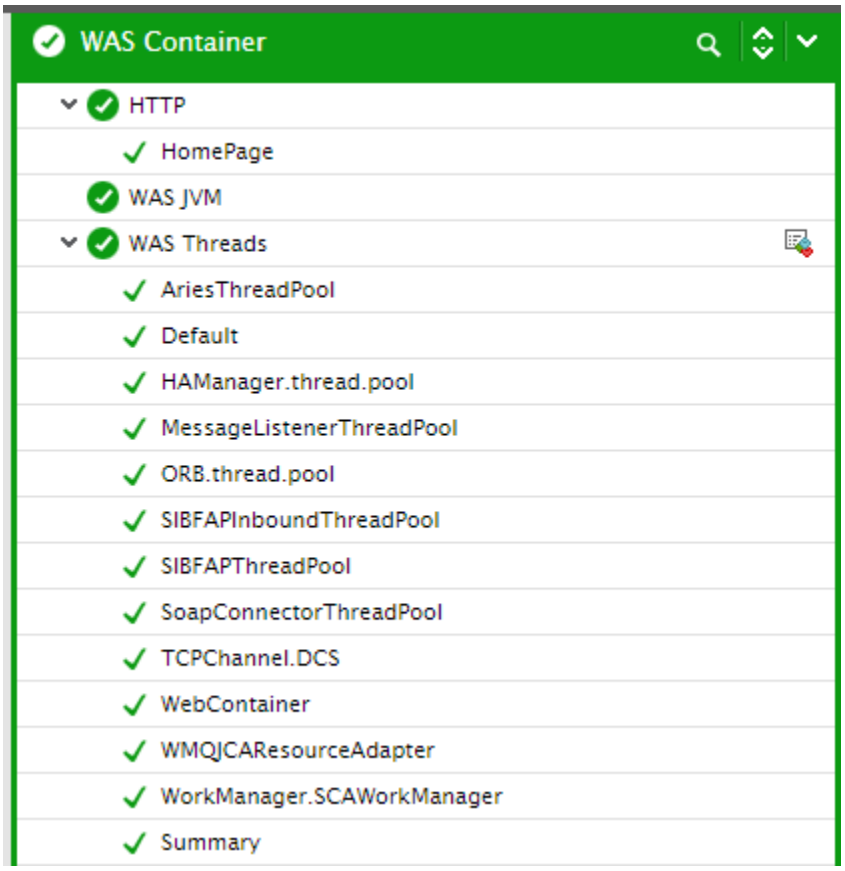


Figure 3.8: The tests associated with the WAS Container layer

3.2.2.1 WAS Cache Test

The WASCache test monitors the cache usage on the WebSphere server.

Purpose	Monitors the cache usage on the WebSphere server
Target of the test	A WebSphere application server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebSphere application server 3. **PORT** – The port number of the WebSphere application server 4. **SERVERHOSTNAME** – Specify the host name of the application server instance being monitored. 5. **APPPORT** – Specify the port number to be used for accessing the **egurkha** application that has been deployed on the server. 6. **NODENAME** - Specify the node name of the server instance being monitored. To know the node name, do the following ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the **Node** that corresponds to the application server instance being monitored, and specify that name against the **NODENAME** parameter. 7. **SERVERNAME** - Provide the name of the server instance being monitored in the **SERVERNAME** text box. To know the server name, do the following: ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the **Name** of the monitored server instance, and specify that name against the **SERVERNAME** parameter. If the server instance being monitored is part of a WebSphere cluster, then you need to provide the host name that corresponds to the connector port of the *Deployment Manager* of the cluster as the **SERVERNAME**. To determine the **SERVERNAME** in this case, do the following: • Connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin** > or **https://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**>. • Login to the WebSphere Administrative console • Expand the **System Administration** node in the tree-structure in the left pane of the console and click on the **Deployment Manager** sub-node within.

- In the right panel, click on the **Configuration** tab page to view the configuration of the **Deployment Manager**. In the **Additional Properties** section of the **Configuration** tab page, expand the **Ports** node.
- A list of ports will then appear. Click on the **Details** button alongside the ports list.
- If the SOAP port has been set as the connector port in your environment, then scroll down the page that appears next until you view the **Port Name, SOAP_CONNECTOR_ADDRESS**. Make note of the **Host** name that corresponds to this port name. If the RMI port is the connector port in your environment, then make note of the **Host** name that corresponds to the **Port** name, **BOOTSTRAP_ADDRESS**.
- Specify this **Host** name as the **SERVERNAME**.

8. **CONNECTORPORT** - The applications that are deployed on a server instance use the **CONNECTORPORT** for all internal communications with the application server. The connector port can be a SOAP port or an RMI port. The default connector port however, is the SOAP port. To know the connector port number, do the following:
   - Login to the WebSphere Administrative Console.
   - Expand the **Servers** node in the tree structure in the left pane of the console, and click on **Application Servers** within.
   - A list of application server instances and their corresponding node names will then appear in the right pane of the console. In the right pane, click on the server name link that corresponds to the server instance that is being monitored.
   - Doing so invokes the **Configuration** of the application server instance clicked on. Scroll down the **Configuration** tab page to view the **Communications** section.
   - Expand the **Ports** link in this section to view a list of ports. If the default connector port is in use, then the port number displayed against **SOAP_CONNECTOR_ADDRESS** should be specified as the **CONNECTORPORT**. If an RMI port has been explicitly set as the connector port, then specify the port number displayed against **BOOTSTRAP_ADDRESS** as the **CONNECTORPORT**.

   If the server instance being monitored is part of a WebSphere cluster, then you need to provide the SOAP/RMI port of the *Deployment Manager* of the cluster as the **CONNECTORPORT**. To determine the **CONNECTORPORT** in this case, do the following:
   - Connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin** > or **https://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**.
   - Login to the WebSphere Administrative console.
   - Expand the **System Administration** node in the tree-structure in the left pane of the console and click on the **Deployment Manager** sub-node within.
   - In the right panel, click on the **Configuration** tab page to view the configuration of the **Deployment Manager**. In the **Additional Properties** section of the **Configuration** tab page, expand the **Ports** node.

<table>
<tr><td></td><td colspan="3">
A list of ports will then appear. If the default connector port is in use, then the port number displayed against SOAP_CONNECTOR_ADDRESS should be specified as the CONNECTORPORT. If an RMI port has been explicitly set as the connector port, then specify the port number displayed against BOOTSTRAP_ADDRESS as the CONNECTORPORT.
9. SSL - Select Yes if SSL (Secured Socket Layer) is to be used to connect to the WebSphere server, and No if it is not.
10. USER - If security has been enabled for the WebSphere server being monitored, then provide a valid USER name to login to the WebSphere server. If the WebSphere server does not require any authentication, then the USER text box should contain the default value 'none'.
11. PASSWORD – If security has been enabled for the WebSphere server being monitored, then provide the PASSWORD that corresponds to the specified USER name. If the WebSphere server does not require any authentication, then leave the PASSWORD text box with its default setting.
12. CONFIRM PASSWORD - If security has been enabled, confirm the specified PASSWORD by retyping it in the CONFIRM PASSWORD text box. If the WebSphere server does not require any authentication, then leave the CONFIRM PASSWORD text box with its default setting.
</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for each cache on the server instance being monitored</td></tr>
<tr><td rowspan="4">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Client requests:
Indicates the number of requests for cacheable objects that were generated by applications running on the application server, since the last measurement period.</td><td>Number</td><td></td></tr>
<tr><td>Explicit invalidation:
Indicates the number of explicit invalidations since the last measurement period.</td><td>Number</td><td></td></tr>
<tr><td>Hits on memory:
Indicates the number of requests for cacheable objects that were served from memory since the last measurement period.</td><td>Number</td><td>While direct disk reads cause an increase in processing overheads, memory reads are less expensive. Therefore, a high value of this measure is indicative of the good health of the server.</td></tr>
</table>

	Hits on disk: Indicates the number of requests for cacheable objects that are served from the disk since the last measurement period.	Number	Reading from the disk is more expensive than reading from the cache. Therefore, ideally, this value should be low.
	Memory cache entry: Indicates the number of in-memory cache entries since the last measurement period.	Number	
	Max memory cache entry: Indicates the maximum number of in-memory cache entries.	Number	
	Miss count: Indicates the number of requests for cacheable objects that were not served from the cache since the last measurement period.	Number	Ideally, this value should be low.
	Remote creations: Indicates the number of cache entries that were received from co-operating dynamic caches, since the last measurement period.	Number	
	Remote hits: Indicates the number of requests for cacheable objects that were served from other JVMs within the replication domain, since the last measurement period.	Number	
	Timeout invalidations: Indicates the number of cache entries that were removed from the memory and disk because of a timeout, since the last measurement period.	Number	

3.2.2.2 WAS JVM Test

The WASJVM test monitors the usage of the WebSphere JVM heap.

> **Note:**
>
> To enable the test to collect metrics related to the garbage collection and thread activity, you should enable the Java Virtual Machine Tool Interface (JVMTI) of the WebSphere Server.

Purpose	Monitors the usage of the WebSphere JVM heap
Target of the test	A WebSphere application server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebSphere application server 3. **PORT** – The port number of the WebSphere application server 4. **SERVERHOSTNAME** – Specify the host name of the application server instance being monitored. 5. **APPPORT** – Specify the port number to be used for accessing the **egurkha** application that has been deployed on the server. 6. **NODENAME** - Specify the node name of the server instance being monitored. To know the node name, do the following ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the **Node** that corresponds to the application server instance being monitored, and specify that name against the **NODENAME** parameter. 7. **SERVERNAME** - Provide the name of the server instance being monitored in the **SERVERNAME** text box. To know the server name, do the following: ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the **Name** of the monitored server instance, and specify that name against the **SERVERNAME** parameter. If the server instance being monitored is part of a WebSphere cluster, then you need to provide the host name that corresponds to the connector port of the *Deployment Manager* of the cluster as the **SERVERNAME**. To determine the **SERVERNAME** in this case, do the following: • Connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin** > or **https://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**>. • Login to the WebSphere Administrative console • Expand the **System Administration** node in the tree-structure in the left pane of the console and click on the **Deployment Manager** sub-node within.

- In the right panel, click on the **Configuration** tab page to view the configuration of the **Deployment Manager**. In the **Additional Properties** section of the **Configuration** tab page, expand the **Ports** node.
- A list of ports will then appear. Click on the **Details** button alongside the ports list.
- If the SOAP port has been set as the connector port in your environment, then scroll down the page that appears next until you view the **Port Name**, **SOAP_CONNECTOR_ADDRESS**. Make note of the **Host** name that corresponds to this port name. If the RMI port is the connector port in your environment, then make note of the **Host** name that corresponds to the **Port** name, **BOOTSTRAP_ADDRESS**.
- Specify this **Host** name as the **SERVERNAME**.

8. **CONNECTORPORT** - The applications that are deployed on a server instance use the **CONNECTORPORT** for all internal communications with the application server. The connector port can be a SOAP port or an RMI port. The default connector port however, is the SOAP port. To know the connector port number, do the following:

   - Login to the WebSphere Administrative Console.
   - Expand the **Servers** node in the tree structure in the left pane of the console, and click on **Application Servers** within.
   - A list of application server instances and their corresponding node names will then appear in the right pane of the console. In the right pane, click on the server name link that corresponds to the server instance that is being monitored.
   - Doing so invokes the **Configuration** of the application server instance clicked on. Scroll down the **Configuration** tab page to view the **Communications** section.
   - Expand the **Ports** link in this section to view a list of ports. If the default connector port is in use, then the port number displayed against **SOAP_CONNECTOR_ADDRESS** should be specified as the **CONNECTORPORT**. If an RMI port has been explicitly set as the connector port, then specify the port number displayed against **BOOTSTRAP_ADDRESS** as the **CONNECTORPORT**.

   If the server instance being monitored is part of a WebSphere cluster, then you need to provide the SOAP/RMI port of the *Deployment Manager* of the cluster as the **CONNECTORPORT**. To determine the **CONNECTORPORT** in this case, do the following:

   - Connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin** > or **https://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**>.
   - Login to the WebSphere Administrative console.
   - Expand the **System Administration** node in the tree-structure in the left pane of the console and click on the **Deployment Manager** sub-node within.
   - In the right panel, click on the **Configuration** tab page to view the configuration of the **Deployment Manager**. In the **Additional Properties** section of the **Configuration** tab page, expand the **Ports** node.

- A list of ports will then appear. If the default connector port is in use, then the port number displayed against **SOAP_CONNECTOR_ADDRESS** should be specified as the **CONNECTORPORT**. If an RMI port has been explicitly set as the connector port, then specify the port number displayed against **BOOTSTRAP_ADDRESS** as the **CONNECTORPORT**.

9. **SSL** - Select **Yes** if **SSL** (Secured Socket Layer) is to be used to connect to the WebSphere server, and **No** if it is not.
10. **USER** - If security has been enabled for the WebSphere server being monitored, then provide a valid **USER** name to login to the WebSphere server. If the WebSphere server does not require any authentication, then the **USER** text box should contain the default value 'none'.
11. **PASSWORD** – If security has been enabled for the WebSphere server being monitored, then provide the **PASSWORD** that corresponds to the specified **USER** name. If the WebSphere server does not require any authentication, then leave the **PASSWORD** text box with its default setting.
12. **CONFIRM PASSWORD** - If security has been enabled, confirm the specified **PASSWORD** by retyping it in the **CONFIRM PASSWORD** text box. If the WebSphere server does not require any authentication, then leave the **CONFIRM PASSWORD** text box with its default setting.

Measurements made by the test

Measurement	Measurement Unit	Interpretation
Free memory: Indicates the amount of memory currently available in the JVM.	MB	A very low value of this measure is indicative of excessive memory utilization in the JVM.
Used memory: Indicates the amount of memory that has been currently utilized by the JVM.	MB	A high value of this measure indicates a heavy workload on the WebSphere application server. In such a case, you might want to consider increasing the JVM heap size.
GC count: Indicates the number of GC calls since the last measurement period.	Number	If adequate memory is not allotted to the JVM, then the value of this measure would be very high. A high value of this measure is indicative of a high frequency of GC. This is not a good sign, as GC, during its execution, has the tendency of suspending an application, and a high frequency of GC would only adversely impact the application's performance. To avoid this, it is recommended that you allot sufficient memory to the JVM.

	Percent gc time: Indicates the percentage of time spent on GC.	Percent	If adequate memory is not allotted to the JVM, then the value of this measure would be very high. This is not a good sign, as GC, during its execution, has the tendency of suspending an application, and a high value of this measure would only adversely impact the application's performance. To avoid this, it is recommended that you allot sufficient memory to the JVM.
	Percent heap used: Indicates the percentage of heap memory utilized by the JVM.	Percent	A high value of this measure indicates a heavy workload on the WebSphere application server. In such a case, you might want to consider increasing the JVM heap size.
	Objects allocated: Indicates the number of objects allocated in the heap since the last measurement period.	Number	
	Objects freed: Indicates the number of objects freed in the heap since the last measurement period.	Number	
	Objects moved: Indicates the number of objects in the heap since the last measurement period.	Number	
	Threads started: Indicates the number of threads started since the last measurement period.	Number	A high value is indicative of high server workload.
	Threads ended: Indicates the number of threads that ended since the last measurement period.	Number	
	Waits for lock: Indicates the number of times a thread waits for a lock, since the last measurement period.	Number	
	Wait for lock time: Indicates the average time a thread waits for a lock.	Secs	

3.2.2.3 WAS Object Pools Test

The WASObjectPools test reports critical statistics pertaining to the object pools on the WebSphere server.

Purpose	Reports critical statistics pertaining to the object pools on the WebSphere server
Target of the test	A WebSphere application server
Agent deploying the test	An internal agent
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebSphere application server 3. **PORT** – The port number of the WebSphere application server 4. **SERVERHOSTNAME** – Specify the host name of the application server instance being monitored. 5. **APPPORT** – Specify the port number to be used for accessing the **egurkha** application that has been deployed on the server. 6. **NODENAME** - Specify the node name of the server instance being monitored. To know the node name, do the following ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the **Node** that corresponds to the application server instance being monitored, and specify that name against the **NODENAME** parameter. 7. **SERVERNAME** - Provide the name of the server instance being monitored in the **SERVERNAME** text box. To know the server name, do the following: ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the **Name** of the monitored server instance, and specify that name against the **SERVERNAME** parameter. If the server instance being monitored is part of a WebSphere cluster, then you need to provide the host name that corresponds to the connector port of the *Deployment Manager* of the cluster as the **SERVERNAME**. To determine the **SERVERNAME** in this case, do the following: • Connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin** > or **https://<IP address of the WebSphere server:Port number of the WebSphere server>\admin** gin to the WebSphere Administrative console • Expand the **System Administration** node in the tree-structure in the left pane of the console and click on the **Deployment Manager** sub-node within.

- In the right panel, click on the **Configuration** tab page to view the configuration of the **Deployment Manager**. In the **Additional Properties** section of the **Configuration** tab page, expand the **Ports** node.
- A list of ports will then appear. Click on the **Details** button alongside the ports list.
- If the SOAP port has been set as the connector port in your environment, then scroll down the page that appears next until you view the **Port Name**, **SOAP_CONNECTOR_ADDRESS**. Make note of the **Host** name that corresponds to this port name. If the RMI port is the connector port in your environment, then make note of the **Host** name that corresponds to the **Port** name, **BOOTSTRAP_ADDRESS**.
- Specify this **Host** name as the **SERVERNAME**.

8. **CONNECTORPORT** - The applications that are deployed on a server instance use the **CONNECTORPORT** for all internal communications with the application server. The connector port can be a SOAP port or an RMI port. The default connector port however, is the SOAP port. To know the connector port number, do the following:

   - Login to the WebSphere Administrative Console.
   - Expand the **Servers** node in the tree structure in the left pane of the console, and click on **Application Servers** within.
   - A list of application server instances and their corresponding node names will then appear in the right pane of the console. In the right pane, click on the server name link that corresponds to the server instance that is being monitored.
   - Doing so invokes the **Configuration** of the application server instance clicked on. Scroll down the **Configuration** tab page to view the **Communications** section.
   - Expand the **Ports** link in this section to view a list of ports. If the default connector port is in use, then the port number displayed against **SOAP_CONNECTOR_ADDRESS** should be specified as the **CONNECTORPORT**. If an RMI port has been explicitly set as the connector port, then specify the port number displayed against **BOOTSTRAP_ADDRESS** as the **CONNECTORPORT**.

   If the server instance being monitored is part of a WebSphere cluster, then you need to provide the SOAP/RMI port of the *Deployment Manager* of the cluster as the **CONNECTORPORT**. To determine the **CONNECTORPORT** in this case, do the following:

   - Connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin** > or **https://<IP address of the WebSphere server:Port number of the WebSphere server>\admin** >.
   - Login to the WebSphere Administrative console.
   - Expand the **System Administration** node in the tree-structure in the left pane of the console and click on the **Deployment Manager** sub-node within.
   - In the right panel, click on the **Configuration** tab page to view the configuration of the **Deployment Manager**. In the **Additional Properties** section of the **Configuration** tab page, expand the **Ports** node.

	K. A list of ports will then appear. If the default connector port is in use, then the port number displayed against **SOAP_CONNECTOR_ADDRESS** should be specified as the **CONNECTORPORT**. If an RMI port has been explicitly set as the connector port, then specify the port number displayed against **BOOTSTRAP_ADDRESS** as the **CONNECTORPORT**. 9. **SSL** - Select **Yes** if **SSL** (Secured Socket Layer) is to be used to connect to the WebSphere server, and **No** if it is not. 10. **USER** - If security has been enabled for the WebSphere server being monitored, then provide a valid **USER** name to login to the WebSphere server. If the WebSphere server does not require any authentication, then the **USER** text box should contain the default value 'none'. 11. **PASSWORD** – If security has been enabled for the WebSphere server being monitored, then provide the **PASSWORD** that corresponds to the specified **USER** name. If the WebSphere server does not require any authentication, then leave the **PASSWORD** text box with its default setting. 12. **CONFIRM PASSWORD** - If security has been enabled, confirm the specified **PASSWORD** by retyping it in the **CONFIRM PASSWORD** text box. If the WebSphere server does not require any authentication, then leave the **CONFIRM PASSWORD** text box with its default setting.

Measurements made by the test	Measurement	Measurement Unit	Interpretation
	Objects created: Indicates the number of new objects created by the object pool, since the last measurement period.	Number	
	Objects allocated: Indicates the current count of objects allocated by the object pool.	Number	
	Objects returned: Indicates the current count of objects returned to the pool.	Number	
	Idle objects: Indicates the current count of idle objects.	Number	

3.2.2.4 WAS Threads Test

To optimize performance and at the same time to support concurrent accesses from users, the application server uses thread pools. It is critical to monitor a WebSphere server's thread pools on an ongoing basis. This test monitors the thread pools on a WebSphere server.

Purpose	Monitors the thread pools on a WebSphere server
Target of the test	A WebSphere application server
Agent deploying the test	An internal agent
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebSphere application server 3. **PORT** – The port number of the WebSphere application server 4. **SERVERHOSTNAME** – Specify the host name of the application server instance being monitored. 5. **APPPORT** – Specify the port number to be used for accessing the **egurkha** application that has been deployed on the server. 6. **NODENAME** - Specify the node name of the server instance being monitored. To know the node name, do the following ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the **Node** that corresponds to the application server instance being monitored, and specify that name against the **NODENAME** parameter. 7. **SERVERNAME** - Provide the name of the server instance being monitored in the **SERVERNAME** text box. To know the server name, do the following: ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the **Name** of the monitored server instance, and specify that name against the **SERVERNAME** parameter. If the server instance being monitored is part of a WebSphere cluster, then you need to provide the host name that corresponds to the connector port of the *Deployment Manager* of the cluster as the **SERVERNAME**. To determine the **SERVERNAME** in this case, do the following: • Connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin** or **https://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**. • Login to the WebSphere Administrative console • Expand the **System Administration** node in the tree-structure in the left pane of the console and click on the **Deployment Manager** sub-node within.

- In the right panel, click on the **Configuration** tab page to view the configuration of the **Deployment Manager**. In the **Additional Properties** section of the **Configuration** tab page, expand the **Ports** node.
- A list of ports will then appear. Click on the **Details** button alongside the ports list.
- If the SOAP port has been set as the connector port in your environment, then scroll down the page that appears next until you view the **Port Name**, **SOAP_CONNECTOR_ADDRESS**. Make note of the **Host** name that corresponds to this port name. If the RMI port is the connector port in your environment, then make note of the **Host** name that corresponds to the **Port** name, **BOOTSTRAP_ADDRESS**.
- Specify this **Host** name as the **SERVERNAME**.

8. **CONNECTORPORT** - The applications that are deployed on a server instance use the **CONNECTORPORT** for all internal communications with the application server. The connector port can be a SOAP port or an RMI port. The default connector port however, is the SOAP port. To know the connector port number, do the following:

   - Login to the WebSphere Administrative Console.
   - Expand the **Servers** node in the tree structure in the left pane of the console, and click on **Application Servers** within.
   - A list of application server instances and their corresponding node names will then appear in the right pane of the console. In the right pane, click on the server name link that corresponds to the server instance that is being monitored.
   - Doing so invokes the **Configuration** of the application server instance clicked on. Scroll down the **Configuration** tab page to view the **Communications** section.
   - Expand the **Ports** link in this section to view a list of ports. If the default connector port is in use, then the port number displayed against **SOAP_CONNECTOR_ADDRESS** should be specified as the **CONNECTORPORT**. If an RMI port has been explicitly set as the connector port, then specify the port number displayed against **BOOTSTRAP_ADDRESS** as the **CONNECTORPORT**.

   If the server instance being monitored is part of a WebSphere cluster, then you need to provide the SOAP/RMI port of the *Deployment Manager* of the cluster as the **CONNECTORPORT**. To determine the **CONNECTORPORT** in this case, do the following:

   - Connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin** or **https://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**.
   - Login to the WebSphere Administrative console.
   - Expand the **System Administration** node in the tree-structure in the left pane of the console and click on the **Deployment Manager** sub-node within.
   - In the right panel, click on the **Configuration** tab page to view the configuration of the **Deployment Manager**. In the **Additional Properties** section of the **Configuration** tab page, expand the **Ports** node.

	• A list of ports will then appear. If the default connector port is in use, then the port number displayed against **SOAP_CONNECTOR_ADDRESS** should be specified as the **CONNECTORPORT**. If an RMI port has been explicitly set as the connector port, then specify the port number displayed against **BOOTSTRAP_ADDRESS** as the **CONNECTORPORT**. 9. **SSL** - Select **Yes** if **SSL** (Secured Socket Layer) is to be used to connect to the WebSphere server, and **No** if it is not. 10. **USER** - If security has been enabled for the WebSphere server being monitored, then provide a valid **USER** name to login to the WebSphere server. If the WebSphere server does not require any authentication, then the **USER** text box should contain the default value 'none'. 11. **PASSWORD** – If security has been enabled for the WebSphere server being monitored, then provide the **PASSWORD** that corresponds to the specified **USER** name. If the WebSphere server does not require any authentication, then leave the **PASSWORD** text box with its default setting. 12. **CONFIRM PASSWORD** - If security has been enabled, confirm the specified **PASSWORD** by retyping it in the **CONFIRM PASSWORD** text box. If the WebSphere server does not require any authentication, then leave the **CONFIRM PASSWORD** text box with its default setting.

Measurements made by the test	Measurement	Measurement Unit	Interpretation
	Active count: Indicates the number of threads that are currently active.	Number	A high value for this measure is indicative of a high load on this application and combined with the creation and destroy rates might give insights of the application pattern. This measure is also useful for determining usage trends. For example, it can show the time of day and the day of the week in which you usually reach peak thread count. In addition, the creation of too many threads can result in out of memory errors or thrashing. By watching this metric, you can reduce excessive memory consumption before it's too late.
	Create count: Indicates the number of threads that were created since the last measurement period.	Number	A sudden increase in the value of this measure directly relates to an increase in the activity happening in this application.
	Destroy count: Indicates the number of threads that were destroyed since the last measurement period.	Number	A decrease in the value of this measure indicates that the threads are being active for a long period of time, which might indicate anomalies within the application.

	Pool size: Indicates the number of threads in the pool, currently.	Number	If the pool size is high and the number of active threads is low, it signifies that the threads are not being destroyed immediately after use.
	Threads hung count: Indicates the number of concurrently stopped threads.	Number	

3.2.3 The WAS Databases Layer

The **WAS Database** layer monitors the connection pools on the WebSphere application server.

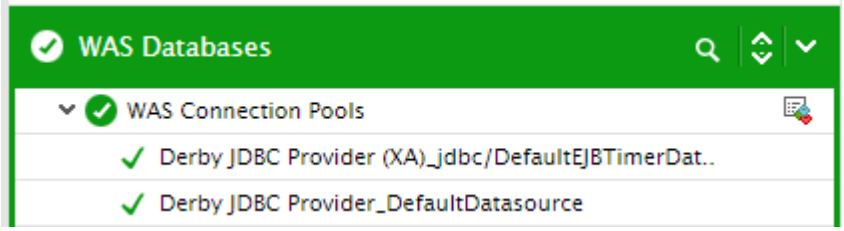


Figure 3.9: The test associated with the WAS Databases layer

3.2.3.1 WAS Connection Pools Test

The WASConnPoolTest monitors the usage of the connection pools on the WebSphere server.

Purpose	Monitors the usage of the connection pools on the WebSphere server
Target of the test	A WebSphere application server
Agent deploying the test	An internal agent
Outputs of the test	One set of results for each connection pool being monitored

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebSphere application server 3. **PORT** – The port number of the WebSphere application server 4. **SERVERHOSTNAME** – Specify the host name of the application server instance being monitored. 5. **APPPORT** – Specify the port number to be used for accessing the **egurkha** application that has been deployed on the server. 6. **NODENAME** - Specify the node name of the server instance being monitored. To know the node name, do the following ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the **Node** that corresponds to the application server instance being monitored, and specify that name against the **NODENAME** parameter. 7. **SERVERNAME** - Provide the name of the server instance being monitored in the **SERVERNAME** text box. To know the server name, do the following: ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the **Name** of the monitored server instance, and specify that name against the **SERVERNAME** parameter. If the server instance being monitored is part of a WebSphere cluster, then you need to provide the host name that corresponds to the connector port of the *Deployment Manager* of the cluster as the **SERVERNAME**. To determine the **SERVERNAME** in this case, do the following: • Connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin** or **https://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**. • Login to the WebSphere Administrative console • Expand the **System Administration** node in the tree-structure in the left pane of the console and click on the **Deployment Manager** sub-node within.

- In the right panel, click on the **Configuration** tab page to view the configuration of the **Deployment Manager**. In the **Additional Properties** section of the **Configuration** tab page, expand the **Ports** node.
- A list of ports will then appear. Click on the **Details** button alongside the ports list.
- If the SOAP port has been set as the connector port in your environment, then scroll down the page that appears next until you view the **Port Name**, **SOAP_CONNECTOR_ADDRESS**. Make note of the **Host** name that corresponds to this port name. If the RMI port is the connector port in your environment, then make note of the **Host** name that corresponds to the **Port** name, **BOOTSTRAP_ADDRESS**.
- Specify this **Host** name as the **SERVERNAME**.

8. **CONNECTORPORT** - The applications that are deployed on a server instance use the **CONNECTORPORT** for all internal communications with the application server. The connector port can be a SOAP port or an RMI port. The default connector port however, is the SOAP port. To know the connector port number, do the following:
   - Login to the WebSphere Administrative Console.
   - Expand the **Servers** node in the tree structure in the left pane of the console, and click on **Application Servers** within.
   - A list of application server instances and their corresponding node names will then appear in the right pane of the console. In the right pane, click on the server name link that corresponds to the server instance that is being monitored.
   - Doing so invokes the **Configuration** of the application server instance clicked on. Scroll down the **Configuration** tab page to view the **Communications** section.
   - Expand the **Ports** link in this section to view a list of ports. If the default connector port is in use, then the port number displayed against **SOAP_CONNECTOR_ADDRESS** should be specified as the **CONNECTORPORT**. If an RMI port has been explicitly set as the connector port, then specify the port number displayed against **BOOTSTRAP_ADDRESS** as the **CONNECTORPORT**.

   If the server instance being monitored is part of a WebSphere cluster, then you need to provide the SOAP/RMI port of the *Deployment Manager* of the cluster as the **CONNECTORPORT**. To determine the **CONNECTORPORT** in this case, do the following:
   - Connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin** > or **https://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**>.
   - Login to the WebSphere Administrative console.
   - Expand the **System Administration** node in the tree-structure in the left pane of the console and click on the **Deployment Manager** sub-node within.
   - In the right panel, click on the **Configuration** tab page to view the configuration of the **Deployment Manager**. In the **Additional Properties** section of the **Configuration** tab page, expand the **Ports** node.

	• A list of ports will then appear. If the default connector port is in use, then the port number displayed against **SOAP_CONNECTOR_ADDRESS** should be specified as the **CONNECTORPORT**. If an RMI port has been explicitly set as the connector port, then specify the port number displayed against **BOOTSTRAP_ADDRESS** as the **CONNECTORPORT**. 9. **SSL** - Select **Yes** if **SSL** (Secured Socket Layer) is to be used to connect to the WebSphere server, and **No** if it is not. 10. **USER** - If security has been enabled for the WebSphere server being monitored, then provide a valid **USER** name to login to the WebSphere server. If the WebSphere server does not require any authentication, then the **USER** text box should contain the default value 'none'. 11. **PASSWORD** – If security has been enabled for the WebSphere server being monitored, then provide the **PASSWORD** that corresponds to the specified **USER** name. If the WebSphere server does not require any authentication, then leave the **PASSWORD** text box with its default setting. 12. **CONFIRM PASSWORD** - If security has been enabled, confirm the specified **PASSWORD** by retyping it in the **CONFIRM PASSWORD** text box. If the WebSphere server does not require any authentication, then leave the **CONFIRM PASSWORD** text box with its default setting.

Measurements made by the test	Measurement	Measurement Unit	Interpretation
	Allocate count: Indicates the number of connections allocated to the pool during the last measurement period.	Number	
	Close count: Indicates the number of connections released from the pool during the last measurement period.	Number	Ideally, this value should be low.
	Create count: Indicates the number of connections created during the last measurement period.	Number	
	Fault count: Indicates the number of connection timeouts in the pool in the last measurement period.	Number	Ideally, this value should be low. An unusually high value could indicate an application leak.
	Freed count: Indicates the number of connections that were returned to the pool in the last measurement period	Number	A very low value of this measure could result in a shortage of connections in the pool.

	Free pool size: Indicates the current number of free connections in the pool.	Number	
	Pool size: Indicates the current size of the connection pool.	Number	
	Jdbc time: Indicates the time taken by the JDBC queries to execute.	Secs	A low value is ideal.

3.2.4 The WAS Objects Layer

This layer transactions to the WebSphere server and reports how quickly the server processes the transactions. In addition, the test monitors the EJBs on the servers and reports the responsiveness of the bean methods.

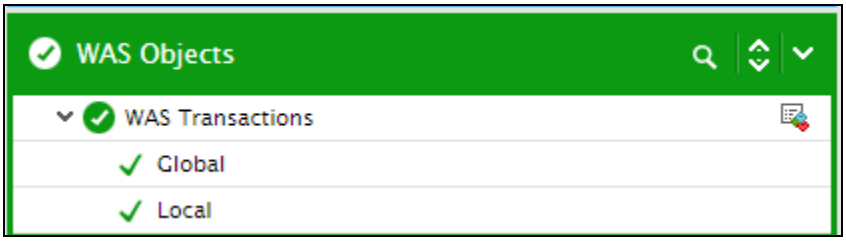


Figure 3.10: The test mapped to the WAS Objects layer

3.2.4.1 WAS Transactions Test

Transactions are the key functionality of the WebSphere application server. The WASTransactions test monitors these transactions.

Purpose	Monitors the transactions on the WebSphere application server
Target of the test	A WebSphere application server
Agent deploying the test	An internal agent
Outputs of the test	One set of results for each transaction on the WebSphere application server

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebSphere application server 3. **PORT** – The port number of the WebSphere application server 4. **SERVERHOSTNAME** – Specify the host name of the application server instance being monitored. 5. **APPPORT** – Specify the port number to be used for accessing the **egurkha** application that has been deployed on the server. 6. **NODENAME** - Specify the node name of the server instance being monitored. To know the node name, do the following ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the **Node** that corresponds to the application server instance being monitored, and specify that name against the **NODENAME** parameter. 7. **SERVERNAME** - Provide the name of the server instance being monitored in the **SERVERNAME** text box. To know the server name, do the following: ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the **Name** of the monitored server instance, and specify that name against the **SERVERNAME** parameter. If the server instance being monitored is part of a WebSphere cluster, then you need to provide the host name that corresponds to the connector port of the *Deployment Manager* of the cluster as the **SERVERNAME**. To determine the **SERVERNAME** in this case, do the following: • Connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin** or **https://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**. • Login to the WebSphere Administrative console • Expand the **System Administration** node in the tree-structure in the left pane of the console and click on the **Deployment Manager** sub-node within.

- In the right panel, click on the **Configuration** tab page to view the configuration of the **Deployment Manager**. In the **Additional Properties** section of the **Configuration** tab page, expand the **Ports** node.
- A list of ports will then appear. Click on the **Details** button alongside the ports list.
- If the SOAP port has been set as the connector port in your environment, then scroll down the page that appears next until you view the **Port Name**, **SOAP_CONNECTOR_ADDRESS**. Make note of the **Host** name that corresponds to this port name. If the RMI port is the connector port in your environment, then make note of the **Host** name that corresponds to the **Port** name, **BOOTSTRAP_ADDRESS**.
- Specify this **Host** name as the **SERVERNAME**.

8. **CONNECTORPORT** - The applications that are deployed on a server instance use the **CONNECTORPORT** for all internal communications with the application server. The connector port can be a SOAP port or an RMI port. The default connector port however, is the SOAP port. To know the connector port number, do the following:

   - Login to the WebSphere Administrative Console.
   - Expand the **Servers** node in the tree structure in the left pane of the console, and click on **Application Servers** within.
   - A list of application server instances and their corresponding node names will then appear in the right pane of the console. In the right pane, click on the server name link that corresponds to the server instance that is being monitored.
   - Doing so invokes the **Configuration** of the application server instance clicked on. Scroll down the **Configuration** tab page to view the **Communications** section.
   - Expand the **Ports** link in this section to view a list of ports. If the default connector port is in use, then the port number displayed against **SOAP_CONNECTOR_ADDRESS** should be specified as the **CONNECTORPORT**. If an RMI port has been explicitly set as the connector port, then specify the port number displayed against **BOOTSTRAP_ADDRESS** as the **CONNECTORPORT**.

   If the server instance being monitored is part of a WebSphere cluster, then you need to provide the SOAP/RMI port of the *Deployment Manager* of the cluster as the **CONNECTORPORT**. To determine the **CONNECTORPORT** in this case, do the following:

   - Connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin** or **https://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**.
   - Login to the WebSphere Administrative console.
   - Expand the **System Administration** node in the tree-structure in the left pane of the console and click on the **Deployment Manager** sub-node within.
   - In the right panel, click on the **Configuration** tab page to view the configuration of the **Deployment Manager**. In the **Additional Properties** section of the **Configuration** tab page, expand the **Ports** node.

	• A list of ports will then appear. If the default connector port is in use, then the port number displayed against **SOAP_CONNECTOR_ADDRESS** should be specified as the **CONNECTORPORT**. If an RMI port has been explicitly set as the connector port, then specify the port number displayed against **BOOTSTRAP_ADDRESS** as the **CONNECTORPORT**. 9. **SSL** - Select **Yes** if **SSL** (Secured Socket Layer) is to be used to connect to the WebSphere server, and **No** if it is not. 10. **USER** - If security has been enabled for the WebSphere server being monitored, then provide a valid **USER** name to login to the WebSphere server. If the WebSphere server does not require any authentication, then the **USER** text box should contain the default value 'none'. 11. **PASSWORD** – If security has been enabled for the WebSphere server being monitored, then provide the **PASSWORD** that corresponds to the specified **USER** name. If the WebSphere server does not require any authentication, then leave the **PASSWORD** text box with its default setting. 12. **CONFIRM PASSWORD** - If security has been enabled, confirm the specified **PASSWORD** by retyping it in the **CONFIRM PASSWORD** text box. If the WebSphere server does not require any authentication, then leave the **CONFIRM PASSWORD** text box with its default setting.

Measurements made by the test	Measurement	Measurement Unit	Interpretation
	Active count: Indicates the number of concurrently active transactions.	Number	If the value of this measure is high, it signifies greater load on the server. This might increase the number of waiting transactions.
	Commits count: Indicates the number of transactions that were committed since the last measurement period.	Number	If the number of transactions that are being committed is very high, it signifies load on the server. It might be caused when some locked transactions are released suddenly.
	Rollback count: Indicates the number of transactions that were rolled back since the last measurement period.	Number	A high value indicates a problem with the application or with some other (e.g. Database).
	Begun count: Indicates the number of transactions that were started on the server since the last measurement period.	Number	A high value indicates an overload on the server.
	Timedout count: Indicates the number of transactions that timed out since the last measurement period.	Number	A rise in the value could be due to the problem with the application or with some other dependent server like the database.

	Transaction time: Indicates the average duration of the transactions.	Secs	A high transaction duration value indicates increased load on the server.
	Throughput: Indicates the transaction throughput.	Reqs/Sec	

3.2.4.2 WAS Beans Test

The WAS Beans test automatically discovers the EJBs deployed on the WebSphere server and reports critical statistics pertaining to each of the EJBs.

Purpose	Automatically discovers the EJBs deployed on the WebSphere server and reports critical statistics pertaining to each of the EJBs
Target of the test	A WebSphere application server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebSphere application server 3. **PORT** – The port number of the WebSphere application server 4. **SERVERHOSTNAME** – Specify the host name of the application server instance being monitored. 5. **APPPORT** – Specify the port number to be used for accessing the **egurkha** application that has been deployed on the server. 6. **NODENAME** - Specify the node name of the server instance being monitored. To know the node name, do the following ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the **Node** that corresponds to the application server instance being monitored, and specify that name against the **NODENAME** parameter. 7. **SERVERNAME** - Provide the name of the server instance being monitored in the **SERVERNAME** text box. To know the server name, do the following: ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the **Name** of the monitored server instance, and specify that name against the **SERVERNAME** parameter. If the server instance being monitored is part of a WebSphere cluster, then you need to provide the host name that corresponds to the connector port of the *Deployment Manager* of the cluster as the **SERVERNAME**. To determine the **SERVERNAME** in this case, do the following: • Connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin** or **https://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**. • Login to the WebSphere Administrative console • Expand the **System Administration** node in the tree-structure in the left pane of the console and click on the **Deployment Manager** sub-node within.

- In the right panel, click on the **Configuration** tab page to view the configuration of the **Deployment Manager**. In the **Additional Properties** section of the **Configuration** tab page, expand the **Ports** node.
- A list of ports will then appear. Click on the **Details** button alongside the ports list.
- If the SOAP port has been set as the connector port in your environment, then scroll down the page that appears next until you view the **Port Name**, **SOAP_CONNECTOR_ADDRESS**. Make note of the **Host** name that corresponds to this port name. If the RMI port is the connector port in your environment, then make note of the **Host** name that corresponds to the **Port** name, **BOOTSTRAP_ADDRESS**.
- Specify this **Host** name as the **SERVERNAME**.

8. **CONNECTORPORT** - The applications that are deployed on a server instance use the **CONNECTORPORT** for all internal communications with the application server. The connector port can be a SOAP port or an RMI port. The default connector port however, is the SOAP port. To know the connector port number, do the following:

   - Login to the WebSphere Administrative Console.
   - Expand the **Servers** node in the tree structure in the left pane of the console, and click on **Application Servers** within.
   - A list of application server instances and their corresponding node names will then appear in the right pane of the console. In the right pane, click on the server name link that corresponds to the server instance that is being monitored.
   - Doing so invokes the **Configuration** of the application server instance clicked on. Scroll down the **Configuration** tab page to view the **Communications** section.
   - Expand the **Ports** link in this section to view a list of ports. If the default connector port is in use, then the port number displayed against **SOAP_CONNECTOR_ADDRESS** should be specified as the **CONNECTORPORT**. If an RMI port has been explicitly set as the connector port, then specify the port number displayed against **BOOTSTRAP_ADDRESS** as the **CONNECTORPORT**.

   If the server instance being monitored is part of a WebSphere cluster, then you need to provide the SOAP/RMI port of the *Deployment Manager* of the cluster as the **CONNECTORPORT**. To determine the **CONNECTORPORT** in this case, do the following:

   - Connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin** or **https://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**.
   - Login to the WebSphere Administrative console.
   - Expand the **System Administration** node in the tree-structure in the left pane of the console and click on the **Deployment Manager** sub-node within.
   - In the right panel, click on the **Configuration** tab page to view the configuration of the **Deployment Manager**. In the **Additional Properties** section of the **Configuration** tab page, expand the **Ports** node.

	• A list of ports will then appear. If the default connector port is in use, then the port number displayed against **SOAP_CONNECTOR_ADDRESS** should be specified as the **CONNECTORPORT**. If an RMI port has been explicitly set as the connector port, then specify the port number displayed against **BOOTSTRAP_ADDRESS** as the **CONNECTORPORT**. 9. **SSL** - Select **Yes** if **SSL** (Secured Socket Layer) is to be used to connect to the WebSphere server, and **No** if it is not. 10. **USER** - If security has been enabled for the WebSphere server being monitored, then provide a valid **USER** name to login to the WebSphere server. If the WebSphere server does not require any authentication, then the **USER** text box should contain the default value 'none'. 11. **PASSWORD** – If security has been enabled for the WebSphere server being monitored, then provide the **PASSWORD** that corresponds to the specified **USER** name. If the WebSphere server does not require any authentication, then leave the **PASSWORD** text box with its default setting. 12. **CONFIRM PASSWORD** - If security has been enabled, confirm the specified **PASSWORD** by retyping it in the **CONFIRM PASSWORD** text box. If the WebSphere server does not require any authentication, then leave the **CONFIRM PASSWORD** text box with its default setting.
Outputs of the test	One set of results for each EJB deployed on the WebSphere application server

Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Create count: Indicates the number of times this EJB was created during the last measurement period.	Number	
	Avg create time: Indicates the average time taken by a bean create call.	Secs	Ideally, this value should be low.
	Remove count: Indicates the number of times this bean was removed during the last measurement period.	Number	
	Avg remove time: Indicates the average time taken by a bean remove call.	Secs	
	Activation count: Indicates the number of times this bean was activated during the last measurement period.	Number	

	Avg activation time: Indicates the average time taken by a bean activate call, including the time at the database.	Secs	Ideally, this value should be low.
	Store count: Indicates the number of times this bean was stored in the persistent storage during the last measurement period.	Number	
	Avg store time: Indicates the average time for storing this bean in a persistent storage.	Secs	
	Instantiates count: Indicates the number of times this bean was instantiated during the last measurement period.	Number	A sudden increase in the number of instantiations indicates a bottleneck on the server. It may be due to greater load on the server or there might be a loophole in the application.
	Freed count: Indicates the number of times during the last measurement period this bean object was freed.	Number	A very low value indicates a bottleneck on the server. This might affect the performance of the application.
	Ready count: Indicates the number of concurrently ready beans.	Number	Greater the ready beans count, better will be the application performance.
	Passive count: Indicates the number of beans in the passivated state during the last measurement.	Number	
	Pooled count: Indicates the number of objects currently in the pool.	Number	
	Drains count: Indicates the number of times during the last measurement period the daemon found the pool was idle and attempted to clean it.	Number	
	Retrieve count: Indicates the number of calls during the last measurement period retrieving an object from the pool.	Number	

	Retrieve success count: Indicates the number of times a retrieve found an object in the pool, during the last measurement period.	Number	
	Returns count: Indicates the number of calls returning an object to the pool, during the last measurement period.	Number	
	Returns discard count: Indicates the number of times during the last measurement period the returning object was discarded because the pool was full.	Number	Ideally, this value should be low. A consistent high value could indicate a full pool, and consequently, an overloaded server. You might then want to consider resizing the pool in order to accommodate more number of objects.
	Methods call count: Indicates the number of method calls during the last measurement period.	Number	A high value indicates that the server is busy.
	Methods response time: Indicates the average response time of the bean methods.	Secs	This value should be low for optimal performance of the application server. The value may go high, if there are more objects in the pool, which is a sign of overload.
	Avg passivate time: The average time taken by a bean passivate call, including the time at the database	Secs	
	Load count: The number of times this bean was loaded from the persistent storage during the last measurement period	Number	
	Avg load time: The average time for loading a bean data from the persistent storage	Secs	Ideally, this value should be low.

3.2.5 The WAS Applications Layer

This layer extracts critical performance statistics pertaining to the following:

- The Http sessions on the server
- the web applications deployed on the WebSphere application server
- the synchronous and asynchronous requests received by WebSphere application server
- the Object Request Brokers (ORB)
- the web services mounted on a WebSphere server
- the JCA connection pools on the server

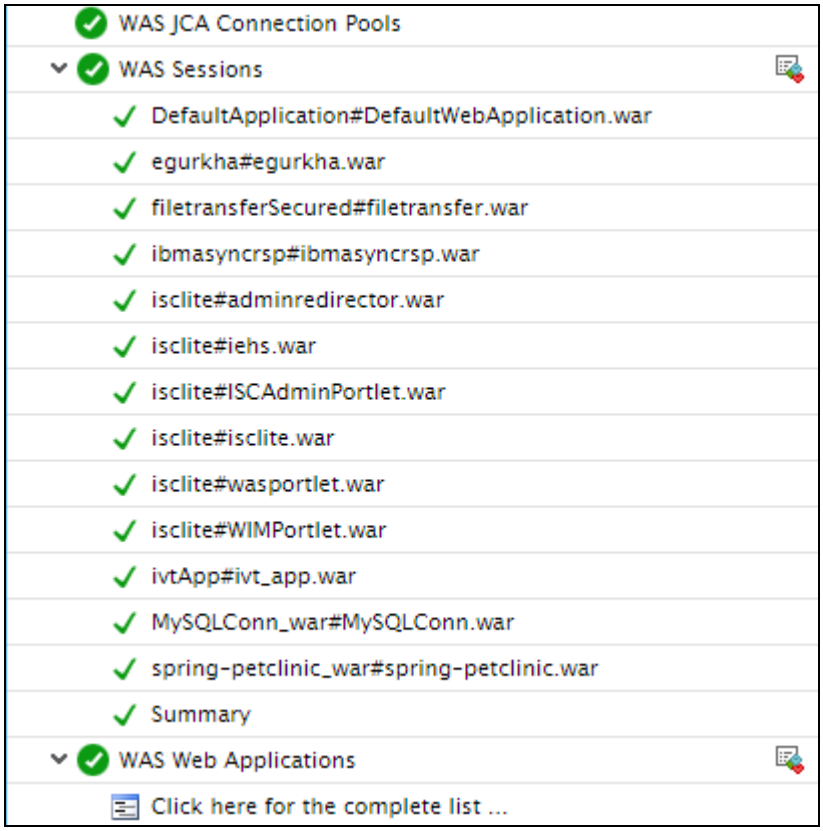


Figure 3.11: The tests associated with the WAS Applications layer

3.2.5.1 WAS Sessions Test

HTTP sessions form a part of any business application. This test monitors the HTTP sessions on the WebSphere application server.

Purpose	Monitors the HTTP sessions on the WebSphere application server
Target of the test	A WebSphere application server
Agent deploying the test	An internal agent

Outputs of the test	One set of results for each session on the WebSphere application server
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebSphere application server 3. **PORT** – The port number of the WebSphere application server 4. **SERVERHOSTNAME** – Specify the host name of the application server instance being monitored. 5. **APPPORT** – Specify the port number to be used for accessing the **egurkha** application that has been deployed on the server. 6. **NODENAME** - Specify the node name of the server instance being monitored. To know the node name, do the following ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the **Node** that corresponds to the application server instance being monitored, and specify that name against the **NODENAME** parameter. 7. **SERVERNAME** - Provide the name of the server instance being monitored in the **SERVERNAME** text box. To know the server name, do the following: ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the **Name** of the monitored server instance, and specify that name against the **SERVERNAME** parameter. If the server instance being monitored is part of a WebSphere cluster, then you need to provide the host name that corresponds to the connector port of the *Deployment Manager* of the cluster as the **SERVERNAME**. To determine the **SERVERNAME** in this case, do the following: • Connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin** or **https://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**. • Login to the WebSphere Administrative console • Expand the **System Administration** node in the tree-structure in the left pane of the console and click on the **Deployment Manager** sub-node within.

- In the right panel, click on the **Configuration** tab page to view the configuration of the **Deployment Manager**. In the **Additional Properties** section of the **Configuration** tab page, expand the **Ports** node.
- A list of ports will then appear. Click on the **Details** button alongside the ports list.
- If the SOAP port has been set as the connector port in your environment, then scroll down the page that appears next until you view the **Port Name**, **SOAP_CONNECTOR_ADDRESS**. Make note of the **Host** name that corresponds to this port name. If the RMI port is the connector port in your environment, then make note of the **Host** name that corresponds to the **Port** name, **BOOTSTRAP_ADDRESS**.
- Specify this **Host** name as the **SERVERNAME**.

8. **CONNECTORPORT** - The applications that are deployed on a server instance use the **CONNECTORPORT** for all internal communications with the application server. The connector port can be a SOAP port or an RMI port. The default connector port however, is the SOAP port. To know the connector port number, do the following:
   - Login to the WebSphere Administrative Console.
   - Expand the **Servers** node in the tree structure in the left pane of the console, and click on **Application Servers** within.
   - A list of application server instances and their corresponding node names will then appear in the right pane of the console. In the right pane, click on the server name link that corresponds to the server instance that is being monitored.
   - Doing so invokes the **Configuration** of the application server instance clicked on. Scroll down the **Configuration** tab page to view the **Communications** section.
   - Expand the **Ports** link in this section to view a list of ports. If the default connector port is in use, then the port number displayed against **SOAP_CONNECTOR_ADDRESS** should be specified as the **CONNECTORPORT**. If an RMI port has been explicitly set as the connector port, then specify the port number displayed against **BOOTSTRAP_ADDRESS** as the **CONNECTORPORT**.

   If the server instance being monitored is part of a WebSphere cluster, then you need to provide the SOAP/RMI port of the *Deployment Manager* of the cluster as the **CONNECTORPORT**. To determine the **CONNECTORPORT** in this case, do the following:
   - Connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin** or **https://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**.
   - Login to the WebSphere Administrative console.
   - Expand the **System Administration** node in the tree-structure in the left pane of the console and click on the **Deployment Manager** sub-node within.
   - In the right panel, click on the **Configuration** tab page to view the configuration of the **Deployment Manager**. In the **Additional Properties** section of the **Configuration** tab page, expand the **Ports** node.

	• A list of ports will then appear. If the default connector port is in use, then the port number displayed against **SOAP_CONNECTOR_ADDRESS** should be specified as the **CONNECTORPORT**. If an RMI port has been explicitly set as the connector port, then specify the port number displayed against **BOOTSTRAP_ADDRESS** as the **CONNECTORPORT**. 9. **SSL** - Select **Yes** if **SSL** (Secured Socket Layer) is to be used to connect to the WebSphere server, and **No** if it is not. 10. **USER** - If security has been enabled for the WebSphere server being monitored, then provide a valid **USER** name to login to the WebSphere server. If the WebSphere server does not require any authentication, then the **USER** text box should contain the default value 'none'. 11. **PASSWORD** – If security has been enabled for the WebSphere server being monitored, then provide the **PASSWORD** that corresponds to the specified **USER** name. If the WebSphere server does not require any authentication, then leave the **PASSWORD** text box with its default setting. 12. **CONFIRM PASSWORD** - If security has been enabled, confirm the specified **PASSWORD** by retyping it in the **CONFIRM PASSWORD** text box. If the WebSphere server does not require any authentication, then leave the **CONFIRM PASSWORD** text box with its default setting.

Measurements made by the test	Measurement	Measurement Unit	Interpretation
	Active count: Indicates the number of sessions that are currently accessed by requests.	Number	A high value indicates an increased workload on the server.
	Live count: Indicates the number of sessions that are currently live.	Number	A high value indicates an increased workload on the server.
	Create count: Indicates the number of sessions that were newly created since the last measurement period.	Number	A high value indicates a high level of activity in this application.
	Invalidate count: Indicates the number of sessions that were invalidated since the last measurement period.	Number	This measure is indicative of the session usage pattern of this application.
	Invalid session requests: Indicates the number of requests that were received since the last measurement period, for a session that no longer exists.	Number	

	Cache discards: Indicates the number of session objects that were forced out of the cache.	Number	
	New session failures: Indicates the number of times since the last measurement period, the request for a new session could not be handled because the value exceeded the maximum session count	Number	A consistent high value of this measure could indicate that many sessions have been alive for too long a time. A long session lifetime may occur due to one of the following reasons: ➢ The application may not timeout the sessions after a fixed interval of time. ➢ The sessions in the application might be active for a very long time.
	Timeout invalidates: Indicates the number of sessions that were invalidated since the last measurement period, due to timeouts.	Number	

3.2.5.2 WAS Web Applications Test

The WASWebApplications test reports statistics pertaining to the web applications deployed on a WebSphere server.

Purpose	Reports statistics pertaining to the web applications deployed on a WebSphere server
Target of the test	A WebSphere application server
Agent deploying the test	An internal agent
Outputs of the test	One set of results for each web application deployed on the WebSphere application server

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebSphere application server 3. **PORT** – The port number of the WebSphere application server 4. **SERVERHOSTNAME** – Specify the host name of the application server instance being monitored. 5. **APPPORT** – Specify the port number to be used for accessing the **egurkha** application that has been deployed on the server. 6. **NODENAME** - Specify the node name of the server instance being monitored. To know the node name, do the following: ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the **Node** that corresponds to the application server instance being monitored, and specify that name against the **NODENAME** parameter. 7. **SERVERNAME** - Provide the name of the server instance being monitored in the **SERVERNAME** text box. To know the server name, do the following: ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the **Name** of the monitored server instance, and specify that name against the **SERVERNAME** parameter. If the server instance being monitored is part of a WebSphere cluster, then you need to provide the host name that corresponds to the connector port of the *Deployment Manager* of the cluster as the **SERVERNAME**. To determine the **SERVERNAME** in this case, do the following: • Connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin** or **https://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**. • Login to the WebSphere Administrative console • Expand the **System Administration** node in the tree-structure in the left pane of the console and click on the **Deployment Manager** sub-node within.

- In the right panel, click on the **Configuration** tab page to view the configuration of the **Deployment Manager**. In the **Additional Properties** section of the **Configuration** tab page, expand the **Ports** node.
- A list of ports will then appear. Click on the **Details** button alongside the ports list.
- If the SOAP port has been set as the connector port in your environment, then scroll down the page that appears next until you view the **Port Name**, **SOAP_CONNECTOR_ADDRESS**. Make note of the **Host** name that corresponds to this port name. If the RMI port is the connector port in your environment, then make note of the **Host** name that corresponds to the **Port** name, **BOOTSTRAP_ADDRESS**.
- Specify this **Host** name as the **SERVERNAME**.

8. **CONNECTORPORT** - The applications that are deployed on a server instance use the **CONNECTORPORT** for all internal communications with the application server. The connector port can be a SOAP port or an RMI port. The default connector port however, is the SOAP port. To know the connector port number, do the following:
   - Login to the WebSphere Administrative Console.
   - Expand the **Servers** node in the tree structure in the left pane of the console, and click on **Application Servers** within.
   - A list of application server instances and their corresponding node names will then appear in the right pane of the console. In the right pane, click on the server name link that corresponds to the server instance that is being monitored.
   - Doing so invokes the **Configuration** of the application server instance clicked on. Scroll down the **Configuration** tab page to view the **Communications** section.
   - Expand the **Ports** link in this section to view a list of ports. If the default connector port is in use, then the port number displayed against **SOAP_CONNECTOR_ADDRESS** should be specified as the **CONNECTORPORT**. If an RMI port has been explicitly set as the connector port, then specify the port number displayed against **BOOTSTRAP_ADDRESS** as the **CONNECTORPORT**.

   If the server instance being monitored is part of a WebSphere cluster, then you need to provide the SOAP/RMI port of the *Deployment Manager* of the cluster as the **CONNECTORPORT**. To determine the **CONNECTORPORT** in this case, do the following:
   - Connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin** or **https://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**.
   - Login to the WebSphere Administrative console.
   - Expand the **System Administration** node in the tree-structure in the left pane of the console and click on the **Deployment Manager** sub-node within.
   - In the right panel, click on the **Configuration** tab page to view the configuration of the **Deployment Manager**. In the **Additional Properties** section of the **Configuration** tab page, expand the **Ports** node.

	• A list of ports will then appear. If the default connector port is in use, then the port number displayed against **SOAP_CONNECTOR_ADDRESS** should be specified as the **CONNECTORPORT**. If an RMI port has been explicitly set as the connector port, then specify the port number displayed against **BOOTSTRAP_ADDRESS** as the **CONNECTORPORT**. 9. **SSL** - Select **Yes** if **SSL** (Secured Socket Layer) is to be used to connect to the WebSphere server, and **No** if it is not. 10. **USER** - If security has been enabled for the WebSphere server being monitored, then provide a valid **USER** name to login to the WebSphere server. If the WebSphere server does not require any authentication, then the **USER** text box should contain the default value 'none'. 11. **PASSWORD** – If security has been enabled for the WebSphere server being monitored, then provide the **PASSWORD** that corresponds to the specified **USER** name. If the WebSphere server does not require any authentication, then leave the **PASSWORD** text box with its default setting. 12. **CONFIRM PASSWORD** - If security has been enabled, confirm the specified **PASSWORD** by retyping it in the **CONFIRM PASSWORD** text box. If the WebSphere server does not require any authentication, then leave the **CONFIRM PASSWORD** text box with its default setting.

Measurements made by the test	Measurement	Measurement Unit	Interpretation
	Loaded servlets: Indicates the number of servlets that were loaded since the last measurement period.	Number	
	Reload count: Indicates the number of servlets that were reloaded since the last measurement period.	Number	
	Request count: Indicates the number of requests that a servlet/JSP processed since the last measurement period.	Number	
	Concurrent requests: Indicates the current number of requests processed concurrently.	Number	
	Error count: Indicates the number of errors in JSP/Servlet since the last measurement period.	Number	

	Service time: Indicates the response time of the JSP/servlet.	Secs	
	Throughput: Indicates the throughput of this web application.	Reqs/Sec	

3.2.5.3 WAS Gateway Test

The WASGateway test reports the number of synchronous and asynchronous requests received by and responses sent by the WebSphere server.

Purpose	Reports the number of synchronous and asynchronous requests received by and responses sent by the WebSphere server
Target of the test	A WebSphere application server
Agent deploying the test	An internal agent
Outputs of the test	One set of results for every Gateway on the WebSphere application server being monitored

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebSphere application server 3. **PORT** – The port number of the WebSphere application server 4. **SERVERHOSTNAME** – Specify the host name of the application server instance being monitored. 5. **APPPORT** – Specify the port number to be used for accessing the **egurkha** application that has been deployed on the server. 6. **NODENAME** - Specify the node name of the server instance being monitored. To know the node name, do the following ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the **Node** that corresponds to the application server instance being monitored, and specify that name against the **NODENAME** parameter. 7. **SERVERNAME** - Provide the name of the server instance being monitored in the **SERVERNAME** text box. To know the server name, do the following: ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the **Name** of the monitored server instance, and specify that name against the **SERVERNAME** parameter. If the server instance being monitored is part of a WebSphere cluster, then you need to provide the host name that corresponds to the connector port of the *Deployment Manager* of the cluster as the **SERVERNAME**. To determine the **SERVERNAME** in this case, do the following: • Connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin** or **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**. • Login to the WebSphere Administrative console • Expand the **System Administration** node in the tree-structure in the left pane of the console and click on the **Deployment Manager** sub-node within.

- In the right panel, click on the **Configuration** tab page to view the configuration of the **Deployment Manager**. In the **Additional Properties** section of the **Configuration** tab page, expand the **Ports** node.
- A list of ports will then appear. Click on the **Details** button alongside the ports list.
- If the SOAP port has been set as the connector port in your environment, then scroll down the page that appears next until you view the **Port Name**, **SOAP_CONNECTOR_ADDRESS**. Make note of the **Host** name that corresponds to this port name. If the RMI port is the connector port in your environment, then make note of the **Host** name that corresponds to the **Port** name, **BOOTSTRAP_ADDRESS**.
- Specify this **Host** name as the **SERVERNAME**.

8. **CONNECTORPORT** - The applications that are deployed on a server instance use the **CONNECTORPORT** for all internal communications with the application server. The connector port can be a SOAP port or an RMI port. The default connector port however, is the SOAP port. To know the connector port number, do the following:

   - Login to the WebSphere Administrative Console.
   - Expand the **Servers** node in the tree structure in the left pane of the console, and click on **Application Servers** within.
   - A list of application server instances and their corresponding node names will then appear in the right pane of the console. In the right pane, click on the server name link that corresponds to the server instance that is being monitored.
   - Doing so invokes the **Configuration** of the application server instance clicked on. Scroll down the **Configuration** tab page to view the **Communications** section.
   - Expand the **Ports** link in this section to view a list of ports. If the default connector port is in use, then the port number displayed against **SOAP_CONNECTOR_ADDRESS** should be specified as the **CONNECTORPORT**. If an RMI port has been explicitly set as the connector port, then specify the port number displayed against **BOOTSTRAP_ADDRESS** as the **CONNECTORPORT**.

   If the server instance being monitored is part of a WebSphere cluster, then you need to provide the SOAP/RMI port of the *Deployment Manager* of the cluster as the **CONNECTORPORT**. To determine the **CONNECTORPORT** in this case, do the following:

   - Connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin** or **https://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**.
   - Login to the WebSphere Administrative console.
   - Expand the **System Administration** node in the tree-structure in the left pane of the console and click on the **Deployment Manager** sub-node within.
   - In the right panel, click on the **Configuration** tab page to view the configuration of the **Deployment Manager**. In the **Additional Properties** section of the **Configuration** tab page, expand the **Ports** node.

	• A list of ports will then appear. If the default connector port is in use, then the port number displayed against **SOAP_CONNECTOR_ADDRESS** should be specified as the **CONNECTORPORT**. If an RMI port has been explicitly set as the connector port, then specify the port number displayed against **BOOTSTRAP_ADDRESS** as the **CONNECTORPORT**. 9. **SSL** - Select **Yes** if **SSL** (Secured Socket Layer) is to be used to connect to the WebSphere server, and **No** if it is not. 10. **USER** - If security has been enabled for the WebSphere server being monitored, then provide a valid **USER** name to login to the WebSphere server. If the WebSphere server does not require any authentication, then the **USER** text box should contain the default value 'none'. 11. **PASSWORD** – If security has been enabled for the WebSphere server being monitored, then provide the **PASSWORD** that corresponds to the specified **USER** name. If the WebSphere server does not require any authentication, then leave the **PASSWORD** text box with its default setting. 12. **CONFIRM PASSWORD** - If security has been enabled, confirm the specified **PASSWORD** by retyping it in the **CONFIRM PASSWORD** text box. If the WebSphere server does not require any authentication, then leave the **CONFIRM PASSWORD** text box with its default setting.

Measurements made by the test	Measurement	Measurement Unit	Interpretation
	Sync request count: Indicates the number of synchronous requests that were made, since the last measurement period.	Number	
	Sync response count: Indicates the number of synchronous responses that were sent, since the last measurement period.	Number	
	Async request count: Indicates the number of asynchronous requests that were made, since the last measurement period.	Number	
	Async response count: Indicates the number of asynchronous responses that were made, since the last measurement period.	Number	

3.2.5.4 WAS ORB Performance Test

The WASORBPerformance test reports statistics pertaining to the ORBs (Object Request Broker) on a WebSphere server.

Purpose	Reports statistics pertaining to the ORBs (Object Request Broker) on a WebSphere server
Target of the test	A WebSphere application server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebSphere application server 3. **PORT** – The port number of the WebSphere application server 4. **SERVERHOSTNAME** – Specify the host name of the application server instance being monitored. 5. **APPPORT** – Specify the port number to be used for accessing the **egurkha** application that has been deployed on the server. 6. **NODENAME** - Specify the node name of the server instance being monitored. To know the node name, do the following ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the **Node** that corresponds to the application server instance being monitored, and specify that name against the **NODENAME** parameter. 7. **SERVERNAME** - Provide the name of the server instance being monitored in the **SERVERNAME** text box. To know the server name, do the following: ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the **Name** of the monitored server instance, and specify that name against the **SERVERNAME** parameter. If the server instance being monitored is part of a WebSphere cluster, then you need to provide the host name that corresponds to the connector port of the *Deployment Manager* of the cluster as the **SERVERNAME**. To determine the **SERVERNAME** in this case, do the following: • Connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin** or **https://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**. • Login to the WebSphere Administrative console • Expand the **System Administration** node in the tree-structure in the left pane of the console and click on the **Deployment Manager** sub-node within.

- In the right panel, click on the **Configuration** tab page to view the configuration of the **Deployment Manager**. In the **Additional Properties** section of the **Configuration** tab page, expand the **Ports** node.
- A list of ports will then appear. Click on the **Details** button alongside the ports list.
- If the SOAP port has been set as the connector port in your environment, then scroll down the page that appears next until you view the **Port Name**, **SOAP_CONNECTOR_ADDRESS**. Make note of the **Host** name that corresponds to this port name. If the RMI port is the connector port in your environment, then make note of the **Host** name that corresponds to the **Port** name, **BOOTSTRAP_ADDRESS**.
- Specify this **Host** name as the **SERVERNAME**.

8. **CONNECTORPORT** - The applications that are deployed on a server instance use the **CONNECTORPORT** for all internal communications with the application server. The connector port can be a SOAP port or an RMI port. The default connector port however, is the SOAP port. To know the connector port number, do the following:

   - Login to the WebSphere Administrative Console.
   - Expand the **Servers** node in the tree structure in the left pane of the console, and click on **Application Servers** within.
   - A list of application server instances and their corresponding node names will then appear in the right pane of the console. In the right pane, click on the server name link that corresponds to the server instance that is being monitored.
   - Doing so invokes the **Configuration** of the application server instance clicked on. Scroll down the **Configuration** tab page to view the **Communications** section.
   - Expand the **Ports** link in this section to view a list of ports. If the default connector port is in use, then the port number displayed against **SOAP_CONNECTOR_ADDRESS** should be specified as the **CONNECTORPORT**. If an RMI port has been explicitly set as the connector port, then specify the port number displayed against **BOOTSTRAP_ADDRESS** as the **CONNECTORPORT**.

   If the server instance being monitored is part of a WebSphere cluster, then you need to provide the SOAP/RMI port of the *Deployment Manager* of the cluster as the **CONNECTORPORT**. To determine the **CONNECTORPORT** in this case, do the following:

   - Connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin** or **https://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**.
   - Login to the WebSphere Administrative console.
   - Expand the **System Administration** node in the tree-structure in the left pane of the console and click on the **Deployment Manager** sub-node within.
   - In the right panel, click on the **Configuration** tab page to view the configuration of the **Deployment Manager**. In the **Additional Properties** section of the **Configuration** tab page, expand the **Ports** node.

	• A list of ports will then appear. If the default connector port is in use, then the port number displayed against **SOAP_CONNECTOR_ADDRESS** should be specified as the **CONNECTORPORT**. If an RMI port has been explicitly set as the connector port, then specify the port number displayed against **BOOTSTRAP_ADDRESS** as the **CONNECTORPORT**. 9. **SSL** - Select **Yes** if **SSL** (Secured Socket Layer) is to be used to connect to the WebSphere server, and **No** if it is not. 10. **USER** - If security has been enabled for the WebSphere server being monitored, then provide a valid **USER** name to login to the WebSphere server. If the WebSphere server does not require any authentication, then the **USER** text box should contain the default value 'none'. 11. **PASSWORD** – If security has been enabled for the WebSphere server being monitored, then provide the **PASSWORD** that corresponds to the specified **USER** name. If the WebSphere server does not require any authentication, then leave the **PASSWORD** text box with its default setting. 12. **CONFIRM PASSWORD** - If security has been enabled, confirm the specified **PASSWORD** by retyping it in the **CONFIRM PASSWORD** text box. If the WebSphere server does not require any authentication, then leave the **CONFIRM PASSWORD** text box with its default setting.

Measurements made by the test	Measurement	Measurement Unit	Interpretation
	Requests count: Indicates the number of requests sent to the ORB, since the last measurement period.	Number	
	Concurrent requests count: Indicates the current number of requests concurrently processed by the ORB.	Number	
	Lookup time: Indicates the amount of time taken to lookup an object reference before method dispatch can be carried out.	Secs	An excessively long time may indicate an EJB container lookup problem.
	Processing time: Indicates the time that it takes a registered portable interceptor to run.	Secs	

3.2.5.5 WAS Web Service Test

The WASWebServer test reports statistics pertaining to the web services mounted on a WebSphere server.

Purpose	Reports statistics pertaining to the web services mounted on a WebSphere server

Target of the test	A WebSphere application server
Agent deploying the test	An internal agent
Outputs of the test	One set of results for every web service on the WebSphere application server being monitored
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebSphere application server 3. **PORT** – The port number of the WebSphere application server 4. **SERVERHOSTNAME** – Specify the host name of the application server instance being monitored. 5. **APPPORT** – Specify the port number to be used for accessing the **egurkha** application that has been deployed on the server. 6. **NODENAME** - Specify the node name of the server instance being monitored. To know the node name, do the following ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the **Node** that corresponds to the application server instance being monitored, and specify that name against the **NODENAME** parameter. 7. **SERVERNAME** - Provide the name of the server instance being monitored in the **SERVERNAME** text box. To know the server name, do the following: ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the **Name** of the monitored server instance, and specify that name against the **SERVERNAME** parameter. If the server instance being monitored is part of a WebSphere cluster, then you need to provide the host name that corresponds to the connector port of the *Deployment Manager* of the cluster as the **SERVERNAME**. To determine the **SERVERNAME** in this case, do the following: • Connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin** or **https://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**. • Login to the WebSphere Administrative console • Expand the **System Administration** node in the tree-structure in the left pane of the console and click on the **Deployment Manager** sub-node within.

- In the right panel, click on the **Configuration** tab page to view the configuration of the **Deployment Manager**. In the **Additional Properties** section of the **Configuration** tab page, expand the **Ports** node.
- A list of ports will then appear. Click on the **Details** button alongside the ports list.
- If the SOAP port has been set as the connector port in your environment, then scroll down the page that appears next until you view the **Port Name**, **SOAP_CONNECTOR_ADDRESS**. Make note of the **Host** name that corresponds to this port name. If the RMI port is the connector port in your environment, then make note of the **Host** name that corresponds to the **Port** name, **BOOTSTRAP_ADDRESS**.
- Specify this **Host** name as the **SERVERNAME**.

8. **CONNECTORPORT** - The applications that are deployed on a server instance use the **CONNECTORPORT** for all internal communications with the application server. The connector port can be a SOAP port or an RMI port. The default connector port however, is the SOAP port. To know the connector port number, do the following:

   - Login to the WebSphere Administrative Console.
   - Expand the **Servers** node in the tree structure in the left pane of the console, and click on **Application Servers** within.
   - A list of application server instances and their corresponding node names will then appear in the right pane of the console. In the right pane, click on the server name link that corresponds to the server instance that is being monitored.
   - Doing so invokes the **Configuration** of the application server instance clicked on. Scroll down the **Configuration** tab page to view the **Communications** section.
   - Expand the **Ports** link in this section to view a list of ports. If the default connector port is in use, then the port number displayed against **SOAP_CONNECTOR_ADDRESS** should be specified as the **CONNECTORPORT**. If an RMI port has been explicitly set as the connector port, then specify the port number displayed against **BOOTSTRAP_ADDRESS** as the **CONNECTORPORT**.

   If the server instance being monitored is part of a WebSphere cluster, then you need to provide the SOAP/RMI port of the *Deployment Manager* of the cluster as the **CONNECTORPORT**. To determine the **CONNECTORPORT** in this case, do the following:

   - Connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin** or **https://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**.
   - Login to the WebSphere Administrative console.
   - Expand the **System Administration** node in the tree-structure in the left pane of the console and click on the **Deployment Manager** sub-node within.
   - In the right panel, click on the **Configuration** tab page to view the configuration of the **Deployment Manager**. In the **Additional Properties** section of the **Configuration** tab page, expand the **Ports** node.

	• A list of ports will then appear. If the default connector port is in use, then the port number displayed against **SOAP_CONNECTOR_ADDRESS** should be specified as the **CONNECTORPORT**. If an RMI port has been explicitly set as the connector port, then specify the port number displayed against **BOOTSTRAP_ADDRESS** as the **CONNECTORPORT**. 9. **SSL** - Select **Yes** if **SSL** (Secured Socket Layer) is to be used to connect to the WebSphere server, and **No** if it is not. 10. **USER** - If security has been enabled for the WebSphere server being monitored, then provide a valid **USER** name to login to the WebSphere server. If the WebSphere server does not require any authentication, then the **USER** text box should contain the default value 'none'. 11. **PASSWORD** – If security has been enabled for the WebSphere server being monitored, then provide the **PASSWORD** that corresponds to the specified **USER** name. If the WebSphere server does not require any authentication, then leave the **PASSWORD** text box with its default setting. 12. **CONFIRM PASSWORD** - If security has been enabled, confirm the specified **PASSWORD** by retyping it in the **CONFIRM PASSWORD** text box. If the WebSphere server does not require any authentication, then leave the **CONFIRM PASSWORD** text box with its default setting.

Measurements made by the test	Measurement	Measurement Unit	Interpretation
	Loaded services: Indicates the number of web services loaded by the application server since the last measurement period.	Number	
	Dispatched requests: Indicates the number of requests that were dispatched by the service to a target code, since the last measurement period.	Number	
	Processed requests: Indicates the number of requests dispatched successfully with corresponding replies, since the last measurement period.	Number	
	Received requests: Indicates number of requests received by the service.	Number	

	Response time: Indicates the average time between the receipt of a request and the return of a reply.	Secs	A very high response time could indicate a bottleneck at the web service.
	Request response time: Indicates the average time between the receipt of the request and the dispatch for processing the request.	Secs	
	Reply response time: Indicates the average time between the dispatch of the reply and return of the reply.	Secs	

3.2.5.6 WAS JCA Connection Pools Test

The WAS JCA Connection Pools test monitors the usage of the JCA connection pools on the WebSphere Application server.

Purpose	Monitors the usage of the JCA connection pools on the WebSphere Application server
Target of the test	A WebSphere application server
Agent deploying the test	An internal agent
Outputs of the test	One set of results for each connection pool being monitored

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The IP address of the WebSphere application server 3. **PORT** – The port number of the WebSphere application server 4. **SERVERHOSTNAME** – Specify the host name of the application server instance being monitored. 5. **APPPORT** – Specify the port number to be used for accessing the **egurkha** application that has been deployed on the server. 6. **NODENAME** - Specify the node name of the server instance being monitored. To know the node name, do the following ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the **Node** that corresponds to the application server instance being monitored, and specify that name against the **NODENAME** parameter. 7. **SERVERNAME** - Provide the name of the server instance being monitored in the **SERVERNAME** text box. To know the server name, do the following: ➢ Login to the WebSphere Administrative Console. ➢ Expand the **Servers** node in the tree structure in the left pane of the console, and click on the **Application Servers** link within. ➢ A list of application server instances and their corresponding node names will then appear in the right pane of the console. From this list, you can figure out the **Name** of the monitored server instance, and specify that name against the **SERVERNAME** parameter. If the server instance being monitored is part of a WebSphere cluster, then you need to provide the host name that corresponds to the connector port of the *Deployment Manager* of the cluster as the **SERVERNAME**. To determine the **SERVERNAME** in this case, do the following: • Connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin** or **https://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**. • Login to the WebSphere Administrative console • Expand the **System Administration** node in the tree-structure in the left pane of the console and click on the **Deployment Manager** sub-node within.

- In the right panel, click on the **Configuration** tab page to view the configuration of the **Deployment Manager**. In the **Additional Properties** section of the **Configuration** tab page, expand the **Ports** node.
- A list of ports will then appear. Click on the **Details** button alongside the ports list.
- If the SOAP port has been set as the connector port in your environment, then scroll down the page that appears next until you view the **Port Name**, **SOAP_CONNECTOR_ADDRESS**. Make note of the **Host** name that corresponds to this port name. If the RMI port is the connector port in your environment, then make note of the **Host** name that corresponds to the **Port** name, **BOOTSTRAP_ADDRESS**.
- Specify this **Host** name as the **SERVERNAME**.

8. **CONNECTORPORT** - The applications that are deployed on a server instance use the **CONNECTORPORT** for all internal communications with the application server. The connector port can be a SOAP port or an RMI port. The default connector port however, is the SOAP port. To know the connector port number, do the following:

   - Login to the WebSphere Administrative Console.
   - Expand the **Servers** node in the tree structure in the left pane of the console, and click on **Application Servers** within.
   - A list of application server instances and their corresponding node names will then appear in the right pane of the console. In the right pane, click on the server name link that corresponds to the server instance that is being monitored.
   - Doing so invokes the **Configuration** of the application server instance clicked on. Scroll down the **Configuration** tab page to view the **Communications** section.
   - Expand the **Ports** link in this section to view a list of ports. If the default connector port is in use, then the port number displayed against **SOAP_CONNECTOR_ADDRESS** should be specified as the **CONNECTORPORT**. If an RMI port has been explicitly set as the connector port, then specify the port number displayed against **BOOTSTRAP_ADDRESS** as the **CONNECTORPORT**.

   If the server instance being monitored is part of a WebSphere cluster, then you need to provide the SOAP/RMI port of the *Deployment Manager* of the cluster as the **CONNECTORPORT**. To determine the **CONNECTORPORT** in this case, do the following:

   - Connect to the WebSphere Administrative console using the URL: **http://<IP address of the WebSphere server:Port number of the WebSphere server>\admin** or **https://<IP address of the WebSphere server:Port number of the WebSphere server>\admin**.
   - Login to the WebSphere Administrative console.
   - Expand the **System Administration** node in the tree-structure in the left pane of the console and click on the **Deployment Manager** sub-node within.
   - In the right panel, click on the **Configuration** tab page to view the configuration of the **Deployment Manager**. In the **Additional Properties** section of the **Configuration** tab page, expand the **Ports** node.

	• A list of ports will then appear. If the default connector port is in use, then the port number displayed against **SOAP_CONNECTOR_ADDRESS** should be specified as the **CONNECTORPORT**. If an RMI port has been explicitly set as the connector port, then specify the port number displayed against **BOOTSTRAP_ADDRESS** as the **CONNECTORPORT**. 9. **SSL** - Select **Yes** if **SSL** (Secured Socket Layer) is to be used to connect to the WebSphere server, and **No** if it is not. 10. **USER** - If security has been enabled for the WebSphere server being monitored, then provide a valid **USER** name to login to the WebSphere server. If the WebSphere server does not require any authentication, then the **USER** text box should contain the default value 'none'. 11. **PASSWORD** – If security has been enabled for the WebSphere server being monitored, then provide the **PASSWORD** that corresponds to the specified **USER** name. If the WebSphere server does not require any authentication, then leave the **PASSWORD** text box with its default setting. 12. **CONFIRM PASSWORD** - If security has been enabled, confirm the specified **PASSWORD** by retyping it in the **CONFIRM PASSWORD** text box. If the WebSphere server does not require any authentication, then leave the **CONFIRM PASSWORD** text box with its default setting.

Measurements made by the test	Measurement	Measurement Unit	Interpretation
	Connections allocated: Indicates the number of connections allocated to the pool during the last measurement period.	Number	
	Connections freed: Indicates the number of connections that were returned to the pool in the last measurement period.	Number	A very low value of this measure could result in a shortage of connections in the pool.
	Connections created: Indicates the number of connections created during the last measurement period.	Number	
	Connections closed: Indicates the number of connections released from the pool during the last measurement period.	Number	Ideally, this value should be low.
	Connections in pool: Indicates the number of connections in this connection pool.	Number	

	Free connections in pool: Indicates the number of free connection available in this connection pool.	Number	
	Waiting threads: Indicates the number of threads that are currently waiting in this connection pool	Number	
	Faults: Indicates the number of faults (for e.g., timeouts) that occurred in this connection pool per second during the last measurement period.	Faults/sec	Ideally, the value of this measure should be zero.
	Percent of the pool in use: Indicates the current utilization of this connection pool in percentage.	Percent	This value of this measure is based on the number of connections that are configured for this connection pool.
	Percent of the time that all connections are in use: Indicates the number of times (expressed as percentage) all the connections of this connection pool were in use.	Percent	
	Avg. use time of connections: Indicates the average time for which the connections of this connection pool were in use.	MilliSec	
	Avg. wait time to grand connection: Indicates the average time a client has to wait before the connections were granted from this connection pool.	MilliSec	
	Managed connections: Indicates the number of managed connections that are currently in use in this connection pool.	Number	

	Connections associated with physical connection: Indicates the number of connections that are associated with physical connections in this connection pool.	Number	

Chapter 4

Monitoring iPlanet Application Servers

The iPlanet Application server is a Java EE application server system, based on the Netscape Application Server and NetDynamics Application Server.

Figure 4.1 depicts the *Netscape Application* monitoring model used by an eG agent to monitor iPlanet application servers. The **Operating System**, **Network**, and **Tcp** layers have already been discussed in the *Monitoring Unix and Windows Servers* document. The **Application Processes** layer tracks the status of the different processes that comprise the iPlanet application server. Since the iPlanet server requires the executive server, the C server, and the Java server to be executing in order to function effectively, the **Application Processes** layer represents the cumulative state of all of these server processes. Above the **Application Processes** layer is the **NAS Service** layer.

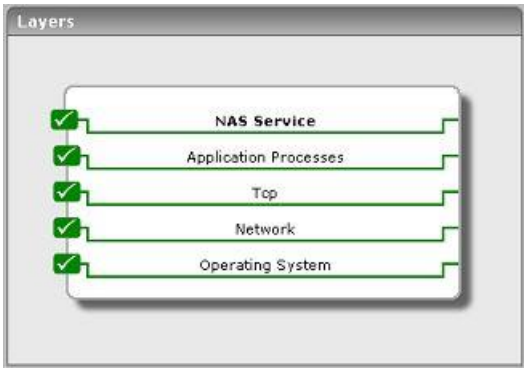


Figure 4.1: Model of an iPlanet Application server showing the different layers monitored for the server

Using the *Netscape Application* model, administrators can quickly determine the health of the NAS server engine.

The sections that follow discuss the **NAS Service** layer only, as all other layers have been discussed elaborately in the *Monitoring Unix and Windows Servers* document.

4.1 The NAS Service Layer

This layer represents the different services offered by the iPlanet application server. To measure the state of these services, an eG agent uses the Simple Network Management Protocol (SNMP) support provided by the iPlanet application server. The details of the NasSnmp test (see Figure 4.2) that tracks the status of the iPlanet application server are listed below.

Figure 4.2: The NasSnmpTest that maps to the NAS Service layer of an iPlanet application server

4.1.1 NAS SNMP Test

For this test to function properly, the iPlanet application server's SNMP monitoring capability should be enabled. Please refer to the iPlanet Administrator Guide to determine how the SNMP capabilities of the iPlanet application server can be turned on. The outputs of the NasSnmp test are listed below:

Purpose	To measure statistics pertaining to an iPlanet application server
Target of the test	An iPlanet application server
Agent deploying the test	An external agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** –The host for which the test is to be configured. 3. **PORT** - The port to which the specified **HOST** listens 4. **SNMPPORT** – The port number on which the application server is exposing the SNMP MIB 5. **SNMPVERSION** – By default, the eG agent supports SNMP version 1. Accordingly, the default selection in the **SNMPVERSION** list is **v1**. However, if a different SNMP framework is in use in your environment, say SNMP **v2** or **v3**, then select the corresponding option from this list. 6. **SNMPCOMMUNITY** – The SNMP community name that the test uses to communicate with the target server. This parameter is specific to SNMP **v1** and **v2** only. Therefore, if the **SNMPVERSION** chosen is **v3**, then this parameter will not appear. 7. **USERNAME** – This parameter appears only when **v3** is selected as the **SNMPVERSION**. SNMP version 3 (SNMPv3) is an extensible SNMP Framework which supplements the SNMPv2 Framework, by additionally supporting message security, access control, and remote SNMP configuration capabilities. To extract performance statistics from the MIB using the highly secure SNMP v3 protocol, the eG agent has to be configured with the required access privileges – in other words, the eG agent should connect to the MIB using the credentials of a user with access permissions to be MIB. Therefore, specify the name of such a user against the **USERNAME** parameter. 8. **AUTHPASS** – Specify the password that corresponds to the above-mentioned **USERNAME**. This parameter once again appears only if the **SNMPVERSION** selected is **v3**. 9. **CONFIRM PASSWORD** – Confirm the **AUTHPASS** by retyping it here. 10. **AUTHTYPE** – This parameter too appears only if **v3** is selected as the **SNMPVERSION**. From the **AUTHTYPE** list box, choose the authentication algorithm using which SNMP v3 converts the specified **USERNAME** and **PASSWORD** into a 32-bit format to ensure security of SNMP transactions. You can choose between the following options: ➢ **MD5** – Message Digest Algorithm ➢ **SHA** – Secure Hash Algorithm 11. **ENCRYPTFLAG** – This flag appears only when **v3** is selected as the **SNMPVERSION**. By default, the eG agent does not encrypt SNMP requests. Accordingly, the **ENCRYPTFLAG** is set to **NO** by default. To ensure that SNMP requests sent by the eG agent are encrypted, select the **YES** option. 12. **ENCRYPTTYPE** – If the **ENCRYPTFLAG** is set to **YES**, then you will have to mention the encryption type by selecting an option from the **ENCRYPTTYPE** list. SNMP v3 supports the following encryption types: ➢ **DES** – Data Encryption Standard ➢ **AES** – Advanced Encryption Standard 13. **ENCRYPTPASSWORD** – Specify the encryption password here. 14. **CONFIRM PASSWORD** – Confirm the encryption password by retyping it here.

<table>
<tr><td></td><td colspan="3">15. DATA OVER TCP – By default, in an IT environment, all data transmission occurs over UDP. Some environments however, may be specifically configured to offload a fraction of the data traffic – for instance, certain types of data traffic or traffic pertaining to specific components – to other protocols like TCP, so as to prevent UDP overloads. In such environments, you can instruct the eG agent to conduct the SNMP data traffic related to the equalizer over TCP (and not UDP). For this, set the DATA OVER TCP flag to Yes. By default, this flag is set to No.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for each iPlanet engine. The iPlanet application server has three main engines – KXS, KCS, and KJS.</td></tr>
<tr><td rowspan="6">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Request rate:
Rate of requests to the NAS engine.</td><td>Reqs/Sec</td><td>A high request rate is an indicator of server overload. By comparing the request rates across application servers, an operator can gauge the effectiveness of load balancers (if any) that are in use.</td></tr>
<tr><td>Response time:
Average response time (in seconds) for requests serviced by this NAS engine.</td><td>Secs</td><td>An increase in response time associated with one of the NAS engines can indicate a problem with the specific engine alone.</td></tr>
<tr><td>Threads utilized:
The percentage of threads of this engine that are in active use.</td><td>Percent</td><td>A value of close to 100% is indicative of a bottleneck with a specific engine.</td></tr>
<tr><td>Data transmit rate:
Rate at which the data is transferred by the engine in response to the incoming requests.</td><td>KB/Sec</td><td>A sudden change in data transmit rate can be indicative of a change in the characteristics of key applications hosted on the engine.</td></tr>
<tr><td>Data received rate:
Rate at which the data is received by the engine.</td><td>KB/Sec</td><td>A sudden increase or decrease in data rate to the engine is indicative of either an increase or decrease in popularity of applications hosted on the NAS engine under consideration.</td></tr>
</table>

Chapter 5

Monitoring Coldfusion Application Servers

ColdFusion is an application server and software development framework used for the development of computer software in general. This application server is most often used for data-driven web sites or intranets, and can also be used to generate remote services such as SOAP web services or Flash remoting. Error-free functioning of the ColdFusion server is therefore a key requirement for the continuous availability of these critical end-user services. To ensure that the ColdFusion is always accessible and is performing to peak capacity, it is necessary to constantly watch over the performance of the server, spot error conditions before they actually occur, and resolve the errors with immediate effect.

eG Enterprise provides an exclusive *ColdFusion* monitoring model that facilitates 24x7 monitoring of the ColdFusion server, and proactive alerting of probable problem conditions with the server. This model is shown in Figure 5.1.

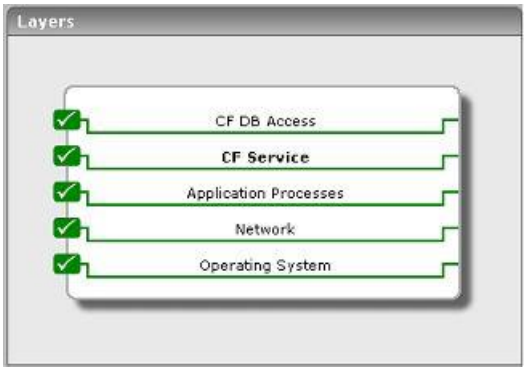


Figure 5.1: Layer model for a Coldfusion server

Every layer of this hierarchical model is mapped to one/more tests that collectively enable administrators to determine the following:

- Is the ColdFusion server overloaded with requests?
- Are the applications hosted on ColdFusion able to obtain quick access to the database?
- Is there an unusual increase in the data traffic to and from the server?

- Is the server processing requests quickly, or is the request queue growing steadily?
- Is the server sending out timely responses for the requests, or is the responsiveness of the server too slow?

The sections to come discuss each of the top 2 layers of Figure 5.1 above. The remaining layers have been dealt with extensively in the *Monitoring Unix and Windows Servers* document.

5.1 The CF Service Layer

This layer represents the different services offered by the Coldfusion application server. To monitor Coldfusion servers, the eG Enterprise suite uses monitoring capabilities supported by the Coldfusion servers. A special test page installed on the Coldfusion server interfaces with the Coldfusion server's monitoring interface to extract a variety of statistics pertaining to the Coldfusion server. The status of this layer is determined by the results of a Coldfusion test (see Figure 5.2). The details about the Coldfusion test have been provided in the following sections.

Figure 5.2: The ColdfusionTest that maps to the CF Service layer of a Coldfusion application server

5.1.1 Coldfusion Test

This tests measures statistics pertaining to a Coldfusion server. The outputs of this test are described below.

Purpose	To measure statistics pertaining to a Coldfusion application server
Target of the test	A Coldfusion application server
Agent deploying the test	An internal agent

<table>
<tr><td>Configurable parameters for the test</td><td colspan="3">1. TEST PERIOD - How often should the test be executed
2. HOST – The host for which the test is to be configured.
3. PORT - The port to which the specified host listens
4. WEBSERVERPORT – The port number of a web server that is configured with the Coldfusion monitoring capability. This web server has to be one that is already configured to work with a Coldfusion application server
5. SSL - Select Yes if SSL (Secure Socket Layer) has been enabled, and No if it is not.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for each Coldfusion application server.</td></tr>
<tr><td rowspan="6">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Request rate:
Rate of requests to the Coldfusion server.</td><td>Reqs/Sec</td><td>A high request rate is an indicator of server overload. By comparing the request rates across application servers, an operator can gauge the effectiveness of load balancers (if any) that are in use.</td></tr>
<tr><td>Database access rate:
Rate of database accesses issued by applications executing on the Coldfusion server.</td><td>Reqs/Sec</td><td>An unusually low or high rate of database accesses from one or more applications hosted on the Coldfusion application server may provide hints on anomalies with the applications.</td></tr>
<tr><td>Data transmit rate:
Rate at which the data is transferred by the application server in response to incoming requests.</td><td>KB/Sec</td><td>A sudden change in data transmit rate can be indicative of a change in the characteristics of key applications hosted on the engine.</td></tr>
<tr><td>Data receive rate:
Rate at which the data is received by the application server.</td><td>KB/Sec</td><td>A sudden increase or decrease in data rate to the application server is indicative of either an increase or decrease in popularity of applications hosted on the Coldfusion application server.</td></tr>
<tr><td>Requests queued:
Number of requests queued waiting for service from the Coldfusion application server.</td><td>Number</td><td>An increase in requests queued can indicate a bottleneck at the application server. The problem may be caused either because of an application server problem, a problem with specific applications hosted on the Coldfusion server, or because of backend problems (e.g., with the database server, payment gateway, etc.).</td></tr>
<tr><td>Requests running:
Number of requests currently being processed by the application server.</td><td>Number</td><td>An increase in requests running may indicate an increase in user workload (to be sure, correlate this value with the data transmit and receive rates). Alternatively, a slowdown at the application server may also cause the requests that are simultaneously executing to increase.</td></tr>
</table>

	Requests timeout rate: Rate at which requests are timing out while waiting for service from the Coldfusion server.	Reqs/Sec	An increase in the time out rate of requests is a clear indication of a problem with one or more applications executing on a Coldfusion server. Requests may time out because of an application problem, because of failure to access external servers (e.g., databases, payment gateways), or because of server overload. By determining whether all of the web transactions that use the Coldfusion server are experiencing problems, an operator can determine if the problem is related to the application server or with specific applications.
	Avg queue time: Average time in seconds spent by a request waiting for service by the Coldfusion server.	Secs	An increase in queuing delay reflects a server bottleneck.
	Avg response time: Average time (in seconds) for processing a request at the server.	Secs	An increase in response time can occur because there are too many simultaneous requests or because of a bottleneck with any of the applications executing on the server.
	Avg database access time: Average time (in seconds) for database accesses from applications executing on the Coldfusion server.	Secs	A large value of DB access time can be caused by poor query construction, bottlenecks at the database server(s), etc.

5.1.2 Coldfusion Log Test

This test monitors a ColdFusion log file for warnings. This test is disabled by default. To enable the test, go to the **ENABLE / DISABLE TESTS** page using the menu sequence : Agents -> Tests -> Enable/Disable, pick *Coldfusion* as the **Component type**, *Performance* as the **Test type**, choose this test from the **DISABLED TESTS** list, and click on the **>>** button to move the test to the **ENABLED TESTS** list. Finally, click the **Update** button.

Purpose	To monitor a ColdFusion log file for warnings
Target of the test	A ColdFusion server
Agent deploying the test	An internal agent

<table>
<tr><td>Configurable parameters for the test</td><td colspan="3">1. TEST PERIOD - How often should the test be executed
2. HOST –The host for which the test is to be configured.
3. PORT - The port to which the specified HOST listens
4. LOGFILE – The path to the ColdFusion log file to be monitored
5. DETAILED DIAGNOSIS - To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the On option. To disable the capability, click on the Off option.
The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled:
➢ The eG manager license should allow the detailed diagnosis capability
➢ Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for every ColdFusion server</td></tr>
<tr><td rowspan="2">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Warnings:
The number of warnings reported by the ColdFusion server during the last measurement period.</td><td>Number</td><td>The detailed diagnosis for this metric provides more details on the warnings reported in the Coldfusion logs.
Information about the URLs that are providing slow response, the number of slow responses, and the average response time for these accesses can also be received.</td></tr>
</table>

5.2 The CF DB Access Layer

This layer tracks the statistics of the database access of the applications hosted on a Coldfusion server with the help of the Coldfusion test (see Figure 5.3).

Figure 5.3: The ColdfusionTest that maps to the CF DB Access layer of a Coldfusion application server

Chapter 6

Monitoring SilverStream Application Servers

The SilverStream Application Server is a comprehensive, J2EE certified platform for building and deploying enterprise-class Web applications. It supports the full Java 2 Enterprise Edition standard -- JavaServer Pages (JSP pages), Enterprise JavaBeans (EJBs), and all the other J2EE 1.2 components and technologies.

Errors in the functioning of this application server could have an adverse impact on the overall performance and availability of the dependent web applications; this in turn would result in significantly decreasing the productivity of the end-users, who transact business with the help of these web applications. To avoid such an unpleasant outcome, the SilverStream application server's performance should be scrutinized regularly.

eG Enterprise provides a special *SilverStream* monitoring model (see Figure 6.1) to periodically monitor the helath of the Silverstream application server. The eG agents can track the availability, performance, and usage of SilverStream application servers. Critical information about the health of a SilverStream server such as the current load on the server, current sessions, percentage of thread pool utilization, processing time for requests, memory usage patterns, etc., can be obtained from the eG agents. Coupled with eG Enterprise's relative thresholding, single click diagnosis, historical trending, and integrated monitoring capabilities, this new enhancement offers a powerful, single stop monitoring solution for customers using SilverStream application servers.

The SilverStream server uses a SilverServer application process to start the server. The Processes test parameters for SilverStream servers should be configured to monitor this process. To obtain statistics specific to a SilverStream server, the eG Enterprise suite relies on the Client API provided by SilverStream server. SilverStream server can be configured to listen on three different ports – Runtime port, design port and Admin port. When the SilverStream server is first installed on a particular port number, all the three port numbers will have the same value. Through eG Enterprise's administrative interface, the Admin port number on which the SilverStream server listens must be specified. For the eG Enterprise suite to use the SilverStream Client API, the root path of the SilverStream installation must be specified through eG Enterprise's administrative interface. If SilverStream server is configured to authenticate users connecting to it, a valid username and password must be specified through eG Enterprise's administrative interface. While configuring the parameters for this test, the value corresponding to the **ISAUTHENTICATED** should be "Y".

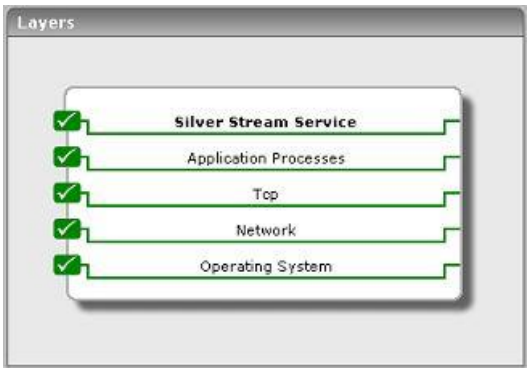


Figure 6.1: Layer model for a SilverStream application server

The sections that follow elaborate on the first layer of Figure 6.1 only, as all other layers have been extensively dealt with in the *Monitoring Unix and Windows Servers* document.

6.1 The Silver Stream Service Layer

This layer tracks the health of the SilverStream server using the SilverStream test (see Figure 6.2).

Figure 6.2: Tests mapping to the Silver Stream Service layer

6.1.1 SilverStream Test

Using the SilverStream client API, this test tracks various statistics relating to the SilverStream server.

Purpose	To measure the statistics pertaining to a SilverStream application server
Target of the test	A SilverStream application server
Agent deploying the test	An internal agent

<table>
<tr><td>Configurable parameters for the test</td><td colspan="3">1. TEST PERIOD - How often should the test be executed
2. ADMIN PORT – The port number on which the SilverStream server is listening for administrative purpose
3. ROOTPATH – Root path where SilverStream server is installed.
4. ISAUTHENTICATED – Is the server running in an authenticated mode or not. Value should be entered as Y (for Yes) and N (for No).
5. USER - If the SilverStream server is running in an authenticated mode, then the user name has to be supplied.
6. PASSWORD - If the SilverStream server is running in an authenticated mode, then the password corresponding to the user name has to be supplied.
7. CONFIRM PASSWORD – Confirm the PASSWORD by retyping it here.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for each SilverStream application server.</td></tr>
<tr><td rowspan="6">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Server usage:
The current utilization of the server. It is a value between 1 and 4. A value of 1 indicates light utilization while a value of 4 indicates high utilization of the server.</td><td>Number</td><td>If the server is under high utilization for a prolonged period of time, it is indicative of the server reaching its maximum capacity.</td></tr>
<tr><td>Thread usage:
The percentage of threads associated with the client connections. This includes threads, which may or may not be currently handling user requests.</td><td>Percent</td><td>If this measure reaches 100%, then the client connections are queued before execution. In this situation, the total number of threads spawned by the server can be increased depending on the capacity.</td></tr>
<tr><td>Percent idle threads:
The percentage of threads associated with client connections, which are not currently handling user requests.</td><td>Percent</td><td>This measure is indicative of the percent of threads waiting for further user requests.</td></tr>
<tr><td>Request rate:
Number of requests per second to the SilverStream server.</td><td>Reqs/Sec</td><td>A sudden increase in this value indicates an unusual burst of requests for your application server. This usually means that there is sudden high activity on your application or abnormal/malicious attacks.</td></tr>
<tr><td>Mean response time:
The average time taken to process the requests coming to the server.</td><td>Secs</td><td>A sudden increase in the mean response time is indicative of a bottleneck on the application server.</td></tr>
</table>

	Max response time: The maximum time taken to process any request since the start of the server.	Secs	A sudden increase in the maximum response time is indicative of a bottleneck on the application server.
	Data transmit rate: The rate of data transmitted by the server while serving client requests.	KB/Sec	A large increase in the data transmission rate can be indicative of an increase in the popularity of one or more web sites hosted on the server. This measure is directly related to Request_rate.
	Memory utilization: The percentage of memory used by the SilverStream server inside the Java virtual machine in which it is running.	Percent	A sudden increase in memory utilization may be indicative of memory leaks in the applications running on the server. When this measure reaches 100%, it indicates that the SilverStream server has reached its maximum capacity.
	Total sessions: The total number of sessions associated with the server.	Number	This is indicative of the number of user sessions maintained in the server.
	Idle sessions: The number of sessions associated with the server, which is in idle state.	Number	This measure is indicative of the number of user sessions waiting for further user requests.

Chapter 7

Monitoring JRun Application Servers

JRun is an application server from Macromedia that is based on Sun Microsystems' Java 2 Platform, Enterprise Edition (J2EE). JRun consists of Java Server Page (JSP), Java servlets, Enterprise JavaBeans, the Java Transaction Service (JTS), and the Java Messaging Service (JMS). JRun works with the most popular Web servers including Apache, Microsoft's Internet Information Server (IIS), and any other Web server that supports Internet Server Application Program Interface (ISAPI) or the Web's common gateway interface (CGI).

If the JRun application server is unable to process the business logic swiftly and efficiently, end-users are bound to experience a significant slowdown in the responsiveness of the web application they interact with. To ensure that the applications supported by the JRun server function optimally at all times, constant monitoring of the JRun server's availability and internal operations is essential.

eG Enterprise presents a hierarchical *JRun* monitoring model (see Figure 7.1), which executes diagnostic tests on the JRun server to extract a wide variety of performance heuristics. Using these statistics, administrators can guage the following:

- Does the JRun server have adequate threads for handling its current and anticipated workload? Are too many requests waiting for threads?
- Is the server able to process requests quickly?
- Are there any requests for which processing has been delayed significantly?
- Have any requests been dropped by the server?
- Are too many requests awaiting processing?
- How quickly does the server respond to a request?
- Has sufficient memory been allocated to the server to serve requests effectively?
- Is the user activity on the server unusually high?

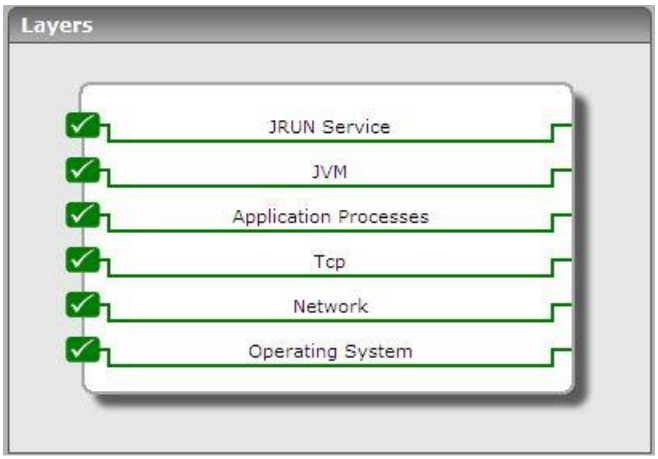


Figure 7.1: Layer model for a JRun application server

The sections to come will discuss the **JVM** and **JRUN Service** layers only, as the other layers have been discussed elaborately in the *Monitoring Unix and Windows Servers* document.

7.1 The JVM Layer

This layer collectively reports the resource usage and overall health of the JRun JVM.

Figure 7.2: The tests mapped to the JVM layer

All the tests listed in Figure 7.2 have been discussed in the previous chapters.

7.2 The JRUN Service Layer

This layer tracks the health of the JRun service. The status of the **JRUN Service** layer is determined by the results of three tests, namely: JRunThread test, JRunService test and JRunServer test.

Figure 7.3: Tests mapping to the JRUN Service layer

7.2.1 JRun Threads Test

The JRun server includes a thread pool, wherein each thread in the pool is used to service an incoming request. The size of the thread pool is dynamically increased / decreased depending on the rate of incoming requests. Since a single JRun server may comprise of multiple instances, the JrunThread test monitors the thread pool usage for each of the server instances. One set of results is reported per instance of a JRun server. In Figure 7.3, there are two instances of the JRun server. Hence, two sets of results are reported corresponding to the default, App1 instances.

Purpose	To measure the thread pool usage of all the server instances of a JRun server		
Target of the test	An Allaire JRun Server		
Agent deploying the test	An internal agent		
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** - The host for which the test is to be configured. 3. **PORT -** The port number on which the host is listening 4. **HOMEDIR -** The directory in which the JRun server has been installed In Windows environments, if the JRun server is installed at `d:\program files\allaire\jrun`, **HomeDir** has to be set to `d:\progra~1\allaire\jrun`.		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**

	Thread utilization: This indicates the percentage of existing threads, which are currently active.	Percent	A value consistently close to 100% is indicative of a bottleneck in the JRun server. In this case, incoming requests may have to wait for threads to be available to process the requests and the user may see an increased delay while accessing the server. To improve the performance of a JRun server 3.0, consider increasing the **jcp.endpoint.main.active.threads** property in the **local.properties** configuration file (residing in the **JRUN_HOME_DIR>/servers/servername**), so that the server can allocate more threads for processing user requests. In case of a JRun server 4.0 modify the **activeHandlerThreads** attribute of the **WebService** in the **jrun.xml** file located in the **<JRUN_HOME_DIR>/servers/<SERVER_NAME>/SERVER-INF** directory. If the value of this metric is below 20%, the thread pool size may be set to be too large. Hence, consider reducing the **jcp.endpoint.main.active.threads** property in **local.properties** file of the JRun server 3.0. In case of a JRun server 4.0, modify the **activeHandlerThreads** attribute of the **WebService** in the **jrun.xml** file located in the **<JRUN_HOME_DIR>/servers/<SERVER_NAME>/SERVER-INF** directory.
	Waiting threads: This indicates the number threads that are being queued in the server.	Number	A high value indicates that several threads are getting queued since the server is busy processing other threads. To reduce this number for a JRun server 3.0, you should increase the value of the **jcp.endpoint.main.active.threads** property in the **local.properties** configuration file, so that the server's JVM can handle more threads simultaneously. At the same time, care must be taken to ensure that the server does not become less efficient. In case of a JRun server 4.0, modify the **activeHandlerThreads** attribute of the **WebService** in the **jrun.xml** file located in the **<JRUN_HOME_DIR>/servers/<SERVER_NAME>/SERVER-INF** directory.

	Total threads: This metric indicates the overall number of threads in all states in the server.	Number	This metric must be considered in conjunction with the *Thread utilization* metric. Where possible ensure that the number of total threads is not set to be much larger than the maximum number of simultaneous requests expected for the server.

Note:

If a new server instance is added to a JRun application server while its being monitored, it will take at least an hour for the new instance to appear in the eG monitor console.

7.2.2 JRun Service Test

This test monitors the processing of requests by a JRun server.

Purpose	To measure metrics related to the performance of all the server instances of a JRun server		
Target of the test	An Allaire JRun Server		
Agent deploying the test	An internal agent		
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** - The host for which the test is to be configured. 3. **PORT -** The port number on which the host is listening 4. **HOMEDIR -** The directory in which the JRun server has been installed In Windows environments, if the JRun server is installed at `d:\program files\allaire\jrun`, **HomeDir** has to be set to `d:\progra~1\allaire\jrun`.		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**

	Avg queue time: This value indicates the average time a request spends waiting for processing by the server.	Secs	A low value here would indicate that the server is performing optimally. An increase in queuing delay reflects a server bottleneck. For a JRun server 3.0, consider increasing the **`jcp.endpoint.main.active.threads`** property in the **`local.properties`** file, to ensure that additional threads are available to process incoming requests. In case of a JRun server 4.0, modify the **`activeHandlerThreads`** attribute of the **`WebService`** in the **`jrun.xml`** file located in the **`<JRUN_HOME_DIR>/servers/<SERVER_NAME>/SERVER-INF`** directory. A number of compute intensive tasks can also end up increasing the queuing time for a request.
	Avg processing time: This value indicates the average time taken by the server to process a request.	Secs	A high value here would indicate that processing time per request is very high, as the requests might be performing complex/time-consuming computation. Consider determining which of the server side processing tasks is compute intensive and explore ways of minimizing the server processing overhead.
	Avg response time: This indicates the average time spent by a request in queuing and processing.	Secs	An increase in response time can occur because there are too many simultaneous requests or because of a bottleneck with any of the applications executing on the server.
	Data read rate: This indicates the total rate of data received by the server for all incoming requests.	KB/Sec	An unusually high value indicates an increase in workload to the server. The *Avg queue time* metric indicates whether the increased incoming data rate is impacting the server performance.
	Data write rate: This indicates the total rate of data sent by the server in response to all incoming requests.	KB/Sec	An unusually high value indicates an increase in workload to the server. The *Avg queue time* metric indicates whether the increased incoming data rate is impacting the server performance.
	Delayed requests: This value indicates the number of requests delayed at the server.	Number	While the *Avg queue time* gives an indicator of how long requests are being queued, this measure provides an indicator of how many requests were queued at the server over the last measurement period. This value should be close to 0 for peak performance.

	Dropped requests: This indicates the number of requests that were dropped since the server could not process them or queue them.	Number	This value should be close to 0 at most times. Therefore, if a JRun server 3.0 drops a large number of requests, consider increasing the parameter **`jcp.endpoint.main.max.threads`**, in the **`local.properties`** file. This parameter indicates the maximum number of requests that can be processed or queued at any instant. In case of a JRun server 4.0, modify the **`activeHandlerThreads`** attribute of the **`WebService`** in the **`jrun.xml`** file located in the **`<JRUN_HOME_DIR>/servers/<SERVER_NAME>/SERVER-INF`** directory.
	Request rate: This indicates the rate of requests handled by the JRun server.	Reqs/sec	This value is an indicator of server workload across all its connectors.

Note:

If a new server instance is added to a JRun application server while its being monitored, it will take at least hour for the new instance to appear in the eG monitor console.

7.2.3 JRun Server Test

This test periodically tracks the measures related to the Java virtual machine of all the instances of a JRun server.

Purpose	To measure the metrics related to the Java virtual machine (JVM) of all the instances of a JRun server		
Target of the test	An Allaire JRun Server		
Agent deploying the test	An internal agent		
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** - The host for which the test is to be configured. 3. **PORT -** The port number on which the host is listening 4. **HOMEDIR -** The directory in which the JRun server has been installed In Windows environments, if the JRun server is installed at **`d:\program files\allaire\jrun`**, **HomeDir** has to be set to **`d:\progra~1\allaire\jrun`**.		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**

	Total server memory: This value indicates the total amount of memory that is being currently used by the server.	MB	An unusually large usage of memory by the server is a cause for concern. Further analysis is required to determine whether any of the applications running have memory leaks. If the memory is still low, consider starting the server with a higher memory usage setting.
	Free server memory: This value indicates the total amount of memory that is not in use by the server.	MB	A very low value of free memory is also an indication of high memory utilization within the JVM.
	Active sessions: This indicates the current number of active sessions in the server.	Number	A high value of this measure may indicate an increase in the server workload.
	Sessions in memory: This indicates the number of active sessions in the server memory. Sessions can be persisted to a session repository depending upon your JRun configuration.	Number	A high value may indicate that there are a large number of sessions residing in the memory. Some of these sessions might be active or inactive. If the value is too high, consider changing the value of `session.persistence` to false. This would stop persistence of a session when the server is terminated.

Note:

If a new server instance is added to a JRun application server while its being monitored, it will take at least hour for the new instance to appear in the eG monitor console.

Chapter 8

Monitoring Orion Servers

An Orion Server is a J2EE-compliant application server that is used in many Internet environments. Since a minute or marked deterioration in the performance of this application server can adversely impact the health of the web-based application it supports, it is imperative that the Orion server is monitored continuously, and probable problems detected quickly and accurately.

eG Enterprise has designed a specialized *Orion* monitoring model (see Figure 8.1), that not only monitors the Orion server top-down, but also detects problems with the server before they occur, automatically triages the problems and assigns priorities to each, and alerts administrators accordingly.

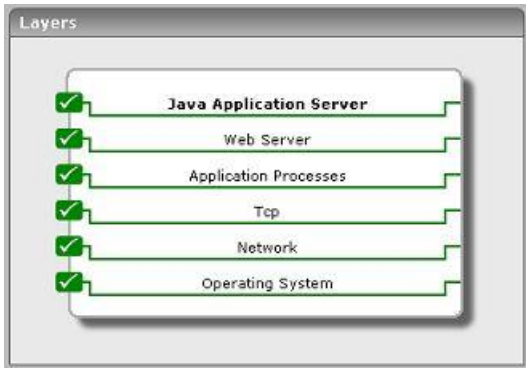


Figure 8.1: Layer model of an Orion/Tomcat server

The following section deals with the top layer alone, as the other layers have already been discussed at length in the *Monitoring Unix and Windows Servers* document.

8.1 The Java Application Server Layer

The tests depicted by Figure 8.2 execute on this layer, and report on the thread and memory usage of the Orion server.

Figure 8.2: Tests associated with the Java Application Server layer

8.1.1 Java Server Details Test

This test reports the performance statistics pertaining to the Java Virtual Machine (JVM) running on an Orion server.

Purpose	Reports the performance statistics pertaining to the Java Virtual Machine (JVM) running on an Orion server.		
Target of the test	An Orion server		
Agent deploying the test	An Internal agent		
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** – The host on which the Orion/Tomcat server is running 3. **PORT** – The port on which the specified Orion/Tomcat server is listening for HTTP requests 4. **EGURI** - The JavaServerTest makes use of a file named **EgPerfTest.jsp** to generate measures. By default, this file is located in the **<EG_INSTALL_DIR>/lib** directory. To execute the JavaServerTest, move this file to one of the application directories of the Orion server. On Unix, you can execute the script **/opt/egurkha/bin/setup_jserver** to do this. While configuring the JavaServerTest, specify the location of the application directory where the **EgPerfTest.jsp** file resides, in the **EGURI** text box, in the following format: **http://<Ipaddress:portNo/directory name>**. For example, assume that the **EgPerfTest.jsp** is available in the **JavaTest** directory of the host 192.168.10.57:7077. Therefore, **EGURI** would be: **http://192.168.10.57:7077/JavaTest**.		
Outputs of the test	One set of results for the server being monitored		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Active threads: Indicates the number of active threads in the JVM.	Number	A high value for this measure is indicative of a high load on the JVM.

	Total memory usage: Indicates the total memory available in the JVM.	MB	A high value indicates a high processing capability of the JVM. Watch for increasing memory usage over time, which could indicate a memory leak in one or more applications hosted on the application server.
	Free memory: Indicates the unused memory in the JVM.	MB	A very low value of free memory is an indication of high memory utilization on the JVM.

Chapter 9

Monitoring Tomcat Servers

The Tomcat server is a Java based Web Application container that was created to run Servlets and JavaServer Pages (JSP) in Web applications. As part of Apache's open source Jakarta project, it has nearly become the industry accepted standard reference implementation for both the Servlets and JSP API.

Application developers capitalize on the capabilities of the Tomcat container to build robust web applications that provide mission-critical services to end users. Naturally, the 24 x 7 availability and speedy responsiveness of the Tomcat server is imperative for the applications and the dependent businesses to remain afloat.

Note:

The eG agents are capable of monitoring Tomcat version 3.x, 4.x, 5.x, and 6.0, in an agent-based and an agentless manner.

Using the specialized monitoring model that eG Enterprise offers for the Tomcat server (see Figure 9.1), one can extensively monitor every layer of the Tomcat server, automatically correlate performance across the layers, and accurately locate the problem source.

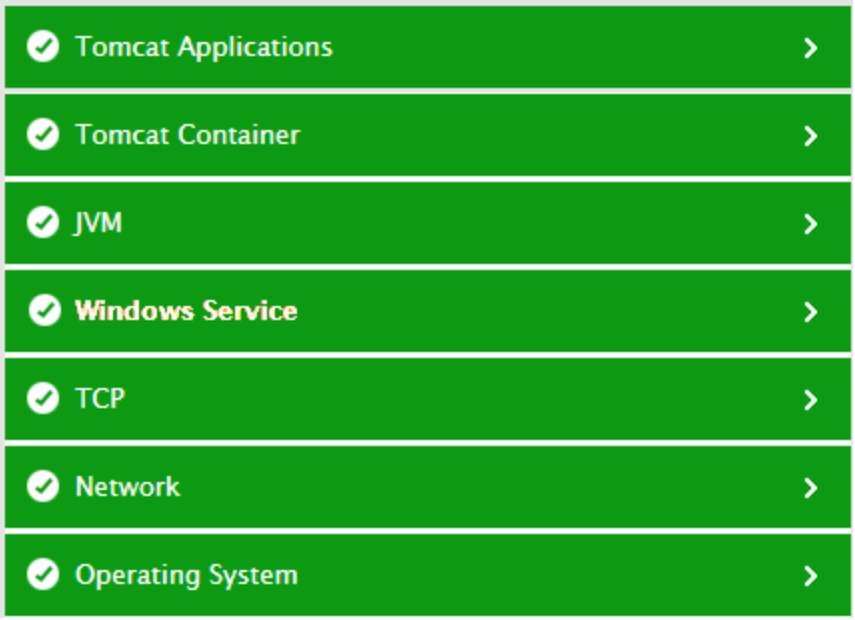


Figure 9.1: The layer model of the Tomcat server

Each layer depicted by Figure 9.1 performs a number of tests on the Tomcat server and evaluates the critical aspects of Tomcat performance such as thread usage, memory management, processing capabilities of the servlets, efficiency of the JSP engine, etc. To enable the monitoring, you will first have to install a custom **egtomcat** application (i.e., the **egtomcat.war** file in the **<EG_INSTALL_DIR>\lib** directory) on the server. Next, if you are monitoring Tomcat 6.0, then, after war deployment, copy the **commons-logging-api.jar** file in the **<CATALINA_HOME>\lib** directory to the **<EG_AGENT_INSTALL_DIR>\lib** directory. On the other hand, if you are monitoring Tomcat 5.x, then copy the **commons-logging-api.jar** file in the **<CATALINA_HOME>\bin** directory to the **<EG_AGENT_INSTALL_DIR>\lib** directory.

Note:

The eG agent can monitor a Tomcat server, only if the Tomcat server executes on JDK 1.5 or above.

The eG agent can then begin monitoring the Tomcat Server. The statistics so collected enable administrators find quick and accurate answers to persistent performance-related queries, such as the following:

Availability monitoring	➢ Is the Tomcat server available? ➢ How quickly does it respond to requests?
Thread pool usage monitoring	➢ Have adequate threads been allocated to the pool? ➢ Are too many threads idle?
Servlet monitoring	➢ Is the server taking too long to process servlets? Which servlet is contributing to the delay?
Jasper monitoring	➢ How frequently do reloads occur? ➢ Are the JSPs been updated often?
Connector monitoring	➢ How quickly are connectors processing requests? Is there a delay in request processing? If so, which connector is responsible for the delay? ➢ How much traffic is generated by a connector?

	➢ Have any errors occurred during request processing?
JVM monitoring	➢ Has the JVM been up and running continuously? ➢ How many classes have been loaded/unloaded by the JVM? ➢ Is there a garbage collection bottleneck? ➢ Does the JVM have sufficient free memory?
Session manager monitoring	➢ Is the server workload high? How many sessions are currently active on the server? ➢ Were too many sessions rejected?
Cache monitoring	➢ Are cache hits optimal? ➢ Are disk accesses low?

The sections to come discuss the top 3 layers of the layer model, as the remaining layers have already been discussed in the *Monitoring Unix and Windows Servers* document.

9.1 The JVM Layer

The tests associated with this layer provide users with valuable insight into the various aspects of Java Virtual Machines including:

- Class loading/unloading
- Server availability
- Garbage collection activity
- Memory/CPU management

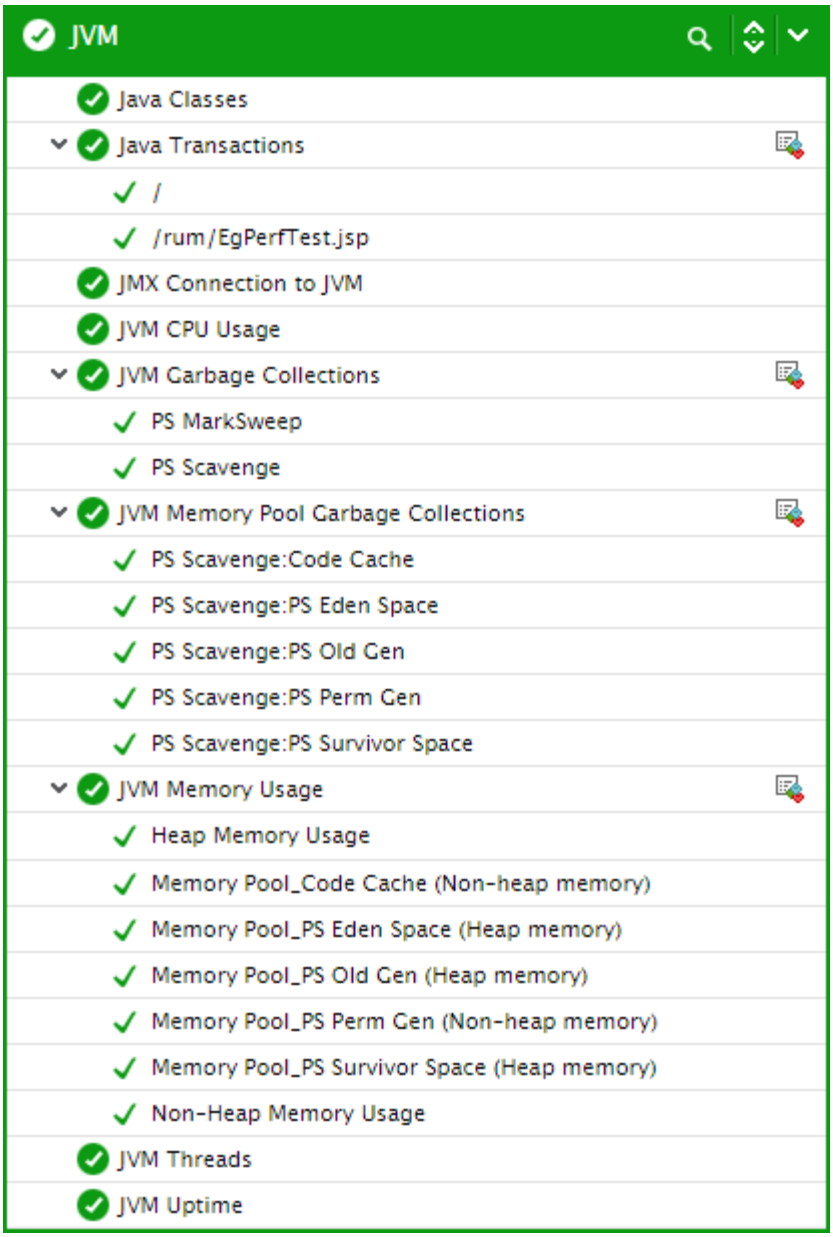


Figure 9.2: Tests associated with JVM layer

9.1.1 JMX Connection to JVM

This test reports the availability of the target Java application, and also indicates whether JMX is enabled on the application or not. In addition, the test promptly alerts you to slowdowns experienced by the application, and also reveals whether the application was recently restarted or not.

Purpose	Reports the availability of the target Java application, and also indicates whether JMX is enabled on the application or not. In addition, the test promptly alerts you to slowdowns experienced by the application, and also reveals whether the application was recently restarted or not
Target of the	A Tomcat server

<table>
<tr><td>test</td><td colspan="3"></td></tr>
<tr><td>Agent deploying the test</td><td colspan="3">An internal/remote agent</td></tr>
<tr><td>Configurable parameters for the test</td><td colspan="3">1. TEST PERIOD - How often should the test be executed
2. HOST - The host for which the test is to be configured
3. PORT - The port number at which the specified HOST listens
4. JMX REMOTE PORT – Here, specify the port at which the JMX listens for requests from remote hosts. Ensure that you specify the same port that you configured in the management.properties file in the <JAVA_HOME>\jre\lib\management folder used by the target application (refer to the Monitoring Java Applications document).
5. USER, PASSWORD, and CONFIRM PASSWORD – If JMX requires authentication only (but no security), then ensure that the USER and PASSWORD parameters are configured with the credentials of a user with read-write access to JMX. To know how to create this user, refer to the Monitoring Java Applications document. Confirm the password by retyping it in the CONFIRM PASSWORD text box.
6. JNDINAME – The JNDINAME is a lookup name for connecting to the JMX connector. By default, this is jmxrmi. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same.
7. JMX PROVIDER – This test uses a JMX Provider to access the MBean attributes of the target Java application and collect metrics. Specify the package name of this JMX Provider here. By default, this is set to com.sun.jmx.remote.protocol.
8. TIMEOUT – Specify the duration (in seconds) for which this test should wait for a response from the target Java application. If there is no response from the target beyond the configured duration, the test will timeout. By default, this is set to 240 seconds.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for the Java application being monitored</td></tr>
<tr><td rowspan="2">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>JMX availability:
Indicates whether the target application is available or not and whether JMX is enabled or not on the application.</td><td>Percent</td><td>If the value of this measure is 100%, it indicates that the Java application is available with JMX enabled. The value 0 on the other hand, could indicate one/both the following:
• The Java application is unavailable;
• The Java application is available, but JMX is not enabled;</td></tr>
<tr><td></td><td>JMX response time:
Indicates the time taken to connect to the JMX agent of the Java application.</td><td>Secs</td><td>A high value could indicate a connection bottleneck.</td></tr>
</table>

	Has the PID changed? Indicates whether/not the process ID that corresponds to the Java application has changed.		This measure will report the value **Yes** if the PID of the target application has changed; such a change is indicative of an application restart. If the application has not restarted - i.e., if the PID has not changed - then this measure will return the value **No**.

9.1.2 JVM File Descriptors Test

This test reports useful statistics pertaining to file descriptors.

Purpose	Reports useful statistics pertaining to file descriptors		
Target of the test	A Tomcat server		
Agent deploying the test	An internal/remote agent		
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port number at which the specified **HOST** listens 4. **JMX REMOTE PORT** – Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (refer to the *Monitoring Java Applications* document). 5. **USER**, **PASSWORD**, and **CONFIRM PASSWORD** – If JMX requires **authentication only** (but no security), then ensure that the **USER** and **PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to the *Monitoring Java Applications* document. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 6. **JNDINAME** – The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same. 7. **JMX PROVIDER** – This test uses a JMX Provider to access the MBean attributes of the target Java application and collect metrics. Specify the package name of this JMX Provider here. By default, this is set to *com.sun.jmx.remote.protocol*. 8. **TIMEOUT** – Specify the duration (in seconds) for which this test should wait for a response from the target Java application. If there is no response from the target beyond the configured duration, the test will timeout. By default, this is set to *240* seconds.		
Outputs of the test	One set of results for the Java application being monitored		
Measurements made by the	**Measurement**	**Measurement Unit**	**Interpretation**

test	**Open file descriptors in JVM:** Indicates the number of file descriptors currently open for the application.	Number	
	Maximum file descriptors in JVM: Indicates the maximum number of file descriptors allowed for the application.	Number	
	File descriptor usage by JVM: Indicates the file descriptor usage in percentage.	Percent	

9.1.3 Java Classes Test

This test reports the number of classes loaded/unloaded from the memory.

Purpose	Reports the number of classes loaded/unloaded from the memory
Target of the test	A Java application
Agent deploying the test	An internal/remote agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port number at which the specified **HOST** listens 4. **MODE** – This test can extract metrics from the Java application using either of the following mechanisms: • Using SNMP-based access to the Java runtime MIB statistics; • By contacting the Java runtime (JRE) of the application via JMX To configure the test to use SNMP, select the **SNMP** option. On the other hand, choose the **JMX** option to configure the test to use JMX instead. By default, the **JMX** option is chosen here. 5. **JMX REMOTE PORT** – This parameter appers only if the **MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (see page **Error! Bookmark not defined.**). 6. **USER**, **PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **USER** and **PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to Section **Error! Reference source not found.**. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 7. **JNDINAME** – This parameter appears only if the **MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have resgistered the JMX connector in the RMI registery using a different lookup name, then you can change this default value to reflect the same. 8. **JMX PROVIDER** – This parameter appears only if the **MODE** is set to **JMX**. This test uses a JMX Provider to access the MBean attributes of the target Java application and collect metrics. Specify the package name of this JMX Provider here. By default, this is set to *com.sun.jmx.remote.protocol*. 9. **TIMEOUT** – Specify the duration (in seconds) for which this test should wait for a response from the target Java application. If there is no response from the target beyond the configured duration, the test will timeout. By default, this is set to *240* seconds if the **MODE** is **JMX**, and *10* seconds if the **MODE** is **SNMP**. 10. **SNMPPORT** – This parameter appears only if the **MODE** is set to **SNMP**. Here specify the port number through which the server exposes its SNMP MIB. Ensure that you specify the same port you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (see page **Error! Bookmark not defined.**). 11. **SNMPVERSION** – This parameter appears only if the **MODE** is set to **SNMP**. The default selection in the **SNMPVERSION** list is **v1**. However, for this test to work, you have to select SNMP **v2** or **v3** from this list, depending upon which version of SNMP is in use in the target environment. 12. **SNMPCOMMUNITY** – This parameter appears only if the **MODE** is set to **SNMP**. Here, specify the SNMP community name that the test uses to communicate with the mail server. The default is public. This parameter is specific to SNMP **v1** and **v2** only. Therefore, if the **SNMPVERSION** chosen is **v3**, then this parameter will not appear.

	13. **USERNAME** – This parameter appears only when **v3** is selected as the **SNMPVERSION**. SNMP version 3 (SNMPv3) is an extensible SNMP Framework which supplements the SNMPv2 Framework, by additionally supporting message security, access control, and remote SNMP configuration capabilities. To extract performance statistics from the MIB using the highly secure SNMP v3 protocol, the eG agent has to be configured with the required access privileges – in other words, the eG agent should connect to the MIB using the credentials of a user with access permissions to be MIB. Therefore, specify the name of such a user against the **USERNAME** parameter. 14. **AUTHPASS** – Specify the password that corresponds to the above-mentioned **USERNAME**. This parameter once again appears only if the **SNMPVERSION** selected is **v3**. 15. **CONFIRM PASSWORD** – Confirm the **AUTHPASS** by retyping it here. 16. **AUTHTYPE** – This parameter too appears only if **v3** is selected as the **SNMPVERSION**. From the **AUTHTYPE** list box, choose the authentication algorithm using which SNMP v3 converts the specified **USERNAME** and **PASSWORD** into a 32-bit format to ensure security of SNMP transactions. You can choose between the following options: ➢ **MD5** – Message Digest Algorithm ➢ **SHA** – Secure Hash Algorithm 17. **ENCRYPTFLAG** – This flag appears only when **v3** is selected as the **SNMPVERSION**. By default, the eG agent does not encrypt SNMP requests. Accordingly, the **ENCRYPTFLAG** is set to **NO** by default. To ensure that SNMP requests sent by the eG agent are encrypted, select the **YES** option. 18. **ENCRYPTTYPE** – If the **ENCRYPTFLAG** is set to **YES**, then you will have to mention the encryption type by selecting an option from the **ENCRYPTTYPE** list. SNMP v3 supports the following encryption types: ➢ **DES** – Data Encryption Standard ➢ **AES** – Advanced Encryption Standard 19. **ENCRYPTPASSWORD** – Specify the encryption password here. 20. **CONFIRM PASSWORD** – Confirm the encryption password by retyping it here. 21. **DATA OVER TCP – This parameter is applicable only if MODE is set to SNMP.** By default, in an IT environment, all data transmission occurs over UDP. Some environments however, may be specifically configured to offload a fraction of the data traffic – for instance, certain types of data traffic or traffic pertaining to specific components – to other protocols like TCP, so as to prevent UDP overloads. In such environments, you can instruct the eG agent to conduct the SNMP data traffic related to the equalizer over TCP (and not UDP). For this, set the **DATA OVER TCP** flag to **Yes**. By default, this flag is set to **No**.		
Outputs of the test	One set of results for the Java application being monitored		
Measurements made by the	**Measurement**	**Measurement Unit**	**Interpretation**

test	**Classes loaded:** Indicates the number of classes currently loaded into memory.	Number	Classes are fundamental to the design of Java programming language. Typically, Java applications install a variety of class loaders (that is, classes that implement java.lang.ClassLoader) to allow different portions of the container, and the applications running on the container, to have access to different repositories of available classes and resources. A consistent decrease in the number of classes loaded and unloaded could indicate a road-block in the loading/unloading of classes by the class loader. If left unchecked, critical resources/classes could be rendered inaccessible to the application, thereby severely affecting its performance.
	Classes unloaded: Indicates the number of classes currently unloaded from memory.	Number	
	Total classes loaded: Indicates the total number of classes loaded into memory since the JVM started, including those subsequently unloaded.	Number	

9.1.4 JVM Garbage Collections Test

Manual memory management is time consuming, and error prone. Most programs still contain leaks. This is all doubly true with programs using exception-handling and/or threads. Garbage collection (GC) is a part of a Java application's JVM that automatically determines what memory a program is no longer using, and recycles it for other use. It is also known as "automatic storage (or memory) reclamation". The JVM Garbage Collections test reports the performance statistics pertaining to the JVM's garbage collection.

Purpose	Reports the performance statistics pertaining to the JVM's garbage collection
Target of the test	A Java application
Agent deploying the test	An internal/remote agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port number at which the specified **HOST** listens 4. **MODE** – This test can extract metrics from the Java application using either of the following mechanisms: • Using SNMP-based access to the Java runtime MIB statistics; • By contacting the Java runtime (JRE) of the application via JMX To configure the test to use SNMP, select the **SNMP** option. On the other hand, choose the **JMX** option to configure the test to use JMX instead. By default, the **JMX** option is chosen here. 5. **JMX REMOTE PORT** – This parameter appers only if the **MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (see page **Error! Bookmark not defined.**). 6. **USER**, **PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **USER** and **PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to Section **Error! Reference source not found.**. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 7. **JNDINAME** – This parameter appears only if the **MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have resgistered the JMX connector in the RMI registery using a different lookup name, then you can change this default value to reflect the same. 8. **JMX PROVIDER** – This parameter appears only if the **MODE** is set to **JMX**. This test uses a JMX Provider to access the MBean attributes of the target Java application and collect metrics. Specify the package name of this JMX Provider here. By default, this is set to *com.sun.jmx.remote.protocol*. 9. **TIMEOUT** – Specify the duration (in seconds) for which this test should wait for a response from the target Java application. If there is no response from the target beyond the configured duration, the test will timeout. By default, this is set to *240* seconds if the **MODE** is **JMX**, and *10* seconds if the **MODE** is **SNMP**. 10. **SNMPPORT** – This parameter appears only if the **MODE** is set to **SNMP**. Here specify the port number through which the server exposes its SNMP MIB. Ensure that you specify the same port you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (see page **Error! Bookmark not defined.**). 11. **SNMPVERSION** – This parameter appears only if the **MODE** is set to **SNMP**. The default selection in the **SNMPVERSION** list is **v1**. However, for this test to work, you have to select SNMP **v2** or **v3** from this list, depending upon which version of SNMP is in use in the target environment. 12. **SNMPCOMMUNITY** – This parameter appears only if the **MODE** is set to **SNMP**. Here, specify the SNMP community name that the test uses to communicate with the mail server. The default is public. This parameter is specific to SNMP **v1** and **v2** only. Therefore, if the **SNMPVERSION** chosen is **v3**, then this parameter will not appear.

	13. **USERNAME** – This parameter appears only when **v3** is selected as the **SNMPVERSION**. SNMP version 3 (SNMPv3) is an extensible SNMP Framework which supplements the SNMPv2 Framework, by additionally supporting message security, access control, and remote SNMP configuration capabilities. To extract performance statistics from the MIB using the highly secure SNMP v3 protocol, the eG agent has to be configured with the required access privileges – in other words, the eG agent should connect to the MIB using the credentials of a user with access permissions to be MIB. Therefore, specify the name of such a user against the **USERNAME** parameter. 14. **AUTHPASS** – Specify the password that corresponds to the above-mentioned **USERNAME**. This parameter once again appears only if the **SNMPVERSION** selected is **v3**. 15. **CONFIRM PASSWORD** – Confirm the **AUTHPASS** by retyping it here. 16. **AUTHTYPE** – This parameter too appears only if **v3** is selected as the **SNMPVERSION**. From the **AUTHTYPE** list box, choose the authentication algorithm using which SNMP v3 converts the specified **USERNAME** and **PASSWORD** into a 32-bit format to ensure security of SNMP transactions. You can choose between the following options: ➢ **MD5** – Message Digest Algorithm ➢ **SHA** – Secure Hash Algorithm 17. **ENCRYPTFLAG** – This flag appears only when **v3** is selected as the **SNMPVERSION**. By default, the eG agent does not encrypt SNMP requests. Accordingly, the **ENCRYPTFLAG** is set to **NO** by default. To ensure that SNMP requests sent by the eG agent are encrypted, select the **YES** option. 18. **ENCRYPTTYPE** – If the **ENCRYPTFLAG** is set to **YES**, then you will have to mention the encryption type by selecting an option from the **ENCRYPTTYPE** list. SNMP v3 supports the following encryption types: ➢ **DES** – Data Encryption Standard ➢ **AES** – Advanced Encryption Standard 19. **ENCRYPTPASSWORD** – Specify the encryption password here. 20. **CONFIRM PASSWORD** – Confirm the encryption password by retyping it here. 21. **DATA OVER TCP – This parameter is applicable only if MODE is set to SNMP.** By default, in an IT environment, all data transmission occurs over UDP. Some environments however, may be specifically configured to offload a fraction of the data traffic – for instance, certain types of data traffic or traffic pertaining to specific components – to other protocols like TCP, so as to prevent UDP overloads. In such environments, you can instruct the eG agent to conduct the SNMP data traffic related to the equalizer over TCP (and not UDP). For this, set the **DATA OVER TCP** flag to **Yes**. By default, this flag is set to **No**.		
Outputs of the test	One set of results for each garbage collector that is reclaiming the unused memory on the JVM of the Java application being monitored		
Measurements made by the	**Measurement**	**Measurement Unit**	**Interpretation**

test	**No of garbage collections started:** Indicates the number of times this garbage collector was started to release dead objects from memory during the last measurement period.	Number	
	Time taken for garbage collection: Indicates the time taken to by this garbage collector to perform the current garbage collection operation.	Secs	Ideally, the value of both these measures should be low. This is because, the garbage collection (GC) activity tends to suspend the operations of the application until such time that GC ends. Longer the GC time, longer it would take for the application to resume its functions. To minimize the impact of GC on application performance, it is best to ensure that GC activity does not take too long to complete.
	Percent of time spent by JVM for garbage collection: Indicates the percentage of time spent by this garbage collector on garbage collection during the last measurement period.	Percent	

9.1.5 JVM Memory Pool Garbage Collections Test

While the **JVM Garbage Collections** test reports statistics indicating how well each collector on the JVM performs garbage collection, the measures reported by the **JVM Memory Pool Garbage Collections** test help assess the impact of the garbage collection activity on the availability and usage of memory in each memory pool of the JVM. Besides revealing the count of garbage collections per collector and the time taken by each collector to perform garbage collection on the individual memory pools, the test also compares the amount of memory used and available for use pre and post garbage collection in each of the memory pools. This way, the test enables administrators to guage the effectiveness of the garbage collection activity on the memory pools, and helps them accurately identify those memory pools where enough memory could not reclaimed or where the garbage collectors spent too much time.

Purpose	Helps assess the impact of the garbage collection activity on the availability and usage of memory in each memory pool of the JVM
Target of the test	A Java application
Agent deploying the test	An internal/remote agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port number at which the specified **HOST** listens 4. **MEASURE MODE** - This test allows you the option to collect the desired metrics using one of the following methodologies: • By contacting the Java runtime (JRE) of the application via JMX • Using GC logs To use JMX for metrics collections, set the measure mode to **JMX**. On the other hand, if you intend to use the GC log files for collecting the required metrics, set the **MEASURE MODE** to **Log File**. In this case, you would be required to enable GC logging. The procedure for this has been detailed in Section **Error! Reference source not found.** of this document. 5. **JMX REMOTE PORT** – This parameter will be available only if the **MEASURE MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (see page **Error! Bookmark not defined.**). 6. **JNDINAME** – This parameter will be available only if the **MEASURE MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have resgistered the JMX connector in the RMI registery using a different lookup name, then you can change this default value to reflect the same. 7. **USER**, **PASSWORD**, and **CONFIRM PASSWORD** – This parameter will be available only if the **MEASURE MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **USER** and **PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to Section **Error! Reference source not found.**. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 8. **JREHOME** - This parameter will be available only if the **MEASURE MODE** is set to **Log File**. Specify the full path to the Java Runtime Environment (JRE) used by the target application. 9. **LOGFILENAME** - This parameter will be available only if the **MEASURE MODE** is set to **Log File**. Specify the full path to the GC log file to be used for metrics collection. 10. **JMX PROVIDER** – This test uses a JMX Provider to access the MBean attributes of the target Java application and collect metrics. Specify the package name of this JMX Provider here. By default, this is set to *com.sun.jmx.remote.protocol*. 11. **TIMEOUT** – Specify the duration (in seconds) for which this test should wait for a response from the target Java application. If there is no response from the target beyond the configured duration, the test will timeout. By default, this is set to *240* seconds.		
Outputs of the test	One set of results for every *GarbageCollector:MemoryPool* pair on the JVM of the Java application being monitored		
Measurements made by the	**Measurement**	**Measurement Unit**	**Interpretation**

<table>
<tr><td>test</td><td>Has garbage collection happened:
Indicates whether garbage collection occurred on this memory pool in the last measurement period.</td><td></td><td>This measure reports the value Yes if garbage collection took place or No if it did not take place on the memory pool.
The numeric values that correspond to the measure values of Yes and No are listed below:</td></tr>
<tr><td></td><td></td><td></td><td><table><tr><th>State</th><th>Value</th></tr><tr><td>Yes</td><td>1</td></tr><tr><td>No</td><td>0</td></tr></table>
Note:
By default, this measure reports the value Yes or No to indicate whether a GC occurred on a memory pool or not. The graph of this measure however, represents the same using the numeric equivalents – 0 or 1.</td></tr>
<tr><td></td><td>Collection count:
Indicates the number of time in the last measurement pool garbage collection was started on this memory pool.</td><td>Number</td><td></td></tr>
<tr><td></td><td>Initial memory before GC:
Indicates the initial amount of memory (in MB) that this memory pool requests from the operating system for memory management during startup, before GC process.</td><td>MB</td><td rowspan="2">Comparing the value of these two measures for a memory pool will give you a fair idea of the effectiveness of the garbage collection activity.
If garbage collection reclaims a large amount of memory from the memory pool, then the Initial memory after GC will drop. On the other hand, if the garbage collector does not reclaim much memory from a memory pool, or if the Java application suddenly runs a memory-intensive process when GC is being performed, then the Initial memory after GC may be higher than the Initial memory before GC.</td></tr>
<tr><td></td><td>Initial memory after GC:
Indicates the initial amount of memory (in MB) that this memory pool requests from the operating system for memory management during startup, after GC process</td><td>MB</td></tr>
</table>

	Max memory before GC: Indicates the maximum amount of memory that can be used for memory management by this memory pool, before GC process.	MB	Comparing the value of these two measures for a memory pool will provide you with insights into the effectiveness of the garbage collection activity. If garbage collection reclaims a large amount of memory from the memory pool, then the *Max memory after GC* will drop. On the other hand, if the garbage collector does not reclaim much memory from a memory pool, or if the Java application suddenly runs a memory-intensive process when GC is being performed, then the *Max memory after GC* value may exceed the *Max memory before GC*.
	Max memory after GC: Indicates the maximum amount of memory (in MB) that can be used for memory management by this pool, after the GC process.	MB	
	Committed memory before GC: Indicates the amount of memory that is guaranteed to be available for use by this memory pool, before the GC process.	MB	
	Committed memory after GC: Indicates the amount of memory that is guaranteed to be available for use by this memory pool, after the GC process.	MB	
	Used memory before GC: Indicates the amount of memory used by this memory pool before GC.	MB	Comparing the value of these two measures for a memory pool will provide you with insights into the effectiveness of the garbage collection activity. If garbage collection reclaims a large amount of memory from the memory pool, then the *Used memory after GC* may drop lower than the *Used memory before GC*. On the other hand, if the garbage collector does not reclaim much memory from a memory pool, or if the Java application suddenly runs a memory-intensive process when GC is being performed, then the *Used memory after GC* value may exceed the *Used memory before GC*.
	Used memory after GC: Indicates the amount of memory used by this memory pool after GC.	MB	

	Percentage of memory collected: Indicates the percentage of memory collected from this pool by the GC activity.	Percent	A high value for this measure is indicative of a large amount of unused memory in the pool. A low value on the other hand indicates that the memory pool has been over-utilized. Compare the value of this measure across pools to identify the pools that have very little free memory. If too many pools appear to be running short of memory, it could indicate that the target application is consuming too much memory, which in the long run, can slow down the application significantly.
	Collection duration: Indicates the time taken by this garbage collector for collecting unused memory from this pool.	Mins	Ideally, the value of this measure should be low. This is because, the garbage collection (GC) activity tends to suspend the operations of the application until such time that GC ends. Longer the GC time, longer it would take for the application to resume its functions. To minimize the impact of GC on application performance, it is best to ensure that GC activity does not take too long to complete.

9.1.6 JVM Threads Test

This test reports the status of threads running in the JVM. Details of this test can be used to identify resource-hungry threads.

Purpose	Reports the status of threads running in the JVM
Target of the test	A Java application
Agent deploying the test	An internal/remote agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port number at which the specified **HOST** listens 4. **MODE** – This test can extract metrics from the Java application using either of the following mechanisms: • Using SNMP-based access to the Java runtime MIB statistics; • By contacting the Java runtime (JRE) of the application via JMX To configure the test to use SNMP, select the **SNMP** option. On the other hand, choose the **JMX** option to configure the test to use JMX instead. By default, the **JMX** option is chosen here. 5. **JMX REMOTE PORT** – This parameter appears only if the **MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (see page **Error! Bookmark not defined.**). 6. **USER**, **PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **USER** and **PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to Section **Error! Reference source not found.**. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 7. **JNDINAME** – This parameter appears only if the **MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have resgistered the JMX connector in the RMI registery using a different lookup name, then you can change this default value to reflect the same. 8. **JMX PROVIDER** – This parameter appears only if the **MODE** is set to **JMX**. This test uses a JMX Provider to access the MBean attributes of the target Java application and collect metrics. Specify the package name of this JMX Provider here. By default, this is set to *com.sun.jmx.remote.protocol*. 9. **TIMEOUT** – Specify the duration (in seconds) for which this test should wait for a response from the target Java application. If there is no response from the target beyond the configured duration, the test will timeout. By default, this is set to *240* seconds if the **MODE** is **JMX**, and *10* seconds if the **MODE** is **SNMP**. 10. **SNMPPORT** – This parameter appears only if the **MODE** is set to **SNMP**. Here specify the port number through which the server exposes its SNMP MIB. Ensure that you specify the same port you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (see page **Error! Bookmark not defined.**). 11. **SNMPVERSION** – This parameter appears only if the **MODE** is set to **SNMP**. The default selection in the **SNMPVERSION** list is **v1**. However, for this test to work, you have to select SNMP **v2** or **v3** from this list, depending upon which version of SNMP is in use in the target environment. 12. **SNMPCOMMUNITY** – This parameter appears only if the **MODE** is set to **SNMP**. Here, specify the SNMP community name that the test uses to communicate with the mail server. The default is public. This parameter is specific to SNMP **v1** and **v2** only. Therefore, if the **SNMPVERSION** chosen is **v3**, then this parameter will not appear.

13. **USERNAME** – This parameter appears only when **v3** is selected as the **SNMPVERSION**. SNMP version 3 (SNMPv3) is an extensible SNMP Framework which supplements the SNMPv2 Framework, by additionally supporting message security, access control, and remote SNMP configuration capabilities. To extract performance statistics from the MIB using the highly secure SNMP v3 protocol, the eG agent has to be configured with the required access privileges – in other words, the eG agent should connect to the MIB using the credentials of a user with access permissions to be MIB. Therefore, specify the name of such a user against the **USERNAME** parameter.
14. **AUTHPASS** – Specify the password that corresponds to the above-mentioned **USERNAME**. This parameter once again appears only if the **SNMPVERSION** selected is **v3**.
15. **CONFIRM PASSWORD** – Confirm the **AUTHPASS** by retyping it here.
16. **PCT MEDIUM CPU UTIL THREADS** - By default, the **PCT MEDIUM CPU UTIL THREADS** parameter is set to 50. This implies that, by default, the threads for which the current CPU consumption is between 50% and 70% (the default value of the **PCT HIGH CPU UTIL THREADS** parameter) willl be counted as medium CPU-consuming threads. The count of such threads will be reported as the value of the **Medium CPU threads** measure.
17. This default setting also denotes that threads that consume less than 50% CPU will, by default, be counted as **Low CPU threads**. If need be, you can modify the value of this **PCT MEDIUM CPU UTIL THREADS** parameter to change how much CPU should be used by a thread for it to qualify as a medium CPU-consuming thread. This will consequently alter the count of low CPU-consuming threads as well.
18. **PCT HIGH CPU UTIL THREADS** - By default, the **PCT HIGH CPU UTIL THREADS** parameter is set to 70. This implies that, by default, the threads that are currently consuming over 70% of CPU time are counted as high CPU consumers. The count of such threads will be reported as the value of the **High CPU threads** measure. If need be, you can modify the value of this parameter to change how much CPU should be used by a thread for it to qualify as a high CPU-consuming thread.
19. **AUTHTYPE** – This parameter too appears only if **v3** is selected as the **SNMPVERSION**. From the **AUTHTYPE** list box, choose the authentication algorithm using which SNMP v3 converts the specified **USERNAME** and **PASSWORD** into a 32-bit format to ensure security of SNMP transactions. You can choose between the following options:
    - **MD5** – Message Digest Algorithm
    - **SHA** – Secure Hash Algorithm

20. **ENCRYPTFLAG** – This flag appears only when **v3** is selected as the **SNMPVERSION**. By default, the eG agent does not encrypt SNMP requests. Accordingly, the **ENCRYPTFLAG** is set to **NO** by default. To ensure that SNMP requests sent by the eG agent are encrypted, select the **YES** option.
21. **ENCRYPTTYPE** – If the **ENCRYPTFLAG** is set to **YES**, then you will have to mention the encryption type by selecting an option from the **ENCRYPTTYPE** list. SNMP v3 supports the following encryption types:
    - **DES** – Data Encryption Standard
    - **AES** – Advanced Encryption Standard
22. **ENCRYPTPASSWORD** – Specify the encryption password here.
23. **CONFIRM PASSWORD** – Confirm the encryption password by retyping it here.
24. **TIMEOUT** - This parameter appears only if the **MODE** is set to **SNMP**. Here, specify the duration (in seconds) within which the SNMP query executed by this test should time out in the **TIMEOUT** text box. The default is 10 seconds.
25. **USEPS** - **This flag is applicable only for AIX LPARs.** By default, on AIX LPARs, this test uses the **tprof** command to compute CPU usage. Accordingly, the **USEPS** flag is set to **No** by default. On some AIX LPARs however, the **tprof** command may not function properly (this is an AIX issue). While monitoring such AIX LPARs therefore, you can configure the test to use the **ps** command instead for metrics collection. To do so, set the **USEPS** flag to **Yes**.

    Note:

    Alternatively, you can set the **AIXusePS** flag in the **[AGENT_SETTINGS]** section of the **eg_tests.ini** file (in the **<EG_INSTALL_DIR>\manager\config** directory) to **yes** (default: **no**) to enable the eG agent to use the **ps** command for CPU usage computations on AIX LPARs. If this global flag and the **USEPS** flag for a specific component are both set to **no**, then the test will use the default **tprof** command to compute CPU usage for AIX LPARs. If either of these flags is set to **yes**, then the **ps** command will perform the CPU usage computations for monitored AIX LPARs.

    In some high-security environments, the **tprof** command may require some special privileges to execute on an AIX LPAR (eg., *sudo* may need to be used to run **tprof**). In such cases, you can prefix the **tprof** command with another command (like *sudo*) or the full path to a script that grants the required privileges to **tprof**. To achieve this, edit the **eg_tests.ini** file (in the **<EG_INSTALL_DIR>\manager\config** directory), and provide the prefix of your choice against the **AixTprofPrefix** parameter in the **[AGENT_SETTINGS]** section. Finally, save the file. For instance, if you set the **AixTprofPrefix** parameter to *sudo*, then the eG agent will call the **tprof** command as *sudo tprof*.

<table>
<tr><td></td><td colspan="3">26. DATA OVER TCP – This parameter is applicable only if MODE is set to SNMP. By default, in an IT environment, all data transmission occurs over UDP. Some environments however, may be specifically configured to offload a fraction of the data traffic – for instance, certain types of data traffic or traffic pertaining to specific components – to other protocols like TCP, so as to prevent UDP overloads. In such environments, you can instruct the eG agent to conduct the SNMP data traffic related to the equalizer over TCP (and not UDP). For this, set the DATA OVER TCP flag to Yes. By default, this flag is set to No.
27. DD FREQUENCY - Refers to the frequency with which detailed diagnosis measures are to be generated for this test. The default is 1:1. This indicates that, by default, detailed measures will be generated every time this test runs, and also every time the test detects a problem. You can modify this frequency, if you so desire. Also, if you intend to disable the detailed diagnosis capability for this test, you can do so by specifying none against DD FREQUENCY.
28. DETAILED DIAGNOSIS - To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the On option. To disable the capability, click on the Off option.
The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled:
• The eG manager license should allow the detailed diagnosis capability
• Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for the Java application being monitored</td></tr>
<tr><td rowspan="3">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Total threads:
Indicates the total number of threads (including daemon and non-daemon threads).</td><td>Number</td><td></td></tr>
<tr><td>Runnable threads:
Indicates the current number of threads in a runnable state.</td><td>Number</td><td>The detailed diagnosis of this measure, if enabled, provides the name of the threads, the CPU usage by the threads, the time for which the thread was in a blocked state, waiting state, etc.</td></tr>
</table>

	Blocked threads: Indicates the number of threads that are currently in a blocked state.	Number	If a thread is trying to take a lock (to enter a synchronized block), but the lock is already held by another thread, then such a thread is called a blocked thread. The detailed diagnosis of this measure, if enabled, provides in-depth information related to the blocked threads.
	Waiting threads: Indicates the number of threads that are currently in a waiting state.	Number	A thread is said to be in a Waiting state if the thread enters a synchronized block, tries to take a lock that is already held by another thread, and hence, waits till the other thread notifies that it has released the lock. Ideally, the value of this measure should be low. A very high value could be indicative of excessive waiting activity on the JVM. You can use the detailed diagnosis of this measure, if enabled, to figure out which threads are currently in the waiting state. While waiting, the Java application program does no productive work and its ability to complete the task-at-hand is degraded. A certain amount of waiting may be acceptable for Java application programs. However, when the amount of time spent waiting becomes excessive or if the number of times that waits occur exceeds a reasonable amount, the Java application program may not be programmed correctly to take advantage of the available resources. When this happens, the delay caused by the waiting Java application programs elongates the response time experienced by an end user. An enterprise may use Java application programs to perform various functions. Delays based on abnormal degradation consume employee time and may be costly to corporations.

	Timed waiting threads: Indicates the number of threads in a TIMED_WAITING state.	Number	When a thread is in the TIMED_WAITING state, it implies that the thread is waiting for another thread to do something, but will give up after a specified time out period. To view the details of threads in the TIMED_WAITING state, use the detailed diagnosis of this measure, if enabled.
	Low CPU threads: Indicates the number of threads that are currently consuming CPU lower than the value configured in the **PCT MEDIUM CPU UTIL THREADS** text box.	Number	
	Medium CPU threads: Indicates the number of threads that are currently consuming CPU that is higher than the value configured in the **PCT MEDIMUM CPU UTIL THREADS** text box and is lower than or equal to the value specified in the **PCT HIGH CPU UTIL THREADS** text box.	Number	
	High CPU threads: Indicates the number of threads that are currently consuming CPU that is greater than the percentage configured in the **PCT HIGH CPU UTIL THREADS** text box.	Number	Ideally, the value of this measure should be very low. A high value is indicative of a resource contention at the JVM. Under such circumstances, you might want to identify the resource-hungry threads. To know which threads are consuming excessive CPU, use the detailed diagnosis of this measure.
`	**Peak threads:** Indicates the highest number of live threads since JVM started.	Number	
	Total threads: Indicates the the total number of threads started (including daemon, non-daemon, and terminated) since JVM started.	Number	
	Daemon threads: Indicates the current number of live daemon threads.	Number	

	Deadlock threads: Indicates the current number of deadlocked threads.	Number	Ideally, this value should be 0. A high value is a cause for concern, as it indicates that many threads are blocking one another causing the application performance to suffer. The detailed diagnosis of this measure, if enabled, lists the deadlocked threads and their resource usage.

If the mode for the **JVM Threads** test is set to **SNMP**, then the detailed diagnosis of this test will not display the **Blocked Time** and **Waited Time** for the threads. To make sure that detailed diagnosis reports these details also, do the following:

- Login to the application host.
- Go to the **<JAVA_HOME>\jre\lib\management** folder used by the target application, and edit the *management.properties* file in that folder.
- Append the following line to the file:

```
com.sun.management.enableThreadContentionMonitoring
```

- Finally, save the file.

9.1.7 JVM Cpu Usage Test

This test measures the CPU utilization of the JVM. If the JVM experiences abnormal CPU usage levels, you can use this test to instantly drill down to the threads that are contributing to the CPU spike. Detailed stack trace information provides insights to code level information that can highlight problems with the design of the Java application.

- If you want to collect metrics for this test from the JRE MIB – i.e, if the mode parameter of this test is set to **SNMP** – then ensure that the **SNMP** and **SNMP Trap** services are up and running on the application host.
- While monitoring a Java application executing on a Windows 2003 server using SNMP, ensure that the *community string* to be used during SNMP access is explicitly added when starting the SNMP service.

Purpose	Measures the CPU utilization of the JVM
Target of the test	A Java application
Agent deploying the	An internal/remote agent

test	

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port number at which the specified **HOST** listens 4. **MODE** – This test can extract metrics from the Java application using either of the following mechanisms: • Using SNMP-based access to the Java runtime MIB statistics; • By contacting the Java runtime (JRE) of the application via JMX To configure the test to use SNMP, select the **SNMP** option. On the other hand, choose the **JMX** option to configure the test to use JMX instead. By default, the **JMX** option is chosen here. 5. **JMX REMOTE PORT** – This parameter appers only if the **MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (see page **Error! Bookmark not defined.**). 6. **JNDINAME** – This parameter appears only if the **MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have resgistered the JMX connector in the RMI registery using a different lookup name, then you can change this default value to reflect the same. 7. **USER**, **PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **USER** and **PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to Section **Error! Reference source not found.**. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 8. **JMX PROVIDER** – This parameter appears only if the **MODE** is set to **JMX**. This test uses a JMX Provider to access the MBean attributes of the target Java application and collect metrics. Specify the package name of this JMX Provider here. By default, this is set to *com.sun.jmx.remote.protocol*. 9. **TIMEOUT** – Specify the duration (in seconds) for which this test should wait for a response from the target Java application. If there is no response from the target beyond the configured duration, the test will timeout. By default, this is set to *240* seconds if the **MODE** is **JMX**, and *10* seconds if the **MODE** is **SNMP**. 10. **SNMPPORT** – This parameter appears only if the **MODE** is set to **SNMP**. Here specify the port number through which the server exposes its SNMP MIB. Ensure that you specify the same port you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (see page **Error! Bookmark not defined.**). 11. **SNMPVERSION** – This parameter appears only if the **MODE** is set to **SNMP**. The default selection in the **SNMPVERSION** list is **v1**. However, for this test to work, you have to select SNMP **v2** or **v3** from this list, depending upon which version of SNMP is in use in the target environment. 12. **SNMPCOMMUNITY** – This parameter appears only if the **MODE** is set to **SNMP**. Here, specify the SNMP community name that the test uses to communicate with the mail server. The default is public. This parameter is specific to SNMP **v1** and **v2** only. Therefore, if the **SNMPVERSION** chosen is **v3**, then this parameter will not appear.

13. **USERNAME** – This parameter appears only when **v3** is selected as the **SNMPVERSION**. SNMP version 3 (SNMPv3) is an extensible SNMP Framework which supplements the SNMPv2 Framework, by additionally supporting message security, access control, and remote SNMP configuration capabilities. To extract performance statistics from the MIB using the highly secure SNMP v3 protocol, the eG agent has to be configured with the required access privileges – in other words, the eG agent should connect to the MIB using the credentials of a user with access permissions to be MIB. Therefore, specify the name of such a user against the **USERNAME** parameter.
14. **AUTHPASS** – Specify the password that corresponds to the above-mentioned **USERNAME**. This parameter once again appears only if the **SNMPVERSION** selected is **v3**.
15. **CONFIRM PASSWORD** – Confirm the **AUTHPASS** by retyping it here.
16. **AUTHTYPE** – This parameter too appears only if **v3** is selected as the **SNMPVERSION**. From the **AUTHTYPE** list box, choose the authentication algorithm using which SNMP v3 converts the specified **USERNAME** and **PASSWORD** into a 32-bit format to ensure security of SNMP transactions. You can choose between the following options:
    - **MD5** – Message Digest Algorithm
    - **SHA** – Secure Hash Algorithm
17. **ENCRYPTFLAG** – This flag appears only when **v3** is selected as the **SNMPVERSION**. By default, the eG agent does not encrypt SNMP requests. Accordingly, the **ENCRYPTFLAG** is set to **NO** by default. To ensure that SNMP requests sent by the eG agent are encrypted, select the **YES** option.
18. **ENCRYPTTYPE** – If the **ENCRYPTFLAG** is set to **YES**, then you will have to mention the encryption type by selecting an option from the **ENCRYPTTYPE** list. SNMP v3 supports the following encryption types:
    - **DES** – Data Encryption Standard
    - **AES** – Advanced Encryption Standard
19. **ENCRYPTPASSWORD** – Specify the encryption password here.
20. **CONFIRM PASSWORD** – Confirm the encryption password by retyping it here.

	21. **USEPS** - **This flag is applicable only for AIX LPARs.** By default, on AIX LPARs, this test uses the **tprof** command to compute CPU usage. Accordingly, the **USEPS** flag is set to **No** by default. On some AIX LPARs however, the **tprof** command may not function properly (this is an AIX issue). While monitoring such AIX LPARs therefore, you can configure the test to use the **ps** command instead for metrics collection. To do so, set the **USEPS** flag to **Yes**. **Note:** Alternatively, you can set the **AIXusePS** flag in the **[AGENT_SETTINGS]** section of the **eg_tests.ini** file (in the **<EG_INSTALL_DIR>\manager\config** directory) to **yes** (default: **no**) to enable the eG agent to use the **ps** command for CPU usage computations on AIX LPARs. If this global flag and the **USEPS** flag for a specific component are both set to **no**, then the test will use the default **tprof** command to compute CPU usage for AIX LPARs. If either of these flags is set to **yes**, then the **ps** command will perform the CPU usage computations for monitored AIX LPARs. In some high-security environments, the **tprof** command may require some special privileges to execute on an AIX LPAR (eg., *sudo* may need to be used to run **tprof**). In such cases, you can prefix the **tprof** command with another command (like *sudo*) or the full path to a script that grants the required privileges to **tprof**. To achieve this, edit the **eg_tests.ini** file (in the **<EG_INSTALL_DIR>\manager\config** directory), and provide the prefix of your choice against the **AixTprofPrefix** parameter in the **[AGENT_SETTINGS]** section. Finally, save the file. For instance, if you set the **AixTprofPrefix** parameter to *sudo*, then the eG agent will call the **tprof** command as *sudo tprof*. 22. **DATA OVER TCP – This parameter is applicable only if MODE is set to SNMP.** By default, in an IT environment, all data transmission occurs over UDP. Some environments however, may be specifically configured to offload a fraction of the data traffic – for instance, certain types of data traffic or traffic pertaining to specific components – to other protocols like TCP, so as to prevent UDP overloads. In such environments, you can instruct the eG agent to conduct the SNMP data traffic related to the equalizer over TCP (and not UDP). For this, set the **DATA OVER TCP** flag to **Yes**. By default, this flag is set to **No**. 23. **DD FREQUENCY** - Refers to the frequency with which detailed diagnosis measures are to be generated for this test. The default is *1:1*. This indicates that, by default, detailed measures will be generated every time this test runs, and also every time the test detects a problem. You can modify this frequency, if you so desire. Also, if you intend to disable the detailed diagnosis capability for this test, you can do so by specifying *none* against **DD FREQUENCY**. 24. **DETAILED DIAGNOSIS** - To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the **On** option. To disable the capability, click on the **Off** option. The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled: • The eG manager license should allow the detailed diagnosis capability • Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.
Outputs of the test	One set of results for the Java application being monitored

Measurements made by the test	Measurement	Measurement Unit	Interpretation
	CPU utilization of JVM: Indicates the percentage of total available CPU time taken up by the JVM.	Percent	If a system has multiple processors, this value is the total CPU time used by the JVM divided by the number of processors on the system. Ideally, this value should be low. An unusually high value or a consistent increase in this value is indicative of abnormal CPU usage, and could warrant further investigation. In such a situation, you can use the detailed diagnosis of this measure, if enabled, to determine which runnable threads are currently utilizing excessive CPU.

The detailed diagnosis of the *CPU utilization of JVM* measure lists all the CPU-consuming threads currently executing in the JVM, in the descending order of the **Percentage Cpu Time** of the threads; this way, you can quickly and accurately identify CPU-intensive threads in the JVM. In addition to CPU usage information, the detailed diagnosis also reveals the following information for every thread:

- The number of times the thread was blocked during the last measurement period, the total duration of the blocks, and the percentage of time for which the thread was blocked;
- The number of times the thread was in wating during the last measurement period, the total duration waited, and the percentage of time for which the thread waited;
- The **Stacktrace** of the thread, using which you can nail the exact line of code causing the CPU consumption of the thread to soar;

Details of the threads

Time	Thread Name	ThreadID	Thread State	Cpu Time (Secs)	Percentage Cpu Time (%)	Blocked Count	Blocked Time (Secs)	Percentage Blocked Time (%)	Waited	Waited Time (Secs)	Percentage Waited Time (%)	Stacktrace
Jun 22, 2009 14:42:30												Stack Trace
	http7077-Processor2	19	RUNNABLE	2.296	0.6651	103	0.006	0	83	534.26	18.18	java.net.SocketInputStream.socketRead0(Native Method); java.net.SocketInputStream.read(SocketInputStream.java:129); org.apache.coyote.http11.InternalInputBuffer.fill(InternalInputBuffer.java:767); org.apache.coyote.http11.InternalInputBuffer.parseRequestLine (InternalInputBuffer.java:428); org.apache.coyote.http11.Http11Processor.process (Http11Processor.java:790); org.apache.coyote.http11.Http11Protocol$Http11ConnectionHandler.processConnection (Http11Protocol.java:700); org.apache.tomcat.util.net.TcpWorkerThread.runIt (PoolTcpEndpoint.java:584); org.apache.tomcat.util.threads.ThreadPool$ControlRunnable.run (ThreadPool.java:683); java.lang.Thread.run(Thread.java:619);
	http7077-Processor4	21	RUNNABLE	2.89	0.4811	231	0.045	0	403	654.029	0	java.net.SocketInputStream.socketRead0(Native Method); java.net.SocketInputStream.read(SocketInputStream.java:129); org.apache.coyote.http11.InternalInputBuffer.fill(InternalInputBuffer.java:767); org.apache.coyote.http11.InternalInputBuffer.parseRequestLine (InternalInputBuffer.java:428); org.apache.coyote.http11.Http11Processor.process (Http11Processor.java:790); org.apache.coyote.http11.Http11Protocol$Http11ConnectionHandler.processConnection (Http11Protocol.java:700); org.apache.tomcat.util.net.TcpWorkerThread.runIt (PoolTcpEndpoint.java:584); org.apache.tomcat.util.threads.ThreadPool$ControlRunnable.run (ThreadPool.java:683); java.lang.Thread.run(Thread.java:619);
	http7077-Processor1	18	RUNNABLE	3.984	0.4528	103	0.014	0	407	562.412	17.27	java.net.SocketInputStream.socketRead0(Native Method); java.net.SocketInputStream.read(SocketInputStream.java:129); org.apache.coyote.http11.InternalInputBuffer.fill(InternalInputBuffer.java:767); org.apache.coyote.http11.InternalInputBuffer.parseRequestLine (InternalInputBuffer.java:428); org.apache.coyote.http11.Http11Processor.process (Http11Processor.java:790);

Figure 9. 3: The detailed diagnosis of the CPU utilization of JVM measure

9.1.8 JVM Memory Usage Test

This test monitors every memory type on the JVM and reports how efficiently the JVM utilizes the memory resources of each type.

- This test works only on Windows platforms.
- This test can provide detailed diagnosis information for only those monitored Java applications that use **JRE 1.6 or higher**.

Purpose	Monitors every memory type on the JVM and reports how efficiently the JVM utilizes the memory resources of each type
Target of the test	A Java application
Agent deploying the test	An internal/remote agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port number at which the specified **HOST** listens 4. **MODE** – This test can extract metrics from the Java application using either of the following mechanisms: • Using SNMP-based access to the Java runtime MIB statistics; • By contacting the Java runtime (JRE) of the application via JMX To configure the test to use SNMP, select the **SNMP** option. On the other hand, choose the **JMX** option to configure the test to use JMX instead. By default, the **JMX** option is chosen here. 5. **JMX REMOTE PORT** – This parameter appers only if the **MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (see page **Error! Bookmark not defined.**). 6. **USER**, **PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **USER** and **PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to Section **Error! Reference source not found.**. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 7. **JNDINAME** – This parameter appears only if the **MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have resgistered the JMX connector in the RMI registery using a different lookup name, then you can change this default value to reflect the same. 8. **JMX PROVIDER** – This parameter appears only if the **MODE** is set to **JMX**. This test uses a JMX Provider to access the MBean attributes of the target Java application and collect metrics. Specify the package name of this JMX Provider here. By default, this is set to *com.sun.jmx.remote.protocol*. 9. **TIMEOUT** – Specify the duration (in seconds) for which this test should wait for a response from the target Java application. If there is no response from the target beyond the configured duration, the test will timeout. By default, this is set to *240* seconds if the **MODE** is **JMX**, and *10* seconds if the **MODE** is **SNMP**. 10. **SNMPPORT** – This parameter appears only if the **MODE** is set to **SNMP**. Here specify the port number through which the server exposes its SNMP MIB. Ensure that you specify the same port you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (see page **Error! Bookmark not defined.**). 11. **SNMPVERSION** – This parameter appears only if the **MODE** is set to **SNMP**. The default selection in the **SNMPVERSION** list is **v1**. However, for this test to work, you have to select SNMP **v2** or **v3** from this list, depending upon which version of SNMP is in use in the target environment. 12. **SNMPCOMMUNITY** – This parameter appears only if the **MODE** is set to **SNMP**. Here, specify the SNMP community name that the test uses to communicate with the mail server. The default is public. This parameter is specific to SNMP **v1** and **v2** only. Therefore, if the **SNMPVERSION** chosen is **v3**, then this parameter will not appear.

13. **USERNAME** – This parameter appears only when **v3** is selected as the **SNMPVERSION**. SNMP version 3 (SNMPv3) is an extensible SNMP Framework which supplements the SNMPv2 Framework, by additionally supporting message security, access control, and remote SNMP configuration capabilities. To extract performance statistics from the MIB using the highly secure SNMP v3 protocol, the eG agent has to be configured with the required access privileges – in other words, the eG agent should connect to the MIB using the credentials of a user with access permissions to be MIB. Therefore, specify the name of such a user against the **USERNAME** parameter.
14. **AUTHPASS** – Specify the password that corresponds to the above-mentioned **USERNAME**. This parameter once again appears only if the **SNMPVERSION** selected is **v3**.
15. **CONFIRM PASSWORD** – Confirm the **AUTHPASS** by retyping it here.
16. **AUTHTYPE** – This parameter too appears only if **v3** is selected as the **SNMPVERSION**. From the **AUTHTYPE** list box, choose the authentication algorithm using which SNMP v3 converts the specified **USERNAME** and **PASSWORD** into a 32-bit format to ensure security of SNMP transactions. You can choose between the following options:
    - **MD5** – Message Digest Algorithm
    - **SHA** – Secure Hash Algorithm
17. **ENCRYPTFLAG** – This flag appears only when **v3** is selected as the **SNMPVERSION**. By default, the eG agent does not encrypt SNMP requests. Accordingly, the **ENCRYPTFLAG** is set to **NO** by default. To ensure that SNMP requests sent by the eG agent are encrypted, select the **YES** option.
18. **ENCRYPTTYPE** – If the **ENCRYPTFLAG** is set to **YES**, then you will have to mention the encryption type by selecting an option from the **ENCRYPTTYPE** list. SNMP v3 supports the following encryption types:
    - **DES** – Data Encryption Standard
    - **AES** – Advanced Encryption Standard
19. **ENCRYPTPASSWORD** – Specify the encryption password here.
20. **CONFIRM PASSWORD** – Confirm the encryption password by retyping it here.
21. **DATA OVER TCP – This parameter is applicable only if MODE is set to SNMP.** By default, in an IT environment, all data transmission occurs over UDP. Some environments however, may be specifically configured to offload a fraction of the data traffic – for instance, certain types of data traffic or traffic pertaining to specific components – to other protocols like TCP, so as to prevent UDP overloads. In such environments, you can instruct the eG agent to conduct the SNMP data traffic related to the equalizer over TCP (and not UDP). For this, set the **DATA OVER TCP** flag to **Yes**. By default, this flag is set to **No**.

22. **HEAP ANALYSIS** – By default, this flag is set to **off**. This implies that the test will not provide detailed diagnosis information for memory usage, by default. To trigger the collection of detailed measures, set this flag to **On**.

    Note:

    If heap analysis is switched **On**, then the eG agent will be able to collect detailed measures only if the Java application being monitored uses **JDK 1.6 OR HIGHER**.

23. **JAVA HOME** – This parameter appears only when the **HEAP ANALYSIS** flag is switched **On**. Here, provide the full path to the install directory of **JDK 1.6 or higher** on the application host. For example, *c:\JDK1.6.0*.

24. **EXCLUDE PACKAGES** - The detailed diagnosis of this test, if enabled, lists the Java classes/packages that are using the pool memory and the amount of memory used by each class/package. To enable administrators to focus on the memory consumed by those classes/packages that are specific to their application, without being distracted by the memory consumption of basic Java classes/packages, the test, by default, excludes some common Java packages from the detailed diagnosis. The packages excluded by default are as follows:

    - All packages that start with the string *java* or *javax* - in other words, *java.** and *javax.**.
    - Arrays of primitive data types - eg., *[Z*, which is a one-dimensional array of type boolean, *[[B*, which is a 2-dimensional array of type byte, etc.
    - A few class loaders - eg., *<symbolKlass>, <constantPoolKlass>, <instanceKlassKlass>, <constantPoolCacheKlass>*, etc.

    This is why, the **EXCLUDE PACKAGES** parameter is by default configured with the packages mentioned above. You can, if required, append more packages or patterns of packages to this comma-separated list. This will ensure that such packages also are excluded from the detailed diagnosis of the test. **Note that the EXCLUDE PACKAGES parameter is of relevance only if the HEAP ANALSIS flag is set to 'Yes'**.

25. **INCLUDE PACKAGES** - By default, this is set to *all*. This indicates that, by default, the detailed diagnosis of the test (if enabled) includes all classes/packages associated with the monitored Java application, regardless of whether they are basic Java packages or those that are crucial to the functioning of the application. However, if you want the detailed diagnosis to provide the details of memory consumed by a specific set of classes/packages alone, then, provide a comma-separated list of classes/packages to be included in the detailed diagnosis in the **INCLUDE PACKAGES** text box. **Note that the INCLUDE PACKAGES parameter is of relevance only if the HEAP ANALSIS flag is set to 'Yes'**.

	26. **DD FREQUENCY** - Refers to the frequency with which detailed diagnosis measures are to be generated for this test. The default is *1:1*. This indicates that, by default, detailed measures will be generated every time this test runs, and also every time the test detects a problem. You can modify this frequency, if you so desire. Also, if you intend to disable the detailed diagnosis capability for this test, you can do so by specifying *none* against **DD FREQUENCY**. 27. **DETAILED DIAGNOSIS** - To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the **On** option. To disable the capability, click on the **Off** option. The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled: • The eG manager license should allow the detailed diagnosis capability • Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.		
Outputs of the test	One set of results for every memory type on the JVM being monitored		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Initial memory: Indicates the amount of memory initially allocated at startup.	MB	
	Used memory: Indicates the amount of memory currently used.	MB	It includes the memory occupied by all objects, including both reachable and unreachable objects. Ideally, the value of this measure should be low. A high value or a consistent increase in the value could indicate gradual erosion of memory resources. In such a situation, you can take the help of the detailed diagnosis of this measure (if enabled), to figure out which class is using up memory excessively.
	Available memory: Indicates the amount of memory guaranteed to be available for use by the JVM.	MB	The amount of **Available memory** may change over time. The Java virtual machine may release memory to the system and committed memory could be less than the amount of memory initially allocated at startup. Committed will always be greater than or equal to used memory.

	Free memory: Indicates the amount of memory currently available for use by the JVM.	MB	This is the difference between **Available memory** and **Used memory**. Ideally, the value of this measure should be high.
	Max free memory: Indicates the maximum amount of memory allocated for the JVM.	MB	
	Used percentage: Indicates the percentage of used memory.	Percent	Ideally, the value of this measure should be low. A very high value of this measure could indicate excessive memory consumption by the JVM, which in turn, could warrant further investigation. In such a situation, you can take the help of the detailed diagnosis of this measure (if enabled), to figure out which class is using up memory excessively.

The detailed diagnosis of the *Used memory* measure, if enabled, lists all the classes that are using the pool memory, the amount and percentage of memory used by each class, the number of instances of each class that is currently operational, and also the percentage of currently running instances of each class. Since this list is by default sorted in the descending order of the percentage memory usage, the first class in the list will obviously be the leading memory consumer.

Details of JVM Heap Usage

Time	Class Name	Instance Count	Instance Percentage	Memory used(MB)	Percentage memory used
Jun 17, 2009 12:11:01					
	com.ibc.object.SapBusinessObject	104003	11.5774	12.629	22.5521
	[Ljava.lang.Object;	23586	2.6255	7.4904	13.3759
	<constMethodKlas>	41243	4.5911	5.8357	10.4211
	java.lang.String	174044	19.3742	3.9836	7.1136
	[C	240000	26.7163	3.6621	6.5396
	[B	7336	0.8166	3.5868	6.4051
	<methodKlas>	41243	4.5911	3.1514	5.6275
	<symbolKlas>	69152	7.6979	2.8014	5.0025
	[I	26240	2.921	2.3018	4.1105
	<constantPoolKlas>	3097	0.3448	2.0491	3.6591
	<instanceKlassKlas>	3097	0.3448	1.296	2.3144
	<constantPoolCacheKlas>	2663	0.2964	1.2536	2.2386
	[S	5546	0.6174	0.4283	0.7649
	java.util.Hashtable$Entry	15908	1.7708	0.3641	0.6502
	<methodDataKlas>	870	0.0968	0.3594	0.6418
	java.lang.reflect.Method	4269	0.4752	0.3257	0.5816
	java.lang.Class	3383	0.3766	0.3097	0.5531
	java.util.Vector	13266	1.4767	0.3036	0.5422

Figure 9. 4: The detailed diagnosis of the Used memory measure

9.1.9 JVM Uptime Test

This test tracks the uptime of a JVM. Using information provided by this test, administrators can determine whether the JVM was restarted. Comparing uptime across Java applications, an admin can determine the JVMs that have been running without any restarts for the longest time.

Purpose	Tracks the uptime of a JVM
Target of the test	A Java application
Agent deploying the test	An internal/remote agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port number at which the specified **HOST** listens 4. **MODE** – This test can extract metrics from the Java application using either of the following mechanisms: • Using SNMP-based access to the Java runtime MIB statistics; • By contacting the Java runtime (JRE) of the application via JMX To configure the test to use SNMP, select the **SNMP** option. On the other hand, choose the **JMX** option to configure the test to use JMX instead. By default, the **JMX** option is chosen here. 5. **JMX REMOTE PORT** – This parameter appears only if the **MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (see page **Error! Bookmark not defined.**). 6. **USER**, **PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **USER** and **PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to Section **Error! Reference source not found.**. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 7. **JNDINAME** – This parameter appears only if the **MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have resgistered the JMX connector in the RMI registery using a different lookup name, then you can change this default value to reflect the same. 8. **JMX PROVIDER** – This parameter appears only if the **MODE** is set to **JMX**. This test uses a JMX Provider to access the MBean attributes of the target Java application and collect metrics. Specify the package name of this JMX Provider here. By default, this is set to *com.sun.jmx.remote.protocol*. 9. **TIMEOUT** – Specify the duration (in seconds) for which this test should wait for a response from the target Java application. If there is no response from the target beyond the configured duration, the test will timeout. By default, this is set to *240* seconds if the **MODE** is **JMX**, and *10* seconds if the **MODE** is **SNMP**. 10. **SNMPPORT** – This parameter appears only if the **MODE** is set to **SNMP**. Here specify the port number through which the server exposes its SNMP MIB. Ensure that you specify the same port you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (see page **Error! Bookmark not defined.**). 11. **SNMPVERSION** – This parameter appears only if the **MODE** is set to **SNMP**. The default selection in the **SNMPVERSION** list is **v1**. However, for this test to work, you have to select SNMP **v2** or **v3** from this list, depending upon which version of SNMP is in use in the target environment. 12. **SNMPCOMMUNITY** – This parameter appears only if the **MODE** is set to **SNMP**. Here, specify the SNMP community name that the test uses to communicate with the mail server. The default is public. This parameter is specific to SNMP **v1** and **v2** only. Therefore, if the **SNMPVERSION** chosen is **v3**, then this parameter will not appear.

13. **USERNAME** – This parameter appears only when **v3** is selected as the **SNMPVERSION**. SNMP version 3 (SNMPv3) is an extensible SNMP Framework which supplements the SNMPv2 Framework, by additionally supporting message security, access control, and remote SNMP configuration capabilities. To extract performance statistics from the MIB using the highly secure SNMP v3 protocol, the eG agent has to be configured with the required access privileges – in other words, the eG agent should connect to the MIB using the credentials of a user with access permissions to be MIB. Therefore, specify the name of such a user against the **USERNAME** parameter.
14. **AUTHPASS** – Specify the password that corresponds to the above-mentioned **USERNAME**. This parameter once again appears only if the **SNMPVERSION** selected is **v3**.
15. **CONFIRM PASSWORD** – Confirm the **AUTHPASS** by retyping it here.
16. **AUTHTYPE** – This parameter too appears only if **v3** is selected as the **SNMPVERSION**. From the **AUTHTYPE** list box, choose the authentication algorithm using which SNMP v3 converts the specified **USERNAME** and **PASSWORD** into a 32-bit format to ensure security of SNMP transactions. You can choose between the following options:
    - **MD5** – Message Digest Algorithm
    - **SHA** – Secure Hash Algorithm
17. **ENCRYPTFLAG** – This flag appears only when **v3** is selected as the **SNMPVERSION**. By default, the eG agent does not encrypt SNMP requests. Accordingly, the **ENCRYPTFLAG** is set to **NO** by default. To ensure that SNMP requests sent by the eG agent are encrypted, select the **YES** option.
18. **ENCRYPTTYPE** – If the **ENCRYPTFLAG** is set to **YES**, then you will have to mention the encryption type by selecting an option from the **ENCRYPTTYPE** list. SNMP v3 supports the following encryption types:
    - **DES** – Data Encryption Standard
    - **AES** – Advanced Encryption Standard
19. **ENCRYPTPASSWORD** – Specify the encryption password here.
20. **CONFIRM PASSWORD** – Confirm the encryption password by retyping it here.
21. **TIMEOUT** - This parameter appears only if the **MODE** is set to **SNMP**. Here, specify the duration (in seconds) within which the SNMP query executed by this test should time out in the **TIMEOUT** text box. The default is 10 seconds.

<table>
<tr><td></td><td colspan="3">22. DATA OVER TCP – This parameter is applicable only if MODE is set to SNMP. By default, in an IT environment, all data transmission occurs over UDP. Some environments however, may be specifically configured to offload a fraction of the data traffic – for instance, certain types of data traffic or traffic pertaining to specific components – to other protocols like TCP, so as to prevent UDP overloads. In such environments, you can instruct the eG agent to conduct the SNMP data traffic related to the equalizer over TCP (and not UDP). For this, set the DATA OVER TCP flag to Yes. By default, this flag is set to No.
23. DD FREQUENCY - Refers to the frequency with which detailed diagnosis measures are to be generated for this test. The default is 1:1. This indicates that, by default, detailed measures will be generated every time this test runs, and also every time the test detects a problem. You can modify this frequency, if you so desire. Also, if you intend to disable the detailed diagnosis capability for this test, you can do so by specifying none against DD FREQUENCY.
24. DETAILED DIAGNOSIS - To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the On option. To disable the capability, click on the Off option.
The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled:
• The eG manager license should allow the detailed diagnosis capability
• Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for every Java application monitored</td></tr>
<tr><td>Measurements made by the</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
</table>

<table>
<tr>
<td>test</td>
<td>Has JVM been restarted?:
Indicates whether or not the JVM has restarted during the last measurement period.</td>
<td></td>
<td>If the value of this measure is No, it indicates that the JVM has not restarted. The value Yes on the other hand implies that the JVM has indeed restarted.
The numeric values that correspond to the restart states discussed above are listed in the table below:
<table>
<tr><th>State</th><th>Value</th></tr>
<tr><td>Yes</td><td>1</td></tr>
<tr><td>No</td><td>0</td></tr>
</table>
Note:
By default, this measure reports the value Yes or No to indicate whether a JVM has restarted. The graph of this measure however, represents the same using the numeric equivalents – 0 or 1.</td>
</tr>
<tr>
<td></td>
<td>Uptime during the last measure period:
Indicates the time period that the JVM has been up since the last time this test ran.</td>
<td>Secs</td>
<td>If the JVM has not been restarted during the last measurement period and the agent has been running continuously, this value will be equal to the measurement period. If the JVM was restarted during the last measurement period, this value will be less than the measurement period of the test. For example, if the measurement period is 300 secs, and if the JVM was restarted 120 secs back, this metric will report a value of 120 seconds. The accuracy of this metric is dependent on the measurement period – the smaller the measurement period, greater the accuracy.</td>
</tr>
<tr>
<td></td>
<td>Total uptime of the JVM:
Indicates the total time that the JVM has been up since its last reboot.</td>
<td>Secs</td>
<td>Administrators may wish to be alerted if a JVM has been running without a reboot for a very long period. Setting a threshold for this metric allows administrators to determine such conditions.</td>
</tr>
</table>

9.1.10 Tests Disabled by Default for a Tomcat Server

The tests discussed above are enabled by default for a Tomcat server. In addition to these tests, the eG agent can be optionally configured to execute a few other tests that report critical statistics related to CPU usage, thread usage, and the uptime of the Tomcat JVM. To enable one/more of these tests, open the **AGENTS – TESTS CONFIGURATION** page using the Agents -> Tests -> Configure menu sequence, select **Tomcat** from the **Component type** list, scroll down the test list that appears to view the **DISABLED TESTS** section, select the check box corresponding to the JVM test of interest to you, and then, click the **Update** button. These tests have been discussed below.

9.1.10.1 Java Transactions Test

When a user initiates a transaction to a Java-based web application, the transaction typically travels via many Java components before completing execution and sending out a response to the user.

The key Java components have been briefly described below:

- **Filter:** A filter is a program that runs on the server before the servlet or JSP page with which it is associated. All filters must implement **javax.servlet.Filter**. This interface comprises three methods: **init, doFilter, and destroy.**
- **Servlet:** A servlet acts as an intermediary between the client and the server. As servlet modules run on the server, they can receive and respond to requests made by the client. If a servlet is designed to handle HTTP requests, it is called an **HTTP Servlet**.
- **JSP:** Java Server Pages are an extension to the Java servlet technology. A JSP is translated into Java servlet before being run, and it processes HTTP requests and generates responses like any servlet. Translation occurs the first time the application is run.
- **Struts:** The Struts Framework is a standard for developing well-architected Web applications. Based on the Model-View-Controller (MVC) design paradigm, it distinctly separates all three levels (Model, View, and Control).

A delay experienced by any of the aforesaid Java components can adversely impact the total response time of the transaction, thereby scarring the user experience with the web application. In addition, delays in JDBC connectivity and slowdowns in SQL query executions (if the application interacts with a database), bottlenecks in delivery of mails via the Java Mail API (if used), and any slow method calls, can also cause insufferable damage to the 'user-perceived' health of a web application.

The challenge here for administrators is to not just isolate the slow transactions, but to also accurately identify where the transaction slowed down and why - is it owing to inefficent JSPs? poorly written servlets or struts? poor or the lack of any JDBC connectivity to the database? long running queries? inefficient API calls? or delays in accessing the POJO methods? The **eG JTM Monitor** provides administrators with answers to these questions!

With the help of the **Java Transactions** test, the **eG JTM Monitor** traces the route a configured web transaction takes, and captures live the total responsiveness of the transaction and the response time of each Java component it visits en route. This way, the solution proactively detects transaction slowdowns, and also precisely points you to the Java components causing it - is it the Filters? JSPs? Servlets? Struts? JDBC? SQL query? Java Mail API? or the POJO? In addition to revealing where (i.e., at which Java component) a transaction slowed down, the solution also provides the following intelligent insights, on demand, making root-cause identification and resolution easier:

- A look at the methods that took too long to execute, thus leading you to those methods that may have contributed to the slowdown;
- Single-click access to each invocation of a chosen method, which provides pointers to when and where a method spent longer than desired;
- A quick glance at SQL queries and Java errors that may have impacted the responsiveness of the

transaction;

Using these interesting pointers provided by the **eG JTM Monitor**, administrators can diagnose the root-cause of transaction slowdowns within minutes, rapidly plug the holes, and thus ensure that their critical web applications perform at peak capacity at all times!

Before attempting to monitor Java transactions using the **eG JTM Monitor**, the following configurations will have to be performed:

1. In the **<EG_INSTALL_DIR>\lib** directory (on Windows; on Unix, this will be **/opt/egurkha/lib**) of the eG agent, you will find the following files:
   - **eg_jtm.jar**
   - **aspectjrt.jar**
   - **aspectjweaver.jar**
   - **jtmConn.props**
   - **jtmLogging.props**
   - **jtmOther.props**
2. Login to the system hosting the Java application to be monitored.
3. If the eG agent will be 'remotely monitoring' the target Java application (i.e., if the Java application is to be monitored in an 'agentless manner'), then, copy all the files mentioned above from the **<EG_INSTALL_DIR>\lib** directory (on Windows; on Unix, this will be **/opt/egurkha/lib**) of the eG agent to any location on the Java application host.
4. Then, proceed to edit the start-up script of the Java application being monitored, and append the following lines to it:

```
set JTM_HOME=<<PATH OF THE LOCAL FOLDER CONTAINING THE JAR FILES AND PROPERTY FILES
LISTED ABOVE>>
"-javaagent:%JTM_HOME%\aspectjweaver.jar"
"-DEG_JTM_HOME=%JTM_HOME%"
```

   Note that the above lines will change based on the operating system and the web/web application server being monitored.

   Then, add the **eg_jtm.jar**, **aspectjrt.jar**, and **aspectjweaver.jar** files to the **CLASSPATH** of the Java application being monitored.

   Finally, save the file. Once this is done, then, the next time the Java application starts, the **eG JTM Monitor** scans the web requests to the application for configured URL patterns. When a match is found, the **eG JTM Monitor** collects the desired metrics and stores them in memory.

   Then, every time the eG agent runs the **Java Transactions** test, the agent will poll the **eG JTM Monitor** (on the target application) for the required metrics, extract the same from the application's memory, and report them to the eG manager.

5. Next, edit the **jtmConn.props** file. You will find the following lines in the file:

```
#Contains the connection properties of eGurkha Java Transaction Monitor
JTM_Port=13631
Designated_Agent=
```

   By default, the **JTM_Port** parameter is set to 13631. If the Java application being monitored listens on a different JTM port, then specify the same here. In this case, when managing a **Java Application** using the eG

administrative interface, specify the **JTM_Port** that you set in the **jtmConn.props** file as the **Port** of the Java application.

Also, against the **Designated_Agent** parameter, specify the IP address of the eG agent which will poll the **eG JTM Monitor** for metrics. If no IP address is provided here, then the **eG JTM Monitor** will treat the host from which the very first 'measure request' comes in as the **Designated_Agent**.

> **Note:**
>
> In case a specific **Designated_Agent** is not provided, and the **eG JTM Monitor** treats the host from which the very first 'measure request' comes in as the **Designated_Agent**, then if such a **Designated_Agent** is stopped or uninstalled for any reason, the **eG JTM Monitor** will wait for a maximum of 10 measure periods for that 'deemed' **Designated_Agent** to request for metrics. If no requests come in for 10 consecutive measure periods, then the **eG JTM Monitor** will begin responding to 'measure requests' coming in from any other eG agent.

6. Finally, save the **jtmConn.props** file.

Then, proceed to configure the **Java Transactions** test as discussed in Section 9.1.10.1 of this document.

9.1.10.2 JVM Details Test

This reveals the health of the Tomcat class loaders and daemon threads, and also indicates JVM availability.

Purpose	Reveals the health of the Tomcat class loaders and daemon threads, and also indicates JVM availability
Target of the test	Tomcat server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** - The host for which the test is to be configured 3. **PORT** – The port number on which the Tomcat server listens 4. **MEASUREMENT MODE** – This test can extract metrics from Tomcat using either of the following mechanisms: • By deploying the **egtomcat.war** file in the **<EG_INSTALL_DIR>\lib** directory of the eG agent host on the Tomcat server; • By contacting the Java runtime (JRE) of Tomcat via JMX To configure the test to use **egtomcat.war** file, first select the **War** file option. Then, refer to the *Configuring and Monitoring Tomcat Servers* document to know how to deploy the WAR file on the target Tomcat server. On the other hand, if you want the test to use JMX instead, then first, select the **JMX** option. Then, follow the procedure detailed in the *Configuring and Monitoring Tomcat Servers* document to configure the test to use **JMX**. By default, the **JMX** option is chosen here. 5. **JNDINAME** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same. 6. **JMX REMOTE PORT** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *catalina.sh* (or *catalina.bat* file) file in the **<CATALINA_HOME_DIR>/bin** folder of the target Tomcat server (refer to the *Configuring and Monitoring Tomcat Servers* document for more details). 7. **JMX USER**, **JMX PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MEASUREMENT MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **JMX USER** and **JMX PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to the *Configuring and Monitoring Tomcat Servers* document. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 8. **SSL -** This parameter appears only if the measurement **MODE** is set to **War File**. Indicate **YES** if the Tomcat server is SSL-enabled. 9. **URL** - This parameter appears only if the measurement mode is set to **War File**. Specify the URL of the managed Tomcat server to enable the test to connect to it and extract measures from it. The **URL** specification should be of the format: *http://{TomcatIP}:{TomcatPort}.* 10. **USERNAME**, **PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MEASUREMENT MODE** is set to **War File**. In the **USERNAME** text box, specify a name of a user who has been assigned the **Manager role** on the Tomcat server to be monitored; these users are typically allowed to control web applications deployed on the Tomcat server. Specify the **PASSWORD** of this user, and confirm the password by retyping it in the **CONFIRM PASSWORD** text box.

	11. **ENCRYPTPASS** - This parameter appears only if the measurement mode is set to **War File**. Select **Yes** if you want to encrypt the password. 12. **JMX PROVIDER** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. This test uses a JMX Provider to access the MBean attributes of Tomcat and collect metrics. Specify the package name of this JMX Provider here. By default, this is set to *com.sun.jmx.remote.protocol*. 13. **TIMEOUT** – Specify the duration (in seconds) for which this test should wait for a response from Tomcat. If there is no response from Tomcat beyond the configured duration, the test will timeout. By default, this is set to *240* seconds.		
Outputs of the test	One set of results for the Tomcat server being monitored.		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Total classes loaded: Refers to the total number of classes that have been loaded since the Java virtual machine started execution.	Number	
	Classes loaded: Indicates the number of classes that have been loaded in the Java virtual machine since the last measurement period.	Number	Classes are fundamental to the design of Java programming language. Like many server applications, Tomcat installs a variety of class loaders (that is, classes that implement java.lang.ClassLoader) to allow different portions of the container, and the web applications running on the container, to have access to different repositories of available classes and resources. A consistent decrease in the number of classes loaded and unloaded could indicate a road-block in the loading/unloading of classes by the class loader. If left unchecked, critical resources/classes could be rendered inaccessible to web applications, thereby severely affecting application performance.
	Classes unloaded: Indicates the total number of classes that have been unloaded in the Java virtual machine since the last measurement period.	Number	
	Total daemon threads: Indicates the current number of live daemon threads.	Number	The main function of the daemon threads is to provide service to other threads, running in the same process as the daemon thread. If the value of this measure is equal to that of the Live_threads measure, then JVM would stop executing; in other words, when the only remaining threads are the daemon threads, then JVM shuts down and so does Tomcat.
	Live threads: Indicates the current number of live daemon and non-daemon threads.	Number	

	Deadlock threads: The current number of deadlock threads	Number	Ideally, the value of this measure should be 0. A non-zero value indicates the occurrence of a deadlock. When a thread attempts to acquire a resource that is already locked by another thread, a deadlock situation arises.
	Server uptime: The uptime of Java virtual machine	Mins	To ensure that the JVM is up and running for a long time, you need to make sure that at least one non-daemon thread is executing at all times. This is because, without any non-daemon threads, the daemon threads have no recipients for the service it provides; it hence brings down both the JVM and Tomcat.

9.1.10.3 Tomcat JVM Garbage Collection Test

Manual memory management is time consuming, and error prone. Most programs still contain leaks. This is all doubly true with programs using exception-handling and/or threads. Garbage collection (GC) is a part of Tomcat's JVM that automatically determines what memory a program is no longer using, and recycles it for other use. It is also known as "automatic storage (or memory) reclamation''. The JVMGarbage test reports the performance statistics pertaining to the JVM's garbage collection.

Purpose	Reveals how well the Tomcat's JVM performs garbage collection
Target of the test	A Tomcat server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** - The host for which the test is to be configured 3. **PORT** – The port number on which the Tomcat server listens 4. **MEASUREMENT MODE** – This test can extract metrics from Tomcat using either of the following mechanisms: • By deploying the **egtomcat.war** file in the **<EG_INSTALL_DIR>\lib** directory of the eG agent host on the Tomcat server; • By contacting the Java runtime (JRE) of Tomcat via JMX To configure the test to use **egtomcat.war** file, first, select the **War File** option. Then, refer to the *Configuring and Monitoring Tomcat Servers* document to know how to deploy the WAR file on the target Tomcat server. On the other hand, if you want the test to use JMX instead, then first, select the **JMX** option. Then, follow the procedure detailed in the *Configuring and Monitoring Tomcat Servers* document to configure the test to use **JMX**. By default, the **JMX** option is chosen here. 5. **JNDINAME** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same. 6. **JMX REMOTE PORT** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *catalina.sh* (or *catalina.bat* file) file in the **<CATALINA_HOME_DIR>/bin** folder of the target Tomcat server (refer to the *Configuring and Monitoring Tomcat Servers* document for more details). 7. **JMX USER**, **JMX PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MEASUREMENT MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **JMX USER** and **JMX PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to the *Configuring and Monitoring Tomcat Servers* document. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 8. **SSL -** This parameter appears only if the **MEASUREMENT MODE** is set to **War File**. Indicate **YES** if the Tomcat server is SSL-enabled. 9. **URL** - This parameter appears only if the **MEASUREMENT MODE** is set to **War File**. Specify the URL of the managed Tomcat server to enable the test to connect to it and extract measures from it. The **URL** specification should be of the format: *http://{TomcatIP}:{TomcatPort}.* 10. **USERNAME**, **PASSWORD**, and **CONFIRM PASSWORD** – **THESE PARAMETERS APPEAR ONLY IF THE MEASUREMENT MODE** is set to **War File**. In the **USERNAME** text box, specify a name of a user who has been assigned the **Manager role** on the Tomcat server to be monitored; these users are typically allowed to control web applications deployed on the Tomcat server. Specify the **PASSWORD** of this user, and confirm the password by retyping it in the **CONFIRM PASSWORD** text box.

	11. **ENCRYPTPASS** - This parameter appears only if the **MEASUREMENT MODE** is set to **War File**. Select **Yes** if you want to encrypt the password. 12. **JMX PROVIDER** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. This test uses a JMX Provider to access the MBean attributes of Tomcat and collect metrics. Specify the package name of this JMX Provider here. By default, this is set to *com.sun.jmx.remote.protocol*. 13. **TIMEOUT** – Specify the duration (in seconds) for which this test should wait for a response from Tomcat. If there is no response from Tomcat beyond the configured duration, the test will timeout. By default, this is set to *240* seconds.		
Outputs of the test	One set of results for the Tomcat server being monitored.		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	No of collections : Indicates the number of garbage collections that were performed by the JVM since the last measurement period.	Number	If adequate memory is not allotted to the JVM, then the value of this measure would be very high. A high value of this measure is indicative of a high frequency of GC. This is not a good sign, as GC, during its execution, has the tendency of reducing the performance for applications, and a high frequency of GC would only adversely impact the application's performance. To avoid this, it is recommended that you allot sufficient memory to the JVM.
	Time taken : Indicates the time taken for GC execution, since the last measurement period.	Secs	A shorter GC execution time is desired to avoid issues in application performance and database connection bottlenecks.
	Elapsed time : Indicates the percentage of time spent on GC execution.	Percent	By carefully examining the application behavior in terms of memory utilization, you should arrive at an optimal ratio of the number of times the GC needs to run and how long it should take to complete. Accordingly, you can fine-tune the GC activity.

9.1.10.4 JVM Memory Test

The memory system of the Java Virtual machines manages two types of memory, which are Heap and Non Heap. To define Heap, the Java virtual machine is a heap that is the runtime data area from which memory for all class instances and arrays are allocated. It is created at the Java Virtual Machine start-up and the memory for the objects is reclaimed by an automatic memory management systems known as Garbage collector. The Heap may be of fixed size or may be expanded and shrunk.

The Java virtual machine has a method area that is shared among all threads. This method area is called non heap. It stores per class structures such as runtime constant pool field and method data, and the code for methods and constructors. It is created at the Java Virtual Machine start up.

In order to ensure the uninterrupted functioning of the Tomcat server, sufficient memory resources need to be made available to the JVM memory pools. Inadequacies in memory allocations could lead to slow start up issues or intermittent application failures. The JVMMemoryTest periodically reports usage statistics of the JVM memory pools, so that memory bottlenecks are promptly detected and resolved.

Purpose	To indicate the memory of individual memory pools of the Java virtual machine
Target of the test	A Tomcat server
Agent deploying the test	An internal agent

`Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** - The host for which the test is to be configured 3. **PORT** – The port number on which the Tomcat server listens 4. **MEASUREMENT MODE** – This test can extract metrics from Tomcat using either of the following mechanisms: • By deploying the **egtomcat.war** file in the **<EG_INSTALL_DIR>\lib** directory of the eG agent host on the Tomcat server; • By contacting the Java runtime (JRE) of Tomcat via **JMX** To configure the test to use **egtomcat.war** file, first, select the **War File** option. Then, refer to the *Configuring and Monitoring Tomcat Servers* document to know how to deploy the WAR file on the target Tomcat server. On the other hand, if you want the test to use JMX instead, then first, select the **JMX** option. Then, follow the procedure detailed in the *Configuring and Monitoring Tomcat Servers* document to configure the test to use **JMX**. By default, the **JMX** option is chosen here. 5. **JNDINAME** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same. 6. **JMX REMOTE PORT** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *catalina.sh* (or *catalina.bat* file) file in the **<CATALINA_HOME_DIR>/bin** folder of the target Tomcat server (refer to the *Configuring and Monitoring Tomcat Servers* document for more details). 7. **JMX USER**, **JMX PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MEASUREMENT MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **JMX USER** and **JMX PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to the *Configuring and Monitoring Tomcat Servers* document. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 8. **SSL -** This parameter appears only if the **MEASUREMENT MODE** is set to **War File**. Indicate **YES** if the Tomcat server is SSL-enabled. 9. **URL** - This parameter appears only if the **MEASUREMENT MODE** is set to **War File**. Specify the URL of the managed Tomcat server to enable the test to connect to it and extract measures from it. The **URL** specification should be of the format: *http://{TomcatIP}:{TomcatPort}.* 10. **USERNAME**, **PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MEASUREMENT MODE** is set to **War File**. In the **USERNAME** text box, specify a name of a user who has been assigned the **Manager role** on the Tomcat server to be monitored; these users are typically allowed to control web applications deployed on the Tomcat server. Specify the **PASSWORD** of this user, and confirm the password by retyping it in the **CONFIRM PASSWORD** text box.

	11. **ENCRYPTPASS** - This parameter appears only if the **MEASUREMENT MODE** is set to **War File**. Select **Yes** if you want to encrypt the password. 12. **JMX PROVIDER** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. This test uses a JMX Provider to access the MBean attributes of Tomcat and collect metrics. Specify the package name of this JMX Provider here. By default, this is set to *com.sun.jmx.remote.protocol*. 13. **TIMEOUT** – Specify the duration (in seconds) for which this test should wait for a response from Tomcat. If there is no response from Tomcat beyond the configured duration, the test will timeout. By default, this is set to *240* seconds.		
Outputs of the test	One set of results for the Tomcat server being monitored.		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Used: Indicates the amount of memory currently in use.	MB	
	Free: Indicates the amount of unused memory currently available in a server.	MB	Ideally, this value should be high. An unusually low value for the available memory can indicate a memory bottleneck. Check the memory utilization of individual processes to figure out the process(es) that has (have) maximum memory consumption and look to tune their memory usages and allocations accordingly.
	Initial : Indicates the initial amount of memory that Java virtual machine requests from the operating system (OS) for memory management during startup.	MB	An unusually high usage of memory by the Java Virtual machine from the OS is a cause of concern. Further analysis is required to determine if specific applications or queries are consuming excess memory.

	Pending objects: Indicates the number of objects in the heap/non-heap memory for which finalization is pending.	Number	Finalization allows an object to gracefully clean up after itself when it is being collected. When the garbage collector detects that an object is garbage, the garbage collector calls the object's Finalize method (if it exists) and then the object's memory is reclaimed - in other words, the garbage collector frees the memory allocated to the object. This measure is available only for the **Heap_Memory** and **Nonheap_Memory** descriptors of this test. A high value for this measure indicates that a chunk of heap / non-heap memory (as the case may be) in the JVM is awaiting reclamation. Object finalization facilitates efficient memory re-use, and thus ensures that the JVM memory pools do not run out of memory. If the value of this measure grows continuously, it could imply that objects are not releasing the memory resources properly. This in turn could be because the Finalize method does not exist for some objects, or there could be a bottleneck in the invocation of the method. Either way, thorough investigation can only provide pointers to the source of the problem.

9.2 The Tomcat Container Layer

The tests mapped to this layer monitor the health of the Tomcat container by reporting:

- How well the Tomcat JVM uses the memory resources available to it
- How effectively the Tomcat cache has been utilized;
- Whether/not the Tomcat thread pools have been used optimally;
- How efficiently each Tomcat connector processes the data traffic to it.

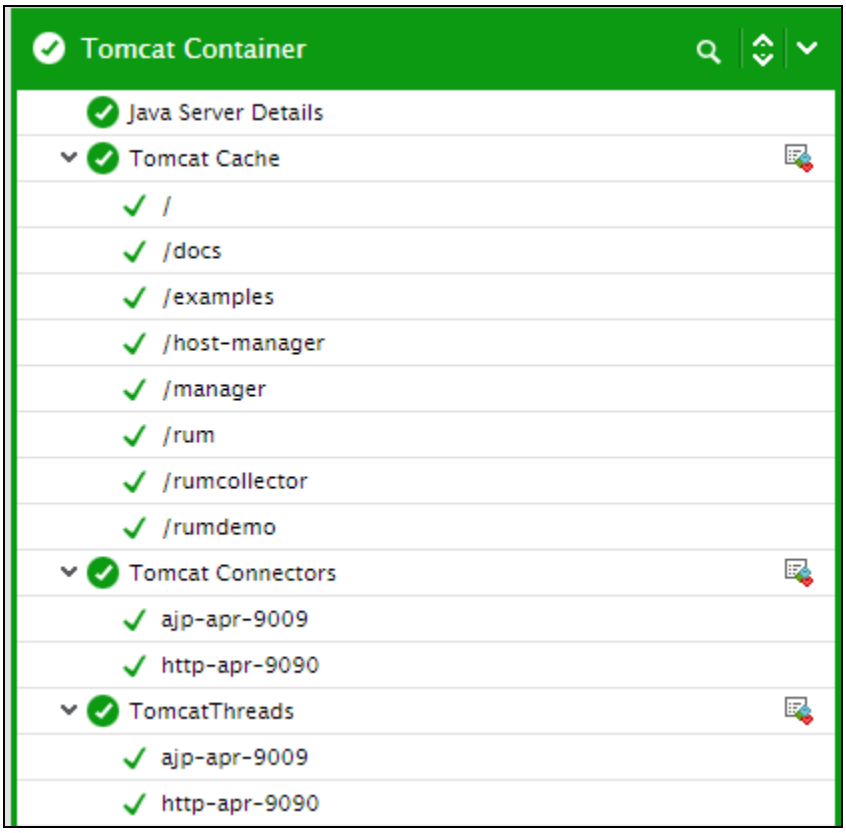


Figure 3.12: The tests mapped to the Tomcat Container layer

9.2.1 Java Server Details Test

This test reports the performance statistics pertaining to the Java Virtual Machine (JVM) running on a Tomcat server.

Purpose	Reports the performance statistics pertaining to the Java Virtual Machine (JVM) running on a Tomcat server
Target of the test	A Tomcat server
Agent deploying the test	An Internal agent

<table>
<tr><td>Configurable parameters for the test</td><td colspan="3">1. TEST PERIOD - How often should the test be executed
2. HOST – The host on which the Tomcat server is running
3. PORT – The port on which the specified Tomcat server is listening for HTTP requests
4. EGURI - The Java Server Details Test makes use of a file named EgPerfTest.jsp to generate measures. By default, this file is located in the <EG_INSTALL_DIR>/lib directory. To execute this test, move this file to one of the application directories of the Tomcat server. On Unix, you can execute the script /opt/egurkha/bin/setup_jserver to do this. While configuring this test, specify the location of the application directory where the EgPerfTest.jsp file resides, in the EGURI text box, in the following format: http://<Ipaddress:portNo/directory name>. For example, assume that the EgPerfTest.jsp is available in the JavaTest directory of the host 192.168.10.57:7077. Therefore, EGURI would be: http://192.168.10.57:7077/JavaTest.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for the server being monitored</td></tr>
<tr><td rowspan="4">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Active threads:
Indicates the number of active threads in the JVM.</td><td>Number</td><td>A high value for this measure is indicative of a high load on the JVM.</td></tr>
<tr><td>Total memory usage:
Indicates the total memory available in the JVM.</td><td>MB</td><td>A high value indicates a high processing capability of the JVM. Watch for increasing memory usage over time, which could indicate a memory leak in one or more applications hosted on the application server.</td></tr>
<tr><td>Free memory:
Indicates the unused memory in the JVM.</td><td>MB</td><td>A very low value of free memory is an indication of high memory utilization on the JVM.</td></tr>
</table>

9.2.2 Tomcat Cache Test

A well-sized cache could go a long way in reducing direct disk accesses and the resultant processing overheads. The TomcatCache test reveals whether/not the Tomcat server cache is effectively utilized.

Purpose	Reveals whether/not the Tomcat server cache is effectively utilized.
Target of the test	A Tomcat server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** - The host for which the test is to be configured 3. **PORT** – The port number on which the Tomcat server listens 4. **MEASUREMENT MODE** – This test can extract metrics from Tomcat using either of the following mechanisms: • By deploying the **egtomcat.war** file in the **<EG_INSTALL_DIR>\lib** directory of the eG agent host on the Tomcat server; • By contacting the Java runtime (JRE) of Tomcat via **JMX** To configure the test to use **egtomcat.war** file, first, select the **War File** option. Then, refer to the *Configuring and Monitoring Tomcat Servers* document to know how to deploy the WAR file on the target Tomcat server. On the other hand, if you want the test to use JMX instead, then first, select the **JMX** option. Then, follow the procedure detailed in the *Configuring and Monitoring Tomcat Servers* document to configure the test to use **JMX**. By default, the **JMX** option is chosen here. 5. **JNDINAME** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same. 6. **JMX REMOTE PORT** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *catalina.sh* (or *catalina.bat* file) file in the **<CATALINA_HOME_DIR>/bin** folder of the target Tomcat server (refer to the *Configuring and Monitoring Tomcat Servers* document for more details). 7. **JMX USER**, **JMX PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MEASUREMENT MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **JMX USER** and **JMX PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to the *Configuring and Monitoring Tomcat Servers* document. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 8. **SSL -** This parameter appears only if the measurement mode is set to **War File**. Indicate **YES** if the Tomcat server is SSL-enabled. 9. **URL** - This parameter appears only if the measurement mode is set to **War File**. Specify the URL of the managed Tomcat server to enable the test to connect to it and extract measures from it. The **URL** specification should be of the format: *http://{TomcatIP}:{TomcatPort}.* 10. **USERNAME**, **PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the measurement mode is set to **War File**. In the **USERNAME** text box, specify a name of a user who has been assigned the **Manager role** on the Tomcat server to be monitored; these users are typically allowed to control web applications deployed on the Tomcat server. Specify the **PASSWORD** of this user, and confirm the password by retyping it in the **CONFIRM PASSWORD** text box.

	11. **ENCRYPTPASS** - This parameter appears only if the measurement mode is set to **War File**. Select **Yes** if you want to encrypt the password. 12. **JMX PROVIDER** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. This test uses a JMX Provider to access the MBean attributes of Tomcat and collect metrics. Specify the package name of this JMX Provider here. By default, this is set to *com.sun.jmx.remote.protocol*. 13. **TIMEOUT** – Specify the duration (in seconds) for which this test should wait for a response from Tomcat. If there is no response from Tomcat beyond the configured duration, the test will timeout. By default, this is set to *240* seconds.		
Outputs of the test	One set of results for Tomcat server being monitored.		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Access count: The number of cache accesses since the last measurement period.	Number	
	Hits count: Indicates the number of requests served from the cache since the last measurement period.	Number	Physical I/O takes a significant amount of time, and also increases the CPU resources required. The server configuration should therefore ensure that the required information is available on the memory. A low value of this measure indicates that physical I/O is greater.
	Cache size: Indicates the current size of cache.	KB	A high value ensures higher cache hits and lower physical I/O.

9.2.3 Tomcat Threads Test

The Http connector in the Tomcat Web server represents a Connector component that supports the HTTP/1.1 protocol, which enables Catalina to function as a stand-alone web server, besides its ability to execute servlets and JSP pages. A particular instance of this component listens for connections on a specific TCP port number on the server to perform request processing and response creation. You can have one or more such Connectors configured to form a part of a single Service with each forwarding service to the associated Engine.

As soon as your server startup time is up, this Connector will create a number of request processing threads which are based on the value configured for the minSpareThreads attribute. Each incoming request requires a thread for the duration of that request. If more simultaneous requests are received than can be handled by the currently available request processing threads, additional threads will be created up to the configured maximum (the value of the maxThreads attribute). If still more simultaneous requests are received, they are stacked up inside the server socket created by the Connector, up to the configured maximum (the value of the acceptCount attribute). Any further simultaneous requests will receive "connection refused" errors, until resources are available to process them.

Continuous monitoring of thread pools is imperative to ensure the smooth transaction of business on the Tomcat web server. The TomcatThreads test periodically observes thread pool usage to proactively determine inadequacies in the allocation of threads to the pool, and to predict future thread requirements.

Purpose	Periodically observes thread pool usage to proactively determine inadequacies in the allocation of threads to the pool, and to predict future thread requirements
Target of the test	A Tomcat server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** - The host for which the test is to be configured 3. **PORT** – The port number on which the Tomcat server listens 4. **MEASUREMENT MODE** – This test can extract metrics from Tomcat using either of the following mechanisms: • By deploying the **egtomcat.war** file in the **<EG_INSTALL_DIR>\lib** directory of the eG agent host on the Tomcat server; • By contacting the Java runtime (JRE) of Tomcat via **JMX** To configure the test to use **egtomcat.war** file, first, select the **War File** option. Then, refer to the *Configuring and Monitoring Tomcat Servers* document to know how to deploy the WAR file on the target Tomcat server. On the other hand, if you want the test to use JMX instead, then first, select the **JMX** option. Then, follow the procedure detailed in the *Configuring and Monitoring Tomcat Servers* document to configure the test to use **JMX**. By default, the **JMX** option is chosen here. 5. **JNDINAME** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same. 6. **JMX REMOTE PORT** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *catalina.sh* (or *catalina.bat* file) file in the **<CATALINA_HOME_DIR>/bin** folder of the target Tomcat server (refer to the *Configuring and Monitoring Tomcat Servers* document for more details). 7. **JMX USER**, **JMX PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MEASUREMENT MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **JMX USER** and **JMX PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to the *Configuring and Monitoring Tomcat Servers* document. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 8. **SSL -** This parameter appears only if the measurement mode is set to **War File**. Indicate **YES** if the Tomcat server is SSL-enabled. 9. **URL** - This parameter appears only if the measurement mode is set to **War File**. Specify the URL of the managed Tomcat server to enable the test to connect to it and extract measures from it. The **URL** specification should be of the format: *http://{TomcatIP}:{TomcatPort}.* 10. **USERNAME**, **PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the measurement mode is set to **War File**. In the **USERNAME** text box, specify a name of a user who has been assigned the **Manager role** on the Tomcat server to be monitored; these users are typically allowed to control web applications deployed on the Tomcat server. Specify the **PASSWORD** of this user, and confirm the password by retyping it in the **CONFIRM PASSWORD** text box.

<table>
<tr><td></td><td colspan="3">11. ENCRYPTPASS - This parameter appears only if the measurement mode is set to War File. Select Yes if you want to encrypt the password.

12. JMX PROVIDER – This parameter appears only if the MEASUREMENT MODE is set to JMX. This test uses a JMX Provider to access the MBean attributes of Tomcat and collect metrics. Specify the package name of this JMX Provider here. By default, this is set to com.sun.jmx.remote.protocol.

13. TIMEOUT – Specify the duration (in seconds) for which this test should wait for a response from Tomcat. If there is no response from Tomcat beyond the configured duration, the test will timeout. By default, this is set to 240 seconds.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for each thread pool managed by the Tomcat server being monitored.</td></tr>
<tr><td rowspan="4">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Thread count:

Indicates the number of threads that are currently assigned to a connector.</td><td>Number</td><td></td></tr>
<tr><td>Threads busy:

Indicates the number of threads which are currently busy in processing requests.</td><td>Number</td><td>A high value for this measure indicates that there is hectic activity at the connector level.</td></tr>
<tr><td>Max threads:

Indicates the maximum number of threads that this pool can contain.</td><td>Number</td><td>In the Tomcat server, a maxThreads attribute can be set for every connector to indicate the maximum number of simultaneous requests that can be handled by that connector. This measure reports this maxThreads value. The default maxThreads value for a connector is 200.

If the value of the Thread count measure grows close to the value of this measure, it indicates that the number of threads in the pool needs to be increased for effective operation of this application. Alternatively, you may also consider changing the maximum number of threads that a pool can contain. However, exercise caution when altering the maximum thread count, as a very high thread count can cause the app to slowdown from excessive memory usage. Likewise, if the maximum thread count is set too low, it will cause requests to block or timeout.</td></tr>
</table>

	Max spare threads: Indicates the maximum number of spare threads that can exist in a thread pool.	Number	Ideally for a connector, the default value is set to 50, which will determine the maximum number of unused request processing threads that will be allowed to exist until the thread pool starts stopping the unnecessary threads.
	Min spare threads : Indicates the minimum number of spare threads that are currently available for processing requests.	Number	Generally, for a connector, the default value for this parameter is set to 4, which is less than the value set in maxThreads. This attribute will determine the number of request processing threads that will be created when this Connector is first started. The connector will also make sure it has the specified number of idle processing threads available.

9.2.4 Tomcat Connectors Test

The Http connector in the Tomcat Web server, represents a Connector component that supports the HTTP/1.1 protocol, which enables Catalina to function as a stand-alone web server, besides its ability to execute servlets and JSP pages. A particular instance of this component listens for connections on a specific TCP port number on the server to perform request processing and response creation. You can have one or more such Connectors configured to form a part of a single Service with each forwarding service to the associated engine.

The TomcatConnectorTest observes the data traffic on each connector and measures the connector's processing ability.

Purpose	Observes the data traffic on each connector and measures the connector's processing ability.
Target of the test	Tomcat server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** - The host for which the test is to be configured 3. **PORT** – The port number on which the Tomcat server listens 4. **MEASUREMENT MODE** – This test can extract metrics from Tomcat using either of the following mechanisms: • By deploying the **egtomcat.war** file in the **<EG_INSTALL_DIR>\lib** directory of the eG agent host on the Tomcat server; • By contacting the Java runtime (JRE) of Tomcat via **JMX** To configure the test to use **egtomcat.war** file, first, select the **War File** option. Then, refer to the *Configuring and Monitoring Tomcat Servers* document to know how to deploy the WAR file on the target Tomcat server. On the other hand, if you want the test to use JMX instead, then first, select the **JMX** option. Then, follow the procedure detailed in the *Configuring and Monitoring Tomcat Servers* document to configure the test to use **JMX**. By default, the **JMX** option is chosen here. 5. **JNDINAME** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same. 6. **JMX REMOTE PORT** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *catalina.sh* (or *catalina.bat* file) file in the **<CATALINA_HOME_DIR>/bin** folder of the target Tomcat server (refer to the *Configuring and Monitoring Tomcat Servers* document for more details). 7. **JMX USER**, **JMX PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MEASUREMENT MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **JMX USER** and **JMX PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to the *Configuring and Monitoring Tomcat Servers* document. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 8. **SSL -** This parameter appears only if the measurement mode is set to **War File**. Indicate **YES** if the Tomcat server is SSL-enabled. 9. **URL** - This parameter appears only if the measurement mode is set to **War File**. Specify the URL of the managed Tomcat server to enable the test to connect to it and extract measures from it. The **URL** specification should be of the format: *http://{TomcatIP}:{TomcatPort}.* 10. **USERNAME**, **PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the measurement mode is set to **War File**. In the **USERNAME** text box, specify a name of a user who has been assigned the **Manager role** on the Tomcat server to be monitored; these users are typically allowed to control web applications deployed on the Tomcat server. Specify the **PASSWORD** of this user, and confirm the password by retyping it in the **CONFIRM PASSWORD** text box.

<table>
<tr><td></td><td colspan="3">11. ENCRYPTPASS - This parameter appears only if the measurement mode is set to War File. Select Yes if you want to encrypt the password.
12. JMX PROVIDER – This parameter appears only if the MEASUREMENT MODE is set to JMX. This test uses a JMX Provider to access the MBean attributes of Tomcat and collect metrics. Specify the package name of this JMX Provider here. By default, this is set to com.sun.jmx.remote.protocol.
13. TIMEOUT – Specify the duration (in seconds) for which this test should wait for a response from Tomcat. If there is no response from Tomcat beyond the configured duration, the test will timeout. By default, this is set to 240 seconds.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for every connector configured on the Tomcat server being monitored.</td></tr>
<tr><td rowspan="6">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Request count:
Indicates the number of requests received by the connector, since the last measurement period.</td><td>Number</td><td></td></tr>
<tr><td>Avg processing time:
Indicates the average time taken by the connector to process requests.</td><td>Secs</td><td>This measure is a clear indicator of the Connector health. Ideally, this value should be low. A very high value indicates processing bottlenecks.</td></tr>
<tr><td>Data sent:
Reports the data that was sent by the connector since the last measurement period.</td><td>KB</td><td></td></tr>
<tr><td>Data received:
Reports the data that was received by the connector since the last measurement period.</td><td>KB</td><td>Both the Data sent and Data received measures together indicate the load on the Tomcat server.</td></tr>
<tr><td>Error count:
Indicates the number of errors that were reported by the connector since the last measurement period.</td><td>Number</td><td>Ideally, the value of this measure should be 0. A non-zero value warrants further investigation.</td></tr>
</table>

9.3 The Tomcat Application Layer

The tests associated with this layer report useful statistics related to the web applications deployed on the Tomcat server. From these metrics, the state of the sessions to each application can be ascertained, the request processing ability of the servlets can be measured, and the count of JSPs loaded and reloaded can be determined.

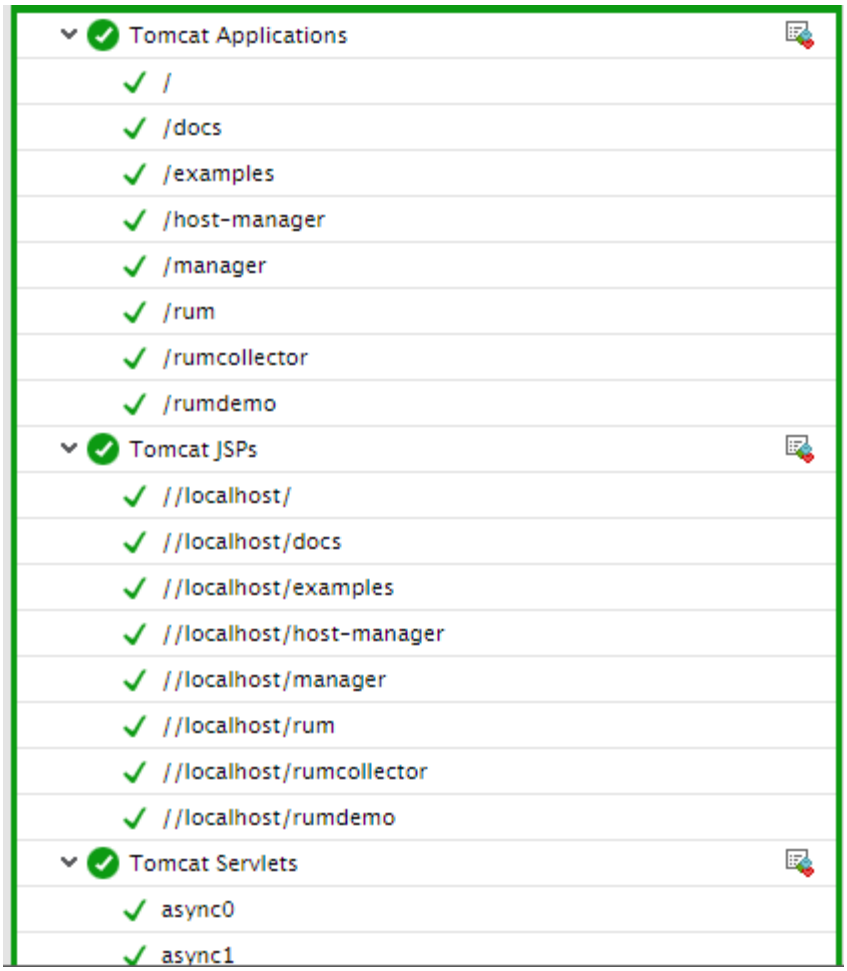


Figure 9.5: Tests associated with the Tomcat Applications layer

9.3.1 Tomcat Applications Test

The Manager element on the Tomcat server represents the session manager that will be used to create and maintain HTTP sessions as requested by the associated web application. A session state is maintained for a period, typically starting with user interactions and ending with last interaction.

Besides memory management, manager also looks into various aspects including CPU usage, network load that large sessions introduce. The scalability and performance of any web based application depends upon how well HTTP sessions are transmitted and managed over network.

An application must guarantee that a user's session state is properly maintained in order to exhibit correct behavior for that user. The TomcatApplications test closely monitors the state of sessions to every application on the Tomcat server.

Purpose	Closely monitors the state of sessions to every application on the Tomcat server
Target of the test	A Tomcat server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** - The host for which the test is to be configured 3. **PORT** – The port number on which the Tomcat server listens 4. **MEASUREMENT MODE** – This test can extract metrics from Tomcat using either of the following mechanisms: • By deploying the **egtomcat.war** file in the **<EG_INSTALL_DIR>\lib** directory of the eG agent host on the Tomcat server; • By contacting the Java runtime (JRE) of Tomcat via **JMX** To configure the test to use **egtomcat.war** file, first, select the **War File** option. Then, refer to the *Configuring and Monitoring Tomcat Servers* document to know how to deploy the WAR file on the target Tomcat server. On the other hand, if you want the test to use JMX instead, then first, select the **JMX** option. Then, follow the procedure detailed in the *Configuring and Monitoring Tomcat Servers* document to configure the test to use **JMX**. By default, the **JMX** option is chosen here. 5. **JNDINAME** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same. 6. **JMX REMOTE PORT** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *catalina.sh* (or *catalina.bat* file) file in the **<CATALINA_HOME_DIR>/bin** folder of the target Tomcat server (refer to the *Configuring and Monitoring Tomcat Servers* document for more details). 7. **JMX USER**, **JMX PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MEASUREMENT MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **JMX USER** and **JMX PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to the *Configuring and Monitoring Tomcat Servers* document. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 8. **SSL -** This parameter appears only if the **MEASUREMENT MODE** is set to **War File**. Indicate **YES** if the Tomcat server is SSL-enabled. 9. **URL** - This parameter appears only if the **MEASUREMENT MODE** is set to **War File**. Specify the URL of the managed Tomcat server to enable the test to connect to it and extract measures from it. The **URL** specification should be of the format: *http://{TomcatIP}:{TomcatPort}.* 10. **USERNAME**, **PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MEASUREMENT MODE** is set to **War File**. In the **USERNAME** text box, specify a name of a user who has been assigned the **Manager role** on the Tomcat server to be monitored; these users are typically allowed to control web applications deployed on the Tomcat server. Specify the **PASSWORD** of this user, and confirm the password by retyping it in the **CONFIRM PASSWORD** text box.

	11. **ENCRYPTPASS** - This parameter appears only if the measurement mode is set to **War File**. Select **Yes** if you want to encrypt the password. 12. **JMX PROVIDER** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. This test uses a JMX Provider to access the MBean attributes of Tomcat and collect metrics. Specify the package name of this JMX Provider here. By default, this is set to *com.sun.jmx.remote.protocol*. 13. **TIMEOUT** – Specify the duration (in seconds) for which this test should wait for a response from Tomcat. If there is no response from Tomcat beyond the configured duration, the test will timeout. By default, this is set to *240* seconds.		
Outputs of the test	One set of results for every application on the Tomcat server being monitored.		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Active sessions: Indicates the sessions that are currently active.	Number	A high value for this measure is indicative of heavy load on the Tomcat server.
	Max sessions: Indicates the maximum number of active sessions that can be allowed at one time on the Tomcat server.	Number	
	Expired sessions: Indicates the number of sessions that expired since the last measurement period.	Number	A large number of expired sessions could hint at the need to reset the TIMEOUT period for sessions on the Tomcat server.
	Rejected sessions: Indicates the number of sessions that were rejected since the last measurement period.	Number	It is imperative to check if there is any loss of session state happening due to network congestion. Therefore, if the value of this measure is unusually high, the reasons behind the unusual occurrence would have to be investigated. You can also consider increasing the maximum active session count.

9.3.2 Tomcat Jsps Test

The TomcatJsps test monitors the performance of the JSPs used by each of the applications deployed on Tomcat.

Purpose	Monitors the performance of the JSPs used by each of the applications deployed on Tomcat
Target of the test	A Tomcat server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** - The host for which the test is to be configured 3. **PORT** – The port number on which the Tomcat server listens 4. **MEASUREMENT MODE** – This test can extract metrics from Tomcat using either of the following mechanisms: • By deploying the **egtomcat.war** file in the **<EG_INSTALL_DIR>\lib** directory of the eG agent host on the Tomcat server; • By contacting the Java runtime (JRE) of Tomcat via **JMX** To configure the test to use **egtomcat.war** file, first, select the **War File** option. Then, refer to the *Configuring and Monitoring Tomcat Servers* document to know how to deploy the WAR file on the target Tomcat server. On the other hand, if you want the test to use JMX instead, then first, select the **JMX** option. Then, follow the procedure detailed in the *Configuring and Monitoring Tomcat Servers* document to configure the test to use **JMX**. By default, the **JMX** option is chosen here. 5. **JNDINAME** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same. 6. **JMX REMOTE PORT** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *catalina.sh* (or *catalina.bat* file) file in the **<CATALINA_HOME_DIR>/bin** folder of the target Tomcat server (refer to the *Configuring and Monitoring Tomcat Servers* document for more details). 7. **JMX USER**, **JMX PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MEASUREMENT MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **JMX USER** and **JMX PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to the *Configuring and Monitoring Tomcat Servers* document. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 8. **SSL -** This parameter appears only if the measurement mode is set to **War File**. Indicate **YES** if the Tomcat server is SSL-enabled. 9. **URL** - This parameter appears only if the measurement mode is set to **War File**. Specify the URL of the managed Tomcat server to enable the test to connect to it and extract measures from it. The **URL** specification should be of the format: *http://{TomcatIP}:{TomcatPort}.* 10. **USERNAME**, **PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the measurement mode is set to **War File**. In the **USERNAME** text box, specify a name of a user who has been assigned the **Manager role** on the Tomcat server to be monitored; these users are typically allowed to control web applications deployed on the Tomcat server. Specify the **PASSWORD** of this user, and confirm the password by retyping it in the **CONFIRM PASSWORD** text box.

	11. **ENCRYPTPASS** - This parameter appears only if the measurement mode is set to **War File**. Select **Yes** if you want to encrypt the password. 12. **JMX PROVIDER** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. This test uses a JMX Provider to access the MBean attributes of Tomcat and collect metrics. Specify the package name of this JMX Provider here. By default, this is set to *com.sun.jmx.remote.protocol*. 13. **TIMEOUT** – Specify the duration (in seconds) for which this test should wait for a response from Tomcat. If there is no response from Tomcat beyond the configured duration, the test will timeout. By default, this is set to *240* seconds.		
Outputs of the test	One set of results for every application deployed on the Tomcat server being monitored.		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Load count: Indicates the number of JSPs that have been loaded into the web application since the last measurement period.	Number	
	Reload count: Indicates the number of JSPs that have been reloaded since the last measurement period.	Number	As one of the rules, by default, the JSP container will automatically reload the translated class of a JSP page whenever the page is retranslated, a class called by the page is modified (presuming the class was loaded by the OC4J JSP container class loader, not the system class loader), or any page in the same application is reloaded. Using this measure therefore, you can keep track of the changes made to the JSP pages.

9.3.3 Tomcat Servlets Test

A servlet is a small Java program that runs within a web server. These servlets receive and respond to requests from web clients, usually across HTTP.

Typically, these servlets run inside a servlet container that handles recurring multiple requests. The performance and reliability of any web based application depends upon how well the requests from web clients are managed. The TomcatServlets test enables administrators to assess the performance of servlets on the basis of their request handling capabilities.

Purpose	Assesses the performance of servlets on the basis of their request handling capabilities
Target of the test	A Tomcat server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** - The host for which the test is to be configured 3. **PORT** – The port number on which the Tomcat server listens 4. **MEASUREMENT MODE** – This test can extract metrics from Tomcat using either of the following mechanisms: • By deploying the **egtomcat.war** file in the **<EG_INSTALL_DIR>\lib** directory of the eG agent host on the Tomcat server; • By contacting the Java runtime (JRE) of Tomcat via **JMX** To configure the test to use **egtomcat.war** file, first, select the **War File** option. Then, refer to the *Configuring and Monitoring Tomcat Servers* document to know how to deploy the WAR file on the target Tomcat server. On the other hand, if you want the test to use JMX instead, then first, select the **JMX** option. Then, follow the procedure detailed in the *Configuring and Monitoring Tomcat Servers* document to configure the test to use **JMX**. By default, the **JMX** option is chosen here. 5. **JNDINAME** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same. 6. **JMX REMOTE PORT** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *catalina.sh* (or *catalina.bat* file) file in the **<CATALINA_HOME_DIR>/bin** folder of the target Tomcat server (refer to the *Configuring and Monitoring Tomcat Servers* document for more details). 7. **JMX USER**, **JMX PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MEASUREMENT MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **JMX USER** and **JMX PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to the *Configuring and Monitoring Tomcat Servers* document. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 8. **SSL -** This parameter appears only if the measurement mode is set to **War File**. Indicate **YES** if the Tomcat server is SSL-enabled. 9. **URL** - This parameter appears only if the measurement mode is set to **War File**. Specify the URL of the managed Tomcat server to enable the test to connect to it and extract measures from it. The **URL** specification should be of the format: *http://{TomcatIP}:{TomcatPort}.* 10. **USERNAME**, **PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the measurement mode is set to **War File**. In the **USERNAME** text box, specify a name of a user who has been assigned the **Manager role** on the Tomcat server to be monitored; these users are typically allowed to control web applications deployed on the Tomcat server. Specify the **PASSWORD** of this user, and confirm the password by retyping it in the **CONFIRM PASSWORD** text box.

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Outputs of the test	One set of results for every servlet on the Tomcat server being monitored.		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Request count: Indicates the number of requests handled by the servlet since the last measurement period.	Number	
	Avg processing time: Indicates the average time taken by the servlet to process the requests since the last measurement period.	Secs	If the value of this measure increases consistently, it indicates a gradual deterioration in the server performance.
	Max processing time: Indicates the maximum time taken by the servlet to process the requests.	Secs	If the time taken is significantly high, check for the errors or bottlenecks that interfere with the servlet's normal operation.
	Min processing time: Indicates the minimum time taken by the servlet to process the current request.	Secs	Minimum time taken to process the request is indicative of error free execution of service by the servlet.
	Error count: Indicates the errors encountered by the servlet, when a request is processed	Number	Ideally, the value for this measure should be 0. An error reported by this measure is a cause of concern; an analysis of the underlying reasons is hence necessitated.

Chapter 10

Monitoring SunONE Application Servers

The Sun ONE Application suite offers a comprehensive list of products for Internet infrastructures, i.e., web server, middleware application server, LDAP server, messaging server, and identity server, that are used in many domains such as banking, trading, healthcare, and logistics to support mission-critical services. IT infrastructures based on the Sun ONE Application suite follow the popular multi-tier architecture wherein the web server functions as the front-end receiving client requests, the application server hosts the business logic components, the identity server manages user policies, the directory server handles access rights and other user information lookups, and the database server stores and retrieves application data.

Routine monitoring of the infrastructure including the network, system, and application is imperative to ensure that the infrastructure functions at peak performance at all times. Since each Sun ONE application performs a different, specialized function, the monitoring has to be specific to each application – e.g., is the mail server delivering emails? is the application server's heap effectively sized?. More importantly, since the different Sun ONE applications inter-operate to support the end-user service, it is critical that the monitoring system track the inter-dependencies between applications in order to pin-point the exact source of a performance bottleneck in the infrastructure.

The eG Sun ONE monitor offers extensive infrastructure monitoring capabilities for the Sun ONE application suite. Pre-built models for Sun ONE web, application (see Figure 10.1), directory, and messaging servers dictate what metrics are to be collected by eG agents, what thresholds are to be applied to the metrics, and how the metrics are to be correlated in order to assist with problem diagnosis.

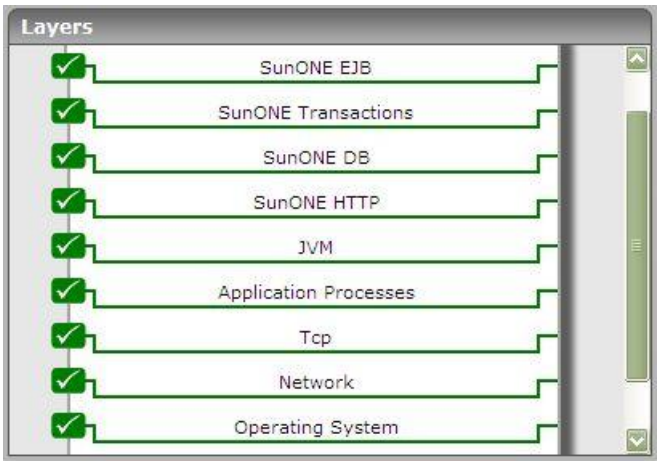

Figure 10.1: The layer model of a SunONE application server

Using the customized model for the SunONE Application server (see Figure 10.1), you can monitor the following:

- Server up/down time monitoring
- Server throughput tracking in terms of requests and data traffic
- JDBC connection pool usage levels and connection failure reports
- Thread pool execution status levels
- Transaction-related measures including the number of transactions that are completed, rolled back and in-progress
- EJB caching efficiency, bean pool-related metrics

10.1 The JVM Layer

This layer collectively reports the resource usage and overall health of the SunONE JVM.

Figure 10.2: The tests mapped to the JVM layer

All the tests displayed in Figure 10.2 have been dealt with in the previous chapters.

10.2 The SunONE HTTP Layer

To monitor the performance of the virtual web server on the SunONE server, use the SunONE Http test associated with this layer (see Figure 10.3).

Figure 10.3: Tests associated with the SunONE HTTP layer

10.2.1 SunONE Http Test

This test measures the health of the virtual server configured for the SunONE Http server.

Purpose	Measures the health of the virtual server configured for the SunONE Http server		
Target of the test	Any SunONE application server		
Agent deploying the test	An internal agent		
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** - The host for which the test is to be configured. 3. **PORT** – The port number on which the SunONE application server is running 4. **USER** – A valid user name for the SunONE server to be monitored 5. **PASSWORD** – Password for the SunONE server to be monitored 6. **ADMIN PORT** – The port number on which the "asadmin" tool runs 7. **SERVER** – Name of the SunONE server to be monitored 8. **APPSERVERDIR** – The directory in which SunONE application server is installed		
Outputs of the test	One set of results for every virtual server configured for the web server		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Request rate: Rate of requests to the web server during the last measurement period.	Reqs/Sec	This measure reflects the server workload.

	Data received: Rate at which the data is received by the server during the last measurement period	KB/Sec	
	Data transmitted: Rate at which the data is transmitted by the server during the last measurement period.	KB/Sec	
	Data transmit high watermark : The high-water-mark of the data transmit rate by this server	KB	
	Open connections: Number of server threads/processes currently in use for serving requests	Number	Ideally, this measure must be low. Too many server threads or processes serving user requests could indicate a server-side bottleneck – either with the web server itself or with one of the backend components that the web server uses (e.g., database server).
	Open connections high water mark: The high-water-mark of the open connections count	Number	Changes in the high water mark are indicative of times when the server has been a performance bottleneck. Note that the high water mark value gets reset every time the server is restarted.
	200 responses : Percentage of responses with a status code in the range of 200-299 during the last measurement period	Percent	
	300 responses : Percentage of responses with a status code in the range of 300-399 during the last measurement period	Percent	
	400 errors: Percentage of errors with a status code in the range of 400-499 during the last measurement period	Percent	
	500 errors: Percentage of errors with a status code in the range of 500-599 during the last measurement period	Percent	

	Other responses: Percentage of responses with a status code that is greater than or equal to 600 during the last measurement period	Percent	

10.3 The SunONE DB Layer

The size of the JDBC connection pools governs the constant availability of connections to the database. The metrics reported by the **SunONE DB** layer assist you in keeping a close watch on the fluctuations in the pool size, so that additional connection requirements can be foreseen and allocated to the pool.

Figure 10.4: Tests associated with the SunONE DB layer

10.3.1 SunONE Jdbc Test

This test reports the performance metrics related to the JDBC connection pools of a SunONE application server.

Purpose	Reports the performance metrics related to the JDBC connection pools of a SunONE application server
Target of the test	Any SunONE application server
Agent deploying the test	An internal agent
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** - The host for which the test is to be configured. 3. **PORT** – The port number on which the SunONE application server is running 4. **USER** – A valid user name for the SunONE server to be monitored 5. **PASSWORD** – Password for the SunONE server to be monitored 6. **ADMIN PORT** – The port number on which the "asadmin" tool runs 7. **SERVER** – Name of the SunONE server to be monitored 8. **APPSERVERDIR** – The directory in which SunONE application server is installed
Outputs of the test	One set of results for every JDBC connection pool

Measurements made by the test	Measurement	Measurement Unit	Interpretation
	Waiting threads: The number of threads that are waiting for a database connection	Number	Ideally, this measure should have a low value. A high value of this measure indicates that the database is slow or does not have additional connections to allocate to service requests from the web application server.
	Connections failed: The total number of times a thread has failed to acquire a JDBC connection	Number	This value can increase for various reasons – connection failures can happen if the database server is down or if the maximum limit of simultaneous connections possible has been reached. Alternatively, if the database pool is not adequately sized (i.e., too few maximum connections), connection failures can occur.
	Connection timeouts: The total number of connection requests that have been timed out	Number	Ideally, this measure should have a low value. A high value of this measure indicates that the database is slow or does not have additional connections to allocate to service requests from the web application server.

10.4 The SunONE Transactions Layer

The number of transactions that are committed and rolled back by the application server serves as a good indicator of server workload, processing ability of the server, and potential performance issues (if any). The test associated with the **SunONE Transactions** layer (see Figure 10.5) facilitates this assessment.

Figure 10.5: Test associated with the SunONE Transactions layer

10.4.1 SunONE Transactions Test

This test reports measures pertaining to the transactions in a SunONE application server.

Purpose	Reports measures pertaining to the transactions in a SunONE application server		
Target of the test	Any SunONE application server		
Agent deploying the test	An internal agent		
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** - The host for which the test is to be configured. 3. **PORT** – The port number on which the SunONE application server is running 4. **USER** – A valid user name for the SunONE server to be monitored 5. **PASSWORD** – Password for the SunONE server to be monitored 6. **ADMIN PORT** – The port number on which the "asadmin" tool runs 7. **SERVER** – Name of the SunONE server to be monitored 8. **APPSERVERDIR** – The directory in which SunONE application server is installed		
Outputs of the test	One set of results for every SunONE application server monitored		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Transactions completed: Returns the total number of transactions that have been completed by this server	Number	
	Transaction rollbacks: Returns the total number of transactions that have been rolled back by this server	Number	A high rollback rate indicates a problem with specific beans. Possible reasons for this could be problems with the design and implementation of the specific bean or problems with any of the dependent servers of the bean (e.g., database server).
	Transactions in flight: Returns the total number of transactions that are currently in progress	Number	A significantly high value may denote a load on the server. This may indicate that specific transactions are taking too long to process requests.

10.5 The SunONE EJB Layer

SunONE application server caches stateless, entity and message driven beans. Adequately sized caches are essential for quickly servicing client requests. Using the tests associated with this layer (see Figure 10.6), the caching activity can be closely monitored and deficiencies in size can be promptly reported.

Figure 10.6: Tests associated with the SunONE EJB layer

10.5.1 SunONE Ejb Cache Test

This test extracts the caching related metrics pertaining to such EJBs. Use the **Click here** hyperlink in the test configuration page to configure the EJB groups that need to be monitored by the eG Enterprise suite. **By default, the eG Enterprise system will monitor only those EJBs that are part of a group.**

Purpose	Monitor SunONE application server's EJB caching activity		
Target of the test	Any SunONE application server that has one or more stateless, entity, or message driven beans		
Agent deploying the test	An internal agent		
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** - The host for which the test is to be configured. 3. **PORT** – The port number on which the SunONE application server is running 4. **USER** – A valid user name for the SunONE server to be monitored 5. **PASSWORD** – Password for the SunONE server to be monitored 6. **ADMIN PORT** – The port number on which the "asadmin" tool runs 7. **SERVER** – Name of the SunONE server to be monitored 8. **APPSERVERDIR** – The directory in which SunONE application server is installed 9. **AUTODISCOVERY** – By default, the eG Enterprise suite allows administrators to configure EJB groups using the eG administrative interface, and reports metrics pertaining to every group so created. Accordingly, by default, **AUTODISCOVERY** is set to **NO**. If you want EJBs to be discovered and monitored automatically, then select the **YES** option against **AUTODISCOVERY**. When this is done, the eG agent automatically discovers all the EJBs on the SunONE application server, and reports one set of measures for every EJB hosted on the server.		
Outputs of the test	One set of results for every EJB group configured or EJB (as the case may be)		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**

	Resize quantity: The quantity by which the cache size is reduced when the number of beans in the cache equals the maximum cache size (that is, when cache overflow occurs)	Number	This is a configuration parameter for the EJB cache. **This measure will not be available for Sun Java Application Server 8.2 and above.**
	Cache misses: The number of times a user request did not find a bean in the cache during the last measurement period.	Number	Ideally, the percentage of cache misses to cache hits should be a low percentage.
	Idle timeouts: Rate at which the cache cleaner thread is scheduled. This cleaner thread examines all beans in the cache and passivates those beans that are not accessed for cache-idle-timeout-in-seconds.	Secs	This is a configuration parameter for the EJB cache. **This measure will not be available for Sun Java Application Server 8.2 and above.**
	Passivations: Number of passivations. Applies only to stateful session beans during the last measurement period.	Number	
	Cache hits: The number of times a user request found an entry in the cache during the last measurement period.	Number	
	Passivation errors: Number of errors during passivation. Applies only to stateful session beans during the last measurement period.	Number	
	Beans in cache: The number of beans in the cache. This is the current size of the cache	Number	The ratio of beans in cache to the maximum beans in cache is an indicator of the cache occupancy. For maximum performance, the cache occupancy and hit rate must be high.

	Expired sessions: The number of expired sessions removed by the cleanup thread during the last measurement period. Applies only to stateful session beans	Number	
	Max beans in cache: The maximum number of beans that can be held in the cache beyond which cache overflow occurs	Number	This is a configuration parameter for the EJB cache.
	Passivation successes: Number of times passivation completed successfully. Applies only to stateful session beans	Number	

10.5.2 SunONE EJB Pools Test

This test reports statistics pertaining to the EJB pools for stateful session beans and entity beans. Use the **Click here** hyperlink in the test configuration page to configure the EJB groups that need to be monitored by the eG Enterprise suite. **By default, the eG Enterprise system will monitor only those EJBs that are part of a group.**

Purpose	Monitor SunONE application server's EJB pools
Target of the test	Any SunONE application server with one or more entity beans or stateful session beans
Agent deploying the test	An internal agent
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST** - The host for which the test is to be configured. 3. **PORT** – The port number on which the SunONE application server is running 4. **USER** – A valid user name for the SunONE server to be monitored 5. **PASSWORD** – Password for the SunONE server to be monitored 6. **ADMIN PORT** – The port number on which the "asadmin" tool runs 7. **SERVER** – Name of the SunONE server to be monitored 8. **APPSERVERDIR** – The directory in which SunONE application server is installed 9. **AUTODISCOVERY** – By default, the eG Enterprise suite allows administrators to configure EJB groups using the eG administrative interface, and reports metrics pertaining to every group so created. Accordingly, by default, **AUTODISCOVERY** is set to **NO**. If you want EJBs to be discovered and monitored automatically, then select the **YES** option against **AUTODISCOVERY**. When this is done, the eG agent automatically discovers all the EJBs on the SunONE application server, and reports one set of measures for every EJB hosted on the server.

Outputs of the test	One set of results for every EJB group configured or every EJB (as thee cae be)		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Idle timeout: Returns the time out period set for the bean.	Sec	This is a configuration setting. **This measure will not be available for Sun Java Application Server 8.2 and above.**
	Steady pool size: Indicates the average number of beans that a pool contains during the last measurement period.	Number	**This measure will not be available for Sun Java Application Server 8.2 and above.**
	Beans destroyed: The total number of beans in a pool that have been destroyed by the pool during the last measurement period.	Number	
	Waiting threads: Returns the number of threads that are waiting to get an instance of the bean	Number	The value of this measure should be low for optimal performance.
	Beans in pool: The number of beans in the bean pool currently	Number	
	Max pool size: The maximum number of beans that the pool can contain	Number	This is a configuration setting.
	Pool resize quantity: This is the value by which the pool size can be increased or decreased, as per the requirements.	Number	This is a configuration setting. **This measure will not be available for Sun Java Application Server 8.2 and above.**
	Beans created: Indicates the number of beans that have been created for a pool, during the last measurement period	Number	

Chapter 11

Monitoring Oracle 9i Application Servers

Oracle9 *i* Application Server (Oracle9 *i* AS) is a J2EE-certified application server, which integrates all the technology required to develop and deploy e-business portals, transactional applications, and Web services into a single product. Oracle9 *i* AS provides a productive development environment for developers to create Internet Applications including J2EE Applications, Web Services, Enterprise Portals, Wireless and Business Intelligence Applications. Its open and integration-ready architecture and standards compliance ensures that Web applications can integrate with any IT environment, including legacy systems, and Oracle and non-Oracle databases.

This versatility and reliability is what makes the Oracle 9 *i AS* a key ingredient in advanced IT infrastructures providing critical services to end-users. Recurring or even sporadic operational/availability issues with the Oracle 9i AS, can therefore cause prolonged delays in the delivery of these critical services, in turn causing service level guarantees to be violated!

To avoid the related penalties and loss of reputation, it would be good practice to constantly observe the functioning of the Oracle 9iAS, and take action as soon as or even before a problem condition surfaces.

eG Enterprise prescribes an exclusive *O9i Application Server* monitoring model (see Figure 11.1), which runs tests on all the key components of the Oracle 9iAS from its JVM, JDBC drivers, caches, to its web modules, web contexts, transactions, etc. By automatically analyzing the performance data extracted by these tests from the server, eG Enterprise proactively detects potential bottlenecks to performance, accurately pin-points the root-cause of these problems, and instantly alerts administrators to the problem source.

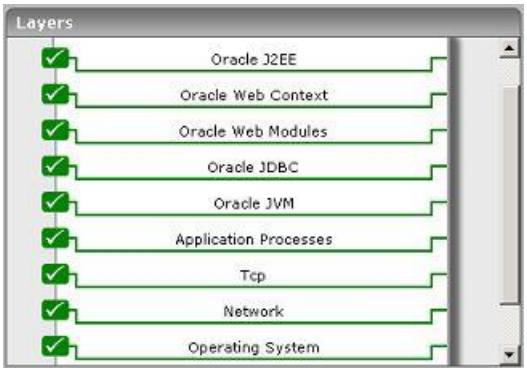

Figure 11.1: The layer model of the Oracle 9i AS

Each layer of the monitoring model depicted by Figure 11.1 monitors and reports metrics on every performance-influencing aspect of the Oracle 9i AS. Using these metrics, administrators can determine the following:

- Is the Oracle JVM available?
- Does the JVM have sufficient free memory?
- Is the workload on the JVM optimal?
- Is the server able to connect to the database quickly?
- Are too many JDBC connections open on the server?
- Does the connection cache have adequate free connections?
- Is the connection cache utilized effectively?
- Are transaction rollbacks kept at a minimum?
- Are the web modules processing requests quickly?
- Is any web module taking too much time to process requests?
- Does the server take too much time to service JSP and servlet requests?

Note:

- To effectively monitor an Oracle 9i Application server on Unix, ensure that the install user of the application server and that of the eG agent (which is monitoring the application server) are the same.
- Any component on an Oracle 9i Application server (be it OC4J or the Oracle HTTP server) can be monitored by eG only if the Oracle 9i Application Server Release 2.0 is installed, with dmctl and dmstool.

The sections below discuss the metrics reported by the top 5 layers of Figure 11.1 only, as all other layers have been dealt with in the *Monitoring Unix and Windows Servers* document.

11.1 The Oracle JVM Layer

Use the test associated with this layer to track the workload on and the memory heap usage of the Oracle JVM.

Figure 11.2: Tests associated with the Oracle JVM layer

11.1.1 Oracle 9i Jvm Test

The JVM test is used to analyze overall JVM performance for the processes of an Oracle 9i AS instance. The JVM metrics provide useful information about threads and heap memory allocation. You should check these values to make sure that JVM resources are utilized within expected ranges.

Purpose	Analyzes the overall JVM performance for the processes of an Oracle 9i AS instance		
Target of the test	An Oracle 9i AS		
Agent deploying the test	An internal Agent		
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** In the **PORT** text box, it is recommended that you provide the port at which the OPMN (Oracle Process Manager and Notification) process of the Oracle application server instance listens. To know at which port OPMN listens, click on the Ports tab in the following URL: `http://<oraHttpServerIP>:<OraHttpServerport>`. This tab lists the port numbers that were assigned to the services executing on the Oracle application server. The port number displayed against the **Oracle notification server request port** entry is the OPMN port, and the same should be specified in the **PORT** text box. 4. **HOMEDIR** – The absolute path of the directory in which the Oracle 9i application server has been installed		
Outputs of the test	One set of results for every Oracle 9i AS instance monitored		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Active thread groups: Indicates the current number of active thread groups in the JVM.	Number	A high value for this measure is indicative of a high load on the JVM.

	Active threads: Indicates the current number of active threads in the JVM.	Number	A high value for this measure is indicative of a high load on the JVM.
	Free heap: Indicates the unused memory in the JVM.	MB	The free heap value governs the performance of the JVM. A low value could result in excessive garbage collection, slowing down responses/processing in the JVM.
	Min free heap: Indicates the low water mark of memory in the JVM since it started.	MB	This metric indicates the time when the free heap reached its minimum value.
	Heap usage: Indicates the used memory in the JVM currently.	MB	A very high value for this measure indicates heavy load on the JVM.
	Max heap usage: The high water mark of heap used in the JVM since it was started.	MB	A very high value for this measure indicates heavy load on the JVM.
	JVM availability: Indicates the availability of the Oracle 9i AS instance.	Percent	If this value is 100%, then it indicates that the JVM is running. If it is 0, it indicates that the JVM is not available or is not running.

11.1.2 Java Transactions Test

When a user initiates a transaction to a Java-based web application, the transaction typically travels via many Java components before completing execution and sending out a response to the user.

The key Java components have been briefly described below:

- **Filter:** A filter is a program that runs on the server before the servlet or JSP page with which it is associated. All filters must implement **javax.servlet.Filter**. This interface comprises three methods: **init, doFilter, and destroy.**
- **Servlet:** A servlet acts as an intermediary between the client and the server. As servlet modules run on the server, they can receive and respond to requests made by the client. If a servlet is designed to handle HTTP requests, it is called an **HTTP Servlet**.
- **JSP:** Java Server Pages are an extension to the Java servlet technology. A JSP is translated into Java servlet before being run, and it processes HTTP requests and generates responses like any servlet. Translation occurs the first time the application is run.
- **Struts:** The Struts Framework is a standard for developing well-architected Web applications. Based on the Model-View-Controller (MVC) design paradigm, it distinctly separates all three levels (Model, View, and Control).

A delay experienced by any of the aforesaid Java components can adversely impact the total response time of the transaction, thereby scarring the user experience with the web application. In addition, delays in JDBC connectivity and slowdowns in SQL query executions (if the application interacts with a database), bottlenecks in delivery of mails

via the Java Mail API (if used), and any slow method calls, can also cause insufferable damage to the 'user-perceived' health of a web application.

The challenge here for administrators is to not just isolate the slow transactions, but to also accurately identify where the transaction slowed down and why - is it owing to inefficent JSPs? poorly written servlets or struts? poor or the lack of any JDBC connectivity to the database? long running queries? inefficient API calls? or delays in accessing the POJO methods? The **eG JTM Monitor** provides administrators with answers to these questions!

With the help of the **Java Transactions** test, the **eG JTM Monitor** traces the route a configured web transaction takes, and captures live the total responsiveness of the transaction and the response time of each Java component it visits en route. This way, the solution proactively detects transaction slowdowns, and also precisely points you to the Java components causing it - is it the Filters? JSPs? Servlets? Struts? JDBC? SQL query? Java Mail API? or the POJO? In addition to revealing where (i.e., at which Java component) a transaction slowed down, the solution also provides the following intelligent insights, on demand, making root-cause identification and resolution easier:

l. A look at the methods that took too long to execute, thus leading you to those methods that may have contributed to the slowdown;

m. Single-click access to each invocation of a chosen method, which provides pointers to when and where a method spent longer than desired;

n. A quick glance at SQL queries and Java errors that may have impacted the responsiveness of the transaction;

Using these interesting pointers provided by the **eG JTM Monitor**, administrators can diagnose the root-cause of transaction slowdowns within minutes, rapidly plug the holes, and thus ensure that their critical web applications perform at peak capacity at all times!

Before attempting to monitor Java transactions using the **eG JTM Monitor**, the following configurations will have to be performed:

1. In the **<EG_INSTALL_DIR>\lib** directory (on Windows; on Unix, this will be **/opt/egurkha/lib**) of the eG agent, you will find the following files:

   o. **eg_jtm.jar**

   p. **aspectjrt.jar**

   q. **aspectjweaver.jar**

   r. **jtmConn.props**

   s. **jtmLogging.props**

   t. **jtmOther.props**

2. Login to the system hosting the Java application to be monitored.

3. If the eG agent will be 'remotely monitoring' the target Java application (i.e., if the Java application is to be monitored in an 'agentless manner'), then, copy all the files mentioned above from the **<EG_INSTALL_DIR>\lib** directory (on Windows; on Unix, this will be **/opt/egurkha/lib**) of the eG agent to any location on the Java application host.

4. Then, proceed to edit the start-up script of the Java application being monitored, and append the following lines to it:

```
set JTM_HOME=<<PATH OF THE LOCAL FOLDER CONTAINING THE JAR FILES AND PROPERTY FILES
LISTED ABOVE>>
"-javaagent:%JTM_HOME%\aspectjweaver.jar"
"-DEG_JTM_HOME=%JTM_HOME%"
```

Note that the above lines will change based on the operating system and the web/web application server being monitored.

Then, add the **eg_jtm.jar**, **aspectjrt.jar**, and **aspectjweaver.jar** files to the **CLASSPATH** of the Java application being monitored.

Finally, save the file. Once this is done, then, the next time the Java application starts, the **eG JTM Monitor** scans the web requests to the application for configured URL patterns. When a match is found, the **eG JTM Monitor** collects the desired metrics and stores them in memory.

Then, every time the eG agent runs the **Java Transactions** test, the agent will poll the **eG JTM Monitor** (on the target application) for the required metrics, extract the same from the application's memory, and report them to the eG manager.

5. Next, edit the **jtmConn.props** file. You will find the following lines in the file:

```
#Contains the connection properties of eGurkha Java Transaction Monitor
JTM_Port=13631
Designated_Agent=
```

By default, the **JTM_Port** parameter is set to 13631. If the Java application being monitored listens on a different JTM port, then specify the same here. In this case, when managing a **Java Application** using the eG administrative interface, specify the **JTM_Port** that you set in the **jtmConn.props** file as the **Port** of the Java application.

Also, against the **Designated_Agent** parameter, specify the IP address of the eG agent which will poll the **eG JTM Monitor** for metrics. If no IP address is provided here, then the **eG JTM Monitor** will treat the host from which the very first 'measure request' comes in as the **Designated_Agent**.

> **Note:**
>
> In case a specific **Designated_Agent** is not provided, and the **eG JTM Monitor** treats the host from which the very first 'measure request' comes in as the **Designated_Agent**, then if such a **Designated_Agent** is stopped or uninstalled for any reason, the **eG JTM Monitor** will wait for a maximum of 10 measure periods for that 'deemed' **Designated_Agent** to request for metrics. If no requests come in for 10 consecutive measure periods, then the **eG JTM Monitor** will begin responding to 'measure requests' coming in from any other eG agent.

6. Finally, save the **jtmConn.props** file.

Then, proceed to configure the **Java Transactions** test as discussed in Section 9.1.10.1 of this document.

11.1.3 Java Classes Test

This test reports the number of classes loaded/unloaded from the memory.

Purpose	Reports the number of classes loaded/unloaded from the memory
Target of the test	An Oracle 9i AS
Agent deploying the test	An internal/remote agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port number at which the specified **HOST** listens 4. **MODE** – This test can extract metrics from the Java application using either of the following mechanisms: • Using SNMP-based access to the Java runtime MIB statistics; • By contacting the Java runtime (JRE) of the application via JMX To configure the test to use SNMP, select the snmp option. On the other hand, choose the jmx option to configure the test to use JMX instead. By default, the jmx option is chosen here. 5. **JMX REMOTE PORT** – This parameter appears only if the **MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (refer to the *Monitoring Java Applications* document). 6. **USER**, **PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **USER** and **PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to the *Monitoring Java Applications* document. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 7. **JNDINAME** – This parameter appears only if the **MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same. 8. **SNMPPORT** – This parameter appears only if the **MODE** is set to **SNMP**. Here specify the port number through which the server exposes its SNMP MIB. Ensure that you specify the same port you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (refer to the *Monitoring Java Applications* document). 9. **SNMPVERSION** – This parameter appears only if the **MODE** is set to **SNMP**. The default selection in the **SNMPVERSION** list is **v1**. However, for this test to work, you have to select SNMP **v2** or **v3** from this list, depending upon which version of SNMP is in use in the target environment. 10. **SNMPCOMMUNITY** – This parameter appears only if the **MODE** is set to **SNMP**. Here, specify the SNMP community name that the test uses to communicate with the mail server. The default is public. This parameter is specific to SNMP **v1** and **v2** only. Therefore, if the **SNMPVERSION** chosen is **v3**, then this parameter will not appear.

	11. **USERNAME** – This parameter appears only when **v3** is selected as the **SNMPVERSION**. SNMP version 3 (SNMPv3) is an extensible SNMP Framework which supplements the SNMPv2 Framework, by additionally supporting message security, access control, and remote SNMP configuration capabilities. To extract performance statistics from the MIB using the highly secure SNMP v3 protocol, the eG agent has to be configured with the required access privileges – in other words, the eG agent should connect to the MIB using the credentials of a user with access permissions to be MIB. Therefore, specify the name of such a user against the **USERNAME** parameter. 12. **AUTHTYPE** – This parameter too appears only if **v3** is selected as the **SNMPVERSION**. From the **AUTHTYPE** list box, choose the authentication algorithm using which SNMP v3 converts the specified **USERNAME** and **PASSWORD** into a 32-bit format to ensure security of SNMP transactions. You can choose between the following options: ➢ **MD5** – Message Digest Algorithm ➢ **SHA** – Secure Hash Algorithm 13. **ENCRYPTFLAG** – This flag appears only when **v3** is selected as the **SNMPVERSION**. By default, the eG agent does not encrypt SNMP requests. Accordingly, the **ENCRYPTFLAG** is set to **NO** by default. To ensure that SNMP requests sent by the eG agent are encrypted, select the **YES** option. 14. **ENCRYPTTYPE** – If the **ENCRYPTFLAG** is set to **YES**, then you will have to mention the encryption type by selecting an option from the **ENCRYPTTYPE** list. SNMP v3 supports the following encryption types: ➢ **DES** – Data Encryption Standard ➢ **AES** – Advanced Encryption Standard 15. **ENCRYPTPASSWORD** – Specify the encryption password here. 16. **CONFIRM PASSWORD** – Confirm the encryption password by retyping it here. 17. **TIMEOUT** - This parameter appears only if the **MODE** is set to **SNMP**. Here, specify the duration (in seconds) within which the SNMP query executed by this test should time out in the **TIMEOUT** text box. The default is 10 seconds.		
Outputs of the test	One set of results for the server being monitored		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Classes loaded: Indicates the number of classes currently loaded into memory.	Number	Classes are fundamental to the design of Java programming language. Typically, Java applications install a

	Classes unloaded: Indicates the number of classes currently unloaded from memory.	Number	variety of class loaders (that is, classes that implement java.lang.ClassLoader) to allow different portions of the container, and the applications running on the container, to have access to different repositories of available classes and resources. A consistent decrease in the number of classes loaded and unloaded could indicate a road-block in the loading/unloading of classes by the class loader. If left unchecked, critical resources/classes could be rendered inaccessible to the application, thereby severely affecting its performance.
	Total classes loaded: Indicates the total number of classes loaded into memory since the JVM started, including those subsequently unloaded.	Number	

11.1.4 JVM Threads Test

This test reports the status of threads on the JVM, and also reveals resource-hungry threads, so that threads that are unnecessarily consuming CPU resources can be killed.

Purpose	Reports the status of threads on the JVM, and also reveals resource-hungry threads, so that threads that are unnecessarily consuming CPU resources can be killed
Target of the test	An Oracle 9i AS
Agent deploying the test	An internal/remote agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port number at which the specified **HOST** listens 4. **MODE** – This test can extract metrics from the Java application using either of the following mechanisms: • Using SNMP-based access to the Java runtime MIB statistics; • By contacting the Java runtime (JRE) of the application via JMX To configure the test to use SNMP, select the snmp option. On the other hand, choose the jmx option to configure the test to use JMX instead. By default, the jmx option is chosen here. 5. **JMX REMOTE PORT** – This parameter appears only if the **MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (refer to the *Monitoring Java Applications* document). 6. **USER**, **PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **USER** and **PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to the *Monitoring Java Applications* document. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 7. **JNDINAME** – This parameter appears only if the **MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same. 8. **SNMPPORT** – This parameter appears only if the **MODE** is set to **SNMP**. Here specify the port number through which the server exposes its SNMP MIB. Ensure that you specify the same port you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (refer to the *Monitoring Java Applications* document). 9. **SNMPVERSION** – This parameter appears only if the **MODE** is set to **SNMP**. The default selection in the **SNMPVERSION** list is **v1**. However, for this test to work, you have to select SNMP **v2** or **v3** from this list, depending upon which version of SNMP is in use in the target environment. 10. **SNMPCOMMUNITY** – This parameter appears only if the **MODE** is set to **SNMP**. Here, specify the SNMP community name that the test uses to communicate with the mail server. The default is public. This parameter is specific to SNMP **v1** and **v2** only. Therefore, if the **SNMPVERSION** chosen is **v3**, then this parameter will not appear.

11. **USERNAME** – This parameter appears only when **v3** is selected as the **SNMPVERSION**. SNMP version 3 (SNMPv3) is an extensible SNMP Framework which supplements the SNMPv2 Framework, by additionally supporting message security, access control, and remote SNMP configuration capabilities. To extract performance statistics from the MIB using the highly secure SNMP v3 protocol, the eG agent has to be configured with the required access privileges – in other words, the eG agent should connect to the MIB using the credentials of a user with access permissions to be MIB. Therefore, specify the name of such a user against the **USERNAME** parameter.
12. **AUTHTYPE** – This parameter too appears only if **v3** is selected as the **SNMPVERSION**. From the **AUTHTYPE** list box, choose the authentication algorithm using which SNMP v3 converts the specified **USERNAME** and **PASSWORD** into a 32-bit format to ensure security of SNMP transactions. You can choose between the following options:
    - **MD5** – Message Digest Algorithm
    - **SHA** – Secure Hash Algorithm
13. **ENCRYPTFLAG** – This flag appears only when **v3** is selected as the **SNMPVERSION**. By default, the eG agent does not encrypt SNMP requests. Accordingly, the **ENCRYPTFLAG** is set to **NO** by default. To ensure that SNMP requests sent by the eG agent are encrypted, select the **YES** option.
14. **ENCRYPTTYPE** – If the **ENCRYPTFLAG** is set to **YES**, then you will have to mention the encryption type by selecting an option from the **ENCRYPTTYPE** list. SNMP v3 supports the following encryption types:
    - **DES** – Data Encryption Standard
    - **AES** – Advanced Encryption Standard
15. **ENCRYPTPASSWORD** – Specify the encryption password here.
16. **CONFIRM PASSWORD** – Confirm the encryption password by retyping it here.
17. **TIMEOUT** - This parameter appears only if the **MODE** is set to **SNMP**. Here, specify the duration (in seconds) within which the SNMP query executed by this test should time out in the **TIMEOUT** text box. The default is 10 seconds.
18. **PCT LOW CPU UTIL THREADS** – This test reports the number of threads in the JVM that are consuming low CPU. This thread count will include only those threads for which the CPU usage is equal to or lesser than the value specified in the **PCT LOW CPU UTIL THREADS** text box. The default value displayed here is 30.
19. **PCT MEDIUM CPU UTIL THREADS** - This test reports the number of threads in the JVM that are consuming CPU to a medium extent. This thread count will include only those threads for which the CPU usage is higher than the **PCT LOW CPU UTIL THREADS** configuration and is lower than or equal to the value specified in the **PCT MEDIUM CPU UTIL THREADS** text box. The default value displayed here is 50.

<table>
<tr><td></td><td colspan="3">20. PCT HIGH CPU UTIL THREADS - This test reports the number of threads in the JVM that are consuming high CPU. This thread count will include only those threads for which the CPU usage is either greater than the PCT MEDIUM CPU UTIL THREADS configuration, or is equal to or greater than the value specified in the PCT HIGH CPU UTIL THREADS text box. The default value displayed here is 70.
21. DD FREQUENCY - Refers to the frequency with which detailed diagnosis measures are to be generated for this test. The default is 1:1. This indicates that, by default, detailed measures will be generated every time this test runs, and also every time the test detects a problem. You can modify this frequency, if you so desire. Also, if you intend to disable the detailed diagnosis capability for this test, you can do so by specifying none against DD FREQUENCY.
22. DETAILED DIAGNOSIS - To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the On option. To disable the capability, click on the Off option.
The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled:
• The eG manager license should allow the detailed diagnosis capability
• Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for the server being monitored</td></tr>
<tr><td rowspan="3">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Total threads:
Indicates the total number of threads (including daemon and non-daemon threads).</td><td>Number</td><td></td></tr>
<tr><td>Runnable threads:
Indicates the current number of threads in a runnable state.</td><td>Number</td><td>The detailed diagnosis of this measure, if enabled, provides the name of the threads, the CPU usage by the threads, the time for which the thread was in a blocked state, waiting state, etc.</td></tr>
</table>

	Blocked threads: Indicates the number of threads that are currently in a blocked state.	Number	If a thread is trying to take a lock (to enter a synchronized block), but the lock is already held by another thread, then such a thread is called a blocked thread. The detailed diagnosis of this measure, if enabled, provides in-depth information related to the blocked threads.
	Waiting threads: Indicates the number of threads that are currently in a waiting state.	Number	A thread is said to be in a Waiting state if the thread enters a synchronized block, tries to take a lock that is already held by another thread, and hence, waits till the other thread notifies that it has released the lock. Ideally, the value of this measure should be low. A very high value could be indicative of excessive waiting activity on the JVM. You can use the detailed diagnosis of this measure, if enabled, to figure out which threads are currently in the waiting state. While waiting, the Java application program does no productive work and its ability to complete the task-at-hand is degraded. A certain amount of waiting may be acceptable for Java application programs. However, when the amount of time spent waiting becomes excessive or if the number of times that waits occur exceeds a reasonable amount, the Java application program may not be programmed correctly to take advantage of the available resources. When this happens, the delay caused by the waiting Java application programs elongates the response time experienced by an end user. An enterprise may use Java application programs to perform various functions. Delays based on abnormal degradation consume employee time and may be costly to corporations.

	Timed waiting threads: Indicates the number of threads in a TIMED_WAITING state.	Number	When a thread is in the TIMED_WAITING state, it implies that the thread is waiting for another thread to do something, but will give up after a specified time out period. To view the details of threads in the TIMED_WAITING state, use the detailed diagnosis of this measure, if enabled.
	Low CPU threads: Indicates the number of threads that are currently consuming CPU lower than the value configured in the **PCT LOW CPU UTIL THREADS** text box.	Number	
	Medium CPU threads: Indicates the number of threads that are currently consuming CPU that is higher than the value configured in the **PCT LOW CPU UTIL THREADS** text box and is lower than or equal to the value specified in the **PCT MEDIUM CPU UTIL THREADS** text box.	Number	
	High CPU threads: Indicates the number of threads that are currently consuming CPU that is either greater than the percentage configured in the **PCT MEDIUM CPU UTIL THREADS** or lesser than or equal to the value configured in the **PCT HIGH CPU UTIL THREADS** text box.	Number	Ideally, the value of this measure should be very low. A high value is indicative of a resource contention at the JVM. Under such circumstances, you might want to identify the resource-hungry threads and kill them, so that application performance is not hampered. To know which threads are consuming excessive CPU, use the detailed diagnosis of this measure.
`	**Peak threads:** Indicates the highest number of live threads since JVM started.	Number	
	Started threads: Indicates the the total number of threads started (including daemon, non-daemon, and terminated) since JVM started.	Number	
	Daemon threads: Indicates the current number of live daemon threads.	Number	

	Deadlock threads: Indicates the current number of deadlocked threads.	Number	Ideally, this value should be 0. A high value is a cause for concern, as it indicates that many threads are blocking one another causing the application performance to suffer. The detailed diagnosis of this measure, if enabled, lists the deadlocked threads and their resource usage.

Note:

If the **MODE** for the **JVM Threads** test is set to **SNMP**, then the detailed diagnosis of this test will not display the **Blocked Time** and **Waited Time** for the threads. To make sure that detailed diagnosis reports these details also, do the following:

- Login to the server host.
- Go to the **<JAVA_HOME>\jre\lib\management** folder used by the WebLogic server, and edit the *management.properties* file in that folder.
- Append the following line to the file:

```
com.sun.management.enableThreadContentionMonitoring
```

Note:

While viewing the measures reported by the **JVM Thread** test, you can also view the resource usage details and the **stack trace** information for all the threads, by clicking on the **STACK TRACE** link in the **Measurements** panel.

A **stack trace** (also called **stack backtrace** or **stack traceback**) is a report of the active stack frames instantiated by the execution of a program. It is commonly used to determine what threads are currently active in the JVM, and which threads are in each of the different states – i.e., alive, blocked, waiting, timed waiting, etc.

Typically, when the JVM begins exhibiting erratic resource usage patterns, it often takes administrators hours, even days to figure out what is causing this anomaly – could it be owing to one/more resource-intensive threads being executed by the WebLogic server? If so, what is causing the thread to erode resources? Is it an inefficient piece of code? In which case, which line of code could be the most likely cause for the spike in resource usage? To be able to answer these questions accurately, administrators need to know the complete list of threads that are executing on the JVM, view the **stack trace** of each thread, analyze each stack trace in a top-down manner, and trace where the problem originated.

11.1.5 JVM Cpu Usage Test

This test measures the CPU utilization of the JVM. If the JVM experiences abnormal CPU usage levels, you can use this test to instantly drill down to the classes and the methods within the classes that contributing to the resource contention at the JVM.

Purpose	Reports the status of threads on the JVM, and also reveals resource-hungry threads, so that threads that are unnecessarily consuming CPU resources can be killed
Target of the test	An Oracle 9i AS
Agent deploying the test	An internal/remote agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port number at which the specified **HOST** listens 4. **MODE** – This test can extract metrics from the Java application using either of the following mechanisms: • Using SNMP-based access to the Java runtime MIB statistics; • By contacting the Java runtime (JRE) of the application via JMX To configure the test to use SNMP, select the snmp option. On the other hand, choose the jmx option to configure the test to use JMX instead. By default, the **JMX** option is chosen here. 5. **JMX REMOTE PORT** – This parameter appears only if the **MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (refer to the *Monitoring Java Applications* document). 6. **USER**, **PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **USER** and **PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to the *Monitoring Java Applications* document. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 7. **JNDINAME** – This parameter appears only if the **MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same. 8. **SNMPPORT** – This parameter appears only if the **MODE** is set to **SNMP**. Here specify the port number through which the server exposes its SNMP MIB. Ensure that you specify the same port you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (refer to the *Monitoring Java Applications* document). 9. **SNMPVERSION** – This parameter appears only if the **MODE** is set to **SNMP**. The default selection in the **SNMPVERSION** list is **v1**. However, for this test to work, you have to select SNMP **v2** or **v3** from this list, depending upon which version of SNMP is in use in the target environment. 10. **SNMPCOMMUNITY** – This parameter appears only if the **MODE** is set to **SNMP**. Here, specify the SNMP community name that the test uses to communicate with the mail server. The default is public. This parameter is specific to SNMP **v1** and **v2** only. Therefore, if the **SNMPVERSION** chosen is **v3**, then this parameter will not appear.

11. **USERNAME** – This parameter appears only when **v3** is selected as the **SNMPVERSION**. SNMP version 3 (SNMPv3) is an extensible SNMP Framework which supplements the SNMPv2 Framework, by additionally supporting message security, access control, and remote SNMP configuration capabilities. To extract performance statistics from the MIB using the highly secure SNMP v3 protocol, the eG agent has to be configured with the required access privileges – in other words, the eG agent should connect to the MIB using the credentials of a user with access permissions to be MIB. Therefore, specify the name of such a user against the **USERNAME** parameter.
12. **AUTHTYPE** – This parameter too appears only if **v3** is selected as the **SNMPVERSION**. From the **AUTHTYPE** list box, choose the authentication algorithm using which SNMP v3 converts the specified **USERNAME** and **PASSWORD** into a 32-bit format to ensure security of SNMP transactions. You can choose between the following options:
    - **MD5** – Message Digest Algorithm
    - **SHA** – Secure Hash Algorithm
13. **ENCRYPTFLAG** – This flag appears only when **v3** is selected as the **SNMPVERSION**. By default, the eG agent does not encrypt SNMP requests. Accordingly, the **ENCRYPTFLAG** is set to **NO** by default. To ensure that SNMP requests sent by the eG agent are encrypted, select the **YES** option.
14. **ENCRYPTTYPE** – If the **ENCRYPTFLAG** is set to **YES**, then you will have to mention the encryption type by selecting an option from the **ENCRYPTTYPE** list. SNMP v3 supports the following encryption types:
    - **DES** – Data Encryption Standard
    - **AES** – Advanced Encryption Standard
15. **ENCRYPTPASSWORD** – Specify the encryption password here.
16. **CONFIRM PASSWORD** – Confirm the encryption password by retyping it here.
17. **TIMEOUT** - This parameter appears only if the **MODE** is set to **SNMP**. Here, specify the duration (in seconds) within which the SNMP query executed by this test should time out in the **TIMEOUT** text box. The default is 10 seconds.
18. **PROFILER HOME** – JIP (Java Interactive Profiler) is a high performance, low overhead profiler that is written entirely in Java and used extensively to gather performance data pertaining to a JVM. The eG agent comes bundled with JIP, and takes the help of JIP to provide detailed diagnosis information related to the CPU usage of the JVM. To make sure that this test contacts JIP for detailed resource usage metrics, you need to indicate the location of the JIP in the **PROFILER HOME** text box.

	Typically, the files related to this profiler are available in **<EG_INSTALL_DIR>\lib\jip** directory (in Windows; in Unix, this will be: **/opt/egurkha/lib/jip**). If only a single Java application on a host is being monitored, then the **jip** folder can remain in the same location. The **PROFILER HOME** parameter should then be configured with **/opt/egurkha/lib/jip** or **<EG_INSTALL_DIR>\lib\jip**, as the case may be. However, if more than one Java application on a single host is to be monitored, then first ensure that the **jip** folder is copied to two different locations on the same host. The **PROFILER HOME** parameter should in this case be configured with the location of the **jip** folder that corresponds to the Java application for which this test is being currently configured. For instance, say *japp1* and *japp2* are 2 Java applications that are being managed by the eG Enterprise system. Assume that the **jip** folder has been copied to the *C:\japp1* and *D:\japp2* folders. Now, while configuring this test for the *japp1* application, specify *C:\japp\jip* in **PROFILER HOME**. Similarly, when configuring this test for the *japp2* application, enter *D:\japp2\jip* in **PROFILER HOME**. 19. **PROFILER** – The JIP can be turned on or off while the JVM is still running. For the eG agent to be able to report detailed diagnosis of the CPU usage metric, the profiler should be turned on. Accordingly, the **PROFILER** flag is set to **On** by default. If you do not want detailed diagnosis, then you can set the **PROFILER** flag to **Off**. 20. **DD FREQUENCY** - Refers to the frequency with which detailed diagnosis measures are to be generated for this test. The default is *1:1*. This indicates that, by default, detailed measures will be generated every time this test runs, and also every time the test detects a problem. You can modify this frequency, if you so desire. Also, if you intend to disable the detailed diagnosis capability for this test, you can do so by specifying *none* against **DD FREQUENCY**. 21. **DETAILED DIAGNOSIS** - To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the **On** option. To disable the capability, click on the **Off** option. The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled: • The eG manager license should allow the detailed diagnosis capability • Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.		
Outputs of the test	One set of results for the server being monitored		
Measurements made by the	**Measurement**	**Measurement Unit**	**Interpretation**

test	**CPU utilization of JVM:** Indicates the percentage of CPU currently utilized by the JVM.	Percent	Ideally, this value should be low. An unusually high value or a consistent increase in this value is indicative of abnormal CPU usage, and could warrant further investigation. In such a situation, you can use the detailed diagnosis of this measure, if enabled, to determine which methods invoked by which classes are causing the steady/sporadic spikes in CPU usage.

11.1.6 JVM Memory Usage Test

This test monitors every memory type on the JVM and reports how efficiently the JVM utilizes the memory resources of each type.

Purpose	Monitors every memory type on the JVM and reports how efficiently the JVM utilizes the memory resources of each type
Target of the test	An Oracle 9i AS
Agent deploying the test	An internal/remote agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port number at which the specified **HOST** listens 4. **MODE** – This test can extract metrics from the Java application using either of the following mechanisms: • Using SNMP-based access to the Java runtime MIB statistics; • By contacting the Java runtime (JRE) of the application via JMX To configure the test to use SNMP, select the snmp option. On the other hand, choose the jmx option to configure the test to use JMX instead. By default, the **JMX** option is chosen here. 5. **JMX REMOTE PORT** – This parameter appears only if the **MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (refer to the *Monitoring Java Applications* document). 6. **USER**, **PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **USER** and **PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to the *Monitoring Java Applications* document. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 7. **JNDINAME** – This parameter appears only if the **MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same. 8. **SNMPPORT** – This parameter appears only if the **MODE** is set to **SNMP**. Here specify the port number through which the server exposes its SNMP MIB. Ensure that you specify the same port you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (refer to the *Monitoring Java Applications* document). 9. **SNMPVERSION** – This parameter appears only if the **MODE** is set to **SNMP**. The default selection in the **SNMPVERSION** list is **v1**. However, for this test to work, you have to select SNMP **v2** or **v3** from this list, depending upon which version of SNMP is in use in the target environment. 10. **SNMPCOMMUNITY** – This parameter appears only if the **MODE** is set to **SNMP**. Here, specify the SNMP community name that the test uses to communicate with the mail server. The default is public. This parameter is specific to SNMP **v1** and **v2** only. Therefore, if the **SNMPVERSION** chosen is **v3**, then this parameter will not appear.

<table>
<tr><td></td><td colspan="3">
11. USERNAME – This parameter appears only when v3 is selected as the SNMPVERSION. SNMP version 3 (SNMPv3) is an extensible SNMP Framework which supplements the SNMPv2 Framework, by additionally supporting message security, access control, and remote SNMP configuration capabilities. To extract performance statistics from the MIB using the highly secure SNMP v3 protocol, the eG agent has to be configured with the required access privileges – in other words, the eG agent should connect to the MIB using the credentials of a user with access permissions to be MIB. Therefore, specify the name of such a user against the USERNAME parameter.
12. AUTHPASS – Specify the password that corresponds to the above-mentioned USERNAME. This parameter once again appears only if the SNMPVERSION selected is v3.
13. CONFIRM PASSWORD – Confirm the AUTHPASS by retyping it here.
14. AUTHTYPE – This parameter too appears only if v3 is selected as the SNMPVERSION. From the AUTHTYPE list box, choose the authentication algorithm using which SNMP v3 converts the specified USERNAME and PASSWORD into a 32-bit format to ensure security of SNMP transactions. You can choose between the following options:
➢ MD5 – Message Digest Algorithm
➢ SHA – Secure Hash Algorithm
15. ENCRYPTFLAG – This flag appears only when v3 is selected as the SNMPVERSION. By default, the eG agent does not encrypt SNMP requests. Accordingly, the ENCRYPTFLAG is set to NO by default. To ensure that SNMP requests sent by the eG agent are encrypted, select the YES option.
16. ENCRYPTTYPE – If the ENCRYPTFLAG is set to YES, then you will have to mention the encryption type by selecting an option from the ENCRYPTTYPE list. SNMP v3 supports the following encryption types:
➢ DES – Data Encryption Standard
➢ AES – Advanced Encryption Standard
17. ENCRYPTPASSWORD – Specify the encryption password here.
18. CONFIRM PASSWORD – Confirm the encryption password by retyping it here.
19. TIMEOUT - This parameter appears only if the MODE is set to SNMP. Here, specify the duration (in seconds) within which the SNMP query executed by this test should time out in the TIMEOUT text box. The default is 10 seconds.
</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for every memory type on the JVM being monitored</td></tr>
<tr><td>Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td></td><td>Initial memory:
Indicates the amount of memory initially allocated at startup.</td><td>MB</td><td>The detailed diagnosis of this measure, when enabled, reveals the memory pools on the JVM, the memory type of every pool, and the memory manager managing the pool.</td></tr>
</table>

	Used memory: Indicates the amount of memory currently used.	MB	It includes the memory occupied by all objects including both reachable and unreachable objects.
	Available memory: Indicates the amount of memory guaranteed to be available for use by the JVM.	MB	The amount of **Available memory** may change over time. The Java virtual machine may release memory to the system and committed memory could be less than the amount of memory initially allocated at startup. Committed will always be greater than or equal to used memory.
	Free memory: Indicates the amount of memory currently available for use by the JVM.	MB	This is the difference between **Available memory** and **Used memory**. Ideally, the value of this measure should be high.
	Max free memory: Indicates the maximum amount of memory allocated for the JVM.	MB	
	Used percentage: Indicates the percentage of used memory.	Percent	Ideally, the value of this measure should be low. A very high value of this measure could indicate excessive memory consumption by the JVM, which in turn, could warrant further investigation.

11.1.7 JVM Uptime Test

This test helps track whether a scheduled reboot of the JVM has occurred or not.

Purpose	Helps track whether a scheduled reboot of the JVM has occurred or not
Target of the test	An Oracle 9i AS
Agent deploying the test	An internal/remote agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port number at which the specified **HOST** listens 4. **MODE** – This test can extract metrics from the Java application using either of the following mechanisms: • Using SNMP-based access to the Java runtime MIB statistics; • By contacting the Java runtime (JRE) of the application via JMX To configure the test to use SNMP, select the snmp option. On the other hand, choose the jmx option to configure the test to use JMX instead. By default, the jmx option is chosen here. 5. **JMX REMOTE PORT** – This parameter appears only if the **MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (refer to the *Monitoring Java Applications* document). 6. **USER**, **PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **USER** and **PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to the *Monitoring Java Applications* document. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 7. **JNDINAME** – This parameter appears only if the **MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same. 8. **SNMPPORT** – This parameter appears only if the **MODE** is set to **SNMP**. Here specify the port number through which the server exposes its SNMP MIB. Ensure that you specify the same port you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (refer to the *Monitoring Java Applications* document). 9. **SNMPVERSION** – This parameter appears only if the **MODE** is set to **SNMP**. The default selection in the **SNMPVERSION** list is **v1**. However, for this test to work, you have to select SNMP **v2** or **v3** from this list, depending upon which version of SNMP is in use in the target environment. 10. **SNMPCOMMUNITY** – This parameter appears only if the **MODE** is set to **SNMP**. Here, specify the SNMP community name that the test uses to communicate with the mail server. The default is public. This parameter is specific to SNMP **v1** and **v2** only. Therefore, if the **SNMPVERSION** chosen is **v3**, then this parameter will not appear.

	11. **USERNAME** – This parameter appears only when **v3** is selected as the **SNMPVERSION**. SNMP version 3 (SNMPv3) is an extensible SNMP Framework which supplements the SNMPv2 Framework, by additionally supporting message security, access control, and remote SNMP configuration capabilities. To extract performance statistics from the MIB using the highly secure SNMP v3 protocol, the eG agent has to be configured with the required access privileges – in other words, the eG agent should connect to the MIB using the credentials of a user with access permissions to be MIB. Therefore, specify the name of such a user against the **USERNAME** parameter. 12. **AUTHPASS** – Specify the password that corresponds to the above-mentioned **USERNAME**. This parameter once again appears only if the **SNMPVERSION** selected is **v3**. 13. **CONFIRM PASSWORD** – Confirm the **AUTHPASS** by retyping it here. 14. **AUTHTYPE** – This parameter too appears only if **v3** is selected as the **SNMPVERSION**. From the **AUTHTYPE** list box, choose the authentication algorithm using which SNMP v3 converts the specified **USERNAME** and **PASSWORD** into a 32-bit format to ensure security of SNMP transactions. You can choose between the following options: ➢ **MD5** – Message Digest Algorithm ➢ **SHA** – Secure Hash Algorithm 15. **ENCRYPTFLAG** – This flag appears only when **v3** is selected as the **SNMPVERSION**. By default, the eG agent does not encrypt SNMP requests. Accordingly, the **ENCRYPTFLAG** is set to **NO** by default. To ensure that SNMP requests sent by the eG agent are encrypted, select the **YES** option. 16. **ENCRYPTTYPE** – If the **ENCRYPTFLAG** is set to **YES**, then you will have to mention the encryption type by selecting an option from the **ENCRYPTTYPE** list. SNMP v3 supports the following encryption types: ➢ **DES** – Data Encryption Standard ➢ **AES** – Advanced Encryption Standard 17. **ENCRYPTPASSWORD** – Specify the encryption password here. 18. **CONFIRM PASSWORD** – Confirm the encryption password by retyping it here. 19. **TIMEOUT** - This parameter appears only if the **MODE** is set to **SNMP**. Here, specify the duration (in seconds) within which the SNMP query executed by this test should time out in the **TIMEOUT** text box. The default is 10 seconds.		
Outputs of the test	One set of results for the server being monitored		
Measurements made by the	**Measurement**	**Measurement Unit**	**Interpretation**

<table>
<tr>
<td>test</td>
<td>Has the JVM been restarted?:
Indicates whether or not the JVM has restarted during the last measurement period.</td>
<td></td>
<td>If the value of this measure is No, it indicates that the JVM has not restarted. The value Yes on the other hand implies that the JVM has indeed restarted.
The numeric values that correspond to the reboot states discussed above are listed in the table below:
<table>
<tr><th>State</th><th>Value</th></tr>
<tr><td>Yes</td><td>1</td></tr>
<tr><td>No</td><td>0</td></tr>
</table>
Note:
By default, this measure reports the value Yes or No to indicate whether a JVM has restarted. The graph of this measure however, represents the same using the numeric equivalents – 0 or 1.</td>
</tr>
<tr>
<td></td>
<td>Uptime during the last measure period:
Indicates the time period that the JVM has been up since the last time this test ran.</td>
<td>Secs</td>
<td>If the JVM has not been restarted during the last measurement period and the agent has been running continuously, this value will be equal to the measurement period. If the JVM was restarted during the last measurement period, this value will be less than the measurement period of the test. For example, if the measurement period is 300 secs, and if the JVM was restarted 120 secs back, this metric will report a value of 120 seconds. The accuracy of this metric is dependent on the measurement period – the smaller the measurement period, greater the accuracy.</td>
</tr>
<tr>
<td></td>
<td>Total uptime of the JVM:
Indicates the total time that the JVM has been up since its last reboot.</td>
<td>Secs</td>
<td>Administrators may wish to be alerted if a JVM has been running without a reboot for a very long period. Setting a threshold for this metric allows administrators to determine such conditions.</td>
</tr>
</table>

11.1.8 JVM Garbage Collections Test

Manual memory management is time consuming, and error prone. Most programs still contain leaks. This is all

doubly true with programs using exception-handling and/or threads. Garbage collection (GC) is a part of a Java application's JVM that automatically determines what memory a program is no longer using, and recycles it for other use. It is also known as "automatic storage (or memory) reclamation". The JvmGarbageCollection test reports the performance statistics pertaining to the JVM's garbage collection.

Purpose	Reports the performance statistics pertaining to the JVM's garbage collection
Target of the test	An Oracle 9i AS
Agent deploying the test	An internal/remote agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port number at which the specified **HOST** listens 4. **MODE** – This test can extract metrics from the Java application using either of the following mechanisms: • Using SNMP-based access to the Java runtime MIB statistics; • By contacting the Java runtime (JRE) of the application via JMX To configure the test to use SNMP, select the snmp option. On the other hand, choose the jmx option to configure the test to use JMX instead. By default, the jmx option is chosen here. 5. **JMX REMOTE PORT** – This parameter appears only if the **MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (refer to the *Monitoring Java Applications* document). 6. **USER**, **PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **USER** and **PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to the *Monitoring Java Applications* document. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 7. **JNDINAME** – This parameter appears only if the **MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same. 8. **SNMPPORT** – This parameter appears only if the **MODE** is set to **SNMP**. Here specify the port number through which the server exposes its SNMP MIB. Ensure that you specify the same port you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (refer to the *Monitoring Java Applications* document). 9. **SNMPVERSION** – This parameter appears only if the **MODE** is set to **SNMP**. The default selection in the **SNMPVERSION** list is **v1**. However, for this test to work, you have to select SNMP **v2** or **v3** from this list, depending upon which version of SNMP is in use in the target environment. 10. **SNMPCOMMUNITY** – This parameter appears only if the **MODE** is set to **SNMP**. Here, specify the SNMP community name that the test uses to communicate with the mail server. The default is public. This parameter is specific to SNMP **v1** and **v2** only. Therefore, if the **SNMPVERSION** chosen is **v3**, then this parameter will not appear.

	11. **USERNAME** – This parameter appears only when **v3** is selected as the **SNMPVERSION**. SNMP version 3 (SNMPv3) is an extensible SNMP Framework which supplements the SNMPv2 Framework, by additionally supporting message security, access control, and remote SNMP configuration capabilities. To extract performance statistics from the MIB using the highly secure SNMP v3 protocol, the eG agent has to be configured with the required access privileges – in other words, the eG agent should connect to the MIB using the credentials of a user with access permissions to be MIB. Therefore, specify the name of such a user against the **USERNAME** parameter. 12. **AUTHPASS** – Specify the password that corresponds to the above-mentioned **USERNAME**. This parameter once again appears only if the **SNMPVERSION** selected is **v3**. 13. **CONFIRM PASSWORD** – Confirm the **AUTHPASS** by retyping it here. 14. **AUTHTYPE** – This parameter too appears only if **v3** is selected as the **SNMPVERSION**. From the **AUTHTYPE** list box, choose the authentication algorithm using which SNMP v3 converts the specified **USERNAME** and **PASSWORD** into a 32-bit format to ensure security of SNMP transactions. You can choose between the following options: ➢ **MD5** – Message Digest Algorithm ➢ **SHA** – Secure Hash Algorithm 15. **ENCRYPTFLAG** – This flag appears only when **v3** is selected as the **SNMPVERSION**. By default, the eG agent does not encrypt SNMP requests. Accordingly, the **ENCRYPTFLAG** is set to **NO** by default. To ensure that SNMP requests sent by the eG agent are encrypted, select the **YES** option. 16. **ENCRYPTTYPE** – If the **ENCRYPTFLAG** is set to **YES**, then you will have to mention the encryption type by selecting an option from the **ENCRYPTTYPE** list. SNMP v3 supports the following encryption types: ➢ **DES** – Data Encryption Standard ➢ **AES** – Advanced Encryption Standard 17. **ENCRYPTPASSWORD** – Specify the encryption password here. 18. **CONFIRM PASSWORD** – Confirm the encryption password by retyping it here. 19. **TIMEOUT** - This parameter appears only if the **MODE** is set to **SNMP**. Here, specify the duration (in seconds) within which the SNMP query executed by this test should time out in the **TIMEOUT** text box. The default is 10 seconds.
Outputs of the test	One set of results for every garbage collector configured on the WebSphere server being monitored

Measurements made by the	Measurement	Measurement Unit	Interpretation

test	**No of garbage collections started:** Indicates the number of times garbage collection started to release dead objects form memory.	Number	
	Time taken for garbage collection: Indicates the time taken to perform the current garbage collection operation.	Secs	Ideally, the value of both these measures should be low. This is because, the garbage collection (GC) activity tends to suspend the operations of the application until such time that GC ends. Longer the GC time, longer it would take for the application to resume its functions. To minimize the impact of GC on application performance, it is best to ensure that GC activity does not take too long to complete.
	Percent of time spent by JVM for garbage collection: Indicates the percentage of time spent by JVM in garbage collection.	Percent	

11.1.9 JVM Memory Pool Garbage Collections Test

While the **JVM Garbage Collections** test reports statistics indicating how well each collector on the JVM performs garbage collection, the measures reported by the **JVM Memory Pool Garbage Collections** test help assess the impact of the garbage collection activity on the availability and usage of memory in each memory pool of the JVM. Besides revealing the count of garbage collections per collector and the time taken by each collector to perform garbage collection on the individual memory pools, the test also compares the amount of memory used and available for use pre and post garbage collection in each of the memory pools. This way, the test enables administrators to guage the effectiveness of the garbage collection activity on the memory pools, and helps them accurately identify those memory pools where enough memory could not reclaimed or where the garbage collectors spent too much time.

Purpose	Helps assess the impact of the garbage collection activity on the availability and usage of memory in each memory pool of the JVM
Target of the test	An Oracle 9i AS
Agent deploying the test	An internal/remote agent

<table>
<tr><td>Configurable parameters for the test</td><td colspan="3">1. TEST PERIOD - How often should the test be executed

HOST - The host for which the test is to be configured

PORT - The port number at which the specified HOST listens

MEASURE MODE - This test allows you the option to collect the desired metrics using one of the following methodologies:

• By contacting the Java runtime (JRE) of the application via JMX

• Using GC logs

To use JMX for metrics collections, set the measure mode to jmx.

On the other hand, if you intend to use the GC log files for collecting the required metrics, set the MEASURE MODE to Log File. In this case, you would be required to enable GC logging. The procedure for this has been detailed in the Monitoring Java Applications document.

2. JMX REMOTE PORT – This parameter appears only if the MODE is set to JMX. Here, specify the port at which the JMX listens for requests from remote hosts. Ensure that you specify the same port that you configured in the management.properties file in the <JAVA_HOME>\jre\lib\management folder used by the target application (refer to the Monitoring Java Applications document).

3. USER, PASSWORD, and CONFIRM PASSWORD – These parameters appear only if the MODE is set to JMX. If JMX requires authentication only (but no security), then ensure that the USER and PASSWORD parameters are configured with the credentials of a user with read-write access to JMX. To know how to create this user, refer to the Monitoring Java Applications document. Confirm the password by retyping it in the CONFIRM PASSWORD text box.

4. JNDINAME – This parameter appears only if the MODE is set to JMX. The JNDINAME is a lookup name for connecting to the JMX connector. By default, this is jmxrmi. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same.

5. JREHOME - This parameter will be available only if the MEASURE MODE is set to Log File. Specify the full path to the Java Runtime Environment (JRE) used by the target application.

6. LOGFILENAME - This parameter will be available only if the MEASURE MODE is set to Log File. Specify the full path to the GC log file to be used for metrics collection.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for every GarbageCollector:MemoryPool pair on the JVM of the server being monitored</td></tr>
<tr><td>Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td></td><td>Has garbage collection happened:

Indicates whether garbage collection occurred on this memory pool in the last measurement period.</td><td></td><td>This measure reports the value Yes if garbage collection took place or No if it did not take place on the memory pool.

The numeric values that correspond to the measure values of Yes and No are listed below:</td></tr>
</table>

			<table><tr><th>State</th><th>Value</th></tr><tr><td>Yes</td><td>1</td></tr><tr><td>No</td><td>0</td></tr></table> **Note:** By default, this measure reports the value *Yes* or *No* to indicate whether a GC occurred on a memory pool or not. The graph of this measure however, represents the same using the numeric equivalents – *0* or *1*.
	Collection count: Indicates the number of time in the last measurement pool garbage collection was started on this memory pool.	Number	
	Initial memory before GC: Indicates the initial amount of memory (in MB) that this memory pool requests from the operating system for memory management during startup, before GC process.	MB	Comparing the value of these two measures for a memory pool will give you a fair idea of the effectiveness of the garbage collection activity. If garbage collection reclaims a large amount of memory from the memory pool, then the *Initial memory after GC* will drop. On the other hand, if the garbage collector does not reclaim much memory from a memory pool, or if the Java application suddenly runs a memory-intensive process when GC is being performed, then the *Initial memory after GC* may be higher than the *Initial memory before GC*.
	Initial memory after GC: Indicates the initial amount of memory (in MB) that this memory pool requests from the operating system for memory management during startup, after GC process	MB	

	Max memory before GC: Indicates the maximum amount of memory that can be used for memory management by this memory pool, before GC process.	MB	Comparing the value of these two measures for a memory pool will provide you with insights into the effectiveness of the garbage collection activity. If garbage collection reclaims a large amount of memory from the memory pool, then the *Max memory after GC* will drop. On the other hand, if the garbage collector does not reclaim much memory from a memory pool, or if the Java application suddenly runs a memory-intensive process when GC is being performed, then the *Max memory after GC* value may exceed the *Max memory before GC*.
	Max memory after GC: Indicates the maximum amount of memory (in MB) that can be used for memory management by this pool, after the GC process.	MB	
	Committed memory before GC: Indicates the amount of memory that is guaranteed to be available for use by this memory pool, before the GC process.	MB	
	Committed memory after GC: Indicates the amount of memory that is guaranteed to be available for use by this memory pool, after the GC process.	MB	
	Used memory before GC: Indicates the amount of memory used by this memory pool before GC.	MB	Comparing the value of these two measures for a memory pool will provide you with insights into the effectiveness of the garbage collection activity. If garbage collection reclaims a large amount of memory from the memory pool, then the *Used memory after GC* may drop lower than the *Used memory before GC*. On the other hand, if the garbage collector does not reclaim much memory from a memory pool, or if the Java application suddenly runs a memory-intensive process when GC is being performed, then the *Used memory after GC* value may exceed the *Used memory before GC*.
	Used memory after GC: Indicates the amount of memory used by this memory pool after GC.	MB	

	Percentage memory collected: Indicates the percentage of memory collected from this pool by the GC activity.	Percent	A high value for this measure is indicative of a large amount of unused memory in the pool. A low value on the other hand indicates that the memory pool has been over-utilized. Compare the value of this measure across pools to identify the pools that have very little free memory. If too many pools appear to be running short of memory, it could indicate that the target application is consuming too much memory, which in the long run, can slow down the application significantly.
	Collection duration: Indicates the time taken by this garbage collector for collecting unused memory from this pool.	Mins	Ideally, the value of this measure should be low. This is because, the garbage collection (GC) activity tends to suspend the operations of the application until such time that GC ends. Longer the GC time, longer it would take for the application to resume its functions. To minimize the impact of GC on application performance, it is best to ensure that GC activity does not take too long to complete.

11.1.10 JMX Connection to JVM

This test reports the availability of the target Java application, and also indicates whether JMX is enabled on the application or not. In addition, the test promptly alerts you to slowdowns experienced by the application, and also reveals whether the application was recently restarted or not.

Purpose	Reports the availability of the target Java application, and also indicates whether JMX is enabled on the application or not. In addition, the test promptly alerts you to slowdowns experienced by the application, and also reveals whether the application was recently restarted or not
Target of the test	An Oracle 9i AS
Agent deploying the test	An internal/remote agent

<table>
<tr><td>Configurable parameters for the test</td><td colspan="3">1. TEST PERIOD - How often should the test be executed
2. HOST - The host for which the test is to be configured
3. PORT - The port number at which the specified HOST listens
4. JMX REMOTE PORT – Here, specify the port at which the JMX listens for requests from remote hosts. Ensure that you specify the same port that you configured in the management.properties file in the <JAVA_HOME>\jre\lib\management folder used by the target application (refer to the Monitoring Java Applications document).
5. USER, PASSWORD, and CONFIRM PASSWORD – If JMX requires authentication only (but no security), then ensure that the USER and PASSWORD parameters are configured with the credentials of a user with read-write access to JMX. To know how to create this user, refer to the Monitoring Java Applications document. Confirm the password by retyping it in the CONFIRM PASSWORD text box.
6. JNDINAME – The JNDINAME is a lookup name for connecting to the JMX connector. By default, this is jmxrmi. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for the Java application being monitored</td></tr>
<tr><td rowspan="3">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>JMX availability:
Indicates whether the target application is available or not and whether JMX is enabled or not on the application.</td><td>Percent</td><td>If the value of this measure is 100%, it indicates that the Java application is available with JMX enabled. The value 0 on the other hand, could indicate one/both the following:
u. The Java application is unavailable;
v. The Java application is available, but JMX is not enabled;</td></tr>
<tr><td>JMX response time:
Indicates the time taken to connect to the JMX agent of the Java application.</td><td>Secs</td><td>A high value could indicate a connection bottleneck.</td></tr>
<tr><td></td><td>Has the PID changed?
Indicates whether/not the process ID that corresponds to the Java application has changed.</td><td></td><td>This measure will report the value Yes if the PID of the target application has changed; such a change is indicative of an application restart. If the application has not restarted - i.e., if the PID has not changed - then this measure will return the value No.</td></tr>
</table>

11.1.11 JVM File Descriptors Test

This test reports useful statistics pertaining to file descriptors.

Purpose	Reports useful statistics pertaining to file descriptors		
Target of the test	An Oracle 9i AS		
Agent deploying the test	An internal/remote agent		
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port number at which the specified **HOST** listens 4. **JMX REMOTE PORT** – Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *management.properties* file in the **<JAVA_HOME>\jre\lib\management** folder used by the target application (refer to the *Monitoring Java Applications* document). 5. **USER**, **PASSWORD**, and **CONFIRM PASSWORD** – If JMX requires **authentication only** (but no security), then ensure that the **USER** and **PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to the *Monitoring Java Applications* document. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 6. **JNDINAME** – The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same.		
Outputs of the test	One set of results for the Java application being monitored		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Open file descriptors in JVM: Indicates the number of file descriptors currently open for the application.	Number	
	Maximum file descriptors in JVM: Indicates the maximum number of file descriptors allowed for the application.	Number	
	File descriptor usage by JVM: Indicates the file descriptor usage in percentage.	Percent	

11.2 The Oracle JDBC Layer

The tests associated with this layer (see Figure 11.3) enable administrators to:

- Measure the health of the JDBC connections in every instance of the server
- Monitor the usage of the connection cache
- Determine the number and type of transactions executing on the server

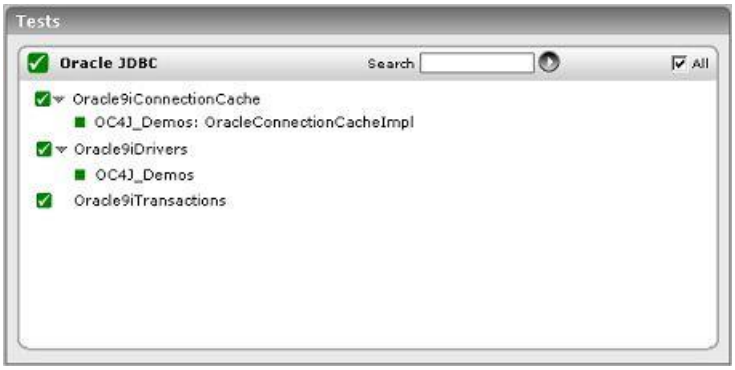

Figure 11.3: The tests associated with the Oracle==== JDBC layer

11.2.1 Oracle 9i Drivers Test

This test reports the performance metrics related to the JDBC Connection in an instance of the Oracle 9i application server.

Purpose	Reports the performance metrics related to the JDBC Connection in Oracle 9i application server instance		
Target of the test	An Oracle 9i AS		
Agent deploying the test	An internal agent		
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** In the **PORT** text box, it is recommended that you provide the port at which the OPMN (Oracle Process Manager and Notification) process of the Oracle application server instance listens. To know at which port OPMN listens, click on the Ports tab in the following URL: `http://<oraHttpServerIP>:<OraHttpServerport>`. This tab lists the port numbers that were assigned to the services executing on the Oracle application server. The port number displayed against the **Oracle notification server request port** entry is the OPMN port, and the same should be specified in the **PORT** text box. 4. **HOMEDIR** – The absolute path of the directory in which the Oracle 9i application server has been installed		
Outputs of the test	One set of results for every instance of the Oracle 9i AS monitored		
Measurements made by the	**Measurement**	**Measurement Unit**	**Interpretation**

test	**Threads creating connections:** Indicates the current number of threads creating connections.	Number	
	Avg connection create time: Indicates the average time spent creating connections during the last measurement period.	Secs	An increase in this metric could indicate a bottleneck in the database/database connection points.
	Max connection create time: Indicates the high water mark indicating the maximum time spent creating connections since the server was started.	Secs	A high value for this measure is indicative of a bottleneck during database access.
	Connections open: Indicates the number of connections that have been opened per second in the last measurement period.	Conns/Sec	A very high value for this measure indicates a heavy load on database access.
	Connections closed: Indicates the number of connections that have been closed per second.	Conns/Sec	The value of this measure must be equal to the *Connections open*. If this value is consistently less than *Connections open*, then it indicates a potential problem - that connections are hanging on to the database server.

11.2.2 Oracle 9i Connection Cache Test

This test reports the performance metrics related to the connection cache of an instance of the Oracle9i application server.

Purpose	Reports the performance metrics related to the connection cache of every instance of the Oracle9i application server
Target of the test	An Oracle 9i AS
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** In the **PORT** text box, it is recommended that you provide the port at which the OPMN (Oracle Process Manager and Notification) process of the Oracle application server instance listens. To know at which port OPMN listens, click on the Ports tab in the following URL: `http://<oraHttpServerIP>:<OraHttpServerport>`. This tab lists the port numbers that were assigned to the services executing on the Oracle application server. The port number displayed against the **Oracle notification server request port** entry is the OPMN port, and the same should be specified in the **PORT** text box. 4. **HOMEDIR** – The absolute path of the directory in which the Oracle 9i application server has been installed		
Outputs of the test	One set of results for every instance of the Oracle 9i AS monitored		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Free cache size: Indicates the number of free slots in the connection cache.	Number	
	Cache size: Indicates the total size of the connection cache.	Number	
	Cache hits: Indicates the number of times a request for connection has been fulfilled by the cache.	Conns/Sec	Reading from the cache is less expensive than reading from disk. Therefore, the higher this value, the better.
	Cache misses: Indicates the rate at which the cache failed to fulfill a request for connection.	Conns/Sec	Reading from the cache is less expensive than reading from disk. Therefore, the lower this value, the better.

11.2.3 Oracle 9i Transactions Test

This test reports the performance metrics related to the transactions occurring on the Oracle9i application server.

Purpose	Reports the performance metrics related to the transactions occurring on the Oracle9i application server
Target of the test	An Oracle 9i AS
Agent deploying the test	An internal agent

<table>
<tr><td>Configurable parameters for the test</td><td colspan="3">1. TEST PERIOD - How often should the test be executed
2. HOST - The host for which the test is to be configured
3. PORT - In the PORT text box, it is recommended that you provide the port at which the OPMN (Oracle Process Manager and Notification) process of the Oracle application server instance listens. To know at which port OPMN listens, click on the Ports tab in the following URL: <code>http://<oraHttpServerIP>:<OraHttpServerport></code>. This tab lists the port numbers that were assigned to the services executing on the Oracle application server. The port number displayed against the Oracle notification server request port entry is the OPMN port, and the same should be specified in the PORT text box.
4. HOMEDIR – The absolute path of the directory in which the Oracle 9i application server has been installed</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for every instance of the Oracle 9i AS monitored</td></tr>
<tr><td rowspan="4">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Active transactions:
Indicates the current number of open transactions.</td><td>Number</td><td>A high value of this measure may indicate a large number of active transactions. Alternatively, this may also indicate that due to some reasons the users are not able to complete the transactions.</td></tr>
<tr><td>Transactions commits:
Indicates the rate at which the transactions were committed.</td><td>Trans/Sec</td><td></td></tr>
<tr><td>Transaction rollbacks:
Indicates the rate at which transactions were rolled back during the last measurement period.</td><td>Trans/Sec</td><td>A high value here would mean that more number of transactions are being rolled back.</td></tr>
</table>

11.3 The Oracle Web Modules Layer

The **Oracle9iWebModules** test associated with this layer tracks the requests to every web module on each of the monitored Oracle 9i AS instances.

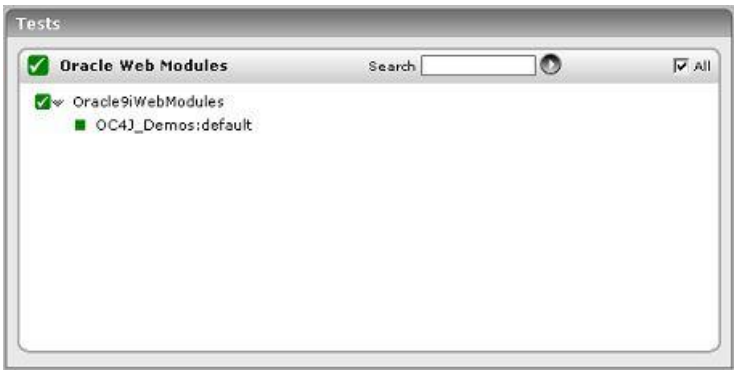

Figure 11.4: The tests associated with the Oracle Web Modules layer

11.3.1 Oracle 9i Web Modules Test

This test reports the performance metrics related to every web module in every instance of the Oracle9i application server.

Purpose	Reports the performance metrics related to every web module in every instance of the Oracle9i application server		
Target of the test	An Oracle 9i AS		
Agent deploying the test	An internal agent		
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** In the **PORT** text box, it is recommended that you provide the port at which the OPMN (Oracle Process Manager and Notification) process of the Oracle application server instance listens. To know at which port OPMN listens, click on the Ports tab in the following URL: `http://<oraHttpServerIP>:<OraHttpServerport>`. This tab lists the port numbers that were assigned to the services executing on the Oracle application server. The port number displayed against the **Oracle notification server request port** entry is the OPMN port, and the same should be specified in the **PORT** text box. 4. **HOMEDIR** – The absolute path of the directory in which the Oracle 9i application server has been installed		
Outputs of the test	One set of results for every web module on every instance of the Oracle 9i AS monitored		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Requests active: Indicates the current number of threads servicing web requests.	Number	A high value of this measure indicates a heavy load on the web module. An increase in requests running may indicate an increase in user workload. Alternatively, a slowdown of the application server may also cause the requests that are simultaneously executing to increase.

	Requests completed: Indicates the average time spent servicing web requests during the last measurement period.	Secs	A very high value for this measure indicates that the web module is handling many requests.
	Avg request process time: Indicates the average time spent servicing web requests during the last measurement period.	Trans/Sec	An increase in this value may be indicative of a problem in the application server. This increase could also be attributed to a problem in database tier provided the application is using the database for servicing the request.
	Max request process time: Indicates the high water mark indicating the maximum time spend servicing a web request	Secs	
	Avg context resolve time: Indicates the average time spent to create/find the servlet context during the last measurement period.	Secs	A very high value is an indication of heavy load on the web module.
	Avg request parse time: Indicates the average time spent to read/parse requests during the last measurement.	Secs	Comparing the total request processing time with the context resolution time and request parsing time, can provide an indication of where a request is spending time in the O9i AS instance.

11.4 The Oracle Web Context Layer

Using the test associated with this layer, administrators can monitor the session load on every web context on an Oracle 9i AS instance, and can determine whether any web context is taking too much time to create/locate a servlet instance.

Figure 11.5: The tests associated with the Oracle Web Context layer

11.4.1 Oracle 9i Web Contexts Test

This test reports the performance metrics related to every web context on each instance of the Oracle 9i AS.

Purpose	Reports the performance metrics related to every web context on each instance of the Oracle 9i AS		
Target of the test	An Oracle 9i AS		
Agent deploying the test	An internal agent		
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** In the **PORT** text box, it is recommended that you provide the port at which the OPMN (Oracle Process Manager and Notification) process of the Oracle application server instance listens. To know at which port OPMN listens, click on the Ports tab in the following URL: `http://<oraHttpServerIP>:<OraHttpServerport>`. This tab lists the port numbers that were assigned to the services executing on the Oracle application server. The port number displayed against the **Oracle notification server request port** entry is the OPMN port, and the same should be specified in the **PORT** text box. 4. **HOMEDIR** – The absolute path of the directory in which the Oracle 9i application server has been installed		
Outputs of the test	One set of results for every web context on each instance of the Oracle 9i AS monitored		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Active sessions: Indicates the current number of active sessions.	Number	A high value may indicate that there is a high load on the web context.
	Avg session lifetime: Indicates the average session life time during the last measurement period.	Secs	A high value may indicate that a session that was opened on this web context may not be closed properly.
	Avg servlet resolve time: Indicates the maximum time spent to create/locate the servlet instance (within the servlet context).	Secs	
	Avg servlet resolve time: Indicates the average time spent to create/locate the servlet instance (within the servlet context) during the last measurement period.	Secs	

11.5 The Oracle J2EE Layer

To monitor the health of the JSPs and servlets on an Oracle 9i AS instance, use the tests associated with this layer (see Figure 11.6).

Figure 11.6: The tests associated with the Oracle J2EE layer

11.5.1 Oracle 9i Jsps Test

This test reports the performance metrics related to the JSPs deployed in an Oracle9i application server instance. In order to enable users to easily manage and monitor the JSPs deployed on an Oracle 9i application server, the eG Enterprise suite provides the **Click Here** hyperlink, which when clicked allows users to add, modify, or delete groups of JSPs. **Note that by default eG Enterprise monitors only those JSPs that are part of a group.**

Purpose	Reports the performance metrics related to the JSPs deployed in an Oracle9i application server instance
Target of the test	An Oracle 9i AS
Agent deploying the test	An internal agent

<table>
<tr><td>Configurable parameters for the test</td><td colspan="3">1. TEST PERIOD - How often should the test be executed
2. HOST - The host for which the test is to be configured
3. PORT - In the PORT text box, it is recommended that you provide the port at which the OPMN (Oracle Process Manager and Notification) process of the Oracle application server instance listens. To know at which port OPMN listens, click on the Ports tab in the following URL: <code>http://<oraHttpServerIP>:<OraHttpServerport></code>. This tab lists the port numbers that were assigned to the services executing on the Oracle application server. The port number displayed against the Oracle notification server request port entry is the OPMN port, and the same should be specified in the PORT text box.
4. HOMEDIR – The absolute path of the directory in which the Oracle 9i application server has been installed
5. AUTODISCOVERY – By default, eG Enterprise allows administrators to configure JSP groups using the eG administrative interface, and reports metrics pertaining to every group so created. Accordingly, by default, AUTODISCOVERY is set to NO. If you want JSPs to be discovered and monitored automatically, then select the YES option against AUTODISCOVERY. When this is done, the eG agent automatically discovers all the JSPs on the server, and reports one set of measures for every JSP so discovered.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for every JSP group monitored or for every JSP auto-discovered (as the case may be)</td></tr>
<tr><td rowspan="4">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Threads serving JSPs:
Indicates the current number of active requests for the JSP.</td><td>Number</td><td>If a majority of the threads/processes are in use simultaneously to serve requests for a specific JSP, this may be indicative of a problem with the design of this page. Further investigation is needed to determine the cause of the bottleneck - whether it is the processing of the JSP, whether it is a bottleneck in the database tier, whether the database query (ies) are non-optimal etc. Alternatively, a slowdown of the application server may also cause the requests that are simultaneously executing to increase.</td></tr>
<tr><td>Requests completed:
Indicates the rate at which requests were processed by this JSP.</td><td>Reqs/Sec</td><td>Comparing this metric across JSPs can indicate which pages are most accessed. Optimizing the most heavily accessed pages can result in a significant improvement in the user-perceived performance of that web application.</td></tr>
<tr><td>Avg request process time:
Indicates the average time spent in servicing the JSP during the last measurement period.</td><td>Secs</td><td>An increase in this value may be indicative of a problem in the application server/JSP logic.</td></tr>
</table>

	Max request process time: Indicates the maximum time spent servicing a JSP since the server started.	Secs	

11.5.2 Oracle 9i Servlets Test

This test reports the performance metrics pertaining to the servlets deployed in an Oracle 9i AS instance. In order to enable users to easily manage and monitor servlets, the eG Enterprise suite provides the **Click Here** hyperlink, which when clicked allows users to add, modify, or delete servlet groups. **Note that by default eG Enterprise monitors only those servlets that are part of a group.**

Purpose	Reports the performance metrics related to the servlets deployed in an Oracle9i application server instance		
Target of the test	An Oracle 9i AS		
Agent deploying the test	An internal agent		
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** In the **PORT** text box, it is recommended that you provide the port at which the OPMN (Oracle Process Manager and Notification) process of the Oracle application server instance listens. To know at which port OPMN listens, click on the Ports tab in the following URL: `http://<oraHttpServerIP>:<OraHttpServerport>`. This tab lists the port numbers that were assigned to the services executing on the Oracle application server. The port number displayed against the **Oracle notification server request port** entry is the OPMN port, and the same should be specified in the **PORT** text box. 4. **HOMEDIR** – The absolute path of the directory in which the Oracle 9i application server has been installed 5. **AUTODISCOVERY** – By default, eG Enterprise allows administrators to configure servlet groups using the eG administrative interface, and reports metrics pertaining to every group so created. Accordingly, by default, **AUTODISCOVERY** is set to **NO**. If you want servlet s to be discovered and monitored automatically, then select the **YES** option against **AUTODISCOVERY**. When this is done, the eG agent automatically discovers all the servlet s on the server, and reports one set of measures for every servlet so discovered.		
Outputs of the test	One set of results for every servlet group configured or for every discovered servlet (as the case may be)		
Measurements made by the	**Measurement**	**Measurement Unit**	**Interpretation**

test	**Threads for servlet:** Indicates the current number of threads servicing this servlet.	Number	If a majority of the threads/processes are in use simultaneously to serve requests for a specific servlet, this may be indicative of a problem with a specific servlet or one of the components used by it. Alternatively, a slowdown of the application server may also cause the requests that are simultaneously executing to increase for all servlets.
	Requests completed: Indicates the rate of calls to the service() method.	Reqs/Sec	A very high value for this measure indicates that the servlet has been accessed many times.
	Avg request process time: Indicates the average time spent in servicing the servlet during the last measurement period.	Secs	Comparing the request processing time across servlets, an administrator can determine which servlet(s) can be a performance bottleneck. An increase in response time of a servlet with load, could indicate a design problem with the servlet - eg., use of a non-optimal database query, database connection pool shortage, contention for shared resources, etc.
	Max request process time: Indicates the maximum time spent on a servlet's service() call.	Secs	

Chapter 12

Monitoring Oracle 10g Application Servers

Oracle Application Server 10*g* offers a comprehensive solution for developing, integrating, and deploying applications, portals, and Web services. Based on a powerful and scalable J2EE server, Oracle Application Server 10*g* provides complete business integration and business intelligence suites, and best-of-breed portal software. Further, it is designed for grid computing and full lifecycle support for Service-Oriented Architecture (SOA).

In order to ensure that the quality of the business-critical services supported by the Oracle Application server 10*g* does not suffer due to incapacities of the application server, it is essential that the server is monitored 24 x 7, and its performance fine-tuned to meet the demands of the service users.

eG Enterprise provides out-of-the-box an *Oracle Application* monitoring model, that caters to the specific monitoring needs of the Oracle 10g application servers (see Figure 12.1).

Figure 12.1: The layer model of the Oracle 10G application server

As you can see, the monitoring model depicted by Figure 12.1 is the same as that which eG Enterprise offers for the Oracle 9i Application server (see Figure 11.1). The tests associated with every layer of Figure 12.1, and the metrics that each test reports, have therefore been discussed already in Chapter 11 of this document, which focuses on the *O9i Application Server* model.

The difference however lies in the **Oracle J2EE** layer, which supports two additional tests for the *Oracle Application* model– the **OracleEjbs** test and the **OracleJmsStore** test.

Note:

To effectively monitor an Oracle application server on Unix, ensure that the install user of the application server and that of the eG agent (which is monitoring the application server) are the same.

Hence, the sections to come will discuss only the **Oracle J2EE** layer and the two new tests associated with it.

12.1 The Oracle J2EE Layer

The tests associated with this layer monitor the health of the following:

- JSPs
- Servlets
- The EJB container
- Java Message Service (JMS)

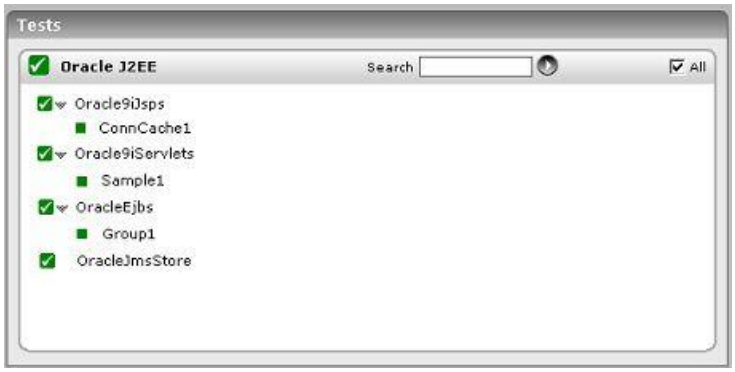

Figure 12.2: The tests associated with the Oracle J2EE layer

12.1.1 Oracle Ejbs Test

This test monitors the state of EJB component groups hosted on an Oracle application server (10g or higher). Use the **Click here** hyperlink in the test configuration page to configure the EJB groups that need to be monitored by the eG Enterprise suite. **By default, the eG Enterprise system will monitor only those EJBs that are part of a group.**

Purpose	Monitors the state of EJB component groups hosted on an Oracle application server (10g or higher)
Target of the test	An Oracle Application Server 10g or higher
Agent deploying the test	An internal agent

<table>
<tr><td>Configurable parameters for the test</td><td colspan="3">1. TEST PERIOD - How often should the test be executed
2. HOST - The host for which the test is to be configured
3. PORT - In the PORT text box, it is recommended that you provide the port at which the OPMN (Oracle Process Manager and Notification) process of the Oracle application server instance listens. To know at which port OPMN listens, click on the Ports tab in the following URL: <code>http://<oraHttpServerIP>:<OraHttpServerport></code>. This tab lists the port numbers that were assigned to the services executing on the Oracle application server. The port number displayed against the Oracle notification server request port entry is the OPMN port, and the same should be specified in the PORT text box.
4. HOMEDIR – The absolute path of the directory in which the Oracle application server has been installed
5. AUTODISCOVERY – By default, the eG suite allows administrators to configure EJB groups using the eG administrative interface, and reports metrics pertaining to every group so created. Accordingly, by default, AUTODISCOVERY is set to NO. If you want EJBs to be discovered and monitored automatically, then select the YES option against AUTODISCOVERY. When this is done, the eG agent automatically discovers all the EJBs on the application server, and reports one set of measures for every EJB on the server.
6. DETAILED DIAGNOSIS - To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the On option. To disable the capability, click on the Off option.
The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled:
➢ The eG manager license should allow the detailed diagnosis capability
➢ Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for every EJB group configured or every EJB auto-discovered</td></tr>
<tr><td rowspan="4">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Avg activation time:
Indicates the average time taken for activating this bean/ beans in this EJB group.</td><td>Secs</td><td></td></tr>
<tr><td>Avg creation time.:
Indicates the average time taken for creating this bean/ beans in this EJB group.</td><td>Secs</td><td></td></tr>
<tr><td>Avg passivation time:
Indicates the average time taken for passivating this bean/ beans in this EJB group.</td><td>Secs</td><td></td></tr>
<tr><td></td><td>Avg post create time:
Indicates the average time taken for a post create call on this bean/ beans in this EJB group.</td><td>Secs</td><td></td></tr>
</table>

	Avg removal time: Indicates the average time taken for removing this bean/ beans in this EJB group.	Secs	
	Bean activations: Indicates the number of times this bean/ beans in this EJB group were activated.	Number	
	Bean creations: Indicates the number of times this bean/beans in this EJB group were created.	Number	
	Bean passivations: Indicates the number of times this bean/ beans in this EJB group were passivated.	Number	
	Bean postcreations: Indicates the number of times this bean/ beans in this EJB group were post created.	Number	
	Bean removals: Indicates the number of times this bean/ beans in this EJB group were removed.	Number	
	Current threads activate: Indicates the number of threads that are currently used for activating this bean/ beans in this EJB group.	Number	
	Current threads creation: Indicates the number of threads that are currently used for invoking a create call on this bean/ beans in this EJB group.	Number	
	Current threads passivate: Indicates the number of threads that are currently used for passivating this bean/ beans in this EJB group.	Number	
	Current threads postcreate: Indicates the number of threads that are currently used for placing a postcreate call on this bean/ beans in this EJB group.	Number	
	Current threads remove: Indicates the number of threads that are currently used for removing this bean/ beans in this EJB group.	Number	

12.1.2 Oracle Jms Store Test

This test monitors the health of the Java Message Service (JMS) store that the Oracle Enterprise Messaging Service (OEMS) supports. OEMS is a standards-based (JMS, JCA) messaging platform offering a comprehensive set of messaging and integration features for developing and deploying distributed applications in a service-oriented architecture (SOA) environment. OEMS also forms the underlying messaging infrastructure for Oracle's Enterprise Service Bus (ESB) and the BPEL Process Manager components of Oracle Fusion Middleware.

Purpose	Monitors the health of the Java Message Service (JMS) specification that the Oracle Enterprise Messaging Service (OEMS) supports		
Target of the test	An Oracle Application Server 10g or higher		
Agent deploying the test	An internal agent		
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** In the **PORT** text box, it is recommended that you provide the port at which the OPMN (Oracle Process Manager and Notification) process of the Oracle application server instance listens. To know at which port OPMN listens, click on the Ports tab in the following URL: `http://<oraHttpServerIP>:<OraHttpServerport>`. This tab lists the port numbers that were assigned to the services executing on the Oracle application server. The port number displayed against the **Oracle notification server request port** entry is the OPMN port, and the same should be specified in the **PORT** text box. 4. **HOMEDIR** – The absolute path of the directory in which the Oracle application server has been installed		
Outputs of the test	One set of results for the Oracle Application server 10g that is monitored		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Messages count: Indicates the total number of messages in the store – both committed and rolledback.	Number	
	Messages dequeued: Indicates the number of dequeued messages.	Number	
	Messages discarded: Indicates the number of messages discarded from the store.	Number	

	Messages enqueued: Indicates the number of enqueued messages.	Number	
	Messages expired: Indicates the number of expired messages.	Number	
	Messages paged in: Indicates the number of paged in messages.	Number	
	Messages paged out: Indicates the number of paged out messages.	Number	
	Messages pending: Indicates the number of messages pending completion.	Number	
	Messages recovered: Indicates the number of recovered messages.	Number	
	Messages rolledback: Indicates the number of messages that were rolled back.	Number	
	Store size: Indicates the size of the JMS store.	MB	

Chapter 13

Monitoring Oracle Forms Servers

An important component of the Oracle Internet Platform is the **Oracle Forms Server**. This application server is optimized to deploy Oracle Forms applications in a multi-tiered environment. It delivers the application infrastructure and the event model to ensure that Internet-based Forms applications automatically scale and perform over any network.

Oracle Forms Developer and Oracle Forms Services provide a complete application framework for optimal deployment of Oracle Forms applications on the Internet. The Oracle Forms Developer enables business developers to build Java applications that are optimized for the Internet without writing any Java code. This developer is specifically designed and optimized to build transactional database applications for the Oracle8i/9i database. It integrates with the Oracle Designer to visually capture business requirements and transform them into physical designs. Using Oracle Forms Developer, you can customize Oracle's pre-packaged applications, to suit the needs of your organization.

It is therefore evident that even the slightest of disturbances in the overall performance or internal operation of the Oracle Forms server, can adversely impact the scalability and network compatability of the Forms applications it supports. If such an eventuality is to be prevented, then it is recommended that you continuously monitor the Oracle Forms server for any minor/major deviations.

eG Enterprise provides an exclusive *Oracle Forms9i* monitoring model (see Figure 13.1) that executes tests on the Forms server to keep track of its internal health and external availability, and alerts administrators of impending performance issues.

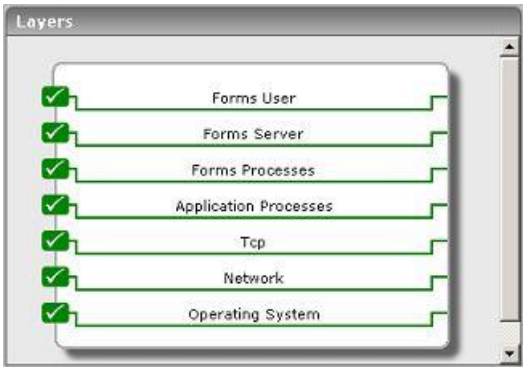

Figure 13.1: The layer model of an Oracle Forms server

The metrics that these tests collect from the Oracle Forms server, enable administrators to find quick and accurate answers to the following performance queries:

- Are all the critical Forms processes currently running?
- Is the resource consumption of the Forms processes optimal?
- How is the session load on the server? Are there too many sessions currently active on the server? Which users have initiated these sessions?
- Are there any idle sessions?
- What is the average session duration? Have sessions remained open for unreasonably long periods?
- Is the Forms server responding slowly to user requests? If so, which user do these requests pertain to?
- Is any user's processes consuming too much CPU and memory resources?

The sections to come will discuss the top 3 layers of Figure 13.1, as all other layers have been discussed elaborately in the *Monitoring Unix and Windows Servers* document.

Note:

Before attempting to monitor an Oracle Forms server, ensure that its **tracing** capability is enabled.

13.1 The Forms Processes Layer

This layer is associated with an **F9iProcess** test that reports how well the critical Forms server processes utilize the CPU and memory resources.

Figure 13.2: The tests associated with the Forms Processes layer

13.1.1 F9i Processes Test

This test reports the memory and CPU usage of the Oracle Forms 9i server processes.

Purpose	Reports the memory and CPU usage of the Oracle Forms 9i server processes		
Target of the test	An Oracle Forms Server		
Agent deploying the test	An internal agent		
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port to which the specified **HOST** listens 4. **FORMWORKDIR** – The path to the install directory of the Oracle Forms 9i server. Typically, this will be the <ORAHOMEDIR>/Forms90/. 5. **FORMSRUNTIME** - The value, "ifweb90.exe", is displayed here. This is the Forms server runtime executable. 6. **ORAHOMEDIR** - The install directory of the Oracle 9i server. This specification becomes more important when more than one Oracle 9i AS installation exists on a host. 7. **TRCCLEANUPTIME** - For Oracle 9i Forms monitoring, eG requires tracing to be enabled for the server. The trace files corresponding to completed sessions are automatically cleaned by the eG agent. The frequency with which these files are to be cleared from the server is to be specified in the **TRCCLEANUPTIME** textbox. The default value displayed in the **TRCCLEANUPTIME** text box is 30 minutes.		
Outputs of the test	One set of results for every Oracle Forms server monitored		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Number of processes running: Indicates the number of Forms processes currently running.	Number	This value indicates if too many or too few instances corresponding to the specified process are executing on the host.

	CPU usage: Indicates the percentage of CPU time utilized by the Forms processes.	Percent	A very high value could indicate that the specified process is consuming excessive CPU resources.
	Memory usage: Indicates the percentage of memory utilized by the Forms processes.	Percent	

13.2 The Forms Server Layer

This layer tracks the user sessions to the Forms server to identify sessions that have been open for an unreasonably long time. In addition, the layer also measures the responsiveness of the Forms server to client requests.

Figure 13.3: Tests associated with the Forms Server layer

13.2.1 F9i Sessions Test

This test monitors the user sessions to the Oracle Forms 9i server.

Purpose	Monitors the user sessions to the Oracle Forms 9i server
Target of the test	An Oracle Forms Server
Agent deploying the test	An internal agent

<table>
<tr><td>Configurable parameters for the test</td><td colspan="3">1. TEST PERIOD - How often should the test be executed
2. HOST - The host for which the test is to be configured
3. PORT - The port to which the specified HOST listens
4. FORMWORKDIR – The path to the install directory of the Oracle Forms 9i server. Typically, this will be the <ORAHOMEDIR>/Forms90/.
5. FORMSRUNTIME - The value, "ifweb90.exe", is displayed here. This is the Forms server runtime executable.
6. ORAHOMEDIR - The install directory of the Oracle 9i server. This specification becomes more important when more than one Oracle 9i AS installation exists on a host.
7. TRCCLEANUPTIME - For Oracle 9i Forms monitoring, eG requires tracing to be enabled for the server. The trace files corresponding to completed sessions are automatically cleaned by the eG agent. The frequency with which these files are to be cleared from the server is to be specified in the TRCCLEANUPTIME textbox. The default value displayed in the TRCCLEANUPTIME text box is 30 minutes.
8. SESSIONIDLETIME - One of the measures returned by this test, is the number of idle sessions. While taking a count of idle sessions, the test will consider only those sessions that have remained idle for the duration specified in the SESSIONIDLETIME text box. The default value displayed here is 10. This means that the test will track those sessions that have been idle for 10 minutes or more. You can change this value, if required.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for every Oracle Forms server monitored</td></tr>
<tr><td rowspan="5">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Total sessions:
Indicates the total number of Forms sessions currently running.</td><td>Number</td><td>Tracking the value of this measure over time provides an idea of the workload of the Forms server.</td></tr>
<tr><td>Active sessions:
Indicates the total number of currently active Forms sessions.</td><td>Number</td><td>A high value may indicate that there is a heavy processing load on the server.</td></tr>
<tr><td>Idle sessions:
Indicates the total number of currently idle Forms sessions.</td><td>Number</td><td></td></tr>
<tr><td>Sessions added:
Indicates the total number of Forms sessions newly added in the last measurement period.</td><td>Number</td><td></td></tr>
<tr><td></td><td>Sessions removed:
Indicates the total number of Forms sessions removed in the last measurement period.</td><td>Number</td><td>This metric can indicate unusual session disconnects.</td></tr>
<tr><td></td><td>Avg session duration:
Indicates the average duration of all current sessions.</td><td>Mins</td><td>By tracking the average duration of current sessions and the number of simultaneous sessions, a Forms administrator can obtain critical information for capacity planning.</td></tr>
</table>

13.2.2 F9i Response Test

This test measures the responsiveness of the Oracle Forms 9i server to user requests.

Purpose	Measures the responsiveness of the Oracle Forms 9i server to user requests		
Target of the test	An Oracle Forms Server		
Agent deploying the test	An internal agent		
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port to which the specified **HOST** listens 4. **FORMWORKDIR** – The path to the install directory of the Oracle Forms 9i server. Typically, this will be the <ORAHOMEDIR>/Forms90/. 5. **FORMSRUNTIME** - The value, "ifweb90.exe", is displayed here. This is the Forms server runtime executable. 6. **ORAHOMEDIR** - The install directory of the Oracle 9i server. This specification becomes more important when more than one Oracle 9i AS installation exists on a host. 7. **TRCCLEANUPTIME** - For Oracle 9i Forms monitoring, eG requires tracing to be enabled for the server. The trace files corresponding to completed sessions are automatically cleaned by the eG agent. The frequency with which these files are to be cleared from the server is to be specified in the **TRCCLEANUPTIME** textbox. The default value displayed in the **TRCCLEANUPTIME** text box is 30 minutes.		
Outputs of the test	One set of results for every Oracle Forms server monitored		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Forms request rate: Indicates the rate of requests processed by the Forms server during the last measurement period.	Reqs/Sec	A high value may indicate that there is a heavy load on the Forms server
	Database request rate: Indicates the rate of requests from the Forms server to the database server during the last measurement period	Reqs/Sec	A high value may indicate that there is a heavy load on the database server
	Client/network response time: Indicates the average time spent by requests in the last measurement period waiting for responses from the client. This measure includes the client think time and the network latency.	Secs	A sudden increase in response time could indicate a heavy network traffic.

	Forms server response time: Indicates the average processing time of requests at the Forms server.	Secs	A sudden increase in response time is indicative of a potential performance bottleneck on the Forms server.
	Database response time: Indicates the average response time of the database server for servicing requests passed to it from the Forms server.	Secs	A sudden increase in response time is indicative of a potential performance bottleneck on the database server.

13.3 The Forms User Layer

Use the **F9iUsers** test associated with this layer to track the user activity on the Forms server.

Figure 13.4: Tests associated with the Forms User layer

13.3.1 F9i Users Test

This test reports general statistics pertaining to the database users.

Purpose	Reports general statistics pertaining to the database users
Target of the test	An Oracle Forms Server
Agent deploying the test	An internal agent

<table>
<tr><td>Configurable parameters for the test</td><td colspan="3">1. TEST PERIOD - How often should the test be executed
2. HOST - The host for which the test is to be configured
3. PORT - The port to which the specified HOST listens
4. FORMWORKDIR – The path to the install directory of the Oracle Forms 9i server. Typically, this will be the <ORAHOMEDIR>/Forms90/.
5. FORMSRUNTIME - The value, "ifweb90.exe", is displayed here. This is the Forms server runtime executable.
6. ORAHOMEDIR - The install directory of the Oracle 9i server. This specification becomes more important when more than one Oracle 9i AS installation exists on a host.
7. TRCCLEANUPTIME - For Oracle 9i Forms monitoring, eG requires tracing to be enabled for the server. The trace files corresponding to completed sessions are automatically cleaned by the eG agent. The frequency with which these files are to be cleared from the server is to be specified in the TRCCLEANUPTIME textbox. The default value displayed in the TRCCLEANUPTIME text box is 30 minutes.</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for every Oracle Forms server user being monitored</td></tr>
<tr><td rowspan="5">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Forms request rate:
Indicates the rate of requests received by a Forms server for a specific user during the last measurement period.</td><td>Reqs/Sec</td><td>A comparison of this measure across users can be used to determine which user(s) are heavily using the Forms server.</td></tr>
<tr><td>Database request rate:
Indicates the rate of requests to the database issued by the Forms server for a specific user during the last measurement period.</td><td>Reqs/Sec</td><td>A comparison of this measure across users can indicate the top users of the Forms database.</td></tr>
<tr><td>Client/network response time:
Indicates the response time of the client and network for this database user.</td><td>Secs</td><td>A sudden increase in response time could be indicative of heavy network traffic.</td></tr>
<tr><td>Forms server response time:
Indicates the response time of the Forms server for a particular database user.</td><td>Secs</td><td>A sudden increase in response time is indicative of a potential performance bottleneck in the Forms server.</td></tr>
<tr><td></td><td>Database response time:
Indicates the response time of the database for a particular database user.</td><td>Secs</td><td>A sudden increase in response time is indicative of a potential performance bottleneck on the database server.</td></tr>
<tr><td></td><td>Sessions:
Indicates the total number of Forms sessions running for a particular database user.</td><td>Number</td><td>A high value may indicate that there is a high load on the server.</td></tr>
</table>

	Avg session duration: Indicates the average duration of the Forms sessions running for a particular database user.	Mins	
	Memory usage: Indicates the percentage of memory utilized by the Forms processes corresponding to a particular database user.	Percent	A sudden increase in memory utilization for a process may be indicative of memory leaks in the application.
	CPU usage: Indicates the percentage of CPU time utilized by the Forms processes corresponding to a particular database user.	Percent	A very high value could indicate that the processes are consuming excessive CPU resources.

Chapter 14

Monitoring Borland Enterprise Servers (BES)

The Borland Enterprise Server is a set of services and tools that enable users to build, deploy, and manage enterprise applications in any corporate environment. These applications provide dynamic content by using JSP, servlets, and Enterprise Java Bean (EJB) technologies.

Just like any other application server, it is imperative to monitor the BES also, so as to ensure the stability of the mission-critical services it supports.

eG Enterprise has developed a specialized *Borland* monitoring model (see Figure 14.1), that monitors all internal and external parameters that can affect the performance of the BES.

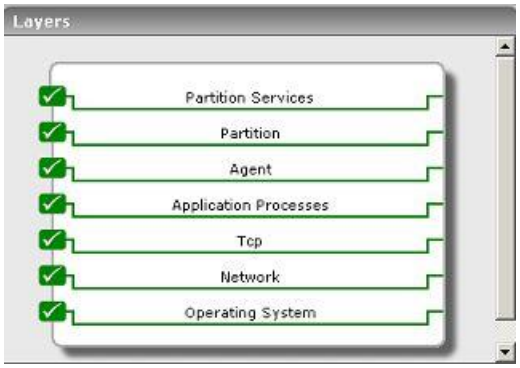

Figure 14.1: The layer model of a Borland Enterprise server

Every layer of Figure 14.1 is mapped to a set of tests, which when executed on the BES, extracts critical statistics that can enable administrators to determine the following:

- Does the BES management agent have adequate memory to discharge its duties?
- Is sufficient memory available to the BES partitions?
- Where is BES spending too much time? - is it on any of the CMP-related activities? is it on any JDBC1 or JDBC2 activity? is it on activating or passivating EJBs? or is it on specific transactions?

The following sections discuss each of the top 3 layers of Figure 14.1 elaborately. The other layers have already been dealt with in the *Monitoring Unix and Windows Servers* document.

14.1 The Agent Layer

To monitor the memory usage of the BES management agent, use the **AgentStat** test associated with this layer.

Figure 14.2: The tests associated with the Agent layer

14.1.1 Agent Statistics Test

This test reports the runtime statistics pertaining to a BES management agent.

Purpose	Reports the runtime statistics pertaining to a BES management agent		
Target of the test	A BES server		
Agent deploying the test	An internal agent		
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The smart agent port number 4. **MGMT_PORT_NUMBER** – The port number where the management agent listens 5. **USER** – The name of a BES user 6. **PASSWORD** – The password of the specified **USER** 7. **CONFIRM PASSWORD** – Confirm the **PASSWORD** by retyping it here. 8. **REALM** - The BES server realm		
Outputs of the test	One set of results for every BES server monitored		
Measurements made by the	**Measurement**	**Measurement Unit**	**Interpretation**

test	**Memory available:** Indicates the heap available for the management agent.	MB	
	Memory used: Indicates the amount of heap used by the management agent.	MB	
	Max memory used: Indicates the maximum amount of heap used by the management agent.	MB	
	Active threads: Indicates the current number of active threads in the management agent	Number	
	Num of partitions: Indicates the number of partitions in use under this management agent	Number	

14.2 The Partition Layer

The tests associated with the **Partition** layer help administrators determine how efficiently the BES performs garbage collection, and how well its partitions function.

Figure 14.3: The tests associated with the Partition layer

The JVMGC test has already been discussed while discussing the tests associated with a WebLogic server. This section will therefore deal with the PartitionStat test only.

14.2.1 Partition Stat Test

The PartitionStat test reports the runtime statistics of a BES partition.

Purpose	Reports the runtime statistics pertaining of a BES partition
Target of the	A BES server

test			
Agent deploying the test	An internal Agent		
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The smart agent port number 4. **MGMT_PORT_NUMBER** – The port number where the management agent listens 5. **USER** – The name of a BES user 6. **PASSWORD** – The password of the specified **USER** 7. **CONFIRM PASSWORD** – Confirm the **PASSWORD** by retyping it here. 8. **REALM** - The BES server realm		
Outputs of the test	One set of results for every BES partition monitored		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Memory available: Indicates the heap available for the partition.	MB	
	Memory used: Indicates the amount of heap used by the partition.	MB	
	Max memory used: Indicates the maximum amount of heap used by the partition.	MB	
	Active thread count: Indicates the current number of active threads in the partition	Number	
	Deployed archives: Indicates the number of archives deployed in the partition	Number	

14.3 The Partition Services Layer

The tests mapped to this layer reports the time taken by BES for performing the following (see Figure 14.4):

- CMP and other activities
- JDBC1 and JDBC2 activities
- Activating and Passivating stateful session beans
- Different types of transactions

Figure 14.4: The tests associated with the Partition Services layer

14.3.1 CMP Test

This test reports the time taken by the BES EJB container for performing CMP related activities.

Purpose	Reports the time taken by the BES EJB container for performing CMP related activities		
Target of the test	A BES server		
Agent deploying the test	An internal agent		
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The smart agent port number 4. **MGMT_PORT_NUMBER** – The port number where the management agent listens 5. **USER** – The name of a BES user 6. **PASSWORD** – The password of the specified **USER** 7. **CONFIRM PASSWORD** – Confirm the **PASSWORD** by retyping it here. 8. **REALM** - The BES server realm		
Outputs of the test	One set of results for every BES partition monitored		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	EntityHome: Indicates the time spent in the container, implementing EJBHome-related operations specific to Entity beans.	Secs	

	Cmp: Indicates the time spent in the CMP engine (excluding other CMP tasks listed explicitly).	Secs	
	CmpInit: Indicates the time spent initializing the CMP engine (startup cost only).	Secs	
	CmpQuery: Indicates the time spent in the CMP engine doing SQL queries.	Secs	
	CmpUpdate: Indicates the time spent in the CMP engine doing SQL updates	Secs	
	CmpGetConn: Indicates the time spent in the CMP engine getting JDBC connections (startup cost only).	Secs	
	CmpPrepareStmt: Indicates the time spent in the CMP engine preparing statements (startup cost only).	Secs	

14.3.2 Ejb Cont Stat Test

This test reports the time taken by the BES EJB container for performing various activities.

Purpose	Reports the time taken by the BES EJB container for performing various activities
Target of the test	A BES server
Agent deploying the test	An internal agent
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The smart agent port number 4. **MGMT_PORT_NUMBER** – The port number where the management agent listens 5. **USER** – The name of a BES user 6. **PASSWORD** – The password of the specified **USER** 7. **CONFIRM PASSWORD** – Confirm the **PASSWORD** by retyping it here. 8. **REALM** - The BES server realm
Outputs of the test	One set of results for every BES partition monitored

Measurements made by the test	Measurement	Measurement Unit	Interpretation
	DispatchPOA: Indicates the time spent on receiving the TCP request, and sending the reply.	Secs	
	DispatchHome: Indicates the time spent in the container dispatching methods to EJBHome objects.	Secs	
	DispatchRemote: Indicates the time spent in the container dispatching methods to EJBRemote objects.	Secs	
	DispatchBean: Indicates the time spent in the bean methods.	Secs	
	ResourceCommit: Indicates the time spent specifically in committing the work done on the resource (that is, in committing to a database such as Oracle)	Secs	
	Synchronization: Indicates the time spent in various Synchronization callbacks.	Secs	
	LoadClass: Indicates the time spent loading classes from EJB Jars, etc. (startup cost only).	Secs	
	ORBActivate: Indicates the time spent in the ORB, allocating objects from pools	Secs	
	ORBDeactivate: Indicates the time spent in the ORB, releasing objects to pools	Secs	

14.3.3 JDBC1 Test

This test reports the time taken by BES for performing JDBC1 related activities.

Purpose	Reports the time taken by BES for performing JDBC1 related activities
Target of the test	A BES server
Agent	An internal Agent

deploying the test			
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The smart agent port number 4. **MGMT_PORT_NUMBER** – The port number where the management agent listens 5. **USER** – The name of a BES user 6. **PASSWORD** – The password of the specified **USER** 7. **CONFIRM PASSWORD** – Confirm the **PASSWORD** by retyping it here. 8. **REALM** - The BES server realm		
Outputs of the test	One set of results for every BES partition monitored		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Jdbc1GetCon: Indicates the time spent in the Jdbc1 data source to get a pooled connection.	Secs	
	Jdbc1NewCon: Indicates the time spent in the Jdbc1 datasource to get a new connection (startup cost only).	Secs	
	Jdbc1RegRes: Indicates the time spent in the Jdbc1 datasource to register a transaction resource in transaction service.	Secs	

14.3.4 JDBC2 Test

This test reports the time taken by BES for performing JDBC2 related activities.

Purpose	Reports the time taken by BES for performing JDBC2 related activities
Target of the test	A BES server
Agent deploying the test	An internal Agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The smart agent port number 4. **MGMT_PORT_NUMBER** – The port number where the management agent listens 5. **USER** – The name of a BES user 6. **PASSWORD** – The password of the specified **USER** 7. **CONFIRM PASSWORD** – Confirm the **PASSWORD** by retyping it here. 8. **REALM** - The BES server realm		
Outputs of the test	One set of results for every BES partition monitored		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Jdbc2GetCon: Indicates the time spent in the Jdbc2 datasource to get a pooled connection.	Secs	
	Jdbc2NewCon: Indicates the time spent in the Jdbc2 datasource to get a new connection (startup cost only).	Secs	
	Jdbc2RegRes: Indicates the time spent in the Jdbc2 datasource to register a transaction resource in transaction service.	Secs	
	Jdbc2NewXaCon: Indicates the time spent in the Jdbc2 datasource to get a new XA-enabled connection (startup cost only)	Secs	
	Jdbc2XaStart: Indicates the time spent in the Jdbc2 datasource, starting a transaction branch	Secs	
	Jdbc2XaEnd: Indicates the time spent in the Jdbc2 datasource to end a transaction branch.	Secs	

14.3.5 SFBeans Test

This test reports the time taken by the EJB container for passivating and activating stateful session beans.

Purpose	Reports the time taken by the EJB container for passivating and activating stateful session beans
Target of the	A BES server

<table>
<tr><td>test</td><td colspan="3"></td></tr>
<tr><td>Agent deploying the test</td><td colspan="3">An internal Agent</td></tr>
<tr><td>Configurable parameters for the test</td><td colspan="3">1. TEST PERIOD - How often should the test be executed
2. HOST - The host for which the test is to be configured
3. PORT - The smart agent port number
4. MGMT_PORT_NUMBER – The port number where the management agent listens
5. USER – The name of a BES user
6. PASSWORD – The password of the specified USER
7. CONFIRM PASSWORD – Confirm the PASSWORD by retyping it here.
8. REALM - The BES server realm</td></tr>
<tr><td>Outputs of the test</td><td colspan="3">One set of results for every BES partition monitored</td></tr>
<tr><td rowspan="3">Measurements made by the test</td><td>Measurement</td><td>Measurement Unit</td><td>Interpretation</td></tr>
<tr><td>Activation time:
Indicates the time spent in activating a stateful session bean.</td><td>Secs</td><td>If the EJB container spends more time in passivating and activating the bean instances, then try increasing the timeout period for EJBs. The default value is five seconds. This property can be set in the container properties file for the Partition you are configuring. This file is located at: /var/servers//adm/properties/partitions/(partition-name)/services/ejbcontainer.properties. This file can be edited to set the ejb.sfsb.passivation_timeout property.</td></tr>
<tr><td>Passivation time:
Indicates the time spent passivating stateful session beans.</td><td>Secs</td><td>If the EJB container spends more time in passivating and activating the bean instances, then try increasing the timeout period for EJBs. The default value is five seconds. This property can be set in the container properties file for the Partition you are configuring. This file is located at: /var/servers//adm/properties/partitions/(partition-name)/services/ejbcontainer.properties. This file can be edited to set the ejb.sfsb.passivation_timeout property.</td></tr>
</table>

14.3.6 Transactions Test

This test reports the time taken by the EJB container for performing transaction related activities.

Purpose	Reports the time taken by the EJB container for performing transaction related activities		
Target of the test	A BES server		
Agent deploying the test	An internal Agent		
Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The smart agent port number 4. **MGMT_PORT_NUMBER** – The port number where the management agent listens 5. **USER** – The name of a BES user 6. **PASSWORD** – The password of the specified **USER** 7. **CONFIRM PASSWORD** – Confirm the **PASSWORD** by retyping it here. 8. **REALM** - The BES server realm		
Outputs of the test	One set of results for every BES partition monitored		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Begin transactions: Indicates the time spent beginning transactions.	Secs	
	Commit transactions: Indicates the time spent beginning transactions.	Secs	
	Rollback transactions: Indicates the time spent rolling back transactions	Secs	

Chapter 15

Monitoring JBoss Application Servers

The JBoss Application Server is a widely used Java application server that provides a J2EE certified platform for developing and deploying enterprise Java applications, web applications, and portals, and also offers extended enterprise services such as clustering, caching, and persistence.

To monitor the JBoss application server, eG requires administrators to deploy two specialized components on the target server. These components are, the **eG MBean Service** component, and the **eG Web Component**.

- **eG MBean Service Component:** This service is started by JBoss as soon as this component is deployed to the server. The main purpose of this component is to get the MBean server instance running on the JBoss server. It also provides static methods which use the MBean server instance to gather relevant statistics from the JBoss server.
- **eG Web Component:** This web component consists of one servlet. The eG agent will connect to this servlet by passing relevant arguments. The servlet will then invoke the corresponding static method of the MBean service component and return the result to the eG agent. The agent will then compute the required metrics and upload the same the eG manager.

In order to enable the eG agents to extract statistics from the JBoss server, the above-mentioned components need to be deployed on the JBoss server.

Once the components are deployed on the JBoss server, the eG agent periodically executes tests on the server to capture the statistics collected by the components, and reports them to the eG manager. These tests are mapped to specific layers of the JBoss application server's layer model (see Figure 15.1).

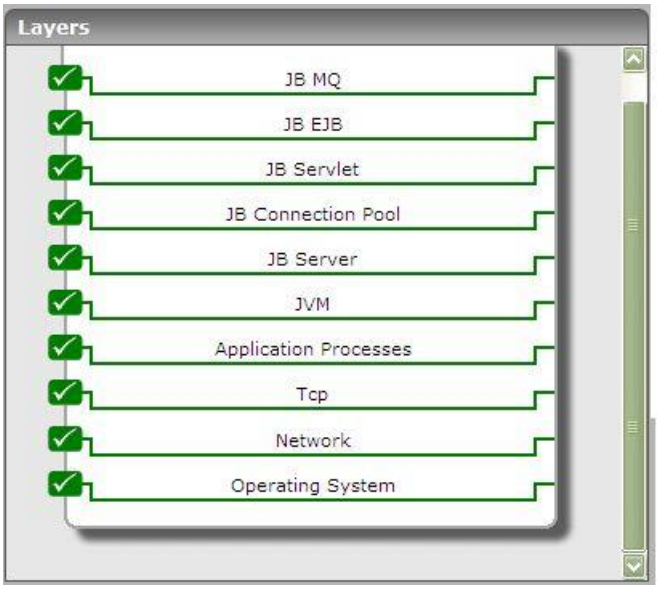

Figure 15.1: The layer model of a JBoss application server

Note:

The *JBoss* monitoring model provided by eG Enterprise (see Figure 15.1) can be used to monitor a JBoss server (versions 4.0 and 4.2.3), in an agent-based or an agentless manner.

The measures reported by the tests enable JBoss administrators to make accurate performance judgments with respect to the following:

JVM heap monitoring	➢ How much memory has been allocated to the JVM heap? ➢ Is adequate free memory available in the JVM heap?
Request processing capability Monitoring	➢ Is the server taking too long to process requests? ➢ Are too many errors encountered by the server during request processing? ➢ Is the server overloaded with requests?
Thread pool monitoring	➢ How many threads are currently busy? Does the server appear to be handling too much load? ➢ Are there adequate spare threads in the pool for

	future processing requirements? ➢ Does the thread pool require resizing?
Connection pool monitoring	➢ Are enough connections available in the connection pool, or do more connections have to be allotted to the pool?
Servlet monitoring	➢ How frequently was the servlet invoked? ➢ Does the servlet take too long to execute?
EJB monitoring	➢ How frequently are EJBs created/removed? ➢ Are there any EJBs that are ready to service clients? ➢ How many EJBs are currently in the EJB pool?
Messaging service monitoring	➢ Are too many messages have been enqueued? ➢ How quickly does the queue process messages within?
Topic monitoring	➢ Does the topic take too long to process messages? ➢ What type of messages are currently available in the topic - durable or non-durable? ➢ How many durable subscribers are there to a topic?

The sections to come will indulge in an elaborate discussion of the top 6 layers of the layer model depicted by Figure 15.1. As the other layers have been dealt with in great detail in the *Monitoring Unix and Windows Servers* document, this chapter will not be discussing them again.

15.1 The JVM Layer

This layer collectively reports the resource usage and overall health of the JBoss JVM.

Figure 15.2: The tests mapped to the JVM layer

All the tests displayed in Figure 15.2 have been dealt with in the previous chapters.

15.2 The JB Server Layer

The tests associated with the **JB Server** layer (see Figure 15.3) measure the request processing capability of the JBoss server by monitoring critical parameters such as thread pool usage and memory heap utilization.

Figure 15.3: The tests associated with the JB Server layer

15.2.1 Jboss JVM Test

This test monitors the heap usage and thread usage of the Java Virtual Machine (JVM) on which the JBoss application server runs.

Purpose	Monitors the heap usage and thread usage of the Java Virtual Machine (JVM) on which the JBoss application server runs
Target of the test	A JBoss application server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port number at which the specified **HOST** listens 4. **MEASUREMENT MODE** – This test can extract metrics from JBoss using either of the following mechanisms: • By deploying the **EgJBossAgent.sar** and **egjboss.war** files on the target JBoss server; • By contacting the Java runtime (JRE) of JBoss via **JMX** To configure the test to use the **EgJBossAgent.sar** and **egjboss.war** files, first, select the **War File** option. Then, refer to the *Configuring and Monitoring JBoss Servers* document to know how to deploy these files on the target JBoss server. On the other hand, if you want the test to use JMX instead, then first, select the **JMX** option. Then, follow the procedure detailed in the *Configuring and Monitoring JBoss Servers* document to configure the test to use **JMX**. By default, the **JMX** option is chosen here. 5. **JNDINAME** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same. 6. **JMX REMOTE PORT** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *management.properties* file of the target JBoss server (refer to the *Configuring and Monitoring JBoss Servers* document for more details). 7. **JMX USER**, **JMX PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MEASUREMENT MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **JMX USER** and **JMX PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to the *Configuring and Monitoring JBoss Servers* document. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 8. **SSL -** This parameter appears only if the **MEASUREMENT MODE** is set to **War File**. Indicate **Yes** if the JBoss server is SSL-enabled. 9. **URL** - This parameter appears only if the **MEASUREMENT MODE** is set to **War File**. Specify the URL to be accessed to collect metrics pertaining to the JBoss server. By default, this test connects to a managed JBoss server and attempts to obtain the metrics of interest by accessing the local Mbeans of the server. Accordingly, by default, this parameter is set to **http://<JBossServerIP>:<JbossServerPort>**. 10. **JMX PROVIDER** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. This test uses a JMX Provider to access the MBean attributes of the JBoss server and collect metrics. Specify the package name of this JMX Provider here. By default, this is set to *com.sun.jmx.remote.protocol*. 11. **TIMEOUT** – Specify the duration (in seconds) for which this test should wait for a response from the JBoss server. If there is no response from the server beyond the configured duration, the test will timeout. By default, this is set to *240* seconds.
Outputs of the test	One set of results for every JBoss server monitored

Measurements made by the test	Measurement	Measurement Unit	Interpretation
	Free memory: Indicates the memory available in the JVM heap of the JBoss application server.	MB	If this value decreases consistently, then try increasing the memory heap of the JVM.
	Used memory: Indicates the amount of JVM heap memory used.	MB	
	Total memory: Indicates the total memory allocated to the JVM.	MB	
	Active threads: Indicates the total number of threads that are currently active in the JBoss server.	Number	

15.2.2 Jboss Server Test

This test monitors the requests handled by the JBoss server.

Purpose	Monitors the requests handled by the JBoss server
Target of the test	A JBoss application server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port number at which the specified **HOST** listens 4. **MEASUREMENT MODE** – This test can extract metrics from JBoss using either of the following mechanisms: • By deploying the **EgJBossAgent.sar** and **egjboss.war** files on the target JBoss server; • By contacting the Java runtime (JRE) of JBoss via **JMX** To configure the test to use the **EgJBossAgent.sar** and **egjboss.war** files, first, select the **War File** option. Then, refer to the *Configuring and Monitoring JBoss Servers* document to know how to deploy these files on the target JBoss server. On the other hand, if you want the test to use JMX instead, then first, select the **JMX** option. Then, follow the procedure detailed in the *Configuring and Monitoring JBoss Servers* document to configure the test to use **JMX**. By default, the **JMX** option is chosen here. 5. **JNDINAME** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same. 6. **JMX REMOTE PORT** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *management.properties* file of the target JBoss server (refer to the *Configuring and Monitoring JBoss Servers* document for more details). 7. **JMX USER**, **JMX PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MEASUREMENT MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **JMX USER** and **JMX PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to the *Configuring and Monitoring JBoss Servers* document. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 8. **SSL -** This parameter appears only if the **MEASUREMENT MODE** is set to **War File**. Indicate **Yes** if the JBoss server is SSL-enabled. 9. **URL** - This parameter appears only if the **MEASUREMENT MODE** is set to **War File**. Specify the URL to be accessed to collect metrics pertaining to the JBoss server. By default, this test connects to a managed JBoss server and attempts to obtain the metrics of interest by accessing the local Mbeans of the server. Accordingly, by default, this parameter is set to **http://<JBossServerIP>:<JbossServerPort>**. 10. **JMX PROVIDER** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. This test uses a JMX Provider to access the MBean attributes of the JBoss server and collect metrics. Specify the package name of this JMX Provider here. By default, this is set to *com.sun.jmx.remote.protocol*. 11. **TIMEOUT** – Specify the duration (in seconds) for which this test should wait for a response from the JBoss server. If there is no response from the server beyond the configured duration, the test will timeout. By default, this is set to *240* seconds.
Outputs of the test	One set of results for every JBoss server monitored

Measurements made by the test	Measurement	Measurement Unit	Interpretation
	Request rate: Indicates the rate of requests to the server during the last measurement period.	Reqs/Sec	With the advent of HTTP/1.1 multiple requests can be transmitted over the same TCP connection. The ratio of requests per connection can provide an idea of the effectiveness of the HTTP 1.1 protocol.
	Data transmit rate: Indicates the rate at which the data was transmitted by the server during the last measurement period.	KB/Sec	A large increase in the data transmission rate can be indicative of an increase in the popularity of one or more web sites hosted on the server.
	Data received rate: Indicates the rate at which data was received by the server during the last measurement period.	KB/Sec	An increase in this value is indicative of an increase in user requests to the server.
	Avg request processing time: Indicates the average time taken by the server to process requests.	MSecs	A high value may be an indication of slow performance of the server.
	Max request processing time: Indicates the maximum time taken by the server to process requests.	MSecs	
	Error rate: Indicates the rate at which errors were encountered by the server in the last measurement period.	Errors/Sec	

15.2.3 Jboss Thread Pools Test

This test monitors the thread pools in the JBoss server.

Purpose	Monitors the thread pools in the JBoss server
Target of the test	A JBoss application server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port number at which the specified **HOST** listens 4. **MEASUREMENT MODE** – This test can extract metrics from JBoss using either of the following mechanisms: • By deploying the **EgJBossAgent.sar** and **egjboss.war** files on the target JBoss server; • By contacting the Java runtime (JRE) of JBoss via **JMX** To configure the test to use the **EgJBossAgent.sar** and **egjboss.war** files, first, select the **War File** option. Then, refer to the *Configuring and Monitoring JBoss Servers* document to know how to deploy these files on the target JBoss server. On the other hand, if you want the test to use JMX instead, then first, select the **JMX** option. Then, follow the procedure detailed in the *Configuring and Monitoring JBoss Servers* document to configure the test to use **JMX**. By default, the **JMX** option is chosen here. 5. **JNDINAME** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same. 6. **JMX REMOTE PORT** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *management.properties* file of the target JBoss server (refer to the *Configuring and Monitoring JBoss Servers* document for more details). 7. **JMX USER**, **JMX PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MEASUREMENT MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **JMX USER** and **JMX PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to the *Configuring and Monitoring JBoss Servers* document. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 8. **SSL -** This parameter appears only if the **MEASUREMENT MODE** is set to **War File**. Indicate **Yes** if the JBoss server is SSL-enabled. 9. **URL** - This parameter appears only if the **MEASUREMENT MODE** is set to **War File**. Specify the URL to be accessed to collect metrics pertaining to the JBoss server. By default, this test connects to a managed JBoss server and attempts to obtain the metrics of interest by accessing the local Mbeans of the server. Accordingly, by default, this parameter is set to **http://<JBossServerIP>:<JbossServerPort>**. 10. **JMX PROVIDER** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. This test uses a JMX Provider to access the MBean attributes of the JBoss server and collect metrics. Specify the package name of this JMX Provider here. By default, this is set to *com.sun.jmx.remote.protocol*. 11. **TIMEOUT** – Specify the duration (in seconds) for which this test should wait for a response from the JBoss server. If there is no response from the server beyond the configured duration, the test will timeout. By default, this is set to *240* seconds.
Outputs of the test	One set of results for each thread pool configured in the JBoss server.

Measurements made by the test	Measurement	Measurement Unit	Interpretation
	Current busy threads: Indicates the number of threads that are currently busy.	Number	The value of this measure serves as a good indicator of server workload.
	Current thread count: Indicates the number of threads currently spawned in the JVM.	Number	
	Min spare threads: Indicates the minimum number of spare threads.	Number	
	Max spare threads: Indicates the maximum number of spare threads.	Number	
	Max threads: Indicates the maximum number of threads that this pool can contain.	Number	If the number of threads in a pool grows close to the value of this measure, it indicates that the number of threads in the pool needs to be increased for effective operation of this application. Alternatively, you may also consider changing the maximum number of threads that a pool can contain. However, exercise caution when altering the maximum thread count, as a very high thread count can cause the app to slowdown from excessive memory usage. Likewise, if the maximum thread count is set too low, it will cause requests to block or timeout.

15.3 The JB Connection Pool Layer

This layer of the JBoss application server monitors the connection pools configured in the JBoss application server, and indicates whether the pools have been adequately sized and are being effectively utilized.

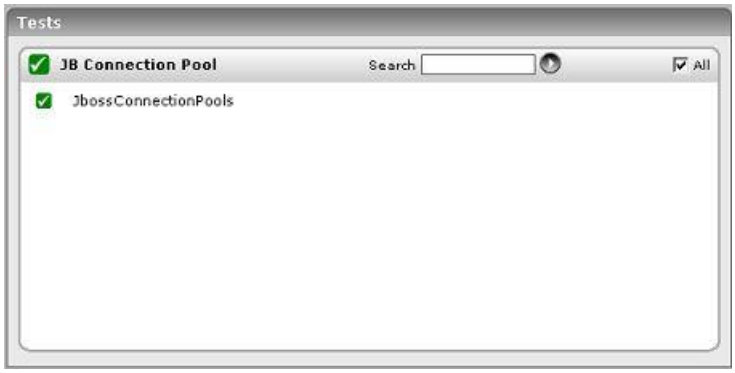

Figure 15.4: The test associated with the JB Connection Pool layer

15.3.1 Jboss Connection Pools Test

This test monitors the various connection pools configured in the JBoss server, and reveals how well the pools have been used.

Purpose	Monitors the various connection pools configured in the JBoss server, and reveals how well the pools have been used
Target of the test	A JBoss application server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port number at which the specified **HOST** listens 4. **MEASUREMENT MODE** – This test can extract metrics from JBoss using either of the following mechanisms: • By deploying the **EgJBossAgent.sar** and **egjboss.war** files on the target JBoss server; • By contacting the Java runtime (JRE) of JBoss via **JMX** To configure the test to use the **EgJBossAgent.sar** and **egjboss.war** files, first, select the **War File** option. Then, refer to the *Configuring and Monitoring JBoss Servers* document to know how to deploy these files on the target JBoss server. On the other hand, if you want the test to use JMX instead, then first, select the **JMX** option. Then, follow the procedure detailed in the *Configuring and Monitoring JBoss Servers* document to configure the test to use **JMX**. By default, the **JMX** option is chosen here. 5. **JNDINAME** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same. 6. **JMX REMOTE PORT** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *management.properties* file of the target JBoss server (refer to the *Configuring and Monitoring JBoss Servers* document for more details). 7. **JMX USER**, **JMX PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MEASUREMENT MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **JMX USER** and **JMX PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to the *Configuring and Monitoring JBoss Servers* document. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 8. **SSL -** This parameter appears only if the **MEASUREMENT MODE** is set to **War File**. Indicate **Yes** if the JBoss server is SSL-enabled. 9. **URL** - This parameter appears only if the **MEASUREMENT MODE** is set to **War File**. Specify the URL to be accessed to collect metrics pertaining to the JBoss server. By default, this test connects to a managed JBoss server and attempts to obtain the metrics of interest by accessing the local Mbeans of the server. Accordingly, by default, this parameter is set to **http://<JBossServerIP>:<JbossServerPort>**. 10. **JMX PROVIDER** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. This test uses a JMX Provider to access the MBean attributes of the JBoss server and collect metrics. Specify the package name of this JMX Provider here. By default, this is set to *com.sun.jmx.remote.protocol*. 11. **TIMEOUT** – Specify the duration (in seconds) for which this test should wait for a response from the JBoss server. If there is no response from the server beyond the configured duration, the test will timeout. By default, this is set to *240* seconds.
Outputs of the test	One set of results for each connection pool configured in the JBoss server.

Measurements made by the test	Measurement	Measurement Unit	Interpretation
	Connections created: Indicates the total number of connections created since the start of the connection pool.	Number	
	Current connections: Indicates the number of connections currently in the pool.	Number	
	Connections in use: Indicates the number of connections that are currently in use.	Number	If the value of this measure reaches that of the Curr_conn_count measure, then it indicates that the pool requires resizing.
	Connections destroyed: Indicates the number of connections that were destroyed since the start of the server.	Number	
	Max connections in use: Indicates the high water mark of the connections in use count.	Number	
	Available connections: Indicates the number of connections that are currently available in the pool for clients to use.	Number	Ideally, this value should be high.
	Min connection size: Indicates the minimum value of the number of connections in the pool since the start of the pool.	Number	
	Max connection size: Indicates the maximum value of the number of connections in the pool since the start of the pool.	Number	

15.4 The JB Servlet Layer

The **JB Servlet** layer executes the **JbossServlets** test (see Figure 15.5) that monitors the performance of the servlets deployed on the JBoss application server.

Figure 15.5: The test associated with the JB Servlet layer

15.4.1 Jboss Servlets Test

This test monitors the servlets deployed on the JBoss server. If the JBoss server hosts a large number of servlets, then managing the individual servlets would be quiet a challenge. Therefore, to enable administrators to manage servlets easily, the eG Enterprise system allows the configuration of servlet groups. The eG agent executing this test will then, by default, report measures for every group that is configured. To configure servlet groups, click on the **Click here** hyperlink in the test configuration page of the JbServletTest.

Purpose	Monitors the servlets deployed on the JBoss server
Target of the test	A JBoss application server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port number at which the specified **HOST** listens 4. **MEASUREMENT MODE** – This test can extract metrics from JBoss using either of the following mechanisms: • By deploying the **EgJBossAgent.sar** and **egjboss.war** files on the target JBoss server; • By contacting the Java runtime (JRE) of JBoss via **JMX** To configure the test to use the **EgJBossAgent.sar** and **egjboss.war** files, first, select the **War File** option. Then, refer to the *Configuring and Monitoring JBoss Servers* document to know how to deploy these files on the target JBoss server. On the other hand, if you want the test to use JMX instead, then first, select the **JMX** option. Then, follow the procedure detailed in the *Configuring and Monitoring JBoss Servers* document to configure the test to use **JMX**. By default, the **JMX** option is chosen here. 5. **JNDINAME** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same. 6. **JMX REMOTE PORT** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *management.properties* file of the target JBoss server (refer to the *Configuring and Monitoring JBoss Servers* document for more details). 7. **JMX USER**, **JMX PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MEASUREMENT MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **JMX USER** and **JMX PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to the *Configuring and Monitoring JBoss Servers* document. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 8. **SSL -** This parameter appears only if the **MEASUREMENT MODE** is set to **War File**. Indicate **Yes** if the JBoss server is SSL-enabled. 9. **URL** - This parameter appears only if the **MEASUREMENT MODE** is set to **War File**. Specify the URL to be accessed to collect metrics pertaining to the JBoss server. By default, this test connects to a managed JBoss server and attempts to obtain the metrics of interest by accessing the local Mbeans of the server. Accordingly, by default, this parameter is set to **http://<JBossServerIP>:<JbossServerPort>**. 10. **JMX PROVIDER** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. This test uses a JMX Provider to access the MBean attributes of the JBoss server and collect metrics. Specify the package name of this JMX Provider here. By default, this is set to *com.sun.jmx.remote.protocol*. 11. **TIMEOUT** – Specify the duration (in seconds) for which this test should wait for a response from the JBoss server. If there is no response from the server beyond the configured duration, the test will timeout. By default, this is set to *240* seconds.
Outputs of the test	By default, the test reports one set of results for each servlet group that is configured using the eG administrative interface.

Measurements made by the test	Measurement	Measurement Unit	Interpretation
	Invocation rate: Indicates the number of times the servlet was invoked per second in the last measurement period.	Invocations/Sec	This is indicative of the load on a servlet.
	Avg invocation time: Indicates the average time taken to execute a servlet.	Msecs	
	Max invocation time: Indicates the maximum time taken to execute a servlet.	Msecs	

15.5 The JB EJB Layer

The **JB EJB** layer executes the **JbossEjbs** test (see Figure 15.6), which evaluates the performance of the Enterprise Java Beans (EJBs) deployed on the JBoss application server.

Figure 15.6: The test associated with the JB EJB layer

15.5.1 Jboss Ejbs Test

This test monitors the EJBs deployed on the JBoss server. If the JBoss server hosts a large number of EJBs, then managing the individual EJBs would be quiet a challenge. Therefore, to enable administrators to manage EJBs easily, the eG Enterprise system allows the configuration of EJB groups. The eG agent executing this test will then, by default, report measures for every group that is configured. To configure EJB groups, click on the **Click here** hyperlink in the test configuration page of the JbEjbTest.

Purpose	Monitors the EJBs deployed on the JBoss server
Target of the test	A JBoss application server

Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port number at which the specified **HOST** listens 4. **MEASUREMENT MODE** – This test can extract metrics from JBoss using either of the following mechanisms: • By deploying the **EgJBossAgent.sar** and **egjboss.war** files on the target JBoss server; • By contacting the Java runtime (JRE) of JBoss via **JMX** To configure the test to use the **EgJBossAgent.sar** and **egjboss.war** files, first, select the **War File** option. Then, refer to the *Configuring and Monitoring JBoss Servers* document to know how to deploy these files on the target JBoss server. On the other hand, if you want the test to use JMX instead, then first, select the **JMX** option. Then, follow the procedure detailed in the *Configuring and Monitoring JBoss Servers* document to configure the test to use **JMX**. By default, the **JMX** option is chosen here. 5. **JNDINAME** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same. 6. **JMX REMOTE PORT** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *management.properties* file of the target JBoss server (refer to the *Configuring and Monitoring JBoss Servers* document for more details). 7. **JMX USER**, **JMX PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MEASUREMENT MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **JMX USER** and **JMX PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to the *Configuring and Monitoring JBoss Servers* document. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 8. **SSL -** This parameter appears only if the **MEASUREMENT MODE** is set to **War File**. Indicate **Yes** if the JBoss server is SSL-enabled. 9. **URL** - This parameter appears only if the **MEASUREMENT MODE** is set to **War File**. Specify the URL to be accessed to collect metrics pertaining to the JBoss server. By default, this test connects to a managed JBoss server and attempts to obtain the metrics of interest by accessing the local Mbeans of the server. Accordingly, by default, this parameter is set to **http://<JBossServerIP>:<JbossServerPort>**. 10. **JMX PROVIDER** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. This test uses a JMX Provider to access the MBean attributes of the JBoss server and collect metrics. Specify the package name of this JMX Provider here. By default, this is set to *com.sun.jmx.remote.protocol*. 11. **TIMEOUT** – Specify the duration (in seconds) for which this test should wait for a response from the JBoss server. If there is no response from the server beyond the configured duration, the test will timeout. By default, this is set to *240* seconds.
Outputs of the test	By default, the test reports one set of results for each EJB group that is configured using the eG administrative interface.

Measurements made by the test	Measurement	Measurement Unit	Interpretation
	Creation rate: Indicates the rate of creation of beans.	EJBs/Sec	
	Removal rate: Indicates the rate at which the EJBs are removed.	EJBs/Sec	
	Message rate: Indicates the rate at which messages are handled.	Msgs/Sec	
	Method ready count: Indicates the number of EJBs where the methods are currently in the ready state to service clients. A Method is a function invoked by clients on the EJB to perform a specific task.	Number	
	Ready count: Indicates the number of EJBs that are currently ready to service clients.	Number	
	Pooled count: Indicates the number of EJBs that are in the pool, currently.	Number	
	Passive count: Indicates the number of EJB instances that have been passivated, currently. Passivation is the act of storing an EJB instance in a permanent store like a hard disk for future activation.	Number	

15.6 The JB MQ Layer

The tests associated with the **JB MQ** layer (see Figure 15.7) monitor the messaging service of the JBoss application server.

Figure 15.7: The tests associated with the JB MQ layer

The JMS API stands for Java Message Service Application Programming Interface, and is used by the JBoss server to send asynchronous business-quality messages to other applications. In the messaging world, messages are not sent directly to other applications. Instead, messages are sent to destinations. A destination is the object on the JBossMQ server that clients use to send and receive messages. There are two types of destination objects, namely, **Queues** and **Topics**. The **JbossMQQueues** test and the **JbossMQTopics** test mapped to the **JB MQ** layer monitor each of the above-mentioned destination objects, respectively.

15.6.1 Jboss MQ Queues Test

This test monitors the queues on the JBoss server. Clients that are in the point-to-point paradigm typically use queues. They expect that message sent to a queue will be received by only one other client once and only once. If multiple clients are receiving messages from a single queue, the messages will be load balanced across the receivers. Queue objects, by default, will be stored under the JNDI queue/ sub context.

Purpose	Monitors the queues on the JBoss server
Target of the test	A JBoss application server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port number at which the specified **HOST** listens 4. **MEASUREMENT MODE** – This test can extract metrics from JBoss using either of the following mechanisms: • By deploying the **EgJBossAgent.sar** and **egjboss.war** files on the target JBoss server; • By contacting the Java runtime (JRE) of JBoss via **JMX** To configure the test to use the **EgJBossAgent.sar** and **egjboss.war** files, first, select the **War File** option. Then, refer to the *Configuring and Monitoring JBoss Servers* document to know how to deploy these files on the target JBoss server. On the other hand, if you want the test to use JMX instead, then first, select the **JMX** option. Then, follow the procedure detailed in the *Configuring and Monitoring JBoss Servers* document to configure the test to use **JMX**. By default, the **JMX** option is chosen here. 5. **JNDINAME** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same. 6. **JMX REMOTE PORT** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *management.properties* file of the target JBoss server (refer to the *Configuring and Monitoring JBoss Servers* document for more details). 7. **JMX USER**, **JMX PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MEASUREMENT MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **JMX USER** and **JMX PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to the *Configuring and Monitoring JBoss Servers* document. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 8. **SSL -** This parameter appears only if the **MEASUREMENT MODE** is set to **War File**. Indicate **Yes** if the JBoss server is SSL-enabled. 9. **URL** - This parameter appears only if the **MEASUREMENT MODE** is set to **War File**. Specify the URL to be accessed to collect metrics pertaining to the JBoss server. By default, this test connects to a managed JBoss server and attempts to obtain the metrics of interest by accessing the local Mbeans of the server. Accordingly, by default, this parameter is set to **http://<JBossServerIP>:<JbossServerPort>**. 10. **JMX PROVIDER** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. This test uses a JMX Provider to access the MBean attributes of the JBoss server and collect metrics. Specify the package name of this JMX Provider here. By default, this is set to *com.sun.jmx.remote.protocol*. 11. **TIMEOUT** – Specify the duration (in seconds) for which this test should wait for a response from the JBoss server. If there is no response from the server beyond the configured duration, the test will timeout. By default, this is set to *240* seconds.

	12. **DD FREQUENCY** – It refers to the frequency with which detailed diagnosis measures are to be generated for this test. The default is *1:1*. This indicates that, by default, detailed measures will be generated every time this test runs, and also every time the test detects a problem. You can modify this frequency, if you so desire. Also, if you intend to disable the detailed diagnosis capability for this test, you can do so by specifying *none* against **DD FREQUENCY**. 13. **DETAILED DIAGNOSIS** - To make diagnosis more efficient and accurate, the eG system embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the **On** option against **DETAILED DIAGNOSIS**. To disable the capability, click on the **Off** option.		
Outputs of the test	One set of results for every queue on the JBoss application server		
Measurements made by the test	**Measurement**	**Measurement Unit**	**Interpretation**
	Max queue depth: Indicates the max value of the number of messages that were in this queue since the start of the queue.	Number	
	Message processing rate: Indicates the rate at which messages are being processed by this queue.	Msgs/Sec	
	Receivers count: Indicates the number of clients that are currently configured as receivers of messages from this queue.	Msgs/Sec	
	Current queue depth: Indicates the number of messages currently in this queue.	Number	A high value is indicative of server workload, or a delivery bottleneck. Use the detailed diagnosis of this measure to know the *JMS ID*, *Priority*, *Time*, *ProducerID*, and the contents of each *Message* in the queue.
	Scheduled messages count: Indicates the number of messages in this queue that are currently scheduled to be delivered.	Number	Use the detailed diagnosis of this measure to know the *JMS ID*, *Priority*, *Time*, *ProducerID*, and the contents of each *Message* that is scheduled for delivery.
	Queue occupied: Indicates the percentage of queue length that is occupied by messages.	Percent	A high value is a cause for concern as it could indicate a bottleneck in message delivery, which may be heavily populating the queue with messages.
	Message delivered: Indicates the number of messages in this queue that have been delivered.	Number	A high value is desired for this measure.

	Messages added: Indicates the number of messages that were added to this queue during the last measurement period.	Number	
	Last message sent time: Indicates the time that elapsed since the last message was sent from this queue.	Secs	Ideally, the value of this measure should be low. A high value is indicative of a delay in message delivery or a message processing bottleneck.
	Subscriber count: Indicates the number of subscribers who are registered with this queue.	Number	Use the detailed diagnosis of this measure to view the ID of all the subscribers registered with the queue.
	Receivers count: Indicates the number of clients that are currently configured as receivers of messages from this queue.	Number	Use the detailed diagnosis of this measure to view the ID of all the receivers configured for this queue.

15.6.2 Jboss MQ Topics Test

The JbossMQTopics test monitors the topics on the JBoss server. Topics are used in the publish-subscribe paradigm. When a client publishes a message to a topic, he expects that a copy of the message will be delivered to each client that has subscribed to the topic. However, if the client is not up, running and receiving messages from the topics, it will miss messages published to the topic. To get around this problem of missing messages, clients can start a durable subscription. This is like having a VCR record a show you cannot watch at its scheduled time so that you can see what you missed when you turn your TV back on. Similarly, messages meant for a durable subscriber are stored in the persistent cache even when the subscriber is inactive. These messages are delivered to durable subscribers when they connect to the server.

Purpose	Monitors the topics on the JBoss server
Target of the test	A JBoss application server
Agent deploying the test	An internal agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port number at which the specified **HOST** listens 4. **MEASUREMENT MODE** – This test can extract metrics from JBoss using either of the following mechanisms: • By deploying the **EgJBossAgent.sar** and **egjboss.war** files on the target JBoss server; • By contacting the Java runtime (JRE) of JBoss via **JMX** To configure the test to use the **EgJBossAgent.sar** and **egjboss.war** files, first, select the **War File** option. Then, refer to the *Configuring and Monitoring JBoss Servers* document to know how to deploy these files on the target JBoss server. On the other hand, if you want the test to use JMX instead, then first, select the **JMX** option. Then, follow the procedure detailed in the *Configuring and Monitoring JBoss Servers* document to configure the test to use **JMX**. By default, the **JMX** option is chosen here. 5. **JNDINAME** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. The **JNDINAME** is a lookup name for connecting to the JMX connector. By default, this is *jmxrmi*. If you have registered the JMX connector in the RMI registry using a different lookup name, then you can change this default value to reflect the same. 6. **JMX REMOTE PORT** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. Here, specify the port at which the **JMX** listens for requests from remote hosts. Ensure that you specify the same port that you configured in the *management.properties* file of the target JBoss server (refer to the *Configuring and Monitoring JBoss Servers* document for more details). 7. **JMX USER**, **JMX PASSWORD**, and **CONFIRM PASSWORD** – These parameters appear only if the **MEASUREMENT MODE** is set to **JMX**. If JMX requires **authentication only** (but no security), then ensure that the **JMX USER** and **JMX PASSWORD** parameters are configured with the credentials of a user with *read-write* access to JMX. To know how to create this user, refer to the *Configuring and Monitoring JBoss Servers* document. Confirm the password by retyping it in the **CONFIRM PASSWORD** text box. 8. **SSL -** This parameter appears only if the **MEASUREMENT MODE** is set to **War File**. Indicate **Yes** if the JBoss server is SSL-enabled. 9. **URL** - This parameter appears only if the **MEASUREMENT MODE** is set to **War File**. Specify the URL to be accessed to collect metrics pertaining to the JBoss server. By default, this test connects to a managed JBoss server and attempts to obtain the metrics of interest by accessing the local Mbeans of the server. Accordingly, by default, this parameter is set to **http://<JBossServerIP>:<JbossServerPort>**. 10. **JMX PROVIDER** – This parameter appears only if the **MEASUREMENT MODE** is set to **JMX**. This test uses a JMX Provider to access the MBean attributes of the JBoss server and collect metrics. Specify the package name of this JMX Provider here. By default, this is set to *com.sun.jmx.remote.protocol*. 11. **TIMEOUT** – Specify the duration (in seconds) for which this test should wait for a response from the JBoss server. If there is no response from the server beyond the configured duration, the test will timeout. By default, this is set to *240* seconds.
Outputs of the test	One set of results for every topic on the JBoss application server

Measurements made by the test	Measurement	Measurement Unit	Interpretation
	Max topic depth: Indicates the max value of the number of messages in the topic since the start of the queue.	Number	
	Msg process rate: Indicates the rate at which messages were being processed by the topic in the last measurement period.	Msgs/Sec	
	Durable messages count: Indicates the number of durable messages currently in the topic.	Number	
	Non-durable messages count: Indicates the number of non-durable messages currently in the topic.	Number	
	Total subjects count: Indicates the total number of subscribers to a topic.	Number	
	Durable subjects count: Indicates the number of durable subscribers to the topic.	Number	If the total number of durable subscribers is high, then we can expect the total durable messages to be stored on the server also to be relatively on the higher side.
	Non-durable subjects count: Indicates the number of subscribers to the topic who are currently non-durable.	Number	

Chapter 16

Monitoring Domino Application Servers

The Lotus Domino server is an open, secure platform optimized to deliver messaging, applications, and online collaboration that integrates your enterprise systems with dynamic business processes. Used by small and large enterprises alike, the Domino server helps harness the power of the web to facilitate rapid application development, provides an efficient messaging mechanism, and also aids in securing IT environments from unauthorized access.

Owing to its wide usage and the crucial role it plays in the development, delivery, and security of business-critical services, even a semblance of a problem in the functioning of the Domino application server could be perilious to the health, availability, and reliability of a service offering. To avoid such adversities, it is necessary to keep a constant eye on the performance-impacting activities of the Domino application server, so that issues come to light early and are addressed quickly.

eG Enterprise has developed an exclusive *Domino application* monitoring model (see Figure 16.6) for the Domino application server, which employs an eG agent to continuously monitor the performance of the server. This eG agent executes tests which communicate with the Domino SNMP agent to collect key metrics relating to server performance. To facilitate this communication, SNMP should be enabled on the application server.

16.1 Enabling SNMP on a Domino Server

Domino SNMP Agent services are provided by two types of programs:

- LNSNMP -- The Lotus Notes SNMP agent. As an independent application, LNSNMP is insulated from most Domino server malfunctions and, by itself, adds negligible overhead to the server.
- Two Domino server add-ins -- the QuerySet Handler and the Event Interceptor.

The QuerySet Handler and the Event Interceptor depend on the Domino server; if the server fails for any reason, these programs fail as well.

The following components comprise the Domino SNMP Agent architecture:

- A platform-specific **Master SNMP Agent** -- An independent, non-Lotus, agent usually supplied with the operating system platform that provides SNMP services for the machine. This SNMP Agent transports the SNMP traps and Get/Set responses across the network to the management station.
- The **Domino SNMP Agent** consisting of:

- *LNSNMP Agent* -- The Lotus Notes SNMP agent, which receives trap notifications from the Event Interceptor and then forwards them to the management station using the platform-specific SNMP Agent. LNSNMP also handles requests for Domino-related information from the management station by passing the request to the QuerySet Handler and responding back to the management station.
- *QuerySet Handler* -- Which queries server statistics information, sets the value of configurable Domino-based parameters, and returns Domino statistics information to LNSNMP, which then forwards the information to the management station using the platform-specific master SNMP Agent.
- *Event Interceptor* -- Which responds to the SNMP Trap notification for Domino Event Handlers by instructing LNSNMP to issue a trap.

- The **Domino MIB** -- A standard Management Information Base (MIB) file for Lotus Domino servers that can be compiled and used by a network management program such as eG Enterprise.

16.1.1 Enabling SNMP for a Domino Server on Solaris

To enable SNMP on a Domino server on Solaris, follow the broad steps given below:

- Install the Master SNMP agent on the Domino server
- Configure the Domino SNMP agent to communicate with the Master SNMP agent

Each of these steps has been discussed in great detail below.

16.1.1.1 Installing and Configuring the Master SNMP Agent on the Domino Server

On Solaris platform, the Domino SNMP Agent uses the SMUX protocol, per RFC 1227, to communicate with the system's Master SNMP Agent. The Solaris Master SNMP Agent does not support the SMUX protocol, making it necessary to substitute a Master SNMP Agent that does. On Solaris platforms, Domino includes a suitable NET-SNMP Master Agent, called NET-SNMPD, already configured to support the SMUX protocol and the Domino SNMP Agent.

Note:

Before using NET-SNMPD, disable any existing Master SNMP Agent. Please follow the steps below for disabling an existing Master SNMP Agent running on Solaris.

- Log in as root.
- Stop the **snmpdx** daemon by typing, **/etc/rc3.d/S76snmpdx stop**.
- Disable the **snmpdx** daemon by issuing the command, **mv /etc/rc3.d/S76snmpdx /etc/rc3.d/s76snmpdx**.

To use the NET-SNMPD that is provided with Domino, do the following:

1. Login as the root user.

2. Next, install the NET-SNMPD files. Enter this command, changing the Domino executable path if necessary: **cp /opt/lotus/notes/latest/sunspa/net-snmpd* /etc**
3. Arrange for NET-SNMPD to be restarted after a reboot. Enter these commands:

   ln -f -s /etc/net-snmpd.sh /etc/init.d/net-snmpd

   ln -f -s /etc/init.d/net-snmpd /etc/rc2.d/S76net-snmpd

   ln -f -s /etc/init.d/net-snmpd /etc/rc1.d/K76net-snmpd
4. After installation, proceed to configure and start NET-SNMPD. Here is how:
5. Udate the **/etc/net-snmpd.conf** file with appropriate community names for your remote management infrastructure. Community names are set using the **rocommunity** and **rwcommunity** directives. For instance, to set a community named **nppublic**, the command would be: **Set rocommunity value to nppublic**
6. To manually start NET-SNMPD, login as the root user and issue the command, **/etc/net-snmpd.sh start**. To stop NET-SNMPD, use this command: **/etc/net-snmpd.sh stop**

16.1.1.2 Configuring the Domino SNMP Agent

The Domino SNMP Agent configuration on Solaris involves the following:

- Configuring the LNSNMP agent to work with the Master SNMP Agent that is provided with the Domino server on Solaris
- Completing the configuration by starting the add-in tasks

Before attempting to configure the Domino SNMP agent, ensure the following:

- The Solaris Master SNMP Agent provided with Domino should be properly installed and configured on the server. Refer to the steps discussed in Section 16.1.1.1 for the procedure.
- TCP/IP and SNMP should be properly installed and configured on the server. Ensure that the Domino executable and the Domino data directories are in your search path.
- The Domino SNMP Agent is set up to run automatically. Once the Domino SNMP Agent is configured, it is virtually always running, even when Domino is not. If you later upgrade Domino, stop the LNSNMP process, before beginning the upgrade process.

To configure the LNSNMP agent, do the following:

1. Login as the root-user.
2. Stop the LNSNMP process. Enter this command: **lnsnmp.sh stop**
3. Stop the NET-SNMP Master Agent by entering this command: **/etc/net-snmpd.sh stop**
4. Start the NET-SNMP Master Agent by entering this command: **/etc/net-snmpd.sh start**
5. Start the LNSNMP process using the command, **lnsnmp.sh start**
6. Create a link to the LNSNMP script. Enter this command, changing the Domino executable path if necessary: **ln -f -s /opt/lotus/notes/latest/sunspa/lnsnmp.sh /etc/init.d/lnsnmp**
7. Arrange for LNSNMP to be restarted after a reboot. Enter these commands:

   ln -f -s /etc/init.d/lnsnmp /etc/rc2.d/S77lnsnmp

ln -f -s /etc/init.d/lnsnmp /etc/rc1.d/K77lnsnmp

After configuring the LNSNMP agent, start the Domino server add-in tasks such as the QuerySet, Event Interceptor, and Statistic Collector tasks. To achieve this, do the following:

1. To support SNMP queries, start the QuerySet add-in task. Enter this command on the Domino Server console: **load quryset**
2. To support SNMP traps for Domino events, start the Event Interceptor add-in task. Enter this command on the Domino Server console: **load intrcpt**
3. To support Domino statistic threshold traps, start the Statistic Collector add-in task. Enter this command on the Domino Server console: **load collect**
4. Arrange for the add-in tasks to be restarted automatically when Domino is next restarted. Add **quryset** and/or **intrcpt** and **collect** to the ServerTasks variable in Domino's **notes.ini** file.

   *ServerTasks =Update,Replica,Router,Amgr,AdminP,CalConn,Sched,LDAP,**quryset,intrcpt,collect***

16.1.2 Enabling SNMP for a Domino Server on Linux

To enable SNMP on a Domino server on Linux, follow the broad steps given below:

- Install the Master SNMP agent on the Domino server
- Configure the Domino SNMP agent to communicate with the Master SNMP agent

Each of these steps has been discussed in great detail below.

16.1.2.1 Installing and Configuring the Master SNMP Agent on the Domino Server

Like the Solaris platform, on Linux also the Domino SNMP Agent uses the SMUX protocol, per RFC 1227, to communicate with the system's Master SNMP Agent. Some Linux distributions include a Master SNMP Agent that supports the SMUX protocol; others do not. On Linux platforms, Domino includes a suitable NET-SNMP Master Agent, called NET-SNMPD, already configured to support the SMUX protocol and the Domino SNMP Agent.

> **Note:**
>
> Before using NET-SNMPD, disable any existing MasterSNMP Agent. For information on disabling an existing Master SNMP Agent, see your Master SNMP Agent's documentation.

To use the NET-SNMPD that is provided with Domino, do the following:

1. Login as the root user.
2. Next, install the NET-SNMPD files. Enter this command, changing the Domino executable path if necessary: **cp /opt/lotus/notes/latest/linux/net-snmpd* /etc**

3. Arrange for NET-SNMPD to be restarted after a reboot. Enter these commands:

   ln -f -s /etc/net-snmpd.sh /etc/rc.d/init.d/net-snmpd

   chkconfig --add net-snmpd

   chkconfig net-snmpd on

4. After installation, proceed to configure and start NET-SNMPD. Here is how:
5. Udate the **/etc/net-snmpd.conf** file with appropriate community names for your remote management infrastructure. Community names are set using the **rocommunity** and **rwcommunity** directives. For instance, to set a community named **nppublic**, the command would be, **Set rocommunity value to nppublic**.
6. To manually start NET-SNMPD, login as the root user and issue the command, **/etc/net-snmpd.sh start**. To stop NET-SNMPD, use the command, **/etc/net-snmpd.sh stop**.

16.1.2.2 Configuring the Domino SNMP Agent

The Domino SNMP Agent configuration on Linux involves the following:

- Configuring the LNSNMP agent to work with the Master SNMP Agent that is provided with Domino on Linux
- Completing the configuration by starting the add-in tasks

Before attempting to configure the Domino SNMP agent, ensure the following:

- The Linux Master SNMP Agent provided with Domino should be properly installed and configured on the server. Refer to the steps discussed in Section 16.1.1.1 for the procedure.
- TCP/IP and SNMP should be properly installed and configured on the server. Ensure that the Domino executable and the Domino data directories are in your search path.
- The Domino SNMP Agent is set up to run automatically. Once the Domino SNMP Agent is configured, it is virtually always running, even when Domino is not. If you later upgrade Domino, stop the LNSNMP process, before beginning the upgrade process.

To configure the LNSNMP agent, do the following:

1. Login as the root-user.
2. Stop the LNSNMP process. Enter this command: **lnsnmp.sh stop**
3. Stop the NET-SNMP Master Agent by entering this command: **/etc/net-snmpd.sh stop**
4. Start the NET-SNMP Master Agent by entering this command: **/etc/net-snmpd.sh start**
5. Start the LNSNMP process using the command, **lnsnmp.sh start**.
6. Arrange for LNSNMP to be restarted after a reboot. Enter these commands:

   ln -f -s /opt/lotus/notes/latest/linux/lnsnmp.sh /etc/rc.d/init.d/lnsnmp

   chkconfig --add lnsnmp

   chkconfig lnsnmp on

After configuring the LNSNMP agent, start the Domino server add-in tasks such as the QuerySet, Event Interceptor, and Statistic Collector tasks. To achieve this, do the following:

1. To support SNMP queries, start the QuerySet add-in task. Enter this command on the Domino Server console: **load quryset**
2. To support SNMP traps for Domino events, start the Event Interceptor add-in task. Enter this command on the Domino Server console: **load intrcpt**
3. To support Domino statistic threshold traps, start the Statistic Collector add-in task. Enter this command on the Domino Server console: **load collect**
4. Arrange for the add-in tasks to be restarted automatically when Domino is next restarted. Add **quryset** and/or **intrcpt** and **collect** to the ServerTasks variable in Domino's **notes.ini** file.

   *ServerTasks =Update,Replica,Router,Amgr,AdminP,CalConn,Sched,LDAP,**quryset,intrcpt,collect***

16.1.3 Enabling SNMP for a Domino Server on AIX

To enable SNMP on an AIX Domino server, you will have to configure the Domino SNMP agent. This involves ensuring that the LNSNMP process communicates with the SNMPD subsystem (on the AIX installation of Domino) using the SMUX protocol.

However, prior to configuring the Domino SNMP agent, make sure that the following are in place:

- TCP/IP and SNMP should be properly installed and configured on the server. Also, make sure that the Domino executable and the Domino data directories are in your search path
- The trap destinations and community names for AIX should be appropriately configured in the /etc/snmpd.conf file for your remote management infrastructure. Remember to keep the view identifiers unique for each trap destination.
- The Domino SNMP Agent is set up to run automatically. This means that once the Domino SNMP Agent is configured, it is virtually always running, even when Domino is not. If you later upgrade Domino you should stop the LNSNMP process before beginning the upgrade process.

Next, proceed to configure the Domino SNMP agent, using the procedure explained below:

1. Login as the root user.
2. Stop the LNSNMP process. Enter this command: **lnsnmp.sh stop**
3. Stop the SNMPD (SNMP Daemon) subsystem. The Simple Network Management Protocol (SNMP) daemon is a background server process that can be run on any Transmission Control Protocol/Internet Protocol (TCP/IP) workstation host. The daemon, acting as SNMP agent, receives, authenticates, and processes SNMP requests from manager applications. This daemon is installed and started by default on AIX systems. To stop SNMPD, enter this command: **stopsrc -s snmpd**
4. Configure SNMPD to accept LNSNMP as an SMUX peer. Add the following line to the **/etc/snmpd.peers** file: **"Lotus Notes Agent" 1.3.6.1.4.1.334.72 "NotesPasswd"**
5. Configure SNMPD to accept an SMUX association from LNSNMP. Add the following line to /**etc/snmpd.conf**: **smux 1.3.6.1.4.1.334.72 NotesPasswd**
6. Start the SNMPD subsystem. Enter this command: **startsrc -s snmpd**
7. Start the LNSNMP process. Enter this command: **lnsnmp.sh start**
8. Create a link to the LNSNMP script. Enter this command, changing the Domino executable path if necessary: **ln -**

f -s /opt/lotus/notes/latest/ibmpow/lnsnmp.sh /etc/lnsnmp.rc

9. Arrange for LNSNMP to be restarted after a reboot. Add the following line to the end of the **/etc/rc.tcpip** file: **/etc/lnsnmp.rc start**

After configuring the LNSNMP agent, start the Domino server add-in tasks such as the QuerySet, Event Interceptor, and Statistic Collector tasks, using the procedure discussed in Section 16.1.2.2.

16.1.4 Enabling SNMP for a Domino Server on Windows

To enable SNMP on a Windows Domino server, follow the broad steps given below:

- Install the Windows SNMP service on the target host
- Install the LNSNMP agent (i.e., the Lotus Domino SNMP agent) on the target host
- Configure the Lotus Domino SNMP agent as a service on the target host

Each of these steps is discussed in great detail in the sections to come.

16.1.4.1 Installing the Windows SNMP Service

To install the SNMP service on Windows 2000, do the following:

1. Login to the Windows 2000 system as an administrator.
2. Click on the **Start** button on the taskbar, and follow the menu sequence: Settings -> Control Panel.
3. Double-click on the **Add/Remove Programs** option in the Control Panel window (see Figure 16.1).

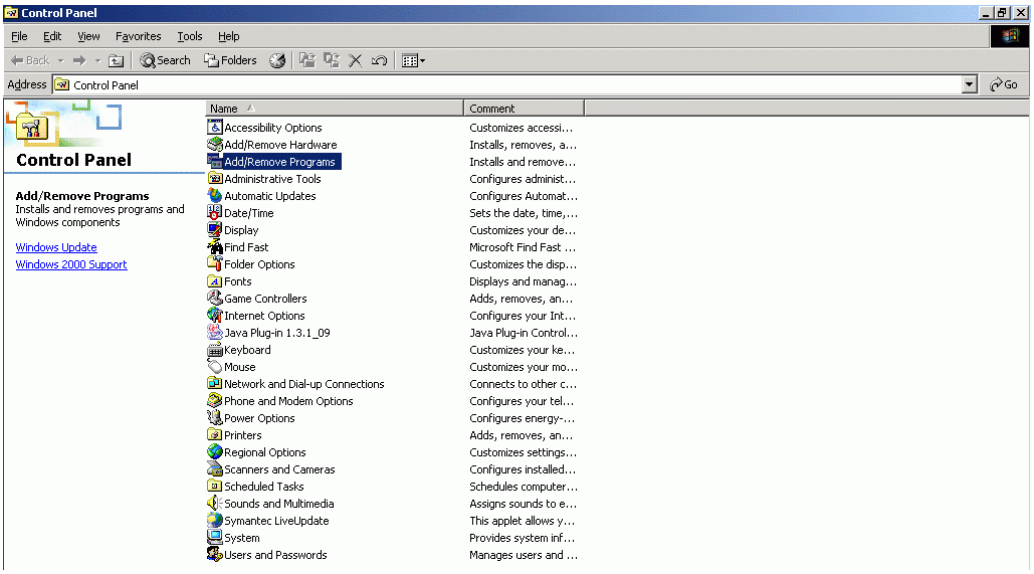

Figure 16.1: The Add/Remove Programs option in the Control Panel window

4. Next, select the **Add/Remove Windows Components** option from the **Add/Remove Programs** dialog box (see

Figure 16.2).

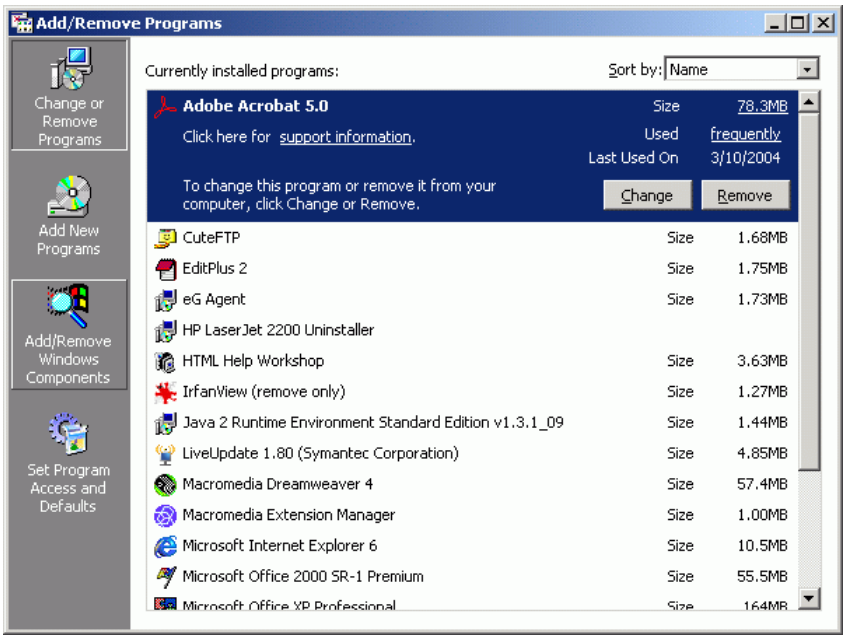

Figure 16.2: Select the Add/Remove Windows Components option

5. Then, a list of windows components that can be added will appear. Select the **Management and Monitoring Tools** option from this list, and click the **Details** button to view more details about it (see Figure 16.3).

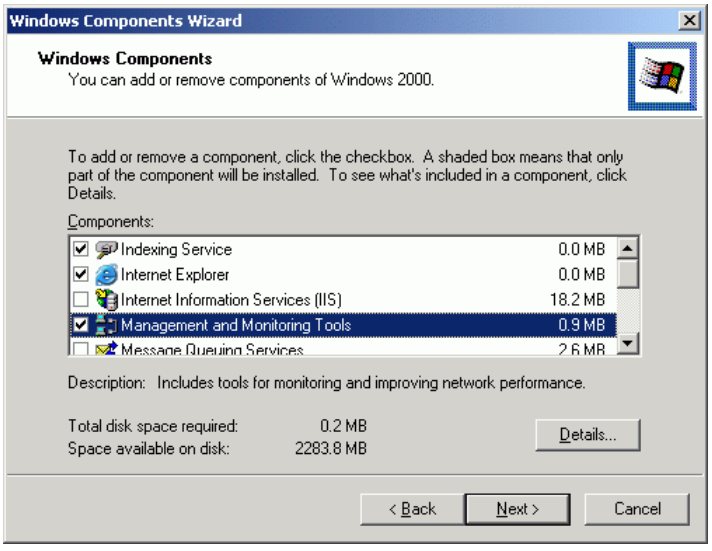

Figure 16.3: Selecting the Management and Monitoring Tools option

6. From the list that appears next, select the **Simple Network Management Protocol** (SNMP) option to add it. Then, click the **OK** button (see Figure 16.4).

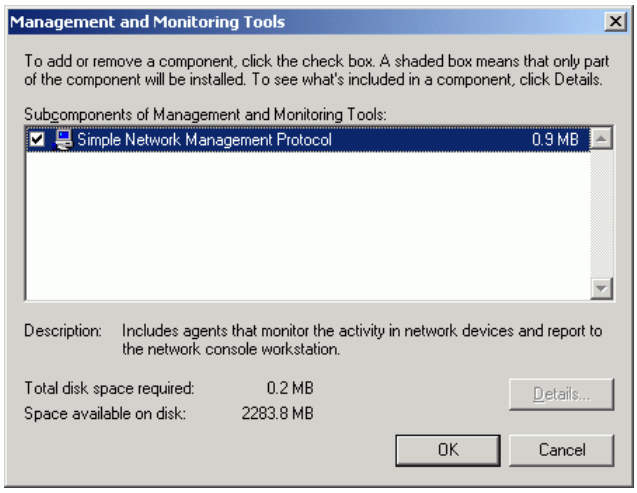

Figure 16.4: Selecting the SNMP option

7. You will then return to Figure 16.3. Click the **Next** button here to proceed with installing the **SNMP** service.
8. If you are prompted for the path to the Windows 2000 installation CD, provide the correct path, and click on the **OK** button to begin installing the **SNMP** service (see Figure 16.5).

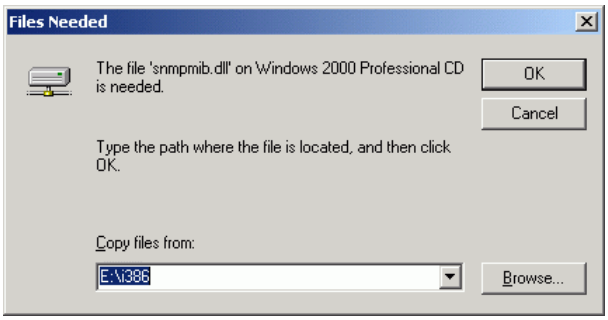

Figure 16.5: Providing the path to the Windows 2000 CD

16.1.4.2 Installing the LNSNMP Agent

To install the LNSNMP agent, do the following:

1. Run the **nvinst.exe** executable that is available in the **<DOMINO_INSTALL_DIR>/w32intel** folder.
2. Once execution begins, setup will prompt you to choose one of the following options:

```
Domino Management Agent for Windows NT installation.
Copyright (c) 1994-1999, Lotus Development Corporation.  All Rights Reserved.

Lotus Domino Management Agent Install (Version 5.0)
Installation Options
-------------------------------------------------

   1) Install Domino SNMP Agent Software
   2) Install Domino Mail Reflector Software
   3) Install Both Options 1 and 2
   Q) Quit Installation
```

```
   Choice (1/2/3/Q): 1
```

3. To install the LNSNMP agent, enter **1** as the **Choice**.
4. Setup will then request your confirmation for adding the Collector task. Enter **y** to add the task.

```
The "Collector" task is not currently configured to run on this system.  This task
is necessary if you want Notes to generate events based on statistics thresholds.

Do you want to add this task now? (y/n): y
```

5. Once the LNSNMP agent installation completes, the following message will appear:

```
Domino Management Agent successfully installed.
Please reboot the system for the changes to take effect.

D:\Lotus\Domino\w32intel>

After Rebooting start the LNSNMP Service first
And then start the Domino Server.
```

16.1.4.3 Configuring the LNSNMP Agent

Prior to configuring the LNSNMP agent, ensure the following:

- Before using the Domino SNMP Agent, make sure TCP/IP and SNMP are properly installed and configured on the server. Also, make sure that the Domino executable and the Domino data directories are in your search path.
- If you need to add the Windows SNMP Service to your system, be prepared to reinstall any Windows service packs immediately after adding the Windows SNMP Service.
- The Windows SNMP Service is configured by double-clicking the Network icon in the Control Panel, then selecting the Services tab, then selecting SNMP Service, and then clicking the Properties button. You will want to configure appropriate trap destinations and community names for your remote management infrastructure.
- The Domino SNMP Agent is configured as a Windows Service and is set up to run automatically. This means that once the Domino SNMP Agent is configured, it is virtually always running, even when Domino is not. If you later upgrade Domino you should stop the LNSNMP and Windows SNMP Services before beginning the upgrade process.

To configure the LNSNMP agent, do the following:

1. Stop the LNSNMP and SNMP services. Enter these commands:

   net stop lnsnmp

   net stop snmp

2. Configure the Lotus Domino SNMP Agent as a service. Enter this command: **lnsnmp -Sc**
3. Start the SNMP and LNSNMP services. Enter these commands:

   net start snmp

   net start lnsnmp

After configuring the LNSNMP agent, start the Domino server add-in tasks such as the QuerySet, Event Interceptor, and Statistic Collector tasks, using the procedure discussed in Section 16.1.2.2

Once the Domino SNMP agent is completely configured, the tests executed by the eG agent (which is monitoring the Domino server's performance), polls the SNMP agent at frequent intervals for performance data. The SNMP agent then retrieves the desired performance statistics from the SNMP MIB of the Domino server and forwards the same to the eG agent.

Using these statistics, administrators can easily and accurately answer the following performance queries:

- Has the Domino server's capacity been fully utilized? If not, what percentage of its capacity is still available for request processing?
- Are sufficient threads available for handling requests to the Domino server?
- Are there too many concurrent connection requests to the server?
- Has enough memory been allocated to the Domino processes and shared memory segments?
- Are the NSF buffer pools and buffer control pools adequately sized on the Domino database?
- Are hits to the database cache optimal, or does the cache require any resizing?
- How many databases are currently awaiting replication and for how long have they been waiting? Were too many databases in the queue for too long? If so, can additional replicators be configured to share the load?
- Has the cluster replicator successfully handled all replication requests to it, or have too many requests failed?
- What is the current load on the web server component of the application server? Is it too heavy?
- Is the idle session count kept at a minimum?

The tests that reveal the above are mapped to the various layers of the monitoring model of Figure 16.6.

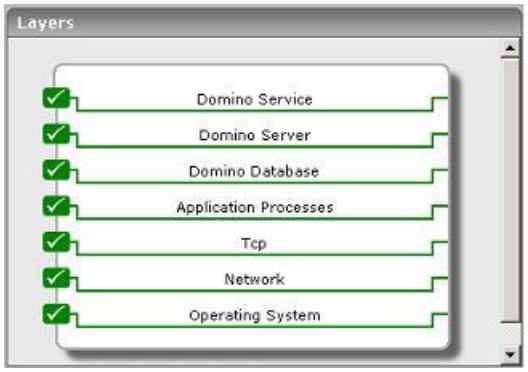

Figure 16.6: Layer model of the Domino application server

The section that follows discusses the first layer of Figure 16.6 and the tests that are mapped to it. While the next 2 layers have been dealt with extensively in the *Monitoring Mail Servers* document, the remaining layers have been elaborately discussed in the *Monitoring Unix and Windows Servers* document.

16.2 The Domino Service Layer

The critical services provided by the Domino server are monitored by the tests associated with the **Domino Service** layer. These include:

- Servicing the web requests to its web server component
- Servicing the database replication requests to servers in a cluster

Figure 16.7: The tests associated with the Domino Service Layer

16.2.1 Lotus Notes Web Server Test

This test reports the web server statistics of a Lotus Domino server.

Purpose	Reports the web server statistics of a Lotus Domino server
Target of the test	A Domino application server
Agent deploying the test	An internal/remote agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port number at which the specified **HOST** listens 4. **SNMPPORT** - The port number through which the server exposes its SNMP MIB. The default value is 161. 5. **SNMPVERSION** – By default, the eG agent supports SNMP version 1. Accordingly, the default selection in the **SNMPVERSION** list is **v1**. However, if a different SNMP framework is in use in your environment, say SNMP **v2** or **v3**, then select the corresponding option from this list. 6. **SNMPCOMMUNITY** – The SNMP community name that the test uses to communicate with the target server. The default is public. This parameter is specific to SNMP **v1** and **v2** only. Therefore, if the **SNMPVERSION** chosen is **v3**, then this parameter will not appear. 7. **USERNAME** – This parameter appears only when **v3** is selected as the **SNMPVERSION**. SNMP version 3 (SNMPv3) is an extensible SNMP Framework which supplements the SNMPv2 Framework, by additionally supporting message security, access control, and remote SNMP configuration capabilities. To extract performance statistics from the MIB using the highly secure SNMP v3 protocol, the eG agent has to be configured with the required access privileges – in other words, the eG agent should connect to the MIB using the credentials of a user with access permissions to be MIB. Therefore, specify the name of such a user against the **USERNAME** parameter. 8. **AUTHPASS** – Specify the password that corresponds to the above-mentioned **USERNAME**. This parameter once again appears only if the **SNMPVERSION** selected is **v3**. 9. **CONFIRM PASSWORD** – Confirm the **AUTHPASS** by retyping it here. 10. **AUTHTYPE** – This parameter too appears only if **v3** is selected as the **SNMPVERSION**. From the **AUTHTYPE** list box, choose the authentication algorithm using which SNMP v3 converts the specified **USERNAME** and **PASSWORD** into a 32-bit format to ensure security of SNMP transactions. You can choose between the following options: ➢ **MD5** – Message Digest Algorithm ➢ **SHA** – Secure Hash Algorithm 11. **ENCRYPTFLAG** – This flag appears only when **v3** is selected as the **SNMPVERSION**. By default, the eG agent does not encrypt SNMP requests. Accordingly, the **ENCRYPTFLAG** is set to **NO** by default. To ensure that SNMP requests sent by the eG agent are encrypted, select the **YES** option. 12. **ENCRYPTTYPE** – If the **ENCRYPTFLAG** is set to **YES**, then you will have to mention the encryption type by selecting an option from the **ENCRYPTTYPE** list. SNMP v3 supports the following encryption types: ➢ **DES** – Data Encryption Standard ➢ **AES** – Advanced Encryption Standard 13. **ENCRYPTPASSWORD** – Specify the encryption password here. 14. **CONFIRM PASSWORD** – Confirm the encryption password by retyping it here.
	15. **TIMEOUT** - Specify the duration (in seconds) within which the SNMP query executed by this test should time out in the **TIMEOUT** text box. The default is 10 seconds.

Outputs of the test	One set of results for the Domino application server that is monitored		
Measurements made by the test	Measurement	Measurement Unit	Interpretation
	Request rate: Indicates the number of requests handled by the web server during the last measurement period.	Reqs/Sec	A high value is indicative of heavy work load on the server.
	HTTP connections: Indicates the number of HTTP connections accepted during the last measurement period.	Conns/Sec	
	Current connections: Indicates the number of current HTTP connections.	Number	
	Data received rate: Indicates the amount of data received by the web server during the last measurement period.	Kbytes/Sec	
	Data sent rate: Indicates the amount of data sent by the web server during the last measurement period.	Kbytes/Sec	
	Http workers: Indicates the number of HTTP worker processes currently servicing web server requests.	Number	
	Idle session timeouts: Indicates the number of idle sessions timed out during the last measurement period.	Number	Idle sessions might waste server resources. If the load on a server is very high and idle sessions are also quiet a few, you may want to reduce the idle session timeout value so that idle sessions get timed out more often. This way the strain on the server is greatly reduced, and server resources are preserved.

16.2.2 Lotus Notes Replication Test

A Domino cluster is a group of two or more servers that provides users with constant access to data, balances the workload between servers, improves server performance, and maintains performance when you increase the size of your enterprise. The servers in a cluster contain replicas of databases that you want to be readily available to users at all times. If a user tries to access a database on a cluster server that is not available, Domino opens a replica of that database on a different cluster server, if a replica is available. Domino continuously synchronizes databases so that whichever replica a user opens, the information is always the same.

There is a special component on the servers in a cluster, called "Cluster Replicator" that is responsible for replication being performed between the databases. When a cluster replicator learns of a change to a database, it immediately pushes that change to all other replicas in the cluster. All replication events are stored in memory, and if a destination server is not available, the "Cluster Replicator" continues to store these events in memory until the destination server bevomes available.

By default, every server in a cluster consists of a single cluster replicator. However, in order to augment the performance of the Domino cluster, multiple replicators can be configured on a server. The decision to introduce more replicators on a cluster server can be taken only after understanding and analyzing how well the default replicator on the server handles the replication requests to it. The LnReplication test periodically monitors a cluster server's replicator-related activities and reveals critical performance statistics based on which administrators can decide whether/not to add more replicators to it.

Purpose	Periodically monitors a cluster server's replicator-related activities
Target of the test	A Domino application server
Agent deploying the test	An internal/remote agent

Configurable parameters for the test	1. **TEST PERIOD** - How often should the test be executed 2. **HOST -** The host for which the test is to be configured 3. **PORT -** The port number at which the specified **HOST** listens 4. **SNMPPORT** - The port number through which the server exposes its SNMP MIB. The default value is 161. 5. **SNMPVERSION** – By default, the eG agent supports SNMP version 1. Accordingly, the default selection in the **SNMPVERSION** list is **v1**. However, if a different SNMP framework is in use in your environment, say SNMP **v2** or **v3**, then select the corresponding option from this list. 6. **SNMPCOMMUNITY** – The SNMP community name that the test uses to communicate with the mail server. The default is public. This parameter is specific to SNMP **v1** and **v2** only. Therefore, if the **SNMPVERSION** chosen is **v3**, then this parameter will not appear. 7. **USERNAME** – This parameter appears only when **v3** is selected as the **SNMPVERSION**. SNMP version 3 (SNMPv3) is an extensible SNMP Framework which supplements the SNMPv2 Framework, by additionally supporting message security, access control, and remote SNMP configuration capabilities. To extract performance statistics from the MIB using the highly secure SNMP v3 protocol, the eG agent has to be configured with the required access privileges – in other words, the eG agent should connect to the MIB using the credentials of a user with access permissions to be MIB. Therefore, specify the name of such a user against the **USERNAME** parameter. 8. **AUTHPASS** – Specify the password that corresponds to the above-mentioned **USERNAME**. This parameter once again appears only if the **SNMPVERSION** selected is **v3**. 9. **CONFIRM PASSWORD** – Confirm the **AUTHPASS** by retyping it here. 10. **AUTHTYPE** – This parameter too appears only if **v3** is selected as the **SNMPVERSION**. From the **AUTHTYPE** list box, choose the authentication algorithm using which SNMP v3 converts the specified **USERNAME** and **PASSWORD** into a 32-bit format to ensure security of SNMP transactions. You can choose between the following options: ➢ **MD5** – Message Digest Algorithm ➢ **SHA** – Secure Hash Algorithm 11. **ENCRYPTFLAG** – This flag appears only when **v3** is selected as the **SNMPVERSION**. By default, the eG agent does not encrypt SNMP requests. Accordingly, the **ENCRYPTFLAG** is set to **NO** by default. To ensure that SNMP requests sent by the eG agent are encrypted, select the **YES** option. 12. **ENCRYPTTYPE** – If the **ENCRYPTFLAG** is set to **YES**, then you will have to mention the encryption type by selecting an option from the **ENCRYPTTYPE** list. SNMP v3 supports the following encryption types: ➢ **DES** – Data Encryption Standard ➢ **AES** – Advanced Encryption Standard 13. **ENCRYPTPASSWORD** – Specify the encryption password here. 14. **CONFIRM PASSWORD** – Confirm the encryption password by retyping it here.
	15. **TIMEOUT** - Specify the duration (in seconds) within which the SNMP query executed by this test should time out in the **TIMEOUT** text box. The default is 10 seconds.

Outputs of the test	One set of results for the Domino application server that is monitored		
Measurements made by the test	Measurement	Measurement Unit	Interpretation
	Successful replications: Indicates the rate of successful replications during the last measurement period.	Replications/Sec	
	Replication failures: Indicates the rate of failed replications during the last measurement period.	Replications/Sec	
	Replication docs added: Indicates the rate at which replication docs were added during the last measurement period.	Docs/Sec	
	Replication docs deleted: Indicates the rate at which replication docs were deleted during the last measurement period.	Docs/Sec	
	Replication docs updated: Indicates the rate at which replication docs were updated during the last measurement period.	Docs/Sec	
	Avg work queue length: Indicates the average work queue length since server startup.	Number	
	Current work queue length: Indicates the current number of databases awaiting replication by the cluster replicator.	Number	If the value of this measure increases consistently, it could indicate a replication backlog - in other words, too many databases could be waiting to be replicated. In such a case, consider configuring more replicators on the server so that replication workload is shared and pending replication requests are cleared in a timely manner. Steady spikes in this measure could also indicate insufficient network bandwidth to process the transactions. If this is the case, you should consider setting up a private LAN for your cluster.

	Avg work queue wait time: Indicates the average amount of time in seconds that a database spent on the work queue.	Secs	Since the cluster replicator checks its queue every 15 seconds, this number should be under 15 during periods of light load. If this number is frequently higher than 30, you should consider adding one or more cluster replicators.
	Data received rate: Indicates the rate at which data was received by the replicator during the last measurement period.	KBytes/Sec	
	Data sent rate: Indicates the rate at which data was sent by the replicator during the last measurement period.	KBytes/Sec	

Chapter 17

Conclusion

This document has described in detail the monitoring paradigm used and the measurement capabilities of the eG Enterprise suite of products with respect to **application servers**. For details of how to administer and use the eG Enterprise suite of products, refer to the user manuals.

We will be adding new measurement capabilities into the future versions of the eG Enterprise suite. If you can identify new capabilities that you would like us to incorporate in the eG Enterprise suite of products, please contact support@eginnovations.com. We look forward to your support and cooperation. Any feedback regarding this manual or any other aspects of the eG Enterprise suite can be forwarded to feedback@eginnovations.com.