Monitoring Unix and Windows Servers

eG Innovations Product Documentation

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Total Performance Visibility

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Chapter 1: Introduction

Most current day IT infrastructures are heterogeneous environments including a mix of different server hardware and operating systems. Sometimes, administrators might not want to monitor any of the applications executing on these operating systems, but would be interested in knowing how healthy the operating system hosting the application is. To cater to these needs, eG Enterprise offers 100% web-based, integrated moni of heterogeneous IT infrastructures. Administrators can monitor and manage a variety of Unix, Windows, and legacy operating systems from a common console. A novel layer model representation is used to analyze and depict the performance of different protocol layers of the infrastructure – network, operating system, TCP/IP stack, critical application processes and services, etc. By using a common performance model representation across heterogeneous infrastructures, eG Enterprise ensures that administrators are not exposed to the differing nature of each operating system and hence, have a short learning curve.

The monitoring can be done in an agent-based or in an agentless manner, and administrators can pick and choose the servers that have to be monitored with agents (e.g., critical production servers) and those that can be monitored in an agentless manner (e.g., staging servers).

A single agent license suffices to monitor a server and the agent license is transportable across operating systems. Agent-based and agentless monitoring is supported for Microsoft Windows 2000/2003, Sun Solaris, Red Hat Linux, Free BSD, SuSE Linux, HPUX, Tru64, and AIX operating systems. Agentless monitoring is also available for Novell Netware, OpenVMS, and OS/400 operating systems.

The following table summarizes the system monitoring capabilities of the eG Enterprise Suite.

Capability	Metric	Description
CPU Monitoring	CPU utilization per processor of a server	• Know if a server is sized correctly in terms of processing power; • Determine times of day when CPU usage level is high
	Run queue length of a server	Determine how many processes are contending for CPU resources simultaneously
	Top 10 CPU consuming processes on a server	Know which processes are causing a CPU spike on the server
	Top 10 servers by CPU utilization	Know which servers have high CPU utilization, and which ones are under-utilized

Capability	Metric	Description
Memory Monitoring	Free memory availability	• Track free memory availability on your servers; • Determine if your servers are adequately sized in terms of memory availability
	Swap memory usage	Determine servers with high swap usage
	Top 10 processes consuming memory on the server	Know which processes are taking up memory on a server
	Top 10 servers by memory usage	Know which servers have the lowest free memory available and hence, may be candidates for memory upgrades
I/O Monitoring	Blocked processes	• Track the number of processes blocked on I/O; • Indicates if there is an I/O bottleneck on the server
	Disk activity	• Track the percentage of time that the disks on a server are heavily used. • Compare the relative busy times of the disks on a server to know if you can better balance the load across the disks of a server
	Disk read/write times	Monitor disk read and write times to detect instances when a disk is slowing down (Windows only)
	Disk queue length	Track the number of processes queued on each disk drive to determine disk drives that may be responsible for slow downs
	Top 10 processes by disk activity	Determine which processes are causing disk reads/writes
Uptime Monitoring	Current uptime	• Determine how long a server has been up; • Track times when a server was rebooted; • Determine times when unplanned reboots happened;
	Top 10 servers by uptime	Know which servers have not been rebooted for a long time;
Disk Space	Total capacity	Know the total capacity of each of the disk

Capability	Metric	Description
Monitoring		partitions of a server
	Free space	• Track the free space on each of the disk partitions of a server; • Proactively be alerted of high disk space levels on a server;
Page File Usage	Current usage	Monitor and alert on page file usage of a Windows server;
Network Traffic Monitoring	Bandwidth usage	• Track the bandwidth usage of each of the network interfaces of a server (Windows only); • Identify network interfaces that have excessive usage
	Outbound queue length	• Determine queuing on each of the network interfaces of a server; • Identify network interfaces that may be causing a slowdown;
	Incoming and outgoing traffic	• Track the traffic into and out of a server through each interface; • Identify servers and network interfaces with maximum traffic;
Network Monitoring	Packet loss	• Track the quality of a network connection to a server; • Identify times when excessive packet loss happens;
	Average delay	Determine the average delay of packets to a server;
	Availability	Determine times when a server is not reachable over the network;
TCP Monitoring	Current connections	Track currently established TCP connections to a server;
	Incoming/outgoing TCP connection rate	Monitor the server workload by tracking the rate of TCP connections to and from a server
	TCP retransmissions	• Track the percentage of TCP segments retransmitted from the server to clients;

Capability	Metric	Description
		• Be alerted when TCP retransmits are high and therefore, are likely to cause significant slowdowns in application performance;
Process Monitoring	Processes running	• Track the number of processes of a specific application that are running simultaneously; • Identify times when a specific application process is not running
	CPU usage	• Monitor the CPU usage of an application over time; • Determine times when an application is taking excessive CPU resources.
	Memory usage	• Track the memory usage of an application over time; • Identify if an application has a memory leak or not;
	Threads	Track the number of threads running for an application's process (Windows only);
	Handles	• Track the number of handles held by an application over time (Windows only); • Identify if a process has handle leaks;
Windows Services Monitoring	Availability	Determine if a service is running or not
Server Log Monitoring	New events	• Track the number of information, warning, and error events logged in the Microsoft Windows System and Application event logs; • Correlate events in the Windows event logs with other activity on the server (e.g., service failure) • Obtain details of the events in the event logs;
	Security success and failure events	• Monitor all events logged in the Microsoft Windows Security log;

Capability	Metric	Description
		- Obtain details of all failure events;
	Events in /var/adm/messages log	Track and be alerted of all errors logged in the /var/adm/messages log of a Unix system
Auto-correction	Automatic restart of failed services	Determine Windows services that should be running automatically; Monitor if these services are up or not, and restart any failed service automatically

This document details the monitoring models that eG Enterprise offers for monitoring Windows and Unix systems.

Chapter 2: Monitoring Unix Servers

For hosts running flavors of Unix, eG Enterprise offers specialized monitoring models - one each for every Unix-based operating system that is supported by eG Enterprise. These are, namely:

- Linux
- Solaris
- AIX
- HPUX

Note :

- Only a **Basic Monitor** license is required for using each of the above-mentioned monitoring models, regardless of the monitoring approach you employ - i.e., agent-based or agentless.
- In addition to the above models, a *Generic* server model is also available, which can be used for monitoring any generic Unix host - this again consumes a **Basic Monitor** license only.

Figure 2.1 below depicts the *Linux* monitoring model.

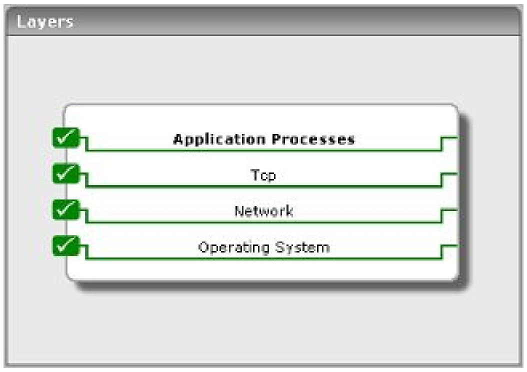


Figure 2.1: The Linux monitoring model

The key advantage of this monitoring model is that it is consistent across all the Unix-based operating systems that the eG agent supports – in other words., the *Linux, Solaris, AIX*, and *HPUX* models offered out-of-the-box by the eG Enterprise suite are represented by the same set of layers depicted by Figure 2.1.

Note:

Figure 2.1 also represents the *Generic* server model offered by eG Enterprise.

However, the tests mapped to each layer and the metrics they report may differ from one OS-specific model to another.

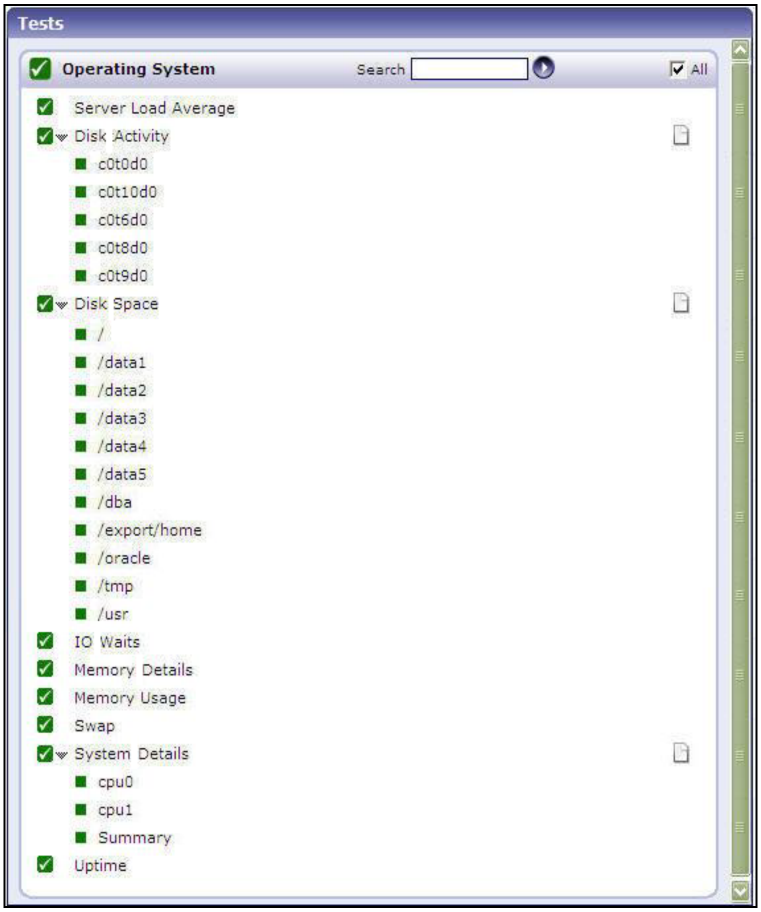
This chapter discusses each of these OS-specific models in detail.

2.1 Monitoring Linux Servers

Figure 2.1 displays the layer model of a Linux server. While the **Operating System** layer represents the state of the host system on which the application executes, the **Network** layer represents the state of the network links to and from the host system. Depending on whether the application relies on the Transmission Control Protocol (TCP) or the User Datagram Protocol (UDP), either the **TCP** or the **UDP** layers is used to represent the status of the transport protocol. The **Application Processes** layer tracks the status of key processes executing on the host system.

2.1.1 The Operating System Layer

Since the status of a host depends on its CPU, memory, and disk utilization, the eG Enterprise suite uses a SystemDetails test that tracks the CPU and memory utilization and DiskActivity and DiskSpace tests that monitor the disk utilization. Figure 2.2 illustrates the tests that map to the **Operating System** layer. While the SystemDetails test tracks the overall health of the target host, the DiskActivity and DiskSpace tests report the states of each of the disk partitions of the host individually.



Tests

☑ Operating System Search ☑ All

- ☑ Server Load Average
- ☑ Disk Activity
  - ■ c0t0d0
  - ■ c0t10d0
  - ■ c0t6d0
  - ■ c0t8d0
  - ■ c0t9d0
- ☑ Disk Space
  - ■ /
  - ■ /data1
  - ■ /data2
  - ■ /data3
  - ■ /data4
  - ■ /data5
  - ■ /dba
  - ■ /export/home
  - ■ /oracle
  - ■ /tmp
  - ■ /usr
- ☑ IO Waits
- ☑ Memory Details
- ☑ Memory Usage
- ☑ Swap
- ☑ System Details
  - ■ cpu0
  - ■ cpu1
  - ■ Summary
- ☑ Uptime

Figure 2.2: Tests that map to the Operating System layer of a Linux server

2.1.1.1 OS File Checksum Test

A checksum is a simple type of redundancy check that is used to detect errors in files.

Errors may frequently occur in files when the files are written to a disk, transmitted across a network or otherwise manipulated. The errors can even be very small - for example, a single incorrect bit - but even such small errors can greatly affect the quality of data and make it useless. For example, you can apply a checksum to an installation file after it is received from the download server to check for errors after the download, as such errors can render the corresponding software uninstallable.

To alert administrators to such integrity issues with system files that they deem critical, eG periodically runs the **OS File Checksum** test. This test creates a checksum by calculating the binary values (using a pre-defined algorithm) of every file configured for monitoring and storing the results. Each time the test runs, a new checksum is calculated and compared with the existing checksum. If there is a non-match, the test promptly alerts administrators to it, as it could be because of errors in the file.

Target of the test : Any Unix/Windows host system

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each configured **DIRECTORY PATH**

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 -** Refers to the port used by the specified host. By default, it is NULL.
4. **DIRECTORY PATH** – Provide a comma-separated list of the full path to directories and/or files that you want the test to monitor. For example, your specification can be: /usr/logs/err.log,/Oracle/logs where /usr/logs/err.log is a file and /Oracle/logs is a directory. Where a directory is provided, all files within that directory will be monitored and will appear as descriptors of the test.

   Your specification can also be of the following format: DisplayName@Path_to_Directory_or_File. For example: Error@/usrlogs/err.log. Multiple such specifications can be provided as a comma- separated list – for instance, Error@/usrlogs/err.log,Oracle@/Oracle/logs,Web@/web/weblogs. In this case, the DisplayNames such as Error, Oracle, and Web will be displayed as the first-level descriptors of this test, and the files in each configured directory will be displayed as the second-level descriptors.

   Note:

   - When you provide the path to a directory as part of the **DIRECTORY PATH** specification, only those files available within that directory will be monitored; sub- directories inside that directory and files within the sub-directories will not be considered.
   - If your **DIRECTORY PATH** specification includes the path to individual files, make sure that you provide the file extensions along with the file names.
5. **EXCLUDE PATTERN** – If you do not want the test to monitor specific patterns of files in the configured directories, then provide a comma-separated list of file name patterns to be excluded from monitoring, in the following format: DisplayName@FileNamePattern. The DisplayNames you use here should be the same as the DisplayNames you use as part of your **DIRECTORY PATH** specification. For instance, if your **DIRECTORY PATH** specification is, Oracle@/Oracle/logs,Web@/web/weblogs , then, your **EXCLUDE PATTERN** configuration may be: Oracle@*info*.log,Web@gen*.log,Web@*minor.log. This configuration holds that in the /Oracle/logs directory, all files with names that embed the string info

should be configured and in the /web/weblogs directory, all files with names that begin with the string gen and all files with names that end with string minor should be ignored.

If your **DIRECTORY PATH** specification does not include DisplayNames and instead includes a comma-separated list of directory paths – eg., /usr/logs,/agent/logs – then your **EXCLUDE PATTERN** specification should be of the following format: DirectoryPath@FileNamePattern. For instance, if your **DIRECTORY PATH** specification is /usr/logs,/agent/logs, then your **EXCLUDE PATTERN** configuration may be:/usr/logs:*minor*.log,/agent/logs:info*.log,/agent/logs:*warn.log. According to this configuration, the test will ignore all files with names that embed the string minor in the /usr/logs directory. In the /agent/logs directory, the test will ignore the files with names that begin with info and the files with names that end with warn.

By default, the **EXCLUDE PATTERN** is set to *none*, indicating that no files are excluded from monitoring, by default. This is the ideal setting if your **DIRECTORY PATH** specification does not include any directories, and is instead configured with the path to individual files.

6. **USE EXE** – **This flag is applicable to Windows platforms only**. By default, this flag is set to **No**. This implies that, by default, the test uses a predefined Java class named Message Digest to compute the checksum of configured files. In some flavors of Windows, this Java class may not work. In such cases, you can instruct the test to use an executable named exf.exe to compute checksum. For this, set the **USE EXE** flag to **Yes**.
7. 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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Has checksum	Indicates whether/not		If the checksum value of a file has

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td>been modified:</td><td>the checksum value of this file has changed since the last measurement period.</td><td></td><td>changed since the last time this test ran, then the value of this measure will be Yes. In this case, you can use the detailed diagnosis of this test to know what was the previous checksum value and the new checksum value of each test. Typically, a change in the checksum value indicates an error.
If there is no change in the checksum value, then this measure will report the value No. Note that the value No does not imply that there is no error. It simply means that the test could not detect any errors. Among the types of errors that cannot be detected by simple checksum algorithms are reordering of the bytes, inserting or deleting zero- valued bytes and multiple errors that cancel each other out
The numeric values that correspond to the measure values discussed above are as follows:
<table><tr><th>Measure Value</th><th>Numeric Value</th></tr><tr><td>Yes</td><td>1</td></tr><tr><td>No</td><td>0</td></tr></table>
<b>Note:</b>
By default, the test reports the <b>Measure Value</b>s listed in the table</td></tr>
</table>

Measurement	Description	Measurement Unit	Interpretation
			above to indicate whether/not the checksum value has changed. In the graph of this measure however, the same is represented using the numeric equivalents only.

2.1.1.2 Server Load Average Test

In UNIX computing, the system load is a measure of the amount of work that a computer system performs. The load average represents the average system load over a period of time. This test reports the average load of Unix systems by reporting three metrics, which represent the system load during the last one-, five-, and fifteen-minute periods.

Note:

This test executes only on **Unix systems**.

Target of the test : Any Unix host system

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each host monitored

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 -** Refers to the port used by the specified host. By default, it is NULL.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Average load in the last 1 min:	Indicates the average number of processes waiting in the run-queue over the past 1 minute.	Number	For an idle computer, the value of these measures will be 0. Each process using or waiting for CPU (the ready queue or run queue) will

Measurement	Description	Measurement Unit	Interpretation
			increment these values by 1. Most UNIX systems count only processes in the running (on CPU) or runnable (waiting for CPU) states. However, Linux also includes processes in uninterruptible sleep states (usually waiting for disk activity), which can lead to markedly different results if many processes remain blocked in I/O due to a busy or stalled I/O system. This, for example, includes processes blocking due to an NFS server failure or to slow media (e.g., USB 1.x storage devices). Such circumstances can result in significantly increasing the value of this measure, which may not reflect an actual increase in CPU use, but will still give an idea on how long users have to wait. For single-CPU systems that are CPU-bound, one can think of load average as a percentage of system utilization during the respective time period. For systems with multiple CPUs, one must divide the number by the number of processors in order to get a comparable percentage. For example, if these measures report the values 1.73, 0.50, and 7.98, respectively, on a single-CPU system, these values can be interpreted as follows: • during the last minute, the CPU was overloaded by 73% (1 CPU with 1.73 runnable processes, so that 0.73 processes had to wait

Measurement	Description	Measurement Unit	Interpretation
Average load in the last 5 mins:	Indicates the average number of processes waiting in the run-queue over the past 5 minutes.	Number	
Average load in the last 15 mins:	Indicates the average number of processes waiting in the run-queue over the past 15 minutes.	Number	

2.1.1.3 Disk Activity Test

On Linux systems, the test will return the input/output utilization of each "device" on the system. The device name is in the format "hdiskn" for 2.2 kernels, where "n" is the device number. For newer Linux kernels though, the device name is displayed as "devm-n", where m is the major number of the device, and n a distinctive number.

Target of the test : Any host system

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each host monitored

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. **USEEXE** - Setting the **USEEXE** flag to true, ensures that the disk activity metrics are collected by executing a binary instead of dynamically linking to the Performance instrumentation library. By default, this is set to false.
4. **DISKS**- To obtain disk activity metrics for both logical and physical disks, enter all in the DISKS text box. To collect metrics for physical disks, set the DISKS parameter to Physical and to collect metrics for logical disks, set the parameter to Logical.
5. **USE SUDO –** This parameter is of significance to Linux and Solaris platforms only. By default, the **USE SUDO** parameter is set to **No**. This indicates that, by default, this test will report the

detailed diagnosis for the *Disk busy* measure of each disk partition being monitored by executing the */usr/bin/iotop* command or */usr/sbin/iotop* command. However, in some highly secure environments, the eG agent install user may not have the permissions to execute this command directly. In such cases, do the following:

- Edit the SUDOERS file on the target host and append an entry of the following format to it:

  <eG_agent_install_user> ALL=(ALL) NOPASSWD:<Command_with_path>

  For instance, if the *eG agent install user* is *eguser*, then the entries in the SUDOERS file should be:

  eguser ALL=(ALL) NOPASSWD: /usr/bin/iotop

  eguser ALL=(ALL) NOPASSWD: /usr/sbin/iotop

- Finally, save the file.
- Then, when configuring the test using the eG admin interface, set the **USE SUDO** parameter to **Yes**. This will enable the eG agent to execute the *sudo /usr/bin/iotop* command or *sudo /usr/sbin/iotop* and retrieve the detailed diagnosis of the *Disk busy* measure.

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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Disk busy:	Indicates the percentage of elapsed time during which the disk is busy	Percent	Comparing the percentage of time that the different disks are busy, an administrator can determine whether

Measurement	Description	Measurement Unit	Interpretation
	processing requests (i.e., reads or writes).		the application load is properly balanced across the different disks. The detailed diagnosis of this measure will reveal the top-10 I/O-intensive processes executing on the host.
Disk read time:	Indicates the average time in seconds of a read of data from the disk.	Secs	
Disk write time:	Indicates the average time in seconds of a write of data from the disk.	Secs	
Data read rate from disk:	Indicates the rate at which bytes are transferred from the disk during read operations.	KB/Sec	A very high value indicates an I/O bottleneck on the server.
Data write rate to disk:	Indicates the rate at which bytes are transferred from the disk during write operations.	KB/Sec	A very high value indicates an I/O bottleneck on the server.
Disk service time:	Indicates the average time that this disk took to service each transfer request (i.e., the average I/O operation time)	Secs	A sudden rise in the value of this measure can be attributed to a large amount of information being input or output. A consistent increase however, could indicate an I/O processing bottleneck.
Disk queue time:	Indicates the average time that transfer requests waited idly on queue for this disk.	Secs	Ideally, the value of this measure should be low.
Disk response time:	Indicates the average time taken for read and write operations of this disk.	Secs	The value of this measure is the sum of the values of the Disk service time and Disk queue time measures. A consistent increase in the value of this measure could indicate a latency in I/O processing.

Measurement	Description	Measurement Unit	Interpretation
Disk read rate:	Indicates the number of reads happening on a logical disk per second.	Reads/Sec	A dramatic increase in this value may be indicative of an I/O bottleneck on the server.
Disk write rate:	Indicates the number of writes happening on a local disk per second.	Writes/Sec	A dramatic increase in this value may be indicative of an I/O bottleneck on the server.
Avg queue length:	Indicates the average number of both read and write requests that were queued for the selected disk during the sample interval.	Number	
Avg IO read size:	Indicates the average number of bytes transferred from disk during read operations.	KB	Larger I/Os tend to have higher latency (for example, BACKUP/RESTORE operations issue 1 MB transfers by default).
Avg IO write size:	Indicates the average number of bytes transferred into disk during write operations.	KB	
Split IO:	Reports the rate at which the operating system divides I/O requests to the disk into multiple requests.	Splits/Sec	A split I/O request might occur if the program requests data in a size that is too large to fit into a single request or if the disk is fragmented. Factors that influence the size of an I/O request can include application design, the file system, or drivers. A high rate of split I/O might not, in itself, represent a problem. However, on single-disk systems, a high rate for this counter tends to indicate disk fragmentation. **This measure is reported for Windows VMs only.**
Avg IO read size:	Indicates the average number of both read and write requests that were queued for the selected		

Measurement	Description	Measurement Unit	Interpretation
	disk during the sample interval.		
Avg IO write size:	Indicates the average number of both read and write requests that were queued for the selected disk during the sample interval.		
Split IO:	Indicates the average number of both read and write requests that were queued for the selected disk during the sample interval.		

Note:

- For this test to report measures on Unix systems, the *sysstat* package must be installed on the server (check for the existence of the *iostat* command on the target system).
- For this test to report measures on Linux systems in particular, the *iotop* command should exist on the system.
- If the sysstat version installed on the target server is less than 4.0.7, the following measures also will not be available – *Data read rate from disk* and *Data write rate to disk*.

2.1.1.4 Disk Space Test

This test monitors the space usage of every disk partition on a host. While this test typically reports the space usage of every physical disk partition on a host, when monitoring hosts running Windows 2008/Vista/7 hosts however, this test reports usage metrics of physical and logical partitions.

Target of the test : Any host system

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each physical/logical disk partition and/or NFS drive on the host monitored

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. **DISCOVER NFS** – This flag is applicable for Windows 7 and Windows 2008 operating systems only. Set this flag to **Yes,** if you want the test to automatically discover NFS drives on your system and report their status as well. By default, this flag is set to **No.**
4. **EXCLUDE – This parameter is of significance to Unix systems.** Against this parameter, you can provide a comma-separated list of disk partitions that you want to exclude from monitoring. On Unix systems, you can use this parameter to exclude temporary partitions that the Unix system itself creates from monitoring.
5. **DOMAIN, DOMAIN USER, AND DOMAIN PASSWORD – These parameters are applicable to Windows systems only.** When monitoring a Windows system, if the **DISCOVER NFS** flag of this test is set to **Yes**, then the test should be configured with the privileges of a valid domain user in order to auto-discover NFS drives and report their usage and status. In such a case therefore, specify a valid Windows domain name against **DOMAIN** , provide the name of a valid user in that domain against **DOMAIN USER**, and specify the password of that user against **PASSWORD**. Once the domain user credentials are provided, the test auto-discovers all those NFS drives on the target Windows system to which the configured domain user has access.
6. **CONFIRM PASSWORD –** Retype the **PASSWORD** of the configured domain user here.
7. **TIMEOUT** - 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.
8. **USE SUDO – This parameter applies only to Linux and Solaris systems.** By default, the **USE SUDO** parameter is set to **No**. This indicates that, by default, this test will report metrics by executing the *df -Pk –l* command on the Solaris host. However, in some highly secure environments, the eG agent install user may not have the permissions to execute this command directly. In such cases, do the following:

   - Edit the **SUDOERS** file on the target host and append an entry of the following format to it:

     <eG_agent_install_user> ALL=(ALL) NOPASSWD:<Command>

     For instance, if the *eG agent install user* is *eguser*, then the entry in the **SUDOERS** file should be:

     eguser ALL=(ALL) NOPASSWD: df –Pk -l

- Finally, save the file.
- Then, when configuring the test using the eG admin interface, set the **USE SUDO** parameter to **Yes**. This will enable the eG agent to execute the sudo *df –Pk –l* command and retrieve the desired metrics.

9. **SUDO PATH** – **This parameter is relevant only when the use sudo parameter is set to 'Yes'.** By default, the **SUDO PATH** is set to *none*. This implies that the sudo command is in its default location – i.e., in the */usr/bin* or */usr/sbin* folder of the target Solaris host. In this case, the eG agent automatically runs the metastat command with sudo from its default location, once the **USE SUDO** flag is set to **Yes**. However, if the sudo command is available in a different location in your environment, you will have to explicitly specify the full path to the sudo command in the **SUDO PATH** text box to enable the eG agent to run the sudo command.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Total capacity:	Indicates the total capacity of a disk partition.	MB	
Used space:	Indicates the amount of space used in a disk partition.	MB	
Free space:	Indicates the current free space available for each disk partition of a system.	MB	
Percent usage:	Indicates the percentage of space usage on each disk partition of a system.	Percent	A value close to 100% can indicate a potential problem situation where applications executing on the system may not be able to write data to the disk partition (s) with very high usage.
Drive availability:	Indicates whether/not this drive is available currently.	Percent	If the drive is available, then this measure will report the value 100. If not, then this measure will report the value 0.

Measurement	Description	Measurement Unit	Interpretation
			This measure gains significance when monitoring NFS drives, as it enables you to identify those drives that are no longer mapped to the system.

2.1.1.5 System Details Test

This operating system-specific test relies on native measurement capabilities of the operating system to collect various metrics pertaining to the CPU and memory usage of a host system. The details of this test are as follows:

Target of the test : Any host system

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each host monitored

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. **DURATION -** This parameter is of significance only while monitoring Unix hosts, and indicates how frequently within the specified **TEST PERIOD**, the agent should poll the host for CPU usage statistics.
4. **SUMMARY** – This attribute is applicable to multi-processor systems only. If the **Yes** option is selected, then the eG agent will report not only the CPU and memory utilization of each of the processors, but it will also report the summary (i.e., average) of the CPU and memory utilizations of the different processors. If the **No** option is selected, then the eG agent will report only the CPU usage of the individual processors.
5. **USEIOSTAT** – **This parameter is of significance to Solaris platforms only**. By default, the **USEIOSTAT** flag is set to **No**. This indicates that, by default, SystemTest reports the CPU utilization of every processor on the system being monitored, and also provides the average CPU utilization across the processors. However, if you want SystemTest to report only the average CPU utilization across processors and across user sessions, then set the **USEIOSTAT** flag to **Yes**. In such a case, the processor-wise breakup of CPU utilization will not be available.

6. **USEPS - This flag is applicable only for AIX LPARs**. By default, this flag is set to **No**.
7. **INCLUDE WAIT - This flag is applicable to Unix hosts alone**. On Unix hosts, CPU time is also consumed when I/O waits occur on the host. By default, on Unix hosts, this test does not consider the CPU utilized by I/O waits while calculating the value of the *CPU utilization* measure. Accordingly, the **INCLUDE WAIT** flag is set to **No** by default. To make sure that the CPU utilized by I/O waits is also included in CPU usage computations on Unix hosts, set this flag to **Yes**.
8. **USEGLANCE - This flag applies only to HP-UX systems**. HP GlancePlus/UX is Hewlett-Packards's online performance monitoring and diagnostic utility for HP-UX based computers. There are two user interfaces of GlancePlus/UX -- Glance is character-based, and *gpm* is motif-based. Each contains graphical and tabular displays that depict how primary system resources are being utilized. In environments where *Glance* is run, the eG agent can be configured to integrate with *Glance* to pull out detailed metrics pertaining to the CPU usage of the HP-UX systems that are being monitored. By default, this integration is disabled. This is why the **USEGLANCE** flag is set to **No** by default. You can enable the integration by setting the flag to **Yes**. If this is done, then the test polls the *Glance* interface of HP GlancePlus/UX utility to report the detailed diagnosis information.
9. **USE TOP FOR DD - This parameter is applicable only to Linux platforms**. By default, this parameter is set to **No**. This indicates that, by default, this test will report the detailed diagnosis of the *System CPU utilization* measure for each processor being monitored by executing the *usr/bin/ps* command. In some environments however, this command may not return accurate diagnostics. In such cases, set the **USE TOP FOR DD** parameter to **Yes**. This will enable the eG agent to extract the detailed diagnosis of the System CPU utilization measure by executing the */usr/bin/top* command instead.
10. 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.

Measurements made by the test

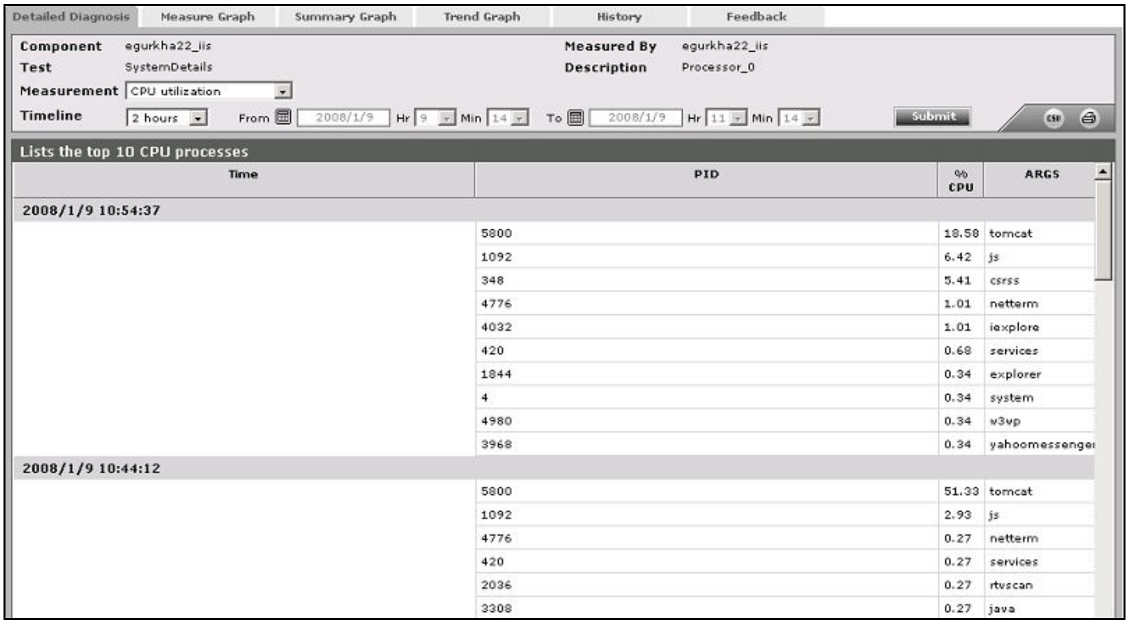
Measurement	Description	Measurement Unit	Interpretation
CPU utilization:	This measurement indicates the percentage of utilization of the CPU time of the host system.	Percent	A high value could signify a CPU bottleneck. The CPU utilization may be high because a few processes are consuming a lot of CPU, or because there are too many processes contending for a limited resource. Check the currently running processes to see the exact cause of the problem.
System CPU utilization:	Indicates the percentage of CPU time spent for system-level processing.	Percent	An unusually high value indicates a problem and may be due to too many system-level tasks executing simultaneously.
Run queue length:	Indicates the instantaneous length of the queue in which threads are waiting for the processor cycle. This length does not include the threads that are currently being executed.	Number	A value consistently greater than 2 indicates that many processes could be simultaneously contending for the processor.
Blocked processes:	Indicates the number of processes blocked for I/O, paging, etc.	Number	A high value could indicate an I/O problem on the host (e.g., a slow disk).
Swap memory:	On Windows systems, this measurement denotes the committed amount of virtual memory. This corresponds to the space reserved for	MB	An unusually high value for the swap usage 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

Measurement	Description	Measurement Unit	Interpretation
	virtual memory on disk paging file(s). On Solaris systems, this metric corresponds to the swap space currently available. On HPUX and AIX systems, this metric corresponds to the amount of active virtual memory (it is assumed that one virtual page corresponds to 4 KB of memory in this computation).		accordingly.
Free memory:	Indicates the amount of memory (including standby and free memory) that is immediately available for use by processes, drivers or Operating System.	MB	This measure typically indicates the amount of memory available for use by applications running on the target host. On Unix operating systems (AIX and Linux), the operating system tends to use parts of the available memory for caching files, objects, etc. When applications require additional memory, this is released from the operating system cache. Hence, to understand the true free memory that is available to applications, the eG agent reports the sum of the free physical memory and the operating system cache memory size as the value of the Free memory measure while monitoirng AIX and Linux operating systems.

Note:

For multi-processor systems, where the CPU statistics are reported for each processor on the system, the statistics that are system-specific (e.g., run queue length, free memory, etc.) are only reported for the "Summary" descriptor of this test.

The detailed diagnosis capability of the *System CPU utilization* and *CPU utilization* measures, if enabled, provides a listing of the top 10 CPU-consuming processes (see Figure 2.3). In the event of a Cpu bottleneck, this information will enable users to identify the processes consuming a high percentage of CPU time. The users may then decide to stop such processes, so as to release the CPU resource for more important processing purposes.



Component egurkha22_iis
Test SystemDetails
Measurement CPU utilization
Timeline 2 hours From 2008/1/9 Hr 9 Min 14 To 2008/1/9 Hr 11 Min 14

Measured By egurkha22_iis
Description Processor_0

Lists the top 10 CPU processes

Time	PID	% CPU	ARGS
2008/1/9 10:54:37			
	5800	18.58	tomcat
	1092	6.42	js
	348	5.41	csrss
	4776	1.01	netterm
	4032	1.01	iexplore
	420	0.68	services
	1844	0.34	explorer
	4	0.34	system
	4980	0.34	v3up
	3968	0.34	yahoomessenger
2008/1/9 10:44:12			
	5800	51.33	tomcat
	1092	2.93	js
	4776	0.27	netterm
	420	0.27	services
	2036	0.27	rtvscan
	3308	0.27	java

Figure 2.3: Figure 2.3: The top 10 CPU consuming processes

Note:

While instantaneous spikes in CPU utilization are captured by the eG agents and displayed in the Measures page, the detailed diagnosis will not capture/display such instantaneous spikes. Instead, detailed diagnosis will display only a consistent increase in CPU utilization observed over a period of time.

2.1.1.6 I/O Waits Test

The IOWaits test reports the CPU utilization of processes waiting for input or output. This test works on Solaris, Linux, AIX, and HPUX platforms only.

Target of the test : Solaris, Linux, AIX and HPUX systems

Agent deploying the test : An internal agent

Outputs of the test : One set of results for the system being monitored

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. **DURATION -** By default, this parameter is set to **5** seconds. This implies that, by default, the test will report the CPU usage of processes averaged across the 5 seconds.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
CPU utilization waiting for I/O:	Indicates the percentage of CPU utilized by processes waiting for input or output.	Percent	If this percentage exceeds 10%, it indicates a critical issue which needs to be addressed immediately.

2.1.1.7 Swap Test

Swap space is space on a hard disk used as the virtual memory extension of a computer's real memory (RAM). The least recently used files in RAM can be "swapped out" to the hard disk until they are needed later so that new files can be "swapped in" to RAM. Having an appropriate amount of swap space is important for optimal system performance.

Target of the test : A Solaris, Linux, AIX or HPUX system only

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every server being monitored

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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Swap used:	Indicates the total swap space that is either allocated or reserved.	MB	
Swap allocated:	Indicates the total swap space currently allocated for use as a backing store.	MB	This measure is not available for HPUX systems.
Swap reserved:	Indicates the total amount of swap space not currently allocated but claimed for future use.	MB	This measure is not available for AIX and HPUX systems.
Swap available:	Indicates the total swap space that is currently available for future reservation and allocation.	MB	
Swap used percent:	Indicates the percentage of swap space that is allocated or reserved.	Percent	A value close to 100% indicates that the swap space configured may not be sufficient. A value close to 0 may imply that the swap space configured may be too large.
Swap queue:	Indicates the number of processes swapped out currently.	Number	Ideally, this value should be close to 0. This measure is not available for AIX systems.

2.1.1.8 Memory Details Test

This test reports statistics pertaining to the memory utilization of target systems. The measures made by this test are as follows:

Target of the test : Any host system

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every server being monitored

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

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Memory page ins:	Indicates the number of times per second that a process needed to access a piece of memory that was not in its working set, meaning that the system had to retrieve it from the page file.	Pages/Sec	
Memory page outs:	Indicates the number of times per second the system decided to trim a process's working set by writing some memory to disk in order to free up physical memory for another process.	Pages/Sec	This value is a critical measure of the memory utilization on a server. If this value never increases, then there is sufficient memory in the system. Instantaneous spikes of this value are acceptable, but if the value itself starts to rise over time or with load, it implies that there is a memory shortage on the server.

2.1.1.9 Memory Usage Test

This test reports statistics related to the usage of the physical memory of the system.

Target of the test : Any host system

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every server being monitored

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. **USEGLANCE - This flag applies only to HP-UX systems**. HP GlancePlus/UX is Hewlett-Packards's online performance monitoring and diagnostic utility for HP-UX based computers. There are two user interfaces of GlancePlus/UX -- *Glance* is character-based, and *gpm* is motif-based. Each contains graphical and tabular displays that depict how primary system resources are being utilized. In environments where *Glance* is run, the eG agent can be configured to integrate with *Glance* to pull out detailed metrics pertaining to the memory usage of the HP-UX systems that are being monitored. By default, this integration is disabled. This is why the **USEGLANCE** flag is set to **No** by default. You can enable the integration by setting the flag to **Yes**. If this is done, then the test polls the *Glance* interface of HP GlancePlus/UX utility to report the detailed diagnosis information pertaining to memory usage.
4. **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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Total physical memory:	Indicates the total physical memory of the system.	MB	
Used physical memory:	Indicates the used physical memory of the system.	MB	

Measurement	Description	Measurement Unit	Interpretation
Free physical memory:	Memory that does not contain any valuable data, and that will be used first when processes, drivers or Operating System need more memory. This does not include standby memory.	MB	This measure typically indicates the amount of memory available for use by applications running on the target host. On Unix operating systems (AIX and Linux), the operating system tends to use parts of the available memory for caching files, objects, etc. When applications require additional memory, this is released from the operating system cache. Hence, to understand the true free memory that is available to applications, the eG agent reports the sum of the free physical memory and the operating system cache memory size as the value of the Free physical memory measure while monitoring AIX and Linux operating systems.
Physical memory utilized:	Indicates the percent usage of physical memory.	Percent	Ideally, the value of this measure should be low. While sporadic spikes in memory usage could be caused by one/more rogue processes on the system, a consistent increase in this value could be a cause for some serious concern, as it indicates a gradual, but steady erosion of valuable memory resources. If this unhealthy trend is not repaired soon, it could severely hamper system performance, causing anything from a slowdown to a complete system meltdown.

Measurement	Description	Measurement Unit	Interpretation
			You can use the detailed diagnosis of this measure to figure out which processes on the host are consuming memory excessively.

Note:

While monitoring Linux/AIX operating systems, you may observe discrepancies between the value of the *Physical memory utilized* measure and the memory usage percentages reported per process by the detailed diagnosis of the same measure. This is because, while the *Physical memory utilized* measure takes into account the memory in the OS cache of the Linux/AIX operating system, the memory usage percent that the detailed diagnosis reports per process does not consider the OS cache memory.

2.1.1.10 Uptime Test

In most production environments, it is essential to monitor the uptime of critical servers in the infrastructure. By tracking the uptime of each of the servers, administrators can determine what percentage of time a server has been up. Comparing this value with service level targets, administrators can determine the most trouble-prone areas of the infrastructure.

In some environments, administrators may schedule periodic reboots of their servers. By knowing that a specific server has been up for an unusually long time, an administrator may come to know that the scheduled reboot task is not working on a server.

This test included in the eG agent monitors the uptime of critical Windows and Unix servers.

Target of the test : A Windows or Unix server

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every server being monitored

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. **REPORTMANAGERTIME** – By default, this flag is set to **Yes**, indicating that, by default, the

detailed diagnosis of this test, if enabled, will report the shutdown and reboot times of the device in the manager's time zone. If this flag is set to **No**, then the shutdown and reboot times are shown in the time zone of the system where the agent is running(i.e., the system being managed for agent-based monitoring, and the system on which the remote agent is running - for agentless monitoring).

4. **LOG LOCATION - This is applicable only to Windows platforms.** Typically, the first time this test executes on a Windows system/server, it creates a *sysuptime_ <Nameofmonitoredcomponent>.log* in the **<EG_ AGENT_ INSTALL_ DIR> \agent\logs** directory. This log file keeps track of the system reboots - each time a reboot occurs, this log file is updated with the corresponding details. During subsequent executions of this test, the eG agent on the Windows system/server reads this log file and reports the uptime and reboot-related metrics of the target. In case of a physical Windows system/server, this log file 'persists' in the said location, regardless of how often the system is rebooted. However, in case of a Windows system/server that has been 'provisioned' by a Provisioning server, this log file is recreated in the **<EG_AGENT_INSTALL_DIR>\agent\logs** directory every time a reboot/refresh occurs. In the absence of a 'persistent' log file, the test will not be able to track reboots and report uptime accurately. To avoid this, when monitoring a provisioned Windows system/server, you have the option to instruct the test to create the *sysuptime_ <Nameofmonitoredcomponent>.log* file in an alternate location that is 'persistent' - i.e., in a directory that will remain regardless of a restart. Specify the full path to this persistent location in the **LOG LOCATION** text box. For instance, your **LOG LOCATION** can be, *D:\eGLogs*. In this case, when the test executes, the *sysuptime_<Nameofmonitoredcomponent>.log* file will be created in the *D:\eGLogs\eGagent\logs* folder. By default, the **LOG LOCATION** parameter is set to *none*.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Has the system been rebooted?:	Indicates whether the server has been rebooted during the last measurement period or not.		If this measure shows 1, it means that the server was rebooted during the last measurement period. By checking the time periods when this metric changes from 0 to 1, an administrator can determine the times when this server was rebooted.

Measurement	Description	Measurement Unit	Interpretation
Uptime during the last measure period:	Indicates the time period that the system has been up since the last time this test ran.	Seconds	If the server has not been rebooted during the last measurement period and the agent has been running continuously, this value will be equal to the measurement period. If the server was rebooted 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 server was rebooted 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.
Total uptime of the system:	Indicates the total time that the server has been up since its last reboot.		This measure displays the number of years, months, days, hours, minutes and seconds since the last reboot. Administrators may wish to be alerted if a server has been running without a reboot for a very long period. Setting a threshold for this metric allows administrators to determine such conditions.

Note:

- For a Unix host, if a value less than a minute is configured as the **TEST PERIOD** of the Uptime test, then, the **Uptime during the last measure period** measure will report the value 0 until the minute boundary is crossed. For instance, if you configure the Uptime test for a Unix host to run every 10 seconds, then, for the first 5 test execution cyles (i.e., 10 x 5 = 50 seconds), the **Uptime during the last measure period** measure will report the value 0 only; however, the sixth time the test executes (i.e, when test execution touches the 1 minute boundary), this measure will report the value 60 seconds. This way, every sixth measurement period will report 60 seconds as the uptime of the host. This is because, Unix hosts report uptime only in minutes and not in seconds.

- For systems running Windows 8 (or above), the Uptime test may sometimes report incorrect values. This is because of the 'Fast Startup' feature, which is enabled by default for Windows 8 (and above) operating systems. This feature ensures that the Windows operating system is NOT SHUTDOWN COMPLETELY, when the host is shutdown. Instead, the operating system saves the image of the Windows kernel and loaded drivers to the file, C:\hiberfil.sys, upon shutdown. When the Windows host is later started, the operating system simply loads hiberfil.sys into memory to resume operations, instead of performing a clean start. Because of this, the Windows system will not record this event as an actual 'reboot'. As a result, the Uptime test will not be able to correctly report if any reboot happened recently ; neither will it be able to accurately compute the time since the last reboot.

  To avoid this, you need to disable the Fast Startup feature on Windows 8 (and above). The steps to achieve this are outlined below:

  1. Login to the target Windows system.
  2. Edit the Windows Registry. Look for the following registry entry:

     HKEY_ LOCAL_ MACHINE\SYSTEM\CurrentControlSet\Control\Session Manager\Power

  3. Locate the **HiberbootEnabled** key under the entry mentioned above.
  4. Change the value of this key to *0* to turn off Fast Startup. By default, its value will be *1*, as Fast Startup is enabled by default.

     Also, note that the Fast Startup feature does not work if the system is “restarted”; it works only when the system is shutdown and then started.

2.1.1.11 Message Queues Test

A message queue is a linked list of messages stored within the kernel and identified by a message queue identifier. Two (or more) processes can exchange information via access to a common system message queue.

The Linux kernel (2.6) implements two message queues: **System V IPC messages** and **POSIX Message Queue**.

IPC messaging lets processes send and receive messages, and queues messages for processing in an arbitrary order. A process can invoke msgsnd() to send a message. He needs to pass the IPC identifier of the receiving message queue, the size of the message and a message structure, including the message type and text. On the other side, a process invokes msgrcv() to receive a message, passing the IPC identifier of the message queue, where the message should get stored, the size and a value t. t specifies the message returned from the queue - a positive value means the first message with its type equal to t is returned; a negative value returns the last message equal to type t, and zero returns the first message of the queue. There are limitations upon the size of a message (max), the total number of messages (mni), and the total size of all messages in the queue (mnb). This implies that if the number or size of the messages in a message queue touches these limits or grows close to these limits, it could indicate a problem condition that should be investigated. To proactively capture such problem conditions, administrators should continuously monitor the growth in the length and size of each IPC message queue on a server. This is exactly what the **Message Queues** test does!

This test auto-discovers the message queues on a monitored server, and closely tracks the number and size of the messages in each queue, thus instantly pointing administrators to those queues that have too many outstanding messages or very large messages. This way, potential bottlenecks in inter-process communication can be isolated and treated!

Target of the test : A Linux, AIX, HPUX, or Solaris server

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every queue owner (by default) of the server being monitored

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. **REPORT BY –** By default, this flag is set to **Owner**. This implies that, by default, the test metrics for every message queue owner on the target server. You can set this flag to **Total**, if you want the test to report metrics for the **Total** descriptor alone; in this case, the test will aggregate measures across all the message queues on the server. Alternatively, you can pick the **Owner and Total** option. In this case, the test will report metrics per owner and also for the **Total** descriptor.

4. **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**.

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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Number of queues:	Indicates the number of queues for this owner. For the Total descriptor, this measure indicates the total number of message queues on the server.	Number	**This measure will be reported for the Total descriptor, only if the REPORT BY flag is set to Total or Owner and Total.**
Outstanding messages in queue:	For each owner, this measure indicates the total number of outstanding messages in all queues owned by that owner.	Number	A high value or a consistent increase in the value of this measure is an indication that many messages are still undelivered to the receiver. Typically, this occurs if either or both the following are true: • The number of bytes already on the queue is equal to the

Measurement	Description	Measurement Unit	Interpretation
			maximum number of bytes that the queue can handle. • The total number of messages on all queues system- wide is equal to the system- imposed limit. In such cases, you may either have to remove messages from the queue, or reset the maximum limits, so that inter- process communication remains unaffected.
Data in message queue:	For each owner, this measure indicates the total number of bytes in outstanding messages across all queues owned by that owner.	KB	Compare the value of this measure across owners to identify that owner whose queues are of the maximum size. If the max value is abnormally high, it could mean that one or more queues owned by that owner contain heavy messages or too many messages. You may then want to identify which queues are of the maximum size and why. For this, you can use the detailed diagnosis of this measure. The detailed diagnosis, if enabled, reveals details of each queue owned by the owner. The details include the name of the creator of each message queue, the number of bytes of data that each queue contains, the number of messages in every queue, the sender process and receiver process for the last message to the queue, and more. From this, you can easily pick

Measurement	Description	Measurement Unit	Interpretation
			the queues with the maximum number of messages and those that are of the maximum size. If any queue contains very few messages but is of a large size, it could mean that those messages are heavy. On the other hand, if any queue contains many messages and is also of a large size, it could mean that the queue is not processing messages and delivering them as quickly as it should. This could signal a potential bottleneck in inter-process communication, which would require further investigation.
Maximum size allowed:	For each owner, this indicates the total number of bytes allowed in all message queues owned by that owner.	KB	
Is message queue full?	For each owner, this indicates whether/not any queue owned by that owner has been used upto capacity – i.e., whether/not the number of bytes in the outstanding messages on that queue is equal to the maximum number of bytes allowed.		If any message queue owned by an owner is full, the value of this measure will be *Yes*. If no message queue is full, then the value of this measure will be *No*. The numeric values that correspond to the above-mentioned measure values are described in the table below:

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td></td><td></td><td></td><td><table><tr><th>Measure Value</th><th>Numeric Value</th></tr><tr><td>Yes</td><td>0</td></tr><tr><td>No</td><td>1</td></tr></table>
<b>Note:</b>
By default, this measure reports one of the <b>Measure Value</b>s listed in the table above. The graph of this measure however will represent the same using the numeric equivalents only.</td></tr>
<tr><td>Number of non-zero message queues:</td><td>Indicates the total number of queues on the server that are of a size greater than 0.</td><td>Number</td><td><b>This measure is available only for the ‘Total’ descriptor.</b>
To know which queues are of a non- zero size, use the detailed diagnosis of this measure.</td></tr>
<tr><td>Total data in message queue:</td><td>Indicates the total number of bytes in outstanding messages in all message queues on the server.</td><td>KB</td><td><b>This measure is available only for the ‘Total’ descriptor.</b>
To know which queue contains the maximum number of bytes in outstanding messages, use the detailed diagnosis of this measure.</td></tr>
</table>

2.1.1.12 IPC Semaphores Test

Semaphores are data structures that are used for synchronization between two or more processes. They are often used to monitor and control the availability of system resources such as shared memory segments. Basically, they can be viewed as a single integer that represents the amout of resources available. When a process wants a resource, it checks the value of the semaphore, and if it it non-zero, it decrements the appropriate number from the semaphore in accordance to the amout of resources it wishes to use. The kernel will block the process if the semaphore is zero or doesn't have a value high enough for the decrement.

Semaphores can be operated on as individual units or as elements in a set. A semaphore set consists of a control structure and an array of individual semaphores. A set of semaphores can contain up to 25 elements. Like message queues, the semaphore set creator can change its ownership or permissions. To know the count and composition of semaphore sets and understand who owns which semaphore set, administrators can use the **IPC Semaphores** test.

Target of the test : Solaris, Linux, AIX and HPUX systems

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every semaphore set owner (by default) of the server being monitored

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. **REPORT BY** – By default, this flag is set to **Owner**. This implies that, by default, the test metrics for every semaphore set owner on the target server. You can set this flag to **Total**, if you want the test to report metrics for the **Total** descriptor alone; in this case, the test will aggregate measures across all the semaphore sets on the server. Alternatively, you can pick the **Owner and Total** option. In this case, the test will report metrics per owner and also for the **Total** descriptor.
4. **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**.
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:

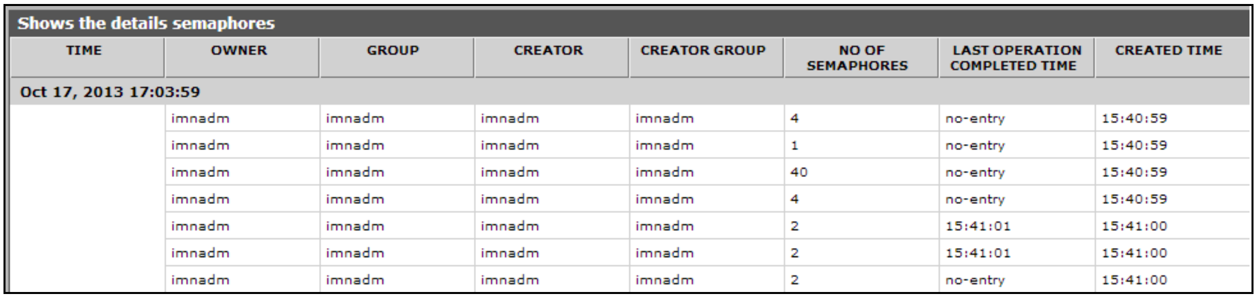
   - The eG manager license should allow the detailed diagnosis capability
   - Both the normal and abnormal frequencies configured for the detailed diagnosis measures

should not be 0.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Number of semaphore sets:	Indicates the number of semaphore sets owned by this owner. For the Total descriptor, this measure indicates the total number of semaphore sets on the server.	Number	This measure will be reported for the Total descriptor, only if the report by flag is set to Total or Owner and Total. To know the complete details of each semaphore set owned by an owner and the number of semaphores each set contains, use the detailed diagnosis of this measure.
Number of semaphores:	For each owner, this measure reports the total number of semaphores that are in the semaphore sets owned by that owner. For the Total descriptor, this measure indicates the total number of semaphores in all the semaphore sets created on the server.	Number	This measure will be reported for the Total descriptor, only if the report by flag is set to Total or Owner and Total. You can compare the value of this measure across owners to know which owner owns the maximum semaphores. To know which semaphore sets are owned by such an owner, use the detailed diagnosis of the Number of semaphore sets measure.

The detailed diagnosis of the *Number of semaphore sets* measure reveals the creator of each semaphore set, the number of semaphores in each set, when the set was created, and what was the last time each set was accessed. From this, you can quickly identify semaphore sets with the maximum number of semaphores and those that were used recently.



Shows the details semaphores

TIME	OWNER	GROUP	CREATOR	CREATOR GROUP	NO OF SEMAPHORES	LAST OPERATION COMPLETED TIME	CREATED TIME
Oct 17, 2013 17:03:59							
	imnadm	imnadm	imnadm	imnadm	4	no-entry	15:40:59
	imnadm	imnadm	imnadm	imnadm	1	no-entry	15:40:59
	imnadm	imnadm	imnadm	imnadm	40	no-entry	15:40:59
	imnadm	imnadm	imnadm	imnadm	4	no-entry	15:40:59
	imnadm	imnadm	imnadm	imnadm	2	15:41:01	15:41:00
	imnadm	imnadm	imnadm	imnadm	2	15:41:01	15:41:00
	imnadm	imnadm	imnadm	imnadm	2	no-entry	15:41:00

Figure 2.4: The detailed diagnosis of the Number of semaphore sets measure

2.1.1.13 Shared Memory Test

Shared memory (SHM) is another method of interprocess communication (IPC) whereby 2 or more processes share a single chunk of memory to communicate. The shared memory system can also be used to set permissions on memory, allowing for things like malloc debuggers to be written.

Shared memory is persistent. It does not go away when no program is referencing it. This can be a good thing, but it can tie up system resources. To conserve system resources, administrators should cleanup the shared memory if it is not in use anymore. But, how would administrators know whether a shared memory segment is currently in use or not, and if used, which processes are using it? For this, administrators can use the **Shared Memory** test. This test auto-discovers the owners of SHM segments, monitors the usage of each segment, and reports the number of SHM segments owned by each owner, the number of segments mapped to/not mapped to processes, the count of processes attached to the segments, the total size of the SHM segments owned by each owner, and the number of SHM segments removed, cleared, and locked for every owner. This way, the test points to those owners with SHM segments that are not even mapped to any process, leave alone being used; thus memory segments that are candidates for removal/release can be identified.

Target of the test : A Linux, AIX, HPUX, or Solaris server

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every SHM segment owner (by default) of the server being monitored

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. **REPORT BY –** By default, this flag is set to **Owner**. This implies that, by default, the test metrics

for every SHM segment owner on the target server. You can set this flag to **Total**, if you want the test to report metrics for the **Total** descriptor alone; in this case, the test will aggregate measures across all the SHM segments on the server. Alternatively, you can pick the **Owner and Total** option. In this case, the test will report metrics per owner and also for the **Total** descriptor.

4. **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**.
5. 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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Number of shared memory segments:	For each owner, this indicates the number of shared memory segments owned by that owner. For the Total descriptor, this indicates the total number of shared memory segments on the target server, regardless of owner.	Number	This measure will be reported for the **Total** descriptor, only if the **REPORT BY FLAG** is set to **Total** or **Owner** and **Total**. To know the complete details of each SHM segment owned by an owner, use the detailed diagnosis of this measure. From the detailed diagnosis, you can figure out which user and process created each

Measurement	Description	Measurement Unit	Interpretation
			SHM segment, when it was created, the size of each segment, the number of processes mapped to each segment, and more! Using this information, you can accurately isolate those SHM segments that are of the maximum size, and those that have been sized poorly. You can also point to SHM segments that are not attached to any processes; you can either attach such segments to processes, remove them, or clear the space in them to conserve system resources.
Number of shared memory segments with no process attached:	For each owner, this indicates the number of shared memory segments owned by that owner to which no processes are attached currently. For the Total descriptor, this indicates the total number of shared memory segments on the target server without any processes attached.	Number	This measure will be reported for the **Total** descriptor, only if the **REPORT BY FLAG** is set to **Total** or **Owner** and **Total**. You can use the detailed diagnosis of this measure to know which segments have no processes attached. Such segments are candidates for removal / space release.
Number of processes attaching to shared memory segments:	For each owner, this indicates the number of processes that are currently attached to the SHM segments owned by that owner. For the Total descriptor, this	Number	This measure will be reported for the **Total** descriptor, only if the **REPORT BY FLAG** is set to **Total** or **Owner** and **Total**. You can use the detailed diagnosis of this measure to know which

Measurement	Description	Measurement Unit	Interpretation
	indicates the total number of processes attached to all SHM segments on the target server.		processes are attached to which SHM segment.
Total size of shared memory segments:	For each owner, this indicates the total size of all SHM segments owned by that owner. For the Total descriptor, this indicates the total size of all SHM segments on the target server.	KB	This measure will be reported for the **Total** descriptor, only if the **REPORT BY FLAG** is set to **Total** or **Owner** and **Total**.
Number of shared memory segments removed:	For each owner, this indicates the number of SHM segments owned by that owner that have been removed. For the Total descriptor, this indicates the total number of SHM segments that have been removed from the target server.	Number	This measure will be reported for the **Total** descriptor, only if the **REPORT BY FLAG** is set to **Total** or **Owner** and **Total**. You can use the detailed diagnosis of this measure to know which shared memory segments have been removed.
Number of shared memory segments cleared:	For each owner, this indicates the number of SHM segments owned by that owner that have been cleared. For the Total descriptor, this indicates the total number of SHM segments on the server that have been cleared.	Number	This measure will be reported for the **Total** descriptor, only if the **REPORT BY FLAG** is set to **Total** or **Owner** and **Total**. You can use the detailed diagnosis of this measure to know which shared memory segments have been cleared.

Measurement	Description	Measurement Unit	Interpretation
Number of shared memory segments locked:	For each owner, this indicates the number of SHM segments owned by that owner that are currently locked. For the Total descriptor, this indicates the total number of SHM segments on the server that are currently locked.	Number	Since multiple processes may attempt to modify a shared memory segment at the same time, it is possible that certain errors could crop up when updates to the segment occur simultaneously. This *concurrent* access is almost always a problem when you have multiple writers to a shared object. To get around this, you can use semaphores to lock the shared memory segment while a process is writing to it. This measure will be reported for the **Total** descriptor, only if the **REPORT BY FLAG** is set to **Total** or **Owner** and **Total**. You can use the detailed diagnosis of this measure to know which shared memory segments are locked currently.

2.1.1.14 Tests Disabled by Default

Besides the tests discussed above, the **Operating System** layer of a *Linux* server is mapped to quiet a few other tests that are disabled by default. To enable these tests, go to the **ENABLE / DISABLE TESTS** page using the menu sequence : Agents -> Tests -> Enable/Disable, pick the desired **Component type**, set *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. The sections to come discuss such tests elaborately.

Besides the above, hardware monitoring expertise can also be optionally built into the **Operating System** layer. Please refer to the *Hardware Monitoring* document for further details.

2.1.1.14.1 Disk Test

This operating system-specific test periodically tracks the percentage disk space utilized per disk partition of the host.

Target of the test : Any host system

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every disk partition monitored

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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Disk utilization:	Indicates the percentage utilization of the disk partition.	Percent	When the utilization of a disk partition approaches 100%, many applications using the partition could begin to experience failures.

2.1.1.14.2 Disk IO Performance Test

This test auto-discovers the physical disks on a server, and accurately points you to the disk that is currently experiencing a high level of I/O activity.

Target of the test : A Solaris/Linux/AIX host

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each disk supported by the host

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. **TARGETDISKIORATE** – Specify a positive integer value that represents the highest level of I/O activity (in KB/Sec) that can occur on a disk. If the actual I/O activity reported by this test exceeds the value configured here, the disk is said to be *busy*.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Disk IO:	Indicates the rate at which I/O reads and writes occur on this disk.	KB/Sec	
Disk busy :	Indicates the percentage of time for which this disk was busy processing I/O requests.	Percent	This measure is reported only for those disks for which the value of the Disk IO measure is greater than or equal to the targetdiskiorate configured. If this measure appears in the eG monitoring console for a disk, it clearly indicates that the said disk is busy. Comparing the percentage of time that the different disks are busy, an administrator can determine whether the application load is properly balanced across the different disks.
Disk I/O at target busy :	Indicates whether this disk is busy processing requests or not.	Boolean	If the value of the *Disk IO* measure is greater than or equal to the **TARGETDISKIORATE** configured for this test, then, this measure will return the value 1; this indicates that the disk is busy. If the value of the *Disk IO* measure falls below the **TARGETDISKIORATE**

Measurement	Description	Measurement Unit	Interpretation
			that has been configured, then the value of this measure will be 0; this indicates that the disk is not busy.

2.1.1.14.3 Network Errors Test

This test reports the network errors and collisions that occur during data transmission and reception by a host via each of its network interfaces.

Target of the test : Any host system

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every network interface of the target host

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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Incoming packet errors:	Indicates the number of input errors that occurred during the last measurement period.	Packets	High input errors could indicate that the network is saturated, the local host is overloaded, or there is a physical network problem.
Outgoing packet errors:	Indicates the number of output errors that occurred during the last measurement period.	Packets	High output errors could indicate a saturated local network or a bad physical connection between the host and the network.
Packet collisions:	Indicates the number of collisions that occurred during the last measurement period.	Number	A high value is normal for this measure, but if the percentage of output packets that result in a collision is too high, it indicates that the network is saturated.

2.1.1.14.4 DNS Lookup Test

This test emulates an 'nslookup' command to a DNS server for resolving a configured IP/host name, and reports the availability of the DNS server, the success/failure of the command, and the speed with which the server responded to the command. In practice, NsLookup reaches out over the Internet to do a DNS lookup from an authorized name server, and then formats the information returned for convenient display. Based on the statistics reported, administrators can figure out whether the DNS server is available over the network and also identify slowdowns in the responsiveness of the server.

Target of the test : Any host system

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every network interface of the target host

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. **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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
DNS server availability:	Indicates the availability of DNS Server.		The values for the availability of the DNS Server is provided in the table

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td></td><td></td><td></td><td>below:
<table>
<tr><th>Measure Value</th><th>Numeric Value</th></tr>
<tr><td>Available</td><td>1</td></tr>
<tr><td>Not Available</td><td>0</td></tr>
</table>
<b>Note:</b>
By default, this measure can report the <b>Measure Value</b> s mentioned above while indicating the availability of DNS Server. However, the graph of this measure is indicated using the numeric equivalents.
The detailed diagnosis for this measure provides the IP or the DNS Server Name, only when the DNS server is in available state.</td></tr>
<tr><td>DNS lookup success:</td><td>Indicates the status of the NSLookup for the server.</td><td></td><td>The values for the status of the NSLookup is provided in the table below:
<table>
<tr><th>Measure Value</th><th>Numeric Value</th></tr>
<tr><td>Lookup Successful</td><td>1</td></tr>
<tr><td>Lookup Not Successful</td><td>0</td></tr>
</table>
<b>Note:</b>
By default, this measure can report the <b>Measure Value</b> s mentioned above while indicating the status of the NSLookup for the server.</td></tr>
</table>

Measurement	Description	Measurement Unit	Interpretation
			However, the graph of this measure is indicated using the numeric equivalents. When the value is 0 (i.e. Lookup not Successful), the detailed diagnosis for this measure provides the reason for the NSLookup failure.
DNS lookup time:	Indicates the response time of the NSLookup.	Seconds	Ideally, the value of this measure should be low.

2.1.1.14.5 Inodes Test

An Inode is a data structure holding information about files in a Unix file system. There is an inode for each file and a file is uniquely identified by the file system on which it resides and its inode number on that system. Each inode contains the following information: the device where the inode resides, locking information, mode and type of file, the number of links to the file, the owner's user and group ids, the number of bytes in the file, access and modification times, the time the inode itself was last modified and the addresses of the file's blocks on disk. A Unix directory is an association between file names and inode numbers. The operating system is configured to hold a maximum number of inode objects for each disk partition. When there are no free Inodes, then new files cannot be created in the system. The purpose of this test is to provide the statistics of the Inodes for each. This test works on the Unix platforms only.

Target of the test : A Unix system

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every file system configured

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. **FSTYPE -** There is an inode for each file on a machine and a file is uniquely identified by the file system on which it resides and its inode number on that system. Therefore, provide a file system name in the **FSTYPE** text box - eg., *nfs* (for network file systems). Multiple file system names can be provided as a comma-separated list - eg., *nfs,ufs,bfs*.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Inodes used:	The number of inodes that are currently in use for a disk partition.	Number	
Inodes free:	The number of Inodes that are free for a disk partition.	Number	
Inodes total:	The total number of Inodes that are available for a disk partition	Number	
Percent inode usage:	The percentage of the inodes that are currently in use for a disk partition	Percent	High percentage of inode usage may lead to a problem in creating new files / directories.

2.1.1.14.6 Var Adm Messages Test

This test reports the count of new CPU and memory errors that have occurred between two test runs.

Target of the test : A Solaris

Agent deploying the test : An internal agent

Outputs of the test : One set of results for the every error pattern configured

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 at which the **HOST** listens
4. **ALERTFILE** - The full path to the alert file that needs to be monitored. By default, */var/adm/messages* will be displayed therein.

   Also, instead of a specific log file, the path to the directory containing alert files can be provided - eg., */user/logs*. This ensures that eG monitors the most recent files in the specified directory. If while monitoring a log file in a directory a newer log file gets added to that directory, then eG will first finish monitoring the original log file and then start monitoring the new one. Specific log file name patterns can also be specified, so that the log file(s) monitored are restricted to files that match the specified patterns. For example, to monitor the latest log files with names containing the strings 'dblogs' and 'applogs', the parameter specification can be, */tmp/db/*dblogs*,/tmp/app/*applogs**. Here, '*' indicates leading/trailing spaces (as the case may be).

The eG monitor interface will report one set of measurements for every configured path. You can also configure the path in the following format:*Name@logfilepath*. Here, *Name* represents the display name of the path being configured. Accordingly, the parameter specification for the 'dblogs' and 'applogs' example discussed above can be: *dblogs@/tmp/db/*dblogs*,applogs@/tmp/app/*applogs** . In this case, the display names 'dblogs' and 'applogs' will alone be displayed as descriptors of the test, and not the individual paths.

5. **SEARCHPATTERN** - input the error patterns to search for in the specified alert file in the following format: PatternName:ErrorPattern. Here, PatternName refers to the display name of the error pattern. In other words, it is this name that will be displayed as an info (descriptor) of the VarAdmMsgsTest in the eG monitor interface. The ErrorPattern refers to the pattern of errors to search for in the alert file. An error pattern can be expressed in any of the following forms - *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 example, by providing the entry *Kernel_errors:*kern** here, you can instruct the eG Enterprise system to search for errors containing the text 'kern'. Statistics related to these errors will be displayed in the eG monitor interface when the info *Kernel_errors* is clicked on. Multiple error patterns can be monitored as a comma- separated list. For example, *Kernel_ errors:*kern*,Memory_errors:*AFT**. A single pattern may also be of the form e1+e2, where + signifies an OR condition. That is, the PatternName is matched if either e1 is true or e2 is true.

6. **LINES** - To enable eG to provide additional information about the errors in the detailed diagnosis page, you can specify in the LINES text box the number of lines of text below and above the 'error line' (in the alert file) that the detailed diagnosis page should display. This specification should be in the format: *No. of lines above:No. of lines below*. By default, this is set to '0:0', which will display only the error line in the detailed diagnosis page. If you set it to 2:3, then besides the error line, 2 lines above and 3 lines below the error line will also be displayed in the detailed diagnosis page.

7. **EXCLUDEPATTERN** - Provide a comma-separated list of patterns to be excluded from monitoring in the **EXCLUDEPATTERN** text box. For example *critical*,*exception**. By default, this parameter

is set to '*none*'.

8. **UNIQUEMATCH** - By default, the **UNIQUEMATCH** parameter is set to **FALSE**, indicating that, by default, the test checks every line in the log file for the existence of each of the configured **SEARCHPATTERNS**. By setting this parameter to **TRUE**, you can instruct the test to ignore a line and move to the next as soon as a match for one of the configured patterns is found in that line. For example, assume that *Pattern1:*fatal*,Pattern2:*error** is the **SEARCHPATTERN** that has been configured. If **UNIQUEMATCH** is set to FALSE, then the test will read every line in the log file completely to check for the existence of messages embedding the strings 'fatal' and 'error'. If both the patterns are detected in the same line, then the number of matches will be incremented by 2. On the other hand, if **UNIQUEMATCH** is set to **TRUE**, then the test will read a line only until a match for one of the configured patterns is found and not both. This means that even if the strings 'fatal' and 'error' follow one another in the same line, the test will consider only the first match and not the next. The match count in this case will therefore be incremented by only 1.

9. **ROTATINGFILE** - By default, the **ROTATINGFILE** parameter is set to **FALSE**. To instruct the eG Enterprise system to monitor newer log files also, set this parameter to **TRUE**. Otherwise, set it to **FALSE**.

10. **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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Recent errors:	Indicates the number of new CPU and memory errors that occurred between two test runs.	Number	The detailed diagnosis of this measure, if enabled, will list the recent errors and additional lines of information pertaining to the errors

Measurement	Description	Measurement Unit	Interpretation
			(if configured).

2.1.1.14.7 Inode Cache Test

This test monitors the size of the inode cache and the cache hit ratio. Based on these metrics, the inode cache can be configured for optimal performance. This test is disabled by default.

Target of the test : A Solaris

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every server being monitored

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

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Current size:	Indicates the current size of the Inode cache.	Number	
Max size:	Indicates the maximum size allowed for the Inode cache.	Number	
Cache hits:	Indicates the number of hits during lookups to the Inode cache in the last measurement period.	Number	
Cache misses:	Indicates the number of misses during lookups to	Number	

Measurement	Description	Measurement Unit	Interpretation
	the Inode cache in the last measurement period.		
Cache hit ratio:	Indicates the ratio of hits to total lookups to the inode cache in the last measurement period.	Percent	

2.1.1.14.8 Buffer Cache Test

This test monitors the usage of the system's buffer cache. This test is disabled by default.

Target of the test : A Solaris

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every server being monitored

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

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Cache lookups	Indicates the number of lookups to the buffer cache during the last measurement period.	Number	
Cache hits:	Indicates the number of hits from the buffer cache during the last measurement period.	Number	

Measurement	Description	Measurement Unit	Interpretation
Buffer cache hit ratio:	Indicates the ratio of cache hits to total lookups during the last measurement period.	Percent	A value close to 90% is good.
Buffers locked:	Indicates the number of buffers locked during the last measurement period.	Number	
New buffer requests:	Indicates the number of new buffer requests issued during the last measurement period.	Number	
Waits for buffer allocations:	Indicates the number of buffer allocation requests during the last measurement period that had to wait	Number	This value should be close to 0 for optimal operation.

2.1.1.14.9 Application Connections Test

The Application Connections test tracks the TCP connections for specified ports on a target host. This test is particularly useful while monitoring multi-tier infrastructures, where the challenge is to zero-in on the bottleneck tier in the event of an infrastructure-wide slowdown. By monitoring the connections established to each tier it is possible to determine which tier is causing a slow-down. For example, consider a multi-tier infrastructure with a web server, application server, and a database server. If the number of established connections suddenly increases on all the tiers at about the same time, this indicates a bottleneck at the database (since a database slowdown impacts the application server and web server tiers). On the other hand, if the web and application server tiers alone show a connection increase, it indicates a bottleneck at the application server and not the database. This test is disabled by default.

Target of the test : Any host

Agent deploying the test : An internal/remote agent

Outputs of the test : One set of results for every port configured

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. **SERVERIP -** The **SERVERIP** text box displays '*' by default, indicating that, by default, connections on all the IP addresses on the target system will be monitored by the test. You can override this default setting by providing a single **SERVERIP**, so that connections running on a particular IP on the specified **HOST** are alone tracked.
5. **PORTS -** The **PORTNOS** parameter will display the target system's port number by default. In this case, the test will report metrics pertaining to the default port only. You can override this default setting by providing a single or a comma-separated list of port numbers to be monitored. The test will then report the status of the TCP connections to each of the port numbers so configured.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Syn_ sent connections:	Indicates the number of connections that are in the process of being established by the host to other server(s).	Number	
Syn_ received connections:	Indicates the number of connections that are in the process of being established by remote hosts to this host.	Number	
Established connections:	Indicates the total number of TCP connections on this host for the port number(s) specified in the test arguments.	Number	The number of TCP connections established is a key indicator of the server workload. A significant increase in this metric may indicate a slow down in request handling by the application.

Measurement	Description	Measurement Unit	Interpretation
Close_ wait connections:	Indicates the current number of TCP connections to a port that are in the TCP CLOSE_ WAIT state. Connections remain in the close wait state when they are waiting for a process to close the TCP socket.	Number	
Fin_ wait_ 1 connections:	Indicates the number of TCP connections to a TCP port that are in the FIN_ WAIT_ 1 state. A TCP connection moves to the FIN_ WAIT_ 1 state when a local program closes a socket but the remote server does not respond.	Number	A large number of FIN_WAIT_1 connections can occur if clients are not properly closing down TCP connections. A connection may linger in this state for tens of minutes.
Fin_ wait_ 2 connections:	Indicates the number of TCP connections to a TCP port that are in the FIN_ WAIT_ 2 state. A connection moves to the FIN_WAIT_2 state when a remote server shuts down its side of a TCP connection and the local server does not respond to it.	Number	
Time_ wait connections:	Indicates the number of connections in the TCP TIME_ WAIT state. The TIME_ WAIT state is a	Number	

Measurement	Description	Measurement Unit	Interpretation
	safety mechanism, to catch stray packets for that connection after the connection is "officially" closed. Since the maximum time that such stray packets can exist is 2 times the maximum round- trip time, the TIME_ WAIT state lasts twice the round- trip period. Roughly, the duration is 30- 120 seconds.		
TCP Send queue:	Send-Q is used to show the socket buffer status. This indicates the number of bytes that have been sent to the destination, and are awaiting acknowledgement. (Available only for Solaris, Linux, HP-UX and AIX)	Number	A high value of this measure indicates a poor network response.
TCP Receive queue:	Receive- Q is used to show the socket buffer status. The number indicates the number of bytes received from the source and copied. (Available only for Solaris, Linux, HP-UX and AIX)	Number	A high value of this measure indicates a poor network response.

2.1.1.14.10 Unix Tables Test

This test monitors critical process, inode, file, and lock tables. If any of these tables reach the OS-specified maximum limit, application programs that use these tables will start to fail. Hence, monitoring the utilization of these tables on a periodic basis is critical. This test is disabled by default.

Target of the test : A Solaris, Linux, or HPUX system only

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every server being monitored

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

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Process table size:	Indicates the number of process entries (proc structures) currently in use.	Number	This measure will not be available for Linux systems.
Process table maxsize:	Indicates the maximum number of process entries that can exist (the **MAX_ NPROCS OS** parameter setting)	Number	This measure will not be available for Linux systems.
Process table utilization:	Indicates the percentage of process entries in use currently.	Percent	A value close to 100% indicates that the system could be running out of process table entries. This measure will not be available for Linux systems.
Inode table size:	Indicates the number of inodes in memory currently.	Number	

Measurement	Description	Measurement Unit	Interpretation
Inode table maxsize:	Indicates the number of inodes currently allocated in the kernel.	Number	This measure will not be available for Linux systems.
Inode table utilization:	Indicates the percentage of inodes in memory out of the total currently allocated in the kernel.	Percent	This measure will not be available for Linux systems.
File table size:	Indicates the number of entries in the open file table.	Number	
File table maxsize:	Indicates the size of the open file table in the kernel.	Number	
File table utilization:	Indicates the number of entries in the open file table as a percentage of the file table size.	Percent	
Lock table size:	Indicates the shared memory record table entries currently used.	Number	This measure will not be available for Linux and HPUX systems.
Lock table maxsize:	Indicates the shared memory record table entries allocated in the kernel.	Number	This measure will not be available for Linux and HPUX systems.
Lock table utilization:	Indicates the number of shared memory record table entries currently used as a % of the total number of entries for this table allocated in the kernel.	Percent	This measure will not be available for Linux and HPUX systems.

2.1.1.14.11 Paging Test

This test monitors memory paging in/out activity, and can provide early warning indicators of system memory bottlenecks. This test is disabled by default.

Target of the test : A Solaris, Linux, or HPUX system only

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every server being monitored

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

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Pageout requests:	Indicates the page- out requests/sec.	Reqs/Sec	This measure will not be available for Linux systems.
Pages swapped out:	Indicates the pages paged out per sec.	Pages/Sec	This measure will not be available for HPUX systems.
Pages freed:	Indicates the pages freed out per sec by the page scanner.	Pages/Sec	This measure will not be available for Linux and HPUX systems.
Pages scanned:	Indicates the pages scanned by the page daemon as it looks for pages used infrequently.	Pages/Sec	If the page daemon scanning rate stays above 200 pages per second for long periods of time, then a memory shortage is likely. This measure will not be available for Linux and HPUX systems.
Ufs inodes removed:	Indicates the percentage of UFS inodes removed from the free list while still pointing at reusable memory pages. This is	Percent	This measure will not be available for Linux and HPUX systems.

Measurement	Description	Measurement Unit	Interpretation
	the same as the percentage of igets that force page flushes.		

2.1.1.14.12 Process State Test

This test reports the total number of processes running on a system and the number of processes in the different process states - active, sleeping, runnable, zombie, stopped, etc. An unusually large number of processes in any of these six states can be an indicator of a problem. This test is disabled by default.

Target of the test : A Solaris, Linux, or HPUX system only

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every server being monitored

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. **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.

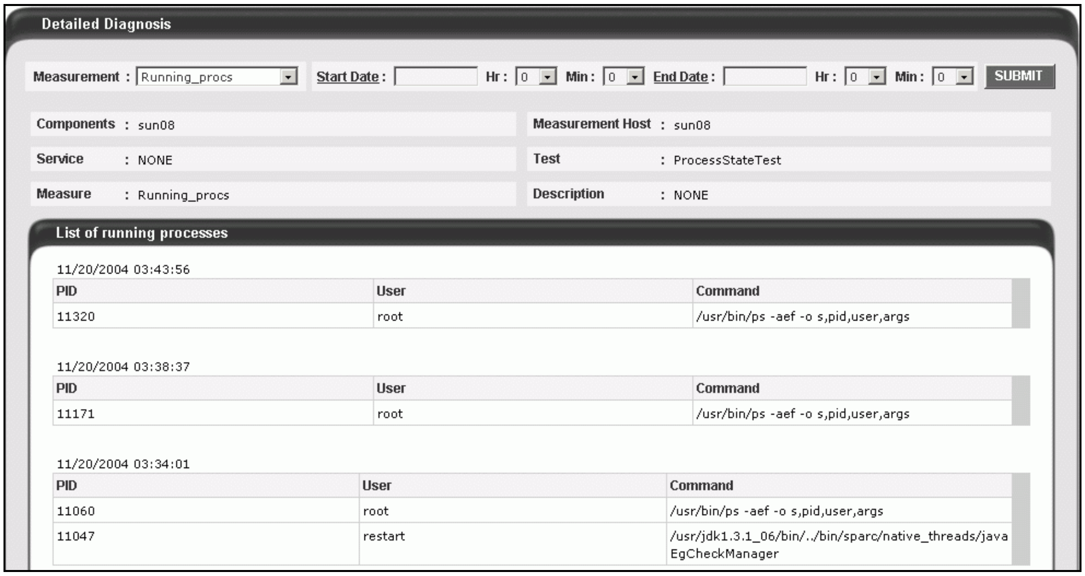
   The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled:

   - 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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Total processes:	Indicates the total number of processes on the system.	Number	
Running processes:	Indicates the number of processes that are currently running on a processor.	Number	
Sleeping processes:	Indicates the number of processes that are waiting for an event to complete.	Number	
Runnable processes:	Indicates the number of processes that are waiting to be scheduled for execution.	Number	
Zombie processes:	Indicates the number of processes that are in the zombie state - i.e., the process terminated, but its parent did not wait for it.	Number	
Stopped processes:	Indicates the number of processes in a stopped state; A process can be in a stopped state if it receives a job control signal. Alternatively, a process that is being traced can also enter this state.	Number	

The detailed diagnosis of the *Running processes* measure, if enabled, provides the Ids of the processes that are currently running, the user who initiated the processes, and the command used for invoking the process (see Figure 2.5).



Measurement : Running_procs Start Date : Hr : 0 Min : 0 End Date : Hr : 0 Min : 0

Components : sun08	Measurement Host : sun08
Service : NONE	Test : ProcessStateTest
Measure : Running_procs	Description : NONE

List of running processes

11/20/2004 03:43:56

PID	User	Command
11320	root	/usr/bin/ps -aef -o s,pid,user,args

11/20/2004 03:38:37

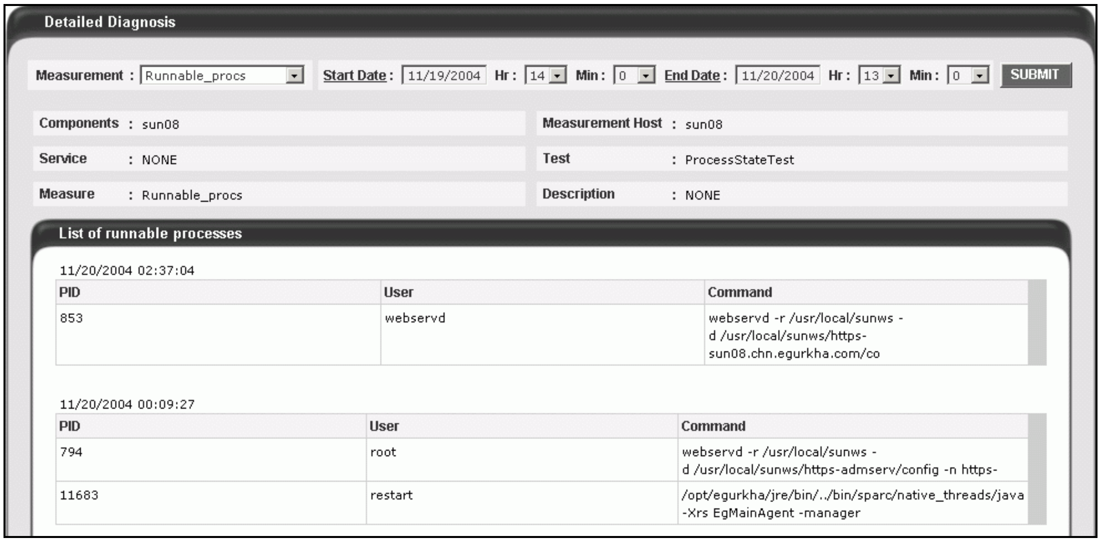
PID	User	Command
11171	root	/usr/bin/ps -aef -o s,pid,user,args

11/20/2004 03:34:01

PID	User	Command
11060	root	/usr/bin/ps -aef -o s,pid,user,args
11047	restart	/usr/jdk1.3.1_06/bin/../bin/sparc/native_threads/java EgCheckManager

Figure 2.5: Detailed diagnosis of the Running processes measure

The detailed diagnosis of the *Runnable processes* measure, if enabled, provides the Ids of the processes that are waiting to be scheduled for execution, the user who initiated the processes, and the command used for invoking the process (see Figure 2.6).



Measurement : Runnable_procs Start Date : 11/19/2004 Hr : 14 Min : 0 End Date : 11/20/2004 Hr : 13 Min : 0

Components : sun08	Measurement Host : sun08
Service : NONE	Test : ProcessStateTest
Measure : Runnable_procs	Description : NONE

List of runnable processes

11/20/2004 02:37:04

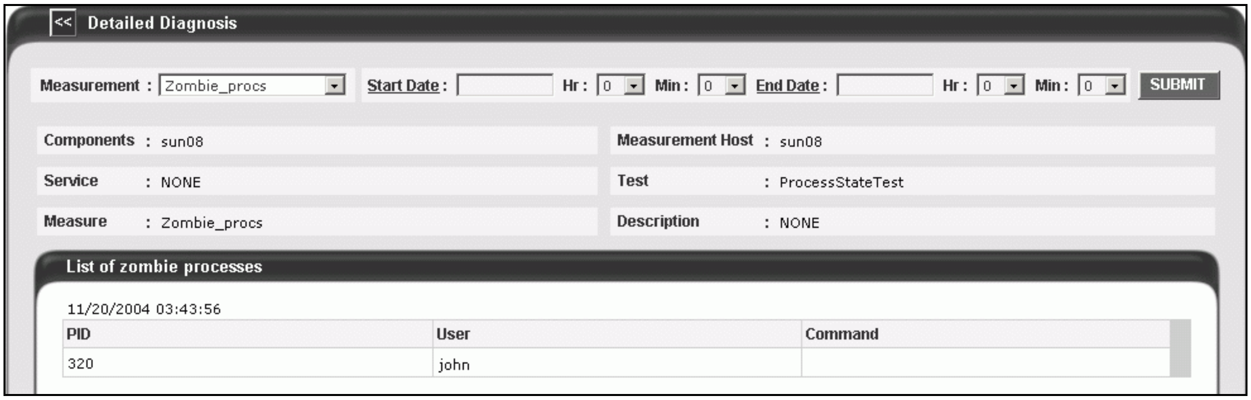
PID	User	Command
853	webservd	webservd -r /usr/local/sunws -d /usr/local/sunws/https-sun08.chn.egurkha.com/co

11/20/2004 00:09:27

PID	User	Command
794	root	webservd -r /usr/local/sunws -d /usr/local/sunws/https-admserv/config -n https-
11683	restart	/opt/egurkha/jre/bin/../bin/sparc/native_threads/java -Xrs EgMainAgent -manager

Figure 2.6: The detailed diagnosis of the Runnable processes measure

The detailed diagnosis of the *Zombie processes* measure, if enabled, provides the Ids of the processes that are in a zombie state, the user who initiated the processes, and the command used for invoking the process (see Figure 2.7).



Measurement : Zombie_procs Start Date : Hr : 0 Min : 0 End Date : Hr : 0 Min : 0

Components : sun08	Measurement Host : sun08
Service : NONE	Test : ProcessStateTest
Measure : Zombie_procs	Description : NONE

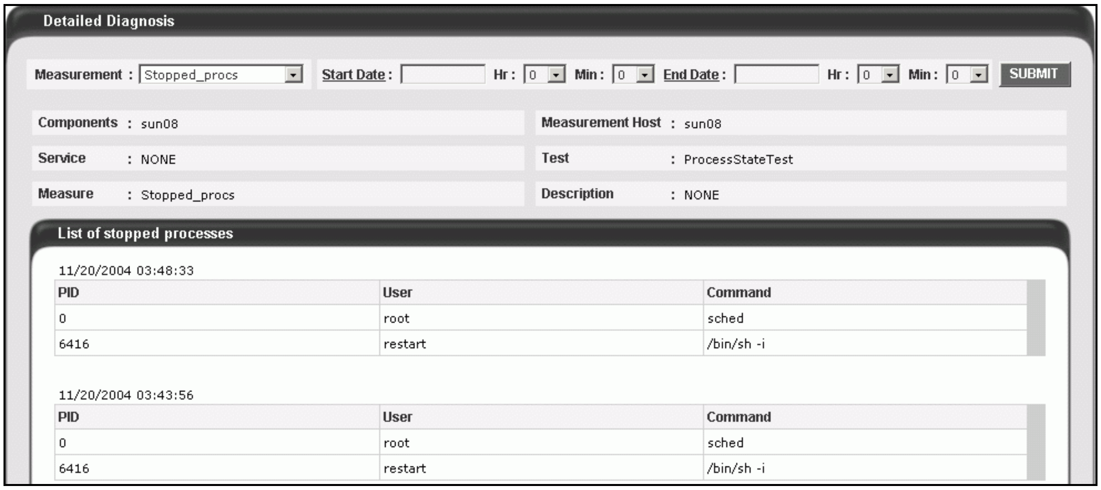
List of zombie processes

11/20/2004 03:43:56

PID	User	Command
320	john	

Figure 2.7: The detailed diagnosis of the Zombie processes measure

The detailed diagnosis of the *Stopped processes* measure, if enabled, provides the Ids of the processes that are in a stopped state, the user who initiated the processes, and the command used for invoking the process (see Figure 2.8).



Measurement : Stopped_procs Start Date : Hr : 0 Min : 0 End Date : Hr : 0 Min : 0

Components : sun08	Measurement Host : sun08
Service : NONE	Test : ProcessStateTest
Measure : Stopped_procs	Description : NONE

List of stopped processes

11/20/2004 03:48:33

PID	User	Command
0	root	sched
6416	restart	/bin/sh -i

11/20/2004 03:43:56

PID	User	Command
0	root	sched
6416	restart	/bin/sh -i

Figure 2.8: The detailed diagnosis of the Stopped processes measure

2.1.1.14.13 Nfs Mounts Test

Network File System protocol (NFS) is often used to share file systems between servers and clients. Often, if an NFS file system fails, the directories mapped to the NFS file system will be unavailable. Accesses to these directories/files will take a long time and ultimately fail. This could potentially result in application failures and outages. Hence, administrators need the capability to detect when an

NFS file system is unavailable or is running out of space. The Nfs Mounts test provides administrators with this capability.

This test executes on a system that is an NFS client – i.e., is mounting directories from remote servers - auto-discovers all NFS-mounted directories, and reports in real-time the availability and space usage of each of these directories. This test is supported only on Unix platforms (and not on Windows).

Target of the test : A Unix host

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every NFS-mounted directory auto-discovered

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. **TIMEOUT -** 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.
4. **EXCLUDE FILE SYSTEMS** – Provide a comma-separated list of file systems to be excluded from monitoring. By default, this is set to none, indicating that all file systems will be monitored by default.
5. **REPORT BY FILE SYSTEM** – This test reports a set of measures for every NFS-mounted directory auto-discovered on a target NFS client – this implies that the discovered directory names will appear as descriptors of this test in the eG monitoring console. By selecting an option from the **REPORT BY FILE SYSTEM** list, you can indicate how you want to display these directory names in the eG monitoring console. By default, the **Remote Filesystem** option is chosen; this indicates that, by default, the eG monitoring console will refer to each directory using the complete path to that directory in the remote file system – typically, this would include the name of the remote file system. For instance, if the *shares* directory on a remote host with IP *192.168.10.1* is being monitored, then the corresponding descriptor will be: *//192.168.10.1/shares*.

   If you choose the **Local Filesystem** option instead, then, the eG monitoring console will display only the name of the local file that is mapped to the remote directory – for example, if the *//192.168.10.1/shares* directory is locally mapped to the file */mnt*, then the descriptor will be */mnt*.

   Alternatively, you can have both the remote file system path and the local file mapping displayed in the eG monitoring console, by selecting the **Both** option from this list. In such a case, the descriptor will be of the format: *//192.168.10.1/shares (/mnt)*.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Is the NFS mount available?:	Indicates whether the directory is accessible or not.	Percent	The value 100 indicates that the mounted NFS is accessible. The value 0 indicates that the mounted NFS is not accessible.
Total capacity:	Indicates the current total capacity of the mounted system disk partition.	MB	
Used space:	Indicates the amount of space currently used in a mounted system disk partition.	MB	
Free space:	Indicates the free space currently available on a disk partition of a mounted system.	MB	
Percent usage:	Indicates the percentage of space used on a mounted system disk partition.	Percent	Ideally, this value should be low. A high value or a value close to 100% is indicative of excessive space usage on this mounted system disk partition. If a number of NFS directories are exhibiting similar usage patterns, it is a definite cause for concern, as it indicates that the NFS file system as a whole could be running out of space. If this situation is not brought under control soon, application failures

Measurement	Description	Measurement Unit	Interpretation
			and outages will become inevitable!

2.1.1.14.14 OS Details Test

The OS Details test reports additional system-related metrics pertaining to the target system.

Target of the test : Any host

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every host monitored

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. **PROCESS LIMIT -** The **PROCESS LIMIT** determines what type of processes are to be included in the detailed diagnosis of the *Processes count* measure of this test. By default, 5 is the **PROCESS LIMIT**. This implies that the detailed diagnosis of the *Processes count* measure will by default list only those processes for which more than 5 instances are currently running on the target host. Processes with less than 5 currently active instances will not be displayed in the detailed diagnosis. This limit can be changed.
4. **EXCLUDE PROCESS -** If you want to exclude one/more processes from the detailed diagnosis of the *Processes count* measure, then specify a comma-separated list of processes to be excluded in the **EXCLUDE PROCESS** text box. By default, the *svchost* process is excluded from the detailed diagnosis of this test.
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

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Processes count:	Indicates the number of processes running on the system.	Number	The detailed diagnosis of this measure will list the processes that are currently running and the number of instances of each process that are running.
Context switches:	This value is the combined rate at which all processors on the computer are switched from one thread to another.	Switches/Sec	Context switches occur when a running thread voluntarily relinquishes the processor, is preempted by a higher priority ready thread, or switches between user-mode and privileged (kernel) mode to use an Executive or subsystem service. If the context switch rate is unusually high, it implies that there is excessive contention for CPU resources.

2.1.1.14.15 File Status Test

This test reports whether configured files are available or not, and if available, reports the size of the individual files.

Target of the test : Any Unix or Windows host

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every configured file path

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. **FILENAME -** Provide a comma-separated list of the full path of the files that are to be monitored. For instance, on a Unix host, your specification can be: *opt/usr/alert.log,opt/tmp/error.log*. On a Windows host, your specification can be: *C:\eGurkha\agent\logs\agentout.log,C:\eGurkha\agent\logs\agenterr.log*.

   Also, if you want to monitor files with names that include a date, then your **FILENAME** specification should indicate the date format used for naming the files. For instance, to monitor all files that are named error, but which end with dates that are of the format DDMMYY, your **FILENAME** specification should be: *C:\logs\errorDDMMYY*. As per this specification, files such as *error21082015, error22082015,* and *error24082015* will be monitored.

   Your **FILENAME** specification can include file names with dates and without dates – for eg., C *:\eGurkha\agent\logs\agentout.log,C:\eGurkha\agent\logs\agenterr.log, C:\logs\errorDDMMYY,C:\errorlogs\MMDDYYYY_error*

   If you wish to monitor the latest file in a folder that consists of too many files with the same extension, say for example *.log*, then your **FILENAME** specification should be : *C:\Temp\*.log.*

   Note:

   Wildcard characters are not supported while entering the full path of the files in the **FILENAME** text box. So, provide the exact path of the files in the same.

4. **DATE PATTERN** – Using this test, you can also monitor all files with names that include a date. If your **FILENAME** specification above includes files with dates, then set the **DATE PATTERN** flag to **Yes**. If this is done, then the test will look for date patterns in your **FILENAME** specification. If your **FILENAME** specification does not include data patterns, set this flag to **No**. If this is done, then the test will not look for date patterns in your **FILENAME** specification. Say that you include a file name that embeds a date pattern in your **FILENAME** specification – eg., *C:\logs\errorMMDDYYYY* - and set the **DATE PATTERN** flag to **No**. In this case, the test will disregard the date pattern *MMDDYYYY*, and will instead search for a file with the name, errorMMDDYYYY.

5. **MAX AGE IN HOURS -** Specify the time duration in hours beyond which this test should report whether/not the file configured against the **FILENAME** is updated. By default, this parameter is set to *none*.

Measurements made by the test

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td>File availability:</td><td>Indicates whether this file is currently available or not.</td><td>Percent</td><td>This measure reports the value 100, if the file is available in the configured path. If the files is not available, a value of 0 is reported.</td></tr>
<tr><td>File size:</td><td>Indicates the current size of this file.</td><td>MB</td><td>This measure reports the size of a file only if the File availability measure returns a value of 100 for that file - i.e., only when the file is available.</td></tr>
<tr><td>File growth during the last measurement period:</td><td>Indicates the increase in the size of this file since the last measurement period.</td><td>KB</td><td>A consistent increase in the value of this measure indicates that the file size is increasing steadily.</td></tr>
<tr><td>Is the file modified?</td><td>Indicates whether/not this file was modified.</td><td></td><td>If the size of the file increased from the last measurement period, then this measure will report the value Yes. If there is no change in file size since the last measurement period, then this measure will report the value No.
The numeric values that correspond to these measure values are as follows:<table><tr><th>Measure Value</th><th>Numeric Value</th></tr><tr><td>Yes</td><td>100</td></tr><tr><td>No</td><td>0</td></tr></table><b>Note:</b>
By default, this test reports the <b>Measure Value</b>s listed in the table</td></tr>
</table>

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td></td><td></td><td></td><td>above to indicate whether/not a file has grown. In the graph of this measure however, the same is represented using the numeric equivalents only.</td></tr>
<tr><td>Is the file not updated above configured hours?</td><td>Indicates whether this file is not updated since the time duration specified against the <b>MAX AGE IN HOURS</b> parameter.</td><td></td><td>If this file is not updated beyond the specified time duration, then this measure will report a value <i>Yes</i>. Otherwise, this measure will report the value <i>No</i>.
The numeric values that correspond to these measure values are as follows:
<table>
<tr><th>Measure Value</th><th>Numeric Value</th></tr>
<tr><td>Yes</td><td>1</td></tr>
<tr><td>No</td><td>0</td></tr>
</table>
<b>Note:</b>
By default, this test reports the <b>Measure Value</b>s listed in the table above to indicate whether his file was not updated beyond the specified time duration. In the graph of this measure however, the same is represented using the numeric equivalents only.</td></tr>
</table>

2.1.1.14.16 File Monitor Test

This test monitors a configured directory, and reports the total number of files in that directory that match configured patterns. In addition, the test also reports the age of the oldest file of all the matching files.

Target of the test : Any Unix or Windows host

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every configured **FILE PATH**

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 at which the **HOST** listens
4. **FILE PATH -** Specify the full path to the directory to be monitored. For eg., *c:\app\logdir*. Multiple directory paths can be configured in the following format: < *DisplayName1>@<DirectoryPath1>,<DisplayName2>@<DirectoryPath2>,...* Every *DisplayName* will appear as a descriptor of this test. For instance, on a Windows host your specification can be: *LogPath:C:\eGurkha\agent\logs,OraPath:C:\Oracle\alerts\logs* . Likewise, on a Unix host, your specification can be: *LogPath:opt/eGurkha/agent/logs*,*ErrorPath:opt/usr/tmp/errors*.
5. **FILENAME PATTERN -** If only a single directory has been configured against **FILE PATH**, then, in this text box, provide a comma-separated list of filename patterns to be monitored. For example, *error,warning*. Your pattern specifications can also include wildcard characters. For example, to monitor files with names that begin with the word 'log', and those that end with the word 'err', your pattern specification can be: *log*,*err*. Similarly, to monitor those files with names that embed say, 'warn', your specification can be: **warn**. A leading * signifies any number of leading characters, and a trailing * signifies any number of trailing characters.

   If multiple directories have been configured against **FILE PATH**, then, you can specify a file pattern for each directory so configured. Your specification in this case should be of the following format: *<DisplayName_of_Filepath1>@<Filename_pattern1>,<DisplayName_of_Filepath2>@<Filename_pattern2>,...*For instance, if the **FILE PATH** has been configured with two directories with display names *LogPath* and *OraPath*, the **FILENAME PATTERN** can be: *LogPath:*error*,OraPath:*alert**. You can also configure multiple patterns for each directory specified against **FILEPATH**. For example, if the **FILE PATH** has been configured with two directories with display names *LogPath* and *OraPath*, and you want to monitor all files with names that contain the strings ‘error’ and ‘info’ in each of the directories, your specification would be: *LogPath@*error*,LogPath@*info*,OraPath@*error*,OraPath@*info**.

   Note:

   The file name patterns should not contain file extensions – for instance, your **FILENAME PATTERN** specification cannot be as follows: *LogPath:*error*.log,OraPath:*alert*.txt.*

6. **DATE PATTERN -** In some environments, file names may begin with the dates on which the files were created/modified. If you want this test to monitor only those files that begin with configured date patterns, then set the **DATE PATTERN** flag to **True**. In this case, only those **FILENAME PATTERN**s that begin with a date pattern will be considered for monitoring by this test. All other patterns will be ignored. If the **DATE PATTERN** is set to **False**, then all configured **FILENAME PATTERN**s will be monitored.

   Say, you want to monitor only those files with names that begin with dates of the format, *ddmmyy*. To achieve this, first set the **DATE PATTERN** flag to **True**, and then, specify the following in your **FILENAME PATTERN** text box: <DisplayName_of_FilePath>@ddmmyy*.*.

7. **INCLUDE SUB DIRECTORY** – By default, this test will only search the directories configured against **FILE PATH** for the specifiled **FILENAME PATTERNS.** If these directories contain sub-directories, then such sub-directories will by default be excluded from monitoring. This is why, the **INCLUDE SUB DIRECTORY** flag is set to **False** by default. If you want this test to also scan the sub-directories within the configured **FILE PATHS** for the specified **FILENAME PATTERNS,** then set the **INCLUDE SUB DIRECTORY** flag to **True**.

8. **FILE EXTENSION** – By default, this parameter is set to none, indicating that this test monitors all files that match the configured **FILENAME PATTERN** regardless of the file extensions. However, if you want the test to monitor only those matching files that have a specific extension – say txt, log, ini, etc. - then mention that extension against the **FILE EXTENSION** parameter. **Note that only one extension can be provided here.**

9. **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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Number of files:	Indicates the number of files that match the configured pattern in this directory.	Number	Use the detailed diagnosis of this measure to determine which files match the configured pattern, the last modified date and time of every file, and the age of each file (in minutes).
Age of oldest file:	Indicates the age (in minutes) of the oldest file that matches the configured pattern in this directory.	Minutes	Use the detailed diagnosis of the Number of files measure to identify the oldest file of this pattern.

2.1.2 The Network Layer

The **Network** layer handles connectivity of the host system to the network, and includes packet traffic transmitted to and from the server. An eG agent tracks the status of the network layer to determine whether the network link to the target host is available or not, the bandwidth available on the network link, and to the rate of packet transmissions to and from the host. For monitoring, an eG agent uses two tests (see Figure 2.9):

- **Network** test that monitors the connectivity to and from a host. An external agent executes this test.
- **NetworkTraffic** test, which is executed by an internal agent. This test tracks the rate of packets received and transmitted by each of the network interfaces of a host. A separate set of results is reported for each network interface of the host. For example, Figure 2.9 depicts the test results for a host with a single network interface that is named en0.

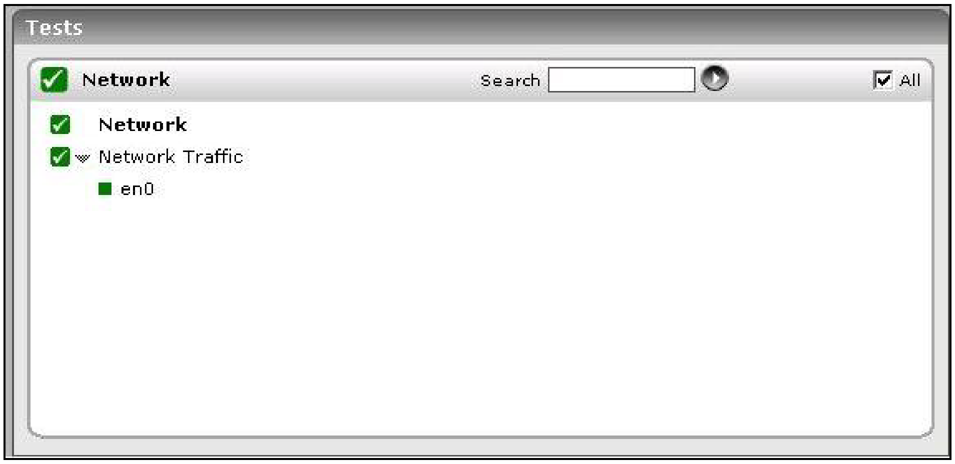


Figure 2.9: The tests that map to the Network layer of a Linux server

2.1.2.1 Network Test

This test monitors the network connectivity from an external location (e.g., the eG server) to a host system.

Target of the test : A host system

Agent deploying the test : An external agent

Outputs of the test : One set of outputs for every target host being monitored

Configurable parameters for this test

1. **TEST PERIOD -** How often should the test be executed
2. **HOST -** The host for which the test is to be configured.
3. **TARGETS -** In the **TARGETS** text box, specify a comma-separated list of *name:IP address* pairs. While the *name* is just a display name, the *IP address* refers to the IP to be monitored. This specification will ensure that the test pings multiple IP addresses. For example - *mysql:192.168.0.102,egwebsite:209.15.165.127*
4. **PACKETSIZE -** The size of packets used for the test (in bytes)
5. **PACKETCOUNT –** The number of packets to be transmitted during the test
6. **TIMEOUT -** How long after transmission should a packet be deemed lost (in seconds)
7. **PACKETINTERVAL -** Represents the interval (in milliseconds) between successive packet transmissions during the execution of the network test for a specific target.

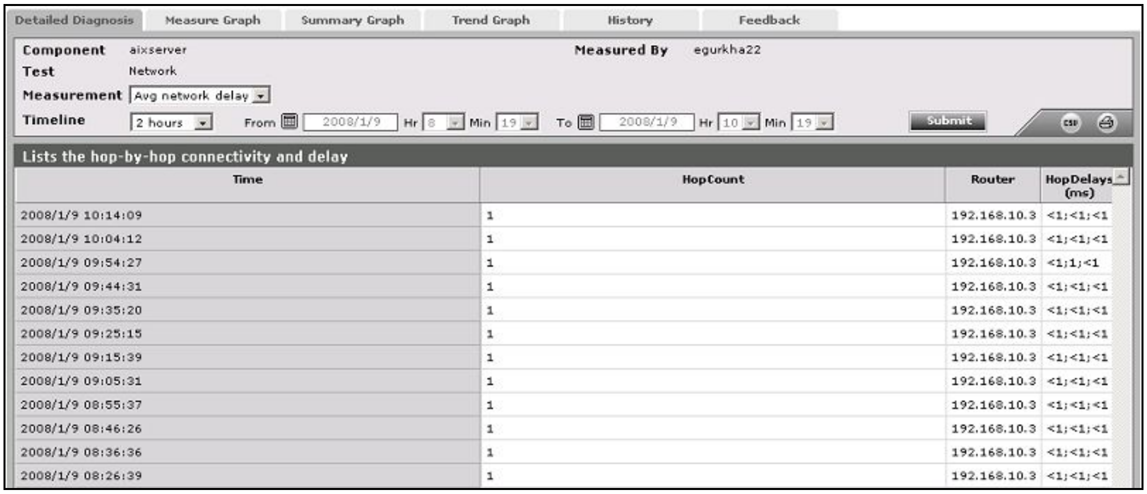
8.	To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability 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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Avg network delay	Indicates the average delay between transmission of packet to a target and receipt of the response to the packet at the source.	Secs	An increase in network latency could result from misconfiguration of the router (s) along the path, network congestion, retransmissions at the network, etc.
Min network delay	The minimum time between transmission of a packet and receipt of the response back.	Secs	A significant increase in the minimum round-trip time is often a sure sign of network congestion.
Packet loss	Indicates the percentage of packets lost during transmission from source to target and back.	Percent	Packet loss is often caused by network buffer overflows at a network router or by packet corruptions over the network. The detailed diagnosis for this measure provides a listing of routers that are on the path from the external agent to target server, and the delays on each hop. This information can be used to diagnose the hop (s) that could be causing excessive packet

Measurement	Description	Measurement Unit	Interpretation
			loss/delays.
Network availability	Indicates whether the network connection is available or not	Percent	A value of 100 indicates that the system is connected. The value 0 indicates that the system is not connected. Typically, the value 100 corresponds to a Pkt_loss_pct of 0.

The detailed diagnosis capability of the *Average delay* measure, if enabled, lists the hop-by-hop connectivity and delay (see Figure 2.10). The information provided includes the **HopCount**, the IP of the **Router**, and the delay at the displayed hop (in milliseconds). In the event of a very high *Average delay*, a user can use this information to “zero-in” on the exact hop at which the delay has occurred, probe into the root-cause of the delay, and resolve the issue, so as to optimize network performance.



Component aixserver

Test Network

Measured By egurkha22

Measurement Avg network delay

Timeline 2 hours From 2008/1/9 Hr 8 Min 19 To 2008/1/9 Hr 10 Min 19

Lists the hop-by-hop connectivity and delay

Time	HopCount	Router	HopDelays (ms)
2008/1/9 10:14:09	1	192.168.10.3	<1;<1;<1
2008/1/9 10:04:12	1	192.168.10.3	<1;<1;<1
2008/1/9 09:54:27	1	192.168.10.3	<1;1;<1
2008/1/9 09:44:31	1	192.168.10.3	<1;<1;<1
2008/1/9 09:35:20	1	192.168.10.3	<1;<1;<1
2008/1/9 09:25:15	1	192.168.10.3	<1;<1;<1
2008/1/9 09:15:39	1	192.168.10.3	<1;<1;<1
2008/1/9 09:05:31	1	192.168.10.3	<1;<1;<1
2008/1/9 08:55:37	1	192.168.10.3	<1;<1;<1
2008/1/9 08:46:26	1	192.168.10.3	<1;<1;<1
2008/1/9 08:36:36	1	192.168.10.3	<1;<1;<1
2008/1/9 08:26:39	1	192.168.10.3	<1;<1;<1

Figure 2.10: Detailed diagnosis of the *Average delay* measure listing the hop-by-hop connectivity and delay

Note:

If the **Network** test is executed by a Linux agent, then this agent will not be able to collect the detailed measures (i.e., detailed diagnosis) for the **Network** test. To resolve this issue, do the following:

1. Login to the eG manager and edit the **eg_tests.ini** file (in the **/opt/egurkha/manager/config** directory) on it.
2. By default, the **MaxHopsForNetworkTestDD** parameter in the **[AGENT_SETTINGS]** section of the file is set to **3**. Change this to **16** instead and save the file.

2.1.2.2 Network Traffic Test

From an internal agent, this test measures the traffic received and transmitted by a host system via each of its network interfaces.

Target of the test : A host system

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every network interface of the target host (On Windows systems, the total traffic through all the network interfaces is reported by this test).

Configurable parameters for this test

1. **TEST PERIOD -** How often should the test be executed
2. **HOST -** The host for which the test is to be configured.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Incoming traffic:	Represents the rate of incoming traffic.	Pkts/Sec	An increase in traffic to the server can indicate an increase in accesses to the server (from users or from other applications) or that the server is under an attack of some form.
Outgoing traffic:	Represents the rate of outgoing traffic	Pkts/Sec	An increase in traffic from the server can indicate an increase in accesses to the server (from users or from other applications).

2.1.3 The Tcp Layer

As indicated earlier, a generic application relies on either the TCP or UDP protocols for data transport. While many applications such as web server, web application servers, and database servers rely on the TCP protocol, some other applications such as DNS servers and WAP gateways rely on the UDP protocol. To track the health of the TCP layer of a host, and its effect on the status of any application server, the eG Enterprise suite uses a Tcp test shown in Figure 2.11.

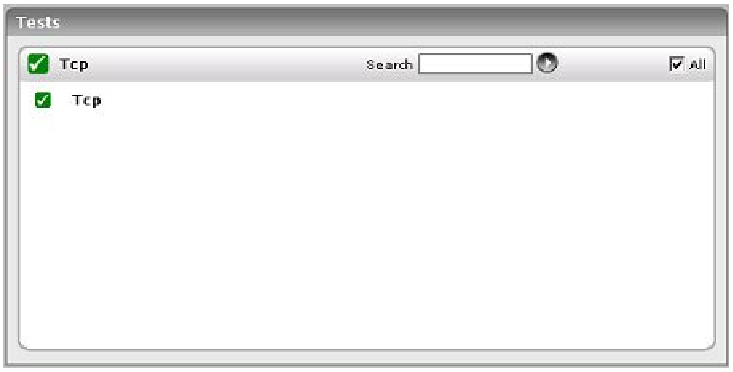


Figure 2.11: The test mapped to the Tcp layer of a Linux server

2.1.3.1 TCP Test

This test, executed by an internal agent, tracks various statistics pertaining to TCP connections to and from a host. The details of the test are provided below:

Target of the test : A host system

Agent deploying the test : An Internal agent

Outputs of the test : One set of results for each host system monitored

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. **REPORTINGNAMES -** The detailed diagnosis of this test lists the top-10 hosts that have established the maximum number of TCP connections with the monitored host. Set this flag to **Yes** if you want the detailed diagnosis to display the host name of these hosts and not the IP address. To view the IP address of the hosts instead, set this flag to **No**.
4. 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.

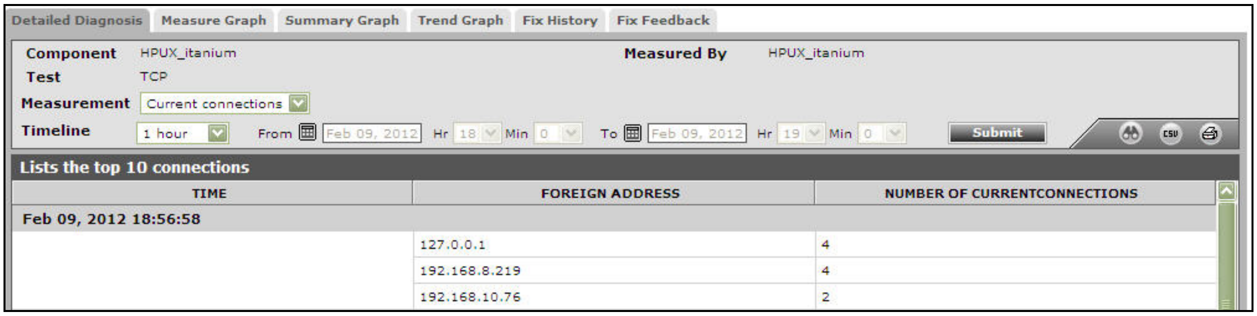
Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
In connection rate:	Connections per second received by the server	Conns/Sec	A high value can indicate an increase in input load.
Out connection rate:	Connections per second initiated by the server	Conns/Sec	A high value can indicate that one or more of the applications executing on the host have started using a number of TCP connections to some other host(s).
Current connections:	Currently established connections	Number	A sudden increase in the number of connections established on a host can indicate either an increase in load to one or more of the applications executing on the host, or that one or more of the applications are experiencing a problem (e.g., a slow down). On Microsoft Windows, the current connections metrics is the total number of TCP connections that are currently in the ESTABLISHED or CLOSE_WAIT states. The detailed diagnosis of this test, if

Measurement	Description	Measurement Unit	Interpretation
			enabled, lists the top-10 hosts that have established the maximum number of TCP connections with the monitored host.
Connection drops:	Rate of established TCP connections dropped from the TCP listen queue.	Conns/Sec	This value should be 0 for most of the time. Any non- zero value implies that one or more applications on the host are under overload or that the bandwidth of your server is insufficient. With ample bandwidth, the server can establish and serve connections before they time out. If bandwidth is insufficient, the connections fail or are dropped.
Connection failures:	Rate of half open TCP connections dropped from the listen queue	Conns/Sec	TCP counts a connection as having failed when it goes directly from sending (SYN-SENT) or receiving (SYN-RCVD) to CLOSED, or from receiving (SYN-RCVD) to listening (LISTEN). This value should be 0 for most of the time. A prolonged non-zero value can indicate either that the server is under SYN attack or that there is a problem with the network link to the server that is resulting in connections being dropped without completion. It could also indicate a bandwidth shortage. If the server has sufficient bandwidth, it can establish and serve connections before they time out. If bandwidth is insufficient, the connections fail or are dropped.

Measurement	Description	Measurement Unit	Interpretation
			This measure is not available in the Windows version of the product.

If the test reports a high number of *Current Connections*, then you can use the detailed diagnosis of this measure to know which hosts are contributing the TCP connection overload on the host. The detailed diagnosis lists the IP address/host names of the top-10 hosts and the number of connections that each host has established with the monitored host.



Component HPUX_itanium
Measured By HPUX_itanium
Test TCP
Measurement Current connections
Timeline 1 hour From Feb 09, 2012 Hr 18 Min 0 To Feb 09, 2012 Hr 19 Min 0

Lists the top 10 connections

TIME	FOREIGN ADDRESS	NUMBER OF CURRENTCONNECTIONS
Feb 09, 2012 18:56:58		
	127.0.0.1	4
	192.168.8.219	4
	192.168.10.76	2

Figure 2.12: The detailed diagnosis of the Current Connections measure

2.1.3.2 Throughput Test

Sometimes, a server may be functional and connected to the network, but the network connectivity may not be good enough to provide good throughput. This may result in applications hosted on the server offering poor response to users. Speed mismatch between the network interface card on the server and the switch port that it is connected to is often one of the main reasons why such throughput issues occur in production environments.

The **Throughput** test aims to monitor and detect situations when the throughput for data transfer to and from a server drops below acceptable levels. This test is executed by the eG agent installed on a server, and it emulates an upload and a download action from a server. Upload involves data transfer from the agent on the server, while download involves downloading of content to the server from a remote location. The upload and download activities are initiated against the eG management console to which the agent reports. Hence, the throughput metrics report the values that users can expect when transmitting data between the server being monitored and the eG management console.

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 the desired **Component type**, set

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.

Target of the test : A host system

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each host system monitored

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. **UPLOADSIZE -** Define the size of data transferred by the agent to the management console to perform this test.
4. **DOWNLOADSIZE -** Define the amount of data downloaded by the agent from the management console during the course of this test.
5. **URL -** Specify the eG management console URL that the agent connects to in order to perform this test in the **URL** text box.
6. **TIMEOUT** - Specify the amount of time in seconds that this test can run for. Beyond this period, the test terminates with a failure.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Upload availability:	This metric indicates whether the upload data transfer succeeded or not. This metric takes a value of 0 if the data upload to the eG management console fails. A value of 100 indicates that the upload completed successfully.	Percent	Upload failures indicate either a problem with the eG management console, or a failure of the network routing to the eG management console (e.g., because one of the routers on the path to the eG management console is down).
Upload speed:	This metric represents the throughput seen	Kbps	A significant reduction in this value over time indicates a potential

Measurement	Description	Measurement Unit	Interpretation
	during upload transfers (i.e., from the server being monitored to the eG management console).		problem scenario that needs investigation - i.e., is it the network or the eG management server that is causing the slowdown (if the bottleneck is at the eG management server, the slowdown would be seen across the board by all the agents).
Download availability:	This metric indicates whether the download data transfer succeeded or not. This metric takes a value of 0 if the data download from the eG management console fails. A value of 100 indicates that the download completed successfully.	Percent	Download failures indicate either a problem with the eG management console, or a failure of the network routing to the eG management console (e.g., because one of the routers on the path to the eG management console is down). It is especially important to monitor upload and download throughput values for networks that have different downstream and upstream characteristics like ADSL or Hybrid Fiber Coaxial networks.
Download speed:	This metric represents the throughput seen during download transfers (i.e., from the eG management console to the server being monitored).	Kbps	A significant reduction in this value over time indicates a potential problem scenario that needs investigation - i.e., is it the network or the eG management server that is causing the slowdown (if the bottleneck is at the eG management server, the slowdown would be seen across the board by all the agents).

2.1.3.3 Ephemeral Ports Test

An ephemeral (short-lived) port is a transport protocol port for Internet Protocol (IP) communications allocated automatically from a predefined range by the TCP/IP stack software. It is used by the Transmission Control Protocol (TCP), User Datagram Protocol (UDP), or the Stream Control Transmission Protocol (SCTP) as the port assignment for the client end of a client– server communication to a well known port on a server. Ephemeral ports may also be used to free up a well- known service listening port and establish a service connection to the client host. The allocations are temporary and only valid for the duration of the communication session. After completion of the communication session, the ports become available for reuse.

This test monitors the usage of ephemeral ports, and reports whether adequate ports are available for use. With the help of this test, you can proactively detect over- utilization of ports and promptly prevent port exhaustion.

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 the desired **Component type**, set *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.

Target of the test : A host system

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each host system monitored

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 at which the **HOST** listens. The default is NULL.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Ephemeral ports in use:	Indicate the number of ephemeral ports that are currently in use.	Number	

Measurement	Description	Measurement Unit	Interpretation
Ephemeral ports available:	Indicates the total number of ports in the TCP/IP stack's predefined range of ports - i.e., in the pool of ephemeral ports.	Number	
Free ephemeral ports:	Indicates the number of ports that are available for use.	Number	The value of this measure is the difference between the Total ports and the Ports in Use measures. A port is considered free when its yet to be assigned to a client, or was assigned and later released for re-use when the client connection terminated. A value 0 for this measure is something to be concerned about, particularly, on Windows systems. On Windows systems, if all the available ephemeral ports are allocated to client applications then the client experiences a condition known as TCP/IP port exhaustion. When TCP/IP port exhaustion occurs, client port reservations cannot be made and errors will occur in client applications that attempt to connect to a server via TCP/IP sockets. To avoid port exahustion and support high connection rates, reduce the *TIME_ WAIT* value and increase the port range. **Note:** Port exhaustion may not occur on

Measurement	Description	Measurement Unit	Interpretation
			Unix systems due to the higher default connection rate in those operating systems.
Ephemeral port usage:	Indicates the percentage of ephemeral ports that are in use.	Percent	A high value could indicate that many clients are connecting to the system without explicitly requesting for a specific port number. It could also mean that many ephemeral ports have not been released even after the clients terminated their connections. A value close to 100% could be a cause for concern, particularly on Windows systems. This is because, on Windows, if all the available ephemeral ports are allocated to client applications then the client experiences a condition known as TCP/IP port exhaustion. When TCP/IP port exhaustion occurs, client port reservations cannot be made and errors will occur in client applications that attempt to connect to a server via TCP/IP sockets. To avoid port exahustion and support high connection rates, reduce the *TIME_ WAIT* value and increase the port range. **Note:** Port exhaustion may not occur on Unix systems due to the higher default connection rate in those operating systems.

2.1.4 The Udp Layer

The Udp test (see Figure 2.13) tracks the health of the Udp layer.

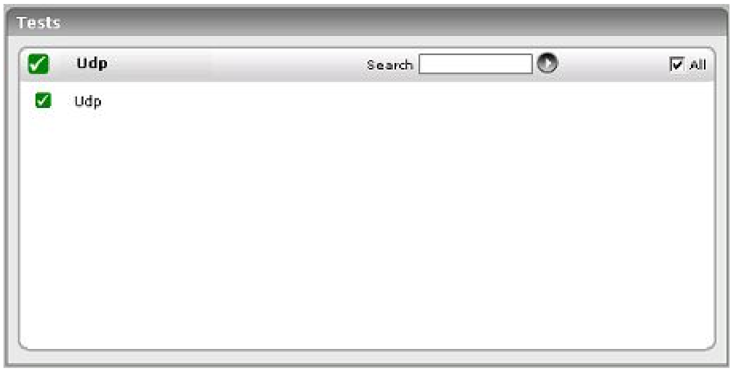


Figure 2.13: Tests mapping to the Udp layer of a Linux server

2.1.4.1 UDP Test

This test tracks various statistics of interest pertaining to the UDP stack of a host.

Target of the test : A host system

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each host system monitored

1. **TEST PERIOD -** How often should the test be executed
2. **HOST -** The host for which the test is to be configured.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Traffic in:	UDP packets (datagrams) per second received by the target host.	Pkts/Sec	A high value can indicate an increase in input load.
Traffic out:	UDP packets (datagrams) per second transmitted by applications on the	Pkts/Sec	A high value can indicate an increase in load to one or more applications, or a change in the characteristics of one or more

Measurement	Description	Measurement Unit	Interpretation
	target host.		applications.
Packet overflow rate:	Rate of UDP buffer overflows at the host.	Pkts/Sec	Typically, this value should be zero. A sudden increase in the buffer overflow rate can be indicative of an overload condition on the host. Check the UDP buffer settings on the system or the buffer sizing used by the concerned applications to consider ways of alleviating this problem.

2.1.5 The Application Processes Layer

This layer depicts the states of the different processes that must be executing for the application service to be available. The Processes test (see Figure 2.14) tracks various statistics pertaining to the different application processes. Details of this test are provided below.

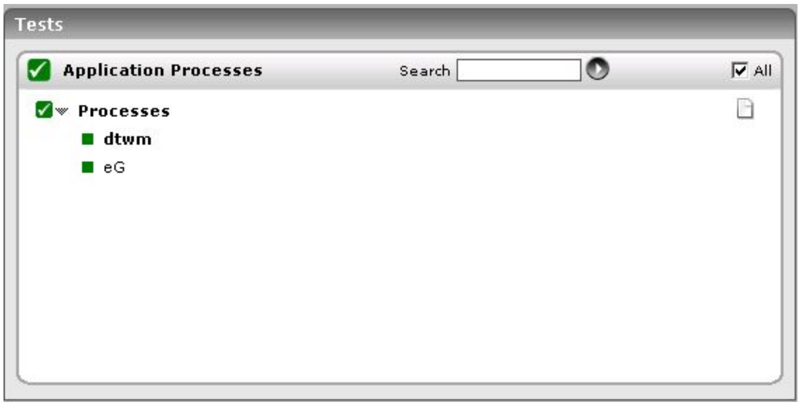


Figure 2.14: The Processes test that tracks the health of the Application Processes layer of a Linux server

2.1.5.1 Processes Test

Application processes can be identified based on specific regular expression patterns. For example, web server processes can be identified by the pattern *httpd*, while DNS server processes can be specified by the pattern *named* where * denotes zero or more characters. For each such pattern, the process test reports a variety of CPU and memory statistics.

Target of the test : Any application server

Agent deploying the test : An internal agent

Outputs of the test : One set of results per process pattern specified

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. **PROCESS -** In the **PROCESS** text box, enter a comma separated list of names:pattern pairs which identify the process(es) associated with the server being considered. processName is a string that will be used for display purposes only. processPattern is an expression 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. The pattern(s) used vary from one application to another and must be configured per application. For example, for an iPlanet application server (Nas_server), there are three processes named kcs, kjs, and kxs associated with the application server. For this server type, in the *Process* text box, enter "kcsProcess:*kcs*, kjsProcess:*kjs*, kxsProcess:*kxs*, where * denotes zero or more characters. Other special characters such as slashes (\) can also be used while defining the process pattern. For example, if a server's root directory is /home/egurkha/apache and the server executable named httpd exists in the bin directory, then, the process pattern is "*/home/egurkha/apache/bin/httpd*".

   Note:

   The **PROCESS** parameter supports process patterns containing the ~ character.

   To determine the process pattern to use for your application, on Windows environments, look for the process name(s) in the Task Manager -> Processes selection. To determine the process pattern to use on Unix environments, use the ps command (e.g., the command "ps -e -o pid,args" can be used to determine the processes running on the target system; from this, choose the processes of interest to you.)

   Also, while monitoring processes on Windows, if the **WIDE** parameter of this test is set to **true**, then your process patterns can include the full path to the process and/or the arguments supported by the process. For instance, your *processpattern* specification can be as follows:

   Terminal:C:\WINDOWS\System32\svchost -k DcomLaunch,Remote:C:\WINDOWS\system32\svchost.exe -k netsvcs

To save the time and effort involved in such manual process specification, eG Enterprise offers an easy-to-use auto-configure option in the form of a **View/Configure** button that is available next to the **PROCESS** text box. Refer to Section **2.1.5.1.1** topic to know how to use the auto-configure option.

5. **IGNORECASE** – **This parameter is applicable to Unix environments alone.** By default, this parameter is set to **Yes**, indicating that the test will monitor the process names/patterns configured against the **PROCESS** parameter in a case-insensitive manner. In other words, the test will report the count and resource usage of all processes that match the configured process name/pattern, even if their cases do not match. For instance, if the **PROCESS** parameter is configured with *Apache:*apache**, then the test will monitor the process named apache and the one named *APACHE* by default. If you, on the other hand, want process monitoring to be performed in a case-sensitive manner, then set this flag to **No**.
6. **USER** - By default, this parameter has a value "none"; this means that the test monitors all processes that match the configured patterns, regardless of the user executing them. If you want the test to monitor the processes for specific users alone, then, on Unix platforms, specify a comma-separated list of users to be monitored in the **USER** text box. For instance: *john,elvis,sydney*

   While monitoring Windows hosts on the other hand, your *user* configuration should be a comma-separated list of "domain name-user name" pairs, where every pair is expressed in the following format: *Domainname\Username*. For example, to monitor the processes of user *john* and *elvis* who belong to domain *mas* , your *user* specification should be: *mas\john,mas\elvis*. Also, on a Windows host, you will find system processes running on the following user accounts: *SYSTEM*, *LOCAL SERVICE*, and *NETWORK SERVICE*. While configuring these *user* accounts, make sure the *Domainame* is always *NT AUTHORITY*. In this case therefore, your *user* specification will be: *NT AUTHORITY\SYSTEM,NT AUTHORITY\LOCAL SERVICE,NT AUTHORITY\NETWORK SERVICE*.

   If multiple processes are configured for monitoring and multiple users are also configured, then the test will check whether the first process is run by the first user, the second process by the second user, and so on. For instance, if the processes configured are *java:java.exe,apache:*httpd** and the users configured are *john,elvis*, then the test will check whether user john is running the process java, and user *elvis* is running the process *apache*. Similarly, if multiple processes are configured, but a single user alone is configured, then the test will check whether the specified user runs each of the configured processes. However, if you want to check whether a single process, say java.exe, is run by multiple users - say, *james* and *jane* - then, you have to do the following:

- Your *user* specification should be: *james,jane* (if the target host is a Unix host), or *<Domainname>\james,<Domainname>\jane* (if the target host is a Windows host)
- Your *process* configuration should be: *Process1:java.exe*,*Process2:java.exe*. The number of processes in this case should match the number of users.
- Such a configuration will ensure that the test checks for the *java.exe* process for both the users, *james* and *jane*.

7. **CORRECT** - Increased uptime and lower mean time to repair are critical to ensuring that IT infrastructures deliver a high quality of service to users. Towards this end, the eG Enterprise suite embeds an optional auto-correction capability that enables eG agents to automatically correct problems in the environment, as soon as they occur. With this capability, as and when an abnormal situation is detected, an eG agent can initiate corrective actions automatically to resolve the problem. Automatic correction without the need for manual intervention by IT operations staff reduces service downtime and improves operational efficiency. By default, the auto-correction capability is available in the eG Enterprise suite for the *Processes running* measure of Processes test, and the *Service availability* measure of **WindowsServices** test. The eG Enterprise suite includes a default auto-correction script for Processes test.

   When a process that has been configured for monitoring stops, this script automatically executes and starts the process. To enable the auto-correction capability for the Processes test, first, select the **TRUE** option against the **CORRECT** parameter in this page (by default, **FALSE** will be selected here).

8. **ALARMTYPE** - Upon selecting the **true** option, three new parameters, namely, **ALARMTYPE**, **USERPARAMS**, and **CORRECTIVESCRIPT** will appear. You can set the corrective script to execute when a specific type of alarm is generated, by selecting an option from the **ALARMTYPE** list box. For example, if the **Critical** option is chosen from the **ALARMTYPE** list box, then the corrective script will run only when a critical alarm for the Processes test is generated. Similarly, if the **Critical/Major** option is chosen, then the corrective script will execute only when the eG Enterprise system generates critical or major alarms for the Processes test. In order to ensure that the corrective script executes regardless of the alarm type, select the **Critical/Major/Minor** option.

9. **USERPARAMS** - The user-defined parameters that are to be passed to the corrective script are specified in the **USERPARAMS** text box. One of the following formats can be applied to the **USERPARAMS** specification:

   exec@processName:command: In this specification, *processName* is the display name of the process pattern specified against the **PROCESS** parameter, and *command* is the command to be executed by the default script when the process(es) represented by the *processName* stops. For example, assume that the PROCESS parameter of Processes test has been configured in the following manner: *Apache:*/opt/egurkha/manager/apache/bin/httpd*,Tomcat:*java*tomcat**, where *Apache* and *Tomcat* are the *processNames* or display names of the configured patterns. If auto-correction is enabled for these processes, then the **USERPARAMS** specification can be as follows:

exec@Apache:/opt/egurkha/manager/apache/bin/apachectl start,Tomcat: /opt/tomcat/bin/catalina.sh start

This indicates that if the processes configured under the *processName "Apache"* stop (i.e. **/opt/egurkha/manager/apache/bin/httpd**), then the script will automatically execute the command *"/opt/egurkha/manager/apache/bin/apachectl start"* to start the processes. Similarly, if the *"Tomcat"* processes (i.e. **java*tomcat**) stop, the script will execute the command *"/opt/tomcat/bin/catalina.sh start"* to start the processes.

command: In this specification, *command* signifies the command to be executed when any of the processes configured for monitoring, stop. Such a format best suits situations where only a single process has been configured for monitoring, or, a single command is capable of starting all the configured processes. For example, assume that the PROCESS parameter has been configured to monitor *IISWebSrv:*inetinfo**. Since only one process requires monitoring, the first format need not be used for configuring the USERPARAMS. Therefore, simplify specify the command, *"net start World Wide Web Publishing Service"*.

Note:

- The **USERPARAMS** specification should be placed within double quotes if this value includes one or more blank spaces (eg.,"*Apache:/opt/egurkha/bin/apachectl start*").
- Note that if a processName configured in the **PROCESS** parameter does not have a corresponding entry in **USERPARAMS** (as discussed in format 1), then the auto- correction capability will not be enabled for these processes.

10. **CORRECTIVESCRIPT** - Specify none in the **CORRECTIVESCRIPT** text box to use the default auto-correction script. Administrators can build new auto- correction capabilities to address probable issues with other tests, by writing their own corrective scripts. To know how to create custom auto-correction scripts, refer to the eG User Manual.

11. **WIDE - This parameter is valid on Solaris, Windows, and Linux systems only**.

    On Solaris systems (before v11), if the value of the **WIDE** parameter is **Yes**, the eG agent will use *usr/ucb/ps* instead of */usr/bin/ps* to search for processes executing on the host. In Solaris

11, the eG agent uses the */usr/bin/ps auxwww* command to perform the process search. The */usr/ucb/ps* and the */usr/bin/ps auxwww* commands provide a long output (> 80 characters), whereas */usr/bin/ps* only outputs the first 80 characters of the process path and its arguments. However, some Solaris systems are configured with tightened security, which prevents the *usr/ucb/ps* and/or the */usr/bin/ps auxwww*command to be executed by any and every user to the system - in other words, only pre-designated users will be allowed to execute this command. The **sudo** (*superuser do*) utility (see http://www.gratisoft.us/sudo/) can be used to allow designated users to execute this command. If your system uses **sudo** to restrict access to the commands that return a long output, then set *wide* to **Yes** and then specify the value **sudo** for the *keonizedservercmd* parameter. This will ensure that not only does the agent use the */usr/ucb/ps* and/or the */usr/bin/ps auxwww* command (as the case may be) to monitor processes (like it would do if the *wide* parameter were set to be **Yes**), but it would also use **sudo** to execute this command.

Note:

If the **Processes** test on Solaris 11 fails, then do the following:

- Check whether the *wide* parameter is set to **Yes**.
- If so, then make sure that the *keonizedservercmd* parameter is set to **sudo**.
- If the test still fails, then look for the following error in the **error_log** file (that resides in the **/opt/egurkha/agent/logs** directory) on the eG agent host:

  ERROR ProcessTest: ProcessTest failed to execute [sudo: pam_ authenticate: Conversation failure]

- The aforesaid error occurs if the sudo command prompts for a password at runtime. If you find such an error in the **error_log** file, then, open the **sudoers** file on the target host and append an entry of the following format to it:

  Defaults:<eG_Install_Username> !authenticate

  For instance, if eguser is the eG install user, then your entry will be: *Defaults:eguser !authenticate*

  This entry will make sure that you are no longer prompted for a password.

- Save the file and restart the eG agent.

On Windows environments, by default, the eG agent uses *perfmon* to search for the processes that match the configured patterns. Accordingly, the **WIDE** parameter is set to **false** by default. Typically, a process definition in Windows includes the *full path to the process*, the *process name*, and *process arguments* (if any). *Perfmon* however scans the system only for *process names* that match the configured patterns – in other words, the process path and arguments are ignored by *perfmon*. This implies that if multiple processes on a Windows host have the same name as specified against *processpattern*, then *perfmon* will only be able to report the overall resource usage across all these processes; it will not provide any pointers to the exact process that is eroding the host's resources. To understand this better, consider the following example. Typically, Windows represents any Java application executing on it as *java.exe*. Say, two Java applications are executing on a Windows host, but from different locations.

If *java.exe* has been configured for monitoring, then by default, *perfmon* will report the availability and average resource usage of both the Java applications executing on the host. If say, one Java application goes down, then *perfmon* will not be able to indicate accurately which of the two Java applications is currently inaccessible. Therefore, to enable administrators to easily differentiate between processes with the same name, and to accurately determine which process is unavailable or resource-hungry, the eG agent should be configured to perform its process searches based on the process path and/or process arguments, and not just on the process name – in other words, the eG agent should be configured **not to use perfmon**.

To achieve this, first, set the **WIDE** parameter to **Yes**. This will instruct the eG agent to not use *perfmon* to search for the configured process patterns. Once this is done, then, you can proceed to configure a *processpattern* that includes the *process arguments* and/or the *process* path, in addition to the *process* name. For instance, if both the *Remote Access Connection Manager* service and the *Terminal Services* service on a Windows host, which share the same name – *svchost* - are to be monitored as two different processes, then your *processpattern* specification should be as follows:

Terminal:C:\WINDOWS\System32\svchost -k DcomLaunch,Remote:C:\WINDOWS\system32\svchost.exe -k netsvcs

You can also use wildcard characters, wherever required. For instance, in the above case, your *processpattern* can also be:

*Terminal:*svchost -k DcomLaunch,Remote:*svchost.exe -k netsvcs*

Similarly, to distinctly monitor two processes having the same name, but operating from different locations, your specification can be:

JavaC:c:\javaapp\java.exe,JavaD:d:\app\java.exe

Note:

- Before including process paths and/or arguments in your *processpattern* configuration, make sure that the **WIDE** parameter is set to **Yes**. If not, the test will not work.
- If your *processpattern* configuration includes a process path that refers to the *Program Files* directory, then make sure that you **do not a include a ~** (tilde) while specifying this directory name. For instance, your *processpattern* specification should not be say, Adobe:*C:\Progra~1\Adobe\AcroRd32.exe*.

12. **KEONIZEDSERVERCMD** - On Solaris hosts, this test takes an additional **KEONIZEDSERVERCMD** parameter. Keon is a security mechanism that can be used with a multitude of operating systems to provide a centralized base for user account and password management, user access and inactivity control, system integrity checking, and auditing. If the Keon security model is in use on the Solaris host being monitored, then this test may require special user privileges for executing the operating system commands. In such a case, specify the exact command that the test is permitted to execute, in the **KEONIZEDSERVERCMD** text box. For example, if the keon command to be executed by the test is **sudo**, specify **sudo** in the **KEONIZEDSERVERCMD** text box. Alternatively, you can even specify the full path to the **sudo** command in the **KEONIZEDSERVERCMD** text box. On the other hand, if a Keon security model is not in place, then set the **KEONIZEDSERVERCMD** parameter to *none*.
13. **USEGLANCE** - **This flag applies only to HP-UX systems**. HP GlancePlus/UX is Hewlett-Packards's online performance monitoring and diagnostic utility for HP-UX based computers. There are two user interfaces of GlancePlus/UX -- *Glance* is character-based, and *gpm* is motif-based. Each contains graphical and tabular displays that depict how primary system resources are being utilized. In environments where *Glance* is run, the eG agent can be configured to integrate with *Glance* to pull out the process status and resource usage metrics from the HP-UX systems that are being monitored. By default, this integration is disabled. This is why the **USEGLANCE** flag is set to **No** by default. You can enable the integration by setting the flag to **Yes**. If this is done, then the test polls the *Glance* interface of HP GlancePlus/UX utility to pull out the desired metrics.
14. **USEPS** - **This flag is applicable only for AIX LPARs.** By default, on AIX LPARs, this test uses the **tprof** command to compute CPU usage of the processes on the LPARs. 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 of processes executing on AIX LPARs. If either of these flags is set to **yes**, then the **ps** command will perform the CPU usage computations for such processes.

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*.

15. **USE TOP -** This parameter is applicable only to Linux platforms. By default, this parameter is set to **No**. This indicates that, by default, this test will report *process health metrics* by executing the usr/bin/ps command on Linux. In some Linux environments however, this command may not function properly. In such cases, set the **USE TOP** parameter to **Yes**.This will enable this test to collect metrics using the */usr/bin/top* command.

16. **ISPASSIVE** – If the value chosen is **Yes**, then the server under consideration is a passive server in a cluster. No alerts will be generated if the server is not running. Measures will be reported as "Not applicable" by the agent if the server is not up.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Processes running:	Number of instances of a process (es) currently executing on a host.	Number	This value indicates if too many or too few processes corresponding to an application are executing on the host.
CPU utilization:	Percentage of CPU used by executing process (es) corresponding to the pattern specified.	Percent	A very high value could indicate that processes corresponding to the specified pattern are consuming excessive CPU resources.
Memory utilization:	For one or more processes corresponding to a specified set of patterns, this value represents the ratio of the resident set size of the processes to the physical memory of the host system, expressed as a percentage.	Percent	A sudden increase in memory utilization for a process(es) may be indicative of memory leaks in the application.

Note:

- The default configurations of the Processes test are applicable for JRun server 4.0. However, if you are monitoring a JRun server 3.0, you would have to modify the default configurations.
- In JRun server 3.0, 2 processes are associated with the admin and default servers. They are, "jrun.exe" and "javaw.exe" respectively in Windows and "jrun" and "javaw" in Unix.
- Similarly, the JRun Server 4.0 has two default processes, one running for the admin server and the other for the default server. These processes are, namely, "jrun.exe" in Windows and "jrun" in Unix. When you add a new server instance, these processes get created automatically with the same names as mentioned above.
- Special characters that are not allowed as part of your manual pattern specifications are as follows:

- ` (Grave Accent)
- | (Vertical bar)
- < (less than)
- > (greater than)
- ~ (tilda)
- @ (at)
- # (hash)
- % (Percent)

Note:

- Administrators can extend the built-in auto-correction capabilities to address probable issues with the other measures of the Processes test, by writing their own corrective scripts for the same. The custom-defined script can be associated with the Processes test in the same manner discussed above.
- The name of the custom-defined script should be of the following format: *InternalTestName_ InternalMeasureName*. For example, a script that is written to correct problems with the CPU utilization measure (of the Processes test) should be named as "*ProcessTest_Cpu_util*", where *ProcessTest* is the internal name of the **Processes** test, and Cpu_util is the internal name for the *CPU utilization* measure. To know the internal names of tests and measures, use any of the **eg_ lang*.ini** file in the <EG_INSTALL_DIR>\manager\config directory. The script extensions will differ according to the operating system on which it will execute. The extensions supported by Windows environments are: *.bat, .exe, .com*, and *.cmd*. Scripts to be executed on Unix environments do not require any extension. The most commonly used extension is *.sh*.
- At any given point of time, only one script can be specified in the **CORRECTIVESCRIPT** text box.
- As already stated, the sample script for Processes test will be available for every operating system. If the script is uploaded to the eG manager once for an operating system, it will automatically apply to all the agents executing on the same operating system. For example, say that an environment comprises of 3 agents, all executing on Windows 2000 environments. While configuring the Processes test for one of the agents, if the administrator uploads the sample script, then he/she will not have to repeat the process for the other 2 agents.
- Once the eG agent downloads a corrective script from the eG manager, any changes made to the script in the manager side will not be reflected in the agent side, immediately. This is because, the eG agent checks the manager for the existence of an updated version of the corrective script, only once a day. If an update is available, the agent downloads the same and overwrites the script that pre-exists.

Note:

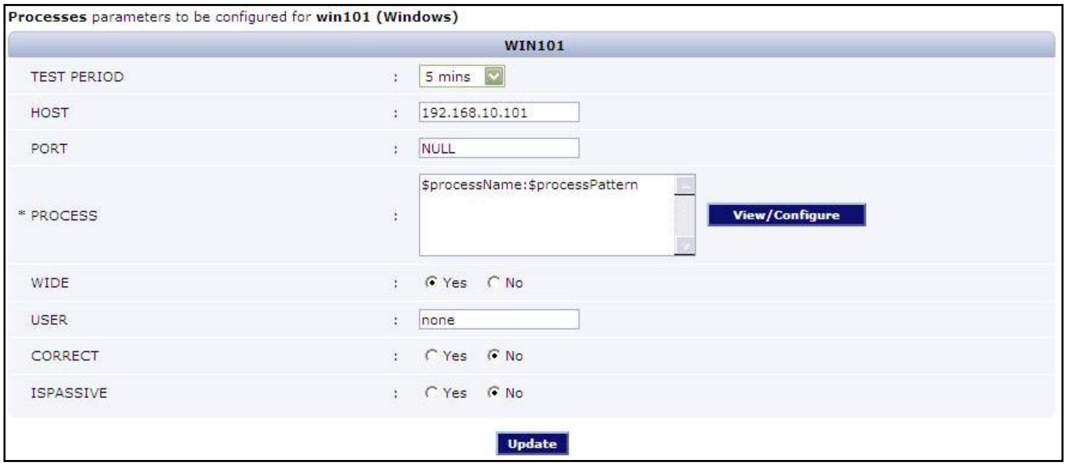
The Processes test of LDAP servers takes an additional parameter named ispassive. If the value chosen against this parameter is **Yes**, then the LDAP server under consideration is a passive server in an LDAP cluster. No alerts will be generated if the server is not running. Measures will be reported as "Not applicable" by the agent if the server is not up.

2.1.5.1.1 Auto-configuring the Process Patterns to be Monitored

To save the time and effort involved in manual process specification, eG Enterprise offers an easy-to-use auto-configure option in the form of a **View/Configure** button that is available next to the PROCESS text box.

To auto-configure the processes to be monitored, do the following:

1. Click on the **View/Configure** button next to the *process* text area in the **Processes** test configuration page (see Figure 2.15).



Processes parameters to be configured for **win101 (Windows)**

WIN101

TEST PERIOD	:	5 mins
HOST	:	192.168.10.101
PORT	:	NULL
* PROCESS	:	$processName:$processPattern
WIDE	:	● Yes ○ No
USER	:	none
CORRECT	:	○ Yes ● No
ISPASSIVE	:	○ Yes ● No

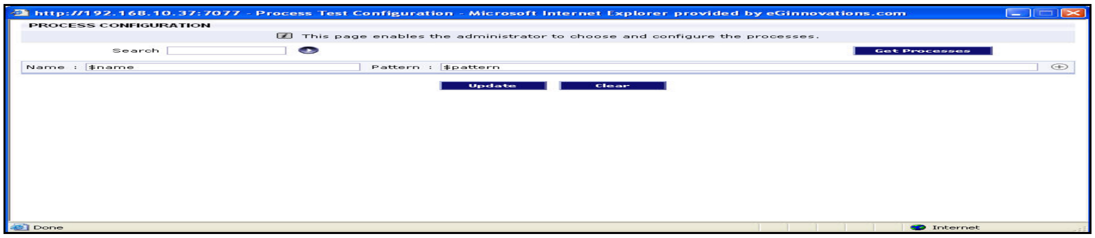
Figure 2.15: Configuring the Processes test

Note:

The **View/Configure** button will appear only if the following conditions are fulfilled:

- The Processes test must be executed in an agent-based manner.
- The eG agent executing the test should be of version 5.2 or above.
- In case the eG manager in question is part of a redundant manager setup, then the agent executing the test must be reporting metrics to the primary manager only.

2. When the **View/Configure** button is clicked, a **PROCESS CONFIGURATION** page will appear (see Figure 2.16).



http://192.168.10.37:7077 - Process Test Configuration - Microsoft Internet Explorer provided by eGinnovations.com

PROCESS CONFIGURATION

This page enables the administrator to choose and configure the processes.

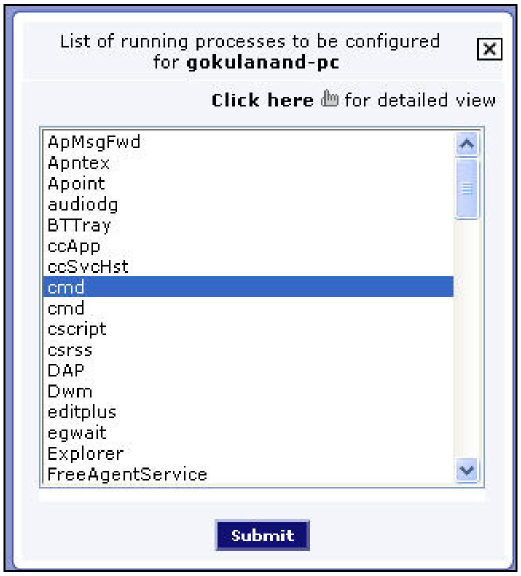
Search

Name : $name

Pattern : $pattern

Figure 2.16: Auto-configuring the processes to be monitored

3. Upon clicking the **Get Processes** button in the **PROCESS CONFIGURATION** page, a pop up window with a list of processes that are running on the host will be displayed (see Figure 2.17).



List of running processes to be configured for **gokulanand-pc**

Click here for detailed view

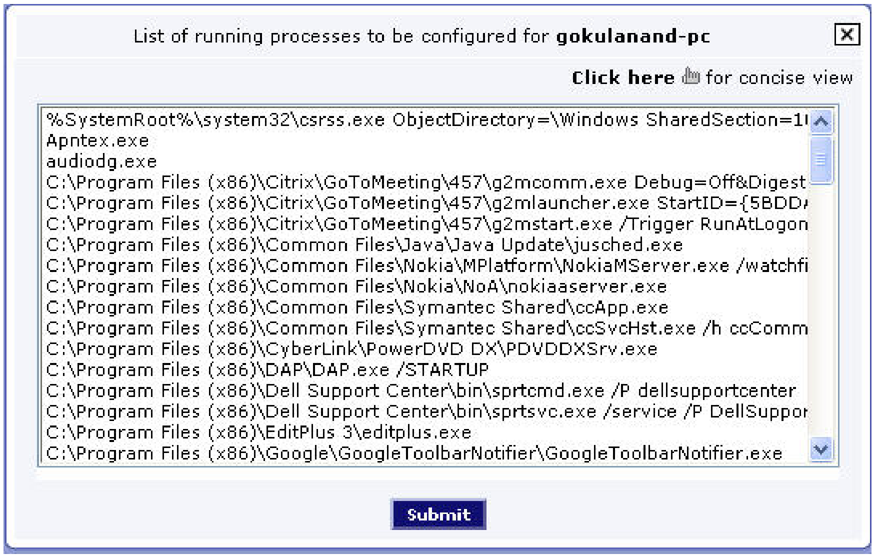
ApMsgFwd
Apntex
Apoint
audiodg
BTTray
ccApp
ccSvcHst
cmd
cmd
cscript
csrss
DAP
Dwm
editplus
egwait
Explorer
FreeAgentService

Figure 2.17: List of auto-discovered processes

Note:

The processes that are already configured for monitoring will not be listed in Figure 2.17.

4. By default, Figure 2.17 provides a 'concise' view of the process list - i.e., only the process names will be listed in the pop-up window, and not the detailed description of the processes. You can click on the **Click here** link in the pop up window to switch to the detailed view (see Figure 2.18).


List of running processes to be configured for **gokulanand-pc**
Click here for concise view
Submit

```
%SystemRoot%\system32\csrss.exe ObjectDirectory=\Windows SharedSection=1
Apntex.exe
audiodg.exe
C:\Program Files (x86)\Citrix\GoToMeeting\457\g2mcomm.exe Debug=Off&Digest
C:\Program Files (x86)\Citrix\GoToMeeting\457\g2mlauncher.exe StartID={5BDD
C:\Program Files (x86)\Citrix\GoToMeeting\457\g2mstart.exe /Trigger RunAtLogon
C:\Program Files (x86)\Common Files\Java\Java Update\jusched.exe
C:\Program Files (x86)\Common Files\Nokia\MPlatform\NokiaMServer.exe /watchfi
C:\Program Files (x86)\Common Files\Nokia\NoA\nokiaaserver.exe
C:\Program Files (x86)\Common Files\Symantec Shared\ccApp.exe
C:\Program Files (x86)\Common Files\Symantec Shared\ccSvcHst.exe /h ccComm
C:\Program Files (x86)\CyberLink\PowerDVD DX\PDVDDXSrv.exe
C:\Program Files (x86)\DAP\DAP.exe /STARTUP
C:\Program Files (x86)\Dell Support Center\bin\sprtcmd.exe /P dellsupportcenter
C:\Program Files (x86)\Dell Support Center\bin\sprtsvc.exe /service /P DellSuppor
C:\Program Files (x86)\EditPlus 3\editplus.exe
C:\Program Files (x86)\Google\GoogleToolbarNotifier\GoogleToolbarNotifier.exe
```

Figure 2.18: The detailed view of processes

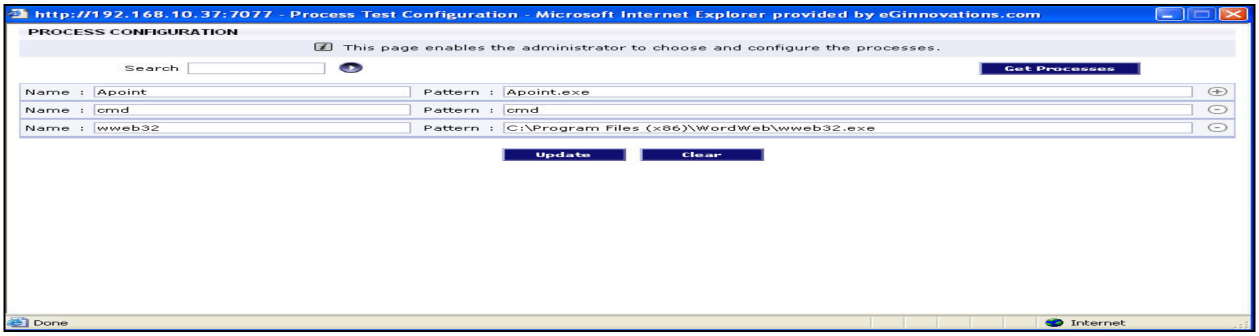
5. As you can see, in the detailed view, the complete process path and process arguments accompany each auto-discovered process.

6. Regardless of the view you are in, select the process or list of processes that require monitoring and click the SUBMIT button in the pop-up window. **Note that you can select processes from both the views**.

   Note:

   The **Processes** test includes a *wide* flag that is set to **Yes** by default. In this case, your *process* specification can include the process path and arguments (if any). Therefore, if the *wide* flag is set to **Yes**, then, the eG agent will report metrics for the process(es) that are selected in both the concise manner and detailed manner. If the **WIDE** flag is set to **No**, the eG agent will collect metrics only for the process(es) that are selected in a concise manner.

7. Clicking the **SUBMIT** button in the pop-up will automatically populate the **Name** and **Pattern** text boxes available in the **PROCESS CONFIGURATION** page, with the name and pattern of the chosen process (see Figure 2.19).


http://192.168.10.37:7077 - Process Test Configuration - Microsoft Internet Explorer provided by eGinnovations.com
Search
Get Processes
Update
Clear
Done
Internet

PROCESS CONFIGURATION

This page enables the administrator to choose and configure the processes.

Name :	Apoint	Pattern :	Apoint.exe
Name :	cmd	Pattern :	cmd
Name :	wweb32	Pattern :	C:\Program Files (x86)\WordWeb\wweb32.exe

Figure 2.19: Multiple auto-discovered processes configured for monitoring

8. You can add more name:pattern pairs in the PROCESS CONFIGURATION page by clicking on the encircled '+' button present at the end of the first **Name** and **Pattern** specification. To remove a specification that pre-exists, just click on the encircled '-' button that corresponds to it. The contents of the **Name** and **Pattern** text boxes can also be edited manually.

   Note:

   Duplicate processes will appear in the list of processes pop-up, provided the process description is different - for instance, if a 'cmd.exe' process and a 'cmd.bat' process execute on the same host, then both processes will be listed as 'cmd' in the 'concise' view of the process list. If such duplicate processes are chosen for monitoring, then, each process will appear as a separate **Name** and **Pattern** pair in the **PROCESS CONFIGURATION** page. To proceed, the user must enter a different name in the **Name** text box for each process, so that every distinct pattern can be identified in a unique manner.

2.1.5.2 Application File Checksum Test

A checksum is a simple type of redundancy check that is used to detect errors in files.

Errors may frequently occur in files when the files are written to a disk, transmitted across a network or otherwise manipulated. The errors can even be very small - for example, a single incorrect bit - but even such small errors can greatly affect the quality of data and make it useless. For example, you can apply a checksum to an installation file after it is received from the download server to check for errors after the download, as such errors can render the corresponding software uninstallable.

To alert administrators to such integrity issues with application files that they deem critical, eG periodically runs the **Application File Checksum** test. This test creates a checksum by calculating the binary values (using a pre-defined algorithm) of every file configured for monitoring and storing the results. Each time the test runs, a new checksum is calculated and compared with the existing checksum. If there is a non-match, the test promptly alerts administrators to it, as it could be because of errors in the file.

Target of the test : Unix/Windows server

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each configured **DIRECTORY PATH**

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 -** Refers to the port used by the specified host. By default, it is NULL.
4. **DIRECTORY PATH** – Provide a comma-separated list of the full path to directories and/or files that you want the test to monitor. For example, your specification can be: */usr/logs/err.log,/Oracle/logs* where */usr/logs/err.log* is a file and /Oracle/logs is a directory. Where a directory is provided, all files within that directory will be monitored and will appear as descriptors of the test.

   Your specification can also be of the following format: DisplayName@Path_to_Directory_or_ File. For example: *Error@/usrlogs/err.log*. Multiple such specifications can be provided as a comma- separated list – for instance, *Error@/usrlogs/err.log,Oracle@/Oracle/logs,Web@/web/weblogs* . In this case, the *DisplayNames* such as *Error*, *Oracle*, and *Web* will be displayed as the first-level descriptors of this test, and the files in each configured directory will be displayed as the second-level descriptors.

   Note:

   - When you provide the path to a directory as part of the directory path specification, only those files available within that directory will be monitored; sub-directories inside that directory and files within the sub-directories will not be considered.
   - If your **DIRECTORY PATH** specification includes the path to individual files, make sure that you provide the file extensions along with the file names.

5. **EXCLUDE PATTERN** – If you do not want the test to monitor specific patterns of files in the configured directories, then provide a comma-separated list of file name patterns to be excluded from monitoring, in the following format: *DisplayName@FileNamePattern*. The *DisplayNames* you use here should be the same as the *DisplayNames* you use as part of your

DIRECTORY PATH specification. For instance, if your **DIRECTORY PATH** specification is, *Oracle@/Oracle/logs,Web@/web/weblog*, then, your **EXCLUDE PATTERN** configuration may be: *Oracle@*info*.log,Web@gen*.log,Web@*minor.log*. This configuration holds that in the */Oracle/logs* directory, all files with names that embed the string info should be configured and in the */web/weblogs* directory, all files with names that begin with the string gen and all files with names that end with string minor should be ignored.

If your **DIRECTORY PATH** specification does not include *DisplayNames* and instead includes a comma-separated list of directory paths – eg., */usr/logs,/agent/logs* – then your **EXCLUDE PATTERN** specification should be of the following format: *DirectoryPath@FileNamePattern*. For instance, if your **DIRECTORY PATH** specification is */usr/logs,/agent/logs*, then your **EXCLUDE PATTERN** configuration may be: */usr/logs:*minor*.log,/agent/logs:info*.log,/agent/logs:*warn.log* . According to this configuration, the test will ignore all files with names that embed the string minor in the */usr/logs* directory. In the */agent/logs* directory, the test will ignore the files with names that begin with info and the files with names that end with warn.

By default, the **EXCLUDE PATTERN** is set to *none*, indicating that no files are excluded from monitoring, by default. This is the ideal setting if your **DIRECTORY PATH** specification does not include any directories, and is instead configured with the path to individual files.

6. **USE EXE** – **This flag is applicable to Windows platforms only**. By default, this flag is set to **No**. This implies that, by default, the test uses a predefined Java class named Message Digest to compute the checksum of configured files. In some flavors of Windows, this Java class may not work. In such cases, you can instruct the test to use an executable named exf.exe to compute checksum. For this, set the **USE EXE** flag to **Yes**.
7. **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.

Measurements made by the test

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td>Has checksum been modified:</td><td>Indicates whether/not the checksum value of this file has changed since the last measurement period.</td><td></td><td>If the checksum value of a file has changed since the last time this test ran, then the value of this measure will be Yes. In this case, you can use the detailed diagnosis of this test to know what was the previous checksum value and the new checksum value of each test. Typically, a change in the checksum value indicates an error.
If there is no change in the checksum value, then this measure will report the value No. Note that the value No does not imply that there is no error. It simply means that the test could not detect any errors. Among the types of errors that cannot be detected by simple checksum algorithms are reordering of the bytes, inserting or deleting zero- valued bytes and multiple errors that cancel each other out
The numeric values that correspond to the measure values discussed above are as follows:
<table><tr><th>Measure Value</th><th>Numeric Value</th></tr><tr><td>Yes</td><td>1</td></tr><tr><td>No</td><td>0</td></tr></table>
<b>Note</b>:</td></tr>
</table>

Measurement	Description	Measurement Unit	Interpretation
			By default, the test reports the **Measure Value**s listed in the table above to indicate whether/not the checksum value has changed. In the graph of this measure however, the same is represented using the numeric equivalents only.

2.1.5.3 TCP Port Status Test

This test tracks various statistics pertaining to TCP connections to and from a host, from an external perspective. This test is disabled by default for a *Generic* 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 the desired **Component type**, set *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.

Target of the test : Any host system

Agent deploying the test : An external agent

Outputs of the test : One set of results for every configured port name

For some other component-types, like the Oracle database server, this test is enabled by default.

1. **TEST PERIOD -** How often should the test be executed
2. **HOST -** Host name of the server for which the test is to be configured
3. **PORT -** Enter the port to which the specified **HOST** listens
4. **TARGETPORTS** – Specify either a comma-separated list of port numbers that are to be tested (eg., 80,7077,1521), or a comma-separated list of *port name:port number* pairs that are to be tested (eg., smtp:25,mssql:1433). In the latter case, the port name will be displayed in the monitor interface. Alternatively, this parameter can take a comma-separated list of *port name:IP address:port number* pairs that are to be tested, so as to enable the test to try and connect to Tcp ports on multiple IP addresses. For example, *mysql:192.168.0.102:1433,egwebsite:209.15.165.127:80*.

5. **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 60 seconds.
6. **ISPASSIVE** – If the value chosen is yes, then the server under consideration is a passive server in a cluster. No alerts will be generated if the server is not running. Measures will be reported as "Not applicable" by the agent if the server is not up.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Availability:	Whether the TCP connection is available	Percent	An availability problem can be caused by different factors – e.g., the server process may not be up, a network problem may exist, or there could be a configuration problem with the DNS server.
Response time:	Time taken (in seconds) by the server to respond to a request.	Secs	An increase in response time can be caused by several factors such as a server bottleneck, a configuration problem with the DNS server, a network problem, etc.

2.1.5.4 Application Process Test

The Processes test monitors the server daemon processes and their resource usage. Often, the unavailability of a server daemon is an error condition. In some cases, if specific processes are running or too many of such processes are running, this may indicate an error condition. For example, in a Citrix environment, a process called cmstart.exe is part of the Citrix login process. When logins are working well, there will be very few cmstart.exe processes running on a server. However, when users experience slow logins or have difficulty in launching applications on a Citrix Presentation Server, many cmstart.exe processes are observed. The Application Process test is used to monitor processes like cmstart that are not expected to be running on a server, but which show an unusual change in the number of processes or their resource usage when problem situations occur.

The Application Process 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 the desired

Component type, set *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.

Target of the test : Unix/Windows server

Agent deploying the test : An internal agent

Outputs of the test : One set of results per process pattern specified

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. **PROCESS -** In the **PROCESS** text box, enter a comma separated list of names:pattern pairs which identify the process(es) associated with the server being considered. processName is a string that will be used for display purposes only. processPattern is an expression 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 example, in a Citrix environment, a process called *cmstart.exe* is part of the Citrix login process. When logins are working well, there will be very few *cmstart.exe* processes running on a server. However, when users experience slow logins or have difficulty in launching applications on a Citrix Presentation Server, many *cmstart.exe* processes are observed. This process hence requires monitoring. Similarly, users might also want to be alerted if any instance of the dreaded virus *drwatson.exe* is executing on the system. Therefore, the **PROCESS** configuration in this case will be: *Citrixstartprocess:*cmstart*,Virus:*drwatson**. Other special characters such as slashes (\) can also be used while defining the process pattern. Typically, slashes (\) are used when the configured process pattern includes the full directory path to the process to be monitored.

   To determine the process pattern to use for your application, on Windows environments, look for the process name(s) in the Task Manager -> Processes selection. To determine the process pattern to use on Unix environments, use the ps command (e.g., the command "ps -e -o pid,args" can be used to determine the processes running on the target system; from this, choose the processes of interest to you).

   Also, note that the **PROCESS** parameter is **case-sensitive** in **Unix environments**.
5. **USER -** By default, this parameter has a value "none"; this means that the test monitors all processes that match the configured patterns, regardless of the user executing them. If you

want the test to monitor the processes for specific users alone, then, on Unix platforms, specify a comma-separated list of users to be monitored in the **USER** text box. For instance: *john,elvis,sydney*

While monitoring Windows hosts on the other hand, your **USER** configuration should be a comma-separated list of "domain name-user name" pairs, where every pair is expressed in the following format: *Domainname\Username*. For example, to monitor the processes of user john and elvis who belong to domain *mas* , your **USER** specification should be: *mas\john,mas\elvis*. Also, on a Windows host, you will find system processes running on the following user accounts: *SYSTEM*, *LOCAL SERVICE*, and *NETWORK SERVICE*. While configuring these **USER** accounts, make sure the *Domainame* is always *NT AUTHORITY*. In this case therefore, your **USER** specification will be: *NT AUTHORITY\SYSTEM,NT AUTHORITY\LOCAL SERVICE,NT AUTHORITY\NETWORK SERVICE*.

If multiple **PROCESS**es are configured for monitoring and multiple **USER**s are also configured, then the test will check whether the first process is run by the first user, the second process by the second user, and so on. For instance, if the **PROCESS** es configured are *java:java.exe,apache:*httpd** and the **USER**s configured are john,elvis, then the test will check whether user john is running the process java, and user elvis is running the process apache. Similarly, if multiple **PROCESS**es are configured, but a single **USER** alone is configured, then the test will check whether the specified **USER** runs each of the configured **PROCESS**es. However, if you want to check whether a single process, say *java.exe*, is run by multiple users - say, *james* and *jane* - then, you have to do the following:

- Your **USER** specification should be: *james,jane* (if the target host is a Unix host), or *<Domainname>\james,<Domainname>\jane* (if the target host is a Windows host)
- Your **PROCESS** configuration should be: *Process1:java.exe,Process2:java.exe* . The number of processes in this case should match the number of users.
- Such a configuration will ensure that the test checks for the *java.exe* process for both the users, james and jane.

6. **CORRECT** - Increased uptime and lower mean time to repair are critical to ensuring that IT infrastructures deliver a high quality of service to users. Towards this end, the eG Enterprise suite embeds an optional auto-correction capability that enables eG agents to automatically correct problems in the environment, as soon as they occur. With this capability, as and when an abnormal situation is detected, an eG agent can initiate corrective actions automatically to resolve the problem. Automatic correction without the need for manual intervention by IT operations staff reduces service downtime and improves operational efficiency. By default, the auto-correction capability is available in the eG Enterprise suite for the *Number of processes*

running measure of Processes test, and the *Service availability* measure of the WindowsServices test. You can enable this capability for the *ApplicationProcess* test, to correct a problem condition pertaining to a particular measure reported by that test. To enable the auto-correction capability for the ApplicationProcess test, first, select the **TRUE** option against the **CORRECT** parameter in this page (by default, **FALSE** will be selected here).

7. **ALARMTYPE** - Upon selecting the **TRUE** option, three new parameters, namely, **ALARMTYPE**, **USERPARAMS**, and **CORRECTIVESCRIPT** will appear. You can set the corrective script to execute when a specific type of alarm is generated, by selecting an option from the **ALARMTYPE** list box. For example, if the **CRITICAL** option is chosen from the **ALARMTYPE** list box, then the corrective script will run only when a critical alarm for the ApplicationProcess test is generated. Similarly, if the **CRITICAL/MAJOR** option is chosen, then the corrective script will execute only when the eG Enterprise system generates critical or major alarms for the ApplicationProcess test. In order to ensure that the corrective script executes regardless of the alarm type, select the **CRITICAL/MAJOR/MINOR** option.

8. **USERPARAMS** - The user-defined parameters that are to be passed to the corrective script are specified in the **USERPARAMS** text box. One of the following formats can be applied to the **USERPARAMS** specification:

   - *exec@processName:command*: In this specification, *processName* is the display name of the process pattern specified against the PROCESS parameter, and *command* is the command to be executed by the default script when there is a problem condition pertaining to the *processName*.
   - *command*: In this specification, *command* signifies the command to be executed when there is a problem condition pertaining to any of configured processes. Such a format best suits situations where only a single process has been configured for monitoring, or, a single command is capable of starting all the configured processes.

   Note:

   - The **USERPARAMS** specification should be placed within double quotes if this value includes one or more blank spaces.
   - Note that if a *processName* configured in the **PROCESS** parameter does not have a corresponding entry in **USERPARAMS** (as discussed in format 1), then the auto-correction capability will not be enabled for these processes.

9. **CORRECTIVESCRIPT** - Administrators will have to build the auto-correction capability for this test to address probable issues with it, by writing their own corrective script. To know how to create custom auto-correction scripts, refer to the *eG User Manual*. The full path to the

corrective script should be specified here.

10. **WIDE** - This parameter is valid on Solaris and Windows systems only.

    On Solaris environments, if the value of the **WIDE** parameter is **true**, the eG agent will use usr/ucb/ps instead of /usr/bin/ps to search for processes executing on the host. /usr/ucb/ps provides a long output (> 80 characters), whereas /usr/bin/ps only outputs the first 80 characters of the process path and its arguments. However, some Solaris systems are configured with tightened security, which prevents the usr/ucb/pscommand to be executed by any and every user to the system - in other words, only pre-designated users will be allowed to execute this command. The **sudo** (*superuser do*) utility (see http://www.gratisoft.us/sudo/) can be used to allow designated users to execute this command. If your system uses **sudo** to restrict access to the /usr/ucb/ps command, then specify the value of the "wide" parameter to be "sudo". This will ensure that not only does the agent use the /usr/ucb/ps command to monitor processes (like it would do if the "wide" parameter were set to be true), but it would also use **sudo** to execute this command.

    On Windows environments, by default, the eG agent uses perfmon to search for the processes that match the configured patterns. Accordingly, the **WIDE** parameter is set to **false** by default. Typically, a process definition in Windows includes the full path to the process, the process name, and process arguments (if any). Perfmon however scans the system only for process names that match the configured patterns – in other words, the process path and arguments are ignored by perfmon. This implies that if multiple processes on a Windows host have the same name as specified against **PROCESSPATTERN**, then perfmon will only be able to report the overall resource usage across all these processes; it will not provide any pointers to the exact process that is eroding the host's resources. To understand this better, consider the following example. Typically, Windows represents any Java application executing on it as java.exe. Say, two Java applications are executing on a Windows host, but from different locations. If java.exe has been configured for monitoring, then by default, perfmon will report the availability and average resource usage of both the Java applications executing on the host. If say, one Java application goes down, then perfmon will not be able to indicate accurately which of the two Java applications is currently inaccessible. Therefore, to enable administrators to easily differentiate between processes with the same name, and to accurately determine which process is unavailable or resource-hungry, the eG agent should be configured to perform its process searches based on the process path and/or process arguments, and not just on the process name – in other words, the eG agent should be configured not to use perfmon.

    To achieve this, first, set the **WIDE** parameter to **true**. This will instruct the eG agent to not use perfmon to search for the configured process patterns. Once this is done, then, you can proceed to configure a **PROCESSPATTERN** that includes the process arguments and/or the process path, in addition to the process name. For instance, if both the Remote Access Connection Manager service and the Terminal Services service on a Windows host, which share the same name – svchost - are to be monitored as two different processes, then your **PROCESSPATTERN** specification should be as follows:

Terminal:C:\WINDOWS\System32\svchost -k DcomLaunch,Remote:C:\WINDOWS\system32\svchost.exe -k netsvcs

You can also use wildcard characters, wherever required. For instance, in the above case, your **PROCESSPATTERN** can also be:

*Terminal:*svchost -k DcomLaunch,Remote:*svchost.exe -k netsvcs*

Similarly, to distinctly monitor two processes having the same name, but operating from different locations, your specification can be:

JavaC:c:\javaapp\java.exe,JavaD:d:\app\java.exe

Note:

- Before including process paths and/or arguments in your **PROCESSPATTERN** configuration, make sure that the **WIDE** parameter is set to **true**. If not, the test will not work.
- If your **PROCESSPATTERN** configuration includes a process path that refers to the Program Files directory, then make sure that you **do not a include a ~** (tilde) while specifying this directory name. For instance, your **PROCESSPATTERN** specification should not be say, *Adobe:C:\Progra~1\Adobe\AcroRd32.exe*.

11. **USEPS - This flag is applicable only for AIX LPARs.** By default, on AIX LPARs, this test uses the **tprof** command to compute CPU usage of the processes on the LPARs. 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 of processes executing on AIX LPARs. If either of these flags is set to **yes**, then the **ps** command will perform the CPU usage computations for such processes.

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*.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Processes running:	Number of instances of a process (es) currently executing on a host.	Number	If there is a significant change in the value of this measure, it is an indicator of a problem situation.
CPU utilization:	Percentage of CPU used by executing process (es) corresponding to the pattern specified.	Percent	A very high value could indicate that processes corresponding to the specified pattern are consuming excessive CPU resources.
Memory utilization:	For one or more processes corresponding to a specified set of patterns, this value represents the ratio of the resident set size of the processes to the physical memory of the host system, expressed as a percentage.	Percent	A sudden increase in memory utilization for a process(es) may be indicative of memory leaks in the application.

2.1.5.5 Log Monitor Test

This test monitors multiple log files for different error patterns. This test is disabled by default. To enable this test, click on the check box corresponding to the test name in the **DISABLED TESTS** list of the **AGENTS – TESTS CONFIGURATION** page that appears when the Agents -> Tests -> Configure menu sequence is followed, and click the **Update** button therein.

Target of the test : Any host system

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every **ALERTFILE** and **SEARCHPATTERN** combination.

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 at which the server listens
4. **ALERTFILE** - Specify the path to the log file to be monitored. For eg., */user/john/new_john.log*. Multiple log file paths can be provided as a comma-separated list - eg., */user/john/critical_egurkha.log,/tmp/log/major.log*.

   Also, instead of a specific log file path, the path to the directory containing log files can be provided - eg., */user/logs*. This ensures that eG Enterprise monitors the most recent log files in the specified directory. Specific log file name patterns can also be specified. For example, to monitor the latest log files with names containing the strings 'dblogs' and 'applogs', the parameter specification can be, */tmp/db/*dblogs*,/tmp/app/*applogs**. Here, '*' indicates leading/trailing characters (as the case may be). In this case, the eG agent first enumerates all the log files in the specified path that match the given pattern, and then picks only the latest log file from the result set for monitoring.

   Your **ALERTFILE** specification can also be of the following format: *Name@logfilepath_or_pattern*. Here, *Name* represents the display name of the path being configured. Accordingly, the parameter specification for the 'dblogs' and 'applogs' example discussed above can be: *dblogs@/tmp/db/*dblogs*,applogs@/tmp/app/*applogs**. In this case, the display names 'dblogs' and 'applogs' will alone be displayed as descriptors of this test.

   Every time this test is executed, the eG agent verifies the following:

   - Whether any changes have occurred in the size and/or timestamp of the log files that were monitoring during the last measurement period;

- Whether any new log files (that match the **ALERTFILE** specification) have been newly added since the last measurement period;

If a few lines have been added to a log file that was monitored previously, then the eG agent monitors the additions to that log file, and then proceeds to monitor newer log files (if any). If an older log file has been overwritten, then, the eG agent monitors this log file completely, and then proceeds to monitor the newer log files (if any).

5. **SEARCHPATTERN** - Enter the specific patterns of messages to be monitored. The pattern should be in the following format: <PatternName>:<Pattern>, where <PatternName> is the pattern name that will be displayed in the monitor interface and <Pattern> is an expression of the form - *expr* or expr or *expr or expr*, etc. A leading '*' signifies any number of leading characters, while a trailing '*' signifies any number of trailing characters.

   For example, say you specify ORA:ORA-* in the SEARCHPATTERN text box. This indicates that "ORA" is the pattern name to be displayed in the monitor interface. "ORA-*" indicates that the test will monitor only those lines in the log file which start with the term "ORA-". Similarly, if your pattern specification reads: offline:*offline, then it means that the pattern name is offline and that the test will monitor those lines in the log file which end with the term offline.

   A single pattern may also be of the form e1+e2, where + signifies an OR condition. That is, the <PatternName> is matched if either e1 is true or e2 is true.

   Multiple search patterns can be specified as a comma- separated list. For example: ORA:ORA-*,offline:*offline*,online:*online

   If the **ALERTFILE** specification is of the format *Name@logfilepath*, then the descriptor for this test in the eG monitor interface will be of the format: *Name:PatternName*. On the other hand, if the **ALERTFILE** specification consists only of a comma-separated list of log file paths, then the descriptors will be of the format: *LogFilePath:PatternName*.

   Also, if a comma-separated list of alert files is provided in the **ALERTFILE** text box in the format Name@logfilepath, and you want to monitor one/more specific patterns of logs in each alert file, then your specification would be of the format:

   Name@<PatternName>:<Pattern>

   For instance, say, your **ALERTFILE** specification is as follows: *dblogs@/tmp/db/*dblogs*,applogs@/tmp/app/*applogs**. Now, assume that you want to monitor the following entries in the specified alert files:

Alert file	Pattern
dblogs	*error*
dblogs	Ora*
applogs	*warning
applogs	*ora-info*

The **SEARCHPATTERN** specification in this case will hence be as follows:

*dblogs@error:*error*,dblogs@ora:ora*,applogs@warning:*warning, applogs@info:*ora-info**

If you want all the messages in a log file to be monitored, then your specification would be: *<PatternName>:**.

6. **LINES** - Specify two numbers in the format x:y. This means that when a line in the log file matches a particular pattern, then x lines before the matched line and y lines after the matched line will be reported in the detail diagnosis output (in addition to the matched line). The default value here is 0:0. Multiple entries can be provided as a comma-separated list.

   If you give 1:1 as the value for **LINES**, then this value will be applied to all the patterns specified in the **SEARCHPATTERN** field. If you give *0:0,1:1,2:1* as the value for LINES and if the corresponding value in the **SEARCHPATTERN** field is like ORA:ORA-*,offline:*offline*,online:*online then:

   0:0 will be applied to ORA:ORA-* pattern

   1:1 will be applied to offline:*offline* pattern

   2:1 will be applied to online:*online pattern

7. **EXCLUDEPATTERN** - Provide a comma- separated list of patterns to be excluded from monitoring in the **EXCLUDEPATTERN** text box. For example **critical*,*exception**. By default, this parameter is set to 'none'.

8. **EXCLUDEFILES** - Provide a comma-separated list of file formats to be excluded from monitoring in the **EXCLUDEFILES** text box. By default, this parameter is set to '**.gz,*.tar,*.zip*' indicating that the files of the mentioned formats will be excluded from monitoring by the test. However, you can add more file formats to the default list in the following format: '**.gz,*.tar,*.zip, *cab, *7z*, *rar'.

9. **UNIQUEMATCH** - By default, the **UNIQUEMATCH** parameter is set to **FALSE**, indicating that, by

default, the test checks every line in the log file for the existence of each of the configured **SEARCHPATTERN**. By setting this parameter to TRUE, you can instruct the test to ignore a line and move to the next as soon as a match for one of the configured patterns is found in that line. For example, assume that *Pattern1:*fatal*,Pattern2:*error** is the **SEARCHPATTERN** that has been configured. If **UNIQUEMATCH** is set to FALSE, then the test will read every line in the log file completely to check for the existence of messages embedding the strings 'fatal' and 'error'. If both the patterns are detected in the same line, then the number of matches will be incremented by 2. On the other hand, if **UNIQUEMATCH** is set to **TRUE**, then the test will read a line only until a match for one of the configured patterns is found and not both. This means that even if the strings 'fatal' and 'error' follow one another in the same line, the test will consider only the first match and not the next. The match count in this case will therefore be incremented by only 1.

10. **ROTATINGFILE** - This flag governs the display of descriptors for this test in the eG monitoring console.

    If this flag is set to true and the **ALERTFILE** text box contains the full path to a specific (log/text) file, then, the descriptors of this test will be displayed in the following format: *Directory_ containing_monitored_file:<SearchPattern>.* For instance, if the **ALERTFILE** parameter is set to *c:\eGurkha\logs\syslog.txt*, and **ROTATINGFILE** is set to true, then, your descriptor will be of the following format: *c:\eGurkha\logs:<SearchPattern>* . On the other hand, if the **ROTATINGFILE** flag had been set to false, then the descriptors will be of the following format: *<FileName>:<SearchPattern> - i.e., syslog.txt:<SearchPattern>* in the case of the example above.

    If this flag is set to true and the **ALERTFILE** parameter is set to the directory containing log files, then, the descriptors of this test will be displayed in the format: *Configured_ directory_ path:<SearchPattern>*. For instance, if the **ALERTFILE** parameter is set to *c:\eGurkha\logs*, and **ROTATINGFILE** is set to true, then, your descriptor will be: *c:\eGurkha\logs:<SearchPattern>*. On the other hand, if the **ROTATINGFILE** parameter had been set to false, then the descriptors will be of the following format: *Configured_ directory:<SearchPattern>* - i.e., *logs:<SearchPattern>* in the case of the example above.

    If this flag is set to **true** and the **ALERTFILE** parameter is set to a specific file pattern, then, the descriptors of this test will be of the following format: *<FilePattern>:<SearchPattern>*. For instance, if the **ALERTFILE** parameter is set to *c:\eGurkha\logs\*sys**, and **ROTATINGFILE** is set to true, then, your descriptor will be: **sys*:<SearchPattern>*. In this case, the descriptor format will not change even if the **ROTATINGFILE** flag status is changed.

11. **OVERWRITTENFILE -** By default, this flag is set to **false**. Set this flag to **true** if log files do not 'roll

over' in your environment, but get overwritten instead. In such environments typically, new error/warning messages that are captured will be written into the log file that pre-exists and will replace the original contents of that log file; unlike when 'roll over' is enabled, no new log files are created for new entries in this case. If the **OVERWRITTENFILE** flag is set to true, then the test will scan the new entries in the log file for matching patterns. However, if the flag is set to false, then the test will ignore the new entries.

12. **ROLLOVERFILE -** By default, this flag is set to **false**. Set this flag to **true** if you want the test to support the 'roll over' capability of the specified **ALERTFILE**. A roll over typically occurs when the timestamp of a file changes or when the log file size crosses a pre-determined threshold. When a log file rolls over, the errors/warnings that pre-exist in that file will be automatically copied to a new file, and all errors/warnings that are captured subsequently will be logged in the original/old file. For instance, say, errors and warnings were originally logged to a file named *error_log*. When a roll over occurs, the content of the file *error_log* will be copied to a file named error_log.1, and all new errors/warnings will be logged in *error_log*. In such a scenario, since the **ROLLOVERFILE** flag is set to **false** by default, the test by default scans only *error_log.1* for new log entries and ignores *error_log*. On the other hand, if the flag is set to **true**, then the test will scan both *error_log* and *error_log.1* for new entries.

    If you want this test to support the 'roll over' capability described above, the following conditions need to be fulfilled:

    - The **ALERTFILE** parameter has to be configured only with the name and/or path of one/more alert files. File patterns or directory specifications should not be specified in the **ALERTFILE** text box.
    - The roll over file name should be of the format: "*<ALERTFILE>.1*", and this file must be in the same directory as the **ALERTFILE**.

13. **USEUTF8 -** If UTF-8 encoding is to be used for reading the specified log file, then, set the **USEUTF8** flag to **true**. By default, this flag is set to **false**. If multiple log files are being monitored, then, for each file, you will have to indicate whether UTF-8 encoding is to be used for reading that file or not. For instance, assume that the **ALERTFILE** parameter is set to *dblogs@/tmp/db/dblogs.log,applogs@/tmp/app/applogs.log*. Now, to instruct the test to use UTF-8 encoding for reading the '*dblogs*' log file and not to use the UTF-8 encoding while reading the '*applogs*' log file, your **USEUTF8** setting should be as follows: **true**,**false**. **Note that the number of values provided against the USEUTF8 parameter should be equal to the number of log files being monitored. Also, note that if the ALERTFILE being monitored has BOM, then the test will automatically use UTF-8 encoding to read that file, even if the USEUTF8 flag is set to false.**

Note:

If your **ALERTFILE** specification consists of file patterns that include wildcard characters (eg., */tmp/db/*dblogs*,/tmp/app/*applogs**), then the files that match such patterns will only support the ANSI format, and not the UTF format, even if the UTF-8 parameter is set to true for such patterns.

14. **USEUTF16** - If UTF-16 encoding is to be used for reading the specified log file, then, set the **USEUTF16** flag to **true**. By default, this flag is set to **false**. If multiple log files are being monitored, then, for each file, you will have to indicate whether UTF-16 encoding is to be used for reading that file or not. For instance, assume that the **ALERTFILE** parameter is set to *dblogs@/tmp/db/dblogs.log,applogs@/tmp/app/applogs*.log. Now, to instruct the test to use UTF-16 encoding for reading the '*dblogs*' log file and not to use the UTF-16 encoding while reading the '*applogs*' log file, your USEUTF8 setting should be as follows: **true**,**false**. **Note that the number of values provided against the USEUTF16 parameter should be equal to the number of log files being monitored**.

    Note:

    If your **ALERTFILE** specification consists of file patterns that include wildcard characters (eg., */tmp/db/*dblogs*,/tmp/app/*applogs**), then the files that match such patterns will only support the ANSI format, and not the UTF format, even if the UTF-16 parameter is set to true for such patterns.

15. **CASESENSITIVE** - This flag is set to **No** by default. This indicates that the test functions in a 'case-insensitive' manner by default. This implies that, by default, the test ignores the case of your **ALERTFILE** and **SEARCHPATTERN** specifications. If this flag is set to **Yes** on the other hand, then the test will function in a 'case-sensitive' manner. In this case therefore, for the test to work, even the case of your **ALERTFILE** and **SEARCHPATTERN** specifications should match with the actuals.

16. **ENCODEFORMAT** – By default, this is set to *none*, indicating that no encoding format applies by default. However, if the test has to use a specific encoding format for reading from the specified **ALERTFILE** , then you will have to provide a valid encoding format here - eg., UTF-8, UTF-16, etc. Where multiple log files are being monitored, you will have to provide a comma-separated list of encoding formats – one each for every log file monitored. Make sure that your encoding format specification follows the same sequence as your **ALERTFILE** specification. In other words, the first encoding format should apply to the first alert file, and so on. For instance, say that your alertfile specification is as follows: *D:\logs\report.log,E:\logs\error.log*, C:\logs\warn_log. Assume that while UTF-8 needs to be used for reading from report.log , UTF-16 is to be used for reading from warn_log . No encoding format need be applied to

error.log. In this case, your **ENCODEFORMAT** specification will be: UTF-8,none,UTF-16.

17. **USE SUDO** – By default, the eG agent does not require any special permissions to parse and read messages from the log file to be monitored. This is why, the **USE SUDO** parameter is set to **No** by default. In some highly-secure Unix environments however, the eG agent install user may not have the permission to read the log file to be monitored. In such environments, you will have to follow the steps below to ensure that the test is able to read the log file and report metrics:

    - Edit the SUDOERS file on the target host and append an entry of the following format to it:

      <eG_agent_install_user> ALL=(ALL) NOPASSWD: <Log_file_with_path>

      For instance, if the eG agent install user is eguser, and the log file to be monitored is /usr/bin/logs/procs.log, then the entry in the SUDOERS file should be:

      eguser ALL=(ALL) NOPASSWD: /usr/bin/logs/procs.log

    - Finally, save the file.
    - Then, when configuring this test using the eG admin interface, set the **USE SUDO** parameter to **Yes**. Once this is done, then every time the test runs, it will check whether the eG agent install user has the necessary permissions to read the log file. If the user does not have the permissions, then the test runs the sudo command to change the permissions of the user, so that the eG agent is able to read from the log file

18. **SUDO PATH** - This parameter is relevant only when the **USE SUDO** parameter is set to '**Yes**'. By default, the **SUDO PATH** is set to *none*. This implies that the sudo command is in its default location – i.e., in the */usr/bin or /usr/sbin* folder of the target host. In this case, once the **USE SUDO** flag is set to **Yes** , the eG agent automatically runs the sudo command from its default location to allow access to the configured log file. However, if the sudo command is available in a different location in your environment, you will have to explicitly specify the full path to the sudo command in the **SUDO PATH** text box to enable the eG agent to run the sudo command.

19. **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**.

20. **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.

Measurements made by the test

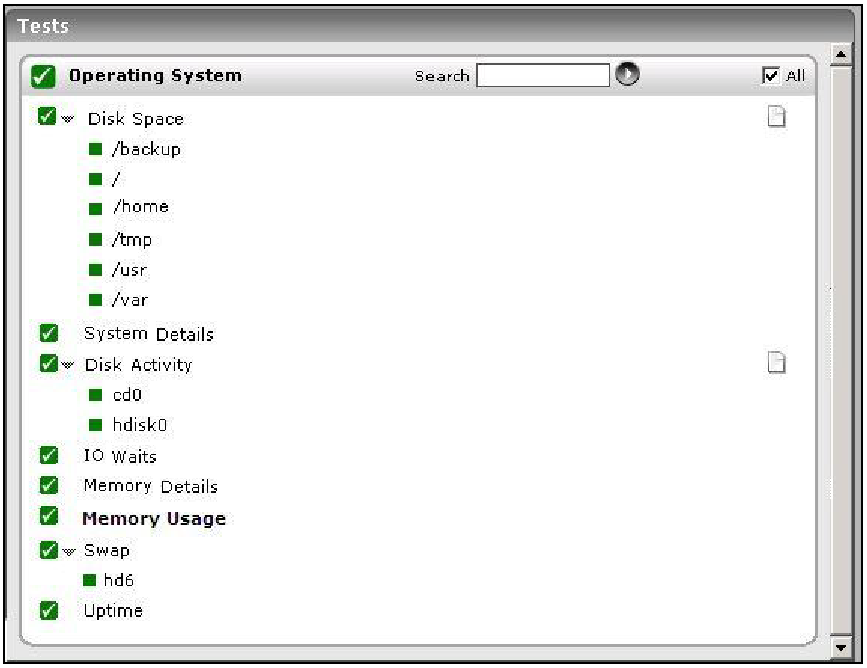
Measurement	Description	Measurement Unit	Interpretation
Number of messages	Indicates the number of messages that were added to the log when the test was last executed.	Number	The value of this measure is a clear indicator of the number of “new” messages that have come into the log of the monitored server. The detailed diagnosis of this measure, if enabled, provides the detailed descriptions of the errors of the configured patterns.

2.2 Monitoring Solaris Servers

Use the Solaris monitoring model to monitor the overall health of the Solaris operating system, the resource usage of the processes executing on it, and the network availability of the Solaris host. The Solaris model will be represented by the same set of layers as the Linux monitoring model of Figure 2.1. This section discusses the tests mapped to each of the layers.

2.2.1 The Operating System Layer

Like the *Linux* model, the Operating System layer of the *Solaris* model too is mapped to a **System Details** test that tracks the CPU and memory utilization, and a **Disk Space** test that monitors the disk utilization. Also, similar to the *Linux* model, the **Operating System** layer of the *Solaris* model too measures memory usage, IO waits, swap usage, and uptime of the host. All these tests have been discussed elaborately in Section **2.1.1** of this document.



Tests

☑ **Operating System** Search ☑ All

☑ Disk Space

🟩 /backup

🟩 /

🟩 /home

🟩 /tmp

🟩 /usr

🟩 /var

☑ System Details

☑ Disk Activity

🟩 cd0

🟩 hdisk0

☑ IO Waits

☑ Memory Details

☑ **Memory Usage**

☑ Swap

🟩 hd6

☑ Uptime

Figure 2.20: Tests that map to the Operating System layer of a Solaris server

The difference however lies in the **Disk Activity** test of the *Solaris* model. The metrics reported by this test are slightly different for the *Linux* and *Solaris* models. The sub-section that follows will discuss this test alone.

2.2.1.1 Disk Activity Test

When executed on Windows, Solaris, AIX, and HP-UX systems, this test reports statistics pertaining to the input/output utilization of each physical disk on a system.

Target of the test : Any host system

Agent deploying the test : An internal/remote agent

Outputs of the test : One set of results for each physical disk on the host monitored

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. **USEEXE** - Setting the **USEEXE** flag to true, ensures that the disk activity metrics are collected by executing a binary instead of dynamically linking to the Performance instrumentation library. By default, this is set to false.

4. **DISKS**- To obtain disk activity metrics for both logical and physical disks, enter all in the DISKS text box. To collect metrics for physical disks, set the DISKS parameter to Physical and to collect metrics for logical disks, set the parameter to Logical.

5. **USE SUDO –**This parameter is of significance to Linux and Solaris platforms only. By default, the **USE SUDO** parameter is set to **No**. This indicates that, by default, this test will report the detailed diagnosis for the Disk busy measure of each disk partition being monitored by executing the /usr/bin/iotop command or /usr/sbin/iotop command. However, in some highly secure environments, the eG agent install user may not have the permissions to execute this command directly. In such cases, do the following:

   - Edit the SUDOERS file on the target host and append an entry of the following format to it:

     <eG_agent_install_user> ALL=(ALL) NOPASSWD:<Command_with_path>

     For instance, if the *eG agent install user* is *eguser*, then the entries in the SUDOERS file should be:

     eguser ALL=(ALL) NOPASSWD: /usr/bin/iotop

     eguser ALL=(ALL) NOPASSWD: /usr/sbin/iotop

   - Finally, save the file.
   - Then, when configuring the test using the eG admin interface, set the **USE SUDO** parameter to **Yes**. This will enable the eG agent to execute the *sudo /usr/bin/iotop* command or *sudo /usr/sbin/iotop* and retrieve the detailed diagnosis of the *Disk busy* measure.

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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Disk busy:	Indicates the percentage of elapsed time during which the disk is busy processing requests (i.e., reads or writes).	Percent	Comparing the percentage of time that the different disks are busy, an administrator can determine whether the application load is properly balanced across the different disks.
Disk read time:	Indicates the average time in seconds of a read of data from the disk.	Secs	
Disk write time:	Indicates the average time in seconds of a write of data from the disk.	Secs	
Avg queue length:	Indicates the average number of both read and write requests that were queued for the selected disk during the sample interval.	Number	
Disk read rate:	Indicates the number of reads happening on a logical disk per second.	Reads/Sec	A dramatic increase in this value may be indicative of an I/O bottleneck on the server.
Data read rate from disk:	Indicates the rate at which bytes are transferred from the disk during read operations.	KB/Sec	A very high value indicates an I/O bottleneck on the server.
Disk write rate:	Indicates the number of writes happening on a local disk per second.	Writes/Sec	A dramatic increase in this value may be indicative of an I/O bottleneck on the server.
Data write rate to disk:	Indicates the rate at which bytes are	KB/Sec	A very high value indicates an I/O bottleneck on the server.

Measurement	Description	Measurement Unit	Interpretation
	transferred from the disk during write operations.		
Disk service time:	Indicates the average time that this disk took to service each transfer request (i.e., the average I/O operation time)	Secs	A sudden rise in the value of this measure can be attributed to a large amount of information being input or output. A consistent increase however, could indicate an I/O processing bottleneck.
Disk queue time:	Indicates the average time that transfer requests waited idly on queue for this disk.	Secs	Ideally, the value of this measure should be low.
Disk I/O time:	Indicates the avarage time taken for read and write operations of this disk.	Secs	The value of this measure is the sum of the values of the Disk service time and Disk queue time measures. A consistent increase in the value of this measure could indicate a latency in I/O processing.

Note:

For this test to report measures on Unix systems, the *sysstat* package must be installed on the server (check for the existence of the *iostat* command on the target system).

- If the sysstat version installed on the target server is less than 4.0.7, the following measures also will not be available – *Data read rate from disk* and *Data write rate to disk*.
- The eG agent monitoring Solaris hosts can only measure the time for access to the disk (not differentiating between read and write times). This is why, this test reports the *Disk read time* and *Disk write time* to be the disk access time reported by the operating system

2.2.1.2 Disk Space Test

This test monitors the space usage of every disk partition on a host. While this test typically reports the space usage of every physical disk partition on a host, when monitoring hosts running Windows

2008/Vista/7 hosts however, this test reports usage metrics of physical and logical partitions.

Target of the test : Any host system

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each physical/logical disk partition and/or NFS drive on the host monitored

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. **DISCOVER NFS** – This flag is applicable for Windows 7 and Windows 2008 operating systems only. Set this flag to **Yes,** if you want the test to automatically discover NFS drives on your system and report their status as well. By default, this flag is set to **No.**
4. **EXCLUDE – This parameter is of significance to Unix systems.** Against this parameter, you can provide a comma-separated list of disk partitions that you want to exclude from monitoring. On Unix systems, you can use this parameter to exclude temporary partitions that the Unix system itself creates from monitoring.
5. **DOMAIN, DOMAIN USER, AND DOMAIN PASSWORD – These parameters are applicable to Windows systems only.** When monitoring a Windows system, if the **DISCOVER NFS** flag of this test is set to **Yes**, then the test should be configured with the privileges of a valid domain user in order to auto-discover NFS drives and report their usage and status. In such a case therefore, specify a valid Windows domain name against **DOMAIN** , provide the name of a valid user in that domain against **DOMAIN USER**, and specify the password of that user against **PASSWORD**. Once the domain user credentials are provided, the test auto-discovers all those NFS drives on the target Windows system to which the configured domain user has access.
6. **CONFIRM PASSWORD –** Retype the **PASSWORD** of the configured domain user here.
7. **TIMEOUT -** 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.
8. **USE SUDO –This parameter applies only to Linux and Solaris systems.** By default, the **USE SUDO** parameter is set to **No**. This indicates that, by default, this test will report metrics by executing the *df -Pk –l* command on the Solaris host. However, in some highly secure environments, the eG agent install user may not have the permissions to execute this command directly. In such cases, do the following:

- Edit the **SUDOERS** file on the target host and append an entry of the following format to it:

  <eG_agent_install_user> ALL=(ALL) NOPASSWD:<Command>

  For instance, if the *eG agent install user* is *eguser*, then the entry in the **SUDOERS** file should be:

  eguser ALL=(ALL) NOPASSWD: df –Pk -l

- Finally, save the file.
- Then, when configuring the test using the eG admin interface, set the **USE SUDO** parameter to **Yes**. This will enable the eG agent to execute the sudo *df –Pk –l* command and retrieve the desired metrics.

9. **SUDO PATH** – **This parameter is relevant only when the use sudo parameter is set to 'Yes'.** By default, the **SUDO PATH** is set to *none*. This implies that the sudo command is in its default location – i.e., in the */usr/bin* or */usr/sbin* folder of the target Solaris host. In this case, the eG agent automatically runs the metastat command with sudo from its default location, once the **USE SUDO** flag is set to **Yes**. However, if the sudo command is available in a different location in your environment, you will have to explicitly specify the full path to the sudo command in the **SUDO PATH** text box to enable the eG agent to run the sudo command.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Total capacity:	Indicates the total capacity of a disk partition.	MB	
Used space:	Indicates the amount of space used in a disk partition.	MB	
Free space:	Indicates the current free space available for each disk partition of a system.	MB	
Percent usage:	Indicates the percentage of space usage on each	Percent	A value close to 100% can indicate a potential problem situation where

Measurement	Description	Measurement Unit	Interpretation
	disk partition of a system.		applications executing on the system may not be able to write data to the disk partition (s) with very high usage.
Drive availability:	Indicates whether/not this drive is available currently.	Percent	If the drive is available, then this measure will report the value 100. If not, then this measure will report the value 0. This measure gains significance when monitoring NFS drives, as it enables you to identify those drives that are no longer mapped to the system.

2.2.1.3 Tests Disabled by Default

Besides the tests depicted by Figure 2.20, the **Operating System** layer of a *Solaris* server is mapped to many other tests that are disabled by default. You can enable these tests, 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 the desired **Component type**, set *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.

These tests have already been discussed in Section **2.1.1.14**. In addition to these tests, some tests are available for Solaris hosts alone and discussed in the following sections.

2.2.1.3.1 Cron Jobs Test

Cron is a time-based scheduling service, and is hence considered to be a convenient mechanism for running critical jobs. On Solaris, to track when and how the scheduled jobs ran, you can enable the logging of cron jobs. Subsequently, a log file is created in the */var/cron/log* directory, to which every cron activity is logged.

In other Unix (non-Solaris) hosts however, to enable cron logging, you have to do the following:

1. Create a separate wrapper script to execute each cron job. This script should also track the status, start time, and end time of the cron job. For example, given below is a sample wrapper script named *wcron2.sh*.

```
#!/bin/sh
echo "Started Wrapper script - $0 - at `date` - $$"
’’ Cron Command here.
echo "Exit Code for - $0 is - $? - $$"
echo "Completed Wrapper script - $0 - at `date` - $$"
```

2. Schedule the wrapper script to run at the same frequency in which you want the corresponding cron job to run. When doing so, make sure that the wrapper script outputs a log file, which will contain the start time, completed time, the script name and the status of the cron job. To achieve the above, use the following command:

```
*/10 * * * * /tmp/wcron2.sh >> /var/log/wcron2.log 2>&1
```

   Here, *10* indicates that the wrapper script should run every 10 minutes. You can provide any value (in minutes) here to indicate the frequency of the cron job.

   /tmp/wcron2.sh is the full path to the wrapper script that has to be run at the specified frequency

   /var/log/wcron2.log is the full path to the log file (*wcron2.log)* to which the status, start time, end time, and cron job name have to be written.

   Note:

   The log file should have the same name as the wrapper script that creates it. For instance, if the wrapper script is named *wcron2*, the corresponding log file should be named *wcron2.log*.

   >> symbol indicates that every time the wrapper script runs, the log file contents will be overwritten.

3. The contents of the log file will be similar to the same cited below:

```
Started Wrapper script - /tmp/cronjob.sh - at Thu Oct  3 17:24:01 IST 2013 - 21946
cronjob .sh
Exit Code for - /tmp/cronjob.sh is - 0 - 21946
Completed Wrapper script - /tmp/cronjob.sh - at Thu Oct  3 17:24:01 IST 2013 - 21946
```

Once the cron log file is available, you can periodically track the success/failure of the scheduled cron jobs by executing the **Cron Jobs** test. This test checks the cron log file at configured intervals and reports the status of the cron jobs.

Target of the test : Any Unix host

Agent deploying the test : An internal agent

Outputs of the test : One set of results for the host monitored

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. **LOGFILEPATH -** This test monitors the cron log file to determine the status of the cron jobs. Therefore, in the **LOGFILEPATH** text box, specify the path to the folder that contains the cron log file to be monitored. On Solaris, by default, this will be */var/cron/log*. On other Unix hosts, specify the log file location that you provided when scheduling the execution of the wrapper script (refer to step 2 of procedure discussed in page Section above).

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Scheduled jobs:	Indicates the number of jobs that are scheduled to run in the next measurement period.	Number	
Outstanding jobs:	Indicates the number of jobs that were started but not completed during the last measurement period.	Number	This includes jobs that were started and those that were still executing during the last measurement period. A very high value could be a cause for concern, and might require further investigation.
Completed jobs:	Indicates the number of jobs that were completed during the last measurement period.	Number	

Measurement	Description	Measurement Unit	Interpretation
Failed jobs:	Indicates the number of jobs that were completed during the last measurement period, but with errors.	Number	The error status could be due to permission issues, path issues, problem while executing the job itself, etc.
Max pending job time:	Indicates the maximum time for which the jobs have remained pending.	Mins	A very high value of this measure could indicate a problem condition.
Max completion time:	Indicates the maximum time taken by the jobs for completion.	Mins	A very high value of this measure could indicate a problem condition.
Avg pending job time:	Indicates the average time for which jobs have remained pending.	Mins	A very high value of this measure could indicate a problem condition.
Avg completion time:	Indicates the average time taken by the jobs for completion.	Mins	A very high value of this measure could indicate a problem condition.
Pending jobs:	Indicates the number of cron jobs that are scheduled, but are yet to start running.	Number	

2.2.1.3.2 ZFS Pools Test

ZFS is a combined file system and logical volume manager designed by Sun Microsystems. The features of ZFS include data integrity verification against data corruption modes, support for high storage capacities, integration of the concepts of filesystem and volume management, snapshots and copy-on-write clones, continuous integrity checking and automatic repair, RAID-Z and native NFSv4 ACLs.

ZFS uses the concept of *storage pools* to manage physical storage. Historically, file systems were constructed on top of a single physical device. To address multiple devices and provide for data redundancy, the concept of a *volume manager* was introduced to provide the image of a single device so that file systems would not have to be modified to take advantage of multiple devices. This design added another layer of complexity and ultimately prevented certain file system advances, because the file system had no control over the physical placement of data on the virtualized volumes.

ZFS eliminates the volume management altogether. Instead of forcing you to create virtualized volumes, ZFS aggregates devices into a storage pool. The storage pool describes the physical characteristics of the storage (device layout, data redundancy, and so on), and acts as an arbitrary data store from which file systems can be created. File systems are no longer constrained to individual devices, allowing them to share space with all file systems in the pool. You no longer need to predetermine the size of a file system, as file systems grow automatically within the space allocated to the storage pool. When new storage is added, all file systems within the pool can immediately use the additional space without additional work.

High usage of disk space in a pool can cause a severe contention for disk resources amidst the file systems sharing the space in the pool; this in turn results in slowdowns when users attempt to access data from these file systems. A high level of I/O activity on or bandwidth usage by a storage pool can also slowdown disk accesses. To ensure that such adversities do not occur, administrators need to constantly monitor the space usage and I/O operations of the storage pools. The **ZFS Pools** test facilitates this. Using this test, administrators can closely track the space usage and read-write operations to each storage pool, be proactively alerted to a potential space crisis in a pool, and accurately isolate those pools that are experiencing abnormal levels of bandwidth usage and I/O.

Target of the test : A Solaris host

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each storage pool configured

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** - Refers to the port used by the specified **HOST**. Here it is NULL.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Pool size:	Indicates the total	GB	The value of this measure is equal to

Measurement	Description	Measurement Unit	Interpretation
	size of this pool.		the sum of the sizes of all top- level virtual devices.
Allocated space:	Indicates the amount of physical space allocated to all datasets and internal metadata in this pool.	GB	Note that this amount differs from the amount of disk space as reported at the file system level.
Free space:	Indicates the amount of unallocated space in this pool.	GB	
Capacity in use:	Indicates the amount of disk space used, expressed as a percentage of the total disk space in this pool.	Percent	Ideally, the value of this measure should not exceed 80%. If space usage exceeds this threshold, consider using ZFS quotas and reservations to keep it under check. You can use the quota property to set a limit on the amount of space a file system can use. In addition, you can use the reservation property to guarantee that some amount of space is available to a file system. You can also dynamically add space to a pool by adding a new top-level virtual device.
Health:	Indicates the current health status of this pool.		The values that this measure can report, their numeric equivalents, and their descriptions have been discussed in the table below:

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td></td><td></td><td></td><td>
<table>
<tr><th>Measure Value</th><th>Numeric Value</th><th>Description</th></tr>
<tr><td>Offline</td><td>0</td><td>The device has been explicitly taken offline by the administrator.</td></tr>
<tr><td>Online</td><td>1</td><td>The device or virtual device is in normal working order.</td></tr>
<tr><td>Degraded</td><td>2</td><td>The virtual device has experienced a failure but can still function.</td></tr>
<tr><td>Unavail</td><td>3</td><td>The device or virtual device cannot be opened.</td></tr>
<tr><td>Faulted</td><td>4</td><td>The device or virtual device is completely inaccessible.</td></tr>
<tr><td>Removed</td><td>5</td><td>The device was physically removed while the system was running.</td></tr>
</table>
<b>Note:</b>
</td></tr>
</table>

Measurement	Description	Measurement Unit	Interpretation
			By default, this measure reports one of the **Measure Value**s listed in the table above. The graph of this measure however will represent the health status using the numeric equivalents only.
Operations read:	Indicates the rate at which read I/O operations were sent to the pool or device, including metadata requests.	Kilobytes/Sec	High values of these measures are indicative of high levels of I/O activity on a pool. Compare the values of these measures across pools to identify the I/O-intensive pools.
Operations write:	Indicates the rate at which write I/O operations were sent to the pool or device.	Kilobytes/Sec	
Read bandwidth:	Indicates the bandwidth of all read operations (including metadata).	Kilobytes/Sec	High values for these measures indicate high bandwidth usage by a pool. By comparing the values of these measures across pools, you can isolate those pools that consume bandwidth excessively, and also understand when they spend too much bandwidth - when reading? or writing?
Write bandwidth:	Indicates the bandwidth of all write operations.	Kilobytes/Sec	
Scrub status:	Indicates the status of ZFS scrubs that may have been performed on this pool during the last 8 days.		ZFS Scrubs allows you to schedule and manage scrubs on a ZFS volume. Performing a ZFS scrub on a regular basis helps to identify data integrity problems, detects silent data corruptions caused by transient hardware issues, and provides early alerts to disk failures. If you have consumer- quality drives, consider a weekly scrubbing schedule. If you have

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td></td><td></td><td></td><td>datacenter- quality drives, consider a monthly scrubbing schedule.
Depending upon the amount of data, a scrub can take a long time. Scrubs are I/O intensive and can negatively impact performance. They should be scheduled for evenings or weekends to minimize the impact to users.
The values that this measure can take and their corresponding numeric values have been detailed below:
<table>
<tr><th>Measure Value</th><th>Numeric Value</th></tr>
<tr><td>Scrub completed</td><td>1</td></tr>
<tr><td>Scrub in progress | resilver</td><td>2</td></tr>
<tr><td>Scrub in progress</td><td>3</td></tr>
<tr><td>Scrub repaired</td><td>4</td></tr>
<tr><td>None requested</td><td>5</td></tr>
<tr><td>Expired</td><td>6</td></tr>
</table>
<b>Note:</b>
By default, this measure reports one of the <b>Measure Value</b>s listed in the table above. The graph of this measure however will represent the scrub status using the numeric equivalents only.</td></tr>
</table>

2.2.1.3.3 ZFS Virtual Devices Test

Each storage pool is comprised of one or more virtual devices. A virtual device is an internal representation of the storage pool that describes the layout of physical storage and its fault characteristics. As such, a virtual device represents the disk devices or files that are used to create the storage pool.

Slow, overloaded virtual devices can delay accesses to the ZFS, thereby causing the user experience with the file system to suffer. This test enables administrators to isolate slow devices and understand how I/O load is distributed across devices, so that administrators are forewarned of slowdowns and/or abnormal load conditions.

Target of the test : A Solaris host

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each virtual device in a storage pool

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** - Refers to the port used by the specified **HOST**. Here it is NULL.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Free space:	Indicates the amount of data currently stored in this.	MB	This amount differs from the amount of disk space available to actual file systems by a small margin due to internal implementation details.
Allocated space:	Indicates the amount of disk space available in this device.	MB	This amount differs from the amount of disk space available to datasets by a small margin.
Operations read:	Indicates the rate at which read I/O operations were sent to	Reads/Sec	High values of these measures are indicative of high levels of I/O activity on a device. Compare the

Measurement	Description	Measurement Unit	Interpretation
	this device, including metadata requests.		values of these measures across virtual devices to identify the I/O-intensive devices.
Operations write:	Indicates the rate at which write I/O operations were sent to this device.	Writes/Sec	
Read bandwidth:	Indicates the bandwidth of all read operations (including metadata) to this device.	Reads/Sec	High values for these measures indicate high bandwidth usage by a virtual device. By comparing the values of these measures across devices, you can isolate those devices that consume bandwidth excessively, and also understand when they consume too much bandwidth - when reading? or writing?
Write bandwidth:	Indicates the bandwidth of all write operations to this device.	Writes/Sec	

2.2.1.3.4 Disk Usage Test

Dataset is the generic name that is used to refer to the following ZFS components: clones, file systems, snapshots, and volumes. Each dataset is identified by a unique name in the ZFS namespace. Datasets are identified using the following format:

pool/path[@snapshot]

pool - Identifies the name of the storage pool that contains the dataset

path - Is a slash-delimited path name for the dataset component

snapshot - Is an optional component that identifies a snapshot of a dataset

A snapshot is a read-only copy of a file system or volume. A clone on the other hand is a writable volume or file system whose initial contents are the same as the snapshot from which it was created. Both snapshots and clones do not consume any disk space initially, but as and when changes are made to the underlying dataset, snapshots and clones start using disk space. This implies that the existence of too many snapshots/clones or the presence of large sized snapshots and clones can add significantly to the disk space consumption of a dataset, causing a serious contention for disk space resources on the host! To conserve disk space usage therefore, administrators often resort to configuring a quota limit for each dataset or enabling compression on a ZFS folder. But how will an administrator ascertain the effectiveness of these configurations? This is where the **ZFS Disk Usage** test helps!

For every dataset on ZFS, this test reports the total space usage of the dataset, thus pointing you to those datasets that are rapidly eroding storage space. Alongside, the test enables administrators to keep track of the quota limit set for a dataset and the compression ratio achieved by a dataset, so that the impact of these configurations on the total disk space usage of the dataset can be effectively assessed; the results of this analysis can later be used to fine-tune the configurations! In addition, the test monitors the count of snapshots and clones created from each dataset and reports the space usage of these snapshots and clones, thus leading you to why a particular dataset is consuming too much space – is it because too many snapshots were created from that dataset? Is it because of the large size of the snapshots? Is it owing to incessant cloning of the snapshots? Or is it due to the large size of the snapshot clones?

Target of the test : A Solaris host

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each dataset

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** - Refers to the port used by the specified **HOST**. Here it is NULL.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Available space:	Indicates the amount of disk space currently available to this dataset and all its children, assuming no other activity in the pool.	GB	A high value is desired for this measure. You can compare the value of this measure across datasets to know which databse has very little space available.
Used space:	Indicates the amount of	GB	Ideally, the value of this measure

Measurement	Description	Measurement Unit	Interpretation
	space currently consumed by this dataset and all its descendents.		should be low. You can even compare the value of this measure across datasets to identify the dataset that is over-utilizing the disk space.
Referred space:	Indicates the total space currently allocated to this dataset.	GB	This is the sum of Available space and Used space.
Percentage of space used:	Indicates the percentage of space used by this dataset.	Percent	A low value is desired for this measure. A consistent rise in the value of this measure is a cause for concern, as it indicates gradual erosion of disk space by a dataset. Compare space usage across datasets to know which dataset is consuming disk space excessively. To know why this dataset is hogging disk space, check out the value reported by the Total space used by snapshots and Total space used by clones measures for that dataset. This will indicate what is causing the space crunch – snapshots of the dataset? Or clones of the snapshots of the dataset? Based on this analysis, you may want to consider identifying and destroying some snapshots and/or clones – say, the ones that are no longer used actively - so as to free disk space. You may also want to take a look at the value of the Quota and the

Measurement	Description	Measurement Unit	Interpretation
			Compression ratio measures for that dataset to understand whether/not altering the quota and/or compression algorithm will help in reducing disk space usage of the dataset.
Snapshots count:	Indicates the number of snapshots currently available for this dataset.	Number	By correlating Snapshots count with Total space used by snapshots you can understand whether too many snapshots of small sizes were created for the dataset or few snapshots of very large sizes. In the event of a space crunch, you can also compare the value of the Total space used by snapshots with that of the Total space used by clones measure to know what is occupying too much space – snapshots? Or clones? Based on this analysis, you may want to consider identifying and destroying some snapshots and/or clones – say, the ones that are no longer used actively - so as to free disk space.
Total space used by snapshots:	Indicates the total amount of disk space currently used by the snapshots of this dataset.	GB	
Clones count:	Indicates the number of clones currently associated with this dataset.	Number	By correlating Clones count with Total space used by clones you can understand whether too many clones of small sizes were created for the dataset or few clones of very large sizes. In the event of a space crunch, you can also compare the value of the

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td></td><td></td><td></td><td rowspan="2">Total space used by snapshots measure with that of the Total space used by clones measure to know what is occupying too much space – snapshots? Or clones? Based on this analysis, you may want to consider identifying and destroying some snapshots and/or clones – say, the ones that are no longer used actively - so as to free disk space.</td></tr>
<tr><td>Total space used by the clones:</td><td>Indicates the total amount of disk space currently used by the clones associated with this dataset.</td><td>GB</td></tr>
<tr><td>Compression status:</td><td>Indicates the current compression status of this dataset.</td><td></td><td>‘Compression’ is a feature of ZFS, which when turned on, saves disk space and improves performance of the system. Internally, ZFS allocates data using multiples of the device's sector size, typically either 512 bytes or 4KB. When compression is enabled, a smaller number of sectors can be allocated for each block.

If compression is enabled for the dataset, this measure will report the value On. If compression is disabled, this measure will report the value Off.

The numeric values that correspond to these measure values are listed below:

<table>
<tr><th>Measure Value</th><th>Numeric Value</th></tr>
<tr><td>On</td><td>1</td></tr>
<tr><td>Off</td><td>0</td></tr>
</table>
</td></tr>
</table>

Measurement	Description	Measurement Unit	Interpretation
			Note: By default, this measure reports one of the **Measure Value**s listed in the table above. The graph of this measure however will represent the compression status using the numeric equivalents only.
Compression ratio:	Indicates the current compression ratio of this dataset.	Ratio	A consistent drop in this value is disconcerting, as it indicates that data blocks are not been compressed efficiently, thereby increasing disk space consumption. Under such circumstances, you may want to change the compression algorithm in use. LJZB is the default compression algorithm for ZFS. Specifically, it provides fair compression, has a high compression speed, has a high decompression speed and detects incompressible data quickly. The other options available are: • LZ4 • GZIP • ZLE A good alterative to LJZB would be LZ4. Tests have revealed that LZ4 averages a 2.1:1 compression ratio, while GZIP is much slower.
Quota:	Indicates the current quota limit set for this dataset.	GB	Quota limits the amount of disk space a dataset and its descendents can consume. This

Measurement	Description	Measurement Unit	Interpretation
			property enforces a hard limit on the amount of disk space used, including all space consumed by descendents, such as file systems and snapshots. If the load on the dataset is consistently high, you may want to increase the quota limit to ensure that there is no loss of data. Likewise, if the dataset is consuming space excessively owing to too many unused snapshots/clones, you may want to reduce the quota limit, so that administrators are discouraged from needlessly creating snapshots and clones.

2.2.2 The Network Layer

The **Network** layer handles connectivity of the host system to the network, and includes packet traffic transmitted to and from the server.

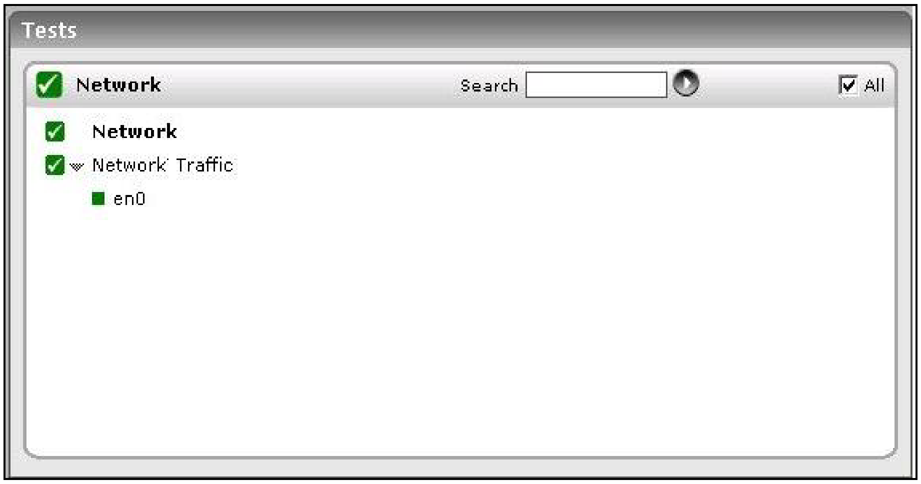


Figure 2.21: The tests that map to the Network layer of a Solaris server

Since the tests mapped to this layer have already been discussed in Section **2.1.2** of this document.

2.2.3 The Tcp Layer

As indicated earlier, a generic application relies on either the TCP or UDP protocols for data transport. While many applications such as web server, web application servers, and database servers rely on the TCP protocol, some other applications such as DNS servers and WAP gateways rely on the UDP protocol. To track the health of the TCP layer of a host, and its effect on the status of any application server, the eG Enterprise suite uses a Tcp test shown in Figure 2.22.

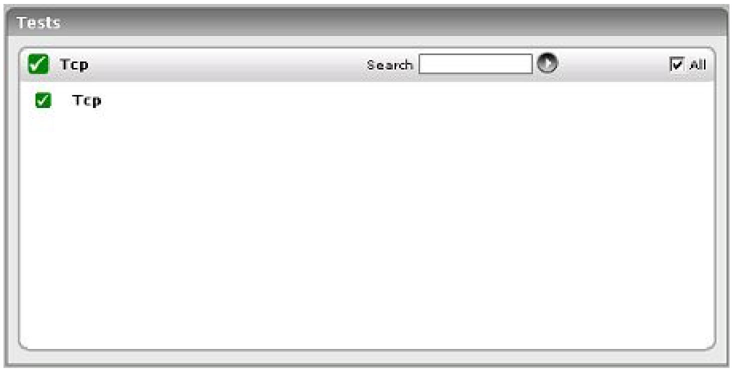


Figure 2.22: The test mapped to the Tcp layer of a Solaris server

The test depicted by Figure 2.11 and the tests that are disabled by default for this layer have already been dealt with in Section **2.1.3** of this document. Therefore, let us proceed to the next layer.

2.2.4 The Application Processes Layer

This layer depicts the states of the different processes that must be executing for the application service to be available. The Processes test (see Figure 2.23) tracks various statistics pertaining to the different application processes. Details of this test are provided below.

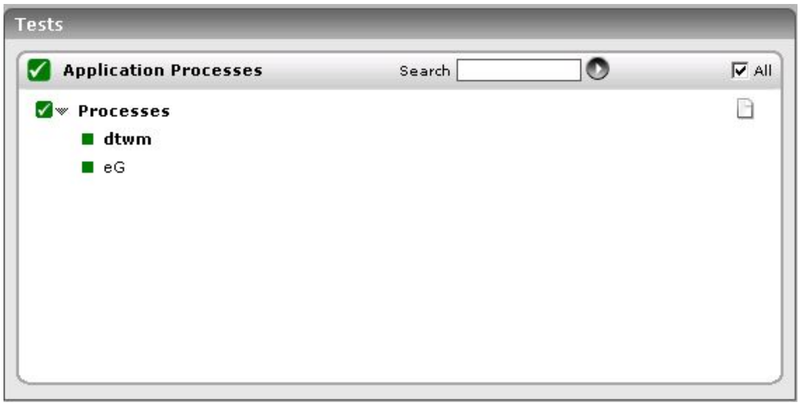


Figure 2.23: The Processes test that tracks the health of the Application Processes layer of a Solaris server

As the Processes test and the procedure to auto-configure the processes to be monitored have been discussed elaborately in Section **2.1.5** of this document.

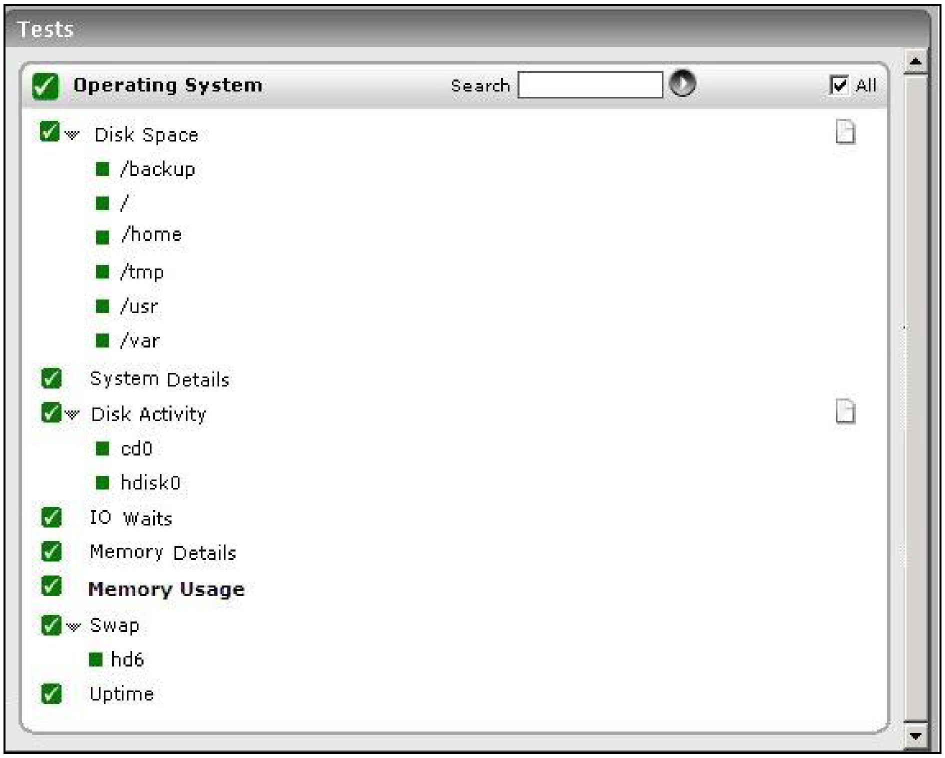
2.3 Monitoring AIX Servers

The AIX monitoring model offered by the eG Enterprise Suite provides in-depth insights into the performance of AIX operating systems. This monitoring model is the same as depicted by Figure 2.1.

The sub-sections that will follow discusses each of the layers in great detail.

2.3.1 The Operating System Layer

Like the *Linux* model, the **Operating System** layer of the *AIX* model too is mapped to a SystemDetails test that tracks the CPU and memory utilization, and a DiskSpace test that monitors the disk utilization. Also, similar to the *Linux* model, the **Operating System** layer of the *AIX* model too measures CPU usage, memory usage, IO waits, swap usage, and uptime of the host. All these tests have been discussed elaborately in Section **2.1.1** of this document.



Tests

☑ Operating System Search ☑ All

- ☑ Disk Space
  - 🟩 /backup
  - 🟩 /
  - 🟩 /home
  - 🟩 /tmp
  - 🟩 /usr
  - 🟩 /var
- ☑ System Details
- ☑ Disk Activity
  - 🟩 cd0
  - 🟩 hdisk0
- ☑ IO Waits
- ☑ Memory Details
- ☑ **Memory Usage**
- ☑ Swap
  - 🟩 hd6
- ☑ Uptime

Figure 2.24: Tests that map to the Operating System layer of an AIX server

The difference however lies in the SystemDetails test and the DiskActivity test of the *AIX* model. While you will find subtle differences in the parameters of the SystemDetails test of *Linux* and *AIX* hosts, the metrics reported by this test will slightly vary for the *Linux* and *AIX* models. The sub-section that follows will discuss these tests alone.

2.3.1.1 System Details Test

This operating system-specific test relies on native measurement capabilities of the operating system to collect various metrics pertaining to the CPU and memory usage of a host system. The details of this test are as follows:

Target of the test : Any host system

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each host monitored

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. **DURATION -** This parameter is of significance only while monitoring Unix hosts, and indicates how frequently within the specified **TEST PERIOD**, the agent should poll the host for CPU usage statistics.

4. **SUMMARY** – This attribute is applicable to multi-processor systems only. If the **Yes** option is selected, then the eG agent will report not only the CPU and memory utilization of each of the processors, but it will also report the summary (i.e., average) of the CPU and memory utilizations of the different processors. If the **No** option is selected, then the eG agent will report only the CPU usage of the individual processors.

5. **USEIOSTAT** – This parameter is of significance to **Solaris platforms** only. By default, the **USEIOSTAT** flag is set to **No**. This indicates that, by default, SystemTest reports the CPU utilization of every processor on the system being monitored, and also provides the average CPU utilization across the processors. However, if you want SystemTest to report only the average CPU utilization across processors and across user sessions, then set the **USEIOSTAT** flag to **Yes**. In such a case, the processor-wise breakup of CPU utilization will not be available.

6. **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*.

7. **INCLUDE WAIT - This flag is applicable to Unix hosts alone**. On Unix hosts, CPU time is also consumed when I/O waits occur on the host. By default, on Unix hosts, this test does not consider the CPU utilized by I/O waits while calculating the value of the *CPU utilization* measure. Accordingly, the **INCLUDE WAIT** flag is set to **No** by default. To make sure that the CPU utilized by I/O waits is also included in CPU usage computations on Unix hosts, set this flag to **Yes**.

8. 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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
CPU utilization:	This measurement indicates the percentage of utilization of the CPU time of the host system.	Percent	A high value could signify a CPU bottleneck. The CPU utilization may be high because a few processes are consuming a lot of CPU, or because there are too many processes contending for a limited resource. Check the currently running processes to see the exact cause of the problem.
System CPU utilization:	Indicates the percentage of CPU time spent for system-level processing.	Percent	An unusually high value indicates a problem and may be due to too many system-level tasks executing simultaneously.
Run queue length:	Indicates the instantaneous length of the queue in which threads are waiting for the processor cycle. This length does not include the threads that are currently being executed.	Number	A value consistently greater than 2 indicates that many processes could be simultaneously contending for the processor.
Blocked processes:	Indicates the number of processes blocked for I/O, paging, etc.	Number	A high value could indicate an I/O problem on the host (e.g., a slow disk).
Swap memory:	On Windows systems, this measurement denotes the committed amount of virtual memory. This corresponds to the space reserved for	MB	An unusually high value for the swap usage 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

Measurement	Description	Measurement Unit	Interpretation
	virtual memory on disk paging file(s). On Solaris systems, this metric corresponds to the swap space currently available. On HPUX and AIX systems, this metric corresponds to the amount of active virtual memory (it is assumed that one virtual page corresponds to 4 KB of memory in this computation).		accordingly.
Free memory:	Indicates the amount of memory (including standby and free memory) that is immediately available for use by processes, drivers or Operating System.	MB	This measure typically indicates the amount of memory available for use by applications running on the target host. On Unix operating systems (AIX and Linux), the operating system tends to use parts of the available memory for caching files, objects, etc. When applications require additional memory, this is released from the operating system cache. Hence, to understand the true free memory that is available to applications, the eG agent reports the sum of the free physical memory and the operating system cache memory size as the value of the Free memory measure while monitoring AIX and Linux operating systems.

Note:

For multi-processor systems, where the CPU statistics are reported for each processor on the system, the statistics that are system-specific (e.g., run queue length, free memory, etc.) are only reported for the "**Summary**" descriptor of this test.

2.3.1.2 Disk Activity Test

When executed on Windows, Solaris, AIX, and HP-UX systems, this test reports statistics pertaining to the input/output utilization of each physical disk on a system.

Target of the test : Any host system

Agent deploying the test : An internal/remote agent

Outputs of the test : One set of results for each host monitored

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. **USEEXE -** Setting the **USEEXE** flag to **true**, ensures that the disk activity metrics are collected by executing a binary instead of dynamically linking to the Performance instrumentation library. By default, this is set to **false**.
4. **DISKS-** To obtain disk activity metrics for both logical and physical disks, enter *all* in the **DISKS** text box. To collect metrics for physical disks, set the **DISKS** parameter to *Physical* and to collect metrics for logical disks, set the parameter to *Logical*.
5. **DETAILED DIAGNOSIS – This parameter does not apply to AIX hosts.**

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Disk busy:	Indicates the percentage of elapsed time during which the disk is busy processing requests (i.e., reads or writes).	Percent	Comparing the percentage of time that the different disks are busy, an administrator can determine whether the application load is properly balanced across the different disks.
Data read rate from	Indicates the rate at	KB/Sec	A very high value indicates an I/O

Measurement	Description	Measurement Unit	Interpretation
disk:	which bytes are transferred from the disk during read operations.		bottleneck on the server.
Data write rate to disk:	Indicates the rate at which bytes are transferred from the disk during write operations.	KB/Sec	A very high value indicates an I/O bottleneck on the server.
Disk service time:	Indicates the average time that this disk took to service each transfer request (i.e., the average I/O operation time)	Secs	A sudden rise in the value of this measure can be attributed to a large amount of information being input or output. A consistent increase however, could indicate an I/O processing bottleneck.
Disk queue time:	Indicates the average time that transfer requests waited idly on queue for this disk.	Secs	Ideally, the value of this measure should be low.
Disk I/O time:	Indicates the avarage time taken for read and write operations of this disk.	Secs	The value of this measure is the sum of the values of the Disk service time and Disk queue time measures. A consistent increase in the value of this measure could indicate a latency in I/O processing.
Disk read rate:	Indicates the number of reads happening on a logical disk per second.	Reads/Sec	A dramatic increase in this value may be indicative of an I/O bottleneck on the server.
Disk write rate:	Indicates the number of writes happening on a local disk per second.	Writes/Sec	A dramatic increase in this value may be indicative of an I/O bottleneck on the server.
Avg queue length:	Indicates the average number of both read and	Number	

Measurement	Description	Measurement Unit	Interpretation
	write requests that were queued for the selected disk during the sample interval.		

Note:

- For this test to report measures on Unix systems, the *sysstat* package must be installed on the server (check for the existence of the *iostat* command on the target system).
- If the sysstat version installed on the target server is less than 4.0.7, the following measures also will not be available – *Data read rate from disk* and *Data write rate to disk*.
- Detailed diagnosis will not be available for systems operating on AIX platforms.

2.3.1.3 Tests Disabled by Default

Besides the tests depicted by Figure 2.1, the **Operating System** layer of an *AIX* server is mapped to many other tests that are disabled by default. You can enable these tests, by opening the **AGENTS – TESTS CONFIGURATION** page (using the Agents -> Tests -> Configure menu sequence in the eG administrative interface), selecting the check box against the test name in the **DISABLED TESTS** list, and clicking the **Update** button therein.

These tests have already been discussed in Section **2.1.1.14**. In addition to these tests, a **Tunnable Parameters** test is available for AIX hosts alone.

2.3.1.3.1 Tunable Parameters Test

This test will work on AIX hosts only. The test reports how well the AIX system is utilizing the virtual memory.

Target of the test : Any host system

Agent deploying the test : An internal agent

Outputs of the test : One set of results for the AIX host being monitored

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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Real memory pages:	Indicates the size of the real memory in KBytes.	Kbyes	4 Kb equals to 1 page.
Lruable pages:	Indicates the number of 4 KB pages considered for replacement.	Number	This number excludes the pages used for VMM (Virtual memeory manager) internal pages, and the pages used for the pinned part of the kernel text.
Free pages:	Indicates the number of 4 KB pages currently used by the file cache.	Number	
Memory pools:	Indicates the number of memory pools.	Number	
Pinned pages:	Indicates the number of pinned 4KB pages.	Number	
Pinned memory:	Indicates the tuning parameter (managed using vmo) specifying the percentage of real memory which can be pinned.	Percent	
Minimum persistent memory:	This measure indicates the tuning parameter (managed using vmo) in percentage of real memory.	Percent	This specifies the point below which file pages are protected from the re-page algorithm.
Maximum persistent memory:	Indicates the Tuning parameter (managed using vmo) in percentage of real memory.	Percent	This specifies the point above which the page stealing algorithm steals only file pages.

Measurement	Description	Measurement Unit	Interpretation
Persistent file cache:	Indicates the percentage of memory currently used by the file cache.	Percent	
Currently used file cache memory:	Indicates the number of pages that are currently used by the file cache.	Number	
Memory used by compressed pages:	Indicates the percentage of memory that are relatively compressed.	Number	
Compressed memory pages:	Indicates the number of unused pages that are relatively compressed and stored in memory.	Number	
Memory occupied by client pages:	Indicates the number of unused pages that are relatively compressed and stored in memory.	Number	
Maximum memory for client pages:	Indicates a limit on the maximum amount of memory that should be used to cache non-computational client pages; It is the maximum percentage of memory which can be used for client pages.	Number	Because all non- computational client pages are a subset of the total number of non-computational permanent storage pages, the maxclient limit must always be less than or equal to the maxperm limit.
Client pages:	Indicates the number of client pages.	Number	
Pageouts scheduled for client file systems:	Indicates the number of pageouts scheduled for client file systems.	Number	

Measurement	Description	Measurement Unit	Interpretation
Pending disk I/O requests blocked:	Indicates the number of pending disk I/O requests that have been blocked since the pbuf are not available.	Number	Pbufs are pinned memory buffers used to hold I/O requests at the logical volume manager layer.
Paging space I/O requests blocked:	Indicates the number of paging space I/O requests that have been blocked since the psbufs are not available.	Number	Psbufs are pinned memory buffers used to hold I/O requests at the virtual memory manager layer.
Filesystem I/O requests blocked:	Indicates the number of filesystem I/O requests blocked because no fsbuf was available.	Number	Fsbufs are pinned memory buffers used to hold I/O requests in the filesystem layer.
Client filesystem I/O requests blocked:	Indicates the number of client filesystem I/O requests blocked because no fsbuf was available.	Number	NFS (Network File System) and VxFS (Veritas) are client filesystems. Fsbufs are pinned memory buffers used to hold I/O requests in the filesystem layer.
External pager client filesystem I/O requests blocked:	Indicates the number of external pager client filesystem I/O requests blocked because no fsbuf was available.	Number	JFS2 is an external pager client filesystem. Fsbuf are pinned memory buffers used to hold I/O requests in the filesystem layer.

Besides the above, hardware monitoring expertise can also be optionally built into the **Operating System** layer of an AIX host. Please refer to the *Hardware Monitoring* document for further details.

2.3.2 The Network Layer

The **Network** layer handles connectivity of the host system to the network, and includes packet traffic transmitted to and from the server.

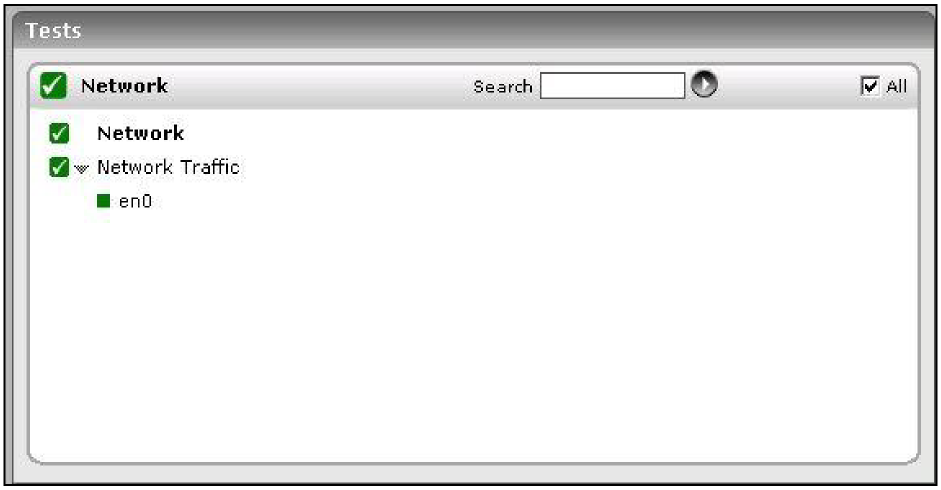


Figure 2.25: The tests that map to the Network layer of an AIX server

Since the tests mapped to this layer have already been discussed in Section **2.1.2** of this document.

2.3.3 The Tcp Layer

As indicated earlier, a generic application relies on either the TCP or UDP protocols for data transport. While many applications such as web server, web application servers, and database servers rely on the TCP protocol, some other applications such as DNS servers and WAP gateways rely on the UDP protocol. To track the health of the TCP layer of a host, and its effect on the status of any application server, the eG Enterprise suite uses a Tcp test shown in Figure 2.26.

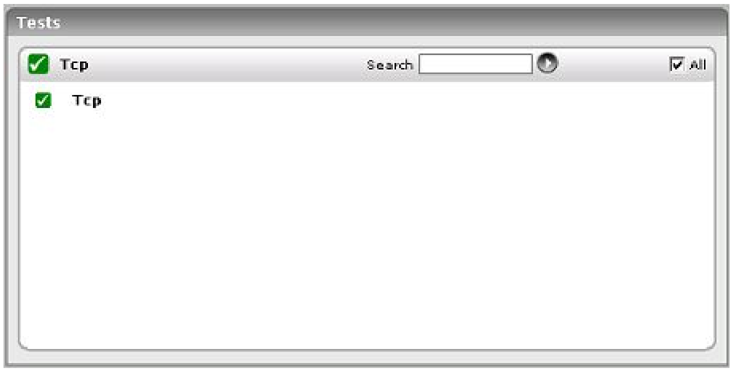


Figure 2.26: The test mapped to the Tcp layer of an AIX server

The test depicted by Figure 2.26 and the tests that are disabled by default for this layer have already been dealt with in Section **2.1.3** of this document. Therefore, let us proceed to the next layer.

2.3.4 The Application Processes Layer

This layer depicts the states of the different processes that must be executing for the application service to be available. The Processes test (see Figure 2.27) tracks various statistics pertaining to the different application processes.

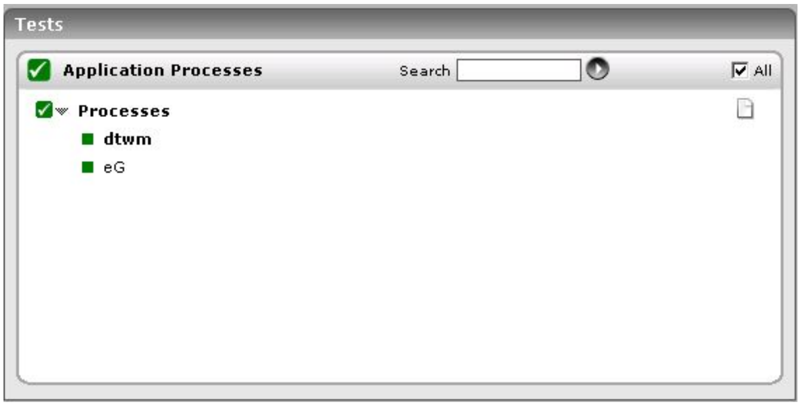


Figure 2.27: The Processes test that tracks the health of the Application Processes layer of an AIX server

2.3.4.1 Processes Test

Application processes can be identified based on specific regular expression patterns. For example, web server processes can be identified by the pattern *httpd*, while DNS server processes can be specified by the pattern *named* where * denotes zero or more characters. For each such pattern, the process test reports a variety of CPU and memory statistics.

Target of the test : Any application server

Agent deploying the test : An internal agent

Outputs of the test : One set of results per process pattern specified

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. **PROCESS -** In the **PROCESS** text box, enter a comma separated list of names:pattern pairs which identify the process(es) associated with the server being considered. processName is a string that will be used for display purposes only. processPattern is an expression 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. The pattern (s) used vary from one application to another and must be configured per application. For example, for an iPlanet application server (Nas_server), there are three processes named kcs, kjs, and kxs associated with the application server. For this server type, in the **PROCESS** text box, enter "kcsProcess:*kcs*, kjsProcess:*kjs*, kxsProcess:*kxs*, where * denotes zero or more characters. Other special characters such as slashes (\) can also be used while defining the process pattern. For example, if a server's root directory is /home/egurkha/apache and the server executable named httpd exists in the bin directory, then, the process pattern is "*/home/egurkha/apache/bin/httpd*".

Note:

The **PROCESS** parameter supports process patterns containing the ~ character.

To determine the process pattern to use for your application, on Windows environments, look for the process name(s) in the Task Manager -> Processes selection. To determine the process pattern to use on Unix environments, use the ps command (e.g., the command "ps -e -o pid,args" can be used to determine the processes running on the target system; from this, choose the processes of interest to you.)
Also, while monitoring processes on Windows, if the **WIDE** parameter of this test is set to **true**, then your process patterns can include the full path to the process and/or the arguments supported by the process. For instance, your **PROCESSPATTERN** specification can be as follows:

Terminal:C:\WINDOWS\System32\svchost -k DcomLaunch,Remote:C:\WINDOWS\system32\svchost.exe -k netsvcs

Also, note that the **PROCESS** parameter is **case-sensitive** in **Unix environments**.

To save the time and effort involved in such manual process specification, eG Enterprise offers an easy-to-use auto-configure option in the form of a **View/Configure** button that is available next to the **PROCESS** text box. Refer to Section **2.1.5.1.1** to know how to use the auto-configure option.

5. **USER** - The **USER** parameter will work only for Unix platforms and not Windows. By default, this parameter has a value "none", which means the test does not look for a process(es) for a specific user. If the value of the "user" parameter is not "none", then the Processes test searches for all processes of a specific user.
6. **CORRECT** - Increased uptime and lower mean time to repair are critical to ensuring that IT infrastructures deliver a high quality of service to users. Towards this end, the eG Enterprise

suite embeds an optional auto-correction capability that enables eG agents to automatically correct problems in the environment, as soon as they occur. With this capability, as and when an abnormal situation is detected, an eG agent can initiate corrective actions automatically to resolve the problem. Automatic correction without the need for manual intervention by IT operations staff reduces service downtime and improves operational efficiency. By default, the auto-correction capability is available in the eG Enterprise suite for the *Processes running* measure of Processes test, and the *Service availability* measure of WindowsServices test. The eG Enterprise suite includes a default auto-correction script for **Processes** test.

When a process that has been configured for monitoring stops, this script automatically executes and starts the process. To enable the auto-correction capability for the Processes test, first, select the **TRUE** option against the **CORRECT** parameter in this page (by default, **FALSE** will be selected here).

7. **ALARMTYPE -** Upon selecting the **True** option, three new parameters, namely, **ALARMTYPE**, **USERPARAMS**, and **CORRECTIVESCRIPT** will appear. You can set the corrective script to execute when a specific type of alarm is generated, by selecting an option from the **ALARMTYPE** list box. For example, if the **Critical** option is chosen from the **ALARMTYPE** list box, then the corrective script will run only when a critical alarm for the Processes test is generated. Similarly, if the **Critical/Major** option is chosen, then the corrective script will execute only when the eG Enterprise system generates critical or major alarms for the Processes test. In order to ensure that the corrective script executes regardless of the alarm type, select the **Critical/Major/Minor** option.
8. **USERPARAMS -** The user-defined parameters that are to be passed to the corrective script are specified in the **USERPARAMS** text box. One of the following formats can be applied to the **USERPARAMS** specification:

   - *exec@processName:command*: In this specification, *processName* is the display name of the process pattern specified against the PROCESS parameter, and *command* is the command to be executed by the default script when the process(es) represented by the *processName* stops. For example, assume that the **PROCESS** parameter of Processes test has been configured in the following manner: *Apache:*/opt/egurkha/manager/apache/bin/httpd*,Tomcat:*java*tomcat**, where *Apache* and *Tomcat* are the *processNames* or display names of the configured patterns. If auto-correction is enabled for these processes, then the **USERPARAMS** specification can be as follows:

     exec@Apache:/opt/egurkha/manager/apache/bin/apachectl start,Tomcat:
     /opt/tomcat/bin/catalina.sh start

This indicates that if the processes configured under the *processName "Apache"* stop (i.e. **/opt/egurkha/manager/apache/bin/httpd**), then the script will automatically execute the command *"/opt/egurkha/manager/apache/bin/apachectl start"* to start the processes. Similarly, if the *"Tomcat"* processes (i.e. **java*tomcat**) stop, the script will execute the command *"/opt/tomcat/bin/catalina.sh start"* to start the processes.

9. *command*: In this specification, *command* signifies the command to be executed when any of the processes configured for monitoring, stop. Such a format best suits situations where only a single process has been configured for monitoring, or, a single command is capable of starting all the configured processes. For example, assume that the **PROCESS** parameter has been configured to monitor *IISWebSrv:*inetinfo**. Since only one process requires monitoring, the first format need not be used for configuring the **USERPARAMS**. Therefore, simplify specify the command, *"net start World Wide Web Publishing Service"*.

   Note:

   - The **USERPARAMS** specification should be placed within double quotes if this value includes one or more blank spaces (eg.,"*Apache:/opt/egurkha/bin/apachectl start*").
   - Note that if a *processName* configured in the **PROCESS** parameter does not have a corresponding entry in **USERPARAMS** (as discussed in format 1), then the auto- correction capability will not be enabled for these processes.

10. **CORRECTIVESCRIPT** - Specify none in the **CORRECTIVESCRIPT** text box to use the default auto-correction script. Administrators can build new auto- correction capabilities to address probable issues with other tests, by writing their own corrective scripts. To know how to create custom auto-correction scripts, refer to the eG User Manual.

11. **WIDE** - **This parameter is valid on Solaris and Windows systems only.**

    On Solaris systems (before v11), if the value of the **WIDE** parameter is **Yes**, the eG agent will use *usr/ucb/ps* instead of */usr/bin/ps* to search for processes executing on the host. In Solaris 11, the eG agent uses the */usr/bin/ps auxwww* command to perform the process search. The */usr/ucb/ps* and the */usr/bin/ps auxwww* commands provide a long output (> 80 characters), whereas */usr/bin/ps* only outputs the first 80 characters of the process path and its arguments. However, some Solaris systems are configured with tightened security, which prevents the *usr/ucb/ps*and/or the */usr/bin/ps auxwww*command to be executed by any and every user to the system - in other words, only pre-designated users will be allowed to execute this command. The **sudo** (*superuser do*) utility (see http://www.gratisoft.us/sudo/) can be used to allow designated users to execute this command. If your system uses **sudo** to restrict access to the commands that return a long output, then set **WIDE** to **Yes** and then specify the value **sudo** for the **KEONIZEDSERVERCMD** parameter. This will ensure that not only does the agent use the */usr/ucb/ps and/*or the */usr/bin/ps auxwww* command (as the case may be) to monitor processes (like it would do if the **WIDE** parameter were set to be **Yes**), but it would also use **sudo** to execute this command.

Note:

If the **Processes** test on Solaris 11 fails, then do the following:

- Check whether the **WIDE** parameter is set to **Yes**.
- If so, then make sure that the **KEONIZEDSERVERCMD** parameter is set to **sudo**.
- If the test still fails, then look for the following error in the **error_log** file (that resides in the **/opt/egurkha/agent/logs** directory) on the eG agent host:

  ERROR ProcessTest: ProcessTest failed to execute [sudo: pam_ authenticate: Conversation failure]

- The aforesaid error occurs if the sudo command prompts for a password at runtime. If you find such an error in the **error_log** file, then, open the SUDOERS file on the target host and append an entry of the following format to it:

  Defaults:<eG_Install_Username> !authenticate

  For instance, if eguser is the eG install user, then your entry will be: *Defaults:eguser !authenticate*

This entry will make sure that you are no longer prompted for a password.
Save the file and restart the eG agent.

On Windows environments, by default, the eG agent uses *perfmon* to search for the processes that match the configured patterns. Accordingly, the **WIDE** parameter is set to **false** by default. Typically, a process definition in Windows includes the *full path to the process*, the *process name*, and *process arguments* (if any). *Perfmon* however scans the system only for *process names* that match the configured patterns – in other words, the process path and arguments are ignored by *perfmon*. This implies that if multiple processes on a Windows host have the same name as specified against **PROCESSPATTERN**, then *perfmon* will only be able to report the overall resource usage across all these processes; it will not provide any pointers to the exact process that is eroding the host's resources. To understand this better, consider the following example. Typically, Windows represents any Java application executing on it as *java.exe*. Say, two Java applications are executing on a Windows host, but from different locations.

If *java.exe* has been configured for monitoring, then by default, *perfmon* will report the availability and average resource usage of both the Java applications executing on the host. If say, one Java application goes down, then *perfmon* will not be able to indicate accurately which of the two Java applications is currently inaccessible. Therefore, to enable administrators to easily differentiate between processes with the same name, and to accurately determine which process is unavailable or resource-hungry, the eG agent should be configured to perform its process searches based on the process path and/or process arguments, and not just on the process name – in other words, the eG agent should be configured **not to use perfmon**.

To achieve this, first, set the **WIDE** parameter to **Yes** This will instruct the eG agent to not use *perfmon* to search for the configured process patterns. Once this is done, then, you can proceed to configure a **PROCESSPATTERN** that includes the *process arguments* and/or the *process* path, in addition to the *process* name. For instance, if both the *Remote Access Connection Manager* service and the *Terminal Services* service on a Windows host, which share the same name – *svchost* - are to be monitored as two different processes, then your **PROCESSPATTERN** specification should be as follows:

Terminal:C:\WINDOWS\System32\svchost -k DcomLaunch,Remote:C:\WINDOWS\system32\svchost.exe -k netsvcs

You can also use wildcard characters, wherever required. For instance, in the above case, your **PROCESSPATTERN** can also be:

*Terminal:*svchost -k DcomLaunch,Remote:*svchost.exe -k netsvcs*

Similarly, to distinctly monitor two processes having the same name, but operating from different locations, your specification can be:

JavaC:c:\javaapp\java.exe,JavaD:d:\app\java.exe

Note:

- Before including process paths and/or arguments in your **PROCESSPATTERN** configuration, make sure that the **WIDE** parameter is set to **Yes**. If not, the test will not work.
- If your **PROCESSPATTERN** configuration includes a process path that refers to the Program Files directory, then make sure that you **do not a include a ~** (tilde) while specifying this directory name. For instance, your **PROCESSPATTERN** specification should not be say, Adobe:*C:\Progra~1\Adobe\AcroRd32.exe.*

12. **KEONIZEDSERVERCMD -** On Solaris hosts, this test takes an additional **KEONIZEDSERVERCMD** parameter. Keon is a security mechanism that can be used with a multitude of operating systems to provide a centralized base for user account and password management, user access and inactivity control, system integrity checking, and auditing. If the Keon security

model is in use on the Solaris host being monitored, then this test may require special user privileges for executing the operating system commands. In such a case, specify the exact command that the test is permitted to execute, in the **KEONIZEDSERVERCMD** text box. For example, if the keon command to be executed by the test is *sudo*, specify *sudo* in the **KEONIZEDSERVERCMD** text box. Alternatively, you can even specify the full path to the *sudo* command in the **KEONIZEDSERVERCMD** text box. On the other hand, if a Keon security model is not in place, then set the **KEONIZEDSERVERCMD** parameter to *none*.

13. **USEPS** - **This flag is applicable only for AIX LPARs.** By default, on AIX LPARs, this test uses the **tprof** command to compute CPU usage of the processes on the LPARs. 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 of processes executing on AIX LPARs. If either of these flags is set to **yes**, then the **ps** command will perform the CPU usage computations for such processes.

    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*.

14. **ISPASSIVE** – If the value chosen is **Yes**, then the server under consideration is a passive server in a cluster. No alerts will be generated if the server is not running. Measures will be reported as “Not applicable’ by the agent if the server is not up.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Processes running:	Number of instances of a process (es) currently executing on a host.	Number	This value indicates if too many or too few processes corresponding to an application are executing on the host.
CPU utilization:	Percentage of CPU used by executing process (es) corresponding to the pattern specified.	Percent	A very high value could indicate that processes corresponding to the specified pattern are consuming excessive CPU resources.
Memory utilization:	For one or more processes corresponding to a specified set of patterns, this value represents the ratio of the resident set size of the processes to the physical memory of the host system, expressed as a percentage.	Percent	A sudden increase in memory utilization for a process(es) may be indicative of memory leaks in the application.

3.1 Monitoring HPUX Servers

Use the HPUX model provided by eG Enterprise to measure the overall health of the HPUX operating systems. Like all other Unix-based models, the HPUX model too is represented using the same hierarchical layer structure as the Linux model.

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

3.1.1 The Operating System Layer

Like the *Linux* model, the **Operating System** layer of the *HPUX* model too is mapped to a SystemDetails test that tracks the CPU and memory utilization, and a DiskSpace test that monitors the disk utilization. Also, similar to the *Linux* model, the **Operating System** layer of the *HPUX* model too measures memory usage, IO waits, swap usage, and uptime of the host. All these tests have been discussed elaborately in Section **2.1.1** of this document.

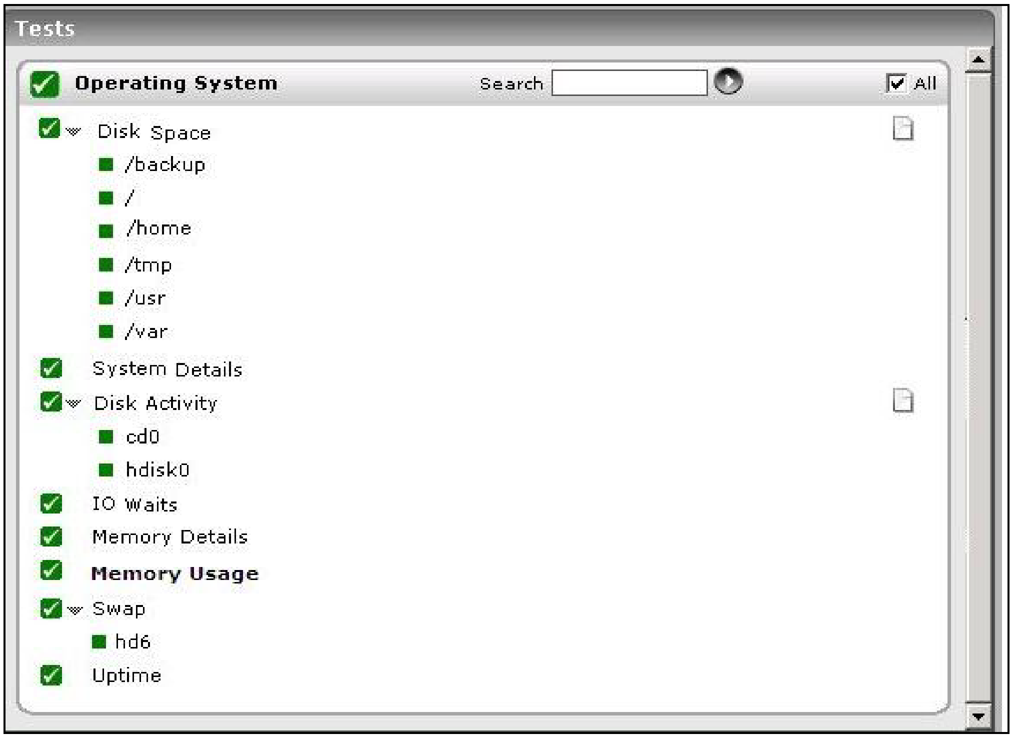


Figure 3.1: Tests that map to the Operating System layer of an HPUX server

The difference however lies in the DiskActivity test of the *HPUX* model. The metrics reported by this test are slightly different for the *Linux* and *HPUX* models. The sub-section that follows will discuss this test alone.

3.1.1.1 Disk Activity Test

When executed on Windows, Solaris, AIX, and HP-UX systems, this test reports statistics pertaining to the input/output utilization of each physical disk on a system.

Target of the test : Any host system

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each host monitored

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. **USEEXE -** Setting the **USEEXE** flag to **true**, ensures that the disk activity metrics are collected by executing a binary instead of dynamically linking to the Performance instrumentation library. By default, this is set to **false**.
4. **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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Disk read time:	Indicates the average time in seconds of a read of data from the disk.	Secs	

Measurement	Description	Measurement Unit	Interpretation
Disk write time:	Indicates the average time in seconds of a write of data from the disk.	Secs	
Disk read rate:	Indicates the number of reads happening on a logical disk per second.	Operations/Sec	A dramatic increase in this value may be indicative of an I/O bottleneck on the server.
Data read rate from disk:	Indicates the rate at which bytes are transferred from the disk during read operations.	KB/Sec	A very high value indicates an I/O bottleneck on the server.
Disk write rate:	Indicates the number of writes happening on a local disk per second.	Operations/Sec	A dramatic increase in this value may be indicative of an I/O bottleneck on the server.
Data write rate to disk:	Indicates the rate at which bytes are transferred from the disk during write operations.	KB/Sec	A very high value indicates an I/O bottleneck on the server.
Disk service time:	Indicates the average time that this disk took to service each transfer request (i.e., the average I/O operation time)	Secs	A sudden rise in the value of this measure can be attributed to a large amount of information being input or output. A consistent increase however, could indicate an I/O processing bottleneck.
Disk queue time:	Indicates the average time that transfer requests waited idly on queue for this disk.	Secs	Ideally, the value of this measure should be low.
Disk I/O time:	Indicates the avarage time taken for read and write operations of this	Secs	The value of this measure is the sum of the values of the Disk service time and Disk queue time

Measurement	Description	Measurement Unit	Interpretation
	disk.		measures. A consistent increase in the value of this measure could indicate a latency in I/O processing.

Note:

- For this test to report measures on Unix systems, the *sysstat* package must be installed on the server (check for the existence of the *iostat* command on the target system).
- If the sysstat version installed on the target server is less than 4.0.7, the following measures also will not be available – *Data read rate from disk* and *Data write rate to disk*.
- As the HPUX operating system only provides the overall transfer rate to and from the disk, the eG agent reports this value for both the *Disk read rate* and the *Disk write rate*. Likewise, the *Data read rate from disk* and *Data write rate to disk* are also reported as the same values (i.e., equal to the data transfer rate from the disk). Likewise, the *Disk read time* and *Disk write time* are also reported as the same values (i.e., equal to the seconds per average seek).
- Detailed diagnosis will not be available for systems operating on HPUX platforms.

3.1.1.2 Tests Disabled by Default

Besides the tests depicted by Figure 2.1, the **Operating System** layer of an *HPUX* server is mapped to many other tests that are disabled by default. You can enable these tests, by opening the agents – tests configuration page (using the Agents -> Tests -> Configure menu sequence in the eG administrative interface), selecting the check box against the test name in the **DISABLED TESTS** list, and clicking the **Update** button therein.

These tests have already been discussed in Section **2.1.1.14** of this document.

Besides the above, hardware monitoring expertise can also be optionally built into the **Operating System** layer of an HPUX host. Please refer to the *Hardware Monitoring* document for further details.

In addition to the above, a **Volume Groups** test is mapped to the HPUX server alone, but is disabled by default.

3.1.1.3 Volume Groups Test

Logical Volume Manager (LVM) is a storage management system on HPUX that lets you allocate and manage disk space for file systems or raw data. Any disk that is initialized for LVM usage is called an LVM disk or a physical volume (PV). Physical volumes are organized into volume groups (VGs). A volume group can consist of one or more physical volumes, and there can be more than one volume group in the system. Once created, the volume group, not the disk, is the entity that represents data storage. If any of these volume groups is unavailable/inactive, the data contained within that group will be rendered inaccessible to the host and the mission-critical applications running on it. The quick detection and speedy resolution of volume group failures is hence imperative to ensure 24x7 data availability. For this purpose, the **Volume Groups** test must be periodically executed on the target HPUX server. This test continuously monitors the volume groups on the HPUX server, and pinpoints those groups that are unavailable/inactive. This way, the test rapidly brings volume group failures to the notice of administrators, and thus enables them to swiftly initiate remedial measures.

Target of the test : Any host system

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each volume group on the HPUX server monitored

Configurable parameter 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. **USE SUDO –** By default, the **USE SUDO** parameter is set to **No**. This indicates that, by default, this test will report the health of volume group by executing the vgdisplay –v command. However, in some highly secure environments, the eG agent install user may not have the permissions to execute this command directly. In such cases, do the following:

   - Edit the **SUDOERS** file on the target host and append an entry of the following format to it:

     <eG_agent_install_user> ALL=(ALL) NOPASSWD: <Command>

     For instance, if the *eG agent install user* is *eguser*, then the entries in the **SUDOERS** file should be:

     eguser ALL=(ALL) NOPASSWD: vgdisplay -v

   - Finally, save the file.
   - Then, when configuring the test using the eG admin interface, set the **USE SUDO** parameter to **Yes**. This will enable the eG agent to execute the *sudo vgdisplay -v* command to retrieve

the desired metrics.

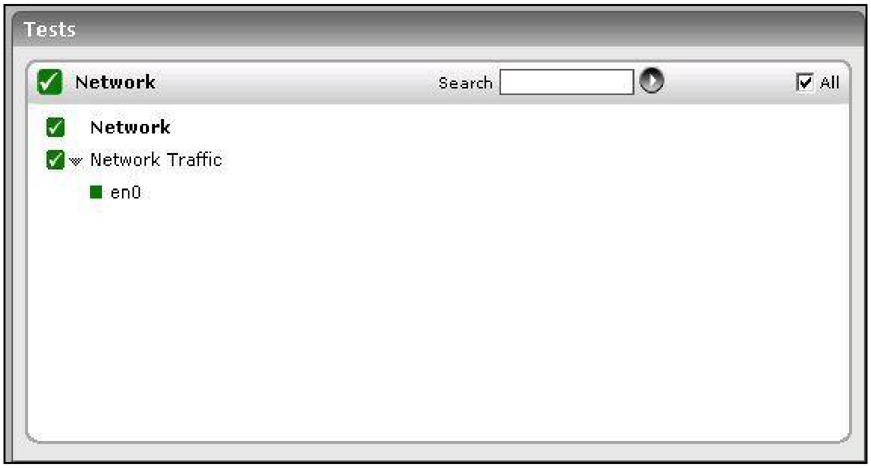
4. **SUDO PATH** – **This parameter is relevant only when the USE SUDO parameter is set to 'Yes'**. By default, the **SUDO PATH** is set to *none*. This implies that the *sudo* command is in its default location – i.e., in the */usr/bin* or */usr/sbin* folder of the target HPUX server. In this case, the eG agent automatically runs the *vgdisplay -v* command with *sudo* from its default location, once the **USE SUDO** flag is set to **Yes**. However, if the *sudo* command is available in a different location in your environment, you will have to explicitly specify the full path to the *sudo* command in the **SUDO PATH** text box to enable the eG agent to run the *sudo* command.

Measurements made by the test

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td>Status:</td><td>Indicates the current status of this volume group.</td><td></td><td>The values that this measure can take and their corresponding numeric values are as follows:
<table>
<tr><th>Measure Value</th><th>Numeric Value</th></tr>
<tr><td>Unavailable/inactive</td><td>0</td></tr>
<tr><td>Available</td><td>1</td></tr>
</table>
<b>Note:</b>
By default, this measure reports the <b>Measure Values</b> listed in the table above to indicate the current state of the volume group. In the graph of this measure however, the same is represented using the corresponding numeric equivalents only.</td></tr>
</table>

3.1.2 The Network Layer

The **Network** layer handles connectivity of the host system to the network, and includes packet traffic transmitted to and from the server.



☑ Network

☑ Network

☑ Network Traffic

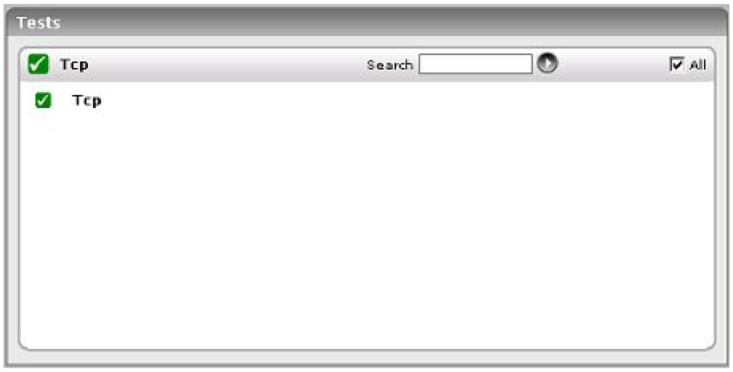
■ en0

Figure 3.2: The tests that map to the Network layer of an HPUX server

Since the tests mapped to this layer have already been discussed in Section **2.1.2** of this document.

3.1.3 The Tcp Layer

As indicated earlier, a generic application relies on either the TCP or UDP protocols for data transport. While many applications such as web server, web application servers, and database servers rely on the TCP protocol, some other applications such as DNS servers and WAP gateways rely on the UDP protocol. To track the health of the TCP layer of a host, and its effect on the status of any application server, the eG Enterprise suite uses a Tcp test shown in Figure 3.3.



☑ Tcp

☑ Tcp

Figure 3.3: The test mapped to the Tcp layer of an HPUX server

The test depicted by Figure 3.3 and the tests that are disabled by default for this layer have already been dealt with in Section **2.1.3** of this document. Therefore, let us proceed to the next layer.

3.1.4 The Application Processes Layer

This layer depicts the states of the different processes that must be executing for the application service to be available. The Processes test (see Figure 3.4) tracks various statistics pertaining to the different application processes.

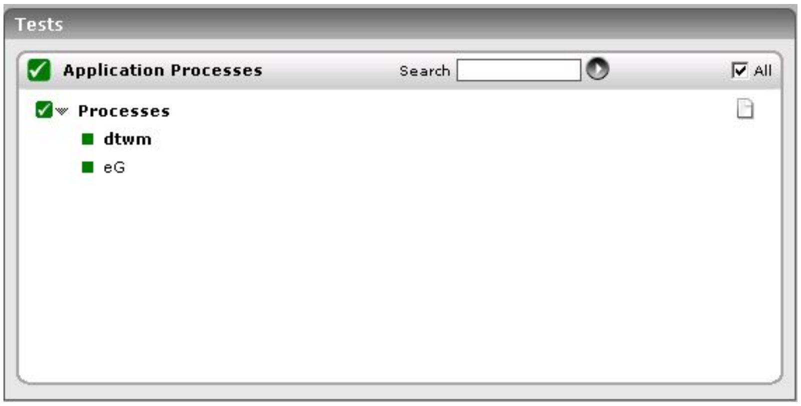
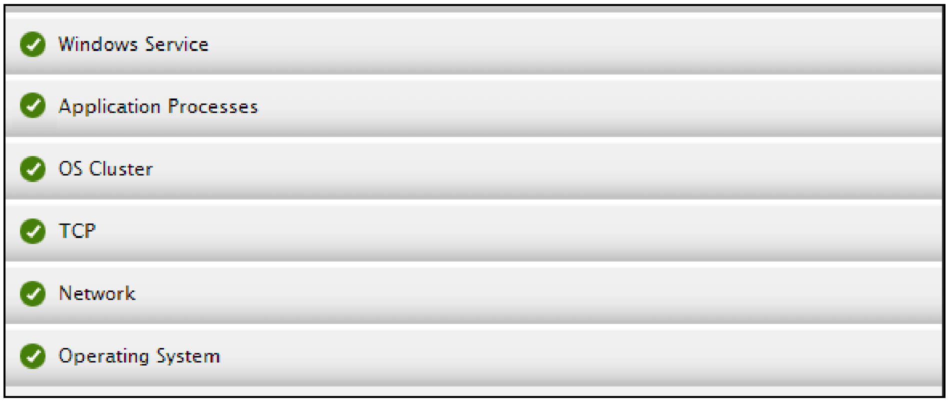


Figure 3.4: The Processes test that tracks the health of the Application Processes layer of an HPUX server

As the Processes test and the procedure to auto-configure the processes to be monitored have been discussed elaborately in Section **2.1.5** of this document.

Chapter 4: Monitoring Windows Servers

In order to monitor the overall health of Windows hosts in particular, eG Enterprise embeds the Microsoft Windows server model (see Figure 4.1)



✓ Windows Service

✓ Application Processes

✓ OS Cluster

✓ TCP

✓ Network

✓ Operating System

Figure 4.1: Layer model for a Windows server

An operator can use the **Application Processes** layer in Figure 4.1 to monitor different processes executing on the Windows server. The **TCP**, **Network**, and **Operating System** layers monitor the TCP/IP statistics, network availability and traffic rate, and CPU, memory, and disk statistics pertaining to the target server. The topmost layer is the **Windows Service** layer which tracks the health of the different services of the corresponding Windows server.

Note:

- Only a basic agent license is required for using the Windows model.
- To monitor applications running on a Windows 8/2012 host, you need to make sure that the **.NET Framework 3.5 Features** is enabled on that host.
- The eG agent will be able to monitor applications on Windows 2003 using powershell scripts only if Windows Powershell 2.0 pre-exists on that Windows 2003 host.

The sections to come discuss each of these layers in great detail.

4.1 The Hardware layer

This layer helps you to monitor the hardware components of the Windows generic server. Using the tests of this layer, administrators can monitor the voltage, temperature and utilization of each hardware component and proactively detect any abnormalities, if any.

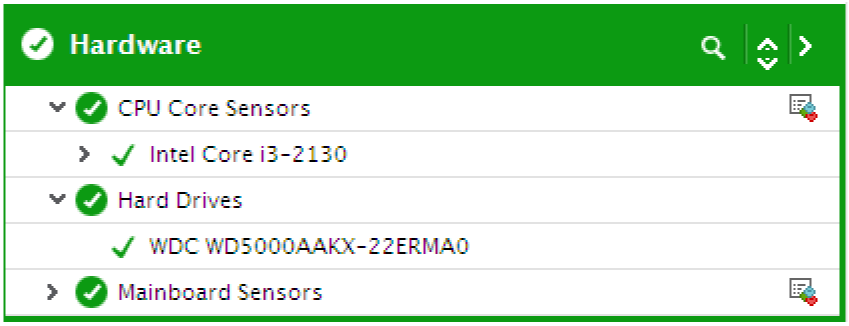


Figure 4.2: The Hardware layer

Let us now discuss each test associated with this layer in detail in the forthcoming sections.

4.1.1 CPU Core Sensors Test

For each CPU core available in the host system, this test reports the current speed, temperature and power of the CPU core. In addition, this test reports the percentage of load handled by each CPU core. This way, administrators may be alerted to the impending load balancing issues caused by the CPU cores.

Target of the test: Any host system

Agent executing the test: An internal agent

Output of the test: One set of results for each CPU core of the host system being monitored.

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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Clock Speed	Indicates the current speed of this CPU core.	MHz	A very low value for this measure indicates that the CPU core is slow. Comparing the value of this measure across CPU cores will point you to that CPU core that is currently very slow.

Measurement	Description	Measurement Unit	Interpretation
Temperature	Indicates the current temperature of this CPU core.	Celsius	The value of this measure should be within optimal range. A sudden/gradual increase in the value of this measure may impact the functioning of the CPU core and needs to be attended to immediately.
Load Utilized	Indicates the percentage of load handled by this CPU core.	Percent	Comparing the value of this measure across the CPU cores will help you identify the CPU core that is overloaded.
Power utilized	Indicates the power consumed by this CPU core.	Watts	

4.1.2 GPU Sensors Test

This test monitors each GPU available in the hardware unit of the host system and reports the voltage, temperature and the load handled by each GPU. In addition, this test reports the speed of each GPU and the average speed of the fans in each GPU. This way, administrators may be alerted to potential overload condition of the GPU and help administrators identify potential issues that may affect the functioning of the GPU.

Target of the test: Any host system

Agent executing the test: An internal agent

Output of the test: One set of results for each GPU available in the hardware unit of the host system being monitored.

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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Voltage utilized	Indicates the current voltage of this GPU.	Volts	
Clock Speed	Indicates the current speed of this GPU.	MHz	A very low value for this measure indicates that the GPU is slow. Comparing the value of this measure across GPUs will point you to that GPU that is currently very slow.
Temperature	Indicates the current temperature of this GPU.	Celsius	The value of this measure should be within permissible limits. A sudden/gradual increase in the value of this measure may affect the functioning of the server and needs to be immediately attended to.
Load Utilized	Indicates the percentage of load handled by this GPU.	Percent	Comparing the value of this measure across GPUs will help you identify the GPU that is handling the maximum load.
Total revolutions	Indicates the average speed of the fans in this GPU.	RPM	The speed of the fans must be within the permissible range. A sudden increase/decrese in the value of this measure is a cause for concern.

4.1.3 Hard Drives Test

This test reports the current temperature and space utilization of each hard disk available in the host system. Using this test, administrators may be alerted to potential abnormalities in temperature and space crunch of the hard disk, if any.

Target of the test: Any host system

Agent executing the test: An internal agent

Output of the test: One set of results for each hard disk of the host system being monitored.

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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Temperature	Indicates the current temperature of this hard disk.	Celsius	Ideally, the value of this measure should be within prescribed limits. A sudden/gradual increase in the value of this measure may adversely affect the functioning of the server and therefore, administrators may need to attend to the issue immediately.
Physical hard disk space utilized	Indicates the percentage of space that is currently utilized by this hard disk.	Percent	A value close to 100 indicates that the hard disk is currently running out of space. Administrators may need to either free up the space or need to add more space to the hard disk to ensure smooth functioning of the server.

4.1.4 Mainboard Sensors Test

This test reports the current voltage, temperature and revolutions made by each mainboard, and promptly alerts administrators to potential abnormalities, if any.

Target of the test: Any host system

Agent executing the test: An internal agent

Output of the test: One set of results for every mainboard of the host system being monitored.

Configurable parameters for the test

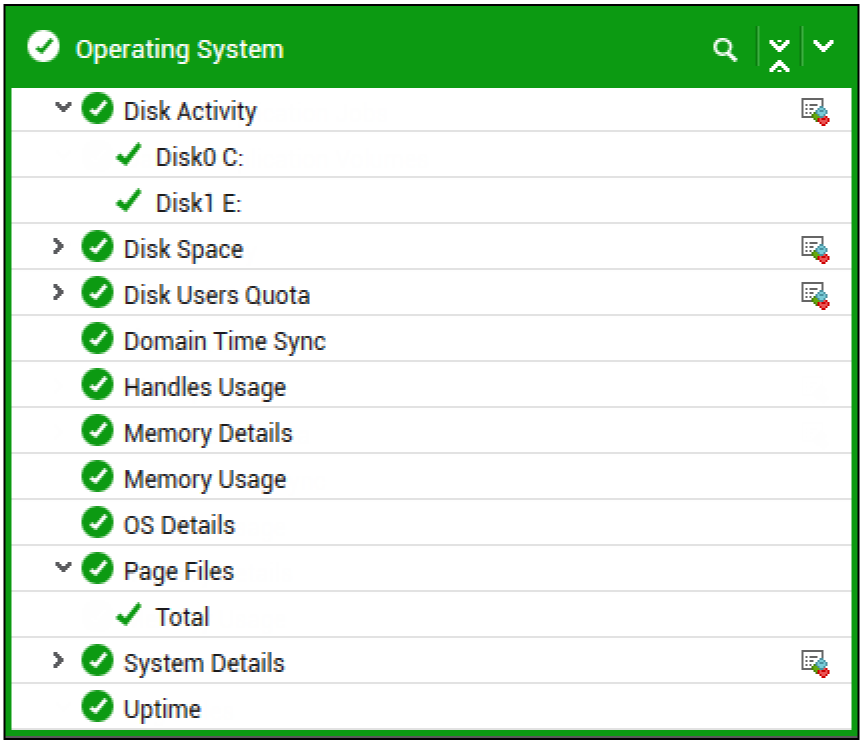
1. **TEST PERIOD -** How often should the test be executed.
2. **HOST -** The host for which the test is to be configured.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Voltage utilized	Indicates the current voltage of this mainboard.	Volts	
Temperature utilized	Indicates the current temperature of this mainboard.	Celsius	The value of this measure should be within optimal range. A sudden/gradual increase in the value of this measure may impact the functioning of the server and needs to be attended to immediately.
Total revolutions	Indicates the average speed of the fans in this mainboard.	RPM	The speed of the fans must be within the permissible range. A sudden increase/decrese in the value of this measure is a cause for concern.

4.2 The Operating System Layer

One of the key functions of this layer is to monitor the CPU/memory/disk resources utilized by the Windows host, and report whenever there is excessive resource usage at the host. Figure 4.3 depicts the tests associated with this layer.



Operating System

- Disk Activity
  - Disk0 C:
  - Disk1 E:
- Disk Space
- Disk Users Quota
- Domain Time Sync
- Handles Usage
- Memory Details
- Memory Usage
- OS Details
- Page Files
  - Total
- System Details
- Uptime

Figure 4.3: The tests associated with the Operating System layer of a Windows Generic server

Since most of the tests listed in Figure 4.3 have already been dealt with in Chapter 1, this section deals with the **SystemDetails** test (as the test parameters applicable are slightly different for Windows systems), the **DiskActivity** test (as it reports a different set of metrics for a Windows server), the **MemoryDetails** test (as it reports additional measures for Windows sytems), the **WindowsSystem** test and the **PageFiles** test only.

4.2.1 Memory Usage Test

This test reports statistics related to the usage of the physical memory of the system.

Target of the test : Any host system

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every server being monitored

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. **USEGLANCE - This flag applies only to HP-UX systems**. HP GlancePlus/UX is Hewlett-Packards's online performance monitoring and diagnostic utility for HP-UX based computers. There are two user interfaces of GlancePlus/UX -- *Glance* is character-based, and *gpm* is motif-based. Each contains graphical and tabular displays that depict how primary system resources are being utilized. In environments where *Glance* is run, the eG agent can be configured to integrate with *Glance* to pull out detailed metrics pertaining to the memory usage of the HP-UX systems that are being monitored. By default, this integration is disabled. This is why the **USEGLANCE** flag is set to **No** by default. You can enable the integration by setting the flag to **Yes**. If this is done, then the test polls the *Glance* interface of HP GlancePlus/UX utility to report the detailed diagnosis information pertaining to memory usage.

4. **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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Total physical memory:	Indicates the total physical memory of the system.	MB	
Used physical memory:	Indicates the used physical memory of the system.	MB	
Free physical memory:	Memory that does not contain any valuable data, and that will be used first when	MB	This measure typically indicates the amount of memory available for use by applications running on the target host.

Measurement	Description	Measurement Unit	Interpretation
	processes, drivers or Operating System need more memory. This does not include standby memory.		On Unix operating systems (AIX and Linux), the operating system tends to use parts of the available memory for caching files, objects, etc. When applications require additional memory, this is released from the operating system cache. Hence, to understand the true free memory that is available to applications, the eG agent reports the sum of the free physical memory and the operating system cache memory size as the value of the Free physical memory measure while monitoring AIX and Linux operating systems.
Physical memory utilized:	Indicates the percent usage of physical memory.	Percent	Ideally, the value of this measure should be low. While sporadic spikes in memory usage could be caused by one/more rogue processes on the system, a consistent increase in this value could be a cause for some serious concern, as it indicates a gradual, but steady erosion of valuable memory resources. If this unhealthy trend is not repaired soon, it could severely hamper system performance, causing anything from a slowdown to a complete system meltdown. You can use the detailed diagnosis of this measure to figure out which processes on the host are consuming memory excessively.

Measurement	Description	Measurement Unit	Interpretation
Available physical memory (MB):	Indicates the amount of physical memory, immediately available for allocation to a process or for system use.	MB	Not all of the Available physical memory is Free physical memory. Typically, Available physical memory is made up of the Standby List, Free List, and Zeroed List. When Windows wants to trim a process' working set, the trimmed are moved (usually) to the Standby List. From here, they can be brought back to life in the working set with only a soft page fault (much faster than a hard fault, which would have to talk to the disk). If a page stays in the standby List for a long time, it gets freed and moved to the Free List. In the background, there is a low priority thread (actually, the only thread with priority 0) which takes pages from the Free List and zeros them out. Because of this, there is usually very little in the Free List. All new allocations always come from the Zeroed List, which is memory pages that have been overwritten with zeros. This is a standard part of the OS' cross-process security, to prevent any process ever seeing data from another. If the Zeroed List is empty, Free List memory is zeroed and used or, if that is empty too, Standby List memory is freed, zeroed, and used. It is because all

Measurement	Description	Measurement Unit	Interpretation
			three can be used with so little effort that they are all counted as "available". A high value is typically desired for this measure. **This measure will be available for Windows 2008 hosts only.**
Modified memory:	Indicates the amount of memory that is allocated to the modified page list.	MB	This memory contains cached data and code that is not actively in use by processes, the system and the system cache. This memory needs to be written out before it will be available for allocation to a process or for system use. Cache pages on the modified list have been altered in memory. No process has specifically asked for this data to be in memory, it is merely there as a consequence of caching. Therefore it can be written to disk at any time (not to the page file, but to its original file location) and reused. However, since this involves I/O, it is not considered to be Available physical memory. **This measure will be available for Windows 2008 hosts only.**
Standby memory:	Indicates the amount of memory assigned to the standby list.	MB	This memory contains cached data and code that is not actively in use by processes, the system and the system cache. It is immediately available for allocation to a process

Measurement	Description	Measurement Unit	Interpretation
			or for system use. If the system runs out of available free and zero memory, memory on lower priority standby cache page lists will be repurposed before memory on higher priority standby cache page lists. Typically, Standby memory is the aggregate of Standby Cache Core Bytes,Standby Cache Normal Priority Bytes, and Standby Cache Reserve Bytes. Standby Cache Core Bytes is the amount of physical memory, that is assigned to the core standby cache page lists. Standby Cache Normal Priority Bytes is the amount of physical memory, that is assigned to the normal priority standby cache page lists. Standby Cache Reserve Bytes is the amount of physical memory, that is assigned to the reserve standby cache page lists. **This measure will be available for Windows 2008 hosts only.**
Cached memory:	This measure is an aggregate of Standby memory and Modified memory.	MB	**This measure will be available for Windows 2008 hosts only.**

4.2.2 System Details Test

This operating system-specific test relies on native measurement capabilities of the operating system to collect various metrics pertaining to the CPU and memory usage of a host system. The details of this test are as follows:

Target of the test : Any host system

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each host monitored

1. **TEST PERIOD -** How often should the test be executed
2. **HOST -** The host for which the test is to be configured.
3. **DURATION -** This parameter is of significance only while monitoring Unix hosts, and indicates how frequently within the specified **TEST PERIOD**, the agent should poll the host for CPU usage statistics.
4. **SUMMARY** – This attribute is applicable to multi-processor systems only. If the **Yes** option is selected, then the eG agent will report not only the CPU and memory utilization of each of the processors, but it will also report the summary (i.e., average) of the CPU and memory utilizations of the different processors. If the **No** option is selected, then the eG agent will report only the CPU usage of the individual processors.
5. **USEIOSTAT** – This parameter is of significance to **Solaris platforms** only. By default, the **USEIOSTAT** flag is set to **No**. This indicates that, by default, SystemTest reports the CPU utilization of every processor on the system being monitored, and also provides the average CPU utilization across the processors. However, if you want SystemTest to report only the average CPU utilization across processors and across user sessions, then set the **USEIOSTAT** flag to **Yes**. In such a case, the processor-wise breakup of CPU utilization will not be available.
6. **USEPS - This flag is applicable only for AIX LPARs.** By default, this flag is set to **No**.
7. **INCLUDE WAIT - This flag is applicable to Unix hosts alone**. On Unix hosts, CPU time is also consumed when I/O waits occur on the host. By default, on Unix hosts, this test does not consider the CPU utilized by I/O waits while calculating the value of the *CPU utilization* measure. Accordingly, the **INCLUDE WAIT** flag is set to **No** by default. To make sure that the CPU utilized by I/O waits is also included in CPU usage computations on Unix hosts, set this flag to **Yes**.

9. 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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
CPU utilization:	This measurement indicates the percentage of utilization of the CPU time of the host system.	Percent	A high value could signify a CPU bottleneck. The CPU utilization may be high because a few processes are consuming a lot of CPU, or because there are too many processes contending for a limited resource. Check the currently running processes to see the exact cause of the problem.
System CPU utilization:	Indicates the percentage of CPU time spent for system-level processing.	Percent	An unusually high value indicates a problem and may be due to too many system-level tasks executing simultaneously.
Run queue length:	Indicates the instantaneous length of the queue in which threads are waiting for the processor cycle. This length does not include the threads that are currently being executed.	Number	A value consistently greater than 2 indicates that many processes could be simultaneously contending for the processor.
Blocked processes:	Indicates the number of processes blocked for I/O, paging, etc.	Number	A high value could indicate an I/O problem on the host (e.g., a slow disk).
Swap memory:	On Windows systems,	MB	An unusually high value for the

Measurement	Description	Measurement Unit	Interpretation
	this measurement denotes the committed amount of virtual memory. This corresponds to the space reserved for virtual memory on disk paging file(s). On Solaris systems, this metric corresponds to the swap space currently available. On HPUX and AIX systems, this metric corresponds to the amount of active virtual memory (it is assumed that one virtual page corresponds to 4 KB of memory in this computation).		swap usage 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.
Free memory:	Indicates the amount of memory (including standby and free memory) that is immediately available for use by processes, drivers or Operating System.	MB	This measure typically indicates the amount of memory available for use by applications running on the target host. On Unix operating systems (AIX and Linux), the operating system tends to use parts of the available memory for caching files, objects, etc. When applications require additional memory, this is released from the operating system cache. Hence, to understand the true free memory that is available to applications, the eG agent reports the sum of the free physical

Measurement	Description	Measurement Unit	Interpretation
			memory and the operating system cache memory size as the value of the Free memory measure while monitoirng AIX and Linux operating systems.
Steal Time	Indicates the percentage of time a virtual processor waits for a real CPU while the hypervisor is servicing another virtual processor.	Percent	This measure is applicable only for the Windows VMs that are provisioned via a VMware vSphere ESX. A low value is desired for this measure. A high value for this measure indicates that a particular virtual processor is waiting longer for real CPU resources. If this condition is left unattended, it can stall the tasks performed by the virtual processor and cause the overall performance of the virtual processor to deteriorate significantly and badly impact user- experience with the target server. The impact of stolen CPU always manifests in slowness but can have more profound effects on your infrastructure. Here are some examples: • Slower page load times • Slower database query times • Slower processing of reports • Increased queue size of

Measurement	Description	Measurement Unit	Interpretation
			asynchronous tasks because of an inability to process them quickly • Increased IaaS bill due to launching more servers to handle the same amount of load To avoid such eventualities, administrators should either immediately terminate the virtual machine and launch a replacement or upgrade the VM to have more CPU.

Note:

For multi-processor systems, where the CPU statistics are reported for each processor on the system, the statistics that are system-specific (e.g., run queue length, free memory, etc.) are only reported for the "**Summary**" descriptor of this test.

4.2.3 Disk Space Test

This test monitors the space usage of every disk partition on a host. While this test typically reports the space usage of every physical disk partition on a host, when monitoring hosts running Windows 2008/Vista/7 hosts however, this test reports usage metrics of physical and logical partitions.

Target of the test : Any host system

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each physical/logical disk partition and/or NFS drive on the host monitored

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. **DISCOVER NFS** – This flag is applicable for Windows 7 and Windows 2008 operating systems

only. Set this flag to **Yes,** if you want the test to automatically discover NFS drives on your system and report their status as well. By default, this flag is set to **No.**

4. **DOMAIN**, **DOMAIN USER**, **AND DOMAIN PASSWORD** – **These parameters are applicable to Windows systems only.** When monitoring a Windows system, if the **DISCOVER NFS** flag of this test is set to **Yes,** then the test should be configured with the privileges of a valid domain user in order to auto-discover NFS drives and report their usage and status. In such a case therefore, specify a valid Windows domain name against **DOMAIN** , provide the name of a valid user in that domain against **DOMAIN USER**, and specify the password of that user against **PASSWORD**. Once the domain user credentials are provided, the test auto-discovers all those NFS drives on the target Windows system to which the configured domain user has access.
5. **CONFIRM PASSWORD** – Retype the **PASSWORD** of the configured domain user here.
6. **TIMEOUT-** 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

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Total capacity:	Indicates the total capacity of a disk partition.	MB	
Used space:	Indicates the amount of space used in a disk partition.	MB	
Free space:	Indicates the current free space available for each disk partition of a system.	MB	
Percent usage:	Indicates the percentage of space usage on each disk partition of a system.	Percent	A value close to 100% can indicate a potential problem situation where applications executing on the system may not be able to write data to the disk partition (s) with very high usage.
Drive availability:	Indicates whether/not	Percent	If the drive is available, then this

Measurement	Description	Measurement Unit	Interpretation
	this drive is available currently.		measure will report the value 100. If not, then this measure will report the value 0. This measure gains significance when monitoring NFS drives, as it enables you to identify those drives that are no longer mapped to the system.

Note:

In case of *Hyper-V* and *Hyper-V VDI* components, the **Disk Space te**st reports metrics for an additional Total descriptor. For this descriptor, the test reports the total disk capacity and space usage across all the disk partitions of the monitored Hyper-V host.

4.2.4 Disk Activity Test

When executed on Windows systems, this test reports statistics pertaining to the input/output utilization of each physical disk on a system.

Target of the test : Any host system

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each physical disk on the host monitored.

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. **USEEXE -** Setting the **USEEXE** flag to **true**, ensures that the disk activity metrics are collected by executing a binary instead of dynamically linking to the Performance instrumentation library. By default, this is set to **false**.
4. **DISKS -** This parameter enables you to choose which type of
5. **TRACE** - By default, this flag is set to **No**, indicating that the test does not generate in-depth details such as details on files that are read from/written to the disk, by default, so as to conserve

storage space. However, if you want the test to generate and store details for each and every file that is read from/written to the disk, set the **TRACE** flag to **Yes**.

6. **DISK BUSY PERCENT - This parameter is applicable only when the TRACE flag is set to Yes**. Specify the percentage of time beyond which the test should reveal the detailed diagnosis for the *Disk Busy* measure. By default, this parameter is set to 20. However, you can override this value as per your requirement.

7. **READ SIZE IN KB - This parameter is applicable only when the TRACE flag is set to Yes**. By default, the value of this parameter is set to 10 KB indicating that this test will additionally report the detailed measures for the files that are read from the disk only when the size of files is minimum of 10 KB. This setting helps you to conserve space on the database. However, you can override the default value of this parameter as per your requirement.

   By default, the value of this parameter is set to 10 KB indicating that this test will report the additional details on the files in the detailed diagnosis only when the files with minimum size of 10 KB is read from the disk. This setting will help you conserve the storage space on the database. However, you can override the default value as per your requirement.

8. **WRITE SIZE IN KB - This parameter is applicable only when the TRACE flag is set to Yes**. By default, the value of this parameter is set to 10 KB indicating that this test will report the detailed measures only when the files with minimum size of 1KB is written on the disk. This setting will help you conserve the storage space on the database. However, you can override the default value as per your requirement.

9. **DISK RESPONSE TIME SECS - This parameter is applicable only when the TRACE flag is set to Yes**. By default, the value of this parameter is set to 1 second. This implies that the test will report the detailed measures only when the files with minimum size of 10KB is read from/written to the disk within the time specified against this parameter. This setting will help you conserve the storage space on the database. However, you can override the default value as per your requirement.

10. **EVENT CAPTURE INTERVAL IN SECS - This parameter is applicable only when the TRACE flag is set to Yes**. By default, the value of this parameter is set to 10 seconds. This implies that the test will monitor the files involved in the disk operations performed within the time specified against this parameter. However, you can override this value as per your requirement.

11. **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.

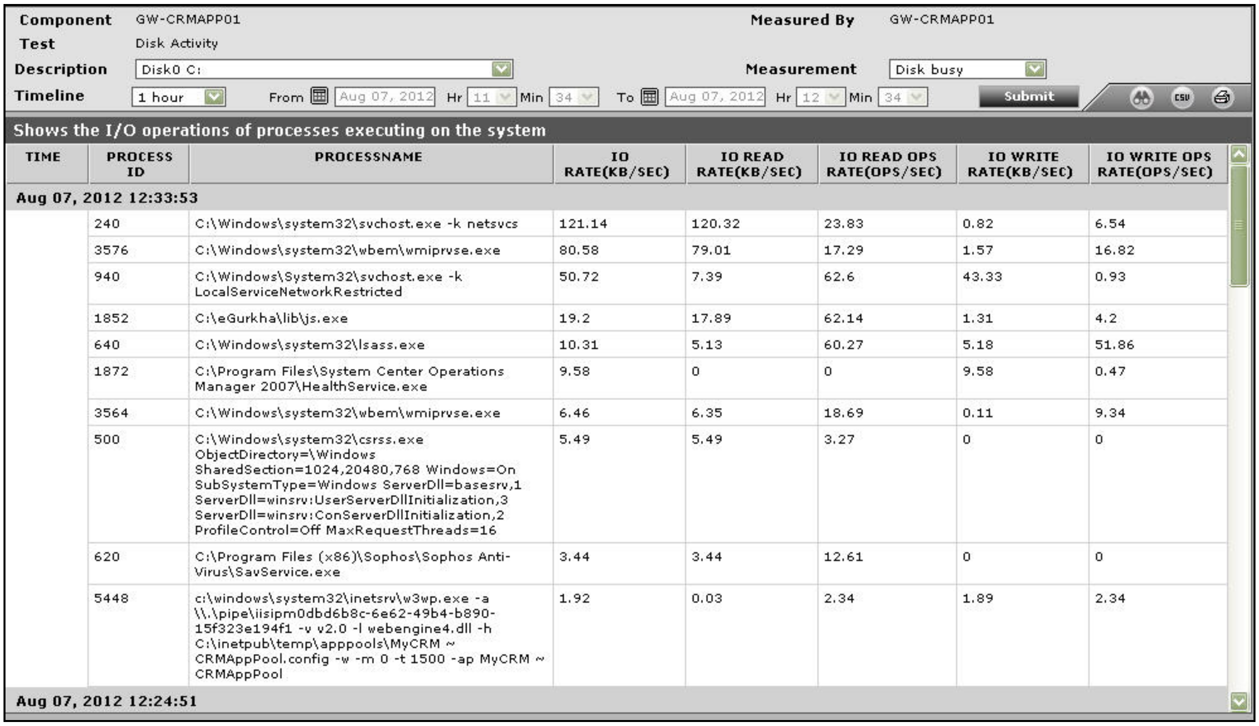
Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Disk busy:	Indicates the percentage of elapsed time during which the disk is busy processing requests (i.e., reads or writes).	Percent	Comparing the percentage of time that the different disks are busy, an administrator can determine whether the application load is properly balanced across the different disks. The detailed diagnosis of this measure will reveal the top-10 I/O-intensive processes executing on the host.
Disk busy due to reads:	Indicates the percentage of elapsed time that the selected disk drive is busy servicing read requests.	Percent	
Disk busy due to writes:	Indicates the percentage of elapsed time that the selected disk drive is busy servicing write requests.	Percent	
Disk read time:	Indicates the average time in seconds of a read of data from the disk.	Secs	
Disk write time:	Indicates the average time in seconds of a write of data from the disk.	Secs	
Avg queue length:	Indicates the average number of both read and write requests that were	Number	

Measurement	Description	Measurement Unit	Interpretation
	queued for the selected disk during the sample interval.		
Current disk queue length:	The number of requests outstanding on the disk at the time the performance data is collected.	Number	This measure includes requests in service at the time of the snapshot. This is an instantaneous length, not an average over the time interval. Multi-spindle disk devices can have multiple requests active at one time, but other concurrent requests are awaiting service. This counter might reflect a transitory high or low queue length, but if there is a sustained load on the disk drive, it is likely that this will be consistently high. Requests experience delays proportional to the length of this queue minus the number of spindles on the disks. This difference should average less than two for good performance.
Disk read rate:	Indicates the number of reads happening on a logical disk per second.	Reads/Sec	A dramatic increase in this value may be indicative of an I/O bottleneck on the server.
Data read rate from disk:	Indicates the rate at which bytes are transferred from the disk during read operations.	KB/Sec	A very high value indicates an I/O bottleneck on the server.
Disk write rate:	Indicates the number of writes happening on a local disk per second.	Writes/Sec	A dramatic increase in this value may be indicative of an I/O bottleneck on the server.
Data write rate to disk:	Indicates the rate at which bytes are transferred from the disk during write operations.	KB/Sec	A very high value indicates an I/O bottleneck on the server.
Disk service time:	Indicates the average time that this disk took to service each transfer	Secs	A sudden rise in the value of this measure can be attributed to a large amount of information being input or

Measurement	Description	Measurement Unit	Interpretation
	request (i.e., the average I/O operation time)		output. A consistent increase however, could indicate an I/O processing bottleneck.
Disk queue time:	Indicates the average time that transfer requests waited idly on queue for this disk.	Secs	Ideally, the value of this measure should be low.
Disk I/O time:	Indicates the avarage time taken for read and write operations of this disk.	Secs	The value of this measure is the sum of the values of the Disk service time and Disk queue time measures. A consistent increase in the value of this measure could indicate a latency in I/O processing.
Avg IO read size:	Indicates the average number of bytes transferred from disk during read operations.	KB	Larger I/Os tend to have higher latency (for example, BACKUP/RESTORE operations issue 1 MB transfers by default).
Avg IO write size:	Indicates the average number of bytes transferred into disk during write operations.	KB	
Split IO:	Reports the rate at which the operating system divides I/O requests to the disk into multiple requests.	Splits/Sec	A split I/O request might occur if the program requests data in a size that is too large to fit into a single request or if the disk is fragmented. Factors that influence the size of an I/O request can include application design, the file system, or drivers. A high rate of split I/O might not, in itself, represent a problem. However, on single-disk systems, a high rate for this counter tends to indicate disk fragmentation.

The detailed diagnosis of the *Disk busy* measure and the *Avg queue length* measure reveal the top-10 I/O-intensive processes executing on the target host.



Component GW-CRMAPP01

Measured By GW-CRMAPP01

Test Disk Activity

Description Disk0 C:

Measurement Disk busy

Timeline 1 hour From Aug 07, 2012 Hr 11 Min 34 To Aug 07, 2012 Hr 12 Min 34

Shows the I/O operations of processes executing on the system

TIME	PROCESS ID	PROCESSNAME	IO RATE(KB/SEC)	IO READ RATE(KB/SEC)	IO READ OPS RATE(OPS/SEC)	IO WRITE RATE(KB/SEC)	IO WRITE OPS RATE(OPS/SEC)
Aug 07, 2012 12:33:53							
	240	C:\Windows\system32\svchost.exe -k netsvcs	121.14	120.32	23.83	0.82	6.54
	3576	C:\Windows\system32\wbem\wmiprvse.exe	80.58	79.01	17.29	1.57	16.82
	940	C:\Windows\System32\svchost.exe -k LocalServiceNetworkRestricted	50.72	7.39	62.6	43.33	0.93
	1852	C:\eGurkha\lib\js.exe	19.2	17.89	62.14	1.31	4.2
	640	C:\Windows\system32\lsass.exe	10.31	5.13	60.27	5.18	51.86
	1872	C:\Program Files\System Center Operations Manager 2007\HealthService.exe	9.58	0	0	9.58	0.47
	3564	C:\Windows\system32\wbem\wmiprvse.exe	6.46	6.35	18.69	0.11	9.34
	500	C:\Windows\system32\csrss.exe ObjectDirectory=\Windows SharedSection=1024,20480,768 Windows=On SubSystemType=Windows ServerDll=basesrv,1 ServerDll=winsrv:UserServerDllInitialization,3 ServerDll=winsrv:ConServerDllInitialization,2 ProfileControl=Off MaxRequestThreads=16	5.49	5.49	3.27	0	0
	620	C:\Program Files (x86)\Sophos\Sophos Anti-Virus\SavService.exe	3.44	3.44	12.61	0	0
	5448	c:\windows\system32\inetsrv\w3wp.exe -a \\.\pipe\iisipm0dbd6b8c-6e62-49b4-b890-15f323e194f1 -v v2.0 -l webengine4.dll -h C:\inetpub\temp\apppools\MyCRM ~ CRMAppPool.config -w -m 0 -t 1500 -ap MyCRM ~ CRMAppPool	1.92	0.03	2.34	1.89	2.34
Aug 07, 2012 12:24:51							

Figure 4.4: The detailed diagnosis of the Disk Activity test

4.2.5 Memory Details Test

This test reports statistics pertaining to the memory utilization of target systems.

This test reports statistics pertaining to the memory utilization of target systems. The measures made by this test are as follows:

Target of the test : Any host system

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every server being monitored

1. **TEST PERIOD -** How often should the test be executed
2. **HOST -** The host for which the test is to be configured

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Free entries in system page table:	Indicates the number of page table entries not currently in use by the system.	Number	The maximum number of System PTEs that a server can have is set when the server boots. In heavily-used servers, you can run out of system PTEs. You can use the registry to increase the number of system PTEs, but that encroaches into the paged pool area, and you could run out of paged pool memory. Running out of either one is bad, and the goal should be to tune your server so that you run out of both at the exact same time. Typically, the value of this metric should be above 5000.
Pages read from disk:	Indicates the average number of times per second the disk was read to resolve hard fault paging.	Reads/Sec	
Pages written to disk:	Indicates the average number of times per second the pages are written to disk to free up the physical memory.	Writes/Sec	
Memory page ins:	Indicates the number of times per second that a process needed to access a piece of memory that was not in its working set, meaning that the system had to retrieve it from the page	Pages/Sec	

Measurement	Description	Measurement Unit	Interpretation
	file.		
Memory page outs:	Indicates the number of times per second the system decided to trim a process's working set by writing some memory to disk in order to free up physical memory for another process.	Pages/Sec	This value is a critical measure of the memory utilization on a server. If this value never increases, then there is sufficient memory in the system. Instantaneous spikes of this value are acceptable, but if the value itself starts to rise over time or with load, it implies that there is a memory shortage on the server.
Non- paged pool kernel memory size:	Indicates the total size of the kernel memory nonpaged pool.	MB	The kernel memory nonpage pool is an area of system memory (that is, physical memory used by the operating system) for kernel objects that cannot be written to disk, but must remain in physical memory as long as the objects are allocated. Typically, there should be no more than 100 MB of non-paged pool memory being used.
Memory paged pool size:	Indicates the total size of the Paged Pool.	MB	If the Paged Pool starts to run out of space (when it's 80% full by default), the system will automatically take some memory away from the System File Cache and give it to the PagedPool. This makes the System File Cache smaller. However, the system file cache is critical, and so it will never reach zero. Hence, a significant increase in the paged pool size is a problem. This metric is a useful indicator of memory leaks in a system. A memory leak occurs

Measurement	Description	Measurement Unit	Interpretation
			when the system allocates more memory to a process than the process gives back to thepool. Any time of process can cause a memory leak. If the amount of pagedpool data keeps increasing even though the workload on the server remains constant, it is an indicator of a memory leak.
Committed memory in use:	Indicates the committed bytes as a percentage of the Commit Limit.	Percent	Whenever this measure exceeds 80- 90%, application requests to allocate memory in the virtual memory (page file). This ratio can be reduced by increasing the Physical memory or the Page file.
Pool non- paged failures:	Indicates the number of times allocations have failed from non paged pool.	Number	Generally, a non- zero value indicates a shortage of physical memory.
Pool paged failures:	Indicates the number of times allocations have failed from paged pool.	Number	A non- zero value indicates a shortage of physical memory.
Copy read hits:	Indicates what percent of read I/O being served is coming from system cache, not disk.	Percentage	This is an important counter for applications like the Citrix Provisioning server that stream large volumes of data. If the RAM cache of the server is not sufficiently large, a lot of the I/O requests will be served from the disk, and not the system cache. This will reduce performance. Hence, it is critical to monitor this metric. The higher the value, the better the performance you can see

Measurement	Description	Measurement Unit	Interpretation
			from the server.
Copy reads:	Indicates how many hits you are really getting.	Reads/Sec	A copy read is a file read operation that is satisfied by a memory copy from a page in the cache to the application's buffer. The LAN redirector uses this method for retrieving information from the cache, as does the LAN server for small transfers. This method is also used by the disk file systems.

4.2.6 Page Files Test

When the load imposed by applications and services running on a server nears the amount of installed RAM, additional storage is necessary. The page file serves as the temporary store on disk for memory that cannot be accommodated in the physical RAM. Since it is frequently accessed for storing and retrieving data that is needed for virtual memory access by application, the location and sizing of the page files can have a critical impact on a server's performance. Ideally, the server operating system and the page file should be available on different drives for optimal performance. Splitting the page file across different drives can improve performance further. A rule of thumb in sizing the page file is to set the maximum size of the page file to 1.5 times the available RAM. While this works well for systems with smaller physical memory, for other systems, the optimal page file size has to be determined based on experience using the system and studying the typical workload.

This tracks the usage of each of the page files on a Windows server.

Target of the test : A Windows host only

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every page file on a Windows server

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. **REPORTTOTAL -** Set this flag to **Yes** if you want the test to report total page file usage - i.e., the aggregate usage across multiple page files. In this case therefore, a **Total** descriptor will newly appear for this test in the eG monitoring console.

4. **REPORTTOTALONLY -** If both the **REPORTTOTAL** and **REPORTTOTALONLY** flags are set to **Yes**, then the test will report only the aggregate usage across multiple page files - in other words, the test will report values for the **Total** descriptor only. Likewise, if the **REPORTTOTAL** flag is set to **No**, and the **REPORTTOTALONLY** flag is set to **Yes**, then again, the test will report current usage for the **Total** descriptor only. However, if both the **REPORTTOTAL** and **REPORTTOTALONLY** flags are set to **No**, then the test will report individual usages only. Also, if the **REPORTTOTAL** flag is set to **Yes** and the **REPORTTOTALONLY** flag is set to **No**, then both the individual and **Total** usages will be reported.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Current usage:	Indicates the current usage of a page file.	Percent	This metric should be less than 90%. If the page file does not have additional space, additional users/processes cannot be supported and system performance will suffer. To improve performance, consider resizing the page file. Microsoft Windows allows a minimum and maximum size of the page file to be specified. If the system has sufficient disk space, consider setting the page file to start out at the maximum size (by using the same value for the minimum and maximum sizes), so that system resources are not spent growing the page file size when there is a virtual memory shortage.

4.2.7 OS Details Test

This reports additional system-related metrics pertaining to the target system.

Target of the test : Any host

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every host monitored

Configurable parameters for this test

1. **TEST PERIOD -** How often should the test be executed
2. **HOST -** The host for which the test is to be configured.
3. **PROCESS LIMIT -** The **PROCESS LIMIT** determines what type of processes are to be included in the detailed diagnosis of the *Processes count* measure of this test. By default, 5 is the **PROCESS LIMIT**. This implies that the detailed diagnosis of the *Processes count* measure will by default list only those processes for which more than 5 instances are currently running on the target host. Processes with less than 5 currently active instances will not be displayed in the detailed diagnosis. This limit can be changed.
4. **EXCLUDE PROCESS** - If you want to exclude one/more processes from the detailed diagnosis of the *Processes count* measure, then specify a comma-separated list of processes to be excluded in the **EXCLUDE PROCESS** text box. By default, the *svchost* process is excluded from the detailed diagnosis of this test.
5. 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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Processes count:	Indicates the number of processes running on	Number	

Measurement	Description	Measurement Unit	Interpretation
	the system.		
Threads count:	Indicates the number of threads in the system.	Number	**This measure will be available only for Windows hosts**.
Registry quota in use:	Indicates the percentage of registry quota currently in use by the system.	Percent	If this measure begins to reach 100%, we need to increase the total registry size set in Control Panel/System's Virtual Memory tab. **This measure will be available only for Windows hosts**.
Context switches:	This value is the combined rate at which all processors on the computer are switched from one thread to another.	Switches/Sec	Context switches occur when a running thread voluntarily relinquishes the processor, is preempted by a higher priority ready thread, or switches between user- mode and privileged (kernel) mode to use an Executive or subsystem service. If the context switch rate is unusually high, it implies that there is excessive contention for CPU resources.
System calls rate:	This value is the combined rate of calls to operating system service routines by all processes running on the computer.	Calls/Sec	Operating system calls are used to perform all of the basic scheduling and synchronization of activities on the computer, and provide access to non- graphic devices, memory management, and name space management. Excessively high number of system calls can impact the performance of a system. Watch for processes that are issuing a large number of system calls. Applications corresponding to these processes could be

Measurement	Description	Measurement Unit	Interpretation
			candidates for performance optimizations. **This measure will be available only for Windows hosts**.
Pin read hits:	Indicates The percentage of pin read requests that hit the file system cache, i.e., did not require a disk read in order to provide access to the page in the file system cache.	Percent	While pinned, a page's physical address in the file system cache will not be altered. The LAN Redirector uses this method for retrieving data from the cache, as does the LAN Server for small transfers. This is usually the method used by the disk file systems as well. The pin read hits should be close to 100% for high performance. **This measure will be available only for Windows hosts**.
Pin read rate:	Indicates the frequency of reading data into the file system cache preparatory to writing the data back to disk.	Reads/Sec	Pages read in this fashion are pinned in memory at the completion of the read. While pinned, a page's physical address in the file system cache will not be altered. This measure will be available only for Windows hosts.
Interrupt time:	Indicates the percentage of time spent by the processor for receiving and servicing the hardware interrupts during the last polling interval.	Percent	This is an indirect indicator of the activity of devices that generate interrupts such as system Clocks, the mouse device drivers, data communication lines, network interface cards and other peripheral devices. In general, a very high value of this measure might indicate that a disk

Measurement	Description	Measurement Unit	Interpretation
			or network adapter needs upgrading or replacing. **This measure will be available only for Windows hosts**.

4.2.8 Handles Usage Test

This test monitors and tracks the handles opened by processes running in a target Windows system.

Target of the test : A Windows host

Agent deploying the test : An internal agent

Outputs of the test : One set of results for the Windows host being monitored

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. **HANDLES GROWTH LIMIT** – This defines the upper limit of the handles opened by any process. By default, this parameter is set to 8000.
4. **IGNORE PROCESSES IN DD** – The detailed diagnosis of the *Processes using handles above limit* measure reveals the top-10 processes that are using handles above the configured limit, the number of handles used by each process, and the break-up of the handle count by sub-handles (i.e., the count of file handles, disk handles, etc.). For processes that typically open thousands of handles, storing granular, sub-handle-level information pertaining to these handles may impose additional strain on the eG database. In such cases, you can reduce the strain on the eG database by configuring in the **IGNORE PROCESSES IN DD** text box, a comma-separated list of process names/process patterns for which *sub-handle-wise breakup* need not be collected and stored in the eG database. The default value in this text box is *ccSvcHst.exe*. This implies that, by default, the detailed diagnosis of the *Processes using handles above limit* measure will only provide the total number of open handles for *ccSvcHst.exe* process, but not the sub-handle-level information. If required, you can choose to exclude the sub-handle-wise breakup from the detailed diagnosis for more processes by including these process names/patterns as part of the **IGNORE PROCESSES IN DD** specification.

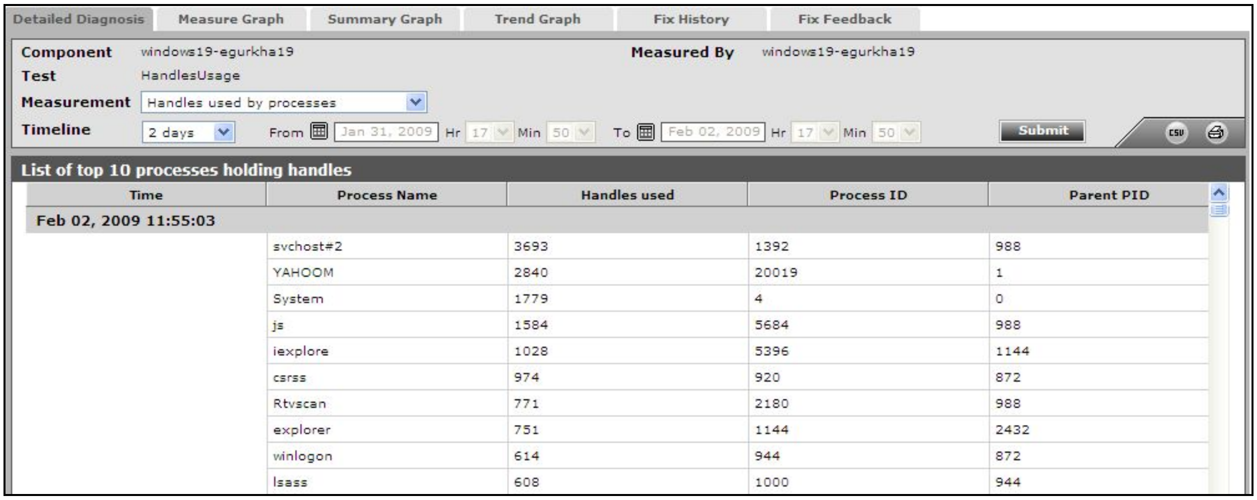
For instance, your specification can be: **ccSvcHst.exe*,*js.exe*,*java.exe*:*

6. **SHOW SUB HANDLES IN DD -** By default, this flag is set to **No** indicating that this test will not report sub-handle details as part of its detailed diagnostics, by default. This setting will help you to conserve space in the eG database. However, you can set this flag to **Yes** if you want to see the sub-handles opened by each of the top-10 processes in the detailed diagnosis.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Handles used by processes:	Indicates the number of handles opened by various processes running in a target Windows system in the last measurement period.	Number	Use the detailed diagnosis of this measure to determine the top-10 processes in terms of number of handles opened. This information brings to light those processes with too many open handles. By closely tracking the handle usage of these processes over time, you can identify potential handle leaks.
Processes using handles above limit:	Indicates the number of processes that have opened the handles on or above the value defined in the input parameter - **HANDLES GROWTH LIMIT**.	Number	Using the detailed diagnosis of this measure, you can accurately isolate the process (es) that has opened more handles than the permitted limit. A high value of this measure indicates that too many processes are opening handles excessively. You might want to closely observe the handle usage of these processes over time to figure out whether the spike in usage is sporadic or consistent. A consistent increase in handle usage could indicate a handle leak.

The detailed diagnosis of the *Handles used by processes* measure, if enabled, lists the names of top-10 processes in terms of handle usage, the number of handles each process uses, the process ID, and the ID of the parent process.



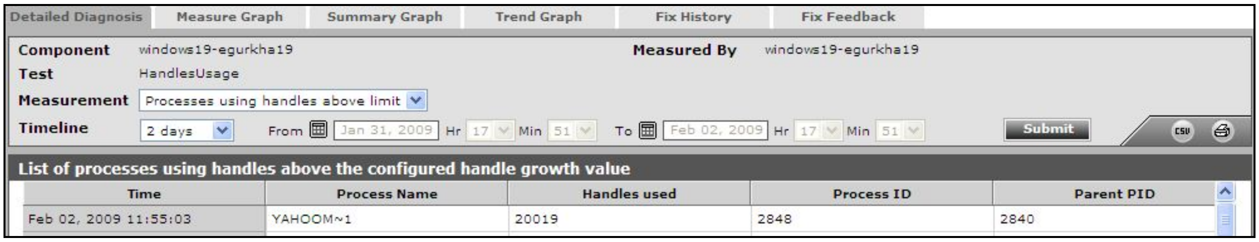
Component windows19-egurkha19 Measured By windows19-egurkha19
Test HandlesUsage
Measurement Handles used by processes
Timeline 2 days From Jan 31, 2009 Hr 17 Min 50 To Feb 02, 2009 Hr 17 Min 50

List of top 10 processes holding handles

Time	Process Name	Handles used	Process ID	Parent PID
Feb 02, 2009 11:55:03				
	svchost#2	3693	1392	988
	YAHOOM	2840	20019	1
	System	1779	4	0
	js	1584	5684	988
	iexplore	1028	5396	1144
	csrss	974	920	872
	Rtvscan	771	2180	988
	explorer	751	1144	2432
	winlogon	614	944	872
	lsass	608	1000	944

Figure 4.5: The detailed diagnosis of the Handles used by processes measure

The detailed diagnosis of the *Processes using handles above limit* measure, if enabled, lists the details of processes that are using more handles than the configured limit.



Component windows19-egurkha19 Measured By windows19-egurkha19
Test HandlesUsage
Measurement Processes using handles above limit
Timeline 2 days From Jan 31, 2009 Hr 17 Min 51 To Feb 02, 2009 Hr 17 Min 51

List of processes using handles above the configured handle growth value

Time	Process Name	Handles used	Process ID	Parent PID
Feb 02, 2009 11:55:03	YAHOOM~1	20019	2848	2840

Figure 4.6: The detailed diagnosis of the Processes using handles above limit measure

4.2.9 DNS Changes Test

This test alerts administrators to a change in the IP address of the DNS server.

Target of the test : A Windows host

Agent deploying the test : An internal agent

Outputs of the test : One set of results for the Windows host being monitored

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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Has DNS configuration changed?:	Indicates whether the IP address of the DNS server has changed.	Boolean	If the value of this measure is 1, it indicates that the IP address of the DNS server has changed; the value 0 indicates that the IP address has not changed.

4.2.10 Windows Disk Alignment Test

The Windows operating system writes data to disk in 64k chucks. However, Windows Server 2000, 2003 and Windows XP all incorrectly begin writing data at the 63rd sector. This means the first 1k of the chuck is written into one sector, and the remaining 63k in the next, and so on. The consequence of this behavior means that for every read and write, two sectors must be accessed from disk instead of one. This basically doubles your disk I/O. The additional I/O (especially if small) can impact system resources significantly.

Therefore, whenever a Windows host experiences a slowdown, you may want to check the disk alignment to determine whether the slowdown can be attributed to one/more unaligned disk partitions. This test enables you to perform such a check.

Target of the test : A Windows host

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each physical disk partition on the Windows host being monitored

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

Measurements made by the test

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td>Disk partition alignment status:</td><td>Indicates whether this disk partition is aligned or not.</td><td></td><td>If the partition is unaligned, this test reports the value Partition is not aligned. For an aligned partition, this test reports the value Partition is aligned.
The numeric values that correspond to the above- mentioned measure values are described in the table below:
<table><tr><th>Measure Value</th><th>Numeric Value</th></tr><tr><td>Partition is aligned</td><td>100</td></tr><tr><td>Partition is not aligned</td><td>0</td></tr></table>
<b>Note:</b>
By default, this measure reports one of the <b>Measure Value</b>s listed in the table above. The graph of this measure however will represent the disk alignment status using the numeric equivalents - 100 or 0.
If a partition is found to be misaligned, you can use the detailed diagnosis of this test to figure out the caption, device ID, logical partition name, and block size of the faulty partition.</td></tr>
</table>

4.2.11 Disk Users Quota Test

Disk quotas track and control disk space usage for NTFS volumes, allowing administrators to control the amount of data that each user can store on a specific NTFS volume. By using disk quotas, you can configure Microsoft Windows Server to do the following:

- Log an event when a user exceeds a specified disk space warning level. The warning level specifies the point at which a user is nearing the quota limit.
- Prevent further use of disk space or log an event when a user exceeds a specified disk space limit.

If the specified disk quota is violated by a user, it indicates that that user’s files are occupying a huge chunk of space on the disk partition, leaving very little disk space free for the files of other users. To prevent disk space contentions, administrators need to track disk space usage on a continuous basis and figure out which user on which partition is unnecessarily eroding the space on the partition. The **Disk Users Quota** test helps in this regard.

This test monitors how each user to a server is utilizing every disk partition on the server, promptly detects a quota violation, and instantly alerts administrators to the violation. This way, administrators can understand:

- Which disk is being utilized excessively?
- Which user is using that disk over the prescribed quota?
- Which limit has been exceeded – warning? or the hard limit?

Based on these findings, administrators can then investigate the reasons for excessive space usage by a particular user and employ measures to resolve the space crunch.

Note:

This test executes only on Windows 2008 servers and Microsoft File Servers (i.e., the *MS File server* component in eG) operating on Windows 2008 platform.

Target of the test : A Windows host

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each physical disk partition that is being used by each user to the target server

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.

Measurements made by the test

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td>Status:</td><td>Indicates whether/not the disk quota set for this user on this disk partition has been violated, and if so, which limit has been violated.</td><td></td><td>The values that this measure can report and their corresponding numeric values have been detailed below:
<table>
<tr><th>Measure Value</th><th>Description</th><th>Numeric Value</th></tr>
<tr><td>OK</td><td>The disk quota has not been exceeded</td><td>0</td></tr>
<tr><td>Warning</td><td>The warning limit of the disk quota has been exceeded</td><td>1</td></tr>
<tr><td>Exceeded</td><td>The hard limit of the disk quota has been exceeded</td><td>2</td></tr>
</table>
If the measure reports Warning or Exceeded, it is a cause for concern, as it indicates excessive utilization of the space in the disk partition by a specific user. You may then have to</td></tr>
</table>

Measurement	Description	Measurement Unit	Interpretation
			figure out why that particular user is using so much space. If required, you may have to allocate more space to the partition, delete unnecessary files from the partition to create more space, or fine-tune the disk quota to suit the workload of your environment. Note: By default, this measure reports one of the Measure Values listed in the table above. The graph of this measure however will represent the quota violation status using the numeric equivalents – 0 to 2.
Disk used:	Indicates the amount of disk space that is currently used by this user on this partition.	GB	By comparing the value of this measure across descriptors, you can figure out which user is making the most use of which disk partition.
Quota used:	Indicates the percentage of the quota set for this user on this partition that is currently in use.	Percent; but, if the value of this measure is No limit, then no unit of measurement will appear for this metric in the eG monitoring console.	This is calculated using the formula: *(Disk Used / Quota limit)*100* If the value of this measure is 100% or close to it, it indicates that a specific user is making abnormal use of the space on a particular disk partition. By comparing the value of this measure across descriptors, you can figure out which user is making the most use of which disk partition. To make sure that there is always enough space on the 'most- used'

Measurement	Description	Measurement Unit	Interpretation
			partition for the files of other users, you may have to allocate more space to the partition, delete unnecessary files from the partition to create more space, or fine-tune the disk quota to suit the workload of your environment. If the value of this measure is reported as -6, it indicates that no limit has been set. In such a situation therefore, this measure will display the value No limit.
Limit remaining:	Indicates the amount of disk quota that is yet o be used by this user on this disk partition.	GB; but, if the value of this measure is No limit, then no unit of measurement will appear for this metric in the eG monitoring console.	A high value is desired for this measure. If the value of this measure is reported as -6, it indicates that no limit has been set. In such a situation therefore, this measure will display the value No limit.
Quota Limit:	Indicates the disk quota specified for this user on this partition.	GB	
Warning level:	Indicates the disk space usage limit set for this disk partition when used by this user, beyond which an event will be logged in the event log warning	GB	

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td></td><td>administrators of an impending disk space crunch.</td><td></td><td></td></tr>
<tr><td>Is user over the warning limit?</td><td>Indicates whether/not the usage of this disk partition by this user has exceeded the specified ‘warning’ limit.</td><td></td><td>The values that this measure report and their corresponding numeric values have been listed in the table below:
<table>
<tr><th>Measure Value</th><th>Numeric Value</th></tr>
<tr><td>Yes</td><td>1</td></tr>
<tr><td>No</td><td>0</td></tr>
</table>
If the measure reports the value Yes, it is a cause for concern, as it indicates that the disk quota is about to be used up. You may then have to figure out why that particular user is using so much space. If required, you may have to allocate more space to the partition, delete unnecessary files from the partition to create more space, or fine-tune the disk quota to suit the workload of your environment.
Note:
By default, this measure reports one of the **Measure Value**s listed in the table above to indicate whether the warning limit has been violated or not. The graph of this measure however will represent the same using the numeric equivalents.</td></tr>
<tr><td>Is user over the hard limit?</td><td>Indicates whether/not the usage of this disk partition by this user</td><td></td><td>The values that this measure report and their corresponding numeric values have been listed in the table</td></tr>
</table>

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td></td><td>has exceeded the specified ‘hard’ limit.</td><td></td><td>below:
<table>
<tr><th>Measure Value</th><th>Numeric Value</th></tr>
<tr><td>Yes</td><td>1</td></tr>
<tr><td>No</td><td>0</td></tr>
</table>
If the measure reports the value <i>Yes</i>, it is a cause for concern, as it indicates that the disk quota is about to be used up. You may then have to figure out why that particular user is using so much space. If required, you may have to allocate more space to the partition, delete unnecessary files from the partition to create more space, or fine-tune the disk quota to suit the workload of your environment.
<b>Note:</b>
By default, this measure reports one of the Measure Values listed in the table above to indicate whether the hard limit has been violated or not. The graph of this measure however will represent the same using the numeric equivalents.</td></tr>
</table>

4.2.12 Crash Details Test

Event logs on Windows servers capture critical error conditions such as service crashes and application crashes on the servers, application and service hangs, and service errors. Since the crash/slowness experienced by any mission-critical program/service on a Windows server may affect the uptime of the dependent business services, administrators should be able to instantly capture these serious problem conditions, investigate the reasons for their occurrence, and promptly resolve them. This is exactly what the **Crash Details** test helps administrators achieve! This test periodically scans the event logs on a Windows server and reports the count of crashes, hangs, and errors that may have occurred recently on that server. Detailed diagnostics provided by this test pinpoints the applications/services that crashed, hanged, or encountered errors, and thus enables quick and efficient troubleshooting.

Note:

This test will not report metrics on Windows 2000/2003/XP systems.

Target of the test: A Windows host

Agent executing the test: An internal agent

Output of the test: One set of results for the Windows host being monitored.

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 at which the specified **HOST** listens. By default, this is NULL.
4. **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**.
5. 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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Recent application crashes:	Indicates the number of application crash events that occurred during the last measurement period.	Number	An event with the ID 1000 is logged in the event log every time a program terminates unexpectedly on a Windows server. This measure reports the number of events in the event log with event ID 1000. Use the detailed diagnosis of this measure to know which programs and modules stopped suddenly.
Recent service crashes:	Indicates the number of service crash events that occurred during the last measurement period.	Number	An event with the ID 7031 is logged in the Service Control Manager every time a service terminates ungracefully. This measure reports the number of events in the event log with event ID 7031. Use the detailed diagnosis of this measure to know the complete details of such events.
Recent application hangs:	Indicates the number of application hang events that occurredduring the last measurement period.	Number	An event with the ID 1002 is logged in the Application Event Log every time an application hangs. This measure reports the number of events in the event log with event ID 1002. Use the detailed diagnosis of this measure to know the complete details of the recent application hang events.
Recent service	Indicates the number of	Number	An event with the ID 7022 is

Measurement	Description	Measurement Unit	Interpretation
hangs	service hang events that occurred during the last measurement period.		logged in the Service Control Manager every time a service hangs. This measure reports the number of events in the event log with event ID 7022. Use the detailed diagnosis of this measure to know the complete details of the recent service hang events.
Recent service errors	Indicates the number of service errors that occurred during the last measurement period.	Number	Events with the ID 7023, 7024, and 7026 are logged in the Service Control Manager every time a service error occurs. This measure reports the number of events in the event log with the aforesaid event IDs. Use the detailed diagnosis of this measure to know the complete details of the recent service errors.

4.2.13 Windows Update Details Test

Microsoft regularly releases various Windows updates to enhance and protect a Windows system. These updates fix newly discovered security holes and bugs, add malware definitions to Windows Defender and Security Essentials utilities, strengthen Office security and add new features/enhancements to the system. By installing these updates regularly, you can keep your system highly secure, reliable and stable, and can maintain the performance of the system at peak. If the Windows system is not updated regularly, the critical bugs and security errors may increase vulnerabilities of the system. These vulnerabilities can be exploited by the malware or hackers, thus exposing your system to malicious attacks and degrading the system's performance. To avoid such eventualities, you should regularly check whether the system is up-to-date or not. This check can be easily done using the **Windows Update Details** test.

This test continuously monitors the Windows system and reports the current status of the Windows updates on the system. Besides, this test indicates whether any update is pending on the system and whether the system is rebooted or not. In the process, this test also reports the total number updates to be installed for the system and the number of Windows updates of different types at regular intervals.

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 *Microsoft Windows* as the desired **Component type**, set *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.

Target of the test : A Windows System

Agent deploying the test : An internal agent

Outputs of the test : One set of results for the Windows system being monitored.

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. **DD FOR TOTAL UPDATES** – In large environments where hundreds of Windows systems have been deployed, the frequent collection of detailed diagnosis information related to the update details of the systems may increase the processing overheads of the eG agent, and may even choke the eG database. To avoid this, by default, the **DD FOR TOTAL UPDATES** flag is set to **No** indicating that this test will not report the detailed diagnostics for the *Total Updates Available* measure. However, you can set this flag to **Yes** if you want to collect the detailed diagnostics of the *Total Updates Available* measure.
5. **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**.
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.

Measurements made by the test

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td>Are pending updates available?</td><td>Indicates whether/not the updates are pending.</td><td></td><td>The values that this measure can report and the numeric values they indicate have been listed in the table below:
<table><tr><th>Measure Value</th><th>Numeric Value</th></tr><tr><td>No</td><td>0</td></tr><tr><td>Yes</td><td>1</td></tr></table>
<b>Note:</b>
By default, this measure can report the <b>Measure Value</b>s mentioned above while indicating whether/not the updates are available. However, the graph of this measure is indicated using the numeric equivalents.</td></tr>
<tr><td>Is a system reboot pending?</td><td>Indicates whether the Windows system is rebooted or not.</td><td></td><td>The values that this measure can report and the numeric values they indicate have been listed in the table below:
<table><tr><th>Measure Value</th><th>Numeric Value</th></tr><tr><td>No</td><td>0</td></tr><tr><td>Yes</td><td>1</td></tr></table>
<b>Note:</b></td></tr>
</table>

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td></td><td></td><td></td><td>By default, this measure can report the <b>Measure Value</b>s mentioned above while indicating whether the system is rebooted or not. However, the graph of this measure is indicated using the numeric equivalents.</td></tr>
<tr><td>Windows update service status</td><td>Indicates the current status of the Windows update service.</td><td></td><td>The values that this measure can report and the numeric values they indicate have been listed in the table below:
<table>
<tr><th>Measure Value</th><th>Numeric Value</th></tr>
<tr><td>Unknown</td><td>0</td></tr>
<tr><td>Running</td><td>1</td></tr>
<tr><td>Start pending</td><td>2</td></tr>
<tr><td>Continue pending</td><td>3</td></tr>
<tr><td>Pause pending</td><td>4</td></tr>
<tr><td>Stop pending</td><td>5</td></tr>
<tr><td>Paused</td><td>6</td></tr>
<tr><td>Stopped</td><td>7</td></tr>
</table>
<b>Note:</b>
By default, this measure can report the <b>Measure Value</b>s mentioned above while indicating the current status of each Windows update service. However, the graph of this measure is indicated using the numeric equivalents.</td></tr>
<tr><td>Total updates available</td><td>Indicates the total number of Windows updates available for the system.</td><td>Number</td><td>The detailed diagnosis of this measure, if enabled, lists the Windows updates available for the system and the categories of the available updates.</td></tr>
<tr><td>Critical updates available</td><td>Indicates the number of critical updates available</td><td>Number</td><td>A critical update is a widely and frequently released update that deals</td></tr>
</table>

Measurement	Description	Measurement Unit	Interpretation
	for the system.		with the specific, non-security related, critical bugs. If these bugs are not fixed quickly, they can cause serious performance degradation, interoperability malfunction or disturb application compatibility.
Important updates available	Indicates the number of important updates available for the system.	Number	The important updates help fixing the vulnerabilities using which malware/hackers can exploit the system resources or steal data. This in tun may leave the confidentiality and integrity of the system defenseless and make the user data unavailable.
Moderate updates available	Indicates the number of moderate security updates available for the system.	Number	The moderate updates fix a vulnerability whose exploitation can be mitigated to a significant degree by default configuration, auditing, or difficulty of exploitation.
Low updates available	Indicates the number of low security updates available for the system.	Number	These updates fix the vulnerability whose exploitation is extremely difficult.
Optional updates available	Indicates the number of optional updates available for the system.	Number	An optional update includes Feature Pack and standard Updates, and does not have a severity rating.

4.2.14 Tests Disabled by Default

Besides the tests discussed above, the **Operating System** layer of a *Windows* server is mapped to a few tests that are disabled by default. Enabling these tests ensures that useful information is available to users. To enable the tests, go to the **ENABLE / DISABLE TESTS** page using the menu sequence : Agents -> Tests -> Enable/Disable, pick *Windows* as the **Component type**, set *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.

4.2.15 WMI Health Status Test

Windows Management Instrumentation (WMI) is a set of specifications from Microsoft for consolidating the management of devices and applications in a network from Windows computing systems. It runs as a service with the display name "Windows Management Instrumentation" and the service name "winmgmt".

WMI is also one of the mechanisms the eG agent uses to remotely access and monitor the health of Windows servers and Windows-based applications. If the WMI service is down or is corrupt, eG will not be able to run WMI scripts on the target Windows host/application and will hence not be able to collect performance statistics. Sometimes, the WMI service may be up and running, but the WMI script may not run for some reason. From a monitoring stand-point therefore, if eG is unable to pull metrics from a target Windows host, administrators may want to know the root-cause of the failure – is it because the WMI service is not running? or is it because the WMI script failed? This is exactly what the **WMI Health Status** test reveals!

The test emulates a WMI script execution on a target Windows host, and in the process, checks the status of the WMI service and of the script execution. This way, the test points eG users to the real reason why the eG agent was unable to pull metrics from a Windows target – is it the non-availability of the WMI service? Or is it the failure of the script?

Target of the test : A Windows host

Agent deploying the test : An internal/remote agent

Outputs of the test : One set of results for the Windows host being monitored

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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Script execution availability:	Indicates whether the script execution succeeded or failed.	Percent	If the value of this measure is 100, it implies that the script executed successfully. If this measure reports the value 0, it implies that the script execution failed.

Measurement	Description	Measurement Unit	Interpretation
WMI service availability:	Indicates whether/not the WMI service is up and running.	Percent	If the value of this measure is 100, it implies that the WMI service is up and running on the host. If this measure reports the value 0, it implies that the WMI service is down.

4.2.16 Windows Service Status Test

This test is specific to Microsoft Windows systems. This test discovers all the services that are configured for automatic startup on the system. Everytime the test executes, it checks if each of the automatic services is up or not. If a service is down and the maximum number of restart attempts has not been reached, then the test attempts to restart the service. Whether the service restarted successfully or not is reported as one of the measures of the test. If a service is down and the maximum number of restart attempts has been reached, the test takes no automatic action to restart the service.

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 the desired **Component type**, set *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.

Target of the test : Windows-based applications only

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every auto-discovered service

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. **RESTARTATTEMPTS -** Specify the maximum number of times the eG Enterprise system should try to restart an automatic service that has stopped. If attempts made to start the automatic service continue to fail beyond this prescribed limit, then eG will not perform any further restart attempts.
4. **REDISCOVER -** Specify the number of times the test is to be executed before the eG Enterprise

system runs a new discovery for services.

5. **RESTART** - If the automatic services stop, then eG can be configured to automatically restart the services by setting **RESTART** to **True**. To disable auto-restart, specify **False**.
6. **RESTARTCHECKPERIOD** - After a restart attempt, the eG agent will wait for a while and then verify whether the service has successfully restarted or not. In the **RESTARTCHECKPERIOD** text box, specify this waiting period.
7. **EXCLUDESVCS** - Some automatic services - for example, services that cannot be restarted automatically - can be excluded from monitoring by providing the service names in the **EXCLUDESVCS** text box, as a comma-separated list. For this specification, you can also use wild card patterns – for instance, _*Published*.*World Wide*_.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Service availability:	Indicates whether the service is currently running or not.	Percent	A value of 100 is reported if the service is running when this test executes. If the service is down, the test attempts to restart the service and once again checks the service status. If the service has been restarted, availability is reported as 100. On the other hand, if the service has failed to restart, availability is reported as 0.
Successful restart:	Indicates whether the stopped service has been successfully restarted or not.	Number	This measure is relevant only if the test execution has determined that the service has stopped. The value of 1 denotes that the service was successfully restarted by the test. Otherwise, this measure takes a value of 0.
Failed restarts:	Indicates the number of restarts that have failed.	Number	This measure has a value of 0 if the service does not have to be restarted by the test, or if a restart of the service by the test is successful.

Measurement	Description	Measurement Unit	Interpretation
			If a restart of the service by the test is not successful, this value is incremented by 1. If the value of this measure equals the **RESTARTATTEMPTS** parameter of the test, the eG agent stops attempting to restart the failed service.

4.2.17 Disk Fragmentation Test

In computing, file system fragmentation, sometimes called file system aging, is the inability of a file system to lay out related data sequentially (contiguously) This increases disk head movement or *seeks*, which are known to hinder throughput. File system fragmentation is projected to become more problematic with newer hardware due to the increasing disparity between sequential access speed and rotational latency (and to a lesser extent seek time), of consumer-grade hard disks, on which file systems are usually placed. Thus, fragmentation is an important problem in recent file system research and design.

The correction to existing fragmentation is to reorganize files and free space back into contiguous areas, a process called *defragmentation*. *Defragmentation* is the mechanism that physically reorganizes the contents of the disk in order to store the pieces of each file close together and in order (contiguously). It also attempts to create larger regions of free space using *compaction* to impede the return of fragmentation. Some defragmenters also try to keep smaller files within a single directory together, as they are often accessed in sequence.

This test determines the extent of fragmentation that has occurred on every disk partition/volume on a Windows host. This analysis is essential as it enables administrators to proactively decide whether it is time for **disk defragmentation** to be carried out or not and on which disk volumes.

This test is disabled by default.

Target of the test : A Windows host

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every disk volume on the monitored host

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

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Total fragmentation:	Indicates the percentage of this volume that has been fragmented.	Percent	Ideally, this value should be low. A high value is indicative of a highly fragmented volume. This could multiply the data access time and could cause inefficient usage of the storage space. Such situations necessitate defragmentation, which is sure to make reading and writing to the disk much faster. Preemptive techniques attempt to keep fragmentation at a minimum at the time data is being written on the disk. The simplest is appending data to an existing fragment in place where possible, instead of allocating new blocks to a new fragment. Many of today's file systems attempt to preallocate longer chunks, or chunks from different free space fragments, called extents to files that are actively appended to. This largely avoids file fragmentation when several files are concurrently being appended to, thus avoiding their becoming excessively intertwined.

Measurement	Description	Measurement Unit	Interpretation
			Retroactive techniques attempt to reduce fragmentation, or the negative effects of fragmentation, after it has occurred. Many file systems provide defragmentation tools, which attempt to reorder fragments of files, and sometimes also decrease their scattering (i.e. improve their contiguity, or locality of reference) by keeping either smaller files in directories, or directory trees, or even file sequences close to each other on the disk.
Average free space size:	Indicates the average size of the free space extents on this volume that has been fragmented.	MB	Free space fragmentation means that the empty space on a disk is broken into scattered parts rather than being collected in one big empty space. This type of fragmentation occurs when there are several unused areas of the file system where new files or metadata can be written to. Unwanted free space fragmentation is generally caused by deletion or truncation of files, but file systems may also intentionally insert fragments ("bubbles") of free space in order to facilitate extending nearby files Fragmented free space should ideally be low. A high value for these measures therefore, could cause data file creation and extension worries. Even an odd

Measurement	Description	Measurement Unit	Interpretation
			spike or two would hence necessitate defragmentation. **Note that the 'Average free space size' and the 'Free space count' measures will be available on Windows 2008 (or above) only**.
Free space fragmentation:	Indicates the percentage of free space on this volume that has been fragmented.	Percent	
Free space count:	Indicates the number of free space extents on this volume that has been fragmented.	Number	
Largest free space size:	Indicates the size of the largest free space extent on this volume that has been fragmented.	MB	**This measure is available only on Windows 2008 (or above)**.
File fragmentation:	Indicates the percentage of files that are fragmented on this volume.	Percent	Sometimes when you install a program or create a data file, the file ends up chopped up into chunks and stored in multiple locations on the disk - this is called file fragmentation. A high value of this measure indicates that there exists a severe dearth of sequential data on the volume. This makes data retrieval difficult and time-consuming. Only defragmentation can resolve such a situation. **This measure will not be reported on Windows 2008 (or above)**.

4.2.18 OS Cache Test

This test reveals whether or not the operating system's cache has been effectively utilized. This test is disabled by default.

Target of the test : A Windows host

Agent deploying the test : An internal agent

Outputs of the test : One set of qresults for every Windows host monitored

Configurable parameters for this test

1. **TEST PERIOD -** How often should the test be executed
2. **HOST -** The host for which the test is to be configured.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Copy read hits:	Indicates the percentage of cache copy read requests that hit the cache - i.e., they did not require a disk read in order to provide access to the page in the cache.	Percent	A copy read is a file read operation that is satisfied by a memory copy from a page in the cache to the application's buffer. The LAN Redirector uses this method for retrieving information from the cache, as does the LAN Server for small transfers. This is a method used by the disk file systems as well. Ideally, the value of this measure should be high. A very low value could indicate an increase in disk accesses and related processing overheads.
Copy reads:	Indicates the frequency of reads from pages of the file system cache that involve a memory copy of the data from the cache to the application's buffer.	Reads/Sec	The LAN Redirector uses this method for retrieving information from the file system cache, as does the LAN Server for small transfers. This is a method used by the disk file systems as well.
Data flushes:	Indicates the rate at which the file system	Flushes/Sec	

Measurement	Description	Measurement Unit	Interpretation
	cache has flushed its contents to disk as the result of a request to flush or to satisfy a write-through file write request. More than one page can be transferred on each flush operation.		
Data map hits:	Indicates the percentage of data maps in the file system cache that could be resolved without having to retrieve a page from the disk, because the page was already in physical memory.	Percent	A high value of this measure is desirable.
Data maps:	Indicates the frequency with which a file system such as NTFS, maps a page of a file into the file system cache to read the page.	Maps/Sec	
Fast reads:	Indicates the frequency of reads from the file system cache that bypass the installed file system and retrieve the data directly from the cache.	Reads/Sec	Normally, file I/O requests invoke the appropriate file system to retrieve data from a file, but this path permits direct retrieval of data from the cache without file system involvement if the data is in the cache. Even if the data is not in the cache, one invocation of the file system is avoided and processing overheads are reduced.
Lazy write flushes:	Indicates the rate at which the Lazy Writer	Flushes/Sec	Lazy Writing is the process of updating the disk after the page

Measurement	Description	Measurement Unit	Interpretation
	thread has written to disk.		has been changed in memory, so that the application that changed the file does not have to wait for the disk write to be complete before proceeding. More than one page can be transferred by each write operation.
Lazy write pages:	Indicates the rate at which the Lazy Writer thread has written to disk.	Pages/Sec	
MDL read hits:	Indicates the percentage of Memory Descriptor List (MDL) Read requests to the file system cache that hit the cache, i.e., did not require disk accesses in order to provide memory access to the page(s) in the cache.	Percent	Ideally, this percentage should be high.
MDL reads:	Indicates the frequency of reads from the file system cache that use a Memory Descriptor List (MDL) to access the data.	Reads/Sec	The MDL contains the physical address of each page involved in the transfer, and thus can employ a hardware Direct Memory Access (DMA) device to effect the copy. The LAN Server uses this method for large transfers out of the server.
Pin read hits:	Indicates the percentage of pin read requests that hit the file system cache, i.e., did not require a disk read in order to provide access to the page in the file system cache.	Percent	While pinned, a page's physical address in the file system cache will not be altered. The LAN Redirector uses this method for retrieving data from the cache, as does the LAN Server for small transfers. This is usually the method used by the disk file systems as well.
Read aheads:	Indicates the frequency	Reads/Sec	The read aheads permit the data to

Measurement	Description	Measurement Unit	Interpretation
	of reads from the file system cache in which the Cache detects sequential access to a file.		be transferred in larger blocks than those being requested by the application, reducing the overhead per access.

4.2.19 Windows Shares Test

This test periodically connects to remote Windows hosts in the target environment, verifies whether shared folders configured for monitoring exist on those hosts, and also reports whether/not configured users have at least 'read-only' access to those folders.

Target of the test : A Windows host

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every **SHARENAME** configured

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 at which the specified **HOST** listens. By default, this is NULL.
4. **SHARENAME -** To view/configure the shared folders for monitoring, the eG administrative interface embeds a special configuration page. To access this page, click on the ⚙ icon against the **SHARENAME** parameter in the test configuration page. In the Configuration of Windows Shares pop up window that appears next, specify the details as explained in the Section **4.2.19.1**.
5. **USE DIR** - By default, this test uses the net share command to report metrics. In some environments, the net share command may falsely alert you to the unavailability of a shared folder - i.e., it may report that a shared folder is unavailable, when in fact, it is available. In such environments therefore, you may want to use the **dir** command instead to report metrics. To use the **dir** command, set this flag to **Yes**. By default, this flag is set to **No**.

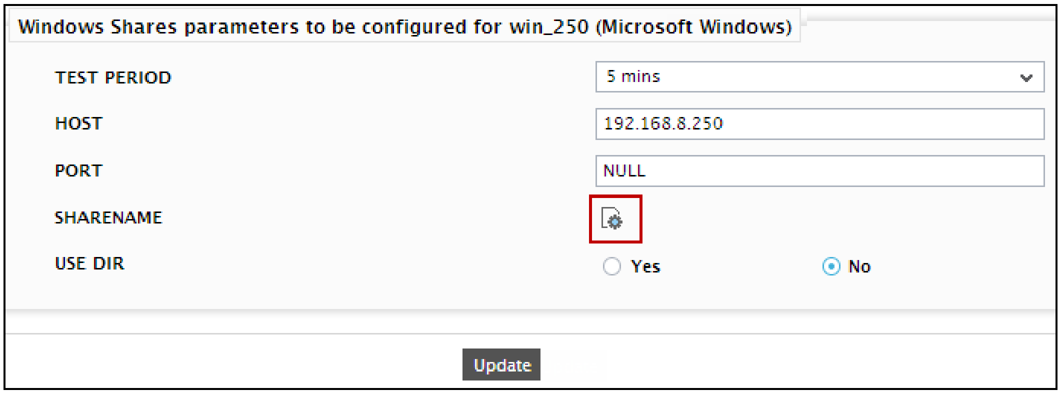
Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Is authentication of share folder successful?:	Indicates whether this shared folder exists or not.		The value 100 for this measure indicates that the share exists. If the measure reports the value 0, it indicates that the shared folder does not exist. If so, then the test attempts to create the share using the configured user credentials.
Is share folder accessible?:	Indicates whether/not the configured user has at least 'read-only' access to this shared folder.		If the shared folder exists (i.e., if the Share Authentication measure reports the value 100), then the value 100 for this measure indicates that the configured user can open the shared folder and read its contents. If the shared folder does not exist (i.e., if the Share Authentication measure reports the value 0), then the value 100 for this measure indicates that the configured user could create the shared folder. Likewise, if the shared folder exists (i.e., if the Share Authentication measure reports the value 100), then the value 0 for this measure indicates that the configured user does not have the right to access the folder. On the other hand, if the shared folder does not exist (i.e., if the Share Authentication measure reports the value 0), then the value 0 for this measure indicates that the configured user could not create the shared folder.

4.2.19.1 Configuring the Windows Shares

To configure the Windows share folders, do the following;

1. Click on the icon in the test configuration page as show in Figure 4.7.

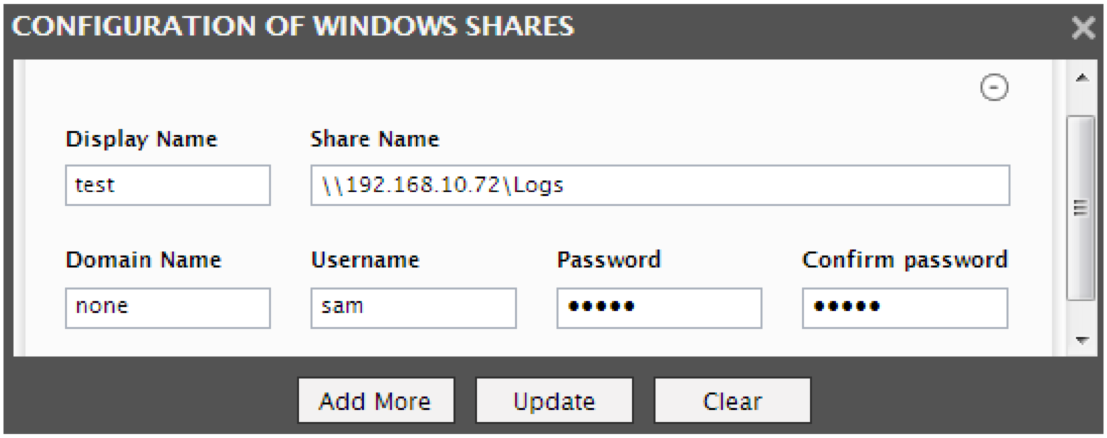


Windows Shares parameters to be configured for win_250 (Microsoft Windows)

TEST PERIOD	5 mins
HOST	192.168.8.250
PORT	NULL
SHARENAME	
USE DIR	○ Yes ● No

Figure 4.7: Configuring the Windows Shares test

2. Then, the Configuration of Window Shares pop up window appears as shown in Figure 4.8.



CONFIGURATION OF WINDOWS SHARES

Display Name	test
Share Name	\\192.168.10.72\Logs
Domain Name	none
Username	sam
Password	●●●●●
Confirm password	●●●●●

Figure 4.8: Configuring the Windows shares

3. Next, specify the following in Figure 4.8;

- **Display name :** Provide the display name of the shared folder to be monitored in the Display Name text box. This Display Name will appear as the descriptor of the test.
- **Share Name :** Specify the exact path to the shared folder in the Share Name text box. For instance, the Share Name can be: \\192.168.10.72\Logs.
- **Domain Name :** In this text box, specify the name of the domain to which the user specified in the Username text box belongs to. If the user does not belong to any domain, then specify none in the Domain name text box.

- **User Name** and **Password** : Specify the credentials of the user who is authorized to access the configured shared folder, in the Username and Password text boxes.
- **Confirm Password** : Confirm the password by retyping it in the Confirm Password text box.

Finally , click on the **Update** button to configure the shared folder. This will lead you back to the test configuration page. To configure more shared folders, click on the **Add more** button and specify the details as explained above. Use the **Clear** button to clear all the shared folder configurations. To remove the any one of the share folder specification, use the encircled minus button in the top right-corner.

4.2.20 Windows Scheduled Tasks Test

The **Task Scheduler** on Windows systems enables you to automatically perform routine tasks - eg., starting an application, sending an email, or showing a message box - on a chosen computer. Tasks can be scheduled to execute:

- When a specific system event occurs.
- At a specific time.
- At a specific time on a daily schedule.
- At a specific time on a weekly schedule.
- At a specific time on a monthly schedule.
- At a specific time on a monthly day-of-week schedule.
- When the computer enters an idle state.
- When the task is registered.
- When the system is booted.
- When a user logs on.
- When a Terminal Server session changes state.

Administrators need to continuously track the status of tasks so scheduled, so that they can always tell which tasks are running as per schedule and which scheduled tasks have failed. The **Windows Scheduled Tasks** test helps in this regard. This test monitors pre-configured tasks at periodic intervals and reports the count of tasks in various stages of progress. To determine which tasks are in what state currently, use the detailed diagnosis of the test.

Target of the test : A Windows host

Agent deploying the test : An internal/remote agent

Outputs of the test : One set of results for the Windows system being monitored

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 at which the specified **HOST** listens
4. **TASKLIST -** By default, *all* is displayed here indicating that the test monitors all scheduled tasks by default. You can override this default setting by providing a comma-separated list of tasks to be monitored. **Note that the task name specified here should be exactly the same as that which is displayed in the 'Scheduled Tasks' window that appears when the 'Scheduled Tasks' option in the Control Panel is clicked.**
5. **EXCLUDE FOLDER** – If this test is being configured for a **Windows 2008 system**, then you can exclude all scheduled tasks that reside in specific folders from the monitoring purview of this test. For this , provide a comma-separated list of folders to be excluded in this text box. For instance, *\Microsoft,*\Windows*,*\WPD,*\Windows Defender*. By default, this parameter is *none*.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Running tasks:	Indicates the number of tasks that are currently running.	Number	
Succeeded tasks:	Indicates the number of tasks that are not running currently, but ran successfully during its last scheduled execution.	Number	Use the detailed diagnosis of this measure to know which tasks have succeeded.
Failed tasks:	Indicates the number of tasks that failed currently.	Number	A task is said to have failed when the most recent attempt to start the task did not work. Use the detailed diagnosis of this measure to view the failed tasks.
Disabled tasks:	Indicates the number of	Number	If one or more attempts to run a

Measurement	Description	Measurement Unit	Interpretation
	tasks that are currently disabled.		task was missed, then such a task is counted as a disabled task. Tasks that have been explicitly disabled by a user will also be included in the disabled tasks count.
Unknown tasks:	Indicates the number of tasks that could not be identified.	Number	Use the detailed diagnosis of this measure to determine the unknown tasks.
Queued tasks:	Indicates the number of tasks in queue currently.	Number	

4.2.20.1 Domain Time Sync Test

NTP is a fault-tolerant, highly scalable time protocol and it is used for synchronizing computer clocks by using a designated reference clock. A reference clock is some device or machinery that spits out the current time. The special thing about these things is accuracy. Reference clocks must be accurately following some time standard. NTP will compute some additional statistical values based on the current time reported by the reference clock, which will describe the quality of time it sees. Among these values are: offset (or phase), jitter (or dispersion), frequency error, and stability. Thus each NTP server will maintain an estimate of the quality of its reference clocks and of itself.

This test reports the time difference between the reference clock and that of the target environment, and thus helps assess the quality of time seen by the windows server. With the help of this test, you can also easily determine whether the reference time changed recently.

Target of the test : A Windows/Unix host

Agent deploying the test : An internal agent

Outputs of the test : One set of results for the host being monitored

Configurable parameters for the tests

1. **TEST PERIOD -** How often should the test be executed
2. **HOST -** The host for which the test is to be configured.

3. NTP SERVER - **This parameter is applicable only if the target server is a Windows server.** By default, this parameter is set to *none* indicating that the default designated reference clock would be used to synchronize the server clock. In Microsoft Windows, the Windows Time service automatically synchronizes your computer's internal clock with other clocks in the network. The time source for this synchronization varies, depending on whether the computer is joined to an Active Directory domain or to a workgroup. If the computers belong to an Active Directory domain, the Windows Time service configures itself automatically by using the Windows Time service that is available on domain controllers. The Windows Time service configures a domain controller in its domain as a reliable time source and synchronizes itself periodically with this source. This is why, if the Windows server being monitored is part of a domain, you need not disturb the default setting none of this parameter.

   When the computers are part of a workgroup on the other hand, you must manually configure the time synchronization settings. You must identify a computer as a locally reliable time source by configuring the Windows Time service on that computer to use a known accurate time source, either by using special hardware or by using a time source that is available on the Internet. You can configure all other workgroup computers manually to synchronize their time with this local time source. This is why, if the Windows server being monitored is part of a workgroup, you will have to manually specify the hostname or the IP address of the computer that should be used as the local time source, against this parameter.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
NTP offset:	Indicates the time difference between the local clock and the designated reference clock.	Secs	For a tiny offset, NTP will adjust the local clock; for small and larger offsets, NTP will reject the reference time for a while. In the latter case, the operating system's clock will continue with the last corrections effective while the new reference time is being rejected. After some time, small offsets (significantly less than a second) will be slewed (adjusted slowly), while larger offsets will cause the clock to be stepped (set anew).

Measurement	Description	Measurement Unit	Interpretation
			Huge offsets are rejected, and NTP will terminate itself, believing something very strange must have happened.

4.2.21 Data Deduplication Volumes Test

Once the Data Deduplication feature is enabled for a volume, the Data Deduplication engine can potentially process all of the data on the selected volume (except a file size less than 32 KB, files in folders that are excluded, or files that have age settings applied). The deduplication engine involves finding and removing duplication within volume data without compromising its fidelity or integrity. After the volume is enabled for deduplication and the data is optimized, the volume contains the following:

- **Unoptimized files** - For example, unoptimized files could include files that do not meet the selected file-age policy setting, system state files, alternate data streams, encrypted files, files with extended attributes, files smaller than 32 KB, other reparse point files, or files in use by other applications (the “in use” limit is removed in Windows Server 2012 R2).
- **Optimized files** - Files that are stored as reparse points that contain pointers to a map of the respective chunks in the chunk store that are needed to restore the file when it is requested.
- **Chunk store** - Location for the optimized file data.
- **Additional free space** - The optimized files and chunk store occupy much less space than they did prior to optimization.

Using this test, administrators can find out the statistics related to the above-said files. This test reveals the space utilization on each volume and the size of the optimized files, datastores and chunks.

This test is disabled by default. To enable the test, select the **ENABLE / DISABLE** option from the **Tests** menu of the **Agents** tile in the **Admin** tile menu. Select *Microsoft Windows* as the **Component type**, and pick *Performance* as the **Test type**. From the list of **DISABLED TESTS**, pick this test and click the **<** button to enable it. Finally, click **Update**.

Target of the test : A Windows host

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each deduplication volume on the target host.

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 -** Refers to the port used by the specified **HOST**. Here it is NULL.
4. **DOMAIN -** Specify the name of the Windows domain to which the target host belongs.
5. **USERNAME -** Here, enter the name of a valid domain user with login rights to the target host.
6. **PASSWORD -** Provide the password of the above-mentioned user in this text box.
7. **CONFIRM PASSWORD -** Confirm the password by retyping it here.
8. **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.
9. **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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Capacity	Indicates the total capacity of this volume.	GB	
Free space	Indicates the amount of space available for use on this volume.	GB	A high value is desired for this measure.
Used space	Indicates the amount of	GB	

Measurement	Description	Measurement Unit	Interpretation
	space utilized on this volume.		
Unoptimized space	Indicates the total logical size of all (optimized and non-optimized) files on this volume.	GB	
Saved space	Indicates the difference between the logical size of the optimized files and the logical size of the chunk store (i.e. the sum of the deduplicated user data and deduplication metadata).	GB	
Saving rate	Indicates the percentage of deduplication saved space on this volume.	Percent	
Optimized files	Indicates the number of the optimized files on this volume.	Number	
Optimized files size	Indicates the total size of the all optimized files on this volume.	GB	
Optimized file saving rate	Indicates the percentage of space utilized for saving the optimized files on this volume.	Percent	
In-policy files	Indicates the number of files that are currently qualifies for optimization.	Number	
In-policy files size	Indicates the total size of files that are currently qualifies for optimization.	GB	
Last optimization result	Indicates the result of an optimization job that was run last on this volume.		The values that this measure can report and their corresponding numeric values are discussed in the table above:

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td></td><td></td><td></td><td><table><tr><th>Measure Value</th><th>Numeric Value</th></tr><tr><td>Success</td><td>0</td></tr><tr><td>Failure</td><td>1</td></tr></table>
<b>Note:</b>
By default, this measure reports the <b>Measure Value</b>s listed in the table above. In the graph of this measure however, the value of this measure is represented using their numeric equivalents only.</td></tr>
<tr><td>Last garbage collection result</td><td>Indicates the result of an garbage collection job that was run last on this volume.</td><td></td><td>The values that this measure can report and their corresponding numeric values are discussed in the table above:<table><tr><th>Measure Value</th><th>Numeric Value</th></tr><tr><td>Success</td><td>0</td></tr><tr><td>Failure</td><td>1</td></tr></table>
<b>Note:</b>
By default, this measure reports the <b>Measure Value</b>s listed in the table above. In the graph of this measure however, the value of this measure is represented using their numeric equivalents only.</td></tr>
<tr><td>Last scrubbing result</td><td>Indicates the result of an scrubbing job that was run last on this volume.</td><td></td><td>The values that this measure can report and their corresponding numeric values are discussed in the table above:</td></tr>
</table>

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td></td><td></td><td></td><td><table><tr><th>Measure Value</th><th>Numeric Value</th></tr><tr><td>Success</td><td>0</td></tr><tr><td>Failure</td><td>1</td></tr></table><p><b>Note:</b></p><p>By default, this measure reports the <b>Measure Value</b>s listed in the table above. In the graph of this measure however, the value of this measure is represented using their numeric equivalents only.</p></td></tr>
<tr><td>Usage type</td><td>Indicates the type of data to be stored in this volume.</td><td></td><td><p>The values that this measure can report and their corresponding numeric values are discussed in the table above:</p><table><tr><th>Measure Value</th><th>Numeric Value</th></tr><tr><td>Default</td><td>1</td></tr><tr><td>HyperV</td><td>2</td></tr><tr><td>Backup</td><td>3</td></tr></table><p><b>Note:</b></p><p>By default, this measure reports the <b>Measure Value</b>s listed in the table above. In the graph of this measure however, the value of this measure is represented using their numeric equivalents only.</p></td></tr>
<tr><td>Minimum file age</td><td>Indicates the minimum number of days since users have accessed a file before the deduplication engine optimizes the file</td><td>Number</td><td></td></tr>
<tr><td>Minimum files size</td><td>Specifies the minimum</td><td>GB</td><td>The deduplication engine optimizes the</td></tr>
</table>

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td></td><td>size threshold for files that are to be optimized.</td><td></td><td>files that meet the minimum size threshold.</td></tr>
<tr><td>Is data compressed after deduplication?</td><td>Indicates whether/not the data is compressed after deduplication on this volume.</td><td></td><td>The values that this measure can report and their corresponding numeric values are discussed in the table above:
<table><tr><th>Measure Value</th><th>Numeric Value</th></tr><tr><td>No</td><td>0</td></tr><tr><td>Yes</td><td>1</td></tr></table>
<b>Note:</b>
By default, this measure reports the <b>Measure Value</b>s listed in the table above. In the graph of this measure however, the value of this measure is represented using their numeric equivalents only.</td></tr>
<tr><td>Chunk redundancy threshold</td><td>Indicates the chunk redundancy threshold set for this volume.</td><td></td><td>This measure specifies that if the data deduplication engine discovers 50 chunks of identical data, it makes one redundant copy as a safeguard.</td></tr>
<tr><td>Is byte-by-byte verification performed?</td><td>Indicates whether/not byte-by-byte verification is performed for each duplicated chunk.</td><td></td><td>The values that this measure can report and their corresponding numeric values are discussed in the table above:
<table><tr><th>Measure Value</th><th>Numeric Value</th></tr><tr><td>No</td><td>0</td></tr><tr><td>Yes</td><td>1</td></tr></table>
<b>Note:</b>
By default, this measure reports the <b>Measure Value</b>s listed in the table above. In the graph of this measure</td></tr>
</table>

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td></td><td></td><td></td><td>however, the value of this measure is represented using their numeric equivalents only.</td></tr>
<tr><td>Are files in use optimized?</td><td>Indicates whether the files in this volume are optimized or not.</td><td></td><td>The values that this measure can report and their corresponding numeric values are discussed in the table above:
<table><tr><th>Measure Value</th><th>Numeric Value</th></tr><tr><td>No</td><td>0</td></tr><tr><td>Yes</td><td>1</td></tr></table>
<b>Note:</b>
By default, this measure reports the <b>Measure Value</b>s listed in the table above. In the graph of this measure however, the value of this measure is represented using their numeric equivalents only.</td></tr>
<tr><td>Are files partially optimized?</td><td>Indicates whether the files in this volume are partially optimized.</td><td></td><td>The values that this measure can report and their corresponding numeric values are discussed in the table above:
<table><tr><th>Measure Value</th><th>Numeric Value</th></tr><tr><td>No</td><td>0</td></tr><tr><td>Yes</td><td>1</td></tr></table>
<b>Note:</b>
By default, this measure reports the <b>Measure Value</b>s listed in the table above. In the graph of this measure however, the value of this measure is represented using their numeric equivalents only.</td></tr>
</table>

Measurement	Description	Measurement Unit	Interpretation
Data chunks	Indicates the number of data chunks in a container.	Number	
Data containers	Indicates the number of containers in the data store.	Number	
Average data chunk size	Indicates the average size of data chunk in the data store.	GB	
Data chunk median size	Indicates the number of data streams in a container.	GB	
Data store uncompacted freespace	Indicates the amount of uncompacted space that is available for use on this volume.	GB	
Stream map chunks	Indicates the number of stream map chunks in a container.	Number	
Stream map containers	Indicates the number of containers in the stream map store.	Number	
Average stream map chunks	Indicates the stream map store size divided by the total number of streams in the store.	GB	
Median stream map chunks	Indicates the number of median stream chunks stored in this volume.	Number	
Maximum stream map chunks	Indicates the maximum number of stream map chunks that can be stored in this volume.	Number	
Hotspot chunks	Indicates the number of hotspots in a container.	Number	
Hotspot containers	Indicates the number of	Number	

Measurement	Description	Measurement Unit	Interpretation
	hotspots containers in the stream map store.		
Median hotspot references	Indicates the number of median hotspot references.	Number	
Corruption log entries	Indicates the number of log entries on data corruptions on this volume.	Number	Some of the most common causes for deduplication to report corruption are: • Incompatible Robocopy options used when copying data • Incompatible Backup/Restore program used on a dedup volume • Migrating a deduplicated volume to a down-level Windows Server version • Enabling compression on volume roots also enabled with deduplication • Hardware issues • File System corruption Ideally, a low value is desired for this measure. A sudden/gradul increase in the value of this measure indicates decrease in data integrity of the volume.
Total chunk store size	Indicates total chunk store size on this volume.	GB	The chunk store is an organized series of container files in the System Volume Information folder that Data Deduplication uses to uniquely store chunks.

4.2.22 Data Deduplication Jobs Test

Data deduplication works by finding portions of files that are identical and storing just a single copy of the duplicated data on the disk. The technology required to find and isolate duplicated portions of files on a large disk is pretty complicated. Microsoft uses an algorithm called chunking, which scans data on the disk and breaks it into chunks whose average size is 64KB. These chunks are stored on disk in a hidden folder called the chunk store. Then, the actual files on the disk contain pointers to individual chunks in the chunk store. If two or more files contain identical chunks, only a single copy of the chunk is placed in the chunk store and the files that share the chunk all point to the same chunk.

Microsoft has tuned the chunking algorithm sufficiently that in most cases, users will have no idea that their data has been deduplicated. Access to the data is as fast as if the data were not deduplicated. For performance reasons, data is not automatically deduplicated as it is written. Instead, regularly scheduled deduplication jobs scan the disk, applying the chunking algorithm to find chunks that can be deduplicated. Data deduplication works through the following jobs:

Job Name	Description
Optimization	The Optimization job deduplicates by chunking data on a volume per the volume policy settings, (optionally) compressing those chunks, and storing chunks uniquely in the chunk store.
Garbage Collection	The Garbage Collection job reclaims disk space by removing unnecessary chunks that are no longer being referenced by files that have been recently modified or deleted.
Integrity Scrubbing	The Integrity Scrubbing job identifies corruption in the chunk store due to disk failures or bad sectors. When possible, Data Deduplication can automatically use volume features (such as mirror or parity on a Storage Spaces volume) to reconstruct the corrupted data. Additionally, Data Deduplication keeps backup copies of popular chunks when they are referenced more than 100 times in an area called the hotspot.
Unoptimization	The Unoptimization job, which is a special job that should only be run manually, undoes the optimization done by deduplication and disables Data Deduplication for that volume.

Data Deduplication uses a post-processing strategy to optimize and maintain a volume's space efficiency so it is important that Data Deduplication jobs are successfully completed without any delay. If, for any reason, the Data Deduplication jobs are not completed quickly, it will result in an overload condition due to long-winding job queues. This in turn will cause slowdown on the target host. In the event of such abnormalities, administrators will have to instantly figure out the count of jobs that are being queued. The **Data Deduplication Jobs** test helps administrators in this regard!

This test monitors the jobs on the target host, and reports the number of jobs that are currently running and the number of jobs that are in queue. Using these metrics, administrators can instantly know the current workload on the host as well as the overload condition (if any).

This test is disabled by default. To enable the test, select the **ENABLE / DISABLE** option from the **Tests** menu of the **Agents** tile in the **Admin** tile menu. Select *Microsoft Windows* as the **Component type**, and pick *Performance* as the **Test type**. From the list of **DISABLED TESTS**, pick this test and click the **<** button to enable it. Finally, click **Update**.

Target of the test : A Windows host

Agent deploying the test : An internal agent

Outputs of the test : One set of results for the target host being monitored.

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 -** Refers to the port used by the specified **HOST**. Here it is NULL.
4. **DOMAIN -** Specify the name of the Windows domain to which the target host belongs.
5. **USERNAME -** Here, enter the name of a valid domain user with login rights to the target host.
6. **PASSWORD -** Provide the password of the above-mentioned user in this text box.
7. **CONFIRM PASSWORD -** Confirm the password by retyping it here.
8. **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.
9. **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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Running jobs	Indicates the number of jobs that are currently running on the target host.	Number	This measure is a good indicator of the workload on the target host.
Queued jobs	Indicates the number of jobs that are currently in queue.	Number	

4.3 The Network Layer

The **Network** layer handles connectivity of the host system to the network, and includes packet traffic transmitted to and from the server. Like the *Generic* server, the **Network** layer of the *Windows Generic* server also executes a **Network** and a **NetworkTraffic** test. In addition to these two tests, an exclusive **WindowsNetworkTraffic** test (see Figure 4.9) is mapped to the *Windows Generic* server.

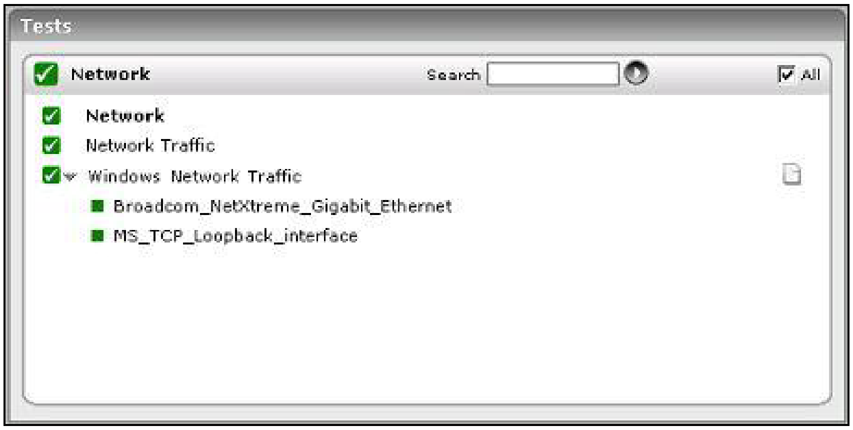

Tests
☑ Network
Search
☑ All
☑ Network
☑ Network Traffic
☑ Windows Network Traffic
Broadcom_NetXtreme_Gigabit_Ethernet
MS_TCP_Loopback_interface

Figure 4.9: Tests associated with the Network layer of a Windows Generic server

4.3.1 Windows Network Traffic Test

This is an internal test that monitors the incoming and outgoing traffic through a Microsoft Windows server.

Target of the test : A Windows host

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every network interface of the target host.

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. **EXCLUDE -** Provide the network interfaces to be excluded from monitoring, as a comma-separated list.
4. **IS FULL DUPLEX -** By default, this flag is set to **Yes**, indicating that the incoming and outgoing data traffic is handled in full duplex mode. This means that the network interfaces are sending and receiving data at the same time. If the data traffic in your environment is handled in half-duplex mode, set this flag to **No**. This means that the network interfaces are not sending and receiving data at the same time; in essence, it is a one-way conversation. In this case, the test halves the value of the *Incoming traffic* and *Outgoing traffic* measures.
5. **REPORT BY CONNECTION ID -** By default, this flag is set to **No**. This implies that by default, the network interfaces are identified using their names. On the other hand, if you want the test to identify the network interfaces using their connection IDs instead of the names, then set this flag to **Yes**. Then, the test will identify the network interfaces using the connection IDs and report metrics for every connection ID.
6. **SHOW TOP -** By default, this parameter is set to 10 indicating that the test will report detailed diagnosis only for the top -10 applications that used maximum bandwidth while transferring data over every network interface. Using the information displayed by the detailed diagnosis, you can easily find out the non-critical applications (if any) that are using more bandwidth than the business critical applications and take necessary steps to alleviate the issue. However, you can increase or decrease the value of the Show Top parameter depending upon the level of visibility you require.
7. **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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Incoming traffic:	Indicates the rate at which data (including framing characters) is received on a network interface.	Mbps	An abnormally high rate of incoming traffic may require additional analysis. For a managed Hyper-V or Hyper-V VDI component, the Windows Network Traffic test reports metrics for an additional Total descriptor. For this descriptor, this measure will reveal the rate of incoming data traffic on all network interfaces supported by the Hyper-V or Hyper-V VDI host. Incoming_ traffic=Format:Application_name Pid Remote_ address Incoming_ traffic_ (Mbits/sec) Outgoing_ traffic_ (Mbits/sec)
Outgoing traffic:	Represents the rate at which data (including framing characters) is sent on a network interface.	Mbps	An abnormally high rate of outgoing traffic may require additional analysis. For a managed Hyper-V or Hyper-V VDI component, the Windows Network Traffic test reports metrics for an additional Total descriptor. For this descriptor, this measure will reveal the rate of outgoing data traffic on all network interfaces supported by the Hyper-V or

Measurement	Description	Measurement Unit	Interpretation
			Hyper-V VDI host. Application_ name,Pid,Remote_ address,Incoming_ traffic,Outgoing_ traffic,Total_traffic
Max bandwidth:	An estimate of the capacity of a network interface.	Mbps	**This measure will not be reported for the 'Total' descriptor of this test**.
Bandwidth usage:	Indicates the percentage of bandwidth used by this network interface.	Percent	By comparing the bandwidth usage with the maximum bandwidth of an interface, an administrator can determine times when the network interface is overloaded or is being a performance bottleneck. For a managed Hyper-V or Hyper-V VDI component, the Windows Network Traffic test reports metrics for an additional Total descriptor. For this descriptor, this measure will reveal the total bandwidth used by the target Hyper-V or Hyper-V VDI host across all its network interfaces.
Output queue length:	Indicates the length of the output packet queue (in packets).	Number	If this is longer than 2, delays are being experienced and the bottleneck should be found and eliminated if possible. For a managed Hyper-V or Hyper-V VDI component, the Windows Network Traffic test reports metrics for an additional Total descriptor. For this descriptor, this measure will reveal the total number of packets in the output queues of all network interfaces supported by the Hyper-V or Hyper-V VDI host.
Outbound packet errors:	The number of outbound packets that could not be transmitted because of errors.	Number	Ideally, number of outbound errors should be 0. For a managed Hyper-V or Hyper-V VDI

Measurement	Description	Measurement Unit	Interpretation
			component, the Windows Network Traffic test reports metrics for an additional Total descriptor. For this descriptor, this measure will reveal the total number of outbound packets with errors on all network interfaces supported by the Hyper-V or Hyper-V VDI host.
Inbound packet errors:	The number of inbound packets that contained errors preventing them from being deliverable to a higher-layer protocol.	Number	Ideally, number of inbound errors should be 0. For a managed Hyper-V or Hyper-V VDI component, the Windows Network Traffic test reports metrics for an additional Total descriptor. For this descriptor, this measure will reveal the total number of inbound packets with errors on all network interfaces supported by the Hyper-V or Hyper-V VDI host.

Note:

If this test is not reporting measures for a server, make sure that you have enabled the SNMP service for that server.

4.3.2 Windows Team Network Traffic Test

NIC teaming, also known as Load Balancing/Failover (LBFO), allows multiple network adapters to be placed into a team for the purposes of:

- bandwidth aggregation, and/or
- traffic failover to maintain connectivity in the event of a network component failure.

The architecture of the Windows NIC teaming solution is as follows:

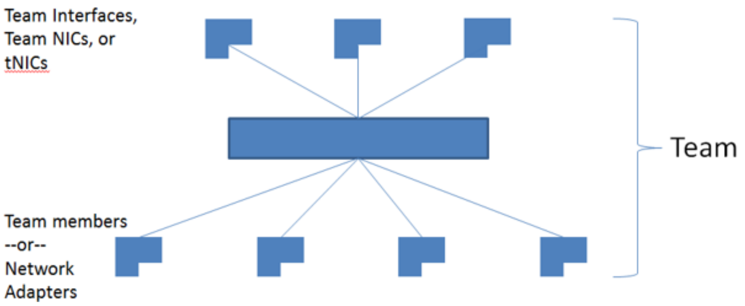


Figure 4.10: NIC teaming architecture

One or more physical NICs are connected into the NIC teaming solution common core, which then presents one or more virtual adapters (team NICs [tNICs] or team interfaces) to the operating system. There are a variety of algorithms that distribute outbound traffic between the NICs.

Regardless of the algorithm used, if a single member of a team goes down, then the other active members of that team may end up handling more traffic than their configuration allows. This can increase packet drops and significantly degrade network performance. Administrators should therefore be promptly alerted if even a single member of a team becomes unavailable.

In addition, administrators should closely monitor the bandwidth usage of a team, so that the adequacy of the collective bandwidth resources of the team members can be evaluated, and team capacity expanded if required.

The **Windows Team Network Traffic** test helps administrators achieve all of the above. This test monitors the status (up/down) of each NIC team, and alerts administrators if even a single member of a team is unavailable. Additionally, the test reports the bandwidth usage of each team and points to those teams that are experiencing a bandwidth contention. The network throughput of each team and packet discards are reported, so that administrators can quickly identify the team with a poor throughput. In the process, the test throws a spotlight on capacity constraints and performance deficiencies in teams, so that administrators can effectively plan the future capacity of their teams and initiate measures to improve network throughput and performance.

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 the desired **Component type**, set *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.

Note:

This test will be applicable only for the Windows hosts 2012 and above.

Target of the test : A Windows host

Agent executing the test : An internal agent

Output of the test : One set of results for each NIC team.

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.

Measurements reported by the test

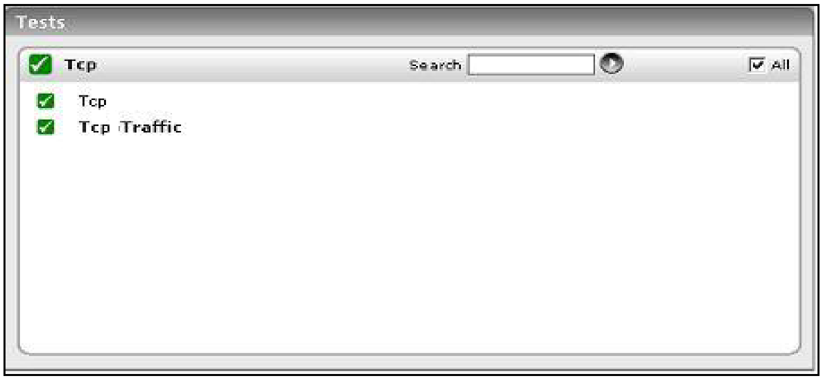
<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td>Status</td><td>Indicates the current status of this team.</td><td></td><td>This measure reports the value Up, if all members of a team are up and running. The value Down is reported if even one member of a team is down.
The numeric values that correspond to the measure values mentioned above are as follows:
<table><tr><th>Measure Value</th><th>Numeric Value</th></tr><tr><td>Up</td><td>1</td></tr><tr><td>Down</td><td>0</td></tr></table>
<b>Note:</b>
This test typically reports the <b>Measure Value</b>s listed in the table above to indicate the status of a team. In the graph of this measure however, status is represented using the numeric equivalents only.</td></tr>
<tr><td>Incoming traffic</td><td>Indicates the rate at which data (including framing characters) was</td><td>Mbps</td><td></td></tr>
</table>

Measurement	Description	Measurement Unit	Interpretation
	received by this team.		
Outgoing traffic	Indicates the rate at which data (including framing characters) was sent by this team.	Mbps	
Total traffic	Indicates the rate at which (including framing characters) data was handled by this team.	Mbps	This is a good indicator of the throughput of a team.
Max bandwidth	Represents an estimate of the capacity of the team.	Mbps	
Bandwidth usage	Indicates the percentage of Max bandwidth used by this team.	Percent	A value close to 100% is a cause for concern, as it indicates that the team is about to exhaust the available bandwidth resources. You may want to consider add more NICs to the team to expand its capacity.
Output queue length	Indicates the length of the output packet queue for this team.	Number	A long output queue could indicate that the team members are unable to transmit packets as quickly as they are being sent to it, causing many outgoing packets to queue up for transmission. This in turn could be owing to inadequate processing power / bandwidth with the team. Consider increasing bandwidth by adding more NICs or try fine-tuning the load-balancing algorithm.
Outbound packet discards	Indicates the number of outbound packets that were discarded by this team.	Number	

Measurement	Description	Measurement Unit	Interpretation
Outbound packet errors	The number of outbound packets that could not be transmitted by this team because of errors	Number	Ideally, number of outbound errors should be 0.
Inbound packet discards	The number of inbound packets that were discarded by this team.	Number	
Inbound packet errors	The number of inbound packets that contained errors preventing them from being deliverable to a higher- layer protocol.	Number	Ideally, number of inbound errors should be 0.
Packets received	Indicates the rate at which the packets were received by this team.	KB/sec	
Packets sent	Indicates the rate at which the packets were sent by this team.	KB/sec	

4.4 The Tcp Layer

Using the Tcp test, the **Tcp** layer monitors the health of TCP connections to and from the target server.



Tests

☑ Tcp Search ☑ All

☑ Tcp

☑ Tcp Traffic

Figure 4.11: The tests mapped to the Tcp layer of a Windows Generic server

Since the **Tcp** test has already been discussed in the *Monitoring Generic Servers* chapter, let us proceed to look at the **TcpTraffic** test.

4.4.1 TCP Traffic Test

The TCP layer of Windows servers like Microsoft SQL, Exchange, Citrix, etc., will have an additional TCP Traffic test (see Figure 4.11). This test monitors the TCP protocol traffic to and from a server. Since most popular applications (Web servers, Citrix, Databases, Application servers, etc.) rely on the TCP protocol for their proper functioning, traffic monitoring at the TCP protocol layer can provide good indicators of the performance seen by the applications that use TCP. The most critical metric at the TCP protocol layer is the percentage of retransmissions. Since TCP uses an exponential back-off algorithm for its retransmissions, any retransmission of packets over the network (due to network congestion, noise, data link errors, etc.) can have a significant impact on the throughput seen by applications that use TCP.

Target of the test : A host system (Windows servers only)

Agent deploying the test : An Internal agent

Outputs of the test : One set of results for each host system monitored

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. **SEGMENTS_ SENT_ MIN** - Specify the minimum threshold for the number of segments sent/transmitted over the network. The default value is 10; in this case, the test will compute/report the **TCP retransmit ratio** measure only if more than 10 segments are sent

over the network. On the other hand, if less than 10 segments are sent, then the test will not compute/report the **TCP retransmit ratio** measure. This is done to ensure that no false alerts are generated by the eG Enterprise system for the **TCP retransmit ratio** measure. You can change this minimum threshold to any value of your choice.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Segments received:	Indicates the rate at which segments are received by the server.	Segments/Sec	
Segments sent:	Indicates the rate at which segments are sent to clients or other servers	Segments/Sec	
Segment retransmissions:	Indicates the rate at which segments are being retransmitted by the server to clients/other servers	Segments/Sec	
TCP retransmit ratio:	Indicates the ratio of the rate of data retransmissions to the rate of data being sent by the server to clients/other servers	Percent	Ideally, the retransmission ratio should be low (< 5%). Most often retransmissions at the TCP layer have significant impact on application performance. Very often a large number of retransmissions are caused by a congested network link, bottlenecks at a router causing buffer/queue overflows, or by lousy network links due to poor physical layer characteristics (e.g., low signal to noise ratio). By tracking the percentage of retransmissions at a server, an administrator can quickly be

Measurement	Description	Measurement Unit	Interpretation
			alerted to problem situations in the network link(s) to the server that may be impacting the service performance.

4.5 The OS Cluster Layer

This layer will appear only if the 'Fail over cluster service' is enabled on the Windows system/server being monitored. With the help of the tests mapped to this layer, you can determine the following:

- Know the clusters that are currently managed by the Windows Failover Cluster Manager;
- Know which nodes are part of a cluster;
- Determine the current state of each node;
- Rapidly detect the failure of the cluster service on the monitored node;
- Identify the services/applications that have been clustered, promptly detect service/application failures, and pinpoint the probable reasons for the same;
- Identify cluster networks that are currently down;
- Pinpoint cluster resources that are offline;
- Track the current capacity and usage of cluster disks and cluster shared volumes and proactively detect potential space crunches.

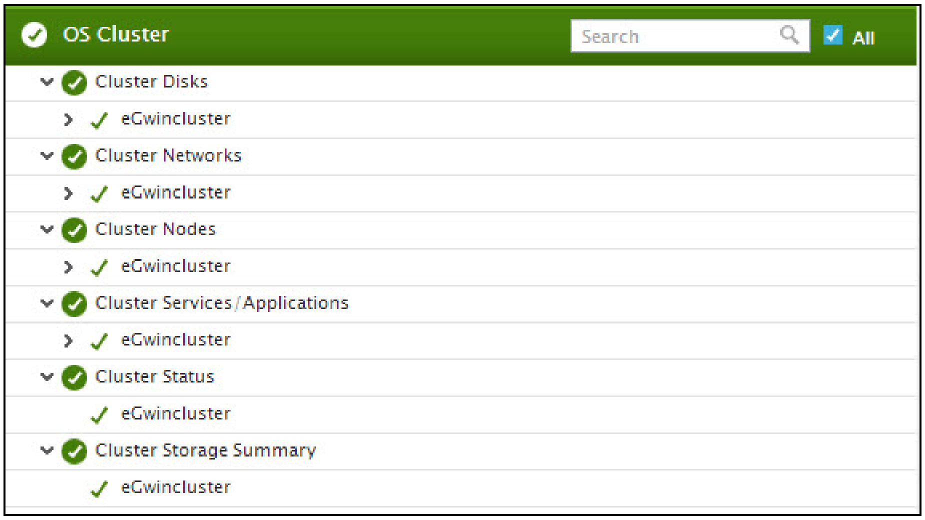


Figure 4.12: The tests mapped to the OS Cluster layer

Note:

The tests mapped to the OS Cluster layer run only in the agent-based mode. This is why, you need to install an eG agent on at least one node in the cluster to enable these tests to report cluster-level metrics. For best results however, it is recommended that you install an eG agent on each node in the cluster; this way, even if one node goes down due to any reason, cluster health can continue to be monitored using the agents on the other nodes.

4.5.1 Failover cluster Nodes Test

The independent Windows systems that are grouped in a cluster and that work together as a unified computing resource are known as nodes. In a fail-over cluster typically, the cluster nodes are connected by physical cables and by software. If one of the nodes fails, another node begins to provide service through a process known as failover. As long as users have continuous access to the cluster resources, they will not care which cluster node is currently active and is serving their requests. Administrators on the other hand, may want to know which node in the cluster is active, and why certain nodes have gone down. To determine the same, administrators can run the **Failover Cluster Nodes** test. This test reports the current status of each node in every cluster that has been configured on the server, and thus points administrators to those cluster nodes that are currently down or whose operations have been paused.

Target of the test : A node in a Windows cluster

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each node in every cluster created

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 at which the specified **HOST** listens. By default, this is *Null*.
4. **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**.
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.

Measurements made by the test

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td>Cluster node status:</td><td>Indicates the current state of this node.</td><td>Number</td><td>The values that this measure can report and the states they indicate have been listed in the table below:
<table>
<tr><th>Measure Value</th><th>Numeric Value</th></tr>
<tr><td>Up</td><td>100</td></tr>
<tr><td>Down</td><td>70</td></tr>
<tr><td>Paused</td><td>50</td></tr>
<tr><td>Joining</td><td>30</td></tr>
<tr><td>Unknown</td><td>10</td></tr>
</table>
<b>Note:</b>
By default, this measure can report the <b>Measure Value</b> s mentioned above while indicating the current state of each cluster node. However, the graph of this measure is indicated using the numeric equivalents.</td></tr>
</table>

Measurement	Description	Measurement Unit	Interpretation
			To know the network interface, network adapter, and other attributes a cluster node has been configured with, use the detailed diagnosis of this measure.

4.5.2 Failover Cluster Networks Test

A network (sometimes called an interconnect) performs one of the following roles in a cluster:

- A *private network* carries internal cluster communication. The Cluster service authenticates all internal communication, but administrators who are particularly concerned about security can restrict internal communication to physically secure networks.
- A *public network* provides client systems with access to cluster application services. IP Address resources are created on networks that provide clients with access to cluster services.
- A *mixed* (public-and-private) *network* carries internal cluster communication and connects client systems to cluster application services.

A network that is not enabled for use by the cluster (that is, neither public nor private) carries traffic unrelated to cluster operation.

Regardless of the role that a network performs, its availability is critical to the smooth functioning of the cluster, as without the network, communication between cluster nodes and between clients and cluster nodes become impossible. This is why, if a client complains of service/resource inaccessibility, administrators must check the status of the cluster networks to figure out if a down network is what is denying end- users access. This is where the **Failover Cluster Networks** testhelps.

Using this test, administrators can determine which cluster network is up and which is down, so that they can ascertain what type of cluster communication is impacted – internal communication between the cluster nodes? Communication between the client and the cluster services/applications? Or both?

Target of the test : A node in a Windows cluster

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each cluster network configured for every cluster created

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 at which the specified **HOST** listens. By default, this is *Null*.

Measurements made by the test

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td>Cluster network status:</td><td>Indicates the current state of this cluster network.</td><td></td><td>The values that this measure can report and the states they indicate have been listed in the table below:
<table>
<tr><th>State</th><th>Numeric value</th></tr>
<tr><td>Up</td><td>100</td></tr>
<tr><td>Partitioned</td><td>70</td></tr>
<tr><td>Down</td><td>50</td></tr>
<tr><td>Unavailable</td><td>30</td></tr>
<tr><td>Unknown</td><td>10</td></tr>
</table>
<b>Note:</b>
By default, this measure can report the <b>State</b>s mentioned above while indicating the current state of each cluster network. However, the graph of this measure is indicated using the numeric equivalents.</td></tr>
</table>

4.5.3 Failover Cluster Disks Test

A cluster resource is any physical or logical component that has the following characteristics:

- Can be brought online and taken offline.
- Can be managed in a server cluster.
- Can be hosted (owned) by only one node at a time.

One of the standard cluster resource type is the Physical Disk Resource Type. You use the Physical Disk resource type to manage disks that are on a cluster storage device. Each cluster disk will at any point in time be owned only by a single node in the cluster. Moreover, when configuring a service or application for a cluster, you can select the cluster disk the service/application should use.

If a cluster disk fails or is in an offline state for a long time, it might affect the functioning of the services/applications that rely on that disk for their functioning. Likewise, if a cluster disk runs short of space suddenly, once again the associated services/applications will be affected. To protect these critical services/applications from failure and to define robust fail-over policies for cluster disk resources, administrators will have to continuously monitor the state and usage of each of the cluster disk resources. This can be achieved using the **Failover Cluster Disks** test. This test auto-discovers the cluster disks and tracks the state and usage of each disk, so that administrators are proactively alerted to abnormalities in the state and excesses in the usage of any disk.

Target of the test : A node in a Windows cluster

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each cluster disk associated with every cluster created

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 at which the specified **HOST** listens. By default, this is *Null*.
4. **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.

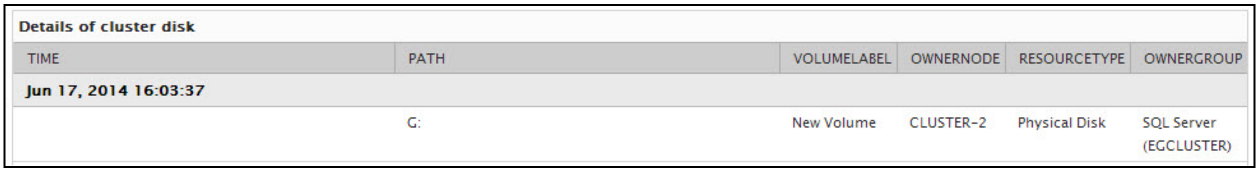
Measurements made by the test

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td>Cluster disk status:</td><td>Indicates the current state of this cluster disk.</td><td></td><td>The values that this measure can report and the states they indicate have been listed in the table below:
<table>
<tr><th>State</th><th>Numeric Value</th></tr>
<tr><td>Online</td><td>100</td></tr>
<tr><td>Failed</td><td>90</td></tr>
<tr><td>Offline</td><td>80</td></tr>
<tr><td>Unknown</td><td>10</td></tr>
<tr><td>Inherited</td><td>30</td></tr>
<tr><td>Initializing</td><td>50</td></tr>
<tr><td>Pending</td><td>60</td></tr>
<tr><td>Offline Pending</td><td>65</td></tr>
<tr><td>Online Pending</td><td>70</td></tr>
</table>
If the cluster service detects that a cluster disk is not operational, it attempts to restart that cluster disk. You can specify the number of times the cluster service can attempt to restart a resource in a given time interval. If the cluster service exceeds the maximum number of restart attempts within the specified time period, and the disk is still not</td></tr>
</table>

Measurement	Description	Measurement Unit	Interpretation
			operational, the cluster service considers the disk to have failed. Typically, a failed disk will adversely impact the availability and performance of the services/applications to which that disk has been assigned. To ensure high availability of services/applications, you can add the cluster disk and the services/applications that depend on that disk to a single cluster group and configure a fail-over policy for that group. Then, you can configure the failure of the cluster disk to trigger a group fail-over, so that the entire group is failed over to another node in the cluster. The detailed diagnosis of this measure, if enabled, will indicate the path of the cluster disk, which node currently owns the cluster disk, the shared volume, and the owner group.
Total capacity of cluster disk:	Indicates the total capacity of this cluster disk.	GB	
Space used in cluster disk:	Indicates the space in this cluster disk that is in use currently.	GB	Ideally, the value of this measure should be low. A high value is indicative of excessive space usage by a cluster disk.
Free space in	Indicates the amount of	GB	A high value is desired for this

Measurement	Description	Measurement Unit	Interpretation
cluster disk:	space in this cluster disk that is currently unused.		measure.
Percentage of cluster disk space used:	Indicates the percentage of the total capacity of this cluster disk that is utilized.	Percent	A value close to 100% is indicative of abnormal space usage. Compare the value of this measure across cluster disks to know disk is using space excessively. Before assigning storage to a cluster service/application, you may want to check this comparison to figure out which cluster disks have enough space to manage more services/applications.

Using the detailed diagnosis of the *Cluster disk status* measure, you can determine the path of the cluster disk, which node currently owns the cluster disk, the shared volume, and the owner group.



Details of cluster disk

TIME	PATH	VOLUMELABEL	OWNERNODE	RESOURCETYPE	OWNERGROUP
Jun 17, 2014 16:03:37					
	G:	New Volume	CLUSTER-2	Physical Disk	SQL Server (EGCLUSTER)

Figure 4.13: The detailed diagnosis of the Cluster disk status measure

4.5.4 Failover Cluster Services/Applications Test

A variety of different services or applications can be configured for high availability in a failover cluster. While some services/applications are cluster-aware – i.e., are applications that function in a co-ordinated way with other cluster components – some others are cluster-unaware – i.e., are applications that do not interact with the cluster at all.

The list of cluster-aware applications that administrators can choose from when configuring high-availability are as follows:

- **DFS Namespace Server**: Provides a virtual view of shared folders in an organization. When a user views the namespace, the folders appear to reside on a single hard disk. Users can navigate the namespace without needing to know the server names or shared folders that are hosting the data.

- **DHCP Server**: Automatically provides client computers and other TCP/IP-based network devices with valid IP addresses.
- **Distributed Transaction Coordinator (DTC)**: Supports distributed applications that perform transactions. A transaction is a set of related tasks, such as updates to databases, that either succeed or fail as a unit.
- **File Server**: Provides a central location on your network where you can store and share files with users.
- **Internet Storage Name Service (iSNS) Server**: Provides a directory of iSCSI targets.
- **Message Queuing**: Enables distributed applications that are running at different times to communicate across heterogeneous networks and with computers that may be offline.
- **Other Server**: Provides a client access point and storage only.
- **Print Server**: Manages a queue of print jobs for a shared printer.
- **Remote Desktop Connection Broker** (formerly TS Session Broker): Supports session load balancing and session reconnection in a load-balanced remote desktop server farm. RD Connection Broker is also used to provide users access to RemoteApp programs and virtual desktops through RemoteApp and Desktop Connection.
- **Virtual Machine**: Runs on a physical computer as a virtualized computer system. Multiple virtual machines can run on one computer.
- **WINS Server**: Enables users to access resources by a NetBIOS name instead of requiring them to use IP addresses that are difficult to recognize and remember.

To configure high-availability for services/applications that are cluster-unaware, administrators can use the Generic Application, Generic Script, and Generic Service options.

When configuring fail-over for a service/application, you need to assign an IP address to that service/application. You can also add storage to a clustered service/application, or even associate additional resources with the service/application.

When a service/application fails over, administrators may need to know which cluster node that service/application has switched to. Likewise, administrators will also need to know if fail-over was unsuccessful for a service/application, and if so, why - is it because the cluster disk used by the service/application has run out of space? Is it because the IP address of the service/application is in conflict with another IP address in the environment? Is it because the service/application has been deliberately stopped or brought to the offline mode? The **Failover Cluster Service/Applications** Test provides administrators with answers to all these questions!

For each service/application that has been configured for high-availability, this test reports the current state of that service/application, thus enabling administrators to figure out if fail-over was successful or not. The test additionally reports the IP state and server state of each service/application and tracks the space usage in the storage mapped to a service/application, thus pointing administrators to the probable cause for service failures. The resources added to every service/application and the current state of the resources is also revealed, so that administrators can determine whether/not the offline state of a resource is causing the dependent service/application to fail.

Target of the test : A node in a Windows cluster

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each service/application managed by every cluster created

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 at which the specified **HOST** listens. By default, this is *Null*.
4. **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**.
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.

Measurements made by the test

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td>Service/application status:</td><td>Indicates the current state of this service/application.</td><td>Number</td><td>The values that this measure can report and the states they indicate have been listed in the table below:
<table>
<tr><th>Measure Value</th><th>Numeric Value</th></tr>
<tr><td>Online</td><td>100</td></tr>
<tr><td>Failed</td><td>90</td></tr>
<tr><td>Offline</td><td>80</td></tr>
<tr><td>Unknown</td><td>10</td></tr>
<tr><td>Inherited</td><td>30</td></tr>
<tr><td>Initializing</td><td>50</td></tr>
<tr><td>Pending</td><td>60</td></tr>
<tr><td>Offline Pending</td><td>65</td></tr>
<tr><td>Online Pending</td><td>70</td></tr>
</table>
<b>Note:</b>
By default, this measure can report the <b>Measure Value</b> s mentioned above while indicating the current state of the service/application. However, the graph of this measure is indicated using the numeric equivalents.</td></tr>
</table>

Measurement	Description	Measurement Unit	Interpretation
			If this measure reports the value 90 for a service/application, it is a clear indicator that that service/application could not be failed over. In such a situation, you can check the value of the Server state, IP state, Failed resources, and Percentage of space free in used cluster disks measures of that service to know what could have possibly caused the service/application to fail. For further diagnosis, you can also use the detailed diagnostics reported by this test, which reveals the resources associated with the service/application and the current state of each resource.
Server status:	Indicates the current state of the server created in the cluster for this service/application.	Number	When using the Failover Cluster Manager to configure high availability for a service/application, you are required to provide a fully qualified DNS name for the service/application being configured and assign an IP address to it. This measure reports the current state of that DNS name. To know which name was assigned to the service, use the detailed diagnosis of this measure. The values that this measure can

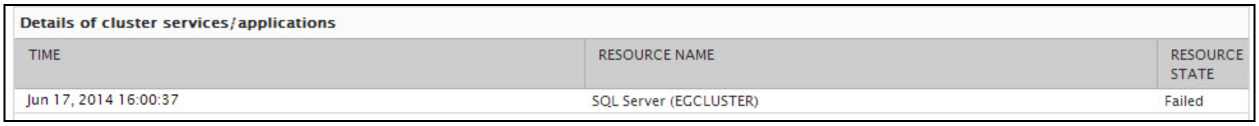
<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td></td><td></td><td></td><td>report and the states they indicate have been listed in the table below:
<table><tr><th>Measure Value</th><th>Numeric Value</th></tr><tr><td>Online</td><td>100</td></tr><tr><td>Failed</td><td>90</td></tr><tr><td>Offline</td><td>80</td></tr><tr><td>Unknown</td><td>10</td></tr><tr><td>Inherited</td><td>30</td></tr><tr><td>Initializing</td><td>50</td></tr><tr><td>Pending</td><td>60</td></tr><tr><td>Offline Pending</td><td>65</td></tr><tr><td>Online Pending</td><td>70</td></tr></table>
<b>Note:</b>
By default, this measure can report the <b>Measure Value</b> s mentioned above while indicating the current state of the server. However, the graph of this measure is indicated using the numeric equivalents.</td></tr>
<tr><td>IP status:</td><td>Indicates the current status of the IP address assigned to this service/application.</td><td>Number</td><td>The values that this measure can report and the states they indicate have been listed in the table below:</td></tr>
</table>

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td></td><td></td><td></td><td>
<table>
<tr><th>Measure Value</th><th>Numeric Value</th></tr>
<tr><td>Online</td><td>100</td></tr>
<tr><td>Failed</td><td>90</td></tr>
<tr><td>Offline</td><td>80</td></tr>
<tr><td>Unknown</td><td>10</td></tr>
<tr><td>Inherited</td><td>30</td></tr>
<tr><td>Initializing</td><td>50</td></tr>
<tr><td>Pending</td><td>60</td></tr>
<tr><td>Offline Pending</td><td>65</td></tr>
<tr><td>Online Pending</td><td>70</td></tr>
</table>
<b>Note:</b>
By default, this measure can report the <b>Measure Value</b> s mentioned above while indicating the current state of the IP address. However, the graph of this measure is indicated using the numeric equivalents.
Use the detailed diagnosis of this measure to know the IP address assigned to the service/application.
</td></tr>
<tr><td>Has the owner changed?:</td><td>Indicates whether/not the owner of this service/application has changed since the last measurement period.</td><td></td><td>The values that this measure can report and their corresponding numeric values have been listed in the table below:</td></tr>
</table>

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td></td><td></td><td></td><td><table><tr><th>Measure Value</th><th>Numeric Value</th></tr><tr><td>No</td><td>0</td></tr><tr><td>Yes</td><td>1</td></tr></table>If this measure reports the value No for a service/application, and Service state is Failed, then it clearly indicates that fail-over has not occurred for that service/application.
<b>Note:</b>
By default, this measure reports one of the <b>Measure Value</b>s listed in the table above. The graph of this measure however will represent whether/not the owner has changed using the numeric equivalents only.
To know which node currently owns the service/application, use the detailed diagnosis of this measure.</td></tr>
<tr><td>Total disk space:</td><td>Indicates the total capacity of all cluster disks mapped to this service/application.</td><td>MB</td><td>Use the detailed diagnosis of this measure to know which cluster disks are attached to a service/application, the current status of the disks, and the usage of each disk.</td></tr>
<tr><td>Total free space:</td><td>Indicates the total amount of free space in all cluster disks mapped to this</td><td>MB</td><td>Ideally, the value of this measure should be high.</td></tr>
</table>

Measurement	Description	Measurement Unit	Interpretation
	service/application.		
Percentage of space free:	Indicates the percentage of space that is free in the cluster disks mapped to this service/application.	MB	Ideally, the value of this measure should be high. Compare the value of this measure across services/applications to know which service/application has the least free space. You may want to make space in the cluster disks mapped to this service/application, so as to prevent service/application failure owing to lack of space.
Total resources:	Indicates the number of other resources that are online in this service/application.	Number	Use the detailed diagnosis of this measure to know the name, type, and owner of all the resources associated with a service/application.
Online resources:	Indicates the number of resources associated with this service/application that are currently online.	Number	Use the detailed diagnosis of this measure to know the name, type, state and owner of the online resources associated with a service/application.
Offline resources:	Indicates the number of resources associated with this service/application that are currently offline.	Number	Use the detailed diagnosis of this measure to know the name, type, state, and owner of the offline resources associated with a service/application.
Failed resources:	Indicates the number of resources associated with this service/application that have failed currently.	Number	Ideally, the value of this measure should be 0. If this measure reports a non-zero value, you can use the detailed diagnosis of this measure to know the name, type, state, and owner of each of the failed resources associated with a service/application.

The detailed diagnosis of the *Service/application status* measure reveals the name and state of the resources associated with a service.

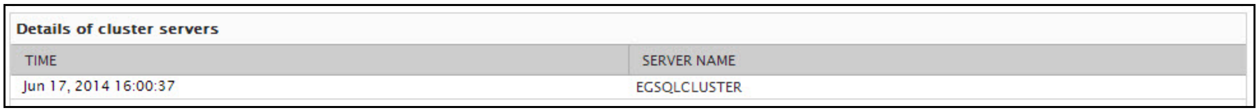


Details of cluster services/applications

TIME	RESOURCE NAME	RESOURCE STATE
Jun 17, 2014 16:00:37	SQL Server (EGCLUSTER)	Failed

Figure 4.14: The detailed diagnosis of the Service/application status measure

The detailed diagnosis of the *Server status* measure reveals the DNS name that was assigned to the service/application when it was configured for high availability.

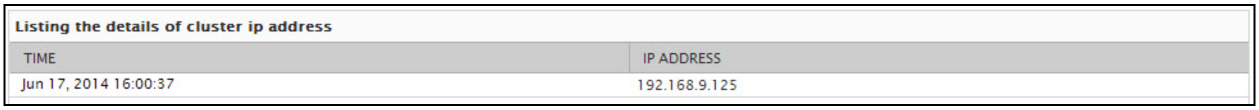


Details of cluster servers

TIME	SERVER NAME
Jun 17, 2014 16:00:37	EGSQLCLUSTER

Figure 4.15: The detailed diagnosis of the Server status measure

Using the detailed diagnosis of the *IP status* measure you can determine the IP address assigned to the service/application.

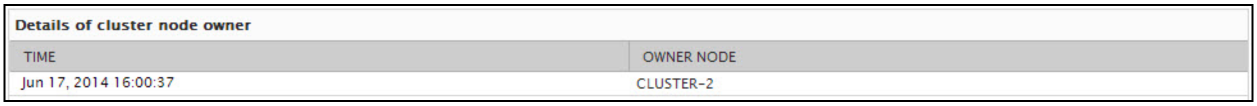


Listing the details of cluster ip address

TIME	IP ADDRESS
Jun 17, 2014 16:00:37	192.168.9.125

Figure 4.16: The detailed diagnosis of the IP status measure

To know which node currently owns the service/application, use the detailed diagnosis of the *Has the owner changed?* measure.

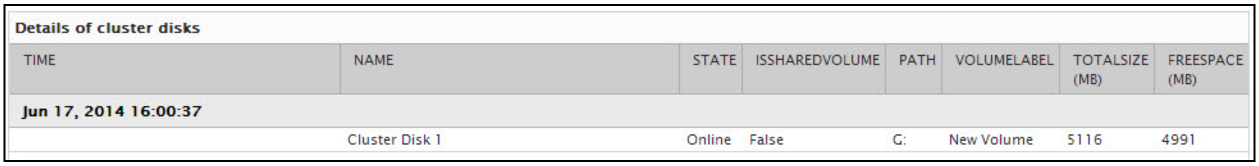


Details of cluster node owner

TIME	OWNER NODE
Jun 17, 2014 16:00:37	CLUSTER-2

Figure 4.17: The detailed diagnosis of the Has the owner changed? measure

Use the detailed diagnosis of the *Total disk space* measure to know which cluster disks are attached to a service/application, the current status of the disks, and the usage of each disk. With the help of this information, administrators can quickly identify those disks that may be running out of space and draw out plans to increase the capacity of such disks, so that service/application failures can be averted.

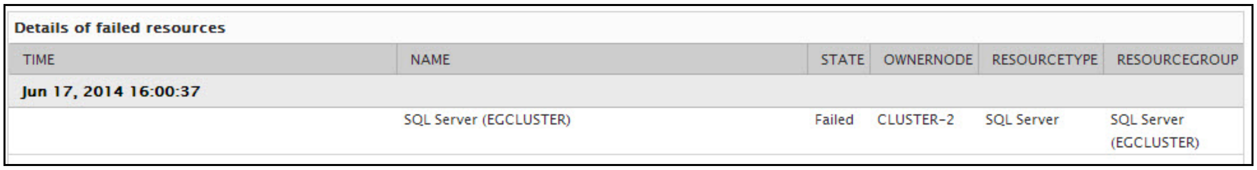


Details of cluster disks

TIME	NAME	STATE	ISSHAREDVOLUME	PATH	VOLUMELABEL	TOTALSIZE (MB)	FREESPACE (MB)
Jun 17, 2014 16:00:37							
	Cluster Disk 1	Online	False	G:	New Volume	5116	4991

Figure 4.18: The detailed diagnosis of the Total disk space measure

The detailed diagnosis of the *Failed resources* measure reveals the name, type, current state, owner, and resource group of each failed resource.

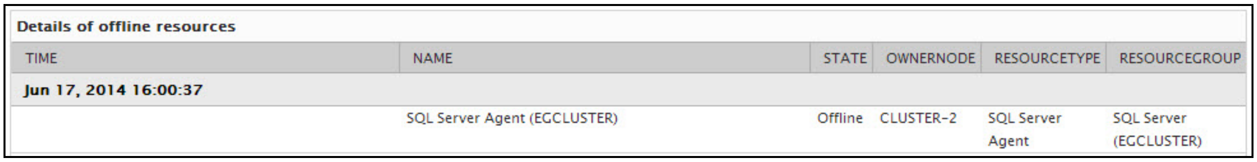


Details of failed resources

TIME	NAME	STATE	OWNERNODE	RESOURCETYPE	RESOURCEGROUP
Jun 17, 2014 16:00:37					
	SQL Server (EGCLUSTER)	Failed	CLUSTER-2	SQL Server	SQL Server (EGCLUSTER)

Figure 4.19: The detailed diagnosis of the Failed resources measure

The detailed diagnosis of the *Offline resources* measure reveals the name, type, current state, owner, and resource group of each failed resource.



Details of offline resources

TIME	NAME	STATE	OWNERNODE	RESOURCETYPE	RESOURCEGROUP
Jun 17, 2014 16:00:37					
	SQL Server Agent (EGCLUSTER)	Offline	CLUSTER-2	SQL Server Agent	SQL Server (EGCLUSTER)

Figure 4.20: The detailed diagnosis of the Offline resources measure

4.5.5 Failover Cluster Storage Summary Test

One of the most important aspects to plan for before configuring a fail-over cluster is storage. Sufficient storage space must be available for the use of the cluster resources at all times, so that these critical resources do not fail owing to the lack of enough free space in the cluster storage. Administrators should hence periodically track the space usage in the cluster storage, check whether cluster disks in storage are used effectively or not, determine how much free space is available in the used and unused cluster disks, and figure out whether/not the space available is sufficient to handle the current and the future workload of the cluster. To monitor space usage in the cluster storage and take informed, intelligent storage management decisions, administrators can take the help of the **Failover Cluster Storage Summary** test.

This test monitors the cluster storage and presents a quick summary of the space usage across the used and unused cluster disks that are part of the storage. In the process, the test reveals how much free space is available in the used and unused disks in the storage; using this metric, administrators can figure out whether/not the cluster has enough free space to meet the current and the future demands. If not, administrators can use the pointers provided by this test again to decide what needs to be done to avert resource failures - should more physical disk resources be added to the cluster to handle the current and anticipated load? should space be cleared in the used cluster disks to make room for more data? can better management of unused disks help conserve storage space?

Target of the test : A node in a Windows cluster

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every cluster that has been created

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 at which the specified **HOST** listens. By default, this is *Null*.
4. **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.

Measurements made by the test

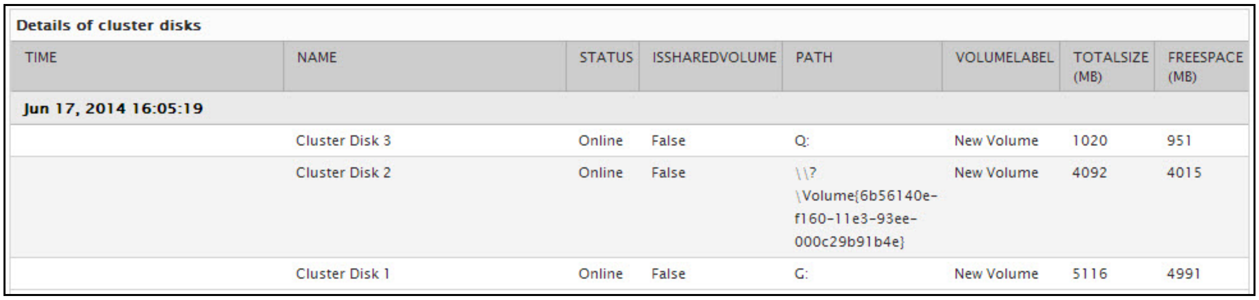
Measurement	Description	Measurement Unit	Interpretation
Total disk count:	Indicates the total number of disks in the cluster storage.	Number	The detailed diagnosis of this measure, if enabled, lists the disks in the cluster storage, and the current state, path, and usage of each cluster disk. This way, disks

Measurement	Description	Measurement Unit	Interpretation
			that are running out of space can be isolated, so that efforts to increase the capacity of such disks can be initiated.
Unused cluster disks:	Indicates the number of cluster disks that are not currently used by any cluster resource (i.e., service/application).	Number	If the number of Unused cluster disks is more than the number of Used disks in cluster, it could indicate over- utilization of a few disks. In such a situation, compare the value of the Percentage of space free in used cluster disks measure with that of the Percentage of space free in unused cluster disks measure. If this comparison reveals that the used disks have very little free space as opposed to unused disks, it is a clear indicator that the storage resources have not been properly managed. You may want to consider reducing the load on some of the used disks by assigning the unused disks to services/applications that generate more data and hence consume more space. To know which disks in the cluster storage are currently not used, use the detailed diagnosis of the Unused cluster disks measure. To know which disks in the cluster storage are in use currently, take the help of the detailed diagnosis of the Used disks in cluster measure.
Used disks in cluster:	Indicates the number of cluster disks that are currently used by a cluster resource.	Number	

Measurement	Description	Measurement Unit	Interpretation
Total capacity of used cluster disks:	Indicates the total capacity of all the used disks in the cluster.	MB	
Capacity of unused cluster disks:	Indicates the total capacity of all unused disks in cluster.	MB	
Total free space in used cluster disks:	Indicates the total amount of space in the used cluster disks that is currently available for use.	MB	
Free space in unused cluster disks:	Indicates the total amount of space in the unused cluster disks that is currently available for use.	MB	
Percentage of space free in used cluster disks:	Indicates the percentage of space that is free in used cluster disks.	Percent	For optimal cluster performance, the value of both these measures should be high. If both are low, then it indicates that the cluster is critically low on space; if the situation persists, or worse, aggravates, the resources clustered will fail! To prevent this, you can clear space on both the used and unused disks. If many disks are unused, you can even map data- intensive services/applications with these disks, so that the load on used disks is reduced. You may also want to consider adding more physical disk resources to the cluster to increase its total storage

Measurement	Description	Measurement Unit	Interpretation
			capacity.
Percentage of space free in unused cluster disks:	Indicates the percentage of space that is free in unused cluster disks.	Percent	
Disks with online status :	Indicates the number of cluster disks that are currently online.	Number	
Disks with offline status :	Indicates the number of cluster disks that are currently offline.	Number	
Disks with failed status :	Indicates the number of cluster disks that are currently failed.	Number	
Disks with pending status :	Indicates the number of cluster disks that are currently in pending state.	Number	

The detailed diagnosis of the *Total disks count* measure, if enabled, lists the disks in the cluster storage, and the current state, path, and usage of each cluster disk. This way, disks that are running out of space can be isolated, so that efforts to increase the capacity of such disks can be initiated.

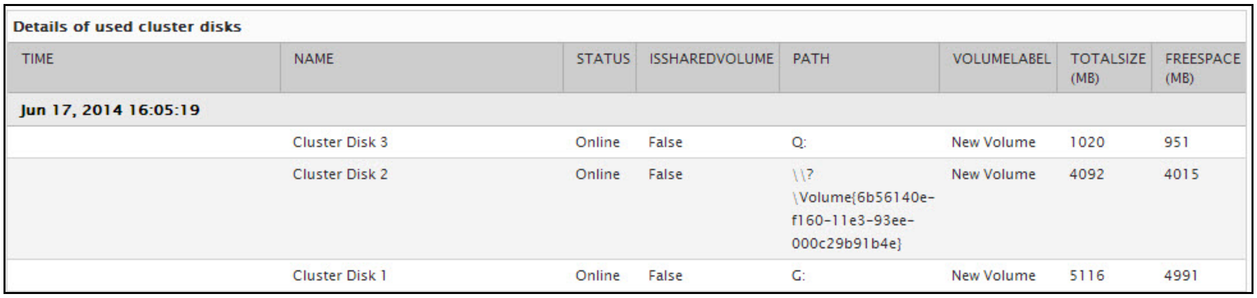


Details of cluster disks

TIME	NAME	STATUS	ISSHAREDVOLUME	PATH	VOLUMELABEL	TOTALSIZE (MB)	FREESPACE (MB)
Jun 17, 2014 16:05:19							
	Cluster Disk 3	Online	False	Q:	New Volume	1020	951
	Cluster Disk 2	Online	False	\\?\Volume{6b56140e-f160-11e3-93ee-000c29b91b4e}	New Volume	4092	4015
	Cluster Disk 1	Online	False	G:	New Volume	5116	4991

Figure 4.21: The detailed diagnosis of the Total disk count measure

To know which disks in the cluster storage are in use currently, take the help of the detailed diagnosis of the *Used disks in cluster* measure.



Details of used cluster disks

TIME	NAME	STATUS	ISSHAREDVOLUME	PATH	VOLUMELABEL	TOTALSIZE (MB)	FREESPACE (MB)
Jun 17, 2014 16:05:19							
	Cluster Disk 3	Online	False	Q:	New Volume	1020	951
	Cluster Disk 2	Online	False	\\?\Volume{6b56140e-f160-11e3-93ee-000c29b91b4e}	New Volume	4092	4015
	Cluster Disk 1	Online	False	G:	New Volume	5116	4991

Figure 4.22: The detailed diagnosis of the Used disks in cluster measure

4.5.6 Failover Cluster Shared Volumes Test

A Cluster Shared Volume is a shared disk containing an NTFS or ReFS (Windows Server 2012 R2 only) volume that is made accessible for read and write operations by all nodes within a Windows Server Failover Cluster.

Virtual machines or applications that run on CSV are no longer bound to storage, and they can share a common disk to reduce the number of LUNs, as shown in the following figure.

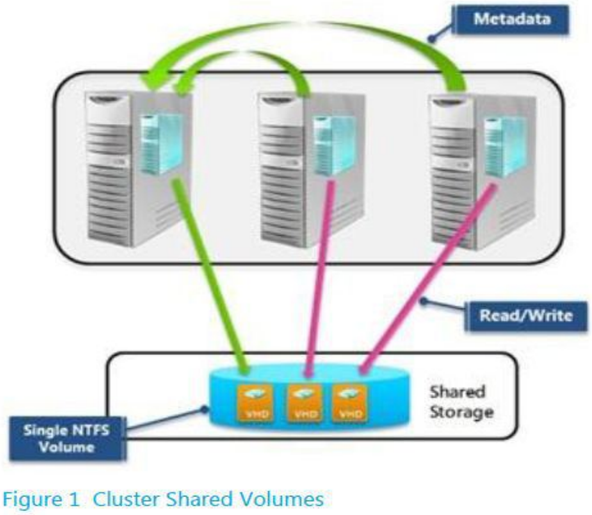


Figure 4.23: How the Cluster Shared Volume works?

Live migration of virtual machines becomes faster because volume ownership does not need to change.

This is why, if a CSV fails, the availability and operations of the VMs using that CSV will be adversely impacted. Likewise, if a CSV has limited or no free space, the dependent VMs will begin to malfunction. This is why, administrators should use the **Failover Cluster Shared Volumes** test.

This test auto-discovers the CSVs that have been configured in each cluster, and continuously tracks the state and space usage of each CSV. This way, failed CSVs and the ones that have run out of space can be accurately isolated.

Target of the test : A node in a Windows cluster

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each CSV on every cluster that is managed by the Windows Failover Cluster Manager

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 at which the specified **HOST** listens. By default, this is *Null*.
4. **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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Status:	Indicates the current status of this CSV.	Number	The values that this measure can report the states they indicate have been listed in the table below:

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td></td><td></td><td></td><td>
<table>
<tr><th>Measure Value</th><th>Numeric Value</th></tr>
<tr><td>Online</td><td>100</td></tr>
<tr><td>Failed</td><td>50</td></tr>
<tr><td>Offline</td><td>20</td></tr>
</table>
<b>Note:</b>
By default, this measure can report the <b>Measure Value</b> s mentioned above while indicating the current state of each CSV. However, the graph of this measure is indicated using the numeric equivalents.
Use the detailed diagnosis of this measure to know which node currently owns the CSV and the path to the CSV.
</td></tr>
<tr><td>Total capacity of shared volume:</td><td>Indicates the total capacity of this CSV.</td><td>MB</td><td></td></tr>
<tr><td>Space used in shared volume:</td><td>Indicates the amount of space used in this CSV .</td><td>MB</td><td>Ideally, the value of this measure should be low.</td></tr>
<tr><td>Free space in shared volume:</td><td>Indicates the amount of space that is free in this CSV.</td><td>MB</td><td>Ideally, the value of this measure should be high.</td></tr>
<tr><td>Percentage of space used in shared volume:</td><td>Indicates the percentage of total space in this CSV that is currently in use.</td><td>Percent</td><td>Compare the value of this measure across CSVs to know which CSV is being utilized excessively. A value close to 100% is a cause for concern as it indicates that that CSV is about to run out of space soon. You should then allocate more space to that CSV or clear</td></tr>
</table>

Measurement	Description	Measurement Unit	Interpretation
			space in the CSV by removing unnecessary or obsolete data from it.
Percentage of space free in unused cluster disks:	Indicates the percentage of space that is free in unused cluster disks.	Percent	

4.5.7 Failover Cluster Status Test

Whenever a user complains of the inaccessibility of a resource (i.e., a server/service/application), the administrator should first check whether that resource is part of a cluster, and if so, check whether the Windows cluster service has been enabled and is running on each node of the cluster. This is where the **Failover Cluster Status** test helps. This test reports whether a monitored node is part of a cluster or not and if so, indicates whether/not the cluster service is enabled and running on that node. This way, administrators can be promptly alerted to the sudden termination or the absence of the cluster service on a cluster node. In addition, the test also reports the composition of the cluster – i.e., the number of nodes and services/applications that have been clustered as part of the monitored cluster setup.

Target of the test : A node in a Windows cluster

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every cluster being monitored

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 at which the specified **HOST** listens. By default, this is *Null*.
4. **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.

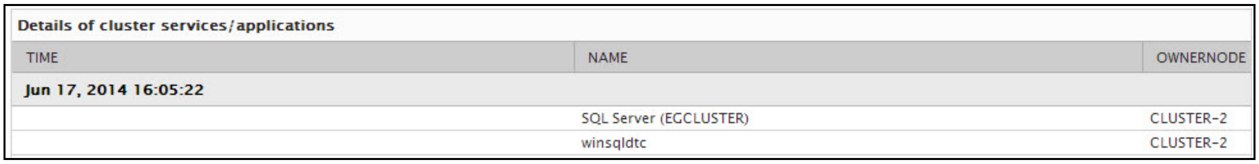
Measurements made by the test

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td>Does the cluster exist?:</td><td>Indicates whether/not the cluster service is installed on the monitored node.</td><td></td><td>The values that this measure can report and their corresponding numeric values have been listed in the table below:
<table>
<tr><th>Measure Value</th><th>Numeric Value</th></tr>
<tr><td>Yes</td><td>100</td></tr>
<tr><td>No</td><td>0</td></tr>
</table>
<b>Note:</b>
By default, this measure reports one of the <b>Measure Value</b>s listed in the table above. The graph of this measure however will indicate whether/not the monitored server is cluster-enabled or not.</td></tr>
<tr><td>Cluster status:</td><td>Indicates the current status of the cluster service on the target node.</td><td></td><td>The values that this measure can report and their corresponding numeric values have been listed in the table below:</td></tr>
</table>

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td></td><td></td><td></td><td><table><tr><th>Measure Value</th><th>Numeric Value</th></tr><tr><td>Running</td><td>100</td></tr><tr><td>Stopped</td><td>0</td></tr></table>
<b>Note:</b>
By default, this measure reports one of the <b>Measure Value</b> s listed in the table above. The graph of this measure however will indicate whether/not the cluster service is running using the numeric equivalents only.</td></tr>
<tr><td>Is the cluster active?:</td><td>Indicates whether/not the cluster is currently activer.</td><td></td><td>The values that this measure can report and their corresponding numeric values have been listed in the table below:
<table><tr><th>Measure Value</th><th>Numeric Value</th></tr><tr><td>Yes</td><td>100</td></tr><tr><td>No</td><td>0</td></tr></table>
<b>Note:</b>
By default, this measure reports one of the <b>Measure Values</b> listed in the table above. The graph of this measure however will report the status of the cluster service using the numeric equivalents only.</td></tr>
<tr><td>Number of services/applications:</td><td>Indicates the number of services/applications that</td><td>Number</td><td>To know which services/applications are</td></tr>
</table>

Measurement	Description	Measurement Unit	Interpretation
	are currently clustered under this cluster.		currently clustered, use the detailed diagnosis of this measure.
Number of nodes:	Indicates the number of nodes in this cluster.	Number	To know which nodes are the members of the cluster, use the detailed diagnosis of this measure.

Use the detailed diagnosis of the *Number of services/applications* measure to know which services/applications have been configured for high availability under a cluster, and which cluster node owns each service/application.

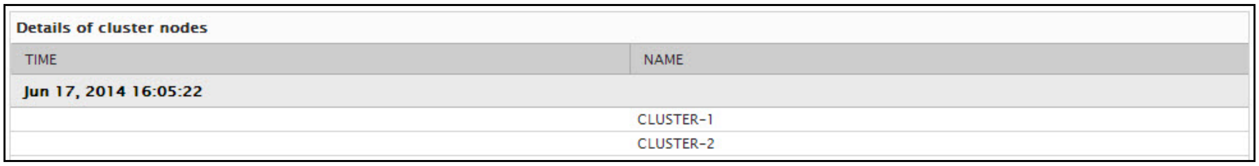


Details of cluster services/applications

TIME	NAME	OWNERNODE
Jun 17, 2014 16:05:22		
	SQL Server (EGCLUSTER)	CLUSTER-2
	winsqldtc	CLUSTER-2

Figure 4.24: The detailed diagnosis of the Number of services/applications measure

Use the detailed diagnosis of the *Number of nodes* measure to know which nodes are members of a cluster.



Details of cluster nodes

TIME	NAME
Jun 17, 2014 16:05:22	
	CLUSTER-1
	CLUSTER-2

Figure 4.25: The detailed diagnosis of the Number of nodes measure

4.5.8 Failover Cluster Core Resources Test

A cluster requires that a set of resources be online in order to operate. These resources are called the *core resources*, and consist of:

- An IP Address resource, an IPv6 Address resource, and/or an IPv6 Tunnel Address resource that provides the cluster IP address.

- A Network Name resource that provides the cluster name. This resource depends on the IP Address resource, IPv6 Address resource, and/or IPv6 Tunnel Address resource to create a failover cluster instance.
- A quorum resource that ensures cluster integrity and the persistence of accurate state information.

The core resources by default, reside in a single group called the cluster group. The cluster group is created automatically during cluster setup.

If the core resources cannot be brought online, the cluster will not form and no resources in any group will be online. In other words, if the core resources take too long to be available or if the core resources frequently goes offline, then it means that the entire cluster group is failing frequently causing inconvenience to the users using the cluster. Administrators should therefore, continuously keep track on the current state of the core resources to proactively detect any abnormalities with respect the state of the core resources. The **Failover Cluster Core Resources** helps administrators in this regard.

This test auto-discovers the core resources of a cluster group and reports the current state of each core resource. This way, administrators may proactively be alerted to abnormalities, if any.

Target of the test : A node in a Windows cluster

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each core resource of the cluster group

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. **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**.
4. **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.

Measurements made by the test

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td>Core resource status:</td><td>Indicates the current state of this core resource.</td><td></td><td>The values that this measure can report and the states they indicate have been listed in the table below:
<table>
<tr><th>State</th><th>Numeric value</th></tr>
<tr><td>Online</td><td>100</td></tr>
<tr><td>Failed</td><td>90</td></tr>
<tr><td>Offline</td><td>80</td></tr>
<tr><td>Unknown</td><td>10</td></tr>
<tr><td>Inherited</td><td>30</td></tr>
<tr><td>Initializing</td><td>50</td></tr>
<tr><td>Pending</td><td>60</td></tr>
<tr><td>Offline Pending</td><td>65</td></tr>
<tr><td>Online Pending</td><td>70</td></tr>
</table>
<b>Note:</b>
By default, this measure can report the <b>State</b>s mentioned above while indicating the current state of each core resource. However, the graph of this measure is indicated using</td></tr>
</table>

Measurement	Description	Measurement Unit	Interpretation
			the numeric equivalents. The detailed diagnosis of this measure lists the owner node, the type of the core resource and the cluster group.

4.5.9 Failover Cluster Network Connections Test

A failover cluster requires network connectivity among nodes and between clients and nodes. Problems with a network adapter or Ethernet ports or other network device (either physical problems or configuration problems) can interfere with connectivity. Administrators should therefore check the connectivity status of the network adapters/devices/Ethernet ports round the clock to avoid failure of the failover cluster. The **Failover Cluster Network Connections** test helps administrators in this regard!

This test reports the current network connection state of each Ethernet port in the failover cluster. Using this test, administrators can proactively detect abnormalities in the failover cluster and maintain communication between the clients and nodes within the cluster.

Target of the test : A node in a Windows cluster

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each Ethernet port in the failover cluster being monitored

Configurable parameters for the test

1. **TEST PERIOD** – How often should the test be executed
2. **HOST -** The IP address of the host for which the test is to be configured.
3. **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.

Measurements made by the test

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td>Network connection status:</td><td>Indicates the current network connection status of each Ethernet port in this cluster.</td><td></td><td>The values that this measure can report and the states they indicate have been listed in the table below:
<table>
<tr><th>State</th><th>Numeric value</th></tr>
<tr><td>Up</td><td>100</td></tr>
<tr><td>Available</td><td>70</td></tr>
<tr><td>Failed</td><td>50</td></tr>
<tr><td>Unreachable</td><td>30</td></tr>
<tr><td>Unknown</td><td>10</td></tr>
</table>
<b>Note:</b>
By default, this measure can report the <b>State</b> mentioned above while indicating the current network connection state of each Ethernet port. However, the graph of this measure is indicated using the numeric equivalents.
The detailed diagnosis of this measure lists the name of the network, the name of the adapter, the ID of the network adapter and the IP address.</td></tr>
</table>

4.5.10 Failover Cluster WMI Connectivity Test

WMI is Windows Management Instrumentation, which is an interface through which Windows components can provide information and notifications to each other, often between remote computers. Failover Clustering and System Center Virtual Machine Manager (SCVMM) often use WMI to communicate between cluster nodes, so if there is an issue contacting a cluster node, it is primarily essential to see if the WMI service is up and running. In some cases, the cluster nodes may not be able to communicate with each other even when the WMI service is up and running much to the agony of the administrators. To troubleshoot this communication failure, administrators should often verify if the namespace of the WMI service for the cluster is available to all the cluster nodes. The **Failover Cluster WMI Connectivity** test comes in handy to the administrators in this regard!

This test reports the current state of the WMI service and if the WMI service is running, this test will also report the connectivity status of the failover cluster WMI.

Target of the test : A node in a Windows cluster

Agent deploying the test : An internal agent

Outputs of the test : One set of results for the WMI service of the cluster node being monitored

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.

Measurements made by the test

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td>WMI service status:</td><td>Indicates the current state of the WMI service.</td><td></td><td>The values that this measure can report and the states they indicate have been listed in the table below:
<table>
<tr><th>State</th><th>Numeric value</th></tr>
<tr><td>Running</td><td>100</td></tr>
<tr><td>Start</td><td>90</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td></td><td></td><td></td><td>
<table>
<tr><th>State</th><th>Numeric value</th></tr>
<tr><td>Pending</td><td></td></tr>
<tr><td>Continue Pending</td><td>70</td></tr>
<tr><td>Pause Pending</td><td>60</td></tr>
<tr><td>Paused</td><td>50</td></tr>
<tr><td>Stop Pending</td><td>20</td></tr>
<tr><td>Stopped</td><td>10</td></tr>
</table>
<b>Note:</b>
By default, this measure can report the <b>State</b>s mentioned above while indicating the current state of the WMI. However, the graph of this measure is indicated using the numeric equivalents.
</td></tr>
<tr><td>Failover cluster WMI connectivity:</td><td>Indicates the connectivity status of the failover clustering WMI.</td><td></td><td>
The values that this measure can report and the states they indicate have been listed in the table below:
<table>
<tr><th>State</th><th>Numeric value</th></tr>
<tr><td>Connected</td><td>100</td></tr>
<tr><td>Not Connected</td><td>90</td></tr>
<tr><td>Not Installed</td><td>70</td></tr>
</table>
<b>Note:</b>
By default, this measure can report the <b>States</b> mentioned above while
</td></tr>
</table>

Measurement	Description	Measurement Unit	Interpretation
			indicating the connectivity status of the failover clustering WMI. However, the graph of this measure is indicated using the numeric equivalents.

4.6 The Application Processes Layer

To monitor the resource usage of critical processes on a Windows host, the **Application Processes** layer of the Windows server executes the Processes test.

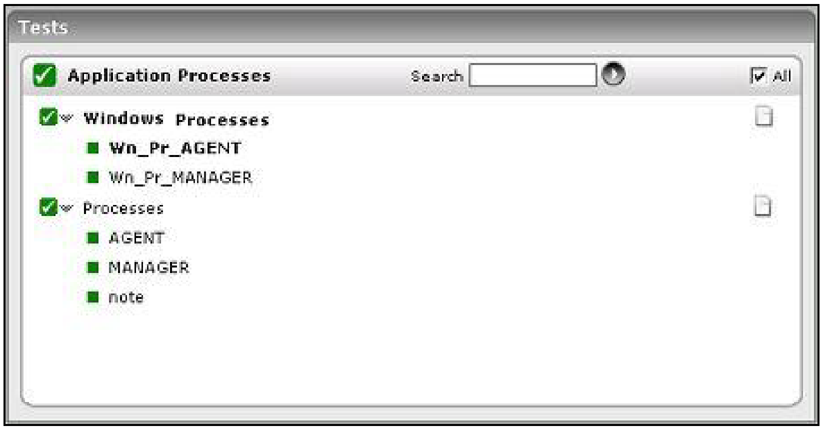


Figure 4.26: The tests mapped to the Application Processes layer of a Windows Generic server

In addition to the **Processes** test, the **Application Processes** layer of a Windows server is associated with a **Windows Processes** test, which has been discussed in the following section.

4.6.1 Windows Processes Test

The Windows Processes test reports additional statistics pertaining to processes running on Microsoft Windows systems.

Target of the test : A Windows host

Agent deploying the test : An internal agent

Outputs of the test : One set of results per process pattern specified

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. **PROCESS -** In the **PROCESS** text box, enter a comma separated list of names:pattern pairs which identify the process(es) associated with the server being considered. processName is a string that will be used for display purposes only. processPattern is an expression 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 example, to monitor the Word and Powerpoint applications on a system, in the **PROCESS** text box, enter *officeProcess:*winword*,*power**, where * denotes zero or more characters.

   To save the time and effort involved in such manual process specification, eG Enterprise offers an easy-to-use auto-configure option in the form of a **View/Configure** button that is available next to the PROCESS text box. Refer to Section 2.1.5.1.1 of this document o know how to use the auto-configure option.

5. **WIDE -** On Windows environments, by default, the eG agent uses *perfmon* to search for the processes that match the configured patterns. Accordingly, the **WIDE** parameter is set to **false** by default. Typically, a process definition in Windows includes the *full path to the process*, the *process name*, and *process arguments* (if any). *Perfmon* however scans the system only for *process names* that match the configured patterns – in other words, the process path and arguments are ignored by *perfmon*. This implies that if multiple processes on a Windows host have the same name as specified against **PROCESS**, then *perfmon* will only be able to report the overall resource usage across all these processes; it will not provide any pointers to the exact process that is eroding the host's resources. To understand this better, consider the following example. Typically, Windows represents any Java application executing on it as *java.exe*. Say, two Java applications are executing on a Windows host, but from different locations.

   If *java.exe* has been configured for monitoring, then by default, *perfmon* will report the availability and average resource usage of both the Java applications executing on the host. If say, one Java application goes down, then *perfmon* will not be able to indicate accurately which of the two Java applications is currently inaccessible.

   Therefore, to enable administrators to easily differentiate between processes with the same name, and to accurately determine which process is unavailable or resource-hungry, the eG agent should be configured to perform its process searches based on the process path and/or process arguments, and not just on the process name – in other words, the eG agent should be configured **not to use perfmon**.

To achieve this, first, set the **WIDE** parameter to **Yes**. This will instruct the eG agent to not use perfmon to search for the configured process patterns. Once this is done, then, you can proceed to configure a **PROCESSPATTERN** that includes the process arguments and/or the process path, in addition to the *process* name. For instance, if both the *Remote Access Connection Manager* service and the *Terminal Services* service on a Windows host, which share the same name – svchost - are to be monitored as two different processes, then your **PROCESSPATTERN** specification should be as follows:

Terminal:C:\WINDOWS\System32\svchost- k DcomLaunch,Remote:C:\WINDOWS\system32\ svchost.exe-knetsvcs

You can also use wildcard characters, wherever required. For instance, in the above case, your **PROCESSPATTERN** can also be:

*Terminal:*svchost -k DcomLaunch,Remote:*svchost.exe -k netsvcs*

Similarly, to distinctly monitor two processes having the same name, but operating from different locations, your specification can be:

JavaC:c:\javaapp\java.exe,JavaD:d:\app\java.exe

Note:

- Before including process paths and/or arguments in your **PROCESSPATTERN** configuration, make sure that the **WIDE** parameter is set to **true**. If not, the test will not work.
- If your **PROCESSPATTERN** configuration includes a process path that refers to the *Program Files* directory, then make sure that you **do not include a ~** (tilde) while specifying this directory name. For instance, your **PROCESSPATTERN** specification should not be say, Adobe:*C:\Progra~1\Adobe\AcroRd32.exe*

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Number of processes running:	Indicates the number of processes that are currently running.	Number	

Measurement	Description	Measurement Unit	Interpretation
Handle count:	Indicates the number of handles opened by the process.	Number	An increasing trend in this measure is indicative of a memory leak in the process.
Number of threads:	Indicates the number of threads that are used by the process.	Number	
Virtual memory used:	Indicates the amount of virtual memory that is being used by the process.	MB	
I/O data rate:	Indicates the rate at which processes are reading and writing bytes in I/O operations.	Kbytes/Sec	This value counts all I/O activity generated by each process and includes file, network and device I/Os.
I/O data operations:	Indicates the rate at which the process 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 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 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 all matching	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

Measurement	Description	Measurement Unit	Interpretation
	processes.		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 a process.	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. If a process pattern matches multiple processes, the memory working set reported is the sum of the working sets for the processes that match the specified pattern. Detailed diagnosis for this test provides details of the individual processes and their individual working sets. Comparing the working set across processes indicates which process (es) are taking up excessive memory. By tracking the working set of a process over time, you can determine if the application has a memory leak or not.

4.6.2 eG Agent JVM Memory Test

This test enables eG users to quickly detect and troubleshoot memory contentions in the eG agent's JVM. By monitoring how the eG agent's JVM is utilizing the memory available to it, the test proactively alerts eG users if it finds that the JVM is running out of free memory. This way, eG users are warned of probable slowness or failure of the eG agent that may be caused due to the lack of memory. Based on the usage reports provided by this test, eG users can figure out how to size the JVM, so as to ensure the continuous availability and peak performance of the eG agent.

Target of the test : Any system hosting the eG agent

Agent deploying the test : An internal agent

Outputs of the test : One set of results for the host being monitored

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 at which the specified **HOST** listens

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Maximum memory:	Returns the maximum amount of memory that the Java virtual machine will attempt to use. If there is no inherent limit then the maximum value will be returned.	MB	If you had configured the eG agent's –Xmx setting with 512M, then the value of this measure will be 512 MB.
Current total memory:	Returns the total amount of memory in the Java virtual machine. The value returned by this method may vary over time, depending on the host environment.	MB	If you had configured the eG agent's –Xrs setting with 214M, then the value of this measure will be 214 MB.
Current used	Indicates the amount of	MB	The value of this measure is the

Measurement	Description	Measurement Unit	Interpretation
memory:	memory that the JVM is using for the eG agent.		difference between the value of the Current total memory and Current free memory measures. Ideally, the value of this measure should be low. A consistent rise in this value is a cause for concern.
Current free memory:	Indicates the amount of free memory in the JVM.	MB	Ideally, the value of this measure should be high. A consistent drop in this value is a cause for concern.
Maximum memory usage:	Indicates the percentage of maximum memory that is used by the eG agent.	Percent	The formula for calculating this measure is: *(Current used memory / Maximum memory) *100* Ideally, the value of this measure should be low. If this value keeps growing closer to 100%, it indicates excessive memory usage by the eG agent, which in turn may cause the agent to fail or slow down. You may want to change the maximum memory configuration of the eG agent to avoid such an eventuality.

Note:

The **Application Processes** layer is also mapped to a **Tcp Port Status** test, which is disabled by default for the *Windows Generic* sever, just as in the case of the *Generic* server.

4.7 The Windows Service Layer

This layer, which is available only for Windows-based applications, represents the different services of the corresponding Windows components in the environment. An eG agent uses

WindowsServices test to track the health of this layer. In addition, the layer also periodically monitors the application, security, and system-related events that occur on the target Windows host.

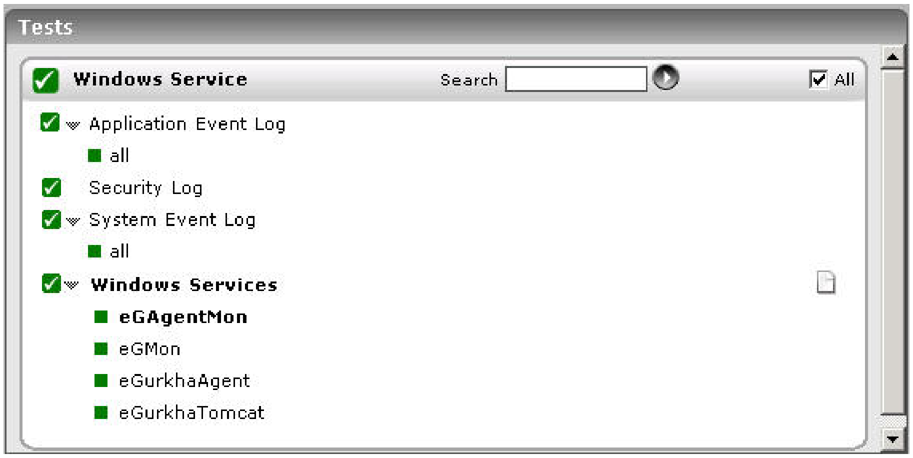


Figure 4.27: The tests mapped to the Windows Service layer of a Windows Generic server

4.7.1 Windows Services Test

Many server applications in Windows environments run as background services. The WindowsServices test checks the availability of the service that corresponds to an application.

Target of the test : An IIS web server

Agent deploying the test : An internal/remote agent

Outputs of the test : One set of results for every Service name that has been configured.

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. **SERVICENAME -** Name of the service that is to be checked. More than one service name can also be provided with comma as the separator.

   Note:

   - When configuring the **SERVICENAME**, make sure that you specify the **Display Name**of the service, and not the service **Name** you see in the **Services** window on your Windows host.
   - When monitoring an MS SQL server, the **SERVICE** parameter will be set to *MSSQLServer*

by default. However, if the MS SQL server being monitored was installed using a named instance, the SQL service name will change. In such a case therefore, ensure that the **SERVICE** parameter is reconfigured to reflect the correct service name.

To save the time and effort involved in manual service specification, eG Enterprise offers an easy-to-use auto-configure option in the form of a **View/Configure** button that is available next to the **SERVICENAME** text box. Refer to Auto-configuring the Windows Services to be Monitored for details on how to use this option.

5. **CORRECT -** Increased uptime and lower mean time to repair are critical to ensuring that IT infrastructures deliver a high quality of service to users. Towards this end, the eG Enterprise suite embeds an optional auto-correction capability that enables eG agents to automatically correct problems in the environment, as soon as they occur. With this capability, as and when an abnormal situation is detected, an eG agent can initiate corrective actions automatically to resolve the problem. Automatic correction without the need for manual intervention by IT operations staff reduces service downtime and improves operational efficiency. By default, the auto-correction capability is available in the eG Enterprise suite for the Num_procs_running measure of ProcessTest, and the Availability measure of WinServiceTest. The eG Enterprise suite includes a default auto-correction script for WinServiceTest, which executes when the service that the eG agent has been configured to monitor, stops. To enable the auto-correction capability of the WinServiceTest, first, select the **TRUE** option against the **CORRECT** parameter in this page (by default, **FALSE** will be selected here).
6. **ALARMTYPE -** Upon selecting the TRUE option, two new parameters, namely, **ALARMTYPE**, **USERPARAMS**, and **CORRECTIVESCRIPT** will appear. The **ALARMTYPE** parameter indicates when the auto-corrective script should execute. You can set the corrective script to execute when a specific type of alarm is generated, by selecting an option from the **ALARMTYPE** list box. For example, if the Critical option is chosen from the **ALARMTYPE** list box, then the corrective script will run only when a critical alarm for the WinServiceTest is generated. Similarly, if the *Critical/Major* option is chosen, then the corrective script will execute only when the eG Enterprise system generates critical or major alarms for the WinServiceTest. In order to ensure that the corrective script executes regardless of the alarm type, select the *Critical/Major/Minor* option.
7. **USERPARAMS -** The default script for WinServiceTest takes no parameters. Therefore, specify *none* against USERPARAMS.
8. **CORRECTIVESCRIPT -** The **CORRECTIVESCRIPT** text box can also contain *none*, so that the default script is automatically associated with the test. Administrators can build new auto-correction capabilities to address probable issues with other tests, by writing their own corrective scripts. To know how to create custom auto-correction scripts, refer to the eG User

Manual.

9. **ISPASSIVE** – If the value chosen is YES, then the server under consideration is a passive server in a cluster. No alerts will be generated if the server is not running. Measures will be reported as “Not applicable’ by the agent if the server is not up.

Measurements made by the test

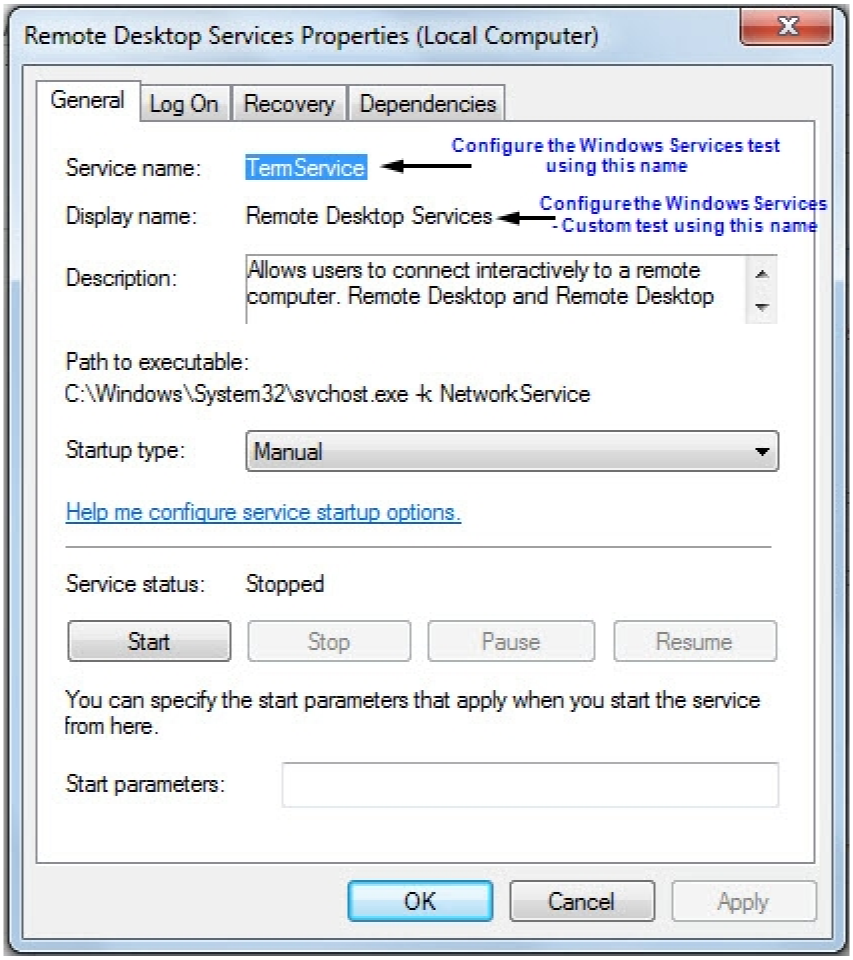
<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td>Service availability:</td><td>Indicates the availability of the service.</td><td>Percent</td><td>A value of 100 indicates that the specified service has been configured and is currently executing. A value of 0 for this measure indicates that the specified service has been configured on the server but is not running at this time. A value of – 1 indicates that the service has not been configured on the target system.</td></tr>
<tr><td>Service state :</td><td>Indicates the current state of this service.</td><td></td><td>The values that this measure can report and their corresponding numeric values are discussed in the table below:
<table>
<tr><th>Measure Value</th><th>Numeric Value</th></tr>
<tr><td>Running</td><td>1</td></tr>
<tr><td>StartPending</td><td>2</td></tr>
<tr><td>Stopped</td><td>3</td></tr>
<tr><td>StopPending</td><td>4</td></tr>
<tr><td>Paused</td><td>5</td></tr>
<tr><td>PausePending</td><td>6</td></tr>
</table>
<b>Note:</b>
By default, this measure reports the</td></tr>
</table>

Measurement	Description	Measurement Unit	Interpretation
			Measure Values listed in the table above to indicate service state. However, in the graph of this measure, service state is represented using the corresponding numeric equivalents only.

4.7.2 Windows Services – Custom Test

Like the **Windows Services** test, the **Windows Services – Custom** test too reports whether/not specified services are available on the Windows host. Here again, the intent is to alert administrators when services associated with critical Windows applications inadvertently stop. The difference between these two tests however, lies in how these services are to be configured for monitoring. While the **Windows Services** test needs to be configured with the Display name of the services, the **Windows Services – Custom** test needs to be configured with the actual Service names.

For instance, if the RDP service on a Windows host is to be monitored for availability, use Figure 4.28 to understand how this service is to be configured for the **Windows Services** and the **Windows Services – Custom** tests.


Remote Desktop Services Properties (Local Computer)
General
Log On
Recovery
Dependencies
Help me configure service startup options.
Start
Stop
Pause
Resume
OK
Cancel
Apply

Service name: TermService

Configure the Windows Services test using this name

Display name: Remote Desktop Services

Configure the Windows Services - Custom test using this name

Description: Allows users to connect interactively to a remote computer. Remote Desktop and Remote Desktop

Path to executable:
C:\Windows\System32\svchost.exe -k NetworkService

Startup type: Manual

Service status: Stopped

You can specify the start parameters that apply when you start the service from here.

Start parameters:

Figure 4.28: The Service Properties window

Target of the test : A Windows host

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every Service name that has been configured.

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. **SERVICENAME -** Name of the service that is to be checked. More than one service name can also be provided with comma as the separator.

   Note:

When configuring the **SERVICENAME**, make sure that you specify the **Service Name** and not the **Display Name** of the service.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Service availability:	Indicates the availability of the service.	Percent	A value of 100 indicates that the specified service has been configured and is currently executing. A value of 0 for this measure indicates that the specified service has been configured on the server but is not running at this time. A value of –1 indicates that the service has not been configured on the target system.

4.7.3 Application Event Log Test

This test reports the statistical information about the application events generated by the target system.

Target of the test : Unix/ Windows Server

Agent deploying the test :

Outputs of the test : One set of results for the **FILTER** configured

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** – Refers to the port used by the EventLog Service. Here it is null.
4. **LOGTYPE** – Refers to the type of event logs to be monitored. The default value is *application*.
5. **POLICY BASED FILTER -** Using this page, administrators can configure the event sources, event IDs, and event descriptions to be monitored by this test. In order to enable administrators to

easily and accurately provide this specification, this page provides the following options:

- Manually specify the event sources, IDs, and descriptions in the **FILTER** text area, or,
- Select a specification from the predefined filter policies listed in the **FILTER** box

For explicit, manual specification of the filter conditions, select the **NO** option against the **POLICY BASED FILTER** field. This is the default selection. To choose from the list of pre-configured filter policies, or to create a new filter policy and then associate the same with the test, select the **YES** option against the **POLICY BASED FILTER** field.

6. **FILTER** - If the **POLICY BASED FILTER** flag is set to **NO**, then a **FILTER** text area will appear, wherein you will have to specify the event sources, event IDs, and event descriptions to be monitored. This specification should be of the following format: *{Displayname}:{event_sources_to_be_included}:{event_ sources_ to_ be_ excluded}: {event_ IDs_ to_ be_ included}: {event_ IDs_ to_ be_ excluded}:{event_descriptions_to_be_included}:{event_descriptions_to_be_excluded}*. For example, assume that the **FILTER** text area takes the value, *OS_ events:all:Browse,Print:all:none:all:none*. Here:

- *OS_events* is the display name that will appear as a descriptor of the test in the monitor UI;
- *all* indicates that all the event sources need to be considered while monitoring. To monitor specific event sources, provide the source names as a comma-separated list. To ensure that none of the event sources are monitored, specify *none*.
- Next, to ensure that specific event sources are excluded from monitoring, provide a comma-separated list of source names. Accordingly, in our example, *Browse* and *Print* have been excluded from monitoring. Alternatively, you can use all to indicate that all the event sources have to be excluded from monitoring, or none to denote that none of the event sources need be excluded.
- In the same manner, you can provide a comma-separated list of event IDs that require monitoring. The all in our example represents that all the event IDs need to be considered while monitoring.
- Similarly, the *none* (following *all* in our example) is indicative of the fact that none of the event IDs need to be excluded from monitoring. On the other hand, if you want to instruct the eG Enterprise system to ignore a few event IDs during monitoring, then provide the IDs as a comma-separated list. Likewise, specifying *all* makes sure that all the event IDs are excluded from monitoring.
- The *all* which follows implies that all events, regardless of description, need to be included for monitoring. To exclude all events, use *none*. On the other hand, if you provide a comma-

separated list of event descriptions, then the events with the specified descriptions will alone be monitored. Event descriptions can be of any of the following forms - *desc**, or *desc*, or **desc**,or *desc**, or *desc1*desc2*, etc. *desc* here refers to any string that forms part of the description. A leading '*' signifies any number of leading characters, while a trailing '*' signifies any number of trailing characters.

- In the same way, you can also provide a comma-separated list of event descriptions to be excluded from monitoring. Here again, the specification can be of any of the following forms: *desc**, or *desc*, or **desc**,or *desc**, or *desc1*desc2*, etc. *desc* here refers to any string that forms part of the description. A leading '*' signifies any number of leading characters, while a trailing '*' signifies any number of trailing characters. In our example however, none is specified, indicating that no event descriptions are to be excluded from monitoring. If you use *all* instead, it would mean that all event descriptions are to be excluded from monitoring.

By default, the **FILTER** parameter contains the value: *all:all:none:all:none:all:none*. Multiple filters are to be separated by semi-colons (;).

Note:

The event sources and event IDs specified here should be exactly the same as that which appears in the Event Viewer window.

On the other hand, if the **POLICY BASED FILTER** flag is set to **YES**, then a **FILTER** list box will appear, displaying the filter policies that pre-exist in the eG Enterprise system. A filter policy typically comprises of a specific set of event sources, event IDs, and event descriptions to be monitored. This specification is built into the policy in the following format:

{Policyname}:{event_sources_to_be_included}:{event_sources_to_be_excluded}:{event_IDs_to_be_included}:{event_IDs_to_be_excluded}:{event_descriptions_to_be_included}:{event_descriptions_to_be_excluded}

To monitor a specific combination of event sources, event IDs, and event descriptions, you can choose the corresponding filter policy from the **FILTER** list box. Multiple filter policies can be so selected. Alternatively, you can modify any of the existing policies to suit your needs, or create a new filter policy. To facilitate this, a **Click here** link appears just above the test configuration section, once the **YES** option is chosen against **POLICY BASED FILTER**. Clicking on the **Click here** link leads you to a page where you can modify the existing policies or create a new one (refer to page Section). The changed policy or the new policy can then be associated with the test by selecting the policy name from the **FILTER** list box in this page.

7. **USEWMI -** The eG agent can either use WMI to extract event log statistics or directly parse the

event logs using event log APIs. If the **USEWMI** flag is **YES**, then WMI is used. If not, the event log APIs are used. This option is provided because on some Windows NT/2000 systems (especially ones with service pack 3 or lower), the use of WMI access to event logs can cause the CPU usage of the *WinMgmt* process to shoot up. On such systems, set the **USEWMI** parameter value to **NO**. On the other hand, when monitoring systems that are operating on any other flavor of Windows (say, Windows 2003/XP/2008/7/Vista/12), the **USEWMI** flag should always be set to '**Yes**'.

8. **STATELESS ALERTS -** Typically, the eG manager generates email alerts only when the state of a specific measurement changes. A state change typically occurs only when the threshold of a measure is violated a configured number of times within a specified time window. While this ensured that the eG manager raised alarms only when the problem was severe enough, in some cases, it may cause one/more problems to go unnoticed, just because they did not result in a state change. For example, take the case of the EventLog test. When this test captures an error event for the very first time, the eG manager will send out a **CRITICAL** email alert with the details of the error event to configured recipients. Now, the next time the test runs, if a different error event is captured, the eG manager will keep the state of the measure as **CRITICAL**, but will not send out the details of this error event to the user; thus, the second issue will remain hidden from the user. To make sure that administrators do not miss/overlook critical issues, the eG Enterprise monitoring solution provides the **stateless alerting** capability. To enable this capability for this test, set the **STATELESS ALERTS** flag to **Yes**. This will ensure that email alerts are generated for this test, regardless of whether or not the state of the measures reported by this test changes.

9. **EVENTS DURING RESTART** - By default, the EVENTS DURING RESTART flag is set to **Yes**. This ensures that whenever the agent is stopped and later started, the events that might have occurred during the period of non-availability of the agent are included in the number of events reported by the agent. Setting the flag to **No** ensures that the agent, when restarted, ignores the events that occurred during the time it was not available.

10. **DDFORINFORMATION** – eG Enterprise also provides you with options to restrict the amount of storage required for event log tests. Towards this end, the **DDFORINFORMATION** and **DDFORWARNING** flags have been made available in this page. By default, both these flags are set to **Yes**, indicating that by default, the test generates detailed diagnostic measures for information events and warning events. If you do not want the test to generate and store detailed measures for information events, set the **DDFORINFORMATION** flag to **No**.

11. **DDFORWARNING** – To ensure that the test does not generate and store detailed measures for warning events, set the **DDFORWARNING** flag to **No**.

12. **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**.

13. **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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Application errors:	This refers to the number of application error events that were generated.	Number	A very low value (zero) indicates that the system is in a healthy state and all applications are running smoothly without any potential problems. An increasing trend or high value indicates the existence of problems like loss of functionality or data in one or more applications. Please check the Application Logs in the Event Log Viewer for more details.
Application information count:	This refers to the number of application information events generated when the	Number	A change in the value of this measure may indicate infrequent but successful operations performed by one or more applications.

Measurement	Description	Measurement Unit	Interpretation
	test was last executed.		Please check the Application Logs in the Event Log Viewer for more details.
Application warnings:	This refers to the number of warnings that were generated when the test was last executed.	Number	A high value of this measure indicates application problems that may not have an immediate impact, but may cause future problems in one or more applications. Please check the Application Logs in the Event Log Viewer for more details.
Application critical errors:	Indicates the number of critical events that were generated when the test was last executed.	Number	A critical event is one that an application or a component cannot automatically recover from. **This measure is applicable only for Windows 2008/Windows Vista/Windows 7 systems.** A very low value (zero) indicates that the system is in a healthy state and all applications are running smoothly without any potential problems. An increasing trend or high value indicates the existence of fatal/irrepairable problems in one or more applications. The detailed diagnosis of this measure describes all the critical application events that were generated during the last measurement period. Please check the Application Logs in

Measurement	Description	Measurement Unit	Interpretation
			the Event Log Viewer for more details.
Application verbose:	Indicates the number of verbose events that were generated when the test was last executed.	Number	Verbose logging provides more details in the log entry, which will enable you to troubleshoot issues better. **This measure is applicable only for Windows 2008/Windows Vista/Windows 7 systems.** The detailed diagnosis of this measure describes all the verbose events that were generated during the last measurement period. Please check the Application Logs in the Event Log Viewer for more details.

The filter policy for the ApplicationEventLog test, ApplicationEvents test, SystemEvents test, and SystemEventLog test typically comprises of a specific set of event sources, event IDs, and event descriptions to be monitored. This specification is expressed by the eG Enterprise system in the following format:

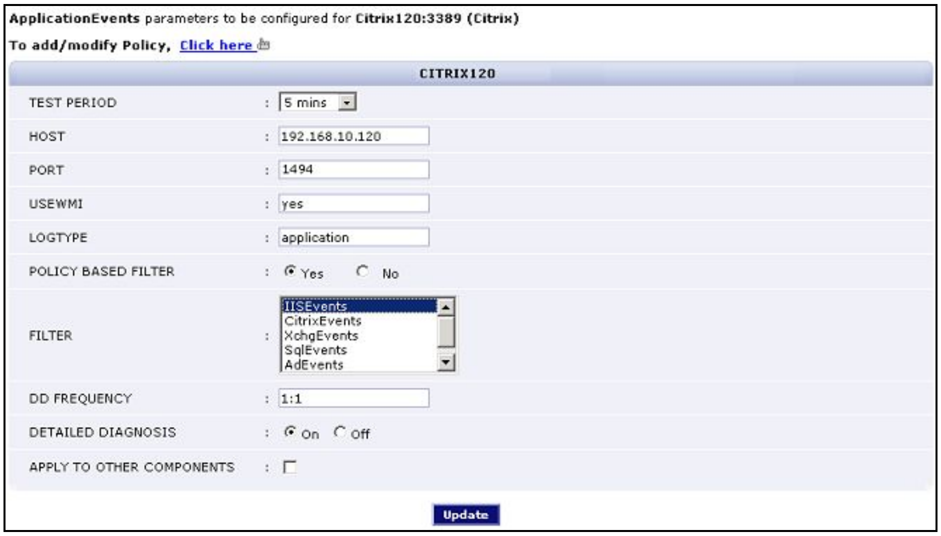
```
{Policyname}:{event_sources_to_be_included}:{event_sources_to_be_excluded}:{event_IDs_to_
be_included}:{event_IDs_to_be_excluded}:{event_descriptions_to_be_included}:{event_
descriptions_to_be_excluded}
```

On the other hand, the filter policy for the SecurityLog test comprises of a specific set of event sources, event ids, and users to be monitored. This specification is expressed by the eG Enterprise system in the following format:

```
{Policyname}:{event_sources_to_be_included}:{event_sources_to_be_excluded}:{event_IDs_to_
be_included}:{event_IDs_to_be_excluded}:{users_to_be_included}:{users_to_be_excluded}
```

To add a new policy, do the following:

1. Click on the **Click here** hyperlink available just above the test configuration of the ApplicationEventLog test, ApplicationEvents test, SystemEvents test, SystemEventLog test, or SecurityLog test (see Figure 4.29).



ApplicationEvents parameters to be configured for **Citrix120:3389 (Citrix)**

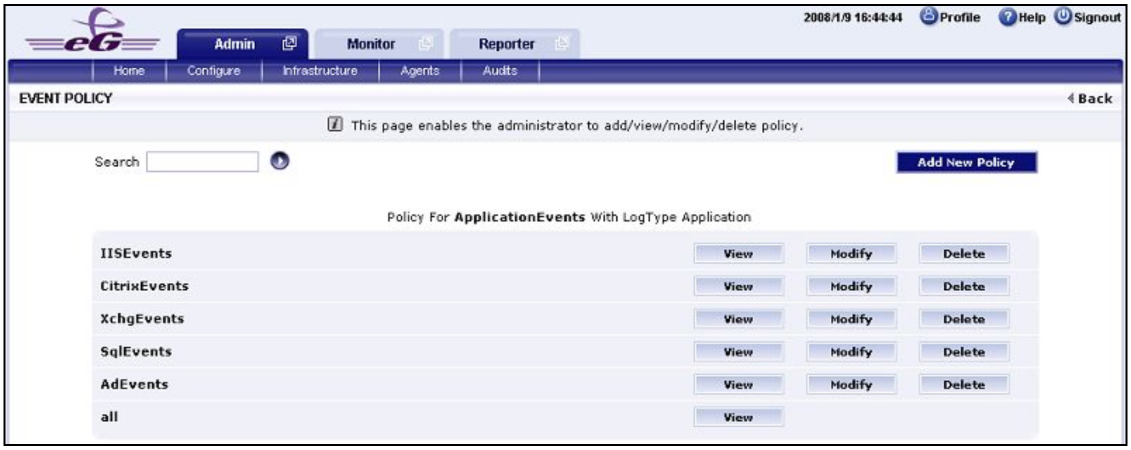
To add/modify Policy, Click here

CITRIX120

TEST PERIOD	:	5 mins
HOST	:	192.168.10.120
PORT	:	1494
USEWMI	:	yes
LOGTYPE	:	application
POLICY BASED FILTER	:	● Yes ○ No
FILTER	:	IISEvents CitrixEvents XchgEvents SqlEvents AdEvents
DD FREQUENCY	:	1:1
DETAILED DIAGNOSIS	:	● On ○ Off
APPLY TO OTHER COMPONENTS	:	□

Figure 4.29: Figure 3. 29: Configuring an ApplicationEvents test

2. Figure 4.30 will then appear listing the policies that pre-exist.



EVENT POLICY

This page enables the administrator to add/view/modify/delete policy.

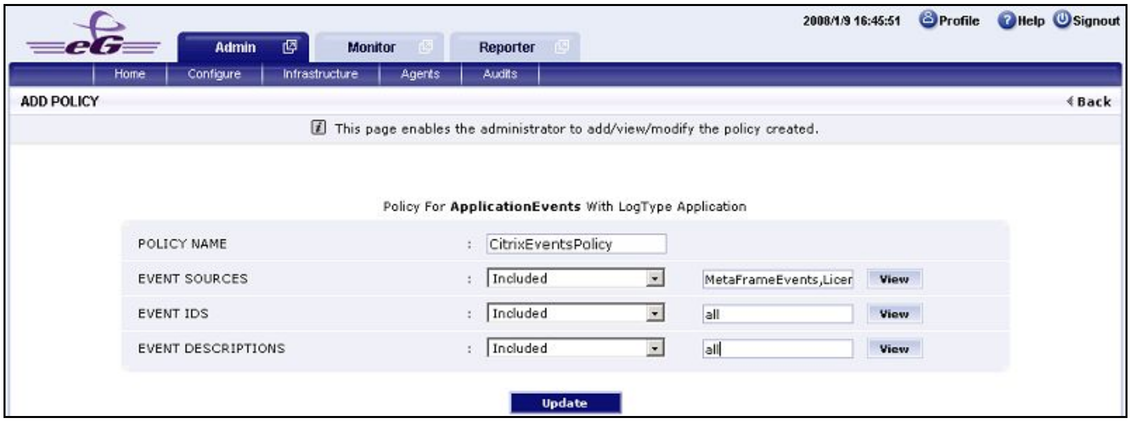
Policy For **ApplicationEvents** With LogType Application

IISEvents	View	Modify	Delete
CitrixEvents	View	Modify	Delete
XchgEvents	View	Modify	Delete
SqlEvents	View	Modify	Delete
AdEvents	View	Modify	Delete
all	View		

Figure 4.30: List of policies

3. To view the contents of a policy, click on the **View** button against the policy name. While a policy can be modified by clicking on the **Modify** button, it can be deleted using the **Delete** button. The default policy is all, which can only be viewed and not modified or deleted. The specification contained within this policy is: *all:none:all:none:all:none*.

4. To create a new policy, click on the **Add New Policy** button in Figure 4.30. Doing so invokes Figure 4.31, using which a new policy can be created.



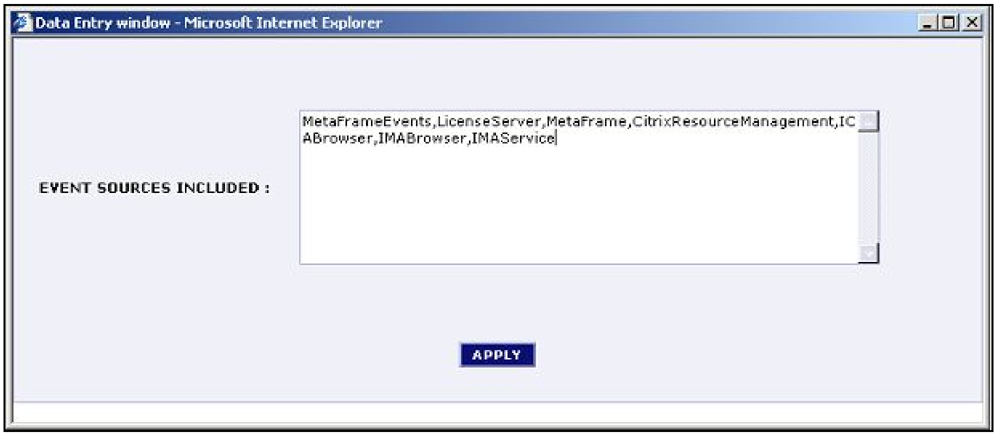
Policy For **ApplicationEvents** With LogType Application

POLICY NAME	:	CitrixEventsPolicy	
EVENT SOURCES	:	Included	MetaFrameEvents,Licer
EVENT IDS	:	Included	all
EVENT DESCRIPTIONS	:	Included	all

Figure 4.31: Adding a new filter policy

5. In Figure 4.31, first, provide a unique name against **POLICY NAME**.

6. To include one/more event sources for monitoring, select **Included** from the **EVENT SOURCES** drop-down list, and then specify a comma-separated list of event sources in the adjacent text box. If you require more space to specify the event sources, click on the **View** button next to the text box. This will invoke an **EVENT SOURCES INCLUDED** text area (see Figure 4.32), wherein the specification can be provided more clearly and comfortably.



EVENT SOURCES INCLUDED : MetaFrameEvents,LicenseServer,MetaFrame,CitrixResourceManagement,ICABrowser,IMABrowser,IMAService

Figure 4.32: Viewing the text area

7. To exclude specific event sources from monitoring, select **Excluded** from the **EVENT SOURCES** drop-down list, and then specify a comma-separated list of event sources to be excluded in the adjacent text box. If you require more space to specify the event sources, click on the **View** button next to the text box. This will invoke an **EVENT SOURCES EXCLUDED** text area, wherein the specification can be provided more clearly and comfortably.

Note:

At any given point in time, you can choose to either **Include** or **Exclude** event sources, but you cannot do both. If you have chosen to include event sources, then the eG Enterprise system automatically assumes that no event sources need be excluded. Accordingly, the *{event_ sources_to_be_excluded}* section of the filter format mentioned above, will assume the value *none*. Similarly, if you have chosen to exclude specific event sources from monitoring, then the *{event_sources_to_be_included}* section of the format above will automatically take the value *all*, indicating that all event sources except the ones explicitly excluded, will be included for monitoring.

8. In the same way, select **Included** from the **EVENT IDS** list and then, provide a comma-separated list of event IDs to be monitored. For more space, click on the **View** button next to the text box, so that an **EVENT IDS INCLUDED** text area appears.
9. If you, on the other hand, want to exclude specific event IDs from monitoring, then first select **Excluded** from the **EVENT IDS** list box, and then provide a comma-separated list of event IDs to be excluded. For more space, click on the **View** button next to the text box, so that an **EVENT IDS EXCLUDED** text area appears.

   Note:

   At any given point in time, you can choose to either **Include** or **Exclude** event IDs, but you cannot do both. If you have chosen to include event IDs, then the eG Enterprise system automatically assumes that no event IDs need be excluded. Accordingly, the *{event_IDs_to_be_ excluded}* section of the filter format mentioned above, will assume the value *none*. Similarly, if you have chosen to exclude specific event IDs from monitoring, then the *{event_IDs_to_be_ included}* section of the format above will automatically take the value *all*, indicating that all event IDs except the ones explicitly excluded, will be included for monitoring.

10. Likewise, select **Included** from the **EVENT DESCRIPTIONS** list and then, provide a comma-separated list of event descriptions to be monitored. For more space, click on the **View** button next to the text box, so that an **EVENT DESCRIPTIONS INCLUDED** text area appears.
11. For excluding specific event descriptions from monitoring, first select **Excluded** from the **EVENT DESCRIPTIONS** list box, and then provide a comma-separated list of event descriptions to be excluded. For more space, click on the **View** button next to the text box, so that an **EVENT DESCRIPTIONS EXCLUDED** text area appears.

    Note:

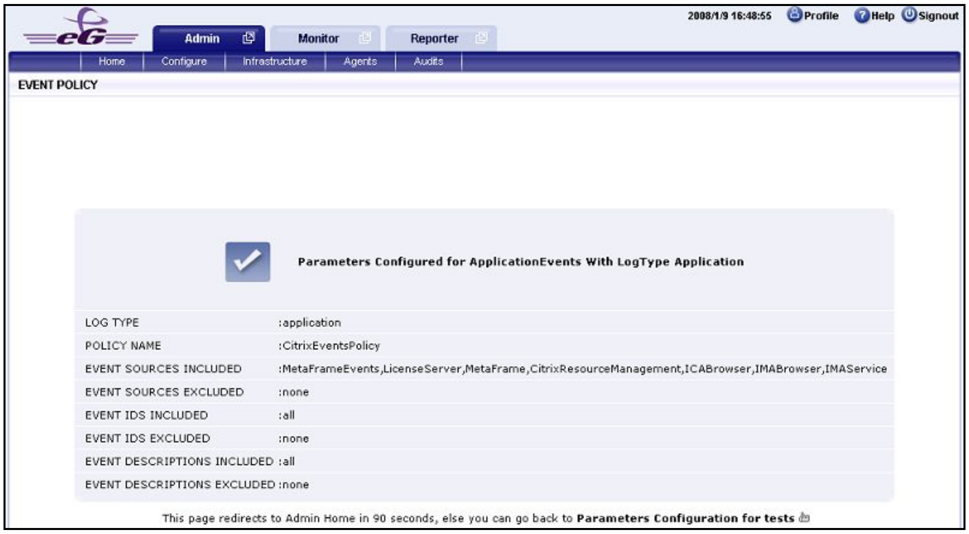
    Instead of the complete event descriptions, wild card-embedded event description patterns can be provided as a comma-separated list in the **Included** or **Excluded** text boxes. For instance, to include all events that start with *st* and vi, your **Included** specification should be: *st*,vi**. Similarly, to exclude all events with descriptions ending with *ed* and *le*, your **Excluded** specification should be: **ed,*le*.

12. In case of the **SecurityLog** test however, you will not be required to include/exclude **EVENT DESCRIPTIONS**. Instead, an **EVENT USERS** field will appear, using which you need to configure users who need to be included/excluded from monitoring.

    Note:

    At any given point in time, you can choose to either **Include** or **Exclude** event descriptions/users, but you cannot do both. If you have chosen to include event descriptions/users, then the eG Enterprise system automatically assumes that no event descriptions/users need be excluded. Accordingly, the {*event_descriptions_to_be_excluded*} section or the {*users_to_be_excluded*} section (as the case may be) of the filter formats mentioned above, will assume the value *none*. Similarly, if you have chosen to exclude specific event descriptions/users from monitoring, then the *{event_descriptions_to_be_included}* section or the {*users_to_be_included*} section (as the case may be) of the formats above will automatically take the value *all*. This indicates that all event descriptions/users except the ones explicitly excluded, will be included for monitoring.

13. Finally, click the **Update** button.
14. The results of the configuration will then be displayed as depicted by Figure 4.33.



EVENT POLICY

Parameters Configured for ApplicationEvents With LogType Application

LOG TYPE	:application
POLICY NAME	:CitrixEventsPolicy
EVENT SOURCES INCLUDED	:MetaFrameEvents,LicenseServer,MetaFrame,CitrixResourceManagement,ICABrowser,IMABrowser,IMAService
EVENT SOURCES EXCLUDED	:none
EVENT IDS INCLUDED	:all
EVENT IDS EXCLUDED	:none
EVENT DESCRIPTIONS INCLUDED	:all
EVENT DESCRIPTIONS EXCLUDED	:none

This page redirects to Admin Home in 90 seconds, else you can go back to **Parameters Configuration for tests**

Figure 4.33: Results of the configuration

Note:

If you have configured a policy to **Include** a few/all events (sources/IDs/descriptions/users), and **Exclude** *none*, then, while reconfiguring that policy, you will find that the **Include** option is chosen by default from the corresponding drop-down list in Figure 4.30. On the other hand, if you have configured a policy to to **Exclude** a few specific events and **Include** *all* events, then, while modifying that policy, you will find the **Exclude** option being the default selection in the corresponding drop-down list in Figure 4.30.

4.7.4 System Event Log Test

This test reports the statistical information about the system events generated by the target system.

Target of the test : A Windows host

Agent deploying the test : An internal agent

Outputs of the test : One set of results for the **FILTER** configured

1. **TEST PERIOD -** How often should the test be executed
2. **HOST -** The host for which the test is to be configured
3. **PORT** – Refers to the port used by the EventLog Service. Here it is *null*.
4. **LOGTYPE –** Refers to the type of event logs to be monitored. The default value is system.
5. **USEWMI** - The eG agent can either use WMI to extract event log statistics or directly parse the event logs using event log APIs. If the **USEWMI** flag is **YES**, then WMI is used. If not, the event log APIs are used. This option is provided because on some Windows NT/2000 systems (especially ones with service pack 3 or lower), the use of WMI access to event logs can cause the CPU usage of the WinMgmt process to shoot up. On such systems, set the **USEWMI** parameter value to **NO**. **On the other hand, when monitoring systems that are operating on any other flavor of Windows (say, Windows 2003/XP/2008/7/Vista/12), the USEWMI flag should always be set to 'Yes'**.
6. **EVENTS DURING RESTART** - By default, the **EVENTS DURING RESTART** flag is set to **Yes**. This ensures that whenever the agent is stopped and later started, the events that might have occurred during the period of non-availability of the agent are included in the number of events reported by the agent. Setting the flag to **No** ensures that the agent, when restarted, ignores the events that occurred during the time it was not available.
7. **POLICY BASED FILTER** - Using this page, administrators can configure the event sources, event IDs, and event descriptions to be monitored by this test. In order to enable administrators to easily and accurately provide this specification, this page provides the following options:

- Manually specify the event sources, IDs, and users in the **FILTER** text area, or,
- Select a specification from the predefined filter policies listed in the **FILTER** box
- For explicit, manual specification of the filter conditions, select the NO option against the **POLICY BASED FILTER** field. To choose from the list of pre-configured filter policies, or to create a new filter policy and then associate the same with the test, select the **YES** option against the **POLICY BASED FILTER** field. This is the default selection.

8. **FILTER** - If the **POLICY BASED FILTER** flag is set to **NO**, then a **FILTER** text area will appear, wherein you will have to specify the event sources, event IDs, and event users to be monitored. This specification should be of the following format: *{Displayname}:{event_sources_to_be_included}:{event_ sources_ to_ be_ excluded}: {event_ IDs_ to_ be_ included}: {event_ IDs_ to_ be_ excluded}:{users_to_be_included}:{ users_to_be_excluded}*. For example, assume that the **FILTER** text area takes the value, *OS_events:all:Browse,Print:all:none:all:none*. Here:

- *OS_events* is the display name that will appear as a descriptor of the test in the monitor UI;
- *all* indicates that all the event sources need to be considered while monitoring. To monitor specific event sources, provide the source names as a comma-separated list. To ensure that none of the event sources are monitored, specify *none*.
- Next, to ensure that specific event sources are excluded from monitoring, provide a comma-separated list of source names. Accordingly, in our example, *Browse* and *Print* have been excluded from monitoring. Alternatively, you can use *all* to indicate that all the event sources have to be excluded from monitoring, or *none* to denote that none of the event sources need be excluded.
- In the same manner, you can provide a comma-separated list of event IDs that require monitoring. The *all* in our example represents that all the event IDs need to be considered while monitoring.
- Similarly, the *none* (following *all* in our example) is indicative of the fact that none of the event IDs need to be excluded from monitoring. On the other hand, if you want to instruct the eG Enterprise system to ignore a few event IDs during monitoring, then provide the IDs as a comma-separated list. Likewise, specifying *all* makes sure that all the event IDs are excluded from monitoring.
- In the same way, you can also ensure that events generated by specific users on the target host are alone tracked by providing a comma-separated list of users to be monitored – for example, *john,elvis*. In our example however, *all* is specified, indicating that *all* users need be monitored.
- You can similarly indicate if specific users need to be excluded from monitoring. In our

example however, *none* is provided to ensure that no users are excluded from monitoring.

- By default, the **FILTER** parameter contains the value: *all:all:none:all:none:all:none*. Multiple filters are to be separated by semi-colons (;).

Note:

The event sources and event IDs specified here should be exactly the same as that which appears in the Event Viewer window.

On the other hand, if the **POLICY BASED FILTER** flag is set to **YES**, then a **FILTER** list box will appear, displaying the filter policies that pre-exist in the eG Enterprise system. A filter policy typically comprises of a specific set of event sources, event IDs, and users to be monitored. This specification is built into the policy in the following format:

{Policyname}:{event_sources_to_be_included}:{event_sources_to_be_excluded}:{event_IDs_to_be_included}:{event_IDs_to_be_excluded}:{users_to_be_included}:{users_to_be_excluded}

To monitor a specific combination of event sources, event IDs, and users, you can choose the corresponding filter policy from the **FILTER** list box. Multiple filter policies can be so selected. Alternatively, you can modify any of the existing policies to suit your needs, or create a new filter policy. To facilitate this, a **Click here** link appears just above the test configuration section, once the **YES** option is chosen against **POLICY BASED FILTER**. Clicking on the **Click here** link leads you to a page where you can modify the existing policies or create a new one (refer to page Section). The changed policy or the new policy can then be associated with the test by selecting the policy name from the **FILTER** list box in this page.

9. **STATELESS ALERTS -** Typically, the eG manager generates email alerts only when the state of a specific measurement changes. A state change typically occurs only when the threshold of a measure is violated a configured number of times within a specified time window. While this ensured that the eG manager raised alarms only when the problem was severe enough, in some cases, it may cause one/more problems to go unnoticed, just because they did not result in a state change. For example, take the case of the EventLog test. When this test captures an error event for the very first time, the eG manager will send out a **CRITICAL** email alert with the details of the error event to configured recipients. Now, the next time the test runs, if a different error event is captured, the eG manager will keep the state of the measure as **CRITICAL**, but will not send out the details of this error event to the user; thus, the second issue will remain hidden from the user. To make sure that administrators do not miss/overlook critical issues, the eG Enterprise monitoring solution provides the **stateless alerting** capability. To enable this capability for this test, set the **STATELESS ALERTS** flag to **Yes**. This

will ensure that email alerts are generated for this test, regardless of whether or not the state of the measures reported by this test changes.

10. **DDFORINFORMATION** – eG Enterprise also provides you with options to restrict the amount of storage required for event log tests. Towards this end, the **DDFORINFORMATION** and **DDFORWARNING** flags have been made available in this page. By default, both these flags are set to **Yes**, indicating that by default, the test generates detailed diagnostic measures for information events and warning events. If you do not want the test to generate and store detailed measures for information events, set the **DDFORINFORMATION** flag to **No**.

11. **DDFORWARNING** – To ensure that the test does not generate and store detailed measures for warning events, set the **DDFORWARNING** flag to **No**.

12. **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**.

13. **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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
System errors:	This refers to the number of system error events generated during the last execution of the test.	Number	A very low value (zero) indicates that the system is in healthy state and all Windows services and low level drivers are running without any potential problems.

Measurement	Description	Measurement Unit	Interpretation
			An increasing trend or a high value indicates the existence of problems such as loss of functionality or data in one or more Windows services and low level drivers. Please check the System Logs in the Event Log Viewer for more details.
System information messages:	This refers to the number of service-related and driver-related information events that were generated during the test's last execution.	Number	A change in value of this measure may indicate infrequent but successful operations performed by one or more applications. Please check the System Logs in the Event Log Viewer for more details.
System warnings:	This refers to the number of service-related and driver-related warnings generated in the during the test's last execution.	Number	A high value of this measure indicates problems that may not have an immediate impact, but may cause future problems in one or more Windows servers and low level drivers. Please check the System Logs in the Event Log Viewer for more details.
System critical errors:	Indicates the number of critical events that were generated when the test was last executed.	Number	A critical event is one that a system cannot automatically recover from. **This measure is applicable only for Windows 2008/Windows Vista/Windows 7 systems**. A very low value (zero) indicates that the system is in a healthy state

Measurement	Description	Measurement Unit	Interpretation
			and is running smoothly without any potential problems. An increasing trend or high value indicates the existence of fatal/irrepairable problems in the system. The detailed diagnosis of this measure describes all the critical system events that were generated during the last measurement period. Please check the System Logs in the Event Log Viewer for more details.
System verbose:	Indicates the number of verbose events that were generated when the test was last executed.	Number	Verbose logging provides more details in the log entry, which will enable you to troubleshoot issues better. **This measure is applicable only for Windows 2008/Windows Vista/Windows 7 systems**. The detailed diagnosis of this measure describes all the verbose events that were generated during the last measurement period. Please check the System Logs in the Event Log Viewer for more details.

4.7.5 Custom Event Log Test

This test reports the count and details of general information, warning, and error events of any type - be it application or system – that has been configured for monitoring.

Target of the test : Unix/Windows server

Agent deploying the test : An internal agent

Outputs of the test : One set of results for the **FILTER** configured

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** – Refers to the port used by the EventLog Service. Here it is null.
4. **LOGTYPE** – Refers to the type of event logs to be monitored. The default value is *application*.
5. **POLICY BASED FILTER -** Using this page, administrators can configure the event sources, event IDs, and event descriptions to be monitored by this test. In order to enable administrators to easily and accurately provide this specification, this page provides the following options:

    - Manually specify the event sources, IDs, and descriptions in the **FILTER** text area, or,
    - Select a specification from the predefined filter policies listed in the **FILTER** box

    For explicit, manual specification of the filter conditions, select the **NO** option against the **POLICY BASED FILTER** field. This is the default selection. To choose from the list of pre-configured filter policies, or to create a new filter policy and then associate the same with the test, select the **YES** option against the **POLICY BASED FILTER** field.

6. **FILTER** - If the **POLICY BASED FILTER** flag is set to **NO**, then a **FILTER** text area will appear, wherein you will have to specify the event sources, event IDs, and event descriptions to be monitored. This specification should be of the following format: *{Displayname}:{event_sources_to_be_included}:{event_ sources_ to_ be_ excluded}: {event_ IDs_ to_ be_ included}: {event_ IDs_ to_ be_ excluded}:{event_descriptions_to_be_included}:{event_descriptions_to_be_excluded}*. For example, assume that the **FILTER** text area takes the value, *OS_ events:all:Browse,Print:all:none:all:none*. Here:

    - *OS_events* is the display name that will appear as a descriptor of the test in the monitor UI;
    - *all* indicates that all the event sources need to be considered while monitoring. To monitor

specific event sources, provide the source names as a comma-separated list. To ensure that none of the event sources are monitored, specify *none*.

- Next, to ensure that specific event sources are excluded from monitoring, provide a comma-separated list of source names. Accordingly, in our example, *Browse* and *Print* have been excluded from monitoring. Alternatively, you can use all to indicate that all the event sources have to be excluded from monitoring, or none to denote that none of the event sources need be excluded.
- In the same manner, you can provide a comma-separated list of event IDs that require monitoring. The all in our example represents that all the event IDs need to be considered while monitoring.
- Similarly, the *none* (following *all* in our example) is indicative of the fact that none of the event IDs need to be excluded from monitoring. On the other hand, if you want to instruct the eG Enterprise system to ignore a few event IDs during monitoring, then provide the IDs as a comma-separated list. Likewise, specifying *all* makes sure that all the event IDs are excluded from monitoring.
- The *all* which follows implies that all events, regardless of description, need to be included for monitoring. To exclude all events, use *none*. On the other hand, if you provide a comma-separated list of event descriptions, then the events with the specified descriptions will alone be monitored. Event descriptions can be of any of the following forms - *desc**, or *desc*, or **desc**,or *desc**, or *desc1*desc2*, etc. *desc* here refers to any string that forms part of the description. A leading '*' signifies any number of leading characters, while a trailing '*' signifies any number of trailing characters.
- In the same way, you can also provide a comma-separated list of event descriptions to be excluded from monitoring. Here again, the specification can be of any of the following forms: *desc**, or *desc*, or **desc**,or *desc**, or *desc1*desc2*, etc. *desc* here refers to any string that forms part of the description. A leading '*' signifies any number of leading characters, while a trailing '*' signifies any number of trailing characters. In our example however, none is specified, indicating that no event descriptions are to be excluded from monitoring. If you use *all* instead, it would mean that all event descriptions are to be excluded from monitoring.

By default, the **FILTER** parameter contains the value: *all:all:none:all:none:all:none*. Multiple filters are to be separated by semi-colons (;).

Note:

The event sources and event IDs specified here should be exactly the same as that which appears in the Event Viewer window.

On the other hand, if the **POLICY BASED FILTER** flag is set to **YES**, then a **FILTER** list box will appear, displaying the filter policies that pre-exist in the eG Enterprise system. A filter policy typically comprises of a specific set of event sources, event IDs, and event descriptions to be monitored. This specification is built into the policy in the following format:

{Policyname}:{event_sources_to_be_included}:{event_sources_to_be_excluded}:{event_IDs_to_be_included}:{event_IDs_to_be_excluded}:{event_descriptions_to_be_included}:{event_descriptions_to_be_excluded}

To monitor a specific combination of event sources, event IDs, and event descriptions, you can choose the corresponding filter policy from the **FILTER** list box. Multiple filter policies can be so selected. Alternatively, you can modify any of the existing policies to suit your needs, or create a new filter policy. To facilitate this, a **Click here** link appears just above the test configuration section, once the **YES** option is chosen against **POLICY BASED FILTER**. Clicking on the **Click here** link leads you to a page where you can modify the existing policies or create a new one (refer to page Section **4.7.5**). The changed policy or the new policy can then be associated with the test by selecting the policy name from the **FILTER** list box in this page.

7. **USEWMI** - The eG agent can either use WMI to extract event log statistics or directly parse the event logs using event log APIs. If the **USEWMI** flag is **YES**, then WMI is used. If not, the event log APIs are used. This option is provided because on some Windows NT/2000 systems (especially ones with service pack 3 or lower), the use of WMI access to event logs can cause the CPU usage of the *WinMgmt* process to shoot up. On such systems, set the **USEWMI** parameter value to **NO**. On the other hand, when monitoring systems that are operating on any other flavor of Windows (say, Windows 2003/XP/2008/7/Vista/12), the **USEWMI** flag should always be set to '**Yes**'.
8. **STATELESS ALERTS** - Typically, the eG manager generates email alerts only when the state of a specific measurement changes. A state change typically occurs only when the threshold of a measure is violated a configured number of times within a specified time window. While this ensured that the eG manager raised alarms only when the problem was severe enough, in some cases, it may cause one/more problems to go unnoticed, just because they did not result in a state change. For example, take the case of the EventLog test. When this test captures an error event for the very first time, the eG manager will send out a **CRITICAL** email alert with the details of the error event to configured recipients. Now, the next time the test runs, if a different error event is captured, the eG manager will keep the state of the measure as **CRITICAL**, but will not send out the details of this error event to the user; thus, the second issue will remain hidden from the user. To make sure that administrators do not miss/overlook critical issues, the eG Enterprise monitoring solution provides the **stateless alerting** capability. To enable this capability for this test, set the **STATELESS ALERTS** flag to **Yes**. This

will ensure that email alerts are generated for this test, regardless of whether or not the state of the measures reported by this test changes.

9. **EVENTS DURING RESTART** - By default, the EVENTS DURING RESTART flag is set to **Yes**. This ensures that whenever the agent is stopped and later started, the events that might have occurred during the period of non-availability of the agent are included in the number of events reported by the agent. Setting the flag to **No** ensures that the agent, when restarted, ignores the events that occurred during the time it was not available.

10. **DDFORINFORMATION** – eG Enterprise also provides you with options to restrict the amount of storage required for event log tests. Towards this end, the **DDFORINFORMATION** and **DDFORWARNING** flags have been made available in this page. By default, both these flags are set to **Yes**, indicating that by default, the test generates detailed diagnostic measures for information events and warning events. If you do not want the test to generate and store detailed measures for information events, set the **DDFORINFORMATION** flag to **No**.

11. **DDFORWARNING** – To ensure that the test does not generate and store detailed measures for warning events, set the **DDFORWARNING** flag to **No**.

12. **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**.

13. **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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Information messages:	This refers to the number of information events that were generated during the test's last execution.	Number	A change in value of this measure may indicate infrequent but successful operations performed by one or more applications. Please check the appropriate logs – i.e., Application of System Event Logs, depending upon the logtype configuration of this test - in the Event Log Viewer for more details.
Warnings:	This refers to the number of warnings generated during the test's last execution.	Number	A high value of this measure indicates problems that may not have an immediate impact, but may cause future problems. Please check the appropriate logs – i.e., Application of System Event Logs, depending upon the logtype configuration of this test - in the Event Log Viewer for more details.
Error messages:	This refers to the number of error events generated during the last execution of the test.	Number	A very low value (zero) is desired for this measure, as it indicates good health. An increasing trend or a high value indicates the existence of problems. Please check the appropriate logs – i.e., Application of System Event Logs, depending upon the logtype configuration of this test - in the Event Log Viewer for more details.
Critical messages:	Indicates the number of critical events that were	Number	A critical event is one that a system/application cannot automatically recover from.

Measurement	Description	Measurement Unit	Interpretation
	generated when the test was last executed.		This measure is applicable only for Windows 2008/Windows Vista/Windows 7 systems. A very low value (zero) indicates that the system/application is in a healthy state and is running smoothly without any potential problems. An increasing trend or high value indicates the existence of fatal/irrepairable problems. The detailed diagnosis of this measure describes all the critical events captured by the configured logtype during the last measurement period. Please check the appropriate logs – i.e., Application of System Event Logs, depending upon the logtype configuration of this test - in the Event Log Viewer for more details.
Verbose messages:	Indicates the number of verbose events that were generated when the test was last executed.	Number	Verbose logging provides more details in the log entry, which will enable you to troubleshoot issues better. This measure is applicable only for Windows 2008/Windows Vista/Windows 7 systems. The detailed diagnosis of this measure describes all the verbose events that were captured by the

Measurement	Description	Measurement Unit	Interpretation
			configured logtype during the last measurement period. Please check the appropriate logs – i.e., Application of System Event Logs, depending upon the logtype configuration of this test - in the Event Log Viewer for more details.

4.7.6 Security Log Test

This test reports statistics relating to the Windows security log audits.

Target of the test : Any Windows host system

Agent deploying the test : An internal agent

Outputs of the test : One set of results for the server being monitored

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** – Refers to the port used by the EventLog Service. Here it is *null*.
4. **SUCCESSEVENTSINDD** - By default, this parameter displays *none*, indicating that by default none of the successful log audits will be reflected in the detailed diagnosis. If you set this parameter to, say 10, then the test will display only the 10 most recent successful log audits in the detailed diagnosis page. Setting this parameter to *all*, on the other hand will make sure that all successful log audits are listed in the detailed diagnosis.
5. **FAILUREEVENTSINDD** - By default, this parameter displays *all*, indicating that by default all the failed log audits will be reflected in the detailed diagnosis. If you set this parameter to, say 10, then the test will display only the 10 most recent log audits that failed, in the detailed diagnosis page. Setting this parameter to *none*, on the other hand will make sure that none of the failed log audits are listed in the detailed diagnosis.
6. **USEWMI -** The eG agent can either use WMI to extract event log statistics or directly parse the

event logs using event log APIs. If the **USEWMI** flag is **YES**, then WMI is used. If not, the event log APIs are used. This option is provided because on some Windows NT/2000 systems (especially ones with service pack 3 or lower), the use of WMI access to event logs can cause the CPU usage of the WinMgmt process to shoot up. On such systems, set the **USEWMI** parameter value to **NO**. **On the other hand, when monitoring systems that are operating on any other flavor of Windows (say, Windows 2003/XP/2008/7/Vista/12), the USEWMI flag should always be set to 'Yes'**.

7. **EVENTS DURING RESTART** - By default, the **EVENTS DURING RESTART** flag is set to **Yes**. This ensures that whenever the agent is stopped and later started, the events that might have occurred during the period of non-availability of the agent are included in the number of events reported by the agent. Setting the flag to **No** ensures that the agent, when restarted, ignores the events that occurred during the time it was not available.

8. **POLICY BASED FILTER** - Using this page, administrators can configure the event sources, event IDs, and event descriptions to be monitored by this test. In order to enable administrators to easily and accurately provide this specification, this page provides the following options:

   - Manually specify the event sources, IDs, and users in the **FILTER** text area, or,
   - Select a specification from the predefined filter policies listed in the **FILTER** box
   - For explicit, manual specification of the filter conditions, select the NO option against the **POLICY BASED FILTER** field. To choose from the list of pre-configured filter policies, or to create a new filter policy and then associate the same with the test, select the **YES** option against the **POLICY BASED FILTER** field. This is the default selection.

9. **FILTER** - If the **POLICY BASED FILTER** flag is set to **NO**, then a **FILTER** text area will appear, wherein you will have to specify the event sources, event IDs, and event users to be monitored. This specification should be of the following format: *{Displayname}:{event_sources_to_be_included}:{event_ sources_ to_ be_ excluded}: {event_ IDs_ to_ be_ included}: {event_ IDs_ to_ be_ excluded}:{users_to_be_included}:{ users_to_be_excluded}*. For example, assume that the **FILTER** text area takes the value, *OS_events:all:Browse,Print:all:none:all:none*. Here:

   - *OS_events* is the display name that will appear as a descriptor of the test in the monitor UI;
   - *all* indicates that all the event sources need to be considered while monitoring. To monitor specific event sources, provide the source names as a comma-separated list. To ensure that none of the event sources are monitored, specify *none*.
   - Next, to ensure that specific event sources are excluded from monitoring, provide a comma-separated list of source names. Accordingly, in our example, *Browse* and *Print* have been excluded from monitoring. Alternatively, you can use *all* to indicate that all the event sources

have to be excluded from monitoring, or *none* to denote that none of the event sources need be excluded.

- In the same manner, you can provide a comma-separated list of event IDs that require monitoring. The *all* in our example represents that all the event IDs need to be considered while monitoring.
- Similarly, the *none* (following *all* in our example) is indicative of the fact that none of the event IDs need to be excluded from monitoring. On the other hand, if you want to instruct the eG Enterprise system to ignore a few event IDs during monitoring, then provide the IDs as a comma-separated list. Likewise, specifying *all* makes sure that all the event IDs are excluded from monitoring.
- In the same way, you can also ensure that events generated by specific users on the target host are alone tracked by providing a comma-separated list of users to be monitored – for example, *john,elvis*. In our example however, *all* is specified, indicating that *all* users need be monitored.
- You can similarly indicate if specific users need to be excluded from monitoring. In our example however, *none* is provided to ensure that no users are excluded from monitoring.
- By default, the **FILTER** parameter contains the value: *all:all:none:all:none:all:none*. Multiple filters are to be separated by semi-colons (;).

Note:

The event sources and event IDs specified here should be exactly the same as that which appears in the Event Viewer window.

On the other hand, if the **POLICY BASED FILTER** flag is set to **YES**, then a **FILTER** list box will appear, displaying the filter policies that pre-exist in the eG Enterprise system. A filter policy typically comprises of a specific set of event sources, event IDs, and users to be monitored. This specification is built into the policy in the following format:

{Policyname}:{event_sources_to_be_included}:{event_sources_to_be_excluded}:{event_IDs_to_be_included}:{event_IDs_to_be_excluded}:{users_to_be_included}:{users_to_be_excluded}

To monitor a specific combination of event sources, event IDs, and users, you can choose the corresponding filter policy from the **FILTER** list box. Multiple filter policies can be so selected. Alternatively, you can modify any of the existing policies to suit your needs, or create a new filter policy. To facilitate this, a **Click here** link appears just above the test configuration section, once the **YES** option is chosen against **POLICY BASED FILTER**. Clicking on the **Click** link leads you to a page where you can modify the existing policies or create a new one (refer to page Section). The changed policy or the new policy can then be associated with the test by selecting the policy name from the **FILTER** list box in this page.

10. **STATELESS ALERTS -** Typically, the eG manager generates email alerts only when the state of a specific measurement changes. A state change typically occurs only when the threshold of a measure is violated a configured number of times within a specified time window. While this ensured that the eG manager raised alarms only when the problem was severe enough, in some cases, it may cause one/more problems to go unnoticed, just because they did not result in a state change. For example, take the case of the EventLog test. When this test captures an error event for the very first time, the eG manager will send out a **CRITICAL** email alert with the details of the error event to configured recipients. Now, the next time the test runs, if a different error event is captured, the eG manager will keep the state of the measure as **CRITICAL**, but will not send out the details of this error event to the user; thus, the second issue will remain hidden from the user. To make sure that administrators do not miss/overlook critical issues, the eG Enterprise monitoring solution provides the **stateless alerting** capability. To enable this capability for this test, set the **STATELESS ALERTS** flag to **Yes**. This will ensure that email alerts are generated for this test, regardless of whether or not the state of the measures reported by this test changes.

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:

    - 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.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Successful audits:	Indicates the number of successful audits of windows security logs.	Number	The detailed diagnosis of this measure, if enabled, provides the details of the successful log audits.
Failure audits:	Indicates the number of windows security log audits that failed.	Number	The detailed diagnosis of this measure, if enabled, provides the details of the failed log audits.

Note:

The **STATELESS ALERTING** capability is currently available for the following tests alone, by default:

- EventLog test
- ApplicationEventLog test
- SystemEventLog test
- ApplicationEvents test
- SystemEvents test
- SecurityLog test
- Account Management Events test

If need be, you can enable the **stateless alerting** capability for other tests. To achieve this, follow the steps given below:

a. Login to the eG manager host.

b. Edit the **eg_specs.ini** file in the **<EG_INSTALL_DIR>\manager\config** directory.

c. Locate the test for which the **Stateless Alarms** flag has to be enabled.

d. Insert the entry, **-statelessAlerts yes**, into the test specification as depicted below:

```
EventLogTest::$hostName:$portNo=$hostName, -auto, -host $hostName -port $portNo -eventhost $hostIp -eventsrc all -excludedSrc none -useWmi yes -statelessAlerts yes -ddFreq 1:1 -rptName $hostName, 300
```

e. Finally, save the file.

f. If need be, you can change the status of the **statelessAlerts** flag by reconfiguring the test in the eG administrative interface.

Once the stateless alerting capability is enabled for a test (as discussed above), you will find that everytime the test reports a problem, the eG manager does the following:

- Closes the alarm that pre-exists for that problem;
- Sends out a normal alert indicating the closure of the old problem;
- Opens a new alarm and assigns a new alarm ID to it;
- Sends out a fresh email alert to the configured users, intimating them of the new issue.

In a redundant manager setup, the secondary manager automatically downloads the updated **eg_ specs.ini** file from the primary manager, and determines whether the stateless alerting capability has been enabled for any of the tests reporting metrics to it. If so, everytime a threshold violation is detected by such a test, the secondary manager will perform the tasks discussed above for the problem reported by that test. Similarly, the primary manager will check whether the stateless alert flag has been switched on for any of the tests reporting to it, and if so, will automatically perform the above-mentioned tasks whenever those tests report a deviation from the norm.

Note:

- Since alerts will be closed after every measurement period, alarm escalation will no longer be relevant for tests that have **statelessAlerts** set to **yes**.
- For tests with **statelessAlerts** set to **yes**, **statelessAlerts** will apply for all measurements of that test (i.e., it will not be possible to only have one of the measurements with stateless alerts and others without).
- If **statelessAlerts** is set to **yes** for a test, an alarm will be opened during one measurement period (if a threshold violation happens) and will be closed prior to the next measurement period. This way, if a threshold violation happens in successive measurement periods, there will be one alarm per measurement period. This will reflect in all the corresponding places in the eG Enterprise system. For example, multiple alerts in successive measurement periods will result in multiple trouble tickets being opened (one for each measurement period). Likewise, the alarm history will also show alarms being opened during a measurement period and closed during the next measurement period.

About eG Innovations

eG Innovations provides intelligent performance management solutions that automate and dramatically accelerate the discovery, diagnosis, and resolution of IT performance issues in on-premises, cloud and hybrid environments. Where traditional monitoring tools often fail to provide insight into the performance drivers of business services and user experience, eG Innovations provides total performance visibility across every layer and every tier of the IT infrastructure that supports the business service chain. From desktops to applications, from servers to network and storage, from virtualization to cloud, eG Innovations helps companies proactively discover, instantly diagnose, and rapidly resolve even the most challenging performance and user experience issues.

eG Innovations is dedicated to helping businesses across the globe transform IT service delivery into a competitive advantage and a center for productivity, growth and profit. Many of the world's largest businesses use eG Enterprise to enhance IT service performance, increase operational efficiency, ensure IT effectiveness and deliver on the ROI promise of transformational IT investments across physical, virtual and cloud environments.

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