Monitoring VMware RDS

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Monitoring the VMware View RDS

VMware is already known for providing virtualized applications through VMware ThinApp™, and centralized application and desktop management through View™. Horizon now adds a new option: application remoting based on Microsoft Remote Desktop Services (RDS).

RDS, formerly known as Terminal Services, is a Microsoft technology that enables remote users to share applications installed on servers in the data center, as well as to share session-based desktops.

RDS hosting of applications is also sometimes referred to as app publishing or app remoting. RDS hosting provides users with access to applications that are installed on a remote RDS host. In Horizon, Remote Desktop Services hosts (RDS hosts) deliver Windows-based applications or desktops. The RDS host is a server containing both Microsoft RDS and View Agent™. By installing an application on an RDS host, you can make a single instance of an application available to thousands of users, who access it remotely.

For a more than satisfactory user experience with RDS hosting, administrators must make sure that these remote users are able to access applications on the RDS hosts quickly and are able to use them continuously. Inexplicable delays in application access, prolonged slowness when running applications on the RDS hosts, sudden session log outs, are some of the key spoilers of a user's experience with VMware View RDS. To proactively detect and avert such anomalies before end-users notice, an administrator should monitor the VMware View RDS environment 24x7.

The eG Enterprise suite offers 100% web-based monitoring of application delivery via View's RDS hosting option. For this purpose, eG Enterprise provides a specialized *VMware View RDS* monitoring model. This model defines the key performance metrics that need to be tracked to determine the service level achieved by View's RDS farms.

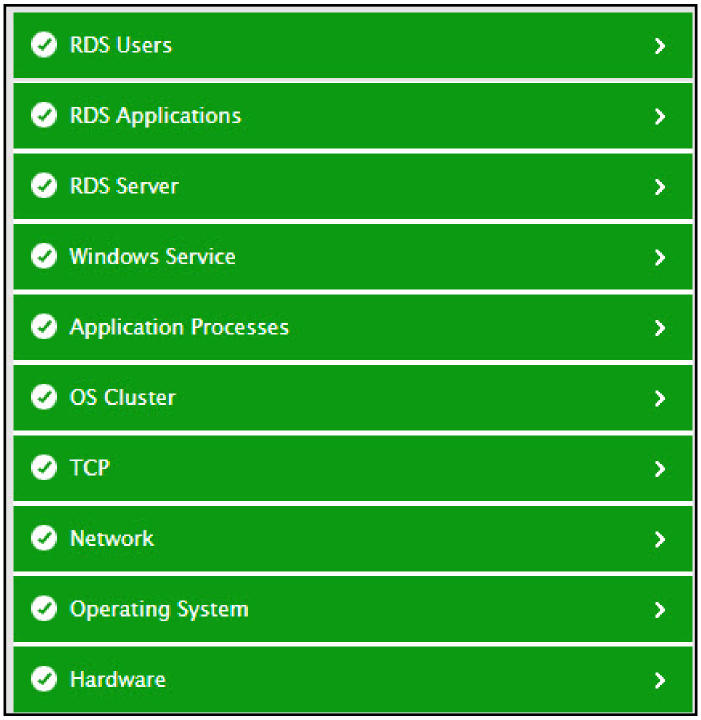


Figure 1.1: Layer model of VMware View RDS

Each layer of the Figure 1.1 is mapped to a variety of tests that provide valuable insights into the overall health and performance of the RDS farm. With the help of the metrics reported by these tests, you can find quick and accurate answers for the following queries:

VMware View RDS server Monitoring	Are the VMware View RDS servers available to service user requests? Are there sporadic disconnects from the VMware View RDS server? At what times do peak usage of the servers happen and is the server capacity adequate? Is the user load being balanced across all the servers?
User Monitoring	Are users able to login to the server farm? How long is the login process taking? What is the average response time that a user sees when connecting to a VMware View RDS server? How many users are logged in to each server in the VMware View RDS server farm? What is the resource usage (CPU and memory) for each user? What is the I/O activity generated by every user? How much network bandwidth is consumed by every user? Are too many page faults occurring in the processes executed on a server? If so, what are those processes, and who are the users executing them?

	Which user is using a lot of handles?
Operating System Monitoring	What is the average CPU and memory usage on all the servers in the farm? Is any unusual memory scanning/paging activity happening on the systems? Are the critical VMware View RDS server processes up? What is their resource consumption?
Hosted Application Monitoring	What are the applications hosted on a VMware View RDS server? Who is using each application? What is the resource usage for each published application?

The sections that follow will focus on the top 4 layers. The remaining layers have already been dealt with in the *Monitoring Unix and Windows Servers* document.

1.1 The RDS Server Layer

The tests associated with this layer (see Figure 1.2) enable administrators to measure the health of the client to server connectivity, using metrics such as the following:

- The availability of the VMware View RDS server and its responsiveness to client requests
- Login time to the server
- The status of file serving as seen by a RDS client

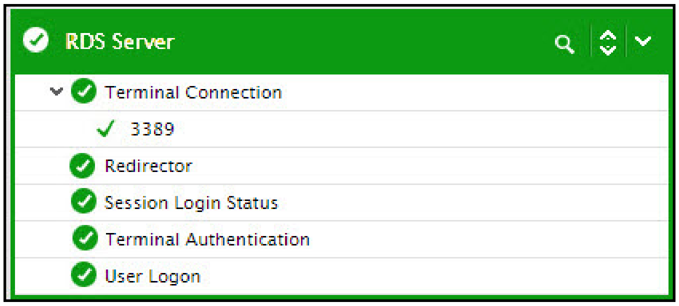


Figure 1.2: The tests mapped to the RDS Server layer

1.1.1 Terminal Connection Test

This test tracks various statistics pertaining to VMware View RDS connections to and from a host, from an external perspective.

Target of the test : A VMware View RDS server

Agent deploying the test: An external agent

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

Configurable parameters for the test

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 a comma-separated list of port numbers that are to be tested (eg., 80,7077,1521). By default, the default terminal sever port, 3389, will be displayed here.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Connection availability:	Whether the VMware View RDS server 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.
Connection 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.

1.1.2 Terminal Authentication Test

This test emulates the user login process at the system level on a VMware View RDS server and reports whether the login succeeded and how long it took.

Target of the test : A VMware View RDS server

Agent deploying the test: An external agent

Outputs of the test : One set of results for every port 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 VMware View RDS server
4. **USERNAME** - This test emulates the user login process at the system level on a VMware View RDS server. Therefore, specify the login name of a user with both **interactive logon** and **logon locally** privileges.
5. **PASSWORD** - Enter the password that corresponds to the specified **USERNAME**.
6. **CONFIRM PASSWORD**– Confirm the password by retyping it here.
7. **DOMAIN** - Specify the name of the domain to which the test will try to login. If the test is to login to a local host, specify 'none' here.

   Note:

   If users are spread across multiple domains, then, you can configure this test with multiple **DOMAIN** specifications; in this case, for every **DOMAIN**, a **USER-PASSWORD** pair might also have to be configured. Sometimes, you might want the test to login as specific users from the same domain, to check how long each user login takes. Both these scenarios require the configuration of multiple **DOMAIN**s and/or multiple **USER** names and **PASSWORD**s. In order to enable users to specify these details with ease, eG Enterprise provides a special page; to access this page, click on the **Click here** hyperlink at the top of the parameters in the test configuration page. To know how to use this page, refer to the Configuring Multiple Users for the Citrix Authentication Test section in the *Monitoring Citrix Environments* document.
8. **REPORT BY DOMAIN** - By default, this flag is set to **Yes**. This implies that by default, this test will report metrics for every *domainname\username* configured for this test. This way, administrators will be able to quickly determine which user logged in from which domain. If you want the detailed diagnosis to display the *username* alone, then set this flag to **No**.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Authentication status:	Indicates whether the login was successful or not	Percent	A value of 100 % indicates that the login has succeeded. The value 0 is indicative of a failed login.
Authentication time:	Indicates the time it took to login	Secs	If this value is very high then it could be owing to a configuration issue (i.e. the domain might not be configured properly) or a slow-down/unavailability of the primary domain server.

1.1.3 Redirector test

File serving very often is a much underestimated part of RDS server environments. Improperly configured file serving components can wreak havoc on a server farm's performance.

File serving in RDS server environments is used at different times. For instance, every time a user logs on or off, profile data may be copied back and forth between the file server and the VMware View RDS server. Another example involves multiple applications accessing configurations stored in files from a remote file server. Folder redirection, if used, is another form of file retrievals from file servers.

File serving problems can have a detrimental impact on the performance of VMware View RDS server environments. Often, these problems may manifest in many ways. For example, users may see very slow access to their home directory, or folders. Even with a small profile, logging on and off could take a long time. Random application crashes can also happen, especially for applications that rely on file servers to store their configuration files remotely. Such file serving problems are often the most difficult to diagnose.

The Redirector component of the Microsoft Windows operating system handles file serving at the client end, and the **Redirector** test monitors this component's activity, and tracks the status of file serving as seen by a file server's client (i.e., the VMware View RDS server).

Target of the test : A VMware View RDS server

Agent deploying the test: An external agent

Outputs of the test : One set of results for every port 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 VMware View RDS server

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Data received:	This metric shows the rate of data that were received by the local server from the network. This includes all the application data as well as network protocol information.	MB/Sec	
Data sent:	This metric represents the	MB/sec	

Measurement	Description	Measurement Unit	Interpretation
	rate at which data is leaving the Redirector to the network. This includes all the application data as well as network protocol information.		
Current commands:	This metric indicates the number of requests to the Redirector that are currently queued for service.	Number	The *Current Commands* measure indicates the number of pending commands from the local computer to all destination servers. This means that if one of the destination servers does not respond in a timely manner, the number of current commands on the local computer may increase. If the local computer is serving many sessions, a high number of current commands does not necessarily indicate a problem or a bottleneck. However, if the Current Commands measure shows a high number and the local computer is idle, this may indicate a network- related problem or a redirector bottleneck on the local computer. For example, there may be a network- related problem or a local bottleneck if the computer is idle overnight but the counter shows a high number during that period.
Network errors:	This metric denotes the rate at which serious unexpected errors are occurring during file system access from a remote server.	Errors/sec	Such errors generally indicate that the Redirector and one or more Servers are having serious communication difficulties. For example an SMB (Server Manager Block) protocol error is a Network Error. An entry is written to the System Event Log and provides details.

Measurement	Description	Measurement Unit	Interpretation
Reads denied :	This metric denotes the rate at which the server is unable to accommodate requests for raw read operations.	Reads/sec	When a read is much larger than the server's negotiated buffer size, the Redirector requests a Raw Read which, if granted, would permit the transfer of the data without lots of protocol overhead on each packet. To accomplish this, the server must lock out other requests, so the request is denied if the server is really busy.
Hung server sessions:	This metric shows the number of active sessions that are timed out and unable to proceed due to a lack of response from the remote file server.	Number	
Writes denied:	This metric denotes the rate at which the server is unable to accommodate requests for raw write operations	Writes/sec	When a write is much larger than the server's negotiated buffer size, the Redirector requests a Raw Write which, if granted, would permit the transfer of the data without lots of protocol overhead on each packet. To accomplish this, the server must lock out other requests, so the request is denied if the server is really busy.

1.1.4 Session Login Status Test

Administrators typically use the *Change logon* command line tool to enable / disable logons from client sessions to the VMware View RDS server. Disabling client logons will deny all users access to the server. Whenever users complaint of login failures, administrators might first want to check the status of the client logons to determine whether it has been disabled or not. This test periodically reports the status of logons from client sessions to the VMware View RDS server.

Target of the test : A VMware View RDS server

Agent deploying the test: An external agent

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

Configurable parameters for the test

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 **HOST** listens

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Session login status:	Indicates whether the client sessions to the server are currently enabled or not.	Percent	If the value for this measure is 100, it indicates all client logons are enabled. If the value of this measure is 0, it indicates that client logons are disabled.

1.1.5 User Logon Test

The process of a user logging into a VMware View RDS server is fairly complex. First, the domain controller is discovered and the login credentials are authenticated. Then, the corresponding user profile is identified and loaded. Next, group policies are applied and logon scripts are processed to setup the user environment. In the meantime, additional processing may take place for a user – say, applying system profiles, creating new printers for the user, and so on. A slowdown in any of these steps can significantly delay the logon process for a user. Since logons on Windows happen sequentially, this may adversely impact the logins for other users who may be trying to access the VMware View RDS server at the same time. Hence, if a user complains that he/she is unable to access an application published on VMware View RDS, administrators must be able to rapidly isolate exactly where the logon process is stalling and for which user. The typical process for monitoring and troubleshooting the login process on Windows 2003 is to use the user environment debugging mechanism. To enable this on Windows 2003 and to set the logging level associated with the userenv.log file, perform the following steps:

- Start a registry editor (e.g., regedit.exe).
- Navigate to the **HKEY_ LOCAL_ MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\Winlogon** registry subkey.
- From the **Edit** menu, select **New**, **DWORD** Value.
- Enter the name *UserEnvDebugLevel*, then press **Enter**.
- Double-click the new value, set it to 65538 (decimal) - which corresponds to the debugger output.

Once these changes are enabled, details about the Windows login process are logged into the file *%systemroot%\debug\usermode\userenv.log* . The log file is written to the *%Systemroot%\Debug\UserMode\Userenv.log* file. If the *Userenv.log* file is larger than 300 KB, the file is renamed *Userenv.bak*, and a new *Userenv.log* file is created. This action occurs when a user logs on locally or by using Terminal Services, and the Winlogon process starts. However, because the size check only occurs when a user logs on, the *Userenv.log* file may grow beyond the 300 KB limit. The 300 KB limit cannot be modified.

The **User Logon** test periodically checks the *userenv log* file on Windows 2003 to monitor the user login and profile loading process and accurately identify where the process is bottlenecked. On Windows 2008 (or above), this test takes the help of the Windows event logs to capture anomalies in the user login and profile loading process and report where the process is bottlenecked - in the authentication process? during profile loading? during GPO processing and if so, which GPO?

By default, this test is disabled. To enable the test, go to the **ENABLE / DISABLE TESTS** page using the menu sequence : Agents -> Tests -> Enable/Disable, pick *VMware View RDS* as the **Component type**, *Performance* as the **Test type**, choose the test from the **DISABLED TESTS** list, and click on the **>>** button to move the test to the **ENABLED TESTS** list. Finally, click the **Update** button.

Target of the test : A VMware View RDS server

Agent deploying the test: An external agent

Outputs of the test : One set of results for every port 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 VMware View RDS server
4. **REPORT TOTAL** – By default, this flag is set to **No**. In this case therefore, the test will only report metrics for every user to the RDS server. If this flag is set to **Yes**, then the test will report metrics for a *Total* descriptor – the metrics reported by this descriptor will be aggregated across all users to the RDS server. This way, administrators will receive a system-wide overview of the health of the profile loading/unloading process.
5. **REPORT FOR EACH USER –** By default, this flag is set to **Yes**. This implies that, by default, the test will report metrics for each user to the RDS server. If you set this flag to No, then make sure that the **REPORT TOTAL FLAG** is set to '**Yes**'. Because, if both the **REPORT FOR EACH USER** and the **REPORT TOTAL** flags are set to **No, then the test will not run!** On the other hand, if only the **REPORT TOTAL** flag is set to **Yes**, the test will only report metrics for the *Total* descriptor. Moreover, if both the **REPORT TOTAL** and the **REPORT FOR EACH USER** flags are set to **Yes**, then the test will report metrics per user and will additionally report metrics for the *Total* descriptor as well.
6. **REPORT BY DOMAIN NAME –** By default, this flag is set to **No**. This means that, by default, the test will report metrics for each *username* only. You can set this flag to **Yes**, to ensure that the test reports metrics for each *domainname\username*.
7. **REPORT UNKNOWN –** By default, this flag is set to **No**. Accordingly, the test, by default, disregards user sessions that have remained active on the server for a duration lesser than the **TEST PERIOD**. If you want the test to report metrics for such users as well, then set this flag to **Yes**. In this case, the test will additionally support an *Unknown* descriptor – the metrics reported by this descriptor will be aggregated across all such user sessions that have been active on the server only for a limited duration.
8. **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**
Logon duration:	Indicates the average time taken by this user for logging in during the last measurement period.	Msecs	If this value is abnormally high for any user, then, you can compare the User account discovery time, LDAP bind time to Active Directory, Client side extension processed time, DC discovery time, Total group policy object file access time, Avg system policy processing time and User profile load time measures to know exactly where that user's login process experienced a bottleneck - is it when loading the profile? is it when processing system policies? is it when processing group policies? is it when interacting with AD for authenticating the user login? **This measure will not be available for VMware View RDS servers operating on Windows 2003.**
User account discovery:	Indicates the amount of time taken by the system call to get account information for this user during the last measurement period.	Msecs	Compare the value of this measure across users to know which user's logon process spent maximum time in retrieving account information. **This measure will not be available for VMware View RDS servers operating on Windows 2003.**

Measurement	Description	Measurement Unit	Interpretation
LDAP bind time to Active Directory:	Indicates the amount of time taken by the LDAP call for this user to connect and bind to Active Directory during the last measurement period.	MSecs	Compare the value of this measure across users to know which user's logon process spent maximum time in connecting to Active Directory. Besides impacting authentication time, high LDAP bind time may also affect group policy processing. **This measure will not be available for VMware View RDS servers operating on Windows 2003.**
Client side extension processed time:	Indicates the amount of time that client side extensions took for processing group policies for this user during the last measurement period.	MSecs	Compare the value of this measure across users to know which user's logon process spent maximum time in group policy processing. If this measure reports an unusually high value for any user, then, you may want to check the value of the LDAP bind time to Active Directory measure for that user to figure out if a delay in connecting to AD is affecting group policy processing. This is because, group policies are built on top of AD, and hence rely on the directory service's infrastructure for their operation. As a consequence, DNS and AD issues may affect Group Policies severely. One could say that if an AD issue does not interfere with authentication, at the very least it will hamper group policy processing. You can also use the detailed diagnosis of this measure to know which client side extension was used to process which group policy for a particular user. **This measure will not be available for VMware View RDS servers operating on Windows 2003.**

Measurement	Description	Measurement Unit	Interpretation
DC discovery time:	Indicates the time taken to discover the domain controller to be used for processing group policies for this user during the last measurement period.	MSecs	Compare the value of this measure across users to know which user's logon process spent maximum time in domain controller discovery. **This measure will not be available for VMware View RDS servers operating on Windows 2003.**
Total group policy object file accessed time:	Indicates the amount of time the logon process took to access group policy object files for this user during the last measurement period.	MSecs	Compare the value of this measure across users to know which user's logon process spent maximum time in accessing the group policy object file. **This measure will not be available for VMware View RDS servers operating on Windows 2003.**
User profile load time:	Indicates the amount of time it took to load this user's profile successfully in the last measurement period.	MSecs	Compare the value of this measure across users to know which user's profile took the longest time to load. One of the common reasons for long profile load times is large profile size. In such circumstances, you can use the User Profile test to determine the current size of this user's profile. If the profile size is found to be large, you can conclude that it is indeed the size of the profile which is affecting the profile load time. Another reason would be the absence of a profile. If the user does not already have a profile a new one is created. This slows down the initial logon quite a bit compared to subsequent logons. The main reason is that Active Setup runs the IE/Mail/Theme initialization routines. Moreover, this measure reports the average time taken for loading a user's profile across all the sessions of that user. To know the profile load time per

Measurement	Description	Measurement Unit	Interpretation
			user session, use the detailed diagnosis of this measure. This will accurately pinpoint the session in which the profile took the longest to load. **This measure will not be available for VMware View RDS servers operating on Windows 2003.**
Profile load starts:	Indicates the number of times this user's profile was loaded in the last measurement period.	Number	This metric gives an idea of the rate at which users are logging in to the server.
Group policy starts:	Indicates the number of group policy applications started for this user in the last measurement period.	Number	Logon performance improves when fewer Group Policies are applied. Merge GPOs when possible instead of having multiple GPOs.
Group policy completes:	Indicates the number of group policy applications completed for this user in the last measurement period.	Number	
Client side extensions applied:	Indicates the number of client side extensions used for processing group policies for this user during the last measurement period.	Number	
Max group policy time:	Indicates the maximum time taken for applying group policies for this user in the last measurement period.	Msecs	**This measure will be available only for VMware View RDS servers operating on Windows 2003.**
Profile load starts:	Indicates the number of profile loads started for this	Number	Use the detailed diagnosis of this measure to know the details of the user

Measurement	Description	Measurement Unit	Interpretation
	user in the last measurement period.		sessions in which profile loads were started.
Profile load successes:	Indicates the number of successful profile loads for this user in the last measurement period.	Number	
Profile loading failures:	Indicates the number of profile load failures for this user in the last measurement period.	Number	An unusual increase in number of profile loading failures is a cause for concern. The *userenv.log/event logs* file will have details of what profile loads failed and why.
Profile load failures percent:	Indicates the percentage of profile loads that failed for this user in the last measurement period.	Percent	A low value is desired for this measure. Compare the value of this measure across users to know which user's profile failed to load most often.
Avg user profile load time:	Indicates the average time it took to load this user's profile successfully in the last measurement period.	Msecs	Ideally, profile load time should be low for any user. A high value or a consistent rise in this value is a cause for concern, as it indicates a delay in profile loading. This in turn will have a negative impact on user experience. One of the common reasons for long profile load times is large profile size. Compare the value of this measure across users to identify that user whose profile took the longest to load. Then, use the User Profile test to determine the current size of this user's profile. If the profile size is found to be large, you can conclude that it is indeed the size of the profile which is affecting the profile load time. **This measure will be available only for VMware View RDS servers operating on Windows 2003.**

Measurement	Description	Measurement Unit	Interpretation
Max profile load time:	Indicates the maximum time it took to load a profile during the last measurement period.	Msecs	**This measure will be available only for VMware View RDS servers operating on Windows 2003.**
Profile unload starts:	Indicates the number of profile unloads started for this user during the last measurement period.	Number	Use the detailed diagnosis of this measure measure to know when a user's session was initiated and how long each session remained active on the RDS server. From this, you can infer how many sessions were active for a user on the server and the duration of each session, and thus identify long-running sessions for the user.
Profile unload successes:	Indicates the number of successful profile unloads for this user during the last measurement period.	Number	
Profile unload failures:	Indicates the number of unsuccessful profile unloads during the last measurement period.	Number	
Profile unload failures percent:	Indicates the profile unload failures as a percentage of the total profile unloads.	Percent	
Avg user profile unload time:	Indicates the average time for unloading a profile during the last measurement period.	Msecs	**This measure will be available only for VMware View RDS servers operating on Windows 2003.**
Max profile unload time:	Indicates the maximum time for unloading a profile during the last measurement period.	Msecs	**This measure will be available only for VMware View RDS servers operating on Windows 2003.**

Measurement	Description	Measurement Unit	Interpretation
System policy starts:	Indicates the number of system policy processes that were started for this user in the last measurement period.	Number	
System policy completes:	Indicates the number of system policy completions for this user in the last measurement period.	Number	Compare the total number of starts to completions. if there is a significant discrepancy, this denotes a bottleneck in system policy application. Check the userenv.log file for more details.
Avg system policy processing time:	Indicates the average time taken for applying system policies in the last measurement period for this user.	Msecs	If the system policy times are long, check the detailed diagnosis to view if the policy handling is taking time for all users. Analyze the userenv.log to determine the reason for any slowdown.
Max system policy time:	Indicates the maximum time for applying system policies for this user in the last measurement period.	Msecs	

1.2 The RDS Application Layer

The health of a VMware View RDS server depends upon the health of the applications it hosts. The RDS Applications test associated with this layer monitors application health.

Figure 1.3: The test mapped to the RDS Applications layer

1.2.1 RDS Applications Test

This test reports statistics pertaining to the different applications deployed within the VMware View RDS server and their usage by its clients.

Target of the test : A VMware View RDS server

Agent deploying the test: An external agent

Outputs of the test : One set of results for every port 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 VMware View RDS server
4. **APPS**- By default, **all** is displayed here, which will auto-discover and monitor all the applications that are running on the VMware View RDS server. To monitor specific applications instead, you have to enter a comma separated list of processName:processPattern pairs which identify the applications published on 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, if a Microsoft Word application has been published on the VMware View RDS server, then the **PROCESS** to be specified is: Word:*winword*, where Word is the string to be displayed in the monitor interface, and *winword* is the application's executable. 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*".

   The test will rediscover the applications every 6th time the test runs.
5. **REPORT BY DOMAIN NAME** – By default, this flag is set to **Yes**. This implies that by default, the detailed diagnosis of this test will display the domainname\username of each user who accessed an application on the server. This way, administrators will be able to quickly determine which user logged into the server from which domain. If you want the detailed diagnosis to display only the *username* of these users, set this flag to **No**.
6. **ENABLE BROWSER MONITORING** – By default, this flag is set to **No**, indicating that the eG agent does not monitor browser activity on the VMware View RDS server. If this flag is set to **Yes,** then, whenever one/more IE (Internet Explorer) browser instances on the RDS server are accessed, the detailed diagnosis of the *Processes running* measure will additionally reveal the URL being accessed via each IE instance and the resources consumed by every URL. Armed with this information, administrators can identify the web sites that are responsible for excessive resource usage by an IE instance.
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 **Off** option. To disable the capability, click **On** the option.

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

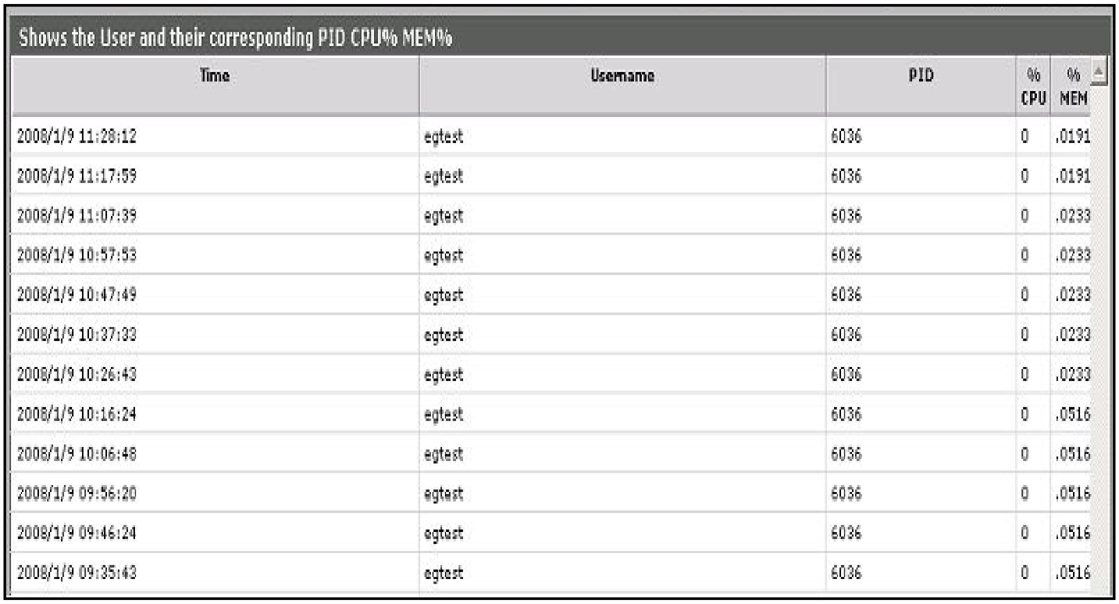
   - The eG manager license should allow the detailed diagnosis capability

- 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 running:	Number of instances of the published application currently executing on the VMware View RDS server	Number	This value indicates if too many or too few instances corresponding to an application are executing on the host. The detailed diagnosis of this measure, if enabled, displays the complete list of processes executing, the users executing them, and their individual resource utilization.
Cpu usage:	Percentage of CPU used by the published application	Percent	A very high value could indicate that the specified application is consuming excessive CPU resources.
Memory usage:	This value represents the ratio of the resident set size of the memory utilized by the application to the physical memory of the host system, expressed as a percentage.	Percent	A sudden increase in memory utilization for an application may be indicative of memory leaks in the application.

The detailed diagnosis of the *Processes running* measure, if enabled, provides the list of processes currently executing, the users executing them, and their CPU and memory usage. Using these details, you can quickly detect resource-intensive instances and the user executing them.



Shows the User and their corresponding PID CPU% MEM%

Time	Username	PID	% CPU	% MEM
2008/1/9 11:28:12	egtest	6036	0	.0191
2008/1/9 11:17:59	egtest	6036	0	.0191
2008/1/9 11:07:39	egtest	6036	0	.0233
2008/1/9 10:57:53	egtest	6036	0	.0233
2008/1/9 10:47:49	egtest	6036	0	.0233
2008/1/9 10:37:33	egtest	6036	0	.0233
2008/1/9 10:26:43	egtest	6036	0	.0233
2008/1/9 10:16:24	egtest	6036	0	.0516
2008/1/9 10:06:48	egtest	6036	0	.0516
2008/1/9 09:56:20	egtest	6036	0	.0516
2008/1/9 09:46:24	egtest	6036	0	.0516
2008/1/9 09:35:43	egtest	6036	0	.0516

Figure 1.4: The detailed diagnosis of the Processes running measure

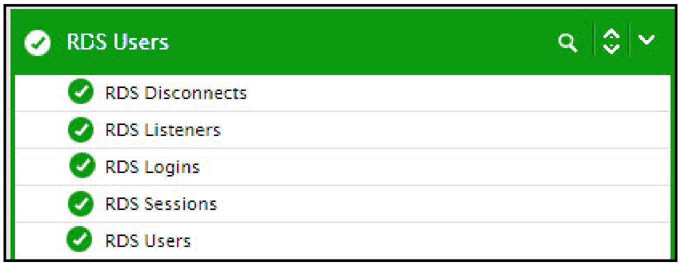
Moreover, if one or more browser instances are found to consume excessive CPU, memory and disk I/O resources on a server or a desktop, then for each such browser instance, administrators can now see a mapping of browser process to URL being accessed, as well as the resources used by each browser process in the detailed diagnosis. Armed with this information, administrators can determine the steps required to avoid excessive resource usage by browser instances – e.g., whether specific web sites are responsible for this, whether users are accessing web sites (e.g., youtube, facebook, etc.) that they should not be accessing from a corporate network, etc.

Note:

- The eG agent will perform browser activity monitoring only if the **ENABLE BROWSER MONITORING** flag is set to **Yes**.
- The eG agent will monitor browser activity only of the browser being accessed is **Internet Explorer**.

1.3 The RDS Users Layer

By continuously monitoring the user behavior on a VMware View RDS server, administrators can accurately gauge resource usage per user, and derive guidelines for upgrading server capacity and imposing stricter access rules. The tests associated with this layer (see Figure 1.5) facilitate such user-related analysis.



✓ RDS Users

✓ RDS Disconnects

✓ RDS Listeners

✓ RDS Logins

✓ RDS Sessions

✓ RDS Users

Figure 1.5: The tests mapped to the RDS Users layer

1.3.1 RDS Listeners Test

The listener component runs on the VMware View RDS server and is responsible for listening for and accepting new client connections. If this listener component is down, users may not be able to access applications on the RDS hosts!

This is why, if a user complains of the inaccessibility of an application, administrators should first check whether the RDS listener component is up and running or not. The **RDS Listeners** test helps administrators perform this check. This test tracks the status of the default listener ports and reports whether any of the ports is down.

Target of the test : A VMware View RDS server

Agent deploying the test : An external agent

Outputs of the test : One set of results for every port 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 **HOST** listens
4. **SESSION IDS** – The default listener ports - *65536,65537,65538* – will be displayed here by default. You can override this default specification by adding more ports or by removing one/more existing ports.

Measurements of the test

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td><b>Is listener down?:</b></td><td>Indicates whether/not this listener port is down.</td><td></td><td>This measure reports the value Yes if the listener port is down and No if the port is up and running. 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>0</td></tr>
<tr><td>No</td><td>1</td></tr>
</table>
<b>Note:</b></td></tr>
</table>

Measurement	Description	Measurement Unit	Interpretation
			By default, this measure reports the above-mentioned **Measure Value**s to indicate the status of a listener port. However, the graph of this measure will represent the same using the numeric equivalents only.

1.3.2 RDS Sessions Test

This test reports performance statistics related to VMware View RDS server user sessions.

Target of the test : A VMware View RDS server

Agent deploying the test: An external agent

Outputs of the test : One set of results for every port 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 VMware View RDS server
4. **IGNORE DOWN SESSION IDS** - By default, this parameter is set to *65536,65537,65538*– these are nothing but the default ports at which the listener component listens. If any of these ports go down, then by default, this test will not count any of the sessions that failed when attempting to connect to that port as a **Down session**. You can override this default setting by adding more ports or by removing one/more existing ports.
5. **REPORTUSINGMANAGERTIME**- By default, this flag is set to **Yes**. This indicates that the user login time displayed in the **DETAILED DIAGNOSIS** page for this test will be based on the eG manager's time zone by default. Set this flag to **No** if you want the login times displayed in the **DETAILED DIAGNOSIS** page for this test to be based on the VMware View RDS server's local time.
6. **REPORT BY DOMAIN NAME** – By default, this flag is set to **Yes**. This implies that by default, the detailed diagnosis of this test will display the *domainname\username* of each user who logged into the VMware View RDS server. This way, administrators will be able to quickly determine which user logged in from which domain. If you want the detailed diagnosis to display the *username* alone, then set this flag to **No**.
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:

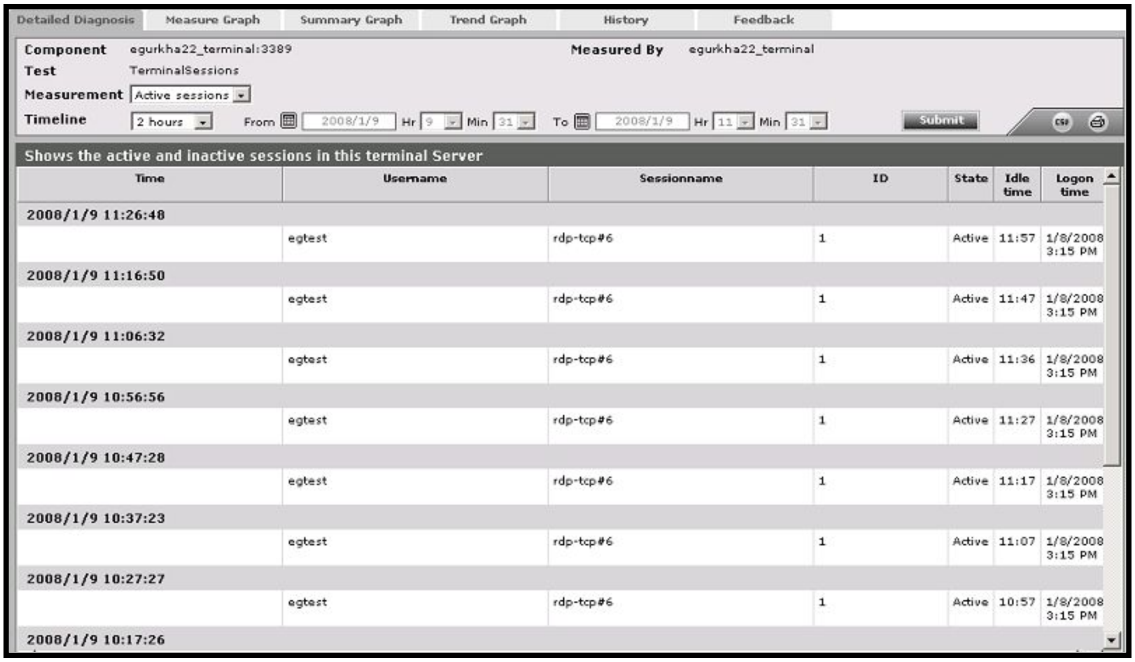
- The eG manager license should allow the detailed diagnosis capability
- Both the normal and abnormalfrequencies configured for the detailed diagnosis measures should not be 0.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Active sessions:	Indicates the number of active terminal services sessions currently on the server.	Number	This measure gives an idea of the server workload in terms of active sessions. Tracking the number of active sessions with time, an administrator can obtain information that can help him/her plan the capacity of their VMware View RDS server farms. The detailed diagnosis capability, if enabled, lists the active and inactive sessions on the VMware View RDS server.
Idle sessions:	Indicates the number of sessions that are initialized and are currently ready to accept connections.	Number	To optimize the performance of a server, two default (idle) sessions are initialized before any client connections are made. For performance reasons, the number of idle sessions should be less than ten.
Connected sessions:	Indicates the current number of sessions that are connected, but no user has logged on to the server.	Number	A consistent increase in the value of this measure could indicate that users are having trouble logging in. Further investigation may hence be required.
Connecting sessions:	Indicates the number of sessions that are in the process of connecting.	Number	A very high value for this measure indicates a problem with the session or connection.
Disconnected sessions:	Indicates the number of sessions from which users have disconnected, but	Number	Too many disconnected sessions running indefinitely on a VMware View RDS server cause excessive

Measurement	Description	Measurement Unit	Interpretation
	which are still active and can be reconnected.		consumption of the server resources. To avoid this, a session limit is typically configured for disconnected sessions on the VMware View RDS server. When a session limit is reached for a disconnected session, the session ends, which permanently deletes it from the server.
Listen sessions:	Indicates the current number of sessions that are ready to accept connections.	Number	
Shadow sessions:	Indicates the current number of sessions that are remotely controlling other sessions.	Number	A non- zero value for this measure indicates the existence of shadow sessions that are allowed to view and control the user activity on another session. Such sessions help in troubleshooting/resolving problems with other sessions under their control.
Down sessions:	Indicates the current number of sessions that could not be initialized or terminated.	Number	Ideally, the value of this measure should be 0. By default, if sessions to any of these ports – *65536, 65537, 65538* – could not be initialized or terminated, they will not be counted as a 'down session'.
Init sessions:	Indicates the current number of sessions that are initializing.	Number	A high value for this measure could indicate that many sessions are currently experiencing initialization problems.

The detailed diagnosis capability of the *Active sessions* measure, if enabled, lists the active and inactive sessions on the VMware View RDS server, and provides details such as the user who initiated the sessions, the session login time, the duration for which the session was idle, etc.



Component egurkha22_terminal:3389

Measured By egurkha22_terminal

Test TerminalSessions

Measurement Active sessions

Timeline 2 hours From 2008/1/9 Hr 9 Min 31 To 2008/1/9 Hr 11 Min 31

Shows the active and inactive sessions in this terminal Server

Time	Username	Sessionname	ID	State	Idle time	Logon time
2008/1/9 11:26:48						
	egtest	rdp-tcp#6	1	Active	11:57	1/8/2008 3:15 PM
2008/1/9 11:16:50						
	egtest	rdp-tcp#6	1	Active	11:47	1/8/2008 3:15 PM
2008/1/9 11:06:32						
	egtest	rdp-tcp#6	1	Active	11:36	1/8/2008 3:15 PM
2008/1/9 10:56:56						
	egtest	rdp-tcp#6	1	Active	11:27	1/8/2008 3:15 PM
2008/1/9 10:47:28						
	egtest	rdp-tcp#6	1	Active	11:17	1/8/2008 3:15 PM
2008/1/9 10:37:23						
	egtest	rdp-tcp#6	1	Active	11:07	1/8/2008 3:15 PM
2008/1/9 10:27:27						
	egtest	rdp-tcp#6	1	Active	10:57	1/8/2008 3:15 PM
2008/1/9 10:17:26						

Figure 1.6: The detailed diagnosis of the Active sessions measure

1.3.3 RDS Users Test

A VMware View RDS server environment is a shared environment in which multiple users connect to a server/server farm and access a wide variety of applications. When server resources are shared, excessive resource utilization by a single user could impact the performance for other users. Therefore, continuous monitoring of the activities of each and every user on the server is critical. Towards this end, the **RDS Users** test assesses the traffic between the user terminal and the server, and also monitors the resources taken up by a user's session on the server. The results of this test can be used in troubleshooting and proactive monitoring. For example, when a user reports a performance problem, an administrator can quickly check the bandwidth usage of the user's session, the CPU/memory/disk usage of this user's session as well as the resource usage of other user sessions. The admin also has access to details on what processes/applications the user is accessing and their individual resource usage. This information can be used to spot any offending processes/ applications.

Target of the test : A VMware View RDS server

Agent deploying the test: An internal agent

Outputs of the test : One set of results for every user who is currently connected to the VMware RDS 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 VMware View RDS server

4. **USERNAMES** - Specify the name of the user whose performance statistics need to be generated. Multiple user names can be specified as a comma-separated list. *all* is used to indicate that all users of the VMware View RDS server are to be monitored.

5. **REPORT BY DOMAIN NAME** – By default, this flag is set to **Yes**. This implies that by default, this test will report metrics for every *domainname\username*. This way, administrators will know which user logged in from which domain. If you want the test to report metrics for every *username* only, then set this flag to **No**.

6. **ENABLE BROWSER MONITORING** – By default, this flag is set to **No**, indicating that the eG agent does not monitor browser activity on the VMware View RDS server. If this flag is set to **Yes,** then, whenever one/more IE (Internet Explorer) browser instances on the RDS server are accessed, the detailed diagnosis of the *User sessions* measure will additionally reveal the URL being accessed via each IE instance and the resources consumed by every URL. Armed with this information, administrators can identify the web sites that are responsible for excessive resource usage by an IE instance.

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
User sessions:	Represents the current number of sessions for a particular user	Number	A value of 0 indicates that the user is not currently connected to the VMware View RDS server.
CPU usage of user's processes:	The cpu utilization for a session is the percentage of time that all of the threads/processes of a user session used the processor to execute instructions. If a user is connected via	Percent	This value indicates the percentage of Cpu resources that are used by applications run by this user. Excessive CPU usage by a user can impact performance for other users. Check the detailed diagnosis to view the offending processes/applications.

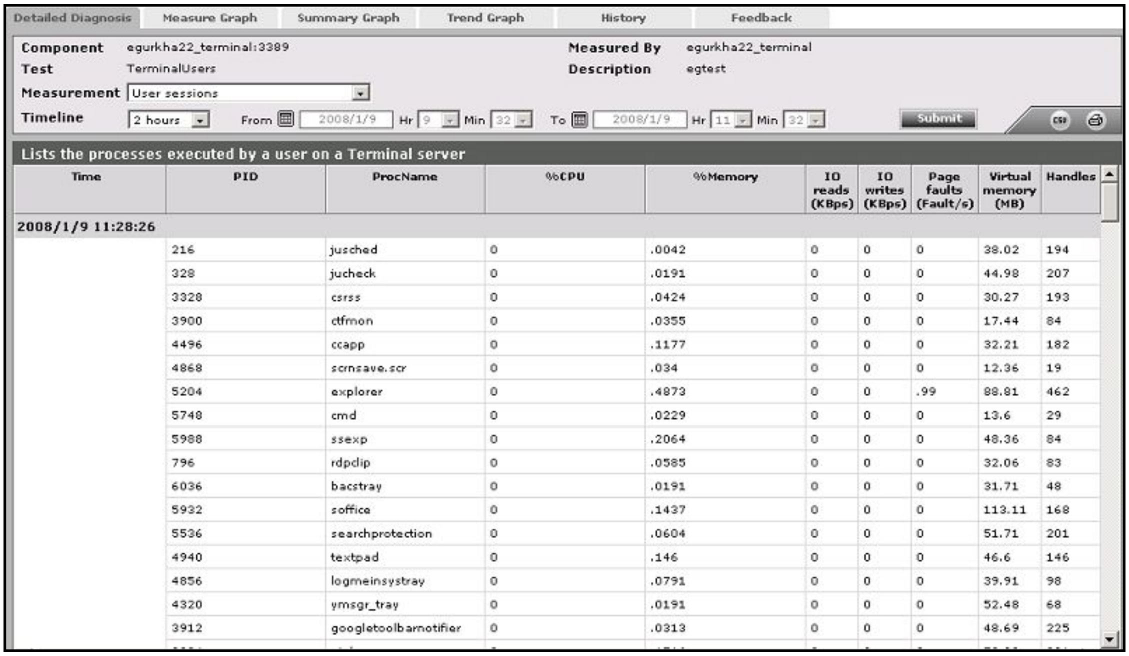
Measurement	Description	Measurement Unit	Interpretation
	multiple sessions, the value reported is the sum of all cpu utilizations across all the sessions.		
Memory usage of user's processes:	This value represents the ratio of the resident set size of the memory utilized by the user to the physical memory of the host system, expressed as a percentage. If a user is connected via multiple sessions, the value reported is the sum of all memory utilizations across all the sessions.	Percent	This value indicates the percentage of memory resources that are used up by a specific user. By comparing this value across users, an administrator can identify the most heavy users of the VMware View RDS server. Check the detailed diagnosis to view the offending processes/applications.
Input bandwidth:	Indicates the average bandwidth used for client to server communications for all the sessions of a user	KB/Sec	
Input errors:	The average number of input errors of all types for all the sessions of a user. Example: Lost ACK's, badly formed packets, etc.	Errors/Sec	
Output bandwidth:	Indicates the average bandwidth used for server to client communications for all the sessions of a user	KB/Sec	
Output errors:	The average number of output errors of all types for all the sessions of a user. Example: Lost ACK's, badly formed packets, etc.	Errors/Sec	

Measurement	Description	Measurement Unit	Interpretation
I/O read rate for user's processes:	Indicates the rate of I/O reads done by all processes being run by a user.	KBps	These metrics measure the collective I/O activity (which includes file, network and device I/O's) generated by all the processes being executed by a user. When viewed along with the system I/O metrics reported by the DiskActivityTest, these measures help you determine the network I/O. Comparison across users helps identify the user who is running the most I/O-intensive processes. Check the detailed diagnosis for the offending processes/applications.
I/O write rate for user's processes:	Indicates the rate of I/O writes done by all processes being run by a user.	KBps	
Faults for user's processes:	Indicates the rate of page faults seen by all processes being run by a user.	Faults/Sec	Page Faults occur in the threads executing in a process. A page fault occurs when a thread refers to a virtual memory page that is not in its working set in main memory. If the page is on the standby list and hence already in main memory, or if the page is in use by another process with whom the page is shared, then the page fault will not cause the page to be fetched from disk. Excessive page faults could result in decreased performance. Compare values across users to figure out which user is causing most page faults.
Virtual memory of user's processes:	Indicates the total virtual memory being used by all processes being run by a user.	MB	Comparison across users reveals the user who is being a drain on the virtual memory space.
Handles used by user's processes:	Indicates the total number of handles being currently held by all processes of a user.	Number	A consistent increase in the handle count over a period of time is indicative of malfunctioning of programs. Compare this value across users to see which user is using a lot of handles. Check detailed diagnosis for further information.

Measurement	Description	Measurement Unit	Interpretation
CPU time used by user’s sessions:	Indicates the percentage of time, across all processors, this user hogged the CPU.	Percent	The CPU usage for user’s processes measure averages out the total CPU usage of a user on the basis of the number of processors. For instance, if your VMware View RDS server is using an 8-core processor and the total CPU usage of a user across all his/her sessions amounts to 80%, then the value of the CPU usage for user’s processes measure for that user will be 10 % (80/8 processors = 10). This accurately denotes the extent of CPU usage in an environment where load is uniformly balanced across multiple processors. However, in environments where load is not well-balanced, the CPU usage for user’s processes measure may not be an accurate indicator of CPU usage per user. For instance, if a single processor is used nearly 80% of the time by a user, and other 7 processors in the 8- core processor environment are idle, the CPU usage for user’s processes measure will still report CPU usage as 10%. This may cause administrators to miss out on the fact that the user is actually hogging a particular processor! In such environments therefore, its best to use the CPU time used by user’s sessions measure! By reporting the total CPU usage of a user across all his/her sessions and across all the processors the target VMware View RDS server supports, this measure serves as the true indicator of the level of CPU usage by a user in dynamic environments. For instance, in the example above, the CPU time used by user’s sessions of the user will be 80% (and not 10%, as in

Measurement	Description	Measurement Unit	Interpretation
			the case of the CPU usage for user's processes measure). A high value or a consistent increase in the value of this measure is hence serious and demands immediate attention. In such situations, use the detailed diagnosis of the CPU usage for user's processes measure to know what CPU-intensive activities are being performed by the user.

The detailed diagnosis of the *User sessions*, *CPU usage of user's processes*, and *Memory usage of user's processes* measures lists the processes executed by a user on the VMware View RDS server, and reports the resource usage of each process (see Figure 1.7).



Component egurkha22_terminal:3389
Test TerminalUsers
Measured By egurkha22_terminal
Description egtest
Measurement User sessions
Timeline 2 hours From 2008/1/9 Hr 9 Min 32 To 2008/1/9 Hr 11 Min 32

Lists the processes executed by a user on a Terminal server

Time	PID	ProcName	%CPU	%Memory	IO reads (KBps)	IO writes (KBps)	Page faults (Fault/s)	Virtual memory (MB)	Handles
2008/1/9 11:28:26									
	216	jusched	0	.0042	0	0	0	38.02	194
	328	jucheck	0	.0191	0	0	0	44.98	207
	3328	csrss	0	.0424	0	0	0	30.27	193
	3900	ctfmon	0	.0355	0	0	0	17.44	84
	4496	ccapp	0	.1177	0	0	0	32.21	182
	4868	scrnsave.scr	0	.034	0	0	0	12.36	19
	5204	explorer	0	.4873	0	0	.99	88.81	462
	5748	cmd	0	.0229	0	0	0	13.6	29
	5988	ssexp	0	.2064	0	0	0	48.36	84
	796	rdpclip	0	.0585	0	0	0	32.06	83
	6036	bacstray	0	.0191	0	0	0	31.71	48
	5932	soffice	0	.1437	0	0	0	113.11	168
	5536	searchprotection	0	.0604	0	0	0	51.71	201
	4940	textpad	0	.146	0	0	0	46.6	146
	4856	logmeinsystray	0	.0791	0	0	0	39.91	98
	4320	ymsgr_tray	0	.0191	0	0	0	52.48	68
	3912	googletoolbarnotifier	0	.0313	0	0	0	48.69	225

Figure 1.7: The detailed diagnosis of the User sessions measure

Where one/more instances of the Internet Explorer browser are running, the detailed diagnosis additionally displays the website URL accessed using each IE instance, the domain of every URL, and the website title. In the event of excessive resource usage by an IE instance, this information will shed light on the resource-intensive web site that was being accessed.

Note:

- The eG agent will perform browser activity monitoring only if the **ENABLE BROWSER MONITORING** flag is set to **Yes**.
- The eG agent will monitor browser activity only of the browser being accessed is **Internet Explorer**.

1.3.4 RDS Disconnects Test

A user session is terminated when a user logs off from the VMware View RDS server or when the session is abruptly interrupted (e.g., due to server, network, or application errors). When a user logs off, all the applications started by the user are terminated. However, when a user disconnects, the applications started by the user will keep running on the server consuming resources. Hence, the number of disconnected sessions on a VMware View RDS server should be kept to a minimum. Abrupt disconnects can significantly impact the end user experience, and hence, it is important to monitor the number of disconnected sessions at any point of time.

Target of the test : A VMware View RDS server

Agent deploying the test: An external agent

Outputs of the test : One set of results for every port 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 VMware View RDS server
4. **RECONNECTPERIOD** - This parameter is used by the test while computing the value for the **Quick reconnects** measure. This measure counts all the users who reconnected to the VMware View RDS server within the short period of time (in minutes) specified against **RECONNECTPERIOD**.
5. **REPORT BY DOMAIN NAME** - By default, this flag is set to **Yes**. This implies that by default, the detailed diagnosis of this test will display the *domainname\username* of each user who disconnected from the server recently. This way, administrators will be able to quickly determine which user belongs to which domain. If you want the detailed diagnosis to display the *username* alone, then set this flag to **No**.
6. **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**.
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.

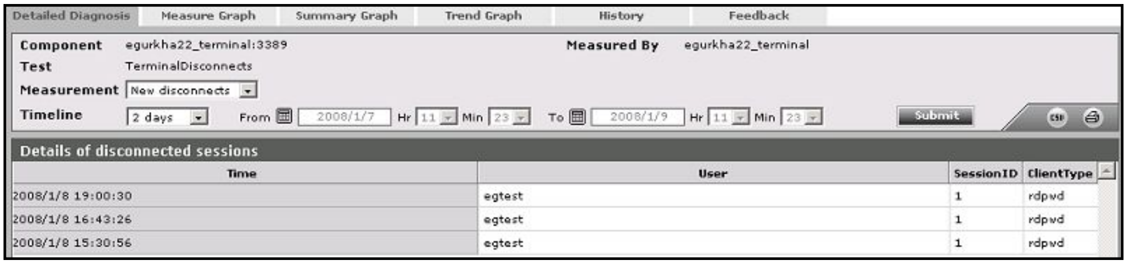
   The option to selectively enabled/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled:

   - 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 disconnected sessions:	Indicates the total number of sessions that are in the disconnected state.	Number	
New disconnects:	Indicates the number of sessions that were disconnected in the last measurement period	Number	The detailed diagnosis of this measure, if enabled lists the users who have recently disconnected.
Quick reconnects:	Indicates the number of users who reconnected soon after a disconnect.	Number	The detailed diagnosis of this measure, if enabled lists the users who have reconnected quickly.

The detailed diagnosis for the *New disconnects* measurement indicates the user, session ID, and client type for each newly disconnected session. This information can be used to track whether specific users are being disconnected often (see Figure 1.8).



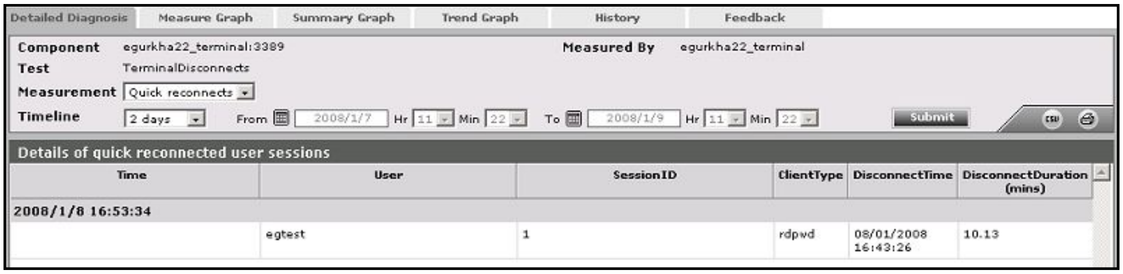
Component	egurkha22_terminal:3389	Measured By	egurkha22_terminal
Test	TerminalDisconnects		
Measurement	New disconnects		
Timeline	2 days	From 2008/1/7 Hr 11 Min 23	To 2008/1/9 Hr 11 Min 23

Details of disconnected sessions

Time	User	SessionID	ClientType
2008/1/8 19:00:30	egtest	1	rdpwd
2008/1/8 16:43:26	egtest	1	rdpwd
2008/1/8 15:30:56	egtest	1	rdpwd

Figure 1.8: The detailed diagnosis of the New disconnects measure

The detailed diagnosis for the *Quick reconnects* measurement indicates the user, session ID, client type, the exact time at which the session disconnected, and duration of the disconnect, for each session that quickly reconnected. This information can be used to track whether specific users are being disconnected often (see Figure 1.9).



Component egurkha22_terminal:3389

Measured By egurkha22_terminal

Test TerminalDisconnects

Measurement Quick reconnects

Timeline 2 days From 2008/1/7 Hr 11 Min 22 To 2008/1/9 Hr 11 Min 22

Details of quick reconnected user sessions

Time	User	SessionID	ClientType	DisconnectTime	DisconnectDuration (mins)
2008/1/8 16:53:34					
	egtest	1	rdpwd	08/01/2008 16:43:26	10.13

Figure 1.9: The detailed diagnosis of the Quick reconnects measure

1.3.5 RDS Logins Test

This test monitors the new logins to the VMware View RDS server.

Target of the test : A VMware View RDS server

Agent deploying the test: An external agent

Outputs of the test : One set of results for every port 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 VMware View RDS server
4. **REPORTUSINGMANAGERTIME** - By default, this flag is set to **Yes**. This indicates that the user login time displayed in the **DETAILED DIAGNOSIS** page for this test will be based on the eG manager's time zone by default. Set this flag to **No** if you want the login times displayed in the **DETAILED DIAGNOSIS** page for this test to be based on the VMware View RDS server's local time.
5. **REPORT BY DOMAIN NAME** – By default, this flag is set to **Yes**. This implies that by default, the detailed diagnosis of this test will display the *domainname\username* of each user session that logged out. This default setting ensures that administrators are able to quickly determine the domains to which the users who logged out belonged. You can set this flag to **No** if you want detailed diagnosis to display only the *username* of the users who logged out.
6. **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**.
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.

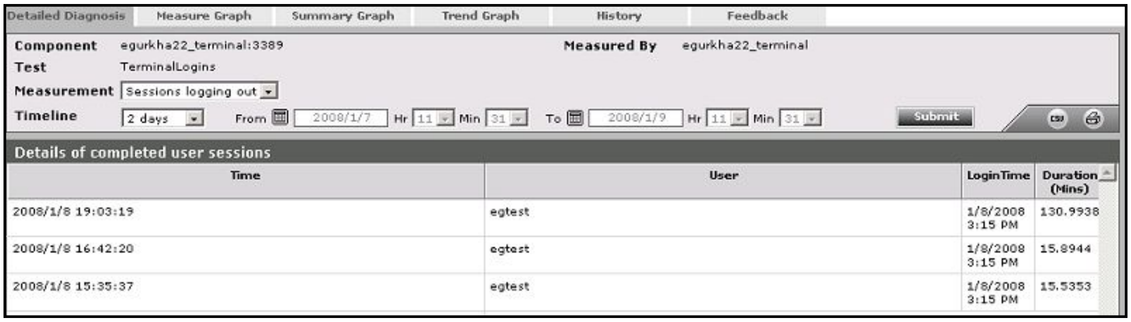
The option to selectively enabled/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled:

- 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
New logins:	Indicates the number of new logins to the VMware View RDS server in the last measurement period.	Number	A consistent zero value could indicate a connection issue.
Percent new logins:	Indicates the percentage of current sessions that logged in during the last measurement period.	Percent	
Sessions logging out:	Indicates the number of sessions that logged out.	Number	If all the current sessions suddenly log out, it indicates a problem condition that requires investigation.

The detailed diagnosis of the *Sessions logging out* measure lists the sessions that logged out.



Component egurkha22_terminal:3389
Measured By egurkha22_terminal
Test TerminalLogins
Measurement Sessions logging out
Timeline 2 days From 2008/1/7 Hr 11 Min 31 To 2008/1/9 Hr 11 Min 31

Details of completed user sessions

Time	User	LoginTime	Duration (Mins)
2008/1/8 19:03:19	egtest	1/8/2008 3:15 PM	130.9938
2008/1/8 16:42:20	egtest	1/8/2008 3:15 PM	15.8944
2008/1/8 15:35:37	egtest	1/8/2008 3:15 PM	15.5353

Figure 1.10: The detailed diagnosis of the Sessions logging out measure

1.3.6 Blast Session Details Test

The BLAST Session protocol allows files on a remote computer to be manipulated - i.e., to be deleted, renamed, or printed on the remote. Owing to the improved remote file management capabilities that Blast offers, VMware now supports the Blast protocol too for user communication with virtual desktops and applications on VMware RDS hosts. Because of this, there is a need to know which users have connected to VMware RDS hosts via Blast and how the experience of each user is. This is why, the Blast Session Details test auto-discovers the users who are connected to VMware RDS hosts via the Blast protocol, and measures the bandwidth usage, frames processing ability, I/O performance, throughput, and time taken to establish each user's session. In the process, bandwidth-hungry, latent sessions can be accurately isolated.

Target of the test : A VMware View RDS server

Agent deploying the test: An internal agent

Outputs of the test : One set of results for every user who is currently connected to the VMware RDS host via the Blast protocol

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 VMware View RDS server
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
User sessions:	Represents the current number of sessions for a particular user	Number	A value of 0 indicates that the user is not currently connected to the VMware View RDS server. You can use the detailed diagnosis of this measure to know which applications are currently run by a user and the resource usage of each application. Resource- hungry applications can thus be identified.

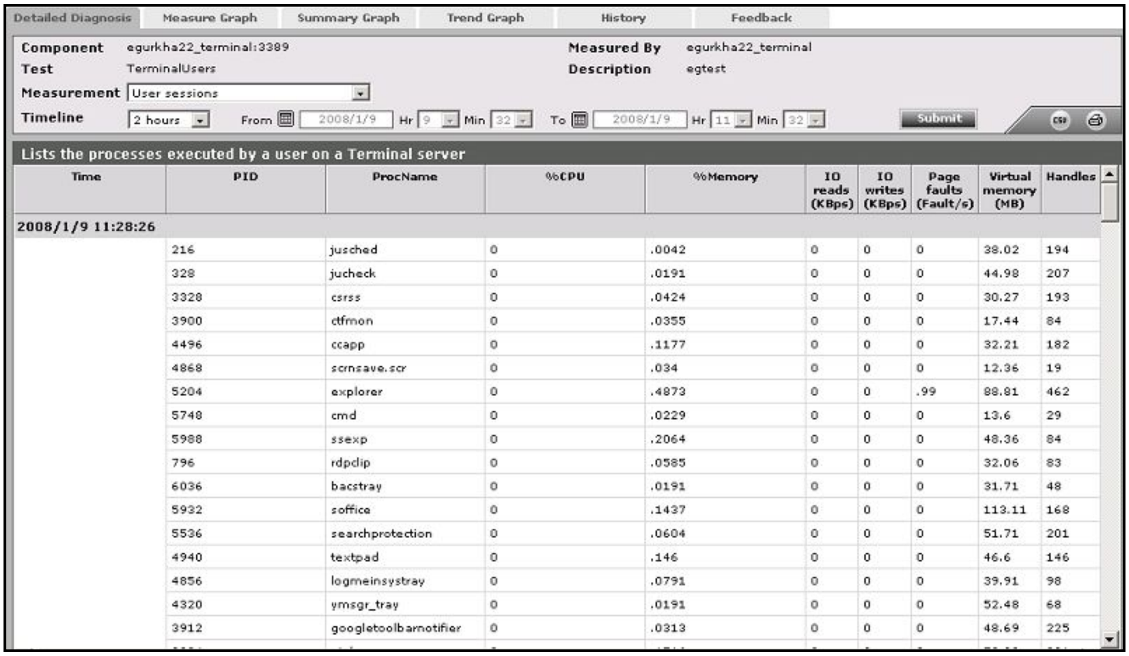
Measurement	Description	Measurement Unit	Interpretation
CPU usage of user's processes:	The CPU utilization for a session is the percentage of time that all of the threads/processes of a user session used the processor to execute instructions. If a user is connected via multiple sessions, the value reported is the sum of all CPU utilizations across all the sessions.	Percent	This value indicates the percentage of CPU resources that are used by applications run by this user. Excessive CPU usage by a user can impact performance for other users. Check the detailed diagnosis to view the offending processes/applications.
Memory usage of user's processes:	This value represents the ratio of the resident set size of the memory utilized by the user to the physical memory of the host system, expressed as a percentage. If a user is connected via multiple sessions, the value reported is the sum of all memory utilizations across all the sessions.	Percent	This value indicates the percentage of memory resources that are used up by a specific user. By comparing this value across users, an administrator can identify the Blast sessions that are engaged in memory- intensive processing on the VMware View RDS server. Check the detailed diagnosis to view the offending processes/applications.
Input bandwidth:	Indicates the average bandwidth used for client to server communications for all the sessions of a user.	KB/Sec	
Input errors:	The average number of input errors of all types for all the sessions of a user. Example: Lost ACK's, badly formed packets, etc.	Errors/Sec	
Output bandwidth:	Indicates the average bandwidth used for server to client communications for all the sessions of a user	KB/Sec	

Measurement	Description	Measurement Unit	Interpretation
Output errors:	The average number of output errors of all types for all the sessions of a user. Example: Lost ACK's, badly formed packets, etc.	Errors/Sec	
I/O read rate for user's processes:	Indicates the rate of I/O reads done by all processes being run by a user.	KBps	These metrics measure the collective I/O activity (which includes file, network and device I/O's) generated by all the processes being executed by a user. When viewed along with the system I/O metrics reported by the Disk Activity Test, these measures help you determine the network I/O. Comparison across users helps identify the user who is running the most I/O- intensive processes. Check the detailed diagnosis for the offending processes/applications.
I/O write rate for user's processes:	Indicates the rate of I/O writes done by all processes being run by a user.	KBps	
Faults for user's processes:	Indicates the rate of page faults seen by all processes being run by a user.	Faults/Sec	Page Faults occur in the threads executing in a process. A page fault occurs when a thread refers to a virtual memory page that is not in its working set in main memory. If the page is on the standby list and hence already in main memory, or if the page is in use by another process with whom the page is shared, then the page fault will not cause the page to be fetched from disk. Excessive page faults could result in decreased performance. Compare values across users to figure out which user is causing most page faults.
Virtual memory of user's processes:	Indicates the total virtual memory being used by all processes being run by a user.	MB	Comparison across users reveals the user who is being a drain on the virtual memory space.
	Indicates the total number of	Number	A consistent increase in the handle

Measurement	Description	Measurement Unit	Interpretation
Handles used by user's processes:	handles being currently held by all processes of a user.		count over a period of time is indicative of malfunctioning of programs. Compare this value across users to see which user is using a lot of handles. Check detailed diagnosis for further information.
CPU time used by user's sessions:	Indicates the percentage of time, across all processors, this user hogged the CPU.	Percent	The CPU usage for user's processes measure averages out the total CPU usage of a user on the basis of the number of processors. For instance, if your VMware View RDS server is using an 8-core processor and the total CPU usage of a user across all his/her sessions amounts to 80%, then the value of the CPU usage for user's processes measure for that user will be 10 % (80/8 processors = 10). This accurately denotes the extent of CPU usage in an environment where load is uniformly balanced across multiple processors. However, in environments where load is not well-balanced, the CPU usage for user's processes measure may not be an accurate indicator of CPU usage per user. For instance, if a single processor is used nearly 80% of the time by a user, and other 7 processors in the 8- core processor environment are idle, the CPU usage for user's processes measure will still report CPU usage as 10%. This may cause administrators to miss out on the fact that the user is actually hogging a particular processor! In such environments therefore, its best to use the CPU time used by user's sessions measure! By reporting the total CPU usage of a user across all his/her sessions and across all the processors the target VMware View RDS server

Measurement	Description	Measurement Unit	Interpretation
			supports, this measure serves as the true indicator of the level of CPU usage by a user in dynamic environments. For instance, in the example above, the CPU time used by user's sessions of the user will be 80% (and not 10%, as in the case of the CPU usage for user's processes measure). A high value or a consistent increase in the value of this measure is hence serious and demands immediate attention. In such situations, use the detailed diagnosis of the CPU usage for user's processes measure to know what CPU-intensive activities are being performed by the user.
Bandwidth	Indicates the bandwidth usage of all sessions of this user	Kbps	Compare the value of this measure across users to know which user is consuming the maximum bandwidth.
Frame rate	Indicates the rate at which frames are processed during this user's sessions.	Frames/Sec	FPS is how fast your graphics card can output individual frames each second. It is the most time- tested and ideal measure of performance of a GPU. Higher the value of this measure, healthier is the GPU.
Round trip time	Indicates the round trip latency between this user and the server.	Seconds	A high value is indicative of a connection bottleneck.
Throughput	Indicates the network throughput of this user's sessions.	Kbps	A poor network throughput could cause latencies in network communication.

The detailed diagnosis of the *User sessions*, *CPU usage of user's processes*, and *Memory usage of user's processes* measures lists the processes executed by a user on the VMware View RDS server, and reports the resource usage of each process (see Figure 1.11).



Component egurkha22_terminal:3389

Test TerminalUsers

Measured By egurkha22_terminal

Description egtest

Measurement User sessions

Timeline 2 hours From 2008/1/9 Hr 9 Min 32 To 2008/1/9 Hr 11 Min 32

Lists the processes executed by a user on a Terminal server

Time	PID	ProcName	%CPU	%Memory	IO reads (KBps)	IO writes (KBps)	Page faults (Fault/s)	Virtual memory (MB)	Handles
2008/1/9 11:28:26									
	216	jusched	0	.0042	0	0	0	38.02	194
	328	jucheck	0	.0191	0	0	0	44.98	207
	3328	csrss	0	.0424	0	0	0	30.27	193
	3900	ctfmon	0	.0355	0	0	0	17.44	84
	4496	ccapp	0	.1177	0	0	0	32.21	182
	4868	scrnsave.scr	0	.034	0	0	0	12.36	19
	5204	explorer	0	.4873	0	0	.99	88.81	462
	5748	cmd	0	.0229	0	0	0	13.6	29
	5988	ssexp	0	.2064	0	0	0	48.36	84
	796	rdpclip	0	.0585	0	0	0	32.06	83
	6036	bacstray	0	.0191	0	0	0	31.71	48
	5932	soffice	0	.1437	0	0	0	113.11	168
	5536	searchprotection	0	.0604	0	0	0	51.71	201
	4940	textpad	0	.146	0	0	0	46.6	146
	4856	logmeinsystray	0	.0791	0	0	0	39.91	98
	4320	ymsgr_tray	0	.0191	0	0	0	52.48	68
	3912	googletoolbarnotifier	0	.0313	0	0	0	48.69	225

Figure 1.11: The detailed diagnosis of the User sessions measure

1.3.7 PCoIP Session Details Test

PCoIP - PC over IP - is a proprietary protocol for remote workstation and desktop resolution. VMware View supports PCoIP to deliver applications to users connecting to their VMware RDS hosts. Since PCoIP recognizes different types of content and then uses different compression algorithms based on the content type, it is often considered ideal to deliver on the promise of a rich user experience. Because of its popularity, there is a need to know which users have connected to VMware RDS hosts via PCoIP and how the experience of each user is.

The PCoIP Session Details test auto-discovers the users who are currently connected to their VMware RDS hosts via PCoIP. For each such user, the test reports the following:

- The latency experienced by each user's sessions;
- The bandwidth used by the incoming and outgoing data/audio/multimedia traffic transacted by the PCoIP communication channel between each user and the VMware RDS server;

Using this test, an administrator can identify user sessions that are being impacted by high latency and abnormal bandwidth usage. In addition, the test also reveals the type of traffic that is causing excessive bandwidth usage, thereby providing pointers to how the client configuration can be fine-tuned in order to reduce bandwidth consumption and improve performance.

Target of the test : A VMware View RDS server

Agent deploying the test: An internal agent

Outputs of the test : One set of results for every user who is currently connected to the VMware RDS host via the PCoIP protocol

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 VMware View RDS server
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
User sessions:	Represents the current number of sessions for a particular user	Number	A value of 0 indicates that the user is not currently connected to the VMware View RDS server. You can use the detailed diagnosis of this measure to know which applications are currently run by a user and the resource usage of each application. Resource- hungry applications can thus be identified.
CPU usage of user's processes:	The CPU utilization for a session is the percentage of time that all of the threads/processes of a user session used the processor to execute instructions. If a user is connected via multiple sessions, the value reported is the sum of all CPU utilizations across all the sessions.	Percent	This value indicates the percentage of CPU resources that are used by applications run by this user. Excessive CPU usage by a user can impact performance for other users. Check the detailed diagnosis to view the offending processes/applications.

Measurement	Description	Measurement Unit	Interpretation
Memory usage of user's processes:	This value represents the ratio of the resident set size of the memory utilized by the user to the physical memory of the host system, expressed as a percentage. If a user is connected via multiple sessions, the value reported is the sum of all memory utilizations across all the sessions.	Percent	This value indicates the percentage of memory resources that are used up by a specific user. By comparing this value across users, an administrator can identify the PCoIP sessions that are engaged in memory- intensive processing on the VMware View RDS server. Check the detailed diagnosis to view the offending processes/applications.
Input bandwidth:	Indicates the average bandwidth used for client to server communications for all the sessions of a user.	KB/Sec	
Input errors:	The average number of input errors of all types for all the sessions of a user. Example: Lost ACK's, badly formed packets, etc.	Errors/Sec	
Output bandwidth:	Indicates the average bandwidth used for server to client communications for all the sessions of a user	KB/Sec	
Output errors:	The average number of output errors of all types for all the sessions of a user. Example: Lost ACK's, badly formed packets, etc.	Errors/Sec	
I/O read rate for user's processes:	Indicates the rate of I/O reads done by all processes being run by a user.	KBps	These metrics measure the collective I/O activity (which includes file, network and device I/O's) generated by all the processes being executed by a user. When viewed along with the system I/O

Measurement	Description	Measurement Unit	Interpretation
			metrics reported by the Disk Activity Test, these measures help you determine the network I/O. Comparison across users helps identify the user who is running the most I/O- intensive processes. Check the detailed diagnosis for the offending processes/applications.
I/O write rate for user's processes:	Indicates the rate of I/O writes done by all processes being run by a user.	KBps	
Faults for user's processes:	Indicates the rate of page faults seen by all processes being run by a user.	Faults/Sec	Page Faults occur in the threads executing in a process. A page fault occurs when a thread refers to a virtual memory page that is not in its working set in main memory. If the page is on the standby list and hence already in main memory, or if the page is in use by another process with whom the page is shared, then the page fault will not cause the page to be fetched from disk. Excessive page faults could result in decreased performance. Compare values across users to figure out which user is causing most page faults.
Virtual memory of user's processes:	Indicates the total virtual memory being used by all processes being run by a user.	MB	Comparison across users reveals the user who is being a drain on the virtual memory space.
Handles used by user's processes:	Indicates the total number of handles being currently held by all processes of a user.	Number	A consistent increase in the handle count over a period of time is indicative of malfunctioning of programs. Compare this value across users to see which user is using a lot of handles. Check detailed diagnosis for further information.

Measurement	Description	Measurement Unit	Interpretation
CPU time used by user's sessions:	Indicates the percentage of time, across all processors, this user hogged the CPU.	Percent	The CPU usage for user's processes measure averages out the total CPU usage of a user on the basis of the number of processors. For instance, if your VMware View RDS server is using an 8-core processor and the total CPU usage of a user across all his/her sessions amounts to 80%, then the value of the CPU usage for user's processes measure for that user will be 10 % (80/8 processors = 10). This accurately denotes the extent of CPU usage in an environment where load is uniformly balanced across multiple processors. However, in environments where load is not well-balanced, the CPU usage for user's processes measure may not be an accurate indicator of CPU usage per user. For instance, if a single processor is used nearly 80% of the time by a user, and other 7 processors in the 8- core processor environment are idle, the CPU usage for user's processes measure will still report CPU usage as 10%. This may cause administrators to miss out on the fact that the user is actually hogging a particular processor! In such environments therefore, its best to use the CPU time used by user's sessions measure! By reporting the total CPU usage of a user across all his/her sessions and across all the processors the target VMware View RDS server supports, this measure serves as the true indicator of the level of CPU usage by a user in dynamic environments. For instance, in the example above, the CPU time used by user's sessions of the user will be 80% (and not 10%, as in

Measurement	Description	Measurement Unit	Interpretation
			the case of the CPU usage for user's processes measure). A high value or a consistent increase in the value of this measure is hence serious and demands immediate attention. In such situations, use the detailed diagnosis of the CPU usage for user's processes measure to know what CPU-intensive activities are being performed by the user.
Data received rate:	Indicates the rate at which data was received by this user from the server.	Kbit/Sec	Comparing the value of each of these measures across users will enable administrators to quickly and accurately identify users who are consuming the maximum bandwidth. Once you zero-in on the user, you can compare the Data received rate of that user with the Data sent rate to know when the user consumed more bandwidth - when receiving data or while sending data?
Data sent rate:	Indicates the rate at which data was sent by this user to the server.	Kbit/Sec	
Audio data received rate:	Indicates the bandwidth used while transmitting sound/audio to this user.	Kbit/Sec	Comparing these values across users will reveal which user is sending/receiving bandwidth- intensive sound/audio files over PCoIP.
Audio data sent rate:	Indicates the bandwidth used while receiving sound/audio from this user.	Kbit/Sec	
Imaging data received rate:	Indicates the bandwidth used when sending imaging data to this user.	Kbit/Sec	Comparing these values across users will reveal which user is sending/receiving bandwidth- intensive images over PCoIP.
Imaging data sent rate:	Indicates the bandwidth used when receiving imaging data from this user.	Kbit/Sec	
Decoder capability	Indicates the current	Kbit/Sec	

Measurement	Description	Measurement Unit	Interpretation
rate:	estimate of the decoder processing capability.		
Received bandwidth:	Indicates the overall bandwidth consumed by the packets received by this user.	Kbit/Sec	Comparing the values of these measures across users will reveal which user is performing bandwidth-intensive operations over the PCoIP channel.
Transmitted bandwidth:	Indicates the overall bandwidth consumed by PCoIP packets sent by this user.	Kbit/Sec	
USB data received rate:	Indicates the bandwidth used when this user received USB data over the PCoIP channel.	Kbit/Sec	Comparing the values of these measures across users will reveal which user is sending/receiving bandwidth-intensive USB data over the PCoIP channel.
USB data sent rate:	Indicates the bandwidth used when this user sent USB data over the PCoIP channel.	Kbit/Sec	
Transmitted packets lost:	Indicates the number of PCoIP packets lost by this user during transmission	Number	Ideally, the value of this measure should be 0.
Received packets lost:	Indicates the number of PCoIP packets lost by this user during reception.	Number	Ideally, the value of this measure should be 0.
Percent packet loss during reception:	Indicates the percentage of packets received by this user that were lost.	Percent	A high value for these measures is indicative of a bad network connection between the user terminal and the virtual desktop.
Percent packet loss during transmission:	Indicates the percentage of packets transmitted by this user that were lost.	Percent	

Measurement	Description	Measurement Unit	Interpretation
Encoded frames:	Indicates the number of imaging frames that were encoded per second.	Frames/Sec	
Round trip time:	Indicates the round trip latency between the server and this user terminal.	Seconds	Comparing the value of this measure across users will enable administrators to quickly and accurately identify users who are experiencing higher latency when connecting to the RDS server.
Session duration:	Indicates the total time for which this user's session was open on the server.	Seconds	Compare the value of this measure to know which user was logged into the server for the maximum time.
Transmitted bandwidth limit	Indicates the maximum bandwidth that PCoIP packet transmissions by this user can consume.	Kbps	Compare the value of this measure with the value of the Transmitted bandwidth measure for a user to know whether/not packet transmissions of that user are over-utilizing the bandwidth.

2

Conclusion

This document has described in detail the monitoring paradigm used and the measurement capabilities of the eG Enterprise suite of products with respect to the **VMware RDS**. For details of how to administer and use the eG Enterprise suite of products, refer to the user manuals.

We will be adding new measurement capabilities into the future versions of the eG Enterprise suite. If you can identify new capabilities that you would like us to incorporate in the eG Enterprise suite of products, please contact support@eginnovations.com. We look forward to your support and cooperation. Any feedback regarding this manual or any other aspects of the eG Enterprise suite can be forwarded to feedback@eginnovations.com.