

Monitoring Underlying System Resources

User's Guide



Version 6.0

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Contents

Introduction	6
What Can Be Monitored?	7
Resource Monitoring Overview.....	9
Resource Monitors Workspace.....	10
Navigation Trees	10
Monitor Packs	10
Monitor Sets.....	11
Monitoring Configurations.....	11
Right-Click Menus	11
Monitor Packs	13
Resource Monitor Types	14
Cloning a Monitor Pack.....	17
Editing a Monitor Pack	17
Template Resource Monitors	17
Cloning and Editing Template Resource Monitors.....	17
Custom Command Resource Monitors.....	19
Monitor Sets.....	20
Monitor Agents.....	22
Installation	22
Considering Installation Location	22
Installation Process	23
Configuring in StressTester™	23
Monitoring Configurations.....	25
Configuring Performance Tests	27
Monitor Pack: Command Line	28
Introduction.....	28
Implementation.....	28
Connection Options.....	28
Template Resource Monitor Parameters	28
Custom Command Resource Monitor.....	29
Monitor Pack: Microsoft Windows.....	30
Introduction.....	30
Implementation.....	30
Connection Options.....	30
Template Resource Monitor Parameters	31
Custom Command Resource Monitor.....	31
Monitor Pack: Solaris	33
Introduction.....	33

Implementation	33
Connection Options	33
Template Resource Monitor Parameters	34
Custom Command Resource Monitor	35
Monitor Pack: Linux	36
Introduction	36
Implementation	36
Connection Options	36
Template Resource Monitor Parameters	37
Custom Command Resource Monitor	38
Monitor Pack: Java Virtual Machine	39
Introduction	39
Implementation	39
Connection Options	39
Template Resource Monitor Parameters	40
Custom Command Resource Monitor	40
Monitor Pack: .NET / CLR / ASP	41
Introduction	41
Implementation	41
Connection Options	41
Template Resource Monitor Parameters	42
Custom Command Resource Monitor	42
Monitor Pack: MySQL	43
Introduction	43
Implementation	43
Connection Options	43
Template Resource Monitor Parameters	44
Custom Command Resource Monitor	44
Monitor Pack: Oracle	45
Introduction	45
Implementation	45
Connection Options	45
Template Resource Monitor Parameters	46
Custom Command Resource Monitor	46
Monitor Pack: SQL Server	47
Introduction	47
Implementation	47
Connection Options	47
Template Resource Monitor Parameters	48
Custom Command Resource Monitor	48
Monitor Pack: Apache Web Server	49
Introduction	49
Implementation	49

Connection Options.....	49
Template Resource Monitor Parameters	49
Monitor Pack: Microsoft IIS.....	50
Introduction.....	50
Implementation.....	50
Connection Options.....	50
Template Resource Monitor Parameters	51
Custom Command Resource Monitor.....	51
Appendix A: Suggested Configuration Process	52

Introduction

This user guide describes how you can use StressTester™ to monitor any aspect of the system against which the performance test is being executed; and hence identify the causes for poor performance results when such occur.

A common question is:

[Why monitor system resources?](#)

Performance testing will tell you whether your application will scale to handle the predicted load, the response times that will be experienced by users at different loads, and if and at what point the system becomes unusable or fails.

However, when the results of the performance tests are not acceptable to the business, it is imperative to understand why the system is failing to perform and/or scale so that remedial work can be undertaken to achieve the required performance.

StressTester™ Resource Monitors provide the information that allows the cause(s) for poor system performance to be understood so that you can take remedial action to achieve the performance and scalability your business requires.

What Can Be Monitored?

When monitoring a system under test, you will want to understand a number of things about each component in your system infrastructure. For example, you will want to understand how your database is performing as well as the transaction throughput and how effective the buffer cache is.

For this reason, the StressTester™ components that monitor individual metrics in your system are grouped by the type of infrastructure component they monitor. These groupings are called **Monitor Packs**.

At the time of production of this user guide, StressTester™ Monitor Packs exist for the following infrastructure components:

Operating Systems

- Microsoft Windows
- Solaris
- Linux

Application Environments

- Java
- .NET

Databases

- SQL Server
- Oracle
- MySQL
- PostgreSQL
- Informix

Web Servers

- Apache web server
- Microsoft IIS

Note: New Monitor Packs are released on a regular basis. Please check the StressTester™ web site (www.stresstester.com) for an up-to-date list of the Monitor Packs available.

There is also an additional Monitor Pack supplied with StressTester™ - “Command Line”. This Monitor Pack allows you to create your own Resource Monitors to monitor any other aspect of

StressTester™: Monitoring Underlying System Resources

the system under test. Please refer to the [Monitor Pack: Command Line](#) section below for more details.

Resource Monitoring Overview

This section provides an overview of how you configure StressTester™ to monitor the underlying system. It describes components of interest and introduces the StressTester™ resource monitoring terminology.

As described above, StressTester™ is provided with [Monitor Packs](#) that contain groups of Resource Monitors related to the same system infrastructure component.

The Resource Monitors within the Monitor Packs can be configured by yourself to make them more relevant to your system – ensuring the information StressTester™ provides is exactly what your business requires.

Some of the Monitor Packs contain a large number of Resource Monitors and it is probable that not all are relevant to your system. It is likely that you will identify ‘favourite’ Resource Monitors you will want to use in every performance test, and then to add others when these highlight a problem with an infrastructure component.

StressTester™ [Monitor Sets](#) allow you to choose how many Resource Monitors from a Monitor Pack you wish to execute during a performance test. A Monitor Set is effectively a subset of the Resource Monitors within a Monitor Pack.

When you have configured your Monitor Sets, you then need to decide where these will be executed – Resource Monitors can be executed on the system they are monitoring, or on a remote system.

The StressTester™ component that executes Resource Monitors during a performance test is called a [Monitor Agent](#). You can configure as many Monitor Agents as you require.

The final stage of configuring resource monitoring in StressTester™ is to create [Monitoring Configurations](#). These specify on which Monitor Agents the Resource Monitors in a Monitor Set execute, and how they access the system component (for example the credentials to access a database or the port on which a component is listening).

The above may seem quite a bit of effort to configure resource monitoring but it should be noted that you rarely, after the first time, need to modify Resource Monitors or edit Monitor Agent details; you typically will just change the Resource Monitors in the Monitor Set and maybe edit or create new Monitoring Configurations.

Resource Monitors Workspace

With the exception of the Monitor Agents, the configuration of all resource monitoring components is performed in the Resource Monitors workspace of the StressTester™ user interface.



To access this workspace, click the “Resource Monitors” button on the left hand side of the StressTester™ user interface.

Note: If you do not have the Resource Monitors button showing, this indicates that your license does not allow the configuration or use of Resource Monitors.

Navigation Trees

When the workspace is entered, the workspace navigation trees and introduction page are displayed.

Note: It is highly recommended that you read the introduction page the first time you use the workspace; it contains valuable information.

The three navigation trees within the workspace hold nodes for Monitor Packs, Monitor Sets and Monitoring Configurations.

Monitor Packs

By selecting a node in the Monitor Packs navigation tree, a data panel will be displayed showing the details of the selected Monitor Pack.

Please refer to the [Monitor Packs](#) section below for more details of the fields and buttons on the panel.

Note: Monitor Pack names shown in grey font indicate that your license does not allow the use of Resource Monitors in those Packs.

Monitor Sets

By clicking a node in the Monitor Sets navigation tree, a data panel will be displayed showing the details of the selected Monitor Set.

Please refer to the [Monitor Sets](#) section below for more details of the fields and buttons on the panel.

Monitoring Configurations

By clicking a node in the Configurations navigation tree, a data panel will be displayed showing the details of the selected Monitor Configuration.

Please refer to the [Monitor Configurations](#) section below for more details of the fields and buttons on the panel.

Right-Click Menus

Most nodes within the Resource Monitors workspace navigation trees have context sensitive right-click menus – providing easy access to the majority of the StressTester™ user interface's functionality.

The sections below detail the different functionality available on the different tree nodes.

Monitor Packs

Menu Item	Description
Import Monitor Pack	Imports a Monitor Pack from a file.

Monitor Pack

Menu Item	Description
Create Monitor Set	Creates a new Monitor Set from this Monitor Pack.
Clone	Creates a copy of this Monitor Pack.
Export	Exports the Monitor Pack in a format suitable for importing into another StressTester™ installation.

Menu Item	Description
Delete	Deletes the Monitor Pack from StressTester™ and all monitoring results associated with Resource Monitors in the Pack. This function is not available on Monitor Packs supplied with StressTester™.

Monitor Sets

Menu Item	Description
Import Monitor Set	Imports a Monitor Set from a previously created export file.

Monitor Set

Menu Item	Description
Export	Exports the Monitor Set in a format suitable for importing into another StressTester™ installation.
Delete	Deletes the Monitor Set from StressTester™.

Configurations

Menu Item	Description
Create Configuration	Creates a new Monitoring Configuration.

Monitoring Configuration

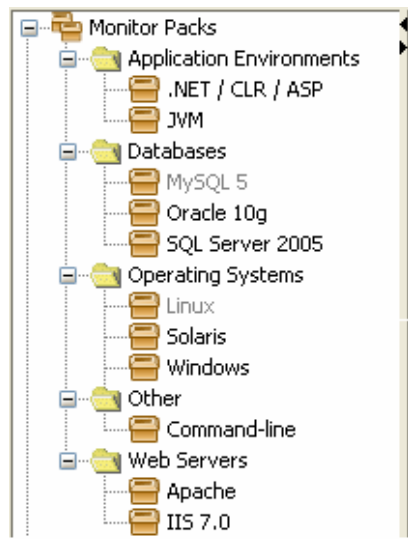
Menu Item	Description
Delete	Deletes the Monitoring Configuration from StressTester™.
Clone	Creates a copy of this Monitoring Configuration.

Monitor Packs

A Monitor Pack is a group of Resource Monitors that monitor a common infrastructure component (e.g. database, web server, etc.).

To see the Monitor Packs available in your installation of StressTester™, navigate to the Resource Monitors workspace and expand the Monitor Packs navigation tree.

You will see a list of Monitor Packs, grouped by the category of component they monitor, similar to the partial screen shot shown below.



Note: You will notice that some of the Monitor Pack names are shown in grey font. This indicates that your license does not permit the configuration and use of these Monitor Pack.

When you select a Monitor Pack node, details of the contents of the Monitor Pack will be shown in the data panel.

A screen similar to the one shown on the next page will be displayed.

NOTE: This Monitor Pack was supplied with StressTester™ and therefore, apart from the sample intervals and threshold values for Resource Monitors, it cannot be edited. In order to configure 'template' Resource Monitors (shown in red font), create your own Monitors, or delete Monitors from the Pack, you should first clone it and then edit the created clone.

To set sample intervals and threshold values on non-template Resource Monitors, select the Monitor in the table below and edit the fields shown at the bottom of the screen.

To clone the Monitor Pack, right-click on it in the navigation tree and select the "Clone" option.

Monitor Pack Name:

Resource Type:

Monitor Name	Category	Poll (sec)	Max Value	Thres. Type	Thres. Value
Avail Memory	Memory	10	2048	Max	0
Memory Pages In	Memory	10	50	Max	0
Memory Pages Out	Memory	10	50	Max	0
NW Bytes Received	Network	10	13107200	Max	0
NW Bytes Sent	Network	10	13107200	Max	0
All Disks Avg Read Queue	Disk	10	50	Max	0
All Disks Avg Write Queue	Disk	10	50	Max	0
Disk # Avg Read Queue	Disk	10	50	Max	0
Disk # Avg Write Queue	Disk	10	50	Max	0

Name: Description:

Category:

Parameters: No parameters are required for this Resource Monitor

Sample Interval: sec

Metrics

The fields in this section allow you to specify how you wish results to be displayed in the Analyse Results workspace and also whether you wish to configure a threshold (a limit that a Resource Monitor should not normally pass), which will be used in the Analyse Results workspace to identify Resource Monitors that are above/below what is expected.

Please refer to the context Help or the Monitoring Underlying System Resources user guide for more details of the fields in this section.

Maximum Value: Threshold Type: Threshold Value:

Units: Decimal Places: Metric is rate

The supplied Microsoft Windows Monitor Pack.

For Monitor Packs supplied with StressTester™, you will see a notice at the top of the screen. This informs you that although you can edit the threshold and sample interval parameters for Resource Monitors in the Monitor Pack, you cannot delete or clone any of the Resource Monitors.

The screen has fields at the top for the Monitor Pack name and the type of system component it monitors, and then a summary table of all the Resource Monitors in the pack.

Resource Monitor Types

There are three types of Resource Monitors that can exist in a Monitor Pack: executable, template and Custom Command.

Executable Resource Monitors are ready to add to Monitor Sets and use in performance tests. The vast majority of Resource Monitors supplied with StressTester™ are executable. These Resource Monitors are shown in black font in the table.

Template Resource Monitors require a little further customization before they become executable. These are Resource Monitors that require one or more names or other identifiers that will be specific

to your system (e.g. the name of a database, the identity of a running process, etc.) and are shown in red font in the table.

Custom Command Resource Monitors require further customization but provide you with access to the underlying technology StressTester™ is using to monitor the system component – allowing you to monitor any metric made available by the component. These Resource Monitors have the name “Custom Command” and are shown in red font in the table.

To see further details about an individual Resource Monitor, click the Resource Monitor’s row in the summary table.

After selecting a Resource Monitor, the Monitor’s details are shown in the lower half of the screen. The fields in this part of the screen are as follows:

Column	Description
Name	The name of the Resource Monitor.
Description	The description of the metric returned by the Resource Monitor and, if the Resource Monitor is a template or Custom Command, how it is configured.
Category	The category that the Resource Monitor will be grouped within, in the Monitor Set configuration screen.
Parameters	For template Resource Monitors, the parameters that can be configured to allow the Resource Monitor to be executed are shown in a name-value table. For non-template Resource Monitors, no parameters are displayed.
Sample Interval	The frequency of execution of the Resource Monitor.
Maximum Value	The expected maximum value for the Resource Monitor.
Units	A text description of the unit of measurement for the Resource Monitor.

Column	Description
Threshold Type	<p>The type of threshold configured for the Resource Monitor.</p> <p>Thresholds allow StressTester™ to automatically identify system resources that breached a certain user-specified limit during a performance test.</p> <p>Valid types are “None” (no threshold is specified), “Max” and “Min”.</p>
Threshold Value	<p>The value over/under which the Resource Monitor is considered to have breached its threshold.</p>
Decimal Places	<p>The number of decimal places to which StressTester™ should truncate data returned by the Resource Monitor.</p>
Metric is Rate	<p>When checked, StressTester™ calculates the difference between two consecutive executions of the Resource Monitor, and divides the value by the number of seconds between executions.</p> <p>This is therefore a “change per second” measurement.</p>

The majority of fields on the screen for Monitor Packs supplied with StressTester™ are read-only. The only fields you can modify on Resource Monitors within such Packs are those concerning the sample interval and metrics of the Resource Monitors.

To edit other Resource Monitor fields, you must first clone the Monitor Pack, and then you can edit all of the fields, as well as removing unwanted Resource Monitors and creating new ones of your own.

Note: The reason for forcing you to clone before you can edit the Resource Monitors’ main details is to protect you from accidentally corrupting your Monitor Packs and not having a ‘base’ to revert to.

Cloning a Monitor Pack

As described above, Monitor Packs supplied with StressTester™ cannot be directly edited.


You must therefore create a clone and edit that clone as required.

To clone a Monitor Pack, right-click on its node in the navigation panel and select the “Clone” option. You can then provide a name for the new Monitor Pack and click OK.

Editing a Monitor Pack

Cloned Monitor Packs can be edited. The normal reason to clone and edit Monitor Packs is to edit template and Custom Command Resource Monitors within the Pack.

As well as editing template Resource Monitors, you can also delete Resource Monitors – however it is only recommended you do this when you are certain you will never need that Resource Monitor.

To delete a Resource Monitor, click the delete button  at the end of its row in the summary table, and confirm you wish to delete.

Template Resource Monitors

Template Resource Monitors are provided where it is necessary for you to enter customization details for the metric to be measured, before the Resource Monitor can be used in a performance test.


The information required is typically a ‘name’ or other ‘identifier’ that is specific to your system.

An example of a Template Resource Monitor is one that measures the usage of a specific CPU in a multi-CPU server. In order for the Resource Monitor to function, it will require the CPU identifier.

Cloning and Editing Template Resource Monitors

Template Resource Monitors are clearly identified in the Monitor Pack – their lines in the summary table are shown in red font.

You can edit or clone a template Resource Monitor in a Monitor Pack you have created.

To clone a template Resource Monitor, within the Monitor Pack screen, click the Copy button  at the end of its row in the summary table. This will copy the template Resource Monitor into the next line of the table and select it for editing in the bottom section of the screen.

The screen below shows a clone of the *Process CPU Total* template Resource Monitor.

The table below shows the Resource Monitors within this Monitor Pack.

Selecting a row will show details of the Resource Monitor in the lower half of the screen. Some details are editable so that you can configure the Resource Monitor as required.

Rows with red font indicate the Resource Monitor is a 'template' – it is not yet fully configured and therefore cannot be used in a performance test. If you wish to monitor the metric that the template Resource Monitor provides, first clone the template using the button at the end of the row, and then edit the clone.

Monitor Pack Name:

Resource Type:

Monitor Name	Category	Poll (sec)	Max. Value	Thres. Type	Thres. Value	...
CPU Total Utilisation	System	10	100	Max	90	
Processor Queue	System	10	50	Max	0	
Process CPU Total	System	10	100	Max	90	
Process User CPU	System	10	100	Max	90	
Handle Count	Process	10	50	Max	0	
Private Bytes	Process	10	104857600	Max	0	
Thread Count	Process	10	50	Max	0	
Virtual Bytes	Process	10	104857600	Max	0	

Name: Description:

Category:

Parameters:

Name	Value
instance	2

Sample Interval: sec

Metrics

The fields in this section allow you to specify how you wish results to be displayed in the Analyse Results workspace and also whether you wish to configure a threshold (a limit that a Resource Monitor should not normally pass), which will be used in the Analyse Results workspace to identify Resource Monitors that are above/below what is expected.

Please refer to the context Help or the Monitoring Underlying System Resources user guide for more details of the fields in this section.

Maximum Value: Threshold Type: Threshold Value:

The user has configured the cloned Resource Monitor to measure the total utilization of the second CPU, with a threshold value of 85%.

When you have completed all the fields in a cloned Resource Monitor, select another Resource Monitor in the summary table to copy the edited fields into the summary table.

To save updates to the Monitor Pack, click the “Save” button in the toolbar.

Custom Command Resource Monitors

The majority of Monitor Packs include a template Resource Monitor named “Custom Command”.

This Resource Monitor provides that ability to specify parameters to access any metric from the system component being monitored.

For example, for the Microsoft Windows Monitor Pack – which uses Windows Management Instrumentation (WMI) to monitor the operating system – the Custom Command Resource Monitor allows you to specify the WMI Object, Instance and Attribute. With this you can therefore monitor any of the thousands of metrics exposed via WMI.

To create a custom Resource Monitor, the process is exactly the same as for other template Resource Monitors: (if not already done so) clone the Monitor Pack, clone the Custom Command Resource Monitor, and then configure it as required.

Monitor Sets

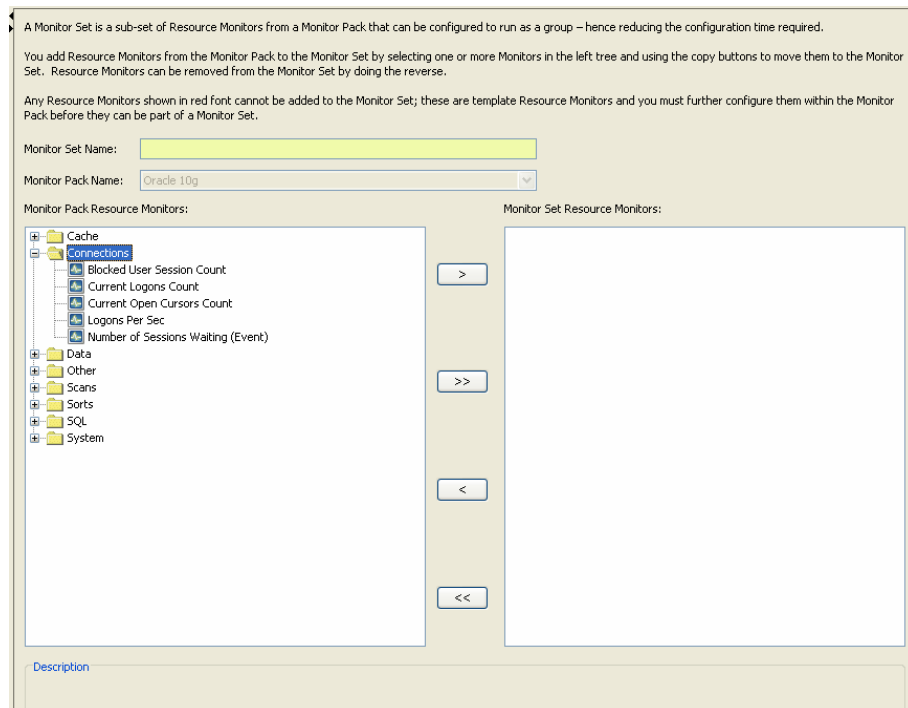
Once you have edited the Monitor Packs to customize the Resource Monitors to your requirements, you can then create Monitor Sets.

A Monitor Set is a subset of the Resource Monitors within a Monitor Pack that will be used within a performance test.

Typical uses of Monitor Sets are to have different levels of monitoring granularity – one Monitor Set for high level metrics, and then if problems are reported by the Resource Monitors in the high-level Monitor Set, another Monitor Set includes many more Resource Monitors to measure at a deeper level.

To create a Monitor Set, right-click on the relevant Monitor Pack node and choose the “Create Monitor Set” option.

You will be presented with a screen similar to the one shown below.



The screen is divided into two areas; the area on the left shows all the Resource Monitors in the selected Monitor Pack that have not been added to the Monitor Set, and the area on the right shows the Resource Monitors that have been added to the Monitor Set.

The Resource Monitors in both areas are grouped in the trees by their categories.

To move Resource Monitors between the areas, select one or more Resource Monitors and use the single direction button to transfer the Monitors to or from the Set.

If you select an individual Resource Monitor, its description is shown at the bottom of the screen.

To move all remaining executable Resource Monitors to the Set, or remove all the Resource Monitors from the Set, use the double direction arrows.

Template Resource Monitors that have not been configured cannot be transferred into the Set and will remain in the left hand area.

When you have created the Monitor Set you require, click the "Save" button on the toolbar.

Monitor Agents

The next thing for you to consider is where to locate the StressTester™ executable components – Monitor Agents – that run the Resource Monitors.

StressTester™ has been designed so that Monitor Agents can run on the machine hosting the system component to be monitored, or on a remote machine.

Monitor Agents have been designed to:

- Use very little system resource (CPU and memory)
- Have flexible deployment options (running locally or remotely to the machine being monitored)
- Be able to execute correctly in complex network infrastructures – including across DMZ implementations

Monitor Agents can therefore provide the information you require to diagnose performance problems, using a configuration that works for your organization, no matter how complex your network infrastructure may be.

Note: All StressTester™ user interface installations have a local Monitor Agent (called “LocalMonitorAgent”). Therefore, if you are using a trial version of the software, or your local machine has network access to the machines you wish to monitor, the easiest thing to do is to just use this local Monitor Agent.

Installation

This section details how you should determine where to install Monitor Agents, and the process for installation.

Considering Installation Location

Monitor Agents are designed to be able to examine system components on remote or local machines.

Therefore, you have the option of installing the Monitor Agent on a machine that is suitable for your organization, yet still managing to examine the system under test. Of course, the Monitor Agent will

need to be able to connect to the machine it is monitoring, as well as accessing the metrics it requires.

Such connection and privilege information is configured in the StressTester™ GUI (see the [Monitoring Configurations](#) section below).

Installation Process

To install a Monitor Agent, download the relevant installation package from the StressTester™ web site, and then follow the instructions supplied with the download.

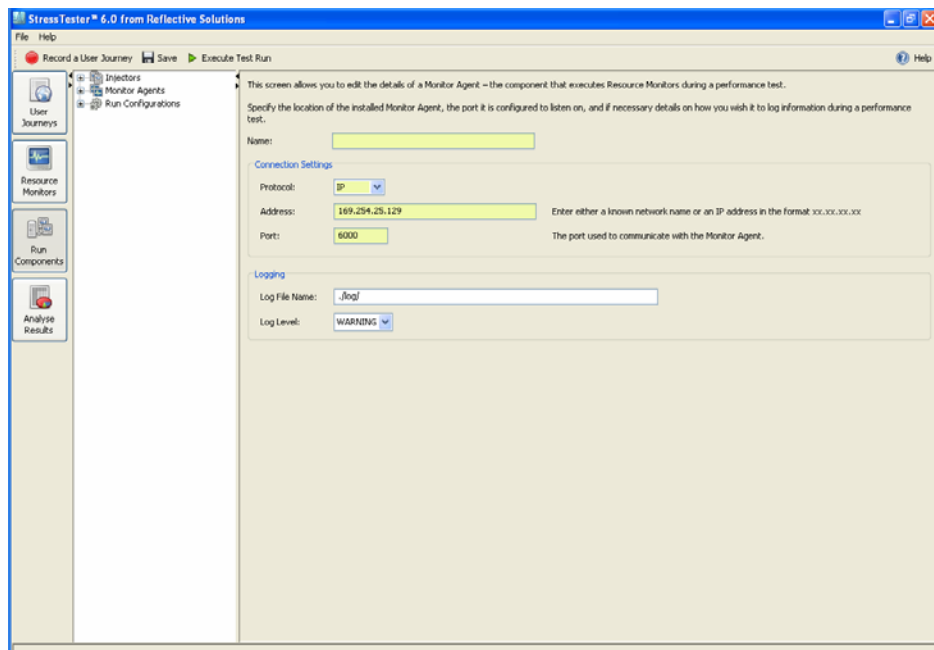
Note: Monitor Agents are not licensed and therefore you can install as many as you like, wherever you like.

Configuring in StressTester™

Before Resource Monitors can be configured to run on a particular Monitor Agent, the details of the Monitor Agent must be created within StressTester™.

To create a new Monitor Agent, within the Run Components workspace, right-click the Monitor Agents node and select the “Create Monitor Agent” option.

A screen similar to the one shown below will be displayed.



The fields on the screen are as follows:

Field	Description
Name	The name you wish to give to this Monitor Agent. Note: It is recommended that you name the Monitor Agent after the location where it is installed – either a place or a server name.
Protocol	The protocol used for communications between the StressTester™ GUI and the Monitor Agent.
Address	The address of the machine on which the Monitor Agent runs. This can be a known network name or an IP address in the format xx.xx.xx.xx.
Port	The port number on which the Monitor Agent will be configured to listen.
Log File Name	The name of the directory (on the machine on which the Monitor Agent executes) that will be used for logging information and error messages.
Log Level	The level of logging that should be performed. WARNING – The default. It will display messages deemed severe enough to warrant attention. ERROR - This will exclude any information that doesn't involve a critical fault. INFO – Shows more information, including times when start or stop signals were received and other data that could be of use if you are experiencing problems. DEBUG - This should only be used under instruction from Reflective Solutions Support.

When you have updated the Monitor Agent properties, click the “Save” toolbar button.

Monitoring Configurations

Now you have the Resource Monitors you wish to use during a performance test in Monitor Sets, and your Monitor Agents defined, you are ready to perform the last stage of the set-up of resource monitors – creating Monitoring Configurations.

Monitoring Configurations define how the Resource Monitors within a Monitor Set access a particular instance of the system component being monitored (e.g. how an Oracle Monitor Set monitors a particular Oracle installation).

To create a new Monitoring Configuration, within the Resource Monitors workspace, right-click the Configurations node and select the “Create Configuration” option.

A screen similar to the one shown below to be displayed.

A Monitor Configuration specifies how the Resource Monitors within a Monitor Set will monitor the system under test. It defines which Monitor Agent will run the Resource Monitors, and how the Monitor Agent will connect to the component being monitored. Please use the context Help if you are unsure of any of the fields on this screen.

Name:

Monitor Set:

Monitor Agent:

JVM Monitoring Configuration

StressTester™ monitors Java Virtual Machines using the Java Management Extension (JMX). Enter the parameters below to define how the Monitor Agent can connect to the JMX for the JVM being monitored.

Address:

Display Name:

Port:

User Name:

Password: Confirm Password:

The actual fields that will be displayed on the screen depend on the type of system component being monitored. This is because different configuration information is required for different component types e.g. for monitoring an Oracle database as opposed to a Solaris operating system.

The fields that appear on all Monitoring Configuration screens are:

Field	Description
Name	The name you wish to give to this Monitoring Configuration.
Monitor Set	The Monitor Set containing the Resource Monitors to execute during the performance test.
Monitor Agent	The Monitor Agent that will execute the Monitor Set.

The other fields that appear depend on the type of the Monitor Pack from which the Monitor Set was created.

Please refer to the appropriate [Monitor Pack](#) sections below for details of the fields for each Monitor Pack type.

When you have completed all the required fields, click “Save” on the toolbar.

Configuring Performance Tests

You are now ready to execute performance tests including resource monitoring.

Please refer to the [Executing Performance Tests](#) user guide to understand how to add Monitoring Configurations to Test Run Configurations.

Monitor Pack: Command Line

Introduction

It is understood that no matter how many Monitor Packs are supplied with StressTester™, there will always be the occasion when the user needs to monitor a different type of system component during a performance test.

Therefore, StressTester™ is supplied with a Command Line Monitor Pack. This Pack allows Resource Monitors to be configured that can monitor any aspect of the system on which the Monitor Agent is running.

Metrics can be obtained by invoking system commands, executing batch or shell programs, or calling executables. This facility ensures that any aspect of the system can be monitored and allows the user complete flexibility as to what they can measure during a performance test.

Implementation

All Resource Monitors in the Command Line Monitor Pack simply specify the command that should be executed on the system on which the Monitor Agent runs.

The command should always return a single decimal number. If this is not the case, an error will be logged and will be visible within the Analyze Results workspace during the performance test.

Connection Options

There are no user-specifiable connection options for Resource Monitors within Monitor Sets derived from a Command Line Monitor Pack. All Resource Monitors are executed on the Monitor Agent's local machine as a sub-process of the Monitor Agent.

Template Resource Monitor Parameters

There are no specific template Resource Monitors in the Command Line Monitor Pack.

Custom Command Resource Monitor

The Custom Command Resource Monitor requires the following parameters to be specified:

Parameter	Description
Command	This is the command you wish to execute on the machine on which the Monitor Agent runs.

Monitor Pack: Microsoft Windows

Introduction

The Windows Monitor Pack allows any metric of the Microsoft Windows operating system – from Microsoft Windows 95 and onwards – to be monitored during a performance test.

Implementation

StressTester™ accesses Windows operating system metrics by making direct calls to the Windows Management Instrumentation facility (WMI).

Connection Options

Monitoring Configurations can be created to monitor Windows metrics on the machine on which the Monitor Agent is executing, or on a remote machine.

When configuring to monitor the local machine, no connection parameters need to be specified.

When configuring to monitor a remote machine, the following fields need to be supplied:

Field	Description
Address	The address (either known network name or IP address) of the machine to be monitored.
Display Name	In the Analyze Results workspace, Resource Monitors are grouped by both the type of component they monitor, and also the 'server' they monitor. The Display Name field allow you to specify a name for the second type of grouping (e.g. "App Server 1")
User Name (see note below)	The user name to supply when accessing WMI running on the remote machine.

Field	Description
Password (see note below)	The password to supply when accessing WMI running on the remote machine.
Confirm Password (see note below)	The password re-entered to confirm it has been typed correctly.

Note: If the Monitor Agent is running under the login of a user that has the necessary privilege to access WMI on the remote machine, then these final three fields are optional.

Template Resource Monitor Parameters

There are a number of template Resource Monitors within the Windows Monitor Pack.

When configuring these, you may be required to specify one or more of the parameters described below.

Parameter Name	Description
CPU	The number of the CPU
Disk	The identity of the disk
instance	The name of the process whose I/O is to be measured
IF Name	The name of the network interface card whose traffic is to be measured
Process Name	The name of the process whose I/O is to be measured

Custom Command Resource Monitor

The Custom Command Resource Monitor for the Windows Monitor Pack requires the following parameters to be specified:

Parameter	Description
Object	The identity of the WMI Object providing the metric required
Instance	The instance of the object whose attribute is required
Attribute	The name of the attribute required

If you are unsure of what values to supply for the Custom Command Resource Monitor, there are many free programs to assist you in finding the objects and attributes available on your system. One such tool is “WMI Explorer” from KS Soft (www.ks-soft.net).

Monitor Pack: Solaris

Introduction

The Solaris Monitor Pack allows key performance metrics of the operating system to be monitored.

Implementation

StressTester™ uses system monitoring commands to return the metric values of interest.

Connection Options

Monitoring Configurations can be created to monitor Solaris metrics on the machine on which the Monitor Agent is executing, or on a remote machine.

When configuring to monitor the local machine, the following fields need to be supplied:

Field	Description
User Name	The Solaris account you wish to run the Resource Monitors 'as' (the Resource Monitors will be executed using a <code>sudo</code> command).
Password	The password of the account executing the Monitor Agent.
Confirm Password	The password re-entered to confirm it has been typed correctly.

When configuring to monitor a remote machine, you can choose the communication protocol to use to connect to the Solaris machine; either “SSH” (secure shell) or “Telnet”.

The following fields must be supplied:

Field	Description
Address	The address (either known network name or IP address) of the machine to be monitored.
Display Name	In the Analyze Results workspace, Resource Monitors are grouped by both the type of component they monitor, and also the ‘server’ they monitor. The Display Name field allow you to specify a name for the second type of grouping (e.g. “App Server 1”)
Port	The port that the Solaris machine is listening upon for communication in the selected protocol.
User Name	The Solaris account that should be used to authenticate the Monitor Agent to the Solaris machine.
Password	The password for the specified Solaris account.
Confirm Password	The password re-entered to confirm it has been typed correctly.

Template Resource Monitor Parameters

There are a number of template Resource Monitors within the Solaris Monitor Pack.

When configuring these, you may be required to specify one or more of the parameters described below.

Parameter Name	Description
Disk	The name of the disk drive whose metrics are to be monitored.

Custom Command Resource Monitor

The Custom Command Resource Monitor for the Solaris Monitor Pack requires the following parameter to be specified:

Parameter	Description
Command	This is the command you wish to execute on the Solaris machine.

Note: It should be remembered that all Resource Monitors must return only one decimal value; therefore you may need to process the results of the system command you specify to extract the value of interest (e.g. using `grep`, `awk` or similar)

Monitor Pack: Linux

Introduction

The Linux Monitor Pack allows key performance metrics of the operating system to be monitored.

Implementation

StressTester™ uses system monitoring commands to return the metric values of interest.

Connection Options

Monitoring Configurations can be created to monitor Linux metrics on the machine on which the Monitor Agent is executing, or on a remote machine.

When configuring to monitor the local machine, the following fields need to be supplied:

Field	Description
User Name	The Linux account you wish to run the Resource Monitors 'as' (the Resource Monitors will be executed using a <code>sudo</code> command).
Password	The password of the account executing the Monitor Agent.
Confirm Password	The password re-entered to confirm it has been typed correctly.

When configuring to monitor a remote machine, you can choose the communication protocol to use to connect to the Linux machine; either “SSH” (secure shell) or “Telnet”.

The following fields must be supplied:

Field	Description
Address	The address (either known network name or IP address) of the machine to be monitored.
Display Name	In the Analyze Results workspace, Resource Monitors are grouped by both the type of component they monitor, and also the ‘server’ they monitor. The Display Name field allow you to specify a name for the second type of grouping (e.g. “App Server 1”)
Port	The port that the Linux machine is listening upon for communication in the selected protocol.
User Name	The Linux account that should be used to authenticate the Monitor Agent to the Linux machine.
Password	The password for the specified Linux account.
Confirm Password	The password re-entered to confirm it has been typed correctly.

Template Resource Monitor Parameters

There are a number of template Resource Monitors within the Linux Monitor Pack.

When configuring these, you may be required to specify one or more of the parameters described below.

Parameter Name	Description
Disk	The name of the disk drive whose metrics are to be monitored.

Custom Command Resource Monitor

The Custom Command Resource Monitor for the Linux Monitor Pack requires the following parameters to be specified:

Parameter	Description
Command	This is the command you wish to execute on the Linux machine.

Note: It should be remembered that all Resource Monitors must return only one decimal value; therefore you may need to process the results of the system command you specify to extract the value of interest (e.g. using `grep`, `awk` or similar)

Monitor Pack: Java Virtual Machine

Introduction

The Java Virtual Machine (JVM) Monitor Pack provides access to all the monitoring metrics made available by JVMs of version 5 and above.

Implementation

StressTester™ uses Java Management Extension (JMX) calls to retrieve the metrics of interest.

Connection Options

Monitoring Configurations can be created to monitor local or remote JVMs.

The fields required to monitor either type are the same:

Field	Description
Address	The address (either known network name or IP address) of the machine on which the JVM is executing.
Display Name	In the Analyze Results workspace, Resource Monitors are grouped by both the type of component they monitor, and also the 'server' they monitor. The Display Name field allow you to specify a name for the second type of grouping (e.g. "App Server 1")
Port	The port on which the JVM is configured to accept JMX requests.
User Name	Optional field. Specify a valid value if the JVM requires a user name to access the metrics.
Password	Optional field. If a User Name is specified, this field holds the corresponding password.

Field	Description
Confirm Password	The password re-entered to confirm it has been typed correctly.

Template Resource Monitor Parameters

There are no template Resource Monitors within the Monitor Pack with the exception of the Custom Command.

Custom Command Resource Monitor

The Custom Command Resource Monitor requires two parameters:

Parameter Name	Description
MBean Name	The name of the JMX MBean containing the attribute of interest.
Attribute	The name of the attribute.

Monitor Pack: .NET / CLR / ASP

Introduction

The .NET / CLR / ASP Monitor Pack allows any .NET metric to be monitored during a performance test.

Implementation

StressTester™ accesses .NET metrics by making direct calls to the Windows Management Instrumentation facility (WMI).

Connection Options

Monitoring Configurations can be created to monitor .NET metrics on the machine on which the Monitor Agent is executing, or on a remote machine.

When configuring to monitor the local machine, no connection parameters need to be specified.

When configuring to monitor a remote machine, the following fields need to be supplied:

Field	Description
Address	The address (either known network name or IP address) of the machine to be monitored.
Display Name	In the Analyze Results workspace, Resource Monitors are grouped by both the type of component they monitor, and also the 'server' they monitor. The Display Name field allow you to specify a name for the second type of grouping (e.g. "App Server 1")
User Name (see note below)	The user name to supply when accessing WMI running on the remote machine.
Password (see note below)	The password to supply when accessing WMI running on the remote machine.

Field	Description
Confirm Password (see note below)	The password re-entered to confirm it has been typed correctly.

Note: If the Monitor Agent is running under the login of a user that has the necessary privilege to access WMI on the remote machine, then these final three fields are optional.

Template Resource Monitor Parameters

As supplied, all Resource Monitors within the .NET / CLR / ASP Monitor Pack are template Resource Monitors. This is because they all require the name of the .NET 'process' that is to be monitored to be specified.

The parameters that can appear in the template Resource Monitors are:

Parameter Name	Description
Process Name	The name of the .NET process.

Custom Command Resource Monitor

The Custom Command Resource Monitor for the .NET / CLR / ASP Monitor Pack requires the following parameters to be specified:

Parameter	Description
Object	The identity of the WMI Object providing the metric required.
Instance	The instance of the object whose attribute is required.
Attribute	The name of the attribute required.

If you are unsure of what values to supply for the Custom Command Resource Monitor, there are many free programs to assist you in finding the objects and attributes available on your system. One such tool is "WMI Explorer" from KS Soft (www.ks-soft.net).

Monitor Pack: MySQL

Introduction

The MySQL Monitor Pack provides access to the key metrics of the MySQL database.

Implementation

The Monitor Pack uses SQL to access performance data maintained by the MySQL server within the MySQL database.

Connection Options

Monitoring Configurations can be created to monitor MySQL metrics on the machine on which the Monitor Agent is executing, or on a remote machine.

When configuring to monitor on the local machine, the following fields need to be supplied:

Field	Description
Database Name	The name of the database to be monitored.
Port	The port on which the database management system is listening for JDBC connections.
User Name	The account name to use to connect to the database.
Password	The password for the specified account.
Confirm Password	The password re-entered to confirm it has been typed correctly.

When configuring to monitor on a remote machine, two additional fields are required:

Field	Description
Display Name	<p>In the Analyze Results workspace, Resource Monitors are grouped by both the type of component they monitor, and also the 'server' they monitor.</p> <p>The Display Name field allow you to specify a name for the second type of grouping (e.g. "App Server 1")</p>
Address	The address (either known network name or IP address) of the machine to be monitored.

Template Resource Monitor Parameters

With the exception of the Custom Command Resource Monitor, the MySQL Monitor Pack contains no template Resource Monitors.

Custom Command Resource Monitor

The Custom Command Resource Monitor for the MySQL Monitor Pack requires the following parameters to be specified:

Parameter	Description
MetricId	This is the "name" of the metric as defined in the response to the "mysqladmin status" command.

Monitor Pack: Oracle

Introduction

The Oracle Monitor Pack provides access to information contained within the Oracle 'v\$' tables.

Implementation

The Resource Monitors access the information within the `v$metric` database table by executing SQL against the specified database.

Connection Options

Monitoring Configurations can be created to monitor Oracle metrics on the machine on which the Monitor Agent is executing, or on a remote machine.

When configuring to monitor on the local machine, the following fields need to be supplied:

Field	Description
Database Name	The name of the database to be monitored.
Port	The port on which the database management system is listening for JDBC connections.
User Name	The account name to use to connect to the database.
Password	The password for the specified account.
Confirm Password	The password re-entered to confirm it has been typed correctly.

When configuring to monitor on a remote machine, two additional fields are required:

Field	Description
Display Name	<p>In the Analyze Results workspace, Resource Monitors are grouped by both the type of component they monitor, and also the 'server' they monitor.</p> <p>The Display Name field allow you to specify a name for the second type of grouping (e.g. "App Server 1")</p>
Address	The address (either known network name or IP address) of the machine to be monitored.

Template Resource Monitor Parameters

With the exception of the Custom Command Resource Monitor, the Oracle Monitor Pack contains no template Resource Monitors.

Custom Command Resource Monitor

The Custom Command Resource Monitor for the Oracle Monitor Pack requires the following parameters to be specified:

Parameter	Description
MetricId	The METRIC_ID of the record within the v\$metric table that identifies the required metric.
GroupId (optional)	If the MetricId does not resolve to a single value, then the metric required may be further identified by specifying its group identifier.
EntityId (optional)	If specification of the GroupId still does not resolve to a single value, then the metric required may be further defined by adding an entity identifier.

Monitor Pack: SQL Server

Introduction

The SQL Server Monitor Pack allows any SQL Server metric to be monitored during a performance test.

Implementation

StressTester™ accesses SQL Server metrics by making direct calls to the Windows Management Instrumentation facility (WMI).

Connection Options

Monitoring Configurations can be created to monitor SQL Server metrics on the machine on which the Monitor Agent is executing, or on a remote machine.

When configuring to monitor on the local machine, one field needs to be specified:

Field	Description
Instance Name	The name of the SQL Server installation ('instance').

When configuring to monitor on a remote machine, the following fields need to be supplied:

Field	Description
Display Name	<p>In the Analyze Results workspace, Resource Monitors are grouped by both the type of component they monitor, and also the 'server' they monitor.</p> <p>The Display Name field allow you to specify a name for the second type of grouping (e.g. "App Server 1")</p>
Address	The address (either known network name or IP address) of the machine to be monitored.

Field	Description
Instance Name	The name of the SQL Server installation ('instance').
User Name	The user name to supply when accessing WMI running on the remote machine.
Password	The password to supply when accessing WMI running on the remote machine.
Confirm Password	The password re-entered to confirm it has been typed correctly.

Template Resource Monitor Parameters

The parameters that can appear in the template Resource Monitors within the SQL Server Monitor Pack are:

Parameter Name	Description
Database	The name of the database to be monitored.

Custom Command Resource Monitor

The Custom Command Resource Monitor for the SQL Server Monitor Pack requires the following parameters to be specified:

Parameter	Description
Object	The identity of the WMI Object providing the metric required.
Instance	The instance of the object whose attribute is required.
Attribute	The name of the attribute required.

If you are unsure of what values to supply for the Custom Command Resource Monitor, there are many free programs to assist you in finding the objects and attributes available on your system. One such tool is "WMI Explorer" from KS Soft (www.ks-soft.net).

Monitor Pack: Apache Web Server

Introduction

The Apache Monitor Pack allows all of the metrics exposed by the Apache web server to be monitored during a performance test.

Implementation

The Resource Monitors access the Apache web server metrics by making a call to the monitoring URL hosted on the web server.

Note: In order for Apache web server Resource Monitors to function correctly, the server-status Servlet must be enabled on the Apache web server.

Connection Options

The fields required to configure the Monitoring Configuration are:

Field	Description
Display Name	<p>In the Analyze Results workspace, Resource Monitors are grouped by both the type of component they monitor, and also the 'server' they monitor.</p> <p>The Display Name field allow you to specify a name for the second type of grouping (e.g. "App Server 1")</p>
URL	<p>The URL to call to retrieve the metrics.</p> <p>This URL has the format:</p> <p>http://HOST:PORT/server-status?auto</p>

Template Resource Monitor Parameters

There are no template Resource Monitors in the Apache Monitor Pack.

Monitor Pack: Microsoft IIS

Introduction

The IIS Monitor Pack allows any IIS metric to be monitored during a performance test.

Implementation

StressTester™ accesses IIS metrics by making direct calls to the Windows Management Instrumentation facility (WMI).

Connection Options

Monitoring Configurations can be created to monitor IIS metrics on the machine on which the Monitor Agent is executing, or on a remote machine.

When configuring to monitor the local machine, no connection parameters need to be specified.

When configuring to monitor a remote machine, the following fields need to be supplied:

Field	Description
Address	The address (either known network name or IP address) of the machine to be monitored.
Display Name	In the Analyze Results workspace, Resource Monitors are grouped by both the type of component they monitor, and also the 'server' they monitor. The Display Name field allow you to specify a name for the second type of grouping (e.g. "App Server 1")
User Name	The user name to supply when accessing WMI running on the remote machine.
Password	The password to supply when accessing WMI running on the remote machine.

Field	Description
Confirm Password	The password re-entered to confirm it has been typed correctly.

Template Resource Monitor Parameters

The parameters that can appear in the template Resource Monitors are:

Parameter Name	Description
Web Service Name	The name of the particular web service to be monitored.

Custom Command Resource Monitor

The Custom Command Resource Monitor for the IIS Monitor Pack requires the following parameters to be specified:

Parameter	Description
Object	The identity of the WMI Object providing the metric required.
Instance	The instance of the object whose attribute is required.
Attribute	The name of the attribute required.

If you are unsure of what values to supply for the Custom Command Resource Monitor, there are many free programs to assist you in finding the objects and attributes available on your system. One such tool is “WMI Explorer” from KS Soft (www.ks-soft.net).

Appendix A: Suggested Configuration Process

The above sections have detailed how you can create the items within StressTester™ required to configure resource monitoring.

This section details the process that Reflective Solutions suggests you follow when determining what and how to monitor the system you are testing.

List the Infrastructure Components

Firstly, list the components that make up your system – the database, application server, operating systems, web server, etc.

Identify Monitor Packs

Using the list of system components, determine which Monitor Pack you will use to monitor each component, and whether you will need to use the Command Line Monitor Pack for any component.

Identify Resource Monitors

Review each identified Monitor Pack and identify the Resource Monitors you wish to use during the performance test.

This may be an iterative process; you may identify a small set initially and then if one or more components need to be focused upon, identify further Resource Monitors for subsequent performance test.

Configure Template Resource Monitors

If any of the identified Resource Monitors are templates (including “Custom Command”), clone the relevant Monitor Packs.

Then edit the templates within the cloned Monitor Pack to make them executable.

Resource Monitor Maximum Values and Thresholds

Review each of the identified Resource Monitors to check that the Maximum Value, Threshold Type and Threshold Value are appropriate for your system. If they are not, update the values as needed.

Create Monitor Sets

For each Monitor Pack, create one or more Monitor Sets (you would create more if you will be monitoring more than one installation of the system component and you wish different Resource Monitors to be used against each installation).

Determine Monitor Agent Locations

Consider the system you will be monitoring, and where the Monitor Agents should be located in order that they can:

- communicate with the StressTester™ user interface
- read and write to the StressTester™ database
- access the system they are monitoring

In addition, if firewalls exist between the StressTester™ user interface and/or StressTester™, determine on which ports the inter-process communication will occur and arrange for the firewalls to allow such communication.

Create Monitor Agents

Create the Monitor Agents you require.

Create Monitoring Configurations

For each installation of each type of system component you will monitor (for example, each installation of Solaris), create a Monitoring Configuration to specify the Monitor Set containing the Resource Monitors, the Monitor Agent on which they should execute and system component specific parameters.