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<table>
<thead>
<tr>
<th>United States and Canada</th>
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<tbody>
<tr>
<td><strong>Address</strong></td>
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<tr>
<td>BMC Software, Inc.</td>
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<tr>
<td>2101 CityWest Blvd.</td>
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<tr>
<td>Houston TX 77042-2827</td>
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</tbody>
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Overview
What is Monitoring Studio?

TrueSight Operations Management - Monitoring Studio is a powerful tool designed to help administrators to fulfill their custom monitoring needs. This toolbox enables you to monitor almost any technology (application, server, device, etc.) for which there is no out-of-the-box monitoring solution. In a few clicks, you can cover up to 100% of your technologies in your BMC monitoring environment. Compatible with Linux/UNIX and Windows, it is a simple and effective way to rapidly deploy the monitoring of custom technologies without any coding and with all the benefits of a “standard” solution maintenance, updates and patches etc. to further respond to growing technological needs for specific business-critical technologies.

**Monitoring Studio** is a monitoring solution designed to seamlessly integrate with Central Monitoring Administration and TrueSight Operations Management. Refer to the Installing the Monitoring Solution chapter for detailed information about the installation procedure.

What to Monitor with Monitoring Studio?

Depending on the nature of the technology you wish to monitor, Monitoring Studio offers a large choice of tools that you can easily configure.

**Monitoring Studio** allows you to create and monitor your own custom collection of components locally and remotely, such as software applications, processes, files, folders, Windows services and event logs.

With **Monitoring Studio**, you will also be able to analyze database queries and Web requests for example, and perform string searches, extract numeric values from monitored components result outputs. See chapter User Goals and Features to know more about all the monitoring tools offered with **Monitoring Studio**.

Key Concepts and Terminology

Here is a list of definitions for concepts and terms used in this documentation:

- **Central Monitoring Administration** is the Console that allows Administrators to configure all the elements required to monitor technologies in an IT environment. Central Monitoring Administration is also referred to as **CMA** in this document. For detailed information about this product, refer to the official documentation provided on the BMC Web site.
- **TrueSight Operations Management** is the platform where the data collected by monitoring solutions, such as **Monitoring Studio**, is made available to Administrators.
A Technology refers to any component that can be monitored via Monitoring Studio, for example an application, a server, a device, a database, a process, etc.

TrueSight Operations Management - Monitoring Studio is the official name of the product described in this document. It can also be referred to as Monitoring Studio.

A Policy refers to a group of user-defined settings that CMA uses to configure monitoring solutions, such as Monitoring Studio. A policy is applied when CMA receives a request from the BMC PATROL Agents that match the Agent selection properties in the policy.

A Monitor Group is designed to gather a host and its related monitors (monitoring tools). This grouping facilitates the management of monitors. A monitor group can be named after the technology it monitors to easily distinguish monitor groups in the BMC Consoles.

A Host is typically a device on which the technology you wish to monitor is installed. Monitoring Studio creates instances of hosts and displays them in TrueSight Operations Management.

Monitors are the monitoring tools that you need to configure for monitoring a specific technology. They also refer to the instances of these monitoring tools.

Documentation Scope

This user guide provides detailed information about concepts and operating procedures directly in connection with the use of TrueSight Operations Management - Monitoring Studio. Other considerations relating to configuring or operating Central Monitoring Administration or TrueSight Operations Management are NOT included in this document. For information about BMC products, please refer to BMC support Web site.
User Goals and Features

Depending on the nature of the technology that needs to be monitored, Monitoring Studio offers a large choice of tools that can easily be configured and tailored to any organization needs. More specifically, the solution allows TrueSight Operations Management administrators to:

- Monitor processes
- Launch and analyze commands or scripts
- Send queries to a database back-end
- Monitor and analyze files
- Monitor file systems
- Monitor folders
- Monitor Windows performance
- Poll SNMP agents and listen for SNMP traps
- Execute and analyze WBEM queries
- Send requests to a web front-end
- Monitor Windows events
- Monitor Windows services
- Execute and analyze WMI queries

Monitoring Studio also enable administrators to perform string searches, extract numeric values from monitored technologies' return outputs in order to retrieve and analyze valuable information.

Product at a Glance

Product Integration within the BMC Framework

The diagram below shows how Monitoring Studio integrates within your BMC framework and shows interaction between all the components that compose your monitored environment.
Requirements

BMC Framework

- BMC ProactiveNet 9.5 and higher.
- BMC ProactiveNet Central Monitoring Administration 9.5 and higher.
- BMC TrueSight Operations Management

PATROL Agent

TrueSight Operations Management - Monitoring Studio supports PATROL Agent v9.5.00 and higher.

JAVA

TrueSight Operations Management - Monitoring Studio requires Java 1.6 or higher and a Java Runtime Environment (JRE) to be installed on the same system that runs the PATROL Agent.

You can download the Java Runtime Environment along with the monitoring solution from the Sentry Software Web site.

UNIX/Linux Systems

Password authentication must be enabled on all UNIX/Linux systems that are monitored.
To enable password authentication:

1. Edit `/etc/ssh/sshd_config` configuration file.
2. Set `PasswordAuthentication` to `yes`:
   ```bash
   # vi /etc/ssh/sshd_config
   PasswordAuthentication yes
   ```
3. Save your modifications.
4. Restart SSH service:
   ```bash
   # /etc/init.d/ssh restart
   ```

**Credentials Management**

In order to avoid security integrity breach, administrators are asked to authenticate to access almost every component in a standard IT environment (host servers, databases, files, etc.).

*TrueSight Operations Management - Monitoring Studio* requires these credentials to connect to the targeted hosts and to collect data from the technologies you want to monitor.

Since technologies may or may not require specific username and password to grant access to their data, *Monitoring Studio* offers two different levels of credentials.

**System Credentials**

System Credentials are provided at the Host level and can be shared by several monitors. When the system credentials are changed, users only need to modify the credentials once for all the monitors to inherit the changes.

The following monitors can only use system credentials.

- File Systems
- Processes
- Windows Events
- Windows Performance Counters
- Windows Services
- WMI Queries

If the system credentials are not specified when monitoring a localhost, *Monitoring Studio* will use the PATROL Agent's default account information defined via the Agent Properties panel of the Monitoring Policy Configuration page in CMA. For performing remote monitoring, system credentials are mandatory for the monitors listed above; failing to provide this authentication information will prevent the monitors to collect any data.
Specific Credentials

For security purpose, some technologies may require additional privileges to allow access to their data. In this case, Monitoring Studio enables users to provide specific credentials that will apply to the Host and its Monitor Types. Monitor Types owned by the same host may use different credentials.
The following monitors may require specific credentials. If specific credentials are not provided, the solution will automatically use the system credentials provided at the Host level:

- **Command Lines**
- **Database Queries**
- **Files**
- **Folders**
- **WBEM Queries**
- **Web Requests**

### String Searches and Numeric Value Extraction

Some technologies report their bad health through repeated error messages or critical numbers which are hidden deep in log files, output of commands, database, Web page, etc. **Monitoring Studio** is capable of parsing all these data by means of **String Search and Numeric Value Extraction features** to detect the source of potential problems and alert you when they occur.

#### Searching for a Specific String

The **String Search** feature of **Monitoring Studio** enables you to run fast and powerful searches for strings on some of the monitored objects that you previously configured such as flat or log files, the output of a Web request or a database query, OID content, etc. You can then decide to trigger an alert and send a notification to your hypervision system when the string specified is found or not found in the return output of monitored instances.

#### Extracting Numeric Values

The **Numeric Value Extraction** feature of **Monitoring Studio** enables you to extract numeric values from a text input such as the output of a command, a Web page, the result of a WBEM or SQL query etc. All you need to do is indicate how to find the numeric values within the monitored object and **Monitoring Studio** will extract and report them as graphs in TrueSight Operations Management.

String Search and Numeric Value Extraction features are available for the following monitors (also called information sources):
Thresholds and Alerts Actions

Thresholds
Thresholds let you define the status of an attribute based on specific conditions. TrueSight Operations Management - Monitoring Studio provides thresholds for most of the attributes managed by the solution. This thresholds are applied by default when you first start Monitoring Studio but can be easily tailored to your needs via the policies of Central Monitoring Administration. When a metric reaches the predefined warning or alert threshold, Monitoring Studio generates an alarm.

Alert Actions
Alert Actions enable you to configure specific actions to be executed when an alert is raised on an attribute. Monitoring Studio provides flexibility in fault management by triggering actions, such as trigger an event, annotate a graph, and executing a command, to notify you of the alerts generated while monitoring a technology. Alert actions can be set for all the instances of a Monitor Group as well as for individual Monitor instance.
Installing the Monitoring Solution
The installation can be handled from TrueSight Operations Management. Once the latest version of the solution has been loaded into TrueSight Operations Management, administrators can create all the installation packages required for their different operating systems and platforms and save them for later use in the Monitoring Installation Packages list. These packages can then be deployed to multiple computers. Administrators just have to connect to TrueSight Operations Management from the server where they want to install the package, download it and launch the installation.

This section describes the different steps to follow to install Monitoring Studio:
- Importing Monitoring Studio into Central Monitoring Administration
- Creating the Installation Package
- Downloading the Installation Package
- Installing the Package
Importing the Monitoring Solution into Central Administration

The TrueSight Central Monitoring Repository includes the current versions of the BMC PATROL Agent and BMC PATROL Monitoring Solutions that you can use with BMC TrueSight. If the version available in the Repository does not correspond to the latest one, you will have to manually import it:

1. Log on to TrueSight Operations Management.
2. Click the Repository drawer and select Manage Repository.
3. Check that the version of the BMC component available is actually the latest one. If not, download the latest version corresponding to your operating system (Windows or UNIX/Linux) available on the Sentry Software Website and save it on the local computer from which you are running the Central Monitoring Administration web-based console.
4. From TrueSight Operations Management, click Import.
5. Select Single solution.
7. Click Import.

The selected archive file is imported to the repository.
Creating the Installation Package

The installation package to deploy to managed systems can be created directly from TrueSight Operations Management:

1. Log on to TrueSight Operations Management
2. Click the Repository drawer and select Deployable Package Repository.
3. Click Add.
4. Select the operating system and platform for which you want to create a package. The components available in the repository for the selected operating system and platform are displayed.
5. Select the Installation Package Component:
   - From the Available components list, select the relevant component.
   - From the Version list, select the latest version.
   - Click the right arrow button to move the component into the Selected Components list. By default, the appropriate BMC PATROL Agent for the operating system and platform that you chose is included in the Selected components list.
   - Click Next. The Add Component Installation Package wizard are displayed.
6. Go through the wizard and specify the required PATROL information. The Installation Package Details is displayed.
7. Verify that:
   - the operating system and platform are correct
   - the components that you want to include are listed in the Included Components list.
8. Provide the following information:
   - Name: Enter a unique name for the package.
   - (Optional) Description: Enter a description of the package. The description is displayed in the Monitoring Installation Packages list on the Monitoring Repository window.
   - Format: Select a file compression format for the package.
9. Click Save Installation Package.
10. Click Close. The package is now available in the Monitoring Installation Packages list.
Downloading the Installation Package

You can download an installation package and install the components on one or more hosts. The installation runs silently with the information entered during package creation.

**Recommendation**
If you defined the BMC TrueSight Integration Service variable for PATROL Agents in the installation package, ensure the agents are started in phases. Do not start newly deployed agents all at once. Start and configure monitoring for the agents in planned phases to reduce the performance impact on the Integration Service nodes and on the BMC TrueSight Server associated with the automatic workflow process.

1. Log on to TrueSight Operations Management from the computer on which the PATROL Agent is installed or to be installed.
2. Click the Repository drawer and select Deployable Package Repository.
3. (Optional) To filter the list of installation packages, select an operating system from the Filter by Operating System list.
4. Click the link for the installation package that you want to download.
5. Through the browser's download dialog box, save the installation package.

Installing the Package

This chapter provides a step by step procedure to install a monitoring solution package:

1. From the computer on which you want to install the package, log on to TrueSight Operations Management.
2. (Optional) To filter the list of installation packages, select an operating system from the Filter by Operating System list.
3. Click the link for the installation package that you want to download.
4. Through the browser's download dialog box, save the installation package in a temporary file.
5. Extract the installation package as appropriate for your operating system. The package is extracted to the bmc_products directory on the current host.
6. From the bmc_products directory, run the installation utility for your operating system:
   - (UNIX or Linux) RunSilentInstall.sh
   - (Microsoft Windows) RunSilentInstall.exe

The package is installed on the current host. If the package includes a BMC PATROL Agent, the agent sends a configuration request by passing its tags to Central Monitoring Administration, via the Integration Service. Central Monitoring Administration evaluates policies that match the tags, determines the final configuration to be applied, and sends the configuration information back to the agent. Monitoring is based on the configuration information received by the agent.
Monitoring with Monitoring Studio
Once the configuration of a `Host` and a `Monitor Group` is completed, you can then define the Monitors that will collect data from the targeted technologies you need to monitor. **Monitoring Studio** provides a large range of Monitors to cover the various technologies of your IT environment.

The following table lists the monitors available for monitoring any technologies according to the operation system (OS) they use (from source Agent to target Host).

<table>
<thead>
<tr>
<th>Monitors</th>
<th>Windows to Windows</th>
<th>UNIX to Windows</th>
<th>Windows to UNIX</th>
<th>UNIX to UNIX</th>
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<tr>
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</tr>
<tr>
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<td>Folders</td>
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</tbody>
</table>
Configuring Hosts and Groups

The monitoring of any technology can be configured through a Policy that you can create or edit via Central Monitoring Administration. You can then apply the policy to the PATROL Agents that share the same tag, or according to their IP address or hostname.

For detailed information about policies, please refer to the Central Monitoring Administration user documentation available on the BMC Web site.

To configure the monitoring of a technology with Monitoring Studio

1. Log on to Central Monitoring Administration.
2. In the Navigation pane, click the Policies drawer.
3. Expand the Monitoring folder and select a policy view (e.g. All).
4. Create a Policy that will be deployed on the PATROL Agents that share the same specified tag.
5. Click the Monitor Configuration link and click the button.
6. In the Monitoring Solution field, select Monitoring Studio. The related Monitoring Profile, Version and Monitor Type information is automatically displayed.
7. Define the Monitoring Studio Configuration options:
   - Define a Host settings
   - Configure a Monitor Group
   - Create Monitors
   - Optional — Search Monitors' output for specified string
   - Optional — Extract numeric values from Monitors' output
   - Optional — Define the Monitor's polling interval
   - Optional — Set alert actions
8. Click the Add to List button to complete the creation of the monitor group.
9. Once the policy is completed and deployed to the PATROL Agents it targets, Monitoring Studio will start collecting data from the managed technologies on local or remote hosts. The data will automatically be made available in TrueSight Operations Management.

You can also create a monitor for an existing policy, in this case select the policy to which you want to add a monitor type and click the button. Once the Monitor Type panel is displayed, you can then proceed with the procedure described above from step 6.

Define Host Settings

The first action you need to perform is to provide Monitoring Studio with the information related to the Host on which the technology you want to monitor is running. Once the Host settings are configured its instance is automatically created in TrueSight Operations Management.
The Host instance contains all the information about the server where the technology to monitor is running (hostname, system type, connection credentials, host availability check information, etc.).

A Host instance is always listed under a Group instance. A Group can only contain one host.

To configure the connection settings for a host

1. In the Monitoring Studio Configuration panel, scroll to the Host Settings section.

2. Provide the following information:
   - **Hostname**: Enter the name (or IP address or Fully Qualified Domain Name) of the host on which the technology you wish to monitor is running. By default, Monitoring Studio offers to establish a connection to the server on which the PATROL Agent is installed (localhost).
   - **System Type**: Select the operating system running on the host you wish to connect to (Windows, UNIX/Linux or Other). Select Other if the targeted host uses an operating system different from Windows or UNIX/Linux.
   - **System Username**: Enter the username that will be used by Monitors relying on System Credentials to collect data from the targeted host.
   - **System Password**: Enter the password for the username provided above, that will be used by Monitors relying on System Credentials to collect data from the targeted host.

When monitoring a local host, if credentials are not provided, Monitoring Studio will use the default PATROL Agent account. For remote monitoring, System Credentials are mandatory for the monitors listed below; failing to provide this authentication information will prevent the solution from collecting any data:
   - File Systems
   - Processes
   - Windows Event Logs
   - Windows Performance Counters
   - Windows Services
   - WMI Queries
   - **Create a Device in the Console**: Select this option if you wish Monitoring Studio to create an instance of the device in TrueSight Operations Management. All associated monitors
and their events and attributes will be attached to this new device in TrueSight Operations Management. If this option is not selected, they will be attached to the device matching the PATROL Agent host.

3. **Optional — Configure the Host Availability Check:**
   - Select the method(s) **Monitoring Studio** should use to test the availability of the monitored host:

   ![Host Availability Check Settings](image)

   - **Ping Check**: Default option. Select this option to have **Monitoring Studio** ping the monitored host up to four times in a row. To be successful, the targeted host must respond to at least one ping command during each collection cycle.

   - **Hostname Resolution Check**: Select this option to have **Monitoring Studio** resolve the hostname of the monitored host to an IP address.

   - **SNMP Check**: Select this option to have **Monitoring Studio** check the monitored host availability via an SNMP session. For the SNMP availability check to be successful, an SNMP session is opened with the targeted host and a snmp_get_next() is performed on the OID "1.3.6.1". If it fails, a second snmp_get_next() is tried on the OID "1.3.6.1.4.1". If anything is returned, the SNMP availability check is successful.

     If the PATROL Agent configuration variable "/snmp/support" value is not "yes" an error message will be reported through the Collection Error Count attribute under the Monitor Group object. The SNMP check will not be performed.

   - **SSH Check**: Select this option to have **Monitoring Studio** check the targeted host availability via the SSH protocol. For the SSH availability check to be successful, **Monitoring Studio** must be able to connect to the host using the provided System Credentials (required in the Host Settings).

   - **TCP Check - Port Number**: Select this option to have **Monitoring Studio** check the targeted host availability via a TCP connection. You must provide a port number for the TCP connection.

   - **WMI Check**: Select this option to have **Monitoring Studio** check the monitored host availability via the WMI protocol using the provided System Credentials (to use towards
Windows-based host only).

✓ **Signature Files Check**: Click to open the **Signature Files Check** dialog box. If at least one of the signature files is present, the check is considered successful:
  1. Provide the name and full path of the signature file on the targeted host.
  2. Click the **Add to List** button to complete the configuration of the **Signature File Check**.

![Signature Files Check](image)

**Signature Files Check Settings**

- **Wildcards are not supported in signature files**
- **Disable Monitors When the Host is Unreachable**: Select this option if you wish **Monitoring Studio** to disable the monitoring of all the technology instances monitored on the target host. If any of the selected host availability check fails, note that the monitoring will resume automatically when the host becomes available again.
- **Click Close**.

You are now ready to [configure your Monitor Group](#).

### Configure a Monitor Group

A **Monitor Group** is designed to facilitate the management of the monitored technologies (application, server, device, etc.). It contains a host and one or several monitors. Typically, the Monitor Group display name is the name of the technology you wish to monitor, for example 'My Company's Web Site'. A Monitor Group can only contain one host.
To Configure a monitor group

1. In the Monitoring Studio Configuration panel, scroll to the Monitor Group Settings section.

   ![Monitor Group Settings]

2. Enter the Internal ID that will be used internally by TrueSight Operations Management to identify the Monitor Group.

3. Enter a Display Name that is significant to you and that identifies the technology you wish to monitor. This name will be used as a label to identify the Monitor Group in TrueSight Operations Management.

4. **Optional** — Set the Group Alert Actions options. Group Alert Actions are typical alert actions that apply to all Monitors attached to the Group when their thresholds are breached. **Note that these alert actions add up to the alert actions defined at the Monitor level.**

   Click the Group Alert Actions button to display the settings panel:

   ![Group Alert Actions Settings]

   Select one or several alert actions you wish Monitoring Studio to perform when a threshold is breached. Macros can be used to customize alert actions, refer to the Alert Actions Macros chapter for detailed information.

   - **Event**: select this option to have Monitoring Studio trigger a PATROL event. Use the Event Content field to provide the string that will be displayed with the event. The %

   - **Annotation**: select this option to annotate the Graph.

   - **Command Line**: select this option to execute a Command.

   - **Username**:

   - **Password**:

   - **Command Line to Execute**:
The `%{SEN_ALERT_DEFAULTCONTENT}` macro is proposed by default to provide basic information about the event.

- **Annotation**: select this option to have Monitoring Studio annotate the attribute’s graph. Use the **Annotation Content** field to provide the string that will be displayed at the annotation point. The `%{SEN_ALERT_DEFAULTCONTENT}` macro is proposed by default to display basic information at the annotation point.

- **Command Line**: Select this option to have Monitoring Studio execute a command line. Provide the **Username** and **Password** required to run the command line as well as the command line you wish Monitoring Studio to execute. The Command Line is executed on the localhost or the targeted Agent.

5. **Optional** — Define the **Group Constants** for the Monitor Group. Constants are very useful for monitoring a technology whose properties may change from one system to another. Constants are defined at the Monitor Group level and can be reused in the monitors related to the group. Here are some examples of use:

### Example

You specify the monitoring of a remote device using SNMP polling and SNMP trap listening objects in Monitoring Studio. Instead of specifying the IP address of the remote device directly in these SNMP monitor instances, you can define a DEVICE_IPADDRESS constant at the level of the Monitor Group and use `%{DEVICE_IPADDRESS}` in the SNMP polling and SNMP listening objects. If the IP address changes later, you will only need to modify the value of the DEVICE_IPADDRESS constant, instead of editing every SNMP polling and trap listening object.

- Click the **Group Constants** button to open the settings panel and provide the required information:
Group Constants Settings

- **Constant name**: Enter the name of the constant.
- **Value**: Set a value for the constant.
- Click the **Add to List** button to complete the creation of the Group Constant.

6. Click **Close**.

The next step consists in configuring Monitors for the technologies you wish to monitor.

## Configuring Monitors

Once you have created the Monitor Group and defined the Host connection settings associated to your targeted technology, you need to choose and configure the tools, or Monitors, that Monitoring Studio will use to collect data from this technology.

### To configure a monitor

1. Log on to **Central Monitoring Administration**.
2. In the **Navigation** pane, click the **Policies** drawer.
3. Expand the **Monitoring** folder and select a policy view (e.g. **All**).
4. Create a **Policy** that will be deployed on the PATROL Agents that share the same specified tag or according to their IP address, hostname, etc.
5. Click the **Monitor Configuration** link and click the **+** button
6. In the **Monitoring Solution** field, select **Monitoring Studio**. The related **Monitoring Profile**, **Version** and **Monitor Type** information is automatically displayed. **Monitoring Studio** provides a large range of monitoring tools (Monitors) to watch over almost any component of your IT environment. Each Monitor is described in details in the **Monitoring with Monitoring Studio** chapter.
7. Define the targeted **Host settings**.
8. Configure a **Monitor Group**.

To modify the settings of an existing monitor, simply edit the corresponding policy, then click the **Monitor Configuration** link, then select the **Monitoring Studio** Monitor Type and click . Scroll down to the **List – Monitor Groups** section and double-click the Monitor Group to which you want to add a Monitor.
Analyzing Command Lines

Even though TrueSight Operations Management - Monitoring Studio offers a variety of monitoring methods (Monitors), there might be an in-house script or command that you need to run and analyze on a regular basis to monitor a specific technology.

The Command Line Monitor allows you to search for strings and numeric values in the returned output of the command and trigger alerts when the string/value is found or not found.

In addition, the Command Line Monitor allows you to stop the command execution when it times out. The execution status of the command can be verified by searching for specific strings in the result or looking for some exit codes.

To create a command line

1. Access the Monitoring Studio Configuration panel, as explained in the Configure Monitor Settings chapter.
2. In the Monitors section, click the Command Lines button.
3. The Command Lines panel is displayed to provide the connection credentials and define the command line settings.
4. Provide the Credentials required to establish a connection to the Host:

   **Credentials**
   - **Username**: Enter the username to use to establish the connection with the Host. Leave this field blank to use the username provided for the Host at the Monitor Group level.
   - **Password**: Enter the password to use to establish the connection with the Host. Leave this field blank to use the password provided for the Host at the Monitor Group level.

5. Define the Command Line Settings:

   **Command Line Settings**
   - **Command Line**: Enter the command line or the path to the script that Monitoring Studio will execute. You can use the following macros in the command line that will be resolved at the run time:
The %{SEN_SCRIPTPATH} macro should provide the script file path on the local PATROL Agent system.

The %{SEN_SCRIPTPATH} macro doesn't support local environment variables (Example: %PATROL_HOME%).

- **Timeout (seconds):** Specify the time in seconds after which the command will be stopped. The default timeout is set to 30 seconds. When the timeout is reached, Monitoring Studio will consider that the command has failed to execute properly and will set the value of the **Status** attribute to 2 (Failed). No further analysis will be performed (string search or numeric value extraction).

- **Report Errors in Group’s "Collection Error Count":** Select this option to have the Collection Error Count attribute of the Group reflect possible alerts triggered upon the Command Line execution. The **Collection Error Count** attribute of the group reports on the collection errors of all monitors, associated to the group, for which this option is available and selected, providing a global view of the collection errors for the whole group.

6. **Define the Command Execution Validation** criteria:

- **Execution is Validated When Output Contains:** Enter the text that needs to match the command output for the command to be considered successful. The regular expression entered here will be searched in the output of the command. If it is not found, the **Status** attribute of the Command Line monitor is automatically set to 2 (Failed) indicating that the command failed to execute properly.

- **Exit Codes Below Mean the Command Execution:** Select an execution option (succeeded/failed), to state if the command line was properly executed or not, depending on the option selected. When one of the exit codes is or not found depending on the execution option selected, the **Exit Status** attribute of the Command Line monitor is automatically set to 1 indicating that the command failed to execute properly.

- **Exit Codes:** Enter one or several exit codes (delimited by commas) that needs to be returned by the command line execution to be considered successful or failed, depending on the option selected above.
7. Define the **Monitor Settings**:

![Monitor Settings](image)

- **Internal ID**: Enter an ID to identify the managed command line instance in TrueSight Operations Management.
- **Display Name**: Enter a name to identify the managed command line instance in TrueSight Operations Management.
- **Optional — Polling Interval**: Set the frequency at which the data collection will be performed. Default is 2 minutes.
- **Optional — Alert Actions**: Define the action(s) **Monitoring Studio** needs to perform when the threshold for any attribute of this command line is breached.

8. **Optional** — Define the **Content Processing** rules you wish to apply to the command line output:

![Content Processing](image)

- **String Searches**: Define the search criteria for a specific string you wish to find or not find in the command line output.
- **Numeric Extractions**: Define any numeric value to be extracted from the command line output.

9. Click the **Add to List** button to complete the creation of the command line instance.

10. Click **Close**.
Analyzing a Database Query

The **Database Query Analysis** tool executes SQL queries on the most popular database servers currently available on the market (Microsoft SQL Server, MySQL, Oracle and PostgreSQL) and monitors their return output within your TrueSight Operations Management environment. You can then run string or numeric value searches on the return output to monitor the result in myriad ways.

If the technology you wish to monitor uses a database server, you can test this database by sending applicative queries to the database server, or by testing the content of some critical data tables. As query results are stored by **Monitoring Studio** in a pipe-separated table format, it is easy to specify strings to be searched or numeric values to be extracted from a database query. Please refer to the **string search** and **numeric value extraction** sections for more information.

**To Analyze a Database Query**

1. Access the **Monitoring Studio Configuration** panel, as explained in the Configure Monitor Settings chapter.
2. In the **Monitors** section, click the **Database Queries** button.
3. The **Database Queries** panel is displayed to offer you several options. The procedure may differ according to the type of server you wish to query:

![Command Line panel](image)

4. Click the type of database server you wish to query to display its specific configuration panel:
   - Performing a query on a Microsoft SQL Server database
   - Performing a query on a MySQL Server database
   - Performing a query on an Oracle Database Server
   - Performing a query on a PostgreSQL database
   - Performing a query on an Other Database
Performing a Query on a Microsoft SQL Server Database

This section details the various connection settings available for performing queries on a Microsoft SQL database server. First steps are common to all database queries and connection methods. They are described in the Analyzing a Database Query chapter.

⚠️ Performing a query on a Microsoft SQL Server 2000 is not possible with Java 1.8 and the SSL encryption enabled.

 Configuring a connection to a Microsoft SQL database server

1. Define the Connection Settings to the Microsoft SQL database server:

```
<table>
<thead>
<tr>
<th>Connection Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>SQL Server Instance Name: default</td>
</tr>
<tr>
<td>SQL Server Port Number: 1443</td>
</tr>
<tr>
<td>SSL Encryption: ☐</td>
</tr>
<tr>
<td>Authentication Mode: SQL Server</td>
</tr>
<tr>
<td>Username:</td>
</tr>
<tr>
<td>Password:</td>
</tr>
</tbody>
</table>
```

- **SQL Server Instance Name**: Specify the SQL server instance name you wish to use, if there are several SQL Server instances installed. Leave "default" if there is a single instance.
- **SQL Server Port Number**: Enter the number of the port that will be used to access the SQL database.
- **Encryption**: Select this option to encrypt the query with the HTTPS protocol. HTTPS is a secure version of the Hyper Text Transfer Protocol (HTTP) based on the SSL (Secure Sockets Layer) protocol. SSL creates a secure connection between a client and a server (SQL Server 2000 is not supported), over which any amount of data can be sent securely.
- **Authentication mode (SQL Server/Windows)**:
  - Select **Windows** if you wish to connect to the database through a Windows user account. In that case, SQL Server validates the account name and password using the Windows identity validation (trusted connection).
  - Select **SQL Server** if you wish to connect to the database with a specified login name and password from a non-trusted connection. In that case, SQL Server performs the authentication itself by checking if a SQL Server login account has been set up and if the specified password matches the one previously recorded. If SQL Server does not have a login account set, authentication fails and you get an error message.
- **Username**: Enter the username to use to connect to the database. Leave blank to use the username provided at the Host level.
- **Password**: Enter the password associated with the specified username. Leave blank to use
the password provided at the Host level.

⚠️ Connection Settings will be shared by all the queries defined within the Microsoft SQL Server Monitors.

2. Define the **SQL Query and Timeout** properties:

<table>
<thead>
<tr>
<th>SQL Query and Timeout</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SQL Query</strong></td>
</tr>
<tr>
<td><strong>Timeout (seconds)</strong></td>
</tr>
<tr>
<td><strong>Report Errors in Group’s Collection Error Count</strong></td>
</tr>
</tbody>
</table>

- **SQL Query**: Enter the SQL query you wish to perform.
- **Timeout (seconds)**: Specify the time in seconds after which the query will be stopped. Default is 30 seconds. If the query times out, the **Status** attribute of the _Studio Database Query_ Monitor Type will be set to 2 (Failed) and an alarm will be triggered in TrueSight Operations Management.
- **Report Errors in Group’s “Collection Error Count”**: Select this option to have the **Collection Error Count** attribute of the Group Monitor reflect possible alerts triggered upon the query execution. The **Collection Error Count** attribute of the group reports on the collection errors of all monitors, associated to the group, for which this option is available and selected, providing a global view of the collection errors for the whole group.

3. Define the **Monitor Settings**:

- **Internal ID**: Enter an ID to identify the managed SQL query instance in TrueSight Operations Management.
- **Display Name**: Enter a name to identify the managed SQL query instance in TrueSight Operations Management.
- **Optional — Polling Interval**: Set the frequency at which the data collection will be performed. Default is 2 minutes.
- **Optional — Alert Actions**: Define the action(s) _Monitoring Studio_ needs to perform when the threshold for this SQL query instance is breached.

4. **Optional** — Define the **Content Processing** rules you wish to apply to the SQL query output:

- **String Searches**: Define the search criteria for a specific string you wish to find or not find in the SQL query output.
- **Numeric Extractions**: Define any numeric value to be extracted from the SQL query output.

5. Click the **Add to List** button to complete the creation of the SQL query instance.

6. Click **Close**.
Performing a Query on a MySQL Server Database

This section details the various connection settings available for performing queries on a MySQL server database. First steps are common to all database queries and connection methods. They are described in the Analyzing a Database Query chapter.

Configuring a connection to a MySQL server database

1. Define the **Connection Settings** to the MySQL server database:
   - **Database Name**: Enter the name of the database.
   - **MySQL Port Number**: Enter the port that will be used to access the MySQL server database.
   - **Username**: Enter the username to use to connect to the database.
   - **Password**: Enter the password associated with the specified username.

   *Connection Settings will be shared by all the queries defined within the MySQL Server Monitors.*

2. Define the **SQL Query and Timeout** properties:
   - **SQL Query**: Enter the SQL query you wish to perform.
   - **Timeout (seconds)**: Specify the time in seconds after which the query will be stopped. Default is 30 seconds. If the query times out, the **Status** attribute of the Studio Database Query Monitor Type will be set to 2 (Failed) and an alarm will be triggered in TrueSight Operations Management.
   - **Report Errors in Group’s "Collection Error Count"**: Select this option to have the Collection Error Count attribute of the Group Monitor reflect possible alerts triggered upon the query execution. The Collection Error Count attribute of the group reports on the collection errors of all monitors, associated to the group, for which this option is available and selected, providing a global view of the collection errors for the whole group.
3. Define the **Monitor Settings**:
   - **Internal ID**: Enter an ID to identify the managed MySQL query instance in TrueSight Operations Management.
   - **Display Name**: Enter a name to identify the managed MySQL query instance in TrueSight Operations Management.
   - **Optional — Polling Interval**: Set the frequency at which the data collection will be performed. Default is 2 minutes.
   - **Optional — Alert Actions**: Define the action(s) Monitoring Studio needs to perform when the threshold for this MySQL query instance is breached.

4. **Optional** — Define the **Content Processing** rules you wish to apply to the MySQL query output:
   - **String Searches**: Define the search criteria for a specific string you wish to find or not find in the MySQL query output.
   - **Numeric Extractions**: Define any numeric value to be extracted from the MySQL query output.

5. Click the **Add to List** button to complete the creation of the MySQL query instance.

6. Click **Close**.

### Performing a Query on a PostgreSQL Database

This section details the various connection settings available for performing queries on a PostgreSQL database server. First steps are common to all database queries and connection methods. They are described in the [Analyzing a Database Query](#) chapter.

### Configuring a connection to a PostgreSQL server database

1. Define the **Connection Settings** to the PostgreSQL server database:

   ![Connection Settings Table]

   - **Database Name**: Enter the name of the PostgreSQL database.
   - **PostgreSQL Port Number**: Enter the port that will be used to access the PostgreSQL database.
   - **Username**: Enter the username to use to connect to the database.
   - **Password**: Enter the password associated with the specified username.

   *Connection Settings will be shared by all the queries defined within the PostgreSQL Server Monitor.*
2. Define the **SQL Query and Timeout** properties:

<table>
<thead>
<tr>
<th>SQL Query and Timeout</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SQL Query</strong></td>
</tr>
<tr>
<td><strong>Timeout (seconds)</strong></td>
</tr>
<tr>
<td>Report Errors in Group's CollectionErrorCount</td>
</tr>
</tbody>
</table>

**PostgreSQL Server Database - Query and Timeout Settings**

- **SQL Query**: Enter the SQL query you wish to perform.
- **Timeout (seconds)**: Specify the time in seconds after which the query will be stopped. Default is 30 seconds. If the query times out, the **Status** attribute of the Studio Database Query Monitor Type will be set to 2 (Failed) and an alarm will be triggered in TrueSight Operations Management.
- **Report Errors in Group's "Collection Error Count"**: Select this option to have the Collection Error Count attribute of the Group Monitor reflect possible alerts triggered upon the query execution. The Collection Error Count attribute of the group reports on the collection errors of all monitors, associated to the group, for which this option is available and selected, providing a global view of the collection errors for the whole group.

3. Define the **Monitor Settings**:

- **Internal ID**: Enter an ID to identify the managed PostgreSQL query instance in TrueSight Operations Management.
- **Display Name**: Enter a name to identify the managed PostgreSQL query instance in TrueSight Operations Management.
- **Optional — Polling Interval**: Set the frequency at which the data collection will be performed. Default is 2 minutes.
- **Optional — Alert Actions**: Define the action(s) Monitoring Studio needs to perform when the threshold for this PostgreSQL query instance is breached.

4. **Optional —** Define the **Content Processing** rules you wish to apply to the PostgreSQL query output:

- **String Searches**: Define the search criteria for a specific string you wish to find or not find in the PostgreSQL query output.
- **Numeric Extractions**: Define any numeric value to be extracted from the PostgreSQL query output.

5. Click the **Add to List** button to complete the creation of the PostgreSQL query instance.

6. Click **Close**.

### Performing a Query on an Oracle Database Server

This section details the various connection settings available for performing queries on an Oracle database server. First steps are common to all database queries and connection methods. They are described in the **Analyzing a Database Query** chapter.

### Configuring a connection to a Oracle database server
1. Define the **Connection Settings** to the Oracle database server:

    ![Connection Settings](image)

    - **Database Name**: Enter the name of the database.
    - **Oracle Port Number**: Enter the port to be used to access the Oracle database.
    - **Username**: Enter the username to use to connect to the database.
    - **Password**: Enter the password associated with the specified username.

    *Connection Settings will be shared by all the queries defined within the Oracle Database Server Monitors.*

2. Define the **Oracle Query and Timeout** properties

    ![SQL Query and Timeout](image)

    - **SQL Query**: Enter the SQL query you wish to perform.
    - **Timeout (seconds)**: Specify the time in seconds after which the query will be stopped. Default is 30 seconds. If the query times out, the **Status** attribute of the Studio Database Query Monitor Type will be set to 2 (Failed) and an alarm will be triggered in TrueSight Operations Management.
    - **Report Errors in Group's CollectionErrorCount**: Select this option to have the Collection Error Count attribute of the Group Monitor reflect possible alerts triggered upon the query execution. The Collection Error Count attribute of the group reports on the collection errors of all monitors, associated to the group, for which this option is available and selected, providing a global view of the collection errors for the whole group.

3. Define the **SQL Query and Timeout** properties

    ![SQL Query and Timeout](image)

    - **SQL Query**: Enter the SQL query you wish to perform.
    - **Timeout (seconds)**: Specify the time in seconds after which the query will be stopped. Default is 30 seconds. If the query times out, the **Status** attribute of the Studio Database Query Monitor Type will be set to 2 (Failed) and an alarm will be triggered in TrueSight Operations Management.
    - **Report Errors in Group's CollectionErrorCount**: Select this option to have the Collection Error Count attribute of the Group Monitor reflect possible alerts triggered upon the query execution. The Collection Error Count attribute of the group reports on the collection errors of all monitors, associated to the group, for which this option is available and selected, providing a global view of the collection errors for the whole group.
- **SQL Query**: Enter the SQL query you wish to perform.
- **Timeout (seconds)**: Specify the time in seconds after which the query will be stopped. Default is 30 seconds. If the query times out, the **Status** attribute of the Studio Database Query Monitor Type will be set to 2 (Failed) and an alarm will be triggered in TrueSight Operations Management.
- **Report Errors in Group’s "Collection Error Count"**: Select this option to have the **Collection Error Count** attribute of the Group Monitor reflect possible alerts triggered upon the query execution. The **Collection Error Count** attribute of the group reports on the collection errors of all monitors, associated to the group, for which this option is available and selected, providing a global view of the collection errors for the whole group.

4. Define the **Monitor Settings**:
   - **Internal ID**: Enter an ID to identify the managed Oracle database query instance in TrueSight Operations Management.
   - **Display Name**: Enter a name to identify the managed Oracle database query instance in TrueSight Operations Management.
   - **Optional — Polling Interval**: Set the frequency at which the data collection will be performed. Default is 2 minutes.
   - **Optional — Alert Actions**: Define the action(s) Monitoring Studio needs to perform when the threshold for this Oracle database query instance is breached.

5. **Optional — Define the Content Processing rules you wish to apply to the Oracle database query output**:
   - **String Searches**: Define the search criteria for a specific string you wish to find or not find in the Oracle database query output.
   - **Numeric Extractions**: Define any numeric value to be extracted from the Oracle database query output.

6. Click the **Add to List** button to complete the creation of the Oracle database query instance.
7. Click **Close**.

**Performing a Query on an Other Database**

This section details the various connection settings available for performing queries on database servers other than Microsoft SQL, MySQL, Oracle or PostgreSQL. First steps are common to all database queries and connection methods. They are described in the Analyzing a Database Query chapter.
Configuring a connection to a other database server

1. Define the **Connection Settings** to the other server database:

   **Connection Settings**
   - ODBC Connection String
   - Password

   *Other Database - Connection Settings*

   - **ODBC Connection String**: Enter the connection string that includes attributes such as the name of the driver, server, database and security information (username and password). In computing, a connection string is a string that specifies information about a data source and the means of connecting to it. It is passed in code to an underlying driver or provider in order to initiate the connection.
   - **Password**: Passwords are sensitive information that should not be displayed without being encrypted. When a password is included in the string you wish to execute, it is highly recommended to use the `%{SEN_PASSWORD}` macro in the string and enter the corresponding password in the Password field (encrypted display).

   *Connection Settings will be shared by all the queries defined within the database Monitor.*

   **Example**

   ```
   String = Driver={MySQL ODBC 3.51 Driver};Server=myserver;Database=mydatabase;User=user;Password=%{SEN_PASSWORD};Option=3;
   Password = ********
   ```

2. Define the **Monitor Settings**:
   - **Internal ID**: Enter an ID to identify the managed database query instance in TrueSight Operations Management.
   - **Display Name**: Enter a name to identify the managed database query instance in TrueSight Operations Management.
   - **Optional — Polling Interval**: Set the frequency at which the data collection will be performed. Default is 2 minutes.
   - **Optional — Alert Actions**: Define the action(s) Monitoring Studio needs to perform when the threshold for this database query instance is breached.

3. **Optional — Define the Content Processing rules you wish to apply to the database query output**:
   - **String Searches**: Define the search criteria for a specific string you wish to find or not find in the database query output.
   - **Numeric Extractions**: Define any numeric value to be extracted from the database query output.

4. Click the **Add to List** button to complete the creation of the database query instance.

5. Click **Close**.
Monitoring Files (Flat and Log)

The File Monitoring Tool is designed to monitor the presence, content, growth and change of a specific file. Therefore, the solution is able to instantly detect and alert when a critical file goes missing or if the file size is growing too fast, for example. It is one of the most important monitoring tools offered by TrueSight Operations Management - Monitoring Studio as a lot of technologies deal with files and many of them are critical. The most typical usage of file monitoring is parsing a log file. Most technologies use log files to trace their operations and notify operators when failures occur.

Selecting the right file type to monitor (flat or log) is essential to allow Monitoring Studio to read the monitored file correctly. Note that searching strings in flat or log files is also performed slightly differently, depending on the file type. Flat files are entirely updated and therefore need to be parsed entirely, as opposed to log files where new lines are appended at the end of the file - and hence only these new lines need to be analyzed.

The following procedure applies to the monitoring of both Flat and Log files.

To monitor a file (flat and log)

1. Access the Monitoring Studio Configuration panel, as explained in the Configure Monitor Settings chapter.
2. In the Monitors section, click the Files (Flat) or Files (Log) button.
3. Provide the Credentials required to establish a connection to the Host.

File (Flat or Log) — Credentials Settings

- **Username**: Enter the username to use to establish the connection with the Host. Leave this field blank to use the username provided for the Host at the Monitor Group level.
- **Password**: Enter the password for the username provided above, to use to establish the connection with the Host. Leave this field blank to use the password provided for the Host at the Monitor Group level.

4. Define the File Settings

File (Flat or Log) — File Settings

- **Filename (Full Path)**: Enter the path and name of the file you wish to monitor. You can use:
✓ the ? wildcard to replace one character; the * wildcard to replace one or more characters
✓ a date/time format to dynamically assign the current date or time in the file name.

Simply insert the following string in the "Filename" field, where the date/time format appears, replacing the three dots by date format symbols: %{SEN_TIME:...}. For the complete list of format symbols, definitions and examples, please refer to the Format Symbols chapter.

5. Define the Monitor Settings

![Monitor Settings](image)

- **Internal ID**: Enter an ID to identify the managed monitored file instance in TrueSight Operations Management.
- **Display Name**: Enter a name to identify the managed monitored file instance in TrueSight Operations Management.
- **Optional — Polling Interval**: Set the frequency at which the data collection will be performed. Default is 2 minutes.
- **Optional — Alert Actions**: Define the action(s) Monitoring Studio needs to perform when the threshold for this managed file instance is breached.

6. **Optional — Define the Content Processing rules you wish to apply to the monitored file output:**

![Content Processing](image)

- **String Searches**: Define the search criteria for a specific string you wish to find or not find in the monitored file output.

⚠️ The string search for Flat and Log files is slightly different. Refer to the Searching for a Specific String chapter for detailed information.

- **Numeric Extractions**: Define any numeric value to be extracted from the monitored file output.

7. Click the **Add to List** button to complete the creation of File (Flat or Log) instance.
8. Click **Close**.
Monitoring a File System

Because file systems are often a critical resource for technologies, **TrueSight Operations Management - Monitoring Studio** provides a **File System** monitoring tool to rapidly identify which components are impacted when a file system is full.

To monitor a file system

1. Access the **Monitoring Studio Configuration** panel, as explained in the Configure Monitor Settings chapter.
2. In the **Monitors** section, click the **File Systems** button.
3. The **File Systems** panel is displayed to provide the connection credentials and define the file system settings.
4. Provide the **File System** information:

   ```plaintext
   File Settings
   File System: Enter the name of the file system you wish to monitor.
   ```

5. Define the **Monitor Settings**:

   ```plaintext
   Monitor Settings
   Internal ID: Enter an ID to identify the managed file system instance in TrueSight Operations Management.
   Display Name: Enter a name to identify the managed file system instance in TrueSight Operations Management.
   Optional — Polling Interval: Set the frequency at which the data collection will be performed. Default is 2 minutes.
   Optional — Alert Actions: Define the action(s) Monitoring Studio needs to perform when the threshold for this file system instance is breached.
   ```

6. Configure the File System Cache refreshing frequency. Monitoring Studio relies on a cache mechanism to share the information among the monitors in order to use as little resources as possible on the target host and over the network. The cache will be refreshed if one of the monitors needs to collect data (polling interval reached) and the cache is older than the selected minimum cache refresh.
**File System Cache**

| Minimum Cache Refresh (seconds) | 15 |

**File System — File System Cache**

- **Minimum Cache Refresh (seconds)**: Use the spin button to set the minimum number of seconds Monitoring Studio must wait before refreshing the file system cache. Default is 15 seconds.

7. Click the **Add to List** button to complete the creation of the file system instance.
8. Click **Close**.

**Monitoring Folders**

Since folders/directories are critical elements for a technology, checking their content is a good way to monitor their health. The **Folder Monitoring** tool monitors folders (directories) that store files processed by the technology. It measures their size, growth and flow (including how many files moved in and out, etc.).

This feature allows you to:

- Ensure that your technology is not overloaded (number of files to be processed, e.g.)
- Measure the technology activity (how many removed files, that is, how many have been processed)
- Check the age of the newest file (whether the data is coming in properly...)
- Check the age of the oldest file (whether the technology is running late in processing queued files).

⚠️ **Folder monitoring may be time-consuming for large size folders. Therefore, the solution will automatically reduce its monitoring features when the monitored folder contains more than 1000 files. To change this limit, set the configuration variable "/SENTRY/STUDIO/<hostID>/folderLimit" to a suitable value.**

**To monitor folders**

1. Access the **Monitoring Studio Configuration** panel, as explained in the Configure Monitor Settings chapter.
2. In the **Monitors** section, click the **Folders** button.
3. The **Folders** panel is displayed to provide the connection credentials and define the folder settings.
4. Provide the **Credentials** information

```markdown
<table>
<thead>
<tr>
<th>Credentials</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Username</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Password</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

**Folders — Credentials Settings**
- **Username**: Enter the username to use to establish the connection with the Host on which the folder you wish to monitor is located. Leave this field blank to use the username provided for the Host at the Monitor Group level.
- **Password**: Enter the password to use to establish the connection with the Host on which the folder you wish to monitor is located. Leave this field blank to use the password provided for the Host at the Monitor Group level.

5. **Define the Folder Settings**

   - **Folder Path**: Enter the name and path of the folder (directory) you wish to monitor.
   - **Include Subfolders**: Select this option to monitor all the sub-folders of the above-specified folder.
   - **Monitor Only Files Matching This Mask**: Optional — Specify the file types or enter masks to have Monitoring Studio only monitor the corresponding files (e.g.: .txt; myFiles? .log; file.*).

     You can use wildcards such as "*" to replace any number of characters, or "?" to replace just one character. You may also use several masks separated by ";". TrueSight Operations Management - Monitoring Studio will only take into account the files matching the masks entered.

6. **Define the Monitor Settings**

   - **Internal ID**: Enter an ID to identify the monitored folder instance in TrueSight Operations Management.
   - **Display Name**: Enter a name to identify the monitored folder instance in TrueSight Operations Management.
   - **Polling Interval**: Set the frequency at which the data collection will be performed. Default is 2 minutes.
   - **Alert Actions**: Define the action(s) Monitoring Studio needs to perform when the threshold for this managed folder instance is breached.

7. Click the **Add to List** button to complete the creation of the folder instance.

8. Click **Close**.

---

**Configuring Monitors**

**Username**: Enter the username to use to establish the connection with the Host on which the folder you wish to monitor is located. Leave this field blank to use the username provided for the Host at the Monitor Group level.

**Password**: Enter the password to use to establish the connection with the Host on which the folder you wish to monitor is located. Leave this field blank to use the password provided for the Host at the Monitor Group level.

5. **Define the Folder Settings**

   - **Folder Path**: Enter the name and path of the folder (directory) you wish to monitor.
   - **Include Subfolders**: Select this option to monitor all the sub-folders of the above-specified folder.
   - **Monitor Only Files Matching This Mask**: Optional — Specify the file types or enter masks to have Monitoring Studio only monitor the corresponding files (e.g.: .txt; myFiles? .log; file.*).

     You can use wildcards such as "*" to replace any number of characters, or "?" to replace just one character. You may also use several masks separated by ";". TrueSight Operations Management - Monitoring Studio will only take into account the files matching the masks entered.

6. **Define the Monitor Settings**

   - **Internal ID**: Enter an ID to identify the monitored folder instance in TrueSight Operations Management.
   - **Display Name**: Enter a name to identify the monitored folder instance in TrueSight Operations Management.
   - **Polling Interval**: Set the frequency at which the data collection will be performed. Default is 2 minutes.
   - **Alert Actions**: Define the action(s) Monitoring Studio needs to perform when the threshold for this managed folder instance is breached.

7. Click the **Add to List** button to complete the creation of the folder instance.

8. Click **Close**.
Monitoring Processes

When monitoring a technology, you typically want to check that its processes are running properly; yet spotting specific processes amongst all the running processes can sometimes be challenging.

The Process Monitoring tool provided by TrueSight Operations Management - Monitoring Studio allows you to easily check the presence of Windows, UNIX, or Linux processes by specifying one or more of the following criteria:

- The process name (as it appears in ps or in the Windows Task Manager)
- The Command line that was used to spawn the process
- The Username the process is run as
- The PID file path that contains the process ID

While the first 3 criteria can be combined to identify a process, the PID must always be used alone.

To monitor a process

1. Access the Monitoring Studio Configuration panel, as explained in the Configure Monitor Settings chapter.
2. In the Monitors section, click the Processes button.
3. The Processes panel is displayed to define the process monitoring settings and specify the process detection details method.
4. Define the Detection by Process Details information:

   **Detection by Process Details**

<table>
<thead>
<tr>
<th>Process Name</th>
<th>Command Line</th>
<th>Process Runs as This User</th>
</tr>
</thead>
</table>

   * Processes — Detection by Process Details

   - **Process Name**: Enter the name of the process you wish to monitor (including the extension for Windows processes).
   - **Command Line**: Specify the command line that launched the process.
   - **Process Runs as This User**: Enter the username the monitored process is running as.

   **Examples of settings for detection by process details**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Processes that match the criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example 1</td>
<td>PatrolAgent.exe</td>
</tr>
<tr>
<td>● Process name MUST BE EXACTLY patrolagent.exe</td>
<td>PatrolAgent.exe</td>
</tr>
</tbody>
</table>
To monitor all processes of a selected user, enter only the “User Identity” and leave “Process name” and “Command-line” empty.

Search criteria are case-sensitive on UNIX and Linux.

None of the details listed above are mandatory, but at least one of them must be specified.

5. Or, define the Detection by PID File option. Some technologies record their PID (process ID) in a pre-defined file. To make sure these technologies are operating properly, Monitoring Studio can read the PID from this file and monitor the corresponding process.

### Detection by PID File

**PID File Path**: Enter the path of the PID file. At each polling, the solution reads this file, retrieves the PID number and checks whether this process PID exists or not. Normally, the process PID is dynamically allocated. The process PID number should be at the very beginning of the file’s content.

6. Enable/Disable the Child Processes option:

### Child Processes

**Include Child Processes**: Select this option to have Monitoring Studio include the child processes associated to the current main process in the calculation of the process performance statistics.
7. Configure the **Status Interpretation** settings (UNIX/Linux only). This feature allows you to qualify the **Status** attribute of a process according to its state. The solution can then trigger an alert according to the **Status** attribute value. For example, if you apply **Suspicious** to the **Status** attribute for the **Stopped** state, an alert (**Warning**) will be triggered when the process is stopped and its **Status** attribute will be set to **Suspicious**.

- **Optional** — For each of the process possible state, select the value of the **Status** attribute: **OK**, **Suspicious** or **Failed**. By default, the overall process state will be interpreted as listed in the table below:

<table>
<thead>
<tr>
<th>Process State</th>
<th>Attribute Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Running</td>
<td>OK</td>
</tr>
<tr>
<td>Sleeping</td>
<td>OK</td>
</tr>
<tr>
<td>Queued</td>
<td>OK</td>
</tr>
<tr>
<td>Waiting</td>
<td>OK</td>
</tr>
<tr>
<td>Intermediate</td>
<td>OK</td>
</tr>
<tr>
<td>Stopped</td>
<td>Suspicious</td>
</tr>
<tr>
<td>Growing</td>
<td>Suspicious</td>
</tr>
<tr>
<td>Unknown</td>
<td>Suspicious</td>
</tr>
<tr>
<td>Terminated</td>
<td>Failed</td>
</tr>
<tr>
<td>Not Running</td>
<td>Failed</td>
</tr>
</tbody>
</table>

8. Define the **Monitor Settings**: 

- **Internal ID**: Enter an ID to identify the monitored process in TrueSight Operations Management.
- **Display Name**: Enter a name to identify the monitored process in TrueSight Operations Management.
- **Optional** — **Polling Interval**: Set the frequency at which the data collection will be performed. Default is 2 minutes.
- **Optional** — **Alert Actions**: Define the action(s) **Monitoring Studio** needs to perform when the threshold for this managed process instance is breached.
9. Set the **Process Cache** time. **Monitoring Studio** relies on a cache mechanism to share the information among the monitors in order to use as little resources as possible on the target host and over the network. The cache will be refreshed if one of the monitors needs to collect data (polling interval reached) and the cache is older than the selected minimum cache refresh.

<table>
<thead>
<tr>
<th>Process Cache</th>
<th>Minimum Cache Refresh (seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

**Processes — Monitor Settings**

- **Minimum Cache Refresh (seconds):** Collected process data are cached to the namespace under each monitored Host instance. These data are shared between other process monitors under the same host. A cache most recent than this value will not be refreshed even if a collector tries to refresh it. Enter the number of seconds after which the cache will be refreshed. Default is 15 seconds.

10. Click the **Add to List** button to complete the creation of the process instance.
11. Click **Close**.

## Monitoring SNMP Agents

The **SNMP** Monitor is designed to poll the SNMP agent and retrieve the values of a given OID (object identifier), or the values of an SNMP table, thereby enabling administrators to be notified when a problem occurs or just be informed of the status of the monitored device/attribute.

Many technologies rely on middleware instrumented with SNMP (Simple Network Management Protocol) agents, which contain managed objects that provide information related to the current state of its operation. These objects are arranged in a Management Information Base (MIB). SNMP is an Application Layer protocol that allows external tools to communicate with the agent and read the values of the objects.
To monitor an SNMP Agent or Traps

1. Access the Monitoring Studio Configuration panel, as explained in the Configure Monitor Settings chapter.
2. In the Monitors section, click the SNMP button.
3. The SNMP panel is displayed.

4. Define the Connection Settings. The SNMP agent collects critical information about the middleware, and Monitoring Studio, directly polls the agent and retrieves the value of a given OID (object identifier). The administrator can then interrogate the MIB and interpret the value of the OID retrieved by the solution. The 3 basic steps to poll the SNMP agent are:
   - Provide the SNMP Polling Port Number: Enter the port used to poll the SNMP agent. Default standard port is 161.
   - Provide the Community information: Enter the name of the community used by the SNMP agent. Default is 'public'.
   - Click the button corresponding to the OID to be polled (numeric) or (String), the SNMP Table, or the Traps to listen.

Polling SNMP Agents from a Single Numeric-based OID

To poll SNMP Agents from a Single OID (Numeric)

1. The Single OID (Numeric) panel allows you configure the polling of SNMP Agents from one OID (Numeric):

<table>
<thead>
<tr>
<th>OID Settings</th>
<th>* 1.3.6.1.4.1.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OID</td>
<td>1.3.6.1.4.1</td>
</tr>
<tr>
<td>Monitored Value</td>
<td>Raw Value</td>
</tr>
<tr>
<td>Report Errors in Group's &quot;Collection Error Count&quot;</td>
<td>No</td>
</tr>
</tbody>
</table>

Polling SNMP Agents — Configure the OID (Numeric) settings
2. **OID**: Enter the OID (object identifier) to poll, as provided by the Management Information Base (MIB).

3. **Monitored Value**: Select the value you wish Monitoring Studio to collect:
   - **Raw Value**: Reports on the actual value collected upon data polling.
   - **Delta**: Reports on the difference between values collected during two consecutive polling.
   - **Delta Per Second/Minute/Hour**: Reports on the value resulting of the division of the Delta value by the number of seconds/minutes/hour elapsed between the collection times.

4. **Report Errors in Group's "Collection Error Count"**: Select this option to have the Collection Error Count attribute of the Group monitor reflect possible alerts triggered upon the SNMP monitoring execution. The Collection Error Count attribute of the group reports on the collection errors of all monitors, associated to the group, for which this option is available and selected, providing a global view of the collection errors for the whole group.

5. **Define the Monitor Settings**:

   ![Monitor Settings](image)

   - **Internal ID**: Enter an ID to identify the managed SNMP Agent in TrueSight Operations Management.
   - **Display Name**: Enter a name to identify the managed SNMP Agent in TrueSight Operations Management.
   - **Optional — Polling Interval**: Set the frequency at which the data collection will be performed. Default is 2 minutes.
   - **Optional — Alert Actions**: Define the action(s) Monitoring Studio needs to perform when the threshold for this managed SNMP Agent is breached.

6. Click the **Add to List** button to complete the creation of the SNMP Single OID (Numeric) instance.

### Polling SNMP Agents from a Single String-based OID

#### To poll SNMP Agents from a Single OID (String)

1. The Single OID (String) panel allows you configure the polling of SNMP Agents from one OID (String):

   ![OID Settings](image)
- **OID**: Enter the OID (object identifier) to poll, as provided by the Management Information Base (MIB).
- **Report Errors in Group’s “Collection Error Count”**: Select this option to have the Collection Error Count attribute of the Group reflect possible alerts triggered upon the SNMP monitoring execution. The **Collection Error Count** attribute of the group reports on the collection errors of all monitors, associated to the group, for which this option is available and selected, providing a global view of the collection errors for the whole group.

2. Define the **Monitor Settings**:

   ![Monitor Settings](image)

   - **Internal ID**: Enter an ID to identify the managed SNMP Agent in TrueSight Operations Management.
   - **Display Name**: Enter a name to identify the managed SNMP Agent in TrueSight Operations Management.
   - **Optional — Polling Interval**: Set the frequency at which the data collection will be performed. Default is 2 minutes.
   - **Optional — Alert Actions**: Define the action(s) **Monitoring Studio** needs to perform when the threshold for this managed SNMP Agent is breached.

3. **Optional — Define the **Content Processing** rules you wish to apply to the SNMP Agent monitoring output**:

   ![Content Processing](image)

   - **String Searches**: Define the search criteria for a specific string you wish to find or not find in the SNMP Agent monitoring output.
   - **Numeric Extractions**: Define any numeric value to be extracted from the SNMP Agent monitoring output.

4. Click the **Add to List** button to complete the creation of the SNMP Single OID (String) instance.

5. Click **Close**.
Polling SNMP Agents from an SNMP Table

To poll SNMP Agents from an SNMP Table

1. The **Table** panel allows you configure the polling of SNMP Agents from an SNMP Table:

   **Table Settings**

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Root OID</td>
<td>1.3.6.1.4.1.</td>
</tr>
<tr>
<td>Column Numbers</td>
<td></td>
</tr>
<tr>
<td>Report Errors in Group’s &quot;Collection Error Count&quot;</td>
<td>✔ ✔</td>
</tr>
</tbody>
</table>

   *Polling SNMP Agents from a Table — Configure the OID settings*

2. Configure the **Table Settings**:
   - **Root OID**: Enter the Table OID (object identifier) to poll, as given by the Management Information Base (MIB).
   - **Column Numbers**: Enter the column numbers in the SNMP table that **Monitoring Studio** will poll. Column numbers must be delimited by commas (Example: 4,8,9). Leave the field blank to retrieve values from the entire row. Enter "ID" to retrieve the row identifier.
   - **Report Errors in Group’s "Collection Error Count"**: Select this option to have the **Collection Error Count** attribute of the **Group** reflect possible alerts triggered upon the SNMP monitoring execution. The **Collection Error Count** attribute of the group reports on the collection errors of all monitors, associated to the group, for which this option is available and selected, providing a global view of the collection errors for the whole group.

3. Define the **Monitor Settings**:

   **Monitor Settings**

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal ID</td>
<td></td>
</tr>
<tr>
<td>Display Name</td>
<td></td>
</tr>
</tbody>
</table>

   *Polling SNMP Agents from a Table — Monitor Settings*

   - **Internal ID**: Enter an ID to identify the managed SNMP Agent in TrueSight Operations Management.
   - **Display Name**: Enter a name to identify the managed SNMP Agent in TrueSight Operations Management.
   - **Optional — Polling Interval**: Set the frequency at which the data collection will be performed. Default is 2 minutes.
   - **Optional — Alert Actions**: Define the action(s) **Monitoring Studio** needs to perform when the threshold for this managed SNMP Agent is breached.
4. Optional — Define the Content Processing rules you wish to apply to the SNMP Agent monitoring output:

- **Content Processing**
  - **String Searches**: Define the search criteria for a specific string you wish to find or not find in the SNMP Agent monitoring output.
  - **Numeric Extractions**: Define any numeric value to be extracted from the SNMP Agent monitoring output.

5. Click the **Add to List** button to complete the creation of the SNMP monitor instance.

6. Click **Close**.

**Listening for SNMP Traps**

The SNMP Trap Listening tool monitors and listens for SNMP traps and enables rapid recovery actions depending on the traps received, thereby ensuring optimal functioning of applications or devices that send SNMP traps.

- The SNMP Agent emitting the traps should be configured to send them to the PATROL Agent where Monitoring Studio is installed and running, otherwise, the solution will not be able to receive any SNMP trap. No other Trap Listener should be running at the same time.

**To listen for SNMP Traps**

1. Access the Monitoring Studio Configuration panel, as explained in the Configure Monitor Settings chapter.
2. In the Monitors section, click the SNMP button.
3. The SNMP panel is displayed. Click the Traps button to display the Traps configuration panel.
4. Provide the two standard SNMP Trap identifiers in the Traps Settings section:

- **Enterprise OID**: Enter the ID of the SNMP Trap. You can use regular expressions.
- **Trap Number**: Enter the number identifying the SNMP Trap.
5. Configure the Varbinds Settings. A Varbind or Variable Binding is a sequence of two specific fields. The first field is an OID, which addresses a specific attribute. The second field contains the Value of the specified attribute:

- **Varbind 1 OID**: Enter the identifier for the first Varbind.
- **Varbind Value**: Enter the value for the first Varbind.
- **Varbind 2 OID**: Enter the identifier for the second Varbind.
- **Varbind2 Value**: Enter the value for the second Varbind.

6. Define the Acknowledgment Rule to make Monitoring Studio acknowledge alerts according to the following settings:

- **Acknowledge Alert After (minutes)**: Specify the number of minutes after which you wish Monitoring Studio to automatically acknowledge the alerts. Default is 120 minutes.
- **When Acknowledging**: Specify the action you wish Monitoring Studio to perform when acknowledging an alert:
  - Select the **Reset "Matching Trap Count"** option to have Monitoring Studio automatically reset the counter of the Matching Trap Count attribute to zero.
  - Select the **Reset "Matching Trap Count by One"** option to have Monitoring Studio automatically decrease by one the value of the counter of the Matching Trap Count attribute. Use this option if you need the solution to acknowledge each SNMP Trap.
- **Acknowledge Alert if the Following Trap is Received**: This option enables you to have Monitoring Studio acknowledge an alert for a specific Trap:
  - **Trap Number**: Enter the number identifying the SNMP Trap.
  - **Varbind OID**: Enter the identifier for the Varbind attached to the SNMP Trap.
  - **Varbind Value**: Enter the value for the specific Varbind.
7. Configure the Alert Action Execution settings:

**Alert Actions Execution**

- **Execute Alert Actions**: Select the condition on which you wish Monitoring Studio to execute an alert action: **When Thresholds are Breached** or for **Each Matching Trap**.

8. Define the Monitor Settings:

**Monitor Settings**

- **Internal ID**: Enter an ID to identify the managed SNMP Trap instance in TrueSight Operations Management.
- **Display Name**: Enter a name to identify the managed SNMP Trap instance in TrueSight Operations Management.
- **Optional — Alert Actions**: Define the action(s) Monitoring Studio needs to perform when the threshold for this SNMP Trap instance is breached or for each matching trap, according to the option selected in the Execute Alert Actions section.

9. Click the **Add to List** button to complete the creation of the SNMP Trap instance.

10. Click **Close**.
Analyzing Web Requests

The Web Request Analysis tool monitors your web-based technologies, sends HTTP requests, posts forms, parse the HTML page that is returned, etc. to ensure that end-users actually see what they should see on their browser.

To analyze a Web request

1. Access the Monitoring Studio Configuration panel, as explained in the Configure Monitor Settings chapter.
2. In the Monitors section, click the Web Requests button.
3. The Web Requests panel is displayed to provide the connection credentials and define the web request settings.

<table>
<thead>
<tr>
<th>Web Request Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>URL</strong></td>
</tr>
<tr>
<td><strong>Request Type</strong></td>
</tr>
<tr>
<td><strong>Timeout (seconds)</strong></td>
</tr>
<tr>
<td><strong>Report Errors in Group's &quot;Collection Error Count&quot;</strong></td>
</tr>
</tbody>
</table>

- **URL**: Enter the URL of the web site that needs to be monitored. From a Windows agent, it is possible to poll a secure web site by using the "https" method.
- **Request Type**: Select either the "GET" or "POST" mode. The "GET" mode (HTTP GET method) is the standard way to query a Web page from a Web server. The "POST" mode (HTTP POST method) is classically used to post a form to a Web server and obtain the result of the processing of the form data. If you choose this mode you need to specify which variables with what values must be passed to the Web server. You must check the Web form HTML source to know which method needs to be used (GET or POST).
- **Timeout (seconds)**: Specify the time in seconds after which the request will be stopped. The default is set to 30 seconds. If the request times out, the Status attribute of the Studio Web Request Monitor Type will be set to 2 (Failed) and an alarm will be triggered in TrueSight Operations Management.
- **Report Errors in Group's "Collection Error Count"**: Select this option to have the Collection Error Count attribute of the Group reflect possible alerts triggered upon the Web request execution. The Collection Error Count attribute of the group reports on the collection errors of all monitors, associated to the group, for which this option is available and selected, providing a global view of the collection errors for the whole group.

⚠️ Some Web forms can be passed to the server with the HTTP GET method. In this case, the form data goes through the URL ([http://server/form.php?varA=valueA&varB=valueB&...](http://server/form.php?varA=valueA&varB=valueB&...)).

💡 To post a form to a Web server, you need to enter the URL of the script/CGI/page that will actually process the data, which may be different from the Web page URL that shows the form itself. Again, you need to check the Web form HTML source to identify the URL to query.

---

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4. Define the **Proxy Settings**, if your environment uses a proxy server:

<table>
<thead>
<tr>
<th>Proxy Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proxy Hostname</td>
</tr>
<tr>
<td>Proxy Port Number</td>
</tr>
</tbody>
</table>

- **Proxy Hostname**: Enter the hostname of the proxy server.
- **Proxy Port Number**: Enter the port number on the proxy server that will be used to convey the web requests.

5. Specify the **HTTP Authentication** credentials. Refer to the [HTTP Authentication](#) chapter for details:

<table>
<thead>
<tr>
<th>HTTP Authentication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Username</td>
</tr>
<tr>
<td>Password</td>
</tr>
</tbody>
</table>

6. Define the **Form Inputs for POST Requests** (if you have selected the **POST (variables from a form)** type in the Web Requests Settings section):

<table>
<thead>
<tr>
<th>Form Inputs for POST Request</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form Input Field Name</td>
</tr>
<tr>
<td>Value</td>
</tr>
</tbody>
</table>

- **Form Input Field Name**: specify the variable to be transmitted to the Web server.
- **Value**: specify the value for the specific variable you have entered.
- Click the **Add to List** button to complete the creation of the POST form.

7. Define the **Web Service Information for POST Requests** (if you have selected the **POST (Web Service)** type in the Web Requests Settings section):

<table>
<thead>
<tr>
<th>Web Service Information for POST Requests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content-Type</td>
</tr>
<tr>
<td>Headers</td>
</tr>
<tr>
<td>Body</td>
</tr>
</tbody>
</table>
- **Content-Type**: Specify the MIME type for the message and the character encoding used for the XML body of the request.
- **Optional — Header**: Enter application-specific information (like authentication, payment, etc) about the Web Service message to be sent with the request.
- **Body**: Enter the path to the localhost file containing the Web Service body or content of the body itself. The file needs to be on the local PATROL Agent.

**Example**

```xml
<?xml version="1.0"?>
<soap:Envelope
xmlns:soap="http://www.w3.org/2001/12/soap-envelope"
soap:encodingStyle="http://www.w3.org/2001/12/soap-encoding">
  <soap:Body xmlns:m="http://www.example.org/stock">
    <m:GetStockPrice>
      <m:StockName>IBM</m:StockName>
    </m:GetStockPrice>
  </soap:Body>
</soap:Envelope>
```

8. Define the **Monitor Settings**:

```
Monitor Settings

<table>
<thead>
<tr>
<th>Internal ID</th>
<th>*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display Name</td>
<td>*</td>
</tr>
</tbody>
</table>

Web Request — Monitor Settings

- **Internal ID**: Enter an ID to identify the managed Web request instance in TrueSight Operations Management.
- **Display Name**: Enter a name to identify the managed Web request instance in TrueSight Operations Management.
- **Optional — Polling Interval**: Set the frequency at which the data collection will be performed. Default is 2 minutes.
- **Optional — Alert Actions**: Define the action(s) Monitoring Studio needs to perform when the threshold for this Web request instance is breached.

9. **Optional — Define the Content Processing rules you wish to apply to the Web request output**:

```
Content Processing

<table>
<thead>
<tr>
<th>String Searches</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Numeric Extractions</td>
<td></td>
</tr>
</tbody>
</table>

Web Request — Content Processing
- **Content to BeParsed:** Select what you would like to retrieve from the Web page returned by the Web server: *Entire HTTP Response, Web Page with HTML Tags* or *Web Page without HTML Tags*.
- **String Searches:** Define the search criteria for a specific string you wish to find or not find in the Web request output.
- **Numeric Extractions:** Define any numeric value to be extracted from the Web request output.

10. Click the **Add to List** button to complete the creation of the Web request instance.
11. Click **Close**.

## Monitoring Windows Event Logs

The **Windows Event Logs** tool monitors events posted by your technology to consolidate the application monitoring under a unique icon. You will therefore not have to additionally look up Windows Event Log. It also enables you to define automatic acknowledgment of previously triggered alerts by specifying the Windows event that will acknowledge the alert.

*This function is only available to agents running on Windows systems. Windows 2003 cannot be monitored remotely.*

### To monitor a Windows event log

1. Access the **Monitoring Studio Configuration** panel, as explained in the Configure Monitor Settings chapter.
2. In the **Monitors** section, click the **Windows Event Logs** button.
3. The **Windows Event Logs** panel is displayed. Provide the required Windows event log information.
4. Define the **Event Settings**:

   - **Event Log Name:** Enter the name of the Windows event log you wish to monitor.
   - **Provider Name:** Enter the name of the event provider. Typically, the software or driver that triggers the event.
   - **Count Events with These Event IDs:** Enter the ID(s) of the event(s) for which Monitoring Studio will trigger an alert.
   - **But Exclude These Event IDs:** Enter the ID(s) of the event(s) for which Monitoring Studio
will NOT trigger an alert.

Use a comma (,) to separate several IDs or a hyphen (-) between the first and the last ID to indicate a range. Example: 4372,4375,4380-4385.

5. Configure the Event Level settings. This option allows you to select the Windows Event type you wish to monitor. Available options are: Critical, Error, Warning, Information.

<table>
<thead>
<tr>
<th>Event Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical</td>
</tr>
<tr>
<td>Error</td>
</tr>
<tr>
<td>Warning</td>
</tr>
<tr>
<td>Information</td>
</tr>
</tbody>
</table>

Windows Event Logs — Event Level Settings

6. Optional — Define the Acknowledgment Rule. The automatic acknowledging feature allows you to manage the alerts for the Matching Event Count attribute:

<table>
<thead>
<tr>
<th>Acknowledgment Rule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acknowledge Alert After (minutes)</td>
</tr>
<tr>
<td>When Acknowledging</td>
</tr>
</tbody>
</table>

Windows Event Logs — Acknowledgment Rule Settings

- Acknowledge Alert After (minutes): Specify the number of minutes after which you wish Monitoring Studio to automatically acknowledge the alerts. Default is 120 minutes.
- Acknowledge on These Event IDs: Enter the ID(s) of the event(s) for which Monitoring Studio will automatically acknowledge the alerts.

Use a comma (,) to separate several IDs or a hyphen (-) between the first and the last ID to indicate a range.

Example

6005 is the ID of the event that occurs when the Event log service is started. The first line of the description of such an event is "The Event log service was started." The Event ID and the Source can be used by product support representatives to troubleshoot system problems.

Finally, specify the action you wish Monitoring Studio to perform when acknowledging an alert:

✔ Select the Reset "Matching Event Count" option to have Monitoring Studio automatically reset the counter to zero.
✔ Select the Decrease "Matching Event Count by One" option to have Monitoring Studio automatically decrease the value of the counter by one. Use this option if you need the solution to acknowledge each event count to get a close follow-up on the log activity.
7. Define the **Monitor Settings**:

| Monitor Settings |
|------------------|------------------|
| **Internal ID**  | *                |
| **Display Name** | *                |
| **Polling Interval** |               |
| **Alert Actions** |                 |

- **Internal ID**: Enter an ID to identify the managed event log instance in TrueSight Operations Management.
- **Display Name**: Enter a name to identify the managed event log instance in TrueSight Operations Management.
- **Optional — Polling Interval**: Set the frequency at which the data collection will be performed. Default is 2 minutes.
- **Optional — Alert Actions**: Define the action(s) Monitoring Studio needs to perform when the threshold for this event log instance is breached.

8. Configure the **Windows Event Cache** refreshing frequency:

<table>
<thead>
<tr>
<th>Windows Event Cache</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Cache Refresh (seconds)</td>
</tr>
</tbody>
</table>

- **Minimum Cache Refresh (seconds)**: Use the spin button to set the minimum number of seconds Monitoring Studio must wait before refreshing the event cache. Default is 15 seconds. Monitoring Studio relies on a cache mechanism to share the information among the monitors in order to use as little resources as possible on the target host and over the network. The cache will be refreshed if one of the monitors needs to collect data (polling interval reached) and the cache is older than the selected minimum cache refresh.

9. Click the **Add to List** button to complete the creation of the Window event log instance.
10. Click **Close**.

### Monitoring Windows Performance Counters

The **Windows Performance Counter** feature is designed to monitor any commercial Windows-based technology or any custom technology relying on a Windows-based middleware which is instrumented through Windows Performance Counters.

The Windows Performance Counter Monitor collects information about objects on your Windows systems and measures them. These objects can be processors, threads, processes, memory, etc., with each one having an associate set of counters and possibly instances. The data gathered by the Windows performances about specific components can be used to identify problems and bottlenecks within your technology and plan ahead for your future needs.
The Windows Performance Counters tool brings Windows performance data, important to the proper functioning of your applications, within your BMC framework and automatically notifies administrators when a value breaches a specific threshold.

*This function is only available to agents running on Windows systems.*

To monitor a Windows performance counter

1. Access the Monitoring Studio Configuration panel, as explained in the Configure Monitor Settings chapter.
2. In the Monitors section, click the Windows Perf Counters button.
3. The Windows Performance Counters panel is displayed to specify the performance counter to monitor.
4. Provide the Performance Counter Settings information for the Windows performance counter you wish to monitor:

   - **Performance Object**: Enter the name of the Windows performance object that contains the counter you wish to monitor, for example: `Win32_PerfRawData_PerfOS_Processor`.
   - **Instance Name**: Enter the name of the instance you wish to monitor. This name is used to distinguish between multiple performance objects of the same type on a single device, for example: `0`.
   - **Performance Counter**: Enter the name of the performance counter you wish to monitor, for example: `PercentUserTime`.
5. Optional — Select a Rescaling option, if needed. A scale can be used to divide or multiply the Windows performance value by a specific number.
To do so, simply select the *Divide by the Value Below* or *Multiply by the Value Below* option and type in the number you wish the value to be divided/multiplied by. Leave this option set to *No Rescaling* (default) if you wish the solution to report on the performance counter raw value.

6. **Define the Monitor Settings**

   ![Monitor Settings](image)

   - **Internal ID**: Enter an ID to identify the monitored performance counter in TrueSight Operations Management.
   - **Display Name**: Enter a name to identify the monitored performance counter in TrueSight Operations Management.
   - **Optional — Polling Interval**: Set the frequency at which the data collection will be performed. Default is 2 minutes.
   - **Optional — Alert Actions**: Define the action(s) Monitoring Studio needs to perform when the threshold for this managed performance counter instance is breached.

7. Click the **Add to List** button to complete the creation of the performance counter instance.

8. Click **Close**.

### Monitoring a Windows Service

Many software technologies that run on any Windows operating systems run as Windows services, running as background processes with no direct user interface and no logged-on user. Typically, they start automatically and are expected to stay running without human intervention. When one of these critical services fails, many users and external services can immediately be affected. Therefore, making sure that these services are seamlessly running is a key requirement for most system administrators.

> *This function is only available to agents running on Windows systems.*
To monitor a Windows service

1. Access the Monitoring Studio Configuration panel, as explained in the Configure Monitor Settings chapter.
2. In the Monitors section, click the Windows Services button.
3. The Windows Services panel is displayed to specify the service to monitor.
4. Provide the Name of the Windows service you wish to monitor.

<table>
<thead>
<tr>
<th>Service Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Service Name</strong></td>
</tr>
</tbody>
</table>

5. Configure the Status Interpretation settings. This feature allows you to qualify the Status attribute of a Windows service according to its state. The solution can then trigger an alert according to the Status attribute value. For example, if you apply Failed to the Status attribute for the Stopped state, an alert (Alarm) will be triggered when the Windows service is stopped and its Status attribute will be set to Failed.

- **Optional** — For each of the process possible state, select the value of the Status attribute: OK, Suspicious or Failed. By default, the overall service state will be interpreted as listed in the table below:

<table>
<thead>
<tr>
<th>Service State</th>
<th>Attribute Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Running</td>
<td>OK</td>
</tr>
<tr>
<td>Paused</td>
<td>Suspicious</td>
</tr>
<tr>
<td>Stopped</td>
<td>Failed</td>
</tr>
<tr>
<td>Pending Start</td>
<td>Suspicious</td>
</tr>
<tr>
<td>Pending Continue</td>
<td>Suspicious</td>
</tr>
<tr>
<td>Pending Pause</td>
<td>Suspicious</td>
</tr>
<tr>
<td>Pending Stop</td>
<td>Suspicious</td>
</tr>
<tr>
<td>Not Installed</td>
<td>Failed</td>
</tr>
<tr>
<td>Unknown</td>
<td>Suspicious</td>
</tr>
</tbody>
</table>

6. Define the Monitor Settings

<table>
<thead>
<tr>
<th>Monitor Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Internal ID</strong></td>
</tr>
<tr>
<td><strong>Display Name</strong></td>
</tr>
</tbody>
</table>

- **Internal ID**: Enter an ID to identify the monitored service in TrueSight Operations Management.
- **Display Name**: Enter a name to identify the monitored service in TrueSight Operations Management.
- **Optional — Polling Interval**: Set the frequency at which the data collection will be performed. Default is 2 minutes.
- **Optional — Alert Actions**: Define the action(s) Monitoring Studio needs to perform when the threshold for this managed service instance is breached.

7. Click the **Add to List** button to complete the creation of the Windows service instance.
8. Click **Close**.

## Analyzing WBEM Queries

WBEM (Web-Based Enterprise Management) is a set of systems management technologies developed to unify the management of distributed computing environments that provides users with information about the status of local or remote computer systems.

**Monitoring Studio** can execute WBEM queries on your system and consolidate them within your TrueSight environment along with the application monitoring under a single icon. It can also query the WBEM repository for class and instance information.

### To analyze a WBEM query

1. Access the **Monitoring Studio Configuration** panel, as explained in the Configure Monitor Settings chapter.
2. In the **Monitors** section, click the **WBEM** button.
3. The **WBEM** panel is displayed to provide connection information and credentials.
4. Configure the **Connection Settings**:

<table>
<thead>
<tr>
<th>Connection Settings</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>WBEM Port Number</td>
<td>5989</td>
</tr>
<tr>
<td>Encryption</td>
<td>✓</td>
</tr>
<tr>
<td>Username</td>
<td></td>
</tr>
<tr>
<td>Password</td>
<td></td>
</tr>
</tbody>
</table>

### WBEM Port Number:
Enter the port number you wish to use for the connection. By default, in standard environments, the port 5988 is used for non-encrypted data, while port 5989 is used for encrypted data.

### Encryption:
Select this option to encrypt the query with the HTTPS protocol. HTTPS is a secure version of the Hyper Text Transfer Protocol (HTTP) based on the SSL (Secure Sockets Layer) protocol. SSL creates a secure connection between a client and a server, over which any amount of data can be sent securely.

### Username:
Enter the username to use to perform the WBEM query. Leave blank to use the username provided at the host level.

### Password:
Enter the password to use to perform the WBEM query. Leave blank to use the username Provided at the host level.
password provided at the host level.

5. Define the **WBEM Query** settings:

```
WBEM Query Settings
```

- **Namespace**: Enter the WBEM namespace (*Example: root\emc*). A namespace is a logical group of related monitor types representing a specific technology or area of management.
- **WBEM Query**: Enter your query (*Example: SELECT * FROM Win32 process*).
- **Timeout (seconds)**: Specify the time in seconds after which the query will be stopped. If the query times out, the **Status** attribute of the **Studio WBEM Query** Monitor Type will be set to 2 (Failed) and an alarm will be triggered in TrueSight Operations Management.
- **Report Errors in Group's "Collection Error Count"**: Select this option to have the **Collection Error Count** attribute of the **Group** reflect possible alerts triggered upon the WBEM query execution. The **Collection Error Count** attribute of the group reports on the collection errors of all monitors, associated to the group, for which this option is available and selected, providing a global view of the collection errors for the whole group.

6. Define the **Monitor Settings**:

```
Monitor Settings
```

- **Internal ID**: Enter an ID to identify the managed WBEM query instance in TrueSight Operations Management.
- **Display Name**: Enter a name to identify the managed WBEM query instance in TrueSight Operations Management.
- **Optional — Polling Interval**: Set the frequency at which the data collection will be performed. Default is 2 minutes.
- **Optional — Alert Actions**: Define the action(s) **Monitoring Studio** needs to perform when the threshold for this WMI query instance is breached.

7. **Optional** — Define the **Content Processing** rules you wish to apply to the WBEM query output:
Configuring Monitors

TrueSight Operations Management - Monitoring Studio 9.0.00

Content Processing

- **String Searches**: Define the search criteria for a specific string you wish to find or not find in the WBEM query output.
- **Numeric Extractions**: Define any numeric value to be extracted from the WBEM query output.

8. Click the **Add to List** button to complete the creation of the WBEM query instance.
9. Click **Close**.

Analyzing WMI Queries

WMI (Windows Management Instrumentation) is the Microsoft implementation of WBEM (Web Based Enterprise Management) that provides users with information about the status of local or remote computer systems.

**TrueSight Operations Management - Monitoring Studio** can execute WMI queries on your system and consolidate them within your TrueSight Operations Management environment. It can also query the WMI repository for monitor type and instance information. You can for example request the WMI that returns all the objects representing shut-down events from your desktop system.

To analyze a WMI query

1. Access the **Monitoring Studio Configuration** panel, as explained in the Configure Monitor Settings chapter.
2. In the Monitors section, click the **WMI** button.
3. The **WMI** panel is displayed. Provide the connection credentials and define the WMI query settings.
4. Provide the **WMI Query** information

<table>
<thead>
<tr>
<th><strong>WMI Query Settings</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Namespace</strong></td>
</tr>
<tr>
<td><strong>WQL Query</strong></td>
</tr>
<tr>
<td><strong>Timeout (seconds)</strong></td>
</tr>
<tr>
<td>*<em>Report Errors in Group's <em>Collection Error Count</em></em></td>
</tr>
</tbody>
</table>

- **Namespace**: Enter the WMI namespace (*Example: root\cimv2*). A namespace is a logical group of related monitor types representing a specific technology or area of management.
- **WQL Query**: Enter your query (*Example: SELECT * FROM Win32 process*). In case you need
help to build your WMI query, you could download WMI CIM Studio, which is one of the WMI Administrative tools on the Microsoft site.

- **Timeout (seconds):** Specify the time in seconds after which the query will be stopped. If the query times out, the *Status* attribute of the [Studio WMI Query Monitor Type](#) will be set to 2 (Failed) and an alarm will be triggered in TrueSight Operations Management.

- **Report Errors in Group’s "Collection Error Count":** Select this option to have the *Collection Error Count* attribute of the *Group* reflect possible alerts triggered upon the WMI query execution. The *Collection Error Count* attribute of the group reports on the collection errors of all monitors, associated to the group, for which this option is available and selected, providing a global view of the collection errors for the whole group.

### Basic WMI Queries

Queries may be issued against WMI resources using WMI Query Language (WQL). WQL is a subset of SQL designed to retrieve information from WMI. A simple example of a WMI query would be: `SELECT * FROM Win32_Process`. This retrieves all attributes (the * is used as a wildcard) for all processes currently running on the computer. `Win32_Process` is the name of the WMI class for Windows processes.

WMI queries of this type are often issued from a script using Windows Script Host or from any technology or tool that can access WMI. Queries retrieve specific information from instances of WMI resources or execute methods against instances to perform such actions as stopping services, or starting processes.

<table>
<thead>
<tr>
<th>Keyword</th>
<th>Example code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SELECT</strong></td>
<td><code>SELECT *</code></td>
<td>Specifies what properties are returned. Typically * is used to simply retrieve all.</td>
</tr>
<tr>
<td><strong>FROM</strong></td>
<td><code>FROM __InstanceCreationEvent</code></td>
<td>Specifies the event class to query. This will be the extrinsic or intrinsic event class.</td>
</tr>
<tr>
<td><strong>WHERE</strong></td>
<td><code>WHERE TargetInstance ISA 'Win32_Process' AND TargetInstance.Name = 'notepad.exe'</code></td>
<td>Filters the results. For intrinsic events, will usually include the ISA keyword to specify the class of the TargetInstance. Note: WMI queries support dot characters in the <strong>WHERE</strong> statement.</td>
</tr>
</tbody>
</table>

5. **Define the Monitor Settings:**

![Monitor Settings](image)

- **Internal ID:** Enter an ID to identify the managed WMI query instance in TrueSight Operations Management.
- **Display Name:** Enter a name to identify the managed WMI query instance in TrueSight Operations Management.
Operations Management.
- **Optional — Polling Interval**: Set the frequency at which the data collection will be performed. Default is 2 minutes.
- **Optional — Alert Actions**: Define the action(s) Monitoring Studio needs to perform when the threshold for this WMI query instance is breached.

6. **Optional** — Define the Content Processing rules you wish to apply to the WMI query output:

```
<table>
<thead>
<tr>
<th>WMI Query — Content Processing</th>
</tr>
</thead>
<tbody>
<tr>
<td>String Searches</td>
</tr>
</tbody>
</table>
```

- **String Searches**: Define the search criteria for a specific string you wish to find or not find in the WMI query output.
- **Numeric Extractions**: Define any numeric value to be extracted from the WMI query output.

7. Click the **Add to List** button to complete the creation of the WMI query instance.
8. Click **Close**.

### Analyzing Information Sources

#### Searching for a Specific String

The **String Search** Monitor allows you to run fast and powerful searches for strings on the information sources that you previously configured (flat or log files, output of a Web request or a database query, OID content, etc).

Please note that the **String Search** Monitor works slightly differently on "running sources" (Log files) than on flat sources (flat files, command lines, Web requests, etc.):

- **On "running sources"** (Log files):
  - the strings are searched only in new lines since the last polling. For a string search in a running source, two graphs are built:
    - Number of matching lines since the last acknowledgment or Number of matches for the current collect.
    - Number of matches per minute since the last polling.
  - you can specify auto-acknowledging strings that will automatically reset the graph to the "number of matches".
    - Refer to the **String Searches for log Files** chapter for detailed information.

- **On "flat sources"** (any other source):
  - the strings are searched in the entire source every time (the whole file, the whole standard output, the whole HTTP response, the whole dataset). For a string search in a flat source, one graph is built: **Number of matches at the current polling**.
  - you cannot specify auto-acknowledging strings since the attribute is recalculated from "0"
Configuring Monitors

To search for a specific string

1. Log on to Central Monitoring Administration.
2. Create (or edit) a Policy that will be deployed on the PATROL Agents that share the same specified tag or according to their IP address, hostname, etc.
3. Click the Monitor Configuration link and click the (+ or -) button.
4. In the Monitoring Solution field, select Monitoring Studio. The related Monitoring Profile, Version and Monitor Type information is automatically displayed.
5. Select the Monitoring Studio Monitor Type and click .
7. From a specific Monitors panel (command lines, files, queries, etc.), click the String Searches button.
8. The String Searches panel is displayed to define the string search settings.
9. Provide the String Search information:

   - **Considered Line Numbers**: By default, the string(s) will be searched for in all the lines of the specified source but you can also specify the line numbers to be scanned. Line numbers are specified as follows:
     - x, y: line x and line y
     - x-y: all lines from x to y inclusive
     - x: only line x
     - x-: all lines from x to the end of the file inclusive
   - **Count Lines Matching With**: Enter the regular expression that needs to be found for the line to be counted.
   - **But Exclude Those Matching With**: Enter the regular expression that needs to be found for the line NOT to be counted.
10. Define the Monitor Settings:
String Search — Monitor Settings

- **Internal ID**: Enter an ID to identify the managed string search instance in TrueSight Operations Management.
- **Display Name**: Enter a name to identify the managed string search instance in TrueSight Operations Management.
- **Optional — Alert Actions**: Define the action(s) Monitoring Studio needs to perform when the threshold for this string search instance is breached.

11. Click the **Add to List** button to complete the creation of the string search instance.
12. Click **Close**.

**String Searches for Log Files**

Since a log file is constantly evolving in terms of contents, the **String Search** option performs slightly differently for log files than for any other sources (see Searching for a Specific String for detailed information about the string search option for 'flat sources').

**To search for a specific string in a log file**

1. Log on to **Central Monitoring Administration**.
2. Create (or edit) a **Policy** that will be deployed on the PATROL Agents that share the same specified tag or according to their IP address, hostname, etc..
3. Click the **Monitor Configuration** link and click the (+) button.
4. In the **Monitoring Solution** field, select **Monitoring Studio**. The related **Monitoring Profile**, **Version** and **Monitor Type** information is automatically displayed.
5. Select the **Monitoring Studio** Monitor Type and click ✍.
6. Select the **Monitoring Studio** Monitoring Solution.
7. Click the **Files (Log)** button
8. In the list of files, select the file on which you wish to perform a string search and click the **String Searches** button. You can also configure a string search when you create a brand new File (Log) Monitor instance.
9. The **String Searches** panel is displayed to define the string search settings.
10. Provide the **String Search** information

<table>
<thead>
<tr>
<th>String Search Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count Lines Matching with</td>
</tr>
<tr>
<td>But Exclude those Matching with</td>
</tr>
<tr>
<td>&quot;Matching Lines Count&quot; Report Matches</td>
</tr>
</tbody>
</table>

**String Search for Log Files — Settings**

- **Count Lines Matching With**: Enter the regular expression that needs to be found for the line to be counted.
- **But Exclude Those Matching With**: Enter the regular expression that needs to be found for the line NOT to be counted.
- **"Matching Lines Count" Report Matches**: Select the period Monitoring Studio will consider for counting the number of lines matching the string search:
✓ **Since Last Acknowledge (Incremental)**: Select this option to count the lines matching the string search since the last time the Matching Line Count attribute was reset.

✓ **In the Current Collect Only**: Select this option to count the lines matching the string search during the current collect.

11. Define the **Acknowledgment Rule** settings:

   ![Acknowledgment Rule](image)

   **String Search for Log Files — Acknowledgment Rule Settings**

   - **Acknowledge Alert After (minutes)**: Enter the number of minutes after which Monitoring Studio will automatically acknowledge an alert triggered on the Matching Lines Count attribute. Default is 120 minutes.
   - **Acknowledge Alert When a Line Matches With**: Enter the string that, if found, will automatically make Monitoring Studio acknowledge an alert on the Matching Lines Count attribute.
   - **When Acknowledging**: Specify the action you wish Monitoring Studio to perform when acknowledging an alert:
     ✓ Select the **Reset "Matching Line Count"** option to have Monitoring Studio automatically reset the counter of the Matching Line Count attribute to zero.
     ✓ Select the **Reset "Matching Line Count by One"** option to have Monitoring Studio automatically decrease by one the value of the counter of the Matching Line Count attribute. Use this option if you need the solution to acknowledge each event count to get a close follow-up on the log activity.

12. Define the **Alert Actions Execution** criteria:

   ![Alert Actions Execution](image)

   **String Search for Log Files — Alert Action Execution**

   - **Execute Alert Actions**: Select the condition that needs to be met for the defined alert action to be performed: **When the Thresholds are Reached** or **Every Time a Matching Line is Found**. Note that when using the later option, the solution will perform as much Alert Actions as the number of matching lines found.

13. Define the **Monitor Settings**

   ![Monitor Settings](image)
String Search for Log Files — Monitor Settings

- **Internal ID**: Enter an ID to identify the managed string search instance in TrueSight Operations Management.
- **Display Name**: Enter a name to identify the managed string search instance in TrueSight Operations Management.
- **Optional — Alert Actions**: Define the action(s) Monitoring Studio needs to perform when the threshold for this string search instance is breached.

14. Click the **Add to List** button to complete the creation of the string search instance.
15. Click **Close**.

Extracting Numeric Values

Problems with technologies are not always as simple as a sentence explaining that an "error has occurred." Sometimes, a technology reports its health by providing critical numbers, like a queue length, a processing time, a utilization percentage, etc. These numbers may be reported by the technology through its files, in the output of commands, in a database, in a Web page, etc. TrueSight Operations Management - Monitoring Studio extracts these values and reports them as graphs in TrueSight Operations Management. This feature is called **Numeric Value** extraction as its purpose is to extract numeric values from a text input (the output of a command, a Web page, the result of a SQL query, or WBEM query etc.).

All you need to do is indicate how to find the numeric value(s) within the information source. The basic mechanism is:

1. Specify an information source.
2. Specify with a regular expression the location of the numeric value within the searched lines.
3. Indicate the numeric value’s position in these lines i.e. before/after the string; column number etc.
4. Indicate which numbers are to be considered if several lines contain the searched numeric value: first value, last value, calculate average; highest value; lowest value.

The numeric value searching function works a bit differently on "running sources" (Log files and never-ending command lines) than on flat sources (flat files, command lines, Web requests, etc.):

- On "running sources" (Log files); the numeric values are searched only in new lines since the last polling.
- On "flat sources" (flat files, command lines, Web requests, database queries), the numeric values are searched in the entire source (the whole file, the whole standard output, the whole HTTP response, the whole data-set).

If several values are found, it is possible to select which value should be kept: the last value found, the average of all values, the minimum or maximum or a total of all values. A graph is then built with this value.
To extract a numeric value

1. Log on to Central Monitoring Administration.
2. Create (or edit) a Policy that will be deployed on the PATROL Agents that share the same specified tag or according to their IP address, hostname, etc.
3. Click the Monitor Configuration link and click the + (or ☑) button.
4. In the Monitoring Solution field, select Monitoring Studio. The related Monitoring Profile, Version and Monitor Type information is automatically displayed.
5. Select the Monitoring Studio Monitor Type and click ☑.
7. Select a monitor group in the Monitor Groups List and click the specific Monitor (command lines, files, queries, etc.) for which you want to perform a numeric extraction, then click the Numeric Extractions button.
8. The Numeric Extractions panel is displayed to define the numeric extractions settings.

**Extracting Numeric Value — Settings**

- **Extract Numeric Values From**: Select the option corresponding to the lines that will search for the numeric extraction:
  - **All Lines**: All lines of the text will be scanned for the Numeric value search. There is no need to provide further information.
  - **The Line Numbers Below**: Only specific line numbers will be scanned. The line numbers must be specified in the text field below. Line numbers are specified as follows:
    - x, y: line x and line y
    - x-y: all lines from x to y inclusive
    - x: only line x
    - x-: all lines from x to the end of the file inclusive
  - **Expected Format**: The line scanned will be the lines matching the regular expression specified in the field.
  - **In Case of Multiple Values**: Select an option and enter a value in the field provided.
  - **Monitored Value**: The Numeric Values are Located

- **Col. Separators**: Click the button to set column separators.
- **Rescaling**: Click the button to rescale the numeric values.

- **Extract Numeric Values From**: Select the option corresponding to the lines that will search for the numeric extraction:
  - **All Lines**: All lines of the text will be scanned for the Numeric value search. There is no need to provide further information.
  - **The Line Numbers Below**: Only specific line numbers will be scanned. The line numbers must be specified in the text field below. Line numbers are specified as follows:
    - x, y: line x and line y
    - x-y: all lines from x to y inclusive
    - x: only line x
    - x-: all lines from x to the end of the file inclusive
  - **Expected Format**: The line scanned will be the lines matching the regular expression specified in the field.
  - **In Case of Multiple Values**: Select an option and enter a value in the field provided.
  - **Monitored Value**: The Numeric Values are Located

- **Col. Separators**: Click the button to set column separators.
- **Rescaling**: Click the button to rescale the numeric values.
below:

- **After/Before the String...**: Indicate if the numeric value is located after or before the string to be entered in the text field.

- **At the Character Offset...**: The value should be at a specific character offset in the line. Enter the offset number in the box. The solution will look for the numeric value at that exact character offset in the line. If no numeric data is found, no value will be collected.

- **In the Column Number...**: The previously selected lines contain several columns identified by a separator character. Enter the column number that should contain the value and click the Column separators button to specify how columns are separated.

- **Expected Format**: This option allows you to extract numeric values that use blank, comma or points as decimal and thousand separators. Monitoring Studio will look for a number in the location specified previously. When a character that does not match the expected format is found, the parsing stops. So, if the expected format is 1,000 and Monitoring Studio finds 1 000, the returned value will be 1. Select the expected format for the value to be searched.

- **In Case of Multiple Values**: Select the option corresponding to the action you wish the solution to perform when multiple values are extracted:
  - **Keep the Last**: Only the latest value found will be kept (default).
  - **Calculate the Average**: The values found will be averaged and only the result will be kept.
  - **Calculate the Sum**: The values found will be summed and only the result will be kept.
  - **Keep the First**: Only the first value found will be kept.
  - **Select the Lowest**: Only the lowest value found will be kept.

- **Monitored Values**: Select the option corresponding to the post-processing action you wish the solution to perform:
  - **Raw Value**: The values are reported as collected. No post-processing is performed.
  - **Delta**: The value reported corresponds to the difference between values collected during two consecutive polling.
  - **Delta per second/minute/hour**: The value reported corresponds to the result of the division of the Delta by the number of seconds/minutes/hour elapsed between the collection times.

> Delta calculation cannot be processed until at least two collects are performed.
9. Specify the Column Separators options. Click the Col. Separator button to display the following panel:

- **Blank Space**: A blank space will be considered as column separator.
- **Tab**: A tab will be considered as column separator.
- **Semicolon (;)**: A semicolon will be considered as column separator.
- **Comma (,)**: A comma will be considered as column separator.
- **Pipe (|)**: A pipe will be considered as column separator.
- **Other Separators**: Enter the character(s) that will be considered as column separator(s). If you need to provide more than one character, simply type the separators one after the other.
- **Consecutive Separators**: Select the way consecutive separator should be processed.
  - **Must be Treated as a Single One**: Each consecutive separators must be treated as a single separator.
  - **Mean Empty Columns**: Each separator is treated as an individual column separator and the column is considered empty. Any combination can be used, even when boxes are checked and separators entered in the box.

Click Close.

10. Specify the Rescaling options. Click the Rescaling button to display the following panel:

- **Rescaling**: Select an option to rescale the value that is being extracted in order to have a more readable graph in TrueSight Operations Management:
  - **No rescaling**
  - **Divide the value by a value that then gives you the reading in terms best suited to you**
  - **Multiply the extracted value by a constant factor**

This can be useful if you extract numeric values in bytes but prefer to show a graph in megabytes. In such a case, you would divide the values by 1048576 (1024*1024).
11. Define the **Monitor Settings**:

![Monitor Settings](image.png)

- **Internal ID**: Enter an ID to identify the monitored object.
- **Display Name**: Enter a name to identify the monitored object in the Console.
- **Optional — Alert Actions**: Define the action(s) *Monitoring Studio* needs to perform when the threshold for this instance is breached.

12. Click the **Add to List** button to complete the creation of the **Numeric Extraction** instance.

13. Click **Close**.
Configuring Other Monitoring Settings
Configuring Thresholds

When you are creating or editing a policy, you can add and configure monitor thresholds. The Add Instance Thresholds dialog box presents threshold configuration fields for TrueSight Operations Management monitors that are configured through Central Monitoring Administration.

For details about baselines and Key Performance Indicators (KPI), see TrueSight Operations Management or Central Monitoring Administration user documentation or refer to the Managing Baselines and Key Performance Indicators chapter. For details about the monitored attributes, refer to the specific monitor type in the Reference Guide chapter.

Before you begin

Ensure that your monitor configuration is complete before thresholds are applied. Thresholds cannot be applied to monitors that are not configured through Central Monitoring Administration. If you have not done so already, please refer to the Configuring Monitor Settings chapter.

Recommended Thresholds

Thresholds define acceptable high and/or low values for the data collected. Thresholds can be created as part of a policy that can be applied to multiple monitor types on multiple BMC PATROL Agents.

The Reference Guide chapter provides a list of monitor types with their respective attributes and the thresholds applied by default.

⚠️ Do not set server thresholds for availability or Boolean oriented parameters or any other parameters that will have events generated for them by the PATROL Agents.

Configuring Monitor Thresholds

To configure monitor thresholds:

1. Log on to TrueSight Operations Management.
2. Edit the Monitoring Policy that applies to the PATROL Agent for which you need to configure thresholds:
   - In the Navigation pane, click the Policies drawer
   - Expand the Monitoring folder and select a policy view (e.g. All).
   - Select your policy and click ✍️.
3. Check the **Server Threshold Configuration** box.
4. Click the **Server Threshold Configuration** link.
5. In the **Server Threshold Configuration** page, click +.
6. Select the relevant **Solution, Version, and Monitor Type**.
7. In the **Instance Name** field, specify the instance to which the threshold configuration will be applied. You can either use a string or the following regular expression patterns: \?, _, +, *, ( ), |, [ ], { }, ^, $.
8. Check the **Match Device Name** box if you want the entire <deviceName>\<instanceName> string to be considered.
9. From the **Attribute** list, select a monitor attribute.
10. In the **Threshold** section:
    - Select the threshold type.
    - Set the threshold parameters values.
    - Click **Add**.
11. Resume the procedure to configure all the monitor thresholds required.
12. Click **Close**. The configuration details are displayed in the **Server Threshold Configuration** page.
13. Click **Finish**.

New threshold configurations are pushed to BMC PATROL Agents with matching Central Monitoring Configuration tags, IP address, hostname, etc.

### Editing a Threshold Configuration

To edit a threshold configuration:

1. Log on to **TrueSight Operations Management**.
2. Edit the **Monitoring Policy** that applies to the PATROL Agent for which you need to edit thresholds:
   - In the **Navigation** pane, click the **Policies** drawer
   - Expand the **Monitoring** folder and select a policy view (e.g. **All**).
   - Select your policy and click **Edit**.
3. Click the **Server Threshold Configuration** link.
4. On the **Server Threshold Configuration** page, select an **Instance Name** and click **Edit**.
5. Edit the threshold configuration values and click **Update**.
6. When you finish editing the threshold configuration, click **Close**.
7. Click **Finish**.

Updated threshold configurations are pushed to BMC PATROL Agents with matching Central Monitoring Configuration tags.
Deleting a Threshold Configuration

To delete a threshold configuration:

1. Log on to TrueSight Operations Management.
2. Edit the Monitoring Policy that applies to the PATROL Agent for which you need to edit thresholds:
   - In the Navigation pane, click the Policies drawer
   - Expand the Monitoring folder and select a policy view (e.g. All).
   - Select your policy and click 📊.
3. Click the Server Threshold Configuration link.
4. On the Server Threshold Configuration page, select an Instance Name and click 🗑️
5. Click Yes to confirm deletion.
6. After you delete one or more threshold configurations, click Finish to save changes to the policy.

Deleted threshold configurations are removed from BMC PATROL Agents with matching Central Monitoring Configuration tags.

Defining Alert Actions

Alert Actions enable the administrator to choose specific actions to be executed when a failure is detected. With Alert Actions, it is possible to customize the way a problem notification is performed.

Monitoring Studio can be configured to run one, several, or all types of Alert Actions when an alert is triggered for a monitored technology. Alert actions can be specified for a Monitor Group or for individual Monitors. The settings and functionality of these two features are similar but, the Group Alert Actions apply to all the monitors of a group while individual Alert Actions apply to the Monitor for which they are defined.

To avoid redundancy, we have chosen to illustrate this chapter with the Group Alert Action panel. Note that the options for configuring the Monitor Alert Actions are identical and operate in the same manner.

To configure Group or Monitor Alert Actions
1. Edit or create the **Monitor Group** or the **Monitor** for which you want to define alert actions.

2. Click the **Group Alert Actions/Alert Actions** button to display the configuration panel:

   **Group Alert Actions Panel**

3. Select one or several alert actions you wish **Monitoring Studio** to perform when a threshold is breached. Macros can be used to customize alert actions, refer to the **Alert Actions Macros** chapter for detailed information:
   - **Event**: select the **Upon Threshold Breach, Trigger an Event** option to have **Monitoring Studio** trigger a PATROL event. Use the **Event Content** field to provide the string that will be displayed with the event.
   - **Annotation**: select the **Upon Threshold Breach, Annotate the Graph** option to have **Monitoring Studio** annotate the attribute’s graph. Use the **Annotation Content** field to provide the string that will be displayed at the annotation point.
   - **Command Line**: Select the **Upon Thresholds Breach, Execute a Command** option to have **Monitoring Studio** execute a command line on the targeted Host. Provide the **Username** and **Password** required to run the command line (or leave these fields blank to use the username and password provided at the Host level) as well as the command line you wish the solution to execute.

4. Click **Close**.

### Alert Actions Macros

A macro is a variable whose value is replaced when an **Alert Action** is triggered. Macros can be used to customize the content of each **Alert Action**. For example: `%{VALUE}` is replaced by the actual current value of the attribute that triggered the alert.

Each macro listed in the tables below contains information about what triggered the alert. Some
macros are "general" or "common" - these can be used for any object, and some are "object-specific" macros that are specific to the object, such as databases or files, etc.

*Macro syntax supports white spaces.*

## General Macros

The macros listed in the table below can be used with alert actions on any object.

<table>
<thead>
<tr>
<th>General Macro</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>% (SEN_ALERT_DEFAULTCONTENT)</td>
<td>Default alert content suitable for events and annotations, which resolves to the following macro syntax: %SEN_GROUP_NAME%SEN_HOST_NAME%SEN_PARAMETER_STATUS on %SEN_PARAMETER_NAME%SEN_OBJECT_LABEL.</td>
</tr>
<tr>
<td>% (SEN_ALERT_DEFAULTLOGMESSAGE)</td>
<td>Default alert content suitable for log files, which resolves to the following macro syntax: %SEN_TIME:%Y-%m-%d %H:%M:%S%SEN_GROUP_ID%SEN_PARAMETER_STATUS on %SEN_PARAMETER_NAME%SEN_OBJECT_LABEL.</td>
</tr>
<tr>
<td>%SEN_CREDENTIALS</td>
<td>Username of the Host as provided in CMA for a Monitor Group.</td>
</tr>
<tr>
<td>%SEN_DATE</td>
<td>Date on which the alert action is performed (YYYY-MM-DD format).</td>
</tr>
<tr>
<td>%SEN_GROUP_CLASS</td>
<td>Class name of the Monitor Group.</td>
</tr>
<tr>
<td>% (SEN_GROUP_COLLECTIONERRORS)</td>
<td>All collection errors collected for the Monitor Group at the time of the alert action.</td>
</tr>
<tr>
<td>% (SEN_GROUP_CONTACT)</td>
<td>Contact information for the Monitor Group, if set under PATROL configuration /SENTRY/STUDIO/&lt;groupID&gt;/contact.</td>
</tr>
<tr>
<td>% (SEN_GROUP_DESCRIPTION)</td>
<td>Description for the Monitor Group, if set under PATROL configuration /SENTRY/STUDIO/&lt;groupID&gt;/description.</td>
</tr>
<tr>
<td>%SEN_GROUP_ID</td>
<td>PATROL identifier of the Monitor Group.</td>
</tr>
<tr>
<td>%SEN_GROUP_LABEL</td>
<td>Name of the Monitor Group triggering the alert action.</td>
</tr>
<tr>
<td>%SEN_GROUP_TYPE</td>
<td>Type of the Monitor Group triggering the alert.</td>
</tr>
<tr>
<td>%SEN_HOST_DOMAIN</td>
<td>Domain of the targeted host.</td>
</tr>
<tr>
<td>%SEN_HOST_FQDN</td>
<td>Fully qualified domain name of the targeted host.</td>
</tr>
<tr>
<td>% (SEN_HOST_IPADDRESS)</td>
<td>IP address of the targeted host.</td>
</tr>
<tr>
<td>%SEN_HOST_NAME</td>
<td>Name of the targeted host.</td>
</tr>
<tr>
<td>General Macro</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>% {SEN_HOST_SNMPCOMMUNITY}</td>
<td>SNMP community set for the SNMP Agent on the targeted host.</td>
</tr>
<tr>
<td>% {SEN_HOST_SYSTEMTYPE}</td>
<td>Operating system type of the targeted host.</td>
</tr>
<tr>
<td>% {SEN_HOSTNAME}</td>
<td>Name of the monitored host as provided in CMA.</td>
</tr>
<tr>
<td>% {SEN_INFORMATION}</td>
<td>Detailed information about the alert.</td>
</tr>
<tr>
<td>% {SEN_INFORMATIONONELINE}</td>
<td>Detailed information about the alert in a single line (no carriage return).</td>
</tr>
<tr>
<td>% {SEN_NEWLINE}</td>
<td>Inserts carriage return.</td>
</tr>
<tr>
<td>% {SEN_OBJECT_CLASS}</td>
<td>Class name of the object to which the alert action belongs.</td>
</tr>
<tr>
<td>% {SEN_OBJECT_ID}</td>
<td>PATROL identifier of the object triggering the alert.</td>
</tr>
<tr>
<td>% {SEN_OBJECT_LABEL}</td>
<td>Display name of the object triggering the alert.</td>
</tr>
<tr>
<td>% {SEN_OBJECT_TYPE}</td>
<td>Type of the object triggering the alert (&quot;Process&quot;, &quot;String&quot;, etc.).</td>
</tr>
<tr>
<td>% {SEN_PARAMETER_ALARM1MAX}</td>
<td>Alarm1 maximum range of the parameter triggering the alert.</td>
</tr>
<tr>
<td>% {SEN_PARAMETER_ALARM1MIN}</td>
<td>Alarm1 minimum range of the parameter triggering the alert.</td>
</tr>
<tr>
<td>% {SEN_PARAMETER_ALARM1TIMES}</td>
<td>Number of consecutive times the parameter triggering the alert must have a value within the alarm1 range before the alert occurs.</td>
</tr>
<tr>
<td>% {SEN_PARAMETER_ALARM1TYPE}</td>
<td>Alarm alert type of the parameter triggering the alert (OK, WARN, ALARM).</td>
</tr>
<tr>
<td>% {SEN_PARAMETER_ALARM2MAX}</td>
<td>Alarm2 maximum range of the parameter triggering the alert.</td>
</tr>
<tr>
<td>% {SEN_PARAMETER_ALARM2MIN}</td>
<td>Alarm2 minimum range of the parameter triggering the alert.</td>
</tr>
<tr>
<td>% {SEN_PARAMETER_ALARM2TIMES}</td>
<td>Number of consecutive times the parameter triggering the alert must have a value within the alarm2 range before the alert occurs.</td>
</tr>
<tr>
<td>% {SEN_PARAMETER_ALARM2TYPE}</td>
<td>Alarm2 alert type of the parameter triggering the alert (OK, WARN, ALARM).</td>
</tr>
<tr>
<td>General Macro</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>% {SEN_PARAMETER_BORDERMAX}</td>
<td>Border maximum range of the parameter triggering the alert.</td>
</tr>
<tr>
<td>% {SEN_PARAMETER_BORDERMIN}</td>
<td>Border minimum range of the parameter triggering the alert.</td>
</tr>
<tr>
<td>% {SEN_PARAMETER_BORDERTIMES}</td>
<td>Number of consecutive times the parameter triggering the alert must have a value outside the border range before the alert occurs.</td>
</tr>
<tr>
<td>% {SEN_PARAMETER_BORDERTYPE}</td>
<td>Border alert type of the parameter triggering the alert (OK, WARN, ALARM).</td>
</tr>
<tr>
<td>% {SEN_PARAMETER_NAME}</td>
<td>Display name of the parameter triggering the alert.</td>
</tr>
<tr>
<td>% {SEN_PARAMETER_STATUS}</td>
<td>Status of the parameter.</td>
</tr>
<tr>
<td>% {SEN_PARAMETER_VALUE}</td>
<td>Value of the parameter triggering the alert.</td>
</tr>
<tr>
<td>% {SEN_PARENT_&lt;macro-name-without-SEN_&gt;}</td>
<td>Gets the parent’s object’s macro. The name of the parent’s macro is copied in the syntax without the SEN_. Example: In the case of a String Search performed on a Command Line (parent) output, to read the full output from the alert action in LastMatchingLines, the solution needs to read parent’s %{SEN_RESULT}, which can be accessed using % {SEN_PARENT_RESULT}.</td>
</tr>
<tr>
<td>% {SEN_PARENT_CLASS}</td>
<td>Class name of the parent object to which the alert action belongs.</td>
</tr>
<tr>
<td>% {SEN_PARENT_ID}</td>
<td>PATROL identifier of the object’s parent.</td>
</tr>
<tr>
<td>% {SEN_PARENT_LABEL}</td>
<td>Name of the object’s parent triggering the alert.</td>
</tr>
<tr>
<td>% {SEN_PARENT_TYPE}</td>
<td>Type of the object’s parent triggering the alert (“File”, “CommandLine”, etc.).</td>
</tr>
<tr>
<td>% {SEN_PASSWORD}</td>
<td>Encrypted password of the targeted host.</td>
</tr>
<tr>
<td>% {SEN_RESULT}</td>
<td>Query result received for the monitored object during data collection, when available.</td>
</tr>
<tr>
<td>% {SEN_STATUSINFORMATION}</td>
<td>Provides detailed information about the Status attribute of the monitored object, when available.</td>
</tr>
<tr>
<td>% {SEN_TIME}</td>
<td>Time of the alert action (in HH-MM-SS format).</td>
</tr>
<tr>
<td>% {SEN_TIME:&lt;date-time-format&gt;}</td>
<td>Time of the alert action with a configurable time format as described in the Format Symbols chapter. Example: % {SEN_TIME:%H%M%S} may read 094517 at run time.</td>
</tr>
</tbody>
</table>
### General Macro

<table>
<thead>
<tr>
<th>Macros</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>%SEN_USERNAME</td>
<td>Username to use to connect to the targeted host.</td>
</tr>
<tr>
<td>%/{...}</td>
<td><strong>Recommended for advanced users only.</strong> Provides an internal instance variable name to be inserted. The path is relative to the object triggering the alert. Example: %/{worstParam} will contain the name of the worst parameter on this instance, which is an application instance built-in variable (see the &quot;PATROL Script Language Reference&quot; document).</td>
</tr>
</tbody>
</table>

### Object Specific Macros

The macros listed in the tables below can be used with alert actions specifically for their respective object type.

#### Command Line Macros

<table>
<thead>
<tr>
<th>Macros</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>%SEN_COMMANDLINE</td>
<td>Command line being executed and analyzed.</td>
</tr>
<tr>
<td>%SEN_EXITSTATUSCODE</td>
<td>Exit status returned by the system after executing the command.</td>
</tr>
</tbody>
</table>

#### Database Macros

<table>
<thead>
<tr>
<th>Macros</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>%SEN_DATABASENAME</td>
<td>Name of the database the SQL query is sent to. For example, the database name for SQL Server, or the Oracle SID for Oracle.</td>
</tr>
<tr>
<td>%SEN_DATABASETYPE</td>
<td>Type of the database.</td>
</tr>
<tr>
<td>%SEN_QUERY</td>
<td>SQL statement sent for execution.</td>
</tr>
</tbody>
</table>

#### File Macros

<table>
<thead>
<tr>
<th>Macros</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>%SEN_FILENAME</td>
<td>Name of the monitored file as entered in CMA.</td>
</tr>
<tr>
<td>%SEN_MONITOREDFILE</td>
<td>Current file being monitored.</td>
</tr>
</tbody>
</table>

#### File System Macros

<table>
<thead>
<tr>
<th>Macros</th>
<th>Description</th>
</tr>
</thead>
</table>
%{SEN_FILESYSTEM}  Name of the monitored file system.

### Folder Macros

<table>
<thead>
<tr>
<th>Macros</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>%{SEN_FOLDER}</td>
<td>Name of the folder being monitored.</td>
</tr>
<tr>
<td>%{SEN_OLEDESTREMAININGINFOLDER}</td>
<td>Name of the oldest remaining file in the folder.</td>
</tr>
</tbody>
</table>

### Host Macros

<table>
<thead>
<tr>
<th>Macros</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>%{SEN_AVAILABILITYCHECKS}</td>
<td>List of availability checks, separated by commas.</td>
</tr>
<tr>
<td>%{SEN_CREDENTIALSLIST}</td>
<td>List of credentials, separated by commas.</td>
</tr>
<tr>
<td>%{SEN_SIGNATUREFILES}</td>
<td>List of signatures files, separated by commas.</td>
</tr>
<tr>
<td>%{SEN_TCPPORT}</td>
<td>Port number used to perform the TCP availability check.</td>
</tr>
</tbody>
</table>

### Process Macros

<table>
<thead>
<tr>
<th>Macros</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>% (SEN_COMMANDLINE)</td>
<td>Process command line being searched for, as entered in CMA.</td>
</tr>
<tr>
<td>% (SEN_MATCHINGPROCESSES)</td>
<td>List of all the processes that match the search criteria.</td>
</tr>
<tr>
<td>%{SEN_PIDFILE}</td>
<td>Path to the PID file whose corresponding process is being monitored.</td>
</tr>
<tr>
<td>%{SEN_PROCESSNAME}</td>
<td>Process name being searched for, as entered in CMA.</td>
</tr>
<tr>
<td>%{SEN_USERID}</td>
<td>Process user ID being searched for, as entered in CMA.</td>
</tr>
<tr>
<td>% (SEN_WORSTPROCESSCOMMANDLINE)</td>
<td>Command line of the first worst process.</td>
</tr>
<tr>
<td>% (SEN_WORSTPROCESS_NAME)</td>
<td>Name of the first worst process.</td>
</tr>
<tr>
<td>% (SEN_WORSTPROCESS_PID)</td>
<td>PID of the first worst process.</td>
</tr>
</tbody>
</table>
### Defining Alert Actions

<table>
<thead>
<tr>
<th>Macro</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>%SEN_WORSTPROCESS_PPID</td>
<td>PPID of the first worst process.</td>
</tr>
<tr>
<td>%SEN_WORSTPROCESS_STATE</td>
<td>State of the first worst process.</td>
</tr>
<tr>
<td>%SEN_WORSTPROCESS_USERNAME</td>
<td>Username of the first worst process.</td>
</tr>
<tr>
<td>%SEN_WORSTPROCESS_ES</td>
<td>A list of worst processes, semicolon delimited, containing PID, process name, username, PPID, state and command line.</td>
</tr>
</tbody>
</table>

#### SNMP Polling Macros

<table>
<thead>
<tr>
<th>Macros</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>%SEN_CONTENT</td>
<td>Content of the OID being polled.</td>
</tr>
<tr>
<td>%SEN_OID</td>
<td>SNMP OID being polled.</td>
</tr>
</tbody>
</table>

#### SNMP Trap Macros

<table>
<thead>
<tr>
<th>Macros</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>%SEN_CONTENT</td>
<td>Content of the found trap.</td>
</tr>
<tr>
<td>%SEN_ENTERPRISEID</td>
<td>Enterprise ID (OID) of the SNMP traps being looked for.</td>
</tr>
<tr>
<td>%SEN_FOUNDIP</td>
<td>Actual originating IP address of the trap that has been received.</td>
</tr>
<tr>
<td>%SEN_FOUNDTRAPNUMBER</td>
<td>Actual SNMP trap number that has been received and matches the entered criteria.</td>
</tr>
<tr>
<td>%SEN_TRAPNUMBER</td>
<td>SNMP Trap numbers (specific numbers) being looked for.</td>
</tr>
</tbody>
</table>

#### String Macros

<table>
<thead>
<tr>
<th>Macros</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>%SEN_LASTMATCHINGLINE</td>
<td>Last line that match with the String search criteria.</td>
</tr>
<tr>
<td>%SEN_LASTMATCHINGLINES</td>
<td>Last 10 lines that match with the String search criteria.</td>
</tr>
<tr>
<td>%SEN_STRING1</td>
<td>First regular expression being searched for.</td>
</tr>
<tr>
<td>%SEN_STRING2</td>
<td>Second regular expressions being searched for.</td>
</tr>
</tbody>
</table>

#### Web Request Macros

<table>
<thead>
<tr>
<th>Macros</th>
<th>Description</th>
</tr>
</thead>
</table>
### WBEM Macros

<table>
<thead>
<tr>
<th>Macros</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>%{SEN_NAMESPACE}</td>
<td>Namespace of the WBEM query.</td>
</tr>
<tr>
<td>%{SEN_QUERY}</td>
<td>Executed WBEM query.</td>
</tr>
</tbody>
</table>

### Windows Event Macros

<table>
<thead>
<tr>
<th>Macros</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>%{SEN_MATCHINGEVENTS}</td>
<td>List of matching events.</td>
</tr>
<tr>
<td>%{SEN_PROVIDER}</td>
<td>Name of the event provider.</td>
</tr>
<tr>
<td>%{SEN_EVENTID}</td>
<td>Monitored event IDs as configured in the monitor.</td>
</tr>
<tr>
<td>%{SEN_EVENTLOG}</td>
<td>Name of the monitored event log.</td>
</tr>
<tr>
<td>%{SEN_CONTENT}</td>
<td>Message content of the last matching event.</td>
</tr>
<tr>
<td>%{SEN_RECORDNUMBER}</td>
<td>Last matching event record number.</td>
</tr>
</tbody>
</table>

### Windows Performance Macros

<table>
<thead>
<tr>
<th>Macros</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>%{SEN_PERFORMANCECOUNTER}</td>
<td>Windows performance counter being monitored.</td>
</tr>
<tr>
<td>%{SEN_PERFORMANCEINSTANCE}</td>
<td>Windows performance object instances being monitored.</td>
</tr>
<tr>
<td>%{SEN_PERFORMANCEOBJECT}</td>
<td>Windows performance object name being monitored.</td>
</tr>
</tbody>
</table>

### Windows Service Macros

<table>
<thead>
<tr>
<th>Macros</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>%{SEN_SERVICENAME}</td>
<td>Name of the monitored Windows service.</td>
</tr>
</tbody>
</table>

### WMI Macros

<table>
<thead>
<tr>
<th>Macros</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>%{SEN_NAMESPACE}</td>
<td>Namespace of the WMI query.</td>
</tr>
<tr>
<td>%{SEN_QUERY}</td>
<td>Executed WMI query.</td>
</tr>
</tbody>
</table>

---

**See Also**

[Format Symbols for %{SEN_TIME:…} Macros](#)
## Format Symbols for `{SEN_TIME:...}` Macros

The following table recapitulates all of the time formats available for the `{SEN_TIME:...}` macro.

<table>
<thead>
<tr>
<th>Format</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>%%</td>
<td>This symbol allows you to use a percent sign (%) in the format of a date string</td>
</tr>
<tr>
<td>%a</td>
<td>Locale's abbreviated name of the day of week</td>
</tr>
<tr>
<td>%A</td>
<td>Locale's full name of the day of week</td>
</tr>
<tr>
<td>%b</td>
<td>Locale's abbreviated name of the month</td>
</tr>
<tr>
<td>%B</td>
<td>Locale's full name of the month</td>
</tr>
<tr>
<td>%c</td>
<td>Locale's appropriate date and time representation</td>
</tr>
<tr>
<td>%C</td>
<td>Data and time as %c</td>
</tr>
<tr>
<td>%d</td>
<td>Day of month [1,31]; single digits are preceded by 0</td>
</tr>
<tr>
<td>%D</td>
<td>Date as %m/%d/%y</td>
</tr>
<tr>
<td>%e</td>
<td>Day of month [1,31]; single digits are preceded by a space</td>
</tr>
<tr>
<td>%h</td>
<td>Locale's abbreviated name of the month</td>
</tr>
<tr>
<td>%H</td>
<td>Hour (24-hour clock) [0,23]; single digits are preceded by 0</td>
</tr>
<tr>
<td>%I</td>
<td>Hour (12-hour clock) [1,12]; single digits are preceded by 0</td>
</tr>
<tr>
<td>%j</td>
<td>Day of year [1,366]; single digits are preceded by 0</td>
</tr>
<tr>
<td>%k</td>
<td>Hour (24-hour clock) [0,23]; single digits are preceded by a space</td>
</tr>
<tr>
<td>%l</td>
<td>Hour (12-hour clock) [1,12]; single digits are preceded by a space</td>
</tr>
<tr>
<td>%m</td>
<td>Month as a decimal number [1,12]; single digits are preceded by 0</td>
</tr>
<tr>
<td>%M</td>
<td>Minute [0,61]</td>
</tr>
<tr>
<td>%n</td>
<td>Insert a new line</td>
</tr>
<tr>
<td>%p</td>
<td>Locale's equivalent of either a.m. Or p.m.</td>
</tr>
<tr>
<td>%r</td>
<td>Appropriate time representation in 12-hour clock format with %p</td>
</tr>
<tr>
<td>%R</td>
<td>Time as %H:%M</td>
</tr>
<tr>
<td>%s</td>
<td>Seconds [0,61]</td>
</tr>
<tr>
<td>%t</td>
<td>Insert a tab</td>
</tr>
<tr>
<td>%T</td>
<td>Time as %H:%M:%S</td>
</tr>
<tr>
<td>%u</td>
<td>Day of week as a decimal number [1,7], with 1 representing Monday</td>
</tr>
<tr>
<td>%U</td>
<td>Week of the year as a decimal number [0,53], with Sunday as the first day of week 1</td>
</tr>
<tr>
<td>%V</td>
<td>Week of the year as a decimal number [01,53], with Monday as the first day of the week. If the week containing 1 January has four or more days in the new year, then it is considered week 1; otherwise, it is week 53 of the previous year, and the next week is week 1.</td>
</tr>
<tr>
<td>%W</td>
<td>Day of week as a decimal number [0,6], with 0 representing Sunday</td>
</tr>
<tr>
<td>Format</td>
<td>Description</td>
</tr>
<tr>
<td>--------</td>
<td>-------------</td>
</tr>
<tr>
<td>%W</td>
<td>Week of the year as a decimal number [0,53], with Monday as the first day of week 1</td>
</tr>
<tr>
<td>%x</td>
<td>Locale's appropriate date representation</td>
</tr>
<tr>
<td>%X</td>
<td>Locale's appropriate time representation</td>
</tr>
<tr>
<td>%y</td>
<td>Year within century [0,99]</td>
</tr>
<tr>
<td>%Y</td>
<td>Year, including the century (for example 1993)</td>
</tr>
<tr>
<td>%z</td>
<td>Abbreviated or full name of time zone, or no bytes if no information of the time zone exists</td>
</tr>
<tr>
<td>%Ec</td>
<td>Locale's alternative appropriate date and time representation</td>
</tr>
<tr>
<td>%EC</td>
<td>Name of the base year (period) in the locale's alternative representation</td>
</tr>
<tr>
<td>%Ex</td>
<td>Locale's alternative date representation</td>
</tr>
<tr>
<td>%EX</td>
<td>Locale's alternative time representation</td>
</tr>
<tr>
<td>%Ey</td>
<td>Offset from %EC (year only) in the locale's alternative representation</td>
</tr>
<tr>
<td>%EY</td>
<td>Alternative representation of the year in full</td>
</tr>
<tr>
<td>%Od</td>
<td>Day of the month using the locale's alternative numeric symbols</td>
</tr>
<tr>
<td>%Oe</td>
<td>Same as %Od</td>
</tr>
<tr>
<td>%OH</td>
<td>Hour (24-hour clock) using the locale's alternative numeric symbols</td>
</tr>
<tr>
<td>%OI</td>
<td>Hour (12-hour clock) using the locale's alternative numeric symbols</td>
</tr>
<tr>
<td>%Om</td>
<td>Month using the locale's alternative numeric symbols</td>
</tr>
<tr>
<td>%OM</td>
<td>Minutes using the locale's alternative numeric symbols</td>
</tr>
<tr>
<td>%OS</td>
<td>Seconds using the locale's alternative numeric symbols</td>
</tr>
<tr>
<td>%OU</td>
<td>Week of the year (Sunday as the first day of the week) using the locale's alternative numeric symbols</td>
</tr>
<tr>
<td>%Ow</td>
<td>Day of week (Sunday=0) using the locale's alternative numeric symbols</td>
</tr>
<tr>
<td>%OW</td>
<td>Week of the year (Monday as the first day of the week) using the locale's alternative numeric symbols</td>
</tr>
<tr>
<td>%Oy</td>
<td>Year (offset from %C) in the locale's alternative representation and using the locale's alternative numeric symbols</td>
</tr>
</tbody>
</table>
Setting the Polling Interval

A polling interval defines how often new data is collected. A new collect can be performed from once every second, to once in a day. Polling intervals can be set for objects created by TrueSight Operations Management - Monitoring Studio that collect data (files, processes, command lines, SNMP polling etc.). By default, the polling interval is set to 2 minutes on all objects, which can be modified at any time.

To set the polling interval

1. Access the Monitoring Studio Configuration panel, as explained in the Configure Monitor Settings chapter.
2. In the Monitors section, select the monitoring method for which you need to set the polling interval.
3. The related panel is displayed. Click the Polling Interval button.

⚠️ The option to set polling intervals is not available for string searches, numeric values and SNMP trap instances, since either they do not have collectors, or as in the case of SNMP traps – have collectors that react to events.

4. Configure the polling interval options:

   5. **Collect**: Select the frequency of the polling:
      - ✓ Every…: This option allows you to specify the number of hours, minutes, and/or seconds at which the polling operation will be performed.
      - ✓ Collect once a day at: This option allows you to specify the time of day at which the polling operation will be performed, by setting the hour (24 hours), minutes and seconds (for example: if you wish the polling to be performed once a day at 2:30 pm, set the timer to: 14:30:00).
      - ✓ Collect once a week on <weekday> at: This option allows you to specify the time of a specific day at which the polling operation will be performed, by setting the hour (24 hours), minutes and seconds (for example: if you wish the polling to be performed once a day at 2:30 pm, set the timer to: 14:30:00).
6. Click **OK**.

**Importing an Agent Configuration**

⚠️ This operation is only possible if you have previously exported an Agent configuration via the Monitoring Configuration Export KM Command from a PATROL Console.

Basically, importing an Agent configuration consists in importing a configuration file, .cfg, that has been previously "exported" from another Agent and saved. The exporting procedure must be performed from a PATROL Console. Refer to the **Exporting Configuration to a File** chapter of the Monitoring Studio KM for PATROL User Documentation available on Sentry Software’s Website.

**To import an Agent Configuration**

1. Log on to **Central Monitoring Administration**.
2. In the **Navigation** pane, click the **Policies** drawer.
3. Expand the **Monitoring** folder and select a policy view (e.g. All).
4. Create+a **Policy** that will be deployed on the PATROL Agents that share the same specified Tag.
5. Only select the **Configuration Variables** option.
6. Click the **Import** button and select the exported **Monitoring Studio** configuration file (.cfg). This will import the full Monitoring Studio configuration.
7. Recheck the imported configuration values and change them if required.
8. Check that the configuration variable: /SENTRY/STUDIO/forceClassicConfigMode is set to 1. If it is missing, simply create it and set it to 1.
9. Deploy the policy.

⚠️ You may import a PATROL Agent configuration (.cfg) with any type of thresholds. If necessary, Monitoring Studio will convert the thresholds to the type of thresholds currently used at the next discovery (within an hour).
Monitor Types and Attributes

Introduction

This chapter lists all the monitor types and attributes provided by TrueSight Operations Management - Monitoring Studio to monitor your systems.

Please note that depending on the type of managed systems, some attributes may not be available.

Monitor Types

- Studio Command Line
- Studio Database Query
- Studio File
- Studio File System
- Studio Folder
- Studio Group
- Studio Host
- Monitoring Studio
- Studio Number Extract
- Studio Process
- Studio SNMP Polling
- Studio SNMP Trap
- Studio String Search
- Studio WBEM Query
- Studio Web Request
- Studio Windows Event
- Studio Windows Performance Counter
- Studio Windows Service
- Studio WMI Query
## Studio Command Line

### Attributes

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Units</th>
<th>Default Alert Conditions</th>
<th>Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Execution Time*</td>
<td>Time taken by the command to be executed. Value set by commandLineColl.</td>
<td>Seconds</td>
<td>Warning ≥ 30</td>
<td>Response Time</td>
</tr>
<tr>
<td>Exit Status</td>
<td>Status of the command exit code. Value set by commandLineColl.</td>
<td>{0 = Successful ; 1 = Failed}</td>
<td>Alert = 1</td>
<td></td>
</tr>
<tr>
<td>Status*</td>
<td>Status of the command line execution. Value set by commandLineColl.</td>
<td>{0 = OK ; 1 = Suspicious ; 2 = Failed}</td>
<td>Warning = 1 Alarm = 2</td>
<td></td>
</tr>
</tbody>
</table>

For detailed information about KPI, see [Managing Baselines and Key Performance Indicators](#).

* Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in TrueSight Operations Management

## Studio Database Query

### Attributes

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Units</th>
<th>Default Alert Conditions</th>
<th>Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Execution Time*</td>
<td>Time taken by the database query to be executed. Value set by dbQueryColl every 2 minutes.</td>
<td>Seconds</td>
<td>Warning ≥ 15 Alarm ≥ 60</td>
<td>Response Time</td>
</tr>
<tr>
<td>Status</td>
<td>Status of the database query execution. Value set by dbQueryColl every 2 minutes.</td>
<td>{0 = OK ; 1 = Suspicious ; 2 = Failed}</td>
<td>None</td>
<td>Availability</td>
</tr>
</tbody>
</table>

For detailed information about KPI, see [Managing Baselines and Key Performance Indicators](#).

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# Studio File

## Attributes

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Units</th>
<th>Default Alert Conditions</th>
<th>Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exists*</td>
<td>Indicates whether the file exists or not. Value set by fileColl.</td>
<td>(0 = File exists; 1 = File does not exist)</td>
<td>Alarm = 1</td>
<td>Availability</td>
</tr>
<tr>
<td>Growth Percentage</td>
<td>File growth percentage. Value set by fileColl.</td>
<td>Percentage per minute (%/min)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Growth Speed</td>
<td>File growth speed. Value set by fileColl.</td>
<td>Kilobytes per minute (KB/min)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Last Changed</td>
<td>Elapsed time since the file was modified. Value set by fileColl.</td>
<td>Minutes</td>
<td>Warning ≥ 7 200 Alarm ≥ 14 400</td>
<td>Statistics</td>
</tr>
<tr>
<td>Size*</td>
<td>File size. Value set by fileColl.</td>
<td>Kilobytes (KB)</td>
<td>Alarm = 0</td>
<td>Statistics</td>
</tr>
</tbody>
</table>

* Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in TrueSight Operations Management

# Studio File System

## Attributes

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Units</th>
<th>Default Alert Conditions</th>
<th>Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available Capacity*</td>
<td>Total capacity not consumed in the file system. Value set by fileSystemColl.</td>
<td>Megabytes (MB)</td>
<td>Alarm ≤ 10</td>
<td>Statistics</td>
</tr>
<tr>
<td>Available Capacity Percentage*</td>
<td>Percentage of capacity not consumed in the file system. Value set by fileSystemColl.</td>
<td>Percentage (%)</td>
<td>Warning ≤ 10 Alarm ≤ 1</td>
<td>Statistics</td>
</tr>
<tr>
<td>Available Inodes Percentage</td>
<td>Percentage of available inodes on UNIX and Linux platforms. Value set by fileSystemColl.</td>
<td>Percentage (%)</td>
<td>Warning ≤ 10 Alarm ≤ 1</td>
<td>Statistics</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
<td>Units</td>
<td>Default Alert Conditions</td>
<td>Attribute Type</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------------------------</td>
<td>--------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Consumed Capacity Growth</td>
<td>Percentage of the capacity that is actually consumed per hour in the file system. Value set by fileSystemColl.</td>
<td>Percentage per hour (%/h)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Percentage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumed Capacity Growth</td>
<td>Speed at which the capacity is actually consumed in the file system. Value set by fileSystemColl.</td>
<td>Megabytes per hour (MB/h)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Speed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in TrueSight Operations Management

## Studio Folder

### Attributes

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Units</th>
<th>Default Alert Conditions</th>
<th>Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deleted File Rate</td>
<td>Displays the number of deleted files per minute. Value set by folderColl.</td>
<td>Files per minutes (Files/min)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Exists*</td>
<td>Indicates whether the folder exists or not since the last collection. Value set by folderColl.</td>
<td>(0 = Folder exists ; 1 = Folder does not exist)</td>
<td>Alarm = 1</td>
<td>Availability</td>
</tr>
<tr>
<td>File Count*</td>
<td>Displays the current number of files in a folder (includes sub-folders, if any, when the option is activated). Value set by folderColl.</td>
<td>File(s)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Growth Percentage</td>
<td>Displays the percentage of the folder size growth per minute since the last polling. Value set by folderColl.</td>
<td>Percentag e per minute (%/min)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Growth Speed</td>
<td>Displays the folder size growth per minute since the last polling. Value set by folderColl.</td>
<td>Kilobytes per minute (KB/min)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Last Modified File Elapsed Time</td>
<td>Displays the elapsed time since the last modification of any file in this folder. Value set by folderColl.</td>
<td>Minutes</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Longest Time File Remains in Folder</td>
<td>Displays the longest time an existing file has been placed in the folder.</td>
<td>Minutes</td>
<td>None</td>
<td>Statistics</td>
</tr>
</tbody>
</table>
### Monitor Types and Attributes

#### TrueSight Operations Management - Monitoring Studio 9.0.00

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
<th>Units</th>
<th>Default Alert Conditions</th>
<th>Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modified File Rate</td>
<td>Displays the rate of modified files per minute. Value set by folderColl.</td>
<td>Files per minutes (Files/min)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>New File Rate</td>
<td>Displays the rate of new files per minute. Value set by folderColl.</td>
<td>Files per minutes (Files/min)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Oldest Modified File Elapsed Time</td>
<td>Displays the elapsed time since the oldest modification of any file in this folder (or sub-folder, when the option is activated). Value set by folderColl.</td>
<td>Minutes</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Size*</td>
<td>Total size of all the files in the folder (include sub-folders if any) in MB. Value set by folderColl.</td>
<td>Megabytes (MB)</td>
<td>None</td>
<td>Statistics</td>
</tr>
</tbody>
</table>

*Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in TrueSight Operations Management

## Studio Group

### Attributes

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Units</th>
<th>Default Alert Conditions</th>
<th>Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collection Error Count*</td>
<td>Number of collection problems that occurred on the host and the related monitors attached to its group. This attribute is cumulative, each new reported errors increases the value of this attribute by one. The Collection Error Count value will be reset after a given time if no new errors are found. The default timeout is 15 minutes but can be configured with the :/SENTRY/STUDIO/&lt;groupID&gt;/collectionErrorCountAutoAcknowledgeTime variable. Value set by collectionErrorColl.</td>
<td>Errors</td>
<td>Alarm ≥ 1</td>
<td>Collecton Status</td>
</tr>
</tbody>
</table>

*Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in TrueSight Operations Management
Studio Host

Attributes

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Units</th>
<th>Default Alert Conditions</th>
<th>Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status*</td>
<td>Status of the host availability. Value set by the availabilityCheckColl.</td>
<td>{0 = OK ; 1 = Signature Files not Present; 2 = Unreachable}</td>
<td>Warning = 1 Alarm = 2</td>
<td>Availability</td>
</tr>
</tbody>
</table>

*Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in TrueSight Operations Management

Monitoring Studio

Attributes

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Units</th>
<th>Default Alert Conditions</th>
<th>Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collection Error Count</td>
<td>Number of errors that prevent Monitoring Studio from operating properly. This attribute is cumulative, new errors increase the value of the attribute. The Collection Error Count value will be reset after a given time if no new errors are found. The default timeout is 135 minutes but can be configured with the following variable: /SENTRY/STUDIO/collectionErrorCountAutoAcknowledgeTime</td>
<td>Errors</td>
<td>Alarm ≥ 1</td>
<td>Collection Status</td>
</tr>
<tr>
<td>Debug Status</td>
<td>Indicates whether the debug mode has been enabled or not. Value set by studioColl.</td>
<td>{0 = Off ; 1 = On}</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Host Count</td>
<td>Total number of Hosts managed by the solution. Note: Identical hosts are counted as if they were unique. Value set by studioColl.</td>
<td>Hosts</td>
<td>None</td>
<td>Statistics</td>
</tr>
</tbody>
</table>
Monitor Count* | Total number of Monitors managed by the solution. Value set by studioColl.
--- | ---
Monitors | None | Statistics

* Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in TrueSight Operations Management

### Studio Number Extract

#### Attributes

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Units</th>
<th>Default Alert Conditions</th>
<th>Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value*</td>
<td>Value of the extracted Numeric Value (no value will be given if no number is found) Value set by the collector of the parent’s object.</td>
<td>Value</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Value Found</td>
<td>States if a numeric valued has been found. {0 = Value found ; 1 = Value not found}</td>
<td></td>
<td>None</td>
<td>Statistics</td>
</tr>
</tbody>
</table>

* Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in TrueSight Operations Management

### Studio Process

#### Attributes

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Units</th>
<th>Default Alert Conditions</th>
<th>Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child Count</td>
<td>Displays the number of child process of the matching process(es). Value set by processColl.</td>
<td>Processes</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Count*</td>
<td>Displays the number of processes that match the criteria. Value set by processColl.</td>
<td>Processes</td>
<td>Alarm = 0</td>
<td>Statistics</td>
</tr>
<tr>
<td>Handle Count (Windows only)</td>
<td>Displays the number of handles opened by the matching process(es). Value set by processColl.</td>
<td>Handles</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Page Faults Per Seconds (Windows only)</td>
<td>Displays the number of page faults per second caused by the matching process(es). Value set by processColl.</td>
<td>Faults per seconds (Faults/s)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
<td>Units</td>
<td>Default Alert Conditions</td>
<td>Attribute Type</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>------------------</td>
<td>--------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Page File Bytes</td>
<td>Displays the page file used by the matching process(es). Value set by processColl.</td>
<td>Megabytes (MB)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Private Bytes (Windows only)</td>
<td>Displays the amount of memory that has been allocated by this process and that cannot be shared with others. Value set by processColl.</td>
<td>Megabytes (MB)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Processor Time*</td>
<td>Displays the processor time percent used by the matching process(es). Value set by processColl.</td>
<td>Percentage (%)</td>
<td>Warning ≥ 100</td>
<td>Statistics</td>
</tr>
<tr>
<td>Status* (UNIX/Linux only)</td>
<td>Worst status of all matching processes. Value set by processColl.</td>
<td>{0 = OK ; 1 = Suspicious ; 2 = Failed}</td>
<td>Warning = 1 Alarm = 2</td>
<td>Availability</td>
</tr>
<tr>
<td>Thread Count (Windows only)</td>
<td>Displays the number of threads of the matching process(es). Value set by processColl.</td>
<td>Threads</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Virtual Bytes</td>
<td>Displays the virtual memory used by the matching process(es). Value set by processColl.</td>
<td>Megabytes (MB)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Working Set (Windows only)</td>
<td>Displays the working set size of the matching process(es). Value set by processColl.</td>
<td>Megabytes (MB)</td>
<td>None</td>
<td>Statistics</td>
</tr>
</tbody>
</table>

For detailed information about KPI, see Managing Baselines and Key Performance Indicators.

* Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in TrueSight Operations Management.

**Studio SNMP Polling**

**Attributes**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Units</th>
<th>Default Alert Conditions</th>
<th>Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Execution Time*</td>
<td>Time taken by the SNMP polling to be executed. Value set by snmpPollingColl.</td>
<td>Seconds</td>
<td>Warning ≤ 30</td>
<td>Response Time</td>
</tr>
<tr>
<td>Value*</td>
<td>Value of the SNMP received. Value set by snmpPollingColl. Note: Only applicable to SNMPs of integer type.</td>
<td>Value</td>
<td>None</td>
<td>Statistics</td>
</tr>
</tbody>
</table>
Monitor Types and Attributes

### TrueSight Operations Management - Monitoring Studio 9.0.00

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Units</th>
<th>Default Alert Conditions</th>
<th>Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status</td>
<td>Status of the SNMP polling execution. Value set by snmpPollingColl.</td>
<td></td>
<td>{0 = OK ; 1 = Suspicious ; 2 = Failed}</td>
<td>Availability</td>
</tr>
</tbody>
</table>

For detailed information about KPI, see Managing Baselines and Key Performance Indicators.

* Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in TrueSight Operations Management

## Studio SNMP Trap

### Attributes

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Units</th>
<th>Default Alert Conditions</th>
<th>Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Matching Trap Count*</td>
<td>Number of SNMP traps matching the search. Value set by snmpTrapColl.</td>
<td>Traps</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Matching Trap Rate*</td>
<td>Number of SNMP traps per minute matching the search. Value set by snmpTrapColl.</td>
<td>Traps per minute (Traps/min)</td>
<td>None</td>
<td>Statistics</td>
</tr>
</tbody>
</table>

* Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in TrueSight Operations Management

## Studio String Search

### Attributes

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Units</th>
<th>Default Alert Conditions</th>
<th>Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Matching Line Count*</td>
<td>Number of lines matching the String search. Value set by the collector of the parent object.</td>
<td>Lines</td>
<td>Alarm ≥ 1</td>
<td>Statistics</td>
</tr>
<tr>
<td>Matching Line Rate*</td>
<td>Number of lines matching the String search per minute. Value set by the collector of the parent object. The Matching Line Rate attribute is only activated for String searches in log files.</td>
<td>Lines per minutes (lines/min)</td>
<td>None</td>
<td>Statistics</td>
</tr>
</tbody>
</table>

* Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in TrueSight Operations Management
### Studio WBEM Query

#### Attributes

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Units</th>
<th>Default Alert Conditions</th>
<th>Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Execution Time*</td>
<td>Time taken by the WBEM query to be executed. Value set by wbemQueryColl.</td>
<td>Seconds</td>
<td>Warning ≤ 30</td>
<td>Response Time</td>
</tr>
<tr>
<td>Status*</td>
<td>Status of the WBEM query execution. Value set by wbemQueryColl.</td>
<td>{0 = OK ; 1 = Suspicious ; 2 = Failed}</td>
<td>Warning = 1 Alarm = 2</td>
<td>Availability</td>
</tr>
</tbody>
</table>

For detailed information about KPI, see Managing Baselines and Key Performance Indicators.

*Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in TrueSight Operations Management.*

### Studio Web Request

#### Attributes

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Units</th>
<th>Default Alert Conditions</th>
<th>Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Execution Time*</td>
<td>Time taken by the Web request to be executed. Value set by webRequestColl.</td>
<td>Seconds</td>
<td>Warning ≥ 15 Alarm ≥ 30</td>
<td>Response Time</td>
</tr>
<tr>
<td>HTTP Status*</td>
<td>Web request status. Value set by webRequestColl.</td>
<td>{0 = OK ; 1 = Degraded ; 2 = Failed}</td>
<td>Warning = 1 Alarm = 2</td>
<td>Availability</td>
</tr>
<tr>
<td>HTTP Status Code</td>
<td>Web response Status code. Value set by webRequestColl.</td>
<td>n/a</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Status</td>
<td>Status of the Web request execution. Value set by webRequestColl.</td>
<td>{0 = OK ; 1 = Suspicious ; 2 = Failed}</td>
<td>Warning = 1 Alarm = 2</td>
<td>Availability</td>
</tr>
</tbody>
</table>

For detailed information about KPI, see Managing Baselines and Key Performance Indicators.

*Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in TrueSight Operations Management.*
Studio Windows Event

Attributes

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Units</th>
<th>Default Alert Conditions</th>
<th>Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Matching Event Count*</td>
<td>Number of Matching Windows Events. Value set by winEventColl.</td>
<td>Events</td>
<td>Alarm ≥ 1</td>
<td>Statistics</td>
</tr>
<tr>
<td>Matching Event Rate*</td>
<td>Rate of matching Windows Events. Value set by winEventColl.</td>
<td>Events per minutes (events/min)</td>
<td>None</td>
<td>Statistics</td>
</tr>
</tbody>
</table>

* Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in TrueSight Operations Management

Studio Windows Performance Counter

Attributes

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Units</th>
<th>Default Alert Conditions</th>
<th>Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value*</td>
<td>Value of the monitored Windows Performance counter. Value set by winPerfColl.</td>
<td>Attribute specific</td>
<td>None</td>
<td>Statistics</td>
</tr>
</tbody>
</table>

* Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in TrueSight Operations Management

Studio Windows Service

Attributes

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Units</th>
<th>Default Alert Conditions</th>
<th>Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status*</td>
<td>Status of the Windows Service. Value set by winServiceColl.</td>
<td>{0 = OK ; 1 = Suspicious ; 2 = Failed}</td>
<td>Warning = 1 Alarm = 2</td>
<td>Availability</td>
</tr>
</tbody>
</table>

* Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in TrueSight Operations Management
Studio WMI Query

Attributes

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Units</th>
<th>Default Alert Conditions</th>
<th>Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Execution Time*</td>
<td>Time taken by the WMI query to be executed. Value set by wmiQueryColl.</td>
<td>Seconds</td>
<td>Warning ≤ 30</td>
<td>Response Time</td>
</tr>
<tr>
<td>Status</td>
<td>Status of the WMI query execution. Value set by wmiQueryColl.</td>
<td></td>
<td>Warning = 1 Alarm = 2</td>
<td>Availability</td>
</tr>
</tbody>
</table>

*Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in TrueSight Operations Management.

Managing Baselines and Key Performance Indicators

In order to facilitate the detection of abnormalities on your monitored environment, TrueSight Operations Management calculates baselines per attributes based on values collected over a specified period of time to determine a normal operating range. When the collected values for these attributes are out of range, an alert is triggered.

Some attributes are identified by default as Key Performance Indicators (with the icon) and therefore automatically included in the baseline calculation.

Managing baselines

The baseline is the expected normal operating range for a metric or attribute of a monitor.

The baseline is calculated by collecting the values for a monitor’s attributes and metrics over a specified time period and establishing a low baseline value (consisting of the 10th percentile of all the values for a given time period) and a high baseline value (consisting of the 90th percentile of all the values for a given time period), taking a weighted average of these values over time. A higher weight is given to the latest data being factored into the baseline average. The accuracy of the baseline improves over time.
Requirements for baseline generation

For baselines to be generated for an attribute, that abnormality threshold means that the threshold exists and is not suppressed. Additionally, if the Key Performance Indicator (KPI) mode is active, only those attributes that have an active abnormality threshold and are also KPI attributes will have baselines generated for them.

⚠️ Absolute thresholds (with "outside baseline") or signature thresholds do not satisfy these requirements.

Managing Key Performance Indicators

The KPI attribute of an attribute can be activated or deactivated manually through TrueSight Operations Management. In this monitoring solution, some attributes have been designated as important indicators of performance (KPIs). We do not recommend that these default settings are modified.

However, advanced users may activate or deactivate KPIs from TrueSight Operations Management.

To add or remove Key Performance Indicator (KPI) attributes for a monitor type

1. In the Administration Console, from the menu bar, choose Tools > KPI Administration. The KPI Administration dialog box is displayed.
2. From the Monitor Type list, choose the monitor type for which you want to add or remove KPI attributes. A list of attributes for the selected monitor type is displayed.
3. In the KPI column for the attributes that you want to add or remove as Key Performance Indicators:
   - select the KPI check box to add the corresponding attribute as a KPI
   - deselect the KPI check box to remove the corresponding attribute from the KPIs for that monitor type

⚠️ For complete and detailed information on this procedure, please refer to TrueSight Operations Management documentation available from BMC Web site.
About... 

About HTTP Authentication

The HTTP authentication is a login/password-based mechanism implemented in the HTTP protocol itself. A Web server that requires an HTTP authentication will display a dialog box in Internet Explorer.

HTTP authentication has nothing to do with an authentication system of a Web page with a form asking for user credentials like any public web mail service, for example.

There are 3 different HTTP authentication schemes, depending on the machine where Monitoring Studio is running:

- Basic (Windows, UNIX, Linux)
- Digest (Windows)
- NTLM (Windows)

For Basic HTTP authentication, the password is sent in a base 64-encoded form and is therefore very easily decoded.

If you need to test a Web page or retrieve information from a Web server that requires HTTP Digest or NTLM authentication, we recommend that you install Monitoring Studio on a Windows system and set up the Web requests from this machine (Web requests can be sent to remote systems).

About Monitor Internal Identifiers

In TrueSight Operations Management - Monitoring Studio, all objects are identified with a unique ID. When configuring Monitoring Studio using a third-party tool, it is important to have a clear understanding of the ID formats.

There are four different ID formats which vary according to the type of objects:

Group ID

The Group ID is the internal identifier as entered when configuring the Monitor Group Settings in the Monitoring Studio Configuration panel. It is referred to as <groupID>. 
Host ID

The Host ID is referred to as <hostID> and always follows this format: <groupID>@<hostname> where:

- <groupID> is the Internal ID as entered when configuring the Group Settings
- <hostname> is the Hostname/IP address/FQDN of the host on which the technology you wish to monitor is running

Monitor ID

For all Monitors attached to a Host, the Monitor ID format is as follows:
<groupID>@<hostID>:<monitorType>:<monitorID> where:

- <groupID> is the Internal ID as entered when configuring the Monitor Group Settings
- <hostID> is the <groupID>@<hostname> (Hostname/IP address/FQDN)
- <monitorType> is the type of Monitor (Command Line, Web Request, Folder, Process, etc.)
- <monitorID> is the internal ID as entered when configuring the Monitor Settings

Example

If you configure the monitoring of a File with the ID "myFile" under the Host "myHost" which belongs to the Group "myGroup", the complete ID of the instance of the File monitoring type will be: myGroup@myHost:File:myFile

Monitor Children ID

For String Search and Numeric Value Extraction tools, the Monitor Children ID format is as follows: <parentID>:<monitorType>:<monitorID> where:

- <parentID> is the <groupID>@<hostID>:<monitorType>:<monitorID>
- <monitorType> is the type of Monitor: String Search or Numeric Value Extraction
- <monitorID> is the internal ID as entered when configuring the Monitor Settings

Example

If you configure a String Search with the ID "myStringSearch" under the File "myFile" which belongs to the Host "myHost" which itself belongs to the Group "myGroup", the complete ID of the instance of the String Search monitoring type will be: myGroup@myHost:File:myFile:StringSearch:myStringSearch
About Processes

What's a process

In practice, a process is basically a binary code being executed by processors. Processes are launched by the operating system (since the operating system controls the execution flow) and have several properties: PID (unique identifier of a process); Name; User ID; Command line that was used to launch the process (arguments passed to the binary); Environment; CPU and memory usage; Other various OS-specific properties.

How to identify a process

When you monitor an application, you typically want to check that the application's processes are running properly. The problem lies in how to identify the processes of this application, how to recognize them amongst all of the running processes.

The only thing that really identifies a process is its PID (Process ID). But since the PID is an integer number randomly set upon the process startup, most often we cannot use it to identify the processes of an application (unless the application gives you its PID in a so-called PID file).

In general, you recognize application processes by their name if this criterion is enough to distinguish them from other processes. If the name of the process is not sufficient, you can identify application processes by parsing the process’s command lines. This is typically useful with scripts and java processes, whose process names are the same: java, CSCRIPT.EXE, etc.

Process name

Under Windows, the name of a process is basically the file name of the binary file which is being executed: Java.exe, IisAdmin.exe. It always includes the " .EXE" extension. Process names can easily be shown in Windows Task Manager.

Under UNIX, the process name could be either the file name of the binary being executed, including the path or not, or something completely different (e.g. Oracle processes).

⚠️ The naming of processes is highly platform dependent. Linux processes are not named in the same way as on HP-UX servers, for example. Under UNIX, process names can be shown by executing the "ps –e –o name" command line.

Process command line

Every process is launched through a command line, which consists of the file path to the binary
which has to be executed, and arguments that have to be passed to the binary: `<path to the binary file> <argument1> <argument2> etc.`

If the directory of the binary file is in the PATH environment variable, the path may not be included in the command line: `<binary file name> <argument1> <argument2> etc.`

This is the only way to distinguish Java processes and scripts from others, because their process names are all identical (Java.EXE). Unfortunately, in Windows, there is no easy way to see the command lines of the currently running processes. Under UNIX, processes command lines can be shown by executing the "ps –e –o comm" command.

**Process user ID**

On both Windows and UNIX systems, processes run "as" a user. Depending on this, the process may be allowed to access various system resources (files, network, databases, etc.). In secured environments, most applications processes have to run as a specific user to let them access the application resources. If the processes run as another user, the application is very likely to fail and not run properly. This is why it could be important to check that the processes of the application you want to monitor are running as the appropriate user.

**PID file**

A classic way for applications to indicate they are running is to write the PID of their process into a given file. In this case we only need to read this file and check whether the PID written in the file corresponds to a running process. Please note that now the PID file is not provided for all the applications and most Windows applications do not provide PIDs.
About Regular Expressions

Regular expressions are used in Monitoring Studio to define strings to be searched for. A regular expression is:

- A string formatted with a specific syntax.
- It is intended to select some lines in a text, which will match the regular expression.

Regular expressions are commonly used in pattern matching, and especially on UNIX systems with the grep, awk and sed commands. You can use regular expressions in Monitoring Studio in order to:

- Find a process
- Search for strings in a file
- Check a web page
- Parse a table in a database
- Retrieve numbers, etc.

The following table describes the regular expression syntax that is supported in Monitoring Studio.

<table>
<thead>
<tr>
<th>Character</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| . (dot)   | Match any single character  
Example: Err.. will match Err01, Err02 or ErrAB, etc. |
| [xyz]     | Match any character in the brackets  
Example: Err[123] will match Err1, Err2 or Err3  
[Ee]rror will match either error or Error |
| ^[xyz]    | Match any character not in the brackets  
Example: Err[^12345] will match Err0, Err6, Err7, etc. but not Err1 |
| [a-z]     | Match any character in the range in the brackets  
Example: Err[0-9] will match Err0, Err1, etc. and Err9  
Err[A-Z][0-9] will match ErrA0, ErrA1, ErrS9, ErrZ0, etc. but not Err1A  
Err[A-Z0-9] will match ErrA0, ErrA1, etc. and Err1A |
| ^[a-z]    | Match any character not in the range in the brackets  
Example: Application[^0-9] will match ApplicationA, ApplicationB, Application! but not Application1 |
| *         | Match zero or more repetitions of the preceding  
Example: Err[0-9A-F]* will match Err, Err0, ErrA, Err11, ErrBF0001, etc.  
Error.*ApplicationABC will match all lines that contains Error and ApplicationABC further (Critical Error 0x000295F0 on ApplicationABC) |
<p>| +         | Match one or more repetitions of the preceding |</p>
<table>
<thead>
<tr>
<th>Pattern</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>Err[0-9A-F]+</code></td>
<td>Will match Err0, ErrA, Err11, ErrBF0001, etc. but not Err</td>
<td><strong>About...</strong></td>
</tr>
<tr>
<td><code>^</code></td>
<td>Match the beginning of the line</td>
<td><code>^Err</code> will match all lines that begin with Err</td>
</tr>
<tr>
<td><code>$</code></td>
<td>Match the end of the line</td>
<td><code>[0-9]+</code> connections$ will match all lines that end with xxx connections where xxx is an integer</td>
</tr>
<tr>
<td><code>\&lt;</code></td>
<td>Match the beginning of a word</td>
<td><code>\&lt;set</code> will match any line that contains a word that begins with set. It will not match a line that only contains the word unset</td>
</tr>
<tr>
<td><code>\&gt;</code></td>
<td>Match the end of a word</td>
<td><code>[Aa]pplication\&gt;</code> will match all lines that contain the word Application or application but not ApplicationAA</td>
</tr>
<tr>
<td><code>{expression}</code></td>
<td>Defines an expression which has to be processed as a unit regarding the modifier *, + and |</td>
<td><code>\(_[a-zA-Z0-9]\\)+</code> will match only sequences like _patrol, _patrol_agent, _patrol_console, etc.</td>
</tr>
<tr>
<td><code>exprA|exprB</code></td>
<td>Match either exprA or exprB</td>
<td><code>(firewall)|(antivirus)</code> will match all lines that contains either the word firewall or the word antivirus</td>
</tr>
<tr>
<td><code>\</code></td>
<td>Avoid the meaning of the following character</td>
<td><code>\</code> will match the single character dot (.) <code>C:\\Program Files will match C:\Program Files</code></td>
</tr>
</tbody>
</table>

**Example:**
- `Err[0-9A-F]+` will match Err0, ErrA, Err11, ErrBF0001, etc. but not Err
- `^Err` will match all lines that begin with Err
- `[0-9]+` connections$ will match all lines that end with xxx connections where xxx is an integer
- `\<set` will match any line that contains a word that begins with set. It will not match a line that only contains the word unset
- `[Aa]pplication\>` will match all lines that contain the word Application or application but not ApplicationAA
- `\(_[a-zA-Z0-9]\\)+` will match only sequences like _patrol, _patrol_agent, _patrol_console, etc.
- `(firewall)\|(antivirus)` will match all lines that contains either the word firewall or the word antivirus
- `\` will match the single character dot (.) `C:\\Program Files will match C:\Program Files`
About WMI

Definition

Windows Management Instrumentation (WMI) is a set of specifications from Microsoft for consolidating the management of devices and applications in a network from Windows computing systems. WMI is the Microsoft implementation of Web Based Enterprise Management (WBEM), which is built on the Common Information Model (CIM), a computer industry standard for defining device and application characteristics so that system administrators and management programs can control devices and applications from multiple manufacturers or sources in the same way.

What does it do?

WMI provides users with information about the status of local or remote computer systems. It also supports such actions as the configuration of security settings, setting and changing system properties, setting and changing permissions for authorized users and user groups, assigning and changing drive labels, scheduling processes to run at specific times, backing up the object repository, and enabling or disabling error logging. You can use WMI to manage both local and remote computers.

The word "Instrumentation" in WMI refers to the fact that WMI can get information about the internal state of computer systems, much like the dashboard instruments of cars can retrieve and display information about the state of the engine. WMI "instruments" by modeling objects such as disks, processes, or other objects found in Windows systems. These computer system objects are modeled using classes such as Win32_LogicalDisk or Win32_Process; as you might expect, the Win32_LogicalDisk class models the logical disks installed on a computer, and the Win32_Process class models any processes currently running on a computer. Classes are based on the extensible schema called the Common Information Model (CIM). The CIM schema is a public standard of the Distributed Management Task Force (http://www.dmtf.org/). WMI capabilities also include eventing, remoting, querying, views, user extensions to the schema, instrumentation, and more.

WMI Concepts

CIM Repository

CIM stands for Common Information Model and the repository is the WMI schema that stores the class definitions that model WMI-managed resources. The repository holds the information required to work with live resources in the computing environment. It does not contain actual data about these resources since this data is dynamically retrieved as required. It is this schema that allows the wide variety of different resources to be uniformly managed.
Namespace

CIM classes are organized into namespaces. Each namespace in the CIM contains a logical group of related classes representing a specific technology or area of management. Anytime a connection is made to WMI, a namespace must be specified. Only the classes contained within this namespace may be accessed by the connection. The most common namespace used for Windows management is root\cimv2. This contains the classes with the Win32_ prefix representing various components of the Windows operating system and hosting computer. Examples include Win32_Process (running processes in Windows), Win32_LogicalDisk (Windows logical disk drives), and Win32_ComputerSystem (the computer hosting Windows).

The namespace also includes the CIM_DataFile class which can be used to monitor files and folders. The following table lists common namespaces.

<table>
<thead>
<tr>
<th>Namespace</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>root\cimv2</td>
<td>Contains the most useful classes including all Win32_ classes</td>
</tr>
<tr>
<td>root\default</td>
<td>Contains registry events</td>
</tr>
</tbody>
</table>

Class

Every resource managed by WMI is defined by a class. A class is a template for each type of resource and defines the properties that will be collected for that resource. Examples of common WMI classes are shown in the table below.

<table>
<thead>
<tr>
<th>Class</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Win32_Process</td>
<td>Processes running on a Windows computer</td>
</tr>
<tr>
<td>Win32_ComputerSystem</td>
<td>The computer running a Windows operating system</td>
</tr>
<tr>
<td>CIM_DataFile</td>
<td>A file stored on a disk</td>
</tr>
</tbody>
</table>

Instance

An Instance is a unique occurrence of a particular class. For example, each service installed on a Windows computer is an instance of the Win32_Service class. The C drive is an instance of the Win32_LogicalDrive class.

<table>
<thead>
<tr>
<th>Instance</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Winmgmt</td>
</tr>
<tr>
<td>DisplayName</td>
<td>Windows Management Instrumentation</td>
</tr>
<tr>
<td>PathName</td>
<td>C:\WINDOWS\system32\svchost.exe -k netsvcs</td>
</tr>
<tr>
<td>StartMode</td>
<td>Auto</td>
</tr>
</tbody>
</table>
Property

A property is unique piece of information about an instance. All instances of a class will have the same set of properties although the values each instance’s properties may differ. Sample Properties of the Win32_Service class are shown in the table below:

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Unique name of the service.</td>
</tr>
<tr>
<td>DisplayName</td>
<td>Displayed name of the service.</td>
</tr>
<tr>
<td>PathName</td>
<td>The command line path that was executed to start the service.</td>
</tr>
<tr>
<td>StartMode</td>
<td>Startup type of the service (Auto, Manual, or Disabled)</td>
</tr>
<tr>
<td>State</td>
<td>Current state of the service (Running, Stopping, or Stopped)</td>
</tr>
</tbody>
</table>
Basic WMI Queries

Queries may be issued against WMI resources using WMI Query Language (WQL). WQL is a subset of SQL designed to retrieve information from WMI. A simple example of a WMI query would be: `SELECT * FROM Win32_Process`. This retrieves all attributes (the * is used as a wildcard) for all processes currently running on the computer. `Win32_Process` is the name of the WMI class for Windows processes.

WMI queries of this type are often issued from a script using Windows Script Host or from any application or tool that can access WMI. Queries retrieve specific information from instances of WMI resources or execute methods against instances to perform such actions as stopping services, or starting processes.

<table>
<thead>
<tr>
<th>Keyword</th>
<th>Example code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SELECT</td>
<td>SELECT *</td>
<td>Specifies what properties are returned. Typically * is used to simply retrieve all.</td>
</tr>
<tr>
<td>FROM</td>
<td>FROM __InstanceCreationEvent</td>
<td>Specifies the event class to query. This will be the extrinsic or intrinsic event class.</td>
</tr>
<tr>
<td>WHERE</td>
<td>WHERE TargetInstance ISA <code>Win32_Process</code> AND TargetInstance.Name = <code>notepad.exe</code></td>
<td>Filters the results. For intrinsic events, will usually include the ISA keyword to specify the class of the TargetInstance.</td>
</tr>
</tbody>
</table>

In case you need help to build your WMI query, you could download WMI CIM Studio – which is one of the WMI Administrative tools on the Microsoft site.
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