CA IT Process Automation Manager

Connector Overview

- INSTALLATION AND CONFIGURATION OF CA IT PAM CONNECTORS

- OVERVIEW OF AVAILABLE CONNECTORS AND THEIR OPERATORS

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ca Transforming IT Management

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CA PRODUCT REFERENCES

This document references the following CA products:

■ CA IT Process Automation Manager™ (CA IT PAM)

■ CA AutoSys® Workload Automation (formerly CA Unicenter® AutoSys® Job Management Unicenter AutoSys JM)

■ CA Spectrum ® Automation Manager (formerly CA DCA Manager)

■ CA Spectrum ® Infrastructure Manager (CA Spectrum® IM, formerly CA Spectrum® Network Fault Manager)

■ CA Service Desk Manager (formerly Unicenter® Service Desk)

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Chapter 1: Working with CA IT PAM Connectors

Overview

CA IT Process Automation Manager (IT PAM) is a powerful solution that enables you to define, build, orchestrate, manage and report on automated processes. These processes can work across multiple operating systems and a large number of applications and, in this way, cover a wide range of operational functions and roles within your organization.

CA IT PAM uses application-specific Connectors to perform tasks, such as gathering data, as well as to perform actions on the target systems and target applications. These Connectors are lightweight operators that are executed either on the Orchestrator, on Agents residing on the application server or on Proxy Agents that can remotely perform the required task or collect the data on/from the application server.

Each Connector Module typically includes multiple operators that each performs one of the following specialized tasks:

- Decision Tree Support Operator

  These operators typically return a binary (true/false, success/failure) value that can be used to decide how to branch in the process. In some situations the value it returns might have more than two options, but it is always a small and well defined set of possible values to return.

- Data Collection

  These operators are used to collect more complex datasets from the target application. The result is usually stored in a local dataset and can be further analyzed by other operators. If required, the data can also be made global so that it can be used by other Processes.

- Active Management

  CA IT PAM operators can also be used to perform actions on the target system. This includes all operators that, in any way, change the behavior of the target system. A few examples of this would be: sending an event, reconfiguring the application, starting or stopping a related service.

In some cases, a single operator may perform more than one of these functions. For example, a Connector might both perform an action and return a result set based on that update.

CA IT PAM includes a large number of Connectors (sometimes referred to as "Connector modules"). It is also easy to create additional Connectors and their related operators by calling standard, application-specific executables located on the Agent box or by using standard scripting languages for more complex functions.

This document provides a high level overview of the Connectors that are shipped out-of-the-box with CA IT PAM 2.1 SP3 as well as some best practices on how to work with these Connectors. It also includes best practices for creating custom Connectors/operators to connect to and work with additional application and/or functions.

Note: Additional Connectors can be downloaded from the CA IT PAM Best Practices page, which accessed through the following link:

https://support.ca.com/phpdocs/0/common/impcd/r11/Catalyst/ITPAM_Frame_sc.htm

Installing/Enabling Connectors

To minimize the application footprint and the complexity of the user interface, only a set of generic and commonly used Connectors are installed by default. Other Connectors should be installed only if/when necessary. From an installation/maintenance point of view Connectors can be divided into three groups:

■ Built-in "generic" Connectors

   These are generic Connectors that are automatically installed on each Orchestrator.

■ Connectors installed/maintained by the install wizard

   There are a small number of compiled Connectors that are installed during the installation of the Orchestrator. See the section "Installing Connectors Using the Install Wizard" below for more information about this.

■ Manually imported Connectors

   The remaining group of Connectors is manually imported after the Orchestrator has been correctly installed and configured. This includes both Connectors that are shipped with CA IT PAM as well as custom Connectors. See the section "Manually Importing Connectors" below for more information about this.

Installing Connectors Using the Install Wizard

When you first install a Domain Orchestrator you will be prompted to "Choose Connectors that need to be Installed/Updated" and the wizard will present a list of all compiled Connectors (this includes the "CA AutoSys Connector", "CA Service Desk Connector", "CA Spectrum Connector" and the "SAP Connector").

Note: It is highly recommended that you before installing IT PAM carefully analyze which connectors you might need in your environment. Installing an extra connector at this point is easy and it consumes very little resource unless it's being actively used. If you are considering using a connector at a later point it should when at all possible be installed during the initial implementation.

Spectrum-specific requirements

If you are planning to install the "CA Spectrum Connector" you need to first determine which version of Spectrum you are using (both r8.x and r9.x are supported) and you also need to have access to the Spectrum Infrastructure Management Server or a file share with the JAR files listed below.

For **CA Spectrum r8.x**: global81.jar, jsafeJCEFIPS.jar, lm.jar, ssorb81.jar, ssorbbeans81.jar, ssorbutil81.jar, util81.jar, utilapp81.jar, utilnet81.jar, utilsrv81.jar, vbhelper81.jar, vbjorb.jar and vbsec.jar

For **CA Spectrum r9.x**: global90.jar, jsafeJCEFIPS.jar, lm.jar, sanct6.jar, sanctuary.jar, ssorb90.jar, ssorbutil90.jar, util90.jar, utilapp90.jar, utilnet90.jar, utilsrv90.jar, vbhelper90.jar, vbjorb.jar, vbsec.jar

By default these files are located in the following directory on the Spectrum Server:

`\win32app\SPECTRUM\lib\`

General Instructions for Installing all Compiled Connectors

The following instructions focus only on installing the Connector and start at the very end of the Domain Orchestrator installation process.

1. Proceed with the standard installation process until you reach the "Choose Connectors that need to be installed/Updated" dialog:

2. Check all Connectors that you might use in your environment. Remember that:

    > For the Spectrum Connector you will need to provide additional information (see "Spectrum-specific requirements" above).

    > It is a best practice to install all Connectors that you might need at this stage. Installing a Connector after the installation completes is supported but also a more complex process.

3. Click Next.

4. If you selected the Spectrum Connector the following dialog appears:
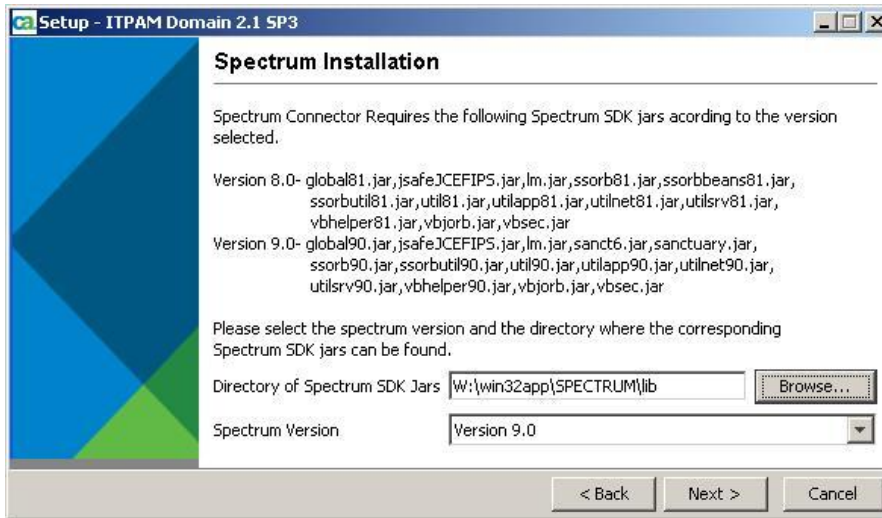
Provide the path to the JAR file on the SpectroSERVER and select the applicable Spectrum version number. Click Next.

5. Once the files have been copied and IT PAM is configured the "Completing the ITPAM Domain Setup Wizard" dialog will appear. Click Finish.

Manually Importing Connectors

Both custom Connectors and Connectors that are shipped with the product but not included as part of the Install Wizard can be manually installed on each Orchestrator.

Note: Connectors that are shipped with CA IT PAM are packaged as XML files in the directory "\ITPAM\server\c2o\.c2orepository\public\operators\". Although this directory also include XML files for the four Connectors ("CA AutoSys Connector", "CA Service Desk Connector", "CA Spectrum Connector" and "SAP Connector") that are managed by the Install Wizard, these four Connectors must be installed using the method "Installing Connectors Using the Install Wizard" described above.

To manually import Connectors do the following:

1. Open the CA IT PAM client using the url http://<itpamserver>:port/itpam and log in with a user ID that has administrative privileges (itpamadmin).

2. Open the Java IT PAM Client by clicking on the IT PAM Client link in the upper right corner of the web page and wait until the new UI is opened.

3. In the left hand pane of the configuration browser drill into the Orchestrator on which the Connector will be installed on.

4. Right click on the Orchestrator and select Open.

   This opens the library browser in context of this Orchestrator.

5. Right click on the root "/" and select Import.

6. In the open window drill down to locate the Connector you would like to install.

   Tip: Connectors that are shipped with the product can be found in the "\ITPAM\server\c2o\.c2orepository\public\operators\" directory.

7. Select the XML file corresponding to that Connector and click Open

   Note: If a Connector is supported by the Install Wizard then it must be installed through the wizard. Do not try to install "AutoSys", "Service Desk", "Spectrum" or "SAP" Connectors using the manual import method.

8. Select the "Set imported version as current" and "Make imported custom operations/sensors available" checkboxes and click OK.

The selected Connector is now installed and will be available for use the next time you open a new or existing process.

Configuration of Connectors

After you have installed the Connector you might need to configure it to correctly work in your environment. Depending on the Connector this can be done in either of two different ways:

■ Setting the Connector/Module properties

■ Creating a Default Dataset

Following is additional information on how to do this and when each approach is recommended.

Set Connector/Module Properties

Typically out-of-the-box Connectors (both the standard built-in Connectors, as well as Connectors that are installed through the Install Wizard) can - and should - be configured by setting the Connector/Module properties in the Configuration Browser. These properties are Connector-specific and often critical to ensure correct functionality of the Connectors.

The Connectors that can/should be configured using this method are:

■ Alert Module

■ CA AutoSys EWA Module

■ CA Service Desk Module

■ Process Module

■ SAP Module

■ SNMP Module

■ SOAP Module

■ Spectrum Module

■ Workflow Module

By default, these properties are defined for the complete domain and inherited by the individual environments and Orchestrators within that Domain. However, for each Connector these properties can be set locally for each environment and, if you prefer, even for each Orchestrator.

Update Connectors in Domains or Environments

To modify these properties for a Domain or an Environment do the following:

1. Open the CA IT PAM client using the url http://<itpamserver>:port/itpam and log in with a user ID with administrative privileges (itpamadmin)

2. Open the Java IT PAM Client by clicking on the IT PAM Client link in the upper right corner of the web page. Wait until the new UI are opened.

3. In the left hand pane of the configuration browser select the Domain or Environment for which the Connector will be configured.

4. Right click on the selected node (Domain, Environment or Orchestrator) and select Lock.

5. With the node still selected click the Modules tab in the right hand pane.

6. Double-click on the module that that you would like to configure.

7. If this is an "Environment" deselect the "Inherit Settings" checkbox.

8. Update all properties for this Connector as required and click Apply.

9. Repeat the steps 5 through 8 for each Connector you would like to modify.

10. Save the changes by clicking on the Save Icon or by selecting File, Save from the menu.

11. Right click on the selected node in the left hand pane and select Unlock

Update Connectors in Orchestrators

To modify these properties for an individual Orchestrator do the following:

1. Open the CA IT PAM client using the url http://<itpamserver>:port/itpam and log in using a user ID that has administrative privileges (itpamadmin)

2. Open the Java IT PAM Client by clicking on the IT PAM Client link in the upper right corner of the web page. Wait until the new UI are opened.

3. In the left hand pane of the configuration browser select the "Orchestrators" panel

4. Right click on the Orchestrator you would like to configure and select Lock

5. With this Orchestrator still selected, Click the Modules tab in the right hand pane.

6. Double-click on the module that that you would like to configure

7. Deselect the "Inherit settings" checkbox.

8. Update all properties required for this Connector and click Apply.

9. Repeat steps 5 through 8 for each Connector you would like to modify.

10. Save the changes by clicking on the Save Icon or by selecting File, Save from the menu.

11. Right click on the selected Orchestrator in the left hand pane and select Unlock.

Create Default Dataset

In situations where the IT PAM Connector typically has common default values it is a good idea to create variables with these default values in a common Named dataset. This is especially useful for maintenance reasons in situations where these values are likely to change. An obvious example of this, is, of course, is passwords that change on a regular basis, but other commonly shared objects, such as usernames, server names, and paths, should typically also be stored in Named datasets.

Some custom Connectors rely directly on a shared dataset called "Default" located in the Custom Operators folder. Since this dataset is shared among multiple Connectors it is critical to follow a strict naming standard when creating the variables and to separate them by using one or more "pages" for each Connector.

The following example describes how to setup the Default dataset for the MS SQL Server Connector and ensure that all names are unique when adding variables for other Connectors to the same dataset. It is considered a best practice to use well defined prefix for all variables in this dataset and to track these 'reserved' prefixes in a string variable called PREFIX_IN_USE at the top of the Dataset.

1. Open the CA IT PAM client using the url http://<itpamserver>:port/itpam and log in using a user ID with administrative privileges (itpamadmin)

2. Open the Java IT PAM Client by clicking on the IT PAM Client link in the upper right corner of the web page. Wait until the new UI are opened.

3. In the left hand pane of the configuration browser navigate to the Orchestrator on which the Connector is installed.

4. Right click on the Orchestrator and select Open.

   This opens the library browser in context of this Orchestrator.

5. Drill into the "/Custom Operator" node. If it already includes a dataset called "Defaults" go to step 8.

6. Right click on the "/Custom Operator" node and select New Object / Dataset..

7. Rename the newly create dataset to "Defaults"

8. Open the "Defaults" dataset by double-clicking on it

9. If the variable "PREFIX_IN_USE" exists go to step 12. Otherwise right click on "Parameters" and select "Add Parameter"

10. Rename the "Var_0" to "PREFIX_IN_USE"

11. Ensure the type of the variable is "string" and select the checkboxes for "Read Only", "Multiline" and "Inline".

12. Click on current value in the "PREFIX_IN_USE" variable, ensure that the prefix you are planning to use isn't already listed and then add it to the list together with a short description. For example:

    ```
    MSSQL – prefix for the MS SQL Server Connector
    ```

13. Set the "No of visible rows" value to the number of prefixes you have defined.

14. Right click on "Parameters" in the left hand pane and select Add Page

15. Rename the newly created page to reflect the name of the Connector you are adding default variables for. For our example it would be:

    `MS SQL Server Connector`

16. Right click on the newly created page and select Add Parameter

17. Rename this newly create variable "var_x" to a suitable name starting with the prefix you reserved in step 12 above.

18. Define the variable as required for the application.

19. Repeat step 16-18 for each variable you need to create for this Connector.

    For our MS SQL Server example we are adding two string type variables with the names "MSSQLServer" and "MSSQLUser" and one password variable called "MSSQLPass"

20. Save the dataset by clicking on the save icon or by using the File, Save menu.

21. Check in the updated dataset by clicking on the "Check-In" icon, ensure the "Set Current Version" is checked and click OK

Common Configuration Options Across Operators

The following sections provide guidelines and tips for working with common configuration options that can apply to multiple operators.

For more information on this see the section "Common Properties of All Operators" in the *CA IT PAM Programming Reference Guide*.

General Guidelines

Following are some common tips and tricks that can help you simplify your work and avoid some common mistakes when working with operators and other objects.

- **Checking In /Setting Modified objects to Current**

  Ensure that any modified external object is set to "Current" (this is typically done while checking in the object) before you try to use it from a process.

  This step is easy to forget if you are developing a process that uses external objects, such as secondary processes, forms or Named datasets. If you do not set the object to "Current" your process will use the previous version of the object.

- **Enlarge text fields in the operators property list**

  When you are configuring operators and trying to add a large amount of text it can sometimes be difficult to view the full text in the relatively small default text box. If you hover the mouse just to the right of the textbox a "notepad icon" will appear.
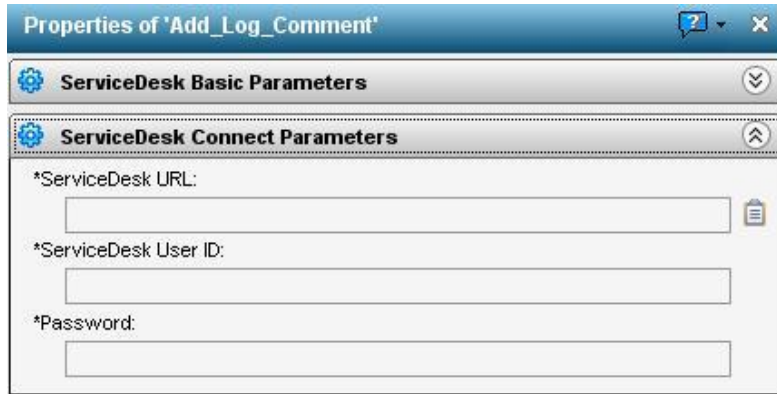
Click on this icon to open a larger window to work with. This will give you a better view and better control of what you are typing.

- **Use Named datasets to store passwords and other common parameters**

  As noted earlier, it is considered a best practice to store parameters that are likely to change or that are common across multiple operators and/or processes in Named datasets. This highly simplifies the process of updating the values across the environment. It is especially useful for passwords not only because they are likely to be changed but also because by storing them they can be encrypted by CA IT PAM.

- **Ensure the operator correctly parses any path/filename**

  In most cases use of normalized path/file names is recommended, using forward slashes ("/") regardless of whether the path applies to a Unix or Windows environment. However, for certain operators (and, especially for custom Connectors) this is not supported and you might need to use a backslash ("\") or a double backslash ("\\"). It is also recommended to store the paths in a variable; this will simplify any future changes in the environment as well as minimize the need to use double backslashes.

Execution Settings

Execution Settings is a common palette for most operators.. This palette allows you to define, in more detail, how and where this operator will be executed. The available sections in this palette are:

- Target

  This section allows you to define on what Touchpoint this operation should be executed on. The value can either be a fixed Touchpoint or a calculated expression.

- Processing

  Use the processing area to define pre-/post-execution code that is executed before and/or after the operator is executed. For more information related to this see the *CA IT PAM Development Guide*.

- Loop

  By default, the Loop section is set to one (1) iteration, but you can easily configure the operator to be executed multiple times. The repeat count is a calculated field so you can use a variable or an expression to dynamically specify the count at runtime. The loop can also be set to an infinite loop.

■ Custom Operation (only on custom/imported operators)

This area is only available on custom/imported operators and not on out-of-the-box operators that are installed using the install wizard. This is a read-only field that indicates where in the library the custom operator is stored.

Simulation functions

You can simulate processing of selected operators in a process or a of the complete process by setting the simulation properties for either an operation or the entire process. More information about this can be found in the section "Simulate Processing of Operators" in the *CA IT PAM Development Guide*.

The configuration options you can access through the "Simulation" panel for the individual operator are:

■ Type

This allows you to turn off the simulation or enable it in local or distant mode. The local simulation completely blocks the operation from being executed while the distant simulationcall workflow module calls the associated module. The associated module verifies the provided parameter but doesn't execute the operation; if the parameters are incorrect the simulation fails.

■ Delay

The delay is a calculated field that specifies a simulated delay in seconds.

■ End Condition

Allow you to specify a result for the simulated operator. For a local or distant simulation this can be "Completed" or "Failed". For a distant simulation you can also specify "Custom Result" and specify the result in the Custom Result field.

■ Custom Result

This specifies an integer value returned by the Result variable in the operator dataset.

■ Evaluate pre-execution and post execution code (checkbox)

This allows you to control if pre/post execution code should be ignored or not.

■ Override simulation options in Process

Check this option to ensure that simulation options set for the process don't affect the simulation of this operator.

Information

The information panel allows you to specify the name of the operator as well as a large number of properties related to the visual presentation of the operator.

More details about this panel can be found in the section "Information Properties (Process Module Parameters)" in the *CA IT PAM Programming Reference Guide*.

The configuration options you can access through the Information panel include:

■ Name

The name is especially important since this is used when the operator or its dataset is referenced by other operators. The operator name can include alphanumeric and symbol characters, but it cannot include spaces. The name has to be unique within a Process.

It is considered a best practice to use a naming standard that are well defined and provide descriptive names.

■ Use Default Icon

If you uncheck this box you can select a custom icon by clicking on the icon.

■ Show

Allows you to override the process preferences as it pertains to showing the icon information configured in the Text area (see below)

■ Background

Allows you to configure the background color for the icon information

■ Position (relative to the icon)

Defines where the icon information should be displayed in relation to the icon.

■ Text

Allows you to control the font and the content of the icon information. It is typically considered a best practice to keep the "update automatically" checked and, in this way, display the operator's name. If you would like to have a lengthier description you can consider using the "Comment" operator in the common palette.

Custom Connectors

There are a large number of Connectors available that allow you to connect to and integrate an equally large number of applications and operating systems with CA IT PAM. These Connectors provide you with a very powerful method of integrating your environment. For example, you can execute a task and gather information from application A, have a CA IT PAM process analyze the result and, based on the result, email a request for approval to the manager in charge of the operation and, after the approval, execute additional operations on applications B and C.

Despite this flexibility, there will always be situations where your processes could be enhanced and/or simplified if you could create additional Connectors for your specific tasks and applications.

If you are familiar with the application you will integrate with and a scripting language that can perform the required tasks on your platform you can easily create new, highly specialized Connectors for your specific needs. Information on creating custom operators and packaging them as Connectors can be found in the chapter "Create Custom Operators" in the *CA IT PAM Development Guide*.

For example, consider any of the "Manually Imported Connectors" (see "Manually Imported Connectors Shipped with the DVD"). A simple example of a Perl-based operator that can be used is the parse that is implemented in the "File Utils (Property File Parser)". However, you can use any script language that is implemented on the Touchpoint. In addition to choosing between a .bat, .cmd, .js, .vbs and .wsh extension, you can also manually enter any other extension and, if it is registered on the Windows Touchpoint, the associated interpreter will be used.

Chapter 2: Available Connectors

Overview

This chapter provides an overview of the currently available Connectors for CA IT PAM 2.1, the value they provide, and a list of the operators that are included in the individual Connectors.

The real value of CA IT PAM lies in its ability to use Connectors to integrate multiple applications and platforms within your system. For example, you can use an OS specific Connector to verify an OS setting based on an event noted by an application specific Connector (using one or more OS specific Connectors) and then create and update a ticket in your service desk using your service desk Connector. This is obviously just one example of how CA IT PAM is connecting all your applications together as one.

Note: In some situations, including the CA IT PAM User Interface, the word "Modules" is used to describe Connectors. For the purposes of this document "module" is used to refer to built-in default Connectors. All other Connectors are referred to, as "Connectors."

Note: The information below applies to CA IT PAM 2.1 SP3. If you are using an earlier or later release, it is critical that you verify that the connectors and operators you need are shipped with, and supported for your particular environment.

Built-In Connectors / Modules

CA IT PAM includes a large number of default operators that always are available. These operators are sorted into 11 modules that are described below.

■ Common Module

■ Alert Module

■ Date-Time Module

■ File Transfer Module

■ File Watch Module

■ Interpreter Module

■ JMX Module

■ Process Module

■ SNMP Module

■ SOAP Module

■ Workflow Module

For more details on any of the built-in Connectors see the *CA IT Programming Reference Guide*.

Common

The common module includes a set of common operators that are used in most processes. It is also unique in that, in addition to the default operators, which are listed below, each user can also add operators from any other Connector by right clicking on them and selecting Add to Common Palette. This makes it easy to find the operator the user most commonly uses.

Note: Keeping track of the "personal" common palette is just one of the reasons why it is a good idea to have each user log in with a personal user ID.

Operators

- Comment

- Loop

- And Condition

- Or Condition

- Derivation

- Custom Operations

- Start

- Normal Stop

Abnormal StopAlert Module

Alert Operators can run on both Orchestrators and Agents and are used to notify operators of an incident or other condition in processing a CA IT PAM Process. IT PAM supports sound alerts to play a sound file on a system operator's console, e-mail alerts to deliver e-mail to specified recipients, or telephony alerts that dial a specified recipient and play a sound file. The Alert Module works on both Windows and Unix Touchpoints.

Tip: A best practice is to create separate Process objects that not only trigger alerts, but also handles escalation and perform other tasks related to the alert. Then, invoke the alert Processes from other Processes as needed using the Run Process Operator.

More information related to this Connector can be found in the section "Alert Module" in the *CA IT PAM Programming Reference Guide*.

Operators

- Break Sound Alert

- Email Alert

- Sound Alert

- Telephony Alert

Date-Time Module

The Date-Time operators run on Orchestrator Touchpoints and support date and time options for other Connectors as well as conditional operations for executing branches in a Process. They can compare the current date and time with a specified date and time, test whether the current date falls within a calendar rule, wait until a specified date and time or wait for a specified time.

More information related to this Connector can be found in the section "Date-Time Module" in the *CA IT PAM Programming Reference Guide*.

Operators

- Calendar Date Test

- Date-Time Check

- Date-Time Wait

- Delay

File Transfer Module

The File Transfer Module acts as a File Transfer Protocol (FTP or SFTP) client that supports remote file operations in a Process. The FTP Module can be executed on either Orchestrator or Agent Touchpoints.

For SFTP transfers the module is using SSH2 and communicates with the SFTP server machine based on user name and password credentials in the Touchpoint. Before using SFTP, you must establish an initial SSH connection at some point and set up the certificates with an SSH client.

More information related to this Connector can be found in the section "File Transfer Module" in the *CA IT PAM Programming Reference Guide*.

Operators

- Delete Directory

- Delete File

- Get File

- Get File Information

- Make Directory

- Move File

- Put File

File Watch Module

The File Watch Module can run on either an Agent or Orchestrator and monitors the existence or status (including size and last modification time) of a file or directory. Additionally, the module can also look for specific patterns (using POSIX rules) within the contents of a file. For example, this can be used to wait until an XML file contains a specific pattern and then execute a process; or look at log files and their contents to find out if there are error messages in those files.

More information related to this Connector can be found in the section "File Watch Module" in the *CA IT PAM Programming Reference Guide*.

Operators

- Directory Entries
- Get File Status
- Scan File Contents
- Watch File

Interpreter Module

The Interpreter Module is an Orchestrator module that executes segments of code in calculations and manages IT PAM resource allotments in Processes.

The Module can "Execute code assigning values to variables", "Wait for Boolean expressions to become True", "Perform actions on virtual resources", "Wait for or test the availability of virtual resources" and "Test value of Boolean expressions".

More information related to this Connector can be found in the section "Interpreter Module" in the *CA IT PAM Programming Reference Guide*.

Operators

- Calculation
- Resources
- Wait for Condition

JMX Module

The JMX Module can run on Agent and Orchestrator Touchpoints and can perform various tasks on ManagedBeans (MBeans) resources using Java Management Extensions (JMX) technology. The Operators use a specified username and password to connect to a JMX Service URL or a JMX Server on a specified Host and Port.

More information related to this Connector can be found in the section "JMX Module" in the *CA IT PAM Programming Reference Guide*.

Operators

- JMX Get (value of MBean)

- JMX Invoke (JMX method)

- JMX Set (value of MBean)

Process Module

The Process Module runs on Agent and Orchestrator Touchpoints and provides functions to start the execution of shell scripts or executable programs on computers running UNIX or Windows. A Script Operator can execute any script that host running the script has an interpreter for.

There are a number of properties that can be configured on the Process Module Tab of the Configuration Browser. These includes properties, such as "default shell", "default profile", "require user credentials checkbox", "default user", "default password", "load user profile checkbox", "disable password check (Unix)".

More information related to this Connector can be found in the section "Process Module" in the *CA IT PAM Programming Reference Guide*.

Operators

- Start Process

- Start Script

SNMP Module

The SNMP operators run on both Orchestrator and Agent Touchpoints and are used to interact with SNMP devices or SNMP managers (such as network managers). They can determine the state of a configuration element of an IP device. It will also generate SNMP-based alerts (traps) to SNMP enabled devices.

The "Poll Frequency" for the SNMP watch can be configured in the SNMP Service tab in the configuration Browser.

More information related to this Connector can be found in the section "SNMP Module" in the *CA IT PAM Programming Reference Guide*.

Operators

- Get SNMP Variable

- Put SNMP Variable

- Send SNMP Trap

- Watch SNMP Variable

SOAP Module

The SOAP Modules operators run on both Orchestrators and Agents and support calls to remote modules using SOAP, retrieves responses, and saves information from the response for use by other operations in a Process. The module supports Asynchronous and Synchronous SOAP Client Call operations and an XML Extraction operation. The module uses XPath version 1.0 for parsing and extracting information from retrieved data.

SOAP requests can be constructed during design or runtime using CA IT PAM datasets the and the results can easily be passed on to other Connectors.

The properties "Maximum result length", "URL part for Asynchronous SOAP servlet" and "Asynchronous SOAP Servlet Method" can be configured in the SOAP service tab of the Configuration Browser.

More information related to this Connector can be found in the section "SOAP Module" in the *CA IT PAM Programming Reference Guide*.

Operators

- Asynchronous SOAP Client Call

- Soap Client Call

- XML Extraction

Workflow Module

This module only runs on Orchestrator Touchpoints and it is responsible for starting and interpreting the results from IT PAM Processes. This allows you to break a large workflow into more manageable pieces or request a user to interact and provide additional information or approval for a specific task.

The "Time to keep completed user actions" can be configured in the Workflow module tab in the configuration browser.

More information related to this Connector can be found in the section "Workflow Module" in the *CA IT PAM Programming Reference Guide*.

Operators

- Run Process

- Run Process in Detached Mode

- User Interaction

Out-of-the-Box Connectors – Managed by the Install Wizard

In addition to the built-in Connectors that are available in all CA IT PAM installation there are a number of Connectors that you can and should install using the install wizard for the CA IT PAM Domain Orchestrator. The selecting dialog for installing these Connectors appears at the very end of the Orchestrator installation and is called "Choose Connectors that needs to be Installed/Updated". If required, the install wizard will request some additional information for the selected Connector. For more details on this see the Connector specific sections below. See the section "Installing Connectors Using the Install Wizard" on page 8 to find out more information on how to install these.

- CA AutoSys Connector

- CA Service Desk Connector

- CA Spectrum Connector

- SAP Connector

CA AutoSys Connector

The CA AutoSys Connector provides close integration with CA AutoSys, enabling you to create, list, modify and startjobs as well as modify their associated calendars, job hosts, status, owner. The IT PAM Touchpoint that runs the operators must also have an AutoSys Agent installed.

Configuration properties for the CA AutoSys Connector are set by opening the module tab in the Configuration browser and double-clicking on the CA AutoSys EWA module entry. This includes the following properties:

- Default AutoSys JM Server (default is localhost)

- Default AutoSys JM Server Port (default is 9000)

- Default AutoSys User (default is autosys)

- Default User's Password

- Default eIAM Artifact

Operators

- Change Job Priority
- Change Job Status
- Create Autosys Job
- Delete Autosys Job
- Force Start Autosys Job
- Get Global Variable Value
- Get Job Status
- Kill Autosys Job
- List Defined Calendars
- List Global Variables
- List Job Details
- List Jobs Run
- Log Comment
- Set Global Variable Value
- Set Hold Status
- Set Ice Status
- Start Autosys Job
- Update Autosys Job
- Update Box Name
- Update Job Files
- Update Job Host
- Update Job Owner
- Update Run Calendar

CA Service Desk Connector

The CA Service Desk Connector simplifies automation of Service Desk operations as well integrations between CA Service Desk and other components that are in any way integrated with CA IT PAM. The Connector uses the Service Desk Web Services interface to obtain information about Service Desk objects, as well as to create, update or close tickets, create log comments and/or attach change orders to requests.

Configuration properties for the CA Service Desk Connector are set by opening the Module tab in the Configuration Browser and double-clicking on the CA Service Desk Module. There you can define a number of properties including:

- Maximum result length (bytes)
- Default Service Desk Web Service URL
- Default Service Desk User
- Default User's Password
- Service Desk Handles Configuration

The default URL is http://localhost:8080/axis/services/USD_R11_WebService and you will obviously need to change this to point to your existing Service Desk server and provide a valid username/password pair.

Operators

- Attach Change Order to Request
- Base Close ServiceDesk Ticket
- Base Object Type Information
- Base Select ServiceDesk Elements
- Base ServiceDesk Interface
- Base Update ServiceDesk Element
- Change Order Close Ticket
- Change Order Create
- Change Order Log Comments
- Change Order Select Ticket
- Change Order Set Assignee
- Change Order Set Status
- Change Order Update Ticket
- Issue Close Ticket

- Issue Create
- Issue Log Comments
- Issue Select Tickets
- Issue Set Assignee
- Issue Set Status
- Issue Update Ticket
- Request Close Ticket
- Request Create
- Request Log Comments
- Request Select Ticket
- Request Set Assignee
- Request Set Status
- Request Update Ticket

CA Spectrum Connector

The CA Spectrum Connector allows CA ITPAM to integrate with CA Spectrum and to read and manipulate alarms and events directly from a workflow. The interfaces that are used to connect to Spectrum use version-specific JAR files provided through your Spectrum server during the installation of the connector.

Configuration properties for the CA Spectrum Connector are set by opening the Module tab in the Configuration Browser and double-clicking on the Spectrum Module entry. There you can define a number of properties including:

- SpectroServer Version
- SpectroServer Domain
- Username
- Password
- Naming Service Port

Required JAR files

Before installing the CA Spectrum Connector ensure that you have access to the Spectrum Infrastructure Management Server or a file share with the following JAR files:

For CA Spectrum r8.x: global81.jar, jsafeJCEFIPS.jar, lm.jar, ssorb81.jar, ssorbbeans81.jar, ssorbutil81.jar, util81.jar, utilapp81.jar, utilnet81.jar, utilsrv81.jar, vbhelper81.jar, vbjorb.jar and vbsec.jar

For CA Spectrum r9.x: global90.jar, jsafeJCEFIPS.jar, lm.jar, sanct6.jar, sanctuary.jar, ssorb90.jar, ssorbutil90.jar, util90.jar, utilapp90.jar, utilnet90.jar, utilsrv90.jar, vbhelper90.jar, vbjorb.jar, vbsec.jar

By default, these files are located in the directory "\win32app\SPECTRUM\lib\" on the Spectrum server.

Operators

- Acknowledge Alarm

- Clear Alarm

- Create Event

- Get Alarm Details

- Get Alarms List

- Get Events List

- Update Alarm

SAP Connector

The SAP Module executes jobs on SAP version 3.1h or later machines and also searches Jobs matching certain criteria. The module consists of an IT PAM SAP Proxy Orchestrator running on a Windows Touchpoint with the SAP client Libraries. The proxy communicates with the SAP server using the TCP/IP protocol. To submit a job, you must define its steps and specify whether they are Advanced Business Application Programming (ABAP) steps or external programs.

Typical SAP actions consist of running a program or shell script. The SAP Interface Server allows you to include SAP jobs in your processes and to use IT PAM to schedule, control, and coordinate them with other tasks. For example, a process can sequentially perform a Windows task, perform an Oracle task, run an SAP process, do a file transfer, and then finish.

To modify configuration properties open the Module tab in the Configuration Browser and double-click the SAP Module entry. Here you can define a number of properties including:

- SAP Destination Name (as defined in the saprfc.ini file)

- SAP User

- SAP User Password

- Language

- SAP Client" (an ID that identifies you to the system).

For more information related to this Connector see "SAP Module" section in the *CA IT PAM Programming Reference Guide*.

Operators

- SAP Job

- SAP Job Search

Manually Imported Connectors Shipped with the DVD

In addition to the Connectors that are installed automatically with the product and the ones that can be installed using the Install Wizard there is also a set of Connectors that are shipped on the DVD. By default these Connectors are copied to the Orchestrator install directory. Together with the XML files for the Connectors that are installed by the Install Wizard these are located in "\ITPAM\server\c2o\.c2orepository\public\operators\" . Instructions on how to install these Connectors can be found in the section "Manually Importing Connectors" on page 10 .

Note: If a Connector is supported by the Install Wizard – such as the AutoSys, Service Desk, Spectrum or SAP Connectors - you must use the wizard to install it. Do not try to install those Connectors using the manual import method.

The Connectors that are shipped with (but not automatically installed by) CA IT PAM 2.1 SP3 are:

- CA Spectrum Automation Manager (formerly, CA DCA Manager) Connector

- Exchange Server Connector

- File Utils (Property File Parser) Connector

- GUI Automation – Auto Hot Key Connector

- HP OpenView Connector

- HP Service Desk (formerly Peregrine) Connector

- Miscellaneous Connector

- MS Access Connector

- MS SQL Server Connector

- IBM Tivoli Netcool Connector

- Networking and Communications Connector

- Oasis (CA IT PAM) Utilities

- Oracle Connector

- Sun Solaris Management Connector

- Sybase Connector

- Symantec BackupExec Connector

- Tivoli TEC Connector

- Unix Management Connector

- VMware Connector

- Windows Management Connector

Note: Many of these connectors are only shipped with CA IT PAM 2.1 SP3. If you are using either a previous or subsequent release it is critical that you verify that the connectors and operators you need are shipped with, and supported for your environment.

CA Spectrum Automation Manager (formerly, CA DCA Manager) Connector

The Spectrum Automation Manager Connector provides methods to use CA IT PAM to directly control the execution of CA Spectrum Automation Manager Jobs. These methods simplify the process of building otherwise complex workflows that connect all components in your datacenter automation environment.

In addition to the specific Spectrum Automation Manager operators listed below you can also use IT PAM Connectors for other components that are included in your solution, such as CA Service Desk Connector, CA AutoSys Connector, Windows Management, Unix Management, Sun Solaris Management Connector, and VMware Connector.

It is also important to note that you can trigger an IT PAM process from Spectrum Automation Manager by calling the action "Run ITPAM process" or by using the CLI dpmitpamadapter from the Spectrum Automation Manager server.

Operators

- Create Job

- Deploy Job

- Verify Job

Exchange Server Connector

The Exchange Server Connector allows you to access information about mailboxes and emails as well as Exchange queues and servers.

Operators

- Filter Inbox Messages

- Get Cluster Resource Info

- Get Connector State Info

- Get Folder Tree Info

- Get Mailbox Info

- Get Name Exchange Org

- Get Queues and Attributes

- Get Server Information

- Get Server State Information

- Read Email

File Utils (Property File Parser) Connector

To find Connectors/operators to assist with manipulating files and directories see OS-specific functions in the "Windows Management" and "Unix Management" sections.

The File Utils Connector that is shipped with CA IT PAM enables you to parse out variables and their assigned values from a property file and allows you to control valid characters in the variable name using regular expression. This can, for example, enable you to look only y for specific variables or ignore variables that are commented out. This Connector requires that Perl is installed on the Touchpoint.

These variables will be returned in the associated dataset. In other words, if the regular expression only allows alphanumeric characters, a file with the following content:

```
A=34
B
Test=resultstring#
Test#=56
```

Will return the variables "A=34" and "Test=resultstring#" but not "Test#=56" since the "#" would be blocked by the regular expression and not "B" since it hasn't been assigned a value.

This Connector can also be seen as an example of how you can relatively easily create your own custom Connector using your favorite script language. By making relatively small modifications to this "property file parser" you can create new operators that parse other types of text files.

Operators

- Parse File

GUI Automation – Auto Hot Key Connector

The GUI Automation Connector provides an AutoHotkey Connector for Windows that allows you to create automation based on GUI events in Windows operating systems. Since this Connector integrates with AutoHotKey, AutoHotKey needs to be installed on the agent machine. To take full advantage of this Connector it is important that you have a good understanding of AutoHotKey commands.

The operators for this Connector are divided into two modules in the IT PAM User Interface.

Operators located in GUI Automation Module

- List Window Properties (Windows)

- Window Check (Windows)

Operators located in Misc Module

- Window Control Actions

- Window Send Messages

- Window Send to Control

- Window UI Action

HP OpenView Connector

The HP Open View Connector integrates CA IT PAM with HP OpenView. It allows you to trigger actions in any components that integrate with CA IT PAM based on events in HP OpenView. It also allows you to create or update events in HP OpenView based on events/actions in CA IT PAM or other components that integrate with CA IT PAM.

Since the operators for this Connector utilize HP OpenView commands, such as "opcmsg", as well as Perl scripting to perform actions, these have to be available on the Touchpoint running these operators.

Operators

- Create Event

- Get Event

- List Events

- Update Event

HP Service Desk (formerly Peregrine) Connector

The HP Service Desk Connector integrates the HP Service Desk with CA IT PAM and simplifies automation of Service Desk operations as well integrations between HP Service Desk and other components that are, any way, integrated with CA IT PAM. The Connector allow you to start and stop the Application Server as well as to read, create and manipulate Change Orders, Incidents, and Problems within the service desk.

Operators

- Create Change
- Create Incident
- Create Problem
- Get Change
- Get Incident
- Get Problem
- List Change Codes
- List Incident Codes
- List Problem Codes

- Query Changes
- Query Incidents
- Query Problems
- Start Application Server
- Stop Application Server
- Update Change
- Update Incident
- Update Problem

Miscellaneous Connector

The Miscellaneous Connector panel includes two groups of operators: one set for Windows GUI Automation and one set for getting/downloading XML files from web servers and e-mails from POP3 servers.

Note: The Get POP3 Mail function requires Perl and that the Net::POP3, Mime::Parser, HTML::Parser and the Switch plug-in be installed and enabled.

The operators for GUI Automation (integration with AutoHotKey) are described in the section GUI Automation – Auto Hot Key on page 31.

Operators

- Download URL
- Get POP3 Mail

Operators logically connected to "GUI Automation – Auto Hot Key" above

- Window Control Actions
- Window Send Messages
- Window Send to Control
- Window UI Actions

MS Access Connector

The MS Access Connector runs on agent boxes with access to your MS Access database. It allows you to execute SQL queries on MS Access 2003 compatible databases and returns the result in a local dataset. This can be used to control further actions in the workflow.

Operators

- Execute SQL

MS SQL Server Connector

The MS SQL Server Connector allows you to integrate IT PAM and its workflows with your MS SQL Server in many ways - everything from various maintenance tasks (such as starting or stopping the server, triggering a backup of the database) and listing various types of metadata related to the database (login mode, version, databases, views, tables, users, roles, etc), to running actual SQL queries. The results are stored in IT PAM datasets and can be reached and used in integration with other IT PAM operators and Connectors.

Some of the default values in this Connector require you to manually create a "Default" dataset in the "Custom Operators" folder using the following values:

MSSQLServer
MSSQLUser
MSSQLPass

For detailed instructions on how to create this default dataset see the section "Create Default Dataset" on page 13.

Operators

- Backup SQL Database
- Change Mirroring Mode
- Display Login Mode
- Display Version Info
- Execute SQL
- Execute SQL Query
- List Databases
- List Free Space DB

- List Roles in DB
- List Size of DB
- List Tables in DB
- List Users in DB
- List Views in DB
- Start Server
- Stop Server

IBM Tivoli Netcool Connector

The Netcool Connector allows you to use CA IT PAM process flows to connect to and work with events from Netcool as well as starting and stopping the Netcool Process Agent. The CA IT PAM process flows can both read and take actions based on Netcool event attributes as well as creating and updating event in Netcool.

Operators

- Netcool Event Attributes
- Netcool Event Create
- Netcool Event Update
- Netcool Event List
- Start Process Agent
- Stop Process Agent

Networking and Communications Connector

The Networking and Communications Connector allows you to integrate with network devices using a number of approaches. The Connector can get information about interfaces, network packets and devices through SNMP. In addition, it can run generic commands through Telnet and SSH or, through a telnet session, execute Cisco specific commands on a Cisco Router or Switch.

Operators

- Cisco Run Commands
- Get Interfaces Info
- Get Packets Info
- Get System Info
- Get TCP/IP Sockets
- SSH Run Commands
- Telnet Run Commands

Oasis (CA IT PAM) Utilities

The CA IT PAM Connector (also called "Oasis Utilities") provides a number of operators that simplify certain commonly used tasks in your CA IT PAM environment. Amongst others this includes advanced pattern matching of results in datasets, regardless of whether the result is located in an array or in a simple string.

Operators

- Change Scripting Host

- Match Parse String

- Match Pattern in Array

- Match Pattern in Array & Lookup

Oasis Management

- Check Sensor Dependencies

Oracle Connector

The Oracle Connector is executed on a Touchpoint on which Oracle database resides and can both manage the server by starting and stopping it as well as execute SQL queries against the database. The result set from the SQL query is stored in a local dataset and can be used and manipulated from other Connectors and operators in the workflow. On Unix the start/stop functions are performed using direct execution of dbstart and dbshut. On Windows, the start/stop functions are executed using VB scripts to control the status of the service. SQL commands are executed using a common Perl script for both Windows and Unix platforms.

Some of the default values in the Connector require you to manually create a "Defaults" dataset in the "Custom Operators" folder with the values:

```
ORCUser
ORCPass
```
For detailed instructions on how to create this default dataset see the section "Create Default Dataset" on page 13.
Operators

- Execute SQL

- Start Oracle Server (Unix)

- Start Oracle Server (Windows)

- Stop Oracle Server (Unix)

- Stop Oracle Server (Windows)

Sun Solaris Management Connector

The Sun Solaris Management Connector complements the UNIX management Connector by providing a set of more Solaris-specific functions. The operators are implemented in a Bourne Shell and should be executed on the agent that you need more information about.

Operators

- CPU Utilization
- List Processes By State
- Memory Utilization
- Mount Device Information
- Network Interface Stats
- Processor Information
- Swap Space Information
- Uptime View Compare
- Users View Compare

Sybase Connector

The Sybase Connector is executed on a Touchpoint on which the Sybase database resides and can both manage the server by starting and stopping it as well as execute SQL queries against the database. The result set from the SQL query is stored in a local dataset and can be used and manipulated from other Connectors and operators in the workflow. On Unix the start/stop functions are performed using direct execution of startserver. Under Windows the start/stop function uses VB scripts to control the status of the service. SQL commands are executed using a common Perl script for both Windows and Unix platforms.

Operators

- Execute SQL
- Start Sybase Server (Unix)
- Start Sybase Server (Windows)
- Stop Sybase Server (Unix)
- Stop Sybase Server (Windows)

Symantec BackupExec Connector

The Symantec BackupExec Connector provides operators that not only allow you to schedule backup and restore jobs from CA IT PAM, but also allow you to determine and modify the status of previously scheduled jobs. In addition to this, the Connector also allows you to manage the backup server environment itself with administrative functions such as "Is Backup Server Available", "Are Services Running", "Start Backup System Services", "Stop Backup System Services", "Dump Service Status" and "Dump System Properties". As with all other operators, the results from these operators are stored in local datasets and can be used and further manipulated by other operators in the workflow.

Operators

■   Administration

■   Cancel, Hold, Resume Job

■   Dump Job Status

■   Run Backup Job

■   Run Restore Job

Tivoli TEC Connector

The Tivoli Enterprise Console (TEC) Connector allows CA IT PAM to integrate with events from TEC enabling you to both by have the workflow take actions based on information in events as well as create or modify events in TEC. The operators are implemented using Perl scripts and native TEC commands (such as wtdumper, wpostemsg and wsetemsg) and should be executed on an agent with TEC installed.

Operators

■   Create Event

■   Get Event

■   List Events

■   Modify Event

Unix Management Connector

The Unix Management Connector implements a large number of UNIX specific functions in areas such as File System Management, Process Management and System Tools. Most of the operators are implemented in Perl; however the "Run Unix command" is implemented in the Bourne shell. The operator should be executed on an agent located on the system on which you would like to perform the action.

Operators

- Copy File
- Copy Folder
- Create File
- Create Folder
- Delete File
- Delete Folder
- Disk Usage
- Find Largest File
- Get CPU intense Processes
- Get Free Disk Space

- Get Process by PID
- Get Processes
- Get Processes by State
- Get Top Processes
- Kill Process
- Move File
- Move Folder
- Ping
- Run Unix command

VMware Connector

The VMware Connector integrates CA IT PAM with VMware ESX/ESXi and provides operators for a large number of actions that are needed to effectively automate your virtual datacenter. It includes functions for identifying information (including performance data) related to both the virtual machine and host system. Based on this information, and on information from other Connectors, you can automatically take action on both your virtual machines and hosts, as well as on your complete virtual center environment.

For example host operations include functions such as "Disconnect from Virtual Center", "Reconnect to Virtual Center", "Enter maintenance mode", "Exit maintenance mode", "Reboot", "Shutdown" or "Remove from Cluster".

Operators

- Add Host to VC
- Create VM
- Delete VM
- Get Host Info
- Get Host List
- Get Host Perf Info
- Get VM Info
- Get VM List

- Get VM Perf Info
- Host Operations
- Revert to Snapshot
- VM Clone
- VM Power Operations
- VM Relocate
- VM Take Snapshot

Windows Management Connector

The Windows Management Connector provides a large number of operators that assist in integrating Windows Management tasks in CA IT PAM workflows. These operators allow you to automate a large number of functions, such as creating and managing users, adding/removing these user to groups, a large number of file management functions, listing and updating the status of services (including starting/stopping, startup type, changing password, etc), reading and manipulating the windows event log, run generic SQL ODBC queries, mapping drives and update MOM alerts.

For the sake of simplicity the list the list of operators provided below is divided into four separate groups:

Active Directory Operators

- Add Mailbox
- Add User To Group
- Create Group
- Create Organizational Unit
- Create User Account
- Delete AD Object
- Join Computer To Domain

- List AD Objects
- List All Users in Domain
- List Domain Controllers
- List Dormant Users
- Remove User from Group
- Setup Share for User Account

File System Management Operators

- Compress File
- Compress Folder
- Copy File
- Copy Folder
- Copy Multiple Files
- Copy Multiple Folders
- Create File
- Decompress File
- Decompress Folder

- Delete File
- Delete Folder
- Get Disk Space
- Get File System Info
- List Files Folders
- Rename File
- Rename Folder

Process Management Operators

- Check Service Status
- Control Service
- Get Processes
- Get Top Processes

- Kill Process by PID
- Modify Service Account
- Modify Startup Type
- Query Service

System Tools Operators

- Check Connectivity
- Event Log Create Event
- Event Log Get Attr
- Event Log Get List
- Event Log Poll Events
- Event Log Purge
- Get Available Memory

- List Logical Drive
- Map to Logical Drive
- ODBC Run Query
- Send Popup Message
- Unmap Logical Drive
- Update MOM Alert