End-to-End Automation Management Component
Administrator's and User's Guide
Contents

Figures .................................................. vii

Tables ..................................................... ix

About this guide .......................................... xi
Who should read this guide .......................... xi
How to use this guide .................................. xi
Where to find more information .................. xi
Conventions used in this guide ....................... xii
   Typeface conventions ................................ xii
   Terminology used in this guide .................. xii
Related information ...................................... xiv

Summary of changes ...................................... xv
What's new for Tivoli System Automation 2.3 ..... xv

Part 1. Introducing end-to-end automation management .................. 1

Chapter 1. What end-to-end automation management can do for you .......... 3
The scope of automated management of resources .................. 3
The scope of end-to-end automation management of business applications .......................... 5
The scope of the SA operations console .................................. 6
Role of an operator ........................................... 6
Role of an administrator ....................................... 7
Role of an application owner .................................... 7

Chapter 2. Components of end-to-end automation management ............... 9
Automation J2EE framework .................................. 10
Automation engine ............................................ 10
Automation manager .......................................... 11
Automation engine resource adapter ....................... 11
First-level automation manager resource adapter .......... 11
Automation adapter .......................................... 11
SA operations console ....................................... 12
End-to-end automation manager command shell .............. 12
End-to-end automation policy ............................... 12
First-level automation domain ............................... 13
Automation database ........................................... 13
Automation Software Development Kit ..................... 13

Chapter 3. SA operations console modes .................................. 15
End-to-end automation mode .................................. 15
First-level automation mode ................................... 15
Direct access mode ............................................ 16

Chapter 4. Communication flow between the components .................. 19
Policy activation and subscription .......................... 19
A first-level automation domain sends a resource modified event .......................... 20
An operator submits a request against a resource reference .................................. 22
The operations console is used in first-level automation mode .......................... 24

Chapter 5. Automation concepts ........................................ 27
Resources of the end-to-end automation domain .......................... 27
Resource references .......................................... 27
Resource groups .............................................. 27
Choice groups ................................................ 27
Goal-driven automation ....................................... 27
How the automation manager is informed about automation goals .................. 28
How the default desired state is determined .................. 29
Understanding relationships .................................. 29
   What is a relationship? ................................... 29
   StartAfter relationship .................................. 30
   StopAfter relationship .................................. 32
   ForcedDownBy relationship .............................. 33
How requests become goals ..................................... 34
Requests processing when relationships exist .................. 35
Request priorities ............................................. 35
How requests against resource references are processed .................. 37
   User credentials of the end-to-end automation manager .............. 37
   Example scenarios ........................................ 38
When the end-to-end automation manager will not generate requests .................. 40
   The referenced resource is a monitor resource .................. 40
   The referenced resource is in a transitional state .............. 41
   The referenced resource is in a specific operational state .......... 41
   Automation is suspended for the resource .................. 41
Additional remarks about requests that are generated by the end-to-end automation manager .................. 42
Canceling obsolete end-to-end automation manager requests on first-level automation resources .................................. 42
Canceling requests on SA for Multiplatforms resources .................. 42
Canceling requests on SA z/OS resources ..................... 44

Part 2. First steps .............................................. 45

Chapter 6. Overview ............................................ 47

Chapter 7. Starting the sample end-to-end automation domain ............... 49

Chapter 8. Activating the sample end-to-end automation policy .............. 51
What you must know about the information area 127
What you must know about the Menu 128
Setting your user preferences 129
Setting your user preferences for Integrated Solutions Console 129
Setting your user preferences for the SA operations console 129

Chapter 21. Monitoring resources 131
State information provided on the operations console 131
  Compound state and operational state 131
  State information provided for domains 132
  State information provided for nodes 137
  State information provided for resources 137
Monitoring tasks 142
  Finding out where resources are located 142
  Finding out to which groups a resource belongs 142
  Finding out whether a resource is referenced by a resource reference 142
Switching between resource references and referenced resources 142
Displaying relationships 144
Viewing log files 144
  Displaying operator instructions using the info link 144
  Displaying owner contact information 145
Limiting the scope of the resource table 145
  Displaying only resources that are in an error or warning state 145
  Searching for resources 145
  Working with name filters 147
Hiding domains 150
Using non-top-level resources as domain health indicators 151
Refreshing the operations console 151
Managing your user credentials for first-level automation domains 152
  Storing your user credentials in the credential vault 152
  Changing and deleting your user credentials 153

Chapter 22. Managing resources 155
Working with automation policies 155
  Activating an automation policy 155
  Deactivating a policy 157
  Modifying an end-to-end automation policy 157
Working with requests 157
  Submitting start requests 158
  Submitting stop requests 158
  Displaying information about an operator request 159
  Displaying request lists 159
  Canceling requests 160
  Bringing resources online and offline 161
  Resetting a resource from an unrecoverable error 161
  Steps for resetting a resource 162
  Suspending and resuming automation for resources 162
  Steps for suspending automation for a resource 163
  Steps for resuming automation for a resource 163

Chapter 23. Using the end-to-end automation manager command shell 167
Using the command shell in shell mode 167
Using the command shell in line mode 168

Part 5. Working with automation adapters 169

Chapter 24. Working with the HACMP adapter and HACMP objects 171
Special considerations for the HACMP adapter 171
Representation of HACMP objects and possible actions on the operations console 171
Defining an end-to-end automation policy for HACMP resources 174
Controlling the HACMP adapter through commands 175

Chapter 25. Working with the MSCS adapter and Microsoft Server Clustering objects 177
Special considerations for the MSCS adapter 177
Representation of MSCS objects and possible actions on the operations console 178
Defining an end-to-end automation policy for MSCS resources 179
  Referencing MSCS resources in an end-to-end automation policy 179
  Starting and stopping the MSCS adapter 181

Chapter 26. Working with the VCS adapter for Solaris/SPARC and VCS objects 183
Special considerations for the VCS adapter for Solaris/SPARC 183
Representation of VCS objects and relationships in the SA operations console 184
  Representation of VCS objects 184
  Representation of VCS resource relationships 184
  Possible operations on VCS objects from the SA operations console 185
Defining an end-to-end automation policy for VCS resources 187
  Policy example 187
  Controlling the VCS adapter through commands 188

Part 6. Appendixes 189
Figures

1. Components of end-to-end automation management ........................................... 10
2. Communication flow: Policy activation .................................................................. 19
3. Communication flow: First-level automation domain sends a resource modified event ..................................................... 21
4. Communication flow: Operator submits a request against a resource reference .................. 23
5. Communication flow: SA operations console is used for managing first-level automation domains only ................................................. 25
6. Command shell page of the end-to-end automation manager configuration dialog .................................................. 67
7. User credentials page of the end-to-end automation manager configuration dialog .................. 68
8. General page for a first-level resource .................................................................. 77
9. Common Event Infrastructure Service panel ......................................................... 103
10. Custom properties panel ....................................................................................... 104
11. Main panel of the operations console ..................................................................... 118
12. Topology tree and resources section .................................................................... 120
13. Layout of the resources section ............................................................................ 123
14. Main menu ........................................................................................................... 128
15. State information on the General page .................................................................. 138
16. Name filters page on the Preferences panel ........................................................ 149
17. Visible automation domains page .......................................................................... 150
18. Two node HACMP cluster on the operations console .............................................. 172
19. HACMP top-level resource group ......................................................................... 172
20. HACMP node instances of a resource group .......................................................... 173
21. HACMP resource ................................................................................................. 173
22. Additional Info page for an HACMP cluster .......................................................... 213
Tables

1. End-to-end automation-specific terms xiii
2. Short names used in this guide xiv
3. Priority ranking of requests 36
4. Access roles, user groups, and user IDs for Tivoli System Automation for Multiplatforms 63
5. Access roles for Tivoli System Automation 65
6. Recommendations for referencing SA for Multiplatforms resources in end-to-end automation policies 78
7. Steps for defining a new end-to-end automation policy 78
8. Specifying expressions in an XML file 82
9. Command line options for the automation engine 96
10. Messages and return codes returned by the automation engine 98
11. Valid XPath event selectors 107
12. Icons used for the elements of the topology tree 121
13. Some flavors of topology tree icons 121
14. Icons in the Status column of the topology tree 122
15. Compound state icons 132
16. Operational state descriptions provided on the General page for a domain 133
17. Domain state icons 135
18. Communication state 136
19. Observed state of a node 137
20. Operational state descriptions on the General page for a resource 138
21. Operator request icons in the information area 159
22. Adapter control commands 175
23. Defining a resource reference for an MSCS group 179
24. Defining a resource reference for a move group representing an MSCS resource 180
25. Defining a resource reference for a fixed resource representing an MSCS resource 180
26. Defining a resource reference for an MSCS network 181
27. Defining a resource reference for an MSCS network interface 181
28. Representation of VCS objects in the SA operations console 184
29. Results of include and exclude operations on VCS nodes from the SA operations console 185
30. Results of start and stop operations on VCS resources 185
31. Results from suspend and resume operations on VCS resources 186
32. Adapter control commands 188
33. Worksheet for defining an end-to-end automation policy 191
34. Environment variables of the automation J2EE framework 202
About this guide

This guide provides information about administering and using the end-to-end automation management component and the HACMP, MSCS, and VCS automation adapters of IBM Tivoli System Automation for Multiplatforms.

Who should read this guide

This guide is for administrators who administer the End-to-End Automation Management component of IBM Tivoli System Automation for Multiplatforms, and for operators who want to monitor and manage resources from the operations console.

How to use this guide

Use the parts of this guide that correspond to the job that you will do:

- Part 1, “Introducing end-to-end automation management,” on page 1 gives you an overview of end-to-end automation management, its goals, the automation concepts, and the functionality provided by the End-to-End Automation Management component.
- Part 2, “First steps,” on page 45 describes how you can use the sample environment that is configured during the installation to learn about end-to-end automation management.
- Part 3, “Administering the End-to-End Automation Management component,” on page 61 describes how to create policies, manage users, and start and stop the components of end-to-end automation management.
- Part 4, “Monitoring and managing automated resources,” on page 109 describes how to exploit the functionality of end-to-end automation management.
- Part 5, “Working with automation adapters,” on page 169 describes how to work with the adapters for and objects of HACMP, MSCS, and VCS on Solaris/SPARC domains.
- In the Appendixes you find reference information you may need for using and operating the end-to-end automation management component.

Where to find more information

In addition to this manual, the IBM Tivoli System Automation for Multiplatforms library contains the following books:

- IBM Tivoli System Automation for Multiplatforms Installation and Configuration Guide, SC33-8273
- IBM Tivoli System Automation for Multiplatforms End-to-End Automation Management Component Reference, SC33-8276
- IBM Tivoli System Automation for Multiplatforms Base Component Administrator’s and User’s Guide, SC33-8272
- IBM Tivoli System Automation for Multiplatforms Base Component Reference, SC33-8274

You can download the documentation at

http://publib.boulder.ibm.com/tividd/tid/IBM_Tivoli_System_Automation_for_Multiplatforms_2.3.html
The IBM Tivoli System Automation for Multiplatforms home page contains useful up-to-date information, including support links and downloads for maintenance packages.

You find the IBM Tivoli System Automation for Multiplatforms home page at:


Conventions used in this guide

This guide uses several conventions for special terms and actions and operating system commands and paths.

Typeface conventions

This guide uses the following conventions:

- Typically, file names, directories, and commands appear in a different font. For example:
  - File name: setup.jar
  - Directory: /etc/hosts
  - Command: eezdmn -reconfig
- Variables are either italicized, enclosed in brackets, or both. For example:
  - http://<hostname.yourco.com>/index.html
- Frequently, variables are used to indicate a root installation directory:
  - Root installation directory of the End-to-End Automation Management component: <EEZ_INSTALL_ROOT> or EEZ_INSTALL_ROOT
  - WebSphere Application Server root installation directory: <was_root> or was_root
- Directories are shown with forward slashes (/), unless operating-system specific information is provided. On Windows systems, you should use backward slashes (\) when typing at a command line, unless otherwise noted.
- Operating-system specific information is provided. For example:
  - AIX, Linux: /opt/IBM/tsamp/eez
  - Windows: C:\Program Files\IBM\tsamp\eez

Terminology used in this guide

This section describes terms that are specific to end-to-end automation management and that you will frequently encounter in this manual, in other publications related to end-to-end automation management, and on the operations console.

Two different types of terms are introduced in this section:

- The end-to-end automation specific terms that are important for understanding the concepts of end-to-end automation management.
- The short forms of terms that are used in this guide to ensure readability.

End-to-end automation-specific terminology

In the following table, you find the definitions of important terms related to end-to-end automation management. Additional terms are described in Chapter 2, “Components of end-to-end automation management,” on page 9 and in the glossary.
### Table 1. End-to-end automation-specific terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>choice group</td>
<td>An end-to-end automation resource group whose members are alternatives. Only one of the members can be active at a time. If the desired state of the choice group is Online, the end-to-end automation manager tries to keep the active resource online but will only start the resource in place if it fails. An operator can start a different member of a choice group from the operations console.</td>
</tr>
<tr>
<td>direct access mode</td>
<td>An operations console mode in which only resources that are automated by the Base component of IBM Tivoli System Automation for Multiplatforms can be managed and monitored from the console.</td>
</tr>
<tr>
<td>domain health indicators</td>
<td>Resources whose state is used to indicate whether or not a domain is healthy. If the observed state of such a resource differs from its desired state, an error or warning appears on the operations console for the domain by which it is hosted. This make it possible to monitor resources simply by observing the domains in the topology tree and drilling down to resource level only when a problem is indicated for the domain. By default, a domain's top-level resources are used as domain health indicators. On the operations console you can define that other resources are to be used for this purpose.</td>
</tr>
<tr>
<td>end-to-end automation mode</td>
<td>An operations console mode in which end-to-end automation management is installed and active. In this mode, resources that are hosted by the end-to-end automation domain and by first-level automation domains can be monitored and managed from the operations console.</td>
</tr>
<tr>
<td>first-level automation mode</td>
<td>An operations console mode in which only resources that are hosted by first-level automation domains can be monitored and managed from the console. The End-To-End Automation Management component is installed but end-to-end automation management is not active.</td>
</tr>
</tbody>
</table>
| monitor resource                    | A first-level automation resource that has the following characteristics:  
  • its current state can be monitored from the operations console  
  • its desired state cannot be changed through start and stop requests |
| resource                            | Any application, process, or service that is monitored and managed by a first-level or end-to-end automation manager. If not stated otherwise, the term is used to refer to both resources and groups of resources on any automation level and on the specific automation level described in the context in which the term appears. |
| resource group                      | In end-to-end automation management, a collection of resource references that have the same desired state and are managed and monitored as one unit. The first-level resources referenced by the resource references in a group can be hosted by different first-level domains. Resource groups are defined in the end-to-end automation policy. |
### Table 1. End-to-end automation-specific terms (continued)

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>resource reference</td>
<td>A resource that is managed by the end-to-end automation manager. Resource references are virtual resources that refer to actual resources that are managed by a first-level automation manager. Resource references are defined in the end-to-end automation policy.</td>
</tr>
<tr>
<td>top-level resource</td>
<td>A resource or resource group that is displayed in the resource table when a domain is first selected. Typically, these are resources that are either not members of a group, or groups that are not nested within other groups. By default, such resources are used as domain health indicators.</td>
</tr>
</tbody>
</table>

### Short names used in this guide

To ensure the readability of this guide, short names are used for some products and for some of the subcomponents of the End-to-End Automation Management component of IBM Tivoli System Automation for Multiplatforms. The full names are used whenever the context demands it. For example, the end-to-end automation policy will usually be referred to as policy, however, when it might not become clear from the context whether the term refers to the policy of the end-to-end automation domain or to that of a first-level automation domain, the full term is used.

### Table 2. Short names used in this guide

<table>
<thead>
<tr>
<th>Term used in this guide</th>
<th>Used for...</th>
</tr>
</thead>
<tbody>
<tr>
<td>automation adapter</td>
<td>end-to-end automation management adapter</td>
</tr>
<tr>
<td>automation engine</td>
<td>end-to-end automation decision engine</td>
</tr>
<tr>
<td>automation manager</td>
<td>end-to-end automation manager</td>
</tr>
<tr>
<td>End-to-End Automation Management component of IBM Tivoli System Automation for Multiplatforms</td>
<td>End-to-End Automation Management component of IBM Tivoli System Automation for Multiplatforms</td>
</tr>
<tr>
<td>operations console</td>
<td>operations console of IBM Tivoli System Automation for Multiplatforms</td>
</tr>
<tr>
<td>SA operations console</td>
<td>IBM Tivoli System Automation for Multiplatforms</td>
</tr>
<tr>
<td>policy</td>
<td>end-to-end automation policy</td>
</tr>
<tr>
<td>SA for Multiplatforms</td>
<td>IBM Tivoli System Automation for Multiplatforms</td>
</tr>
<tr>
<td>SA z/OS</td>
<td>IBM Tivoli System Automation for z/OS</td>
</tr>
</tbody>
</table>

### Related information

**WebSphere Application Server publications:**

The latest versions of all WebSphere Application Server publications can be found on the WebSphere Application Server library Web site at

[http://www.ibm.com/software/webservers/appserv/was/library/](http://www.ibm.com/software/webservers/appserv/was/library/)

**IBM DB2 publications:**

DB2 publications can be found on the IBM DB2 UDB Web site at


The link to the PDF manuals is available in the Other resources section on the Web page.
Summary of changes

What's new for Tivoli System Automation 2.3

In Version 2 Release 3, the following new features and enhancements are introduced for the End-to-End Automation Management component of IBM Tivoli System Automation for Multiplatforms:

**Automation adapter for VERITAS Cluster Server (VCS) for Solaris/SPARC clusters**

Using this adapter, first-level automation domain clusters that are managed by VCS on Solaris/SPARC platforms can be integrated into the end-to-end automation environment of IBM Tivoli System Automation for Multiplatforms, and resources that are made highly available by VCS can be incorporated into end-to-end automation policies. The adapter is delivered as a separately installable entity together with the end-to-end automation management component.

**High availability for the End-to-End Automation Management component can be provided**

You can use the Base component to provide high availability for the End-to-End Automation Management component. This includes the end-to-end automations engine, the WebSphere application server that hosts the end-to-end J2EE framework as well as the operations console and (optionally) DB2.

**IBM TEC extension for launch-in-context capability is available**

The IBM TEC Extension for Tivoli System Automation for Multiplatforms allows navigating from a displayed event in the Event Console of Tivoli Enterprise Console (TEC Event Console) to the corresponding resource or domain in the SA operations console.

**TEP launch-in-context support is available**

If Tivoli Enterprise Portal (TEP) for resource monitoring and management is used, the launch-in-context support for Tivoli Enterprise Portal can be set up. Launch-in-context support enables users to launch Tivoli Enterprise Portal workspaces from the SA operations console with a single mouse click.

**One common server is used for both the Tivoli System Automation J2EE infrastructure and the SA operations console**

Among others, this has the following benefits:

- Reduced memory consumption
- Both WebSphere Application Server and Tivoli System Automation administrative tasks can be performed from a single common Integrated Solutions Console
- Configuration becomes easier, for example, through common configuration of tracing

**Console enhancements**

Integrated Solutions Console and the SA operations console provide multiple enhancements:

- The new look and feel of Integrated Solutions Console further improves usability.
- Access role support has been enhanced to make user management easier and faster.
- Smooth, AJAX driven, automatic refreshes for resource state changes in the SA Operations Console make full page refreshes obsolete.
- Automation policy wizard for activating and deactivating policies is available as separate task on the console navigation tree (and also supports the activation and deactivation of Base component automation policies).
- New view for resource groups in the SA operations console is available: The **Location info** tab for groups shows on which nodes the group members are located and identifies which are currently running.

**IBM Support Assistant plug-in for IBM Tivoli System Automation for Multiplatforms is available**

The IBM Support Assistant is a productivity tool that saves you time searching product, support and educational resources. If a PMR needs to be opened, IBM Support Assistant helps you gather support information, then create and track your electronic problem report. IBM Support Assistant is a free stand-alone application that you can install on any workstation, then enhance by installing the plug-in module for IBM Tivoli System Automation for Multiplatforms.
Part 1. Introducing end-to-end automation management

Chapter 1. What end-to-end automation management can do for you .............................................. 3
The scope of automated management of resources ......................................................... 3
The scope of end-to-end automation management of business applications ......................... 5
The scope of the SA operations console ........................................................................ 6
Role of an operator ........................................................................................................ 6
Role of an administrator ................................................................................................ 7
Role of an application owner ............................................................................................ 7

Chapter 2. Components of end-to-end automation management ................................................. 9
Automation J2EE framework ............................................................................................ 10
Automation engine .......................................................................................................... 10
Automation manager ....................................................................................................... 11
Automation engine resource adapter .............................................................................. 11
First-level automation manager resource adapter ........................................................ 11
Automation adapter ....................................................................................................... 11
SA operations console ................................................................................................... 11
End-to-end automation manager command shell ............................................................ 12
End-to-end automation policy ........................................................................................ 12
First-level automation domain ...................................................................................... 13
Automation database ...................................................................................................... 13
Automation Software Development Kit ........................................................................ 13

Chapter 3. SA operations console modes .................................................................................... 15
End-to-end automation mode ........................................................................................ 15
First-level automation mode .......................................................................................... 15
Direct access mode ......................................................................................................... 16

Chapter 4. Communication flow between the components ......................................................... 19
Policy activation and subscription .................................................................................. 19
A first-level automation domain sends a resource modified event ............................... 20
An operator submits a request against a resource reference .......................................... 22
The operations console is used in first-level automation mode ....................................... 24

Chapter 5. Automation concepts ............................................................................................... 27
Resources of the end-to-end automation domain ............................................................... 27
Resource references ......................................................................................................... 27
Resource groups .............................................................................................................. 27
Choice groups ................................................................................................................... 27
Goal-driven automation .................................................................................................. 27
How the automation manager is informed about automation goals ................................... 28
How the default desired state is determined ..................................................................... 29
Understanding relationships ......................................................................................... 29
What is a relationship? ..................................................................................................... 29
StartAfter relationship .................................................................................................. 30
Details on the start behavior of the StartAfter relationship ............................................ 30
StopAfter relationship .................................................................................................. 32

Details on the stop behavior of the StopAfter relationship .............................................. 32
ForcedDownBy relationship ......................................................................................... 33
Details on the force down behavior of the ForcedDownBy relationship ......................... 34
How requests become goals ......................................................................................... 34
Requests processing when relationships exist ............................................................... 35
Request priorities ........................................................................................................... 35
How requests against resource references are processed .............................................. 37
User credentials of the end-to-end automation manager .................................................. 37
Example scenarios ........................................................................................................... 38
A policy is activated ......................................................................................................... 38
An operator issues a request against a resource reference ............................................. 39
The state of a referenced resource changes ..................................................................... 40
When the end-to-end automation manager will not generate requests ......................... 40
The referenced resource is a monitor resource ............................................................... 40
The referenced resource is in a transitional state ............................................................ 41
The referenced resource is in a specific operational state ............................................... 41
Automation is suspended for the resource ..................................................................... 41
Additional remarks about requests that are generated by the end-to-end automation manager ................................................................. 42
Canceling obsolete end-to-end automation manager requests on first-level automation resources ........................................................................................................... 42
Canceling requests on SA for Multiplatforms resources ................................................... 42
Example: The referenced resource is a SA for Multiplatforms Base component resource group ................................................................................................................. 43
Example: The referenced resource is a SA for Multiplatforms Base component resource ........................................................................................................... 43
Canceling requests on SA z/OS resources ....................................................................... 44
Chapter 1. What end-to-end automation management can do for you

The scope of automated management of resources

Automation means that a certain desired run time behavior of Information Technology (IT) can be described in a formal way and that an automation decision instance, the so-called automation engine, performs tasks on behalf of a human operator.

This is true for many aspects of operations management. The focus of IBM Tivoli System Automation is on automating the availability of IT resources. This is defined as the capability to automatically start and stop IT resources, typically, these are applications. The automation engine acts based on the understanding of operationally related resources and with the knowledge of alternative resource instances that provide the same service in case of outages.

The following figure shows an example in which the databases can run on three different nodes.

When you use SA for Multiplatforms, you no longer need to specify event correlation rules in sophisticated scripts. Such scripts would describe the desired behavior in complex lists such as

\[
\text{If (DB3 failed) and (Node 1 running) then (start DB1) else...}
\]

IBM Tivoli System Automation offers a resource management model with a relationship graph and a set of defined abstract resource states as input. The knowledge about how state changes of specific resources are propagated to the related resources is expressed by the semantic of the relationship rather than by exposing those scripting rules.

All required actions are submitted by the automation engine when the desired state and the current situation require an intervention. All you need to describe is the resource topology, namely, the resources, and their relationships and grouping dependencies.
The input specification is done in a so-called automation policy document. Resource groups of different types define the special semantics of the automation behavior of the members inside a group. For example, a group can express that all members must be started and stopped together. Another group type might express that its members are alternatives to each other. Such a group would always allow only one member to run at a time.

Groups also provide aggregated state information about their members. This gives an operator the opportunity to immediately see whether all required and dependent resources are in their desired state. In IBM Tivoli System Automation groups can even be nested, which gives an operator an ever increasing entry point for controlling and monitoring resources.

The following figure shows an example of a so-called move group. The members of move group "DB group" are alternative instances of resource "DB". An instance of resource "DB" is available on each node and the instances are alternatives. For example, if the database on Node 3 fails, Tivoli System Automation chooses one of the alternatives on another node.

You can also define relationships between resources in the policy. Relationships can define:
- sequences for the start and stop behavior of resources
- fault scopes: when one resource fails another resource is forced down
- location constraints: a resource must always or must never run on the same node as another resource

The End-to-End Automation Management component of SA for Multiplatforms includes a set of products that implement this notion of automation. The technology can be used to describe typical High Availability (HA) scenarios based on HA clustered environments, but can also be used to coordinate the start and stop behavior of heterogeneous distributed applications.
The scope of end-to-end automation management of business applications

This section focuses on the automation aspects of heterogeneous distributed applications with the assumption that many of the resource relationships which are valid in a homogeneous peer node cluster are also of use in heterogeneous environments. For example, the possibility to group IT resources to define a higher level entity is extremely useful to model IT business applications.

Cluster-spanning start and stop ordering is also valid between services on distributed tiers, and the possibility to reflect an overall availability state on a resource that represents the overall business application level is definitely valuable.

The scope of the End-to-End Automation Management component of SA for Multiplatforms is the automation of operations-related tasks in an environment that consists of multiple server clusters. Each individual server cluster is homogeneous because it is comprised of servers running the same operating system and system software. However, multiple server clusters may each have another operating system environment.

Instead of re-inventing resource management of individual resources at the heterogeneous cluster level, end-to-end automation management makes use of the automation solution that is available on each homogeneous cluster. This functionality is provided, for example, by the other products of the IBM Tivoli System Automation (SA) product family, namely, SA for Multiplatforms and SA z/OS, and by High Availability Cluster Multi-Processing (HACMP), Microsoft Server Clustering (MSCS), VERITAS Cluster Server (VCS) for Solaris/SPARC.

In this manual, an automation solution on a homogeneous cluster is called a first-level automation domain. End-to-end automation management does not replace these first-level automation domains but rather builds upon and integrates them.

In the example shown in the figure above, the resource Web, which is defined on a Windows cluster, has a startAfter relationship to the group Enterprise Service, which consists of resources that are running on an AIX or Linux cluster and on a z/OS sysplex.
In end-to-end automation management, the resources App and DB2 can have relationships among each other although they are running on different clusters.

The scope of first-level automation domains is to ensure the high availability of resources as specified in their local (first-level) automation policy. The scope of end-to-end automation is to control the relationships these resources have that span the first-level automation cluster boundary. End-to-end automation does not replace the first-level automation products. Rather, it sends requests to the first-level automation domains in order to accomplish the goals specified in the end-to-end automation policy.

If an operator submits a request to start the resource Web in the example above, end-to-end automation management will first start the resource group Enterprise Service. This is because end-to-end automation sends the requests to start App and DB2 in the correct sequence to the two first-level automation clusters AIX Cluster and z/OS Sysplex. After the resources App and DB2 have been started successfully by the first-level automation product, the group Enterprise Service changes to a Started state, which satisfies the start/After relationship of the resource Web. End-to-end automation now sends a request to bring Web online on the Linux cluster.

**The scope of the SA operations console**

SA for Multiplatforms provides a user front-end, the so-called SA operations console, that can be used by operators for monitoring and controlling the availability status of all automated resources. The SA operations console provides this capability on a domain-spanning level. This means that an operator can monitor all automated resources in the enterprise environment from a single console.

This has two major benefits:
- Operators who monitor and manage automated resources that are hosted by clusters of systems spanning different operating systems do not need to have specific knowledge about the particular operating systems.
- Different automation products can be used on different local clusters. An operator does not have to know the different automation concepts or learn how to work with native automation product-specific front-ends (native user interfaces).

To realize these benefits, the automation products must meet the following requirements:
- They must have a common set of resource availability states.
- They must have a common set of operations an operator can perform against the automated resources.

This means that the native user interface may still be required for particular, highly specialized operations and for performing some product-specific monitoring and problem analysis tasks.

**Role of an operator**

An operator is defined as a person who is responsible for ensuring the continuous availability of all business-relevant IT resources within a specific enterprise.

An operator must mainly accomplish two major tasks:
• Perform planned maintenance work on IT resources. Resources can be systems, networks, or applications. Maintenance can include applying fixes, replacing defective hardware, and applying (preventive) fixes to applications.

• React to problems. Whenever an IT resource encounters a problem, the operator must be alerted. The operator is in charge of finding the root cause of the problem and resolving it as quickly as possible.

To accomplish these tasks, operators can use either the operations console of SA for Multiplatforms, which provides a user interface that is designed to support an operator in performing the tasks, or the end-to-end automation manager command shell.

**Role of an administrator**

The task of a administrator is to define and set up the relationships of IT resources in the data center of the enterprise. In this document it is assumed that administrators are typically not involved in the daily business of keeping the business-relevant IT-resources running. They have a supporting role, for example, they specify automation policies and help operators to resolve severe problems.

Starting with Tivoli System Automation for Multiplatforms 2.3, some additional tasks are available from the navigation tree of Integrated Solutions Console for which only administrators are authorized, for example, setting up launch in context support, which allows operators to launch Tivoli Enterprise Portal (TEP) work spaces from the SA operations console.

Specifying automation policies includes defining automation policies, verifying the correct logic of the policies by running the policy checking tool, and activating the policies from the SA operations console. These tasks may be performed on test systems first before the policies are activated on the production systems.

Administrators may also use the SA operations console to drill down to those applications whose failure is the root cause of a problem.

**Role of an application owner**

In IBM Tivoli System Automation, an application owner is responsible for an application that is automated and, therefore, controlled as a resource at least by a first-level automation product and may even be referenced by a resource reference that is controlled by end-to-end automation.

In either case, application owners can no longer use the standard mechanisms to start and stop these applications. Instead, they must use the proper methods of the first-level automation manager to start and stop such applications (such as the command-line interface of the Base component of SA for Multiplatforms). When the application resource is integrated into end-to-end automation, the application owner must use either the end-to-end automation operations console or the end-to-end command shell in order to issue requests to start and stop the application.

A feasible way of doing this is to integrate the automation manager commands (command-line interface commands of the SA for Multiplatforms Base component or end-to-end automation manager command shell commands in line mode, respectively) into the startup and shutdown scripts of the application for which the application owner is responsible. This allows application owners to use
application-typical scripts for starting and stopping and prevents them from having to remember SA for Multiplatforms specific commands.
Chapter 2. Components of end-to-end automation management

This chapter provides an overview of the following components of end-to-end automation management:

- “Automation J2EE framework” on page 10
- “Automation engine” on page 10
- “Automation manager” on page 11
- “Automation engine resource adapter” on page 11
- “First-level automation manager resource adapter” on page 11
- “Automation adapter” on page 11
- “SA operations console” on page 11
- “End-to-end automation manager command shell” on page 12
- “End-to-end automation policy” on page 12
- “First-level automation domain” on page 13
- “Automation database” on page 13
- “Automation Software Development Kit” on page 13

The relationships among the components are illustrated in the following figure.
Automation J2EE framework

The automation J2EE framework comprises the components that are deployed within WebSphere Application Server during the installation of the End-to-End Automation Management component and that act as communication framework between the first-level automation domains and the automation engine and the SA operations console. Together with the automation database, the framework ensures that required automation domain data and operator preferences are kept in persistent storage.

Automation engine

The automation engine is the decision-making component of the automation manager. It runs as a separate process (daemon or service) on the same system as the WebSphere Application Server where the automation J2EE framework and the operations console have been installed and are running. The automation engine is notified when the current (observed) state of referenced resources has changed. The automation engine compares the observed state of the resource with its desired state that is defined in the end-to-end automation policy and calculates resulting start or stop requests. With the help of the automation J2EE framework,
the resulting requests are sent to the first-level automation domain that hosts the referenced resource in order to reach the desired state.

The automation engine has to be started by using its command line interface. After startup, the automation engine is displayed as end-to-end automation domain on the SA operations console. After startup, the automation engine is idling until an end-to-end automation policy is activated.

### Automation manager

The term describes the combination of the automation J2EE framework and the automation engine. The end-to-end automation manager’s role concerning the management of resource references specified in the end-to-end automation policy can be compared to that of the automation managers that are running on first-level automation domains with respect to the resources managed by them.

### Automation engine resource adapter

This resource adapter is a J2EE component that is required by the automation J2EE framework in order to communicate with the automation engine. It is based on the standard J2EE connector architecture. As any other resource adapter, it is deployed and managed using Integrated Solutions Console.

### First-level automation manager resource adapter

This resource adapter is a J2EE component that is required by the automation J2EE framework in order to communicate with the automation adapters that run on the first-level automation domains. It is based on the standard J2EE connector architecture. As any other resource adapter, it is deployed and managed using Integrated Solutions Console.

The first-level automation manager resource adapter is responsible for all synchronous communication paths to the first-level automation domains. However, the automation engine must always be started in order to receive an event when the state of a resource changes that is hosted by a first-level automation domain.

### Automation adapter

An automation adapter process must run on each first-level automation domain. Together with the first-level automation manager resource adapter, the automation adapter ensures normalized communication between the end-to-end automation J2EE framework and the automation manager of the first-level automation domain.

### SA operations console

The SA operations console is the Web-based graphical user interface to the end-to-end automation domain and to the first-level automation domains.

For information about the different modes in which you can run the operations console, refer to [Chapter 3, “SA operations console modes,” on page 15](#).
End-to-end automation manager command shell

The end-to-end automation manager command shell allows you to perform the following tasks by issuing commands to the end-to-end automation manager:

- List resources and resource groups and their states
- List resource group members
- List relationships
- Display, activate, and deactivate policies
- Change the preferred member of a choice group
- Issue online and offline requests against resources and cancel requests
- Reset a resource from an unrecoverable error

You can use the command shell in addition to or instead of the operations console. Using the command shell has the following benefits:

- You can work with end-to-end automation domains from systems where no Web browser is available for displaying the operations console.
- You can use the commands in system scripts or Windows batch files, for example, to monitor or issue requests against resources or to activate a different policy. You can have the scripts launched automatically, for example, by a workload scheduler, such as Tivoli Workload Scheduler, or the cron daemon on UNIX platforms.
- Users who are not working with the operations console on a daily basis may find it easier to use than the operations console.

For information about the end-to-end automation manager command shell, refer to Chapter 23, “Using the end-to-end automation manager command shell,” on page 167.

End-to-end automation policy

The policy is defined in an XML file. The file contains the definitions of all resource references, groups and relationships which will be managed by the end-to-end automation domain. The document will be read by the end-to-end automation manager at policy activation time. The automation manager will automatically set up the links between the end-to-end automation domain and any available or joining first-level automation domains hosting resources that are referenced by resource references in the currently activate policy.

The end-to-end automation policy describes:

- The aggregation of resource references and of groups of resource references. By gathering resource references in groups and by building group hierarchies, the aggregated state of a complete enterprise application can be monitored easily. In addition, because all members of a group can be started or stopped through a single request, only one request is needed to start or stop all resources that are required by a business application, which may be distributed over multiple first-level automation domains.
- The relationships between resource references, such as which resource must be in an online state before another resource can be started.
- The desired states of the resource references. The desired state is the automation goal the end-to-end automation manager tries to reach by keeping each defined resource reference in this state.
First-level automation domain

This term is used for an automation back-end hosting resources that are managed by some automation management product, for example, a Linux cluster on which the applications are automated by SA for Multiplatforms. Such a cluster becomes a first-level automation domain when an automation adapter has been installed and configured and is running on one of the nodes of the cluster. Only resources that are managed by a first-level automation domain can be the target of resource references.

Automation database

The automation database is needed by the automation J2EE framework in order to store persistent information about automation domains (the end-to-end automation domain and first-level automation domains) and operator preferences. The database also holds some information about the currently active automation policy. However, the policy itself is not stored in the database. The policy itself is made persistent by specifying it as an XML document and placing it in the policy pool directory which is used by the automation engine.

Automation Software Development Kit

The Automation Software Development Kit defines a set of classes that are used by all other end-to-end automation subcomponents. These classes represent the common data model of end-to-end automation management and the methods that are needed to access it. The Automation Software Development Kit component is not visible as a running part neither by itself nor within WebSphere Application Server. However, references to the classes may appear in messages in various trace and log files which are written by subcomponents of the End-to-End Automation Management component.
Chapter 3. SA operations console modes

This chapter gives an overview of the three different modes in which the SA operations console of Tivoli System Automation for Multiplatforms can be used.

End-to-end automation mode

In this mode, end-to-end automation management is active. From the SA operation console, you can monitor and manage the resources of the end-to-end automation domain and of the first-level automation domains that are connected to the end-to-end automation manager.

Prerequisites for using the SA operations console in end-to-end automation mode:
- The End-to-End Automation Management component is installed.
- The end-to-end automation manager and the end-to-end automation engine are running.
- The automation adapters on the first-level automation domains are configured to send events to the end-to-end automation manager (end-to-end automation mode).
- The automation adapters are running.
- An end-to-end automation policy is active.

This is what you will see on the SA operations console:
- In the topology tree, the end-to-end automation domain is displayed.
- First-level automation domains hosting resources that are referenced in the end-to-end automation policy are displayed as children of the end-to-end automation domain.
- First-level automation domains that are not hosting resources that are referenced in the end-to-end automation policy appear at the same level of the domain hierarchy as the end-to-end automation domain.

This is what you can do on the SA operations console:
- You can monitor and manage the resources that are hosted by the end-to-end automation domain and by the first-level automation domains.
- You can activate and deactivate automation policies for automation domains that support policy activation from the SA operations console (see also Chapter 19, “Domain capabilities,” on page 113).
- You can perform the full set of tasks described in Part 4, “Monitoring and managing automated resources,” on page 109.

First-level automation mode

In this mode, end-to-end automation management is not active. You can use the SA operations console for monitoring and managing resources of domains that are automated by first-level automation products for which automation adapters are provided (Base component of SA for Multiplatforms, SA z/OS, HACMP, Microsoft® Server Cluster, VERITAS Cluster Server for Solaris).

Prerequisites for using the SA operations console in first-level automation mode:
- The End-to-End Automation Management component is installed.
- The automation engine of the End-to-End Automation Management component is started in conversion-only mode. In this mode, it is only used for converting events into the required format. No end-to-end automation domain is available and no end-to-end automation is performed.
- The automation adapters on the first-level automation domains are configured to send events to the end-to-end automation manager (end-to-end automation mode).
- The automation adapters are running.

This is what you will see on the SA operations console:
- In the topology tree, all automation domains appear at the same level.

This is what you can do on the SA operations console:
- You can monitor and manage the resources of the first-level automation domains.
- You can activate and deactivate automation policies for automation domains that support policy activation from the SA operations console (see also Chapter 19, “Domain capabilities,” on page 113).

For detailed information about the communication flow that occurs when the SA operations console is used in first-level automation mode, refer to Chapter 24, “The operations console is used in first-level automation mode” on page 24. For information on how you start the automation engine in conversion-only mode, refer to Chapter 15, “Using the command-line interface of the automation engine,” on page 95.

**Direct access mode**

In this mode, you can use the SA operations console for monitoring and managing resources that are automated by the following first-level automation products:
- Base component of SA for Multiplatforms
- HACMP
- Microsoft Server Cluster
- VERITAS Cluster Server

On the system on which the SA operations console is installed, the End-to-End Automation Management component must not be installed.

**Note:** A first-level automation domain can only be connected to either an SA operations console in direct access mode or an SA operations console in one of the other modes.

Prerequisites for using the SA operations console in direct access mode:
- The SA operations console is installed.
- The automation adapters for the first-level automation domains are configured to send events to the SA operations console (direct access mode).
- The automation adapters are running.

This is what you will see on the SA operations console:
- In the topology tree, you see the automation domains.

This is what you can do on the SA operations console:
- You can monitor and manage the resources that are hosted by the first-level automation domains.
• You can activate and deactivate automation policies for automation domains that support policy activation from the SA operations console (see also Chapter 19, “Domain capabilities,” on page 113).
Chapter 4. Communication flow between the components

The following sections provide an overview of the communication flows between the components involved in end-to-end automation management.

Policy activation and subscription

The following figure shows the communication flow that occurs when a new policy is activated:

![Communication flow diagram]

This is a description of the scenario shown in the figure above:

1. An operator requests the activation of an end-to-end automation policy using either the operations console or the end-to-end automation manager command shell.
2. The name of the policy is passed to the automation J2EE framework with the request for activation.

3. The request is passed to the automation engine resource adapter.

4. The policy activation request is passed to the automation engine.

5. The automation engine loads the policy from the policy pool directory.

6. The automation engine parses the policy XML document and creates all resources, groups, and relationships within its internal storage structure. At this time, the automation engine has no information about the observed state of any of the defined resource references. It also does not know if the first-level automation domains hosting the referenced resources defined in the policy are currently online. This is why the automation engine now subscribes to the automation J2EE framework to be informed about the state of any first-level automation domain that hosts referenced resources.

7. The automation J2EE framework returns a list of all first-level automation domains that are currently online. (From then on, the automation engine will be informed of all state changes in the domains it subscribed for, for example, when an automation adapter sends its domain join event at a later time.)

8. The automation engine subscribes to the resources hosted by the first-level automation domains which were returned in step 7. This is done because the automation engine needs to get informed about the current (observed) state of all resources in this first-level automation domain in order to calculate the states and resulting requests for the resource references defined in the automation policy.

9. The subscription for state changes of resources is passed to the first-level automation manager resource adapter.

10. The subscription is passed to the first-level automation domain. From now on, the automation engine will be informed whenever the state of one of the resources it subscribed for changes.

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**A first-level automation domain sends a resource modified event**

The following figure shows the communication flow that occurs when the observed state of a first-level automation resource that is referenced in the active policy changes.
This is a description of the scenario shown in the figure above:

1. The observed state of a resource which is referenced by a resource reference in the active end-to-end automation policy changes. In such a case, a so-called state change event is sent to the automation J2EE framework.

2. The automation J2EE framework has a list of all subscribers that must be informed when the state of this resource changes. In the scenario shown in the figure above, there are two subscribers for this resource:
   - the end-to-end automation domain has made a subscription (see to “Policy activation and subscription” on page 19)
   - an operator is monitoring this resource from the operations console

Therefore, the automation J2EE framework forwards the state change event to two recipients:
- The event is forwarded to the operations console
- Via the automation engine resource adapter, it is also forwarded to the automation engine

3. The event is forwarded
a. to the operator monitoring the operations console
b. to the automation engine

4. The automation engine calculates the new states for the resource reference pointing to this resource and for all groups and related resources. In addition, as a reaction to the new situation, it may generate new requests.

5. Each of the resulting requests is forwarded to the automation J2EE framework. The framework forwards each request to the first-level automation domain that hosts the resource to which the request applies.

6. The request is passed through the first-level automation manager resource adapter.

7. The request is transmitted to the first-level automation domain, which will evaluate the request and react accordingly.

An operator submits a request against a resource reference

The following figure shows the communication flow that occurs when an operator submits a request against a resource reference:
This is a description of the scenario shown in the figure above.
1. An operator submits a request against a resource reference using either the operations console or the end-to-end automation manager command shell.

2. The operations console forwards the request to the automation J2EE framework.

3. The request is passed through the automation engine resource adapter.

4. The request is passed to the automation engine.

5. If automation for the resource reference is not currently suspended, the automation engine calculates all resulting requests (for request-driven first-level automation domains) or commands (for command-driven first-level automation domains) which must be issued against referenced first-level automation resources. These calculations take into account all relationships defined in the active end-to-end automation policy.
6. All resulting requests or commands against referenced resources are passed to the automation J2EE framework.

7. The requests or commands are passed through the first-level automation manager resource adapter.

8. The requests or commands are passed to the first-level automation domains. The first-level automation managers will handle the requests or commands and start or stop the resources depending on the relationships defined in the active first-level automation policy.

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**The operations console is used in first-level automation mode**

When you use the operations console in first-level automation mode, in which case you monitor and manage first-level automation domains only, you start the automation engine using the converter option `-co (eezdmn -co)`. This will start the automation engine in "conversion-only" mode, that is, it will only be used to convert events but no end-to-end automation domain will be available and no end-to-end automation will be performed.

The following figure shows the communication flow that occurs when the automation engine is running in conversion-only mode and the operations console is used for monitoring and managing first-level automation domains only.
This is a description of the scenario shown in the figure above:

1. The operator opens the resource table for a first-level automation domain on the operation console.

2. The operations console performs a query for resource-related information (states and other information) against the automation J2EE framework. In addition, it also subscribes for this resource in order to be informed about future state changes.

3. The query and the subscription request are passed through the first-level automation manager resource adapter.

4. The query and the subscription request are passed to the first-level automation domain. The query results, that is, the current states of the resources, are returned to the operations console.

5. The observed state of the resource changes. Because the operations console subscribed for such events, a state change event is generated and passed to the automation engine.
6. Because the automation engine is running in conversion-only mode, it only translates the EIF event and puts it into the JMS topic that is used by the automation J2EE framework for getting posted about such events.

**Note:** The automation engine always converts events in this way. This is also true for the other scenarios described in this chapter, where this fact is not mentioned in order to keep the scenarios as simple as possible.

7. The change event is passed to the operations console because it is on the subscriber list.

8. The state of the displayed resources is updated accordingly.
Chapter 5. Automation concepts

Resources of the end-to-end automation domain

The end-to-end automation manager manages the following types of resources:

- Resource references
- Resource groups
- Choice groups

Resource references

End-to-end automation resource references are virtual resources that reference actual resources. The actual resources are hosted by first-level automation domains.

Resource groups

End-to-end automation resource groups are composed of member resource references that are functionally related, share the same automation goal, and will be managed as one unit. Group members can be resource references, choice groups, or other resource groups, thus allowing an arbitrary level of nested groups.

Choice groups

End-to-end automation choice groups have the following characteristics:

- The members of a choice group are configuration alternatives that provide the same functionality (for example, two databases where one is used as production database and the other serves as backup).
- Only one of the members can be online at a time.
- The members can be either resource references or resource groups.
- One member of the choice group is defined as the preferred member. When the desired state of the choice group is online, the preferred member is kept online by the automation manager. The other members are kept offline.
- When a member other than the preferred member is to be brought online, an operator must change the preferred member.

Goal-driven automation

End-to-end automation is goal-driven. This means:

- The automation manager knows the automation goal for each resource it manages. The automation goal is the so-called desired state of the resource. Possible desired states for a resource are Online or Offline. The end-to-end automation manager pursues the automation goal by trying to keep the resource in its desired state.
- The automation manager is aware of relationships between resources that are defined in the end-to-end automation policy. It ensures that the relationships are fulfilled before a resource is started or stopped, that is, it ensures that any other resources that must be started or stopped first are actually started or stopped first.
- The automation manager pursues the automation goals not by issuing start or stop commands, but rather by submitting requests to the first-level automation managers that ask that the automation goal of the resource be changed. This ensures that a resource is only started or stopped when the first-level
automation manager has determined that any relationships defined for the resource in the first-level automation policy are fulfilled and no higher priority requests exist.

To ensure that each resource is kept in its desired state, the automation manager keeps track of various states for each resource. The following list gives a short overview of the states the automation manager knows for a resource and that are also displayed on the operations console:

**Desired state**
The desired state is the automation goal the automation manager pursues. Possible desired states are Online and Offline. When the desired state is online, the automation manager tries to keep the resource online. When the desired state is offline, the automation manager tries to keep the resource offline.

**Compound state**
The compound state indicates whether the resource or resource group works as desired or whether problems have occurred. It provides a traffic-light-like indicator informing operators when they need to react to a situation.

**Operational state**
The operational state provides additional information about the compound state.

**Observed state**
The observed state describes the current state of the actual first-level automation resource as reported by the first-level automation manager.

For a description of all states that are displayed in the operations console, refer to “State information provided on the operations console” on page 131.

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**How the automation manager is informed about automation goals**

The automation manager is informed about the automation goal for a specific resource in the following ways:

- The default desired state for a resource is defined in the end-to-end automation policy.
- At runtime, the desired state is influenced by operator actions (start and stop requests) and by a resource’s relationships (StartAfter, StopAfter, and ForcedDownBy relationships):
  - Operators can change the desired state of a resource at runtime by submitting a start or stop request. If such a start or stop request can be fulfilled, the desired state of the resource changes to the new value. The new automation goal remains valid until the request is canceled or overruled by another request.
  - When the automation goal of a resource changes and the resource has StartAfter or StopAfter relationships, the desired states of the resources that are involved in the relationship change as well (if they are not in the requested desired state already). In such a case, the change of the desired state also persists until the original request is canceled or overruled by a higher priority request.
  - A ForcedDownBy relationship will result in a transient change of the automation goal when another resource is forced down.
How the default desired state is determined

The default desired state of any resource of the end-to-end automation domain (resource reference, resource group, and choice group) depends on the definition in the policy. The default desired state is the automation goal the automation manager will pursue if no other requests against the resource exist. The XML tag for defining the desired state in the XML policy is optional, this means that the default desired state can but need not necessarily be defined for each resource.

This is how the default desired state of a resource is determined:

• When the desired state of a resource reference is not defined in the policy and the resource reference is not a member of a resource group or choice group, the default (Online) is used.

• All members of a resource group have the same default desired state. The desired state of a resource group takes precedence over the desired state defined in the policy for any of its members. When the desired state is defined in the policy for a member of the group, it will be ignored even if it differs from the desired state of the group.

• When the desired state of a resource group is not defined in the policy, the default (Online) will be used.

• The default desired state of the members of a choice group depends on the default desired state of the choice group:
  – If the default desired state of the choice group is online, which is also the default that is used when the desired state is not defined in the policy, the automation manager will try to keep the so-called preferred member online and the other members offline.
  – If the default desired state is offline, all members will be kept offline.

Understanding relationships

The end-to-end automation manager is aware of relationships between resources. Relationships are defined in the end-to-end automation policy. In end-to-end automation management, there are three types of relationships:

• StartAfter relationships
• StopAfter relationships
• ForcedDownBy relationships

What is a relationship?

Relationships can exist between two resource references, a resource reference and a group, and between two groups. The resources involved in a relationship can be hosted by different domains.

A relationship exists between a source resource and a target resource.

As the arrow in the figure above indicates, relationships always have a direction: In a StartAfter relationship, for example, target resource B would be started before source resource A.
By using combinations of managed relationships, complex automation scenarios can be defined. This is shown in this figure:

The arrows between the resources in the figure could, for example, represent the following three relationship definitions in the policy:
1. A StartAfter B
2. B StopAfter A
3. B StartAfter C

The source or target of a relationship can be resource references or groups of the end-to-end automation domain.

Whenever the automation goal of a resource is changed, for example, by a start or stop request, the automation manager checks whether StartAfter or StopAfter relationships are defined for the resource and, if this is the case, ensures that the relationships are fulfilled.

**StartAfter relationship**

The StartAfter relationship ensures that the source resource is only started when the target resource is online.

The StartAfter relationship provides the following behavior scheme:

This StartAfter relationship defines the start sequence for resources A and B:
- When source resource A has to be started, then the target resource B is started first.
- After resource B has become online, resource A is started.

**Details on the start behavior of the StartAfter relationship**

The start behavior is controlled through the observed state of the target resource. At the time when the observed state of resource B has become online, resource A is started. Here are some examples for the start behavior that results from StartAfter relationships:
- In the example shown in the following figure, resource A and resource B are members of the same resource group:

When the desired state of their resource group is set to online, for example by a start request, both members A and B are started. Due to the StartAfter relationship from A to B, resource B is started first. Once the observed state of resource B is online, resource A is started.
- In the example shown in the following figure, resource A is a member of resource group RG_A, and resource B is a member of resource group RG_BC, and a StartAfter relationship is defined between A and B. Then the start
behavior of the StartAfter relationship is triggered when the desired state of RG_A is set to online, for example, by a start request.

![Diagram showing desired states and StartAfter relationship]

Due to the start sequence defined by the StartAfter relationship, resource B has to be started first. However, because RG_BC’s desired state is set to offline, the following conflict exists:

RG_BC wants resource B to be offline whereas the StartAfter relationship forces B to be started. The end-to-end automation manager resolves this conflict in such a way that the online request is always more important than the offline request. Therefore resource B is started even though other possible group members of RG_BC will not be started since the desired state of their group is offline. After resource B is online, the end-to-end automation manager will try to start resource A. Resource C is not started.

When the desired state of RG_A is changed to offline in this scenario, resources A and B are stopped simultaneously. The reason for this behavior is that resource B was started due to the start request against resource group RG_A, which had been passed on to resource B due to the StartAfter relationship.

When the desired state of RG_A is set to offline, the start request for resource B is removed and the desired state of RG_B, which is offline, causes resource B to be stopped.

- The StartAfter relationship only acts in the forward direction of the relationship. In this example, resource A and resource B are members of different resource groups (A belongs to RG_A and B belongs to RG_B). In this case, setting the desired state of RG_B to online does not result in any action on resource A because resource B has no forward relationship to resource A.

![Diagram showing desired states and StartAfter relationship]

When RG_A’s desired state is set to online, resource A can be started right away since resource B is already online.

- In this example, resource A has a StartAfter relationship to resource B and resource C.

In this case, starting A requires that both resources B and C are online before the end-to-end automation manager can start resource A. If A, B, and C are members of the resource group RG_ABC, setting the desired state of RG_ABC to online causes that resources B and C are started in parallel first. When the observed state of both resources is online, then resource A is started.
In this example, resource A is a member of resource group RG_A, resource B is a member of resource group RG_B, and resource C is a member of resource group RG_C.

A has a StartAfter relationship to both B and C. Setting RG_A’s desired state to online causes that due to the StartAfter relationship resource C and resource B are started. After both resources B and C are online, A is started.

**StopAfter relationship**

The StopAfter relationship ensures that the source resource can only be stopped when the target resource is offline.

The StopAfter relationship provides the following behavior scheme:

Resource A will not be stopped unless the target resource B has been brought offline before.

**Details on the stop behavior of the StopAfter relationship**

The stop behavior is controlled via the observed state of the target resource. At the time when the observed state of resource B has become offline, resource A is stopped. Here are some examples for the stop behavior that results from StopAfter relationships:

- This is an example of a simple StopAfter relationship. Source resource A cannot be stopped while target resource B is in observed state online.

When the desired state of resource A is set to offline, the automation manager stops B first. Once B is offline, A will be stopped.

- In this example, source resource A and target resource B are members of the same resource group.

When the desired state of resource group RG_AB is set to Online, both members A and B are started. Since the StopAfter relationship does not define a start sequence, resources A and B can be started simultaneously. Setting their resource group’s desired state to offline causes that all members are stopped. Due to the
relationship from A to B, resource B is stopped first. When the observed state of resource B is offline, resource A is stopped.

- In this example, resources A and B are members of different resource groups (A belongs to RG_A, and B belongs to RG_B). RG_B has the desired state offline.

As long as the desired state of RG_B remains Offline, you can start and stop RG_A without any dependency to resource group RG_B. If you set the desired state of RG_B to online and the desired state of RG_A to offline, source resource A cannot stop as long as target resource B is Online. If the desired of RG_A is offline, you can start or stop RG_B without any dependency to resource A.

- In this example, resource A is a member of resource group RG_A, resource B is a member of resource group RG_B, and resource C is a member of resource group RG_C. A has a StopAfter relationship to both B and C.

If the desired state of RG_A is online and you want to stop it, RG_A cannot be stopped as long as the desired state of both RG_B and RG_C is online. Only when both RG_B and RG_C have a desired state of offline, resource A can be stopped.

**ForcedDownBy relationship**

Use the ForcedDownBy relationship to ensure that the source resource is brought down if the target resource comes offline.

The ForcedDownBy relationship provides the following behavior scheme:

Resource A is forced offline when the target resource B goes offline. The stop of resources A and B can happen in parallel. The force down of resource A will be triggered when resource B enters any of the regular down states (Offline) after having previously been in an Online state or when resource B fails while it is offline.

**Note:** After Resource A has stopped, its desired state will change to the current desired state again. For example, if Resource A has the desired state Online and is forced down because Resource B fails, the following happens:

1. Resource A is brought offline.
2. When the observed state of Resource A has changed to Offline, its desired state again changes to Online and Resource A will be started.

**Details on the force down behavior of the ForcedDownBy relationship**
The basic principle of the ForcedDownBy relationship is that source resource A must be forced Offline when target resource B goes offline or fails. Here are some examples that illustrate the behavior when a ForcedDownBy relationship is defined:

- In this example, resource A has a ForcedDownBy relationship to resource B.

![Diagram of ForcedDownBy relationship](image)

Both resources are online. In case resource B goes offline, resource A will be forced down.

- In this example, resource A is member of resource group RG_A, and resource B is member of resource group RG_B, and A has a ForcedDownBy relationship with resource B. The force down behavior of the ForcedDownBy relationship is triggered by a failure of resource B. Due to the ForcedDownBy relationship, resource A will be stopped as well. This will happen even though the desired state of RG_A is Online. However, because the desired state of RG_A is still online, resource A will be restarted by the end-to-end automation manager. To achieve the behavior that resource A remains offline as long as resource B is offline, add an additional StartAfter relationship between resource A and resource B.

![Diagram of ForcedDownBy relationship with StartAfter](image)

**How requests become goals**
In end-to-end automation management, operators start and stop resources by submitting requests.

A request asks that one specific resource should be moved to a specific desired state (its automation goal). Using requests instead of commands ensures that the priority of requests is honored and that any relationships that have been defined for the resource are fulfilled before a resource is started or stopped.

Here is a simplified example that describes what happens when an operator submits a start request against a resource reference:

- The end-to-end automation manager checks whether a request has been submitted against the resource reference that has a higher priority than the current request. If this is not the case, the operator request wins and the desired state of the resource reference is set to online.

- The end-to-end automation manager checks whether StartAfter relationships are defined for the resource reference in the automation policy. When no such relationship exists, the automation manager sends a start request against the referenced resource to the first-level automation manager.

- The first-level automation manager checks whether requests against the resource exist that have a higher priority than the current request. If this is not the case, the first-level automation manager checks whether relationships have been
Requests

Priorities

Processing

This means that what happens after a start or stop request is submitted depends on the following conditions:

- Whether the resource has StartAfter or StopAfter relationships.
- Whether other higher priority requests exist for the resource itself or for a resource to which it has a relationship.

Requests processing when relationships exist

When a start or stop request is submitted against an end-to-end automation resource, the automation managers involved ensure that any relationships defined for the resource are fulfilled before the source resource is started or stopped. To achieve this goal, automation managers use two types of requests, namely, genuine requests and votes. Votes are a special type of request that have the following characteristics:

- Votes are internal requests that an automation manager generates against the target resource of a relationship.

  To ensure that a relationship of a resource reference is fulfilled when a request is submitted against the source resource, the end-to-end automation manager will generate both a vote and a request:
  
  - A vote is generated against the target resource reference.
  - If the vote wins, that is, if no higher priority request against the target resource reference exists, the automation manager will generate a request against the referenced resource and forward it to the first-level automation manager.

- When a vote wins, the desired state of the target resource is changed accordingly. The new desired state persists until it is either overruled by a higher priority request or the request against the source resource is canceled.

- When the request against the resource is canceled, the votes that were generated against the target resources of a relationship are canceled as well.

- Operator requests can be canceled by any other operator from the operations console. Votes that were generated due to an operator request cannot be canceled directly. They are canceled automatically when the request against the source resource is canceled.

Request priorities

Requests that are submitted against an end-to-end automation resource are kept in the resource’s request list. Whether a request to change the desired state of a resource is successful, that is, if the request wins, depends on the priority rank of the requests that are already in the resource’s request list. A request will only win if it has a higher priority than any of the other requests or votes in the list.

The priority rank of a request is determined by the value of its priority attribute (Prio), its source, and its type (online or offline):

Possible priority values:

- **Force** - Overrides requests with any other priority value. The value can only be set using the `resreq` command of the end-to-end automation manager command shell.
High  Overrides low priority requests. The value is used as fixed value for requests that are issued from the operations console.

Low  The value can only be set using the resreq command of the end-to-end automation manager command shell.

Possible sources of a request:

Operator
Default value that is set for requests that are submitted from the operations console or through a command that is issued in the end-to-end automation manager command shell or used in a system script or Windows batch file.

Automation
Default value that is set for requests that are generated by the end-to-end automation manager.

ExtSched
This value can be set for end-to-end automation manager command shell commands that are used in shell scripts or Windows batch files. These scripts are typically launched automatically, for example, by an external scheduler, such as Tivoli Workload Scheduler or the cron daemon on UNIX systems.

To determine the priority ranking of requests that were submitted against a resource, the end-to-end automation manager first evaluates the value of the priority attribute. If multiple requests have the same priority value, the value of the source attribute is evaluated: Operator requests have the highest priority, followed by Automation requests, and finally by ExtSched requests. If the requests could still not be prioritized, start requests take precedence over stop requests.

Table 3 illustrates the priority ranking of requests. The asterisks (*) indicate the default priority of requests that are issued from the operations console or end-to-end automation manager command shell if no priority is specified.

Table 3. Priority ranking of requests

<table>
<thead>
<tr>
<th>Priority</th>
<th>Source</th>
<th>Request type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Force</td>
<td>Operator</td>
<td>Online</td>
</tr>
<tr>
<td>Force</td>
<td>Operator</td>
<td>Online</td>
</tr>
<tr>
<td>Force</td>
<td>Automation</td>
<td>Online</td>
</tr>
<tr>
<td>Force</td>
<td>Automation</td>
<td>Offline</td>
</tr>
<tr>
<td>Force</td>
<td>Automation</td>
<td>Online</td>
</tr>
<tr>
<td>Force</td>
<td>ExtSched</td>
<td>Online</td>
</tr>
<tr>
<td>Force</td>
<td>ExtSched</td>
<td>Offline</td>
</tr>
<tr>
<td>High</td>
<td>Operator</td>
<td>Online*</td>
</tr>
<tr>
<td>High</td>
<td>Operator</td>
<td>Offline*</td>
</tr>
<tr>
<td>High</td>
<td>Automation</td>
<td>Online</td>
</tr>
<tr>
<td>High</td>
<td>Automation</td>
<td>Offline</td>
</tr>
<tr>
<td>High</td>
<td>ExtSched</td>
<td>Online</td>
</tr>
<tr>
<td>High</td>
<td>ExtSched</td>
<td>Offline</td>
</tr>
<tr>
<td>Low</td>
<td>Operator</td>
<td>Online</td>
</tr>
<tr>
<td>Low</td>
<td>Operator</td>
<td>Offline</td>
</tr>
<tr>
<td>Low</td>
<td>Automation</td>
<td>Online</td>
</tr>
<tr>
<td>Low</td>
<td>Automation</td>
<td>Offline</td>
</tr>
<tr>
<td>Low</td>
<td>ExtSched</td>
<td>Online</td>
</tr>
<tr>
<td>Low</td>
<td>ExtSched</td>
<td>Offline</td>
</tr>
</tbody>
</table>

Additional prioritization rules:
• Requests have a higher priority than votes that were generated by the automation manager of the same automation domain.

• Requests generated by the end-to-end automation manager against a first-level automation resource have a lower priority than votes generated against the same resource by the first-level automation manager.

• When an operator submits a request against a resource reference, resource group, or choice group, the request that is forwarded to the first-level automation manager is generated by the end-to-end automation manager. As requests that are generated by an automation manager have a lower priority than requests that are submitted by an operator, such a request will not win when the request list contains an operator request that was submitted directly against the first-level automation resource.

• Requests submitted by different operators have the same priority.

• Requests generated by any automation manager against the same resource have the same priority.

• Requests generated by the same automation manager replace each other.

How requests against resource references are processed

This chapter describes how requests against resource references are processed by the end-to-end automation manager.

As described above, resource references are virtual resources that are hosted by the end-to-end automation engine. Resource references point to actual resources that are hosted by first-level automation domains. The actual resources that are referenced by a resource reference are called referenced resources.

Requests against referenced resources are evaluated by the end-to-end automation manager and result from the following scenarios:

• An operator issues a request against a resource reference. If automation for the resource reference is not suspended, the end-to-end automation manager evaluates the request and forwards it to one or more referenced resources.

• A state change event of a referenced resource causes the end-to-end automation manager to react by generating requests against one or more referenced resources.

• An operator activates an end-to-end automation policy. The end-to-end automation manager creates requests against all referenced resources to ensure that the desired state of the resource references defined in this policy is fulfilled.

User credentials of the end-to-end automation manager

When the end-to-end automation manager issues requests against referenced resources, it must authenticate itself to the first-level automation domains that host the referenced resources. For authentication, the end-to-end automation manager uses the user credentials (user ID and password) that are specified on the User credentials page of the configuration dialog.

The user credentials are needed because the automation manager is a stand-alone process that must be able react to exceptional situations even if no operator is logged in.

If the referenced resource that is targeted by the request is hosted by a first-level automation domain for which specific user credentials have been specified, the automation manager uses these credentials for authentication. If no specific user
credentials for the domain are specified in the configuration dialog, the automation manager uses the generic credentials that must be specified in the configuration dialog.

This is an example of how the user credentials for the automation engine are specified in the configuration dialog:

On the User credentials page shown above, specific credentials are only defined for the first-level automation domain FEPlex. When the end-to-end automation engine issues requests against referenced resources that are hosted by FEPLEX, it authenticates itself using the user ID jdoe and the corresponding password.

When it issues requests against referenced resources that are hosted by other first-level automation domains, the end-to-end automation engine uses the user ID and the password specified in the fields **Generic user ID** and **Generic password**.

**Example scenarios**

In the scenarios described in the following sections, it is assumed that the end-to-end automation policy contains the following specifications:

```
ResourceReference A ---- startAfter ----> ResourceReference B
```

```
refers to
Resource A on FEPLEX
```

```
refers to
Resource B on MYDOMAIN
```

**A policy is activated**

When the policy containing the definitions above is activated, the automation engine first subscribes for the referenced resources Resource A, which is hosted by the domain FEPLEX, and Resource B, which is hosted by the domain MYDOMAIN.
(see also “Policy activation and subscription” on page 19). To make the subscriptions, the automation engines uses the user credentials that are specified in the end-to-end automation manager configuration dialog. For information about the configuration dialog, see the IBM Tivoli System Automation for Multiplatforms Installation and Configuration Guide, section “Configuring the end-to-end automation manager”.

After receiving the subscriptions, the automation managers on both first-level automation domains create a so-called initial resource event for each referenced resource and send them to the end-to-end automation manager. The initial resource events inform the end-to-end automation manager of the current observed state of Resource A and Resource B. After receiving and processing these events, the end-to-end automation manager sets the states of both resource references (ResourceReference A and ResourceReference B) accordingly. Depending on which desire state is defined for the resource references in the end-to-end automation policy, the end-to-end automation manager generates requests and sends them to the referenced resources.

Note:

• After receiving the initial event for a resource, the end-to-end automation manager always generates a request against the referenced resource and sends it to the first-level automation domain. This is done even if the current observed state of the referenced resource already matches the desired state of the resource reference in the end-to-end automation policy. This ensures the desired state from the end-to-end automation policy is known on the first-level automation domain.

• The end-to-end automation manager writes a message to the domain log file that contains the user ID of the operator who activated the policy from the operations console.

An operator issues a request against a resource reference

An operator can issue requests against resource references from the operations console (see “An operator submits a request against a resource reference” on page 22 for a description of the complete flow). This request is passed to the end-to-end automation manager with the operator’s user ID. The end-to-end manager writes a message to the log file of the end-to-end automation domain. This message contains the user ID of the operator who issued this request from the operations console.

Subsequently, the end-to-end automation engine calculates the resulting actions. Assume that the operator with the user ID "Charles" issued a start request against ResourceReference A. The end-to-end automation manager will evaluate the new desired states of all resource references defined in the automation policy. In this particular case, also assume that ResourceReference B currently is in an offline state. As a start/after relationship between ResourceReference A and ResourceReference B is defined in the policy, the first resulting action is to ensure that ResourceReference B is started, which results in an Online request against Resource B.

The automation engine generates an Online request against Resource B. This Online request is forwarded to the first-level automation domain MYDOMAIN with the credentials specified in the configuration dialog for this domain (in this case, let us assume the user ID "bob" has been specified for accessing MYDOMAIN).
The request can now be viewed on the referenced resource Resource B. The request that has been added by the end-to-end automation manager has the source E2EMGR and the user ID that is specified for this domain in the configuration dialog ("bob").

Subsequently, the end-to-end automation engine waits for the request to be processed by the first-level automation domain MYDOMAIN. After the end-to-end automation manager receives the resource status change event that informs it of the fact that Resource B has become online, the end-to-end automation engine generates the Online request against Resource A, which is hosted by FEPLEX, authenticating itself with the user ID "root". This request can now be viewed on the referenced resource Resource A. The source of this request is E2EMGR. On Resource Reference A, the end-to-end operator request issued by "Charles" can also be viewed. On this level, however, the request source is OPERATOR, and the user ID is "Charles".

To sum up: When an operator submits a request against a resource reference from the operations console, this may result in the generation of requests against more than one referenced resource. These resulting requests are issued by the end-to-end automation manager using the credentials from the configuration dialog. The user ID of the operator who submits or cancels a request against a resource reference is logged in the log file of the end-to-end automation domain. It can also be viewed when the resource reference is selected.

**The state of a referenced resource changes**
Whenever the state of a referenced resource changes, the end-to-end automation manager is informed of the state change through an event. The state of the resource reference is updated accordingly. In some cases, the automation engine of the automation manager will create requests against this referenced resource or other referenced resources because of the state change. As described in the scenarios above, the end-to-end automation manager will use the user credentials specified in the configuration dialog when it issues the requests against the referenced resources.

**When the end-to-end automation manager will not generate requests**
The previous sections described the situations in which the end-to-end automation manager generates requests against referenced resources that are hosted by first-level automation domains. The following sections describe in which situations the end-to-end automation manager will not generate requests.

**The referenced resource is a monitor resource**
In some situations, a first-level automation manager is not able to handle requests against specific resources.

When the end-to-end automation manager or the operations console subscribes for events for such a resource, the initial resource event contains the information that the particular resource is a so-called monitor resource.

The end-to-end automation manager will never generate requests against such resources. Whenever a state change event is received from these resources, the state of the corresponding resource reference is only updated.

However, a state change of a monitor resource can still cause some other resource references to be started or stopped by a request that is generated by the
automation manager. This happens if the resource reference referencing the
monitor resource is a member of some relationship.

**The referenced resource is in a transitional state**

The end-to-end automation engine does not generate requests if the referenced
resource is in a so-called transitional state. Transitional states are, for example, the
states Starting or Stopping. The end-to-end manager waits until the transition is
completed before generating a request.

**The referenced resource is in a specific operational state**

Some operational states of referenced resources also cause the end-to-end
automation engine not to create requests. In general, it can be said that whenever
the referenced resource is in a state where it cannot accept requests, the end-to-end
automation engine will not create one.

In any state change event from a referenced resource, the first-level automation
manager not only sends the current observed state but also the current operational
state. If the operational state already indicates an error, the end-to-end automation
manager assumes that the first-level automation manager already handles the
current state of this referenced resource. The first-level automation manager
already reacts to the particular situation. Therefore, it would not make sense for
the end-to-end automation manager to also create a new request which might
request the same operations as the first-level automation manager is already trying
to perform.

The following list contains the operational state descriptions that will cause the
end-to-end automation manager not to create requests:

Warning: Waiting for initial state info
Warning: Online/Offline request pending
Warning: The communication has been interrupted
Error: The resource has an unrecoverable problem
Error: The hosting node is gone
Error: The resource has been excluded from automation
Error: The resource cannot be started/stopped because the online/offline request
did not win at this moment
Error: The resource reference references a resource that does not exist
Error: The resource cannot be started/stopped because of unfulfilled dependencies
Error: Unable to contact the referenced resource
Error: The referenced resource is in an error state

**Automation is suspended for the resource**

When automation for end-to-end automation resources is suspended, the
automation manager will not to react on observed state changes by issuing
requests against the resource. A state change of a suspended resource can still act
as a trigger for state changes of other resources that have a relationship to the
suspended resource. This includes that resources having relationships to the
suspended resource may still be started or stopped by automation.

If operator requests are submitted against suspended resources, they will be added
to the resource’s request list but the automation manager will not generate requests
against the referenced resources.

For more information about the automation behavior that occurs when automation
is suspended, see “Suspending and resuming automation for resources” on page
362.
**Additional remarks about requests that are generated by the end-to-end automation manager**

The end-to-end automation manager never cancels requests that were generated against referenced resources. If the desired state of a resource reference changes, for example, from online to offline, the end-to-end automation manager does not cancel the Online request against the referenced resource but generates an Offline request and sends it to the referenced resource.

The first-level automation domain handles this request by overwriting the previous request and processing the new request.

If the end-to-end automation manager fails and is restarted, the policy that was active at the time of failure is automatically activated again. The end-to-end automation manager again subscribes for the referenced resources and sends default requests to the referenced resources.

**Canceling obsolete end-to-end automation manager requests on first-level automation resources**

When an administrator deactivates the currently active end-to-end automation policy or activates a new one, the desired states of the resource references from the old policy that were propagated to the referenced first-level automation resources are retained as automation requests. This has the advantage that the referenced resources do not have to be restarted when the desired state in the old and new policy is identical.

However, the new policy may not contain references to the relevant first-level automation resources at all. In such a case, some of the requests that are retained in a first-level automation domain may be obsolete. The following sections describe how you can identify and delete such obsolete requests.

**Canceling requests on SA for Multiplatforms resources**

Perform the following steps to find and remove requests that were issued by the end-to-end automation manager against resources or resource groups hosted by SA for Multiplatforms:

1. To obtain a list of all resource groups against which a request has been issued, enter the following command:
   
   `lsrgreq -L`

2. In the list, identify all resource groups with a request from source Automation

3. Cancel these requests with the following command:
   
   `regreq -o cancel -s Automation <GROUPNAME>`

4. To obtain a list of all group members against which a request has been issued, enter the following command:
   
   `lsrgreq -L -m`

5. In the list, identify all resources with a request from source Automation
6. Cancel these requests using the following command:

   rgmbrreq -o cancel -s Automation <MEMBERNAME>

---

**Example: The referenced resource is a SA for Multiplatforms Base component resource group**

To list all requests against resource groups in a Base component domain, issue the following command:

```
lsrgreq -L
```

The following list is generated:

Displaying Resource Group request information:
All request information
ResourceGroup Priority Action Source NodeList ActiveStatus UserID ...
my_rg high start Automation {} Active e2e

The Active request is a relict from the old end-to-end automation policy. To remove the remaining request, enter the following command:

```
rgreq -o cancel -S Automation my_rg
```

**Example: The referenced resource is a SA for Multiplatforms Base component resource**

To list all requests that were issued directly against resources in a Base component domain, enter the following command:

```
lsrgreq -L -m
```

The following list is generated:

Displaying Member Resource request information:
All request information
Member Resource 1:
Priority = High
Action = start
Source = Automation
ActiveStatus = Active
UserID = e2e
Comments = 20050503142734+0200 |

The Active request is a relict from the old automation policy. To remove the obsolete request, enter the following command:

```
rgmbrreq -o cancel -S Automation IBM.Application:my_resource
```

**Note:** When the referenced resource is a SA for Multiplatforms fixed resource, the node name must be appended:

```
rgmbrreq -o cancel -S Automation IBM.Application:my_resource:node1
```

When the request has been removed, the observed state of my_resource changes from Online to Offline as defined in the first-level automation policy.
Canceling requests on SA z/OS resources

This is an example of a REXX script which can be used for the following purposes:

- Find all requests which have been issued by the end-to-end automation manager
- Cancel the requests that were found

```rexx
/**/
Address NetVAsis,
'PIPE (NAME INGVOTE),
   NETV INGVOTE,OUTMODE=LINE',
   DROP FIRST 3 LINES',
   DROP LAST 1 LINE',
   SEP',
   CASEI COLLECT BREAK BEFORE 27.5 /Req :/',
   CASEI LOC 27.12 /Org : E2EMGR/',
   EDIT 1.25 1 SKIPTO :/: WORD 2.1 NW',
   'FWDLINE 2 SKIPTO :/: UPTO /(/ 2.* NW',
   STEM data.'
Do i = 1 To data.0
Parse Var data.i name type system . 27 request source .
resource = Strip(name'/'type'/'system,'T','/')
say,
   'INGSET KILL' resource' REQUEST='request 'SOURCE='source 'VERIFY=NO'
End i
```
Part 2. First steps

Chapter 6. Overview ........................................... 47

Chapter 7. Starting the sample end-to-end automation domain ........................................... 49

Chapter 8. Activating the sample end-to-end automation policy ........................................... 51

Chapter 9. Creating and activating a new sample automation policy ........................................... 53
Creating a new sample policy .................................................................................. 53
Changing the domain name .................................................................................. 54

Chapter 10. Displaying a first-level automation domain on the SA operations console ....... 57
Where to find the first-level automation domain on the SA operations console .......... 57

Chapter 11. Creating a policy that references actual first-level resources ................. 59
Chapter 6. Overview

During the installation of the End-to-End Automation Management component, a sample end-to-end automation management environment is set up:
- The sample end-to-end automation domain “FriendlyE2E” is configured
- The sample policy file sample.xml is saved to the policy pool directory

The following chapters describe how you can use the sample end-to-end automation environment to learn more about the design of the SA operations console and the functionality it provides, and about the tasks you need to perform to create, change, and activate policies.

You can use the following chapters like a tutorial. When you follow the descriptions, you will learn:
- How to connect to an end-to-end automation domain (see Chapter 7, “Starting the sample end-to-end automation domain,” on page 49)
- How to activate an automation policy (see Chapter 8, “Activating the sample end-to-end automation policy,” on page 51)
- How to create and activate a new automation policy (see Chapter 9, “Creating and activating a new sample automation policy,” on page 53)
- How to display the first-level automation domains and the resources that are hosted by the domains on the SA operations console (see Chapter 10, “Displaying a first-level automation domain on the SA operations console,” on page 57)
- Which steps are required to adapt an automation policy and to activate the modified policy (see Chapter 11, “Creating a policy that references actual first-level resources,” on page 59)

Note: In the descriptions in the following chapters it is assumed that you accepted “FriendlyE2E” as name for the end-to-end automation domain when you installed the End-to-End Automation Management component. If you specified a different name for the end-to-end automation domain during or after the installation, you must first change the domain name you specified to “FriendlyE2E”. How you achieve this is described in “Changing the domain name” on page 54.
Chapter 7. Starting the sample end-to-end automation domain

Perform the following steps to launch the SA operations console of Tivoli System Automation for Multiplatforms (SA operations console) and to display the sample end-to-end automation domain on the console:

1. Log in to the system on which the WebSphere Application Server instance is installed that hosts the automation J2EE framework.

2. Check that the WebSphere Application Server instance is running.

3. Start the automation engine:
   - **Windows:**
     On the task bar, click start > Run, and click **Browse** to navigate to the start script of the automation engine (eezdmn.bat). Start the automation engine with the following command:
     eezdmn.bat
   - **AIX and Linux:**
     Start the automation engine with the following command:
     eezdmn

4. Open your Web browser and connect to Integrated Solutions Console. The address you enter has the following form:
   http://<your_was_server>:<console_port>/ibm/console
   If you accepted the default ports during the installation of WebSphere Application Server, the port number is 9060.

5. On the Login panel of Integrated Solutions Console, enter your user ID and password:
   - You can use the System Automation administrator user ID you created during installation. If you accepted the default value, the user ID is eezadmin.
   - If you have already created and authorized end-to-end automation-specific user IDs, the user ID you use for logging on must belong to a group that allows you to activate a policy.
   After entering your user ID and password, click **Log in**.
   By default, you will now be seeing the Welcome page of Integrated Solutions Console, displaying the installed product suites that use Integrated Solutions Console for administrative tasks. You can click on the entry for Tivoli System Automation to view the System Automation-specific Welcome page. The tasks that you can see in the navigation tree on the left depend on the roles your user ID has been assigned to.

6. On the navigation tree on the left, click **Tivoli System Automation for Multiplatforms > Operational Tasks.**

7. Click **Activate an automation policy** to display the "Activate policy" task.
Results:
- The "Activate policy" task is displayed, listing the available automation domains:
  - In the domain table, the end-to-end automation domain "FriendlyE2E" is displayed. The domain was configured during the installation of the End-to-End Automation Management component.
  - The Active policy column is empty because no policy has been activated yet.

Next step:
- To be able to explore the SA operations console, you need to activate the sample policy. This is described in Chapter 8, "Activating the sample end-to-end automation policy," on page 51. Note that you can also activate an automation policy from the SA operations console (see "Working with automation policies" on page 155).
Chapter 8. Activating the sample end-to-end automation policy

To be activated, automation policies must be available in the automation domain’s policy pool directory. During the installation of the End-to-End Automation Management component, the sample policy sample.xml was saved to the policy pool directory.

To activate the sample policy, perform the following steps:

1. Open the “Activate an automation policy” task as described in Chapter 7, “Starting the sample end-to-end automation domain,” on page 49.

2. Make sure that the domain “FriendlyE2E” is selected and click Next. This brings up the “Select an automation policy” panel.

3. Select the policy “Sample E2E Policy” and click Activate.

Results:

- The automation manager activates the automation policy.
- When the policy is active, the domain table in the “Activate an automation policy” task will be updated to display the active policy information.

Next steps:

- Open the SA operations console to explore the SA operations console and to view the dummy resources that have been specified in the automation policy. You can open the console from the navigation tree or by clicking Open domain in the “Activate an automation policy” task.
- To learn about the layout of the console, to find out how to navigate it and what the displayed elements represent, refer to the descriptions in Chapter 20, “Using Integrated Solutions Console for Tivoli System Automation for Multiplatforms,” on page 115. For information about the icons that are displayed on the console, see the IBM Tivoli System Automation for Multiplatforms End-to-End Automation Management Component Reference.
- To understand how the resources that are displayed on the SA operations console map to the definitions in the XML policy file, refer to the sample.xml policy file in the IBM Tivoli System Automation for Multiplatforms End-to-End Automation Management Component Reference.
- To learn how to create and activate a new policy, perform the tasks described in Chapter 9, “Creating and activating a new sample automation policy,” on page 53.
Chapter 9. Creating and activating a new sample automation policy

In this chapter you learn which tasks you need to perform to create and activate your own end-to-end automation policy for a new end-to-end automation domain.

The step-by-step descriptions provided in the sections of this chapter contain all the information you need to perform the tasks for a new sample policy. For detailed information about defining XML policies, refer to Chapter 13, “Creating and modifying automation policies,” on page 71.

Creating a new sample policy

Perform the following steps to create a new sample policy:

1. Log in on the system where the end-to-end automation manager is installed.

2. Go to the policy pool directory and copy the file sample.xml to your working directory.

3. Open the copy of sample.xml in an XML editor.

   Note: You can also use a text editor for creating and editing XML policy files. Whichever editor you choose, you must ensure that you can save the file in UTF-8 format. Policy files in any other format cannot be activated.

4. Change the <PolicyInformation> section in the file as shown in the following example (changes to the original sample.xml are marked in bold):

   <PolicyInformation>
   <PolicyName> My sample policy </PolicyName>
   <AutomationDomainName> My Domain </AutomationDomainName>
   <PolicyToken>0.1</PolicyToken>
   <PolicyAuthor>Bob</PolicyAuthor>
   <PolicyDescription>My first policy</PolicyDescription>
   </PolicyInformation>

5. Create a new dummy resource reference:

   <ResourceReference name="My Reference">
   <DesiredState>Offline</DesiredState>
   <Description>My first resource reference</Description>
   <Owner>Bob</Owner>
   <InfoLink>http://www.example.com</InfoLink>
   <ReferencedResource>
   <AutomationDomain>MyFLADomain</AutomationDomain>
   <Name>MyResource</Name>
   <Class>ResourceGroup</Class>
   </ReferencedResource>
   </ResourceReference>

6. Save the new policy as MySamplePolicy.xml and copy it to the policy pool directory.
Before you can activate the policy, you must change the domain name in the configuration dialog of the automation manager. This is described in the following section.

### Changing the domain name

You can only activate an end-to-end automation policy if the domain name in the XML element `<AutomationDomainName>` in the XML policy file is identical to the name of the currently active end-to-end automation domain. The name of the currently active end-to-end automation domain is specified on the Domain page of the configuration dialog.

If you have edited the XML policy file according to the description in the previous section, you have changed the `<AutomationDomainName>` in the policy file to “My Domain”. This is why you need to change the name of the end-to-end automation domain in the configuration dialog before you can activate the policy. This is described in the following procedure.

Perform the following steps:

1. Log in to the system on which the end-to-end automation manager is installed.

2. Stop the automation engine:
   - **Windows:**
     - On the task bar, click **start** -> **Run**, and click **Browse** to navigate to the stop script of the automation engine (eezdmn.bat). Stop the automation engine with the following command:
       
       ```
       eezdmn.bat -shutdown
       ```
   - **AIX and Linux:**
     - Stop the automation engine with the following command:
       
       ```
       eezdmn -shutdown
       ```

3. Start the end-to-end automation manager configuration dialog and open the Domain page. For information on how to start the configuration dialog, refer to the [IBM Tivoli System Automation for Multiplatforms Installation and Configuration Guide](#) section “Configuring the end-to-end automation manager”.

4. On the Domain page, change the name in the field **Domain name** to “My domain”.

5. Click **Save**.

6. Click **Cancel** to close the dialog.

7. Start the automation engine as described in Chapter 7, “Starting the sample end-to-end automation domain,” on page 49.

   Shortly after the automation engine has started, the new automation domain “My Domain” appears in the topology tree, on the SA operations console. The domain “FriendlyE2E” still exists but is grayed out. The domain has left, as this state is described in the terminology of end-to-end automation management.
8. **Activate the new policy by following the instructions provided in “Activating an automation policy” on page 155.**

9. On the SA operations console, select the domain “My Domain” in the topology tree. The new resource “My Reference” is displayed in the resource table.
Chapter 10. Displaying a first-level automation domain on the SA operations console

To work with resources that are hosted by a first-level automation domain from the operation console, you perform the following steps:

1. If first-level automation resources are included in end-to-end automation management, check that the user credentials for the first-level automation domain are specified on the User credentials page of the end-to-end automation manager configuration dialog. The end-to-end automation manager needs these credentials to authenticate itself to the first-level automation domain.

   The end-to-end automation manager configuration dialog is described in the IBM Tivoli System Automation for Multiplatforms Installation and Configuration Guide. For detailed information about the User credentials page, refer to the online help of the configuration dialog.

2. Check that the automation adapter for the automation product that automates the first-level automation domain is configured such that it contacts the end-to-end automation manager. For information about configuring the automation adapters, see the IBM Tivoli System Automation for Multiplatforms Installation and Configuration Guide. For the SA z/OS adapter, check that the value for eif-send-to-hostname is set correctly.

3. Check that the adapter is running or start it.

Where to find the first-level automation domain on the SA operations console

Shortly after you have started the adapter, the first-level automation domain sends a so-called domain-join event to the end-to-end automation manager. This event contains all the data the automation manager needs to contact the first-level automation domain.

The new automation domain is displayed in the topology tree on the SA operations console:

- If no end-to-end automation policy is active or if the active end-to-end automation policy does not contain references to resources that are hosted by the first-level automation domain, the new first-level automation domain is displayed at the same tree level as the end-to-end automation domain.

- If an end-to-end automation policy is active and the policy contains references to resources that are hosted by the first-level automation domain, the domain is displayed as a child element of the end-to-end automation domain.

If a first-level automation domain of SA for Multiplatforms is not visible although it should appear in the topology tree, refer to the troubleshooting section for information on how to resolve the problem.
Chapter 11. Creating a policy that references actual first-level resources

After an adapter on a first-level automation domain is configured, the resources that are hosted by this domain are available for being referenced in an end-to-end automation policy.

To create the resource references for the resources of the first-level automation domain, you can use the sample policy My sample policy that you created in section "Creating a new sample policy" on page 53, and modify it accordingly.

To gather the data about the first-level resources that you need for defining resource references, you can use the information provided for the resources of the first-level automation domains in the information area of the SA operations console.
Chapter 12. Managing users

The topics in this chapter describe how to manage the user credentials that are needed for working with the End-to-End Automation Management component.

Creating and authorizing users to work with Tivoli System Automation from Integrated Solutions Console

Table 4 lists the user IDs and user groups that are created during the installation of the End-to-End Automation Management component and shows to which access roles they are assigned (see “Access roles for IBM Tivoli System Automation for Multiplatforms” on page 64 for access role details).

The WebSphere administrative role suppressmonitor determines whether you have access to WebSphere specific administration tasks from Integrated Solutions Console. WebSphere administrative tasks are not available in Integrated Solutions Console for users to whose user IDs only this role is assigned (and no other role that would grant access to WebSphere administrative tasks).

<table>
<thead>
<tr>
<th>Groups</th>
<th>Default user IDs (created during installation)</th>
<th>Roles</th>
</tr>
</thead>
<tbody>
<tr>
<td>EEZAdministratorGroup</td>
<td>eezdmn</td>
<td>EEZAdministrator, suppressmonitor</td>
</tr>
<tr>
<td>EEZOperatorGroup</td>
<td>eezadmin</td>
<td>EEZOperator, suppressmonitor</td>
</tr>
<tr>
<td>EEZConfiguratorGroup</td>
<td></td>
<td>EEZConfigurator, suppressmonitor</td>
</tr>
<tr>
<td>EEZMonitorGroup</td>
<td></td>
<td>EEZMonitorGroup, suppressmonitor</td>
</tr>
<tr>
<td>EEZEndToEndAccessGroup</td>
<td></td>
<td>EEZEndToEndAccess</td>
</tr>
</tbody>
</table>

After the installation of the End-to-End Automation Management component is complete, you must created additional user IDs and assign at least one of the System Automation specific access roles that are used to control which tasks users can perform from the console (see “Access roles for IBM Tivoli System Automation for Multiplatforms” on page 64).

Users may have to have more than one role to be able to perform the actions they are responsible for. For example, operators who need to be able to submit start and stop requests against end-to-end automation resources must have the roles EEZOperator and EEZEndToEndAccess:

- The EEZOperator role authorizes them to monitor resources, perform query-type operations, and submit requests from the operations console. User who only have this role can only submit requests against first-level automation resources.
- The EEZEndToEndAccess role authorizes them to also submit requests against end-to-end automation resources.

To assign access roles to users you do the following:
1. You create the users in Integrated Solutions Console.

2. You assign the users to the user groups.
   If a user must have more than one access role, you assign the user to multiple user groups.
   For example, when a user must have both the EEZOperator role and the EEZEndToEndAccess role, you assign the user to the groups EEZOperatorGroup and EEZEndToEndAccessGroup. This will give the user both of the required roles.

For detailed information on how to create and authorize users in Integrated Solutions Console, see the Websphere Application Server documentation.

Access roles for IBM Tivoli System Automation for Multiplatforms

Table 5 on page 65 describes the access roles that determine which Tivoli System Automation tasks are available to a user in Integrated Solutions Console.

The access roles are created during the installation of the End-to-End Automation Management component and assigned to the user groups listed in the right column of the table. To assign access roles to individual users, you assign the users' IDs to the corresponding user groups.

The access roles are only effective if WebSphere administrative security and application security are enabled. The installation of the End-to-End Automation Management component ensures that WebSphere security is enabled. If you choose to disable WebSphere security, be aware that no authentication and authorization checking will be performed when operations against the end-to-end automation domain are performed, which may have an undesired impact on first-level automation resources. This includes:

- The activation and deactivation of end-to-end automation policies.
- The submission of requests against end-to-end automation resources (including resource references). These requests may cause the end-to-end automation engine to issue requests against first-level automation resources that will be honored because the end-to-end automation engine is authorized to issue these requests.

The EEZ^ access roles only authorize users to access and work with Tivoli System Automation for Multiplatforms tasks. Other administrative console tasks are only available to users who have the Websphere Application Server Administrator access role.
<table>
<thead>
<tr>
<th>Role</th>
<th>Permissions</th>
<th>Group name</th>
</tr>
</thead>
<tbody>
<tr>
<td>EEZMonitor</td>
<td>Grants minimum access rights. Users who have this role can perform query-type operations but cannot activate and deactivate automation policies or perform actions that modify the state of resources, for example, they cannot submit start requests. In the navigation tree, the following tasks are available to EEZMonitor users: • SA operations console • Stored domain credentials</td>
<td>EEZMonitorGroup</td>
</tr>
<tr>
<td>EEZOperator</td>
<td>In addition to the permissions granted by the EEZMonitor role, users who have this role have the ability to issue requests against resources. The role does not permit users to perform tasks that change the configuration, such as activating and deactivating policies. In the navigation tree, the following tasks are available to EEZOperator users: • SA operations console • Stored domain credentials To manage both first-level and end-to-end automation resources, EEZOperator users must also have the EZEZendToEndAccess role.</td>
<td>EEZOperatorGroup</td>
</tr>
<tr>
<td>EEZConfigurator</td>
<td>In addition to the permissions granted by the EEZMonitor role, users who have this role have the ability to perform tasks that change the configuration, such as activating and deactivating policies. Users who have only this role cannot submit requests against resources. The role is required to be able to work with policies. In the navigation tree, the following tasks are available to EEZConfigurator users: • SA operations console • Stored domain credentials • Activate an automation policy • Deactivate active automation policy To be able to work with end-to-end automation policies, EEZConfigurator users must also have the EZEZendToEndAccess role.</td>
<td>EEZConfiguratorGroup</td>
</tr>
</tbody>
</table>
Table 5. Access roles for Tivoli System Automation (continued)

<table>
<thead>
<tr>
<th>Role</th>
<th>Permissions</th>
<th>Group name</th>
</tr>
</thead>
<tbody>
<tr>
<td>EEZAdministrator</td>
<td>Extends the EEZOperator and EEZConfigurator roles, granting maximum access rights. Users who have this role have the ability to perform all operations available on the SA operations console. In the navigation tree, the following tasks are available to EEZAdministrator users: • SA Operations Console • Activate an automation policy • Deactivate active automation policy • Stored domain credentials • Tivoli Enterprise Portal launch-in-context configuration To be able to manage both first-level and end-to-end automation domains, EEZAdministrator users must also have the EEZEndToEndAccess role.</td>
<td>EEZAdministratorGroup</td>
</tr>
<tr>
<td>EEZEndToEndAccess</td>
<td>Users who do not have this role, can view and monitor the end-to-end automations domain and the resources hosted by the domain. This role is only required if a user needs to start or stop end-to-end automation resources or activate and deactivate end-to-end automation policies. This means that this role determines which type of automation domain a user who has this role can or cannot access. It does not determine which operations can be performed by a user given this role.</td>
<td>EEZEndToEndAccessGroup</td>
</tr>
</tbody>
</table>

Managing user authentication for command shell users

The end-to-end automation manager requires authentication when a user invokes the end-to-end automation manager command shell. The end-to-end automation manager supports three different authentication modes. On the Command shell page of the end-to-end automation manager configuration dialog you can select the desired authentication mode and, if you are using a shared user ID for authentication, change the password for the user ID.
The configuration dialog is described in the IBM Tivoli System Automation for Multiplatforms Installation and Configuration Guide, in chapter "Configuring the End-to-End Automation Management component".

### Modifying the user credentials of the end-to-end automation engine

You administer the user credentials of the automation engine on the User credentials page of the end-to-end automation manager configuration dialog:

**Credentials for accessing the WebSphere Application Server**

You specify the credentials the end-to-end automation engine uses to authenticate itself to WebSphere Application Server during the installation of the End-to-End Management component. The default user ID is `ezadmin`.

**Credentials for accessing first-level automation domains**

You specify the credentials the end-to-end automation engine uses to authenticate itself to first-level automation domains on the User credentials page.

The following figure shows the User credentials page. For information about the end-to-end automation manager configuration dialog, see the IBM Tivoli System Automation for Multiplatforms Installation and Configuration Guide. Information about the properties that can be configured in the dialog is also provided in the dialog help.
Modifying the user credentials of the end-to-end automation management server

Modifying the default user ID used to access DB2

This authentication entry is required to allow the application EEZEAR to access the DB2 database.

Perform the following steps to modify the default authentication data the automation management server uses to access DB2:

1. Log on to Integrated Solutions Console.

2. Go to Security > Secure administration, applications, and infrastructure > Java Authentication and Authorization Service > J2C authentication data

3. In the table, select the alias EEZDB2AuthAlias

4. Change the password or both the user ID and the password and click OK.

5. From the menu, select save.
6. Click **save** to save and activate the new configuration. Do not restart WebSphere Application Server.


**Modifying the WebSphere Application Server user ID**

The end-to-end automation management server uses the WebSphere Application Server JMS Provider to send and receive asynchronous messages (events). To do so, it must authenticate itself to WebSphere Application Server with a valid WebSphere Application Server authenticated user ID. The default user ID is *eezadmin*.

To modify the user credentials, perform the following steps:

1. Log in to Integrated Solutions Console.

2. Go to **Security > Secure administration, applications, and infrastructure > Java Authentication and Authorization Service > J2C authentication data**

3. In the table, select the Alias EEZJMSAuthAlias.

4. Make your changes and click **OK**.

5. From the menu, select **save**.

6. Click **save** to save and activate the new configuration. Do not restart WebSphere Application Server.
Chapter 13. Creating and modifying automation policies

The automation policy is a core component of end-to-end automation management. The policy determines:

- which resources are managed by end-to-end automation management
- the behavior of the end-to-end automation manager

You specify the automation policy in an XML file. In the XML policy file, you make the following specifications:

- You define the resources that are to be managed by the end-to-end automation manager, namely, resource references, resource groups, and choice groups.
- You can define the default desired states, that is, the default automation goals that the end-to-end automation manager is to pursue.
- You define StartAfter, StopAfter, and ForcedDownBy relationships.

This chapter describes all the required steps for defining a policy. It is intended to serve as a roadmap that guides you through the process of policy definition. The following table lists the tasks that you need to perform in the recommended sequence and points you to the related description:

<table>
<thead>
<tr>
<th>Step</th>
<th>Task</th>
<th>Description</th>
<th>Associated topics and procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Identify candidate clusters and syplexes, and the resources that are candidates for end-to-end automation management</td>
<td>Identify the first-level automation clusters and syplexes that host resources that have relationships, and the relevant resources. You may want to complete this task in close cooperation with the persons responsible for the first-level automation domains.</td>
<td>“The scope of end-to-end automation policies” on page 72</td>
</tr>
<tr>
<td>2</td>
<td>Identify relationships or group dependencies</td>
<td>Identify the relationships or group dependencies of the resources running on the syplexes and clusters.</td>
<td>“The scope of end-to-end automation policies” on page 72</td>
</tr>
</tbody>
</table>
### Gather information about the first-level automation resources

When you create the XML policy file in a later step, you will need resource-specific data, for example, the name of the resource, the name of the first-level automation domain it belongs to, its class, and the node on which it resides.

In addition, you should gather information about who can be contacted in case of problems, for example, the name and phone number of the person who is responsible for the resource. You should provide a short description of the resource, and, if at all possible, a URL where more information about the resource can be obtained.

### Define the automation policy in an XML file

Use a suitable XML editor or text editor to create the XML file and define the automation policy using the data you have collected in the previous steps.

---

**What you must know before you define an end-to-end automation policy**

### The scope of end-to-end automation policies

As described in Chapter 1, “What end-to-end automation management can do for you,” on page 3, end-to-end automation management is not intended to take over the role of first-level automation products. The main focus of first-level automation products is on ensuring the high availability of applications within a cluster of systems. This task must remain as close as possible to the resources for which high availability is to be ensured.

The scope of end-to-end automation policies starts where local first-level automation capabilities end - on the border of a first-level automation cluster. Consequently, end-to-end automation policies should only define cluster-spanning relationships and groups. The following examples provide some information on what you must consider when defining resource references for first-level automation resources.
The examples in the figure above show three resource references that were created for resources or resource groups that are hosted by a first-level-automation domain. These examples are described in the following sections.

**Example 1**

This example illustrates why it is not desirable to create resource references pointing to resources that are members of first-level automation groups if the integrity of first-level automation is to be ensured.

For this scenario, assume that:

- Resource reference "Ref 1" references an actual resource which is a member of the first-level automation domain group "Grp A".
- In the end-to-end automation policy, the desired state Online is defined for resource reference "Ref 1".
- In the first-level automation policy, the desired state Offline is defined for both "Grp A" and "Grp B".

When the end-to-end automation policy is activated, the end-to-end automation manager issues an Online request against the first-level automation resource that is referenced by "Ref 1". The first-level automation manager receives the request. If the referenced resource is offline, it will try to start the application.

If the referenced resource is started due to the request from the end-to-end automation manager, the observed state of "Grp A" changes accordingly. "Grp A" has been defined to be offline. This goal cannot be accomplished by the first-level automation manager because the request on the group member has a higher priority and will be fulfilled. As a result, the compound state of "Grp A" changes, indicating that a problem has occurred. The same is true for "Grp B".

An additional problem occurs because of the dependency between "Grp A" and the first-level automation resource "Res X". The administrator who created the first-level automation policy may have assumed that the relationship to "Res X" would always be evaluated before a member of "Grp A" is started. In such a scenario, however, this is not the case and the dependency will not be honored.

**Example 2**

In this example, resource reference "Ref 2" refers to "Grp A" which is hosted by the same first-level automation domain. This has the following two advantages over the constructs in Example 1:
1. All members of "Grp A" will be started or stopped in accordance with the
desired group behavior. After the completion of the request from the
end-to-end automation manager, "Grp A" changes to a normal end state and no
problem will be indicated on the operations console.

2. The relationship to "Res X" will be evaluated when the request is send to
"Grp A". This ensures that all required actions will be performed by the
first-level automation manager as defined by the administrator of the policy.

Only one problem remains: First-level automation cannot reach the desired state
defined in the policy for "Grp B". However, in certain circumstances, referencing
"Grp A" may reflect the desired behavior within in the scope of end-to-end
automation. In such a case, the operator must understand that "Grp B" is in a
problem state because end-to-end automation needed to start a member of this
group in order to accomplish an end-to-end business goal.

Example 3
The two examples above show that creating an end-to-end automation policy
which defines "Ref 3" will cause the least amount of undesired behavior. In this
scenario, "Ref 3" references the outermost (or top-level) resource group defined in
the first-level automation policy. No matter what desired state has been defined for
"Ref 3", the first-level automation manager will act according to the request it
receives from the end-to-end automation manager and all of the constructs defined
in the first-level automation policy will remain in a satisfactory state.

Identifying cluster-spanning dependencies
This chapter is intended to give some advice on how to identify first-level
automation resources that have cluster-spanning relationships. Such resources are
candidates for being referenced in the end-to-end automation policy.

Two kinds of dependencies can be expressed in the constructs of an end-to-end
automation policy:
1. Grouping concept: defines the general structure of resources and resource
groups
2. Relationship concept: represents run-time dependencies between resources and
resource groups

The following sections describe how you can find groups and relationships among
automated resources that are hosted by different first-level automation domains.

Grouping of resources
Questions to ask:
• Which of the resources that are automated by different first-level automation
domains need to be available at the same time?
• Which of the resources that are automated by different first-level automation
domains can act as alternatives for other resources in case these fail?
• Which resources should be grouped together to ensure that their state can be
easily monitored? For example, a group could comprise all resources that will be
monitored by the same operator even if the resources are hosted by different
first-level automation domains.

An enterprise application consists of multiple resources (for example, applications
and IP addresses) that can belong to different business tiers and areas of
responsibility.
In order to automate resources effectively, the resources need to be restructured from a technical and organizational point of view. This is why the grouping concept is introduced in end-to-end and first-level automation.

Organizing resources in groups has the following benefits:
- Groups are logical containers that can be controlled as one logical instance.
- Groups organize the automated resources in a hierarchical structure.
- A group can be composed of resource references and other end-to-end automation groups. The possibility of nesting groups allows you to structure complex environments into several layers.
- By encapsulating resources and nested groups within groups, you can organize your automated resources in a hierarchical structure that serves as the logical basis for an end-to-end automation policy.

Resources can be gathered in groups according to logical, technical, security, or responsibility criteria. For example:
- A resource group can be made up of resource references that reference all resources in an SAP environment.
- A group can include all resources that have the same owner.

End-to-end automation groups can be platform-spanning. This means that resource references for resources that are hosted by different first-level domains can be gathered in one group. As shown in the illustration below, the resource references that refer to a DB2 group on a first-level z/OS sysplex can be gathered in a group together with the application "App", which is physically hosted on an AIX cluster.

**Relationships**
Questions to ask:
- Which automated resource on a specific first-level automation domain needs which other resource on another automation domain in order to run?
- What are typical tasks for an operator to start or stop applications in order to start or stop some solution? Are workflow documents available which describe the sequence in which applications need to be started or stopped?
• How does an operator apply maintenance to specific applications? Are documents available that describe in which sequence an operator must shut down applications?
• In case of an unexpected failure of some critical applications on a first-level automation domain, do other applications on other automation domains need to be stopped as well?

Relationships represent dependencies between resources or groups. A relationship exists between a source and a target. Source and target can be either resource references or groups. For example, a relationship A StartAfter B ensures that resource A can only start when resource B is online.

Before you define a policy, you need to identify the relationships between the resources. When you identify the relationships that need to be defined in the policy, you should list the relationship information in the following sequence:

• source resource
• first-level automation domain name
• target resource
• first-level automation domain name
• relationship type

Example scenario: Stopping of a resource is triggered by the shutdown of another resource: The following example describes when a ForcedDownBy relationship between two resources is required.

In the description below, the following desired states are assumed for Resource A and Resource B:

• Resource A has the default desired state Online.
• Resource B has the default desired state Offline.

You need to define a ForcedDownBy relationship between source resource Resource A and target resource Resource B (Resource A ForcedDownBy Resource B) if you want to achieve the following behavior:

• Whenever Resource B is started, for example, due to an operator request, this should not have any effect on Resource A.
• Whenever Resource B was online and is stopping, for example, after it was started due to an operator’s Online request and the request is canceled, or when Resource B fails while it is offline, Resource A must be bounced, that is, it has to be stopped and restarted again, for example, to allow Resource A to synchronize with Resource B.

Gathering the required data for defining a policy
This is the information you need for defining a policy:
• Resource identification data (for example, Name, Class, Location)
• Resource descriptions (Owner, InfoLink, short description)
• Information about cross-cluster relationships

Additionally, you should establish ownership for end-to-end automation resources and groups.

When you define a resource reference in an end-to-end automation policy, you must provide information about the first-level resource in the <ReferencedResource> subelement. You can easily obtain all the required
information on the operations console by displaying the General page for the first-level resource.

![Figure 8. General page for a first-level resource](image)

This is how you display the information for a first-level resource on the operations console:

1. Make sure that the adapter for the first-level domain whose resources you want to reference in the policy is correctly configured and running.
2. Open the operations console and select the first-level automation domain.
3. Select the first-level resource you want to reference in the automation policy.
4. Open the General page for the resource.
5. In the end-to-end automation policy, specify the information in the policy exactly as it appears on the page. Especially, if no node information is provided on the General page, do not specify the `<Node>` element in the end-to-end automation policy.

A worksheet for gathering the data you need for defining a policy is available in Appendix A, “Policy definition worksheet,” on page 191.

**Considerations for referencing first-level automation resources**

The sections below list the considerations that apply when you create resource references for resources that are managed by first-level automation products of the IBM Tivoli System Automation product family.

For considerations that apply when you reference resources that are managed by other first-level automation products, refer to Part 5, “Working with automation adapters,” on page 169.

**Considerations for referencing SA for Multiplatforms Base component resources**

When you create resource references for SA for Multiplatforms Base component resources, the following considerations apply:

- Creating resources references for fixed resources that are constituents of a floating resource is not recommended because such resources cannot be controlled by end-to-end automation management and they can only be monitored but not managed from the operations console.
• You should avoid creating resource references for individual members of a SA for Multiplatforms group. For information about the effects that referencing such resources may have, refer to “The scope of end-to-end automation policies” on page 72.

Table 6. Recommendations for referencing SA for Multiplatforms resources in end-to-end automation policies

<table>
<thead>
<tr>
<th>RSCT classes IBM.* used in SA for Multiplatforms</th>
<th>Valid</th>
<th>Recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM.NetworkInterface</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>IBM.ResourceGroup</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>IBM.Equivalency</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>IBM.Application</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>IBM.ServiceIP</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>IBM.Test</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

Restrictions for referencing SA z/OS resources

Resource references should not be created for the following SA z/OS resources:

• Resources that have external startup or shutdown set to ALWAYS should not be referenced.
  The reason is that requests that are generated against such a resource reference always fail. As a result, the state of such a resource reference changes to Unrecoverable error as soon as the end-to-end automation manager generates the initial request after policy activation. For such resource references, the state cannot be resolved by using the Reset function.

• Passive application groups should not be referenced because operator requests against such resource references cannot be canceled from the operations console.

• Resources which have an agent or the manager automation flag set to NO should not be referenced because operator requests against such resource references cannot be canceled from the operations console in most cases.

• Resources for which the NOSTART option is specified during the agent start should not be referenced because the end-to-end automation manager will not honor the option. This means that when the resource reference had the desired state Online, the referenced resource would be started after agent startup although the NOSTART option was specified.

Defining an end-to-end automation policy

When you have gathered the data for a new policy as described above, it is recommended that you complete the steps that are required for creating the policy in the following sequence:

Table 7. Steps for defining a new end-to-end automation policy

<table>
<thead>
<tr>
<th>Step</th>
<th>Task</th>
<th>This is where the task is described</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Create the XML policy file</td>
<td>“Creating the XML policy file” on page 29</td>
</tr>
<tr>
<td>2</td>
<td>Define the resources of the end-to-end automation domain</td>
<td>“Defining the resources of the end-to-end automation domain” on page 82</td>
</tr>
<tr>
<td>3</td>
<td>Define resource groups and choice groups</td>
<td>“Defining groups” on page 85</td>
</tr>
</tbody>
</table>
Table 7. Steps for defining a new end-to-end automation policy (continued)

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Define StartAfter, StopAfter, and ForcedDownBy relationships</td>
</tr>
</tbody>
</table>

**Notes:**
1. To ensure that your XML policy file remains readable and maintainable, structure your file carefully by dividing it into sections. The following structure is recommended:
   a. Resource references
   b. Groups
   c. Relationships
You can use comments in the policy file to separate the sections within the file.
2. An example of a complete XML policy file is provided in the IBM Tivoli System Automation for Multiplatforms End-to-End Automation Management Component Reference.
3. Do not edit an XML policy file in the policy pool directory. Always use a copy of the XML file, edit it in a working directory, and update the PolicyToken before you save the file to the policy pool directory.
4. The following chapters assume that you have a good basic knowledge of XML.

**Creating the XML policy file**

This section describes the basic elements an XML policy file contains. Some of these elements are required and the policy cannot be activated if they are omitted. Some of the optional elements should not be omitted because they can be used to provide important meta-information about the policy (for example, the name of the owner of the policy and the date when the policy was last changed).

When you create an XML file with just the elements described in this section, you have a template you can use to create XML policy files. However, it is recommended that you use the official XML policy file template that you find in the following directory:

EEZ_INST_ROOT/policyPool/template.xml

To use the template, copy the file to your working directory and rename it according to your file naming conventions.

To create the XML policy file, you can use any commercial, shareware, or free-ware XML or ASCII editor as long as the editor allows you to save the file in UTF-8 format. XML files in any other format will be rejected by the policy checking tool.

If you use an XML editor to create the XML policy file, the editor will create the basic XML policy template for you. Additionally, most XML editors have a validation function that ensures that your XML code conforms to the relevant schema. When you want to use these functions, you must ensure that the XML editor knows where to find the relevant schema. This is where the schema for the end-to-end automation policy files is located:

EEZ_INST_ROOT/policyPool/EEZPolicy.xsd

Here is an example of the basic elements that all policy documents should contain (the required elements are marked in **bold**):
<xml version="1.0" encoding="UTF-8"?>
<AutomationPolicy version="1.0"
xmlns="http://www.ibm.com/TSA/Policy.xsd"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.ibm.com/TSA/Policy.xsd EEZPolicy.xsd">
  <PolicyInformation>
    <PolicyName>Sample E2E Policy</PolicyName>
    <AutomationDomainName>FriendlyE2E</AutomationDomainName>
    <PolicyToken>1.0.5</PolicyToken>
    <PolicyAuthor>Michael Atkins</PolicyAuthor>
    <PolicyDescription>
      Policy for the end-to-end automation domain FriendlyE2E.
      Last Update: 09/16/07
      Last Editor: Michael Atkins
      Change History:
      ------------------------------------------------------
      Date  Name                Description
      ------------------------------------------------------
      09/16/07 Michal Atkins    Initial Policy
      ------------------------------------------------------
    </PolicyDescription>
  </PolicyInformation>
</AutomationPolicy>

The elements have the following meaning:

**XML declaration**
The XML file must begin with the following XML declaration and the encoding statement:

```xml
<?xml version="1.0" encoding="UTF-8"?>
```

**Element AutomationPolicy**
The complete XML policy must be enclosed in an `<AutomationPolicy>` element. The closing tag `<AutomationPolicy>` must be the last element and the last line in the XML policy file.

Use the following declarations in your policy file:

```xml
<AutomationPolicy version="1.0"
xmlns="http://www.ibm.com/TSA/Policy.xsd"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.ibm.com/TSA/Policy.xsd EEZPolicy.xsd">
```

```
</AutomationPolicy>
```

The four attributes of the AutomationPolicy element and their values must be specified exactly as shown in the example above. Here is an explanation of what the attributes specify:

**version**
This is the minimum version of the End-to-End Automation Management component required for this policy.

**xmlns**
This is the namespace declaration.

**xmlns:xsi**
This is the XML schema format used for this XML policy.

**xsi:schemaLocation**
This is the XML schema that defines the XML syntax to which this policy XML file must conform and against which the policy checking tool checks the validity of the XML file before you can activate the policy.
**Element PolicyInformation and its subelements**

You use the element PolicyInformation and its children to provide important information about the policy.

The element is required and must occur only once in an XML policy file. PolicyInformation has three required subelements that uniquely identify the policy (namely, PolicyName, AutomationDomainName, and PolicyToken).

Two additional subelements (namely, PolicyAuthor and PolicyDescription) are optional but declaring them and maintaining them carefully throughout a policy's life-cycle simplifies the maintenance and administration of XML policy files.

Here is an example of a PolicyInformation definition (the required elements are marked in **bold**):

```xml
<PolicyInformation>
  <PolicyName>Sample E2E Policy</PolicyName>
  <AutomationDomainName>FriendlyE2E</AutomationDomainName>
  <PolicyToken>1.0.1</PolicyToken>
  <PolicyAuthor>Michael Atkins</PolicyAuthor>
  <PolicyDescription>
    Policy for the end-to-end automation domain FriendlyE2E.
    Last Update: 09/16/07
    Last Editor: Michael Atkins
    Change History:
    ------------------------------------------------------
    Date       Name             Description
    ------------------------------------------------------
    09/16/07   Michal Atkins    Initial Policy
    ------------------------------------------------------
  </PolicyDescription>
</PolicyInformation>
```

These are the required subelements of PolicyInformation:

**PolicyName**

Assign a meaningful name to your policy. When you have more than one policy in your policy pool directory, especially if you change policies frequently, a meaningful PolicyName makes it easy to determine the policy's purpose and usage. The PolicyName can have up to 64 characters.

**AutomationDomainName**

This is the name of the end-to-end automation domain for which the policy will be used. The automation domain name is specified in the end-to-end automation configuration dialog (page Domain, field **Domain name**). Only if the domain name in the policy file matches the domain name on the configuration dialog page will the policy be accepted for activation. The AutomationDomainName can have up to 64 characters.

**PolicyToken**

Careful versioning of policy files is important to be able to keep track of your changes. You use the PolicyToken element to identify the version in the XML policy file. The format is optional. The policy checking tool will only verify that the PolicyToken element is available in the XML policy file. The content will not be checked. The PolicyToken can have up to 64 characters.

The PolicyInformation element has these optional subelements:
**PolicyAuthor**
Use this element to identify the author of the policy. A maximum of 64 characters is supported.

**PolicyDescription**
This element may contain free text, for example, comments, or a table for the change history as in the example above. A maximum of 1024 characters is supported.

When you have created an XML file with the elements described above, you should give the file a meaningful name and save it to your working directory before you start defining the resources of the end-to-end automation domain in the file.

**Using expressions in XML policy files**
When you use expressions in XML policy files, the following characters must be coded to ensure that they are treated as operators and not as XML control characters.

<table>
<thead>
<tr>
<th>Character</th>
<th>Code in XML policy file</th>
</tr>
</thead>
<tbody>
<tr>
<td>&amp;</td>
<td>&amp;</td>
</tr>
<tr>
<td>&lt;</td>
<td>&lt;</td>
</tr>
<tr>
<td>&gt;</td>
<td>&gt;</td>
</tr>
</tbody>
</table>

**Defining the resources of the end-to-end automation domain**
You define the resources of the end-to-end automation domain by declaring a ResourceReference element for each first-level automation resource that you want to include in end-to-end automation management.

This is an example of a complete resource reference definition (the elements marked in **bold** are required for resource references pointing to actual resources that are managed by SA for Multiplatforms or SA z/OS):

```xml
<ResourceReference name="Enterprise DB2">
  <DesiredState>Offline</DesiredState>
  <Description>Database Enterprise DB2 on FEPLEX2</Description>
  <Owner>Bob Owens
    phone: 555-3677
    e-mail: b.owens@example.com
  </Owner>
  <InfoLink>http://www.example.com/help/DB2</InfoLink>
  <ReferencedResource>
    <AutomationDomain>FEPLEX2</AutomationDomain>
    <Name>DB2</Name>
    <Class>APG</Class>
    <Node>node1</Node>
  </ReferencedResource>
</ResourceReference>
```

To create a resource reference, you need the following information about the first-level automation resource it points to (the so-called referenced resource):
- The name of the first-level automation domain that hosts the resource.
- The name by which the resource is known in the first-level automation domain.
- The Class element is optional. In some cases, however, the class to which the resource belongs must be specified.
• The Node element is optional. Only specify the Node element when creating a resource reference for a fixed resource. Do not specify the node for any other type of first-level automation resource.

Here is a description of the element ResourceReference and its subelements:

ResourceReference
This is the element that will be used to create the end-to-end automation resource that will be managed by the end-to-end automation manager and that can be monitored and managed by the end-to-end automation operator from the operations console.

The name you define for the resource in its name attribute must be unique within the policy; the same name cannot be used for another ResourceReference, ResourceGroup, or ChoiceGroup in the policy.

As operators can set name filters to see only selected resources in the resource table of the operations console, your naming conventions for resource references should support filtering by name, for example, by using common prefixes.

The name can have a maximum of 64 characters. Do not use more than one blank to separate strings within the name. Duplicate blanks will be ignored.

Description
Use this element to enter a description of the resource.

The description will appear on the operations console when an operator selects the resource in the resource table. The element is optional.

The free text you type can have up to 1024 characters.

Owner
Use this element to enter the name of the owner of the resource and to provide information on how the owner can be contacted.

The information will appear on the operations console when an operator selects the resource in the resource table. The element is optional.

The owner information you provide can have up to 1024 characters.

InfoLink
Use this optional element to specify a URL that points to additional information about the resource, for example, to an HTML page. The link will be available on the operations console when an operator selects the resource in the resource table.

The URL can have up to 1024 characters.

DesiredState
You can use this element to define the default desired state for the resource reference. Valid states are Online and Offline.

The element DesiredState is optional. The default value is Online. For information on how the default desired state of a resource is calculated when it is a member of a reference group or choice group, refer to Chapter 5, “Automation concepts,” on page 27.

ReferencedResource
ReferencedResource is a container element. You use its subelements to specify which first-level automation domain resource or resource group is to be included in end-to-end automation management.
The element ReferencedResource consists of the subelements AutomationDomain, Name, Class, and Node.

Here is an example of a resource reference for a resource that is managed by SA for Multiplatforms (required elements are marked in **bold**):

```xml
<ReferencedResource>
  <AutomationDomain>FEClusterSAP</AutomationDomain>
  <Name>SAP AppServer</Name>
  <Class>IBM.Application</Class>
  <Node>node1.ibm.com</Node>
</ReferencedResource>
```

Here is an example of a resource reference for a resource that is managed by SA z/OS (required elements are marked in **bold**):

```xml
<ResourceReference name="NFS Server">
  <DesiredState>Offline</DesiredState>
  <Description>Resource reference NFS Server</Description>
  <Owner>Bob Owens</Owner>
  <InfoLink>file://X:/help/NFS.pdf</InfoLink>
  <ReferencedResource>
    <AutomationDomain>FLEX1</AutomationDomain>
    <Name>NFS Server</Name>
    <Class>APG</Class>
    <Node>node3</Node>
  </ReferencedResource>
</ResourceReference>
```

The subelements of ReferencedResource have the following meaning:

**AutomationDomain**

Use this element to specify the name of the first-level automation domain that hosts the referenced resource.

The domain name can have up to 64 characters.

The element is required.

**Name**

This is the name by which the referenced resource is known in its first-level automation domain. The name can have up to 64 characters.

The element is required.

**Class**

This is the resource class of the referenced resource in the first-level automation domain. The name of the resource class can have up to 64 characters. The element is optional, but must be defined for resources that are automated by SA for Multiplatforms or SA z/OS.

**Node**

This is the name of the host (SA for Multiplatforms) or the name of the system (SA z/OS) in the first-level automation domain on which the referenced resource is located.

**Restrictions:**

- Maximum number of characters supported: 256
- Host name or system name must be specified in first-level automation domain syntax.
- The Node element is optional. Only specify the Node element when you create a resource reference for a fixed resource. Do not specify the node for any other type of first-level automation resource.

Note that creating resource references for fixed resources is **not** recommended.
Defining groups

You can define two different types of groups:

**Resource groups**
You use a resource group to gather resources in one group that share these characteristics:

- They are functionally related (for instance, they are components of a distributed business application).
- They have the same desired state (either Online or Offline) and should be managed and monitored as one unit.
- Typically, the members of a resource group are hosted by different first-level automation domains.

For information on how you define a resource group in an XML policy file, see “Defining resource groups.”

**Choice groups**
Choice groups make it easy to manage alternatives of redundant applications or application groups. For example, operators can switch from the production setup to the test setup of an application or application group without having to know how the applications are started or stopped.

Choice groups ensure that only one member of the group (the preferred member) is online at any given time. When an operator switches to an alternative, end-to-end automation management ensures that the old preferred member is brought into an offline state and is stopped before the new preferred member is started.

For information on how you define a choice group in an XML policy file, see “Defining choice groups” on page 87.

**Defining resource groups**
This is an example of a resource group definition in an XML policy file (the required elements are marked in **bold**):

```
<ResourceGroup name="Friendly Computer Shop">
  <DesiredState>Online</DesiredState>
  <Description>Resource group Friendly Computer Shop</Description>
  <Owner>Jerry Owens</Owner>
  <InfoLink>http://www.example.com/help/policy/compshop.html</InfoLink>
  <Members>
    <ResourceGroup name="mySAP Solutions"/>
    <ResourceReference name="WebSphere AE"/>
  </Members>
</ResourceGroup>
```

The elements have the following meaning:

**ResourceGroup**
This is the element that will be used to create an end-to-end automation resource group.

Members of a resource group can be other resource groups or resource references.

The name you define for the resource group in its **name** attribute must be unique within the policy; the same name cannot be used for any other ResourceGroup, ChoiceGroup, or ResourceReference in the policy.
As operators can set name filters to see only selected resources in the resource table on the operations console, your naming conventions for resource groups should support filtering by name.

The name can have a maximum of 64 characters. Do not use more than one blank to separate strings within the name. Duplicate blanks will be ignored.

**Note:**
- Resource groups can be nested, but one resource group cannot be a member of more than one resource group.
- Making a choice group a member of a resource group is not recommended. If you do, a warning will be issued during policy activation.

The ResourceGroup element has the following subelements:

**DesiredState**
You can use this element to define the default desired state for the resource group. Valid states are *Online* and *Offline*.

The element is optional. You only need to define the desired state if the resource group is to be kept offline. When you do not define the desired state here, the default value (Online) is used.

**Description**
Use this optional element to provide a description of the resource group. The description will appear on the operations console when an operator selects the resource group. The description can have up to 1024 characters.

**Owner**
Use this optional element to enter the name of the owner of the resource group and to provide information on how the owner can be contacted. The information will appear on the operations console when an operator selects the resource group. The owner information you provide can have up to 1024 characters.

**InfoLink**
Use this optional element to specify a URL that points to additional information about the resource, for example, to an HTML page. The link will be available on the operations console when an operator selects the group. The link can have up to 1024 characters.

**Members**
You use this container element to define which of the resource references or resource groups that you have defined in the policy make up the resource group. To define the members, you must use the element definition for the resource reference or resource group that is to become a member of the group.

```xml
<Members>
  <ResourceGroup name="mySAP Solutions"/>
  <ResourceReference name="WebSphere AE"/>
</Members>
```

**Note:** A resource reference that is a member of a resource group cannot be a member of a choice group.
Defining choice groups

This is an example of a choice group definition in an XML policy file (the required elements are marked in bold):

```xml
<ChoiceGroup name="HTTP Server">
  <DesiredState>Offline</DesiredState>
  <Description>Choice group for choosing one HTTP Server</Description>
  <Owner>Jenny Parker</Owner>
  <InfoLink>http://www.example.com/choice</InfoLink>
  <Members>
    <ResourceReference name="HTTP Server Prim" preferred="true"/>
    <ResourceReference name="HTTP Server Backup"/>
  </Members>
</ChoiceGroup>
```

The elements have the following meaning:

**ChoiceGroup**

This is the element that will be used to create a choice group.

Resource groups and resource references can be members of a choice group.

The name you define for the choice group in its `name` attribute must be unique within the policy, the same name cannot be used for another ChoiceGroup, ResourceReference, or ResourceGroup in the policy.

As operators can set name filters to see only selected resources in the resource table of the operations console, your naming conventions for choice groups should support filtering by name.

The name can have a maximum of 64 characters. Do not use more than one blank to separate strings within the name. Duplicate blanks will be ignored.

**Notes:**

1. Making a choice group a member of a resource group is not recommended. If you do, a warning will be issued during policy activation.

2. Making a choice group a member of another choice group is not recommended. If you do, a warning will be issued during policy activation.

The ChoiceGroup element has the following sub-elements:

**DesiredState**

The DesiredState is the automation goal that the automation manager will try to achieve. Valid states are `Online` and `Offline`.

For choice groups that are to be kept online, the element is optional, because `Online` is the default that will be used when you do not declare the desired state in the XML file.

When the desired state is Online, the automation manager will try to keep the so-called preferred member of the group online and will try to keep the other member or members offline.

When the desired state is Offline, you must declare the DesiredState element. Then the automation manager will try to keep all members of the group offline.

**Description**

Use this optional element to enter a description of the choice group. The description will appear on the operations console when an operator selects...
the choice group but will also facilitate the maintenance of the policy document itself. The free text you type can have up to 1024 characters.

**Owner**

Use this optional element to enter the name of the owner of the choice group or of the resources that make up the choice group and to provide information on how the owner can be contacted. The information will appear on the operations console when an operator selects the choice group. The owner information you provide can have up to 1024 characters.

**InfoLink**

Use this optional element to specify a URL that points to additional information about the choice group, for example, to an HTML page. The link will be available on the operations console when an operator selects the choice group. The link can have up to 1024 characters.

**Members**

You use this container element to define which of the resource references or resource groups that you have defined in the policy make up the choice group.

To define the members, you must use the element definition for the resource reference or resource group that is to become a member of the group. Additionally, one of the members in the list of group members must have the attribute *preferred*="true". This is the member that will be kept online by the automation manager if the desired state of the choice group is Online. For all other members, the attribute can be omitted, because the default is false.

```xml
<Members>
  <ResourceReference name="HTTP Server Prim" preferred="true"/>
  <ResourceReference name="HTTP Server Backup"/>
</Members>
```

**Note:** A resource reference that is a member of a choice group cannot be a member of a resource group.

**Defining StartAfter, StopAfter, and ForcedDownBy relationships**

**Defining a StartAfter relationship**

This is an example where IMS Connect is started first when a start request is submitted against Banking Application:

```xml
<Relationship>
  <Source>
    <ResourceReference name="Banking Application"/>
  </Source>
  <Type>StartAfter</Type>
  <Target>
    <ResourceReference name="IMS Connect"/>
  </Target>
</Relationship>
```

The elements have the following meaning:

**Source**

This is container element that contains the resource reference or end-to-end automation group that can only be started if the resource or group that is specified in the Target element is online.
To define the source resource, use the ResourceReference, ResourceGroup or ChoiceGroup definition.

**Type**  Type must be set to StartAfter.

**Target**  This is container element that contains the resource reference or end-to-end automation group that will be automatically started first if an operator submits a start request against the resource or group that is specified in the Target element and the target resource is not online.

To define the target resource, use the ResourceReference, ResourceGroup or ChoiceGroup definition.

**Defining a StopAfter relationship**

This is an example where Banking Application is stopped first when a stop request is submitted against IMS Connect:

```xml
<Relationship>
  <Source>
    <ResourceReference name="IMS Connect"/>
  </Source>
  <Type>StopAfter</Type>
  <Target>
    <ResourceReference name=" Banking Application"/>
  </Target>
</Relationship>
```

The elements have the following meaning:

**Source**  This is container element that contains the resource reference or end-to-end automation group that can only be stopped if the resource or group that is specified in the Target element is offline.

To define the source resource, use the ResourceReference, ResourceGroup or ChoiceGroup definition.

**Type**  Type must be set to StopAfter.

**Target**  This is container element that contains the resource reference or end-to-end automation group that will be automatically stopped first if an operator submits a stop request against the resource or group that is specified in the Target element and the target resource is not offline.

To define the target resource, use the ResourceReference, ResourceGroup or ChoiceGroup definition.

**Defining a ForcedDownBy relationship**

When two resources have a ForcedDownBy relationship, one of the resources is forced down by the automation manager if the other resource goes offline unexpectedly or is forced down itself.

This is an example where Banking Application is brought offline when IMS Connect goes offline unexpectedly:

```xml
<Relationship>
  <Source>
    <ResourceReference name=" Banking Application"/>
  </Source>
  <Type>ForcedDownBy</Type>
  <Target>
    <ResourceReference name="IMS Connect"/>
  </Target>
</Relationship>
```
The elements have the following meaning:

**Source**
This is the container element that defines which resource reference or group will be forced offline if the target resource:
- goes offline unexpectedly after having been online, or
- fails, regardless of its former state

To define the source resource, use the ResourceReference, ResourceGroup or ChoiceGroup definition.

**Type**
Type must be set to ForcedDownBy.

**Target**
If the resource reference or group contained in this container element goes offline unexpectedly or is forced down, this will trigger the force down of the source resource.

To define the target resource, use the ResourceReference, ResourceGroup or ChoiceGroup definition.

### Saving the policy in the policy pool directory

XML policy files must be saved to the policy pool directory. To find out where the policy pool directory is located, launch the configuration dialog, open the Domain page and click **Advanced**. The default is `<EEZ_INSTALL_ROOT>/policyPool`.

For the files in the policy pool directory, the following recommendations apply:
- Make backup copies of all XML policy files. The XML file in the policy pool directory and its backup copy must be identical.
- Do not modify an XML policy file in the policy pool directory, especially not the one in which the currently active policy is defined. If the automation engine needs to be restarted, it will reload the same policy file from the policy pool directory. If the policy file has been modified, problems may occur, especially if the changes are incorrect or not valid.
- When you update an XML policy file, use a copy of the file to make the changes and update the PolicyToken tag in the policy file before you save it to the policy pool directory.

When you have saved the XML policy to the policy pool directory, you use the operations console to activate the policy. This is described in "Activating an automation policy" on page 155. When you try to activate a policy, the validity of the policy is checked automatically.

Alternatively, you can start the policy checking tool from a command line. This is described in the following section.

### Starting the policy checking tool from a command line

Perform the following steps:
1. Open a command window.
2. On Windows systems, change the directory to `EEZ_INSTALL_ROOT/bin`.
3. Issue the following command to start the tool:
   - On Windows: `eezpolicychecker.bat <policy_file_name>`
   - On AIX and Linux: `eezpolicychecker <policy_file_name>`
If the policy file you want to check is not in the policy pool directory, you must enter the fully qualified file name.
Chapter 14. Setting up information pages for operators

In the information area of the operations console, you can make an info link available for each resource and group. The operator can follow the link to display information pages that provide additional information about the automated application. For resources of the end-to-end automation domain, you define the URL of the link in the InfoLink element of the XML policy.

If you have not yet set up such information pages, here are some suggestions for what they could include:

- A description of the managed application
- Procedures for analyzing and fixing problems (for example, where the logs are located, what to look for in the logs, where to find check scripts)
- Information about the primary and secondary contacts for the application
- Information about service periods and service level agreements
Chapter 15. Using the command-line interface of the automation engine

This section describes how you use the command-line interface of the automation engine. For information about the end-to-end automation manager command shell, see Chapter 23, “Using the end-to-end automation manager command shell,” on page 167.

You use the script files eezdmn.bat (on Windows systems) and eezdmn.sh (for AIX and Linux systems) for the following purposes:

• starting the automation engine

  Note: The way in which you start the automation engine determines in which mode the operations console runs:
  – To run the operations console in end-to-end automation mode, the automation engine must be started with the command eezdmn or eezdmn -start.
  – To run the operations console in first-level automation mode, the automation engine must be started with the command eezdmn -co.

• stopping the automation engine

• monitoring its current state

• refreshing its configuration at runtime

To perform these tasks, do the following:
1. Log in to the system on which the automation manager is installed.

2. On Windows systems, change the directory to EEZ_INSTALL_ROOT/bin.

3. Enter the command for the function you want to use. The command has the following syntax:
   `eezdmn <option>`
   For example:
   `eezdmn -shutdown`
   [Table 9 on page 96] provides an overview of the available options. A detailed description is provided in the following sections of this chapter.

Note: If the automation engine is running on a Windows server, it will be stopped when you log off from Windows, switch to a different user ID, or set the system to Stand by or Hibernate. To ensure that end-to-end automation is active continuously, do not use any of these functions. To prevent unauthorized access, only lock your computer.
**eezdmn options quick reference**

The following table presents an overview of the options that are available for the command.

**Table 9. Command line options for the automation engine**

<table>
<thead>
<tr>
<th>Option</th>
<th>Short form</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-start</td>
<td></td>
<td>Starts the automation engine. This is the default that is used when no option is specified.</td>
</tr>
<tr>
<td>-shutdown</td>
<td>-shutd</td>
<td>Stops the automation engine.</td>
</tr>
<tr>
<td>-monitor</td>
<td>-m</td>
<td>Retrieves the current state of the automation engine.</td>
</tr>
<tr>
<td>-reconfig</td>
<td>-r</td>
<td>Refreshes the credentials the automation manager uses to contact referenced resources that are hosted by first-level automation domains. You must always invoke the command with this option when you have modified configuration properties in the configuration dialog.</td>
</tr>
<tr>
<td>-co</td>
<td></td>
<td>Starts the automation engine in conversion-only mode. In this mode, only the EIF-to-JMS conversion functionality is activated, the process will not act as automation engine. End-to-end automation management will not be performed. You must invoke the command with this option if you want to run the operations console in first-level automation mode.</td>
</tr>
<tr>
<td>-xd</td>
<td></td>
<td>Dumps internal information into a specified file. This debug option generates detailed information that IBM support can use for debugging the automation states of resources.</td>
</tr>
<tr>
<td>-?</td>
<td></td>
<td>Displays the version identifier of the automation engine and a help text that lists the command options.</td>
</tr>
</tbody>
</table>

**eezdmn options**

This section provides a detailed description of the options you can use with the **eezdmn** (Windows) or **eezdmn.sh** (AIX and Linux) command.

**-start**

The option -start is the default value that is used when you enter the command **eezdmn** without specifying an option. The command starts the automation engine. During startup, the automation engine reads and processes the configuration parameters you specified on the Domain and User credentials pages of the configuration dialog. For information about the end-to-end automation manager **configuration dialog**, see the [IBM Tivoli System Automation for Multiplatforms Installation and Configuration Guide](#).
When the automation engine has started successfully, the end-to-end automation domain is displayed on the operations console. The domain has the name that is defined in the **Domain name** field on the Domain page of the configuration dialog.

When you start the automation engine for the first time after you installed the End-to-End Automation Management component, you must subsequently activate an end-to-end automation policy.

If a policy for the domain had previously been active, the last active policy will be reactivated automatically if it is found in the policy pool directory.

**Note**: After you start the automation engine, you may receive the message that the automation engine is in IDLE state and that no policy is activated even if the last active policy is available in the policy pool directory. This is because it takes time to load the last active policy.

**Return codes**
The following table lists the return codes that are returned by the command `eездmn -start`.

<table>
<thead>
<tr>
<th>Code</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>The automation engine was started successfully or was already running.</td>
</tr>
<tr>
<td>2</td>
<td>Error: No valid license key was found on the system. The automation engine could not be started.</td>
</tr>
<tr>
<td>8</td>
<td>Error: Incorrect attributes were specified. The automation engine could not be started.</td>
</tr>
<tr>
<td>9</td>
<td>Error: The automation engine could not be started. Check the automation engine log file for details.</td>
</tr>
<tr>
<td>10</td>
<td>Severe error: Required components are missing or corrupted. The automation engine could not be started.</td>
</tr>
</tbody>
</table>

**-shutdown**
Use the option -shutdown to stop the automation engine in a controlled way. When the automation engine is stopped, end-to-end automation for the resources that are defined in the end-to-end automation policy will stop as well.

If you stop the automation engine, contact to the first-level automation domains will be lost, which means that events are no longer received and the resource state information that is displayed on the operations console will be outdated shortly after the engine has stopped.

**Return codes**
The following table lists the return codes that are returned by the command `eездmn -shutdown`.

<table>
<thead>
<tr>
<th>Code</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>The automation engine was stopped successfully.</td>
</tr>
<tr>
<td>1</td>
<td>The automation engine had already been stopped.</td>
</tr>
<tr>
<td>8</td>
<td>Error: Incorrect attributes were specified. The automation engine could not be stopped.</td>
</tr>
<tr>
<td>9</td>
<td>Error: The automation engine could not be stopped. Check the automation engine log file for details.</td>
</tr>
</tbody>
</table>
-monitor

Use the option -monitor to retrieve information about the current state of the automation engine. When you issue the command, the following message is displayed:

State of the EEZ automation engine is: <state-related information>

where <state-related information> stands for one of the states described in the following table.

Table 10. Messages and return codes returned by the automation engine

<table>
<thead>
<tr>
<th>Code</th>
<th>State-related information in the message</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RUNNING – Policy is activated</td>
<td>This is the normal state after a policy has been activated and end-to-end automation is running.</td>
</tr>
<tr>
<td>2</td>
<td>STARTING – Automation engine is not ready yet</td>
<td>The automation engine is being started. It cannot be contacted as a domain yet.</td>
</tr>
<tr>
<td>3</td>
<td>STOPPING – Automation engine does not accept requests anymore</td>
<td>The automation engine is being stopped.</td>
</tr>
<tr>
<td>4</td>
<td>IDLE – No policy is activated</td>
<td>The automation engine is running. Before end-to-end automation can start, a policy must be activated. After you start the automation engine, you will always receive the message that the automation engine is in IDLE state and that no policy is activated. This is because it takes time to load the last active policy. As soon as the policy is loaded, the state of the automation engine will change.</td>
</tr>
<tr>
<td>5</td>
<td>Process is only converting EIF messages</td>
<td>This informational message appears when the automation engine was started in conversion-only mode (with the command line option -co). It indicates that the automation engine is running but end-to-end automation is not being performed.</td>
</tr>
<tr>
<td>6</td>
<td>NOT AVAILABLE – Automation engine probably not started</td>
<td>No contact to the automation engine can be established. It is assumed that it has not been started yet.</td>
</tr>
<tr>
<td>7</td>
<td>No state-related information is displayed.</td>
<td>Unknown</td>
</tr>
<tr>
<td>8</td>
<td>No state-related information is displayed.</td>
<td>Incorrect attributes were specified. The command could not be processed.</td>
</tr>
<tr>
<td>9</td>
<td>PROBLEM – See message log for details</td>
<td>Problems have been detected. Check the message log file for information on the problems that have occurred. If you cannot resolve the problems, contact IBM support.</td>
</tr>
</tbody>
</table>
Table 10. Messages and return codes returned by the automation engine (continued)

<table>
<thead>
<tr>
<th>Code</th>
<th>State-related information in the message</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>SEVERE – See message log for details</td>
<td>Severe problems have been detected. Check the message log file for information about the problems that have occurred. If you cannot resolve the problems, contact IBM support.</td>
</tr>
</tbody>
</table>

-reconfig

Use the option -reconfig to activate new configuration settings. You must invoke the command with this option in the following cases:

- After modifying configuration properties in the end-to-end automation manager configuration dialog. (For information about the configuration dialog, see the IBM Tivoli System Automation for Multiplatforms Installation and Configuration Guide)
- When a security exception was reported while the automation manager tried to access a first-level automation domain, and the problem has been resolved.

Return codes

The following table lists the return codes that are returned by the command eezdmn -reconfig.

<table>
<thead>
<tr>
<th>Code</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>The automation engine was reconfigured successfully.</td>
</tr>
<tr>
<td>8</td>
<td>Error: Incorrect attributes were specified. The reconfiguration could not be performed.</td>
</tr>
<tr>
<td>9</td>
<td>Error: The automation engine could not be contacted, it may not be running. The automation engine must be up and running in order to be reconfigured.</td>
</tr>
</tbody>
</table>

-co

Use this option to start the automation engine in conversion-only mode. This is required when you want to use the operations console in first-level automation mode, because in this case, the EIF-to-JMS functionality of the automation engine is required but end-to-end automation management must not be performed. For more information about using the operation console for first-level automation management only, refer to “The operations console is used in first-level automation mode” on page 24.

Return codes

The following table lists the return codes that are returned by the command eezdmn -co.

<table>
<thead>
<tr>
<th>Code</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>The automation engine was started successfully or was already running.</td>
</tr>
<tr>
<td>2</td>
<td>Error: No valid license key was found on the system. The automation engine could not be started.</td>
</tr>
<tr>
<td>8</td>
<td>Error: Incorrect attributes were specified. The automation engine could not be started.</td>
</tr>
<tr>
<td>9</td>
<td>Error: The automation engine could not be started. Check the automation engine log file for details.</td>
</tr>
</tbody>
</table>
-xd

Use this command option only when IBM requests debugging information for one or more resources that are hosted by the end-to-end automation manager. The command will dump the debugging information into a file.

When you enter the command, you must provide additional parameters. This is the complete syntax of the command:

```
eezdmn -xd ("*"|"<resource_name>[,<resource_name>]")<name_of_dump_file>
```

The parameters have the following meaning:

* Specify this parameter when you want to dump information about all resources of the end-to-end automation domain into the file `<name_of_dump_file>`. Depending on the number of resources defined in the active policy, the resulting dump file can be large.

<resource_name>

To only write information about specific resources to the file `<name_of_dump_file>`, list the names of all relevant resources, separated by commas, and enclose the list in quotation marks. This is an example of the syntax of such a command:

```
eezdmn -xd ("Resource_A,Resource_B")dump1.txt
```

**Return codes**

The following table lists the return codes that are returned by the command `eezdmn -xd`.

<table>
<thead>
<tr>
<th>Code</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>The operation completed successfully.</td>
</tr>
<tr>
<td>8</td>
<td>Error: Incorrect attributes were specified. The operation could not be performed.</td>
</tr>
<tr>
<td>9</td>
<td>Error: The automation engine could not be contacted. Check the automation engine log file for details.</td>
</tr>
</tbody>
</table>

-?

Use this option to display the following help text:

IBM Tivoli System Automation end-to-end automation engine
Version: 2.3.0.072401, NO_APAR

Usage:
```
eezdmn [option]
```

-START Starts the automation engine
-STOP | -SHUTD Stops the automation engine
-MONITOR | -M Displays the current state
-RECONFIG | -R Re-configures the automation engine
-CO Starts only the EIF2JMS conversion thread
-XD ("*" | "<RES_NAME>[,<RES_NAME>]")<DUMPFILE> Dumps (all | specific) resources to a file

When no option is specified, start is used
Chapter 16. Starting and stopping

The following applications and components may need to be started and stopped:

- **WebSphere Application Server** for end-to-end automation management
  The server must be started to use the End-to-End Automation Management component (see "Starting and stopping WebSphere Application Server").

- **End-to-end automation manager** configuration dialog
  For information about starting the configuration dialog, see the **IBM Tivoli System Automation for Multiplatforms Installation and Configuration Guide**.

- **Automation adapters**
  An automation adapter must be started on each first-level automation domain that hosts resources that are referenced in the end-to-end automation policy. For information on starting and stopping the automation adapters, refer to the adapter documentation for the first-level automation product.

- **End-to-end automation engine**
  For starting and stopping the automation engine, you use the `eezdmn` command. For information on how to use the command, refer to Chapter 15, "Using the command-line interface of the automation engine," on page 95.

Starting and stopping WebSphere Application Server

The WebSphere Application Server instance for end-to-end automation management is started in the same way as any other WebSphere Application Server instance. The following sections describe how you use the scripts to start or stop WebSphere Application Server.

Starting and stopping WebSphere Application Server on Windows

When you are running WebSphere Application Server on a Windows system, you usually start and stop WebSphere Application Server by clicking the relevant icons on your desktop. If the icons are not available, you can start and stop the server from the Windows Start menu:

Start > All Programs > IBM WebSphere > Application Server V6.1 > Profiles > <profile_name> > Start the server

Alternatively, you can use the start and stop scripts that are available in the directory `<was_root>/bin`:

- To start WebSphere Application Server, open a command prompt and issue the following command:
  `<was_root>/bin\startServer.bat <ServerName> -profileName <profile_name>`

- To stop WebSphere Application Server, open a command prompt and issue the following command:
  `<was_root>/bin\stopServer.bat <ServerName> -profileName <profile_name>`
  ```
  -user <was_admin_user> -password <was_admin_password>
  ```
Starting and stopping WebSphere Application Server on AIX and Linux

To start WebSphere Application Server on AIX and Linux systems, issue this command from a command line:

```
<was_root>/bin/startServer.sh <ServerName> -profileName <profile_name>
```

To stop WebSphere Application Server on AIX and Linux systems, issue this command from a command line:

```
<was_root>/bin/stopServer.sh <ServerName> -profileName <profile_name>
```

- `user <was_admin_user_ID>`
- `password <was_admin_password>`

Starting and stopping the automation J2EE framework

The automation J2EE framework is started and stopped automatically when WebSphere Application Server is started or stopped.

Alternatively, you can start and stop the automation J2EE framework from Integrated Solutions Console as you would any other application that is running in a WebSphere Application Server environment. The name of the automation J2EE framework on the console is EEZEAR.

Starting and stopping the automation engine

The `eezdmn` command and the command options you use for starting and stopping the automation engine are described in Chapter 15, “Using the command-line interface of the automation engine,” on page 95.
Chapter 17. Using Tivoli Enterprise Console with SA for Multiplatforms

Configuring Tivoli Enterprise Console

If you have not activated or configured the Tivoli Enterprise Console (TEC) function during the installation of SA for Multiplatforms, you can do so by performing the following steps in Integrated Solutions Console:

1. Activate the Common Event Infrastructure (CEI) service when the application server is started:
   a. Click Servers > Application servers > <server_name> > Container Services > Common Event Infrastructure Service.
   b. Select the check box Enable service at server startup.

c. Save the Master configuration and restart the WebSphere Application Server.

2. Configure the Tivoli Enterprise Console and install the baroc file:
   a. In Integrated Solutions Console, click Resources > JMS > Queue connection factories > TECQueueConnectionFactory > Custom properties (see Figure 10 on page 104).
   b. Set ServerLocation to your TEC server name.
   c. Set ServerPort to the port the TEC server is listening to. Typically, this is port 5529.
   d. Install the file SystemAutomation.baroc on your TEC server.
3. Configure the SA for Multiplatforms property that controls TEC event creation:
   a. In Integrated Solutions Console, click **Environment > Naming > Name Space Bindings**.
   b. Switch to “All scopes” or “Server” scope.
   c. Click **EEZEventsToTECEnabled**.
   d. Set **String value** to one of the following values:
      - To enable creation of TEC events: “true”
      - To disable creation of TEC events: “false”
Enabling Tivoli Enterprise Console event filtering

When you use the event console of the Tivoli Enterprise Console (TEC) product to display events, all end-to-end automation events are sent to the event console by default. To limit the scope of events that are forwarded to the event console, you can use the default Common Event Infrastructure (CEI) event filter that is provided for end-to-end automation management in order to achieve the following goals:

- All domain events and all operator request events are sent to the event console.
- Only resource events with severity level Critical are sent to the event console.

Resource events with severity level Warning or lower are dropped and not displayed on the event console.

The following sections describe how you activate and customize the default filter.

Activating the default CEI filter

To activate the default event filter, perform the following steps:


2. Enter the following values in the fields on the page:

   - **Name**: Type EEZDefaultEventFilter in the field.
   - **JNDI name**: Type the following string in the field:
     
     com/ibm/eez/aab/tec/EEZDefaultEventFilter
Description
Type the following description in the field:
EEZ Default Event Filter

Filter Configuration String
To specify that all domain events and operator request events are forwarded to the event console but resource events are to be forwarded only if they have the severity level Critical, type the following configuration string in the field:
CommonBaseEvent[@severity > 30 and extendedDataElements
    [name = "sa_event_category"
    and @values = "ResourceEvent"]
or extendedDataElements
    [name = "sa_event_category"
    and @values = "DomainEvent"]]

The string specifies an XPath event selector that describes the events you want to use for filtering events. Events matching this event selector are sent to the event server; events that do not match will be discarded.

3. Click OK and save the configuration.


5. Verify that the Event filtering enabled check box is selected.

6. Verify that in the JNDI name for event filter field, the JNDI name of the filter you created is selected:
   com/ibm/eez/aab/tec/EEZDefaultEventFilter

7. Click OK and save the configuration.

8. Restart WebSphere Application Server to activate the filter.

Customizing the default event filter
You customize the default event filter by modifying the XPath event selector in the field Filter Configuration String on the Filter Factory Profile page (see previous section).

When modifying the XPath operators, remember the following rules:
• When used to compare XML dateTime values, the comparison operators perform logical comparisons that recognize time zone differences.
• Logical operators and function names must be specified using all lowercase letters (for example, and rather than AND).
• Operators must be separated with white space from the surrounding attribute names and values (@severity > 30 rather than @severity>30).
• Parentheses can be used to change operator precedence.
The following examples are valid XPath event selectors.

<table>
<thead>
<tr>
<th>XPath event selector</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CommonBaseEvent[@extensionName = 'ApplicationStarted']</td>
<td>All events with the extensionName attribute ApplicationStarted.</td>
</tr>
<tr>
<td>CommonBaseEvent[sourceComponentId/@location = 'server1']</td>
<td>All events containing a sourceComponentId element with the location attribute server1.</td>
</tr>
<tr>
<td>CommonBaseEvent[@severity]</td>
<td>All events with a severity attribute, regardless of its value.</td>
</tr>
<tr>
<td>CommonBaseEvent[@creationTime &lt; '2003-12-10T12:00:00-05:00' and @severity &gt; 30]</td>
<td>All events created before noon EST on 10 December 2003 and with severity greater than 30 (warning):</td>
</tr>
<tr>
<td>CommonBaseEvent[contains(@msg, 'disk full')]</td>
<td>All events with the phrase disk full occurring within the msg attribute.</td>
</tr>
<tr>
<td>CommonBaseEvent[@severity = 30 or @severity = 50) and @priority = 100]</td>
<td>All events with a severity attribute equal to 30 or 50, and a priority attribute equal to 100.</td>
</tr>
</tbody>
</table>
## Part 4. Monitoring and managing automated resources

### Chapter 18. Overview ............................................. 111

### Chapter 19. Domain capabilities ......................... 113

### Chapter 20. Using Integrated Solutions Console for Tivoli System Automation for Multiprotocols .................................................. 115
Configuring your Web browser for Integrated Solutions Console .................................................. 115
Logging in to Integrated Solutions Console ......................................................................................... 115
Integrated Solutions Console layout ...................................................................................................... 116
Tivoli System Automation tasks in the navigation tree ....................................................................... 117
SA operations console layout .................................................................................................................. 118
What you must know about the topology tree ....................................................................................... 119
Navigating the topology tree .................................................................................................................... 120
Selecting an element in the topology tree ................................................................................................. 121
Limiting the scope of the topology tree ................................................................................................... 121
What is displayed in the topology column ............................................................................................... 121
What you can see in the Status column .................................................................................................... 122
What you can see in the Located here column .......................................................................................... 122
What you must know about the resources section .................................................................................. 122
Section header ......................................................................................................................................... 123
View and Search ....................................................................................................................................... 123
Resource table views ............................................................................................................................... 123
Group hierarchy view .............................................................................................................................. 124
Search results view ................................................................................................................................... 126
What you must know about the information area ..................................................................................... 127
What you must know about the Menu ...................................................................................................... 128
Setting your user preferences .................................................................................................................... 129
Setting your user preferences for Integrated Solutions Console ........................................................... 129
Automatically launching pages at logon ................................................................................................... 129
Using My tasks to customize the task list in the navigation tree ............................................................... 129
Setting your user preferences for the SA operations console .................................................................. 129
Specifying the maximum number of entries to be displayed .................................................................... 130

### Chapter 21. Monitoring resources ............................. 131
State information provided on the operations console ............................................................................. 131
Compound state and operational state ..................................................................................................... 131
Compound state values ............................................................................................................................ 131
Compound state icons .............................................................................................................................. 132
State information provided for domains .................................................................................................... 132
Operational state descriptions provided on the General page .................................................................. 133
Domain state ............................................................................................................................................. 135
Communication state .............................................................................................................................. 136
State information provided for nodes ....................................................................................................... 137
State information provided for resources .................................................................................................. 137
Operational state descriptions provided on the General page .................................................................. 138
Observed state ........................................................................................................................................... 140
Desired state ............................................................................................................................................. 141
Monitoring tasks ........................................................................................................................................ 142
Finding out where resources are located ................................................................................................. 142
Finding out to which groups a resource belongs ..................................................................................... 142
Finding out whether a resource is referenced by a resource reference .................................................. 142
Switching between resource references and referenced resources ..................................................... 142
Identifying which first-level automation resource is referenced by a resource reference ....................... 143
Identifying the resource reference that references a first-level automation resource ............................. 143
Displaying relationships ............................................................................................................................ 144
Viewing log files ........................................................................................................................................ 144
Displaying operator instructions using the info link .................................................................................. 144
Displaying owner contact information ..................................................................................................... 145
Limiting the scope of the resource table .................................................................................................... 145
Displaying only resources that are in an error or warning state ............................................................... 145
Searching for resources ........................................................................................................................... 145
Submitting a search .................................................................................................................................... 145
Search panel sections and controls ........................................................................................................... 146
Working with name filters ........................................................................................................................ 147
Defining a name filter ................................................................................................................................. 147
Applying an existing name filter .............................................................................................................. 148
Administering name filters ....................................................................................................................... 148
Displaying only resources against which operator requests were submitted ......................................... 149
Hiding domains ......................................................................................................................................... 150
Using non-top-level resources as domain health indicators ................................................................... 151
Refreshing the operations console ............................................................................................................ 151
Managing your user credentials for first-level automation domains .................................................... 152
Storing your user credentials in the credential vault ................................................................................ 152
Changing and deleting your user credentials ............................................................................................ 153

### Chapter 22. Managing resources .............................. 155
Working with automation policies ............................................................................................................. 155
Activating an automation policy .............................................................................................................. 155
Steps for checking the validity of a policy from the SA operations console .............................................. 155
Steps for activating an automation policy ................................................................................................ 156
Deactivating a policy .................................................................................................................................. 157
Modifying an end-to-end automation policy ............................................................................................ 157
Working with requests ............................................................................................................................. 157
Submitting start requests .......................................................................................................................... 158
Submitting stop requests .......................................................................................................................... 158
Displaying information about an operator request ................................................................................... 159
Displaying request lists ............................................................................................................................. 159
Steps for viewing a request list and request details .................................................................................. 160
Canceling requests .................................................................................................................................... 160

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Chapter 18. Overview

This part of this guide provides the following information:

**Domain capabilities**
- The mode in which you are running the SA operations console and the capabilities of the automation domain you are working with determine which Tivoli System Automation tasks can be performed on an automation domain. For an overview of the operations console modes, refer to [Chapter 3, “SA operations console modes,” on page 15](#). The domain capabilities are outlined in [Chapter 19, “Domain capabilities,” on page 113](#).

**Using Integrated Solutions Console for Tivoli System Automation for Multiplatforms**
- Integrated Solutions Console provides a common administrative console for multiple products. Tivoli System Automation for Multiplatforms is one of these products. The SA operations console and additional administrative tasks that are specific to Tivoli System Automation are accessed from the administrative console of Integrated Solutions Console, which is displayed in a Web browser window.

The topics in [Chapter 20, “Using Integrated Solutions Console for Tivoli System Automation for Multiplatforms,” on page 115](#) provide an overview of the layout and functionality of the administrative console of Integrated Solutions Console and outline the Tivoli System Automation tasks that can be performed.

Note that in this documentation, the terms "administrative console of Integrated Solutions Console" and "Integrated Solutions Console" are used as synonyms.

- [Chapter 21, “Monitoring resources,” on page 131](#)
  - This topic describes how you can use the SA operations console to monitor resources and to analyze and resolve the problems that may occur.

- [Chapter 22, “Managing resources,” on page 155](#)
  - This topic describes how you start and stop resources from the SA operations console, suspend and resume automation for a resource, include nodes in automation and exclude them from automation, explains the procedures for working with choice groups, and describes how you have to proceed when a resource that has encountered an unrecoverable error should be included in automation again.

- [Chapter 23, “Using the end-to-end automation manager command shell,” on page 167](#)
  - This topic describes how to use the end-to-end automation manager command shell to perform end-to-end automation-specific tasks.
Chapter 19. Domain capabilities

The capabilities of an automation domain determine which Tivoli System Automation tasks you can perform from Integrated Solutions Console. The capabilities of an automation domain in turn are determined by the capabilities of the automation product that is used to automate the domain.

The following table lists the domain capabilities by automation product:

<table>
<thead>
<tr>
<th>Automation product</th>
<th>Request-driven (1) / Search resources with operator requests (2)</th>
<th>Search by name (3)</th>
<th>Search by class (4)</th>
<th>Suspend automation for resources (5)</th>
<th>Activate automation policies</th>
<th>Deactivate automation policies</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA MP End-to-End Automation Management component</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>SA MP Base component</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>SA z/OS</td>
<td>Y</td>
<td>Y</td>
<td>Y (6)</td>
<td>Y (6)</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>HACMP</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Microsoft Server Clustering (MSCS)</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>VERITAS Cluster Server for Solaris/SPARC (VCS)</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>

Notes:

(1) Only request-driven automation domains maintain request lists for resources, in which requests are stored until they are canceled, and which are analyzed to determine the winning request whenever a new request is submitted or an existing request is canceled.

On the SA operations console, request-related controls (for example, the buttons Request online and Request offline for starting and stopping resources, and the button View requests for displaying the request list) are only available for resources that are hosted by request-driven automation domains. For more information, refer to “Working with requests” on page 157.
For command-driven automation domains, the buttons **Bring online** and **Bring offline** are available for starting and stopping resources. For more information, refer to **Bringing resources online and offline** on page 161.

(2), (3), (4) The entries in the table show which filter criteria can be specified on the Search panel. For example, some domains do not allow searching for resources against which operator requests were submitted. For more information, refer to **Searching for resources** on page 145.

(5) Suspending automation for a resource causes the automation manager not to react on observed state changes by issuing requests against the resource. For more information, refer to **Suspending and resuming automation for resources** on page 162.

(6) Supported from SA z/OS V3R1 (PTF OA17989 must be installed)
Chapter 20. Using Integrated Solutions Console for Tivoli System Automation for Multiplatforms

The SA operations console and additional administrative tasks that are specific to Tivoli System Automation are accessed from the user interface of Integrated Solutions Console, which provides a common administrative console for multiple products. The user interface of Integrated Solutions Console is displayed in a Web browser window.

Configuring your Web browser for Integrated Solutions Console

The following Web browsers are supported:
- Microsoft Internet Explorer V6.0 SP1
- Mozilla V1.7.8
- Firefox 1.5

To display Integrated Solutions Console in your Web browser, the following settings are required:
- JavaScript must be enabled in all Web browsers.
- For Microsoft Internet Explorer, the following settings are required:
  - Set the security level to medium.
    Do not set the security level to “high”. If high security is required, be sure to set the entry ActiveX controls and plugins - Initialize and Script ActiveX controls not marked as safe on the Security settings page to Enable.
    Otherwise, the information displayed on the console is not updated automatically.
  - Set Scripting - Active Scripting to Enable on the Security settings page.
    Otherwise, navigation problems may occur.

Logging in to Integrated Solutions Console

To access Integrated Solutions Console perform the following steps:
1. Open a Web browser window and type the address of Integrated Solutions Console in the Address field.
   The entry must have the following form:
   http://<hostname>:<port>/ibm/console
   where <hostname> is the name of the host on which Integrated Solutions Console is running and <port> is the port number of Integrated Solutions Console. The default port is 9060.
2. Wait for the console to load into the browser. A login page is displayed after the console starts.
3. Specify your user ID and password and click Log in.
   The user interface for Integrated Solutions Console is displayed.
   After you are logged in, be sure to use the Logout link in the console toolbar when you are finished using the console and to prevent unauthorized access. If there is no activity during this login session for an extended period of time, the session expires and you must log in again to access the console.
If the user ID that you provide is already logged in at a different location, you are prompted to choose between logging out from the other location or returning to the login page.

It is recommended that you do not use multiple browser windows on the same client system simultaneously to connect to the same Integrated Solutions Console, because browser types other than Microsoft Internet Explorer will share a single HTTP session between multiple browser instances if these instances are running on the same system and connect to the same Integrated Solutions Console. Working with multiple browser instances using the same HTTP session will cause unexpected results.

The same situation occurs if you open multiple Microsoft Internet Explorer browser windows using File > New Window (or Ctrl+N) from an existing Integrated Solutions Console session, because in this case the new browser window and the one from which it was opened will also share the same session.

### Integrated Solutions Console layout

This topic provides an overview of the layout of the user interface of Integrated Solutions Console. For detailed information about using the user interface, see the Integrated Solutions Console online help, which is accessible through the Help link in the console toolbar.

#### Banner
Displays a common image across all Integrated Solutions Console installations. The banner includes a greeting to the user who is logged in and links to log out of the console and to open console help.

#### Navigation tree
Lists the tasks available in the console. Tasks are grouped into organizational nodes that represent categories of tasks. The organizational nodes can be nested in multiple levels. Which tasks are shown depends on your user role and on your current View settings. When you click a task in the navigation, a page is displayed in the work area containing one or more modules for completing the task.

Use the View selection list at the top of the navigation tree to modify the list of tasks according to your preferences. You can organize the tasks as follows:

- **All tasks**
  This shows all tasks in the console. Tasks are grouped into organizational nodes. The tasks that are specific to IBM Tivoli System Automation are available under the node IBM Tivoli System Automation for Multiplatforms.

- **My tasks**
  This shows only the tasks that you have added to the view. This list is initially empty, but provides a link to the My Tasks page. Use My Tasks to add and remove from the My Tasks list in the navigation. For detailed information about using My Tasks, see the console help.

- **Product selection**
  Selecting a product name shows only the tasks for the particular product, for example, IBM Tivoli System Automation for Multiplatforms or WebSphere Application Server.
Work area
When you launch a page, the content of the page is displayed in the work area. If you have not launched any pages, the Integrated Solutions Console Welcome page is displayed in the work area. It displays the products that are installed that use the Integrated Solutions Console as common user interface. You can open the Welcome page for IBM Tivoli System Automation for Multiplatforms by clicking the product name in the list.

Tivoli System Automation tasks in the navigation tree
Which Tivoli System Automation tasks you can see depends on your Tivoli System Automation user role and on your current View settings. If you have not customized the View task list, you expand the IBM Tivoli System Automation for Multiplatforms entry in the navigation tree to display the list of product-specific tasks you have access to. The following list gives an overview of all available Tivoli System Automation tasks.

Welcome
Opens the Welcome page for Tivoli System Automation. To open the page, you can also click the IBM Tivoli System Automation for Multiplatforms link on the Welcome page for Integrated Solutions Console.

SA operations console
Opens the SA operations console in the work area. You use the SA operations console for managing and monitoring automated resources and for performing administrative tasks, some of which are also available from the navigation tree (for example, policy activation and deactivation for automation domains that support the tasks).

Operational tasks
The node contains the following tasks:

Activate an automation policy
Allows you to activate automation policies for automation domains that support policy activation. You can also perform the task from the SA operations console.

Deactivate active automation policy
Allows you to deactivate the currently active automation policy for automation domains that support policy deactivation. You can also perform the task from the SA operations console.

Settings
The node contains the following tasks:

Stored domain credentials
Use this task to administer your user credentials for the first-level automation domains to which you have access. The user credentials for an automation domain are saved to the credential vault when you access the domain for the first time.

Tivoli Enterprise Portal launch-in-context configuration
If you are using both the SA operations console and Tivoli Enterprise Portal for resource monitoring and management, use this task to set up launch-in-context support for Tivoli Enterprise Portal. Launch-in-context enables users to launch Tivoli Enterprise Portal work spaces from the SA operations console with a single mouse click.
SA operations console layout

To open the SA operations console, click Tivoli System Automation for Multiplatforms > SA operations console in the navigation tree: The main panel of the SA operations console is displayed. It is divided into several areas:

![Main panel of the operations console](image)

**Figure 11. Main panel of the operations console**

1. **Menu bar**
   
   Use the entries in the Menu, which is available on the menu bar, to refresh the information displayed in the topology tree and the resource table, to change your user preferences for the SA operations console, and to display information about the version of the SA operations console you are using. For more information, refer to “What you must know about the Menu” on page 128.

2. **Title bar**
   
   Use the controls on the title bar to display the online help for the page you are displaying and for minimizing and maximizing the panel.

3. **Information bar**
   
   The information bar is not shown in the figure above. It is displayed below the menu bar when you have performed an action on an element in the operations console. It displays a message confirming that the request or command has been submitted for processing. The message on the information bar only confirms the initial action, it is not updated while the command or request is being processed. The results of the system actions that are performed due to the request or command are reflected on the operations console itself. There you can see, for example, that the status of a resource has changed.

   The confirmation message is replaced with a new message whenever you perform an action against an element in the operations console. Clicking Clear on the information bar hides the information bar from view. It reappears with a new confirmation message when you perform an action on an element.

4. **Information area**
   
   Use the pages in the information area to obtain information about the element you have selected in the topology tree or resource table, and to
perform actions against the element. For more information, refer to “What you must know about the information area” on page 127.

4 Resources section
Use the areas of the resources section to work with resources:

View and Search
The View and Search functions allow you to limit the scope of the resource table.

Resource table
Displays a list of resources and their states. You use it to select and work with resources. For more information about the resources section, refer to “What you must know about the resources section” on page 122.

The resource table has two views:

Search results view
When you use Search to see only a specific set of resources in the resource table, the search results are displayed in the search results view. For more information, refer to “Search results view” on page 126.

Group hierarchy view
The group hierarchy view is displayed when you are not displaying the results of a search. For more information, refer to “Group hierarchy view” on page 124.

5 Topology tree
The topology tree shows the automation domains and the nodes that belong to the domains. The topology tree displays state-related information, allows you to select and work with domains and nodes, and is used to control what is displayed in the resource table. For more information, refer to “What you must know about the topology tree.”

What you must know about the topology tree
The following figure shows the topology tree and the resources section.
The topology tree is divided into three columns (see Figure 12):

- The **Topology** column shows the automation domains and the nodes that belong to a domain in a hierarchical view (see “What is displayed in the topology column” on page 121).
- The **Status** column shows the health status of the domain (see “What you can see in the Status column” on page 122).
- The **Located here** column is used to identify by which domain a resource is hosted and on which node or nodes it is located (see “What you can see in the Located here column” on page 122).

Figure 12 shows the following scenario:

- In the topology tree, the end-to-end automation domain (“FriendlyE2E”) is selected. The icon in the Status column indicates that at least one resource that is hosted by "FriendlyE2E" is in an error state.
- The resource table, in the resources section, shows the resources of the resource group “Stock Trading Application”.
- In the resource table, the resource reference “IMS Connect” is selected. The check marks in the **Located here** column of the topology tree indicate that the resources that are referenced by the resource reference “IMS Connect” are hosted by the first-level automation domain “FEPLEX1” and show on which nodes they are located.

**Navigating the topology tree**

You click the twistie in front of a domain icon to expand or collapse the nodes belonging to the domain.
Selecting an element in the topology tree

To select an element in the topology tree, you click the name of the element.

When you select a domain or node, you influence what is displayed in the resource table and in the information area:

- The resource table shows the top-level resources of the domain or node.
- The pages in the information area show information about the element that is selected in the topology tree. Depending on which type of element you have selected, buttons are enabled on the pages that let you perform actions against the element.

Limiting the scope of the topology tree

By default, all automation domains are displayed in the topology tree. When you are not interested in seeing all automation domains or if you are not authorized to access particular domains, you can hide domains from view (for more information, refer to “Hiding domains” on page 150).

What is displayed in the topology column

In the topology column you see the automation domains and the nodes that are managed by each first-level automation domain. When an end-to-end automation policy is active, the first-level automation domains whose resources are referenced in the policy appear below the end-to-end automation domain icon.

The following icons are used to identify the elements in the topology tree:

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="icon" /></td>
<td>An automation domain. When the domain is not online or its state is unknown, the icon is grayed-out.</td>
</tr>
<tr>
<td><img src="image" alt="icon" /></td>
<td>A node that belongs to a first-level automation domain. When a node is not online, the icon is grayed-out.</td>
</tr>
</tbody>
</table>

The icons change their appearance if something happens that you need to be informed of. The following table provides some examples. For more details, see the IBM Tivoli System Automation for Multiplatforms End-to-End Automation Management Component Reference.

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="icon" /></td>
<td>At least one event was lost. Events inform you of a change to a resource, for example, a change in state of a first-level automation resource. This icon indicates that such an event could not be received, for example, because the network was down when the event was sent. This means that the information displayed on the operations console may not be correct for all resources. To resolve the problem, perform a Refresh all (Menu —&gt; Refresh all) to update the information on the operations console.</td>
</tr>
<tr>
<td><img src="image" alt="icon" /></td>
<td>The first-level automation domain is online and commands and queries can be issued against the domain but no resource events are received.</td>
</tr>
</tbody>
</table>
Table 13. Some flavors of topology tree icons (continued)

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Automation" /></td>
<td>The first-level automation domain is online and resource events are still received from the domain but commands and queries cannot be issued against the domain.</td>
</tr>
<tr>
<td><img src="image" alt="Errors" /></td>
<td>There are new severe errors in the log file of the domain.</td>
</tr>
</tbody>
</table>

**What you can see in the Status column**

The Status column is used to inform you of the health status of a domain. When the domain is healthy, the column is empty.

By default, a domain is considered healthy if none of the top-level resources that are hosted by the domain has encountered a problem that may require your attention. However, you can also define that a different set of resources is to be used to indicate whether a domain is healthy or not (refer to “Using non-top-level resources as domain health indicators” on page 151).

If a resource that is used as domain health indicator has encountered a problem, one of the following icons appears in the Status column:

Table 14. Icons in the Status column of the topology tree

<table>
<thead>
<tr>
<th>Icon</th>
<th>The icon indicates ...</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Warning" /></td>
<td>A warning has been issued. The problem may still be resolved automatically, but the element should be monitored carefully.</td>
</tr>
<tr>
<td><img src="image" alt="Error" /></td>
<td>The red error icon indicates that an error has occurred. To resolve the error, operator intervention is required.</td>
</tr>
<tr>
<td><img src="image" alt="Black Error" /></td>
<td>The black error icon indicates that an unrecoverable error has occurred. To resolve the problem, urgent operator intervention is required.</td>
</tr>
</tbody>
</table>

As the topology tree informs you of problems in a domain or on a node, you can use it as an entry point for monitoring resources.

**What you can see in the Located here column**

You use the Located here column to find out which domain hosts a resource or the members of a group and on which nodes the resources are located.

To determine the location of a resource, select the resource in the resource table. When you have made your selection, check marks in the Located here column indicate the hosting domain. Additionally, if you have expanded the domain, in which case the node hierarchy is displayed, check marks identify the node or nodes on which the resource is located (see Figure 12 on page 120).

More detailed information about the location of resources and their current observed state is displayed on the "Location info" tab which is available for resource references and for first-level and end-to-end automation groups.

**What you must know about the resources section**

The following figure shows the layout of the resources section.
The resources section has the following areas:

**Section header**

The section header displays the name of the domain or node that is currently selected in the topology tree.

**View and Search**

The View and Search functions allow you to limit the scope of the resource table:

**View**

Select the Errors and warnings item from the View drop-down list to display only resources that are in an error or warning state. The view is always applied to the list of resources which is currently displayed in the resource table.

**Search**

Allows you to display only resources that meet specific search criteria (see “Searching for resources” on page 145 for more information).

**Resource table views**

The resource table has two views, which are described in the sections below. In both views, you can perform the following basic actions:

**Select a resource**

To select a resource, you click its name in the Resource column.

**Control the sort order of the resource table**

You can sort the resource table on any column by clicking the sort arrow in the column header.

A solid sort arrow in a column header indicates that the table is currently sorted on the column. The direction in which the solid sort arrow is pointing indicates the current sort order (ascending or descending). By clicking on the solid sort arrow, you can toggle between ascending and descending sort order.
When you position the cursor over a sort arrow, a hover help text appears showing the current sort status of the column and the sort order that will result when the sort arrow is clicked.

**Page through the resource table**
The resource table may extend over multiple pages. To page through the table or to go to a specific resource you use the controls that are available in the status line below the table.

**Group hierarchy view**
The group hierarchy view is displayed when you are not displaying the results of a search. In the following figure, the top-level resources of the automation domain "Friendly E2E", which is selected in the topology tree, are displayed in the resource table.

<table>
<thead>
<tr>
<th>Resource name</th>
<th>Compound state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friendly Computer Shop</td>
<td>OK</td>
</tr>
<tr>
<td>Stock Trading Application</td>
<td>Error</td>
</tr>
<tr>
<td>eMail Hosting0</td>
<td>OK</td>
</tr>
<tr>
<td>eMail Hosting1</td>
<td>OK</td>
</tr>
<tr>
<td>eMail Hosting10</td>
<td>OK</td>
</tr>
<tr>
<td>eMail Hosting11</td>
<td>OK</td>
</tr>
<tr>
<td>eMail Hosting12</td>
<td>OK</td>
</tr>
<tr>
<td>eMail Hosting13</td>
<td>OK</td>
</tr>
<tr>
<td>eMail Hosting14</td>
<td>OK</td>
</tr>
<tr>
<td>eMail Hosting15</td>
<td>OK</td>
</tr>
</tbody>
</table>

When you select a group in the resource table, the members of the group are displayed in the resource table. In the area above the table, a bread crumb trail appears. On the trail, the name of the group whose members are listed in the resource table is highlighted, indicating that the group is selected.

The bread crumb trail is useful for navigation and orientation:
• When you drill down into the group hierarchy, an entry is added to the trail for each group you select.
• The last entry on the trail identifies the group whose members are currently displayed in the resource table. When the group name is highlighted, the group is selected and the group details are displayed in the information area.
• When you click Top on the bread crumb trail, the top-level resources of the automation domain or node that is selected in the topology tree are again displayed in the resource table and the bread crumb trail disappears.
• When the bread crumb trail starts to get deeper than three levels, an ellipsis symbol (...) replaces all but the last two entries on the trail.

The ellipsis symbol cannot be clicked. To navigate upward through the group hierarchy, click an available group name on the trail until the group you want to view appears again, and select the group name on the trail to display the group members in the resource table.

**Resource column:** The Resource column lists the resources of the selected element, which is either an automation domain, a node, or a group.
• To sort the resources alphabetically by name, click the sort arrow in the column header.
• The resource icon to the left of the resource name indicates both the resource type and its online status: when the resource is online, its icon is active, when the resource is offline, the icon is grayed out.
• When a resource is in a warning or error state, the resource icon is highlighted with a warning or error icon.

• An operator icon ‼ indicates that an operator request was submitted against the resource. The color of the operator icon changes while the request is being processed, yellow indicates that the request has been submitted, green indicates that the request was completed successfully.

The following table lists the resource icons that appear in the resource column.

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Resource Icon" /></td>
<td>A resource that is hosted by a first-level automation domain for which no resource reference is specified in the end-to-end automation policy</td>
</tr>
<tr>
<td><img src="image2" alt="Resource Icon" /></td>
<td>An end-to-end automation resource reference that references a first-level automation resource</td>
</tr>
<tr>
<td><img src="image3" alt="Resource Icon" /></td>
<td>A first-level automation resource that is referenced by a resource reference</td>
</tr>
<tr>
<td><img src="image4" alt="Resource Icon" /></td>
<td>A resource group</td>
</tr>
<tr>
<td><img src="image5" alt="Resource Icon" /></td>
<td>A choice group or a first-level automation domain move group</td>
</tr>
</tbody>
</table>

The following table lists the warning and error icons that appear in resource column when a resource is in an error or warning state.

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image6" alt="Warning Icon" /></td>
<td>The yellow warning icon indicates that the resource is in warning state.</td>
</tr>
<tr>
<td><img src="image7" alt="Error Icon" /></td>
<td>The red error icon indicates that the resource is in an error state.</td>
</tr>
</tbody>
</table>
Icon | Description
--- | ---
[ ] | The black error icon indicates that the resource has encountered an unrecoverable error.

For more information on the icons that may appear on the SA operations console, see the [IBM Tivoli System Automation for Multiplatforms End-to-End Automation Management Component Reference](#).

**Compound state column:** The column shows the compound state of the resource. By sorting on this column, you can group the resources by state.

The compound state can have one of the following values:

<table>
<thead>
<tr>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td>The resource is working as desired.</td>
</tr>
<tr>
<td>Warning</td>
<td>The resource is in warning state.</td>
</tr>
<tr>
<td>Error</td>
<td>The resource is in an error state.</td>
</tr>
<tr>
<td>Fatal</td>
<td>The resource has encountered an unrecoverable error.</td>
</tr>
</tbody>
</table>

**Search results view**

When you use *Search* to see only a specific set of resources in the resource table, the search results are displayed in the search results view. In the area above the resource table, the search criteria that were used for the search are displayed. In this view, the resource table has the following layout:

<table>
<thead>
<tr>
<th>Resources of FriendlyE2E</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>View</strong></td>
</tr>
<tr>
<td>Search results for <em>SAP</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Resource name</th>
<th>Compound state</th>
<th>Number of</th>
</tr>
</thead>
<tbody>
<tr>
<td>mySAP Solutions</td>
<td>OK</td>
<td>Friendly Computer Shop</td>
</tr>
<tr>
<td>SAP App Server</td>
<td>OK</td>
<td>mySAP Solutions</td>
</tr>
<tr>
<td>SAP EIQ Server</td>
<td>OK</td>
<td>mySAP Solutions</td>
</tr>
</tbody>
</table>

To limit the scope of resources that are currently displayed in the resource table to those that are in an error or warning state, you can additionally apply the *Errors and warnings* view that is provided in the *View* field.

**Resource table columns:** In the search results view, the resource table has three columns:

**Resource column**

In the column, the resources that match the search criteria are listed.

- To sort the resources alphabetically by name, click the sort arrow in the column header.
- If a resource is in a warning or error state, the resource icon is highlighted with a warning or error icon.
• If an operator request was submitted against the resource, an operator icon is displayed.
• Clicking a resource selects the resource and its details are displayed in the information area.

**Note:** When you select a group in the search results view, the group details will be displayed in the information area, but the resource table will not switch to the group hierarchy view to display the group members.

To display the group’s members in the group hierarchy view, you must select the group and click **Clear results** (see “Clearing the search results”).

**Compound state column**

The column shows the compound state of the resource. By sorting on this column, you can group the resources by state.

**Member of column**

If a resource is a member of a group, the name of the group is displayed in this column. When you sort the resource table on this column, the resources that are members of the same group are listed next to each other.

**Clearing the search results:** When you click **Clear results**, the resource table switches back to the group hierarchy view. Which resources are then displayed in the group hierarchy view, depends on your selection in the search results view:

• No resource was selected: the top-level resources of the automation domain or node that is selected in the topology tree are displayed.
• A resource group was selected: The group members are displayed. On the bread crumb trail, the name of the group is highlighted, the group details are displayed in the information area.
• A resource that is a member of a group was selected: The group members are displayed, the group name is displayed on the bread crumb trail but is not highlighted, the name of the selected resource is highlighted in the resource list.

---

**What you must know about the information area**

In the information area, you find detailed information about the element that is currently selected in the topology tree or in the resource table.

On the pages in the information area, controls are available that let you perform actions on the selected element. Which pages are available and what they contain depends on the type of element that is currently selected:

<table>
<thead>
<tr>
<th>When you select ...</th>
<th>...these pages are available</th>
</tr>
</thead>
</table>
| the end-to-end automation domain in the topology tree | • General  
• Policy |
| a first-level automation domain in the topology tree | • General  
• Policy  
• Additional Info |
| a node in the topology tree | • General  
• Additional Info (available only if additional information exists) |
When you select ... | ...these pages are available
---|---
a resource or group in the resource table | • General
  • Relationships (available only if the resource has relationships)
  • Location info (available only for resource references and for first-level and end-to-end automation groups)
  • Additional Info (available only if additional information exists)

For detailed information about the pages in the information area, refer to the SA operations console online help. For detailed information about the internal states that are displayed on the Additional Info page for an end-to-end automation resource, refer to the [IBM Tivoli System Automation for Multiplatforms End-to-End Automation Management Component Reference](https://www.ibm.com/support/docview.wss?uid=swg24033892) appendix “Additional state-related information about end-to-end automation resources”.

### What you must know about the Menu

The Menu is available on the menu bar of the SA operations console.

![Figure 14. Main menu](image)

You use the entries in the menu to perform these actions:

**Refresh all**

Retrieves the available information for all elements that are displayed on the operations console from the automation managers and updates the information on the SA operations console. You will rarely need to use this function because the smart refresh function usually guarantees that the information on the operations console is up-to-date.

**Preferences**

Displays the Preferences page. You use the pages on the Preferences page to customize the SA operations console (see “Setting your user preferences for the SA operations console” on page 129).

**About**

Displays information about the version of the component you are using.
Setting your user preferences

This topic describes how you can specify what you see when you display Integrated Solutions Console and the SA operations console.

Setting your user preferences for Integrated Solutions Console

Automatically launching pages at logon
To specify that a page is to be launched automatically when you log on to Integrated Solutions Console, open the page and select the entry "Add to My Startup Pages" from the Select Action drop down menu.

To view the list of pages that are launched automatically, click My Startup Pages in the navigation tree. To remove an entry from the list, select the entry and click Remove. To specify the page that will be displayed at logon, select the Default option. For more information, see the My Startup Pages online help.

Example:

To automatically launch and display the SA operations console at logon, perform these steps:
1. Open the SA operations console.
2. From the Select Action drop down menu, select "Add to My Startup Pages".
3. To open the My Startup Pages list, click My Startup Pages in the navigation tree.
4. In the page list, select the Default option for the SA operations console entry.

Using My tasks to customize the task list in the navigation tree
Use My tasks to create and edit a list of tasks to view in the console navigation. A task includes a page that contains one or more Web applications, or console modules, that are used to complete that task. When you first access the console, all tasks to which you have access are displayed in the navigation. My tasks is especially useful to customize the navigation to show only the tasks you use most often. After you customize your tasks, My Tasks is initially displayed each time you log in to the console.

Follow these general steps to customize your task list in the navigation tree:
1. Select My tasks from the View selection list in the navigation. If you have never used My tasks before, you must click Add tasks to open it.
2. Use the check boxes to select and deselect tasks from the My tasks navigation.
3. To save your changes, click Apply.
4. To cancel your changes, click Reset.

After applying your selections, your customized task list is displayed in the navigation tree.

Setting your user preferences for the SA operations console
To set your user preferences for the SA operations console, use the pages that are available on the Preferences page. To open the Preferences page, do this:
1. Open the SA operations console.
2. From the Menu on the menu bar, select Preferences.
The following pages are accessible from the Preferences page:

**Name filters**

Use this page to define and manage the name filters you use for limiting the scope of the resource table (for more information, refer to “Working with name filters” on page 147).

Additionally, you can define which resources are to be used as domain health indicators (for more information, refer to “Using non-top-level resources as domain health indicators” on page 151).

**Visible domains**

Use this page to limit the scope of the topology tree by defining which domains should be hidden from view (for more information, refer to “Hiding domains” on page 150).

**View**

Use this page to adapt the topology tree and the resource table to your screen resolution (see “Specifying the maximum number of entries to be displayed”).

**Specifying the maximum number of entries to be displayed**

Use the View page (Menu > Preferences > View) to change the number of entries that are displayed in the topology tree and the resources section when both are visible. This is helpful when the current values are inadequate for your screen resolution. The number of entries that are displayed when either the topology tree or the resource section is hidden is adapted automatically.

To change the values, perform the following steps:

1. In one or both fields on the View page, specify how many entries are to be displayed by default. The valid range is 5 through 100.
2. Click OK to save your changes.
Chapter 21. Monitoring resources

This section describes how you can use the operations console of SA for Multiplatforms to monitor the states of resources, and to identify and analyze problems.

State information provided on the operations console

Observing the states of resources is the most important aspect of monitoring. The topics in this section describe the state-related information that is provided on the operations console for domains, nodes, and resources.

Compound state and operational state

The compound state plays an important role in monitoring and problem analysis. It informs you of the health status of a domain, a group, or a resource.

On the operations console, information about the compound state is provided for domains, groups, and individual resources. The compound state is complemented by the operational state, which provides additional information about the compound state.

The compound state is displayed as an icon that appears in several places on the operations console:

- In the topology tree, a warning or error icon appears in the Status column when a resource that you are using as domain health indicator for the domain has encountered a problem. When no compound state icon is displayed in the topology tree, this indicates that the domain is healthy.
- In the resource table, the resource icon in the resource column is highlighted with a warning or error icon when a resource has encountered a problem.
- The compound state icon also appears on the General page of a domain, group, or resource. To the right of the compound state icon on the General page, the operational state description is displayed providing additional information about the compound state.

The fact that the health status of a resource is indicated for the resource itself, for the group it belongs to, and for the domain which hosts it, allows you to monitor resources simply by observing the compound state of the domains in the topology tree. When no problem is indicated there, this usually means that all resources are working as desired.

Compound state values

The compound state has the following possible values:

**OK**  The resource works as desired.

**Warning**  A problem has occurred. Operator intervention is not yet required, but careful monitoring is recommended.

**Error**  A severe problem has occurred. Operator intervention is required.

**Fatal**  An unrecoverable error has occurred. Operator intervention is required.
Compound state icons
The following table lists the compound state icons that appear on the operations console when a problem has occurred.

<table>
<thead>
<tr>
<th>Icon</th>
<th>Example</th>
<th>Description</th>
</tr>
</thead>
</table>
| ![Warning Icon] | ![Warning Icon Example] | Compound state: Warning  
The yellow icon indicates that the resource may require your attention. However, the problem may still be resolved by automation management. Check the operational state description on the General page for more information on the problem.  
When the resource for which the warning is indicated is used as domain health indicator, the warning icon is also displayed in the status column of the topology for the domain that hosts the resource. |
| ![Error Icon] | ![Error Icon Example] | Compound state: Error  
The red icon indicates that the resource may require operator intervention. Check the operational state description on the General page for more information on the problem. |
| ![Fatal Icon] | ![Fatal Icon Example] | Compound state: Fatal  
The black icon indicates that an unrecoverable error has occurred. Operator intervention is required to resolve the problem. Check the operational state description on the General page for more information.  
**Note:** When an unrecoverable error has occurred and the problem has been resolved, the resource will not be automated again automatically. To include the resource in automation again, the function [Reset from unrecoverable error](#) must be used (see "Resetting a resource from an unrecoverable error" on page 161). |

State information provided for domains
This section describes the states that are displayed on the operations console for a domain:
- Operational state
- Domain state
- Communication state

In the topology tree, icons inform you of the compound state, the domain state, and the communication state of a domain. Additional information about these states is available in the status section on the General page for the domain that is selected in the topology tree.

The following figure shows the status section on the General page for a domain:
Operational state descriptions provided on the General page

The following table lists some of the operational state descriptions that are displayed on the General page when a domain is selected in the topology tree, and provides some basic information on how you can proceed when a problem has occurred.

The operational state description is displayed to the right of the compound state icon on the General page. For general information about the compound state, see “Compound state and operational state” on page 131.

Table 16. Operational state descriptions provided on the General page for a domain

<table>
<thead>
<tr>
<th>Description on the General page</th>
<th>Troubleshooting</th>
</tr>
</thead>
<tbody>
<tr>
<td>The domain’s top-level resources work as desired.</td>
<td>None.</td>
</tr>
<tr>
<td>The domain contains top-level resources with warnings. At least one resource matching the name filter &lt;current domain filter&gt; has a warning.</td>
<td><strong>What it means</strong>: At least one of the resources you are using as domain health indicators has encountered a problem. <strong>What you can do</strong>: Find out which resource is affected and monitor it carefully. Usually, the resource will recover automatically.</td>
</tr>
</tbody>
</table>

Information area

<table>
<thead>
<tr>
<th>General</th>
<th>Automation domain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Name: Friendly²E</td>
<td></td>
</tr>
<tr>
<td>Status</td>
<td></td>
</tr>
<tr>
<td>Domain state: Online</td>
<td></td>
</tr>
<tr>
<td>Communication state: No communication problems</td>
<td></td>
</tr>
<tr>
<td>The automation domain’s top level resources work as desired</td>
<td></td>
</tr>
<tr>
<td>Log</td>
<td></td>
</tr>
</tbody>
</table>

View log...
Table 16. Operational state descriptions provided on the General page for a domain (continued)

<table>
<thead>
<tr>
<th>Description on the General page</th>
<th>Troubleshooting</th>
</tr>
</thead>
<tbody>
<tr>
<td>The domain contains top-level resources with errors. At least one resource matching the name filter <code>&lt;current domain filter&gt;</code> has an error.</td>
<td><strong>What it means:</strong> At least one of the resources you are using as domain health indicators has encountered a serious problem. Operator intervention may be required. <strong>What you can do:</strong> Find out which resource is affected and analyze the problem, for example:  • View the domain log file and check for error messages.  • Drill down to the affected first-level automation resource and check its compound state.  • Check the relationships of the affected resource.  • View the requests and votes that have been issued against the resource.  • Consult the information pages for the resource. The information pages are available in the information area when you select the resource in the resource table.  • Contact the owner of the application.</td>
</tr>
</tbody>
</table>
Table 16. Operational state descriptions provided on the General page for a domain (continued)

<table>
<thead>
<tr>
<th>Description on the General page</th>
<th>Troubleshooting</th>
</tr>
</thead>
</table>
| The domain contains top-level resources with unrecoverable errors. At least one resource matching the name filter <current domain filter> has an unrecoverable error. | **What it means:** At least one of the resources you are using as domain health indicators has encountered an unrecoverable problem. **What you can do:** Find out which resource is affected and analyze the problem, for example:  
  - View the domain log file and check for error messages.  
  - Identify the location of the resource and check the system and application logs for error messages.  
  - Drill down to the affected first-level automation resource and check its compound state.  
  - Consult the information pages for the resource. The information pages are available in the information area when you select the resource in the resource table.  
  - Contact the owner of the application. If the message is displayed for the end-to-end automation domain, ensure that the automation engine's user credentials for the first-level automation domains are specified correctly in the configuration dialog. After resolving the problem, you must use the Reset function to include the resource in automation again. |

**Domain state**
The domain state indicates whether the domain is currently online, offline, or whether the state is unknown. The domain state value is displayed on the General page. Possible values are:

- Online
- Offline
- Unknown

In the topology tree, the appearance of the domain icon shows the state of the domain:

Table 17. Domain state icons

<table>
<thead>
<tr>
<th>Icon</th>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Icon" /></td>
<td>Online</td>
<td>The active icon indicates that the domain is online.</td>
</tr>
<tr>
<td><img src="image2" alt="Icon" /></td>
<td>Offline or Unknown</td>
<td>The grayed out icon indicates that the domain is offline or that its state is unknown.</td>
</tr>
</tbody>
</table>

Chapter 21. Monitoring resources  135
Communication state
The communication state provides you with the following information:
- Adapter-related information: whether the adapter to the first-level automation domain is operational
- Connectivity-related information:
  - whether events can be received from the automation adapter
  - whether requests or queries can be submitted to the automation adapter
- When events were lost

On the operations console, the communication state is indicated in two places:
- In the topology tree, the appearance of the domain icon changes when a problem has occurred.
- On the General page of a domain, a description of the communication state is provided.

The following table gives you an overview of how a problem is indicated in the topology tree and on the General page. For more information on the icons that may appear, see the [IBM Tivoli System Automation for Multiplatforms End-to-End Automation Management Component Reference](https://www.ibm.com/products/tivoli-system-automation-for-multiplatforms/end-to-end-automation-management-component-reference).

<table>
<thead>
<tr>
<th>Communication state icons and state descriptions</th>
<th>What it means</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Icon" /></td>
<td>No communication problems.</td>
</tr>
<tr>
<td><img src="image2.png" alt="Icon" /></td>
<td>Commands and queries can currently be issued against this domain, but at least one resource event was lost.</td>
</tr>
<tr>
<td><img src="image3.png" alt="Icon" /></td>
<td>No commands or queries can currently be issued against this domain, but resource events are still received.</td>
</tr>
</tbody>
</table>

| ![Icon](image1.png) | No action is required. |
| ![Icon](image2.png) | The state information provided for the domain’s resources may be outdated. Perform a Refresh all to update the information. If the domain stays in this state for a longer period of time, the configuration properties of the domain may need to be changed. Inform the system administrator of the domain. |
| ![Icon](image3.png) | One of the following problems may have occurred: |
|                     | • The adapter has failed. Try to start the adapter. |
|                     | • The network is down. Call the network administrator. |
|                     | • A firewall has been activated which commands or queries cannot pass. Call the responsible administrator. |
|                     | • For the end-to-end automation domain: Contact the system administrator. The administrator should check whether the automation engine is still active. |
### Table 18. Communication state (continued)

<table>
<thead>
<tr>
<th>Communication state icons and state descriptions</th>
<th>What it means</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Icon] Commands and queries can currently be issued against this domain, but no resource events are received.</td>
<td>The state information provided for the resources that are hosted by the domain may be outdated. Perform a Refresh all to update the information. The configuration properties of the domain may need to be changed. Inform the system administrator of the domain.</td>
</tr>
<tr>
<td>![Icon] None of the communication paths to this domain are currently working.</td>
<td>No queries can be submitted, no events can be received. The resource state information may be outdated. No refresh is possible. Check if the adapter has failed.</td>
</tr>
<tr>
<td>![Icon] No commands or queries can currently be issued against this domain and at least one resource event was lost.</td>
<td>The state information provided for the resources of the domain may be outdated. View the log files manually for further information.</td>
</tr>
<tr>
<td>The automation adapter is currently not running.</td>
<td>The adapter may have been stopped intentionally by an administrator.</td>
</tr>
</tbody>
</table>

### State information provided for nodes

The observed state of a node indicates whether a node is currently
- online or offline
- included in automation or excluded from automation

The observed state of a node is visible in the topology tree and in the state section on the General page. The following table gives you an overview of how the observed state is displayed. For more information on the icons that may appear, see the [IBM Tivoli System Automation for Multiplatforms End-to-End Automation Management Component Reference](#).

**Table 19. Observed state of a node**

<table>
<thead>
<tr>
<th>Icon</th>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Icon] Online</td>
<td>Online</td>
<td>The active icon indicates that the node is online.</td>
</tr>
<tr>
<td>![Icon] Offline</td>
<td>Offline</td>
<td>The grayed out icon indicates that the node is offline.</td>
</tr>
<tr>
<td>![Icon] Online</td>
<td>Online</td>
<td>The node is online and has been excluded from automation.</td>
</tr>
<tr>
<td>![Icon] Offline</td>
<td>Offline</td>
<td>The node is offline and has been excluded from automation.</td>
</tr>
</tbody>
</table>

### State information provided for resources

On the operations console, you find the following state-related information about a resource or group:
Compound state
The compound state icon indicates whether a resource works as desired or has encountered an error.

Operational state
The operational state provides additional information about the compound state. The operational state description is displayed to the right of the compound state icon on the General page.

Observed state
The observed state represents the current state of the resource as reported by the automation manager of the domain by which it is hosted.

Desired state
The desired state reflects the automation goal of the resource.

Information about these states is available on the General page in the resource status section. The observed state and the compound state are also visible in the resource table.

The following figure shows the resource status section on the General page for a resource reference. When you select a different type of resource in the resource table, the section header on the General page changes accordingly, but the appearance of the section itself and the way in which the state information is provided are identical for all types of resources.

![Figure 15. State information on the General page](image)

The following sections describe the states and their possible values, and explain how and where the states are displayed.

**Operational state descriptions provided on the General page**
The possible values of the compound state and how the compound state of a resource is indicated in the resource table and in the topology tree is described in “Compound state and operational state” on page 131.

The following table lists some of the operational state descriptions that are displayed on the General page when a resource is selected in the resource table. Most of the descriptions that appear there are self-explanatory. In some cases, the table provides additional information about what may have caused a problem.

<table>
<thead>
<tr>
<th>Operational state description on the General page</th>
<th>Possible causes and actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>The resource works as desired.</td>
<td></td>
</tr>
</tbody>
</table>
Table 20. Operational state descriptions on the General page for a resource (continued)

<table>
<thead>
<tr>
<th>Operational state description on the General page</th>
<th>Possible causes and actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>The resource works as desired but is dormant.</td>
<td>No action required.</td>
</tr>
<tr>
<td>Warning: The resource is performing poorly.</td>
<td></td>
</tr>
<tr>
<td>Warning: The resource has stopped but not completed its job.</td>
<td>This message is displayed for end-to-end automation resources only. Usually, the message is transient and requires no action. It is displayed after the automation engine is started, indicating that the initial event for the resource has not yet been received from the first-level automation domain. The message usually disappears as soon as the initial event has been received.</td>
</tr>
<tr>
<td>Warning: No contact to resource.</td>
<td>This message is displayed for first-level automation resources only. It usually means that the resource was forced down by a first-level operator.</td>
</tr>
<tr>
<td>Warning: The communication has been interrupted.</td>
<td>This message is displayed for resource references only. It indicates that the first-level automation domain which hosts the referenced resource is not available.</td>
</tr>
<tr>
<td>Warning: The resource has been forced down.</td>
<td>This message is displayed for first-level automation resources only. It indicates that the node on which the resource is located is offline.</td>
</tr>
<tr>
<td>Error: The hosting domain is gone.</td>
<td>This message indicates that the policy contains an incorrect reference or that the adapter cannot send the names of the resources of the domain.</td>
</tr>
<tr>
<td>Error: The hosting node is gone.</td>
<td></td>
</tr>
<tr>
<td>Error: The resource has been excluded from automation.</td>
<td></td>
</tr>
<tr>
<td>Error: The resource reference references a resource that does not exist.</td>
<td></td>
</tr>
<tr>
<td>Error: The start processing did not finish successfully.</td>
<td></td>
</tr>
<tr>
<td>Error: The stop processing did not finish successfully.</td>
<td></td>
</tr>
<tr>
<td>Error: The referenced resource is in an error state.</td>
<td>This message indicates that the end-to-end automation manager cannot bring the resource reference into the desired state because the referenced resource has encountered an error. To correct the error, the problem that was encountered by the referenced resource must be resolved.</td>
</tr>
<tr>
<td>The resource has an unrecoverable problem.</td>
<td></td>
</tr>
<tr>
<td>The resource has an unrecoverable problem: The start processing did not finish successfully.</td>
<td></td>
</tr>
<tr>
<td>The resource has an unrecoverable problem: The stop processing did not finish successfully.</td>
<td></td>
</tr>
</tbody>
</table>
Table 20. Operational state descriptions on the General page for a resource (continued)

<table>
<thead>
<tr>
<th>Operational state description on the General page</th>
<th>Possible causes and actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>The resource has an unrecoverable problem: Unable to contact the referenced resource.</td>
<td>This message indicates that the end-to-end automation manager cannot establish contact with the referenced resource. This problem occurs when the end-to-end automation manager caught some exceptions when it tried to access the referenced resource. To analyze the problem, look in the end-to-end automation domain log file for additional information about the exception. After resolving the problem you must use the Reset function to include the resource in automation again.</td>
</tr>
</tbody>
</table>

The following messages are displayed when a start or stop request has been submitted.

<table>
<thead>
<tr>
<th>Message</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warning: Online request pending.</td>
<td>An operator has submitted a start request against the resource.</td>
</tr>
<tr>
<td>Warning: Offline request pending.</td>
<td>An operator has submitted a stop request against the resource.</td>
</tr>
<tr>
<td>Warning: Operation in progress.</td>
<td>A temporary state. The message is displayed while a resource is starting or stopping.</td>
</tr>
<tr>
<td>Error: The resource cannot be started because the online request did not win at this moment.</td>
<td>The start request did not win. However, the request stays in the request list and may be processed at a later time. You can check the request list of the resource to find out why the request did not win.</td>
</tr>
<tr>
<td>Error: The resource cannot be stopped because the offline request did not win at this moment.</td>
<td>The stop request did not win. However, the request stays in the request list and may be processed at a later time. You can check the request list of the resource to find out why the request did not win.</td>
</tr>
<tr>
<td>Error: The resource cannot be started because of unfulfilled dependencies.</td>
<td>The resource could not be started because a resource that had to be started first could not be started. Check the relationships of the resource to find out which target resource could not be started.</td>
</tr>
<tr>
<td>Error: The resource cannot be stopped because of unfulfilled dependencies.</td>
<td>The resource could not be stopped because a resource that had to be stopped first could not be stopped. Check the relationships of the resource to find out which target resource could not be stopped.</td>
</tr>
</tbody>
</table>

**Observed state**

The observed state represents the current state of the resource as reported by the automation manager.

Possible values are:

**Online**
The resource is online.

**Offline**
The resource is offline.

**Starting**
The resource is starting.

**Stopping**
The resource is stopping.
Unknown
The automation manager has no information about the current state of the resource. When displayed for an end-to-end automation resource, this state indicates that the resource has not been contacted yet.

On the General page, the state value is provided in the resource state section (see Figure 15 on page 138). In the resource table, the resource icon indicates the observed state of the resource:
• When the icon is active, the resource is online or stopping.
• When the icon is grayed out, the resource is not online. This is the case when the resource is offline or starting, or when the current state of the resource is unknown.

Desired state
The desired state reflects the automation goal of a resource. The automation manager tries to keep the resource in this state. The default desired state is specified in the automation policy. At runtime, the desired state is influenced by operator actions (start and stop requests) and by a resource’s relationships (StartAfter, StopAfter, and ForcedDownBy relationships). (For more information on automations goals and relationships, see Chapter 5, “Automation concepts,” on page 27.)

Possible values are:

Online
The automation goal is set to online. The automation manager tries to keep the resource online.

Offline
The automation goal is set to offline. The automation manager tries to keep the resource offline.

Not changeable
This value is displayed for monitor resources, which can be monitored on the operations console but whose desired state cannot be changed through start or stop requests.
Monitoring tasks

The following sections describe tasks you will perform to obtain information about resources and for analyzing problems.

Finding out where resources are located

To find out where the resources that are referenced by a resource reference are located, use one of these approaches:

- Select the resource reference in the resource table. Click the Location info tab in the information area to display the names, states, and locations of the referenced first-level resources.
- Select the resource reference in the resource table. In the topology tree, check marks appear in the Located here column, indicating where the referenced resources are located (see Figure 12 on page 120).

To find out where the members of a first-level group are located, use one of these approaches:

- Select the group in the resource table. Click the Location info tab in the information area to display the names, states, and locations of the group members.
- Select the group in the resource table. In the topology tree, check marks appear in the Located here column, indicating where the referenced resources are located.

Finding out to which groups a resource belongs

Perform the following steps to find out to which group a resource belongs:

1. Select the resource in the resource table and open the General page in the information area.

2. The groups of which the resource is a member are listed in the Used by section on the General page.

Finding out whether a resource is referenced by a resource reference

A right-pointing arrow at the top of a resource icon indicates that the first-level resource is referenced by a resource reference. To identify the resource reference that references a referenced first-level resource, select the referenced resource. You find the name of the corresponding resource reference in the Used by section on the General page. You can navigate to the resource reference by clicking its name.

Switching between resource references and referenced resources

In many places on the operations console, the names of elements are implemented as links that allow you to quickly jump to the element. Typically, when you click such a link, the current contents of the operations console change to display the information for the selected element. You can use the links, for example, to perform the following tasks:
Identify which first-level automation resource is referenced by a resource reference

This is helpful when you are monitoring the resources of the end-to-end automation domain and you see that a problem is indicated for a resource reference.

Identifying the resource reference that references a first-level automation resource

These tasks are described in the following sections.

**Identifying which first-level automation resource is referenced by a resource reference**

Perform the following steps:

1. Select the resource reference in the resource table.
   This is what is displayed on the operations console:
   - In the *Located here* column of the topology tree, a check mark indicates which first-level domain hosts the resource.
   - In the information area, the information pages for the resource reference are displayed. The *Referenced resource* section on the General page shows the name of the referenced resource.

2. Click the name of the referenced resource in the *Referenced Resource* section.

**Results:**

This is what is displayed on the operations console:

- In the topology tree, the first-level automation domain that hosts the referenced resource is selected.
- The resources section header displays the name of the first-level automation domain.
- In the resource table, the referenced resource is selected.
- In the information area, the information pages for the referenced resource are displayed.

**Identifying the resource reference that references a first-level automation resource**

Perform the following steps:

1. Select the first-level automation resource in the resource table to display the information pages for the resource in the information area. In the *Used by* section on the General page, the name of the corresponding resource reference is displayed.

2. Click the name of the resource reference in the *Used by* section.

**Results:**

This is what is displayed on the operations console:

- In the topology tree, the end-to-end automation domain is selected.
• In the header of the resources section the name of the end-to-end automation domain is displayed.
• In the resource table, the resource reference is selected.
• In the information area, the information pages for the resource reference are displayed.

Displaying relationships
You use the Relationships page in the information area to display the forward and backward relationships for a resource. For each resource that participates in a relationship, a hyperlink lets you jump to the resource.

Before you begin:
• The Relationships page is only available for resources for which relationships have been defined.
• For first-level automation resources, the Relationships page may contain first-level automation-specific relationships.

Perform the following steps to display the relationships of a resource:
1. Select the resource in the resource table.
2. In the information area, click the Relationships tab to open the Relationships page.
   To jump to a resource, click the name of the resource in the relationship table.

Viewing log files
Much information about a domain, its nodes, and the resources that are hosted by the domain is written to the log file of the domain. You can display the domain log file from the operations console. Checking a log file for messages always is an important step in problem analysis. Viewing a log file is especially important when the domain icon indicates that there are new severe errors in the log file.

You can display a domain log file by performing the following steps:
1. Select the domain in the topology tree.
2. On the General page, click View log.

Result: The log file is displayed in the Log viewer panel.

For information about displaying the log file of the end-to-end automation domain when the file is not accessible from the operations console, for example, because the automation engine is not running, refer to “Viewing the XML log file of the automation engine” on page 194.

Displaying operator instructions using the info link
Instructions that have been specifically provided for a resource can be helpful when a problem occurs and you need additional information about the resource.

To display the operator instructions for a resource, perform the following steps:
1. Select the resource in the resource table and open the General page in the information area.

2. On the General page, click Info link.

Result: The operator instructions for the resource are displayed.

**Displaying owner contact information**

Information about the owner of a resource is available on the General page for a resource. To display the General page, select the resource in the resource table and click the General tab in the information area.

**Limiting the scope of the resource table**

This section describes how you use the View and Search functions to limit the scope of resources that are displayed in the resource table.

**Displaying only resources that are in an error or warning state**

The item Errors and warnings that is available in the View field allows you to list only resources in the resource table that are in an error or warning state.

To activate the Errors and warnings view, select the corresponding item in the View field. To deactivate it, select the item All resources from the View list.

The Errors and warnings view is always applied to the list of resources that is currently displayed in the resource table:

- The top-level resources of a domain or node are displayed in the resource table:
  When you activate the Errors and warnings view, the resource table lists all resources of the domain or node that are in an error or warning state.

- A group is selected in the resource table:
  When you activate the Errors and warnings view, the resource table displays only the group members that are in an error or warning state.

- You are displaying the results of a search:
  When you activate the Errors and warnings view, the resource table displays only the resources that match the search criteria and are in an error or warning state.

**Searching for resources**

Use the Search panel to display only resources that meet specific search criteria. The resources will be displayed in the search results view of the resource table.

**Submitting a search**

To submit a search, perform the following steps:

1. Select a domain or node.

2. Click the Search button above the resource table. The Search panel is displayed.

3. Specify the search criteria for the resources you want to display.

4. Click OK to submit the search.
Results:
The resources that match the search criteria are displayed in the search results view of the resource table. If you specified a new search phrase in the Resource name section, the search phrase is saved as a name filter for the domain and becomes available in the Resource name drop-down list on the Search panel for the domain or any of its nodes.

Note: Search results are not refreshed automatically. To refresh, clear the search results and perform the search again.

Search panel sections and controls
The search criteria you can specify on the panel vary depending on the capabilities of the selected domain, or, if you selected a node, on the capabilities of the domain to which the node belongs. You can specify any, multiple, or all search criteria that are available.

Resource name section
Allows you to specify a search phrase to display only resources whose names contain the phrase.

You have the following options:
• To use an existing search phrase, select the search phrase from the drop-down list.
• To enter a new search phrase, select Use entry from below from the drop-down list and type the search phrase in the field below. Search phrases can have the following syntax:
  – Type the exact resource name to display a specific resource.
  – Use the asterisk * as a wildcard to display all resources whose names contain the search phrase. The wildcard can appear in any position and, if necessary, more than once (for example, "DB2"), and can stand for 0..n characters.
  – To display all the resources that contain at least one of several search phrases, type all phrases separated by a blank; the wildcard can be used in one or all phrases (for example, "DB2* SAP*").
  – For resource names that may contain blanks, type the complete search phrase including the blank and enclose the phrase in single or double quotation marks, for example, "SAP "Server". This ensures that it will be recognized as a single phrase.

Resource class section
• Search for any resource class
  This option is selected by default. If selected, the resource class is not used as search criterion.
• Search only for selected resource classes
  Allows you to search for resources by resource class type. To specify a class type, select the appropriate check box.
• Search for resource classes matching the following search pattern
  Allows you to specify a search phrase to display only resources whose class names contain the search phrase. Note that this option is not available for all automation domains, even if searching by resource class name is otherwise allowed.
  Search phrases can have the following syntax:
- To search for resources of a specific resource class, type the exact class name.
- Use the asterisk * as a wildcard to display resources whose class names contain the search phrase. The wildcard can appear in any position and, if necessary, more than once, and can stand for 0..n characters.
- To display all the resources whose resource class names contain at least one of several search phrases, type all phrases separated by a blank; the wildcard can be used in one or all phrases.
- For resource class names that may contain blanks, type the complete search phrase including the blank and enclose the phrase in single or double quotation marks. This ensures that it will be recognized as a single phrase.

**Miscellaneous section**
Select the check box to search for resources against which operator requests have been submitted.

Note that selecting the check box is only valid for request driven domains and has no effect for command-driven domains.

**Working with name filters**
Name filters are search phrases that you use to display only resources in the resource table whose name contains a search phrase. Typically, you specify these search phrases in the **Resource name** section on the Search panel, which appears when you click the Search button above the resource table. When you enter a search phrase on the Search panel and submit the query, the search phrase is saved as name filter and is from then on available for the domain and all of its nodes in the **Resource name** drop-down list on the Search panel until you delete it.

This topic describes how you define, edit, and delete name filters on the Name filters page, on the Preferences panel.

**Defining a name filter**

**Before you begin:**
You can define name filters in the following ways:

- You specify a search phrase in the **Resource name** section on the Search panel (for details, see “Searching for resources” on page 145).
- You specify a search phrase on the Name filters page, on the Preferences panel. Note that search phrases that you define there also become available for the domain and its nodes in **Resource name** drop-down list on the Search panel.

Perform the following steps to define a name filter on the Name filters page:

1. Open the Name filters page (**Menu --> Preferences --> Name filters**).

2. Select the domain for which you want to define a new filter.

3. Click New. The Name filters panel is displayed.

4. Specify the search phrase to define the name filter. You have the following options:
   - To display only one specific resource, type the exact resource name.
Use the asterisk * as wildcard to display all resources whose names contain the search phrase. The wildcard can appear in any position and, if necessary, more than once (for example, *DB2*), and can stand for 0..n characters.

To display all the resources that contain at least one of several search phrases, type all phrases separated by a blank; the wildcard can be used in one or all phrases (for example, *DB2* SAP*).

For resource names that may contain blanks, type the complete search phrase including the blank and enclose the search phrase in single or double quotation marks, for example, “*SAP* Server”. This ensures that it will be recognized as a single phrase.

5. Click OK.

Results:
The search phrase you specified is saved as a name filter for the domain. Note that the filter is domain-specific. If you want to use the same search phrase for a different domain and its nodes, you must specifically define an identical filter for that domain.

**Applying an existing name filter**
Perform the following steps to apply an existing filter:
1. Select the domain or the node to which you want to apply the filter.

2. Click Search. The Search page is displayed.

3. From the Resource name drop-down list, select the filter you want to apply.

4. Click OK to apply the filter.

Results:
• The search results view of the resource table is displayed. Depending on whether you selected a domain or a node in the topology tree, the table lists only the resources of the selected domain or node whose names match the filter criteria.

• The filter remains active until you deactivate it by clicking **Clear results**.

**Administering name filters**
On the Name filters page, on the Preferences panel, you can perform the following tasks:
• Define a new filter
• Edit a filter
• Delete filters

Perform the following steps to administer your name filters:
1. Open the Preferences panel (Menu —> Preferences).

2. Open the Name filters page.
3. Select the domain whose filters you want to work with. The list of name filters that have been defined for the domain is displayed. Depending on whether name filters have already been defined for the domain, buttons are enabled that allow you to work with the name filters.

![Image of Name filters page on the Preferences panel]

*Figure 16. Name filters page on the Preferences panel*

4. You use the buttons to perform the following tasks:
   - **New** Opens the Name filters page on which you can specify a new name filter.
   - **Edit** Opens the Name filters page on which you can edit the name filter you selected. The button is only enabled when you have already defined a name filter for the selected domain.
   - **Delete** Deletes the name filter you have selected. The button is only enabled when you have already defined a name filter for the selected domain.
   - **Delete all** Deletes all name filters that are available for the selected domain. The button is only enabled when you have already defined a name filter for the selected domain.

**Displaying only resources against which operator requests were submitted**
You can limit the scope of the resource table to resources against which operator requests were submitted. You use this option separately or combine it with a name filter.

Perform the following steps use the option:
1. Select the domain or the node.
2. Click Search. The Search page is displayed.

3. Select the check box Only resources with operator requests.

4. Click OK.

Results:
- The search results view of the resource table is displayed. Depending on whether you selected a domain or a node in the topology tree, the table only lists the resources of the selected domain or node against which operator requests have been submitted.
- You return to the group hierarchy view by clicking Clear results.

Hiding domains

By default, all domains are displayed in the topology tree. You can limit the scope of the topology tree by hiding domains from view, for example, domains in which you are not interested or for which you are not authorized. This has the advantage that you will no longer be prompted for your user credentials for these domains.

Perform the following steps:
1. Open the Preferences panel (Menu —> Preferences)

2. Click the Visible domains tab to open the Visible automation domains page. The page shows a hierarchical view of the available domains.

Figure 17. Visible automation domains page
3. Deselect the domains that should not appear in the topology tree and click OK.

**Result:** The topology tree only shows the selected domains and you will receive events for these domains only.

**Using non-top-level resources as domain health indicators**

Domain health indicators are resources whose state is used to indicate whether a domain is healthy. When such a resource goes into a warning or error state, a warning or error icon appears in the Status column of the topology tree for the domain that hosts the affected resource.

By default, the top-level resources of a domain are used as domain health indicators, but you can specify that other resources are to be used as domain health indicators by performing the steps below.

To specify which resources are to be used as domain health indicators, you use a name filter, either an existing one or one that you create specifically for the purpose.

Perform the following steps:
1. Open the Preferences panel (**Menu —> Preferences**).
2. Open the Name filters page.
3. Select the domain from the list of domains.
4. If the filter you want to use is already available, proceed with step 5.
   - If you want to use new filter, click **New** and define the name filter on the panel that appears.
5. At the bottom of the Name filters page, select the check box *The resources matching the following name filter will be used to determine the domain’s health.* The list of available filters below the radio button is now active.
6. Select a filter from the list and click **OK**.

**Result:** The resources that match the criteria defined in the selected filter will be used as domain health indicators.

**Refreshing the operations console**

The smart refresh function of the operations console checks at short intervals whether new information is available for any of the displayed elements. If new information is available, for example, when the state of a resource has changed, the operations console is updated accordingly.
On the smart refresh menu, you can force an immediate smart refresh, and suspend and reactivate the automatic smart refresh. To open the smart refresh menu, click the Refresh icon, which is displayed on menu bar to the left of the ? button.

**Note:** A smart refresh only updates the information on the SA operations console that has changed since the last smart refresh. This usually guarantees that the information displayed on the console reflects the actual current state of all elements.

In rare cases, you may want to use Refresh all (Menu > Refresh all) to update the operations console. Refresh all retrieves the latest information for all elements that are displayed on the operations console from the automation managers and updates the complete contents of the operations console regardless of whether or not the information has changed.

The following controls and fields are available on the smart refresh menu:

**Pause Refresh**
Temporarily turns off the smart refresh function.

Smart refresh will resume automatically when you click a button or link on the SA operations console, or select, expand, or collapse an element in the topology tree or resource table. To manually reactivate the refresh function, click Resume Refresh.

**Resume Refresh**
To reactivate the smart refresh function, click Resume Refresh.

**Manual Refresh**
Refreshes outdated information on the SA operations console.

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### Managing your user credentials for first-level automation domains

**Storing you user credentials in the credential vault**
If a domain that requires user authentication joins the operations console for the first time, a yellow warning symbol appears in the Status column of the topology tree:

Click the domain to open the Automation domain authentication page.
Enter a user ID that is valid for the domain. The user ID need not be root but it should be authorized to perform operations on resources in the first-level automation domain that are supported by the operations console, for example, bringing an automated resource online or excluding a node from automation. Note that the user ID must be an alphanumeric string with characters that are part of the local code set.

If you leave the check box on the page selected, your user credentials for the domain are saved to the credential vault and the user ID will not be required on further attempts to access the domain.

**Note:** The user credentials that are used by the end-to-end automation engine to authenticate itself to first-level automation domains are not stored in the credential vault. You specify the credentials of the automation engine on the configuration dialog of the End-to-End Automation Management component. For information about the configuration dialog, see the [IBM Tivoli System Automation for Multiplatforms Installation and Configuration Guide](#).

### Changing and deleting your user credentials

Perform the following steps to manage your user credentials that are stored in the credential vault:

1. Click **Tivoli System Automation for Multiplatforms > Settings > Stored domain credentials** in the navigation tree.

2. On the "Stored domain credentials" page, you have the following options:
   - To change your user credentials for a domain, select the domain from the Credentials in credential vault table and click **Edit** to bring up the "First-level automation domain authentication" page. Note that the user ID must be an alphanumeric string with characters that are part of the local code set.
   - To delete the user credentials for a specific domain from the credential vault, select the domain and click **Delete**.
• To delete your user credentials for all first-level automation domains from the credential vault, click **Delete all.**
Chapter 22. Managing resources

Managing resources comprises the following tasks:
- Activating and deactivating automation policies and checking their validity
- Starting and stopping resources through requests (for request-driven automation domains) or commands (for command-driven automation domains)
- Suspending and resuming automation for resources
- Resetting resources from unrecoverable errors
- Starting and stopping choice groups or changing their preferred members
- Excluding nodes that are managed by first-level automation managers from automation and including them in automation again

This chapter describes how you perform these tasks from the SA operations console.

Working with automation policies

The following topics describe how you work with automation policies on the SA operations console.

**Note:** To activate or deactivate an end-to-end automation policy or to list the policies that are available in the policy pool of the End-to-End Automation Management component, you can also use the end-to-end automation manager command shell. For information about the command shell, see Chapter 23, “Using the end-to-end automation manager command shell,” on page 167. For information about the available command shell commands, see the IBM Tivoli System Automation for Multiplatforms End-to-End Automation Management Component Reference.

Activating an automation policy

**Steps for checking the validity of a policy from the SA operations console**

Perform this task to check the validity of automation policies in the policy pool of an automation domain and to obtain the information required to resolve policy errors and warnings.

To perform the task, the following prerequisites must be met:
- You must have at least EEZConfigurator privileges.
- The domain supports policy activation from the SA operations console.
- The policy pool directory is configured for the domain.
- The policy file is available in the policy pool directory.

Perform the following steps:

1. Open the "Select an automation policy" page in one of these ways:
   - In the console navigation tree, click Tivoli System Automation for Multiplatforms > Operational Tasks > Activate an automation policy. On the "Activate an automation policy" page, select the appropriate automation domain and click Next.
• Open the SA operations console, select the appropriate automation domain in the topology tree, open the domain’s Policy page, and click **Activate new policy**.

2. If a warning or error icon appears in the right column of the policy table, warnings, errors, or both were issued during the validity check that was performed when you opened the page. To view the list of problems for a policy, select the policy and click the **View warnings** or **View errors** button that appears below the **Description** field. If errors where found in the file, you must correct them before the policy can be activated. Although warnings do not prevent the policy from being activated, you should check if they cannot be avoided.

3. Click **Cancel** to close the policy list.

4. Repeat the procedure until all problems in the file are resolved.

**Steps for activating an automation policy**

Perform this task to activate an automation policy for an automation domain.

To perform the task, the following prerequisites must be met:
• You must have at least EEZConfigurator privileges.
• The domain supports policy activation from the SA operations console
• The policy pool directory is configured for the domain.
• The policy file is available in the policy pool directory.
• The validity of the policy has been checked and all errors that would prevent the policy from being activated have been corrected.

Perform the following steps:

1. Open the "Select an automation policy" page in one of these ways:
   • In the console navigation tree, click **Tivoli System Automation for Multiplatforms > Operational Tasks > Activate an automation policy**. On the "Activate an automation policy" page, select the appropriate automation domain and click **Next**.
   • Open the SA operations console, select the appropriate automation domain in the topology tree, open the domain’s Policy page, and click **Activate new policy**.

2. Select the policy you want to activate from the policy table. The policy must be error-free to be activated.

3. Click **Activate** to activate the policy. If you try to activate a policy that is already active, you receive a warning.

**Result:**
• The policy is activated and the domain is automated according to the specifications in the automation policy.
Deactivating a policy

Perform this task to deactivate the currently active automation policy of an automation domain. This may be required, for example, if the policy causes severe problems that cannot be resolved in any other way.

To perform the task, the following prerequisites must be met:
• You must have at least EEZConfigurator privileges.
• The domain supports policy deactivation from the SA operations console.

To deactivate an active policy, open the SA operations console, select the automation domain from the topology tree, open the domain’s “Policy” page and click Deactivate policy, or perform these steps:
1. On the console navigation tree, click Tivoli System Automation for Multiplatforms > Operational Tasks > Deactivate current policy.

2. On the “Deactivate active policy” page, select the appropriate automation domain and click Deactivate policy.

Result:
• The policy is deactivated, the domain is no longer automated.

Modifying an end-to-end automation policy

Modified policies are treated like new policies. Before you activate a modified policy:
• Make sure that you have updated the version information in the PolicyToken tag in the XML policy file.
• Check the validity of the policy as described in “Steps for checking the validity of a policy from the SA operations console” on page 155 and correct any errors.

To activate the policy, proceed as described in “Activating an automation policy” on page 155.

Working with requests

The tasks described in this topic are only available for resources that are hosted by request-driven automation domains.

Note: The topic describes how you perform the tasks on the operations console. You can also use the end-to-end automation manager command shell to work with end-to-end automation resources. For information about the command shell, see Chapter 23, “Using the end-to-end automation manager command shell,” on page 167. For information about the available command shell commands, see the IBM Tivoli System Automation for Multiplatforms End-to-End Automation Management Component Reference.

When an automation domain is request-driven, you start and stop resources by changing their desired state. This you achieve by submitting start or stop requests that ask the automation manager to bring a resource online or offline. The automation manager will only change the desired state of a resource when your request wins. When your request wins, the actual resource will only be started or stopped after all relationships have been fulfilled. (For a detailed description of
how start and stop requests are processed by the automation manager, refer to
Chapter 5, “Automation concepts,” on page 27

For submitting requests, the following rules apply:
• Start requests can only be submitted against resources in desired state Offline.
• Stop requests can only be submitted against resources in desired state Online.
• Requests cannot be submitted if another operator request has already been
  submitted against the resource. In this case, the operator request must be
canceled to change the desired state of the resource.
• Requests cannot be submitted against members of a choice group but must be
  submitted against the group. This will bring the preferred member online or
  offline.
• Requests should not be submitted against first-level automation resources that
  are referenced by a resource reference. Only when you submit the request
  against the resource reference it is ensured that all relationships are fulfilled
  before the resource is started or stopped.
• Requests cannot be submitted against monitor resources. For such resources, the
  buttons for submitting requests are not available on the operations console.

**Submitting start requests**

Perform the following steps to submit a start request:

1. In the resource table, select the resource you want to start.

2. On the General page, click Request Online.
The Request Online panel is displayed.

3. On the Request Online panel, specify a comment in the entry field. The
   comment can later be viewed by displaying the request details.

4. Click Submit to submit the request.

**Results:**

• A confirmation message is displayed on the information bar, indicating that the
  request has been submitted for processing.
• After the next refresh, resource icon is highlighted with the yellow operator icon,
  indicating that a request was issued against the resource.
• The request is processed. Processing of the request is complete when the
  resource has been started.

**Submitting stop requests**

Perform the following steps to submit a stop request:

1. In the resource table, select the resource you want to stop.

2. On the General page, click Request Offline.
The Request Offline panel is displayed.

3. On the Request Offline panel, specify a comment in the entry field. The
   comment can later be viewed by displaying the request details.
4. Click **Submit** to submit the request.

**Results:**
- A confirmation message is displayed on the information bar, indicating that the request has been submitted for processing.
- After the next refresh, resource icon is highlighted with the yellow operator icon, indicating that a request was issued against the resource.
- The request is processed. Processing of the request is complete when the resource has been stopped.

**Displaying information about an operator request**

When an operator has submitted a start or stop request against a resource, an operator request icon appears on the General page for the resource. The icon indicates the status of the request:

*Table 21. Operator request icons in the information area*

<table>
<thead>
<tr>
<th>Operator request icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A stop request has been submitted. The yellow operator icon indicates that the observed state of the resource is not Offline yet.</td>
</tr>
<tr>
<td></td>
<td>A start request has been submitted. The yellow operator icon indicates that the observed state of the resource is not Online yet.</td>
</tr>
<tr>
<td></td>
<td>The green operator icon indicates that the stop request has been completed successfully. The observed state of the resource is Offline.</td>
</tr>
<tr>
<td></td>
<td>The green operator icon indicates that the start request has been completed successfully. The observed state of the resource is Online.</td>
</tr>
</tbody>
</table>

This is how you can display more information about the request:
- Move the mouse over the operator request icon to display the user ID of the operator who submitted the request.
- Click the operator request icon to bring up the Request details panel.

**Displaying request lists**

All requests and votes (internal requests that were propagated due to relationships) that have been submitted against a resource are added to the resource’s request list. You can display the list to find out which requests and votes have been issued and which of the requests wins. The list is sorted by priority with the winning request listed at the top.

The list contains information about each request or vote, for example:
- the requested action (Online, Offline, or Suspend)
- its source (for example, OPERATOR); if the request was submitted by an operator, the Source column also shows the user ID of the operator
- additional information about the request (in the Request info column). The information is generated by the automation manager that manages the resource
- its priority
- the creation date and time
From the Request list panel, you can display detailed information about each of the requests or votes, including the comments that were added by operators when they submitted the request.

**Steps for viewing a request list and request details**

Perform the following steps:

1. In the resource table, select the resource whose request list or request details you want to view.

2. On the General page, click **View requests**.
   The Request list is displayed. The list is sorted by priority. The first entry is the winning request.

3. To display the details for a request, select the resource in the list and click **More info**.
   The Request details panel is displayed.

**Canceling requests**

You can cancel operator requests that have been submitted against resources. Votes and requests generated by automation managers cannot be canceled.

This is what happens when you cancel a request:

- When you cancel a request that did not win, you prevent it from being completed at a later time.
- When you cancel the request that is responsible for the current desired state of the resource, you change the desired state of the resource to the opposite if there are no other requests or votes in the request list that will win when the canceled request is removed.
- When you cancel a request, votes that were generated against other resources because of StartAfter or StopAfter relationships are canceled as well.

**Steps for canceling requests**

Perform the following steps to cancel a request:

1. Select the resource in the resource table.

2. On the **General** page, click **Cancel request**.
   The button is only enabled if there is an operator request in the request list of the resource.

   The text to the left of the **Cancel request** button describes the resource’s expected desired state after the request has been canceled. The expected desired state is calculated in this way:

   - If there are other requests or votes in the request list, the winning request determines the expected desired state.
   - If there are no other request or votes in the list, the desired state that is defined in the policy becomes the automation goal.

   The desired state that is actually set after cancelation can differ from the expected state, for example, when a new request or vote is generated at the same time or immediately after you canceled the request.
Bringing resources online and offline

Perform this task to issue start or stop commands against resources that are hosted by command-driven automation domains, which do not maintain request lists for resources.

Before you begin:
Before issuing a start or stop command against a referenced first-level automation resource, you must suspend automation for the corresponding end-to-end automation resource reference, if the command will bring the referenced resource into a state that conflicts with the desired state of the resource reference.

If automation for the resource reference is not suspended in such a case, the end-to-end automation manager will issue a request against the referenced resource when it detects the state conflict, which will immediately bring the referenced resource into the desired state again that is defined for the resource reference. (see also "Suspending and resuming automation for resources" on page 162).

To bring a resource online or offline, perform the following steps:
1. Select the resource in the resource table.
2. On the general page, click Bring online or Bring offline.
   
   Note: The observed state of the resource determines which button is enabled. If the resource’s observed state is Online, the Bring offline button is enabled, if its observed state is Offline, the Bring online button is enabled. If the resource’s observed state is neither Online nor Offline, both buttons are enabled.

3. On the panel that appears, specify a comment. The comment is written to the log file for later reference.

4. Click Submit to submit the command.

Result: The resource is started or stopped.

Resetting a resource from an unrecoverable error

When a resource becomes available for automation management again after an unrecoverable error was resolved by an operator, the automation manager will not start automating the resource again without your intervention. When the resource is available again, you must inform the automation manager that the resource can be included in automation management again. You do this by using the Reset function on the operations console. The Reset function is only available for first-level automation resources and resource references that are in state Unrecoverable error.

Note: This topic describes how you reset a resource from the operations console. You can also perform the task by using the command resetres in the end-to-end automation manager command shell. For information about the command shell, see Chapter 23, ‘‘Using the end-to-end automation manager command shell,’’ on page 167.
Steps for resetting a resource

Perform the following steps:

1. Select the resource in the resource table.

2. On the General page, click Reset to include the resource in automation management again.

Results:

- A confirmation message is displayed on the information bar, indicating that the command to reset the resource has been submitted for processing.
- Automation management for the resource will resume:
  - When you have reset a first-level automation resource, the resource will be managed by the first-level automation manager again.
  - When you have reset a resource reference, the end-to-end automation manager will take over again. If the referenced first-level automation resource also was in state Unrecoverable error, the reset will be propagated to the referenced resource.

Suspending and resuming automation for resources

Suspending automation for a resource causes the automation manager not to react on observed state changes by issuing requests against the resource. When automation is suspended for a resource, its observed state still reflects its actual state and its compound state is still calculated in the usual way (by comparing the actual observed state of the resource to its desired state) but a state mismatch no longer triggers automation requests against the resource.

However, a state change of a suspended resource can trigger state changes of resources that have a relationship to the suspended resource, for example, such resources may still be started or stopped by automation when the suspended resource is started or stopped.

Suspending automation for a resource can be helpful in many situations, for example, when you want to apply service to an automated first-level resource. In such situations, you may want to start and stop the application to be serviced directly, without always having to interact with the automation manager for starting and stopping the corresponding resource, or the service installation process (for example, an update installation program) may need to start and stop the application repeatedly and will not interact with the automation manager to do so. In such service scenarios, you can suspend automation for the resource before applying service and resume automation when you are done.

Suspected resources show the following behavior:

**An end-to-end automation resource group is suspended**

Automation is suspended for the group and all of its members.

**An end-to-end automation choice group is suspended**

Automation is suspended for the group and all of its members. This
means, for example, that the end-to-end automation manager will not stop any alternative member whose observed state changes to online. Therefore, it is no longer ensured that only one member (the preferred member) is online at a time.

A suspended resource has relationships
A resource’s relationships are still honored when automation is suspended:
  • A suspended resource as the target of a forcedDownBy relationship can still cause the source resource to be stopped whenever the observed state of the suspended resource changes to offline.
  • The observed state change of a suspended resource as the target of a startAfter or stopAfter relationship still triggers the start or stop of the source resource.

States Suspending automation does not have an impact on how the operational and compound states of the resource are calculated, and a mismatch between the desired state and the observed state still causes the resource to go into a warning or error state, which is then displayed on the operations console.

Operator requests can be submitted
Operator requests (Online, Offline, Cancel) are accepted although the resource is suspended. Depending on which action is performed, the requests are added to or removed from the request list and may trigger a change of the desired state. However, the automation manager will not take action to change the observed state should it conflict with the new desired state.

Suspected end-to-end automation resources can be reset
Suspected resources that are in operational state Unrecoverable Error or Reference Broken can be reset. A reset causes the observed state to change to Unknown, and the end-to-end automation manager will resubscribe for the referenced resource in order to retrieve the current observed state.

Steps for suspending automation for a resource
Perform the following steps:
1. Select the resource in the resource table.

2. On the general page, click Suspend automation.

3. On the panel that appears, specify a comment for later reference.

4. Click Submit.

Steps for resuming automation for a resource
Perform the following steps:
1. Select the resource in the resource table.

2. On the general page, click Resume automation.

3. On the panel that appears, specify a comment.
4. Click Submit.

Including a node in automation and excluding a node from automation

From the operations console, you can exclude a node from first-level automation, for example, for maintenance purposes, and include it again when you want the automation manager to take over again:

- When you exclude a node, the corresponding command is sent directly to the first-level automation manager. The first-level automation manager stops all resources that are running on the node and moves them to a different node if possible.

As the command is sent directly to the first-level automation manager, the end-to-end automation manager is not informed of the fact that the resources were stopped deliberately by an operator. However, as most of the first-level automation resources will be moved to a different node and run there, the automation manager will not even realize that these resources were stopped at their original location.

For the resources that could not be moved, however, end-to-end automation management may not be successful while they are down. For resources for which a resource reference exists and that have the desired state Online, the end-to-end automation manager will unsuccessfully issue start requests, and the resource references pointing to these resources will go into warning state. The start requests sent by the end-to-end automation manager will be retained and, if they win, be completed when the node is included again.

- When you include a node in automation again, the first-level automation manager will start the resources whose automation goal is Online. All resources that are located on the node will automatically be included in first-level and end-to-end automation again.

Steps for excluding a node from automation

To exclude a node from automation, perform the following steps:

1. Select the node in the topology tree.

2. On the General page, click Exclude node.

   Before the exclude command is sent to the first-level automation manager, you will be asked to confirm the action. Click OK to send the exclude command to the first-level automation manager.

Results:

- A confirmation message is displayed on the information bar, indicating that the exclude node command has been submitted for processing.
- The first-level resource manager will stop all resources that are running on the node, moving them to a different node if possible.

Steps for including a node in automation

Perform the following steps:

1. Select the node in the topology tree.

2. On the General page, click Include node.
Note: The button is only available if the node is currently excluded from automation.

Results:
- A confirmation message is displayed on the information bar, indicating that the include node command has been submitted for processing.
- The first-level automation manager will start all resources on the node whose automation goal is Online. First-level and end-to-end automation for the resources will commence.

Working with choice groups

Choice groups are end-to-end automation resources. They have the following characteristics:
- The members are configuration alternatives that provide the same functionality (for example, two database instances where one is used as the production database and the other serves as backup).
- Only one of the members can be online at a time.
- Members can be either resource groups or resource references. The first-level automation resources which are referenced by the members of a choice group can be located on different nodes or hosted by different domains.
- One member of the choice group is defined as the so-called preferred member. When the desired state of the choice group is Online, the preferred member is kept online by the automation manager while the other members are kept offline.
- When a member other than the preferred member is to be brought online, the preferred member must be changed.

When you want to change the desired state of a choice group or bring a member other than the currently preferred member online, the following rules apply:
- Start or stop requests must be submitted against the choice group, not against an individual member (see "Steps for starting the preferred member of a choice group" on page 166).
- To bring a member other than the currently preferred member online, you change the preferred member of the choice group by using a simple function on the operations console. Changing the preferred member for a choice group whose desired state is online, leads to the following results:
  - the old preferred member is brought offline if it is still online
  - the new preferred member of the group is brought online and kept online by the automation manager.

This is described in "Steps for starting a different member of a choice group" on page 166.

Note: This topic describes how you work with choice groups on the operations console. You can also change the preferred member of a choice group by using the command chprefmbr in the end-to-end automation manager command shell. For information about the command shell, see Chapter 23, “Using the end-to-end automation manager command shell,” on page 167. For information about the chprefmbr command, see the IBM Tivoli System Automation for Multiplatforms End-to-End Automation Management Component Reference.
Steps for starting the preferred member of a choice group

Perform the following steps to start the preferred member of a choice group whose current state is Offline:

1. In the resource table, select choice group whose preferred member you want to start.

2. On the General page, click Request online.

Results:

- A confirmation message is displayed on the information bar, indicating that the request to start the resource has been submitted for processing.
- When the request has been completed:
  - the preferred member is online
  - the automation manager will try to keep the preferred member online and the other members offline

Steps for starting a different member of a choice group

Use the procedure described below:

- for choice groups whose desired state is Online
- and the preferred member of the choice group has failed or needs to be stopped
- and a different member of the choice group is to be started

Note: You can also use this procedure for choice groups whose desired state is Offline, for example, because you want to be sure that a member other than the currently preferred member is started when a start request is issued for the group.

In such a case, only the preferred member setting is changed. The automation manager will continue to try to keep all members of the group offline.

Perform the following steps:

1. Select the choice group in the resource table.

2. In the Possible Choices table on the General page, select the choice group member that you want to start. Below the table, the button Set as preferred appears.

3. Click Set to preferred.

If the desired state of the choice group is Online, this will trigger the following actions:

- If the old preferred member is online, it is stopped.
- The new preferred member is started.
- The automation manager will try to keep the new preferred member online and the other members offline.

If the desired state of the choice group is Offline, just the setting for the preferred member is changed, the automation manager will continue to try to keep all members of the choice group offline.
Chapter 23. Using the end-to-end automation manager command shell

You can use the end-to-end automation manager command shell to perform the following tasks by issuing commands to the end-to-end automation manager:

- List resources and resource groups and their states
- List resource group members
- List relationships
- Display, activate, and deactivate policies
- Change the preferred member of a choice group
- Issue online and offline requests against resources, and cancel requests
- Suspend and resume automation for resources
- Reset a resource from an unrecoverable error

The command shell can be used in two modes:

- **Line mode:** Allows you to issue a single command against the automation manager. When the command has been executed, the results are displayed on standard output and the command shell is closed. The output from a line mode command can be redirected to a file or to a tool that parses the results (for example, awk).

- **Shell mode:** Opens a subshell in interactive mode, allowing you to issue multiple commands against the automation manager successively. In shell mode, only one session is opened against the automation manager and you have to authenticate yourself only once. In shell mode, only automation manager commands are supported. In particular, it is not possible to redirect the output of a command to a file or to another command.

You cannot use the command shell to control the end-to-end automation engine, such as starting and stopping. For a description of the command-line interface of the automation engine, see Chapter 15, “Using the command-line interface of the automation engine,” on page 95.

The following sections describe how to invoke and use the command shell in both modes. For a detailed description of the available commands, see the IBM Tivoli System Automation for Multiplatforms End-to-End Automation Management Component Reference.

Using the command shell in shell mode

**Before you begin:**

- The end-to-end automation manager you want to connect to must be active (the WebSphere Application Server that the end-to-end automation manager uses (server1)). Otherwise, you will receive a message but the shell is not closed and you can issue a limited set of commands.

To access the command shell in shell mode, perform the following steps:

1. Log in to the server on which the end-to-end automation manager is running (using a Secure Shell, for example).
2. Issue the command **eezcs.**
3. Type your user credentials.

Results:
- If the command shell finds an active end-to-end automation domain:
  - The domain is selected as target for all commands you issue from the command shell.
  - A sub-shell opens and prompts you for input.

  **Example:**
  This is what you see in the command shell when an active end-to-end automation domain ("FriendlyE2E") was found:
  ```
  saxb05:/root # eezcs
  Connecting...
  Realm/Cell Name: null
  User Identity: eezadmin
  User Password: EEZS0120I
  Using end-to-end domain FriendlyE2E.
  EEZCS>
  ```

  For a detailed description of the available commands, see the [IBM Tivoli System Automation for Multiplatforms End-to-End Automation Management Component Reference](#).

- If no active end-to-end automation domain is found because no domain has joined or the domain is not online, a message is displayed but the connection is not closed and you can still issue the following commands at the command prompt:

  **lseezdom**
  Shows information about all domains that are currently known to the automation manager. The list of domains may contain first-level automation domains.

  **help**
  Displays the usage instructions for all shell commands or, when invoked with the command name as attribute, for a specific command.

  **quit**
  Closes the command shell.

---

**Using the command shell in line mode**

To issue a single command to an end-to-end automation manager, enter:

```
 eezezcs -c <command>
```

**Results:** When the command has been executed, the results are displayed, and the command shell is closed.

For a detailed description of the available commands, see the [IBM Tivoli System Automation for Multiplatforms End-to-End Automation Management Component Reference](#).
### Part 5. Working with automation adapters

#### Chapter 24. Working with the HACMP adapter and HACMP objects

<table>
<thead>
<tr>
<th>Special considerations for the HACMP adapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Representation of HACMP objects and possible actions on the operations console</td>
<td>171</td>
</tr>
<tr>
<td>Defining an end-to-end automation policy for HACMP resources</td>
<td>174</td>
</tr>
<tr>
<td>Controlling the HACMP adapter through commands</td>
<td>175</td>
</tr>
</tbody>
</table>

#### Chapter 25. Working with the MSCS adapter and Microsoft Server Clustering objects

<table>
<thead>
<tr>
<th>Special considerations for the MSCS adapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Representation of MSCS objects and possible actions on the operations console</td>
<td>177</td>
</tr>
<tr>
<td>Defining an end-to-end automation policy for MSCS resources</td>
<td>179</td>
</tr>
<tr>
<td>Referencing MSCS resources in an end-to-end automation policy</td>
<td>179</td>
</tr>
<tr>
<td>Referencing MSCS groups in an end-to-end automation policy</td>
<td>179</td>
</tr>
<tr>
<td>Referencing move groups representing MSCS resources in an end-to-end automation policy</td>
<td>180</td>
</tr>
<tr>
<td>Referencing fixed resources representing MSCS resources in an end-to-end automation policy</td>
<td>180</td>
</tr>
<tr>
<td>Referencing MSCS networks in an end-to-end automation policy</td>
<td>180</td>
</tr>
<tr>
<td>Referencing MSCS network interfaces in an end-to-end automation policy</td>
<td>181</td>
</tr>
<tr>
<td>Starting and stopping the MSCS adapter</td>
<td>181</td>
</tr>
</tbody>
</table>

#### Chapter 26. Working with the VCS adapter for Solaris/SPARC and VCS objects

<table>
<thead>
<tr>
<th>Special considerations for the VCS adapter for Solaris/SPARC</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Representation of VCS objects and relationships in the SA operations console</td>
<td>183</td>
</tr>
<tr>
<td>Representation of VCS objects</td>
<td>184</td>
</tr>
<tr>
<td>Representation of VCS resource relationships</td>
<td>184</td>
</tr>
<tr>
<td>Possible operations on VCS objects from the SA operations console</td>
<td>185</td>
</tr>
<tr>
<td>Including VCS nodes in and excluding them from automation</td>
<td>185</td>
</tr>
<tr>
<td>Starting and stopping VCS cluster resources</td>
<td>185</td>
</tr>
<tr>
<td>Suspending and resuming automation for VCS cluster resources</td>
<td>186</td>
</tr>
<tr>
<td>Resetting VCS resources from unrecoverable errors</td>
<td>187</td>
</tr>
<tr>
<td>Defining an end-to-end automation policy for VCS resources</td>
<td>187</td>
</tr>
<tr>
<td>Policy example</td>
<td>187</td>
</tr>
<tr>
<td>Controlling the VCS adapter through commands</td>
<td>188</td>
</tr>
</tbody>
</table>
Chapter 24. Working with the HACMP adapter and HACMP objects

The following sections describe how to work with the High Availability Cluster Multi-Processing (HACMP) adapter and HACMP objects.

Important notes:
1. The HACMP adapter can only be connected to an End-to-End Automation Management component V2R2 or later.
2. HACMP object names and their text fields, for example, group names, resource names, and descriptions, must not contain the following characters:
   " (double quotation mark), ' (single quotation mark), ; (semicolon), $ (dollar sign), / (slash)

Special considerations for the HACMP adapter

The following considerations apply to the system automation adapter for HACMP (HACMP adapter):

- HACMP clusters are not request- but command-driven. Commands for bringing resources and groups online or offline are performed but not retained as persistent goals. No list of previously issued commands is available, and commands previously issued against a group or resource cannot be canceled. The latest command issued against a group or resource determines whether it should be online or offline. Commands issued by operators have the same priority as commands issued by the end-to-end automation manager.
- HACMP resources and groups cannot be suspended from automation by an end-to-end automation operator.
- HACMP groups have no “real” desired state. HACMP performs online and offline commands on HACMP groups by propagating them to member resources. HACMP groups only act as containers and reflect the state of the contained HACMP resources. If some of the HACMP resources in a group were brought online and others offline, the group is in a mixed state - it is not clear whether the desired state of the group is online or offline.
- HACMP clusters do not have a policy concept as known by end-to-end automation. For this reason, the Policy Information page for HACMP domains does not show reasonable information.

Representation of HACMP objects and possible actions on the operations console

HACMP clusters

HACMP clusters are displayed as first-level domains on the operations console.

HACMP cluster nodes

HACMP cluster nodes are displayed on the operations console as nodes of their HACMP domain:
The nodes of an HACMP domain can be included in and excluded from automation:

- Excluding a node from automation: Stops the cluster services on the node.
- Including the node in automation: Starts the cluster services on the node.

**HACMP resource groups and resources**

HACMP resource groups are displayed as top-level resource groups. They can be brought online and offline from the operations console. Performing the actions on the operations console invokes the following command:

cIRGmove <resource_group>

HACMP resource groups are either move groups (if non-concurrent) or "collection" resource groups (if concurrent).

The following figure shows the single HACMP move group ("shop_rg") that is hosted by the domain "cl_hacmp".

When you open the top-level resource group ("shop_rg"), you see that it comprises two resource groups. These resource groups are so-called "node instances" of the actual (top-level) resource group and are merely used as virtual containers for the constituents of the top-level resource group that can run on a specific node. As the HACMP sample domain depicted in the figures in this chapter consists of two nodes and the HACMP resource group can run on each of the nodes, the top-level resource group contains one virtual resource group for each node:
As the top-level HACMP resource group is a so-called move group, which means that the group can only run on one node at a time, the node instance on node "p570sa07", which is currently running, appears in color, while the other node instance is grayed out.

When you open a node instance, the constituents of the top-level resource group that can run on the node are displayed. The sample node instance "shop_rg (p570sa07)" contains only a single member:

Note that mountpoints, logical volumes, and volume groups that are automated by HACMP are not displayed in the resources section of the operations console.

**HACMP relationships**

On the operations console, only parent-child relationships between HACMP resource groups are reflected. The following HACMP resource group dependencies are not displayed on the operations console:
- "online on the same node" (collocation of resource groups)
- "online on different nodes" (anticollocation of resources groups)
- "online on same site" (site-collocation of resource groups)
Defining an end-to-end automation policy for HACMP resources

To include HACMP resources in an end-to-end automation policy, you create a resource reference for each of the HACMP resource groups that is to be managed by end-to-end automation management. You can use any of the end-to-end automation-specific relationships to specify dependencies between HACMP resource groups, or between resource groups that are managed by HACMP and resources that are managed by other first-level automation products.

When you define a resource reference for an HACMP resource group in an end-to-end automation policy, you must provide information about the HACMP resource group in the <ReferencedResource> subelement. You can easily obtain all the required information on the operations console by displaying the General page for the HACMP resource group (see "Gathering the required data for defining a policy" on page 76).

This is a sample end-to-end automation policy that references HACMP resources:

```xml
<?xml version="1.0" encoding="UTF-8"?>
<AutomationPolicy version="1.0"
 xmlns="http://www.ibm.com/TSA/Policy.xsd"
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xsi:schemaLocation="http://www.ibm.com/TSA/Policy.xsd EEZPolicy.xsd ">
 <PolicyInformation>
  <PolicyName>E2E:shop->db2</PolicyName>
  <AutomationDomainName>FriendlyE2E</AutomationDomainName>
  <PolicyToken>1.9.7</PolicyToken>
  <PolicyAuthor>Schawer</PolicyAuthor>
  <PolicyDescription>Demo policy shop(HACMP) depends-on db2(ITSAMP).</PolicyDescription>
 </PolicyInformation>

 <ResourceReference name="refha_shop">
  <!-- <DesiredState>Online</DesiredState> -->
  <Description>e2e ref to HACMP shop application.</Description>
  <Owner>Peter ext:7704</Owner>
  <InfoLink>http://www.example.com</InfoLink>
  <ReferencedResource>
   <AutomationDomain>cl_hacmp/AutomationDomain>
   <Name>shop_rg</Name>
   <Class>IBM.HacmpResourceGroup</Class>
  </ReferencedResource>
 </ResourceReference>

 <ResourceReference name="refsa_db2">
  <!-- <DesiredState>Online</DesiredState> -->
  <Description>e2e ref to ITSAMP db2 application.</Description>
  <Owner>Schawer ext:3704</Owner>
  <InfoLink>http://w3.it-dep.com</InfoLink>
  <ReferencedResource>
   <AutomationDomain>samp55078/AutomationDomain>
   <Name>db2_rg</Name>
   <Class>IBM.ResourceGroup</Class>
  </ReferencedResource>
 </ResourceReference>

 <Relationship>
  <Source>
   <ResourceReference name="refha_shop"/>
  </Source>
  <Type>ForcedDownBy</Type>
  <Target>
   <ResourceReference name="refsa_db2"/>
  </Target>
</Relationship>
</AutomationPolicy>
```
Controlling the HACMP adapter through commands

The following table lists the adapter control commands.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>hacadapter status</td>
<td>Checks if the adapter is running and returns the RSCT return code for the operational state (OpState):</td>
</tr>
<tr>
<td></td>
<td>0 Unknown. The adapter status cannot be determined.</td>
</tr>
<tr>
<td></td>
<td>1 Online. The adapter is running.</td>
</tr>
<tr>
<td></td>
<td>2 Offline. The adapter is not running.</td>
</tr>
<tr>
<td>hacadapter start</td>
<td>Starts the adapter if it is not running:</td>
</tr>
<tr>
<td></td>
<td>• If the adapter is automated, the command requests HACMP cluster services to start the adapter on the preferred node. The command returns when the clRGmove command completed.</td>
</tr>
<tr>
<td></td>
<td>• If the adapter is not automated, it is started on the node where the command was issued. The exit code is 0 if the command was successful.</td>
</tr>
<tr>
<td>hacadapter stop</td>
<td>Stops the adapter if it is running:</td>
</tr>
<tr>
<td></td>
<td>• If the adapter is automated, the command requests HACMP cluster services to stop the adapter on the preferred node. The command returns when the clRGmove command completed.</td>
</tr>
<tr>
<td></td>
<td>• If the adapter is not automated, it is stopped on the node where the command was issued. The exit code is 0 if the command was successful.</td>
</tr>
</tbody>
</table>
Chapter 25. Working with the MSCS adapter and Microsoft Server Clustering objects

The following sections describe how to work with Microsoft Server Clustering (MSCS) objects and the MSCS adapter.

Important notes:
1. The MSCS adapter can only be connected to an End-to-End Automation Management component V2R2 or later.
2. MSCS object names and their text fields, for example, group names, resource names, and descriptions, must not contain the following characters:
   " (double quotation mark), ' (single quotation mark), ; (semicolon)

Special considerations for the MSCS adapter

The following considerations apply to the MSCS adapter:

• MSCS clusters are not request- but command-driven. Commands for bringing resources and groups online or offline are performed but not retained as persistent goals. No list of previously issued commands is available, and commands previously issued against a group or resource cannot be canceled. The latest command issued against a group or resource determines whether it should be online or offline. Commands issued by operators have the same priority as commands issued by the end-to-end automation manager.

• MSCS resources and groups cannot be suspended from automation by an end-to-end automation operator.

• MSCS groups have no “real” desired state. MSCS performs online and offline commands on MSCS groups by propagating them to member resources. MSCS groups only act as containers and reflect the state of the contained MSCS resources. If some of the MSCS resources in a group were brought online and others offline, the group is in a mixed state - it is not clear whether the desired state of the group is online or offline.

• MSCS clusters do not have a policy concept as known by end-to-end automation. For this reason, the Policy Information page for MSCS domains does not show reasonable information.

• MSCS does not monitor resources which are not expected to be online.

Example:
A file share resource has two different cluster nodes as possible owners. If the file share is currently defined and working (that is, online) on the first node, MSCS does not monitor the state of the file share on the second cluster node. MSCS will not notice a manual definition of the file share on the second node. The MSCS adapter does not work around this monitoring approach and is thus not able to reliably report resources’ offline states.

• MSCS groups reject offline commands in the following cases:
  - The group contains the quorum resource.
  - The group contains the MSCS adapter service resource (if the adapter is made highly available).

• MSCS resources reject offline commands in the following cases:
  - The resource is the quorum resource and the quorum resource directly or indirectly depends on the resource to be taken offline.
The resource is the MSCS adapter service resource (if the adapter is made highly available).

If the MSCS adapter service resource directly or indirectly depends on the resource to be taken offline (if the adapter is made highly available).

- MSCS nodes reject exclude commands if the adapter is made highly available and the group that contains the MSCS adapter service resource is located on the node. In this case, message EEZ0012E appears indicating that the group in question cannot be taken offline without impacting the MSCS adapter.

### Representation of MSCS objects and possible actions on the operations console

**MSCS clusters**
MSCS clusters are displayed as first-level domains on the operations console.

**Nodes**
MSCS cluster nodes are displayed on the operations console as nodes of their MSCS domain. They can be included in and excluded from automation:
- Excluding a node from automation: The MSCS node is suspended and all resources are moved away from the node.
- Including the node in automation: Resumes the MSCS node.

**MSCS networks**
MSCS networks are displayed as resource groups that contain MSCS network interfaces as group members. MSCS networks can only be monitored on the operations console.

**MSCS network interfaces**
MSCS networks interfaces are displayed as resources. An MSCS network interface is always a member of exactly one MSCS network. MSCS network interfaces can only be monitored on the operations console.

**MSCS groups**
MSCS groups are displayed as resource groups which contain MSCS resources as group members. MSCS groups can be brought online and taken offline. As MSCS is command-driven, no request lists are maintained by MSCS. MSCS propagates online and offline actions against a group to the member resources.

**MSCS resources**
MSCS resources are displayed as move groups which contain a set of member resources. One member resource ("fixed resource") is displayed for each MSCS node on which the MSCS resource is allowed to run. The move group representing an MSCS resource is always a member of exactly one MSCS group. Move groups representing MSCS resources can be brought online and taken offline. As MSCS is command-driven, no request lists are maintained by MSCS.

**MSCS resource type objects**
MSCS resource types are only displayed as additional information on the Additional Info page on the operations console.

**MSCS relationships**
The MSCS relationships hasMemberNetwork and hasMemberGroup are represented as group memberships. All other MSCS relationships are only displayed as additional or location information.
Defining an end-to-end automation policy for MSCS resources

All resources that are hosted by an MSCS cluster can be referenced in an end-to-end automation policy. However, online and offline commands are only supported for the following MSCS resources, which is why they are the recommended choice for referenced resources:

- Resource groups representing MSCS groups
- Move groups representing MSCS resources

For the following MSCS resources online and offline commands are not supported:

- Fixed resources representing MSCS resources
- Resource groups representing MSCS networks
- Resources representing MSCS network interfaces

When you define a resource reference in an end-to-end automation policy, you must provide information about the MSCS resource in the <ReferencedResource> subelement. You can easily obtain the required information on the operations console by displaying the General page for the MSCS resource (see "Gathering the required data for defining a policy" on page 76).

Referencing MSCS resources in an end-to-end automation policy

Use the following sections to learn what you must specify when you define resource references for MSCS resources in an end-to-end automation policy.

Referencing MSCS groups in an end-to-end automation policy

The following table shows what must be specified for an MSCS group in an end-to-end automation policy.

Table 23. Defining a resource reference for an MSCS group

<table>
<thead>
<tr>
<th>ReferencedResource subelement</th>
<th>What to specify</th>
</tr>
</thead>
<tbody>
<tr>
<td>AutomationDomain</td>
<td>Name of the MSCS domain</td>
</tr>
<tr>
<td>Name</td>
<td>Name of the group in the MSCS cluster. The name is displayed in the information area of the operations console.</td>
</tr>
<tr>
<td>Class</td>
<td>MSCS.Group</td>
</tr>
<tr>
<td>Node</td>
<td>The node element must be omitted</td>
</tr>
</tbody>
</table>

Example:

```xml
<ResourceReference name="Ref database-rg">
    <Description>This is the reference to MSCS.Group</Description>
    <Owner>Bob Smith</Owner>
    <InfoLink>http://www.example.com/help/</InfoLink>
    <ReferencedResource>
        <AutomationDomain>saxbopt-kk</AutomationDomain>
        <Name>database-rg</Name>
        <Class>MSCS.Group</Class>
    </ReferencedResource>
</ResourceReference>
```
Referencing move groups representing MSCS resources in an end-to-end automation policy

The following table shows what must be specified in an end-to-end automation policy for move groups representing MSCS resources.

<table>
<thead>
<tr>
<th>ReferencedResource subelement</th>
<th>What to specify</th>
</tr>
</thead>
<tbody>
<tr>
<td>AutomationDomain</td>
<td>Name of the MSCS domain</td>
</tr>
<tr>
<td>Name</td>
<td>Name of the resource in the MSCS cluster. The name is displayed in the information area of the operations console.</td>
</tr>
<tr>
<td>Class</td>
<td>The MSCS resource type of the resource must be appended to the prefix MSCS.MoveGroup, for example, MSCS.MoveGroup.Generic Service</td>
</tr>
<tr>
<td>Node</td>
<td>The node element must be omitted</td>
</tr>
</tbody>
</table>

Example:

```
<ResourceReference name="Ref database">
    <Description>This is the reference to MSCS.MoveGroup.Generic Application</Description>
    <Owner>Bob Smith</Owner>
    <InfoLink>http://www.example.com/help</InfoLink>
    <ReferencedResource>
        <AutomationDomain>saxbopt-kk</AutomationDomain>
        <Name>database</Name>
        <Class>MSCS.MoveGroup.Generic Application</Class>
    </ReferencedResource>
</ResourceReference>
```

Referencing fixed resources representing MSCS resources in an end-to-end automation policy

The following table shows what must be specified in an end-to-end automation policy for fixed resources representing MSCS resources.

<table>
<thead>
<tr>
<th>ReferencedResource subelement</th>
<th>What to specify</th>
</tr>
</thead>
<tbody>
<tr>
<td>AutomationDomain</td>
<td>Name of the MSCS domain</td>
</tr>
<tr>
<td>Name</td>
<td>Name of the resource in the MSCS cluster. The name is displayed in the information area of the operations console.</td>
</tr>
<tr>
<td>Class</td>
<td>The MSCS resource type of the resource must be appended to the prefix MSCS.FixedResource, for example, MSCS.FixedResource.Generic Service</td>
</tr>
<tr>
<td>Node</td>
<td>Name of the node to which the fixed resource is bound.</td>
</tr>
</tbody>
</table>

Referencing MSCS networks in an end-to-end automation policy

The following table shows what must be specified for an MSCS network in an end-to-end automation policy.
Table 26. Defining a resource reference for an MSCS network

<table>
<thead>
<tr>
<th>ReferencedResource subelement</th>
<th>What to specify</th>
</tr>
</thead>
<tbody>
<tr>
<td>AutomationDomain</td>
<td>Name of the MSCS domain</td>
</tr>
<tr>
<td>Name</td>
<td>Name of the network in the MSCS cluster. The name is displayed in the information area of the operations console.</td>
</tr>
<tr>
<td>Class</td>
<td>MSCS.Network</td>
</tr>
<tr>
<td>Node</td>
<td>Node element must be omitted.</td>
</tr>
</tbody>
</table>

Referencing MSCS network interfaces in an end-to-end automation policy

The following table shows what must be specified for an MSCS network interface in an end-to-end automation policy.

Table 27. Defining a resource reference for an MSCS network interface

<table>
<thead>
<tr>
<th>ReferencedResource subelement</th>
<th>What to specify</th>
</tr>
</thead>
<tbody>
<tr>
<td>AutomationDomain</td>
<td>Name of the MSCS domain</td>
</tr>
<tr>
<td>Name</td>
<td>Name of the network in the MSCS cluster. The name is displayed in the information area of the operations console.</td>
</tr>
<tr>
<td>Class</td>
<td>MSCS.Network</td>
</tr>
<tr>
<td>Node</td>
<td>Node element must be omitted.</td>
</tr>
</tbody>
</table>

Starting and stopping the MSCS adapter

How you start or stop an MSCS adapter depends on whether the adapter is highly available:

The adapter is made highly available using MSCS
   You start or stop the adapter by bringing the MSCS adapter group online or taking it offline in the Microsoft Cluster Administrator.

The adapter is not made highly available using MSCS
   You start or stop the adapter using the following services from the Services panel on the Microsoft Management Console:
   - JaasLogon
   - SA MP MSCS Adapter
Chapter 26. Working with the VCS adapter for Solaris/SPARC and VCS objects

The following sections describe how to work with the adapter for VERITAS Cluster Server for Solaris/SPARC (VCS) clusters and VCS objects.

Important notes:
1. The VCS adapter for Solaris/SPARC can only be connected to an End-to-End Automation Management component V2R3 or later.
2. VCS object names and their text fields, for example, group names, resource names, and descriptions, must not contain the following characters:
   " (double quotation mark), ' (single quotation mark), ; (semicolon), $ (dollar sign), / (slash)

Special considerations for the VCS adapter for Solaris/SPARC

The following considerations apply to the Tivoli System Automation adapter for VCS for Solaris/SPARC (VCS adapter):

- VCS Global (Remote) clusters are not supported.
- VCS Global Service Groups are not supported.
- VCS clusters are not request- but command-driven. Commands for bringing resources and groups online or offline are performed but not retained as persistent goals. No list of previously issued commands is available, and commands that were previously issued against a group or resource cannot be canceled. The latest command that was issued against a group or resource determines whether it should be online or offline. Commands issued by operators have the same priority as commands issued by the end-to-end automation manager.
- VCS resources and groups can be suspended from automation by an end-to-end automation operator.
- VCS groups have no “real” desired state. VCS performs online and offline commands on VCS groups by propagating them to member resources. VCS groups only act as containers and reflect the state of the contained VCS resources. If some of the VCS resources in a group were brought online and others offline, the group is in a mixed state - it is not clear whether the desired state of the group is online or offline.
- VCS clusters do not have a policy concept as known by end-to-end automation. This is why the Policy Information page for VCS domains does not show reasonable information.
Representation of VCS objects and relationships in the SA operations console

Representation of VCS objects

Table 28. Representation of VCS objects in the SA operations console

<table>
<thead>
<tr>
<th>VCS resource type</th>
<th>Entity in SA operations console</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VCS.Cluster</td>
<td>First-level automation domain</td>
<td>VCS clusters are displayed as first-level automation domains</td>
</tr>
<tr>
<td>VCS.System</td>
<td>Nodes of the VCS domain</td>
<td>VCS systems are displayed as nodes of the first-level domain to which they belong</td>
</tr>
<tr>
<td>VCS.Group</td>
<td>Top-level move or collection group that consists of one member collection group for each node on which the VCS group can run</td>
<td></td>
</tr>
<tr>
<td>VCS.&lt;resource_type&gt; where &lt;resource_type&gt; stands for any VCS resource type</td>
<td>Fixed resource</td>
<td>The fixed resources are members of the node instance collection groups</td>
</tr>
</tbody>
</table>

Representation of VCS resource relationships

Table 29. Representation of VCS resource relationships in the SA operations console

<table>
<thead>
<tr>
<th>VCS relationship type</th>
<th>Representation in Tivoli System Automation</th>
</tr>
</thead>
<tbody>
<tr>
<td>group membership</td>
<td>Group membership:</td>
</tr>
<tr>
<td></td>
<td>• One top-level VCS.Group contains one VCS.group instance per node (node instance)</td>
</tr>
<tr>
<td></td>
<td>• The node instances of the VCS.group contain VCS.&lt;resource_type&gt; instances</td>
</tr>
<tr>
<td>hosted-by relationship</td>
<td>Resources that are hosted by nodes:</td>
</tr>
<tr>
<td></td>
<td>• VCS.Group</td>
</tr>
<tr>
<td></td>
<td>• VCS.&lt;resource_type&gt;</td>
</tr>
<tr>
<td>resource-to-resource relationship</td>
<td>All types of VCS resource-to-resource relationships are mapped to VCS.&lt;resource_type&gt;-to-VCS.&lt;resource_type&gt; relationships. The relationship type name on the SA operations console always is &quot;isLinkedTo&quot;.</td>
</tr>
<tr>
<td>group-to-group relationship</td>
<td>All types of VCS resource-to-resource relationships are mapped to VCS.Group-to-VCS.Group relationships. On the SA operations console, the original VCS relationship names are retained.</td>
</tr>
</tbody>
</table>
Possible operations on VCS objects from the SA operations console

Including VCS nodes in and excluding them from automation

Table 30. Results of include and exclude operations on VCS nodes from the SA operations console

<table>
<thead>
<tr>
<th>Operation on SA operations console</th>
<th>Target</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exclude from automation</td>
<td>VCS cluster node</td>
<td>The VCS system freeze command is invoked with the options -persistent and -evacuate:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. The system's active service groups are failed over to another system in the cluster.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. The freeze is enabled.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. The node will not be used for hosting failover resources.</td>
</tr>
<tr>
<td>Include in automation</td>
<td>VCS cluster node</td>
<td></td>
</tr>
</tbody>
</table>

Starting and stopping VCS cluster resources

- VCS clusters are not request- but command-driven. As a result, the request lists of end-to-end automation resources that reference VCS resources are always empty.
- As no request list is kept for these resources, comments you enter on the SA operations console when you start or stop VCS resources are not retained and appear in the domain log file only.
- Start and stop operations against VCS resources are submitted synchronously. When the VCS command returns, an exception with a detailed message is displayed on the SA operations console.

Table 31. Results of start and stop operations on VCS resources

<table>
<thead>
<tr>
<th>Operation on SA operations console</th>
<th>Target</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bring online</td>
<td>Top-level resource group of a first-level VCS automation domain</td>
<td>The top-level resource group is started on any node VCS finds suitable</td>
</tr>
<tr>
<td></td>
<td>Node instance of a resource group (node instance) of a first-level VCS automation domain</td>
<td>The resource group is started on the specific node</td>
</tr>
<tr>
<td></td>
<td>VCS.&lt;resource_type&gt; (fixed resource)</td>
<td>The resource is started on the specific node</td>
</tr>
</tbody>
</table>
Table 31. Results of start and stop operations on VCS resources (continued)

<table>
<thead>
<tr>
<th>Operation on SA operations console</th>
<th>Target</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bring offline</td>
<td>Top-level resource group of first-level VCS automation domain</td>
<td>The top-level resource group is stopped on all nodes in the VCS domain on which it is online</td>
</tr>
<tr>
<td></td>
<td>Node instance of a resource group of a first-level VCS automation domain</td>
<td>The resource group is started on the specific node</td>
</tr>
<tr>
<td></td>
<td>VCS.&lt;resource_type&gt; (fixed resource)</td>
<td>The resource is stopped on the specific node</td>
</tr>
</tbody>
</table>

**Suspending and resuming automation for VCS cluster resources**

Suspending and resuming automation is supported for all types of VCS cluster resource groups and resources. Automation can only be suspended for resources and resource groups that are not online. If you try to suspend automation from the SA operations console for a resource that is online, you will receive an error message.

Table 32. Results from suspend and resume operations on VCS resources

<table>
<thead>
<tr>
<th>Operation on SA operations console</th>
<th>Target</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Suspend automation</strong></td>
<td>Top-level resource group of a first-level VCS automation domain</td>
<td>The VCS group freeze command with the option -persistent is invoked: All actions are disabled, including autostart, online, offline, and failover.</td>
</tr>
<tr>
<td></td>
<td>Node instance of a resource group of a first-level VCS automation domain</td>
<td>The VCS group disable command with the option -sys is invoked: The group cannot be brought online or switched over to another node.</td>
</tr>
<tr>
<td></td>
<td>VCS.&lt;resource_type&gt; (fixed resource)</td>
<td>The VCS resource modify command with the parameter Enabled 0 is invoked: The resource cannot be brought online.</td>
</tr>
<tr>
<td><strong>Resume automation</strong></td>
<td>Top-level resource group of first-level VCS automation domain</td>
<td>All actions are enabled.</td>
</tr>
<tr>
<td></td>
<td>Node instance of a resource group of a first-level VCS automation domain</td>
<td>The VCS group unfreeze command with the option -persistent is invoked: All actions are enabled.</td>
</tr>
<tr>
<td></td>
<td>VCS.&lt;resource_type&gt; (fixed resource)</td>
<td>The VCS resource modify command with the parameter Enabled 1 is invoked: The resource can be brought online.</td>
</tr>
</tbody>
</table>
Resetting VCS resources from unrecoverable errors
In Tivoli System Automation, resources can enter the state Unrecoverable error, which indicates that a problem requires manual intervention and cannot be resolved automatically. Resources in state Unrecoverable error must be reset after the problem has been resolved to be automated again. The Reset operation in Tivoli System Automation corresponds to clearing faulted resources in VCS.

In Tivoli System Automation, the following VCS resources can be reset:
- Top-level resource groups: the member resources will be reset on all nodes
- Node instances: the group and the member resources will be reset on the particular node
- Fixed resources: the fixed resource will be reset on a particular node

Defining an end-to-end automation policy for VCS resources
To include VCS resources in an end-to-end automation policy, you create a resource reference for each top-level resource group of the VCS automation domain that is to be managed by end-to-end automation management. Only create end-to-end automation resource references for top-level VCS resource groups. Do not create resource references for node instances of VCS resources groups or VCS fixed resources.

You can use any of the end-to-end automation-specific relationships to specify dependencies between VCS resource groups, or between resource groups that are managed by VCS and resources that are managed by other first-level automation products.

When you define a resource reference for an VCS resource group in an end-to-end automation policy, you must provide information about the VCS resource group in the <ReferencedResource> subelement. You can easily obtain all the required information on the operations console by displaying the General page for the VCS resource group (see "Gathering the required data for defining a policy" on page 76).

Policy example
This is an example of an end-to-end automation policy that references VCS resources:

```xml
<?xml version="1.0" encoding="UTF-8"?>
<AutomationPolicy version="1.0"
 xmlns="http://www.ibm.com/TSA/Policy.xsd"
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xsi:schemaLocation="http://www.ibm.com/TSA/Policy.xsd EEZPolicy.xsd ">
 <PolicyInformation>
  <PolicyName>Sample E2E Policy</PolicyName>
  <AutomationDomainName>FriendlyE2E</AutomationDomainName>
  <PolicyToken>1.0.1</PolicyToken>
  <PolicyAuthor>Michael Atkins</PolicyAuthor>
  <PolicyDescription>End-to-End Automation Policy</PolicyDescription>
 </PolicyInformation>
 <ResourceReference name="Ref DB2 Group">
  <Description>A reference to a VCS.Group</Description>
  <Owner>Bob Smith</Owner>
  <InfoLink>http://www.example.com/help/</InfoLink>
  <ReferencedResource>
   <AutomationDomain>saxbopt-kk</AutomationDomain>
   <Name>DB2Group</Name>
  </ReferencedResource>
 </ResourceReference>
</AutomationPolicy>
```
Controlling the VCS adapter through commands

A VCS adapter is active when it is running and listening for requests from a host (end-to-end automation manager or SA operations console), which is listening for events from the adapter on a different connection.

The following table lists the adapter control commands.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
</table>
| vcsadapter status | Checks whether the adapter is running.  
|               | Available return codes:                                                      |
|               | 0 Unknown. The adapter status cannot be determined.                          |
|               | 1 Online. The adapter is running.                                             |
|               | 2 Offline. The adapter is not running.                                       |
| vcsadapter start | Starts the adapter if it is not running:                                    |
|               | • If the adapter is automated, the command requests VCS to start the        |
|               |     adapter on the preferred node.                                           |
|               | • If the adapter is not automated, it is started on the node where the      |
|               |     command was issued. The exit code is 0 if the command was successful.   |
| vcsadapter stop  | Stops the adapter if it is running:                                         |
|               | • If the adapter is automated, the command requests VCS to stop the         |
|               |     adapter on the preferred node.                                           |
|               | • If the adapter is not automated, it is stopped on the node where the      |
|               |     command was issued. The exit code is 0 if the command was successful.   |
|               | **Note**: The VCS adapter cannot be stopped from the SA operations console. |
|               | A stop attempt results in an error message.                                 |

Note: The VCS adapter cannot be stopped from the SA operations console. A stop attempt results in an error message.
Part 6. Appendixes
Appendix A. Policy definition worksheet

Use this worksheet to collect the information required for creating a resource reference for a first-level automation resource. The information you need about the first-level automation resource is available on the resource's General page (see “Gathering the required data for defining a policy” on page 76).

Table 34. Worksheet for defining an end-to-end automation policy

<table>
<thead>
<tr>
<th>1.1 First-level automation domain</th>
<th>Domain name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2</td>
<td>Host name</td>
</tr>
<tr>
<td>1.3</td>
<td>Owner</td>
</tr>
<tr>
<td>1.4</td>
<td>User ID for accessing the domain</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2.1.1 Resource information</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1.2</td>
<td>Class</td>
</tr>
<tr>
<td>2.1.3</td>
<td>Node</td>
</tr>
<tr>
<td>2.1.4</td>
<td>Owner</td>
</tr>
<tr>
<td>2.1.5</td>
<td>Description</td>
</tr>
<tr>
<td>2.1.6 URL for InfoLink</td>
<td></td>
</tr>
<tr>
<td>2.1.7 Relationship(s) to</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2.2.1 Resource information</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2.2</td>
<td>Class</td>
</tr>
<tr>
<td>2.2.3</td>
<td>Node</td>
</tr>
<tr>
<td>2.2.4</td>
<td>Owner</td>
</tr>
<tr>
<td>2.2.5</td>
<td>Description</td>
</tr>
<tr>
<td>2.2.6 URL for InfoLink</td>
<td></td>
</tr>
<tr>
<td>2.2.7 Relationship(s) to</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2.3.1 Resource information</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.3.2</td>
<td>Class</td>
</tr>
<tr>
<td>2.3.3</td>
<td>Node</td>
</tr>
<tr>
<td>2.3.4</td>
<td>Owner</td>
</tr>
<tr>
<td>2.3.5</td>
<td>Description</td>
</tr>
<tr>
<td>2.3.6 URL for InfoLink</td>
<td></td>
</tr>
<tr>
<td>2.3.7 Relationship(s) to</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2.4.1 Resource information</th>
<th>Name</th>
</tr>
</thead>
</table>
Table 34. Worksheet for defining an end-to-end automation policy (continued)

<table>
<thead>
<tr>
<th>2.4.2</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.4.3</td>
<td>Node</td>
</tr>
<tr>
<td>2.4.4</td>
<td>Owner</td>
</tr>
<tr>
<td>2.4.5</td>
<td>Description</td>
</tr>
<tr>
<td>2.4.6</td>
<td>URL for InfoLink</td>
</tr>
<tr>
<td>2.4.7</td>
<td>Relationship(s) to</td>
</tr>
</tbody>
</table>
Appendix B. Troubleshooting

Where to find the log and trace files

This section describes where you find the log and trace files that are relevant for end-to-end automation management.

Where to find the Tivoli Common Directory

Message and trace logs for Tivoli products are located under a common parent called the Tivoli Common Directory. The log and trace files of all subcomponents of SA for Multiplatforms that are not running within WebSphere Application Server, for example, the log and trace files of the end-to-end automation engine and of the automation adapters, are written to the product-specific subdirectory of the Tivoli Common Directory.

The path to the Tivoli Common Directory is specified in the properties file log.properties. The file log.properties is located in the following directory:

- **Windows**: C:\Program Files\IBM\tivoli\common\cfg
- **AIX/Linux**: /etc/ibm/tivoli/common/cfg

In the log.properties file, the path to the Tivoli Common Directory is defined in the property tivoli_common_dir=<path_to_Tivoli_Common_Directory>.

These are the default values:

- For **Windows** systems: C:/Program Files/IBM/tivoli/common
  
  Note that forward slashes are used as path delimiters in this properties file.
- For **AIX** and **Linux** systems:
  
  /var/ibm/tivoli/common

These are the relevant subdirectories for end-to-end automation management:

<table>
<thead>
<tr>
<th>Subdirectory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>&lt;Tivoli_Common_Directory&gt;/eez/logs</code></td>
<td>message log files, trace files</td>
</tr>
<tr>
<td><code>&lt;Tivoli_Common_Directory&gt;/eez/ffdc</code></td>
<td>FFDC files</td>
</tr>
</tbody>
</table>

For additional information on where to find the log and trace files of the automation engine, see below. For information about the log and trace files of the automation adapters, refer to the adapter-specific documentation.

Log and trace files of the automation engine

The log files and trace files of the automation engine are available in the directory `<Tivoli_Common_Directory>/eez/logs`.

Message log file: `<Tivoli_Common_Directory>/eez/logs/msgengine.log`

This is the domain log file of the end-to-end automation domain that can be displayed from the operations console.

Trace log file: `<Tivoli_Common_Directory>/eez/logs/traceengine.log`
Which messages and traces are written to the files is specified on the Logger page of the end-to-end automation manager configuration dialog. For information about the configuration dialog, refer to the [IBM Tivoli System Automation for Multiplatforms Installation and Configuration Guide](https://www.ibm.com/support/docview.wss?uid=swg24054410) For a detailed description of the properties that can be configured on the page, refer to the configuration dialog help.

**Viewing the XML log file of the automation engine**

The log and trace files are written in XML format. Because the XML files may be difficult to read, you can use a tool that converts the XML file to HTML format and view the HTML file instead of the XML source file. This section describes how to use the tool.

**Notes:**

1. Typically, you will display and browse the log file of the end-to-end automation engine by selecting the end-to-end automation domain in the topology tree on the operations console and clicking View log on the General page. Only when you cannot access the log file from the operations console, for example, because the automation engine does not start, should you proceed as described in this section.

2. The trace files are intended for use by IBM support only.

You find the tool in the directory `<EEZ_INSTALL_ROOT>/install`. There, look for the file `logviewer214_basics.zip`.

Prerequisites for using the tool:

- A tool for unzipping the file (not included in the Tivoli System Automation for Multiplatforms package)
- J2SE (included in the WebSphere Application Server 6.1 installation)

After unzipping the file, refer to the file `readme.html` for further installation instructions and for information about the features of the formatting tool.

After you have installed the tool, you can use the following scripts to convert the log and trace files to HTML and display them in a Web browser:

- **Windows**: `viewer.bat`
- **AIX/Linux**: `viewer.sh`

As described in the `readme.html`, the viewer script takes a so-called query string to format the HTML output. This is an example of such a query string:

```sql
select Time,SourceFile,SourceMethod,MessageId,LogText,Exception,Thread
where (ProductId=SAMP)
```

It is recommended that you save the query string in a plain text file (for example, with the name `stdtrace`). To invoke the viewer script, use the following command:

```bash
viewer -f stdtrace traceengine.xml > traceengine.html
```

**Log and trace files of the operations console and the automation J2EE framework**

The operations console and the automation J2EE framework of the End-to-End Automation Management component use the log files and the tracing function of WebSphere Application Server.

By default, the information is written to these log and trace files:

- `SystemOut.log`
- `SystemErr.log`
• trace.log

The files are located in the following directory:
<was_root>/profiles/<profile_name>/logs/<server_name>

where <profile_name> is the name of the profile of the server where the automation J2EE framework is installed. The default profile name is AppSrv01.

You use Integrated Solutions Console to set the parameters for logging and tracing:
• To specify log file parameters, for example, the log file names, the maximum size, and the number of history log files to be preserved, open Integrated Solutions Console and navigate to Troubleshooting > Logs and Trace > <server_name> > Diagnostic Trace
• To set the parameters for tracing, for example, to switch tracing on or off or to define for which components traces should be recorded, open the Integrated Solutions Console and navigate to Troubleshooting > Logs and Trace > <server_name> > Change Log Detail Levels.

For more information, see the information center for WebSphere Application Server, Version 6.1, at:

http://publib.boulder.ibm.com/infocenter/wasinfo/v6r1/

Changing the log and trace settings for the components of Tivoli System Automation

Use this topic to obtain an overview of how to change logging and tracing levels for the components of Tivoli System Automation on Integrated Solutions Console. For detailed information on changing log and trace settings, refer to the Integrated Solutions Console online help.

To configure logging and tracing perform these steps:
1. Open the Change Log Detail Levels page (Troubleshooting > Logs and Trace > <server_name> > Change Log Detail Levels).
2. Click the Runtime tab.
3. Enable the check box Save runtime changes to configuration as well.
4. Select a Tivoli System Automation component or group and set the desired logging level on the context menu that appears.
5. Click Apply or OK to save your changes.

Traceable components

For the components of Tivoli System Automation for Multiplatforms that run in WebSphere Application Server, it is possible to enable logging and tracing with different scopes, varying from all component groups (com.ibm.eez.*) to very fine-grained individual components.

You change the logging and tracing levels for the components of Tivoli System Automation for Multiplatforms on the Change Log Detail Levels page on Integrated Solutions Console. The names of the components start with the string com.ibm.eez. To change the log detail levels for all traceable user interface components, change the settings for the component group com.ibm.eez.ui.*.
Converting XML trace files to HTML format

The end-to-end automation engine and various adapters write traces and logs in an XML file format:

- The log files, which contain messages for administrators and operators, are automatically converted to HTML and can be viewed on the operations console by clicking the View log button for a domain.
- The trace files are only intended for use by IBM support. They are used, for example, to analyze the automation behavior or the startup or shutdown sequences of a component and may also contain additional information about exceptions that were generated by the automation engine or an automation adapter.

Trace files are hard to read because they are written in an XML dialect. However, you can easily convert them to HTML format to display them in a Web browser such as Mozilla or Microsoft Internet Explorer.

To convert the XML trace files to HTML, you use the log viewer tool that is shipped with the End-to-End Automation Management component. You find the log viewer tool in the following directory of the End-to-End Automation Management component archive:

<EEZ_INSTALL_ROOT>/install/logviewer214 Basics.zip

You can unzip the file to any directory. For additional information about the tool, refer to the readme.html file, which becomes available in the directory to which you unzip the files.

To convert a trace file to HTML, perform the following steps:

1. Create a file named stdtrace.
2. Add the following single line to the file:
   ```
   select Time, SourceFile, SourceMethod, MessageId, LogText, Exception, Thread where (ProductId=SAMP)
   ```
3. Edit the file viewer.bat or viewer.sh and adjust the JAVA_PATH variable to point to the Java runtime environment shipped with WebSphere Application Server.
4. Use the viewer.bat or viewer.sh script to convert the trace or log file to HTML, for example:
   ```
   viewer -f stdtrace traceengine.xml > traceengine.html
   ```

Log files in a multilingual environment

In general, messages are generated according to the locale that best fits the language preference specified in the browser in which the operations console is displayed. Messages are presented on the operations console and written to one or multiple log files, depending on the SA for Multiplatforms subcomponent that generates the message.

If multiple browsers with different language preferences are used, the log files may contain messages in multiple languages. Additionally, some messages are written to the log files independent of any operator interaction. For example, when a SA for Multiplatforms subcomponent is started or stopped, it writes a message to its log file according to the locale in which it was started or stopped.
In case you need to understand the content of a message in the log file that is written in a language you do not know, refer to the message catalog provided in the End-to-End Automation Management Component Reference to find the message by message ID.

**Viewing log files in a multilingual environment**

If you need multiple-language encoding support in the administrative console, for example, because some of your automation domains are running in locales with encodings other than those specified in the client browser, you can use the JVM argument `client.encoding.override=UTF-8` to configure an application server for UCS Transformation Format. This format enables an application server to handle most character encodings.

**Example:**

If you use the SA operations console to view the log file of a first-level automation domain running in a German locale and the default language of your browser is set to Japanese, German special characters that appear in the log may not be displayed correctly in the Japanese browser if you have not set the `client.encoding.override` to UTF-8.

To configure an application server for UCS Transformation Format, perform these steps:

1. In the administrative console, click **Servers > Application servers** and select the server you want to enable for UCS Transformation Format.
2. Then, under Server Infrastructure, click **Java and Process Management > Process Definition > Java Virtual Machine.**
3. Specify `-Dclient.encoding.override=UTF-8` for **Generic JVM Arguments** and click **OK.** When this argument is specified, UCS Transformation Format is used instead of the character encoding that would be used if the `autoRequestEncoding` option was in effect.
4. Click **Save** to save your changes.
5. Restart the application server.

**Problems occur when multiple browser windows are used to connect to the same Integrated Solutions Console from the same client system**

If you are using a browser other than Microsoft Internet Explorer, opening multiple browser windows on the same client machine to connect to the same Integrated Solutions Console will cause unexpected results. This is because only Microsoft Internet Explorer establishes a separate HTTP session for each browser instance. Other browser types will share a single session between multiple browser instances on the same system if these instances connect to the same Integrated Solutions Console.

The same situation occurs if you open multiple Microsoft Internet Explorer browser windows using **File —> New Window** (or Ctrl+N) from an existing Integrated Solutions Console session, because in this case the new browser window and the one from which it was opened will also share the same session.
The end-to-end automation domain is not displayed on the operations console

If the end-to-end automation domain is not displayed on the operations console although the automation J2EE framework is running and the automation engine is started, perform the following steps:

1. In the end-to-end automation manager configuration dialog, verify that all parameters are set correctly.
2. Restart the automation engine.

For information about the configuration dialog, refer to the IBM Tivoli System Automation for Multiplatforms Installation and Configuration Guide. For information on starting the automation engine, refer to Chapter 15, “Using the command-line interface of the automation engine,” on page 95.

A Base component domain is not displayed in the topology tree

If a first-level automation domain does not appear in the topology tree on the operations console, perform the following steps to analyze and resolve the problem:

1. Check if the adapter is running by issuing the following command on one of the nodes of the domain:
   `samadapter status`
   If the adapter is running, a message like in the following example comes up:
   `samadapter is running on sapb13`

   If the adapter is automated, a message like in the following example comes up:
   `Automated ResourceGroup 'samadapter-rg' runs on sapb13`

   Make a note of the name of the node on which the adapter runs (in the example this is sapb13) and proceed with step 4.

2. If the adapter is not running, issue the following command to check if the domain is online:
   `lsrpdomain`
   A message like in the following example comes up:
   
<table>
<thead>
<tr>
<th>Name</th>
<th>OpState</th>
<th>RSCTActiveVersion</th>
<th>MixedVersions</th>
<th>TSPort</th>
<th>GSPort</th>
</tr>
</thead>
<tbody>
<tr>
<td>domain1</td>
<td>Online</td>
<td>2.4.4.2</td>
<td>No</td>
<td>12347</td>
<td>12348</td>
</tr>
</tbody>
</table>

   If OpState is not Online, start the domain.

3. If the domain is online, start the adapter with the following command:
   `samadapter start`
   After the start message has appeared, reissue the following command:
   `samadapter status`

4. If the adapter is running, check again on the operations console if the domain now appears in the topology tree. Note that it may take time until the contact to the end-to-end automation manager is established after the adapter is started.
5. If the domain still does not appear in the topology tree, you need the connection information that you specified in the adapter configuration dialog to resolve the problem.

Perform the following steps:

a. Launch the adapter configuration dialog of SA for Multiplatforms by issuing the following command on a node in the domain:

cfssamadapter

b. On the entry panel of the configuration dialog, click **Configure**.

c. Open the Adapter page on the Configure panel and write down the values that appear in the following fields:

   - **Host name or IP Address**
   - **Request port number**

   This is the connection information the end-to-end automation management host uses to reach the adapter on any of the nodes in the domain.

d. Open the page Host using adapter and write down the values that appear in the following fields:

   - **Host name or IP Address**
   - **Event port number**

   This is the connection information the adapter on any of the nodes in the domain uses to reach the end-to-end automation management host.

6. Check if end-to-end automation management can be reached from each node in the domain. A simple test is `ping <end-to-end management host>`. If there is a firewall between the nodes of the domain and the end-to-end automation management host, check with the network administrator if the firewall permits a connection between the node (page Adapter: **Host name or IP Address**) and the end-to-end management host (page Host using adapter: **Host name or IP Address** and **Event port number**).

7. The adapter determines whether SSL must be used for the communication with the end-to-end automation manager. To check the SSL settings of the adapter, launch the adapter configuration dialog using the command `cfssamadapter`. On the Security page, verify that the SSL settings are correct.

   **Note:** If the end-to-end automation manager is configured for using SSL, the adapter must be configured for SSL as well. The SSL configuration of the end-to-end automation manager is performed from Integrated Solutions Console.

8. On the end-to-end automation management host, use `netstat` to find out if it is listening for events on the event port defined in **Event port number**.

   When the event port number is set to 2002 on a Windows host, `netstat` brings up a message like in the following example:
C:\>netstat
Active Connections
Proto Local Address Foreign Address State
...TCP E2EHOST:2002 sapb13.boeblingen.de.ibm.com:45688 ESTABLISHED
...

If netstat does not display any information about the event port defined in Event port number, open the file /etc/hosts (on Windows the file is located in C:\WIN\system32\drivers\etc\hosts) and verify that the loopback address (127.0.0.1) is not related to the actual host name. The loopback address should be related to localhost only.
For example, the entry in /etc/hosts may look like the following:
127.0.0.1 localhost.localdomain localhost

9. Check if each node in the domain can be reached from end-to-end automation management. A simple test is ping <hostname or IP Address>.
If there is a firewall between the end-to-end automation management host and the nodes of the domain, check with the network administrator if the firewall permits a connection between the end-to-end automation management host (page Host using adapter: Host name or IP Address and Request port number) and the node (page Adapter: Host name or IP Address).

10. On the node on which the adapter is running, use netstat to find out if it is listening on the port defined in Request port number.
For example, when the Request port number is set to 2001, netstat brings up a message like this on AIX and Linux hosts:
sapb13:~ # netstat -atn | grep 2001
tcp 0 0 9.152.20.113:2001 :::* LISTEN

11. When the communication between all ports has been established correctly (see the descriptions above), check whether the EEZ Publisher is running. The EEZ Publisher must be running on the master node of the Base component of SA for Multiplatforms.
To check if the Publisher is running, perform the following steps:
a. Issue the following command on one of the nodes of the first-level automation domain:
lssamctrl
If the Publisher is enabled, you will receive output like in the following example:
safli03:~ # lssamctrl | grep Publisher
EnablePublisher = EEZ
b. Issue the following command on the master node of the Base component of SA for Multiplatforms:
ps ax
You should receive output like in the following example:
safli04:~ # ps ax | grep Publisher
25756 ? S 0:00 TECPublisher /etc/opt/IBM/tsamp/sam/cfg/EEZPublisher.conf EEZ
25757 ? S 0:00 TECPublisher /etc/opt/IBM/tsamp/sam/cfg/EEZPublisher.conf EEZ
25758 ? S 0:00 TECPublisher /etc/opt/IBM/tsamp/sam/cfg/EEZPublisher.conf EEZ
25759 ? S 0:00 TECPublisher /etc/opt/IBM/tsamp/sam/cfg/EEZPublisher.conf EEZ
c. Issue the following command on the SA for Multiplatforms node on which the adapter is running:

```
netstat
```

You should receive output like in the following example:

```
afli03:~ # netstat -atn | grep 5539
tcp 0 0 :::5539 :::* LISTEN
tcp 0 0 9.152.21.82:5539 9.152.20.92:32793 ESTABLISHED
```

If the Publisher is not running or communication on port 5539 cannot be established, perform the following steps:

a. Check that the file /etc/Tivoli/tec/samPublisher.conf contains the following entry:

```
#---SAMP-EEZ:
Publisher=EEZ
LibraryPath=libTECPublisher.so
ConfigPath=/etc/opt/IBM/tsamp/sam/cfg/EEZPublisher.conf
```

b. Check that the file /etc/opt/IBM/tsamp/sam/cfg/EEZPublisher.conf contains the following entries:

```
ServerLocation=adapter_ip_address
ServerPort=5539
```

The value specified for `adapter_ip_address` in the file must match the value provided on the Adapter page of the SA for Multiplatforms adapter configuration dialog.

12. If the domain still does not appear on the operations console, contact IBM support and provide diagnostic information:

a. On each node in the domain, find out where the trace files are located. The trace files can be found in the /eez/logs subdirectory of the Tivoli Common Directory. To find the path to the Tivoli Common Directory, issue the following command:

```
cat /etc/ibm/tivoli/common/cfg/log.properties
```

The command returns the path to the Tivoli Common Directory, for example:

```
Tivoli_common_dir=/var/ibm/tivoli/common
```

This means that the trace files can be found in the following directory:

```
/var/ibm/tivoli/common/eez/logs
```

b. Use `tar` to package all files in the directory and provide the archive to IBM support.

---

**Security exception when trying to subscribe to resources that are hosted on a first-level automation domain**

If you see the following error messages in the domain log file of the end-to-end automation domain, verify that the credentials for the first-level automation domain have been specified:

**EEZD0069E**

A Security Exception was caught trying to subscribe to resources hosted on automation domain with name `first-level domain`. Following is a list of resources the automation engine tried to subscribe to: (resource_group/IBM.ResourceGroup/).
EEZD0072E
An EEZUserSecurityException was caught trying to contact another automation domain. Original message text is: EEZA0009E Invocation of adapter plug-in failed:
plug-in=com.ibm.sam.eezplugin.SAMFLA, method=SUBSCRIBE_RESOURCE, internalRetcode=41, taskRetcode=0.

To check that the user credentials for the first level automation domain have been specified correctly, check the settings on the User credentials page of the configuration dialog.
For information about the configuration dialog, refer to the IBM Tivoli System Automation for Multiplatforms Installation and Configuration Guide. For detailed information about the User credentials page, refer to the online help of the configuration dialog.

**Automation J2EE framework (EEZEAR) does not support Java 2 security**

Java 2 security is not supported by the EEZEAR application. If Java 2 security is enabled, EEZEAR will no longer start.

Note that Java 2 security will be automatically enabled when you enable WebSphere security in Integrated Solutions Console. In this case, you must disable Java 2 security in Integrated Solutions Console.

**Resolving timeout problems**

If you experience timeout problems when accessing first-level automation domains, this may mean that the default values of some optional J2EE framework environment variables are not appropriate for your environment.

The following table lists the environment variables that you may need to change to resolve the problems.

More information about the environment variables is provided in the following sections. Section "Modifying the environment variables for the automation J2EE framework" on page 204 describes how you change the environment variables on Integrated Solutions Console.

**Table 35. Environment variables of the automation J2EE framework**

<table>
<thead>
<tr>
<th>Variable name</th>
<th>Minimum value</th>
<th>Default value</th>
<th>Maximum value</th>
</tr>
</thead>
<tbody>
<tr>
<td>com.ibm.eez.aab.watchdog-interval-seconds</td>
<td>60</td>
<td>300</td>
<td>86400</td>
</tr>
<tr>
<td>com.ibm.eez.aab.watchdog-timeout-seconds</td>
<td>2</td>
<td>10</td>
<td>60</td>
</tr>
<tr>
<td>com.ibm.eez.aab.domain-removal-hours</td>
<td>1</td>
<td>48</td>
<td>1000</td>
</tr>
<tr>
<td>com.ibm.eez.aab.invocation-timeout-seconds</td>
<td>30</td>
<td>60</td>
<td>3600</td>
</tr>
</tbody>
</table>

**Rules:**
- If the value of an environment variable is below the minimum value for that variable, the minimum value is used.
• If the value of an environment variable is above the maximum value for that variable, the maximum value is used.

• Cross-dependency: To ensure that domains are removed only after the health state has moved to some timeout or failed state, the value of the variable com.ibm.eez.aab.domain-removal-hours must be greater than the value of com.ibm.eez.aab.watchdog-interval-seconds/3600.

If you specify values that violate this rule, the user-specified value for com.ibm.eez.aab.domain-removal-hours is ignored and the value of com.ibm.eez.aab.domain-removal-hours is set to com.ibm.eez.aab.watchdog-interval-seconds/3600 +1.

Watchdog - A mechanism for monitoring the domain communication states

The automation J2EE framework includes a watchdog mechanism to determine the health state of the communication with each domain (either the end-to-end automation domain or a first-level domain). If the automation J2EE framework and the domain in question have not communicated successfully during the time interval defined by the environment variable com.ibm.eez.aab.watchdog-interval-seconds (default value: 300), the automation J2EE framework invokes a test operation on the domain. This test operation may only take a limited amount of time, as defined by the environment variable com.ibm.eez.aab.watchdog-timeout-seconds. Depending on the outcome of this test operation, the domain communication health state is updated and reflected in the operations console accordingly.

If a very large number of domains is to be monitored or the domain contains a very large number of resources and the value of com.ibm.eez.aab.watchdog-interval-seconds is not sufficiently large, the watchdog may not be able to contact all domains and receive their reply events within the given time. This results in incorrect communication state changes for the affected domains:

• In the WebSphere Application Server message log, pairs of messages EEZJ1003I can be found for each of these domains, indicating that the domain's communication state changed from "OK" to "AsyncTimeout" and back to "OK" within a short period of time.

• In addition, the operations console icons for the affected domains change accordingly for a short period of time from "The domain is online" to "Resource events cannot be received" and back to "The domain is online".

To resolve the problem, increase com.ibm.eez.aab.watchdog-interval-seconds to a value that is approximately double that of the number of domains. For example, if there are 200 domains, the value of com.ibm.eez.aab.watchdog-interval-seconds should be set to 400.

If the number of resources to be monitored on the operations console is very large, increase the value of com.ibm.eez.aab.watchdog-interval-seconds in steps of 200 seconds until the result is satisfactory.

Database clean-up timeout for automation domains

The automation J2EE framework contains a mechanism for removing automation domains from the database after a period of inactivity. The domains themselves are not removed, just the representation of the domains in the automation J2EE framework is removed.
When the automation J2EE framework detects that no communication with a particular domain has occurred for a time interval that is longer than the clean-up timeout interval defined in the environment variable `com.ibm.eez.aab.domain-removal-hours`, it removes the related domain information from the database.

If the automation J2EE framework had been stopped for a time, such domains will be removed only after attempts to contact them have failed.

Whenever the automation J2EE framework removes a domain, the operations console is notified about the change and refreshed accordingly.

**Method invocation timeout between the automation J2EE framework and the automation adapters**

A timeout value can be set in order to control how long an operation between the automation J2EE framework and the automation adapters may take. The environment variable `com.ibm.eez.aab.invocation-timeout-seconds` is used to define this timeout value.

The value of this environment variable should be at least 15 seconds less than the value of the WebSphere ORB request timeout property. Otherwise, "CORBA.NO_RESPONSE: Request timed out" errors may be encountered by the operations console or the automation engine if an operation takes longer than the time interval specified by the ORB request timeout. The default value for the WebSphere ORB request timeout is 180 seconds. The ORB request timeout property can be changed from Integrated Solutions Console. To view or change the property, open Integrated Solutions Console and navigate to Servers --> Application Servers --> server1 --> Container Services --> ORB service. See the WebSphere documentation for more information about the ORB request timeout property.

The `com.ibm.eez.aab.invocation-timeout-seconds` variable is used for the communication with all automation adapters. There is no individual timeout value per automation adapter.

**Note:** The communication with the end-to-end automation engine does not support method invocation timeout. This means that either the connection cannot be established, in which case the operation returns with an exception immediately, or the operation will continue until a connection is established.

**Modifying the environment variables for the automation J2EE framework**

The current value of each variable is displayed when the application EEZEAR is started. Look for messages EEZJ1004I, EEZJ1005I, EEZJ1006I in the WebSphere Application Server log (SystemOut.log).

If the default values of the environment variables are not appropriate for your environment, you can change them by performing these steps on Integrated Solutions Console:

1. Log on to Integrated Solutions Console.

2. Click Servers --> Application Servers --> server1 -->
   
   Server Infrastructure --> Java and Process Management --> Process Definition -->
   
   Additional Properties --> Java Virtual Machine
Additional Properties —> Custom Properties

3. Click **New** to change the setting of a variable.

4. Enter values for **Name** (com.ibm.eez.aab.<variable_name>) and **Value** (<new_value>). You can also enter a description.

5. Save your changes.

WebSphere Application Server must be restarted for the changes to take effect.

**Modifying the time zone settings for the operations console**

The times stamps that are displayed on the operations console are derived from the time zone settings of the operating system on the system on which the Integrated Solutions Console server is installed. If the times in the time stamps differ from the local time at your location, check the time zone settings on your Integrated Solutions Console server.

The time settings can usually be set with the configuration tools that are provided with the operating system:

- On AIX, you can configure time settings with the smit or smitty system configuration tool. Use the menu entries **System environments —> Change/Show Date and Time** to adjust the time settings.
- On SuSE Linux, you can use the yast2 or yast system configuration tools. Use the menu entries **System —> Date and Time (SLES-9) or System —> Set Time Zone** (SLES-8).
- On Red Hat Linux distributions, you can use the configuration tools redhat-config-time or system-config-time.
- On Windows, you can adjust the time settings on the Control Panel.

You may have to restart your operating system for the changes to take effect.

**Note:**

**AIX, Linux:**

If you have modified the time zone settings as described above but the times displayed in the time stamps on the operations console are still inappropriate, you can set the environment variable **TZ** to resolve the problem.

**Examples:**

- To set the time zone for Berlin, Germany, use the following command:
  ```
  export TZ="Europe/Berlin"
  ```
- To set the time zone to US Eastern Standard Time, use the following command:
  ```
  export TZ="US/Eastern"
  ```
Unrecoverable error state displayed for first-level automation resources is incorrect

When the connectivity between the nodes of a cluster is reestablished after a connectivity failure, the operations console may incorrectly indicate that the resources on the nodes of the cluster are in state Unrecoverable error.

This behavior is the result of a cluster split in cases where both subclusters do not terminate themselves (for more information on cluster split situations, refer to the IBM Tivoli System Automation for Multiplatforms Base Component Administrator's and User's Guide).

To resolve the problem, that is, to display the correct state of the resources, event caching must be switched off in the event publisher.

To do this, perform the following steps:
1. Open the file /etc/Tivoli/tec/EEZpublisher.conf.
2. Locate the entry for the affected node.
3. In the relevant entry, change the setting for BufferEvents to NO.

Example:

This is the entry for the node "sapb04" in the file EEZpublisher.conf. The setting for BufferEvents has been changed to NO:

ServerLocation=sapb04
ServerPort=5529
ConnectionMode=connection_less
BufferEvents=NO
BufEvtPath=/etc/Tivoli/tec/EEZPublisher.cache
NO_UTF8_CONVERSION=YES

WebSphere Application Server cannot connect to DB2

When you receive an error message indicating that WebSphere Application Server could not establish a connection with the DB2 database EAUTODBDS, this may indicate that the DB2 port number is not specified correctly on Integrated Solutions Console.

To check if this is the case, perform these steps:
1. On the DB2 server system, check which port number DB2 is using. On Linux, for example, use the netstat command to obtain the following information:

```
    tmcc-123-87:~ # netstat -atnp | grep db2
    tcp  0  0 0.0.0.0:50001  0.0.0.0:*  LISTEN  622/db2tcpcm 0
    tcp  0  0 9.152.123.87:50001  9.152.123.87:33090  ESTABLISHED 1362/db2agent (EAUT
    tcp  0  0 9.152.123.87:50001  9.152.123.87:32954  ESTABLISHED 1379/db2agent (OPCO

```

In the example, the correct DB2 port number is 50001.
2. On Integrated Solutions Console, navigate to Resources > JDBC > JDBC providers > DB2 Universal JDBC Driver (XA) > Data sources > EAUTODBDS and check whether the port number is specified correctly in the field Port number.
Critical exceptions in the WebSphere Application Server log file

If the End-to-End Automation Management component cannot be accessed from the operations console although the WebSphere Application Server is running, or if the domain topology in the operations console does not look like expected, check the WebSphere Application Server log file for one or multiple of the following exceptions or stack trace fragments:

```
java.lang.IllegalMonitorStateException: JVMLK002: current thread not owner
```

```
CNTR00019E: EJB threw an unexpected (non-declared) exception during invocation of method "findByPrimaryKey". Exception data: java.lang.NullPointerException
```

```
CNTR00019E: EJB threw an unexpected (non-declared) exception during invocation of method "findByPrimaryKey". Exception data: com.ibm.websphere.cpi.CPIException: ; nested exception is: java.lang.ClassCastException: com.ibm.eez.aab.EEZDomainSessionBean
```

To resolve the problem, do this:

1. Disable the just-in-time compiler (JIT) of the WebSphere Java Virtual Machine (JVM)
2. Restart WebSphere Application Server
If the domain topology still does not look like expected, deactivate the end-to-end automation policy and activate it again.

### OutOfMemoryError in the WebSphere Application Server log file

An OutOfMemoryError may occur if a large amount of data is returned from a first-level automation domain. Depending on the situation, the error may become visible on the operations console or in the WebSphere Application Server message log file.

Perform the following steps to increase the JVM heap size:

1. Log on to Integrated Solutions Console.
3. Increase the "Maximum Heap Size". The default value is 256 MB. If OutOfMemoryErrors occurred, it is recommended that you increase the value to 512 MB. Refer to the WebSphere Application Server online documentation for more information about how to determine the optimum value for the maximum heap size, depending on the available physical memory.
4. Save your changes. WebSphere Application Server must be restarted for the changes to take effect.

"Unable to set up the event path..." error message is displayed in Integrated Solutions Console

When you try to connect the operations console, the following error message is displayed in Integrated Solutions Console:

Unable to set up the event path between the operations console and the management server:
CWSIA024E: An exception was received during the call to the method
    JmsManagedConnectionFactoryImpl.createConnection:
    com.ibm.websphere.sib exception SIRexourceException:
CWSIT0006E: It is not possible to contact a messaging engine in bus EEZBus

This may indicate a problem with the DB2 instance account for the end-to-end automation management databases. To check if this is the case, check whether the password for the DB2 instance account has expired or is incorrect.

### EEZBus is not started

The EEZBus is a component running within WebSphere Application Server that contains the automation J2EE framework. There are several potential reasons why the EEZBus cannot be started. The reasons and proposed actions are described in the following sections.

### EEZBus is not started due to a security problem

If the EEU Bus cannot be started, this may indicate a problem with the DB2 instance account for the end-to-end automation management databases, regardless of whether you are using DB2 or LDAP as the user registry.

In such a case, one or more of the following symptoms may occur:
• On the Messages engine panel of Integrated Solutions Console (Service integration > Buses > EEZBus > Messages engines) you can see that the EEZBus is not started. When you try to start the bus, the following error message is displayed:

The message engine <node_name.server_name> EEZBus cannot be started.

• Message “EEZD0010E” appears in the automation engine log file msgengine.log.

• If you are using DB2 as the user registry, the following exception appears in the WebSphere Application Server log file:

```java
00010f1d FreePool E J2CA0046E: Method createManagedConnectionWithMCWrapper caught an exception during creation of the ManagedConnection for resource jms/EEZTopicConnectionFactory, throwing ResourceAllocationException. Original exception: javax.resource.ResourceException: CWSIT0006E: The message engine bus, EEZBus is not started because an internal database is in an inconsistent state
```

To eliminate a problem with the DB2 instance account as the cause, check the database connection from Integrated Solutions Console:

1. Select the data source.
2. Click Test connection.

If the DB2 instance account for the end-to-end automation management databases causes the problem, you receive the following message:

```java
Test connection failed for data source EAUTOBDOS on server <servername> at node <nodename> with the following exception:
java.lang.Exception: java.sql.SQLException:
            Connection authorization failure occurred.
```

**EEZBus is not started because an internal database is in an inconsistent state**

Check if the message log file of WebSphere Application Server contains the following message (where sapb1Node01.server1-EEZBus must be replaced with the messaging engine name based on the node name of your WebSphere Application Server installation):

```plaintext
```

```
"/opt/IBM/WebSphere/AppServer/profiles/default/databases/com.ibm.ws.sib/sapb1Node01.server1-EEZBus", see the next exception for details.
DSRA0010E: SQL State = XJ041, Error Code = 40,0000DSRA0010E: SQL State = XJ041, Error Code = 40,000
```

Appendix B. Troubleshooting 209
If this message exists, check if the directory described in the message exists in the file system. If it does, complete the following steps:

- Stop the WebSphere Application Server.
- Rename (or remove) the directory described in the message.
- Start the WebSphere Application Server.
- Verify in the WebSphere Application Server message log that the error message shown above does no longer appear and that the EEZBus was started successfully:
  
  CWSID0016I: Messaging engine sapb11Node01.server1-EEZBus is in state Started.

**Note:** Similarly, if the CommonEventInfrastructure_Bus cannot be started and an analogous message appears in the WebSphere Application Server message log, remove the directory described in the message, and restart the WebSphere Application Server.

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### Checking the Tivoli Event Integration Facility function

This section describes how you verify that the Tivoli Event Integration Facility (EIF) is installed and configured correctly by sending an event to the event server. If the event appears on the Tivoli Enterprise Console, the configuration is correct.

**Prerequisites:**

- WebSphere Application Server is running
- The Tivoli Enterprise Console server is running
- Common Event Infrastructure (CEI) is installed
- EIF is installed
- CEI and EIF are configured:
  - In Integrated Solutions Console, navigate to **Resources > JMS > JMS Providers > EIF JMS Provider > JMS connection factories** and do this:
    - Verify that TECQueueConnectionFactory exists.
    - Select TECQueueConnectionFactory and navigate to **Custom Properties**. Ensure that the value for the ServerLocation property contains the host name or address of the TEC server. In addition, ensure that the value for the ServerPort property contains the number of the port on which the TEC server is listening.
  - Check that the SystemAutomation.baroc file is located in the following directory:
    - **Windows:** <EEZ_CONF_ROOT>
      For example:
      ```
      C:\Program Files\IBM\tsamp\eez\cfg
      ```
    - **AIX and Linux:** <EEZ_CONF_ROOT>
      For example:
      ```
      /etc/opt/IBM/tsamp/eez/cfg
      ```
  - Ensure that the SystemAutomation.baroc file is known to Tivoli Enterprise Console
    For information on how to import, compile, load, and activate the BAROC file on the Tivoli Enterprise Console server, refer to the manual [IBM Tivoli Enterprise Console Rule Developer’s Guide Version 3.9, SC32-1234](#) (Chapter 1, Rule development fundamentals - Rules - Rule bases - Rule base manipulation procedures using the rule builder).
  - Verify that EEZEventsToTECEnabled is set to `true`. 

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210  End-to-End Automation Management Component: Administrator's and User's Guide
– In Integrated Solutions Console, navigate to **Environment > Naming > Name Space Bindings** and select **EEZEventsToTECEnabled**.
– Ensure the “String value” field is set to **true**.
– Restart the WebSphere Application Server.
– In the WebSphere administrative console, navigate to **Applications > Enterprise Applications** and verify that the application **EEZEAR** is started.
– In the TEC, an event related to the start of **EEZEAR** appears.

**Troubleshooting command shell problems**

**AIX/Linux: Command shell hangs in shell mode - no input is possible**

The command shell supports a command history function which can be exploited by using the scroll-up and scroll-down keys. On Windows this is a standard functionality provided by Java. On AIX/Linux this functionality is implemented by particular native input libraries. On some systems (depending on the distribution and version, and the shell used), this native code may lead to problems, for example:

- **EEZCS** fails with a javacore
- No input is possible (not even CTRL-C)

In order to circumvent this problem, you can disable the command history function by setting the HISTORY value to “false” in the file `<EEZ_INSTALL_ROOT>/bin/eezcs.sh`. This is the default setting in eezcs.sh which you need to change:

```
# Set HISTORY to false if you experience input problems
HISTORY=false
```

**Troubleshooting automation engine problems**

**eezdmn command hangs during startup or shutdown**

If the **eezdmn** command is hung during startup or shutdown of the automation engine, for example, because of an extreme load on the automation manager, you receive a timeout message after 60 seconds.

You can adjust the timeout value by adding the parameter `EEZDMNCLIREADTIMEOUT` to the script file `eezdmn.sh` (AIX/Linux) or to the batch file `eezdmn.bat` (Windows) and setting it to an appropriate value. The timeout value must be specified in milliseconds. For example, to receive a timeout message after 30 seconds, set the value of the parameter to 30000.

**Troubleshooting HACMP adapter problems**

Use this section for troubleshooting problems you experience when working with the HACMP adapter.

**HACMP adapter log files**

**Increasing the trace logging level**

If your trace is not detailed enough to analyze a problem and the problem can be recreated, it may be useful to increase the trace logging level:

1. Invoke the adapter configuration dialog using **cfghacadapter**.
2. On the main panel of the configuration dialog, click **Configure**.
3. Select the Logger tab.
4. Set the **Trace logging level** to **Maximum**.
5. Click **Apply**. The new setting takes effect immediately.

For more information about the HACMP adapter configuration dialog, see the *Installation and Configuration Guide*.

**Log file locations**
The HACMP adapter log files are located in the Tivoli Common Directory:
- Default location: `/var.ibm/tivoli/common`
- HACMP adapter-specific subdirectory structure in the Tivoli Common Directory:
  - `eez/ffdc` – Contains the First Failure Data Capture files (if the FFDC recording level is not set to Off in the adapter configuration dialog)
  - `eez/logs` – Contains the HACMP adapter trace file:
    - `traceFlatAdapter.log`

**HACMP adapter does not start**
Possible causes:
- HACMP level is lower than 5.3.0.5
  To check, use: `lslpp -l cluster.es.server.utils`
- Cluster services have not been started
  Start the services using smitty: `hacmp --> C-SPOC --> Manage...

**HACMP adapter terminates**

*Cluster services terminated while the HACMP adapter was running*
If the adapter is automated, it should restart automatically on next priority node where cluster services run.

*Adapter attempts to start but terminates again*
This may indicate that the adapter has not been configured correctly. For information about configuring the adapter, see the *Tivoli System Automation for Multiprocessing Installation and Configuration Guide*.

**HACMP adapter does not connect to the host**
Make sure the firewall allows connections in both directions.

Check with `netstat`:
- whether the adapter listens on the request port (default port is 2001)
- whether the end-to-end automation manager listens on the event port (default port is 2002)

**HACMP resource groups cannot be started or stopped**
To bring HACMP resource groups online or offline, the HACMP Cluster-SubState must be **STABLE**. If the Cluster-SubState is **UNSTABLE**, which is typically the case during resource state transitions, Bring online and Bring offline actions against resource groups are not accepted. You can view the Cluster-Substate on the Additional Info page for the HACMP cluster. The information on the page is not updated automatically. To see if the Cluster-SubState has changed, use **Menu --> Refresh all** from the Menu bar of the operations console. When the
Cluster-SubState has changed to STABLE, Bring online and Bring offline actions against resource groups can again be perform.

The following figure shows the Additional Info page for the HACMP cluster "cl_hacmp":

![Figure 22. Additional Info page for an HACMP cluster]

**Troubleshooting MSCS adapter problems**

Use this section for troubleshooting problems you experience when working with the MSCS adapter.

**MSCS adapter log files**

This is where the adapter log files are located:

- **Tivoli Common Directory**
  - Default location: C:\Program Files\IBM\tivoli\common
  - MSCS adapter-specific subdirectory structure in Tivoli Common Directory:
    - eez\ffdc – Contains the First Failure Data Capture files (if the FFDC recording level is not set to Off in the adapter configuration dialog)
    - eez\logs – Contains the MSCS adapter log files:
      - msgMSCSAdapter.log
      - traceMSCSAdapter.log (if trace logging level is not set to Off)
      - eventMSCSAdapter.log (if trace logging level is not set to Off)
  - The default adapter installation directory is C:\Program Files\IBM\tsamp\eez\mscs.

- **Subdirectories and files used for troubleshooting:**
  - The file data\eez.release.information.txt is created in the adapter installation directory when the MSCS adapter is started. It contains information about service applied to the MSCS adapter and about the configuration settings used.
  - The installation log files are located in the subdirectory _inst_logs.

**Adapter configuration dialog problems occur**

A problem occurs using the adapter configuration dialog

Problem determination:
The file cfgmscsadapter.bat contains a command for launching the
configuration dialog
The file contains a duplicate of this command which enables diagnostic
output (option -DEBUG)

**The Apply button on the Logger page cannot be clicked**
Possible cause: The MSCS adapter is not running.

**Configuration files cannot be replicated**
Possible causes:
- The MSCS cluster is not available.
- The cluster contains only a single node.

**Replication fails with the message "Login on target node failed"**
Possible cause: The domain user ID was not specified in the correct format,
which is <user_ID>@<domain_name>.

**MSCS adapter does not start**

**MSCS adapter does not start**
Problem determination:
- The application event log should contain the message “The service SA
  MP MSCS Adapter has been started.”
- In the configuration file cfg\mscs.service.properties, uncomment the
  property service-log-file, restart the service, and investigate the
  resulting file.
  Ensure to comment the property again before returning to normal
  operation.

**The SA MP Adapter Service reports the status Started for some seconds and
stops again**
- Startup should be completed within 60 seconds.
- Refresh the view to see the actual status.

Problem determination:
- Investigate the MSCS adapter log file msgMSCSAdapter.log.
- If no error messages can be found, increase the trace logging level to
  Maximum and provide all logs to IBM support.

**The file msgMSCSAdapter.log contains the message EEZA0061E indicating that
the adapter failed to bind to a socket**
Possible reason if the MSCS adapter service is made highly available using
MSCS:
- The network name or virtual IP address used for the “Automation
  adapter host” is not available during adapter startup
Possible solution:
- Check the spelling of the network name or virtual IP address in the
  adapter configuration dialog.
- Check that there are appropriate “Network Name” / “IP Address”
  resources defined in MSCS and that they are working properly.
- Check that the MSCS adapter service resource has a dependency on the
  “Network Name” / “IP Address” resources in MSCS.
**MSCS adapter terminates**

The MSCS adapter services stops and the log files contain no related error messages. In particular, message “EEZA0104I” does not appear in the MSCS adapter log file msgMSCSAdapter.log. The message indicates that the MSCS adapter was successfully stopped.

Problem determination:
1. Search for javacore.*.txt files in the subdirectory lib.
2. Use Windows tool drwtsn32 to configure dump capturing. Use the following settings:

3. Try to recreate the MSCS adapter termination.
4. Provide the data to IBM support.

**MSCS domain does not join**

The MSCS domain does not join within two minutes and the MSCS adapter service is no longer running.

Problem determination:
- Investigate the MSCS adapter log file msgMSCSAdapter.log.
- If no problems can be found, increase the trace logging level to “Maximum” and provide all logs to IBM support.

**The MSCS domain does not join within two minutes but the MSCS adapter service is running**

Problem determination and possible causes:
- An invalid host name or IP address is specified for the end-to-end automation management server.
• The end-to-end automation management server cannot be reached from the system running the MSCS adapter. To check, use ping, telnet, and tracert commands.
• Determine the network name / IP address the MSCS adapter sends to the end-to-end automation management server:
  – Increase the trace logging level at least to “Minimum”, restart the MSCS adapter, investigate the log file eventMSCSAdapter.log.
  – Locate the latest adapter join event (“EVT_RSN=domainAdapterJoin”). The event contains the required information.
• The system running the MSCS adapter cannot be reached from the end-to-end server. To check, use ping, telnet, and tracert commands.

Troubleshooting VCS adapter problems

Use this section for troubleshooting problems you experience when working with the VCS adapter.

VCS adapter log files

This is where the adapter log files are located:
• Tivoli Common Directory
  Default location: /var.ibm/tivoli/common/
  The log files are written to the following subdirectories of the Tivoli Common Directory:
  – eez/ffdc – Contains the First Failure Data Capture files (if the FFDC recording level is not set to Off in the adapter configuration dialog)
  – eez/logs – Contains the VCS adapter log files:
    - msgVCSAdapter.log
    - traceVCSAdapter.log (if the trace logging level is not set to Off)
• The default adapter installation directory is /opt/IBM/tsamp/eez/vcs
Appendix C. Using IBM Support Assistant

IBM Support Assistant is a free, stand-alone application that you can install on any workstation. IBM Support Assistant saves you time searching product, support, and educational resources and helps you gather support information when you need to open a problem management record (PMR) or Electronic Tracking Record (ETR), which you can then use to track the problem.

You can then enhance the application by installing product-specific plug-in modules for the IBM products you use. The product-specific plug-in for IBM Tivoli System Automation for Multiplatforms provides you with the following resources:

- Support links
- Education links
- Ability to submit problem management reports

Installing IBM Support Assistant and the Tivoli System Automation for Multiplatforms plug-in

To install the IBM Support Assistant V3.0, complete these steps:

- Go to the IBM Support Assistant Web Site: [www.ibm.com/software/support/isa/](http://www.ibm.com/software/support/isa/)
- Download the installation package for your platform. Note that you will need to sign in with an IBM user ID and password (for example, a MySupport or developerWorks® user ID). If you do not already have an IBM user ID, you may complete the free registration process to obtain one.
- Uncompress the installation package to a temporary directory.
- Follow the instructions in the Installation and Troubleshooting Guide, included in the installation package, to install the IBM Support Assistant.

To install the plug-in for IBM Tivoli System Automation for Multiplatforms, complete these steps:

1. Start the IBM Support Assistant application. IBM Support Assistant is a Web application that is displayed in the default, system configured Web-browser.
2. Click the Updater tab within IBM Support Assistant.
3. Click the New Products and Tools tab. The plug-in modules are listed by product family.
5. Select the features you want to install and click Install. Be sure to read the license information and the usage instructions.
6. Restart IBM Support Assistant.
Appendix D. Notices

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Index

A
access roles for IBM Tivoli System Automation for Multiplatforms 64
AIX systems multiple CPUs 207
automation excluding a node 164 including a node 164 resuming 162 suspending 162 automation adapters starting 101 automation domains command-driven 113 request-driven 113 automation engine command-line options 95 eezdmn command 95 log and trace files 193 stopping 95 XML log file, viewing 194 automation J2EE framework environment variables 202 log and trace files 194 starting 102 stopping 102

B
Bring offline 161 Bring online 161

C
capabilities of automation domains 113 changing log and trace settings 195 choice group request Offline 158 choice groups changing the preferred member 166 definition 27 Online request against a member 158 overview 165 starting the preferred member 166 Cluster-SubState HACMP clusters 212 command shell line mode 168 modes 167 shell mode 167 using 167 command-line options automation engine 95 communication flows first-level automation mode 24 policy activation 19 request submission 22
communication state 136 compound state 131 icons 132 resources 138 values 131 contact information displaying 145 conversion-only mode 15, 24, 97, 99 CORBA.NO_RESPONSE errors 204 credential vault 152 D
DB2 access user ID of the automation management server 68 desired state resources 138 direct access mode overview 16 domain capabilities 113 domain health indicators defining 151 domain state 135 domains communication state 136 displaying, troubleshooting 198 domain state 135 hiding 150 operational state 133
E
EEZBus resolving problems 208 eezdmn command options -? 100 -co 99 -monitor 98 -reconfig 99 -shutdown 97 -start 96 -xd 100 quick reference 96 using 95 EEZEAR starting 102 stopping 102 end-to-end automation mode overview 15 environment variables automation J2EE framework 202 Errors and warnings View button 145 event path error resolving 208 expressions in XML policies 82 external shutdown SA z/OS resources 78 external startup SA z/OS resources 78
F
first-level automation mode communication flow 24 overview 15 ForcedDownBy relationships 33 defining 89
G
goal-driven automation overview 27
H
HACMP adapter commands 175 does not connect to host 212 does not start 212 log file locations 212 starting 175 status 175 stopping 175 terminates 212 trace logging level increasing 211 troubleshooting 211 HACMP clusters Additional Info page 212 Cluster-SubState 212 HACMP resource groups cannot be started or stopped 212
I
IBM.Equivalency resource class 158 IllegalMonitorStateException troubleshooting 207 info link 144 information area overview 127 information pages setting up 93 initial resource events 39 Integrated Solutions Console event path error 208 logging on 115
J
J2EE framework starting 102 stopping 102
operations console (continued)
  time zone settings 205
  topology tree 119
  topology tree icons 121
  using views 145
operator instructions
  displaying 144
  operator requests
  searching 149
operators
  expressions in XML files 82
  ORB request timeout 204
  ORB service 204

P
passive application groups
SA z/OS resources 78
policies
  activating 156
  checking
    from a command line 90
    from the operations console 155
  deactivating 157
  defining choice groups 87
  defining groups 85
  defining relationships 88
  defining resource groups 85
  defining resources 82
  expressions in XML files
  operators 82
  ForcedDownBy relationships 89
  modifying 157
SA z/OS resources 78
  sample policy 47
  schema 79
StartAfter relationships 88
StopAfter relationships 89
UTF-8 format 79
worksheet 191
XML declaration 80
XML elements
  AutomationDomain 84
  AutomationDomainName 81
  AutomationPolicy 80
  Class 84
  Name 84
  Node 84
  PolicyAuthor 82
  PolicyDescription 82
  PolicyInformation 81
  PolicyName 81
  PolicyToken 81
  ReferencedResource 83
  ResourceReference 83
  XML template 79
policy checking tool
  policy pool directory 90
preferences
  View page 130
Refresh all 152

relationships
  displaying 144
  ForcedDownBy 33, 89
  StartAfter 30, 88
  StopAfter 32, 89
request lists
  displaying 159
  viewing 160
requests
  canceling 160
  displaying information about
  requests 159
Online 158
overview 157
stop 158
resource groups
  definition 27
  resource references
  definition 27
SA for Multiplatforms resources
  restrictions 77
SA z/OS resources
  restrictions 78
resource table
  limiting the scope 145
  paging through 124
  selecting a resource 123
  sort order 123
  views 123
  group hierarchy 124
  search results 126
resources
  bringing offline 161
  bringing online 161
  compound state 138
  desired state 138, 141
  locating 142
  monitoring 131
  observed state 138, 140
  operational state 138
  resetting, from unrecoverable
  errors 161
  resuming automation 162
  searching 145
  stopping 158
  suspending automation 162
resources section
  overview 122
  resuming automation
  for resources 162
return codes
  eezdmn -co 99
  eezdmn -reconfig 99
  eezdmn -shutdown 97
  eezdmn -start 97
  eezdmn -xd 100

S
SA for Multiplatforms
  restrictions 77
SA operations console
  layout 118
SA z/OS resources
  restrictions
    external shutdown 78
    external startup 78
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Administrator’s and User’s Guide
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