IBM PowerHA SystemMirror for AIX

Standard Edition

Version 7.2

PowerHA SystemMirror Graphical User Interface

IBM

Note

Before using this information and the product it supports, read the information in "Notices" on page 29.

Contents

About this document

This document provides information about viewing and monitoring clusters by using PowerHA SystemMirror for AIX.

Highlighting

The following highlighting conventions are used in this document:

Bold	Identifies commands, subroutines, keywords, files, structures, directories, and other items whose names are predefined by the system. Also identifies graphical objects such as buttons, labels, and icons that the user selects.
Italics	Identifies parameters whose actual names or values are to be supplied by the user.
`Monospace`	Identifies examples of specific data values, examples of text similar to what you might see displayed, examples of portions of program code similar to what you might write as a programmer, messages from the system, or information you should actually type.

Case-sensitivity in AIX

Everything in the AIX operating system is case-sensitive, which means that it distinguishes between uppercase and lowercase letters. For example, you can use the **ls** command to list files. If you type LS, the system responds that the command `is not found`. Likewise, **FILEA**, **FiLea**, and **filea** are three distinct file names, even if they reside in the same directory. To avoid causing undesirable actions to be performed, always ensure that you use the correct case.

ISO 9000

ISO 9000 registered quality systems were used in the development and manufacturing of this product.

Related information

- The PowerHA SystemMirror Version 7.2 for AIX PDF documents are available in the PowerHA SystemMirror 7.2 PDFs topic.
- The PowerHA SystemMirror Version 7.2 for AIX release notes are available in the PowerHA SystemMirror 7.2 release notes topic.

PowerHA SystemMirror graphical user interface (GUI)

In PowerHA SystemMirror Version 7.2 for AIX, you can use a graphical user interface (GUI) to monitor your cluster environment.

The PowerHA SystemMirror GUI provides the following advantages over the PowerHA SystemMirror command line:

- Monitor the status for all clusters, sites, nodes, and resource groups in your environment.
- Scan event summaries and read a detailed description for each event. If the event occurred because of an error or issue in your environment, you can read suggested solutions to fix the problem.
- Search and compare log files. Also, the format of the log file is easy to read and identify important information.
- View properties for a cluster such as the PowerHA SystemMirror version, name of sites and nodes, and repository disk information.

What's new in PowerHA SystemMirror graphical user interface

Read about new or significantly changed information for the PowerHA SystemMirror graphical user interface (GUI) topic collection.

How to see what's new or changed

In this PDF file, you might see revision bars (|) in the left margin that identifies new and changed information.

December 2023: PowerHA SystemMirror Version 7.2.8

The PowerHA SystemMirror GUI is updated with the following features and enhancements:

ROHA on prem
Resource Optimized High Availability (ROHA) is added as a new feature in the PowerHA SystemMirror GUI. The ROHA feature automatically and dynamically manages Dynamic Logical Partitions (DLPARs), Enterprise Pool CoD (EPCoD), and on or off CoD resources. Resources can be acquired and released on demand to manage those efficiently. HMC is used to manage resources. HMC communication can be established by using the following two methods.

- SSH
- REST

Prerequisites

The Lab administrator must perform the following actions.

- The HMC and cluster nodes do not require a password to communicate.
- The HMC details must be updated in the `/etc/hosts` file of all the cluster nodes.

Email notifications Enhancement for System Based Events and Multiple email Configuration
The PowerHA SystemMirror GUI version 7.2.7, has the email notification feature, which configures a single email notification setting for multiple events for example, events like Admin Op, Site Up, RG Move. All email IDs configured in the PowerHA SystemMirror GUI are notified whenever one of the specified events occurs.

Starting PowerHA SystemMirror GUI 7.2.8, the user can create multiple email groups by using the Set email ID option. A user can also set up multiple email profiles for a single cluster.

A new system-specific AIX Shutdown event is added to the list of events. Prior to configuring the email notification, the user can also test the Simple Mail Transfer Protocol (SMTP) configuration by sending a test email.

Prerequisite

The lab administrator must perform the following actions.

- SMTP configuration on the cluster nodes.

MFA with Voice call, TOTP, and Signature authentication methods

The IBM Security Verify feature supports two-factor authentication. The first authentication factor is the username and password. The second authentication factor is a system-generated numeric or alphanumeric code that the user must provide to prove their identity.

In the PowerHA SystemMirror GUI 7.2.6 version, Multi Factor Authentication (MFA) was introduced with the provision of sending One Time Password (OTP) to the user's phone number or to email address. An OTP is valid for a specific time. It becomes invalid after a successful user login or when it expires.

Starting PowerHA SystemMirror GUI 7.2.8 version, the GUI supports MFA with the following features.

- Voice Call: The user receives OTP through a phone call.
- Time-Based One-Time Password (TOTP): TOTP authentication is supported by any authenticator application, for example: Microsoft Authenticator or Google Authenticator.
- Signature Authentication: Signature authentication uses IBM Verify application.

File Collection

Starting PowerHA SystemMirror GUI 7.2.8 version, the user has provision to create, view, modify, and delete a file collection by using the PowerHA SystemMirror File Collection GUI feature. Two default file collections are available.

- Configuration_files
- HACMP_files

Fix Central Installation support for the Service Pack (SP)

In the PowerHA SystemMirror GUI version 7.2.7, users might download Service pack (SP) packages directly from the GUI to discovered clusters with one click, instead of downloading from Fix Central. However, after installation the user had to manually install the SP filesets.

With the introduction of PowerHA SystemMirror GUI version 7.2.8, the GUI allows users to install downloaded files directly from the user interface. Users select the cluster from the drop-down menu and select their preferred installation for the available downloads. With these enhancements, the PowerHA simplifies the update process by using the following upgrade options.

- NDU (Non-Disruptive Update)
- Offline Update

Orphan Resources (Service IP and Application controller)

In PowerHA GUI version 7.2.7 and prior releases, users could create the resources only from the Resource Group page, which was associated with that Resource Group. But starting PowerHA SystemMirror GUI version 7.2.8, the GUI allows users to create independent resources, such as Service IP and Application controller that are not associated with any Resource Groups (RGs). This feature is now available in the Service IP and Application controller GUI. Users can create, edit, delete, and view these resources. Also, users have the flexibility to add these newly created or existing Orphan Resources to a specific RG. Users can either use the Cluster (Resource Page) or the Resource Group (Resource Page).

GLVM Sizing Tool Enhancement for Network Latency

In the previous releases, the Geographic Logical Volume Manager (GLVM) Sizing tool provided the network bandwidth and cache recommendations for the Asynchronous Volume Group(VG).

The GLVM sizing tool in PowerHA version 7.2.8 enhancement provides network latency information and recommendation in the GUI.

Following are some of the additional minor enhancements that are added to the PowerHA SystemMirror GUI 7.2.8 version:

- User can select multiple hostname for Cloud Backup Restoration (CBR). The multiple selection allows the user to initiate the restoration process for the cloud images on multiple nodes (hostname) by selecting the check boxes.
- Delete function for storage devices (part of CBM) is now supported which helps the user to remove the storage devices from the GUI itself.
- Node version is upgraded from Node 16 to Node 18.3.

December 2022: PowerHA SystemMirror Version 7.2.7

The PowerHA SystemMirror GUI is updated with the following features and enhancements:

GLVM sizing tool
  Geographic Logical Volume Manager (GLVM) sizing tool provides suitable recommendations based on the network bandwidth and cache requirements for the asynchronous GLVM network that supports GLVM traffic. The GLVM sizing tool monitors disks and network usage for the specified duration and provides suggestions.

Fix Central
  The latest GUI updates are available on the Fix Central website. You can view and download service packs for different PowerHA SystemMirror versions. These service packs can be applied to the discovered cluster. To download filesets for PowerHA SystemMirror service packs, you must have IBM ID login credentials. To copy the downloaded filesets, you must specify an IP address of a node other than the server node. For the copy operation between the server and the respective node, use a communication method that does not need password authentication.

GLVM Tunables in Multiple Cross-Cluster Verification
  GLVM Tunables in Multiple Cross-Cluster Verification feature provides GLVM policy information for cluster comparison.

Cloud Backup Management (CBM) with DS8000® Support
  The CBM feature allows users to create, view, edit, and delete backup volume group profiles of IBM DS8000 storage disks in IBM Cloud. You can back up the volume group data and store it on IBM or Amazon cloud services.

Cloud Backup Management Restoration
  The Cloud Backup Management Restoration feature allows users to restore backup profiles of a resource group from IBM Cloud or Amazon Web Services (AWS) Cloud. You can back up the volume group data and store it on IBM or Amazon cloud services. You can restore the backed up data by using the disaster recovery operation to prevent data loss or data corruption.

Send Email Notification
  The Send Email Notification feature allows users to set an email notification for various types of events. An email notification about a cluster-based event is sent to the email ID that is set by the user. In PowerHA SystemMirror GUI, a user can modify and delete the email notification configuration that is set. A user can also delete the email notification configuration. To use the Send Email Notification feature, you must use the Simple Mail Transport Protocol (SMTP) configuration on the server node.

Automatic Expiration of Events
  The Automatic Expiration of Events feature closes all notification in the PowerHA SystemMirror GUI dashboard page after one minute (default time).

Translation Support for French language
  In addition to English and Japanese languages, PowerHA SystemMirror GUI is enhanced to support French language translation starting with PowerHA SystemMirror Version 7.2.7, or later.

December 2021: PowerHA SystemMirror Version 7.2.6

The PowerHA SystemMirror GUI is updated with the following features and enhancements:

GLVM historical charts
  Geographic Logical Volume Manager (GLVM) historical charts provides information about cache utilization data in a graphical format. You can view the historical data about cache utilization, network

utilization, and disk utilization for the specified date range by using different time intervals (minute, hour, day, week, and month).

Asynchronous cache sizing in GLVM
You can view and modify asynchronous cache size that is set during GLVM configuration.

GLVM tunables
GLVM tunables are the attributes that are used to configure mirror pool in the physical volume at the remote site. In PowerHA SystemMirror Version 7.2.6, users can set the following GLVM tunable attributes:

- Compression
- I/O group latency
- Number of parallel logical volumes

Multi-factor authentication
In PowerHA SystemMirror Version 7.2.6, multi-factor authentication is enabled for the non-root GUI users. For multi-factor authentication, PowerHA SystemMirror GUI uses IBM Security Verify Access account. Multi-factor authentication can be done by using either mobile authentication or email authentication.

The first authentication method uses the login credentials (username and password). For second authentication method, a user must select either one-time password (OTP) delivered through an email or select the Short Message Service (SMS).

Cloud Backup Management
In PowerHA SystemMirror Version 7.2.6, the Cloud Backup Management feature allows users to create, view, edit, and delete backup profiles of a resource group on cloud. You can take backup of volume group data and store it on the cloud services. You can take backup for IBM and Amazon cloud services.

Multiple Cross-Cluster Verifications
In PowerHA SystemMirror Version 7.2.6, Multiple Cross Cluster Verification feature allows users to compare one primary cluster with multiple clusters in a one-step procedure. You can filter the comparison result that displays differences and similarities between different clusters. You can select many attributes for cluster comparison.

December 2020: PowerHA SystemMirror Version 7.2.5

The PowerHA SystemMirror GUI is updated with the following features and enhancements:

- Geographic Logical Volume Manager (GLVM) configuration is now supported in the PowerHA SystemMirror GUI. For more information, see "GLVM support in the PowerHA SystemMirror GUI" on page 26.
- From PowerHA SystemMirror Version 7.2.5, and later, the dependency of the PowerHA SystemMirror Version 7.2.5 server on the IP address that is associated with the **hostname** command of the PowerHA SystemMirror Version 7.2.5 agent is removed. For more information, see "Restricting the use of IP addresses in the PowerHA SystemMirror GUI " on page 24.
- In PowerHA SystemMirror Version 7.2.5, or later, you can use the Operation Center Support (OCS) to configure the PowerHA SystemMirror GUI for long-term use, with visual and audio alerts. For more information, see "Operation Center Support in the PowerHA SystemMirror GUI" on page 27.
- The PowerHA SystemMirror GUI creates a backup communication method for the PowerHA SystemMirror GUI server by configuring an SSH key. For more information, see "Backup communication system for PowerHA SystemMirror GUI" on page 26

Planning for PowerHA SystemMirror GUI

Before you can install PowerHA SystemMirror GUI, your environment must meet certain requirements.

AIX operating system requirements

The nodes in the clusters on which you install the `cluster.es.smui.agent` fileset and the `cluster.es.smui.common` fileset must be running one of the following versions of the AIX operating system:

- AIX Version 7.1 Service Pack 6, or later
- AIX Version 7.2 Service Pack 1, or later

Notes:

- Before using the PowerHA SystemMirror GUI, you must install and configure secure shell (SSH) on each node.
- OpenSSL and OpenSSH must be installed on the system that is used as the PowerHA SystemMirror GUI server.
- You can install the latest available fixes for the AIX operating system from the Fix Central website.

You must install the following filesets to use PowerHA SystemMirror GUI:

cluster.es.smui.agent
    The `cluster.es.smui.agent` fileset is also known as the GUI agent file set. The GUI agent fileset communicates with the system that you used to install the GUI server fileset. This fileset must be installed on all the nodes in every cluster that you want to be managed with the PowerHA SystemMirror GUI. This fileset can be installed on different versions of PowerHA SystemMirror. For more information, see "Managing previous versions of PowerHA SystemMirror" on page 5.

cluster.es.smui.common
    This fileset must be installed with the `cluster.es.smui.server` (GUI server) fileset and with the `cluster.es.smui.agent` (GUI agent) fileset.

cluster.es.smui.server
    The `cluster.es.smui.server` fileset is also known as the GUI server fileset. The GUI server fileset is typically installed on only one system to manage clusters with the PowerHA SystemMirror GUI. This fileset can be installed on a cluster that is running , or later, or on an AIX LPAR that does not have clusters that are configured.

Managing previous versions of PowerHA SystemMirror

With PowerHA SystemMirror 7.2, or later, you can use the PowerHA SystemMirror GUI to monitor clusters that are run PowerHA SystemMirror 7.2.0 SP 3, or later. The full management capabilities that are provided in PowerHA SystemMirror 7.2 can be only used for clusters that are running PowerHA SystemMirror 7.2, or PowerHA SystemMirror 7.2.1 SP 2, or later. For earlier versions of PowerHA SystemMirror, only the monitoring features are supported.

You must install the `cluster.es.smui.common` and `cluster.es.smui.agent` filesets on all nodes that you want to manage with the PowerHA SystemMirror GUI. To install these filesets for the first time, run the s**mit install_all** command. If the filesets are already installed, then run the **smit update_all** command to apply new service packs.

Adding clusters

You must add clusters to the PowerHA SystemMirror GUI. When you add clusters to the PowerHA SystemMirror GUI, you must have Secure Shell (SSH) configured to facilitate authentication between the PowerHA SystemMirror GUI server and a single node in the cluster.

OpenSSL and OpenSSH must be installed on the system that is used as the PowerHA SystemMirror GUI server. OpenSSH is used to create secure communication between PowerHA SystemMirror GUI server and

nodes in the cluster. OpenSSH is needed only for the cluster addition process. After completion of cluster addition, OpenSSH is no longer used for communication between the server and the agents. For more information, see the OpenSSL website and the OpenSSH website.

The SSH File Transfer Protocol (SFTP) subsystem must be configured to work between the PowerHA SystemMirror GUI server and nodes in the cluster. You can verify that the SFTP subsystem is configured correctly in the `/etc/ssh/sshd_config` file. Verify that following path is correct:

```
Subsystem        sftp    /usr/sbin/sftp-server
```

If the path is not correct, you must enter the correct path in the `/etc/ssh/sshd_config` file, and then restart the `sshd` subsystem.

PowerHA SystemMirror supports both the key-based and password-based form of SSH authentication. SSH might have the ability to accept a password disabled by default. Hence, only key-based authentication is available on the system. To enable password authentication, you must change the SSH configuration. To enable password authentication in SSH, edit the `/etc/ssh/sshd_config` file by adding the following line:

```
PasswordAuthentication yes
```

After you add the `PasswordAuthentication yes` line to the `/etc/ssh/sshd_config` file, restart SSH by entering the following command:

```
stopsrc -s sshd && sleep 10 && startsrc -s sshd
```

The PowerHA GUI requires root authority to create and add clusters, which sometimes is not enabled in SSH. If the root access is disabled in SSH, edit the `/etc/ssh/sshd_config` file by adding the following line:

```
PermitRootLogin yes
```

After you add the `PermitRootLogin yes` line to the `/etc/ssh/sshd_config` file, restart SSH by entering the following command:

```
stopsrc -s sshd && sleep 10 && startsrc -s sshd
```

Gather the following information about your cluster environment before you add clusters to the PowerHA SystemMirror GUI:

Note: You need to connect to only one node in the cluster. After the node is connected, the PowerHA SystemMirror GUI automatically adds all other nodes in the cluster.

- Host name or IP address
- User ID and corresponding password
- SSH password or SSH key location

Note: A single cluster is managed by only one PowerHA SystemMirror GUI server.

Supported web browsers

PowerHA SystemMirror GUI is supported in the following web browsers:

- Google Chrome Version 57, or later
- Firefox Version 54, or later

Installing PowerHA SystemMirror GUI

The PowerHA SystemMirror GUI filesets are located on the PowerHA SystemMirror Version 7.2 for AIX, or later, media.

The PowerHA SystemMirror GUI server monitors clusters that are installed with PowerHA SystemMirror 7.2.0 SP 3, or later releases.

Install the following file sets to use PowerHA SystemMirror GUI:

cluster.es.smui.agent

This file set installs the agent files. Installing this fileset does not start the agent. This file set is automatically installed when you use the **smit install_all** command to install PowerHA SystemMirror Version 7.2, or later. The agent is configured and started when the cluster is added to the PowerHA SystemMirror GUI.

Note: You cannot install the `cluster.es.smui.agent` file set by using the **smit update_all** command. After running the **smit update_all** command, you need to install the `cluster.es.smui.agent` fileset separately.

cluster.es.smui.common

This file set installs common files that are required by both the agent and the PowerHA SystemMirror GUI server. This file set is automatically installed when you use the **smit install_all** command to install PowerHA SystemMirror Version 7.2, or later.

Note: You cannot install the `cluster.es.smui.common` file set by using the **smit update_all** command. After running the **smit update_all** command, you need to install the `cluster.es.smui.common` fileset separately.

cluster.es.smui.server

This file set installs the PowerHA SystemMirror GUI server files. The node on which you install the `cluster.es.smui.server` file set is known as the PowerHA SystemMirror GUI server. Installing this file set does not start the server. You do not need to install this file set on every node in the cluster, nor on every cluster that is to be managed. You can install this file set on a single node to manage multiple clusters.

To install this file set, complete the following steps:

1. From the command line, run **smit install_latest**.
2. Specify the input device or directory that contains the `cluster.es.smui.server` file set.
3. Select the `cluster.es.smui.server` file set from the list.
4. Press Enter to install the file set.

After the `cluster.es.smui.server` file set is installed, you must run the **/usr/es/sbin/cluster/ui/server/bin/smuiinst.ksh** command to complete the installation process. The **smuiinst.ksh** command automatically downloads and installs the remaining files that are required to complete the PowerHA SystemMirror GUI installation process. These downloaded files are not shipped in the file sets because the files are licensed under the General Public License (GPL). Due to expiration of the Bulls freeware, you must use the IBM AIX Toolbox to download dependencies of the PowerHA SystemMirror GUI server. If the PowerHA cluster and the PowerHA SystemMirror GUI server are on PowerHA SystemMirror Version 7.2.3, dependencies remain same.

Starting with PowerHA SystemMirror Version 7.2.8 and later versions of PHA, following Dependencies are changed:

- libgcc-8.1.0-2.aix7.2.ppc.rpm to libgcc-8.3.0-3.aix7.2.ppc.rpm
- libstdcplusplus-8.1.0-2.aix7.2.ppc.rpm to libstdcplusplus-8.3.0-3.aix7.2.ppc.rpm

For PowerHA SystemMirror Version 7.2.4 to version 7.2.7, and later, the following dependencies have updates:

- libgcc-6.3.0-2.aix6.1.ppc.rpm to libgcc-8.3.0-2.aix6.1.ppc.rpm
- libgcc-6.3.0-2.aix7.1.ppc.rpm to libgcc-8.3.0-2.aix7.1.ppc.rpm

- libstdcplusplus-6.3.0-2.aix6.1.ppc.rpm to libstdcplusplus-8.3.0-2.aix6.1.ppc.rpm
- libstdcplusplus-6.3.0-2.aix7.1.ppc.rpm to libstdcplusplus-8.3.0-2.aix7.1.ppc.rpm

For the cluster that is located in PowerHA SystemMirror Version 7.2.3 and needs to be discovered on later versions of PowerHA SystemMirror, the following dependencies have updates

- libstdc++-4.9.2-1.aix7.1.ppc.rpm to libstdcplusplus-4.8.5-1.aix7.1.ppc.rpm
- libstdc++-4.9.2-1.aix6.1.ppc.rpm to libstdcplusplus-4.8.5-1.aix6.1.ppc.rpm
- libgcc-4.9.2-1.aix7.1.ppc.rpm to libgcc-4.8.5-1.aix7.1.ppc.rpm
- libgcc-4.9.2-1.aix6.1.ppc.rpm to libgcc-4.8.5-1.aix6.1.ppc.rpm

The PowerHA SystemMirror GUI server must have internet access or an HTTP proxy that is configured to allow access to the internet to run the **smuiinst.ksh** command. If you are using an HTTP proxy, you must run the **smuiinst.ksh -p** command to specify the proxy information, or you must specify the proxy information by using the *http_proxy* environment variable.

If the PowerHA SystemMirror GUI server does not have internet access, complete the following steps:

1. Copy the **smuiinst.ksh** file from the GUI server to a system that is running the AIX operating system that has internet access.

2. Run the **smuiinst.ksh -d /directory** command where **/directory** is the location where you want to the download the files. For example, **/smuiinst.ksh –d /tmp/smui_rpms**.

3. Copy the downloaded files (**/tmp/smui_rpms**) to a directory on the PowerHA SystemMirror GUI server.

4. From the PowerHA SystemMirror GUI server, run the **smuiinst.ksh -i /directory** command where **/directory** is the location where you copied the downloaded files (**/tmp/smui_rpms**).

After the **smuiinst.ksh** command is complete, a message displays a URL for the PowerHA SystemMirror GUI server. Enter the specified URL into a web browser and from the **Health Summary** menu in the navigation pane, click the ⬤⬤⬤ icon and select **Create Cluster** option.

Migrating the PowerHA SystemMirror GUI database

When you are migrating a PowerHA SystemMirror GUI server that is not configured for high availability, the PowerHA SystemMirror GUI database is migrated automatically. For a highly available PowerHA SystemMirror GUI server, you must manually migrate the database as automatic migration of the database is not possible. You can migrate the PowerHA SystemMirror GUI database after all nodes in the cluster are migrated to the new version of PowerHA SystemMirror. You cannot migrate the PowerHA SystemMirror GUI database during offline or rolling migration due to conflicts over concurrent access to the shared file system that contains the PowerHA SystemMirror GUI database. The PowerHA SystemMirror GUI database cannot be migrated until all the nodes in the cluster are migrated to the new version of PowerHA SystemMirror.

To migrate the PowerHA SystemMirror GUI database, perform the following steps on the active PowerHA SystemMirror GUI server node after all the nodes are migrated:

1. Stop the PowerHA SystemMirror GUI server by running the following command:

```
stopsrc -cs phauiserver && sleep 11
```

2. Mount the file system *pha_gui_fs* by running following command:

```
mount/opt/pha_gui_fs
```

3. Verify that the *smui.db* file is available in the */opt/pha_gui_fs* directory by running the following command:

```
ls -l /opt/pha_gui_fs/smui.db
```

4. Complete the GUI database migration by running the following command:

```
/usr/es/sbin/cluster/ui/server/bin/sqlite/opt/pha_gui_fs/smui.db < /usr/es/sbin/cluster/ui/
server/node_modules/smui-server/resources/ddl-upgrade.sql
```

5. Restart the GUI server by running the following command:

```
startsrc -s phauiserver
```

Migrating to PowerHA SystemMirror GUI Version 7.2.4, or later, on AIX 7.2

In PowerHA SystemMirror Version 7.2.4, and later, the supporting software for PowerHA SystemMirror GUI server is upgraded. If you are migrating from PowerHA SystemMirror Version 7.2.3, and earlier, to PowerHA SystemMirror Version 7.2.4, and later, you can download and install new supporting software by using the **smuiinst.ksh** command. If you choose migrate to PowerHA SystemMirror Version 7.2.4, you must add all clusters that are managed by your previous version of PowerHA SystemMirror GUI server again to the current PowerHA SystemMirror GUI server. However, it is not necessary to remove the copy of previously added clusters from the PowerHA SystemMirror GUI server. After migration, if you do not add all clusters, the PowerHA SystemMirror GUI server will not function.

Note: If you choose to migrate to PowerHA SystemMirror Version 7.2.4 SP 1, and later, you do not need to add all clusters again.

Note: Once the cluster is in a stable state after migration, reload or refresh the GUI so that the migrated PowerHA version's features gets available in the GUI.

Please ignore the interim phases shown on the GUI during the ongoing migration process.

Migrating to PowerHA SystemMirror GUI Version 7.2.4, or later, on AIX 7.3

AIX 7.3 now supports both PowerHA SystemMirror GUI server and PowerHA SystemMirror GUI agent. If you are migrating to PowerHA SystemMirror Version 7.2.4 from any previous versions, then you must install the interim fix after you install PowerHA SystemMirror Version 7.2.4 on PowerHA SystemMirror GUI server node. After you install the `IJ38335s0a/IJ38335s0a.220504.epkg.Z` interim fix, you must again install the `/usr/es/sbin/cluster/ui/server/bin/smuiinst.ksh` script to download and install new dependencies. Later, you can install the latest service pack to migrate to the latest PowerHA SystemMirror Version 7.2.4.

Notes:

- You can install the interim fix only on PowerHA SystemMirror GUI server node.
- For other cluster nodes, interim fix installation and PowerHA SystemMirror GUI dependencies are not required and a user can directly install the latest service pack after PowerHA SystemMirror installation.

Note: Once the cluster is in a stable state after migration, reload or refresh the GUI so that the migrated PowerHA version's features gets available in the GUI.

Please ignore the interim phases shown on the GUI during the ongoing migration process.

Migrating to PowerHA SystemMirror GUI Version 7.2.5, or later, on AIX 7.3

If you are migrating from previous versions of PowerHA SystemMirror to PowerHA SystemMirror Version 7.2.5, or later, you must migrate the PowerHA SystemMirror GUI server node to the latest service pack. To download the PowerHA SystemMirror GUI dependencies, you must again install the `/usr/es/sbin/cluster/ui/server/bin/smuiinst.ksh` script.

Note: Once the cluster is in a stable state after migration, reload or refresh the GUI so that the migrated PowerHA version's features gets available in the GUI.

Please ignore the interim phases shown on the GUI during the ongoing migration process.

Related reference
Troubleshooting PowerHA SystemMirror GUI

You can view log files to help you troubleshoot PowerHA SystemMirror GUI.

Logging in to the PowerHA SystemMirror GUI

After you install the PowerHA SystemMirror GUI, you can log in to the PowerHA SystemMirror GUI from a web browser.

To log in to the PowerHA SystemMirror GUI, complete the following steps:

1. Open a supported web browser, and enter https://*HostName*:8080/#/login, where *HostName* is the system on which you installed the `cluster.es.smui.server` file set.
2. On the login page, enter the user name and password and click **Log In**. You can use the existing usernames and passwords that exist on the system to login. You can use any special characters in the password except single quotation mark.

Note: The first time you log in to the PowerHA SystemMirror GUI, you must add clusters to the GUI or create new clusters.

To add existing clusters to the PowerHA SystemMirror GUI, complete the following steps:

1. In the navigation pane, click the ●●● icon corresponding to **Health Summary**.
2. Select **Add an Existing Cluster**.
3. Complete all required information.
4. Click **Add**.

To create new clusters for the PowerHA SystemMirror GUI, complete the following steps:

1. In the navigation pane, click the ●●● icon corresponding to **Health Summary**.
2. Select **Create a New Cluster**.
3. Complete all required information.
4. Click **Complete**.

Navigating the PowerHA SystemMirror GUI

The PowerHA SystemMirror graphical user interface (GUI) provides you with a web browser interface that can monitor your PowerHA SystemMirror environment.

Health summary

In the PowerHA SystemMirror GUI, you can quickly view all events for a cluster in your environment. The following figure identifies the different areas of the PowerHA SystemMirror GUI that are used to view events and status.
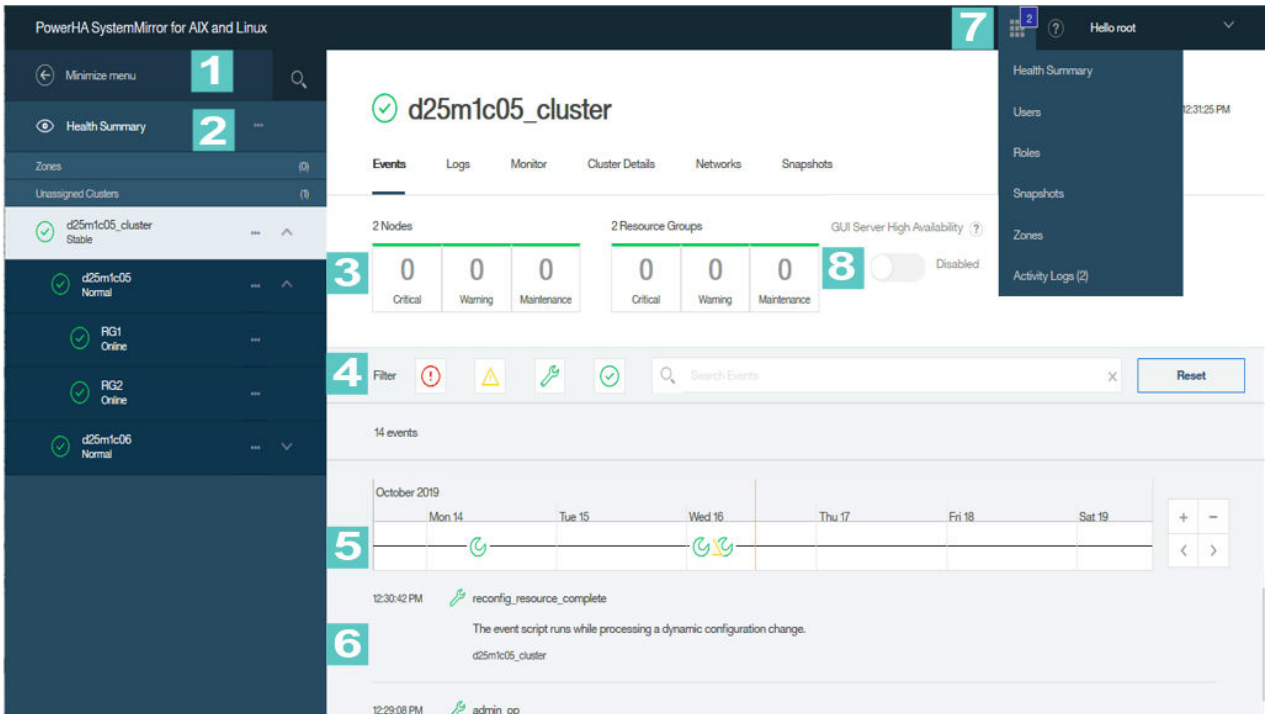
Figure 1. Health summary

1 Navigation pane

This area displays all the zones, clusters, sites, nodes, and resource groups in a hierarchy that was discovered by the PowerHA SystemMirror GUI. You can click to view resources for each cluster.

Note: The clusters are displayed in alphabetic order. However, any clusters that are in a **Critical** or **Warning** state are listed at the start of the list.

2 Health Summary

This menu provides cluster administrative features for the selected item. You can create a cluster, add an existing cluster, remove an existing cluster, import multiple clusters, or create a zone from the

●●● **Health Summary** menu.

3 Scoreboard

This area displays the number of zones, clusters, nodes, and resource groups that are in **Critical**, **Warning**, or **Maintenance** state. You can click **Critical**, **Warning**, or **Maintenance** to view all the messages for a specified resource. For example, in Figure 1, there are 2 resource groups identified. If the warning icon was highlighted and you clicked the warning icon, all messages (critical, warning, and normal) for the 2 resource groups would be displayed.

4 Event filter

In this area, you can click the icons to display all events in your environment that correspond to a specific state. You can also search for specific event names.

5 Event timeline

This area displays events across a timeline of when the event occurred. This area allows you to view the progression of events that lead to a problem. You can zoom in and out of the time range by using the + or – keys or by using the mouse scroll wheel.

6 **Event list**

This area displays the name of the event, the time when each event occurred, and a description of the event. The information that is displayed in this area corresponds to the events you selected from the event timeline area. The most recent event that occurred is displayed first. You can click this area to display more detailed information about the event such as possible causes and suggested actions.

7 **Actions Menu**

This area displays the following menus options:

Users

PowerHA SystemMirror GUI allows an admin to create and manage users by using **Users** menu. The admin can assign built-in roles to new users.

Note: You can only add user names that are defined on the host running the PowerHA SystemMirror GUI server.

Roles

The **Roles** tab displays information about available roles for each user. An admin can create custom roles and provide permission to different users. PowerHA SystemMirror GUI provides the following roles:

- **ha_root**
- **ha_mon**
- **ha_op**
- **ha_admin**

Snapshots

A snapshot is a backup of a cluster's configuration at a particular point in time. You can create snapshots and restore the existing cluster configuration as taken in the snapshot. You can also edit existing snapshot and view details of the snapshot based on different filter options available.

Zones

You can create zones, which are groups of clusters. An admin can create zones and assign any number of clusters to a zone. You can also add new zones or edit existing zones.

Activity Logs

You can view information about all activities performed in the PowerHA SystemMirror GUI that resulted in a change by using the **Activity Logs** tab. This view provides various filters to search for specific activities for the cluster, roles, zone, or user management changes.

8 **GUI Server High Availability**

You can configure the PowerHA SystemMirror GUI server to make it highly available within the cluster by setting the **GUI Server High Availability** option to **Enabled**.

Importing multiple clusters

In PowerHA SystemMirror Version 7.2.4, or later, you can add multiple clusters to the PowerHA SystemMirror GUI at a time by importing a template file that contains details about the cluster. Adding large number of clusters in a single operation not only simplifies the task but also saves time.

The template file is in the comma-separated value (CSV) file format. An example template file follows.

```
DEFAULT LOGIN ID, DEFAULT PASSWORD/SSH KEY
<UserName>,<Password>
IP ADDRESS/HOSTNAME,USERNAME,PASSWORD,ZONE
<IP Address/Hostname>,<UserName>,<Password>,<ZoneName>
<IP Address/Hostname>,<UserName>,<Password>,<ZoneName>
<IP Address/Hostname>,<UserName>,<Password>,<ZoneName>
```

You can edit the template file by using WordPad text editor or a spreadsheet tool. Ensure that you save the file in the plain-text CSV format after you make any changes.

You can specify a hostname or the IP address for one node of each cluster that you want to import into the PowerHA SystemMirror GUI.

You must specify the user ID and the corresponding password that is used for Secure Shell (SSH) authentication on that cluster node. The user ID that you specify must have the `root` authority to add clusters. To add clusters as a non-root user, a `root` user must configure the **sudo** command to be used on one of the nodes in the cluster. For more information about how to configure the **sudo** command, see "Using the PowerHA SystemMirror GUI with non-root users" on page 19.

Users can use an SSH password or a public SSH key for authentication of their user ID. Ensure that the SSH key is contained within a single cell. The SSH key must not span across multiple cells. An SSH key that requires a passphrase is not supported. Only RSA keys are supported.

If the login credentials for all your clusters is the same, you can set the login credentials for all your clusters by specifying the login credentials in the `DEFAULT LOGIN ID, DEFAULT PASSWORD/SSH KEY` line of the template. Also, if you want to use the default credentials, you can specify the login credentials in the `DEFAULT LOGIN ID, DEFAULT PASSWORD/SSH KEY` line of the template. For example, to add all clusters as a `root` user, you can enter `root` in the default user name field. The default credentials can be overridden by specifying a different user name, password, or SSH key for the hostname in the subsequent rows.

Specifying cluster zones are optional. If you specify a cluster zone and if that cluster zone does not exist, the cluster zone is automatically created when you import clusters. If the cluster zone that you specified already exits, the cluster is imported and added to the cluster zone. If you do not specify a cluster zone, the cluster is added to the **Unassigned clusters** list. The unassigned clusters are visible to all PowerHA SystemMirror GUI users with the *ha_mon* role. Users must have the required privileges to perform operation on these clusters. For more information about roles and privileges, see "Adding users and assigning roles " on page 17.

To import multiple clusters to the PowerHA SystemMirror GUI, perform the following steps:

1. On the navigation pane, click ••• corresponding to **Health Summary**.
2. Click **Add Multiple Clusters**.
3. Download and update the template file to add information about each cluster that you want to import.
4. Upload the template file and click **Continue** to add clusters.

   If you want to download the detailed information about clusters that could not be added, click **Export as Excel**.

Cluster zones

PowerHA SystemMirror Version 7.2.2, or later, supports the concepts of cluster zones. Cluster zones can be used to organize clusters in a variety of ways. For example, you might create a zone for all your production clusters, another zone for development clusters, and another zone for test clusters. You can also organize zones based on the geographical location of the clusters, such as clusters located in New York City and clusters located in Boston. Cluster zones can be organized by various application such as DB2 Clusters, WebSphere Clusters, or cluster zones can also be organized by customer name.

Zone management

A group of clusters form a zone. An administrator can create different zones and assign any number of clusters to a zone. However, one cluster cannot be member of multiple zones. By creating a zone, an administrator can restrict the user from accessing a specific group of clusters.

You can also provide access to users for specific zones. If you do not add a user to a zone, that user cannot view clusters that are associated with the zone.

Note: If a cluster is not assigned to any zone, it will be displayed as **Unassigned Cluster** and it will be accessible to all PowerHA SystemMirror GUI users.

To create a zone by using the PowerHA SystemMirror GUI, complete the following steps:

1. Click the ⊞ icon.

2. Select **Zones**.

3. Click **Add zone** and complete all the required information.

4. Click **Continue**.

5. Select a cluster from the list and click **Continue**.

6. Assign a user from the list and click **Save**.

Related information

Adding users and assigning roles
You can create users in the PowerHA SystemMirror graphical user interface (GUI) and use the Role-Based Access Control (RBAC) system to assign elevated privileges to the users.

Log files

PowerHA SystemMirror GUI provides the option to view log information about all files in a cluster.

Log files

To easily compare and identify log files that are displayed in the PowerHA SystemMirror GUI, the log files correspond to a particular color. For example, in the following figure all the log files for the hacmp.out file are displayed in a blue color and all the log files for the cluster.log file are displayed in a yellow color.

The following figure identifies the different areas of the PowerHA SystemMirror GUI that are used to view log files:
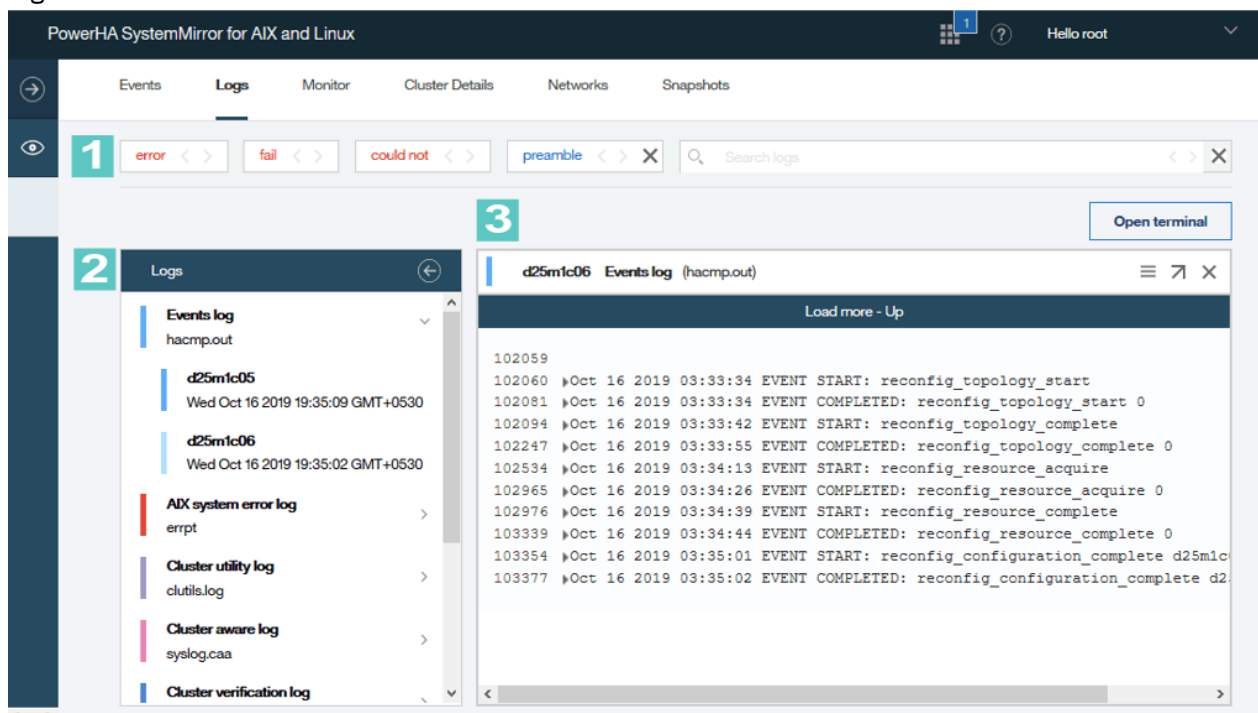

Figure 2. Log files

1   **Search terms**
You can click the following predefined search terms to locate the specified term in the log file:

- error
- fail
- could not

You can click the < and > arrows to move to the previous and next instance of the search term in the selected log file. You can also enter your own search term and create a user-defined search term. A user-defined search term functions similar to the predefined search terms. For example, in the preceding figure, **preamble** is a user-defined search term.

2 **Log file selection**

You can view the following log files from the PowerHA SystemMirror GUI:

- hacmp.out
- errpt
- clutils.log
- clverify.log
- autoverify.log
- clstrmgr.debug
- cluster.log

Note: All of the log files, including the most current and the oldest, are merged together to create a single large log file. For example, when you view the **hacmp.out** log file you are able to view the hacmp.out.1, hacmp.out.2, and hacmp.out.3 log files as a single log file instead of three separate log files.

3 **Log file viewer**

In this area, you can view the log file information. To easily locate important information in the log files, the scripts are located within collapsed sections in the log files. You can expand sections within the log file to view more detailed scripts. You can also open the log file in a separate browser window by clicking the icon.

To view log files of a specific cluster, from the navigation menu, select a cluster. In the details view, click **Logs**.

Activity logs

The PowerHA SystemMirror GUI records all change-related information in the GUI database. The **Activity Logs** tab provides a quick and easy way to view that information. Various filtering options are provided to help find specific historical information about changes that are made to clusters, resource groups, roles, zones, and user accounts. An option to download the **Activity Logs** is provided. You can also export the downloaded **Activity Logs** into a comma-separated values (CSV) file.

Troubleshooting PowerHA SystemMirror GUI

You can view log files to help you troubleshoot PowerHA SystemMirror GUI.

The information in this section is only a reference guide for different techniques and log files you might be able to use to troubleshoot problems with thePowerHA SystemMirror GUI. You must contact IBM support if you are uncertain about the information here or how to solve your problem.

Log files

You can use the following log files to troubleshoot PowerHA SystemMirror GUI:

smui-server.log

This log file is located in the `/usr/es/sbin/cluster/ui/server/logs/` directory. The smui-server.log file contains information about the PowerHA SystemMirror GUI server.

smui-agent.log

This log file is located in the `/usr/es/sbin/cluster/ui/agent/logs/` directory. The smui-agent.log file contains information about the agent that is installed on each PowerHA SystemMirror node.

notify-event.log

This log file is located in the `/usr/es/sbin/cluster/ui/agent/logs/` directory. The notify-event.log file contains information about all PowerHA SystemMirror events that are sent from the agent to the PowerHA SystemMirror server.

Problems logging in to PowerHA SystemMirror GUI

If you are experiencing problems in logging in to the PowerHA SystemMirror GUI, complete the following steps:

1. Check for issues in the `/usr/es/sbin/cluster/ui/server/logs/smui-server.log` file.

2. Verify that the **smuiauth** command is installed correctly. Also, verify that the **smuiauth** command has the correct permissions by running the **ls -l** command from the `/usr/es/sbin/cluster/ui/server/node_modules/smui-server/lib/auth/smuiauth` directory. An output that is similar to the following example is displayed when you run the **ls -l** command:

   ```
   -r-x------    1 root     system        21183 Aug 31     21:48
   ```

3. Verify that you can run the **smuiauth** command by running the **smuiauth -h** command.

4. Verify that the pluggable authentication module (PAM) framework is configured correctly by locating the following lines in the `/etc/pam.conf` file:

   Note: The PAM configuration occurs when you install the `cluster.es.smui.server` file set.

   ```
   smuiauth        auth      required     pam_aix
   smuiauth        account   required     pam_aix
   ```

Problem adding clusters to the PowerHA SystemMirror GUI

If you are not able to add clusters to the PowerHA SystemMirror GUI, complete the following steps:

1. Check for issues in the `/usr/es/sbin/cluster/ui/server/logs/smui-server.log` file.

   a. If SFTP-related signatures exist in the log file, such as `Received exit code 127 while establishing SFTP session`, a problem exists with the SSH communication between the PowerHA SystemMirror GUI server and the cluster you are trying to add.

   b. From the command line, verify that you can connect to the target system by using SSH File Transfer Protocol (SFTP). If you cannot connect, verify that the daemon is running on the PowerHA SystemMirror GUI server and the target node by running the **ps -ef | grep -w sshd | grep -v grep** command. You can also check the SFTP subsystem configuration in the `/etc/ssh/sshd_config` file and verify that following path is correct:

   ```
   Subsystem       sftp    /usr/sbin/sftp-server
   ```

   If the path is not correct, you must enter the correct path in the `/etc/ssh/sshd_config` file, and then restart the `sshd` subsystem.

2. Check for issues in the `/usr/es/sbin/cluster/ui/agent/logs/agent_deploy.log` file on the target cluster.

3. Check for issues in the `/usr/es/sbin/cluster/ui/agent/logs/agent_distribution.log` file on the target cluster.

PowerHA SystemMirror GUI does not update cluster status

If PowerHA SystemMirror GUI does not update the cluster status or does not display new events, or if the cluster displays data gathering error or displays communication error when you discover the cluster in the PowerHA SystemMirror GUI, complete the following steps:

1. Check for the certificate error in the following log files:

    ```
    /usr/es/sbin/cluster/ui/server/logs/smui-server.log
    /usr/es/sbin/cluster/ui/agent/logs/smui-agent.log
    ```

    If a certificate error is written to the log file, it indicates that the certificate on the target cluster and the certificate on the server do not match. A certificate error in the log file might be similar to the following example:

    ```
    WebSocket server - Agent authentication failed, remoteAddress:::ffff:10.40.20.186,
    Reason:SELF_SIGNED_CERT_IN_CHAIN
    ```

2. Resolve the certificate error by regenerating security files on the server node. To regenerate security files, run the following script:

    ```
    /usr/es/sbin/cluster/ui/server/node_modules/smui-server/resources/makesec.ksh -f
    ```

    Note: If you regenerate security files, communication problems might occur in clusters that are discovered in the PowerHA SystemMirror GUI.

3. Restart the server and discover clusters again in the PowerHA SystemMirror GUI. This operation also resolves the communication problem in the cluster.

Migrating the PowerHA SystemMirror GUI database

See Migrating the PowerHA SystemMirror GUI database.

Related concepts

Installing PowerHA SystemMirror GUI
The PowerHA SystemMirror GUI filesets are located on the PowerHA SystemMirror Version 7.2 for AIX, or later, media.

Configuring the PowerHA SystemMirror GUI

Use this information to learn how to use Role-Based Access Control (RBAC), change the default location of log files, and change ports for the PowerHA SystemMirror GUI.

Adding users and assigning roles

You can create users in the PowerHA SystemMirror graphical user interface (GUI) and use the Role-Based Access Control (RBAC) system to assign elevated privileges to the users.

Defining users

In PowerHA SystemMirror GUI, you can create and manage users by clicking **Actions** > **Users**.

Note: Users that are defined in the PowerHA SystemMirror GUI map to user accounts that are defined on the host running the PowerHA SystemMirror GUI server. The login ID of a PowerHA SystemMirror GUI user must match the login ID on the PowerHA SystemMirror GUI server host. If a user is defined in the PowerHA SystemMirror GUI and if the user ID does not have a matching login ID on the PowerHA SystemMirror GUI server host, the user cannot log in to the PowerHA SystemMirror GUI.

After you define users, you can restrict their access to the clusters that are managed within the PowerHA SystemMirror GUI by using clusters zones. Cluster zones provide a method to limit the scope of a user and can be used to implement multi-tenancy. For more information about cluster zone, see "Cluster zones" on page 13.

By default, all users that are defined on the PowerHA SystemMirror GUI server host are allowed to log in to the PowerHA SystemMirror GUI. However, you can restrict specific users from logging into the PowerHA SystemMirror GUI, by changing the configuration file of the PowerHA SystemMirror GUI server. By default, the monitor role *ha_mon* is assigned automatically to a user who logs in to the PowerHA SystemMirror GUI. Elevated privileges and capabilities can be assigned to users that are explicitly defined in the PowerHA SystemMirror GUI by using the predefined roles.

Role-based access control

In PowerHA SystemMirror 7.2.2, or later, the PowerHA SystemMirror GUI has a built-in Role-Based Access Control (RBAC) system that is independent from the AIX operating system RBAC system and it is also easy to access.

Roles

The permission system of the GUI is based on roles. Permissions are allocated to a role and then the role is allocated to one or more users. A user with no role is assigned a default role with view-only monitoring capabilities. The permission system of the GUI is based on roles. Permissions are allocated to a role and then the role is allocated to one or more users.

The PowerHA GUI provides the following predefined roles:

ha_root
>   Users with this role can access every zone that is defined in the GUI without any restrictions. This role is equivalent to the *root* access. When you log in as the `root` user, you are granted `ha_root` permissions.
>
>   **Note:** This role can be used while setting up the GUI, which includes setting up user access and creating zones (if zones will be used).

ha_admin
>   In this role, you are an administrator and can perform all actions except defining users and zones.

ha_op
>   The *ha_op*, or operator, role can access only a subset of cluster management capabilities such as starting and stopping cluster services, starting and stopping resource groups, moving resource groups to another node, creating snapshots, and performing cluster verification.

ha_mon
>   The *ha_mon*, or monitor, role is the default role that is assigned automatically to a user that logs in to the GUI as a non-root user without being added to the GUI's user list.
>
>   **Note:** In this role, you cannot perform any actions on a cluster and you have view-only access. If the users log in that do not have a user account created for them in the GUI, they will not be granted access to any of the zones and they are able to see unassigned clusters only (clusters that are not assigned to any zones)

All *non-ha_root* users might only access to zones that they have been assigned to by an *ha_root* user. They can also access clusters that are not assigned to any zones.

Note: Custom roles can be defined when none of the pre-defined roles are suitable for your needs.

Related concepts
Using the PowerHA SystemMirror GUI with non-root users
The PowerHA SystemMirror graphical user interface (GUI) uses encrypted communication to monitor and to manage clusters through a PowerHA SystemMirror GUI agent. The PowerHA SystemMirror GUI agent is configured and started when a cluster is added to the PowerHA SystemMirror GUI.

Related reference
Cluster zones
PowerHA SystemMirror Version 7.2.2, or later, supports the concepts of cluster zones. Cluster zones can be used to organize clusters in a variety of ways. For example, you might create a zone for all your production clusters, another zone for development clusters, and another zone for test clusters. You can

also organize zones based on the geographical location of the clusters, such as clusters located in New York City and clusters located in Boston. Cluster zones can be organized by various application such as DB2 Clusters, WebSphere Clusters, or cluster zones can also be organized by customer name.

Using the PowerHA SystemMirror GUI with non-root users

The PowerHA SystemMirror graphical user interface (GUI) uses encrypted communication to monitor and to manage clusters through a PowerHA SystemMirror GUI agent. The PowerHA SystemMirror GUI agent is configured and started when a cluster is added to the PowerHA SystemMirror GUI.

Before a cluster is added to the PowerHA SystemMirror GUI, PowerHA SystemMirror uses Secure Shell (SSH) for secure remote communication.

The following tasks use SSH and you must have the `root` authority to perform the following tasks:

- Add an existing cluster to the PowerHA SystemMirror GUI. This feature is available in PowerHA SystemMirror Version 7.2.3, or later.
- Create a cluster that is automatically added to the PowerHA SystemMirror GUI. This feature is available in PowerHA SystemMirror Version 7.2.4, or later.
- Clone a cluster from a snapshot and add the cluster to the PowerHA SystemMirror GUI. This feature is available in PowerHA SystemMirror Version 7.2.4, or later.

A non-root user must be provided `root` authority to perform these tasks. A `root` user must use the **sudo** command to provide root access to a non-root user. The **sudo** command must be preconfigured to allow the specific commands to be run as `root` user.

Note: After the PowerHA SystemMirror GUI agent is started, the communication switches from SSH to the PowerHA SystemMirror GUI agent. The PowerHA SystemMirror GUI agent provides the necessary authority to perform the specific tasks.

To use the **sudo** command, you must install the following RPMs from the AIX Toolbox for Linux® Applications website:

- cyrus-sasl
- db
- gettext
- libgcc
- ncurses
- openldap
- sudo
- zlib

A root user must complete the following steps to configure the **sudo** command to create a user login, and to provide the created user the ability to discover clusters:

1. Run the **visudo** command or directly edit the /etc/sudoers file with a text editor.
2. If you are using PowerHA SystemMirror Version 7.2.4 for AIX, or earlier, add the following text that corresponds to your operating system to the end of the /etc/sudoers file:

```
User_Alias      POWERHA_GUI_USERS = user1,user2,user3,user4
Cmnd_Alias      POWERHA_GUI_CMDS  = /usr/es/sbin/cluster/utilities/clmgr -v query nodes, \
                        /usr/es/sbin/cluster/utilities/clmgr list hosts TYPE=$TYPE, \
                        /usr/es/sbin/cluster/utilities/clmgr -g SMUI list physical_volume NODES=$NODES, \
                        /usr/es/sbin/cluster/utilities/clmgr query cluster, \
                        /usr/es/sbin/cluster/utilities/clmgr -T $ACTIVITY_ID add cluster $NAME NODES=$NODES TYPE=$TYPE REPOSITORIES=$DISKS,
\
                        /usr/es/sbin/cluster/utilities/clmgr -T $ACTIVITY_ID add cluster $NAME NODES=$NODES TYPE=$TYPE, \
                        /usr/es/sbin/cluster/utilities/clmgr -T $ACTIVITY_ID add site $NAME NODES=$NODES, \
                        /usr/es/sbin/cluster/utilities/clmgr -T $ACTIVITY_ID add repository $DISK SITE=$SITE, \
                        /usr/es/sbin/cluster/utilities/clmgr -T $ACTIVITY_ID add repository $DISK NODE=$NODE, \
                        /usr/es/sbin/cluster/utilities/clmgr -T $ACTIVITY_ID manage snapshot $SNAPSHOT_NAME restore
NODES=$NODES REPOSITORIES=$DISKS CLUSTER_NAME=$NAME CONFIGURE=$CONFIGURE FORCE=$FORCE, \
                        /usr/es/sbin/cluster/utilities/clmgr -T $ACTIVITY_ID modify node $NODE name=$NAME, \
                        /bin/mkdir -p /usr/es/sbin/cluster/ui/security, \
                        /bin/tar -xf /tmp/smui-security.tar, \
                        /bin/ksh93 ./deployment.sh,/bin/ksh93 ./distribute.sh, \
                        /bin/rm -f ./deployment.sh ./distribute.sh ./configuration-agent.json ./smui-security.tar
POWERHA_GUI_USERS ALL= NOPASSWD:SETENV: POWERHA_GUI_CMDS
```

3. If you are using PowerHA SystemMirror Version 7.2.5 for AIX, or earlier, add the following text that corresponds to your operating system to the end of the /etc/sudoers file:

```
User_Alias      POWERHA_GUI_USERS   = User1, User2, User3
Cmnd_Alias      POWERHA_GUI_CMDS    = /usr/es/sbin/cluster/utilities/clmgr -v query nodes, \
                                      /usr/es/sbin/cluster/utilities/clmgr list hosts TYPE=$TYPE, \
                                      /usr/es/sbin/cluster/utilities/clmgr -g SMUI list physical_volume NODES=$NODES, \
                                      /usr/es/sbin/cluster/utilities/clmgr query cluster, \
                                      /usr/es/sbin/cluster/utilities/clmgr -v query physical_volume NODES=$NODES TYPE=all, \
                                      /usr/es/sbin/cluster/utilities/clmgr -T $ACTIVITY_ID add cluster $NAME NODES=$NODES
                                       TYPE=$TYPE REPOSITORIES=$DISKS, \
                                      /usr/es/sbin/cluster/utilities/clmgr -T $ACTIVITY_ID add cluster $NAME NODES=$NODES TYPE=$TYPE, \
                                      /usr/es/sbin/cluster/utilities/clmgr -T $ACTIVITY_ID add site $NAME NODES=$NODES, \
                                      /usr/es/sbin/cluster/utilities/clmgr -T $ACTIVITY_ID add repository $DISK SITE=$SITE, \
                                      /usr/es/sbin/cluster/utilities/clmgr -T $ACTIVITY_ID add repository $DISK NODE=$NODE, \
                                      /usr/es/sbin/cluster/utilities/clmgr -T $ACTIVITY_ID manage snapshot restore $SNAPSHOT_NAME
                                      NODES=$NODES REPOSITORIES=$DISKS CLUSTER_NAME=$NAME CONFIGURE=$CONFIGURE FORCE=$FORCE, \
                                      /usr/es/sbin/cluster/utilities/clmgr -T $ACTIVITY_ID modify node $NODE name=$NAME, \
                                      /bin/mkdir -p /usr/es/sbin/cluster/ui/security, \
                                      /usr/es/sbin/cluster/utilities/clmgr -v query interface ATTR=public, \
                                      /bin/tar -xf /tmp/smui-security.tar, /bin/ls, /usr/bin/uname, \
                                      /bin/ksh93 ./deployment.sh,/bin/ksh93 ./distribute.sh, \
                                      /usr/es/sbin/cluster/glvm/utils/cl_glvm_configuration -p $vgName -n $remoteNodes, \
                                      /bin/rm -f ./deployment.sh ./distribute.sh ./configuration-agent.json ./smui-security.tar
                                      ./server-auth.key ./create_user_and_group.sh

POWERHA_GUI_USERS ALL= NOPASSWD:SETENV: POWERHA_GUI_CMDS
```

4. Create a user login and password.

5. Add the login ID of the user to the /etc/sudoers configuration file that was represented as the user user1 in step 2.

Related information

Adding users and assigning roles
You can create users in the PowerHA SystemMirror graphical user interface (GUI) and use the Role-Based Access Control (RBAC) system to assign elevated privileges to the users.

Configuring the PowerHA SystemMirror GUI server to be highly available

You can configure PowerHA SystemMirror GUI server to be highly available either by using the **Enable the GUI Server for High Availability** wizard for the PowerHA SystemMirror GUI server or by using the PowerHA SystemMirror command line interface(CLI).

Configuring the PowerHA SystemMirror GUI server to be highly available by using the PowerHA SystemMirror GUI

In PowerHA SystemMirror Version 7.2.4, or later, you can use the **GUI Server High Availability** option that is available in the cluster view of the PowerHA SystemMirror GUI to enable or to disable the high availability of the PowerHA SystemMirror GUI server.

Before you enable the PowerHA SystemMirror GUI server for high availability, ensure that the server file set of the PowerHA SystemMirror GUI is installed on all nodes of the cluster. After you install the server file set, run the **smuiinst.ksh** command on all nodes of the cluster to complete the installation process. Because the PowerHA SystemMirror GUI server must run only on one node, stop the PowerHA SystemMirror GUI server on other agent nodes by running the following command:

```
stopsrc -cs phauiserver
```

For more information about installing the PowerHA SystemMirror GUI server file set, see Installing PowerHA SystemMirror GUI. The cluster must be in an online state and stable, or in an offline state.

When you set the **GUI Server High Availability** option to **Enabled**, the **Enable the GUI Server for High Availability** wizard for the PowerHA SystemMirror GUI server is displayed. You must specify the volume group that must be used for shared storage, the service IP address to access to the PowerHA SystemMirror GUI server, and network on which the service IP address must be configured to make the PowerHA SystemMirror GUI server highly available. The volume group that you specify must be created before you enable the PowerHA SystemMirror GUI server for high availability. You cannot assign the volume group that is created by using the PowerHA SystemMirror GUI because the volume group is already assigned to a resource group. You can create the volume group by using SMIT or by running the **clmgr** command. Create the volume group across all the cluster nodes and ensure that the volume group is not assigned to any resource group.

Configuring the PowerHA SystemMirror GUI server to be highly available by using the command line interface

In PowerHA SystemMirror Version 7.2.3, or later, you can run the `/usr/es/sbin/cluster/ui/server/bin/server_high_availability.sh` script to make the PowerHA SystemMirror GUI server highly available.

To make the PowerHA SystemMirror GUI server highly available, enter the following command:

```
server_high_availability.sh <Volume_Group> <Service_IP> <Network> [<Netmask>]
```

After you run the `/usr/es/sbin/cluster/ui/server/bin/server_high_availability.sh` script, the PowerHA SystemMirror GUI server functions similar to any other application that PowerHA SystemMirror monitors. For example, you can start or stop the PowerHA SystemMirror GUI server by using the **clmgr** command or by using the SMIT interface. The PowerHA SystemMirror GUI server can be moved to another cluster node, and if a failure occurs, the PowerHA SystemMirror GUI server can failover to another cluster node automatically.

The `server_high_availability.sh` script creates the following objects:

- Resource group that is named pha_gui_server_rg
- Service IP address
- File system that is created in the `/opt/pha_gui_fs` directory
- Application controller that is named pha_gui_server_app
- Application monitor that is named pha_gui_server_mon

Note: Do not change names and the location of the objects the `server_high_availability.sh` script creates. If you want to remove objects that are created, run the `server_high_availability.sh --remove` script.

When you run the `server_high_availability.sh` script, the following actions occur in your environment:

- The server database is copied to the new shared file system.
- The security files in the GUI server that runs the script is copied to the remote server node. This process overwrites any existing security files on the remote server node.

Changing the default location of log files

When a GUI server or agent is initially setup, it creates a set of log files. These log files are created in the `/usr` file system by default. You can use the configuration file of the PowerHA SystemMirror GUI server and the PowerHA SystemMirror GUI agent to change this default location and to customize the method of logging.

The PowerHA SystemMirror GUI server and the PowerHA SystemMirror GUI agent have the following configuration files:

- PowerHA SystemMirror GUI Server: `/usr/es/sbin/cluster/ui/server/log-configuration.json`
- PowerHA SystemMirror GUI Agent: `/usr/es/sbin/cluster/ui/agent/log-configuration.json`

These files can be edited manually, but you must restart the service for the new configuration to take effect. To restart the GUI server and GUI agent use the following commands:

- For PowerHA SystemMirror GUI Server: **stopsrc -cs phauiserver; sleep 11; startsrc -s phauiserver**
- For PowerHA SystemMirror GUI Agent: **stopsrc -cs phauiagent; sleep 11; startsrc -s phauiagent**

An example of the log configuration follows:

```
"logLevel": "info", // Log level. Verbose mode levels: silly, debug, verbose, info, warn, error
```

```
"logDir": "logs", // log directory.
```
The location of log files (absolute path or relative to the current working directory of the process)

```
"maxSizeFile": 5242880, // Maximum size of the logfile.
```
If the size of the log file exceeds, a new file is created.

```
"maxFiles": 7, // Limit the number of files created when the size of the logfile exceeds.
```

```
"consoleEnabled": false, // Enable the log display on console (In addition to the log file).
```

```
"fileEnabled": true, // Enable the daily rotating File logging
```

```
"filename": "smui-agent.log" // filename of the rotating logfile
```

Notes:

- Before you modify the configuration files, ensure that you back up the files.
- All non-numeric values in the configuration file must be enclosed in double quotation marks ("), except for the Boolean values, `true` and `false`.

Changing ports

The PowerHA SystemMirror GUI uses ports to facilitate remote communication. The GUI server uses port 8080 to allow remote browsers to connect to it. The GUI agent uses port 8081 to allow the server to communicate with it. If these ports are not compatible with your firewall configuration, they might be changed.

The PowerHA SystemMirror GUI server and the PowerHA SystemMirror GUI agent have the following configuration files:

- GUI Server: `/usr/es/sbin/cluster/ui/server/configuration-server.json`
- GUI Agent: `/usr/es/sbin/cluster/ui/agent/configuration-agent.json`

The configuration files of the PowerHA SystemMirror GUI server and the PowerHA SystemMirror GUI agent can be manually edited to change the default ports. An example port number section of the GUI server configuration file follows:

```
"port": 8080, // Server port
```

```
"agentPort": 8081, // Port of the agent
```

To change the port number of the PowerHA SystemMirror server, you must change the *port* setting. To change the port number of the PowerHA SystemMirror agent, you must change the *agentPort* setting. If you change a port setting in the server configuration file, you must to update the agent configuration file on every node in each cluster that is being managed by that server. The current, remote GUI agents listen on the original port number. Similarly, if you change the port number of the GUI server, the GUI agents are not aware of the change and the GUI agents try to connect on the old port number. Therefore, you must make similar changes in every agent configuration file.

An example port number section of the GUI agent configuration file follows:

```
 "serverURI": "https://172.19.67.11:8080/", // Smui-App URI
 "port": 8081, // Server port
```

If the configuration file of the GUI server is modified to use a new port number for the GUI agent, the port property in the configuration file of every GUI agent must be updated to match the new value. If the port number of the GUI server is changed, the *serverURI* property of each GUI agent must be updated to specify the new port number. For example, if cluster XYZ has strict firewall rules that do not allow port number 8080 to be used in the data center, and if the network team allows the use of port number 1234, then perform the following steps:

Notes:

- Before you modify the configuration files, ensure that you back up the files.

- All non-numeric values in the configuration file must be enclosed in double quotation marks ("), except for the Boolean values, `true` and `false`.

1. In the `configuration-agent.json` file, change the *port* setting in the range 8080 - 1234 and then restart the server by using the following command:

   GUI Server: `stopsrc -cs phauiserver; sleep 11; startsrc -s phauiserver`

2. On every node that is running a GUI agent, change the `serverURI` in the `configuration-agent.json` file from `"serverURI": "https://172.19.67.11:8080/"`, to `"serverURI": "https://172.19.67.11:1234/"`, and then restart the GUI agent.

   When these files are updated, both the GUI server and the GUI agent must be restarted for the new configuration changes to take effect. To restart the GUI agent, run the following command:

   ```
   stopsrc -cs phauiagent; sleep 11; startsrc -s phauiagent
   ```

Limiting access to the PowerHA SystemMirror GUI

In PowerHA SystemMirror Version 7.2.4, or later, you can increase security of the PowerHA SystemMirror GUI by restricting users access to PowerHA SystemMirror GUI and by preventing anonymous login.

To prevent anonymous login operations and to restrict user access to the PowerHA SystemMirror GUI, you must manually modify the server configuration file, `/usr/es/sbin/cluster/ui/server/configuration-server.json`, on the PowerHA SystemMirror GUI server host.

Notes:

- Before you modify the server configuration file, ensure that you back up the file.
- All non-numeric values in the configuration file must be enclosed in double quotation marks ("), except for the Boolean values, `true` and `false`.

Restricting user access to the PowerHA SystemMirror GUI

When the PowerHA SystemMirror GUI server or a PowerHA SystemMirror GUI agent is initially set up, any users, who are defined on the GUI server host, can log in to the PowerHA SystemMirror GUI with only monitoring capabilities.

To allow access to users that are explicitly defined in the PowerHA SystemMirror GUI, set the value of the `permitAllSystemUsers` property to `"no"` in the server configuration file. The default value for the `permitAllSystemUsers` property is `"yes"` to preserve compatibility with earlier versions.

Preventing anonymous login

Anonymous login operation is permitted for `root` users. Anonymous users are tagged as `root` in the PowerHA SystemMirror activity log file. The activity log file does not display the identity of the user and hence the login information is anonymous.

Note: The `permitRootLogin` feature is available in PowerHA SystemMirror Version 7.2.4, or later.

To ensure that a login ID maps to a specific user in PowerHA SystemMirror GUI and to prevent anonymous `root` login to the PowerHA SystemMirror GUI, set the value of the `permitRootLogin` property to `"no"` in the server configuration file. When you set the property to no, a `root` user cannot log in to the PowerHA SystemMirror GUI. The default value for the `permitRootLogin` property is `"yes"` to preserve compatibility with earlier versions and to allow initial setup of the PowerHA SystemMirror GUI.

Note: If you block the `root` user, ensure that at least one user is defined with the `ha_root` role. If no users have the `ha_root` role, PowerHA SystemMirror ignores the `permitRootLogin="no"` setting, and permits the `root` user to log in to the PowerHA SystemMirror GUI until a user with the `ha_root` role is defined.

After you modify the server configuration file, you must restart the PowerHA SystemMirror GUI server for the new configuration to take effect. To restart the PowerHA SystemMirror GUI server and the PowerHA SystemMirror GUI agent, enter the following command:

```
stopsrc -cs phauiserver; sleep 11; startsrc -s phauiserver
```

Restricting the use of IP addresses in the PowerHA SystemMirror GUI

By default, the PowerHA SystemMirror GUI server uses the IP address that is associated with the **hostname** command. However, in PowerHA SystemMirror Version 7.2.3, or later, you can specify a different IP address that is used by the PowerHA SystemMirror graphical user interface (GUI) to communicate with the PowerHA SystemMirror GUI server.

You must manually modify the `/usr/es/sbin/cluster/ui/server/configuration-server.json` configuration file on the server host to specify a different IP address.

Notes:

- Ensure that you back up the `/usr/es/sbin/cluster/ui/server/configuration-server.json` configuration file before you modify the configuration file.
- All non-numeric values in the configuration file must be enclosed in double quotation marks ("), except for the Boolean values, `true` and `false`.

When a cluster is added to the PowerHA SystemMirror GUI server for monitoring and management, the PowerHA SystemMirror GUI agents that are installed on each cluster node are configured and started. The configuration process sends the PowerHA SystemMirror GUI agent configuration file, `configuration-agent.json`, to each cluster node. The PowerHA SystemMirror GUI agent configuration file is created dynamically on the PowerHA SystemMirror GUI server at run time. The PowerHA SystemMirror GUI agent configuration file contains the IP address and port number that are used by the PowerHA SystemMirror GUI agent to communicate with the PowerHA SystemMirror GUI server.

If you want to use a different IP address for the PowerHA SystemMirror GUI server communication, in the server configuration file, `/usr/es/sbin/cluster/ui/server/configuration-server.json`, specify the new IP address in the `serverAddress` property.

After you modify the server configuration file, you must restart the PowerHA SystemMirror GUI server for the new configuration to take effect. To restart the PowerHA SystemMirror GUI server and the PowerHA SystemMirror GUI agent, enter the following command:

```
stopsrc -cs phauiserver; sleep 11; startsrc -s phauiserver
```

The specified IP address is used only for those clusters that are added to the PowerHA SystemMirror GUI after you updated the IP address in the `serverAddress` property. If PowerHA SystemMirror GUI is already managing clusters and if you want these clusters to switch to the new IP address, you must either remove all your clusters from the PowerHA SystemMirror GUI and add them again, or you must manually update the PowerHA SystemMirror GUI agent configuration file on each node for every cluster.

Removing existing clusters and adding them again

To remove the existing clusters and to add them again, perform the following steps:

1. Remove clusters that are already managed by PowerHA SystemMirror GUI.

    a. On the navigation pane, click ••• corresponding to **Health Summary**.
    b. Click **Remove Clusters**.
    c. Select the cluster that you want to remove.
    d. Click **Remove**.

2. Add the clusters back to the PowerHA SystemMirror GUI.

    - If you want to add few clusters, perform the following steps:

        a. On the navigation pane, click ••• corresponding to **Health Summary**.
        b. Click **Add an Existing Cluster**.
        c. Specify the hostname of the cluster node, authentication method to reach the cluster node, and the user ID and password for authentication.
        d. Click **Add**.

e. Click **Close**.

f. Repeat steps - for each cluster that you want to add.

- If you want to add many clusters, perform the following steps:

a. On the navigation pane, click ••• corresponding to **Health Summary**.

b. Click **Add Multiple Clusters**.

c. Download and update the template file to add information about each cluster that you want to import.

d. Upload the template file and click **Continue** to add clusters. Click **Close**.

Updating the agent configuration file of the PowerHA SystemMirror GUI

On every cluster node in each cluster, modify the `/usr/es/sbin/cluster/ui/agent/configuration-agent.json` file, and replace the old server IP address in the `serverURI` property with the new IP address that you specified in the `serverAddress` property of the PowerHA SystemMirror GUI server configuration file. After modifying the configuration file of the PowerHA SystemMirror GUI agent, you must restart the PowerHA SystemMirror GUI agent for the new configuration to take effect. To restart the PowerHA SystemMirror GUI agent, enter the following command:

```
stopsrc -cs phauiagent; sleep 11; startsrc -s phauiagent
```

New enhancements for PowerHA SystemMirror GUI server and agent

From PowerHA SystemMirror Version 7.2.5, and later, the dependency of the PowerHA SystemMirror Version 7.2.5 server on the hostname of the PowerHA SystemMirror Version 7.2.5 agent is removed. The PowerHA SystemMirror Version 7.2.5 server communicates with each cluster node by using a boot IP address or a persistent IP address. Only addresses that are defined within the PowerHA SystemMirror cluster configuration are considered.

To collect the IP address for each cluster node, PowerHA SystemMirror GUI does not use the **hostname** command. For each node in the cluster, the PowerHA SystemMirror GUI server uses the new **agentAddress** property in the `/usr/es/sbin/cluster/ui/server/configuration-server.json` configuration file to check if the node is defined within it, along with a specific IP address used for that node. If the node is not found, then the GUI server collects all boot IP and persistent addresses from the node, and tests the ability to communicate with that node address from the server. Every time a cluster is synchronized, the PowerHA SystemMirror GUI server rechecks the IP address of each node. You can use the following syntax to specify a unique IP address by using the new **agentAddress** property in the `/usr/es/sbin/cluster/ui/server/configuration-server.json` configuration file of PowerHA SystemMirror GUI server:

```
"agentAddress" : {
      "<CLUSTER_ID_NUMBER>" {
            "<NODE_LABEL>": "<IP_ADDRESS_TO_USE_FOR_THIS_NODE>",
            …
      },
      …
},
```

The following example shows how you can set a unique IP address by using the new `agentAddress` property in the `/usr/es/sbin/cluster/ui/server/configuration-server.json` configuration file.

```
"agentAddress" : {
    "1358561171" {
        "nodeA": "192.168.10.123",
        "nodeB": "192.168.10.127"
    },
    "1351137691" {
        "MyNode": "192.168.10.214",
        "YourNode" : "192.168.10.226"
```

```
        }
    },
```

You can retrieve the cluster ID number from a cluster by logging into it with a terminal and then running the `clmgr -cSa CLUSTER_ID query cluster` command. You can also retrieve the node labels for that cluster by using the `clmgr list nodes` command.

Backup communication system for PowerHA SystemMirror GUI

Use this information to know how the PowerHA SystemMirror GUI deploys a backup communication system.

The PowerHA SystemMirror GUI creates a backup communication method for the PowerHA SystemMirror GUI server by configuring the Secure Shell (SSH) key. If the communication between the PowerHA SystemMirror GUI server and PowerHA SystemMirror GUI agent is lost, the backup communication method can be used to restore communication. During the cluster creation or cluster addition process, you have to confirm if you want to enable the SSH backup communication. After you enable the SSH backup communication, it remains enabled for each new cluster that you add or create.

PowerHA SystemMirror performs the following steps on each node in the cluster:

1. Creates a user and group called **smui**. The **smui** user will have limited access to some of the PowerHA SystemMirror files.
2. Installs the public key of the PowerHA SystemMirror GUI server on each node in the cluster for the **smui** user.

The private key is created and stored on the PowerHA SystemMirror GUI server in a secured folder with root-only access.

Note: The PowerHA SystemMirror GUI uses the backup communication system only for communication problems. It is not used during normal operations.

GLVM support in the PowerHA SystemMirror GUI

Use this information to know how Geographic Logical Volume Manager (GLVM) is supported in PowerHA SystemMirror GUI.

The GLVM configuration has the following limitations:

- PowerHA SystemMirror GUI supports only asynchronous mirroring for GLVM.
- After you configure GLVM, you cannot modify the asynchronous cache size.
- The asynchronous cache utilization graph is updated only when the corresponding resource group is active and when the application controller is active.
- The asynchronous cache utilization graph will not be visible when GLVM is configured outside of the GLVM wizard.

In the PowerHA SystemMirror GUI, you can configure GLVM through any of the following methods:

Cluster creation wizard
During cluster creation, the cluster creation wizard is used for GLVM configuration. As a prerequisite for the cluster creation wizard, you must have a volume group with its physical volumes shared on all local site nodes. Physical volumes of the same size must exist in the remote site and will be automatically detected.

GLVM configuration wizard
The GLVM configuration wizard is used for linked clusters that are already being managed by the PowerHA SystemMirror GUI. You can create and manage multiple GLVM configurations in the same cluster by using the GLVM configuration wizard. Physical volumes of the same size must exist in the remote site and will be automatically detected.

Note: During the GLVM configuration process, the remote disk that is displayed on the summary page of the GLVM configuration wizard might vary.

Before you configure GLVM, ensure that the following prerequisites are met:

- The volume group must be available in all local site nodes and must not use any physical volumes that are shared on any nodes in the remote site.
- XD_data networks are defined in the cluster.
- Python version 2.0.x, or later, must be installed on all the cluster nodes.

Note: To delete GLVM configuration from PowerHA SystemMirror GUI, you must bring the cluster offline before deleting the GLVM configuration.

Operation Center Support in the PowerHA SystemMirror GUI

Use this information to learn about Operation Center Support (OCS) in the PowerHA SystemMirror GUI.

To configure OCS, you must complete the following prerequisites:

- A non-root user must be defined in the PowerHA SystemMirror GUI.
- A PowerHA SystemMirror GUI administrator must assign the **ha_oc** role to the OCS user.

The OCS feature in the PowerHA SystemMirror GUI has the following limitations:

- The maximum size of each uploaded visual or audio file is 5 MB.
- You cannot assign separate alert sounds for each cluster if you are working with multiple clusters.
- Visual alerts do not support visual patterns and are color-based only.

Users can be assigned the *ha_oc* role so that they can become an OCS user. These users can monitor operations, but cannot make any changes to the clusters they are monitoring. The user has access to the **Settings** button that allows user to configure the visual and audio alerts. OCS user can upload custom audio files and can select default sounds that are available for configuring the audio alerts. Only `.mp3` and `.wav` files are supported for custom audio alerts. Users can select different colors for configuring the visual alerts. The default color is red. The audio and visual alerts can be paused and canceled. When an alert is paused, after 5 minutes the alert is activated again if any cluster is still in a critical state.

The session for a user with the **ha_oc** role does not expire when the inactivity time limit is exceeded. The user can turn off the visual and audio alerts by using the **Settings** button.

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