Oracle® MiniCluster S7-2 Administration Guide

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Contents

Using This Documentation

- **Overview** – Describes how to perform Oracle MiniCluster S7-2 administration using specific MiniCluster tools.
- **Audience** – System administrators, and authorized service providers.
- **Required knowledge** – Advanced experience administering enterprise servers.

Product Documentation Library

Documentation and resources for this product and related products are available at https://docs.oracle.com/en/engineered-systems/minicluster-s7-2/.

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Understanding Administration Resources

This document is updated with functions and features for MiniCluster version 1.3.0 software. Depending on the version of software running on your MiniCluster, some features might be slightly different or not present.

These topics describe administration resources for MiniCluster.

MCMU Overview

The MiniCluster Management Utility (MCMU) enables you to perform a variety of installation, configuration, and management activities with a secure, browser user interface (BUI). You select management tasks and provide configuration information, and the utility performs the complex operations in the background.

Note - The MCMU also provides a CLI. See "Using the MCMU CLI" on page 203.

This list summarizes the types of activities you can perform using this utility:

- **Initially configure MiniCluster** – The utility verifies the network and storage topology for MiniCluster, sets up the two SPARC S7-2 compute nodes for internet and management access, and configures an NFS shared file system for application VM group usage as required. The utility configures the network according to site preferences, configures the hostnames and IP addresses for client access and for the management console.
- **Create and manage database virtual machines** – The utility installs the Oracle Grid Infrastructure on the database VM group and supports provisioning of Oracle single instance databases, RAC databases, and RAC One Node databases.

- **Create and manage application virtual machines** – Based on your configuration preferences, the utility provisions either two VMs (one on each compute node), or one VM per application group. Multiple App VM groups can be created. Configuration parameters enable you to host application binaries on local storage or install the binaries in shared storage. You can cluster application VMs and install a grid infrastructure.
- **View the system configuration and network information** – By clicking a few buttons, you can view the configuration of VMs on the compute nodes, view the network topology, see network parameters, and verify initialization processes.
- **Run security benchmarks** – Based on your security requirements, use the MCMU to configure, run, and monitor security benchmarks.
- **Upgrade MiniCluster firmware and software** – The utility installs MiniCluster patch updates, which can include updates to the OS, firmware, Oracle ILOM, and the Oracle Database software.
- **Enable automatic system tuning capabilities** – The MCMU includes a virtual tuning assistant which automatically adjusts system parameters to ensure the system runs optimally.
- **Perform system checks** – By clicking a few buttons in the utility, you can verify the configuration of the system and check the status of the drives.
- **Use simplified support tasks** – The MCMU provides the ability to generate support bundles and to configure the ASR feature.

ORAchk Overview

ORAchk is a configuration audit tool that validates the Oracle environment. It enables you to complete a variety of system checks that would otherwise have to be done manually. ORAchk provides these features:

- Checks the database VM for problems across the various layers of the stack.
- Reports show system health risks with the ability to drill down into specific problems and understand their resolutions
- Can be configured to send email notifications when it detects problems.
- Can be configured to run automatically at scheduled times.

ORAchk is supported for database VMs.

To download ORAchk and to find out more about ORAchk, refer to these resources:

- My Oracle Support article, Doc ID 1268927.02 – Download is available from this article.
- The *ORAchk Quick Start Guide* – Available from `http://docs.oracle.com/cd/E75572_01/`.

For an example of running ORAchk on MiniCluster, see “Run orachk Health Checks (CLI)” on page 230.

Administration Resources

Use this table to identify the task you want to perform and to locate information about the task.

Administrative Task	Description	Links
Initially install and configure the software on MiniCluster.	Use a combination of tools (such as the MCMU) that are provided with the system. Installation procedures are described in the *Oracle MiniCluster S7-2 Installation Guide*.	http://docs.oracle.com/cd/E69469_01
Create and manage database and application VMs and VM groups.	Use the MCMU, which is described in this guide.	“MCMU Overview” on page 17
Perform administrative tasks in a VM through the Oracle Solaris OS.	Oracle Solaris documentation includes information about getting started, booting the OS, administering networks, managing users, creating virtual environments, and setting up an application development environment.	http://docs.oracle.com/en/operating-systems
Perform DB administrative tasks in a DB VM.	The MCMU provides simplified ways to manage the database on VMs. These administrative tasks are described in this guide.	“Configuring DB VMs (BUI)” on page 99
Additional DB administration	Oracle Database documentation provides information about getting started, managing users, application development, using Enterprise Manager plug-ins.	http://docs.oracle.com/en/database
Perform administrative tasks through Oracle ILOM.	Oracle ILOM is firmware that runs on a service processor and is embedded on the compute nodes. It enables lights-out remote management. You manage and monitor the server independently of the OS state. Oracle ILOM documentation includes information on getting started, administration, monitoring and diagnostics, and configuring Oracle ILOM with SNMP and IPMI.	http://www.oracle.com/goto/ilom/docs
Administer the system using Enterprise Manager.	You can install an Enterprise Manager plug-in that enables you to add the system to an Enterprise Manager server in your environment. Oracle Enterprise Manager documentation includes getting started, installation, and administration information.	<future link to EM plug-in info in this doc> http://docs.oracle.com/cd/E11857_01/index.htm
Power on the system.	In this guide.	“Starting and Stopping the System” on page 57

Administrative Task	Description	Links
Shut down or power off the system.	In this guide.	“Starting and Stopping the System” on page 57
Configure Oracle Engineered Systems Hardware Manager.	In this guide.	“Configuring Oracle Engineered Systems Hardware Manager” on page 167
Check the status of the virtual tuning feature.	In this guide.	“Checking the Virtual Tuning Status (BUI)” on page 173

Understanding Zones, VMs, and Storage

These topics describe the components of MiniCluster.

MiniCluster Zones Overview

MiniCluster uses Oracle Solaris zones as the underlying support structure for the system. The creation of zones is automatically handled by the MiniCluster initialization process based on configuration information that you provide. You do not need to administer the technical details of zones, but the MiniCluster tools and documentation use zone technology and terminology, so this section explains key concepts and terms.

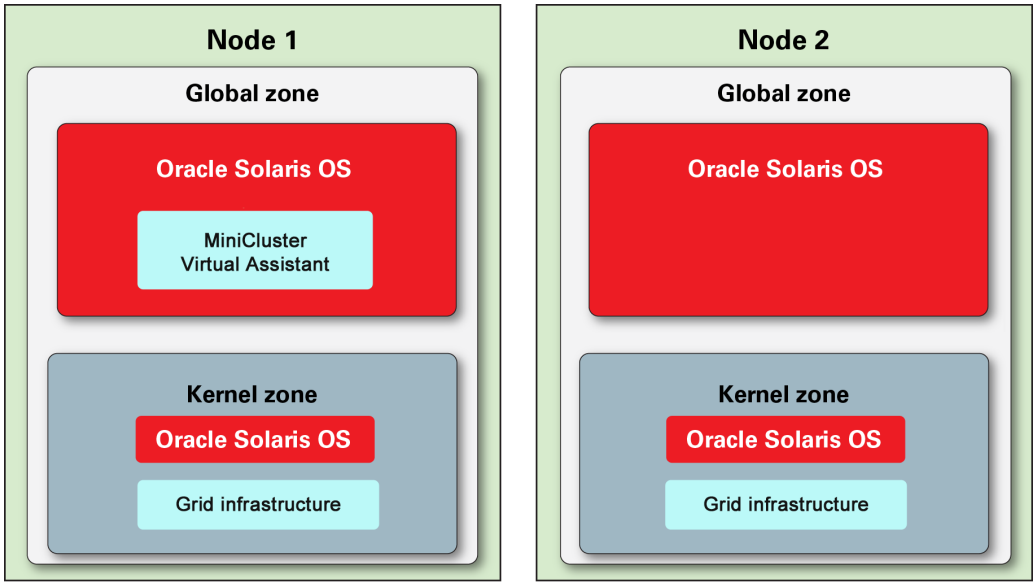
Caution - Never manually manage VMs using Oracle Solaris zone commands. Always manage the VMs through MCMU BUI or MCMU CLI.

Zones are used to virtually divide the resources of a physical machine to simulate multiple machines and OSs.

The Oracle Solaris Zones partitioning technology used in MiniCluster enables you to consolidate multiple hosts and services on a system, affording these benefits:

- Increased hardware utilization
- Flexibility in resource allocation
- Reduced power requirements
- Lower cost of ownership

This illustration shows the zones that are automatically created on every MiniCluster. The illustration represents the system's zone configuration before the creation of VMs.



These zones are automatically created when the system is initialized:

- **Global zones** – One on each node, they include the initial installation of the Oracle Solaris OS from which all the other zones and VMs are created. The global zone on node 1 also contains the MCMU software. Each global zone is assigned 2 CPU cores. Each global zone is automatically configured with network parameters that enable you to access it from your network (see "Log in to the Global or Kernel Zone" on page 35). However, there is minimal administration required in the global zones.
- **Kernel zones** – One on each node, they include an installation of the Oracle Solaris OS, NFS shared with the VMs, and grid infrastructure (GI) components. The OS and GI provide the necessary drivers for the VMs to access file systems on the storage arrays. Each kernel zone is assigned 2 CPU cores. Each kernel zone is automatically configured with network parameters that enable you to access it from your network (see "Log in to the Global or Kernel Zone" on page 35). However, there is minimal administration required in the kernel zones because no site-specific software is added to them.

Note - The zones are automatically configured when the system is installed. For details about the installation process, refer to the *Oracle MiniCluster S7-2 Installation Guide*.

MiniCluster VM Groups and VMs Overview

VMs are used to virtually divide the resources of the system to simulate multiple machines and OSs. Each VM is dedicated to the programs running inside. VMs are isolated, providing a secure environment for running applications and databases.

You might configure separate VMs for individual departments in your organization, with each VM hosting a unique set of applications and databases. Or use VMs to control licensing costs by limiting some software to a set number of cores now with the ability to easily add more cores later. You can use some VMs for development and others for production, or any other combination of deployments.

MiniCluster VMs are created using Solaris non-global zones, and have very similar attributes to MiniCluster zones (described in "MiniCluster Zones Overview" on page 21), including secure isolation, flexibility in resource allocation, and so on. The distinction between MiniCluster zones and VMs is that the zones provide underlying support structures for the system (uniform from one MiniCluster to another) and VMs are the VMs that you customize to suit your enterprise compute needs. You determine the number, type, and configuration of VMs on MiniCluster.

There are two types of VMs:

- **DB VM** – A virtual machine that contains the Oracle Database running in the Oracle Solaris OS.
- **App VM** – A virtual machine that contains the Oracle Solaris OS and any applications that you choose to install.

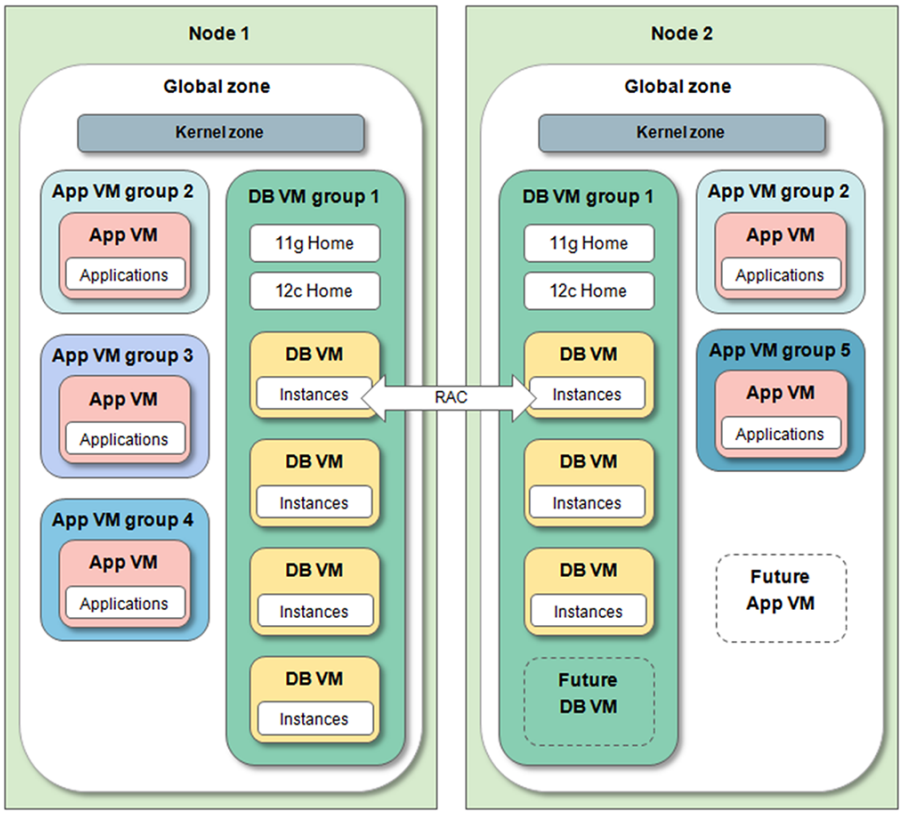
You can configure the system with only one type of VM, or a combination of DB and App VMs.

VMs are easily provisioned using the MCMU BUI or CLI. MCMU prompts you for the VM parameters and then creates, deploys, and configures the VMs.

Note - When the system is installed, the initialization process automatically invokes the MCMU BUI and prompts the installer to configure VMs. The installer can create VMs at that time, or skip that process so that the VMs can be created later. To determine if VMs are present, see "View the DB VM Group and VMs (BUI)" on page 99 and "View App VM Groups and VMs (BUI)" on page 133.

Each VM has its own set of network parameters that enable you to access it from your network (see "Accessing VMs" on page 32).

This illustration shows an example of how the VMs are logically arranged, and lists the main components that make up each type of VM.



- **Global zone** – See "MiniCluster Zones Overview" on page 21.
- **Kernel zone** – See "MiniCluster Zones Overview" on page 21.
- **DB VM group** – The collection of database VMs on the system (the group spans both nodes). One database VM group is supported on the system. The group is configured by specifying the parameters described in "Planning to Create VMs" on page 77.
- **DB VM** – A database virtual machine is a VM that contains the Oracle Database software. You choose to assign a set number of cores to a DB VM, or to have the DB VM share cores with other VMs.
- **DB Home** – The installation of the Oracle Database software in a VM group in a directory of your choosing. You can choose to install one version, or a combination of versions such as 11g, 12.2, 18.3, and other versions. For the latest version information, refer to the Oracle MiniCluster S7-2 Product Notes.
- **DB Instance** – Provides the individual DB configuration details for a given instance of the DB. You create one or more instances in each DB VM. There are a variety of instance parameters to choose from such as RAC, RAC One Node, or single instance.

- **App VM group** – A logical grouping of application VMs. You can have a single or a pair of application VMs in a group. Unlike the DB VM group, you can have as many App VM groups as there are resources available to support them. You can create clusters and install a grid infrastructure.
- **App VM** – An application virtual machine is a VM that contains the Oracle Solaris OS and any applications you install. You choose to assign a set number of cores to an App VM, or to have the App VM share cores with other VMs.
- **Future DB and App VMs** – As long as storage and CPU resources are available, you can create additional VMs at any time, up to a maximum of 12 VMs.

MiniCluster Storage Overview

MCMU automatically assigns each VM the appropriate amount of storage based on the configuration of the VM. This section describes how the MCMU configures the storage.

MiniCluster includes six HDDs in each node, and one or two storage arrays.

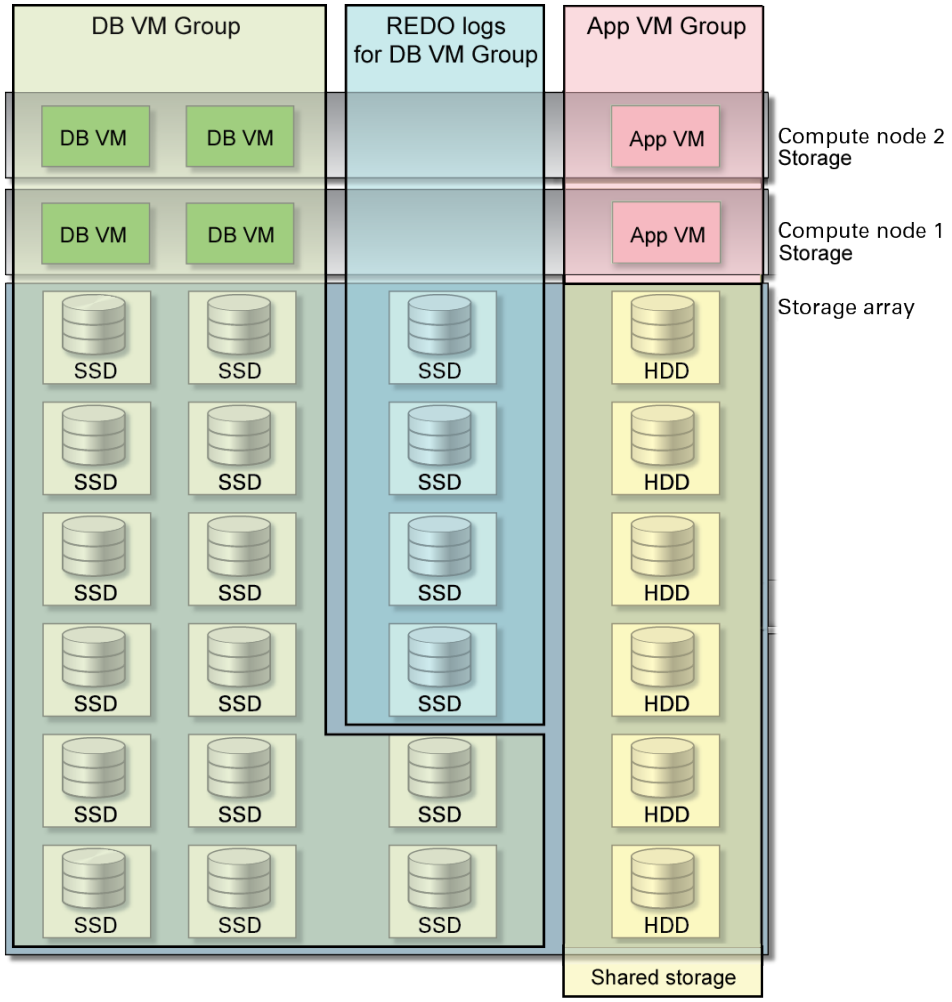
Each compute node provides these storage components:

- 2 HDDs, used by the global and kernel zones. The drives use RAID 10 for high availability.
- 4 HDDs, store the VM root file systems. The drives use RAID 10 for high availability.

One storage array provides these storage components:

- 14 SSDs, reserved for DB VMs. The DB disk groups are either configured for normal redundancy (protection against a single disk failure) or high redundancy (protection against two disk failures).
- 4 SSDS, reserved for DB REDO logs (always set at high redundancy).
- 6 HDDs, provide the NFS storage that can be exported to DB and App VMs (referred to as *internal NFS* in this guide). This internal storage is enabled or disabled when you define a group profile, and can be changed on the fly in the MCMU BUI or CLI. For highly secure environments, refer to the recommendations in “Restrict Access to Shared Storage” in *Oracle MiniCluster S7-2 Security Guide*.

This figure represents how the available storage is arranged. Note that this figure does not include the internal storage that is reserved for the MiniCluster global zones and root file systems.



If you add another storage array to the system (see “Configure an Added Storage Array (CLI)” on page 318), the utility automatically doubles the amount of storage for each of the categories shown in the figure.

In addition to the storage that comes with MiniCluster, you can provide access to other NFS storage in your compute environment. See “Add an External NFS to a VM Group (BUI)” on page 152.

Accessing the System

These topics describe how to access different aspects of the system based on the kind of tasks you need to perform.

Note - These topics assume that the system is already installed and initialized. For details about accessing the system for installation, refer to the *Oracle MiniCluster S7-2 Installation Guide*.

Description	Links
Access the MCMU BUI or CLI to create, edit, and delete DB and application VMs. Also use the MCMU to perform administrative tasks such as managing security benchmarks, updating firmware and software, and to perform any other MCMU functions.	"Accessing the MCMU (BUI and CLI)" on page 27
Access individual VMs to administer software within the VM.	"Accessing VMs" on page 32
Access the underlying VM support structures such as the global zone and kernel zones. Accessing these components is only performed in unique situations, such as to alter certain default system configurations.	"Accessing Underlying VM Support Structures" on page 35
Access Oracle ILOM.	"Accessing Oracle ILOM" on page 37
Review information about the MiniCluster REST API.	"MiniCluster REST API (Removed)" on page 38

Accessing the MCMU (BUI and CLI)

These topics describe how to access and navigate the MCMU BUI, and MCMU CLI.

Log in to the MCMU BUI

This procedure describes how to log into the MCMU BUI through a browser.

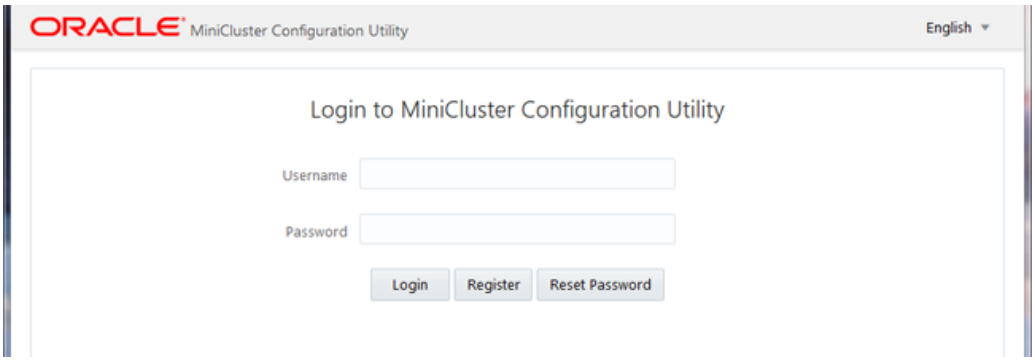
Note - Each user must use their own browser and not share browser sessions.

1. **Open a browser on a system that has network access to MiniCluster.**

2. **Type `https://`*node1_name*`/MCMU` in the browser address field.**
   Replace *node1_name* with the name of the MiniCluster compute node 1.

   Tip - Ensure that you specify `https`, because the utility requires a secure connection. If your browser displays a warning about an insecure connection, add an exception to enable connectivity to the system.

   For example, type **`https://mc7-n1/MCMU`**.



3. **(Optional) In your browser, bookmark this page.**

4. **Enter an MCMU user name and password.**

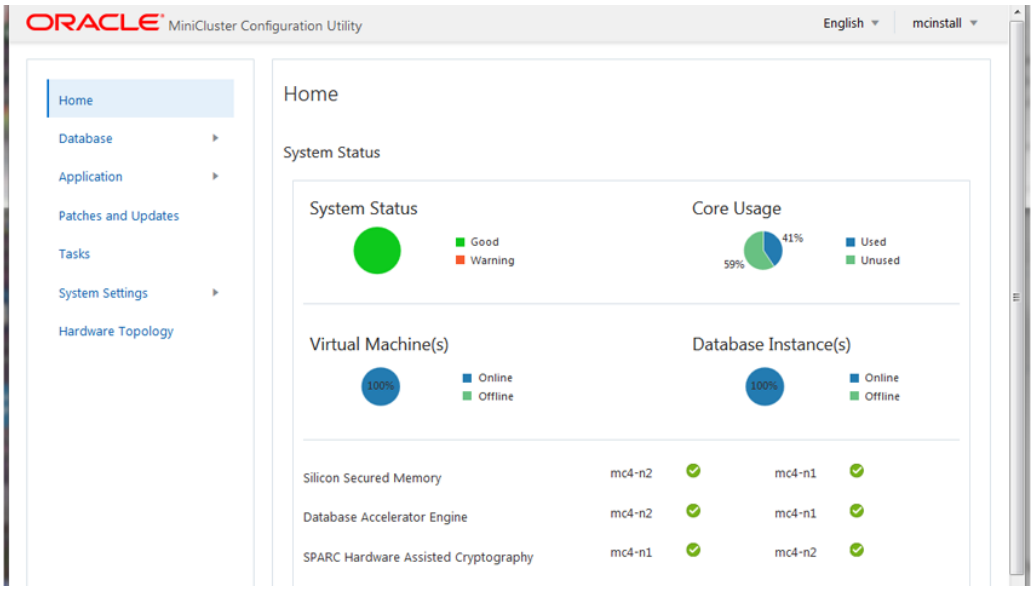
   Note - If you are logging into MCMU for the first time, the utility requires you to create a new password. See "Unlock a User Account and Reset a Password (BUI)" on page 48.

   The System Status page is displayed. For further details, see "MCMU BUI Overview" on page 29. For more information about user accounts, see "Managing MCMU User Accounts (BUI)" on page 39.

The MCMU BUI automatically logs out users after a predetermined amount of inactivity. See “Configure the BUI Session Timeout” on page 165.

MCMU BUI Overview

When you log into the MCMU BUI, the System Status page is displayed. In the upper right corner, you can select your language and other choices from the user-name drop-down menu.



The left navigation panel provides links to these MCMU functions:

- **Home** – Displays the system status page, which provides an overall status of the system, and access to these items:
  - **Compliance Information** – Shows information about security compliance reports. See “Securing the System (BUI)” on page 159.
  - **Virtual Tuning Assistant Status** (not shown in the example) – Farther down the page is an area that shows information from the built-in tuner feature. See “Checking the Virtual Tuning Status (BUI)” on page 173.

- **Database** – Expands to provide access to DB VM group profile features, and to DB VM instance features. This page is where you manage DB VMs. See "Configuring DB VMs (BUI)" on page 99.
- **Application** – Expands to provide access to application VM group profile features, and to a view of App VMs. This page is where you manage App VMs. See "Configuring Application VMs (BUI)" on page 133.
- **Patches and Updates** – Provides access to the utility patching features. See "Updating and Patching MiniCluster Software (BUI)" on page 177.
- **Tasks** – Displays information about running MCMU activities. See "View the Status of Running Tasks (BUI)" on page 76.
- **System Settings** – Expands, providing access to these pages:
  - **System Information** – Displays the MCMU version, Oracle Solaris OS version, and compute node and storage details. See "View System Information (BUI)" on page 64.
  - **Security** – Displays information about encryption keys on each compute node and provides links to administer the encryption keys. See "View Security Information (BUI)" on page 160.
  - **Network** – Displays information about the configured network parameters. See "View and Update Network Parameters in v1.2.4 and Later (BUI)" on page 66.
  - **Firewall Manager** – Displays information about the MiniCluster firewall manager. See "Firewall Protection" on page 159.
  - **User Accounts** – Displays information about MCMU user accounts. See "Display MCMU Users (BUI)" on page 43.
  - **System Checks** – Provides access to perform readiness checks, verify the topology, and calibrate disks. See "Performing System Checks (BUI)" on page 193.
  - **System Setup** – Provides access to the tasks that are performed when the system is initially installed. See "Review or Run Initialization Steps (BUI)" on page 74.
  - **User Input Summary** – Displays the information that was applied to the system during the initial installation, such as IP address allocation. This page also provides a link that enables you to add additional IP addresses to the system. See "View and Update Network Parameters in v1.2.2 and Earlier (BUI)" on page 70.
  - **Support** – Provides access to generate support bundles, to start the Oracle Engineered Systems Hardware Manager (under Oracle direction), and to configure ASR. See "Performing Support Tasks (BUI)" on page 197.
- **Hardware Topology** – Displays a visual representation of the I/O connections to storage arrays. See "View the Hardware Topology (BUI)" on page 194.

Log Out of the MCMU BUI

- **In the upper right corner, click your login name, and select Log Out.**

Log in to the MCMU CLI

1. **From a system that has network access to MiniCluster, use the `ssh` command to log into MiniCluster.**

   Syntax:

   ```
   % ssh mcmu_user_name@minicluster_node_name_or_IPaddress
   ```

   where:

   - *mcmu_user_name* is the name of an MCMU user. The `mcinstall` user is the default primary admin user. The password was set when the system was installed.
   - *minicluster_node_name_or_IPaddress* is the name of the first node on MiniCluster, or the IP address of the first node.

   For example:

   ```
   % ssh mcinstall@mc4-n1
   ```

2. **When prompted, enter the password.**

   For more information about running mcmu CLI commands, see "Using the MCMU CLI" on page 203.

Log Out of the MCMU CLI

Note - After 15 minutes of CLI inactivity, the session is automatically logged out.

- **At the command line prompt, type:**

  ```
  # exit
  ```

Accessing VMs

These topics describe how to access individual VMs (not through the MCMU). Use these procedures to administer software installed in individual VMs.

Caution - Never manually manage VMs using Oracle Solaris zone commands. Always manage the VMs through the MCMU BUI or MCMU CLI. See "Accessing the MCMU (BUI and CLI)" on page 27.

▼ Log in to a DB VM

Use this procedure to log into a VM.

You must have the Tenant Admin (`tadmin`) role to log into a VM. For more information about roles, see "User Roles" on page 39.

If you log directly into a DB VM, you are not accessing the system through the MCMU and you cannot run `mcmu` commands.

Caution - Never manually manage VMs using Oracle Solaris zone commands. Always manage the VMs through MCMU BUI or MCMU CLI.

When you log into MiniCluster, the default prompt is: *username*`@`*hostname/directory*(`%` or `$` or `#`), however, for brevity in examples, the prompt is shortened to `%` for users and `#` for superuser.

This procedure describes how to access VMs using the `ssh` command. Depending on the software and services installed in the VM, the VM might also be accessible through those services.

1. **From a terminal window with network access to the system, use the `ssh` command to log into a DB VM.**

   Syntax:

   `% ssh` *user_name*`@`*VM-hostname_or_IPaddress*

   where:

- *user_name* is a valid user name with the Tenant Admin (`tadmin`) role.

  The default user that is initially configured in DB VMs is `oracle`. For more information about the `oracle` user, see "User Accounts" on page 40
- *VM-hostname_or_IPaddress* is either the hostname or IP address of the VM. You can obtain VM names from Database → Virtual Machines (see "View the DB VM Group and VMs (BUI)" on page 99.

For example:

```
% ssh oracle@dbvmg1-zone-1-mc4-n1
```

2. **Enter a valid password for the user account.**

3. **If needed, assume the `root` role.**

   The password is the same password used for the `oracle` user.

   For example:

```
% su root
Password: **************
#
```

At this point, you can perform administrative tasks in the DB VM.

▼ Log in to an App VM

Use this procedure to log into a VM.

You must have the Tenant Admin (`tadmin`) role to log into a VM. For more information about roles, see "User Roles" on page 39.

If you log directly into a App VM, you are not accessing the system through the MCMU and you cannot run `mcmu` commands.

Caution - Never manually manage VMs using Oracle Solaris zone commands. Always manage the VMs through MCMU BUI or MCMU CLI. See "Accessing the MCMU (BUI and CLI)" on page 27.

When you log into MiniCluster, the default prompt is: *username*@*hostname*:*directory*(`%` or `$` or `#`), however, for brevity in examples, the prompt is shortened to `%` for users and `#` for superuser.

This procedure describes how to access VMs using the `ssh` command. Depending on the software and services installed in the VM, the VM might also be accessible through those services.

1. **From a terminal window with network access to the system, use the `ssh` command to log into a VM.**
   Syntax:

   ```
   % ssh user_name@VM-hostname_or_IPaddress
   ```

   where:

   - *user_name* is a valid user name of a user with the Tenant Admin (`tadmin`) role.
   - *VM-hostname_or_IPaddress* is either the hostname or IP address of the VM. You can obtain VM names from Application → Virtual Machines (see "View App VM Groups and VMs (BUI)" on page 133.

   For example:

   ```
   % ssh mcinstall@appg500-zone-1-mc4-n2
   ```

2. **Enter a valid password for the `mcinstall` user account.**

3. **If needed, assume the `root` role.**
   The password is the same password used for the `mcinstall` user.
   For example:

   ```
   % su root
   Password: **************
   #
   ```

   At this point, you can perform administrative tasks in the App VM.

▼ Log Out of a VM

Use this procedure to log out of a DB VM or App VM.

To completely log out, you need to exit from each login and `su` that you've performed. For example, if you logged into a VM then used the `su` command to assume the `root` role, type `exit` twice.

- **At the prompt, type:**

```
# exit
```

Repeat `exit` as needed.

Accessing Underlying VM Support Structures

In a few specialized situations, you might need to access the underlying VM support structures such as the global zone and kernel zones.

Caution - Accessing the global zone and kernel zones should only be performed by trusted and experienced Oracle Solaris administrators. Performing this procedure involves assuming the root role, which has all administrative privileges. If administrative commands are not performed properly, there is a potential for damaging or deleting critical system data.

- "Log in to the Global or Kernel Zone" on page 35
- "Log Out of the Global Zone" on page 36

▼ Log in to the Global or Kernel Zone

Use this procedure to log in to the global zone. From the global zone, you can access the kernel zones, if needed.

Caution - Never manually create, edit, or delete VMs using Oracle Solaris zone commands. Always create, edit, and delete the VMs through MCMU BUI or MCMU CLI. See "Accessing the MCMU (BUI and CLI)" on page 27.

1. **From a terminal window with network access to the system, use the `ssh` command to log into the global zone.**

   Use the `mcinstall` user account. For more details about this account, see "User Accounts" on page 40.

   ```
   % ssh mcinstall@Node-hostname_or_IPaddress
   ```

   where *Node-hostname_or_IPaddress* is either the hostname or the IP address of node 1 or 2. You can obtain the node name (Hostname Preview) from the MCMU System Settings → System Information page. See "View and Update Network Parameters in v1.2.2 and Earlier (BUI)" on page 70.
   For example:

```
% ssh mcinstall@mc2.us.example.com
```

2. **Enter the password for `mcinstall`.**
   Specify the password that was configured for your system.

3. **If needed, assume the `root` role.**
   The password is the same password used for the `mcinstall` user.
   For example:

   ```
   % su root
   Password: **************
   #
   ```

   At this point, you can perform administrative tasks in the global zone or access the kernel zones.

4. **To get to a kernel zone, perform these commands:**

   Note - Alternatively, you can log directly into a kernel zone using `ssh mcinstall@`*kz_public_hostname*, where *kz_public_hostname* is the system prefix (shown in System Settings → User Input Summary) appended with `ss01` (kernel zone on node 1) or `ss02` (kernel zone on node 2). For example: `ssh mcinstall@mc4ss01`.

   ```
   # zoneadm list
   global
   acfskz
   appvmg1-zone-1-mc4-n1
   dbvmg1-zone-3-mc4-n1
   dbvmg1-zone-1-mc4-n1
   dbvmg1-zone-4-mc4-n1
   dbvmg1-zone-2-mc4-n1
   ```

   In the output, the global zone is identified as `global`. The kernel zone is identified as `acfskz`.

   ```
   # zlogin acfskz
   ```

▼ Log Out of the Global Zone

To completely log out, you need to exit from each login and `su` that you've performed. For example, if you logged into the global zone then used the `su` command to assume the `root` role, type `exit` twice.

- **At the prompt, type:**

  ```
  # exit
  ```

  Repeat the `exit` command if needed.

Accessing Oracle ILOM

These topics describe how to access Oracle ILOM on the nodes. You can use Oracle ILOM to perform a variety of lights-out-management activities such as controlling the power state of the nodes, obtaining health status and fault information, configure boot modes, and so on.

For more information about Oracle ILOM, refer to the Oracle ILOM documentation library at `http://docs.oracle.com/cd/E37444_01`.

- "Log in to Oracle ILOM on a Node" on page 37
- "Log Out of Oracle ILOM" on page 38

▼ Log in to Oracle ILOM on a Node

The default user account in Oracle ILOM is `root`. Specify the password that was configured for your system.

To access Oracle ILOM, you need to know the Oracle ILOM hostname or IP address. To identify these items on your system, see "View System Information (BUI)" on page 64 for hostnames, and "View and Update Network Parameters in v1.2.2 and Earlier (BUI)" on page 70 for IP addresses (ILOM IP addresses are listed as management IP addresses).

- **Depending on how you want to access Oracle ILOM, perform one of these actions:**

  - **Oracle ILOM web interface – In a browser, enter this address, and press Return.**

    `http://`*ILOM_ipaddress*

    The Oracle ILOM Login screen is displayed. Log in using a Oracle ILOM account such as root and password.

- **Oracle ILOM CLI – In a terminal window, enter the following command.**

```
% ssh root@ILOM_hostname_or_ipaddress
    root password: ********
->
```

Log Out of Oracle ILOM

- **Depending on how you accessed Oracle ILOM, perform one of these actions:**

  - **Oracle ILOM web interface – In the upper right corner, click Logout.**

    The Oracle ILOM Login screen is displayed. Log in using a Oracle ILOM account such as root and password.

  - **Oracle ILOM CLI – Type the following command.**

```
-> exit
```

MiniCluster REST API (Removed)

MiniCluster 1.3.0 removes the REST API that was previously available. Any software that was developed to use REST APIs to administer MiniCluster will no longer function.

Managing MCMU User Accounts (BUI)

These topics describe how to manage MCMU user accounts through the BUI. To manage user accounts through the CLI, see “Managing MCMU User Accounts (CLI)” on page 283.

User Roles

When you create an MCMU user, you assign the user one of these roles:

- **Primary Admin (`root` role)** – The `root` role defines the rights and privileges of primary administrators of the MiniCluster system including all its compute nodes, networks, database, and storage. Users with the `root` role can perform all installation and all critical administrative operations without any constraints. As primary administrators, they can delegate operations and approve adding and deleting users including new primary and secondary administrators. The user must login with his/her own credentials. The `mcinstall` user has the root role. All actions and operations carried out are logged and audited based on the user identifier, not the role identifier.

- **Secondary Admin (`mcadmin` role)** – Users who are assigned with this role have read-only access to the global zones. They cannot run the MCMU BUI or CLI. All actions and operations carried out are logged and audited based on the user identifier, not the role identifier.
- **Tenant Admin (`tadmin` role)** – This role defines the rights and privileges of the administrator of a MiniCluster VM. The role defines the rights and privileges of a VM administer involved with day-to-day administrative operations supporting application installations and deployment. Tenant admins cannot run MCMU, or access the global or kernel zones. All actions are audited based on the user identifier, not the role identifier. A Tenant Admin user can use two-factor authentication to securely log in by entering a password from a mobile device. For more instructions, see "Enable One-Time Password (OTP) Authentication (BUI)" on page 50.
- **Auditor (`auditor` role)** – Users with this role only have access to the MCMU BUI audit review page where they can view the audit pool status and generate reports for user activity. Only users with this role can access the audit review page. Auditors cannot access the MCMU (except for the audit page), nor can they log into kernel zones or VMs.

User Accounts

MiniCluster includes the user accounts listed in this table.

User	Password	Role	Description
`mcinstall`	The password is initially configured during the installation.	`root`	The installation process requires you to create `mcinstall` as the MCMU primary administrator and create a password. This account is intended to be the primary administrator for the MCMU. This user account is used for these activities: ■ Performing the system initialization at installation time by running `installmc`. ■ Administering the system, including VMs using the MCMU BUI and `mcmu` CLI. ■ To assume the `root` role (`su` to root) on application VMs and in the global zone and kernel zones for superuser privileges.
MCMU Supervisor – Account name determined at installation time	The password is configured during the installation.	`root`	In the MiniCluster software, the supervisor user is only intended to approve or deny MCMU users as they are created and deleted. This user receives email every time a new MCMU user is created. The new user must be approved by the supervisor and the primary admin (such as mcinstall) for the user account to be enabled.
(Optional) *Tenant Admin* –	Determined upon initial log in.	`tadmin`	This user can perform all post-installation activities, including using OTP, only on VMs.

User	Password	Role	Description
Account name determined at user registration time			This user cannot access the global zone, and cannot run the MCMU BUI or CLI.
`oracle`	Set during the DB VM group profile configuration. See "Password" on page 86	`root`	Each DB VM has an individual oracle user account. This user account is used for these activities: ■ Used as the initial login account to database VMs, from which you can configure the database VMs with a database, data, and other accounts, as needed. ■ To assume the root role (`su` to root) on database VMs for superuser privileges.

Also see "MCMU Password Policies" on page 41.

All actions performed by all MCMU users are logged based on the user's identifier.

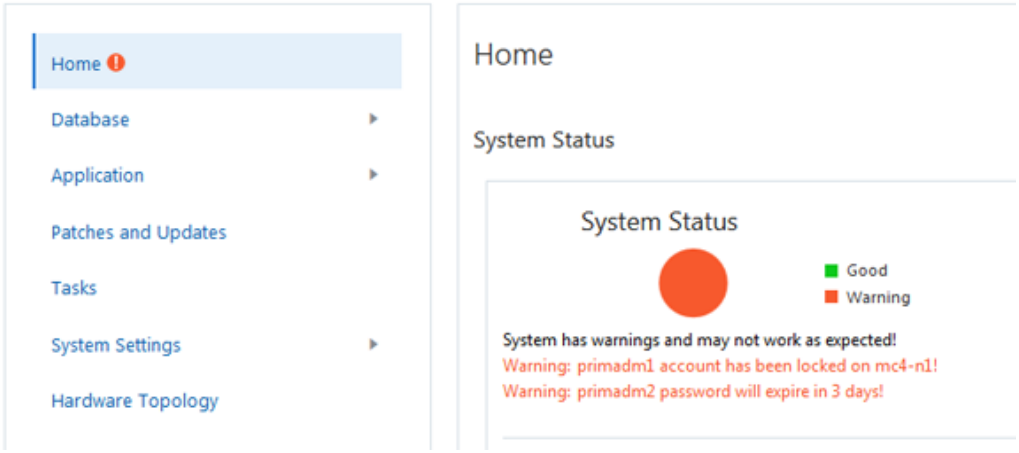
Note - MCMU user accounts are not used for the routine use of the system, such as using the applications and databases. Those user accounts are managed through Oracle Solaris, the application, the database on the VMs, and through your site system administrators.

MCMU Password Policies

When an MCMU user logs into MCMU for the first time, the utility requires the user to create a password that meets these requirements:

- Must contain a minimum of 14 characters (or 15 for DISA STIG Profile configurations)
- Must have a minimum of one numeric character
- Must have a minimum of one uppercase alpha character
- (DISA STIG Profile configurations) Must include one non-alpha-numeric character
- Must differ from a previous password by at least three characters
- Must not match the previous ten passwords

MCMU passwords expire after a certain number of days, at which time the user account is locked, and the following warning is displayed on the home page:



A locked account can be unlocked by following the procedure in "Unlock a User Account and Reset a Password (BUI)" on page 48. To avoid locked accounts, periodically check the expiration date listed in the User Accounts page (see "Display MCMU Users (BUI)" on page 43) and change your password before it expires (see "Change an MCMU User Password (BUI)" on page 48).

MCMU User Approval Process Overview

All MCMU user accounts require approval by the MCMU supervisor and primary admin (`mcinstall`). The process works as follows:

1. The prospective user (or an MCMU user on their behalf) accesses the MCMU registration page and provides these mandatory details:
   - MCMU user name
   - Email address
   - Full name
   - Phone number
   - MCMU role
2. MCMU sends the MCMU supervisor and primary admin an email requesting approval or denial.

   If the user was registered through the MCMU BUI, the email includes a URL to the MCMU approval/denial feature and includes a unique key identifier.

If the user was created through the MCMU CLI, the email includes an `mcmu` command and the unique key identifier.

3. When both the supervisor and primary admin approve the account, the user account is enabled, and MCMU sends the new user and email confirming the account activation.

Subsequent topics in this section describe how to perform these tasks.

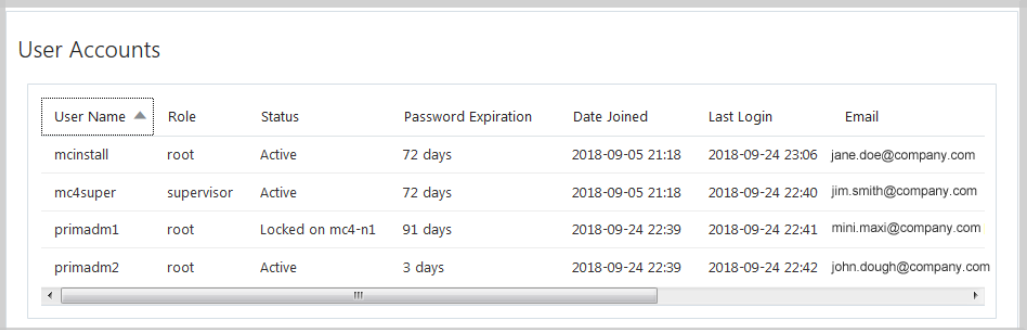
▼ Display MCMU Users (BUI)

1. **Access the MCMU BUI as a primary admin, such as mcinstall.**

   See "Log in to the MCMU BUI" on page 28.

2. **In the navigation panel, select System Settings → User Accounts.**

   The User Summary page is displayed.



The page provides this information:

- **User name** – The user account name.
- **Role** – The role assigned to the user. See "User Roles" on page 39.
- **Status** – Lists the status. Active indicates an approved user. A locked account cannot access MCMU until it is unlocked. See "Unlock a User Account and Reset a Password (BUI)" on page 48.
- **Password Expires** – Lists how many days until the password expires.
- **Date Joined** – Lists the date that the user account was approved.
- **Last Login** – Lists the date that the user last logged into MCMU.

- **Email** – Lists the user's email address.
- **Phone** – Lists the user's phone number.
- **Supervisor** – Lists the MCMU supervisor that approved the user.
- **Enable OTP** – Indicates if a user is assigned to use OTP-based authentication. OTP is available only to the Tenant Administrator role for App and DB VMs. For more details, see “Enable One-Time Password (OTP) Authentication (BUI)” on page 50..

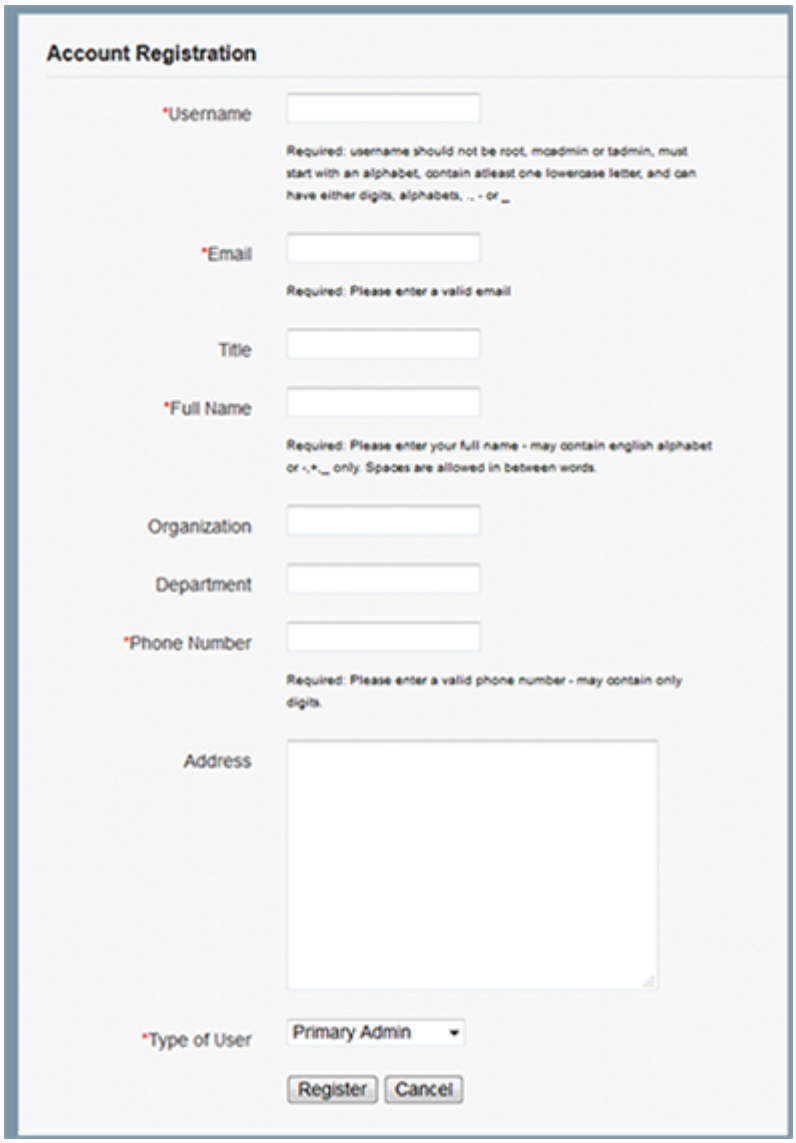
▼ Create a New MCMU User (BUI)

Use this procedure to create a new MCMU user.

1. **Access the MCMU BUI.**

   See “Log in to the MCMU BUI” on page 28.

2. **Click Register.**

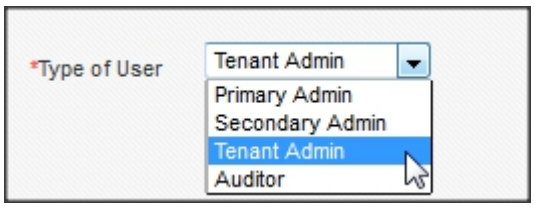


3. **Complete the MCMU registration page.**

   Fields marked with an asterisk are mandatory.

- **User name** – Enter a unique user name for the new user.
- **Email** – Enter the email address for the new user.
- **Title** – (Optional) Enter the user's title.
- **Full Name** – Enter the first and last name for the new user.
- **Organization** – (Optional) Enter the user's organization.
- **Department** – (Optional) Enter the new user's department.
- **Phone Number** – Enter the new user's phone number. Do not include any special characters or spaces.
- **Address** – (Optional) Enter the new user's address.
- **Type of User** – See "User Roles" on page 39 and select one of the following:
  - Primary admin
  - Secondary admin
  - Tenant admin
  - Auditor admin

  If you are creating a new user who will use OTP-based authentication, select Tenant Admin for the Type of User. OTP is available only to the Tenant Administrator role for App and DB VMs. If an existing user with the Tenant Administrator role will use OTP, you must delete the user account and create a new one. For more details, see "Enable One-Time Password (OTP) Authentication (BUI)" on page 50.



4. **Click Register.**

   The account is created, but is not activated until the new user is approved by the primary admin and supervisor (accounts created during the initial installation). The MCMU sends the primary admin and supervisor an email that includes a secure key that is used to approve the user. See "Approve or Reject a New User (BUI)" on page 47.

   After the primary admin and supervisor approve the account, the new user receives email with a link to the MCMU BUI. Upon the first login, the new user is forced to create a password according to the password policies. See "MCMU Password Policies" on page 41.

Approve or Reject a New User (BUI)

Before a new account is enabled, the MCMU primary admin and supervisor must both approve the new user. See "User Accounts" on page 40.

1. **As the MCMU primary admin or supervisor, obtain the MCMU approval email.**

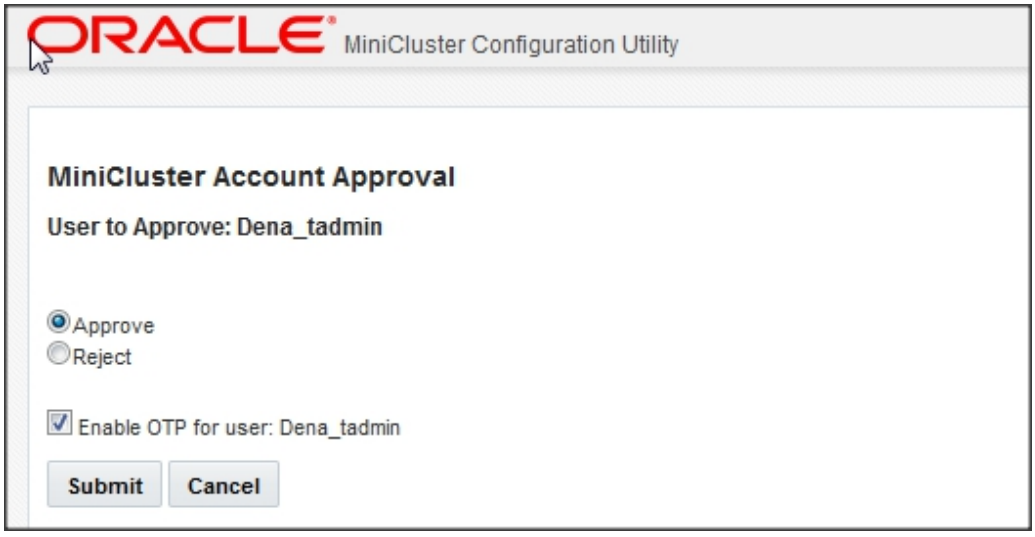
   The email is sent from `mcinstall@`*company-name*.

   Note -If you experience a delay in the email requesting approval of a new user, click your user name and choose the Approval Board in the upper right corner. Verify that the request appears in the Account Creation Request area of the Account Approval Dashboard. Select the user's name and click Next. Select Approve and click Submit to expedite the approval.

2. **In the email, click the approval link (or copy it into a browser).**

3. **Select Approve and select the Enable OTP check box if this user has a Tenant Admin role and requires two-factor authentication.**

   For example:



4. **Click Submit.**

MCMU sends email to the user confirming or denying account activation. If you enabled OTP, that user can now log in with OTP authentication. For more information, see “Enable One-Time Password (OTP) Authentication (BUI)” on page 50.

Change an MCMU User Password (BUI)

Note - The first time a user logs into MCMU, the utility requires the user to enter a new password.

1. **Open a browser on a system that has network access to MiniCluster.**
2. **Type `https://`*node1_name*`/MCMU` in the browser address field.**
   Replace *node1_name* with the name of the MiniCluster compute node 1.
3. **In the login page, enter your user name and password.**
4. **In the upper right corner, click your user name and choose Change Password.**
5. **Enter a new password twice, and click Change Password.**

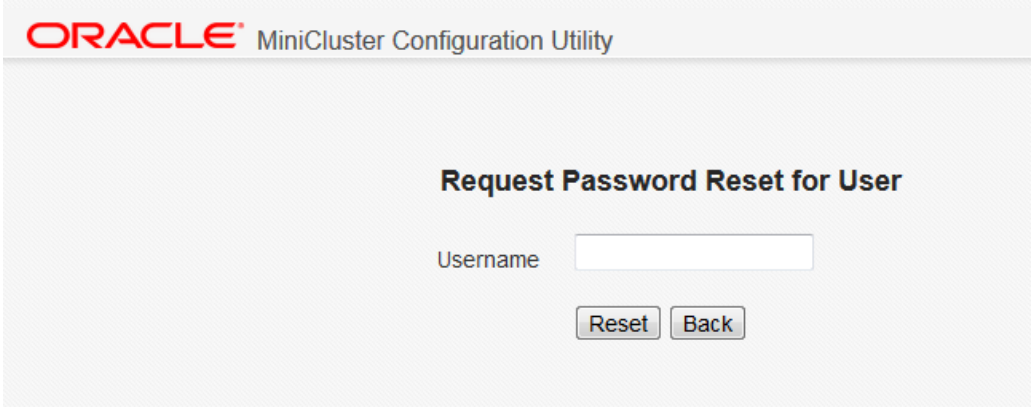
Unlock a User Account and Reset a Password (BUI)

Use this procedure to unlock a locked user account or to reset a password.

Note - The first time a user logs into MCMU, the utility requires the user to enter a new password.

1. **Open a browser on a system that has network access to MiniCluster.**
2. **Type `https://`*node1_name*`/MCMU` in the browser address field.**
   Replace *node1_name* with the name of the MiniCluster compute node 1.

3. **Click Reset Password.**



4. **Enter the user name and click Reset.**

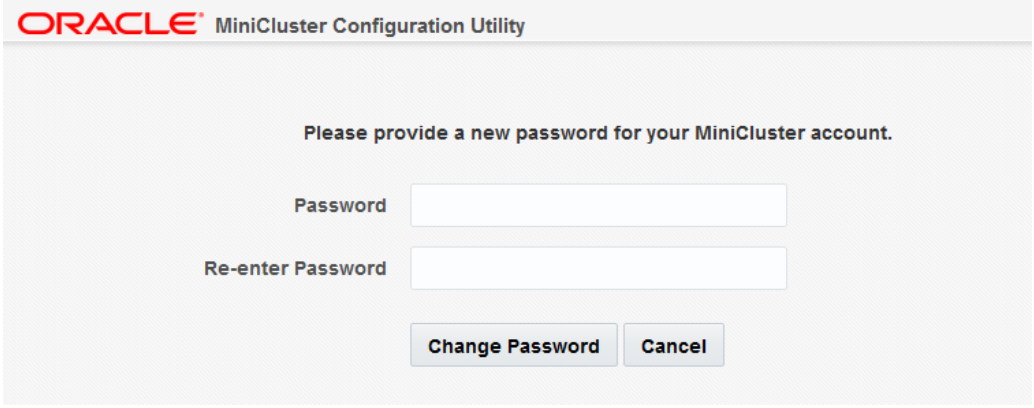
   Email is sent to the MCMU supervisor and primary admin to approve or deny the reset. Once both approvals are submitted to MCMU, you receive an email with a link to MCMU.

5. **Obtain the email approving the password reset.**

   The email is sent to you from `mcinstall@`*mcmu_domainname*.

6. **Log into MCMU with your user name and the temporary password assigned for the reset.**

The utility requires you to create a new password.



7. **Enter a new password twice and click Change Password.**

Enable One-Time Password (OTP) Authentication (BUI)

OTP authenticates a user for a single login or session. OTP supports strong two-factor authentication based on IETF standards, and supports both time and counter-based password. OTP requires access to something a person has (such as a specific mobile device) as well as something a person knows (such as a PIN). OTP is not vulnerable to replay attacks, so it is more secure than a traditional static password.

OTP-based authentication is available for App and DB VMs. If you chose to enable OTP for a user, it is enforced by users registered with the Tenant Administrator role. The users created as primary, secondary, and auditor roles do not support the use of OTP.

You can use SSH to access App and DB VMs with OTP. During the SSH access, the Solaris environment prompts you for your Solaris password, then for the OTP from your mobile authenticator application. You can use the Oracle Mobile Authenticator App or the Google Authenticator App, and you can freely download them from the Apple iOS and Google Android App stores. Oracle MiniCluster's OTP conforms to the HMAC-based and time-based specifications for a OTP, and will work with any authenticator application that conforms to these specifications.

1. **On your mobile device, download the Oracle Mobile Authenticator application.**

You can use the Oracle Mobile Authenticator App or the Google Authenticator App, and you can freely download them from the Apple iOS and Google Android App stores.

2. **Access the MCMU BUI as a new user with the Tenant Administrator role.**

   See “Log in to the MCMU BUI” on page 28.

   If an existing user with the Tenant Administrator role will use OTP, you must delete the user account and create a new one. For instructions, see “Create a New MCMU User (BUI)” on page 44.

3. **On the login page, enter your user name and password.**

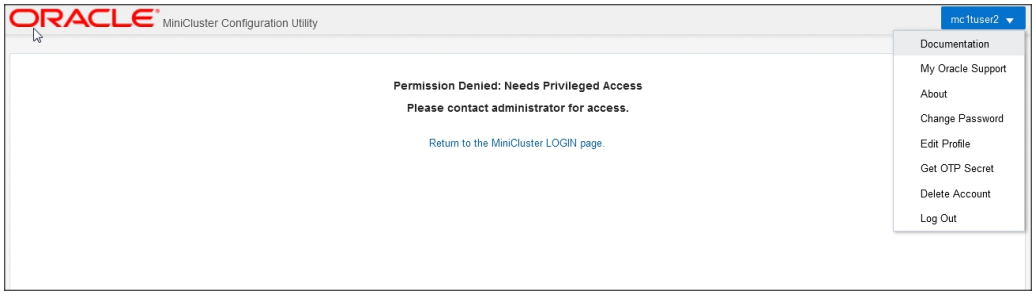
   To use OTP, your user account must be configured with the Tenant Administrator role. See Step 3 in “Create a New MCMU User (BUI)” on page 44.

4. **Create a new password for your account and click Change Password.**

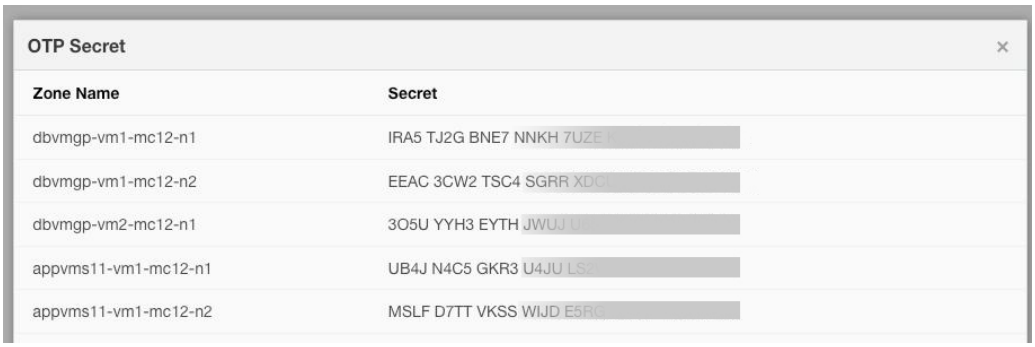
   Type a new password. See “MCMU Password Policies” on page 41.

5. **In the upper right corner, click your user name and choose Get OTP Secret.**

Tip - If you do not see Get OTP Secret in the drop-down menu, verify that you are logged in with a user account with Tenant Administrator privileges.



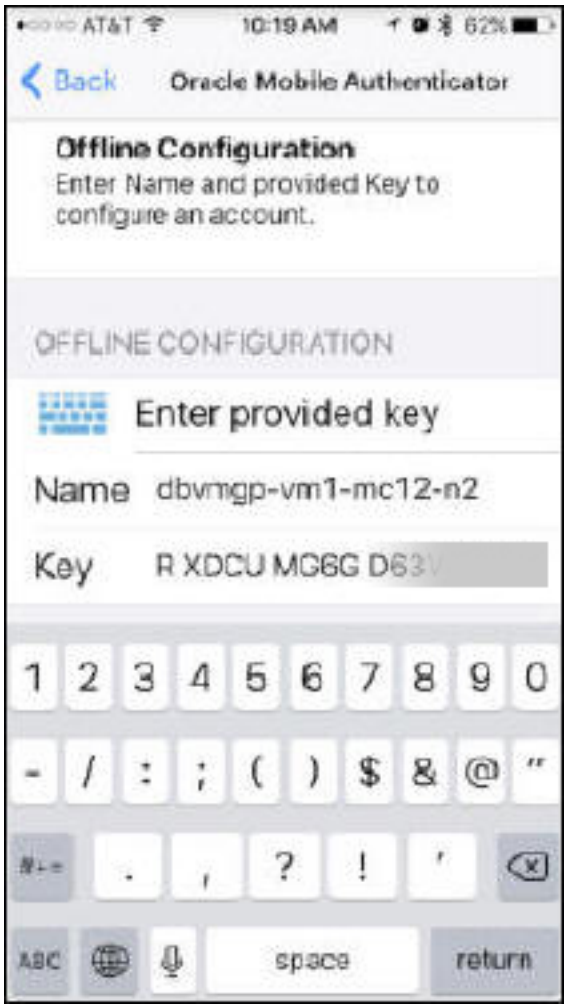
The secret keys for all available VMs are displayed.



6. **On your mobile device, open the Oracle Mobile Authenticator app and click Enter Provided Key.**

7. **On your mobile device, type the zone name and OTP secret key from Step 5.**

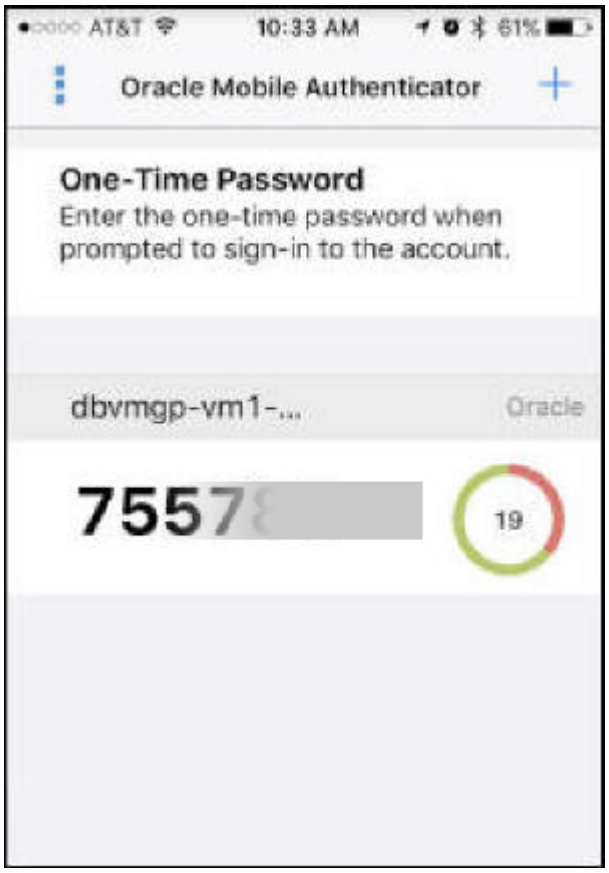
Include the spaces in the OTP key.



8. **On your mobile device, click Add Account.**

Tip - If you do not see the Add Account button on your mobile device, swipe up to remove the keyboard.

After you enter this information, the Oracle Mobile Authenticator starts to generate OTP codes every minute to access the VM.



9. **Log into the MCMU BUI with your user name and the OTP password from your mobile device.**

10. **Use SSH to verify that access to the VM was granted with the OTP.**

    For example, type your Oracle Solaris password and the OTP that was provided.

```
# ssh Dena_tadmin@192.0.2.0
MiniCluster Setup successfully configured
Password:
OTP code:
```

```
Last login: Mon May 17: 9:40:48 2017
ABC Corporation   SunOS5.11   11.3  May 2017
MiniCluster Setup successfully configured
```

Delete a User Account (BUI)

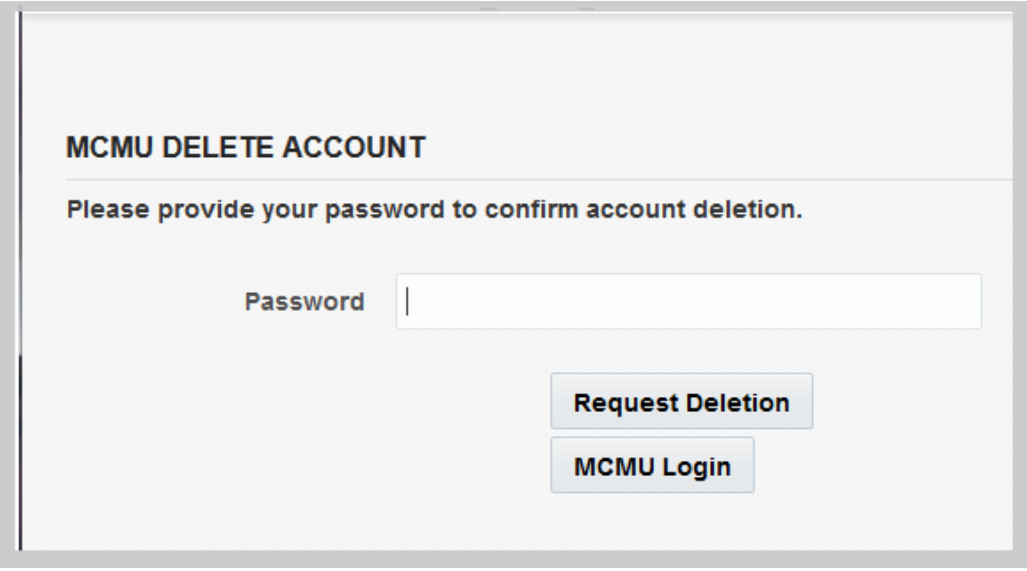
Use this procedure to delete a user account. You must know the user name and password to delete an account through the BUI. The primary admin and supervisor must approve the deletion though email sent from MCMU.

Note - Alternatively, you can delete a user account using the MCMU CLI. See "Delete an MCMU User (CLI)" on page 287

1. **Log into the MCMU BUI as the user you plan to delete.**

   See "Log in to the MCMU BUI" on page 28.

2. **In the upper right corner, click the user name and choose Delete Account.**



3. **Enter your password and click Request Deletion.**

Once the deletion request is approved by the primary admin and supervisor, the account is deleted.

Change a User Profile (BUI)

1. **Log into the MCMU BUI as the user that you plan to change.**

   See "Log in to the MCMU BUI" on page 28.

2. **In the upper right corner, click the user name and choose Edit Profile.**

   The user registration page is displayed.

3. **Enter changes into the registration page.**

4. **Click Save.**

Starting and Stopping the System

These topics describe how to start and stop App and DB components, and how to power on and off the system.

▼ Start the System

This procedure assumes that power is applied to the system, but the compute nodes are shut down (the system is in standby mode). For instructions on how to connect the system to power, refer to the *Oracle MiniCluster S7-2 Installation Guide*.

For additional information about Oracle ILOM, refer to the Oracle ILOM documentation at `http://docs.oracle.com/cd/E37444_01`.

1. **On a system with network access to MiniCluster, log into Oracle ILOM as `root`.**

Note - Start node 1 first because the MCMU is on node 1.

- **Oracle ILOM web interface – In a browser, enter this address, and press Return**

  `http://`*ILOM_hostname_or_ipaddress*

  The Oracle ILOM Login screen is displayed. Log in using your Oracle ILOM root account and password.

- **Oracle ILOM CLI – In a terminal window, enter this information.**

```
% ssh root@ILOM_hostname_or_ipaddress
    root password: ********
->
```

2. **Perform one of these actions.**

   - **Oracle ILOM web interface – Click Host Management → Power Control and select Power On from the Select Action list.**
   - **Oracle ILOM CLI – Enter this command.**

     ```
     -> start /System
     ```

3. **Repeat this procedure to boot the other compute node.**

4. **(Optional) If you are using the Oracle ILOM CLI and you want to connect to the host from Oracle ILOM, start the host console.**

   ```
   -> start /HOST/console
   ```

   Log into the compute node with valid credentials.

   As the compute node boots, messages are displayed on the host console.

5. **Verify the state of the VM components.**

   See:

   - "Obtaining Status (CLI)" on page 223
   - "View System Information (BUI)" on page 64

   When booting is complete, all the configured VMs are available for use. If for some reason any of the VMs are not running, you can manually start them. See "Starting VM Components (CLI)" on page 233.

▼ Shut Down, Reset, or Power Cycle the System

Caution - If the system is not properly shutdown, data corruption can occur.

1. **Notify affected users that the server will be shut down.**

2. **Save any open files and quit all running programs.**

3. **Log into one of the nodes as an MCMU administrator such as `mcinstall`.**

   Do not assume the `root` role.

See "Log in to the MCMU CLI" on page 31.

4. **Stop the DB grid infrastructure.**
   Use this syntax:

   ```
   % mcmu stop -G -n VMgroupname
   ```

   where *VMgroupname* is the name of the DB VM group. To determine the name, see "List a Summary of All DB VM Groups (CLI)" on page 208.
   For example:

   ```
   % mcmu stop -G -n dbgrp1
   ```

5. **Shut down all DB and App VMs.**

   a. **You can shut down VMs in the following ways:**

   - Example of shutting down all VMs in a group:

     ```
     % mcmu stop -V -n VMgroupname
     ```

   - Example of shutting down an individual VM:

     ```
     % mcmu stop -Z -n VMname
     ```

   b. **Verify that all the VM components are stopped on the compute nodes.**
   Example:

   ```
   % mcmu status -Z -a
   ```

6. **Stop the `eshm/omc` SMF service on node 1.**
   The `eshm/omc` SMF service runs on the first node in the global zone. Stopping this service is required before you stop the kernel zones.

   a. **Check to see if the service is running.**
   If the service state is listed as disabled, you don't need to stop the `eshm/omc` service.

   ```
   % svcs eshm/omc
   STATE          STIME    FMRI
   online         May_02   svc:/application/management/eshm/omc:default
   ```

   b. **Become superuser on the first node.**

   ```
   % su -
   ```

```
#
```

c. Stop the service.

```
# svcadm disable eshm/omc
```

d. Check the status until the service state is disabled.

The service might take a few minutes to stop.

```
# svcs eshm/omc
STATE          STIME    FMRI
disabled       10:01:29 svc:/application/management/eshm/omc:default
```

e. Exit superuser.

Type CTRL-D.

7. Stop the GI in the kernel zones.

Use this syntax:

```
% mcmu stop -G -k node x
```

where *x* is 1 or 2.

For example:

```
% mcmu stop -G -k node1
% mcmu stop -G -k node2
```

8. Perform one of these actions:

- **Shutdown the entire system:**

```
% mcmu stop -S
```

- **Shutdown one node:**

```
% mcmu stop -N node_ID
```

9. (For a full power down, perform the remaining steps) From a system with network access to MiniCluster, log into Oracle ILOM on a MiniCluster compute node as root using one of these methods:

- **Oracle ILOM web interface – In a browser, enter this address, and press Return:**

http://*ILOM_hostname_or_ipaddress*

The Oracle ILOM Login screen is displayed. Log in using your Oracle ILOM root account and password.

- **Oracle ILOM CLI – In a terminal window, enter:**

```
% ssh root@ILOM_hostname_or_ipaddress
    root password: ********
->
```

- **Perform one of these actions:**

  - **Oracle ILOM web interface – Click Host Management → Power Control and select the desired operation. For example, select Reset.**

  - **Oracle ILOM CLI – Enter this command:**

```
-> stop /System
```

10. **Repeat the previous step to stop the other compute node.**

11. **Verify the state of the system.**

    See "View System Information (BUI)" on page 64

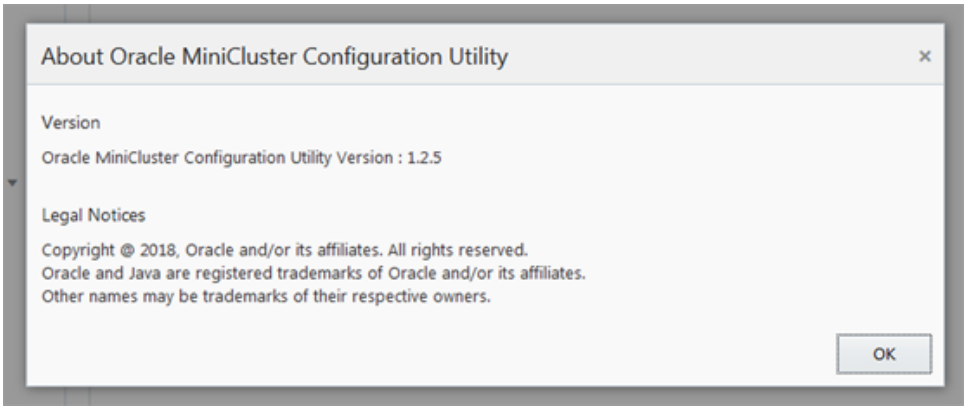
Obtaining System Information (BUI)

These topics describe how to get system information using the MCMU BUI.

▼ Display the MCMU Version (BUI)

1. **Access the MCMU BUI.**
   See "Log in to the MCMU BUI" on page 28.

2. **In the upper right corner, click your user name and choose About.**



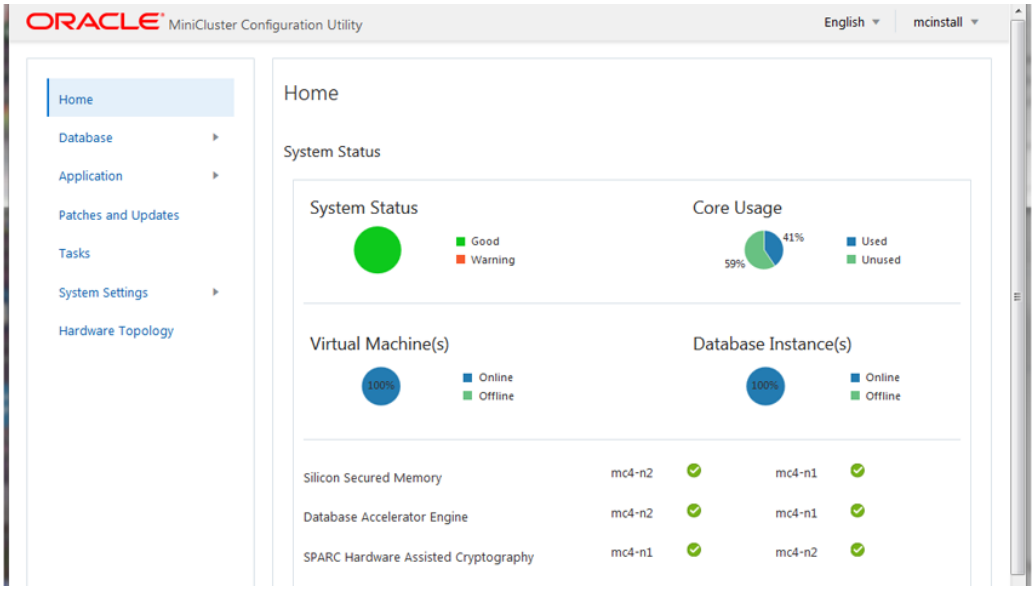
For additional information about software versions, select System Settings → System Information as described in "View System Information (BUI)" on page 64.

View System Information (BUI)

Use this procedure to view specific information about the system, its components, and their current state.

1. **Access the MCMU BUI.**
   See "Log in to the MCMU BUI" on page 28.

2. **In the System Status page, view the system status.**



The System Status panel provides this information:

- **System Status** – Shows a brief status of the system.
- **Core Usage** – Shows the percentage of used and unused cores.
- **Virtual Machines** – Shows the percentage of VMs that are online and offline.
- **Database Instances** – Shows the percentage of DB instances that are online and offline.

- **Silicon Secured Memory** – Indicates whether the feature is functioning on each compute node.
- **Database Accelerator Engine** – Indicates whether the feature is functioning on each compute node.
- **SPARC Hardware Assisted Cryptography** – Indicates whether the feature is functioning on each compute node.

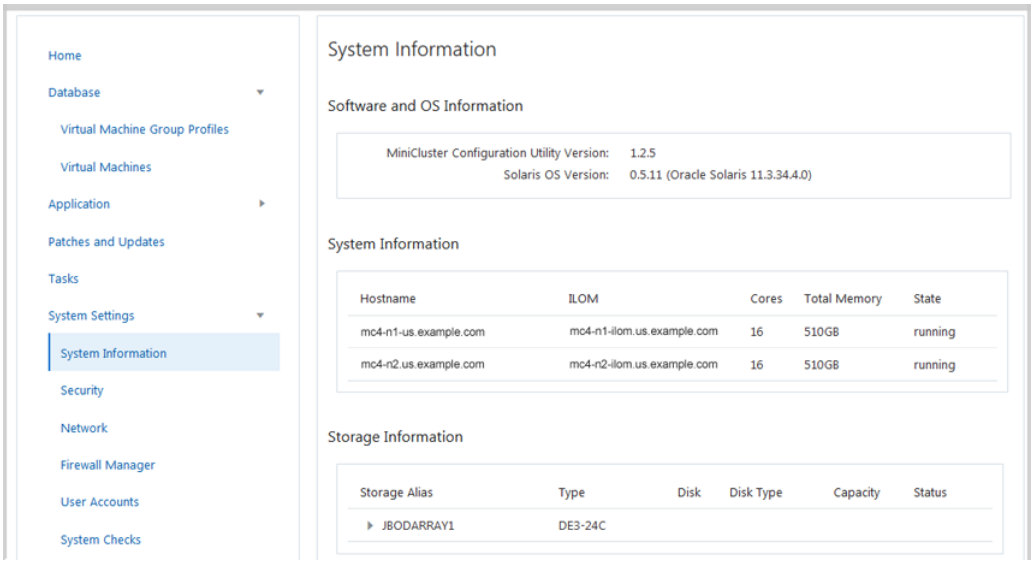
Note - For descriptions of MiniCluster features, refer to the product page at `https://www.oracle.com/engineered-systems/supercluster/minicluster-s7-2/features.html`.

---

3. **In the navigation panel, select System Settings → System Information.**

   The Software and OS Information page is displayed.

   For example:



   This page displays this information:

   - **Software and OS Information** – Shows the MCMU and Oracle Solaris OS versions.
   - **System Information** – Shows the compute node hostnames, Oracle ILOM hostnames, number of cores, memory, and state.

- **Storage Information** – Shows statistics about the storage array. Click the triangle to expand.

View and Update Network Parameters in v1.2.4 and Later (BUI)

Use this procedure to view and update network parameters for MiniCluster systems running v1.2.4 and later.

Note - For MiniCluster systems running v1.2.2 or earlier, see "View and Update Network Parameters in v1.2.2 and Earlier (BUI)" on page 70.

When the system was installed, groups of IP addresses were added to the default IP pool for the future creation of VMs. If those addresses have been consumed, or you want to add additional IP pools on the same or different subnet, perform these actions:

- View the IP parameters.
- Edit IP parameters such as:
  - Gateway IP address
  - Domain name
  - DNS servers
  - NTP servers
  - IP pool IP address ranges
- Add IP pools.
- Delete an IP pool.
- Assign a VLAN ID to an IP pool.

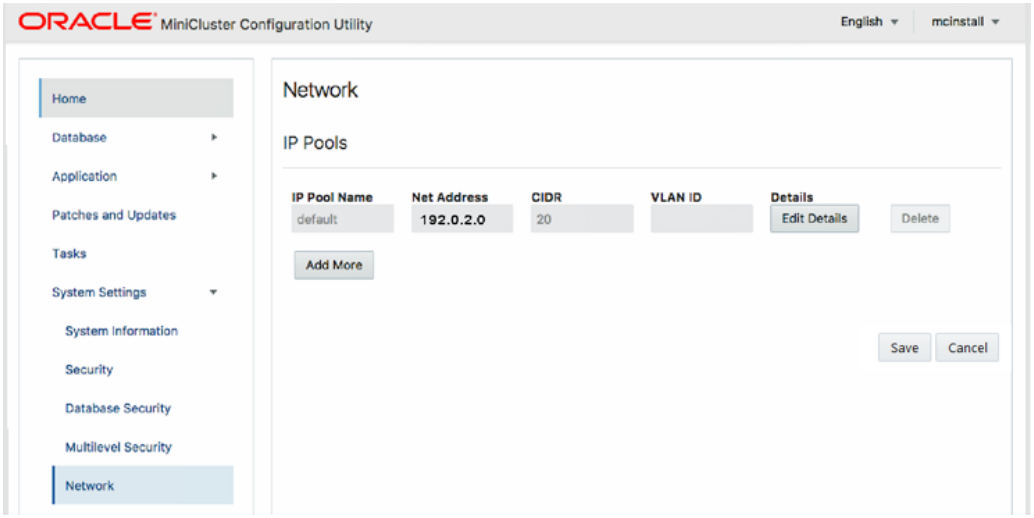
1. **Access the MCMU BUI.**

   See "Log in to the MCMU BUI" on page 28.

2. **In the navigation panel, select System Settings → Network.**

   This page shows the IP pools that are configured in the system.

This example shows the default IP pool which was configured during the initialization of MiniCluster based on what was entered in the offline tool.

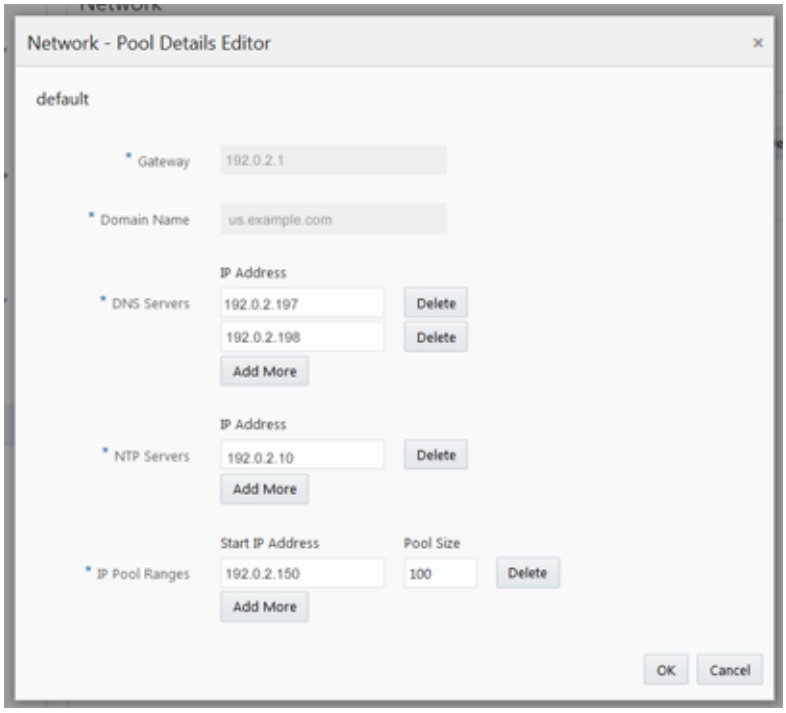


3. **(Optional) Edit, add, delete IP pools, or assign VLAN IDs to IP pools:**

   Perform one or more of these actions:

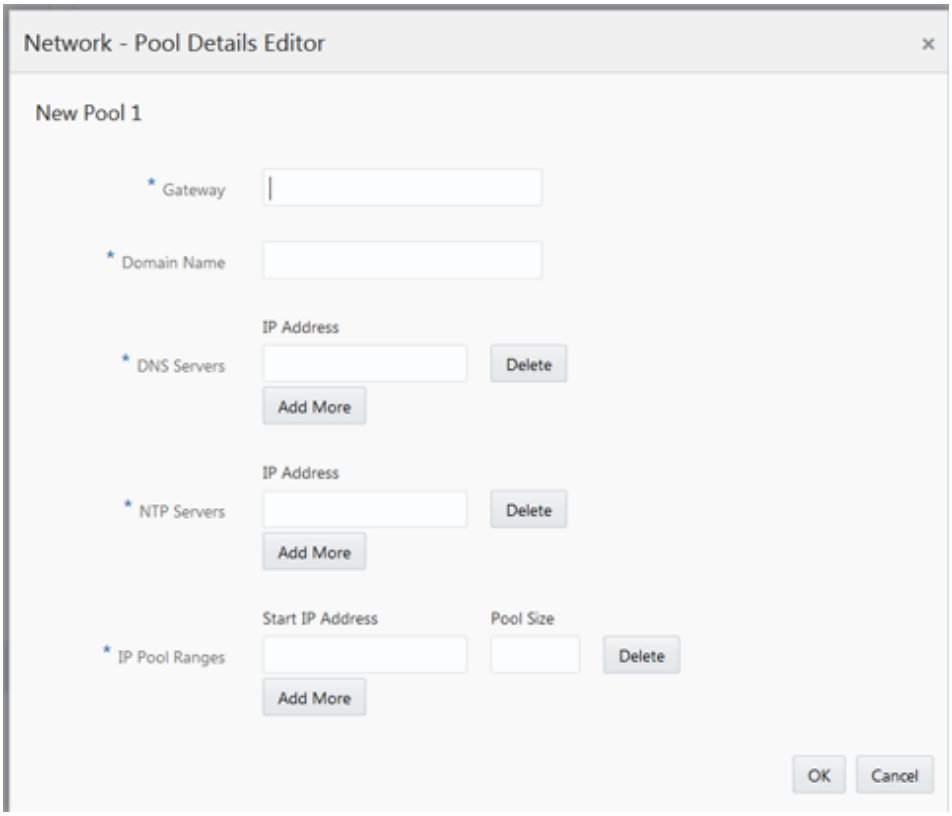
   - **Edit an IP pool:**

     1. For the IP pool you want to change, click Edit Details.
     2. Enter the network parameters.
     3. Click OK.
     4. Click Save, then OK.

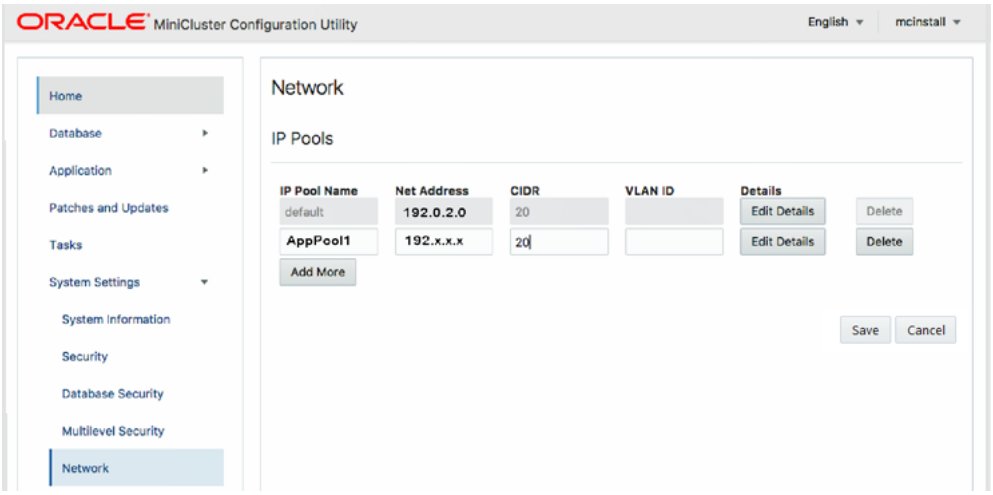


- **Add an IP pool:**

  1. Click Add More.
  2. Enter the IP pool name, net address, CIDR, and (optional) VLAN ID.
  3. Click Edit Details and enter the network parameters.



4. Click OK.
5. Click Save, then OK.



- **Delete an IP pool:**

  1. For the IP pool you want to delete, click Delete.
  2. Click Save, then OK.

  If the Delete button is disabled, IP addresses in that pool are in use and the tool prevents you from deleting the IP pool.

- **Assign a VLAN ID to an IP pool:**

  1. Enter the VLAN ID in the VLAN ID field, and click Save.

View and Update Network Parameters in v1.2.2 and Earlier (BUI)

Use this procedure to view and update network parameters for MiniCluster systems running v1.2.2 and earlier.

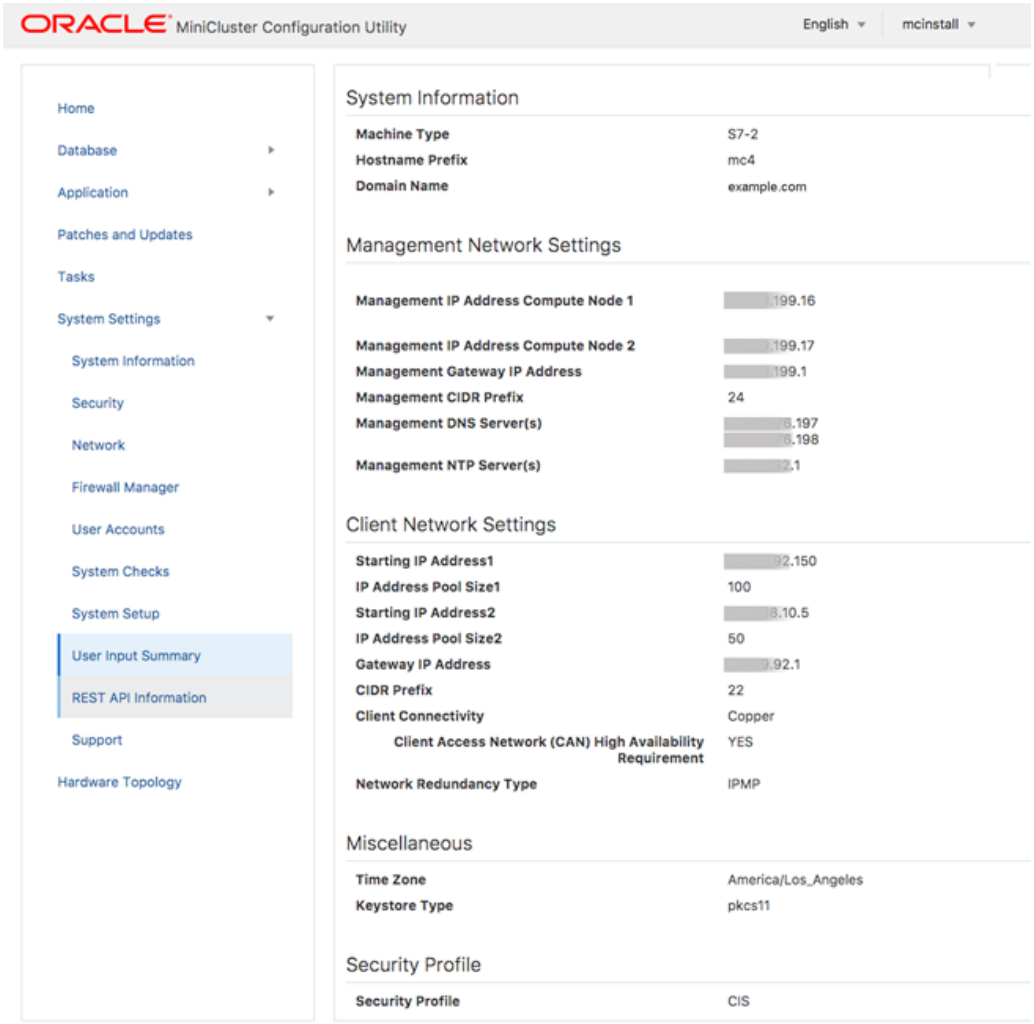
Note - For MiniCluster systems running v1.2.4 or later, see "View and Update Network Parameters in v1.2.4 and Later (BUI)" on page 66.

1. **Access the MCMU BUI.**

   See "Log in to the MCMU BUI" on page 28.

2. **In the navigation panel, select System Settings → User Input Summary.**

   This page shows hostname and network parameters that were configured during the initial installation. For example:



3. **(Optional) Add additional IP addresses.**

When the system was installed, groups of IP addresses were added to the system for the future creation of VMs. If those addresses have been consumed, and you need more addresses, perform these steps.

a. **Under Add IP Range, type the starting IP address and IP pool size.**

b. **Click Add.**

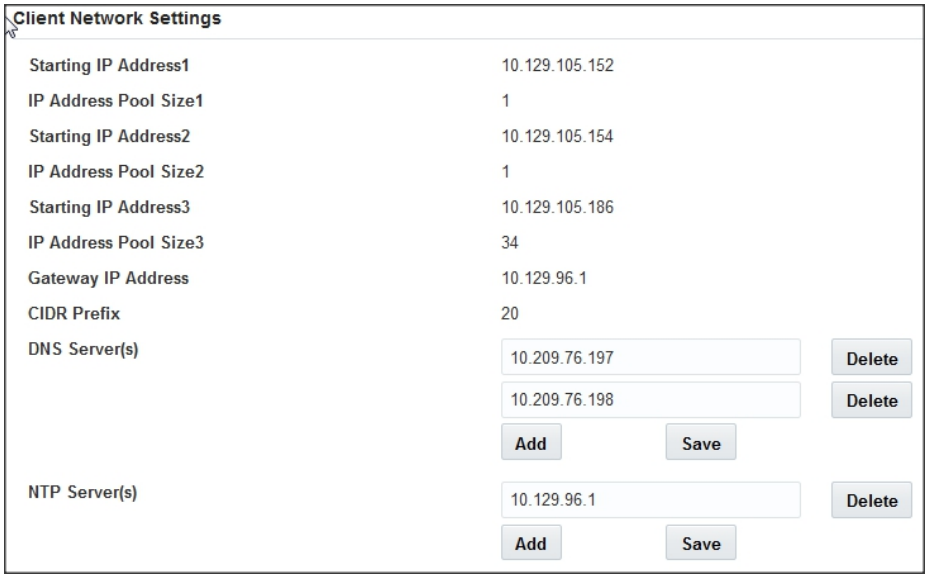
4. **(Optional) Add or remove a DNS server.**

   a. **Add a DNS server.**

      i. **Under Client Network Settings, click Add under the DNS Server entry.**

      ii. **Type the IP address of a DNS server.**

      iii. **Click Save.**



   b. **Remove a DNS Server.**

When the system was installed, IP addresses of available DNS servers were added to the system. If you need to change or remove those IP addresses, perform these steps.

i. **Stop any queries to databases that are dependent on DNS. Consult with your Database Administrator on the best way to do this.**

ii. **Under Client Network Settings on the User Input Summary, click Delete next to the IP address.**

5. **(Optional) Add or remove an NTP server.**

   a. **Add an NTP server.**

      i. **Under Client Network Settings, click Add under the NTP Server entry.**

      ii. **Type the IP address of an NTP server.**

      iii. **Click Save.**

   b. **Remove an NTP Server.**

      When the system was installed, IP addresses of available NTP servers were added to the system. If you need to change or remove those IP addresses, perform these steps.

      i. **Stop any queries to databases that are dependent on NTP. Consult with your Database Administrator on the best way to do this.**

      ii. **Under Client Network Settings on the User Input Summary, click Delete next to the IP address.**

6. **To see the DB VM hostnames and IP addresses, perform these steps:**

   a. **Go to the Database → Virtual Machine Group Profiles page.**

   b. **Click the Edit button.**

      The edit page lists the VM hostname (public hostname) and the associated public IP address for each database VM.

   c. **At the bottom of the page, click Cancel.**

7. **To see the application VM hostnames and IP addresses, perform these steps:**

a. **Go to the Application → Virtual Machine Group Profiles page.**

b. **Click Edit for an application group.**

   The edit page lists the VM hostname (public hostname) and the associated public IP address for each VM.

c. **At the bottom of the page, click Cancel.**

▼ Review or Run Initialization Steps (BUI)

Use this procedure to review the status of the initialization steps that were run when the system was initially installed.

You can also use this procedure to rerun the initialization steps.

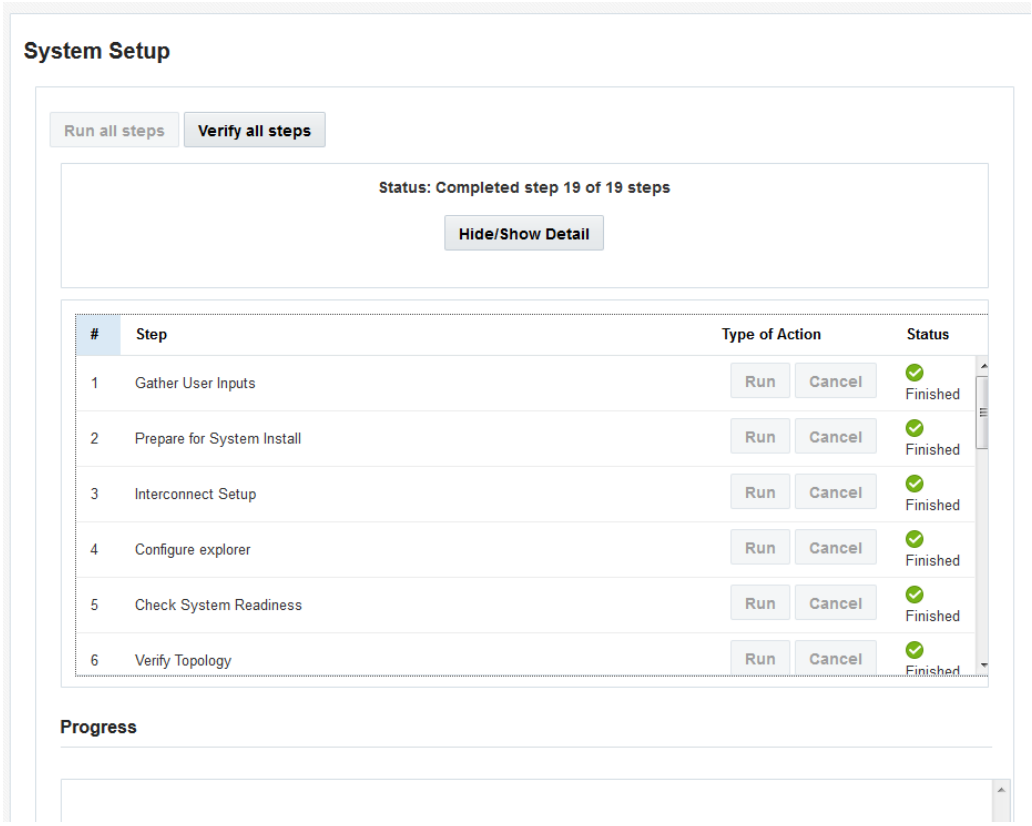
For more information about the initialization process, refer to the *Oracle MiniCluster S7-2 Installation Guide*.

1. **Access the MCMU BUI as a primary admin, such as mcinstall.**

   See "Log in to the MCMU BUI" on page 28.

2. **In the navigation panel, select System Settings → System Setup.**

For example:



The initialization steps are listed with a status of finished or not finished.

3. **If needed, run initialization steps.**

   - **Click Run to run an individual step.**
   - **Click Run all steps to automatically run all the steps.**

   As each step runs, the status is updated.

View the Status of Running Tasks (BUI)

Use this procedure to view that status of the tasks that the utility is performing.

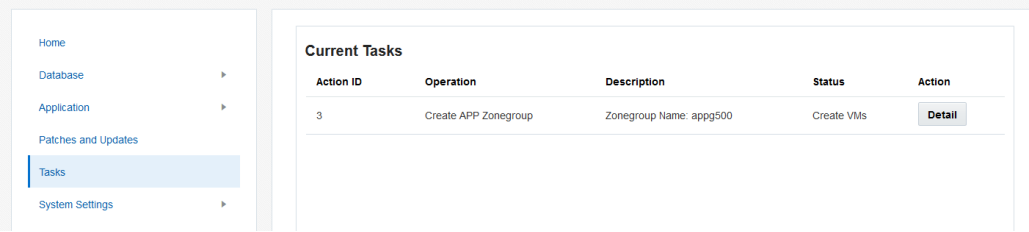
1. **Access the MCMU BUI as a primary admin, such as mcinstall.**

   See “Log in to the MCMU BUI” on page 28.

2. **In the navigation panel, select Tasks.**

   The Current Action Queue page is displayed. If the current action queue is empty, no tasks are currently being performed by the utility.

   For example:



3. **For additional details about the activity, click Detail.**

   After you dismiss the details window, the action is cleared.

4. **To clear an action, click Clear.**

Planning to Create VMs

These topics provide information about planning the configuration of VMs.

Description	Links
Plan the overall configuration.	“Configuration Planning Overview” on page 77
Plan DB VMs.	“DB VM Planning Worksheets (Optional)” on page 78 “DB VM Group Parameters” on page 81 “DB VM Parameters” on page 85 “DB Home Parameters” on page 88 “DB Instance Parameters” on page 90
Plan App VMs.	“App VM Planning Worksheets (Optional)” on page 93 “App VM Group Parameters” on page 94

Configuration Planning Overview

You can create, edit, and delete DB and App VMs at any time. However, if you want to plan for the overall configuration of the system, make these decisions:

1. Determine if VMs have already been created on the system.

   The MiniCluster installation process automatically prompts the installer to create VMs.

   - **DB VMs** – See “View the DB VM Group and VMs (BUI)” on page 99.
   - **App VMs** – See “View App VM Groups and VMs (BUI)” on page 133.
2. Determine the number of DB VMs and App VMs to create, keeping these points in mind:
   - **Total VMs** – You can create a maximum of 12 VMs on each node (24 total).
   - **Number of DB VMs** – You can configure a maximum of 4 DB VMs on each node (8 total).

- **Number of App VMs** – The maximum number of App VMs per node is 12 minus the number of DB VMs you plan to have.

  For example, if you create 4 DB VMs on each node, you can therefore create a total of eight App VMs per node. Another example is to create a 1 DB VM on each node, therefore creating a total of 11 App VMs per node.

As you create VMs, MCMU keeps track of used resources and only enables you to create VMs and assign cores that are available. You do not need to plan to use all the resources at one time. If resources are available, you can add more VMs later.

Note - If you are not sure exactly how many VMs to create, you can skip the planning, create VMs to see how it works, then edit, delete and recreate VMs until you have the configuration that meets your needs.

---

3. Determine how the VMs will be grouped.

   VMs in a group share certain resources such as database installations, shared storage, and so on. For further details, see "DB VM Group Parameters" on page 81 and "App VM Group Parameters" on page 94.

   - **DB VMs** – All the DB VMs are automatically created in one DB VM group, and only one group is supported.
   - **App VMs** – You can include one or two (one on each node) App VMs in a group. You can have as many App VM groups as there are resources to support them.
4. Determine the details for each VM.

   Details include things like number of cores, host names, database versions, instance configurations, and more. For a list of configuration details, review these planning worksheets:

   - **DB VMs** – See "DB VM Planning Worksheets (Optional)" on page 78.
   - **App VMs** – See "App VM Planning Worksheets (Optional)" on page 93.

DB VM Planning Worksheets (Optional)

You can use these planning worksheets to plan the creation of DB VMs, and to anticipate the configuration information that you are asked to provide.

For more details about a particular parameter, click the parameter.

TABLE 1 Worksheet for a DB VM Group Profile

Parameter	Your Value
"VM Group Name" on page 82 1 - 12 lowercase alpha/numeric and - (hyphen) characters	
"Shared Storage" on page 82 No or Yes	
"Number of VMs on Each Node" on page 83 0 - 4 per node	**Node 1:** **Node 2:**
"Security Profile" on page 82 CIS equivalent, PCI-DSS, or DISA STIG	
"Role Separation" on page 83 No or Yes If No, define: ■ (Optional) Specify a non-default ID for the oracle user. Default is 200. If Yes, define a name and ID for these items: ■ Grid ASM Home OS user ■ ASM DBA Group ■ ASM Home Oper Group ■ ASM Home Admin Group ■ Base directory for Grid ASM user ■ RDBMS DBA Group ■ RDBMS Home Oper Group ■ ASM Home Admin Group ■ Base directory for Home OS user	
(v1.2.4 and later) Name of the "IP Pool" on page 83 assigned to this VM group.	
"Group Description" on page 85 Optional descriptive text	

TABLE 2 Worksheet for DB VMs, Clusters, Homes, and Instances

Parameter	Node 1				Node 2			
	VM 1	**VM 2**	**VM 3**	**VM 4**	**VM 1**	**VM 2**	**VM 3**	**VM 4**
Assign a "Public Hostname" on page 86								

Parameter	Node 1				Node 2			
1-25 lowercase alpha/ numeric and - (hyphen) characters								
"Number of Cores" on page 86 If assigned: 1 - 12 max. cores available per node for both DB and APP VMs For a VM to use shared cores, specify 0 (zero).								

"Password" on page 86s for:
 	
`oracle`
 	
`mcinstall`								

CLUSTER PARAMETERS								
"SCAN Name" on page 87 for the cluster.								
GI patch level (Select from what is presented in a drop-down list)								
"System Disk Group" on page 87 (formerly called ASM Redundancy) Normal or High								
"DATA/RECO Disk Group Split" on page 87								
HOME PARAMETERS								
"Oracle Database Version" on page 88 **Note -** Create one home for each DB version you need.	Version for the first home: (Optional) Versions for additional homes:							
INSTANCE PARAMETERS								
"New Instance or Import Existing Instance" on page 90								

Parameter	Node 1	Node 2
"Template Type" on page 90 DW, OLTP, or Custom		
"Instance Type" on page 91 Single, RAC, or RAC-ONE-Node		
VMs assigned to this instance		
"Container DB" on page 92 Y/N		
"PGA Memory Space" on page 93 Default or custom value in MB		
"SGA Memory Space" on page 93 Default or custom value in MB		
"Character Sets" on page 93 Select from menu		
"Instance Name" on page 93 1 - 8 lowercase alpha/ numeric characters		

DB VM Group Parameters

This section describes the parameters you define when you create a DB VM group profile. Use this information in conjunction with these activities:

- When planning DB VMs, described in "DB VM Planning Worksheets (Optional)" on page 78.
- While creating the DB VM group profile with the MCMU BUI, as described in "Create a DB VM Group Profile (BUI)" on page 103 or "Create a DB VM Group Profile (CLI)" on page 247.

VM Group Name

The VMs are logically grouped (see “MiniCluster VM Groups and VMs Overview” on page 23. During the configuration process, you specify a group profile name of your choice. The name can be up to 12 characters, and can contain lowercase letters, numbers, and the - (hyphen) symbol. Later, the VM group name is automatically used as a prefix in the VM hostnames, so specifying a short name can lead to shorter VM names.

Shared Storage

All DB VMs are allocated with storage space (the amount of storage depends on the type of instances configured in the VM). The shared storage provides additional storage, if enabled.

6 HDDs on each storage array are set aside for additional storage space (see “MiniCluster Storage Overview” on page 25).

- If enabled – All the VMs in the group have access to the shared storage.
- If disabled – The VMs will not have access to the shared storage space in the 6 HDDs.

Note - After the creation of VMs, you can enable or disable access to the shared storage at any time. See “Enable or Disable NFS (BUI)” on page 149.

Security Profile

You define a security profile that is applied to the VMs in the group. The security profile automatically configures the system with over 225 security controls. Choose on of these profiles:

- **CIS Equivalent Profile** – Satisfies requirements comparable and equivalent to benchmarks set forth by the Center for Internet Security (CIS) and Security Technical Implementation Guidelines (STIG) assessments.
- **PCI-DSS Profile** – Complies with the Payment Card Industry Data Security Standard (PCI DSS) standard defined by the Payment Card Industry Security Standards Council.
- **DISA STIG Profile** – Includes all the security features of the CIS equivalent Security profile and provides 75 additional security controls. This profile also includes FIPS-140-2 cryptography.

Note - If the system is configured with the DISA STIG profile (performed during the installation), all VMs that are subsequently created should also be configured with the DISA STIG profile.

IP Pool

An IP pool is a range of IP addresses. Each IP pool is a separate subnet. As of v1.2.4, you can create multiple IP pools, then assign different VM groups to different IP pools. You can also assign a VLAN ID to an IP pool.

Create the IP pools before creating the DB VM group. See “View and Update Network Parameters in v1.2.4 and Later (BUI)” on page 66.

Number of VMs on Each Node

You choose between one to four VMs on each node for a maximum of eight DB VMs. For Oracle RAC configurations, ensure that you specify VMs on each node.

You can always change the number of VMs later. See “Add a DB VM to a Group (BUI)” on page 123.

Role Separation

This feature enables you to create a single administrative user, or to create two separate DB administrative users with separate roles (separating ASM administration from RDBMS administration). Separate roles might be required by certain third-party applications.

If you choose to create one administrative user, that user is the Oracle DB Installation user for all Oracle DB software and is a member of the groups needed to perform administration of the grid infrastructure and to administer the DB.

If you choose role separation, two users are created, each a member of different groups so that each user is only able to administer either the ASM grid infrastructure, or the DB.

Based on your selection, the utility automatically provides industry standard values for user and group names, IDs, and file system base.

- **No** – Configures one DB administrative user (`oracle`) with privileges to administer the ASM and RDBMS. These pre-assigned fields are displayed:

  Note - Even when no role separate is selected, the user can choose to provide a new user ID for the oracle user. For example, when the Use default Oracle User ID is selected.

  User Name and Base

  - Name – `oracle`
  - ID – `1001`
  - Base – `/u01/app/oracle`

  DBA Group

  - Name – `dba`
  - ID – `1002`

  OINSTALL Group

  - Name – `oinstall`
  - ID – `1001`

- **Yes** – Enables role separation, and configures these pre-assigned DB administrator users and roles.

  Grid ASM Home OS User and Base

  - Name – `oracle`
  - ID – `1001`
  - Base – `/u01/app/oracle`

  ASM DBA Group

  Membership in this group enables access to the files managed by Oracle ASM.

  - Name – `asmdba`
  - ID – `1004`

  ASM Home Oper Group

  This group of operating system users has a limited set of Oracle instance administrative privileges including starting up and stopping the Oracle ASM instance.

  - Name – `asmoper`
  - ID – `1005`

ASM Home Admin Group

This group uses SQL to connect to an Oracle ASM instance as SYSASM using operating system authentication. The SYSASM privileges permit mounting and dismounting of disk groups, and other storage administration tasks. SYSASM privileges provide no access privileges on an Oracle Database instance. The SYSASM privileges permit mounting and dismounting of disk groups, and other storage administration tasks. SYSASM privileges provide no access privileges on an Oracle Database instance.

- Name – `asmadmin`
- ID – `1006`

RDBMS Home OS User and Base

- Name – `oracle`
- ID – `1000`
- Base – `/u01/app/oracle`

RDBMS DBA Group

- Name – `dba`
- ID – `1002`

RDBMS Home Oper Group

- Name – `oper`
- ID – `1003`

ASM Home Admin Group

- Name – `oinstall`
- ID – `1001`

Group Description

You can leave the field blank, or add a description that briefly describes the DB VM group.

DB VM Parameters

This section describes the DB VM parameters you define while creating the DB VM group profile. Use this information in conjunction with these activities:

- Planning DB VMs, as described in "DB VM Planning Worksheets (Optional)" on page 78.
- Creating DB VM group profile with the MCMU BUI, as described in "Create a DB VM Group Profile (BUI)" on page 103, or CLI described in "Create a DB VM Group Profile (CLI)" on page 247.

Public Hostname

For each VM, specify a unique hostname. This is the name that you add to your DNS. It is the hostname that is used for client access to the VM.

The hostname can be up to 25 alpha-numeric characters and include the - (hyphen) symbol.

Number of Cores

For each VM, specify the number of cores (0 - 12). Before the creation of VMs, there are 24 cores available (12 on each node that are available for VMs). MCMU keeps track of how many cores are assigned to VMs and only enables you to select a number from what is available.

Cores that are not assigned to VMs are pooled together and are available as shared cores.

If you select 0 (zero) cores, the VM uses shared cores. After the DB VM group is deployed, you can change the number of cores on the VMs. See "Edit a DB VM Group Profile (BUI)" on page 121.

Password

For each VM, set a password for the `oracle` user and `mcinstall` user.

If you select 

, MCMU sets the password to a default value (see "User Accounts" on page 40).

For details about MCMU users, see "User Accounts" on page 40. Password policies vary based on the security profile that was selected. See "MCMU Password Policies" on page 41 and "Security Profile" on page 82.

SCAN Name

When you create database clusters, the VMs from both compute nodes are clustered together. Provide a SCAN name for the database cluster that you are setting up.

SCAN is a feature used in Oracle RAC configurations. The SCAN provides a single name for clients to access any database running in a cluster. MCMU provides a default SCAN, or you can specify your own name. The SCAN must be a name that is up to 15 characters long. You can use lowercase letters, numbers and the - (hyphen) symbol.

GI Patch Level

The MCMU BUI provides a list of patch levels that you can choose.

System Disk Group

Select the level of redundancy that you want for the Oracle Cluster Registry (OCR) voting disk group, or SYSTEM disk group. Choose one of these levels:

- **Normal** – Provides three voting disks.
- **High** – Provides five voting disks.

Data Disk Group

In the Define Cluster page, the data disk group redundancy level is displayed. The value is based on what was selected for “System Disk Group” on page 87 in a previous page.

DATA/RECO Disk Group Split

You can configure the percentage of storage that the DATA disk group and RECO disk group use. The default is 80% DATA, 20% RECO.

Use the slider to assign percentage values in 10% increments.

Note - The percentage number shown is the amount for DATA, with the remaining percentage applied to RECO.

REDO Disk Group

In the Define Cluster page, the REDO disk group redundancy level is displayed. This disk group is always configured for high redundancy (provides protection against two disk failures).

RECO Disk Group

In the Define Cluster page, the RECO disk group redundancy level is displayed. The value is based on what was selected for “System Disk Group” on page 87 in a previous page.

DB Home Parameters

This section describes the parameters you define while creating the DB VM homes. Use this information in conjunction with these activities:

- Planning DB VMs, as described in “DB VM Planning Worksheets (Optional)” on page 78.
- Creating a DB VM home with the MCMU BUI, as described in “Create DB Homes (BUI)” on page 115, or CLI described in “Create DB Homes (CLI)” on page 252.

Oracle Database Version

When you configure a database home, you are provided with a choice of selecting from a variety of Oracle Database versions such as the following:

- 11g
- 12c (also available in Standard Edition)
- 12.2 Standard Edition 2
- 18c
- 18.3 Standard Edition 2

- 19c

For information about specific patch levels for the different versions, refer to MOS ID 2153282.1 on My Oracle Support.

The availability of a particular version depends on when the MiniCluster Component Bundle was downloaded at installation time, or when bundles are downloaded for patching and updating (see "Updating and Patching MiniCluster Software (BUI)" on page 177.

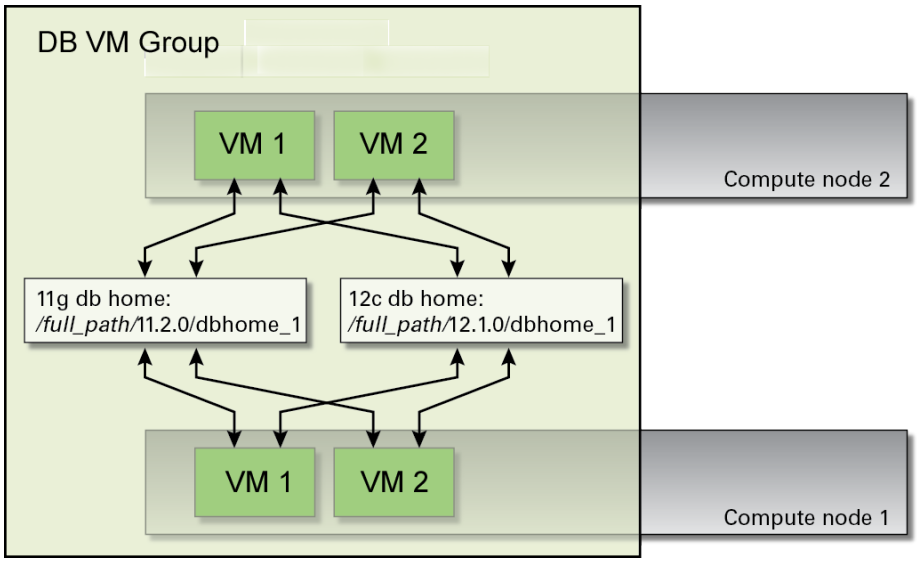
If a particular version is not available at the time that you configure the DB homes, you can eventually upgrade to later versions using the MiniCluster Updating feature.

Each home provides one database version, but you can install multiple homes in a DB VM group. The DB homes you create determine the specific versions of the Oracle Database that are available to each DB instance.

Once the DB home is created, the utility allocates these resources for each DB VM:

- **ZFS root file system** – 40 GB.
- **Database directory** – 100 GB ZFS file system mounted on /u01.
- **DB REDO Logs** – Configured for high redundancy on the storage array.
- **Client network** – 1 virtual network.

This figure shows an example of a DB VM group with two DB homes.



Oracle Home Path

Is the directory path for the Oracle Database. The default is `/u01/app/oracle/product/`*release_number*`/dbhome_`*number*. Accept the default or change the name used for the dbhome_*number*.

Patch Level

Select a version from the drop-down list.

DB Instance Parameters

This section describes the parameters you define while creating the DB VM instances. Use this information in conjunction with these activities:

- Planning DB VMs, as described in "DB VM Planning Worksheets (Optional)" on page 78.
- Creating instances with the MCMU BUI, as described in "Create DB Instances (BUI)" on page 117, or CLI described in "Create DB Instances (CLI)" on page 255.

New Instance or Import Existing Instance

If you choose to create a new instance, MCMU creates a new instance. You are prompted to enter various database parameters such as the instance name, DB type, RAC or single instance, and other parameters.

If you choose to import an existing instance, you specify another instance on the system that will be used to create this instance. The instance must be an instance that was not created using MCMU. You are prompted to enter the instance name, and all the DB parameters are defined by the imported instance.

Template Type

For each DB instance, define the type of DB:

- **DW** – Creates a data warehouse type database, commonly used for analytic workloads.
- **OLTP** – Creates an online transaction processing type database, commonly used for business transaction workloads.
- **Custom** – If selected, you are prompted to browse to a DB template that you provide.

Instance Type

For each DB instance, define the type of instance:

- **Single** – Creates a single database instance on one VM on one compute node.
- **RAC** – Creates an active-active clustered database instance (two VMs) across both compute nodes.
- **RAC One Node** – Creates an active-passive clustered database instance (two VMs) across both compute nodes.

These figures illustrate some examples.

FIGURE 1 Single Instance Example

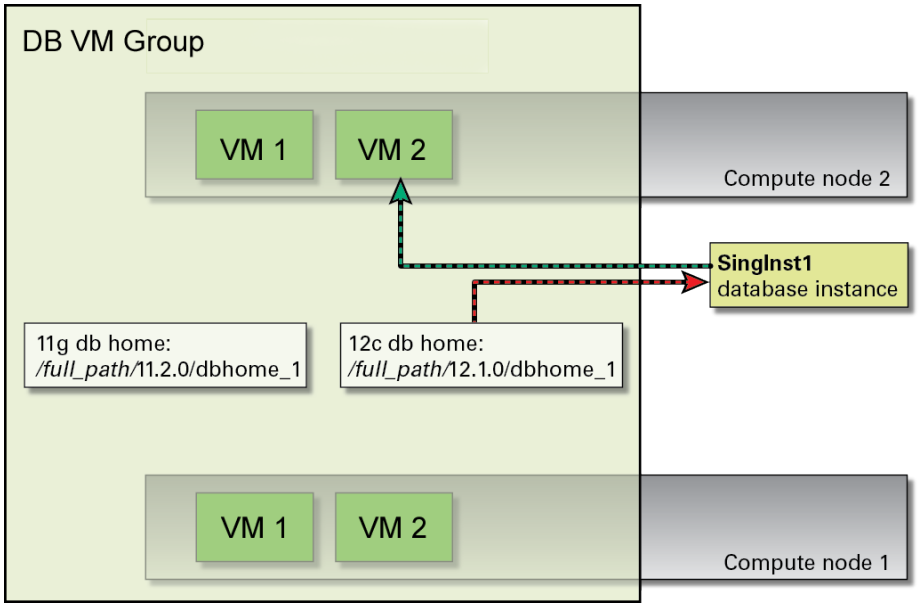
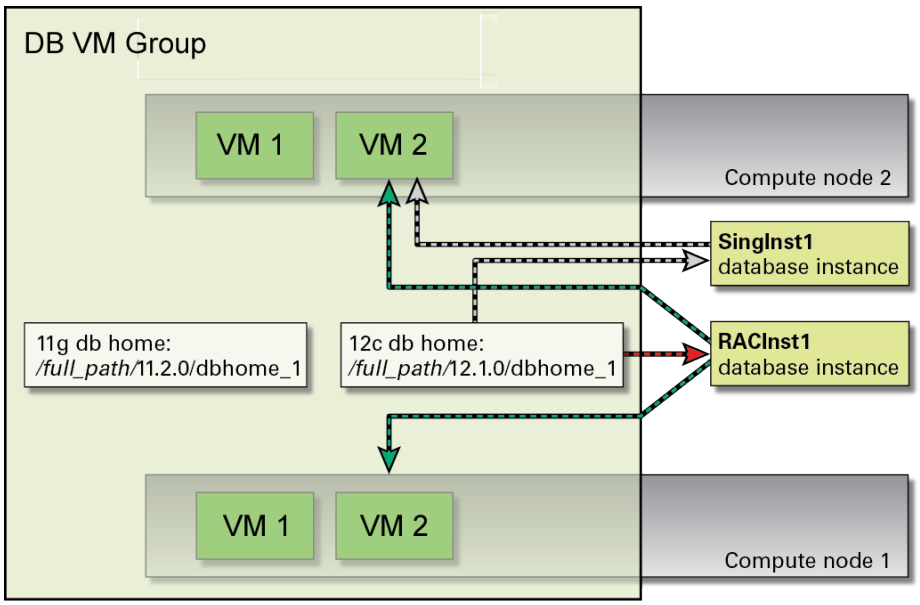


FIGURE 2 RAC Instance Example



Database Instance Version

If multiple homes were created, you select the version of the Oracle Database for this instance. If only one home was created, MCMU automatically uses the database version that is available.

Container DB

This feature enables a single container database to host multiple separate pluggable databases (only selectable for DB versions supporting this feature)

PGA Memory Space

You have the option to specify the size of the PGA (memory for the server processes for the instance), or accept the default value.

SGA Memory Space

You have the option to specify the size of the SGA (memory shared by the processes in the instance), or you can accept the default value.

Character Sets

You have the option to assign the database and national character sets for the instance. If you choose the Recommended option, MCMU assigns the character set.

Instance Name

Each instance must be named. Specify a unique name that is up to 8 characters long. You can use alpha and numeric characters (no special characters).

App VM Planning Worksheets (Optional)

You can use these planning worksheets to plan the creation of App VMs, and to anticipate the configuration information that you are asked to provide.

For more details about a particular parameter, click the parameter.

TABLE 3 Worksheet for an App VM Group Profile

Parameter	Your Value
"VM Group Profile Name" on page 95 1 - 12 lowercase alpha/numeric and - (hyphen) characters	

Parameter	Your Value
"Description" on page 95 Optional descriptive text	
"Number of VMs" on page 95 pair or single	
"Shared Storage" on page 95 Y/N	
"VM Type" on page 96 Oracle Solaris 11.4, 11.3, or Oracle Solaris 10	
"Enable Security" on page 97 (only applies to Oracle Solaris 10 VMs) JASS or none	
(v1.2.4 and later) Name of the "IP Pool" on page 97 assigned to this VM group.	

TABLE 4 Worksheet for App VMs

Parameter	App VM 1	App VM 2
"Public Hostname" on page 97		
"Cores" on page 97 If assigned: 1 - 12 max. cores available per node (for both DB and APP VMs) For a VM to use shared cores, specify 0 (zero).		
Plan to set a "Password" on page 98 for the `oracle` and `mcinstall` users on this VM.		
"Define Cluster" on page 98 Y/N If yes, provide a SCAN.		

App VM Group Parameters

This section describes the parameters you define when you create an App VM group profile. Use this information in conjunction with these activities:

- Planning App VMs, as described in "App VM Planning Worksheets (Optional)" on page 93.
- Creating App VM group profile with the MCMU BUI, as described in "Create an App VM Group Profile (BUI)" on page 135, or CLI described in "Configuring Application VMs (CLI)" on page 275.

VM Group Profile Name

During the configuration process, you specify a group profile name of your choice. The name can be up to 12 characters, and can contain lowercase letters, numbers, and the - (hyphen) symbol. Later, the VM group name is automatically used as a prefix in the VM hostnames, so specifying a short name can lead to shorter VM names.

Description

You can specify an optional description of the VM group.

Number of VMs

You choose one of these options.

- Pair – The utility configures two application VMs (one on each node) in the group.
- Single – The utility configures one VM in the group.

Shared Storage

All App VMs are allocated with storage space. The shared storage provides additional storage, if enabled.

6 HDDs on each storage array are set aside for additional storage space (see “MiniCluster Storage Overview” on page 25).

- If enabled – All the VMs in the group have access to the shared storage.
- If disabled – The VMs will not have access to the shared storage space in the 6 HDDs.

Note - After the creation of VMs, you can enable or disable access to the shared storage at any time. See “Enable or Disable NFS (BUI)” on page 149.

For systems in highly secure environments, do not enable shared storage. For additional security information, refer to the *Oracle MiniCluster S7-2 Security Guide*.

Security Profile

For current versions of MCMU, the security profile is automatically configured for each Oracle Solaris 11 VM based on what was selected for the system during the initial configuration. The following list describes the security profiles that can be selected at install time:

- **CIS Equivalent** – Satisfies requirements comparable and equivalent to benchmarks set forth by the Center for Internet Security (CIS) and Security Technical Implementation Guidelines (STIG) assessments.
- **PCI-DSS** – Complies with the Payment Card Industry Data Security Standard (PCI DSS) standard defined by the Payment Card Industry Security Standards Council.
- **DISA STIG** – Builds on the CIS Equivalent security profile and introduces 75 additional security controls, and includes FIPS-140-2 cryptography.

VM Type

Select one of the to assign the VMs with an OS version:

- **Solaris 11 Native Zone** – Configures Oracle Solaris 11 OS for the App VM. This is a native OS installation because the version is the same as what is installed in the global zones. Choose this VM type if you plan to use the App VM clustering feature.
- **Solaris 10 Branded Zone** – (Introduced in software v1.1.25) Configures Oracle Solaris 10 OS for the App VM. This is a branded OS installation because the version is different than what is installed in the global zones. Branded zones are usually used when applications require a specific OS version.

  Oracle provides quarterly Critical Patch Updates (CPUs) for Oracle Solaris 10, including Solaris 10 Containers (Branded Zones). Review the knowledge articles titled *How to find the Oracle Solaris Critical Patch Update (CPU) Patchsets, Recommended OS Patchsets for Oracle Solaris and Oracle Solaris Update Patch Bundles* (Doc ID **1272947.1**) and *How Patches and Updates Entitlement Works* (Doc ID **1369860.1**). Both articles are available at My Oracle Support. Take any actions necessary to patch applicable Oracle Solaris 10 Branded Zone virtual machines.

Note - For two VM configurations, MCMU automatically configures both VMs with the same VM type.

Enable Security

(Only for Oracle Solaris 10 branded zones) If selected, an Oracle Solaris 10 security service called Java Authentication and Authorization Service (JASS) is assigned to the VMs.

JASS hardens and minimizes the OS attack surface. The configuration is based on the Solaris Security Toolkit, which enforces security controls such as RBAC, allow-listed ports, protocols and services, and ensures that unnecessary services are disabled.

For more information about JASS, refer to the JASS Reference Guide at `https://docs.oracle.com/javase/8/docs/technotes/guides/security/jaas/JAASRefGuide.html`.

Note - For two VM configurations, MCMU automatically configures both VMs with or without the security service based on your selection.

IP Pool

An IP pool is a range of IP addresses. Each IP pool is a separate subnet. As of v1.2.4, you can create multiple IP pools, then assign different VM groups to different IP pools. You can also assign a VLAN ID to an IP pool.

Create the IP pools before creating the App VM group. See “View and Update Network Parameters in v1.2.4 and Later (BUI)” on page 66.

Public Hostname

For each VM, specify a unique hostname. This is the name that you add to your DNS. It is the hostname that is used for client access to the VM.

The hostname can be up to 32 lowercase alpha-numeric characters and include the - (hyphen) symbol.

Cores

For each VM, specify the number of cores. Before the creation of VMs, there are 24 cores available (12 on each node that are available for VMs). MCMU keeps track of how many cores

are assigned to VMs and only enables you to select a number from what is available. If you select 0 (zero) cores, the VM shares available cores. You can assign a different number of cores to each VM within a group.

After the App VM group is deployed, you can change the number of cores on the VMs. See "Edit an App VM Group (BUI)" on page 144.

Password

For each VM, set a password for the `oracle` and `mcinstall` users.

If you select 

, MCMU sets the password to a default value (see "User Accounts" on page 40).

For details about MCMU users, see "User Accounts" on page 40. Password policies vary based on the security profile that was selected. See "MCMU Password Policies" on page 41 and "Security Profile" on page 82.

Define Cluster

(Introduced in software v1.1.25) If you selected the Oracle Solaris 11 VM type, MCMU BUI displays the Define Cluster section (see "Create an App VM Group Profile (BUI)" on page 135). If you enable Clusterware, MCMU configures the two App VMs into a cluster, providing a highly available configuration. If one VM goes down, the system automatically fails over. You can only cluster two App VMs.

Note - If you want to cluster Oracle Solaris 10 branded zones, you must do so manually.

To enable this feature, slide the selector to Yes, and enter a name in the SCAN name field.

Single Client Access Name (SCAN) is a feature used in cluster configurations. The SCAN provides a single name for clients to access all VMs running in the cluster. The SCAN must be a name that is up to 15 characters long. You can use lowercase letters, numbers and the - (hyphen) symbol.

MCMU handles the configuration of the cluster, but if you want additional details, refer to the *Database Clusterware Administration and Deployment Guide* at: `http://docs.oracle.com/database/121/nav/portal_booklist.htm`.

Configuring DB VMs (BUI)

Perform these tasks to view, create, edit, and delete DB VMs.

Description	Link
View the DB VM group and DB VMs.	“View the DB VM Group and VMs (BUI)” on page 99
Create database VMs.	“DB VM Creation Task Overview” on page 101 “Create a DB VM Group Profile (BUI)” on page 103 “Deploy the DB VM Group (BUI)” on page 112 “Create DB Homes (BUI)” on page 115 “Create DB Instances (BUI)” on page 117
Edit a DB VM.	“Edit a DB VM Group Profile (BUI)” on page 121 “Add a DB VM to a Group (BUI)” on page 123
Display a string that can be used by applications to connect to a DB instance.	“Displaying a DB Instance Connect String (BUI)” on page 125
Delete various DB components.	“Deleting DB Components (BUI)” on page 126

Caution - Never manually manage VMs using Oracle Solaris zone commands. Always manage the VMs through MCMU BUI or MCMU CLI.

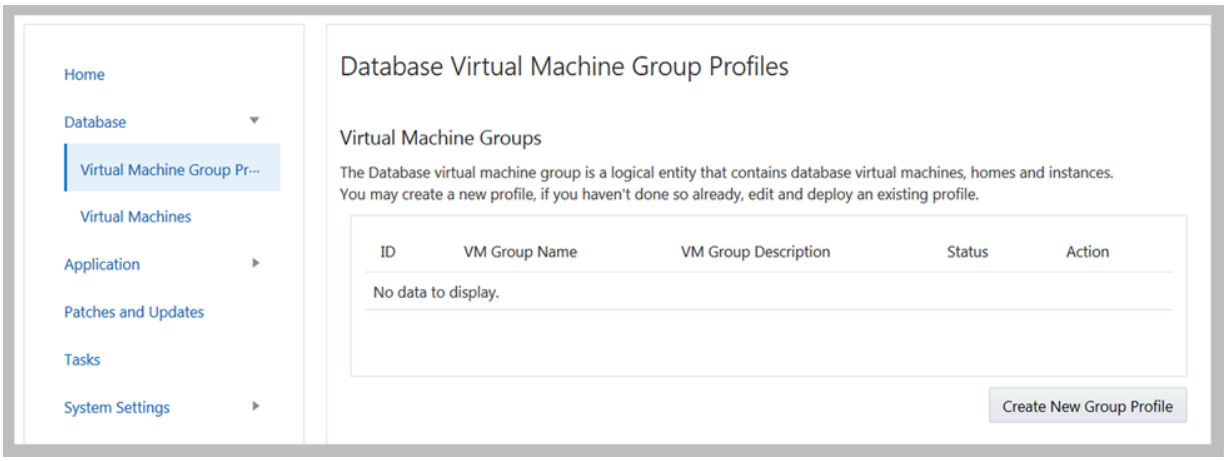
▼ View the DB VM Group and VMs (BUI)

This task describes how to view DB VMs. You can also use this task to determine if DB VMs are configured or not.

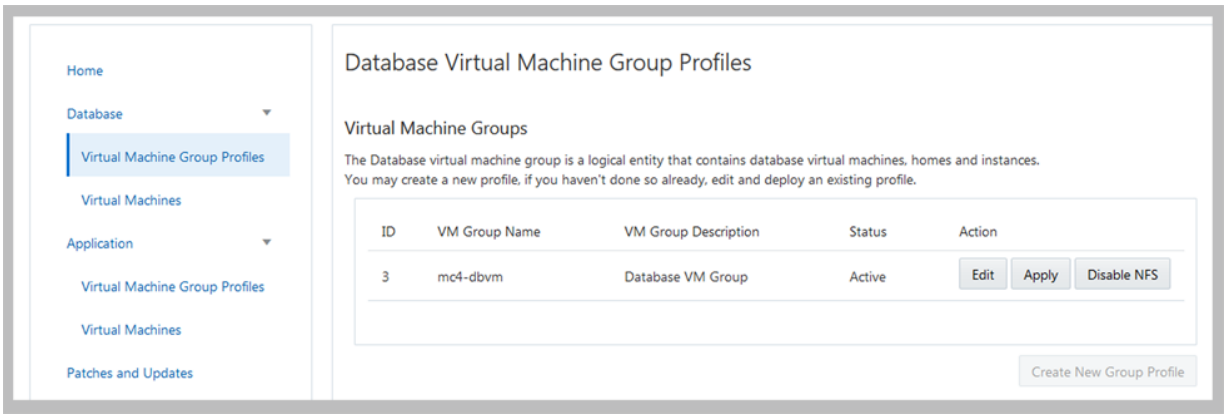
1. **Access the MCMU BUI.**
   See “Log in to the MCMU BUI” on page 28.

2. **In the navigation panel, select Database → Virtual Machine Group Profiles.**

In this example, the page reports No data to display because a DB group profile has not yet been created.



This example shows that a DB VM group profile has been created.



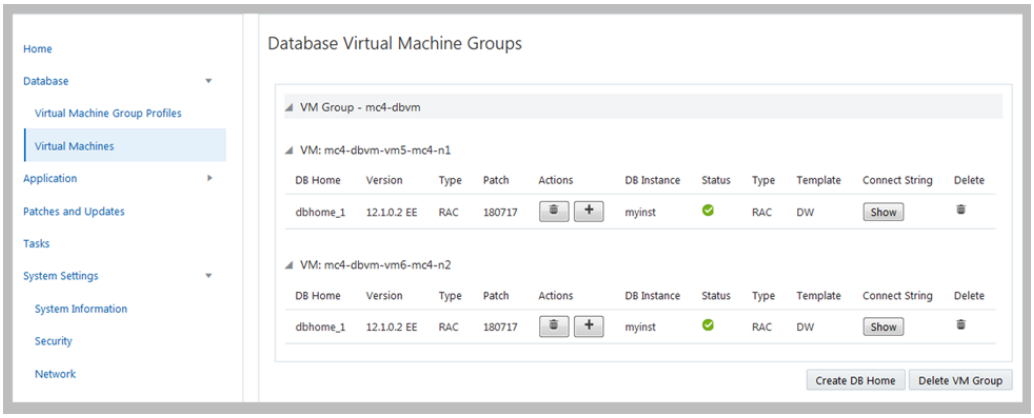
3. **In the navigation panel, select Database → Virtual Machines (formerly Virtual Machine Instances).**

   The Database Virtual Machines page is displayed.

   If this page is blank, the DB group profile has not yet been created or deployed.

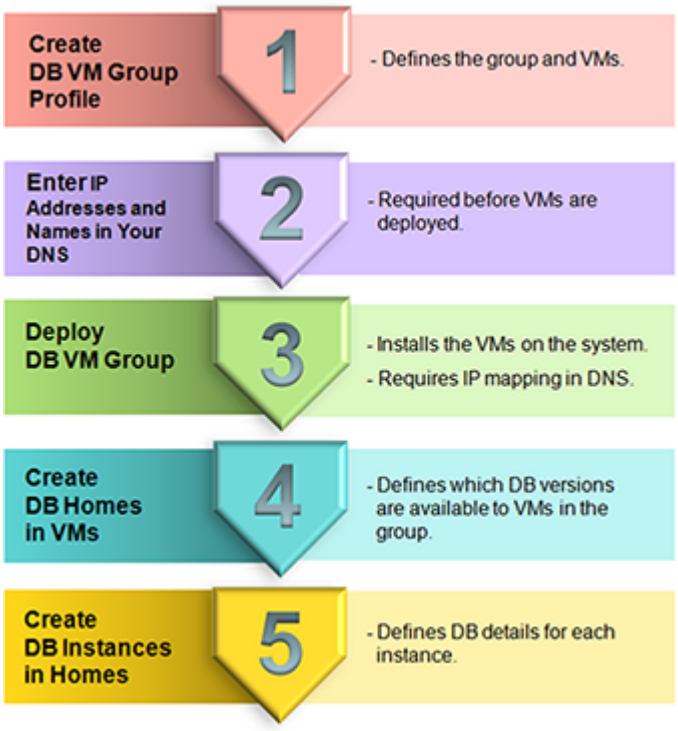
Tip - If the VMs are not listed, click the triangle that is next to the VM group to expand the display. You might need to select another navigation item, then come back to this page.

In this example, there is one VM on each node, and each VM has one online DB instance.



DB VM Creation Task Overview

Creating DB VMs is accomplished though five main tasks:



Task No.	Description	Details You Provide During the Task	BUI Instructions	CLI Instructions
1.	If needed, create additional networks that will be assigned to the VMs during the creation process.	You can accept the default network parameters that were configured during the installation, or edit or add additional networks. "DB VM Group Parameters" on page 81	"View and Update Network Parameters in v1.2.4 and Later (BUI)" on page 66 "View and Update Network Parameters in v1.2.2 and Earlier (BUI)" on page 70	"Managing Networks (CLI)" on page 291
2.	Create DB VM Group Profile.	"DB VM Group Parameters" on page 81 "DB VM Parameters" on page 85	"Create a DB VM Group Profile (BUI)" on page 103	"Create a DB VM Group Profile (CLI)" on page 247
3.	Enter IP addresses and names in your DNS.	MCMU provides you with the public IP addresses and hostnames when you create the DB group profile.		

Task No.	Description	Details You Provide During the Task	BUI Instructions	CLI Instructions
4.	Deploy the DB VM Group.	None	"Deploy the DB VM Group (BUI)" on page 112	"Deploy the DB VM Group (CLI)" on page 251
5.	Create DB Homes in the VMs.	"DB Home Parameters" on page 88	"Create DB Homes (BUI)" on page 115	"Create DB Homes (CLI)" on page 252
6.	Create DB Instances in Homes.	"DB Instance Parameters" on page 90	"Create DB Instances (BUI)" on page 117	"Create DB Instances (CLI)" on page 255

Create a DB VM Group Profile (BUI)

Perform this procedure to create a DB VM group profile.

The DB VM group provides the foundation for the DB VMs and DB instances. Before you can create DB VMs, you must create a DB VM group. One DB VM group is supported on the system. If a DB VM group profile already exists, you cannot create another one.

Note - It is possible that the DB VM group profile was created when the system was initially set up. To determine if a group profile has already been created, see "View the DB VM Group and VMs (BUI)" on page 99.

Your system must be installed and initialized as described in the *Oracle MiniCluster S7-2 Installation Guide*. This ensures that the required packages that contain several necessary files, such as Oracle Solaris OS, Oracle Grid Infrastructure, and so on, are on the system.

1. **Access the MCMU BUI as a primary admin, such as mcinstall.**

   See "Log in to the MCMU BUI" on page 28.

2. **Ensure that the system has pool of IP addresses to apply to the DB VMs.**

   For each DB VM, you need 2 IP addresses. The SCAN requires 3 IP addresses.

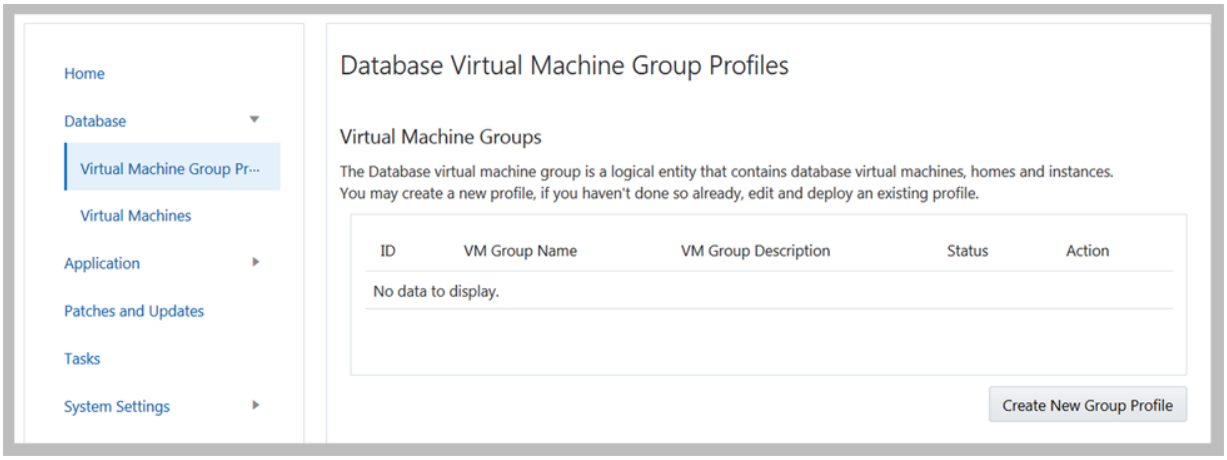
   When the system was installed, a pool of IP addresses was allocated to the system. To view, add, or change IP parameters, see:

   "View and Update Network Parameters in v1.2.4 and Later (BUI)" on page 66

   "View and Update Network Parameters in v1.2.2 and Earlier (BUI)" on page 70

3. **In the navigation panel, select Database → Virtual Machine Group Profiles.**

The Database Virtual Machine Group Profiles Summary page is displayed. This example indicates that a DB group has not yet been created.



4. **Click Create New Group Profile.**

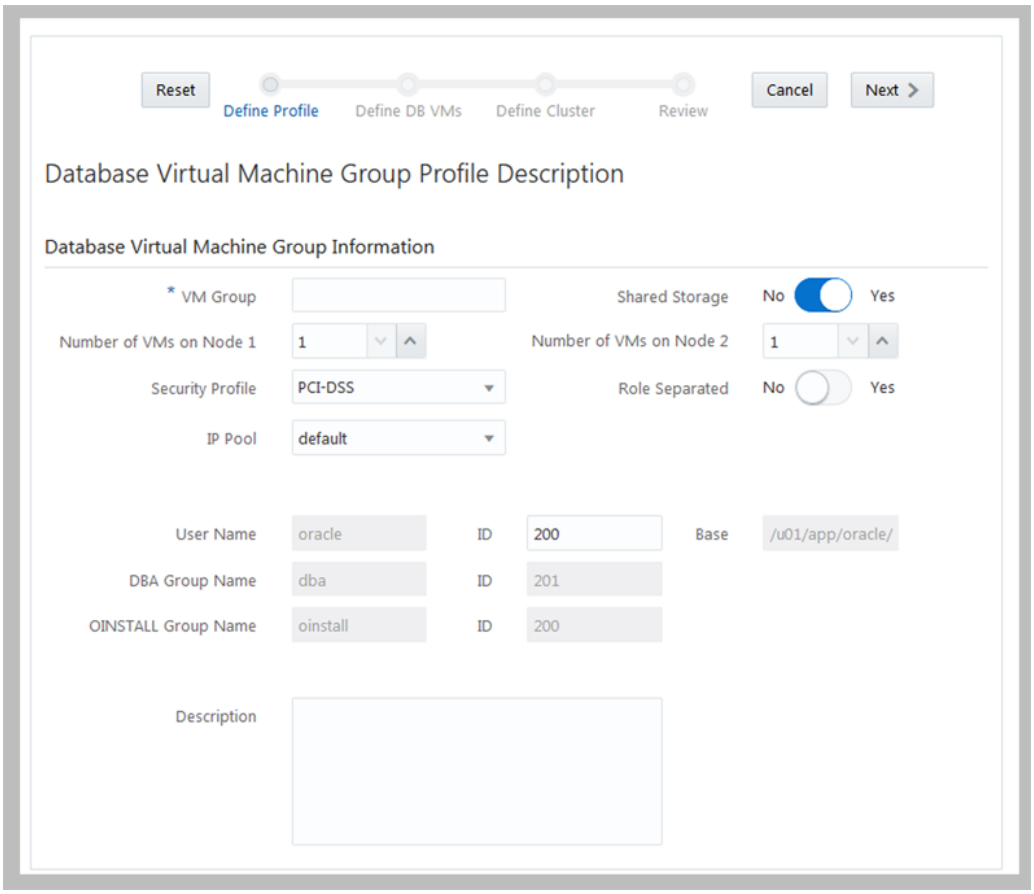
   The Define Profile page is displayed.

5. **In the Define DB VMs page, enter the required information, then click Next.**

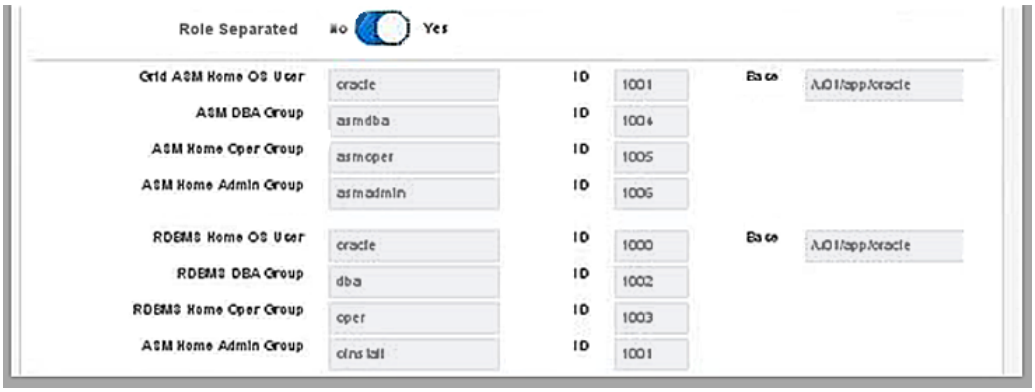
   For details about the required information, use the optional worksheet ("DB VM Planning Worksheets (Optional)" on page 78), or see "DB VM Group Parameters" on page 81.

Note - You do not have to have the same number of VMs on each compute node. However, if you plan to configure all the DB VMs in RAC pairs, assign the same number of VMs to the second compute node.

This example shows the page when Role Separated is set to No.

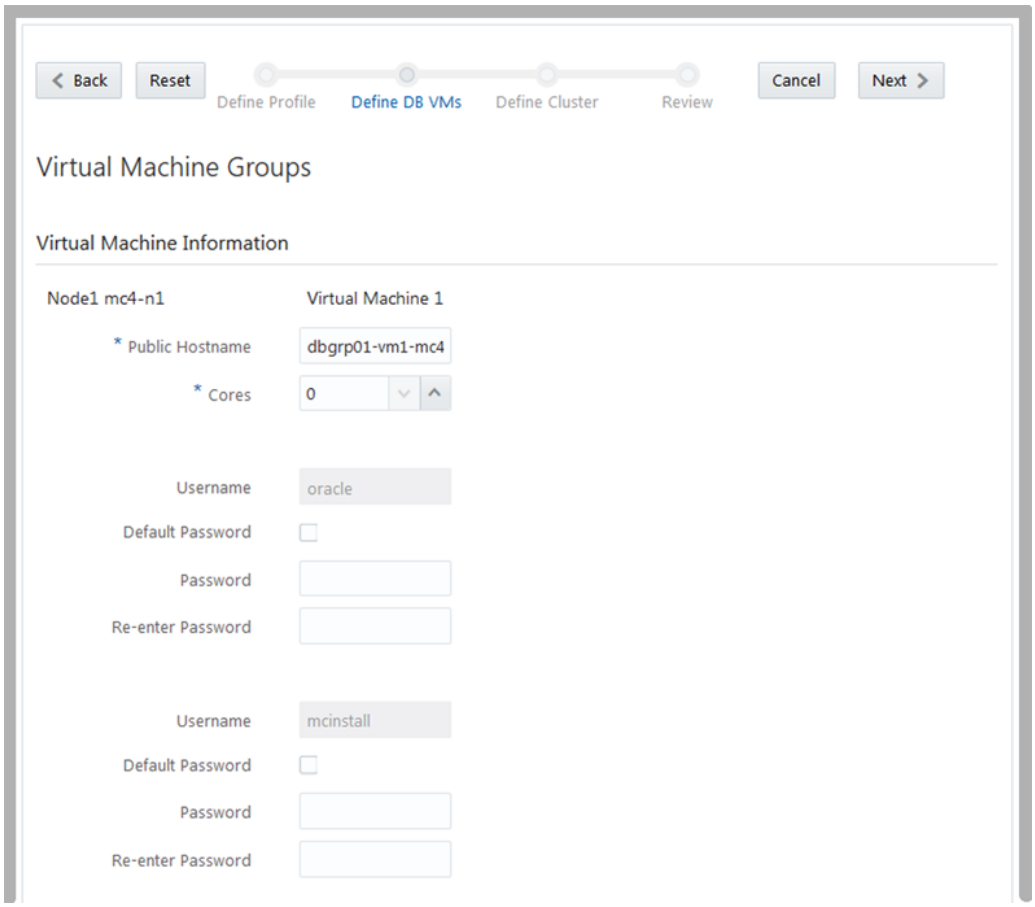


If Role Separated is set to Yes, the lower part of the page shows the users and roles that will be configured.



6. **Complete the Define DB VMs page, then click Next.**

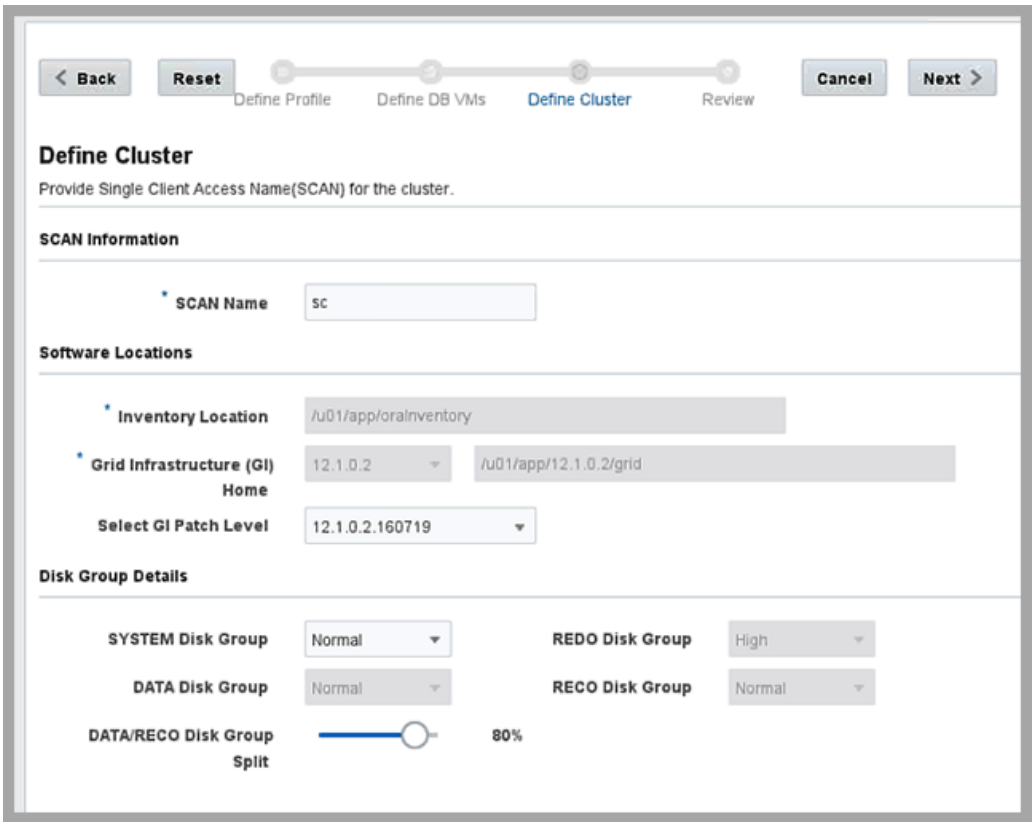
For details about the required information, use the optional worksheet ("DB VM Planning Worksheets (Optional)" on page 78), or see "DB VM Parameters" on page 85.



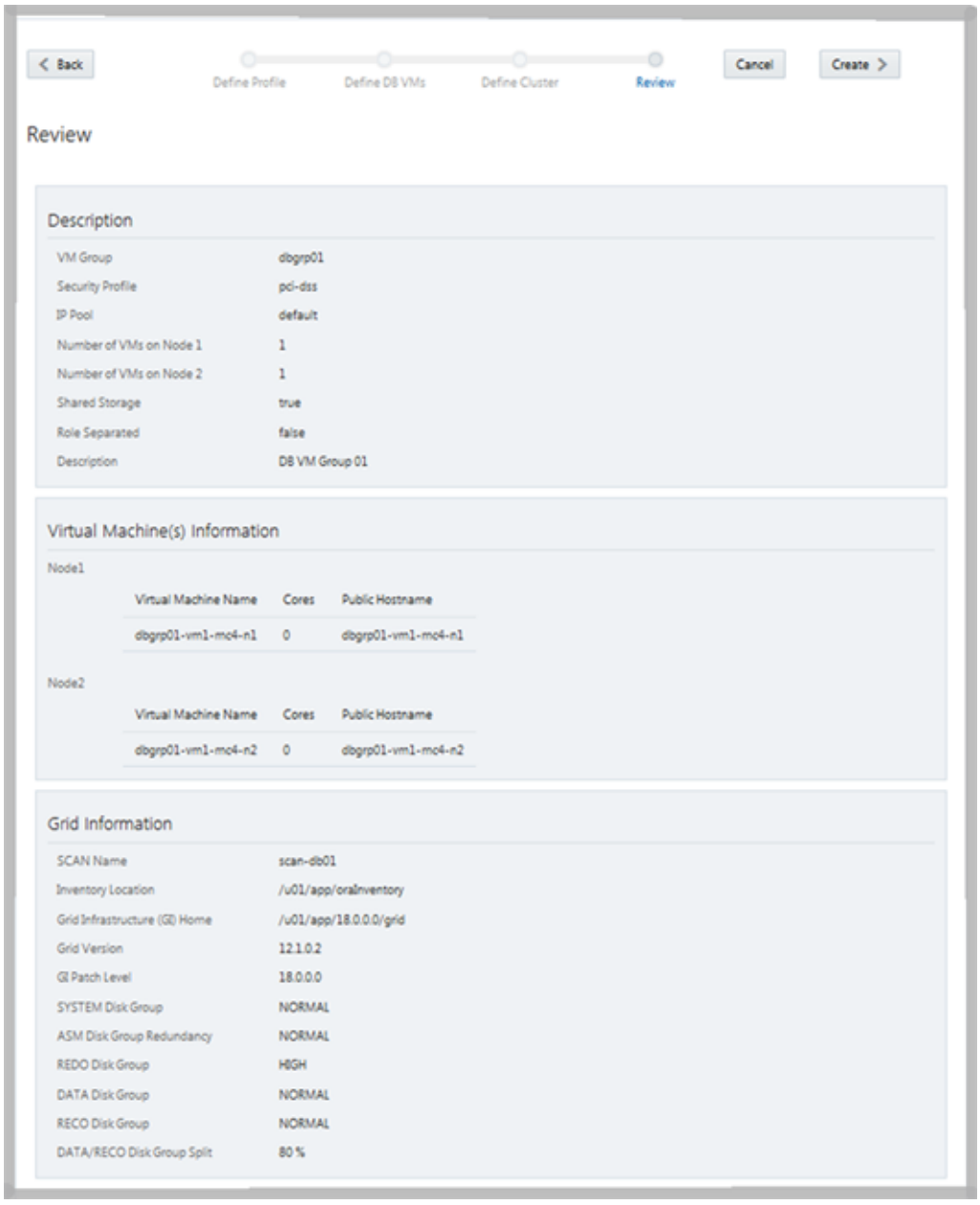
7. **Complete the Define Cluster page, then click Next.**

   Many of the parameters on this page are automatically populated based on the information you provided in the earlier screens.

For details about the required information, use the optional worksheet ("DB VM Planning Worksheets (Optional)" on page 78), or see "DB VM Parameters" on page 85.



8. **Verify that the information in the Review page is correct.**



The Review page lists all the information that you filled in from the previous pages for this DB VM group. The information in this page is not editable.

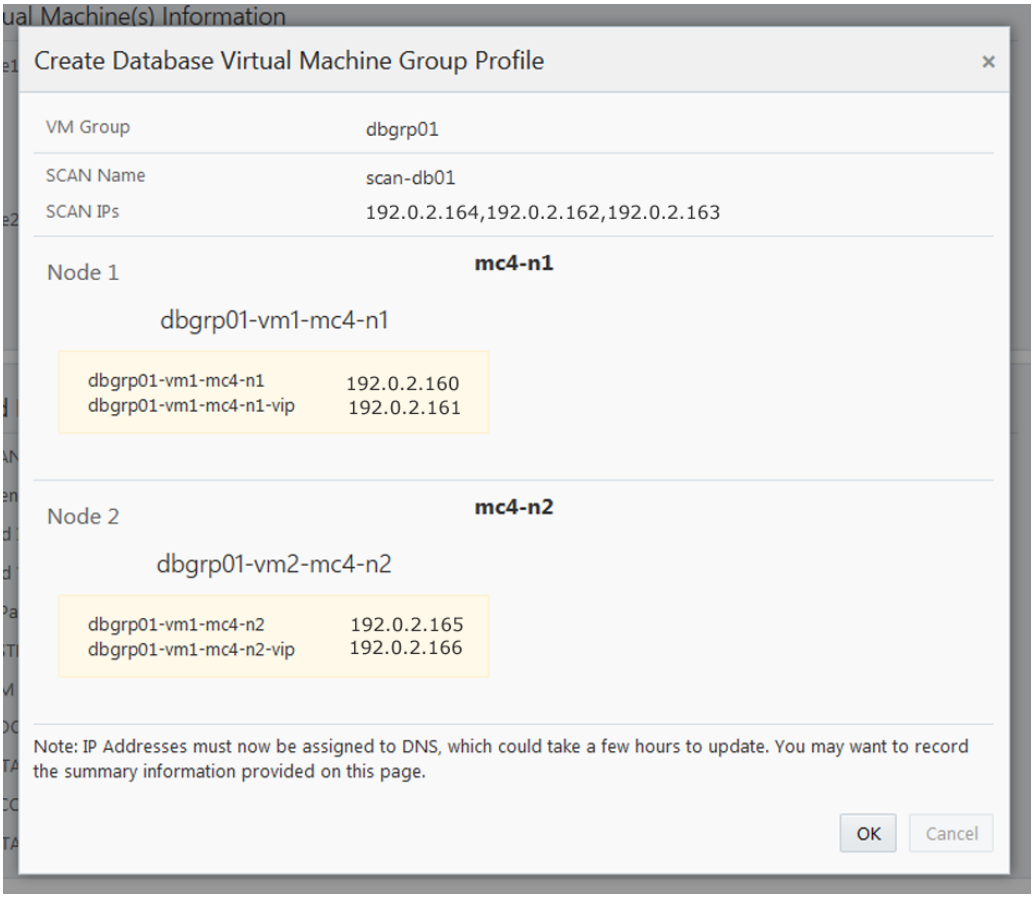
- **If you find any issues with any of the information on the Review page, click either Back to return to a previous screen, or click Cancel to return to the Home page.**

- **If you are satisfied with the information displayed on the Review page, click Create (or Generate). A progress window is displayed. Once complete, dismiss the window.**

The utility begins assigning IP addresses to the VMs based on the IP address information that was entered during the initial installation of the system. This process can take 10 to 30 minutes to complete, depending on the number of DB VMs specified. When the process is finished, a screen is displayed that shows the IP mapping assignments.

9. **Verify that the VM group profile is correct, and note the hostnames and IP addresses for DNS.**

Caution - Do not click Continue until you have recorded all the information shown in this Mapping IP review page.



- **If you find any issues with any of the information, close the window and repeat this task.**
- **If you are satisfied with the information displayed on the Mapping IP review page, record all the information shown in this screen so that you can enter the IP addresses and hostnames into DNS.**

Once you have recorded all the information in the Mapping IP review page, click Confirm. The utility reserves the names and IP addresses for the DB VM group.

10. **Enter all of the IP addresses and names into DNS.**

    As part of the next set of procedures, the utility verifies that the IP addresses and names for the VMs have been entered into DNS correctly, so you must have all of these IP addresses and names entered into DNS before proceeding.

11. **When you have entered all the IP addresses and hostnames into DNS, click Confirm.**

    The utility performs a set of configuration verifications. This takes approximately 15 minutes to complete.

12. **When the group profile process is complete, perform the next task.**

    See "Deploy the DB VM Group (BUI)" on page 112.

▼ Deploy the DB VM Group (BUI)

Use this procedure to deploy the VM group. When you deploy a group, MCMU installs the VMs that were defined in the VM group profile.

If you need to change any of these DB VM parameters, do so before you deploy the group:

- IP addresses
- Hostnames

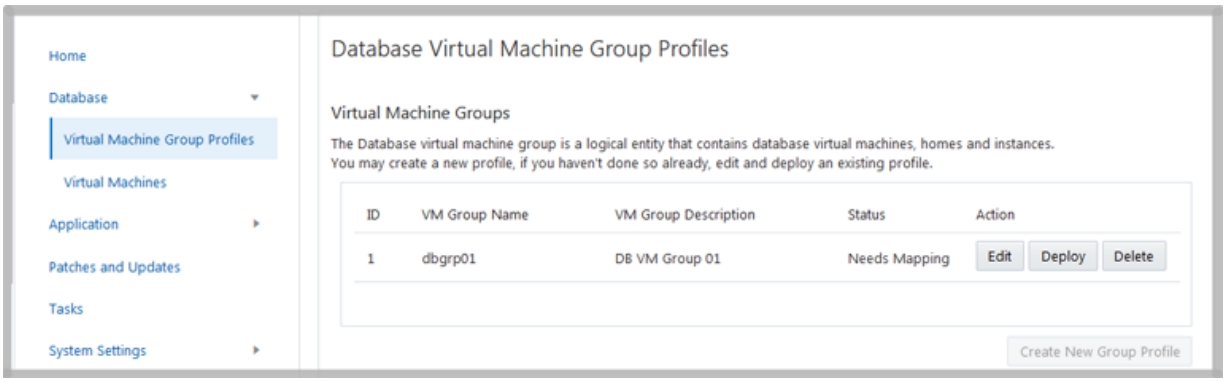
Once the VM group is deployed, you can change the number of cores assigned to each VM, and add or delete VMs.

1. **Ensure that you complete these tasks before deploying the VM group:**

   - "Create a DB VM Group Profile (BUI)" on page 103
   - Enter all of the VM IP addresses and hostnames into your DNS server.

2. **In the navigation panel, select Database → Virtual Machine Group Profiles.**

The Deployment Review page is displayed.

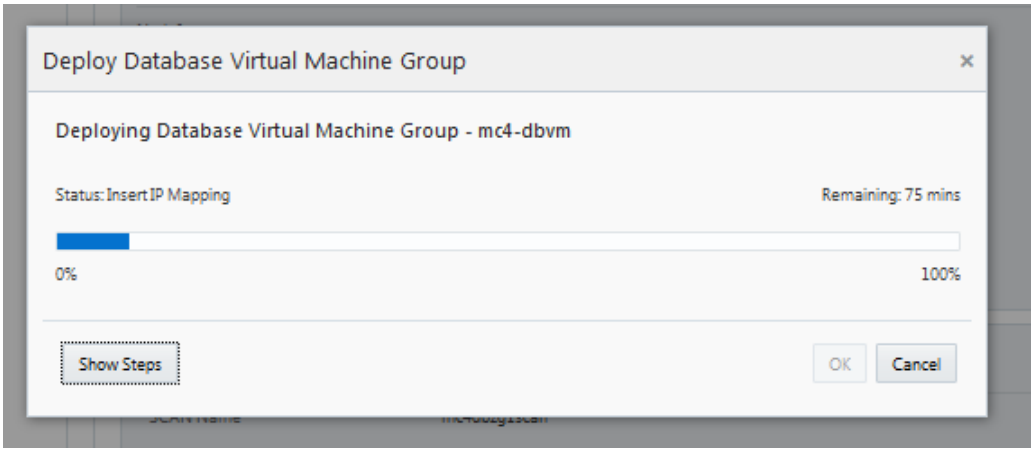


3. **Click Deploy, and review the configuration in the Deployment Review Page.**

4. **Click Deploy.**

   The Create Virtual Machine Group window is displayed. As the utility deploys the VM group, status of each deployment step is updated in this window.

   The deployment takes 40 to 80 minutes to complete.



5. **(Optional) If you want to see all the steps involved, click Show Detail.**

6. **When the deployment is complete, click Complete and go to the next task.**

   See "Create DB Homes (BUI)" on page 115.

▼ Create DB Homes (BUI)

Use this procedure to create DB homes.

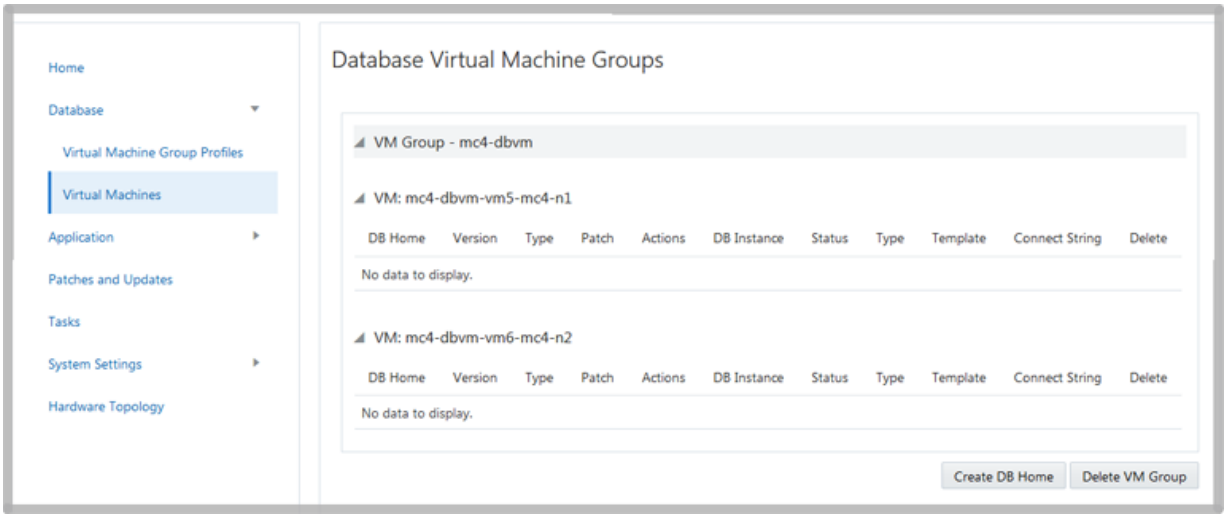
Each DB home provides a particular Oracle Database version that is used to create DB VM database instances. You must create at least one DB home in the group, and optionally, you can create multiple DB homes so that the group is configured with multiple versions of the Oracle Database.

1. **Ensure that you complete these tasks before creating a DB home:**

   - "Create a DB VM Group Profile (BUI)" on page 103.
   - Enter all of the VM IP addresses and hostnames into your DNS server.

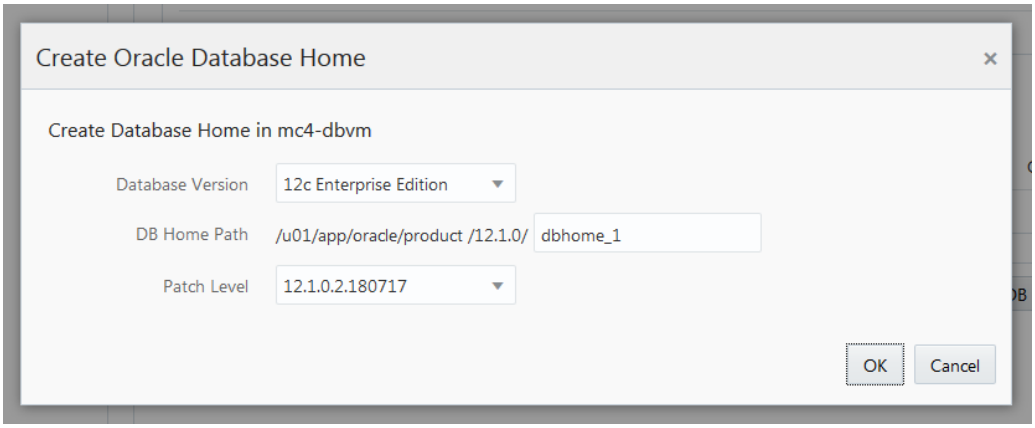
- "Deploy the DB VM Group (BUI)" on page 112.

2. **In the navigation panel, select Database → Virtual Machines (formerly Virtual Machine Instances).**



3. **Click Create DB Home.**

   The Create Oracle Database Home window is displayed.



4. **Specify the selectable items in this window.**

   For details about the required information, use the optional worksheet ("DB VM Planning Worksheets (Optional)" on page 78), or see "DB Home Parameters" on page 88.

5. **Click Create.**

   The utility creates DB home information for every VM within the DB VM group. After approximately 15 to 30 minutes, the status reports that the process is complete.

6. **Once complete, click Finish and consider your next task.**

   - Create another DB home – Repeat this task.
   - Go to the next task – See "Create DB Instances (BUI)" on page 117.

▼ Create DB Instances (BUI)

Before you can perform this task, you must complete these tasks:

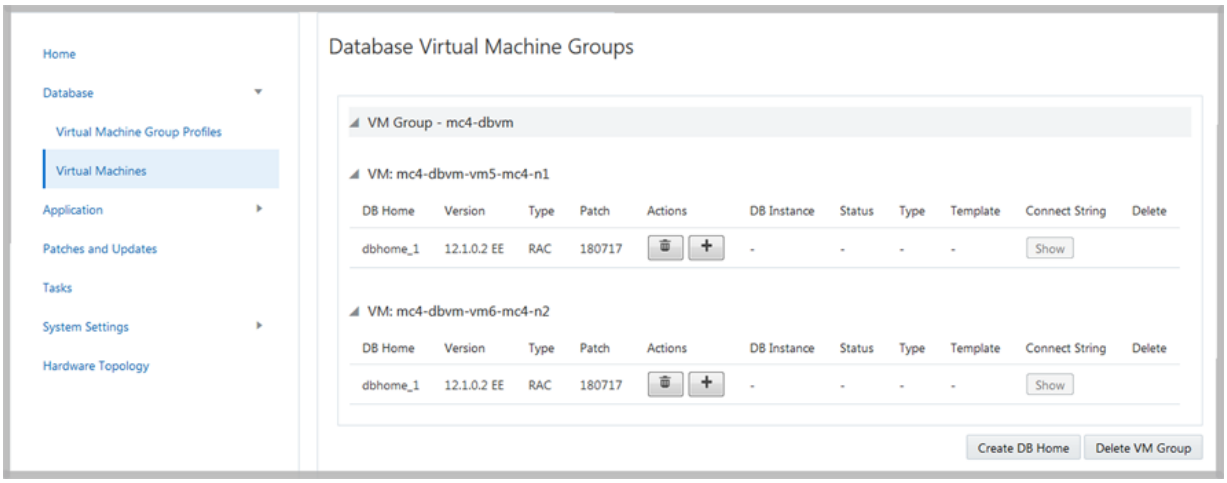
- "Create a DB VM Group Profile (BUI)" on page 103.
- Enter all of the VM IP addresses and hostnames into your DNS server.
- "Deploy the DB VM Group (BUI)" on page 112.
- "Create DB Homes (BUI)" on page 115.

1. **In the navigation panel, select Database → Virtual Machines (formerly Virtual Machine Instances).**

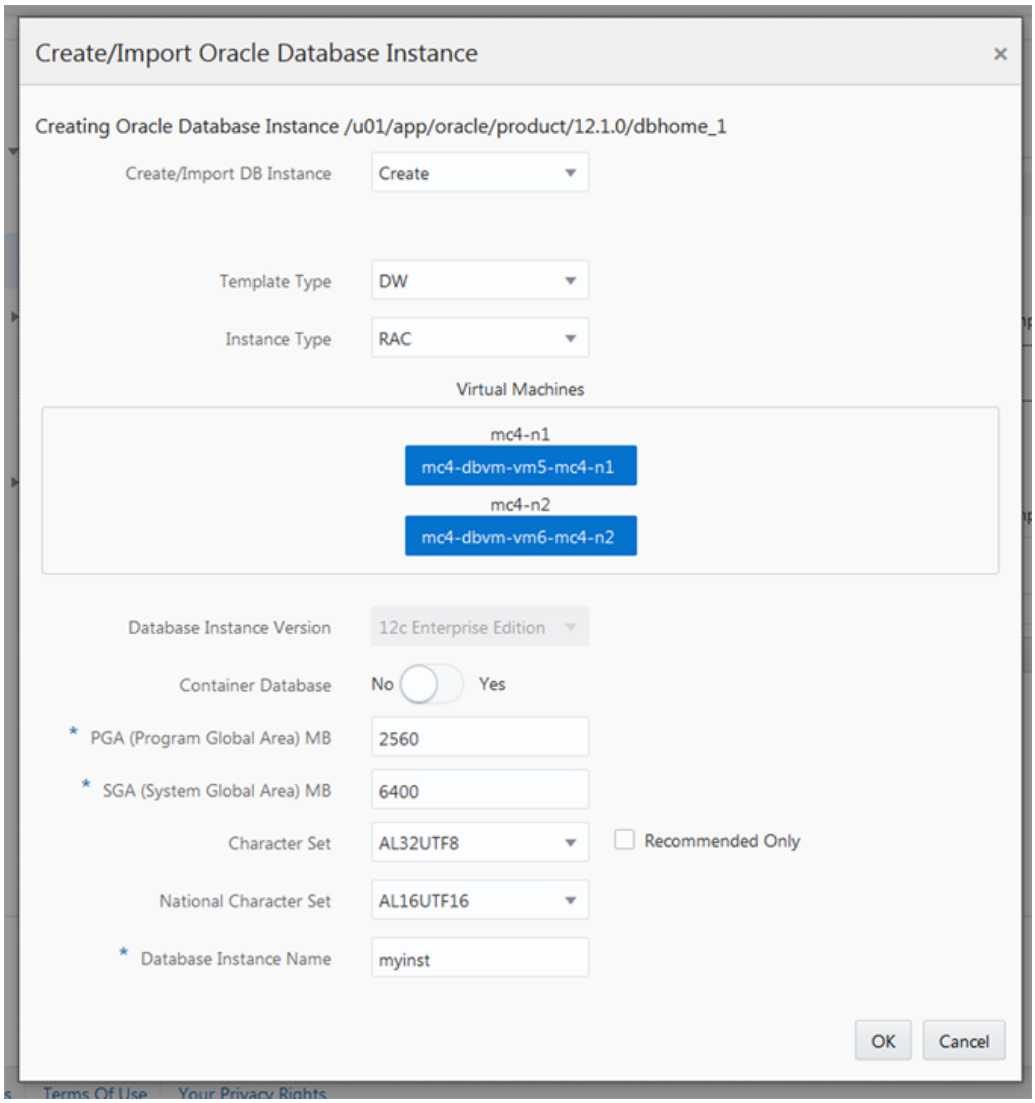
   The Database Virtual Machine Group Summary page is displayed, showing all the VMs in the group.

Tip - If the VMs are not listed, click the triangle that is next to the VM group to expand the display. You might need to select another navigation item, then come back to this page.

In this example, the VMs do not yet have any DB instances, which is evident because no instance names are displayed.



2. **Under one of the VMs, click the + symbol.**



3. **Complete the required information in the order indicated.**

   For details about the required information, use the optional worksheet ("DB VM Planning Worksheets (Optional)" on page 78), or see "DB Instance Parameters" on page 90.

4. **Click Create.**

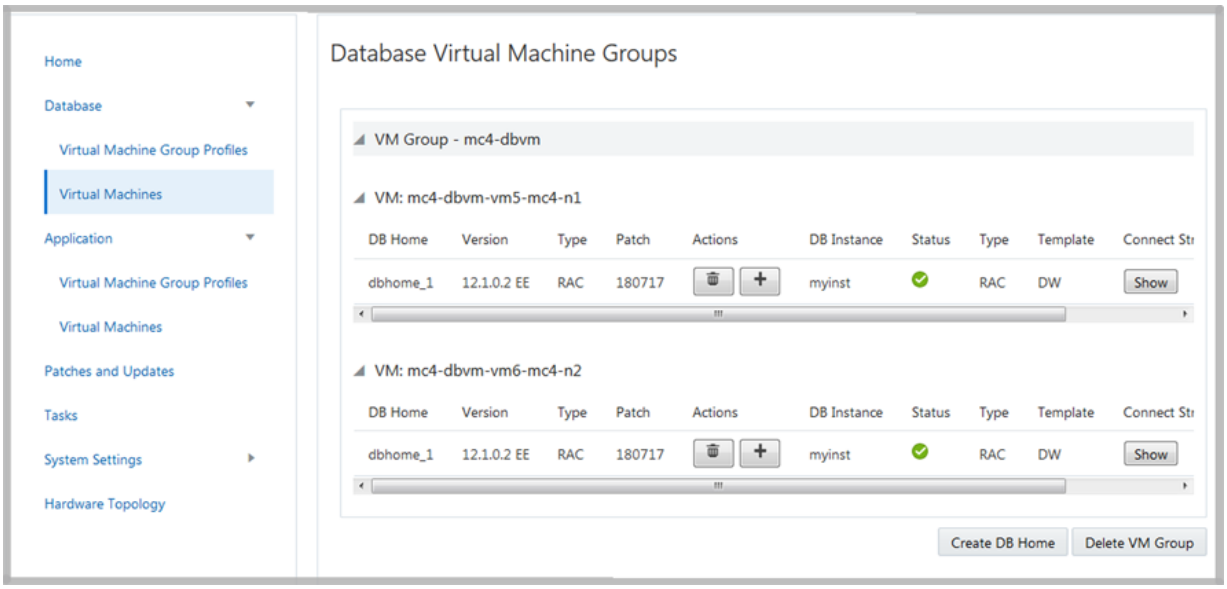
   A progress pop-up window is displayed. This process can take from 15 to 90 minutes to complete, depending on the configuration selected.

   Tip - While the DB instance is being created, you can dismiss the pop-up window and then perform other actions in the main BUI (such as create additional DB instances). To return to the progress pop-up window, in the Virtual Machines page, click the Creating link.

5. **When the process is finished, click OK (Apply in earlier versions).**

6. **Verify that the instance is online.**

   In the Database → Virtual Machines page, identify the VM for which the instance was created. Verify that the Instance Status shows a green checkmark.



7. **Repeat these steps for each DB instance that you want to create.**

   You can create multiple DB instances, until the point where the utility determines that you have reached the limit. At that point, a message stating that there is not enough memory available to create additional DB instances is displayed.

Edit a DB VM Group Profile (BUI)

Use this procedure to edit DB VMs.

You can edit VMs even when they are online and in production. The utility only enables changes to VM parameters that are safe, based on the state of the VM.

For deployed DB groups, you can change the number of cores assigned to the VMs (increase or decrease) and add VMs to the group (to add a VM, see "Add a DB VM to a Group (BUI)" on page 123).

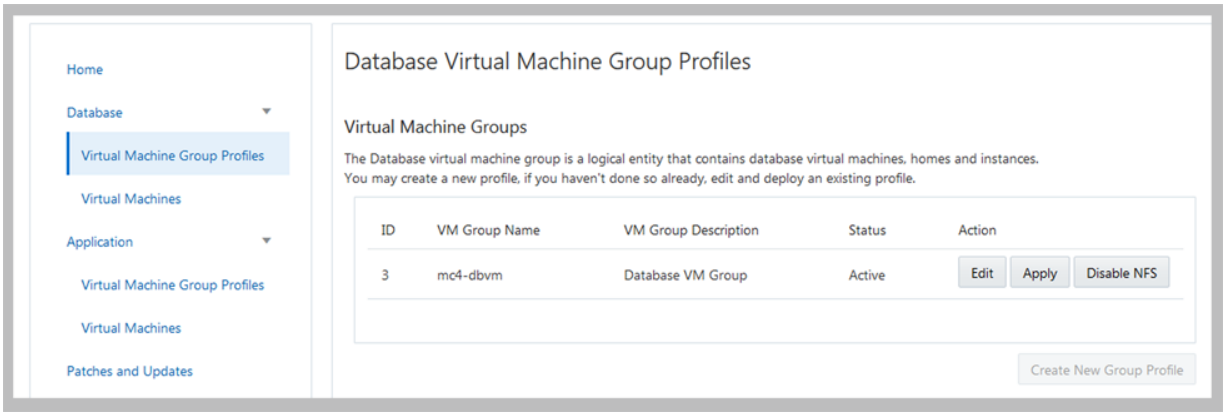
For non-deployed DB groups, you can make the same changes as deployed DB groups, plus change the VM names and IP addresses.

1. **Access the MCMU BUI as a primary admin, such as mcinstall.**

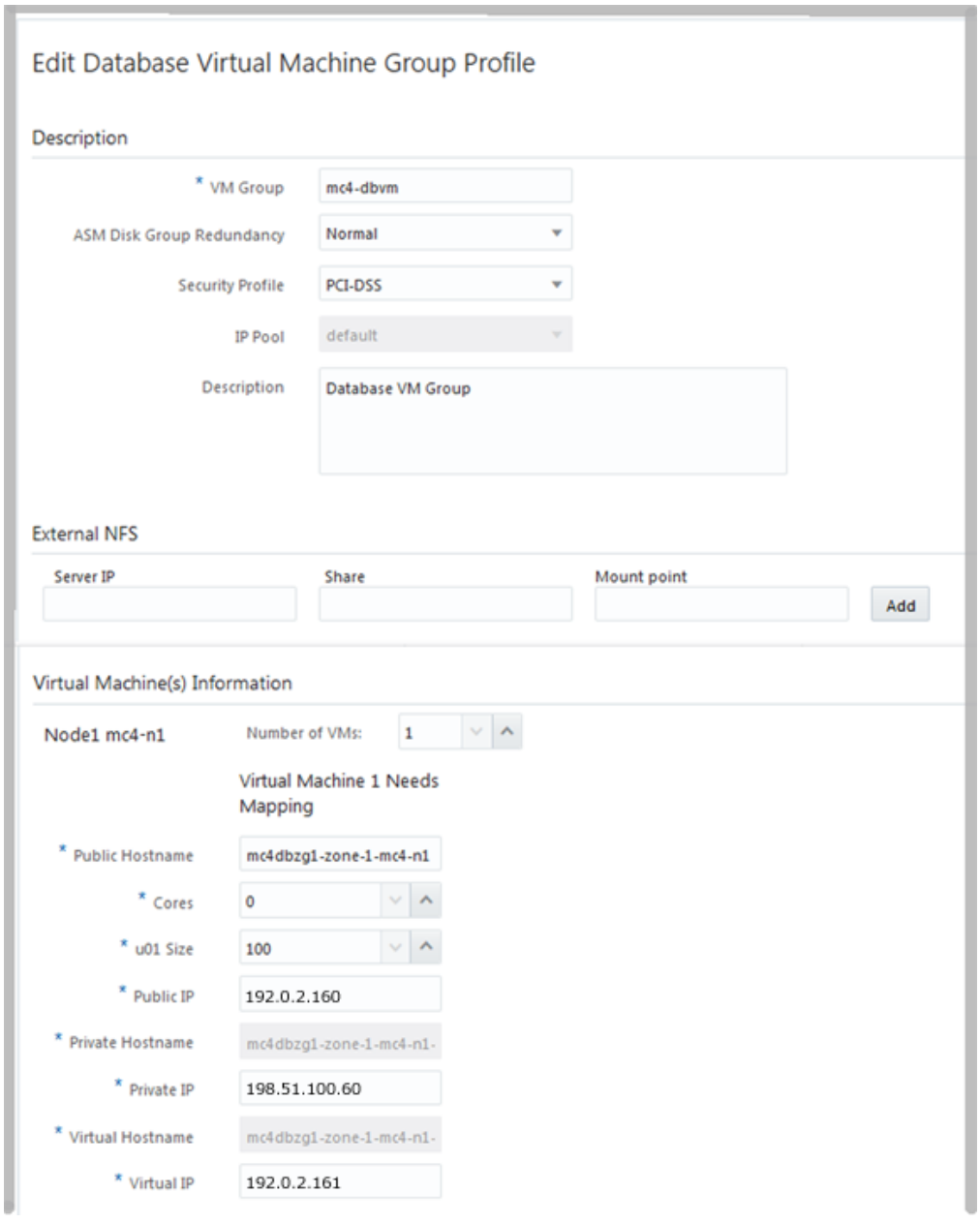
   See "Log in to the MCMU BUI" on page 28.

2. **In the navigation panel, select the Database → Virtual Machine Group Profiles page.**

   For example:



3. **Click Edit.**


Edit Database Virtual Machine Group Profile
Description
* VM Group
mc4-dbvm
ASM Disk Group Redundancy
Normal
Security Profile
PCI-DSS
IP Pool
default
Description
Database VM Group
External NFS
Server IP
Share
Mount point
Add
Virtual Machine(s) Information
Node1 mc4-n1
Number of VMs:
1
Virtual Machine 1 Needs Mapping
* Public Hostname
mc4dbzg1-zone-1-mc4-n1
* Cores
0
* u01 Size
100
* Public IP
192.0.2.160
* Private Hostname
mc4dbzg1-zone-1-mc4-n1-
* Private IP
198.51.100.60
* Virtual Hostname
mc4dbzg1-zone-1-mc4-n1-
* Virtual IP
192.0.2.161

4. **Edit any of the parameters that are enabled for changes, such as the number of cores.**

   If a VM is not deployed, you can change the IP addresses and hostnames.

   For a description of DB VM parameters, see "DB VM Parameters" on page 85.

5. **Perform one of these actions.**

   - **Save** – Click Save to save the changes and provide a summary page. The change does not become active until you click Apply.
   - **Cancel** – Click Cancel to discard the changes and close the window.

6. **Click OK (or Apply for previous versions).**

7. **If you changed the name or IP address of a VM, make the equivalent change in DNS.**

8. **Redeploy the VM group.**

   See "Deploy the DB VM Group (BUI)" on page 112.

   MCMU only redeploys the changes.

▼ Add a DB VM to a Group (BUI)

Use this procedure to add a DB VM to a DB VM group.

You can add VMs even when the group is active.

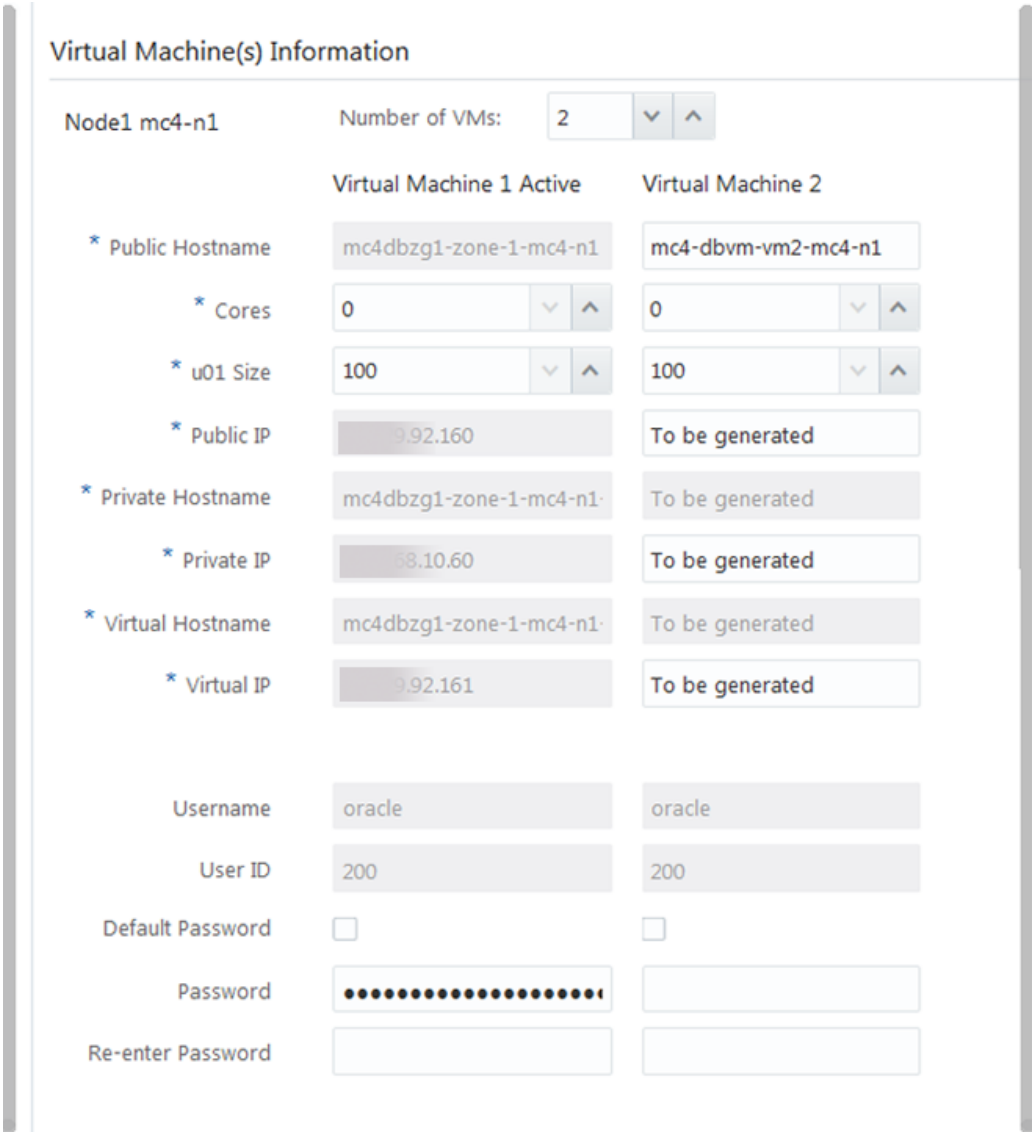
1. **Access the MCMU BUI as a primary admin, such as mcinstall.**

   See "Log in to the MCMU BUI" on page 28.

2. **In the navigation panel, select the Database → Virtual Machine Group Profiles page.**

3. **Click Edit.**

4. **Increase the number of VMs on the nodes.**



5. **Specify passwords for the oracle and mcinstall accounts on each new VM.**

6. **As needed, check and change the details for the new VMs.**

For example, check the hostnames, IP addresses, and number of cores and change them to meet your requirements.

For a description of DB VM parameters, see "DB VM Parameters" on page 85.

7. **Perform one of these actions.**

   - **Save** – Click Save to save the changes. After a few minutes, a summary page is displayed.
   - **Cancel** – Click Cancel to discard the changes and close the window.

8. **Click OK (Apply in earlier versions).**

9. **On the Virtual Machine Group Profiles page, click Edit to view or change the IP addresses that were automatically assigned.**

10. **Add the new DB VMs to your DNS.**

11. **Complete the configuration of the new VMs.**

    Perform these tasks:

    - "Deploy the DB VM Group (BUI)" on page 112
    - "Create DB Homes (BUI)" on page 115
    - "Create DB Instances (BUI)" on page 117

▼ Displaying a DB Instance Connect String (BUI)

This task describes how to display the string that can be used by applications to connect to the DB VM instance.

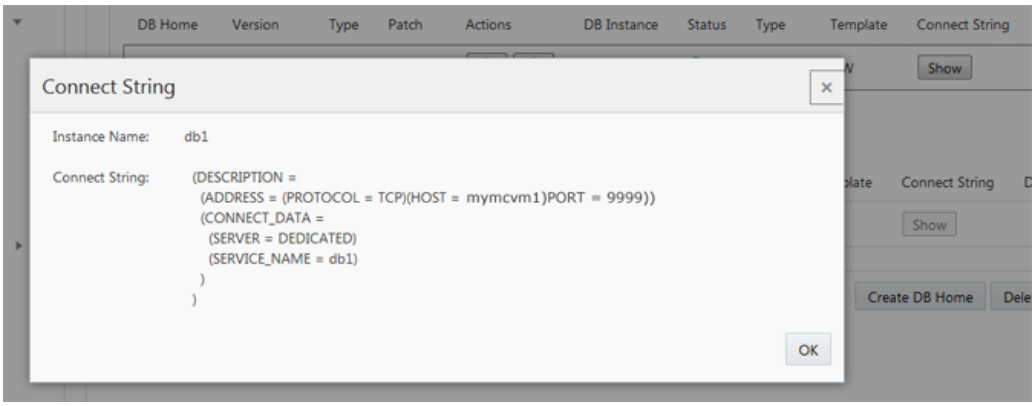
1. **Access the MCMU BUI.**

   See "Log in to the MCMU BUI" on page 28.

2. **In the navigation panel, select Database → Virtual Machines.**

3. **For the DB VM instance of interest, under Connect String, click Show.**

The Connect String dialog box displayed.



Deleting DB Components (BUI)

Use these procedures to delete DB instances, DB home, VMs, and group profiles.

- “Delete a DB Instance (BUI)” on page 126
- “Delete a DB VM (BUI)” on page 127
- “Delete a DB Home (BUI)” on page 130
- “Delete a DB VM Group (BUI)” on page 130
- “Delete a DB VM Group Profile (BUI)” on page 131

▼ Delete a DB Instance (BUI)

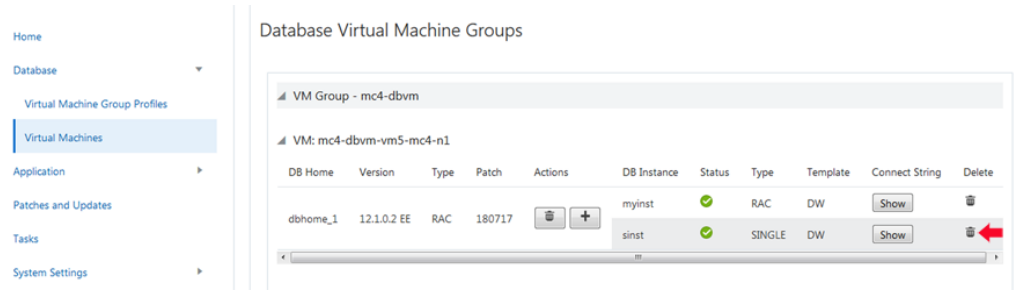
Caution - Deleting a DB instance cannot be undone. Proceed with caution.

1. **Access the MCMU BUI as a primary admin, such as mcinstall.**

   See “Log in to the MCMU BUI” on page 28.

2. **In the navigation panel, select Database → Virtual Machines (formerly Virtual Machine Instances).**

3. **Identify the instance you want to delete,**



4. **Carefully locate and click the trash can icon under the Delete column. (Note - Do not click the trash can icon that is under the Actions column).**

5. **Click Yes (formerly Confirm).**
   The deletion takes a few minutes to complete.

6. **After the deletion, click OK (or Confirm).**

7. **Repeat these steps for each DB instance that you want to delete.**

▼ Delete a DB VM (BUI)

Use this procedure to delete DB VMs.

To delete a RAC or RAC One Node instance for Oracle Database 12.2 and 18.3, you must provide the SYS user password.

Caution - Deleting a DB VM cannot be undone. Proceed with caution.

Note - The ability to delete DB VMs was added to MiniCluster v.1.2.4.

1. **Ensure that the DB VM is backed up or the data is migrated to another VM.**

2. **Access the MCMU BUI as a primary admin, such as mcinstall.**

   See "Log in to the MCMU BUI" on page 28.

3. **Delete all DB instances on the DB VM that you plan to delete.**

   See "Delete a DB Instance (BUI)" on page 126.

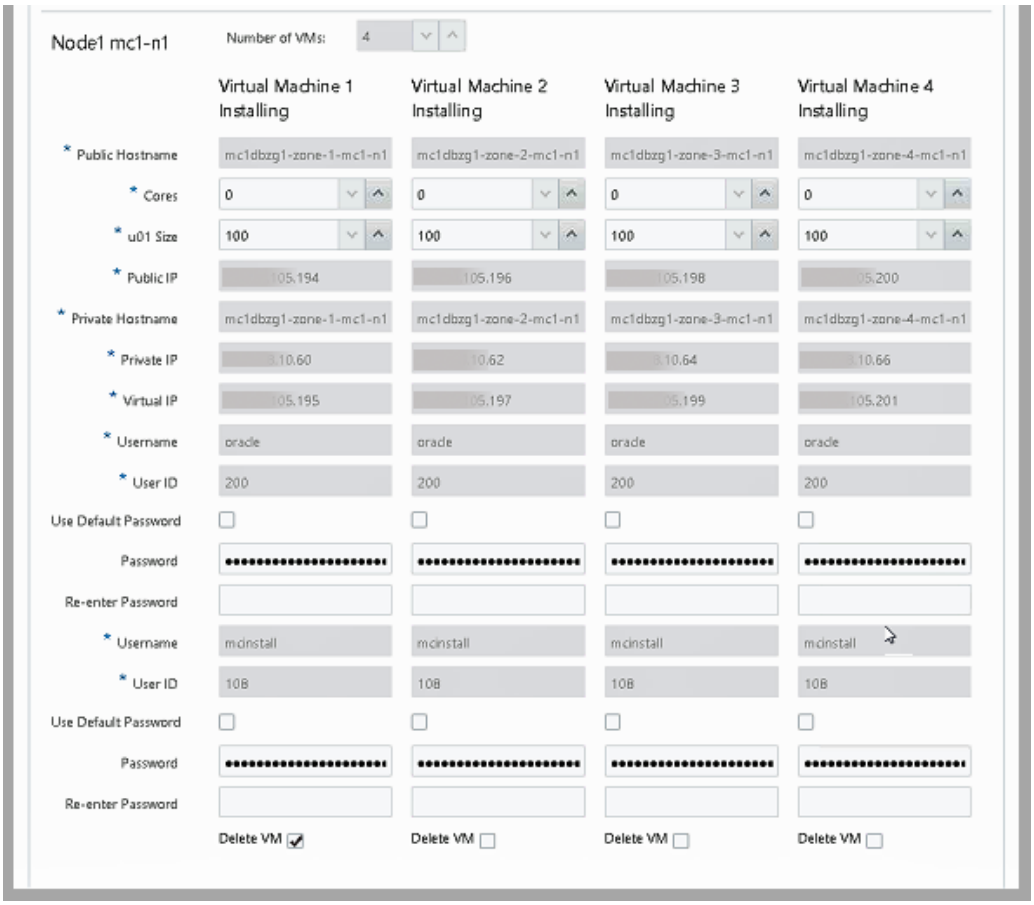
4. **In the navigation panel, select the Database → Virtual Machine Group Profiles page.**

5. **Click the Edit button for the DB VM group that contains the DB VM you plan to delete.**

   The Edit Database Virtual Machine Group Profiles page is displayed.

6. **Identify the VM that you plan to delete and scroll to the bottom of the column of VM parameters.**

7. **Check the Delete VM box for each VM you want to delete.**



8. **Perform one of these actions.**

   - **Save** – Click Save to save the changes. A summary page is displayed.
   - **Cancel** – Click Cancel to discard the changes and close the window.

9. **Click OK (or Confirm).**

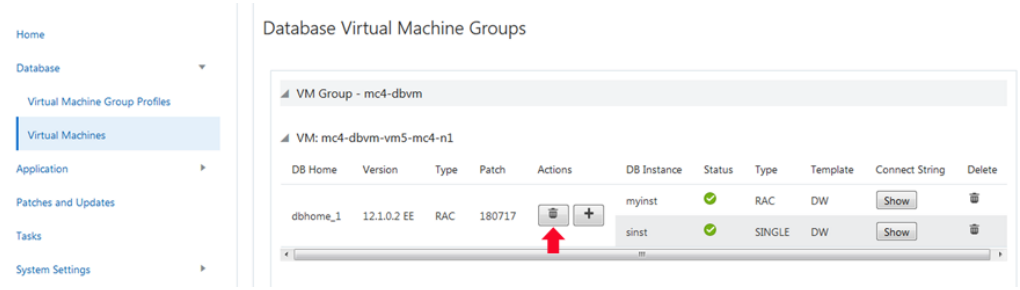
   The DB VMs are deleted.

Delete a DB Home (BUI)

You can only delete a DB home if all the instances in the home have been deleted.

Caution - Deleting a DB home cannot be undone. Proceed with caution.

1. **Access the MCMU BUI as a primary admin, such as mcinstall.**
   See "Log in to the MCMU BUI" on page 28.
2. **In the navigation panel, select Database → Virtual Machines.**
3. **Locate the DB home you want to delete.**
4. **Carefully locate and click the trashcan icon that is under the Actions column (or Edit column). Note - Do not click the icon under the Delete column.**



5. **Click OK (or Confirm) to delete this DB home.**

Delete a DB VM Group (BUI)

Use this procedure to delete a DB VM group. All the VMs in the group will be deleted. The DB group profile is not deleted, and can be redeployed. If the DB group contains DB VMs, the primary admin is notified though email as each VM is deleted.

Caution - Deleting a DB VM group deletes all the VMs, applications, and data associated with the VM group. The deletion cannot be undone. Proceed with caution.

1. **Access the MCMU BUI as a primary admin, such as mcinstall.**
   See "Log in to the MCMU BUI" on page 28.
2. **In the navigation panel, select Database → Virtual Machines.**
3. **Click Delete VM Group.**
4. **Confirm the deletion:**
   - Click Confirm.
   - In previous versions click the confirmation checkbox, then click Confirm.

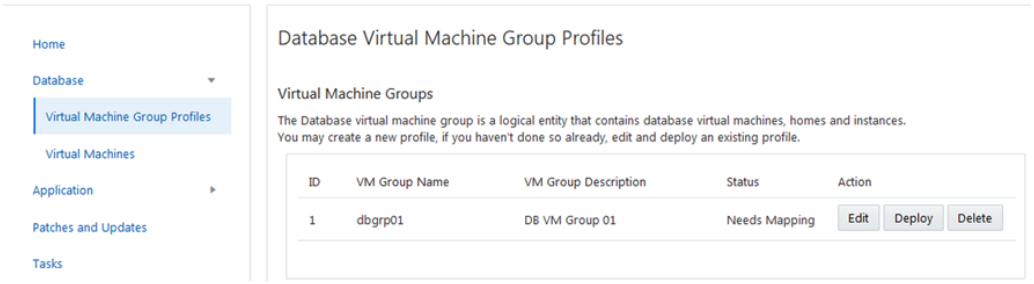
   The deletion can take 15 to 60 minutes, depending on the number of VMs in the group.
5. **After the deletion, click Quit.**

Delete a DB VM Group Profile (BUI)

Use this procedure to delete a DB VM group profile. You can only perform this procedure if the DB group does not exist, has been deleted, or is not deployed.

Caution - The deletion cannot be undone. Proceed with caution.

1. **Access the MCMU BUI as a primary admin, such as mcinstall.**
   See "Log in to the MCMU BUI" on page 28.
2. **In the navigation panel, select Database → Virtual Machine Group Profiles.**



3. **Click Delete.**
4. **Confirm the deletion (click Yes or Confirm).**
   The deletion takes less than a minute.
5. **After the deletion, click OK (or Quit).**

Configuring Application VMs (BUI)

Perform these tasks to view, create, edit, and delete App VMs.

Description	Link
View App VMs.	“View App VM Groups and VMs (BUI)” on page 133
Create App VMs.	“App VM Creation Task Overview” on page 135 “Create an App VM Group Profile (BUI)” on page 135 “Deploy an App VM Group (BUI)” on page 141
Edit an App VM.	“Edit an App VM Group (BUI)” on page 144
Delete an App VM.	“Delete an Undeployed App VM Group” on page 146 “Delete a Deployed App VM Group” on page 146

Caution - Never manually manage VMs using Oracle Solaris zone commands. Always manage the VMs through MCMU BUI or MCMU CLI.

▼ View App VM Groups and VMs (BUI)

1. **Access the MCMU.**
   See “Log in to the MCMU BUI” on page 28.

2. **In the navigation panel, select Application → Virtual Machine Group Profiles.**
   The Application Virtual Machine Group Profiles Summary page is displayed.

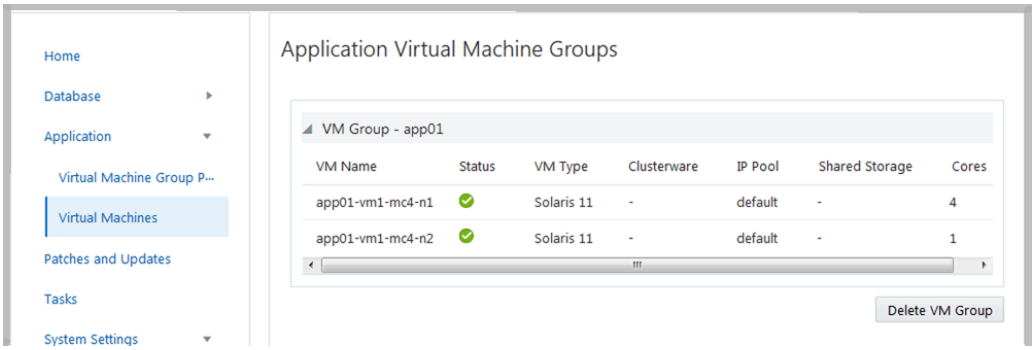
This is an example of a system with one App VM group. If this page reports no data to display, App groups have not been configured yet.

3. **In the navigation panel, select Application → Virtual Machines.**

   The Application Virtual Machines summary page is displayed.

Tip - If the VMs are not listed, click the triangle that is next to the VM group to expand the display. You might need to select another navigation item, then come back to this page.

This example shows one App VM group with two VMs.



App VM Creation Task Overview

Creating App VMs is accomplished though these main tasks:

Task No.	Description	Details You Provide During the Task	BUI Instructions	CLI Instructions
1.	If needed, create additional networks that will be assigned to the VMs during the creation process.	You can accept the default network parameters that were configured during the installation, or edit or add additional networks. "App VM Group Parameters" on page 94	"View and Update Network Parameters in v1.2.4 and Later (BUI)" on page 66 "View and Update Network Parameters in v1.2.2 and Earlier (BUI)" on page 70	"Managing Networks (CLI)" on page 291
2.	Create App VM Group Profile.	"App VM Group Parameters" on page 94	"Create an App VM Group Profile (BUI)" on page 135	"Create an APP VM Group (CLI)" on page 275
3.	Deploy the App VM Group.	None	"Deploy an App VM Group (BUI)" on page 141	"Deploy an App VM Group (CLI)" on page 277

▼ Create an App VM Group Profile (BUI)

The profile is used to define an App VM group, which supports one or two VMs (one on each compute node).

The total number of App VM groups you can create is only limited by the amount of system resources that are available.

For each App VM, you need 1 IP address. When the system was installed, a pool of IP addresses was defined in the system. To see the amount of IP addresses in the pool, in the MCMU BUI, go to System Settings → User Input Summary, and view the IP Address Pool Size.

Note - It is possible that App VM group profiles were created when the system was initially set up. To determine if a group profile has already been created, see "View App VM Groups and VMs (BUI)" on page 133.

---

1. **Access the MCMU BUI as a primary admin, such as mcinstall.**

   See "Log in to the MCMU BUI" on page 28.

2. **In the navigation panel, select Application → Virtual Machine Group Profiles.**

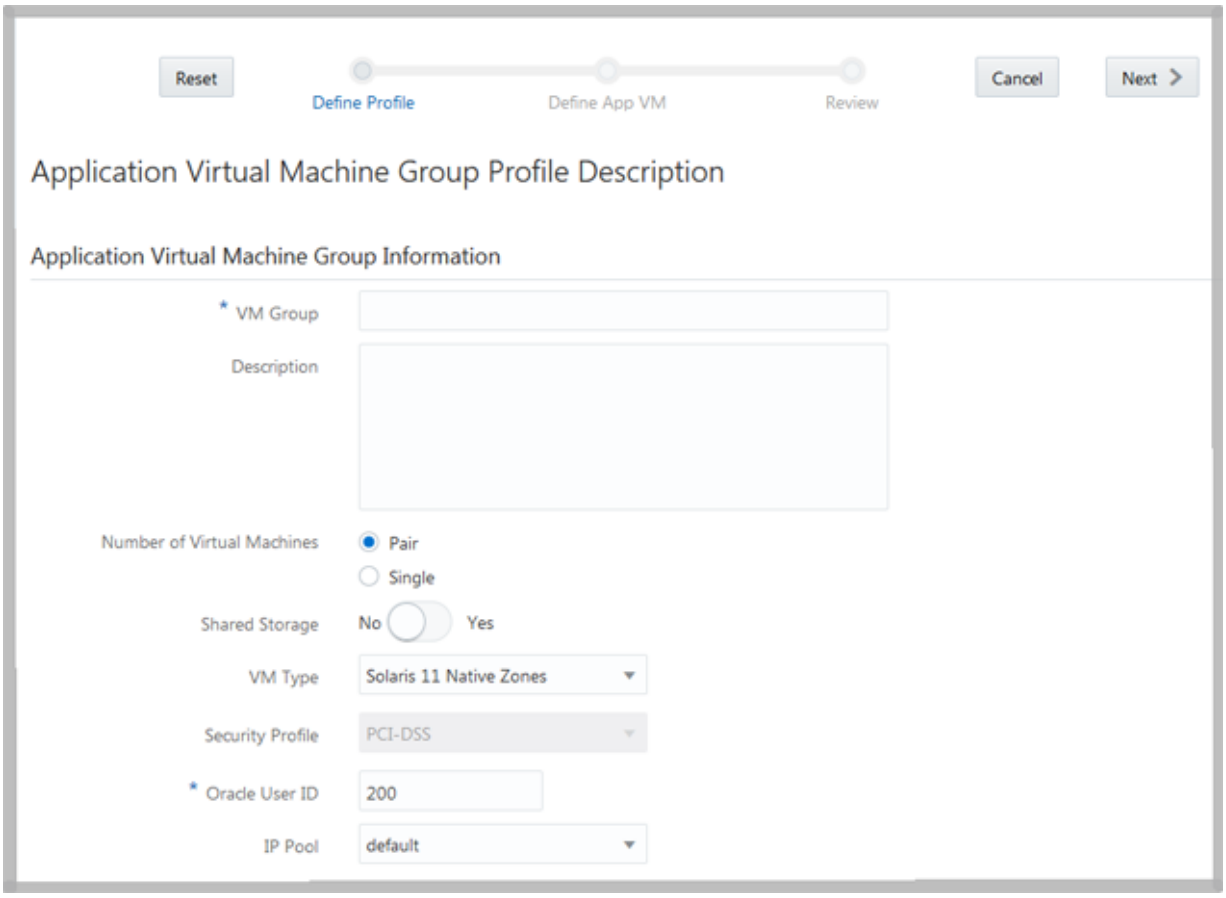
   The Application Virtual Machine Group Profiles Summary page is displayed.

3. **Click Create New Profile.**

   The Application Virtual Machine Group Description page is displayed.

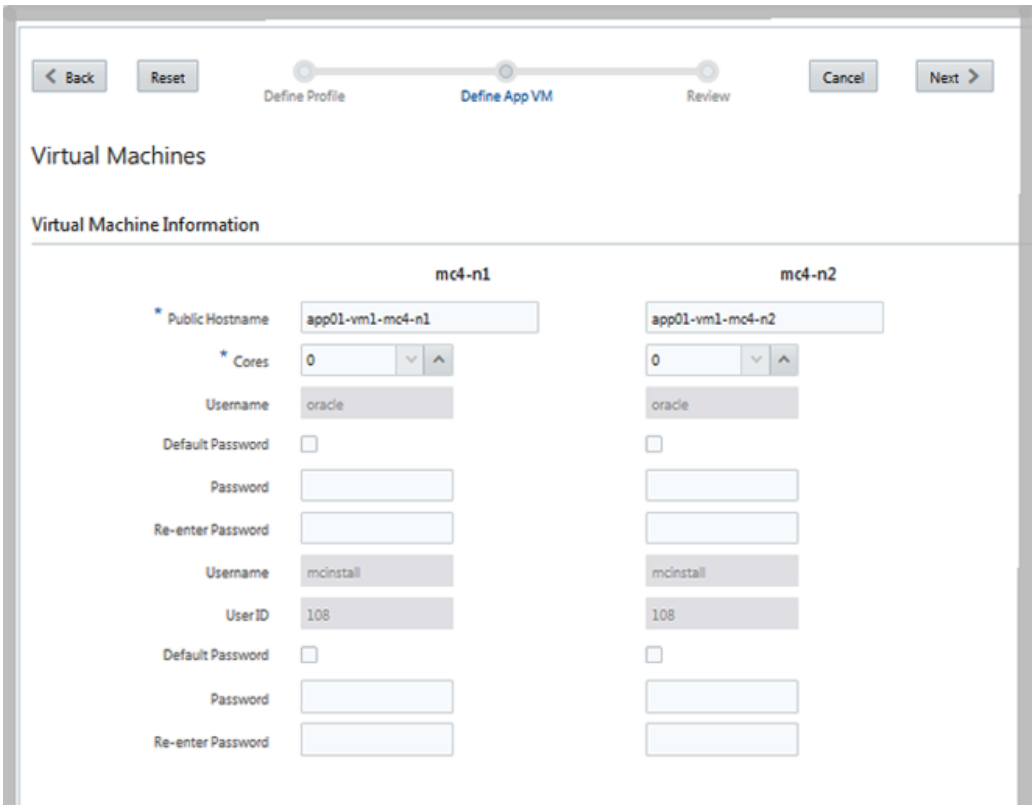
4. **Enter the required information and click Next.**

For details about the required information, use the optional worksheet ("App VM Planning Worksheets (Optional)" on page 93), or see "App VM Group Parameters" on page 94.



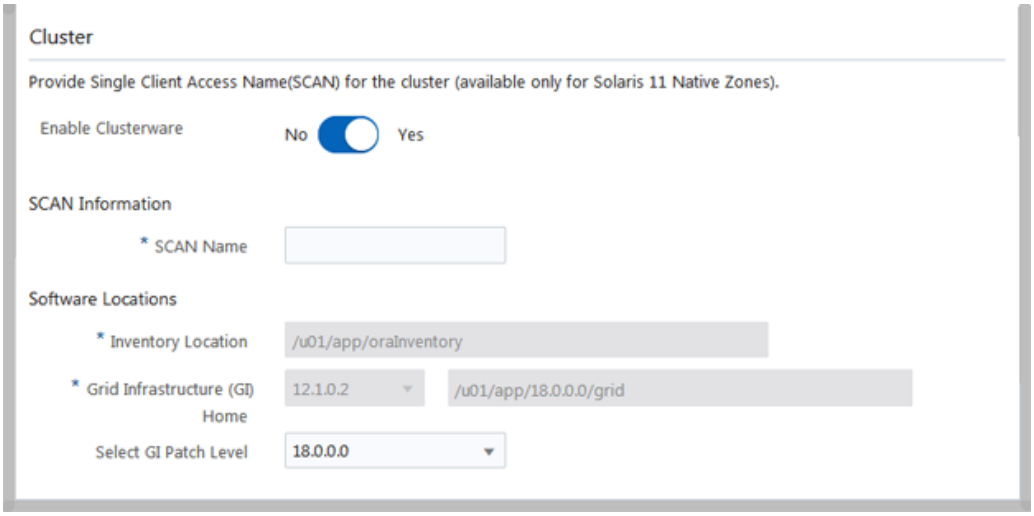
5. **Enter information in the page section including passwords for all accounts.**

This example shows the page that is displayed when a pair of VMs are selected in Step 4. If Single is selected, only one VM is displayed.



If you plan to cluster the App VMs for high availability, complete the Define Cluster section and click Next (for details, see "Define Cluster" on page 98). Otherwise, click Next.

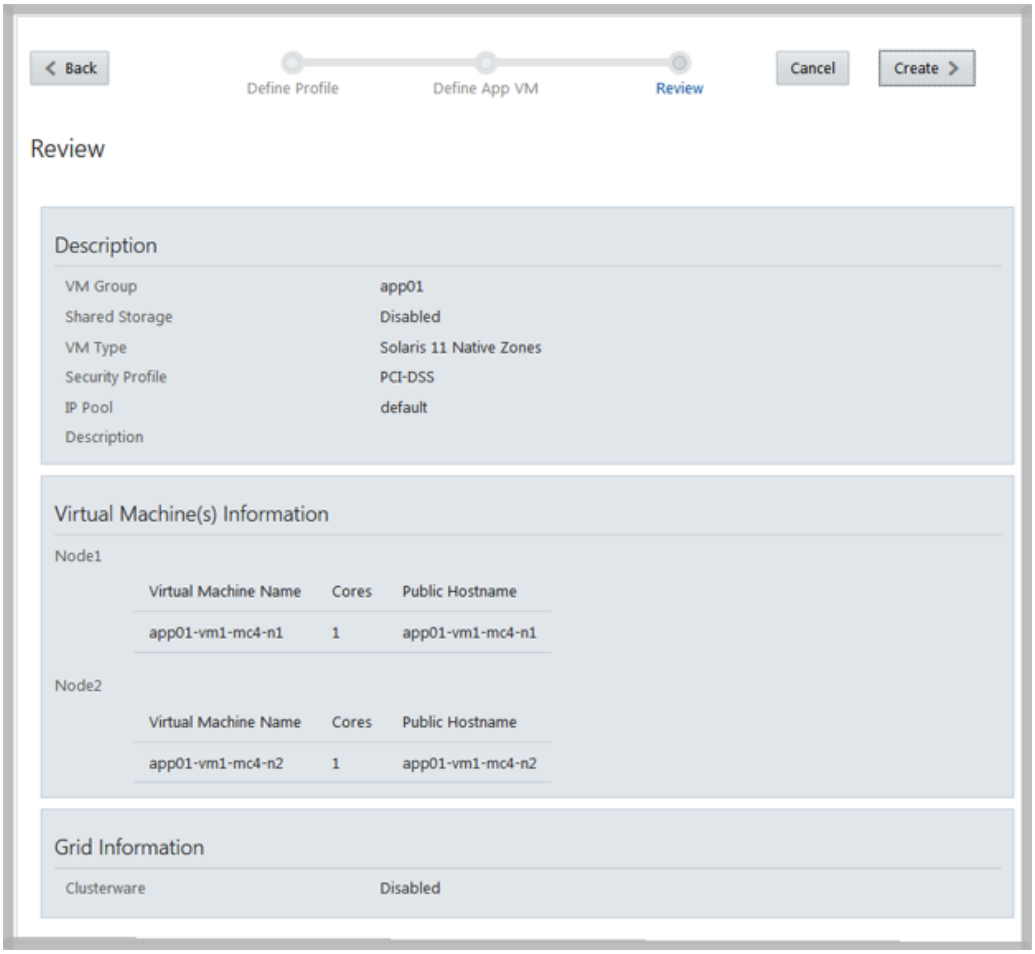
Note that this section of the page is only enabled when you are configuring Oracle Solaris 11 type VMs.



6. **Verify that the information in the Review page is correct.**

   The information in this page is not editable.

If you find any issues with any of the information on the Review page, either click Back to return to a previous screen, or click Cancel to return to the Home page.

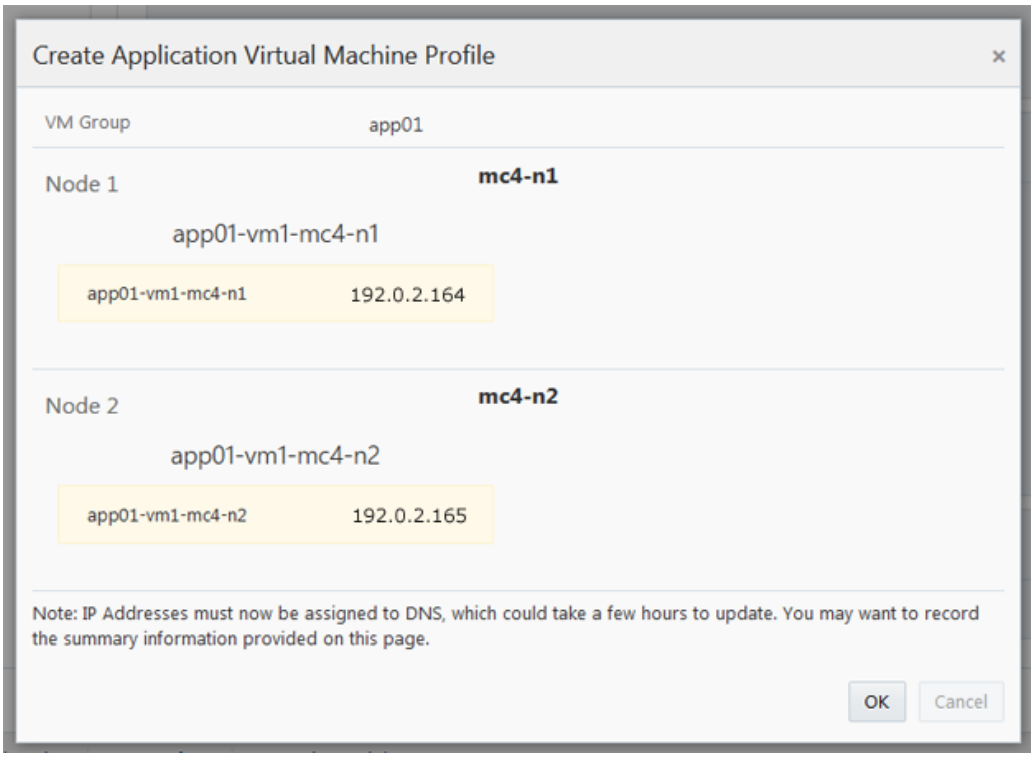


7. **Click Create (formerly Generate).**

   A progress window is displayed. The process takes several minutes to complete.

8. **When the creation is finished, make note of the host names and IP addresses that are displayed.**

Enter the host name and IP addresses into your DNS.



9. **Click OK (or Finish).**

   The App VM group is created with the specified VMs, but the VMs are not available for use until they are deployed.

10. **(Optional) Configure additional App VM groups.**

11. **Go to the next task.**

    See “Deploy an App VM Group (BUI)” on page 141.

▼ Deploy an App VM Group (BUI)

Perform this deployment task for each App VM group that you create.

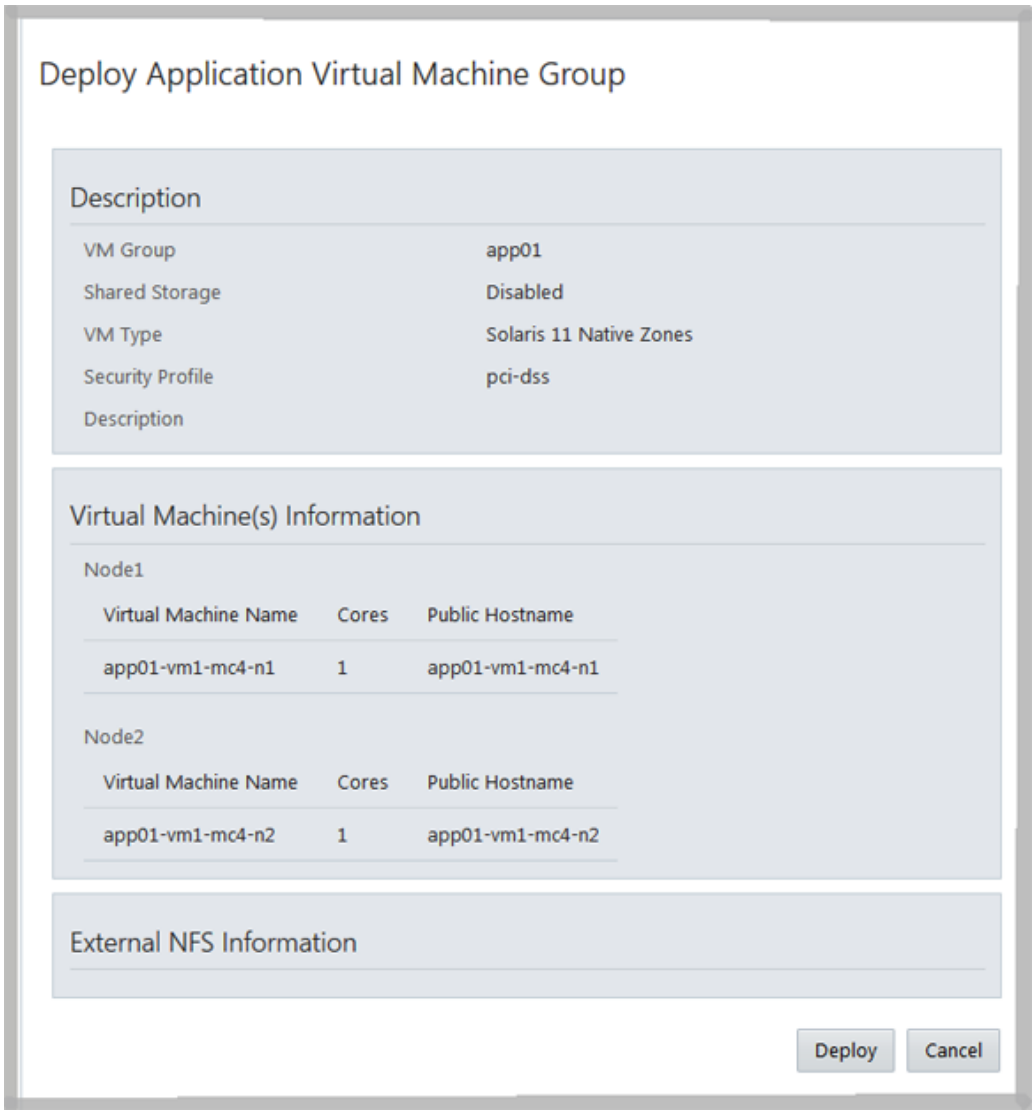
Once complete, the utility allocates these resources to each App VM:

- **ZFS root file system** – 40 GB.
- **Storage for application binaries and files** – 100 GB ZFS file system mounted on `/u01`.
- **Client network** – One virtual network.

1. **Ensure that you have created a VM group.**
   See "Create an App VM Group Profile (BUI)" on page 135.

2. **In the Navigation panel, select Application → Virtual Machine Group Profiles.**

3. **For the App VM group that you want to deploy, click Deploy.**



4. **Review the App parameters and click Deploy.**

Note - If the parameters are not correct, instead select Application → Virtual Machine Group Profiles.

A progress window is displayed. The process takes 7-15 minutes to complete.

To see all the status of the deployment steps, click Show Detail.

5. **When the deployment is finished, click OK (formerly Finish).**

6. **Display the App VM hostnames and IP addresses:**

   a. **Go to the Application → Virtual Machine Group Profiles page.**

   b. **Click Edit for the desired application group.**

      The edit page lists the VM hostname (public hostname) and the associated public IP address for each VM.

   c. **At the bottom of the page, click Cancel.**

7. **If needed, enter the IP addresses and public hostnames into DNS.**

▼ Edit an App VM Group (BUI)

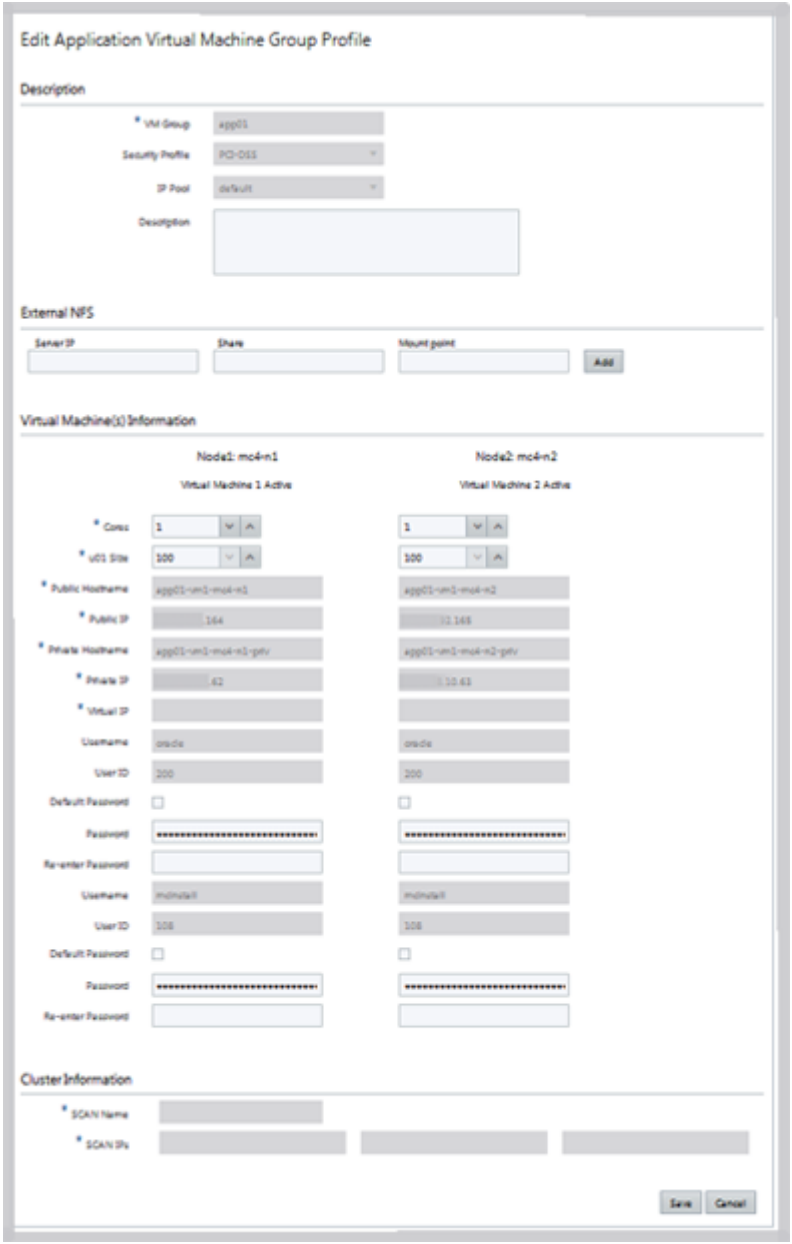
Use this procedure to edit an App VM. You can edit a deployed VM.

1. **Access the MCMU BUI as a primary admin, such as mcinstall.**

   See "Log in to the MCMU BUI" on page 28.

2. **In the navigation panel, select Application → Virtual Machine Group Profiles.**

3. **For the App VM group that you want to edit, click Edit.**



4. **Edit any of the parameters that are enabled for changes.**
5. **Perform one of these actions.**
   - **Save** – Click Save to save the changes. A summary page is displayed.
   - **Cancel** – Click Cancel to discard the changes and close the window.
6. **Click OK (or Save then Apply for previous versions).**

Delete an Undeployed App VM Group

Use this procedure to delete an App VM group that has not been deployed.

Caution - The deletion cannot be undone. Proceed with caution.

1. **Access the MCMU BUI as a primary admin, such as mcinstall.**
   See "Log in to the MCMU BUI" on page 28.
2. **In the navigation panel, select Application → Virtual Machine Group Profiles.**
3. **For the App VM group that you want to delete, click Delete.**
4. **Click Yes (or Confirm).**

Delete a Deployed App VM Group

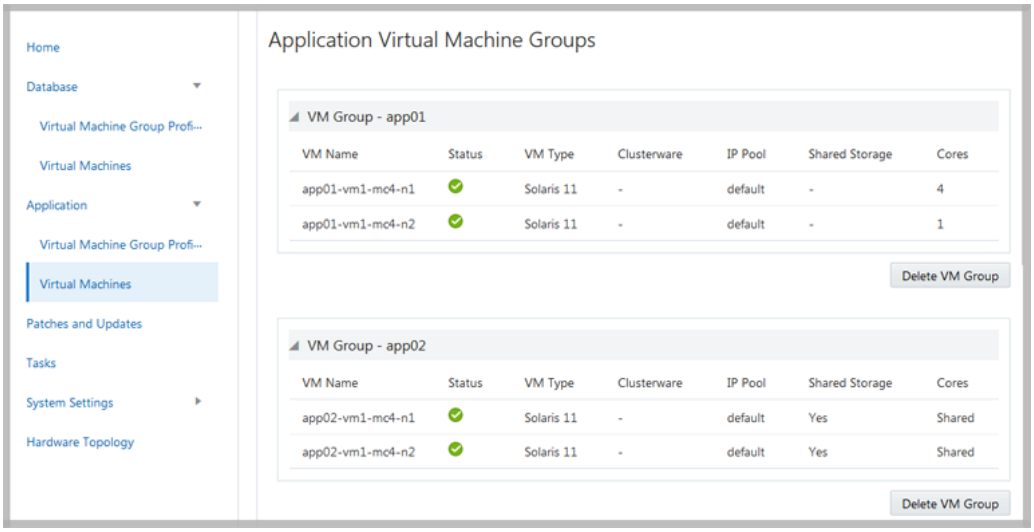
Use this procedure to delete an App VM group that has VMs and has been deployed.

When you delete a deployed App VM group, the VMs in the group are deleted and storage and network resources are returned to the system for future allocation. The utility sends the primary admin email reporting the deletion of each VM.

Caution - Deleting App VM groups deletes all the VMs, applications, and data associated with the VM group. The deletion cannot be undone. Proceed with caution.

1. **Access the MCMU BUI as a primary admin, such as mcinstall.**
   See "Log in to the MCMU BUI" on page 28.

2. **In the navigation panel, select Application → Virtual Machines.**



3. **For the App VM group that you want to delete, click Delete VM Group.**

4. **Click Yes (or Confirm).**

   The App VM group and associated App VMs are deleted. The process takes about 5 minutes to complete.

5. **When the confirmation window indicates that the deletion is done, click OK (or Quit).**

Managing Storage for VM Groups (BUI)

These topics describe how to configure the NFS shared storage and how to add or remove a network file system.

Note - Additional storage management procedures such as preparing a drive for replacement and adding another storage array must be performed using the `mcmu` CLI. See "Managing Storage (CLI)" on page 309.

▼ Enable or Disable NFS (BUI)

As described in "MiniCluster Storage Overview" on page 25, MiniCluster includes storage space on the storage array that can be made available to VMs using NFS. You can also provide VMs with NFS shared storage from other storage devices in your environment. To distinguish between the two types of NFS storage capabilities, this guide uses these terms:

- **Internal NFS** – Refers to storage on the MiniCluster storage array that can be enabled or disabled.
- **External NFS** – Refers to other NFS storage that is provided by servers in your environment.

Use this procedure to enable or disable access to internal and external NFS storage DB VM and App VM groups. You can also use this procedure to identify if NFS is enabled or disabled.

The internal NFS storage provides storage space for any storage purpose, and is available to all VMs within a group if it is enabled.

Caution - Systems deployed in highly secured environments should disable NFS to both internal and external storage. For more information, refer to the *Oracle MiniCluster S7-2 Security Guide*.

This tables describes the configuration results of enabling or disabling NFS in the Group Profiles page.

Shared Storage Configuration	Internal NFS	External NFS
Enabled	NFS services are enabled for all VMs in the group. All the VMs in the group have access to the `/sharedstore` directory and its contents.	If external NFS is configured, all VMs in the group have access to the external NFS through the mount point specified in the group profile.
Disabled	All NFS services are disabled for all VMs in the group. The `/sharedstore` directory and its contents is not available to any VMs in the group.	Network file systems are not available to any VMs in the group. If previously configured, the NFS mount point is not deleted from VMs, but no file system is mounted to it.

The change takes effect immediately and applies to all the VMs in the group. For more information about shared storage on the storage array, see "MiniCluster Storage Overview" on page 25.

Caution - If any software is dependent on data in the shared storage, and you plan to disable shared storage, take appropriate actions to remove the dependencies before you perform this procedure.

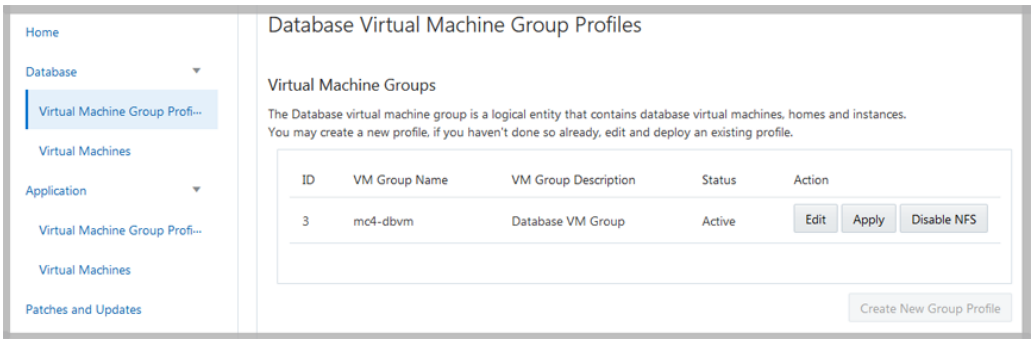
1. **Access the MCMU BUI as a primary admin, such as mcinstall.**

   See "Log in to the MCMU BUI" on page 28.

2. **Navigate to the group profiles page.**

   - For a DB VM group, select the Database → Virtual Machine Group Profiles page

- For an App VM group, select the Application → Virtual Machine Group Profiles page



3. **Click either Disable or Enable NFS (formerly Shared Storage).**

4. **When prompted, click Yes (or Quit).**

   The change takes effect immediately.

5. **To access the shared file system, log into the VM and perform Oracle Solaris commands.**

   To access the file system:

```
% cd /sharedstore
```

   List contents of the directory:

Note - The `/sharedstore` directory is empty until you put software in the directory.

```
% ls /sharedstore
Downloads   Music   Pictures   Presentations   Templates  Texts  Videos
```

Related Information

Oracle Solaris 11.4

- Securing Files and Verifying File Integrity in Oracle Solaris 11.4 (`https://docs.oracle.com/cd/E37838_01/html/E61022/index.html`)
- Managing File Systems in Oracle Solaris 11.4 (`https://docs.oracle.com/cd/E37838_01/html/E61016/index.html`)

- Oracle Solaris 11.4 Information Library (https://docs.oracle.com/cd/E37838_01/index.html)

Oracle Solaris 11.3

- Securing Files and Verifying File Integrity in Oracle Solaris 11.3 (https://docs.oracle.com/cd/E53394_01/html/E54827/index.html)
- Managing File Systems in Oracle Solaris 11.3 (http://docs.oracle.com/cd/E53394_01/html/E54785/index.html)
- Oracle Solaris 11.3 Information Library (https://docs.oracle.com/cd/E53394_01/)

▼ Add an External NFS to a VM Group (BUI)

Use this procedure to add a network file system (NFS) to a DB VM group or an App VM group.

The NFS service must be at minimum NFSv4. The NFS that you add can be any whole or partial directory tree or a file hierarchy, including a single file that is shared by and NFS server.

When you add external NFS to a group, the remote file system is immediately accessible to all the VMs in the group. External NFS is only made available to VMs in a group if shared storage is enabled. See “Enable or Disable NFS (BUI)” on page 149.

1. **(If needed) Check what the NFS server is sharing:**

   a. **Log into the `mcmu` CLI as a primary admin such as mcinstall.**

      See “Log in to the MCMU CLI” on page 31.

   b. **Ensure that an NFS is available form a server in your environment.**

      There are a variety of ways to perform this step, depending on the type of server. This is an example of an Oracle Solaris command that shows what file systems a server is sharing:

      ```
      % /usr/sbin/showmount -e NFSserver_name_or_IPaddress
      ```

   c. **To check the version of the NFS service provided by the NFS server, type:**

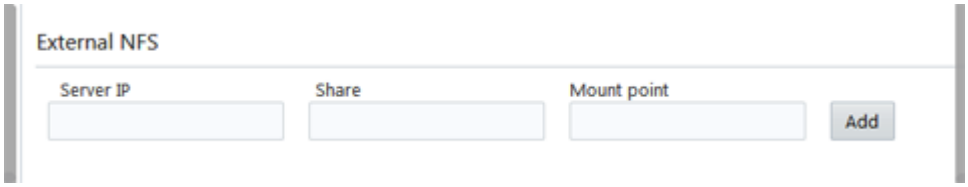
      ```
      % rpcinfo -p NFSserver_name_or_IPaddress | egrep nfs
          100003    4   tcp   2049  nfs
      ```

      The second column displays the version number. You might see several lines of output. One of them must report version 4.

2. **Access the MCMU BUI as a primary admin, such as mcinstall.**
   See "Log in to the MCMU BUI" on page 28.

3. **Navigate to the group profiles page.**
   - For a DB VM group, select the Database → Virtual Machine Group Profiles page.
   - For an App VM group, select the Application → Virtual Machine Group Profiles page.

4. **Click Edit.**
   The Edit Virtual Machine Group Profile page is displayed. Locate this section:



5. **Enter the required information.**
   - **Server IP** – Specify the IP address of the NFS server.
   - **Share** – Specify the NFS file system that is being shared by your NFS server. For example: `/my_nfs`
   - **Mount** – Specify the mount point. For example: `/my_mountpoint` MCMU will create the mount point and make it available to the VMs in the group.

6. **At the bottom of the screen, click Save.**

7. **When prompted, click Done.**

8. **In the DB VM Group Profiles page, click Edit.**

9. **At the bottom of the screen, click Apply and confirm the change.**

10. **When prompted, click Done.**

11. **Change the permissions on the mount point in the VMs.**
    You might need to lighten the permissions on the mount point so that users can access the file system.

    a. **Log into a VM.**

See “Accessing VMs” on page 32.

b. Assume the `root` role.

```
% su root
password: **************
```

c. List the mount point permissions.

In this example, `my_mountpoint` is the mount point, and the permissions are read, write, execute for the root user which doesn't allow any other users access.

```
# ls -ld /my_mountpoint
drwx------   2 root     root           6 Oct 25 17:20 my_mountpoint
```

d. Change permissions on the mount point, and list the permissions.

In this example, the permissions are set to read, write, and execute for the owner and group, and set to read-only for others.

```
# chmod 774 /my_mountpoint
# ls -ld /my_mountpoint
drwxrwxr--   2 root     root           2 Oct 27 09:03 my_mountpoint
```

e. Repeat Step 11 for each VM in the group.

12. To access the network file system, log into the VM and perform Oracle Solaris commands.

To access the file system:

```
% cd /my_mountpoint
```

List contents of the directory:

```
% ls /my_mountpoint
Downloads   Music   Pictures   Presentations  Templates   Texts  Videos
```

Related Information

Oracle Solaris 11.4

- Securing Files and Verifying File Integrity in Oracle Solaris 11.4 (`https://docs.oracle.com/cd/E37838_01/html/E61022/index.html`)
- Managing File Systems in Oracle Solaris 11.4 (`https://docs.oracle.com/cd/E37838_01/html/E61016/index.html`)

- Oracle Solaris 11.4 Information Library (https://docs.oracle.com/cd/E37838_01/index.html)

Oracle Solaris 11.3

- Securing Files and Verifying File Integrity in Oracle Solaris 11.3 (https://docs.oracle.com/cd/E53394_01/html/E54827/index.html)
- Managing File Systems in Oracle Solaris 11.3 (http://docs.oracle.com/cd/E53394_01/html/E54785/index.html)
- Oracle Solaris 11.3 Information Library (https://docs.oracle.com/cd/E53394_01/)

Delete an External NFS From a VM Group (BUI)

Use this procedure to delete a network file system (NFS) from a DB VM group or an App VM group.

When you delete an NFS from a group, the remote file system is immediately unavailable to all the VMs in the group. The mount point is deleted from the system.

1. **Access the MCMU BUI as a primary admin, such as mcinstall.**
   See "Log in to the MCMU BUI" on page 28.
2. **Navigate to the group profiles page.**
   - For a DB VM group, select the Database → Virtual Machine Group Profiles page.
   - For an App VM group, select the Application → Virtual Machine Group Profiles page.
3. **Click Edit.**
   The Edit Virtual Machine Group Profile page is displayed. Locate this section:

4. **Click Delete for the NFS that you want to delete.**
5. **At the bottom of the screen, click Save.**

6. **When prompted, click Done.**
7. **In the DB VM Group Profiles page, click Edit.**
8. **At the bottom of the screen, click Apply, and confirm the change.**
9. **When prompted, click Done.**

Configure Global Zone BE Backups (mcbackup)

This feature is available for MiniCluster version 1.2.4 and later.

You can configure the SMF service called mcbackup to create a snapshot of the global zone boot environment in the /sharedstore/be/*hostname* directory. The service is disabled by default. This procedure describes how to enable and disable the mcbackup service.

Once the mcbackup service is enabled, there is a 15 minute delay, after which a snapshot of the global zone boot environment is created and backed up every hour.

1. **Log into the kernel zone on node 1 as a primary admin such as mcinstall and assume the root role.**

   See "Log in to the Global or Kernel Zone" on page 35.

2. **Ensure that the permissions on the /sharedstore/be directory are limited to only authorized users.**

   For example, list the directory permissions and then set them so that only a user with the root role can access the directory.

3. **Configure the mcbackup service.**

   Run one of these commands:

   - **Enable the mcbackup service.**

     ```
     # svcadm enable mcbackup
     ```

   - **Disable the mcbackup service.**

     ```
     # svcadm disable mcbackup
     ```

4. **Log into the kernel zone on node 2 as a primary admin such as mcinstall and assume the root role.**

See “Log in to the Global or Kernel Zone” on page 35.

5. **Configure the `mcbackup` service.**

   Run one of these commands:

   - **Enable the `mcbackup` service.**

     ```
     # svcadm enable mcbackup
     ```

   - **Disable the `mcbackup` service.**

     ```
     # svcadm disable mcbackup
     ```

Securing the System (BUI)

These topics describe how to view security benchmarks and encryption key information in the MCMU BUI. You can also use the BUI to configure a firewall to protect network traffic.

Note - For detailed information about running security benchmarks and changing SSH keys, refer to the *Oracle MiniCluster S7-2 Security Guide*.

Firewall Protection

The firewall technology provided by MiniCluster differs based on the version of the Oracle Solaris OS that is running on MiniCluster components.

- **MiniCluster 1.3.0 and later**

  MiniCluster now uses the packet filter functionality delivered by Oracle Solaris 11.4 to enable network traffic protection. This enables MiniCluster to protect networks and virtual hosts from network-based intrusions. Packet Filtering is enabled and disabled through the use of the SMF service `svc:/network/firewall` for Global and Kernel Zones, and all VMs running Oracle Solaris 11.4.

  The Firewall Manager feature is available through the MiniCluster BUI (System Settings → Firewall Manager).
- **MiniCluster 1.2.5.22 and earlier**

  MiniCluster provides network traffic protection using Oracle Solaris 11.3 IP Filter-based firewalls for virtual machines, including global, non-global, and kernel zones.

For instruction on updating firewall rules, refer to "Manage Firewall Rules" in *Oracle MiniCluster S7-2 Security Guide*.

To learn about the Oracle Solaris firewall technologies, refer to the following Oracle Solaris Documents:

- Oracle Solaris 11.4– Configuring the Firewall in Oracle Solaris
- Oracle Solaris 11.3– IP Filter Firewall in Oracle Solaris

Security Compliance Benchmarks

When the system is installed, a security profile (CIS Equivalent, PCI-DSS, or DISA-STIG) is selected, and the system is automatically configured to meet that security profile. To ensure that the system continues to operate in accordance with security profiles, the MCMU provides the means to run security benchmarks and access to the benchmark reports.

Running security benchmarks provides these benefits:

- Enables you to evaluate and assess the current security state of the database and application VMs.
- The security compliance tests support the security profile standards based on the security level configured during the installation.
- The security compliance tests run automatically when the system is booted, and can be run on-demand or at scheduled intervals.
- Only available to MCMU primary admins, compliance scores and reports are easily accessed from the MCMU BUI.
- The compliance reports provide remediation recommendations.

▼ View Security Information (BUI)

Use this procedure to view security related information such as compliance reports and encryption key details.

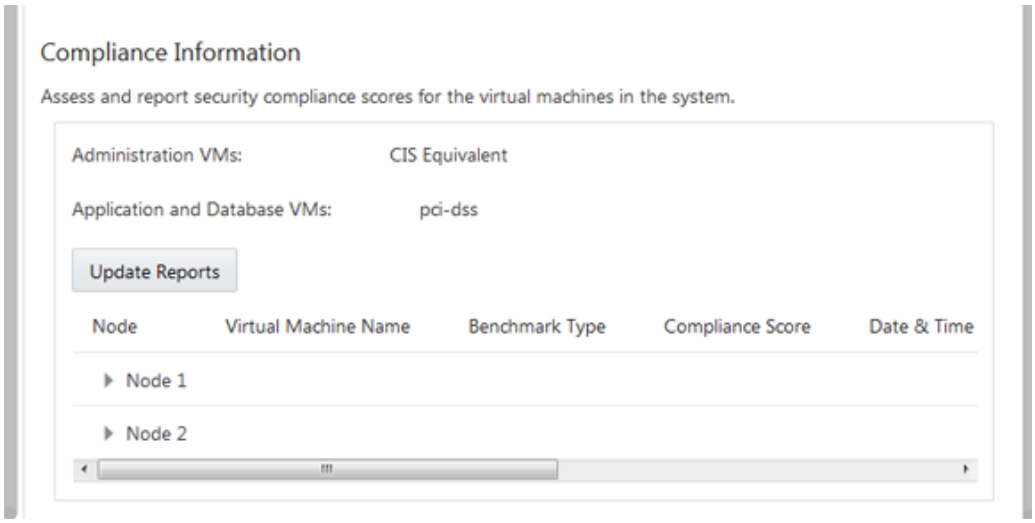
For information about configuring security compliance benchmarks, see "Securing the System (BUI)" on page 159.

1. **Access the MCMU BUI as a primary admin, such as mcinstall.**

See “Log in to the MCMU BUI” on page 28.

2. **In the Home page, scroll down to Compliance Information.**

   This example shows compliance information for a system that has not yet scheduled security benchmarks.:

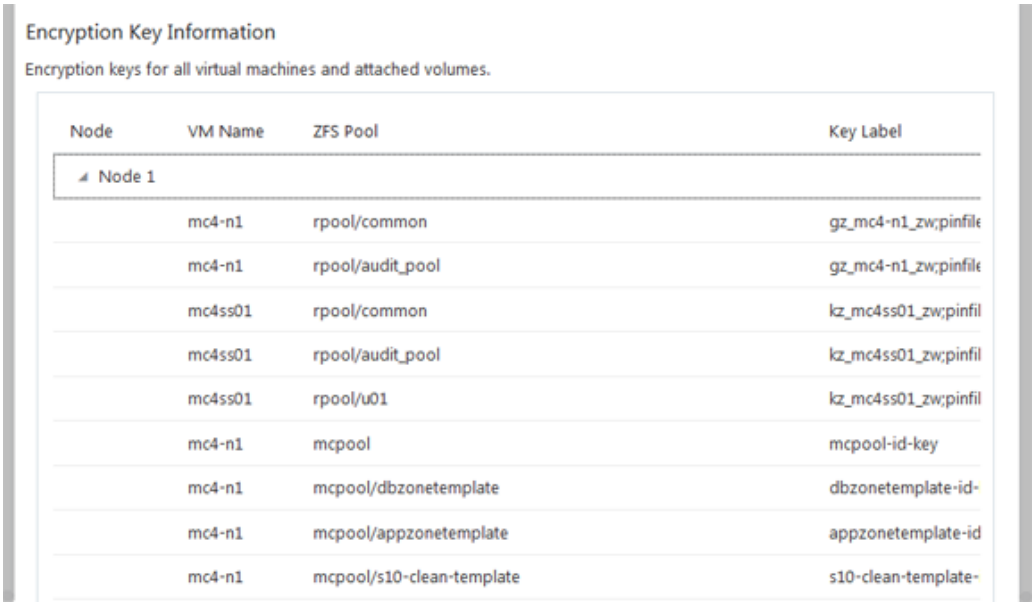


   The Compliance Information panel provides this information:

   - **Node** – Lists the compute nodes. You can expand and collapse the individual nodes by clicking on the arrow.
   - **Virtual Machine Name** – Lists the VM names (hostnames).
   - **Benchmark Type** – Specifies the type of benchmark used (CIS Equivalent, PCI-DSS, or DISA-STIG).
   - **Compliance Score** – Lists the overall score of the compliance run.
   - **Date & Time** – Displays the most recent time that the benchmark was performed.
   - **Remarks** – Provides information about benchmark results.
   - **View Report** – Provides a button that enables you to view a compliance report.
   - **Schedule Compliance** – Provides a button that enables you to schedule a benchmark.

3. **In the navigation panel, select System Settings → Security to access encryption key information.**

Click a node to display details.



To manage encryption keys, refer to the *Oracle MiniCluster S7-2 Security Guide*.

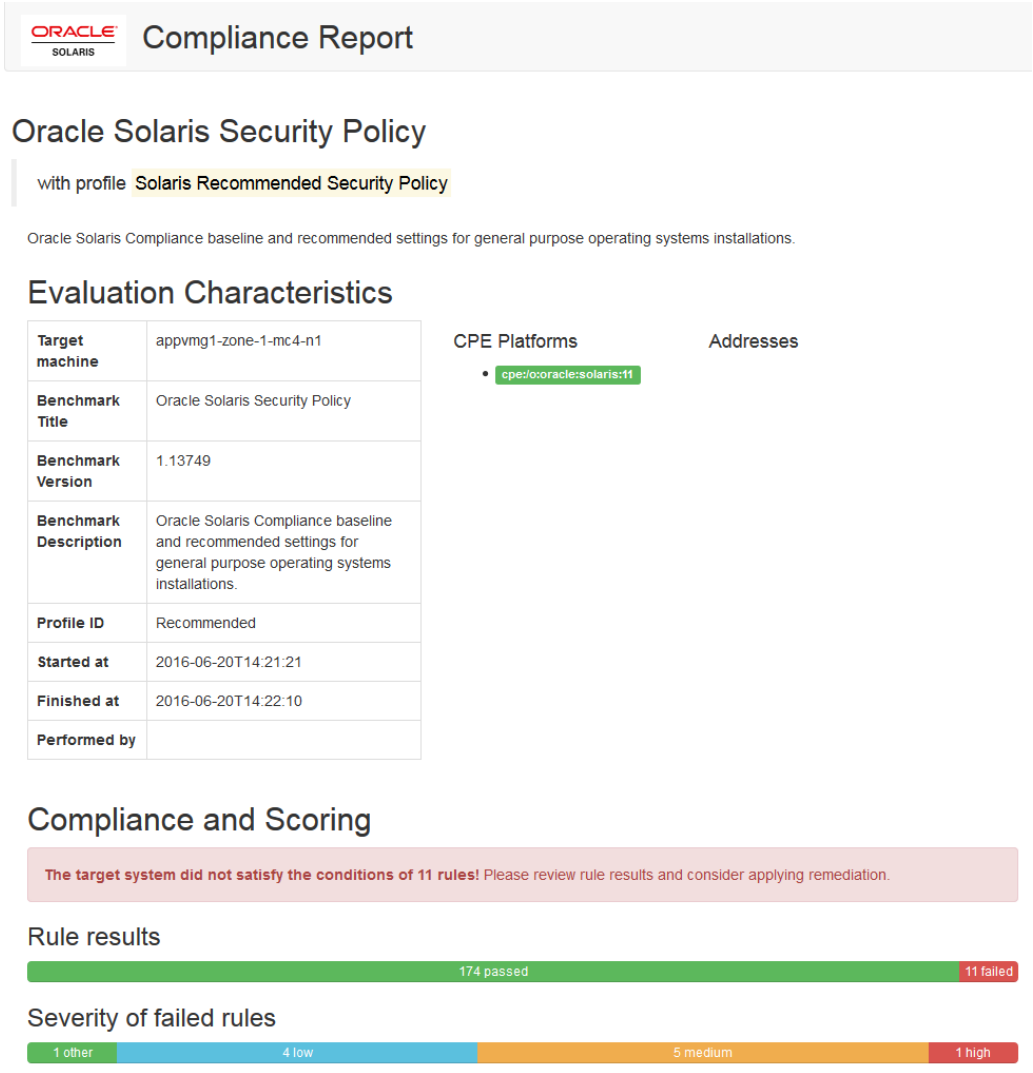
View Benchmark Reports (BUI)

Note - You can only view benchmark reports if a benchmark was schedule and ran.

1. **Access the MCMU BUI as a primary admin, such as mcinstall.**
   See "Log in to the MCMU BUI" on page 28.
2. **In the Home page, scroll down to the Compliance Information panel.**
3. **Click Update Reports.**
   The update process take a minute or so to complete.
4. **Expand the node display and identify the compliance report.**
5. **Scroll to the right and click View Report.**

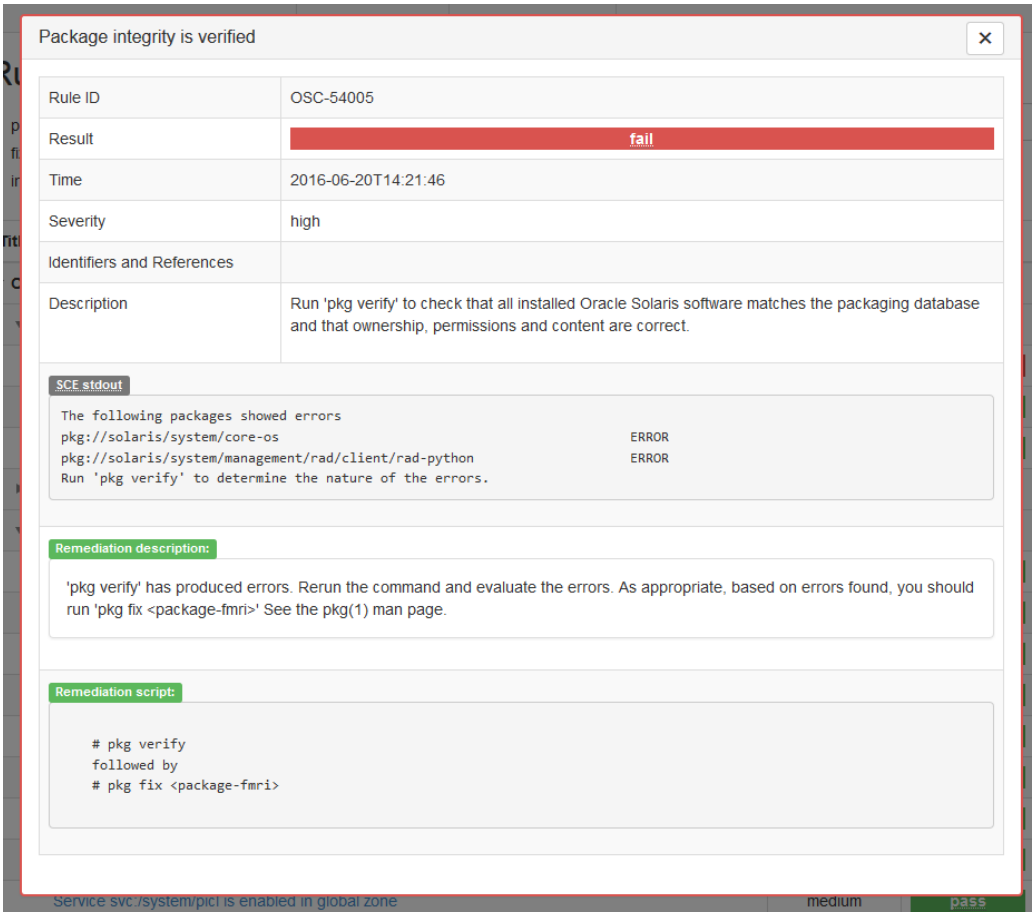
The benchmark report is displayed.

Under Rule Overview, you can select which types of test to display based on their results. You can also specify a search string in the search field.



6. **Click the name of a test to get details and recommended remediation information.**

Note - You can display all the details of all tests by clicking Show all Result Details at the bottom of the report.



7. **Evaluate the security warnings and make corrections as needed.**

Configure the BUI Session Timeout

Caution - Carefully consider the session timeout period. Maintaining a short BUI timeout session is a key security configuration. Ensure that the value you use is in compliance with your corporate security policies.

Note - Each user must use their own browser and not share browser sessions.

1. **Access the MCMU BUI as a primary admin, such as mcinstall.**

   See "Log in to the MCMU BUI" on page 28.

2. **In the navigation panel, select System Settings → Security.**

   The Security page is displayed.

3. **In the BUI Session Timeout section, view the timeout setting.**

4. **To change the duration or disable the timeout, click Change.**

5. **Make the change and click OK.**

Configuring Oracle Engineered Systems Hardware Manager

Oracle Engineered Systems Hardware Manager is a BUI-based system-level hardware management utility intended for use by Oracle Service personnel, or under their direction.

By default, utility is configured at installation. However, if you change Oracle ILOM `root` passwords after the installation, you must update the Oracle Engineered Systems Hardware Manager configuration with the new passwords. This action is required so that service personnel can use the tool to ensure optimum problem resolution and health of the system.

These topics describe how to configure this utility:

Oracle Engineered Systems Hardware Manager Overview

Oracle Engineered Systems Hardware Manager is a BUI-based system-level hardware management utility used by Oracle Service personnel, or under their direction.

The utility provides service personnel with these capabilities:

- Hardware dashboard/health view
- Hardware inventory summary
- Hardware component details
- Ability to launch other Oracle MiniCluster tools
- Easy access to Oracle ILOM and the MCMU
- Problem summary across all components

- System-level problem history, and the ability to manually clear hardware faults and warnings
- Automatic and manual collection of support file bundles
- Manual delivery of support file bundles to My Oracle Support (MOS)

If you change Oracle ILOM `root` passwords after the installation, you must update the Oracle Engineered Systems Hardware Manager configuration with the new passwords. This action is required so that service personnel can use the tool to ensure optimum problem resolution and health of the system.

There are two accounts in Oracle Engineered Systems Hardware Manager:

- **`admin`** – Use this account to configure Oracle Engineered Systems Hardware Manager.
- **`service`** – An account used by Oracle Service personnel.

In addition, Oracle Engineered Systems Hardware Manager must be configured with the passwords for the `root` account on all the Oracle ILOMs in the system.

Note - The utility does not need to know the passwords for the OS, database, applications, or VMs.

Related Information

- “Access Oracle Engineered Systems Hardware Manager” on page 168
- “Update Component Passwords” on page 170
- “Configure the Utility's Password Policies and Passwords” on page 169
- “Configure Certificates and Port Numbers” on page 171

▼ Access Oracle Engineered Systems Hardware Manager

You can access this tool from a browser as described in this procedure, or you can launch the tool from the MCMU BUI. See “Access Oracle Engineered Systems Hardware Manager” on page 197.

1. **Open a browser on a system that has network access to MiniCluster.**
2. **In the browser, type this address:**

   `https://`*node1_name.domain*`:8001`

   Example: https://mc4-n1.us.example.com:8001

The Oracle Engineered Systems Hardware Manager login screen is displayed.

3. **Enter the user name, `admin`, and the password.**

   For more information about the Engineered Systems Hardware Manager user accounts and passwords, see "Configure the Utility's Password Policies and Passwords" on page 169.

Tip - For assistance, refer to the online help that is displayed on each page.

Related Information

- "Configure the Utility's Password Policies and Passwords" on page 169
- "Configure Certificates and Port Numbers" on page 171

▼ Configure the Utility's Password Policies and Passwords

There are two accounts in Oracle Engineered Systems Hardware Manager:

- **`admin`** – Use this account to configure Oracle Engineered Systems Hardware Manager.
- **`service`** – An account used by Oracle Service personnel.

This procedure describes how to manage the passwords and policies for the user accounts.

Note - You can also change the admin password using an alternative procedure described in "Configure the Oracle Engineered System Hardware Manager Password" in *Oracle MiniCluster S7-2 Installation Guide*.

1. **Access the utility as the admin user.**

   See "Access Oracle Engineered Systems Hardware Manager" on page 168.

2. **(If desired) Configure the password policies.**

   Choose Setup → Authentication → User Password Policy.

3. **Change the passwords for the `admin` and `service` accounts.**

   a. **Choose Setup → Authentication → User Management.**

   b. **Click on the user name.**

   c. **Click Edit.**

d. **Enter the required information and click save.**

e. **Repeat Steps b - d to change the other password.**

Related Information

- “Oracle Engineered Systems Hardware Manager Overview” on page 167
- “Access Oracle Engineered Systems Hardware Manager” on page 168
- “Update Component Passwords” on page 170
- “Configure Certificates and Port Numbers” on page 171

▼ Update Component Passwords

You must perform this procedure whenever the Oracle ILOM root password is changed. Keeping Oracle Engineered Systems Hardware Manager up to date ensures that Oracle Service personnel can use the utility to manage MiniCluster components.

For details on which component passwords are required see “Oracle Engineered Systems Hardware Manager Overview” on page 167.

1. **Access the utility.**

   See “Access Oracle Engineered Systems Hardware Manager” on page 168.

2. **Choose Setup → Authentication, and select the Component Access tab.**

3. **Update component passwords:**

   a. **Click Compute Servers to display Compute Server 1 and Computer Server 2 .**

   b. **Click in the check boxes for ILOM (user root), and press Provide Credentials.**

   c. **Enter the password that you have already set in the ILOM.**

   Select the compute server (MiniCluster nodes), and click Provide Credentials. Enter the node's Oracle ILOM passwords.

4. **Restart Oracle Engineered Systems Hardware Manager for the changes to take effect:**

Go to Set Up → Maintenance, select the Restart tab, and click Restart.

OESHM restarts and requires the you to log in again.

Related Information

- "Oracle Engineered Systems Hardware Manager Overview" on page 167
- "Access Oracle Engineered Systems Hardware Manager" on page 168
- "Configure the Utility's Password Policies and Passwords" on page 169
- "Configure Certificates and Port Numbers" on page 171

▼ Configure Certificates and Port Numbers

Perform the relevant steps in this procedure to configure these items used by Oracle Engineered Systems Hardware Manager:

- **Certificates** – Use your own certificates instead of the site- and instance-specific certificates that the utility generates.
- **Ports** – If an application running on MiniCluster uses the same port that the utility uses (8001), you or Oracle Service can configure Oracle Engineered Systems Hardware Manager to use a different port.

1. **Access the utility.**

   See "Access Oracle Engineered Systems Hardware Manager" on page 168.

2. **If needed, configure the utility to use your own certificates.**

   Choose Setup → Certificates.

3. **Change network ports if they conflict with our environment.**

   Choose Setup → Network.

Related Information

- "Oracle Engineered Systems Hardware Manager Overview" on page 167
- "Access Oracle Engineered Systems Hardware Manager" on page 168
- "Update Component Passwords" on page 170
- "Configure the Utility's Password Policies and Passwords" on page 169

Checking the Virtual Tuning Status (BUI)

The virtual tuning assistance is used to keep MiniCluster automatically tuned to best practices.

Note - This section describes how to administer the virtual tuning assistant using the MCMU BUI. For instructions on how to administer the virtual tuning assistant (`mctuner`) using the MCMU CLI, see “Administering the Virtual Tuning Assistant (CLI)” on page 327.

These topics describe how to obtain information from the virtual tuning assistant.

Virtual Tuning Assistant Overview

By default, the virtual tuning assistant is enabled on the system to ensure that the system is running with optimal tuning parameters. There is a tuning instance running on the global and kernel zones on each node.

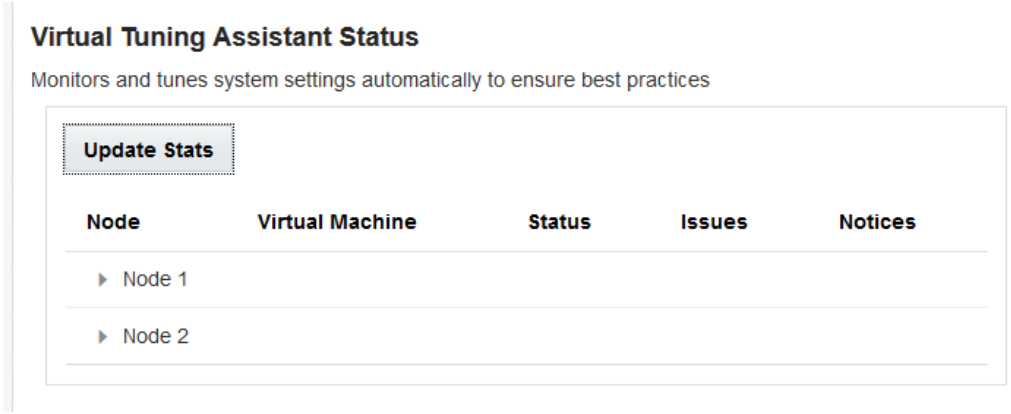
By default, the tuning assistant sends notices to `root@localhost`. To change the email notification email address, see “Configure the `mctuner` Notification Email Address (CLI)” on page 327.

▼ View Virtual Tuning Assistant Status (BUI)

1. **Access the MCMU BUI as a primary admin, such as mcinstall.**

   See “Log in to the MCMU BUI” on page 28.

2. **In the Home page, scroll down to the Virtual Tuning Assistant Status panel.**



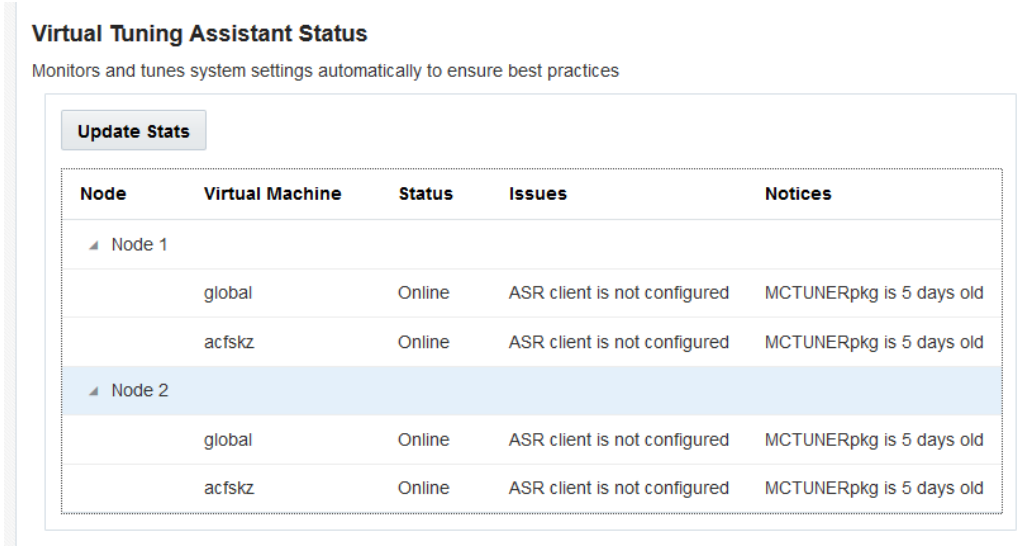
For example:

3. **Click Update Stats.**

   The virtual tuning assistant process is continually monitoring the system's tuning parameters. By updating the stats, the latest tuning information is displayed in the BUI.

4. **Click a node to expand the details for the node.**

For example:



The Virtual Tuning Assistant Status Information panel provides this information:

- **Virtual Machine** – For each VM, this column indicates the type of zone that the VM is based on.
- **Status** – Indicates if the VM is online or offline.
- **Issues** – Displays any issues that the virtual tuning assistant detects.
- **Notices** – Displays virtual tuning assistant notices.

Updating and Patching MiniCluster Software (BUI)

These topics describe how to update MiniCluster system software.

Component Update Process Overview

Always use MCMU to update the MiniCluster software components. Do not apply patches manually unless you are instructed to do so by authorized service personnel.

Updates for MiniCluster, are issued on a periodic basis. The bundled updates are available for download from My Oracle Support (`http://support.oracle.com`.) Search for Doc ID 2153282.1.

The update process can be used to perform these activities:

- Upgrade some components from one major release to another. For example, upgrade the Grid Infrastructure from 12c to 18c. For additional details see "Software Upgrade Requirements" on page 179.
- Update the component software. For example, update a DB VM home from Oracle Database 12.1 Apr18 Proactive Patch to 12.1 Oct18 Proactive Patch. These updates can contain bug fixes and feature updates.
- Apply minor patches.

Applying updates to MiniCluster involves these tasks:

1. Fully backup the system.
2. Download update bundles from My Oracle Support.
3. Unzip, concatenate, and extract the downloaded files to a predefined directory on MiniCluster.
4. Identify software components that require updating. Important – Update the MCMU component before you update any other component.
5. Use the MCMU BUI or CLI to update the system.

Subsequent topics describe how to perform these tasks.

There are a number of MiniCluster software and firmware components that can be updated using MCMU. At any given time, updates might be available for one component, and not others.

Software Components

This table lists components that can be updated (subject to update availability):

Note - The list of components is subject to change for different releases of MiniCluster. To see the exact list for your system, view the current MCMU versions as described in "View Software Component Versions (BUI)" on page 181.

Component Name in the BUI	Component Option Used in the CLI	Description
MiniCluster Configuration Utility	`update_omctoolkit`	MCMU BUI and CLI software. IMPORTANT – After you update this component, you must also update the Grid infrastructure component to the latest version supported on MiniCluster before you can create new DB homes.
Storage tray firmware	`update_jbod`	Firmware on the storage array.
Shared filesystem software	`update_acfs`	Grid infrastructure and ACFS in the kernel zones.
OS package repository	`update_repo`	OS repository used to install and update VMs and global zones.
Shared storage OS	`update_kz`	OS on the kernel zones.
Compute nodes OS	`update_gz`	The OS on the compute nodes.
Compute node firmware	`update_ilom`	Oracle ILOM on the compute nodes.
Grid infrastructure	`update_gi`	Grid infrastructure in DB VMs.
Oracle DB home	`update_oh`	The Oracle DB in DB VMs.

Update Duration Examples

This table lists the approximate duration of the updated for updating various components on a two node cluster. The duration varies depending on the number of VMs and the current workload. As a best practice, perform upgrades during low or no workload periods.

Component	From	To	Approximate Duration of Update
Grid Infrastructure	12.1 July 2016 PSU	12.1 Jul 2018 Proactive	1 hour 15 min.
Grid Infrastructure	12.1 Jul 2018 Proactive	18c	1 hour 20 min.
Shared storage	12.1 July 2016 PSU	12.1 Jul 2018 Proactive	3 hours
Shared storage	12.1 July 2016 Proactive	18c	2 hours

Related Information

- "Software Upgrade Requirements" on page 179
- "Check for and Obtain the Latest Updates" on page 183
- "Update MiniCluster Software (BUI)" on page 188
- "Updating MiniCluster Software (CLI)" on page 331

Software Upgrade Requirements

This section describes the requirements that apply when you upgrade a software component to a new major revision. For example, when you upgrade the Grid Infrastructure from 12c to 18c. These requirements do not apply to PSUs or Proactive patches.

Only these software components can be upgraded to a major revision:

- **MiniCluster Configuration Utility**
- **Storage tray firmware**
- **Compute node firmware**
- **Grid infrastructure** (see **Note**)
- **Shared file system** (see **Note**)

Note - When upgrading the grid infrastructure or shared storage, the current release must be updated to the latest proactive patch level before the upgrade. For example, a system running Oracle Database 12.1 with the April 2018 Proactive patch must be updated with the October 2018 Proactive patch (assuming that is the latest available) before the system can be upgraded to Oracle Database 18c. Also, the system must be idle with no database or applications running.

Requirements When Updating to MiniCluster 1.3.0 (or later)

- MiniCluster must be at release 1.2.5.22 before upgrading to 1.3.0 (or later).
- The compute node OS release must match the release provided in MiniCluster version 1.2.5.22.
- The Grid Infrastructure must be at release 18c with the latest patches applied (delivered with MiniCluster 1.2.5.22).
- All DB Homes must be patched with the latest patches that are available in the 1.2.5.22 release.
- You must upgrade MiniCluster software components in this order:

    1. **MCMU and Compute Node OS (provided In the MiniCluster Core Software bundle)** – upgrades the OS on the global zone, kernel zones, and VMs to Oracle Solaris 11.4.
    2. **Grid Infrastructure (provided in the MiniCluster Component Bundle)** – upgrades the grid infrastructure in the kernel zones to 19c.
    3. **Oracle DB Homes (provided in the MiniCluster Patch Bundle)** – Patches existing DB Homes with patches from the MiniCluster 1.3.0

For additional descriptions of MiniCluster software components, see “View Software Component Versions (BUI)” on page 181“Check for and Obtain the Latest Updates” on page 183.

DB VM Home Updates

Existing DB VM homes can only be updated with the same major release. For example, you can update an Oracle DB home from 12c April 2018 Proactive patch to 12c October 2018 Proactive patch. You cannot upgrade an existing DB home from one major release to another.

However, you can install the Oracle Database of your choice (12.2c and 18c, for example) and then create new DB homes and instances for the DB VMs if you follow these guidelines:

1. Ensure that the Grid infrastructure and Shared filesystem components are running Grid Infrastructure 18c. Use these procedures to view, and if needed, upgrade those components:
    - “Software Upgrade Requirements” on page 179
    - “View Software Component Versions (BUI)” on page 181
    - “Check for and Obtain the Latest Updates” on page 183
    - “Extract the Patch Bundle” on page 185
    - “Install the Component Bundle” on page 187

2. Create a new DB home. See “Create DB Homes (BUI)” on page 115.
3. Create DB instances of the new Oracle Database release. See “Create DB Instances (BUI)” on page 117

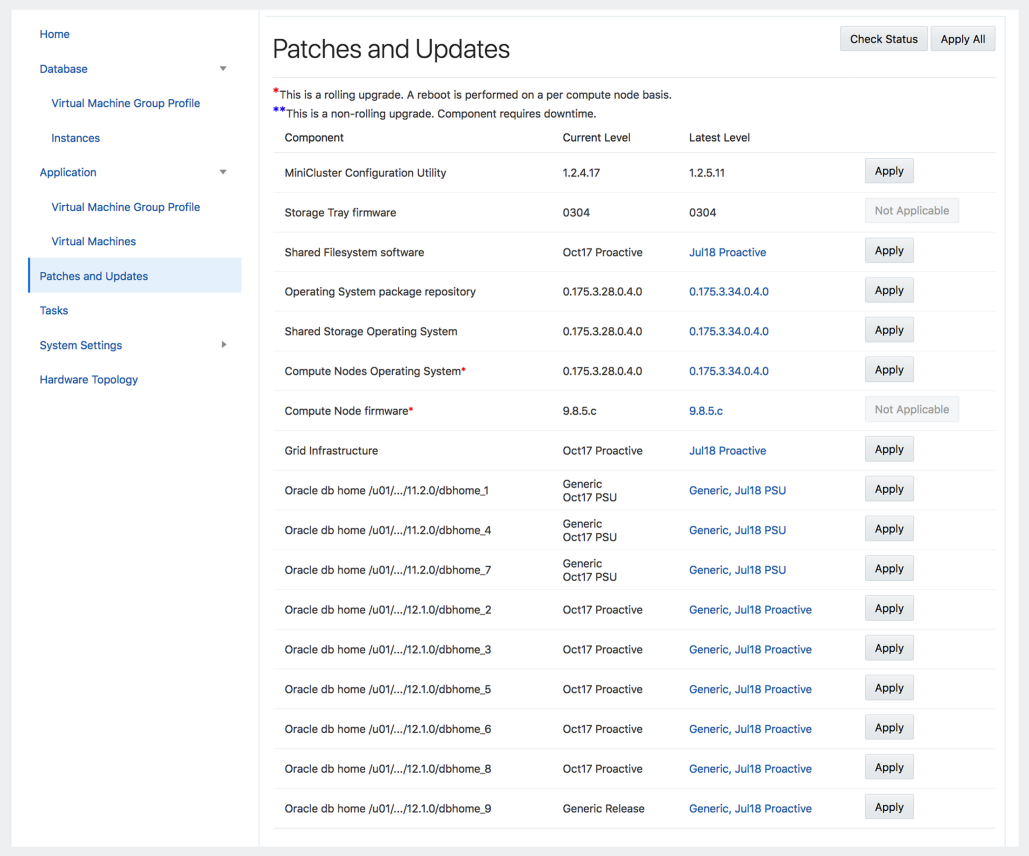
View Software Component Versions (BUI)

The MCMU BUI provides a list of MCMU software versions currently installed on the system.

1. **Access the MCMU BUI as a primary admin, such as mcinstall.**
   See “Log in to the MCMU BUI” on page 28.

2. **In the navigation panel, select Patches and Updates.**

The page shows current software versions on your system. If you have recently installed the component bundle (see “Install the Component Bundle” on page 187), the Latest Level column shows the latest updates that are available and an Apply button is enabled.



3. Identify the availability of any updates.

You can identify the availability of updates in a couple of different ways:

- Manually – Go to My Oracle Support (`http://support.oracle.com`), search for 2153282.1, review the information in the Oracle MiniCluster S7-2: Software Download Center to see if later updates are available.
- Through the MCMU BUI – Perform “Check for and Obtain the Latest Updates” on page 183, “Extract the Patch Bundle” on page 185 and “Update MiniCluster Software (BUI)” on page 188 through Step 7.

Note - Do not click Check Status unless you have installed the latest updates in the `/var/opt/oracle.minicluster/patch` directory as described in "Check for and Obtain the Latest Updates" on page 183. The Check Status feature compares component versions of the system against what is in the `/var/opt/oracle.minicluster/patch` directory.

Check for and Obtain the Latest Updates

Some updates require you to download multiple large zip files. Depending on your network capabilities and the size of the zip files, the download can take a significant amount of time.

IMPORTANT – Information in the Release Notes supersedes instructions in this guide. There are multiple software update scenarios based on the state of MiniCluster (before initial setup, after initial setup) and based on the version currently running on MiniCluster. Depending on your situation, you might need to perform updates in a specific way. For further details, refer to the MiniCluster Release Notes for your release of the software. Go to MOS (`http://support.oracle.com`), and search for MiniCluster Release Notes.

IMPORTANT – Update the MCMU component before you update any other component. If you follow the steps in this procedure, you are directed to do so.

1. **Follow best practices and backup the system before updating software.**
2. **Access the MCMU BUI.**

   See "Log in to the MCMU BUI" on page 28.
3. **In the upper right corner, click your user name and select My Oracle Support.**
4. **Sign into MOS.**
5. **Search 2153282.1.**

   This MOS document is the MiniCluster S7-2: Software Download Center and provides access to MiniCluster downloads.
6. **In Doc ID 2153282.1, click the Latest Release link.**

   You are directed to the latest downloads.

   This table describes the different downloads that are available. Note that not all of these downloads pertain to updating a system. This procedure describes how to download and install the Patch Bundle and the Component Bundle, which are used to update software components.

MiniCluster Initial Configuration Tool Provides the initial configuration tool used to create configuration files required at installation time. For information, refer to the *Oracle MiniCluster S7-2 Installation Guide*.
MiniCluster Component Bundle Provides all or a subset of updates for these components: ■ Oracle DB and GI binaries ■ Oracle Solaris 10 Zone flash archive (for creating Solaris 10 branded VMs) ■ Disk calibration software Download and install the Component Bundle for these situations: ■ During the initial installation. Refer to the *Oracle MiniCluster S7-2 Installation Guide*. ■ Any time that there are updated versions and you want to use those updated versions to configure VMs. This procedure explains how to perform this activity.
MiniCluster Core Software Provides MiniCluster management software (MCMU), Solaris OS and SRU repository files. Download and install the core software if you see a screen telling you that your core software is out of date when you run the `installmc --deploy` command as part of your initial installation. **Note -** MiniCluster systems ship from the factory with the core software installed. You usually only need this download if instructed to obtain it during the installation. You do not use this download for routine software updates. In those cases use the Patch Bundle and Component bundle.
MiniCluster Patch Bundle Provides all or a subset of updates for these components: ■ MCMU ■ GI and DB patches for all supported DB releases (applied to existing DB VMs) ■ Oracle Solaris SRUs (applied to existing VMs) ■ Compute node firmware (Oracle ILOM) ■ Storage array firmware Download and install the Patch Bundle to determine if any of the MiniCluster software components are out of date and to update out of date components. **Note -** Oracle Solaris 10 branded zones are updated outside of the MiniCluster update feature. If you have Oracle Solaris 10 branded zones, apply patches to them separately. Review the knowledge articles titled *How to find the Oracle Solaris Critical Patch Update (CPU) Patchsets, Recommended OS Patchsets for Oracle Solaris and Oracle Solaris Update Patch Bundles* (Doc ID **1272947.1**) and *How Patches and Updates Entitlement Works* (Doc ID **1369860.1**). Both articles are available at My Oracle Support. Take any actions necessary to patch applicable Oracle Solaris 10 Branded Zone virtual machines. This procedure in this chapter describes how to download this Patch Bundle.
MiniCluster Factory Reset ISO

Download and install the factory reset ISO if you want to reset your MiniCluster system back to the original factory settings.

For information on downloading and installing the factory reset ISO, refer to the MOS article titled *Oracle MiniCluster S7-2: How to factory reset the entire system* (Doc ID 2151620.1).

7. **Open and review the Release Notes.**

   Click the MiniCluster Release Notes link under MiniCluster Core Software section.

   The Release Notes provide important information about specific update procedures.

8. **In Doc ID 2153282.1, begin the download process for one of these bundles:**

   - **Patch Bundle** – For updating MCMU, existing VMs GI, DB, and OS, compute node's OS, GI, and firmware, and storage array firmware.
   - **Component Bundle** – (Recommended when you plan to update MCMU) This bundle is for installing the latest releases of the Oracle Database in the DB repository (used to create and update DB VMs).

   To begin the download process, click the patch number for the bundle you want to download.

9. **Using a browser, download each zip file.**

   Click the patch number to access the download page, then download all applicable zip files.

   If desired, read any accompanying README or release notes.

10. **Transfer the downloaded zip files to the `/var/opt/oracle.minicluster/patch` directory on compute node 1.**

11. **(If needed) Download the other bundle.**

    Repeat Step 8 and Step 9 If you want to download both bundles. If you are only updating a particular component, choose the bundle that provides the component update that you want.

12. **Consider your next action.**

    Based on the bundles you downloaded, perform one or more of these procedures:

    - “Extract the Patch Bundle” on page 185
    - “Install the Component Bundle” on page 187

▼ Extract the Patch Bundle

1. **Ensure that you have downloaded the latest Patch Bundle.**

See “Check for and Obtain the Latest Updates” on page 183.

2. **Log into the compute node 1 MCMU CLI as the primary admin such as mcinstall.**

   See “Log in to the MCMU CLI” on page 31.

3. **Unzip the zip files.**

```
% cd /var/opt/oracle.minicluster/patch
% /bin/unzip '*zip'
```

4. **Identify the *version_no* in the names of the patch tar files.**

   In this example, the tar file *version_no* is `1.1.21.4`. Your *version_no* might be different. Make note of the *version_no* for the next step.

```
% ls
MC-README.txt                    p25218297_100_SOLARIS64_2of4.zip
mc-1.1.21.4-patch.tar.aa         p25218297_100_SOLARIS64_3of4.zip
mc-1.1.21.4-patch.tar.ab         p25218297_100_SOLARIS64_4of4.zip
mc-1.1.21.4-patch.tar.ac
mc-1.1.21.4-patch.tar.ad
```

5. **Extract the tar Files.**

   In this example, replace *version_no* with the appropriate *version_no* for your download.

   This command concatenates and extracts all of the files.

```
% cat mc-1.1.21.4-patch.tar.a? | gtar -xf -
```

Note - After the extraction, you can delete the tar and zip files.

6. **Consider your next action.**

   If you also downloaded the Component Bundle, go to “Install the Component Bundle” on page 187.

   If you plan to update the MCMU component, go to: “Update the MCMU Component (CLI)” on page 333

   Otherwise, perform one of these procedures:

   - **Update components using the MCMU BUI** – See “Update MiniCluster Software (BUI)” on page 188.
   - **Update components using the MCMU CLI** – See “Update the MCMU Component (CLI)” on page 333.

Install the Component Bundle

Use this procedure to update the Oracle Database software. Once the Component Bundle is installed, the latest Oracle Database binaries are installed and available for configuration of VMs.

This procedure is also required when you update the MCMU component as described in "Update the MCMU Component (CLI)" on page 333. Install the Component Bundle after updating the MCMU component.

1. **Ensure that you have downloaded the latest Component Bundle.**

   See "Check for and Obtain the Latest Updates" on page 183.

2. **Log into the compute node 1 MCMU CLI as the primary admin such as mcinstall.**

   See "Log in to the MCMU CLI" on page 31.

3. **Unzip the zip files.**

```
% cd /var/opt/oracle.minicluster/patch
% /bin/unzip '*zip'
```

4. **Identify the *version_no* in the names of the tar files.**

   In this example, the *version_no* is `1.1.21.4`. Your *version_no* might be different. Make note of the *version_no* for the next step.

```
% ls
MC-README.txt
mc-1.1.21.4-sfw.tar.ad
mc-1.1.21.4-sfw.tar.aa
mc-1.1.21.4-sfw.tar.ae
mc-1.1.21.4-sfw.tar.ab
```

5. **Extract the tar Files.**

   This command might run for 1.5 hours.

   In this command line, replace *version_no* with the version of your tar files.

```
% cat mc-version_no-sfw.tar.a? | sh ./import.sh

% cd /var/opt/oracle.minicluster/patch
% cat mc-version_no-sfw.tar.a? | sh ./import.sh

Checking directory ownership
Checking directory /commonfs/sfw/OracleDBSW is owned by mcinstall user
```

```
Checking directory /commonfs/sfw/calibration is owned by mcinstall user
Checking directory /commonfs/sfw/s7-sysfw is owned by mcinstall user
Checking directory /commonfs/sfw/s11.3 is owned by mcinstall user
Check PASSED
Extracting Oracle MiniCluster Component Bundle
.............5min.............10min.............
Updating Oracle MiniCluster Component Bundle permissions
..
Oracle MiniCluster Component Bundle uploaded successfully
```

Once complete, delete the tar file:

```
% rm mc-version_no-sfw.tar.a?
```

6. **If the previous step caused the `eshm/omc` service to transition into a maintenance state, clear the service on both nodes.**

```
% su - root
# svcadm clear eshm/omc
```

Clear the `eshm/omc` service on both nodes.

7. **Consider your next action.**

IMPORTANT – Update the MCMU component before you update any other component. See "Update the MCMU Component (CLI)" on page 333.

If you have already updated the MCMU component, you can update other components by performing one of these procedures:

- **Update components using the MCMU BUI** – See "Update MiniCluster Software (BUI)" on page 188.
- **Update components using the MCMU CLI** – See "Update the MCMU Component (CLI)" on page 333.

▼ Update MiniCluster Software (BUI)

This procedure describes how to apply updates to MiniCluster components using the MCMU BUI after the system's initial setup is done. Always use the MCMU BUI to update the MiniCluster components. Do not apply patches manually unless you are instructed to do so by authorized service personnel.

Review the update requirements described in "Software Upgrade Requirements" on page 179 and "DB VM Home Updates" on page 180.

Caution - The MCMU component must be updated before you update any other component. (see "Update the MCMU Component (CLI)" on page 333).

IMPORTANT – Information in the Release Notes supersedes instructions in this guide. Depending on your situation, you might need to perform updates in a specific way. For further details, refer to the MiniCluster Release Notes for your version of the software. Go to MOS (`http://support.oracle.com`), and search for MiniCluster Release Notes.

1. **Ensure that you have downloaded the latest Patch Bundle as described in "Check for and Obtain the Latest Updates" on page 183.**

2. **If you plan to update the grid infrastructure in the kernel zone or in a DB VM, ensure that the system is idle with no database or applications running.**

3. **Access the MCMU BUI as a primary admin, such as `mcinstall`.**

   See "Log in to the MCMU BUI" on page 28.

4. **In the navigation panel, select Patches and Updates.**

   The page shows the versions of software installed on your system.

5. **Click the Check Status button.**

   MCMU compares the software versions installed on MiniCluster with the versions of the patch files in the `/var/opt/oracle.minicluster/patch` directory.

6. **In the dialog window, click Ok (or Confirm).**

7. **In the Patches and Updates page, identify what updates are available.**

   Review the Current Level and Latest Level information.

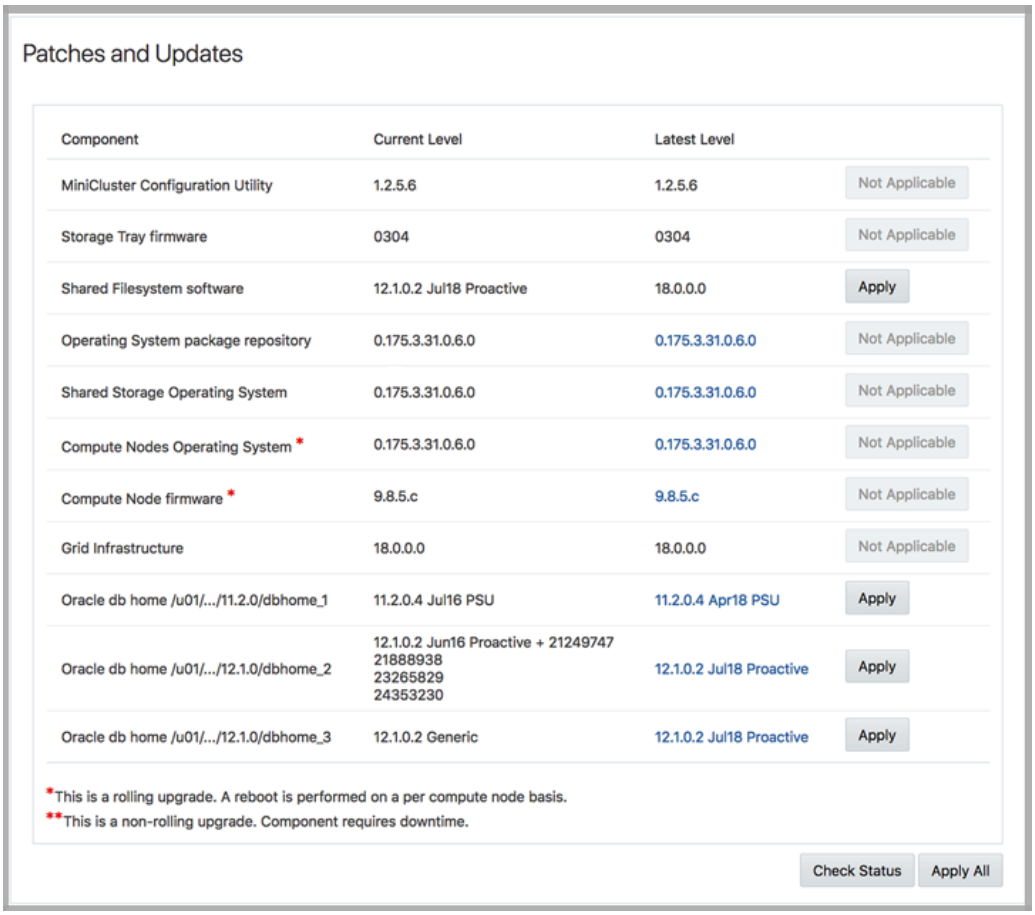
   These buttons indicate which components can be updated:

   - **Apply** – An update is available and the component can be updated.
   - **Not Applicable** – No updates are available for the component, and the component cannot be updated.

   Update availability is based on what is in the `/var/opt/oracle.minicluster/patch` directory.

   For the components marked with an asterisk, MCMU automatically reboots the compute node after the update is applied. The compute nodes are rebooted one at a time, so system availability is maintained where redundancy has been configured with the Oracle Grid Infrastructure. For non-redundant configurations, DB and APP VMS will be unavailable during the reboot.

Updating components marked with two asterisks requires the entire system to be offline.



8. **Choose a method for applying updates.**

Caution - The MCMU component must be updated before you update any other component. (see "Update the MCMU Component (CLI)" on page 333).

Take one of these actions:

- **Click Apply for an individual component** – MCMU applies the update for that component.

When you update individual software components, the MCMU software ensures that any prerequisite updates are applied. For example, when applying the Shared Filesystem Software update, MCMU first updates the Solaris repository, then the Shared Storage OS.

- **Click Apply All** – MCMU automatically applies available component updates in this order:

  1. MCMU
  2. Storage tray firmware
  3. Solaris repository
  4. Solaris in kernel zones
  5. ACFS
  6. Solaris in global zones (updates node 2 first, reboots node 2, then updates node 1 and reboots node 1)

Note - Apply All does not automatically apply the compute node firmware (Oracle ILOM), Grid infrastructure, or Oracle DB home software. Those component updates must be applied individually.

A confirmation window is displayed.

9. **Click Yes (or Confirm).**

   MCMU applies the updates to the system.

   The duration of the update process varies based on the type and number of updates. MCMU displays the progress.

10. **When the dialog window indicates that the update process is complete, click OK (or Confirm).**

    The dialog window is dismissed, and you can run other MCMU BUI functions.

    If you are updating the MiniCluster Configuration Utility component, web services are restarted and you might need to refresh the browser cache (shift-reload).

Performing System Checks (BUI)

The MCMU BUI provides access to several features that enable you to check system states.

▼ Perform a Readiness Check (BUI)

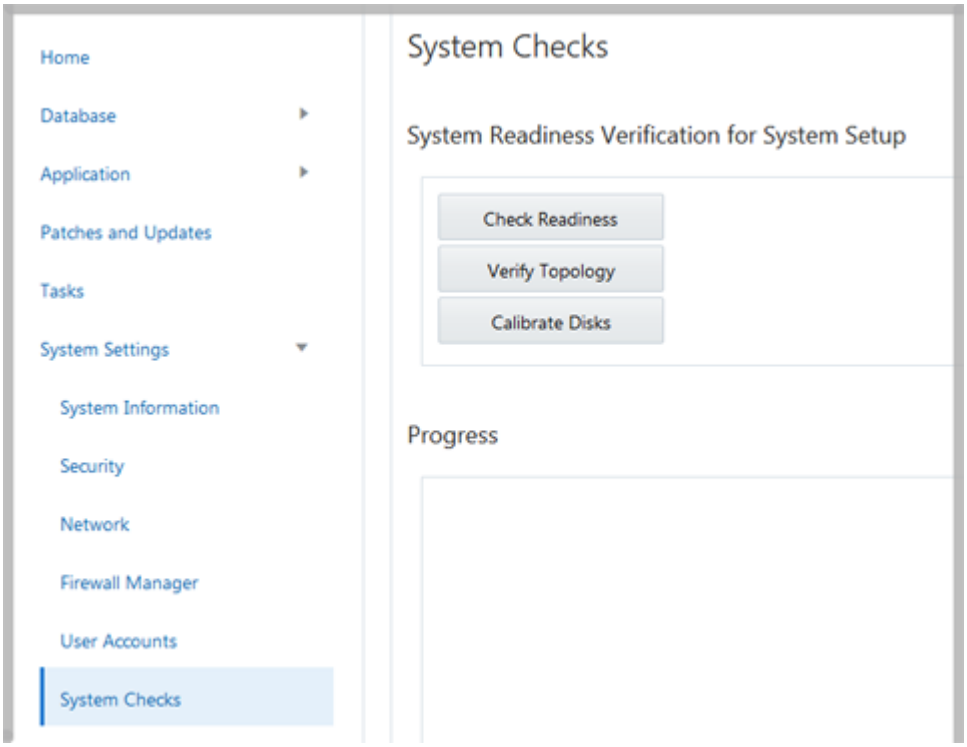
The system readiness check feature checks to ensure that the MiniCluster hardware and software are configured properly and at expected levels. This check is normally performed before the system is configured, but you can run this feature any time.

1. **Access the MCMU BUI as a primary admin, such as mcinstall.**

   See "Log in to the MCMU BUI" on page 28.

2. **In the navigation panel, select System Settings → System Checks.**

The System Checks page is displayed.



3. **Click the Check Readiness button.**

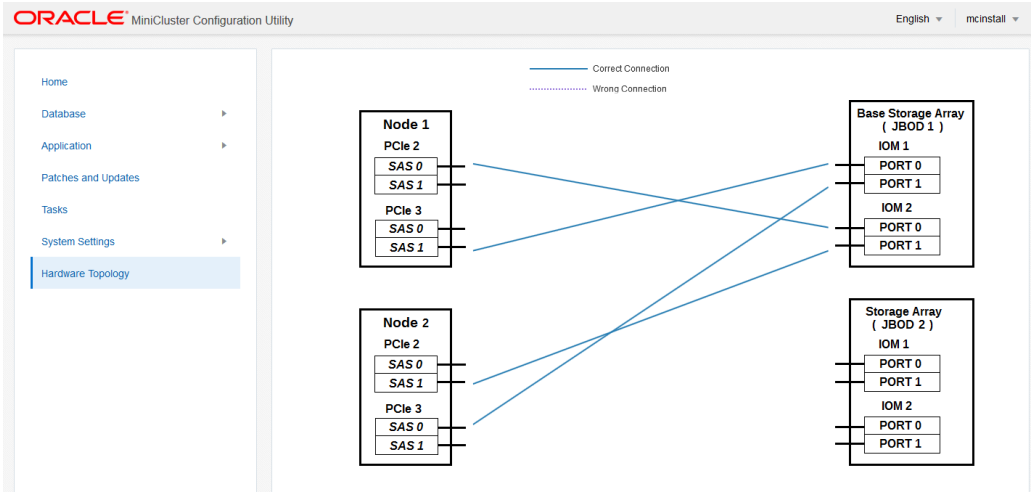
View the Hardware Topology (BUI)

Use this task to check that the I/O cards locations and to verify network connectivity.

1. **Access the MCMU BUI as a primary admin, such as mcinstall.**
   See "Log in to the MCMU BUI" on page 28.

2. **In the navigation panel, select System Hardware Topology.**
   MCMU performs connectivity checks. This runs for a few minutes. Once complete, the Hardware Topology page is displayed.

This example shows the topology of a system with one storage array. Note that a second storage array is shown, but with no connections to the nodes, the system probably only has one storage array.



3. **Click the Verify Topology button.**

Calibrate Disks (BUI)

Use this procedure to check the health of the drives in the system. This feature performs read and write tests on a reserved area of each drive. The check is not destructive to data.

1. **Access the MCMU BUI as a primary admin, such as mcinstall.**

   See "Log in to the MCMU BUI" on page 28.

2. **In the navigation panel, select System Settings → System Checks.**

   The System Checks page is displayed.

3. **Click the Disk Calibration button.**

Performing Support Tasks (BUI)

The MCMU BUI provides access to several support related features.

▼ Access My Oracle Support (BUI)

The MCMU BUI provides a link to My Oracle Support (MOS). MOS provides access to these support functions:

- Oracle knowledge database
- Patches and updates
- Service requests
- Certifications

Note - Access to MOS requires an Oracle support agreement and MOS login credentials.

---

1. **Access the MCMU BUI.**
   See "Log in to the MCMU BUI" on page 28.
2. **In the upper right corner, click your user name and select My Oracle Support.**
3. **Sign in to MOS.**

▼ Access Oracle Engineered Systems Hardware Manager

At the direction of Oracle personnel, you can start the Oracle Engineered Systems Hardware Manager from the MCMU BUI to perform various service related activities.

Note - Oracle Engineered Systems Hardware Manager must be configured before it is accessed. See “Configuring Oracle Engineered Systems Hardware Manager” on page 167.

1. **Access the MCMU BUI as a primary admin, such as mcinstall.**

   See “Log in to the MCMU BUI” on page 28.

2. **In the navigation panel, select System Settings → Support.**

3. **Click the Launch ESHM button.**

4. **Log into Oracle Engineered Systems Hardware Manager.**

   These are the login credentials:

   - User name: `admin`
   - Password: Is the same password used for the `mcinstall` user account.

5. **Follow the direction of Service personnel to perform Oracle Engineered Systems Hardware Manager activities.**

   You can also access the online help by clicking More details on each page.

▼ Creating A Support File Bundle (OESHM)

A support file bundle is a collection of log files which contain system information that can be used to diagnose hardware problems. A support file bundle is always automatically created when a hardware fault is detected. You can also create them manually. You can export support file bundles to Oracle Services through the Oracle Engineered Systems Hardware Manager BUI.

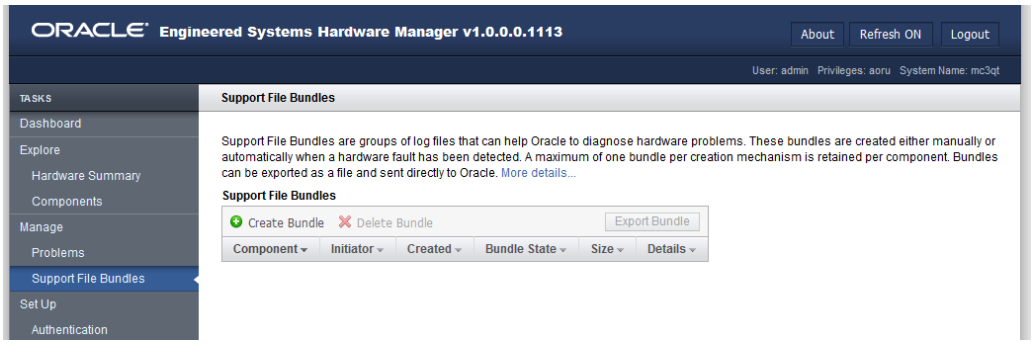
Note - For storage space efficiency, the utility only supports the existence of one support file bundle per component. If a support file bundle exists, it is automatically replaced when a new bundle is generated.

Use this procedure to manually create a support file bundle.

1. **Log into Oracle Engineered Systems Hardware Manager through the MCMU BUI.**

   Log in as the `admin` user. See “Access Oracle Engineered Systems Hardware Manager” on page 197.

2. **From Oracle Engineered Systems Hardware Manager, in the left navigation panel, select Support File Bundles.**



3. **Click Create Bundle.**

4. **In the Create Bundle dialog box, select one of the compute servers.**

5. **Click Create.**

   The utility creates a support file bundle.

6. **To see the status, view the Support File Bundles page.**

▼ Configure the Oracle ASR Client (BUI)

When you have completed the initial installation of the system, you can use MCMU to activate Oracle ASR software for the system.

Oracle ASR software provides the ability to resolve problems quickly by automatically opening service requests for Oracle's qualified server, storage, and Engineered System products when specific faults occur. Parts are dispatched upon receipt of a service request sent by Oracle ASR. In many cases, Oracle engineers are already working to resolve an issue before you are aware that a problem exists.

Oracle ASR securely transports electronic fault telemetry data to Oracle automatically to help expedite the diagnostic process. The one-way event notification requires no incoming Internet connections or remote access mechanism. Only the information needed to solve a problem is communicated to Oracle.

Oracle ASR is a feature of the Oracle hardware warranty, Oracle Premium Support for Systems, and Oracle Platinum Services. To learn more, go to https://www.oracle.com/support/premier/index.html.

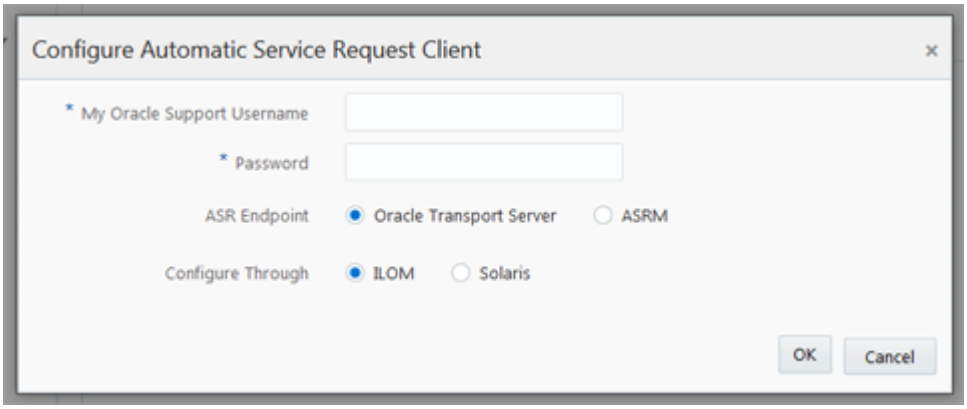
Oracle ASR documentation is available at: http://www.oracle.com/technetwork/systems/asr/documentation

1. **Access the MCMU BUI as a primary admin, such as mcinstall.**

   See "Log in to the MCMU BUI" on page 28.

2. **In the navigation panel, select System Settings → Support.**

3. **Click the Configure Automatic Service Request Client button.**



4. **In the pop-up window, complete the requested information:**

   - **`My Oracle Support Username`** – Specify a valid My Oracle Support user name.
   - **`Password`** – Specify the password.
   - **`ASR Endpoint`** – Select one of the following:
     - **`Oracle Transport Server`** – The ASR client connects directly to Oracle.
     - **`ASRM`** – The ASR client connects to an ASR manager running on a system in your environment.
   - **`Register Point`** – Select one of the following:
     - **`ILOM`** – Telemetry information is handled by Oracle ILOM. This is the preferred setting.
     - **`Solaris`** –Telemetry information is handled by Oracle Solaris.

5. **Click Configure.**

Using the MCMU CLI

Previous sections in this document describe how to administer MiniCluster using the MCMU BUI, which is a good interface to use for guided visual procedures. The majority of BUI procedures can also be performed using the MCMU CLI. The remainder of this document covers the MCMU CLI procedures.

Note - Different versions of the MiniCluster software offer different `mcmu` commands and options. For the most accurate CLI information for the MiniCluster you are using, use `mcmu` help. See "Display `mcmu` Help For All Subcommands (CLI)" on page 204 and "Display `mcmu` Help for a Specific Subcommand (CLI)" on page 205.

These topics describe how to use the `mcmu` command and how to display `mcmu` help.

MCMU CLI Overview

MiniCluster includes the `mcmu` command that enables you to administer the system at the command line.

To perform `mcmu` commands, you must log into the `mcmu` CLI with a valid MCMU account such as the `mcinstall` user account. See "Log in to the MCMU CLI" on page 31.

This is the syntax for the `mcmu` command:

`mcmu` *subcommand subcommand_option additional_option*

where:

- *subcommand* – Specifies one of the subcommands listed in the table.

- *subcommand_option* – An argument that can be specified in either of these formats:
  - *-A* – *A* is a single alpha character (Note: this is case sensitive. Uppercase and lowercase letters perform different operations).
  - *--string* – *string* is a valid string for the subcommand.
- *additional_option* – is a valid argument for the *subcommand_option*.

This example creates a DB instance using the `tenant` subcommand with `-I` (instance) and `-c` (create) options.

```
% mcmu tenant -I -c
```

This example performs the same operation as the previous example:

```
% mcmu tenant --dbinstance -c
```

For the latest CLI information, additional details, and valid options, use the `mcmu` help option. See "Display mcmu Help For All Subcommands (CLI)" on page 204 and "Display mcmu Help for a Specific Subcommand (CLI)" on page 205.

▼ Display mcmu Help For All Subcommands (CLI)

Use this procedure to display the `mcmu` CLI syntax for all the mcmu subcommands and options.

1. **Log into the MCMU CLI.**

   See "Log in to the MCMU CLI" on page 31.

2. **Type:**

```
% mcmu -h
Usage: mcmu [Sub-Command][Sub-command options]

Oracle MiniCluster Configuration Utility
            MCMU v1.3.0

Sub-Commands:
       /var/opt/oracle.minicluster/bin/mcmu [setupmc|patch|tenant|status|start|stop|
compliance|sshkey|user|readiness|mctuner|asr|security|diskutil]

MCMU Options:
         -h, --help                    Show supported options
         -V, --version                 Print version string
.
```

```
<output omitted>
.
```

Display mcmu Help for a Specific Subcommand (CLI)

1. **Log into the MCMU CLI.**

   See "Log in to the MCMU CLI" on page 31.

2. **To display help for a specific subcommand, use this syntax:**

   `mcmu` *subcommand* `-h`

   where *subcommand* is one of the `mcmu` subcommands. For a full list of subcommands, see "Display mcmu Help For All Subcommands (CLI)" on page 204, or type **`mcmu -h`**.

   For example:

```
% mcmu mctuner -h
Usage: mcmu mctuner < -h | -S | -P <options> >

Options:
  -h, --help      show this help message and exit
  -S, --status    show mctuner status in all zones
  -P, --property  set mctuner property in one zone
```

3. **To display help for a specific subcommand option, use this syntax:**

   `mcmu` *subcommand subcommand_option* `-h`

   where:

   - *subcommand* is one of the `mcmu` subcommands.
   - *subcommand_option* is a valid option for the subcommand.

   For example:

```
% mcmu status --zone -h
Usage: mcmu status --zone [-h] [-k NODENUM] [-n ZONENAME]

Options:
         -h, --help                            show this help message and exit
         -k NODENUM, --kernelzone=NODENUM      Show kernel zone status, specified by node number (node1
 or node2)
         -n ZONENAME, --zonename=ZONENAME      Show tenant zone status, specified by zone name
```

Listing Version, Group, and VM Details (CLI)

Note - Different versions of the MiniCluster software offer different `mcmu` commands and options. For the most accurate CLI information for the MiniCluster you are using, use `mcmu` help. See “Display `mcmu` Help For All Subcommands (CLI)” on page 204 and “Display `mcmu` Help for a Specific Subcommand (CLI)” on page 205.

Note - For information about displaying the status of VMs and zones, see “Obtaining Status (CLI)” on page 223.

These topics describe how to display information about the MCMU version, VM group profiles, and VMs.

Description	Links
Determine the version of the MCMU software.	“List the MCMU Version (CLI)” on page 208
List information about DB VMs.	“List a Summary of All DB VM Groups (CLI)” on page 208 “List a Summary of a DB VM Group Profile (CLI)” on page 208 “List Details of a DB VM Group Profile (CLI)” on page 209 “List Details for a DB VM Group (CLI)” on page 212 “List All DB Homes in a Group (CLI)” on page 214 “List Details for a DB Home (CLI)” on page 215 “List All DB Instances in a Group (CLI)” on page 216 “List Details of a DB Instance (CLI)” on page 216
List information about App VMs.	“List a Summary of All App VM Group Profiles (CLI)” on page 217 “List Details of an App Group Profile (CLI)” on page 218 “List a Summary of All App VMs (CLI)” on page 220 “List Details of an App VM (CLI)” on page 220

Description	Links
List VM IP addresses and hostnames	“List the IP and Hostname Entries for DNS (CLI)” on page 222

List the MCMU Version (CLI)

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**
   See “Log in to the MCMU CLI” on page 31.
2. **Type:**

```
% mcmu -V
Oracle MiniCluster Configuration Utility
            MCMU v1.3.0
```

List a Summary of All DB VM Groups (CLI)

Use this procedure to list information about DB groups.

This procedure also lists DB *VMgroupIDs*, which are required to perform other CLI commands.

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**
   See “Log in to the MCMU CLI” on page 31.
2. **Type:**

```
% mcmu tenant -G -l
Listing DB VM Group...

Status : Active
Description :
VMgroupName : dbzg2
editable : True
deletable : True
progress : False
VMgroupID : 1
```

List a Summary of a DB VM Group Profile (CLI)

Use this procedure to list information about DB groups.

This procedure also lists DB *VMgroupIDs*, which are required to perform other CLI commands.

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**
   See "Log in to the MCMU CLI" on page 31.

2. **Type:**

   ```
   % mcmu tenant -P -l
   ```

   Examples:

   - This is an example of a system that does not have any DB VM group profiles configured:

     ```
     % mcmu tenant -P -l
     Listing DB VM Group Profile..
     No VM Group Profiles available yet
     ```

   - This is an example of a system with one DB VM group profile:

     ```
     % mcmu tenant -P -l
     Listing DB VM Group Profile..

     Status : Active
     EditStatus :
     Description : Initial DB VM Group
      - NORMAL redundancy
      - Shared Storage
      - CIS
     deletable : True
     progress : False
     VMgroupName : dbgp1
     editable : True
     VMgroupID : 1
     ```

List Details of a DB VM Group Profile (CLI)

Use this procedure to list details about a DB VM group profile.

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**
   See "Log in to the MCMU CLI" on page 31.

2. **Use this syntax:**

   ```
   % mcmu tenant -P -L VMgroupID
   ```

   where *VMgroupID* is the ID of the DB VM group profile. To determine the *VMgroupID*, see "List a Summary of a DB VM Group Profile (CLI)" on page 208.

For example, to get details on a DB VM group profile with an ID of 1, type:

```
% mcmu tenant -P -L 1
Getting DB VM Group Profile...

GRID DEFINITION
        Status : Active
        inventoryLocation : /u01/app/oraInventory
        gridLocation : /u01/app/12.1.0.2/grid
        redoDiskGroup : HIGH
        dataDiskGroup : NORMAL
        recoDiskGroup : NORMAL
        SCAN_name : dbgp1-scan
        SCAN_ip : 192.0.2.4,192.0.2.5,192.0.2.6

STORAGE DEFINITION
        redundancy : NORMAL
        numberOfDisks : None
        storageArrays :

DB VM GROUP DEFINITION
        status : Active
        VMGroupDesc : Initial DB VM Group
 - NORMAL redundancy
 - Shared Storage
 - CIS
        VMGroupType : database
        VMGroupName : dbgrp1
        operationType : DBZoneGroup_MapIP
        VMGroupID : 1
        globalName : mc3-n1,mc3-n2
        compliance benchmark : No
        shared storage : Yes

DB VM DEFINITIONS

VM 1
        status : Active
        id : 1
        name : dbgp1-vm1-mc3-n1
        globalName : mc3-n1
        cores : 0
        DNSServers : 192.0.2.7,192.0.2.8
        memory : 522496
        virtualNetworks
                private_ip : 192.0.2.10
                private_hostname : mc3-n1vm1-z1-priv
                private_mask : 24
```

```
                public_ip : 192.0.2.11
                public_hostname : mc3-n1vm1-z1
                public_mask : 20
                public_gateway : 192.0.2.1
                virtual_ip : 192.0.2.13
                virtual_hostname : mc3-n1vm1-z1-vip

VM 2
        status : Active
        id : 2
        name : dbgp1-vm1-mc3-n2
        globalName : mc3-n2
        cores : 3
        DNSServers : 192.0.2.7,192.0.2.8
        memory : 522496
        virtualNetworks
                private_ip :192.0.2.14
                private_hostname : mc3-n2vm1-z1-priv
                private_mask : 24
                public_ip : 192.0.2.15
                public_hostname : mc3-n2vm1-z1
                public_mask : 20
                public_gateway : 192.0.2.1
                virtual_ip : 192.0.2.15
                virtual_hostname : mc3-n2vm1-z1-vip

VM 3
        status : Active
        id : 3
        name : dbgp1-vm2-mc3-n1
        globalName : mc3-n1
        cores : 0
        DNSServers : 192.0.2.7,192.0.2.8
        memory : 522496
        virtualNetworks
                private_ip : 192.0.2.16
                private_hostname : mc3-n1vm1-z2-priv
                private_mask : 24
                public_ip : xx.xxx.xxx..198
                public_hostname : mc3-n1vm1-z2
                public_mask : 20
                public_gateway :  192.0.2.1
                virtual_ip : 192.0.2.17
                virtual_hostname : mc3-n1vm1-z2-vip

VM 4
        status : Active
        id : 4
```

```
name : dbgp1-vm2-mc3-n2
globalName : mc3-n2
cores : 2
DNSServers : 192.0.2.7,192.0.2.8
memory : 522496
virtualNetworks
        private_ip : 192.0.2.18
        private_hostname : mc3-n2vm1-z2-priv
        private_mask : 24
        public_ip : 192.0.2.19
        public_hostname : mc3-n2vm1-z2
        public_mask : 20
        public_gateway :  192.0.2.1
        virtual_ip : 192.0.2.20
        virtual_hostname : mc3-n2vm1-z2-vip
```

List Details for a DB VM Group (CLI)

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**
   See "Log in to the MCMU CLI" on page 31.

2. **Use this syntax:**

   ```
   % mcmu tenant -G -L VMgroupID
   ```

   where *VMgroupID* is the ID of the DB VM group profile. To determine the *VMgroupID*, see "List a Summary of All DB VM Groups (CLI)" on page 208.

   For example:

   ```
   % mcmu tenant -G -L 1
   Getting DB VM Group Profile...

   GRID DEFINITION
           Status : Active
           inventoryLocation : /u01/app/oraInventory
           gridLocation : /u01/app/12.1.0.2/grid
           redoDiskGroup : HIGH
           dataDiskGroup : NORMAL
           recoDiskGroup : NORMAL
           SCAN_name : dbgp1-scan
           SCAN_ip : 192.0.2.2,192.0.2.3,192.0.2.4

   STORAGE DEFINITION
           redundancy : NORMAL
           numberOfDisks : None
           storageArrays :
   ```

```
DB VM GROUP DEFINITION
        status : Active
        VMGroupDesc : DB MVM Group 1 - NORMAL - SHARED - CIS
        VMGroupType : database
        VMGroupName : dbgp1
        operationType : DBZoneGroup_MapIP
        VMGroupID : 1
        globalName : mc3-n1,mc3-n2
        compliance benchmark : No
        shared storage : Yes

DB VM DEFINITIONS

VM 1
        status : Active
        id : 1
        name : dbgp1-vm1-mc3-n1
        globalName : mc3-n1
        cores : 4
        DNSServers : 192.0.2.7,192.0.2.8
        memory : 522496
        virtualNetworks
                private_ip : 192.0.2.6
                private_hostname : mc3-n1vm1-z1-priv
                private_mask : 24
                public_ip : 192.0.2.9
                public_hostname : mc3-n1vm1-z1
                public_mask : 20
                public_gateway :  192.0.2.1
                virtual_ip : 192.0.2.10
                virtual_hostname : mc3-n1vm1-z1-vip

VM 2
        status : Active
        id : 2
        name : dbgp1-vm2-mc3-n1
        globalName : mc3-n1
        cores : 3
        DNSServers : 192.0.2.7,192.0.2.8
        memory : 522496
        virtualNetworks
                private_ip : 192.0.2.11
                private_hostname : mc3-n1vm1-z2-priv
                private_mask : 24
                public_ip : 192.0.2.12
                public_hostname : mc3-n1vm1-z2
                public_mask : 20
```

```
                public_gateway :  192.0.2.1
                virtual_ip : 192.0.2.13
                virtual_hostname : mc3-n1vm1-z2-vip

VM 3
        status : Active
        id : 3
        name : dbgp1-vm1-mc3-n2
        globalName : mc3-n2
        cores : 0
        DNSServers : 192.0.2.7,192.0.2.8
        memory : 522496
        virtualNetworks
                private_ip : 192.0.2.14
                private_hostname : mc3-n2vm1-z1-priv
                private_mask : 24
                public_ip : 192.0.2.15
                public_hostname : mc3-n2vm1-z1
                public_mask : 20
                public_gateway :  192.0.2.1
                virtual_ip : 192.0.2.16
                virtual_hostname : mc3-n2vm1-z1-vip

VM 4
        status : Active
        id : 4
        name : dbgp1-vm2-mc3-n2
        globalName : mc3-n2
        cores : 0
        DNSServers : 192.0.2.7,192.0.2.8
        memory : 522496
        virtualNetworks
                private_ip : 192.0.2.17
                private_hostname : mc3-n2vm1-z2-priv
                private_mask : 24
                public_ip : 192.0.2.18
                public_hostname : mc3-n2vm1-z2
                public_mask : 20
                public_gateway : 192.0.2.1
                virtual_ip : 192.0.2.19
                virtual_hostname : mc3-n2vm1-z2-vip
```

▼ List All DB Homes in a Group (CLI)

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**
   See “Log in to the MCMU CLI” on page 31.

2. **Use this syntax:**

```
% mcmu tenant -H -l VMgroupID
```

where *VMgroupID* is the DB VM group ID. To determine the *VMgroupID*, see "List a Summary of a DB VM Group Profile (CLI)" on page 208.

In this example, the *home_ID* is listed in the left column (ID: 1, ID: 9, ID: 2, and so on).

```
% mcmu tenant -H -l 1
        LIST OF DB HOMES IN DB VM GROUP 1

        ID: 1,  VM_ID: 1,  TYPE: RAC, STATUS: Active
        ID: 9,  VM_ID: 1,  TYPE: RAC, STATUS: Active
        ID: 2,  VM_ID: 2,  TYPE: RAC, STATUS: Active
        ID: 10, VM_ID: 2,  TYPE: RAC, STATUS: Active
        ID: 3,  VM_ID: 3,  TYPE: RAC, STATUS: Active
        ID: 11, VM_ID: 3,  TYPE: RAC, STATUS: Active
        ID: 4,  VM_ID: 4,  TYPE: RAC, STATUS: Active
        ID: 12, VM_ID: 4,  TYPE: RAC, STATUS: Active
        ID: 5,  VM_ID: 13, TYPE: RAC, STATUS: Active
        ID: 13, VM_ID: 13, TYPE: RAC, STATUS: Active
        ID: 6,  VM_ID: 14, TYPE: RAC, STATUS: Active
        ID: 14, VM_ID: 14, TYPE: RAC, STATUS: Active
        ID: 7,  VM_ID: 15, TYPE: RAC, STATUS: Active
        ID: 15, VM_ID: 15, TYPE: RAC, STATUS: Active
        ID: 8,  VM_ID: 16, TYPE: RAC, STATUS: Active
        ID: 16, VM_ID: 16, TYPE: RAC, STATUS: Active
```

▼ List Details for a DB Home (CLI)

Use this procedure to list the details about a DB home.

1. **Log into the MCMU CLI.**

   See "Log in to the MCMU CLI" on page 31.

2. **Use this syntax:**

```
% mcmu tenant -H -L home_ID
```

where *home_ID* is the ID of the DB home. To determine the *home_ID*, see "List All DB Homes in a Group (CLI)" on page 214.

For example:

```
% mcmu tenant -H -L 2
```

```
DB HOME INFORMATION

ID: 2
VM_ID: 2
VMGROUP_ID: 1
DB_HOME: /u01/app/oracle/product/12.1.0/db_12c
VERSION: 12.1.0.2
TYPE: RAC
PATCH: 12.1.0.2.160419
STATUS: Active
```

List All DB Instances in a Group (CLI)

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**
   See "Log in to the MCMU CLI" on page 31.

2. **Use this syntax:**

   % **mcmu tenant -I -l** *VMgroupID*

   where *VMgroupID* is DB VM group ID. To determine the *VMgroupID*, see "List a Summary of a DB VM Group Profile (CLI)" on page 208.
   In this example, the *instance_ID* is listed in the left column (ID: 3, ID: 4, ID: 7, and so on).

```
mcmu tenant -I -l 1
        LIST OF DB INSTANCES IN DB VM GROUP 1

        ID: 3, NAME: ol12racC, VM_ID: 1, DBHOME_ID: 1, TYPE: RAC, STATUS: Active
        ID: 4, NAME: ol12racC, VM_ID: 2, DBHOME_ID: 2, TYPE: RAC, STATUS: Active
        ID: 7, NAME: dw11rac1, VM_ID: 3, DBHOME_ID: 11, TYPE: RACONENODE, STATUS: Active
        ID: 8, NAME: dw11rac1, VM_ID: 4, DBHOME_ID: 12, TYPE: RACONENODE, STATUS: Active
        ID: 10, NAME: dw12sin, VM_ID: 15, DBHOME_ID: 7, TYPE: SINGLE, STATUS: Active
```

List Details of a DB Instance (CLI)

Use this procedure to list the details for all the DB instances in a DB home.

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**
   See "Log in to the MCMU CLI" on page 31.

2. **Use this syntax:**

   % **mcmu tenant -I -L** *instance_ID*

where *instance_ID* is the ID of the instance. To determine the *instance_ID*, see "List All DB Instances in a Group (CLI)" on page 216.

For example, to list details on a DB instance with an ID of 3, type:

```
% mcmu tenant -I -l 1
Setting ssh timeout before carrying out further operations. Please wait..
[INFO    ] Log file path : /var/opt/oracle.minicluster/setup/logs/
tenant_cli_100316_155137.log


        LIST OF DB INSTANCES IN DB VM GROUP 1

        ID: 1, NAME: si1, VM_ID: 1, DBHOME_ID: 1, TYPE: SINGLE, STATUS: Active
        ID: 2, NAME: ins7, VM_ID: 1, DBHOME_ID: 1, TYPE: SINGLE, STATUS: Active
```

List a Summary of All App VM Group Profiles (CLI)

Use this procedure to a summary of App VM group profiles.

This procedure also lists App *VMgroupIDs*, which are required to perform other CLI commands.

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

   See "Log in to the MCMU CLI" on page 31.

2. **Type:**

   ```
   % mcmu tenant -A -l
   ```

   For example:

   ```
   % mcmu tenant -A -l
   Listing APP VM Group...

   Status : Active
   EditStatus :
   Description : Drama App VM Group
     - shared
     - multiple
     - CIS
   deletable : True
   progress : False
   VMgroupName : avm1
   ```

```
editable : True
VMgroupID : 2

Status : Active
EditStatus :
Description : Thriller App VM Group - Multiple
  - shared
  - PCI-DSS
deletable : True
progress : False
VMgroupName : avm2
editable : True
VMgroupID : 3

Status : Active
EditStatus :
Description : Documentary App VM Group
  - single
  - no shared storage
  - pci-dss
deletable : True
progress : False
VMgroupName : avm3
editable : True
VMgroupID : 4

Status : Active
EditStatus :
Description : Sci-Fi App VM Group
  - single
  - no shared storage
  - CIS
deletable : True
progress : False
VMgroupName : avm5
editable : True
VMgroupID : 5
```

List Details of an App Group Profile (CLI)

Use this procedure to list the details for an App group profile.

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**
   See “Log in to the MCMU CLI” on page 31.

2. **Use this syntax:**

```
% mcmu tenant -A -L VMgroupID
```

where *VMgroupID* is the App group profile ID. To determine the *VMgroupID*, see “List a Summary of All App VM Group Profiles (CLI)” on page 217.

For example:

```
% mcmu tenant -A -L 2
Getting APP VM Group...

APP VM GROUP DEFINITION
         status : Active
         description : Drama App VM Group
  - shared
  - multiple
  - CIS
         globalName : mc3-n1,mc3-n2
         Name : avm1
         Type : application
         ID : 2
         compliance benchmark : No

APP VM DEFINITION

APPVM 1
         id : 5
         status : Active
         name : avm1-vm1-mc3-n1
         globalName : mc3-n1
         cores : 0
         DNSServers : 192.0.2.7,192.0.2.8
         memory : 522496
         virtualNetworks
                 private_ip : 192.0.2.2
                 private_hostname : mc3-n1vm2-az1-priv
                 private_mask : 24
                 public_ip : 192.0.2.3
                 public_hostname : mc3-n1vm2-az1
                 public_mask : 20
                 public_gateway :  192.0.2.1
                 virtual_ip :
                 virtual_hostname : mc3-n1vm2-az1-vip

APPVM 2
         id : 6
         status : Active
         name : avm1-vm1-mc3-n2
         globalName : mc3-n2
```

```
cores : 2
DNSServers : 192.0.2.7,192.0.2.8
memory : 522496
virtualNetworks
        private_ip : 192.0.2.4
        private_hostname : mc3-n2vm2-az1-priv
        private_mask : 24
        public_ip : 192.0.2.5
        public_hostname : mc3-n2vm2-az1
        public_mask : 20
        public_gateway :  192.0.2.1
        virtual_ip :
        virtual_hostname : mc3-n2vm2-az1-vip
```

List a Summary of All App VMs (CLI)

Use this procedure to retrieve a summary of App VM group profiles.

This procedure also lists App *VMgroupIDs*, which are required to perform other CLI commands.

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**
   See "Log in to the MCMU CLI" on page 31.

2. **Type:**

```
% mcmu tenant -V -l
Listing APP VM Group...

Status : Active
VMgroupName : mc12appzg2
Description : zonegroup description
VMgroupID : 2
```

List Details of an App VM (CLI)

Use this procedure to list the details for an App group profile.

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**
   See "Log in to the MCMU CLI" on page 31.

2. **Use this syntax:**

```
% mcmu tenant -V -L VMgroupID
```

where *VMgroupID* is the App group profile ID. To determine the *VMgroupID*, see "List a Summary of All App VM Group Profiles (CLI)" on page 217.

```
% mcmu tenant -V -L 2
Setting ssh timeout before carrying out further operations. Please wait..
[INFO    ] Log file path : /var/opt/oracle.minicluster/setup/logs/
tenant_cli_100316_161932.log

Getting APP VM Group...

APP VM GROUP DEFINITION
        status : Active
        description : zonegroup description
        Name : mc12appzg2
        Type : application
        ID : 2
        Security Profile : No

EXTERNAL NFS

APP VM DEFINITION

APPVM 1
        id : 5
        status : Active
        name : mc12appzg2n1
        globalName : mc12-n1
        cores : 3
        DNSServers : 192.0.2.7,192.0.2.8
        memory : 522496
        virtualNetworks
                private_ip : 192.0.2.2
                private_hostname : mc12appzg2n1-pub-priv
                private_mask : 24
                public_ip : 192.0.2.3
                public_hostname : mc12appzg2n1-pub
                public_mask : 22
                public_gateway :  192.0.2.1
                virtual_ip :
                virtual_hostname : mc12appzg2n1-pub-vip

APPVM 2
        id : 6
        status : Active
        name : mc12appzg2n2
        globalName : mc12-n2
        cores : 3
```

```
DNSServers : <valid_IP_addr>,<valid_IP_addr>,<valid_IP_addr>
memory : 522496
virtualNetworks
        private_ip : 192.0.2.4
        private_hostname : mc12appzg2n2-pub-priv
        private_mask : 24
        public_ip : 192.0.2.5
        public_hostname : mc12appzg2n2-pub
        public_mask : 22
        public_gateway :  192.0.2.1
        virtual_ip :
        virtual_hostname : mc12appzg2n2-pub-vip
```

▼ List the IP and Hostname Entries for DNS (CLI)

Use this procedure to see a list of hostname and IP addresses that should be mapped in DNS.

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

   See “Log in to the MCMU CLI” on page 31.

2. **Type:**

```
% mcmu tenant -M -n
IP           | HOSTNAME
-------------+----------------------------
192.0.2.2 | mc12dbzg1-zone-3-mc12-n1
192.0.2.3 | mc12dbzg1-zone-3-mc12-n1-vip
192.0.2.4 | mc12dbzg1-zone-3-mc12-n2
192.0.2.5 | mc12dbzg1-zone-3-mc12-n2-vip
```

Obtaining Status (CLI)

Note - Different versions of the MiniCluster software offer different `mcmu` commands and options. For the most accurate CLI information for the MiniCluster you are using, use `mcmu` help. See "Display `mcmu` Help For All Subcommands (CLI)" on page 204 and "Display `mcmu` Help for a Specific Subcommand (CLI)" on page 205.

These topics describe how to view various aspects of the system status:

Note - For mcmu commands that list information about zones and VMs, see "Listing Version, Group, and VM Details (CLI)" on page 207.

▼ Show the Status of Zones and DB VMs (CLI)

Use this procedure to display the status of the zones on both nodes.

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**
   See "Log in to the MCMU CLI" on page 31.

2. **Type:**

   ```
   % mcmu status -Z -a
   ```

   In this example, the zones are identified as:

   - `global` – The global zone.

- `acfskz` – The kernel zone.
- *DB_VMname* – The DB VMs.

For zone descriptions, see "MiniCluster Zones Overview" on page 21.

```
% mcmu status -Z -a
[INFO    ] Zone status on node1
  ID NAME             STATUS      PATH                           BRAND      IP
   0 global           running     /                              solaris    shared
   2 acfskz           running     -                              solaris-kz excl
   7 dbgp1-vm1-mc3-n1 running     /mcpool/dbgp1-vm1-mc3-n1zroot solaris    excl
   8 dbgp1-vm2-mc3-n1 running     /mcpool/dbgp1-vm2-mc3-n1zroot solaris    excl
   - appzonetemplate  installed   /mcpool/appzonetemplate       solaris    excl
   - dbzonetemplate   installed   /mcpool/dbzonetemplate        solaris    excl

[INFO    ] Zone status on node2
  ID NAME             STATUS      PATH                           BRAND      IP
   0 global           running     /                              solaris    shared
   2 acfskz           running     -                              solaris-kz excl
   7 dbgp1-vm1-mc3-n2 running     /mcpool/dbgp1-vm1-mc3-n2zroot solaris    excl
   8 dbgp1-vm2-mc3-n2 running     /mcpool/dbgp1-vm2-mc3-n2zroot solaris    excl
   - appzonetemplate  installed   /mcpool/appzonetemplate       solaris    excl
   - dbzonetemplate   installed   /mcpool/dbzonetemplate        solaris    excl
```

▼ Show the Kernel Zone GI Status (CLI)

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

   See "Log in to the MCMU CLI" on page 31.

2. **Type:**

```
% mcmu status -G -k
--------------------------------------------------------------
Name           Target  State        Server       State details
------------------------------------------------------------------------------
Local Resources
--------------------------------------------------------------
ora.LISTENER.lsnr
               ONLINE  ONLINE       mc2ss01      STABLE
               ONLINE  ONLINE       mc2ss02      STABLE
ora.OCRVOTE.dg
               ONLINE  ONLINE       mc2ss01      STABLE
               ONLINE  ONLINE       mc2ss02      STABLE
ora.SHARED.COMMONVOL.advm
               ONLINE  ONLINE       mc2ss01      STABLE
```

```
               ONLINE  ONLINE       mc2ss02      Volume device /dev/a
                                                   sm/commonvol-230 is
                                                   online,STABLE
ora.SHARED.SSVOL.advm
               ONLINE  ONLINE       mc2ss01      STABLE
               ONLINE  ONLINE       mc2ss02      Volume device /dev/
                                                   asm/ssvol-230
                                                   is online,STABLE
ora.SHARED.dg
               ONLINE  ONLINE       mc2ss01      STABLE
               ONLINE  ONLINE       mc2ss02      STABLE
ora.asm
               ONLINE  ONLINE       mc2ss01      Started,STABLE
               ONLINE  ONLINE       mc2ss02      Started,STABLE
ora.net1.network
               ONLINE  ONLINE       mc2ss01      STABLE
               ONLINE  ONLINE       mc2ss02      STABLE
ora.ons
               ONLINE  ONLINE       mc2ss01      STABLE
               ONLINE  ONLINE       mc2ss02      STABLE
ora.shared.commonvol.acfs
               ONLINE  ONLINE       mc2ss01      mounted on /mnt/comm
                                                   onfs,STABLE
               ONLINE  ONLINE       mc2ss02      mounted on /mnt/comm
                                                   onfs,STABLE
ora.shared.ssvol.acfs
               ONLINE  ONLINE       mc2ss01      mounted on /mnt/
                                                   sharedstore,STABLE
               ONLINE  ONLINE       mc2ss02      mounted on /mnt/shar
                                                   edstore,STABLE
--------------------------------------------------------------------------
Cluster Resources
--------------------------------------------------------------------------
ora.LISTENER_SCAN1.lsnr
      1        ONLINE  ONLINE       mc2ss02      STABLE
ora.LISTENER_SCAN2.lsnr
      1        ONLINE  ONLINE       mc2ss01      STABLE
ora.LISTENER_SCAN3.lsnr
      1        ONLINE  ONLINE       mc2ss01      STABLE
ora.MGMTLSNR
      1        ONLINE  ONLINE       mc2ss01      STABLE
ora.commonfs.export
      1        ONLINE  ONLINE       mc2ss02      STABLE
ora.cvu
      1        ONLINE  ONLINE       mc2ss01      STABLE
ora.mc2ss01.vip
      1        ONLINE  ONLINE       mc2ss01      STABLE
ora.mc2ss02.vip
```

```
      1        ONLINE  ONLINE       mc2ss02      STABLE
ora.mgmtdb
      1        ONLINE  ONLINE       mc2ss01      Open,STABLE
ora.oc4j
      1        ONLINE  ONLINE       mc2ss01      STABLE
ora.omcss.havip
      1        ONLINE  ONLINE       mc2ss02      STABLE
ora.scan1.vip
      1        ONLINE  ONLINE       mc2ss02      STABLE
ora.scan2.vip
      1        ONLINE  ONLINE       mc2ss01      STABLE
ora.scan3.vip
      1        ONLINE  ONLINE       mc2ss01      STABLE
ora.sharedstore.export
      1        ONLINE  ONLINE       mc2ss02      STABLE
--------------------------------------------------------------------------------
```

▼ Show the GI Status of a DB VM (CLI)

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

   See "Log in to the MCMU CLI" on page 31.

2. **Use this syntax:**

   `% mcmu status -G -n` *VMgroupname*

   where *VMgroupname* is the name of the DB VM group. To determine the *VMgroupname*, see "List a Summary of All DB VM Groups (CLI)" on page 208.

   For example:

```
% mcmu status -G -n dbvmg1

--------------------------------------------------------------------------------
Name           Target  State        Server                   State details
--------------------------------------------------------------------------------
Local Resources
--------------------------------------------------------------------------------
ora.DATA.dg
               ONLINE  ONLINE       dbzg2-zg2zone-1-mc2-n1   STABLE
               ONLINE  ONLINE       dbzg2-zg2zone-1-mc2-n2   STABLE
ora.LISTENER.lsnr
               ONLINE  ONLINE       dbzg2-zg2zone-1-mc2-n1   STABLE
               ONLINE  ONLINE       dbzg2-zg2zone-1-mc2-n2   STABLE
ora.RECO.dg
               ONLINE  ONLINE       dbzg2-zg2zone-1-mc2-n1   STABLE
```

```
               ONLINE  ONLINE       dbzg2-zg2zone-1-mc2-n2   STABLE
ora.REDO.dg
               ONLINE  ONLINE       dbzg2-zg2zone-1-mc2-n1   STABLE
               ONLINE  ONLINE       dbzg2-zg2zone-1-mc2-n2   STABLE
ora.SYSTEM.dg
               ONLINE  ONLINE       dbzg2-zg2zone-1-mc2-n1   STABLE
               ONLINE  ONLINE       dbzg2-zg2zone-1-mc2-n2   STABLE
ora.asm
               ONLINE  ONLINE       dbzg2-zg2zone-1-mc2-n1   Started,STABLE
               ONLINE  ONLINE       dbzg2-zg2zone-1-mc2-n2   Started,STABLE
ora.net1.network
               ONLINE  ONLINE       dbzg2-zg2zone-1-mc2-n1   STABLE
               ONLINE  ONLINE       dbzg2-zg2zone-1-mc2-n2   STABLE
ora.ons
               ONLINE  ONLINE       dbzg2-zg2zone-1-mc2-n1   STABLE
               ONLINE  ONLINE       dbzg2-zg2zone-1-mc2-n2   STABLE
--------------------------------------------------------------------------------
Cluster Resources
--------------------------------------------------------------------------------
ora.LISTENER_SCAN1.lsnr
      1        ONLINE  ONLINE       dbzg2-zg2zone-1-mc2-n2   STABLE
ora.LISTENER_SCAN2.lsnr
      1        ONLINE  ONLINE       dbzg2-zg2zone-1-mc2-n1   STABLE
ora.LISTENER_SCAN3.lsnr
      1        ONLINE  ONLINE       dbzg2-zg2zone-1-mc2-n1   STABLE
ora.MGMTLSNR
      1        ONLINE  ONLINE       dbzg2-zg2zone-1-mc2-n1   STABLE
ora.cvu
      1        ONLINE  ONLINE       dbzg2-zg2zone-1-mc2-n1   STABLE
ora.dbzg2-zg2zone-1-mc2-n1.vip
      1        ONLINE  ONLINE       dbzg2-zg2zone-1-mc2-n1   STABLE
ora.dbzg2-zg2zone-1-mc2-n2.vip
      1        ONLINE  ONLINE       dbzg2-zg2zone-1-mc2-n2   STABLE
ora.mgmtdb
      1        ONLINE  ONLINE       dbzg2-zg2zone-1-mc2-n1   Open,STABLE
ora.oc4j
      1        ONLINE  ONLINE       dbzg2-zg2zone-1-mc2-n1   STABLE
ora.scan1.vip
      1        ONLINE  ONLINE       dbzg2-zg2zone-1-mc2-n2   STABLE
ora.scan2.vip
      1        ONLINE  ONLINE       dbzg2-zg2zone-1-mc2-n1   STABLE
ora.scan3.vip
      1        ONLINE  ONLINE       dbzg2-zg2zone-1-mc2-n1   STABLE
--------------------------------------------------------------------------------
```

Show Kernel Zone Status (CLI)

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**
   See "Log in to the MCMU CLI" on page 31.

2. **Use this syntax:**

   ```
   % mcmu status -Z -k nodex
   ```

   where *x* is either 1 or 2.
   For example:

   ```
   % mcmu status -Z -k node1
   [INFO    ] Log file path :
   /var/opt/oracle.minicluster/setup/logs/mcmu_050616_112555.log
     ID NAME             STATUS      PATH                          BRAND      IP
      2 acfskz           running     -                             solaris-kz excl
   ```

Show the VM Status (CLI)

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**
   See "Log in to the MCMU CLI" on page 31.

2. **Use this syntax:**

   ```
   % mcmu status -Z -zonename=VMname
   ```

   where *VMname* is the name of the VM. To determine the name of a DB VM, see "List Details of a DB VM Group Profile (CLI)" on page 209. For an App VM, see "List Details of an App Group Profile (CLI)" on page 218.
   For example:

   ```
   % mcmu status -Z -n dbgp1-vm1-mc3-n1
     ID NAME             STATUS    PATH                           BRAND      IP
      7 dbgp1-vm1-mc3-n1 running   /mcpool/dbgp1-vm1-mc3-n1zroot solaris    excl
   ```

Check the Status of the GI on the Kernel Zone (CLI)

Use this procedure to check the status of the grid infrastructure in a kernel zone.

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

See “Log in to the MCMU CLI” on page 31.

2. **Type:**

```
% mcmu status -G -k
INFO:MCMU.controllers.common.pexpect_util:su to user root successfully.
--------------------------------------------------------------------------------
Name           Target  State        Server                  State details
--------------------------------------------------------------------------------
Local Resources
--------------------------------------------------------------------------------
ora.LISTENER.lsnr
               ONLINE  ONLINE       mc3ss01                 STABLE
               ONLINE  ONLINE       mc3ss02                 STABLE
ora.OCRVOTE.dg
               ONLINE  ONLINE       mc3ss01                 STABLE
               ONLINE  ONLINE       mc3ss02                 STABLE
ora.SHARED.COMMONVOL.advm
               ONLINE  ONLINE       mc3ss01                 STABLE
               ONLINE  ONLINE       mc3ss02                 Volume device /dev/a
                                                              sm/commonvol-377 is
                                                              online,STABLE
ora.SHARED.SSVOL.advm
               ONLINE  ONLINE       mc3ss01                 STABLE
               ONLINE  ONLINE       mc3ss02                 Volume device /dev/a
                                                              sm/ssvol-377 is onli
                                                              ne,STABLE
ora.SHARED.dg
               ONLINE  ONLINE       mc3ss01                 STABLE
               ONLINE  ONLINE       mc3ss02                 STABLE
ora.asm
               ONLINE  ONLINE       mc3ss01                 Started,STABLE
               ONLINE  ONLINE       mc3ss02                 Started,STABLE
ora.net1.network
               ONLINE  ONLINE       mc3ss01                 STABLE
               ONLINE  ONLINE       mc3ss02                 STABLE
ora.ons
               ONLINE  ONLINE       mc3ss01                 STABLE
               ONLINE  ONLINE       mc3ss02                 STABLE
ora.shared.commonvol.acfs
               ONLINE  ONLINE       mc3ss01                 mounted on /commonfs
                                                              ,STABLE
               ONLINE  ONLINE       mc3ss02                 mounted on /commonfs
                                                              ,STABLE
ora.shared.ssvol.acfs
               ONLINE  ONLINE       mc3ss01                 mounted on /sharedst
                                                              ore,STABLE
               ONLINE  ONLINE       mc3ss02                 mounted on /sharedst
```

```
                                                           ore,STABLE
--------------------------------------------------------------------------------
Cluster Resources
--------------------------------------------------------------------------------
ora.LISTENER_SCAN1.lsnr
      1        ONLINE  ONLINE       mc3ss02                STABLE
ora.LISTENER_SCAN2.lsnr
      1        ONLINE  ONLINE       mc3ss01                STABLE
ora.LISTENER_SCAN3.lsnr
      1        ONLINE  ONLINE       mc3ss01                STABLE
ora.MGMTLSNR
      1        ONLINE  ONLINE       mc3ss01                xxx.xxx.xxx.144 192.
                                                             xxx.xx.250,STABLE
ora.commonfs.export
      1        ONLINE  ONLINE       mc3ss01                STABLE
ora.cvu
      1        ONLINE  ONLINE       mc3ss01                STABLE
ora.mc3ss01.vip
      1        ONLINE  ONLINE       mc3ss01                STABLE
ora.mc3ss02.vip
      1        ONLINE  ONLINE       mc3ss02                STABLE
ora.mgmtdb
      1        ONLINE  ONLINE       mc3ss01                Open,STABLE
ora.oc4j
      1        ONLINE  ONLINE       mc3ss01                STABLE
ora.omcss.havip
      1        ONLINE  ONLINE       mc3ss01                STABLE
ora.scan1.vip
      1        ONLINE  ONLINE       mc3ss02                STABLE
ora.scan2.vip
      1        ONLINE  ONLINE       mc3ss01                STABLE
ora.scan3.vip
      1        ONLINE  ONLINE       mc3ss01                STABLE
ora.sharedstore.export
      1        ONLINE  ONLINE       mc3ss01                STABLE
--------------------------------------------------------------------------------
```

▼ Run `orachk` Health Checks (CLI)

Use this procedure to run health checks on database VMs. ORAchk does not run on APP VMs.

Before you can run ORAchk, you must download it and install it in the database VMs.

For more information about ORAchk, refer to "ORAchk Overview" on page 18.

1. **Log in to a database VM and assume the `root` role.**

See “Log in to a DB VM” on page 32.

2. **Change to the directory where orachk is installed.**

3. **Run orachk.**

```
root@mc1dbzg1-mc1zg1zone1:~# ./orachk
         CRS stack is running and CRS_HOME is not set. Do you want to set
CRS_HOME to /u01/app/12.1.0.2/grid?[y/n][y]y
Checking for prompts on mc1dbzg1-mc1zg1zone1 for oracle user...
Checking ssh user equivalency settings on all nodes in cluster
Node mc1dbzg1-mc1zg1zone2 is not configured for ssh user equivalency and the script uses
     ssh to execute checks on remote nodes.
Without this facility the script cannot run audit checks on the remote nodes.
If necessary due to security policies the script can be run individually on each node.
Do you want to configure SSH for user root on mc1dbzg1-mc1zg1zone2  [y/n][y]y
Enter root password on mc1dbzg1-mc1zg1zone2 :-
Verifying root password.
 . .
Checking for prompts for oracle user on all nodes...

Searching for running databases . . . . .
         . .
List of running databases registered in OCR          1.rac12c1          2. None of above
Select databases from list for checking best practices. For multiple     databases,
select 1 for All or comma separated number like 1,2 etc     [1-2][1].1

. . .   Checking Status of Oracle Software Stack - Clusterware, ASM, RDBMS . . . . . .
-----------------------------------------------------------------------------------------

Oracle Stack Status
-----------------------------------------------------------------------------------------
Host Name  CRS Installed  RDBMS Installed    CRS UP    ASM UP    RDBMS UP   DB Instance Name
-----------------------------------------------------------------------------------------
mc1dbzg1-mc1zg1zone1 Yes         Yes           Yes     Yes       Yes        rac12c11
-----------------------------------------------------------------------------------------
. . . . . root passwords are incorrect or login to as root is     disabled in ssh
configuration for following nodes.
You can still continue but root privileged checks will not be executed on following nodes.
         1. mc1dbzg1-mc1zg1zone2
         Do you want to continue[y/n][y]:- y
         *** Checking Best Practice Recommendations (PASS/WARNING/FAIL) ***
Collections and audit checks log file is
    /root/orachk_mc1dbzg1-mc1zg1zone1_rac12c1_061716_150741/log/orachk.log


Checking for prompts in /root/.profile     on mc1dbzg1-mc1zg1zone1 for
    root user...
```

```
    ============================================================
          Node name - mc1dbzg1-mc1zg1zone1
    ============================================================
Collecting - ASM Disk Groups
Collecting - ASM Disk I/O stats
Collecting - ASM Diskgroup Attributes
Collecting - ASM disk partnership imbalance
Collecting - ASM diskgroup attributes
Collecting - ASM diskgroup usable free space          .
.
<output omitted>
.
         Detailed report (html) -
    /root/orachk_mc1dbzg1-mc1zg1zone1_rac12c1_061716_150741/orachk_mc1dbzg1-
mc1zg1zone1_rac12c1_061716_150741.html
    UPLOAD(if required) -     /root/orachk_mc1dbzg1-mc1zg1zone1_rac12c1_061716_150741.zip
```

Starting and Stopping VM Components (CLI)

Note - Different versions of the MiniCluster software offer different `mcmu` commands and options. For the most accurate CLI information for the MiniCluster you are using, use `mcmu` help. See "Display `mcmu` Help For All Subcommands (CLI)" on page 204 and "Display `mcmu` Help for a Specific Subcommand (CLI)" on page 205.

Use the MCMU CLI to start and stop individual VM and zone components.

Typically, the system is started and stopped using Oracle ILOM, which provides a lights-out method for controlling the system. For Oracle ILOM starting instructions, see "Starting and Stopping the System" on page 57. However, there can be situations where you need to start or stop individual MiniCluster components such as the kernel zones.

Starting VM Components (CLI)

Note - These topics assume that power is applied to the system, but the particular component you plan to start is stopped.

These topics describe how to start individual VM and zone components.

Start a Kernel Zone (CLI)

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**
   See "Log in to the MCMU CLI" on page 31.
2. **Use this syntax:**

   ```
   % mcmu start -Z -k nodex
   ```

   where *x* is 1 or 2.

   For example:

   ```
   $ mcmu start -Z -k node1
   ```

Start All VMs in a Group (CLI)

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**
   See "Log in to the MCMU CLI" on page 31.
2. **Use this syntax:**

   ```
   % mcmu start -V -n VMgroupname
   ```

   where *VMgroupname* is the name of the VM group. To determine the name, see "List a Summary of All DB VM Groups (CLI)" on page 208.

   For example:

   ```
   % mcmu start -V -n dbzg2
   ```

Start a Single VM (CLI)

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**
   See "Log in to the MCMU CLI" on page 31.
2. **Use this syntax:**

   ```
   % mcmu start -Z -n VMname
   ```

where *VMname* is the name of the VM. To determine the name of a DB VM, see "List Details of a DB VM Group Profile (CLI)" on page 209. For an App VM, see "List Details of an App Group Profile (CLI)" on page 218.

For example:

```
% mcmu start -Z -n dbzg2-zone-1-mc2-n2
```

Start the Grid Infrastructure for the Application VM Groups (CLI)

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**
   See "Log in to the MCMU CLI" on page 31.

2. **Use this syntax:**

   ```
   % mcmu start -G -k nodex
   ```

   where *x* is the node number (1 or 2).

   For example:

   ```
   % mcmu start -G -k node1
   ```

Start the Grid Infrastructure for the DB VM Group (CLI)

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**
   See "Log in to the MCMU CLI" on page 31.

2. **Use this syntax:**

   ```
   % mcmu start -G -n VMgroupname
   ```

   where *VMgroupname* is the name of the DB VM group. To determine the group name, see "List a Summary of All DB VM Groups (CLI)" on page 208.

   For example:

   ```
   % mcmu start -G -n dbgrp1
   ```

Stopping VM Components (CLI)

Caution - To properly shutdown the system, follow the instructions in “Shut Down, Reset, or Power Cycle the System” on page 58. If the system is not properly shutdown, data corruption can occur.

These topics describe how to stop individual VM components:

- “Stop the Grid Infrastructure in the DB VM Group (CLI)” on page 236
- “Stop the Grid Infrastructure in an Application VM Group (CLI)” on page 236
- “Stop All VMs in a Group (CLI)” on page 237
- “Stop a Single VM (CLI)” on page 237
- “Stop a Kernel Zone (CLI)” on page 238

▼ Stop the Grid Infrastructure in the DB VM Group (CLI)

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

   See “Log in to the MCMU CLI” on page 31.

2. **Use this syntax:**

   ```
   % mcmu stop -G -n VMgroupname
   ```

   where *VMgroupname* is the name of the DB VM group. To determine the name, see “List a Summary of All DB VM Groups (CLI)” on page 208.

   For example:

   ```
   % mcmu stop -G -n dbgrp1
   ```

▼ Stop the Grid Infrastructure in an Application VM Group (CLI)

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

   See “Log in to the MCMU CLI” on page 31.

2. **Use this syntax:**

```
% mcmu stop -G -k nodex
```

where *x* is 1 or 2.

For example:

```
% mcmu stop -G -k node1
```

▼ Stop All VMs in a Group (CLI)

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

See "Log in to the MCMU CLI" on page 31.

2. **Use this syntax:**

```
% mcmu stop -V -n VMgroupname
```

where *VMgroupname* is the name of the VM group. To determine the name, see "List a Summary of All DB VM Groups (CLI)" on page 208.

For example:

```
% mcmu stop -V -n vm2
```

MCMU stops each VM in the group one by one. You are prompted to confirm the stopping of each VM in the group.

▼ Stop a Single VM (CLI)

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

See "Log in to the MCMU CLI" on page 31.

2. **Use this syntax:**

```
% mcmu stop -Z -n VMname
```

where *VMname* is the name of the VM. To determine the name of a DB VM, see "List Details of a DB VM Group Profile (CLI)" on page 209. For an App VM, see "List Details of an App Group Profile (CLI)" on page 218.

For example:

```
% mcmu stop -Z -n dbzg2-zone-1-mc2-n2
```

Stop a Single Node

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

   See "Log in to the MCMU CLI" on page 31.

2. **Stop the node.**

   ```
   % mcmu stop -N nodex
   ```

   where *x* is the node number (1 or 2).

   For example:

   ```
   % mcmu stop -N node2
   [INFO    ] Checking if nodes are in sync
   To start a node that has been shut down, use the boot command at the OpenBoot prompt.
   Do you want to shut down node2? [yes/no] (no): yes
   ```

Tip - To restart the node, connect to the management console and manually start the node with the OpenBoot `boot` command.

Stop a Kernel Zone (CLI)

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

   See "Log in to the MCMU CLI" on page 31.

2. **Use this syntax:**

   ```
   % mcmu stop -Z -k nodex
   ```

   where *x* is 1 or 2.

   For example, to stop the kernel zone on each node, type:

   ```
   % mcmu stop -Z -k node1
   % mcmu stop -Z -k node2
   ```

Verifying that the System Is Ready for the Creation of VMs (CLI)

Note - Different versions of the MiniCluster software offer different `mcmu` commands and options. For the most accurate CLI information for the MiniCluster you are using, use `mcmu` help. See "Display `mcmu` Help For All Subcommands (CLI)" on page 204 and "Display `mcmu` Help for a Specific Subcommand (CLI)" on page 205.

Before you can create VMs, all of the system setup steps must be complete, and the state of the system software, drives, and connectivity must be in expected healthy state. The MCMU CLI provides a number of commands that enable you to verify various aspects of the system setup.

Note - To install and set up the system, refer to the *Oracle MiniCluster S7-2 Installation Guide*.

These topics describe how to verify the setup, and run readiness checks through the CLI.

▼ List the System Setup Steps (CLI)

Use this procedure to determine if the system is set up, and to see if the setup process completed all steps. The setup steps are normally run when the system is initially set up at installation time.

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**
   See "Log in to the MCMU CLI" on page 31.

2. **Display the list of setup steps and the status of each step.**

This example indicates that all the system setup steps have been performed and completed with a status of OK. The log file of the setup process is also displayed.

```
% mcmu setupmc -a
[INFO    ] Log file path : mc_name-n1:/var/opt/oracle.minicluster/setup/logs/mcmu_082216_160419.log
+-------------------------------------------------------------------------------------------------+
| STEP | DESCRIPTION                                                                        | STATUS |
+-------------------------------------------------------------------------------------------------+
| 1    | Check Package Version and Gather User Input                                        | OK     |
| 2    | Prepare for System Install                                                         | OK     |
| 3    | Interconnect Setup                                                                 | OK     |
| 4    | Configure Explorer                                                                 | OK     |
| 5    | Check System Readiness                                                             | OK     |
| 6    | Verify Topology                                                                    | OK     |
| 7    | Prepare Network Interfaces                                                         | OK     |
| 8    | Configure Client Access Network on Node 1                                          | OK     |
| 9    | Configure Client Access Network on Node 2                                          | OK     |
| 10   | Configure NTP Client, Set Password Policy and Setup Apache Web Server              | OK     |
| 11   | Check Configuration and IP Mappings                                                | OK     |
| 12   | Configure ILOM Network                                                             | OK     |
| 13   | Storage: Create Storage Alias, Reset JBOD(s) and Partition All Disks in All JBOD(s) | OK     |
| 14   | Calibrate Disks in All JBOD(s)                                                     | OK     |
| 15   | Shared Storage Setup: Configure and Secure All Kernel Zones                        | OK     |
| 16   | Shared Storage Setup: Install Oracle Grid Infrastructure 12c in Kernel Zones       | OK     |
| 17   | Shared Storage Setup: Apply GI PSU                                                 | OK     |
| 18   | Shared Storage Setup: Configure ACFS and Mount Shared Filesystem in Global Zones   | OK     |
| 19   | Apply Global Zone Security Settings                                                | OK     |
+-------------------------------------------------------------------------------------------------+
```

▼ (If Needed) Run or Rerun System Setup Steps (CLI)

Use this procedure to run any system setup steps that have not been completed, or require rerunning due to a possible problem. To determine the state of the system setup steps, see "List the System Setup Steps (CLI)" on page 239.

Note - The setup steps are normally run when the system is initially set up at installation time.

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

   See "Log in to the MCMU CLI" on page 31.

2. **Perform one of these commands:**

   - **Run all the setup steps, type:**

```
% mcmu setupmc -s all
```

- **Run a specific setup step, type:**

  ```
  % mcmu setupmc -s step-number
  ```

  For example, to run step 1 in the system setup, type:

  ```
  % mcmu setupmc -s 1
  ```

- **Run a range of setup steps, type:**

  ```
  % mcmu setupmc -s starting-step-number-ending-step-number
  ```

  For example, to run steps 1 through 5 in the system setup, type:

  ```
  % mcmu setupmc -s 1-5
  ```

- **Force a step to run, type:**

  This command forces a rerun of a step that previously completed successfully. Not all steps are re-runnable.

  ```
  % mcmu setupmc -s step-number -f
  ```

  For example, to force a rerun on step 1 in the system setup, type:

  ```
  % mcmu setupmc -s 1 -f
  ```

- **Undo the last setup step (if it successfully completed), type:**

  You might need to perform this task if the setup process ran into an error. Check the log files to see what step encountered an error. Then undo all the steps back to the faulted step, then redo

  ```
  % mcmu setupmc -u step-number
  ```

  For example, to undo step 5, if step 5 was successfully completed, type:

  ```
  % mcmu setupmc -u 5
  ```

▼ Verify the System Setup (CLI)

Use this procedure to verify the setup process that was performed at installation time. This procedure is similar to “List the System Setup Steps (CLI)” on page 239, but provides more details about the setup process.

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

   See “Log in to the MCMU CLI” on page 31.

2. **Type:**

```
% mcmu setupmc -v all
[INFO    ] STEP 1: Gather User Inputs VERIFICATION STARTED
To DO://
[INFO    ] STEP 1: Gather User Inputs VERIFICATION COMPLETED
[INFO    ] STEP 2: Prepare for System Install VERIFICATION STARTED
[INFO    ] Invoked by OS user: mcinstall
[INFO    ] Find log at: mc2-n1:/var/opt/oracle.minicluster/setup/logs/
omc_crdb_verify_050516_164030.log
[INFO    ] ---------- Starting Creating SQLite Database and Populating USER_INPUT Table
 Verification
[INFO    ] Check existence of entries in USER_INPUT table started.
[INFO    ] Check existence of entries in USER_INPUT table succeeded.
[INFO    ] Creating SQLite Database / Populating USER_INPUT Table Verification Completed
To DO://
[INFO    ] STEP 2: Prepare for System Install VERIFICATION COMPLETED
[INFO    ] STEP 3: Interconnect Setup VERIFICATION STARTED
:
[INFO    ] Log file path : mc2-n1:/var/opt/oracle.minicluster/setup/logs/
omc_fn_hangepvtip_verify_050516_164031.log
[INFO    ] Verifying reconfiguration of Interconnect IP address..
[INFO    ] Verifying reconfiguration of Interconnect IP address.. Completed.
```

▼ Verify the System, Topology, and Disk Readiness (CLI)

Use this procedure to run MCMU readiness checks to ensure that the system is ready for the creation of VMs.

Readiness checks perform these verifications:

- **System readiness** – Checks to ensure that the MiniCluster hardware and software are configured properly and at expected levels. This check is normally performed before the system is configured, but you can run this feature any time.
- **Topology verification** – Checks that the I/O card locations and verifies network connectivity.
- **Disk calibration** – Checks the health of the drives in the system. This feature performs read and write tests on a reserved area of each drive. The check is not destructive to data.

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

   See “Log in to the MCMU CLI” on page 31.

2. Run all or an individual check.

```
% mcmu readiness -option
```

where *option* is one of these values:

- `a` – Run all checks.
- `c` – Run the disk calibration check.
- `h` – Display the help for the readiness option.
- `s` – Run the system readiness check.
- `t` – Run the topology verification.

This is an example of running all of the readiness checks.

```
% mcmu readiness -a
[INFO    ] Log file path : mc3-n1:/var/opt/oracle.minicluster/setup/logs/
mcmu_082216_171559.log
[INFO    ] Log file path : mc3-n1:/var/opt/oracle.minicluster/setup/logs/
omc_sysready_combined_v2_082216_171559.log
[INFO    ] [40;1;36m Checking for System Readiness..[0m
Aug 22 17:16:00 mccn su: 'su root' succeeded for mcinstall on /dev/pts/2
[INFO    ] _____________________________REPORT_____________________________________
[INFO    ] Description : Checking if aggrpvt0 aggregated link exists... OK
[INFO    ] Description : Each node should be able to ping the other node over private
 network.....OK
[INFO    ] Description : Both nodes should have identical physical device - vanity name
 mapping...OK
[INFO    ] Description : Both nodes should have the physical devices on the same
 slots...OK
[INFO    ] Description : Checking INT and EXT HBA firmware version on mc3-n1.. ...OK
[INFO    ] Description : Checking INT and EXT HBA firmware version on mc3-n2.. ...OK
[INFO    ] Description : Checking System firmware version on mc3-n1.. ...OK
[INFO    ] Description : Checking System firmware version on mc3-n2.. ...OK

[INFO    ] [40;1;32mChecking for System Readiness.. Completed[0m

Aug 22 17:17:50 mccn su: 'su root' succeeded for mcinstall on /dev/pts/1
[INFO    ] Invoked by OS user: root
[INFO    ] Find log at: mc3-n1:/var/opt/oracle.minicluster/setup/logs/
omc_verifytopology_082216_171750.log
[INFO    ] [40;1;36m---------- Starting Verify Toplogy[0m
[INFO    ] Check PCI Layout of Network Cards started.
[INFO    ] Check PCI Layout of Network Cards succeeded.
[INFO    ] Check PCI Layout of Estes Cards started.
[INFO    ] Check PCI Layout of Estes Cards succeeded.
[INFO    ] Check JBOD Disk Arrays started.
[INFO    ] Check JBOD Disk Arrays succeeded.
```

```
.
<output omitted>
.
[INFO    ] Log file path : mc3-n1:/var/opt/oracle.minicluster/setup/logs/
omc_diskcalib_v2_082216_171755.log
[INFO    ] [40;1;36m Calibrating all disks ..[0m
[ HDD ] /dev/chassis/JBODARRAY1/HDD0/disk   c0t5000CCA23B0FBDA4d0
[ HDD ] /dev/chassis/JBODARRAY1/HDD1/disk   c0t5000CCA23B12B068d0
[ HDD ] /dev/chassis/JBODARRAY1/HDD2/disk   c0t5000CCA23B12DA48d0
[ HDD ] /dev/chassis/JBODARRAY1/HDD3/disk   c0t5000CCA23B12D4A4d0
[ HDD ] /dev/chassis/JBODARRAY1/HDD4/disk   c0t5000CCA23B12C030d0
[ HDD ] /dev/chassis/JBODARRAY1/HDD5/disk   c0t5000CCA23B12F358d0
[ SSD ] /dev/chassis/JBODARRAY1/HDD6/disk   c0t5000CCA0536CA820d0
[ SSD ] /dev/chassis/JBODARRAY1/HDD7/disk   c0t5000CCA0536CA788d0
[ SSD ] /dev/chassis/JBODARRAY1/HDD8/disk   c0t5000CCA0536CB3ACd0
[ SSD ] /dev/chassis/JBODARRAY1/HDD9/disk   c0t5000CCA0536CA818d0
.
<output omitted>
.
S U M M A R Y   R E P O R T

STORAGE GROUP: JBODARRAY1_SSD

Average Sequential Write Throughput:
        Achieved: 671 MB/s
        Expected: ~690 MB/s

c0t5000CCA05351B45Cd0 : 661 MB/s
c0t5000CCA0536CAC08d0 : 652 MB/s
c0t5000CCA053558800d0 : 656 MB/s
.
<output omitted>
.
c0t5000CCA04E0DEBA8d0 : 719 MB/s
c0t5000CCA0536CA788d0 : 658 MB/s

STORAGE GROUP: JBODARRAY1_HDD

Average Sequential Write Throughput:
        Achieved: 203 MB/s
        Expected: ~195 MB/s

c0t5000CCA23B12C030d0 : 188 MB/s
c0t5000CCA23B12DA48d0 : 204 MB/s
c0t5000CCA23B0FBDA4d0 : 205 MB/s
c0t5000CCA23B12D4A4d0 : 208 MB/s
c0t5000CCA23B12B068d0 : 218 MB/s
c0t5000CCA23B12F358d0 : 194 MB/s
```

```
[INFO    ] [40;1;32mCalibrating all disks .. Completed
[INFO    ] Calibration report path : /var/opt/oracle.minicluster/setup/logs/
calibration_report.txt
```

Ensure IP Addresses are Available in MCMU for Future VMs

When the system was installed, groups of IP addresses were added to the default IP pool for the future creation of VMs. If those addresses have been consumed you need to add additional IP addresses to MCMU. The commands used to manage network parameters are different based on the version of the MCMU software.

- **Refer to one of these sections based on the version of MCMU software on your system:**
  - “Managing Networks for v1.2.4 or Later Software (CLI)” on page 291
  - “Managing Networks for v1.2.2 or Earlier Systems (CLI)” on page 295

Configuring DB VMs (CLI)

Note - Different versions of the MiniCluster software offer different `mcmu` commands and options. For the most accurate CLI information for the MiniCluster you are using, use `mcmu` help. See "Display `mcmu` Help For All Subcommands (CLI)" on page 204 and "Display `mcmu` Help for a Specific Subcommand (CLI)" on page 205.

These topics provide CLI procedures for the DB VM groups and their associated components (VMs, DB home, and DB instances).

Creating DB VMs (CLI)

For information about planning for VMs, see "Planning to Create VMs" on page 77.

These topics describe how to create DB VMs.

▼ Create a DB VM Group Profile (CLI)

Use this procedure to create a DB VM group.

This task involves performing these activities:

- Create a DB VM group profile

- Deploy the DB VM group

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

   See "Log in to the MCMU CLI" on page 31.

2. **Create the DB VM group profile.**

```
% mcmu tenant -P -c
```

   You are prompted to enter DB VM group profile configuration information.

   a. **Enter the necessary information for the DB VM group profile.**

```
Listing DB VM Group Profile..
Database Virtual Machine Group Profile Description
Enter Virtual Machine Group Profile Name : dbgp1
Enter ASM Disk Group Redundancy [NORMAL,HIGH] (NORMAL): NORMAL
CIS Equivalent Security Settings are default. Do you want to enable PCI DSS Security
 Settings [Yes,No] (No)? NO
Enter Number of VM(s) on Node 1, Max(4) (1): 2
Enter Number of VM(s) on Node 2, Max(4) (1): 2
<-- For systems running v1.2.4 or later -->
IP pool information:
ID: 1   Name: default
ID: 2   Name: DB_IPpool
Select IP pool [1]: 2
<------------------------------------------------------------>
Enter Description : DB Group 1 - NORMAL - SHARED - CIS
```

   b. **Enter the necessary information for the DB VMs.**

      For example, if you entered 2 as the number of VMs on each compute node, these fields are displayed:

```
Define Virtual Machines
Node 1 : mc3-n1

Virtual Machine 1

Enter Cores [0 to max 12] (0): 4
Enter Public Hostname (dbgp1-vm1-mc3-n1): mc3-n1
Do you want to use mcinstall password of global zone for the password for user
 oracle?
Enter Y/N (Y):<Return>
Do you want to use mcinstall password of global zone for the password for user
 mcinstall?
Enter Y/N (Y):<Return>
```

```
Clusterware [Yes,No] (No):<Return>

Virtual Machine 2

Enter Cores [0 to max 8] (0): 3
Enter Public Hostname (dbgp1-vm2-mc3-n1): mc3-n1vm1-z2
Do you want to use mcinstall password of global zone for the password for user
 oracle?
Enter Y/N (Y):<Return>
Do you want to use mcinstall password of global zone for the password for user
 mcinstall?
Enter Y/N (Y):<Return>
Clusterware [Yes,No] (No):<Return>



Node 2 : mc3-n2

Virtual Machine 1

Enter Cores [0 to max 12] (0): 0
Enter Public Hostname (dbgp1-vm1-mc3-n2): mc3-n2vm1-z1
Do you want to use mcinstall password of global zone for the password for user
 oracle?
Enter Y/N (Y):<Return>
Do you want to use mcinstall password of global zone for the password for user
 mcinstall?
Enter Y/N (Y):<Return>
Clusterware [Yes,No] (No):<Return>

Virtual Machine 2

Enter Cores [0 to max 12] (0): 0
Enter Public Hostname (dbgp1-vm2-mc3-n2): mc3-n2vm1-z2
Do you want to use mcinstall password of global zone for the password for user
 oracle?
Enter Y/N (Y):<Return>
Do you want to use mcinstall password of global zone for the password for user
 mcinstall?
Enter Y/N (Y):<Return>
Clusterware [Yes,No] (No):<Return>
```

c. Enter the configuration information for the DB cluster.

```
Define Cluster
Enter SCAN Name : dbgp1-scan
Select GRID Infrastructure Patch Level [12.1.0.2.160419]
 (12.1.0.2.160419): 12.1.0.2.160419
```

```
Shared Storage [Yes,No] (No): yes
```

MCMU creates the DB VM group profile according to the parameters you supplied.

```
Creating DB VM Group Profile...
INFO dbgp1-scan
INFO:MCMU.controllers.zones.dbzonemanager:dbgp1-scan
INFO {'redundancy': 'NORMAL', 'storageArrays': [], 'numberOfDisks': ''}
INFO:MCMU.controllers.zones.dbzonemanager:{'redundancy': 'NORMAL', 'storageArrays':
 [], 'numberOfDisks': ''}
.
<output omitted>
.
message: Creating DB VM Group succeeded.
Getting DB VM Group Profile...

PROFILE INFORMATION
        VMGroupName : dbgp1
        IP pool name : example_pool
        SCAN_name : dbgp1-scan
        SCAN_ip : xx.xxx.73.204,xx.xxx.73.205,xx.xxx.73.206

VM DEFINITIONS

VM 1
        name : dbgp1-vm1-mc3-n1
        globalName : mc3-n1
                public_ip : <valid_VLAN_IP_addr1>
                public_hostname : mc3-n1vm1-z1
                virtual_ip : <valid_VLAN_IP_addr2>
                virtual_hostname : mc3-n1vm1-z1-vip

VM 2
        name : dbgp1-vm2-mc3-n1
        globalName : mc3-n1
                public_ip : <valid_VLAN_IP_addr3>
                public_hostname : mc3-n1vm1-z2
                virtual_ip : <valid_VLAN_IP_addr4>
                virtual_hostname : mc3-n1vm1-z2-vip

VM 3
        name : dbgp1-vm1-mc3-n2
        globalName : mc3-n2
                public_ip : <valid_VLAN_IP_addr5>
                public_hostname : mc3-n2vm1-z1
                virtual_ip : <valid_VLAN_IP_addr6>
                virtual_hostname : mc3-n2vm1-z1-vip
```

```
VM 4
        name : dbgp1-vm2-mc3-n2
        globalName : mc3-n2
                public_ip : xx.xxx.73.130
                public_hostname : mc3-n2vm1-z2
                virtual_ip : 192.0.2.2
                virtual_hostname : mc3-n2vm1-z2-vip

Please insert the IP-mappings in the DNS Server if not already done.
```

3. **Enter all VM and SCAN public IP addresses and public hostnames into your DNS.**
   Ensure that you complete this step before you deploy the DB VM group.

4. **Deploy the DB VM group.**
   See "Deploy the DB VM Group (CLI)" on page 251.

▼ Deploy the DB VM Group (CLI)

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**
   See "Log in to the MCMU CLI" on page 31.

2. **Identify the `VMgroupID` for the profile.**
   List the DB VM group profiles, locate the profile that you just created, and make note of the `VMgroupID` number. The number is used to deploy the DB VM group.
   All existing DB VM group profiles are listed.

```
% mcmu tenant -P -l
Listing DB VM Group Profile..

Status : Active
EditStatus :
Description : Initial DB VM Group
 - NORMAL redundancy
 - Shared Storage
 - CIS
deletable : True
progress : False
VMgroupName : dbgp1
editable : True
VMgroupID : 1
```

3. **Deploy the DB VM group.**

Syntax:

mcmu tenant -G -D *VMgroupID*

where *VMgroupID* is the ID of the DB VM group profile that you just created.

Caution - Ensure that you use the uppercase **D** option for the command. Using the lowercase **d** option for this command deletes that VM group.

For example:

```
% mcmu tenant -G -D 1
Setting ssh timeout before carrying out further operations. Please wait..
[INFO    ] Log file path : /var/opt/oracle.minicluster/setup/logs/
tenant_cli_082316_040823.log

Aug 23 04:08:23 mccn su: 'su root' succeeded for mcinstall on /dev/pts/2
Deploying DB VM Group...
[23/Aug/2016 04:08:28] INFO [dbzonegroup_install:122] Added zonegroup to action data.
updated message, old:  Initializing  with  Insert IP Mapping
[23/Aug/2016 04:08:28] INFO [dbzonegroup_install:1467] Add zonegroup and operation type
 to action.
.
<output omitted>
.
updated message, old:  Finish adding zonegroup information to database.  with  GI Post
 Installation Finished.
[23/Aug/2016 05:23:22] INFO [dbzonegroup_install:93] Method: do performed
[23/Aug/2016 05:23:22] INFO [dbzonegroup_install:132] Add Node to GRID Cluster ends...
updated message, old:  GI Post Installation Finished.  with  Add Node to GRID Cluster
 ends...
[23/Aug/2016 05:23:22] INFO [dbzonegroup_install:98] Action Ends at: 2016-08-23 12:23:22
[23/Aug/2016 05:23:22] INFO [dbzonegroup_install:100] Elapsed Time: 1277.46536207 (secs)
[23/Aug/2016 05:23:22] INFO [dbzonegroup_install:102] Performing method: do finished
Status: 0
Message: Deploying DB VM Group Profile succeed
```

4. **Create DB Homes in the VMs.**

   See “Create DB Homes (CLI)” on page 252.

▼ Create DB Homes (CLI)

Create at least one DB home in each DB VM. You can create multiple DB homes, each with specific version of the Oracle Database.

1. **Create DB home installations in each deployed DB VM.**

   This command enables you to select the version of the Oracle Database that you want installed, then installs the DB software in the DB home directory that you specify. Homes are created in each DB VM.

   Respond to each prompt:

```
% mcmu tenant -H -c
[INFO    ] Log file path : /var/opt/oracle.minicluster/setup/logs/
tenant_cli_082316_184339.log

Database Home Profile Description
Listing DB VM Group Profile..
Status : Active
EditStatus :
Description : DB MVM Group 1 - NORMAL - SHARED - CIS
deletable : True
progress : False
VMgroupName : dbgp1
editable : True
VMgroupID : 1

Select Database VMgroupID [1] (1): 1
Select Database Version [11.2.0.4/12.1.0.2] (12.1.0.2): 12.1.0.2
INFO Cannot find any database home under given zone. Will return default recommended
 name.
INFO:MCMU.controllers.dbzonegroup.update.update:Cannot find any database home under
 given zone. Will return default recommended name.
Enter Oracle Home Directory Name  (dbhome_1): dbhome_12c
Select Database Home Patch Level [12.1.0.2.160419] (12.1.0.2.160419): 12.1.0.2.160419

            List of Inputs for DB Home Creation:

            Database VM Group: dbgp1 (ID: 1)
            Database Version: 12.1.0.2
            Database Patch Level: 12.1.0.2.160419
            Oracle Home Path: /u01/app/oracle/product/12.1.0/dbhome_12c

Do you want to change the inputs?
Enter Y/N (N): N
Creating DB Home...
INFO Initializing Database Home Management Utility.
.
<output omitted>
.
INFO Database home on node: dbgp1-vm1-mc3-n1 with home path of /u01/app/oracle/
product/12.1.0/dbhome_12c has been saved to MCMU database.
```

```
INFO:MCMU.controllers.dbzonegroup.update.database.database_home:Database home on node:
 dbgp1-vm1-mc3-n1 with home path of /u01/app/oracle/product/12.1.0/dbhome_12c has been
 saved to MCMU database.
INFO Database home on node: dbgp1-vm2-mc3-n1 with home path of /u01/app/oracle/
product/12.1.0/dbhome_12c has been saved to MCMU database.
INFO:MCMU.controllers.dbzonegroup.update.database.database_home:Database home on node:
 dbgp1-vm2-mc3-n1 with home path of /u01/app/oracle/product/12.1.0/dbhome_12c has been
 saved to MCMU database.
INFO Database home on node: dbgp1-vm1-mc3-n2 with home path of /u01/app/oracle/
product/12.1.0/dbhome_12c has been saved to MCMU database.
INFO:MCMU.controllers.dbzonegroup.update.database.database_home:Database home on node:
 dbgp1-vm1-mc3-n2 with home path of /u01/app/oracle/product/12.1.0/dbhome_12c has been
 saved to MCMU database.
INFO Database home on node: dbgp1-vm2-mc3-n2 with home path of /u01/app/oracle/
product/12.1.0/dbhome_12c has been saved to MCMU database.
INFO:MCMU.controllers.dbzonegroup.update.database.database_home:Database home on node:
 dbgp1-vm2-mc3-n2 with home path of /u01/app/oracle/product/12.1.0/dbhome_12c has been
 saved to MCMU database.
INFO Add database home information to MCMU database successfully.
INFO:MCMU.controllers.dbzonegroup.update.database.database_home:Add database home
 information to MCMU database successfully.
updated message, old:  Start adding database home information to MCMU database.
 with  Database home on node: dbgp1-vm2-mc3-n2 with home path of /u01/app/oracle/
product/12.1.0/dbhome_12c has been saved to MCMU database.
updated operation, old: Create DB Home  with  Create DB Home
status: 0
message: Database home installation succeeded.
```

2. **(If desired) Repeat Step 1 to install another version of the Oracle Database in the DB VMs.**

   For example, if you originally installed Oracle Database 12c in `/u01/app/oracle/product/12.1.0/dbhome_12c`, you can then install Oracle Database 11g in another home, such as `/u01/app/oracle/product/12.1.0/dbhome_11g`.

Caution - Wait until you see the message *Database home installation succeeded* before you repeat Step 1. Do not repeat Step 1 to install another version of the Oracle Database in the DB VMs until the process completes for the previous installation.

3. **List the status of the DB homes.**

   In this example, two DB homes are active in each VM.

```
% mcmu tenant -H -l 1
[INFO    ] Log file path : /var/opt/oracle.minicluster/setup/logs/
tenant_cli_082316_203949.log

        LIST OF DB HOMES IN DB VM GROUP 1
```

```
ID: 1, VM_ID: 1, TYPE: RAC, STATUS: Active
ID: 5, VM_ID: 1, TYPE: RAC, STATUS: Active
ID: 2, VM_ID: 2, TYPE: RAC, STATUS: Active
ID: 6, VM_ID: 2, TYPE: RAC, STATUS: Active
ID: 3, VM_ID: 3, TYPE: RAC, STATUS: Active
ID: 7, VM_ID: 3, TYPE: RAC, STATUS: Active
ID: 4, VM_ID: 4, TYPE: RAC, STATUS: Active
ID: 8, VM_ID: 4, TYPE: RAC, STATUS: Active
```

4. **Create DB instances.**
   Go to "Create DB Instances (CLI)" on page 255.

▼ Create DB Instances (CLI)

Create at least one instance in each DB VM. You can create multiple DB instances for each DB Home. The total number of instances you can create is limited by the amount of disk space available.

1. **Create a DB instance.**

```
% mcmu tenant -I -c
```

2. **When prompted, enter the requested information.**
   In this example, a RAC instance is selected, so `mcmu` prompts you to select one VM from each node.

```
Database Instance Profile Description
Select Database Instance Type [SINGLE/RAC/RACONE] : rac
Select Database Instance Template: Data Warehouse(DW) / Online Transaction Processing
(OLTP) [DW/OLTP] : dw
List of Character Set
[1] AL32UTF8              [2] AR8ADOS710            [3] AR8ADOS710T
[4] AR8ADOS720            [5] AR8ADOS720T           [6] AR8APTEC715
[7] AR8APTEC715T          [8] AR8ARABICMACS         [9] AR8ASMO708PLUS
[10] AR8ASMO8X            [11] AR8HPARABIC8T        [12] AR8ISO8859P6
[13] AR8MSWIN1256         [14] AR8MUSSAD768         [15] AR8MUSSAD768T
[16] AR8NAFITHA711        [17] AR8NAFITHA711T       [18] AR8NAFITHA721
[19] AR8NAFITHA721T       [20] AR8SAKHR706          [21] AR8SAKHR707
[22] AR8SAKHR707T         [23] AZ8ISO8859P9E        [24] BG8MSWIN
[25] BG8PC437S            [26] BLT8CP921            [27] BLT8ISO8859P13
[28] BLT8MSWIN1257        [29] BLT8PC775            [30] BN8BSCII
[31] CDN8PC863            [32] CEL8ISO8859P14       [33] CL8ISO8859P5
[34] CL8ISOIR111          [35] CL8KOI8R             [36] CL8KOI8U
[37] CL8MACCYRILLICS      [38] CL8MSWIN1251         [39] EE8ISO8859P2
```

```
[40] EE8MACCES            [41] EE8MACCROATIANS      [42] EE8MSWIN1250
[43] EE8PC852             [44] EL8DEC               [45] EL8ISO8859P7
[46] EL8MACGREEKS         [47] EL8MSWIN1253         [48] EL8PC437S
[49] EL8PC851             [50] EL8PC869             [51] ET8MSWIN923
[52] HU8ABMOD             [53] HU8CWI2              [54] IN8ISCII
[55] IS8PC861             [56] IW8ISO8859P8         [57] IW8MACHEBREWS
[58] IW8MSWIN1255         [59] IW8PC1507            [60] JA16EUC
[61] JA16EUCTILDE         [62] JA16SJIS             [63] JA16SJISTILDE
[64] JA16VMS              [65] KO16KSC5601          [66] KO16KSCCS
[67] KO16MSWIN949         [68] LA8ISO6937           [69] LA8PASSPORT
[70] LT8MSWIN921          [71] LT8PC772             [72] LT8PC774
[73] LV8PC1117            [74] LV8PC8LR             [75] LV8RST104090
[76] N8PC865              [77] NE8ISO8859P10        [78] NEE8ISO8859P4
[79] RU8BESTA             [80] RU8PC855             [81] RU8PC866
[82] SE8ISO8859P3         [83] TH8MACTHAIS          [84] TH8TISASCII
[85] TR8DEC               [86] TR8MACTURKISHS       [87] TR8MSWIN1254
[88] TR8PC857             [89] US8PC437             [90] UTF8
[91] VN8MSWIN1258         [92] VN8VN3               [93] WE8DEC
[94] WE8DG                [95] WE8ISO8859P1         [96] WE8ISO8859P15
[97] WE8ISO8859P9         [98] WE8MACROMAN8S        [99] WE8MACROMAN8S
[100] WE8MSWIN1252        [101] WE8NCR4970          [102] WE8NEXTSTEP
[103] WE8PC850            [104] WE8PC858            [105] WE8PC860
[106] WE8ROMAN8           [107] ZHS16CGB231280      [108] ZHS16GBK
[109] ZHT16BIG5           [110] ZHT16CCDC           [111] ZHT16DBT
[112] ZHT16HKSCS          [113] ZHT16MSWIN950       [114] ZHT32EUC
[115] ZHT32SOPS           [116] ZHT32TRIS           [117] US7ASCII
Select Character Set Number (1): 98
List of National Character Set
[1] AL16UTF16             [2] UTF8
Select National Character Set Number (1): 2
Listing DB VM Group Profile..

Status : Active
EditStatus :
Description : DB MVM Group 1 - NORMAL - SHARED - CIS
deletable : True
progress : False
VMgroupName : dbgp1
editable : True
VMgroupID : 1

Select Database VMgroupID [1] (1):
List of All Active VMs in VM Group dbgp1
Getting DB VM Group...

status : Active
name : dbgp1-vm1-mc3-n1
globalName : mc3-n1
```

```
id : 1
memory : 522496
cores : 4

status : Active
name : dbgp1-vm2-mc3-n1
globalName : mc3-n1
id : 2
memory : 522496
cores : 3

status : Active
name : dbgp1-vm1-mc3-n2
globalName : mc3-n2
id : 3
memory : 522496
cores : 0

status : Active
name : dbgp1-vm2-mc3-n2
globalName : mc3-n2
id : 4
memory : 522496
cores : 0

Select Database VM ID [1/2/3/4] : 1
List of All Active DB home in zone dbgp1-vm1-mc3-n1
Listing DB Home...

status : Active
VM_id : 1
version : 12.1.0.2
home : /u01/app/oracle/product/12.1.0/dbhome_12c
type : RAC
id : 1

status : Active
VM_id : 1
version : 11.2.0.4
home : /u01/app/oracle/product/11.2.0/dbhome_11g
type : RAC
id : 5

Select Database Home ID [1/5] : 1
Select one VM from the other compute node

status : Active
name : dbgp1-vm1-mc3-n2
```

```
globalName : mc3-n2
id : 3
memory : 522496
cores : 0

status : Active
name : dbgp1-vm2-mc3-n2
globalName : mc3-n2
id : 4
memory : 522496
cores : 0

Select Secondary Database VM ID [3/4] : 3
Enter Container Database [True/False] (false): false
Enter PGA (Program Global Area) in MB (2560): 5120
Enter SGA (System Global Area) in MB (6400): 12800
Enter Database Instance Name : dw12rac

                List of Inputs for DB Instance Creation:
                Database Instance Type: RAC
                Database Instance Template: DW
                VM: dbgp1-vm1-mc3-n1,dbgp1-vm1-mc3-n2 (ID: 1,3)
                Database Home: /u01/app/oracle/product/12.1.0/dbhome_12c (ID: 1)
                PGA (Program Global Area) in MB: 5120
                SGA (System Global Area) in MB: 12800
                Database Instance Name: dw12rac
                Character Set: WE8MACROMAN8S
                National Character Set: UTF8
                Container Database : false

Do you want to change the inputs?
Enter Y/N (N): N
Creating DB Instance...
INFO Collecting node information for creating instance..
.
<output omitted>
.
```

3. **Repeat this procedure to create one or more DB instances on each DB VM.**

4. **Verify the creation and status of instances.**

   This example lists the details of all DB instances in the specified home ID.

```
% mcmu tenant -I -l 1
Setting ssh timeout before carrying out further operations. Please wait..
[INFO    ] Log file path : /var/opt/oracle.minicluster/setup/logs/
tenant_cli_082416_162942.log
```

```
LIST OF DB INSTANCES IN DB VM GROUP 1

ID: 3, NAME: dw12rac, VM_ID: 1, DBHOME_ID: 1, TYPE: RAC, STATUS: Active
ID: 12, NAME: ol11rac1, VM_ID: 1, DBHOME_ID: 5, TYPE: RACONENODE, STATUS: Active
ID: 14, NAME: ol12sinC, VM_ID: 2, DBHOME_ID: 2, TYPE: SINGLE, STATUS: Active
ID: 7, NAME: dw11rac, VM_ID: 2, DBHOME_ID: 6, TYPE: RAC, STATUS: Active
ID: 4, NAME: dw12rac, VM_ID: 3, DBHOME_ID: 3, TYPE: RAC, STATUS: Active
ID: 11, NAME: ol11rac1, VM_ID: 3, DBHOME_ID: 7, TYPE: RACONENODE, STATUS: Active
ID: 8, NAME: dw11rac, VM_ID: 4, DBHOME_ID: 8, TYPE: RAC, STATUS: Active
ID: 16, NAME: dw11sin, VM_ID: 4, DBHOME_ID: 8, TYPE: SINGLE, STATUS: Active
```

This example lists the details about all the zones.

```
% mcmu status -Z -a
[INFO    ] Log file path : mc3-n1:/var/opt/oracle.minicluster/setup/logs/
mcmu_082416_170213.log
[INFO    ] Zone status on node1
  ID NAME               STATUS      PATH                            BRAND       IP
   0 global             running     /                               solaris     shared
   2 acfskz             running     -                               solaris-kz  excl
   7 dbgp1-vm1-mc3-n1   running     /mcpool/dbgp1-vm1-mc3-n1zroot   solaris     excl
   8 dbgp1-vm2-mc3-n1   running     /mcpool/dbgp1-vm2-mc3-n1zroot   solaris     excl
  11 avm1-vm1-mc3-n1    running     /mcpool/avm1-vm1-mc3-n1zroot    solaris     excl
  14 avm2-vm1-mc3-n1    running     /mcpool/avm2-vm1-mc3-n1zroot    solaris     excl
  17 avm4-vm1-mc3-n1    running     /mcpool/avm4-vm1-mc3-n1zroot    solaris     excl
  20 avm5-vm1-mc3-n1    running     /mcpool/avm5-vm1-mc3-n1zroot    solaris     excl
   - appzonetemplate    installed   /mcpool/appzonetemplate         solaris     excl
   - dbzonetemplate     installed   /mcpool/dbzonetemplate          solaris     excl
[INFO    ] Zone status on node2
  ID NAME               STATUS      PATH                            BRAND       IP
   0 global             running     /                               solaris     shared
   2 acfskz             running     -                               solaris-kz  excl
   7 dbgp1-vm1-mc3-n2   running     /mcpool/dbgp1-vm1-mc3-n2zroot   solaris     excl
   8 dbgp1-vm2-mc3-n2   running     /mcpool/dbgp1-vm2-mc3-n2zroot   solaris     excl
  11 avm1-vm1-mc3-n2   running      /mcpool/avm1-vm1-mc3-n2zroot    solaris     excl
  14 avm2-vm1-mc3-n2   running      /mcpool/avm2-vm1-mc3-n2zroot    solaris     excl
  17 avm6-vm1-mc3-n2   running      /mcpool/avm6-vm1-mc3-n2zroot    solaris     excl
  20 avm7-vm1-mc3-n2   running      /mcpool/avm7-vm1-mc3-n2zroot    solaris     excl
   - appzonetemplate   installed    /mcpool/appzonetemplate         solaris     excl
   - dbzonetemplate    installed    /mcpool/dbzonetemplate          solaris     excl
```

▼ Update a DB VM Group (CLI)

Use this procedure to perform one of these changes to a DB VM group.

- Increase the number of VMs in the group.

- Increase or decrease the number of cores in VMs.
- Increase the maximum allowable file size for `u01`. The maximum file size varies and is displayed at the appropriate prompt. You cannot decrease the file size after you have increased it.

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

   See "Log in to the MCMU CLI" on page 31.

2. **Run the profile update command to enter VM updates.**

   In this example, the number of VMs on node 1 and 2 are increased from two VMs per node to three VMs per node. The new VMs are VM5 and VM6. The `mcmu`command prompts for VM parameters for the new VMs. Responding with Return accepts the default value, which is displayed in parentheses.

   Note - When this command completes, the updates are saved, but not applied.

```
% mcmu tenant -P -u
Listing DB VM Group Profile..

Status : Active
EditStatus :
Description : DBVM Group 1 - NORMAL - SHARED - CIS
deletable : True
progress : False
VMgroupName : dbgp1
editable : True
VMgroupID : 1

Enter ID of the VM Group Profile that you want to edit[1] (1): 1
Do you want to "[E]dit & Save the changes"?
Enter Y/N (Y): Y
Getting DB VM Group Profile...

Edit Database Virtual Machine Group Profile Description

Virtual Machine Group Profile Name : dbgp1
Enter Number of VM(s) on Node 1, between(2,4) (2): 3
Enter Number of VM(s) on Node 2, between(2,4) (2): 3
Enter Description (DB MVM Group 1 - NORMAL - SHARED - CIS): <Return>

Virtual Machine Group Profile Name : dbgp1
.
<output omitted>
.
ASM Disk Group Redundancy : NORMAL
```

```
PCI DSS Security Setting Enabled: No

Enter u01 size (in GB, 100 to max 2182) (165): 200

Number of Disks : None

Number of VM(s) on Node 1 : 3

Number of VM(s) on Node 2 : 3

Description : DBVM Group 1 - NORMAL - SHARED - CIS

Virtual Machines Information

Node 1 : mc3-n1

Virtual Machine 1

CURRENT VM STATUS: active

Public Hostname mc3-n1vm1-z1

Public IP: xx.xxx.73.196

Private Hostname mc3-n1vm1-z1-priv

Private IP: 192.0.2.6

Virtual Hostname mc3-n1vm1-z1-vip

Virtual IP: xx.xxx.73.197
Enter Cores [0 to max 7] (4): <Return>

Virtual Machine 2

CURRENT VM STATUS: active

Public Hostname mc3-n1vm1-z2

Public IP: xx.xxx.73.198

Private Hostname mc3-n1vm1-z2-priv

Private IP: 192.0.2.7

Virtual Hostname mc3-n1vm1-z2-vip
```

```
Virtual IP: xx.xxx.73.199
Enter Cores [0 to max 3] (3): <Return>

Virtual Machine 3

Enter Public Hostname (dbgp1-vm3-mc3-n1): mc3-n1vm1-z3
Enter Public IP (To be generated): <Return>
Enter Private Hostname (mc3-n1vm1-z3-priv): <Return>
Enter Private IP (To be generated): <Return>
Enter Virtual Hostname (mc3-n1vm1-z3-vip): <Return>
Enter Virtual IP (To be generated): <Return>
Enter Cores [0 to max 0] (0): <Return>

Node 2: mc3-n2

Virtual Machine 1

CURRENT VM STATUS: active

Public Hostname mc3-n2vm1-z1

Public IP: xx.xxx.73.100

Private Hostname mc3-n2vm1-z1-priv

Private IP: 192.0.2.2

Virtual Hostname mc3-n2vm1-z1-vip

Virtual IP: xx.xxx.73.101
Enter Cores [0 to max 12] (0): <Return>

Virtual Machine 2

CURRENT VM STATUS: active

Public Hostname mc3-n2vm1-z2

Public IP: xx.xxx.73.102

Private Hostname mc3-n2vm1-z2-priv

Private IP: 192.0.2.5

Virtual Hostname mc3-n2vm1-z2-vip

Virtual IP: xx.xxx.73.106
Enter Cores [0 to max 12] (0):
```

```
Virtual Machine 3

Enter Public Hostname (dbgp1-vm3-mc3-n2): mc3-n2vm1-z3
Enter Public IP (To be generated): <Return>
Enter Private Hostname (mc3-n2vm1-z3-priv): <Return>
Enter Private IP (To be generated): <Return>
Enter Virtual Hostname (mc3-n2vm1-z3-vip): <Return>
Enter Virtual IP (To be generated): <Return>
Enter Cores [0 to max 12] (0): <Return>

Cluster Information

SCAN name : dbgp1-scan
SCAN IPs :192.0.2.7,192.0.2.8,1,192.0.2.9.
.
<output omitted>
.
status: 0
message: Updating DB VM Group Profile succeeded
Getting DB VM Group Profile...

PROFILE INFORMATION
        VMGroupName : dbgp1
        SCAN_name : dbgp1-scan
        SCAN_ip : 192.0.2.10,1192.0.2.11,192.0.2.12

VM DEFINITIONS

VM 1
        name : dbgp1-vm1-mc3-n1
        globalName : mc3-n1
                public_ip : xx.xxx.73.113
                public_hostname : mc3-n1vm1-z1
                virtual_ip : 192.0.2.14
                virtual_hostname : mc3-n1vm1-z1-vip

VM 2
        name : dbgp1-vm2-mc3-n1
        globalName : mc3-n1
                public_ip : xx.xxx.73.115
                public_hostname : mc3-n1vm1-z2
                virtual_ip : 192.0.2.16
                virtual_hostname : mc3-n1vm1-z2-vip

VM 3
        name : dbgp1-vm1-mc3-n2
        globalName : mc3-n2
```

```
                public_ip : xx.xxx.73.117
                public_hostname : mc3-n2vm1-z1
                virtual_ip : 192.0.2.18
                virtual_hostname : mc3-n2vm1-z1-vip

VM 4
        name : dbgp1-vm2-mc3-n2
        globalName : mc3-n2
                public_ip : xx.xxx.73.119
                public_hostname : mc3-n2vm1-z2
                virtual_ip : 192.0.2.20
                virtual_hostname : mc3-n2vm1-z2-vip

VM 5
        name : dbgp1-vm3-mc3-n1
        globalName : mc3-n1
                public_ip : xx.xxx.73.120
                public_hostname : mc3-n1vm1-z3
                virtual_ip : 192.0.2.22
                virtual_hostname : mc3-n1vm1-z3-vip

VM 6
        name : dbgp1-vm3-mc3-n2
        globalName : mc3-n2
                public_ip : xx.xxx.73.121
                public_hostname : mc3-n2vm1-z3
                virtual_ip : 192.0.2.24
                virtual_hostname : mc3-n2vm1-z3-vip

Please insert the IP-mappings in the DNS Server if not already done.
Aug 24 17:17:29 mccn su: 'su root' succeeded for mcinstall on /dev/pts/2

Setting ssh timeout before exiting. Please wait..
mcinstall@mc3-n1:/var/home/mcinstall %
mcinstall@mc3-n1:/var/home/mcinstall %
mcinstall@mc3-n1:/var/home/mcinstall %
```

3. **Enter the new public IP addresses and public hostnames into your DNS.**

4. **Run the command again to apply the changes.**

   When prompted to edit, save, or apply, specify `A` for apply.

```
% mcmu tenant -P -u
Setting ssh timeout before carrying out further operations. Please wait..
[INFO    ] Log file path : /var/opt/oracle.minicluster/setup/logs/
tenant_cli_082416_171912.log

Listing DB VM Group Profile..
```

```
Status : Active
EditStatus : edited
Description : DB MVM Group 1 - NORMAL - SHARED - CIS
deletable : True
progress : False
VMgroupName : dbgp1
editable : True
VMgroupID : 1

Enter ID of the VM Group Profile that you want to edit[1] (1): <Return>
Do you want to "[E]dit & Save" or "[A]pply previously saved changes"?
Enter E/A (E): A
.
<output omitted>
.
INFO:MCMU.controllers.dbzonegroupmanager:Zonegroup is updated with profile changes.
status: 0
message: Updating DB VM Group succeeded.
Getting DB VM Group Profile....
.
<output omitted>
.
```

5. Verify the changes.

In this example, VMs with ID 23 (one on each node) are new DB VMs displayed with a status of running.

```
% mcmu status -Z -a
[INFO    ] Log file path : mc3-n1:/var/opt/oracle.minicluster/setup/logs/
mcmu_082416_180834.log
[INFO    ] Zone status on node1
ID NAME               STATUS      PATH                           BRAND      IP
 0 global             running     /                              solaris    shared
 2 acfskz             running     -                              solaris-kz excl
 7 dbgp1-vm1-mc3-n1   running     /mcpool/dbgp1-vm1-mc3-n1zroot solaris    excl
 8 dbgp1-vm2-mc3-n1   running     /mcpool/dbgp1-vm2-mc3-n1zroot solaris    excl
 1 avm1-vm1-mc3-n1    running     /mcpool/avm1-vm1-mc3-n1zroot  solaris    excl
14 avm2-vm1-mc3-n1    running     /mcpool/avm2-vm1-mc3-n1zroot  solaris    excl
17 avm4-vm1-mc3-n1    running     /mcpool/avm4-vm1-mc3-n1zroot  solaris    excl
20 avm5-vm1-mc3-n1    running     /mcpool/avm5-vm1-mc3-n1zroot  solaris    excl
23 dbgp1-vm3-mc3-n1   running     /mcpool/dbgp1-vm3-mc3-n1zroot solaris    excl
 - appzonetemplate    installed   /mcpool/appzonetemplate       solaris    excl
 - dbzonetemplate     installed   /mcpool/dbzonetemplate        solaris    excl
[INFO    ] Zone status on node2
ID NAME               STATUS      PATH                           BRAND      IP
 0 global             running     /                              solaris    shared
 2 acfskz             running     -                              solaris-kz excl
```

```
 7 dbgp1-vm1-mc3-n2   running     /mcpool/dbgp1-vm1-mc3-n2zroot solaris    excl
 8 dbgp1-vm2-mc3-n2   running     /mcpool/dbgp1-vm2-mc3-n2zroot solaris    excl
11 avm1-vm1-mc3-n2    running     /mcpool/avm1-vm1-mc3-n2zroot  solaris    excl
14 avm2-vm1-mc3-n2    running     /mcpool/avm2-vm1-mc3-n2zroot  solaris    excl
17 avm6-vm1-mc3-n2    running     /mcpool/avm6-vm1-mc3-n2zroot  solaris    excl
20 avm7-vm1-mc3-n2    running     /mcpool/avm7-vm1-mc3-n2zroot  solaris    excl
23 dbgp1-vm3-mc3-n2   running     /mcpool/dbgp1-vm3-mc3-n2zroot solaris    excl
 - appzonetemplate    installed   /mcpool/appzonetemplate       solaris    excl
 - dbzonetemplate     installed   /mcpool/dbzonetemplate        solaris    excl
```

6. Create DB instances on the new DB VMs:

If you didn't add DB VMs, this step doesn't apply.

a. List the current instances.

The new VMs do not show up in the list. After the new instances are created, you can compare this list with a new list. See Step 7.

```
% mcmu tenant -I -l 1
Aug 24 18:10:01 mccn su: 'su root' succeeded for mcinstall on /dev/pts/2

       LIST OF DB INSTANCES IN DB VM GROUP 1
       ID: 3,  NAME: dw12rac,  VM_ID: 1, DBHOME_ID: 1, TYPE: RAC, STATUS: Active
       ID: 12, NAME: ol11rac1, VM_ID: 1, DBHOME_ID: 5, TYPE: RACONENODE, STATUS:
 Active
       ID: 14, NAME: ol12sinC, VM_ID: 2, DBHOME_ID: 2, TYPE: SINGLE, STATUS: Active
       ID: 7,  NAME: dw11rac,  VM_ID: 2, DBHOME_ID: 6, TYPE: RAC, STATUS: Active
       ID: 4,  NAME: dw12rac,  VM_ID: 3, DBHOME_ID: 3, TYPE: RAC, STATUS: Active
       ID: 11, NAME: ol11rac1, VM_ID: 3, DBHOME_ID: 7, TYPE: RACONENODE, STATUS:
 Active
       ID: 8,  NAME: dw11rac,  VM_ID: 4, DBHOME_ID: 8, TYPE: RAC, STATUS: Active
       ID: 16, NAME: dw11sin,  VM_ID: 4, DBHOME_ID: 8, TYPE: SINGLE, STATUS: Active
```

b. Create the instances.

You are prompted to provide instance parameters.

```
% mcmu tenant -I -c
Database Instance Profile Description
Select Database Instance Type [SINGLE/RAC/RACONE] : rac
Select Database Instance Template: Data Warehouse(DW) / Online Transaction
 Processing(OLTP) [DW/OLTP] : oltp
List of Character Set
[1] AL32UTF8              [2] AR8ADOS710            [3] AR8ADOS710T
.
<output omitted>
.
[112] ZHT16HKSCS          [113] ZHT16MSWIN950       [114] ZHT32EUC
```

```
[115] ZHT32SOPS           [116] ZHT32TRIS           [117] US7ASCII
Select Character Set Number (1): 115
List of National Character Set
[1] AL16UTF16             [2] UTF8
Select National Character Set Number (1): <Return>
Listing DB VM Group Profile..

Status : Active
EditStatus :
Description : DB MVM Group 1 - NORMAL - SHARED - CIS
deletable : True
progress : False
VMgroupName : dbgp1
editable : True
VMgroupID : 1

Select Database VMgroupID [1] (1):
List of All Active VMs in VM Group dbgp1
Getting DB VM Group...

status : Active
name : dbgp1-vm1-mc3-n1
globalName : mc3-n1
id : 1
memory : 522496
cores : 4

status : Active
name : dbgp1-vm2-mc3-n1
globalName : mc3-n1
id : 2
memory : 522496
cores : 3

status : Active
name : dbgp1-vm1-mc3-n2
globalName : mc3-n2
id : 3
memory : 522496
cores : 0

status : Active
name : dbgp1-vm2-mc3-n2
globalName : mc3-n2
id : 4
memory : 522496
cores : 0
```

```
status : Active
name : dbgp1-vm3-mc3-n1                <<=== NEW VM
globalName : mc3-n1
id : 13
memory : 522496
cores : 0

status : Active
name : dbgp1-vm3-mc3-n2                <<=== NEW VM
globalName : mc3-n2
id : 14
memory : 522496
cores : 0

Select Database VM ID [1/2/3/4/13/14] : 13              <<=== ID of New VM
List of All Active DB home in zone dbgp1-vm3-mc3-n1
Listing DB Home...

status : Active
VM_id : 13
version : 12.1.0.2
home : /u01/app/oracle/product/12.1.0/dbhome_12c
type : RAC
id : 9

status : Active
VM_id : 13
version : 11.2.0.4
home : /u01/app/oracle/product/11.2.0/dbhome_11g
type : RAC
id : 11

Select Database Home ID [9/11] : 9
Select one VM from the other compute node

status : Active
name : dbgp1-vm1-mc3-n2
globalName : mc3-n2
id : 3
memory : 522496
cores : 0

status : Active
name : dbgp1-vm2-mc3-n2
globalName : mc3-n2
id : 4
memory : 522496
cores : 0
```

```
status : Active
name : dbgp1-vm3-mc3-n2
globalName : mc3-n2
id : 14
memory : 522496
cores : 0

Select Secondary Database VM ID [3/4/14] : 14            <<=== ID of new VM on
 second node
Enter Container Database [True/False] (false):
Enter PGA (Program Global Area) in MB (2560): 5120
Enter SGA (System Global Area) in MB (6400): 12800
Enter Database Instance Name : ol12rac

               List of Inputs for DB Instance Creation:
               Database Instance Type: RAC
               Database Instance Template: OLTP
               VM: dbgp1-vm3-mc3-n1,dbgp1-vm3-mc3-n2 (ID: 13,14)
               Database Home: /u01/app/oracle/product/12.1.0/dbhome_12c (ID: 9)
               PGA (Program Global Area) in MB: 5120
               SGA (System Global Area) in MB: 12800
               Database Instance Name: ol12rac
               Character Set: US7ASCII
               National Character Set: AL16UTF16
               Container Database : false

Do you want to change the inputs?
Enter Y/N (N): N
Creating DB Instance...
.
<output omitted>
.
```

7. List the DB instances to verify the presence and status of the new DB VM instances.

```
% mcmu tenant -I -l 1
Aug 24 18:43:12 mccn su: 'su root' succeeded for mcinstall on /dev/pts/2

       LIST OF DB INSTANCES IN DB VM GROUP 1
       ID: 3,  NAME: dw12rac,  VM_ID: 1, DBHOME_ID:  1,  TYPE: RAC, STATUS: Active
       ID: 12, NAME: ol11rac1, VM_ID: 1, DBHOME_ID:  5,  TYPE: RACONENODE, STATUS:
 Active
       ID: 14, NAME: ol12sinC, VM_ID: 2, DBHOME_ID:  2,  TYPE: SINGLE, STATUS: Active
       ID: 7,  NAME: dw11rac,  VM_ID: 2, DBHOME_ID:  6,  TYPE: RAC, STATUS: Active
       ID: 4,  NAME: dw12rac,  VM_ID: 3, DBHOME_ID:  3,  TYPE: RAC, STATUS: Active
```

```
       ID: 11, NAME: ol11rac1, VM_ID: 3, DBHOME_ID:  7,  TYPE: RACONENODE, STATUS:
 Active
       ID: 8,  NAME: dw11rac,  VM_ID: 4, DBHOME_ID:  8,  TYPE: RAC, STATUS: Active
       ID: 16, NAME: dw11sin,  VM_ID: 4, DBHOME_ID:  8,  TYPE: SINGLE, STATUS: Active
       ID: 19, NAME: ol12rac,  VM_ID: 13, DBHOME_ID: 9,  TYPE: RAC, STATUS: Active
       ID: 20, NAME: ol12rac,  VM_ID: 14, DBHOME_ID: 10, TYPE: RAC, STATUS: Active
```

Deleting DB VM Group Components (CLI)

These topics describe how to delete database VM group Components:

- “Delete a DB VM Group Profile (CLI)” on page 270
- “Delete a DB VM Group (CLI)” on page 271
- “Delete a DB Home (CLI)” on page 272
- “Delete a DB Instance (CLI)” on page 272
- “Delete a DB VM (CLI)” on page 272

▼ Delete a DB VM Group Profile (CLI)

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

   See “Log in to the MCMU CLI” on page 31.

2. **Delete a DB VM group profile.**

   ```
   % mcmu tenant -P -d VMgroupID
   ```

   where *VMgroupID* is the ID of the DB VM group profile that you want to delete.

   For example, to delete a DB VM group profile with an ID of 1:

   ```
   % mcmu tenant -P -d 1
   Setting ssh timeout before carrying out further operations. Please wait..
   [INFO    ] Log file path : /var/opt/oracle.minicluster/setup/logs/
   tenant_cli_082316_034336.log

       Status : Needs Mapping
       VMgroupName : dbgp1
       Description : DB VM Group 1 - Normal - CIS - SHARED
       VMgroupID : 1
   ```

```
Are you sure you want to delete this DB VM Group Profile?
Enter Y/N (Y): y
Deleting DB VM Group Profile...
INFO Start freeing ipaddress and core table
INFO:MCMU.controllers.zones.dbzonemanager:Start freeing ipaddress and core table
INFO Removing GI data.
INFO:MCMU.controllers.zones.dbzonemanager:Removing GI data.
INFO Free Disk & Partitions.
INFO:MCMU.controllers.zones.dbzonemanager:Free Disk & Partitions.
INFO Deleting zone data.
INFO:MCMU.controllers.zones.dbzonemanager:Deleting zone data.
INFO Deleting zonegroup data.
INFO:MCMU.controllers.zones.dbzonemanager:Deleting zonegroup data.
INFO Complete zonegroup profile deletion.
INFO:MCMU.controllers.zones.dbzonemanager:Complete zonegroup profile deletion.
updated message, old:  Initializing  with  Profile deletion succeeded.
Successfully deleted DB VM profile
```

3. **Verify the deletion.**

   For example:

```
% mcmu tenant -P -l
Setting ssh timeout before carrying out further operations. Please wait..
[INFO    ] Log file path : /var/opt/oracle.minicluster/setup/logs/
tenant_cli_082316_034511.log

Listing DB VM Group Profile..
No VM Group Profiles available yet
```

▼ Delete a DB VM Group (CLI)

Caution - Deleting a DB VM group deletes all the VMs, applications, and data associated with the VM group. The deletion cannot be undone. Proceed with caution.

- **Delete a DB VM group.**

```
% mcmu tenant --dbvmgroup -d VMgroupID
```

where *VMgroupID* is the ID of the DB VM group that you want to delete.

For example, to delete a DB VM group with an ID of 1:

```
% mcmu tenant --dbvmgroup -d 1
```

Delete a DB Home (CLI)

Caution - Deleting a DB home cannot be undone. Proceed with caution.

- **Delete the DB home.**

  ```
  % mcmu tenant --dbhome -d home_ID
  ```

  where *home_ID* is the ID of the DB home that you want to delete.

  For example, to delete a DB home within a DB VM with an ID of 3:

  ```
  % mcmu tenant --dbhome -d 3
  ```

Delete a DB Instance (CLI)

Caution - Deleting a DB instance cannot be undone. Proceed with caution.

To delete a RAC or RAC One Node instance for Oracle Database 12.2 and 18.3, you must provide the SYS user password.

- **Delete a DB instance.**

  ```
  % mcmu tenant --dbinstance -d home_ID
  ```

  where *home_ID* is the ID of the DB home that is associated with the DB instance that you want to delete.

  For example, to delete a DB instance that is associated with a DB home with an ID of 3:

  ```
  % mcmu tenant --dbinstance -d 3
  ```

Delete a DB VM (CLI)

Use this procedure to delete DB VMs using the CLI.

Caution - Deleting a DB VM cannot be undone. Proceed with caution.

Note - The ability to delete DB VMs was added to MiniCluster v.1.2.4.

1. **Ensure that the DB VM is backed up or the data is migrated to another VM.**

2. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

   See "Log in to the MCMU CLI" on page 31.

3. **Delete all DB instances on the DB VM that you plan to delete.**

   See "Delete a DB Instance (CLI)" on page 272.

4. **Edit DB VM group profile to delete a DB VM.**

```
% mcmu tenant -P -u
Virtual Machines Information

Node 1 : mc13-n1
Virtual Machine 1

CURRENT VM STATUS: active

Public Hostname mc13dbzg1-zone-1-mc13-n1

Public IP: 10.xxx.xx.xxx

Private Hostname mc13dbzg1-zone-1-mc13-n1-priv

Private IP: 192.xxx.xx.xx

Virtual Hostname mc13dbzg1-zone-1-mc13-n1-vip

Virtual IP: 10.xxx.xx.xxx
Do you want to delete this VM?
Enter Y/N (N): Y
```

5. **Apply the DB VM group profile change.**

```
% mcmu tenant -P -u
         Listing DB VM Group Profile..
         <output omitted>
         Do you want to "[E]dit & Save" or "[A]pply previously saved
changes"?
         Enter E/A (E): A
```

Configuring Application VMs (CLI)

Note - Different versions of the MiniCluster software offer different `mcmu` commands and options. For the most accurate CLI information for the MiniCluster you are using, use `mcmu` help. See “Display `mcmu` Help For All Subcommands (CLI)” on page 204 and “Display `mcmu` Help for a Specific Subcommand (CLI)” on page 205.

These topics provide CLI procedures for configuring App VM groups and VMs.

Description	Links
(Optional) Add IP addresses to the system for future VMs.	“Managing Networks (CLI)” on page 291
Create App VMs.	“Create an APP VM Group (CLI)” on page 275 “Deploy an App VM Group (CLI)” on page 277
Update an App VM group.	“Update an App VM Group (CLI)” on page 278
Toggle the shared storage that is used by App VMs.	“Toggle Shared Storage for an App Group (CLI)” on page 280
Delete App VMs.	“Delete an App VM Group (CLI)” on page 281

▼ Create an APP VM Group (CLI)

Use this procedure to create and deploy App VMs.

The process of creating App VMs involves creating an App VM group. Each group can contain one or two App VMs. Once the groups are created, you deploy the groups, which makes the App VMs available for use.

For information about planning for VMs, see “Planning to Create VMs” on page 77. For details about the information you provide when creating App VMs, see “App VM Group Parameters” on page 94.

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

See “Log in to the MCMU CLI” on page 31.

2. **Create the App VM group.**

```
% mcmu tenant -A -c
```

For example:

```
% mcmu tenant -A -c
Application Virtual Machine Group Profile Description
Enter Virtual Machine Group Profile Name : avm1
Enter Description  : Drama App VM Group
Enter Type [Single,Multiple] (Multiple): multiple
Shared Storage [Yes,No] (No): yes
CIS Equivalent Security Settings are default. Do you want to enable PCI DSS Security
 Settings [Yes,No] (No)? yes

Define Virtual Machines

mc3-n1

Virtual Machine 1

Enter Cores [0 to max 5] (0): 2
Enter Public Hostname (avm1-vm1-mc3-n1): mc3-n1vm2-az1

mc3-n2

Virtual Machine 1

Enter Cores [0 to max 12] (0): <Return>
Enter Public Hostname (avm1-vm1-mc3-n2): mc3-n2vm2-az1
Do you want to use mcinstall password of global zone for the password for user oracle?
Enter Y/N (Y):<Return>
Do you want to use mcinstall password of global zone for the password for user
 mcinstall?
Enter Y/N (Y):<Return>
Clusterware [Yes,No] (No):<Return>


<-- For systems running v1.2.4 or later -->
IP pool information:
ID: 1   Name: default
ID: 2   Name: App_IPpool
Select IP pool [1]: 2
<-------------------------------------------->

Creating APPVM Group Profile...
```

```
.<output omitted>
.
Successfully Created Application VM Group Profile
Getting APP VM Group...

PROFILE INFORMATION
        VMGroupName : avm1
        IP pool name : example_pool

VM DEFINITIONS

VM 1
        name : avm1-vm1-mc3-n1
        globalName : mc3-n1
                public_ip : <valid_VLAN_IP_addr1>
                public_hostname : mc3-n1vm2-az1

VM 2
        name : avm1-vm1-mc3-n2
        globalName : mc3-n2
                public_ip : <valid_VLAN_IP_addr2>
                public_hostname : mc3-n2vm2-az1

Please insert the IP-mappings in the DNS Server if not already done.
Aug 23 16:32:12 mccn su: 'su root' succeeded for mcinstall on /dev/pts/2
```

3. **Make note of the App VM names and public IP addresses.**
4. **(Optional) Repeat Step 2 to create additional App VMs.**
5. **Enter all new app VM names and public IP addresses into your DNS.**
6. **Deploy the App VM group.**
   See “Deploy an App VM Group (CLI)” on page 277.

▼ Deploy an App VM Group (CLI)

Use this procedure to an deploy App VM group. Once deployed, the VMs are available for configuration and use.

1. **Deploy the App VM group.**

Caution - Ensure that you use the uppercase **D** option. Using the lowercase **d** option deletes that VM group.

Use this syntax:

```
mcmu tenant -V -D VMgroupID
```

where *VMgroupID* is the App VM group profile ID that was assigned by mcmu when the group was created. To determine the *VMgroupID*, see "List a Summary of All App VM Group Profiles (CLI)" on page 217.

For example:

```
% mcmu tenant -V -D 2
Setting ssh timeout before carrying out further operations. Please wait..
[INFO    ] Log file path : /var/opt/oracle.minicluster/setup/logs/
tenant_cli_082316_164849.log

Creating APP VM Group...
.
<output omitted>
.
INFO Finish adding zonegroup information to database.
INFO:MCMU.controllers.zones.appzonemanager:Finish adding zonegroup information to
 database.
updated message, old:  Start adding data to MCMU database.  with  Application zonegroup
 creation completed.
Status: 0
Message: Deployment of APP VM Group succeeded.
```

2. **If you have additional App VM groups to deploy, repeat Step 1.**

▼ Update an App VM Group (CLI)

You can change parameters such as the number of cores assigned to each VM. You can also mount an NFS. For undeployed VM groups, you can change IP addresses and hostnames.

If you need to transmit binaries or other files that are larger than 130 MB, you can update the App VM group profile to increase the allowable file size. The maximum file size varies and is displayed at the appropriate prompt. You cannot decrease the allowable size after you have increased it. You will need to perform this change on both nodes.

For details about the information you provide when creating App VMs, see "App VM Group Parameters" on page 94.

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

   See "Log in to the MCMU CLI" on page 31.

2. Update the parameters of an App VM group.

```
% mcmu tenant -A -u
```

For example:

```
% mcmu tenant -A -u
Listing APP VM Group...

Status : Active
EditStatus :
Description :
deletable : True
progress : False
VMgroupName : ff18
editable : True
VMgroupID : 2

Enter ID of the VM Group Profile that you want to edit[2] (2): 2
Do you want to "[E]dit & Save the changes"?
Enter Y/N (Y): Y
Getting APP VM Group...

APP Virtual Machine Group Profile Name : appg500
Enter Description :

Security Profile: DISA-STIG

Enter u01 size (in GB, 100 to max 2182) (165): 200

Add External NFS

Existing External NFS

ID: 1    Mount: /test-mountpoint         Share: /my_directory        Server IP:
 xx.xxx.73.130

Do you want to "[A]dd a Mountpoint, [D]elete a MountPoint, or [C]ontinue editing the VM
 Group Profile"?
Enter A/D/C (A): C

Virtual Machines Information

Node 1 : mc5qt-n1
Enter Cores [0 to max 28] (0):2

        public_hostname : ff18-vm1-mc5qt-n1
        private_hostname : ff18-vm1-mc5qt-n1-priv
```

```
        public_ip : xx.xxx.73.131
        private_ip : 192.0.2.1

Node 2 : mc5qt-n2
Enter Cores [0 to max 28] (0):2

        public_hostname : ff18-vm1-mc5qt-n2
        private_hostname : ff18-vm1-mc5qt-n2-priv
        public_ip : xx.xxx.73.132
        private_ip : 192.0.2.2
Updating APP VM Group Profile...
start to update profile

status: 0
message: Update APP VM Group Profile succeeded.
Getting APP VM Group...

PROFILE INFORMATION
        VMGroupName : ff18

VM DEFINITIONS

VM 1
        name : ff18-vm1-mc5qt-n1
        globalName : mc5qt-n1
                public_ip : xx.xxx.73.133
                public_hostname : ff18-vm1-mc5qt-n1


VM 2
        name : ff18-vm1-mc5qt-n2
        globalName : mc5qt-n2
                public_ip : xx.xxx.73.134
                public_hostname : ff18-vm1-mc5qt-n2

Please insert the IP-mappings in the DNS Server if not already done.
```

▼ Toggle Shared Storage for an App Group (CLI)

Use this procedure to enable or disable shared storage for the App group. To see the current state of shared storage, use the MCMU BUI, and see “Enable or Disable NFS (BUI)” on page 149.

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

   See “Log in to the MCMU CLI” on page 31.

2. **Use this syntax:**

   ```
   % mcmu tenant -V -t VMgroupID
   ```

   where *VMgroupID* is the ID of the App VM group that you want to delete. To determine the *VMgroupID*, see “List a Summary of All App VM Group Profiles (CLI)” on page 217.

Delete an App VM Group (CLI)

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

   See “Log in to the MCMU CLI” on page 31.

2. **Delete an App VM group.**

   ```
   % mcmu tenant -A -d VMgroupID
   ```

   where *VMgroupID* is the ID of the App VM group that you want to delete. To determine the *VMgroupID*, see “List a Summary of All App VM Group Profiles (CLI)” on page 217.

   For example, to delete an App VM group with an ID of 2:

   ```
   % mcmu tenant -A -d 2
   ```

Managing MCMU User Accounts (CLI)

Note - Different versions of the MiniCluster software offer different `mcmu` commands and options. For the most accurate CLI information for the MiniCluster you are using, use `mcmu` help. See “Display `mcmu` Help For All Subcommands (CLI)” on page 204 and “Display `mcmu` Help for a Specific Subcommand (CLI)” on page 205.

You can use the MCMU CLI to manage MCMU user accounts. If you use the CLI to create a user account, the subsequent user approvals must be performed using the CLI.

Note - To manage user accounts using the MCMU BUI, see “Managing MCMU User Accounts (BUI)” on page 39.

▼ Create a New MCMU User (CLI)

If you use the CLI to create a user account, the subsequent user approvals must be performed using the CLI. For additional information about MCMU user concepts, see “Managing MCMU User Accounts (BUI)” on page 39.

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**
   See “Log in to the MCMU CLI” on page 31.

2. **Create a new user.**

   ```
   % mcmu user -c -u username -e email -n fullname -p phonenumber -r role
   ```

where:

- *username* is a unique name for the new user. The name cannot be root or mcadmin. It must start with an alpha character. The name can contain alpha and numeric characters, and can include , '.', '-' or '_' characters.
- *email* is the email address for the new user.
- *fullname* is the first and last name for the new user.
- *phonenumber* is the new user's phone number (digits only. No special characters).
- *role* is one of these values:
  - `primary`
  - `secondary`
  - `tenant_admin`
  - `auditor`

  For role descriptions, see "User Roles" on page 39.

For example:

```
% mcmu user -c -u jsmith -e joe.smith@example.com -n Joe Smith -p 8881112222 -r primary
[INFO    ] Log file path : mc3-n1:/var/opt/oracle.minicluster/setup/logs/
mcmu_082216_193715.log
[INFO    ] User jsmith has been created, please ask the admin and supervisor to run the
 command in New User Approval Request email to approve
```

An email is sent to the primary admin and supervisor accounts. The email contains a secure key that is required to approve the new user.

Note - The user account is created, but not activated until the primary admin and the supervisor approves the new user.

---

3. **Consider your next action.**

   - Approve the new user. See "Approve a New MCMU User (CLI)" on page 284.
   - Reject the new user. See "Reject a New MCMU User (CLI)" on page 285.
   - Check the approval and rejection status of new users. See "List MCMU User Approval and Rejection Status (CLI)" on page 286.

▼ Approve a New MCMU User (CLI)

When a user is created using the CLI, the MCMU admin and supervisor are sent an email that includes a command line with a secure approval key. In most cases, the approver can log into

the mcmu CLI and paste the command line into mcmu to immediately approve the user. If that doesn't work, perform this task.

Both the primary admin and the supervisor must approve the new user before the user account is activated.

To see the status of approvals and rejections, see "List MCMU User Approval and Rejection Status (CLI)" on page 286.

1. **From the primary admin's or supervisor's email account, obtain the secure key.**

   Open the email and copy the secure key. The email is sent from `mcinstall@`*company-name*.

2. **Log into the MCMU CLI.**

   See "Log in to the MCMU CLI" on page 31.

3. **Approve the user.**

   ```
   % mcmu user --approve -r role -u username -k key
   ```

   where:

   - *role* is the role of the person approving the user. Specify one of these roles:
     - `admin`
     - `supervisor`
   - *username* is the name of the new user who is seeking approval.
   - *key* Paste the secure key string that was sent to the admin and supervisor as part of the preliminary approval process.

   This is an example of the admin approving the new user jsmith.

   ```
   % mcmu user --approve -r admin -u jsmith -k q4pruavlauerp-8ujf;queroja
   ```

   The `jsmith` user account still requires the approval of the supervisor before the account is activated.

▼ Reject a New MCMU User (CLI)

When a user is created using the CLI, the MCMU admin and supervisor are sent an email requesting approval of the user. The admin and supervisor must both approve the new user for the account to be activated. If the admin or supervisor fail to approve, or reject the new user, the account is not activated. After a new account is rejected, it cannot be approved.

To see the status of approvals and rejections, see "List MCMU User Approval and Rejection Status (CLI)" on page 286.

1. **From the primary admin's or supervisor's email account, obtain the secure key.**

   When a new user account is created, MCMU emails the primary admin and supervisor an email that contains a secure key which is needed to approve or reject the user. The email is sent from `mcinstall@`*company-name*.

   Open the email and copy the secure key.

2. **Log into the MCMU CLI.**

   See "Log in to the MCMU CLI" on page 31.

3. **Reject the user.**

   ```
   % mcmu user --reject -r role -u username -k key
   ```

   where:

   - *role* is the role of the person rejecting the new user. Specify one of these roles:
     - admin
     - secondary
   - *username* is the name for the new user that you are rejecting.
   - *key* is the secure key string that was emailed to the admin and supervisor. Paste the string into the command line

   In this example, the supervisor rejects the user `bbaker`.

   ```
   % mcmu user --reject -r supervisor -u bbaker -k xxxxxxvlauerp-8ujf;queroja
   ```

▼ List MCMU User Approval and Rejection Status (CLI)

Use this task to view the status of approvals and rejections of users.

Note - Do not use this procedure to view all users because as soon as a user is approved by the admin and supervisor, the user is removed from the list. To see a list of approved users, use the MCMU BUI. See "Display MCMU Users (BUI)" on page 43.

---

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

   See "Log in to the MCMU CLI" on page 31.

2. **List users that have pending approvals.**

   This example shows three user accounts that are waiting for approvals or rejections from the admin and supervisor.

```
% mcmu user -l
[INFO    ] Log file path : mc3-n1:/var/opt/oracle.minicluster/setup/logs/
mcmu_082216_194010.log

username   admin_approved  super_approved  admin_rejected  super_rejected
---------  --------------  --------------  --------------  --------------
jsmith     0               0               0               0
bbaker     0               0               0               0
tenadm     0               0               0               0
```

   In this example, the user jsmith is no longer in the list because the `jsmith` user has been approved by the admin and supervisor. The user `bbaker` was approved by the supervisor, but is waiting for approval from the admin. The user `tenadm` has been rejected by the admin and supervisor.

```
% mcmu user -l
[INFO    ] Log file path : mc3-n1:/var/opt/oracle.minicluster/setup/logs/
mcmu_082316_011656.log

username    admin_approved  super_approved  admin_rejected  super_rejected
----------  --------------  --------------  --------------  --------------
bbaker      0               1               0               0
tenadm      0               0               1               1
```

▼ Delete an MCMU User (CLI)

Use this procedure to delete a user account. The primary admin and supervisor must approve the deletion though email sent from MCMU.

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

   See "Log in to the MCMU CLI" on page 31.

2. **Delete a user's account.**

```
% mcmu user --delete -u username
```

   where *username* is the user name of the user that you are deleting from the system.

   For example:

```
% mcmu user --delete -u jsmith
```

Once the deletion request is approved by the primary admin and supervisor, the account is deleted.

Change an MCMU User Password (CLI)

Use this procedure to change an MCMU user's password. The new password is governed by the password policies. See “MCMU Password Policies” on page 41.

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

   See “Log in to the MCMU CLI” on page 31.

2. **Change the user's password.**

   ```
   % mcmu user --changepswd -u username
   ```

   where *username* is the user name for the user whose password you want to change.

   For example:

   ```
   % mcmu user --changepswd -u jsmith
   [INFO    ] Log file path : mc3-n1:/var/opt/oracle.minicluster/setup/logs/
   mcmu_082516_164544.log
   Enter new password for user jsmith:
   Re-enter new password for jsmith:
   [INFO    ] Password has been changed
   ```

Edit a User Profile (CLI)

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

   See “Log in to the MCMU CLI” on page 31.

2. **Type:**

   ```
   % mcmu user -E -u username
   ```

   where *username* is the user name for the profile you want to change.

   The utility prompts you for changes. For parameters you do not want to change, press Return.

   For example:

   ```
    % mcmu user -E -u user500
   User Information Summary
   ```

```
        Username:       user500
        Email address:  ray.ray@example.com
        Full Name:      Raymond Ray
        Phone Number:   123456789
        Title:
        Organization:
        Department:
        Address:
        Type of User:   Primary Admin
        Supervisor Username:    mc-super
        Supervisor FullName:    Mr Smith
        Supervisor email:       mr.smith@example.com
Do you want to edit the user information? [yes/no] (no): yes
Please press ENTER to keep current value, or provide new value if you want to update
Enter email address [ray.ray@example.com]:
Enter full name [Raymond Ray]:
Enter phone number [123456789]: 408777888
Enter title []:
Enter organization []:
Enter department []:
Enter address []:
Enter supervisor username [mc-super]:
Enter supervisor full name [Mr Smith]:
Enter supervisor email address [mr.smith@example.com]:
[INFO    ] User profile has been successfully updated
```

Managing Networks (CLI)

Note - Different versions of the MiniCluster software offer different `mcmu` commands and options. For the most accurate CLI information for the MiniCluster you are using, use `mcmu` help. See “Display `mcmu` Help For All Subcommands (CLI)” on page 204 and “Display `mcmu` Help for a Specific Subcommand (CLI)” on page 205.

Use one of these sections based on the version of MiniCluster software running on your system:

Managing Networks for v1.2.4 or Later Software (CLI)

Use these procedures for MiniCluster systems running v1.2.4 or later. To determine your version, see “List the MCMU Version (CLI)” on page 208.

An IP pool is a range of IP addresses. Each IP pool is a separate subnet. As of v1.2.4, you can create multiple IP pools then assign different VM groups to different IP pools. You can also assign a VLAN ID to an IP pool.

▼ List IP Pools (CLI, v1.2.4 or later)

Use this procedure for MiniCluster systems running v1.2.4 or later. To determine your version, see “List the MCMU Version (CLI)” on page 208.

1. **Log into the MCMU CLI as a primary admin, such as `mcinstall`.**

   See "Log in to the MCMU CLI" on page 31.

2. **List the IP pools.**

   This example shows the default IP pool which was configured during the initialization of MiniCluster based on what was entered in the offline tool.

```
# mcmu ippool -l
ID: 1
Name: default
Status: assigned
DNS servers: 192.x.x.x, 192.x.x.x
Address: 192.x.x.x
NTP servers: 192.x.x.x
CIDR prefix: 22
Gateway: 192.x.x.x
VLAN ID:
Domain name: example.com
IP range:
        Start IP: 192.x.x.x
        Size: 52
```

▼ Edit Network Parameters in an IP Pool (CLI, v1.2.4 or later)

Use this procedure for MiniCluster systems running v1.2.4 or later. To determine your version, see "List the MCMU Version (CLI)" on page 208.

1. **Log into the MCMU CLI as a primary admin, such as `mcinstall`.**

   See "Log in to the MCMU CLI" on page 31.

2. **Obtain the IP pool ID by running `mcmu ippool -l`.**

3. **Edit an IP pool.**

   Syntax:

   `mcmu ippool -e` *POOL_ID*

   where *POOL_ID* is the IP Pool ID.

   You are prompted to make changes to the current values which are shown in parenthesis. Type Return to accept the current value, or enter a new value.

```
# mcmu ippool -e 2
Do you want to edit the above information? [yes/no] (no): yes
Enter IP pool name (new): example_pool
Enter DNS servers, delimited by comma (192.x.x.x, 192.x.x.x): <Return>
Enter address (192.x.x.x): <Return>
Enter NTP servers, delimited by comma (192.0.2.1): <Return>
Enter CIDR prefix (22): <Return>
Enter gateway (192.0.2.1): <Return>
Enter VLAN ID (13): 24
Enter domain name (example.com): <Return>
IP range:
        Start IP: 192.0.2.0
        Size: 2
Do you want to [E]dit or [D]elete this IP range? Enter E/D (E): d
Do you want to add another IP range? [yes/no] (no): yes
Enter start IP: 192.x.x.x
Enter size: 2
Do you want to add another IP range? [yes/no] (no): yes
Enter start IP: 192.x.x.x
Enter size: 5
Do you want to add another IP range? [yes/no] (no): <Return>
[INFO    ] IP pool has been updated successfully
```

▼ Add a New IP Pool (CLI, v1.2.4 or later)

Use this procedure for MiniCluster systems running v1.2.4 or later. To determine your version, see “List the MCMU Version (CLI)” on page 208.

Add additional IP pools with the required network parameters before creating VM groups.

1. **Log into the MCMU CLI as a primary admin, such as `mcinstall`.**

   See “Log in to the MCMU CLI” on page 31.

2. **Edit an IP pool.**

   Example:

```
# mcmu ippool -c
Enter IP pool name: app_pool
Enter DNS servers, delimited by comma: 192.x.x.x, 192.x.x.x
Enter address: 192.x.x.x
Enter NTP servers, delimited by comma: 192.x.x.x
Enter CIDR prefix: 22
Enter gateway: 192.x.x.x
```

```
Enter VLAN ID: 13
Enter domain name: example.com
IP range:
Enter start IP: 192.x.x.x
Enter size: 2
Do you want to add another IP range? [yes/no] (no): no
[INFO    ] IP pool has been created successfully
```

The new IP pool can now be assigned to App and DB VM groups during the creation of new VM groups.

▼ Delete an IP Pool (CLI, v1.2.4 or later)

Use this procedure for MiniCluster systems running v1.2.4 or later. To determine your version, see "List the MCMU Version (CLI)" on page 208.

1. **Log into the MCMU CLI as a primary admin, such as `mcinstall`.**

   See "Log in to the MCMU CLI" on page 31.

2. **Obtain the IP pool ID by running `mcmu ippool -l`.**

3. **Delete an IP pool.**

   Syntax:

   `mcmu ippool -D` *POOL_ID*

   where *POOL_ID* is the IP pool ID.

   Ensure that you use the uppercase -D option.

   You can only delete an IP pool that is not in use. This example shows that the IP pool status is free, and can be deleted.

```
# mcmu ippool -D 2
ID: 2
Name: example_pool
Status: free
DNS servers: 198.51.100.197, 98.51.100.198
Address: 192.0.2.110
NTP servers: 192.0.2.1
CIDR prefix: 22
Gateway: 192.0.2.1
VLAN ID: 13
Domain name: example.com
```

```
IP range:
        Start IP: 192.0.2.110
        Size: 2

     Start IP: 192.0.2.120
     Size: 5

Do you want to delete this IP pool? [yes/no] (no): yes
[INFO    ] IP pool has been deleted successfully
```

Managing Networks for v1.2.2 or Earlier Systems (CLI)

These topics provide CLI instructions for configuring a new network and managing IP addresses.

▼ Configure Additional Networks (CLI, v1.2.2 or earlier)

Use this procedure for MiniCluster systems running v1.2.2 or earlier. To determine your version, see "List the MCMU Version (CLI)" on page 208.

Use one of these network interfaces to connect to the client access network:

- Through the 10GbE NIC, using the first two ends of the four-ended splitter cable
- Through the NET 2 and NET 3 ports

You can now configure additional networks on unused network interface slots for existing VMs, either in the same subnet or on a different subnet.

1. **Determine which network interface slots are unused and are therefore available for you to configure as an additional network.**

   The network interface slots that are available for you to configure as an additional network depends on how your MiniCluster is connected to the client access network:

- **If your MiniCluster is connected through the 10GbE NIC, through a QSFP to 4x SFP + or MPO to 4x LC duplex splitter cable** – You have the first two ends of the splitter cable (labeled A and B, or 1 and 2) connected to the client access network through 10GbE switches. The following network interface slots are therefore available on both compute nodes for you to configure as additional networks:
  - The other two ends of the splitter cable (labeled C and D, or 3 and 4) connected to the 10GbE NIC
  - The NET 2 and NET 3 ports
- **If your MiniCluster is connected through the NET 2 and NET 3 ports** – You are using those two ports on both compute nodes to connect to the client access network through 10GbE switches. The P 0 port (rightmost port, or port A) on the 10GbE NIC is therefore available for you to configure as additional networks. You can connect a QSFP to 4x SFP and SFP++ or an MPO to 4x LC duplex splitter cable to the P 0 port on the 10GbE NIC, which enables you to connect the four ends of the splitter cable (labeled A through D, or 1 through 4) to the additional network.

Refer to the *Oracle MiniCluster S7-2 Installation Guide* for more information on the connection options for the client access network.

2. **Make the physical connections to the additional network, depending on which network interface slots are available to configure as an additional network.**

   Make one of the following pairs of connections to the additional network to provide high availability:

   - From the 10GbE NIC:
     - The first two ends of the splitter cable (A and B, or 1 and 2), if not already used to connect to the client network
     - The second two ends of the splitter cable (C and D, or 3 and 4)
   - From the NET 2 and NET 3 ports, if not already used to connect to the client network

3. **Log into the MCMU CLI as a primary admin, such as `mcinstall`.**

   See "Log in to the MCMU CLI" on page 31.

4. **Determine the `VMgroupID` of the VM group for the new network.**

   Perform one of these commands:

   - **For DB VM groups, type:**

     In this example, the `VMgroupID` is `1`.

     ```
     % mcmu tenant -G -l
     Listing DB VM Group...
     ```

```
Status : Active
Description :
VMgroupName : dbzg2
editable : True
deletable : True
progress : False
VMgroupID : 1
```

- **For App VM groups, type:**

  In this example, the `VMgroupID` is `2`.

```
% mcmu tenant -A -l
Listing APP VM Group...

Status : Active
EditStatus :
Description : Drama App VM Group
  - shared
  - multiple
  - CIS
deletable : True
progress : False
VMgroupName : avm1
editable : True
VMgroupID : 2
```

5. **Enter this CLI command to begin the configuration process for the additional network.**

```
% mcmu network -a tenant
```

6. **Select the VM group where you want to configure an additional network.**

   Specify the `VMgroupID` number.

```
Select ID [1] (1): 1
```

   The VMs available in that VM group are listed:

```
ID | NAME                | GLOBALZONE | HOSTNAME
---+---------------------+------------+----------------------
 1 | mc1dbzg1-vm1-mc1-n1 | mc1-n1     | mc1dbzg1-zone-1-mc1-n1
 2 | mc1dbzg1-vm1-mc1-n2 | mc1-n2     | mc1dbzg1-zone-1-mc1-n2
```

7. **Select the VMs where you want to configure an additional network.**

```
Enter comma separated list of VM ID(s) ID [1,2] : 1,2
```

The available (unused) network interface pairs are listed:

```
Select any of the interface pairs to configure a network
ID: 1
Interfaces: net4,net5

ID: 2
Interfaces: net6,net7
```

8. **Select the network interface pairs that you want to use for the additional network.**

```
Select ID [1/2] (1):
```

These are the network interface pairs that you can choose from:

- From the NET 2 and NET 3 ports – `net2,net3`
- From the 10GbE NIC:
  - The first two ends of the splitter cable (A and B, or 1 and 2) – `net4,net5`
  - The second two ends of the splitter cable (C and D, or 3 and 4) – `net6,net7`

9. **Enter the remaining necessary information for the additional network.**

```
Enter IP addresses for virtual_machine:
Enter Netmask in CIDR form (valid range: 8-28):
Do you want to input Gateway(Router) address?
Enter Y/N (N):
Enter Default Gateway Address:
Do you want to input DNS Servers and Domain name values?
Enter Y/N (N):
VLAN ID is optional. Do you want to input this value?
Enter Y/N (N):
Enter CAN HA type (IPMP/AGGR):
```

A series of messages appear after you enter all the remaining necessary information for the additional network, providing information on the additional network that is being configured. The following message appears at the conclusion, which confirms that the additional network was configured successfully.

```
[INFO    ] Network successfully configured on all the VM(s)
```

10. **Configure a second additional network, if necessary.**

At this point, you used one of the unused network interface pairs to configure an additional network. Repeat these instructions to configure a second additional network using the remaining unused interface pair, if necessary.

Add IP Addresses for Future VMs (CLI, v1.2.2 or earlier)

Use this procedure to add IP addresses to MiniCluster so they can be applied to VMs as they are created.

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

   See "Log in to the MCMU CLI" on page 31.

2. **Type:**

```
% mcmu tenant -M -i
Setting ssh timeout before carrying out further operations. Please wait..
[INFO    ] Log file path : /var/opt/oracle.minicluster/setup/logs/
tenant_cli_061217_111547.log

[INFO    ] Check if initial setup complete
[INFO    ] Checking for stale operations
Enter first IP address in IP addresses range: 192.0.2.9
Enter number of IPs you want in this range: 1
[INFO    ] Successfully added IP range to IPADDRESS table
```

3. **When prompted, enter the starting IP address and the range.**

Remove an IP Address (CLI, v1.2.2 or earlier)

Use this procedure to remove an available IP address or a range of IP addresses from the IP pool.

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

   See "Log in to the MCMU CLI" on page 31.

2. **Type:**

```
% mcmu tenant -M -r
List of All Free IPs
[1] 192.0.2.12
[2] 192.0.2.13
[3] 192.0.2.14
[4] 192.0.2.15
```

```
[5] 192.0.2.16
[6] 192.0.2.17
Enter IP number or IP number range separated by comma (e.g. "1,3", "1-3", "1,2,3-5"): 6
[INFO    ] Successfully removed IP from MiniCluster system
```

3. **When prompted, type the number for the IP address or the range of IP addresses, separated by a comma.**

```
Enter IP number or IP number range separated by comma (e.g. "1,3", "1-3", "1,2,3-5"): 6
[INFO    ] Successfully removed IP from MiniCluster system
```

▼ Manage the IP Addresses of DNS and NTP Servers (CLI, v1.2.2 or earlier)

Use this procedure for MiniCluster systems running v1.2.2 or earlier. To determine your version, see "List the MCMU Version (CLI)" on page 208.

When the system was installed, IP addresses of available DNS and NTP servers were added to the system. If you need to change or remove those IP addresses, perform these steps.

1. **Log into the MCMU CLI as a primary admin, such as `mcinstall`.**

   See "Log in to the MCMU CLI" on page 31.

2. **Add an IP address or a range of IP addresses to the system.**

```
% mcmu tenant -M -i
Setting ssh timeout before carrying out further operations. Please wait..

Enter first IP address in IP addresses range: 192.0.2.10
Enter number of IPs you want in this range: 2
[INFO    ] Successfully added IP range to IPADDRESS table
[INFO    ] Successfully updated MiniCluster system
```

3. **Change an IP Address.**

   - To update the IP address of a DNS server, type:

```
% mcmu tenant -M -d
Enter Comma Separated List of Maximal 3 unique IP Addresses of DNS Servers
 (192.0.2.7,192.0.2.8): 192.0.2.9
[INFO    ] Successfully updated IP range to IPADDRESS table
[INFO    ] Successfully updated MiniCluster system
```

To enter a range of IP addresses, use a comma to separate a maximum of three unique addresses for DNS servers.

- To update the IP address of an NTP server, type:

```
% mcmu tenant -M -t
Enter Comma Separated List of Maximal 3 unique IP Addresses of DNS Servers
 (192.0.2.20,192.0.2.21): 192.0.2.22
[INFO    ] Successfully updated IP range to IPADDRESS table
[INFO    ] Successfully updated MiniCluster system
```

To enter a range of IP addresses, use a comma to separate a maximum of 2 unique addresses for DNS servers.

4. Remove an IP Address.

See "Remove an IP Address (CLI, v1.2.2 or earlier)" on page 299.

5. Verify that the IP Addresses and host names are mapped correctly in DNS.

```
% mcmu tenant -M -n
Setting ssh timeout before carrying out further operations. Please wait..
[INFO    ] Log file path : /var/opt/oracle.minicluster/setup/logs/
tenant_cli_060117_133005.log

[INFO    ] Check if initial setup complete
[INFO    ] Checking for stale operations
[INFO    ] No scan network information available

IP             | HOSTNAME
---------------+-----------------
192.0.2.12 | aagt2-vm1-cc1-n1
192.0.2.13 | aagt3-vm1-cc1-n1
```

Managing the Security Configuration (CLI)

Note - Different versions of the MiniCluster software offer different `mcmu` commands and options. For the most accurate CLI information for the MiniCluster you are using, use `mcmu` help. See "Display `mcmu` Help For All Subcommands (CLI)" on page 204 and "Display `mcmu` Help for a Specific Subcommand (CLI)" on page 205.

These topics provide CLI procedures for viewing and changing your security configuration.

▼ View and Change the Global Zone Password Policy (CLI)

Note - The `security -p` command only changes the password policy in the global zone.

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

   See "Log in to the MCMU CLI" on page 31.

2. **Type:**

```
% mcmu security -p

        Current password policy conforms to : None
        Do you want to change your password policy to conform to another security
 profile (Y/N)?

Enter Y/N (N): y
TYPE | DESCRIPTION
```

```
-----+---------------
cis  | CIS Equivalent
stig | DISA-STIG
none | None
pci  | PCI-DSS

Select the TYPE of security profile for your password policy

Select Security Profile [cis/stig/none/pci]: pci
[INFO    ] Successfully updated password policy
```

Show Compliance Information (CLI)

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**
   See "Log in to the MCMU CLI" on page 31.

2. **Type:**

```
% mcmu compliance -l
INFO SSH login to mc2-n1 successfully.
.
<output omitted>
.
INFO SSH login to mc2-n1 successfully.
INFO:MCMU.controllers.common.pexpect_util:SSH login to mc2-n1 successfully.

Compliance reporting method:
        Administration VMs:             DISA-STIG
        Application and Database VMs:   DISA-STIG

id  node     zonename           benchmark      score   dateTime   remarks
--  ------   ------------------ ----------     ------  --------   -------
11  mc2-n1   global             disa-stig     87.96               -
12  mc2-n1   dbzg2-vm1-mc2-n1   disa-stig     88.83               -
13  mc2-n1   app1-vm1-mc2-n1    disa-stig     96.94               -
14  mc2-n2   global             disa-stig     87.96               -
15  mc2-n2   dbzg2-vm1-mc2-n2   disa-stig     88.83               -
16  mc2-n2   app1-vm1-mc2-n2    disa-stig     96.94               -
```

Schedule a Compliance Run (CLI)

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**
   See "Log in to the MCMU CLI" on page 31.

2. **Use this syntax:**

   ```
   % mcmu compliance --schedule -n nodex -z VMname -t time -ffrequency
   ```

   where:

   - *nodex* is the node (node1 or node2).
   - *VMname* is the VM name. To determine VM names, see "List Details of an App Group Profile (CLI)" on page 218. Compliance benchmarks are not supported on the kernel zones.
   - *time* is the time that you want the compliance benchmark to run, in 24-hour format (for example, 13:01). The default is the current time.
   - *frequency* is the frequency that you want the compliance benchmark to run (once or monthly).

Set SSH Key Options (CLI)

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**
   See "Log in to the MCMU CLI" on page 31.

2. **Set the key file type.**

   ```
   % mcmu sshkey -type=keytype
   ```

   where *keytype* is default or rekey.

3. **Set the source zone from where the key file is copied.**

   ```
   % mcmu sshkey -source=source_VM
   ```

   where *source_VM* is the source VM that the key is copied from.

4. **Set the destination zone where the key file is copied.**

   ```
   % mcmu sshkey -dest=destination_VM
   ```

   where *destination_VM* is the destination VM that the key is copied to, separated by commas.

Show Encryption Keys (CLI)

Use this procedure to list all the encryption keys on a node.

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

See “Log in to the MCMU CLI” on page 31.

2. **Use this syntax:**

```
% mcmu security -l nodex
```

where *nodex* is node1 or node2.

For example:

```
% mcmu security -l node1

NODENUM | HOSTNAME | DATASET                                                  | KEYLABEL                |
 ENCRYPTKEY  | ENCRYPTSTATUS | KEYSOURCE  | CREATEDATE            | REKEYDATE | KEYSTATUS
--------+----------+----------------------------------------------------------+-------------------------
+-------------+--------------+------------+----------------------+-----------+----------
1       | mc2-n1   | rpool/common                                             | gz_mc2-n1_zw;pinfile    |
 aes-256-ccm | ON           | raw,pkcs11 | Thu Sep 29 17:16 2016 | -         | available
1       | mc2-n1   | rpool/audit_pool                                         | gz_mc2-n1_zw;pinfile    |
 aes-256-ccm | ON           | raw,pkcs11 | Thu Sep 29 17:16 2016 | -         | available
1       | mc2ss01  | rpool/common                                             | kz_mc2ss01_zw;pinfile   |
 aes-256-ccm | ON           | raw,pkcs11 | Thu Sep 29 14:39 2016 | -         | available
1       | mc2ss01  | rpool/audit_pool                                         | kz_mc2ss01_zw;pinfile   |
 aes-256-ccm | ON           | raw,pkcs11 | Thu Sep 29 14:39 2016 | -         | available
1       | mc2ss01  | rpool/u01                                                | kz_mc2ss01_zw;pinfile   |
 aes-256-ccm | ON           | raw,pkcs11 | Thu Sep 29 14:39 2016 | -         | available
1       | mc2-n1   | mcpool/dbzg2-vm1-mc2-n1u01                               | dbzg2-vm1-mc2-n1-id-key |
 aes-256-ccm | ON           | raw,pkcs11 | Fri Sep 30  9:17 2016 | -         | available
1       | mc2-n1   | mcpool/dbzg2-vm1-mc2-n1zroot                             | dbzg2-vm1-mc2-n1-id-key |
 aes-256-ccm | ON           | raw,pkcs11 | Fri Sep 30  9:17 2016 | -         | available
1       | mc2-n1   | mcpool/dbzg2-vm1-mc2-n1zroot/rpool                       | dbzg2-vm1-mc2-n1-id-key |
 aes-256-ccm | ON           | raw,pkcs11 | Fri Sep 30  9:17 2016 | -         | available
1       | mc2-n1   | mcpool/dbzg2-vm1-mc2-n1zroot/rpool/ROOT                  | dbzg2-vm1-mc2-n1-id-key |
 aes-256-ccm | ON           | raw,pkcs11 | Fri Sep 30  9:17 2016 | -         | available
1       | mc2-n1   | mcpool/dbzg2-vm1-mc2-n1zroot/rpool/ROOT/solaris-0        | dbzg2-vm1-mc2-n1-id-key |
 aes-256-ccm | ON           | raw,pkcs11 | Fri Sep 30  9:17 2016 | -         | available
1       | mc2-n1   | mcpool/dbzg2-vm1-mc2-n1zroot/rpool/ROOT/solaris-0/var    | dbzg2-vm1-mc2-n1-id-key |
 aes-256-ccm | ON           | raw,pkcs11 | Fri Sep 30  9:17 2016 | -         | available
1       | mc2-n1   | mcpool/dbzg2-vm1-mc2-n1zroot/rpool/VARSHARE              | dbzg2-vm1-mc2-n1-id-key |
 aes-256-ccm | ON           | raw,pkcs11 | Fri Sep 30  9:17 2016 | -         | available
1       | mc2-n1   | mcpool/dbzg2-vm1-mc2-n1zroot/rpool/export                | dbzg2-vm1-mc2-n1-id-key |
 aes-256-ccm | ON           | raw,pkcs11 | Fri Sep 30  9:17 2016 | -         | available
1       | mc2-n1   | mcpool/dbzg2-vm1-mc2-n1zroot/rpool/export/home           | dbzg2-vm1-mc2-n1-id-key |
 aes-256-ccm | ON           | raw,pkcs11 | Fri Sep 30  9:17 2016 | -         | available
1       | mc2-n1   | mcpool/app1-vm1-mc2-n1u01                                | app1-vm1-mc2-n1-id-key  |
 aes-256-ccm | ON           | raw,pkcs11 | Fri Sep 30 11:26 2016 | -         | available
1       | mc2-n1   | mcpool/app1-vm1-mc2-n1zroot                              | app1-vm1-mc2-n1-id-key  |
 aes-256-ccm | ON           | raw,pkcs11 | Fri Sep 30 11:26 2016 | -         | available
```

```
1       | mc2-n1   | mcpool/app1-vm1-mc2-n1zroot/rpool                    | app1-vm1-mc2-n1-id-key  |
 aes-256-ccm | ON           | raw,pkcs11 | Fri Sep 30 11:26 2016 | -         | available
1       | mc2-n1   | mcpool/app1-vm1-mc2-n1zroot/rpool/ROOT               | app1-vm1-mc2-n1-id-key  |
 aes-256-ccm | ON           | raw,pkcs11 | Fri Sep 30 11:26 2016 | -         | available
1       | mc2-n1   | mcpool/app1-vm1-mc2-n1zroot/rpool/ROOT/solaris-0     | app1-vm1-mc2-n1-id-key  |
 aes-256-ccm | ON           | raw,pkcs11 | Fri Sep 30 11:26 2016 | -         | available
1       | mc2-n1   | mcpool/app1-vm1-mc2-n1zroot/rpool/ROOT/solaris-0/var | app1-vm1-mc2-n1-id-key  |
 aes-256-ccm | ON           | raw,pkcs11 | Fri Sep 30 11:26 2016 | -         | available
1       | mc2-n1   | mcpool/app1-vm1-mc2-n1zroot/rpool/VARSHARE           | app1-vm1-mc2-n1-id-key  |
 aes-256-ccm | ON           | raw,pkcs11 | Fri Sep 30 11:26 2016 | -         | available
1       | mc2-n1   | mcpool/app1-vm1-mc2-n1zroot/rpool/export             | app1-vm1-mc2-n1-id-key  |
 aes-256-ccm | ON           | raw,pkcs11 | Fri Sep 30 11:26 2016 | -         | available
1       | mc2-n1   | mcpool/app1-vm1-mc2-n1zroot/rpool/export/home        | app1-vm1-mc2-n1-id-key  |
 aes-256-ccm | ON           | raw,pkcs11 | Fri Sep 30 11:26 2016 | -         | available
```

▼ Back Up the Encryption Keystore (CLI)

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

   See "Log in to the MCMU CLI" on page 31.

2. **Back up the encryption keystore.**

   ```
   % mcmu security -b
   ```

Note - An encrypted `.tar` file cannot be unzipped with the `untar` command.

Managing Storage (CLI)

Note - Different versions of the MiniCluster software offer different `mcmu` commands and options. For the most accurate CLI information for the MiniCluster you are using, use `mcmu` help. See "Display `mcmu` Help For All Subcommands (CLI)" on page 204 and "Display `mcmu` Help for a Specific Subcommand (CLI)" on page 205.

These topics describe how to use the CLI to manage system storage.

Description	Links
Enable or disable shared storage for a VM group.	"Enable or Disable Shared Storage (CLI)" on page 309
View the status of a storage drive.	"List Drive Status" on page 312
Add an External NFS to an App VM.	"Add External NFS (CLI)" on page 315
View the status of the file systems.	"Check the File Systems Status" on page 317
Enable a new storage array.	"Configure an Added Storage Array (CLI)" on page 318
Manage the replacement of a drive.	"Prepare a Drive for Removal (CLI)" on page 321 "Reattach a Replaced Disk (CLI)" on page 323

▼ Enable or Disable Shared Storage (CLI)

Use this procedure to enable or disable access to the shared storage and NFS for a DB VM group or an App VM group. For more details about this administrative task, see "Enable or Disable NFS (BUI)" on page 149.

The shared storage provides storage space for any storage purpose, and is available to all VMs within a group.

Caution - Systems deployed in highly secured environments should disable shared storage. For more information, refer to the *Oracle MiniCluster S7-2 Security Guide*.

1. **To see if shared storage is currently enabled or disabled, view the DB VM group or App VM group in the BUI.**

   - For a DB VM group – Go to Database → Virtual Machine Group Profile.
   - For an App VM group – Go to Application → Virtual Machine Group Profile.

   Note - You can also enable or disable the shared storage from those BUI pages.

2. **Log into the `mcmu` CLI as a primary admin, such as mcinstall.**

   See "Log in to the MCMU CLI" on page 31.

3. **Identify the `VMgroupID` for the group you plan to enable or disable shared storage.**

   Perform one of these commands:

   - To obtain the `VMgroupID` for an App VM group:

     ```
     % mcmu tenant -A -l
     Listing APP VM Group...

     Status : Active
     EditStatus :
     Description :
     deletable : True
     progress : False
     VMgroupName : ff18
     editable : True
     VMgroupID : 2
     ```

   - To obtain the `VMgroupID` for a DB VM group:

     ```
     % mcmu tenant -P -l
     Listing DB VM Group Profile..
     Status : Active
     EditStatus :
     Description : Initial DB VM Group
      - NORMAL redundancy
      - Shared Storage
      - CIS
     deletable : True
     progress : False
     VMgroupName : dbgp1
     editable : True
     VMgroupID : 1
     ```

4. **Enable or disable the shared storage.**

   When you perform this step, the mcmu CLI toggles the setting. In other words, if shared storage is enabled, this command disables it. If it is disabled, this command enables it.

   Use this syntax:

   mcmu tenant -*X* **-t** *VMgroupID*

   where:

   - *X* – Is either **G** for a DB VM group, or **V** for an app VM group.
   - *VMgroupID* – Is the VM group ID that you identified in the previous step.

```
% mcmu tenant -V -t 2
Getting APP VM Group...

Shared Storage Enabled: True
Are you sure you want to toggle shared storage for this VM Group?
Enter Y/N (N): Y
INFO SSH login to mc-n1.us.example.com successfully.
INFO:MCMU.controllers.common.pexpect_util:SSH login to
mc-n1.us.example.com successfully.
INFO su to user root successfully.
INFO:MCMU.controllers.common.pexpect_util:su to user root successfully.
INFO zlogin to ff18-vm1-mc5qt-n1 successful.
INFO:MCMU.controllers.common.pexpect_util:zlogin to ff18-vm1-mc5qt-n1
successful.
INFO SSH login to mc-n1.us.example.com successfully.
INFO:MCMU.controllers.common.pexpect_util:SSH login to
mc-n1.us.example.com successfully.
INFO su to user root successfully.
INFO:MCMU.controllers.common.pexpect_util:su to user root successfully.
INFO zlogin to ff18-vm1-mc5qt-n2 successful.
INFO:MCMU.controllers.common.pexpect_util:zlogin to ff18-vm1-mc5qt-n2
successful.
toggle operation completed successfully
```

5. **Verify the change by repeating Step 1.**

6. **Access the shared file system by logging into the VM and perform Oracle Solaris commands.**

   To access the file system:

```
% cd /sharedstore
```

   To list contents of the directory:

Note - The `/sharedstore` directory is empty until you put software in the directory.

```
% ls /sharedstore
Downloads      Music     Pictures    Presentations   Templates   Texts   Videos
```

Related Information

- Securing Files and Verifying File Integrity in Oracle Solaris 11.3 (`https://docs.oracle.com/cd/E53394_01/html/E54827/index.html`)
- Managing File Systems in Oracle Solaris 11.3 (`http://docs.oracle.com/cd/E53394_01/html/E54785/index.html`)
- Oracle Solaris 11.3 Information Library (`https://docs.oracle.com/cd/E53394_01/`)

▼ List Drive Status

Use this procedure to view the status of all disks in the cluster. You can view all information for a specific disk, a quick status for all disks, or detailed status for all disks.

1. **Log into the `mcmu` CLI as a primary admin such as mcinstall.**
   See "Log in to the MCMU CLI" on page 31.

2. **Determine how much information you want to retrieve and perform one of these commands.**

   - Get a quick view of the status and names of all disks.

     ```
     % mcmu diskutil -l
     ```

     For example:

     ```
     % mcmu diskutil -l
     [INFO    ] Log file path : mc7-n1:/var/opt/oracle.minicluster/setup/logs/
     mcmu_042617_143016.log
     [INFO    ] Log file path : /var/opt/oracle.minicluster/setup/logs/
     omc_diskutil_functionality_042617_143017.log
     .
     <output omitted>
     .
     DISK                                    STATE
     SYS//SYS/HDD0                           OK
     SYS//SYS/HDD1                           OK
     ```

```
SYS//SYS/HDD2                          OK
SYS//SYS/HDD3                          OK
SYS//SYS/HDD4                          OK
SYS//SYS/HDD5                          OK
SYS//SYS/HDD6                          OK
SYS//SYS/HDD7                          OK
SYS//SYS/MB/EUSB-DISK                  OK
ORACLE-DE3-24C.1524NMQ001/HDD0         OK
ORACLE-DE3-24C.1524NMQ001/HDD1         OK
ORACLE-DE3-24C.1524NMQ001/HDD2         OK
ORACLE-DE3-24C.1524NMQ001/HDD3         OK
ORACLE-DE3-24C.1524NMQ001/HDD4         OK
ORACLE-DE3-24C.1524NMQ001/HDD5         OK
ORACLE-DE3-24C.1524NMQ001/HDD6         OK
ORACLE-DE3-24C.1524NMQ001/HDD7         OK
ORACLE-DE3-24C.1524NMQ001/HDD8         OK
ORACLE-DE3-24C.1524NMQ001/HDD9         OK
ORACLE-DE3-24C.1524NMQ001/HDD10        OK
ORACLE-DE3-24C.1524NMQ001/HDD11        OK
ORACLE-DE3-24C.1524NMQ001/HDD12        OK
ORACLE-DE3-24C.1524NMQ001/HDD13        OK
ORACLE-DE3-24C.1524NMQ001/HDD14        OK
ORACLE-DE3-24C.1524NMQ001/HDD15        OK
ORACLE-DE3-24C.1524NMQ001/HDD16        OK
ORACLE-DE3-24C.1524NMQ001/HDD17        OK
ORACLE-DE3-24C.1524NMQ001/HDD18        OK
ORACLE-DE3-24C.1524NMQ001/HDD19        OK
ORACLE-DE3-24C.1524NMQ001/HDD20        OK
ORACLE-DE3-24C.1524NMQ001/HDD21        OK
ORACLE-DE3-24C.1524NMQ001/HDD22        OK
ORACLE-DE3-24C.1524NMQ001/HDD23        OK
```

- View detailed status of all disks, including path, state, and fault error.

  ```
  % mcmu diskutil -s
  ```

  For example:

```
% mcmu diskutil -s
[INFO    ] Log file path : mc7-n1:/var/opt/oracle.minicluster/setup/logs/mcmu_042617_141349.log
[INFO    ] Log file path : /var/opt/oracle.minicluster/setup/logs/
omc_diskutil_functionality_042617_141349.log
.
<output omitted>
.
```

```
DISK                          PATH                              LOCAL/JBOD   STATE   FAULT ERROR
SYS//SYS/HDD0                 /dev/dsk/c0t5000CCA02D0FD898d0    Local        OK      -
SYS//SYS/HDD1                 /dev/dsk/c0t5000CCA02D0FE230d0    Local        OK      -
SYS//SYS/HDD2                 /dev/dsk/c0t5000CCA02D0FC3D4d0    Local        OK      -
SYS//SYS/HDD3                 /dev/dsk/c0t5000CCA02D0FB28Cd0    Local        OK      -
SYS//SYS/HDD4                 -                                 Local        OK      -
SYS//SYS/HDD5                 -                                 Local        OK      -
SYS//SYS/HDD6                 /dev/dsk/c0t5000CCA02D0F9088d0    Local        OK      -
SYS//SYS/HDD7                 /dev/dsk/c0t5000CCA02D0FA0CCd0    Local        OK      -
SYS//SYS/MB/EUSB-DISK         /dev/dsk/c1t0d0                   Local        OK      -
ORACLE-DE3-24C.1524NMQ001/HDD0  /dev/dsk/c0t5000CCA23B12BCE4d0  JBOD         OK      -
ORACLE-DE3-24C.1524NMQ001/HDD1  /dev/dsk/c0t5000CCA23B12E304d0  JBOD         OK      -
ORACLE-DE3-24C.1524NMQ001/HDD2  /dev/dsk/c0t5000CCA23B1300E0d0  JBOD         OK      -
ORACLE-DE3-24C.1524NMQ001/HDD3  /dev/dsk/c0t5000CCA23B12BD50d0  JBOD         OK      -
ORACLE-DE3-24C.1524NMQ001/HDD4  /dev/dsk/c0t5000CCA23B129F74d0  JBOD         OK      -
ORACLE-DE3-24C.1524NMQ001/HDD5  /dev/dsk/c0t5000CCA23B12F57Cd0  JBOD         OK      -
ORACLE-DE3-24C.1524NMQ001/HDD6  /dev/dsk/c0t5000CCA0536CB720d0  JBOD         OK      -
ORACLE-DE3-24C.1524NMQ001/HDD7  /dev/dsk/c0t5000CCA0536CB4F4d0  JBOD         OK      -
ORACLE-DE3-24C.1524NMQ001/HDD8  /dev/dsk/c0t5000CCA0536C9524d0  JBOD         OK      -
ORACLE-DE3-24C.1524NMQ001/HDD9  /dev/dsk/c0t5000CCA0536CA5D0d0  JBOD         OK      -
ORACLE-DE3-24C.1524NMQ001/HDD10 /dev/dsk/c0t5000CCA0536CA7ACd0  JBOD         OK      -
ORACLE-DE3-24C.1524NMQ001/HDD11 /dev/dsk/c0t5000CCA0536CB688d0  JBOD         OK      -
ORACLE-DE3-24C.1524NMQ001/HDD12 /dev/dsk/c0t5000CCA05351AAE4d0  JBOD         OK      -
ORACLE-DE3-24C.1524NMQ001/HDD13 /dev/dsk/c0t5000CCA05351BEE8d0  JBOD         OK      -
ORACLE-DE3-24C.1524NMQ001/HDD14 /dev/dsk/c0t5000CCA05351B078d0  JBOD         OK      -
ORACLE-DE3-24C.1524NMQ001/HDD15 /dev/dsk/c0t5000CCA05351B94Cd0  JBOD         OK      -
ORACLE-DE3-24C.1524NMQ001/HDD16 /dev/dsk/c0t5000CCA05351AF98d0  JBOD         OK      -
ORACLE-DE3-24C.1524NMQ001/HDD17 /dev/dsk/c0t5000CCA05351B110d0  JBOD         OK      -
ORACLE-DE3-24C.1524NMQ001/HDD18 /dev/dsk/c0t5000CCA05351B6FCd0  JBOD         OK      -
ORACLE-DE3-24C.1524NMQ001/HDD19 /dev/dsk/c0t5000CCA05351B690d0  JBOD         OK      -
ORACLE-DE3-24C.1524NMQ001/HDD20 /dev/dsk/c0t5000CCA04E0DEF60d0  JBOD         OK      -
ORACLE-DE3-24C.1524NMQ001/HDD21 /dev/dsk/c0t5000CCA04E0AC72Cd0  JBOD         OK      -
ORACLE-DE3-24C.1524NMQ001/HDD22 /dev/dsk/c0t5000CCA04E0E02CCd0  JBOD         OK      -
ORACLE-DE3-24C.1524NMQ001/HDD23 /dev/dsk/c0t5000CCA04E0DEB68d0  JBOD         OK      -
```

- View all information for a specific disk.

```
% mcmu diskutil -l
% mcmu diskutil -i diskname
```

where *SYS//SYS/HDD3* is the name of the disk.

For example:

```
% mcmu diskutil -l
```

```
[INFO    ] Log file path : mc7-n1:/var/opt/oracle.minicluster/setup/logs/
mcmu_042617_143016.log
[INFO    ] Log file path : /var/opt/oracle.minicluster/setup/logs/
omc_diskutil_functionality_042617_143017.log
.
<output omitted>
.
DISK                                    STATE
SYS//SYS/HDD0                           OK
SYS//SYS/HDD1                           OK
SYS//SYS/HDD2                           OK
SYS//SYS/HDD3                           OK

% mcmu diskutil -i SYS//SYS/HDD3
[INFO    ] Log file path : mc7-n1:/var/opt/oracle.minicluster/setup/logs/
mcmu_042617_140246.log
[INFO    ] Log file path : /var/opt/oracle.minicluster/setup/logs/
omc_diskutil_functionality_042617_140247.log
.
<output omitted>
.
Disk:               SYS//SYS/HDD3
Device ID:          id1,sd@n5000cca02d0fb28c
Device Name:        c0t5000CCA02D0FB28Cd0
Disk Type:          SSD
Vendor:             HGST
Model:              H101812SFSUN1.2T
Firmware:           A770
Serial:             001526G8MMBZ--------06G8MMBZ
Size:               1.09TB
Slot:               /SYS/HDD3
Status:             OK
```

This command works on internal drives and storage array drives.

▼ Add External NFS (CLI)

Use this procedure to add a network file system (NFS) to a DB VM group or an App VM group.

The NFS service must be NFSv4. The NFS that you add can be any whole or partial directory tree or a file hierarchy, including a single file that is shared by and NFS server.

When you add external NFS to a group, the remote file system is immediately accessible to all the VMs in the group. External NFS is only made available to VMs in a group if shared storage is enabled. See “Enable or Disable NFS (BUI)” on page 149.

1. **Log into the `mcmu` CLI as a primary admin such as mcinstall.**
   See “Log in to the MCMU CLI” on page 31.

2. **(If needed) Check what the NFS server is sharing:**

   a. **Ensure that an NFS is available form a server in your environment.**
      There are a variety of ways to perform this step, depending on the type of server. This is an example of an Oracle Solaris command that shows what file systems a server is sharing:

      ```
      % /usr/sbin/showmount -e NFSserver_name_or_IPaddress
      ```

   b. **To check the version of the NFS service provided by the NFS server, type:**

      ```
      % rpcinfo -p NFSserver_name_or_IPaddress | egrep nfs
          100003    4   tcp   2049  nfs
      ```

      The second column displays the version number. You might see several lines of output. One of them must report version 4.

3. **Edit the App VM group profile.**
   This command displays any existing external NFS and prompts you to add additional external NFS or delete the existing external NFS.

```
% mcmu tenant -A -u
Add External NFS
External NFS

ID 1   Mount: A_mountpoint       Share: data01    Server IP: 192.0xx.xxx

Do you want to "(A)dd a MountPoint, (D)elete a MountPoint or (C)ontinue editing the VM
 Group Profile"?
Enter A/D/C: A
Enter Mount: my_mountpoint
Enter Share: data02
Enter Server IP address: 192.0xx.xxx
Do you want to "(A)dd a MountPoint, (D)elete a MountPoint or (C)ontinue editing the VM
 Group Profile"?
Enter A/D/C: A
Enter Mount: another_mountpoint
Enter Share: data02
Enter Server IP address: 192.0xx.xxx
```

```
Do you want to "(A)dd a MountPoint, (D)elete a MountPoint or (C)ontinue editing the VM
 Group Profile"?
Enter A/D/C: C
```

4. **Respond to the remaining prompts until the command is complete.**

Related Information

- Securing Files and Verifying File Integrity in Oracle Solaris 11.3 (https://docs.oracle.com/cd/E53394_01/html/E54827/index.html)
- Managing File Systems in Oracle Solaris 11.3 (http://docs.oracle.com/cd/E53394_01/html/E54785/index.html)
- Oracle Solaris 11.3 Information Library (https://docs.oracle.com/cd/E53394_01/)

Check the File Systems Status

Use this procedure to check the status of all the file systems.

1. **Log into the `mcmu` CLI as a primary admin such as mcinstall.**
   See "Log in to the MCMU CLI" on page 31.

2. **Check the status of the file systems.**

```
% mcmu diskutil -f
```

For example:

```
% mcmu diskutil -f
[INFO    ] Log file path : mc51-n1:/var/opt/oracle.minicluster/setup/logs/
mcmu_042517_154050.log
[INFO    ] Log file path : /var/opt/oracle.minicluster/setup/logs/
omc_diskutil_functionality_042517_154050.log

INFO zlogin to acfskz successful.
INFO:MCMU.controllers.common.pexpect_util:zlogin to acfskz successful.
INFO su to user oracle successfully.
INFO:MCMU.controllers.common.pexpect_util:su to user oracle successfully.

FILE SYSTEM       AVAILABLE      USED         MOUNT POINT        STATE
mcpool            2.11T          29.3G        /mcpool            OK
rpool             646G           448G         /rpool             OK
omcwallet         1.86GB         0.14GB       /omcwallet         OK
commonfs          69.47GB        30.53GB      /commonfs          OK
sharedstore       17.57TB        35.89GB      /sharedstore       OK
```

Related Information

- Managing File Systems in Oracle Solaris 11.3 (`http://docs.oracle.com/cd/E53394_01/html/E54785/index.html`)

Configure an Added Storage Array (CLI)

Use this procedure to configure a storage array that is added to the system after the initial installation. You can connect the additional storage array and run this procedure on a system that is running.

Note - When MiniCluster is installed, the installation process automatically detects all attached storage (including multiple storage arrays), configures the storage, and makes the storage available for use. This procedure is intended for situations when a storage array is added to the system after the installation.

After you add a JBOD, ASM might need to rebalance to get to a stable state before the added storage is available to use.

1. **Ensure that the additional storage array is physically connected to MiniCluster.**
   For details on connecting storage array hardware, refer to the *Oracle MiniCluster S7-2 Installation Guide*.
   You can verify storage array hardware connectivity through the MCMU BUI Hardware Topology page. See "View the Hardware Topology (BUI)" on page 194.

2. **Log into the `mcmu` CLI as a primary admin such as mcinstall.**
   See "Log in to the MCMU CLI" on page 31.

3. **Configure the new storage array.**

   ```
   % mcmu diskutil -e
   ```

   For example:

   ```
   % mcmu diskutil -e
   [INFO    ] Log file path : mc12-n1:/var/opt/oracle.minicluster/setup/logs/
   mcmu_100416_160829.log

   [INFO    ] Log file path : /var/opt/oracle.minicluster/setup/logs/
   omc_diskutil_functionality_100416_160830.log

   [INFO    ] Log file path : mc12-n1:/var/opt/oracle.minicluster/setup/logs/
   omc_fmdservice_100416_160830.log
   ```

```
[INFO    ] Ensure that fmd Service is Functional and the System Utilities have
 consistent view of JBODs ..
[INFO    ] Ensure that fmd Service is Functional succeeded.
[INFO    ] Cross-check the number of disks reported by diskinfo and format utilities
 succeeded.
[INFO    ] Compare the disks in all JBODs across both compute nodes succeeded.
[INFO    ] Ensure that fmd Service is Functional and the System Utilities have
 consistent view of JBODs .. Completed
Oracle Corporation      SunOS 5.11      11.3    June 2016
Minicluster Setup successfully configured
Unauthorized modification of this system configuration strictly prohibited
[INFO    ] Invoked by OS user: mcinstall
[INFO    ] Find log at: mc12-n1:/var/opt/oracle.minicluster/setup/logs/
omc_node1exec_100416_160835.log
[INFO    ] ---------- Starting Executing Script on the 2nd Node
[INFO    ] Executing Script on the 2nd Node started.
[INFO    ] Check the existence of the script on the 2nd node
[INFO    ] Execute the script on the 2nd node

[INFO    ] Log file path : mc12-n2:/var/opt/oracle.minicluster/setup/logs/
omc_fmdservice_100416_160836.log
[INFO    ] Ensure that fmd Service is Functional and the System Utilities have
 consistent view of JBODs ..
[INFO    ] Ensure that fmd Service is Functional succeeded.
[INFO    ] Cross-check the number of disks reported by diskinfo and format utilities
 succeeded.
[INFO    ] Ensure that fmd Service is Functional and the System Utilities have
 consistent view of JBODs .. Completed
[INFO    ] Executing Script on the 2nd Node succeeded.
[INFO    ] Executing Script on the 2nd Node Completed
[INFO    ] Log file path : mc12-n1:/var/opt/oracle.minicluster/setup/logs/
omc_partitiondisk_100416_160845.log
[INFO    ]  Partitioning disk..
[INFO    ] Labelling and resetting the size of disks..
[INFO    ] Log file path : mc12-n1:/var/opt/oracle.minicluster/setup/logs/
omc_verify_jbods_100416_160856.log
[INFO    ]  Verifying the JBOD(s)..
[INFO    ] Verifying number and size of disks in all JBOD(s)...

                              --------- DISK VERIFICATION------
                        DISK                    CATEGORY   STATUS    REASON

                  c0t5000CCA23B0B3508d0           HDD-8      OK
                  c0t5000CCA23B0BA71Cd0           HDD-8      OK
                  c0t5000CCA23B0BB1D4d0           HDD-8      OK
                  c0t5000CCA23B0BA6E0d0           HDD-8      OK
                  c0t5000CCA23B0BA768d0           HDD-8      OK
                  c0t5000CCA23B0B906Cd0           HDD-8      OK
```

```
                c0t5000CCA0536C9078d0           SSD-1.6    OK
                c0t5000CCA0536CAB44d0           SSD-1.6    OK
                c0t5000CCA0536CAA48d0           SSD-1.6    OK
                c0t5000CCA0536CA7D0d0           SSD-1.6    OK
                c0t5000CCA0536CB368d0           SSD-1.6    OK
                c0t5000CCA0536CB530d0           SSD-1.6    OK
                c0t5000CCA0536C90D4d0           SSD-1.6    OK
                c0t5000CCA0536CAB70d0           SSD-1.6    OK
                c0t5000CCA0536C8BB0d0           SSD-1.6    OK
                c0t5000CCA0536CB510d0           SSD-1.6    OK
                c0t5000CCA0536CB518d0           SSD-1.6    OK
                c0t5000CCA0536CB3A8d0           SSD-1.6    OK
                c0t5000CCA0536CB498d0           SSD-1.6    OK
                c0t5000CCA0536C90FCd0           SSD-1.6    OK
                c0t5000CCA04EB4A994d0           SSD-200    OK
                c0t5000CCA04EB47CB4d0           SSD-200    OK
                c0t5000CCA04E0D6CD4d0           SSD-200    OK
                c0t5000CCA04E0D65E4d0           SSD-200    OK
[INFO    ] Verifying the JBOD(s).. Completed
[INFO    ] Log file path : mc12-n1:/var/opt/oracle.minicluster/setup/logs/
omc_partitiondisk_100416_160906.log
[INFO    ]  Partitioning disk..
[INFO    ] Erasing the disks, creating EFI labels,setting volume name...
[INFO    ] Creating partitions...
[INFO    ] Partitioning disk.. Completed
Storage alias for JBOD ORACLE-DE3-24C:1621NMQ005 was already created. Skipping ..
Creating alias JBODARRAY2 for JBOD ORACLE-DE3-24C.1539NMQ00D ..
Log file location: /var/opt/oracle.minicluster/setup/logs/omc-
crstoragealias.20161004.1609.log

Oracle Corporation      SunOS 5.11      11.3    June 2016
Minicluster Setup successfully configured
Unauthorized modification of this system configuration strictly prohibited
[INFO    ] Invoked by OS user: mcinstall
[INFO    ] Find log at: mc12-n1:/var/opt/oracle.minicluster/setup/logs/
omc_node1exec_100416_161002.log
[INFO    ] ---------- Starting Executing Script on the 2nd Node
[INFO    ] Executing Script on the 2nd Node started.
[INFO    ] Check the existence of the script on the 2nd node
[INFO    ] Execute the script on the 2nd node

Storage alias for JBOD ORACLE-DE3-24C:1621NMQ005 was already created. Skipping ..
Creating alias JBODARRAY2 for JBOD ORACLE-DE3-24C.1539NMQ00D ..
Log file location: /var/opt/oracle.minicluster/setup/logs/omc-
crstoragealias.20161004.1610.log

[INFO    ] Executing Script on the 2nd Node succeeded.
[INFO    ] Executing Script on the 2nd Node Completed
```

Prepare a Drive for Removal (CLI)

This procedure only applies to drives in the storage arrays.

Use this procedure to logically remove a storage array drive from the system before you physically remove the drive.

The length of time that it takes to complete this procedure before you can physically remove the drive depends on the type of drive you are removing:

- **SSD** – The detach operation completes quickly and the drive can be removed immediately.
- **HDD** – The detach operation takes several minutes to complete. Do not remove the drive before the detach operation competes.

1. **Log into the `mcmu` CLI as a primary admin such as mcinstall.**
   See "Log in to the MCMU CLI" on page 31.

2. **Identify the drive name.**
   You might be able to get the drive name from the error message or log file that led to the plan to replace the drive.
   You can use a command such as `diskinfo`. Make note of the long drive name (such as `c0t5000CCA23B0BF34Cd0`) for use with this procedure. Also make note of the shorter name (such as `HDD8`) for use with the followup task when you reattached the replaced drive.
   Also note that the storage array drives are identified by a `JBODARRAY` string.
   For example:

```
 % diskinfo
D:devchassis-path                  c:occupant-compdev
---------------------------------  --------------------
/dev/chassis/SYS/HDD0/disk         c0t5000CCA02D1EE2A8d0
/dev/chassis/SYS/HDD1/disk         c0t5000CCA02D1E7AACd0
/dev/chassis/SYS/HDD2/disk         c0t5000CCA02D1EDCECd0
/dev/chassis/SYS/HDD3/disk         c0t5000CCA02D1ED360d0
/dev/chassis/SYS/HDD4/disk         c0t5000CCA02D1EE6D8d0
/dev/chassis/SYS/HDD5/disk         c0t5000CCA02D1EE6CCd0
/dev/chassis/SYS/HDD6              -
/dev/chassis/SYS/HDD7              -
/dev/chassis/SYS/MB/EUSB-DISK/disk c1t0d0
/dev/chassis/JBODARRAY1/HDD0/disk  c0t5000CCA25497267Cd0
/dev/chassis/JBODARRAY1/HDD1/disk  c0t5000CCA2549732B8d0
/dev/chassis/JBODARRAY1/HDD2/disk  c0t5000CCA254974F28d0
/dev/chassis/JBODARRAY1/HDD3/disk  c0t5000CCA254965A78d0
/dev/chassis/JBODARRAY1/HDD4/disk  c0t5000CCA254978510d0
```

```
/dev/chassis/JBODARRAY1/HDD5/disk   c0t5000CCA254964E3Cd0
/dev/chassis/JBODARRAY1/HDD6/disk   c0t5000CCA0536CA5E4d0
/dev/chassis/JBODARRAY1/HDD7/disk   c0t5000CCA0536CA7B0d0
/dev/chassis/JBODARRAY1/HDD8/disk   c0t5000CCA23B0BF34Cd0
/dev/chassis/JBODARRAY1/HDD9/disk   c0t5000CCA0536CB828d0
/dev/chassis/JBODARRAY1/HDD10/disk  c0t5000CCA0536CB308d0
/dev/chassis/JBODARRAY1/HDD11/disk  c0t5000CCA0536CAF2Cd0
/dev/chassis/JBODARRAY1/HDD12/disk  c0t5000CCA0536CABE4d0
/dev/chassis/JBODARRAY1/HDD13/disk  c0t5000CCA0536CB684d0
/dev/chassis/JBODARRAY1/HDD14/disk  c0t5000CCA0536CA870d0
/dev/chassis/JBODARRAY1/HDD15/disk  c0t5000CCA0536CAB88d0
/dev/chassis/JBODARRAY1/HDD16/disk  c0t5000CCA0536CA754d0
/dev/chassis/JBODARRAY1/HDD17/disk  c0t5000CCA0536CAD10d0
/dev/chassis/JBODARRAY1/HDD18/disk  c0t5000CCA0536CAEF8d0
/dev/chassis/JBODARRAY1/HDD19/disk  c0t5000CCA0536CA83Cd0
/dev/chassis/JBODARRAY1/HDD20/disk  c0t5000CCA04EB272E8d0
/dev/chassis/JBODARRAY1/HDD21/disk  c0t5000CCA04EB27234d0
/dev/chassis/JBODARRAY1/HDD22/disk  c0t5000CCA04EB27428d0
/dev/chassis/JBODARRAY1/HDD23/disk  c0t5000CCA04EB272A0d0
```

3. Detach the disk prior to removing the disk.

```
% mcmu diskutil -D diskname
```

where *diskname* is the name of the disk you plan to remove.

For example:

```
% mcmu diskutil -D c0t5000CCA23B0BF34Cd0
.
<output omitted>
.
INFO:MCMU.controllers.common.pexpect_util:su to user oracle successfully.
[INFO    ] logged into the zone f18-vm1-mc5qt-n1 as oracle
[INFO    ] disk alias found to be RECO_0003
[INFO    ] dropping disk c0t5000CCA23B0BF34Cd0s1
[INFO    ] ['', 'Diskgroup altered.', '']
[INFO    ] ASM rebalance complete in diskgroup RECO in zonegroup f18
[INFO    ] disk alias found to be DATA_0003
[INFO    ] dropping disk c0t5000CCA23B0BF34Cd0s4
[INFO    ] ['', 'Diskgroup altered.', '']
[INFO    ] ASM still initializing, please retry in a few minutes to check the progress by running
'mcmu diskutil -p'

[INFO    ] Disk should NOT be detached until rebalance is complete.

[INFO    ] disk alias found to be SYSTEM_0003
[INFO    ] dropping disk c0t5000CCA23B0BF34Cd0s5
[INFO    ] ['', 'Diskgroup altered.', '']
```

```
[INFO    ] ASM rebalance in progress in the zonegroup f18.
Estimated time of completion is 61.

[INFO    ] Disk should NOT be detached until rebalance is complete.
[INFO    ] exiting surplus
[INFO    ] Partitions to be dropped: [1]
[INFO    ] Removing disk from zones...
[INFO    ] Modifying zones: [u'f18-vm1-mc5qt-n1'] on node: mc5qt-n1
.
<output omitted>
.
[INFO    ] Running.. exit
[INFO    ] Disk {disk} being detached from Minicluster.
```

4. **Check the status of the detach operation.**
   If you want to check the status, but the detach operation is still running, login to the `mcmu` CLI in another window.

   ```
   % mcmu diskutil -p

   [INFO    ] Checking asm rebalance progress
   .
   <output omitted>
   .
   [INFO    ] ASM Rebalance successfully complete. Attempting to remove disk from zones.
   .
   <output omitted>
   .
   [INFO    ] Disk successfully removed from Minicluster.
   ```

5. **When the ASM rebalance is complete, you can remove the drive.**
   After the new drive is installed, reattach the drive. See “Reattach a Replaced Disk (CLI)” on page 323.

▼ Reattach a Replaced Disk (CLI)

This procedure only applies to drives in the storage arrays. Use this procedure to reattach a drive that was detached using `mcmu diskutil -d` before it was replaced.

1. **Log into the `mcmu` CLI as a primary admin such as mcinstall.**
   See “Log in to the MCMU CLI” on page 31.

2. **Identify the full disk name of the replaced drive.**
   You can use a command such as `diskinfo`.

In this example, `HDD8` was replaced, and `diskinfo` shows that the full drive name for `HDD8` is `c0t5000CCA0536CA710d0`.

Also note that the storage array drives are identified by a `JBODARRAY` string.

```
 % diskinfo
D:devchassis-path                   c:occupant-compdev
---------------------------------   --------------------
/dev/chassis/SYS/HDD0/disk          c0t5000CCA02D1EE2A8d0
/dev/chassis/SYS/HDD1/disk          c0t5000CCA02D1E7AACd0
/dev/chassis/SYS/HDD2/disk          c0t5000CCA02D1EDCECd0
/dev/chassis/SYS/HDD3/disk          c0t5000CCA02D1ED360d0
/dev/chassis/SYS/HDD4/disk          c0t5000CCA02D1EE6D8d0
/dev/chassis/SYS/HDD5/disk          c0t5000CCA02D1EE6CCd0
/dev/chassis/SYS/HDD6               -
/dev/chassis/SYS/HDD7               -
/dev/chassis/SYS/MB/EUSB-DISK/disk  c1t0d0
/dev/chassis/JBODARRAY1/HDD0/disk   c0t5000CCA25497267Cd0
/dev/chassis/JBODARRAY1/HDD1/disk   c0t5000CCA2549732B8d0
/dev/chassis/JBODARRAY1/HDD2/disk   c0t5000CCA254974F28d0
/dev/chassis/JBODARRAY1/HDD3/disk   c0t5000CCA254965A78d0
/dev/chassis/JBODARRAY1/HDD4/disk   c0t5000CCA254978510d0
/dev/chassis/JBODARRAY1/HDD5/disk   c0t5000CCA254964E3Cd0
/dev/chassis/JBODARRAY1/HDD6/disk   c0t5000CCA0536CA5E4d0
/dev/chassis/JBODARRAY1/HDD7/disk   c0t5000CCA0536CA7B0d0
/dev/chassis/JBODARRAY1/HDD8/disk   c0t5000CCA0536CA710d0
/dev/chassis/JBODARRAY1/HDD9/disk   c0t5000CCA0536CB828d0
/dev/chassis/JBODARRAY1/HDD10/disk  c0t5000CCA0536CB308d0
/dev/chassis/JBODARRAY1/HDD11/disk  c0t5000CCA0536CAF2Cd0
/dev/chassis/JBODARRAY1/HDD12/disk  c0t5000CCA0536CABE4d0
/dev/chassis/JBODARRAY1/HDD13/disk  c0t5000CCA0536CB684d0
/dev/chassis/JBODARRAY1/HDD14/disk  c0t5000CCA0536CA870d0
/dev/chassis/JBODARRAY1/HDD15/disk  c0t5000CCA0536CAB88d0
/dev/chassis/JBODARRAY1/HDD16/disk  c0t5000CCA0536CA754d0
/dev/chassis/JBODARRAY1/HDD17/disk  c0t5000CCA0536CAD10d0
/dev/chassis/JBODARRAY1/HDD18/disk  c0t5000CCA0536CAEF8d0
/dev/chassis/JBODARRAY1/HDD19/disk  c0t5000CCA0536CA83Cd0
/dev/chassis/JBODARRAY1/HDD20/disk  c0t5000CCA04EB272E8d0
/dev/chassis/JBODARRAY1/HDD21/disk  c0t5000CCA04EB27234d0
/dev/chassis/JBODARRAY1/HDD22/disk  c0t5000CCA04EB27428d0
/dev/chassis/JBODARRAY1/HDD23/disk  c0t5000CCA04EB272A0d0
```

3. Attach a disk.

```
% mcmu diskutil -a diskname
```

where *diskname* is the name of the disk you want to attach.

For example:

```
% mcmu diskutil -a c0t5000CCA0536CA710d0
```

Administering the Virtual Tuning Assistant (CLI)

Note - Different versions of the MiniCluster software offer different `mcmu` commands and options. For the most accurate CLI information for the MiniCluster you are using, use `mcmu` help. See "Display `mcmu` Help For All Subcommands (CLI)" on page 204 and "Display `mcmu` Help for a Specific Subcommand (CLI)" on page 205.

These topics describe how to use the MCMU CLI to check the status of `mctuner` (the virtual tuning assistant).

Note - For instructions on how to use the MCMU BUI to obtain virtual tuning information, see "Checking the Virtual Tuning Status (BUI)" on page 173.

Configure the `mctuner` Notification Email Address (CLI)

By default, the virtual tuning assistant is enabled on the system to ensure that the system is running with optimal tuning parameters. If the tuning assistant detects any issues, it sends email notifications to the email address that is configured for the tuning assistant.

Note - For the most thorough notifications, configure the tuning assistant email address in the global and kernel zones on both nodes.

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

   See "Log in to the MCMU CLI" on page 31.

2. **Check the current email address that is configured in the tuning assistant.**

   In this example, the address is configured as `root@localhost`, which is the factory default, and should be changed to an email address of an administrator.

```
% svcprop mctuner | grep -i email
mctuner_vars/EMAIL_ADDRESS astring root@localhost
mctuner_vars/EMAIL_MESSAGES boolean true
```

3. **Configure the email address for the global zone.**

   In this example, the email address is configured for the global zone on node 1.

```
% mcmu mctuner -P -n node1 -z global -k EMAIL_Address -v admin01@example.com
[INFO    ] Log file path : mc3-n1:/var/opt/oracle.minicluster/setup/logs/
mcmu_082916_191031.log
INFO SSH login to mc3-n1 successfully.
INFO:MCMU.controllers.common.pexpect_util:SSH login to mc3-n1 successfully.
INFO su to user root successfully.
INFO:MCMU.controllers.common.pexpect_util:su to user root successfully.
[INFO    ] mctuner property EMAIL_ADDRESS in zone global on node1 has been set to
 admin01@example.com
```

4. **Configure the email address for the kernel zone.**

   In this example, the email address is configured for the kernel zone on node 1.

```
% mcmu mctuner -P -n node1 -z acfskz -k EMAIL_Address -v admin01@example.com
[INFO    ] Log file path : mc3-n1:/var/opt/oracle.minicluster/setup/logs/
mcmu_082916_191031.log
INFO SSH login to mc3-n1 successfully.
INFO:MCMU.controllers.common.pexpect_util:SSH login to mc3-n1 successfully.
INFO su to user root successfully.
INFO:MCMU.controllers.common.pexpect_util:su to user root successfully.
[INFO    ] mctuner property EMAIL_ADDRESS in zone acfskz on node1 has been set to
 admin01@example.com
```

5. **Repeat Step 3 and Step 4 for node 2.**

```
% mcmu mctuner -P -n node2 -z global -k EMAIL_Address -v admin01@example.com
% mcmu mctuner -P -n node2 -z acfskz -k EMAIL_Address -v admin01@example.com
```

▼ View Virtual Tuning Assistant Status (CLI)

This procedure shows the `mctuner` status for all enabled `mctuner` instances on the system.

1. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

   See “Log in to the MCMU CLI” on page 31.

2. **Type:**

In this example, the status of mctuner is online for the global and kernel zones on both nodes.

```
% mcmu mctuner -S
[INFO    ] Log file path : mc3-n1:/var/opt/oracle.minicluster/setup/logs/
mcmu_082216_172246.log
INFO SSH login to mc3-n1 successfully.
INFO:MCMU.controllers.common.pexpect_util:SSH login to mc3-n1 successfully.
Aug 22 17:22:50 mccn su: 'su root' succeeded for mcinstall on /dev/pts/2
INFO su to user root successfully.
INFO:MCMU.controllers.common.pexpect_util:su to user root successfully.
INFO zlogin to acfskz successful.
INFO:MCMU.controllers.common.pexpect_util:zlogin to acfskz successful.
INFO SSH login to mc3-n2 successfully.
INFO:MCMU.controllers.common.pexpect_util:SSH login to mc3-n2 successfully.
INFO su to user root successfully.
INFO:MCMU.controllers.common.pexpect_util:su to user root successfully.
INFO zlogin to acfskz successful.
INFO:MCMU.controllers.common.pexpect_util:zlogin to acfskz successful.
node        zone        status      issues                          notices
----------  ----------  ----------  ------------------------------  ----------
mc3-n1    global      Online
mc3-n1    acfskz      Online
mc3-n2    global      Online
mc3-n2    acfskz      Online
```

Updating MiniCluster Software (CLI)

Note - Different versions of the MiniCluster software offer different `mcmu` commands and options. For the most accurate CLI information for the MiniCluster you are using, use `mcmu` help. See "Display `mcmu` Help For All Subcommands (CLI)" on page 204 and "Display `mcmu` Help for a Specific Subcommand (CLI)" on page 205.

Only use the CLI commands to update MiniCluster if you are familiar with the updating process and concepts. Otherwise, use the MCMU BUI. The MCMU BUI and updating concepts are covered in "Updating and Patching MiniCluster Software (BUI)" on page 177.

These topics are described in this section:

▼ View Software Component Versions (CLI)

Use this procedure to display the version status of the components through the CLI. Alternatively, you can use the BUI. The BUI provides component version numbers, the CLI does not. See "View Software Component Versions (BUI)" on page 181.

1. **Ensure that the Patch Bundle is downloaded to MiniCluster.**

   The latest Patch Bundle provides the system with the latest component versions, and is used to determine if updates are available for the components. These procedures describe how to administer the Patch Bundle:

   a. **Download the Patch Bundle.**

      See "Check for and Obtain the Latest Updates" on page 183.

   b. **Unzip and extract the bundle.**

      See "Extract the Patch Bundle" on page 185.

2. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

   See "Log in to the MCMU CLI" on page 31.

3. **Upload the latest component versions.**

   Using the `upload` option moves the contents of the Patch Bundle to the `/var/opt/oracle.minicluster/sfw` directory. This is necessary for the list option in Step 4 to report the correct component status.

   This example uploads all the components. It can run for five minutes or more.

```
% mcmu patch -p upload
[INFO    ] Actions to execute: upload
[INFO    ] mcpatch: 0 % Executing strategy of Main level
[INFO    ] Running plugins: ['upload', 'check_be', 'check_jbod', 'check_ilom',
 'check_omctoolkit', 'check_acfs',
                            'check_repo', 'check_solaris_gz', 'check_solaris_kz',
 'check_tenants']
.
<output omitted>
.
[INFO    ] mcpatch: 100 % Done.
[INFO    ] See log file for details: /var/opt/oracle.minicluster/setup/logs/
mc_patch_021617_140513.log
[INFO    ] Completed successfully
```

   This example uploads one component:

```
% mcmu patch -p check_ilom
[INFO    ] Actions to execute: check_ilom
[INFO    ] mcpatch: 0 % Executing strategy of Main level
[INFO    ] Running plugins: ['check_ilom']
[INFO    ] mcpatch: 0 % Started: Check system firmware version of Executing plugins
 strategy
[INFO    ] mcpatch: 0 % Finished: Check system firmware version of Executing plugins
 strategy
[INFO    ] mcpatch: 90 % Executing plugins strategy of Executing strategy
[INFO    ] mcpatch: 90 % Executing strategy of Main level
[INFO    ] mcpatch: 100 % Executing strategy of Main level
[INFO    ] Command execution statistics: pexpect.run=10, task=0
[INFO    ] mcpatch: 100 % Done.
[INFO    ] See log file for details: /var/opt/oracle.minicluster/setup/logs/
mc_patch_021617_140656.log
[INFO    ] Completed successfully
mcinstall@mc5qt-n1:/var/home/mcinstall % exit
```

4. **Display the update status of the components.**

   As shown in the example:

- `CURRENT` – Indicates the component is up-to-date.
- `UPGRADE_NEEDED` – Indicates that a newer version is available for the component .
- `NEWER` – (Not shown) Indicates that a component's version is newer than what is in `/var/opt/oracle.minicluster/sfw`.

```
% mcmu patch -l
COMPONENT------------------------------- | STATUS--------
MiniCluster Configuration Utility         | CURRENT
Storage Tray firmware                     | CURRENT
Shared Filesystem software                | CURRENT
Operating System package repository       | CURRENT
Shared Storage Operating System           | CURRENT
Compute Nodes Operating System            | CURRENT
Compute Node firmware                     | UPGRADE_NEEDED
Grid Infrastructure                       | CURRENT
Oracle db home /u01/.../11.2.0.4/dbhome_3 | CURRENT
Oracle db home /u01/.../11.2.0.4/dbhome_4 | CURRENT
Oracle db home /u01/.../12.1.0.2/dbhome_1 | UPGRADE_NEEDED
Oracle db home /u01/.../12.1.0.2/dbhome_2 | UPGRADE_NEEDED
```

5. **Consider your next action.**

   - Update the MCMU component, see “Update the MCMU Component (CLI)” on page 333.
   - Update any of the other components, see “Update Other MiniCluster Software Components (CLI)” on page 336 or “Update MiniCluster Software (BUI)” on page 188.

▼ Update the MCMU Component (CLI)

Use this procedure to update the MCMU software on a fully installed MiniCluster. This procedure only updates the MCMU software. To update other software components, see “Update Other MiniCluster Software Components (CLI)” on page 336.and “Update MiniCluster Software (BUI)” on page 188.

The system can be updated while DB and App VMs are running.

Caution - The MCMU component must be updated before you update any other component. (see “Update the MCMU Component (CLI)” on page 333).

Caution - For systems running MCMU v1.1.21 and earlier, you must update the MCMU software through the MCMU CLI as described in this procedure. Do not attempt to update MCMU through the BUI because the update might fail. If you experience this problem, follow the instructions in the MiniCluster Release Notes (Doc ID 2214746.1) available at `http://support.oracle.com`, under the heading Upgrading Fully Configured MiniCluster to 1.1.21.4.

To review an overview of the update process, see "Component Update Process Overview" on page 177.

Note - For the latest information about what updates are available, refer to the MiniCluster Release Notes document that is available in MOS Doc ID 2153282.1 at: `http://support.oracle.com`.

1. **Ensure that the correct bundles are downloaded on MiniCluster.**
   These procedures must be performed prior to updating the MCMU software:

   a. **Ensure that the Patch Bundle and Component Bundle are downloaded to MiniCluster.**
      See "Check for and Obtain the Latest Updates" on page 183.

   b. **Ensure that the Patch Bundle is unzipped and extracted in the `/var/opt/oracle.minicluster/patch` directory.**
      See "Extract the Patch Bundle" on page 185.
      Note – You can install the Component Bundle before performing this procedure, or at the end of this procedure. For instructions, see "Install the Component Bundle" on page 187.

2. **Log into the MCMU CLI on compute node 1 as a primary admin, such as mcinstall.**
   See "Log in to the MCMU CLI" on page 31.

3. **Display the current version of MCMU.**

```
% mcmu -V

Oracle MiniCluster Configuration Utility
            MCMU v1.1.18
```

4. **Update the MCMU software component.**
   Note that the `patch_omctoolkit` option cannot be combined with any other `mcmu patch` options.

Syntax:

`mcmu patch -p update_omctoolkit` [*path_to_omctoolkit.p5p*]

By default, this command expects to find the `omctoolkit.p5p` file in the `/var/opt/oracle.minicluster/sfw` directory.

- If you ran the `mcmu patch -p upload` command (a command listed in "View Software Component Versions (CLI)" on page 331), perform this command:

  ```
  % mcmu patch -p update_omctoolkit
  ```

- If you did not run the mcmu `patch -p upload` command, you must specify the path to the `omctoolkit.p5p` file.

  First, identify the `patch-`*version_no* directory name where the Patch Bundle was untarred.

  In this example, `patch-1.1.21.4` is the directory name needed. Your directory name might be different.

  ```
  % cd /var/opt/oracle.minicluster/patch
  % ls
  README.txt              mc-1.1.21.4-patch.tar.ac             omc
  beadm.py                mc-1.1.21.4-patch.tar.ad             patch-1.1.21.4
  mc-1.1.21.4-patch.tar.aa             mc-1.1.21.4-patch.tar.ae             patch.
  json
  mc-1.1.21.4-patch.tar.ab             mc_patch.py             scripts
  ```

  In this command line, replace `patch-`*version_no* with the directory name you identified.

```
% mcmu patch -p update_omctoolkit /var/opt/oracle.minicluster/patch/patch-version_no/mcmu/omctoolkit.p5p
```

Note - When the MCMU component is updated, web services are restarted and you might need to refresh the browser cache (shift-reload) to use the MCMU BUI.

5. Verify the updated version of MCMU.

```
% mcmu -V
Oracle MiniCluster Configuration Utility
            MCMU v1.1.21.4
```

6. (Version dependent) Clear the Apache service.

Only perform this step if you are updating a system that started at version 1.1.21 or lower.

```
% su - root
# svcadm clear apache22
# exit
```

```
%
```

7. **(Version dependent) Set the Supervisor password.**

   Only perform this step if you are updating a system that started at version 1.1.18 or lower.

   Log into the MCMU BUI as the supervisor. MCMU requires you to set the password for the supervisor. Until the supervisor password is set, you cannot login to the MCMU as an admin such as mcinstall. See "Log in to the MCMU BUI" on page 28.

8. **Install the Component Bundle.**

   The Component Bundle contains important components that need to be updated when the MCMU component is updated.

   If you already installed the Component Bundle, skip this step.

   If not, perform this procedure now. See "Install the Component Bundle" on page 187.

▼ Update Other MiniCluster Software Components (CLI)

Use this procedure to update any software component that has an update available, except for the MCMU component (use "Update the MCMU Component (CLI)" on page 333 instead).

Alternatively, you can perform the same updates using the BUI, which is less prone to human error. See "Update MiniCluster Software (BUI)" on page 188.

The system can be updated while DB and App VMs are running.

This tables lists mcmu patch syntax for various components.

Note - The components and options differ from version to version. To see the full list of patch options for your particular version, perform the help command: `mcmu patch -p -h`.

Component	Syntax
Storage array firmware	`mcmu patch -p update_jbod`
GI and ACFS in kernel zones	`mcmu patch -p update_acfs`
OS repository (used to install and update VMs and global zones)	`mcmu patch -p update_repo`
Kernel zone OS	`mcmu patch -p update_kz`
Compute node OS (both nodes)	`mcmu patch -p update_gz`
Oracle ILOM on the compute nodes	`mcmu patch -p update_ilom`

Component	Syntax
(both nodes) **Note -** Depending on the POST configuration, this update can take 40 - 50 minutes to complete.	
GI in DB VMs	`mcmu patch -p update_gi -z` *DBgroup_name*
Oracle DB home	`mcmu patch -p update_oh -z` *DBgroup_name* `--oh` *DBhome_full_path*

1. **Ensure that the Patch Bundle is downloaded to MiniCluster.**

   These procedures must be performed prior to updating the software components:

   a. **Download the Patch Bundle.**

      See "Check for and Obtain the Latest Updates" on page 183.

   b. **Unzip and extract the bundle.**

      See "Extract the Patch Bundle" on page 185.

2. **Log into the MCMU CLI as a primary admin, such as mcinstall.**

   See "Log in to the MCMU CLI" on page 31.

3. **Display the help output to see which update options are available on your system.**

   ```
   % mcmu patch -h
   ```

4. **Update one or more components.**

   Key points:

   - Some component update options can be included on a single command line, separated with commas.
   - These component options can only be updated individually (not combined on a command line): `update_gz`, `update_ilom`, and `update_omctoolkit`
   - A system reboot (one node at a time) is automatically performed after updating each of these component options: `update_gz` and `update_ilom`
   - The GI and Oracle DB homes must be at the same revision levels. When you patch these components, patch the GI before you patch a DB home.
   - Some component options require additional command line arguments, as shown in the examples.

   Examples:

   - Example of updating the compute node firmware:

```
% mcmu patch -p update_ilom
```

- Example of updating the GI in VM group called `mc5dbzg1`:

  The first command in this example (describe in "List a Summary of All DB VM Groups (CLI)" on page 208) displays the DB VM group name that is needed for the `mcmu patch` command.

```
% mcmu tenant -G -l
Listing DB VM Group...
Status : Active
Description :
VMgroupName : mc5dbzg1
editable : True
deletable : True
progress : False
VMgroupID : 1

% mcmu patch -p update_oh -z mc5dbzg1
```

- Example of updating the DB in VM group called `mc5dbzg1` for the DB home at `/u01/app/oracle/product/12.1.0.2/dbhome_1`:

  The first two commands display the DB VM group name and the full path of the DB home that are needed for the `mcmu patch` command. These commands are described in "List a Summary of All DB VM Groups (CLI)" on page 208 and "List Details for a DB Home (CLI)" on page 215.

```
% mcmu tenant -G -l
Listing DB VM Group...
Status : Active
Description :
VMgroupName : mc5dbzg1
editable : True
deletable : True
progress : False
VMgroupID : 1

% mcmu tenant -H -L 2
DB HOME INFORMATION
ID: 2
VM_ID: 2
VMGROUP_ID: 1
DB_HOME: /u01/app/oracle/product/12.1.0/db_12c
VERSION: 12.1.0.2
TYPE: RAC
```

```
PATCH: 12.1.0.2.160419
STATUS: Active
```

```
% mcmu patch -p update_oh -z mc5dbzg1 --oh /u01/app/oracle/product/12.1.0.2/dbhome_1
```

- Example of updating multiple components (GI and OS in the kernel zone, and the storage array firmware) on one line:

```
% mcmu patch -p update_acfs,update_kz,update_jbod
```

5. Consider your next action.

To verify the new versions, use one of these procedures:

- "View Software Component Versions (BUI)" on page 181
- "View Software Component Versions (CLI)" on page 331

Glossary

A

ASR Auto Service Request. A feature of Oracle or Sun hardware that automatically opens service requests when specific hardware faults occur. ASR is integrated with MOS and requires a support agreement. See also MOS.

C

compute server Shortened name for the SPARC server, a major component of MiniCluster.

G

GB Gigabyte. 1 gigabyte = 1024 megabytes.

GbE Gigabit Ethernet.

H

HMAC Hashed Message Authentication Code. An algorithm used to generate one-time passwords.

I

ILOM See Oracle ILOM.

IPMI Intelligent Platform Management Interface.

IPMP IP network multipathing.

M

MOS My Oracle Support.

N

NIC Network interface card.

O

Oracle ASM Oracle Automatic Storage Management. A volume manager and a file system that supports Oracle databases.

Oracle ILOM Oracle Integrated Lights Out Manager. Software on the SP that enables you to manage a server independently from the operating system.

OTP A One-time Password. A MiniCluster administrator in the tenant admin role can enable two-factor authentication for a specific user.

P

POST Power-on self-test. A diagnostic that runs when the compute server is powered on.

Q

QSFP Quad small form-factor, pluggable. A transceiver specification for 10GbE technology.

R

RAC Real Application Cluster.

S

SCAN Single Client Access Name. A feature used in RAC environments that provides a single name for clients to access any Oracle Database running in a cluster. See also RAC.

SFP and SFP+ Small form-factor pluggable standard. SFP+ is a specification for a transceiver for 10GbE technology.

SGA System global area.

SNMP Simple Management Network Protocol.

SPARC server A major component of SuperCluster that provides the main compute resources. Referred to in this documentation as compute server.

T

two-factor authentication Strong authentication that is enforced with OTP.

Z

ZFS A file system with added volume management capabilities. ZFS is the default file system in Oracle Solaris 11.

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