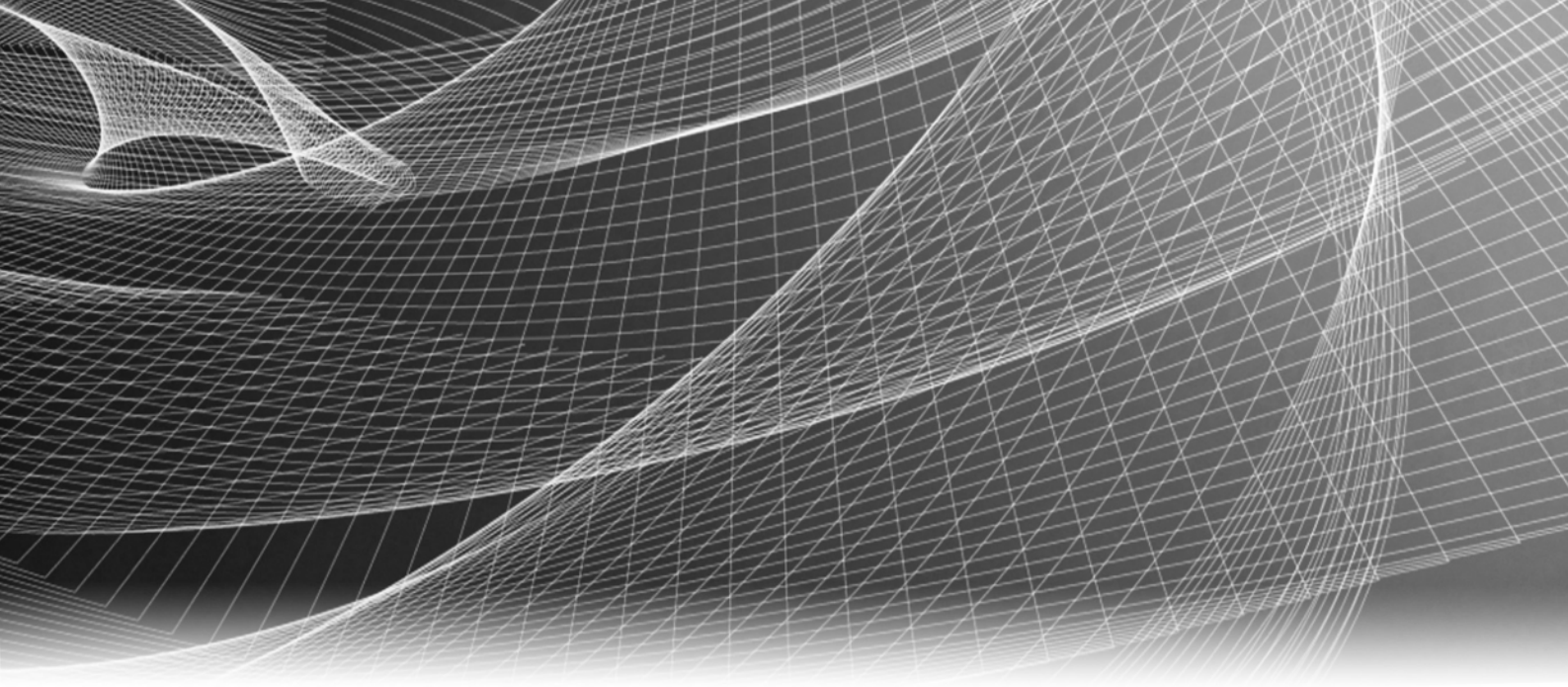

EMC Storage Plug-in for Oracle Enterprise Manager 12*c*

Release Number 12.1.0.2.0

Product Guide

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REV 02

EMC²

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PREFACE

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Purpose

This document describes the architecture, installation, and operation of the EMC® Storage Plug-in for Oracle Enterprise Manager (OEM) 12*c*. The plug-in provides database administrators with comprehensive configuration and performance information about the EMC storage systems that support their databases and applications.

Note: The EMC Storage Plug-in for OEM 12c is a replacement plug-in for previous versions that targeted individual EMC storage systems. Older EMC plug-ins that targeted VMAX and VNX should be uninstalled before installing the EMC Storage Plug-in for OEM 12c.

Audience

This document is for database administrators, EMC personnel, partners, and customers.

Scope

Database administrators can use this document to relate database performance information with the corresponding storage systems to identify performance issues and isolate the root cause. Because the plug-in monitors which storage volumes are associated with each database, configured storage performance alerts and incidents are automatically displayed in the associated database alert list inside the Oracle Enterprise Manager database plug-in.

Related documentation

The following document, located on EMC Online Support, provides additional relevant information. If you do not have access to the document, contact your EMC representative:

- *EMC Storage Plug-in for Oracle Enterprise Manager 12c Release Notes*

Conventions used in this document

EMC uses the following conventions for special notices:

NOTICE

NOTICE is used to address practices not related to personal injury.

Note: A note presents information that is important, but not hazard-related.

Typographical conventions

EMC uses the following type style conventions in this document:

Bold	Used for names of interface elements, such as names of windows, dialog boxes, buttons, fields, tab names, key names, and menu paths (what the user specifically selects or clicks).
Italic	Used for full titles of publications referenced in text.
`Monospace`	Used for: • System output, such as an error message or script • System code • Path names, filenames, prompts, and syntax • Commands and options
`Monospace italic`	Used for variables.
`Monospace bold`	Used for user input.
[ ]	Square brackets enclose optional values.

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Product information—For documentation, release notes, software updates, or information about EMC products, go to EMC Online Support at:

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Your suggestions will help us continue to improve the accuracy, organization, and overall quality of the user publications. Send your opinions of this document to:

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CHAPTER 1
Introduction

This chapter presents the following topics:

Executive summary

The EMC® Storage Plug-in for OEM 12*c* gathers availability, performance, and configuration information for EMC storage systems and combines that information with Oracle database host information for display in the Enterprise Manager web interface. This provides the database administrator with a comprehensive look into the performance of the specific storage used by each database—significantly simplifying the task of tracking database performance and isolating issues.

EMC Storage Plug-in architecture

The EMC Storage Plug-in for OEM 12*c* consists of several components that work together to collect configuration and performance data from both database servers and EMC storage systems.

The plug-in collects metrics from EMC storage systems in different ways based on the optimum connection method:

- For EMC VMAX®, the plug-in relies on EMC Unisphere for VMAX®, which a storage administrator uses to configure and manage a VMAX array. The plug-in uses the Unisphere for VMAX (U4V) Representational State Transfer (REST) API to collect configuration and performance metrics from U4V. The plug-in also uses EMC Solutions Enabler SYMCLI calls to perform additional operations related to metric collection.
- For EMC VNX® Block, the plug-in uses the Navisphere Command Line Interface (NaviCLI) to collect metrics.
- For EMC VNX File, the plug-in uses an SSH connection to the Control Station to collect metrics.
- For EMC XtremIO™, the plug-in uses the XtremIO REST API running on the XtremIO Management Station (XMS) to collect performance information.

To provide storage-to-database mapping, the plug-in installs a small OEM component on each database server to be monitored that provides information about which EMC storage system disks are being used for the associated database.

All configuration and performance information is collected and stored in the Oracle Management Repository (OMR) and displayed in the plug-in UI for easy monitoring of database and storage performance.

The following diagrams provide visual descriptions of the EMC Storage Plug-in architecture.

Figure 1 shows the standard Oracle Enterprise Manager architecture and plug-in distribution. The Oracle Management Server (OMS) and Repository (OMR) are the main part of Oracle Enterprise Manager. Oracle Management Agents (OMAs) are deployed to hosts in the environment. OEM plug-ins, either Oracle developed or third-party plug-ins, run inside the OMA and monitor and manage applications, hosts, databases, and other components.

:

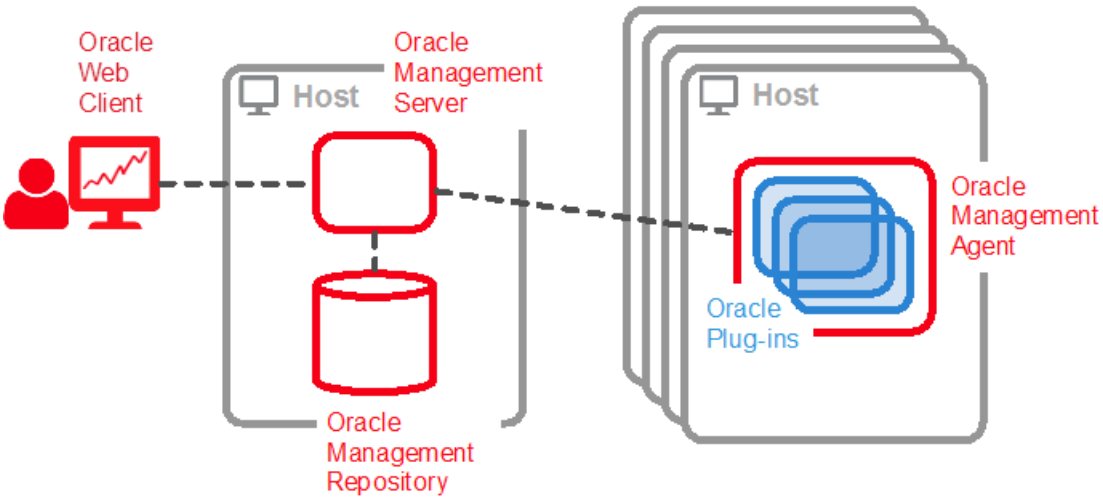

Figure 1 Oracle Enterprise Manager architecture and plug-in distribution

The plug-in has components that run on different servers in the environment, as shown in Figure 2. The UI runs on the Oracle Management Server while the data collection components run on database or other hosts in the environment. Plug-in components, while running on separate logical hosts, can also run on the same physical hosts, depending on how administrators want to deploy these components.

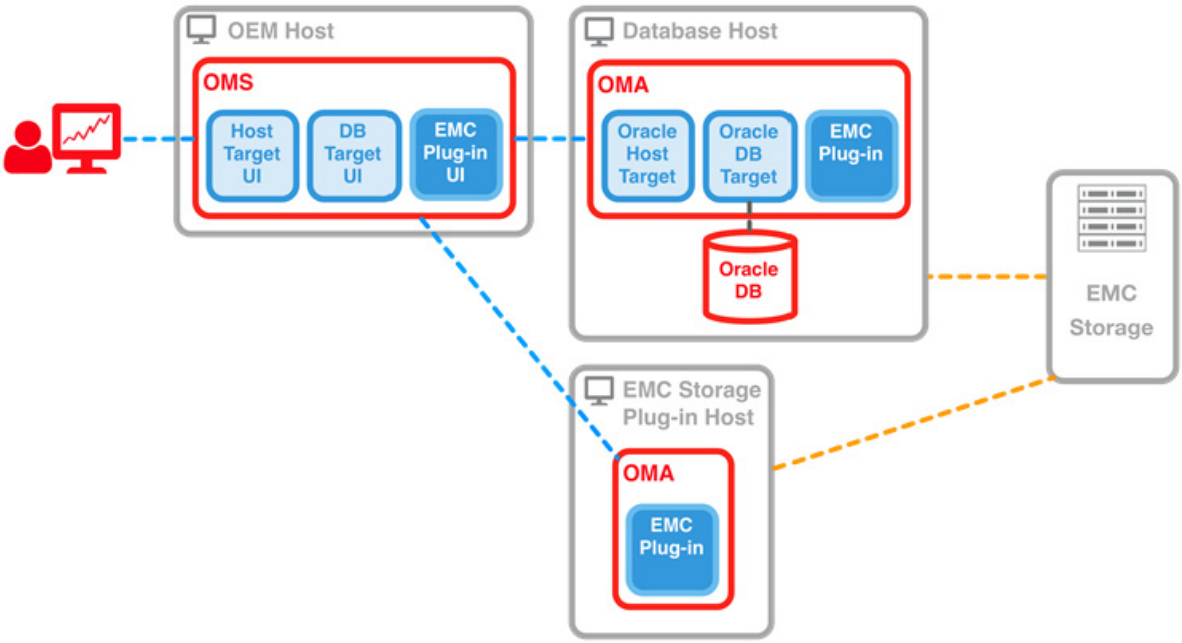

Figure 2 EMC Storage Plug-in logical architecture

Figure 3 shows a more detailed view of the plug-in components on the storage plug-in host.

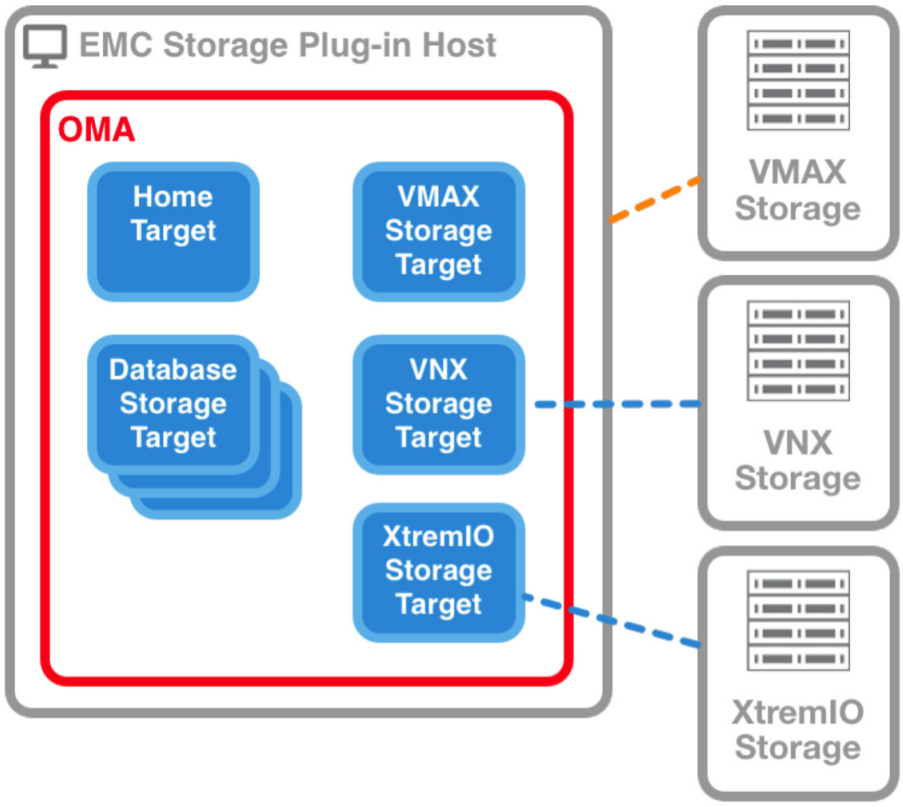

Figure 3 EMC Storage Plug-in components

The Home target is the parent target that manages the other targets as they are configured. The number of required storage targets depends on the number of different types of storage arrays that you want to monitor. Configuring a storage target provides information to the Home target to enable connection to the array for metric collection. After the storage targets are configured, the Home target can collect and display array-level metrics from the storage array.

Database storage targets are configured to collect and display database-level metrics, including the performance of the specific storage volumes used by specific databases. These targets coordinate with small targets on the actual database hosts to provide storage metrics that are specific to that particular database (or ASM instance).

Figure 4 shows a full architecture diagram with all of the plug-in target types and installation locations. This is the typical setup of the plug-in; however, you can modify the architecture for a more distributed setup.

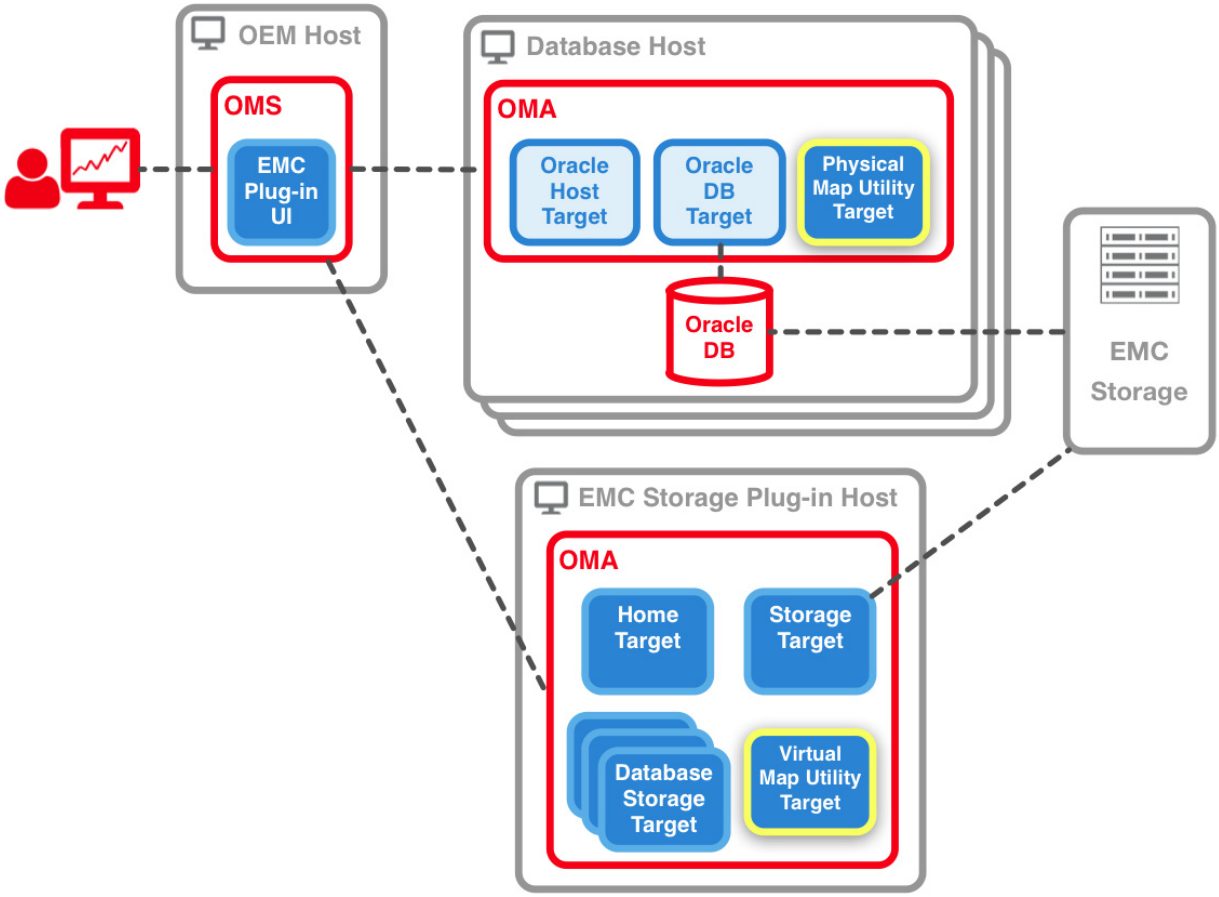

Figure 4 EMC Storage Plug-in target types and installation locations

EMC VMAX metric collection architecture

For collecting VMAX-specific metrics, this plug-in collects storage metrics from a previously configured Unisphere for VMAX (U4V) installation, as shown in Figure 5. Unisphere for VMAX provides a REST API that the plug-in uses to obtain performance and configuration metrics about the VMAX storage systems configured in U4V. The plug-in also uses EMC Solutions Enabler to issue a limited set of SYMCLI commands associated with metric collection from a VMAX array.

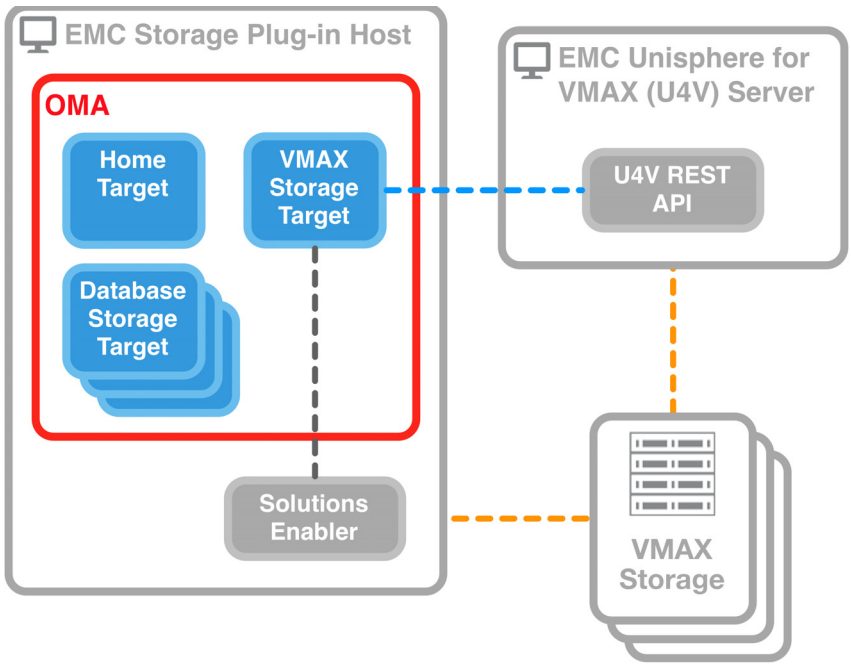

Figure 5 VMAX metric collection architecture

EMC VNX Block metric collection architecture

For VNX Block arrays, Figure 6 shows the direct connection created by the plug-in to the VNX Block storage processor. The connection to the array's storage processor is made through Navisphere Secure Command Line Interface (NaviSecCLI) to collect array level metrics. One VNX Block storage target is used for each VNX Block array.

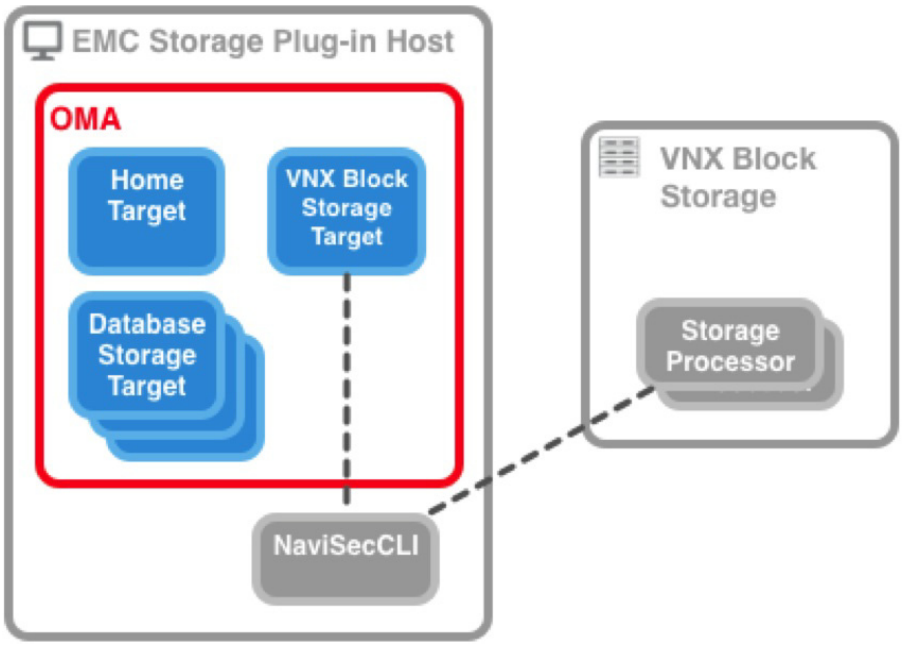

Figure 6 VNX Block metric collection architecture

EMC VNX File metric collection architecture

Figure 7 shows how the VNX File storage target collects data from the VNX File storage control station. Using the Secure Shell (SSH) protocol, the plug-in connects to and collects array level metrics from the control station administrating the VNX File that is being monitored. One VNX File storage target is used for each VNX File array.

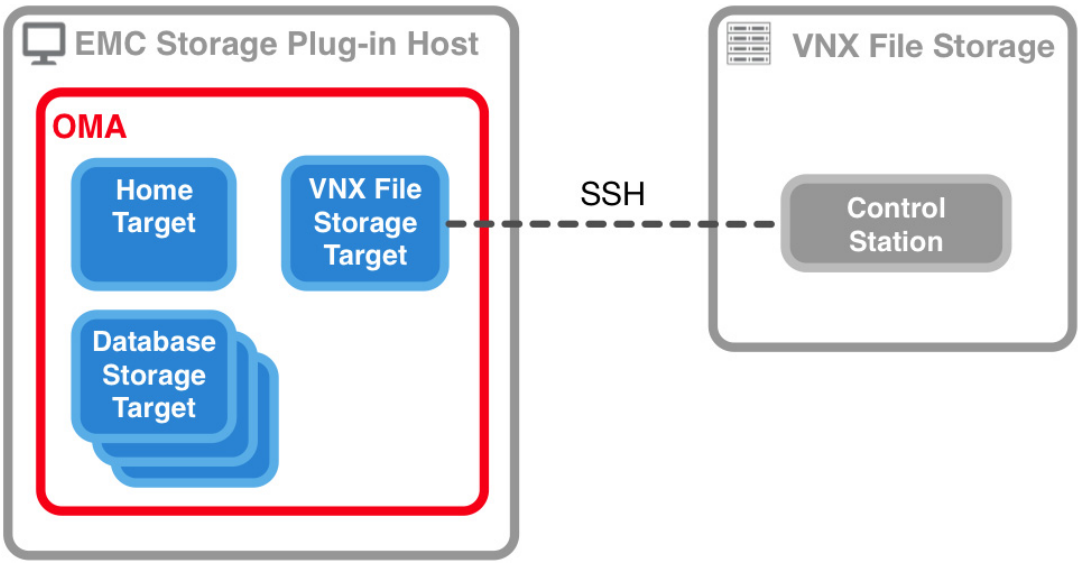

Figure 7 VNX File metric collection architecture

EMC XtremIO metric collection architecture

The EMC Storage Plug-in collects data from the EMC XtremIO storage through the storage's local EMC XtremIO Management Server (XMS), as shown in Figure 8. Using XMS's powerful REST API, the EMC XtremIO Storage target collects storage monitoring metrics and relays the data back to the Oracle Management Agent (OMA) where it is processed through OEM.

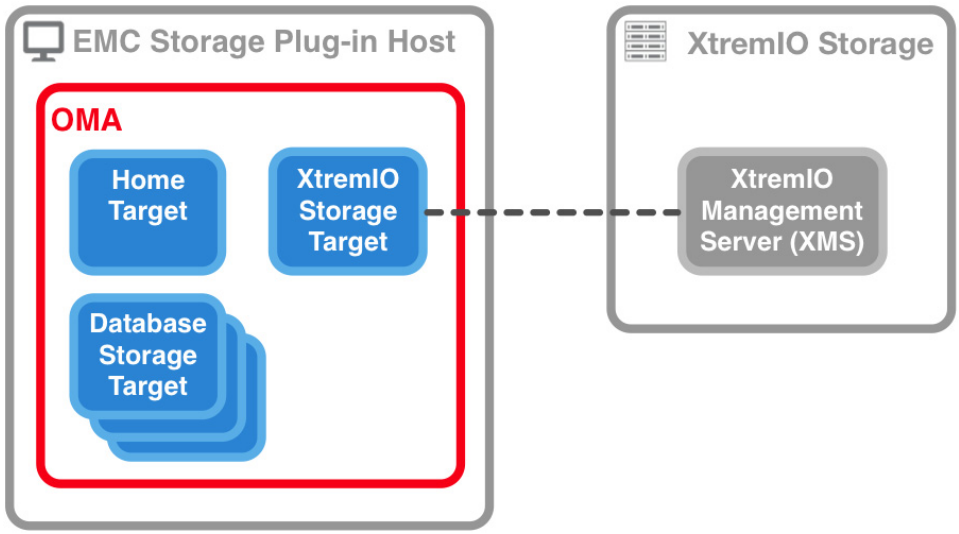

Figure 8 XtremIO metric collection architecture

CHAPTER 2
Deployment Prerequisites

This chapter presents the following topics:

Oracle environment prerequisites

The following versions of Oracle software and operating systems are supported by the plug-in.

Note: For specific details about setting up and preparing an Oracle Enterprise Manager system for the plug-in installation, refer to the *Oracle Enterprise Manager Cloud Control Administrator's Guide*: http://docs.oracle.com/cd/E24628_01/doc.121/e24473/toc.htm

Oracle Enterprise Manager

The plug-in supports the following Oracle Enterprise Manager versions:

- Oracle Enterprise Manager Cloud Control 12*c* R3 (12.1.0.3.0)
- Oracle Enterprise Manager Cloud Control 12*c* R4 (12.1.0.4.0)

Oracle Management Server (OMS)

The plug-in is supported for all Oracle Management Server platforms.

Oracle Management Agent (OMA)

The plug-in is supported for and can be deployed on Oracle Management Agents when the agent is installed on the following operating systems:

- Oracle Linux 4 and 5 (32-bit)
- Oracle Linux 4, 5, and 6 (64-bit)
- Red Hat Enterprise Linux 4 and 5 (32-bit)
- Red Hat Enterprise Linux 4, 5, and 6 (64-bit)
- Microsoft Windows 2008 (32-bit)
- Microsoft Windows 2008, 2008 R2, and 2012 (64-bit)
- Oracle Solaris 11 (x86-64)

Oracle Database

The following versions of the Oracle database, in stand-alone and Oracle Real Application Cluster (RAC) configurations, are supported for monitoring with the plug-in:

- Oracle 11*g* database
- Oracle 12*c* database

Note: If the database is running on ASM, the Oracle ASM target must exist on the OMS and monitor that ASM instance.

EMC VMAX prerequisites

The plug-in uses the VMAX Storage target as the main data-collecting target for VMAX monitoring operations. The target connects to EMC Solutions Enabler and the REST API from Unisphere for VMAX. This target is typically deployed to a single host that has a network connection to Unisphere for VMAX and has Solutions Enabler installed for SYMCLI communication to the VMAX storage systems being monitored. SYMCLI commands require a Fibre Channel (FC) connection to the VMAX array or communication with a remote SYMCLI server must be configured.

The following versions of Unisphere for VMAX are supported:

- Unisphere for VMAX 1.6.x (for VMAX)
- Unisphere for VMAX 8.0.1 or greater (for VMAX3™)

The following versions of Solutions Enabler are supported for the plug-in:

- Solutions Enabler 7.x
- Solutions Enabler 8.x

Enable performance monitoring in U4V

Collecting VMAX storage information with the Unisphere for VMAX REST API requires U4V credentials for connection to the U4V server. A Unisphere for VMAX administrator can supply this account information and create an account specifically for the VMAX Storage target. This account requires the Performance Monitor role for proper operation. The account information is provided to the target during the configuration.

Note: The Unisphere for VMAX Performance Option is required to collect performance metrics. The U4V Performance Option is not supported when Unisphere for VMAX is installed on the VMAX Service Processor.

For the VMAX Storage target to collect information on a VMAX array, performance monitoring must be enabled on the U4V server. To ensure that performance monitoring is enabled:

1. Open a browser window and go to the U4V web interface, typically found at

   https://[host]:[port]/univmax/

2. Click the left VMAX icon on the main control bar and select the VMAX array you want to monitor, as shown in Figure 9.

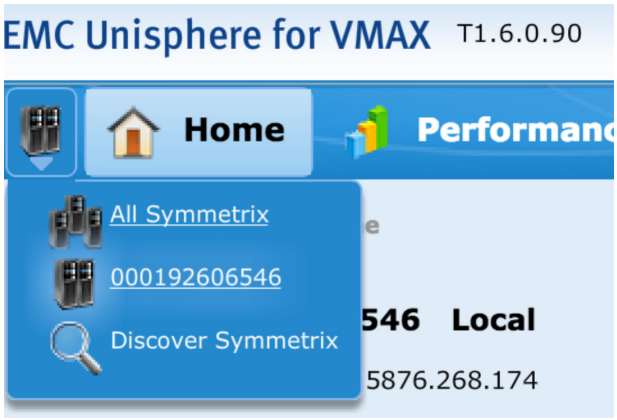

Figure 9 Select a VMAX array

3. Click **Performance** › **Settings** on the main control bar, as shown in Figure 10.

Figure 10 Manage performance settings

4. Click **System Registrations**, as shown in Figure 11.

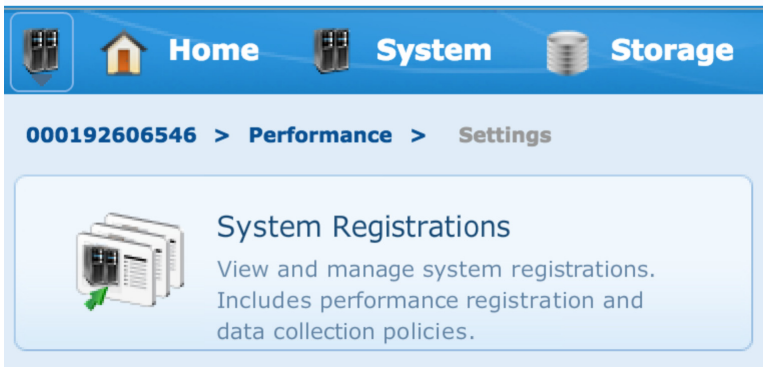

Figure 11 View and manage system registrations

5. Select the row with the array you want to monitor, and click **View Details**, as shown in Figure 12.

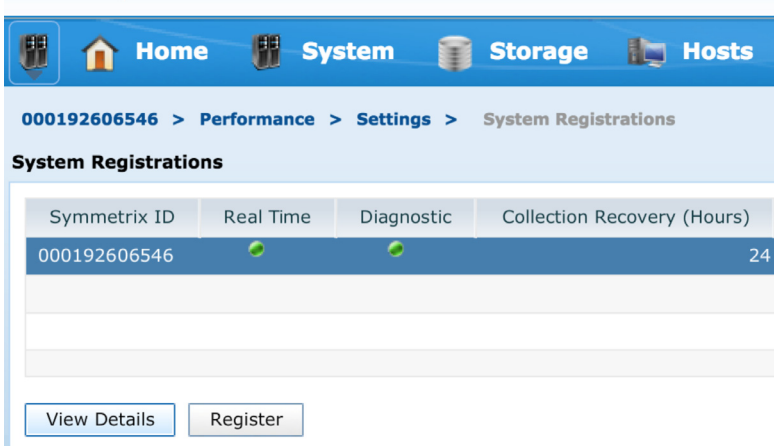

Figure 12 Select an array to monitor

6. Select **Real Time** and **Diagnostic** and click **Apply**, as shown in Figure 13.

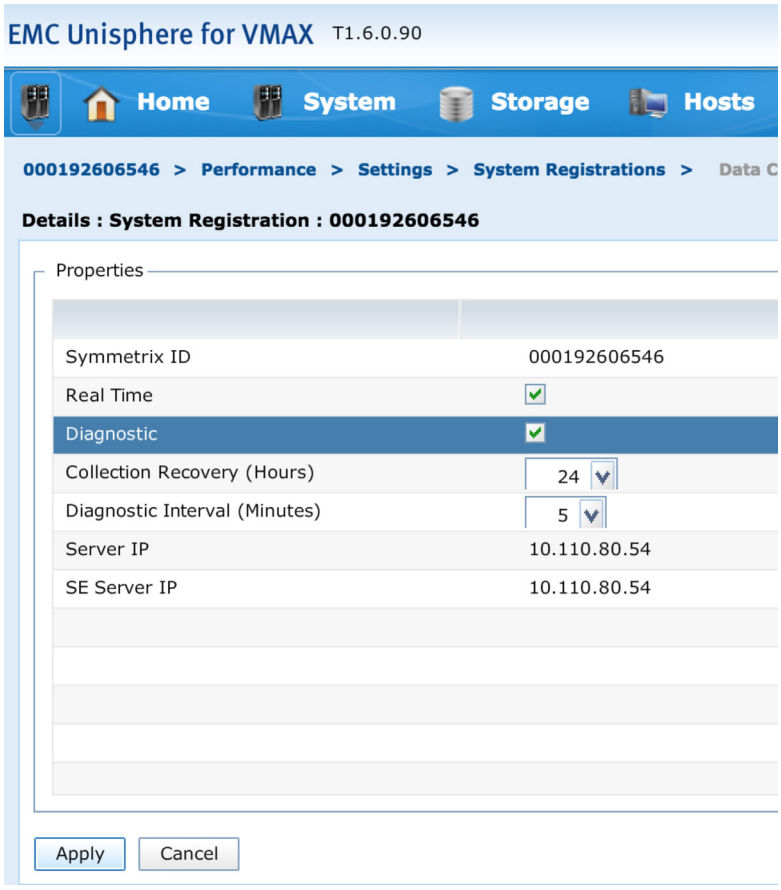

Figure 13 System registration properties

Configure SYMCLI

For the VMAX Storage target to successfully run SYMCLI commands, Solutions Enabler must be installed on the host that the VMAX Storage target is configured on. To run SYMCLI commands through Solutions Enabler, you must configure either a FC connection to the VMAX Storage array or a network connection to a SYMCLI server.

Oracle software users can run the SYMCLI commands and run the EMC Solutions Enabler SYMCLI **symdev** and **symaccess** commands. SYMCLI must be configured to allow the Oracle software user to run these commands. This can be accomplished by adding the user to the SYMAPI **daemon_users** file.

Note: On Red Hat and Oracle Linux, the **daemon_users** file is at the following location:

```
/var/symapi/config/daemon_users
```

Storage groups created by the plug-in

To collect storage metrics for specific volumes being used by a database, the VMAX Storage target creates a custom storage group on the VMAX array that contains those volumes. This storage group is separate from any storage group that the storage administrator has created for masking and provisioning storage to the host. It is only used to group storage devices for metric collection with Unisphere for VMAX. This storage group is automatically deleted when the VMAX Storage target is deleted.

The VMAX storage target uses the following naming convention for the storage group where **‹target-name›** represents the name that users define when configuring database storage monitoring in the plug-in:

```
OEMPI_SG_<target-name>
```

EMC VNX Block prerequisites

The plug-in uses the VNX Block Storage target as the main data collecting target for VNX Block monitoring operations. The target connects to the VNX using the Navisphere Secure Command Line Interface (NaviSecCLI), which makes a network connection to the VNX storage processors. The target must be deployed to a host that has the NaviCLI software installed and configured on it.

You must also have credentials (a username and password) with the rights to execute NaviSecCLI commands. Your storage administrator will provide credentials to be used during deployment of the VNX Block Storage target.

Enable performance monitoring on VNX storage

For the EMC VNX Block Storage target to collect VNX metrics, enable statistics logging on the VNX. Use the following NaviSecCLI commands to check and set the state of statistics logging.

To check the current status of VNX Block statistics logging, type the following NaviSecCLI command from the host that the VNX Block plug-in is installed on:

```
naviseccli -h <array-ip> -scope 0 -user <storage system
  username> -password <storage system password> getcontrol -sl
```

To enable VNX Block statistics logging, type the following NaviSecCLI command:

```
naviseccli -h <array-ip> -scope 0 -user <storage system
  username> -password <storage system password> setstats -on
```

EMC VNX File prerequisites

The plug-in uses the VNX File Storage target as the main data collecting target for VNX File monitoring operations. The target connects to the VNX File Control Station using the SSH protocol. You must have credentials (a username and password) with the rights to run Control Station commands. Your storage administrator will provide credentials to use during the deployment of the VNX File Storage target.

EMC XtremIO prerequisites

The plug-in uses the XtremIO Storage target as the main data collection target for XtremIO monitoring operations. The target connects to the XMS via its REST API for data collection. Your storage administrator will provide the IP address and connection credentials to use during deployment of the XtremIO Storage target.

Configure physical disk mapping

For the plug-in to determine the mapping between database storage and storage array volumes, the Physical Map Utility target uses the Inquiry utility (INQ) and pulls device information from the database host.

The binaries for INQ are packaged with the plug-in. These INQ binaries are in the INQ directory, and each INQ binary that is packaged with the plug-in is designed to run on a different environment setup.

If the database is running on Oracle ASM, the Physical Map Utility target also uses the asmtool for Windows, and asmcmd, and fdisk utilities for Linux and Solaris to collect metrics for Oracle ASM. The plug-in relies on the asmcmd and asmtool utilities to be configured and set up ahead of time. For Windows, the asmtool also needs to be in the Windows PATH for the user under which the OMA services run.

To set up the INQ and fdisk utilities properly:

1. Copy and rename the appropriate INQ binary from the plug-in installation media.
   - For Linux and Solaris: Copy to **/usr/sbin/** and rename the binary to **inq**.
   - For Windows: Copy to a folder included in the Windows PATH and rename the binary to **inq.exe**.

   Note: If a new folder is added to the Windows PATH instead of adding INQ to a folder that already exists in the PATH, you must restart the OMA.

2. For Linux and Solaris, add the following lines to the **/etc/sudoers** file to allow the utilities to be run without a password prompt:

   ```
   [OMA_USER] ALL=NOPASSWORD:[inq path]
   [OMA_USER] ALL=NOPASSWORD:[fdisk path] (for ASM monitoring
   only)
   ```

3. Verify that INQ is properly set up by typing the following command as the oracle user:

   For Linux and Solaris:

```
$ sudo inq
Inquiry utility, Version V8.0.1.0 (Edit Level: 1953) built
with SYMAPI Version V8.0.1.0 (Edit Level 1953)
Copyright (c) [1997-2014] EMC Corporation. All Rights
Reserved.
For help type inq -h.
```

   For Windows:

```
C:\> inq
     Inquiry utility, Version V8.0.1.0 (Edit Level: 1953)
built with SYMAPI Version V8.0.1.0 (Edit Level 1953)
Copyright (c) [1997-2014] EMC Corporation. All Rights
Reserved.
For help type inq -h.
```

   Note: For monitored databases running on Oracle ASM, the Oracle ASM target must be configured and monitoring the Oracle ASM environment in the same OMS system as the EMC Storage Plug-in.

Adobe Flash requirements

The plug-in displays graphical information and metrics in Oracle Enterprise Manager by using Adobe Flash. Adobe Flash must be installed and running on the client machine connecting to the Oracle Enterprise Manager Cloud Control web interface.

Use the latest released version of Adobe Flash for optimal performance.

System virtualization

The prerequisites in this section apply only if you monitor databases in a VMware virtualized computer environment.

The plug-in supports monitoring databases in the following environments:

- Bare-metal or physical installations
- VMware virtualized environments

If the database host disks are all backed by Raw Device Mapping (RDM), no further prerequisites are required for the virtual environment.

The following configurations require prerequisites:

- At least one database is being monitored where the database resides on a Virtual Machine Disk (VMDK). That is, the database uses a non-RDM disk.
- At least one database is being monitored where the database does not reside on an Oracle Automatic Storage Management (ASM) disk group and at least one disk on the database host is backed by a VMDK.

Virtualized hosts that are used for the plug-in or monitored Oracle databases must be virtualized with VMware ESX hypervisor technology with one of the following VMware vSphere versions:

- VMware vSphere 4.1
- VMware vSphere 5.0
- VMware vSphere 5.1
- VMware vSphere 5.5

A vSphere user must be provided for the plug-in to access the vSphere environment. The vSphere user must have at least read access to view each virtual machine hosting a database that you want to monitor.

CHAPTER 3
Installing and Configuring the EMC Storage Plug-in

This chapter presents the following topics:

Installation overview

This chapter describes the installation, setup, and configuration steps in detail.

Figure 14 summarizes the steps for plug-in deployment, plug-in target configuration, and storage monitoring configuration.

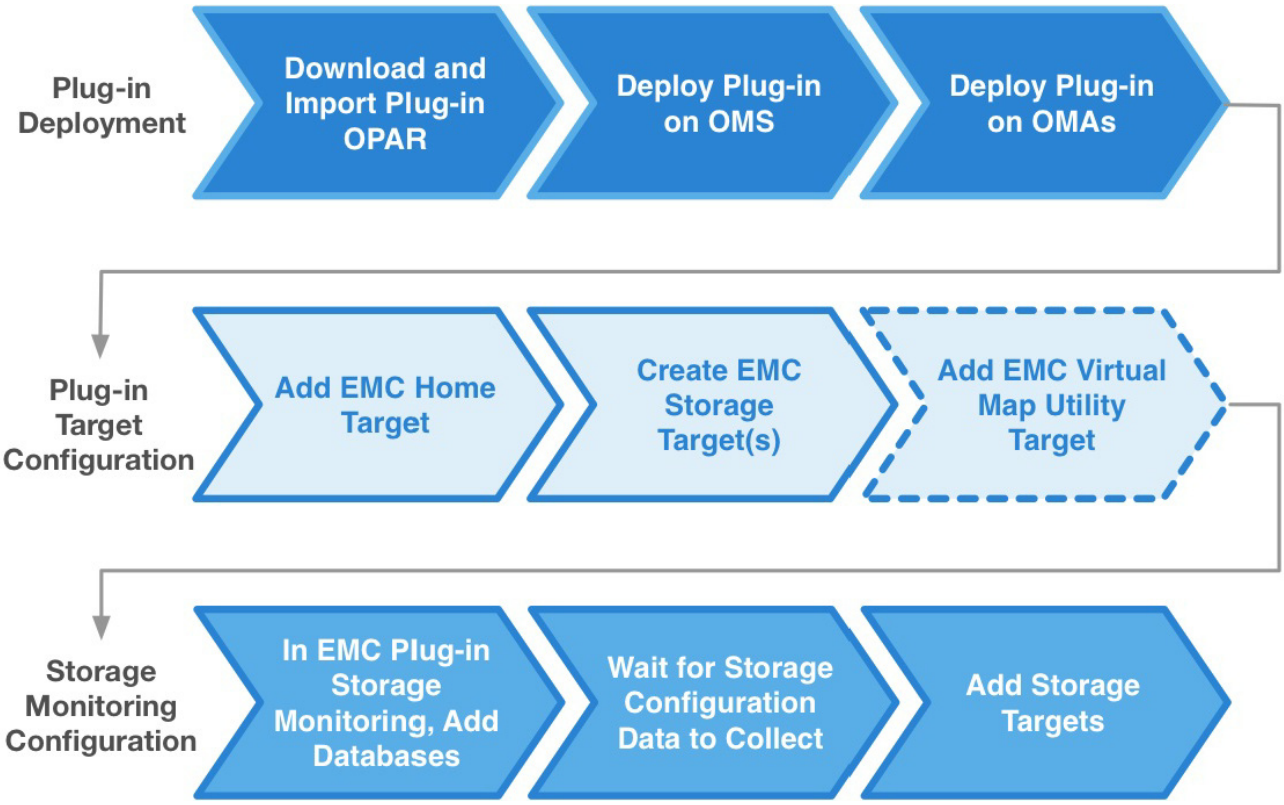

Figure 14 Plug-in installation, deployment, and configuration steps

Upgrade the plug-in

For upgrading the EMC Storage Plug-in for OEM 12c from version 12.1.0.1.0 to version 12.1.0.2.0, follow the same installation procedure as if installing a new plug-in. Targets created in version 12.1.0.1.0 of the plug-in will be unaltered and historical metrics will remain. There is no need to reconfigure these targets. The target version will be increased to 12.1.0.2.0 after the plug-in has been deployed to the corresponding Oracle Management Agent.

Note: The INQ utility installed on the hosts from the first 12.1.0.1.0 plug-in installation must be upgraded to INQ version 8.0.1.0. INQ version 8.0.1.0 is included with the latest 12.1.0.2.0 installation media. "Configure physical disk mapping" provides instructions for installing INQ.

Deploy the plug-in

Ensure that the Oracle Enterprise Manager environment is properly set up for plug-in deployment before deploying the plug-in.

Your OEM environment must have a working **emcli** command line utility, Oracle Software Library, and a deployed Oracle Management Agent.

Refer to the *Oracle Enterprise Manager's Administrator Guide* for help in setting up this environment: http://docs.oracle.com/cd/E24628_01/doc.121/e24473/toc.htm

Download the plug-in

To download the plug-in, go to the Oracle Extensibility Exchange website (www.oracle.com/goto/emextensibility), search the list for the EMC Storage plug-in for Oracle Enterprise Manager 12c, and follow these steps:

1. Click the download icon to open the EMC Online Support website. At the prompt, log in with your EMC Online Support credentials to open the plug-in download page.
2. Click the download link to download a Zip file that contains the plug-in packaged Zip file.
3. Open the Zip file to extract the plug-in OPAR file and transfer it to the Oracle Enterprise Manager server, if it is not already there.

Notes:

- The **EMC-Storage-Plug-in-for-OEM-12c.zip** file includes: Oracle Plug-in Archive (OPAR), open source licenses and attributions that are used by the plug-in, and the EMC Inquiry (INQ) utility.
- **The plug-in consists of two parts:** an Oracle Plug-in Archive (OPAR) file and an End-User License Agreement (EULA). You must confirm acceptance of the EULA when you add an EMC VMAX array as a target to be monitored. The plug-in collects metrics only if the EULA is accepted.

  Important: If you do not accept the EULA, Oracle Enterprise Manager automatically registers an incident. To accept the EULA after you add the target, revise the Monitoring Configuration properties of each EMC target, and change the acceptance answer to **Yes**. The plug-in will then collect and display all metrics for that target. The incident is cleared automatically after you accept the EULA.
- **You can transfer the plug-in to any server location that you choose:** Take note of the location, because you must know it when you begin the import steps.

Import the Plug-in OPAR

After you download and transfer the plug-in to the Oracle Enterprise Manager server, import the plug-in into Enterprise Manager Cloud Control using the **emcli import_update** command. The following command assumes that the plug-in archive (***.opar** file) is on the OEM server where **emcli** is installed.

Type the following command:

```
$ emcli import_update -file="<path to downloaded *.opar file>"
   -omslocal
```

The **-omslocal** flag indicates that the plug-in archive is on the same system where you are running this command and that the path exists on this system.

For example:

```
$ ls -l *.opar
-rw-r--r-- 1 oracle oinstall 591018 Oct 3 18:03
   emc.storage.xplg_12.1.0.2.0.opar

$ emcli import_update
   -file=/tmp/emc.storage.xplg_12.1.0.2.0.opar -omslocal
   Processing update: Plug-in - EMC Storage Monitoring.

Operation completed successfully. Update has been uploaded to
   Enterprise Manager. Please use the Self Update Home to manage
   this update.
```

Note: For more information on importing the plug-in, such as optional flags and command execution examples, refer to the *Oracle Enterprise Manager Cloud Control Administrator's Guide* at http://docs.oracle.com/cd/E24628_01/doc.121/e24473/plugin_mngr.htm

Deploy the plug-in on the Oracle Management Server (OMS)

You must deploy a plug-in on the OMS before it can be used to monitor targets.

To deploy the plug-in on OMS:

1. From the **Setup** menu, click **Extensibility** › **Plug-ins**.

2. In the **Plug-ins** page, select the plug-in and click **Deploy On** › **Management Servers**, as shown in Figure 15.

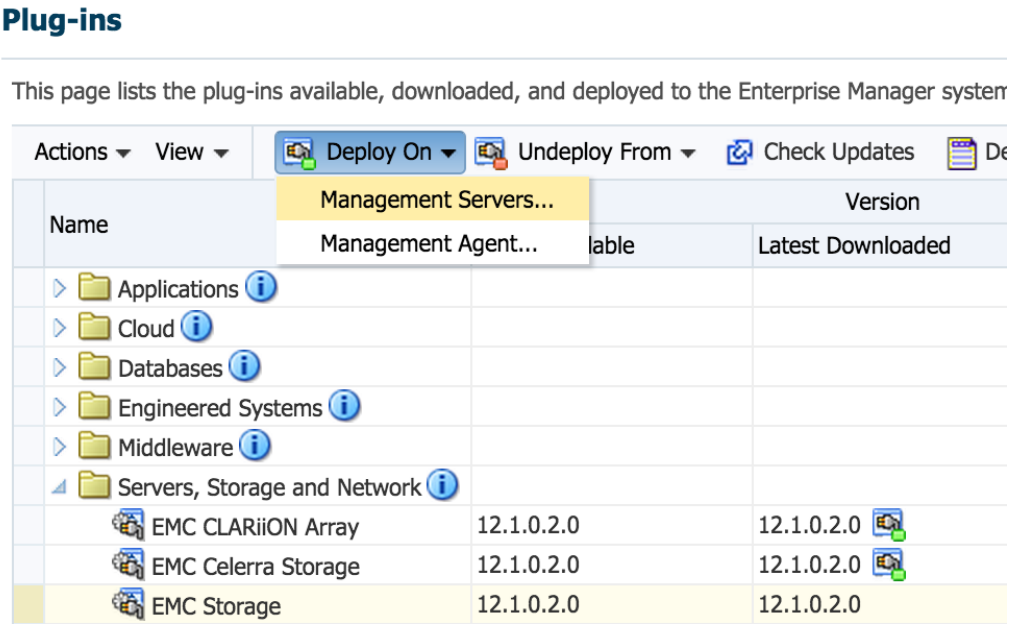

Figure 15 Deploy On › Management Servers

3. In the **Deploy Plug-in on Management Servers General** page, type the **Repository SYS Password** and click **Continue**.
4. In the **Deploy Plug-in on Management Servers Pre-requisite Checks** page, review the list of the checks that were successfully completed and click **Next**.
5. In the **Deploy Plug-in on Management Servers Review** page, click **Deploy** to deploy the plug-in.
6. In the **Deploy Plug-in on Management Servers Confirmation** page, click **Show Status** to view the steps of the deployment.

   Note: Green check marks confirm which steps were completed successfully.

Deploy the plug-in on the OMA

You can now deploy the plug-in on the required set of management agents (hosts running the Oracle Management Agent software). This list is typically comprised of the Oracle database hosts that you want to monitor and one or more EMC Storage Plug-in hosts.

The EMC Storage Plug-in host could either be a separate, dedicated host used solely for this purpose, or it could be an existing database host that you want to perform the function of the EMC Storage Plug-in host. The EMC Storage Plug-in host must have an OMA installed and must be able to connect to the EMC storage systems that are being monitored.

Note: "EMC VMAX prerequisites," "EMC VNX Block prerequisites," "EMC VNX File prerequisites," "EMC VNX File prerequisites," "EMC XtremIO prerequisites," and "Common VMAX Deployment Scenarios"provide details about the prerequisites for each EMC storage type that is being monitored.

To deploy the plug-in on a management agent:

1. Select the plug-in, and click **Deploy On › Management Agent**, as shown in Figure 16.

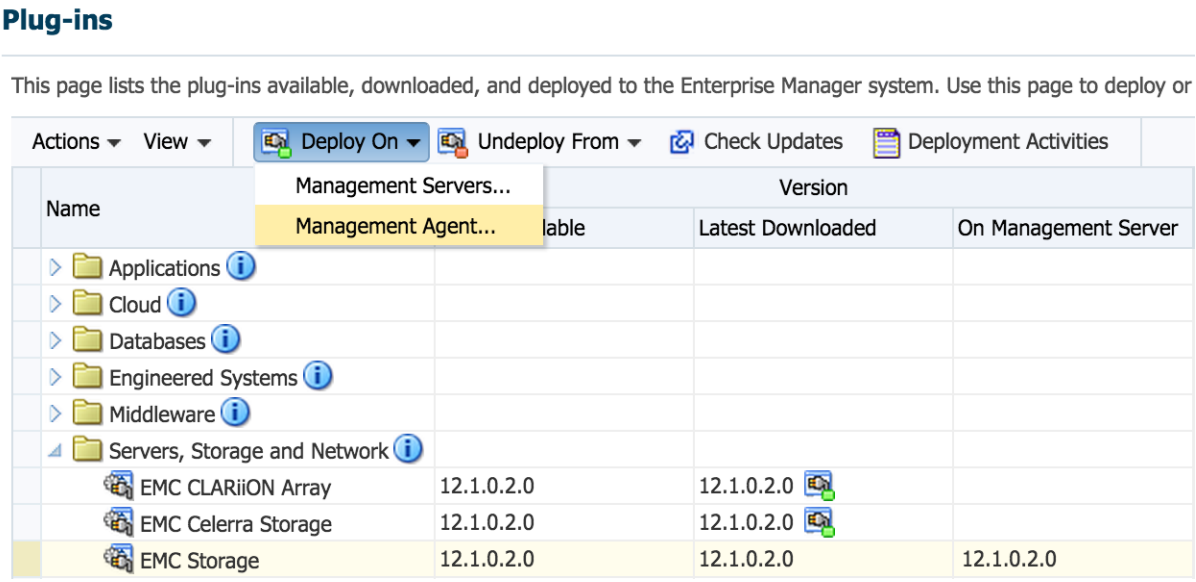

Figure 16 Deploy On › Management Agent

2. Verify the target types being installed and click **Continue**.
3. In the **Deploy Plug-in on Management Agent General** page, click **Add** to add the management agents where the plug-in is to be deployed. Click **Continue**, as shown in Figure 17.

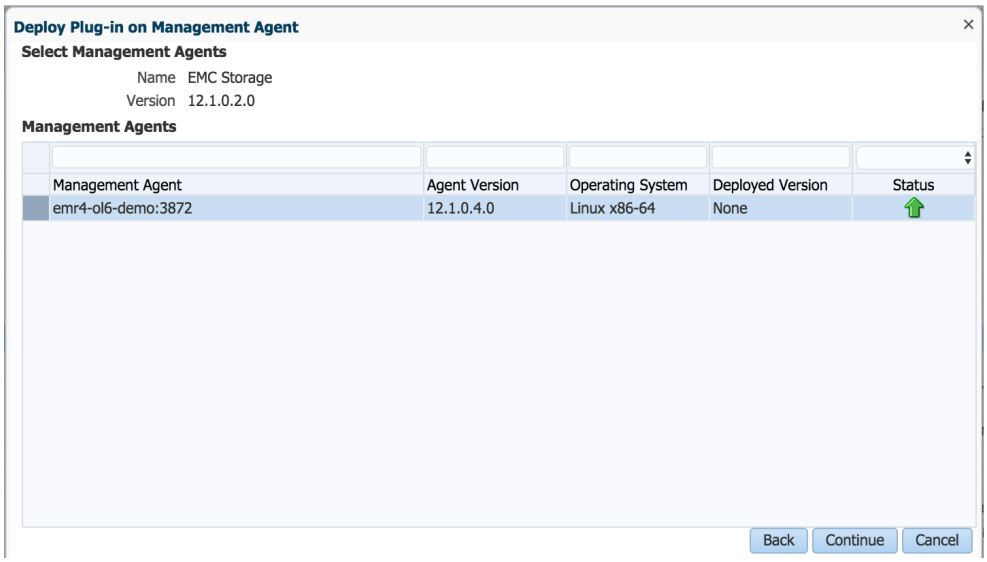

Figure 17 Management agents

4. After the prerequisite checks are completed, click **Next**, as shown in Figure 18.

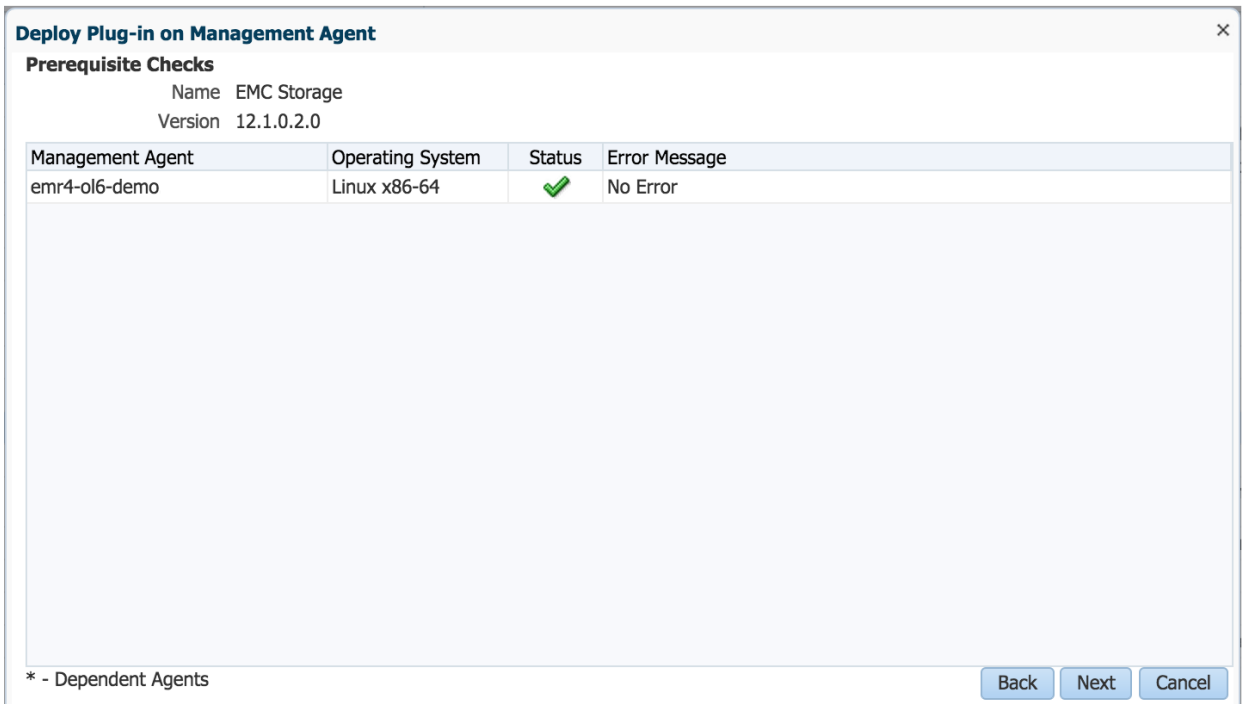

Figure 18 Prerequisite checks

5. In the **Deploy Plug-in on Management Agent Review** page, click **Deploy**, as shown in Figure 19.

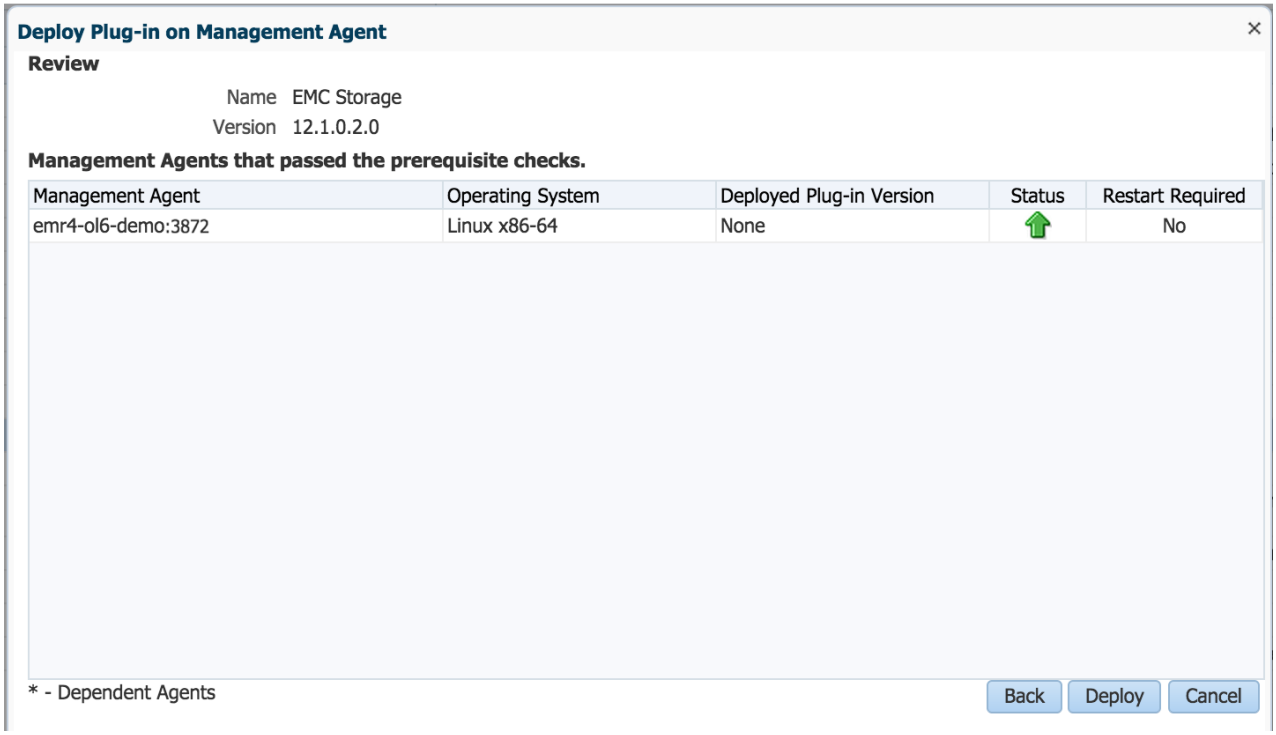

Figure 19 Management agents that passed the prerequisite checks

6. In the **Deploy Plug-in on Management Agent Confirmation** page, click **Show Status**, as shown in Figure 20, to monitor the deployment status.

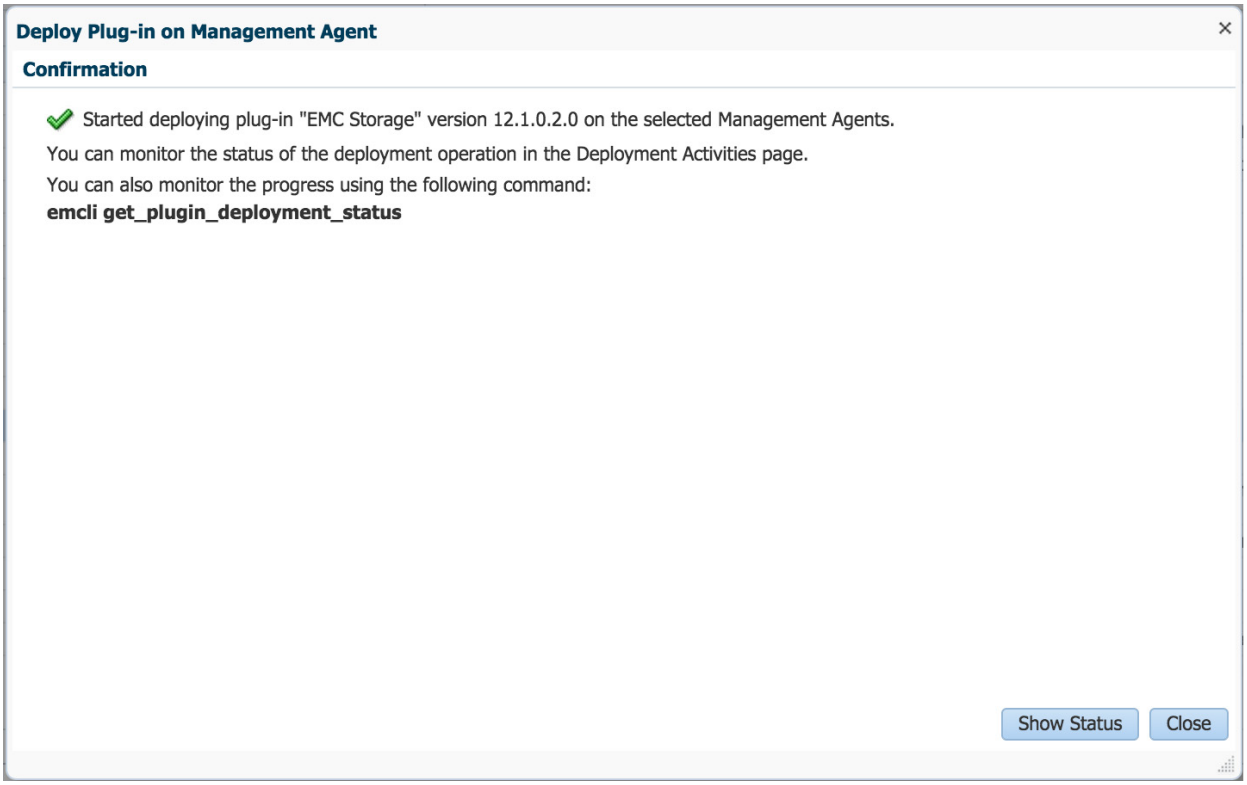

Figure 20 Confirmation of deployed management agents

Note: Green check marks confirm the successful completion of deployment activities and deployment steps.

Verify plug-in deployment

To verify that the plug-in was successfully deployed on the Oracle Management Server and Agent:

1. From the **Setup** menu, click **Extensibility** › **Plug-ins**.
2. Expand the plug-in **Servers, Storage and Network** group.

3. Find the row for the plug-in. This row should now display the correct version in the **On Management Server** column and a number greater than **0** in the **Management Agent with Plug-in** column, as shown in Figure 21.

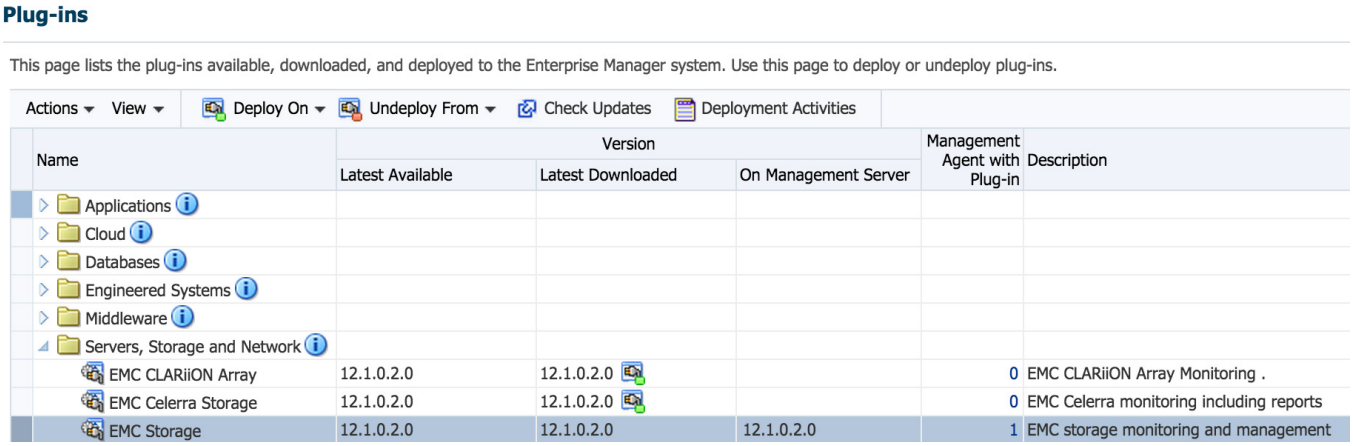

Figure 21 Verify the deployment

Create EMC Storage targets

Use the following procedures to add the EMC Home target and, depending on which EMC storage system that you want to monitor, the EMC VMAX Storage target, the VNX File Storage and Block Storage targets, the XtremIO target, and the EMC Virtual Map Utility target.

The EMC Home target is the dashboard for the plug-in, but it cannot monitor any storage systems until storage targets are created.

Create the EMC Home target

The EMC Home target is the dashboard of the EMC Storage Plug-in and provides a high level view of monitored databases with EMC storage. From here you can configure databases to monitor, find detailed information about the storage those databases use, and examine array-level storage metrics.

To create the EMC Home target:

1. From **Enterprise Manager**, go to **Setup** › **Add Target** › **Add Targets Manually**, as shown in Figure 22.

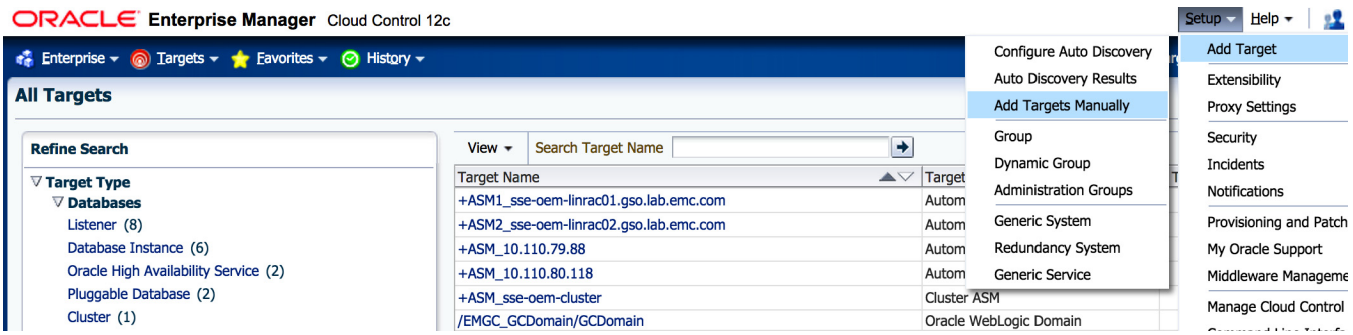

Figure 22 Add Targets Manually

2. Select **Add Targets Declaratively by Specifying Target Monitoring Properties**.
3. From the **Target Type** menu, select **EMC Home**.
4. Specify the desired Oracle Management Agent (OMA), whichever host you designated as the EMC Storage Plug-in Host, and click **Add Manually**, as shown in Figure 23.

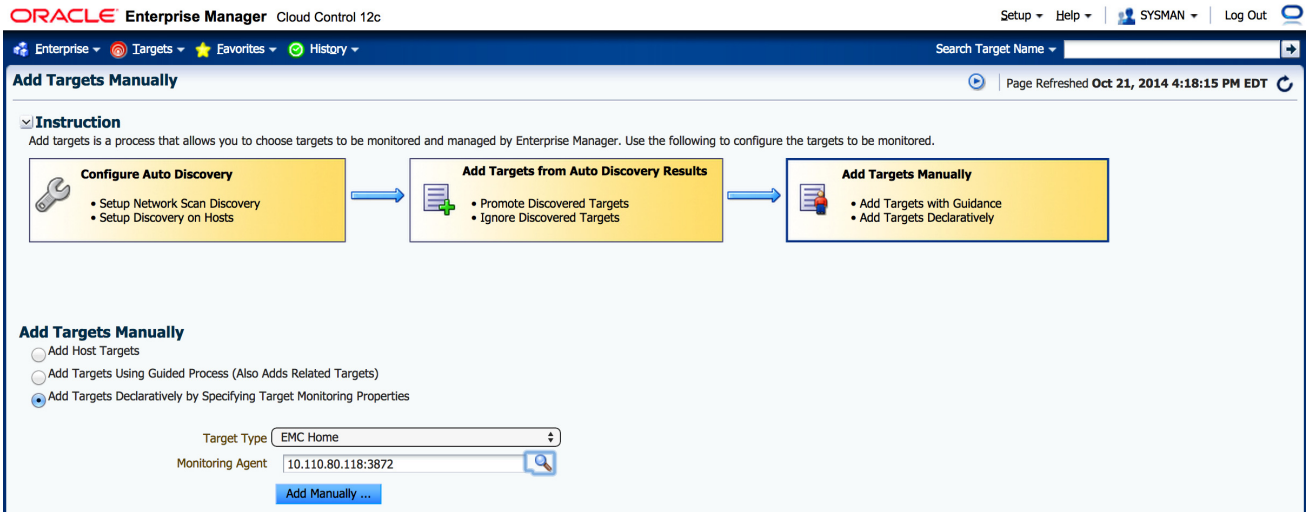

Figure 23 Add an EMC Home Target manually

5. Specify properties for the EMC Home target, as shown in Figure 24:
   - **Target Name**—The name by which Enterprise Manager will identify this target
   - **Do you Accept the EULA?**—Type **Yes**, as the plug-in will not function otherwise

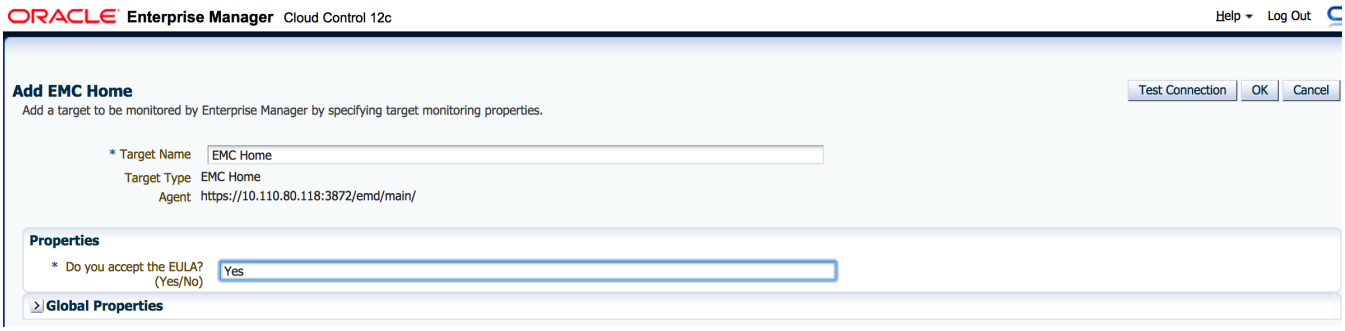

Figure 24 EMC Home target properties

6. Click **Test Connection** to ensure that this configuration will work correctly. If the connection fails, a popup will indicate the cause of the failure.
7. Click **OK** and click **Close** to finish adding the target.

Create the EMC VMAX Storage target

You can use the EMC VMAX Storage target to monitor VMAX arrays and view detailed information on components of the arrays. You must create an EMC VMAX Storage target for each U4V server that you want to monitor.

Note: The EMC VMAX Storage target can monitor all of the VMAX storage systems configured in a U4V server. You do not need to create a VMAX storage target for each VMAX system.

To create a target:

1. From **Enterprise Manager**, go to **Setup** › **Add Target** › **Add Targets Manually**.
2. Select **Add Targets Declaratively by Specifying Target Monitoring Properties**.
3. From the **Target Type** menu, select **EMC VMAX Storage**.
4. Specify the desired Oracle Management Agent (OMA), whichever host you designated as the EMC Storage Plug-in Host, and click **Add Manually**, as shown in Figure 25.

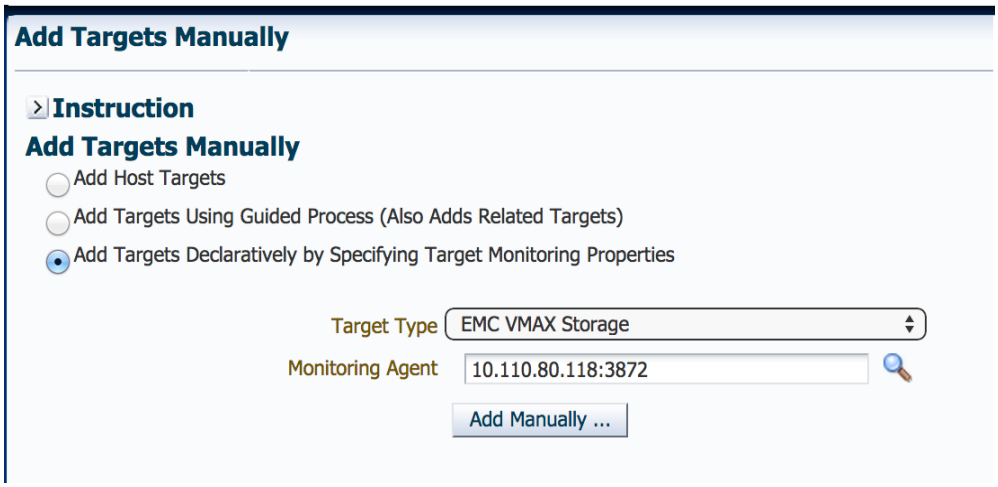

Figure 25 Add an EMC VMAX Storage target manually

Note: The OMA must have Solutions Enabler installed for the VMAX Storage target to work properly.

5. Specify properties for the EMC VMAX Storage target, as shown in Figure 26:
   - **Target Name**—The name by which Enterprise Manager will identify this target
   - **Do you accept the EULA?**—Type **Yes**, as the plug-in will not function otherwise
   - **Full path to symcli**—The full path to the symcli executable on the host where this target is being installed

     Note: If the path includes spaces (such as for Windows) enclose the path with quotes.

   - **U4V Hostname**—The IP or fully qualified domain name of the U4V host

- **U4V Port**—(Optional) The U4V Port number (default value is 8443)
- **U4V User Name**—The name of the user who will connect to U4V
- **U4V User Password**—The password of the user who will connect to U4V

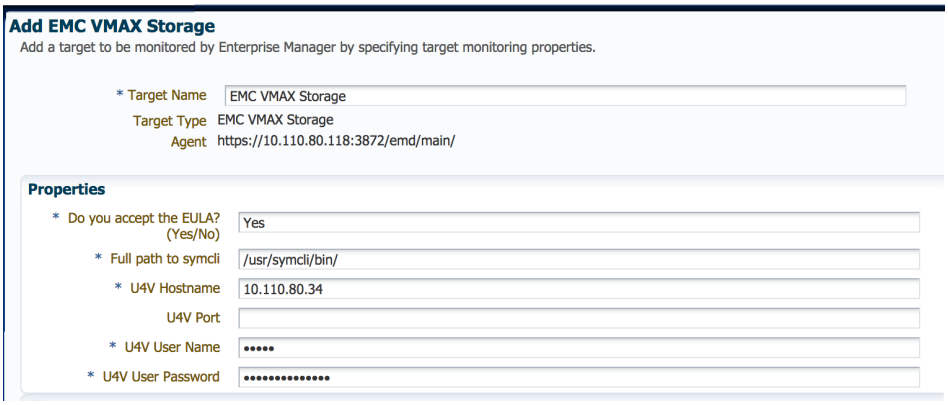

Figure 26 EMC VMAX target properties

6. Click **Test Connection** to ensure that this configuration will work correctly. If the connection fails, an error message will indicate the cause of the failure.
7. Click **OK** and click **Close** to finish adding the target.

Set preferred credentials

To set preferred credentials:

1. Click **Setup** › **Security** › **Preferred Credentials**, as shown in Figure 27.

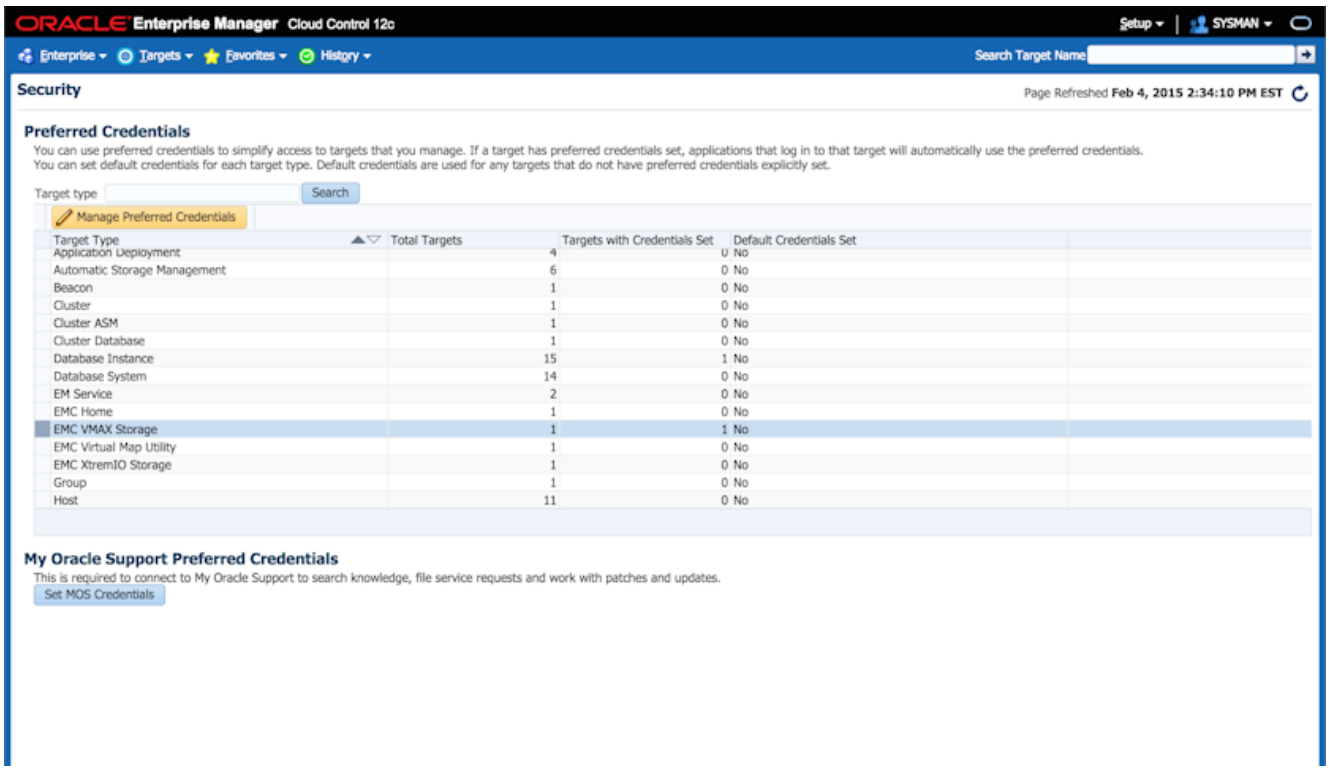

Figure 27 Preferred credentials

2. Select **EMC VMAX Storage** from the list of Target Types.
3. Click **Manage Preferred Credentials**.
4. Select the Target Name from the list and click **Set**.
5. Create or use a preferred credential for the Oracle software user who is granted access to use the SYMCLI utility.

   Note: "Configure SYMCLI" on page 20 provides information about configuring the Oracle software user)

6. Click **Test** and **Save** to finish setting the preferred credentials for the EMC VMAX storage target. Figure 28 confirms that the credentials were created successfully.

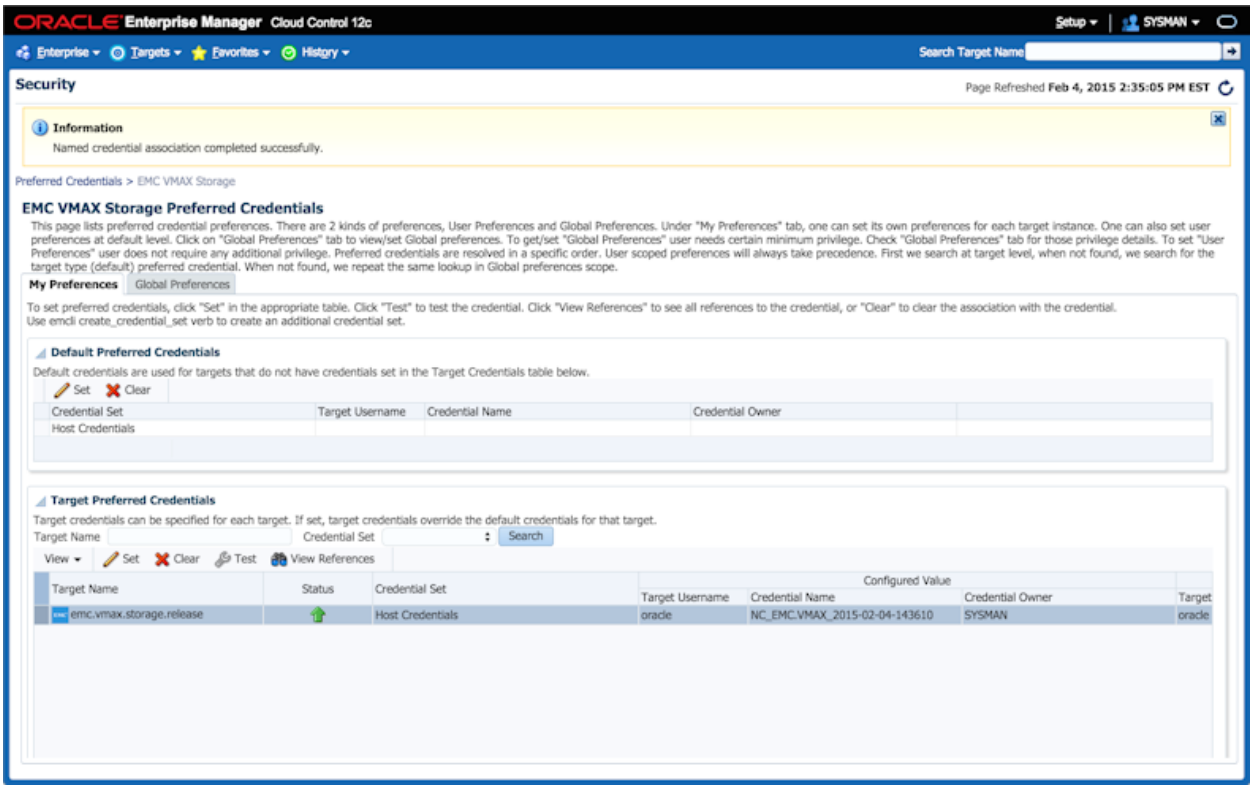

Figure 28 Credentials confirmation

Create the EMC VNX Block Storage target

You can use the EMC VNX Block Storage target to monitor VNX Block arrays and view detailed information about components of the arrays. You must create this target for each VNX Block array that you want to monitor.

To create a target:

1. From **Enterprise Manager**, go to **Setup** › **Add Target** › **Add Targets Manually**.
2. Select **Add Targets Declaratively by Specifying Target Monitoring Properties**.
3. From the **Target Type** menu, select **EMC VNX Block Storage**.

4. Specify the desired Oracle Management Agent (OMA), whichever host you designated as the EMC Storage Plug-in Host, and click **Add Manually**, as shown in Figure Figure 29.

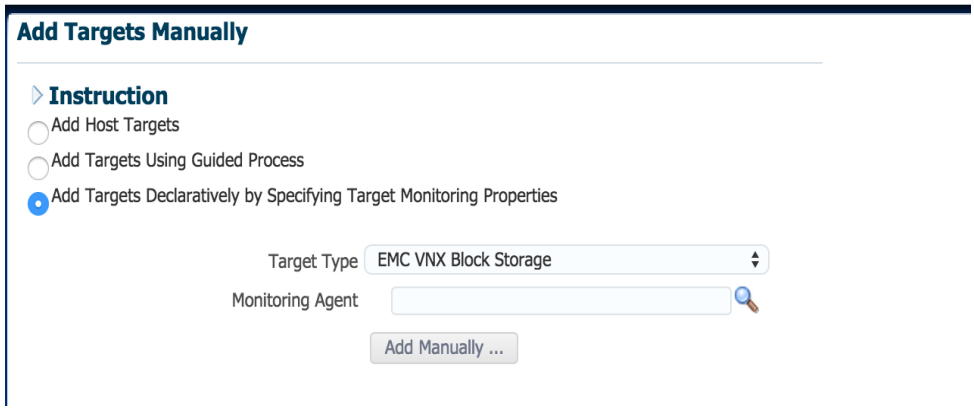

Figure 29 Add an EMC VNX Block Storage target manually

Note: The OMA must have NaviSecCLI installed for the VNX Block Storage target to work properly.

5. Specify properties for the EMC VNX Block Storage target, as shown in Figure 30:
   - **Target Name**—The name by which Enterprise Manager will identify this target
   - **Do you accept the EULA?**—Type **Yes**, as the plug-in will not function otherwise
   - **Full path to naviseccli**—The full path to the naviseccli executable on the host where this target is being installed

     Note: If the path includes spaces (such as for Windows) enclose the path with quotes.

   - **Naviseccli User Name**—The name of the user who will connect through NaviSecCLI
   - **Naviseccli User Password**—The password of the user who will connect through NaviSecCLI
   - **Naviseccli login scope**—An integer of **0** for global or **1** for local
   - **Storage Process A Hostname**—The IP or fully qualified domain name of storage processor A for the VNX Block array

- **Storage Process B Hostname**—The IP or fully qualified domain name of storage processor B for the VNX Block array

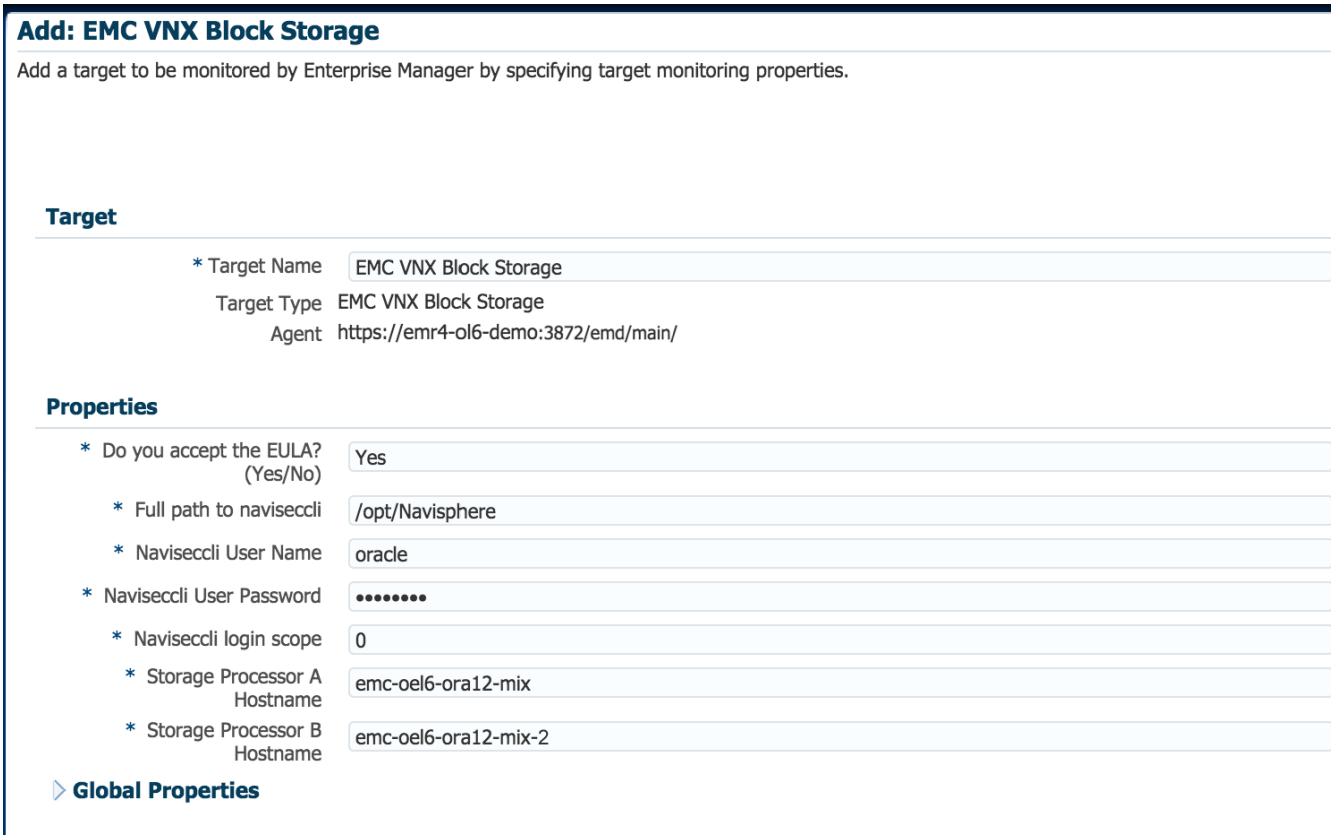

Figure 30 VNX Block Storage configuration

6. Click **Test Connection** to ensure that this configuration will work correctly. If the connection fails, an error message will indicate the cause of the failure.
7. Click **OK** and click **Close** to finish adding the target.

Create the EMC VNX File Storage target

You can use the EMC VNX File Storage target to monitor VNX File arrays and view detailed information about components of the arrays. You must create an EMC VNX File Storage target for each VNX File storage array that you want to monitor.

To create a target:

1. From **Enterprise Manager**, go to **Setup** › **Add Target** › **Add Targets Manually**.
2. Select **Add Targets Declaratively by Specifying Target Monitoring Properties**.
3. From the **Target Type** menu, select **EMC VNX File Storage**.

4. Specify the desired Oracle Management Agent (OMA), whichever host you designated as the EMC Storage Plug-in Host, and click **Add Manually**, as shown in Figure 31.

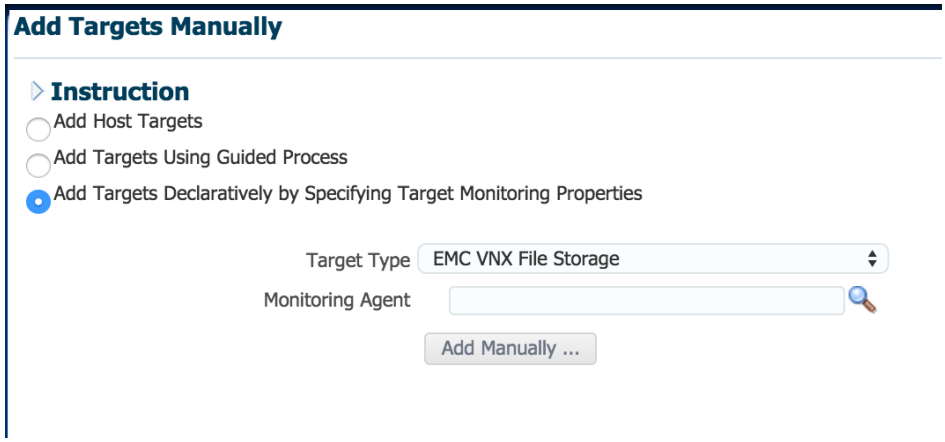

Figure 31 Add an EMC VNX File Storage target manually

5. Specify properties for the EMC VNX File Storage target, as shown in Figure Figure 32:
   - **Target Name**—The name by which Enterprise Manager will identify this target
   - **Control Station Hostname**— The IP or fully qualified domain name of the Control Station for the VNX File
   - **Control Station NAS_DB Path**— Path to the NAS_DB configuration files location

     Note: If the path includes spaces (such as for Windows) enclose the path with quotes.

   - **Control Station Password**—The password of the user who will connect to the Control Station
   - **Control Station User Name**—The name of the user who will connect to the control station
   - **Do you accept the EULA?**—Type **Yes**, as the plug-in will not function otherwise

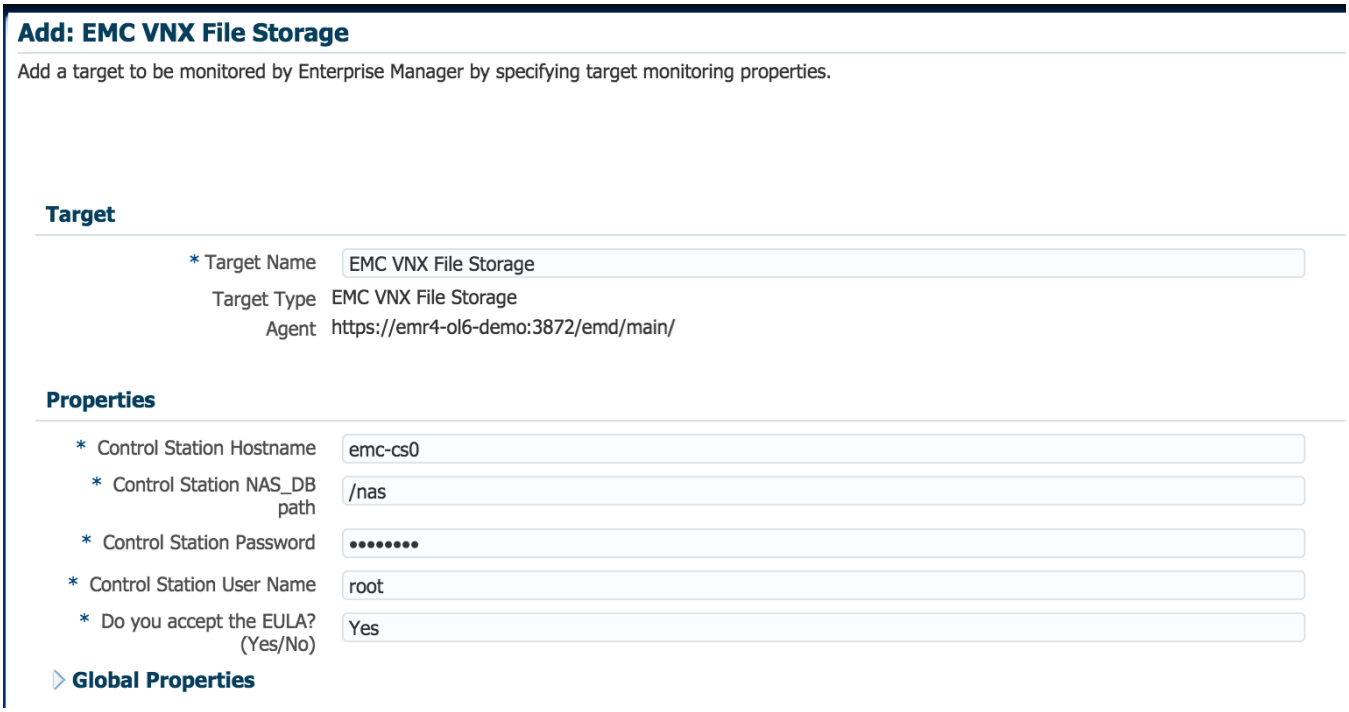

Figure 32 VNX File Storage configuration

6. Click **Test Connection** to ensure that this configuration will work correctly. If the connection fails, an error message will indicate the cause of the failure.
7. Click **OK** and click **Close** to finish adding the target.

Create the EMC XtremIO Storage target

You can use the EMC XtremIO Storage target to monitor XtremIO arrays and view detailed information about components of the arrays. You must create an EMC XtremIO Storage target for each XtremIO array that you want to monitor.

To create the target:

1. From Enterprise Manager, go to **Setup › Add Target › Add Targets Manually**.
2. Select **Add Targets Declaratively by Specifying Target Monitoring Properties**.
3. From the **Target Type** menu, select **EMC XtremIO Storage**.
4. Specify the desired Oracle Management Agent (OMA), whichever host you designated as the EMC Storage Plug-in Host, and click **Add Manually**, as shown in Figure 33.

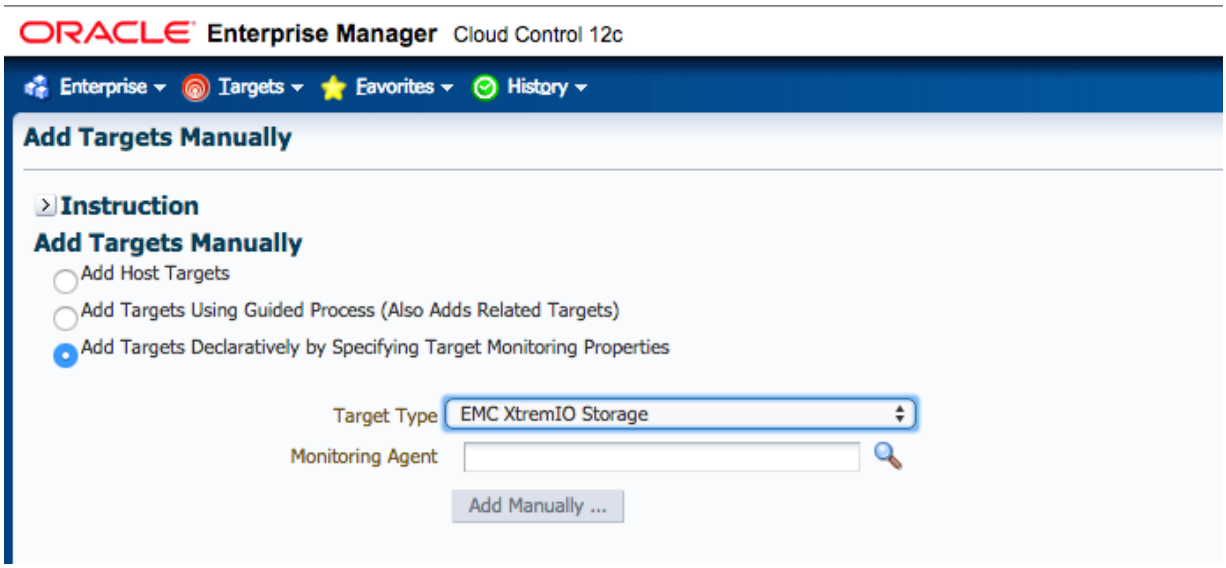

Figure 33 Add an XtremIO target manually

5. Specify properties for the EMC XtremIO Storage target, as shown in Figure 34:
   - **Target Name**—The name by which Enterprise Manager will identify this target
   - **Do you accept the EULA?**—Type **Yes**, as the plug-in will not function otherwise
   - **XMS Host**— The IP or fully qualified domain name of the XMS for the XtremIO Storage Cluster
   - **XMS User Name**—The name of the user who will connect to the XMS REST API
   - **XMS Password**—The password of the user who will connect to XMS REST API

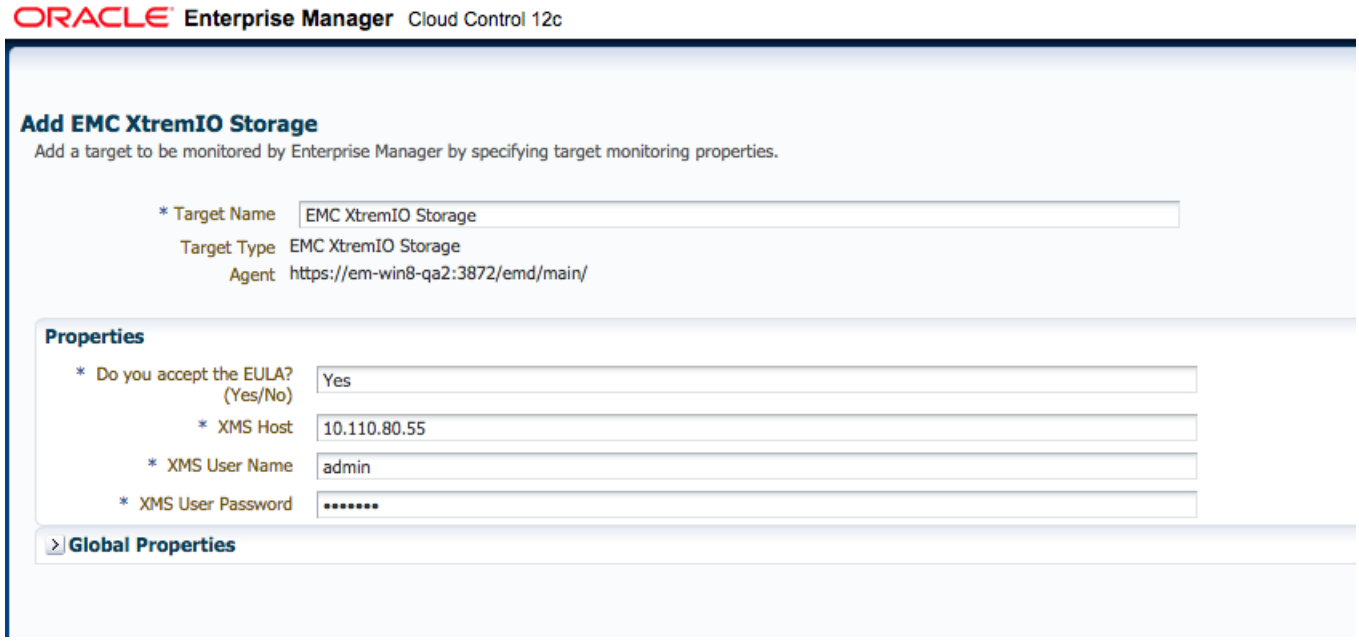

Figure 34 Add an XtremIO target

6. Click **Test Connection** to ensure that this configuration will work correctly. If the connection fails, an error message will indicate the cause of the failure.
7. Click **OK** and click **Close** to finish adding the target.

Create EMC Virtual Map Utility targets

The EMC Virtual Map Utility is a target that interprets the storage structure of vSphere datastores that may be hosting Oracle databases. You must create an EMC Virtual Map Utility target for each VMware vCenter server that hosts databases you want to monitor that use VMware Virtual Disks (VMDKs) for database storage.

To create a target:

1. From **Enterprise Manager**, go to **Setup** › **Add Target** › **Add Targets Manually**.
2. Select **Add Targets Declaratively by Specifying Target Monitoring Properties**.
3. From the **Target Type** menu, select **EMC Virtual Map Utility**.
4. Specify the desired Oracle Management Agent (OMA), whichever host you designated as the EMC Storage Plug-in Host, and click **Add Manually**.

   Note: The OMA must have Solutions Enabler installed for the plug-in to work properly.

5. Specify properties for the EMC Virtual Map Utility target, as shown in Figure 35:
   - **Target Name**—The name by which Enterprise Manager will identify this target
   - **Do you Accept the EULA?**—Select **Yes**, as the plug-in will not function otherwise
   - **vCenter Host name**—The IP or fully qualified domain name of the vCenter host
   - **vCenter User Name**—The name of the user who will connect to vCenter
   - **vCenter User Password**—The password of the user who will connect to vCenter

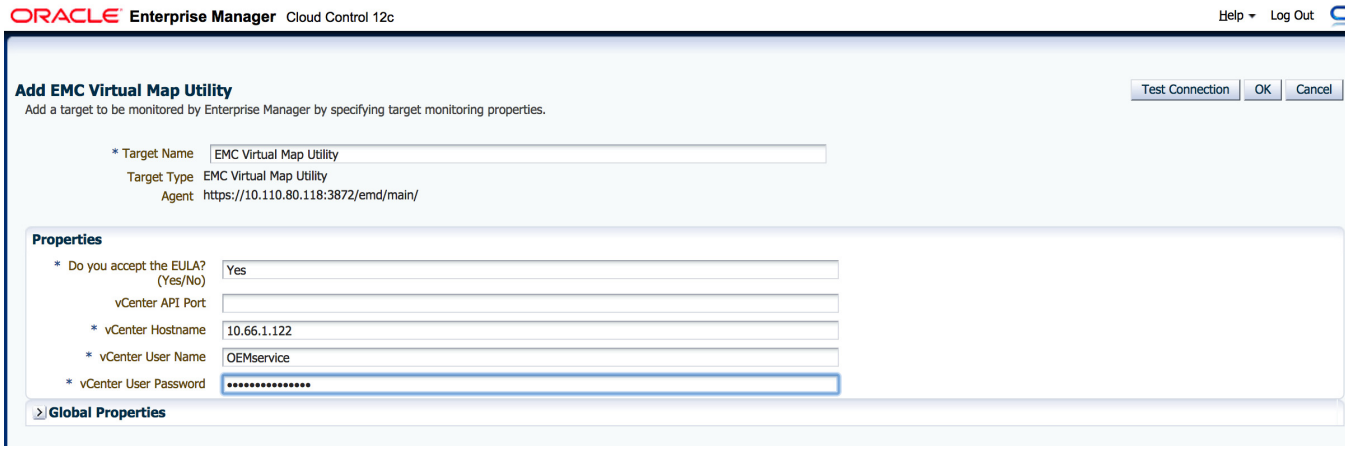

Figure 35 EMC VMAX target properties

6. Click **Test Connection** to ensure that this configuration will work correctly. If the connection fails, an error message will indicate the cause of the failure.
7. Click **OK** and click **Close** to finish adding the target.

EMC Physical Map Utility targets

The EMC Physical Map Utility is a target that interprets the storage structure of Oracle database hosts. An EMC Physical Map Utility target is created automatically for each Oracle Database host that you want to monitor. For details, see "Configure database storage monitoring."

Configure database storage monitoring

After the desired storage targets have been created, you can use those targets to monitor array-level metrics from the corresponding storage systems. Array-level metrics include such components as front-end directors, resource pools, data movers, and others, depending on the array type. You must configure database storage monitoring to monitor the storage volumes used by specific databases.

Add databases to storage monitoring

To monitor the storage of an Oracle database, the database must be registered with the plug-in.

To register the database for storage monitoring:

1. Go to the Home page of the EMC Home target.
2. In the **Database Storage** pane, click **Configure**, as shown in Figure 36.

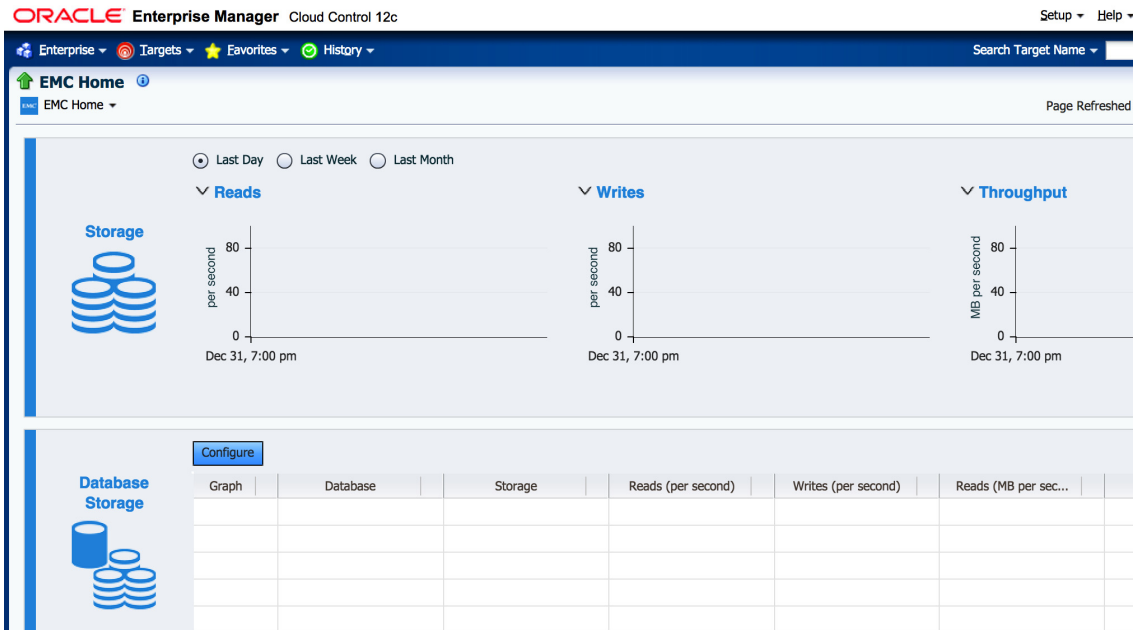

Figure 36 Database storage configuration

Note: The configuration page shows all databases partially or fully configured for storage monitoring by this EMC Home target. The database disks must be backed by a VMAX, VNX, or XtremIO array monitored by the corresponding EMC Storage target that was configured previously.

3. In the **Configure Storage Monitoring** pane, click **Add Database**, as shown in Figure 37, to begin configuring a new database for storage monitoring.

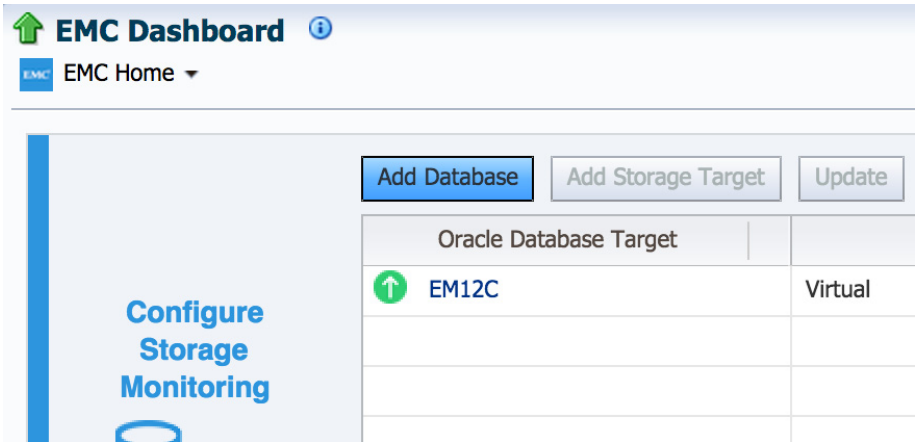

Figure 37 Add a database

The **Add Database** pane lists available databases for storage monitoring.

4. Select checkboxes for the databases you want to configure for storage monitoring, and click **Add**, as shown in Figure 38. This creates an EMC Physical Map Utility target for each selected database host.

Notes:

- The plug-in cannot monitor storage of databases configured for remote monitoring in Enterprise Manager. Ensure that the database is monitored by a local OMA.
- The database host must have the EMC OEM Storage Plug-in deployed to its OMA.

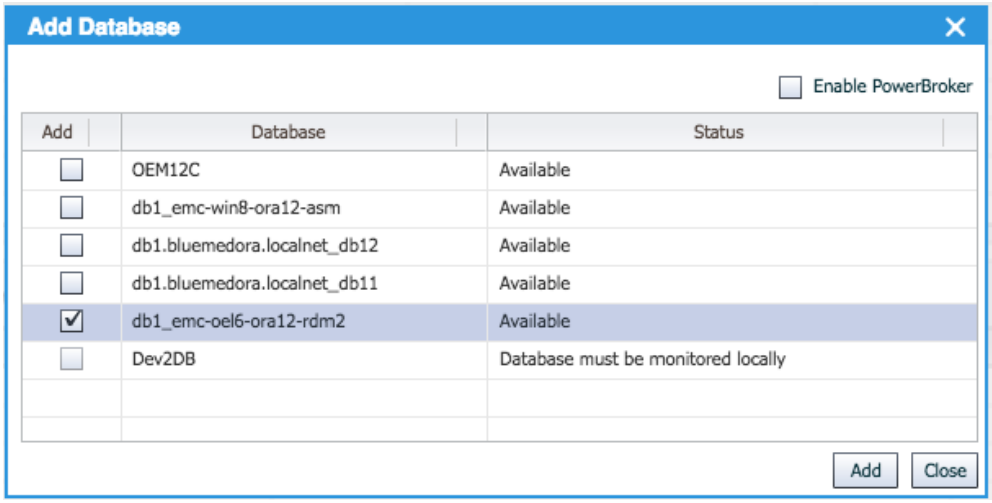

Figure 38 Select databases to add

After the plug-in has successfully added databases for monitoring, the status is shown as **Requires DB Storage Target**.

5. Select the row of the newly added databases and click **Add Storage Target**. After the storage target is added, the setup is complete.

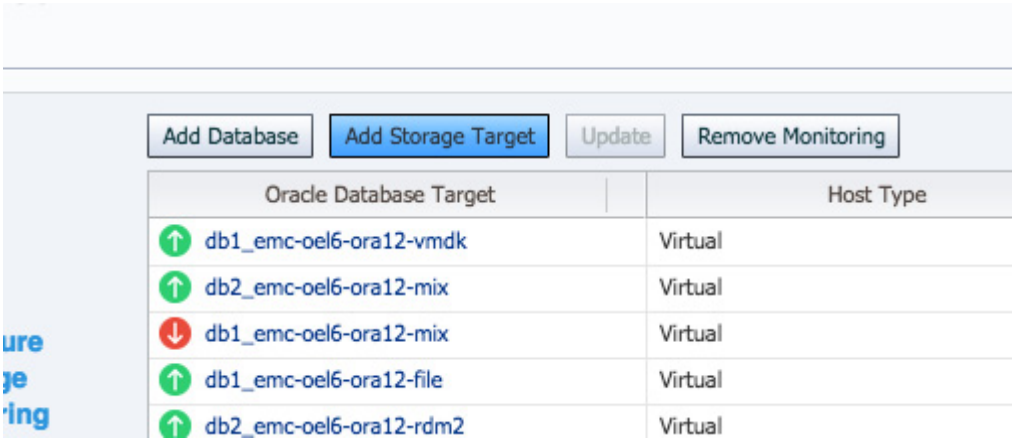

Figure 39 Add a Storage Target

Note:

When adding database monitoring, a Database Storage target is created. In some cases, you must choose the array backing the database. For example, this can happen if the database is backed by VMDK disks on a host that uses both VNX Block and VMAX disks.

The OMS must be restarted before metrics are shown for the new target if you:

- Create a Database Storage target for one array type.
- Remove the storage monitoring.
- Recreate the Database Storage target for a different array type.

6. Review the configuration status of the selected databases.

   Databases display a **Pending** status in the table of configured databases, as shown in Figure 40, until disk information is collected for the database. This can take five to ten minutes. Refresh the page to check for status updates.

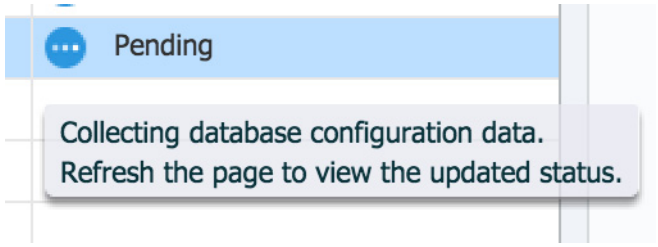

Figure 40 Pending database configuration

Table 1 displays database status update messages and their meaning.

Table 1 Configuration statuses for selected databases

Status update	Status description
Invalid Configuration	The database storage cannot be monitored. Refer to Chapter 3,"Deployment Prerequisites" for reasons why the configuration is invalid.
Requires vSphere	The plug-in must collect virtual disk information from VMware vCenter using an EMC Virtual Map Utility target. To correct this problem, follow the instructions for creating an EMC Virtual Map Utility target in "Create the EMC VMAX Storage target".
Requires DB Storage Target	Select the databases and click **Add Storage Target**. This will create an EMC Database Storage target to monitor the database storage.
Monitoring	The database currently has a database storage target monitoring it.
Pending	Database configuration data is being collected. Refresh the page to view the updated status. The plug-in is waiting to collect disk information from the database. It should be resolved in 5-10 minutes.
Loading	This is displayed while the page runs queries. After the page loads, each of these icons will be updated to show the status of the database.
Requires Update	The disks or ASM configuration used by a database can occasionally change. When this occurs, the target requires an update. Click **Update** to ensure that all targets are up-to-date. **Note:** When a change is made to ASM disks, the **Requires Update** status can take up to 24 hours to appear. While the plug-in's mapping targets will register the change in the next collection, the Oracle ASM target collects this information as a configuration metric, and configuration metrics can take up to 24 hours to be collected.
Requires DB Storage Target	Select the database and click **Add Storage Target**. This will create an EMC Database Storage target to monitor each database's storage.
Requires Virtual Map Utility	The database is running on a VMware virtual machine, and the virtual disks are not configured using RDM. Add a Virtual Map Utility target to support loading configuration data of the virtual disks from vCenter.
Requires Storage Array Target	The database is running on disks in a VMAX, VNX, or XtremIO array unknown to the plug-in. Add a VMAX, VNX, or XtremIO Storage target to monitor the array.

Remove databases from storage monitoring

To stop monitoring the storage of an Oracle database, the database must be unregistered from the plug-in.

To unregister the database for storage monitoring:

1. Go to the EMC Storage Home target's configuration page.
2. In the **Database Storage** pane, click **Configure**.
3. Select the databases to stop monitoring and click **Remove Monitoring**.

   The EMC Database Storage target for this database's storage will be removed. If the EMC Physical Map target on the database's host is no longer associated to any EMC database storage targets, it will also be removed.

Update storage configuration

Occasionally, the disks used by a database can change. For example, a new disk could be added to the host, or the database could store files on a different disk. When this occurs, the database's storage configuration must be updated. The plug-in automatically identifies database configurations that require an update and provides a button for updating them.

To check for out-of-date storage configurations and to update them:

1. Go to the EMC Storage Home target's Configuration page.
2. In the **Database Storage** pane, click **Configure**.
3. Select all databases with **Requires Update** status and click **Update**.

CHAPTER 4
Uninstalling the EMC Storage Plug-in

This chapter presents the following topics:

Overview

This chapter includes procedures for uninstalling a plug-in from Oracle Enterprise Manager. This chapter follows the standard Oracle procedure for uninstalling and removing plug-ins.

For procedures not covered in this document, refer to the *Oracle Enterprise Manager Cloud Control Administrator Guide* at:
http://docs.oracle.com/cd/E24628_01/doc.121/e24473/plugin_mngr.htm

Remove EMC storage targets

To completely remove the plug-in, the targets must be removed prior to undeployment. You can also remove targets that are no longer valid because of old configuration or other maintenance issues.

Remove EMC database storage or Physical Map Utility targets

Remove EMC database storage or Physical Map Utility targets on the target's configuration Page. “Configure database storage monitoring” provides details.

Remove EMC Virtual Map Utility or Home targets

To remove an EMC Virtual Map Utility or Home targets:

1. Go to the **All Targets** page.
2. Right click the target name, and select **Target Setup** › **Remove Target**.
3. Click **Yes** to remove the target.
4. Click **OK** after the target is removed.

Undeploy and delete the plug-in

Use the following procedures to undeploy and delete the plug-in from OMA, OMS, and OEM.

Undeploy From OMA

To undeploy the plug-in from OMA:

1. From the **Setup** menu, click **Extensibility** › **Plug-ins**.
2. In the **Plug-ins** page, select the plug-in and click **Undeploy From** › **Management Agent**, as shown in Figure 41.

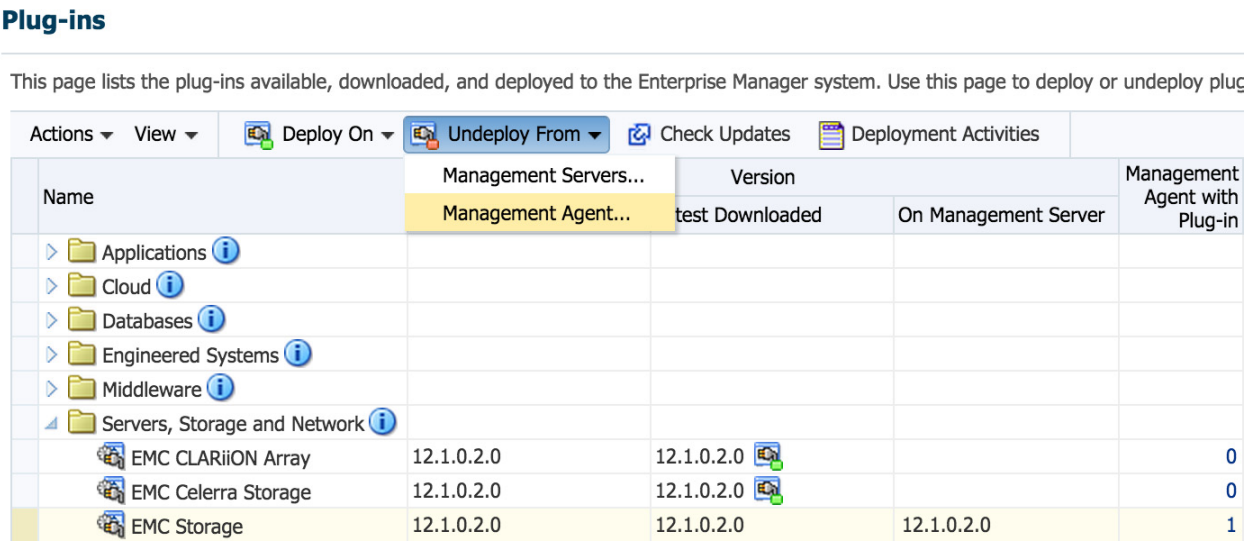

Figure 41 Undeploy From › Management Agent

3. In the **Undeploy Plug-in From Management Agent General** page, click **Add** to select all of the management agents where the plug-in is currently deployed and click **Continue**, as shown in Figure 42.

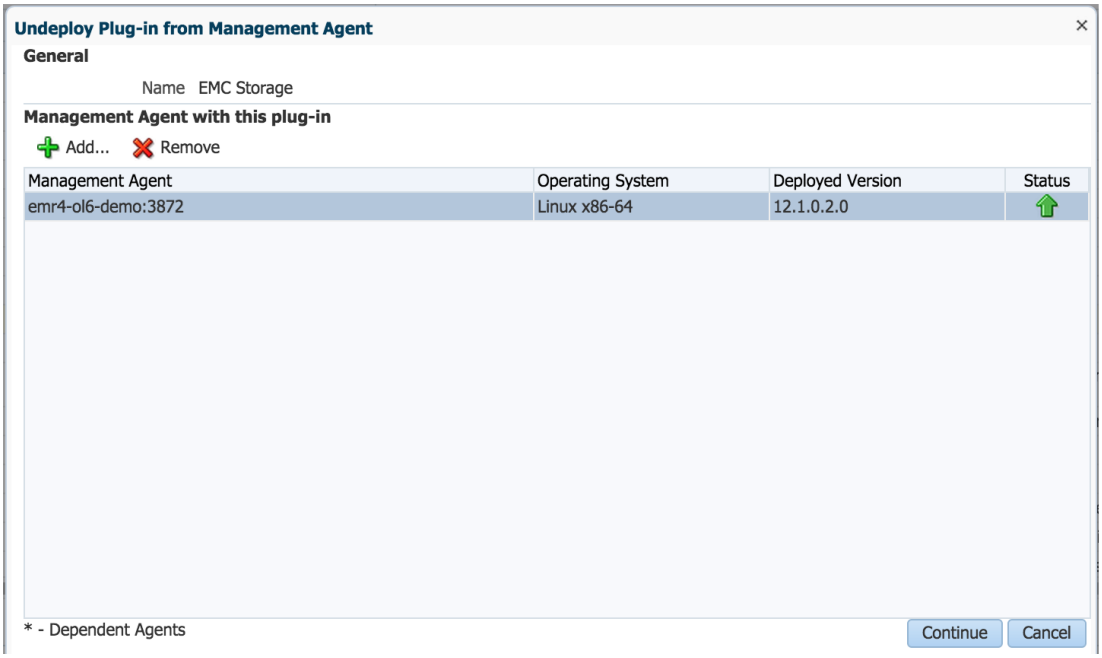

Figure 42 Undeploy Plug-in From Management Agent General page

4. In the **Undeploy Plug-in From Management Agent Review** page, click **Undeploy**.
5. In the **Undeploy Plug-in From Management Server Confirmation** page, click **Show Status** to view the steps of the undeployment.

   Green check marks confirm the steps that were completed successfully.

Undeploy from OMS

To undeploy the plug-in from OMS:

1. After the plug-in is undeployed from management agents, select **Setup** › **Extensibility** › **Plug-ins** to return to the **Plug-ins** page.
2. In the **Plug-ins** page, select the plug-in and click **Undeploy From** › **Management Servers**.
3. In the **Undeploy Plug-in on Management Server General** page, type the **Repository SYS Password** and click **Continue**.
4. In the **Undeploy Plug-in on Management Server Review** page, click **Undeploy**.
5. In the **Undeploy Plug-in From Management Server Confirmation** page, click **Show Status** to view the steps of the undeployment.

   Green check marks confirm the steps that were completed successfully.

Verify the undeployment

To verify that the plug-in was successfully undeployed from the Oracle Management Server and Agent:

1. From the **Setup** menu, click **Extensibility** › **Plug-ins**.
2. Expand the **Servers, Storage and Network** plug-in group.
3. Find the row for the plug-in. This row should now have an empty cell in the **On Management Server** column and a **0** in the **Management Agent with Plug-in** column.

Delete the plug-in From OEM

After the plug-in has been undeployed from both the OMS and OMA, it can then be deleted from Oracle Software Library. Removing the plug-in from the software library is an additional step to ensure a clean installation of the latest plug-in.

To delete the plug-in from the Oracle Software Library:

1. From the **Setup** menu, click **Extensibility** › **Self Update**.
2. Select the plug-in type.
3. In the **Plug-in Updates** table, select the plug-in and click **Actions** › **Delete**.

Note: If the **Delete** option is not available and **Applied** is displayed in the Status column, the plug-in is still deployed in OMS or OMA. Repeat the steps in "Verify the undeployment" to correct this problem.

CHAPTER 5
Using the Plug-in

This chapter presents the following topics:

EMC Home page

The EMC Storage Home target includes a Home page and a Configuration page. The EMC Home page contains the following features, as shown in Figure 43.

- In the **Storage pane** (1), use the menus above the graphs to select a metric to display in the graphs. Select a time period of **Last Day**, **Last Week**, or **Last Month**.
- In the **Database Storage** pane, select a target row to display metrics in the graphs.
- Multiple database storage targets can be graphed simultaneously.
  - In the **Graph** column (2), select the checkbox to display graph details in the Storage pane.
  - In the **Database** column (3), click the link to go to the Oracle database target.
  - In the **Storage** column (4), click the link to go to the EMC database storage target.
- In the **Array** pane, in the **Storage Array** column (5), click the link to go to the storage target.

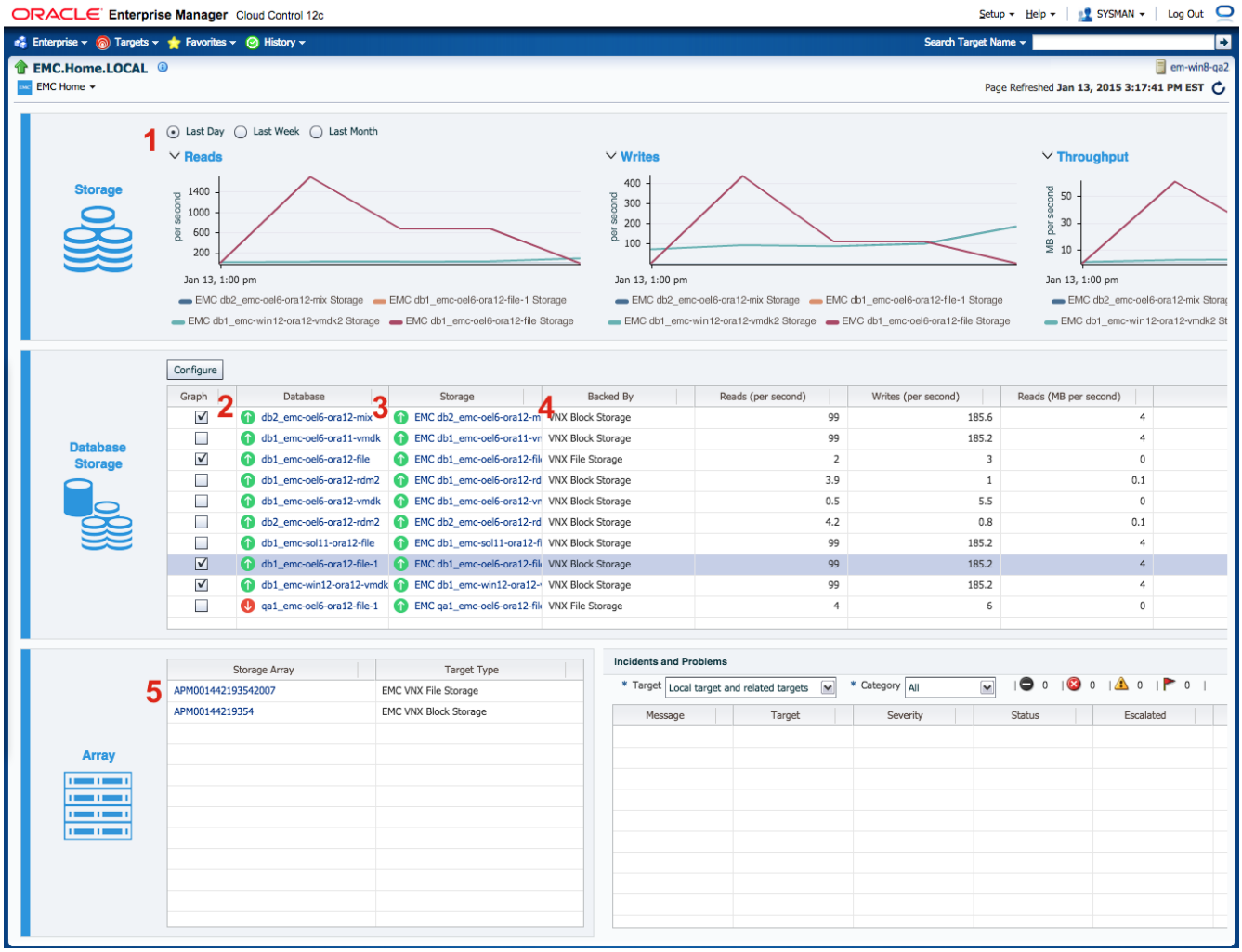

Figure 43 EMC Home page

EMC Database Storage page

The EMC Database Storage page, as shown in Figure 44, displays information about the Oracle database and the storage used by the database. The page includes the following panes and features:

- The **Hierarchy** (1) pane displays the technology stack that is running the database. Click an image or link to go to the corresponding target.
- In the **Storage pane** (2), use the menus above the graphs to select a metric to display in the graphs. Select a time period of **Last Day**, **Last Week**, or **Last Month**.
- The **Database** pane (3) shows corresponding performance information obtained from the standard Oracle database plug-in. This information is used for comparison to the storage metrics in the **Storage** pane.
- The **Incidents and Problems** (4) pane lists incidents for the Database Storage target, which are also forwarded to the corresponding Oracle Database target.

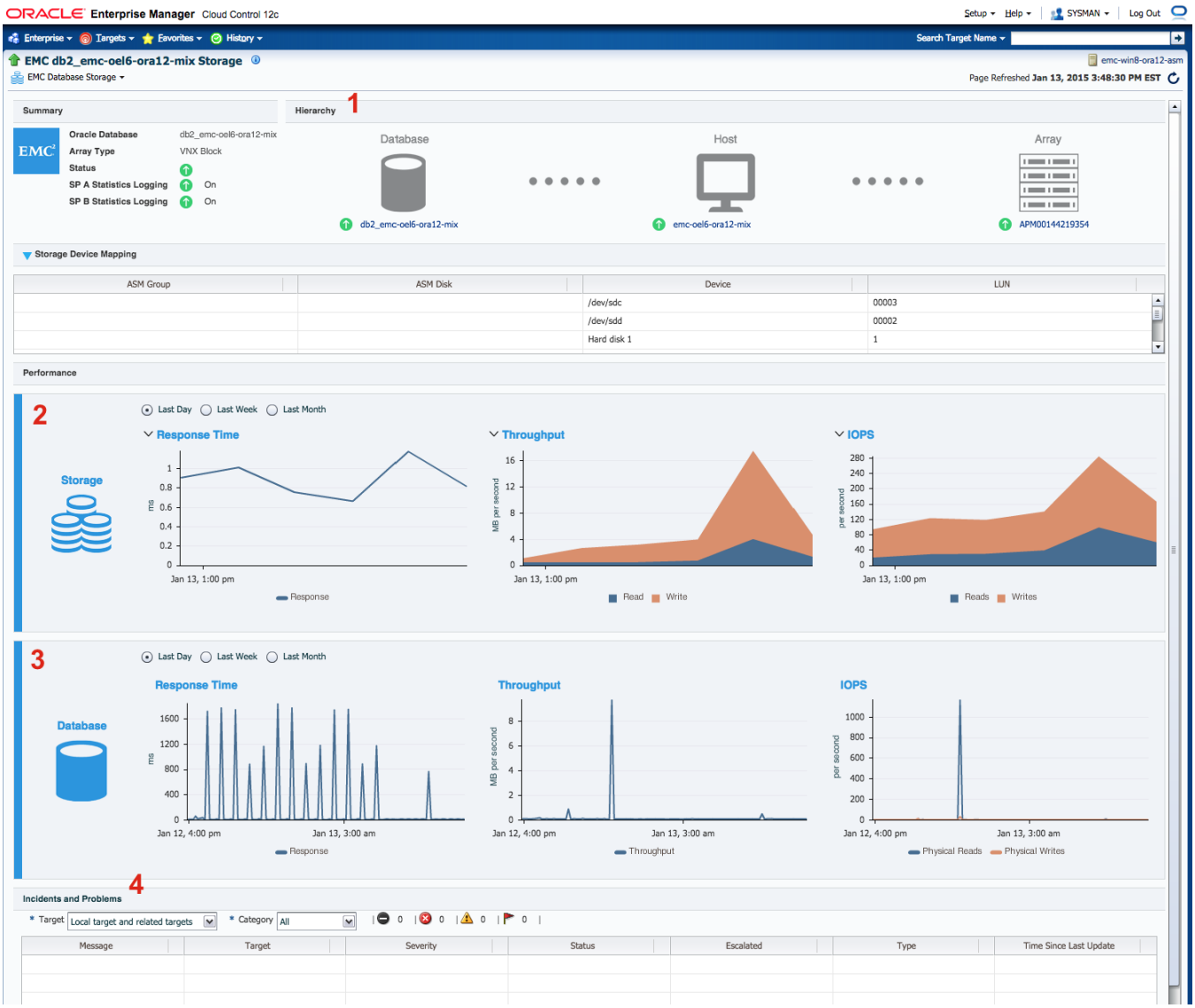

Figure 44 EMC Database Storage page

EMC VMAX Storage page

The EMC VMAX Storage page, as shown in Figure 45, displays information about VMAX arrays. You can view detailed information on individual VMAX arrays and drill down into secondary pages for information on specific components.

- From the **VMAX Array** list box (1), select a VMAX array to display array details in the graphs in the **Array** pane.
- In the **Array** pane, select a time period of **Last Day**, **Last Week**, or **Last Month**.
- In the **Front End Directors** pane (2), click a **Director** link to go to the **Front End Directors** page.
- In the **Thin Pools** pane (3), Click a **Thin Pool** link to go to the **Thin Pools** page.

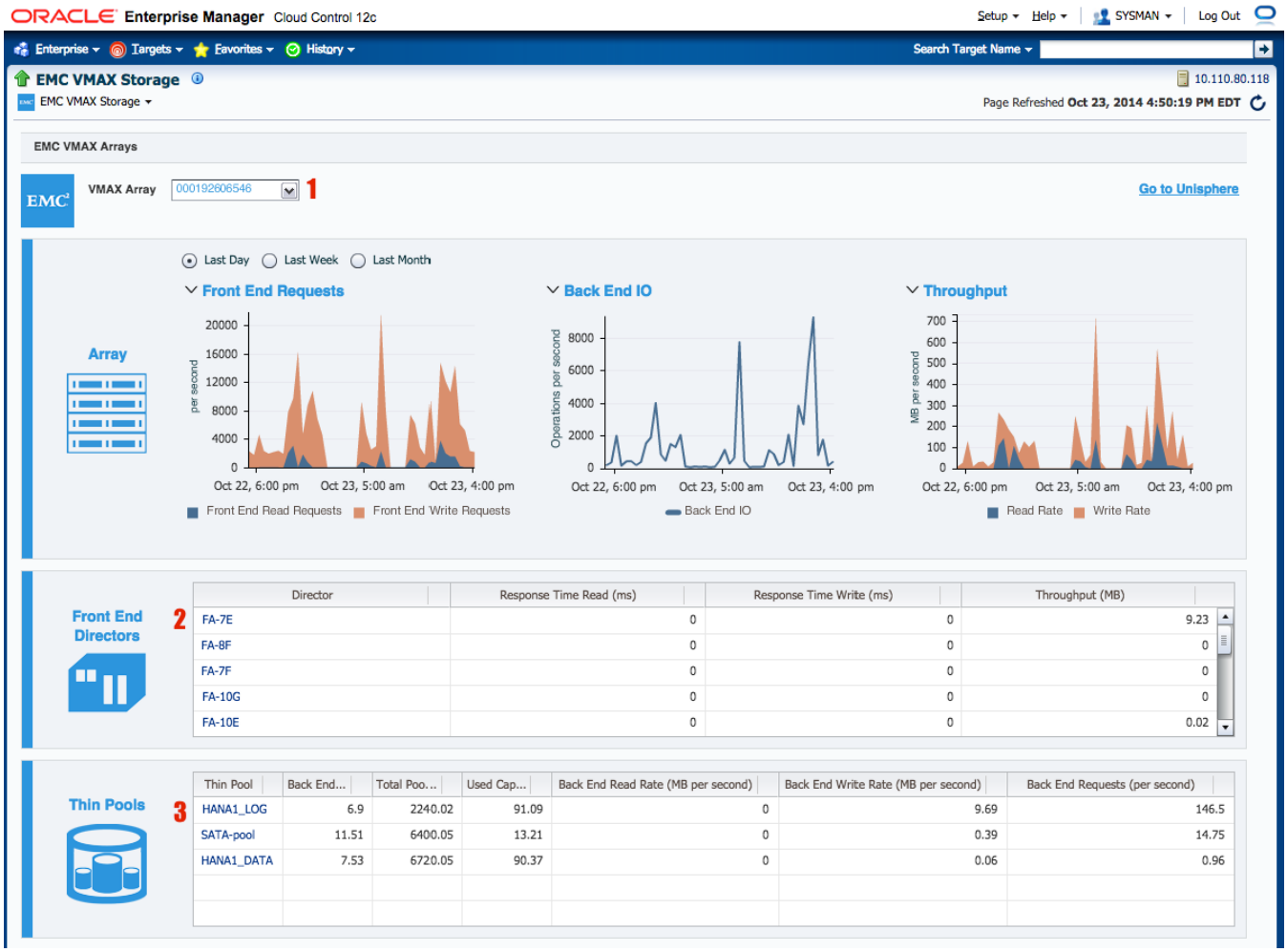

Figure 45 EMC VMAX Storage page

EMC VNX Block Storage page

The EMC VNX Block Storage page, as shown in Figure 46, displays information about VNX Block arrays. You can view detailed information on the VNX Block array and drill down into secondary pages for information on specific components.

- In the **Storage Processors** pane (1), select a time period of **Last Day**, **Last Week**, or **Last Month**.
- The **Storage Processors** pane (2) shows detailed graphs on the performance of the storage processors associated with this VNX Block. Hover over the graphs to see detailed data points.
- In the **Storage Pools** pane (3), Click a **Storage Pool Name** link to go to the corresponding **Storage Pools** page.

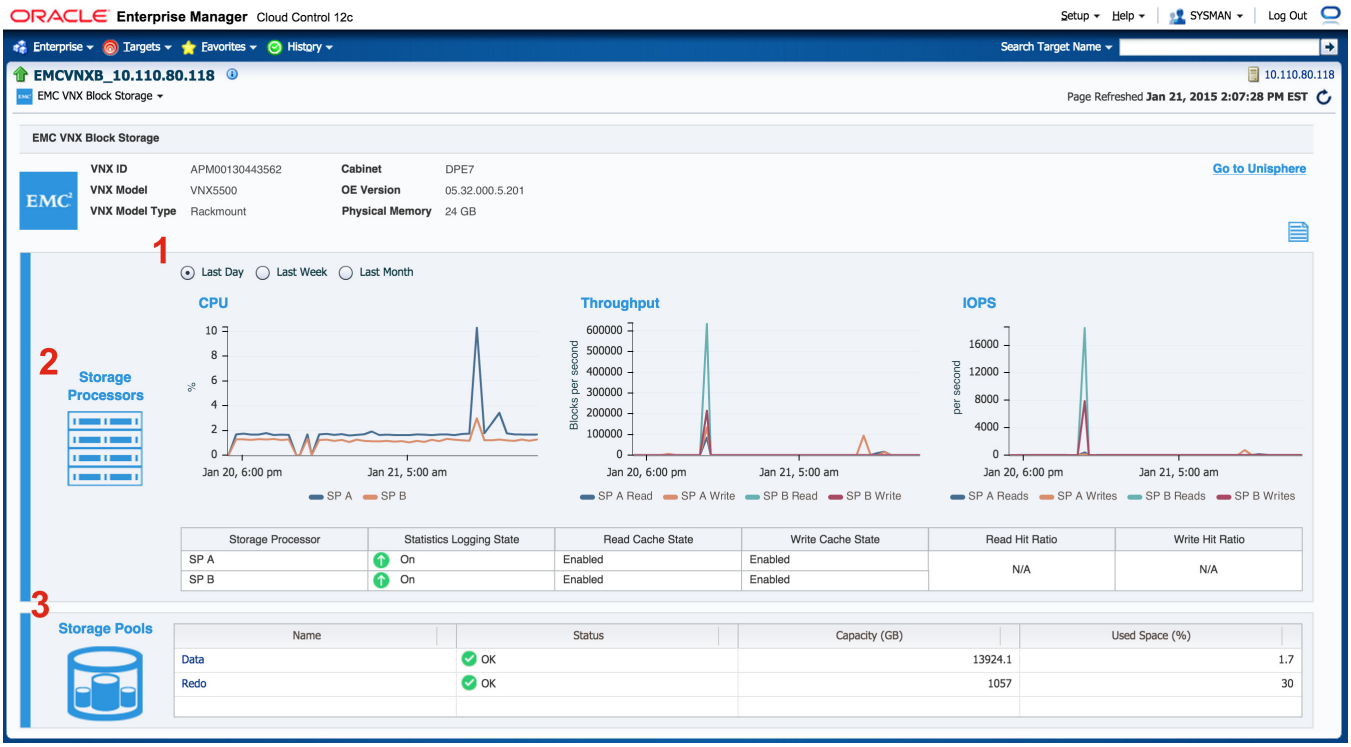

Figure 46 EMC VNX Block Storage page

EMC VNX File Storage page

The EMC VNX File Storage page, as shown in Figure 47, displays information about VNX File arrays. You can view detailed information on the VNX File array and drill down into secondary pages for information on specific components.

- In the **Data Movers** pane (1), Click a Data Mover Name link to go to the corresponding Data Mover page.
- In the **File Systems** pane (2), Click a File System link to go to the corresponding File System page.
- In the **Storage Pools** pane (3), Click a Storage Pool Name link to go to the corresponding Storage Pool page.

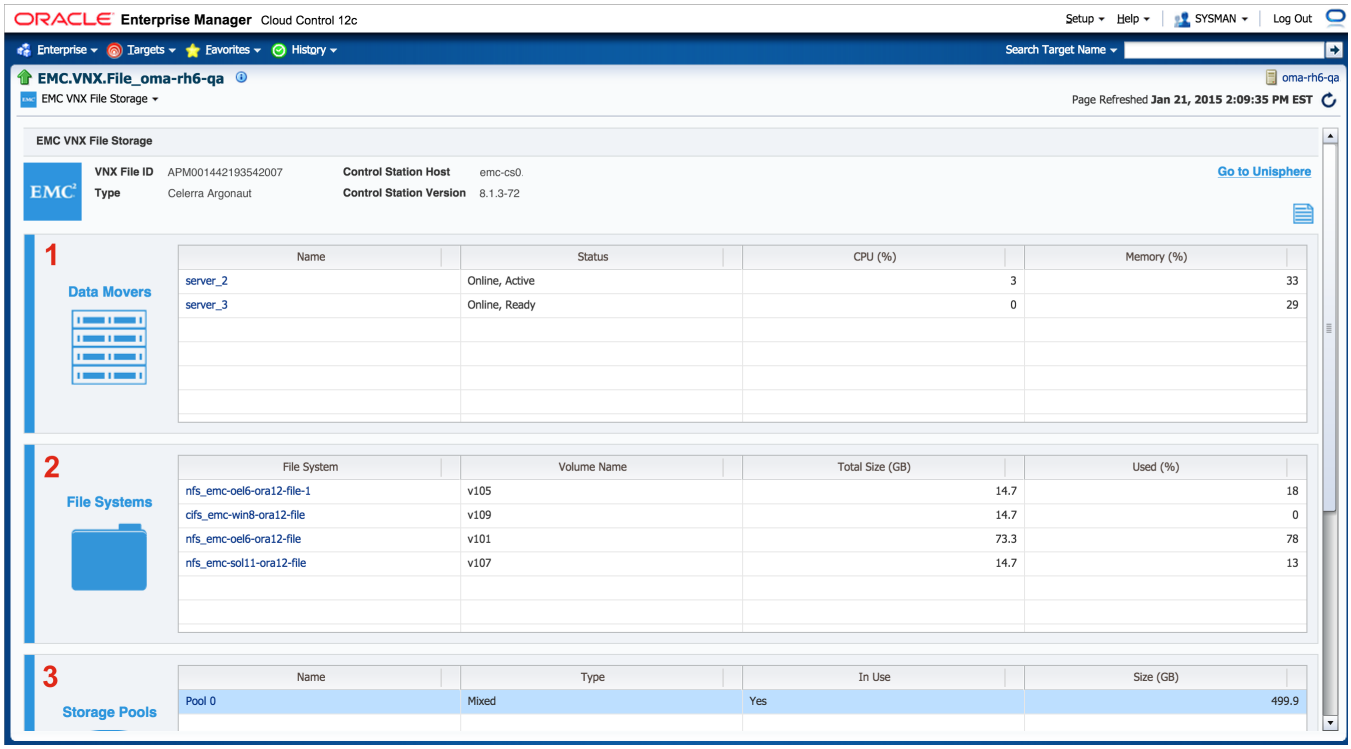

Figure 47 EMC VNX File Storage page

EMC XtremIO Storage page

The EMC XtremIO Storage page, as shown in Figure 48, displays performance and configuration metrics on the monitored XtremIO cluster.

- The **Status** pane (1) shows XtremIO cluster status, configuration, and efficiency metrics. Use this panel to see high-level information on the XtremIO storage.
- In the **Performance** (2) and **Response Time Details** (3) panes, you can view performance and response time related metrics in historical graph format. Click the buttons above the graphs at the top of each pane to filter the historical data to the selected time period. Hovering over the graphs will show detailed data points.
- In the **Data Protection Groups** pane (5), click a link in the **Name** column to open the corresponding Data Protection Group.
- In the **Incidents and Problems** pane (6) view incidents for the targets.

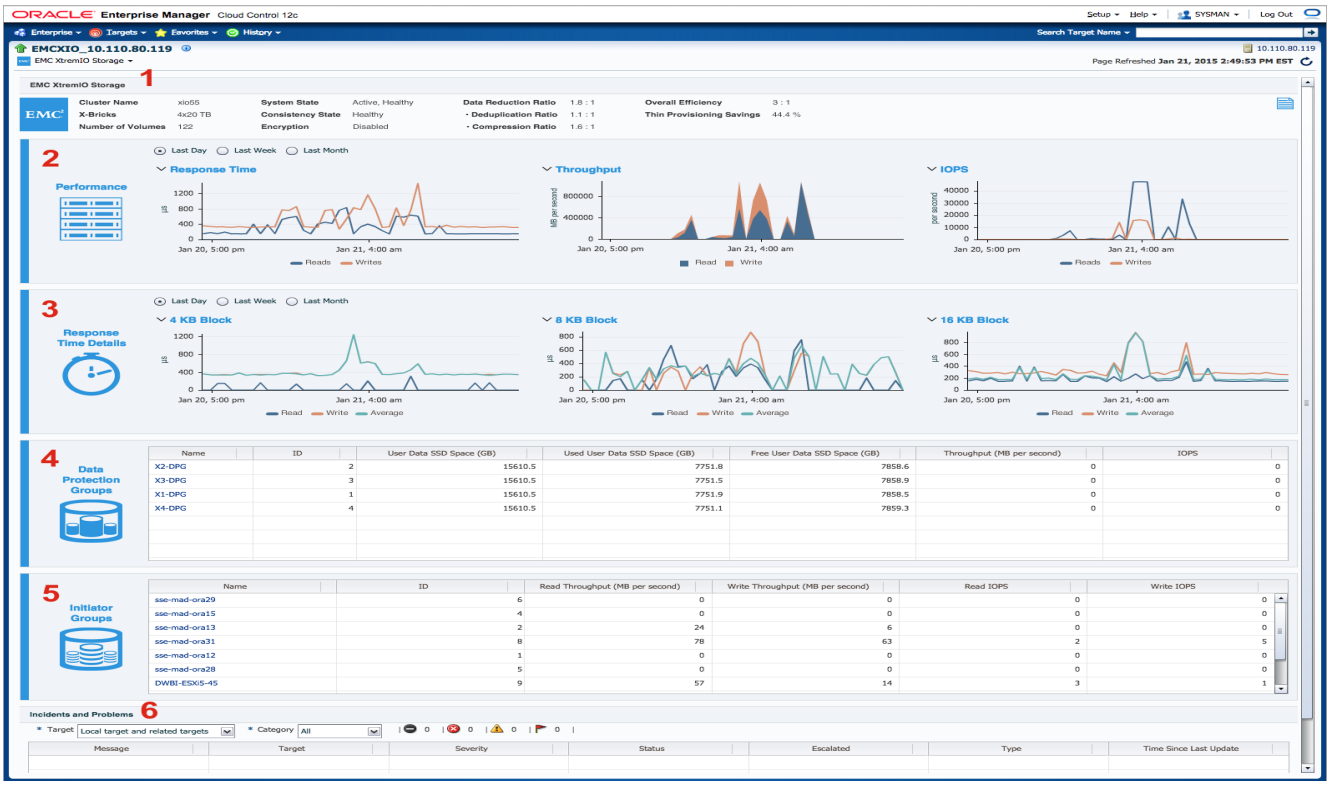

Figure 48 EMC XtremIO Storage Home page

CHAPTER 6
Troubleshooting

This chapter presents the following topics:

Troubleshoot the U4V monitoring configuration

To ensure that U4V is configured for performance monitoring:

1. Open a browser and go to the U4V web interface, typically found at

   https://[host]:[port]/univmax/

2. On the main control bar, click the VMAX icon on the left, and select the VMAX array you want to monitor.
3. On the main control bar, click **Performance**.
4. Click **Settings**.
5. Click **System Registrations**.
6. Ensure that both the **Real Time** and **Diagnostic** columns display the green icon.
7. If green icons are not displayed, select the **Symmetrix ID** row, and click **View Details**, as shown in Figure 49.

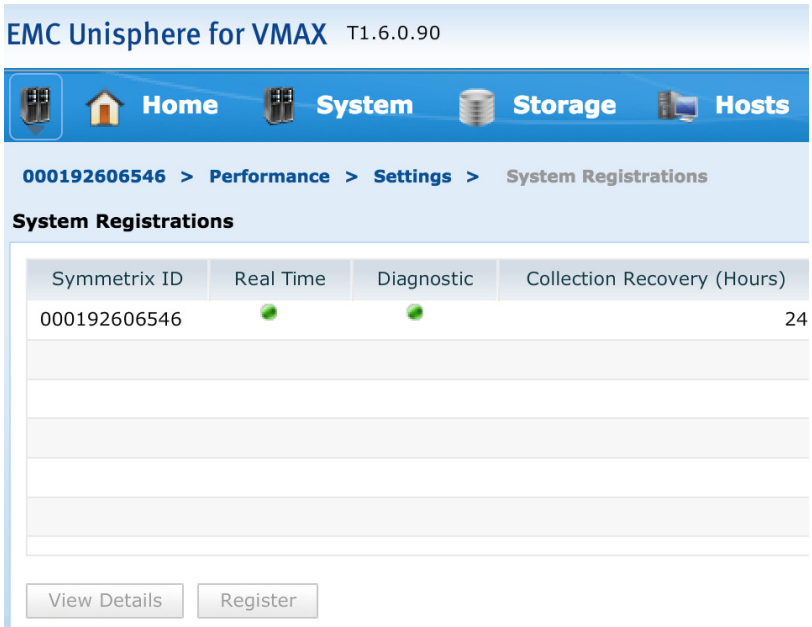

Figure 49 System Registrations

8. Select the **Realtime** and **Diagnostic** checkboxes and click **Apply**, as shown in Figure 50.

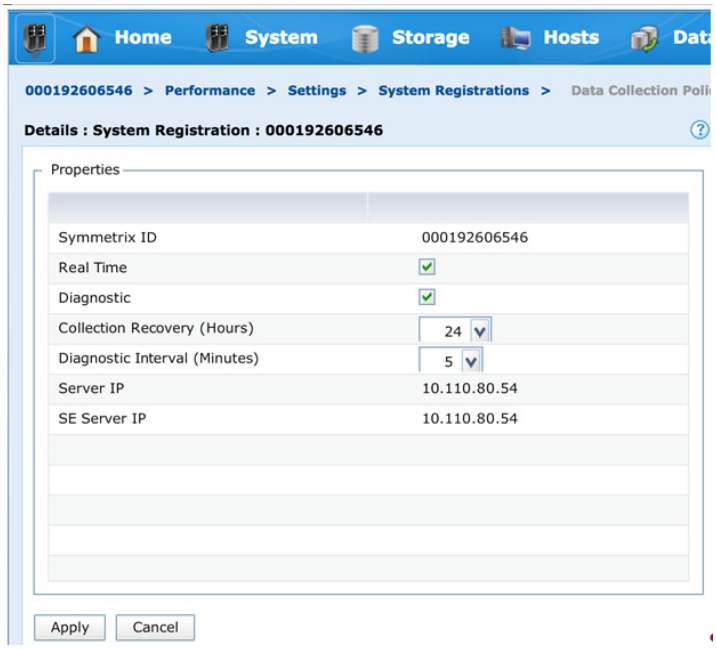

Figure 50 System registration details

Test SYMCLI commands for VMAX storage targets

To verify that SYMCLI is working properly, type the **symdev list** command as the agent user on the storage target host:

```
[oracle@sse-oem-linuxoma1 ~]$ symdev list
```

You should see output similar to the following:

```
Symmetrix ID: 000192606546
        Device Name             Directors                Device Cap
--------------------------- ------------------------------------------
Sym  Physical               SA:P DA:IT  Config Attribute    Sts MB)
--------------------------- ------------- --------------------------
00B4 Not Visible            ***:*  NA:NA  TDEV N/Grp'd      RW  17263
00B5 Not Visible            ***:*  NA:NA  TDEV N/Grp'd      RW  17263
00B6 Not Visible            ***:*  NA:NA  TDEV N/Grp'd      RW  17263
00B7 Not Visible            ***:*  NA:NA  TDEV N/Grp'd      RW  17263
00B8 Not Visible            ***:*  NA:NA  TDEV N/Grp'd      RW  17263
00B9 Not Visible            ***:*  NA:NA  TDEV N/Grp'd      RW  17263
00BA Not Visible            ***:*  NA:NA  TDEV N/Grp'd      RW  17263
```

Test INQ commands

To verify that INQ is working properly, type the **sudo inq** command as the agent user on the Physical Map Utility target host.

If INQ is working correctly, you should see output similar to the following:

```
Inquiry utility, Version V7.6.2.0 (Edit Level: 1808) built with SYMAPI
   Version V7.6.2.0 (Edit Level 1808)

Copyright (c) [1997-2014] EMC Corporation. All Rights Reserved.

For help type inq -h.
.....................................................................
DEVICE          :VEND    :PROD            :REV   :SER NUM    :CAP(kb)
.....................................................................
/dev/sda        :VMware  :Virtual disk    :1.0   :           : 31457280
/dev/sdb        :VMware  :Virtual disk    :1.0   :           : 41943040
/dev/sdc        :VMware  :Virtual disk    :1.0   :           : 16777216
/dev/sdd        :EMC     :SYMMETRIX       :5876  :46000bc000 : 20972160
/dev/sde        :EMC     :SYMMETRIX       :5876  :46000bd000 : 20972160
/dev/sdf        :EMC     :SYMMETRIX       :5876  :46004ce000 : 5760
/dev/sdg        :EMC     :SYMMETRIX       :5876  :46004cf000 : 5760
```

Verify the Physical Mapping Utility

To verify that the Physical Map Utility is working:

1. Type the **sudo inq** command as agent user on the Physical Map Utility target host.
   a. If disks are returned continue to step 2.
   b. If **inq** is not found, ensure that the inq utility has been installed and that the utility is in the PATH statement of the oracle agent user.
   c. If **sudo inq** prompts you for a password, edit the **sudoers** file to so that no password is required.
2. Go to Physical Map **All Metrics** target and select the **Devices** metric.
   a. If no results are displayed, go to step 3.
   b. Check that data has been uploaded. If no data was uploaded, wait until an upload collects.
3. Restart the OMA by running control stop and start or **emtcl stop/start agent** from the host. Then verify the step.

Note: For more information on troubleshooting Oracle Enterprise Manager plug-ins, refer to the plug-in troubleshooting section in the *Oracle Enterprise Manager Cloud Control Administrator's Guide* at:
http://docs.oracle.com/cd/E24628_01/doc.121/e24473/plugin_mngr.htm

---

Plug-in Log locations

When troubleshooting the plug-in, review the plug-in logs for errors that can help to resolve issues. Collecting these logs can also be useful when generating trouble tickets or requesting help from support engineers.

The plug-in includes a Physical Mapping log and a Storage Home Data Provider log in two different locations on the Oracle Management Agent. Locations are based on the plug-in function being logged.

Physical Mapping log

Logs for the physical mapping target are logged with the OMA logs and located at following location:

[Oracle_Home]/agent_inst/sysman/log/*
Use these logs when attempting to troubleshoot issues for disk metrics on the host.

Storage Home Dataprovider log

The EMC Storage Home Data provider logs trace most of the plug-in actions and functions. When troubleshooting the plug-in, start here to find any major errors.

The EMC Storage Home Dataprovider logs are stored in the plug-in installation directory. This enables easy access and organization of the logs.

This is an example of the log file location:

[OMA_HOME]/plugins/emc.storage.xplg.agent.plugin_12.1.0.2.0/scripts/logs/emc_<target_name>.log
4.

Troubleshooting other configuration issues

This section provides solutions for other configuration issues.

Requires Virtual Map Utility status

When monitoring VMDK storage on a virtual machine:

If the status of the Storage target in the configuration page is **Requires Virtual Map Utility** and a confirmed valid Virtual Map Utility target is configured, confirm the following:

1. The Virtual Map Utility target's vCenter user has read permissions for the virtual machine in vCenter for the storage target that the target is being configured for.
2. The database's virtual machine has VMware Tools installed and running properly.

Server certificate trust errors with the VNX Block target in the Test Connection dialogue or plug-in logs

When installing Navisphere CLI for the VNX Block prerequisites, you have the option to install with the **Medium Verification Level**. If you do this, and the certificate requires user acceptance (self-signed or with other problems), it cannot be monitored by the plug-in.

In this case, you will receive the following error in the plug-in logs or in the target's Test Connection dialogue:

> **Unable to validate the identity of the server. There are issues with the certificate presented. Only import this certificate if you have reason to believe it was sent by a trusted source.**

To resolve this issue, when monitoring VNX Block with the EMC Storage Plug-in, you can either configure Navisphere CLI with a **Low Verification Level**, or ensure the server's certificates are valid and automatically acceptable.

Additional physical mapping target configuration if asmcmd and OMA are owned by different users

If you install the Oracle Grid Infrastructure (including ASM) under an Oracle Grid user, or for any user other than the Oracle software user who is configured for the target's OMA, asmcmd cannot be run by the physical mapping target.

Do the following to solve this problem:

- Ensure the Oracle software user is a member of the owning group (typically oinstall).
- Give group permissions to specific log and Perl directories in the Oracle Grid ORACLE_HOME directory as described in the following commands:

```
chmod -R g+rx $ORACLE_HOME/perl/
chmod -R g+w $ORACLE_HOME/log/diag/
```

getTargetMetricMetadata error on a database storage target

When adding database monitoring from the plug-in configuration page for a host backed by multiple arrays, you must choose the array backing the database from the list of possible arrays.

For example, this configuration pop-up becomes available when adding database monitoring if the database is backed by VMDK disks on a host containing both VNX Block and VMAX disks.

You may receive the **getTargetMetricMetadata** error if you do the following:

1. Create a Database Storage target for one of array types in the configuration pop-up.
2. Remove the Database Storage target.
3. Recreate the Database Storage target by selecting a different array type from what was selected in the configuration.

To resolve this issue, restart the OMS to display metrics of the new array type.

APPENDIX A
Common VMAX Deployment Scenarios

This appendix describes several common deployment scenarios, and the benefits and drawbacks of each:

Deploy On U4V server

Figure 51 shows the architecture for one of the simplest deployment configurations. The major components of the plug-in are hosted on a machine with a FC connection to the VMAX arrays. This machine also hosts the U4V REST API and Solutions Enabler.

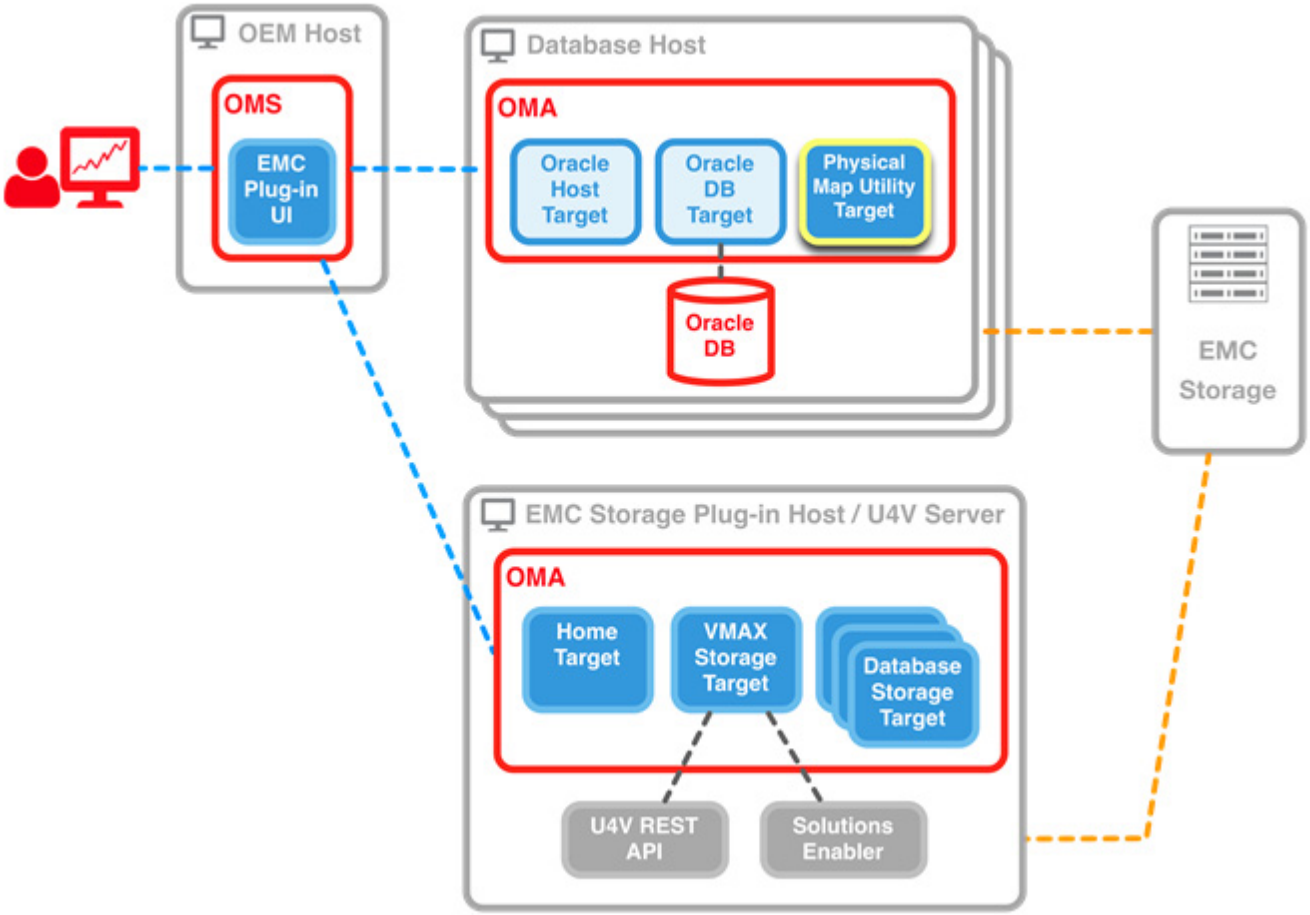

Figure 51 Deployment on a U4V server architecture

When deploying on a U4v server, this configuration:

- Reduces the number of physical machines required for the plug-in
- Leverages existing Solutions Enabler installations and Fiber Channel connections

Note: Storage administrators may not allow OMA installation on U4V servers.

Separate plug-in host

A slightly more distributed configuration is shown in Figure 52. In this example, the major components of the plug-in are still hosted on a machine with a FC connection to the VMAX array, but the U4V REST API is hosted elsewhere.

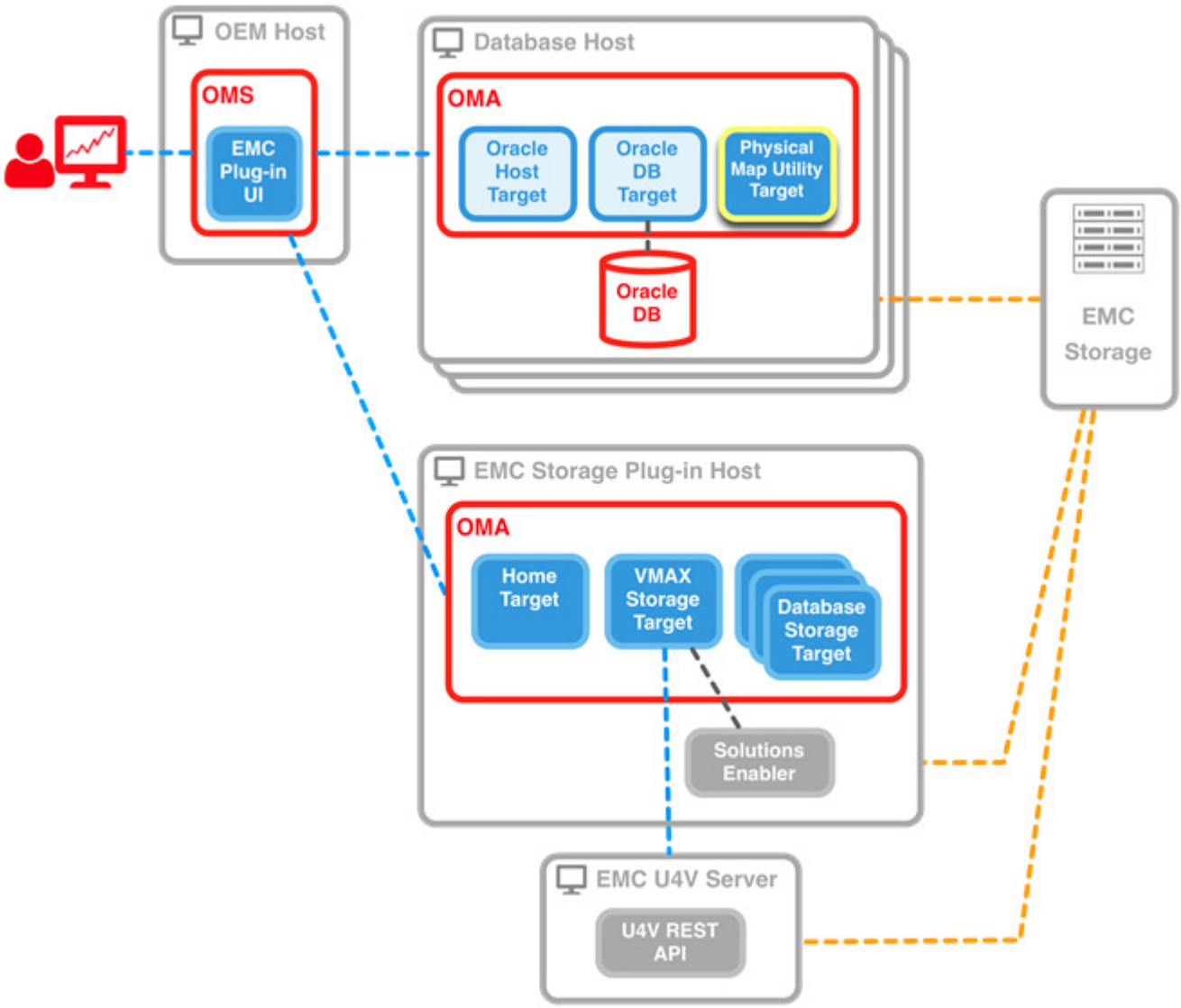

Figure 52 Separate plug-in host architecture

When using a separate plug-in host, this configuration:

- Represents a more typical configuration
- Requires a server with Solutions Enabler and a FC connection to VMAX

Remote SYMCLI host

Figure 53 shows the major components of the plug-in hosted on a machine without a direct FC connection. Solutions Enabler and the U4V REST API are instead accessed remotely.

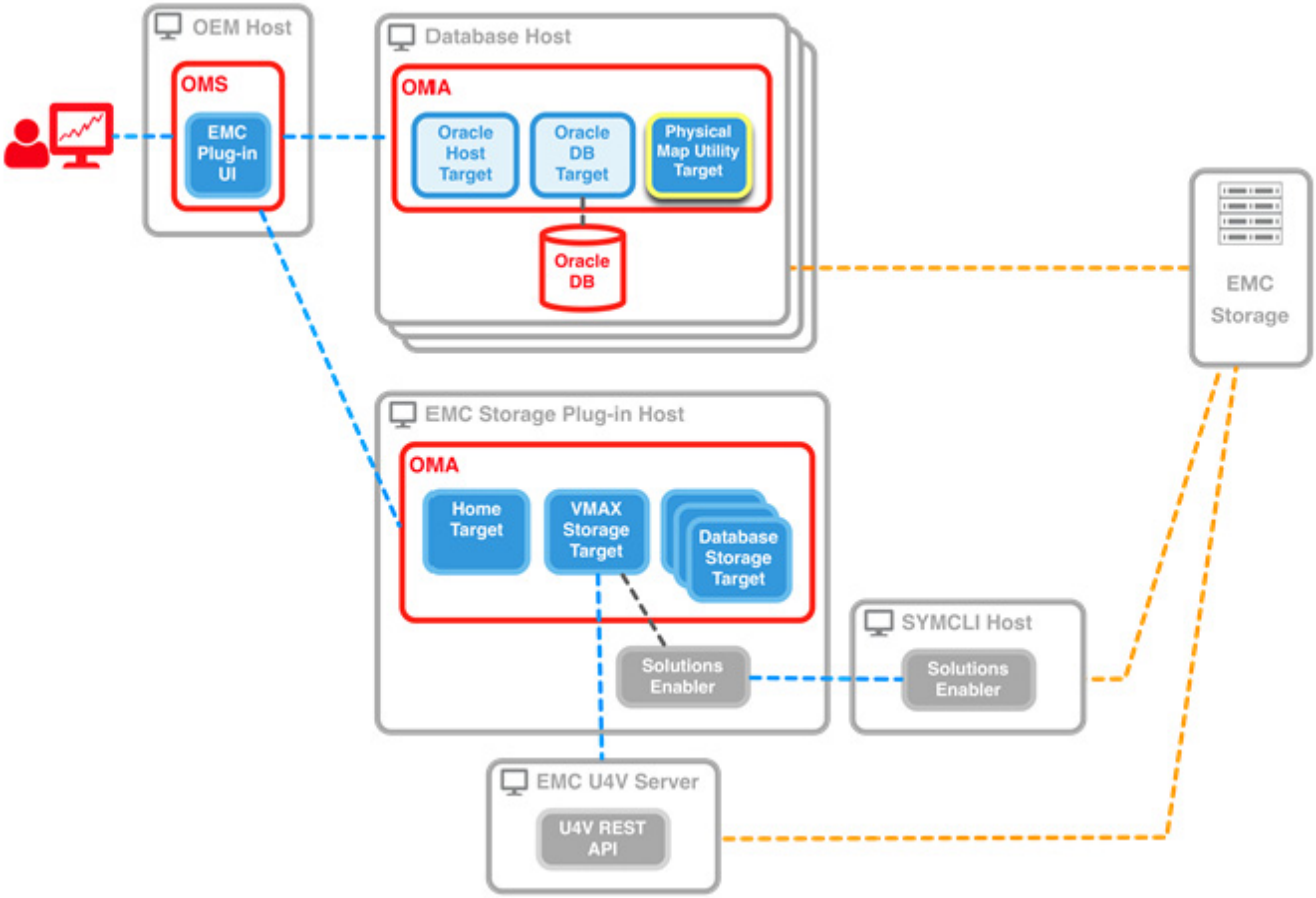

Figure 53 Remote SYMCLI host architecture

When using a remote SYMCLI host, this configuration:

- Allows installation on a server without a FC connection to VMAX
- Requires configuration of the SYMCLI server

Remote EMC Storage Home host

Figure 54 shows an EMC storage Home target hosted on a separate machine from the rest of the major components of the plug-in components.

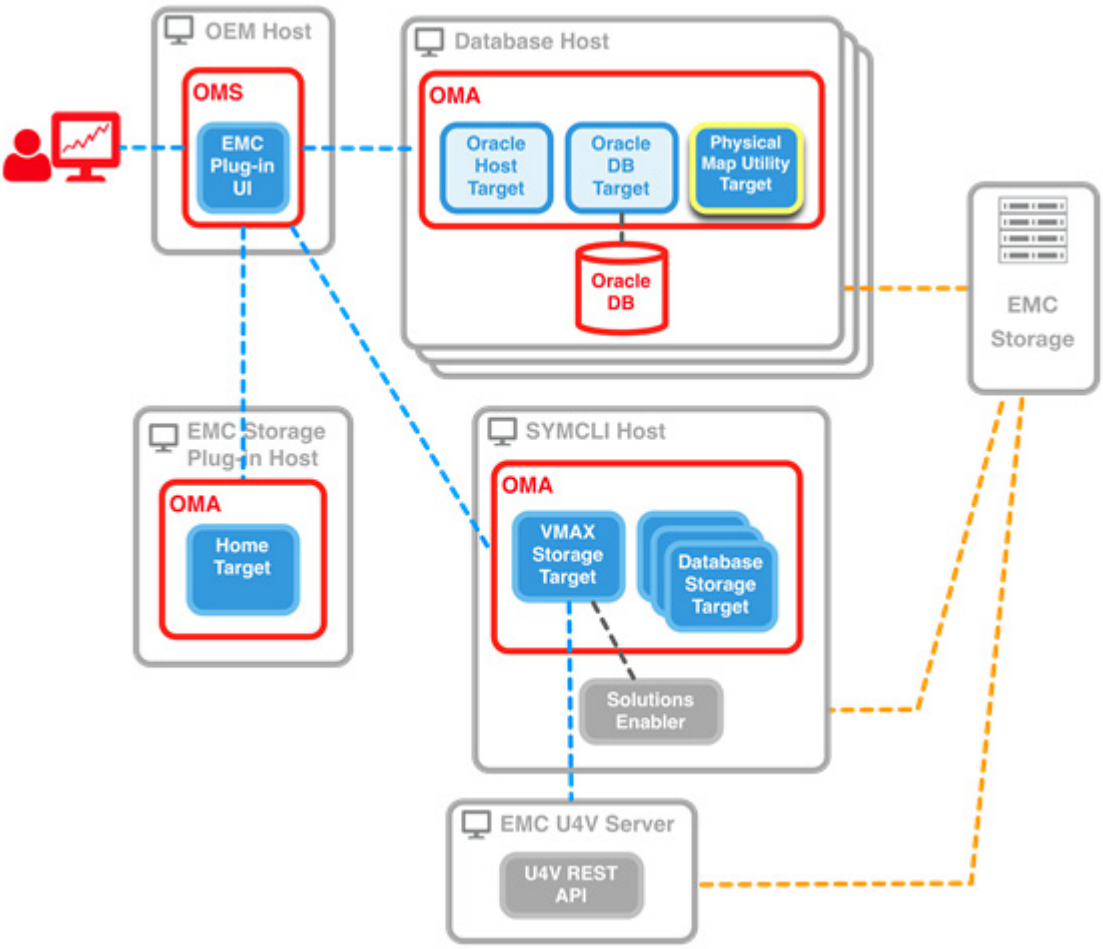

Figure 54 Remote EMC Storage Home host architecture

When using a remote EMC Storage Home host, this configuration allows separation of the Home target from storage target hosts.