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Access to Oracle Support

Oracle customers have access to electronic support through My Oracle Support. For information, visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info or visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs if you are hearing impaired.

Typographical Conventions

The following typographical conventions are used throughout this document.

<table>
<thead>
<tr>
<th>Convention</th>
<th>Meaning/Use</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>italics</em> &lt;italics&gt;</td>
<td>Specifies a variable whose value is supplied by the user. The second example shows less than and greater than signs which are often used to indicate a variable but are not typed.</td>
</tr>
<tr>
<td><em>monospace</em></td>
<td>Indicates commands, filenames, directory paths, and executables, and screen code output.</td>
</tr>
<tr>
<td><strong>bold</strong> <em>monospace</em></td>
<td>Indicates a command that the user types.</td>
</tr>
</tbody>
</table>
Introduction

The Oracle Storage Connect Plug-in for the Oracle ZFS Storage Appliance is a component of the Oracle VM software suite that enables Oracle VM to provision and manage the Oracle ZFS Storage Appliance for virtualization.

This administration guide assumes that the user is familiar with the use of the browser user interface (BUI) and/or the command line interface (CLI) of the Oracle ZFS Storage Appliance. For further information, see the Oracle ZFS Storage Appliance Administration Guide whose location is listed in References at the end of this document.

**NOTE:** References to Sun ZFS Storage Appliance, Sun ZFS Storage 7000, and ZFS Storage Appliance all refer to the same family of Oracle ZFS Storage Appliance products. Some cited documentation and screen displays may still carry these legacy naming conventions.
Overview

The Oracle Storage Connect Plug-in allows Oracle VM to recognize and use the Oracle ZFS Storage Appliance as storage available to the virtualized environments that Oracle VM manages. The Oracle Storage Connect Plug-in supports both iSCSI and Fibre Channel protocols.

Utilizing the plug-in with Oracle VM requires configuration on both the Oracle ZFS Storage Appliance side and Oracle VM Manager side. This document walks you through three major steps to make the Oracle ZFS Storage Appliance (and storage array) accessible to your Oracle VM server:

1. Configuring the Oracle ZFS Storage Appliance:
   - Creating an Oracle VM user and target group on the Oracle ZFS Storage Appliance
   - Enabling remote access services

2. Installing the Oracle Storage Connect Plug-in

3. Configuring Oracle VM to recognize Oracle ZFS Storage Appliance resources:
   - Oracle ZFS Storage Appliance registration/refresh steps in Oracle VM
   - Oracle VM access groups management

After completing these steps, the storage disks on the Oracle ZFS Storage Appliance will be accessible to the Oracle VM server. Users can later access the storage to set up storage repositories, map to virtual machines, and so on, through Oracle VM. Refer to the Oracle VM documentation listed in the References section at the end of this document for detailed instructions on using Oracle VM.

IMPORTANT: Due to a limitation of Oracle VM, it is not possible to register both iSCSI and Fibre Channel (FC) protocols simultaneously on the same Oracle ZFS Storage Appliance.

Hardware and Software Requirements

Requirements for using the Oracle Storage Connect Plug-in include:

- **Oracle VM software version 3.2.1 or later.** Oracle VM comprises the Oracle VM Manager and one or more Oracle VM Servers. This administration guide assumes that the Oracle VM software is correctly installed and configured on the required hardware. For Oracle VM hardware requirements and an installation procedure, see the Oracle VM Installation and Upgrade Guide listed in the References section.

- **Oracle ZFS Storage Appliance running Oracle ZFS Storage Appliance Software OS 8.2 (2013.06.02.0) or later.** This administration guide assumes the Oracle ZFS Storage Appliance is installed and fully configured. For details, see the Oracle ZFS Storage Appliance Administration Guide in the References section. You can verify the currently installed version of the Oracle ZFS Storage Appliance Software from either the BUI or the CLI.
Using the BUI:

1. Log in to the Oracle ZFS Storage Appliance BUI with administrator privileges and go to Maintenance > System.

2. Under Available Updates, verify that the version of the software with the status "Current system software" is 2013.06.05.2.* or later. A version string starting with 2013.06.05.2 indicates that an update to Release 2013.06.05.2 is installed.

Using the CLI:

1. Log in to the Oracle ZFS Storage Appliance CLI using ssh with administrative privileges.

2. Go to Maintenance->System->Updates and check the current version as shown in the following CLI output:

   ```
   aie-zfssa:maintenance system updates> ls
   Updates:
   UPDATE                               DATE                      STATUS
   ak-nas@2013.06.05.2.2,1-1.1          2014-7-8 19:00:16      current
   ```

   • Oracle ZFS Storage Appliance Plug-in package for Oracle VM. The Oracle Storage Connect Plug-in software package contains the following component that must be installed before using the plug-in: the plug-in in Linux RPM format which is to be installed on the Oracle VM Server(s).

Preparation and Configuration of the Oracle ZFS Storage Appliance

Three configuration steps must be performed on the Oracle ZFS Storage Appliance before the Oracle Storage Connect Plug-in can be used:

1. Create an Oracle VM user and associated user role.

   This ensures that an appropriate set of privileges are enabled for provisioning on the Oracle ZFS Storage Appliance. While this is strictly not necessary, it is highly recommended that an Oracle VM user with appropriate permissions be created for use with the plug-in. This allows the plug-in and the Oracle ZFS Storage Appliance storage array to be used without needlessly compromising the array's security.

2. Create an iSCSI target and target group as follows:
   - For iSCSI, create an OVM target group and an OVM target.
• For Fibre Channel (FC), create an OVM target group.

3. Enable the REST service for remote access if you are using an Oracle ZFS Storage Appliance Software version from OS 8.2 (2013.06.05.2.0) to OS 8.3.7 (2013.06.05.3.7). For Oracle ZFS Storage Appliance Software OS 8.4 or later, the REST service is preconfigured as already enabled and cannot be changed.

These steps are described in the following sections. Each step can be completed using the Oracle ZFS Storage Appliance browser user interface (BUI) or command line interface (CLI). The following sections provide examples of both methods.

Setting Up an Oracle VM User and Associated User Role

The Oracle ZFS Storage Appliance can be used by more than one division or group, so it is recommended that you create a local user associated with your Oracle VM Manager and Oracle VM Servers and limit access by this user to selected shares, projects, and pools. Local user access is limited by creating a “role,” setting access authorizations for that role, and then assigning the role to the local user.

The following procedures show how to create a restricted role called ovm_role and assign it to a local user called ovmuser using either the BUI or CLI of the Oracle ZFS Storage Appliance.

Using the BUI

To set up an Oracle VM user and associated role using the Oracle ZFS Storage Appliance BUI, complete the following steps:

1. Go to Configuration > Users.
2. Click the + icon to the left of Roles.
3. In the Name field, enter ovm_role and in the Description field, enter “Role for limiting ovmuser access”.
4. In the Authorizations section, select each Scope shown in Table 1. Set fields and permissions for the scope as shown in the table and click the add button in the upper right corner of the Authorizations section.
<table>
<thead>
<tr>
<th>SCOPE</th>
<th>AUTHORIZATION SETTINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workflow</td>
<td>Owner: *</td>
</tr>
<tr>
<td></td>
<td>Name: *</td>
</tr>
<tr>
<td></td>
<td>Select: read</td>
</tr>
<tr>
<td>SAN</td>
<td>Select: configure</td>
</tr>
<tr>
<td>Shares property schema</td>
<td>Select: modify</td>
</tr>
<tr>
<td>Projects and shares:</td>
<td>Storage pool: * (for unrestricted access) or select a specific pool used for Oracle VM (for example, pool-0)</td>
</tr>
<tr>
<td></td>
<td>Project: * (for unrestricted access) or select a specific project used for Oracle VM (for example, ovm-project)</td>
</tr>
<tr>
<td></td>
<td>Share: * (for unrestricted access) or select a specific share used for Oracle VM</td>
</tr>
</tbody>
</table>

Select all the authorization options:

- changeAccessProps
- changeGeneralProps
- changeProtocolProps
- changeSpaceProps
- changeUserQuota
- clearLocks
- clone
- createProject
- createShare
- destroy
- promote
- rename
- rollback
- rrsource
- rrtarget
- scheduleSnap
- scrub
- scrubSnap
- shadowMigration
- takeSnap

**Note:** In the CLI, this is referred to as `scope = nas`
The selected options are displayed at the bottom of the Add Role dialog as shown in Figure 1. In Figure 1, the `ovm_role` has been restricted to the pool `pool-0`, to the project `ovm-project`, and to any share or LUN in this project.

5. At the top right of the Add Role dialog, click **ADD**.

6. To create a local user, Click the + icon to the left of “Users” in the Configuration tab. The Properties dialog shown in Figure 2 is displayed.
7. Select **Local Only**.

8. In the **Username** field and in the **Full Name** field, enter **ovmuser**.

9. Enter and confirm a **Password**.

10. Under Roles, select the role **ovm_role**.

11. Click **ADD**.

**Using the CLI**

To set up an Oracle VM user and associated role using the Oracle ZFS Storage Appliance CLI, use the following examples:

1. Create a local role:

   ```
   aie-zfssa:> configuration roles
   aie-zfssa:configuration roles> role ovm_role
   aie-zfssa:configuration roles ovm_role (uncommitted)> set description=Role for limiting ovmuser access
   (uncommitted)
   aie-zfssa:configuration roles ovm_role (uncommitted)> commit
   aie-zfssa:configuration roles ovm_role> authorizations
   aie-zfssa:configuration roles ovm_role authorizations> create
   ```

---

**Figure 2. Creating the local user** `ovmuser` and adding the role `ovm_role` to this user

---

**Properties**

<table>
<thead>
<tr>
<th>Username</th>
<th>ovmuser</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Name</td>
<td>ovmuser</td>
</tr>
<tr>
<td>Password</td>
<td>**********</td>
</tr>
<tr>
<td>Confirm</td>
<td>**********</td>
</tr>
<tr>
<td>Require session annotation</td>
<td>☐</td>
</tr>
<tr>
<td>Kiosk user</td>
<td>☐</td>
</tr>
<tr>
<td>Kiosk screen</td>
<td><a href="https://status/dashboard">https://status/dashboard</a></td>
</tr>
</tbody>
</table>
2. Set authorizations for ovm_role. Specific settings for pool and project depend on the configuration of the Oracle ZFS Storage Appliance.

```bash
aie-zfssa:configuration roles ovm_role auth (uncommitted) > set pool=pool-0
    pool = pool-0
aie-zfssa:configuration roles ovm_role auth (uncommitted) > set project=ovm-project
    project = ovm-project
aie-zfssa:configuration roles ovm_role auth (uncommitted) > set allow_changeAccessProps=true
    allow_changeAccessProps = true (uncommitted)
```

...and similar commands for other properties.
aie-zfssa:configuration roles ovm_role auth (uncommitted) > set
allow_rrtarget=true
   allow_rrtarget = true (uncommitted)
aie-zfssa:configuration roles ovm_role auth (uncommitted) > set
allow_scheduleSnap=true
   allow_scheduleSnap = true (uncommitted)
aie-zfssa:configuration roles ovm_role auth (uncommitted) > set
allow_scrub=true
   allow_scrub = true (uncommitted)
aie-zfssa:configuration roles ovm_role auth (uncommitted) > set
allow_shadowMigration=true
   allow_shadowMigration = true (uncommitted)
aie-zfssa:configuration roles ovm_role auth (uncommitted) > set
allow_takeSnap=true
   allow_takeSnap = true (uncommitted)

ovm_role
aie-zfssa:configuration roles ovm_role auth (uncommitted) > commit
aie-zfssa:configuration roles ovm_role authorizations > list
NAME OBJECT PERMISSIONS
auth-000 nas.pool-0.ovm-project.* changeAccessProps
   changeGeneralProps
   changeProtocolProps
   changeSpaceProps
   changeUserQuota
   clearLocks
   clone
   createShare
   createProject
   destroy
   promote
   rename
   rollback
   scheduleSnap
   scrub
   shadowMigration
   takeSnap
   rrsource
   rrtarget

aie-zfssa:configuration roles ovm_role authorizations > create

aie-zfssa:configuration roles ovm_role auth (uncommitted) > set scope=schema
   scope = schema
aie-zfssa:configuration roles ovm_role auth (uncommitted) > set
allow_modify=true
   allow_modify = true (uncommitted)
aie-zfssa:configuration roles ovm_role auth (uncommitted) > commit
aie-zfssa:configuration roles ovm_role authorizations > create
   scope = stmf
aie-zfssa:configuration roles ovm_role auth (uncommitted) > set
allow_configure=true
   allow_configure = true (uncommitted)
aie-zfssa:configuration roles ovm_role auth (uncommitted) > commit
aie-zfssa:configuration roles ovm_role authorizations > create

aie-zfssa:configuration roles ovm_role auth (uncommitted) > set scope=workflow
   scope = workflow
aie-zfssa:configuration roles ovm_role auth (uncommitted)> set
allow_read=true
    allow_read = true (uncommitted)
aie-zfssa:configuration roles ovm_role auth (uncommitted)> commit
aie-zfssa:configuration roles ovm_role authorizations> list
NAME          OBJECT                               PERMISSIONS
auth-000      nas.pool-0.ovm-project.*       changeAccessProps
                changeGeneralProps
                changeProtocolProps
                changeSpaceProps
                changeUserQuota
                clearLocks
                clone
                createShare
                createProject
                destroy
                promote
                rename
                rollback
                scheduleSnap
                scrub
                shadowMigration
                takeSnap
                rrsource
                rrtarget
auth-001      schema                            modify
auth-002      stmf                              configure
auth-003      workflow.*.*                     read
aie-zfssa:configuration roles ovm_role authorizations> done
aie-zfssa:configuration roles ovm_role> done
aie-zfssa:configuration roles> done

3. Create a local user with the previously defined role by following this example:

aie-zfssa:> configuration users
aie-zfssa:configuration users> user ovmuser
aie-zfssa:configuration users ovmuser (uncommitted)> set fullname=ovmuser
    fullname = ovmuser (uncommitted)
aie-zfssa:configuration users ovmuser (uncommitted)> set initial_password=<input password here>
    initial_password = **** (uncommitted)
aie-zfssa:configuration users ovmuser (uncommitted)> commit
aie-zfssa:configuration users ovmuser (uncommitted)> select ovmuser
aie-zfssa:configuration users ovmuser> set roles=ovm_role
    roles = ovm_role (uncommitted)
aie-zfssa:configuration users ovmuser> commit
aie-zfssa:configuration users> done

Configuring Oracle VM Target Groups on the Oracle ZFS Storage Appliance

Storage entities (LUNs) created through the Oracle VM are placed by the plug-in in specific target
groups for each of the supported protocols. For iSCSI, you must configure both a target and target
group before you can use the plug-in for provisioning. For Fibre Channel, you only need to create a target group.

This is a one-time administration step you must perform on each Oracle ZFS Storage Appliance that is to be registered for either protocol. If the Oracle ZFS Storage Appliance is a clustered system, you must separately configure each head of the clustered system that is to be used.

Configuring Target and Target Groups for the iSCSI Protocol

The Oracle Storage Connect Plug-in uses an iSCSI target and target group to create or display LUNs in the iSCSI target group. You must create an iSCSI target and target group for each Oracle ZFS Storage Appliance that is to be registered with the Oracle VM. In the following example, the target and target group are named **OVM-iSCSI-Target** and **OVM-iSCSI** respectively.

If you are registering more than one non-clustered Oracle ZFS Storage Appliance, you can give any name to the iSCSI target and the target group for each Appliance. As of version 2.0 of the plug-in, only the target group name is needed in the plug-in Private Data field for the Oracle ZFS Storage Appliance during the Oracle VM discovery and registration process (see the section **Registering the Oracle ZFS Storage Appliance**).

When registering clustered Oracle ZFS Storage Appliances, you must provide a name that is unique across the cluster for the iSCSI target and the target group for each head.

You can configure the Oracle VM iSCSI target and target group using either the BUI or CLI of the Oracle ZFS Storage Appliance. Both procedures are described in the following sections.

Using the BUI

To configure the Oracle VM iSCSI target and target group using the Oracle ZFS Storage Appliance BUI, complete the following steps:

1. Go to Configuration > SAN > iSCSI Targets.
2. Click on the + icon next to **iSCSI Targets**.
3. Select which network port to use and create an iSCSI target with a unique alias, for example, **OVM-iSCSI-Target**. Then click **OK**.
4. Add the new target to a target group by placing the cursor over the new target entry in the left panel. A Move icon ◁ appears to the left of the entry. Drag and drop the Move icon to the bottom of the iSCSI Targets Groups list in the right column to create a new group named **target-#**.
5. Click the pencil icon at the right of a new target group to display the property dialog for the target group.
6. Enter a **Name** for the target group (for this example, **OVM-iSCSI**)
7. Use the check boxes to assign iSCSI targets to the group.
8. Click **OK** to save the settings for the new target group.

9. Click **APPLY** in the upper right of the Storage Area Network screen to apply the changes to the new target group.

Figure 3 shows the target group OVM-iSCSI with several targets assigned to it.

![Figure 3. The iSCSI target group OVM-iSCSI with multiple assigned iSCSI targets](image)

**Using the CLI**

To configure the Oracle VM iSCSI target and target group using the Oracle ZFS Storage Appliance CLI, use the following example:

1. To create the iSCSI target **OVM-iSCSI-Target**:

   ```
aie-zfssa:> configuration san targets iscsi
aie-zfssa:configuration san targets iscsi> create
aie-zfssa:configuration san targets iscsi target (uncommitted)> get
   alias = (unset)
   iqn = (unset)
   auth = none
   targetchapuser = (unset)
   targetchapsecret = (unset)
   interfaces = nge0
aie-zfssa:configuration san targets iscsi target (uncommitted)> set
   alias=OVM-iSCSI-Target
   alias = OVM-iSCSI-Target (uncommitted)
aie-zfssa:configuration san targets iscsi target (uncommitted)> commit
aie-zfssa:configuration san targets iscsi> list
   TARGET      ALIAS
   target-000  OVM-iSCSI-Target
     |  IQN
          iqn.1986-03.com.sun:02:xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx
   aie-zfssa:configuration san targets iscsi>
   ```
2. Next, create the iSCSI target group OVM-iSCSI.

```
aie-zfssa: > configuration san targets iscsi groups
aie-zfssa:configuration san targets iscsi groups> create
aie-zfssa:configuration san targets iscsi group (uncommitted)> get
   name = (unset)
   targets = (unset)
aie-zfssa:configuration san targets iscsi group (uncommitted)> set name=OVM-iSCSI
   name = OVM-iSCSI (uncommitted)
aie-zfssa:configuration san targets iscsi group (uncommitted)> set targets=iqn.1986-03.com.sun:02:xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx
   targets = iqn.1986-03.com.sun:02:xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx (uncommitted)
aie-zfssa:configuration san targets iscsi group (uncommitted)> commit
aie-zfssa:configuration san targets iscsi groups> list
GROUP   NAME
group-000 OVM-iSCSI
   |-> TARGETS
      iqn.1986-03.com.sun:02:xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx
```

### Configuring Target Groups for the Fibre Channel Protocol

Similarly to iSCSI, an FC target group needs to be created on the Oracle ZFS Storage Appliance before it can be used with Oracle VM. You can perform this step through the BUI or the CLI.

It is assumed that both the Oracle ZFS Storage Appliance and Oracle VM Server hosts have been configured with the appropriate FC cards and placed in the appropriate zones in the FC switch so that the ports are visible to each other. It is also important that the target ports on the Oracle ZFS Storage Appliance are in a Target mode as shown in Figure 4.

#### Using the BUI

1. Log in to the Oracle ZFS Storage Appliance through the browser with appropriate administrative privileges.

2. Traverse the menu path **Configuration>SAN>Targets**.

   Make sure you see the Fibre Channel ports and that they are in the Target mode. (This may involve a reboot of the Oracle ZFS Storage Appliance upon initial configuration.)

3. Place the mouse cursor to the left of each port. A move icon appears beside the port entry. Drag the icon and drop it on the right side of the panel below the list of existing target groups under the **Fibre Channel Target Groups** header. This will create a new target group with the **Name** set to a default name of `target-#` where `#` is some number.
4. Select and edit the target group to change its name from the default `target-#` to the name you wish to use. This will be used in the registration of the Oracle ZFS Storage Appliance in Oracle VM in the 'Private Data' field. Select the ports you wish to place into this new FC target group and click **OK**.

5. Click on **APPLY** to apply the changes.

Figure 4 shows an example of a newly created Oracle VM FC group, **OVM-FC**.

![Figure 4. Creating an Oracle VM Fibre Channel target group called OVM-FC](image)

Using the CLI

1. Log in to the Oracle ZFS Storage Appliance shell (CLI) with appropriate administrative privileges.
2. Configure the Oracle VM FC target group as shown in the following CLI session:

```
aie-zfssa:> configuration san targets
aie-zfssa:configuration san targets> ls
Children:
   fc => Manage fibre channel targets
   iscsi => Manage iSCSI targets
   srp => Manage SRP targets
aie-zfssa:configuration san targets> fc
aie-zfssa:configuration san targets fc> ls
Properties:
   targets = wwn.0123456789ABCDEF, wwn.1123456789ABCDEF

Targets:
   NAME   MODE   WWN                PORT   SPEED
```
Enabling the REST Service on the Oracle ZFS Storage Appliance for Remote Access

The Oracle Storage Connect Plug-in uses a REST service on the Oracle ZFS Storage Appliance for access group management functionalities. If you are using Oracle ZFS Storage Appliance Software versions earlier than OS 8.4 (2013.06.05.4.0), you need to enable the REST service in order to use the plug-in.

Using the BUI

To enable the REST service using the Oracle ZFS Storage Appliance BUI, complete the following steps:

1. Go to Configuration > Services.
2. Under the section Remote Access, click on the power icon to enable the REST service. Figure 5 shows the REST service enabled in the Remote Access pane.

![Remote Access](image)

**Figure 5.** REST service for remote access enabled (for Oracle ZFS Storage Software versions before OS 8.4 only)

**Using the CLI**

To enable the REST service using the Oracle ZFS Storage Appliance CLI, use the following example:

```
aie-zfssa:> configuration services rest
aie-zfssa:configuration services rest> enable
aie-zfssa:configuration services rest> list
Properties:
  <status> = online
```

**Enabling CHAP Authentication for the iSCSI Protocol (Optional)**

CHAP authentication is used to restrict iSCSI access to hosts that supply the correct account name and password combination. If a user does not enable CHAP authentication, communication between the host and the Oracle ZFS Storage Appliance can still be established.

Enabling CHAP authentication requires configuration on both the Oracle ZFS Storage Appliance and Oracle VM Manager. You can configure CHAP on the Oracle ZFS Storage Appliance either through its BUI or through the CLI. Instructions follow for both methods.

**Configuring Settings Using the Oracle ZFS Storage Appliance BUI**

To enable CHAP authentication using the Oracle ZFS Storage Appliance BUI, complete the following steps:

1. Go to Configuration > SAN > iSCSI Targets.
2. Select Oracle VM target and modify. Select the CHAP option, under Initiator authentication mode, as shown in the following figure. Leave the Target CHAP name and Target CHAP secret blank, as OVM uses one-way CHAP validation.
Configuring Settings Using the Oracle ZFS Storage Appliance CLI

To enable CHAP authentication using the Oracle ZFS Storage Appliance CLI, use the following example:

```
aie-zfssa:> configuration san iscsi targets
aie-zfssa:configuration san iscsi targets> select alias=OVM-iSCSI-Target
aie-zfssa:configuration san iscsi targets target-001> set auth=chap
    auth = chap (uncommitted)
aie-zfssa:configuration san iscsi targets target-001> commit
```

Configuring CHAP in the Oracle VM Manager UI

Perform the following steps in the Oracle VM Manager UI:

1. In the Oracle VM manager UI, choose edit for the SAN Server.
2. Select the Access tab and select “Use CHAP (Applies to all Access Hosts)” as shown in the following figure.
3. Edit all the access hosts and set the Access Username and Password. The CHAP credentials for all the access hosts should be the same.
Figure 8. Configuring CHAP for each access host

4. Press OK and wait for the SAN server to be re-validated and refreshed.
Installing the Oracle Storage Connect Plug-in on the Oracle VM Server

To install the Oracle Storage Connect Plug-in on the Oracle VM Server, complete the following steps:

1. Log in to the Oracle VM Server as root.
2. Check if a previous version of the RPM already exists:
   # rpm -qa | grep -i s7k
   If it exists, remove it:
   # rpm -ev osc-oracle-s7k
3. Install the Oracle Storage Connect Plug-in:
   # rpm -ivh osc-oracle-s7k-\(n.n.n\).el6.noarch.rpm
   where \(n.n.n\) represents the current plug-in download version number. Be sure to check the accompanying release notes for your download to verify this number.

   In the following example, the Oracle Storage Connect Plug-in version 2.1.1 is installed. The warning message may be safely ignored.
   # rpm -ivh osc-oracle-s7k-2.1.1.el6.noarch.rpm
   warning: osc-oracle-s7k-2.1.1.el6.noarch.rpm: Header V3 DSA signature: NOKEY, key ID 1e5e0159
   Preparing...                                  1:osc-oracle-s7k

Configuring Oracle VM to Recognize Oracle ZFS Storage Appliance Resources

Once the Oracle Storage Connect Plug-in is properly installed, the Oracle ZFS Storage array that is available must be presented to Oracle VM through its own user interface.

This section describes:

- Using the Oracle VM UI to discover the Oracle VM Server on which the plug-in is installed
- Registering the Oracle ZFS Storage Appliance for subsequent provisioning
- Creating an access group in Oracle VM Manager to map to storage initiators – and thus their assigned physical disks – in the Oracle ZFS Storage Appliance
- Explaining unexpected LUN listings that may appear in the Oracle VM user interface
To keep views of the Oracle ZFS Storage Appliance in sync with the Oracle VM UI, Oracle VM management operations should be performed from the Oracle VM UI whenever possible. If the attributes of a LUN, for example, are changed using the Oracle ZFS Storage Appliance BUI directly, they may be displayed incompletely or incorrectly in the Oracle VM UI.

Details on provisioning the Oracle ZFS Storage Appliance, as well as using the storage for virtualization, is beyond the scope of this guide. Consult the Oracle ZFS Storage Appliance and Oracle VM documentation listed in the References section for further information.

Discovering the Oracle VM Server

Before the Oracle Storage Connect Plug-in can be used with the Oracle ZFS Storage Appliance, the Oracle VM Server on which the Oracle Storage Connect Plug-in has been installed must be (re)discovered. If you have an older version of the plug-in installed, it is essential that you delete the previously discovered Oracle VM Server instance and rediscover it.

To discover an Oracle VM Server:

1. In the Oracle VM Manager user interface (UI), click the **Server and VMs**.
2. Select the **Discover Servers** icon to display the dialog window shown in Figure 6.
3. Specify the IP address and Oracle VM Agent Password for the Oracle VM Server as shown in the following figure.

![Figure 9. Discovering the Oracle VM Server in the Oracle VM Manager interface](image-url)
Registering the Oracle ZFS Storage Appliance

To register the Oracle ZFS Storage Appliance, complete the following steps:

1. In the Oracle VM Manager, go to the Storage tab.

2. Select the **Discover SAN Server** icon to display the dialog window shown in the following figure.

![Discover SAN Server Dialog Window](image)

Figure 10. Registering an Oracle ZFS Storage Appliance in Oracle VM Manager by choosing 'Discover SAN Server'

3. Input the values shown in the following table:

<table>
<thead>
<tr>
<th>FIELD OR OPTION</th>
<th>VALUE TO ENTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Enter the name of the Oracle ZFS Storage Appliance.</td>
</tr>
<tr>
<td>Description</td>
<td>(Optional).</td>
</tr>
<tr>
<td>Select Storage Type</td>
<td>Select <strong>iSCSI Storage Server</strong>.</td>
</tr>
<tr>
<td>Storage Plug-In</td>
<td>Select <strong>Oracle ZFS Storage Appliance SCSI</strong>.</td>
</tr>
</tbody>
</table>

**Note.** If Oracle ZFS Storage Appliance SCSI is not shown as an option, the Oracle Storage Connect Plug-in has not been installed on this Oracle VM Server. See the section "Installing the Oracle Storage Connect Plug-in on the Oracle VM Server" for details.
FIELD OR OPTION | VALUE TO ENTER
--- | ---
Plug-in Private Data | Enter only one Oracle VM target group name configured as detailed in the section "Configuring Oracle VM Target Groups on the Oracle ZFS Storage Appliance." Example: OVM-iSCSI
Admin Host | Enter the host name or IP address where administrative access to the file server is allowed with appropriate credentials. Example: aie-zfssa
Admin Username | Enter the local user defined in . Example: ovmsuser
Admin Password | Enter any reasonably secure password.

4. Click Next. The following figure shows the Create Access Host dialog window where you enter the access information and select OK when completed. Use the table that follows for these entries. With its version 2.0 release, the Oracle Storage Connect Plug-in supports iSCSI multipathing, so you can enter multiple ip addresses configured for the target group entered in the previous dialog.

![Figure 11. Providing access host information to register the Oracle ZFS Storage Appliance in Oracle VM Manager](image)

Use these suggested entries for access host registration.

FIELD OR OPTION | VALUE TO ENTER
--- | ---
Access Host | Enter the host or IP address configured on the Oracle ZFS Storage Appliance to access iSCSI requests from the Oracle VM server. Example: aie-zfssa
Access Port | Leave blank.
If Challenge-Handshake Authentication Protocol (CHAP) is to be used, enable Chap for all Access Hosts before entering access host information. For this example, CHAP is not used.

5. Click **Next** in the wizard to specify Admin Server(s).

6. In the list that is displayed, select the server on which the Oracle Storage Connect Plug-in for the Oracle ZFS Storage Appliance is installed. Click on the > icon to move it from the left pane to the right pane to finish the selection.

7. Click **Finish**.

---

**Configuring Storage Array Access Through Oracle VM Manager Access Groups**

After registration is complete, you must configure Oracle VM access groups for the storage initiators to access your Oracle ZFS Storage Appliance storage array. The Oracle VM Manager uses these access groups to refer to the initiator groups on your Oracle ZFS Storage Appliance. You configure access groups to bind storage initiators to physical disks (LUNs). You can also create multiple access groups in order to arrange and restrict LUN access according to your requirements. However, there are certain restrictions to consider when managing multiple access groups. These are detailed in the section titled "Restrictions in Multiple Access Group Management."
Restrictions for access group naming

The following restrictions apply to names of Oracle VM access groups created for the Oracle ZFS Storage Appliance.

- For access group (initiator group) names, the allowed character set is [A-Za-z0-9-], that is, alphanumeric characters and the dash character (-).
- Group names must be unique across case. For example, if a group named `AG` exists, an attempt to create a group named `ag` will fail.

Examples of allowed names are:

- `OvsAg`
- `Ovs-Ag`
- `OvsAg01`
- `Ovs-Ag01`

Examples of disallowed names are:

- `Ovs Ag` (contains a space)
- `ovsAg&` (contains a trailing ampersand)

Creating an access group

Use the following steps to configure an access group:

1. In the Oracle VM Manager, select the Storage tab, then select your ZFS storage array.
2. In the management pane, select the Perspective Access Groups, as seen in the following figure.

![Figure 13. Selecting Access Groups in the Oracle VM Manager UI](image)

3. Click the Create Access Group icon. The Create Access Group dialog box appears.
4. Enter a name for your new access group and optionally provide a description.

5. Click Next. The next page contains the available storage initiators for this type of storage on the Oracle VM Servers in your environment.

6. Use the arrow buttons to move the required initiators to the Selected Storage initiators box.
   For an iSCSI storage array, the initiator will appear as IQN in the Available Storage Initiators list.
For a Fibre Channel storage array, the initiator will appear as FC Ports in the Available Storage Initiators list.
7. Click Next. The next page displays the available LUNs on the storage array you are registering.

8. Use the arrow button to move the required LUNs to the Selected Physical Disks box. These disks will be presented to the Oracle VM Server as available from the iSCSI or FC initiator that is part of the new access group.
Figure 17. Selecting physical disks to make available to the new access group

9. Click Finish to create the new access group with selected initiators and LUNs. The new access
group now appears in the Access Group table.

10. After configuring the access group, refresh the Oracle ZFS Storage array to make sure that the
current storage layout and access rules are in effect.

The selected LUNs in your storage array are now available to the Oracle VM Servers in this access
group. If you need to modify the way Oracle VM Servers access the LUNs in your storage array, select
the access group you wish to modify. Click the Edit icon to change access group settings such as name,
description, selected storage initiators, and physical disks.

Starting with version 2.0 of the Oracle Storage Connect plug-in, a LUN can belong to multiple access
groups, and an initiator can also belong to multiple access groups. But restrictions apply when
managing the initiator access to LUNs. Please refer to the next section for detailed information.

Restrictions in multiple access group management

When an initiator belongs to multiple access groups, a LUN should not be presented to more than one
of those member access groups at the same time.

Oracle VM does not support a LUN mapping to an initiator through multiple access groups. Consider
the following scenario: an initiator is added to multiple access groups – for example, AG1 and AG2 –
and a LUN is also presented to AG1 and AG2. When the user removes the initiator from AG1, the
LUN will disappear from the initiator even when it is still presented to the initiator through AG2.
Please avoid this kind of operation. If you encounter this problem, perform a refresh on the storage
array. This will bring back the LUN to the initiator; however, the user may experience a temporary loss of service on the LUN.

Refreshing the Storage Array

During array registration, the Oracle Storage Connect Plug-in gathers some information about the storage array. However, before the newly registered array can be used, it must be refreshed so that the Oracle Storage Connect Plug-in can gather detailed information about the array’s access groups, physical disks, and other information to be used by the Oracle Storage Connect Plug-in.

To refresh the storage array:

1. Click the newly registered array to select it.
2. Select the action “Refresh Storage Array” as shown in the following figure.

Registering an Oracle ZFS Storage Appliance can take some time, depending on the number of existing pools, projects, and LUNs.

Registering an Oracle ZFS Storage Appliance Cluster Configuration

If your Oracle ZFS Storage Appliance is cluster-capable, certain considerations must be taken into account when configuring the cluster.

A clustered Oracle ZFS Storage Appliance has two heads, each of which may be active or passive. If both Oracle ZFS Storage heads are active, when you register the appliance, you must create:

- A separate iSCSI target and iSCSI target group for each head (each head must use a different iSCSI target and iSCSI target group)
- A separate FC target group for FC protocol
• A new restricted user for each head

Essentially, each head of a clustered Oracle ZFS Storage Appliance must be treated as a separate storage array. It is assumed that the registration in a cluster will happen when the cluster is in an Active/Active state – that is, both heads are active.

IMPORTANT: Registration is allowed when one head is the owner (Active/Passive), but note that in this case, volume groups belonging to both heads will be seen on registration, but volume groups belonging to the passive head may no longer be seen when the cluster state goes back to Active/Active. However, when registration happens in an Active/Active state and a failover occurs, the volume groups originally seen will continue to be available.

Also note when access groups on one head are modified or deleted, a refresh should be performed on the other head to ensure that the OVM UI is in synch with the clustered Oracle ZFS Storage Appliance.

Unexpected LUN Listings in Oracle VM

When a LUN is created from the Oracle VM UI using the Oracle Storage Connect Plug-in, the LUN is explicitly placed in the target group corresponding to the Oracle ZFS Storage Appliance target group that was created during the preparation and configuration process on the appliance. The name of this target group was entered in the plug-in's Private Data field when the Oracle ZFS Storage Appliance was registered (see the section "Registering the Oracle ZFS Storage Appliance"). When this LUN is presented to an Oracle VM access group (through the Oracle ZFS Storage Appliance initiator group), the LUN's initiator group is set to this Oracle VM access group.

However, when an Oracle ZFS Storage Appliance is used by applications other than Oracle VM, LUNs that are not within the ovm user project/share scope (specified in the section "Setting Up an Oracle VM User and Associated User Role") may also appear in the Oracle VM UI. Consider the scenario in which a LUN is created on the Oracle ZFS Storage Appliance (but not using the Oracle VM UI) and is then placed in default or other initiator groups that also contain the Oracle VM Server on Oracle VM. When the iSCSI or FC bus is refreshed, the LUN appears on the Oracle VM Server and in the Oracle VM UI. Although the LUN is not created under the pool/share scope of the ovm user, it may appear in the Oracle VM UI with the notation SUN(X), where X is a number, and may also be erroneously placed in an arbitrary Volume Group. However, the Oracle Storage Connect Plug-in has no knowledge of the LUN, so this LUN should not be used by Oracle VM.

Debugging and Troubleshooting

When reporting problems to Oracle support staff, please have the following information ready:

• Version numbers of the plug-in, Oracle VM, and Oracle VM Server.

• Installed version of the Oracle ZFS Storage Appliance Software.
• Exact sequence of steps to recreate the problem.

• Debug log from the Oracle VM Server - /var/log/ovs-agent.log. This file may be large, so compress it before uploading.

  **Debugging tip:** When troubleshooting issues, it would help to run a tail of the log file on the Oracle VM Server as follows:

  `%tail -f /var/log/ovs-agent.log`

• Appropriate error messages from the Oracle VM User Interface. A screen snapshot would be helpful as well.

Checking for Common Errors

The following are common and easily corrected errors once their messages are further understood:

• **Connection failure message: URL failure: Connection refused** – This or a similar message may be displayed when registering the Oracle ZFS Storage Appliance if you are not using the correct admin host or credentials for registering the Oracle ZFS Storage Appliance. Verify that you can log in to the Oracle ZFS Storage Appliance with the admin host and credentials being used.

• **Error message: You are not authorized to perform this action. If you wish to proceed, contact an administrator to obtain the proper credentials.** – This message may be seen when modifying a volume group or LUN to which the ovms user may not have access, since the plug-in currently presents all volume groups in the Oracle ZFS Storage Appliance.
Glossary

**Access Group** – Oracle VM (OVM) terminology. **SAN Access Groups** define which storage initiators can be used to access physical disks exposed using some form of SAN storage, such as iSCSI or Fibre Channel. SAN access group functionality is defined by the Oracle VM Storage Connect plug-in you are using.

**FC (Fibre Channel)** – A protocol for sharing SCSI-based storage over a SAN consisting of fiber-optic cables, FC switches, and HBA. The transport protocol used is called Fibre Channel Protocol (FCP) for transmitting the SCSI commands.

**Initiator** – An end point that is capable of initiating a SCSI session, sending SCSI commands and I/O requests. Initiators are identified by unique addressing methods. For iSCSI, an initiator would typically use an IQN addressing form on the host. For FC, it would be an FC port identified by its WWN.

**Initiator Group** – A set of initiators. When an initiator group is associated with a LUN, only initiators from that group may access that LUN. NOTE: The Oracle ZFS Storage Appliance uses the term initiator group as a property of the LUN. See also Access Group.

**Plug-in** – A software component or module that is part of a larger software infrastructure that adds specific functionality or capability.

**Pool** – A ZFS storage pool created on the Oracle ZFS Storage Appliance and comprised of a set of disks. Each pool may be configured on initial storage array setup with its own profile (like mirroring, for example).

**Project** – A storage pool on the Oracle ZFS Storage Appliance may be further sliced up into projects for convenience by the administrator.

**SAN** – (Storage Area Network). A dedicated network that provides access to block-level data storage.
**Storage Array** – A disk storage system which may further be categorized as NAS (Network Attached Storage) or SAN (Storage Area Network). The Oracle ZFS Storage Appliance is an example of a storage array that supports both SAN and NAS.

**Target** – A storage system end point that provides a service of processing SCSI commands and I/O requests from an initiator (see initiator). A target is created by the storage administrator and is identified by unique addressing methods. A target may contain zero or more LUNs.

**Target group** – A set of targets. LUNs are exported over all the targets in one target group (or targetgroup). Note that the Oracle ZFS Storage Appliance uses the term targetgroup as a property of a LUN. All Oracle VM LUNs are placed in a pre-specified Oracle VM targetgroup.

**Volume Group** – An OVM volume group is a unique reference to a Oracle ZFS Storage Appliance array location where a LUN or share may be created and is identified by the tuple `<pool/collection/project>` as in `pool0/local/ovm`. The collection will, as of now, always be 'local'.

**WWN** – World Wide Name, which may use different formats such as IEEE OUI.
References

References to Sun ZFS Storage Appliance, Sun ZFS Storage 7000, and ZFS Storage Appliance all refer to the same family of Oracle ZFS Storage Appliance products. Some cited documentation may still carry these legacy naming conventions.

- Oracle ZFS Storage Appliance Documentation Library, including Installation, Analytics, Customer Service, and Administration guides:
  The Oracle ZFS Storage Appliance Administration Guide is also available through the Oracle ZFS Storage Appliance help context.
  The Help function in Oracle ZFS Storage Appliance can be accessed through the browser user interface.

- Oracle ZFS Storage Appliance Product Information

- Oracle ZFS Storage Appliance White Papers and Subject-Specific Resources

- Oracle Support Center
  http://www.oracle.com/support

- Oracle ZFS Storage Appliance Plug-ins and Downloads

  http://docs.oracle.com/cd/E35328_01/

  http://docs.oracle.com/cd/E50245_01/

  http://docs.oracle.com/cd/E64076_01/