

EMC<sup>®</sup> ViPR<sup>™</sup>

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## User Guide

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EMC Corporation  
Hopkinton, Massachusetts 01748-9103  
1-508-435-1000 In North America 1-866-464-7381  
[www.EMC.com](http://www.EMC.com)

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## FIGURES

# CHAPTER 1

## Introduction to the User View

This chapter contains the following topics:

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## User view users and features overview

The *ViPR User Guide* describes the use of the **User** view of the ViPR Admin and Self-Service UI (the UI) for creating and managing storage using operations made available from the service catalog.

The **User** view provides access to the UI areas required for running services, working with orders, and reviewing the storage resources that you have created. In addition, if you are an approver, it provides access to the approvals area.

Access and use of the service catalog within the User view does not require any administrator privileges, it is accessible to any user who has been configured to access the tenant. In addition, for object storage users who are tenant members, it is possible to use the UI to self-generate an object store key to enable access to ViPR object storage.

When accessing ViPR from the User view, the categories of the service catalog, and the services within each category, that are visible to you can be configured by a Tenant Administrator. In addition, the storage resources (block volumes and file systems) that you have access to depend on the project to which you are assigned by the Tenant Administrator.

If you are Tenant Administrator, restrictions on access to the service catalog, or to resources based on project membership, do not apply; a Tenant Administrator has ultimate authority in the tenant and can access any area of the service catalog and can create resource for any project and access resources belonging to any project.

The administrator tasks that must be performed in order to prepare the ViPR virtual data center for use by provisioning end-users are described in the *ViPR Administrator Guide*.

## Controls bar

The UI provides a controls bar and a menu bar. The controls bar provides access to the following:

- ◆ [User menu on page 10](#)
- ◆ [View selector on page 11](#)
- ◆ [Notifications area on page 11](#)
- ◆ [Online help selector on page 11](#)

### User menu

The **User** menu is a drop-down located at the top-right of the UI, as shown below. In this figure the logged in user does not have any administrator rights, so a view selector is not displayed.

**Figure 1** User menu



The menu provides the following tabs:

### Preferences

Provides access to the **User Preferences** panel which allows you to enable email notifications and to specify the email address to which notifications will be sent. Notifications tell you when an order you have submitted has been approved (or rejected) and when the order has been fulfilled.

### Manage Object Store Keys

Provides access to the **Manage Object Store Keys** page which enables you to add and delete object store keys that will allow you to access ViPR object storage.

### Logout

Enables you to log out from the UI.

### View selector

If you are assigned to an administrator role in ViPR, you can switch between the **Admin** and **User** views using the view selector.

**Figure 2** View selector



If you are a provisioning user and do not have administrator privileges, you will not see the view selector.

### Notifications area

The notifications area is displayed if you are a Tenant Approver and can be expanded to show a list of outstanding approvals, as shown below.

**Figure 3** Notifications area



Clicking on an approval notification opens the approvals page to allow the request to be approved. In addition, as a Tenant Approver, approval requests will be notified by email as long as the approval email address has been added by an administrator.

### Online help selector

You can display context sensitive online help by clicking the question mark on the status bar. The help displayed will be appropriate to the page that is currently displayed.

## User menus and permissions

The menus within the User view enable provisioning users to access the service catalog and execute services which result in the creation of orders.

The following table describes the system features provided by the User view menu and describes how access permissions affect what you can see and do.

**Table 1** User menus

Area	Description	More Information
Home	Provides access to your most recently used services and your most recent orders.	<a href="#">Home page on page 14</a>
Service Catalog	Provides access to the service catalog.	<a href="#">Service Catalog for Users on page 18</a>

**Table 1** User menus (continued)

Area	Description	More Information
	<p>You will be able to run services from the service catalog in order to create and manage storage unless your access to the service catalog has been restricted.</p> <p>As all file system and block volume storage resources belong to projects, you will only be able to create storage resources in, and manage storage resources that belong to, projects on which you have been assigned permissions.</p>	
Orders	<p>Provides access to the orders that you have submitted.</p> <p>You will only have access to the orders that you have submitted.</p>	<a href="#">GUID-DA29A700-401E-4E78-B5FE-CCAC6B47ABD0</a>
Resources	<p>Provides access to reports showing the block and file storage owned by projects that you belong to. You can see all storage created by project members.</p> <p>As all file system and block volume storage resources belong to projects, you will only be able to see storage resources that belong to projects on which you have been assigned permissions.</p>	<a href="#">Resources on page 62</a>
Approvals	<p>Provides access to the approvals area which enables you to approve or reject orders that require approval.</p> <p>You must be a Tenant Approver to see this area.</p>	<a href="#">Approvals on page 58</a>

Apart from the specific cases identified for the Tenant Administrator, Project Administrator, and Tenant Approver all other users assigned to administrator roles are just normal provisioning users in the User view and, in the same way as all users, can be assigned to projects and can be assigned specific access rights on the service catalog. Access to the User view is detailed in [User access to UI on page 12](#).

## User access to UI

The User view can be accessed by all users mapped into the tenant.

The following table shows what access end-users and administrators have at the User view.

**Table 2** User view access

Role	User view area	Access
Tenant Administrator	Service Catalog	Can always see all categories and services. Access cannot be restricted by ACL. Can create storage in and manage storage belonging to all projects.

**Table 2** User view access (continued)

Role	User view area	Access
	Orders	Can see own orders. Can see all orders in Admin view.
	Resources	Can see resources for all projects.
	Approvals	Cannot access this menu.
Project Administrator	Service Catalog	Can see all categories and services. Access can be restricted by Tenant Administrator using ACL. Can create storage in and manage storage belonging to all owned projects and projects assigned by ACL.
	Orders	Can see own orders.
	Resources	Can see resources for projects that he or she owns.
	Approvals	Cannot access this menu.
Tenant Approver	Service Catalog	Can see all categories and services. Access can be restricted by Tenant Administrator using ACL. Can create storage in and manage storage belonging to all projects to which user is assigned.
	Orders	Can see own orders.
	Resources	Can see resources for projects that he or she owns.
	Approvals	Can access in order to approve orders.
All other roles and end-users (no role)	Service Catalog	Can see all categories and services. Access can be restricted by Tenant Administrator using ACL. Can create storage in and manage storage belonging to all projects to which user is assigned.
	Orders	Can see own orders.
	Resources	Can see resources for projects that he or she has been assigned to.
	Approvals	Cannot access this menu.

## Home page

The Home page displays your most recently used services and your most recent orders.

**Figure 4** Home page

The screenshot shows the ViPR Home page. At the top is a navigation bar with tabs for Home, Service Catalog, Orders, Resources, and Approvals. Below the navigation bar is the 'Recently Used Services' section, which contains three service cards: 'Create Block Volume', 'Create Windows Share', and 'Create Unix Share'. Each card has an icon and a description. Below this is the 'Recent Orders' section, which is a table listing the most recent orders.

Number	Status	Service	Summary	Date Submitted
13	✘	Create Block Volume	Create a Block Volume	18 minutes ago
12	✔	Create Windows Share	Create new FileSystem and CIFS Share	20 minutes ago
11	✔	Create Unix Share	Create new FileSystem and NFS Export	21 minutes ago
10	✔	Create Windows Share	Create new FileSystem and CIFS Share	24 minutes ago
9	✔	Create Unix Share	Create new FileSystem and NFS Export	26 minutes ago

Clicking on a recently used service will open the parameter entry form for the service and put you in the service catalog area of the UI. Clicking on an order will open the details for the selected order and put you in the orders area of the UI.

## Search facilities in the UI

The ViPR UI provides a search facility on tables and on selection fields in forms.

To perform filtering, the search string must contain at least three letters; once three letters have been typed, you will see the results of the filtering operation.

On form fields, the list of possible values that can be selected as the value for the field is filtered to those that contain the search string. On tables, the search string is generally matched against the name field of the table.

The search UI controls operate on the client side; a list of values is returned from the ViPR controller and is filtered by the UI control. However, using the ViPR API it is possible to perform controller-side filtering. That is, a client can request the controller to return only the resources that match a specified string.

## Accessing the ViPR UI

You can access the ViPR UI from your browser by specifying the address of the ViPR appliance.

### Procedure

1. To access the UI, you need to enter the address of the ViPR appliance in your browser's address bar:

`https://ViPR_virtual_ip`

2. Enter your username and password. It should be in the format `user@domain.com`.

If you are unable to log in, contact your Tenant Administrator.

All logged in users have access to the User view and you will initially be placed in the user Home page. If you have been assigned to any administrator roles, the Admin view will also be available.

3. You can log out from the Logout item located in the user menu at to right-hand corner of the UI, next to the identity of the logged in user.

## Adding an object data store key

An object data store key can be created in the UI and used to access ViPR object storage.

### Before you begin

Object store keys can be created by ViPR users who are domain users and have access to the UI.

### Procedure

1. Select **User Menu** > **Manage Data Store Keys**.
2. Select **Add**.

A new key will be added to the Data Store Keys table. An object user can have a maximum of 2 object data store keys. The key can be copied and used as the secret key when accessing the ViPR object stores using an object client.

## Rolling-over a object data store key

You can change, or "rollover", an object data store key manually at the ViPR UI.

### Before you begin

Object store keys can be created by ViPR users who are domain users and have access to the ViPR UI.

Where you are accessing an object store using a client that requires you to manually enter an object data store key (also referred to as a secret key), for security, you should periodically change the key that you use. This is often called "secret key rollover."

### Procedure

1. Select **User Menu** > **Manage Data Store Keys**.
2. Select the checkbox next to the object data store key that you want to delete.  
If you have more than one key, this should be the oldest of your two keys.
3. Select **Delete**.
4. To create a new key to replace the deleted key, select **Add**.

A new key will be added to the Data Store Keys table. You can have a maximum of 2 object data store keys. You can copy the key and use it as the secret key when accessing the ViPR object stores using an object client.



# CHAPTER 2

## Provisioning Using the Service Catalog

This chapter contains the following topics:

- ◆ [Service Catalog for Users](#) ..... 18
- ◆ [Services overview](#) ..... 18
- ◆ [Running a service](#) ..... 20
- ◆ [Services end-user reference](#) ..... 22

## Service Catalog for Users

Orders are placed, to run services, from the User view of the Service Catalog.

### Service Catalog

From the User view, the Service Catalog presents the service categories, which contain a set of pre-configured services appropriate to the storage operation to perform.

The services in the Service Catalog, are managed, and controlled by ViPR Administrators. Administrators configure the categories in which services are organized, the options that are available, or visible from a service, the resource constraints enforced in a service, and user access permissions for using a service.

### User view, Service Catalog for administrators

Only administrators logged into ViPR, will have the following options available from the User view of the Service Catalog:

- ◆ The Edit Catalog button is available to allow administration of the service catalog.
- ◆ Additional services are available for example, the Block Storage Services category has services to ingest unmanaged volumes and to move VPLEX volumes which are only available to System Administrators.

### Using the Service Catalog

1. Select the service category best describing the service to run.
2. Complete the service order form.

The available input parameter fields depend on the way the administrator has configured the service. An administrator can create services in which some of the fields are set to specific values and hidden from the user, referred to as "locked."

If an option is not available in a service order form, speak to the ViPR administrator to determine if the option was intentionally made unavailable, and was locked when the service was edited, or created.

---

#### Note

Click Help while entering the service order form to get field specific information for the open form.

---

3. Click Order to run the service.  
The Orders page is displayed and shows the progress of the request. The service might be configured to run the service in an execution window or might require approval, in which case it will not be executed immediately.

## Services overview

Services encapsulate the most common storage operations that ViPR provisioning users will want to perform.

Services can only be executed by provisioning users who belong to the project that owns the provisioned resource, this includes the Project Administrator.

Before running a service, you will need to complete the order form for that service. When provisioning storage, the main selections that you will need to make are the protocol that you want to use and the virtual storage pool (referred to as the virtual pool) which will provide the storage. These concepts are described in the following sections:

- ◆ [Service Forms on page 19](#)

- ◆ [Choosing the virtual pool when provisioning storage on page 20](#)
- ◆ [Choosing the consistency group on page 20](#)

### Service Forms

Each service has a set of input parameters. When selecting a service, the input parameter fields that you are presented with on the input form depend on the way that your administrator has configured the service. An administrator can create services in which some of the fields are set to specific values and hidden from the user, referred to a "locked."

The figures below show the input form for the Create Block Volume service. Firstly with no parameters locked, and then with the choice of storage provider (virtual array and virtual pool) locked so that their values are pre-set and hidden from the provisioning user. With no parameters locked, the virtual array and virtual pool must be specified.

**Create Block Volume**  
Create a Block Volume

Virtual Array: NH-Brocade

Virtual Pool: Select an Option

Project: Select an Option

Name:   
User assigned description of the volume

Consistency Group: Select an Option

Number Of Volumes: 1

Size (GB):

With the parameters locked, in the example below, no storage provider selections are required.

**Create Block Volume**  
Create a Block Volume

Project:

Name:   
User assigned description of the volume

Consistency Group:

Number Of Volumes:

Size (GB):

### Choosing the virtual pool when provisioning storage

The main choice you will be faced with when provisioning new block or file storage is the virtual pool that will provide the storage.

Virtual pools combine a set of physical storage pools capable of providing a defined level of service. Your administrator is likely to set the name of the storage pool so that it gives an idea of the level of service (performance and protection) provided by the pool. Hence, when choosing a storage provider, all you need to be interested in is how much storage you require and picking a pool that provides the level of service required.

Similarly, your administrator might lock a service to a particular virtual pool (so you do not have to select it) and set the name of the service appropriately to indicate the tier of storage the service creates.

### Choosing the consistency group

When provisioning block storage, a consistency group can be specified. All volumes included within a consistency group will be snapshotted when a snapshot of any of the volumes in the group is selected.

## Running a service

You can run a service by selecting it from the service catalog and making a few simple choices. When provisioning storage, these choices can often be as simple as: how much storage do you need and what level of service do you require the storage to satisfy?

When selecting a service, the fields that you are presented with on the input form depend on the way your storage administrator has configured the service. In some cases you will be allowed to choose from a range of virtual storage pools, in others this selection may have been locked down.

### Procedure

1. Select **User > Service Catalog** and open the category that holds the group of services that you are interested in.

If you cannot see the services you want, your catalog view may have been restricted and you will need to request access from your Tenant Administrator.

2. Select the service that you want to run.

The service input form opens and you will need to make choices appropriate to the type of service.

3. Select or enter values for all required fields and any optional fields. Required fields are marked with an asterisk at their right-hand side.
4. When you have specified values for the required parameters, select **Order**.

The **Orders** page is displayed and shows the progress of the request. The service might be configured to run the service in an execution window or might require approval, in which case it will not be executed immediately.

## Services end-user reference

The following table lists the services available in each category of the default service catalog.

Category	Description
Block Storage Services	The block storage services enable the provisioning of block volumes and their export to hosts. <a href="#">Block storage services on page 23</a>
Block Protection Services	The block protection services enable the creation of snapshots, full copies and continuous copies for a volume, and enables failover of a volume. <a href="#">Block protection services on page 30</a>
File Storage Services	The file storage services enable the provisioning of NFS exports or CIFS shares and their export to hosts. <a href="#">File storage services on page 34</a>
File Protection Services	The file protection services enable file systems to be snapshot and for snapshots to be restored. <a href="#">File protection services on page 38</a>
Block Services for Linux	The block services for Linux enable the creation of block volumes and mounting the created volumes, or existing volumes, on Linux hosts. <a href="#">Block services for Linux on page 39</a>
Block Services for Windows	The block services for Windows enables the creation of block volumes and mounting the created volumes, or existing volumes, on a Windows host. <a href="#">Block services for Windows on page 42</a>
Block Services for VMware	The block services for VMware enable the creation of block volumes and mounting the created volumes, or existing volumes, as a datastore on an ESX Host. <a href="#">Block services for VMware on page 44</a>
File Storage for VMware	The file services for VMware enable the creation of file systems and attaching the created file systems, or existing file systems, as a datastore on an ESX Host. <a href="#">File services for VMware on page 49</a>
Data Services	The Data Services support the creation of buckets for use with object and HDFS storage, and the ability to ingest data from ViPR-managed file systems into buckets. <a href="#">Data Services on page 51</a>

## Block storage services

The block storage services enable the provisioning of block volumes and their export to hosts.

**Table 3** Block storage services

Category	Service function
Block Storage Services	<a href="#">Create block volume on page 23</a>
	<a href="#">Create block volume for a host on page 24</a>
	<a href="#">Discover unmanaged volumes on page 25</a>
	<a href="#">Ingest unmanaged volumes on page 25</a>
	<a href="#">Export volume to a host on page 27</a>
	<a href="#">Expand block volume on page 28</a>
	<a href="#">Unexport volume on page 28</a>
	<a href="#">Remove block volumes on page 29</a>
	<a href="#">Remove block volume from host on page 29</a>
	<a href="#">Change virtual pool on page 27</a>
	<a href="#">Change virtual array on page 26</a>

### Create block volume

Creates a block volume. Once created, the volume can be exported to hosts using the appropriate service from the service catalog.

#### Before you begin

- ◆ As a provisioning user you can only create resources and perform operations on resources belonging to projects that you are assigned to (or are the owner of). If you are a Tenant Administrator you can run all services and choose any project to be the owner of the resource.
- ◆ If creating a volume with SRDF protection, an RDF group must have been created on the source and target virtual arrays with the naming convention, `V-  
<project_name>`, and an appropriate policy such as SYNC or ASYNC.

#### Procedure

1. Select **User** > **Service Catalog** > **Block Storage Services** > **Create Block Volume**.
2. Select the **Virtual Array** and **Virtual Pool** from which the storage will be provisioned.  
If there is no option to select the virtual array or virtual pool, the option may have been fixed by a ViPR administrator.
3. Select the **Project** in which the resource will belong.
  - Only the projects assigned to you are available for selection.
  - If the **Project** option is not displayed, the service has been locked to a project and is for use only by members of that project.
4. Enter the **Name** that will be used in ViPR to identify the resource.

5. Select the **Consistency Group** to provide protection for the provisioned resource.  
The selection list contains the consistency groups previously associated with the project. Consistency groups are only required if the virtual pool configuration requires it, otherwise it is optional to choose consistency groups.
6. Select the **Number of volumes** to create.
7. Enter the volume **Size**.
8. Select **Order**.  
The Orders page is displayed with the progress of the order.

## Create block volume for a host

Creates a block volume for a specified host.

### Before you begin

- ◆ As a provisioning user you can only create resources and perform operations on resources belonging to projects that you are assigned to (or are the owner of). If you are a Tenant Administrator you can run all services and choose any project to be the owner of the resource.
- ◆ The host to which you want to attach (export or mount) a block volume must have been configured as a ViPR host asset so that ViPR knows how to connect to it. For a Windows host, your administrator will need to ensure that the host is able to run Windows Remote Management (WinRM) commands.
- ◆ If creating a volume with SRDF protection, an RDF group must have been created on the source and target virtual arrays with the naming convention,  $\nabla$ -`<project_name>`, and an appropriate policy such as SYNC or ASYNC.

### Procedure

1. Select **User** › **Service Catalog** › **Block Storage Services** › **Create Block Volume for a Host**.
2. Select the **Host** to attach to the provisioned storage.
3. Choose whether the **Storage Type** is **Shared**, to manage the storage for the entire cluster, or **Exclusive** to manage the storage for an individual host.
4. Select the **Virtual Array** and **Virtual Pool** from which the storage will be provisioned.  
If there is no option to select the virtual array or virtual pool, the option may have been fixed by a ViPR administrator.
5. Select the **Project** in which the resource will belong.
  - Only the projects assigned to you are available for selection.
  - If the **Project** option is not displayed, the service has been locked to a project and is for use only by members of that project.
6. Enter the **Name** that will be used in ViPR to identify the resource.
7. Select the **Consistency Group** to provide protection for the provisioned resource.  
The selection list contains the consistency groups previously associated with the project. Consistency groups are only required if the virtual pool configuration requires it, otherwise it is optional to choose consistency groups.
8. Select the **Number of volumes** to create.
9. Enter the volume **Size**.

10. Enter -1, which is the default, **HLU** (Host Logical Unit) number to have ViPR automatically assign the HLU, or enter the value manually.

11. Select **Order**.

The Orders page is displayed with the progress of the order.

### After you finish

If the virtual array was configured for manual zoning:

- ◆ If there is an existing zone for the Host and Array:  
After the operation completes, check the Port Group within the Masking View to identify the FA ports that ViPR selected for the request. Compare the FA ports in the zone to the FA ports in the Port Group. If they match, no further action is required. If they do not match, reconfigure the zone to use the same FA ports. Alternatively, a new zone can be created.
- ◆ If there is no existing zoning for the Host and Array:  
After the operation completes, check the Port Group within the Masking View to identify the FA ports that ViPR selected for the request. Create a zone with the appropriate initiator and target ports.

## Discover unmanaged volumes

Finds volumes within a virtual pool which are not under ViPR management.

### Before you begin

The following prerequisites are applicable:

- ◆ This operation requires the System Administrator role in ViPR.
- ◆ The virtual array and virtual pool into which you want to ingest the storage pools must exist when the discovery is performed.

The discovery process finds storage pools on a selected storage system and identifies the virtual array and virtual pool that each array matches with.

### Procedure

1. Select **User** > **Service Catalog** > **Block Storage Services** > **Discover Unmanaged Volumes**.
2. Select the physical block storage system on which you want to discover unmanaged volumes. You can select more than one storage system.
3. Select **Order**.

The orders page is displayed and shows the progress of the request. If the order is successfully fulfilled, you can use the Ingest Unmanaged Volumes to bring them under management by ViPR.

## Ingest unmanaged volumes

Imports unmanaged block volumes, which have previously been discovered, into ViPR. The unmanaged volumes must be in virtual pools associated with the virtual array from which to ingest.

### Before you begin

- ◆ This operation requires the System Administrator role in ViPR.
- ◆ To be ingested, the unmanaged volumes must be in physical pools which are already associated with a ViPR virtual pool.
- ◆ The Discover Unmanaged Volumes service must have been run on the array from which the block volumes will be ingested.

- ◆ If the virtual array or virtual pool has been modified since the last time the unmanaged volumes were discovered, rerun the discovery prior to running the Ingest unmanaged volumes service, to ensure volumes are assigned to the correct virtual array and virtual pool.
- ◆ ViPR will only ingest volumes that are not exported to hosts. Remove the unmanaged exported volumes from the masking view to ingest them into ViPR.
- ◆ Ingested volumes will be assigned to a project. You must belong to the selected project and have write-permission on the project.

### Procedure

1. Select **User > Service Catalog > Block Storage Services > Ingest Unmanaged Volumes**.
2. Select the storage system from which you want to ingest block volumes.
3. Select a virtual array that contains physical array storage pools that you want to import. The storage system might contribute physical storage pools to a number of virtual pools. If you want to ingest from all virtual pools you will need to run the service again for the other virtual pools.

It is possible that not all of the array physical pools are included in the virtual array or arrays that form part of your virtual data center. For that reason, you don't want to ingest all unmanaged block volumes on the array, just those in physical array pools that form part of the virtual array.

4. From the array physical storage pools that form part of the virtual array, select the virtual pool that the unmanaged volumes are in.
5. Select the project that you want the unmanaged volumes to be assigned to.
6. Select **Order**.

The orders page is displayed showing the progress of the request. If the order is successfully fulfilled, you can look at the **User > Resources** page to see the imported volumes.

### After you finish

Once the unmanaged volumes have been ingested into ViPR:

1. Export the volumes to either a Windows or Linux host using the following service.  
**User > Service Catalog > Block Storage Services > Export Volume to Host**.
2. Mount the volumes on a host:
  - For Linux hosts use: **User > Service Catalog > Block Service for Linux > Mount Existing Volume on Linux**.
  - For Windows hosts use: **User > Service Catalog > Block Service for Windows > Mount Existing Volume on Windows**.

## Change virtual array

The Change Virtual Array service is designed to use in a VPLEX environment.

### Before you begin

- ◆ Refer to [Overview of changing the virtual array in a VPLEX environment on page 64](#) for details about how ViPR is used to change the virtual array in a VPLEX environment.
- ◆ This operation requires the System Administrator role in ViPR.
- ◆ This service is only supported in a VPLEX Metro configuration, on local virtual volumes that have not been exported to a host.
- ◆ The new block storage volume is created from the same virtual pool as the original block storage volume. Therefore the new virtual array being chosen must be

configured with the same virtual pool as the original virtual array that was used for the VPLEX virtual volume.

#### Procedure

1. Select **User** > **Service Catalog** > **Block Storage Services** > **Change Virtual Array**.
2. Select the project to which the volume belongs.
3. Select the volume to move.
4. Select the target virtual array; the virtual array to which the volume will be moved.

## Change virtual pool

The Change Virtual Pools service is used in a VPLEX environment.

#### Before you begin

- ◆ There are different use cases for using ViPR to change the virtual pool in a VPLEX environment. Review the use cases in [Use cases for using ViPR to change virtual pools in a VPLEX environment on page 65](#) to understand the process used for each use case.
- ◆ This operation requires the System Administrator role in ViPR.

#### Procedure

1. Select **User** > **Service Catalog** > **Block Storage Services** > **Change Virtual Pool**.
2. Select the project to which the volume belongs.
3. Select the volume to be moved, or changed.
4. Select the target virtual pool.
5. Select **Order**.

## Export volume to a host

Makes an existing volume available to a host.

#### Before you begin

As a provisioning user you can only create resources and perform operations on resources belonging to projects that you are assigned to (or are the owner of). If you are a Tenant Administrator you can run all services and choose any project to be the owner of the resource.

The host to which you want to attach (export or mount) a block volume must have been configured as a ViPR host asset so that ViPR knows how to connect to it. For a Windows host, your administrator will need to ensure that the host is able to run Windows Remote Management (WinRM) commands.

#### Procedure

1. Select **User** > **Service Catalog** > **Block Storage Services** > **Export Volume to a Host**.
2. Choose whether the **Storage Type** is **Shared**, to manage the storage for the entire cluster, or **Exclusive** to manage the storage for an individual host.
3. Select the **Host**, or cluster to which the block volume will be exported.
4. Select the **Project** to which block volume belongs.
5. Select the block **Volume** to export.
6. Enter -1, which is the default, **HLU** (Host Logical Unit) number to have ViPR automatically assign the HLU, or enter the value manually.
7. Select **Order**.

The Orders page is displayed with the progress of the order.

8. When the order is complete, at the **User > Resources** page, observe that the host has been added to the Hosts field for the resource.

### After you finish

If the virtual array was configured for manual zoning:

- ◆ If there is an existing zone for the Host and Array:  
After the operation completes, check the Port Group within the Masking View to identify the FA ports that ViPR selected for the request. Compare the FA ports in the zone to the FA ports in the Port Group. If they match, no further action is required. If they do not match, reconfigure the zone to use the same FA ports. Alternatively, a new zone can be created.
- ◆ If there is no existing zoning for the Host and Array:  
After the operation completes, check the Port Group within the Masking View to identify the FA ports that ViPR selected for the request. Create a zone with the appropriate initiator and target ports.

## Expand block volume

Expands an existing block volume

### Before you begin

As a provisioning user you can only create resources and perform operations on resources belonging to projects that you are assigned to (or are the owner of). If you are a Tenant Administrator you can run all services and choose any project to be the owner of the resource.

### Procedure

1. Select **User > Service Catalog > Block Storage Services > Export Block Volume**.
2. Select the project to which the block volume belongs.
3. Select the **Volume** expand.
4. Enter the **New Size** of the volume.

The storage is expanded from the same virtual array as the original volume.

When meta volumes are used to expand a volume, all meta volume members are the same size. Hence, when you choose to expand a volume, additional meta members are created which are the same size as the original volume. For example, if you expand a 200GB volume to 525GB, two additional volumes of 200GB will be created, giving a total size of 600GB. For this reason the requested and provisioned sizes may not be the same.

5. Select **Order**.

The Orders page is displayed with the progress of the order.

## Unexport volume

Removes the host export associated with a volume. The volume is no longer associated with the initiator.

### Before you begin

As a provisioning user you can only create resources and perform operations on resources belonging to projects that you are assigned to (or are the owner of). If you are a Tenant Administrator you can run all services and choose any project to be the owner of the resource.

**Procedure**

1. Select **User** › **Service Catalog** › **Block Storage Services** › **Unexport Volume**.
2. Select the **Project** to which the volume belongs.
3. Select the **Volume** from which you want to remove the export.
4. Select from which **Host** the export will be removed.
5. Select **Order**.

The Orders page is displayed with the progress of the order.

6. When the order is complete, at the **User** › **Resources** page, observe that the host has been removed from the Hosts field for the resource.

## Remove block volumes

Deletes the block volume.

**Before you begin**

As a provisioning user you can only create resources and perform operations on resources belonging to projects that you are assigned to (or are the owner of). If you are a Tenant Administrator you can run all services and choose any project to be the owner of the resource.

**Procedure**

1. Select **User** › **Service Catalog** › **Block Storage Services** › **Remove Block Volumes**.
2. Select the project from which to delete the volumes.
3. Select the volumes to delete.
4. Select **Order**.

The Orders page is displayed with the progress of the order.

## Remove block volume from host

Deletes a block volume. The block volume to delete is chosen from the volumes associated with the selected host.

As a provisioning user you can only create resources and perform operations on resources belonging to projects that you are assigned to (or are the owner of). If you are a Tenant Administrator you can run all services and choose any project to be the owner of the resource.

**Procedure**

1. Select **User** › **Service Catalog** › **Block Storage Services** › **Remove Volume by Host**.
2. Select the **Host** to which the volume has been exported.
3. Select the block **Volume** to be delete.
4. Select **Order**.

The Orders page is displayed with the progress of the order.

## Block protection services

The block protection services enable the creation of snapshots, full copies and continuous copies for a volume, and enables failover of a volume.

**Table 4** Block protection services

Category	Service function
Block Protection Services	<a href="#">Failover a block volume on page 31</a>
	<a href="#">Create a block snapshot on page 30</a>
	<a href="#">Restore block snapshot on page 31</a>
	<a href="#">Remove block snapshot on page 31</a>
	<a href="#">Create a full copy of a block volume on page 32</a>
	<a href="#">Create a continuous copy of a block volume on page 32</a>
	<a href="#">Remove continuous copy on page 32</a>
	<a href="#">Export VPLEX Metro Volume on page 33</a>

### Create a block snapshot

Creates a snapshot of a block volume. If the volume is part of a consistency group, a snapshot is created for the entire consistency group.

#### Before you begin

As a provisioning user you can only create resources and perform operations on resources belonging to projects that you are assigned to (or are the owner of). If you are a Tenant Administrator you can run all services and choose any project to be the owner of the resource.

#### Procedure

1. Select **User > Service Catalog > Block Protection Services > Create Block Snapshot**.
2. Select to which the project that the belongs.
3. Select the volume for which a snapshot will be created.  
Only the volumes which are in virtual pools that support data protection are listed.
4. Select the snapshot type: Local or Remote.  
Only the snapshot types available for the virtual pool to which the volume belongs are listed.
5. Enter a name to easily identify the snapshot.
6. Select **Order**.  
The Orders page is displayed with the progress of the order.
7. When the order completes, you can open the resource in the resources table on the **User > Resources** page and see that the resource details includes the snapshot details.

## Failover a block volume

Performs a disaster recovery failover operation using RecoverPoint or VMAX SRDF.

### Before you begin

As a provisioning user you can only create resources and perform operations on resources belonging to projects that you are assigned to (or are the owner of). If you are a Tenant Administrator you can run all services and choose any project to be the owner of the resource.

The volume must have been created in a pool that supports RecoverPoint or SRDF protection.

### Procedure

1. Select **User > Service Catalog > Block Protection Services > Failover Block Volume.**
2. Select the project that owns the volume that you want to failover.
 

You will only be offered volumes if a protection array was specified when the volume was created.
3. Select the volume that you want to failover.
4. In the Failover Target field, select the protection array that you want to fail over to.
5. Select **Order.**

## Restore block snapshot

Restore a previous snapshot.

### Before you begin

As a provisioning user you can only create resources and perform operations on resources belonging to projects that you are assigned to (or are the owner of). If you are a Tenant Administrator you can run all services and choose any project to be the owner of the resource.

### Procedure

1. Select **User > Service Catalog > Block Protection Services > Restore Block Snapshot.**
2. Select the project that owns the snapshot volume.
3. Select the volume snapshot.
4. Select the snapshot by the name it was given.
5. Select **Order.**

The Orders page is displayed and you can see the progress of the order. The snapshot of the selected volume will be restored.

## Remove block snapshot

Deletes a snapshot of a block volume.

### Before you begin

As a provisioning user you can only create resources and perform operations on resources belonging to projects that you are assigned to (or are the owner of). If you are a Tenant Administrator you can run all services and choose any project to be the owner of the resource.

### Procedure

1. Select **User > Service Catalog > Block Protection Services > Remove Block Snapshot.**

2. Select the project in which the volume, from which the snapshot will be deleted, resides.
3. Select the volume.
4. Select the snapshot to delete.
5. At the **User > Resources** page, observe that the host has been removed from the Hosts field for the resource.

## Create a full copy of a block volume

Creates a full copy of a block volume.

### Before you begin

The virtual pool must have been configured to allow native snapshots.

### Procedure

1. Select **User > Service Catalog > Block Protection Services > Create Full Copy**.
2. Select the project to which the volume belongs.
3. Select the volume to be copied.
4. Enter a name for the copy.
5. Specify the number of copies you want to make.
6. Select **Order**.

The volume that will hold the full copy is shown in the **User > Resources > Block Volumes** table. If multiple copies are selected they are identified with a number suffix.

## Create a continuous copy of a block volume

Uses a continuous data protection mechanism to create a continuous copy (a mirror) of a block volume.

### Before you begin

The virtual pool in which the volume belongs must have been configured to allow continuous copies.

### Procedure

1. Select **User > Service Catalog > Block Protection Services > Create Continuous Copy**.
2. Select the project to which the volume belongs.
3. Select the volume for which you want to create a continuous copy (often referred to as a mirror).

A volume will only be displayed if the virtual pool to which it belongs has continuous copies enabled.

4. Specify the number of copies you want to make.
5. Select **Order**.

The volume that will hold the full copy is shown in the **User > Resources > Block Volumes** table. If multiple copies are selected they are identified with a number suffix.

## Remove continuous copy

Removes a continuous copy of a block storage volume.

### Before you begin

**Procedure**

1. Select **User** > **Service Catalog** > **Block Protection Services** > **Remove Continuous Copy**.
2. Select the **Project** to which the volume belongs.
3. Select the **Volume** for which the continuous copy was created.
4. Enter the **Continuous Copies** to remove.
5. Select **Order**

**Export VPLEX Metro Volume**

Export the specified VPLEX volumes to the selected host or cluster.

**Before you begin**

- ◆ As a provisioning user you can only create resources and perform operations on resources belonging to projects that you are assigned to (or are the owner of). If you are a Tenant Administrator you can run all services and choose any project to be the owner of the resource.
- ◆ The host to which you want to attach (export or mount) a block volume must have been configured as a ViPR host asset so that ViPR knows how to connect to it. For a Windows host, your administrator will need to ensure that the host is able to run Windows Remote Management (WinRM) commands.

**Procedure**

1. Select **User** > **Service Catalog** > **Block Protection Services** > **Export Volume to a Host**.
2. Choose whether the **Storage Type** is **Shared**, to manage the storage for the entire cluster, or **Exclusive** to manage the storage for an individual host.
3. Select the **Project** to which the volume belongs.
4. Select the **Host**, or cluster to which the volume will be exported.
5. Select the VPLEX Metro **Volume** to export.
6. Enter -1, which is the default, **HLU** (Host Logical Unit) number to have ViPR automatically assign the HLU, or enter the value manually.
7. Select **Order**.

The Orders page is displayed with the progress of the order.

## File storage services

The file storage services enable the provisioning of NFS exports or CIFS shares and their export to hosts.

**Table 5** File storage services

Category	Service function
File Storage Services	<a href="#">Create a Windows share on page 34</a>
	<a href="#">Create Unix share on page 35</a>
	<a href="#">Expand file system on page 36</a>
	<a href="#">Remove file system on page 36</a>
	<a href="#">Discover unmanaged file systems on page 36</a>
	<a href="#">Ingest unmanaged file systems on page 37</a>

### Create a Windows share

Creates a CIFS share. The share can be mapped as a Windows drive at the host.

#### Before you begin

As a provisioning user you can only create resources and perform operations on resources belonging to projects that you are assigned to (or are the owner of). If you are a Tenant Administrator you can run all services and choose any project to be the owner of the resource.

In ViPR, Windows share names can contain only alphanumeric characters.

#### Procedure

1. Select **User > Service Catalog > File Storage Services > Create Windows Share**.
2. Select the **Virtual Array** and **Virtual Pool** from which the storage will be provisioned.  
If there is no option to select the virtual array or virtual pool, the option may have been fixed by a ViPR administrator.
3. Select the **Project** in which the resource will belong.
  - Only the projects assigned to you are available for selection.
  - If the **Project** option is not displayed, the service has been locked to a project and is for use only by members of that project.
4. Enter a name for the CIFS share. The name can only contain alphanumeric characters. This name is used when mapping the share on a Windows host.
5. Enter a comment for the share.
6. Enter the file system **size**.
7. Select **Order**.  
The Orders page is displayed with the progress of the order.
8. To map the Windows share as a network drive, you can look at the Mount Point in the CIFS Share area of the order to find its location.

For example:

```
\\ComputerName\SharedFolder
```

## Create Unix share

Creates an NFS export and sets the permissions on the export. The export details are provided in the order and you can mount it when required. If you want to create a file system and mount in on a VMware ESX Host in a single operation, you should use the service provided for that operation.

### Before you begin

As a provisioning user you can only create resources and perform operations on resources belonging to projects that you are assigned to (or are the owner of). If you are a Tenant Administrator you can run all services and choose any project to be the owner of the resource.

### Procedure

1. Select **User** > **Service Catalog** > **File Storage Services** > **Create Unix Share**.
2. Select the **Virtual Array** and **Virtual Pool** from which the storage will be provisioned.  
If there is no option to select the virtual array or virtual pool, the option may have been fixed by a ViPR administrator.
3. Select the **Project** in which the resource will belong.
  - Only the projects assigned to you are available for selection.
  - If the **Project** option is not displayed, the service has been locked to a project and is for use only by members of that project.
4. Enter a name that ViPR will use to refer to the file system.
5. Enter the file system **size**.
6. Choose the permissions (Read-write, Read-only, or root) that will apply to the export.
7. Enter a comma-separated list of IP addresses or hostnames that will be allowed to access the export.

You must enter the IP address or hostname of the host exactly as it appears in the IP network. If it appears as an IP address, you should specify an IP address. If it appears as a hostname or fully qualified domain name, you should use that. If you do not have access to this information you should ask your Tenant Administrator.

8. Select **Order**.

The Orders page is displayed with the progress of the order.

9. To mount the NFS export, you can look at the order to find its mount point.

For example:

```
lg1w6132:/ifs/sos/Primary_myexp01_a56483f2-ff47-4a48-a072-
c3eae75beb6
```

If you have created a mount-point directory on you system (for example, /mnt/my nfs) the export can then be mounted using:

```
mount -t nfs <vipr_reported_mount_point> /mnt/my nfs
```

```
mount -t nfs lg1w6132:/ifs/sos/Primary_myexp01_a56483f2-ff47-4a48-
a072-c3eae75beb6 /mnt/my nfs
```

## Expand file system

Expands an existing file system.

### Before you begin

As a provisioning user you can only create resources and perform operations on resources belonging to projects that you are assigned to (or are the owner of). If you are a Tenant Administrator you can run all services and choose any project to be the owner of the resource.

### Procedure

1. Select **User > Service Catalog > File Storage Services > Expand File System**.
2. Select the project to which the file system belongs.
3. Select the file system.
4. Enter the new size for the file system.
5. Select **Order**.

## Remove file system

Removes a file system.

### Before you begin

As a provisioning user you can only create resources and perform operations on resources belonging to projects that you are assigned to (or are the owner of). If you are a Tenant Administrator you can run all services and choose any project to be the owner of the resource.

### Procedure

1. Select **User > Service Catalog > File Storage Services > Remove File System**.
2. Select the project to which the file system belongs.
3. Select the file system to be removed.
4. Select **Order**.

The Orders page is displayed with the progress of the order.

## Discover unmanaged file systems

Finds file systems which are not under ViPR management.

### Before you begin

The following prerequisites are applicable:

- ◆ This operation requires the System Administrator role in ViPR.
- ◆ The virtual array and virtual pool into which you want to ingest the storage pools must exist when the discovery is performed.

The discovery process finds storage pools on a selected storage system and identifies the virtual array and virtual pool that each array matches with.

- ◆ File systems will only be discovered on file storage system that have been added to ViPR as physical assets.

### Procedure

1. Select **User > Service Catalog > File Storage Services > Discover Unmanaged File Systems**

2. Select the physical file storage systems from which you want to discover unmanaged file systems. You can select more than one array.
3. Select **Order**.

The orders page is displayed and shows the progress of the request. If the order is successfully fulfilled, you can use the Ingest Unmanaged File Systems to bring them under management by ViPR.

## Ingest unmanaged file systems

Imports unmanaged file systems, which have previously been discovered, into ViPR.

### Before you begin

The following prerequisites are applicable:

- ◆ This operation requires the System Administrator role in ViPR.
- ◆ To be ingested, the unmanaged file systems must be in physical pools which are already associated with a ViPR virtual storage pool.
- ◆ The Discover Unmanaged File Systems service must have been run on the virtual array.
- ◆ Rerun the Discover Unmanaged File Systems service if:
  - ViPR was upgraded from version 1.0, to ensure that the list of discovered unmanaged file systems is updated.
  - The virtual array or virtual pools have been modified since the last time the Discover Unmanaged File Systems service was run.
- ◆ Ingested file systems will be assigned to a project. You must belong to the selected project and have write-permission on the project.

### Procedure

1. Select **User** > **Service Catalog** > **File Storage Services** > **Ingest Unmanaged File Systems**
2. Select the storage system from which you want to ingest file systems.
3. Select the virtual array whose virtual pools contain the storage system physical pools that host the file systems you want to import. The storage system might contribute physical storage pools to a number of virtual pools. If you want to ingest from all virtual pools, you will need to run the service again for the other virtual pools.

It is possible that not all of the storage system physical pools are included in the virtual array that forms part of your virtual data center. For that reason, you don't want to ingest all unmanaged file systems on the storage system, just those in physical storage pools that form part of the virtual pools of the virtual array.

4. Select the virtual pool that the unmanaged volumes are in.
5. Select the project that you want the unmanaged file systems to be assigned to.
6. Select **Order**.

The orders page is displayed showing the progress of the request. If the order is successfully fulfilled, you can look at the **User** > **Resources** page to see the imported volumes.

## File protection services

The file protection services enable file systems to be snapshot and for snapshots to be restored.

**Table 6** File protection services

Category	Service function
File Protection Services	<a href="#">Create file snapshot on page 38</a>
	<a href="#">Restore file snapshot on page 38</a>
	<a href="#">Remove file snapshot on page 39</a>

### Create file snapshot

Creates a snapshot of a file system.

#### Before you begin

As a provisioning user you can only create resources and perform operations on resources belonging to projects that you are assigned to (or are the owner of). If you are a Tenant Administrator you can run all services and choose any project to be the owner of the resource.

#### Procedure

1. Select **User** > **Service Catalog** > **File Protection Services** > **Create File Snapshot**.
2. Select the project to which the file system to be snapshot belongs.
3. Select the file system.
4. Enter a name for the snapshot.

The name is used to identify the snapshot in ViPR. A file system can have multiple snapshots so you should ensure that the name clearly indicates the status of the snapshot.

5. Select **Order**.

The Orders page is displayed with the progress of the order.

### Restore file snapshot

Restores a file system snapshot.

#### Before you begin

As a provisioning user you can only create resources and perform operations on resources belonging to projects that you are assigned to (or are the owner of). If you are a Tenant Administrator you can run all services and choose any project to be the owner of the resource.

#### Procedure

1. Select **User** > **Service Catalog** > **File Protection Services** > **Restore File Snapshot**.
2. Select the project to which the file system belongs.
3. Select the file system.
4. Select the snapshot you want to restore.
5. Select **Order**.

## Remove file snapshot

Removes the snapshot for a file system.

### Before you begin

As a provisioning user you can only create resources and perform operations on resources belonging to projects that you are assigned to (or are the owner of). If you are a Tenant Administrator you can run all services and choose any project to be the owner of the resource.

### Procedure

1. Select **User > Service Catalog > File Protection Services > Remove File Snapshot**.
2. Select the project to which the file system belongs.
3. Select the file system.
4. Select the snapshot you want to remove.
5. Select **Order**.

## Block services for Linux

The block services for Linux enable the creation of block volumes and mounting the created volumes, or existing volumes, on Linux hosts.

**Table 7** Block services for Linux

Block Services for Linux	<a href="#">Create and mount block volume on Linux host on page 39</a>
	<a href="#">Mount an existing volume on Linux on page 40</a>
	<a href="#">Unmount an existing volume on Linux on page 41</a>
	<a href="#">Unmount and delete on page 41</a>
	<a href="#">Expand Linux Mount on page 41</a>

## Create and mount block volume on Linux host

Creates, mounts, and formats a block volume on a Linux host.

### Before you begin

As a provisioning user you can only create resources and perform operations on resources belonging to projects that you are assigned to (or are the owner of). If you are a Tenant Administrator you can run all services and choose any project to be the owner of the resource.

The host to which you want to attach (export or mount) a block volume must have been configured as a ViPR host asset so that ViPR knows how to connect to it.

### Procedure

1. Select **User > Service Catalog > Block Services for Linux > Create and Mount Block Volume**.
2. Select the host to which you want the service to attach the provisioned volume.
3. Choose whether the **Storage Type** is **Shared**, to manage the storage for the entire cluster, or **Exclusive** to manage the storage for an individual host.

4. Select the **Virtual Array** and **Virtual Pool** from which the storage will be provisioned.  
If there is no option to select the virtual array or virtual pool, the option may have been fixed by a ViPR administrator.
5. Select the **Project** in which the resource will belong.
  - Only the projects assigned to you are available for selection.
  - If the **Project** option is not displayed, the service has been locked to a project and is for use only by members of that project.
6. Enter the **Name** that will be used in ViPR to identify the resource.
7. Select the **Consistency Group** to provide protection for the provisioned resource.  
The selection list contains the consistency groups previously associated with the project. Consistency groups are only required if the virtual pool configuration requires it, otherwise it is optional to choose consistency groups.
8. Enter the volume **Size**.
9. Select the file system type that you want the block volume to be formatted as.
10. Specify the mount point for the block volume.
11. Select **Order**.  
The Orders page is displayed. If the order fails when updating multipath entries, the Linux host must be rebooted.

## Mount an existing volume on Linux

Mounts and formats an existing (previously exported) block volume on a Linux host.

### Before you begin

As a provisioning user you can only create resources and perform operations on resources belonging to projects that you are assigned to (or are the owner of). If you are a Tenant Administrator you can run all services and choose any project to be the owner of the resource.

The host to which you want to attach (export or mount) a block volume must have been configured as a ViPR host asset so that ViPR knows how to connect to it.

### Procedure

1. Select **User** > **Service Catalog** > **Block Services for Linux** > **Mount Existing Volume on Linux**.
2. Select the Linux host.
3. Choose whether the **Storage Type** is **Shared**, to manage the storage for the entire cluster, or **Exclusive** to manage the storage for an individual host.
4. Select the **Volume** to be mounted.
5. Select the **File System Type** to apply to the volume.
6. Enable **Format Volume** to have the volume formatted during the service operation.
7. Specify a **Mount Point** for the volume.
8. Enter a valid **HLU** (host logical unit) number, or leave the default, -1, to allow automatic assignment of the HLU.
9. Select **Order**.

## Unmount an existing volume on Linux

Unmounts a block volume from a Linux host leaving the storage intact.

### Before you begin

- ◆ You can only unmount a volume that are part of a project that you are a member of.
- ◆ This service is only supported for Linux hosts that were mounted in ViPR version 1.1 and higher. The service operation will fail if run on Linux hosts mounted in ViPR version 1.0.x.x.

### Procedure

1. Select **User** > **Service Catalog** > **Block Services for Linux** > **Unmount Volume on Linux**.
2. Select the host from which you want to unmount a volume.
3. Choose whether the **Storage Type** is **Shared**, to manage the storage for the entire cluster, or **Exclusive** to manage the storage for an individual host.
4. Select the mount point that you want to remove.
5. Select **Order**.

## Unmount and delete

Deletes a Linux block volume that has been mounted and removes the mount point.

### Before you begin

- ◆ You will only be allowed to unmount and delete a volume that is owned by a project that you are a member of.
- ◆ This service is only supported for Linux hosts that were mounted in ViPR version 1.1 and higher. The service operation will fail if run on Linux hosts mounted in ViPR version 1.0.x.x.

### Procedure

1. Select **User** > **Service Catalog** > **Block Services for Linux** > **Unmount and Delete Volume**.
2. Select the host from which you want to delete the volume.
3. Choose whether the **Storage Type** is **Shared**, to manage the storage for the entire cluster, or **Exclusive** to manage the storage for an individual host.
4. Select the mount point to be deleted.
5. Select **Order**.

## Expand Linux Mount

Expand the size of the mounted block volume for the Linux host.

### Before you begin

- ◆ As a provisioning user you can only create resources and perform operations on resources belonging to projects that you are assigned to (or are the owner of). If you are a Tenant Administrator you can run all services and choose any project to be the owner of the resource.
- ◆ This service is only supported for Linux hosts that were mounted in ViPR version 1.1 and higher. The service operation will fail if run on Linux hosts mounted in ViPR version 1.0.x.x.

### Procedure

1. Select **User** > **Service Catalog** > **Block Services for Linux** > **Expand Linux Mount**.

2. Select the **Linux Host** to which the block volume is mounted.
3. Select the block **Volume**.
4. Enter the new **Size** to increase the volume.
5. Click **Order**.

## Block services for Windows

The block services for Windows enables the creation of block volumes and mounting the created volumes, or existing volumes, on a Windows host.

**Table 8** Block services for Windows

Category	Service function
Block Services for Windows	<a href="#">Create and mount block volume on page 42</a>
	<a href="#">Mount volume on Windows on page 43</a>
	<a href="#">Expand a volume on Windows on page 43</a>
	<a href="#">Unmount a volume on Windows on page 44</a>
	<a href="#">Unmount and delete on page 44</a>

### Create and mount block volume

Creates and mounts a block volume on Windows.

#### Before you begin

As a provisioning user you can only create resources and perform operations on resources belonging to projects that you are assigned to (or are the owner of). If you are a Tenant Administrator you can run all services and choose any project to be the owner of the resource.

#### Procedure

1. Select **User > Service Catalog > Block Services for Windows > Create and Mount Volume**.
2. Select the **Windows Host** on which the volume will be mounted.
3. Choose whether the **Storage Type** is **Shared**, to manage the storage for the entire cluster, or **Exclusive** to manage the storage for an individual host.
4. Select the **Virtual Array** and **Virtual Pool** from which the storage will be provisioned.  
If there is no option to select the virtual array or virtual pool, the option may have been fixed by a ViPR administrator.
5. Select the **Project** in which the resource will belong.
  - Only the projects assigned to you are available for selection.
  - If the **Project** option is not displayed, the service has been locked to a project and is for use only by members of that project.
6. Enter the **Name** that will be used in ViPR to identify the resource.
7. Select the **Consistency Group** to provide protection for the provisioned resource.  
The selection list contains the consistency groups previously associated with the project. Consistency groups are only required if the virtual pool configuration requires it, otherwise it is optional to choose consistency groups.

8. Enter the volume **Size**.
9. Select the file system type that you want the block volume to be formatted as.
10. Select the drive letter that you want the Windows file system to be mapped as.
11. Select **Order**.

The Orders page is displayed with the progress of the order.

## Mount volume on Windows

Mounts and formats a previously created (and exported) block volume.

### Before you begin

- ◆ You will only be allowed to mount a volume that is owned by a project that you are a member of.
- ◆ The volume must have been exported to the host on which it is to be mounted.
- ◆ The host to which you want to attach (export or mount) a block volume must have been configured as a ViPR host asset so that ViPR knows how to connect to it.

### Procedure

1. Select **User** > **Service Catalog** > **Block Services for Windows** > **Mount Volume on Windows**.
2. Select the **Windows Host**.
3. Choose whether the **Storage Type** is **Shared**, to manage the storage for the entire cluster, or **Exclusive** to manage the storage for an individual host.
4. Select the existing volume that you are going to mount.  
You will only see volumes that have been exported to the selected host.
5. Select the file system type that the volume will be formatted with.
6. Enable **Format Volume** to have the volume formatted during the service operation.
7. Select the drive letter, that the volume will be mapped to.
8. Enter the drive label.
9. Enter a valid **HLU** (host logical unit) number, or leave the default, -1, to allow automatic assignment of the HLU.
10. Select **Order**.

## Expand a volume on Windows

Expands an existing volume mounted on a Windows host.

### Before you begin

You will only be allowed to expand a volume that is owned by a project that you are a member of.

A Windows host must have a previously mounted volume.

### Procedure

1. Select **User** > **Service Catalog** > **Block Services for Windows** > **Expand Volume on Windows**.
2. Select the host to which the volume is mapped.
3. Choose whether the **Storage Type** is **Shared**, to manage the storage for the entire cluster, or **Exclusive** to manage the storage for an individual host.

4. Select the drive letter that you want to expand.
5. Enter the new size of the volume.

When meta volumes are used to expand a volume, all meta volume members are the same size. Hence, when you choose to expand a volume, additional meta members are created which are the same size as the original volume. For example, if you expand a 200GB volume to 525GB, two additional volumes of 200GB will be created, giving a total size of 600GB. For this reason the requested and provisioned sizes may not be the same.

6. Select **Order**.

## Unmount and delete

Unmounts a volume from a Windows hosts and deletes it.

### Before you begin

You can only unmount and delete a volume that is owned by a project that you are a member of.

The volume must previously have been mounted on a Windows host.

### Procedure

1. Select **User > Service Catalog > Block Services for Windows > Unmount and Delete Volume**.
2. Select the **Windows Host** from which you want to delete the volume.
3. Choose whether the **Storage Type** is **Shared**, to manage the storage for the entire cluster, or **Exclusive** to manage the storage for an individual host.
4. Select the mapped drive letter to be deleted.
5. Select **Order**.

## Unmount a volume on Windows

Unmounts a volume leaving the storage intact.

### Before you begin

You will only be allowed to unmount a volume that is owned by a project that you are a member of.

A previously mounted volume must exist.

### Procedure

1. Select **User > Service Catalog > Block Services for Windows > Unmount Volume on Windows**.
2. Select the Windows host from which the volume will be unmounted.
3. Select the drive letter from which the volume will be unmounted
4. Select **Order**.

## Block services for VMware

The block services for VMware enable the creation of block volumes and mounting the created volumes, or existing volumes, as a datastore on an ESX Host.

**Table 9** Block services for VMware

Category	Service function
Block Services for VMware	<a href="#">Create a volume and datastore on page 45</a>
	<a href="#">Create volume for VMware on page 46</a>
	<a href="#">Create VMware datastore using existing volume on page 47</a>
	<a href="#">Extend a VMware datastore with new volume on page 47</a>
	<a href="#">Extend a datastore with an existing volume on page 48</a>
	<a href="#">Delete a VMware datastore and its block volume on page 48</a>
	<a href="#">Delete VMware datastore on page 48</a>
	<a href="#">Remove a volume for VMware on page 48</a>

## Create a volume and datastore

Creates a block volume and attaches it to an ESX host as a datastore.

### Before you begin

As a provisioning user you can only create resources and perform operations on resources belonging to projects that you are assigned to (or are the owner of). If you are a Tenant Administrator you can run all services and choose any project to be the owner of the resource.

The vCenter to which you want to attach (export or mount) a block volume must have been configured as a ViPR host asset so that ViPR knows how to connect to it.

### Procedure

1. Select **User** > **Service Catalog** > **Block Services for VMware** > **Create Volume and Datastore**.
2. Specify a name for the datastore.
3. Select a vCenter which manages the ESX Host to which you are going to attach the provisioned storage.
4. Select the datacenter that the datastore will be made available to.
5. Choose whether the **Storage Type** is **Shared**, to manage the storage for the entire cluster, or **Exclusive** to manage the storage for an individual host.
6. Select the **Virtual Array** and **Virtual Pool** from which the storage will be provisioned.  
If there is no option to select the virtual array or virtual pool, the option may have been fixed by a ViPR administrator.
7. Select the **Project** in which the resource will belong.
  - Only the projects assigned to you are available for selection.
  - If the **Project** option is not displayed, the service has been locked to a project and is for use only by members of that project.
8. Enter the **Name** that will be used in ViPR to identify the resource.

9. Select the **Consistency Group** to provide protection for the provisioned resource.

The selection list contains the consistency groups previously associated with the project. Consistency groups are only required if the virtual pool configuration requires it, otherwise it is optional to choose consistency groups.

10. Enter the volume **Size**.

11. Select **Order**.

The Orders page is displayed with the progress of the order.

## Create volume for VMware

Creates one or more block volume for a VMware but does not make them available as a datastore.

### Before you begin

As a provisioning user you can only create resources and perform operations on resources belonging to projects that you are assigned to (or are the owner of). If you are a Tenant Administrator you can run all services and choose any project to be the owner of the resource.

The vCenter to which you want to attach (export or mount) a block volume must have been configured as a ViPR host asset so that ViPR knows how to connect to it.

For a Windows host, your administrator will need to ensure that the host is able to run Windows Remote Management (WinRM) commands.

### Procedure

1. Select **User > Service Catalog > Block Services for VMware > Create Volume for VMware**.
2. Select a vCenter which manages the ESX Host to which you are going to attach the provisioned storage.
3. Select the datacenter that the datastore will be made available to.
4. Choose whether the **Storage Type** is **Shared**, to manage the storage for the entire cluster, or **Exclusive** to manage the storage for an individual host.
5. Select the ESX Host that the datastore will be attached to.
6. Select the **Virtual Array** and **Virtual Pool** from which the storage will be provisioned.
 

If there is no option to select the virtual array or virtual pool, the option may have been fixed by a ViPR administrator.
7. Optionally, select the Protection Virtual Arrays that will be registered with EMC RecoverPoint to provide backup for the block volume that you create.
8. Select the **Project** in which the resource will belong.
  - Only the projects assigned to you are available for selection.
  - If the **Project** option is not displayed, the service has been locked to a project and is for use only by members of that project.
9. Enter the **Name** that will be used in ViPR to identify the resource.
10. Select the **Consistency Group** to provide protection for the provisioned resource.
 

The selection list contains the consistency groups previously associated with the project. Consistency groups are only required if the virtual pool configuration requires it, otherwise it is optional to choose consistency groups.
11. Select the number of volumes you want to create.
12. Enter the volume **Size**.

### 13. Select **Order**.

The Orders page is displayed with the progress of the order.

## Create VMware datastore using existing volume

Creates a VMware datastore using a previously created volume.

### Before you begin

A block volume created for an ESX Host available within the VMware Datacenter must exist.

### Procedure

1. Select **User** > **Service Catalog** > **Block Services for VMware** > **Create VMware Datastore**.
2. Enter a name for the datastore.
3. Select the volume to make available by selecting the ESX Host to which it has been attached. You must first select the vCenter and Datacenter that manages the ESX Host.
4. Select **Order**.

## Extend a VMware datastore with new volume

Extend a VMware datastore with a new block volume.

### Before you begin

As a provisioning user you can only create resources and perform operations on resources belonging to projects that you are assigned to (or are the owner of). If you are a Tenant Administrator you can run all services and choose any project to be the owner of the resource.

### Procedure

1. Select **User** > **Service Catalog** > **Block Services for VMware** > **Extend Datastore with New Volume**.
2. Select a vCenter which manages the ESX Host to which you are going to attach the provisioned storage.
3. Select the **Datacenter**.
4. Choose whether the **Storage Type** is **Shared**, to manage the storage for the entire cluster, or **Exclusive** to manage the storage for an individual host.
5. Select the **ESX Host/Cluster** for which the attached datastore will be extended.
6. Select the **Virtual Array** and **Virtual Pool** from which the storage will be provisioned.  
If there is no option to select the virtual array or virtual pool, the option may have been fixed by a ViPR administrator.
7. Select the **Project** in which the resource will belong.
  - Only the projects assigned to you are available for selection.
  - If the **Project** option is not displayed, the service has been locked to a project and is for use only by members of that project.
8. Enter the **Name** that will be used in ViPR to identify the resource.
9. Select the **Consistency Group** to provide protection for the provisioned resource.

The selection list contains the consistency groups previously associated with the project. Consistency groups are only required if the virtual pool configuration requires it, otherwise it is optional to choose consistency groups.

10. Enter the size of the volume.

11. Select **Order**.

The Orders page is displayed with the progress of the order.

## Extend a datastore with an existing volume

Extends a datastore using an existing block volume.

### Procedure

1. Select **User** > **Service Catalog** > **Block Services for VMware** > **Extend Datastore with Existing**.
2. Select the datastore to be extended. This requires you to select the vCenter and Datacenter which manages the ESX Host on which the block volume that provides the datastore is mounted.
3. Select the block volume to be used to extend the datastore.
4. Select **Order**.
5. Select **Order**.

The Orders page is displayed with the progress of the order.

## Delete a VMware datastore and its block volume

Deletes a datastore and deletes the block volume storage that backs the datastore.

Any data on the volume will be lost.

### Procedure

1. Select **User** > **Service Catalog** > **Block Services for VMware** > **Delete Datastore and Volume**.
2. Locate the datastore by selecting the ESX Host to which it is associated. This requires you to select the vCenter and Datacenter which manages the ESX Host.
3. Select **Order**.

The Orders page is displayed with the progress of the order.

## Delete VMware datastore

Deletes a VMware datastore leaving the storage intact.

### Procedure

1. Select **User** > **Service Catalog** > **Block Services for VMware** > **Delete VMware Datastore**.
2. Locate the datastore by selecting the ESX Host to which it is associated. This requires you to select the vCenter and Datacenter which manages the ESX Host.
3. Select **Order**.

The Orders page is displayed with the progress of the order.

## Remove a volume for VMware

Delete the volume that was created for use as a VMware datastore.

### Before you begin

Any data on the volume will be lost.

**Procedure**

1. Select **User** > **Service Catalog** > **Block Services for VMware** > **Remove Volume for VMware**.
2. Locate the volume by selecting the ESX Host to which it has been exported. This requires you to select the vCenter and Datacenter which manages the ESX Host.
3. Select **Order**.

The Orders page is displayed with the progress of the order.

**File services for VMware**

The file services for VMware enable the creation of file systems and attaching the created file systems, or existing file systems, as a datastore on an ESX Host.

**Table 10** File services for VMware

Category	Service function
File Storage for VMware	<a href="#">Create file system and NFS datastore on page 49</a>
	<a href="#">Create VMware NFS datastore on page 50</a>
	<a href="#">Delete VMware NFS datastore on page 50</a>
	<a href="#">Delete NFS datastore and file system on page 51</a>

**Create file system and NFS datastore**

Creates an NFS export and mounts it to an ESX host as a datastore.

**Before you begin**

As a provisioning user you can only create resources and perform operations on resources belonging to projects that you are assigned to (or are the owner of). If you are a Tenant Administrator you can run all services and choose any project to be the owner of the resource.

The vCenter to which you want to attach an NFS export must have been configured as a ViPR host asset so that ViPR knows how to connect to it.

**Procedure**

1. Select **User** > **Service Catalog** > **File Services for VMware** > **Create File System and NFS Datastore**.
2. Specify a name for the datastore.
3. Select a vCenter which manages the ESX Host to which you are going to attach the provisioned storage.
4. Select the datacenter that the datastore will be made available to.
5. Select the ESX Host that the datastore will be attached to.
6. Select the **Virtual Array** and **Virtual Pool** from which the storage will be provisioned.

If there is no option to select the virtual array or virtual pool, the option may have been fixed by a ViPR administrator.

7. Select the **Project** in which the resource will belong.
  - Only the projects assigned to you are available for selection.

- If the **Project** option is not displayed, the service has been locked to a project and is for use only by members of that project.
8. Enter the name to use when mounting the storage.
  9. Enter the file system **size**.
  10. Provide a comma separated list of IP addresses or hostnames for any additional hosts that should be given access to the export. The selected ESX host for the datastore will automatically be added, as will any additional ESX hosts in the same cluster.
  11. Select **Order**.
- The Orders page is displayed with the progress of the order.

## Create VMware NFS datastore

Creates a VMware datastore from an existing NFS export.

### Before you begin

An NFS export must already exist.

### Procedure

1. Select **User** > **Service Catalog** > **File Services for VMware** > **Create VMware NFS Datastore**.
2. Specify a name for the datastore.
3. Select a vCenter which manages the ESX Host to which you are going to attach the provisioned storage.
4. Select the datacenter that the datastore will be made available to.
5. Select the ESX Host that the datastore will be attached to.
6. Select the **Project** in which the resource will belong.
  - Only the projects assigned to you are available for selection.
  - If the **Project** option is not displayed, the service has been locked to a project and is for use only by members of that project.
7. Select the existing file system that will be mounted as a datastore.
8. Enter the name to use when mounting the storage.
9. Select **Order**.

## Delete VMware NFS datastore

Delete a VMware datastore leaving the NFS export intact.

### Before you begin

As a provisioning user you can only create resources and perform operations on resources belonging to projects that you are assigned to (or are the owner of). If you are a Tenant Administrator you can run all services and choose any project to be the owner of the resource.

### Procedure

1. Select **User** > **Service Catalog** > **File Services for VMware** > **Delete VMware NFS Datastore**.
2. Select the vCenter and the Datacenter to which the datastore is attached.
3. Select the project that the datastore belongs to.

If this field is not displayed, the service has been locked to a project and is for use only by that project.

4. Select the datastore.
5. Select **Order**.

## Delete NFS datastore and file system

Deletes a datastore, the file system, and the associated NFS export.

### Before you begin

As a provisioning user you can only create resources and perform operations on resources belonging to projects that you are assigned to (or are the owner of). If you are a Tenant Administrator you can run all services and choose any project to be the owner of the resource.

### Procedure

1. Select **User > Service Catalog > File Services for VMware > Delete VMware NFS Datastore and File System**.
2. Select the vCenter and the Datacenter to which the datastore is attached.
3. Select the project that the datastore belongs to.

If this field is not displayed, the service has been locked to a project and is for use only by that project.

4. Select the datastore.
5. Select **Order**.

## Data Services

The Data Services services support the creation of buckets for use with object and HDFS storage and support the ingestion of object data from ViPR-managed file systems.

**Table 11** Data Services services

Category	Service function
Data Services	<a href="#">Create bucket for Data Services on page 51</a>
	<a href="#">Delete bucket of Data Services on page 52</a>
	<a href="#">Ingest file system data on page 53</a>

### Create bucket for Data Services

Creates a bucket for use by the ViPR object services and/or HDFS service.

#### Before you begin

- ◆ Data Services must have been configured and at least one data services virtual pool that supports the required access mode or modes (Object, HDFS, or Object and HDFS) must have been created and must have a data store assigned in which to create the bucket.
- ◆ In this procedure a bucket must be assigned to a project. For a user to be able to assign a bucket to the default project, a default project must have been configured by a Tenant Administrator.

**Procedure**

1. Select **User** > **Service** > **Catalog Data Services** > **Create Bucket for Data Services**.
2. Enter a name for the bucket that will be created.
3. Select the virtual pool in which to create the bucket.

The pool that you select must support the object and/or HDFS modes by which you want the bucket to be accessible. For example, if you want the bucket to support HDFS and Object access, you need to ensure that the selected pool supports Object and HDFS operation.

If the bucket is going to be for HDFS data only, or for Object data only, you might want to specify a virtual pool that allows just that type, rather than a pool that allows HDFS and Object access.

4. Select the project to which the bucket should be assigned or select the `default project` that has been assigned.

You will be offered projects to which you have been assigned and the `default project` selection.

5. Select the object access mode for the bucket.

This is the object API that the bucket will support and can be either S3 or none.

Your selections are constrained by the virtual pool type that has been chosen. For example, if a HDFS-only virtual pool has been specified, you can only select None. If an Object-only virtual pool has been specified, you can only select S3. If an HDFS and Object virtual pool has been specified, you can only choose S3 as a bucket created in an Object and HDFS data services virtual pool cannot be HDFS-only.

6. Select the HDFS access mode for the bucket: None or Enable HDFS.

Your selections are constrained by the virtual pool type that has been chosen. For example, if a HDFS-only virtual pool has been specified, you can only select Enable HDFS. If an Object-only virtual pool has been specified, you can only select None. If an HDFS and Object virtual pool has been specified, you can choose either Enable HDFS, if you want the bucket to support HDFS operations, or None, if you intend the bucket to support only object operations.

7. Select **Order** to start creation.

**Delete bucket of Data Services**

Deletes a previously created Data Services object bucket.

**Before you begin**

The following prerequisites apply:

- ◆ The bucket must be empty.

**Procedure**

1. Select **User** > **Service Catalog** > **Data Services** > **Delete Bucket of Data Services**
2. Select a bucket to delete.
3. Select **Order** to start creation.

## Ingest file system data

Use this procedure to ingest data from a file system into ViPR object storage. Where a step requires access to the ViPR UI, you can use the Online Help associated with the specified page to obtain guidance.

### Before you begin

- ◆ If the file system that holds the data to be ingested is not currently managed by ViPR it must be brought under ViPR management using the following steps. These steps must be performed by a user with the ViPR System Administrator role:
  1. Ensure that the file storage system that contains the file systems from which you want to ingest data is available on a ViPR IP network. This should be the same IP network that is being used to provide file storage for Data Services.  
You can add to the IP network from the UI at **Admin > Virtual Assets > Networks**.
  2. Ensure that a data services virtual pool that supports the required data access mode (Object, HDFS, or Object + HDFS) with which you want to access the ingested data exists and has at least one data store associated with it.
  3. Ensure that the file system is not exported. If it is, remove any exports.
  4. Use the **User > Service Catalog > File Storage Services > Discover Unmanaged File Systems** service, followed by the **User > Service Catalog > File Storage Services > Ingest Unmanaged File Systems** service to import the unmanaged file system.
- ◆ If the file system was created in ViPR, and you want to ingest the data on the file system into object storage, you need to remove the file system exports. Currently there is no provision for performing this step from the UI and it must be performed using the API or CLI. More information is provided in the *Data Services Solutions Guide* topic on *Removing file system exports*.
- ◆ A bucket into which the data can be ingested must already exist and must be empty. The bucket should belong to the user who will own the ingested objects. Buckets can be created using the object APIs or from the UI. More information on creating buckets can be found in the *Creating Buckets* topic in the *Data Services Solutions Guide*.  
  
To create a bucket from the UI, use **User > Service Catalog > Data Services > Create Bucket for Data Services**. The online help associated with that topic will provide guidance.
- ◆ You must have the Tenant Administrator role in ViPR in order to use the Ingest File System service.

### Procedure

1. Select **User > Service Catalog > Data Services > Ingest File Systems**.
2. Enter a name for the data store that will be created from the ingested file system.  
  
This is the data store that will be created from the ingested file system. The data store will be assigned to the data services virtual pool to which the specified bucket (sometimes referred to as a keypool) belongs.
3. Enter a description that will be assigned to the data store that is created.
4. Select the project that owns the file system from which data will be ingested.  
  
Only file systems that belong to the selected project will be offered as the source of the data.  
  
The data that is ingested is associated, for metering and showback/chargeback purposes, with the project that owns the bucket into which it is ingested.

5. Select the file system from which the data is to be ingested.

The file system is used as the storage that backs the data store that is created.

6. Enter the name of an existing bucket into which the data will be ingested.

7. Select **Order**.

### **Results**

When you ingest data into a bucket, all the files from the file share are now behaving as objects of the bucket. If the bucket was created using the UI, or created using a different mechanism but without specifying any access control list (ACL), the default ACL for the bucket will be applied and the owner of the bucket has full control. No other user has access unless the ACL is changed to allow access.

The data store that is created from the ingested file system cannot be used for new data. New data for the bucket into which the ingested data is placed, or new buckets, will be written to other data stores.

# CHAPTER 3

## Working with Orders

This chapter contains the following topics:

- ◆ [Orders overview](#)..... 56
- ◆ [Approvals](#)..... 58
- ◆ [Approving or rejecting an order](#)..... 58

## Orders overview

An order is a record of a request to run a service. The order records the details of the request: which service was requested, what parameters were specified in the service request, whether the order is scheduled, and the outcome of the order submission.

### Viewing orders

There are three ways to view information, and status about orders that have been run.

- ◆ Automatically upon log in. The log in **Home** page displays the Recent Used Services, and the Recent Orders.
- ◆ Go to the **User > Orders** page to view the order history.
- ◆ Click a row in the **Order History** table to see details about a specific order.

### Order status

The order status is represented by icons in both the list of Recent Orders in the Home page, and Order History page.

**Table 12** Order status icons

Icon	Meaning
✓	Order was processed successfully.
🕒	Order is scheduled. Open the order to see the execution windows in which it will be executed.
✘	Order failed.
📧	Order is waiting for approval.

### Order details

The order details shows the order request information, details of the selected order, and a summary of the execution steps.

**Table 13** Order details areas

Order area	Contains
Summary	The top part of the order displays the order identity and status on the left-hand side, and displays the parameters passed to the operation on the right-hand side. You will see all of the parameters passed to the service, even if they were hidden on the service form. If the order is scheduled to run in an execution window, the status displays <i>Order Scheduled</i> . if the order requires approval, the status displays <i>Pending Approval</i> .
Affected Resources	Shows the details of the resource that was created as a result of the operation or in which the operation was run.

**Table 13** Order details areas (continued)

Order area	Contains
Order Details	Displays detailed information about the steps taken to process the order.

**Table 14** Affected resources

Affected resource	Description
Block Storage	
Block Export	If the operation exports a block volume to a host, this entry displays the details of the host.
Volume	Shows details of the block volume that has been created. If the operation fails and rollback requires the volume to be deleted, displays: "volume has been deleted."
File Storage	
File System	Shows details of the file system created. If the operation fails and rollback requires the file system to be deleted, displays: "file system has been deleted."
CIFS Share	Shows details of the CIFS share. Indicates the mount point that can be used when mapping the drive on a Windows host.
NFS Export	Shows details of the NFS export. Indicates the mount point that can be used when mounting the file system on a Linux host.

**Table 15** Order details

Category	Content
Logs	Shows the messages written to the log file during execution of the order.
Precheck	Shows the pre-checks carried out before executing the order. The pre-checks ensure that the host to which storage will be attached is available and that there are the required paths between the host HBA and the selected array.
Execution Steps	Lists the execution steps that were carried out in executing the order.
Rollback	If an order fails, the steps carried out to rollback any command executed before failure are listed.

# Approvals

Tenant approvers can access the **Approvals** page from the **Approvals** menu.

## Approval table

The **Approvals** page shows all approvals that have been submitted, the user who submitted the order, the status of the order's approval request, the time it was submitted and, if it has been approved, and who approved it.

Service	Status	Submitted By	Submit Date	Approver
Create Block Volume	Pending	administrator@corp.sean.com	June 24th 2013, 6:13:26 pm +01:00	
Create Block Volume	Approved	administrator@corp.sean.com	June 24th 2013, 5:52:49 pm +01:00	aapprover@corp.sean.com

## Approving orders

Only Tenant Approvers can see the Approvals menu.

Tenant Administrator can configure the approvals feature to send a notification email when an order is waiting for approval.

1. Select the order approval request row to open the approval panel.

**Create Block Volume**  
Create a Block Volume

Order Number:	um:storageos:Order:4f754eac-9ba4-49e2-b4a3-d8ef112d654e	Virtual Storage Array:	NH-Brocade
Date Submitted:	25 Jun 2013 4:54:00 AM UTC	Virtual Storage Pool:	VMAX-Thin (4478 GB Free)
Submitted By:	administrator@corp.sean.com	Protection Virtual Stora...	
Approval Status:	Pending	Project:	iWave Project 1
		Name:	DB Block 1
		Number Of Volumes:	1
		Size (GB):	1

Approve Reject

2. Optionally, enter a reason for approving or rejecting the order.
3. Click Approve or Reject.

## Approving or rejecting an order

Orders for services which are configured to require approval will create an approval request.

### Before you begin

You must be a Tenant Approver to see the Approvals menu.

You should ensure that your Tenant Administrator has configured the approvals feature so that you receive an email when an order is waiting for approval.

**Procedure**

1. Select **User** > **Approvals**.
2. From the Approvals table, select the order that you want to approve.
3. Optionally, add a comment to the approval. If you are going to reject the order, this could be an explanation for the rejection.
4. Select **Approve** or **Reject**.  
If approved, the order will be submitted for fulfillment.



# CHAPTER 4

## Working with Resources

This chapter contains the following topics:

- ◆ [Resources](#)..... 62

## Resources

The Resources page enables the file and block storage resources associated with a selected project to be displayed. You can only see resources for projects that you belong to.

The **Project** drop-down allows a project to be chosen. Selecting the **Block Volume** or **File System** control displays the corresponding table.

### Block volumes

The block volumes table displays the block volumes associated with the selected project.

**Figure 5** Block volume resources table

The screenshot shows the 'Block Volumes' table with the following data:

Volume Name	Size	Virtual Array	Virtual Pool	Protocols
vol-accounts-1	1.0 GB	VA-1	Silver VNX	FC
vol-mx-1	1.0 GB	VA-1	Silver VNX	FC
vol-accounts-3	1.0 GB	VA-1	Silver VNX	FC

Selecting an entry in the table displays the details of the block volume resource.

### File systems

The file systems table displays the file systems associated with the selected project.

**Figure 6** File system resources table

The screenshot shows the 'File Systems' table with the following data:

File System Name	Size	Virtual Array	Virtual Pool	Protocols
nfs-accounts-1	1.00	VA-1	Isilon_A1	NFS
nfs-accounts-34	1.00	VA-1	Isilon_A1	CIFS,NFS
win-accounts-23	2.00	VA-1	Isilon_A1	CIFS,NFS

Selecting an entry in the table displays the details of the file system resource.

# APPENDIX A

## ViPR services for EMC VPLEX Environments

This appendix contains the following topics.

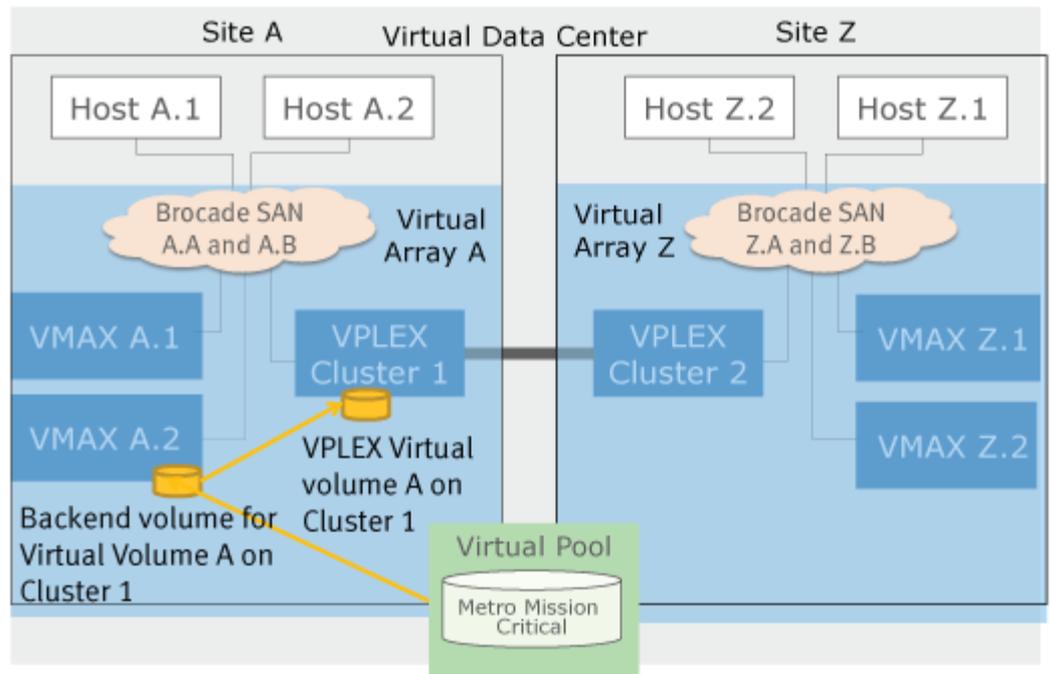
- ◆ [Overview of changing the virtual array in a VPLEX environment.....](#) 64
- ◆ [Use cases for using ViPR to change virtual pools in a VPLEX environment.....](#) 65

## Overview of changing the virtual array in a VPLEX environment

The Change Virtual Array service allows you to use ViPR to change the virtual array used in a VPLEX Metro configuration.

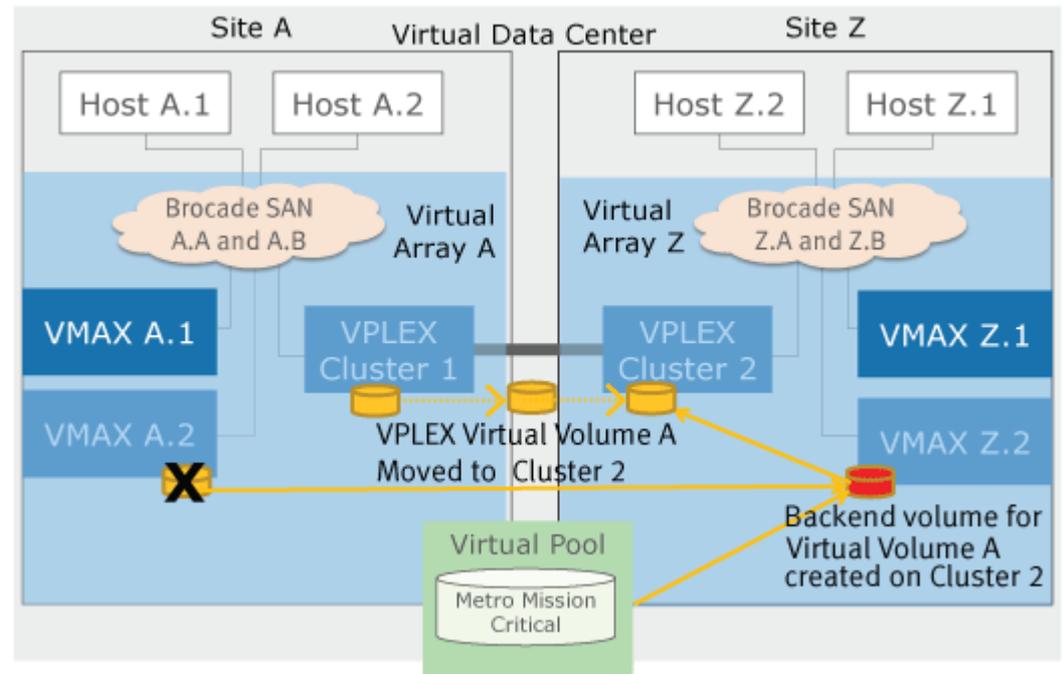
In a VPLEX configuration, each VPLEX cluster exists on a different virtual array. When a new virtual array is selected for a VPLEX local virtual volume, the local virtual volume is moved from the cluster on the original virtual array to the cluster on the selected virtual array, and a new backend storage volume is created on the selected virtual array for the virtual volume. In the following image:

**Figure 7** Initial setup with Virtual Array A



- ◆ The VPLEX is configured with Cluster 1 on Virtual Array A, and Cluster 2 on Virtual Array Z.
- ◆ The backend storage for VPLEX Virtual Volume A, on Cluster 1 is configured from VMAX A.2, which is part of Virtual Array A.

In the next image the virtual array for VPLEX Virtual Volume A is changed to Virtual Array Z.

**Figure 8** Change to Virtual Array Z

- ◆ A new backend storage volume, from the same virtual pool, is configured for VPLEX Virtual Volume A on VMAX Z.2 on Virtual Array Z.
- ◆ The data from the VMAX A.2 backend volume is migrated to the new backend volume on VMAX Z.2 using VPLEX local device migration, resulting in VPLEX Virtual Volume A being moved to Cluster 2 in Virtual Array Z.
- ◆ The VMAX A.2 backend volume is then unexported from VPLEX Cluster 1 and deleted.

## Use cases for using ViPR to change virtual pools in a VPLEX environment

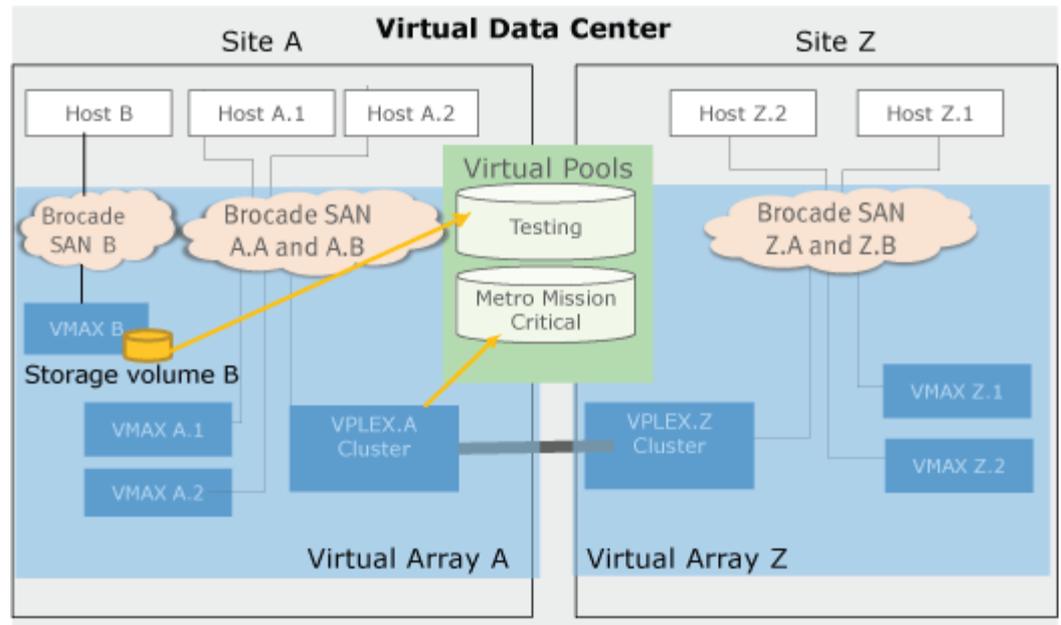
This section provides three use cases for using ViPR to change the virtual pools in a VPLEX environment.

### Change virtual pool to create a new VPLEX virtual volume

Use the Change Virtual Pool service to import a block storage volume from ViPR to create a new VPLEX virtual volume.

If creating a VPLEX local virtual volume, an existing block storage volume, which is selected during the virtual pool change operation, is used for the backend storage used to create the VPLEX local virtual volume. In the following figure:

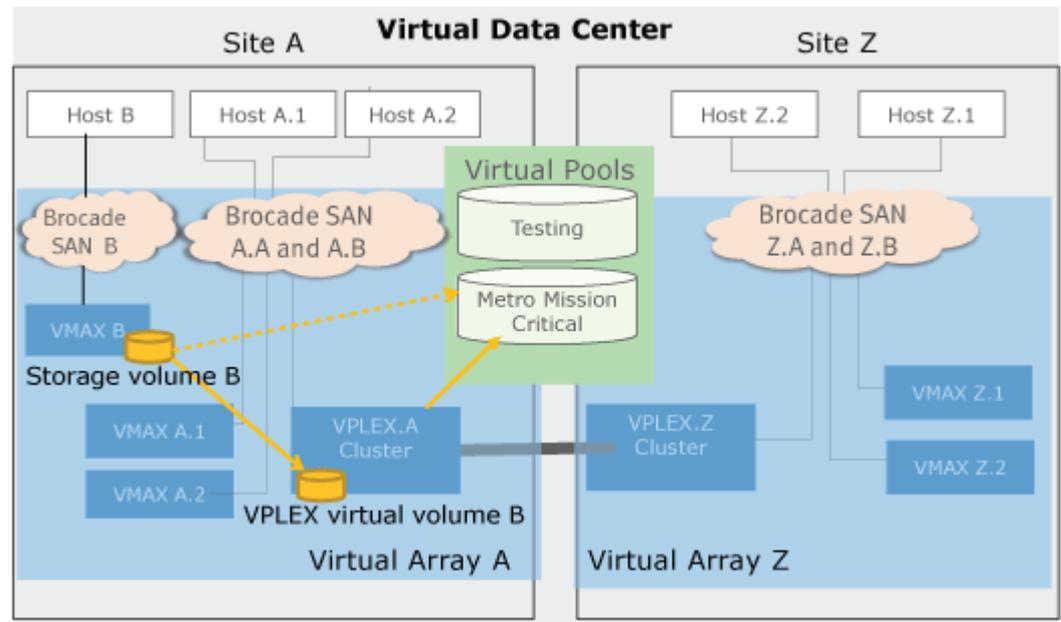
**Figure 9** Storage volume B virtual pool initial setup



- ◆ Storage volume B is on VMAX B array and part of Testing virtual pool.
- ◆ Metro mission critical virtual pool is associated with VPLEX A.
- ◆ Storage volume B, and VPLEX A, have no association.

The virtual pool for Storage volume B, is changed to Metro Mission Critical, which is a storage pool configured for VPLEX, as demonstrated in the next figure:

**Figure 10** Change virtual pool for Storage volume B



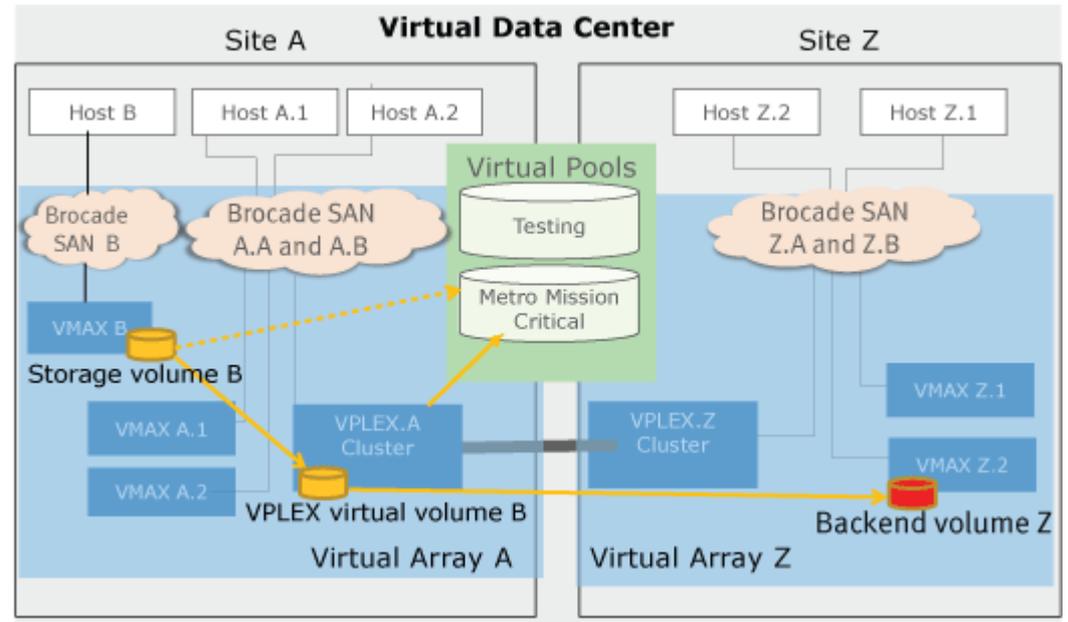
- ◆ Storage volume B is then moved to the Metro Mission Critical virtual pool, which is associated to VPLEX A.
- ◆ VPLEX local virtual volume B is then created from the backend Storage volume B.

If creating a VPLEX distributed virtual volume from block storage, the VPLEX local virtual volume is created from the selected virtual pool. Then a new HA backend storage volume

is created, and attached as a mirror to the VPLEX local virtual volume and the distributed VPLEX volume is created. The data from the backend storage for the VPLEX local virtual volume is then copied to the HA backend volume to ensure the two storage volumes are synchronized.

In the following figure, VPLEX virtual volume B is distributed, Backend volume Z is created in Virtual Array Z, and attached as a mirror to VPLEX virtual volume B:

**Figure 11** Change virtual pool for Storage volume B in a distributed environment



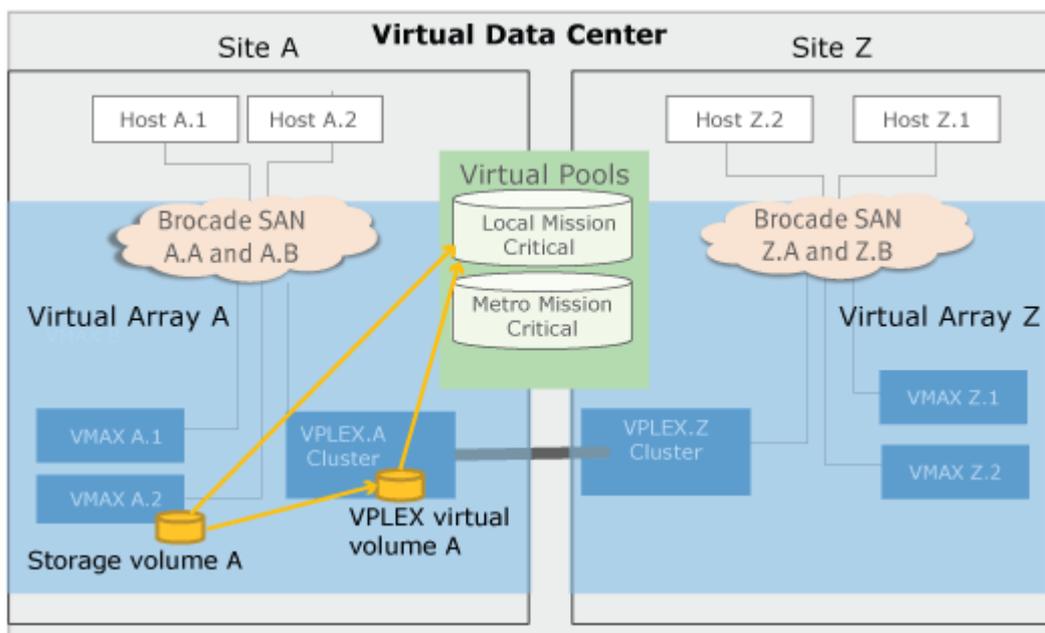
## Change the VPLEX virtual volume remote protection

The Change Virtual Pools service can be used to change the remote protection of a VPLEX virtual volume from local to distributed.

When the Virtual Pool in a VPLEX environment is changed from local to remote, a new HA backend storage volume is created, and attached as a mirror to the VPLEX local virtual volume. The data from the backend storage for the VPLEX local virtual volume is then copied to the HA backend volume to ensure the two storage volumes are synchronized.

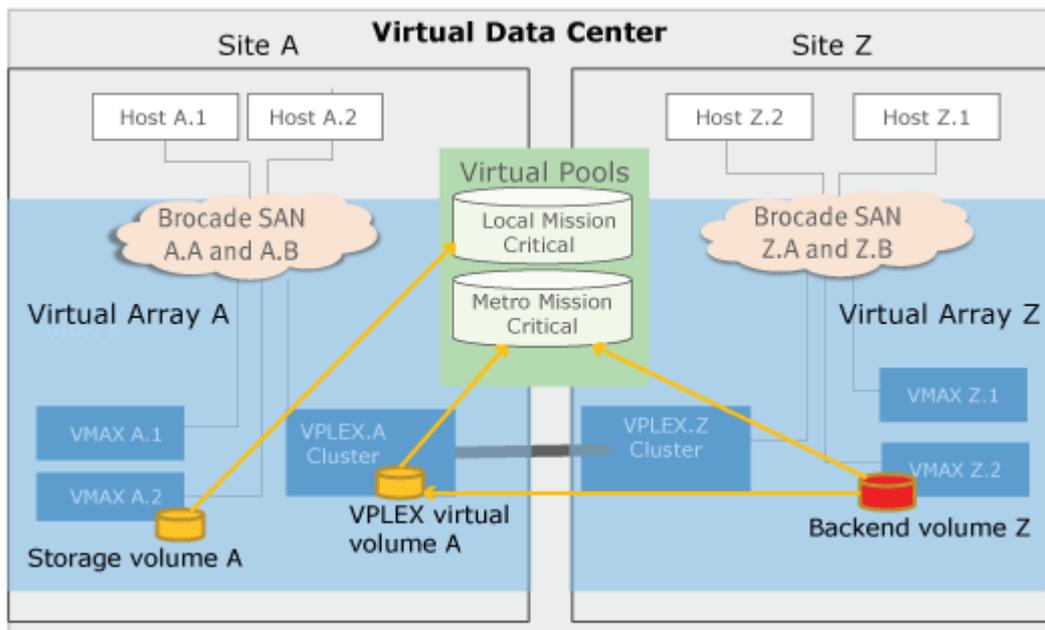
In the initial setup, VPLEX (local) virtual volume A is associated with Local Mission Critical virtual pool. Its backend storage is volume A on VMAX array A.1 as demonstrated in the following figure.

**Figure 12** Initial environment set up with a virtual pool created for local protection



Once the virtual pool is changed for VPLEX (local) virtual volume A to Remote Mission Critical virtual pool, as demonstrated in the next figure:

**Figure 13** Change to a virtual pool configured for remote protection



- ◆ Backend (HA) volume Z is created in Virtual Array Z.
- ◆ The Backend (HA) volume Z in Virtual Array Z is attached as a mirror to the VPLEX virtual volume A in Virtual Array A, which changes the remote protection of VPLEX virtual volume A from a local to distributed.

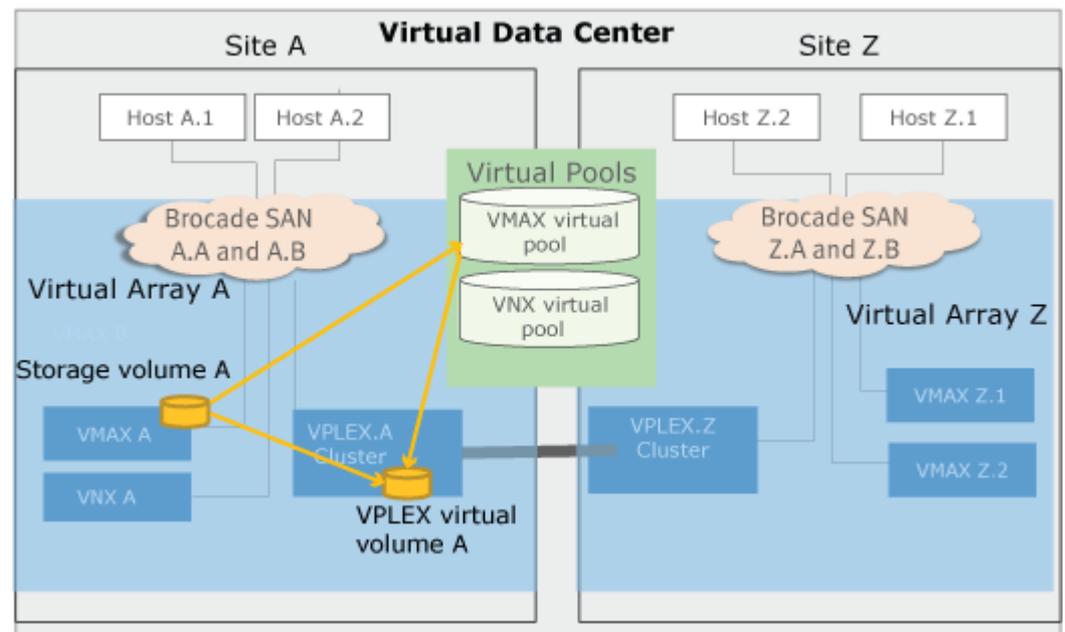
## Change the backend storage volume for a VPLEX virtual volume

Use the Change Virtual Array service to change the backend storage of a VPLEX virtual volume to meet new configuration requirements such as, such as storage system type, disk type, or protocols.

The following use case demonstrates the process of changing the virtual pool to change the type of backend storage from VMAX to VNX.

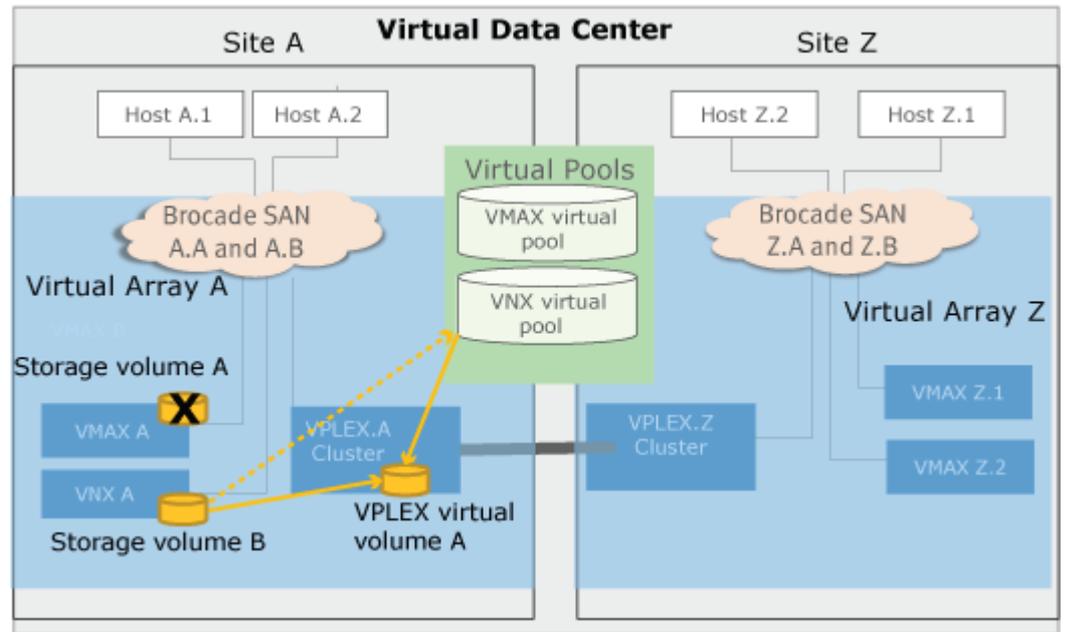
In the following figure VPLEX virtual volume A is associated with VMAX virtual pool. The backend storage for VPLEX virtual volume A is Storage volume A on VMAX A array.

**Figure 14** Initial setup with VMAX virtual pool



When the virtual pool is changed to the VNX virtual pool, as demonstrated in the following figure:

**Figure 15** Change to VNX virtual pool



- ◆ Backend Storage volume B is created on VNX A, and associated with VPLEX virtual volume A.
- ◆ Storage volume A on VMAX A is deleted.