White Paper

EMC ViPR Controller In Existing EMC VMAX 10K/20K/40K Environments

Abstract

This white paper explains how EMC ViPR Controller 2.2 operates in customer SANs where host provisioning occurred before the introduction of ViPR Controller. These are known as co-existence environments. This paper describes what to expect with EMC® VMAX® 10K/20K/40K Masking Views and Fibre Channel switch zoning. It also provides solutions to smoother integration.

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Executive Summary

EMC® ViPR® Controller is storage automation software that abstracts, pools, and automates a datacenter's underlying physical storage infrastructure. It provides a single control plane for heterogeneous storage systems to data center administrators.

Once ViPR Controller is deployed in a data center, ViPR Controller discovers the physical infrastructure including storage systems, Fibre Channel storage area networks (SANs), and hosts so that ViPR Controller can understand the full topology of the data center. ViPR Controller discovers the physical storage pools and the storage ports for each storage system registered with ViPR Controller. The physical pools and ports on the storage systems are used by ViPR Controller to make the storage devices visible to the hosts.

Prior to ViPR Controller, storage provisioning was performed by SAN administrators using a variety of methods including product element managers, APIs, CLI scripting or third-party management applications. They would generally use vendor best practices for configuring Fibre Channel switches and storage arrays. In some cases, administrators develop unique standards that are customized for their organizations.

When ViPR Controller is introduced, it inevitably changes the way provisioning operations are done. In existing environments, EMC VMAX 10K/20K/40K Masking Views and Fibre Channel zones are created by the element manager applications. In many cases, ViPR Controller is compatible with these existing customer configurations. We call this “co-existence.”

Audience

This white paper is intended for storage administrators and architects, customers, and EMC field personnel who want to understand the implementation of storage provisioning with ViPR Controller to a host or a cluster in a Symmetrix VMAX 10K/20K/40K environments.

Understanding Symmetrix VMAX 10K/20K/40K Masking Views

A VMAX 10K/20K/40K Masking View is a logical grouping of related objects and the creation of a view that associates the related groups together. When a VMAX Masking View is created, the necessary mapping and masking operations are performed automatically to provision storage. Once a masking view has been created, any changes to the grouping of initiators, ports, or storage devices are propagated throughout the view and the mapping and masking are automatically updated as required.

The full provisioning process involves multiple steps performed by the SAN administrator. The following are the general steps performed on the Symmetrix when storage is provisioned to a new server.

1) Identify and select appropriate devices based on configuration type and capacity.
2) Identify and verify paths between storage and HBAs.
3) Map devices to appropriate front-end director ports.
4) Mask devices to specific HBAs through specific ports.
5) Fabric switch zoning.

Careful analysis and planning is required before implementation.

The following are definitions for these objects.

- An *initiator group* is a logical grouping of up to 32 Fibre Channel initiators or eight iSCSI names or a combination of both. An initiator group may also contain the name of another initiator group to allow the groups to be cascaded to a depth of one.

- A *port group* is a logical grouping of Fibre Channel and/or iSCSI front-end director ports. The only limit on the number of ports in a port group is the number of ports in the Symmetrix VMAX; however, it is likely that a port group will contain a subset of the available ports in order to isolate workloads to specific ports.

- A *storage group* is a logical grouping of up to 4,096 Symmetrix devices. LUN addresses are assigned to the devices in the storage group when the masking view is created using the dynamic LUN addressing feature.

- A *masking view* defines an association between one initiator group, one port group, and one storage groups. When a masking view is created, the devices in the storage group are mapped to the ports in the port group and masked to the initiators in the initiator group. Depending on the server and application requirements, each server or group of servers may have one or more masking views that associate a set of Symmetrix devices to an application, server, or cluster of servers. Note: In the previous ViPR Controller versions, only one Masking View was supported. In ViPR Controller 2.2, that is no longer the case.

Physical Environment

ESX Cluster

ESXi 5.5 (Managed by vCenter 5.5)
10.247.144.21 (lglbx021)
vmhba2 10:00:00:90:fa:34:4c:32
vmhba3 10:00:00:90:fa:34:4c:33

10.247.144.34 (lglbx034)
vmhba2 10:00:00:90:fa:34:38:52
vmhba3 10:00:00:90:fa:34:38:53

Storage Array

VMAX
000195702258 and 000195702307
5876.272.177

Fibre Channel SAN

Brocade Fibre Channel switches
Connectrix Manager Converged Network Edition 12.1.5
Fabric A
ESX HBA ports
vmhba2 10:00:00:90:fa:34:4c:32
vmhba2 10:00:00:90:fa:34:38:52
VMAX FA ports
8E0 50:00:09:73:00:23:49:1c
10E1 50:00:09:73:00:23:49:25

Fabric B
ESX HBA ports
vmhba3 10:00:00:90:fa:34:4c:33
vmhba3 10:00:00:90:fa:34:38:53
VMAX FA ports
7E0 50:00:09:73:00:23:49:18
9E1 50:00:09:73:00:23:49:21

ViPR Controller Masking View in an Existing Environment

An existing environment requires support for co-existence. It refers to a SAN infrastructure with existing Masking Views and Zoning. ViPR Controller makes use of existing Masking Views and Fibre Channel switch zoning when possible.

The following section details an existing provisioning environment that is leveraged by ViPR Controller for new provisioning operations. Several use cases for existing environments are covered.

ViPR Controller Adds FAST LUN to Masking View with Non-FAST LUN with a Cascaded Storage Group

In this case, an administrator has used Unisphere for VMAX to present a LUN to an ESX cluster from a Non-FAST thin pool in a Cascaded Storage Group. ViPR Controller provisions a FAST volume to the same cluster.

Existing Masking View

Name: ESXCluster5_MV1

Existing Cascaded Storage Group

Parent Name: ESXCluster5_ParentSG
Child Name: ESXCluster5_ChildSG_NonFAST

Existing Volume

Name: brownfieldtestA

Existing Initiator Group

Name: ESXCluster5_ParentIG
Cascaded Name: lglbx021_ChildIG
lglbx034_ChildIG
Initiators: 10:00:00:90:fa:34:4c:32, 10:00:00:90:fa:34:4c:33,
10:00:00:90:fa:34:38:52, 10:00:00:90:fa:34:38:53

Existing Port Group

Name: ESXServer1_PG
VMAX FA Ports: 7E0 50:00:09:73:00:23:49:18
8E0 50:00:09:73:00:23:49:1c
9E1 50:00:09:73:00:23:49:21
10E1 50:00:09:73:00:23:49:25

Existing FC Switch Zoning

Fabric A

zone: lglbx021_8e0_10e1
10:00:00:90:fa:34:4c:32
50:00:09:73:00:23:49:1c
50:00:09:73:00:23:49:25

zone: lglbx034_8e0_10e1
10:00:00:90:fa:34:38:52
50:00:09:73:00:23:49:1c
50:00:09:73:00:23:49:25

Fabric B

zone: lglbx021_7e0_9e1
10:00:00:90:fa:34:4c:33
50:00:09:73:00:23:49:18
50:00:09:73:00:23:49:21

zone: lglbx034_7e0_9e1
10:00:00:90:fa:34:38:53
50:00:09:73:00:23:49:18
50:00:09:73:00:23:49:21

The ViPR Controller administrator will provision a new 20GB LUN from a ViPR Controller vPool that specifies a GOLD policy.

vArray

vArray1 includes:

- Brocade switches - Fabrics A and B
- 4 HBA ports and 4 storage ports
- Automatic selected for SAN zoning

vPool

vPool1 attributes:

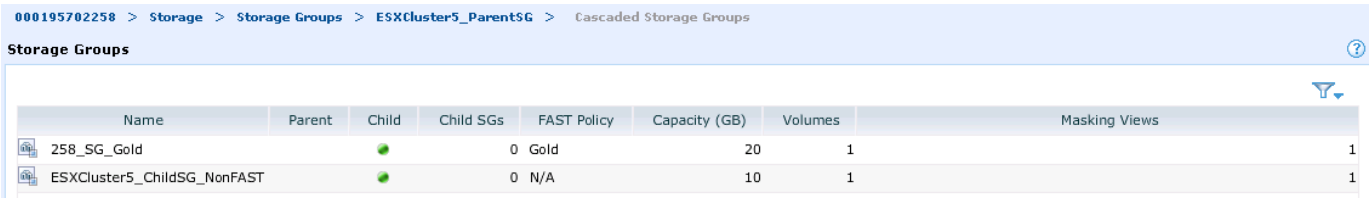
- VSA1
- 1 minimum path
- 4 maximum paths
- 2 paths per initiator
- 1 FAST pool from VMAX 2258

Result

As a result of this particular ViPR Controller provisioning operation, the following occurs.

1) A new Child Storage Group is created.

ViPR Controller leverages the existing Masking View. However, since ViPR Controller created a new LUN from a FAST pool and the existing LUN provisioned was from a non-FAST pool, ViPR Controller created a new Child Storage Group on the VMAX.



The newly created Cascaded Storage Group is named "258_SG_Gold." The Parent name of the existing Storage Group was "ESXCluster5_ParentSG." ViPR Controller appended "_Gold" to reflect the new Storage Group from the Gold FAST pool. The naming convention of this Storage Group may not reflect naming in other environments because ViPR Controller 2.2 introduced customized naming for Masking Views, Initiator Groups, Storage Groups, Port Groups and Zoning.

In the co-existence environment, there were existing zones in Fabrics A and B for ESXCluster5. New functionality in 2.2 no longer requires ViPR Controller to create duplicate zones. ViPR Controller will reuse existing zones even when vArrays are set to "Automatic" for SAN zoning.

Removing ViPR Controller Provisioned Volumes

When the ViPR Controller administrators remove volumes, ViPR Controller takes the following action:

1) Volumes are deleted from the Cascaded Storage Group created by ViPR Controller.
2) The Child Storage Group created by ViPR Controller is deleted.

Note: Zoning is not impacted. The original Child Storage Group is not impacted.

ViPR Controller Adds FAST LUN to Masking View with Non-FAST LUN with Non-Cascaded Storage Group

In this case, an administrator has used Unisphere for VMAX to present a LUN to an ESX cluster from a Non-FAST thin pool in a non-Cascaded Storage Group. ViPR Controller provisions a FAST volume to the same cluster.

Existing Masking View

Name: ESXCluster5_MV1

Existing Cascaded Storage Group

Name: ESXCluster5_SG_NotCascaded

Existing Volume

Name: brownfieldtestA

Existing Initiator Group

Name: ESXCluster5_ParentIG
Cascaded Name: lglbx021_ChildIG
lglbx034_ChildIG
Initiators: 10:00:00:90:fa:34:4c:32, 10:00:00:90:fa:34:4c:33,
10:00:00:90:fa:34:38:52, 10:00:00:90:fa:34:38:53

Existing Port Group

Name: ESXServer1_PG
VMAX FA Ports: 7E0 50:00:09:73:00:24:0D:18
8E0 50:00:09:73:00: 24:0D:1c
9E1 50:00:09:73:00: 24:0D:21
10E1 50:00:09:73:00: 24:0D:25

Existing FC Switch Zoning

Fabric A
zone: lglbx021_8e0_10e1
10:00:00:90:fa:34:4c:32
50:00:09:73:00: 24:0D:1c
50:00:09:73:00: 24:0D:25
zone: lglbx034_8e0_10e1
10:00:00:90:fa:34:38:52
50:00:09:73:00: 24:0D:1c
50:00:09:73:00: 24:0D:25
Fabric B
zone: lglbx021_7e0_9e1
10:00:00:90:fa:34:4c:33
50:00:09:73:00: 24:0D:18
50:00:09:73:00: 24:0D:21
zone: lglbx034_7e0_9e1

10:00:00:90:fa:34:38:53
50:00:09:73:00: 24:0D:18
50:00:09:73:00: 24:0D:21

The ViPR Controller administrator will provision a new 20GB LUN from a ViPR Controller vPool that specifies a GOLD policy.

vArray

vArray1 includes:

- Brocade switches - Fabrics A and B
- 4 HBA ports and 4 storage ports
- Automatic selected for SAN zoning

vPool

vPool1 attributes:

- VSA1
- 2 minimum path
- 4 maximum paths
- 2 paths per initiator
- 1 FAST pool from VMAX 2307

Result

As a result of this particular ViPR Controller provisioning operation, the following occurs.

1) A new volume is created and is added to two Storage Groups.
2) ViPR Controller adds the new volume to appropriate Masking View which has a non-Cascaded, non-FAST Storage Group, "ESXCluster5_SG_NotCascaded."
3) ViPR Controller finds another existing Storage Group that is NOT part of any Masking View named "fakecluster_gold_more." ViPR Controller did not create this Storage Group. "fakecluster_gold_more" is an existing Storage Group. Since this Storage Group has a FAST policy of GOLD, the newly created volume has the policy applied. ViPR Controller will reuse an existing Storage Group rather than create a new one when possible. The volume now resides in two Storage Groups.

Storage Groups

Name	Parent	Child	Child SGs	FAST Policy	Capacity (GB)	Volumes	Masking Views
ESXCluster5_SG_NotCascaded			0	N/A	38	2	1
fakecluster_gold_more			0	GOLD_Policy	23	6	0

ViPR Controller Adds LUN with Host Limits to Masking View with Non-Cascaded Storage Group

In this case, an administrator has used Unisphere for VMAX to present a LUN to an ESX cluster from a Non-FAST thin pool in a non-Cascaded Storage Group. The ViPR Controller vPool has been configured for Host I/O Limits(MB/sec and/or IO/sec). ViPR Controller provisions a FAST volume to the same cluster.

Existing Masking View

Name: ESXCluster5_MV1

Existing Cascaded Storage Group

Name: ESXCluster5_SG_NotCascaded

Existing Volume

Name: brownfieldtestA

Existing Initiator Group

Name: ESXCluster5_ParentIG
Cascaded Name: lglbx021_ChildIG
lglbx034_ChildIG
Initiators: 10:00:00:90:fa:34:4c:32, 10:00:00:90:fa:34:4c:33,
10:00:00:90:fa:34:38:52, 10:00:00:90:fa:34:38:53

Existing Port Group

Name: ESXServer1_PG
VMAX FA Ports: 7E0 50:00:09:73:00:24:0D:18
8E0 50:00:09:73:00: 24:0D:1c
9E1 50:00:09:73:00: 24:0D:21
10E1 50:00:09:73:00: 24:0D:25

Existing FC Switch Zoning

Fabric A
zone: lglbx021_8e0_10e1
10:00:00:90:fa:34:4c:32
50:00:09:73:00: 24:0D:1c
50:00:09:73:00: 24:0D:25
zone: lglbx034_8e0_10e1
10:00:00:90:fa:34:38:52
50:00:09:73:00: 24:0D:1c
50:00:09:73:00: 24:0D:25
Fabric B
zone: lglbx021_7e0_9e1
10:00:00:90:fa:34:4c:33
50:00:09:73:00: 24:0D:18
50:00:09:73:00: 24:0D:21
zone: lglbx034_7e0_9e1

10:00:00:90:fa:34:38:53
50:00:09:73:00: 24:0D:18
50:00:09:73:00: 24:0D:21

The ViPR Controller administrator will provision a new 20GB LUN from a ViPR Controller vPool that specifies a Host IO/sec limit of 400 and a Host MB/sec limit of 600.

vArray

vArray1 includes:

- Brocade switches - Fabrics A and B
- 4 HBA ports and 4 storage ports
- Automatic selected for SAN zoning

vPool

vPool1 attributes:

- VSA1
- 2 minimum path
- 4 maximum paths
- 2 paths per initiator
- Host Front End Bandwidth Limit (MB/sec) 400
- Host Front End IO Limit (IO/sec) 600

Result

As a result of this ViPR Controller provisioning operation, the following occurs.

1) ViPR Controller creates an entirely new Masking View for this operation. Unlike adding a FAST LUN to an existing non-cascaded Storage Group, ViPR Controller doesn't create or reuse a secondary Storage Group outside of any Masking View.
    a. A new Parent Initiator Group is created with existing Child Initiator Groups.
        i. These are the same Child Initiator Groups that are in the existing Masking View.
    b. A new Cascaded Storage Group is created.
        i. Name: VSECluster5_307_SG_GOLD_Policy_bw400_iops600
    c. A new Port Group is created.
        i. ViPR Controller will choose four ports based on its algorithm. Those ports will not necessarily be the same as the existing Masking View depending on how many FA ports are in the vArray.
2) New zones will be created when different storage ports are used.

Name	Initiator Group 1▾	Port Group	Storage Group
VSECluster5_307	VSECluster5_307_CIG	VSECluster5_307_PG	VSECluster5_307_CSG
ESXCluster5_MV1	VSECluster5	Brocade-7e0-8e0-9e1-10e1	ESXCluster5_SG_NotCascaded

ViPR Controller Adds FAST LUN to Host with Multiple Masking Views

In this case, there are two Masking Views for an ESX cluster. Each Masking View has a unique set of ports in their respective Port Groups. Each Masking View has a non-cascaded Storage Group. Multiple Masking Views can be used this way as a manner load balancing across FA ports. ViPR Controller provisions a FAST volume.

Existing Masking View 1

Name: ESXCluster5_MV1

Existing Cascaded Storage Group 1

Name: ESXCluster5_SG_NotCascaded

Existing Volume 1

Name: brownfieldtestA

Existing Initiator Group 1

Name: ESXCluster5_ParentIG
Cascaded Name: lglbx021_ChildIG
lglbx034_ChildIG
Initiators: 10:00:00:90:fa:34:4c:32, 10:00:00:90:fa:34:4c:33,
10:00:00:90:fa:34:38:52, 10:00:00:90:fa:34:38:53

Existing Port Group 1

Name: ESXServer1_PG
VMAX FA Ports: 7E0 50:00:09:73:00:24:0D:18
8E0 50:00:09:73:00: 24:0D:1c
9E1 50:00:09:73:00: 24:0D:21
10E1 50:00:09:73:00: 24:0D:25

Existing Masking View 2

Name: ESXCluster5_MV2

Existing Cascaded Storage Group 2

Name: ESXCluster5_SG2_NotCascaded

Existing Volume 2

Name: brownfieldtestB

Existing Initiator Group 2

Name: ESXCluster5_ParentIG
Cascaded Name: lglbx021_ChildIG
lglbx034_ChildIG
Initiators: 10:00:00:90:fa:34:4c:32, 10:00:00:90:fa:34:4c:33,
10:00:00:90:fa:34:38:52, 10:00:00:90:fa:34:38:53

Existing Port Group 2

Name: ESXServer1_PG2

VMAX FA Ports:

8F1	50:00:09:73:00: 24:0D:5D
10F0	50:00:09:73:00: 24:0D:64
10F1	50:00:09:73:00: 24:0D:65
8F0	50:00:09:73:00: 24:0D:5C

Existing FC Switch Zoning

Fabric A

zone: lglbx021_8e0_10e1_8f0_10f0
10:00:00:90:fa:34:4c:32
50:00:09:73:00: 24:0D:1c
50:00:09:73:00: 24:0D:25
50:00:09:73:00: 24:0D:64
50:00:09:73:00: 24:0D:5C

zone: lglbx034_8e0_10e1_8f0_10f0
10:00:00:90:fa:34:38:52
50:00:09:73:00: 24:0D:1c
50:00:09:73:00: 24:0D:25
50:00:09:73:00: 24:0D:64
50:00:09:73:00: 24:0D:5C

Fabric B

zone: lglbx021_7e0_9e1_8f1_10f1
10:00:00:90:fa:34:4c:33
50:00:09:73:00: 24:0D:18
50:00:09:73:00: 24:0D:21
50:00:09:73:00: 24:0D:5D
50:00:09:73:00: 24:0D:65

zone: lglbx034_7e0_9e1_8f1_10f1
10:00:00:90:fa:34:38:53
50:00:09:73:00: 24:0D:18
50:00:09:73:00: 24:0D:21
50:00:09:73:00: 24:0D:5D
50:00:09:73:00: 24:0D:65

The ViPR Controller administrator will provision a new 20GB LUN from a ViPR Controller vPool that specifies a GOLD policy.

vArray

vArray1 includes:

- Brocade switches - Fabrics A and B
- 4 HBA ports and 4 storage ports
- Automatic selected for SAN zoning

vPool

vPool1 attributes:

- VSA1
- 2 minimum path
- 4 maximum paths
- 2 paths per initiator
- 1 FAST pool from VMAX 2307

Result

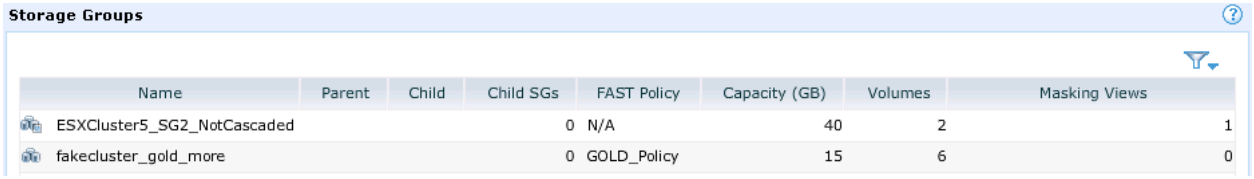
As a result of this particular ViPR Controller provisioning operation, the following occurs.

1) ViPR Controller selects the Masking View that meets the requirements of the provisioning operation. The Masking View matching algorithm processes through several rules.

   This is the sort order of qualified masks that is applied to each rule:

   Priority 1: Prefer Masking Views that contain all initiators in the Masking View over partial or incomplete Masking Views.
   Priority 2: If it is a cluster export, then the cluster Masking View gets preference over the Host Masking View.
   Priority 3: Prefer Masking Views that have cascaded Storage Groups.
   Priority 4: Prefer Masking Views that are less utilized.

2) The new volume is created and is added to two Storage Groups.
3) ViPR Controller adds the new volume to ESXCluster5_MV2 which has a non-Cascaded, non-FAST Storage Group, "ESXCluster5_SG_NotCascaded."
4) ViPR Controller finds another existing Storage Group that is NOT part of any Masking View named "fakecluster_gold_more." Since this Storage Group has a FAST policy of GOLD, the newly created volume has the policy applied. ViPR Controller will reuse an existing Storage Group rather than create a new one when possible. The volume now resides in two Storage Groups.



Name	Parent	Child	Child SGs	FAST Policy	Capacity (GB)	Volumes	Masking Views
ESXCluster5_SG2_NotCascaded			0	N/A	40	2	1
fakecluster_gold_more			0	GOLD_Policy	15	6	0

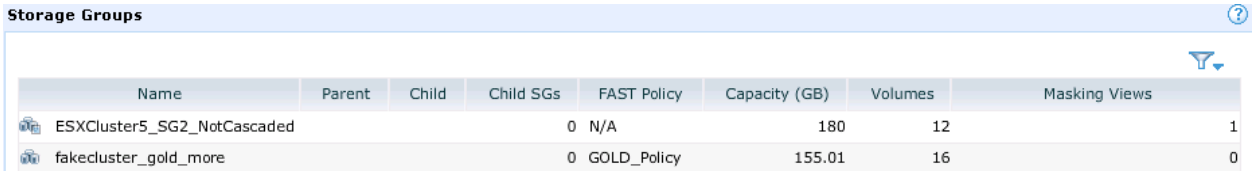
Additional FAST LUNs are Added to a Host with Multiple Masking Views

This case is a follow-on to the previous section. In the previous case, there are two Masking Views for an ESX cluster. Each Masking View has a unique set of ports in their respective Port Groups. Each Masking View has a non-cascaded Storage Group. ViPR Controller provisioned a FAST volume. See "Results" in the previous section for details.

In this case, the ViPR Controller user has provisioned an additional 10 volumes to the same cluster. There were multiple provisioning operations. Some operations were a single volume. Some operations were multiple volumes.

Result

1) In all cases, the new volumes were added to the same two Storage Groups under the same Masking View. After the first provisioning operation in the previous section, ViPR Controller now shows a preference when any additional volumes are provisioned to the host or cluster.



Storage Groups

Name	Parent	Child	Child SGs	FAST Policy	Capacity (GB)	Volumes	Masking Views
ESXCluster5_SG2_NotCascaded			0	N/A	180	12	1
fakecluster_gold_more			0	GOLD_Policy	155.01	16	0

Note: When new provisioning operations use the same vPool or another vPool with similar parameters as a previous provisioning operations, ViPR Controller will try to reuse the existing Storage Groups and Masking Views. The user has no direct control over which Masking View is selected. ViPR Controller can disregard certain Masking Views. (See section below on "no_ViPR")

ViPR Controller will not load balance across multiple Masking Views with different Port Groups.

ViPR Controller Adds New LUN Using vArray with no Matching Ports to the Existing Port Group

In this case, an administrator has used Unisphere for VMAX to present a LUN to an ESX cluster. The Port Group in the Masking View specifies two FA ports. The vArray specifies two different FA ports.

Existing Masking View

Name: ESXCluster5_MV1

Existing Cascaded Storage Group

Parent Name: ESXCluster5_ParentSG
Child Name: ESXCluster5_ChildSG_NonFAST

Existing Volume

Name: brownfieldtestA

Existing Initiator Group

Name: ESXCluster5_ParentIG
Cascaded Name: lglbx021_ChildIG
lglbx034_ChildIG
Initiators: 10:00:00:90:fa:34:4c:32, 10:00:00:90:fa:34:4c:33,
10:00:00:90:fa:34:38:52, 10:00:00:90:fa:34:38:53

Existing Port Group

Name: Brocade-8e0-9e1
VMAX FA Ports: 8E0 50:00:09:73:00:23:49:1c
9E1 50:00:09:73:00:23:49:21

Existing FC Switch Zoning

Fabric A
zone: lglbx021_8e0
10:00:00:90:fa:34:4c:32
50:00:09:73:00:23:49:1c
zone: lglbx034_8e0
10:00:00:90:fa:34:38:52
50:00:09:73:00:23:49:1c
Fabric B
zone: lglbx021_9e1
10:00:00:90:fa:34:4c:33
50:00:09:73:00:23:49:21
zone: lglbx034_9e1
10:00:00:90:fa:34:38:53
50:00:09:73:00:23:49:21

The ViPR Controller administrator provisions a LUN from a ViPR Controller vPool to the existing Masking View.

vArray

vArray1 includes:

- Brocade switches - Fabrics A and B
- 2 HBA ports from each cluster node and 2 FA ports
    - FA ports 7e0 and 10e1 are added to the vArray
        - Note that 8e0 and 9e1 are in the Existing Masking View Port Group
- Automatic selected for SAN zoning

vPool

vPool1 attributes:

- vArray1
- 1 minimum path
- 2 maximum paths
- 1 paths per initiator

Result

As a result of this particular ViPR Controller provisioning operation, the following occurs.

1) ViPR Controller creates an entirely new Masking View. Since the FA ports in the original Masking View don't match the FA ports in the vArray, a new Masking View is created; VSECluster5_258
    a. A new Parent Initiator Group is created with existing Child Initiator Groups.
        i. These are the same Child Initiator Groups that are in the existing Masking View.
    b. A new Cascaded Storage Group is created.
    c. A new Port Group is created.

Name	Initiator Group	Port Group	Storage Group
ESXCluster5_MV1	ESXCluster5_ParentIG	Brocade-8e0-9e1	ESXCluster5_ParentSG
VSECluster5_258	VSECluster5_258_CIG	VSECluster5_258_PG	VSECluster5_258_CSG

2) New zones are created in fabrics A and B.

Fabric A

zone: SDS_1024714421_0090FA344C32_2258_FA10E1
10:00:00:90:fa:34:4c:32
50:00:09:73:00:23:49:25

zone: SDS_1024714434_0090FA343852_2258_FA10E1
10:00:00:90:fa:34:38:52
50:00:09:73:00:23:49:25

Fabric B

zone: SDS_1024714421_0090FA344C33_2258_FA7E0
10:00:00:90:fa:34:4c:33

50:00:09:73:00:23:49:18
zone: SDS_1024714434_0090FA343853_2258_FA7E0
10:00:00:90:fa:34:38:53
50:00:09:73:00:23:49:18

ViPR Controller Adds New LUN Using vArray with One Matching Port to the Existing Port Group

This scenario is very similar to the previous one. In this case, an administrator has used Unisphere for VMAX to present a LUN to an ESX cluster. The Port Group in the Masking View specifies two FA ports. The vArray specifies one of two FA ports from the Port Group.

Existing Masking View

Name: ESXCluster5_MV1

Existing Cascaded Storage Group

Parent Name: ESXCluster5_ParentSG
Child Name: ESXCluster5_ChildSG_NonFAST

Existing Volume

Name: brownfieldtestA

Existing Initiator Group

Name: ESXCluster5_ParentIG
Cascaded Name: lglbx021_ChildIG
lglbx034_ChildIG
Initiators: 10:00:00:90:fa:34:4c:32, 10:00:00:90:fa:34:4c:33,
10:00:00:90:fa:34:38:52, 10:00:00:90:fa:34:38:53

Existing Port Group

Name: ESXServer1_PG
VMAX FA Ports: 7E0 50:00:09:73:00:24:0D:18
8E0 50:00:09:73:00: 24:0D:1c
9E1 50:00:09:73:00: 24:0D:21
10E1 50:00:09:73:00: 24:0D:25

Existing FC Switch Zoning

Fabric A
zone: lglbx021_8e0_10e1
10:00:00:90:fa:34:4c:32
50:00:09:73:00: 24:0D:1c
50:00:09:73:00: 24:0D:25
zone: lglbx034_8e0_10e1
10:00:00:90:fa:34:38:52

50:00:09:73:00: 24:0D:1c
50:00:09:73:00: 24:0D:25

Fabric B

zone: lglbx021_7e0_9e1
10:00:00:90:fa:34:4c:33
50:00:09:73:00: 24:0D:18
50:00:09:73:00: 24:0D:21

zone: lglbx034_7e0_9e1
10:00:00:90:fa:34:38:53
50:00:09:73:00: 24:0D:18
50:00:09:73:00: 24:0D:21

The ViPR Controller administrator provisions a LUN from a ViPR Controller vPool to the existing Masking View.

vArray

vArray1 includes:

- Brocade switches - Fabrics A and B
- 2 HBA ports from each cluster node and 4 FA ports
- VMAX FA Ports:
  - 7E0 50:00:09:73:00: 24:0D:18 (This FA port is also in the existing Port Group)
  - 10F0 50:00:09:73:00: 24:0D:64
  - 10F1 50:00:09:73:00: 24:0D:65
  - 8F0 50:00:09:73:00: 24:0D:5C
- Automatic selected for SAN zoning

vPool

vPool1 attributes:

- vArray1
- 2 minimum path
- 4 maximum paths
- 2 paths per initiator

Result

As a result of this particular ViPR Controller provisioning operation, the following occurs.

1) ViPR Controller adds the volume to the existing Masking View. As long as one storage port resides in the existing Port Group, ViPR Controller will reuse the existing Masking View. If you don't want ViPR Controller to reuse an existing Masking View, refer to the section "Forcing ViPR Controller to Ignore Existing Masking Views."

ViPR Controller Adds LUN Using vArray with Fewer Matching Ports than the Existing Port Group

In this case, an administrator has used Unisphere for VMAX to present a LUN to an ESX cluster. The Port Group in the Masking View specifies four FA ports. The vArray specifies two of the FA ports from the Port Group (one from each fabric).

Existing Masking View

Name: ESXCluster5_MV1

Existing Cascaded Storage Group

Parent Name: ESXCluster5_ParentSG
Child Name: ESXCluster5_ChildSG_NonFAST

Existing Volume

Name: brownfieldtestA

Existing Initiator Group

Name: ESXCluster5_ParentIG
Cascaded Name: lglbx021_ChildIG
lglbx034_ChildIG
Initiators: 10:00:00:90:fa:34:4c:32, 10:00:00:90:fa:34:4c:33,
10:00:00:90:fa:34:38:52, 10:00:00:90:fa:34:38:53

Existing Port Group

Name: ESXServer1_PG
VMAX FA Ports: 7E0 50:00:09:73:00:23:49:18
8E0 50:00:09:73:00:23:49:1c
9E1 50:00:09:73:00:23:49:21
10E1 50:00:09:73:00:23:49:25

Existing FC Switch Zoning

Fabric A
zone: lglbx021_8e0_10e1
10:00:00:90:fa:34:4c:32
50:00:09:73:00:23:49:1c
50:00:09:73:00:23:49:25
zone: lglbx034_8e0_10e1
10:00:00:90:fa:34:38:52
50:00:09:73:00:23:49:1c
50:00:09:73:00:23:49:25
Fabric B
zone: lglbx021_7e0_9e1
10:00:00:90:fa:34:4c:33
50:00:09:73:00:23:49:18

50:00:09:73:00:23:49:21
zone: lglbx034_7e0_9e1
10:00:00:90:fa:34:38:53
50:00:09:73:00:23:49:18
50:00:09:73:00:23:49:21

The ViPR Controller administrator provisions a LUN from a ViPR Controller vPool to the existing Masking View.

vArray

vArray1 includes:

- Brocade switches - Fabrics A and B
- 2 HBA ports from each cluster node and 2 FA ports
    - FA ports 8e0 and 9e1 is added to the vArray
        - Note that 8e0, 9e1, 7e0 and 10e0 are in the Existing Masking View Port Group
- Automatic selected for SAN zoning

vPool

vPool1 attributes:

- vArray1
- 1 minimum path
- 2 maximum paths
- 1 paths per initiator

Result

As a result of this particular ViPR Controller provisioning operation, the following occurs.

1) ViPR Controller adds the volume to the existing Child Storage Group.

Note: In this scenario, the vPool is specifying a maximum of two storage ports. However, the Port Group in the existing Masking View specifies four storage ports. ViPR Controller does not create a new Masking View with a new Port Group. For customers using Port Groups to limit LUN visibility behind multiple FA ports, this could be an issue. Existing Masking Views can be ignored which will force ViPR Controller to create a new Masking View. See next section.

ViPR Controller Adds LUN Using vPool with More Ports than the Existing Port Group

In this co-existence scenario, a SAN administrator has an existing Masking View with one or more LUNs provisioned to the host. This existing Masking View was built with a Port Group with 2 VMAX FA ports. The ViPR Controller Virtual Storage Pool has a 4 storage port requirement.

As previously discussed, ViPR Controller will attempt to reuse a Masking View when possible. However, ViPR Controller will not modify the Port Group within the existing Masking View. A ViPR Controller provisioning operation is primarily based on the attributes of the Virtual Storage Pool. It specifies the number of paths per initiator. The number of paths in the existing Port Group may differ from the Virtual Storage Pool. ViPR Controller will neither increase nor decrease the number of paths in an existing Port Group. For example, if there are 4 VMAX FA ports in the existing Port Group and the vPool requires 8 VMAX FA ports, then the number of VMAX FA ports remains at 4.

Existing Masking View

Name: ESXCluster5_MV1

Existing Cascaded Storage Group

Parent Name: ESXCluster5_ParentSG
Child Name: ESXCluster5_ChildSG_NonFAST

Existing Volume

Name: brownfieldtestA

Existing Initiator Group

Name: ESXCluster5_ParentIG
Cascaded Name: lglbx021_ChildIG
lglbx034_ChildIG
Initiators: 10:00:00:90:fa:34:4c:32, 10:00:00:90:fa:34:4c:33,
10:00:00:90:fa:34:38:52, 10:00:00:90:fa:34:38:53

Existing Port Group

Name: ESXCluster5_PG
VMAX FA Ports: 7E0 50:00:09:73:00:23:49:18
8E0 50:00:09:73:00:23:49:1c
9E1 50:00:09:73:00:23:49:21
10E1 50:00:09:73:00:23:49:25

Existing FC Switch Zoning

Fabric A
zone: lglbx021_8e0_10e1
10:00:00:90:fa:34:4c:32
50:00:09:73:00:23:49:1c

50:00:09:73:00:23:49:25
zone: lglbx034_8e0_10e1
10:00:00:90:fa:34:38:52
50:00:09:73:00:23:49:1c
50:00:09:73:00:23:49:25
Fabric B
zone: lglbx021_7e0_9e1
10:00:00:90:fa:34:4c:33
50:00:09:73:00:23:49:18
50:00:09:73:00:23:49:21
zone: lglbx034_7e0_9e1
10:00:00:90:fa:34:38:53
50:00:09:73:00:23:49:18
50:00:09:73:00:23:49:21

The ViPR Controller administrator provisions a LUN from a ViPR Controller vPool to the renamed Masking View.

vArray

vArray1 includes:

- Brocade switches - Fabrics A and B
- 2 HBA ports from each cluster node and 8 FA ports
- Automatic selected for SAN zoning

vPool

vPool1 attributes:

- vArray1
- 4 minimum path
- 8 maximum paths
- 2 paths per initiator

Result

As a result of this particular ViPR Controller provisioning operation, the following occurs.

1) ViPR Controller creates the volume and adds it to the existing Masking View.

Note: The Port Group and zoning are not modified. Since the number of storage ports remains static, the user must be aware of this before continuing with a ViPR Controller provisioning operation in a co-existence environment. In this scenario, the provisioning operation will complete successfully. However, the user may not be aware that they did not get the number of paths that they expected.
As an alternative to this, the administrator can add “no_ViPR” to the beginning of the existing Masking View name which will force a new Masking View to be created. See the next section.

Forcing ViPR Controller to Ignore Existing Masking Views

In many stated cases, ViPR Controller reused an existing Masking View that had more ports in the Port Group than what was requested in the vPool. It is possible that a host may have multiple Masking Views. An option is available that will force ViPR Controller to ignore one or more Masking Views. This will force ViPR Controller to reuse other Masking Views or create a new one.
Modify the existing Masking View to add "no_ViPR" or "NO_VIPR" to the beginning of the name.

Existing Masking View

Name: ESXCluster5_MV1

Modified Masking View Name

Name: no_ViPR_ESXCluster5_MV1

Existing Cascaded Storage Group

Parent Name: ESXCluster5_ParentSG
Child Name: ESXCluster5_ChildSG_NonFAST

Existing Volume

Name: brownfieldtestA

Existing Initiator Group

Name: ESXCluster5_ParentIG
Cascaded Name: lglbx021_ChildIG
lglbx034_ChildIG
Initiators: 10:00:00:90:fa:34:4c:32, 10:00:00:90:fa:34:4c:33,
10:00:00:90:fa:34:38:52, 10:00:00:90:fa:34:38:53

Existing Port Group

Name: ESXServer1_PG

VMAX FA Ports:	7E0	50:00:09:73:00:23:49:18
	8E0	50:00:09:73:00:23:49:1c
	9E1	50:00:09:73:00:23:49:21
	10E1	50:00:09:73:00:23:49:25

Existing FC Switch Zoning

Fabric A

zone: lglbx021_8e0_10e1
10:00:00:90:fa:34:4c:32
50:00:09:73:00:23:49:1c
50:00:09:73:00:23:49:25

zone: lglbx034_8e0_10e1
10:00:00:90:fa:34:38:52
50:00:09:73:00:23:49:1c
50:00:09:73:00:23:49:25

Fabric B

zone: lglbx021_7e0_9e1
10:00:00:90:fa:34:4c:33
50:00:09:73:00:23:49:18
50:00:09:73:00:23:49:21
zone: lglbx034_7e0_9e1
10:00:00:90:fa:34:38:53
50:00:09:73:00:23:49:18
50:00:09:73:00:23:49:21

The ViPR Controller administrator provisions a LUN from a ViPR Controller vPool to the renamed Masking View.

vArray

vArray1 includes:

- Brocade switches - Fabrics A and B
- 2 HBA ports from each cluster node and 2 FA ports
  - FA ports 8e0 and 9e1 is added to the vArray
    - Note that 8e0, 9e1, 7e0 and 10e0 are in the Existing Masking View Port Group
- Automatic selected for SAN zoning

vPool

vPool1 attributes:

- vArray1
- 1 minimum path
- 2 maximum paths
- 1 paths per initiator

Result

As a result of this particular ViPR Controller provisioning operation, the following occurs.

1) ViPR Controller creates a new Masking View, Initiator Group, Storage Group, and Port Group. The screenshot below shows the existing and new Masking Views.
   a. A new Parent Initiator Group is created with existing Child Initiator Groups.
      i. These are the same Child Initiator Groups that are in the existing Masking View.
   b. A new Cascaded Storage Group is created.
   c. A new Port Group is created.

Name	Initiator Group	Port Group	Storage Group
no_vipr_ESXCluster5_MV1	ESXCluster5_ParentIG	Brocade-7e0-8e0-9e1-10e1	ESXCluster5_ParentSG
VSECluster5_258	VSECluster5_258_CIG	VSECluster5_258_PG	VSECluster5_258_CSG

Note: During the provisioning process, ViPR Controller identified that the existing zones from the existing environment satisfied the new provisioning request. There was no need to create new zones. If the "no_ViPR" is removed from the name of the Masking View, ViPR Controller will consider that for future provisioning operations.

Conclusion

In conclusion, EMC ViPR Controller provides SAN administrators a new management option for provisioning block, file and object storage. A ViPR Controller provisioning operation configures storage, SAN, and hosts parameters. With VMAX, the Masking View includes the Initiator Group, Storage Group and Port Group. In a co-existence configuration, ViPR Controller is provisioning to a host that already has a Masking View associated with it. Because ViPR Controller is architected to follow EMC best practices for block SAN provisioning, there are cases where ViPR Controller will integrate seamlessly. This paper covered both cases and will provide the administrator the necessary tools to ensure ViPR Controller can successfully provision VMAX storage.