EMC Storage for VMware vSphere
Enabled by EMC VPLEX Local
and VMware vSphere 4.1

A Detailed Review

EMC Information Infrastructure Solutions

Abstract

Storage migration and array replacement are costly, time-consuming projects that tie up system administrators and can affect critical applications. This EMC virtualized storage solution uses EMC® VPLEX™ and VMware vSphere 4.1 to provide a repeatable, reliable, and cost-effective way to migrate data between arrays with little downtime.

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Executive summary

Business case
When an organization consolidates its heterogeneous storage arrays or migrates to new storage arrays, the operation typically requires a number of complex error-prone manual steps, and the risk of negatively affecting application SLAs.

Data migration and array replacement are costly, time-consuming activities for administrators. Using technology that enables these tasks to be accomplished quickly and with little effort or impact to an application environment is critical for any organization striving to achieve near 100 percent availability. In addition, automation ensures minimal errors occur, accelerating time to production and revenue generation.

Product solution
EMC® VPLEX™ can eliminate many of the issues associated with managing and provisioning storage in heterogeneous storage environments and can also provide administrators with a repeatable, reliable, and cost-effective procedure for migrating data between arrays.

The EMC Storage for VMware vSphere solution, enabled by EMC VPLEX Local and VMware vSphere 4.1, solves a major IT challenge in a way that previously could not be easily achieved. Traditionally, when organizations faced a technology refresh that resulted in a new storage array being added to the data center environment, it was a major undertaking to move the existing data to the new array, ideally with little to no downtime for applications. This required countless hours spent documenting storage and host layouts, upgrading host firmware, and in some cases hardware, and planning for and executing the actual migrations. All of which typically took weeks, or more likely months.

EMC VPLEX supports heterogeneous array components so you can have mixed data platforms in your data center such as EMC Symmetrix® and CLARiiON®, as well as non-EMC storage. For information about third-party array support, refer to the hardware compatibility list on EMC Powerlink.com.

Key results
With EMC VPLEX, storage migration challenges can be resolved quickly and easily:

- By making the existing array and the new array both visible to VPLEX, data can be migrated seamlessly, without affecting application availability.
- With VPLEX, applications can be migrated in their entirety from one environment (storage and servers) to another with little to no downtime and from there can be used to present all, or only a subset, of the back-end array storage to hosts.
- The process for migrating from a VPLEX Metro configuration to a VPLEX Local configuration can easily be accomplished with little impact to applications and users.
Introduction

Purpose
This white paper provides an overview of the VPLEX Local technology and how it can be used for:

- Data and application environment migration, such as in an “off-lease” scenario or site migration by way of VPLEX Metro to VPLEX Local
- Business continuity, as well as deploying additional computing and storage capacity, to an existing “all-in-one” data center environment through the use of storage virtualization

Scope
The scope of this white paper is to document:

- A new approach to migrate VPLEX DR-1 devices by migrating extents from off-lease storage arrays to new storage arrays.
- The environment configuration for a VPLEX Local deployment in a data center-in-a-rack, including application migration into this configuration from an existing VPLEX Metro
- The options VPLEX Local provides in this configuration where some storage is virtualized and some is not, and reasons why both scenarios may be the preferred method of storage deployment

Audience
This white paper is intended for:

- Field personnel who are implementing a multi-application virtualized data center using VPLEX Metro as the local and distributed federation platform
- Customers, including IT planners, storage architects, and administrators involved in evaluating, acquiring, managing, operating, or designing an EMC multi-application virtualized data center
- EMC staff and partners, for guidance and the development of proposals
## Terminology

The following table defines terms used in this document.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAN</td>
<td>Converged Network Adapter</td>
</tr>
<tr>
<td>Distributed device</td>
<td>Distributed devices are configured by using storage from both clusters, and are therefore used only in a Metro-Plex. A distributed device's components must be other devices, and those devices must be created from storage in both clusters in the Metro-Plex.</td>
</tr>
<tr>
<td>DR</td>
<td>Disaster Recovery</td>
</tr>
<tr>
<td>Extent</td>
<td>A range of blocks (slice) of a storage volume. You can create a full size extent by using the entire capacity of the storage volume, or you can carve the storage volume up into several contiguous slices. Extents are used to create devices, and then virtual volumes.</td>
</tr>
<tr>
<td>FCoE</td>
<td>Fibre Channel over Ethernet</td>
</tr>
<tr>
<td>HA</td>
<td>High Availability</td>
</tr>
<tr>
<td>Metro-Plex</td>
<td>Multiple clusters connected within metropolitan area network (MAN) distances—for example, the same building, site, or campus with a maximum distance of 100 km apart</td>
</tr>
<tr>
<td>Mirroring</td>
<td>The writing of data to two or more storage volumes simultaneously. If one storage volume fails, the system can instantly switch to the other storage volume without losing data or service. RAID 1 provides mirroring.</td>
</tr>
<tr>
<td>UCS</td>
<td>Cisco Unified Computing System</td>
</tr>
<tr>
<td>VM</td>
<td>Virtual Machine. A software implementation of a machine that executes programs like a physical machine.</td>
</tr>
<tr>
<td>VMDK</td>
<td>Virtual Machine Disk format. A VMDK file stores the contents of a virtual machine's hard disk drive. The file can be accessed in the same way as a physical hard disk.</td>
</tr>
<tr>
<td>VPLEX Metro</td>
<td>Provides distributed federation within, across and between two clusters (within synchronous distances)</td>
</tr>
</tbody>
</table>
Solution methodology and objectives

Introduction
This section describes the methodology and objectives used to design and validate the virtualized storage solution.

Solution methodology
The virtualized application environment will be used to test and validate the following:

- Demonstrate the effectiveness of VPLEX for aiding in seamless storage array migration in an “off-lease” scenario
- Demonstrate how VPLEX allows a virtualized application environment to be nondisruptively migrated to a new infrastructure (an all-in-one data center-in-a-rack) from an existing VPLEX Metro configuration between data centers
- Demonstrate a VPLEX Local configuration in a data center-in-a-rack, presenting vSphere datastores both through VPLEX and directly from the back-end storage array

Objectives
This white paper covers the following key areas:

- Take a Microsoft SharePoint 2007 environment on VMware that uses VPLEX Metro and migrate the existing storage array to a new replacement array.
- Migrate the virtualized SharePoint 2007 VMware environment from the VPLEX Metro configuration, using UCS blade servers and Symmetrix VMAX™/CLARiiON CX™, to a data center-in-a-rack configuration using a CX array, VPLEX Local, Dell rackmount servers, and a Brocade SAN.
- Present datastores to the vSphere cluster from both VPLEX Local and directly from the CX array and demonstrate seamless ease of migration between each configuration.
- Detail the reasons why a mixed virtualized storage environment would be used.
## Key components

### Key solution components
The following table lists the major technology components used in the solution application environment.

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMC Symmetrix VMAX</td>
<td>EMC Symmetrix VMAX provides high-end storage for the virtual data center, scaling up to 2 PB of protected capacity and consolidating more workloads with a smaller footprint than alternative arrays. Its innovative EMC Symmetrix Virtual Matrix Architecture™ seamlessly scales performance, capacity, and connectivity on demand to meet all application requirements. For more details about EMC Symmetrix VMAX in this solution, see <a href="#">EMC Symmetrix VMAX considerations</a>.</td>
</tr>
<tr>
<td>EMC CLARiiON CX4-120</td>
<td>The EMC CLARiiON CX4 series delivers industry-leading innovation in midrange storage with the fourth-generation CLARiiON CX storage platform. The unique combination of flexible, scalable hardware design and advanced software capabilities enables EMC CLARiiON CX4 to meet the growing and diverse needs of today's midsize and large enterprises. For more details about EMC CLARiiON in this solution, see <a href="#">EMC CLARiiON CX4-120 considerations</a>.</td>
</tr>
<tr>
<td>EMC VPLEX Local</td>
<td>EMC VPLEX Local is a new storage virtualization platform for the private cloud. EMC VPLEX is the next-generation solution for information mobility and access within, across, and between data centers. For more details about EMC VPLEX Local in this solution, see <a href="#">EMC VPLEX Local considerations</a>.</td>
</tr>
<tr>
<td>VMware vSphere 4.1</td>
<td>VMware vSphere is a complete and robust virtualization platform that dramatically reduces capital and operating costs, and maximizes IT efficiency while giving you agility through automation and the freedom to choose applications, OS, and hardware. For more details about VMware vSphere in this solution, see <a href="#">VMware vSphere considerations</a>.</td>
</tr>
<tr>
<td>Microsoft SharePoint Server 2007</td>
<td>Microsoft SharePoint is a software platform for collaboration and web publishing combined on a single server. SharePoint provides the capability to develop websites, intranets, content management systems, search engines, wikis, blogs, and other tools for business intelligence. For more details about SharePoint Server in this solution, see <a href="#">Microsoft SharePoint Server 2007 configuration</a>.</td>
</tr>
</tbody>
</table>
### Physical architecture

**Architecture introduction**

This section describes two physical architectures:
- Array migration architecture
- Metro-to-Local array migration

**Array migration architecture diagram**

The following diagram illustrates the physical architecture of the array migration environment.

![Array migration architecture diagram](image_url)
Metro-to-Local array migration architecture diagram

The following diagram illustrates the physical architecture of the Metro-to-Local migration environment.

VMware vSphere 4.1
High Availability cluster boot from SAN and shared data stores

EMC VPLEX Local virtual volume

EMC VPLEX Metro

EMC data center in a rack
EMC VPLEX Local

Nondisruptive migration to EMC VPLEX Local in a data center in a rack
Environment profile

Introduction
This section describes the hardware and software resources used in the environment.

Hardware resources
The following table describes the hardware resources used in the solution application environment.

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Quantity</th>
<th>Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cisco UCS blade chassis</td>
<td>1</td>
<td>Two Intel Quad-Core Xeon 2.26 GHz CPU, 48 GB RAM, 10G CNAs, Nexus 6120</td>
</tr>
<tr>
<td>EMC “Datacenter-in-a-rack”</td>
<td>1</td>
<td>CLARiiON CX4-120 array with:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• FC drives and Enterprise Flash Drives</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• FLARE® 30 with FAST Cache</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Five Dell R710 Nehalem-based servers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• VMware vSphere 4.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Brocade B300 fabric switches</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Cisco Catalyst 3750-E IP switches</td>
</tr>
<tr>
<td>Symmetrix VMAX SE</td>
<td>1</td>
<td>FC connectivity, 300 GB/15k FC drives</td>
</tr>
<tr>
<td>VPLEX</td>
<td>2</td>
<td>Dual-engine, four-director midsize – in a Metro configuration and ultimately</td>
</tr>
<tr>
<td></td>
<td></td>
<td>split into a Local config staged in a rack with the data center-in-a-rack</td>
</tr>
<tr>
<td>Nexus 7010 IP switch</td>
<td>1</td>
<td>1 Gb/s and 10 Gb/s Ethernet core switch</td>
</tr>
<tr>
<td>Cisco MDS fabric switch</td>
<td>2</td>
<td>9509 1/2/4G Fibre Channel</td>
</tr>
</tbody>
</table>
The following table describes the software resources used in the solution application environment.

<table>
<thead>
<tr>
<th>Software</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>VMware vSphere</td>
<td>4.1 GA B260247</td>
</tr>
<tr>
<td>VMware vCenter</td>
<td>4.1 GA B259021</td>
</tr>
<tr>
<td>EMC PowerPath®/VE</td>
<td>5.4 SP2</td>
</tr>
<tr>
<td>Windows Server 2008 R2</td>
<td>Enterprise edition</td>
</tr>
<tr>
<td>Microsoft SQL Server 2008</td>
<td>Enterprise edition</td>
</tr>
<tr>
<td>Microsoft Office SharePoint Server</td>
<td>2007, SP1 and CU's</td>
</tr>
<tr>
<td>Visual Studio Test Suite</td>
<td>2008</td>
</tr>
<tr>
<td>KnowledgeLake Doc loader</td>
<td>1.1</td>
</tr>
<tr>
<td>Windows XP Professional</td>
<td>SP3</td>
</tr>
</tbody>
</table>
EMC Symmetrix VMAX considerations

<table>
<thead>
<tr>
<th>EMC Symmetrix VMAX overview</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Symmetrix VMAX series is built on a revolutionary Virtual Matrix Architecture. Symmetrix VMAX delivers unprecedented performance, availability, functionality, and economic advantages.</td>
</tr>
</tbody>
</table>

The Symmetrix VMAX series can be configured with 96 to 2,400 drives and usable capacity up to 2 PB. Systems provide up to 1 TB of global memory and up to 128 Fibre Channel ports, 64 FICON ports, 64 Gigabit Ethernet ports, or 64 iSCSI connections.

The Symmetrix VMAX series is a distributed multi-engine storage system that can scale from one to eight highly available VMAX Engines. Systems are configured around a central system bay and adjacent storage bays of up to 240 drives each. A full range of drive options is available, scaling from ultra-fast Enterprise Flash Drives, to Fibre Channel drives, to the highest-capacity 1 TB SATA II drives.
# EMC CLARiiON CX4-120 considerations

## EMC CLARiiON overview

The EMC CLARiiON CX4 series delivers industry-leading innovation in midrange storage with the fourth-generation CLARiiON CX storage platform. The unique combination of flexible, scalable hardware design and advanced software capabilities enables EMC CLARiiON CX4 series systems, powered by Intel Xeon processors, to meet the growing and diverse needs of today’s midsize and large enterprises. Through innovative technologies like Flash drives, UltraFlex™ technology, and CLARiiON Virtual Provisioning™, customers can:

- Decrease costs and energy use
- Optimize availability and virtualization

## System characteristics

The EMC CLARiiON CX4 model 480 supports up to 256 highly available, dual-connected hosts and has the capability to scale up to 480 disk drives for a maximum capacity of 939 TB. Delivering up to twice the performance and scaling capacity as the previous CLARiiON generation, CLARiiON CX4 is the leading midrange storage solution to meet a full range of needs, from departmental applications to data-center-class business-critical systems.

In addition, EMC CLARiiON CX4 provides the following benefits when deployed in a VMware environment:

- Virtualization-aware Unisphere™
- Unisphere Quality of Service Manager and VMware Distributed Resource Scheduler
- CLARiiON Virtual Provisioning
- Flash drive support
- MetaLUN and Virtual LUN technologies
- UltraFlex technology
EMC VPLEX Local considerations

EMC VPLEX Local overview

EMC VPLEX Local is a storage area network-based (SAN) block local and distributed federation solution that allows the physical storage provided by traditional storage arrays to be virtualized, accessed, and managed across the boundaries between data centers.

This new form of access, called AccessAnywhere, removes many of the constraints of the physical data center boundaries and its storage arrays. AccessAnywhere storage allows data to be moved, accessed, and mirrored transparently between data centers, effectively allowing storage and applications to work between data centers as though those physical boundaries were not there.

The following topics show the differences between:

- Traditional SAN-based storage access
- Storage access through a virtualization layer

Storage access through a virtualization layer

The following figure illustrates storage access through a storage virtualization layer.
SAN considerations for VPLEX Metro

VPLEX Metro in a SAN environment is both a target and an initiator:

- From the host perspective, VPLEX Metro is a target.
- From the back-end storage array perspective, VPLEX Metro is an initiator.

In this way, the hosts are in the same SAN as the VPLEX Metro front-end ports, and the storage arrays are in the same SAN as the VPLEX Metro back-end ports.

In an environment where hosts need to directly access the storage arrays directly, as well as access the VPLEX Metro LUNs (for example, in a migration situation), the hosts, VPLEX Metro front end and back end, and storage arrays all need to be in the same SAN so that the hosts can see the LUNs from both sources.

VPLEX Local features for storage usage

VPLEX Local provides the ability to encapsulate and de-encapsulate existing storage devices while preserving their data. It provides data access and mobility between two VPLEX Local clusters within synchronous distances. With a unique scale-up and scale-out architecture, VPLEX Local’s advanced data-caching and distributed-cache coherency provides workload resiliency, automatic sharing, balancing, and failover of the storage domains. It enables both local and remote data access with predictable service levels.

Note: Any storage volume that is not a multiple of 4 KB cannot be claimed or encapsulated. Refer to the EMC VPLEX Administration Guide for more details.
## VMware vSphere considerations

### VMware vSphere 4.1 overview
VMware vSphere is the industry’s most reliable platform for data center virtualization of the IT infrastructure. It enables the most scalable and efficient use of the x86 server hardware in a robust, highly available environment.

### VMware ESX server
The VMware ESX server:

- Abstracts server processor, memory, storage, and networking resources into multiple virtual machines, forming the foundation of the VMware vSphere 4 suite.
- Partitions physical servers into multiple virtual machines. Each virtual machine represents a complete system with processors, memory, networking, storage, and BIOS.
- Shares single server resources across multiple virtual machines and clusters ESX servers for further sharing of resources.
EMC Symmetrix VMAX and CLARiiON configuration

Introduction
This section describes the configuration of the EMC Symmetrix VMAX and EMC CLARiiON components used in the solution application environment.

EMC CLARiiON CX4-480 configuration
The Microsoft application environment deployed in this solution used an EMC Symmetrix VMAX array for the primary storage, with a subsequent migration to an EMC CLARiiON CX4-120.

The following table details the provisioning of the Boot and Data LUNs.

Note: Refer to the Microsoft Office SharePoint Server 2007 section of this white paper for the breakdown detail of the LUN allocation by virtual machine.

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Capacity</th>
<th>Number of LUNs</th>
<th>RAID type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boot LUNs</td>
<td>200 GB</td>
<td>2</td>
<td>RAID 5 (4+1)</td>
</tr>
<tr>
<td>Index Server Data Volume</td>
<td>150 GB</td>
<td>2</td>
<td>RAID 5 (4+1)</td>
</tr>
<tr>
<td>WFE Data Volume</td>
<td>125 GB</td>
<td>4</td>
<td>RAID 5 (4+1)</td>
</tr>
<tr>
<td>SQL Content DB</td>
<td>100 GB</td>
<td>16</td>
<td>RAID 5 (4+1)</td>
</tr>
<tr>
<td>SQL Content Log Files</td>
<td>75 GB</td>
<td>24</td>
<td>RAID 5 (4+1)</td>
</tr>
<tr>
<td>SQL Search DB</td>
<td>50 GB</td>
<td>3</td>
<td>RAID 5 (4+1)</td>
</tr>
<tr>
<td>SQL Search Log Files</td>
<td>20 GB</td>
<td>12</td>
<td>RAID 1/0</td>
</tr>
<tr>
<td>SQL Temp</td>
<td>15 GB</td>
<td>4</td>
<td>RAID 5 (4+1)</td>
</tr>
</tbody>
</table>
Microsoft SharePoint Server 2007 configuration

This section covers the configuration of the Microsoft SharePoint Server 2007 used in the solution environment.

Virtual machine configuration and resource allocation

The following table details the virtual machine configuration of the SharePoint farm with allocated resources.

<table>
<thead>
<tr>
<th>Server Role</th>
<th>Quantity</th>
<th>vCPUs</th>
<th>Memory (GB)</th>
<th>Bootdisk (GB)</th>
<th>Search Disk (GB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WFE Servers</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>40</td>
<td>100</td>
</tr>
<tr>
<td>Index Servers</td>
<td>1</td>
<td>4</td>
<td>6</td>
<td>50</td>
<td>150</td>
</tr>
<tr>
<td>Application Servers</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>40</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Excel Server (Host Central Admin)</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>40</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>SQL Server 2008</td>
<td>1</td>
<td>4</td>
<td>16</td>
<td>40</td>
<td>Not Applicable</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>7</strong></td>
<td><strong>24</strong></td>
<td><strong>38 GB</strong></td>
<td><strong>290 GB</strong></td>
<td><strong>450 GB</strong></td>
</tr>
</tbody>
</table>
### Off-lease storage array migration (VMAX-to-VMAX)

#### Introduction

With EMC VPLEX, storage presented to hosts can be easily and nondisruptively migrated to a different storage tier within and between back-end storage arrays. In this data migration case, the source volumes for migration reside on Symmetrix VMAX-1, and the target volumes reside on Symmetrix VMAX-2. The host environment consists of VMware ESX hosts in a cluster configuration.

#### Migration diagram

The following illustration shows the off-lease storage array migration. The VPLEX is migrating the data from the source (VMAX-1) to the target (VMAX-2). This migration occurs with no service interruption to the ESX cluster.
Performing the migration

In order to facilitate data migration from one back-end array to another, the VPLEX is installed, configured, and visible to both Symmetrix VMAX storage systems. Migration is then done via the VPLEX as detailed below. The ESX hosts are configured to have access to both VMAX storage systems on the front end through VPLEX via a Fibre Channel SAN.

VPLEX 4.1 introduced a Management Console-based utility called Mobility Central to facilitate data migration between back-end arrays. It provides a central location to create, view, and manage all extent and device mobility jobs.

Use this wizard to:

- Filter the jobs to view by cluster and job type (extent mobility jobs, device mobility jobs, or all jobs).
- Launch the appropriate wizards to create extent and device mobility jobs.
- View the progress and status of mobility jobs.
- Manage mobility jobs (pause, resume, cancel, commit, and so forth).
- View the properties of a mobility job.
Creating an extent mobility job

Use the Create Extent Mobility Job wizard to create an extent mobility job. Creating an extent mobility job begins the process of moving data from one extent to another extent in the same cluster.

The Management Console supports moving data from one extent to another only within the same cluster.

The following steps are required to begin moving data and are represented in the figures below:

Create an extent mobility job.
Select a storage extent:

Create the Source-Target Mapping:
Once the target device is selected specify the mapping.

The transfer speed determines the maximum number of bytes of data transferred at a time from the source to the target. When creating a mobility job, you can control this transfer speed; the higher the speed, the greater the impact on host I/O. A slower transfer speed results in the mobility job taking longer to complete, but has a lower impact on host I/O. Monitor the mobility job's progress and its effect on host I/O. If the job is progressing too slowly, or I/O is greatly impacted, adjust the transfer speed accordingly.

By default, in the management console the transfer speed is set to Low, which translates to 2 MB/s. This transfer speed provides the best throughput while maintaining the best front-end performance in most environments. The following table shows the mapping between the Management Console transfer speed and the transfer-size attribute used in the CLI.

<table>
<thead>
<tr>
<th>Transfer Speed (Management Console)</th>
<th>Transfer-size (CLI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low (default)</td>
<td>2 MB</td>
</tr>
<tr>
<td>Lowest</td>
<td>128 KB</td>
</tr>
<tr>
<td>Medium</td>
<td>8 MB</td>
</tr>
<tr>
<td>High</td>
<td>16 MB</td>
</tr>
</tbody>
</table>
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The VPLEX Management Console will show the progress of the migration:

You can also use VPLEXCLI to check the status of the migration:

Once the job is complete, commit the job to complete the operation and move the data. When you commit an extent mobility job, the source extents are transferred to the target extents.

The temporary extents used during the migration are deleted.
Remove the record of the migration.

The system keeps a record of all mobility jobs performed. After committing or cancelling a mobility job, you can remove a record of the job. Note that a job must be cancelled or committed before you can remove it.
Confirm Remove mobility jobs

Removing a mobility job permanently removes the job from the system.

Mobility jobs to Remove:

Name

Vmax LUN 1 0

Remove Mobility Jobs Results

Results of the mobility Remove operation:

<table>
<thead>
<tr>
<th>Name</th>
<th>Result</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vmax_LUN_1_0</td>
<td>✓</td>
<td>Removed 1 data migration(s) out of 1 requested migration(s).</td>
</tr>
</tbody>
</table>
VPLEX Metro-to-Local and SharePoint migration

Introduction
Under some circumstances, such as a migration to a new data center, a VPLEX Metro configuration may need to be de-coupled, resulting in a VPLEX Local configuration at each site. The result is a VPLEX Local that can be used for a variety of purposes, such as migration of data within arrays in the same data center as detailed previously or sharing of storage and compute resources within a data center.

Migrating a VPLEX
The migration of a VPLEX distributed device to a local device procedure is as follows:

- Attach a mirror to the distributed device on the desired cluster.
- Once the newly added mirror is synchronized, detach it. This leaves both the distributed and local device data intact and functional.
- To keep the data on both devices consistent, the VMs associated with the distributed device should be shut down prior to detaching of the mirror.
- Once the mirror is detached it will become a top-level device and available for export.
- Add this virtual volume to the desired storage view within the VPLEX configuration Management Console to make it accessible to the host.
- Rescan for new datastores within vSphere to make the datastore visible to the cluster.
- Browse the datastore and add the desired VM into inventory to complete the migration of the VMs.
In this white paper, we migrated a MOSS 2007 environment from a data center at “Site A” to a “data center-in-a-rack” configuration (servers, storage, networking all in one) at “Site B”. A pre-migration look, from vCenter, at the VMs associated with our SharePoint environment at Site A is detailed below:
A pre-migration, from the VPLEX Admin Management Console, looks at the distributed devices being migrated to local devices. Note the geometry “raid-1”, which indicates the devices were configured as Distributed RAID 1 (DR1) devices:
Migrating a Metro-to-Local configuration

The procedure for migrating from a Metro to a Local configuration is as follows:

**Step 1**
Add a local mirror to the distributed device (Note: At present this can only be accomplished via CLI)

**Note:** The command to be issued from /clusters/cluster-2 is:

```
device attach-mirror --device /clusters/cluster-2/device_vplex77-SPAPP-Boot_1 --mirror /clusters/cluster-2/device_CX1943-Boot-G2SV-APP_1
```

To monitor progress, issue the rebuild status command:

```
VPLEXCLI:/clusters/cluster-2/devices> rebuild status
[1] storage volumes queued for rebuild
Global rebuilds: 0
Active rebuilds: 0

cluster-2 local rebuilds:

<table>
<thead>
<tr>
<th>device</th>
<th>rebuild type</th>
<th>rebuilder director</th>
<th>rebuilt</th>
<th>total</th>
<th>percent finished</th>
<th>throughput</th>
<th>ETA</th>
</tr>
</thead>
<tbody>
<tr>
<td>device_vplex77-SPAPP-Boot_1</td>
<td>full</td>
<td>ds_0056_mpa</td>
<td>10.10/10.00</td>
<td>10.1%</td>
<td>1.0 MB/s</td>
<td>10.00s</td>
<td></td>
</tr>
</tbody>
</table>
```

The added device, dis-SPAPP-Boot in cluster -2, can be seen by selecting the desired distributed device.

**Step 2**
Detach the mirror from the distributed device. (Note: This will create a virtual volume automatically with the detached mirror device name.)

The distributed device no longer has multiple devices within cluster-2.
Once the device is detached it creates the virtual volume in the name of the device.

**Step 3**

Add the virtual volume into a storage view.
The final several steps are performed from vSphere.

**Step 4**

Rescan for datastores on the desired cluster:

The newly added storage will show up as snaps:

**Note:** There is no need to resignature the devices in vSphere.
Step 5
Browse the datastore and add VMs to inventory:

Finally look at the environment after the migration to the VPLEX Local/data center-in-a-rack environment completes:

```
Z-vCenter.pcloud.emc.net
  VPLEX DC
    Admin-Cluster-Site-8
      10.24.1.15.51
      g2sv-DC-01.pcloud.emc.net
      KLnext-VC
  MSFT
    g2sv-MSFT-01.pcloud.emc.net
    g2sv-MSFT-02.pcloud.emc.net
    g2sv-MSFT-04.pcloud.emc.net
    g2sv-MSFT-07.pcloud.emc.net
  G2SY-SQL1
  G2SY-SQL2
  G2SY-WIFE-01 1
  SwingBench
  SAP
  Sharepoint
    esx01.vsp.gsc.vdc
    esx02.vsp.gsc.vdc
    esx03.vsp.gsc.vdc
    esx04.vsp.gsc.vdc
    esx05.vsp.gsc.vdc
  EMC World Demo 1
  G2SY-APP
  G2SY-EXCEL
  G2SY-INDEX
  G2SY-SP-SQL
  G2SY-WIFE-01
  G2SY-WIFE-02
  G2SY-WIFE-03
```
Virtual machine migration from VPLEX to locally attached storage

Introduction
In some situations it may be desirable to migrate a virtual machine from a datastore presented by VPLEX to a datastore presented directly by an array. This can be accomplished a number of ways, including:

- Storage vMotion (in a VMware environment)
- De-encapsulation of a VPLEX datastore

VPLEX is flexible when it comes to data migration. It provides the ability to migrate devices or extents that make up the virtual volume without impact to the host. It can also provide migration of a virtual volume to a local storage array in the same manner but will be disruptive during the final stages of the migration, mainly the de-encapsulation of the virtual volume and LUN masking.

Migration overview
For this white paper solution we migrated data from an existing virtual volume presented to VPLEX from an existing array to a newly added CX4-120:

- First present the VPLEX with the CX4-120 LUN being used as the target device in the migration process.
- Claim the storage to create the device needed for the purpose of the migration. To do this, create a device mobility job within the VPLEX Management Console to perform the device migration.
- Once the migration is complete and committed, any VMs associated with this virtual volume will need to be shut down for the remaining steps.

The process of de-encapsulation is as follows:

- Remove the virtual volume from its storage view.
- Tear down the virtual volume; this will delete the associated virtual volume, device, and extent but leave the storage volume claimed.
- Unclaim the storage volume before performing the LUN masking needed to present the CX4 LUN directly to the ESX hosts.
- Once masked, the cluster will need to be rescanned for datastores.
Migrating a VM from VPLEX to locally attached storage

Show the virtual volume to be migrated to the local CX4-120:

Step 1
Claim the storage from the new CX4-120:

```
VPLEXcli://clusters/cluster-1/storage-volumes/claim -n CX1943-1TB-LUN1 VPLEX71:60D001602D60E20960160E123D643F11 1TB unclaimed DGC alive traditional
VPLEXcli://clusters/cluster-1/storage-volumes/claim -n CX1943-1TB-LUN2 VPLEX71:60D001602D60E20960160E123D643F11 1TB unclaimed DGC alive traditional
VPLEXcli://clusters/cluster-1/storage-volumes/claim -n CX1943-1TB-LUN3 VPLEX71:60D001602D60E20960160E123D643F11 1TB unclaimed DGC alive traditional
```

Verify the newly added storage has been claimed:

```
CX1943-1TB-LUN1 VPLEX71:60D001602D60E20960160E123D643F11 1TB used DGC
CX1943-1TB-LUN2 VPLEX71:60D001602D60E20960160E123D643F11 1TB used DGC
CX1943-1TB-LUN3 VPLEX71:60D001602D60E20960160E123D643F11 1TB claimed DGC
```
Step 2
Create an extent from the claimed storage:
The Use Maximum checkbox is selected to use the entire capacity.

Finally, click Commit to commit creation.
**Step 3**
Create a device from the newly created extent.

Clear the checkbox as shown in the previous screen.

**Note:** By default, create a virtual volume on each device that is selected. The target device cannot be in use (no virtual volumes created on it).
Step 4
Create a device mobility job:

Note: Select the desired cluster.
Selected the desired source device.
Select the target device and add mapping to the Source Target Mapping field.

Name the mobility job, select the desired transfer speed, and start the migration:
Status can be checked either via VPLEX Management Console or by CLI.
Note: The change needs to be committed once the synchronization completes. The option also exists to cancel the migration, leaving the source device unchanged.
Verify the virtual volume name change. Keep in mind that the VPD ID does not change.

---

**Note:** Any VM associated with the virtual volume should be shut down during the next several steps as they are disruptive.
Step 5
Remove the virtual volume from its storage view.
Step 6
Delete the virtual volume, device, and extent. This can be done manually or by clicking Tear Down in the virtual volume display.
Step 7
Unclaim the storage volume.
Verify that the volume is unclaimed:
Step 8
Using Unisphere for the CX4-120, remove the LUN from the VPLEX storage group and add it to the host storage group.
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Step 9
Rescan for new datastores in vCenter.

Verify newly added storage volumes are available.
Conclusion

Summary
Storage virtualization with EMC VPLEX presents administrators with many options both for data migration as well as for resource aggregation and sharing within a data center. EMC VPLEX Local:

- Allows for heterogeneous storage arrays to be consolidated into a single storage device visible to a host without any special requirements from the host
- Provides easy mobility of entire application environments from one platform to another
- Simplifies the process of moving data across distances, enabling 99.999 percent application uptime even in the case of a storage migration

Findings
This solution validates the effectiveness of VPLEX Local for data migration in an “off-lease” scenario with no application downtime. These results show that:

- Customers can easily and quickly realize the benefits of their new storage arrays
- Conversion from VPLEX Metro to VPLEX Local can easily be accomplished nondisruptively through the easy-to-use VPLEX Management Console
- vSphere datastores can be easily migrated into and out of VPLEX devices with little effect on application uptime

References

Product documentation
For additional information, see the following product documents.

- EMC Support Matrix
- EMC VPLEX CLI Guide
- EMC VPLEX Installation and Setup Guide
- EMC VPLEX Management Console online help

White papers
The following white papers offer additional information:

- Nondisruptive Storage Relocation: Planned Events with EMC VPLEX, Best Practices Planning