Backup Solution Testing on Cisco C-Series Server using Commvault Backup

First Published: 2016-10-20

Last Modified: 2016-10-27

CONTENTS

Backup Solution Testing

Overview

This program Backup Testing (Backup to Disk/De-duplication Disk and Replicate to Tape) validates data backup from the Windows and Linux operating systems on the Cisco UCS environment. Backup data are stored in the Local HDD/De-duplication Disk and replicated to HP MSL 2024 External Tape Library . The objective of Backup Testing is to verify the Backup/Restore of Data files, entire disks of Windows 2012 R2, Linux SLES 11.3, RHEL 7.1, MS SQL, UCS Central and VM's by the backup software (Commvault Backup 11.0).

Acronyms

Acronym	Description
BDR	Baremetal Disaster Recovery
CNA	Converged Network Adapter
FI	Fabric Interconnect
FC	Fibre Channel
Gb	Gigabit Ethernet
GB/S	Gigabit per Second
HDD	Hard Disk Drive
JOS	Japanese Operating System
LUN	Logical Unit Number
MS	Microsoft
OS	Operating System
PCI	Peripheral Component Interface

Acronym	Description
PCIe	Peripheral Component Interface Express
RAID	Redundant Array of Independent Disks
RDM	Raw Device Mapping
RHEL	RedHat Enterprise Linux
SLES	SUSE Linux Enterprise Server
SP	Service Pack
SQL	Structured Query Language
UCS	Unified Computing System
UCSM	Unified Computing System Manager
VIC	Virtual Interface Card
VM	Virtual Machine

Backup Testing Strategy

The requirements gathered for Backup Testing (Backup to Disk/De-duplication Disk and Replicate to Tape) are specific to the Japanese usage and market.

The following requirements are derived based on the inputs and prioritization given by Cisco Japan Solution Engineers:

- JOS Windows Server 2012 R2(x64), SLES 11.3, RHEL 7.1 are installed on the Cisco UCS B Series Server (B460M4, B200M4, B260 M4) for Similar/ Dissimilar Hardware Disaster Recovery

- Windows Server 2012 R2 JOS is installed on the local HDD of C240 M4 Server. Commvault 11.0 is installed on top of it and acts as Backup, Media Server.

- Backup data is stored in C240 M4 Server Local HDD/De-duplication disk and then replicate to HP MSL 2024 External Tape Library using Commvault Backup 11.0 backup software

- Data files of size 500MB includes Microsoft Excel, Microsoft Word and PDF for full backup and additional 100MB files used for incremental/differential backup

- Data backup from the Windows 7 SP1, Windows Server 2012 R2,RHEL 7.1 and SLES 11.3 JOS are deployed as VMs.

- Data backup from the Windows Server 2012 R2, RHEL 7.1 and SLES 11.3 JOS are deployed in baremetal servers

- Full VM Backup of Windows 2012 R2 (x64), RHEL 7.1 and SLES 11.3 in ESXi 6.0 are deployed in UCS B Series servers (B200 M4, B460 M4, B260 M4) for Backup and Recovery to Same/Different host

- Cisco UCS Central VM is also deployed in UCS B Series servers (B200 M4, B460 M4, B260 M4) for Backup and Recovery to Same/Different host

- MS SQL Server 2014 Sp1 is installed in windows 2012 R2 (x64) VM for Database Backup. 15GB RDM is mapped to this VM for the database creation
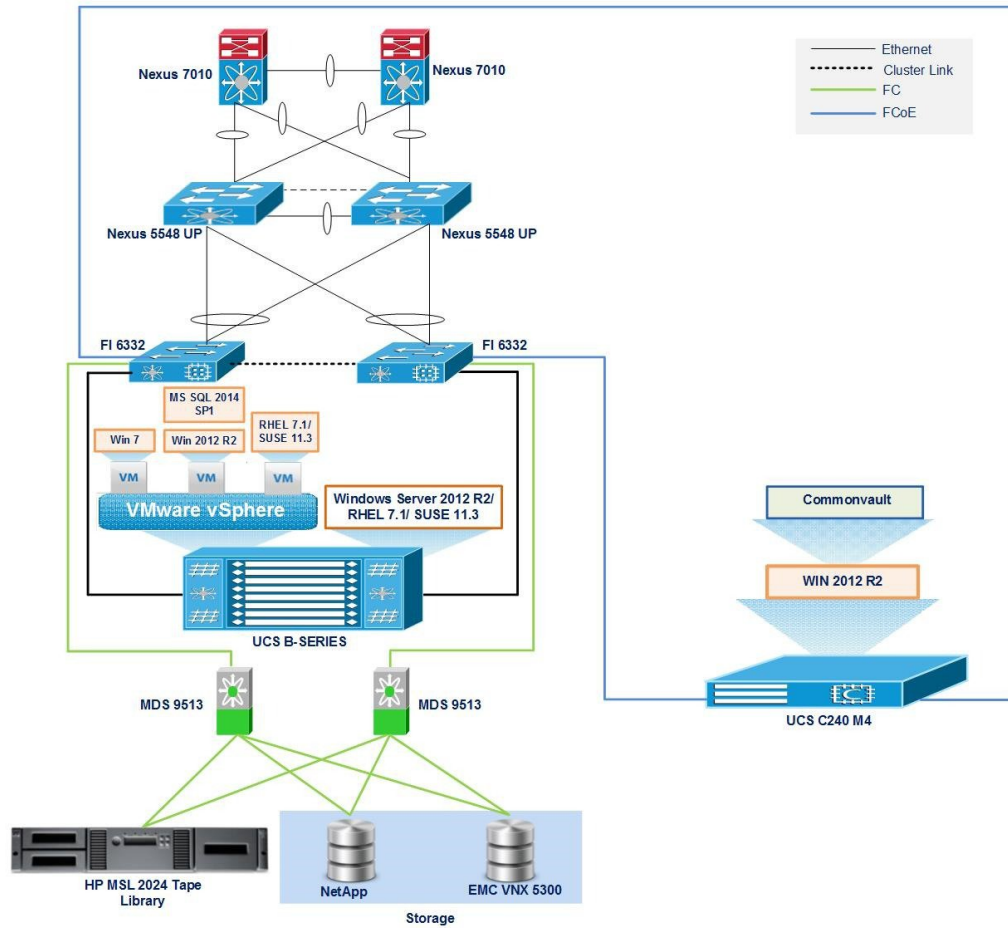
C H A P T E R **2**

Test Topology and Environment Matrix

- Test Topology, page 5
- Environment Matrix, page 6

Test Topology

Fig 1: Topology in use

Environment Matrix

Component	Version
UCS	
Blade servers	Cisco UCS B200 M4, B260 M4, B460 M4
Rack Server	Cisco UCS C240 M4
UCSM	3.1(2b)
Adapters	
Cisco UCS VIC 1380	4.1(2d)
Infra	
Nexus 7010	7.2(1)D1(1)
Nexus 5548 UP	7.2(1)N1(1)

Component	Version
MDS 9513	6.2(13b)
Backup Software	
Commvault Backup	11.0
Operating Systems	
Windows OS	Windows 7 Enterprise SP1 x64 (Japanese)
Windows Server OS	Windows Server 2012 R2 x64 (Japanese)
RHEL	Redhat Enterprise Linux 7.1 x64 (Japanese)
SLES	SUSE Linux Enterprise Server 11.3 (Japanese)
Data Base	
MS SQL server	Microsoft SQL Server 2014 SP1(Japanese)
Hypervisor	
ESXi	VMware ESXi 6.0
UCS Central	
UCS Central	1.5(1a)
Tape Library	
HP MSL 2024 External Tape Library	NA
PCI Adapter	
Cisco UCS VIC 1227	4.1(2d)

Storage Array

Storage	Firmware
NetApp 2554	8.3.2 CMode
EMC VNX	05.32.000.5.218

CHAPTER **3**

Implementation and Features Tested

Design and Implementation

- Backup Server UCS C240 M4 is deployed in UCSM integrated mode connected to FI using VIC 1227.
- The internal RAID controller used on Cisco UCS C240 M4 Server is Cisco 12G SAS Modular RAID Controller card.
- Backup server is connected to HP MSL 2024 External Tape Library through the 8 GB/s FC uplink of the FI.
- Esxi 6.0 is installed in the local HDD of the Client servers (UCS B200 M4, B460 M4, B260 M4).
- VM's in client servers (UCS B200 M4, B460 M4, B260 M4) are deployed in the LUN of EMC VNX and NetApp storages.
- VMware Vcenter 6.0 is deployed to Manage the ESXi host.
- Commvault Backup 11.0 backup client agent for Windows is installed on the Windows Server 2012 R2 x64 and Windows 7 SP1 x64.
- Commvault backup 11.0 client agent for SQL is installed on top of Windows Server 2012 R2 by adding required privileges.
- Commvault backup 11.0 client agent for Linux is also installed on SLES 11.3 and RHEL 7.1.
- VMware vCenter 6.0 is integrated with Commvault 11.0 Backup server for Agentless backup and recovery of VMs.

Features Tested

Data Backup was tested with the following backup methods:

Full Backup

Full backup is the starting point for all other types of backup and contains all the data in the folders and files that are selected to be backed up. Because full backup stores all files and folders, frequent full backups resulting faster and simpler restore operations.

Differential Backup

Differential backup contains all files that have changed since the last FULL backup. The advantage of a Differential backup is that it shortens restore time compared to a full backup or an incremental backup. However, if you perform the differential backup too many times, the size of the differential backup might grow to be larger than the baseline full backup.

Incremental Backup

Incremental backup stores all files that have changed since the last FULL, DIFFERENTIAL, or INCREMENTAL Backup. The advantage of an incremental backup is that it takes the least time to complete. However, during a restore operation, each incremental backup must be processed, which could result in a lengthy restore job.

Synthetic backup

Synthetic backup is an accurate representation of the client's file system at the time of the most recent full backup.

De-Duplication

Deduplication is the process of minimizing storage space taken by the data by detecting data repetition and storing the identical data only once. Deduplication may also reduce network load: if, during a backup, a data is found to be a duplicate of an already stored one, its content is not transferred over the network.

Disk Staging Backup

This is a process in which first data is copied on a Storage Unit then copied to another Storage unit. Images expire after copying data to secondary unit

Compression

Compression reduces the size of a backup by reducing the size of files in the backup. In turn, the smaller backup size decreases the number of media that is required for storage. Compression also decreases the amount of data that travels over the network as well as the network load.

Encryption

The Encryption attribute determines whether the backup should be encrypted. When the server initiates the backup, it passes on the Encryption policy attribute to the client in the backup request. The client compares the Encryption policy attribute to the Encryption host properties for the client. If the encryption permissions for the client are set to REQUIRED or ALLOWED, the policy can encrypt the backups for that client.

AES 128: a data/file encryption technique that uses a 128-bit key to encrypt and decrypt data or files.

AES 256: a data/file encryption technique that uses a 256-bit key to encrypt and decrypt data or files.

Volume Shadow Copy Service

These options are effective only for Windows operating systems. The option defines whether a Volume Shadow Copy Service (VSS) provider has to notify VSS-aware applications that the backup is about to start. This ensures the consistent state of all data used by the applications; in particular, completion of all database transactions at the moment of taking the data snapshot by Symantec NetBackup 7.6.1.

Snapshot

The feature on NetBackup client that takes snapshot of file system state or application prior to performing backups. On UNIX/Linux platforms, this operation requires a specific policy attribute to be turned on to use

this feature. On Windows, this feature is automatically enabled to make use of Windows Volume Shadow Copy Service (VSS).
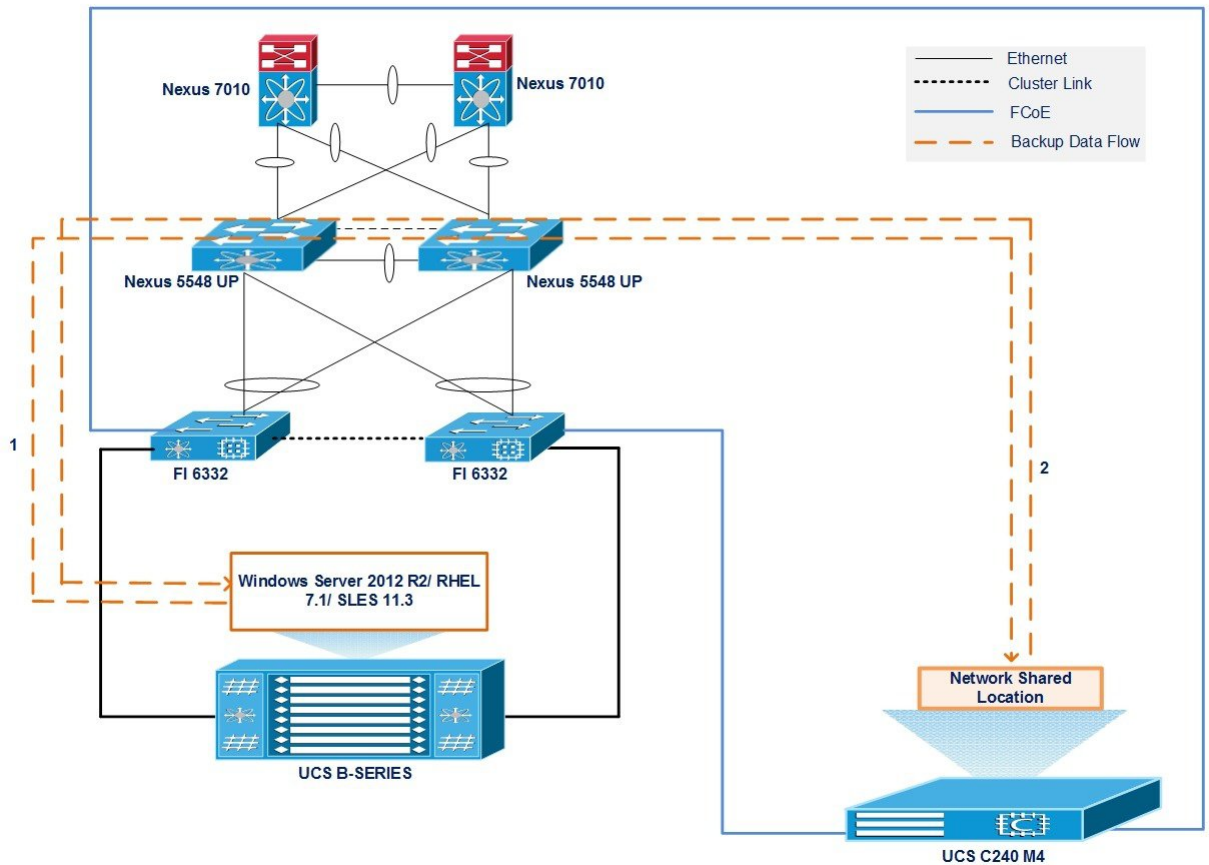
C H A P T E R **4**

Test Scenarios for UCS with Commvault Backup 11.0

Disaster Recovery for Similar Hardware

Fig 2: Topology in use

Backup Data flows		
Step	**From**	**To**
1	Backup of B Series Server(Entire Disk)	Network Share
2	Network Share	B Series Server

Description

- Backup of Entire Disks from Japanese SLES 11.3, RHEL 7.1 and Windows server 2012 R2 Operating System to Network Share Location

- Restore the Entire Disks from Network Share location to the Similar hardware from Commvault Backup 11.0 Recover Option
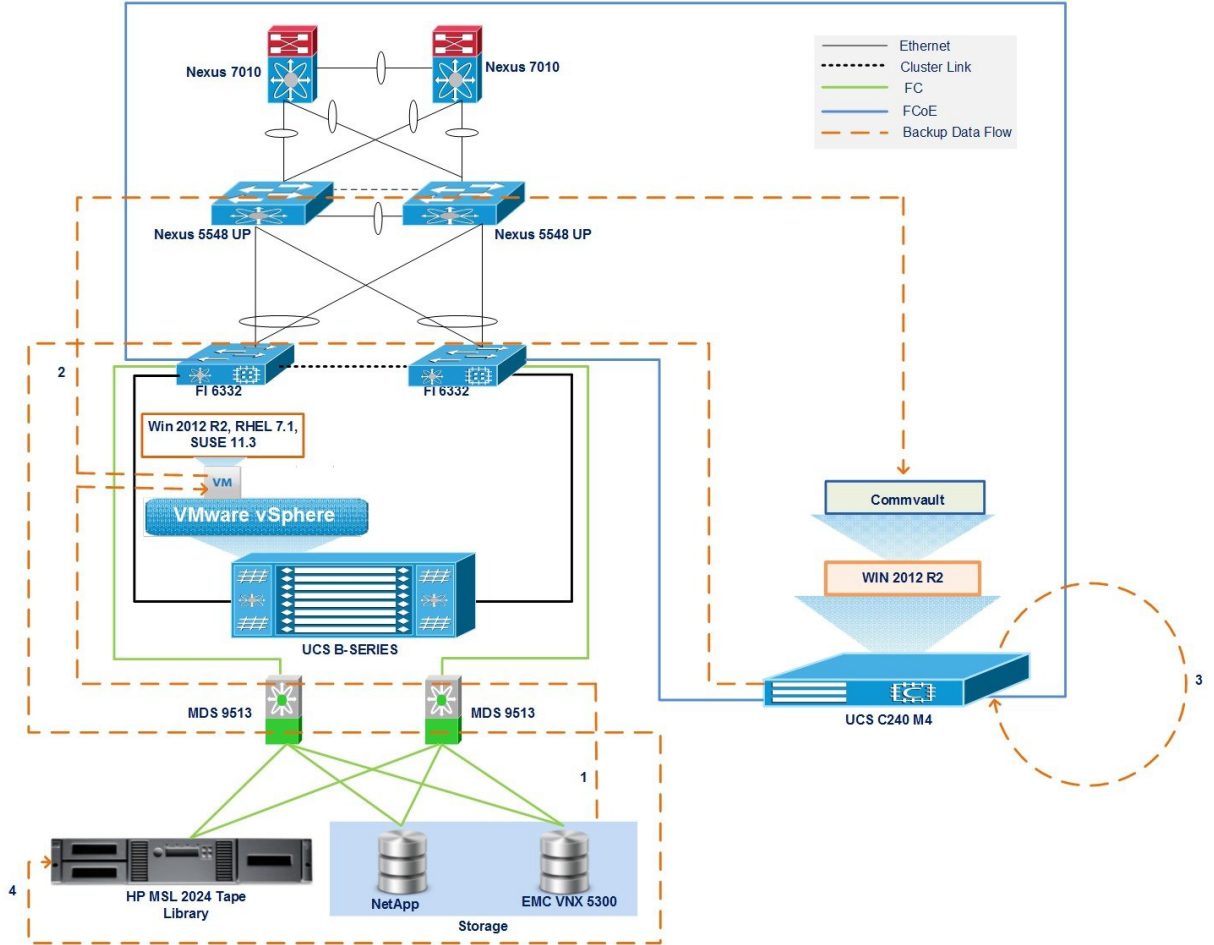
Fig 3: Topology in use
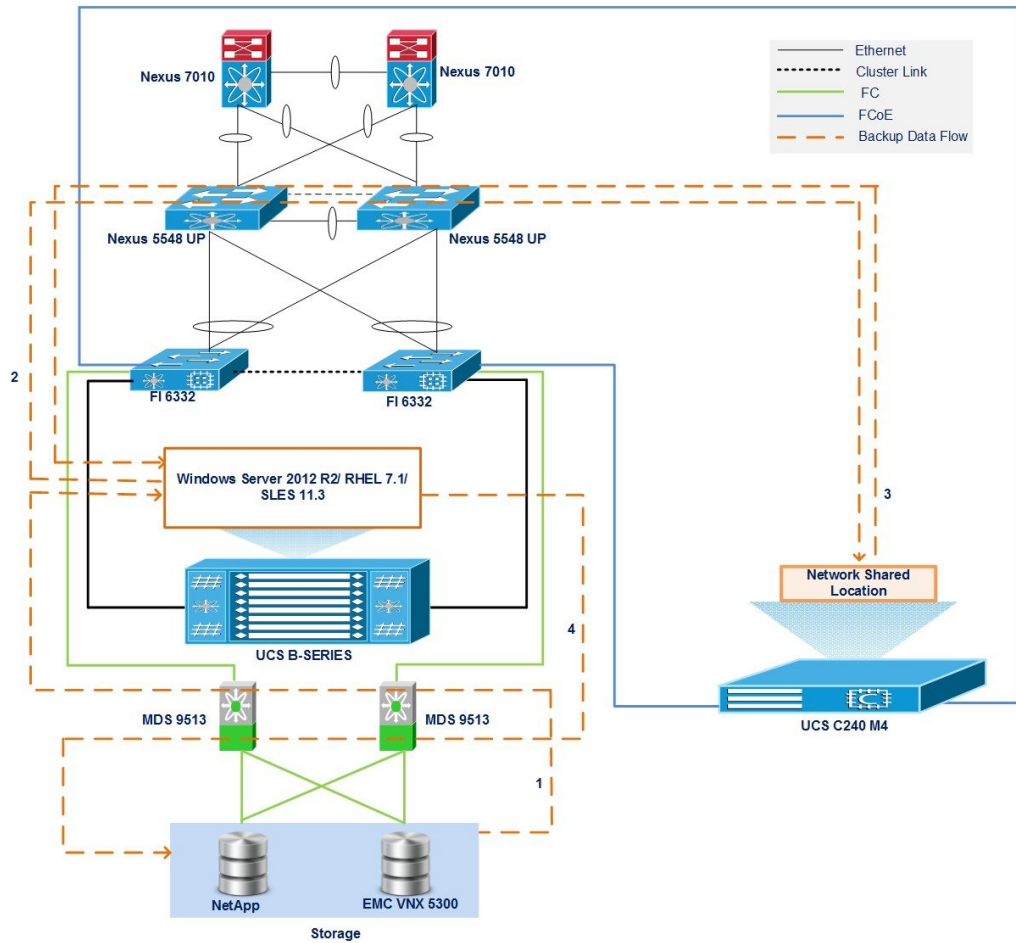
Backup Data flows

Step	From	To
1	Disk array(NetApp, EMC VNX)	B Series Server
2	B Series Server(Entire Disks)	Network Share
3	Network Share	B Series Server
4	B Series Server	Disk array(NetApp, EMC VNX)

Description

- Backup of Entire Disks(SAN Boot) from Japanese SLES 11.3, RHEL 7.1 and Windows server 2012 R2 Operating System to Network Share Location

- Restore the Entire Disks from Network Share location to the Similar hardware from Commvault Backup 11.0 Recover Option

Disaster Recovery for Dis-Similar Hardware

Fig 4: Topology in use
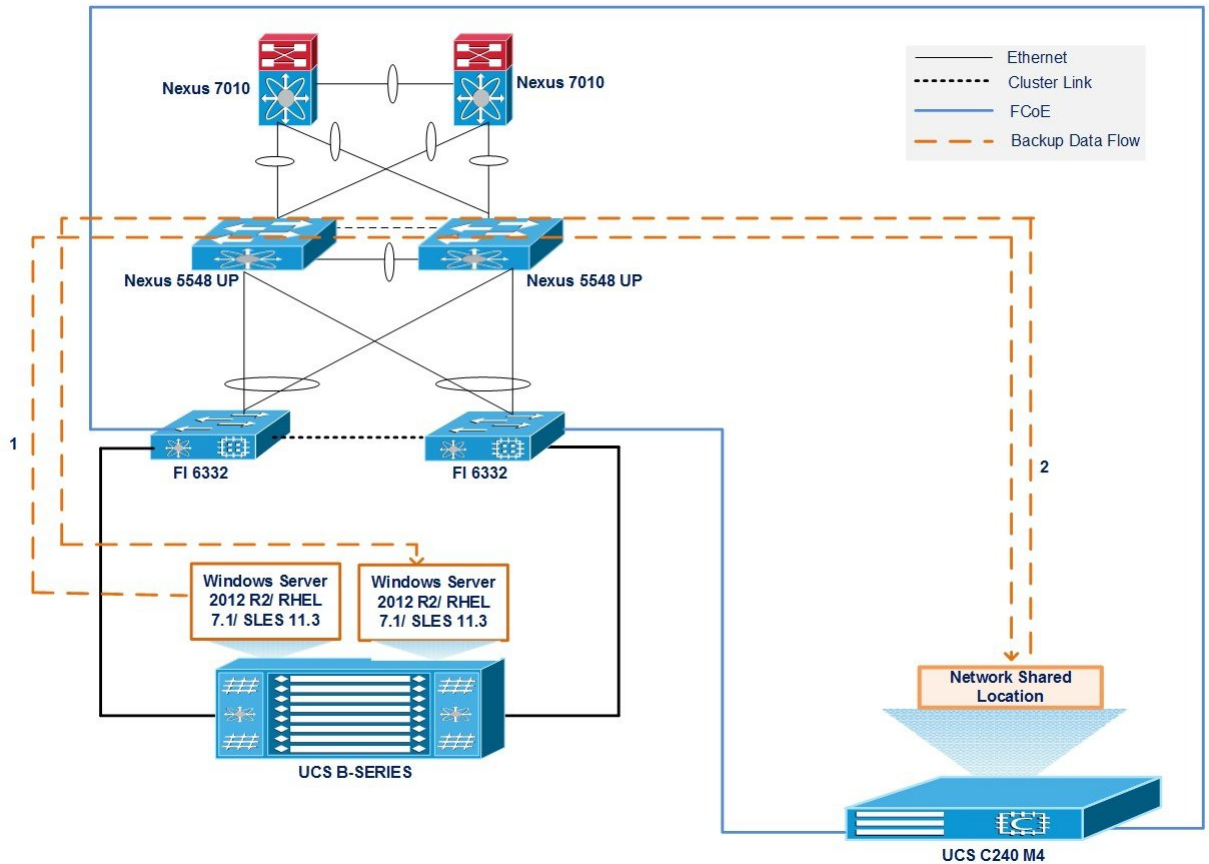
Backup Data flows		
Step	**From**	**To**
1	Backup of B Series Server(Entire Disk)	Network Share
2	Network Share	B Series Server (Different server)

Description

- Backup of Entire Disks from Japanese SLES 11.3, RHEL 7.1 and Windows server 2012 R2 Operating System to Network Share Location
- Restore the Entire Disks from Network Share location to the Dis-Similar hardware from Commvault Backup 11.0 Recover Option

Fig 5: Topology in use
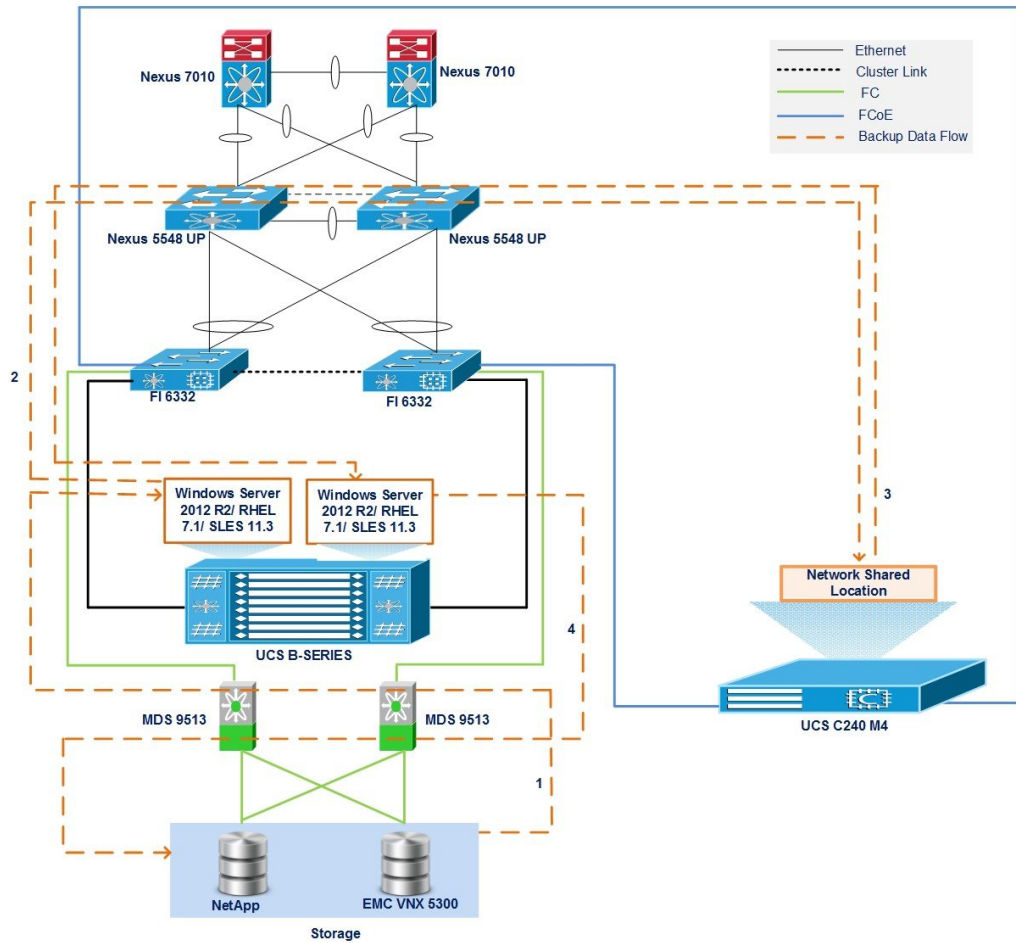
Backup Data flows

Step	From	To
1	Disk array(NetApp, EMC VNX)	B Series Server
2	B Series Server(Entire Disks)	Network Share
3	Network Share	B Series Server (Different Server)
4	B Series Server (Different Server)	Disk array(NetApp, EMC VNX)

Description:

- Backup of Entire Disks from Japanese SLES 11.3 and Windows server 2012 R2 Operating System to Network Share Location

- Restore the Entire Disks from Network Share location to the Dis-Similar hardware from Commvault Backup 11.0 Recover Option

Full VM

Fig 6: Topology in use

Backup Data flows

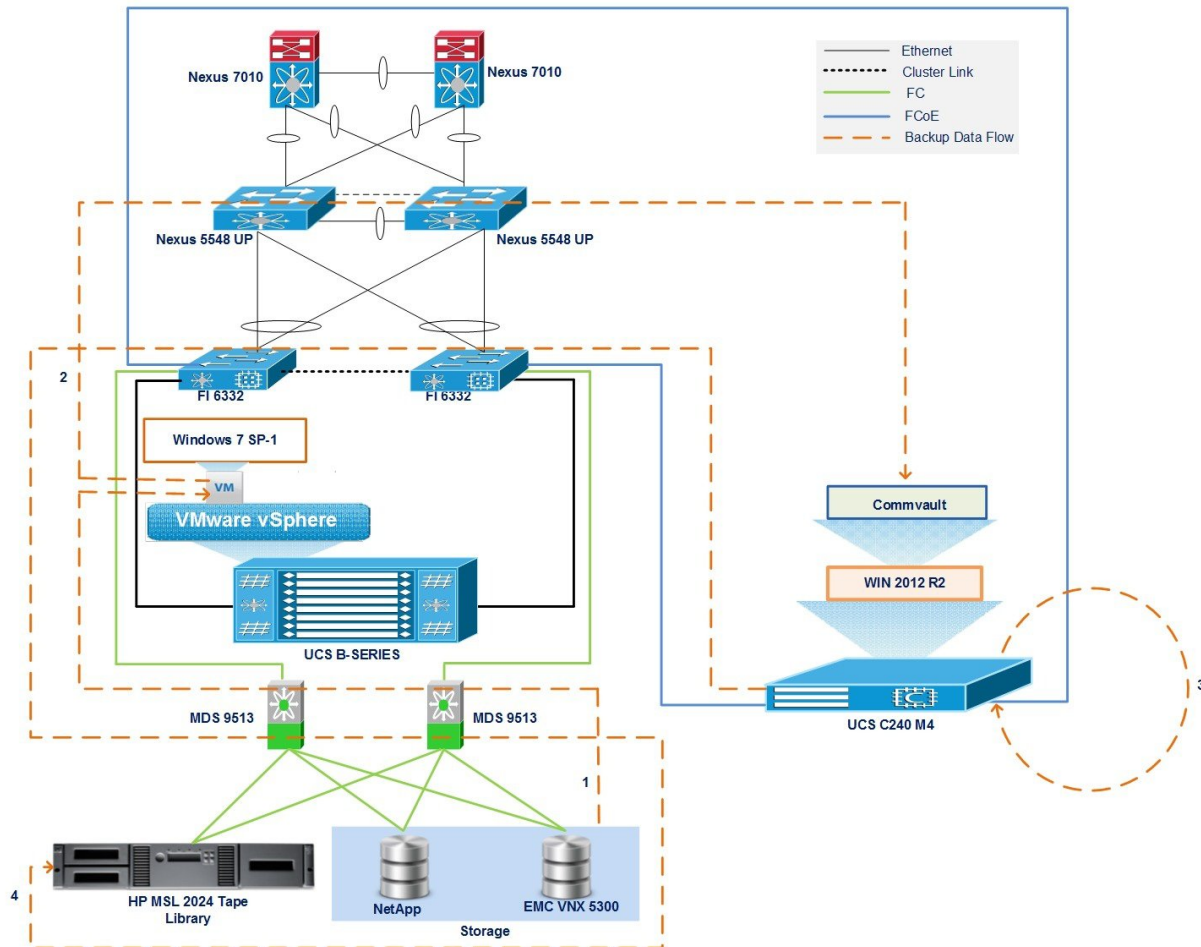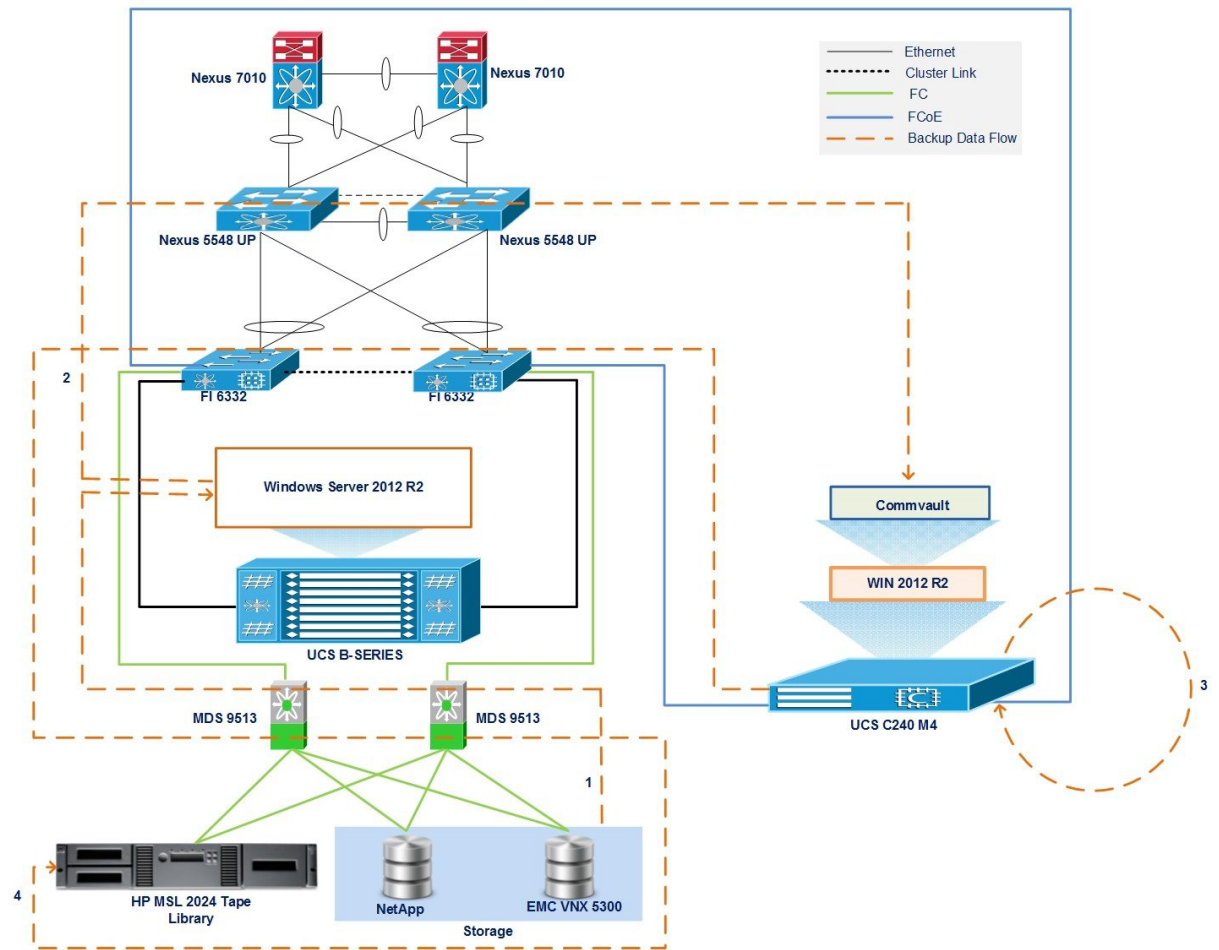| Step	From	To
1	Disk Array (NetApp,EMC VNX)	VM in B series SAN based Server
2	VM in B series SAN based Server(Backup Client)	Backup Server
3	Backup Server	Backup Server Disk
4	Backup Server	HP MSL 2024 External Tape Library

Description:

• Select the VM to be backed up using Commvault Backup 11.0.

• Run the Backup Job and Backup of VM is Successful.

• Select the Archive and create Recovery Plan.

• Specify where to recover as "New Virtual Machine" in Recovery Plan.

• Run the Recovery Job and the Restore of VM is successful .

Windows Files and Folders-VM

Fig 7: Topology in use

Backup Data flows		
Step	**From**	**To**
1	Disk Array (NetApp, EMC VNX)	VM in B series SAN based Server
2	VM in B series SAN based Server(Backup Client)	Backup Server
3	Backup Server	Backup Server Disk

Backup Data flows		
4	Backup Server	HP MSL 2024 External Tape Library

Description

- Backup of data files (Word, PDF, and Excel) from Windows 7 JOS to Backup Server LocalHDD/De-duplication disk and then replicate the same to HP MSL 2024 External Tape Library using Commvault Backup 11.0 software.

- Recover the Files either from Local HDD/De-duplication disk or HP MSL 2024 External Tape Library by using various Recovery Options available on Commvault Backup 11.0 Software.
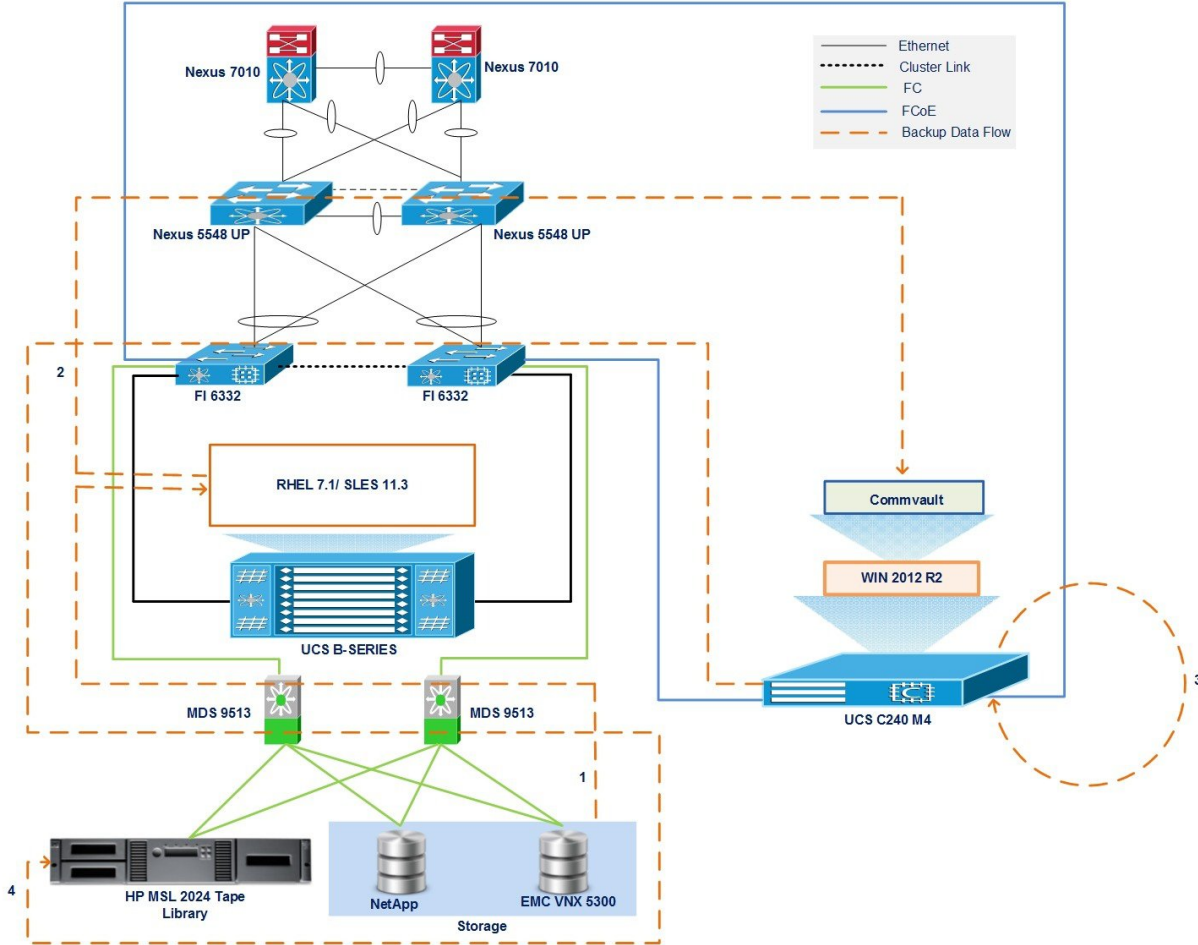
Windows Files and Folders- Baremetal

Fig 8: Topology in use

Backup Data flows		
Step	**From**	**To**
1	Disk Array (NetApp, EMC VNX)	B series SAN based Baremetal Server
2	B series SAN based Baremetal Server(Backup Client)	Backup Server
3	Backup Server	Backup Server Disk
4	Backup Server	HP MSL 2024 External Tape Library

Description:

- Backup of data files (Word, PDF, and Excel) from Windows 2012 R2 JOS to Backup Server LocalHDD/De-duplication disk and then replicate the same to HP MSL 2024 External Tape Library using Commvault Backup 11.0 software.

- Recover the Files either from Local HDD/De-duplication disk or HP MSL 2024 External Tape Library by using various Recovery Options available on Commvault Backup 11.0 Software.

Linux Files and Folders-VM

Fig 9: Topology in use

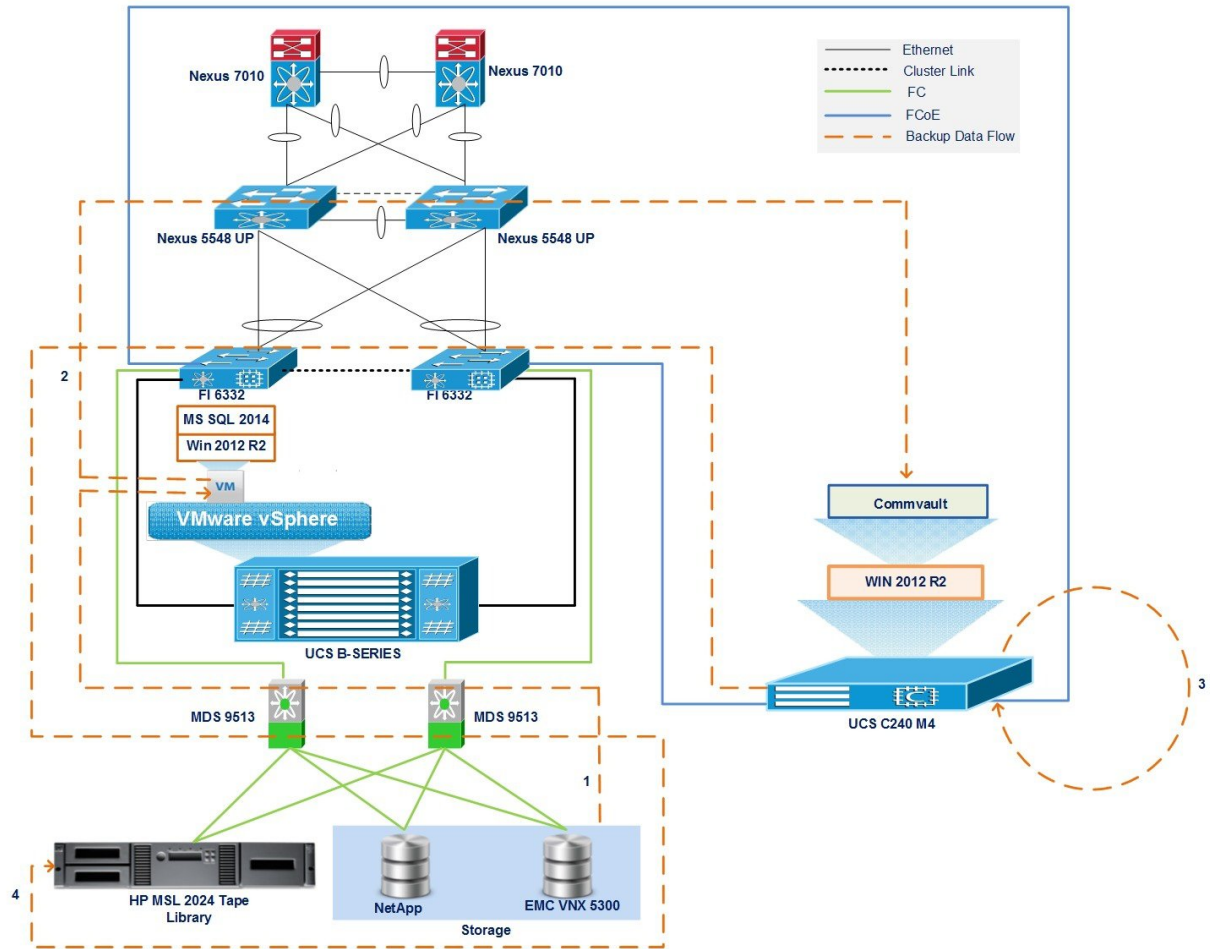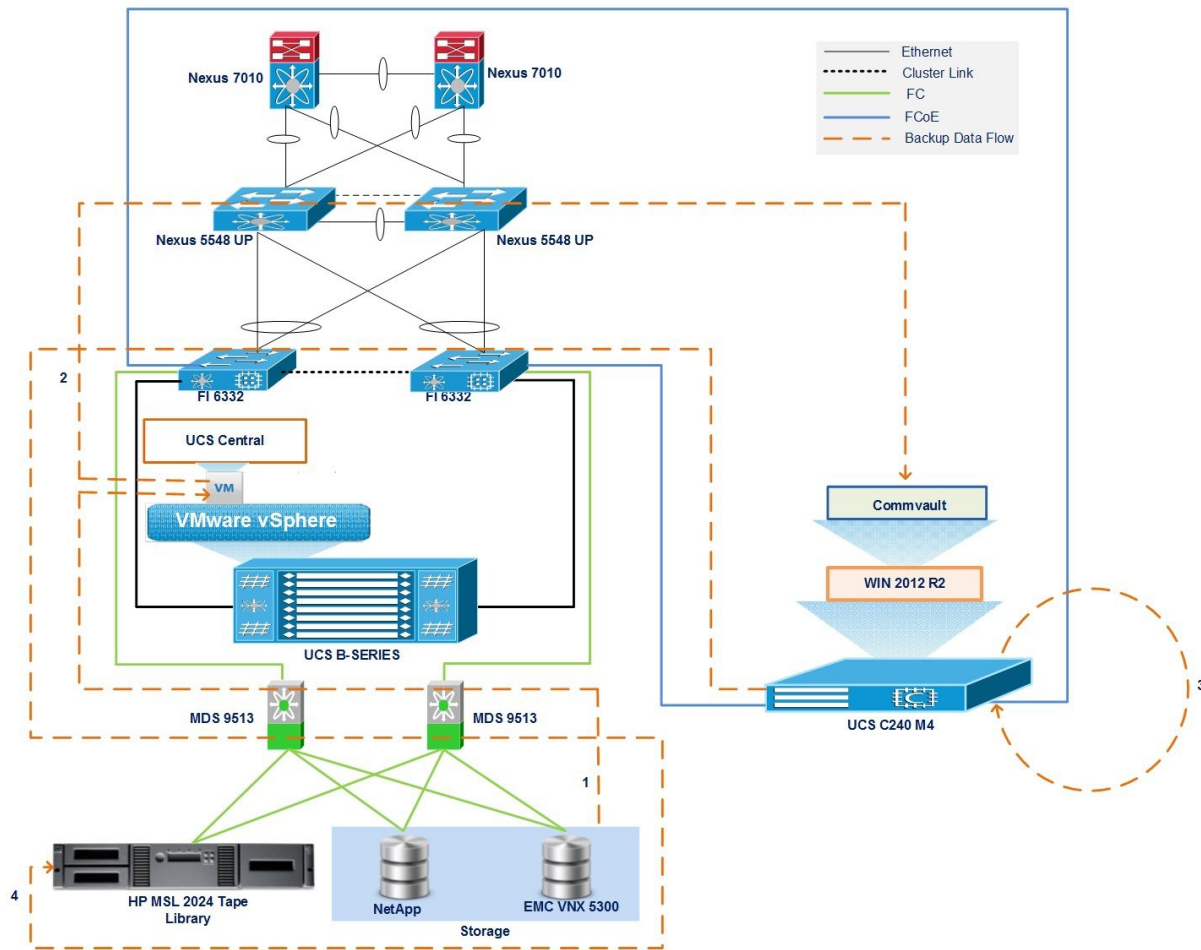| Backup Data flows		
Step	**From**	**To**
1	Disk Array (NetApp, EMC VNX)	VM in B series SAN based Server
2	VM in B series SAN based Server(Backup Client)	Backup Server
3	Backup Server	Backup Server Disk
4	Backup Server	HP MSL 2024 External Tape Library

Description:

- Backup of data files (Word, PDF, and Excel) from Linux OS (RHEL 7.1/ SUSE 11.3) to Backup Server LocalHDD/De-duplication disk and then replicate the same to HP MSL 2024 External Tape Library using Commvault Backup 11.0 software.

- Recover the Files either from Local HDD/De-duplication disk or HP MSL 2024 External Tape Library by using various Recovery Options available on Commvault Backup 11.0 Software.

Linux Files and Folders-Baremetal

Fig 10: Topology in use

Backup Data flows		
Step	**From**	**To**
1	Disk Array (NetApp,EMC VNX)	B series SAN based Baremetal Server
2	B series SAN based Baremetal Server(Backup Client)	Backup Server
3	Backup Server	Backup Server Disk
4	Backup Server	HP MSL 2024 External Tape Library

Description:

• Backup of data files (Word, PDF, and Excel) from Linux OS (RHEL 7.1/ SUSE 11.3) to Backup Server LocalHDD/De-duplication disk and then replicate the same to HP MSL 2024 External Tape Library using Commvault Backup 11.0 software.

• Recover the Files either from Local HDD/De-duplication disk or HP MSL 2024 External Tape Library by using various Recovery Options available on Commvault Backup 11.0 Software.

SQL Backup

Fig 11: Topology in use

Backup Data flows		
Step	**From**	**To**
1	Disk Array (NetApp, EMC VNX)	VM in B series SAN based Server
2	VM in B series SAN based Server(Backup Client)	Backup Server
3	Backup Server	Backup Server Disk

Backup Data flows		
4	Backup Server	HP MSL 2024 External Tape Library

Description:

- Backup of database from MS SQL 2014 SP1 Server to Backup Server LocalHDD/De-duplication disk and then replicate the same to HP MSL 2024 External Tape Library using Commvault Backup 11.0 software.

- Recover the Files either from Local HDD/De-duplication disk or HP MSL 2024 External Tape Library by using various Recovery Options available on Commvault Backup 11.0 Software.

UCS Central Backup

Fig 12: Topology in use

Backup Data flows		
Step	**From**	**To**
1	Disk Array (NetApp, EMC VNX)	VM in B series SAN based Server
2	VM in B series SAN based Server(Backup Client)	Backup Server
3	Backup Server	Backup Server Disk
4	Backup Server	HP MSL 2024 External Tape Library

Description:

- Backup of UCS Central to Backup Server LocalHDD/De-duplication disk and then replicate the same to HP MSL 2024 External Tape Library using Commvault Backup 11.0 software.

- Recover the Files either from Local HDD/De-duplication disk or HP MSL 2024 External Tape Library by using various Recovery Options available on Commvault Backup 11.0 Software.

Issues

- Issues, page 27
- Related Documentation, page 31

Issues

Windows Baremetal Disaster Recovery failed
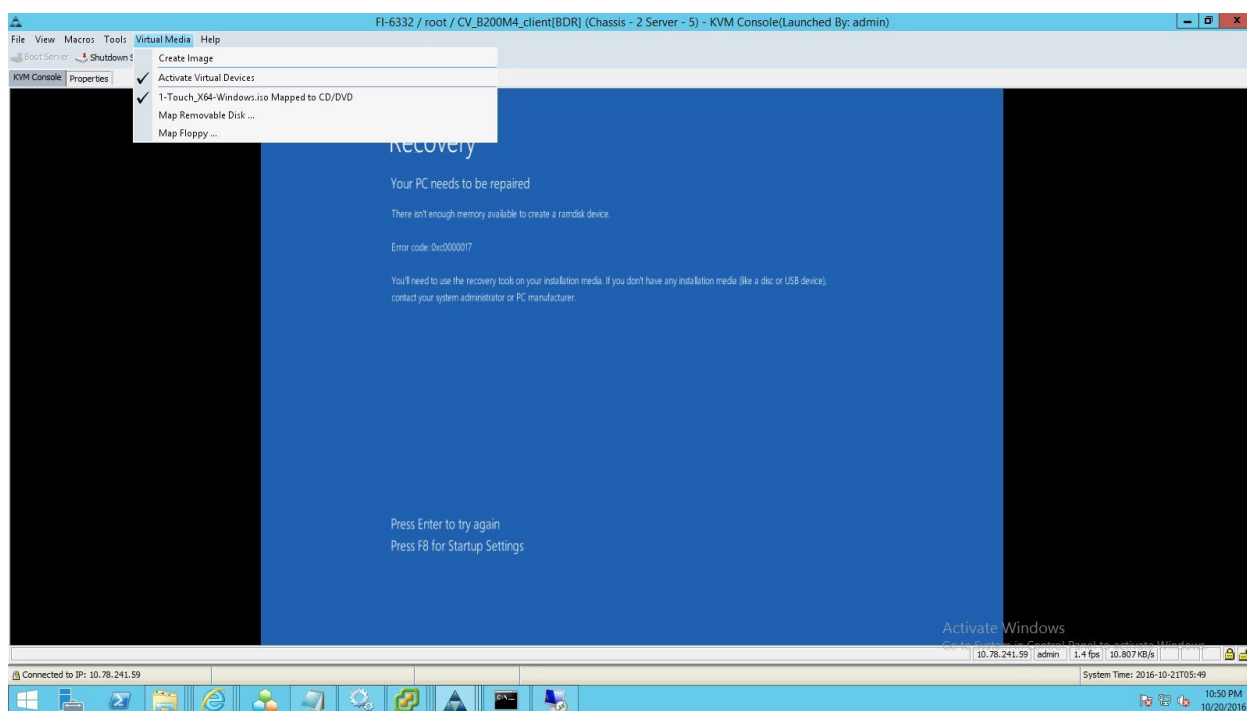
BDR Backup job successfully completed with 1-Touch Windows x64 image

Successfully added Storage and NIC drivers to 1-Touch Windows ISO image
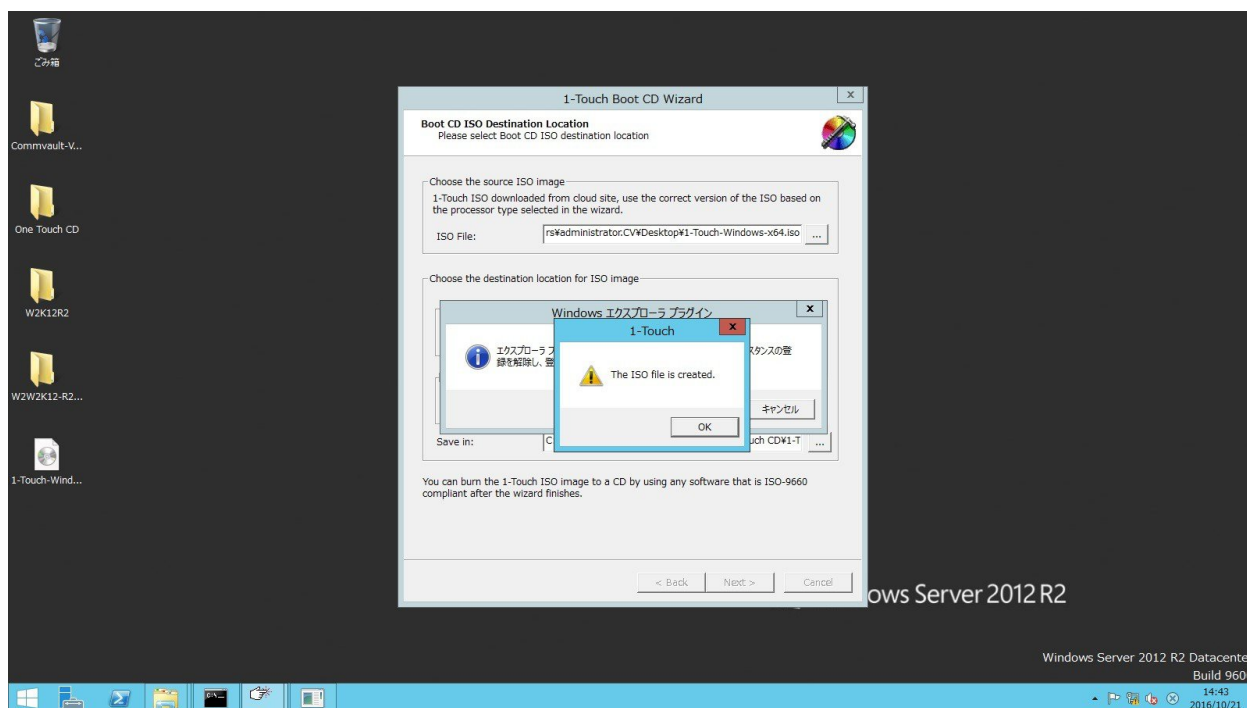
Booting the server with 1-Touch Windows ISO image failed to recover the BDR backup and getting the below screen
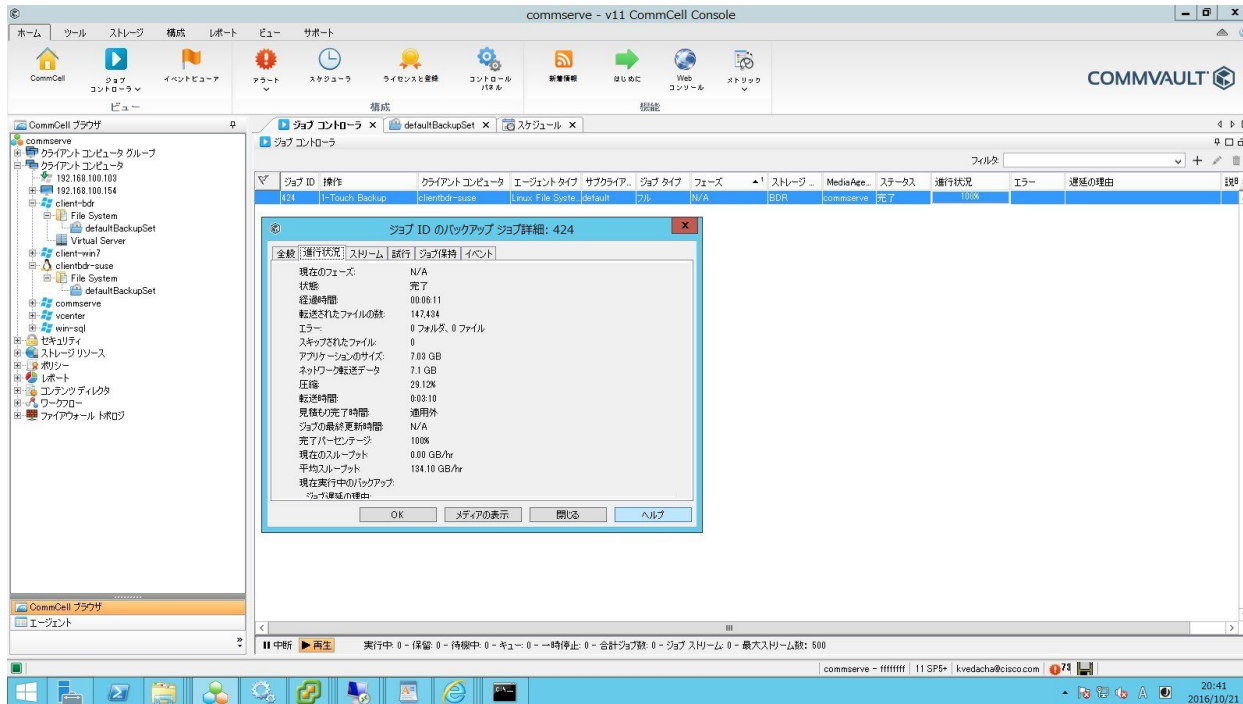

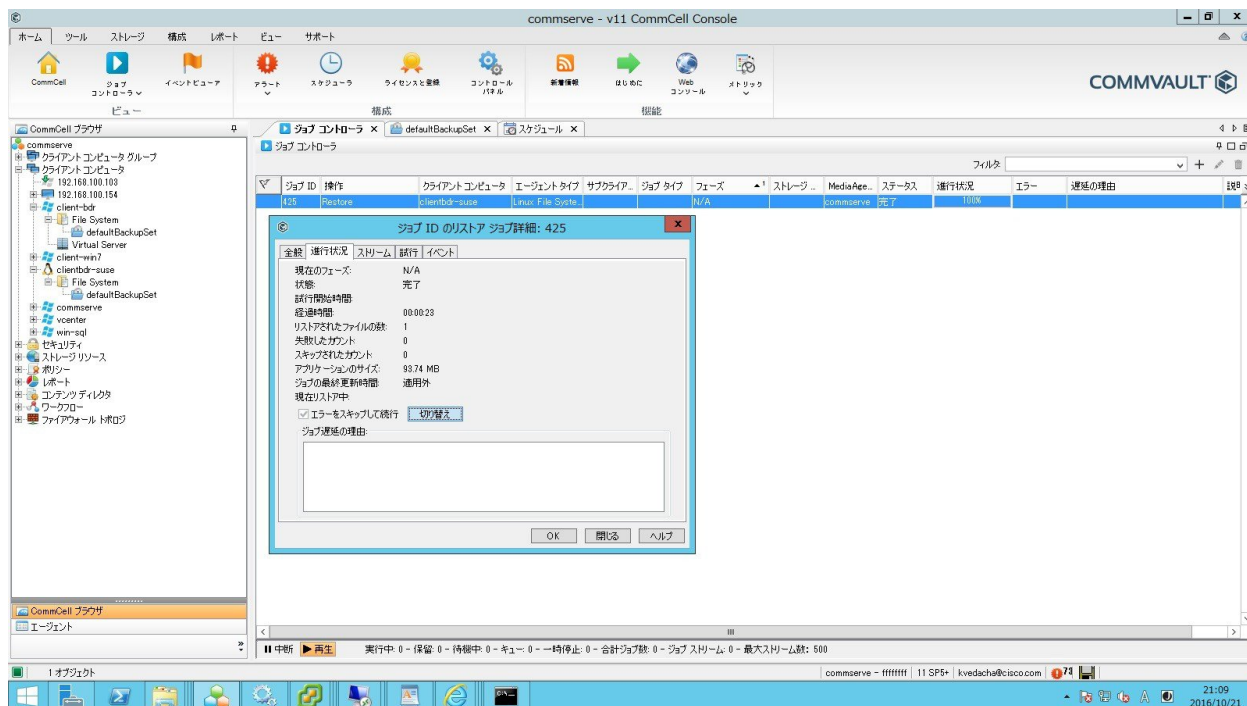**BDR Backup successfully restored as VM using 1-Touch windows ISO image**

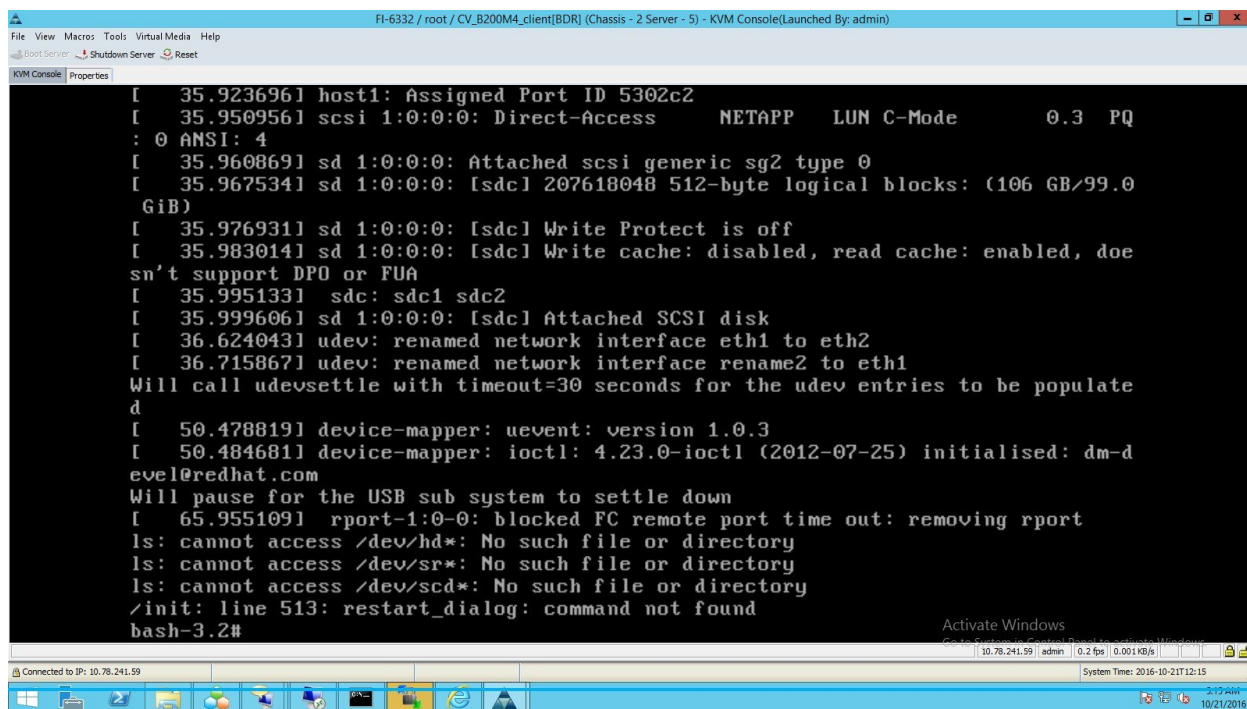**Linux Baremetal Disaster Recovery and P2V Failed**

BDR Backup job successfully completed with 1-Touch Linux x86 ISO image

Linux BDR successfully restored on the Baremetal Server using 1-Touch Linux x86 ISO image

Linux BDR restored successfully and failed to boot the OS

Linux BDR successfully restored as VM using 1-Touch Linux x86 ISO image

Linux BDR restored successfully on VM and failed to boot the OS

Related Documentation

Cisco Servers- Unified Computing

http://www.cisco.com/en/US/docs/unified_computing/ucs/overview/guide/UCS_roadmap.html

https://software.cisco.com/download/navigator.html

Commvault Backup 11.0

http://documentation.commvault.com/commvault/v11/article