



# VRTX RAID Configuration Cloning

*This Dell Technical White Paper addresses how to initially configure a PowerEdge VRTX and then replicate that configuration to other VRTX chassis.*

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# 1 Introduction

This whitepaper describes how to configure a PowerEdge VRTX Chassis' shared storage component and then how to replicate this configuration to other PowerEdge VRTX chassis. Customers can use any of the following methods to configure their chassis storage:

- The CMC Web Interface
- The RACADM Interface
- The CMC WSMAN Interface

A customer can then use either that RACADM Interface of the CMC WSMAN interface to replicate the RAID configuration. If the customer would prefer to use the GUI they can simply perform the same actions on each chassis.



## 2 Initial Shared Storage Configuration

The shared storage component is one of the major features of the PowerEdge VRTX chassis. This unique subsystem allows for the simplicity of a Direct Attach Storage (DAS) subsystem with the flexibility of a Storage Area Network (SAN). This section will cover how to:

1. Create a Virtual Disk
2. Assign a Dedicated Hotspare
3. Allow a Server access to the Virtual Disk

### 2.1 Initial Shared Storage Configuration Using the CMC Web Interface

You can use the following steps to set up your shared storage configuration using the CMC Web interface:

1. Create Virtual Disk
  - a. In the left hand tree, navigate to the “Virtual Disks” page.
  - b. Click “Create”.
  - c. Choose the correct RAID Level then select each physical disk that you want to associate with the virtual disk.
  - d. Change the name, stripe size, capacity, or cache policies if desired.
  - e. Click “Create Virtual Disk”.
2. Assign hotspare
  - a. Click “Manage”.
  - b. Find the virtual disk you wish to assign a hotspare to.
  - c. From the “Virtual Disk Actions” drop-down, select the “Assign...” option that corresponds to the physical disk you wish to assign as a hotspare.
  - d. Click “Apply”.
3. Allow a server to access the virtual disk
  - a. Click “Assign”.
  - b. On the right of the screen, find the virtual disk you wish to allow access to and at the top, find the server you that you want the virtual disk to access. Then, from the corresponding drop-down, select “Full Access”.
  - c. Click “Apply”.



## 2.2 Initial Shared Storage Configuration Using the RACADM Interface

The CMC utilizes a RACADM interface that is identical to that of the iDRAC. Therefore, any experience or scripting for configuration of a RAID controller should be usable on the PowerEdge VRTX.

### 1. Create Virtual Disk

- a. The first step is to determine which physical disks should comprise the virtual disk. You can obtain a list of all physical disks attached to the shared storage subsystem by using the following RACADM command:

```
$ racadm raid get pdisks
Disk.Bay.0:Enclosure.Internal.0-0:RAID.ChassisIntegrated.1-1
Disk.Bay.1:Enclosure.Internal.0-0:RAID.ChassisIntegrated.1-1
```

- b. In the above example output there are two disks. One in slot 0 the other in slot 1. We can use these disks to create a RAID 1 virtual disk as follows:

```
$ racadm raid createvd:RAID.ChassisIntegrated.1-1 -rl r1 -
pdkey:Disk.Bay.0:Enclosure.Internal.0-0:RAID.ChassisIntegrated.1-
1,Disk.Bay.1:Enclosure.Internal.0-0:RAID.ChassisIntegrated.1-1
Raid set operation performed successfully
```

### 2. Assign a hotspare

- a. Determine which physical disks present in the system may be used as hotspares. However, only some of these disks can be used as most of these drives are used in a virtual disk. To identify the available disks based on the State, run the following command:

```
$ racadm raid get pdisks -o -p State
Disk.Bay.0:Enclosure.Internal.0-0:RAID.ChassisIntegrated.1-1
State                               = Online
Disk.Bay.1:Enclosure.Internal.0-0:RAID.ChassisIntegrated.1-1
State                               = Online
Disk.Bay.2:Enclosure.Internal.0-0:RAID.ChassisIntegrated.1-1
State                               = Ready
```

- b. In the above example output there are three physical disks, of which two are in the “Online” state indicating they are being used as part of a virtual disk. The third disk is in “Ready” state indicating that it is ready to be used in a virtual disk or as a hotspare.
- c. Now that we know which disk can be used as a hotspare, we must determine which virtual disk to assign it to. To get a list of virtual disks, run the following command:

```
$ racadm raid get vdisks
Disk.Virtual.0:RAID.ChassisIntegrated.1-1
```

- d. In the above example output there is one virtual disk. We will assign our hotspare to this virtual disk as follows:

```
$ racadm raid hotspare:Disk.Bay.2:Enclosure.Internal.0-
0:RAID.ChassisIntegrated.1-1 -assign yes -type dhs -
vdkey:Disk.Virtual.0:RAID.ChassisIntegrated.1-1
Raid set operation performed successfully
```



3. Allow a server to access the virtual disk
  - a. Now that we have a virtual disk we need to allow one or more servers to access the virtual disk. To allow the blade in slot 1 access:
 

```
$ racadm raid assignva:RAID.ChassisIntegrated.1-1-1 -
vdkey:Disk.Virtual.0:RAID.ChassisIntegrated.1-1 -accesspolicy rw -assignpolicy
single
Raid set operation performed successfully
```

## 2.3 Initial Shared Storage Configuration Using the CMC WSMAN Interface

The CMC utilizes a WSMAN interface very similar to that of the iDRAC and Lifecycle Controller products. To view a comprehensive set of examples for configuration via WSMAN refer to the [Lifecycle Controller's Best Practices](#) document. The best practices document covers the topics - "Creating a Virtual Disk" and "Assigning a Hotspare". This whitepaper only covers the unique VRTX step of allowing a server to access the virtual disk.

1. Allow Server 1 to Access Virtual Disk 0
  - a. Construct an XML file as follows (called assign.xml in this example):
 

```
<p:ChangeVAAccessToVD_INPUT xmlns:p="http://schemas.dmtf.org/wbem/wscim/1/cim-
schema/2/root/dell/cmc/DCIM_RAIDService">
  <p:Target>Disk.Virtual.0:RAID.ChassisIntegrated.1-1</p:Target>
  <p:AccessPolicy>6</p:AccessPolicy>
  <p:AssignmentMode>1</p:AssignmentMode>
  <p:VirtualAdapter>RAID.ChassisIntegrated.1-1-1</p:VirtualAdapter>
</p:ChangeVAAccessToVD_INPUT>
```
  - b. Assign the Virtual Disk Access
 

```
winrm i
DCIM_RAIDService?CreationClassName=DCIM_RAIDService+SystemName=DCIM:Compute
rSystem+Name=DCIM:RAIDService+SystemCreationClassName=DCIM_ComputerSystem -
u:root -p:calvin -r:https://chassis-ip/wsman -a:basic -SkipCNcheck -
SkipCAcheck -encoding:utf-8 -file:assign.xml
```
  - c. Run the configuration job
    - i. Construct an XML file as follows (called job.xml in this example):
 

```
<p:CreateTargetedConfigJob_INPUT xmlns:p="http://schemas.dmtf.org/wbem/wscim/1/cim-
schema/2/root/dell/cmc/DCIM_RAIDService">
  <p:Target>RAID.ChassisIntegrated.1-1</p:Target>
  <p:ScheduledStartTime>TIME_NOW</p:ScheduledStartTime>
  <p:UntilTime>20201111111111</p:UntilTime >
</p:CreateTargetedConfigJob_INPUT>
```



## ii. Start the job

```
winrm i
DCIM_RAIDService?CreationClassName=DCIM_RAIDService+SystemName=DCIM:Compute
rSystem+Name=DCIM:RAIDService+SystemCreationClassName=DCIM_ComputerSystem -
u:root -p:calvin -r:https://chassis-ip/wsman -a:basic -SkipCNcheck -
SkipCAcheck -encoding:utf-8 -file:job.xml
```





## 3 Shared Storage Configuration Replication

Customers deploying several VRTX chassis may want to replicate the storage configuration across several VRTX chassis. In this section, the phrase “Original Chassis” is used to indicate the chassis being replicated from and the phrase “New Chassis” is used to indicate the chassis being replicated to. This section covers how to:

1. Determine current RAID configuration of the VRTX Chassis
2. Replicate Virtual Disks
3. Replicate Hotspares
4. Replicate Server access to Virtual Disks

### 3.1 Replication Using the RACADM Interface

The CMC utilizes a RACADM interface identical to that of the iDRAC. Therefore, any experience or scripting for configuration of a RAID controller must be usable on the PowerEdge VRTX. Additionally, if RACADM was used to configure the original VRTX chassis then the same commands can be used on other chassis to create the same RAID configuration. If this is not possible, then, use the WSMAN method described below.

### 3.2 Replication Using the CMC WSMAN Interface

The WSMAN interface provides many functions, not available through the RACADM interface, which make programmatic replication of a configuration much easier. These functions and data are available through any utility able to access WSMAN such as the winrm tool for Windows or the openwsmancli tool for Linux. This document describes the syntax for winrm. It uses the DNS names of “original-chassis” for the VRTX chassis configuration being cloned from and “new-chassis” for the VRTX chassis configuration that is being cloned to. Replace these with the correct names or IP addresses.

1. Determine the current storage configuration on the original chassis.
  - a. Determine the number and type of Virtual Disks

```
winrm e http://schemas.dmtf.org/wbem/wscim/1/cim-  
schema/2/root/dell/cmc/DCIM_VirtualDiskView -u:root -p:calvin -  
r:https://original-chassis/wsman -a:basic -SkipCNcheck -SkipCACHeck -  
encoding:utf-8
```

```
DCIM_VirtualDiskView  
  BusProtocol = 6  
  Cachecade = 0  
  CurrentActiveController = null  
  DiskCachePolicy = 1024  
  FQDD = Disk.Virtual.0:RAID.ChassisIntegrated.1-1  
  FailoverController = null
```



```

InstanceID = Disk.Virtual.0:RAID.ChassisIntegrated.1-1
LastSystemInventoryTime = 20141124160126.000000+000
LastUpdateTime = 20141124160126.000000+000
LockStatus = 0
MediaType = 1
Name = Virtual Disk 0
ObjectStatus = 0
OperationName = None
OperationPercentComplete = 0
PendingOperations = 0
PhysicalDiskIDs = Disk.Bay.0:Enclosure.Internal.0-
0:RAID.ChassisIntegrated.1-1, Disk.Bay.1:Enclosure.Internal.0-
0:RAID.ChassisIntegrated.1-1, Disk.Bay.2:Enclosure.Internal.0-
0:RAID.ChassisIntegrated.1-1
PrimaryStatus = 1
RAIDStatus = 2
RAIDTypes = 4
ReadCachePolicy = 16
RemainingRedundancy = 1
RollupStatus = 1
SizeInBytes = 1073741824
SpanDepth = 1
SpanLength = 2
StartingLBAINBlocks = 0
StripeSize = 128
VirtualAdapterAccessPolicy = 6, 1, 1, 1
VirtualAdapterIDs = RAID.ChassisIntegrated.2-1-1, RAID.ChassisIntegrated.2-
1-2, RAID.ChassisIntegrated.2-1-3, RAID.ChassisIntegrated.2-1-4
VirtualDiskTargetID = 0
WriteCachePolicy = 1

```

Make note of the following fields for each Virtual Disk. You will need them later to replicate the configuration: DiskCachePolicy, Name, PhysicalDiskIDs, RAIDTypes, ReadCachePolicy, SizeInBytes, SpanDepth, SpanLength, StartingLBAINBlocks, StripeSize, VirtualAdapterAccessPolicy, and WriteCachePolicy.

**b. Determine the number and type of Hotspares**

```

winrm e http://schemas.dmtf.org/wbem/wscim/1/cim-
schema/2/root/dell/cmc/DCIM_PhysicalDiskView -u:root -p:calvin -
r:https://original-chassis/wsman -a:basic -SkipCNcheck -SkipCAcheck -
encoding:utf-8 -filter:"SELECT * FROM DCIM_PhysicalDiskView WHERE
HotSpareStatus != 0"

DCIM_PhysicalDiskView

```



```

BusProtocol = 6
Connector = 0
CurrentActiveController = null
DriveFormFactor = 2
FQDD = Disk.Bay.2:Enclosure.Internal.0-0:RAID.ChassisIntegrated.1-1
FailoverController = null
FreeSizeInBytes = 299439751168
HotSpareStatus = 1
InstanceID = Disk.Bay.2:Enclosure.Internal.0-0:RAID.ChassisIntegrated.1-1
LastSystemInventoryTime = 20141124160126.000000+000
LastUpdateTime = 20141124160126.000000+000
Manufacturer = SEAGATE
ManufacturingDay = 4
ManufacturingWeek = 27
ManufacturingYear = 2012
MaxCapableSpeed = 3
MediaType = 0
Model = ST9300605SS
OperationName = None
OperationPercentComplete = 0
PPID = CN0745GC72622273037MA00
PredictiveFailureState = 0
PrimaryStatus = 1
RaidStatus = 1
Revision = CS09
RollupStatus = 1
SASAddress = 5000C50054D2128D
SecurityState = 0
SerialNumber = 6XP3NG9J
SizeInBytes = 299439751168
Slot = 2
SupportedEncryptionTypes = None
UsedSizeInBytes = 0

```

Make note of the following fields for each Hotspare. You will need them later to replicate the configuration: FQDD and HotSpareStatus.

- c. Make a list of all the PhysicalDiskIDs from step 1a and all the FQDDs from step 1b. Now count the unique values. The new chassis must have drives equal to the number of PhysicalDiskIDs and FQDDs to replicate the configuration.

## 2. Create Virtual Disks

- a. For each virtual disk returned in step 1a perform the following steps:
  - i. Remove any IDs from the PhysicalDiskIDs list that also exist as a hotspare FQDD in step 1b.
  - ii. Construct an XML file as follows (called createvd.xml in this example):



```
<p:CreateVirtualDisk_INPUT xmlns:p="http://schemas.dmtf.org/wbem/wscim/1/cim-
schema/2/root/dell/cmc/DCIM_RAIDService">
  <p:Target>RAID.ChassisIntegrated.1-1</p:Target>
  <p:PDArrary>Value 1 from PhysicalDiskIDs from step 1a</p:PDArrary>
  ...
  <p:PDArrary>Value n from PhysicalDiskIDs from step 1a</p:PDArrary>
  <p:VDPropNameArray>RAIDLevel</p:VDPropNameArray>
  <p:VDPropValueArray>RAIDTypes from step 1a</p:VDPropValueArray>
  <p:VDPropNameArray>SpanLength</p:VDPropNameArray>
  <p:VDPropValueArray>SpanLength from step 1a</p:VDPropValueArray>
  <p:VDPropNameArray>Size</p:VDPropNameArray>
  <p:VDPropValueArray>SizeInBytes from step 1a</p:VDPropValueArray>
  <p:VDPropNameArray>StartingLBA</p:VDPropNameArray>
  <p:VDPropValueArray>StartingLBAinBlocks from step 1a</p:VDPropValueArray>
  <p:VDPropNameArray>VirtualDiskName</p:VDPropNameArray>
  <p:VDPropValueArray>Name from step 1a</p:VDPropValueArray>
  <p:VDPropNameArray>SpanDepth</p:VDPropNameArray>
  <p:VDPropValueArray>SpanDepth from step 1a</p:VDPropValueArray>
  <p:VDPropNameArray>StripeSize</p:VDPropNameArray>
  <p:VDPropValueArray>StripeSize from step 1a</p:VDPropValueArray>
  <p:VDPropNameArray>ReadPolicy</p:VDPropNameArray>
  <p:VDPropValueArray>ReadCachePolicy from step 1a</p:VDPropValueArray>
  <p:VDPropNameArray>WritePolicy</p:VDPropNameArray>
  <p:VDPropValueArray>WriteCachePolicy from step 1a</p:VDPropValueArray>
  <p:VDPropNameArray>DiskCachePolicy</p:VDPropNameArray>
  <p:VDPropValueArray>DiskCachePolicy from step 1a</p:VDPropValueArray>
</p:CreateVirtualDisk_INPUT>
```

iii. Create the Virtual Disk

```
winrm i
DCIM_RAIDService?CreationClassName=DCIM_RAIDService+SystemName=DCIM:Compute
rSystem+Name=DCIM:RAIDService+SystemCreationClassName=DCIM_ComputerSystem -
u:root -p:calvin -r:https://new-chassis/wsman -a:basic -SkipCNcheck -
SkipCACHeck -encoding:utf-8 -file:createvd.xml
```

b. Run the configuration job

i. Construct an XML file as follows (called job.xml in this example):

```
<p:CreateTargetedConfigJob_INPUT xmlns:p="http://schemas.dmtf.org/wbem/wscim/1/cim-
schema/2/root/dell/cmc/DCIM_RAIDService">
  <p:Target>RAID.ChassisIntegrated.1-1</p:Target>
  <p:ScheduledStartTime>TIME_NOW</p:ScheduledStartTime>
  <p:UntilTime>20201111111111</p:UntilTime>
</p:CreateTargetedConfigJob_INPUT>
```



ii. Start the job

```
winrm i
DCIM_RAIDService?CreationClassName=DCIM_RAIDService+SystemName=DCIM:ComputerSystem+Name=DCIM:RAIDService+SystemCreationClassName=DCIM_ComputerSystem -
u:root -p:calvin -r:https://new-chassis/wsman -a:basic -SkipCNcheck -
SkipCAcheck -encoding:utf-8 -file:job.xml
```

3. Assign Hotspares

a. For each hotspare returned in step 1b, perform the following steps:

- i. For each dedicated hotspare (HotSpareStatus = 1), find its FQDD in the PhysicalDiskIDs list from step 1a and make note of the Virtual Disk's FQDD field.
- ii. For disks with a HotSpareStatus equal to 1, construct an XML file as follows (called spare.xml in this example):

```
<p:AssignSpare_INPUT xmlns:p="http://schemas.dmtf.org/wbem/wscim/1/cim-
schema/2/root/dell/cmc/DCIM_RAIDService">
  <p:Target>FQDD from step 1b</p:Target>
  <p:VirtualDiskArray>Virtual Disk FQDD from step 3ai</p:VirtualDiskArray>
</p:AssignSpare_INPUT>
```

- iii. For disks with a HotSpareStatus equal to 2, construct an XML file as follows (called spare.xml in this example):

```
<p:AssignSpare_INPUT xmlns:p="http://schemas.dmtf.org/wbem/wscim/1/cim-
schema/2/root/dell/cmc/DCIM_RAIDService">
  <p:Target>FQDD from step 1b</p:Target>
</p:AssignSpare_INPUT>
```

iv. Assign the hotspare

```
winrm i
DCIM_RAIDService?CreationClassName=DCIM_RAIDService+SystemName=DCIM:ComputerSystem+Name=DCIM:RAIDService+SystemCreationClassName=DCIM_ComputerSystem -
u:root -p:calvin -r:https://new-chassis/wsman -a:basic -SkipCNcheck -
SkipCAcheck -encoding:utf-8 -file:spare.xml
```

b. Run the configuration job

- i. Construct an XML file as follows (called job.xml in this example):

```
<p:CreateTargetedConfigJob_INPUT xmlns:p="http://schemas.dmtf.org/wbem/wscim/1/cim-
schema/2/root/dell/cmc/DCIM_RAIDService">
  <p:Target>RAID.ChassisIntegrated.1-1</p:Target>
  <p:ScheduledStartTime>TIME_NOW</p:ScheduledStartTime>
  <p:UntilTime>20201111111111</p:UntilTime >
</p:CreateTargetedConfigJob_INPUT>
```

- ii. Start the job



```
winrm i
DCIM_RAIDService?CreationClassName=DCIM_RAIDService+SystemName=DCIM:ComputerSystem+Name=DCIM:RAIDService+SystemCreationClassName=DCIM_ComputerSystem -
u:root -p:calvin -r:https://new-chassis/wsman -a:basic -SkipCNcheck -
SkipCAcheck -encoding:utf-8 -file:job.xml
```

#### 4. Replicate Server access to Virtual Disks

##### a. For each virtual disk returned in step 1a, perform the following steps:

##### i. For each value in the VirtualAdapterAccessPolicy do the following:

##### 1. Construct an XML file as follows (called assign.xml in this example):

```
<p:ChangeVAAccessToVD_INPUT xmlns:p="http://schemas.dmtf.org/wbem/wscim/1/cim-
schema/2/root/dell/cmc/DCIM_RAIDService">
  <p:Target>FQDD from step 1a</p:Target>
  <p:AccessPolicy>Value from VirtualAdapterAccessPolicy from step 1a</p:AccessPolicy>
  <p:AssignmentMode>2</p:AssignmentMode>
  <p:VirtualAdapter>RAID.ChassisIntegrated.1-1-1 for the first value in the
VirtualAdapterAccessPolicy list, 2 for the second value, etc.</p:VirtualAdapter>
</p:ChangeVAAccessToVD_INPUT>
```

##### 2. Assign the Virtual Disk Access

```
winrm i
DCIM_RAIDService?CreationClassName=DCIM_RAIDService+SystemName=DCIM:ComputerSystem+Name=DCIM:RAIDService+SystemCreationClassName=DCIM_ComputerSystem -
u:root -p:calvin -r:https://new-chassis/wsman -a:basic -SkipCNcheck -
SkipCAcheck -encoding:utf-8 -file:assign.xml
```

##### b. Run the configuration job

##### i. Construct an XML file as follows (called job.xml in this example):

```
<p:CreateTargetedConfigJob_INPUT xmlns:p="http://schemas.dmtf.org/wbem/wscim/1/cim-
schema/2/root/dell/cmc/DCIM_RAIDService">
  <p:Target>RAID.ChassisIntegrated.1-1</p:Target>
  <p:ScheduledStartTime>TIME_NOW</p:ScheduledStartTime>
  <p:UntilTime>20201111111111</p:UntilTime>
</p:CreateTargetedConfigJob_INPUT>
```

##### ii. Start the job

```
winrm i
DCIM_RAIDService?CreationClassName=DCIM_RAIDService+SystemName=DCIM:ComputerSystem+Name=DCIM:RAIDService+SystemCreationClassName=DCIM_ComputerSystem -
u:root -p:calvin -r:https://new-chassis/wsman -a:basic -SkipCNcheck -
SkipCAcheck -encoding:utf-8 -file:job.xml
```



## 4 Summary

By this time, using the tools readily available on a Windows based system, you should have learned how to clone the Shared Storage configuration of one VRTX chassis system onto another VRTX Chassis. This should greatly reduce the deployment time of your VRTX chassis with similar or identical storage configurations.

