Cisco VSM Deployment Guide for UCS S3260

Contents

Overview

This document describes deploying VSM VM instances on a UCS S3260 Server. Up to 4 VSM 7.9 (or later) VM instances can be deployed.

Once S3260 is setup, please use the following document to deploy the VMs.

http://www.cisco.com/c/dam/en/us/td/docs/security/physical_security/video_surveillance/network/vsm/vm/deploy/VSM-7x-vm-deploy.pdf

Setup Overview

By following the Installation instructions, the resulting setup will look as follows:

- 5 RAID Arrays in total:

  o 1 RAID1 Array

  o 4 RAID5/6 Arrays

- Virtual Drives

  o 9 Virtual Drives(VD) in total

  o 1 VD on RAID1

  o 8 VDs on RAID5/6

- Cisco customized ESXi 6.5 installed on the VD on RAID1.

  (Please follow instructions in STEP 2 to download and install an ESXi 6.5 patch on top of ESXi 6.5 installation)

Installation

Hardware and Software Requirements

Cisco S3260 supports up to 60 Drives. Instructions are available in this doc further.

Refer to the UCS C3260 data sheet.

For your reference, please find below ESXi limitations:

https://www.vmware.com/pdf/vsphere6/r65/vsphere-65-configuration-maximums.pdf

The versions of the software running on the S3260 for validation purposes is as follows:

1. C3160 BIOS

   BIOS Version: C3X60M4.3.0.3b.0.0325171543

2. CIMC Firmware Version

   Firmware Version: 3.0(3b)

3. RAID Controller info

BIOS Version:	6.30.03.0_4.17.08.00_0xC6130202
Firmware Version:	4.700.00-7248
Preboot CLI Version:	N/A
CNTRL-R version:	5.15-0611
Web BIOS Version:	N/A
NVDATA Version:	4.2510.01-0050
Boot Block Version:	3.09.01.00-0000
Boot Version:	N/A

4. ESXi – Vmware-ESXi-6.5.0-5969303-Custom-Cisco-6.5.1.1.iso

   (Please follow instructions in STEP 2 to download and install an ESXi 6.5 patch on top of ESXi 6.5 installation)

5. vCenter 6.5

6. vSphere Web Client is not supported by ESXi 6.5, please use a browser based ESXi client

Benchmarking Stats

We benchmarked S3260 on two different setups and providing the configuration in this document:

1. S3260 with single blade containing 56 4TB (512 native) HDDs, 28 CPU Cores and around 256 GB RAM

2. S3260 with single blade containing 56 10TB (512e) HDDs, 28 CPU Cores and around 256 GB RAM

VSM VMs were deployed on these S3260s in an ESXi based virtualized environment.

We deployed four VSM VM instances (VSM7.9.0-160i-RHEL6_UCS-BC.ova) on a single UCS S3260 server with single blade containing 56 HDD.

Every VSM VM is configured as Media Server only mode, each of these VM instances were tested with 200 cameras up to 200Mbps of video data written into the RAID arrays. Simultaneously each VM instance could support up to 50 Mbps of video data being requested by the client. In total, we tested 800 cameras, 800 Mbps of data can be written across 4 RAID arrays and 200 Mbps streamed out to the client, bringing the total throughput to 1000Mbps or 1Gbps per S3260.

While writing this doc, we do not support beyond 1000 cameras or 1000 Mbps on a single S3260. In addition, we do not support more than four VMs on a single S3260. We are benchmarking more setups for which we will keep on updating this document.

Benchmarking Setup

We validated Cisco VSM to run on the S3260 with 56 4TB HDDs and on a different S3260 with 56 10TB HDDs. A Cisco customized version of ESXi 6.5 is recommended for installing on this server, this contains the required drivers for optimal performance and stability. Always follow UCS S3260 guidelines and recommendations on the versions of firmware that need to be installed on this server.

Step 1 – Create RAID Arrays and Virtual Drives

Step 1.1 – Instructions to create RAID arrays and virtual drives on a S3260 with 4TB disks:

If you have 10 TB disks, ignore this step and jump to Step 1.2.

Create RAID5/6 Arrays either via CIMC or RAID BIOS interface. Change the settings for each RAID to the following:

Note: The following settings are not the default options. Please change them to the following values.

- `64K block size`
- `No Read Ahead`
- `Write Back with BBU Cached`

The following RAIDs were created using the 56 HDD available in the S3260 server:

- RAID 1 containing 2 Drives to install ESXi, approx. 4TB in size, the guideline here is to install ESXi on an array that is managed by the Hardware RAID controller just containing the OS only.

- 4 RAID5/6 Arrays each with 13 disks for VM and media repositories.

  Note: *In case of an S3260 with 60 disks, please create 4 RAID5/6 Arrays with 14 disks each.*

- We recommend to have 2 Global Hot spare Drives to stand in place if there is a drive failure on any of the RAID arrays.

- So our setup had 4 VMs using 52 HDD (13 x 4), 2 disks for ESXi and 2 disks as global hot spare drives making total to 56.

- In case of an S3260 with 60 disks, add additional disk to every VM. Create the 4 VMs using 56 HDD (14 x 4), 2 disks for ESXi and 2 disks as global hot spare drives making total to 60.

Note: We would recommend following ESXi 6.5 Configuration Maximums while creating RAID arrays.

 E.g. VMware doesn't support a partition of size greater than 64 TB with ESXi 6.5

Now, please follow these steps to create RAIDs and the Virtual Drives on them for the VMs.

1. Create a RAID1 array with 2 drives using the entire size of the array for the Virtual Drive. Name it VD_ESX. The ID of this VD should show up at 0.

2. Create a RAID5/6 array containing 13 drives (In case of S3260 with 60 HDD, create this array with 14 drives).

    a. Set the size to be 120GB for the first Virtual Drive. Name it as VD1_VM. This should show up at ID 1. This VD will be used for VM installation.

Physical Drives			Total 14
Physical Drive Nu...	Size (MB)	Status	Type
3	3814697 MB	Online	SAS
4	3814697 MB	Online	SAS
5	3814697 MB	Online	SAS
6	3814697 MB	Online	SAS
7	3814697 MB	Online	SAS

Virtual Drive Properties

Name:	VD1_VM	Disk Cache Policy:	Unchanged	
RAID Level:	RAID 5	Write Policy:	Write Back Good BBU	
Access Policy:	Read-Write	Strip Size (MB):	64 KB	
Read Policy:	No Read Ahead	Size	119999	MB
Cache Policy:	Direct IO			

Save Changes   Close

    b.   Create another VD on the same RAID array using the remaining size of the array. Name it as VD1_MED. This should show up at ID 2.

    Note: If the S3260 has 60 HDD, please create these RAID arrays with 14 drives still using 120GB for VD1_VM and rest of the array for VD1_MED.

3.   Repeat Step 2 for each new RAID array, naming each of the other RAID arrays as VDx_VM with IDs 1, 3, 5 and 7 and VDx_MED with IDs 2, 4, 6 and 8.

4.   You need these IDs to map the data stores at VM back to the actual RAID arrays and verify the setup.

Step 1.2 – Instructions to create RAID arrays and virtual drives on a S3260 with 10TB disks:

Create RAID5/6 Arrays either via CIMC or RAID BIOS interface. Change the settings for each RAID to the following:

Note: The following settings are not the default options. Please change them to the following values.

- `64K block size`
- `No Read Ahead`
- `Write Back with BBU Cached`

The following RAIDs were created using the 56 HDD available in the S3260 server:

- RAID 1 containing 2 Drives to install ESXi, approx. 4TB in size, the guideline here is to install ESXi on an array that is managed by the Hardware RAID controller just containing the OS only.

- 4 RAID5/6 Arrays each with 7 disks for VM and media repositories.

- We recommend to have 2 Global Hot spare Drives to stand in place if there is a drive failure on any of the RAID arrays.

  Till the above steps, the RAIDs are good enough to create 4 VMs. Follow below 2 steps to create RAID arrays for additional media partitions.

- In the case of 3260 with 56 10 TB disks, create 4 RAID5/6 Arrays each with 6 disks each for additional media partitions (/media2, /media3…) consuming rest of the 24 disks.

- In the case of 3260 with 60 10 TB disks, create 4 RAID5/6 Arrays each with 7 disks each for additional media partitions (/media2, /media3...) consuming rest of the 24 disks.

- After installing VM, the setup will have 4 VMs using 28 HDD (7 x 4), 24 HDD for 4 media partitions, 2 disks for ESXi and 2 disks as global hot spare drives. In the case of a 56 drive server, four arrays with 6 x 10TB drives (24 HDD), and in the case of a 60 drive server, four arrays with 7 x 10TB (28 HDD) can be added to the VMs as extra storage repositories.

Note: We would recommend following ESXi 6.5 Configuration Maximums while creating RAID arrays.

E.g. VMware doesn't support a partition of size greater than 64 TB with ESXi 6.5

Now, please follow these steps to create RAIDs and the Virtual Drives on them for the VMs.

5. Create a RAID1 array with 2 drives using the entire size of the array for the Virtual Drive. Name it VD_ESX. The ID of this VD should show up at 0.

6. Create a RAID5/6 array containing 7 drives.

   a. Set the size to be 120GB for the first Virtual Drive. Name it as VD1_VM. This should show up at ID 1. This VD will be used for VM installation.

Physical Drives   Total 7

Physical Drive Nu...	Size (MB)	Status	Type
3	9536743 MB	Online	SAS
4	9536743 MB	Online	SAS
5	9536743 MB	Online	SAS
6	9536743 MB	Online	SAS
7	9536743 MB	Online	SAS

Virtual Drive Properties

Name:	VD1-VM	Disk Cache Policy:	Unchanged
RAID Level:	RAID 5	Write Policy:	Write Back Good BBU
Access Policy:	Read-Write	Strip Size (MB):	64 KB
Read Policy:	No Read Ahead	Size	120000 MB
Cache Policy:	Direct IO		

Save Changes   Close

   b. Create another VD on the same RAID array using the remaining size of the array. Name it as VD1_MED. This should show up at ID 2.

7. Repeat Step 2 for each new RAID array, naming each of the other RAID arrays as VDx_VM with IDs 1, 3, 5 and 7 and VDx_MED with IDs 2, 4, 6 and 8.

8. You need these IDs to map the data stores at VM back to the actual RAID arrays and verify the setup.

9. For additional media partitions, create 4 RAID 5/6 Arrays. Name it as VD1_MED2.

   Create 3 more Arrays naming them VD2_MED2, VD3_MED2, VD4_MED2.
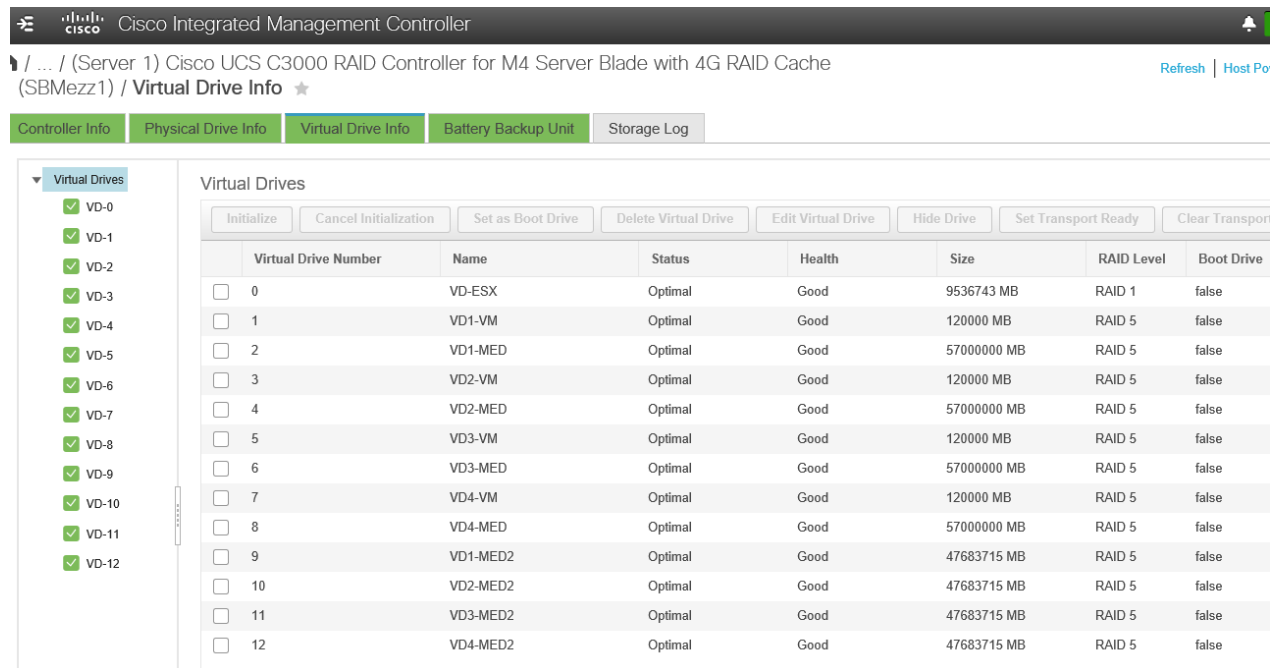
We will use these arrays VDx_MED2 as extra media partitions.

10. Finally the RAIDs will look like below screen shot (This is a 56 x 10TB HDD server)

Please Note: There are only 2 VDs per RAID5/6 array, one for VM and the other for media repository. There is no other VD on the array and we DO NOT support as well. By doing this, we are ensuring the required performance at the storage level is not overloading the array with too many writes/reads from multiple VMs.

Multiple VMs writing into the same RAID array create performance bottle necks, deteriorating the latency for read/write to disk. Poor latency results in dropped frames while writing and reading from the disk. In the snapshot of the RAID BIOS showing VDs, see that each RAID5/6 group contains only one disk for the VM and one disk for the media repository. And also by assigning more than one VM to the same RAID array, a failed array can bring down more cameras.

Step 2 – Installing ESXi

Install the S3260 customized ESXi 6.5 on the VD_ESX drive by following the on screen instructions. Please follow the instructions from VMWare on installing ESXi

https://docs.vmware.com/en/VMware-vSphere/6.5/com.vmware.vsphere.install.doc/GUID-93D0227B-E5ED-40B0-B8E2-71141A32EB00.html

Note: Once you install ESXi 6.5, please download and install a patch on top of ESXi 6.5. Please note this patch is a **MUST** for ESXi 6.5. Please find below build details of the patch:

On the VMware patch download site, download patch with Build Number **7388607** and install it on top of ESXi 6.5. Please reboot the host once you install the patch. Please note this patch is only for ESXi 6.5 not for other versions of ESXi. For other versions of ESXi, please check with VMware.

Step 3 – Adding Host to vCenter

If there is an existing vCenter, add this host to that vCenter. If not, please follow VMWare instructions on installing and configuring vCenter, compatible with ESXi 6.5. Install required VMWare licenses to run ESXi on the host.

We performed below steps with ESXi on a browser.

Step 4 – Importing RAID Arrays into ESXi

Open ESXi on a browser, on the Navigator pane on left side, click on Storage from the list of items on the left side of the page and then click on Datastores.

Figure 5
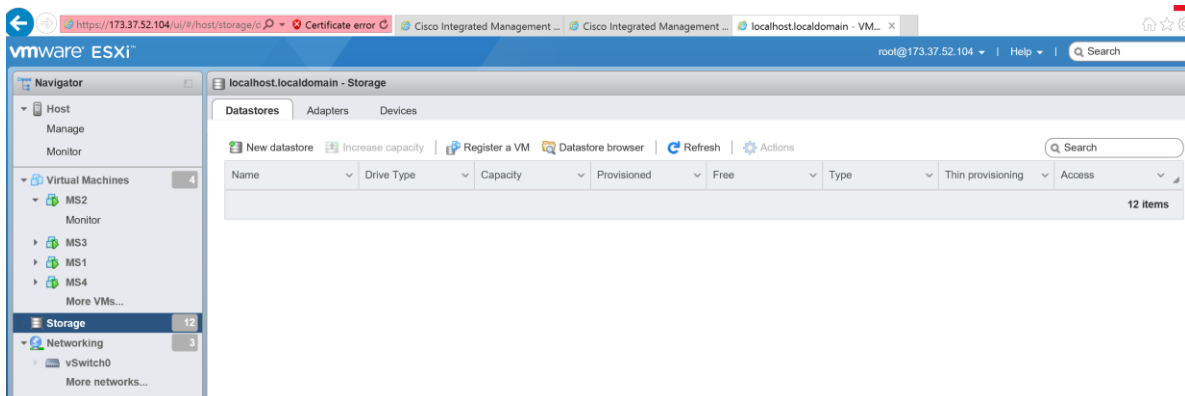
Step 5 – Datastores

Click on New datastore→ Create new VMFS datastore and start adding datastores.

Under DataStores on the same page on vCenter, click on "Add Storage" to start adding these device as disks to deploy the Cisco VSM VM.
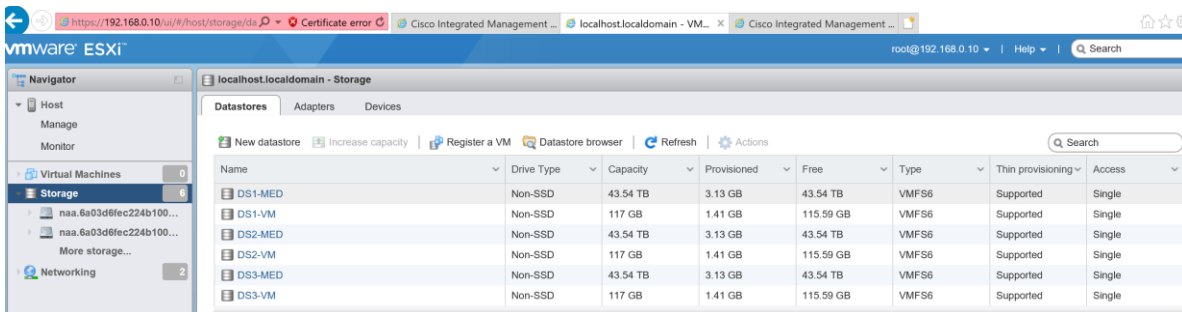
The suggested naming convention is as follows:

1. Add device with name DS1-VM that is approx. 120GB in size. This data store will be used to contain the VM.

2. Add device with name DS1-MED that is approx. 44 TB (RAID5) in size. This data store will be used to contain the media repository.

3. Now repeat steps 1 and 2 for all 4 VMs adding them as DSx-VM and DSx-MED for the remaining VM instances.

This convention helps to track a storage device all the way down to the RAID Array.

A sample screenshot of "Add Storage" section is below – for a 56 x 4TB HDD server:

Figure 6

You should be able to see total 8 data stores for 4 VMs

4. On the S3260 with 10TB disks create extra data stores naming them DSx–MED2, it should look like following:

You should see 12 data stores.
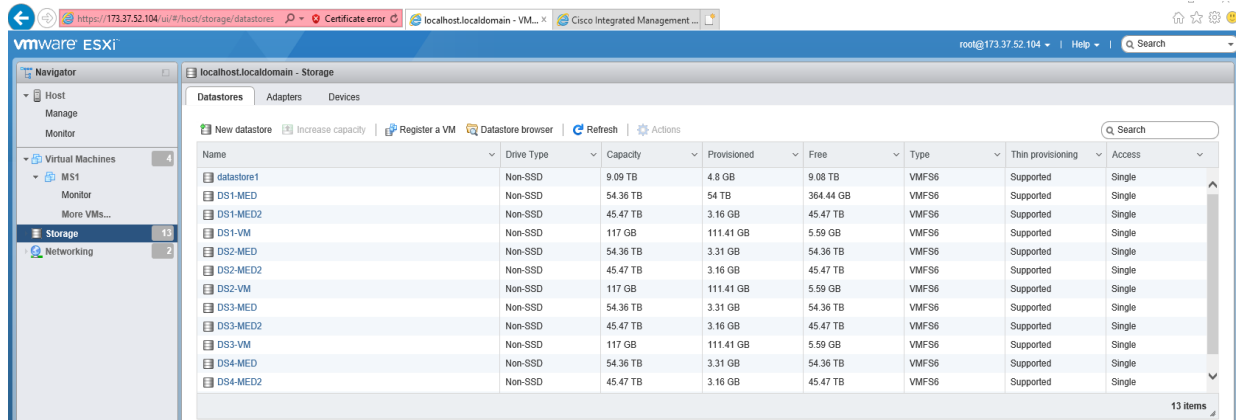
Step 6 – Deploying the OVA

When the first OVA is deployed, pick DS1_VM as the datastore. Following this convention, second OVA is deployed on data store named DS2_VM and so forth.

Following are the screen shots while deploying an OVA:
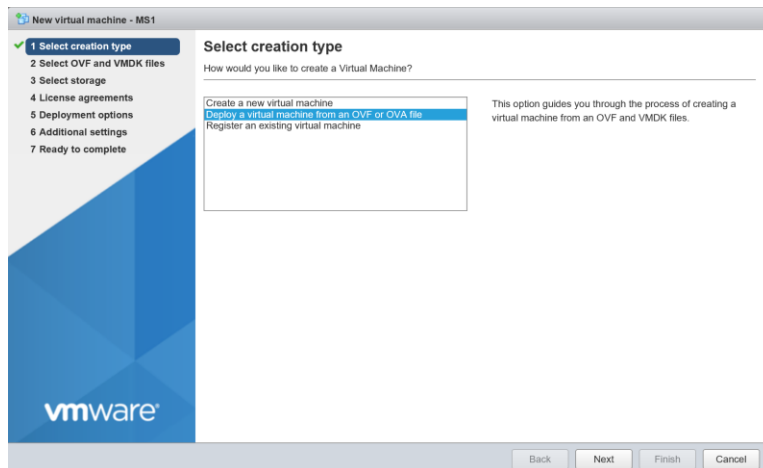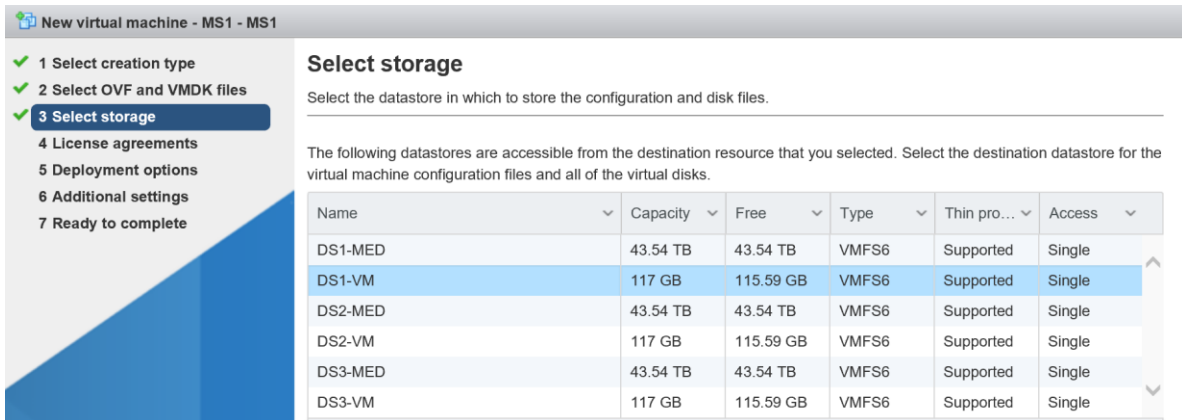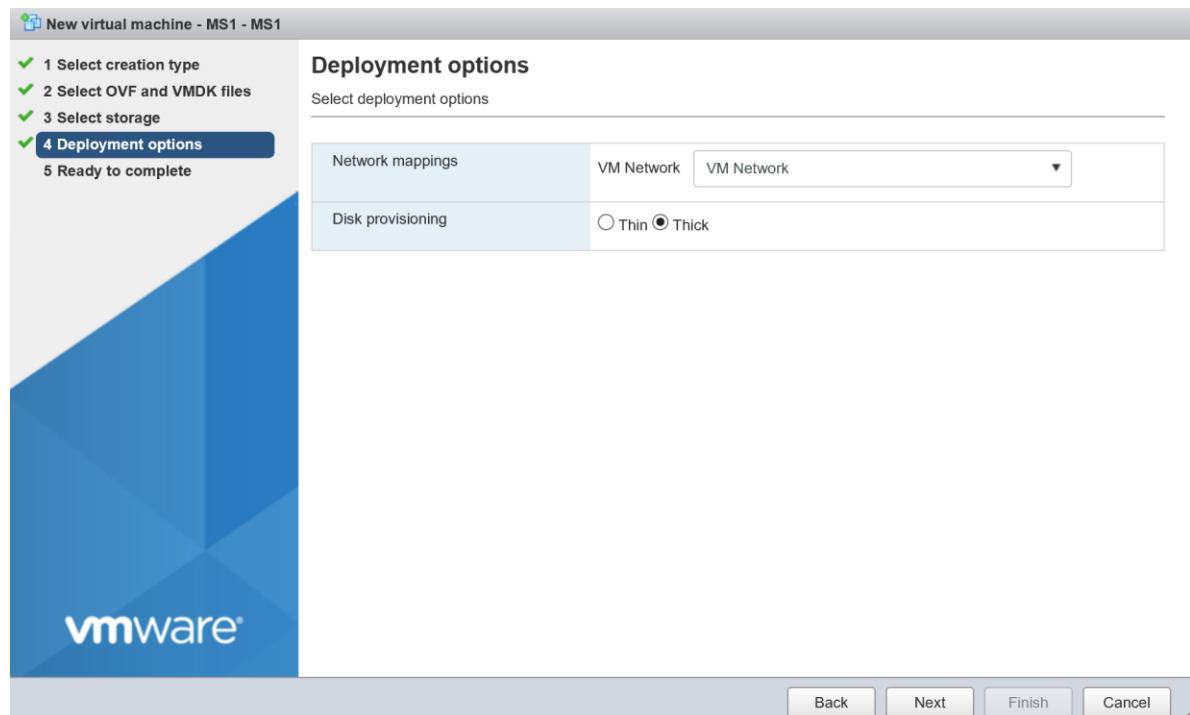
Figure 8

Please make sure to select disk provisioning as Thick:

Figure 9
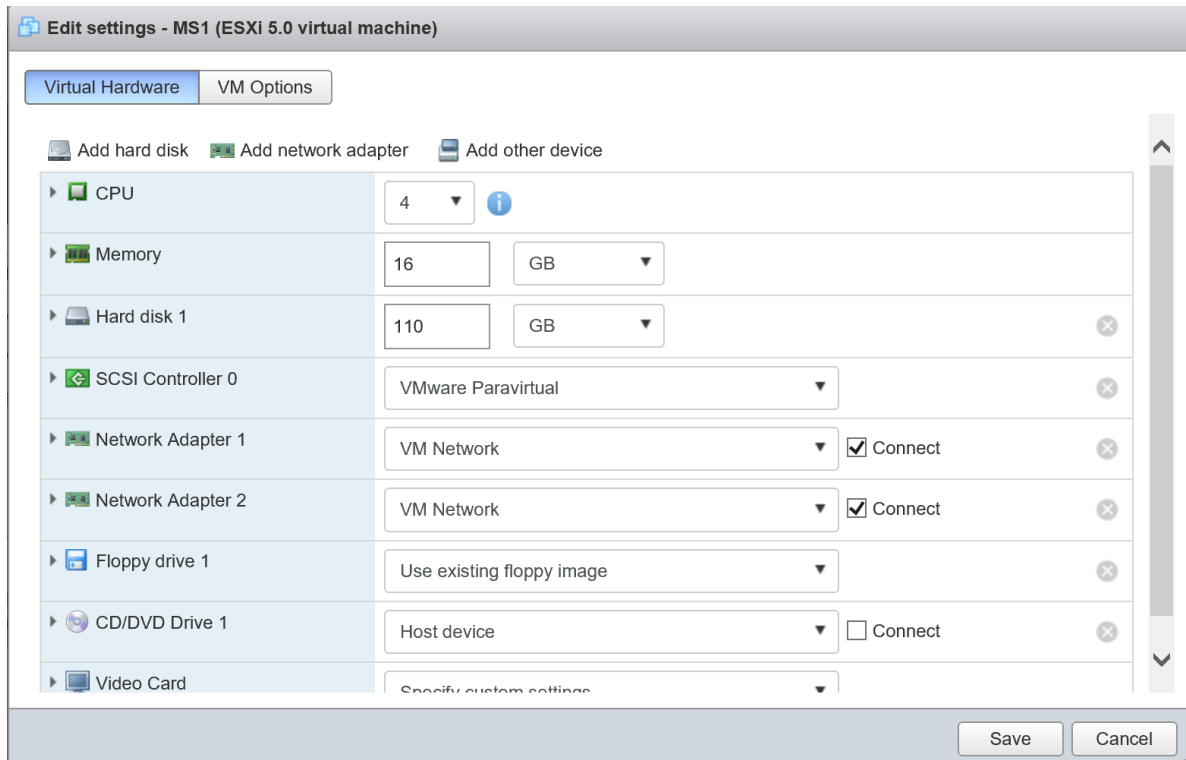
Step 7 – Allocating more memory to every VSM VM

By default 11GB memory is allocated to a VM, please increase it to 16 GB

Step 8 – Adding Media Repositories to the VSM VM

Once VM is deployed, it is time to add media repositories. On the first VM, add DS1-MED datastore as the hard disk. Similarly, on the second VM, add DS2-MED as the hard disk, and so forth.

By doing this, we have ensured that we are not reusing the same datastore and hence the same RAID array on more than one instances of the VSM.

Select the VM and click on **Add hard disk → New Hard disk:**

Figure 10

Following screen shows up:

Once you click on Browse button, following screen shows up. Please select **DS1-MED.**
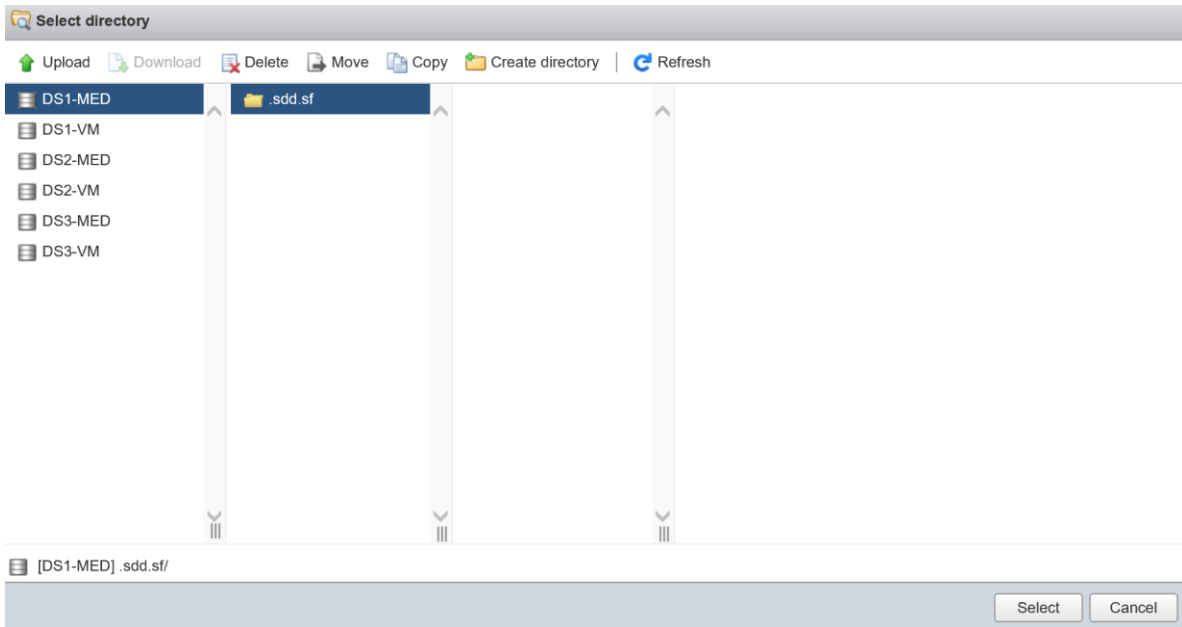
For Disk Provisioning select **Thick provisioned, lazily zeroed**. DO NOT select Thin provisioned.
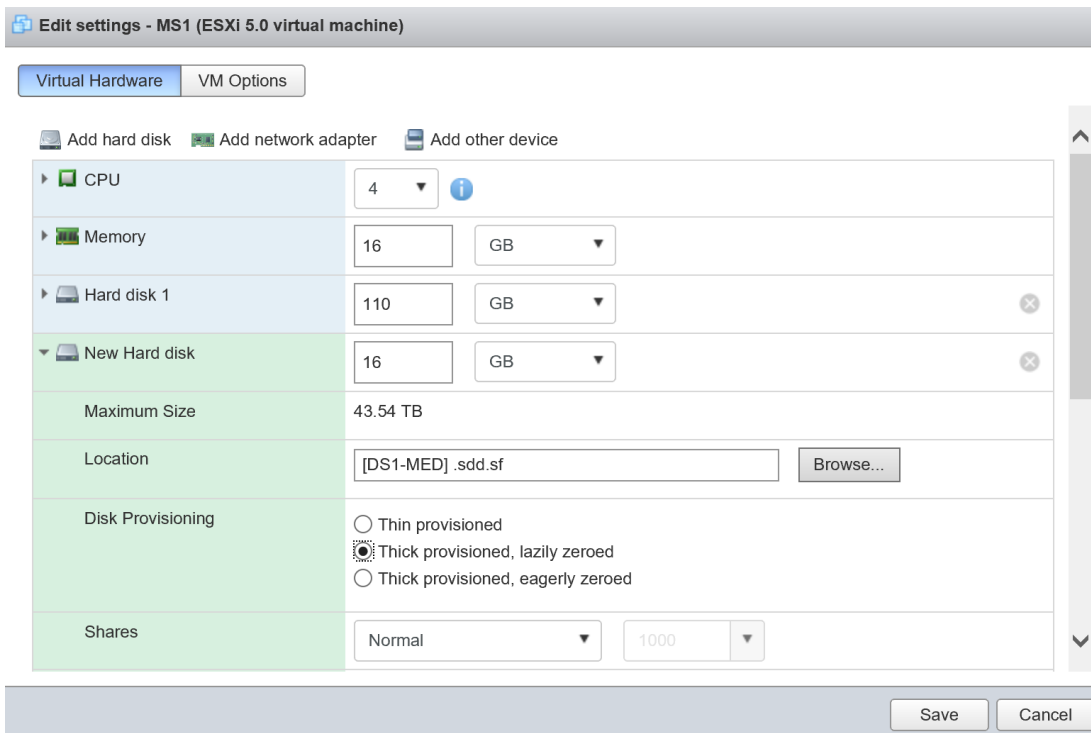
Repeat steps 6, 7 and 8 for all the 4 VMs.

If your server is a S3260 with 10TB HDD, please add extra data stores to create more media partitions

Step 9 – Validating the Setup

Go back and verify there is only a 1 – 1 mapping between Cisco VSM instance and the underlying storage using Table 1. Make sure no two VMs use the same VD. Following the convention mentioned in Table 1 we ensure the RAID arrays are not shared across VMs.

Troubleshooting

Check latency

It is recommended that average write latency does not exceed 20 ms. If the average write latency is higher, it can show up as dropped frames by the recorder. And the cameras with dropped frames may be RED with status message indicating frame drops.

Write latency can be verified at each VM level or at the host level on the performance charts. The issue may be localized to a single VM / RAID array or to the entire RAID arrays under a host bus adapter.

http://kb.vmware.com/selfservice/microsites/search.do?language=en_US&cmd=displayKC&externalId=2001003

Notes

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