VPLEX Management

July 2015

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Lab Exercise 1: VPLEX Cluster Health Check

Purpose:	This Lab will verify the overall VPLEX Metro Cluster Health

Tasks:	**Health Check using Unisphere** **Health Check using VPLEX CLI**

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Lab 1: Part 1 – Health Check with Unisphere

Step	Action
	In this Lab, we will verify the Health and configuration of the VPLEX Cluster. We will check: • VPLEX Cluster Health • FE and BE connectivity • Storage Volume ITLs Use the student Lab Map to obtain the following addresses, along with the user/password • Student Windows Host • VPLEX Cluster Management Address
1.	Log in to your Windows host.
2.	Launch a Web browser session to the VPLEX Cluster Enter the user/password from the student Lab Map

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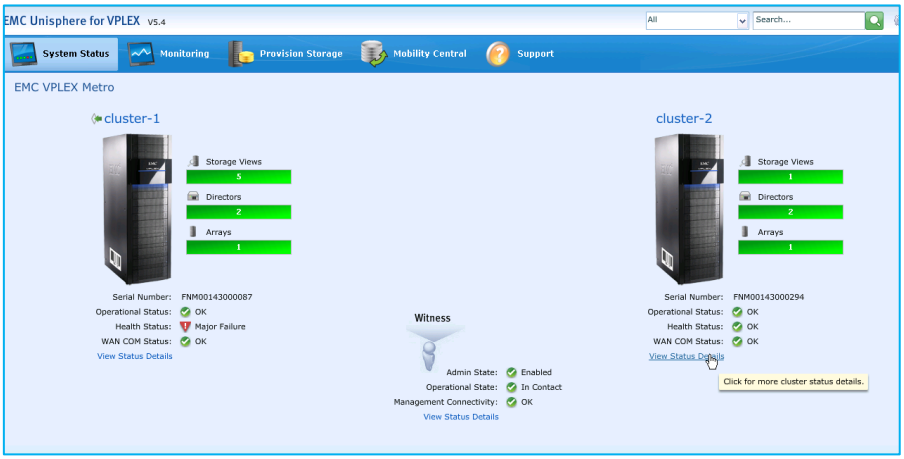
Step	Action
3.	Verify VPLEX Cluster Health From the opening screen the general Status of the VPLEX Cluster can be viewed.  From this screen connectivity from Cluster1 to Cluster 2 and VPLEX Witness can be verified. (Metro Only) The status of the cluster hardware and connectivity to the arrays can also be checked. *Notice the arrow next to the cluster's management server that you are connected to.*
4.	Click the **view status details** link under the icon for Cluster-1 or 2 Verify the cluster status.

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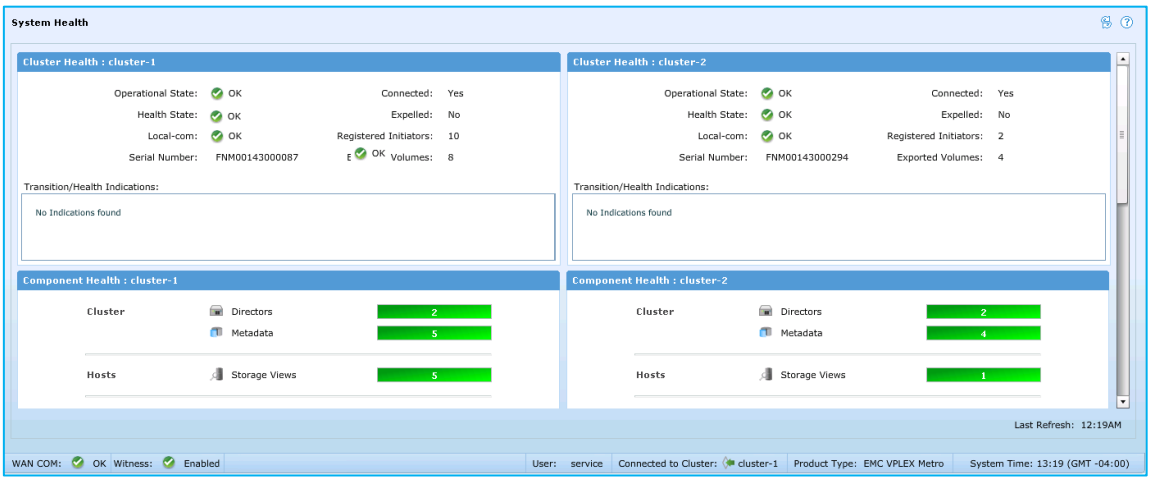
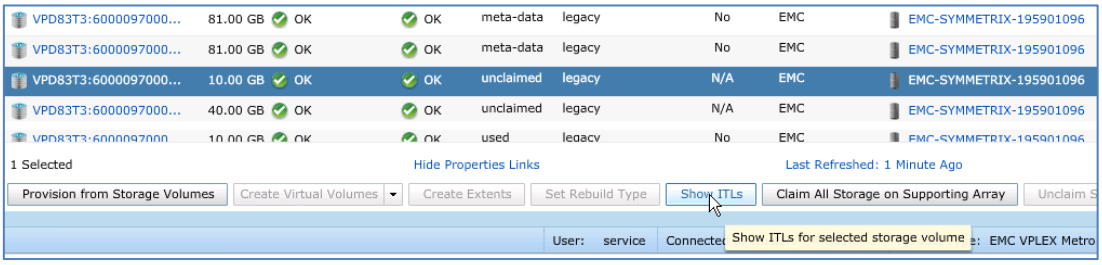
Step	Action
5.	Select Monitoring Select System Health Wait until the test completes
6.	View the status of the VPLEX Cluster 
	The next steps will verify the health and connectivity of the array volumes connected to VPLEX.
7.	Select **Provision Storage** from the top tool Bar. Next Select your assigned **Cluster (1 or 2)** Select **Storage Volumes**

Step	Action
8.	Select Any Storage Volume  ON the bottom of the window, select **Show ITLs**

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Step	Action
9.	Here is an example of the display

Show ITLs

Storage Volume Name: VPD83T3:60000970000195901096533030313841

System ID: VPD83T3:60000970000195901096533030313841

ITLs Find Previous Next

Initiator	Target	LUN
0x50001442a0633010	0x5000097310112180	34
0x50001442a0633010	0x5000097310112184	34
0x50001442a0633011	0x5000097310112184	34
0x50001442a0633011	0x5000097310112180	34
0x50001442b0633010	0x5000097310112184	34
0x50001442b0633010	0x5000097310112180	34
0x50001442b0633011	0x5000097310112180	34
0x50001442b0633011	0x5000097310112184	34

0 Selected 8 items

Close

Use the information from your display to answer the following:

How many ITLs are displayed for this storage volume? _____

Is this optimum?_____

Does this give an indication of zoning? _____

Is this configured for an Active-Active Array or Active-Passive? _____

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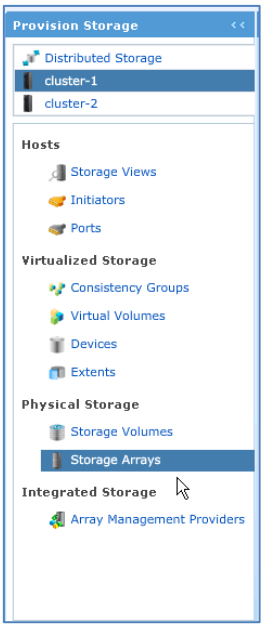
Step	Action
10.	Located in the left most window under Physical Storage, select **Storage Arrays** 
11.	Verify that the connectivity has a green check mark. Note the Logical Unit count.
12.	Select Storage Volumes (left window) The total number of Storage Volumes are located in the right corner. Notice the amount match

End of Lab Exercise

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Lab 1: Part 2 - Health Check with VPLEX CLI

Step	Action
	This lab will verify the VPLEX Cluster health using VPLEX CLI
1.	Log on to your Windows Management host
2.	From the desktop launch Putty and connect with SSH to your assigned VPLEX Cluster.
3.	Log into the management server (seel lab map for the user/password) Launch vplexcli service@VPLEX-Cluster1:~> vplexcli Next log into VPLEX CLI
4.	Run the Health check command VPlexcli:/> `health-check` Notice this command displays the overall health of the cluster. It also provides the code version, and TLA number for each cluster.
5.	Change to the storage volume context for your assigned cluster. VPlexcli:/> `cd clusters/cluster-1/storage-elements/storage-volumes`

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Step	Action
6.	Perform an ll `ll`
7.	Displayed is a list of the storage volumes attached to this cluster. Chose a storage volume and perform an ll for that volume. VPlexcli:/clusters/cluster-1/storage-elements/storage-volumes> `ll VPD83T3:60000970000195901096533030344539` Notice that the exact block size is displayed. Also the number of ITLs that were viewed earlier.
8.	Change back to the root context. VPlexcli:/clusters/cluster-1/storage-elements/storage-volumes> `cd /`
9.	Run the cluster summary command VPlexcli:/> `cluster summary` Notice that the clusters are assigned the same Island ID. This is an indication that the clusters are connected. If each one had a unique ID they are

End of Lab Exercise

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Lab Exercise 2: Provisioning with VPLEX

Purpose:	To provision Local Storage from a VPLEX cluster to a host using Advanced Provisioning.

Tasks:	**Register Host initiators with VPLEX** **Create Virtual Volumes from Storage** **Create Storage Views**

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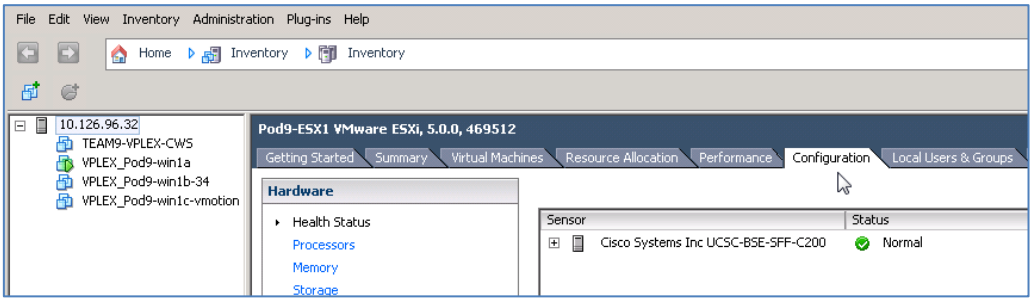
Lab 2: Part 1 – Register Host Initiators

Step	Action
	This Lab will discover and verify the connectivity of the VPLEX Front End Ports Use the student Lab Map to obtain the following addresses, along with the user/password • Student Windows Host • VPLEX Cluster Management Address • ESX Server address user/password
1.	Connect to your assigned Windows Host.
2.	From the desktop, Open VSphere Client and connect to your ESXi Host. (not VCenter Server) See student lab map for login information.
3.	Select the ESX Host in the left window. Select the Configuration Tab. 

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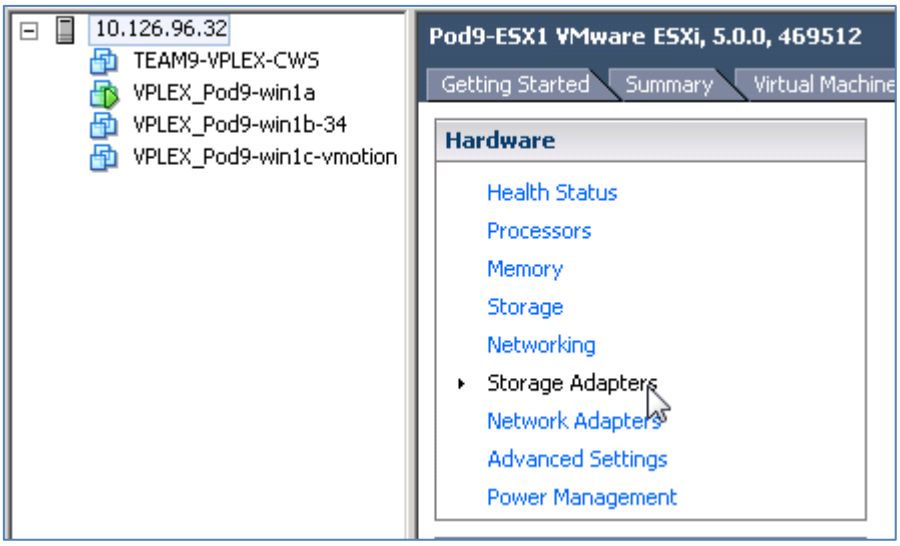
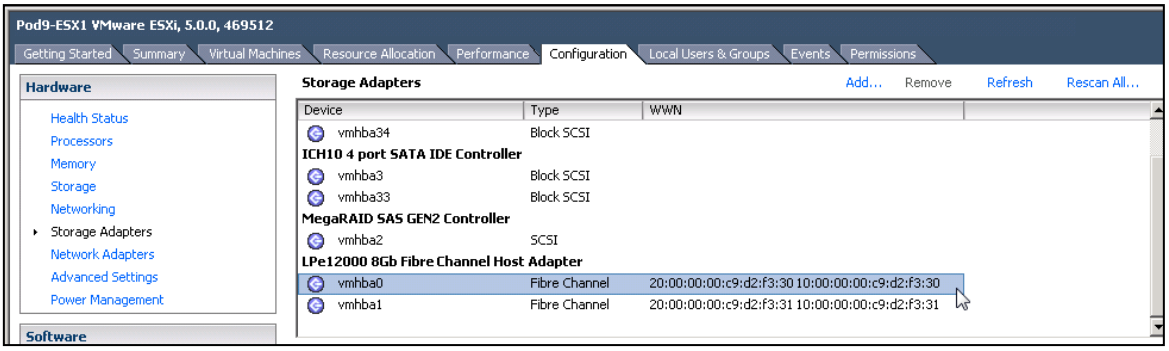
Step	Action
4.	Under Hardware, select the Storage Adapters link. 
5.	In the Right side window Storage Adapters, scroll down to view the Fibre Channel Adapter.  Record the WWNs
6.	From your **Windows** host, launch an SSH session to your assigned VPLEX Cluster. (Putty is installed on the desktop)
7.	Log in using the user/password from the student lab map.

Step	Action

8.	View the initiator port logins to the VPLEX front-end target ports.
	
	VPlexcli:/> `export initiator-port show-logins *`
	
	`Plexcli:/> export initiator-port show-logins *`
	`0012482006c9791`
	`Cluster Names  Initiator Port Names  Target Port Names`
	`----------  ----------  ----------`
	
	`cluster-1  UNREGISTERED-0x50012482006c9791  P0000000047606330-A0-FC00`
	`P0000000047606330-A0-FC01`
	`P0000000047706330-B0-FC01`
	`P0000000047706330-B0-FC00`
	
	This command will display the host initiators that are connected or zoned to the VPLEX Front End Ports
	
	This example displays 1 fabric of an ideal SAN configuration for a single engine
	
	The other would contain a different HBA connected to the remaining 4 FE ports.
	
	Your display should show the WWN's of the ESX server's HBA's viewed earlier.

9.	Log in to Unisphere for VPLEX by entering the Cluster Management address. https://<Management_Station_IP>
10.	Select **Provision Storage**
11.	Select your assigned **Cluster** (1 or 2)

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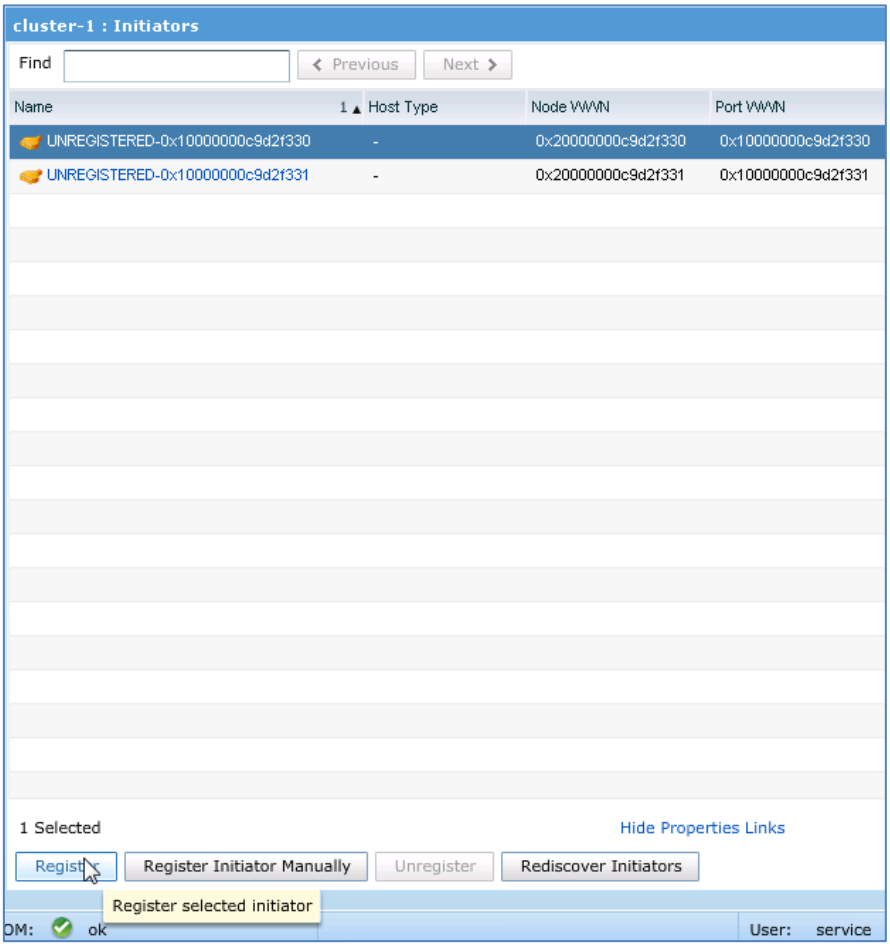
Step	Action
12.	Select **Initiators**
13.	Find the WWN of your assigned ESX Host. If listed as unregistered Select it and Click Register If it is already registered click on the link for the initiators and view the properties 
14.	If there no more unregistered initiators , click on the link for the initiators and view the properties

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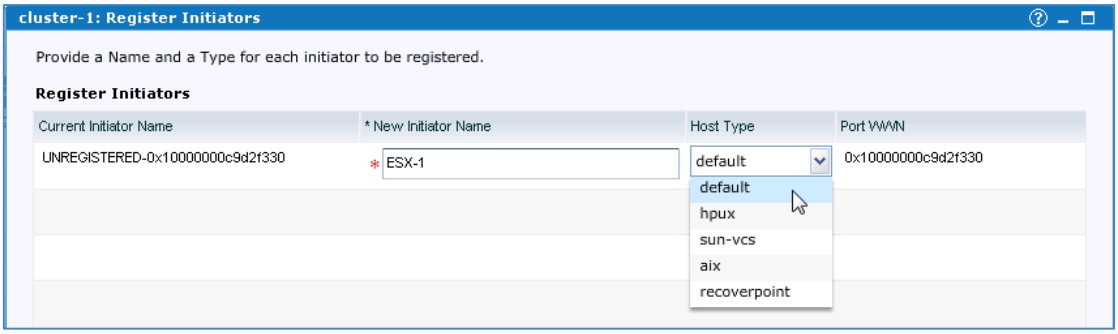
Step	Action
15.	Enter a unique **Initiator name** (You can use your student number for example student1) Chose the **default** host type Click **OK** 

End of Lab Exercise

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Lab 2: Part 2 – Provision Storage

Step	Action
	This lab will use the advanced provisioning method to create a Virtual Volume from an unclaimed Storage Volume masked to VPLEX and provision it to a Host (ESX). It is important that you choose your assigned volumes during the lab exercises. There may be other students sharing the VPLEX Cluster and ESX host at the same time. Use the student Lab Map to obtain the following addresses, along with the user/password • Student Windows Host • VPLEX Cluster Management Address • ESX Server address user/password • Assigned Storage Volumes
1.	Log on to your assigned Windows host
2.	Open a web browser session to Unisphere for VPLEX. Use your assigned Cluster IP address Log in using the user/password from the LAB Map.
3.	Select **Provision Storage**
4.	Select your assigned **Cluster** (1 or 2)
5.	Select **Storage Volumes**
6.	This window should display the storage volumes connected to VPLEX from the Array(s). Notice in the Use column the listings are: claimed, unclaimed, used or meta-data. Select an **assigned** storage volume that is unclaimed. (refer to the student lab map)

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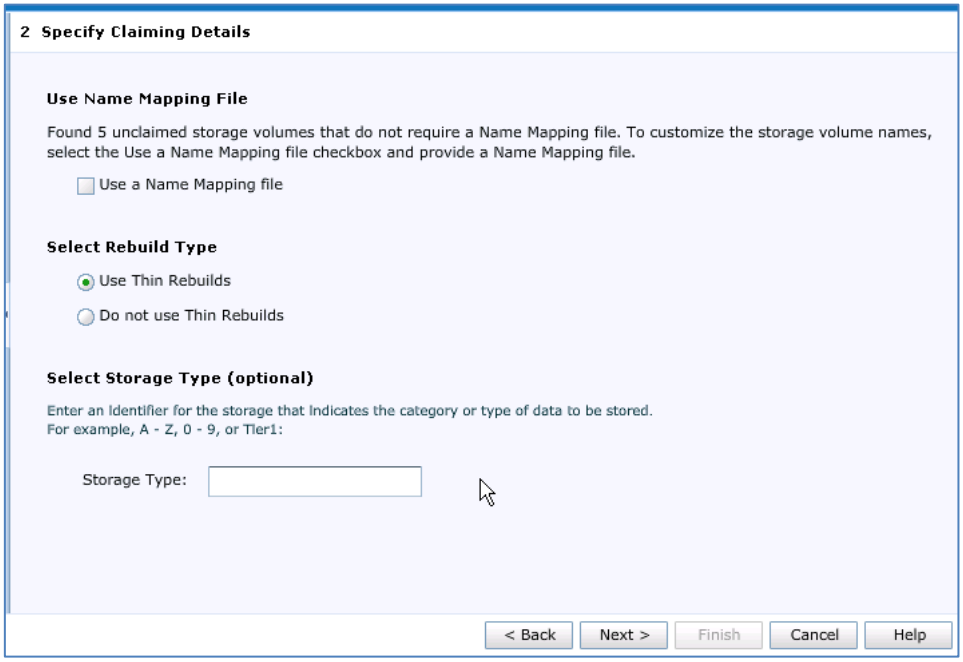
Step	Action
7.	Select Claim All Storage on Supporting Array A wizard should launch.
8.	Choose your assigned Array. Click **Next**
9.	From the Specify Claiming Details step: Do **not** Select the box **Use a Name Mapping file** Select **Use Thin Rebuilds** Click **Next** 

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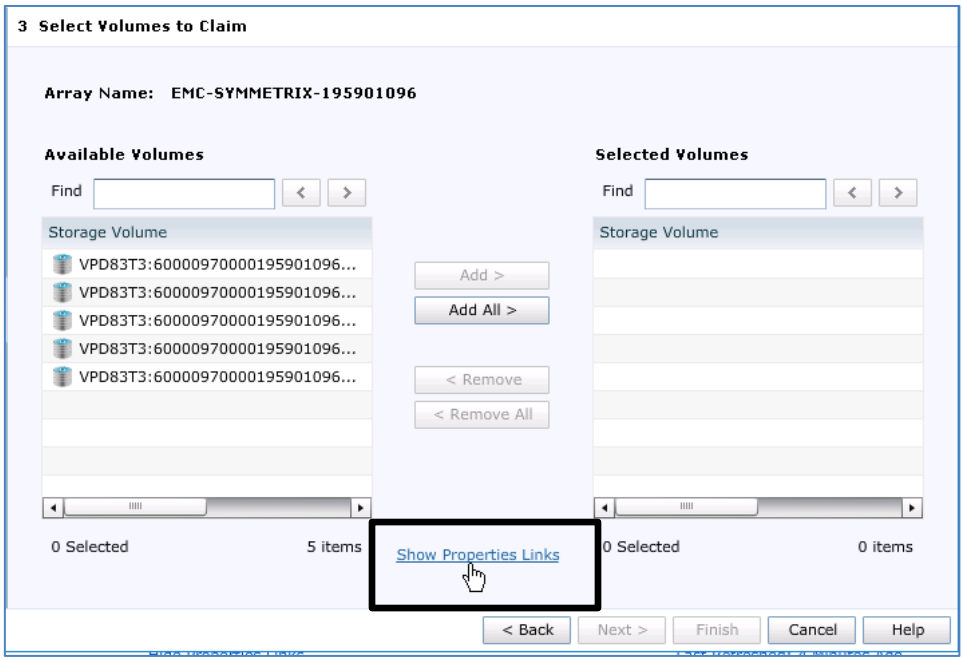
Step	Action
10.	Next is the Select Volumes to Claim step. The volumes presented as a choice are the unclaimed Storage Volumes masked to VPLEX from the selected array. Click on the Show Properties Links so that the Storage Volumes (VPDXXX..) become links. 

Step	Action
11.	Click on a Storage Volume link. The Properties box appears. **Storage Volume Properties** Storage Volume Name: VPD83T3:60000970000195901096533030344530 Use: unclaimed Used By: n/a Storage Volume Type: traditional Storage Array: EMC-SYMMETRIX-195901096 Vendor: EMC Provision Type: legacy Thin Rebuild: N/A System ID: VPD83T3:60000970000195901096533030344530 Block Count: 5243040 Block Size: 4K Capacity: 20 GB Largest Free Chunk: 20 GB Notice this lists the size of the Storage Volume. Use this method to Identify your assigned Storage Volume size. (See Student Lab Map)

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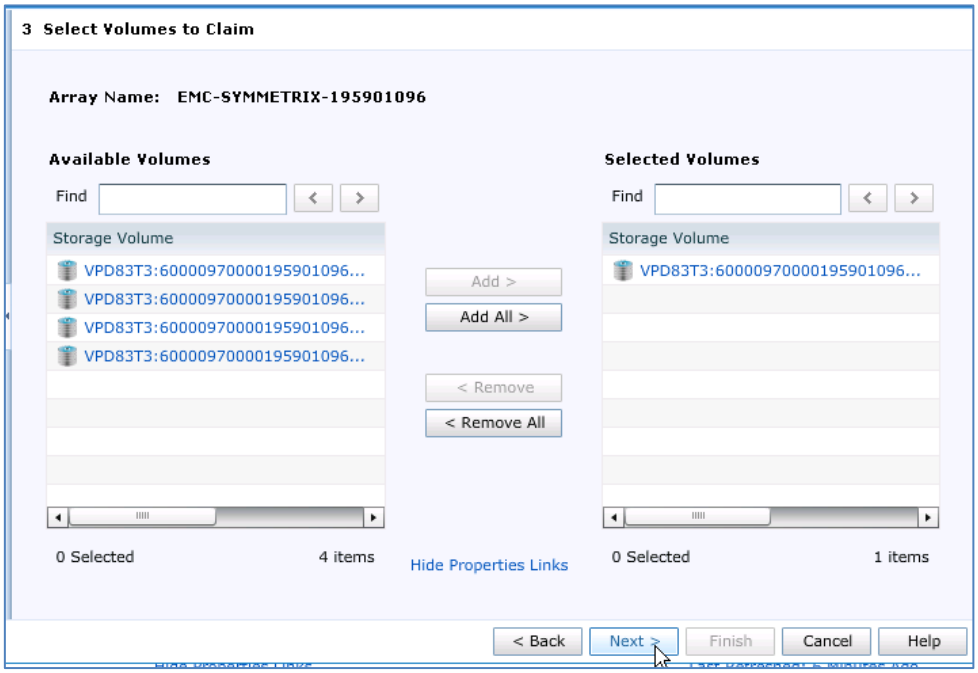
Step	Action
12.	Once you have identified an assigned storage volume, select it and click Add. This will move the Storage Volume to the right box.  Click **Next**

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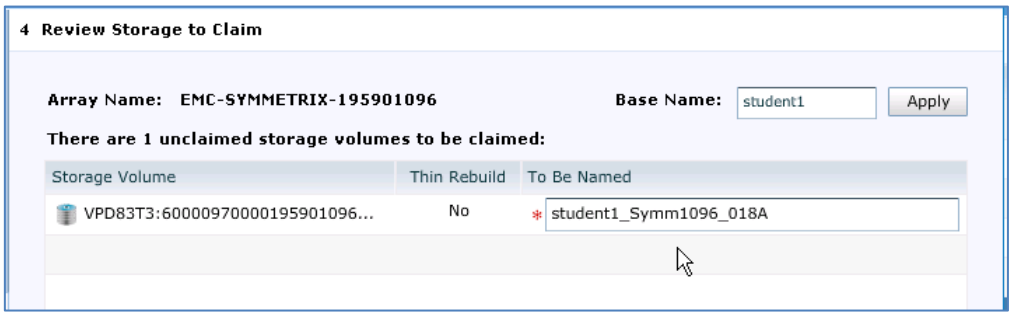
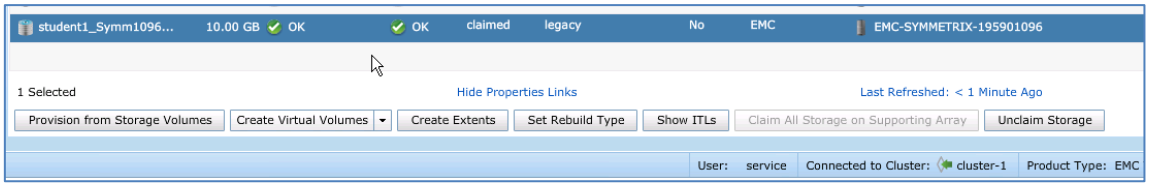
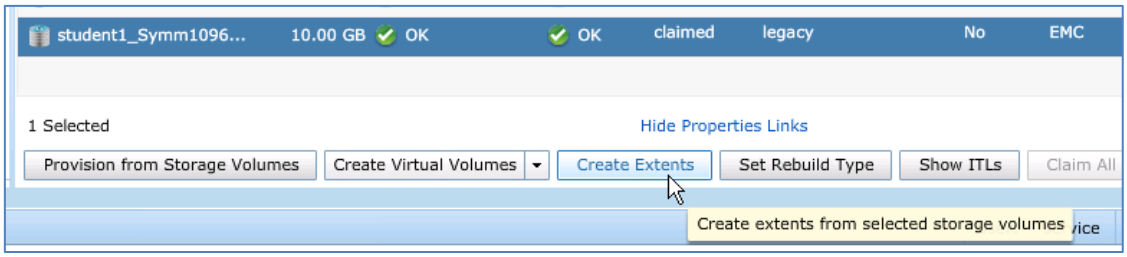
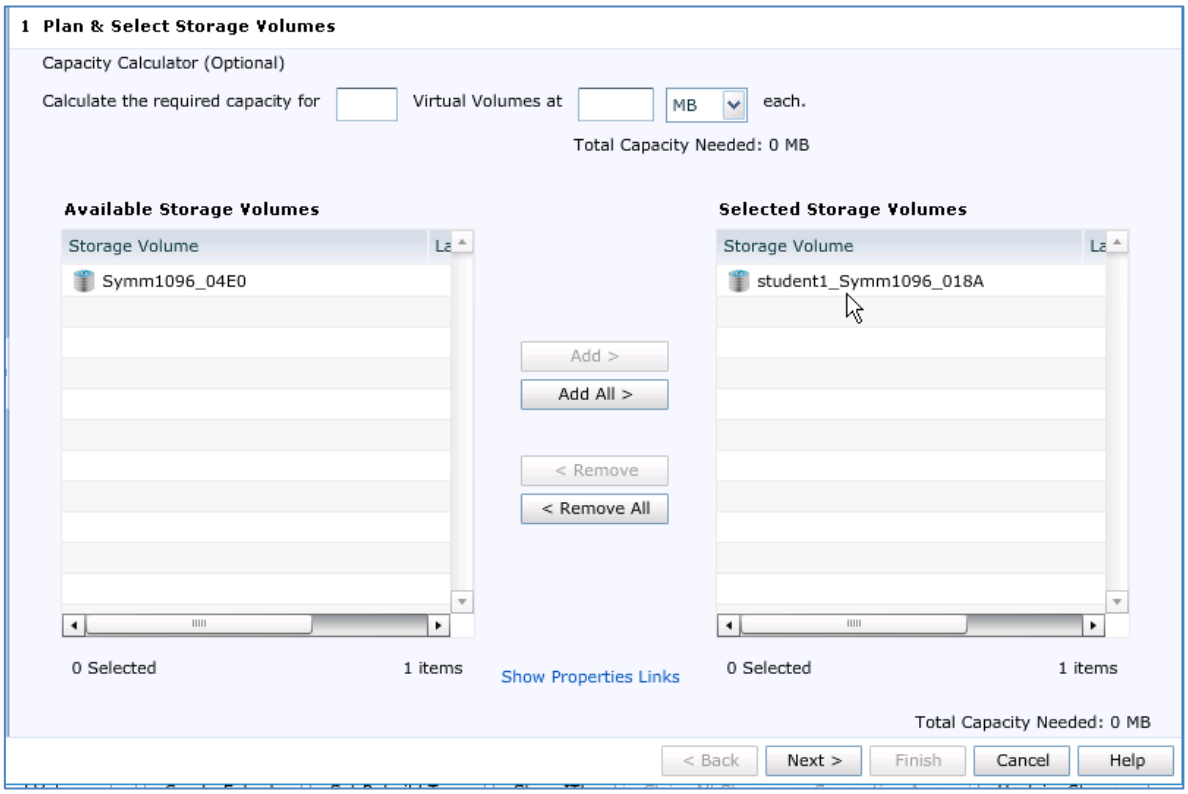
Step	Action
13.	The Review Storage to Claim step appears. This step allows the user to name the Storage Volumes. The default name is array type dependent. In the **Base name box** enter your assigned student number, for example "**student1**". Click Apply Notice the default name was appended to include the base name. This works well for identifying large numbers of volumes of a certain type. If desired you can alter the default name for your own identification. Leave the base name with the student number.  Click **Commit** Click **Close**
14.	The Wizard will close and the window will display the new storage volume as claimed and with the new name. 
15.	**Extent Creation**. **Select** the previously claimed Storage Volume.

Step	Action
16.	Click **Create Extents** 
17.	The Wizard should Launch. Notice the selected Storage Volume is already over to the right.  Verify this is correct and Click **Next**.

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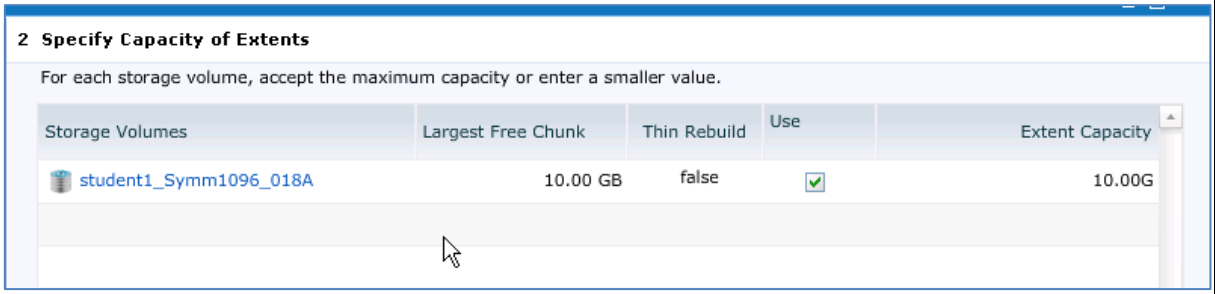
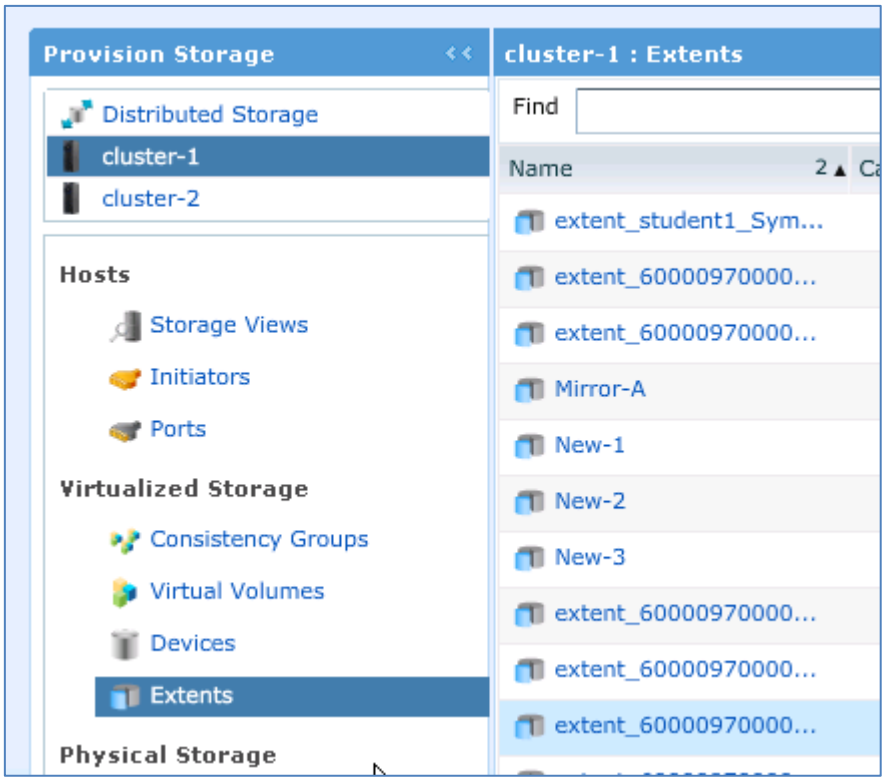
Step	Action
18.	Next you will specify the Capacity of the Extents. This step allows the size of the extent to be configured. Notice the default setting is to use the entire Storage Volume to create the Extent. This can be changed by unselecting the box in the **Use** column and entering the desired size. For this lab we will keep the default settings and use the maximum size. This is also the setting if the Storage Volume has existing Data on it that is to be retained.  Click **Next** Click **Commit** Click **Close**

Step	Action
19.	From the left Window **Provision Storage** select **Extents**  The Extent will have the storage volume name preceded by extent. View the extent previously created.

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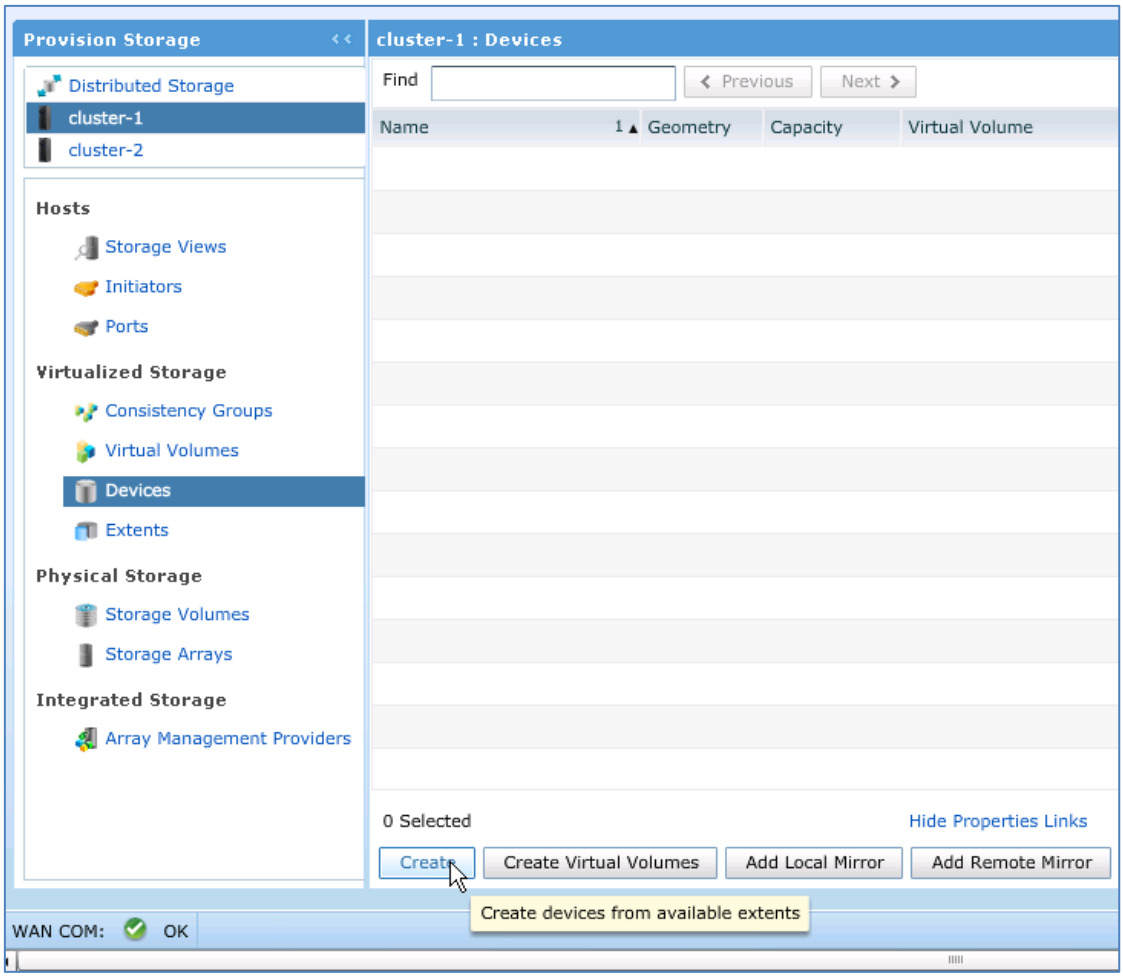
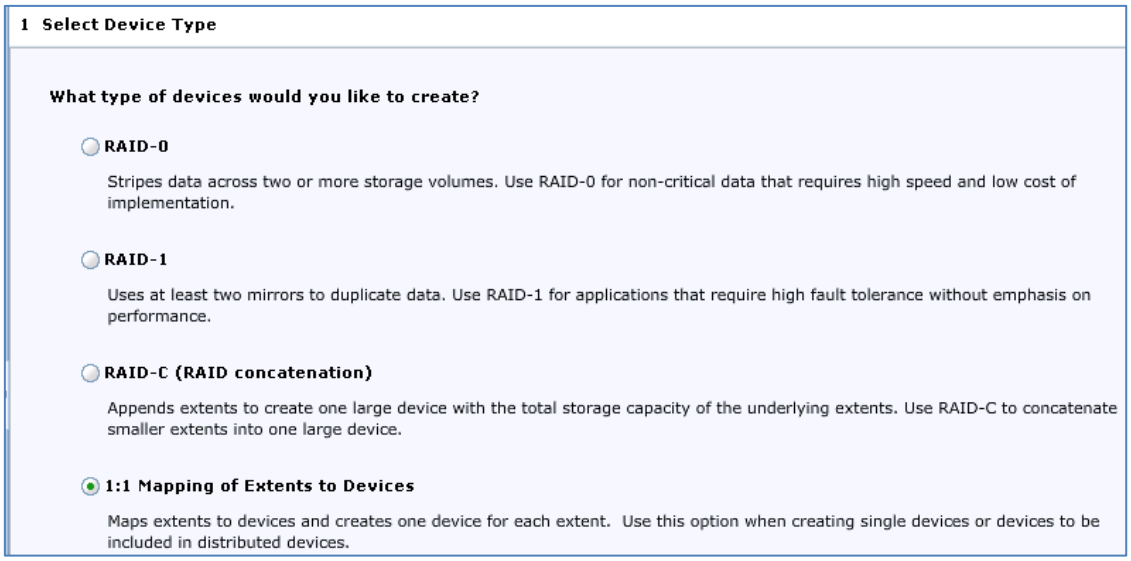
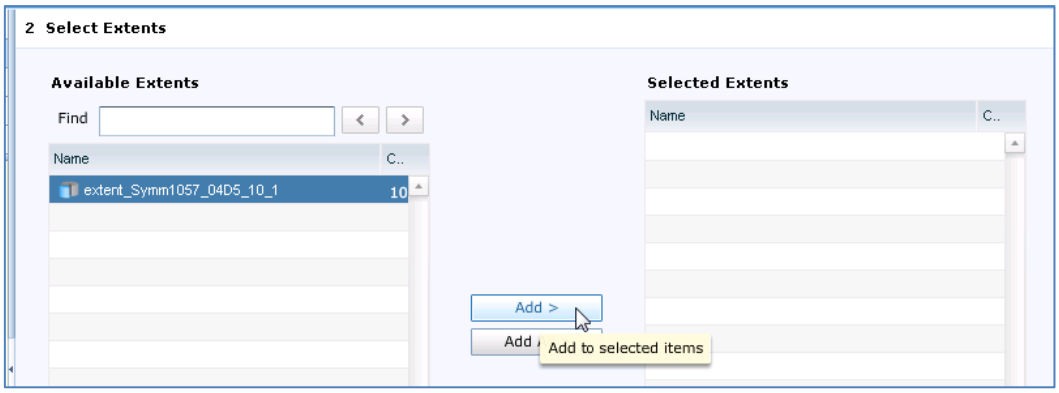
Step	Action
20.	From the left Window **Provision Storage** select Devices  Select **Create**

Step	Action
21.	From the selection of Device types to create choose **1:1 Mapping of Extents to Devices** 
22.	Choose the extent you previously created extent from the list. Click **Add**  Click **Next**

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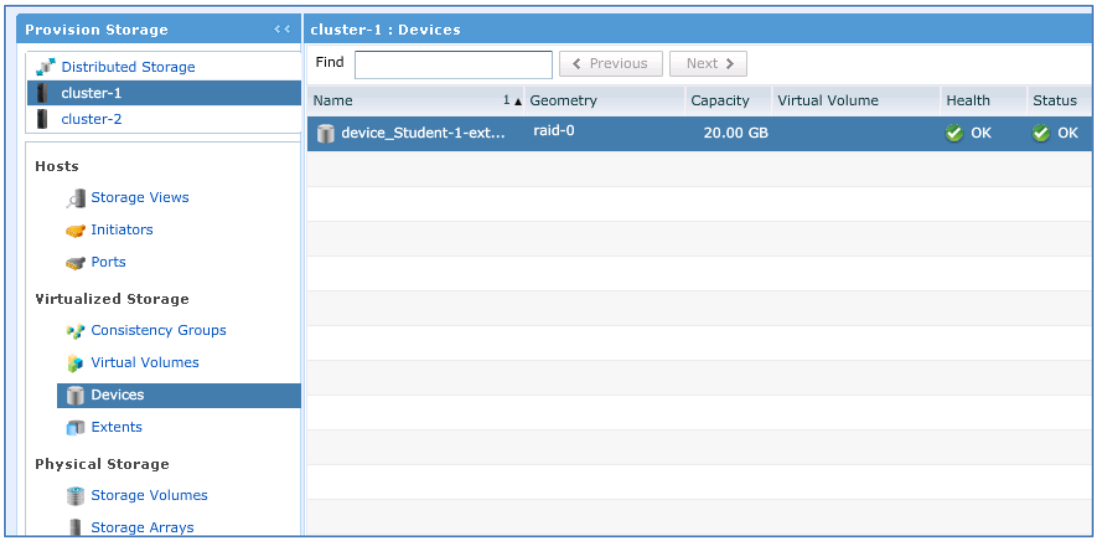
Step	Action
23.	Answer **no** to Automatically create a virtual volume on each device. This is a time saving step, which will create a Virtual Volume on each top level device created. We will manually create the Virtual Volume in order to get a better understanding of the process. Click **Next** Click **Commit** Click **Close**
24.	The Device should appear in the list of cluster devices.  Notice that the **Geometry** displayed is Raid 0. When we selected the method for device creation we chose **1:1 mapping**. If we had chosen Raid 0, as long as we chose 1 device, it is the same result.

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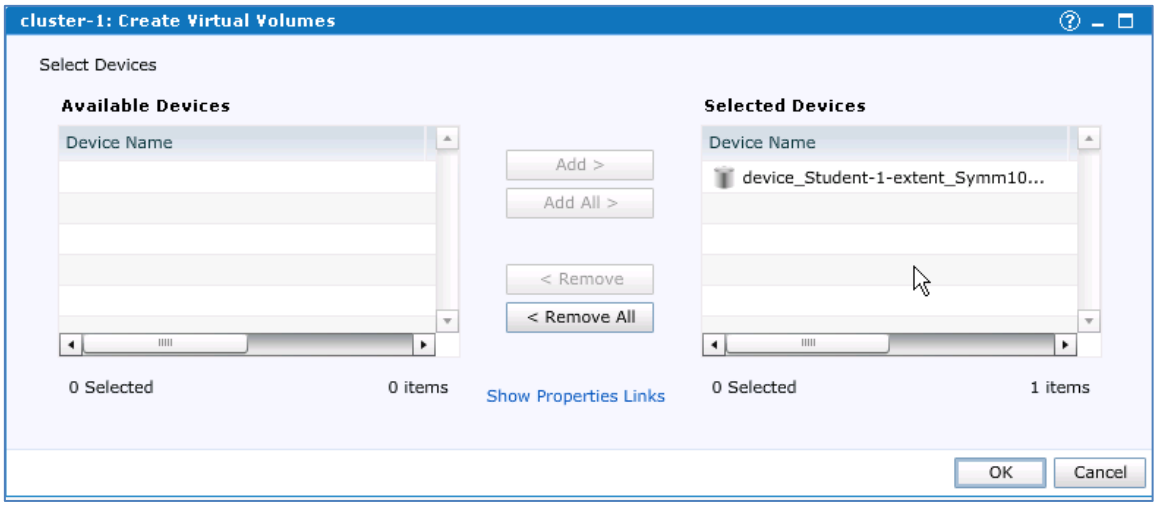
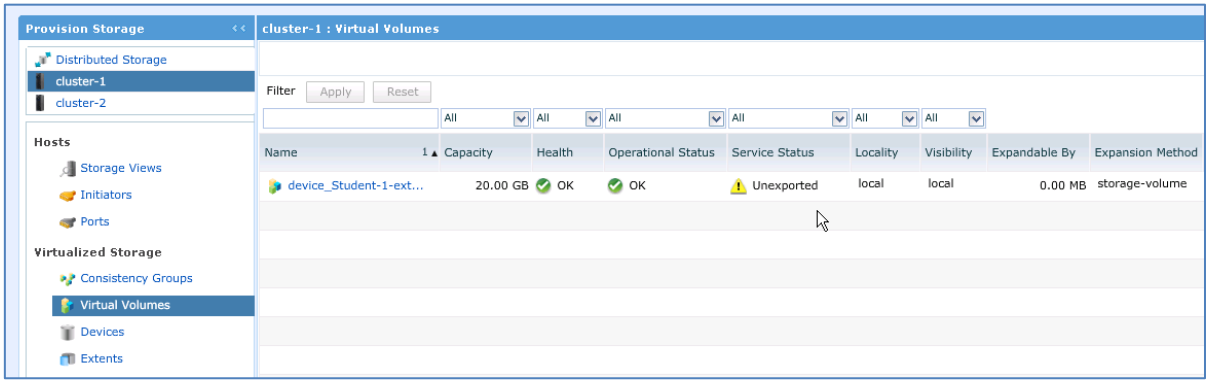
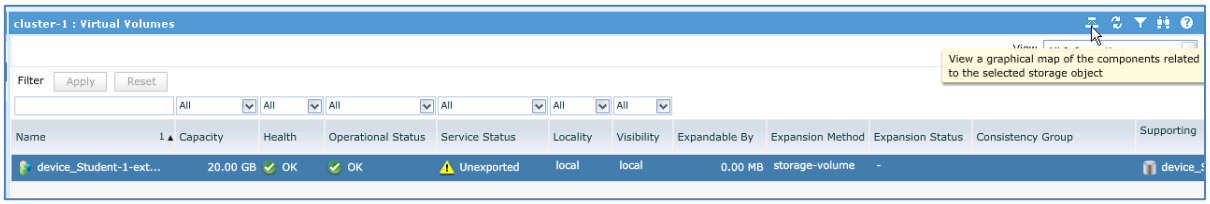
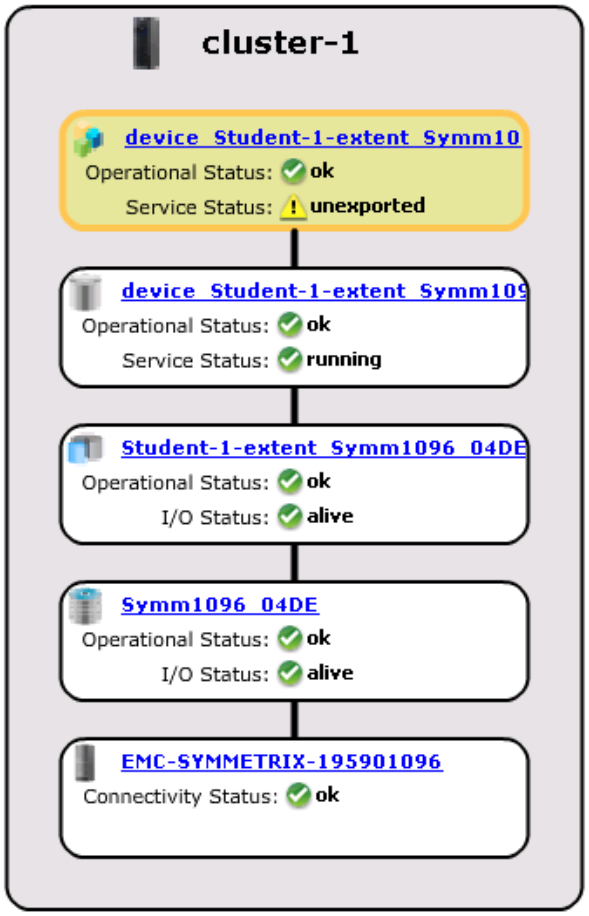
Step	Action
25.	Select the newly created device. Click **Create Virtual Volumes** at the bottom of the window.  The device should be in the Selected Device list. If not Select it and click add. Click **OK** The Virtual Volume will be created
26.	Select Virtual Volumes form the left side under Provision Storage.  This will display a list of all the Virtual Volumes. View the Virtual Volume that was previously created. Take note of it's Service Status. (Unexported) this is an indication of it not being a member of a Storage View.

Step	Action
27.	Select your Virtual Volume and Click on the Map symbol in the right top coner of the window. 
28.	A map will be displayed.  The map will display each VPLEX object from the array to the Virtual Volume. The blue links can be used to display the object's properties. This function works for all VPLEX objects.

End of Lab Exercise

Lab 2: Part 3 – Storage View Creation

Step	Action
1.	From your Assigned Windows host, launch Unisphere for VPLEX. Log in and select **Provision Storage> your assigned cluster>Storage Views**.
2.	Click **Create** We will create a Storage View to provision Virtual Volumes to a host.

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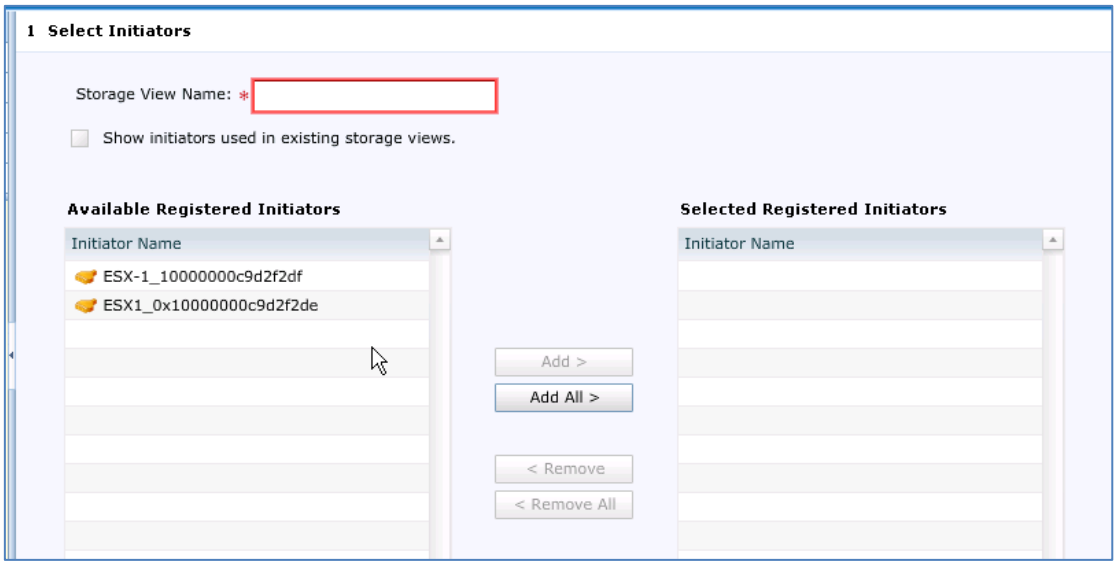
Step	Action
3.	The first step in the wizard is selecting initiators.  Enter a **name** for the Storage View. Use your student number in the name to identify it for future labs. Example: *student-1_Sview* Select both initiators and click Add All. If there are no initiators in the displayed window, check the box next to **Show initiators used in existing storage views** Click **next**

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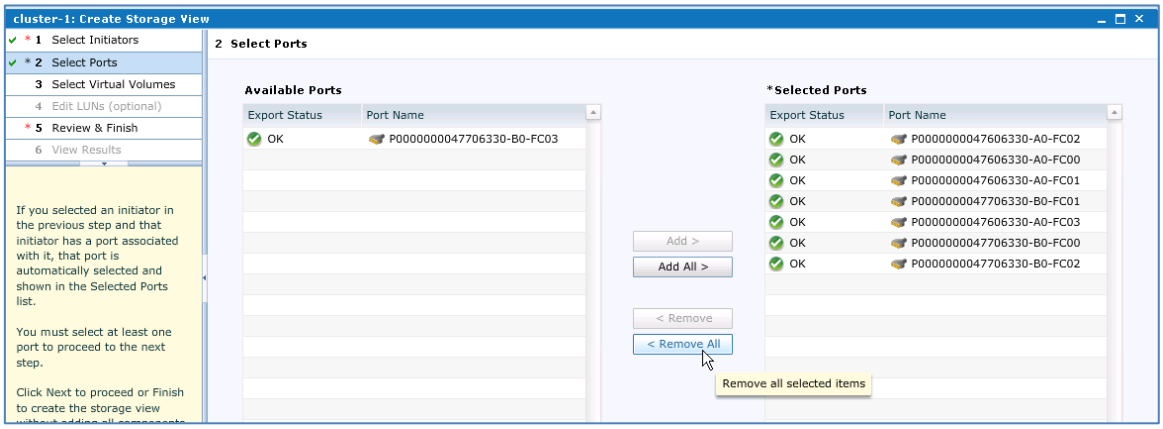
Step	Action
4.	Next we will select the VPLEX FE ports First we will remove the default ports added to the group.  Click **Remove ALL**

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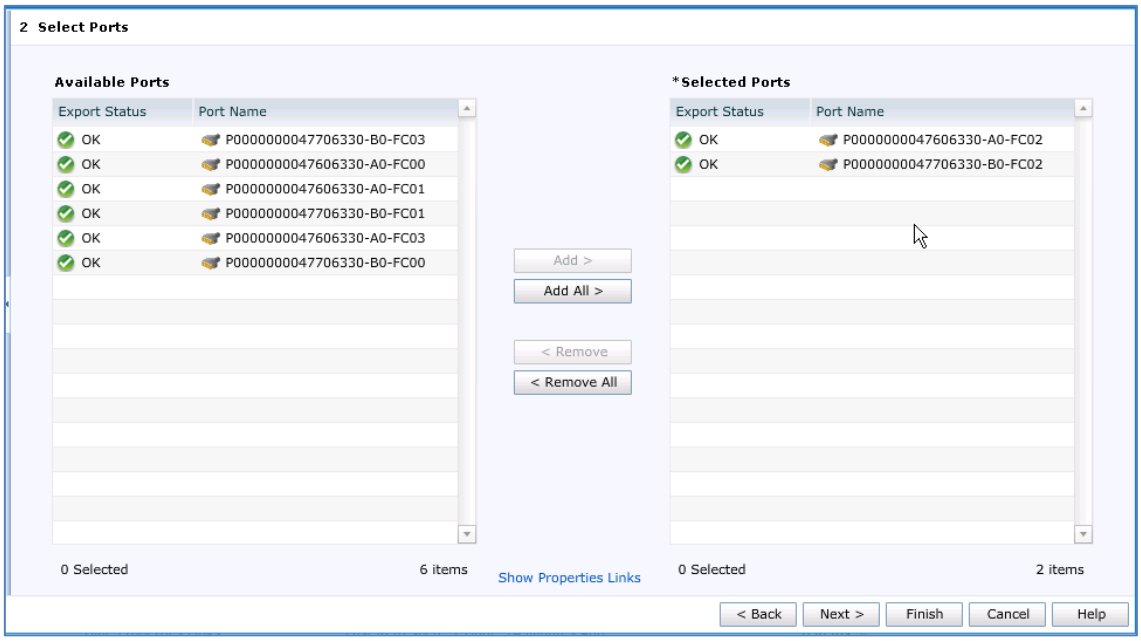
Step	Action
5.	Next we will select 2 Ports. 1 from director A and 1 from Director B.  *We are only selecting **2** ports in this lab environment because we are sharing equipment.* Students 3 and 6 can select FE ports A0-FC00 and B0-FC01 Students 4 and 7 can select FE ports A0-FC01 and B0-FC02 Students 5 and 8 can select FE ports A0-FC02 and B0-FC03 *The key point to think about is for each initiator in the Storage View, the ports selected must match zoning of the FE SAN. (for a normal production environment it is best to include 4 ports per Storage View, 2 from A and 2 from B)* *Click **Next***

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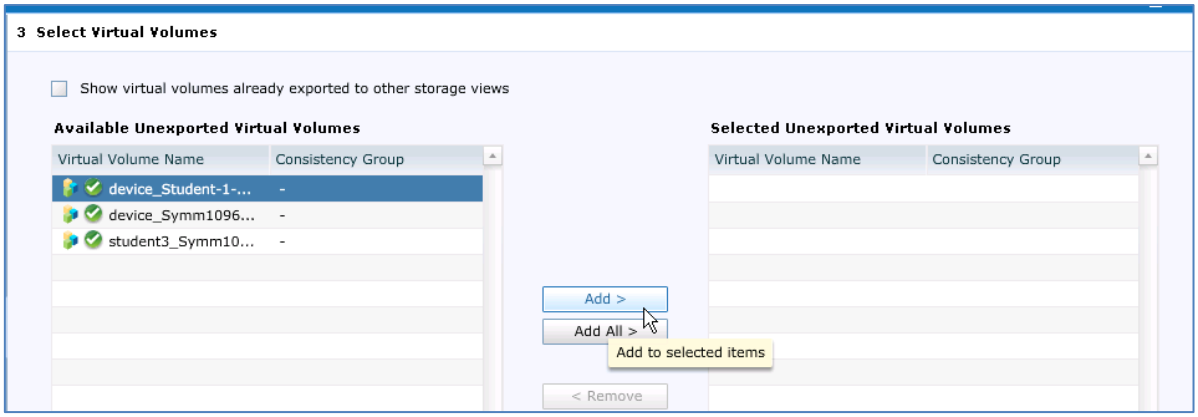
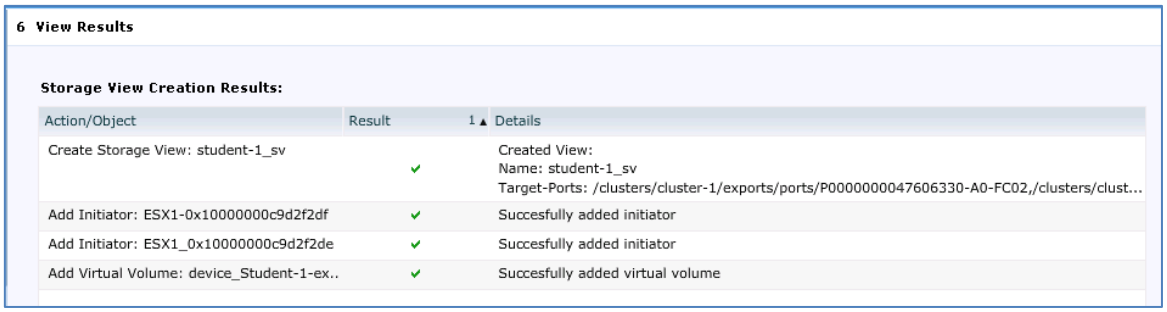
Step	Action
6.	The next step is to add virtual Volumes to the Storage View Select your previously created **Virtual Volume** and Click **Add**.  Click **Next**
7.	Change the LUN number to your student number. For example if you are student 2 enter a 2. Leave the Auto-assign checked. Click **Next** Click **Commit**
8.	The results should be displayed with successful results.  Click **Close**

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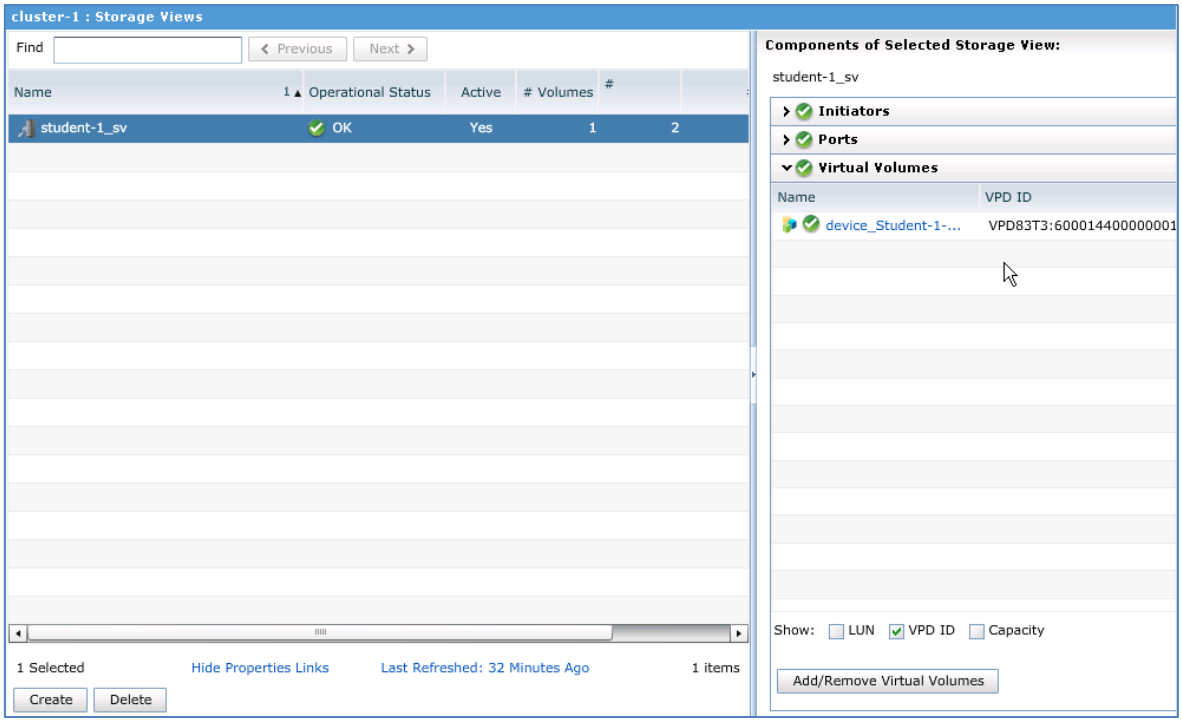
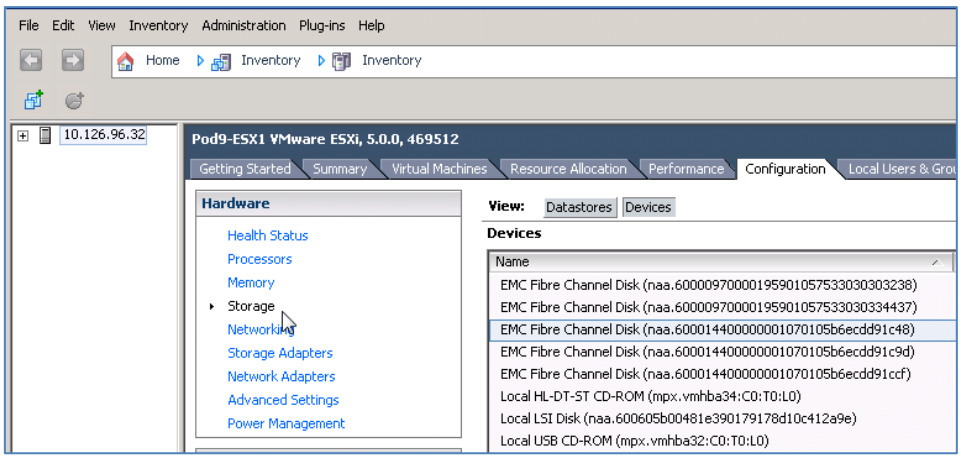
Step	Action
9.	Select your Storage View Notice on the right most Window the components of the Storage View are Displayed. Review the selections by clicking on the component. 
10.	Select **Virtual Volumes** Check the box **VPD ID** The number displayed is the UID of the LUN presented to a host. If you remove the VPD number, VPD8s3T3 in this example, that will be the **UID** seen by the host. Record this number for comparison from the host.

Step	Action
11.	Minimize Unisphere for VPLEX and from your Windows desktop: Open vSphere Client and connect to your **ESX Host**. See the student Lab Map for the IP address and Login information for the ESX host. *Note: do **not** use the login for **vCenter Server**, just the ESX server.*
12.	Select the **Configuration** Tab. Select **Storage** from the Hardware box.  Change the view to **Devices** **Note**: *At this point we are about to perform a rescan of the host HBA. Because there may be other students sharing the ESX server and at the same point (each ESX host will have 1-3 students) we need to check the progress of the other students so that multiple rescans are not performed at the same time.* *If you are in a classroom environment you can ask the other students and coordinate a rescan for each. If you are taking the class online you can message the students or the **instructor**.*

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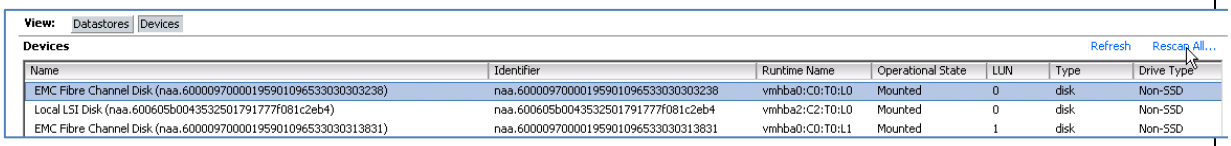
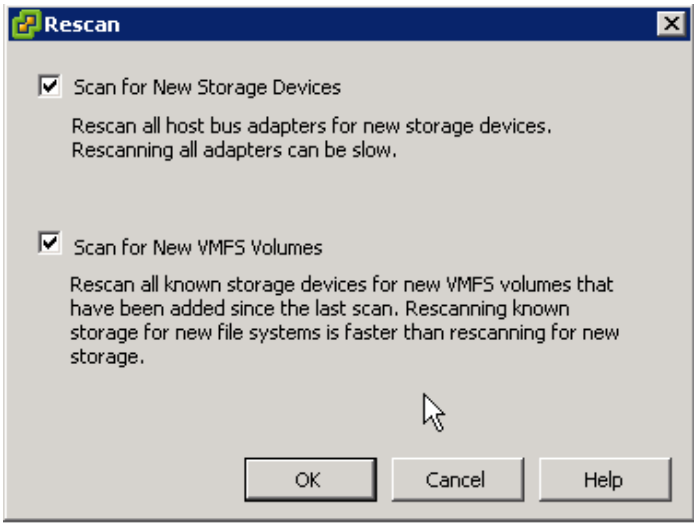
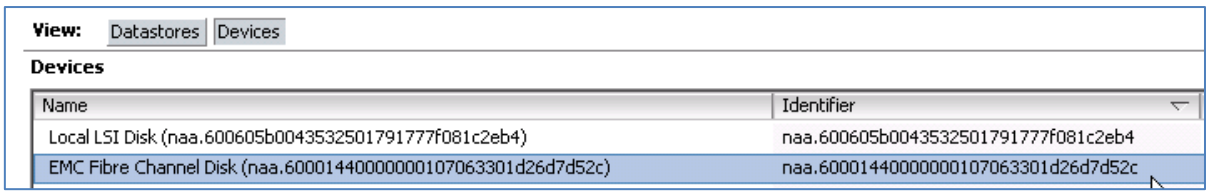
Step	Action
13.	To the right of the window select Rescan 
14.	Leave the 2 checkboxes checked and click **OK** 
15.	View the Recent Tasks window below and wait for completion. The new LUN should be displayed. Verify it is correct by checking the **size** and the **identifier**. Ignore the naa in front of the UID.  Compare it to the VPD number of the Virtual Volume in the Storage View.

End of Lab Exercise

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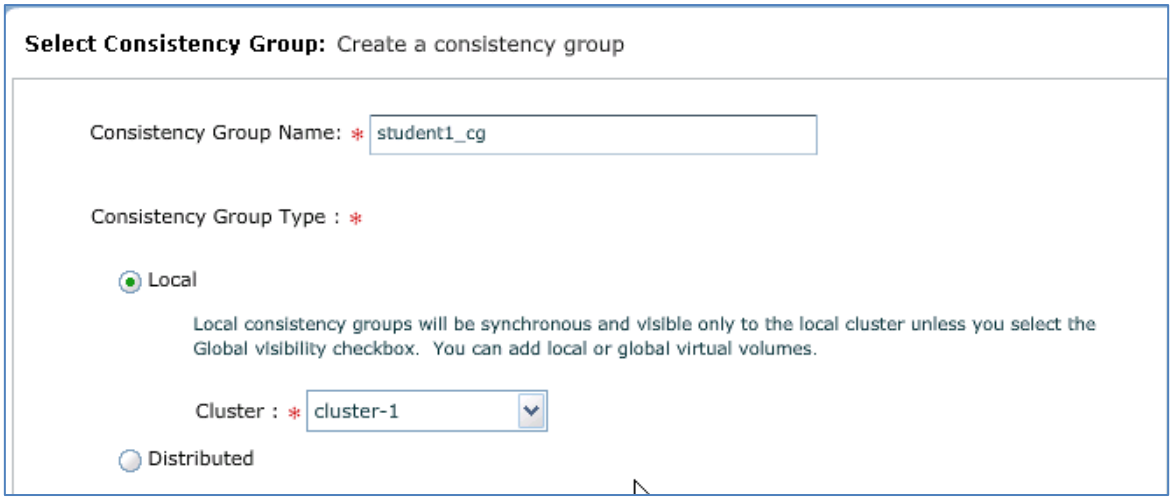
Lab 2: Part 4 – Using Provision from Storage Volume Wizard

Step	Action
	This Lab will provision Storage using the "Provision from Storage Volume method. This method allows for simpler provisioning with less steps, but there are fewer options. It will require the creation of a local consistency group.
1.	From Unisphere for VPLEX navigate to **Provision Storage** Select the **Provision from Storage Volume** icon.
2.	Check the box **Create new consistency group**. Click **Next**

Step	Action
3.	Enter a Consistency Group name. Use your Student number in the name. Select Local Select your assigned Cluster  Click **Next**
4.	Enter a volume name. Use your student number followed by an **_auto** Click **Next**

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Step	Action
5.	Select an Array attached to your assigned Cluster. Select one of your assigned unclaimed Storage Volumes (See Lab Map) **Storage Volumes:** Select a storage volume on cluster 'cluster-1'. Source Storage: EMC-SYMMETRIX-195901096 Available Storage Volumes Name / Capacity / Use Symm1096_04DB / 20.00 GB / claimed Symm1096_04DD / 20.00 GB / claimed Symm1096_04DF / 20.00 GB / claimed VPD83T3:60000970000195901096533303... / 10.00 GB / claimed VPD83T3:60000970000195901096533303... / 10.00 GB / unclaimed VPD83T3:60000970000195901096533303... / 20.00 GB / unclaimed Click **Next**
6.	Add the new Virtual Volume to your existing Storage View **Expose To Hosts:** Expose storage to hosts through storage views. Storage View at cluster-1 * Existing Storage View: student-1_sv None Click **Next**

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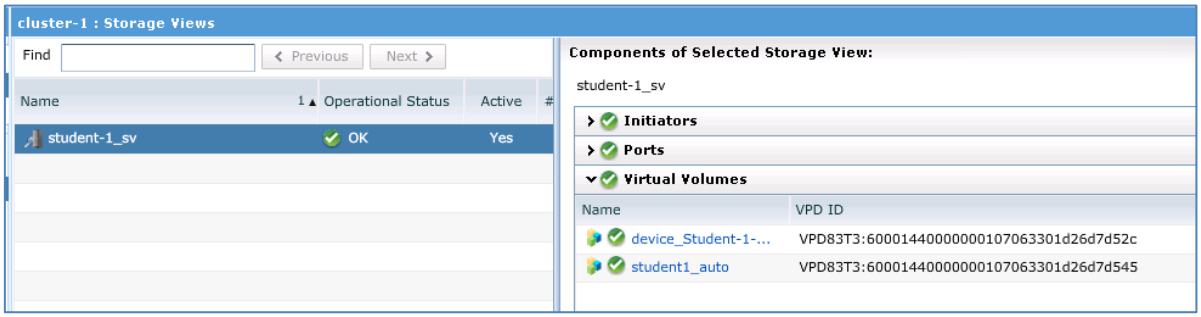
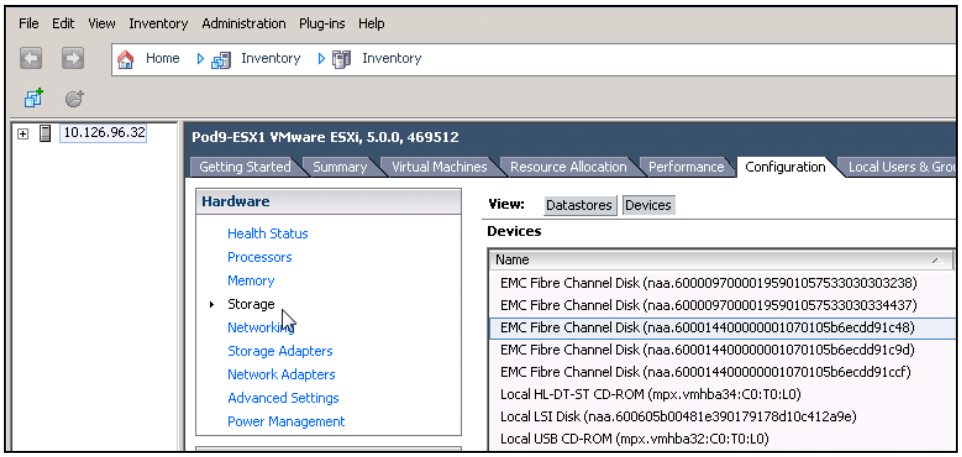
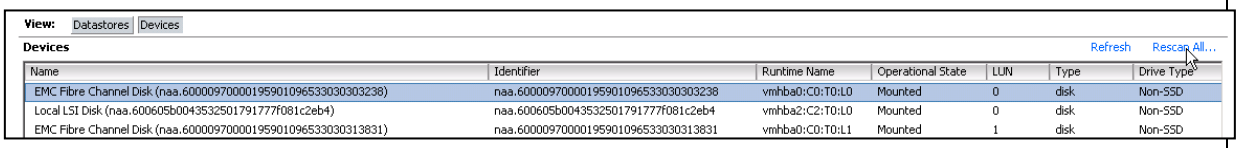
Step	Action
7.	A summary page is displayed Review and Click **Provision Storage** Wait for completion and Click **done**.
8.	Select your assigned Cluster Select **Storage Views**
9.	Select your Storage View. Select Virtual Volumes and verify the new Virtual Volume is in the view 
10.	Minimize Unisphere for VPLEX and from your Windows desktop: Open vSphere Client and connect to your **ESX Host**. See the student Lab Map for the IP address and Login information for the ESX host. *Note: do **not** use the login for **vCenter Server**, just the ESX server.*

Step	Action
11.	Select the **Configuration** Tab. Select **Storage** from the Hardware box.  Change the view to **Devices** **Note**: *At this point we are about to perform a rescan of the host HBA. Because there may be other students sharing the ESX server and at the same point (each ESX host will have 1-3 students) we need to check the progress of the other students so that multiple rescans are not performed at the same time.* *If you are in a classroom environment you can ask the other students and coordinate a rescan for each. If you are taking the class online you can message the students or the* ***instructor****.*
12.	To the right of the window select Rescan 

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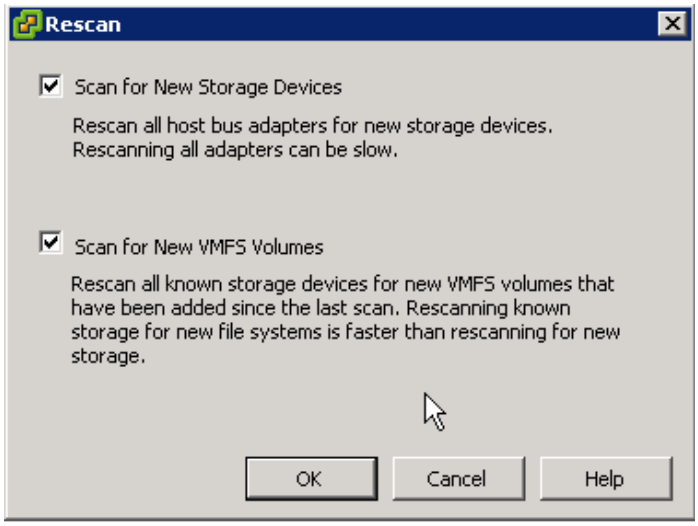
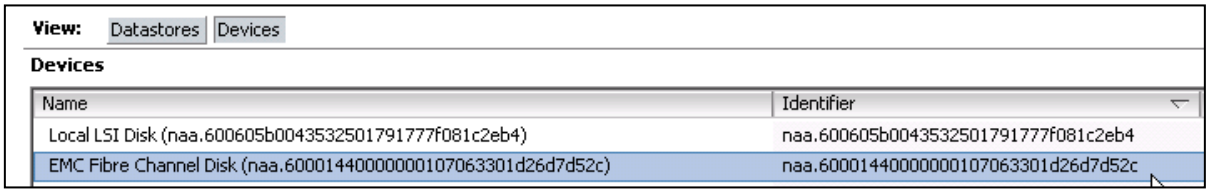
Step	Action
13.	Leave the 2 checkboxes checked and click **OK** 
14.	View the Recent Tasks window below and wait for completion. The new LUN should be displayed. Verify it is correct by checking the size and the **identifier**. Ignore the naa in front of the UID.  Compare it to the VPD number of the Virtual Volume in the Storage View. If the new volumes do not appear click **refresh**. Or try **Rescan** again.

End of Lab Exercise

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Lab 2: Part 5 – Provisioning using VIAS

Step	Action
	This Lab will provision Storage using the VIAS Method. This method reduces the number of steps required to provision storage using VPLEX. As long as the Array is added to the Array Management Provider, VPLEX can provision, mask, and create Virtual Volumes in a few simple steps.
1.	Open Unisphere for VPLEX Log into your assigned Cluster.
2.	First we will verify if the Array Management Provider is registered with the VPLEX Cluster. This may require coordination between students (3 max) assigned to the same cluster. Ask of message the other students if anyone at this point. Select **Provision Storage> Your Assigned Cluster>Array Management Provider** Since there may be up to 2 other students sharing this cluster, another student may have already completed the registration.

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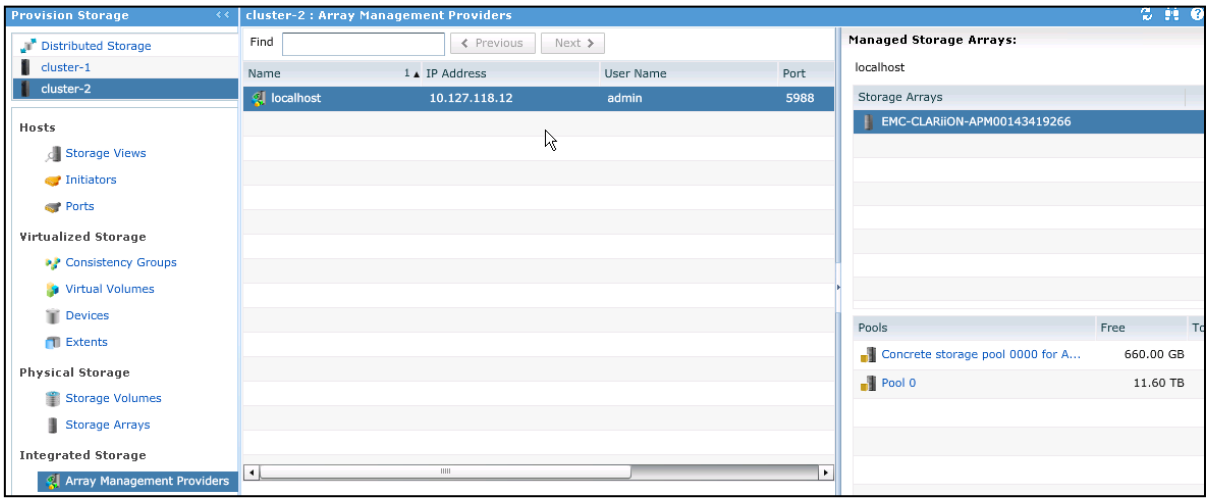
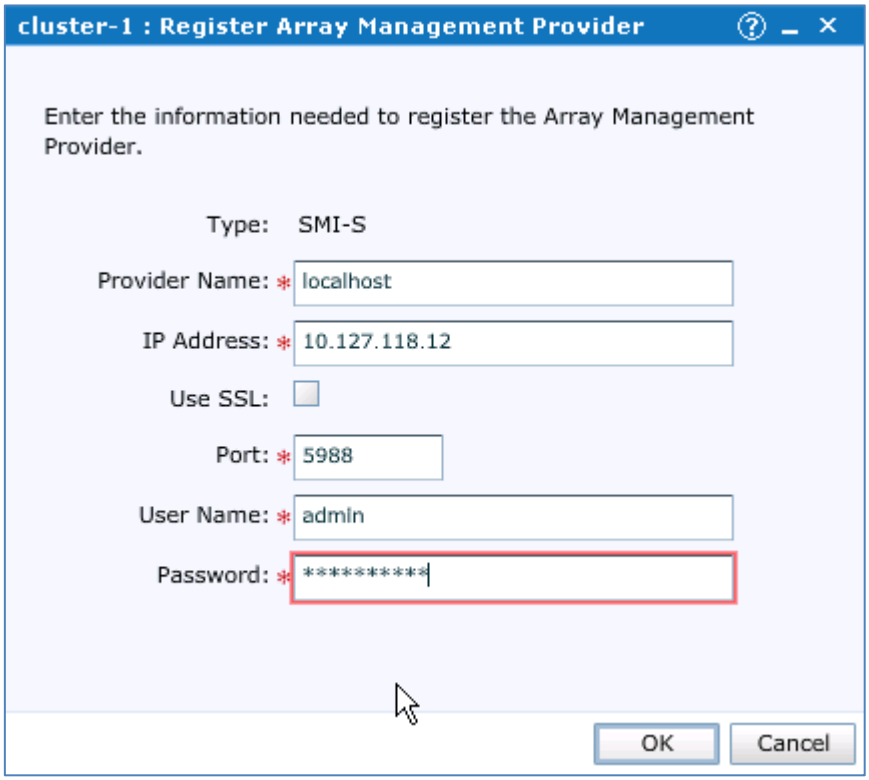
Step	Action
3.	If there is an AMP already registered, select it. Select the Managed Array View the pools. If there are no AMPs, then proceed to the next step to register. 

Step	Action
4.	Click Register  Displayed are the default values to use. These match the configuration of the SMI-s provider installed on the Host. . (not including the IP address) See your student Lab Map for IP address Provider name localhost Use SSL unchecked Port 5988 User admin Password #1Password

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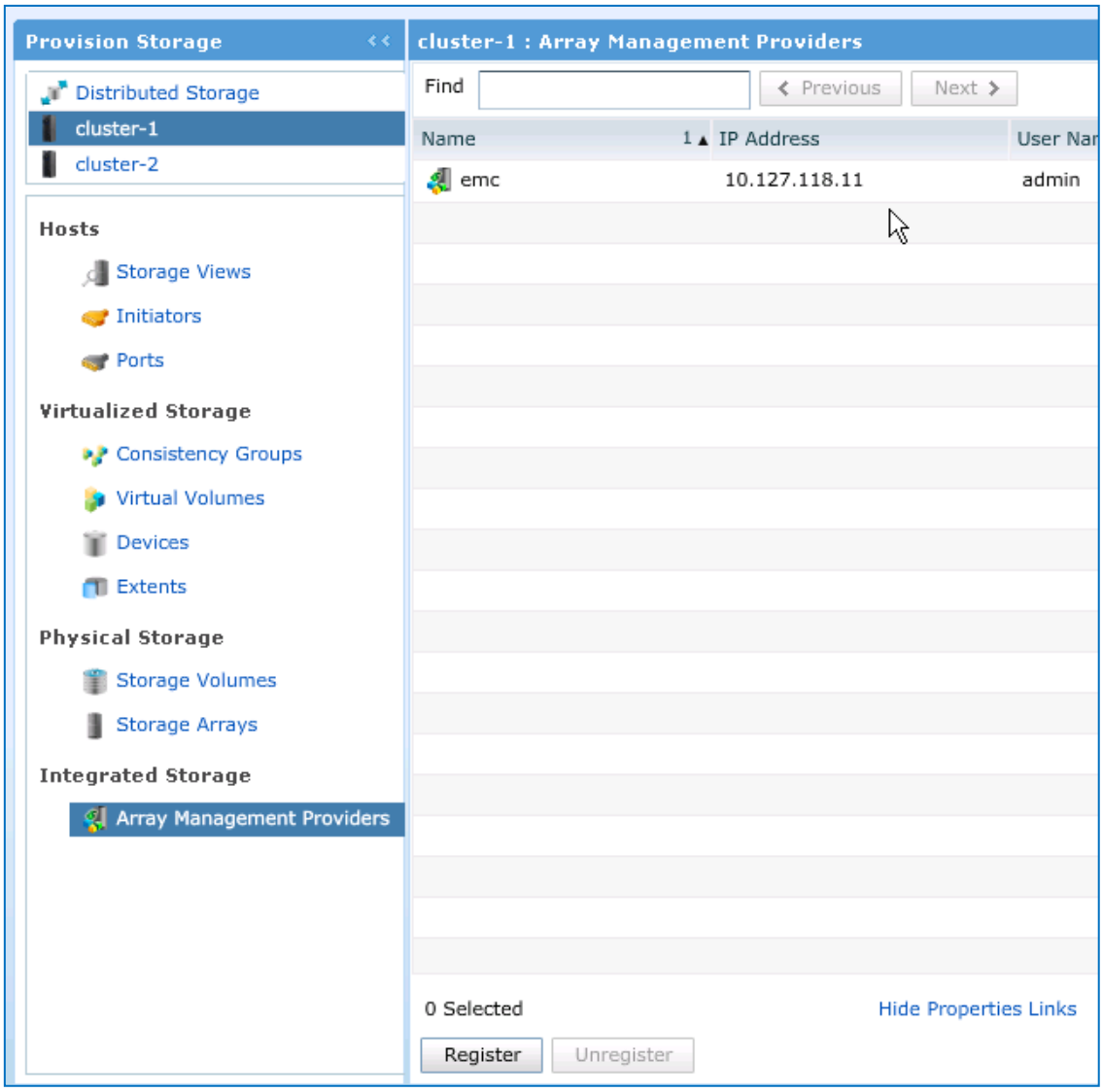
Step	Action
5.	Verify the AMP is registered with VPLEX and the connectivity has a green check mark.  There should be 1 AMP for each VPLEX Cluster

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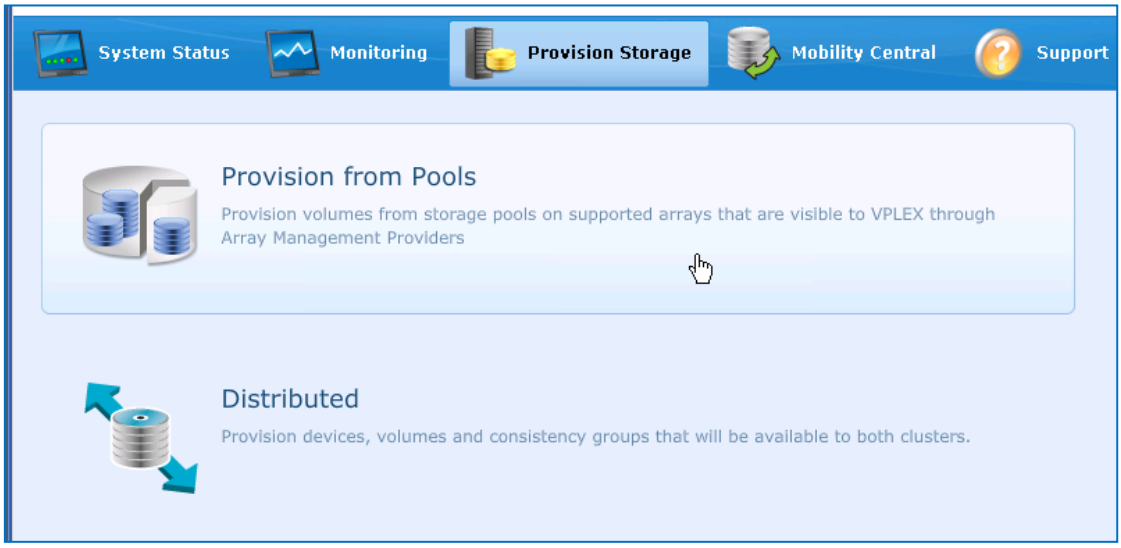
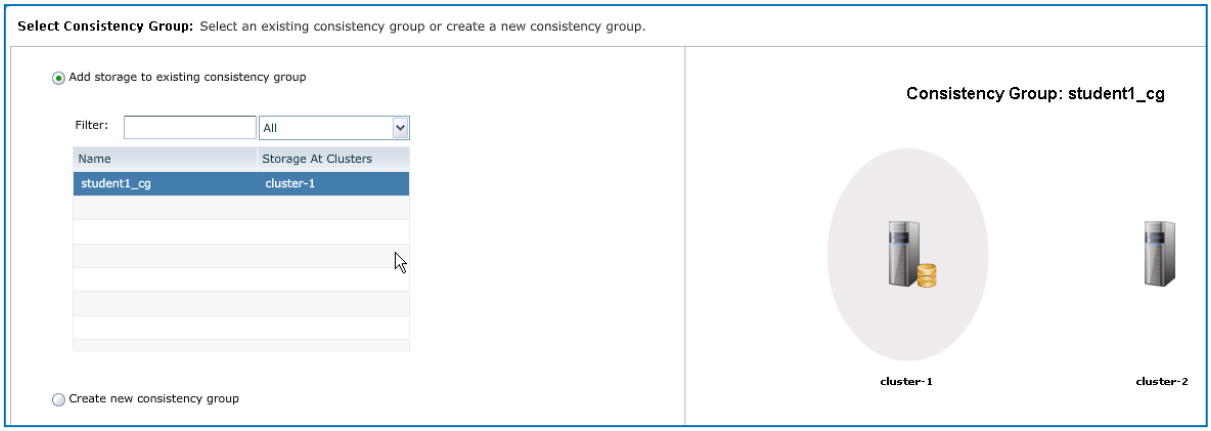
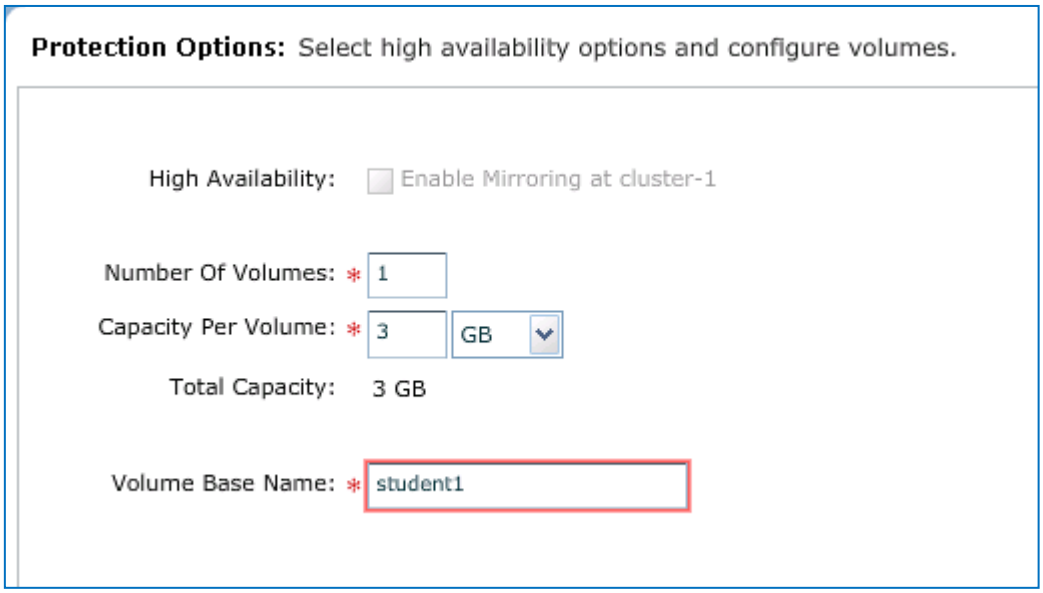
Step	Action
6.	Next we will provision using the **VIAS** method. Navigate to **Provision Storage>Provision from Pools** 
7.	We will use the Consistency Group created previously. Select your Consistency Group and click Next.  Note: notice the dark circle around the cluster where the Consistency Group is configured.

Step	Action
8.	Select **1** for the number of volumes. Change the size (GB) to your assigned volume size. Enter your student number for volume base name. Example: if you are student 1 enter s**tudent1**.  Click **Next**

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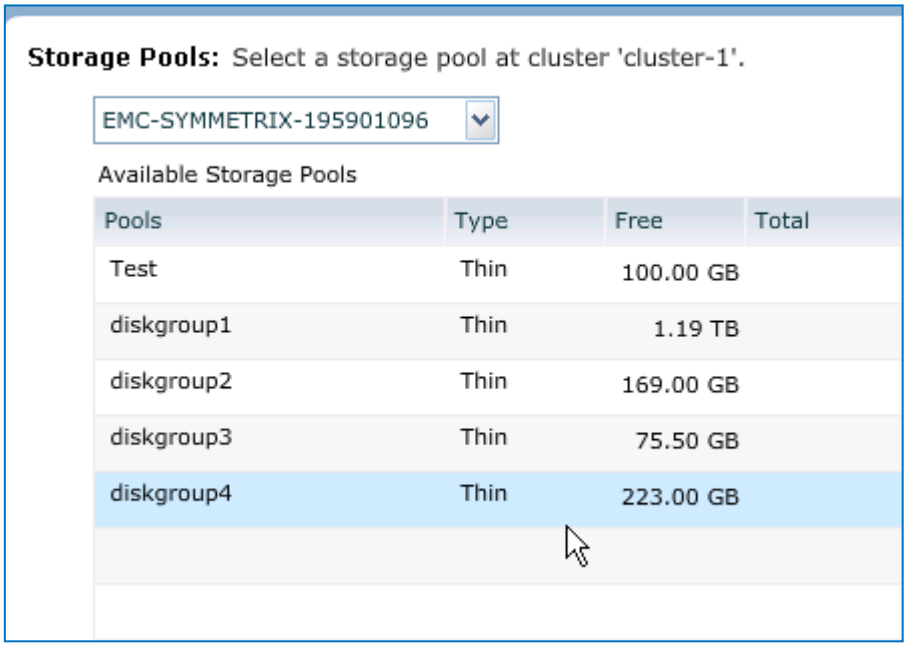
Step	Action
9.	Select an Array attached to your Cluster and registered with the AMP. Chose a Pool to be used to create the LUN. Use the one with the most free space available.  Click **Next**
10.	Use your previously created Storage View. (make sure it is the correct one, as there may be others for other students. Click **Next**

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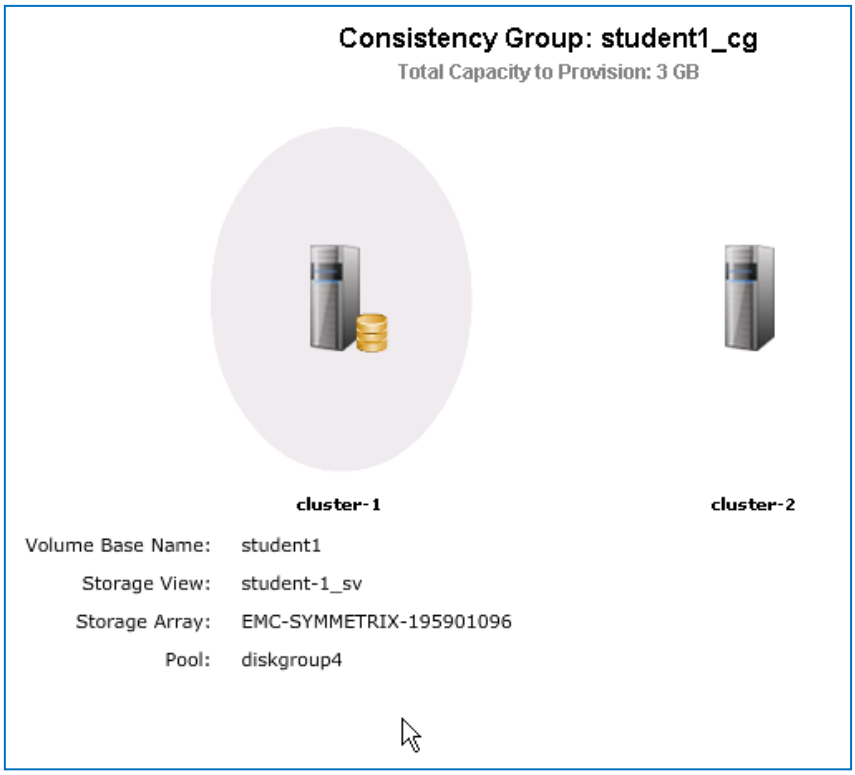
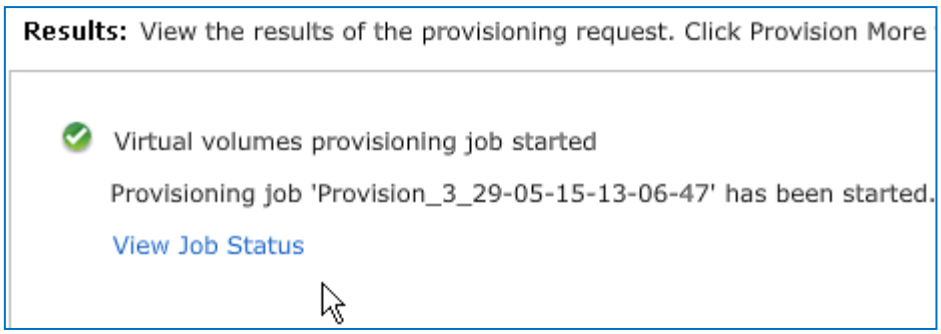
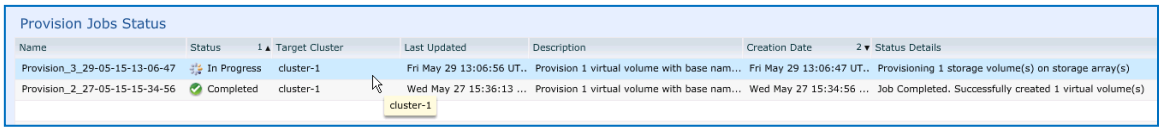
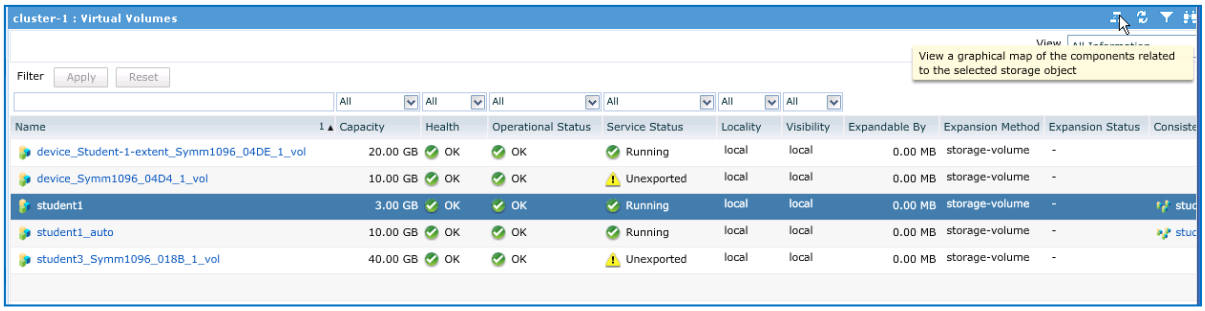
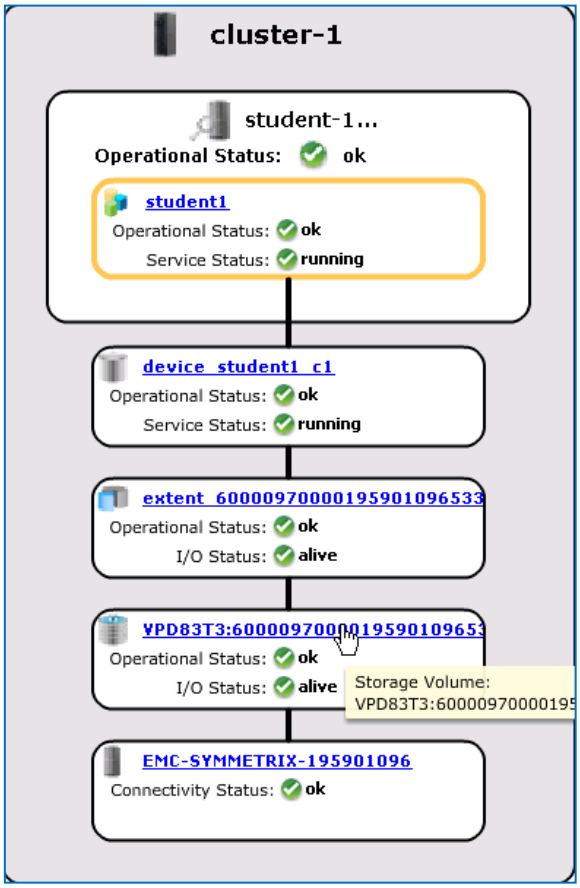
Step	Action
11.	Review the summary page to verify it is correct.  Click **Provision Storage**
12.	The results should be successful. Click **View Job Status** 

Step	Action
13.	Monitor until the job is complete. 
14.	Navigate to **Provision Storage> Cluster-x (** assigned cluster)
15.	Select **Virtual Volumes** Find the Virtual Volume name that was used in the creation wizard.

Step	Action
16.	Select it and click on the Map icon in the top right corner.  This should display a Map.  Click the Link for the Storage Volume
17.	View the Storage Volume properties. Notice the Provision Type is listed as vias. Next we will look at the **ESX server** to verify connectivity

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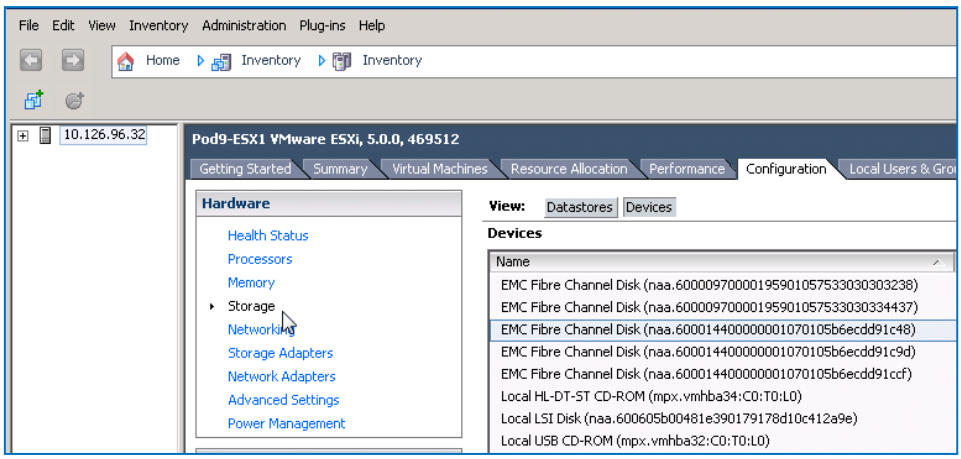
Step	Action
18.	Minimize Unisphere for VPLEX and from your Windows desktop: Open vSphere Client and connect to your **ESX Host**. See the student Lab Map for the IP address and Login information for the ESX host. *Note: do **not** use the login for **vCenter Server**, just the ESX server.*
19.	Select the **Configuration** Tab. Select **Storage** from the Hardware box.  Change the view to **Devices** **Note**: *At this point we are about to perform a rescan of the host HBA. Because there may be other students sharing the ESX server and at the same point (each ESX host will have 1-3 students) we need to check the progress of the other students so that multiple rescans are not performed at the same time.* *If you are in a classroom environment you can ask the other students and coordinate a rescan for each. If you are taking the class online you can message the students or the **instructor**.*

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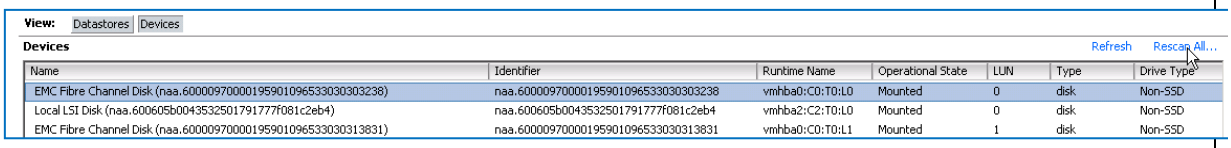
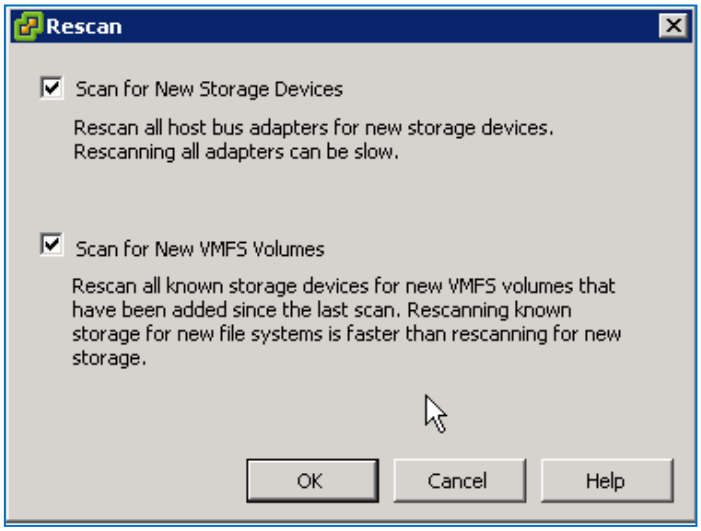
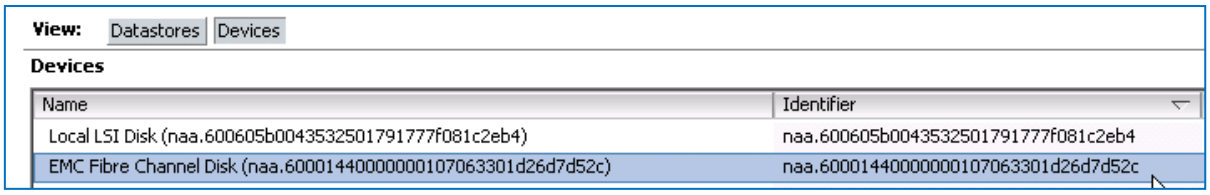
Step	Action
20.	To the right of the window select Rescan 
21.	Leave the 2 checkboxes checked and click **OK** 
22.	View the Recent Tasks window below and wait for completion. The **new** LUN should be displayed. Verify it is correct by checking the size and the **identifier**. Ignore the naa in front of the UID.  Compare it to the VPD number of the Virtual Volume in the **Storage View**. If the new volumes do not appear click refresh. Or try Rescan again.

End of Lab Exercise

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Lab 2: Part 6 - Encapsulation

Step	Action
	This Lab will simulate the procedure for migrating volumes containing application data connected to the Host from the array directly into VPLEX. This is meant to provide the student with a simulation of this procedure. There are many other parameters that we cannot address relating to the application, but this does provide an estimate of the process. Information Needed from Lab Map: ESX Server address and user/password Windows Management Host LUN Identifier of directly masked LUN If you are not very familiar with VMware, just follow the exact steps, which are displayed. No real prior knowledge is required.
1.	Open vSphere Client and connect to your **ESX Host**. See the student Lab Map for the IP address and Login information for the ESX host. *Note: do **not** use the login for **vCenter Server**, just the ESX server.*

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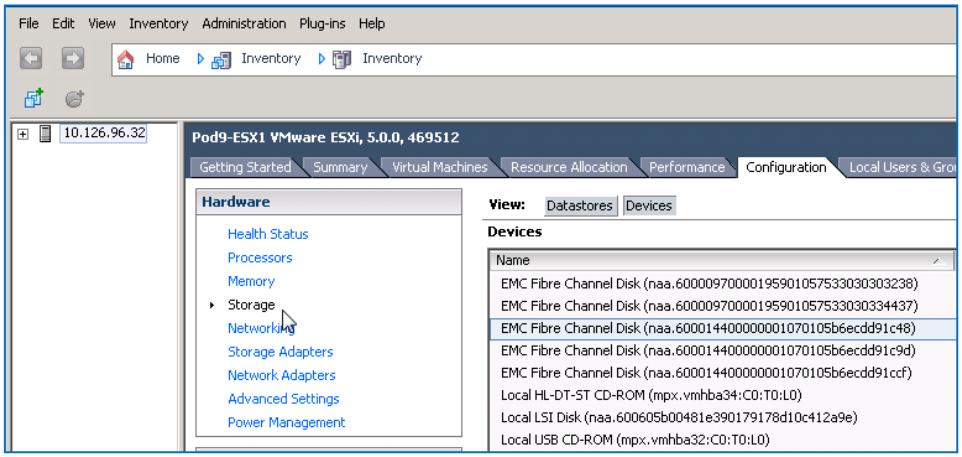
Step	Action
2.	Select the **Configuration** Tab. Select **Storage** from the Hardware box. Change the view to **Devices** 
3.	Look for your assigned LUN masked to the ESX host directly from the Array. Your assigned volume can be found by looking at the size See student Lab Map Compare the UID to the devices you have provisioned from VPLEX. The device provisioned from the Array will have a different UID. *Ask instructor if it is not visible.* Record the identifier.

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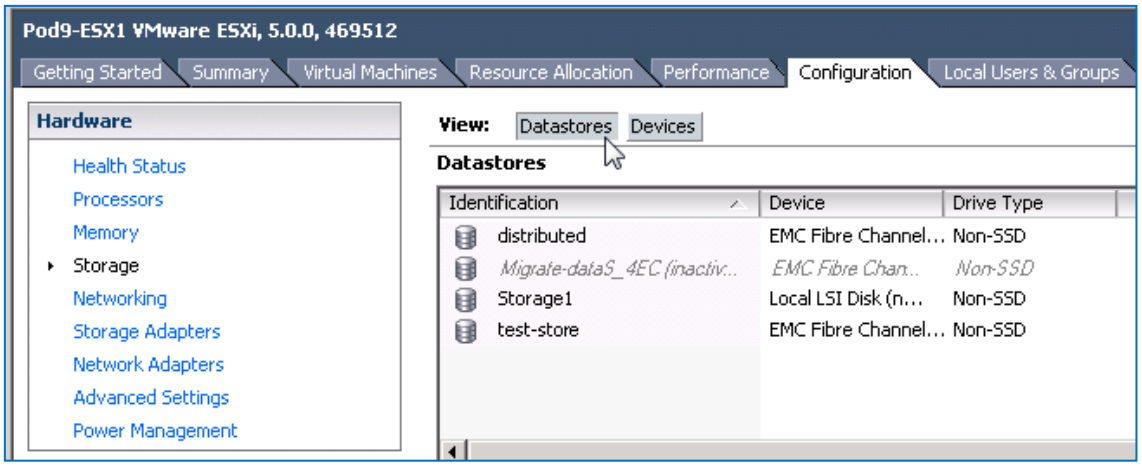
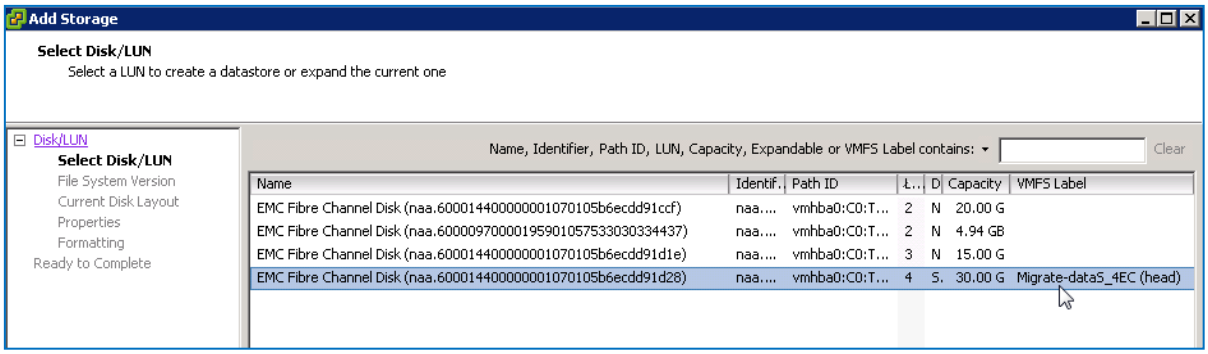
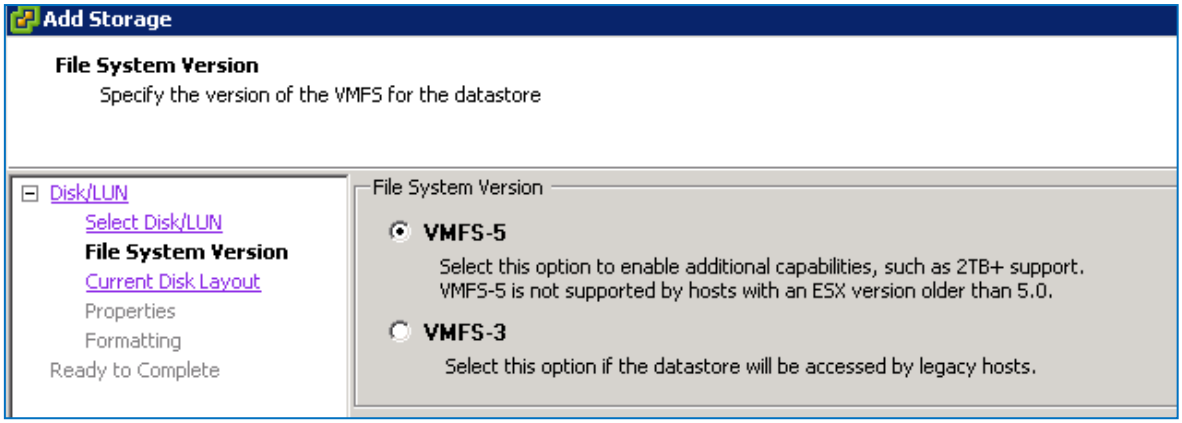
Step	Action
4.	Change the View to Datastores 
5.	Select **Add Storage** (*We will now create a Datastore, which is VMware's version of a file system*) The wizard should launch
6.	Select **Disk/LUN** Click Next

Step	Action
7.	Chose the device that is presented directly from the **array**.  Refer back to the recorded UID or use the size to identify the correct device. Click Next
8.	Select VMFS-5 

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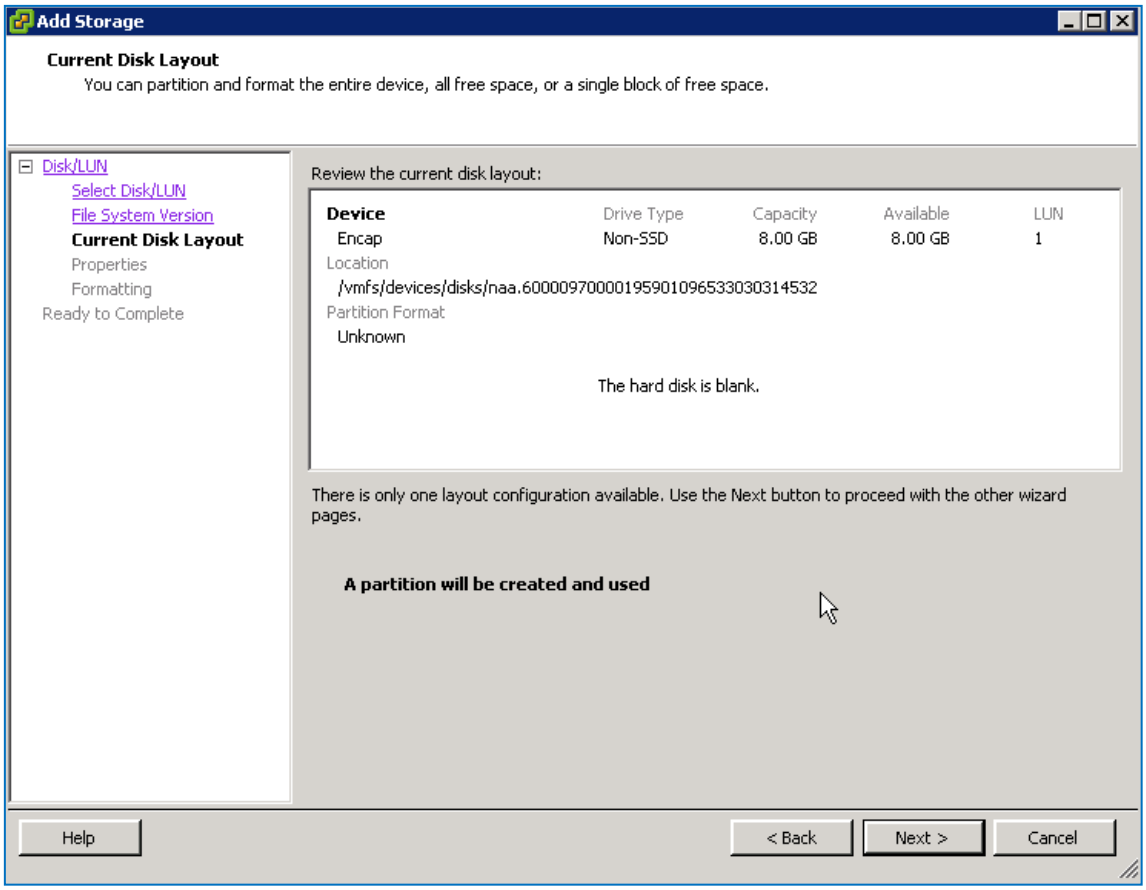
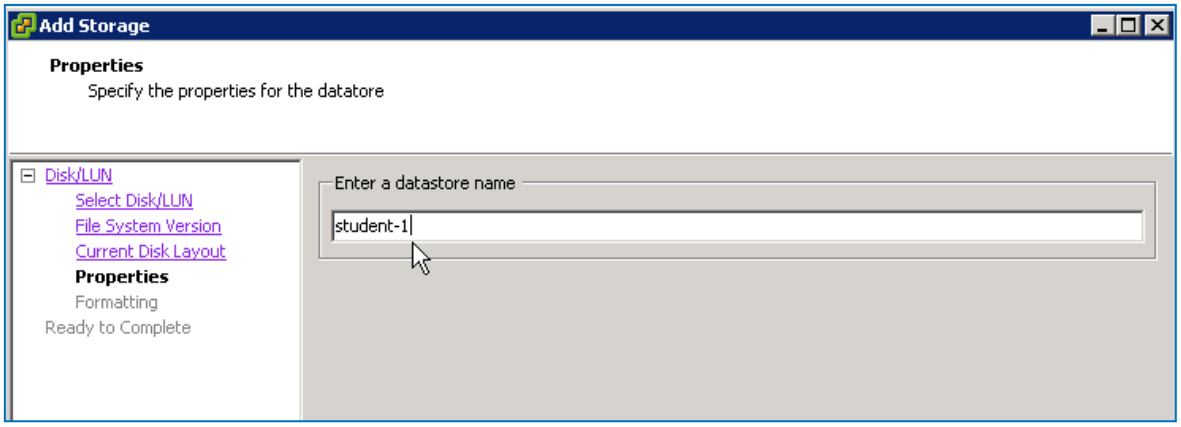
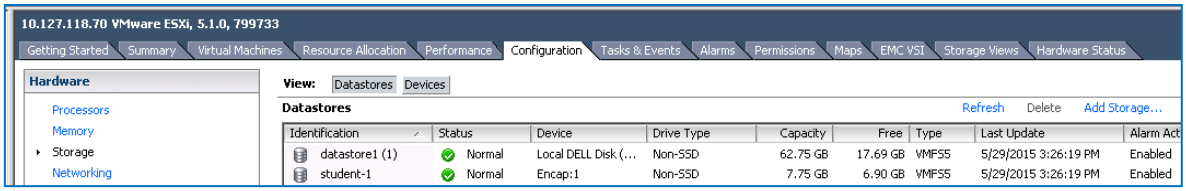
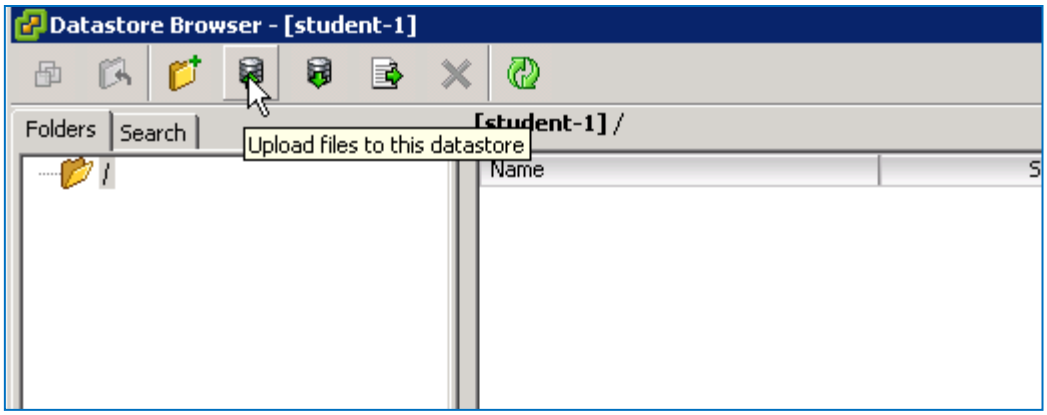
Step	Action
9.	Click Next 
10.	Enter a Datastore name (use student number) 

Step	Action
11.	Select **Maximum available space** Click Next
12.	Task should Complete and Datastore should be visible. 
13.	Right Click on the **new** Datastore and select Browse Datastore  We will copy a file from your management host to simulate application data or files. Select the pictured icon to upload files. Select upload files

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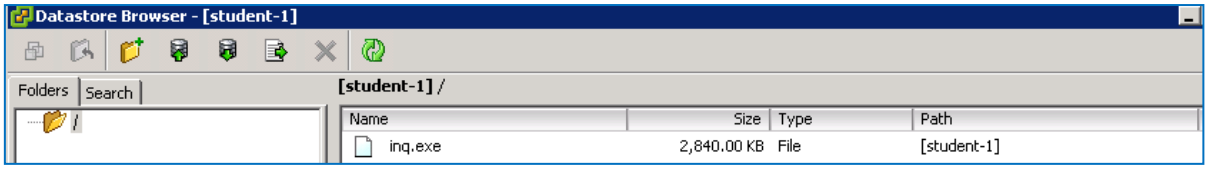
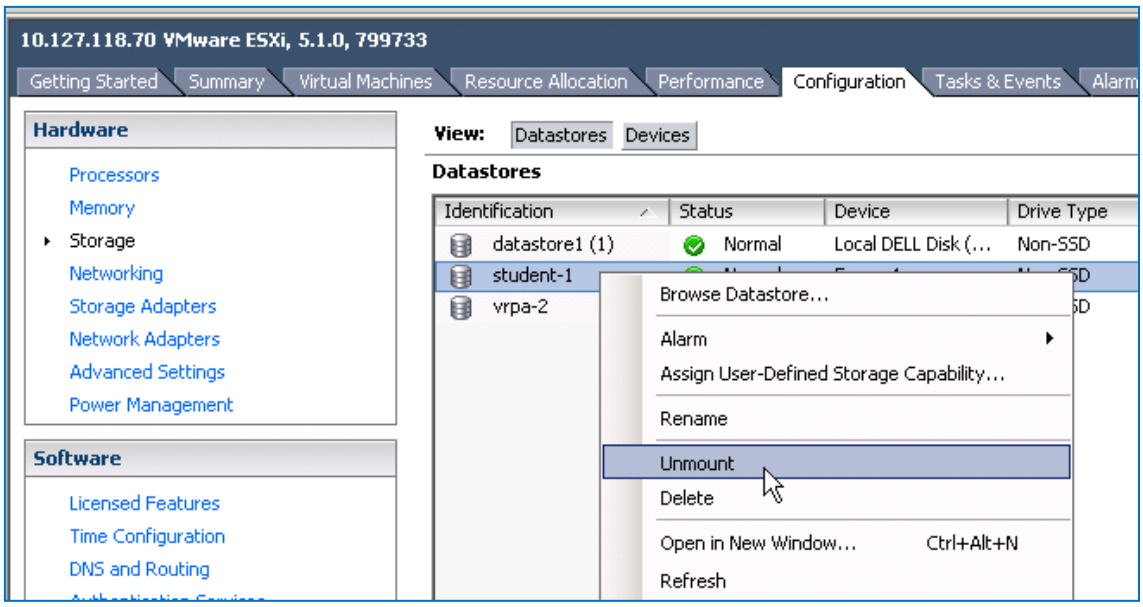
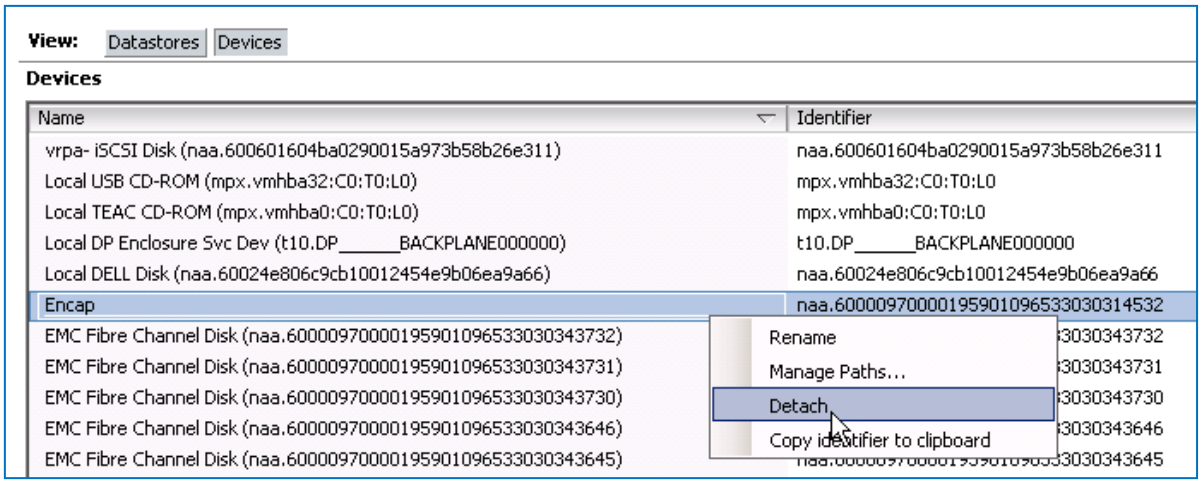
Step	Action
14.	Select any small file, take note of the name, and click **Open**. Answer **yes** to the warning. File should upload and be displayed.  Close the browser window
15.	Next we will bring this simulated application data into VPLEX. First we must remove the Datastore and detach the LUN to avoid any conflicts. Right Click on the new Datastore and Select **Un mount**.  Click OK

Step	Action
16.	Change the view to Devices.  Right Click on the **Device**, use the UID and size to verify, and select **detach**. Click OK to confirm Wait for task completion (bottom window)
17.	Return to Unisphere for VPLEX Navigate to Provision Storage>Cluster-x>Storage Arrays Select your assigned Array and click Rediscover Array Click **OK** then Close
18.	Select **Storage Volumes** from the Provision Storage window on the left.
19.	Locate the Storage Volume previously connected to the ESX server Reference the UID recorded earlier. It will have a VPDxxxx in front .

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Step	Action
20.	Using Putty from the desktop, Log into VPLEX CLI
21.	Change context to the Storage Volume context for your **assigned** cluster. VPlexcli:/> `cd clusters/cluster-1/storage-elements/storage-volumes/` VPlexcli:/clusters/cluster-1/storage-elements/storage-volumes>
22.	List all the Storage Volumes for that cluster. VPlexcli:/clusters/cluster-1/storage-elements/storage-volumes> `ll`
23.	From the list, find the storage volume that was previously presented to the ESX Host. Use the previously recorded UID and the student lab map to identify the volume. The Storage Volume should be **un-claimed**. Next we will use the "storage-tool compose" command to simply provision
24.	This command will create a Virtual Volume and place it in both a Consistency Group and a Storage View if desired. For this lab we will place the Virtual Volume in a Storage View. First we need to find the exact name of the Storage View we had created earlier. Navigate to the Storage View context and perform a list. VPlexcli:/> `cd clusters/cluster-1/exports/storage-views/` VPlexcli:/clusters/cluster-1/exports/storage-views> `ls`

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Step	Action
25.	Record the name of your **Storage View**
26.	Next we will use the storage-tool compose command to create a Virtual Volume. This Storage Volume presently has data on it that we wish to keep. So we will use Raid-0 as our geometry. *Note: If Raid-1 is desired, then it would be required to specify a source for the mirror in order to keep the data.* VPlexcli:/> `storage-tool compose --name student1_vv_compose --geometry raid-0 --storage-volumes VPD83T3:60000970000195901096533030314532 --storage-views /clusters/cluster-1/exports/storage-views/student-1_sv/` Successfully created virtual-volume 'student1_vv_compose
27.	Next we will verify that the Virtual Volume is in the Storage view. VPlexcli:/> `cd /clusters/cluster-1/exports/storage-views` VPlexcli:/clusters/cluster-1/exports/storage-views> `ll student-1_sv` Substitute the name of **your** Storage View in the command above. Displayed will be a list of the Virtual Volumes. Verify the name of the previously created Virtual Volume is there.
28.	Return to vSphere Client and your ESX Server. Select your ESX Host

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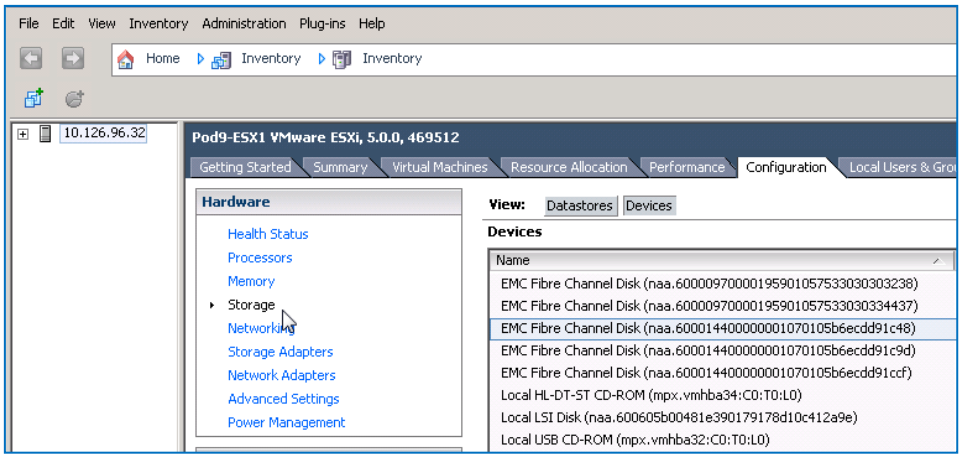
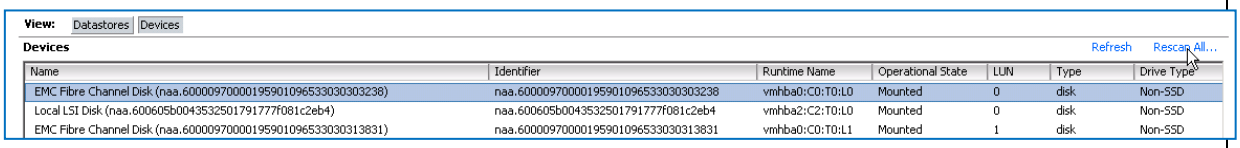
Step	Action
29.	Select the **Configuration** Tab. Select **Storage** from the Hardware box.  Change the view to **Devices** **Note**: *At this point we are about to perform a rescan of the host HBA. Because there may be other students sharing the ESX server and at the same point (each ESX host will have 1-3 students) we need to check the progress of the other students so that multiple rescans are not performed at the same time.* *If you are in a classroom environment you can ask the other students and coordinate a rescan for each. If you are taking the class online you can message the students or the* ***instructor****.*
30.	To the right of the window select Rescan 

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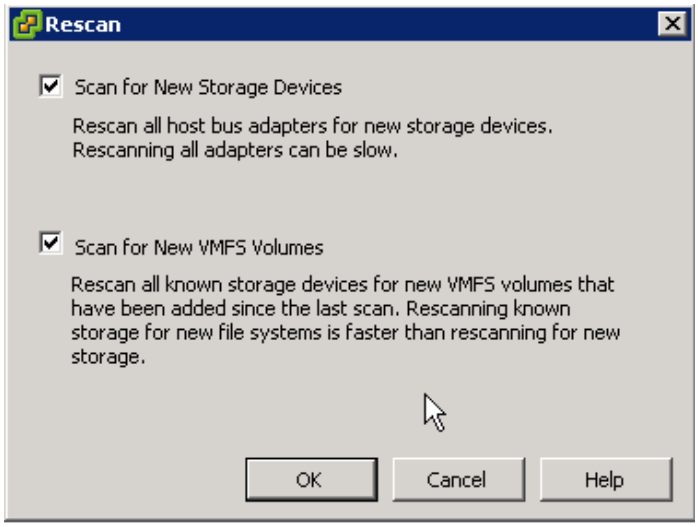
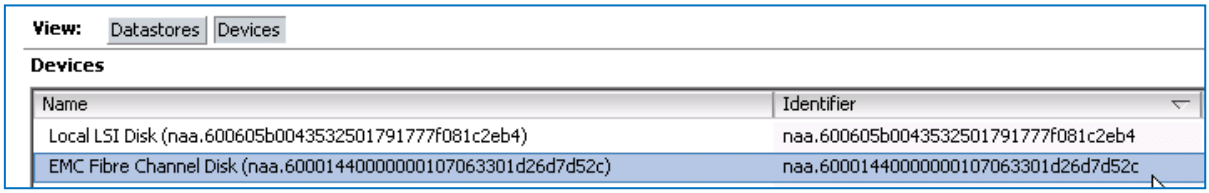
Step	Action
31.	Leave the 2 checkboxes checked and click **OK** 
32.	View the Recent Tasks window below and wait for completion. The new LUN should be displayed. Verify it is correct by checking the size and the **identifier**. Ignore the naa in front of the UID.  Compare it to the VPD number of the Virtual Volume that was previously created with the CLI command.. If the new volumes do not appear click refresh. Or try Rescan again.

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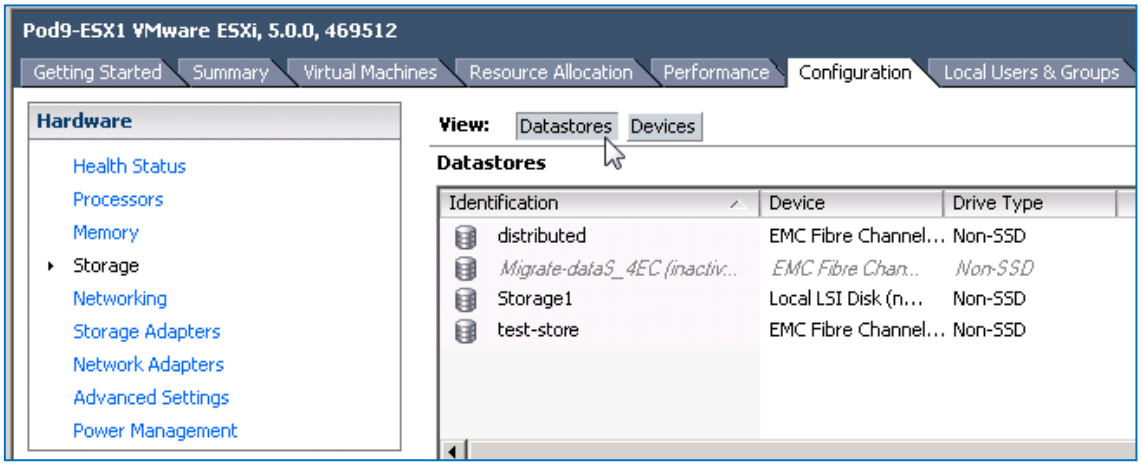
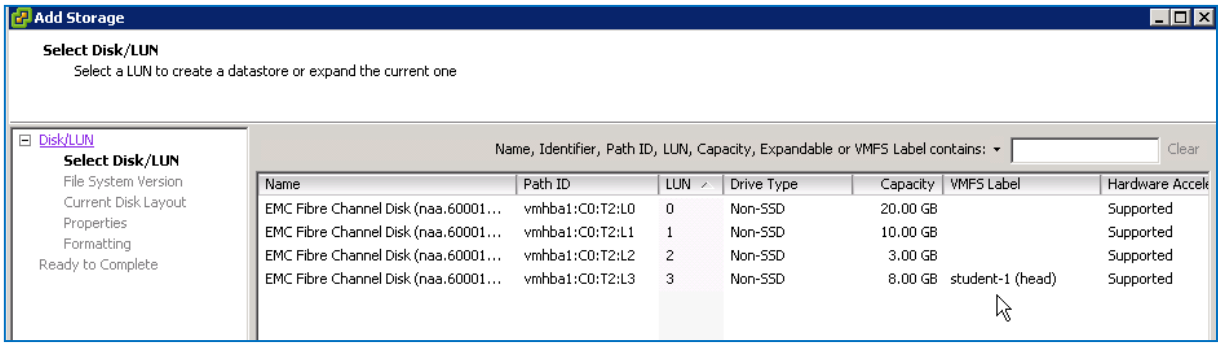
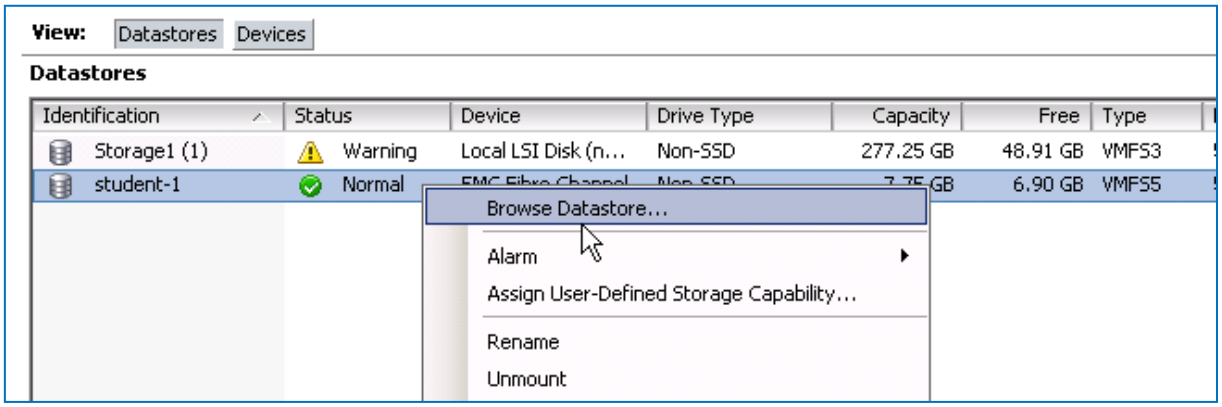
Step	Action
33.	Next we will recover the Datastore Change the View to Datastores 
34.	Select Add Storage The wizard should launch
35.	Select Disk/LUN Click **Next**

Step	Action
36.	Chose the new Virtual Volume just created.  Use the size and the label (should be your student number) to identify.
37.	Select **Keep the existing Signature**. Click Next Click Finish
38.	The Datastore should appear. (if not click refresh) Right Click the Datastore and Select Browse Datastore. 

Step	Action
39.	Verify the file that was copied earlier is present. This was an example of how to move data from host access outside of VPLEX into VPLEX without any loss. This would be the same procedure for any O.S. Just the mounting of a LUN is host specific.

End of Lab Exercise

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Lab Exercise 3: Creating Distributed Devices

Purpose:	To create Distributed Devices and provision them to a host.

Tasks:	**Create Distributed Devices.** **Create Virtual Volumes** **Create Consistency Groups**

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Lab 3: Part 1 – Create Distributed Devices

Step	Action
	This Lab will create Distributed Devices and provision them to a host. Information Needed: ESX Server address and user/password Windows Management Host VPLEX Cluster address and user/password Storage Volume assignments
1.	Open Unisphere for VPLEX from your Windows Management Host.
2.	Next we will create Distributed Devices using the **Advanced Provisioning** method.
3.	Navigate to: Provision Storage>Assigned Cluster>Storage Volumes
4.	View your assigned Storage Volumes. (See Lab Map) Remember that a Storage Volume must be claimed before it can be used in VPLEX. If the "Use" is displayed as **used**, it already has Extents created on it.
5.	Choose one of your **assigned** Storage Volumes that is Unclaimed. Record the UID

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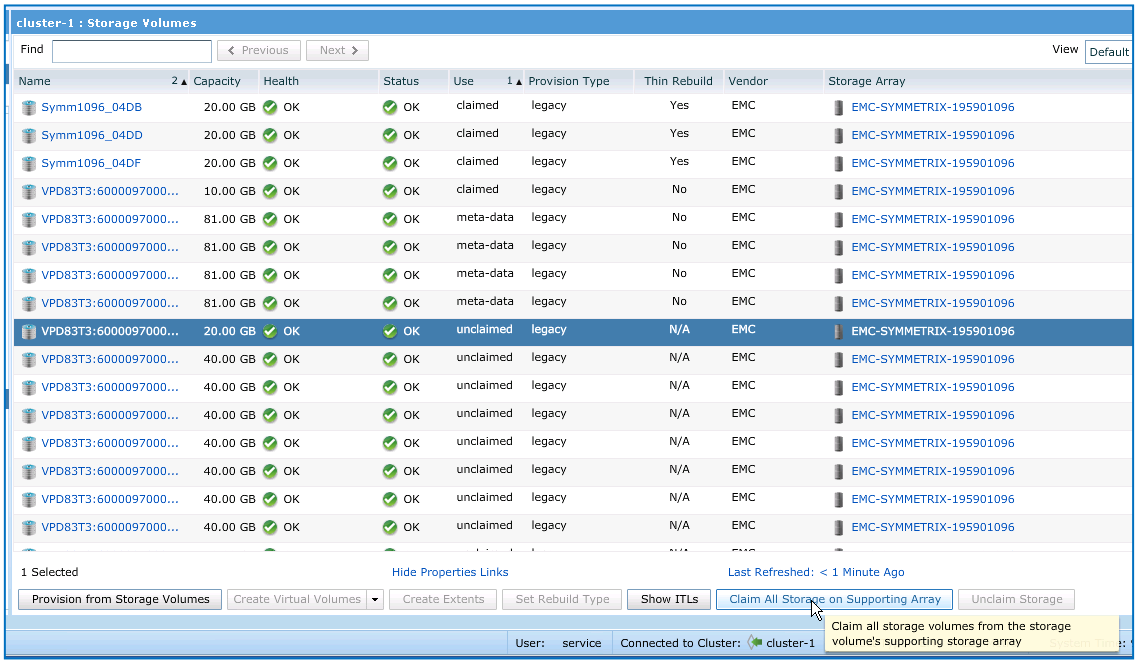
Step	Action
6.	Next we will Claim one of your Assigned Storage Volumes. Select it and Click **Claim All Storage on Supporting Array**. 
7.	Select the Array Click **Next**

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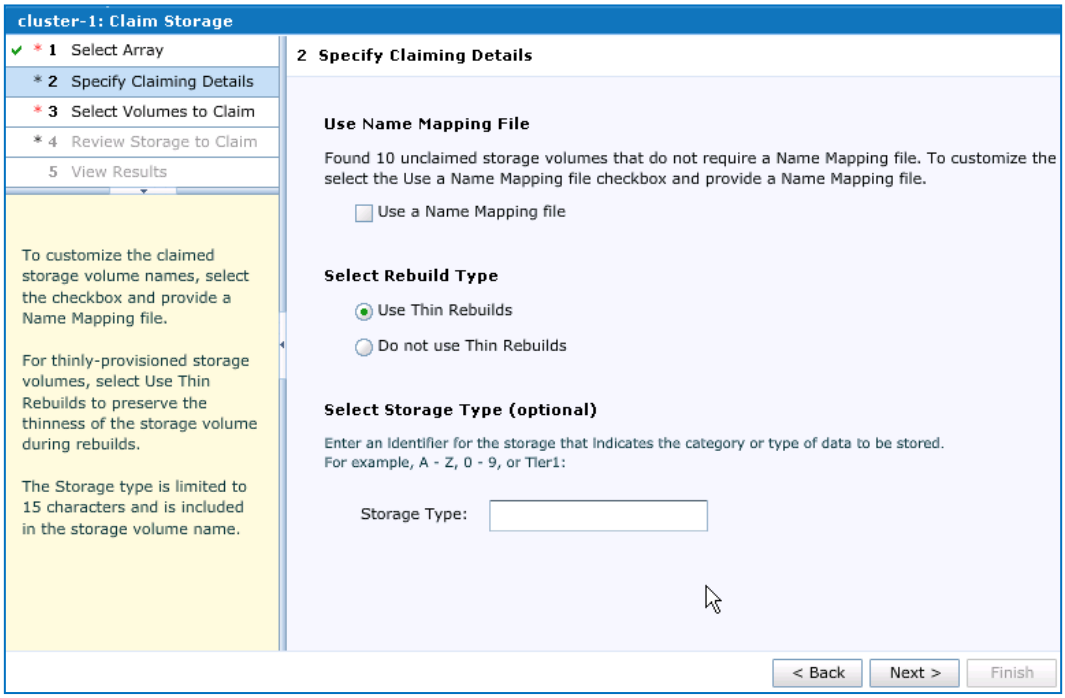
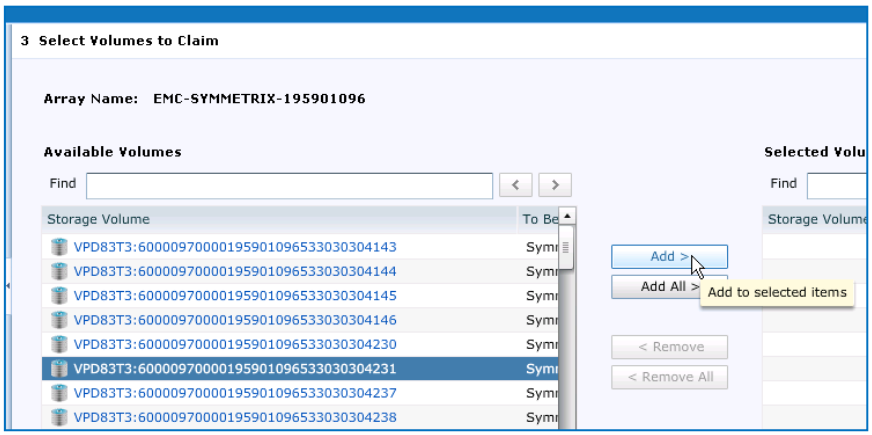
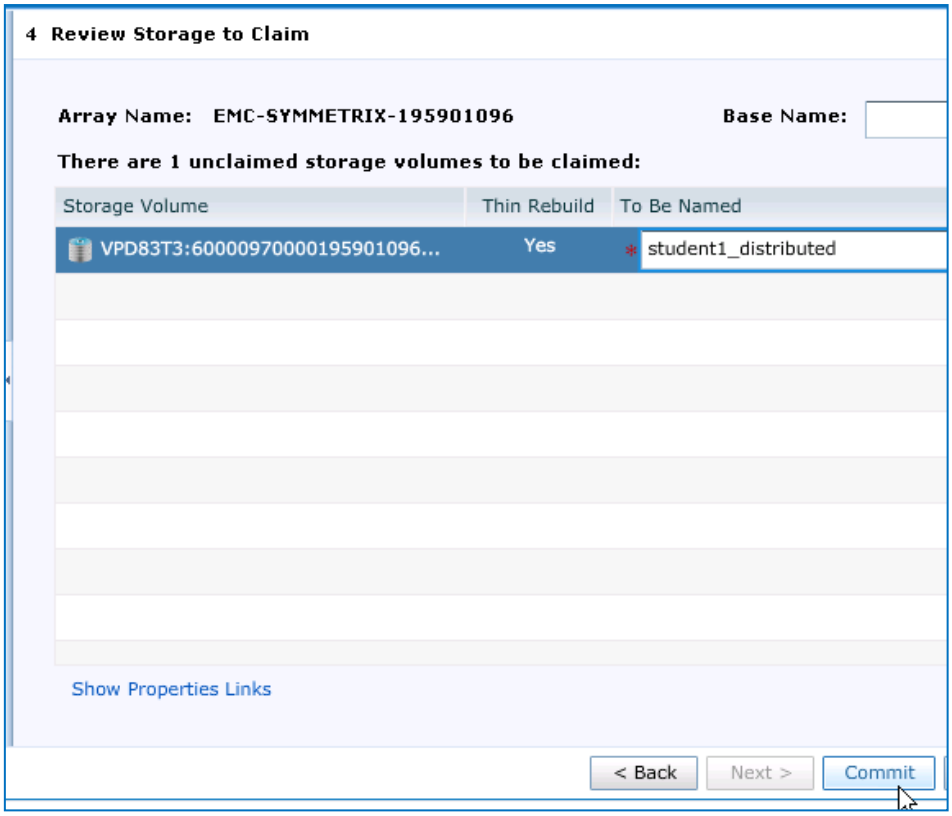
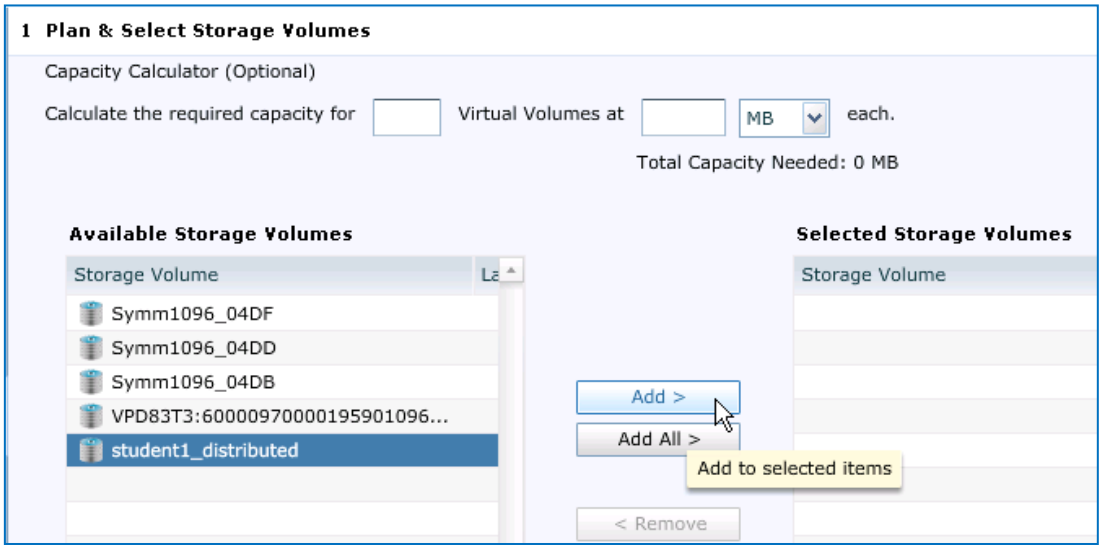
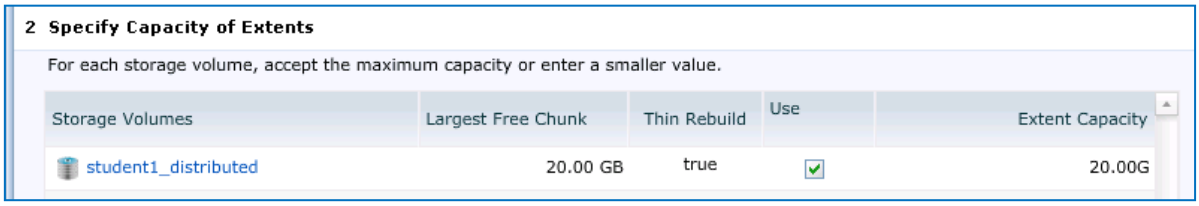
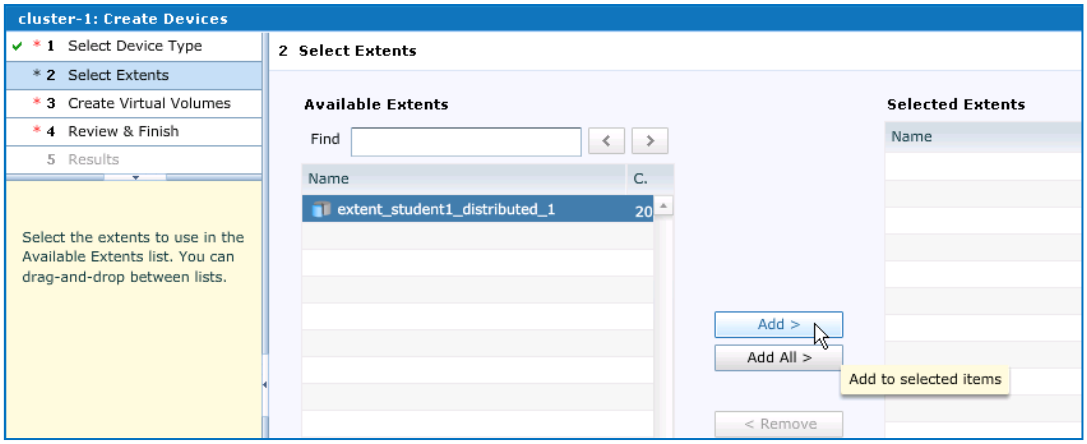
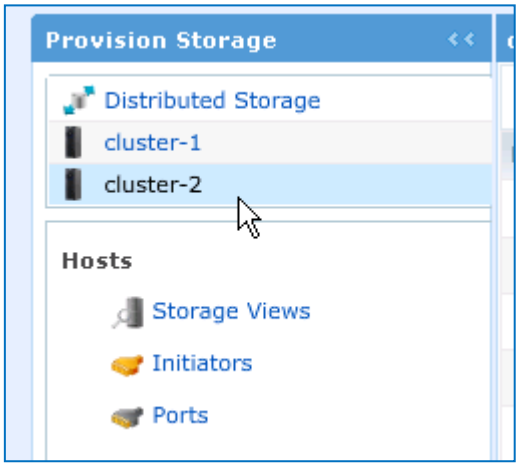
Step	Action
8.	For Claiming Details: Select Rebuild Type **Use Thin Rebuilds** All other boxes can be unchecked  Click **Next**
9.	Select the Storage Volume to claim. Highlight the Storage Volume to Claim and Click Add (Use the UID recorded in step 5)  Click Next

Step	Action
10.	Name the Storage Volume Enter your student number with a **_distributed** at the end. See example below: 
11.	Click **Commit** After successful completion click **Close**
12.	Next we will create Extents Select Extents form the Provision Storage Window on the left. Click **Create**

Step	Action
13.	Select your previously claimed Storage Volume and Click Add Click **Next** 
14.	Provision the entire Storage Volume for the Extent Verify the Largest Free Chunk matches the Extent Capacity (Default settings)  Click Next Click Commit Click Close
15.	Verify the Extent was created

Step	Action
16.	Next we will create a Device on the Extent Select the Extent previously created and Click **Create Devices**
17.	Choose **1:1 Mapping of Extents to Devices** Click **Next**
18.	Select the Extent previously created and Click Add  Click **Next**
19.	Answer **No** to create a Virtual Volume Click **Next**
20.	Click Commit Click **Close**

Step	Action
21.	Change Clusters to the **opposite** cluster. For Example if your assigned Cluster is Cluster-1 and the device that was just created is on Cluster-1, change to Cluster-2 
22.	Repeat Steps 1-19 to create a Device on the other cluster. There is **1** addition to repeating steps -1-19. **Step 10** has you name the Storage Volume, when repeating this step on the opposite cluster makes sure that the name is **not duplicated.** Place an **_1** at the end of the name. *This is very important to avoid duplicate names.* *Note: Very important to use your assigned volumes (See Lab Map) on this cluster, as not to impact other students.*
23.	Now there are 2 Devices on each cluster that can be used to create Distributed Devices and place Virtual Volumes on those Devices. We will also place those into Storage Views and Consistency Groups at Each cluster. Next we will verify the Block count of each Device Log on to Vplexcli for **Cluster-2** (Use putty on the desktop)

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Step	Action
24.	Change directories to /clusters/cluster-2/devices VPlexcli:/> `cd clusters/cluster-2/devices/`
25.	List the devices at that cluster VPlexcli:/clusters/cluster-2/devices> `ls` Find the device that was created in the previous steps.
26.	List the properties of that device to record the block count. VPlexcli:/clusters/cluster-2/devices> `ll device_student1_distributed` Record the Block-count
27.	Repeat the above steps (22-25) for **Cluster 1** Record the Block count.

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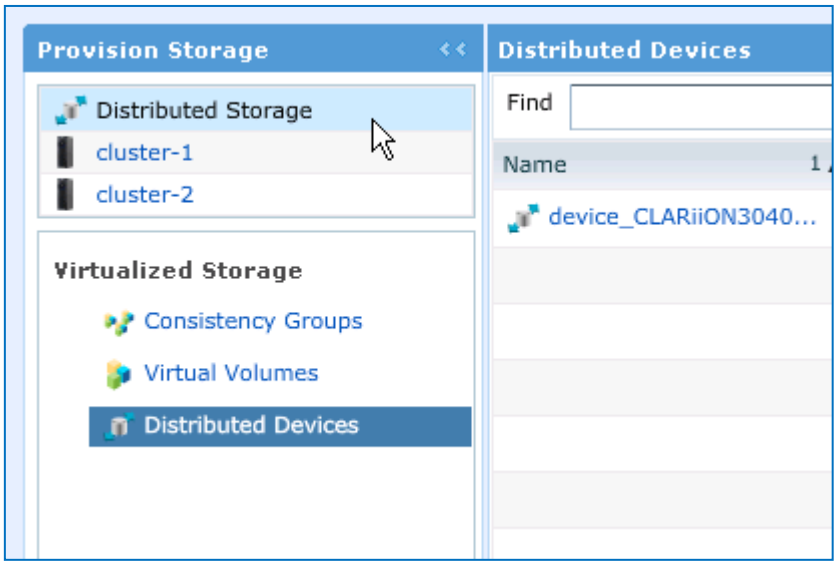
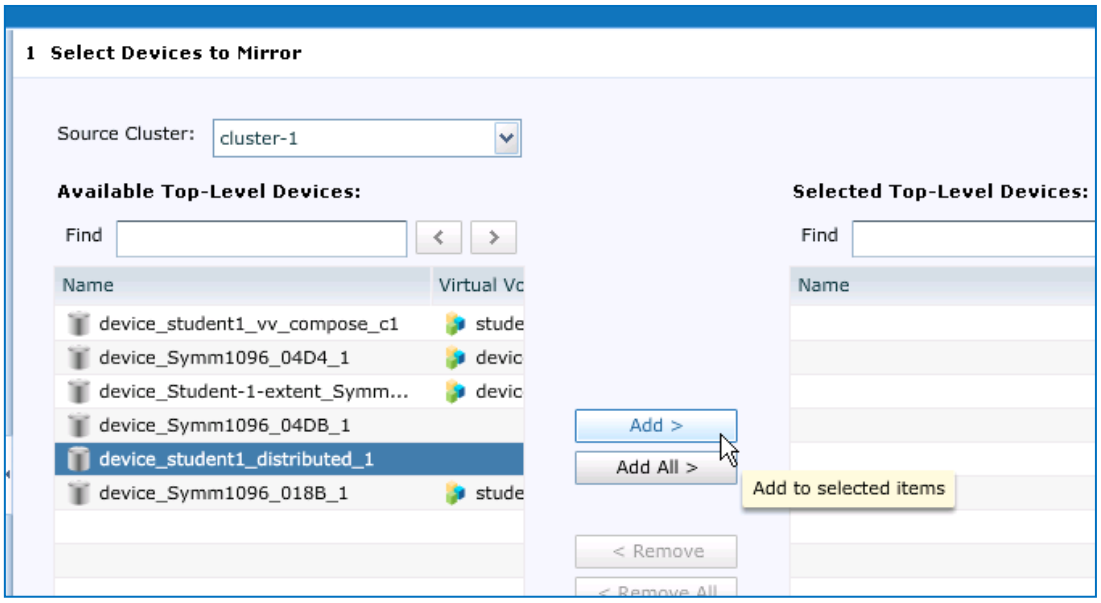
Step	Action
28.	When the distributed Device is created the smaller of the 2 devices that will be mirrored must be the **source**. Navigate to **Distributed Storage** from the left most Provision Storage Window 
29.	Select Distributed Devices and Click **Create**

Step	Action
30.	The Wizard should launch. Select a Source Cluster. Use the Cluster that has the device with the **smallest** block size. (recorded earlier) Click **Add** to select the device  Click **Next**

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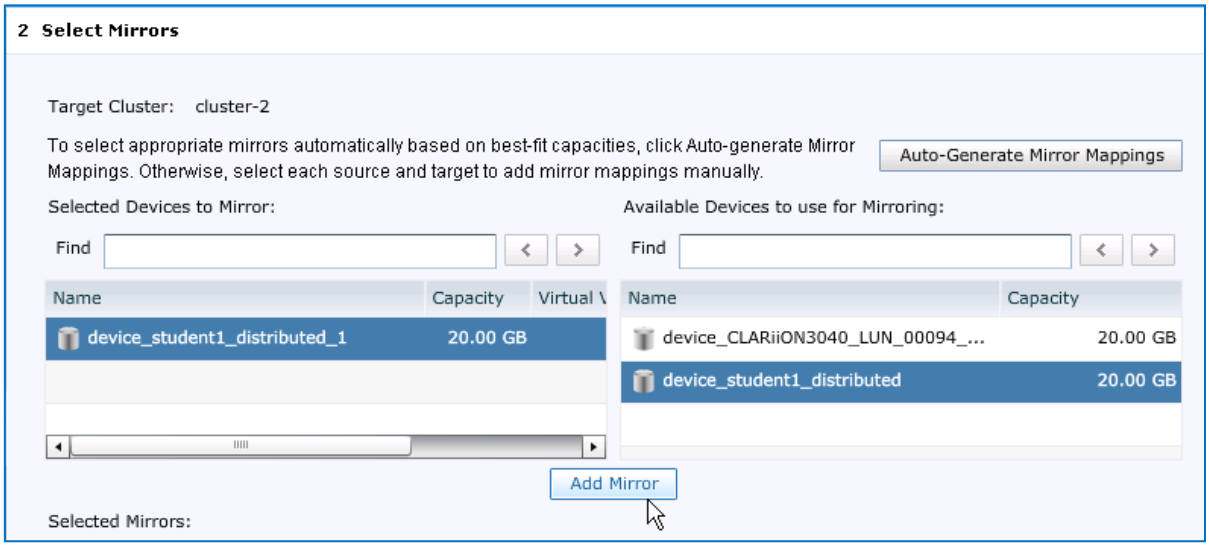
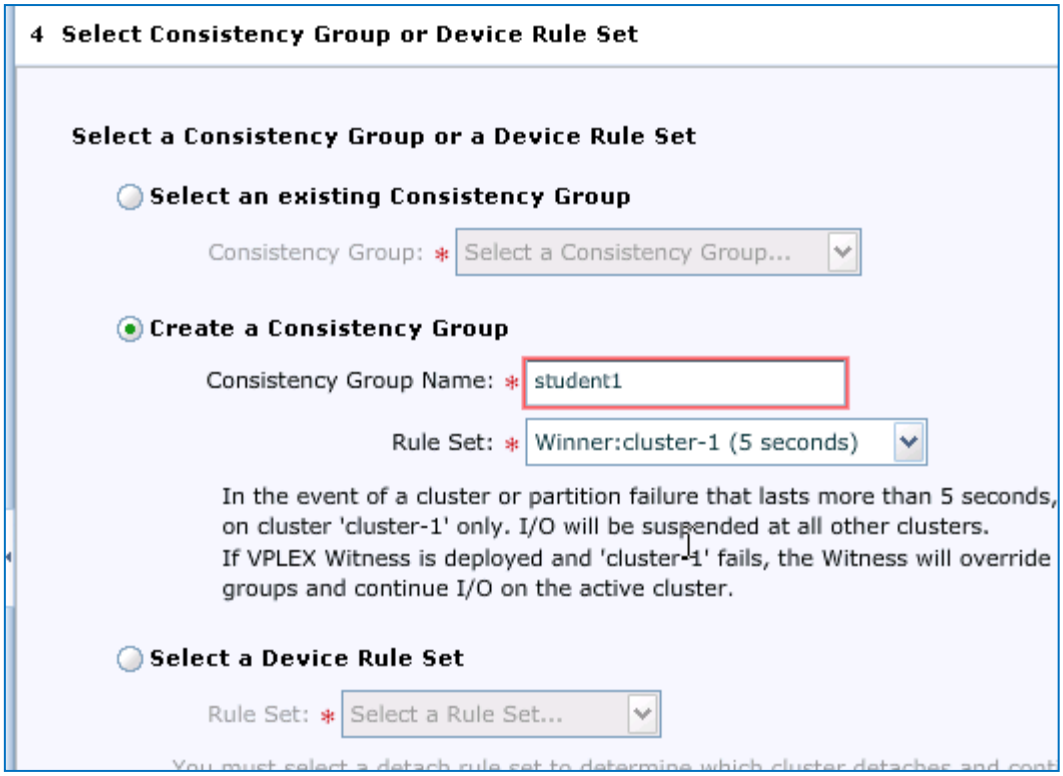
Step	Action
31.	Select the 2 devices to form a mirror. The choices are the other devices in the opposite cluster from the source that are as least as large. Select your Devices and Click **Add Mirror**  Click **Next**
32.	Leave the Synchronize Data Box checked Click **Next**

Step	Action
33.	Next we will create a Consistency Group Select Create a Consistency Group. Use your **Student number_distributed** as the name. Select your **assigned Cluster** as the Winner for the Rule Set  Click **Next**
34.	View the selections, if correct click **Commit** Click **Close** Note: sometimes a failure can occur without an explanation if the **wrong source cluster** is chosen. If this is the case redo the steps and choose the other cluster as the source.

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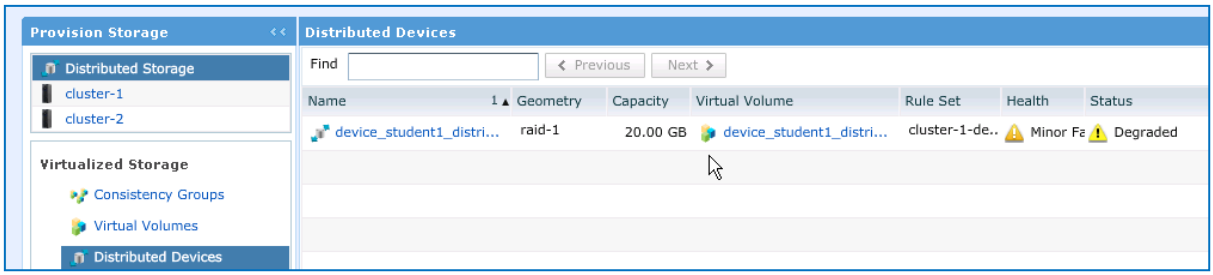
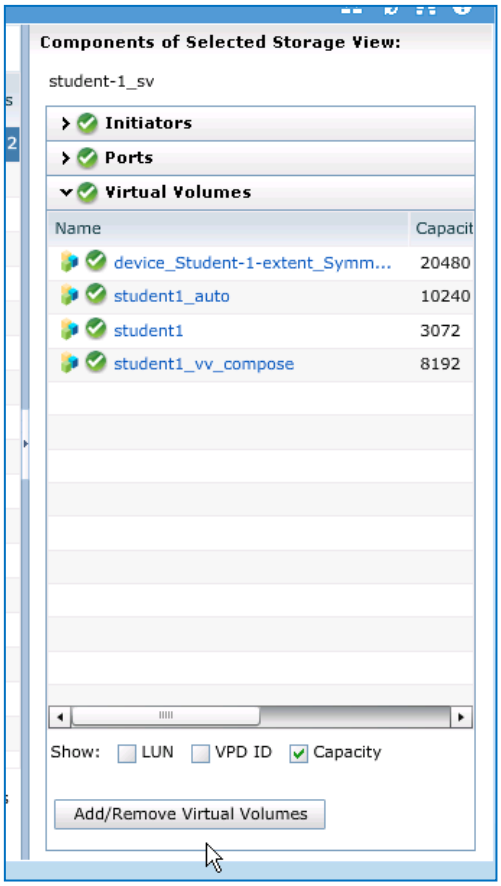
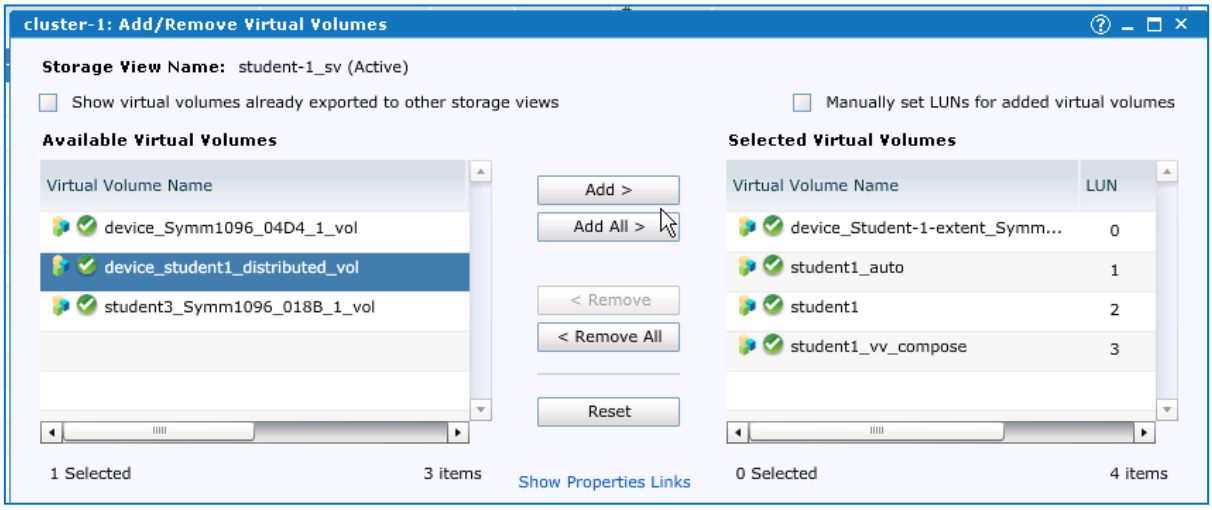
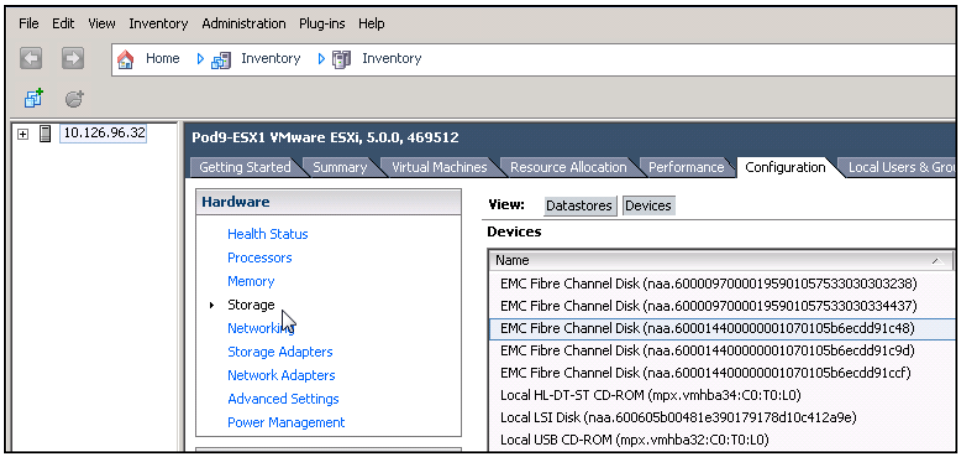
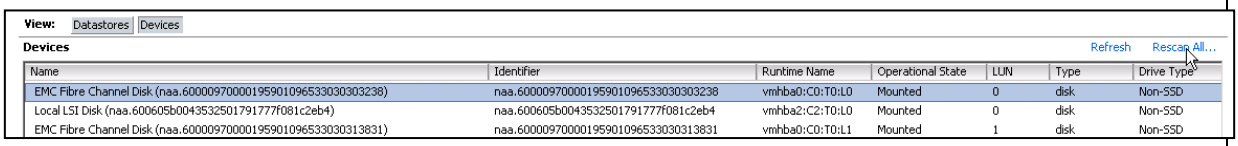
Step	Action
35.	Select Distributed Devices  The state of the device is degraded until the synchronization is complete
36.	Change view to your assigned Cluster Select Storage Views

Step	Action
37.	Select your Storage View and Change the Components view to **Virtual Volumes**



Step	Action
38.	Click Add/Remove Virtual Volumes Add the Distributed Virtual Volume into the Storage View  Click **OK** Click **Close**
39.	Minimize Unisphere for VPLEX and from your Windows desktop: Open vSphere Client and connect to your **ESX Host**. See the student Lab Map for the IP address and Login information for the ESX host. *Note: do **not** use the login for **vCenter Server**, just the ESX server.*

Step	Action
40.	Select the **Configuration** Tab. Select **Storage** from the Hardware box.  Change the view to **Devices** **Note**: *At this point we are about to perform a rescan of the host HBA. Because there may be other students sharing the ESX server and at the same point (each ESX host will have 1-3 students) we need to check the progress of the other students so that multiple rescans are not performed at the same time.* *If you are in a classroom environment you can ask the other students and coordinate a rescan for each. If you are taking the class online you can message the students or the* ***instructor****.*
41.	To the right of the window select Rescan 

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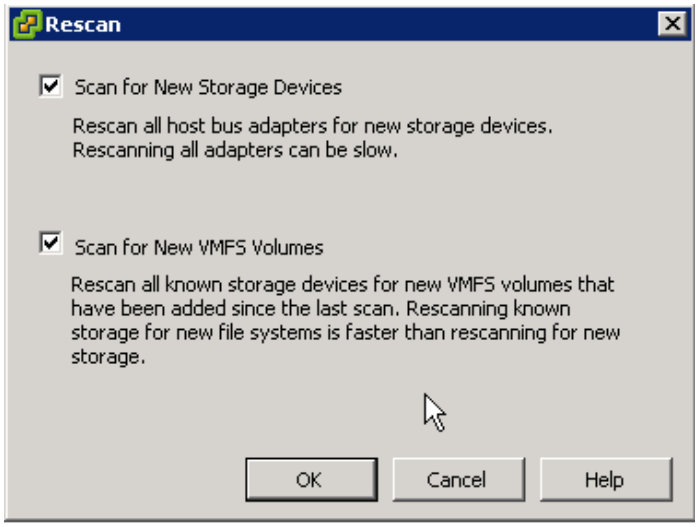
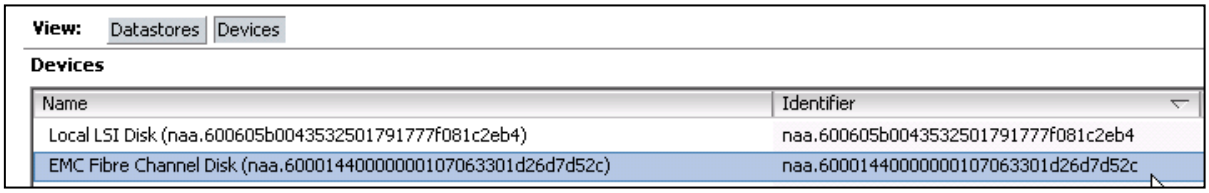
Step	Action
42.	Leave the 2 checkboxes checked and click **OK** 
43.	View the Recent Tasks window below and wait for completion. The new LUN should be displayed. Verify it is correct by checking the size and the **identifier**. Ignore the naa in front of the UID.  Compare it to the VPD number of the Virtual Volume for the **new Distributed Device** in the Storage View.

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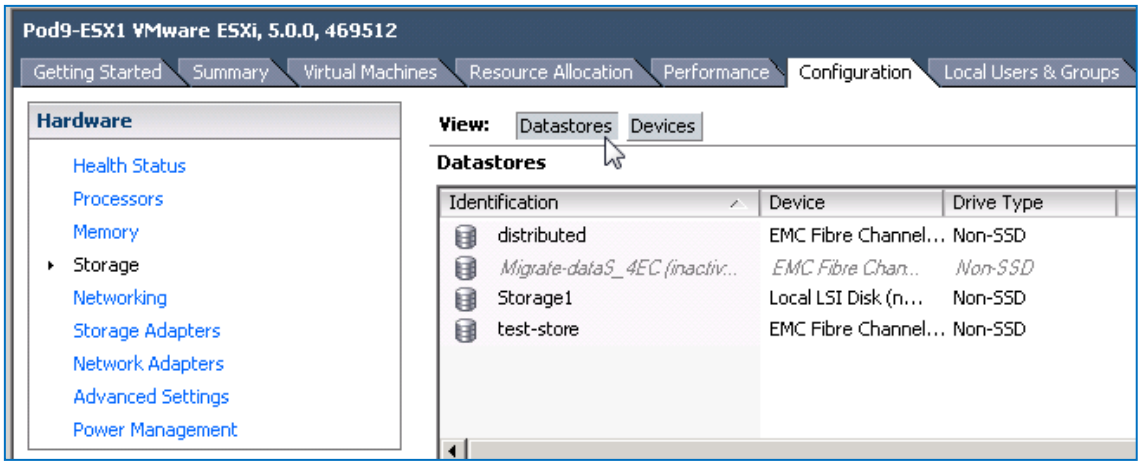
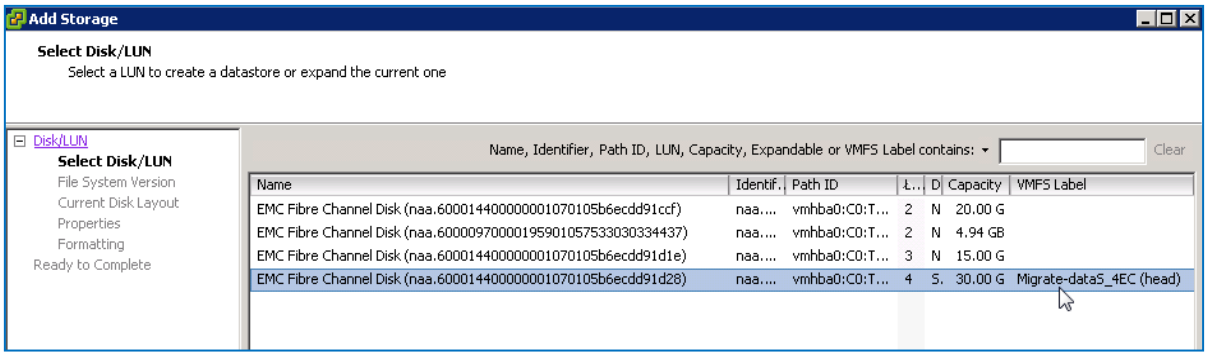
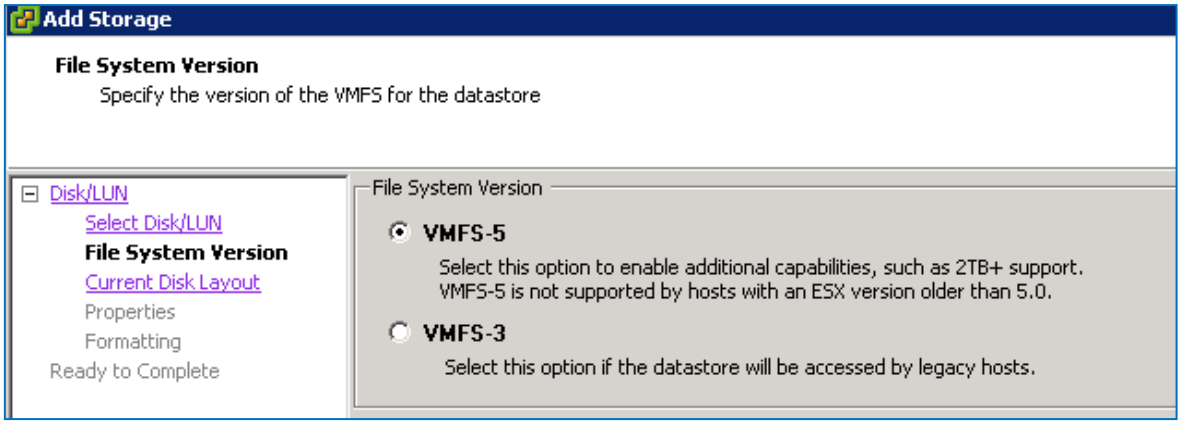
Step	Action
44.	Change the View to Datastores 
45.	Next we will use the ESX Hosts attached to both clusters to demonstrate the features of Distributed Devices. Select **Add Storage** (*We will now create a Datastore, which is VMware's version of a file system*) The wizard should launch
46.	Select Disk/LUN Click Next

Step	Action
47.	Chose the new device that is presented from the array.  Use the **size** to identify the correct device. Click Next
48.	Select VMFS-5 

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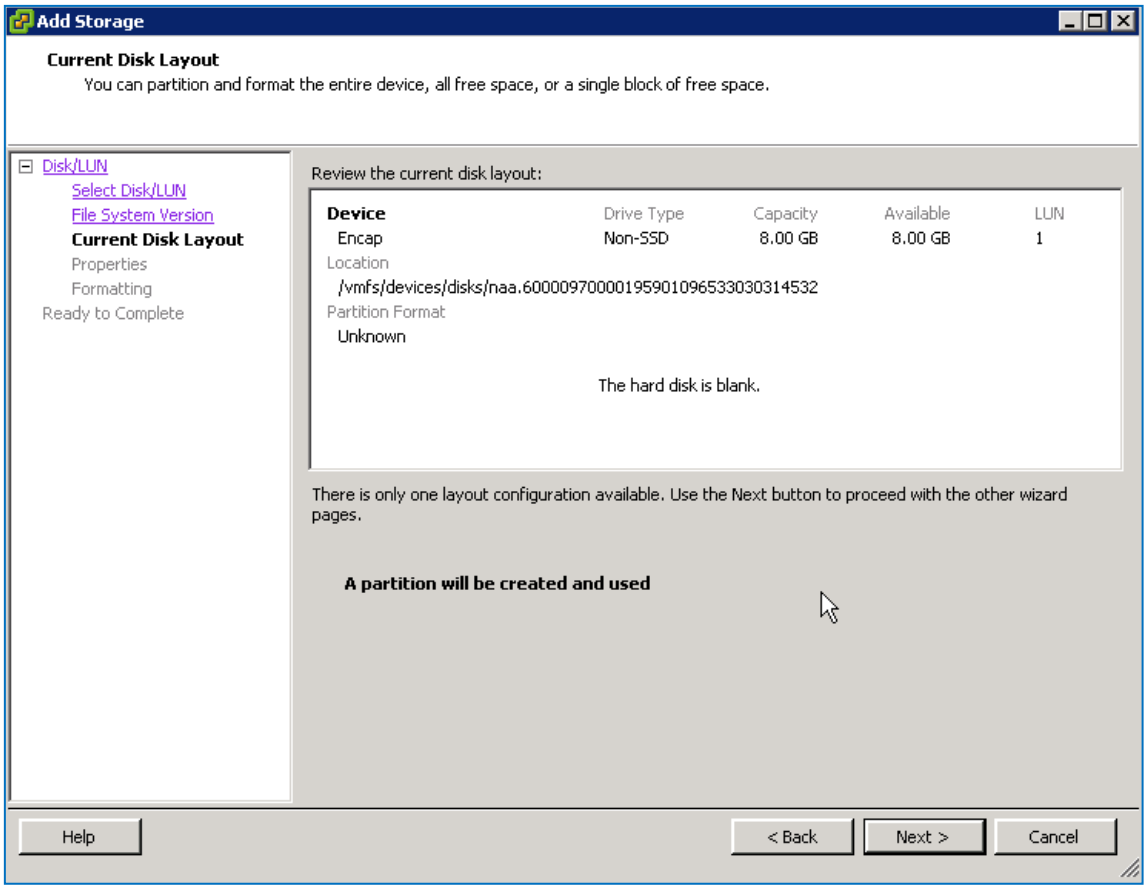
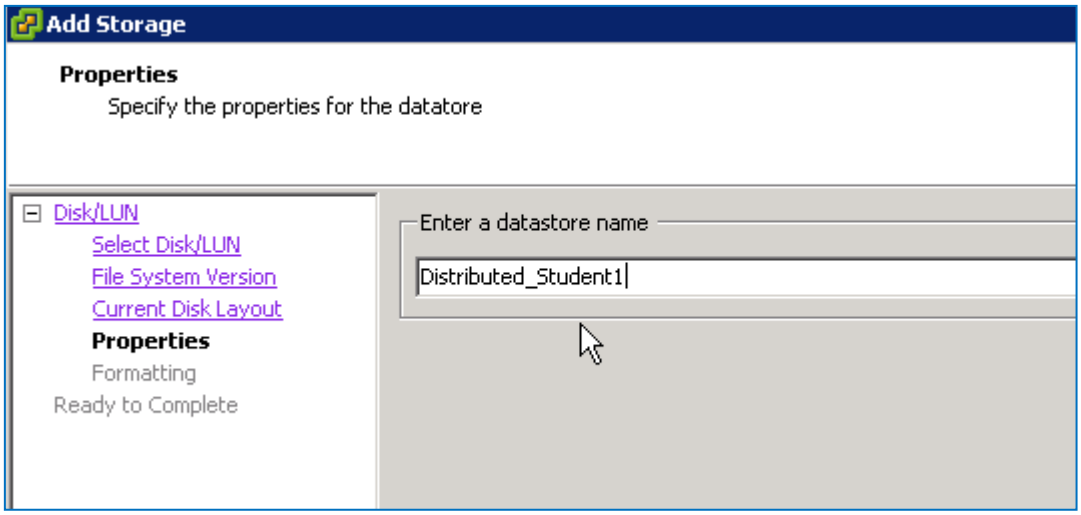
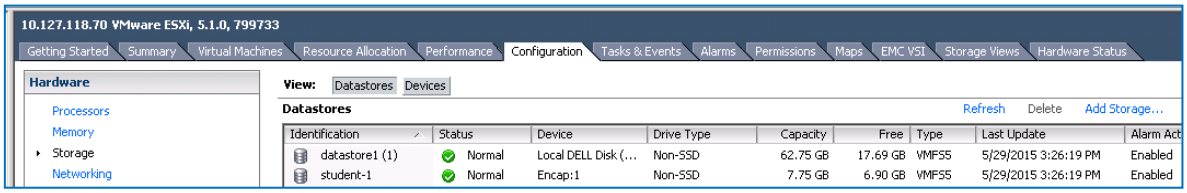
Step	Action
49.	Click Next



Step	Action
50.	Enter a Datastore name (use **distributed_student** number) 
51.	Select **Maximum available space** Click Next
52.	Task should complete and Datastore should be visible. 
53.	Next we will add the Virtual Volume on the **opposite** cluster to the **Storage View** already created. (Any one)

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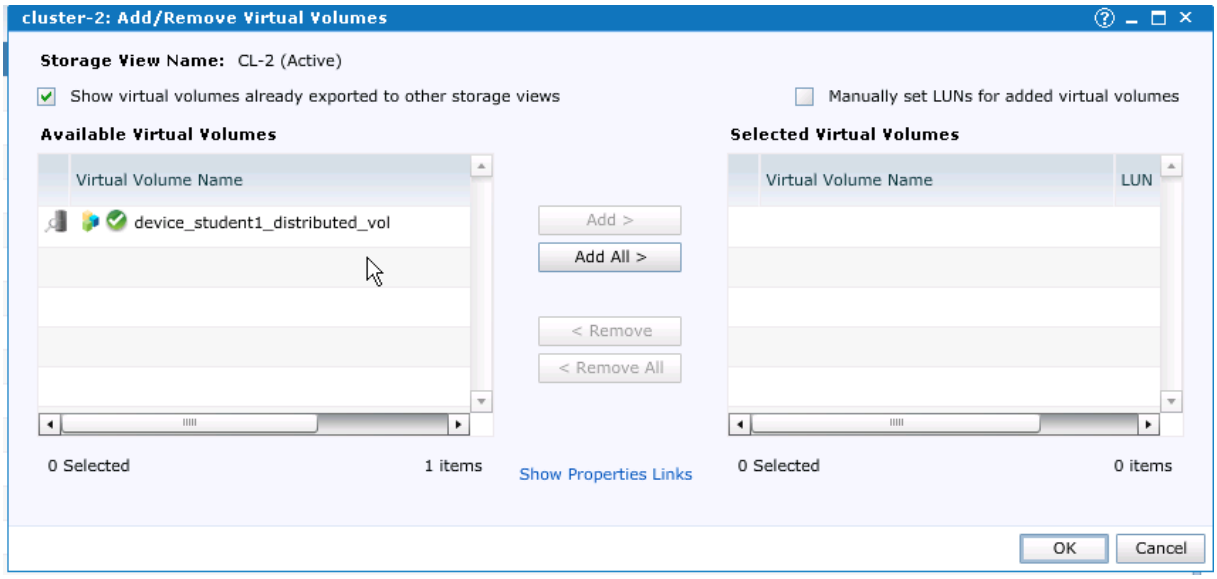
Step	Action
54.	Change the view under **Provision Storage** to the opposite cluster you are assigned. Example if your student Lab Map has Cluster-1 as your assigned cluster change to cluster 2
55.	Select the existing Storage View Change the components window to the right to Virtual Volumes. Select **Add/Remove Virtual Volumes**
56.	Add the Virtual Volume from the distributed Device that was created earlier.  **Check the Box** "Show virtual volumes already exported to other storage views" Click Ok Answer yes to the warning about exporting a volume already in another Storage View.
57.	Change your vSphere Client to the ESX host in the **opposite** cluster See the Lab Map for user/password

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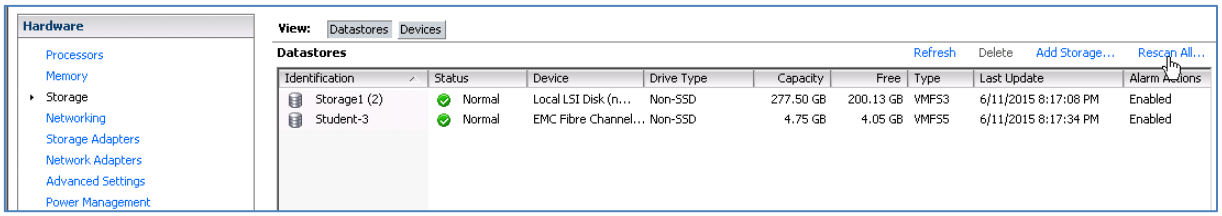
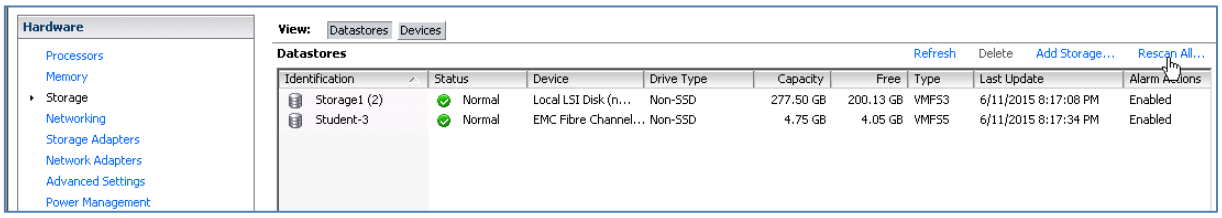
Step	Action
58.	Select the **Configuration** Tab. Select **Storage** from the Hardware box.  Change the view to **Datastores** **Note**: *At this point we are about to perform a rescan of the host HBA. Because there may be other students sharing the ESX server and at the same point (each ESX host will have 1-3 students) we need to check the progress of the other students so that multiple rescans are not performed at the same time.* *If you are in a classroom environment you can ask the other students and coordinate a rescan for each. If you are taking the class online you can message the students or the* ***instructor****.*
59.	To the right of the window select **Rescan** 

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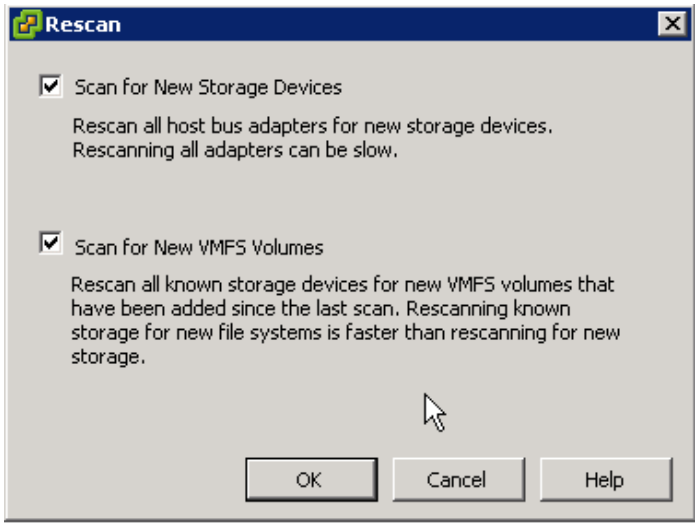
Step	Action
60.	Leave the 2 checkboxes checked and click **OK** 
61.	View the Recent Tasks window below and wait for completion. The new DataStore should be displayed. Verify it is correct by checking the size and name. Compare the name to step 49. This is a demonstration of the ability of VPLEX to provision storage from 2 different clusters at 2 different locations as Active Active. If the Datastore does not appear here are some simple steps to fix the issue. • Rescan again • Change views from Datastore to Devices and verify the device (check size and UID number is displayed) • Use the **Add Storage Wizard** (steps 44-51) pick the same device UID and keep existing Signature.
62.	Close the **vSphere Client** connection to the ESX host. Log in to **vCenter Server** (See Lab Map for user/password)

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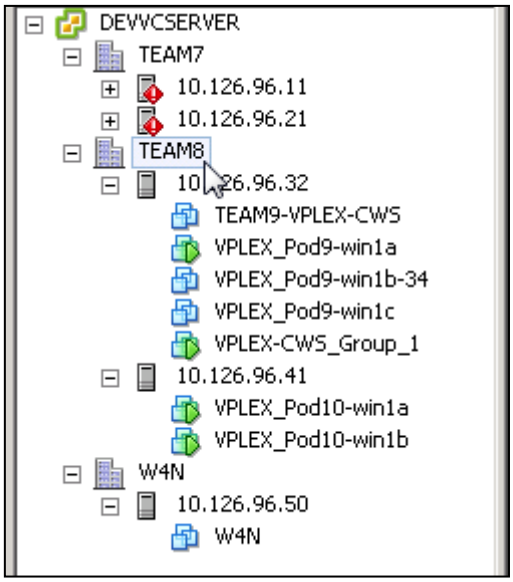
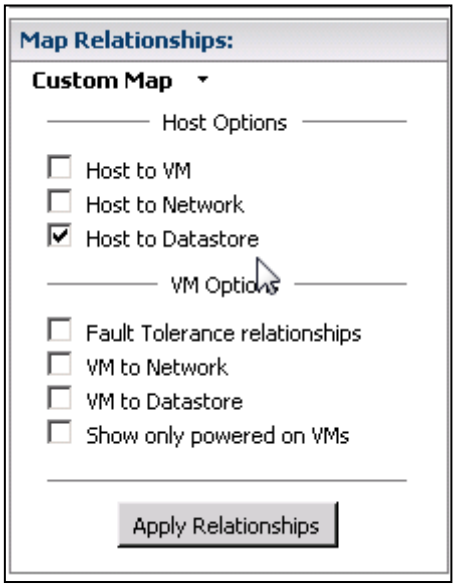
Step	Action
63.	From vCenter Server, select the **Datacenter** that stores the ESX Hosts  *It uses the building Icon.*
64.	Select the **Maps** Tab Change the Map Relationships to Display only **Host to Datastore**  Click Apply Relationships

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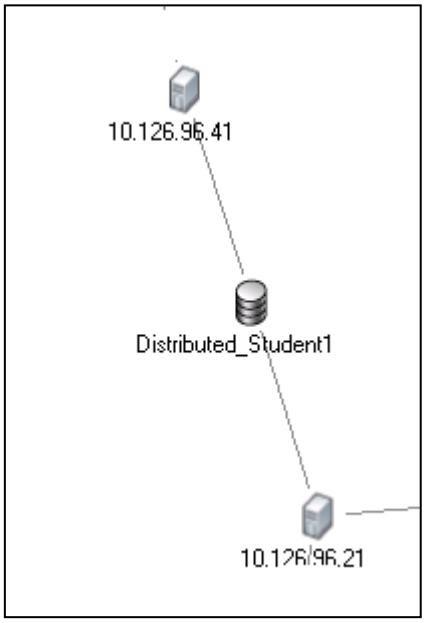
Step	Action
65.	The Map displays the Distributed volume as the same disk. *Hint: look at the storage view previously used. Notice the UID for the Virtual Volumes are the same at both clusters.* 

End of Lab Exercise

Lab 3: Part 2 – Provisioning Distributed Storage with VIAS

Step	Action
	This Lab will demonstrate how to provision Distributed Storage ant both VPLEX Clusters using the VIAS method of provisioning.
1.	Open Unisphere for VPLEX on your assigned Cluster. Log in using the user/password from your student Lab Map.
2.	Navigate to **Provision Storage>** Select **Provision from Pools**.
3.	The Wizard should launch. Select **Next**

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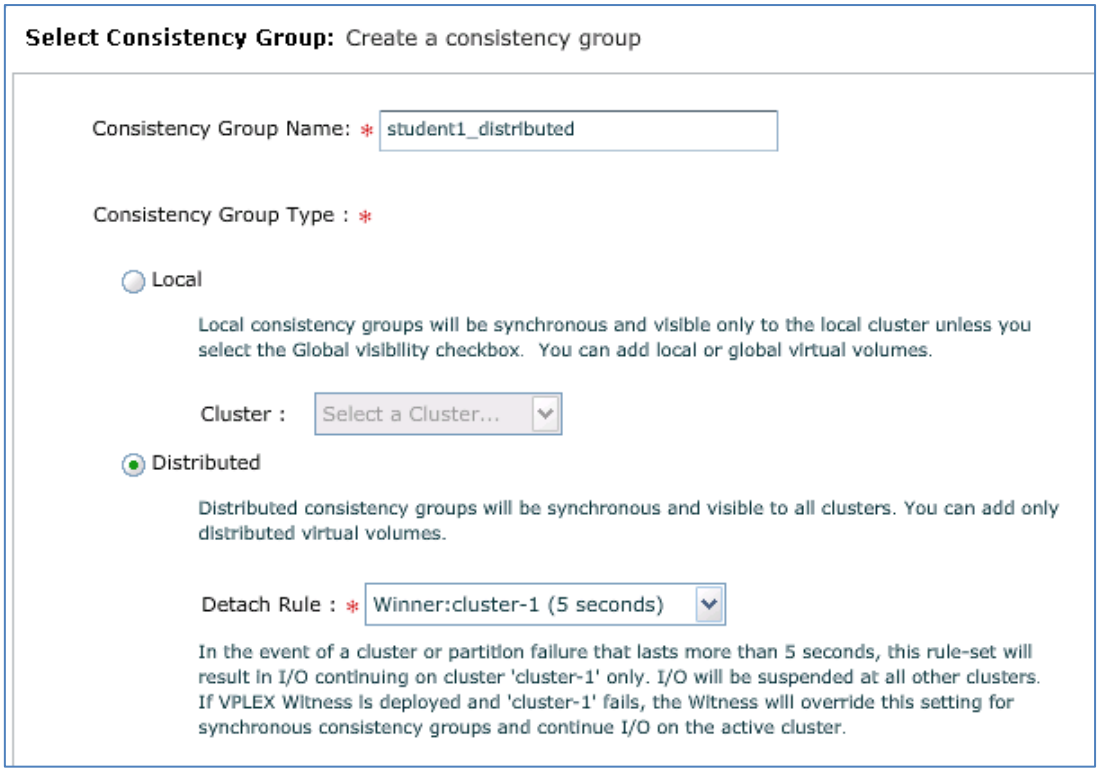
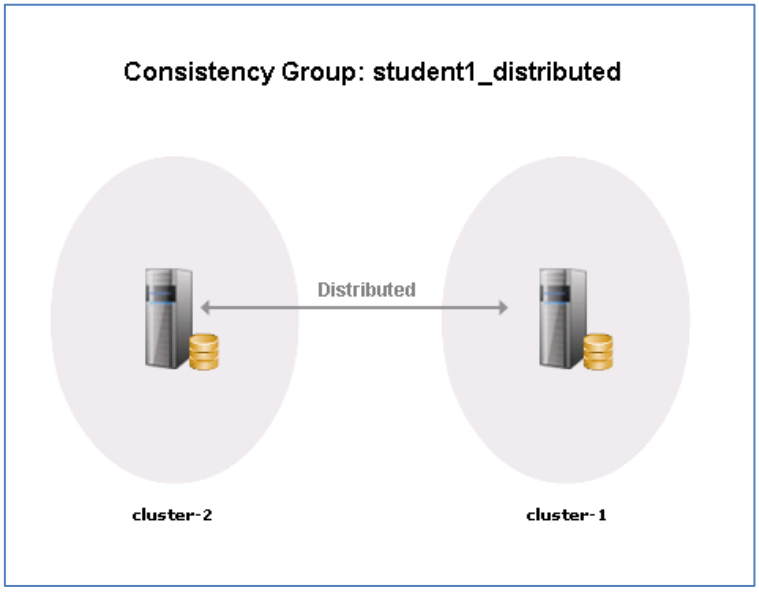
Step	Action
4.	Enter a Consistency Group Name. Use your student number followed by **_distributed**. Select **Distributed**  Change the Detach Rule to Winner (your assigned cluster) Verify the Dark Circle is around **both** Clusters. 

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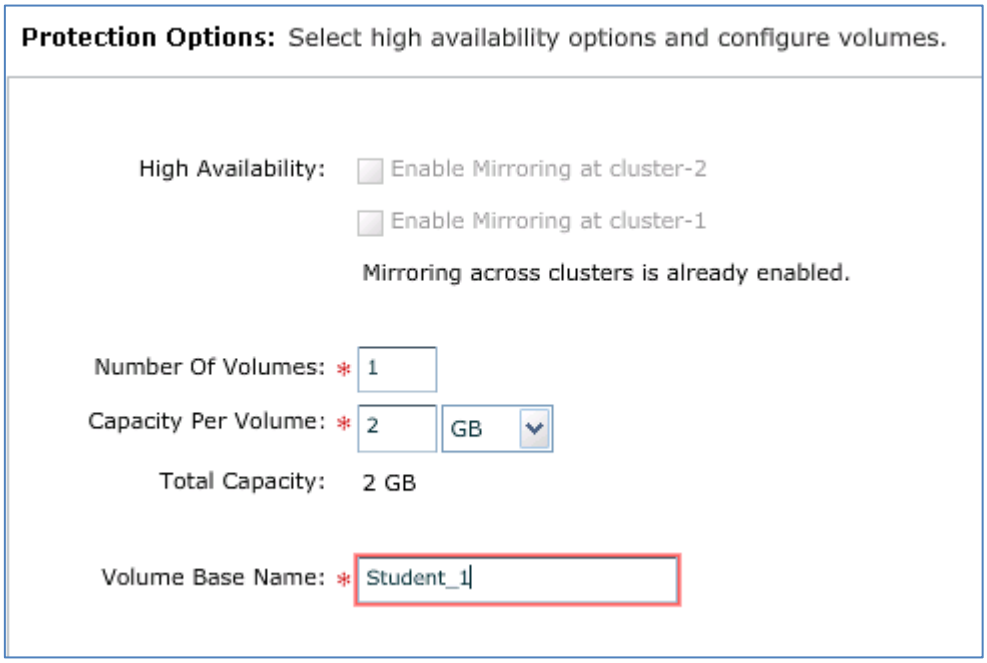
Step	Action
5.	Click **Next**
6.	Change the Number of Volumes to **1** Make the size your assigned size (see Lab Map) Add Student_<student number> to the Volume Base Name.  Click Next

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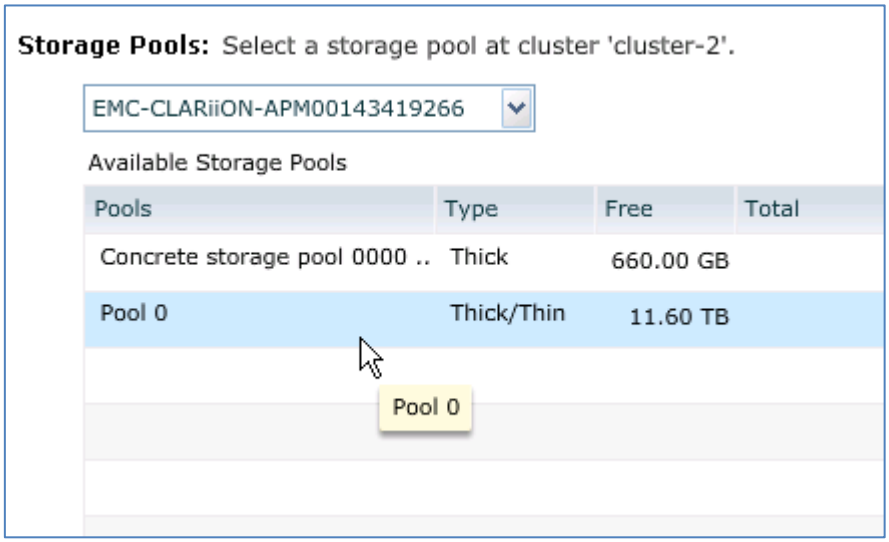
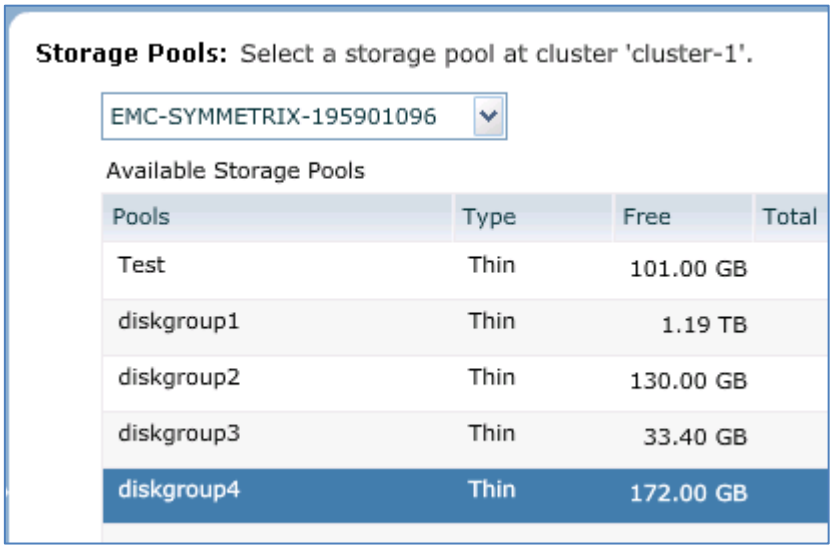
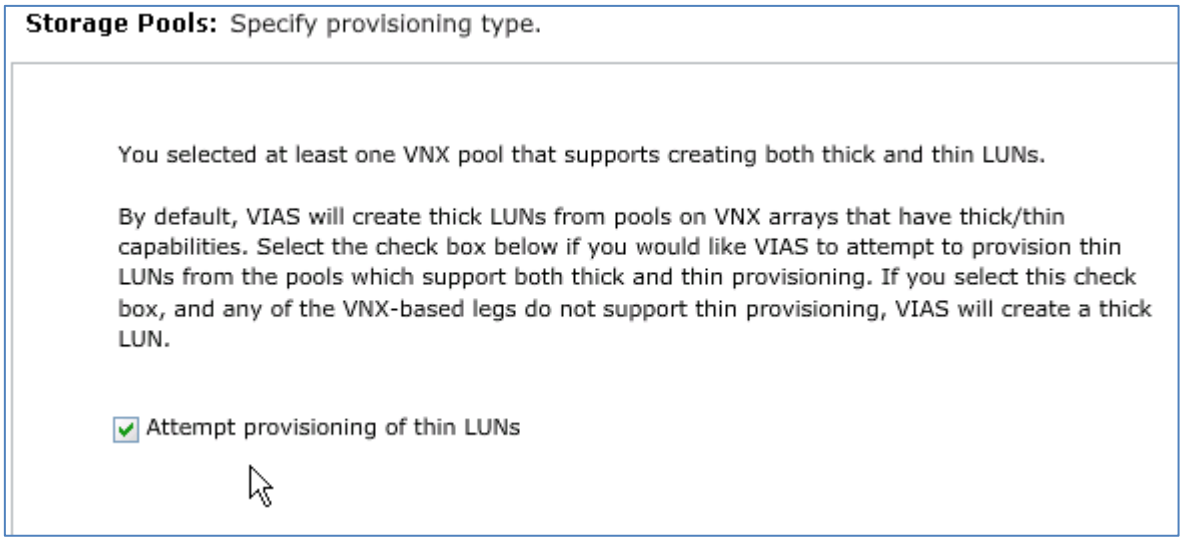
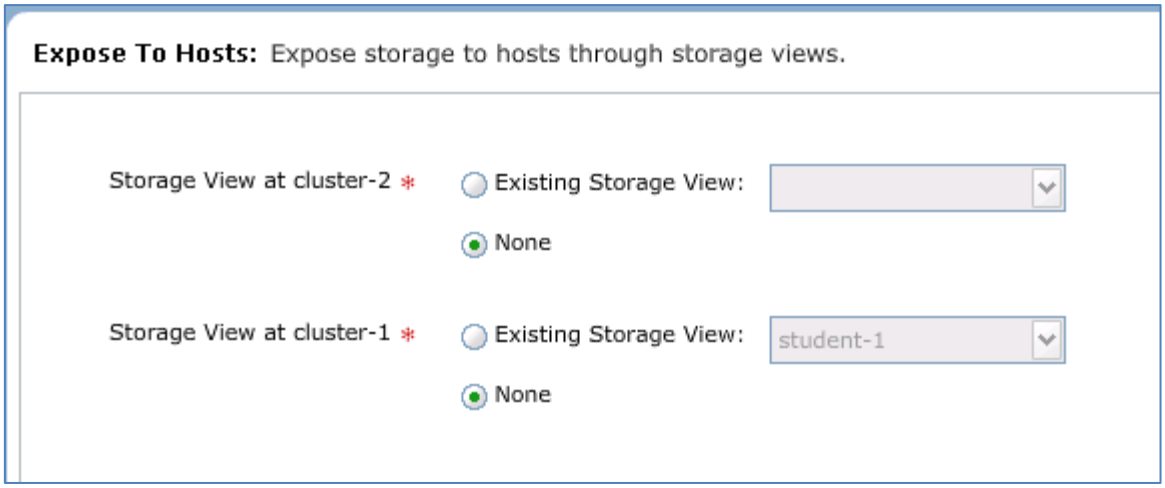
Step	Action
7.	Select the Array for Cluster-2 Select a Storage Pool  Click Next
8.	Select the Array for Cluster-1 Select a Storage Pool  Click Next

Step	Action
9.	View the Warning for VNX Arrays  Check the Box **Attempt provisioning of thin LUNs** Click Next
10.	Select None for Storage Views for both Clusters.  Click Next

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Step	Action
11.	Click **Provision Storage** The Job should run, or it will be queued if other jobs are running. **Results:** View the results of the provisioning request. Click Provision More to provision more storage, or click Done to close the wizard. Consistency group student1_distributed created Set detach rule Virtual volumes provisioning job started Provisioning job 'Provision_1_14-06-15-21-12-20' has been started. View the job status in the Monitoring > Provision Jobs section. View Job Status
12.	Click the **View Job Status** link to check the progress

End of Lab Exercise

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Lab Exercise 4: Mobility with VPLEX

Purpose:	To create Data Mobility jobs using the CLI and GUI. To determine the differences between the functions in the CLI versus the GUI Mobility operations. You will create mobility jobs in the CLI and GUI. You will perform batch mobility and monitor the rebuild status.

Tasks:	• **Perform extent Mobility** • **Perform Device Mobility** • **Perform Batch Mobility**

References:	EMC VPLEX CLI and Administration Guides

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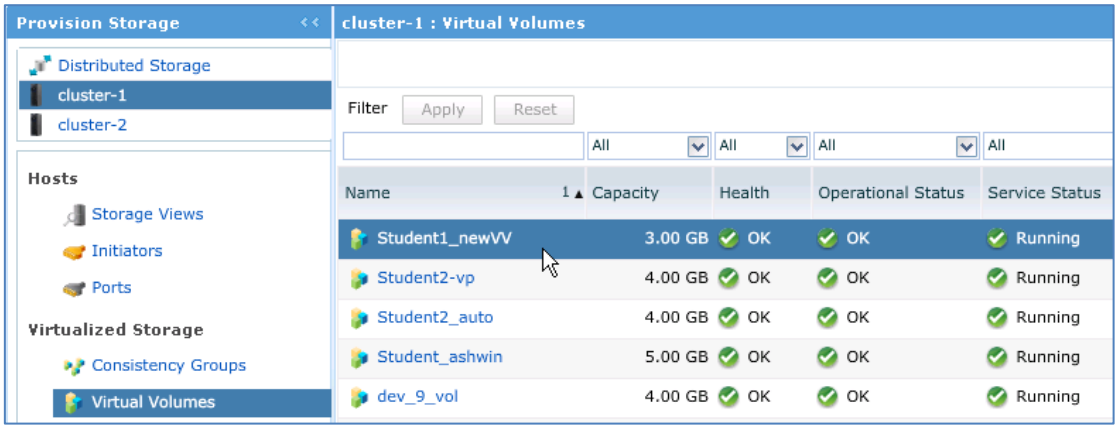
Lab 4: Part 1-Extent Mobility

Step	Action
	This lab will cover the process for performing **Extent** Mobility.
1.	Log in to Unisphere for VPLEX
2.	Navigate to: Provision Storage>Assigned Cluster>Virtual Volumes
3.	Select one of your Local Virtual Volumes previously created. Make sure it's status is "running"  This Virtual Volume is provisioned to a Host. This Lab will move the Extent from one Storage Volume to another, without disruption.

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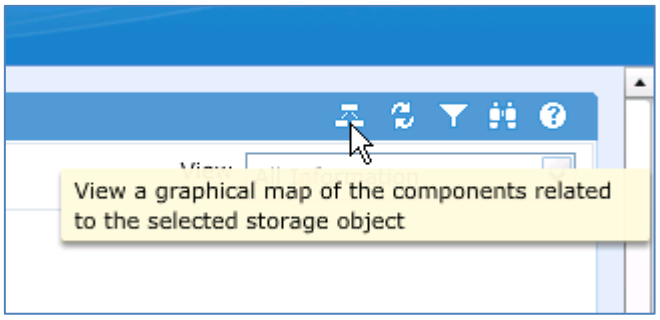
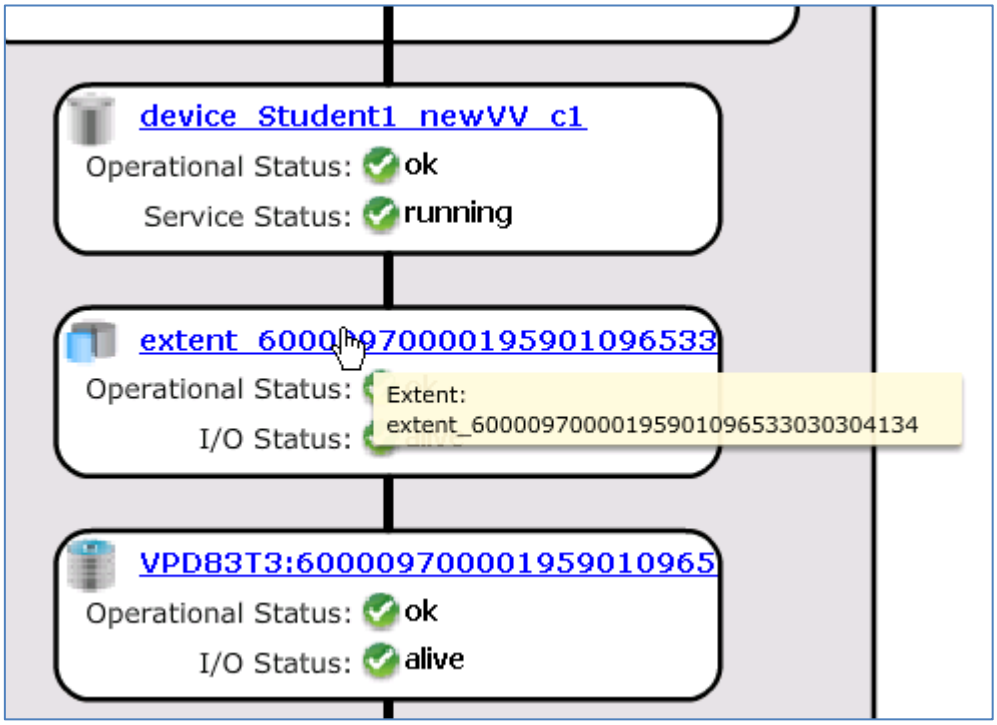
Step	Action
4.	Click on the Map Icon in the right corner. 
5.	A Map of the all the VPLEX objects are displayed. Record the name of the Extent._____  This will be the Source for our Migration. The name can also be discovered from the CLI using the "`show-use-hierarchy -t`" command.

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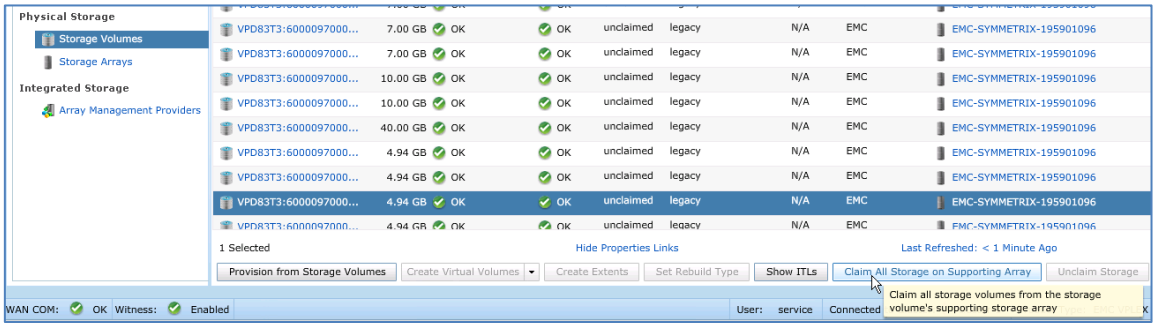
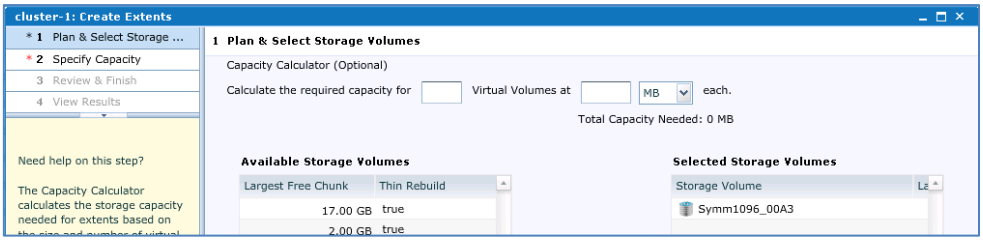
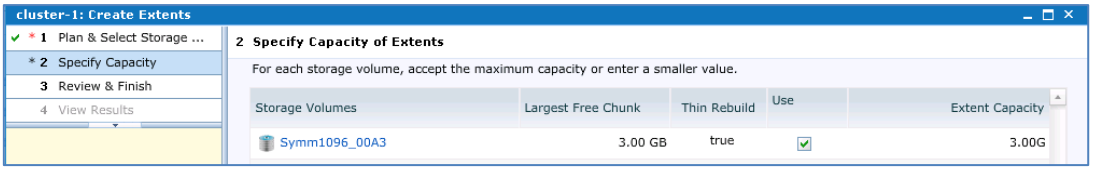
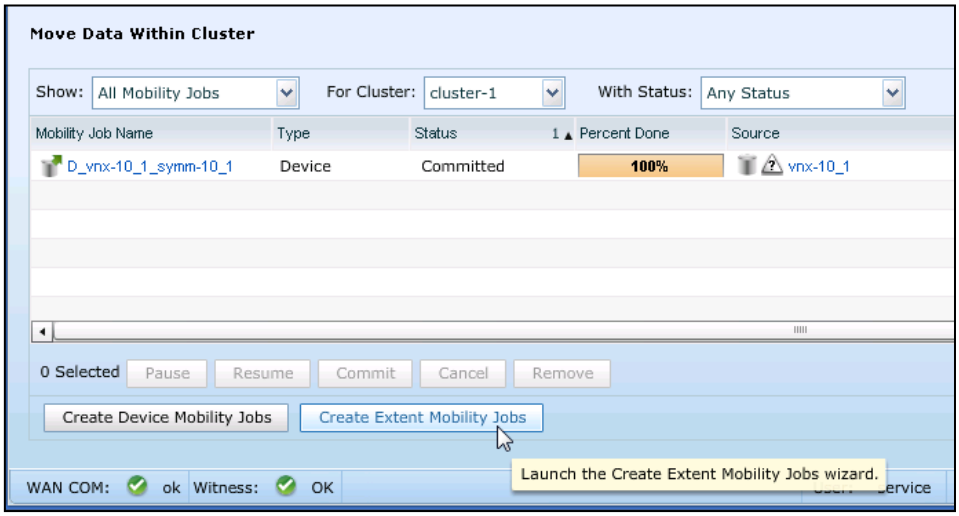
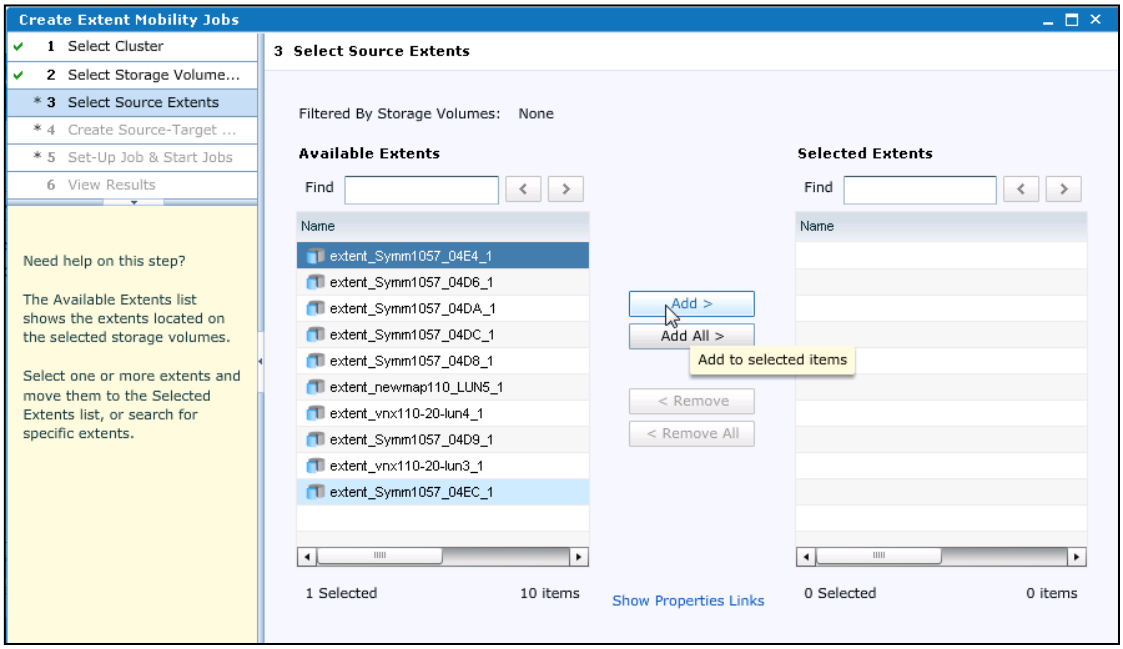
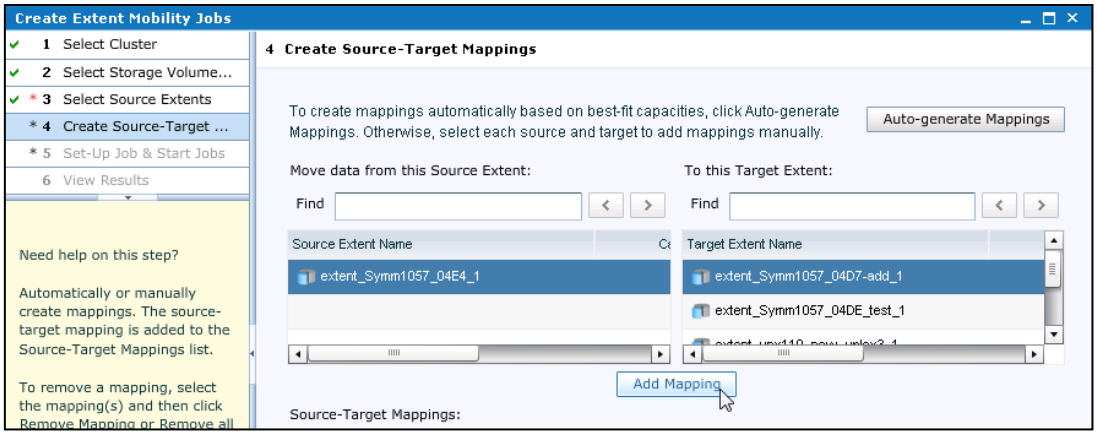
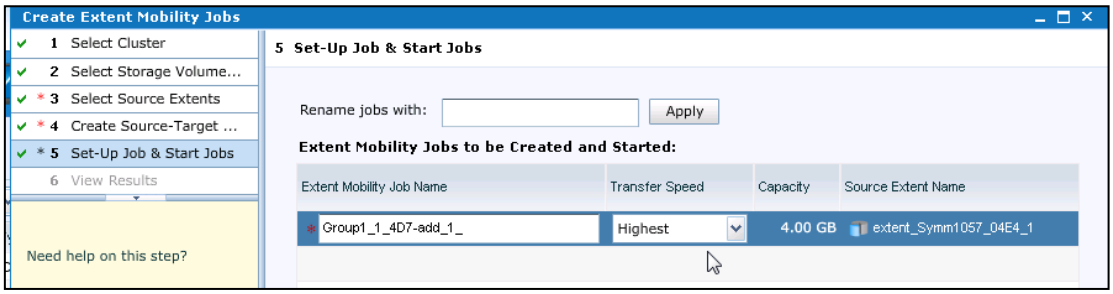
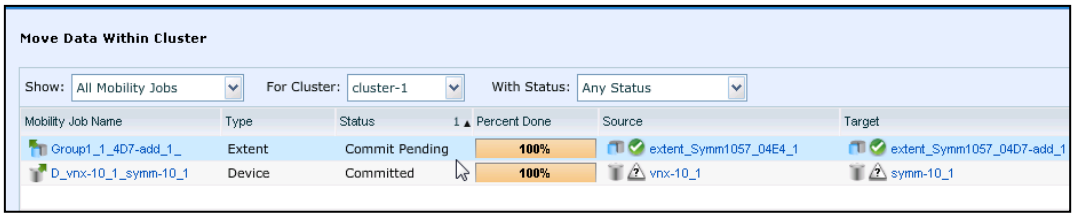
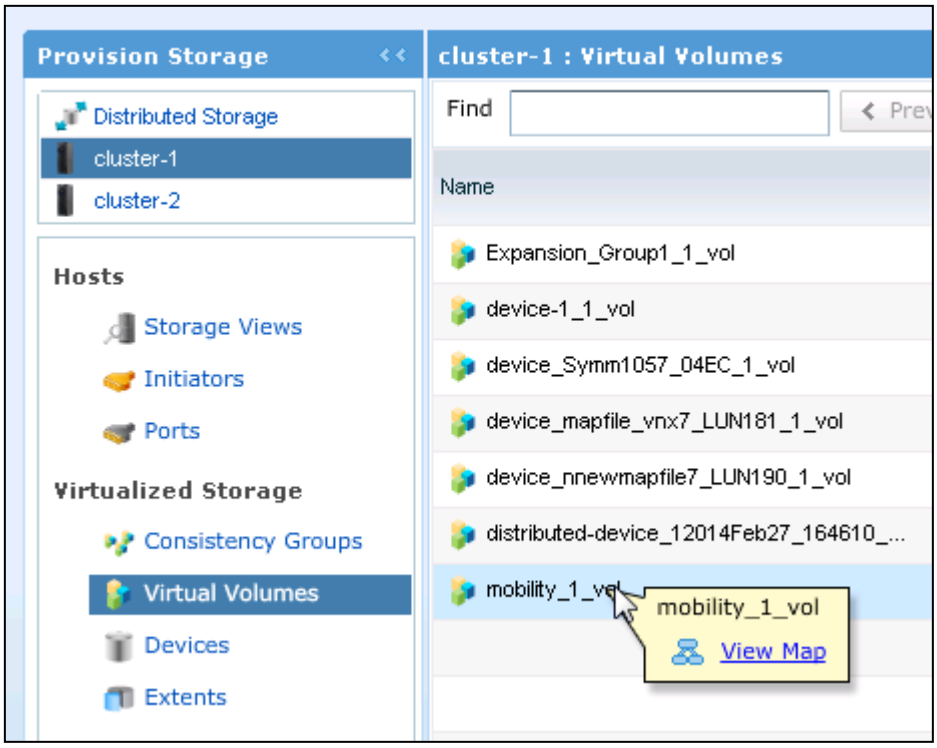
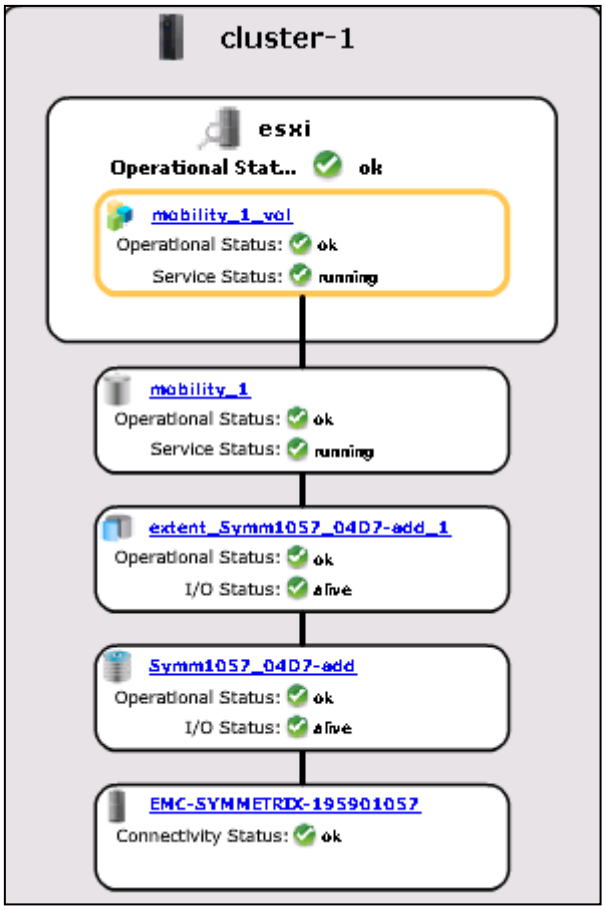
Step	Action
6.	Claim one of your **assigned** Storage Volume s See Lab Map. (see previous lab for steps if required) 
7.	Create a new Extent. Use the Storage Volume just claimed. Select Extents, then Click Create  Click Next
8.	Select the entire Storage Volume to create the Extent.  Click **Finish** then **Commit** Verify there is an Extent of your assigned size

Step	Action
9.	Navigate to Mobility Central>Move Data Within the Cluster
10.	Click Create Extent Mobility Jobs 
11.	Select your assigned Cluster and Click Next
12.	Skip the optional step 2 Click Next

Step	Action
13.	Select the Source Extent Use the extent that was recorded in the previous steps.  Click Next

Step	Action
14.	Chose the empty extent that was created in step 7 for the target. Highlight both and Click **Add Mapping**  Click **Next**
15.	Edit the Job name with your Student number. Use Highest Transfer speed  Click Start Click Close

Step	Action
16.	Monitor the Mobility Job until the status changes to Commit Pending.  Click Commit Click Ok Click Close
17.	Navigate back to Provision Storage>Cluster-x>Virtual Volumes. Select the Virtual Volume that was used in the previous steps. Highlight the volume to view the map 

Step	Action
18.	Review the Map and notice the extent has changed. 

End of Lab Exercise

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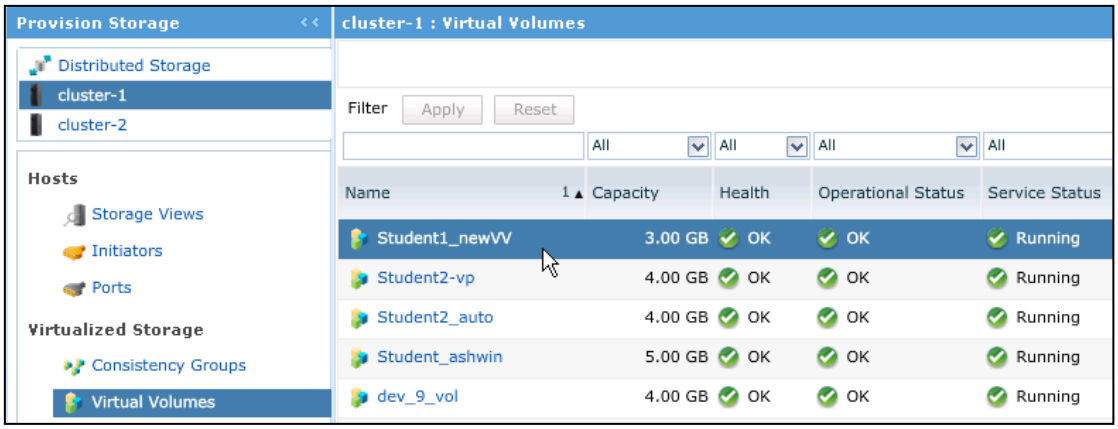
Lab 4: Part 2 – Device Mobility

Step	Action
	This Lab will perform Device Mobility across clusters.
1.	Log in to Unisphere for VPLEX
2.	Navigate to: Provision Storage>Assigned Cluster>Virtual Volumes
3.	Select one of your local Virtual Volumes previously created. Make sure it's status is "running"  This Virtual Volume is provisioned to a Host. This Lab will move the Device without disruption.

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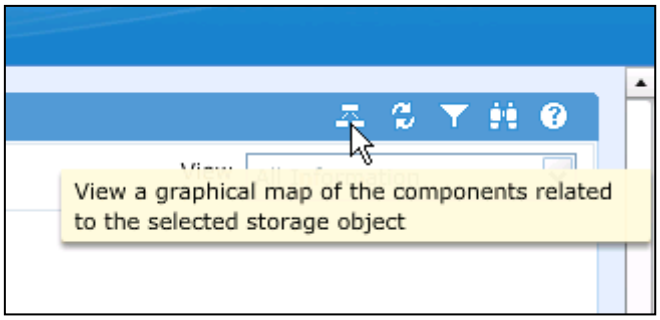
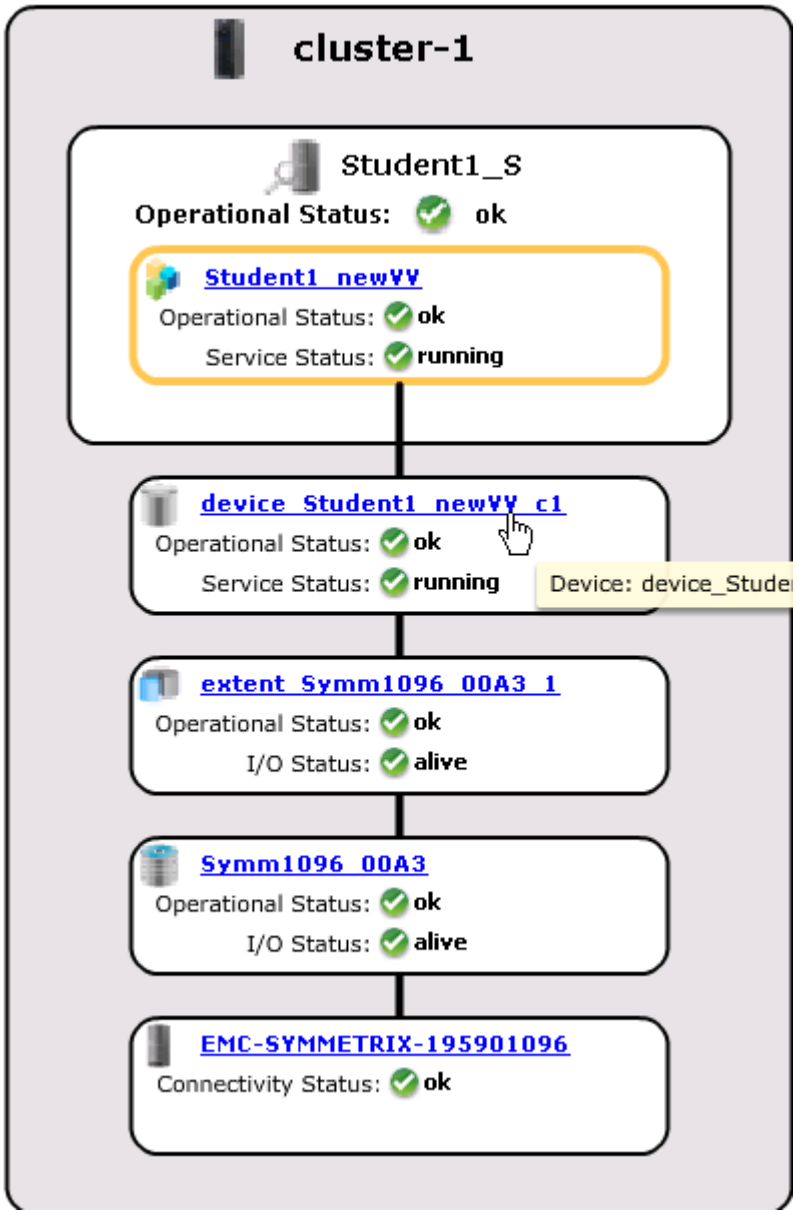
Step	Action
4.	Click on the Map Icon in the right corner. 

Step	Action
5.	A Map of the all the VPLEX objects are displayed. 
6.	Record the **Device Name**
7.	Navigate to: Provision Storage>opposite Cluster>Storage Volumes Example: If you assigned Cluster is **1** then navigate to **2**

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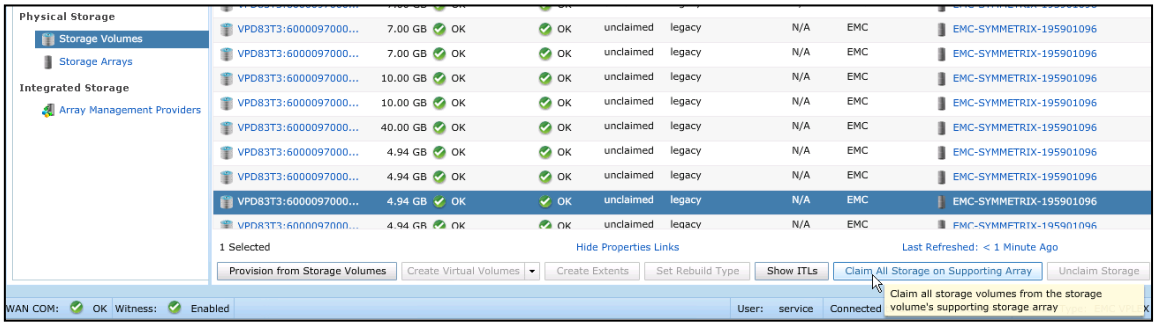
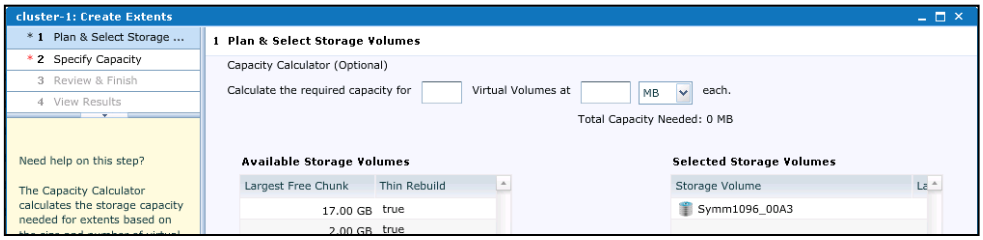
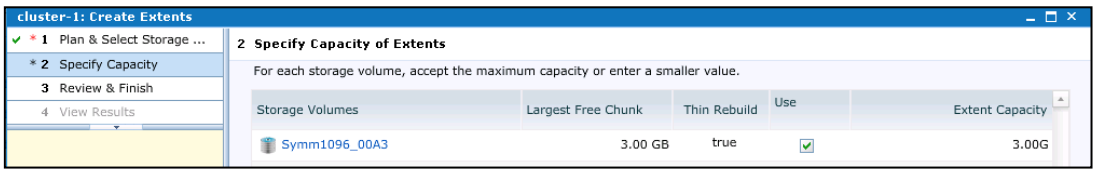
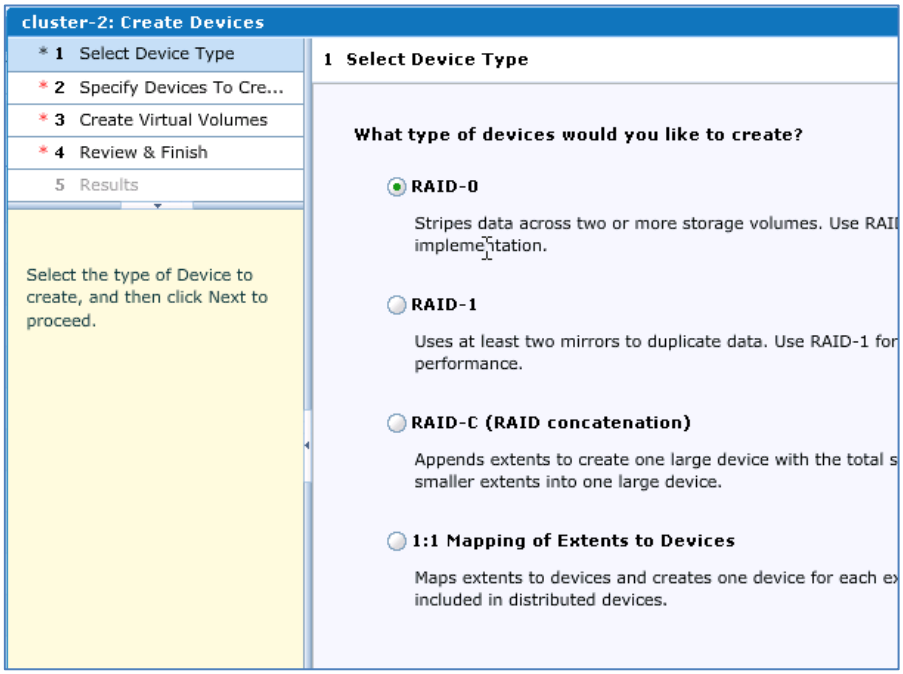
Step	Action
8.	Claim two of your **assigned** Storage Volumes See Lab Map. (see previous lab for steps if required) 
9.	Create 2 new Extents. Use the Storage Volumes just claimed. Select Extents, then Click Create  Click Next
10.	Select the entire Storage Volume to create each Extent.  Click **Finish** then **Commit** Verify there are 2 Extents of your assigned size

Step	Action
11.	Next we will use those 2 Extents to create a Raid-0 Device. The end result will be that the device size will be twice your assigned size. Navigate to **Devices** and Select **Create** The Wizard should launch.
12.	Select Raid-0  Click Next

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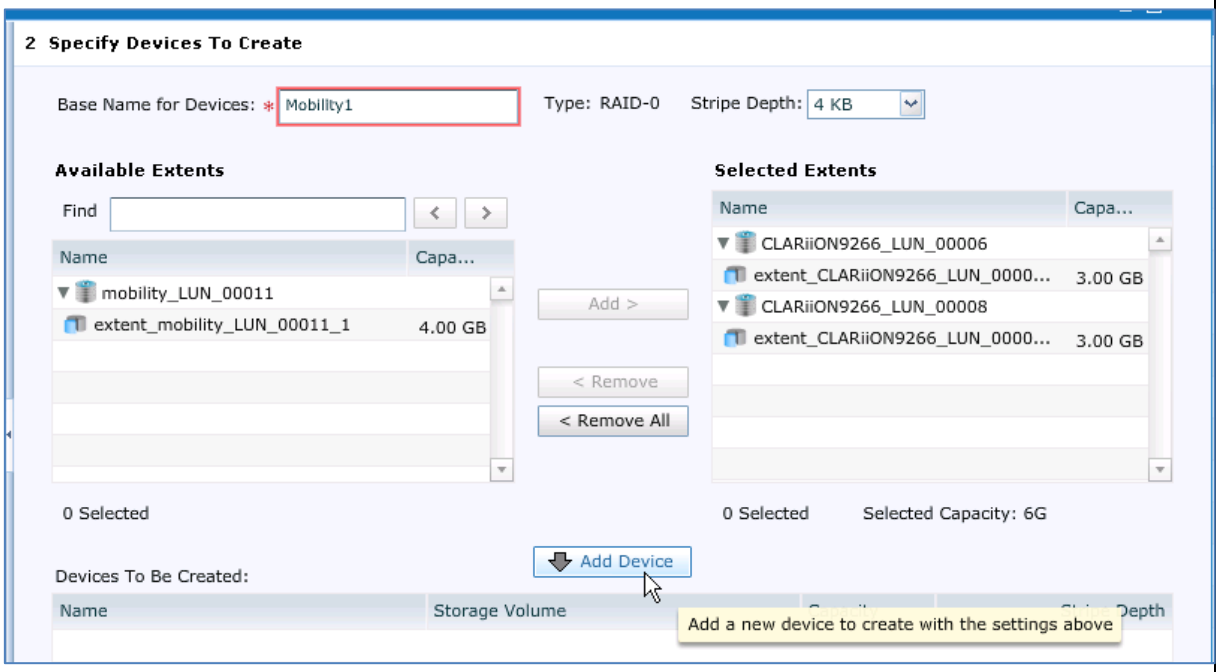
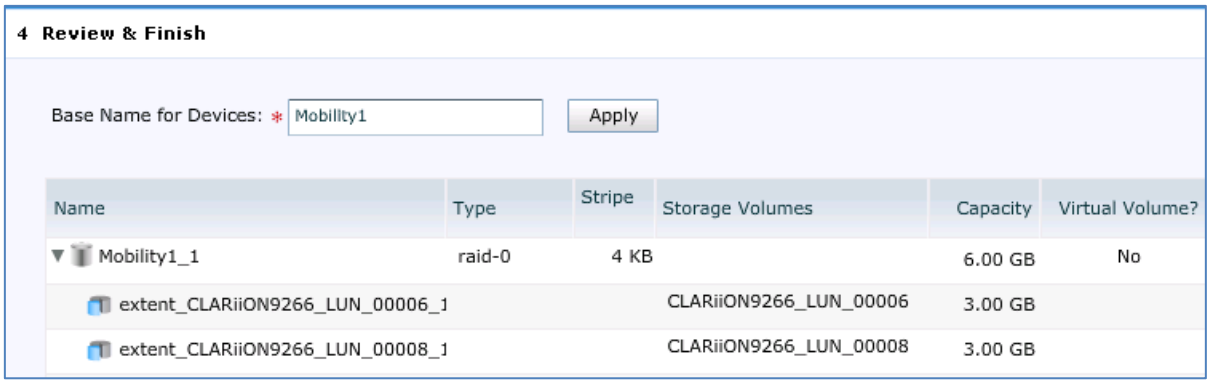
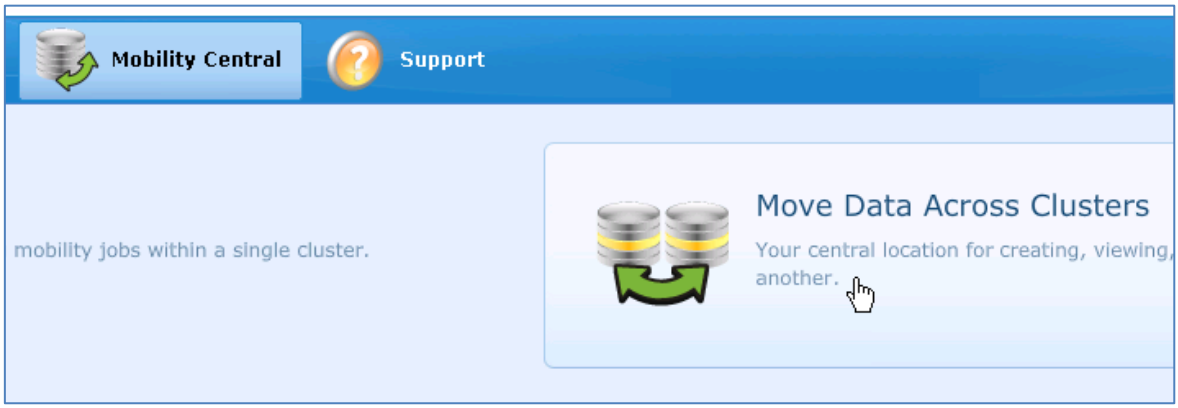
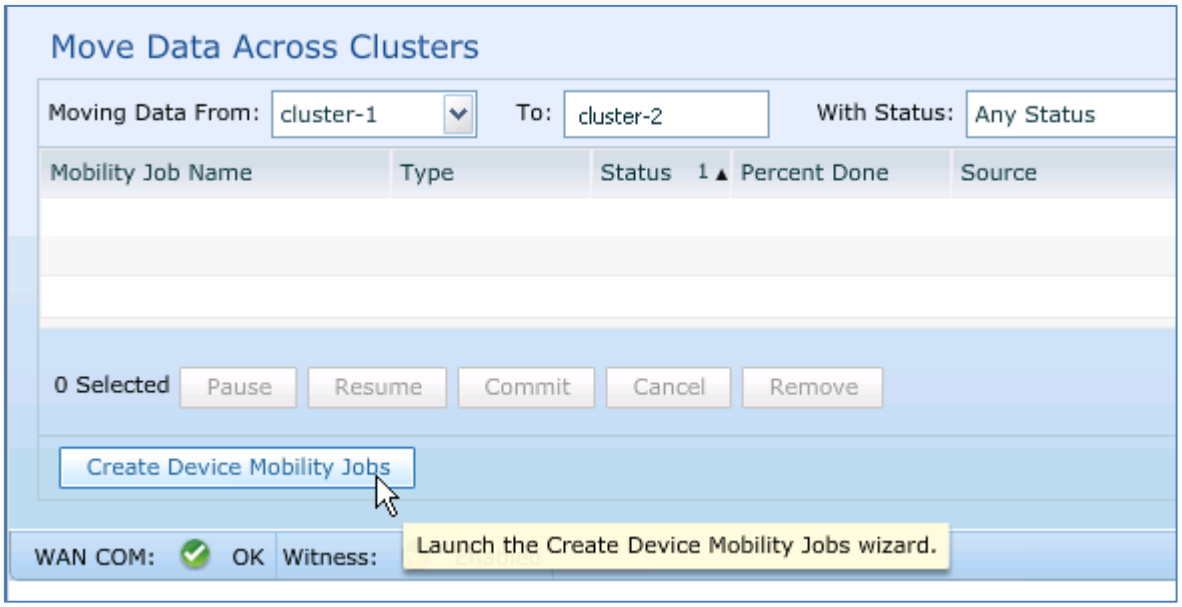
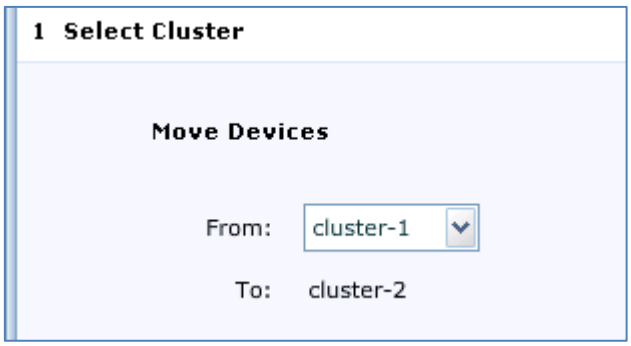
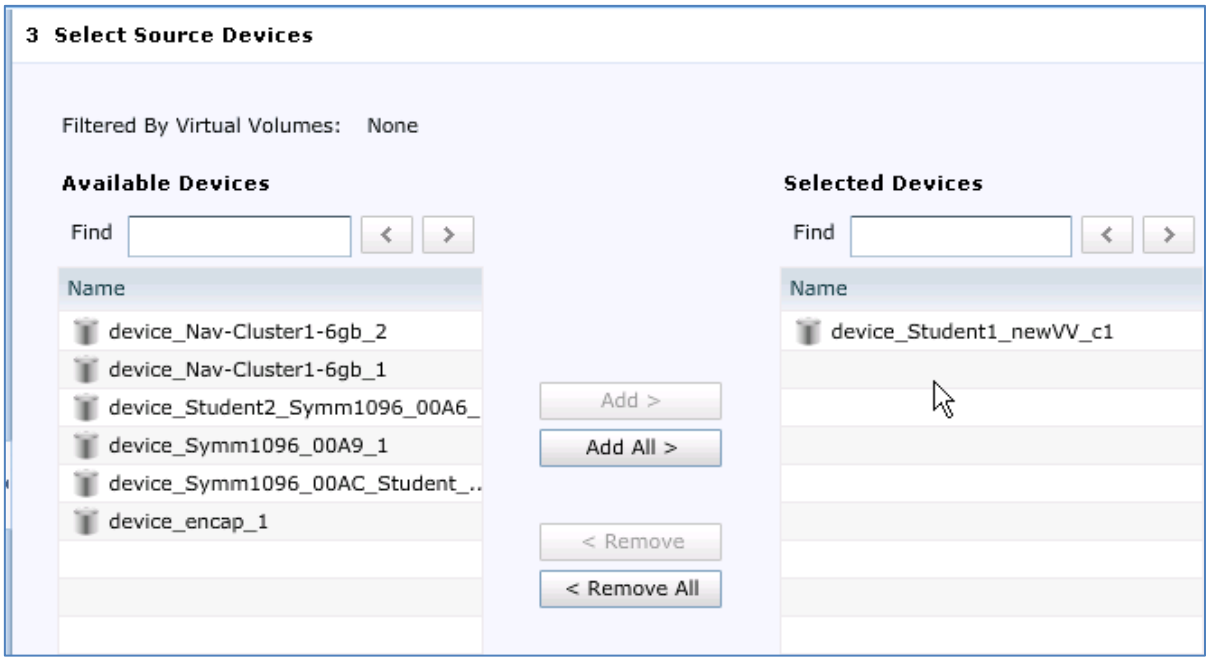
Step	Action
13.	Enter **Mobility** followed by your student number for Base name. Select your 2 Extents and click Add. (be sure to verify the size)  Click **Add Device** Click **Next**
14.	Answer no to “Automatically create a virtual volume on each device” Click Next

Step	Action
15.	Review and Finish  Click **Commit** There should now be a new Device (2x the assigned size)
16.	Select Mobility Central> Move Data Across Clusters. 

Step	Action
17.	Select Create Device Mobility Jobs (bottom of the **display**) 
18.	Select your assigned Cluster in the "**From**" box  Click Next
19.	Click **Next** in the Select Virtual Volumes Window

Step	Action
20.	Select the Device recorded in Step **6** and click **Add**  Click **Next**

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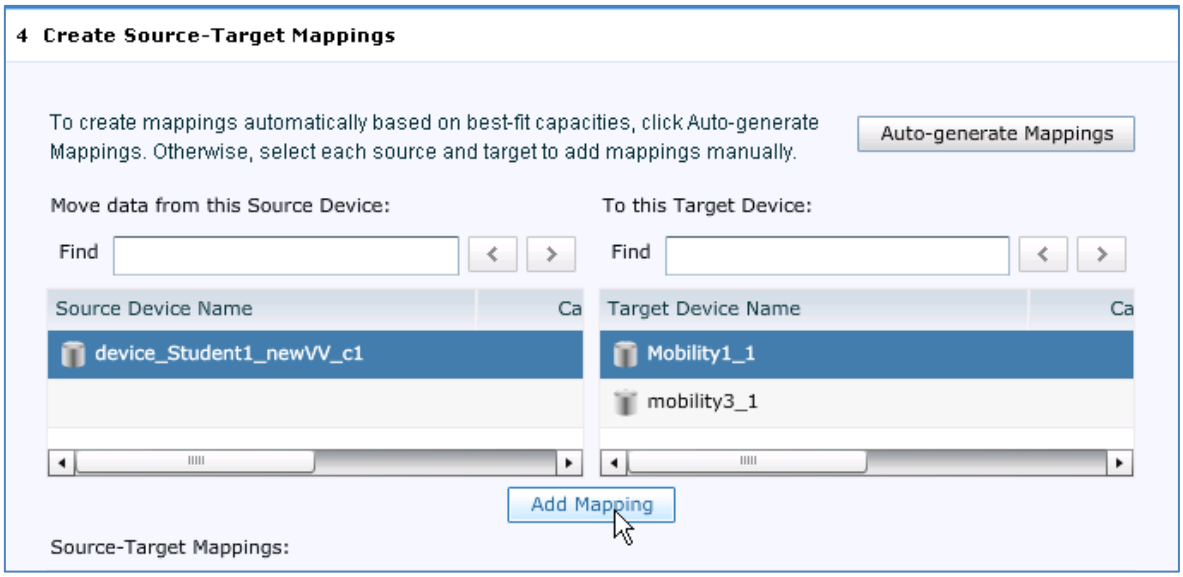
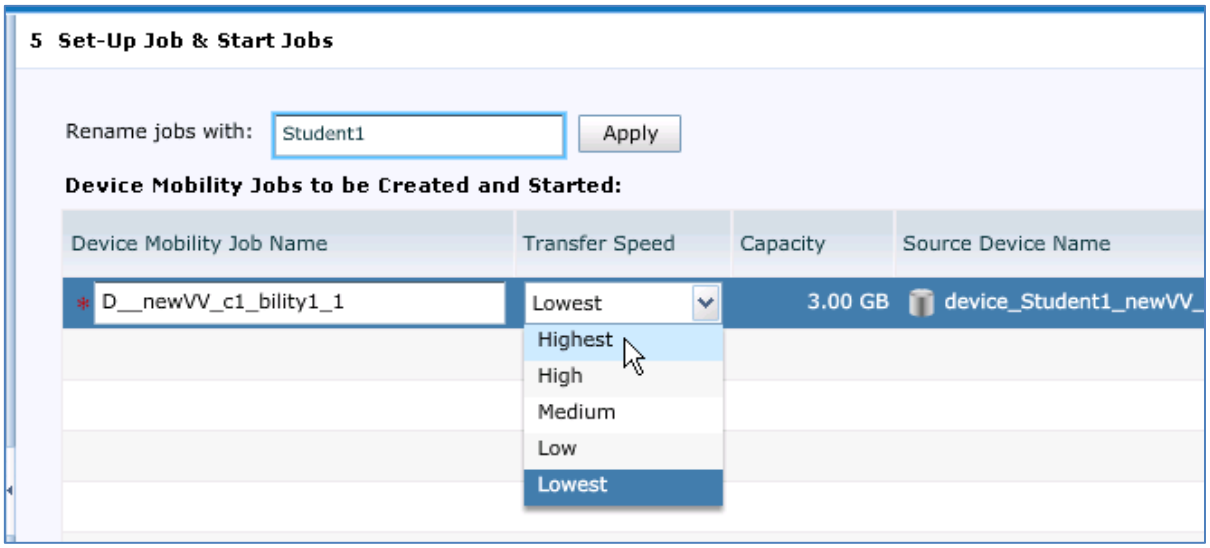
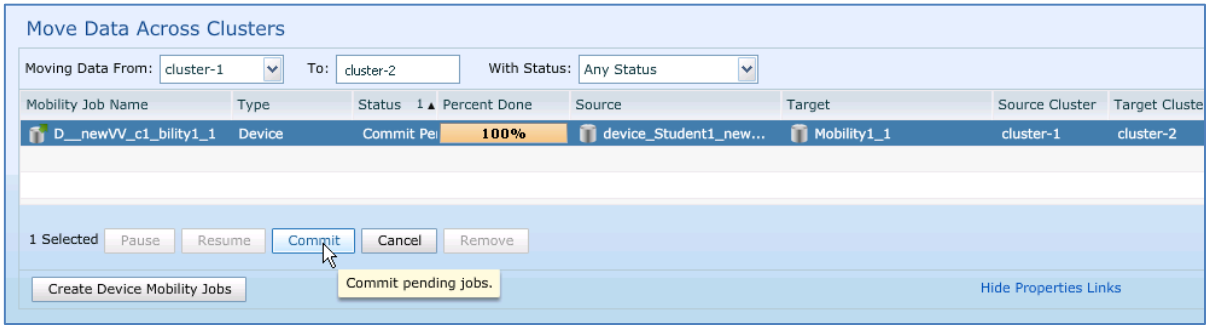
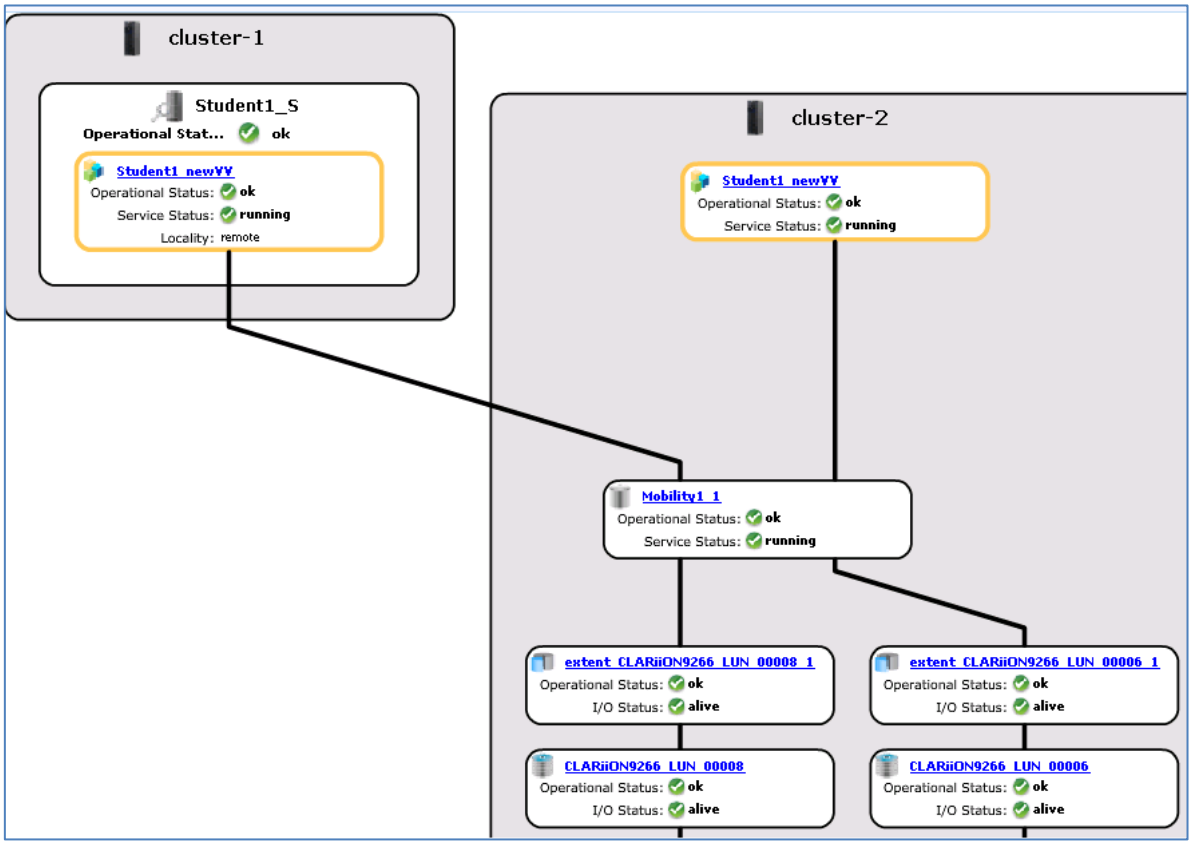
Step	Action
21.	Highlight the 2 devices and Click **Add Mapping**  There will be a warning displayed about the target being larger than the source. Click Yes The 2 Devices should be displayed at the bottom of the window. Click Next

Step	Action
22.	Rename the job with your Student number.  Change the Transfer Speed to Highest Click **Start** Click **Close**
23.	The job will be displayed, monitor the progress  When the percent done reaches 100% Click **Commit**. What steps will this cause?

Step	Action
24.	Click **Ok** to confirm *Notice the job will remain in the list until removed.*

Step	Action
25.	Return to Provision Storage>Cluster-x>Virtual Volumes Select the Virtual Volume from step 3 and display the **map** (icon in right corner)  Notice the Virtual Volume is running on Storage on the opposite Cluster. Also note there is a new Virtual Volume in that cluster. This could be placed in a Storage View at that cluster also.
26.	**Optional step**: If time allows move the device back to the original Cluster.

End of Lab Exercise

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Lab 4: Part 3 – Batch Mobility

Step	Action
	This lab will cover how to perform **batch** mobility jobs. It will demonstrate this using the device mobility feature within a single cluster. We will only use 2 Devices for demonstration, but VPLEX allows for many more.
1.	Log into vplexcli for your assigned cluster
2.	Navigate to the Storage Volume context for your assigned cluster VPlexcli:/> `cd clusters/cluster-1/storage-elements/storage-volumes/` List the Storage Volumes VPlexcli:/clusters/cluster-1/storage-elements/storage-volumes `ll`
3.	Find 2 **unclaimed** Storage Volume of your **assigned** size Next we will use the `storage-tool compose` command to create a virtual volume on each of these Storage Volumes. Use the following command to create a Virtual Volume. Use your student number in the Virtual Volume name as per **example**. VPlexcli:/clusters/cluster-1/storage-elements/storage-volumes> `storage-tool compose --name student3_vv_mobility -g raid-0 -d VPD83T3:60000970000195901096533030304331` Successfully created virtual-volume 'student3_vv_mobility For this lab we will not place the Virtual Volume in a Storage View. Take note of the name as this will be needed later.

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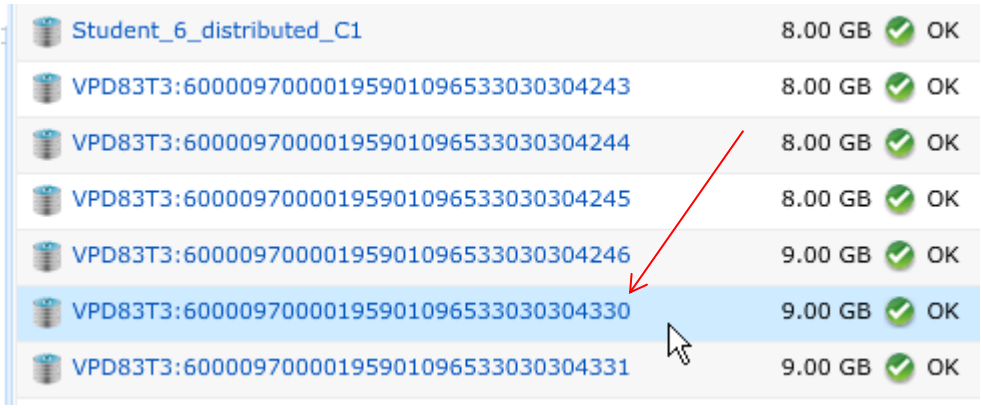
Step	Action
4.	Repeat the above command to create another Virtual Volume. Hint: use an **different** name Keep the vplexcli session open Take note of the name as this will be needed later.
5.	Log in to **Unisphere** for VPLEX to your assigned Cluster.
6.	Navigate to Provision Storage>Assigned Cluster>Storage Volumes We will create 2 devices of your assigned size for use with Batched mobility
7.	From this screen note the **Name** of 2 of your Assigned Storage Volumes.  Select Claim All Storage on Supporting Array
8.	Select the Array and Click **Next**
9.	Select **Use Thin Rebuilds** and Click **Next**

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Step	Action
10.	Select the 2 Storage Volumes previously identified and click Add. Click Next Click Commit Click Close
11.	Select the 2 Storage Volumes just Claimed and Click Create Extents
12.	They should appear in the Selected Storage Volumes window on the right. Click Next
13.	Leave the Use box checked and Click **Finish** Click Commit Click close
14.	Navigate to the Extents window Select the 2 Extents just created and Click create Devices.
15.	Select 1:1 Mapping of Extents to Devices Click Next Select your 2 Extents and click **Add** Click **Next**

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Step	Action
16.	Answer **No** to create Virtual Volumes Click **Next** Click **Commit** 2 Devices will be created Click **Close**
17.	Navigate to **Devices** The 2 new Devices are displayed
18.	Log in to vplexcli for your assigned cluster. Next, create a batched mobility **plan** to move the data We will use the **batch-migrate create** plan CLI command to accomplish this
19.	.Next we will identify the 2 Source **Devices** and the 2 Target **Devices** Use the following command for your **assigned** cluster. VPlexcli:/> `ll clusters/cluster-1/devices/` 2 will have Virtual Volumes on them created in Steps 3 and 4 2 will be your assigned size and will **not** have Virtual Volumes on them. These will be the Targets Record the names: Sources_____ Targets_____

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Step	Action
20.	Next we will create a batch migration plan file. Change to the **devices** context for your assigned cluster. VPlexcli:/> `cd clusters/cluster-1/devices` Run the following command to create the plan file VPlexcli:/clusters/cluster-1/devices> `batch-migrate create-plan student1_migrate.txt --sources device_student3_vv2_mobility_c1,device_student3_vv_mobility_c1 --targets device_Symm1096_00BF_1,device_Symm1096_00C0_1` The result should have created the file and returned this message: `Wrote file /var/log/VPlex/cli/student1_migrate.txt. Please review and edit this file, and run this command in the check-plan phase afterward.`
21.	Next we will check the plan file using the `batch-migrate check-plan` command. VPlexcli:/clusters/cluster-1/devices> `batch-migrate check-plan --file student1_migrate.txt` A message will be displayed that the plan passed.

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Step	Action

22.	Next we will **start** the migration.
	
	This command will start the transfer, but not commit the changes. The transfer size is specified. Transfer-size is the size of the region in cache that is used to service the migration. Transfer-size can be as small 40K, as large as 128 MB, and must be a multiple of 4K. The default value is 128 K. A larger transfer-size results in higher performance for the migration, but may negatively impact front-end I/O. A smaller transfer-size results in lower performance for migration, but creates less impact on front-end I/O and response times for hosts.
	
	VPlexcli:/clusters/cluster-1/devices> `batch-migrate start --file student1_migrate.txt --transfer-size 128M`
	
	`Started device migration 'BR0_0'.`
	
	`Started device migration 'BR0_1'.`
	
	`Started 2 of 2 migrations.`

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Step	Action

23.	Next use the `summary` command to check progress.
	
	VPlexcli:/clusters/cluster-1/devices> `batch-migrate summary --file student1_migrate.txt`
	
	`Processed 2 migrations from batch migration BR0:`
	
	`committed: 0`
	`complete: 2`
	`in-progress: 0`
	`queued: 0`
	`paused: 0`
	`error: 0`
	`cancelled: 0`
	`no-record: 0`
	
	Run the command over until the status is **complete**. Remember that complete is not committed.
	
	Batch Mobility jobs can be also viewed in Unisphere.

24.	Next we will commit the jobs. VPlexcli:/clusters/cluster-1/devices> `batch-migrate commit --file student1_migrate.txt` `Committed 2 of 2 migrations` Use the **summary** command to check the status. The jobs will list as committed.

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Step	Action
25.	We can view the devices to see that the source devices now will not have Virtual Volumes, but the targets will. VPlexcli:/clusters/cluster-1/devices> `ll` Verify by using the source and target names recorded earlier.
26.	Next we will run the clean command. For **device** migrations, cleaning dismantles the source device down to its storage volumes. The storage volumes that are no longer in use are unclaimed. VPlexcli:/clusters/cluster-1/devices> `batch-migrate clean --file student1_migrate.txt` `Cleaned 2 of 2 migrations`
27.	View the Devices for your assigned cluster. VPlexcli:/clusters/cluster-1/devices> `ll` Notice the original source devices have been deleted.
28.	Next we will remove the records of the Mobility jobs. VPlexcli:/clusters/cluster-1/devices> `batch-migrate remove --file student1_migrate.txt` `Removed 2 of 2 migrations`

End of Lab Exercise

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Lab Exercise 5: System Monitoring

Purpose:	To use tools and features in VPLEX for monitoring the environment and performance.

Tasks:	• **Use the CLI to check Cluster Health** • **View VPLEX Performance Monitors using Unisphere**

References:	• Student Guide • EMC VPLEX CLI and Administration Guides

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Lab 5: Part 1 System Monitoring

Step	Action
1.	Log in to the VPLEX using the VPLEXCLI
2.	Use the following commands to monitor the VPLEX environment. Use additional commands as you think would be helpful: **`health-check`** **`director uptime`** **`rebuild status`** **`ll /**/storage-views`**
3.	Use the drill-down command to follow the Virtual Volume assigned to an ESX host to its various entities. Document these here. Virtual Volume _____ Device _____ Extent _____ Storage Volume
4.	Use the proper commands to determine the health of each of these entities.
5.	Listed are some additional commands which can be used to monitor the health of VPLEX. Health of Virtual Volumes **`virtual-volume summary`** Health and state of FE ports **`export port summary`** Health state of storage views **`export storage-view summary`** Storage volumes attached to the BE by specific director **`connectivity director <director name>`** Ex: connectivity director director-2-1-A Shows which ports can communicate with each other. **`connectivity show`**
6.	Please use the above commands to verify the health of the VPLEX Cluster.

End of Lab Exercise

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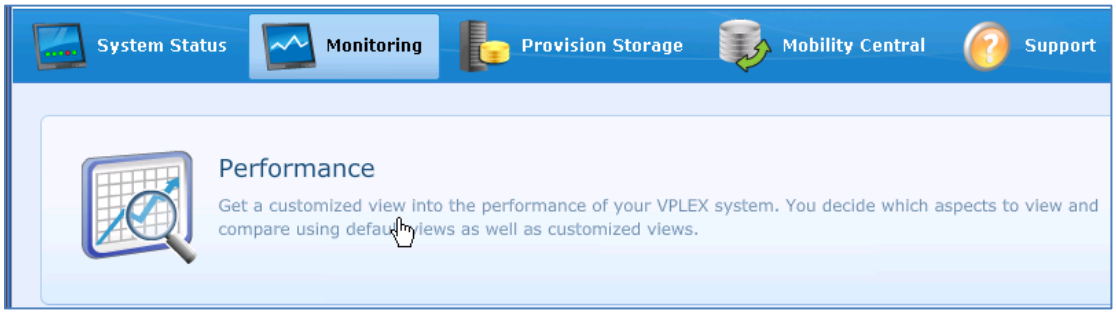
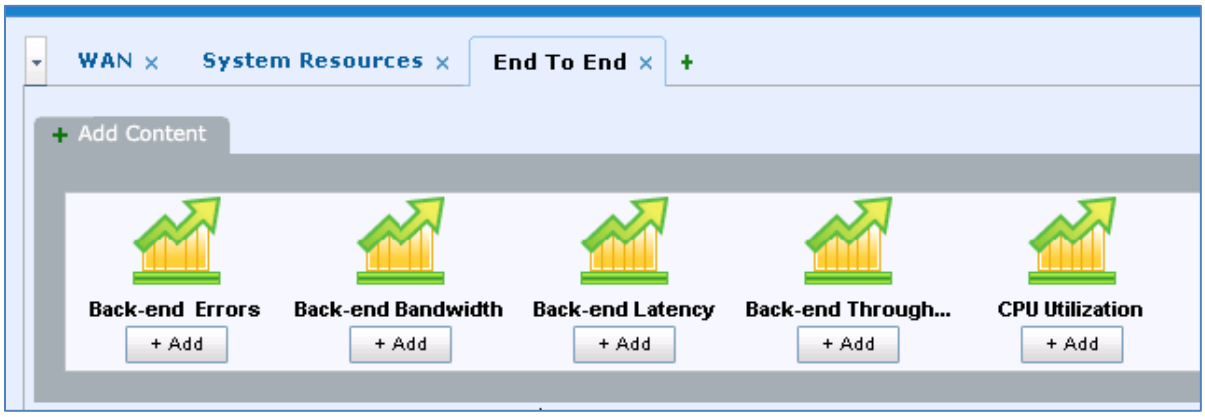
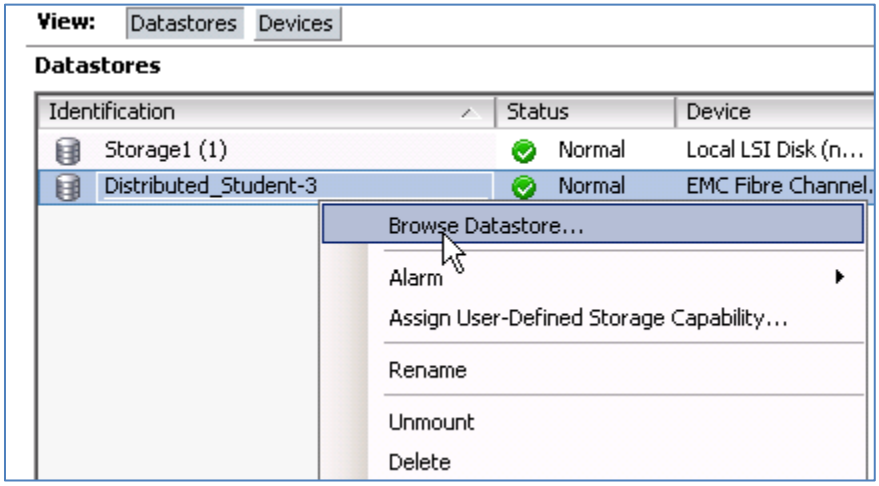
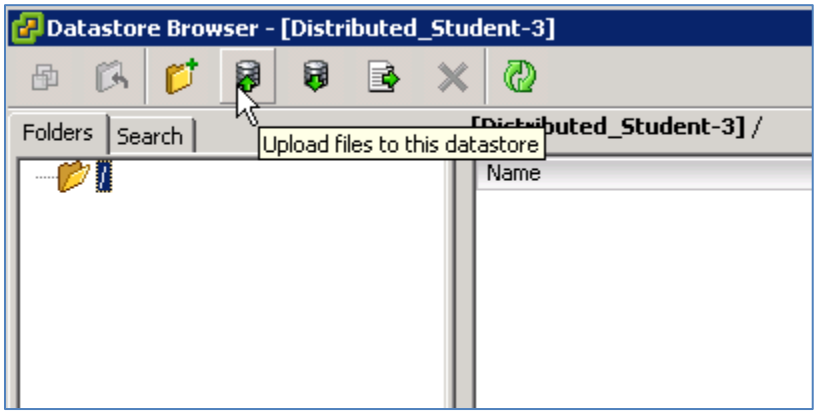
Lab 5: Part 2 – View Performance

Step	Action
	This Lab will display the performance monitoring capabilities of Unisphere for VPLEX.
1.	Log into Unisphere for VPLEX. Use your assigned Cluster.
2.	Navigate to Monitoring. Click the Performance Icon. 
3.	Change tabs to **End to End** View the display of real time performance statistics.

Step	Action
4.	Click the **Add Content** link  View the different options for configuring the performance charts..
5.	Next we will generate I/O to see the different categories display data. Open V Center Client from your Windows desktop Log into your assigned **ESX** host.
6.	Select your Host on the Left and select the Configuration Tab. In the **Hardware** Window select Storage and change the view to **Datastores**.

Step	Action
7.	Select the Datastore created on the Distributed Virtual Volume in **Lab 3 step 49**. This can be identified by the name (Distributed_student#) Right Click on the Datastore and Select **Browse Datastore** 
8.	We will now upload a file(s) to the Datastore to generate I/O to both the local cluster and across the WAN. From the Datastore Browser select the upload Icon  Select Upload File

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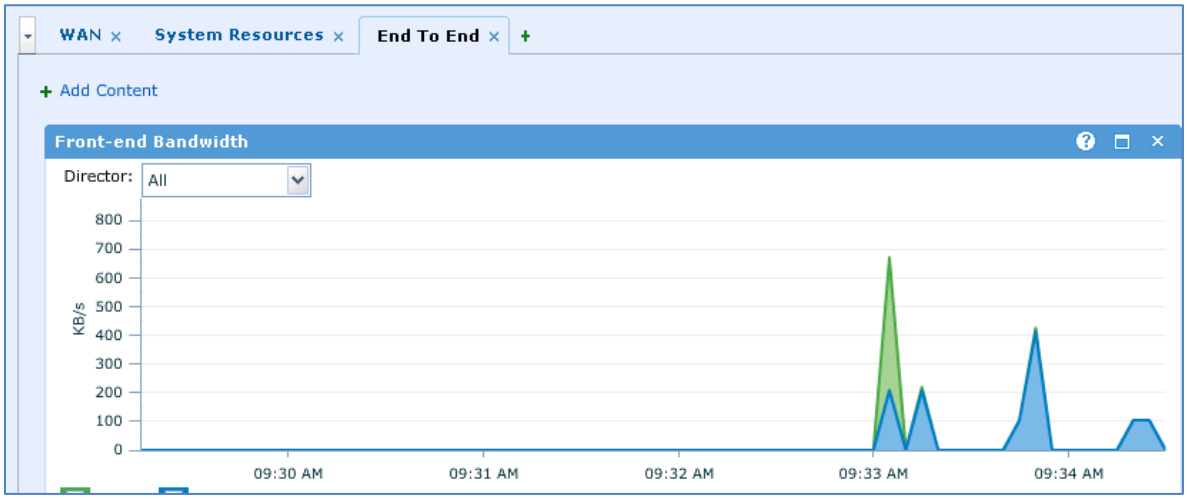
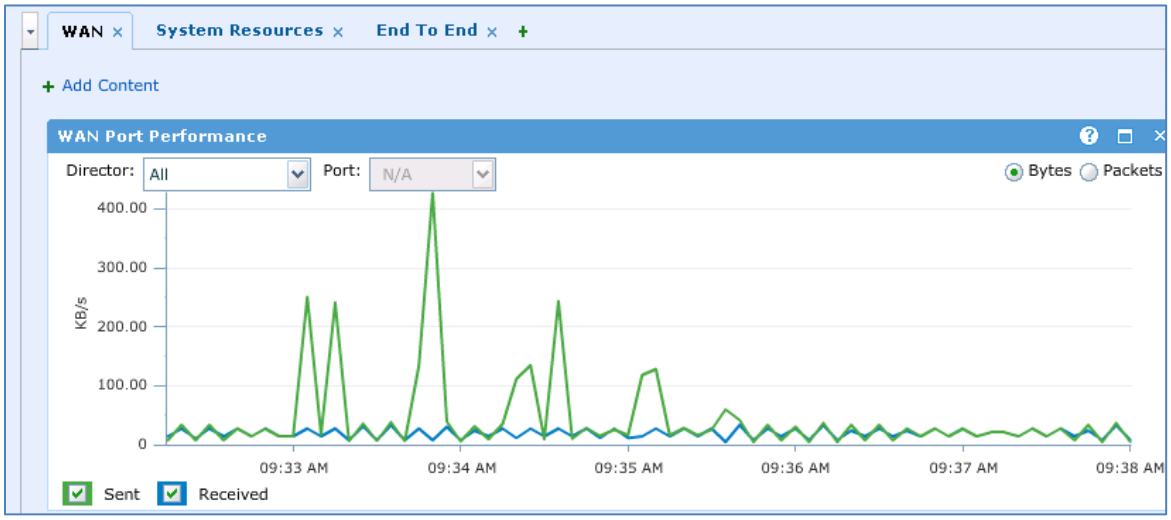
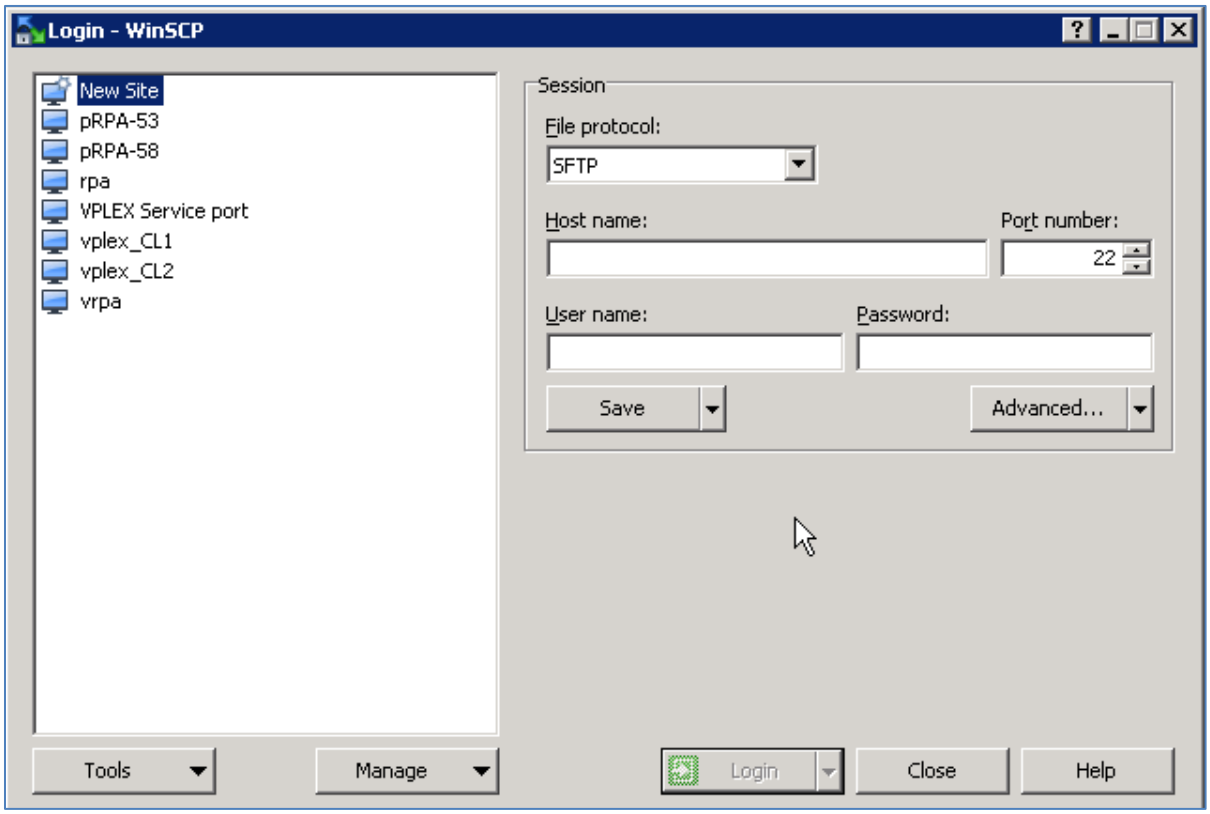
Step	Action
9.	Chose any files from the local hard drive. Click open Click yes to the warning This will copy the files to the Datastore and in turn create I/O to VPLEX
10.	Return to Unisphere From the End to End Tab View the different performance windows, such as Front-end Bandwidth 

Step	Action
11.	Change Tab to WAN View the WAN Performance 
12.	This can be repeated by copying more files.

End of Lab Exercise

Lab 5: Part 3 – Perpetual Monitors

Step	Action
	This Lab will review the location of the VPLEX Perpetual Monitor files on the VPLEX Cluster Management Server.
1.	From your assigned Windows Desktop Launch WinSCP
2.	Enter the Ip address of your assigned VPLEX Cluster, along with the user/password 
3.	The Management Server Directory is on the Right and the local drive for the Windows host is on the left. Navigate to the /var/log/VPlex/cli directory

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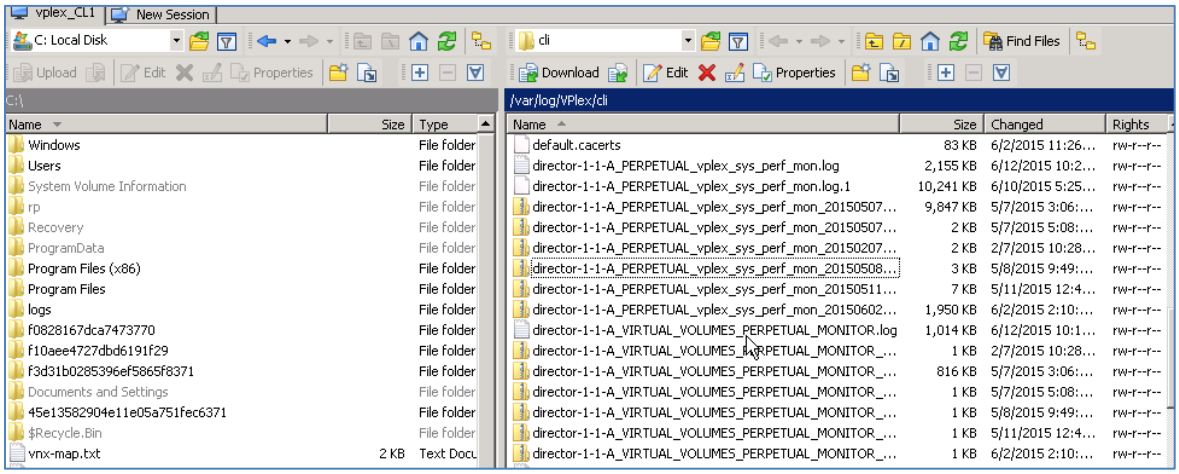
Step	Action
4.	Scroll down to view the perpetual monitor files.  The files all begin with the director number, such as director-1-1-A. *The files with the folder icon are archived; the files that end in .log are active.*
5.	Choose a director file and drag it to your desktop. Open the file with WordPad and view the contents. This gives you an idea of the information contained in the file. The file extension should be changed to **.csv** for viewing in a spreadsheet program.

End of Lab Exercise

Lab 5: Part 4 - Configure Monitors

Step	Action
	In this lab we will use the vplexcli to create individual monitors. We will create a Monitor for an individual Storage Volume. This individual data in not available in the Perpetual Monitor Files.
1.	Log in to your assigned cluster VPLEX Management Server.
2.	Change to the /var/log/VPlex/cli/ directory. service@VPLEX-Cluster1:/> `cd /var/log/VPlex/cli`
3.	Create a Directory using your assigned student number. service@VPLEX-Cluster1:/var/log/VPlex/cli> `mkdir student1`
4.	Log into the **VPlexcli**
5.	Find the Virtual Volume that was distributed. It should have the word distributed in the name. We will use this to identify the Storage Volume it is built on. Use the one from your assigned cluster. VPlexcli:/> `ll clusters/cluster-1/virtual-volumes/` Once the correct volume is located use the following command to find the Storage Volume form your assigned cluster that is created on. VPlexcli:/> `show-use-hierarchy -t /clusters/cluster-1/virtual-volumes/student_1_Disributed_1_vol` Record the Storage Volume from your cluster.

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Step	Action
6.	Next Create a monitor for the Storage volume that was recorded earlier VPlexcli:/ > `monitor create -n student_1_mon --director/engines/engine-1-1/directors/director-1-1-A --stats storage-volume.* --targets /clusters/cluster-1/storage-elements/storage-volumes/Distributed_student-1/` Successfully created 1 monitor(s) out of 1
7.	Next we will create a Sink for the Monitor. VPlexcli:/monitoring/directors/director-1-1-A/monitors> `monitor add-file-sink -n student-1_sink  --monitor director-1-1-A_student_1_mon --file /var/log/VPlex/cli/student1/student-1.csv` Change directories to / VPlexcli://> `cd /` VPlexcli:/>
8.	Now we will Display the Monitor This syntax will display one monitor (use the one previously created) VPlexcli:/>`ls /monitoring/directors/*/monitors/director-1-1-A_student_1_mon` This will display **all** monitors VPlexcli:/>`ls /monitoring/directors/*/monitors`
9.	Write data using previous method from **Lab 5 part 2 steps 6-9**

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Step	Action
10.	This command will Force a poll no matter what the configured interval is. Run VPlexcli:/> `monitor collect director-1-1-A_student_1_mon`
11.	Use Winscp to download the monitor output file to your Windows Host to view the File.

End of Lab Exercise

END OF LAB

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