

VMAX3 Configuration Management – Lab Guide

February 2015

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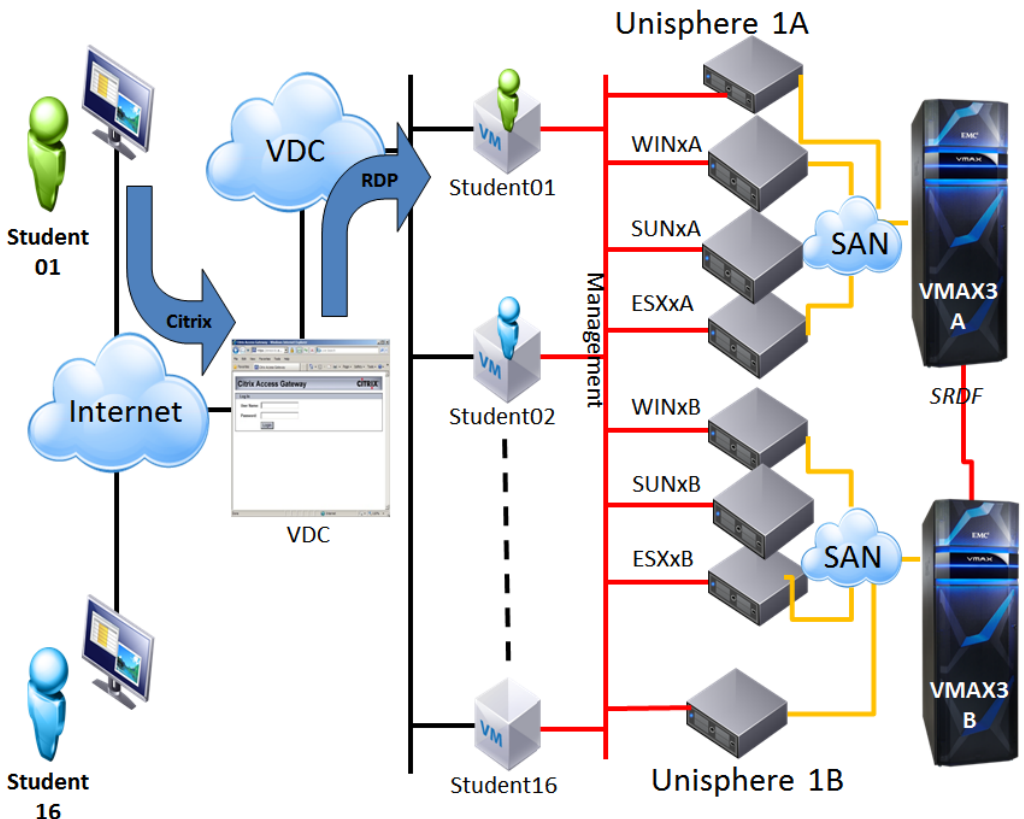
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Lab Exercise 1: Explore VMAX3 Environment

Purpose:	In this lab exercise students will explore the VMAX3 environment that will be used for all the lab exercises in this course.
Tasks:	Login to your assigned Student Desktop Use Unisphere for VMAX to explore VMAX3 environment Use SYMCLI to explore VMAX3 environment
Notes:	All the Lab exercises will be performed from the Student Desktop. So it is crucial that you are able to login to the Student Desktop and then perform all activities from this Desktop. The Student Desktop is a Windows Server.

Lab 1: Part 1 – Login to Student Desktop

Step	Action
1	The graphic illustrates the lab environment  The diagram illustrates the lab environment. On the left, two student icons (Student 01 and Student 16) are shown. Student 01 is connected to a VDC (Virtual Desktop Cloud) via Citrix. Student 16 is connected to the VDC via RDP. The VDC is connected to a Citrix Access Gateway. The VDC manages a pool of virtual machines (VMs) in Unisphere 1A and Unisphere 1B. The VMs are connected to various servers (WINxx, SUNxx, ESXxx) which are connected to SANs and VMAX3 storage arrays via SRDF. The instructor will assign each student the following: Student Group Number <SGN> _____ Student Desktop (StudentSGN) _____ Each student will also be assigned: One Windows (WINxx) or SUN (SUNxx) server SAN attached to a VMAX3 array – The WIN or SUN server has SYMCLI installed _____ One ESXi Server (ESXxx) SAN attached to a VMAX3 array _____ URL for Unisphere for VMAX _____ Login procedures, user names, passwords and IP addresses will be provided by the instructor.

Step	Action
2	Use the VDC/CITIRIX login procedure provided by the instructor to login to your assigned Student Desktop. All the Lab exercises will be performed from the Student Desktop. So it is crucial that you are able to login to the Student Desktop. From the Student Desktop you will be able to: - Use a web browser to login in to Unisphere for VMAX - Use the VMware vSphere client to login to your assigned ESXi Server - Login to your assigned WIN/SUN SYMCLI Host and execute SYMCLI commands from the WIN/SUN host

Continued on next page

Lab 1: Part 2 – Explore VMAX3 Environment with Unisphere for VMAX

Step	Action								
1	The purpose of this lab is to become familiar with the Unisphere for VMAX user interface and to explore the VMAX3 environment. The following information should have already been provided by the instructor: Student Group Number <SGN> : _____ <Unisphere URL>: _____ <Unisphere Username>: _____<Unisphere Password>: _____								
2	You should already be logged into your assigned Student Desktop								
3	Login to Unisphere for VMAX. From your Student Desktop launch Internet Explorer and connect to the Unisphere URL (<a href="https://<UnisphereServerIP>:8443">https://<UnisphereServerIP>:8443) Use the Unisphere login credentials and login to Unisphere.								
4	Explore the Unisphere Home Page Login will bring you to the Home page. The display should show you all the managed arrays. In this lab you should see at least one VMAX3 array with a Local Connection. Record the version of Unisphere for VMAX: _____ If you see a blank screen – Click on Support () in the menu bar and then click on Home (). Record the following information for the Local VMAX3 Array. <table><tr><th>ID</th><th>Connection</th><th>Model</th><th>HYPERMAX OS</th></tr><tr><td></td><td></td><td></td><td></td></tr></table> How much Capacity is in use?  GB of  GB SLO Compliance: Green _____, Yellow _____, Red _____	ID	Connection	Model	HYPERMAX OS				
ID	Connection	Model	HYPERMAX OS						
									

Step	Action
5	Explore the System Dashboard of your Local VMAX3 Array Click on the VMAX3 Icon of your Local array– this will bring up the System Dashboard (System > Dashboard) Record the number of: Front End Directors , Back End Directors , Available Ports  IM Directors , EDS Directors  Record the Cache Size configured on the array: 
6	Explore Front End Directors: Click on the Front End icon () in the System Dashboard to see the listing of all the configured Front End ports. From the Type column note down the type(s) of Front End ports:  Is ACLX enabled for all the Ports?  Port numbers less than 32 should show ACLX enabled. Click on the Dashboard link (System > Dashboard > Front End) to get back to the System Dashboard.
7	Explore Symmetrix Hardware Click on the Symmetrix Hardware Icon () in the System Dashboard to see the configured hardware components and their status: Drill down into each of the hardware components. Click on each to see the component properties and status. HARDWARE COMPONENTS ✓ 000196700483 ✓ ▾ SB-1 ✓ ▶ Engines ✓ ▶ Drive Enclosures ✓ ▶ Standby Power Supplies Click on the Dashboard link (System > Dashboard > System Hardware) to get back to the System Dashboard.

Step	Action										
8	Hover over the Storage section button ( Storage) in the menu bar to see the various Storage related links and tasks under the Storage section. Example below. <table> <tr> <td>Storage Groups Dashboard</td><td>Common Tasks</td></tr> <tr> <td>Service Levels</td><td>Provision Storage to Host</td></tr> <tr> <td>Storage Resource Pools</td><td>Create Volumes</td></tr> <tr> <td>Volumes</td><td></td></tr> <tr> <td>External Storage</td><td></td></tr> </table>	Storage Groups Dashboard	Common Tasks	Service Levels	Provision Storage to Host	Storage Resource Pools	Create Volumes	Volumes		External Storage	
Storage Groups Dashboard	Common Tasks										
Service Levels	Provision Storage to Host										
Storage Resource Pools	Create Volumes										
Volumes											
External Storage											
9	Explore the Storage Groups Dashboard Click on Storage () in the menu bar to go to the Storage Groups Dashboard. Are there any Storage Groups that are not in Compliance?  _____ How many Stable Storage groups?  _____ How many Storage Resource Pools are configured on this array?  _____ Name of SRP:  _____ Click on “View SRP Details” to see the details of the SRP You may not see the “View SRP Details” link if your screen resolution is too small. If you don’t see the link simply hover over the Storage menu option and choose Storage Resource Pools.										

Step	Action																														
10	Explore SRP Details – Record the details of the SRP <table border="1"> <tr> <td>Name</td><td></td></tr> <tr> <td>Default Emulation</td><td></td></tr> <tr> <td>Usable Capacity (GB)</td><td></td></tr> <tr> <td>Allocated Capacity (GB)</td><td></td></tr> <tr> <td>Free Capacity (GB)</td><td></td></tr> <tr> <td>Subscription (GB)</td><td></td></tr> <tr> <td>Reserved Capacity %</td><td></td></tr> <tr> <td>Disk Group Name</td><td>Technology</td><td>Speed (RPM)</td><td>Usable Capacity (GB)</td></tr> <tr> <td></td><td></td><td></td><td></td></tr> <tr> <td></td><td></td><td></td><td></td></tr> <tr> <td></td><td></td><td></td><td></td></tr> </table> Click on the “Service Level” link to see the available service levels	Name		Default Emulation		Usable Capacity (GB)		Allocated Capacity (GB)		Free Capacity (GB)		Subscription (GB)		Reserved Capacity %		Disk Group Name	Technology	Speed (RPM)	Usable Capacity (GB)												
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Default Emulation																															
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Subscription (GB)																															
Reserved Capacity %																															
Disk Group Name	Technology	Speed (RPM)	Usable Capacity (GB)																												
																															
																															
11	Explore available Service Levels List the available service levels and the expected average response times – Click Show Details for more information: <table border="1"> <tr> <td>Name</td><td>Expected Average Response Time</td></tr> <tr> <td></td><td></td></tr> <tr> <td></td><td></td></tr> <tr> <td></td><td></td></tr> <tr> <td></td><td></td></tr> <tr> <td></td><td></td></tr> <tr> <td></td><td></td></tr> </table> Are any Service Levels unavailable?  _____ Why?  _____	Name	Expected Average Response Time																												
Name	Expected Average Response Time																														
																															
																															
																															
																															

Step	Action												
12	Hover over the Hosts section button ( Hosts) in the menu bar to see the various Host related links and tasks in the Hosts section. Example below. Hosts Masking View Initiators Port Groups XtremSW Cache Adapters Virtual Servers Common Tasks Create Host Create Host Group												
13	Explore Hosts (Hosts > Hosts) Click on Hosts ( Hosts) in the menu bar to see the list of configured Hosts. Hosts in Unisphere for VMAX are the same as Initiator Groups. You should see your assigned WIN/SUN SYMCLI host and your assigned ESXi Server listed. The Hosts names will be winxx_ig, sunxx_ig, esxxx_ig etc. Please make sure that your WIN/SUN and ESXi server are listed. Record the following for your assigned WIN/SUN and ESXi Server <table><tr><th>Name</th><th>Masking Views</th><th>Initiators</th><th>Consistent LUNs</th></tr><tr><td>WIN/SUN:</td><td></td><td></td><td></td></tr><tr><td>ESXi:</td><td></td><td></td><td></td></tr></table> There should be 1 Masking View associated with your WIN/SUN and ESXi server.	Name	Masking Views	Initiators	Consistent LUNs	WIN/SUN:				ESXi:			
Name	Masking Views	Initiators	Consistent LUNs										
WIN/SUN:													
ESXi:													
14	Explore Masking Views (Hosts > Masking View) Hover over the Hosts menu option and choose Masking View. You should see masking views for your assigned WIN/SUN and ESXi server. The Masking View names will be winxx, sunxx, esxxx etc. Please make sure that your WIN/SUN and ESXi server masking views are listed.												

Step	Action												
15	Record details of the Masking Views of your WIN/SUN and ESXi Servers. You should still be in the Masking View listing. Record the details of the Masking Views of your WIN/SUN and ESXi servers. <table><tr><th>Masking View Name</th><th>Host (Initiator Group)</th><th>Port Group</th><th>Storage Group</th></tr><tr><td>WIN/SUN:</td><td></td><td></td><td></td></tr><tr><td>ESXi:</td><td></td><td></td><td></td></tr></table>	Masking View Name	Host (Initiator Group)	Port Group	Storage Group	WIN/SUN:				ESXi:			
Masking View Name	Host (Initiator Group)	Port Group	Storage Group										
WIN/SUN:													
ESXi:													
16	Explore Masking View Connections for your WIN/SUN Masking View You should still be in the Masking View listing. Select the masking view of your assigned WIN/SUN host and click on View Connections. In the masking view connections page: Record details of the initiators in your WIN/SUN host: <table><tr><th>WIN/SUN Host (IG) Name</th><th>Initiator(s)</th></tr><tr><td></td><td></td></tr></table> Record the details of the ports in the Port Group <table><tr><th>WIN/SUN Port Group Name</th><th>Director:Ports</th></tr><tr><td></td><td></td></tr></table> Record the details of the devices in the Storage Group <table><tr><th>WIN/SUN Storage Group Name</th><th>Volumes</th></tr><tr><td></td><td></td></tr></table> Click on the Masking Views (> Masking View >) link to return to the Masking View listing.	WIN/SUN Host (IG) Name	Initiator(s)			WIN/SUN Port Group Name	Director:Ports			WIN/SUN Storage Group Name	Volumes		
WIN/SUN Host (IG) Name	Initiator(s)												
													
WIN/SUN Port Group Name	Director:Ports												
													
WIN/SUN Storage Group Name	Volumes												
													

Step	Action												
17	Explore Masking View Connections for your ESXi Masking View You should still be in the Masking View listing. Select the masking view of your assigned ESXi Server and click on View Connections. In the masking view connections page: Record details of the initiators in your ESXi host: <table border="1"> <tr> <td>ESXi Host (IG) Name</td><td>Initiator(s)</td></tr> <tr> <td></td><td></td></tr> </table> Record the details of the ports in the Port Group <table border="1"> <tr> <td>ESXi Port Group Name</td><td>Director:Ports</td></tr> <tr> <td></td><td></td></tr> </table> Record the details of the devices in the Storage Group <table border="1"> <tr> <td>ESXi Storage Group Name</td><td>Volumes</td></tr> <tr> <td></td><td></td></tr> </table> Click on the Masking Views (> Masking View >) link to return to the Masking View listing.	ESXi Host (IG) Name	Initiator(s)			ESXi Port Group Name	Director:Ports			ESXi Storage Group Name	Volumes		
ESXi Host (IG) Name	Initiator(s)												
													
ESXi Port Group Name	Director:Ports												
													
ESXi Storage Group Name	Volumes												
													
18	Logout of Unisphere for VMAX and close the browser session to go back to your Student Desktop.												

Continued on next page

Lab 1: Part 3 – Explore VMAX3 Environment with SYMCLI

Step	Action
1	The purpose of this lab is to explore the VMAX3 environment with SYMCLI. The following information should have already been provided by the instructor: Student Group Number <SGN> : _____ WIN/SUN SYMCLI Host _____ WIN/SUN Host IP _____ Login ID with Administrative/root privileges (Administrator or root) _____ Password: _____ Note: The information shown with SYMCLI should match the information that was seen via Unisphere for VMAX in Lab 1 Part2.
2	You should already be logged into your assigned Student Desktop
3	From your Student Desktop host login to your WIN/SUN SYMCLI host – Use the instructions and login credentials given to you by the instructor. Make sure that you are logging into the WIN/SUN SYMCLI host with administrative/root privileges. On the WIN SYMCLI host you will use a Command Prompt window to execute the SYMCLI commands. On the SUN SYMCLI host you will execute SYMCLI commands from a Shell. You can change the Shell if the default shell is not your preferred shell.
4	Record SYMCLI host name. From the CMD/Shell execute <pre># hostname</pre> What is the name of your SYMCLI host  _____

Step	Action
5	Check the default PATH <u>On Unix</u> <pre># echo \$PATH</pre> Is the directory /usr/symcli/bin included in the PATH? _____ If not add /usr/symcli/bin to your PATH For Unix C shell: set path = (\$path /usr/symcli/bin) For Unix Korn or Bourne shell: PATH=\$PATH:/usr/symcli/bin export PATH <u>On Windows:</u> Check the PATH variable by issuing the command: <pre>C:\> PATH</pre> The following path should be in your environment to complete the lab exercises: \Program Files\emc\symcli\bin (location of SYMCLI binaries) If needed, add to the PATH Environment Variable: Control Panel\System and Security\System – Advanced system settings Environment Variables – Then edit the Path System variable. If you need more help, ask the instructor. <u>On Unix and Windows:</u> <pre># symcli</pre> (where “#” represents the system prompt regardless of Operating System) What is the Solutions Enabler version installed on the host  _____

Step	Action												
6	Discover VMAX3 arrays and identify your Local VMAX3 array <pre># symcfg discover</pre> <pre># symcfg list</pre> You should see at least one local VMAX3 array, you may see a remote array. Record information for your Local VMAX3 array <table><tr><th>SymmID</th><th>Attachment</th><th>Model</th><th>MCode Version</th><th>Cache Size (MB)</th></tr><tr><td></td><td></td><td></td><td></td><td></td></tr></table> In subsequent exercises use the last two(2) digits of the Local VMAX3 array in place of the <local SID> parameter.	SymmID	Attachment	Model	MCode Version	Cache Size (MB)							
SymmID	Attachment	Model	MCode Version	Cache Size (MB)									
7	Check the status of all the hardware components of your local VMAX3 array <pre># symcfg list -env_data -v -sid <local SID></pre> Are there any failed components?												
8	List configured SRPs <pre># symcfg list -srp -sid <local SID></pre> How many SRPs are configured in your local array? Record information about configured SRP(s) <table><tr><th>Name</th><th>Flg DR</th><th>Usable (GB)</th><th>Allocated (GB)</th><th>Free (Gb)</th><th>Subs (%)</th></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> Note: Most VMAX3 arrays will only have one SRP and it will be the default SRP indicated by the value of F (FBA Default) for the D flag.	Name	Flg DR	Usable (GB)	Allocated (GB)	Free (Gb)	Subs (%)						
Name	Flg DR	Usable (GB)	Allocated (GB)	Free (Gb)	Subs (%)								

Step	Action																				
9	View details of the default SRP. <pre># symcfg show -srp <SRP Name e.g. SRP_1> -sid <local SID></pre> Record the Disk Group information. <table><tr><th>#</th><th>Name</th><th>Tech</th><th>Speed (rpm)</th><th>Usable Capacity (GB)</th></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr></table> What are the available SLOs Are any SLOs unavailable? Why?	#	Name	Tech	Speed (rpm)	Usable Capacity (GB)															
#	Name	Tech	Speed (rpm)	Usable Capacity (GB)																	
10	View SLO details <pre># symcfg list -slo -detail -sid <local SID></pre> Record the details for one of the available SLOs. <table><tr><th>Name</th><th>Workload</th><th>Approx Resp Time (ms)</th></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr></table>	Name	Workload	Approx Resp Time (ms)																	
Name	Workload	Approx Resp Time (ms)																			
11	Verify in configuration changes can be made to the VMAX3 array <pre># symconfigure verify -sid <local sid></pre> Did you see the following message [Y/N] “The configuration verification session has succeeded”																				

Step	Action												
12	Discover initiators available to your WIN/SUN SYMCLI host <pre># symaccess discover hba</pre> Record the following Symmetrix ID: Initiator Identifier WWN(s)												
13	List Masking Views configured on the VMAX3 array <pre># symaccess list view -sid <local SID></pre> You should see masking views for your assigned WIN/SUN and ESXi server. The Masking View names will be winxx, sunxx, esxxx etc. Please make sure that your WIN/SUN and ESXi server masking views are listed. <table><tr><th>Masking View Name</th><th>Initiator Group</th><th>Port Group</th><th>Storage Group</th></tr><tr><td>WIN/SUN: </td><td> </td><td> </td><td> </td></tr><tr><td>ESXi: </td><td> </td><td> </td><td> </td></tr></table>	Masking View Name	Initiator Group	Port Group	Storage Group	WIN/SUN:				ESXi:			
Masking View Name	Initiator Group	Port Group	Storage Group										
WIN/SUN:													
ESXi:													
14	View details of the Masking View of your WIN/SUN SYMCLI host. <pre># symaccess show view <winxx/sunxx> -sid <local SID></pre> Confirm that the WWN(s) identified in step 12 are shown in the Initiator Group section of the output. Record the Director/Ports listed in the Port Group section of the output:												
15	Logout of your WIN/SUN SYMCLI host to return to the Student Desktop.												

End of Lab Exercise

Lab Exercise 2: Port Management

Purpose:	In this lab exercise students will use Unisphere for VMAX and SYMCLI to examine port attributes and port associations.
Tasks:	Use Unisphere for VMAX to examine port attributes and associations. Use SYMCLI to examine port attributes and associations.
References:	Lecture Module – Device Creation and Port Management

Lab 2: Part 1 – Port Management with Unisphere for VMAX

Step	Action										
1	Login to your Student Desktop as you did in Lab 1 Part 1										
2	Login to Unisphere for VMAX From your Student Desktop launch Internet Explorer and connect to the Unisphere URL (<a href="https://<UnisphereServerIP>:8443">https://<UnisphereServerIP>:8443) Use the Unisphere login credentials and login to Unisphere.										
3	Navigate to the System Dashboard of your Local VMAX3 array. Click on the VMAX3 icon of your local VMAX3 array in the Home screen to navigate to the System Dashboard.										
4	Navigate to the Front End port listing. Click on the Front End icon () in the System Dashboard to navigate to the listing of all the configured Front End ports.										
5	You had identified the Ports in the Masking View of your WIN/SUN SYMCLI host in Lab 1 Part 2 Step 16. Refer back in you Lab book and copy the information below: <table><tr><td>WIN/SUN Port Group Name</td><td>Director:Ports</td></tr><tr><td></td><td></td></tr></table>	WIN/SUN Port Group Name	Director:Ports								
WIN/SUN Port Group Name	Director:Ports										
											
6	View details of one of the Ports in the WIN/SUN Port Group You should still be in the Front End port listing screen in Unisphere. Select one of the ports identified in the previous step and then click on View Details. From the Properties panel for the port record the settings for the following flags: <table><tr><td>ACLX</td><td>Volume Set Addressing</td><td>SCSI 3</td><td>SCSI Support (OS2007)</td><td>SPC2 Protocol Version</td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr></table>	ACLX	Volume Set Addressing	SCSI 3	SCSI Support (OS2007)	SPC2 Protocol Version					
ACLX	Volume Set Addressing	SCSI 3	SCSI Support (OS2007)	SPC2 Protocol Version							
											

Step	Action								
7	Examine the Set Port Attributes dialog You should still be in the details view of the port. Click on Set Port Attributes to launch the Set Port Attributes dialog. This is where one would make changes to the Port attributes. PLEASE DO NOT MAKE ANY CHANGES TO THE EXISTING SETTINGS. ANY CHANGES WILL NEGATIVELY IMPACT YOUR LAB EXPERIENCE. YOUR HOST MAY LOSE ACCESS TO ITS VOLUMES. Click Cancel to close the dialog without making any changes and return to the port details view. Click on the Dashboard link (System > Dashboard > Front End > FA-1D:28) to return to the System Dashboard.								
8	Examine list of Available Ports You should be in the System Dashboard of your Local VMAX3 array. Does this Array have any Available Ports?  Available Ports  The Available Ports icon () in the Hardware panel will show the number of available ports. In the example above there are 4 free ports. Click the Available Ports icon to see the listing of Available Ports. Record information for one of the available ports. <table><tr><th>Slot</th><th>Port</th><th>Type</th><th>Speed (GB/s)</th></tr><tr><td></td><td></td><td></td><td></td></tr></table> Slot number refers to the director number. Slots 1& 2 are directors 1&2 on Engine 1. Slots 3&4 are directors 3&4 on Engine 2 and so on.	Slot	Port	Type	Speed (GB/s)				
Slot	Port	Type	Speed (GB/s)						
									

Step	Action
9	Examine the method to associate a free port with the FA emulation. Select the port whose properties you recorded in the previous step and then click on Associate. This will launch the Port Association dialog. Free ports can be associated with the FA or RF emulations. To associate the port with the FA emulation click on the Fibre Channel director from the list of available directors. PLEASE DO NOT COMPLETE THE ASSOCIATION PROCESS. Click Cancel to close the Port Association dialog without making any changes.
10	Logout of Unisphere for VMAX and close the browser session to go back to your Student Desktop.

Continued on next page

Lab 2: Part 2 – Port Management with SYMCLI

Step	Action																														
1	You should still be logged into your Student Desktop.																														
2	From your Student Desktop host login to your WIN/SUN SYMCLI host – Use the instructions and login credentials given to you by the instructor. Make sure that you are logging into the WIN/SUN SYMCLI host with administrative/root privileges and ensure that the PATH is set properly for SYMCLI.																														
3	Examine configured director emulations on your local VMAX3 array <pre># symcfg list -dir all -sid <local SID></pre> What is the purpose of the IM and EDS emulations? _____ Do the IM and EDS emulation use CPU Cores?  _____ Are there any ports associated with the IM and EDS emulations?  _____ Record the following for the Disk and Fibre Channel emulations. <table><tr><th>Ident</th><th>Type</th><th>Engine</th><th>Cores</th><th>Ports</th><th>Status</th></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>	Ident	Type	Engine	Cores	Ports	Status																								
Ident	Type	Engine	Cores	Ports	Status																										
																															
4	Examine the physical ports associated with the FA emulation for your local VMAX3 array <pre># symcfg list -fa all -port -detail -novirtual -sid <local SID></pre> Is the ACLX flag enabled for all these ports?  _____ List the ports with the Show ACLX Device flag Enabled: _____																														

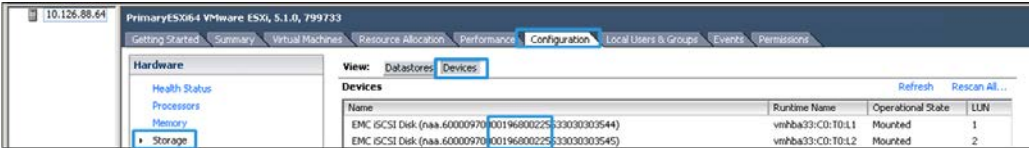
Step	Action				
5	You had identified the Ports in the Masking View of your WIN/SUN SYMCLI host in Lab 1 Part 2 Step 16. Refer back in you Lab book and copy the information below: <table border="1"> <tr> <td>WIN/SUN Port Group Name</td><td>Director:Ports</td></tr> <tr> <td></td><td></td></tr> </table>	WIN/SUN Port Group Name	Director:Ports		
WIN/SUN Port Group Name	Director:Ports				
6	View details of one of the director ports in the WIN/SUN Port Group <pre># symcfg list -fa <dir e.g. 1D> -p <port e.g. 28> -v -sid <local SID></pre> Is the ACLX flag enabled for this port? _____  Is Show ACLX Device enabled for this port?: _____  Is Volume Set Addressing enabled for this port? _____ 				
7	Check to see if your local VMAX3 array has any free ports available <pre># symcfg list -port -free -sid <local SID></pre> Does your array have any free ports? _____ 				
8	What is the symconfigure syntax to associate a free port with a FA emulation? _____ 				
9	Logout of your WIN/SUN SYMCLI host to return to the Student Desktop.				

End of Lab Exercise

Lab Exercise 3: Service Level Objective Based Provisioning with Unisphere for VMAX

Purpose:	In this lab exercise students will use Unisphere for VMAX to perform SLO based provisioning to an ESXi Server.
Tasks:	Use VMware vSphere Client to confirm that the ESXi server sees VMAX3 storage. Use Unisphere for VMAX Provision Storage Wizard to allocate new storage to the ESXi Server. Use VMware vSphere Client to confirm that the ESXi server sees the newly provisioned storage and create a VMFS datastore on the newly provisioned storage.
References:	Lecture Modules: Device Creation and Port Management Storage Allocation using Auto-provisioning Groups.

Lab 3: Part 1 – Confirm ESXi Server has access to VMAX3 Storage

Step	Action
1	Login to your Student Desktop as you did in Lab 1 Part 1
2	The instructor should have already provided you with: Your assigned ESXi Server:  ESXi Server IP address:  ESXi Server username: root ESXi Server password: 
3	Launch the VMware vSphere Client from the Student Desktop and login to your assigned ESXi Server. Use the IP address, User name and Password to login to your ESXi server. Ignore any security and license warnings.
4	List the devices seen by your ESXi Server Go to the Configuration tab of your ESXi Server. Click on Storage in the Hardware frame. Click on Devices to see devices visible to your ESXi Server  You should see some EMC Disks like the graphic above. Observe the “naa” name of the EMC devices. The naa name of the device has the VMAX3 SID as part of the name: As an example: naa. 60000970000196800225533030303544 is a device from a VMAX3 array with a SID of 000196800225.

Step	Action									
5	Record the EMC Devices visible to your ESXi Server									
	<table><tr><th>naa Name</th><th>Runtime Name</th><th>Capacity</th></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr></table>	naa Name	Runtime Name	Capacity						
	naa Name	Runtime Name	Capacity							
										
Based on the naa name, confirm that the VMAX3 SID you see in the naa name matches the SID of your local VMAX3 array.										
The number of EMC devices that you see here should match the information that you had seen for the ESXi Masking View via Unsphere for VMAX in Lab 1 Part 2 Step 17.										
6	Exit the VMware vSphere client.									

Continued on next page

Lab 3: Part 2 – Provision Storage to ESXi Server

Step	Action								
1	You should already be logged into your assigned Student Desktop.								
2	Login to Unisphere for VMAX. From your Student Desktop launch Internet Explorer and connect to the Unisphere URL (<a href="https://<UnisphereServerIP>:8443">https://<UnisphereServerIP>:8443) Use the Unisphere login credentials and login to Unisphere.								
3	Navigate to the Hosts listing of your Local VMAX3 array. Click on the SLO Compliance link of your local VMAX3 array on the Home page – this will bring you to the Storage Groups Dashboard. Now click on the Hosts () in the menu bar to see the Hosts (initiator groups) listing.								
4	Recall the Masking View information for your ESXi server from Lab 1 Part 2 Step 15: <table border="1"><thead><tr><th>Masking View Name</th><th>Host (Initiator Group)</th><th>Port Group</th><th>Storage Group</th></tr></thead><tbody><tr><td>ESXi:</td><td></td><td></td><td></td></tr></tbody></table> Your ESXi Server Host should be listed in the Hosts listing.	Masking View Name	Host (Initiator Group)	Port Group	Storage Group	ESXi:			
Masking View Name	Host (Initiator Group)	Port Group	Storage Group						
ESXi:									
5	View Details of your ESXi Server Host Select your ESXi Host from the host listing and click on View Details . Record the following information: Number of initiators: _____ Number of Masking Views: _____ Consistent LUNs: _____ Port Flag Overrides: _____ You should see at least 1 Masking View associated with your ESXi Server.								

Step	Action
6	Create a Job to provision two 10 GB devices with an SLO of Platinum and Workload Type of OLTP for your ESXi Host. Note: Use any available SLO if Platinum is not available on your system. You should still be in the detailed view of your ESXi Host. Click Provision Storage to Host to launch the Provision Storage wizard: 1 Create Storage Storage Group Name: Type in <SGN>_ESX (e.g. 01_ESX) Service Level: Platinum Workload Type: OLTP Volumes: Type in 2 Volume Capacity: Type in 10 – Make sure capacity is in GB Click Next 2 Select Port Group Choose Existing Select your ESXi Port Group name identified in step 4 Click Next Click OK if you get a Port Group recommendation dialog. 3 Review Masking View Name: Use the auto-generated name – make a note of it: _____ Click Run Suitability Check Did the suitability check succeed? _____ Proceed even if the suitability check fails. Click on Add to Job List Click Close on the Success dialog.

Step	Action
7	Run the storage provisioning job. Click on the Jobs List link at the bottom of the screen to go the Jobs List page. You can also hover over the System menu and choose Jobs List. The name of your Job will be “Create Masking View <Your Masking View Name>” Select your provisioning job and click View Details. In the details view you will see that the job does a series of tasks. Click on Run to run the job. Click OK in the Confirmation dialog. The job may take some time to run. This is a good time to take a break. The status of the job will change to RUNNING. You can follow the progress of the job in the RESULT area of the Job Details view. Wait until you see the status of the job change to SUCCEEDED. You can click the Refresh icon () to refresh the screen if needed. Confirm that the Job ran successfully. Contact instructor if issues arise. Check the Completed Time of the job and compare it with the Last Modified Time. How long did it take this job to run? _____
8	Examine the newly created Masking View. Hover over the Hosts menu option and choose Masking View. Your newly created Masking View should be listed. Select it and click on View Connections. Examine the connections view and make a note of the Volumes that were added to the storage group. Storage Group Volumes: _____ Navigate back to the Masking View listing by clicking on the Masking View link (> Masking View >).

Step	Action
9	Record WWNs of devices in the newly created Masking View Select the newly created Masking View from the listing and click on View Details. Click on the Volumes link in the Related Objects box to see a listing of the Volumes associated with the Masking View. Select the first volume and click on View Details, note down its WWN. WWN1 _____ (e.g. 60000970000196800225533030303930) Click on the Volumes link (> Volumes >)to go back to the volumes listing Select the second volume and click on View Details, note down its WWN. WWN2 _____ We will use this information to confirm that the ESXi server has access to these devices.
10	Logout of Unisphere for VMAX and close the browser session to go back to your Student Desktop.

Continued on next page

Lab 3: Part 3 – Rescan ESXi Server and use VMAX3 Storage

Step	Action																									
1	You should already be logged into your assigned Student Desktop.																									
2	Launch the VMware vSphere Client from the Student Desktop and login to your assigned ESXi Server. Use the IP address, User name and Password to login to your ESXi server. Ignore any security and license warnings.																									
3	Confirm that two new 10 GB VMAX3 devices are seen by your ESXi Server Go to the Configuration tab of your ESXi Server. Click on Storage in the Hardware frame. Click on Devices to see devices visible to your ESXi Server Do you see the two new EMC 10 GB devices that you had provisioned. You may have to perform a Rescan if you don't see the two new devices. Click on Rescan All (Rescan All...) and then click OK in the Rescan dialog. Confirm that the two new 10 GB devices are visible. You may see something like the graphic below: View: Datastores Devices Devices Refresh Rescan All... <table><tr><th>Name</th><th>Runtime Name</th><th>Capacity</th><th>Operational State</th><th>LUN</th></tr><tr><td>EMC iSCSI Disk (naa.60000970000196800225533030303930)</td><td>vmhba33:C0:T0:L3</td><td>10.00 GB</td><td>Mounted</td><td>3</td></tr><tr><td>EMC iSCSI Disk (naa.60000970000196800225533030303931)</td><td>vmhba33:C0:T0:L4</td><td>10.00 GB</td><td>Mounted</td><td>4</td></tr><tr><td>EMC iSCSI Disk (naa.60000970000196800225533030303544)</td><td>vmhba33:C0:T0:L1</td><td>5.63 MB</td><td>Mounted</td><td>1</td></tr><tr><td>EMC iSCSI Disk (naa.60000970000196800225533030303545)</td><td>vmhba33:C0:T0:L2</td><td>5.63 MB</td><td>Mounted</td><td>2</td></tr></table> Confirm that the naa name of the 10 GB devices matches the WWNs of the VMAX3 devices that you had recorded in Part 2 Step 9 of this lab. Contact instructor with any issues.	Name	Runtime Name	Capacity	Operational State	LUN	EMC iSCSI Disk (naa.60000970000196800225533030303930)	vmhba33:C0:T0:L3	10.00 GB	Mounted	3	EMC iSCSI Disk (naa.60000970000196800225533030303931)	vmhba33:C0:T0:L4	10.00 GB	Mounted	4	EMC iSCSI Disk (naa.60000970000196800225533030303544)	vmhba33:C0:T0:L1	5.63 MB	Mounted	1	EMC iSCSI Disk (naa.60000970000196800225533030303545)	vmhba33:C0:T0:L2	5.63 MB	Mounted	2
Name	Runtime Name	Capacity	Operational State	LUN																						
EMC iSCSI Disk (naa.60000970000196800225533030303930)	vmhba33:C0:T0:L3	10.00 GB	Mounted	3																						
EMC iSCSI Disk (naa.60000970000196800225533030303931)	vmhba33:C0:T0:L4	10.00 GB	Mounted	4																						
EMC iSCSI Disk (naa.60000970000196800225533030303544)	vmhba33:C0:T0:L1	5.63 MB	Mounted	1																						
EMC iSCSI Disk (naa.60000970000196800225533030303545)	vmhba33:C0:T0:L2	5.63 MB	Mounted	2																						

Step	Action
4	Create a VMFS Datastore on one of the 10 GB Devices Click the Datastores button (View: Datastores Devices) and then click on Add Storage (Add Storage...) to launch the Add Storage Dialog Choose Disk/LUN for the Storage Type and then click Next. In the Select Disk/LUN screen: Select one 10 GB EMC Disk. Then click Next. Choose VMFS-5 for File System Version, and then click Next. Click Next on the Current Disk Layout screen. Type in a unique name for your datastore: <SGN>_VMAX3_DS. Click Next. Choose the Maximum available space. Click Next. Click Finish in the Ready to Complete screen. Your datastore should appear in the datastores listing.
5	Exit the VMware vSphere client.

End of Lab Exercise

Lab Exercise 4: Service Level Objective Based Provisioning with SYMCLI

Purpose:	In this lab exercise students will use SYMCLI to perform SLO based provisioning to a Windows or a SUN host.
Tasks:	Create a standalone storage group Create VMAX3 thin devices and add them to the storage group. Create a Masking View for the WIN/SUN host with the new storage group and existing initiator and port groups. Rescan the WIN/SUN host to ensure that the newly allocated VMAX3 storage is available.
References:	Lecture Modules: Device Creation and Port Management Storage Allocation using Auto-provisioning Groups.

Lab 4: Part 1 – Create Storage Group and VMAX3 Thin Devices

Step	Action												
1	Login to your Student Desktop as you did in Lab 1 Part 1.												
2	From your Student Desktop host login to your WIN/SUN SYMCLI host – Use the instructions and login credentials given to you by the instructor. Make sure that you are logging into the WIN/SUN SYMCLI host with administrative/root privileges and ensure that the PATH is set properly for SYMCLI.												
3	List the existing storage groups on your local VMAX3 array. <pre># symmsg list -detail -sid <local SID></pre> Are any of the storage groups FAST managed? _____ Hint: Look at the F flag in the output.												
4	Create a new storage group called <SGN>_DSS (e.g. 01_DSS) with an SLO of Gold and WL type of DSS. Note: Use any available SLO if Gold is not available on your system. <pre># symmsg create <SGN>_DSS -slo gold -wl dss -sid <local SID></pre>												
5	Confirm creation of new SG and record its properties <pre># symmsg list -detail -sid <local SID></pre> The newly created SG should be listed. Record its properties. <table><tr><th>SG Name</th><th>Flags EFMSL</th><th>Number Devices</th><th>Child SGs</th><th>SLO</th><th>Workload</th></tr><tr><td><SGN>_DSS</td><td></td><td></td><td></td><td></td><td></td></tr></table> Is this SG FAST Managed? _____ Is it a Parent or a Child SG? _____ The SG should be an empty standalone SG.	SG Name	Flags EFMSL	Number Devices	Child SGs	SLO	Workload	<SGN>_DSS					
SG Name	Flags EFMSL	Number Devices	Child SGs	SLO	Workload								
<SGN>_DSS													

Step	Action
6	Create two thin devices with a 2 GB capacity and add them to the newly created SG. Preview First <pre># symconfigure -sid <local SID> -cmd "create dev count=2, size=2GB, emulation=FBA, config=TDEV, sg=<SGN>_DSS;" preview -nop</pre> Did the preview succeed? _____ Fix any issues and preview again. If preview succeeds – Commit the creation of the devices. <pre># symconfigure -sid <local SID> -cmd "create dev count=2, size=2GB, emulation=FBA, config=TDEV, sg=<SGN>_DSS;" commit -nop</pre> The commit operation may take some time. Did the commit succeed? _____ Contact instructor with any issues. Record the new devices that were created: _____(e.g. 0092:0093)
7	Confirm that the new devices were added to your SG <SGN>_DSS. <pre># symmsg show <SGN>_DSS -sid <local SID></pre> Are the devices that you had created in the previous step part of your <SGN>_DSS SG? _____

Continued on next page

Lab 4: Part 2 – Create Masking View

Step	Action												
1	You should be still logged into your WIN/SUN SYMCLI host.												
2	Display the VMAX3 devices visible to your WIN/SUN SYMCLI Host # symcfg discover # symdev list pd -sid <local SID> How many VMAX3 thin devices does your WIN/SUN host see? _____												
3	If PowerPath is installed determine the Logical Device count and total paths. # powermt display paths What is the Symmetrix logical device count? _____ How many total paths are shown in the penultimate column _____ Are any of the paths dead? _____ If powermt is not in your default path, find it in /etc or /usr/sbin or /sbin or \Program Files\EMC\PowerPath												
4	Confirm that the new storage group (<SGN>_DSS) you created in the previous part exists. # symsg list -detail -sid <local SID> Record the properties of <SGN>_DSS. <table border="1"><thead><tr><th>SG Name</th><th>Flags EFMSL</th><th>Number Devices</th><th>Child SGs</th><th>SLO</th><th>Workload</th></tr></thead><tbody><tr><td><SGN>_DSS</td><td></td><td></td><td></td><td></td><td></td></tr></tbody></table> Is it part of a Masking View? _____ How many devices does it have? _____ The SG should not be part of a Masking View yet and should have 2 devices.	SG Name	Flags EFMSL	Number Devices	Child SGs	SLO	Workload	<SGN>_DSS					
SG Name	Flags EFMSL	Number Devices	Child SGs	SLO	Workload								
<SGN>_DSS													

Step	Action								
5	Recall the Masking View information for your WIN/SUN host from Lab 1 Part 3 Step 13								
	<table><tr><td>Masking View Name</td><td>Initiator Group e.g. winxx_ig or sunxx_ig</td><td>Port Group e.g. hosts_pg</td><td>Storage Group</td></tr><tr><td>WIN/SUN:</td><td></td><td></td><td></td></tr></table>	Masking View Name	Initiator Group e.g. winxx_ig or sunxx_ig	Port Group e.g. hosts_pg	Storage Group	WIN/SUN:			
	Masking View Name	Initiator Group e.g. winxx_ig or sunxx_ig	Port Group e.g. hosts_pg	Storage Group					
	WIN/SUN:								
We will be using the Initiator Group and Port Group from this table when we create a new Masking View for your WIN/SUN host.									
6	Provision the <SGN>_DSS SG to your WIN/SUN host by creating a new Masking View								
	Initiator group identified in the previous step: _____								
	Port group identified in the previous step: _____								
	The storage group <SGN>_DSS: _____								
	Name the masking view <SGN>_DSS_MV (e.g. 01_DSS_MV)								
	# symaccess create view -sid <local SID> -name <SGN>_DSS_MV -sg <SGN>_DSS -ig <winxx_ig/sunxx_ig> -pg <hosts_pg>								
	Confirm the creation of the Masking View								
	# symaccess list view -sid <local SID>								
	<SGN>_DSS_MV should be listed. Record its properties:								
	<table><tr><td>Masking View Name</td><td>Initiator Group</td><td>Port Group</td><td>Storage Group</td></tr><tr><td><SGN>_DSS_MV:</td><td></td><td></td><td></td></tr></table>	Masking View Name	Initiator Group	Port Group	Storage Group	<SGN>_DSS_MV:			
	Masking View Name	Initiator Group	Port Group	Storage Group					
	<SGN>_DSS_MV:								
Confirm that the correct names have been used for the auto-provisioning groups.									

Step	Action
7	View the details of the new Masking View <SGN>_DSS_MV. <pre># symaccess show view <SGN>_DSS_MV -sid <local SID></pre> Confirm that the devices in storage group <SGN>_DSS are listed in the output.
8	View the details of the storage group <SGN>_DSS <pre># symsg show <SGN>_DSS -sid <local SID></pre> Is this storage groups associated with a Masking View? _____ List the devices in <SGN>_DSS: _____ (e.g. 0093, 0093)

Continued on next page

Lab 4: Part 3 – Rescan Host and confirm access to new VMAX3 storage

Step	Action
1	You should be still logged into your WIN/SUN SYMCLI host.
2	Rescan the SCSI bus of your WIN/SUN host to look for the newly provisioned VMAX3 devices. <u>On SUN type</u> <pre># devfsadm -C</pre> <u>On Windows use the DISKPART or “symntctl rescan” command to rescan the bus</u> <pre>C:\>DISKPART DISKPART> rescan DISKPART> exit</pre> OR <pre>C:\> symntctl rescan</pre>
3	If PowerPath is installed issue the commands: <u>On SUN</u> <pre># powermt config</pre> <u>On Windows</u> <pre># powermt check reconfig</pre> Followed by (On SUN and Windows) <pre># powermt display paths</pre> How many total paths are shown in the penultimate column _____ Is the number higher than what you saw earlier [Y/N] _____

Step	Action
4	Run a discovery and list the VMAX3 devices visible to your WIN/SUN host <pre># symcfg discover</pre> <pre># symdev list pd -sid <local SID></pre> Are the devices in the <SGN>_DSS storage group visible to your host? _____ Get help from the instructor if you do not see the correct devices.
5	Optional Step – Instructions are not provided Use OS specific commands to create a file system on one of the newly presented VMAX3 thin devices.
6	Logout of your WIN/SUN SYMCLI host to return to the Student Desktop.

End of Lab Exercise

Lab Exercise 5: Cascaded Storage Groups and SLO/Workload Type Modifications

Purpose:	In this lab exercise students will manage cascaded storage groups. Students will set and modify SLO and Workload type on storage groups. Note: These activities can be performed with Unisphere for VMAX or SYMCLI. This lab will use SYMCLI.
Tasks:	Convert a standalone Storage Group to a Cascaded Storage Group and add a new SG to the Cascaded SG. Move devices non-disruptively from between child SGs. Modify SLO and Workload Type on a SG.
References:	Lecture Module: Storage Allocation using Auto-provisioning Groups

Lab 5: Part 1 - Convert Standalone SG to Cascaded SG

Step	Action
1	Login to your Student Desktop as you did in Lab 1 Part 1.
2	From your Student Desktop host login to your WIN/SUN SYMCLI host – Use the instructions and login credentials given to you by the instructor. Make sure that you are logging into the WIN/SUN SYMCLI host with administrative/root privileges and ensure that the PATH is set properly for SYMCLI.
3	Confirm that the storage group (<SGN>_DSS) you had provisioned to your WIN/SUN host in the previous Lab exercise is a standalone storage group. <pre># symsg show <SGN>_DSS -sid <local SID></pre> Look for the line which starts with “Number of Storage Groups”, this should show a value of zero. The “Storage Group Names” entry should show N/A.
4	Convert your SG to a Cascaded SG. Name the Child SG <SGN>_DSS_1 (e.g. 01_DSS_1) <pre># symsg convert -cascaded <SGN>_DSS <SGN>_DSS_1 -sid <local SID></pre>

Step	Action																		
5	Confirm that your original SG is now a Parent SG and that a Child SG has been created. <pre># symsg list -detail -sid <local SID></pre> Make sure the output lists your original SG and the Child SG name that was used in the previous step. Record the information about both these SGs <table><tr><th>SG Name</th><th>Flags EFMSL</th><th>Number Devices</th><th>Child SGs</th><th>SLO</th><th>Workload</th></tr><tr><td><SGN>_DSS</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td><SGN>_DSS_1</td><td></td><td></td><td></td><td></td><td></td></tr></table> The Flags should indicate that the Original SG is now a Parent and the new SG is a Child. The parent should have no SLO defined and will not be FAST managed. The child should have the SLO and Workload that were originally set on the parent, and will be FAST managed.	SG Name	Flags EFMSL	Number Devices	Child SGs	SLO	Workload	<SGN>_DSS						<SGN>_DSS_1					
SG Name	Flags EFMSL	Number Devices	Child SGs	SLO	Workload														
<SGN>_DSS																			
<SGN>_DSS_1																			
6	Rename your Parent SG (<SGN>_DSS) to <SGN>_Parent (e.g. 01_Parent) <pre>#symsg rename <SGN>_DSS <SGN>_Parent -sid <local SID></pre> Confirm that the Parent SG has been renamed to <SGN>_Parent <pre># symsg list -detail -sid <local SID></pre> The new name should be listed.																		
7	Create a new SG <SGN>_OLTP_2 (e.g. 01_OLTP_2) with an SLO of Platinum and WL type of OLTP Note: Use any available SLO if Platinum is not available on your system. <pre># symsg create <SGN>_OLTP_2 -slo platinum -wl oltp -sid <local SID></pre> Confirm its creation <pre># symsg list -detail -sid <local SID></pre> Make sure the new SG is listed and has the specified SLO and WL type.																		

Step	Action
8	Add the newly created SG to your Parent SG <pre># symmsg -sg <SGN>_Parent add sg <SGN>_OLTP_2 -sid <local SID></pre> Confirm the addition <pre># symmsg show <SGN>_Parent -sid <local SID></pre> The SG you added should show up as a Child SG in the Parent SG.
9	Move one of the devices from the first Child SG <SGN>_DSS_1 to the new child SG <SGN>_OLTP_2 List the devices in first child SG <pre># symmsg show <SGN>_DSS_1 -sid <local SID></pre> Note down the Device number of the second device <dev2> _____(e.g. 0093) Move <dev2> from <SGN>_DSS_1 to <SGN>_OLTP_2 <pre># symmsg -sg <SGN>_DSS_1 move dev <dev2> <SGN>_OLTP_2 -sid <local SID></pre>
10	Confirm that the device has been moved. <pre># symmsg show <SGN>_DSS_1 -sid <local SID></pre> Should only show one device <pre># symmsg show <SGN>_OLTP_2 -sid <local SID></pre> Should show the device that you moved <dev2>
11	Confirm that your WIN/SUN host still has access to the device that was moved. <pre># symcfg discover</pre> <pre># symdev list pd -sid <local SID></pre> Is the device in the <SGN>_OLTP_2 storage group visible to your host? _____

Continued on next page

Lab 5: Part 2 – Manage SLO/Workload Type

Step	Action																								
1	You should be still logged into your WIN/SUN SYMCLI host.																								
2	List all the Storage Groups your local VMAX3 array and the corresponding SLOs and WL type. <pre># symmsg list -detail -sid <local SID></pre> Record the information about the Parent and Child SGs that were used in the previous part (Lab 5 Part 1). <table><tr><th>SG Name</th><th>Flags EFMSL</th><th>Number Devices</th><th>SLO</th><th>Workload</th><th>SRP Name</th></tr><tr><td><SGN>_Parent</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td><SGN>_DSS_1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td><SGN>_OLTP_2</td><td></td><td></td><td></td><td></td><td></td></tr></table> The SLOs and Workload should match the ones you assigned in the earlier labs. Confirm that the information is as you expect it to be.	SG Name	Flags EFMSL	Number Devices	SLO	Workload	SRP Name	<SGN>_Parent						<SGN>_DSS_1						<SGN>_OLTP_2					
SG Name	Flags EFMSL	Number Devices	SLO	Workload	SRP Name																				
<SGN>_Parent																									
<SGN>_DSS_1																									
<SGN>_OLTP_2																									
3	Change the SLO and Workload type for your <SGN>_DSS_1 storage group to Platinum and DSS_REP Note: Use any available SLO if Platinum is not available on your system. <pre># symmsg set -sg <SGN>_DSS_1 -slo platinum -wl dss_rep -sid <local SID></pre>																								
4	Show details of the SG to confirm that the changes have been made <pre># symmsg show <SGN>_DSS_1 -sid <local SID></pre> Confirm that the SLO and Workload changes have been made and the SG is still Fast managed.																								

Step	Action
5	Change the SLO for your <SGN>_OLTP_2 storage group to Optimized <pre># symmsg set -sg <SGN>_OLTP_2 -slo optimized -sid <local SID></pre>
6	Show details of the SG to confirm that the changes have been made <pre># symmsg show <SGN>_OLTP_2 -sid <local SID></pre> Confirm that the SLO is Optimized, Workload is none and the SG is still Fast managed.
7	To remove the SLO and Workload type associated with the SG one has to use the set -noslo option. Try this if you want. <pre># symmsg set -sg <SGN>_OLTP_2 -noslo -sid <local SID></pre>
8	Show details of the SG to confirm that the changes have been made <pre># symmsg show <SGN>_OLTP_2 -sid <local SID></pre> Is this SG FAST Managed? _____
9	Set the SLO and WL type back to Platinum and OLTP for the <SGN>_OLTP_2 storage group. Note: Use any available SLO if Platinum is not available on your system. <pre># symmsg set -sg <SGN>_OLTP_2 -slo platinum -wl oltp -sid <local SID></pre>
10	Logout of your WIN/SUN SYMCLI host to return to the Student Desktop.

End of Lab Exercise

Lab Exercise 6: Managing Host I/O Limits

Purpose:	In this lab exercise students will manage Host I/O limits on cascaded storage groups. Note: These activities can be performed with Unisphere for VMAX or SYMCLI. This lab will use SYMCLI.
Tasks:	Set/Modify Host I/O Limits on a Parent SG Set/Modify I/O Limits on a Child SG View Host I/O Limits demand report
References:	Lecture Module: Storage Allocation using Auto-provisioning Groups

Lab 6: Part 1 – Manage Host I/O Limits

Step	Action												
1	Login to your Student Desktop as you did in Lab 1 Part 1.												
2	From your Student Desktop host login to your WIN/SUN SYMCLI host – Use the instructions and login credentials given to you by the instructor. Make sure that you are logging into the WIN/SUN SYMCLI host with administrative/root privileges and ensure that the PATH is set properly for SYMCLI.												
3	Recall the names of the groups used for the masking view you had created for your WIN/SUN host in an earlier lab (<SGN>_DSS_MV). <pre># symaccess list view -name <SGN>_DSS_MV -sid <local SID></pre> Record the names of the groups <table><tr><th>Masking View Name</th><th>Initiator Group</th><th>Port Group</th><th>Storage Group</th></tr><tr><td></td><td>e.g. winxx_ig or sunxx_ig</td><td>e.g. hosts_pg</td><td><SGN>_Parent</td></tr><tr><td><SGN>_DSS_MV:</td><td></td><td></td><td></td></tr></table>	Masking View Name	Initiator Group	Port Group	Storage Group		e.g. winxx_ig or sunxx_ig	e.g. hosts_pg	<SGN>_Parent	<SGN>_DSS_MV:			
Masking View Name	Initiator Group	Port Group	Storage Group										
	e.g. winxx_ig or sunxx_ig	e.g. hosts_pg	<SGN>_Parent										
<SGN>_DSS_MV:													
4	Recall the names of the Child Storage groups <pre># symmsg show <SGN>_Parent -sid <local SID></pre> Record the name of the Child SGs: <SGN>_DSS_1 _____ <SGN>_OLTP_2 _____												

Step	Action																
5	Check the Host I/O Limits status of the Parent and Child SGs <pre># symsg list -sid <local SID></pre> <table><tr><th>SG Name</th><th>Flags EFMSL</th><th>Number Devices</th><th>Child SGs</th></tr><tr><td><SGN>_Parent</td><td></td><td></td><td></td></tr><tr><td><SGN>_DSS_1</td><td></td><td></td><td></td></tr><tr><td><SGN>_OLTP_2</td><td></td><td></td><td></td></tr></table> Are Host I/O Limits set on any of these storage groups? _____ Hint: Look at the L flag.	SG Name	Flags EFMSL	Number Devices	Child SGs	<SGN>_Parent				<SGN>_DSS_1				<SGN>_OLTP_2			
SG Name	Flags EFMSL	Number Devices	Child SGs														
<SGN>_Parent																	
<SGN>_DSS_1																	
<SGN>_OLTP_2																	
6	Set a 200 MB/S limit on the Parent SG <pre># symsg -sid <local SID> -sg <SGN>_Parent set -bw_max 200</pre> Confirm the setting <pre># symsg -sid <local SID> show <SGN>_Parent</pre> Record the following <table><tr><th>Host I/O Limit</th><th>Host I/O limit MB/Sec</th><th>Host I/O Limit IO/Sec</th><th>Dynamic Distribution</th></tr><tr><td></td><td></td><td></td><td></td></tr></table> Host I/O Limit should be Defined. What is the Dynamic Distribution set to? _____ What are the possible settings for Dynamic Distribution? _____	Host I/O Limit	Host I/O limit MB/Sec	Host I/O Limit IO/Sec	Dynamic Distribution												
Host I/O Limit	Host I/O limit MB/Sec	Host I/O Limit IO/Sec	Dynamic Distribution														

Step	Action																
7	Set the Dynamic Distribution to always on the Parent SG <pre># symsg -sid <local SID> -sg <SGN>_Parent set -dynamic always</pre> Confirm the setting <pre># symsg -sid <local SID> show <SGN>_Parent</pre> What is the Dynamic Distribution set to? _____																
8	Check the Host I/O Limits status of the Parent and Child SGs <pre># symsg list -sid <local SID></pre> <table><tr><th>SG Name</th><th>Flags EFMSL</th><th>Number Devices</th><th>Child SGs</th></tr><tr><td><SGN>_Parent</td><td></td><td></td><td></td></tr><tr><td><SGN>_DSS_1</td><td></td><td></td><td></td></tr><tr><td><SGN>_OLTP_2</td><td></td><td></td><td></td></tr></table> Are Host I/O Limits set on any of these storage groups? _____ Hint: Look at the L flag. The Parent should show D=Defined and the Children should show S=Shared.	SG Name	Flags EFMSL	Number Devices	Child SGs	<SGN>_Parent				<SGN>_DSS_1				<SGN>_OLTP_2			
SG Name	Flags EFMSL	Number Devices	Child SGs														
<SGN>_Parent																	
<SGN>_DSS_1																	
<SGN>_OLTP_2																	
9	Try setting a 300 MB/S limit on the Child SG <SGN>_DSS_1 <pre># symsg -sid <local SID> -sg <SGN>_DSS_1 set -bw_max 300</pre> Did the operation succeed? _____ Explain the reason for the failure: _____																

Step	Action								
10	Set a 100 MB/S limit on the Child SG <SGN>_DSS_1 <pre># symsg -sid <local SID> -sg <SGN>_DSS_1 set -bw_max 100</pre> Confirm the setting <pre># symsg -sid <local SID> show <SGN>_DSS_1</pre> Record the following <table><tr><th>Host I/O Limit</th><th>Host I/O limit MB/Sec</th><th>Host I/O Limit IO/Sec</th><th>Dynamic Distribution</th></tr><tr><td></td><td></td><td></td><td></td></tr></table> Host I/O Limit should show Defined (Shared). What is the Dynamic Distribution set to? _____	Host I/O Limit	Host I/O limit MB/Sec	Host I/O Limit IO/Sec	Dynamic Distribution				
Host I/O Limit	Host I/O limit MB/Sec	Host I/O Limit IO/Sec	Dynamic Distribution						
11	Try setting the Dynamic Distribution to never on the Child SG <SGN>_DSS_1 <pre># symsg -sid <local SID> -sg <SGN>_DSS_1 set -dynamic never</pre> Did the operation succeed? _____ Explain the reason for the failure: _____								

Step	Action																					
12	Check the Host I/O Limits status of the Parent and Child SGs # symsg list -sid <local SID> <table><tr><th>SG Name</th><th>Flags EFMSL</th><th>Number Devices</th><th>Child SGs</th></tr><tr><td><SGN>_Parent</td><td></td><td></td><td></td></tr><tr><td><SGN>_DSS_1</td><td></td><td></td><td></td></tr><tr><td><SGN>_OLTP_2</td><td></td><td></td><td></td></tr></table> What is the Host I/O Limit flag for the <SGN>_DSS_1 set to? _____ Hint: Look at the L flag. The Parent should show D=Defined, <SGN>_DSS_1 should show B=Both and <SGN>_OLTP_2 should show S=Shared.	SG Name	Flags EFMSL	Number Devices	Child SGs	<SGN>_Parent				<SGN>_DSS_1				<SGN>_OLTP_2								
SG Name	Flags EFMSL	Number Devices	Child SGs																			
<SGN>_Parent																						
<SGN>_DSS_1																						
<SGN>_OLTP_2																						
13	View Host I/O Limits Demand report – By Port Group # symsg list -demand -by_pg -sid <local SID> Record the information for your port group identified in step 3 (e.g. hosts_pg) <table><tr><th colspan="2">Port Group</th><th colspan="5">Bandwidth Limit</th></tr><tr><th>Name</th><th>Flags HD</th><th>Port Grp Speed (MB/Sec)</th><th>Maximum Demand (MB/Sec)</th><th>Maximum Demand %</th><th>Number No Limit SGs</th><th>Excess (MB/Sec)</th></tr><tr><td>hosts_pg: _____</td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> What does the value of M for the H flag represent? _____	Port Group		Bandwidth Limit					Name	Flags HD	Port Grp Speed (MB/Sec)	Maximum Demand (MB/Sec)	Maximum Demand %	Number No Limit SGs	Excess (MB/Sec)	hosts_pg: _____						
Port Group		Bandwidth Limit																				
Name	Flags HD	Port Grp Speed (MB/Sec)	Maximum Demand (MB/Sec)	Maximum Demand %	Number No Limit SGs	Excess (MB/Sec)																
hosts_pg: _____																						

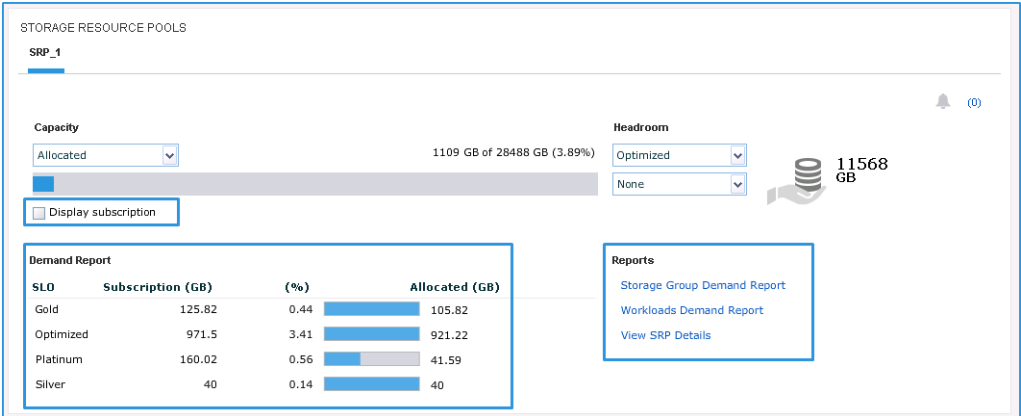
Step	Action
14	View verbose Host I/O Limits By Port Group demand report for your specific port group. <pre># symsg list -demand -by_pg -pg <hosts_pg> -v -sid <local SID></pre> Verbose report should show the limits set on the specific storage groups. Confirm that the report matches the limits you had set on your parent and child storage groups.
15	View Host I/O Limits Demand report – By Port <pre># symsg list -demand -by_port -sid <local SID></pre> This report shows the demand report for specific ports rather than port groups.
16	View verbose Host I/O Limits By Port demand report for your specific port group. <pre># symsg list -demand -by_port -pg <hosts_pg> -v -sid <local SID></pre> The verbose report shows the demand report for specific ports rather than port groups. It will show the limits set on specific storage groups on a per port basis.
17	Logout of your WIN/SUN SYMCLI host to return to the Student Desktop.

End of Lab Exercise

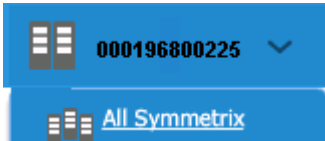
Lab Exercise 7: Monitoring SRP and SLO Compliance with Unisphere for VMAX

Purpose:	In this lab exercise students will use Unisphere for VMAX to monitor SRP and SLO Compliance.
Tasks:	Monitor SRP Reports Monitor Storage Group SLO Compliance
References:	Lecture Module: Monitoring and Workload Planning with Unisphere for VMAX

Lab 7: Part 1 – Monitor SRP Reports

Step	Action
1	Login to your Student Desktop as you did in Lab 1 Part 1.
2	Login to Unisphere for VMAX From your Student Desktop launch Internet Explorer and connect to the Unisphere URL (<a href="https://<UnisphereServerIP>:8443">https://<UnisphereServerIP>:8443) Use the Unisphere login credentials and login to Unisphere.
3	Navigate to the Storage Groups Dashboard of your Local VMAX3 array. Click on the SLO Compliance link of your local VMAX3 array on the Home page – this will bring you to the Storage Groups Dashboard.
4	Look at the Storage Resource Pools panel in the Storage Groups Dashboard. You should see something like the graphic below:  Make sure that the Demand Report and the Reports links are seen. If you don't see the Demand Report or the Reports links you need to maximize the size of your browser window and perhaps the resolution of your Student Desktop.

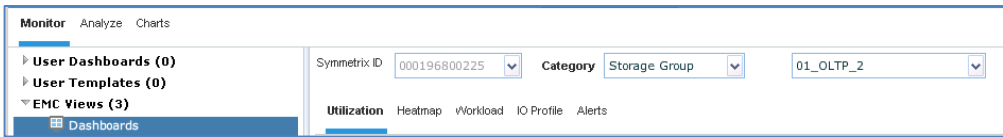
Step	Action																																
5	Record information from the Demand Report <table border="1"> <thead> <tr> <th>SLO</th><th>Subscription (GB)</th><th>(%)</th><th>Allocated (GB)</th></tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table> Is the Allocated capacity less than the Subscription capacity? _____ Is this expected? _____ Add up all the Subscription (%) – Total Subscription (%) = _____ Click the Display Subscription box to see % subscribed: _____ Does this match your total? _____	SLO	Subscription (GB)	(%)	Allocated (GB)																												
SLO	Subscription (GB)	(%)	Allocated (GB)																														
6	View the Storage Group Demand Report. Click on the Storage Group Demand Report link in the Storage Resource Pools panel. Record the information for the storage groups that you had created in earlier labs. <table border="1"> <thead> <tr> <th>Storage Group</th><th>Subscription (GB)</th><th>Allocated (%)</th><th>SNAP Allocated (GB)</th></tr> </thead> <tbody> <tr> <td><SGN>_ESX</td><td> </td><td> </td><td> </td></tr> <tr> <td><SGN>_DSS_1</td><td> </td><td> </td><td> </td></tr> <tr> <td><SGN>_OLTP_2</td><td> </td><td> </td><td> </td></tr> </tbody> </table> What is the SYMCLI command for a similar report? _____	Storage Group	Subscription (GB)	Allocated (%)	SNAP Allocated (GB)	<SGN>_ESX				<SGN>_DSS_1				<SGN>_OLTP_2																			
Storage Group	Subscription (GB)	Allocated (%)	SNAP Allocated (GB)																														
<SGN>_ESX																																	
<SGN>_DSS_1																																	
<SGN>_OLTP_2																																	

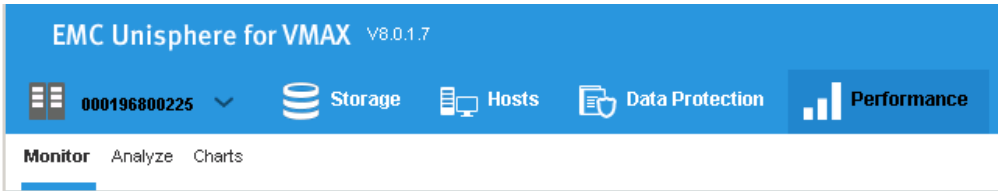
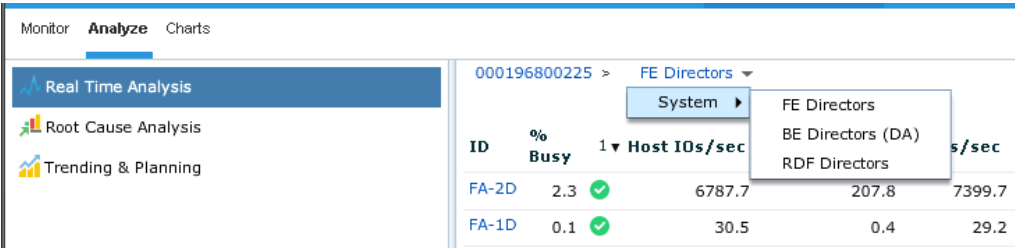
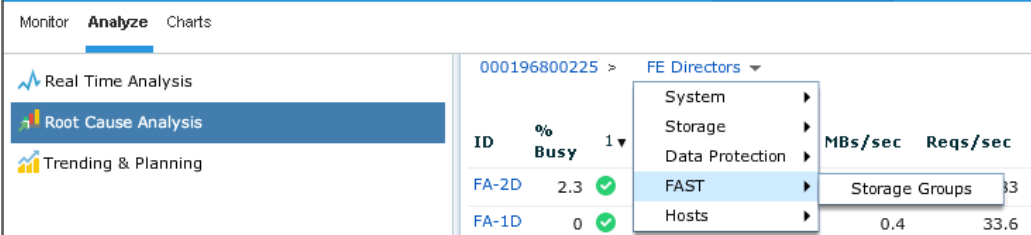
Step	Action
7	View the Workloads Demand Report Click on Storage in the menu bar to go back to the Storage Groups Dashboard. Click on the Workloads Demand Report link in the Storage Resource Pools panel. This is the same as the Demand Report seen in the Storage Resource Pool pane of the Storage Groups Dashboard. This view allows one to drill into each SLO to see the demand for the Workload Types. To see this click on the arrow head icon to the left of an SLO (► Platinum) to drill down. What is the SYMCLI command for a similar report? _____
8	Return to the Home Screen. Use the System Selector and choose All Symmetrix  This should bring you back to the Home screen.
9	Check to see if the Symmetrix Resource Pool Utilization alert is enabled for your local VMAX3 array. Hover over the Home icon and then select Administration. Click on Alert Settings Click on Symmetrix Pool Threshold Alerts Confirm that the Symmetrix Resource Pool Utilization alert is enabled for your local VMAX3 array.
10	Click on Home to return to the Home screen.

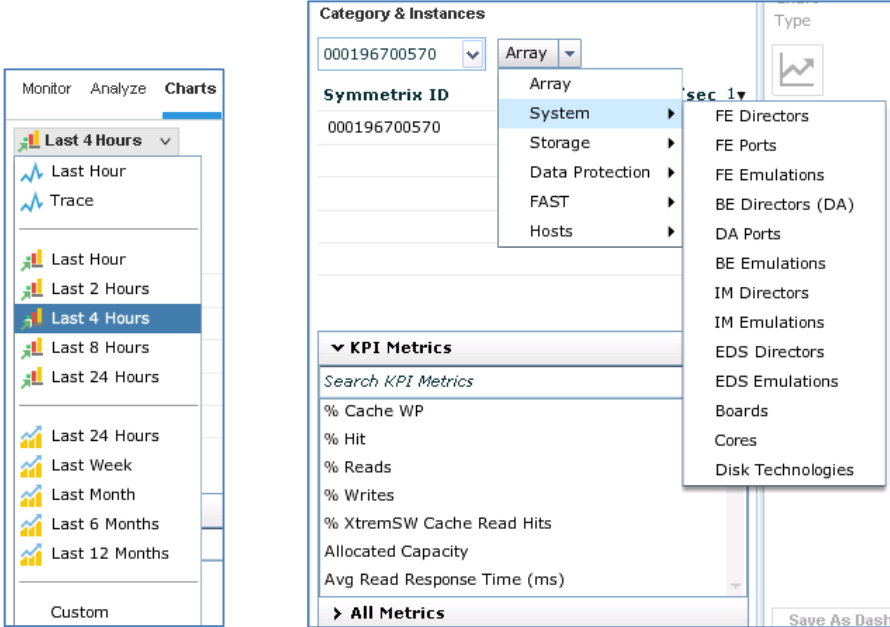
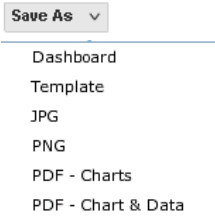
Continued on next page

Lab 7: Part 2 – Monitor SLO Compliance

Step	Action																														
1	You should still be logged into Unisphere for VMAX and be on the Home screen.																														
2	Navigate to the Storage Groups Dashboard of your Local VMAX3 array. Click on the SLO Compliance link of your local VMAX3 array on the Home page – this will bring you to the Storage Groups Dashboard.																														
3	Look at the SLO Compliance panel in the Storage Groups Dashboard. You may see something like the graphic below:  Record the information about the SGs Total # _____ Stable # _____ Marginal # _____ Critical # _____ No SLO # _____ You can click on any of the icons to see the corresponding listing.																														
4	View list of all the configured Storage Groups. Click on the Total icon (🗄️) to see a listing of all the storage groups. Record the information for the storage groups that you had created in earlier labs. <table><tr><th>Name</th><th>SLO Compliance</th><th>SLO</th><th>Workload Type</th><th>Capacity (GB)</th><th>Masking Views</th></tr><tr><td><SGN>_Parent</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td><SGN>_DSS_1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td><SGN>_OLTP_2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td><SGN>_ESX</td><td></td><td></td><td></td><td></td><td></td></tr></table> Is there a SLO compliance associated with your Parent SG? _____ Why? _____ Are the your other SGs SLO Compliant? _____	Name	SLO Compliance	SLO	Workload Type	Capacity (GB)	Masking Views	<SGN>_Parent						<SGN>_DSS_1						<SGN>_OLTP_2						<SGN>_ESX					
Name	SLO Compliance	SLO	Workload Type	Capacity (GB)	Masking Views																										
<SGN>_Parent																															
<SGN>_DSS_1																															
<SGN>_OLTP_2																															
<SGN>_ESX																															

Step	Action
5	View Workload Details of your storage group <SGN>_DSS_1 You should still be in the Storage Groups listing. Select the <SGN>_DSS_1 storage group and click on View Details. Click on the Workload Tab () in the Details view to change the view to Workload. Record information about your SG Service Level: _____ Compliance Range _____ Service Level Compliance: _____ Click on the Storage Groups link ( Storage Groups ) to go back to the Storage Groups listing.
6	View Workload Details of your storage group <SGN>_OLTP_2 You should still be in the Storage Groups listing. Select the <SGN>_OLTP_2 storage group and click on View Details. Click on the Workload Tab () in the Details view to change the view to Workload. Record information about your SG Service Level: _____ Compliance Range _____ Service Level Compliance: _____
7	Explore the Performance Dashboard of your storage group <SGN>_OLTP_2 You should still be in the Workload view of your SG. Click on the Performance Monitor icon () to view the Performance Dashboard of your SG.  Feel free to explore the different tabs for the Storage Group as you wish.

Step	Action
8	Explore other sections of the Performance Dashboard. Performance Dashboard has three main areas. Monitor, Analyze and Charts. In the previous step you were in the Monitor area.  Use the tabs in the top left to move between these three areas. This part of the lab is un-scripted, please feel free to explore all three areas however you wish.
9	Analyze Analyze gives you tabular views of Real Time, Root Cause (Diagnostic) and Trending & Planning (Historical) data.  You can drill into a component for more details.   Explore as you wish.

Step	Action
10	Charts Charts allow you to plot various metrics. You can choose the time range and the category and instances. Explore as you wish.  The screenshot shows the 'Charts' section of the interface. On the left, there's a 'Monitor Analyze Charts' tab bar with 'Charts' selected. Below it, a 'Last 4 Hours' dropdown menu is open, showing options: Last Hour, Last 2 Hours, Last 4 Hours (selected), Last 8 Hours, Last 24 Hours, Last 24 Hours, Last Week, Last Month, Last 6 Months, Last 12 Months, and Custom. In the center, the 'Category & Instances' section shows a dropdown for '000196700570' with 'Array' selected. A dropdown menu is open showing categories: System, Storage, Data Protection, FAST, and Hosts. To the right, a 'Type' dropdown menu is open, showing a list of metrics including FE Directors, FE Ports, FE Emulations, BE Directors (DA), DA Ports, BE Emulations, IM Directors, IM Emulations, EDS Directors, EDS Emulations, Boards, Cores, and Disk Technologies. Below this, a 'KPI Metrics' section is visible with a search bar and a list of metrics: % Cache WP, % Hit, % Reads, % Writes, % XtremSW Cache Read Hits, Allocated Capacity, and Avg Read Response Time (ms). At the bottom right, there's a 'Save As Dash' button. Any chart can be saved as a user defined Dashboard or Template.  The screenshot shows the 'Save As' dropdown menu. It has a 'Save As' button with a dropdown arrow. The menu is open, showing options: Dashboard, Template, JPG, PNG, PDF - Charts, and PDF - Chart & Data.
11	Logout of Unisphere for VMAX and close the browser session to go back to your Student Desktop.

End of Lab Exercise

Lab Exercise 8: Workload Planning with Unisphere for VMAX

Purpose:	In this lab exercise students will use Unisphere for VMAX for Workload Planning.
Tasks:	Examine available headroom for various SLO/Workload Type combinations. Run suitability check while provisioning more storage to an existing storage group.
References:	Lecture Module: Monitoring and Workload Planning with Unisphere for VMAX

Lab 8: Part 1 – Examine Available Headroom

Step	Action												
1	Login to your Student Desktop as you did in Lab 1 Part 1.												
2	Login to Unisphere for VMAX From your Student Desktop launch Internet Explorer and connect to the Unisphere URL (<a href="https://<UnisphereServerIP>:8443">https://<UnisphereServerIP>:8443) Use the Unisphere login credentials and login to Unisphere.												
3	Navigate to the Storage Groups Dashboard of your Local VMAX3 array. Click on the SLO Compliance link of your local VMAX3 array on the Home page – this will bring you to the Storage Groups Dashboard.												
4	Focus on the Headroom section of the Storage Resource Pools panel. Headroom Optimized None  11568 GB What is the available Headroom for the Optimized SLO: _____												
5	Record the available Headroom on your local VMAX3 array for the Platinum SLO and the Workload Types supported by Platinum SLO. First click on the SLO pull down to set the SLO to Platinum and then click on the Workload pull down to set the different workload types. Note: Use any available SLO if Platinum is not available on your system. <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">SLO/WL</th><th style="width: 50%;">Headroom (GB)</th></tr> </thead> <tbody> <tr> <td>Platinum/OLTP</td><td></td></tr> <tr> <td>Platinum/OLTP + Replication</td><td></td></tr> <tr> <td>Platinum/DSS</td><td></td></tr> <tr> <td>Platinum/DSS + Replication</td><td></td></tr> <tr> <td>Platinum/None</td><td></td></tr> </tbody> </table>	SLO/WL	Headroom (GB)	Platinum/OLTP		Platinum/OLTP + Replication		Platinum/DSS		Platinum/DSS + Replication		Platinum/None	
SLO/WL	Headroom (GB)												
Platinum/OLTP													
Platinum/OLTP + Replication													
Platinum/DSS													
Platinum/DSS + Replication													
Platinum/None													

Step	Action												
6	In a similar manner record the available Headroom on your local VMAX3 array for the Diamond SLO and the Workload Types supported by Diamond SLO. Note: Ignore this step if Diamond is not available on your system. <table border="1"> <thead> <tr> <th>SLO/WL</th><th>Headroom (GB)</th></tr> </thead> <tbody> <tr> <td>Diamond/OLTP</td><td></td></tr> <tr> <td>Diamond /OLTP + Replication</td><td></td></tr> <tr> <td>Diamond /DSS</td><td></td></tr> <tr> <td>Diamond /DSS + Replication</td><td></td></tr> <tr> <td>Diamond /None</td><td></td></tr> </tbody> </table> Is the Headroom for Diamond SLO dramatically different compared to the Platinum SLO? _____ Why? _____	SLO/WL	Headroom (GB)	Diamond/OLTP		Diamond /OLTP + Replication		Diamond /DSS		Diamond /DSS + Replication		Diamond /None	
SLO/WL	Headroom (GB)												
Diamond/OLTP													
Diamond /OLTP + Replication													
Diamond /DSS													
Diamond /DSS + Replication													
Diamond /None													

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Lab 8: Part 2 – Expand Existing Storage Group and Run Suitability Check

Step	Action
1	You should still be logged into Unisphere for VMAX and be on the Storage Groups Dashboard.
2	Navigate to the listing of all Storage Groups by clicking on the Total icon  .
3	View the details of your <SGN>_ESX storage group. Select the <SGN>_ESX storage group and click View Details. How many volumes does this SG contain? _____ Recall that in an earlier lab two volumes were added to this SG.
4	Provision more storage to <SGN>_ESX. Click Modify in the details view. This will launch the Modify Storage Group dialog. Increase the number of Volumes from 2 to 4. Click Run Suitability Check Did the check succeed? _____ Proceed with lab even if it failed. Click OK to close the Suitability Check dialog. Click on the drop down beside Add to Job List and select Run Now The image shows a dropdown menu with the text 'Add to Job List' and a downward arrow. Below the menu, the options 'Add to Job List' and 'Run Now' are visible, with 'Run Now' highlighted in blue. It may take a few minutes for the modification to complete. You will see a success dialog if the modification succeeds. Close the dialog. Contact instructor with any issues.

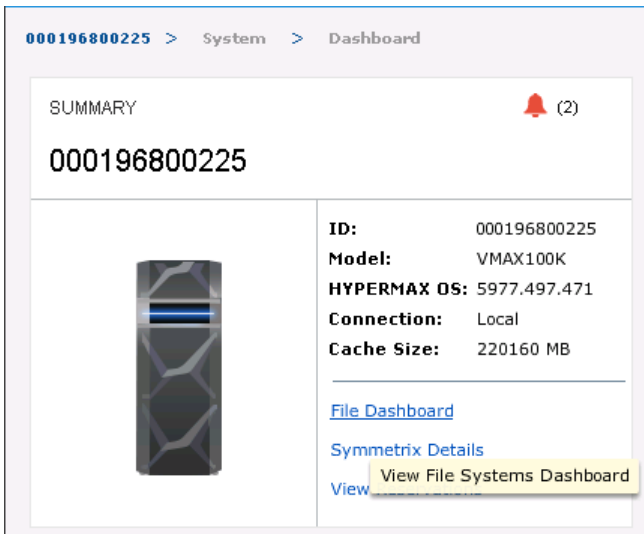
Step	Action
5	Examine details of <SGN>_ESX after the addition of more storage. You should still be in the details view of the SG. How many volumes does the SG have now? _____ Should be 4. Click the Volumes link in the Related Objects panel to see the listing of all the devices. Record the device names of two new devices: _____ (e.g. 0094, 0095).
6	Examine the Masking View associated with <SGN>_ESX Click the <SGN>_ESX link (> 01 ESX > Volumes) to go back to the details view. Click the Masking Views link in the Related Objects panel to see the associated Masking View. Select the Masking View <SGN>_ESX_MV and click View Connections. Examine the connections view and make sure that the storage group shows 4 volumes including the ones that you noted down in the previous step.
7	Logout of Unisphere for VMAX and close the browser session to go back to your Student Desktop.
8	Optional Step Like you did in Lab 3 Part 3 – Use the VMware vSphere client to login to your ESXi server, perform a rescan and ensure that the ESXi server sees the newly provisioned devices. Exit the VMware vSphere client.

End of Lab Exercise

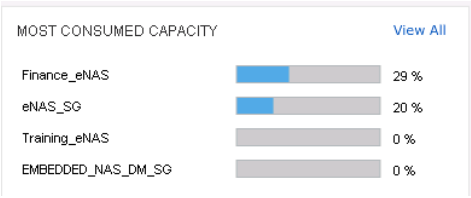
Lab Exercise 9: Provision Storage to eNAS with Unisphere for VMAX File Dashboard

Purpose:	In this exercise students will use Unisphere for VMAX File Dashboard to provision storage to the eNAS system.
Tasks:	Explore the Unisphere for VMAX File Dashboard. Use the Provision Storage for File wizard to provision storage to the eNAS system.
References:	Lecture Module: eNAS Management

Lab 9: Part 1 – Unisphere for VMAX File Dashboard

Step	Action
1	Login to your Student Desktop as you did in Lab 1 Part 1
2	Login to Unisphere for VMAX From your Student Desktop launch Internet Explorer and connect to the Unisphere URL (<a href="https://<UnisphereServerIP>:8443">https://<UnisphereServerIP>:8443) Use the Unisphere login credentials and login to Unisphere.
3	Navigate to the System Dashboard of your Local VMAX3 array. Click on the VMAX3 icon of your local VMAX3 array in the Home screen to navigate to the System Dashboard. eNAS systems will show the File Dashboard link in the Summary panel of the System Dashboard as shown in the example below. 
4	Navigate to the File Dashboard. Click on the File Dashboard link to navigate to the File Dashboard. You may be prompted for the Control Station login credentials. Enter the credentials given to you by the instructor.

Step	Action								
5	File Dashboard – Summary The Summary panel has links for the File Systems, File Storage Groups and File Masking Views as shown in the example below: 000196800225 > System > Dashboard > File Storage APM00112400946 SUMMARY File Systems 4 File Storage Groups 4 File Masking Views 4 Record information about the eNAS system: eNAS ID: APM_____ # of File Systems: _____ # File Storage Groups _____ # File Masking Views _____								
6	File Dashboard – Data Movers The Data Movers panel shows the configured data movers and their status. Record information about the data movers. <table><tr><th>Data Mover Name</th><th>Status</th></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr></table>	Data Mover Name	Status						
Data Mover Name	Status								
7	Explore the File Masking Views File Masking Views  Click on the File Masking Views icon () to see all the Masking Views associated with the eNAS system. Record information about the factory pre-configured masking view EMBEDDED_NAS_DM_MV <table><tr><th>Name</th><th>Host</th><th>Port Group</th><th>Storage Group</th></tr><tr><td> </td><td> </td><td> </td><td> </td></tr></table>	Name	Host	Port Group	Storage Group				
Name	Host	Port Group	Storage Group						

Step	Action
8	View Connection details of the EMBEDDED_NAS_DM_MV masking view. Select the EMBEDDED_NAS_DM_MV masking view from the File Masking View listing and click on View Connections. How many initiators does the Host (Initiator Group) have? _____ How many ports does the Port Group have? _____ How many Volumes in the Storage Group? _____ What is the purpose of the volumes in the pre-configured masking view? _____ Go back to the File Dashboard by clicking on the File Storage link (File Storage > File Masking Views > EMBEDDED_NAS_DM_MV).
9	File Dashboard – Most Consumed Capacity Panel The Most Consumed Capacity panel displays the File Storage Pools with the most consumed capacity. Note: There is a 1:1 correspondence between the File Storage Groups and File Storage Pools. As an example the pre-configured storage group EMBEDDED_NAS_DM_SG is discovered on the eNAS system as a storage pool and given the name of EMBEDDED_NAS_DM_SG. Here is an example:  Click on the View All link to see all the Storage Pools Go back to the File Dashboard by clicking on the File Storage link (> File Storage > Storage Pools).

Step	Action										
10	Explore the File Storage Groups Click on the File Storage Groups icon () to see the list of file storage groups. Record information for the pre-configured storage group. <table><tr><th>Name</th><th>SLO Compliance</th><th>SLO</th><th>Workload Type</th><th>Capacity</th></tr><tr><td>EMBEDDED_NAS_DM_SG</td><td></td><td></td><td></td><td></td></tr></table> Go back to the File Dashboard by clicking on the File Storage link (> File Storage > File Storage Groups).	Name	SLO Compliance	SLO	Workload Type	Capacity	EMBEDDED_NAS_DM_SG				
Name	SLO Compliance	SLO	Workload Type	Capacity							
EMBEDDED_NAS_DM_SG											

Continued on next page

Lab 9: Part 2 – Provision Storage to eNAS

Step	Action
1	You should be still logged into Unisphere for VMAX and be on the File Dashboard. The Common Tasks panel has links that allows one to - Provision Storage for File -  Provision Storage for File Launch Unisphere for VNX -  Launch Unisphere for VNX
2	Provision Storage to the eNAS system. Click on Provision Storage for File in the Common Tasks panel to launch the provisioning wizard 1 Create Storage Storage Group Name: <SGN>_eNAS_SG (e.g. 01_eNAS_SG) Service Level: Silver Workload Type: DSS Volumes: 2 Volume Capacity: 10 GB Click Next 2 Select VNX Host Select EMBEDDED_NAS_DM_IG Click Next 3 Select Port Group Select your EMBEDDED_NAS_DM_PG Click Next 4 Review Masking View Name: Use the auto-generated name – make a note of it: _____ Click on Finish – Provisioning process will start immediately. It may take some time to complete. You can follow the progress of the tasks in the Tasks in progress dialog. You will see a success message if the provisioning succeeds. Close the dialog. Contact instructor with any issues.

Step	Action																					
3	Confirm creation of new File Masking View File Masking Views Click on the File Masking Views icon () to see all the Masking Views associated with the eNAS system. Confirm that the file masking view you just created is listed <SGN>_eNAS_SG_MV Record information about your new file masking view <SGN>_eNAS_SG_MV. <table><tr><th>Name</th><th>Host</th><th>Port Group</th><th>Storage Group</th></tr><tr><td> </td><td> </td><td> </td><td> </td></tr></table>	Name	Host	Port Group	Storage Group																	
Name	Host	Port Group	Storage Group																			
4	View details of your new file masking view <SGN>_eNAS_SG_MV Select your new file masking view <SGN>_eNAS_SG_MV from the File Masking View listing and click on View Details. Click on the Volumes link in the Related Objects panel to see the volumes associated with this masking view. Record information about the volumes. Ensure that there are 2 10 GB volumes with the CELERRA_FBA emulation. <table><tr><th>Name</th><th>Type</th><th>Emulation</th><th>Allocated %</th><th>Capacity (GB)</th><th>Pool State</th><th>Status</th></tr><tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr></table>	Name	Type	Emulation	Allocated %	Capacity (GB)	Pool State	Status														
Name	Type	Emulation	Allocated %	Capacity (GB)	Pool State	Status																
5	Go back to the File Dashboard by clicking on the File Storage link (> File Storage >).																					
6	Logout of Unisphere for VMAX and close the browser session to go back to your Student Desktop.																					

End of Lab Exercise

Lab Exercise 10: Create FS/Share on VMAX3 Storage with Unisphere for VNX

Purpose:	In this exercise students will use Unisphere for VNX to create a file system on VMAX3 storage and then create a CIFS share.
Tasks:	Explore eNAS Mapped Storage Pools. Create a file system on the VMAX3 storage Create a CIFS share
References:	Lecture Module: eNAS Management

Lab 10: Part 1 – Explore eNAS Mapped Storage Pools

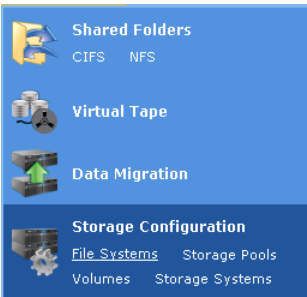
Step	Action
1	Login to your Student Desktop as you did in Lab 1 Part 1
2	Login to Unisphere for VMAX From your Student Desktop launch Internet Explorer and connect to the Unisphere URL (<a href="https://<UnisphereServerIP>:8443">https://<UnisphereServerIP>:8443) Use the Unisphere login credentials and login to Unisphere.
3	Navigate to the File Dashboard of your Local VMAX3 array. Click on the VMAX3 icon of your local VMAX3 array in the Home screen to navigate to the System Dashboard. Click on the File Dashboard link to navigate to the File Dashboard.
4	Launch Unisphere for VNX and login. Click the Launch Unisphere for VNX link in the Common Tasks panel – A new browser session will open. Accept any licensing agreements till you are presented with the Login screen for Unisphere for VNX. Use the VNX login credentials given to you by the instructor to login to Unisphere for VNX. The login process will take you to the All Systems > Dashboard page.

Step	Action										
5	Change the focus of the dashboard to your eNAS system. Click on the All Systems pull down to select the eNAS system – eNAS system will have the same SID as your Local VMAX3 arrays with CS0 at the end. Example - The focus will change to the Dashboard of your eNAS system:										
6	Examine Storage Pools for File Dashboard will show a graphic of the Storage Pools for File with Most Free Capacity <table border="1"> <thead> <tr> <th>Storage Pool</th> <th>Capacity (GB)</th> </tr> </thead> <tbody> <tr> <td>EMBEDDED_NAS_DM_SG</td> <td>0</td> </tr> <tr> <td>Finance_eNAS</td> <td>70.01</td> </tr> <tr> <td>eNAS_SG</td> <td>79.88</td> </tr> <tr> <td>Training_eNAS</td> <td>100.01</td> </tr> </tbody> </table> Click on Show Details to navigate to the Storage Pools listing. Does the pool listing show the Storage Group that you had created in Lab 9 Part 2 (<SGN>_eNAS_SG)? _____ The eNAS system should have automatically discovered the storage group and listed it as a Mapped Pool. Request the instructor to perform a rescan of the storage system if you don't see your pool.	Storage Pool	Capacity (GB)	EMBEDDED_NAS_DM_SG	0	Finance_eNAS	70.01	eNAS_SG	79.88	Training_eNAS	100.01
Storage Pool	Capacity (GB)										
EMBEDDED_NAS_DM_SG	0										
Finance_eNAS	70.01										
eNAS_SG	79.88										
Training_eNAS	100.01										

Step	Action										
7	Examine your Storage Pool - <SGN>_eNAS_SG Record information about your pool <table><tr><th>Name</th><th>Description</th><th>Storage Capacity (GB)</th><th>Storage Used %</th><th>Type</th></tr><tr><td><SGN>_eNAS_SG</td><td></td><td></td><td></td><td></td></tr></table> Select your pool from the pool listing and click on Properties. Record information from the Properties dialog: Advanced Data Services: _____ Does the pool show the SLO you had set when you provisioned the storage in Lab 9? _____ Storage Systems: _____ Cancel out of the Properties dialog.	Name	Description	Storage Capacity (GB)	Storage Used %	Type	<SGN>_eNAS_SG				
Name	Description	Storage Capacity (GB)	Storage Used %	Type							
<SGN>_eNAS_SG											

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Lab 10: Part 2 – Create File System

Step	Action
1	You should still be logged into Unisphere for VNX and you should be on the Storage Pools listing.
2	Navigate to the File Systems listing. Hover over Storage () in the menu bar and choose File Systems.  
3	Create a new File System Click Create to launch the Create File System dialog. Use the following inputs. Create From: Storage Pool File System Name: - Type in <SGN>_eNAS_FS (e.g. 01_eNAS_FS) Storage Pool: Pick your Pool <SGN>_eNAS_SG Storage Capacity: 5 GB Auto Extend Enabled: unchecked Thin Enabled: unchecked Slice Volumes: Checked File-level Retention: Off Deduplication Enabled: unchecked VMware VAAI nested clone support: unchecked Data Mover (R/W): Use default – Make a note of it _____ (e.g. server_2) Mount Point: Default Click OK

Step	Action						
4	View Properties of your new File System Your new file system should appear in the File System listing. Select your file system and click on Properties. Record the following about file systems from the Properties dialog: Data Movers: _____ Storage Pools: _____ Volume: _____ Disk Usage: _____ Cancel out of the Properties dialog.						
5	Check the File System Mount Point Click the Mounts tab in the File Systems page. Record information about your file system <SGN>_eNAS_FS <table><tr><th>File System</th><th>Path</th><th>Data Mover</th></tr><tr><td><SGN>_eNAS_FS</td><td></td><td></td></tr></table> The default path uses the name of the file system. So the path would will look like /<SGN>_eNAS_FS.	File System	Path	Data Mover	<SGN>_eNAS_FS		
File System	Path	Data Mover					
<SGN>_eNAS_FS							

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Lab 10: Part 3 – Create CIFS Share

Step	Action										
1	You should still be logged into Unisphere for VNX and you should be on the Mounts tab of the File Systems page.										
2	Navigate to the Shared Folders CIFS page. Hover over Storage () in the menu bar and choose Shared Folders CIFS. 										
3	Confirm the existence of a CIFS Server Click on the CIFS Servers tab in the CIFS page to see the configured CIFS Servers. Make sure that at least one of the CIFS Servers is using the same Data Mover on which you had created the file system on in Lab 10 Part 2. Record information about the CIFS Server <table><tr><th>NetBIOS Name</th><th>Type</th><th>Data Mover</th><th>Domain</th><th>Interfaces</th></tr><tr><td></td><td></td><td></td><td></td><td></td></tr></table>	NetBIOS Name	Type	Data Mover	Domain	Interfaces					
NetBIOS Name	Type	Data Mover	Domain	Interfaces							
4	Create a CIFS share for your File System Click on the Shares tab in the CIFS page to see the listing of CIFS Shares. Click Create to launch the Create CIFS Share dialog. Use the following inputs: Choose Data Mover: Pick the same data mover your file system was created on CIFS Share Name: <SGN>_eNAS_CIFS File System: Pick your File System <SGN>_eNAS_FS Path: Use the default path \<SGN>_eNAS_FS CIFS Servers: Ensure that the CIFS Server identified earlier is listed User Limit: Leave blank Comment: Type in a comment if you wish Click OK										

Step	Action										
5	View the Properties of the CIFS share you just created. Your CIFS share should appear in the CIFS Shares listing. Record information about your CIFS share <table><tr><th>Name</th><th>File System</th><th>Path</th><th>Data Mover</th><th>CIFS Servers</th></tr><tr><td></td><td></td><td></td><td></td><td></td></tr></table>	Name	File System	Path	Data Mover	CIFS Servers					
Name	File System	Path	Data Mover	CIFS Servers							
6	Logout of Unisphere for VNX and close the browser session.										
7	Logout of Unisphere for VMAX and close the browser session to go back to your Student Desktop.										
8	Try mounting the CIFS share that created to your Student Desktop. CIFS Server Interface IP (from step 3): _____ CIFS Share Name: (from Step 5): _____ CIFS Server Credentials:(from instructor) _____ Start > Run > \\<CIFS Interface IP>\<CIFS Share Name> Copy some files to the CIFS share.										

End of Lab Exercise

