

XtremIO Management Lab Guide

March 2015

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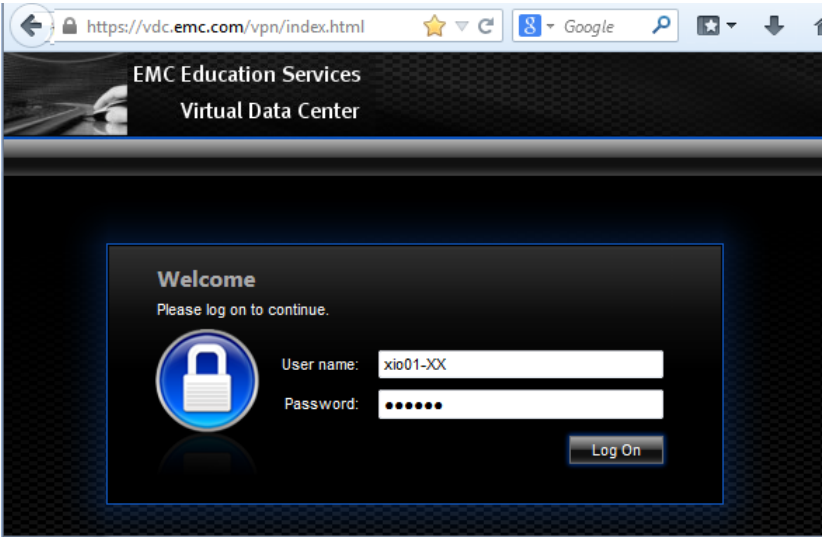
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Lab Exercise: Getting Started

Purpose:	In order to complete the lab exercises in this guide, there are pre-requisite tasks that must be completed. You must be able to connect to the remote equipment being presented and obtain product documentation. The product documentation you obtain will be referenced throughout this course. Note: the written instructions may differ slightly from the screenshots. Screenshots are present for guidance, but the written instructions should be followed.
Tasks:	Connect to the VDC for equipment access Verify supporting system connectivity Download XtremIO product documentation
References:	Student handout Various resources listed in the exercise obtained from support.emc.com

Lab: Part 1 – Connect to the VDC

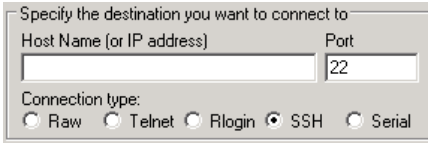
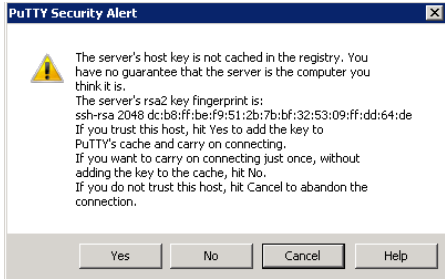
Step	Action
1	Open a web browser and connect to the EMC VDC. • Using the system that you will use in this course to connect to the lab equipment, open a Web Browser ○ Note: Browser vendor and version can impact your ability to connect the EMC VDC. If you have any questions or concerns direct them to your instructor for guidance • Enter the EMC VDC URL as provided in the student handout.  A screenshot of a web browser displaying the EMC VDC login page. The browser's address bar shows the URL 'https://vdc.emc.com/vpn/index.html'. The page header reads 'EMC Education Services Virtual Data Center'. The main content area features a 'Welcome' message, the instruction 'Please log on to continue.', and a login form. The form includes a 'User name' field with the text 'xio01-XX', a 'Password' field with masked characters, and a 'Log On' button. A blue padlock icon is positioned to the left of the login fields.

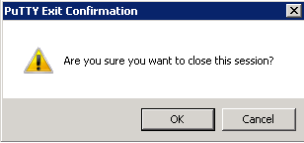
Step	Action
2	Connect to your management system. Select the icon that will provide access to your system as listed in the student handout. Note: If the client does not load, and you are prompted to download a file, the Citrix Receiver has not been installed. You must download and install the Citrix Receiver before you proceed. Ask your instructor if you require assistance.
3	Log in to your management host if prompted for credentials. - Select Use another account - Enter the User name and Password for the management host as provided in the student handout. - Click OK.

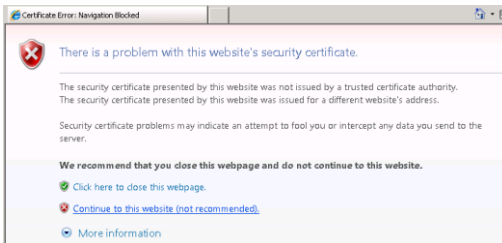
Lab: Part 2 – Document Examination

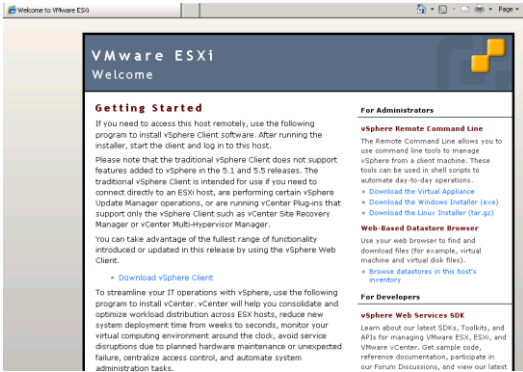
Step	Action
Note	The documents that you will download can be either on the VDC system or another location of your choosing (laptop). You may have to reference these documents in this course in future lab exercises. In the field always check for updates as they may contain important changes and procedures.
1	Open the folder that contains the XtremIO documents. • Double click the XtremIO_Class icon on your VDC desktop  • Double click the XtremIO shortcut  • Open the CopyMeLocal folder.
2	Create a local copy of the documents. • Right click the desktop and select New Folder. • Name the folder XtremIO_Files. • Copy all the files from the CopyMeLocal to the XtremIO_Files folder.
3	Examine the XtremIO 3.0 Storage Array Operations-Guide. • Open XtremIO-3.0-Storage-Array-Operations-Guide • Inspect the table of contents.
4	Examine the XtremIO 3.0 Storage Array User Guide. • Open the XtremIO 3.0 Storage Array User Guide. • Inspect the table of contents.
5	Examine the XtremIO 3.0 Storage Array Pre-Installation Checklist. • Open the XtremIO 3.0 Storage Array Pre-Installation Checklist. • Inspect the table of contents.
6	Examine the XtremIO 3.0 Storage Array Site Preparation Guide. • Open the XtremIO 3.0 Storage Array Site Preparation Guide. • Inspect the table of contents.

Lab: Part 3 – System Connectivity Test

Step	Action
Note	This part of the lab is intended to confirm that the lab's components are online and functional. You will not be asked to perform any configuration steps at this time.
1	Open the PuTTY application Locate the PuTTY icon  on your management host desktop and open the application.
2	Verify your ability to connect to Storage Controller 1. - Inside the Host Name dialog box, place the IP address of Storage Controller 1 (SC1) as provided in your student handout. - Ensure SSH is selected and click Open.  Note: If you are familiar with PuTTY as an application you may choose to “Save Session” as you will be connecting to the resource in the future.
3	Address the security alert. As you are connecting to this Storage Controller for the first time, you will be prompted with a Security Alert, click Yes to continue. 

Step	Action
4	Close the PuTTY session • <u>Do not</u> login to the Storage Controller; click the “X” in the upper right hand side to close the PuTTY session. • Click OK in the PuTTY exit confirmation dialogue box to end the session.  Important Note: If you were <u>unable</u> to connect to this lab system, contact your instructor so that he/she can address the situation as soon as possible.
5	Verify your ability to connect to Storage Controller 2. • Inside the Host Name dialog box place the IP address of Storage Controller 2 (SC2) as provided in your student handout. • Ensure SSH is selected and click Open. Note: If you are familiar with PuTTY as an application you may choose to “Save Session” as you will be connecting to the resource in the future.
6	Address the security alert. • As you are connecting to this Storage Controller for the first time, you will be prompted with a Security Alert; click Yes to continue.
7	Close the PuTTY session. • <u>Do not</u> login to the Storage Controller; click the “X” in the upper right hand side to close the PuTTY session. • Click OK in the PuTTY exit confirmation dialogue box to end the session. Important Note: If you were <u>unable</u> to connect to this lab system, contact your instructor so that he/she can address the situation as soon as possible.

Step	Action
8	Verify your ability to connect the XMS. - Inside the Host Name dialog box, place the IP address of the XtremIO Management Server (XMS) as provided in your student handout. - Ensure SSH is selected and click Open. Note: If you are familiar with PuTTY as an application you may choose to “Save Session” as you will be connecting to the resource in the future.
9	Address the security alert. As you are connecting to this Storage Controller for the first time, you will be prompted with a Security Alert; click Yes to continue.
10	Close the PuTTY session. Do not login to the XMS and click the “X” in the upper right hand side to close the PuTTY session. - Click OK in the PuTTY exit confirmation dialogue box to end the session. Important Note: If you were unable to connect to this lab system, contact your instructor so that he/she can address the situation as soon as possible.
11	Verify your ability to connect the ESXi host. Open Internet Explorer and place the IP address of your ESXi system as provided in the student handout. Press Enter.
12	Address the certificate error. Click “Continue to the website (not recommended)”. 

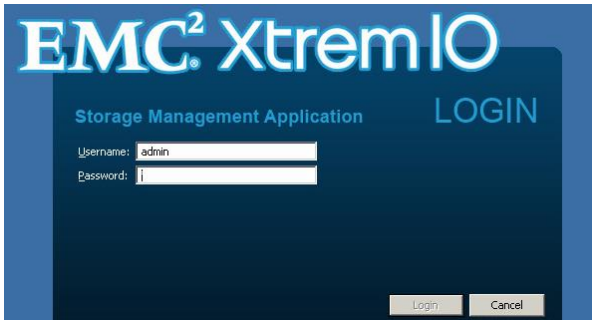
Step	Action
13	Confirm the vSphere Welcome pages load. Confirm your web browser is similar to the image below.  Important Note: If you were <u>unable</u> to connect to this lab system, contact your instructor so that he/she can address the situation as soon as possible.
14	Close the web browser. Click the “X” in the upper right hand side to close the browser session.

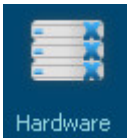
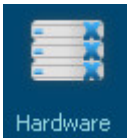
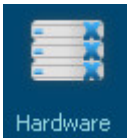
End of Lab Exercise

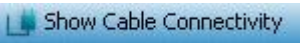
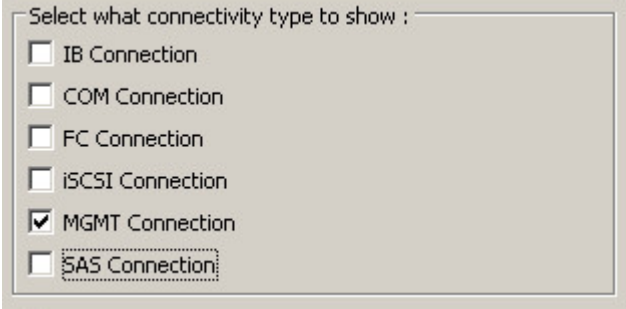
Lab Exercise: XMS Management with the GUI

Purpose:	In order to interact with the XtremIO graphical user interface, an operator must have situational awareness. This lab will walk you through the tabs provided by the interface and some sub-components. This is an exploratory exercise with little configuration, where you will record important information. Future lab exercises will require you to navigate to the locations discussed in this lab.
Tasks:	Connect to the XMS GUI Explore and record information
References:	docu52291_XtremIO-3.0-Storage-Array-User-Guide.pdf

Lab: Part 1 – XMS Login and System Verification

Step	Action
1	Open a web browser and connect to your XMS IP. • Open Internet Explorer. • Place the IP address of the XMS as provided in the student handout in the address bar. • Click the Launch button when your browser resembles the image below.  • If your browser generates any security warnings, accept them. 
2	Log in to your XMS system. • Log in to the XMS server with the username of <code>admin</code> • Use the password listed in the student handout. • Click Login. 

Step	Action		
3	Status bar familiarization Using the screen output, examine the bottom of the dashboard interface and record the following information: Q: What is the status of the XMS GUI? _____ Q: What is the system name of the X-Brick cluster? _____ Q: Which user is currently logged in to the session? _____		
4	Workspace familiarization Note: Because you are connecting to an unused XtremIO storage array, there are no data metrics to be obtained at this time. Note the four areas in the Dashboard workspace Q: Deduplication Ratio is located in which workspace? _____ Q: IOPS is located in which workspace? _____		
5	Obtain XMS hardware information. Proceed to the hardware tab by using one of the methods listed below. <table border="1"> <tr> <td> Click the X-Brick cluster icon in the hardware workspace.  </td><td> Click the Hardware button on the Menu bar.  </td></tr> </table>	Click the X-Brick cluster icon in the hardware workspace. 	Click the Hardware button on the Menu bar. 
Click the X-Brick cluster icon in the hardware workspace. 	Click the Hardware button on the Menu bar. 		
6	Use the XMS GUI to verify health status. Using the screen output answer the following: Hint: Moving the mouse cursor over objects and waiting will produce a tool tip pop-up that will provide additional detail. Q: What is the status of the Data Protection Group? _____ Q: What is the life cycle status of X1-SC1-LocalDisk1? _____ Q: What is the endurance of the 5th drive (going left to right)? _____		

Step	Action
7	Examine XtremIO hardware cable status of the management LAN. - Click the Show Back icon located in the X-Brick workspace  - Click the Show Cable Connectivity icon which is now visible  - Click the Customize View icon  - Inside the area which allows you to select what connectivity type to show, modify the view so that only the MGMT connection is selected.  - Click Keep Changes. - Using the screen output, answer the following: Q: What is the IP address of the X1-SC1-MGMT port? _____ Q: What is the state of the X1-SC1-MGMT port? _____
8	Examine X-Brick properties - Click on the X-Brick Properties icon  - Using the screen output answer the following: Question: Which BBU is the lower Storage Controller connected to? _____ Question: What is the name of the Data Protection Group? _____ - Click OK or the  in the upper right hand corner to close the X-Brick properties window.

End of Lab Exercise

Lab Exercise: XMS Management with the CLI

Purpose:	The XtremIO X-Brick can be managed by the command line interface. The lab will introduce you to some basic commands which you can use to obtain information and configure the XMS.
Tasks:	Connect to the XMS via PuTTY Issue command and examine output
References:	docu52291_XtremIO-3.0-Storage-Array-User-Guide.pdf

Lab: Part 1 – XMS Management with the CLI

Step	Action
Note	This lab assumes you are connected to the VDC environment. If you are not, refer to an earlier lab that walks you through this process.
1	Open the application PuTTY. • Locate the PuTTY shortcut inside the XtremIO_Class folder on your VDC desktop. • Open (double click) the icon.
2	Provide PuTTY with the required information to connect to the XMS system controller. • In the field labeled Host Name enter the IP address of your XMS system as provided in the student handout. • Ensure the connectivity type is set to SSH. • Click Open. Note: As you will be returning to this XMS in future exercises, it is recommended that you save your session information.
3	Log in to your XMS system. • Enter the username <code>xmsadmin</code> • Enter the password as provided in the student handout. • Enter the username <code>admin</code> • Enter the password as provided in the student handout.
4	Display all the <code>show</code> commands. • Type <code>show-</code> and push the Tab key twice. • Push the space bar to scroll through all the available show related commands. Note: You can press q anytime during the output session to quit of the session.

Step	Action
5	Display all the <code>show-clusters</code> commands. - Type <code>show-clusters</code> and push the Tab key twice. - Push the space bar to scroll through all the available show related commands. Q: How many different types of <code>show-clusters</code> commands are listed? _____
6	Ask the CLI for help with a command. Type <code>help show-clusters</code> and press the Enter key. Q: What are the two values that can be defined with this command? _____, _____ Q: Are they required values? _____
7	Perform CLI commands and examine output. Type <code>show-clusters</code> and press the Enter key. Q: What is the cluster name? _____ Q: What is the state of the cluster? _____ Q: How much space is available (SSD-Space)? _____
8	Perform CLI commands and examine output. Type <code>show-clusters-info</code> and press the Enter key. Q: What is the cluster name? _____ Q: What is the software version? _____

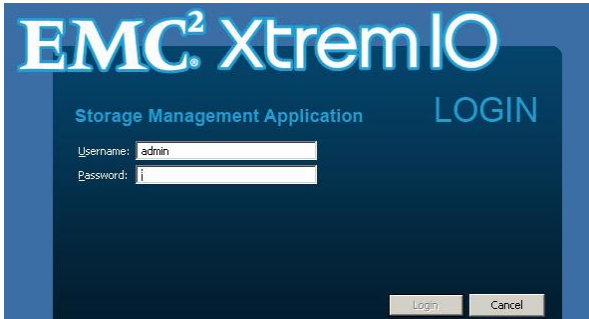
Step	Action
9	Run through some more show commands to determine X-Brick Cluster status. • Type <code>show-storage-controllers</code> and press the enter key Q: What are the two storage controller names? _____, • Type <code>show-storage-controllers-info</code> and press the Enter key. Q: What is the software version of the two storage controllers? _____ • Type <code>show-bbus</code> and press the Enter key. Q: What is the state of both battery backup units? _____ • Type <code>show-daes</code> and press the Enter key. Q: What is the state of the disk array enclosure? _____

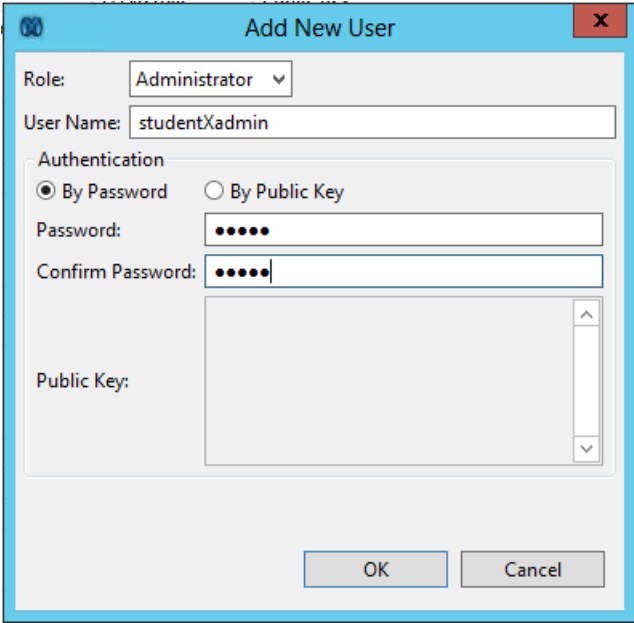
End of Lab Exercise

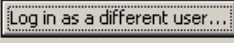
Lab Exercise: XMS User Account Management

Purpose:	User account management is a key task for any system administrator. Perform user account management via the GUI and CLI by creating different users, assigning them different roles, and verifying their privileges.
Tasks:	Create a user account Verify privileges
References:	docu52291_XtremIO-3.0-Storage-Array-User-Guide.pdf

Lab: Part 1 – User Account Creation via GUI

Step	Action
Note	This lab assumes you are connected to the VDC environment. If you are not, refer to an earlier lab that walks you through this process.
1	Log in to your XMS system. - Double-click the XMS application shortcut. - If your browser generates any security warnings, accept them.  - Log in to the XMS server with the username of <code>admin</code> - Use the password listed in the student handout. - Click Login. 
2	Navigate to administration. Click the administration button on the Menu bar.

Step	Action
3	Create an administrator User Account. • Select the Administration icon from the menu bar  • Select the Security tab • Click Users Administration in the left-hand pane. • In the upper right-hand side, click Add. • Select Administrator from the role pull-down menu. • Enter a username of <code>studentXadmin</code> (where X is your student number). • Select Authentication By Password. • Enter a password which is identical to the username. • Confirm the password by typing in the username again. 
4	Confirm your identity in the XMS GUI. • Using the screen output, navigate to the bottom right-hand side of the interface record the following piece of information: Q: Which user currently active on XMS GUI? _____

Step	Action
5	Log in as a different user. Click the Log in as a different user button which is located at the bottom of the XMS GUI interface. 
6	Provide user authentication. - Enter the username <code>studentXadmin</code> (where X is your student number). - Enter the password which is identical to the username.
7	Confirm identity change. Using the screen output, navigate to the bottom right-hand side of the interface record the following piece of information: Q: Which user is currently active on XMS GUI? _____
8	Confirm account functionality. Click each of the menu bar icons and confirm there is no change in the user experience.
9	Create a read-only user account. - In the upper right-hand side click Add. - Select Read-Only from the role pull-down menu. - Enter a username of <code>studentXro</code> (where X is your student number). - Enter a password which is identical to the username. - Confirm the password by typing in the username again.
10	Log in as a different user. - Click the Log in as a different user button which is located at the bottom of the XMS GUI interface. - Log in as the read-only user created in the previous step.

Step	Action
11	Confirm the identity change. Using the screen output, navigate to the bottom right-hand side of the interface record the following piece of information: Q: Which user is currently active on XMS GUI? _____
12	Define the read-only user abilities in the XMS GUI. - Navigate to the Configuration menu bar. - Confirm that the Add, Delete, and Unselect icons are grayed out. - Navigate to the Alerts & Event menu bar. - Right click any alert, note that the Acknowledge Alert and Edit Alert Definition are grayed out. - Navigate to the Administration menu bar. - Confirm that only the user account listed is your read-only account. - Confirm that Add, Edit, and Remove are grayed out.
13	Log out of the XMS GUI. Close the browser window to end the XMS GUI session.

End of Lab Exercise

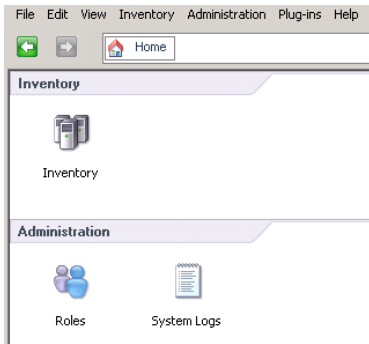
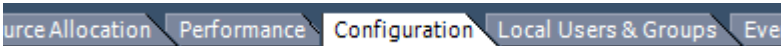
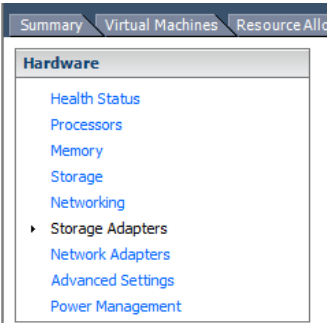
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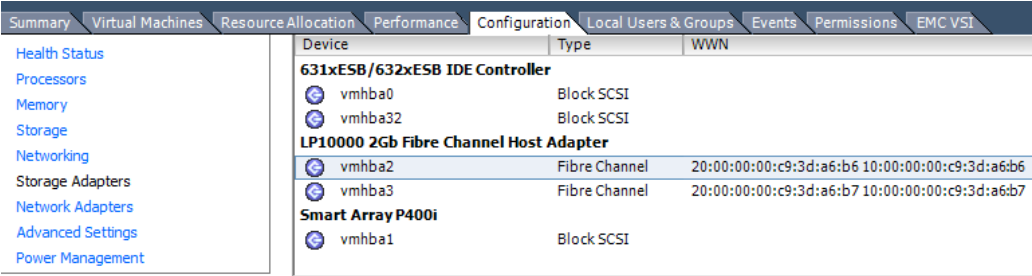
Lab Exercise: XtremIO Storage Provisioning

Purpose:	Successful presentation of storage from an XtremIO X-Brick to an operating system consists of several tasks that need to be performed. This lab will guide you through the required operations needed to create an XtremIO LUN and present it to an existing host.
Tasks:	Discover connected equipment Create a volume Create an Initiator Group Map a volume to an initiator Group
References:	docu52291_XtremIO-3.0-Storage-Array-User-Guide.pdf

Lab: Part 1 – Fibre Channel Connectivity Verification

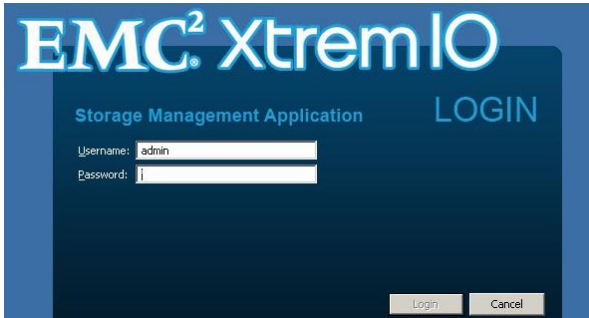
Step	Action
Note	This lab assumes you <u>are connected</u> to the VDC environment. If you are not, refer to an earlier lab that walks you through this process.
1	Log in to you ESXi host. • Open the vSphere client (link is inside the XtremIO_Class folder). • Enter your ESXi IP address as provided in the student handout. • Enter the user name as provided in the student handout. • Enter the password as provide in the student handout. • Click Login. • You will receive a warning message that this ESXi host is being managed by a vCenter server. It is expected; click OK to continue.

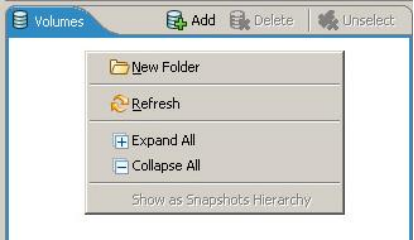
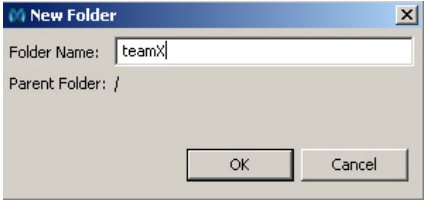
Step	Action
2	Locate the WWN of the ESXi Fibre Channel adapter. - If you are presented with the screen shot below, click the Inventory icon. If not, proceed to the next step.  - Click your ESXi host in the left-hand pane and ensure it is highlighted. - Click the Configuration tab.  - Click Storage Adapters. 

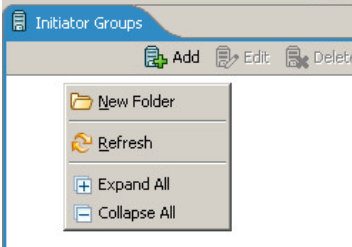
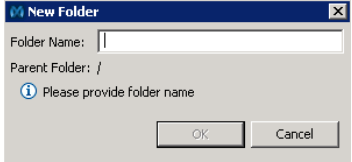
Step	Action
3	Record the WWN information. - In the Storage Adapters dialogue box (directly to the right) locate and record the two WWNs. 1st Fibre Channel Host Adapter : ____:____ 2nd Fibre Channel Host Adapter : ____:____  Note: We only record the last two pairs of hexadecimal characters of the WWN for simplicity. In the field it is best to record the full WWNN and WWPN and validate the entire value.
4	Open the application PuTTY. - Locate the PuTTY shortcut inside the XtremIO_Class folder on your VDC desktop. - Open (double click) the icon.
5	Confirm that the XtremIO storage array that the ESXi has a path to is the correct storage device. - In the field labeled Host Name enter the IP address of your XMS system as provided in the student handout. - Ensure the connective type is set to SSH. - Click Open.
6	Log in to your XMS system. - Enter the username <code>xmsadmin</code> - Enter the password as provided in the student handout. - Enter the username <code>admin</code> - Enter the password as provided in the student handout.

Step	Action
7	Run the <code>show-targets</code> commands to determine the X-Brick Cluster WWNs. - Type <code>show-targets</code> and press the Enter key. Record the Port Address WWNs for the cluster. X1-SC1-fc1 : ____:____ X1-SC1-fc2 : ____:____ X1-SC2-fc1 : ____:____ X1-SC2-fc2 : ____:____ Exit the XMS CLI.
Note	The reason you collected the WWN information is that you may have to provide it to the end user so that they may configure zoning. The provisioning process cannot start until both sides are visible. The zoning in this class has been performed for you. <pre> graph TD subgraph Hosts direction TB subgraph ESXi_Host [ESXi Host] VMHBA1[VMHBA-1 : ____:____] VMHBA2[VMHBA-2 : ____:____] end subgraph XtremIO [XtremIO Storage Array] SC1f1[X1-SC1-fc1 : ____:____] SC1f2[X1-SC1-fc2 : ____:____] SC2f1[X1-SC2-fc1 : ____:____] SC2f2[X1-SC2-fc2 : ____:____] end end ESXi_Host --> FCS[Fibre Channel Switch] XtremIO --> FCS subgraph FCS_Box [Fibre Channel Switch] FCS_Text[This information is need to create/configure zoning] end </pre> The diagram illustrates the process of collecting WWN information for zoning configuration. It shows two boxes at the top: 'ESXi Host' and 'XtremIO Storage Array'. The ESXi Host box contains 'VMHBA-1 : ____:____' and 'VMHBA-2 : ____:____'. The XtremIO Storage Array box contains 'X1-SC1-fc1 : ____:____', 'X1-SC1-fc2 : ____:____', 'X1-SC2-fc1 : ____:____', and 'X1-SC2-fc2 : ____:____'. Two large downward-pointing arrows connect these two boxes to a central box labeled 'Fibre Channel Switch'. Inside the 'Fibre Channel Switch' box, it states 'This information is need to create/configure zoning'.

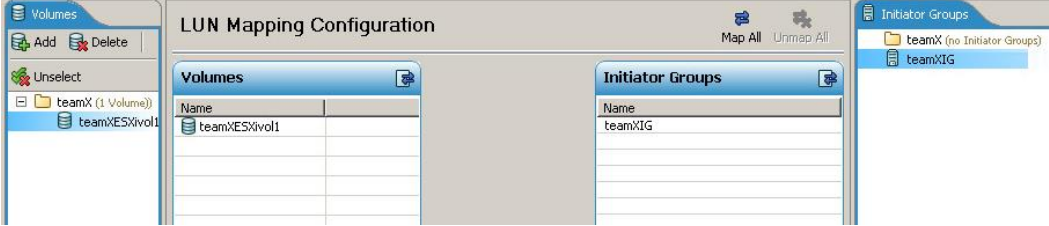
Lab: Part 2 – Volume Presentation to an ESXi Host

Step	Action
Note	You are sharing the XtremIO storage array with other students. It is important that you create and manipulate <u>only your objects</u> .
1	Log in to your XMS system. - Double-click the XMS application shortcut. - If your browser generates any security warnings, accept them.  - Log in to the XMS server with the username of <code>admin</code> - Use the password listed in the student handout. - Click Login. 
2	Navigate to the configuration section of the XMS GUI. Click the  icon on the menu bar.

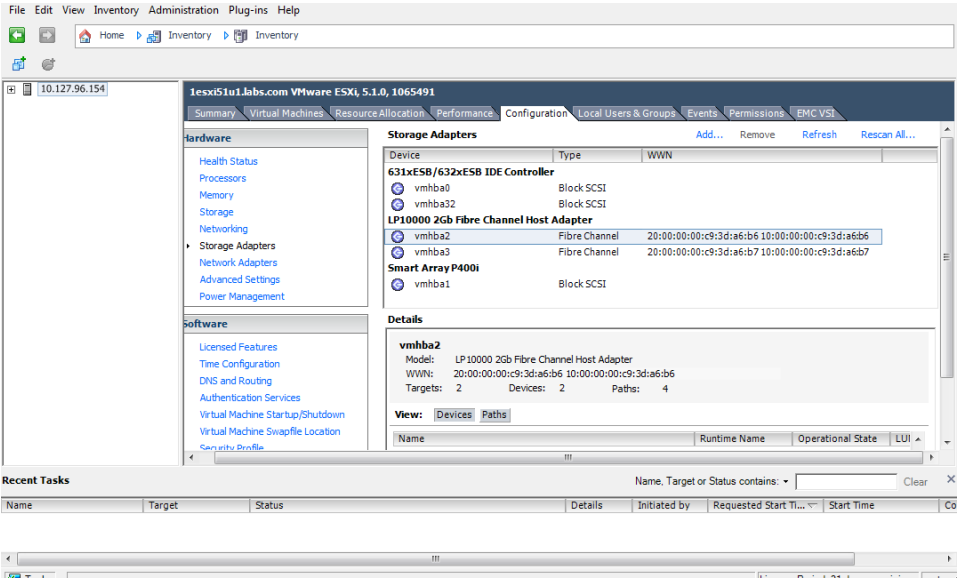
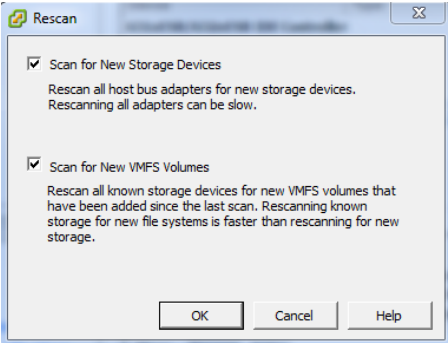
Step	Action
3	Create a volume folder with your student name. - Right click in the Volumes section and select New Folder.  - Enter the value studentX (where X is your student number).  - Click OK.
4	Create an XtremIO storage volume. - In the Volumes section, click the Add icon . - Inside the Add New Volumes pop-up, enter the following values: - Name: studentXESXiVol1 (where X is your student number) - Size: 100GB - Volume Type: Normal - Click Next (not Finish). Note: If you click Finish, the volume will be placed at the root level. You must then click and drag the object to the proper location. - Select the folder you created in an earlier step. - Click Finish.

Step	Action
5	Create an initiator group folder with your student name. - In the right hand pane, right click in the Initiator Groups section and select New Folder.  - Enter the value studentX (where X is your student number).  - Click OK.

Step	Action
6	Create an initiator group. • In the Initiator Group section, click the Add icon  • Inside the Add New Initiator Group pop-up, enter the following values: ○ Initiator Group Name: studentXIG ○ Click Add (right side) ▪ Initiator Name: studentXESXiHBA0 ▪ Initiator Port Address: Select the 1st ESXi WWN value you recorded earlier ▪ Click OK. ○ Click Add (for the second time) ▪ Initiator Name: studentXESXiHBA1 ▪ Initiator Port Address: Select the 2st ESXi WWN value you recorded earlier ○ Click OK. ○ Click Next (not Finish). Note: If you click Finish, the Initiator Group will be placed at the root level. You must then click and drag the object to the proper location. ○ Select the folder you created in an earlier step. • Click Finish.

Step	Action
7	Select both your volume and initiator group and map them together. - Click your Volume on the left side (not the folder - expand the folder if required) so that it is highlighted. - Click your Initiator Group on the right side (not the folder – expand the folder if required) so that it is highlighted. - Examine the output. It should be similar to the image below.   Map All - Click the Map All button - Inside the Volumes pane, <u>adjust the LUN value to X1</u> (where X is your student number). Example: Student 3 would configure LUN31. <u>Do not use LUN0.</u> - Click Apply (at bottom).
8	Return to the XMS Dashboard. Click the Dashboard icon.
9	Minimize the XMS GUI. Minimize the XMS GUI.

Lab: Part 3 – Utilize Presented Storage on an ESXi Host

Step	Action
1	Restore your vSphere Client connection to your ESXi host. • Restore your vSphere Client view to your ESXi host or invoke another session if you have closed it.
2	Navigate to the proper location. • Ensure you are viewing the ESXi host Configuration tab, with the storage adapters selected in the hardware sub-pane. It should look similar to the image below. 
3	Refresh the storage adapters. • Click the Rescan All button Rescan All... (upper right). • You will see the following dialog box; click OK. 

Step	Action
4	Verify device discovery for the first ESXi HBA. • In the Storage Adapters pane, click your 1st Fibre Channel HBA. • In the Details pane, click the Devices button. • Confirm you see LUN X1 (where X is your student number). Note: If you do not see your LUN, notify your instructor.
5	Verify device discovery for the second ESXi HBA. • In the Storage Adapters pane, click your 2st Fibre Channel HBA. • In the Details pane, click the Devices button. • Confirm you see LUN X1 (where X is your student number). Note: If you do not see your LUN, notify your instructor.
6	Create a VMware Datastore on the newly created volume. • Inside the Configuration tab, select Storage in the hardware pane. The screenshot shows the 'Hardware' pane in VMware vSphere. The 'Storage' option is selected and expanded, showing a list of storage-related components: Health Status, Processors, Memory, Storage (selected), Networking, Storage Adapters, Network Adapters, Advanced Settings, and Power Management. • Click Add Storage Add Storage... (upper right). • In the add storage wizard, select the following: ○ Select Storage type: Select Disk/LUN, click Next ○ Select Disk/LUN: Click on your volume, click Next ○ File System Version: Select VMFS-5, click Next ○ Current Disk Layout: Click Next ○ Properties (datastore name): Enter the value studentXESXiVol1, click Next ○ Disk/LUN - Formatting: Leave the default value which is Maximum available space, click Next ○ Ready to Complete: Click Finish

Step	Action
7	Verify datastore creation. - You should now see the studentXESXiVol1 datastore inside the datastores pane. - View the details listed in the datastore details pane. - Confirm it matches what you had presented.

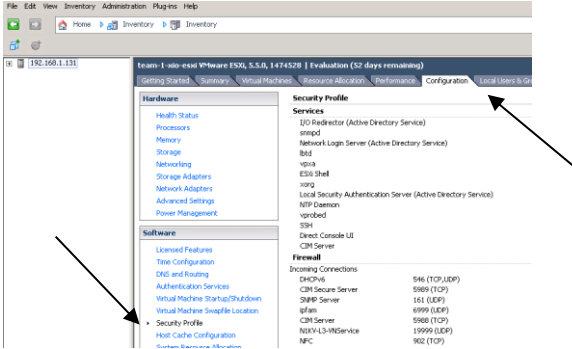
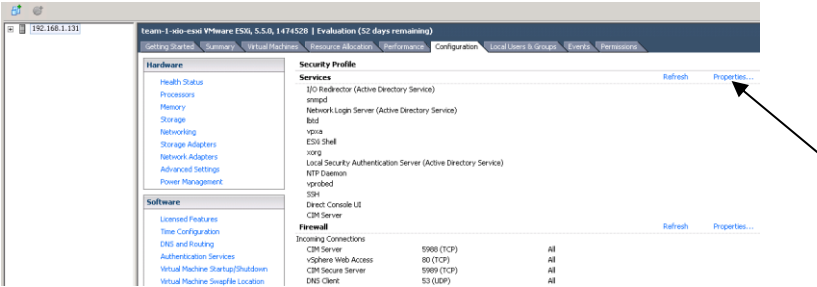
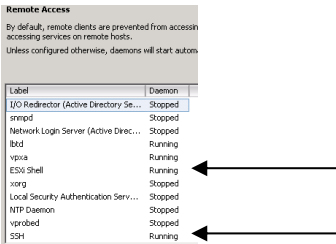
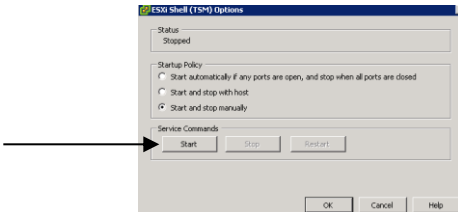
End of Lab Exercise

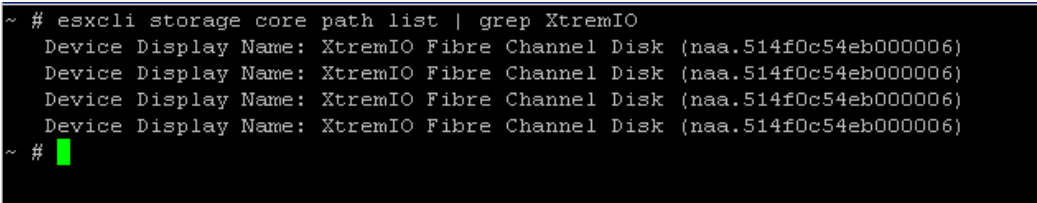
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Lab Exercise: XtremIO VMware ESXi Host Configuration

Purpose:	An XtremIO volume can be presented to an ESXi and, while functional, it is not optimal. This lab guides you through the additional optional steps that can be performed or validated to ensure high performance.
Tasks:	Adjust VMware Advanced settings
References:	docu52291_XtremIO-3.0-Storage-Array-User-Guide.pdf

Lab: Part 1 – Enable SSH and Adjust Advanced Settings

Step	Action
Note	This lab assumes you are connected to the VDC environment. If you are not, refer to an earlier lab that walks you through this process.
Note	Enable SSH access on your ESXi host. - Click your ESXi host -> Configuration tab -> Security Profile  - Click Security Profile Properties  - Record the state of the ESXi Shell and SSH  - If either ESXi Shell and/or SSH are not running, select each service and click Options  - Click Start; note that the status will change from stopped to running. - Click OK to close the service options dialogue box. - Click OK to close the Services Properties dialogue box.

Step	Action
1	Connect to your ESXi host via SSH. Open an SSH session via PuTTY to the ESXi host using the credentials provided in the student handout.
2	Run the following command to set the SchedQuantum parameter. <code>esxcfg-advcfg -s 64 /Disk/SchedQuantum</code>
3	Run the following command to set the DiskMaxIOSize parameter. <code>esxcfg-advcfg -s 4096 /Disk/DiskMaxIOSize</code>
4	Run the following command to obtain the NAA for XtremIO LUNs presented to the ESX host and locate the NAA of the XtremIO volume. <code>esxcli storage core path list grep XtremIO</code> - Your output should similar to the image below - Note a single device is presented over 4 paths  <pre> ~ # esxcli storage core path list grep XtremIO Device Display Name: XtremIO Fibre Channel Disk (naa.514f0c54eb000006) Device Display Name: XtremIO Fibre Channel Disk (naa.514f0c54eb000006) Device Display Name: XtremIO Fibre Channel Disk (naa.514f0c54eb000006) Device Display Name: XtremIO Fibre Channel Disk (naa.514f0c54eb000006) ~ # </pre>
5	Run the following command to set SchedNumReqOutstanding for the device to its maximum value (256). Replace xxx with the number you saw in Step 4. <code>esxcli storage core device set -d naa.xxx -O 256</code> - If the command returns with no error, it completed successfully.
6	Navigate to the proper location to confirm that VAAI is enabled on the ESX server: - Launch the vSphere Client and locate the ESXi host - Select the Configuration tab - From the Software section, click Advanced Settings - Select the DataMover section from the left hand pane
7	Verify that the following parameters are enabled (i.e., both are set to "1"): <code>DataMover.HardwareAcceleratedMove</code> <code>DataMover.HardwareAcceleratedInit</code>
8	Navigate to the proper VMFS3 location and confirm it is enabled on the ESXi server: Select the VMFS3 section from the left hand pane.

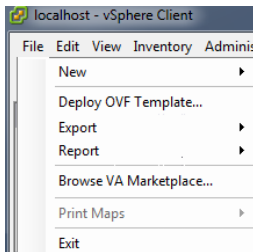
Step	Action
9	Verify that the following parameter is enabled (i.e., set to "1"): • VMFS3.HardwareAcceleratedLocking
10	Clean up • In Advance Setting windows, click Cancel to close the dialogue box.

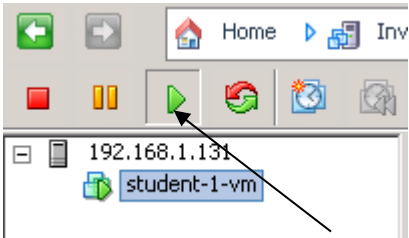
End of Lab Exercise

Lab Exercise: XtremIO Virtual Machine Datastore Workload Test

Purpose:	This lab guides you through process of placing a workload on a VMware virtual machine and monitoring the results.
Tasks:	Deploy a Virtual Machine for testing Use Iometer to create a workload Verify workload statistics
References:	docu52291_XtremIO-3.0-Storage-Array-User-Guide.pdf

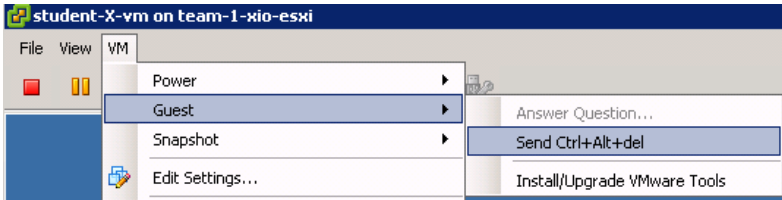
Lab: Part 1 –Deploy a VM on XtremIO Storage

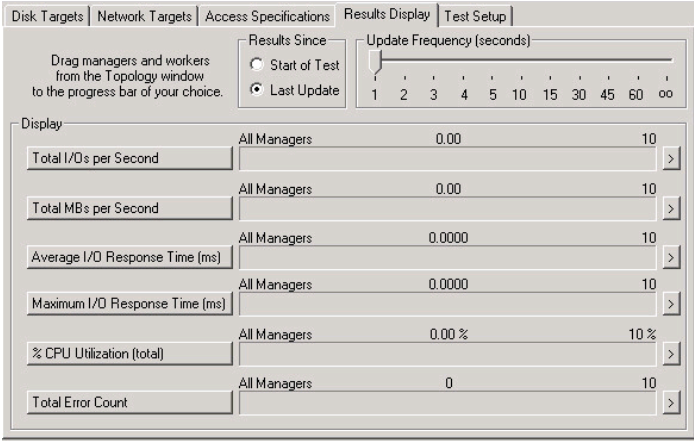
Step	Action
Note	This lab assumes you are connected to the VDC environment. If you are not, refer to an earlier lab that walks you through this process.
1	Open a connection to the ESXi host. • Open the VMware vSphere Client by double-clicking the icon. • Using the student handout for reference, enter the following: ○ ESXi IP address ○ User name ○ Password
2	Deploy the Virtual Machine from a Template. • Using the vSphere Client select File > Deploy OVF Template  The screenshot shows the vSphere Client interface with the 'File' menu open. The 'Deploy OVF Template...' option is highlighted. Other visible options include 'New', 'Export', 'Report', 'Browse VA Marketplace...', 'Print Maps', and 'Exit'.
3	Select the source. • Click the Browse button. • Locate the student-X-vm.ova file inside the XtremIO_Files folder you created on the desktop. • Click Open. • Click Next.
4	Verify OVF Template Details. • Examine the description shown. • Click Next.

Step	Action
5	Name and location - In the Name field, enter student-X-vm, (where <u>X</u> is your student number) (example: student-1-vm) - Click Next.
6	Select XtremIO storage as a destination. - Highlight studentXESXiVol1 (where <u>X</u> is your student number). - Click Next.
7	Disk Format - Select Thick Provision Eager Zero. - Click Next.
8	Ready to Complete. - Verify the installation information. - Leave the “Power on after deployment” unselected. - Click Finish. Note: This process will take a few minutes. Wait until the deployment is complete before proceeding to the next step.
9	Power on your virtual machine. Power on your virtual machine by selecting your VM and clicking the green play button. 
10	Record disk space usage from vSphere Client - Click the Summary tab. - In the Resources Pane (upper right): - Record the Storage volume name: _____ - Record the Used Storage value: _____

Step	Action
11	Open the XMS GUI. • Open the XMS GUI.
12	Record disk space usage for XMS. • Click the configuration tab. • Select the Storage volume you recorded earlier.
13	Examine output. • Examine the Properties (bottom left hand side). • How much space is in use? _____ Q: Do the values differ from an XtremIO and vSphere client perspective? _____

Lab: Part 2 – Run Iometer Workload

Step	Action
1	Navigate to your VM. Open the vSphere Client and select your VM in the left hand pane.
2	Open a console to your VM. Click the open console button 
3	Login to the Windows virtual machine - From the menu bar (top) select VM -> Guest -> Send Ctrl-Alt-Del  - Enter the username and password provided in the student handout.
4	Open Iometer and run a light workload. - Open Iometer and run a light workload by double clicking the xio-light-load.icf file on your VM desktop - Click the Green Flag (center)  to start the workload. - Click Cancel in the Save Results dialog box.

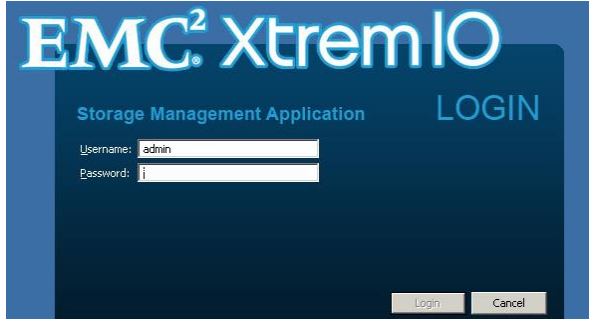
Step	Action
5	Confirm workload is running. - Click the Results Display tab in the Iometer interface. - Adjust the results field to Last Update. - Adjust the Update frequency to 5 seconds. - Record the Total I/O per Second value: _____ 
6	Navigate to XtremIO GUI. - Open your XMS GUI. - Navigate to the Dashboard view.
7	Examine disk usage from XMS GUI. - From the Dashboard inspect the Bandwidth, IOPS, and, Latency tabs. Note: There are many other students performing the same exercise at this time, be sure to identify your volume and initiator group. - Record the IOPS value: _____ Q: Are the values presented from the XMS GUI and Iometer inside the VNM similar? _____
8	Navigate back to your VM and stop the workload. Inside your VM click on the Stop icon 

End of Lab Exercise

Lab Exercise: XtremIO Virtual Machine RDM Workload Test

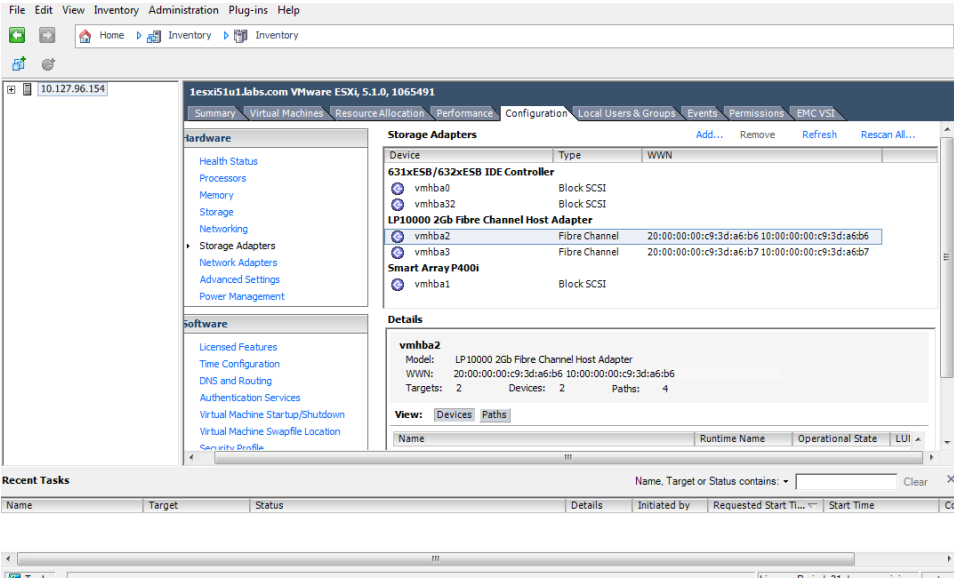
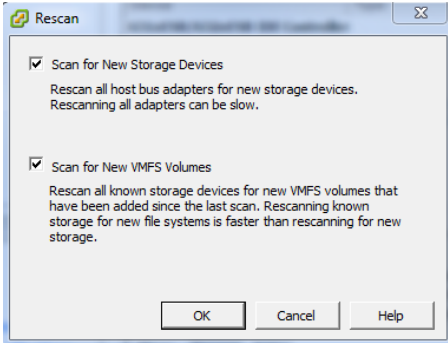
Purpose:	This lab guides you through the process of placing a workload on a VMware virtual machine and monitoring the results.
Tasks:	Create a new LUN on XtremIO Storage Array Map a VM to the new LUN as an RDM Consume the present space from the VM and perform a workload test
References:	docu52291_XtremIO-3.0-Storage-Array-User-Guide.pdf

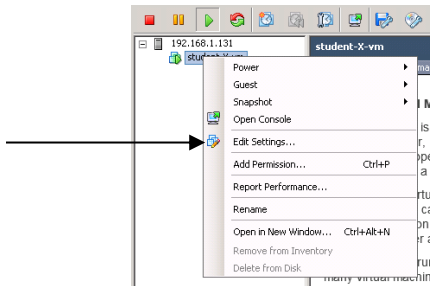
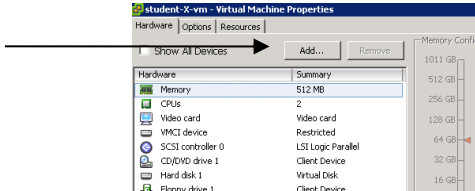
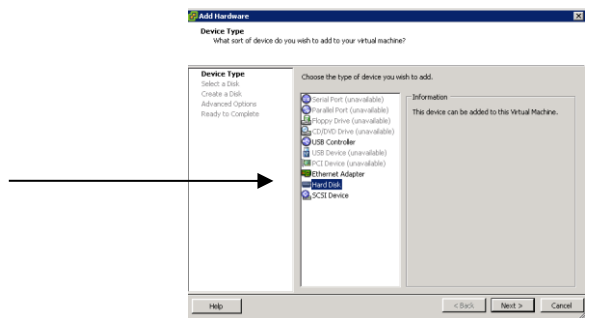
Lab: Part 1 – Create and Map an XtremIO LUN

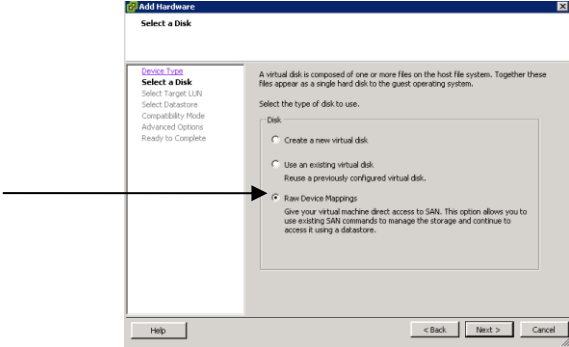
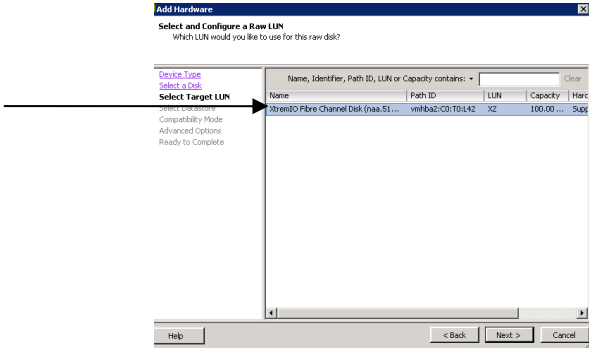
Step	Action
Note	You are sharing the XtremIO storage array with other students. It is important that you create and manipulate <u>only your objects</u> .
1	Open your XMS GUI. 
2	Navigate to the configuration section of the XMS GUI.  Click the Configuration icon on the menu bar.
3	Create an XtremIO storage volume. - In the Volumes section, click the Add icon  Add - Inside the Add New Volumes pop-up, enter the following values: - Name: studentXESXiRDM1 (where X is your student number) - Size: 100G - Volume Type: Normal - Click Next (not Finish) Note: If you click Finish, the volume will be placed at the root level. You must then click and drag the object to the proper location. - Select the folder you created in an earlier step. - Click Finish.

Step	Action
4	Select both your volume and initiator group and map them together - Click your Volume on the left side (not the folder, expand folder if required) so that it is highlighted. - Click your Initiator Group on the left side (not the folder, expand folder if required) so that it is highlighted. - Click the Map All button  - Inside the Volumes pane <u>adjust the LUN value to X2</u> (where X is your student number) - Click Apply (at bottom)
5	Return to the XMS Dashboard. Click the Dashboard icon
6	Minimize the XMS GUI. Minimize the XMS GUI.

Lab: Part 2 – Add an RDM to the Virtual Machine

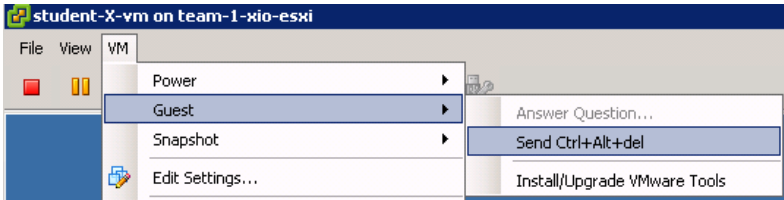
Step	Action
1	Restore your vSphere Client connection to your ESXi host. • Restore your vSphere Client view to your ESXi host or invoke another session if you have closed it.
2	Navigate to the proper location. • Ensure you are viewing the ESXi host Configuration tab, with the storage adapters selected in the hardware sub-pane. It should look similar to the image below. 
3	Refresh the storage adapters. • Click the Rescan All button Rescan All... (upper right) • You will receive the follow dialog box, click OK. 

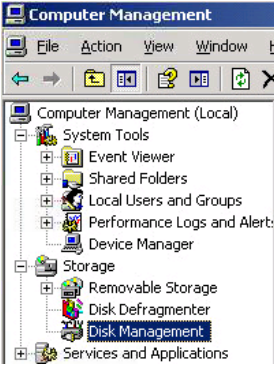
Step	Action
4	Verify device discovery for the newly presented LUN. - In the Details pane (bottom) click the Devices button. - Confirm you see LUN X2 (where X is your student number). Note: If you do not see your LUN, notify your instructor.
5	Add an additional hard disk to your VM. - Right click your VM and select Edit Settings  - Click ADD  - Select the Hard Disk option - Click Next 

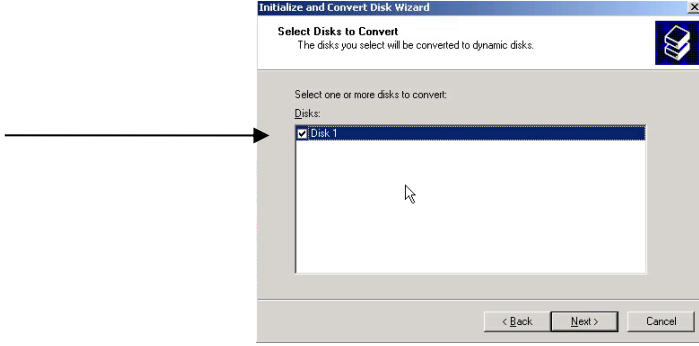
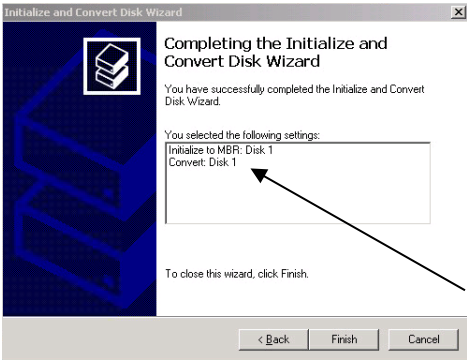
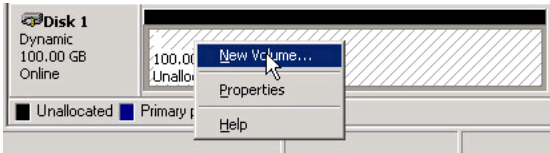
Step	Action
6	Add an RDM. - Select the Raw Device Mapping radio button. - Click Next. 
7	Associate the RDM with the newly created LUN. - Select the LUN with the ID of X2 (where X is your student number). - Click Next. 
8	Choose the datastore that will provide the map to the RDM. - Accept the default radio button, Store with Virtual Machine. - Click Next.
9	Select physical compatibility mode. - Accept the default radio button, Physical. - Click Next.
10	Accept the default virtual device node. Accept the default value, click Next

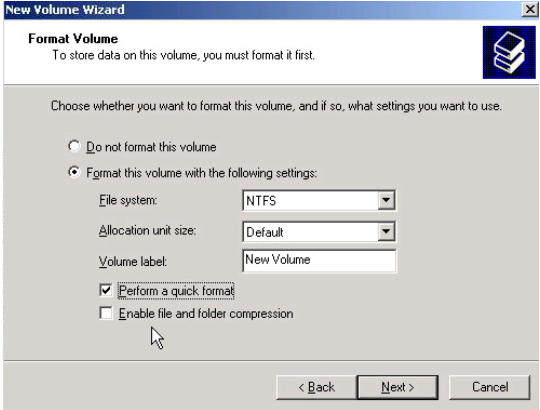
Step	Action
11	Complete the operation. • Examine the summary • Click Finish
12	Close the virtual machine properties dialogue box. • Click OK to close the virtual machine properties dialogue box.

Lab: Part 3 – Format and Run a Workload on the RDM

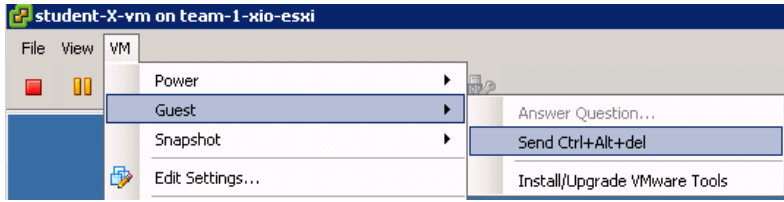
Step	Action
1	Navigate to your vSphere Client. Open the vSphere Client and select your VM in the left hand pane.
2	Open a console to your VM. Click on the open console button 
3	Log in to the Windows virtual machine. - From the menu bar (top) select VM -> Guest -> Send Ctrl-Alt-Del  - Enter the username and password provided in the student handout.

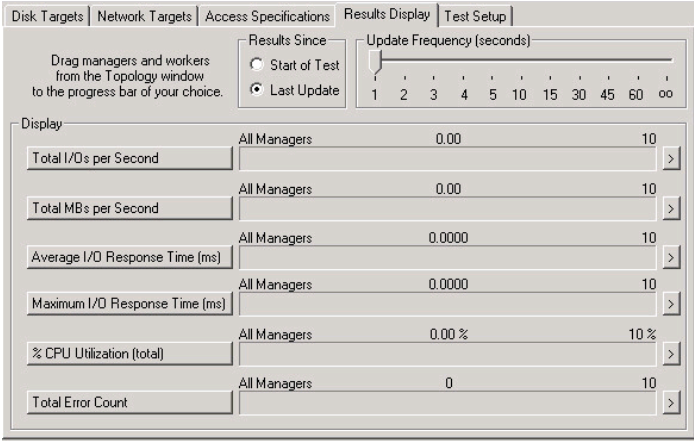
Step	Action
4	Open Windows disk management. - Right click My Computer and select Manage  - Select Disk Management 
5	Initialize and Convert the disk. - You should see the following dialog box, if you do not or you closed it by accident: - Close Computer Management - Perform the previous step  - Click Next.

Step	Action
6	Select the Disk to Initialize Accept the default value and click Next
7	Select disks to convert - Place a check mark in front of Disk 1 - Click Next 
8	Complete the operation. - Confirm that Initialize to MBR: Disk 1 and Convert: Disk 1 are the actions to be performed, - Click Finish. 
9	Select the new volume and format. - Right click on Disk 1 - Select New Volume 

Step	Action
10	Complete the new volume wizard. • Confirm welcome screen ○ Click Next • Select Volume Type ○ Accept the default value and click Next • Select Disks ○ Accept the default value and click Next • Assign Drive Letter or Path ○ Accept the default value and click Next ○ • Format Volume ○ Place a check mark in front of Perform a Quick Format ○ Click Next  • Complete the Wizard ○ Click Finish
11	Close computer management. • Click the X in the upper right hand corner to close Computer Management.

Lab: Part 4 – Present a Workload

Step	Action
1	Navigate to your VM. Open the vSphere Client and select your VM in the left hand pane.
2	Open a console to your VM. Click on the open console button 
3	Log in to the Windows virtual machine. - From the menu bar (top) select VM -> Guest -> Send Ctrl-Alt-Del  - Enter the username and password provided in the student handout.
4	Open Iometer and run a light workload. - Open Iometer and run a light workload by double clicking the xio-light-load.icf file on your VM desktop. - Adjust the Disk Target to select only the new RDM volume. - Click the Green Flag (center)  to start the workload. - Click Cancel in the Save Results dialog box.

Step	Action
5	Confirm workload is running. - Click the Results Display tab in the Iometer interface - Adjust the results field to Last Update - Adjust the Update frequency to 5 seconds - Record the Total I/O per Second value: _____ 
6	Navigate to XtremIO GUI. - Open your XMS GUI - Navigate to the Dashboard view
7	Examine disk usage from XMS GUI. - From the Dashboard inspect the Bandwidth, IOPS, and, Latency tabs Note: There are many other students performing the same exercise at this time, be sure to identify your volume and initiator group. - Record the IOPS value: _____ Q: Are the values presented from the XMS GUI and Iometer inside the VNM similar? _____
8	Navigate back to your VM and stop the workload Inside your VM click on the Stop icon 

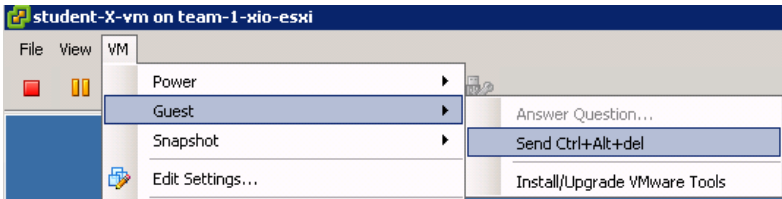
End of Lab Exercise

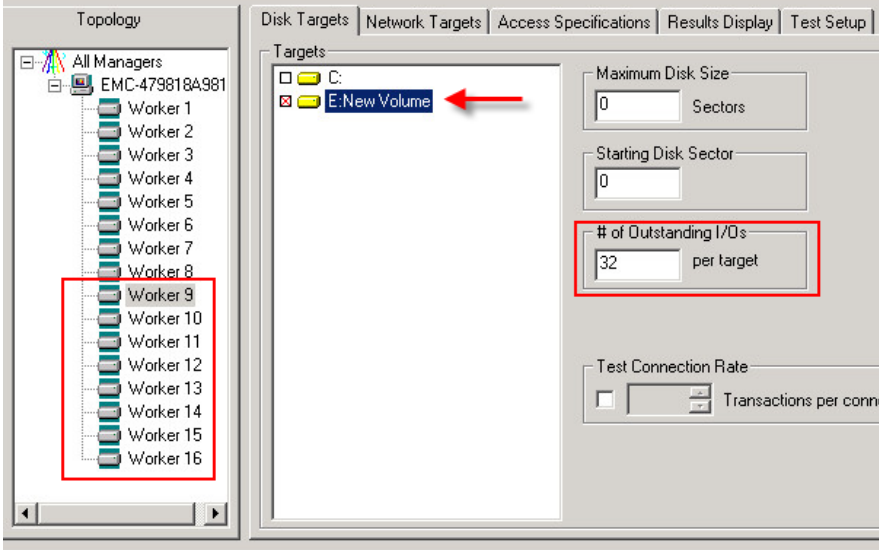
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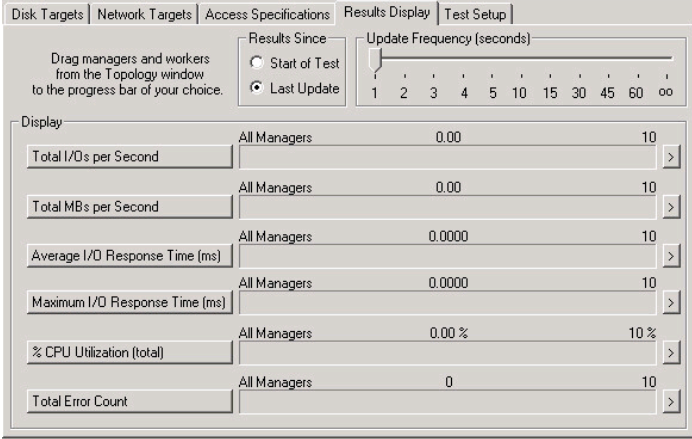
Lab Exercise: XtremIO Advanced Monitoring

Purpose:	This lab exercise guides you through the process of creating graphs and charts to monitor XtremIO workload.
Tasks:	Run a workload on XtremIO volumes Monitor XtremIO volumes and initiators for performance
References:	docu52291_XtremIO-3.0-Storage-Array-User-Guide.pdf

Lab: Part 1 – Run Iometer Workload

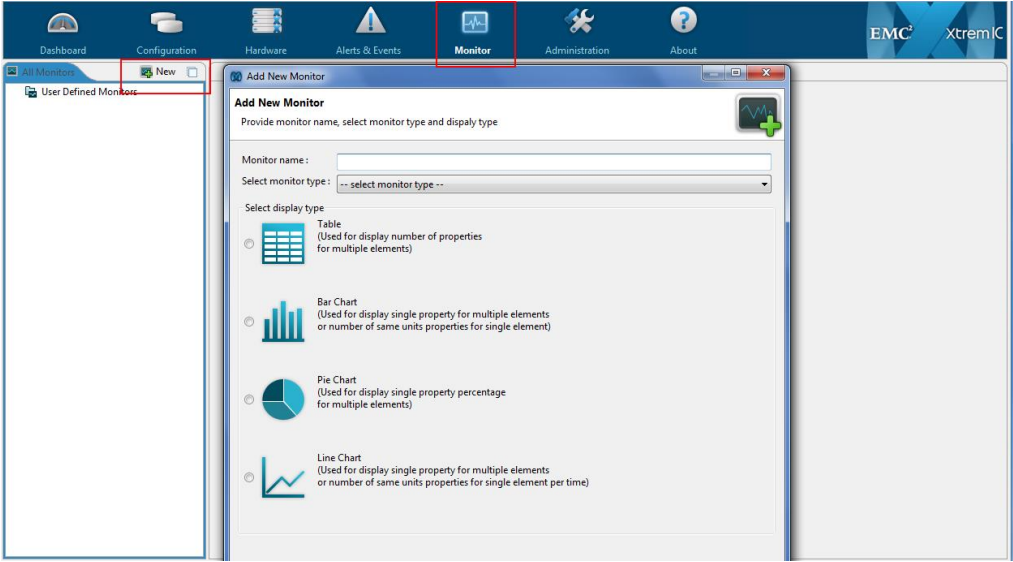
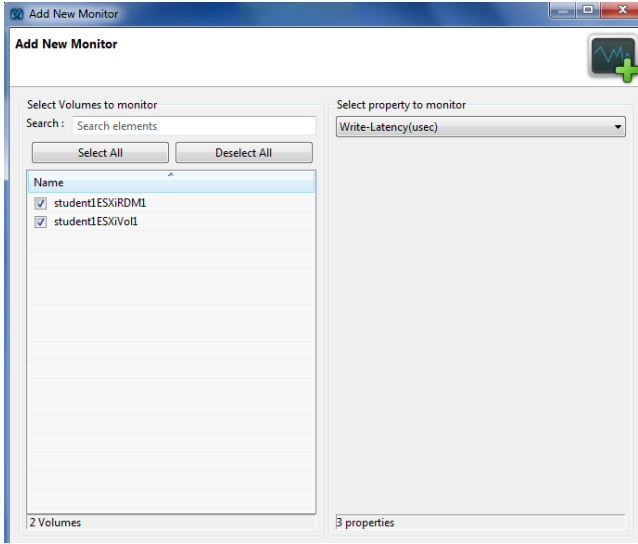
Step	Action
1	Navigate to your VM. Open the vSphere Client and select your VM in the left hand pane
2	Open a console to your VM. Click on the open console button 
3	Log in to the Windows virtual machine. - From the menu bar (top) select VM -> Guest -> Send Ctrl-Alt-Del  - Enter the username and password provided in the student handout.

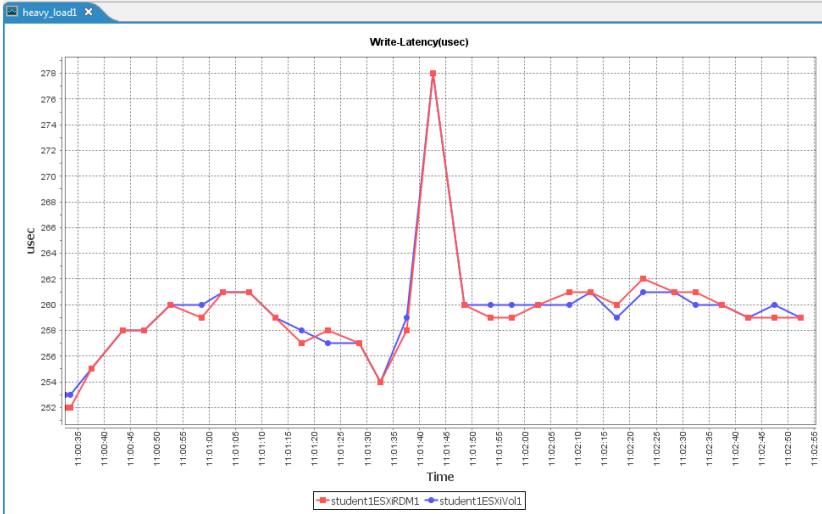
Step	Action
4	Open Iometer and run a heavy workload. • Open Iometer and run a heavy workload by double clicking the xio-heavy-load.icf file on your VM desktop. • Make sure there are 16 workers present and you see Drives C: and E: • Workers 1 through 8 are pointing to drive C: • Select Workers 9 through 16 and point them to drive E: (your RDM volume) • All Workers should have 32 Outstanding I/Os configured  • Click the Green Flag (center)  to start the workload. • Click Cancel in the Save Results dialog box.

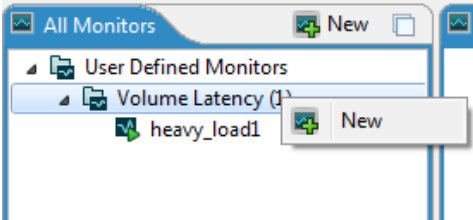
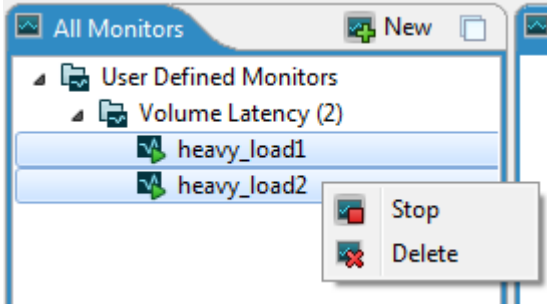
Step	Action
5	Confirm workload is running. - Click the Results Display tab in the Iometer interface. - Adjust the results field to Last Update - Adjust the Update frequency to 5 seconds - Record the Total I/Os per Second value, remember that this value includes both volumes' IOPS: _____ 

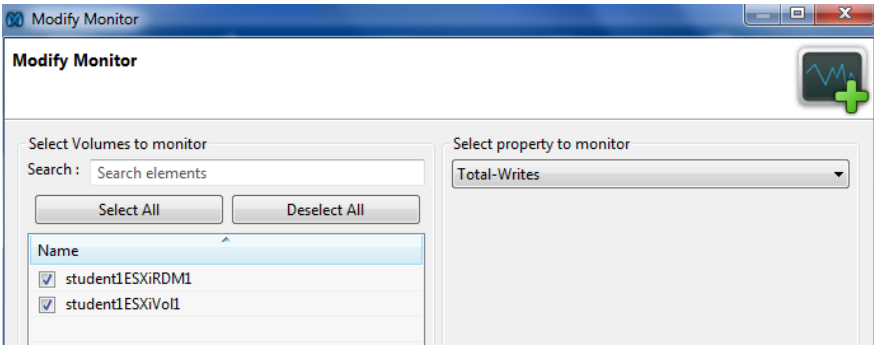
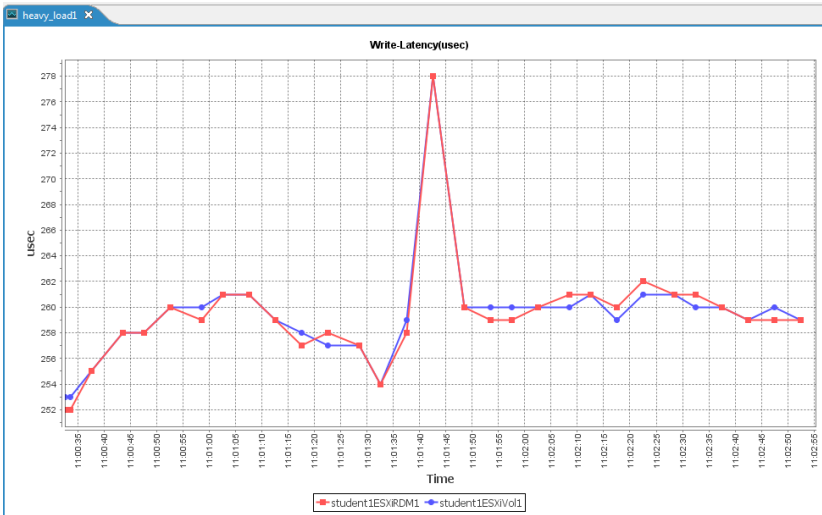
Lab: Part 2 – Monitor Volume and Initiator Performance

Step	Action
Note	You are sharing the XtremIO storage array with other students. It is important that you create and manipulate <u>only your objects</u> .
1	Open your XMS GUI. 
2	Navigate to the monitoring section of the XMS GUI.  Click the  icon on the menu bar.

Step	Action
3	Monitor Volume latency. • Select the New icon in the left-hand panel. • For the Monitor name, enter heavyload1 • Select Volume Latency for the monitor type, and the Line Chart for display type.  • Next, select both of your XIO volumes. Notice that once you select a second volume, the list of properties to monitor turn into a drop down menu, where you can only choose one property. • Select the Write-Latency(usec) property. • Click Next and Finish to generate the graph, wait a few minutes to gather information. 

Step	Action
Note	You should have something similar to the graph below where each line represents a volume. Results may vary. You may modify the graph or save it, by right-clicking the graph.  Q: What is the average Write latency for each volume? _____ _____

Step	Action
4	Add a new Monitor for Volume Latency. - To create a new volume latency monitor, right-click the Volume Latency folder in the left-hand pane and select NEW.  - Name this new monitor heavy_load2 - Select the Line Chart, both of your XIO volumes, and a different property to monitor than the previous time. - Once you have waited a few minutes to populate the graph, right click each Monitor in the left-hand panel and select Stop. 
5	Create a Volume Performance monitor. - Create a new Monitor, but this time, select Volume Performance for the monitor type. - Enter heavy_load3 as the Monitor name and select Table as the display type. - Select your studentxESXiVol1 volume and also select Read-IOPS and Write-IOPS for the properties to monitor and generate the chart. Notice that by selection only one volume, you may now select multiple properties to monitor. Q: What is the percentage of Read to Write IOPS? _____

Step	Action
6	Edit a Monitor. - To modify heavy_load3, right-click the left-hand panel and select Edit - This time, select both of your volumes and from the property to monitor drop-down menu, select Total-Writes and generate the new chart.  Your chart should look similar to the latency chart generated earlier, where you have your volumes represented by two different colors. 

Step	Action
7	Monitor Initiator Performance • Create a new Monitor by the name of heavy_load4 • Select Initiator Performance for monitor type, and the Table for monitor display type. • Next, select both of your ESXi host initiators and the following properties to monitor: Read-IOPS, Write-IOPS, Read-BW, Write-BW • Generate the table. Note that when monitoring various properties, the Table monitor display is the right choice. It provides a cleaner way to display data then a pie chart or line graph.
8	Navigate back to your VM and stop the workload. Inside your VM click the Stop icon 

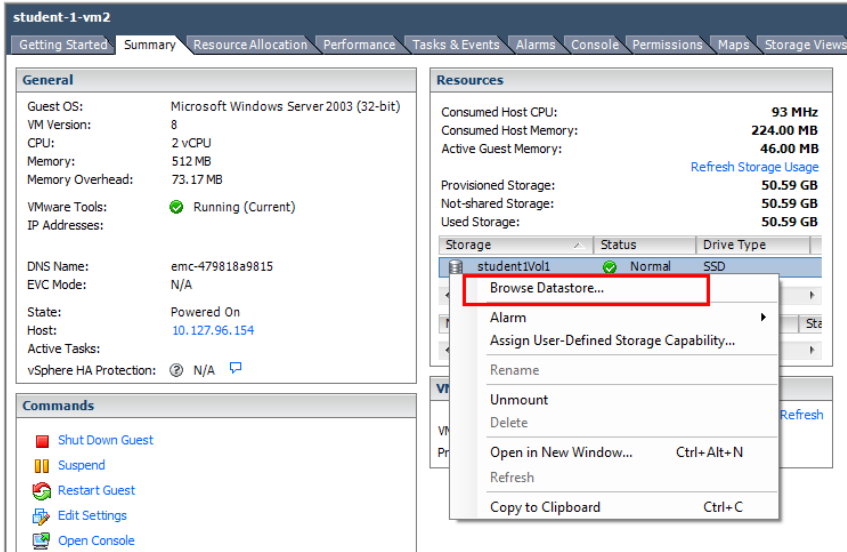
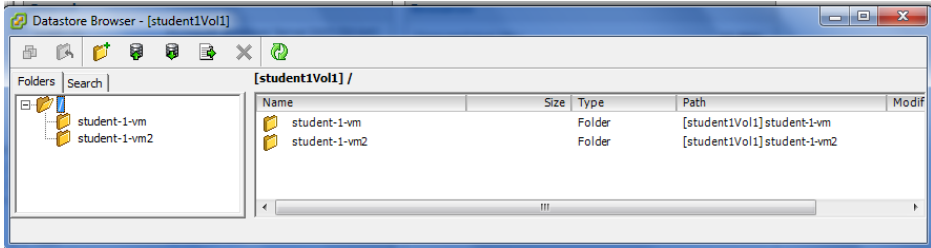
End of Lab Exercise

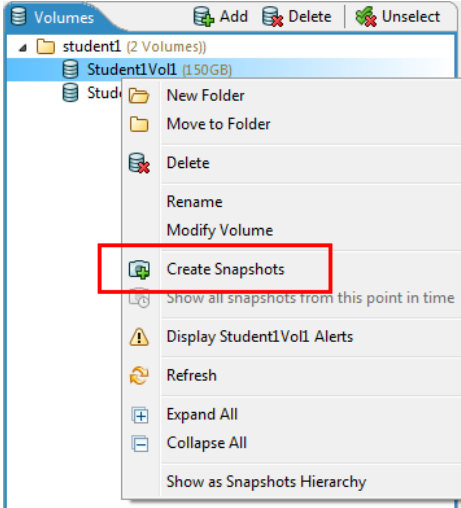
Lab Exercise: XtremIO Snapshots

Purpose:	In this lab exercise we will be implementing XtremIO Snapshots on an ESXi volume. We will take an XtremIO Snapshot of an ESXi datastore, then use the Snapshot for data recovery.
Tasks:	• Create an XtremIO Snapshot • Perform data recovery on a VMware datastore using an XtremIO Snapshot
References:	docu52291_XtremIO-3.0-Storage-Array-User-Guide.pdf

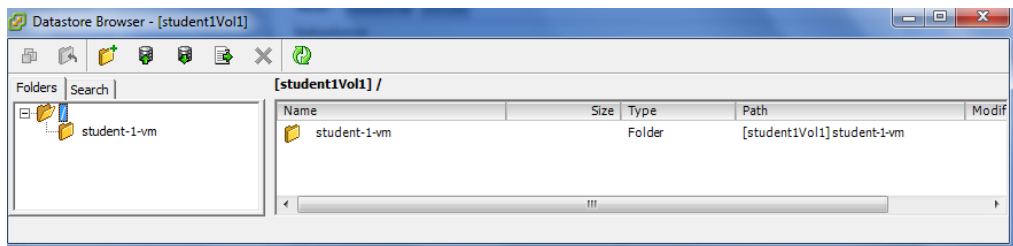
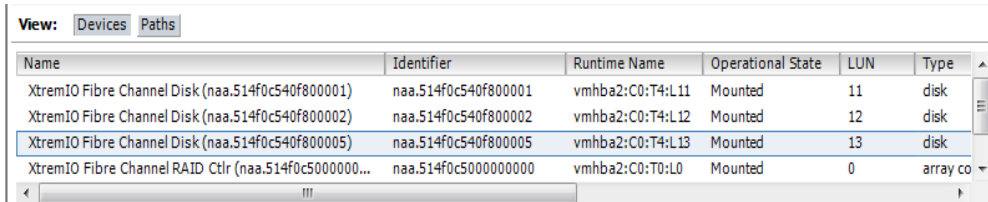
Part 1 - Snapshot Configuration

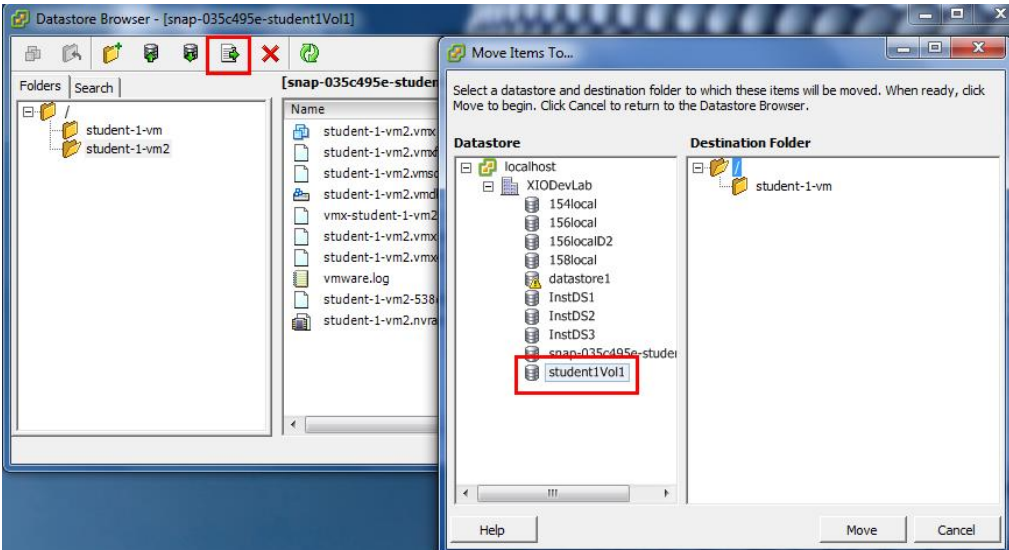
Step	Action
Note	This lab assumes you are connected to the VDC environment. If you are not, refer to an earlier lab that walks you through this process.
Prep	Expand your StudentXESXiVol1 datastore: • Log in to the XtremIO system [or switch to the GUI] • On the XtremIO system, right-click your StudentXESXiVol1 volume, and choose Modify Volume • Change the current size from 100 GB to 200 GB, and click OK • Open [or switch to] a vSphere client session • Browse to Storage on your ESXi host, and select your StudentXESXiVol1 datastore • Right-click the datastore, and choose Properties... • Click the Increase button, and select your datastore in the right-hand pane • Leave all values at their defaults, and click Next until prompted to finish • Click Finish and Close • The datastore has been expanded to 200 GB to allow space for a new VM
1	Deploy a second VM: • Open a vSphere client session • Deploy a second VM and name it student-X-vm2 (where X is your student number). Use your studentXESXiVol1 Datastore. You may refer back to the Virtual Machine DataStore Workload Test Lab, Part 1, for more details on deploying a VM.

Step	Action
2	Browse Datastore contents: - Select your student-X-vm2 machine from the left-hand pane, and select the Summary tab. - Right-click the studentXESXiVol1 Datastore and select Browse Datastore.  - You should see two folders here, one for each of your VMs 

Step	Action
3	Create a Snapshot: • Access the XMS GUI by logging in to your XMS server using the proper credentials provided in the student handout. • Navigate to the Configuration GUI page. • Right-click your studentXESXiVol1 volume and select Create Snapshot.  The screenshot shows the 'Volumes' pane in the XMS GUI. The 'student1' folder is expanded, showing 'Student1Vol1 (150GB)'. A right-click context menu is open over this volume, and the 'Create Snapshots' option is highlighted with a red rectangular box. Other options in the menu include 'New Folder', 'Move to Folder', 'Delete', 'Rename', 'Modify Volume', 'Show all snapshots from this point in time', 'Display Student1Vol1 Alerts', 'Refresh', 'Expand All', 'Collapse All', and 'Show as Snapshots Hierarchy'. • In the Create Snapshot wizard, select studentX (where X is your student number) as the Parent Folder, and keep the default for all other values. • Click Create. • Once the snapshot has been created, it will appear in the Volumes pane.
4	Map snapshot to host: • Select your snapshot volume and map it to your ESXi host. • For the LUN number, enter X3 (where X is your student number). • Remember to click Apply to execute the mapping

Part 2 - Data Recovery using a Snapshot

Step	Action																														
1	Delete your second VM: • Navigate back vSphere and select your student-X-vm2 machine from the left-hand pane and power it off by right-click it and selecting Power > OFF • Right-click the VM and select Delete from disk. • Select your ESXi host from the left-hand pane. • Inside the Configuration tab, select Storage in the hardware pane for your ESXi server. • Browse your studentXESXiVol1 Datastore and verify that your second VM is no longer present.  The screenshot shows the 'Datastore Browser - [student1Vol1]' window. On the left, under 'Folders', 'student-1-vm' is selected. The main pane shows a table with one entry: 'student-1-vm' (Folder) at path '[student1Vol1]student-1-vm'.																														
2	Access the snapshot volume: • Next, select Storage Adapters in the hardware pane for your ESXi server • Select one of the Fibre Channel adapters • Perform a Rescan to view the snapshot volume. Your Devices window should look similar to this, with three different XtremIO disks.  The screenshot shows the 'View: Devices' window. It contains a table with the following data: <table><tr><th>Name</th><th>Identifier</th><th>Runtime Name</th><th>Operational State</th><th>LUN</th><th>Type</th></tr><tr><td>XtremIO Fibre Channel Disk (naa.514f0c540f800001)</td><td>naa.514f0c540f800001</td><td>vmhba2:C0:T4:L11</td><td>Mounted</td><td>11</td><td>disk</td></tr><tr><td>XtremIO Fibre Channel Disk (naa.514f0c540f800002)</td><td>naa.514f0c540f800002</td><td>vmhba2:C0:T4:L12</td><td>Mounted</td><td>12</td><td>disk</td></tr><tr><td>XtremIO Fibre Channel Disk (naa.514f0c540f800005)</td><td>naa.514f0c540f800005</td><td>vmhba2:C0:T4:L13</td><td>Mounted</td><td>13</td><td>disk</td></tr><tr><td>XtremIO Fibre Channel RAID Ctlr (naa.514f0c5000000000)</td><td>naa.514f0c5000000000</td><td>vmhba2:C0:T0:L0</td><td>Mounted</td><td>0</td><td>array co</td></tr></table> • Navigate back to the Storage link in the hardware pane • Click Add Storage Add Storage... (upper right).	Name	Identifier	Runtime Name	Operational State	LUN	Type	XtremIO Fibre Channel Disk (naa.514f0c540f800001)	naa.514f0c540f800001	vmhba2:C0:T4:L11	Mounted	11	disk	XtremIO Fibre Channel Disk (naa.514f0c540f800002)	naa.514f0c540f800002	vmhba2:C0:T4:L12	Mounted	12	disk	XtremIO Fibre Channel Disk (naa.514f0c540f800005)	naa.514f0c540f800005	vmhba2:C0:T4:L13	Mounted	13	disk	XtremIO Fibre Channel RAID Ctlr (naa.514f0c5000000000)	naa.514f0c5000000000	vmhba2:C0:T0:L0	Mounted	0	array co
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XtremIO Fibre Channel Disk (naa.514f0c540f800005)	naa.514f0c540f800005	vmhba2:C0:T4:L13	Mounted	13	disk																										
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Step	Action																																
	• In the add storage wizard, select the following: ○ Select Storage type: Select Disk/LUN, click Next ○ Select Disk/LUN: Click on your X3 volume, click Next ○ Mount Option: Select Assign a new signature, click Next ○ Ready to Complete: Click Finish • After completed, you should now see a new Datastore created from your snapshot volume. <table border="1"><caption>Datastores</caption><thead><tr><th>Identification</th><th>Status</th><th>Device</th><th>Drive Type</th><th>Capacity</th><th>Free</th><th>Type</th><th>Last Update</th></tr></thead><tbody><tr><td>154local</td><td>Normal</td><td>Local VMwareDisk..</td><td>Non-SSD</td><td>63.25 GB</td><td>21.25 GB</td><td>VMFS5</td><td>6/12/2014 9:18:07 PM</td></tr><tr><td>snap-035c495e-student1Vol1</td><td>Normal</td><td>XtremIO Fibre Ch...</td><td>SSD</td><td>149.75 GB</td><td>47.62 GB</td><td>VMFS5</td><td>6/12/2014 9:18:07 PM</td></tr><tr><td>student1Vol1</td><td>Normal</td><td>XtremIO Fibre Ch...</td><td>SSD</td><td>149.75 GB</td><td>98.21 GB</td><td>VMFS5</td><td>6/12/2014 9:18:07 PM</td></tr></tbody></table>	Identification	Status	Device	Drive Type	Capacity	Free	Type	Last Update	154local	Normal	Local VMwareDisk..	Non-SSD	63.25 GB	21.25 GB	VMFS5	6/12/2014 9:18:07 PM	snap-035c495e-student1Vol1	Normal	XtremIO Fibre Ch...	SSD	149.75 GB	47.62 GB	VMFS5	6/12/2014 9:18:07 PM	student1Vol1	Normal	XtremIO Fibre Ch...	SSD	149.75 GB	98.21 GB	VMFS5	6/12/2014 9:18:07 PM
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student1Vol1	Normal	XtremIO Fibre Ch...	SSD	149.75 GB	98.21 GB	VMFS5	6/12/2014 9:18:07 PM																										
3	Perform data recovery: • Browse your snapshot Datastore and verify that the student-X-vm2 (where X is your student number) folder is present. • To copy the student-X-vm2 folder back to your studentXESXiVol1 Datastore, select the folder and click the Move icon in the menu bar. • In the Move Items To window, select the destination, which is your studentXESXiVol1 Datastore. 																																

Step	Action
4	Cancel VM move operation: • Cancel the move of the student-X-vm2 (where X is your student number) folder. We do not need to actually recover this VM.
5	Log off and clean up: • Log off from the vSphere client • Exit the XMS GUI

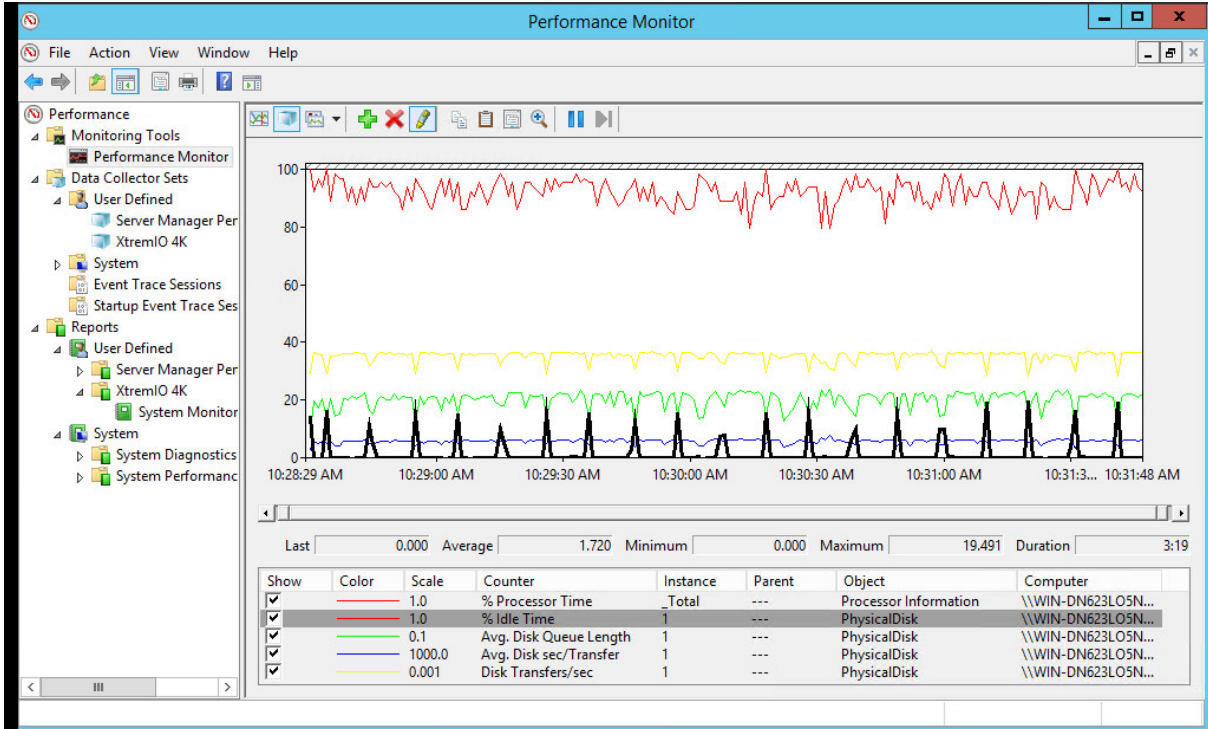
End of Lab Exercise

Lab Exercise: XtremIO Performance

Purpose:	This lab exercise introduces various aspects of XtremIO performance monitoring and troubleshooting.
Tasks:	Examine the environmental data supplied Analyze XtremIO performance and find issues. Make recommendations to correct the issues
References:	docu52291_XtremIO-3.0-Storage-Array-User-Guide.pdf

Lab: Part 1 – Host Monitoring

Step	Action																																																																																																																																																																																																																																																																																																																																										
1	A host is connected to a single X-Brick cluster with Fibre Channel. The host has 2 HBAs, each of which is zoned to a port on each SC. The switch is capable of 4 Gb/s operation. HBA queue depths have been set to the maximum value. Host performance is not meeting expectations. Performance data has been captured from the host and from the array during testing with 4 kB I/Os at a 2:1 R/W ratio. Examine the captured data, and determine the most likely cause of the performance issue.																																																																																																																																																																																																																																																																																																																																										
2	Examine the captured XtremIO performance data. <table><tr><th></th><th>A</th><th>B</th><th>C</th><th>D</th><th>E</th><th>F</th><th>G</th><th>H</th><th>I</th></tr><tr><th>1</th><th>Date-Time</th><th>Write-BW (KB)</th><th>Read-BW (KB)</th><th>Write-IOPs</th><th>Read-IOPs</th><th>Write-Latency (usec)</th><th>Read-Latency (usec)</th><th>Avg-Latency (usec)</th><th></th></tr><tr><td>35377</td><td>Tue Nov 11 10:28:29 2014</td><td>46448</td><td>94076</td><td>11611</td><td>23516</td><td>775</td><td>552</td><td>626</td><td></td></tr><tr><td>35378</td><td>Tue Nov 11 10:28:34 2014</td><td>44994</td><td>92040</td><td>11247</td><td>23008</td><td>758</td><td>537</td><td>610</td><td></td></tr><tr><td>35379</td><td>Tue Nov 11 10:28:39 2014</td><td>46630</td><td>95089</td><td>11657</td><td>23770</td><td>793</td><td>555</td><td>633</td><td></td></tr><tr><td>35380</td><td>Tue Nov 11 10:28:44 2014</td><td>44185</td><td>90427</td><td>11045</td><td>22606</td><td>773</td><td>544</td><td>619</td><td></td></tr><tr><td>35381</td><td>Tue Nov 11 10:28:49 2014</td><td>47215</td><td>96337</td><td>11802</td><td>24083</td><td>773</td><td>550</td><td>623</td><td></td></tr><tr><td>35382</td><td>Tue Nov 11 10:28:54 2014</td><td>45141</td><td>92096</td><td>11283</td><td>23021</td><td>781</td><td>555</td><td>629</td><td></td></tr><tr><td>35383</td><td>Tue Nov 11 10:28:59 2014</td><td>46992</td><td>94849</td><td>11746</td><td>23711</td><td>790</td><td>556</td><td>634</td><td></td></tr><tr><td>35384</td><td>Tue Nov 11 10:29:04 2014</td><td>45100</td><td>92392</td><td>11274</td><td>23096</td><td>785</td><td>552</td><td>629</td><td></td></tr><tr><td>35385</td><td>Tue Nov 11 10:29:09 2014</td><td>45849</td><td>91802</td><td>11460</td><td>22949</td><td>774</td><td>547</td><td>622</td><td></td></tr><tr><td>35386</td><td>Tue Nov 11 10:29:14 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Step	Action
3	Examine the captured host data. 
4	Determine the most likely cause of the low performance.
5	Questions: 1. Does the XtremIO array appear to be performing as expected? Justify your answer. 2. Is the response time at the host acceptable? What value would you expect to see? 3. Does the performance approach what you would expect from a 4 Gb/S SAN? Would performance improve if the switches were 8 Gb/s capable? 4. What is your recommendation for improving the performance of this application?

Lab: Part 2 – HBA and Volume Queue Depth

Step	Action
1	You are investigating a potential performance problem in an XtremIO environment. The environment is configured as follows: Quad X-Brick array 8 ESXi hosts, each with 2 dual-ported FC HBAs Each ESXi host has four 256 GB LUNs allocated to it Each LUN is visible through 8 paths
2	You believe that the queue depth configuration could be a cause of the problem. You notice that the execution throttle for the hosts is set to 1024, and the queue depth per path is set to 64.
3	Questions: 1. Are the queue depth and execution throttle values correct for this environment? What should they be? 2. Would performance be improved if the execution throttle was changed to 2048?

Lab: Part 3 – SAN Configuration

Step	Action
1	You are investigating a potential performance problem in an XtremIO environment. The environment is configured as follows: Quad X-Brick array 8 ESXi hosts, each with 2 dual-ported FC HBAs Each ESXi host has four 256 GB LUNs allocated to it Each LUN is visible through 8 paths The FC switch ports are configured for 4 Gb/s
2	The array performs 750,000 IOPs of 8 kB each at steady state. You believe that the FC switch configuration could be a problem.
3	Questions: 1. What is the expected maximum performance from this SAN configuration? 2. Would performance be improved if the switch ports were configured for 8 Gb/s? 3. Would switching from 8 Gb/s FC to 10 Gb/s iSCSI improve performance in this environment?

End of Lab Exercise

End of Lab