



Lab Guide

Hitachi Data Systems

Enterprise Storage Boot Camp

THI0430

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NanoCopy	Resource Manager	SplitSecond	Thunder 9200	Thunder 9500
Thunder 9585V	Thunder 9580V	Thunder 9570V	Thunder 9530V	Thunder 9520V
Universal Star Network				

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NOTICE:

Notational conventions: 1KB stands for 1,024 bytes, 1MB for 1,024 kilobytes, 1GB for 1,024 megabytes, and 1TB for 1,024 gigabytes, as is consistent with IEC (International Electrotechnical Commission) standards for prefixes for binary and metric multiples.

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HDS Academy 1071

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Product Names

Enterprise Storage Systems

- Hitachi Virtual Storage Platform
- Hitachi Universal Storage Platform® V
- Hitachi Universal Storage Platform® VM

Legacy Products:

- Hitachi Universal Storage Platform®
- Hitachi Network Storage Controller
- Hitachi Lightning 9900™ V Series enterprise storage systems
- Hitachi Lightning 9900™ Series enterprise storage systems

Modular Storage Systems

- Hitachi Adaptable Modular Storage
- Hitachi Adaptable Modular Storage 2000 Family

Legacy Products:

- Hitachi Workgroup Modular Storage
- Hitachi Thunder 9500™ Series modular storage systems
- Hitachi Thunder 9200V™ entry-level storage

Management Tools

- Hitachi Resource Manager™ utility package
 - ♦ Module Volume Migration Software
 - ♦ LUN Manager/LUN Expansion
 - ♦ Network Data Management Protocol (NDMP) agents
 - ♦ Logical Unit Size Expansion (LUSE)
 - ♦ Cache Partition Manager feature
 - ♦ Cache Residency Manager feature
 - ♦ Storage Navigator program
 - ♦ Storage Navigator Modular program
 - ♦ Storage Navigator Modular 2 program

Replication Software

Remote Replication:

- Hitachi Universal Replicator
- Hitachi TrueCopy® Heterogeneous Remote Replication bundle
- Hitachi TrueCopy® Remote Replication bundle (for modular systems)
- Hitachi TrueCopy® Synchronous
- Hitachi TrueCopy® Asynchronous
- Hitachi TrueCopy® Extended Distance

In-System Replication:

- Hitachi ShadowImage® Heterogeneous Replication (for enterprise systems)
- Hitachi ShadowImage® Replication (for modular systems)
- Hitachi Copy-on-Write Snapshot

Hitachi Command Suite

- Hitachi Basic Operating System
- Hitachi Basic Operating System V
- Hitachi Command Director
- Hitachi Device Manager
- Hitachi Dynamic Link Manager Advanced
- Hitachi Dynamic Provisioning
- Hitachi Dynamic Tiering
- Hitachi Global Link Manager
- Hitachi Global Reporter
- Hitachi Replication Manager
- Hitachi Storage Capacity Reporter, powered by APTARE®
- Hitachi Storage Services Manager
- Hitachi Tiered Storage Manager
- Hitachi Tuning Manager
- Hitachi Virtual Server Reporter, powered by APTARE®

Other Software

- Hitachi Backup and Recovery, powered by CommVault®
- Hitachi Backup Services Manager , powered by APTARE®
- Hitachi Business Continuity Manager
- Hitachi Command Control Interface (CCI)
- Hitachi Volume Migration
- Hi-Track® Remote Monitoring system

Other Solutions and Terms

- Hitachi Content Platform
- Hitachi Compute Systems Manager
- Hitachi NAS Platform
- Hi-Star™ crossbar switch architecture
- Hitachi Universal Star Network V

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Introduction

As one of the largest provider of education courses, TIIN is a dynamic organization created from a diverse range of specialist institutions. Today TIIN has more than 2million students and 3000 staff, and it offers more than 400 courses at its 4 campuses across 2 centers.

This huge operation requires an enterprise storage solution that is intelligent and sophisticated enough to meet TIIN's similarly vast IT needs. A single view as a legacy of its creation from separate universities, TIIN's existing IT infrastructure included separate silos of information developed by individual faculties or schools and utilized a variety of storage systems. Different pockets of information and ad hoc usage of storage was starting to create both IT management and business continuity concerns. Without the ability to view all information and applications used throughout TIIN on a single platform, storage utilization was both inefficient and expensive.

This situation called for TIIN to review its data storage and disaster recovery procedures. A storage area network (SAN) implementation from Hitachi Data Systems was considered the best solution to fit in with TIIN's long-term IT strategy. The SAN coupled with advanced software management tools would enable administrators to continuously view, allocate, access, and organize data. Hitachi Command Suite products; Hitachi Device Manager (HDvM) and Hitachi Global Link Manager (HGLM) were selected to provide single-platform control of the new storage infrastructure.

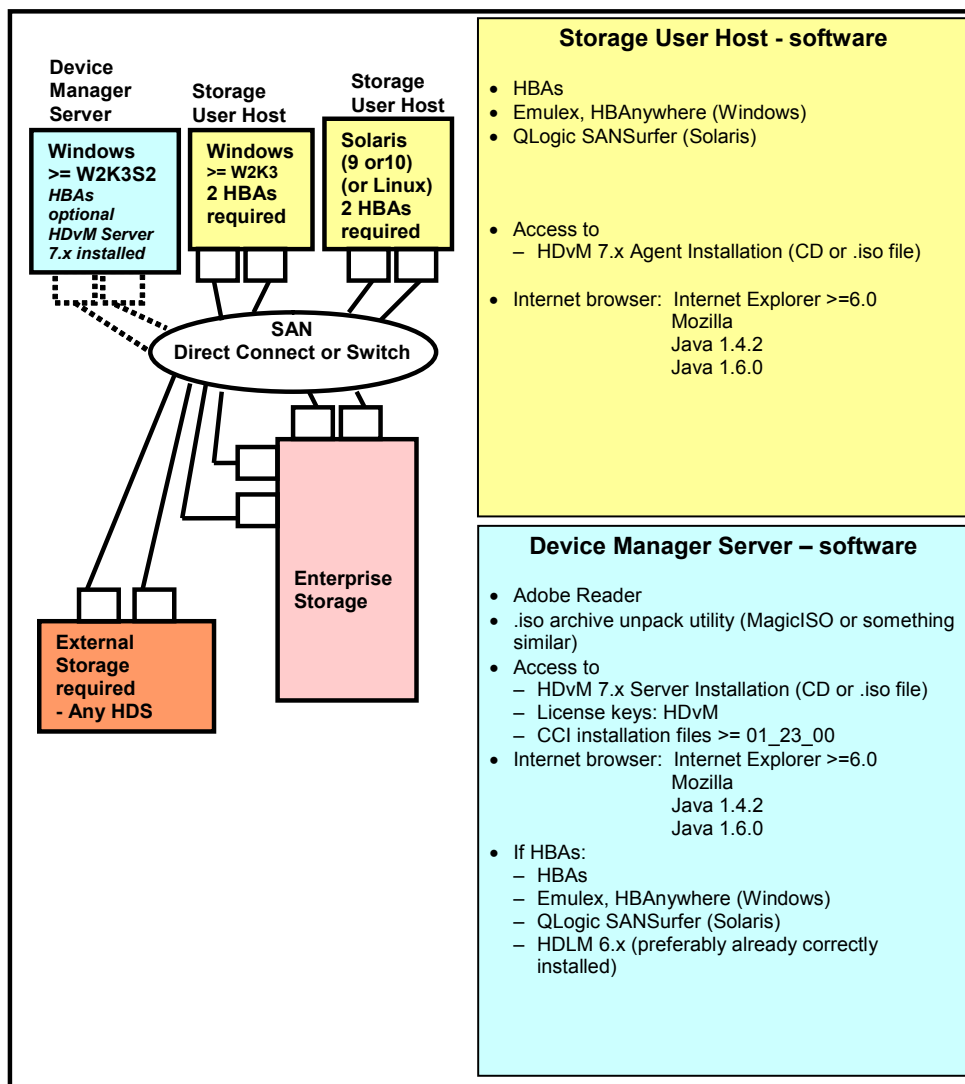
Along with increased capacity and simplified management, TIIN also required:

- Ability to mirror data between two data centers
- Support Novell NetWare, Microsoft Windows, Sun Solaris and UNIX hosts
- Ability to centrally view and manage all paths between storage and the servers
- High level of service and support

TIIN has decided to implement Hitachi Device Manager.

- ♦ Install Device Manager
- ♦ Agent Installation and Configuration
- ♦ Administration
- ♦ Add Storage Systems
- ♦ Storage Provisioning
- ♦ Host Provisioning
- ♦ CLI Setup

You have been tasked with conducting a proof of concept (POC) using the sample configuration below. In the following exercises you will perform the activities as listed. You can use the User Guides for performing the tasks.



Lab Activity 1

Storage Navigator 2

GUI

Overview

Objectives

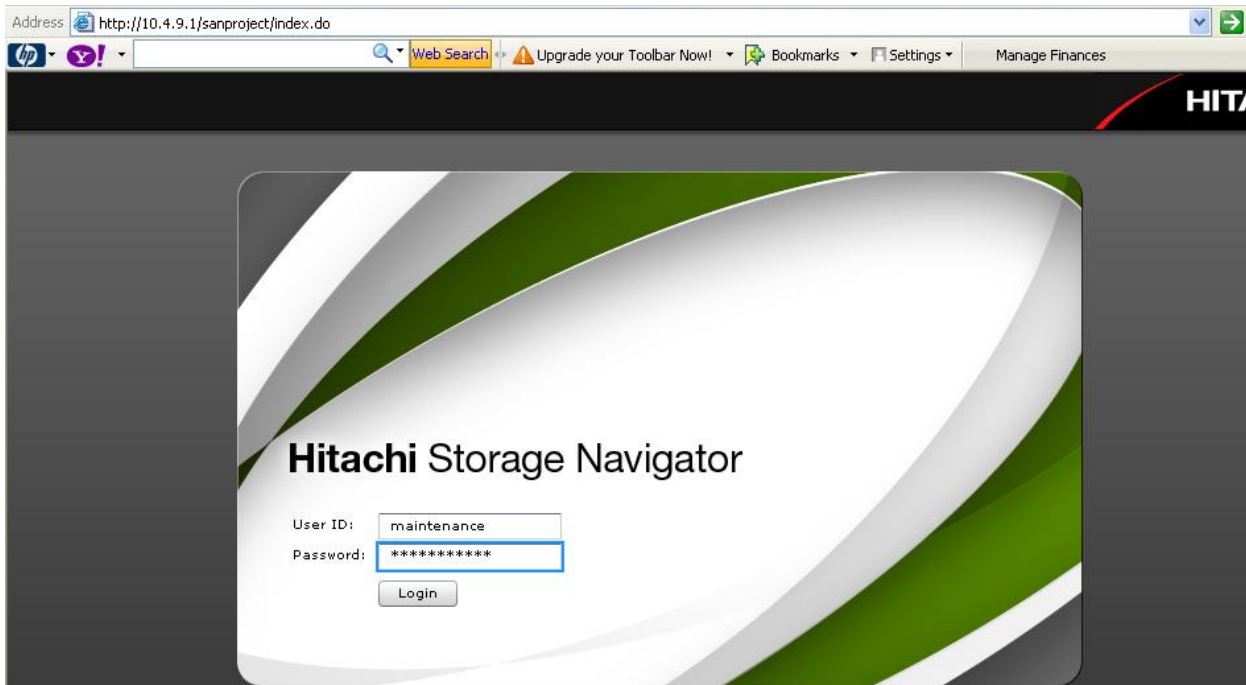
Upon completion of the lab project, you will be able to:

- Log in
- Customize the display
- Navigate
- Check alert status
- Verify your license keys
- Create user accounts
- Export the user account configuration
- Log out

Summary of Activity

Log in and perform basic navigation to gain familiarity with Storage Navigator basics.

1. Login



User ID: **maintenance**

Your instructor will provide the “maintenance” account password if needed. Log in as follows:

1. In your browser, enter the URL (<http://<ip-address>>) for connecting to the SVP.
2. Enter the User ID and Password, and click **Login**. The Storage Navigator initial window opens.

Note: If an Adobe Flash Player Setting dialog box appears, click **Allow**. The Flash Player cache function optimizes the Storage Navigator process. Denying the request might decrease Storage Navigator processing speed.

3. If the SVP is set to support SSL-encrypted communications, the Security Information dialog box may appear. If it displays, click **Yes** to open the Storage Navigator main window.

2. Storage Navigator Alert Status and Display Panels

1. Check your alert status icon; open the alert status window with the alerts link.

Note: This is a Java component so you will see a Java pop up and a *loading* message prior to the actual alerts window. This is normal and will recur for other Java components when using Storage Navigator.



2. Rollover the audit log icon to see audit log space utilization.
3. Check if the resource lock symbol is locked or unlocked.
4. Note the logout link to the right of the username. Use this later to log out gracefully.
5. Take a moment to familiarize yourself with the movable panel boundaries.
6. Use the horizontal or vertical double-chevron symbol << to collapse or expand display areas.
7. Pop-up or pop-down the filter box (used in later labs). Available values will change for each resource.
8. Click the Explorer → Storage Systems accordion menu item. Expand the VSP system to see a resource list. Expand Components and Parity Groups; these should be populated. You may see an empty list for some resources at this point.
9. Click the Performance Monitor element of the Accordion menu. You will use this tool later.
10. Drag General Tasks toward the bottom and pull up the available wizards list by clicking on the "more ..." link. This is a way to allow for a longer list of resource elements than above.
11. Click the Administration element of the Accordion menu. You will use this to create role-based user accounts soon. Click **Administrator User Group**. Notice the breadcrumb trail at top. It says User Groups > Administrator Users Group. As you drill down deeper, this hyperlinked breadcrumb trail becomes useful as a way to return to a higher level.
12. Click on the Storage Systems → VSP (S/N 53xxx) to return to the Hardware and Allocation Summaries. Your allocations will be zero if no LDEVs exist yet. Review the hardware summary and Edit Storage System button to edit the Contact and

Location information. Enter your lab group name or student names for contact, and your training room for location. These fields are simply informational.

3. Verify License Keys

The screenshot shows the Hitachi Storage Navigator web interface. A red circle highlights the 'Settings' menu in the top navigation bar. A red arrow points from this menu to a callout box. The callout box contains the text: 'Setting ► Environmental Setting ► License key...' and '→ Go to License Key Window (Legacy GUI)'. Below the callout, the 'Allocation Summary' table is visible, showing drive capacity and LDEVs.

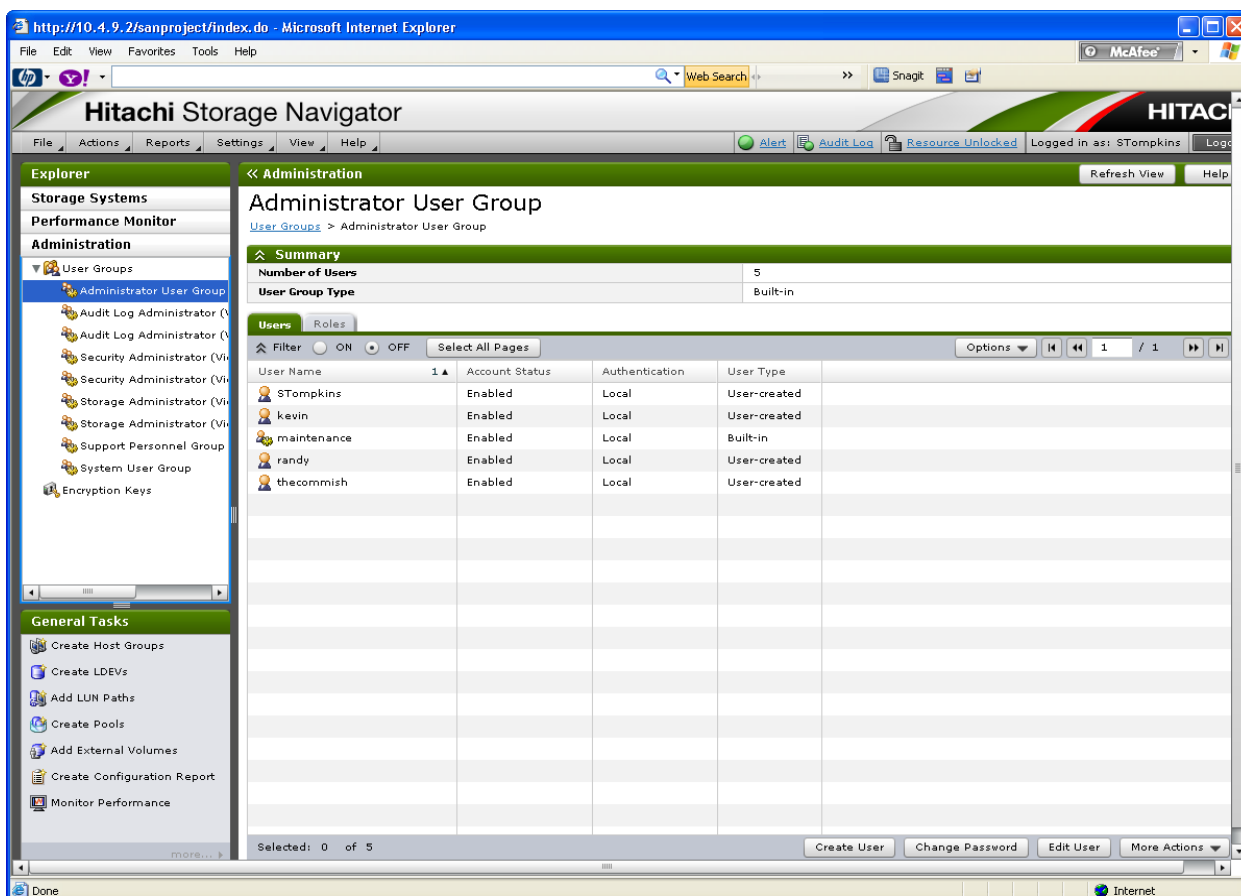
Internal/External		Total	System Type	Total	
Allocated (Excluding V-VOL)	207.63GB	[1%]	Number of LDEVs	Allocated (Excluding V-VOL)	2068
Unallocated (Excluding V-VOL)	7.13TB	[67%]		Unallocated (Excluding V-VOL)	1210
Reserved (Excluding V-VOL)	-	[-%]		Reserved	-
Used THP Pool	-	[-%]		V-VOLs	-
Unused THP Pool	-	[-%]		Total	3278
Other	-	[-%]			
Free	3.35TB	[32%]			
Total	10.68TB				

Use the menu bar to access the License Keys interface. You could also go here to add specific program product licenses. Remember that you can:

- Load a *.plk file to license one or more program products.
- Enter a specific key value to license a program product.
- Verify the installed license keys for your assigned VSP system.

4. User Accounts

Note: You may only see the built-in *maintenance* account in the administrator group



1. Create an administrative account for your lab group. Follow any specific account name instructions your Instructor may provide. Enable the account and use Local authentication. Set a password that is the same as the username.
2. Log out of Storage Navigator using the Logout link.
3. Log in with your new administrator account.
4. Change the password to raid-mainte so it is consistent with the default password.
5. Create another account in a view-only role, for example username_vo in the Storage Administrator (View Only) user group
6. Add the view-only account to the Security Administrator (View Only) group.
7. Remove (not delete) the original view only account (this is how you perform a move of an account).
8. Use **Export** to create a text file list of users. Export is available for most resources to generate a list.

5. Login Message

1. Navigate to Settings > Security > Login Message
2. In the Java applet, enter modify mode (click the quill pen). The lock will turn red.
3. Enter a message, perhaps something such as “This VSP in use by Lab Group 1...”
4. Click Apply to save the message.
5. Exit the Java applet (click the open door icon on the right).
6. Log out of Storage Navigator and log in again. You should see the message at the bottom of the login screen.

6. Email Notifications

To see the email notification setup screen, navigate to:

Settings > Environmental Settings > E-mail information...

Here you would identify the mail server and the from/to email addresses for SIM notifications. When you want to setup a test email notification, you will need specifications for an email server. You can use the **Test Send** button to verify email notification is working as expected.

7. Create and View Reports

1. To work with reports, first you must create a configuration report and then view it using **Storage Systems > VSP > Reports**
2. Navigate and select the **Create Configuration Report** action. It is last in the list of **General Tasks** located in the lower left corner of the Storage Navigator 2 Explorer pane. Create an HTML report. Notice that a Create Configuration Report task is created in the Task Queue. When the Create Configuration Report task is complete, navigate to the **Reports** entry in the upper Explorer list. Locate your report in the list of available reports. Open and investigate the contents of the Configuration Report.
3. Use the **Download Reports** button to save CSV report information. Find and open *allconf.csv*.

8. Task Management

1. At this point, you should have a list of completed tasks.
2. Navigate to **Storage Systems > VSP > Tasks**.
3. Check the task status, name, and type. Drill down using the links to see more detail.
4. Click various column headers to change the sort order.
5. Try the filter tool to reduce the number of displayed tasks.

Note: You will get more experience with viewing and managing Tasks in later lab activities.

— End of Lab Activity 1 —

Lab Activity 2

Agent Installation and Configuration

Introduction

Objectives

Upon completion of the lab project, you should be able to:

- Install and Configure Agents on Windows/Solaris Hosts
- Register Storage Systems to be managed through Device Manager

Installation of the HDvM Agent

There are three methods of registering hosts in Device Manager.

1. Agent less Discovery
2. Manual Addition of Host
3. Device Manager Agent Installation on Host

Prior to installing the agent, determine the following information about your servers (check with instructor if required):

	OS and Version	IP Address	User Name	Password
HDvM Server				
Host 1				
Host 2				
Host 3				
Host 4				
Host 5				

Note: You can discover hosts for other lab groups also but agent installation and configuration should be performed for servers assigned to you only.

1. Installation of the HDvM Agent on Windows Host

- Log in to Windows Host as the administrator.
- Launch the GUI for HDvM by entering the following URL in your browser –
http://HDvM_SERVER_IP:23015/DeviceManager/
or
http://HDvM_SERVER_HOSTNAME:23015/DeviceManager/
- From the **Tools** menu, select **Download**.
- The download dialog appears. Click on the appropriate hyperlink to download the agent on your desktop. Close the download dialog after the download is complete.
- Minimize the HDvM GUI window.
- Uncompress the Agent setup files by executing the downloaded file.
- Run **setup.exe** from the uncompressed files to install the agent.

- When you are prompted, enter the required information.
 - a. Select **No** for setting up RAID Manager.
 - b. Select **Administration > Managed Resources > Hosts**.
 - c. Verify that the windows host appears in the tree now.

2. Register Storage Systems into HDvM

The next step in the initial configuration is to register all storage systems that will be managed through Device Manager.

Before proceeding, determine the following information about your Storage Systems (check with instructor if required):

Storage System	Type VSP/USP/AMS	IP Address1/ IP Address2	User Name	Password
Storage 1				
Storage 2				
Storage 3				
Storage 4				

3. Register Storage Systems into HDvM

To register a storage system:

1. From the **Administration** tab, select **Managed Resources**.
2. From the **Storage Systems** tab, click **Add Storage System**.
3. Specify the appropriate information for registering your storage system and click **OK**. (Use table above).
4. Repeat steps 1–3 to register additional storage systems (if any).
5. Check the **Data Collection Tasks** tab to verify that the task(s) has completed successfully.

Note: Hitachi Device Manager queues the Add Storage System tasks and executes them in a serial order.

6. When the task completes, confirm that the storage system name appears in the Storages tree in the Resources tab.

4. Allocate Storage

You must allocate volumes to a host so the host system can recognize them. The settings used for allocating volumes to a host become the default the next time you allocate volumes to the same host.

If, while allocating internal volumes to a host, no volumes match the specified requirements, volumes are automatically created using the available space.

1. From the **Actions** menu in the **Resources tab**, select **Allocate Volumes**. The Allocate Storage dialog opens.
2. Follow the instructions to specify necessary settings and then create the task.
 - Volume Type – Basic Volume
 - Volume Location – Internal
 - Advanced Options - Format Type – Normal Format (if required)

Note: The Format Type prompt appears only if the volume with the required capacity is not available.

3. Click **Show Plan** to review the plan and specify additional information, as appropriate.
4. Click **Allocate**.
5. When the task completes, confirm that the volumes are recognized by the target host.

Note: When allocation completes, the administrator must mount the volume and create a file system to make the volume writable, (see next section.)

— End of Lab Activity 2 —

Lab Activity 3

Hitachi Dynamic Link Manager Advanced

Introduction

Objectives

Upon completion of the lab project, you should be able to:

- Use Hitachi Dynamic Link Manager (HDLM) software GUI
- Use Hitachi Global Link Manager (HGLM) software GUI
- Perform path management operations

HDLM on Microsoft Windows

1. Launch the **HDLM GUI** from the Start menu of windows.
The GUI displays the LUNs presented to the server. Dynamic Link Manager is managing the dual paths.
2. Click on the Adapter to see the ports numbers (*Check ports where your servers are connected.*)
3. Click the **Path List** tab to see the LUNs.
4. Scroll right to see the I/O counts.
5. Click **Options**.
6. Set **Load Balancing** to **Extended Round Robin**, **Path Health Checking** to **5 minutes** and **Auto Failback** to **ON**.
7. From the **Start** menu or desktop, start the **IOmeter** application.
8. In the Topology pane on the left, expand the icon for your Microsoft Windows host system (for example, WLABA).
9. Select **Hostname** and then select the first and second **PHYSICAL DRIVES** by checking the empty box next to the following two drives (hold the shift key to select the drives). Remember, your drives may be numbered different.
PHYSICALDRIVE :3 or PHYSICALDRIVE :4
10. Enter **10** in the **# of Outstanding I/Os** box (this sets *Command Tag Queuing* to 10).
11. Click the **Access Specifications** tab.
12. From the **Global Access Specifications** pane, select the default entry and then click the **Edit** button.
13. Create a new Access Specification by entering and/or modifying the default settings as shown in the next screen shot. Click **OK**.
14. Click the **Add** button.
15. In the upper row of the IOmeter window, click the **green flag** icon to start IOmeter.
The results of the operation will be saved in the **results** file (you could choose the folder, by default it goes into **My Documents**).
16. Click **Save** to start the I/O process.
17. Click the **Results Display** tab.
18. Slide the **Update Frequency (seconds)** bar to **2** and then select **Last Update** (this causes real-time updates at three second intervals).
19. Minimize the IOmeter window.
20. Launch the HDLM GUI and change to **Path List** view

21. Continually click on **Refresh** to see the I/O count increase.

Notice that **both** paths are receiving **equal** amounts of data.

Cause a Failover

1. Disable one of the switch ports connected to your HBA.

Failover to the other path should occur in about 30 seconds.

2. Continually click on **Refresh** to display the I/O activity.

After a few seconds the *Offline(Error)* status should appear for one of the paths.

3. Enable the disabled port on the switch.
4. Continually click on **Refresh**.
5. The *Failed* should change to *Online*.

HGLM – Host Discovery

1. Click **Add Hosts**. The Add Hosts window will appear. You should be on **Network Scan > Scan Now** tab.
2. Enter the Start IP Address, End IP Address, Agent Service Port, and Remote Port (if applicable) information for your lab setup.
3. Click '**Yes, I have confirmed information above**' checkbox and click **OK**. Wait while the host information is processed and registered with the Global Link Manager server.

The results of the host registration process will be provided. Hosts that have been successfully registered will now be visible in the Host view.

Setting Path Online/Offline from Host View and Subsystems View

1. Select your server under **Hosts** view.
2. Select paths on any one port.
3. Click the **Offline** button to take the paths offline.
4. Select the paths again and click the **Online** button to make the paths online.

You can perform the same operations from the subsystems view also. Hosts can be identified by looking at the Host Name column.

— End of Lab Activity 3 —

Lab Activity 4

Dynamic Provisioning

Introduction

Objectives

Upon completion of the lab project, you should be able to:

- Create Dynamic Provisioning Pool using Create Pool option
- Create new Volumes using Create Volumes option

Create Pool

In this section we will first create an HDP pool. The pool is created by adding capacity (Parity Groups/Logical Volumes).

The items that must be specified when creating a DP pool are listed below.

For Hitachi USP V and VM, and Hitachi Virtual Storage Platform (VSP)

- Pool capacity
- Parity group
- Capacity required

For Hitachi AMS 2000:

- Drive types (such as drive type, revolution, and drive size)
- RAID level and Parity group capacity
- The number of Parity groups

To create a DP pool:

1. From the **Resources** tab, in the navigation tree, select **Pools** under the target storage system.
2. Click **Create Pool**. The Create Pool dialog opens.
3. Specify the **pool name** and other necessary information.
 - a. Add one parity group
 - b. Expand **Advanced** options
 - - Specify pool ID (list shows available ids)
 - - **Enable** subscription setting
 - - Set Subscription Threshold - Warning - 10%, Limit 100%
4. Click **Show Plan** to verify the plan and then click **Execute**.
5. The plan is registered as a task. View the task status to confirm that it **completed**.
6. In the *Storage tree*, return to the *target storage* system, click **DP Pools** and confirm that the pool is created.
7. Select the row with your pool and click **Expand Pool**. Select the parity group to be added to the pool. Click **Show Plan**. Expand **Plan Details**. Check the expansion capacity vs. free capacity on the parity group. The pool gets expanded by volume capacity.

Create Volumes

You create volumes by using the available space in a Hitachi Dynamic Provisioning (HDP)/Hitachi Dynamic Tiering (HDT) pool or Parity group, and then access the volumes when you are ready to allocate them to a host.

Use **Create Volumes** to create **Dynamic Provisioning volumes** from the pool created earlier in the lab.

1. Create 6 volumes of 2GB each.
2. Check the size of the pool and create a volume that is the same size.
3. Check the task status and error message you get (because you are exceeding the subscription threshold limit).
4. Check the number of DP VOLs by navigating to **storage > Pools > Your Pool > DP VOLs**.
5. Check the number of DP VOLs by navigating to **storage > Pools > Your Pool > DP VOLs**.

— End of Lab Activity 4 —

Lab Activity 5

HDT Operations

Introduction

Objectives

Upon completion of the lab project, you should be able to:

- Create HDT Pool using the Create Pool option

Hitachi Dynamic Tiering

Hitachi Dynamic Tiering (HDT) optimizes the investment even further. If you create a pool that combines volumes with different cost performance (such as combining higher cost, high-speed volumes [SSD or SAS] with inexpensive low-speed volumes [SATA]), HDT rearranges the volume load automatically. This rearrangement is performed depending on the I/O load; high-load pages are allocated to high-speed volumes, and low-load pages are allocated to low-speed volumes.

Dynamic Tiering

In this section we will first create an HDT pool. The pool is created by adding capacity (Parity Groups/Logical Volumes).

The items that must be specified when creating a DP pool in VSP are listed below.

- HDT option enabled
- Pool capacity
- Parity group
- Capacity required

To create a HDT pool

1. From the **Resources** tab in the navigation tree, select **Pools** under the target storage system.
2. Click **Create Pool**. The Create Pool dialog opens.
3. Specify the **pool name** and select **Enable** for Hitachi Dynamic Tiering.
4. Depending on your storage system configuration, the **Available Tiers** will be listed for your selection. Select all the Tiers.

Note: When you select a Tier, the related Tier tab under Parity Groups section becomes activated.

5. The next step is to add capacity to each Tier. Select the tab for a Tier under the Parity Group section. Click on **Select Parity Group** to select and add capacity to the tier. Repeat the process for each Tier selected by you in the previous step.
6. In the **Advanced Options** section set the **Reallocation Cycle** to **1 Hrs**.
7. Click **Show Plan** to verify the plan and then click **Execute**.
8. The plan is registered as a task. View the task status to confirm that it **completed**.
9. In the *Storage tree*, return to the *target storage* system, and then click **DP Pools**. Confirm that the pool is created.
10. Select the pool you created. Select the **H/W Tier** tab.
11. Note the Tiers usage.

Tier	Drive Type	Used %
Tier1		
Tier2		
Tier3		

12. Create a 5GB volume from the HDT pool. Map the volume to the Host allocated to you.
13. Discover and assign drive letters to the volume.

— End of Lab Activity 5 —

Lab Activity 6

Tiered Storage Manager

Introduction

Objectives

Upon completion of the lab project, you should be able to:

- Define Storage Tiers
- Define Migration Groups
- Create Migration Tasks
- View Task Status

Create Tiers

1. On the **Resources** tab, click **Tiers**.
2. Select the **All Tiers** to see a list of storage systems.
3. Select the *storage system* in which to create a tier.
4. Click **Create Tier**.
5. Specify the appropriate information.
 - a. Name, Description
 - b. Select Resources
 - c. Basic Search Condition
 - d. Advanced Search Conditions – (*Depends on the Tier Criteria*)

6. Click **OK**.
7. Confirm that the tier is included in the storage system selected in the Tiers tree.

Create Migration Group

1. From the **Actions** menu, select **Migrate Volumes**.
2. Select the appropriate *storage system* under **Storage Domains**.
3. On the **Migration Groups** tab, click **Create MG**.
4. On the **General tab**, specify a name.
5. Click **Add Volume** to select volumes to be added to the Migration group.
6. On the **Rule tab**, specify the following rules:

Parity Group Selection: From the following three methods, specify how the parity groups from which migration target volumes can be selected are chosen.

- i. *Balance Capacity:* Selects migration target volumes so that the parity groups that are selected as the migration destination have the same amount of remaining capacity.
- ii. *Maximum Coverage:* Selects migration target volumes from as many parity groups as possible.
- iii. *Minimum Coverage:* Selects migration target volumes from as few parity groups as possible.

Parity Group Avoidance of Migration Groups (option): Selects migration target volumes from a parity group that is different than the migration destination.

7. If necessary, specify required items on the Notification tab.
8. Click **OK** to create the Migration Group.

Create Migration Task

1. Identify the migration group to be migrated and click the  (*migrate*) icon.
2. On the **Migrate MG** dialog box, select a *tier* and click **Check Compatibility**.
3. A plan with possible pairings copy pair is presented. The plan lists each migration source volume and its target volume or DP pool.
4. You can edit the plan if required by clicking **Edit Pairs** button.

Note: Check the source and target LDEV's. They should be different.
5. Click **ok** to confirm the Migration task.
6. Verify that the migration task completed successfully in the Tiered Storage Manager Task view on the Tasks and Alerts tab.

— End of Lab Activity 6 —

Lab Activity 7

External Storage

Introduction

Objectives

Upon completion of the lab project, you should be able to:

- Setup External Volumes using Virtualize Storage option

Virtualize Storage

Virtualizing volumes is the process of mapping volumes in a source storage system to a target storage system. The volumes in the source storage system (registered and referred to as external volumes) can then be managed in the same way as the volumes in the target storage system (registered and referred to as internal volumes).

Collect the following information from your instructor before moving to the lab steps.

	Serial	Path1 (port) Internal -> External	Path2 (port) Internal -> External
Internal Storage			
External Storage			

Configure External Ports

Use the Element Manager (Storage Navigator) to change Path1/Path2 ports on the Internal Storage to **External**.

To Virtualize Volumes:

1. From the **Configure** menu, select **Virtualize Volumes**.
2. Specify the appropriate information.
3. To change default values, click **Paths**, **Path Priority Setting**, **Host Group**, **LUN Number Setting** and **External Volume Configuration**.
 - ♦ Click **Edit Paths**. Validate the Paths settings.
 - ♦ If paths settings are incorrect. Click **Clear Paths**.
 - ♦ Double click the correct ports in the External Storage port list to move to **Path Editor** window.
 - ♦ In Path Editor window; Click and drag the external storage ports to the internal storage port to specify the link.
 - ♦ - Click **OK**.
4. Click **Show Plan** to review the plan and specify additional information, as appropriate. Verify the information that is displayed.
5. Click **Virtualize**.
6. When the task completes, check the storage system list to confirm that the external volumes are mapped to the target storage system.

— End of Lab Activity 7 —

Lab Activity 8

Virtual Partition Manager

Objectives

Upon completion of the lab project, you should be able to:

- Create a Cache Logical Partition (CLPR).
- Add (migrate) specified parity groups to the CLPR.

Create Cache Logical Partitions

1. Log on to Device Manager.
2. Select your Storage System under **Resource Tab > Resources Panel**.
3. Right click on your *storage system*. Select **Element Manager**.
4. Click the pen icon to change to modify mode.
5. Launch the Partition Definition interface.
 - USP V and VM** – From the menu, select Go > Environmental Settings > Partition Definition.
 - VSP** – Settings > Environmental Settings > Partition Definition
6. Expand **Subsystem** and select **SLPR0/CLPR**.
7. Right click on **SLRP0/CLPR** and select **Create CLPR**.
8. Repeat the previous step to create another CLPR.
9. Expand **SLPR0/CLPR**. **CLPR1** and **CLPR2** should be the newly created Cache Partitions.
10. Click **Apply** to accept default settings.

Add Parity Groups to CLPR

By default all parity groups are part of CLPR0. We will now move specific parity groups to their own dedicated CLPR.

Note: Use the Lab Tasks to identify the CLPR configuration.

1. Expand **SLPR0/CLPR** and select CLPR0.
2. Select the parity groups to be moved to the new partition. Right click and select **Cut**.
3. Select the target CLPR (CLPR1 or CLPR2), right click and select **Paste Resources**.
4. Click **Apply**.

– End of Lab Activity 8 –

Lab Activity 9

Hitachi Replication Manager Initial Setup

Overview

Objectives

Upon completion of this lab activity, you should be able to:

- Perform refresh for the local information source in Replication Manager
- Setup Command Device
- Setup Pair Management Server

References

- *Hitachi Replication Manager Software Users Guide*

Perform Initial Setup Tasks

The following tasks are required for initial setup of the Replication Manager environment and also implementing the Sites and Resource Group features.

1. Perform Refresh of Information Source

Refresh the Replication Manager repositories with information from Device Manager.

Hint: **Settings > Refresh Settings > Configuration Settings**

Validate that your storage systems appear under the **Storage System** folder under Explorer panel.

2. Setup Command Device

Command Devices are used by Command Control Interface (CCI) software for in-band communication with the storage system.

Setup at least one command device on each storage system.

Hint: Storage Systems > [Storage]> open > Cmd Devs > Add Cmd Devices

Command Device Details

Storage System 1 — Command Device ID _____

Storage System 2 — Command Device ID _____

Present the command devices to the respective hosts.

Ensure the volumes show up on your Hosts.

3. Pair Management Server

- Install CCI software on the Primary and Remote Hosts.

Check with instructor for the location of the install files.

- Configure Device Manager Agents on the Hosts to see the new configuration.

*Hint: Execute **hdvmagt_setting.exe** file from the agent install folder.*

Ensure you select the following options for **Specify the setup of RAID**.

Select **Yes** to **Do you want to specify setup of RAID Manager?**

Select **Enable** for **Specify centrally manage pair configuration mode**.

4. Refresh the Hosts from Device Manager

Device Manager should be able to see the latest configuration on the hosts.

5. Create Sites to represent the following structure

- a. Primary Site — Include the following resources:
 - i. Storage Primary
 - ii. Host Primary
- b. Remote Site — Include the following resources:
 - i. Storage Remote
 - ii. Host Remote

— End of Lab Activity 9 —

Lab Activity 10

ShadowImage

Operations

Overview

Objectives

Upon completion of this lab activity, you should be able to:

- Setup ShadowImage pairs
- Manage ShadowImage pair status

References

- *Hitachi Replication Manager Software Users Guide*

Perform ShadowImage Operations

The following tasks will test the functionality offered by ShadowImage software.

1. Identify Production Volume to Replicate

- a. Identify the volume to be replicated – Primary.

LUN — _____ Mount Point/Drive Letter — _____

- b. Identify the volume to be replicated to – Secondary.

LUN — _____

2. Write Data on Primary Volume

Copy some folders from C:\ to the Primary Volume. This will be used as the production data that needs to be replicated to the Secondary Volume.

3. Create ShadowImage Pair

Use Replication Manager GUI to create a ShadowImage Pair. Use the **— 15** specification for creating the pair.

Hint: Hosts > [Hostname] > LUNs > Unpaired > [Primary Volume] > Pair Management

Create Copy Pair

Create Copy Pair includes the following steps:

Step 1	Step 2	Step 3	Step 4
Launching Wizard	Pair Association	Group Management	Task Management
• Select P-VOLs • Select P-VOLs on the LUN list	• Associate Copy Pairs • Specify copy types • Specify S-VOLs • Associate P-VOLs with S-VOLs	• Define Copy Groups • Create Copy groups • Specify pair management parameters • Associate copy pairs with copy groups	• Set Execution Options • Specify immediate or scheduled pair creation • Specify advanced options for pair creation

Step 1 — Launching Wizard

1. From the Hosts or Storage Systems view in the **Resources** drawer, select the primary volume (P-VOL) from the **Unpaired LUN** list.

Note: You mapped this LUN earlier in this lab.

2. In the Application area, click **Pair Management** to launch the Pair Configuration wizard.
3. The introduction screen lists required steps for pair configuration. Click **Next**.

Step 2 — Pair Association

The **Pair Association** window allows user to define complex pair configuration with topological view.

The P-VOLs user specified on the LUN list are listed on the **Pair List** pane. Isolated P-VOL icon is displayed on the **Copy Topology** pane.

1. To create new pair group, click **Add Group** to open the Add Pair Group dialog box.
2. Specify the **Pair Group Name** and select appropriate copy product from the list for **Copy Type** and click **OK**.

Note: In a **Pair Group** name, you cannot use a space character and you cannot use a hyphen (-) at the beginning.

With Add Pair group operation, the window shows new pair group in the **Copy Topology** pane.

3. To assign the S-VOLs, select target P-VOLs on the **Pair List** pane. Now select corresponding S-VOLs on the **Volume Selection** pane.
4. Under **Select Volume** select **Type** as **Secondary**.
5. Under **Filter By**, select the following:

Site: Remote Site

Host Name: <select your remote host>

Storage Systems: <select your remote Storage Systems>

6. Click **Apply**.

Note: To find the S-VOLs quickly, the pane filters by site, host, storage systems, or logical group.

7. From the **Results** tab, expand the Storage Systems, Port and host group and select the S-VOL, and click **Add Selection** to associate P-VOL and S-VOL.

Once S-VOLs are associated with P-VOLs, the window shows pairs of P-VOL and S-VOL on the **Pair List** panel.

8. Click **Next** to proceed.

Step 3 — Group Management

The Group Management window allows a user to define CCI copy groups for the pair groups, and setup parameters for pair management.

The **Pair Group** pane provides a topological view of the pair group defined in the previous step, and a **Pair List** pane lists the copy pairs for the selected pair group.

1. To create new copy group, on the **Copy Group** pane click **Create Group**.

A Copy Group is a group of copy pairs created for management purposes, as required by a particular task or job. Using Copy Groups, you can perform operations such as changing the pair status of multiple copy pairs at once.

The Create Group dialog box appears.

2. Specify Copy Group name and CCI Configuration Definition file related information (instance number and communication port number). The CCI configuration file can be placed separately for the primary volume and secondary volume instances.

If the Copy Group uses existing instance number, specify the number from the list.

As a default value, the window shows pair group name as the copy group name.

3. Enter the following and click **OK**.

Note: You can use other instances and UDP port numbers:

Copy Group: *Grp_Orcl*

Primary Server

Instance Number = 108

UDP Port Number =11108

Secondary Server

Instance Number = 109

UDP Port Number =11109

The Copy Group is now defined. The topology view displays the Copy Group attribute as **Unassigned**.

4. Click **Apply** to add the Pair Group instance to the newly created Copy Group instance. The selected pair instances are added to the Copy Group and also the topology view displays the **Copy Group** attribute as **Assigned**.
5. After confirming that all the pair groups show **Assigned** on the **Pair Group** pane, click **Next** to continue. The Task Management screen appears.

Step 4 — Task Management

The final step of the wizard is to setup execution options, which allows the user to specify the options for pair creation. The **Task List** pane displays copy groups to be created and the default execution option is immediate.

1. Click the **edit** icon of the copy group. The **Task Options** tab displays the following **Execution Request** time options:
 - ♦ Execute Immediately
 - Task will start when Pair Configuration Wizard finishes
 - ♦ Execution Date
 - Scheduled execution, specify date and time
 - ♦ Modify Pair Configuration File Only (Do not create pair)
 - Only modifies the CCI definition (HORCM) configuration file
2. Leave the execution request time to default and click the **Pair Setting** tab and look at the different options.
3. Click **Next** to continue. A confirmation screen with the Pair List and Task List is displayed.
4. Scroll down and click the check box for **I have confirmed the above information and wish to create pair configuration** to create volume pairs. Click **Confirm**.
5. Click **Finish** to end the Pair Configuration Wizard. Task is registered and executed based on the specified schedule.
6. Go to the **Tasks** view and view all the execution tasks listed.
7. Refresh the **Tasks** view to check task completion. The Status column will indicate task execution status.
8. Wait for the completion of all Tasks and ensure the status is **Success**.

4. Check Task/Pair Status

1. Validate that the task was executed successfully.

Hint: Tasks

2. Validate that the Pair Status is now **PAIR**.

Hint: Hosts > [Host Name] > Pairs > Paired > [Pair Volume]

5. Delete the Pair

Validate that the volumes are not paired.

Hint: Hosts > [Host Name] > Pairs > Unpaired

6. Map and mount Secondary Volume to confirm if data was copied.

– End of Lab Activity 10 –

Lab Activity 11

TrueCopy Operations

Overview

Objectives

Upon completion of this lab activity, you should be able to:

- Setup Remote Paths
- Setup TrueCopy Pairs
- Manage TrueCopy Pair status

References

- *Hitachi Replication Manager Software Users Guide*

Perform TrueCopy Operations

Collect the connectivity information about your environment.

Primary Site Port	Remote Site Port
	→
	→
	←
	←

Check with your instructor for above information needed to setup the Remote Paths.

Hint: **Storage Systems** > [Storage Name] > **Open** > **Remote Paths**

A. Setup Remote Paths

1. From the **Explorer** menu, select **Resources**, and then **Storage Systems**.
2. Expand the object tree, and then select a storage system under Storage Systems.
3. Click **Open**.
4. Under the **Remote Paths** tab, click **Create Path**. The Create Remote Path Wizard starts.
5. Follow the instructions provided by the wizard to create a remote path.

The remote path you created is displayed in the Open sub-window.

B. Identify Production Volume to Replicate

1. Identify the volume to be replicated – Primary.
LUN — _____ Mount Point/Drive Letter — _____
2. Identify the volume to be replicated to – Secondary.
LUN — _____

C. Write Data on Primary Volume

Copy some folders from C:\ to the Primary Volume. This will be used as the production data that must be replicated to the Secondary.

D. Create TrueCopy Pair

Use Replication Manager GUI to create a TrueCopy Pair. Use the following specifications for creating the Pair.

- Copy Pace — 15
- Fence Level — Never

Hint: **Hosts** > [Hostname] > **LUNs** > **Unpaired** > [Primary Volume] > **Pair Management**

E. Check Task/Pair Status

1. Validate that the task was executed successfully.

Hint: **Tasks** > **Pair Management**

2. Validate that the Pair Status is now **PAIR**.

Hint: **Hosts** > [Host Name] > **Pairs** > **Paired** > [Pair Volume]

F. Split Pair to Access Secondary Volume

1. To access data copied on to the secondary volume, split the pair.

Hint: **Hosts** > [Host Name] > **Pairs** > **Paired** > [Pair Volume] > [Copy Group] > [Copy Pair] > **Change Pair Status**

2. Validate that the task was executed successfully.

Hint: **Tasks** > **Pair Management**

3. Validate that the Pair Status is now **SPLIT**.

Hint: **Hosts** > [Host Name] > **Pairs** > **Paired** > [Pair Volume]

G. Check Data on Secondary Volume

Mount the secondary volume and verify that the data from the primary volume has been copied.

H. Modify Data on Primary Volume

Create some new folders on the primary volume. This represents the differential data.

I. Resync the Primary and Secondary Volume

1. Unmount the Secondary Volume before resyncing the pair.
2. Perform Resync Operation on the pair.

Hint: Hosts > [Host Name] > Pairs > Paired > [Pair Volume] > [Copy Group] > [Copy Pair] > Change Pair Status

3. Validate that the Pair Status is now **PAIR**.

Hint: Hosts > [Host Name] > Pairs > Paired > [Pair Volume]

J. Validate that the volumes were synchronized again.

1. Split the Pair again (Step F).
2. Validate the data on Secondary Volume (Step G).

K. Delete the Pair

1. Delete the pair.
2. Validate that the volumes are not paired.

Hint: Hosts > [Host Name] > Pairs > Unpaired

L. Delete the Remote Paths

Hint: Storage Systems > [Storage Name] > Open > Remote Paths

— End of Lab Activity 11 —

Lab Activity 12

Hitachi Tuning Manager GUI

Introduction

Objective

In this lab you will use the Hitachi Tuning Manager software basic GUI Navigation options. Upon completion of the lab, you should be able to:

- Log in to Tuning Manager
- Explore Resources options

Overview

The primary objective of this lab project is to give you an opportunity to explore the Main Console.

Log In to Tuning Manager

To begin the lab activity, use one of your lab group servers as web client.

1. Open the web browser and connect to the Tuning Manager server
`http://<IP_address_of_Tuning_Manager_Server>:23015/TuningManager/`
2. Click the **License** button to open the License Information dialog.

Which products have a license key installed?

Which version of Tuning Manager software is installed? _____

Which Tuning Manager license type is installed? _____

What is the total licensed capacity (all DKCs) _____

3. Close the License Info dialog and log in to Tuning Manager software using:

User ID: **system**

Password: **manager**

The Tuning Manager Main Console opens.

Administration Tasks

Familiarize yourself with the information presented.

1. In the Explorer pane, select **Administration**.
2. Choose **Users and Permissions**.
3. List the users provided by default for initial login.

4. Record the permissions granted to the user **System**.

5. **Add New User** specifying **team(x)** (where x is your lab group number) as **User-Id** and **password**.
6. **Change Permissions** for this new user as follows.
HTnM —Admin, All other products — Modify
7. Open a second Web browser, connect to Tuning Manager and log in using the newly generated user credential.

8. Select **Administration** from the Explorer pane and compare the tasks available with the ones for the user, "system."
9. Explain why you are not able to create a new user when logged in as "team(x)"

Reason: _____

Ask you lab instructor if you cannot explain the reason.

10. Close the Tuning Manager GUI for the user, **system**.
 11. Use the **Dashboard** in the Explorer pane of the user, **team(x)** to switch to the HDvM Server.
 12. Interpret what happened. _____
-

If you cannot explain the meaning of the error message presented, ask the lab instructor for clarification before continuing.

13. Log in to the Hitachi Command Suite 7 (HSC) using:

User ID: **system**

Password: **manager**

14. Navigate to **Administration > Resource Groups**, and select the new user in the Resource Group Mappings window.
15. Map the new user to the Resource Group, **All Resources**.
16. Log out of both Device Manger and Tuning Manager.
17. Log in to Tuning Manager again as user **team(x)**.
18. Switch to the HDvM server again.

Is it possible to perform any **Administration** tasks on Device Manager? **Y / N**

Explain why: _____

19. Verify that you can perform functions according to the permission granted.
 20. Open the **File** tab and select **Close** to end HCS application.
Note: Do not use **Logout** for ending HCS since this would disconnect communications between the HCS products. As a result, you would have to execute a new login to HTnM.
 21. Back to the **Tuning Manager Explorer > Administration** of user team(x).
 22. Select **Data Polling**.
-

23. Validate that the following agents are connected to the Tuning Manager server.

Agent for Server System

Agent name _____ Related Agent name _____

Device Manager (HDvM)

Agent name _____ Related Agent name _____

Agent for Switch

Agent name _____ Related Agent name _____

24. Click **Edit General Polling Setting**, set polling to every odd hour and click **OK**.

25. Select the check box for **HDvM** and click **Edit Polling Schedule** on the bottom of the information screen.

26. Set polling to every hour and confirm with **OK**.

27. Select all Agents and perform a manual poll.

28. When polling has finished, click on **System Reports** under **Administration**, select the latest poll record and evaluate the information presented.

29. Close the System Report and select **Data Retention** as Administration task.

30. Review the default data retention period settings.

31. Change the retention value of **System Reports** to 12 weeks.

32. Verify the change.

Basic GUI Navigation

1. In the Explorer pane, click **Resources > Subsystems**, expand **Subsystems** in the Navigation pane and expand the enterprise subsystem monitored by Tuning Manager.
2. Select **Ports** from the tree and click the **Ports** tab in the Explorer Context-Area.
3. Now click the port (hyperlink, not the radio button) to which your Windows or Solaris host is attached. (*Note: Ask your instructor for connectivity details*)
4. What is the default time window of the Trend Reports shown? _____
5. Click **Create** to create a new report time window.
6. Call it "**Last 24 hours at minute,**" provide the appropriate settings, save the report and close the Create Report Window.
7. Click **Correlation Wizard** in the Application bar.
8. Select the following attributes for the **Resources**:
 - a. Ports → IOPS
 - b. CHPs → Busy Rate

9. Specify the Report Window you have just created as **Primary Report Window** and *Last 1 hour at minute* as Secondary Report Window.
10. Click **Next** to view the Trend Report for the resources selected. The Charts allow you to correlate the metrics for multiple resources at a given point of time.
11. Click **Export** to export the data to a .CSV file. Save the file on your desktop, and open it with Microsoft Excel to verify the contents.
12. Close the **Trend Report** to return to the Main Console.
13. Under the **HSDs**, click on the Host Storage Domain (host group) for your Windows or Solaris Host.
14. The **Host Storage Domain** appears as subtitle of the **Port** listing in the Navigation pane.
15. Use the different tabs in the Application area to view the resources correlated with the selected Host Storage Domain.
16. Click on the **Hosts** tab in the explorer context-area to view the File Systems and Device Files associated with the Host Storage Domain.
17. Click on one of the *<Drive Letter>*: for your host. The **Host** view opens. Note the connectivity details available under **Device Files** section.
18. With that selection, run the **Correlation Wizard** and select the following attributes and Resources:
 - a. Ports > IOPS, Transfer (Use CTRL or SHIFT key to select more than one resource)
 - b. Subsystems > Write Pending
 - c. LDEVs > I/O Response Time
 - d. Array Groups > I/O Usage
 - e. Default Report Window
19. Click **Next** to view the Trend Report for the resources selected. Compare the charts and try to create a correlation between the various charts and then close the report.
20. Now run a **Historical Report** for the Windows or Solaris host.
21. Use the Report Window you have created earlier and **CPU Usage(1)** as the **Attribute Group**, then click **Apply**.
22. To make this report appear permanent in the Dashboard click **Save**.
23. Provide the requested attributes and click **OK**.
24. Close the Historical Report generated and verify it displays in the Dashboard.
25. Click **Edit** in the Dashboard section to hide this report.

26. Run a **Forecast Report** for the Windows or Solaris Host with the following attributes:
 - Last 1 hour at minute* for CPU Usage
 - Forecast 10 records
 - Confidence level of 0.95
27. Interpret the data the report is showing and then click **Close**.
28. Click the **Print View** button to view a printable version of the chart and associated data and then close.
29. Back to the Explorer pane, click **Fabrics** and expand the type of Fabric Tuning Manager is monitoring in the Navigation pane.
30. Select a switch and verify the data displayed in the Summary Information.
31. Show the details of at least one port and interpret the information.
 - Note:* There is no Correlation Wizard available for the Fabric Resources.
32. Select any three ports by selecting their check box.
33. Click **Performance Summary** to compare the switch performance metrics. Is the report filtered on the ports you selected? **Y/N**
34. Close.
35. Click **Historical Report** to view past performance metrics. Is the report filtered on the ports you selected? **Y/N**
36. Close.

– End of Lab Activity 12 –

Lab Activity 13

Hitachi Command Director Reports

Introduction

Objectives

Upon completion of the lab project, you should be able to:

- Use Reports to gather information

Viewing Reports

You can access reports on the Dashboard, from the **Select a Report** dropdown menu, or on the tabs that you saved. You can also view the reports that are scheduled from the selected folder or application.

View reports on the Dashboard

1. Select the business view that contains the application that you want to monitor.
Note: that some reports are only for applications.
2. Select the appropriate item and verify that the **Dashboard** tab (default) is selected.

View Reports Using Select a Report Menu

1. Select the business view that contains the application that you want to monitor.
Note: that some reports are only for applications.
2. On the **Select a Report** dropdown menu, select the appropriate report.

View Reports on the Reports Tab

1. Select the **Reports** Tab
2. Select the appropriate report and view the report.

Answer the following questions

- i. Can report delivery be scheduled? Why?

- ii. Reports can be exported in what format?

3. Use the Administrator -> Data Collection -> Host Collectors panel to disable **HOST data collection** for your host.
4. Try launching File System Reports for your Host. Does it work? **Y/N**

– End of Lab Activity 13 –

– END OF LAB –