

13	Make changes to the data on the BCL. We will then revert the changes in Step 14 by re-establishing the BCL. On the Secondary host: Remove all test files from the BCL volumes <pre># cd /students/<SGN>/LAB2BCV # rm testfile.* # ls -al testfile.2???</pre> Unmount the file system and export the volume group <pre># umount /students/<SGN>/LAB2BCV # vgchange -a n bcvgBCLLab2<SGN> # vexport bcvgBCLLab2<SGN></pre>
14	On the Primary host - Re-establish the pairing between the BCLs and the Standard Volumes. This operation copies the data that has changed on the Standard Volumes since the split, to the BCLs (incremental copy). The changes made to the BCLs will be over written. Verify that the changes made to the BCLs are lost and that the changes to the Standard Volumes are copied over. <pre># symmir -g stdbg<SGN> est -nop</pre>

15	Split the BCV, import the volume group, mount the file system and verify that all 3000 testfiles are back on the BCV volumes On the Primary Host: Split the mirrors <pre># symm1r -g stddg<SGN> split -ppath STPDEVs - instant -nop</pre> On the Secondary Host : Import the Volume Group <pre># mkdir /dev/bcvgBCLLab2<SGN> # mknod /dev/bcvgBCLLab2<SGN> c 64 0x01000 # vgimport -m stdv<SGN>.map bcvgBCLLab2<SGN> /dev/dsk/c#t#d# /dev/dsk/c#t#d#</pre> Activate the Volume Group <pre># vgchange -a y bcvgBCLLab2<SGN></pre> Mount the file system and list its contents <pre># mount /dev/bcvgBCLLab2<SGN>/stdlv<SGN> /students/<SGN>/LAB2BCV # cd /students/<SGN>/LAB2BCV # ls -al testfile.* wc -l</pre> How many files are there?	16 On the Secondary Host, make a new directory within the LAB2BCV file system <pre># mkdir /students/<SGN>/LAB2BCV/moredata</pre>
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17	On the Secondary Host, add 500 files to the new directory on the BCV <pre># /students/scripts/CreateFiles.sh /students/<SGN>/LAB2BCV/moredata 500 -nop &</pre> Prepare to restore the contents on the BCV to the Standard Volume <pre># umount /students/<SGN>/LAB2BCV # vgchange -a n bcvgBCLLab2<SGN> # vgeport bcvgBCLLab2<SGN></pre>	
18	Verify that the new file system and data created on the BCVs is now available on the STD devices. On the Primary Host: Start the TimeFinder restore <pre># symmir -g stddg<SGN> restore -nop</pre> Activate the volume group <pre># vgchange -a y stdvg<SGN></pre> Mount the file systems on the standard volume. <pre># mount /dev/stdvg<SGN>/stdlv<SGN> /students/<SGN>/LAB2STD</pre> How many files are in the /students/<SGN>/LAB2STD/moredata directory?	
19	On the Primary Host, split the BCV <pre># symmir -g stddg<SGN> split -nop</pre>	

20	Clean up the server for the next lab group. Unmount file systems, detach the BCVs, destroy the Volume Groups, and remove the mount point directories. On Primary host: <pre># umount /students/<SGN>/LAB2STD # rm -r /students/<SGN>/LAB2STD # vgchange -a n stdvg<SGN> # vexport stdvg<SGN></pre> On Secondary host: <pre># umount /students/<SGN>/LAB2BCV # rm -r /students/<SGN>/LAB2BCV</pre>
	This concludes TimeFinder Lab 2 (HP-UX - LVM).

Lab Exercise 3: TimeFinder Clone (HP-UX LVM)

Purpose:

This exercise is designed to lead the student through the setup and operations of the EMC TimeFinder Clone facility. Students will identify devices for use as the Clone Source and Targets. A volume group, Logical Volume and a file system will be created on the Clone Source device. Data will be written to the file system on the Clone Source, a Clone session with a Clone Target will be created and activated. The data on the Clone Target will then be accessed by the same host as the Clone Source.

Objectives:

- At the completion of this lab, using the HP-UX Volume Manager and the SYMCLI command set, the students will be able to:
- Use the HP-UX Volume Manager to create a Volume Group, Logical Volumes and a File System on a Clone Source Volume.
 - Create a SYMCLI Device group and add a Clone Source and Clone Target Volumes to the same.
 - Create, activate, recreate, and restore a Clone session between the Clone Source and Clone Target.
 - Check the status of the Clone session.
 - Perform Business Continuity Operations by accessing the data on the Clone Target volumes.
 - Terminate the active Clone session.

References:

EMC Solutions Enabler Symmetrix Timefinder CLI - Version 6.0 PRODUCT GUIDE P/N - 300-000-876 - REV A0
PowerPath Product Guidel - Version 4.4 P/N - 300-002-308 - REV A01

Lab 3 Part 1: TimeFinder Clone Functionality

STEP	ACTION -
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1	Create a Volume Group, Volume and filesystem on the Clone Source Volume (Symmetrix Standard Device). Identify the Symmetrix Logical Volumes available to your host. <pre># symlinq more</pre> Or / Plus <pre># ioscan -fnc disk > dev_list3.txt</pre>						
2	Find the Standard Volume assigned as your Clone Source and complete the table. Note: Standard Volumes are Symmetrix Logical Volumes which do not have any description under the "Type" column in the output of the symlinq command. <table><tr><td>Standard Volumes (Clone Source)</td><td>PdevName (c#t#d#s2)</td><td>SymDevName (eg. 031)</td></tr><tr><td>Device 1</td><td></td><td></td></tr></table>	Standard Volumes (Clone Source)	PdevName (c#t#d#s2)	SymDevName (eg. 031)	Device 1		
Standard Volumes (Clone Source)	PdevName (c#t#d#s2)	SymDevName (eg. 031)					
Device 1							

3	Create a Volume Group on the standard volume with the following steps: Create the directory /dev/stdvg<SGN> with the character special file called group <pre># mkdir /dev/clonevg <SGN></pre> <pre># mknod /dev/clonevg<SGN>/group c 64 0x02000</pre> The minor number for the group file should be unique among all the volume groups on the system. It has the format 0xNN0000, where NN runs from 00 to 09. The maximum value of NN is controlled by the kernel tunable parameter maxvgs. The default for maxvgs is 10 and the maximum is 256. Initialize the disks <pre># pvcreate /dev/rdisk/cxtxdx</pre> Create and verify the information of a Volume Group <pre># vgcreate clonevg <SGN> /dev/dsk/c#t#d#</pre> <pre># vgdisplay -v clonevg <SGN></pre> Create an HP-UX Logical Volume called clonevol<SGN> - The following command creates a 200 MB Logical Volume named clonevol<SGN> <pre># lvcreate -L 200 -n clonevol<SGN> clonevg<SGN></pre> Create a UFS file system on the clonevol Logical Volume. The UFS file system is created via the newfs command. Note that the "raw" disk access to the Volume must be used for creating a file system. <pre># newfs /dev/clonevg<SGN>/rclonevol<SGN></pre>
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4	Create a mount point directory and mount the file system.. Note that the "block" disk access to the Volume must be used while mounting the file system. <pre># mkdir /students/<SGN>/clonefs # mount /dev/clonevg<SGN>/clonevol<SGN> /students/<SGN>/clonefs</pre> Add data to the FileSystem on the Clone Source. The script generates 1000 files <pre># /students/scripts/CreateFiles.sh /students/<SGN>/clonefs 1000 -nop</pre> Wait until the files are created. Perform a listing of the files on the file system to confirm that you have created the desired files. <pre># ls -l /students/<SGN>/clonefs</pre> How many files are created? _____						
5	On the secondary host, identify the Device on the same Symmetrix as the primary host that was assigned as your Clone Target. Record the information about your assigned Clone Target in the table below. Note that in this example the Clone Target is a Standard Device. BCV's can also be used as Clone Targets. # symlinq!more <table><tr><td>Clone Target</td><td>PdevName (c#t#d#s2)</td><td>SymDevName (eg. 031)</td></tr><tr><td>Device 1</td><td></td><td></td></tr></table>	Clone Target	PdevName (c#t#d#s2)	SymDevName (eg. 031)	Device 1		
Clone Target	PdevName (c#t#d#s2)	SymDevName (eg. 031)					
Device 1							

6

On the Primary host, create a SYMCLI Device Group and add your Clone Source and Target STD Volumes as members of the Device Group.

```
# symdg -type REGULAR create clonedg<SGN>
```

```
# symld -g clonedg<SGN> add dev
```

```
<CloneSourceSymDevName>
```

```
# symld -g clonedg<SGN> add dev
```

```
<CloneTargetSymDevName>
```

The Clone Source and Target SymDevNames are three digit numbers that were recorded earlier in this lab.

7

Identify the Logical Device Names of the Clone Source and Target

Volumes. A default logical name (ld) is assigned to each Symmetrix device

when it is added or associated with a Device Group. This logical name can be changed if desired. Identify the Logical Device Names assigned to your Clone source and target volumes.

```
# symld -g clonedg<SGN> list
```

Device	Logical Name (eg DEV001)	SymDevName (eg. 031)
Clone Source		
Clone Target		

8	Create a Clone Session. This creates a Clone session between the Clone Source and Clone Target. Creating a Clone session makes the Clone Target "Not-Ready" and also puts a "hold" on that device so that the Target cannot participate in other copy activities like TimeFinder, Snap or Clone. <pre># symclone -g clonedg<SGN> create <CloneSourceLogicalDevName> symId <CloneTargetLogicalDevName> -differential -precopy</pre> What is the purpose of the -precopy option? _____ What is the difference between the Clone create command with and without the "-differential" option? _____ <pre># symclone -g clonedg<SGN> query</pre> What is the "State" of this Clone session? _____ List the number of Protected Tracks on the Source Volume. _____ <pre># symId -g clonedg<SGN> -held list -v</pre> The command lists the devices in the device group that have a "hold" on them. What is the Device Status of the Clone Target device? _____ Why is the Target device placed in a "Not-ready" state after the creation of a Clone Session? _____
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10	Create additional test files on the Source Volume Filesystem. <pre># /students/scripts/CreateFiles.sh /students/<SGN>/clonefs 500 -nop &</pre> Perform a listing of the files on the file system to confirm that you have created the desired files. <pre># ls -l /students/<SGN>/clonefs wc -l</pre> How many files are in the directory?
9	Activate the Clone Session. <pre># symclone -g clonedg<SGN> activate <CloneSourceSymDevName> sym Id <CloneTargetSymDevName> -consistent</pre> <pre># symclone -g clonedg<SGN> query</pre> What is the state of the Clone Session? _____ List the number of Protected Tracks on the Source Volume. _____ <pre># symId -g clonedg<SGN> -held list</pre> What is the Device Status of the Clone Target device? _____ Did the Device Status change from the previous step? _____ What is the purpose of –consistent option? _____

11	Accessing the data on the Clone Target volume from the secondary host ----- On the primary host, create a map file and copy it to the secondary host <pre># umount /students/<SGN>/clonefs # vchange -a n clonevg<SGN> # vxport -p -m clonevg<SGN>.map clonevg<SGN> # rcp clonevg<SGN>.map <secondary_host>:/</pre> On the secondary host <pre># mkdir /dev/clonevg<SGN> # mknode /dev/clonevg<SGN>/group c 64 0x020000 (Note make sure this minor number is unique) # vgimport -m /clonevg<SGN>.map clonevg<SGN> /dev/dsk/c#t#d# # vchange -a y clonevg<SGN></pre>
12	Mount the file systems Clone Target Device and verify that the data is accessible. On the secondary host: <pre># mkdir /students/<SGN>/clonefs</pre> Remember that the Source file system was mounted at the time the Clone Session was activated. Thus a mount of the file system on the Clone device may fail and a "fsck" on the Target volume might be necessary. We will perform an fsck just to be sure. <pre># fsck -p /dev/clonevg<SGN>/rclonevol1<SGN> # mount /dev/clonevg<SGN>/clonevol1<SGN> /students/<SGN>/clonefs # ls -l /students/<SGN>/clonefs</pre> Do you see any of the new test files from Step 10 on the secondary host? Why or Why not?

13	Recreate and activate the clone session to incrementally copy all subsequent changes made to the source device (made after the point-in-time copy initiated) to the target device. On the secondary host: <pre># umount /students/<SGN>/clonefs # vgchange -a n clonevg<SGN></pre> Unmount the file system and deactivate the volume group On the primary host: <pre># symclone -g clonedg<SGN> recreate <CloneSourceLogicalDevName> sym Id <CloneTargetLogicalDevName> # symclone -g clonedg<SGN> activate <CloneSourceSymDevName> sym Id <CloneTargetSymDevName></pre>
14	Accessing the data on the Clone Target volume again on the secondary host On the secondary host: Activate the volume group <pre># vgchange -a y clonevg<SGN></pre> Mount the file systems <pre># mount /dev/clonevg<SGN>/clonevol<SGN> /students/<SGN>/clonefs # ls -l /students/<SGN>/clonefs</pre> How many files are in the directory? _____

15	Restore the data on clone to source volume. The session must have been created with –differential for incremental restore On the secondary host: Create additional 200 test files <pre># /students/scripts/CreateFiles.sh /students/<SGN>/clonefs 200 -nop Wait until all 200 files have been created.</pre> On the primary host: Restore the clone session <pre># symclone -g clonedg<SGN> restore DEV001 sym ld DEV002 -nop</pre> Activate the volume group <pre># vgchange -a y clonevg<SGN></pre> Mount the file system <pre># mount /dev/clonevg<SGN>/clonevol<SGN> /students/<SGN>/clonefs</pre> How many files are in the /students/<SGN>/clonefs directory? _____
16	Terminate the Clone Session on the Primary host. We will terminate the Clone session while the file system on the Target is still mounted. <pre># symclone -g clonedg<SGN> terminate DEV001 sym ld DEV002</pre> <pre># symclone -g clonedg<SGN> query</pre> <pre># symld -g clonedg<SGN> -held list</pre> Is there a "hold" on the Clone Target device? _____

17	Lab Cleanup: We will now clean up the server for the next lab group. On the primary host: <pre># umount /students/<SGN>/clonefs # symdg delete cloned<SGN> -force # vgchange -a n clonevg<SGN> # vgeexport clonevg<SGN> # rm -r /students/<SGN>/clonefs</pre> On the secondary host: <pre># umount /students/<SGN>/clonefs # vgchange -a n clonevg<SGN> # vgeexport clonevg<SGN> # rm -r /students/<SGN>/clonefs</pre>
	This concludes the TimeFinder Lab 3 – Clone (HP-UX - LVM).

Lab Exercise 4: TimeFinder Snap (HP-UX LVM)

Purpose: This exercise is designed to lead the student through the setup and operations of the EMC TimeFinder Snap facility. Students will identify devices for use as the Source and Snap Targets.

Objectives: At the completion of this exercise, using the HP-UX Volume Manager and SYMCLI command set the students will be able to:

- Use the HP-UX LVM to create a Volume Group, Logical Volume and a File System on a source volume.
- Create a SYMCLI Device group and add a Source, and Snap Target Volumes.
- Create and use multiple save device pools
- Monitor save devices
- Create and activate a Snap session between the Source and Snap Target.
- Check the status of the Snap session.
- Perform Business Continuity Operations by accessing the data on the Snap volumes.
- Terminate the active Snap session.

References: EMC Solutions Enabler Symmetrix Timefinder CLI - Version 6.0 PRODUCT GUIDE P/N - 300-000-876 - REV A0
PowerPath Product Guidel - Version 4.4 P/N - 300-002-308 - REV A01

Lab 4 Part 1: TimeFinder Snap - Configuring Additional Save Pools.

STEP	ACTION
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1	Contact the instructor for the save pool devices to be used. New Save Pool Name _____ Symmetrix Device ID (Save Devices) _____
2	List the current save pools on the Symmetrix <pre># symsnap -pools list</pre> How Many save pools are there ? _____
3	List the save devices in the "DEFAULT_POOL" – save pool <pre># symsnap -sid <your symmetrix ID> show pool DEFAULT_POOL</pre> Are any of the save devices in an active state ? _____
4	In this step, the save device in the DEFAULT_POOL assigned to you will be disabled . Create a text file, disable<SGN>.txt, containing the following line: <pre>disable dev <Your Save Device1>:<Your Save Device2> in pool DEFAULT_POOL, type = SAVEDEV;</pre> Use the text file with symconfigure command <pre># symconfigure -sid <Your Symmetrix ID> -f disable<SGN>.txt commit -nop -v</pre> Did the symconfigure command completed successfully? _____

5	Create a new save pool Create a text file, <code>create_pool<SGN>.txt</code>, containing the following line: <pre>create_pool pool<SGN>, type = SAVEDDEV;</pre> Use the text file with <code>symconfigure</code> command <pre># symconfigure -sid <Your Symmetrix ID> -f create_pool<SGN>.txt commit -nop</pre> Verify that a new save pool was created. <pre># symsnap -sid <Your Symmetrix ID> -pools list</pre> What is the state of the pool? _____
6	Add the disabled save device to the new save pool and enable it Create a text file, <code>adddev<SGN>.txt</code> containing the following line: <pre>add dev <Your Save Device1>:<Your Save Device2> to pool pool<SGN>, type = SAVEDDEV, member_state = ENABLE;</pre> Use the <code>adddev<SGN>.txt</code> file with the <code>symconfigure</code> command <pre># symconfigure -sid <Your Symmetrix ID> -f adddev<SGN>.txt commit -nop</pre> Verify that the device was added to the new pool and enabled. <pre># symsnap -sid <Your Symmetrix ID> show pool pool<SGN></pre> What is the state of the pool? _____ What is the state of the device? _____

Lab 4 Part 2: TimeFinder Snap Functionality

STEP		ACTION	
1	Identify the problem	2	Identify the cause
3	Identify the effect	4	Identify the solution
5	Identify the action	6	Identify the result
7	Identify the action	8	Identify the result
9	Identify the action	10	Identify the result
11	Identify the action	12	Identify the result
13	Identify the action	14	Identify the result
15	Identify the action	16	Identify the result
17	Identify the action	18	Identify the result
19	Identify the action	20	Identify the result
21	Identify the action	22	Identify the result
23	Identify the action	24	Identify the result
25	Identify the action	26	Identify the result
27	Identify the action	28	Identify the result
29	Identify the action	30	Identify the result
31	Identify the action	32	Identify the result
33	Identify the action	34	Identify the result
35	Identify the action	36	Identify the result
37	Identify the action	38	Identify the result
39	Identify the action	40	Identify the result
41	Identify the action	42	Identify the result
43	Identify the action	44	Identify the result
45	Identify the action	46	Identify the result
47	Identify the action	48	Identify the result
49	Identify the action	50	Identify the result
51	Identify the action	52	Identify the result
53	Identify the action	54	Identify the result
55	Identify the action	56	Identify the result
57	Identify the action	58	Identify the result
59	Identify the action	60	Identify the result
61	Identify the action	62	Identify the result
63	Identify the action	64	Identify the result
65	Identify the action	66	Identify the result
67	Identify the action	68	Identify the result
69	Identify the action	70	Identify the result
71	Identify the action	72	Identify the result
73	Identify the action	74	Identify the result
75	Identify the action	76	Identify the result
77	Identify the action	78	Identify the result
79	Identify the action	80	Identify the result
81	Identify the action	82	Identify the result
83	Identify the action	84	Identify the result
85	Identify the action	86	Identify the result
87	Identify the action	88	Identify the result
89	Identify the action	90	Identify the result
91	Identify the action	92	Identify the result
93	Identify the action	94	Identify the result
95	Identify the action	96	Identify the result
97	Identify the action	98	Identify the result
99	Identify the action	100	Identify the result

1	Create an HP-UX Volume Group, Identify the Symmetrix Logical Volumes available to your primary host <pre># syminq more Or / Plus # ioscan -fnc disk > dev_list2.txt</pre> Find the Standard Volume assigned as your Source and complete the table. <pre># sympd list</pre>						
2	Note: Standard Volumes are Symmetrix Logical Volumes which do not have any description under the "Type" column in the output of the syminq command. <table><tr><td>Standard Volumes (Source)</td><td>PdevName (c#t#d#)</td><td>SymDevName (eg. 031)</td></tr><tr><td>Device 1</td><td></td><td></td></tr></table>	Standard Volumes (Source)	PdevName (c#t#d#)	SymDevName (eg. 031)	Device 1		
Standard Volumes (Source)	PdevName (c#t#d#)	SymDevName (eg. 031)					
Device 1							

3	Create an HP-UX Volume Group and Logical Volume on the standard device. The following commands creates an HP-UX Volume group with a standard device. <pre># mkdir /dev/snapvg<SGN> # mknode /dev/snapvg<SGN>/group c 64 0x03000 # pvcreate /dev/rds/cxtxdx # vgcreate snapvg<SGN> /dev/dsk/c#t#d# # vgdsply -v snapvg<SGN></pre> Create an HP Logical Volume within the snapvg Volume Group . The following command creates a 400 MB Volume named snaprcvol<SGN> <pre># vchange -a y snapvg<SGN> (if required) # lvcreate -L 400 -n snaprcvol<SGN> snapvg<SGN></pre>
4	Create a UFS file system on the snaprcvol Volume. The UFS file system is created via the newfs command. Note that the "raw" disk access to the Volume must be used for creating a file system. <pre># newfs /dev/snapvg<SGN>/rsnaprcvol<SGN></pre> Create a mount point directory, mount the file system, and add 50 testfiles <pre># mkdir /students/<SGN>/hplab4 # mount /dev/snapvg<SGN>/snaprcvol<SGN> /students/<SGN>/hplab4 # /students/scripts/createfiles.sh /students/<SGN>/hplab4 50 -nop &</pre>

5	On the secondary host, identify the Device assigned as your Snap (VDEV) device. Record the information about your assigned Virtual and BCV devices in the table below. # symdev list -vdev more <table><tr><th>Device Type</th><th>PdevName (c##d#)</th><th>SymDevName (eg. 031)</th></tr><tr><td>Virtual device#1</td><td></td><td></td></tr></table>	Device Type	PdevName (c##d#)	SymDevName (eg. 031)	Virtual device#1		
Device Type	PdevName (c##d#)	SymDevName (eg. 031)					
Virtual device#1							
6	On the primary host, create a SYMCLI Device Group and add the Source, and Virtual Device as members of the Device Group. Create the device group and add source, and Virtual devices <pre># symdg -type REGULAR create stdg<SGN> # symld -g stdg<SGN> add dev <SourceSymDevName> # symld -g stdg<SGN> add dev <VirtualDevSymDevName> - vdev</pre> The Source, and VirtualDev SymDevName are three digit numbers that were recorded earlier in this lab.						
7	List the save pools. Snap session can then be assigned to a specific pool based on the usage pattern. This improves performance of snap volumes. # symsnap list -pools How many save device pools are there? _____						

8	Create snap sessions and assign it to a pool <pre># symsnap -g stddg<SGN> create -svp pool<SGN> <LogicalSourceSymDevName> sym dev <VirtualDevSymDevName> -nop # symsnap -g stddg<SGN> -pools query</pre> What is the status of the SRC⇔TGT column? _____ What the name of the save device pool used by these snap sessions? _____	
9	Activate the snap session. <pre># symsnap -g stddg<SGN> activate <LogicalSourceSymDevName> sym dev <VirtualDevSymDevName> -nop # symsnap -g stddg<SGN> query</pre> What is the status of the SRC⇔TGT column? _____	
10	On the primary host, monitor the usage of save device pool. Create a text file, /students/<SGN>/monitor.sh, action script containing the following lines: <pre>#/bin/sh echo "echo reached 10 percent">/students/<SGN>/monitor.out</pre> Make the file executable <pre># chmod +x /students/<SGN>/monitor.sh</pre>	
11	On the primary host, execute the monitoring command. <pre># symsnap -sid <SYM> monitor -percent 10 -i 5 -action "/students/<SGN>/monitor.sh" -norepeat -svp pool<SGN></pre>	

12	Create a HP map file and copy it to the secondary host. Unmount the file system <pre># umount /students/<SGN>/hplab4</pre> Deactivate the volume group <pre># vgchange -a n snapvg<SGN></pre> Create the mapfile <pre># vgeexport -p -m snapvg<SGN>.map snapvg<SGN></pre> Re-activate the volume group <pre># vgchange -a y snapvg<SGN></pre> Mount the file system back <pre># mount /dev/snapvg<SGN>/snapsrcvol<SGN> /students/<SGN>/hplab4</pre> Copy the file to the secondary host <pre># rcp snapvg<SGN>.map <Secondary_host>: /</pre>
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13	On the secondary host , import the volume group, mount the file system on the snap volume and verify that the data is accessible. <pre># mkdir /dev/snapvg<SGN> # mknod /dev/snapvg<SGN>/group c 64 0x030000 (Make sure your minor number is unique) # vgimport -m snapvg<SGN>.map snapvg<SGN> /dev/dsk/c##t##d# # vchange -a y snapvg<SGN> # mkdir /students/<SGN>/hplab4_snap # fsck -p /dev/snapvg<SGN>/rsnapsrcvol<SGN> # mount /dev/snapvg<SGN>/snapsrcvol<SGN> /students/<SGN>/hplab4_snap # ls -l /students/<SGN>/hplab4_snap On the primary host: # ls -l /students/<SGN>/hplab4 Are the contents of the two directories identical ?</pre>
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14	On the primary host, create additional 500 datafiles on the Source Filesystem. <pre># /students/scripts/CreateFiles.sh /students/<SGN>/hplab4 500 -nop &</pre> Perform a listing of the files on the file system to confirm that you have created the desired files. <pre># ls -l /students/<SGN>/hplab4 wc -l</pre> How many files are in the directory? _____
15	Investigate the Save devices <pre># symsnap list -save devs -svp pool<SGN></pre> What is the total used tracks on all save devices? _____ What is % Full of all save devices? _____ If the % Full is 10 percent or higher, check if the /students/<SGN>/monitor.out file was created by the symsnap monitor command. Was the file created? _____
16	On the secondary host, create 700 test files on the snap volume and verify the tracks used on save devices. <pre># /students/scripts/CreateFiles.sh /students/<SGN>/hplab4_snap 700 -nop &</pre> <pre># symsnap list -save devs -svp pool<SGN></pre> What is the total used tracks on all save devices? _____ How many files are in the students/<SGN>/hplab4_snap directory? _____

17 Prepare the hosts for a restore and restore the virtual device to the standard device.

On the secondary host:

Unmount the file system and deactivate the volume group

```
# umount /students/<SGN>/hplab4_snap
# vgchange -a n snapvg<SGN>
# vgeexport snapvg<SGN>
```

On the primary host:

Unmount the file system and deactivate the volume group

```
# umount /students/<SGN>/hplab4
# vgchange -a n snapvg<SGN>
```

Start the restore

```
# symsnap -g stdbg<SGN> restore -nop
```

Verify the status of the snap sessions

```
# symsnap -g stdbg<SGN> query -multi
```

Note: the original snap session remains and the restore creates an additional snap session. The restore leaves the VDEV in a NOT READY state.

What are the status of the 2 snap sessions?

18	Verify the contents of both source and target are identical On the primary host: Activate the volume group, mount the file system, and list the contents <pre># vgchange -a y snapvg<SGN> # mount /dev/snapvg<SGN>/snapsrcvol1<SGN> /students/<SGN>/hplab4 # ls -la /students/<SGN>/hplab4 wc -l</pre> How many files are in the students/<SGN>/hplab4 directory? _____ Is the number of files equal to that in Step 16? _____
19	Terminate the Snap Session. The restore session must first be terminated using the -restore flag. On the primary host: <pre># symsnap -g stdag<SGN> terminate <LogicalSourceSymDevName> sym Id <LogicalVirtualDevSymDevName> -restore # symsnap -g stdag<SGN> terminate <LogicalSourceSymDevName> sym Id <LogicalVirtualDevSymDevName> -restore</pre> Note: The restore session must first be terminated using the -restore flag.

20	Lab Cleanup: We will now clean up the server for the next lab group. On the primary host: <pre># umount /students/<SGN>/hplab4 # rm -r /students/<SGN>/hplab4 # vgchange -a n snapvg<SGN> # vxexport snapvg<SGN> # symdg delete stdg<SGN> -force</pre> On the secondary host: <pre># umount /students/<SGN>/hplab4_snap # rm -r /students/<SGN>/hplab4_snap</pre>
	This concludes the TimeFinder – Snap (HP-UX LVM) Lab.

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Symmetrix Business Continuity - TimeFinder Solutions Lab Guide - AIX



Global Education and Productivity
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Ver 2.1a

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2.1a	BCL LG Aix V21a.Doc		Name Change

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Notes:

SGN is the abbreviation for **Student Group Number**. This is the number that will be assigned to you by the instructor before starting the lab exercise.

Lab Exercise 1: TimeFinder Set up Lab.

Purpose:

In this lab exercise students will explore the configuration and basic setup of the Symmetrix TimeFinder facility using the EMC Solutions Enabler Command Line Interface (SYMCLI). Business Continuance Volumes (BCVs) will be identified and associated with a SYMCLI Device Group of type REGULAR. The contents of the Standard Volumes will be copied over to the BCVs. After synchronization, the BCVs will be split from the Standard Volumes, giving a point-in-time copy of the data.

After completion of this exercise, participants will be able to:

1. Display and identify the configured BCVs.
2. Create a SYMCLI device group of type REGULAR.
3. Associate BCVs with a SYMCLI device group.
4. Synchronize the BCVs with the Standard Volumes belonging to the SYMCLI device group.
5. Monitor the status and synchronization of the BCVs
6. Split the BCVs from the Standard Volumes to obtain point-in-time copy of the data.

References:

EMC Solutions Enabler Symmetrix Timefinder CLI - Version 6.0 PRODUCT GUIDE P/N - 300-000-876 - REV A06

Lab 1 Part 1: Verify your setup Environment.

STEP	ACTION
------	--------

1	Verify or setup your user environment for SYMCL. Check to see if the directory for SYMCL executables is included in your PATH variable and if not set, and export it. <pre># echo \$PATH</pre> Is the directory /usr/symcli/bin included in the PATH? _____ If not add /usr/symcli/bin to your PATH and export it, using the commands below. <pre># PATH=\$PATH:/usr/symcli/bin # export PATH</pre> Check to see if the directory for SYMCL manual pages is included in your MANPATH variable and if not, set and export it. <pre># echo \$MANPATH</pre> Is the directory /usr/symcli/man included in the MANPATH? _____ If not add /usr/symcli/man to your PATH and export it, using the commands below. <pre># MANPATH=\$MANPATH:/usr/symcli/man # export MANPATH</pre>
2	Initialize the SYMAPI Database (the file <pre>/var/symapi/db/symapi_db.bin) # symcfg discover</pre>

3

Identify the volumes accessible to your hosts. This and following TimeFinder exercises require two standard volumes and two BCL volumes. In the output of the `syminq` command, locate the devices assigned to you and complete the table below.

On the Primary host:

List all the volumes available to your host.

`syminq` | more

Identify the two Standard Volumes and record the host device names (PdevName) and the Symmetrix device names (SymDevName).

Note: Standard Volumes are those which do not have any description under the "Type" column.

Standard Volumes	PdevName (hdiskpower#)	SymDevName
Device 1		
Device 2		

On the Secondary host:

List the BCLs configured on the same Symmetrix and identify and record the pair of BCLs assigned to you.

Display summary information about all BCLs in the attached Symmetrix.

`symbcv list dev` | more

Display summary information about all BCLs accessible to your host.

`symbcv list pd` | more

BCLs	PdevName (hdiskpower#)	SymDevName	Attribute	Status
Device 1				
Device 2				

4

Create a device group, add standard devices and associate BCVs devices. The device group type should be of type REGULAR.

Your device group name: _____

Create a regular device group with the name `stdg<SGN>`.

```
# symdg -type REGULAR create stdg<SGN>
```

Add the two standard devices to the device group. Add the first device using its Physical Device Name (`hdiskpower#`), and the second device using its Symmetrix Device Name (eg. 088).

```
# symld -g stdg<SGN> add pd <PdevName>
# symld -g stdg<SGN> add dev <SymDevName>
```

Verify that the device group was added to the SYMAPI database

```
# symdg list
```

Show detailed information about your device group and record the Logical Device Names (`LdevName`) given to your two Standard Volumes.

```
# symdg show stdg<SGN> | more
```

Std. Volumes	PdevName	SymDevName	LdevName
Device 1			
Device 2			

	Associate the BCVs you identified, with the device group stdbg<SGN>. <pre># symbcv -g stdbg<SGN> associate dev SymDevName # symbcv -g stdbg<SGN> associate dev SymDevName</pre> Verify association and record the Logical Device name given to your BCVs. <pre># symdg show stdbg<SGN> more</pre> <table><tr><th>BCVs</th><th>PdevName</th><th>SymDevName</th><th>LdevName</th></tr><tr><td>Device 1</td><td></td><td></td><td></td></tr><tr><td>Device 2</td><td></td><td></td><td></td></tr></table> Set and export the variable that holds the value of your device group name. If this variable is set, the device group name need not be specified in the command line for subsequent steps. Note: Variables are case sensitive. <pre># export SYMCLI_DG=stdbg<SGN></pre>	BCVs	PdevName	SymDevName	LdevName	Device 1				Device 2			
BCVs	PdevName	SymDevName	LdevName										
Device 1													
Device 2													
5	Query the BCV devices in your device group. Because you set the environment variable SYMCLI_DG, it is not necessary to specify the device group with the -g flag. <pre># symcli query</pre> Did the command run successfully? _____												

6	Establish the pairing between the BCVs and the Standard Volumes. This synchronizes the contents of the BCVs with those of the Standard Volumes. If this is the first ever establish operation between the BCVs and the Standard Volumes, the “-full” option may have to be specified. This is because, the default is an incremental establish. Perform a full Establish a BCV with each standard device in your device group. <pre># symmir establish -full</pre> Query the status of the BCV devices. Obtain the synchronization rate, estimated time to completion. The command below repeats the query every 5 seconds, 10 times. <pre># symmir query -i 5 -c 10</pre> Synchronization rate: _____ Estimated time to completion: _____ BCV Device Status: _____
---	--

7	Split the BCV. A BCV must be fully synchronized before it can be split. Before synchronization is complete, attempt to split the BCV pairs. <pre># symmir split</pre> Did the split action succeed? _____ Run the "query" again and when the synchronization completes, attempt the split again. <pre># symmir query -l 5 # symmir split # symmir query</pre> You now have a point-in-time copy of your "data" - Reestablish your BCV you split above and again query your devices. <pre># symmir establish # symmir query</pre> Why did this establish complete so quickly? _____
8	TimeFinder Lab 2 will explore the use of a logical volume manager to present BCV volumes to the same host. Before proceeding to the next lab, ensure that the Standard-BCV pairs are split. Split the TimeFinder mirror <pre># symmir split</pre> Delete the SYMCLI device group <pre># symdg -force delete stdg<SGN></pre>
	This concludes TimeFinder Local Lab 1.

Lab Exercise 2: TimeFinder Integration Lab.

Purpose: In this lab exercise students will learn to manipulate the BCV DeviceGroup and the Standard Volume Group/ Logical Volumes and File systems..

After completion of this exercise, the students will be able to

- Establish the BCVs with the Standard Volumes and verify that they are fully synchronized.
- Split the BCVs and the Standard Volumes.
- Perform Business Continence Operations.
- Re-establish the BCVs with the Standard Volumes.
- Restore from the BCVs to the Standard Volumes

after performing Business Continence Operations.

References: EMC Solutions Enabler Symmetrix Timefinder CLI - Version 6.0 PRODUCT GUIDE P/N - 300-000-876 - REV A06
SCC Training / Advanced Unix Logical Volume Manager Rev – D / Apr-2004

Lab 2 Part 1: TimeFinder – AIX LVM Integration Lab

STEP	ACTION
------	--------

1

Create an AIX – Volume Group and a filesystem on the Standard Volumes.

Identify the Symmetrix Logical Volumes available to your host.

syminq | more

Note: This command may not return immediately. Wait for the command to finish

Find the two Standard Volumes assigned to you and complete the tables. Ensure that the Volumes you have chosen are not already a part of a AIX Volume group.

lsdev -Cc disk > my_disk.txt

Note: Standard Volumes are those which do not have any description under the "Type" column in the output of the syminq command.

Standard Volumes	PdevName (hdiskpower#)	SymDevName
Device 1		
Device 2		

2	Create an AIX Volume Group. The following command creates an AIX Volume Group named stdvg<SGN> and adds your two STD Volumes to the Volume Group. <pre># mkvg -y stdvg<SGN> -s 4 hdiskpower#</pre> Add an additional disk to the volume group. <pre># extendvg stdvg<SGN> hdiskpower#</pre> List the detailed information of the volume group. <pre># lsvg stdvg<SGN></pre> What is the PP size of the volume group _____ Verify that the two assigned devices belong to the volume group. <pre># lsvg -p stdvg<SGN></pre> Create a 300MB AIX Logical Volume within the stdvg<SGN> Volume Group. The command below creates a Logical Volume named myvol01, Student Group Number>. <pre># mkiv -y myvol01<SGN> stdvg<SGN> 75</pre> Note: Each partition of this volume group is 4 MB. The command above creates a volume with 75 partitions resulting in a volume of 300 MB in size. “Create” and “Mount” the new file system on the Volume Group you just created. <pre># mkdir -p /students/<SGN></pre> <pre># crfs -v jfs -d myvol01<SGN> -m /students/<SGN>/LAB2BCV</pre> <pre># mount /students/<SGN>/LAB2BCV</pre>
---	---

3	Add data to the Standard Volumes. The script create 3000 files. (test_files) <pre># /students/scripts/createFiles.sh /students/<SGN>/LAB2BCV 3000 -nop &</pre>		
4	Identify a pair of BCVs accessible by the Secondary host on the same Symmetrix. Record the information about your assigned BCVs in the table below. <pre># symbcv list pd</pre>		
	BCVs	PdevName (hdiskpower#)	SymDevName (eg. 031)
	Device 1		
	Device 2		
5	Create the device group, add the standard volume, and associate BCV pairs. <pre># symdg create stdg<SGN> -type regular # symld -g stdg<SGN> add dev STDsymDevName1 # symld -g stdg<SGN> add dev STDsymDevName2 # symbcv -g stdg<SGN> associate dev BCVsymDevName1 # symbcv -g stdg<SGN> associate dev BCVsymDevName2</pre>		
6	Confirm creation of the device group. <pre># symmir -g stdg<SGN> query</pre> Did the command run successfully? Why or why not? _____		
7	Establishing the BCVs. This synchronizes the contents of the BCVs with that of the Standard Volumes. <pre># symmir -g stdg<SGN> est -full -exact -nop</pre>		
8	Query the status of the devices. Verify synchronization. <pre># symmir -g stdg<SGN> verify -synched</pre>		

9	Split the BCVs and the Standard Volumes. This split uses PowerPath to briefly hold the I/O to create a consistent image on the BCV volumes <pre># symmir -g stddg<SGN> split -ppath STDDDEVs -instant - nop</pre>
10	On the secondary host, update the AIX configuration database (ODM), import the Volume Group and mount the file system that is on the BCV. <pre># cftmgr # importvg -y stdvg<SGN> hdiskpower# # mkdir -p /students/<SGN>/LAB2BCV # mount -v jfs /dev/myvol01<SGN> /students/<SGN>/LAB2BCV # df -k</pre> Were you able to mount the file system? How many files are in the /students/<SGN>/LAB2BCV and the directories ?

11	Make changes to the data on the BCV. We will then revert the changes in Step 12 by re-establishing the BCV. On the secondary host: Remove all test files from the BCV volumes <pre># cd /students/<SGN>/LAB2BCV # rm testfile.*</pre> Note: If the "rm testfile.*" command does not work, you may need to remove 1000 files at a time due to shell limitation on AIX. Unmount the file system. Then deactivate and deport the volume group. <pre># cd / # umount /students/<SGN>/LAB2BCV # varyoffvg stdvg<SGN> # exportvg stdvg<SGN></pre>
12	On the Primary host, verify if there are any invalid tracks, then re-establish the pairing between the BCVs and the Standard Volumes. This operation copies the data that has changed on the Standard Volumes since the split, to the BCVs (incremental copy). The changes made to the BCVs will be over written. Verify that the changes made to the BCVs are lost and that the changes to the Standard Volumes are copied over. Verify the number of invalid tracks. <pre># symmir -g stdvg<SGN> query</pre> What is the number of invalid tracks? _____ Establish the mirrors. <pre># symmir -g stdvg<SGN> est -nop</pre>

13	On primary host, split the BCV and export the volume group. On the secondary host, import the volume group, mount the file system and verify that all 3000 testfiles are back on the BCV volumes On the primary host: <pre># symmir -g stddg<SGN> split -ppath STDDEVs -instant -nop # umount /students/<SGN>/LAB2BCV # varyofvg stdvg<SGN> # exporting stdvg<SGN></pre> On the secondary host, import the volume group, mount one of your file systems and check out the number of files you have. <pre># importvg -y stdvg<SGN> hdliskpower# # mount -v jfs /dev/myvol01<SGN> /students/<SGN>/LAB2BCV # cd /students/<SGN>/LAB2BCV # ls -al testfile.* wc -l</pre> How many files are there?
----	--

14	On the Secondary host: Create a logical volume on the BCV. - Make a file system on the new Volume, - Create a mount point directory, - Mount the new file system and - Add new data Create a Logical Volume within the Volume Group and a file system. <pre># mklv -y bcvlv<SGN> stdvg<SGN> 16</pre> Create a mount point directory, file system, and mount the file system. <pre># mkdir /students/<SGN>/BCVLAB2FS</pre> <pre># crfs -v jfs -d bcvlv<SGN> -m /students/<SGN>/BCVLAB2FS</pre> <pre># mount /students/<SGN>/BCVLAB2FS</pre> Verify that the file system was mounted. <pre># df -k</pre> Add 500 files to the new file system on the BCV using the following script. <pre># /students/scripts/CreateFiles.sh /students/<SGN>/BCVLAB2FS 500 -nop &</pre>
15	Prepare to restore from the BCVs. As we have changed the Volume Manager configuration on the BCV Volume Group. We will unmount the file system on the BCV, deactivate and export the volume group. On the secondary host: <pre># cd /</pre> <pre># umount /students/<SGN>/BCVLAB2FS</pre> <pre># umount /students/<SGN>/LAB2BCV</pre> <pre># varyofvg stdvg<SGN></pre> <pre># exportvg stdvg<SGN></pre>

16	On the primary host, start the TimeFinder restore, import the volume group and mount the file system on the Standard Volume. Verify that the new file system and data created on the BCL at Step 14 is now available on the STD devices. <pre># symmir -g stdvg<SGN> restore -nop # importvg -Y stdvg<SGN> hdiskpower# # mkdir /students/<SGN>/BCVLAB2FS # mount /students/<SGN>/BCVLAB2FS</pre> How many files are in the /students/<SGN>/BCVLAB2FS directory?
17	Split the BCVs. <pre># symmir -g stdvg<SGN> split -nop</pre>

18	Clean up the server for the next lab group. Unmount file systems, export the Volume Group, and remove the mount point directories. On the primary host: <pre># cd /</pre> Unmount the file systems <pre># umount /students/<SGN>/LAB2BCV # umount /students/<SGN>/BCVLAB2FS</pre> Delete mount points <pre># rm -r /students/<SGN>/LAB2BCV # rm -r /students/<SGN>/BCVLAB2FS</pre> Deactivate and export the volume group <pre># varyofvg stdvg<SGN> # exportvg stdvg<SGN></pre> Delete the SYMCLI device group <pre># symdg delete stdvg<SGN> -force</pre> On the secondary host: Unmount the file systems <pre># umount /students/<SGN>/LAB2BCV # umount /students/<SGN>/BCVLAB2FS</pre> Delete mount points <pre># rm -r /students/<SGN>/BCVLAB2FS</pre> This concludes TimeFinder Local - Lab 2 (AIX).
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Lab Exercise 3: TimeFinder Clone (AIX)

Purpose:	This exercise is designed to lead the student through the setup and operations of the EMC TimeFinder Clone facility. Students will identify devices for use as the Clone Source and Targets. A volume group, Logical Volume and a file system will be created on the Clone Source device. Data will be written to the file system on the Clone Source, a Clone session with a Clone Target will be created and activated. The data on the Clone Target will then be accessed by the same host as the Clone Source.
-----------------	---

Objectives:	At the completion of this lab, using the AIX Volume Manager and the SYMCLI command set, the students will be able to: ▪ Using the AIX Volume Manager to create a Volume Group, Logical Volumes and File System on a Clone Source Volume. ▪ Create a SYMCLI Device group and add a Clone Source and Clone Target Volumes to the same. ▪ Create, activate, recreate, and restore a Clone session between the Clone Source and Clone Target. ▪ Check the status of the Clone session. ▪ Perform Business Continuity Operations by accessing the data on the Clone Target volumes. ▪ Terminate the active Clone session.
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References:	EMC Solutions Enabler Symmetrix Timefinder CLI - Version 6.0 PRODUCT GUIDE P/N - 300-000-876 - REV A0 PowerPath Product Guidel - Version 4.4 P/N - 300-002-308 - REV A01 SCC Training / Advanced Unix Logical Volume Manager Rev – D / Apr-2004
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Lab 3 Part 1: TimeFinder Clone Functionality

STEP	ACTION
------	--------

1	Identify the Symmetrix Logical Volumes available to your primary host. <pre># syminq more # lsdev -Cc disk > my_disk.txt</pre>						
2	Find the Standard Volume assigned as your Clone Source and complete the table. Note: Standard Volumes are Symmetrix Logical Volumes which do not have any description under the "Type" column in the output of the syminq command. <table><tr><th>Standard Volumes (Clone Source)</th><th>PdevName (hdiskpower#)</th><th>SymDevName (eg. 031)</th></tr><tr><td>Device 1</td><td></td><td></td></tr></table>	Standard Volumes (Clone Source)	PdevName (hdiskpower#)	SymDevName (eg. 031)	Device 1		
Standard Volumes (Clone Source)	PdevName (hdiskpower#)	SymDevName (eg. 031)					
Device 1							

3	Create an AIX Volume Group using your STD Volume. <pre># mkvg -y clonevg<SGN> hdiskpower#</pre> Verify that the volume group was created. <pre># lsvg clonevg<SGN></pre> Create a Logical volume within the Volume Group. The following command creates a 200 MB Volume named clonelv<SGN> <pre># mklv -y clonelv<SGN> clonevg<SGN> 50</pre> Create and mount a file system on the clonelv<SGN> Volume. <pre># mkdir /students/<SGN>/clonefs # crfs -v jfs -d clonelv<SGN> -m /students/<SGN>/clonefs # mount /students/<SGN>/clonefs</pre> Verify the file system is mounted. <pre># df -k</pre>
4	Add data to the Filesystem on the Clone Source. The script generates 1000 files <pre># /students/scripts/CreateFiles.sh /students/<SGN>/clonefs 1000 -nop</pre> Wait until the files are created. Perform a listing of the files on the file system to confirm that you have created the test files. <pre># ls -l /students/<SGN>/clonefs</pre> How many files are created?

5	On the Secondary host, identify the Device assigned as your Clone Target. Record the information about your assigned Clone Target in the table below. Note that in this example the Clone Target is a Standard Device. BCV's and SRDF devices can also be used as Clone Targets. <pre># symmd list more</pre> <table><tr><th>Clone Target</th><th>PdevName (hdiskpower#)</th><th>SymDevName (eg. 031)</th></tr><tr><td>Device 1</td><td></td><td></td></tr></table>	Clone Target	PdevName (hdiskpower#)	SymDevName (eg. 031)	Device 1		
Clone Target	PdevName (hdiskpower#)	SymDevName (eg. 031)					
Device 1							
6	On the Primary host, create a SYMCLI Device Group and add your Clone Source and Target STD Volumes as members of the Device Group. Create the SYMCLI device group. <pre># symdg -type REGULAR create stdg<SGN></pre> Add the standard device visible on the Primary host. This will serve as the clone source. <pre># symld -g stdg<SGN> add dev <CloneSourceSymDevName></pre> Add the standard device visible on the Secondary host. This will serve as the clone target. <pre># symld -g stdg<SGN> add dev <CloneTargetSymDevName></pre> The Clone Source and Target SymDevNames are three digit numbers that were recorded earlier in this lab.						

7

Identify the Logical Device Names of the Clone Source and Target Volumes. A default logical name (ld) is assigned to each Symmetrix device when it is added or associated with a Device Group. This logical name can be changed if desired. Identify the Logical Device Names assigned to your Clone source and target volumes.

```
# symld -g stddg<SGN> list
```

Device	Logical Name (eg DEV001)	SymDevName (eg. 031)
Clone Source		
Clone Target		