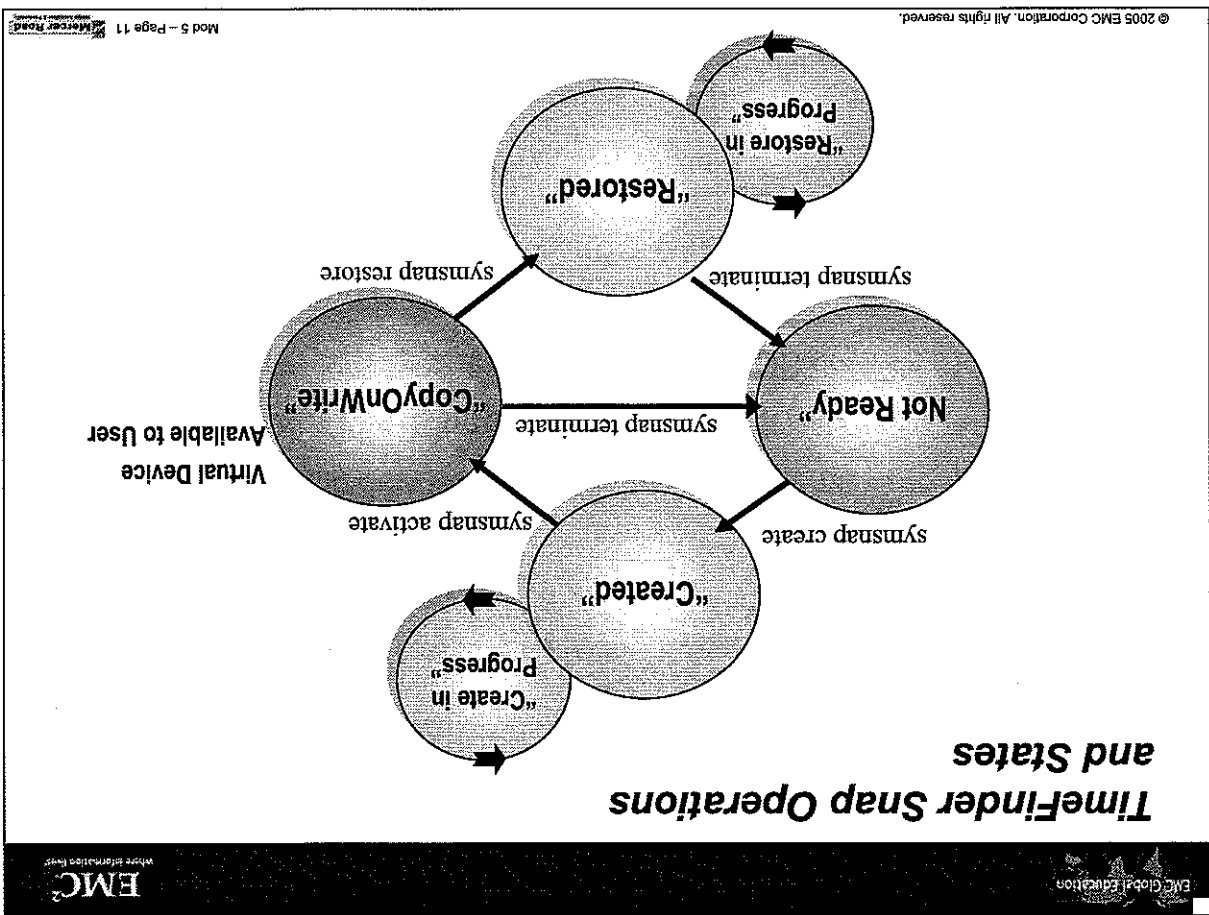




When a virtual device is in a "Not Ready" state, it can participate in a new snap session. The symSnap create argument creates a copy session and sets the track protection bitmap on the source device to protect all tracks and detect which tracks are being accessed by the target host or written to by the source host. The target virtual device remains Not Ready to its host and placed on hold status for copy session usage. This prevents other control operations from using the device. The device pair state will transition from "Create In Progress" to "Created" when complete.

When the copy session is "activated", a point-in-time copy of the data becomes available to a target host. The state of the device pair is "CopyOnFirstWrite". This means that any first write to the source device or target device during an active snap session will result in the data being copied to an additional save device for storage. The target host accesses the copy through the use of device pointers stored on the virtual device. The pointers keep track of where the data is located in physical storage for accessing the point-in-time copy from the time of activation.

SymSnap restore command is used to restore changed tracks to desired restore target which can be either a Symmetrix standard or BCV device. After users issue the command, the status of a virtual device will change to Restored and, subsequently, Restored. The snap session in the Restored state must be terminated before the snap session of the source can be terminated.

Terminating a session with the symSnap terminate command while the device pairs are in the CopyOnFirstWrite or Restored state will cause the session to end. Once the virtual copy session is terminated, the information is no longer available on the virtual device.



TimeFinder/SNAP: Consistent Activation

- Three methods to execute Consistent Activation
 - By specifying **-ppath** and PowerPath STD devices that hold the database
 - Specific devices – supply the device name
 - All devices using keyword **SRCDEVS**
 - Use **--rdb** for automatic mapping of DB devices
 - By specifying **--consistent**
 - By specifying **--vxfs** for VxFS filesystem (Solaris and HP only)

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There are three types of consistent activation available; each offers a restartable copy on the BCV devices:

- PowerPath
- BCA
- Veritas File System

TimeFinder Snap Operations

Common snap operations are

- Create
- Activate
- Restore
- Terminate

```
# symsnap -g savedb create DEV001 vdev 1d VDEV005 -svp save_db
# symsnap -g savedb activate DEV001 vdev 1d VDEV005
# symsnap restore DEV001 vdev 1d VDEV005
# symsnap -g savedb terminate DEV001 vdev 1d VDEV005
```

The SYMCLI symsnap – Create, Activate, Restore, and Terminate command set are displayed.



TimeFinder Snap Restore

Three types of restore operations can be performed for virtual device copy sessions:

- Incremental restore back to the original source device
- Incremental restore to a split BCV
- Full restore to any standard or split BCV device

Three types of restore operations can be performed for virtual device copy sessions:

- Incremental restore back to the original source device.
- Incremental restore to a BCV, which has been split from its original standard source device but maintains the incremental relationship with the source.
- Full restore to any standard or split BCV device outside of the existing copy session. The target device of the restore must be of the same size and emulation type as the source device.

Since Enginuity Version 5670, all original Snap copy sessions are maintained when performing a restore operation. A new restore copy session between the source device and the restore target device is created. A restore operation can only be performed if an additional copy session is available for use..

TimeFinder Snap Configuration Considerations

Cache

- There will be some additional cache required for TimeFinder Snap snapshots.
- Total number of VDEVs (snapshots) must be accounted for in cache calculations.

"VDEV" (snapshots)

- Are persistent so small physical devices must be allocated (1/600th the size of a source device).
- Consume SYM device ID and count as a DA target.
- Are not convertible to / from other device types (Standard / BCV).

Additional Cache is required for Snap snapshots. The number of VDEVs must be included in the cache calculations.

VDEVs are not customer configurable. Symmetric volume limits must be respected, VDEVs consume device IDs and count as DA targets, VDEVs count towards hypervolume limits for physical devices.

TimeFinder Snap Configuration Considerations

▪ **"SaveDev" (Save Area)**

- New type of device within a Symmetrix
- Physical device(s) store original data copied from source on Copy on First Write
- Recommendation of one SaveDev for every five snapshots that will be active at the same time (@20% change rate)
- SaveDev should be spread over as many physical volumes as possible
- SaveDev consumes SYM device IDs and count as DA targets
- Data is striped across entire Save Area

▪ **SaveDev (Save Area) Monitoring**

- SaveDev thresholds can be set and notifications can be sent
- SaveDev can be added dynamically using Symmetrix Manager
- When Save Area fills, all snapshots are terminated one by one
- Potential for rogue application to overrun all Save Area space

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Symmetrix volume limits must be respected. It cannot exceed total Symmetrix budgets for either device ID limits or DA target limits. SaveDev's consume device IDs and count as DA targets and cannot exceed hypervolume limits on physical devices since SaveDevs count towards hypervolume limits for physical devices.



Save Device Space Considerations

- Virtual Devices do not pre-allocate space for all potential copy-on-write tracks
- It is possible to run out of free space on the save devices..
- If Writes cannot complete due to no free space..
- The target VDEV goes Not Ready (NR), applications beware!
- Copy-on-write is disabled and the source track is changed



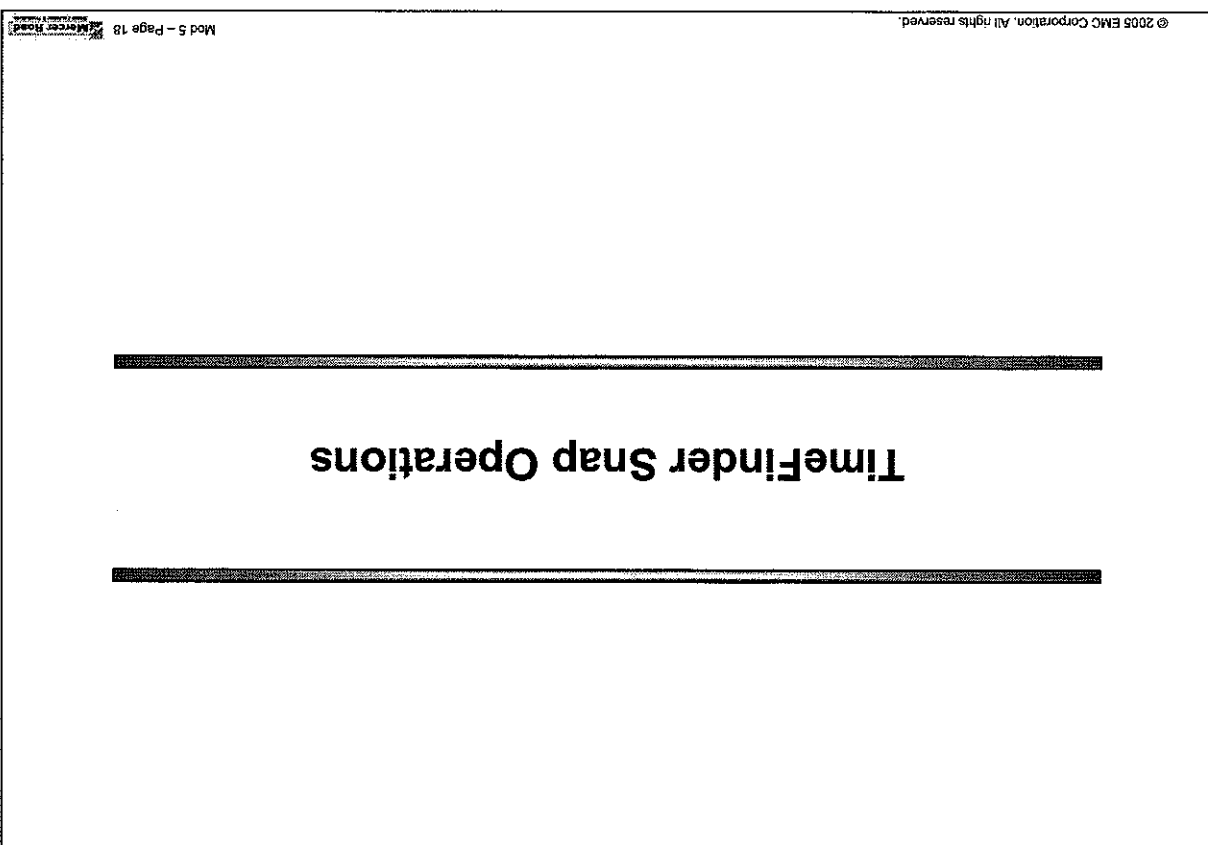
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Use symsnap monitor to track the amount of available space of the save area. The symsnap monitor command can also be used to automatically run an action if a predetermined threshold for space has been crossed. Use -percent nn -action script_pathname to specify the percentage full threshold and script associated with it.



TimeFinder Snap Operations



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List Save Pools

symsnap -pools list

Symmetrix ID: 0001874400024

SAVE DEVICE POOLS

Dev	Total	Enabled	Used	Free	Full Pool	Device
Emul	Tracks	Tracks	Tracks	(%)	State	State

DEFAULT_POOL_FBA	1379520	1379520	0	1379520	0 Enabled	Active





List Save Devices in a Pool

symsnap list -svp DEFAULT_POOL -save devs

Symmetrix ID: 000187400024

S N A P S A V E D E V I C E S

Sym	Emulation	Device	SaveDevice	Pool Name	Total Tracks	Used Tracks	Free Tracks	Full
0357	FBA	DEFAULT_POOL	14370	169	14201	1		
0358	FBA	DEFAULT_POOL	14370	0	14370	0		
0359	FBA	DEFAULT_POOL	14370	0	14370	0		
035A	FBA	DEFAULT_POOL	14370	0	14370	0		
0361	FBA	DEFAULT_POOL	14370	0	14370	0		
0362	FBA	DEFAULT_POOL	14370	57	14313	0		
0363	FBA	DEFAULT_POOL	14370	169	14201	1		
0364	FBA	DEFAULT_POOL	14370	169	14201	1		
0365	FBA	DEFAULT_POOL	14370	169	14201	1		
0366	FBA	DEFAULT_POOL	14370	169	14201	1		

Total Tracks								

View Save Pool's Details

```
# symsnap -sid 24 show pool DEFAULT_POOL
```

```
Symmetrix ID : 000187400024
```

```
Pool Name : DEFAULT_POOL
```

```
Dev Emulation : FBA
```

```
SAVE Devices(96) :
```

Sym	Total	Used	Free	Full	Pool	Device
Dev	Tracks	Tracks	Tracks	(%)	State	State
03E2	14370	0	14370	0	Enabled	Active
03E3	14370	0	14370	0	Enabled	Active
0410	14370	0	14370	0	Enabled	Active
0441	14370	0	14370	0	Enabled	Active
(TRUNCATED)						
Tracks	1379520	0	1379520	0		
MB(s)	43110	0	43110	0		



List Save Device's Details

symdev show 410

Symmetrix ID: 000187400024

Device Physical Name

: Not Visible

Device Symmetrix Name

: 0410

(TRUNCATED)

Device Capacity

{

Cylinders

:

958

Tracks

:

14370

512-byte Blocks

:

919680

MegaBytes

:

449

KiloBytes

:

459840

}

Device Configuration

: 2-Way Mir

Save Pool Name

: DEFAULT_POOL

(TRUNCATED)



Monitoring Save Device Space

- Use symsnap monitor to automatically run an action

```
# symsnap -sid 24 -percent 1 -action one_percent_script.sh -syp DEFAULT_POOL monitor -f 10 -c 5
```

The command monitor the save pool DEFAULT_POOL every 5 seconds for 10 iterations. If the save pool usage reaches 1 percent then execute the one_percent_script.sh.



Add VDEV to Device Group

```
# symdg create snapdg
# symld -sid 24 -g snapdg add dev 8a SRC001
# symld -sid 24 -g snapdg add dev 8f VDEV001
# symdg show snapdg
```

```
Number of STD Devices in Group      : 1
Number of Locally-associated VDEV's : 1
Standard (STD) Devices (1):
```

LdevName	PdevName	Sym Dev	Att. Sts	Cap (MB)
SRC001	/dev/rdisk/c1t2d3s2	008A	RW	449
VDEV Devices Locally-associated (0):				
VDEV001	/dev/rdisk/c2t12d3s2	0410	NR	449



symsnap create

symsnap list

Symmetrix ID: 000187400024
No Snap sessions found

symsnap -g snapdg create SRC001 vdev 1d VDEV001 -svp pool0 -noprompt

'Snap Create' operation execution is in progress for device 'SRC001',
paired with target device 'VDEV001', in
device group 'snapdg'. Please wait...
'Snap Create' operation successfully executed for device 'SRC001',
in group 'snapdg' paired with target device 'VDEV001'.

symsnap list -svp pool0

Symmetrix ID: 000187400024

Source Device	Target Device	Status	SaveDev

	Protected		
Sym	Tracks	Sym	G SRC <=> TGT PoolName

008A	14370 0410	X Created	pool0
Total	-----		
Tracks	14370		
MB(s)	449.1		

symsnap activate

```
# symsnap -g snapdg activate SRC001 sym Id VDEV001 -noprompt
```

```
'Snap Activate' operation execution is in progress for device 'SRC001'
paired with target device 'VDEV001' in
device group 'snapdg'. Please wait...
'Snap Activate' operation successfully executed for device 'SRC001'
in group 'snapdg' paired with target device 'VDEV001'.
```

```
# symsnap list
```

```
symmetrix ID: 000187400024
```

Source Device	Target Device	Status	SaveDev
---------------	---------------	--------	---------

Protected

Sym	Tracks	Sym	G SRC <=> TGT	PoolName
-----	--------	-----	---------------	----------

008A	14187	0410	X CopyOnWrite	pool0
------	-------	------	---------------	-------

Total

Tracks

MB(s)

Legend:

(G) : X = The Target device is associated with a group,
= The Target device is not associated with a group.



symsnap list-savedevs

symsnap list-savedevs

Symmetrix ID: 000187400024

S N A P S A V E D E V I C E S

Sym	Device	SaveDevice	Pool Name	Total Tracks	Used Tracks	Free Tracks	Full (%)
03E2	FBA	DEFAULT_POOL	DEFAULT_POOL	14370	0	14370	0
0410	FBA	DEFAULT_POOL	DEFAULT_POOL	14370	0	14370	0



symsnap restore

```
# symsnap -g snapdg restore SRC001 sym Id VDEV001 -nop
```

```
'Incremental Restore' operation execution is in progress for device  
'SRC001'  
paired with target device 'VDEV001' in  
device group 'snapdg'. Please wait...  
'Incremental Restore' operation successfully initiated for device  
'SRC001'  
in group 'snapdg' paired with target device 'VDEV001'.
```




Terminating Snap Sessions

```
# symsnap -g snapdg terminate SRC001 sym Id VDEV001 -restored -nop
```

```
'Terminate' operation execution is in progress for device 'SRC001'  
paired with target device 'VDEV001' in  
device group 'snapdg'. Please wait...
```

The 'Restored' session
must be terminated
first

```
'Terminate' operation successfully executed for device 'SRC001'  
in group 'snapdg' paired with target device 'VDEV001'.
```

```
# symsnap -g snapdg terminate SRC001 sym Id VDEV001 -nop
```

```
'Terminate' operation execution is in progress for device 'SRC001'  
paired with target device 'VDEV001' in  
device group 'snapdg'. Please wait...
```

```
'Terminate' operation successfully executed for device 'SRC001'  
in group 'snapdg' paired with target device 'VDEV001'.
```

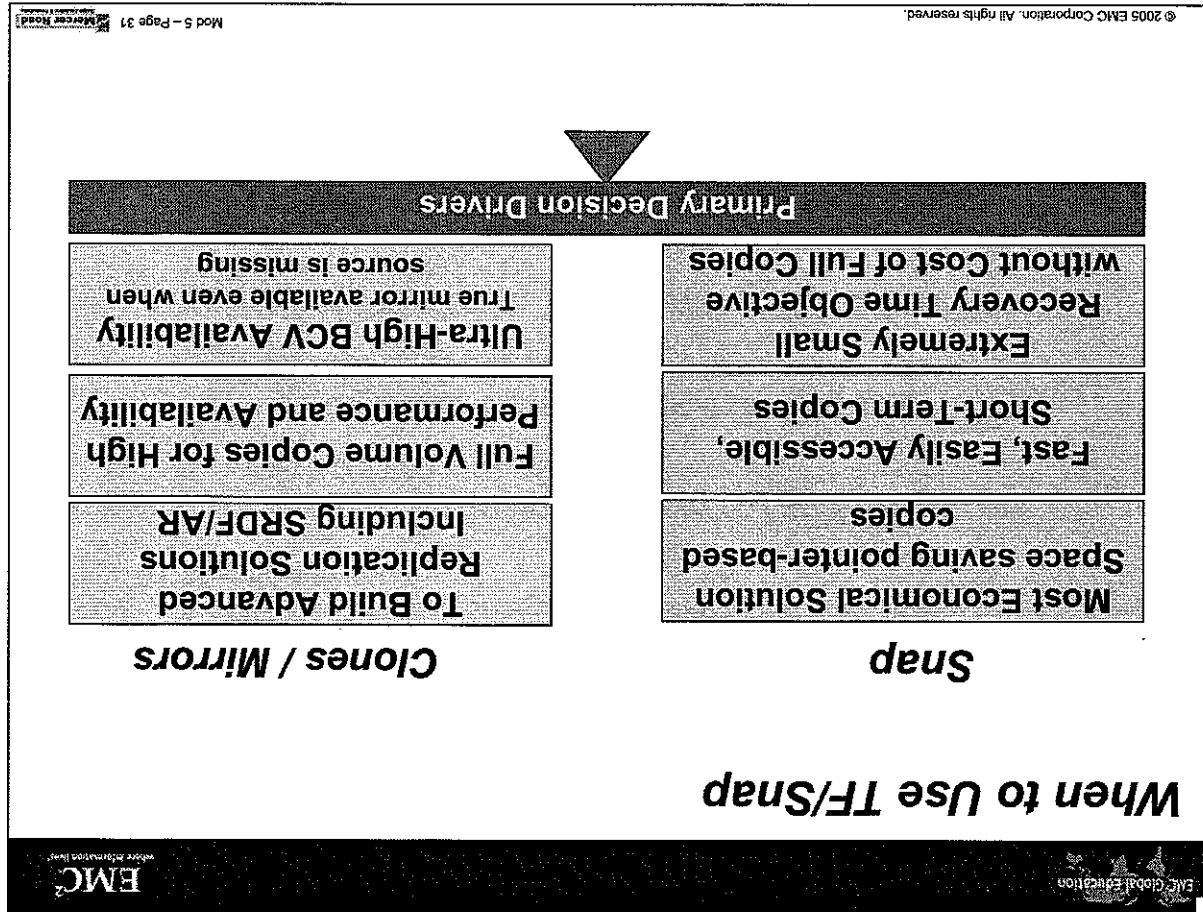
```
# symsnap -g snapdg query
```

```
Device group 'snapdg' does not have any devices that are Snap source devices
```

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The following table represents, when TimeFinder Snap vs. TimeFinder Clone – Mirror should be used. The above is a general diagram / guideline that should be used to generate discussion regarding the appropriate “TimeFinder” solution.

Module Summary

Key points covered in this Module :

- Described the advantages of a TimeFinder Snap environment
- Described a TimeFinder Snap "Copy on First Write" process within a created Snap session
- Described Create, Activate, Terminate and Restore TimeFinder Snap operations
- Identified and describe "Virtual Devices" within a TimeFinder Snap environment
- Described the SymCLI symsnap command set to Monitor, Create, Activate, and Query TimeFinder Snap sessions

The following Module Summary / Key Point for TimeFinder Snap " where presented.



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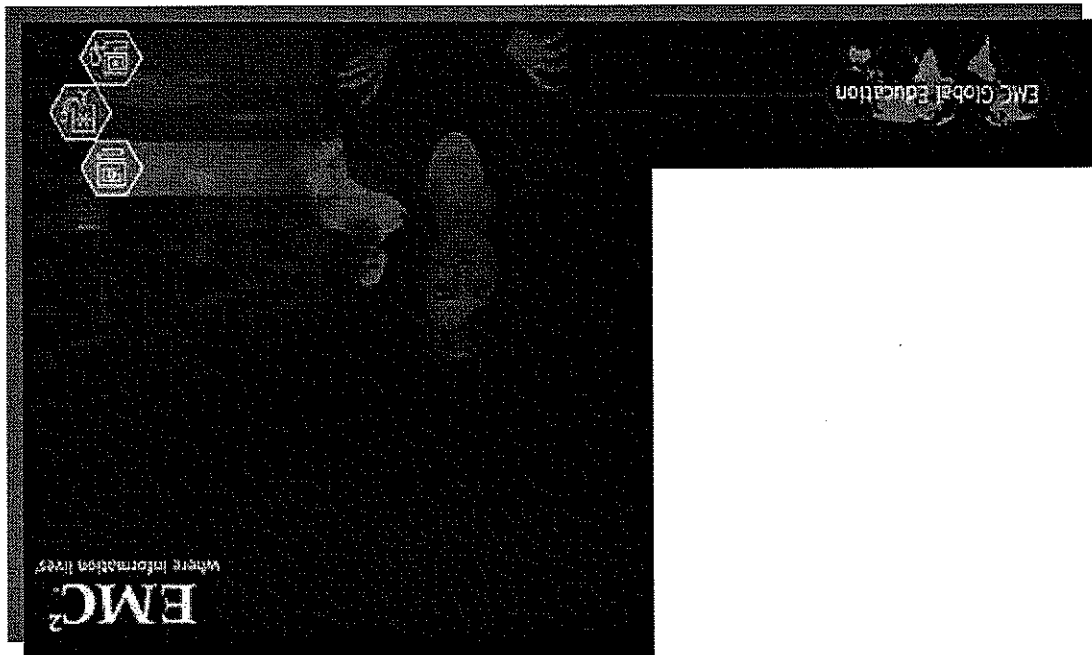
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This concludes, Module V “TimeFinder Snap” for Symmetrix Business Continuity – TimeFinder Solutions.

Symmetrix Business Continuity – TimeFinder Solutions Student Lab Guide

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Rev #	File Name	Date	Activity / Note
1.0a	BCL_LG_Sun_V10a.Doc	07-Apr-05	
1.1a	BCL_LG_Sun_V11a.Doc	23-Apr-05	
1.1a	BCL_LG_Sun_V11a.Doc	15-Jun-2005	Update
		29-Jun-2005	Added Create
			Save Pool
2.1a	BCL_LG_Sun_V21a.Doc	26-Jul-05	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

In this lab exercise students will explore the configuration and basic setup of the Symmetrix TimeFinder facility using the <i>EMC Solutions Enabler</i> 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.	Purpose:
--	------------------------

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.	Objectives:
--	---------------------------

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

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/sympl_db.bin)</pre> <pre># symcfg discover</pre>

3	1. Identify the volumes accessible to your host. This and following TimeFinder exercises require two standard volumes and two BCV volumes. In the output of the <code>syminq</code> command, locate the devices assigned to you and complete the table below. a) 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) under the "Type" column. <table border="1"> <thead> <tr> <th>Standard Volumes</th> <th>PdevName (c##d##s2)</th> <th>SymDevName (eg. 031)</th> </tr> </thead> <tbody> <tr> <td>Device 1</td> <td>/dev/r/rdm/c0010</td> <td>0004</td> </tr> <tr> <td>Device 2</td> <td></td> <td>0003</td> </tr> </tbody> </table>	Standard Volumes	PdevName (c##d##s2)	SymDevName (eg. 031)	Device 1	/dev/r/rdm/c0010	0004	Device 2		0003
Standard Volumes	PdevName (c##d##s2)	SymDevName (eg. 031)								
Device 1	/dev/r/rdm/c0010	0004								
Device 2		0003								
	b) List the BCVs configured on the Symmetrix and identify and record the pair of BCVs assigned to you. i) Display summary information about all BCVs in the attached Symmetrix. # symbcv list dev more ii) Display summary information about all BCVs accessible to your host. # symbcv list pd more iii) Identify the two BCV volumes assigned to you, and record the host device names (PdevName), the Symmetrix device names (SymDevName), attribute, and status in the table below.									