



# **Saving and Restoring Volume Groups and Online JFS/JFS2 Backups**



# Unit Objectives

---

After completing this unit, you should be able to:

- Create, verify, and restore **mkysb** images
- Set up cloning using **mkysb** images
- Shrink file systems and logical volumes
- Describe alternate disk installation techniques
- Back up and restore non-**rootvg** volume groups
- List the steps to perform an online JFS or JFS2 backup

# Creating a System Backup

```
# smit mksysb
```

## Back Up the System

Type or select values in entry fields.  
Press Enter AFTER making all desired changes.

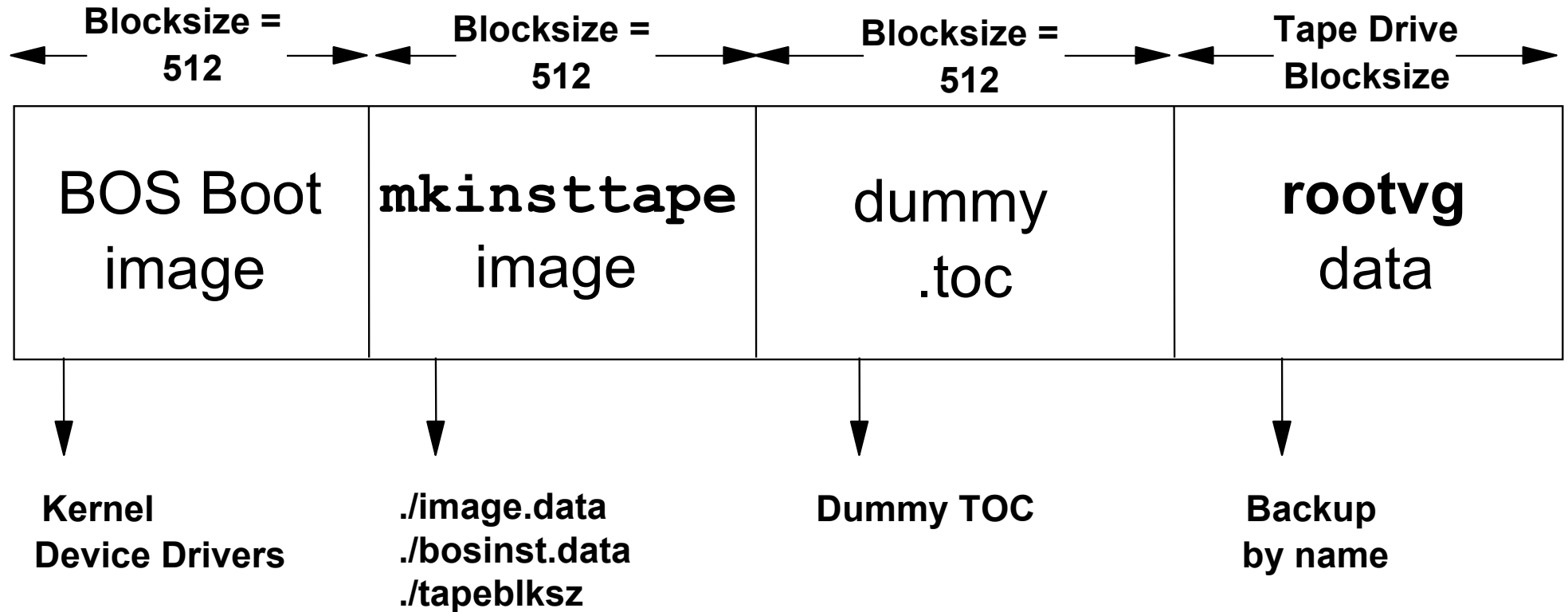
[Entry Fields]

WARNING: Execution of the mksysb command will  
result in the loss of all material  
previously stored on the selected  
output medium. This command backs  
up only rootvg volume group.

* Backup DEVICE or FILE	[]	+ /
Create MAP files?	no	+
EXCLUDE files?	no	+
List files as they are backed up?	no	+
Verify readability if tape device?	no	+
Generate new /image.data file?	yes	+
EXPAND /tmp if needed?	no	+
Disable software packing of backup?	no	+
Backup extended attributes?	yes	+
Number of BLOCKS to write in a single output (Leave blank to use a system default)	[]	#
File system to use for temporary work space (If blank, /tmp will be used.)	[]	/
Back up encrypted files?	yes	+
Back up DMAPI filesystem files?	yes	+

# mksysb Image

---



# CD or DVD mksysb

---

- Personal system backup
  - Will only boot and install the system where it was created
- Generic backup
  - Will boot and install any platform (rspc, rs6k, chrp)
- Non-bootable volume group backup
  - Contains only a volume group image (**rootvg** and non-**rootvg**)
  - Can install AIX after boot from product CD-ROM (**rootvg**)
  - Can be source for alt\_disk\_install
  - Can be restored using **restvg** (for non-**rootvg**)

# The mkcd Command

---

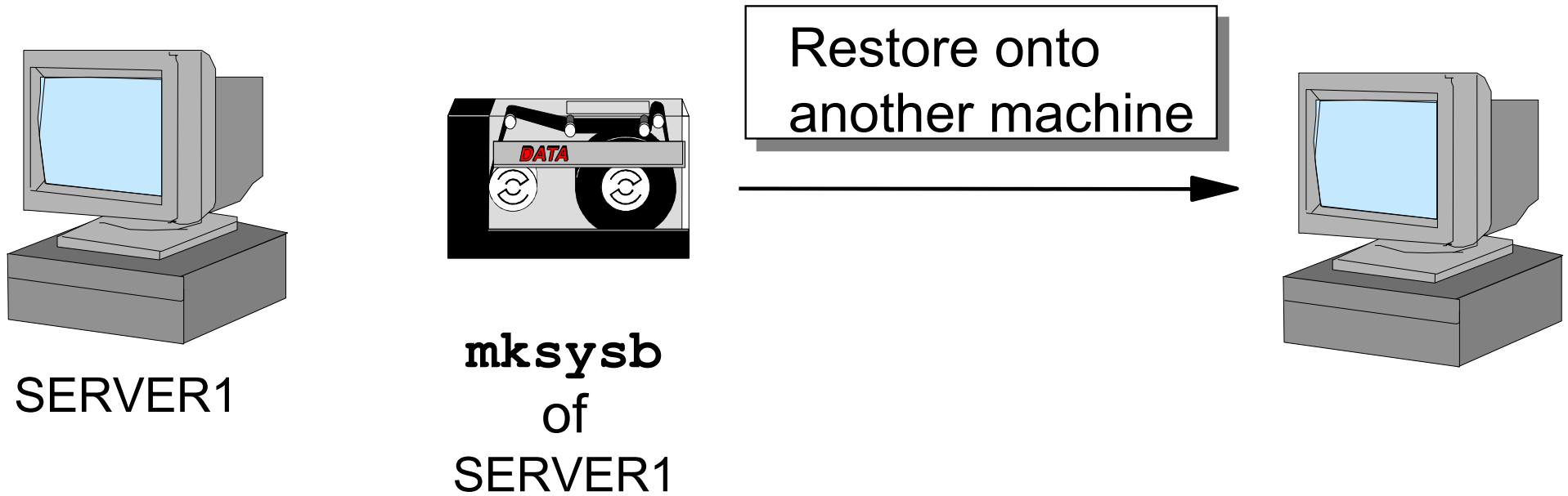
- **mksysb** and **savevg** images are written to CD-Rs and DVDs using **mkcd**
- Supports ISO9660/Rockridge and UDF formats
- Requires third party code to create the Rock Ridge file system and write the backup image
- For information about CD-R, DVD-R, or DVD-RAM drives and CD-R, DVD-R, or DVD-RAM creation software, refer to the following readme file:

**/usr/lpp/bos.sysmgt/mkcd.README.txt**

# Verifying a System Backup

## After mksysb Completion (1 of 2)

---

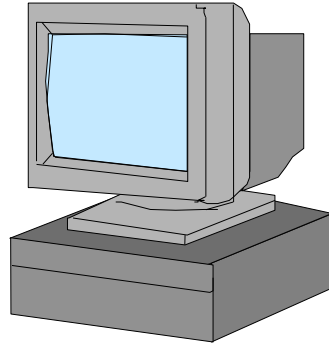


- The only method to verify that a system backup will correctly restore with no problems is to actually restore the **mksysb** onto another machine
- This should be done to test your company's **DISASTER RECOVERY PLAN**

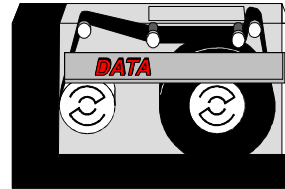
# Verifying a System Backup

## After mksysb Completion (2 of 2)

---



SERVER1



mksysb of  
SERVER1

- Data verification:

```
# tctl -f /dev/rmt0 rewind  
# restore -s4 -Tqvf /dev/rmt0.1 > /tmp/mksysb.log
```

- Boot verification:

Boot from the tape without restoring any data.

**WARNING:** Check the **PROMPT** field in **bosinst.data**!

# mksysb Control File: bosinst.data

---

```
control_flow:
    CONSOLE = Default
    INSTALL_METHOD = overwrite
    PROMPT = yes
    EXISTING_SYSTEM_OVERWRITE = yes
    INSTALL_X_IF_ADAPTER = yes
    RUN_STARTUP = yes
    RM_INST_ROOTS = no
    ERROR_EXIT =
    CUSTOMIZATION_FILE =
    TCB = no
    INSTALL_TYPE =
    BUNDLES =
    RECOVER_DEVICES = Default
    BOSINST_DEBUG = no
    ACCEPT_LICENSES =
    DESKTOP = CDE
    INSTALL_DEVICES_AND_UPDATES = yes
    IMPORT_USER_VGS =
    ENABLE_64BIT_KERNEL = no
    CREATE_JFS2_FS = no
    ALL_DEVICES_KERNELS = yes
    (some bundles ....)

target_disk_data:
    LOCATION =
    SIZE_MB =
    HDISKNAME =

locale:
    BOSINST_LANG =
    CULTURAL_CONVENTION =
    MESSAGES =
    KEYBOARD =
```

# Restoring a mksysb (1 of 2)

- Boot the system in install/maintenance mode:

## Welcome to Base Operating System Installation and Maintenance

- |    |   |   |
|----|---|---|
|    | 1 | Start Install Now with Default Settings       |
|    | 2 | Change/Show Installation Settings and Install |
| >> | 3 | Start Maintenance Mode for System Recovery    |



## Maintenance

- |    |   |                                       |
|----|---|---------------------------------------|
|    | 1 | Access a Root Volume Group            |
|    | 2 | Copy a System Dump to Removable Media |
|    | 3 | Access Advanced Maintenance Functions |
|    | 4 | Erase Disks                           |
| >> | 6 | Install from a System Backup          |



## Choose mksysb Device

- |    |   |                                 |                        |
|----|---|---------------------------------|------------------------|
| >> | 1 | Tape Drive<br>tape/scsi/4mm/2GB | Path Name<br>/dev/rmt0 |
|----|---|---------------------------------|------------------------|

# Restoring a mksysb (2 of 2)

---

## Welcome to Base Operating System Installation and Maintenance

Type the number of your choice and press Enter. Choice is indicated by >>.

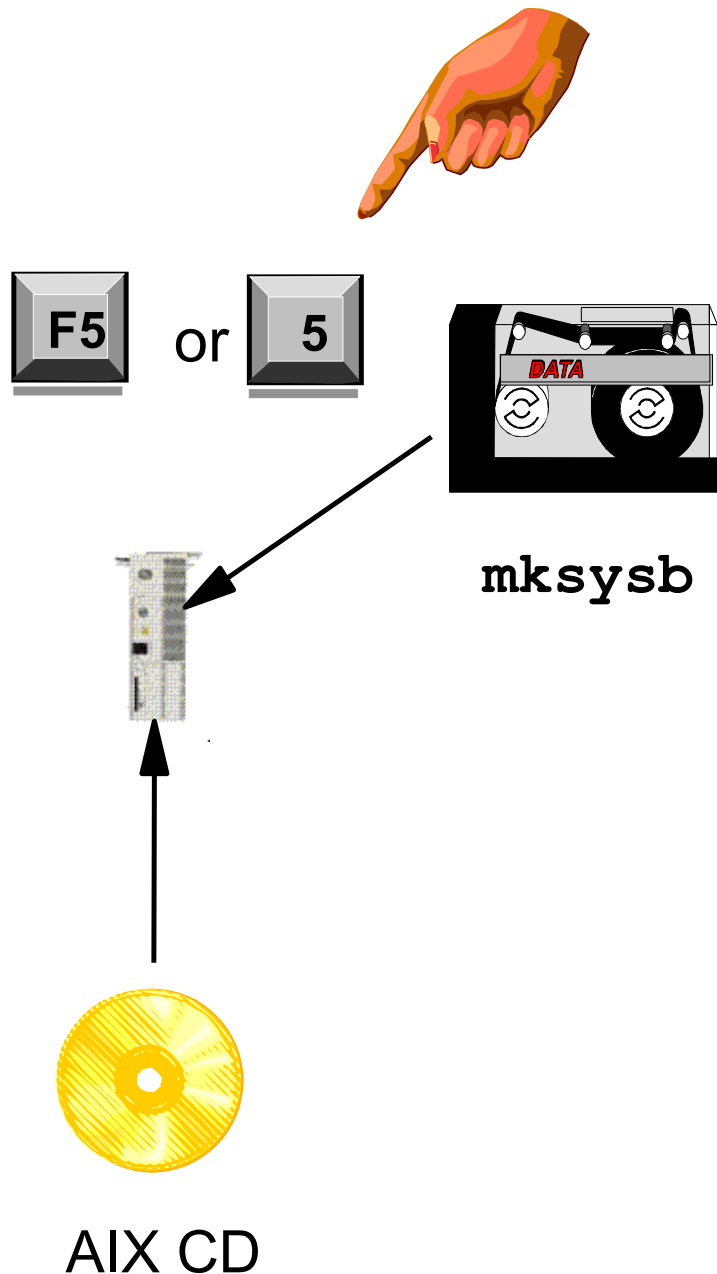
- |    |   |   |
|----|---|---|
|    | 1 | Start Install Now with Default Settings       |
| >> | 2 | Change/Show Installation Settings and Install |
|    | 3 | Start Maintenance Mode for System Recovery    |

## System Backup Installation and Settings

Type the number of your choice and press Enter.

- |   |  |        |
|---|--|--------|
| 1 | Disk(s) where you want to install      | hdisk0 |
| 2 | Use Maps                               | No     |
| 3 | Shrink Filesystems                     | No     |
| 4 | Import User Volume Groups              | No     |
| 5 | Recover Devices                        | No     |
| 0 | Install with the settings listed above |        |

# Cloning Systems Using a mksysb Image



- If all the necessary device and kernel support is in the **mksysb** image:
  1. Insert the **mksysb** media
  2. Boot from the **mksysb** image
- If all device and kernel support is *not* in the **mksysb** image:
  - Insert the **mksysb** tape *and* the AIX Volume 1 CD (same AIX level!)
  - Boot from the AIX CD
  - Select **Start Maintenance Mode for System Recovery**
  - Select **Install from a System Backup**
  - 5. Select the drive containing the backup tape, and press Enter  
(Missing device support will be installed from the AIX CD)

# Changing the Partition Size in rootvg

1. Create image.data:

```
# mkszfile
```

- Edit /image.data:

```
# vi /image.data
```

Change **PPSIZE** stanza


12. Create **mksysb** tape image:

```
# mksysb /dev/rmt0
```

16. Restore **mksysb** tape image

```
vg_data:  
  VGNAME=rootvg  
  PPSIZE=4  
  VARYON=yes  
  ...
```

```
vg_data:  
  VGNAME=rootvg  
  PPSIZE=8  
  VARYON=yes  
  ...
```



# Reducing a JFS File System in rootvg

```
lv_data:
  VOLUME_GROUP=rootvg
  LOGICAL_VOLUME=hd2
  ...
  LPS=58
  ...
  MOUNT_POINT=/usr
  ...
  LV_MIN_LPS=51

fs_data:
  FS_NAME=/usr
  FS_SIZE=475136
  ...
  FS_MIN_SIZE=417792
```

```
lv_data:
  VOLUME_GROUP=rootvg
  LOGICAL_VOLUME=hd2
  ...
  LPS=51
  ...
  MOUNT_POINT=/usr
  ...
  LV_MIN_LPS=51

fs_data:
  FS_NAME=/usr
  FS_SIZE=417792
  ...
  FS_MIN_SIZE=417792
```

1. # mkszfile
3. # mksysb /dev/rmt0

2. # vi /image.data
4. Restore image

# Let's Review 1: `mksysb` Images

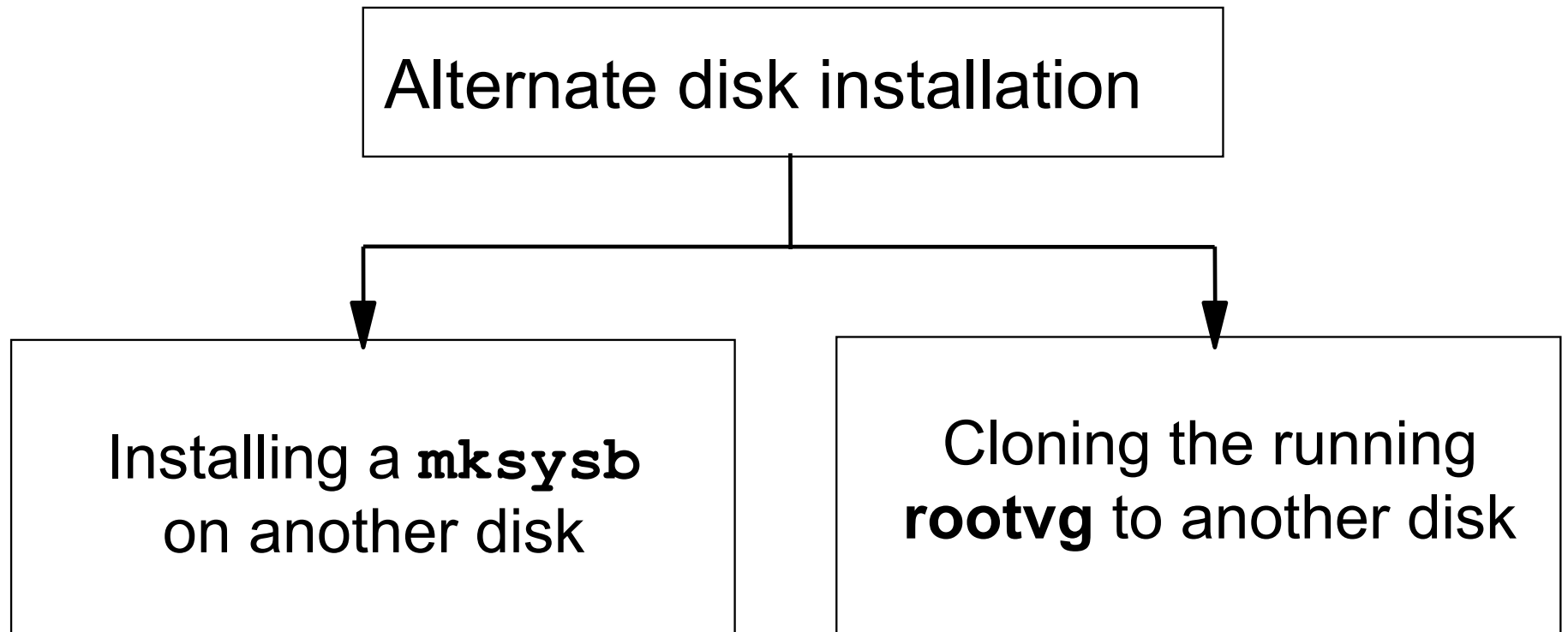
1. True or False? A `mksysb` image contains a backup of all volume groups.
3. List the steps to determine the blocksize of the fourth image in a `mksysb` tape image?
  - 
  - 
  - 
  -
- What does the `bosinst.data` attribute `RECOVER_DEVICES` do?
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_
- True or False? Cloning AIX systems is only possible if the source and target system use the same hardware architecture.
7. What happens if you execute the command `mkszfile`?
  - \_\_\_\_\_

# Let's Review 1 Solution: mksysb Images

1. True or **False**? A **mksysb** image contains a backup of all volume groups.
3. List the steps to determine the blocksize of the fourth image in a **mksysb** tape image?
  - `chdev -l rmt0 block_size=512`
  - `tctl -f /dev/rmt0 rewind`
  - `restore -s2 -xqvf /dev/rmt0.1 ./tapeblksz`
  - `cat ./tapeblksz`
- What does the **bosinst.data** attribute RECOVER\_DEVICES do?  
The RECOVER\_DEVICES determine if the **CuAt** from the source system is restored on the target system or not. If yes, the target gets the same hostname, IP address, routes and other attributes.
- True or **False**? Cloning AIX systems is only possible if the source and target system use the same hardware architecture.  
The missing device support is installed on the target when booting from an AIX CD.
6. What happens if you execute the command **mkszfile**?  
A new image.data file is created in the root directory.

# Alternate Disk Installation

---

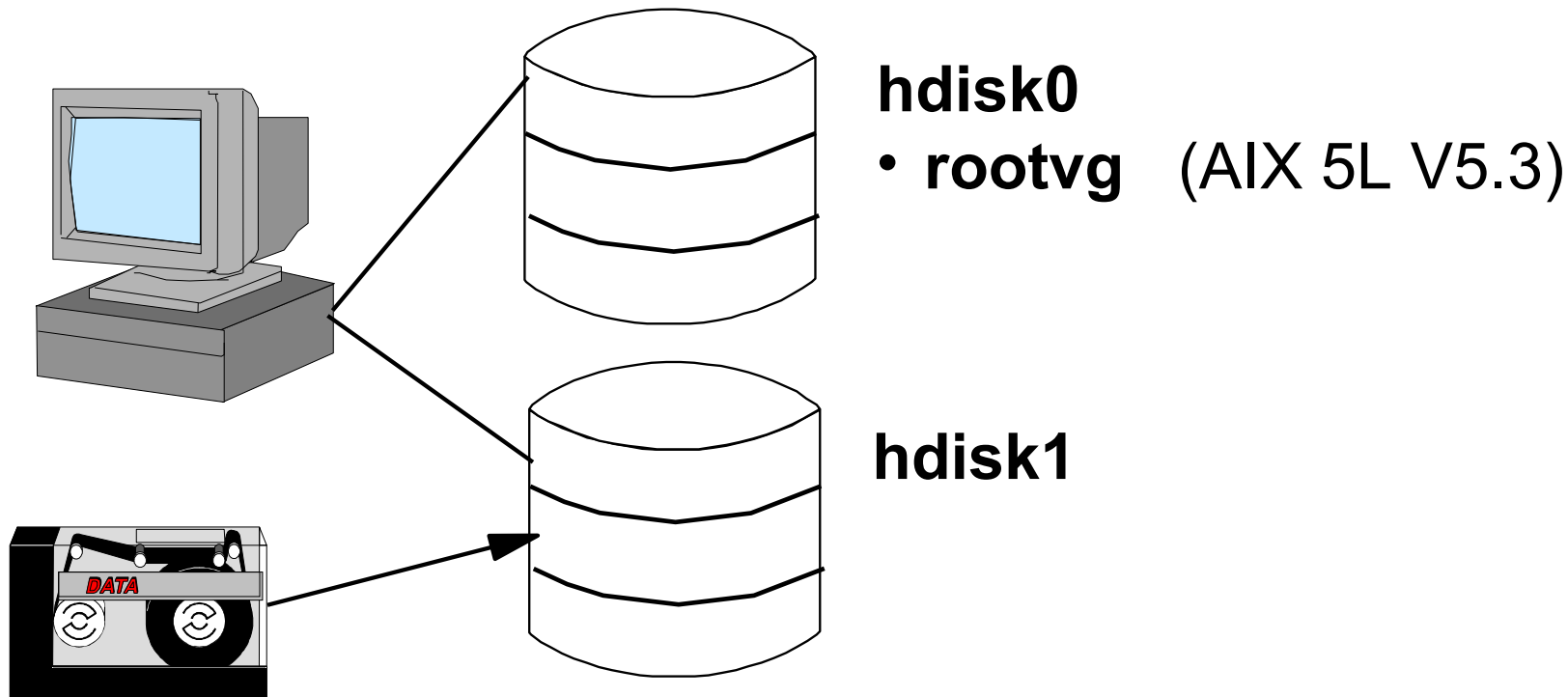


```
# alt_disk_install
```

```
# alt_disk_mksysb
```

```
# alt_disk_copy
```

# Alternate mksysb Disk Installation (1 of 2)



```
# alt_disk_mksysb -m /dev/rmt0 -d hdisk1
```

Installs an AIX 6.1 **mksysb** on **hdisk1** ("second **rootvg**")

- Bootlist will be set to alternate disk (**hdisk1**)
- Changing the bootlist allows you to boot different AIX levels (**hdisk0** boots AIX 5L V5.3, **hdisk1** boots AIX 6.1)

# Alternate mksysb Disk Installation (2 of 2)

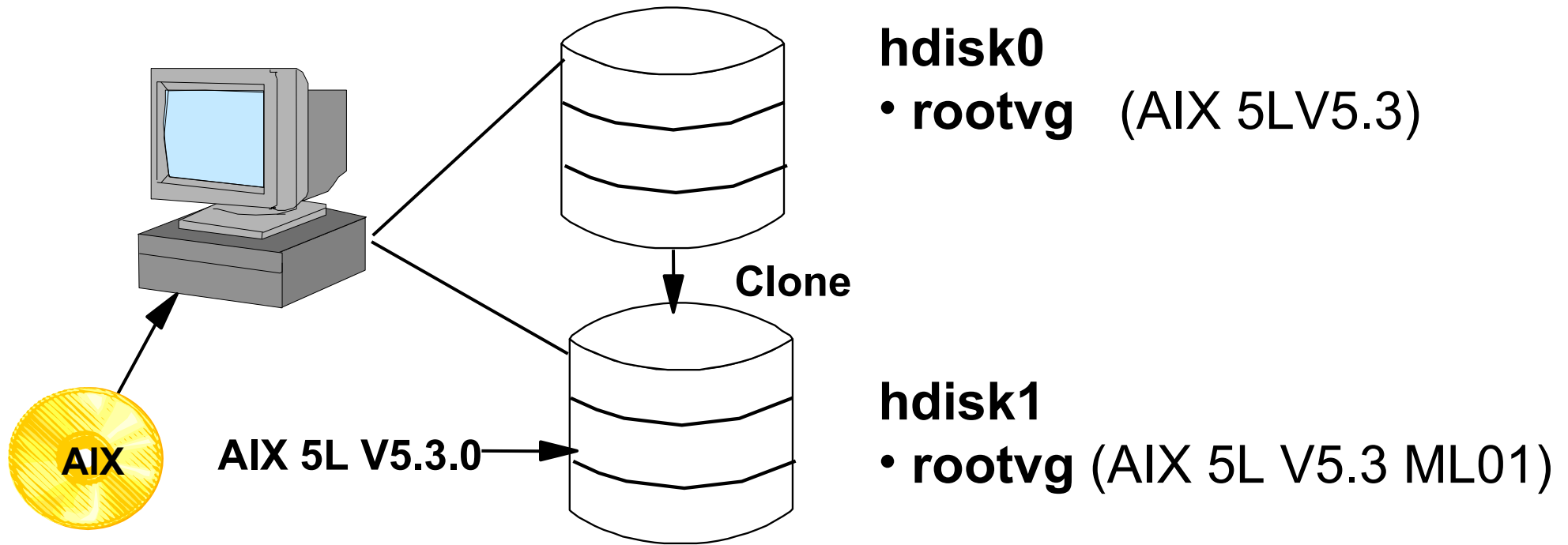
```
# smit alt_mksysb
```

Install mksysb on an Alternate Disk

Type or select values in entry fields.  
Press Enter AFTER making all desired changes.

	[Entry Fields]	
* Target Disk(s) to install	[hdisk1]	+
* Device or image name	[/dev/rmt0]	+
Phase to execute	all	+
image.data file	[ ]	/
Customization script	[ ]	/
Set bootlist to boot from this disk on next reboot?	yes	+
Reboot when complete?	no	+
Verbose output?	no	+
Debug output?	no	+
resolv.conf file	[ ]	/

# Alternate Disk rootvg Cloning (1 of 2)



```
# alt_disk_copy -b update_all -l /dev/cd0 -d hdisk1
```

- Creates a copy of the current **rootvg** ("clone") on **hdisk1**
- Installs a maintenance level on clone (AIX 5L V5300-01)
- Changing the bootlist allows you to boot different AIX levels (**hdisk0** boots AIX 5L V5.3.0, **hdisk1** boots AIX 5L V5300-01)

# Alternate Disk rootvg Cloning (2 of 2)

```
# smit alt_clone
```

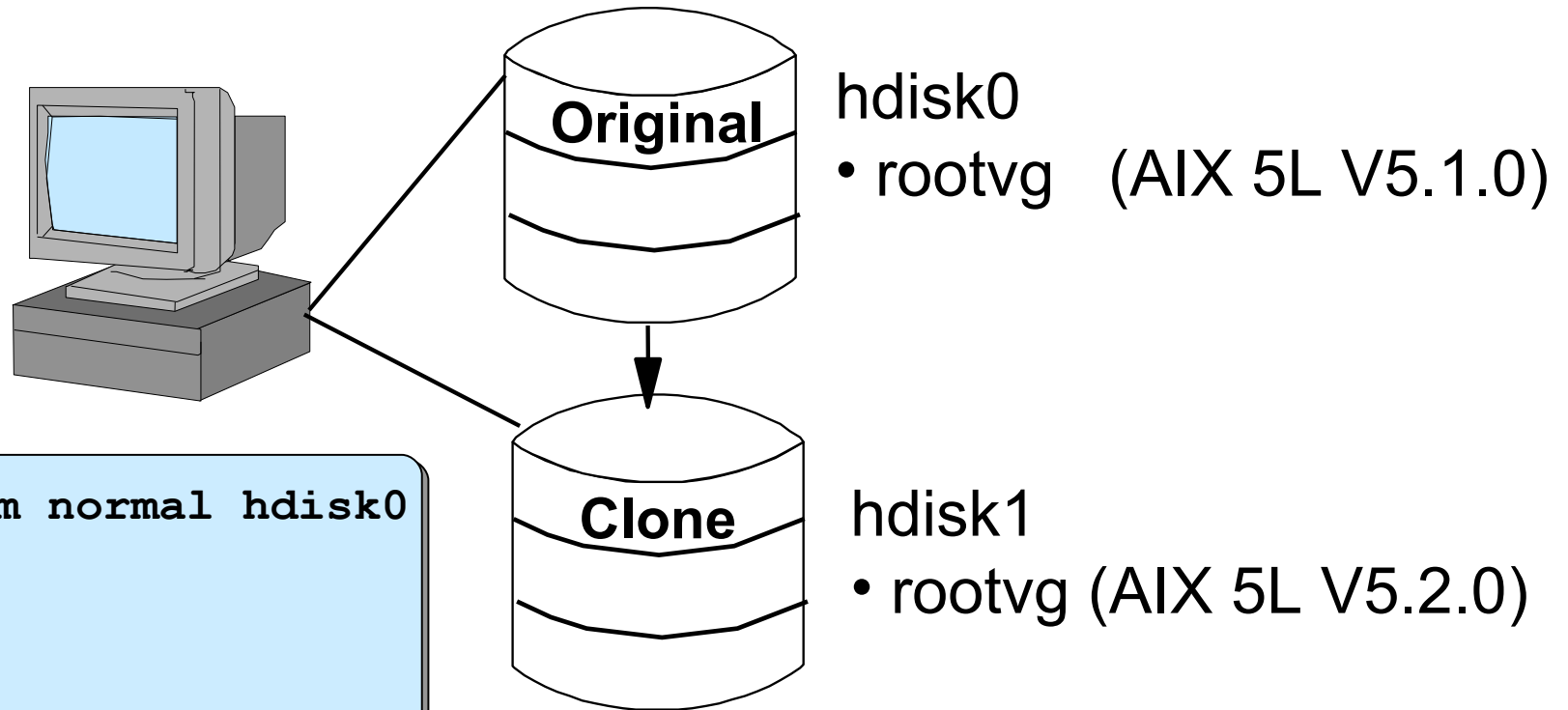
Clone the rootvg to an Alternate Disk

Type or select values in entry fields.

Press Enter AFTER making all desired changes.

	[Entry Fields]
* Target Disk(s) to install	[hdisk1] +
Phase to execute	all +
image.data file	[] /
Exclude list	[] /
Bundle to install	[update_all] +
-OR-	
Fileset(s) to install	[]
Fix bundle to install	[]
-OR-	
Fixes to install	[]
Directory or Device with images (required if filesets, bundles or fixes used)	[/dev/cd0]
...	
Customization script	[] /
Set bootlist to boot from this disk on next reboot?	yes +
Reboot when complete?	no +
...	

# Removing an Alternate Disk Installation



```
# bootlist -m normal hdisk0
# reboot
# lsvg
rootvg
altinst_rootvg
# alt_rootvg_op -X
```

```
# bootlist -m normal hdisk1
# reboot
# lsvg
rootvg
old_rootvg
# alt_rootvg_op -X old_rootvg
```

- **alt\_rootvg\_op -X**  
removes the ODM definition  
from the ODM
- Do not use **exportvg** to  
remove the alternate volume  
group

# Let's Review 2: Alternate Disk Installation

1. Name the two ways alternate disk installation can be used.

- 
- 

2. At what version of AIX can an alternate **mksysb** disk installation occur?

---

• What are the advantages of alternate disk **rootvg** cloning?

- 
- 

• How do you remove an alternate **rootvg**?

---

5. Why not use **exportvg**?

---

# Let's Review 2 Solution:

## Alternate Disk Installation

---

1. Name the two ways alternate disk installation can be used.
  - Installing a **mksysb** image on another disk
  - Cloning the current running **rootvg** to an alternate disk
- At what version of AIX can an alternate **mksysb** disk installation occur? AIX V4.3 and subsequent versions of AIX
- What are the advantages of alternate disk **rootvg** cloning?
  - Creates an online backup
  - Allows maintenance and updates to software on the alternate disk helping to minimize down time
- How do you remove an alternate **rootvg**?  
**alt\_disk\_install -X**
5. Why not use **exportvg**?  
This will remove **rootvg** related entries from **/etc/filesystems**.

# Saving a non-rootvg Volume Group

```
# smit savevg
```

## Back Up a Volume Group to Tape/File

Type or select values in entry fields.  
Press Enter AFTER making all desired changes.

[Entry Fields]

WARNING: Execution of the savevg command will  
result in the loss of all material  
previously stored on the selected  
output medium.

* Backup DEVICE or FILE	[/dev/rmt0]	+/
* VOLUME GROUP to back up	[datavg]	+
List files as they are backed up?	no	+
Generate new vg.data file?	yes	+
Create MAP files?	no	+
EXCLUDE files?	no	+
EXPAND /tmp if needed?	no	+
Disable software packing of backup?	no	+
Backup extended attributes?	yes	+
Number of BLOCKS to write in a single output (Leave blank to use a system default)	[ ]	#
Verify readability if tape device	no	+
Back up Volume Group information files only?	no	+
Back up encrypted files?	yes	+
Back up DMAPI filesystem files?	Yes	+

# savevg/restvg Control File: *vgname.data*

---

```
# mkvgdata datavg  
# vi /tmp/vgdata/datavg/datavg.data
```

```
vg_data:  
    VGNAME=datavg  
    PPSIZE=8  
    VARYON=yes
```

```
lv_data:  
  
    LPs=128  
  
    LV_MIN_LPS=128
```

```
fs_data:  
  
    . . .
```

```
# savevg -f /dev/rmt0 datavg
```

# Restoring a non-rootvg Volume Group

```
# smit restvg
```

## Remake a Volume Group

Type or select values in entry fields.  
Press Enter AFTER making all desired changes.

	[Entry Fields]	
* Restore DEVICE or FILE	[/dev/rmt0]	+/
SHRINK the filesystems?	no	+
Recreate logical volumes and filesystems only	no	+
PHYSICAL VOLUME names	[ ]	+
(Leave blank to use the PHYSICAL VOLUMES listed in the vgname.data file in the backup image)		
Use existing MAP files?	yes	+
Physical partition SIZE in megabytes	[ ]	+#
(Leave blank to have the SIZE determined based on disk size)		
Number of BLOCKS to read in a single input	[ ]	#
(Leave blank to use a system default)		
Alternate vg.data file	[ ]	/
(Leave blank to use vg.data stored in backup image)		

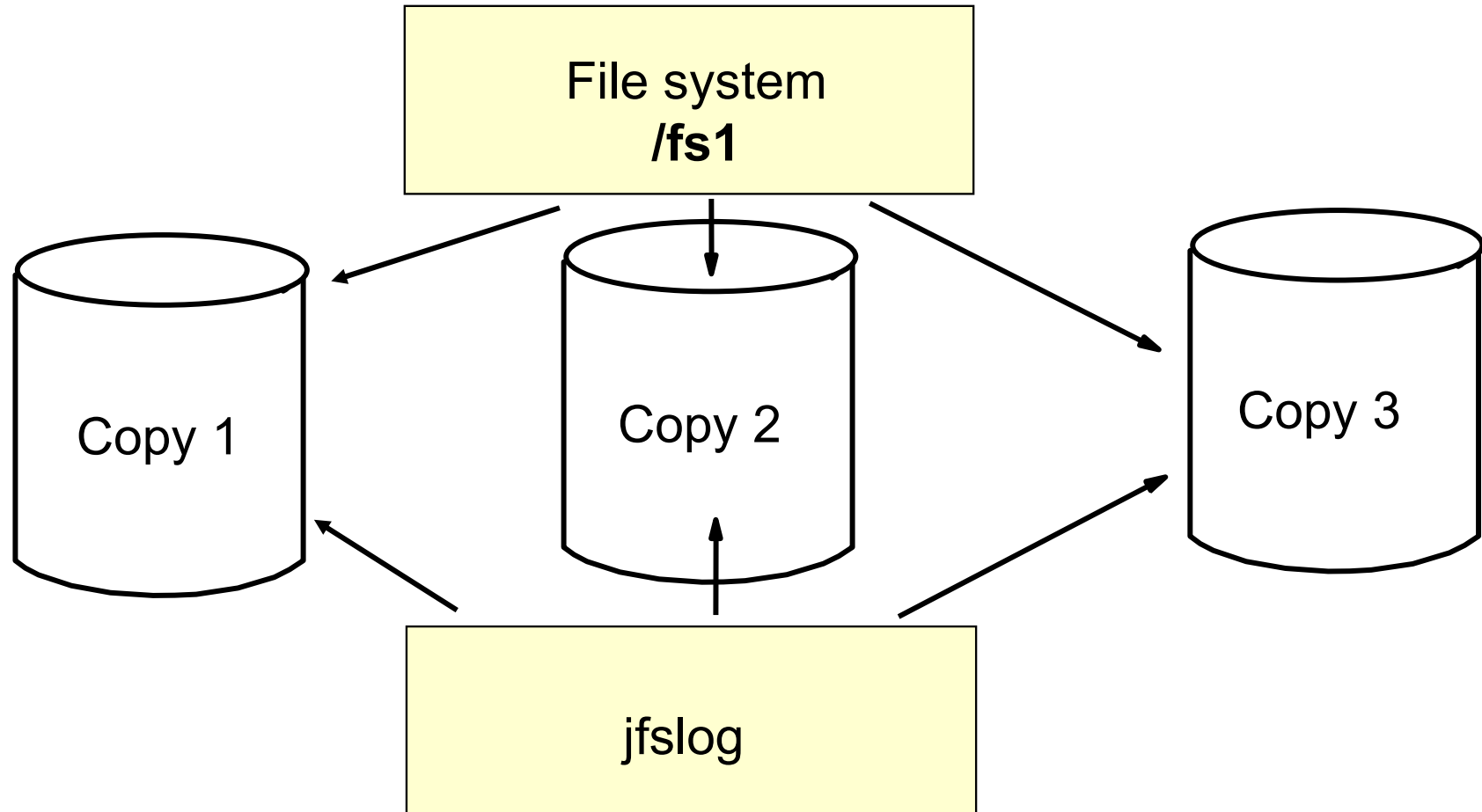
F1=Help  
F5=Reset  
F9=Shell

F2=Refresh  
F6=Command  
F10=Exit

F3=Cancel  
F7=Edit  
Enter=Do

F4=List  
F8=Image

# Online JFS Backup

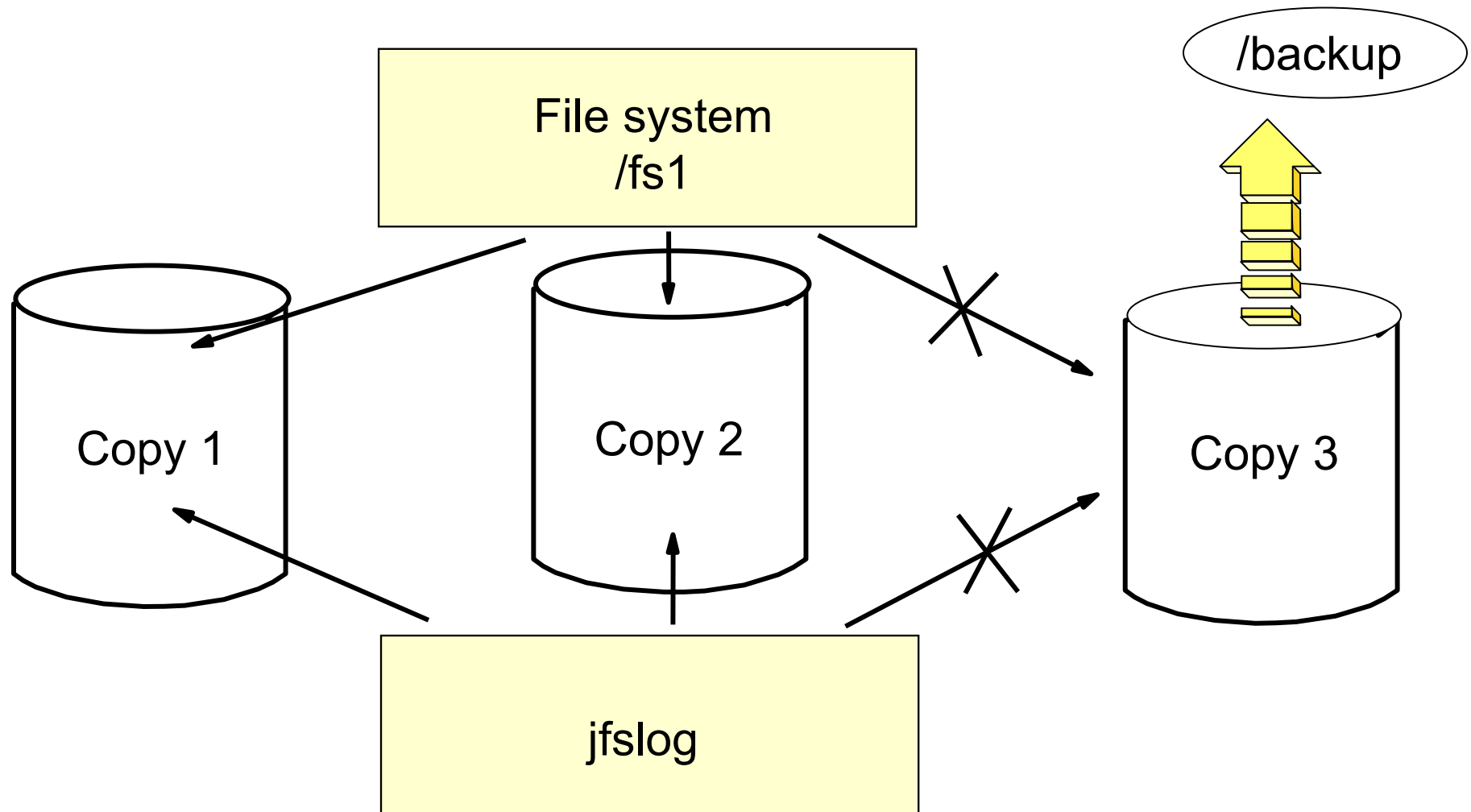


```
# lsvg -l newvg
```

```
newvg:
```

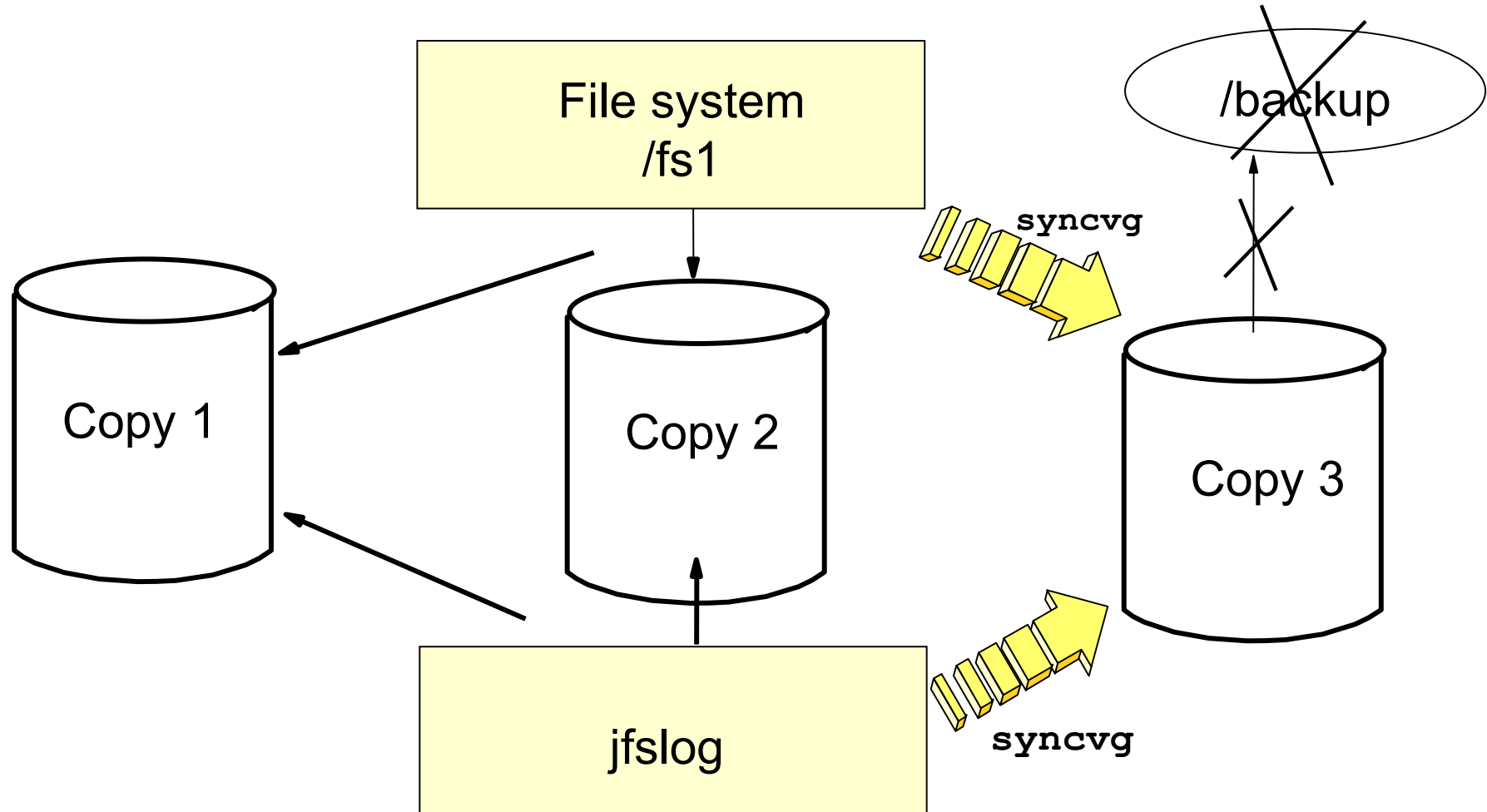
LV NAME	TYPE	LPs	PPs	PVs	LV STATE	MOUNT POINT
loglv00	jfslog	1	3	3	open/syncd	N/A
lv03	jfs	1	3	3	open/syncd	/fs1

# Splitting the Mirror



```
# chfs -a splitcopy=/backup -a copy=3 /fs1
```

# Reintegrate a Mirror Backup Copy



```
# unmount /backup  
# rmfs /backup
```

# Snapshot Support for Mirrored Volume Groups

---

- Split a mirrored copy of a fully mirrored volume group into a snapshot volume group
- All logical volumes must be mirrored on disks that contain only those mirrors
- New logical volumes and mount points are created in the snapshot volume group
- Both volume groups keep track of changes in physical partitions:
  - Writes to a physical partition in the original volume group causes a corresponding physical partition in the snapshot volume group to be marked stale
  - Writes to a physical partition in the snapshot volume group causes that physical partition to be marked stale
- When the volume groups are rejoined, the stale physical partitions are resynchronized
- The user will see the same data in the rejoined volume group as was in the original volume group before the rejoin

# Snapshot Volume Group Commands

```
splitvg [ -y SnapVGname ] [-c copy] [-f] [-i] Vgname
```

- y** Specifies the name of the snapped volume group
- c** Specifies which mirror to use (1, 2 or 3)
- f** Forces the split even if there are stale partitions
- i** Creates an independent volume group which cannot be rejoined into the original

Example: File system **/data** is in the **datavg** volume group. These commands split the volume group, create a backup of the **/data** file system and then rejoins the snapshot volume group with the original.

**1. splitvg -y snapvg datavg**

The volume group **datavg** is split and the volume group **snapvg** is created. The mount point **/fs/data** is created.

**2. backup -f /dev/rmt0 /fs/data**

An i-node based backup of the unmounted file system **/fs/data** is created on tape.

**3. joinvg datavg**

**snapvg** is rejoined with the original volume group and synced in the background.

# JFS2 Snapshot Image

---

- For a JFS2 file system, the point-in-time image is called a snapshot
- A snapshot image of a JFS2 file system can be used to:
  - Create a “backup” of the file system at the point in time the snapshot was created
  - Provide the capability to access files or directories as they were at the time of the snapshot
  - **backup** mounted snapshot to tape, DVD or a remote server
- The snapshot stays stable even if the file system that the snapshot was taken from continues to change
- When a snapshot is initially created, only structure information is included
- When a write or delete occurs, then the affected blocks are copied into the snapshot file system
- A snapshot typically needs 2% - 6% of the space needed for the ***snappedFS***

# Creation of a JFS2 Snapshot

---

- For a JFS2 file system that is already mounted:

- Using an existing logical volume for the snapshot:

```
# snapshot -o snapfrom=snappedFS snapshotLV  
# snapshot -o snapfrom=/home/myfs /dev/mysnaplv
```

- Creating a new logical volume for the snapshot:

```
# snapshot -o snapfrom=snappedFS -o size=Size  
# snapshot -o snapfrom=/home/myfs -o size=16M
```

- For a JFS2 file system that is not mounted:

```
# mount -o snapto=snapshotLV snappedFS-LV MountPoint  
# mount -o snapto=/dev/mysnaplv /dev/fslv00 /home/myfs
```

- To create snapshot and backup in one operation:

```
# backsnap -m MountPoint -s Size BackupOptions snappedFS  
# backsnap -m /mntsnapshot -s size=16M -i -f/dev/rmt0 \  
  /home/myfs
```

# Using a JFS2 Snapshot

---

- When a file becomes corrupted, you can replace it if you have an accurate copy in an online JFS2 snapshot
- To recover individual files from a JFS2 snapshot image:
  - Mount the snapshot:

```
# mount -v jfs2 -o snapshot /dev/mysnaplv /mntsnapshot
```
  - Change to the directory that contains the snapshot:

```
# cd /mntsnapshot
```
  - Copy the accurate file to overwrite the corrupted one:

```
# cp myfile /home/myfs
```

 (Copies only the file named **myfile**)
- To recover entire filesystem to the point of snapshot creation, unmount the filesystem and issue a rollback request:

```
# rollback /home/myfs /dev/mysnaplv
```

# JFS2 Internal Snapshot (AIX 6.1)

---

- Space for a snapshot LV may be small, but a single physical partition may be large.
- An internal snapshot is stored in the snapped filesystem
- Filesystem to be snapped must be enabled at creation:  

```
# crfs -a isnapshot=yes
```

Or

```
smitty crfs dialogue panel: Allow Internal Snapshots [yes]
```
- Use the following procedures to work with an internal snapshot:
  - Creating the internal snapshot:  

```
# snapshot -o snapfrom=snappedFS -n snapshotName
```
  - Mounting the internal snapshot:  

```
# mount -v jfs2 -o snapto=snapshotName /mntsnapshot
```
  - Rollback an internal snapshot (first unmount snappedFS):  

```
# rollback -n snapshotName /home/myfs
```

# Checkpoint

1. The **mkszfile** command will create a file named:
  - a. `/bosinst.data`
  - b. `/image.data`
  - c. `/vgname.data`
2. Which two alternate disk installation techniques are available?
  - 
  - 
  - What are the commands to back up and restore a non-rootvg volume group? \_\_\_\_\_ and \_\_\_\_\_
  - If you want to shrink one file system in a volume group named **myvg**, which file must be changed before backing up the user volume group? \_\_\_\_\_
  - How many mirror copies should you have before performing an online JFS or JFS2 backup? \_\_\_\_\_

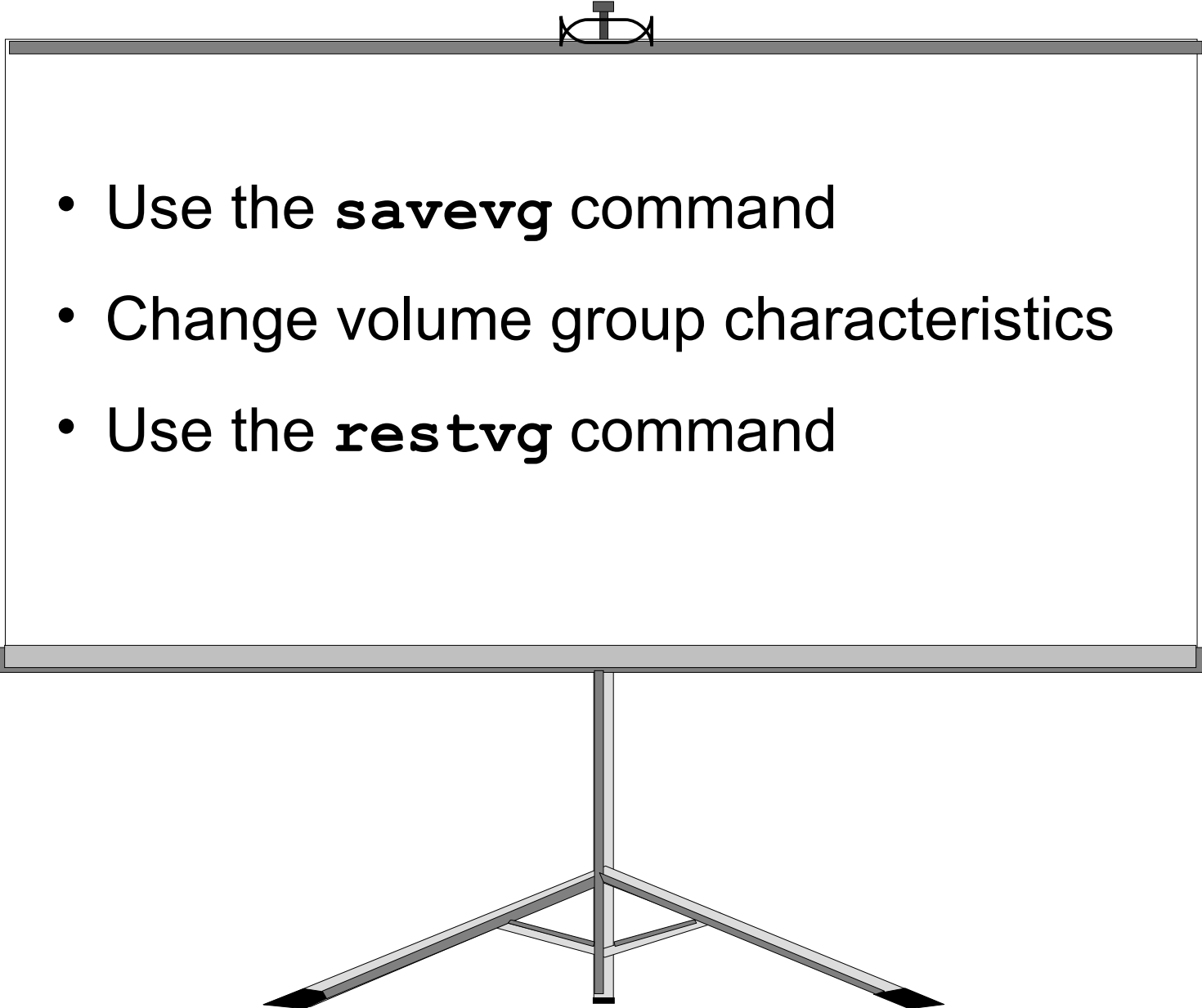
# Checkpoint Solutions

1. The **mkszfile** command will create a file named:
  - /bosinst.data
  - **/image.data**
  - /vgname.data
2. Which two alternate disk installation techniques are available?
  - Installing a **mksysb** on another disk
  - Cloning the **rootvg** to another disk
- What are the commands to back up and restore a non-rootvg volume group? **savevg** and **restvg**
- If you want to shrink one file system in a volume group named **myvg**, which file must be changed before backing up the user volume group? **/tmp/vgdata/myvg/myvg.data**
- How many mirror copies should you have before performing an online JFS backup? **Three**

# Exercise 8:

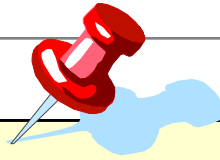
## Saving and Restoring a User Volume Group

---

- 
- Use the **savevg** command
  - Change volume group characteristics
  - Use the **restvg** command

# Unit Summary

---



- Backing up **rootvg** is performed with the **mksysb** command
- A **mksysb** image should always be verified before using it
- **mksysb** control files are **bosinst.data** and **image.data**
- Alternate disk installation techniques are available:
  - Installing a **mksysb** onto an alternate disk
  - Cloning the current **rootvg** onto an alternate disk
- Changing the bootlist allows booting different AIX levels
- Backing up a non-**rootvg** volume group is performed with the **savevg** command
- Restoring a non-**rootvg** volume group is done using the **restvg** command
- Online JFS backups can be performed