



Live Upgrade Guide

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Preface

The *Live Upgrade Guide* describes the Live Upgrade software.

Note - In this document the term “IA” refers to the Intel 32-bit processor architecture, which includes the Pentium, Pentium Pro, Pentium II, Pentium II Xeon, Celeron, Pentium III, and Pentium III Xeon processors and compatible microprocessor chips made by AMD and Cyrix.

Who Should Use This Book

This book is intended for system administrators and other technically-oriented people who install operating system software.

How This Book Is Organized

Chapter 1 describes the Live Upgrade feature and explains how to use it.

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What Typographic Conventions Mean

The following table describes the typographic changes used in this book.

TABLE P-1 Typographic Conventions

Typeface or Symbol	Meaning	Example
AaBbCc123	The names of commands, files, and directories; on-screen computer output	Edit your <code>.login</code> file. Use <code>ls -a</code> to list all files. <code>machine_name% you have mail.</code>
AaBbCc123	What you type, contrasted with on-screen computer output	<code>machine_name% su</code> Password:

TABLE P-1 Typographic Conventions (continued)

Typeface or Symbol	Meaning	Example
<i>AaBbCc123</i>	Command-line placeholder: replace with a real name or value	To delete a file, type <code>rm filename</code> .
<i>AaBbCc123</i>	Book titles, new words, or terms, or words to be emphasized.	Read Chapter 6 in <i>User's Guide</i> . These are called <i>class</i> options. You must be <i>root</i> to do this.

Shell Prompts in Command Examples

The following table shows the default system prompt and superuser prompt for the C shell, Bourne shell, and Korn shell.

TABLE P-2 Shell Prompts

Shell	Prompt
C shell prompt	<code>machine_name%</code>
C shell superuser prompt	<code>machine_name#</code>
Bourne shell and Korn shell prompt	<code>\$</code>
Bourne shell and Korn shell superuser prompt	<code>#</code>

Live Upgrade

This chapter contains the following information:

- “Live Upgrade Overview” on page 9: Live Upgrade characteristics and definitions
- “Live Upgrade Process” on page 11: Boot environments and Live Upgrade files and directories
- “Planning for Live Upgrade” on page 16: How to plan for Live Upgrade
- “Completing a Live Upgrade Process” on page 29: How to complete a Live Upgrade process, including:
 - Accessing Live Upgrade
 - Creating an Alternate Boot Environment
 - Using the Configuration Menu
 - Performing the Software Upgrade Using Live Upgrade
 - Falling Back to the Original Boot Environment
- “Other Live Upgrade Notes” on page 35: Synchronizing mail files and migrating to VXFS
- “Live Upgrade and Veritas VxVM and DiskSuite” on page 35: VxVM and DiskSuite Root mirroring issues
- “Questions and Answers” on page 36: Answers to Live Upgrade questions

Live Upgrade Overview

The Live Upgrade feature includes the following characteristics:

- Available on all Solaris™ 2.6 or compatible operating environments

- Allows you to upgrade software packages from a new *version* (release) of Solaris to your alternate boot environment
- Allows you to upgrade unbundled (Sun and third-party) software packages on your alternate boot environment
- Allows you to *migrate* to a boot environment with different file system types, sizes, and layouts
- Allows you to return or *fall back* to a previous system installation (boot environment) configuration should a failure occur during an upgrade of your current system configuration
- Maintains multiple images of the software packages in your boot environment, including the Solaris Foundation operating system packages
- Requires no application-dependent packaging scripts
- Works with file systems on slices, Veritas VxVM volumes, and DiskSuite metadevices
- Automatically synchronizes mail files on `/var` and any other user defined "sync" files

Note - System software is often distributed across physical disks, so the term boot environment is used instead of boot disk. Boot environment refers to the set of file systems which are considered system file systems, including `/` (root), `/usr`, `/var`, `/opt`, and `/usr/openwin`.

Live Upgrade Definitions

The following definitions will help you when reading this chapter:

Boot environment	Set of mount points for the <code>/</code> (root), <code>/usr</code> , <code>/var</code> , <code>/opt</code> , and <code>/usr/openwin</code> system directories. "Boot environment" (or "BE") is used instead of "boot disk" because this set of mount points can be distributed across multiple disks.
System file systems	File systems that make up the boot environment (for example, <code>/</code> (root), <code>/usr</code> , <code>/var</code> , <code>/opt</code> , and <code>/usr/openwin</code>).
Shared or user file systems	File systems that are common to all boot environments (for example, <code>/export/home</code> , <code>dump</code> , <code>swap</code> , and other local directories) and are not copied when the alternate BE is configured.
Active boot environment	The boot environment that is currently booted (active). Note that the system can only be booted from one boot environment at a time.
Inactive boot environment	Any boot environments that are not <i>active</i> .

Original boot environment

The boot environment that was active when Live Upgrade was initially used to configure a new boot environment. (It was your boot environment before installing Live Upgrade.)

Alternate boot environment

When a new boot environment is created, it is sometimes referred to as the *alternate boot environment*. There are no specific characteristics that make this new boot environment an alternate boot environment.

Accessing Live Upgrade

There are two ways you can access the Live Upgrade feature:

- `/usr/sbin/lu` Menu Interface
- Command line: You can also access Live Upgrade from the command line. Refer to the main Live Upgrade man page `lu(1M)` for more information about the command line utilities.

Live Upgrade Process

During the Live Upgrade process, you complete the following steps:

1. Create an alternate boot environment.
2. Begin a system upgrade on an ABE (Alternate Boot Environment).

To begin the Live Upgrade process, you define an unused set of devices (partitions/slices, volumes, or metadevices) to be used for the alternate boot environment. The contents of the active boot environment (all your currently installed packages) will be copied to an inactive boot environment. The inactive boot environment is then modified to make it bootable.

As shown in the following figure, Live Upgrade copies the `/` (root) file systems, as well as any file systems that begin with `/usr`, `/usr/openwin`, `/var`, or `/opt`. File systems like `/export/home` are shared by the active and inactive boot environments.

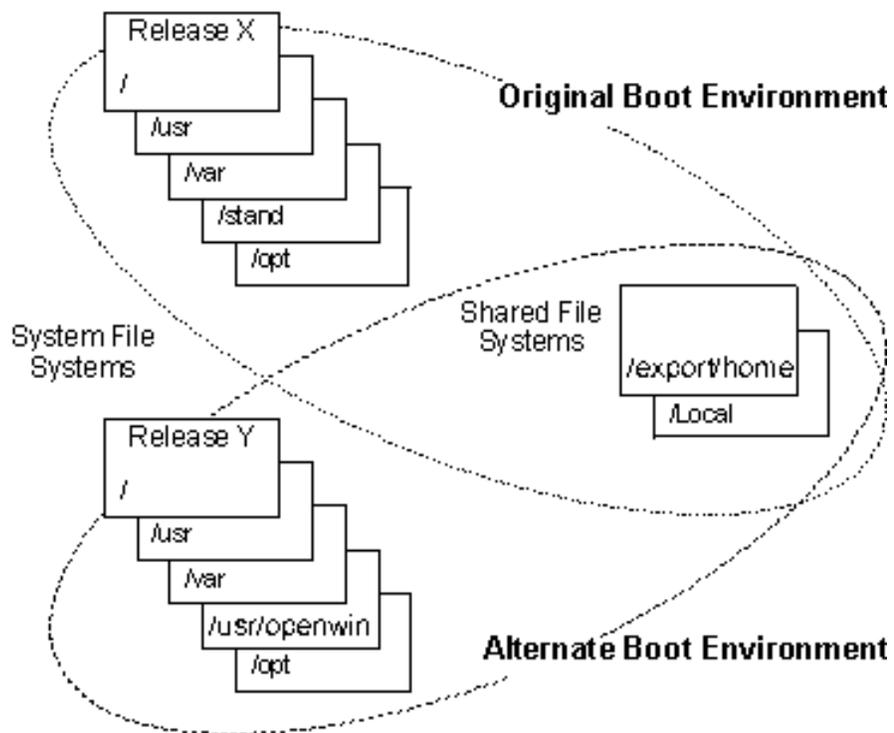


Figure 1-1 Creating an Alternate Boot Environment

3. Compare boot environments.

After creating an alternate boot environment, the contents of the active boot environment can be compared with the contents of an alternate (inactive) boot environment (see the following figure) or to a database of file information that was saved during the creation of an alternate boot environment.

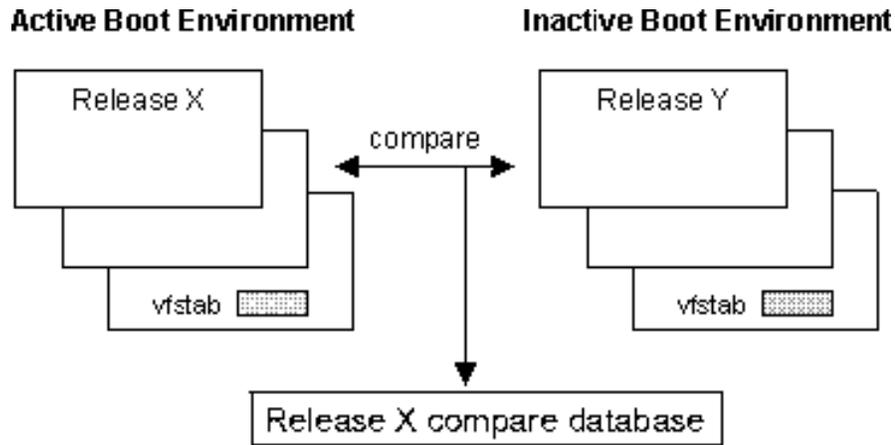


Figure 1-2 Comparing Boot Environments

4. Perform the software upgrade.

Once an alternate boot environment has been created, you can update the system software in the inactive boot environment.

5. After you create and upgrade the alternate boot environment, activate the alternate boot environment and reboot.

Other Live Upgrade Features

Activate a Boot Environment

The activate command and menu function allows for a forced "Sync" operation to occur during the switch between boot environments. The "Sync" operation, normally, only occurs on the first activate and boot to a new boot environment. This "Sync" operation does the following:

- Overwrites, appends, or prepends files listed in the `/etc/lu/synclist` file from the original boot environment to the newly activated boot environment.
- Executes any shutdown scripts in `/etc/lu/rc.d` on the original boot environment during the shutdown after an activation.
- Executes any start-up scripts in `/etc/lu/rc.d` on the newly activated boot environment during the start-up of the new boot environment.

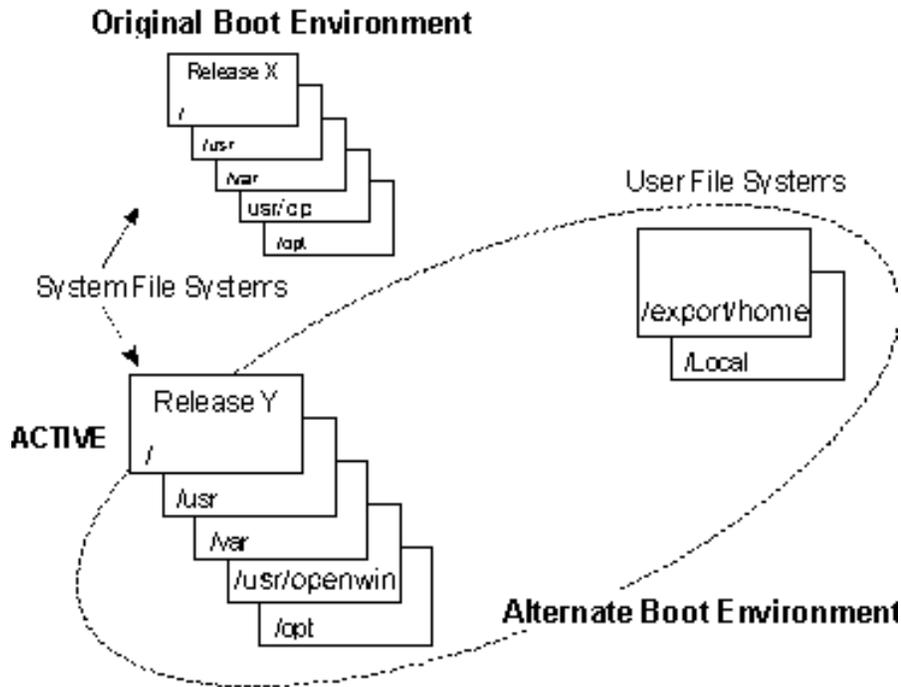


Figure 1-3 Activating a Boot Environment

Fall Back to the Original Boot Environment

Fall back to the original boot environment if one of the following occurs:

- A failure occurs during the upgrade.
- A failure is detected after upgrading the software on your system.
- Your application is not compatible with an upgraded component.

If the system will not boot on the alternate boot environment, use the procedure given when the alternate boot environment was activated, to fall back. If the system is running on the alternate boot environment, simply activate the original boot environment and reboot.

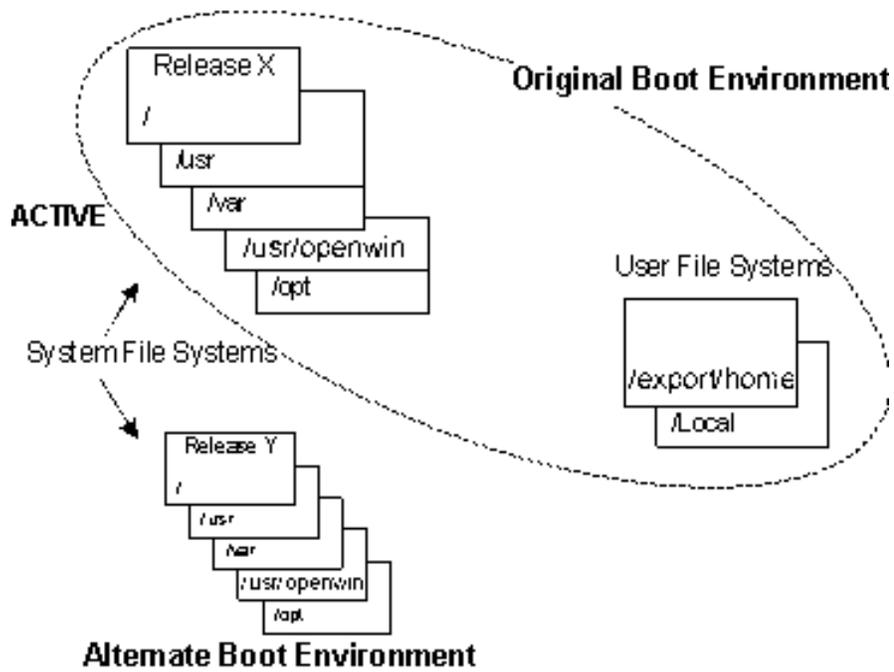


Figure 1-4 Falling Back to Original Boot Environment

Main Files and Directories

The following figure shows the location of most of the files and directories used by Live Upgrade.

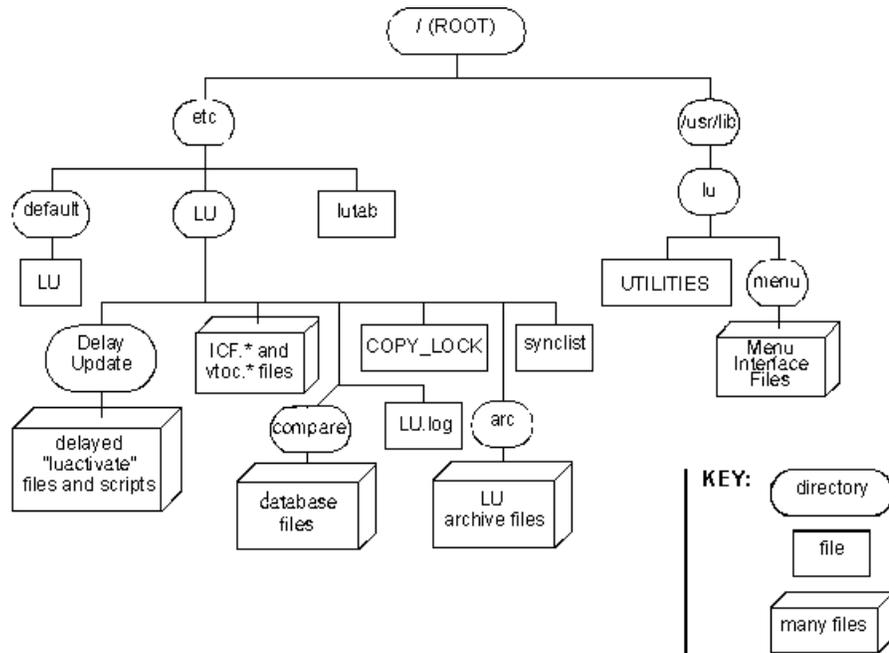


Figure 1-5 Location of Files and Directories

Planning for Live Upgrade

Read the following sections to help you plan for using the Live Upgrade feature.

Managing Boot Environments

During the Live Upgrade process, you may complete any of the following operations:

- Activate a boot environment
- Cancel a scheduled Create/Copy operation
- Compare the contents of two boot environments or determine which files have changed on a certain boot environment since the creation of a particular child boot environment.
- Create a boot environment
- Delete a boot environment
- List all boot environment configurations

- Copy to existing boot environment
- Upgrade any or all of the software on an existing boot environment
- Obtain the status of a boot environment

The following are some guidelines you need to know about boot environments in Live Upgrade:

- Live Upgrade allows you to create a boot environment only on a disk which can serve as a boot disk. Some systems have restrictions regarding which disk(s) can serve as a boot device. Refer to your system's documentation, prior to using Live Upgrade, to determine if any boot restrictions apply.
- If your system is restricted to a single boot device, Live Upgrade can configure your root disk so it can support multiple boot environments. In order for your root disk to support multiple boot environments, you must have approximately 100 megabytes or more of free disk space on your current boot disk. You may be required to reconfigure your current system in order to free up sufficient disk space.

Naming a Boot Environment

You must name boot environments during the following instances:

- The first time you run Live Upgrade, you must name the current system (boot environment).
- Each time you create a new boot environment, you must name this new boot environment.

Naming boot environments will help you identify which environment you have updated. Use a descriptive name for your boot environments (for example, *Solaris 7 BE*). The following restrictions apply to the boot environment name:

- 30 characters or less in length
- No colons (:)
- No double quotes (")

Using the Configuration Menu

After you have specified the boot environment name, you will be put into the Live Upgrade configuration menu where you define an unused set of devices (slices, volumes, or metadevices) to use for the inactive boot environment.

The following figure shows the <Configuration Menu> and explains <Configuration Menu> options.

Active Boot Environment				
Mount Point	Device	FS Type	Size (MB)	%Used
/	c0t4d0s0	ufs	121	49%
/export/root	c0t4d0s1	ufs	551	1%
/export/swap	c0t4d0s4	ufs	121	1%
/nssoft	vol180	vxfs	180	1%
/opt	vol350	vxfs	350	36%
/sdd	mglongvolumena	vxfs	50	3%
/usr	vol500	vxfs	500	66%

New Boot Environment				
Mount Point	Device	FS Type	Size (MB)	Recommended Min Size(MB)
/	c0t0d0s0	ufs	333	321
/export/root	c0t3d0s4	ufs	228	93
/export/swap	c0t4d0s6	ufs	96	62
/usr	disk035vol1	vxfs	501	449
/usr/openwin	vol6	vxfs	700	291
/var	c0t4d0s5	vxfs	41	33

Esc	F2	F3	F4	F5	F6	F7	F8	F9	CTRL-D
HELP	CHOICE	SAVE+EXIT	SLICE	SAVESCRN	ABORT	SCHD+EXIT	SPLIT	MERGE	CLEAR

Figure 1-6 Configuration Menu

Configuration Menu Fields

The following table explains the various parts of the <Configuration Menu>.

TABLE 1-1 Configuration Menu Label Descriptions

Label	Description
Active Boot Environment	File system layout for the active boot environment. Note that the <Configuration Menu> lists only mount points for system directories which reside in separate file systems. The configuration information under "Active Boot Environment" cannot be changed. Other non-system directories which are mounted do not appear under "Active Boot Environment," but they will be shared between boot environments.
New Boot Environment	New boot environment file system layout. This file system layout defaults to the configuration used by the active boot environment and can be changed using the options described in the table, "Configuration Menu Options."
Mount Point (The name of the directory where the file system should be mounted.)	Specifies which directories will be mounted as separate file systems in the new boot environment.

TABLE 1-1 Configuration Menu Label Descriptions *(continued)*

Label	Description
Device	Device used for the file system (regular disk slice, Veritas VxVM volume, or DiskSuite metadvice).
FS Type	File system type.
Size (The physical size of the file system in megabytes.)	Automatically filled when a device is selected. This column cannot be edited.
Recommended Min Size	Minimum device (slice, VxVM volume, or DiskSuite metadvice) size required to hold the file system.

To select menu options (explained in the following table), press function keys displayed above options.

TABLE 1-2 Configuration Menu Options

Option	Definition
ESC HELP	Provides help for the active window.
F2 CHOICES	Displays a window with the choices for the field where the cursor is placed. For the Device field, CHOICES lists all free devices. For / (root), CHOICES only displays free devices that meet specific restrictions for a root file system (the root file system must be on a regular disk slice and not a VxVM volume or DiskSuite metadvice). For the FS Type field, CHOICES lists all the available file system types. The root file system is limited to type UFS.
F3 SAVE+EXIT	Saves the configuration and creates the new boot environment.
F4 SLICE	Runs <code>format</code> to configure storage devices.
F5 SAVESCRN	Writes in ASCII text the current information being displayed by the <Configuration Menu> to a file specified by you.
F6 ABORT	In the main <Configuration Menu>, ABORT causes the creation to exit. The configuration will not be saved, nor will any files or file systems be altered. In any submenu, ABORT exits the submenu leaving you in the main <Configuration Menu>.

TABLE 1-2 Configuration Menu Options *(continued)*

Option	Definition
F7 SCHEDULE+EXIT	Saves the configuration and allows you to schedule the creation of the new boot environment. Time is specified in the same format used by the <code>at</code> utility. (See the <code>at(1)</code> man page for more information.)
F8 SPLIT	Creates a new file system in the new boot environment. You will be prompted to enter a mount point. Upon verifying the mount point, a new line will be added to the new boot environment section.
F9 MERGE	Merges a file system listed in the new boot environment into its parent directory. The mount point is determined by the line the cursor is on when the merge is performed.
CTRL-D CLEAR	Unselects a device field that was previously filled. After clearing, the unselected device is freed and will be available next time CHOICES is used.
CTRL-X	Switches between the new boot environment and active boot environment windows of the display. This option allows you to scroll the windows if all of the file systems cannot be displayed at once.

Selecting a Device for the Alternate / (root) File System

Use the following guidelines when determining what device will be used for the alternate boot environment's / (root) file system:

- The device must be one from which the system can boot.
- The device must be a slice; it cannot be a Veritas VxVM Volume or a DiskSuite metadvice.
- On older systems, a SCSI root device should fall within the first 1 gigabyte of the disk.
- The device cannot be on a shared SCSI bus.

Also note that the device for the inactive root file system usually requires 100 megabytes or more of free disk space depending on your current system configuration. See "Determining the Recommended Minimum Size for System File Systems" on page 21 in this chapter for more information about calculating system file system sizes.

Selecting a Device for the Alternate /usr, /var, and /opt File Systems

Use the following guidelines when deciding what devices to choose for the alternate boot environment's /usr, /var, and /opt file systems:

- The device has to meet the recommended minimum size. See “Determining the Recommended Minimum Size for System File Systems ” on page 21 for more information about calculating system file system sizes.
- The device can be a slice, Veritas VxVM Volume, or a DiskSuite metadvice.
- The device can be on different physical disks. The device does not have to be on the same disk as / (root).
- The device cannot be on a shared SCSI bus.

Other Alternate Boot Environment Guidelines

When creating an alternate boot environment, also note the following:

- Creating an alternate boot environment will take 15 minutes or longer, depending on your system configuration.
- Creating an alternate boot environment will disable root mirroring on the alternate boot environment if mirroring was enabled for the running boot environment. See “Live Upgrade and Veritas VxVM and DiskSuite” on page 35 for more information about root mirroring.
- Creating an alternate boot environment will modify the newly created alternate boot environment so that it is bootable.

Determining the Recommended Minimum Size for System File Systems

To estimate the file system sizes that will be needed to create an alternate boot environment, read the following information.

Note - The terms *file system* and *mount point* refer to the same item in this chapter. *Mount point* is used in this section because that is the label used on the Live Upgrade <Configuration Menu> screen.

The easiest way to determine the size of the file systems is to start the creation of a new boot environment.

If you do not want to create a new boot environment, simply select <F6 ABORT> after recording the information that the Live Upgrade configuration utility calculated (or use <F5 SAVESCRN> to write the data to a text file). Aborting this process will

not alter your system except that the system will assign the active boot environment the name given in the <create> menu.

Using Other Live Upgrade Features

```
1 Live Upgrade
>Activate - Activate a Boot Environment
Cancel - Cancel a Copy Job
Compare - Compare the contents of Boot Environments
Copy - Start/Schedule a Copy
Create - Create a Boot Environment
Current - Name of Current Boot Environment
Delete - Delete a Boot Environment
List - List the filesystems of a Boot Environment
Rename - Change the name of a Boot Environment
Status - List the status of all Boot Environments
Upgrade - Upgrade an Alternate Boot Environment
Help - Help Information on Live Upgrade
Exit - Exit the Live Upgrade Menu System
```

Move to an item with the arrow keys and strike ENTER to select.



Figure 1-7 Live Upgrade Main Menu

From this menu, you can complete the Live Upgrade activities explained in the following sections. If you are using Live Upgrade from the command line, use the following commands for the following activities:

Note - The Live Upgrade product includes man pages for all the listed command line utilities.

TABLE 1-3 Live Upgrade Command Line Options

Activity	Command
Activate BE	luactivate
Cancel scheduled job	lucancel
Compare BEs	lucompare
Copy to existing BE	lucopy

TABLE 1-3 Live Upgrade Command Line Options *(continued)*

Activity	Command
Create new BE	lucreate
Currently running BE	lucurr
Delete BE	ludelete
List file systems for a BE	lufslist
Execute a user shell on an inactive BE	lush
Rename a BE	lurename
Status of all BEs	lustatus
Upgrade	luupgrade

Activate a Boot Environment

To activate a different boot environment, you must perform a Live Upgrade activate command that specifies which boot environment should become active and then perform a system reboot.

A boot environment can also be activated from Out-Of-Service in the event a boot environment experiences a complete boot failure.

SPARC: If you are using a SPARC system and have configured the boot environments so that the / (root) file systems are on different disks, you can boot to another boot environment by changing the primary boot disk in the PROM monitor. Otherwise, you need to boot from the installation media, access the maintenance file system and activate the other boot environment. For example, use the following command: `boot cdrom -s` from ok prompt.

IA: For non-SPARC systems, you need to boot from the installation media, access the maintenance file system and activate the other boot environment. In most instances, you need to boot the Configuration Assistant floppy and boot the CD-ROM with boot option "b -s"

More specific information on how to fall back is provided in the following examples.

Note - The Live Upgrade Activation process prints fall back instructions similar to those in the following examples. In particular, the user should record the following information just in case a fall back is necessary:

- The "Physical Device Name" (for SPARC systems with BEs on different disks)
- The "Logical Device Name" (for SPARC systems with BEs on the same disk)
- The "Logical Device Name" (for IA-based systems)

This device name will depend on the device name of the original boot environment.

EXAMPLE 1-1 SPARC: System with BEs on different disks

If the / (root) file systems for the boot environments are on different physical disks, and you experience a failure while booting, use the following process to fall back to the original boot environment:

1. While the system is booting, enter the PROM monitor (ok prompt).
2. Change the boot device back to the original BE using the following command (at the ok prompt):

```
ok setenv boot-device "Physical Device Name"
```

3. Boot to the original BE using the following command (at the ok prompt):

```
ok boot
```

EXAMPLE 1-2 SPARC: System with BEs on the same disk

If the / (root) file systems for the boot environments are on the same physical disk, and you experience a failure while booting, use the following process to fall back to the original boot environment:

1. Enter the PROM monitor (ok prompt).
2. Boot the machine to Single User mode using a different boot device (like the Solaris Install CD or Network). Examples:

At the ok prompt:

For boot to Solaris CD: `boot cdrom -s`

For boot to network: `boot net -s`

3. Mount the Current BE root slice to some directory (like /mnt) You can use the following command to mount.

```
mount "Logical Device Name" /mnt
```

4. Run `luactivate` utility without any arguments from the current BE root slice, as shown below:

```
/mnt/sbin/luactivate
```

5. `luactivate` activates the previous working boot environment and indicates the result.
6. Exit Single User mode and reboot the machine.

EXAMPLE 1-3 IA: System with BEs on different disks

If the / (root) file systems for the boot environments are on different physical disks, and you experience a failure while booting, use the following process to fall back to the original boot environment:

1. Reboot the machine and enter the appropriate BIOS menus. If your boot devices are SCSI, you should refer to documentation on your SCSI controller on how to enter the SCSI BIOS. If the boot devices are maintained by the system BIOS, refer to system BIOS documentation on how to enter the system BIOS.
2. Based on the appropriate BIOS documentation, change the boot device back to the original BE's boot device.
3. Save the BIOS changes and exit BIOS to begin the boot process.

EXAMPLE 1-4 IA: System with BEs on the same disk

If your system has the / (root) file systems for the boot environments on the same physical disk, and you experience a failure while booting, use the following process to fall back to the original boot environment:

1. Insert and boot to the Configuration Assistant Floppy.
2. Choose a different boot device (like the Solaris Install CD or Network) and bring the system to Single User mode using boot option: `b -s`.
3. Mount the Current BE root slice to some directory (like `/mnt`). Use the following command to mount:

```
mount "Logical Device Name" /mnt
```
4. Run `luactivate` utility without any arguments from the current BE root slice, as shown below:

```
/mnt/sbin/luactivate
```
5. `luactivate` activates the previous working boot environment and indicates the result.
6. Exit Single User mode and reboot the machine.

Cancel

If you want to stop a scheduled job from running, you must perform a Live Upgrade **cancel** command and confirm your request. Only one job can be scheduled at a time.

You can cancel only a scheduled **boot environment creation** or copy job that has not begun to execute. If it has begun executing, you cannot cancel it.

Compare the Boot Environments

There are two methods of comparing Boot Environments. Both methods consider the following file attributes:

- Mode
- Number of links
- Owner
- Group
- Checksum
- Size
- Existence of files in only one boot environment

Compare the contents of the active boot environment with the contents of an inactive boot environment. This comparison method compares two different boot environments, one being the active boot environment.

Since the inactive boot environment is modified to be bootable when it is created, comparing the active boot environment and an inactive (alternate) boot environment will always show some differences. Also, if one of the boot environments has been updated, this comparison shows many differences (thousands of lines of output).

The inactive boot environment must be in a complete state; for instance, it must be created and populated via the **Live Upgrade** menus or using the Live Upgrade command line utilities. Also, the inactive boot environment cannot have a Live Upgrade copy job pending.

Compare the contents of any boot environment with the saved attributes of that same BE at the creation time of a child BE. This comparison method can be used to determine what has changed on a BE since the creation of a certain child BE. Changes to the child (like an Upgrade) have no affect on this comparison as does the other method of BE comparison.

The inactive boot environment must be in a complete state; for instance, it must be created and populated via the **Live Upgrade** menus or using the Live Upgrade command line utilities. Also, the inactive boot environment cannot have a Live Upgrade copy job pending.

Copy

When you **copy** the contents of the active boot environment to an existing inactive boot environment, the contents of the inactive boot environment will be deleted and all the file systems of the active boot environment will be copied to the inactive boot environment.

Schedule this copy job by specifying the scheduled time in `at` format. (See the `at(1)` man page for more information.) When a job is scheduled, a `LOCK` is created and no other copy/create/upgrade operations will be allowed. Only one job can be

scheduled at one time, and to cancel a scheduled job, you must perform a Live Upgrade `cancel` command.

Create

Create an alternate boot environment to define the devices to be used. Then copy all the file systems of the active boot environment to the alternate boot environment. Refer to “To Create an Alternate Boot Environment” on page 30 for more detailed information.

Current

Use the **Current** choice to display the name of the active boot environment. If no boot environments are configured on the system, then it displays the message "No Boot Environments are defined."

Delete

Use **Delete** to remove the boot environment from the Live Upgrade configuration files. You can not delete the active boot environment, or the boot environment that is activated on the next reboot.

List

Use **List** to catalog the configuration of a boot environment.

The following attributes display:

- Mount point
- File system type
- Device for each boot environment mount point
- Size in sectors

Rename

Choose **Rename** to change the name of an existing boot environment. This is useful if you used a descriptive name for your boot environments (for example, *2.6 BE*) and then upgraded the boot environment with new software (for example, *7.0 BE*).

Status

Choose **Status** to list the status of all the boot environments configured on the system.

The following details of the boot environment are displayed:

- Name of the boot environment
- Whether the boot environment is complete
- Whether the boot environment is currently active
- Whether the boot environment becomes active upon next reboot of the system
- Whether the creation or repopulation of the boot environment is Scheduled, Active, or in the process of being upgraded.

Upgrade

Choose **Upgrade** to select a target boot environment, a software upgrade method, and a media device. Any or all of the software on the target boot environment can be upgraded. This includes Sun Solaris software and third-party software. The upgrade methods include:

- Standard Solaris Foundation Upgrade with Patch Addition
- Standard Solaris Foundation Upgrade without Patch Addition
- User selectable install program on software media that is in the standard Solaris CD media format.
- Manual software installation/configuration option. The target boot environment is mounted and the user is placed in a shell on that boot environment. Any installation/configuration operations (`pkgadd`, `pkgrm`, `patchadd`, `patchrm`, `tar`, or `cpio`) can then be performed on this boot environment without affecting the production boot environment.

The following media types are supported:

- Any NFS shared/mounted file system.
- Any CD or file system not under Volume Management and not in use on the production boot environment.
- Any software that is spooled to a standard BE file system (`/`, `/usr`, `/usr/openwin`, `/var`, `/opt`) on the production boot environment prior to the creation of the target boot environment. In this case, the specified media device should be the directory where the spooled software exists.
- Any tape or floppy disk device that is not in use on the production boot environment. In this case, the specified media device should be your desired working directory (Like: `/var/spool/pkg`).

Note - Volume Management must be disabled for use of a floppy disk on an alternate boot environment.

- Any CD under Volume Management for a Solaris foundation upgrade. CDs under Volume management can not be used for non-Solaris foundation upgrades and Solaris Patch additions to a diskless client server. In this case, Volume Management should be disabled and the CD should be manually mounted on the production environment.
-

Note - For CD media, the overall Upgrade method and media selection can be simplified by disabling Volume Management and manually mounting the CD. You can use the following procedure to achieve this:

- Note the CD device name (`/dev/dsk/c0t6d0s0` will be used in this example)
- Stop Volume Management with the command: `sh /etc/init.d/volmgt stop`
- Insert the CD
- Mount the CD:

For standard Solaris media, use the command:

```
mount -F hsfs -o ro /dev/dsk/c0t6d0s0 /mnt
```

For non-Solaris media, refer to the documentation (included with the CD) to determine the command for mounting the CD without Volume Management.

- Enter the above media mount point (`/mnt`) as the "Package media" in the "Upgrade an alternate boot environment" menu option.
-

Completing a Live Upgrade Process

▼ To Access Live Upgrade

1. You can access Live Upgrade using the Live Upgrade FMLI menus, or the command line utilities:

- Accessing Live Upgrade through FMLI Menus

To access Live Upgrade through FMLI, type the command:

```
# /usr/sbin/lu
```

- Accessing Live Upgrade through the Command Line

To access Live Upgrade through the command line, refer to Table 1-3 and the associated man pages.

2. Continue with the next section, “To Create an Alternate Boot Environment” on page 30.

▼ To Create an Alternate Boot Environment

1. After accessing Live Upgrade and choosing "Create", the system displays the following screen:

```
1 Live Upgrade
Activate - Activate a Boot Environment
Cancel - Cancel a Copy Job
Compare - Compare the contents of Boot Environments
Copy - Start/Schedule a Copy
>Create - Create a Boot Environment
Current - Name of Current Boot Environment
Delete - Delete a Boot Environment
List - List the filesystems of a Boot Environment
Rename - Change the name of a Boot Environment
Status - List the status of all Boot Environments
Upgrade - Upgrade an Alternate Boot Environment
Help - Help Information on Live Upgrade
Exit - Exit the Live Upgrade Menu System

2 Create a Boot Environment
Name of Current Boot Environment: Solaris7
Name of New Boot Environment: Solaris7_399

SAVE CANCEL HELP
```

The system shows the name of the current boot environment.

2. Enter the name of the new boot environment.

The following restrictions apply to the boot environment name:

- 30 characters or less in length
- No colons (:)
- No double quotes (")

Use a descriptive name for your boot environments (for example, *Solaris7*).

3. Continue with the next section, “To Use the Configuration Menu” on page 31.

▼ To Use the Configuration Menu

When you create a new or an alternate boot environment, you can configure this new environment in the following ways:

- Split or merge the `/usr`, `/var`, and `/opt` file systems with the root file system or split/merge the `/usr/openwin` file system with `/usr`. Increase or decrease the file system sizes for any of the system file systems.
- Change the file system type for any of the system file systems (except the root file system which must be UFS).

For example, your current boot environment may have all system files (`/`, `/usr`, `/var`, and `/opt`) on a single UFS file system. The alternate boot environment can be configured so that `/`, `/usr`, `/var`, and `/opt`, are all on separate file systems. The `/usr`, `/var`, and `/opt` file systems can be moved to Veritas VxVM disk volumes or DiskSuite metadevices. Also, you can change the file system type for each file system in the inactive (alternate) boot environment (for example, use `ufs` or `vxfs` for your `/usr` file system).

The following figure shows the <Configuration Menu> you will use to configure the inactive boot environment.

Active Boot Environment				
Mount Point	Device	FS Type	Size (MB)	%Used
/	c0t4d0s0	ufs	121	49%
/export/root	c0t4d0s1	ufs	551	1%
/export/swap	c0t4d0s4	ufs	121	1%
/nsssoft	vol180	vxfs	180	1%
/opt	vol350	vxfs	350	36%
/sdd	mylongvolumena	vxfs	50	3%
/usr	vol500	vxfs	500	66%
/usr/openwin	vol450	vxfs	450	48%
/var	vol100	vxfs	100	25%

New Boot Environment				
Mount Point	Device	FS Type	Size (MB)	Recommended Min Size(MB)
/		ufs		74
/export/root		ufs		93
/export/swap		ufs		62
/nsssoft		vxfs		35
/opt		vxfs		179
/sdd		vxfs		35
/usr		vxfs		449
/usr/openwin		vxfs		291
/var		vxfs		33

Esc	F2	F3	F4	F5	F6	F7	F8	F9	CTRL-D
HELP	CHOICE	SAVE+EXIT	SLICE	SAVESCRN	ABORT	SCHD+EXIT	SPLIT	MERGE	CLEAR

Figure 1-8 Live Upgrade Configuration Menu

When <F2 Choices> is selected, a pop-up "Choices" screen appears on the <Configuration Menu>. This screen displays available slices. Slices that are in bold can be selected for the current file system. The slices not in bold are too small to support the given file system. Certain free slices will not appear for selection of the root file system. These include Veritas VxVM volumes and DiskSuite metadevices. Also, for file system types, UFS is the only choice for the root file system.

1. Use the arrow keys on the keyboard to move the field selector between the Device field and FS Type field for the new boot environment. The Size (megabytes) field is automatically completed as the devices are selected.

If current available slices do not meet the minimum requirements, you can enter the format interface from the "Live Upgrade Slice Configuration" screen, using <F4>, and then re-slice any available disks.

2. After slice selection you can save and exit using <F3> or schedule and exit using <F7> from the <Configuration Menu>.

Creating an alternate boot environment will take 15 minutes or longer, depending on your system configuration.

3. After you have configured the new boot environment and exited the <Configuration Menu>, the following <Live Upgrade Main Menu> displays:

```

1 Live Upgrade
>Activate - Activate a Boot Environment
Cancel - Cancel a Copy Job
Compare - Compare the contents of Boot Environments
Copy - Start/Schedule a Copy
Create - Create a Boot Environment
Current - Name of Current Boot Environment
Delete - Delete a Boot Environment
List - List the filesystems of a Boot Environment
Rename - Change the name of a Boot Environment
Status - List the status of all Boot Environments
Upgrade - Upgrade an Alternate Boot Environment
Help - Help Information on Live Upgrade
Exit - Exit the Live Upgrade Menu System

```

Move to an item with the arrow keys and strike ENTER to select.



Figure 1-9 Live Upgrade Main Menu

4. Perform desired functions (Status, List, Rename) from this screen.
5. Continue with the next section, "To Perform the Software Upgrade" on page 33.

▼ To Perform the Software Upgrade

1. Once you create one or more Live Upgrade boot environments and select "Upgrade" from the main menu, you will enter the target boot environment name and the media device that contains the new software packages.

There are several different upgrade methods to choose from depending on whether you wish to upgrade the Solaris Operating System software or if you wish to install unbundled applications. There is also an Upgrade option that allows the user to be placed in a shell environment on an inactive boot environment where any miscellaneous install/removal/configuration operations can be performed by the user. See "Upgrade" on page 28 for more information on the different upgrade methods and media types.

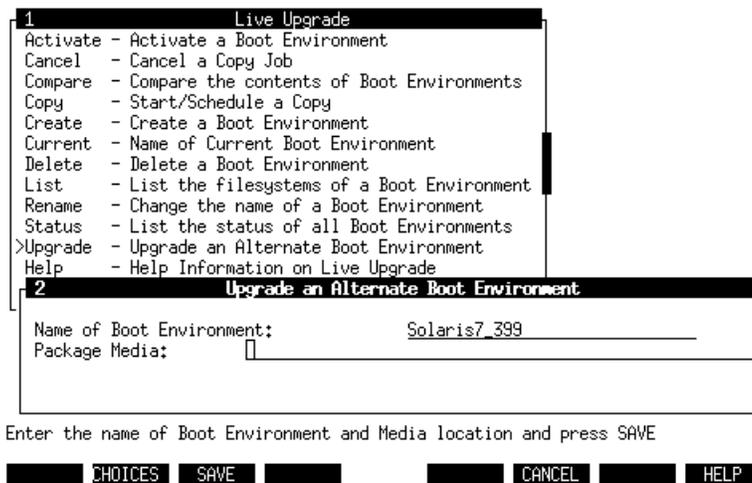


Figure 1-10 Initial Upgrade Menu Screen

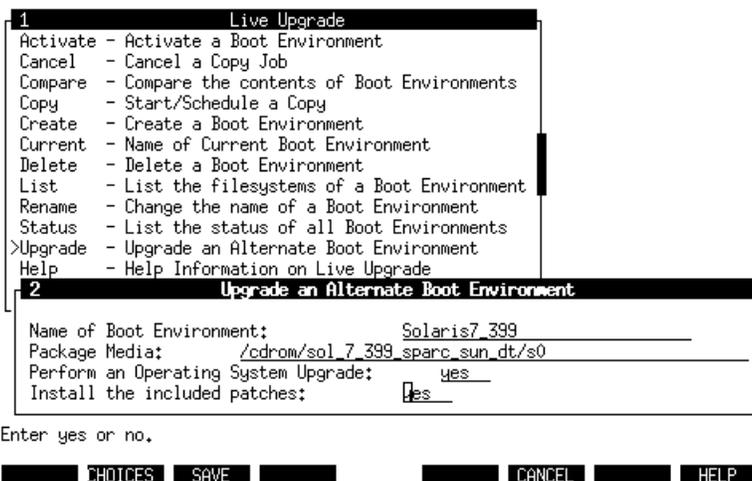


Figure 1-11 Upgrade Menu Screen for Solaris Operating System Upgrade

2. After selecting the boot environment, upgrade method, and media device, choose **SAVE** to update system software on the inactive boot environment.

It will be necessary to do multiple executions of the above upgrade menu function if you have multiple CDs or media devices. After all upgrades are complete, activate the inactive boot environment and reboot.

Falling Back to the Original Boot Environment

Fall back to the original boot environment if a failure is detected after upgrading the software on your system or if your application is not compatible with an upgraded component. If the system will not boot up on the inactive boot environment, use the procedure given when the alternate boot environment was activated to fall back. Otherwise, if the system is running on the alternate boot environment, simply activate the original boot environment. See “Activate a Boot Environment” on page 23 for more information on fall back directions for specific machine configurations (IA vs. SPARC, multiple BEs on one root disk vs. BEs on multiple disks).

Other Live Upgrade Notes

Synchronizing Mail Files

When switching boot environments, the mail files in the `/var/mail` directory may become unsynchronized (in other words, the mail files on the inactive boot environment may become stale).

Live Upgrade will automatically synchronize the files under `/var/mail`. Automatic synchronization is configured by default. Synchronization can be disabled by changing the value of `LU_SYNC_FILE` in the `/etc/default/lu` file to `NO`.



Caution - Synchronize files under `/var/mail` ONLY. Use extreme caution if other files are synchronized. Synchronizing files such as `/etc/vfstab` will result in a corrupted boot environment or an unbootable environment.

Live Upgrade and Veritas VxVM and DiskSuite

VxVM and DiskSuite devices are compatible with Live Upgrade and changes made to the configuration of these products and their devices are visible to all BEs. The only restriction is that BE creations can not directly assign a volume or metadvice for the root file system of a new boot environment. The main reason for assigning a volume/metadvice to the root file system would be for the purpose of mirroring root. Both VxVM and DiskSuite require a special process and series of reboots when configuring the root device for root mirroring. Additionally, VxVM can only maintain one mirrored root file system on a system. For these reasons, Live Upgrade requires the user to first create a boot environment with a root file system on a regular disk slice. After activating and booting the new boot environment, the user should then follow the VxVM or DiskSuite procedure for mirroring this root file system. Live Upgrade does support the creation of a boot environment from an active BE that is using VxVM or DiskSuite mirroring. In this case, on a boot environment creation, Live Upgrade will call the appropriate VxVM or DiskSuite utilities to remove special rootdev settings in the `/etc/system` file of the new boot environment. In the case of VxVM, the user will need to deconfigure any previous rootvol device prior to configuring the new boot environment with root mirroring.

Questions and Answers

The following table contains Live Upgrade related questions and their answers:

Question	Answer
How much additional disk space does Live Upgrade require?	Typically, each boot environment requires from 350 to 800 megabytes of additional disk space depending on your system software configuration. Utilities used by the Live Upgrade user interface will determine your resource requirements.
I'm using an older IA system which can only boot to c0t0d0. Can I use Live Upgrade?	Yes. On systems which have boot disk restrictions, Live Upgrade can configure your root disk so that it is capable of supporting multiple boot environments.
Will swap be configured on the alternate boot environment?	By default, all boot environments share the same swap devices. This can be changed by modifying the boot environment's <code>/etc/vfstab</code> to use a different swap device. The <code>lush</code> command could be used to allow this change prior to booting the inactive boot environment.
On my active boot environment, I have a package spooled under <code>/var/spool/pkg</code> . How do I install the package on an inactive Boot Environment?	To install a package on an inactive boot environment, the media must be accessible on the inactive boot environment. These packages are accessible on the inactive boot environment if the package was spooled prior to the Live Upgrade create/copy to the inactive boot environment. To do the install, select the Upgrade menu option and choose the target boot environment. For the media device, enter <code>/var/spool/pkg</code> . Continuing the upgrade process, you will be placed in a shell on the inactive boot environment in the <code>/var/spool/pkg</code> directory. From there, you can install the package using the <code>pkgadd</code> command. When all packages are added, type "exit" or press CTRL-D to exit the shell and return to the active boot environment. If you did not perform the package spool prior to the Live Upgrade create/copy operation, you could list <code>/tmp</code> as the "Upgrade" media device and then NFS mount the active BE's <code>/var/spool/pkg</code> to a mount point in the shell of the inactive boot environment. Remember, however, to first share the <code>/var/spool/pkg</code> directory on the active BE.

Question	Answer
<p>I have a 500 megabyte file system mounted as <code>/usr/dist</code> in which I store site specific data. Must I copy this data to each boot environment?</p>	<p>By default, yes. Live Upgrade attempts to copy everything in <code>/usr</code>, <code>/var</code>, <code>/opt</code>, including subdirectories (except for NFS file systems). To share your <code>/usr/dist</code> file system among boot environments, perform the following steps:</p> <ol style="list-style-type: none"> 1. <code>umount /usr/dist</code> 2. <code>mkdir -p /export/home/dist</code> 3. <code>rmdir /usr/dist</code> 4. <code>ln -s /export/home/dist /usr/dist</code> 5. edit <code>/etc/vfstab</code> so that the device will be mounted as <code>/export/home/dist</code> 6. <code>mount /export/home/dist</code> <p>Thus, only the symbolic link is copied to all boot environments, and the data on the file system is also shared by them.</p>
<p>Will a reboot take longer if I am switching from one boot environment to another?</p>	<p>No.</p>
<p>What packages do I need to enable the Live Upgrade functionality?</p>	<p>Live Upgrade functionality is available in the <code>SUNWluu</code> and <code>SUNWlur</code> packages. Documentation and man pages are included in the <code>SUNWluman</code> package.</p>
<p>What happens if root mirroring is configured on my system?</p>	<p>During the create/copy to the alternate boot environment, Live Upgrade will disable the root mirroring for the alternate boot environment ONLY. (This does not affect the root mirroring of the active boot environment.) See "Live Upgrade and Veritas VxVM and DiskSuite" on page 35.</p>