
the ADVENTURES OF SAM SOLARIS 10 SYSADMIN

WS-2700-S10: Solaris™ 10 Patching Best Practices Course Reference Guide

November 2009



WS-2700-S10: Solaris™ 10 Patching Best Practices Course Reference Guide is a supplement to the web-based training course: WS-2700-S10: Solaris™ 10 Patching Best Practices. The guide presents the key concepts of the course but it does not contain all the content presented in the course itself. The guide is intended to be used as a reference and refresher after having completed the online course.

For detailed information on any topic presented in this guide, please refer to the appropriate Solaris 10 System Administration guide on docs.sun.com and the BigAdmin Solaris Patching Center website at <http://www.sun.com/bigadmin/patches/solaris/>.

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Topic 1: Solaris 10 Patching Philosophy

Key factors that contributed to the perception of Solaris 10 patching as complex:

- So many patches; hard to pick the right set of patches
- Introduction of Zones into Solaris 10 complicated the creation and testing of patches
- Dim Sum Patching - Running a combination of various Solaris binaries that have never been tested together
- New system administrators never really taught how to patch properly



Point #1: Use Solaris Live Upgrade

- Solaris Live Upgrade reduces the downtime and risk associated with patching because you can patch the alternate boot environment while the system is still in production.
- If issues occur after the new boot environment is activated, you can reboot the system back into the original boot environment and fix the issue without impacting production.



Point #2: Avoid patching live systems with zones when possible!

- Use Solaris Live Upgrade to patch systems with zones.
- Use the appropriate patch bundles to enable your systems to use Solaris Live Upgrade to patch and upgrade systems with non-global zones. For more information see the [Solaris Live Upgrade Patch Requirements](#).

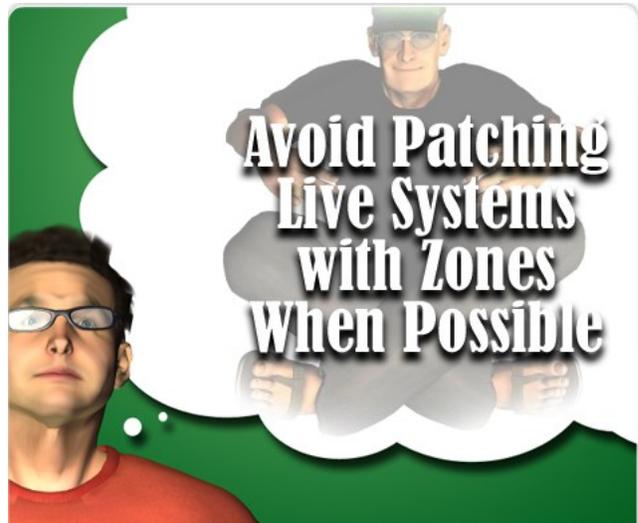
Point #3: Avoid “Dim Sum” patching!

The "Dim Sum" patching problem occurs when Solaris 10 users pick and choose which patches they install from various patch releases instead of upgrading their systems to a defined baseline.

As a result, their systems run a combination of various Solaris binaries that have never been tested together. This less-than-ideal approach can lead to a variety of system problems.

Point #4: Consistently apply Solaris 10 Patching Best Practices!

Applying the Solaris 10 Patching Best Practices in your day-to-day sysadmin routine will make administering and maintaining your systems much easier.



Point #5: Do not hesitate to seek guidance!

Sun Microsystems wants to provide the Solaris 10 sysadmin community with all the support and guidance it needs to keep its systems running smoothly and efficiently.

Sun Microsystems has set up a variety of resources to make your job easier, including:

- [BigAdmin](#)
- [SunSolve](#)
- [Patch Corner Blog](#)



Topic 2: The Solaris 10 Patching Best Practices

1. Always install the latest patch and package utility patches first.

- Patches the patching binaries themselves
- Ensures that the patching utilities function correctly.



Obtaining the Patch Utilities Patch from SunSolve

Patch Utilities Patch

- Located on sunsolve.sun.com
- No charge
- Different patches for SPARC and x86 systems

Before applying the patch utilities patch, verify that the patch has not been previously applied to the system:

```
# patchadd -p | grep "Patch: <patch_id>"
```

2. Upgrade to the latest Solaris 10 Update release during your next major maintenance window.

- Includes newest features
- Ensures a good quality baseline
- Frees up system space



Did You Know?

Each Solaris Update contains all the bug fixes that were available at the time the release was built. These patches are pre-applied into the Solaris Update image. This helps make each Solaris Update successively better quality.

The Solaris 10 Updates are very intensely tested by a wide variety of quality assurance teams in Sun Microsystems. This is why they provide a good quality baseline. Also, it means that all of the Solaris enhancements included in the Solaris Update are fully available to you.

Obtaining the latest Solaris 10 Update release from SunSolve

Solaris 10 Update Release

- Accessed from sunsolve.sun.com
- No charge
- ReadMe file contains step-by-step instructions for performing the upgrade

For information on how to install a Solaris 10 Update, see the [Solaris 10 Release and Installation Collection](#) on docs.sun.com.



3. Keep as up to date as possible with the contents of the Sun Alert patch cluster in between major maintenance windows.

The patches contained in the Sun Alert patch cluster:

- Are considered to be the most important and highly recommended patches for Solaris 10
- Provide the minimum amount of change required to address known Security, Data Corruption, and Availability issues



Did You Know?

The Sun Alert patch cluster contains Solaris operating system (OS) patches only. The cluster provides all available patches that address Sun Alert issues for the Solaris OS itself.

Obtaining the Sun Alert Patch Cluster from SunSolve Demonstration

Sun Alert Patch Cluster:

- Is located on sunsolve.sun.com
- Requires valid support contract to download
- Contains step-by-step instructions in the ReadMe file for performing the upgrade

A screenshot of the SunSolve website. The top section is titled "Find a specific software update (patch)". Below this is a link for "PatchFinder". A red text block reads: "Latest Patch Utility Patches. Sun strongly recommends to patches to ensure they have up-to-date patch utility funct any other patch installation or removal." Below this is a dropdown menu with the text "--Select SunOS and Patch Number--". Further down, there is a link: "Register here for weekly notification of new and updated". At the bottom, there is a section titled "» Temporary or Interim Security Updates" with two bullet points: "• Temporary patches are developed to resolve a spec for general distribution." and "• Access interim security updates when notified by Se Relief(ISR) Patch is available."

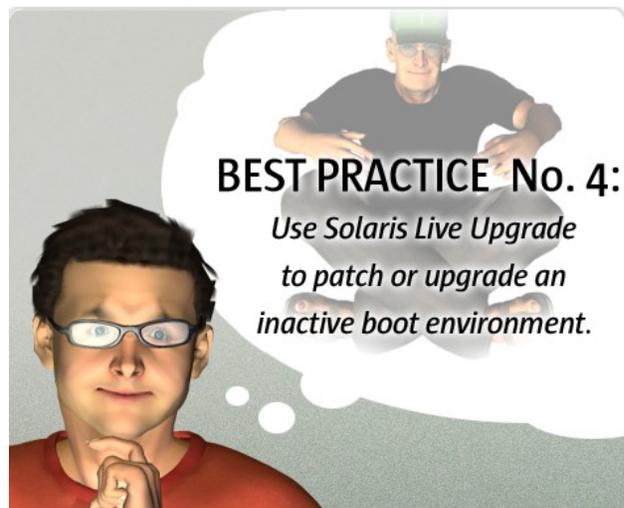
Sun Alert Program

- Provides weekly notifications advising of new and updated Sun Alerts to Contract Sun Customers.
- Notifications detail important hardware and software issues that may pose a risk to your computing environment
- Non-contract subscribers have access to Sun Alerts and Patches for Security-related issues only.
- To sign up for Sun Alert notifications on SunSolve, go to the [Sun Alert subscription page](#).



4. Use Solaris Live Upgrade to patch or upgrade an inactive boot environment.

- Avoids much of the risk and downtime associated with patching the live boot environment
- Provides a simple roll-back mechanism.



Did You Know?

When patching a live boot environment, there's a risk of interaction between the newly patched objects and old versions loaded in memory. Because Solaris Live Upgrade works on an inactive or alternate copy of the boot environment, the issue of the interaction between the newly patched objects and old versions loaded in memory does not arise. Solaris Live Upgrade also removes the need for interim reboots when patching early Solaris 10 releases, thereby minimizing the downtime and risk associated with patching.

The factory pre-install images provided on Sun equipment now contain space for an alternate boot environment for use by Live Upgrade by default.

5. If you are going to use Solaris Live Upgrade to patch systems with non-global zones that are running Solaris 10 8/07 (Update 4) or an earlier Solaris 10 Update release, apply the Solaris 10 Live Upgrade Zones Starter Patch Bundle.

- Patches the system up to the level required to enable the use of Live Upgrade in a basic zones environment
- After the patch bundle has been applied, Solaris Live Upgrade can be used to patch zones in an alternate boot environment



Obtaining the Solaris 10 Live Upgrade Zones Starter Patch Bundle from SunSolve Demonstration

Solaris 10 Live Upgrade Zones Starter Patch Bundle

- Located on sunsolve.sun.com
- Requires valid support contract to download
- ReadMe file contains step-by-step instructions for performing the upgrade

Zones Tips

When patching in a zones environment, consider the following:

- Use Solaris Live Upgrade
- Use Zones "Update on Attach"
 - Greatly decreases complexity of patching zones
 - Syncs up the patch level of non-global zones with the global zone
 - Improves zones patching performance

For more information on Zones "Update on Attach", see the [Patch Corner blog](#).



Using "Update on Attach" to Patch Zones

1. Detach the non-global zones.
2. Apply patches, including Kernel patch 137137-09, to the global zone.
3. Reattach the non-global zones with "Update on Attach."

Note: "Update on Attach" will not remove any withdrawn patches from the non-global zone. Because "Update on Attach" only works for updates, not down-rev'ing, you need to remove any withdrawn patches from all zones before detaching.



Topic 3: What's Next for Solaris 10 Patching?

Zones Parallel Patching Enhancement

- Available with Solaris 10 Update 8
- Parallelizes the patching process
- Improves zones patching performance
- Reduces the maintenance windows required for Zones systems



Did You Know?

Just a point of clarification regarding Zones Parallel Patching: you do not need to upgrade to Solaris 10 Update 8 to use Zones Parallel Patching; this feature is currently available to all customers on all Solaris 10 releases. All you have to do is install patch utilities patch 119254-66 (SPARC) / 119255-66 (x86) and away you go. The difference now is that the patch is pre-applied into Solaris 10 Update 8 and will be pre-applied into all subsequent Solaris Updates.

Improved Patch Space Checks Functionality

The enhancements to the patch space checks functionality in the patchadd command will improve the zones patching experience

Return Code Back Enhancement in patchadd

More fault codes have been added to the Return Code Back in patchadd, so that the reason for the non-install will be readily identifiable.

Pre-flight Checks Tool for patchadd

The pre-flight checks tool for patchadd will ensure that a system is ready to be patched. For more information on the Patching Pre-flight Check ('ppc') tool, go to http://blogs.sun.com/patch/entry/patching_pre_flight_checks_ppc.



Patch Cluster Improvements

Improvements to patch clusters include:

- Using a new `install_cluster` script in the Recommended and Sun Alert patch clusters
- Merging Recommended and SunAlert patch clusters into a single cluster
- Changes to the backend process to improve cluster quality

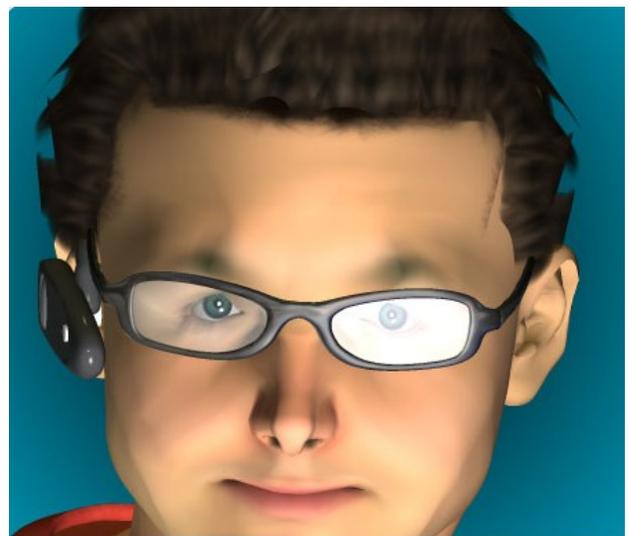
For more information about the patch cluster improvements, go to the [Patch Cluster and Patch Bundle download page](#).

Additional Improvements

Sun Microsystems is also working on the following improvements:

- Patch Product Identifier is designed to tie a product to a patch more closely.
- Patch Entitlement implementation will become stricter (see the [Software Update Entitlement Policy for Solaris](#))
- New Patch Finder is planned to provide a more refined set of search results.

Solaris Test Core Team is proactively reviewing test coverage of new features being added to Solaris Update Releases.



Did You Know?

Future revisions of the PatchFinder Tool will contain further enhancements:

- Patch access entitlement information
- Shopping cart functionality
- Patch dependency resolution
- Patch install order resolution
- Patch set download (effectively Dynamically Generated Patch Clusters)

To try the new PatchFinder Tool, go to <http://sunsolve.sun.com/patchfinder>.

For more information see the related entry on the http://blogs.sun.com/patch/entry/zones_parallel_patching_feature_now.

Where to Find More Information

Visit the BigAdmin Solaris Patching Center and the Patch Corner blog website for the latest updates.

Topic 4: Solaris 10 Patching Resources

Resources for Patching Support and Documentation

Use these websites to make your job easier:

- BigAdmin
- SunSolve
- Patch Corner



BigAdmin

BigAdmin is Sun Microsystems' main website for system administrator resources and community.

<http://www.sun.com/bigadmin>



The screenshot shows the BigAdmin website homepage. At the top, there is a navigation bar with the Sun Microsystems logo and links for Downloads & Trials, Products, Services, and Solutions. Below the navigation bar, the main heading reads "BigAdmin System Administrator Resources and Community". A "Message of the Day" section is visible, featuring three articles from SysOp dated July 07, 06, and 03. The articles discuss configuring Zmanda software, Sun BluePrints best practices, and a firmware flash utility.

SunSolve

You can find the latest Solaris 10 patches and software updates for download on SunSolve.

<http://www.sunsolve.sun.com/>



The screenshot shows the SunSolve website. The navigation bar includes links for Java, Solaris, Communities, About Sun, How to Buy, and My Sun Community. The main heading is "SunSolve Your knowledge destination for trouble". Below the heading, there is a "Support Services" section with a search bar and a "Search" button. The search bar is currently empty, and the "Search" button is labeled "Search »". Below the search bar, there are links to "Search OpenSolaris Bug Reports" and "Search Developer Bug Reports".

Patch Corner

Patch Corner is a blogging site dedicated to providing the latest information on Solaris 10 patching issues and resolutions.

<http://blogs.sun.com/patch/>



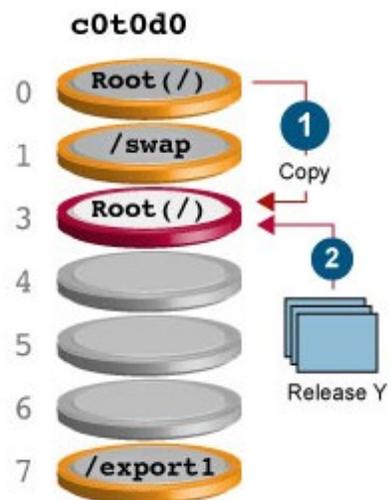
The screenshot shows a blog post from Patch Corner. The header features the Sun Microsystems logo and the text "Patch Corner Patch news and best practice". The date of the post is "Friday Sep 18, 2009". The main heading of the post is "Patching Pre-flight Checks (ppc) to". Below the heading, the text reads "The new Patching Pre-flight Checks ('ppc') tool is now available t" and "The idea for this tool comes directly from customer feedback."



Topic 1: The Advantages of Using Solaris Live Upgrade

Live Upgrade: A Better Way to Patch Solaris 10

- Solaris Live Upgrade revolutionizes the way that you add patches to Solaris products and can save you hours of time and effort.
- The genius of Solaris Live Upgrade is that it creates an identical copy of your Solaris image on an inactive disc partition. This is called an alternate boot environment, or ABE. Your running image is now known as the primary boot environment, or PBE.
- Once this copy is created, you apply the recommended patches or upgrade to the alternate boot environment without interrupting your active system.
- Once you've made all the necessary changes, you simply restart the system to the alternate boot environment and you're finished!



What Can You Do With Live Upgrade?

Solaris Live Upgrade enables you to duplicate a boot environment without affecting the currently running system.

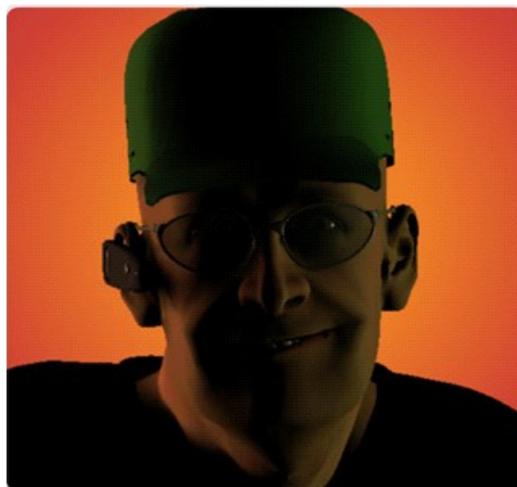
You can:

- Upgrade an alternate boot environment
- Change the current boot environment's disk configuration
- Maintain numerous boot environments with different images

The Benefits of Live Upgrade

Using Solaris Live Upgrade has four main benefits:

- There is no system downtime while you apply the patches
- The patching process is less complex
- The patching process can be completed at your pace and on your schedule
- If a problem occurs, you can quickly revert to the original boot environment with a simple series of commands



Topic 2: Steps of the Solaris Live Upgrade Process

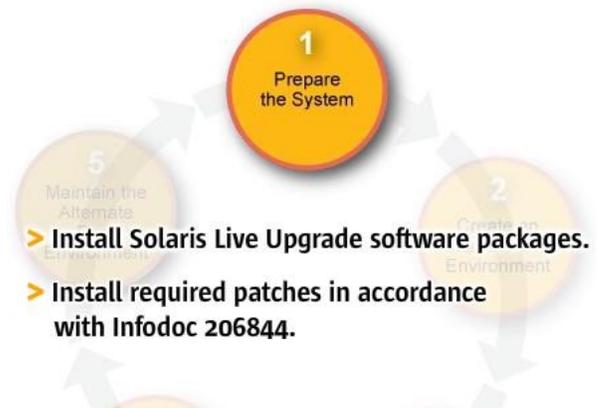
What Are the Steps of the Solaris Live Upgrade Process?

1. Prepare the system for Solaris Live Upgrade.
2. Create an alternate boot environment.
3. Upgrade or update the alternate boot environment.
4. Activate the alternate boot environment, and
5. Maintain the alternate boot environment.



1. Prepare the System for Solaris Live Upgrade

The first step of the process is to prepare the system for Solaris Live Upgrade. During this step you install the Solaris Live Upgrade software packages on your system as well as apply all the required patches listed in Infodoc 206844. Infodoc 206844 contains the patch requirements a system must have in order to use the Solaris Live Upgrade software.



Did You Know?

Veritas now supplies scripts for VxVM 1.5 to enable VxVM to work with Live Upgrade. These scripts are available from Veritas.

2. Create an Alternate Boot Environment

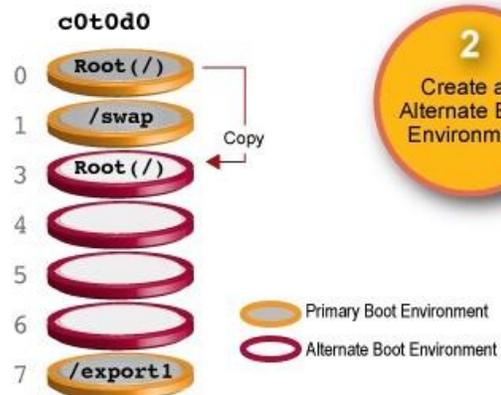
After you have prepared the system for Solaris Live Upgrade, the next step is to use Solaris Live Upgrade to create an alternate boot environment. This alternate boot environment provides a place to copy critical system components where they can be updated without interrupting the system.

As you are creating the alternate boot environment, you can reorganize the disk, customize file systems, and copy critical system components to the alternate boot environment.

The graphic on this page shows the process of creating an alternate boot environment using Solaris Live Upgrade.

Command:

```
# lucreate -c solenv1 \  
-m /:/dev/dsk/c0t0d0s3:ufs \  
-n solenv2
```



3. Upgrade and Update an Alternate Boot Environment

After you have created an alternate boot environment, you can upgrade or update it.

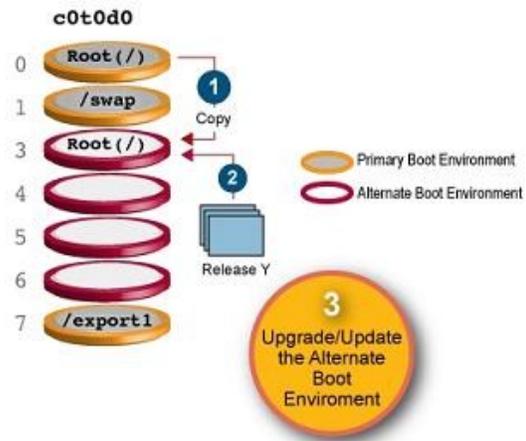
An upgrade consists of installing a Solaris 10 software update release. An update consists of adding individual patches, patch clusters, patch bundles, or packages to the alternate boot environment.

Both the software releases and patches and packages are available for download from sunsolve.sun.com.

You use the `luupgrade` command to upgrade an alternate boot environment and to apply patches and packages.

The graphic on this page shows how to upgrade an alternate boot environment using Solaris Live Upgrade.

```
# luupgrade -u -n solenv2 \  
-s /net/installmachine/export/Solaris_10/OS_image
```



Did You Know? - Upgrading with a Flash Archive

A flash archive is a mirrored image of a system that can be installed on another system of the same architecture.

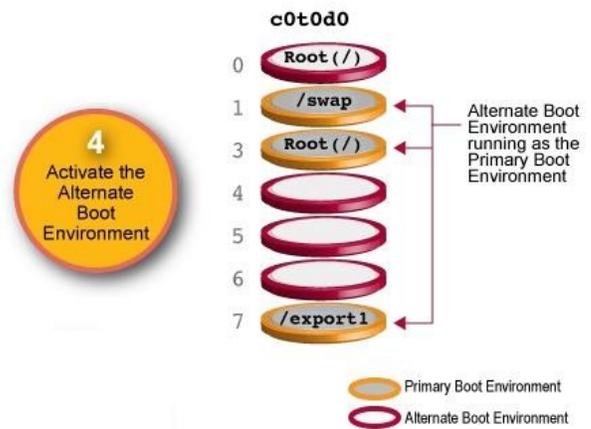
Rather than an upgrade, you can install a Solaris Flash archive on an alternate boot environment. The Solaris Flash installation feature enables you to create a single reference installation of the Solaris OS on a system. This system is called the master system. Then, you can replicate that installation on a number of systems that are called clone systems. In this situation, the alternate boot environment is a clone.

4. Activate an Alternate Boot Environment

When you are ready to switch to the alternate boot environment that you've patched or upgraded, you simply activate the alternate boot environment and then restart the system. Files are synchronized between the primary and alternate boot environments the first time that you restart to the alternate boot environment.

When you restart the system, the configuration that you installed on the alternate boot environment is active. The original primary boot environment then becomes another alternate boot environment.

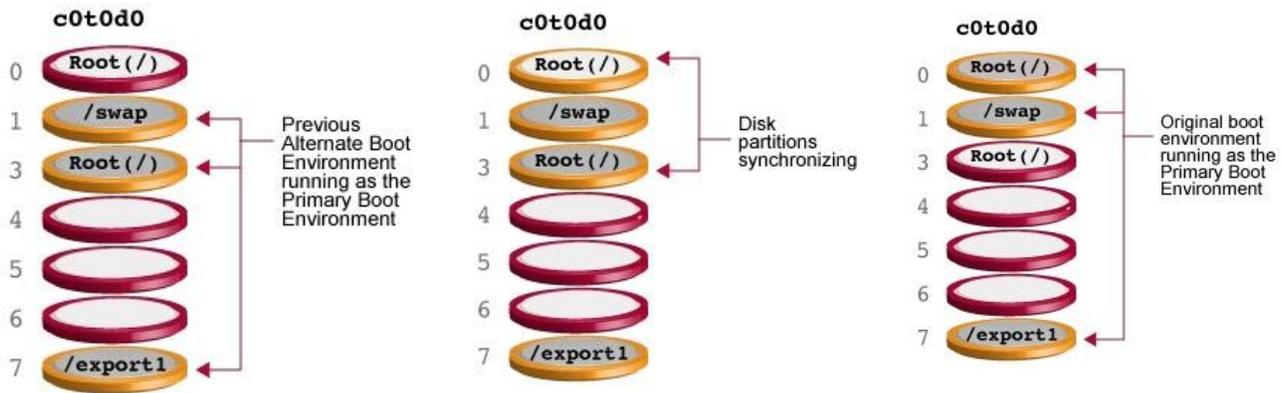
You use the `luactivate` command to activate an alternate boot environment. The graphic on this page shows a switch after a restart to an alternate boot environment.



5. Fall Back to the Original Boot Environment

If a problem occurs, you can quickly revert to the original primary boot environment with an activation and restart.

Using the fall back procedure takes only enough time to restart the system, which is much quicker than backing up and restoring the original. The alternate boot environment that had an issue is preserved. The issue can then be analyzed.



There are different ways to fall back to the previous boot environment. The problem descriptions on this screen describe Solaris Live Upgrade fallback problems and actions.

Problem	Action
The new boot environment boots successfully, but you are not happy with the results	Run the luactivate command with the name of the previous boot environment and reboot. x86/x64 only: Starting with the Solaris 10 1/06 release, you can fall back by selecting the original boot environment that is found on the GRUB menu. The original boot environment and the new boot environment must be based on the GRUB software.
The new boot environment does not boot.	Boot the fallback boot environment in single-user mode, run the luactivate command, and reboot.
You cannot boot in single-user mode.	Perform one of the following: <ul style="list-style-type: none"> •Boot from DVD or CD media or a net installation image •Mount the root (/) file system on the fallback boot environment •Run the luactivate command and reboot

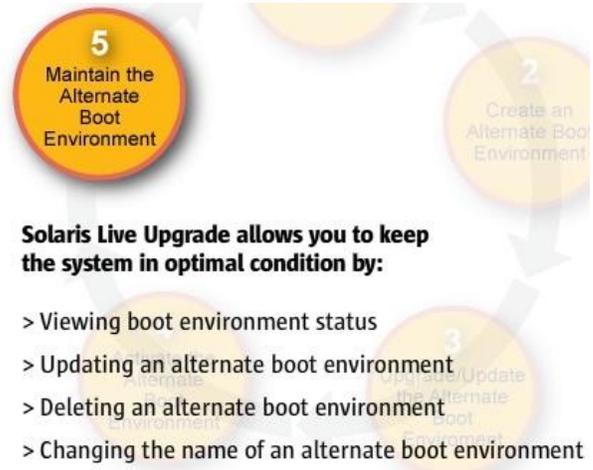
6. Maintain an Alternate Boot Environment

Once you have updated your Solaris system, Solaris Live Upgrade allows you to keep the system in optimal condition by completing a variety of maintenance tasks. These include:

- Viewing boot environment status
- Updating an alternate boot environment
- Deleting an alternate boot environment, and
- Changing the name of an alternate boot environment

For a complete list of maintenance tasks, see the [Solaris 10 10/08 Installation Guide: Solaris Live Upgrade and Upgrade Planning](#).

It contains step-by-step instructions on how to complete each step of the Solaris Live Upgrade process.

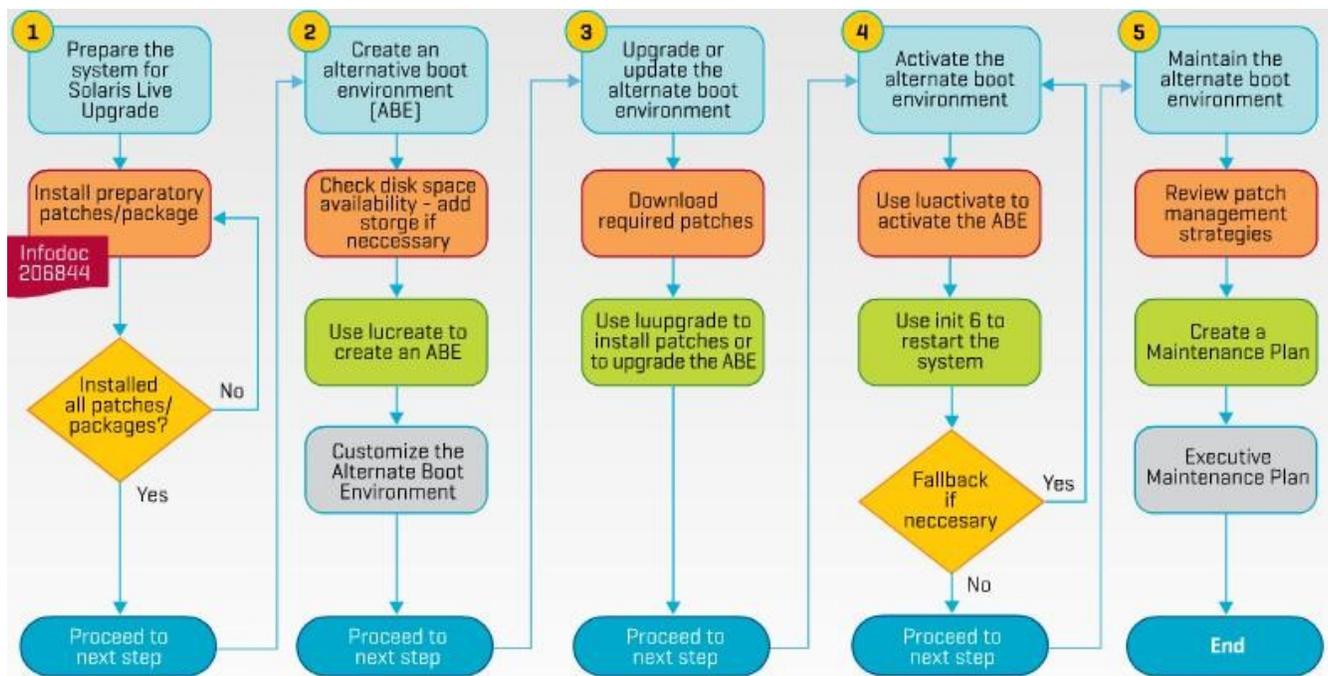


Topic 1: Planning System Preparation and Alternate Boot Environment Creation

Planning for Live Upgrade

Steps of the Solaris Live Upgrade Process

1. Prepare the system for Solaris Live Upgrade.
2. Create an alternate boot environment.
3. Upgrade or update the alternate boot environment.
4. Activate the alternate boot environment
5. Maintain the alternate boot environment.



Step 1: Prepare the System for Solaris Live Upgrade

To prepare the system for Solaris Live Upgrade:

- Install the Solaris Live Upgrade software packages.
- Apply all the required patches listed in [Infodoc 206844](#).

Document Audience:	PUBLIC
Document ID:	206844
Old Document ID:	(formerly 72099)
Title:	Solaris[™] Live Upgrade Software
Copyright Notice:	Copyright © 2009 Sun Microsystems
Update Date:	Fri Jun 05 00:00:00 MDT 2009

Solution Type Technical Instruction

Solution 206844 : Solaris[™] Live Upgrade Software: M

Related Categories

- Home>Product>Software>Operating Systems

Step 2: Create an Alternate Boot Environment – Disk Space Requirements

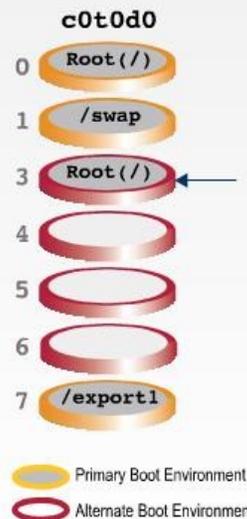
Making a duplicate of the current boot environment enables you to:

- Upgrade your systems to a later Solaris 10 Update release without impacting the production environment
- Fall back to the current boot environment if the alternate boot environment should fail for any reason

The disk on the alternate boot environment must be able to serve as a boot device.

- Some systems restrict which disks can serve as a boot device.
- Refer to your system's documentation to determine if any boot restrictions apply.
- Check that the disk is formatted properly.

Creating an Alternate Boot Environment



Are Your Disks Formatted Properly?

To ensure that your disk is formatted properly:

- Identify slices large enough to hold the file systems to be copied.
- Identify file systems that contain directories that you want to share between boot environments rather than copy. If you want a directory to be shared, you need to create an alternate boot environment with the directory put on its own slice. The directory is then a file system and can be shared with future boot environments.

For more information about creating separate file systems for sharing, see “[Guidelines for Selecting Slices for Shareable File Systems](#)” in the *Solaris 10 10/08 Installation Guide: Solaris Live Upgrade and Upgrade Planning*.

Did you know?

Up until now we've been covering UFS, but we will be covering ZFS™ later in the course.

Enough Disk Space?

Solaris Live Upgrade involves having two simultaneous boot environments, so enough disk space for both is a prerequisite. For general guidelines about the amount of disk space required, refer to the *Solaris 10 10/08 Installation Guide: Planning for Installation and Upgrade*- and review the section titled [Allocating Disk and Swap Space](#).

Special considerations:

When using Live Upgrade in an environment where `/` and `/var` are separate, and if mirroring them to new disk slices (be it same or different disk), you will need at least the space consumed by `df -k /var` and `df -k /`, and then add some extra space for future growth in `/var` and `/`. Be aware that due to issues such as the lack of sparse file support in Live Upgrade, files like `lastlog` will get replicated in full, so if `ls` shows the file `lastlog` is several gigabytes in size, then the `alt root` will also need to be several gigabytes in size and not the few megabytes that the file actually consumes on disk.

In a system configuration with non-global zones, if they are on shared disk (i.e. the disk is shared between both boot env's), then each non-global zone is physically copied on disk, so if each zone has ½ gigabyte, you will need an additional ½ gigabyte to copy each zone for LU.

If `zonpath` is a zfs dataset, cloning is used and very little space will be consumed on the pool. If `zonpath` is a directory in zfs dataset, then new zone is created using a dataset as `zonpath`, and old `zonpath` is copied to new `zonpath`.

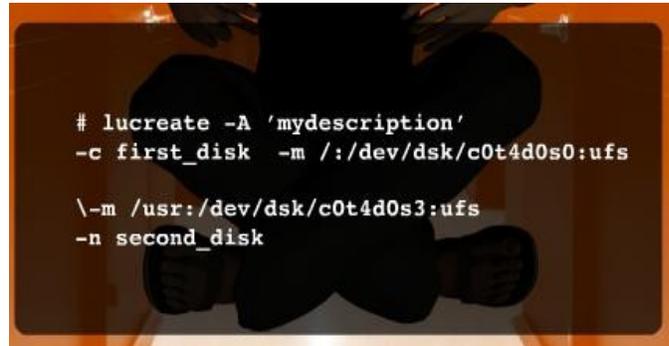
For more information, refer to the *Solaris 10 10/08 Installation Guide: Planning for Installation and Upgrade*.

Step 2: Create an Alternate Boot Environment

– File Systems Guidelines

Follow these guidelines for specifying file systems for the alternate boot environment:

- Specify one -m option for root (/)
- Merge critical file systems
- Limit file systems
- Don't duplicate mounts



```
# lucreate -A 'mydescription'
-c first_disk -m /:/dev/dsk/c0t4d0s0:ufs

\ -m /usr:/dev/dsk/c0t4d0s3:ufs
-n second_disk
```

File System Guidelines

You must specify one -m option for the root (/) file system for the alternate boot environment.

You must specify one -m option for the root (/) file system for the alternate boot environment. If you run lucreate without the -m option, the Configuration menu is displayed. The Configuration menu enables you to customize the alternate boot environment by redirecting files onto new mount points. Exit the Configuration menu and rerun the lucreate command with the -m option.

Some file systems are merged.

Any critical file systems that exist in the current boot environment and that are not specified in a -m option are merged into the next highest-level file system created.

Only the file systems that are specified by the -m option are created on the alternate boot environment.

Only the file systems that are specified by the -m option are created on the alternate boot environment. To create the same number of files systems that is on your current system, you must specify one -m option for each file system to be created.

For example, a single use of the -m option specifies where to put all the file systems. You merge all the file systems from the original boot environment into the one file system that is specified by the -m option. If you specify the -m option twice, you create two file systems. If you have file systems for root (/), /opt, and /var, you would use one -m option for each file system on the alternate boot environment.

Do not duplicate a mount point.

Do not duplicate a mount point. For example, you cannot have two root (/) file systems.

Did You Know?

If you would like to use multiple disk partitions for different file systems, you need to use a -m option for each slice. For example, the following series of commands creates a separate slice for root(/), /usr, and /var:

```
-m/:/dev/dsk/c0t0d0s0:ufs
-m/usr:/dev/dsk/c0t0d0s3:ufs
-m/var:/dev/dsk/c0t0d0s7:ufs
```

Overlapping Slices

Do not overlap slices when reslicing disks. If this condition exists, the alternate boot environment appears to have been created, but when activated, the boot environment does not boot. The overlapping file systems might be corrupted.

For Solaris Live Upgrade to work properly, the vfstab file on the active boot environment must have valid contents and must have an entry for the root (/) file system at the minimum.

Did You Know?

To Create a Boot Environment With RAID-1 Volumes (Mirrors) use the following link:

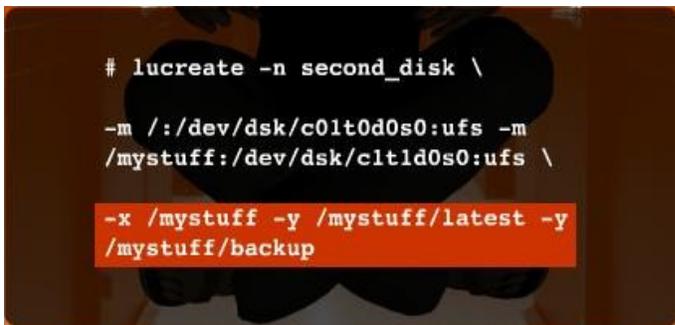
<http://docs.sun.com/app/docs/doc/820-5238/chapter-33?l=en&a=view>

See the section called "Create a Boot Environment with RAID-1 Volumes" and look at examples 4-9 through 4-13.

Step 2: Create an Alternate Boot Environment – Customizing the Environment

You can customize the alternate boot environment by:

- Excluding directories and files
- Reinstating specified subdirectories or files under the excluded directory



```
# lucreate -n second_disk \  
-m /:/dev/dsk/c01t0d0s0:ufs -m  
/mystuff:/dev/dsk/c1t1d0s0:ufs \  
-x /mystuff -y /mystuff/latest -y  
/mystuff/backup
```

lucreate Command Options for Removing and Restoring Directories and Files

Slice for the root (/) File System

When you create an inactive boot environment, you need to identify a slice where the root (/) file system is to be copied. Use the following guidelines when you select a slice for the root (/) file system. The slice must comply with the following:

- Must be a slice from which the system can boot
- Must meet the recommended minimum size
- Can be on different physical disks or the same disk as the active root (/) file system
- Can be a Veritas VolumeManager volume (VxVM). If VxVM volumes are configured on your current system, the lucreate command can create a new boot environment. When the data is copied to the new boot environment, the Veritas file system configuration is lost and a UFS file system is created on the new boot environment.

Slices for Mirrored File Systems

You can create a new boot environment that contains any combination of physical disk slices, Solaris Volume Manager volumes, or Veritas Volume Manager volumes. Critical

file systems that are copied to the new boot environment can be of the following types:

- A physical slice
- A single-slice concatenation that is included in a RAID-1 volume (mirror). The slice that contains the root (/) file system can be a RAID-1 volume.
- A single-slice concatenation that is included in a RAID-0 volume. The slice that contains the root (/) file system can be a RAID-0 volume. When you create a new boot environment, the `lucreate -m` command recognizes the following three types of devices:
 - A physical slice in the form of `/dev/dsk/cwtxdysz`
 - A Solaris Volume Manager volume in the form of `/dev/md/dsk/dnum`
 - A Veritas Volume Manager volume in the form of `/dev/vx/dsk/volume_name`.
If VxVM volumes are configured on your current system, the `lucreate` command can create a new boot environment. When the data is copied to the new boot environment, the Veritas file system configuration is lost and a UFS file system is created on the new boot environment.

Slice for a Swap Volume See “Configuring Swap for the NewBoot Environment” in Solaris 10 10/08 Installation Guide: Solaris Live Upgrade and Upgrade Planning.

Slices for Shareable File Systems Solaris Live Upgrade copies the entire contents of a slice to the designated new boot environment slice. You might want some large file systems on that slice to be shared between boot environments rather than copied to conserve space and copying time. File systems that are critical to the OS such as root (/) and /var must be copied. File systems such as /home are not critical file systems and could be shared between boot environments. Shareable file systems must be user-defined file systems and on separate swap slices on both the active and new boot environments. You can reconfigure the disk several ways, depending your needs.

Topic 2: Planning Upgrading/Updating, Activating, and Maintaining

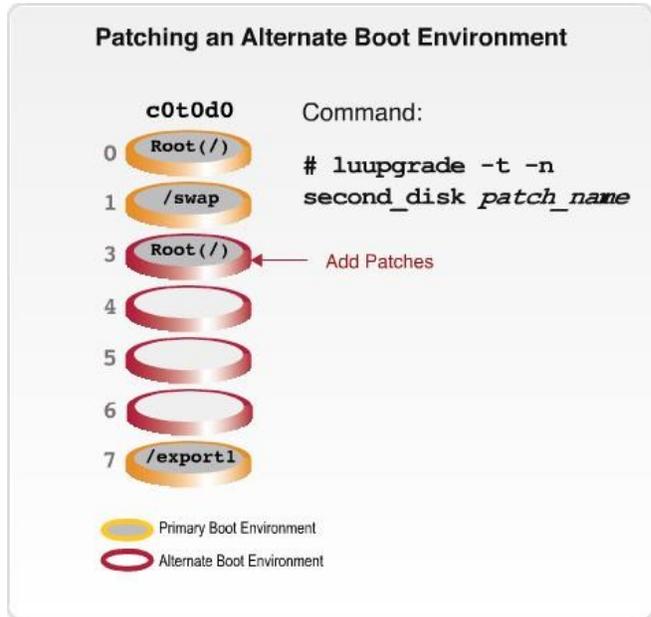
Step 3: Upgrade or Update the Alternate Boot Environment

You can use Solaris Live Upgrade to:

- Upgrade your systems to the latest Solaris 10 Update release.
- Add patches and packages to a system.

You use the `luupgrade` command to perform both upgrades and updates.

Review the software upgrade and patch information available on BigAdmin as part of your planning activities.



Upgrading and Updating Your Alternate Boot Environment

For more information about upgrading an alternate boot environment, see [“Upgrading a Boot Environment” in the Solaris 10 10/08 Installation Guide: Solaris Live Upgrade and Upgrade Planning.](#)

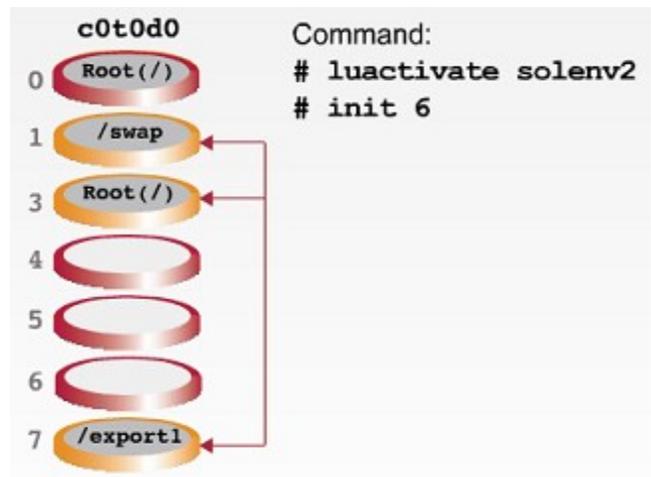
Step 4: Activate the Alternate Boot Environment

To activate an alternate boot environment, you:

- Use the `luactivate` command.
- Restart the system.

Files are synchronized between the previous primary boot environment and the newly created alternate boot environment.

Solaris Live Upgrade provides fallback commands if something didn't go as planned and you need to revert to the previous system configuration.



Activating an Alternate Boot Environment

For information about activating an alternate boot environment, see “Activating a Boot Environment” in the *Solaris 10 10/08 Installation Guide: Solaris Live Upgrade and Upgrade Planning*.

For information about synchronizing the active and alternate boot environments, see “[Synchronizing Files Between Boot Environments](#)” in the *Solaris 10 10/08 Installation Guide: Solaris Live Upgrade and Upgrade Planning*.

Step 5: Maintain the Alternate Boot Environment

It is important to maintain your alternate boot environments.

For recommendations and best practices on developing a patch management maintenance strategy, see BigAdmin and the Patch Corner blog.

With Solaris Live Upgrade you can perform the following maintenance tasks:

- Display the status of all boot environments
- View the configuration of a boot environment
- Update a previously configured boot environment
- Delete an inactive boot environment



Maintaining an Alternate Boot Environment

For more information about maintaining Solaris Live Upgrade, see "[Maintaining Solaris Live Upgrade Boot Environments](#)" in the *Solaris 10 10/08 Installation Guide: Solaris Live Upgrade and Upgrade Planning*.



Module 4: Installing Solaris™ Live Upgrade

Topic 1: Install the Solaris Live Upgrade Packages

Getting Started

Documents that explain how to install the Solaris Live Upgrade software packages:

- [Solaris 10 10/08 Installation Guide: Solaris Live Upgrade and Upgrade Planning](http://docs.sun.com/app/docs/doc/820-5238)
(<http://docs.sun.com/app/docs/doc/820-5238>)
- [Infodoc 206844: Solaris\[™\] Live Upgrade Software: Patch Requirements](http://sunsolve.sun.com/search/document.do?assetkey=1-61-206844-1)
(<http://sunsolve.sun.com/search/document.do?assetkey=1-61-206844-1>)

Did You Know?

Infodoc 206844 was formerly Infodoc 72099.

Key Point to Remember

If using LU to upgrade the OS, the release of the Solaris Live Upgrade packages must match the release of the OS you are upgrading to.

For more information, see [Infodoc 206844](#).



Did You Know?

For customers who may have policies in place that make it difficult to upgrade but okay to patch a system, Sun Microsystems provides corresponding Solaris 10 Patch Bundles for each Solaris 10 Update starting with Solaris 10 05/08.

The Solaris 10 Patch Bundle will not suit everyone. It is a large collection of patches and, therefore, slow to download and install.

For customers who want to bring all their systems to the latest Solaris 10 release patch level, installing or upgrading to the latest Solaris 10 release image remains the recommended option where feasible. The Solaris 10 Patch Bundle was simply created in response to a demand from customers for an alternative option where upgrading was not feasible due to internal customer policies.

Because Solaris Update releases are intensely tested, the patch bundle provides a good quality patch "baseline" on which to standardize systems.

Upgrading Solaris 10 to a Later Solaris 10 Update

For upgrading Solaris 10 to a later Solaris 10 update release, there are two separate scenarios that apply depending on the Solaris Update release level of the system being upgraded and the Solaris Update release that is being upgraded to.

Scenario 1: If the system being upgraded is installed with Solaris 10 11/06 or an earlier Solaris 10 update:

1. Add SUNWlucfg package from Solaris 10 08/07 media or from any Solaris 10 Update release media subsequent to 08/07:

```
# pkgadd SUNWlucfg
```

2. Add the latest Live Upgrade patch from SunSolve for your architecture:

- 121430 (SPARC)
- 121431 (x86)

Scenario 2: If the system being upgraded is installed with Solaris 10 08/07 or a later Solaris 10 update, just add the latest Live Upgrade patch from SunSolve for your architecture:

- 121430 (SPARC)
- 121431 (x86)

Ensure you have the latest patch utilities patches installed on your system.



Note: Sun strongly recommends that customers apply the latest patch utility patches to ensure they have up-to-date patch utility functionality and bug fixes prior to performing any other patch installation or removal.

Did You Know?

The patch utilities patches are located on SunSolve.

To download the patches:

1. Go to sunsolve.sun.com.
2. From SunSolve's main page select the Patches and Updates link.
3. Locate the "Find a specific software update (patch)" section on the Latest Patch Updates page. The patch utility patches are listed in the Latest Patch Utilities Patches pull-down menu.
4. Select and download the patch utilities patches for your system architecture from the pull-down menu.

Install the Solaris Live Upgrade Patch

– **Step 1: Become superuser or assume an equivalent role.**

A terminal window screenshot with a dark blue background and white text. The text shows a user logging in as 'user1' on 'system01 console'. The user enters a password (masked with asterisks). The system displays the last login time as 'Tue May 19 09:00:23 on console' and the system information as 'Sun Microsystems Inc. SunOS 5.10 Generic January 2005'. The user then enters 'su -' to become superuser, enters another password (masked with asterisks), and the system displays 'May 19 09:01:38 system01 su: 'su -' succeeded for user1 on /dev/console'. The prompt changes to '#'.

```
system01 console login: user1
Password: *****
Last login: Tue May 19 09:00:23 on console
Sun Microsystems Inc. SunOS 5.10 Generic January
2005
system01 {user1}: su -
Password: *****
May 19 09:01:38 system01 su: 'su -' succeeded for
user1 on /dev/console
#
```

Did You Know?

RBAC is a security feature for controlling user access to tasks that would normally be restricted to superuser.

RBAC collects superuser capabilities into rights profiles.

Rights profiles are assigned to special user accounts that are called roles.

A user can then assume a role to do a job that requires some of superuser's capabilities.

For more information about roles, see “Configuring RBAC (Task Map)” in *System Administration Guide: Security Services*.

– Step 2: Create a directory to download the patch to if storing the patch on a local disk.

Don't make the patch directory a subdirectory of /tmp instead of /var/tmp because if you had to reboot for any reason, all the files under a /tmp subdirectory would be gone. Whereas in a /var/tmp directory, the files are safe.

```
May 19 09:01:38 system01 su: 'su -'  
user1 on /dev/console  
# mkdir /var/tmp/lupatches
```

– Step 3: Download the patch from SunSolve.

1. Access sunsolve.sun.com
2. Accept the SunSolve License Agreement
3. Select Patches and Updates
4. Enter the patch ID 121431 in the PatchFinder field and click Find Patch
5. Scroll through the README file.
6. Click on HTTP to the right of Download Patch to download the patch.

Did You Know?

To obtain a patch from SunSolve, complete these steps.

1. Access sunsolve.sun.com.
2. Accept the SunSolve License Agreement.
3. When the SunSolve main page appears, select Patches and Updates.
4. Enter the patch ID in the PatchFinder field and click Find Patch.
5. When the README file displays, read through the file and pay special attention to these sections:
 - Installation Requirements
 - Required Patches
 - Patch Installation Instructions
 - Special Install Instructions
6. Click on HTTP to the right of Download Patch to download the patch.

– Step 4: Change to the patch directory

```
# cd /var/tmp/lupatches
#
```

– Step 5: Unzip the patch.

```
# cd /var/tmp/lupatches
# unzip 121431-38.zip
```

– Step 6: Install the patch with the patchadd command

```
# patchadd path_to_patches/patch_id
```

Note: *patch_id* is the patch number or numbers.
Separate multiple patch names with a space.

```
# cd /var/tmp/lupatches
# unzip 121431-38.zip
```

Did You Know?

If the directory you have created for patches contains only the patches you want to install (and not additional patches that you don't want to install), there's no need to list the PatchIDs on the command line; you can just specify the directory that contains the patches. For example,

```
# patchadd -M /var/tmp/lupatches
```

Note: Starting with version 10 of the Solaris operating system, patchadd performs validity and dependency checking among a collection of patches that you specify with the *-M* source specifier.

-- Step 7: Reboot the system if necessary. Certain patches require a reboot to be effective.

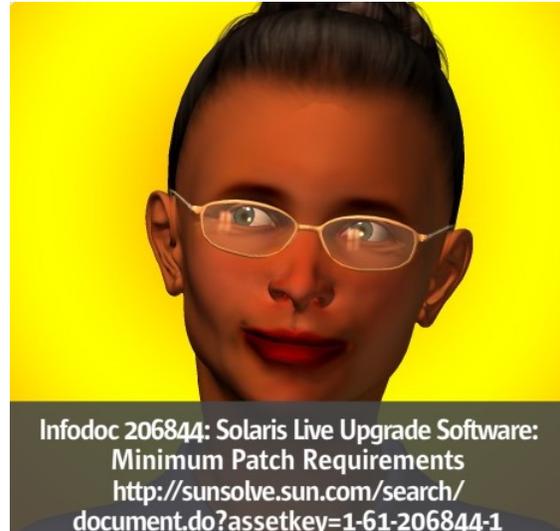
Certain patches require a reboot to be effective. Check the README file for patch 121431-38 for details.

Topic 2: Install Required Patches Needed by Solaris Live Upgrade

Install Required Patches Needed by Solaris Live Upgrade

Documents that explain how to install the required patches for Solaris Live Upgrade:

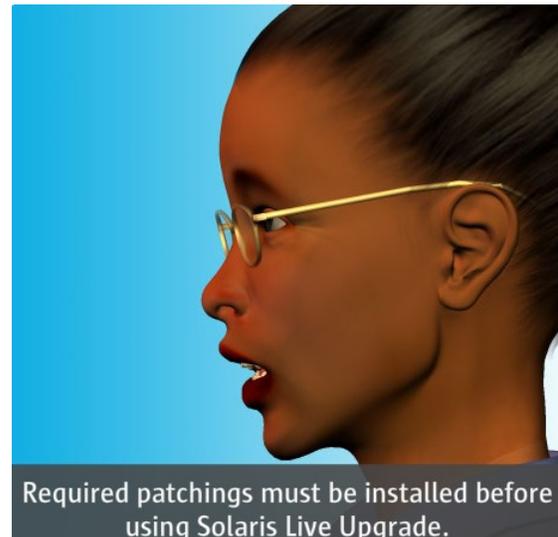
- [Infodoc 206844: Solaris\[™\] Live Upgrade Software: Minimum Patch Requirements](http://sunsolve.sun.com/search/document.do?assetkey=1-61-206844-1)
(<http://sunsolve.sun.com/search/document.do?assetkey=1-61-206844-1>)
- [Solaris 10 10/08 Installation Guide: Solaris Live Upgrade and Upgrade Planning](http://docs.sun.com/app/docs/doc/820-5238)
(<http://docs.sun.com/app/docs/doc/820-5238>)



Key Points to Remember

Required patches for Solaris Live Upgrade:

- Ensure correct operation of Solaris Live Upgrade on a particular OS version
- Potentially fix defects in Solaris Live Upgrade as well as fix defects in components that Solaris Live Upgrade depends on



Did You Know?

In addition to fixing defects, the required patches support the features that are part of the OS version that you are upgrading to.

Install the Required Patches Needed by Solaris Live Upgrade

To utilize all available Solaris Live Upgrade functionality (such as support for non-global zones and ZFS root), install the additional patches listed in Infodoc 206844 for your architecture.

To minimize risk and downtime, use Solaris Live Upgrade to:

- Create an alternate boot environment
- Install the additional patches listed in Infodoc 206844
- Activate the alternate boot environment



The screenshot shows a Sun Microsystems SunSolve page. At the top, there is a navigation breadcrumb: Home > Support > SunSolve >. Below this is a link for a [Printer-Friendly Page]. The main content area contains a table with the following information:

Document Audience:	PUBLIC
Document ID:	206844
Old Document ID:	(formerly 72099)
Title:	Solaris[™] Live Upgrade Software: Minimum P
Copyright Notice:	Copyright © 2009 Sun Microsystems, Inc. All Ri
Update Date:	Fri Jun 05 00:00:00 MDT 2009

Below the table, there is a section titled "Solution Type Technical Instruction" and a line of text: "Solution 206844 : Solaris[™] Live Upgrade Software: Minimum Patch Re".

Did You Know?

Provided specifically for use on systems with non-global zones that are running Solaris 10 08/07 (Update 4) or an earlier Solaris 10 Update, the Solaris 10 Live Upgrade Zones Starter Patch Bundle contains the set of patches needed to provide Solaris Live Upgrade with support for zones on UFS file systems. Its primary use is to simplify the task of patching early Solaris 10 Updates with the necessary multiple kernel patches and associated system reboots.

When the patch bundle is installed, the level of functionality provided is sufficient to enable use of Solaris Live Upgrade on these systems without the need to apply further patches to the active boot environment.

The Solaris 10 Live Upgrade Zones Starter Patch Bundle is available from the SunSolve Patch Cluster and Patch Bundle download page at <http://sunsolve.sun.com/show.do?target=patches/patch-access>.



Topic 1: Guidelines for Creating an Alternate UFS Boot Environment

File Systems and the Alternate Boot Environment

Solaris Live Upgrade distinguishes between two file system types:

- Critical file systems: required by the Solaris OS
- Shareable file systems: user-defined files

File systems can be customized before being copied to the alternate boot environment. Shareable file systems are shared between boot environments by default. Swap can be shared, split, and merged.

Did You Know?

Solaris Live Upgrade distinguishes between two file system types: critical file systems and shareable.

Critical file systems: Critical file systems are required by the Solaris OS. These file systems are separate mount points in the `vfstab` of the active and inactive boot environments. These file systems are always copied from the source to the inactive boot environment. Critical file systems are sometimes referred to as nonshareable.

Shareable file systems: Shareable file systems are user-defined files, such as `/export`, that contain the same mount point in the `vfstab` in both the active and inactive boot environments. Therefore, updating shared files in the active boot environment also updates data in the inactive boot environment. When you create an alternate boot environment, shareable file systems are shared by default.

For UFS file systems, swap is a special shareable volume. Like a shareable file system, all swap slices are shared by default. But, if you specify a destination directory for swap, the swap slice is created.

Guidelines for Creating an Alternate UFS Boot Environment

Follow these guidelines for creating an alternate UFS root boot environment:

- Use the `lucreate` command with the `-m` option to specify which file systems and the number of file systems to be created in the alternate boot environment.
- Specify the exact number of file systems to be created by repeating the `-m` option.
- You must specify one `-m` option for the root (`/`) file system for the alternate boot environment.
- Any critical file systems that exist in the current boot environment and are not specified in a `-m` option are merged into the next highest-level file system created.
- Only the file systems that are specified by the `-m` option are created on the alternate boot environment.

- Do not duplicate a mount point.

Did You Know?

If you run `lucreate` without the `-m` option, the Configuration menu is displayed. The Configuration menu enables you to customize the alternate boot environment by redirecting files onto new mount points.

Solaris Live Upgrade Disk Requirements

Disk Requirement Activities

- Estimate the file system size that is needed to create a boot environment.
- Ensure the disk on the alternate boot environment is able to serve as a boot device.
- Ensure the disk on the alternate boot environment is formatted properly.
 - Identify slices large enough to hold the file systems to be copied.
 - Identify file systems that contain directories that you want to share between boot environments rather than copy.



Topic 2: Create an Alternate UFS Root Boot Environment

Before You Create an Alternate Boot Environment for the First Time

Before you create an alternate UFS root boot environment for the first time:

- Review the guidelines for creating an alternate UFS root boot environment in the [Solaris 10 10/08 Installation Guide: Solaris Live Upgrade and Upgrade Planning](http://docs.sun.com/app/docs/doc/820-5238) (<http://docs.sun.com/app/docs/doc/820-5238>).
- Determine disk space requirements for the alternate boot environment.
- Ensure that the disk on the alternate boot environment can serve as a boot device; it has an SMI label on it.
- Check that the disk has been formatted properly.



Create an Alternate UFS Boot Environment for the First Time

**- Step 1: Become superuser or assume an
equivalent role**

```
system01 console login: user3
Password: *****
Last login: Tue May 20 11:00:23
on console
Sun Microsystems Inc. SunOS 5.10
Generic January 2005
system01 {user3}: su root
Password: *****
May 20 11:01:38 system02 su: 'su root'
succeeded for user1 on /dev/console
#
```

- Step 2: Create the alternate boot environment:

```
# lucreate [-A 'BE_description'] -c BE_name \  
-m mountpoint:device[,metadevice]:fs_options [-m ...] -n BE_name
```

Note: This command takes a while to complete.

Did You Know?

For instructions on how to perform other tasks within the alternate boot environment, such as merging and splitting file systems, copying a shareable file system, using a Solaris Flash Archive, using RAID-1 Volumes, and customizing content, see the *Solaris 10 10/08 Installation Guide: Solaris Live Upgrade and Upgrade Planning*.

A Closer Look at the `lucreate` Command

The following definitions describe each part of the command used to create an alternate UFS root boot environment shown above:

`-A 'BE_description'`

(Optional) Enables the creation of an alternate boot environment description that is associated with the alternate boot environment name (`BE_name`). The description can be any length and can contain any characters.

`-c BE_name`

Assigns the name `BE_name` to the active boot environment. This option is not required and is only used when the first boot environment is created. If you run `lucreate` for the first time and you omit the `-c` option, the software creates a default name for you.

`-m mountpoint`

Can be any valid mount point or `-` (hyphen), indicating

a swap partition. The file systems that are specified as arguments to `-m` can be on the same disk or they can be spread across multiple disks. Use this option as many times as needed to create the number of file systems that are needed.

device can be one of the following:

- The name of a disk device, of the form `/dev/dsk/cwtxdysz`
- The name of a Solaris Volume Manager volume, of the form `/dev/md/dsk/dnum`
- The name of a Veritas Volume Manager volume, of the form `/dev/md/vxfs/dsk/dnum`
- The keyword `merged`, indicating that the file system at the specified mount point is to be merged with its parent

fs_options can be one of the following:

- `ufs`, which indicates a UFS file system.
- `vxfs`, which indicates a Veritas file system.
- `swap`, which indicates a swap volume. The swap mount point must be a `-` (hyphen).

`-n BE_name`

The name of the alternate boot environment to be created. *BE_name* must be unique on the system.

Guidelines for Reconfiguring Swap

Three ways to configure a swap slice by using the `lucreate` command with the `-m` option:

If you do not specify a swap slice, the swap slices belonging to the primary boot environment are configured for the alternate boot environment by default.

If you specify one or more swap slices, these slices are the only swap slices that are used by the alternate boot environment. The two boot environments do not share any swap slices.

You can specify to both share a swap slice and add a slice for swap.

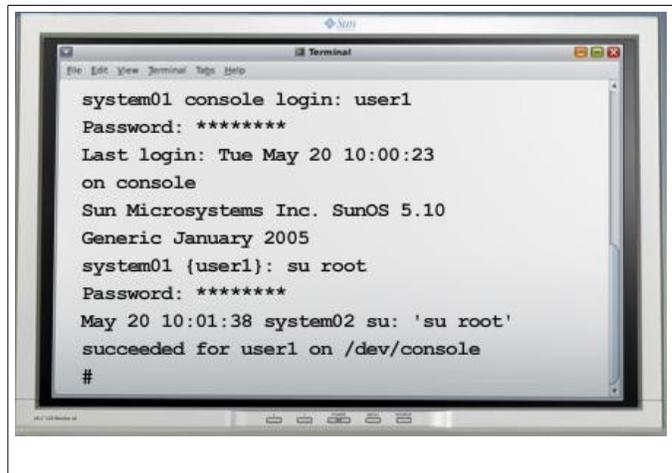


Did You Know?

An advantage to reconfiguring swap is that the reconfigured swap slice, unlike the default swap slice, will not be lost should the creation of the alternate boot environment fail during activation.

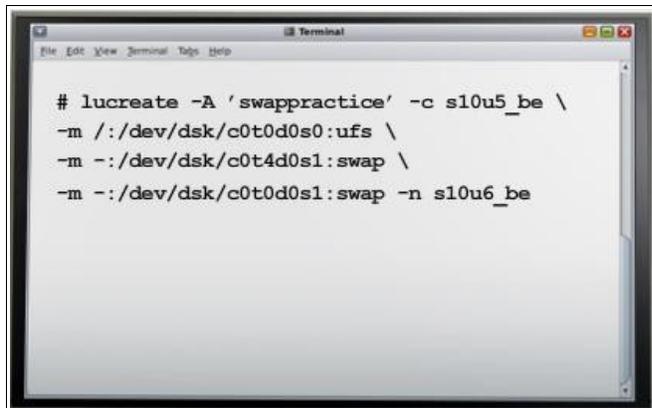
Create an Alternate UFS Root Boot Environment and Reconfigure Swap

- Step 1: Become superuser or assume an equivalent role



- Step 2: Create the alternate boot environment and reconfigure swap:

```
# lucreate [-A  
'BE_description'] -c BE_name \  
-m  
mountpoint:device[,metadevice]:  
fs_options [-m ...] \  
-m -:device:swap -n BE_name
```



Did You Know?

If you have a long list of swap slices, you can create a swap list. lucreate uses this list for the swap slices in the alternate boot environment.

For step-by-step instructions on how to complete this task, see ["To Create a Boot Environment and Reconfigure Swap by Using a List" section in the Solaris 10 10/08 Installation Guide: Solaris Live Upgrade and Upgrade Planning.](#)

Topic 3: Create an Alternate Boot Environment for a ZFS Root Pool

Overview of Solaris Live Upgrade and ZFS Root Pools

With Solaris Live Upgrade, you can:

- Migrate UFS file systems to a ZFS root pool
- Create ZFS root file systems from an existing ZFS root pool
- Use the `lucreate` command to copy critical file systems from an active UFS boot environment to an alternate boot environment within an existing ZFS root pool

Note: User defined (shareable) file systems are not copied between the UFS file system and the ZFS root pool. Swap is not shareable between a UFS root boot environment and a ZFS root pool boot environment.



Solaris Live Upgrade and ZFS Root Pools System Requirements and Limitations

When using Solaris Live Upgrade with ZFS, keep the following system requirements and limitations in mind:

- Sun Microsystems recommends you have the Solaris 10 10/08 (Update 6) release or later installed.
- You must allow for the minimum amount of available pool space required for a bootable ZFS root file system, to include:
 - Amount of physical memory
 - Available disk space
 - Number of boot environments to be created

Note:

If you do not have Solaris 10 10/08 or a later release installed, you can still migrate to ZFS Root by doing the following:

- Apply the Update 6 Kernel patch 137137-09 (SPARC®) / 137138-09 (x86) and associated patches specified in the Special Install Instructions section of the Kernel README file.
- Apply the Solaris Live Upgrade patches specified in Infodoc 206844.

Sun Microsystems recommends that you also apply the latest ZFS, patch and package utility, and Solaris Live Upgrade patches to get the latest bug fixes and enhancements when migrating to a ZFS Root environment.

Solaris Live Upgrade and ZFS Alternate Boot Environment Tasks Overview

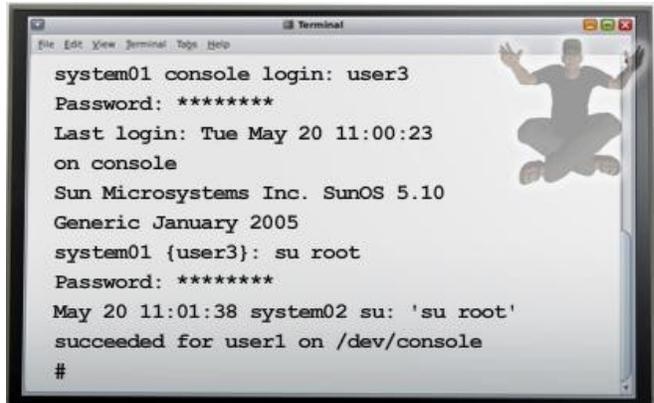
ZFS Alternate Boot Environment Tasks

- Migrate a UFS File System to a ZFS File System
- Create an Alternate Boot Environment Within the Same ZFS Root Pool
- Create an Alternate Boot Environment in a New ZFS Root Pool



Migrate a UFS File System to a ZFS File System

- Step 1: Become superuser or assume an equivalent role.



Did You Know?

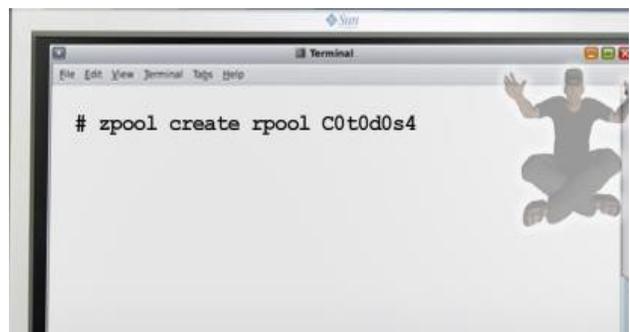
Migration is possible only from a UFS file system to a ZFS file system.
File systems other than a UFS file system cannot be migrated to a ZFS root pool.
A UFS boot environment cannot be created from a ZFS root pool.

- Step 2: Create a ZFS root pool.

```
# zpool create rpool disk_slice
```

The ZFS root pool must be on a single slice to be bootable and upgradeable.

In this example, the new ZFS root pool, rpool, is created on a separate slice, C0t0d0s4.



Did You Know?

Before migrating, a ZFS storage pool must exist, and the ZFS storage pool must be created with slices rather than whole disks to be upgradeable and bootable.

The pool must have an SMI label. An EFI-labeled disk cannot be booted.

x86 only: The ZFS pool must be in a slice with an fdisk partition.

- Step 3: Migrate the UFS root (/) file system to the new ZFS root pool.

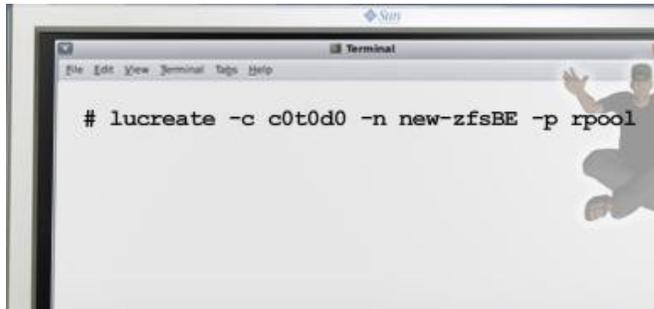
```
# lucreate [-c ufsBE] -n new-  
zfsBE -p rpool
```

The third step is to migrate the UFS root file system to the new ZFS root pool.

In this example, the `lucreate` command migrates the currently running UFS boot environment, `c0t0d0`, to the new ZFS boot environment, `new-zfsBE`, and places the alternate boot environment in `rpool`.

Because the UFS file system data is being copied to the ZFS root pool, the creation of the alternate ZFS boot environment might take a while.

When the alternate boot environment has been created, you can use the `luupgrade` or `luactivate` command to upgrade or activate the new ZFS boot environment.



Did You Know?

When you migrate shared file systems, shared file systems cannot be copied to a separate slice on the new ZFS root pool. For example, when performing a Solaris Live Upgrade with a UFS root (/) file system, you can use the `-m` option to copy the `/export` file system to another device. You do not have the `-m` option of copying the shared file system to a ZFS pool.

When you are migrating a UFS root file system that contains non-global zones, shared file systems are not migrated.

On a system with a UFS root (/) file system and non-global zones installed, the non-global zones are migrated if the zone is in a critical file system as part of the UFS to ZFS migration. Or, the zone is cloned when you upgrade within the same ZFS pool. If a non-global zone exists in a shared UFS (/) file system, to migrate to a ZFS root pool, you must first upgrade the zone, as in previous Solaris releases. For more information on migrating non-global zones, see the ["Solaris Live Upgrade For ZFS With Non-Global Zones Installed" in the Solaris 10 10/08 Installation Guide: Solaris Live Upgrade and Upgrade Planning](#).

A Closer Look at the `lucreate` Command

The following definitions describe each part of the command used to migrate the UFS root (`/`) file system to the new ZFS root pool.

`-c ufsBE`

(Optional) Assigns the name `ufsBE` to the current UFS boot environment. This option is not required and is used only when the first boot environment is created. If you run the `lucreate` command for the first time and you omit the `-c` option, the software creates a default name for you.

`-n new-zfsBE`

Assigns the name `new-zfsBE` to the boot environment to be created. The name must be unique on the system.

`-p rpool`

Places the newly created ZFS root (`/`) file system into the ZFS root pool defined in `rpool`.

- Step 4: (Optional) Verify that the boot environment is complete.

The fourth step is to verify that the alternate boot environment is complete. You do this by entering the `lustatus` command. This command reports whether the alternate boot environment creation is complete and bootable.

```
# lustatus
```

- Step 5: (Optional) Verify the basic dataset information on the system.

The fifth step is to verify the basic dataset information on the system. You do this through the `zfs list` command. The `list` command displays the names of all datasets on the system.

```
# zfs list
```



Did You Know?

You should set dataset properties before using the `lucreate` command. Solaris Live Upgrade creates the datasets for the boot environment and ZFS volumes for the swap area and dump device but does not account for any existing dataset property modifications. This means that if you want a dataset property enabled in the alternate boot environment, you must set the property before the `lucreate` operation. For example:

```
# zfs set compression=on rpool/ROOT
```

Create an Alternate Boot Environment Within the Same ZFS Root Pool

- Step 1: Become superuser or assume an equivalent role.



- Step 2: Create an alternate boot environment.

```
# lucreate [-c zfsBE] -n new-zfsBE
```

Did You Know?

When creating a ZFS boot environment within the same ZFS root pool, you cannot use the `lucreate` command include and exclude options to customize the content.

You cannot use the `-f`, `-o`, `-y`, `-Y`, and `-z` options to include or exclude files from the primary boot environment when creating a boot environment in the same ZFS root pool. However, you can use these options in the following cases:

- Creating a boot environment from a UFS file system to a UFS file system
- Creating a boot environment from a UFS file system to a ZFS root pool
- Creating a boot environment from a ZFS root pool to a different ZFS root pool

- Step 3: (Optional) Verify that the boot environment is complete.

```
# lustatus
```

- Step 4: (Optional) Verify the basic dataset information on the system.

```
# zfs list
```

Create an Alternate Boot Environment in a New ZFS Root Pool

- Step 1: Become superuser or assume an equivalent role.

- Step 2: Create a ZFS root pool

```
# zpool create rpool2  
disk_slice
```

- Step 3: Create the alternate boot environment.

```
# lucreate [-c zfsBE] -n new-  
zfsBE -p rpool2
```



- Step 4: (Optional) Verify that the boot environment is complete.

```
# lustatus
```

- Step 5: (Optional) Verify the basic dataset information on the system.

```
# zfs list
```



Topic 1: Upgrade an Alternate Boot Environment

Overview of Upgrading an Alternate Boot Environment with Solaris Live Upgrade

Things you should know before you upgrade an alternate UFS root boot environment:

- Upgrading an alternate boot environment with the latest OS does not affect the active boot environment.
- The new files merge with the inactive boot environment's critical file systems, but the shareable file systems are not changed.

For more information on upgrading an alternate boot environment, see [“Upgrading a Boot Environment” in the Solaris 10 10/08 Installation Guide: Solaris Live Upgrade and Upgrade Planning.](#)



Did You Know?

You can upgrade when RAID-1 volumes are installed, or if non-global zones are installed, or you can install a Solaris Flash.

You can upgrade an inactive boot environment that contains any combination of physical disk slices, Solaris Volume Manager volumes, ZFS root volumes, or Veritas Volume Manager volumes. The slice that is chosen for the root (/) file system must be a single-slice concatenation that is included in a RAID-1 volume (mirror). For procedures about creating a boot environment with mirrored file systems, see [“To Create a Boot Environment With RAID-1 Volumes \(Mirrors\)” in the Solaris 10 10/08 Installation Guide: Solaris Live Upgrade and Upgrade Planning.](#)

You can upgrade a system that has non-global zones installed with any installation program. For procedures about upgrading with non-global zones, see “Upgrading the Solaris OS on a System With Non-Global Zones Installed” in the Solaris 10 10/08 Installation Guide: Solaris Live Upgrade and Upgrade Planning.

Rather than upgrading, if you have created a Solaris Flash archive, you could install the archive on an inactive boot environment. The new files overwrite critical file systems of the inactive boot environment, but shareable file systems are not changed. See [“Installing Solaris Flash Archives on a Boot Environment” in the Solaris 10 10/08 Installation Guide: Solaris Live Upgrade and Upgrade Planning.](#)

Prepare for the Upgrade

To prepare for the upgrade:

1. Log in to sunsolve.sun.com.
2. Accept the Software License Agreement.
3. Click Patches and Updates on SunSolve's main page.
4. Go to the Downloads section and click Latest Solaris 10 Download.
5. Select a format option (DVD full image, DVD segmented image, or CD image) for the Solaris 10 Update software and click Download.
6. Save file to a directory on the current boot environment.



Did You Know?

Following is an example of the commands you would use to mount the Solaris 10 Update 6 DVD ISO image to a directory (in this example, /export) on an x86 machine:

```
# lofiadm -a /export/sol-10-u6-ga1-x86-dvd.iso
/dev/lofi/1
# mount -F hsfs /dev/lofi/1 /mnt
# cd /mnt
# ls
```

The commands for mounting the DVD ISO image for a SPARC machine would be the same but the image file name would reflect SPARC instead of x86 as follows:

```
# lofiadm -a /export/sol-10-u6-ga1-sparc-dvd.iso
/dev/lofi/1
# mount -F hsfs /dev/lofi/1 /mnt
# cd /mnt
# ls
```

To unmount the image, you would use the following commands for both x86 and SPARC:

```
# cd
# umount /mnt
```

```
# lofiadm -d /dev/lofi/1
#
```

Note:

If you don't run the `umount` command, the OS image stays mounted on `/mnt`. If you reboot, that mount will be lost. The real impact is that if you have a follow-on operation that will use `lofi` and it depends on `/dev/lofi/1` being available, that operation will now fail because the ISO image `lofi` has been left mounted on `/dev/lofi/1`.

You also have the option of burning the ISO image to a DVD. To do this, insert a blank DVD into a DVD burner and perform the following command:

```
#cdrw -i -C /export/sol-10-u6-ga-[sparc or x86]-dvd.iso
```

Upgrade an Alternate UFS Boot Environment

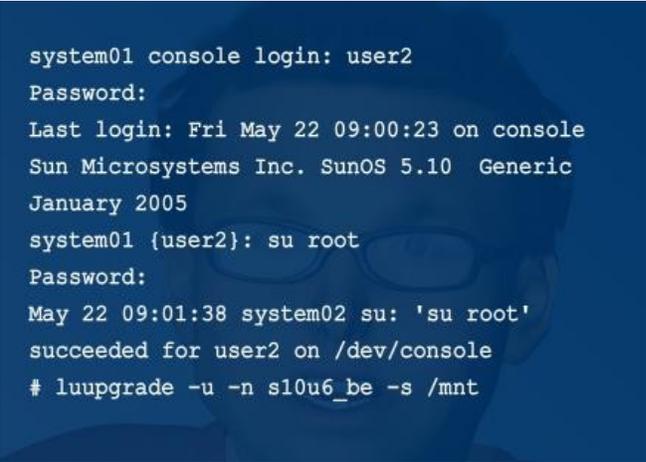
– **Step 1: Become superuser or assume an equivalent role.**



```
system01 console login: user2
Password:
Last login: Fri May 22 09:00:23 on console
Sun Microsystems Inc. SunOS 5.10 Generic
January 2005
system01 {user2}: su root
Password:
May 22 09:01:38 system02 su: 'su root'
succeeded for user2 on /dev/console
#
```

– Step 2: Upgrade the alternate boot environment:

```
# luupgrade -u -n BE_name -s  
os_image_path
```

A terminal window with a blue background and a faint image of a person's face. The text shows a user logging in as 'user2', then switching to 'root', and finally running the 'luupgrade' command to upgrade an alternate boot environment.

```
system01 console login: user2  
Password:  
Last login: Fri May 22 09:00:23 on console  
Sun Microsystems Inc. SunOS 5.10 Generic  
January 2005  
system01 {user2}: su root  
Password:  
May 22 09:01:38 system02 su: 'su root'  
succeeded for user2 on /dev/console  
# luupgrade -u -n s10u6_be -s /mnt
```

Did You Know?

You can also upgrade an alternate boot environment using Solaris Live Upgrade with a multiple CD installation. The steps are as follows:

1. Become superuser or assume an equivalent role.
2. Indicate the boot environment to upgrade and the path to the installation software by typing:

```
# luupgrade -u -n BE_name -s os_image_path
```

Explanation of the commands:

-u	Upgrades an alternate boot environment
-n BE_name	Specifies the name of the alternate boot environment that is to be upgraded
-s os_image_path	Specifies the path name of a directory that contains an installation image

3. When the installer is finished with the contents of the first CD, insert the second CD.
4. This step is identical to the previous step, but the **-u** option is replaced by the **-i** option. Also, choose to run the installer on the second CD with menus or with text.

- This command runs the installer on the second CD with menus.

```
# luupgrade -i -n BE_name -s os_image_path
```

- This command runs the installer on the second CD with text and requires no user interaction.

```
# luupgrade -i -n BE_name -s os_image_path -O '-nodisplay -noconsole'
```

Explanation of the commands:

-i	Installs additional CDs. The software looks for an installation program on the specified medium and runs that program. The installer program is specified with -s .
-n BE_name	Specifies the name of the alternate boot environment that is to be upgraded
-s os_image_path	Specifies the path name of a directory that contains an installation image
-O '-nodisplay -noconsole'	(Optional) Runs the installer on the second CD in text mode and requires no user interaction.

Repeat steps 3 and 4 for each CD that you want to install.
The alternate boot environment is ready to be activated.

Upgrading an Alternate ZFS Boot Environment

To upgrade an alternate boot environments in ZFS using Solaris Live Upgrade, use the following command:

```
# luupgrade -n zfsBE -u -s os_image_path
```

Following is an example of a new boot environment being upgraded by using the `luupgrade` command from an image that is stored in the location indicated with the `-s` option.

```
# luupgrade -n zfsBE -u -s /net/install/export/s10/combined.s10

51135 blocks
miniroot filesystem is <lofs>
Mounting miniroot at
</net/install/export/solaris_10/combined.solaris_10_wos
/Solaris_10/Tools/Boot>
Validating the contents of the media
</net/install/export/s10/combined.s10>.
The media is a standard Solaris media.
The media contains an operating system upgrade image.
The media contains Solaris version <10_1008>.
Constructing upgrade profile to use.
Locating the operating system upgrade program.

Checking for existence of previously scheduled Live
Upgrade requests.
Creating upgrade profile for BE <zfsBE>.
Determining packages to install or upgrade for BE <zfsBE>.
Performing the operating system upgrade of the BE <zfsBE>.
CAUTION: Interrupting this process may leave the boot environment unstable
or unbootable.
Upgrading Solaris: 100% completed
Installation of the packages from this media is complete.
Adding operating system patches to the BE <zfsBE>.
The operating system patch installation is complete.
INFORMATION: The file /var/sadm/system/logs/upgrade_log on boot environment
```

```
<zfsBE> contains a log of the upgrade operation.  
INFORMATION: The file var/sadm/system/data/upgrade_cleanup on boot  
environment <zfsBE> contains a log of cleanup operations required.  
INFORMATION: Review the files listed above. Remember that all of the files  
are located on boot environment <zfsBE>.  
Before you activate boot environment <zfsBE>, determine if any additional  
system maintenance is required or if additional media of the software  
distribution must be installed.  
The Solaris upgrade of the boot environment <zfsBE> is complete.  
The new boot environment can be activated anytime after it is created.  
For more information on upgrading an alternate ZFS boot environment, see  
"Creating a Boot Environment for ZFS Root Pools" in the Solaris 10 10/08  
Installation Guide: Solaris Live Upgrade and Upgrade Planning.
```

A Closer Look at the `luupgrade` Command for Upgrading

The following is the `luupgrade` command for upgrading:

```
# luupgrade -u -n BE_name -s os_image_path
```

See below for an explanation of each part of the command:

-u	Upgrades an alternate boot environment.
-n BE_name	Specifies the name of the alternate boot environment that is to be upgraded.
-s os_image_path	Specifies the path name of a directory that contains an installation image.

Topic 2: Activate an Alternate Boot Environment

Overview of Activating an Alternate Boot Environment

When activating an alternate boot environment for the first time, remember the following tips:

- Activating an alternate boot environment makes it bootable on the next restart of the system.
- You can switch back quickly to the original primary boot environment if a problem occurs on booting the newly activated boot environment.
- The first time you boot from a newly activated alternate boot environment, the Solaris Live Upgrade software synchronizes the newly activated alternate boot environment with the primary boot environment.

Note: During synchronization, certain critical system files and directories are copied from the primary boot environment to the alternate boot environment.



Did You Know

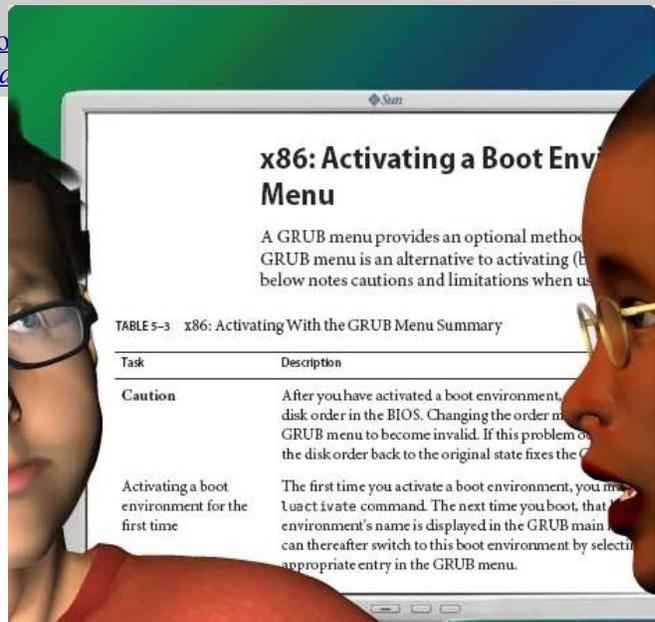
For more information on synchronization, see [“Synchronizing a Boot Environment” in the Solaris 10 10/08 Installation Guide: Solaris Live Upgrade Planning](#).

Activating an x86-based System

Things to keep in mind when activating an x86-based system:

- The first time you activate an alternate boot environment, you must use the `luactivate` command.
- Thereafter, you can switch to this boot environment by selecting the appropriate entry in the GRUB menu.
- Files are not synchronized when you switch between boot environments with the GRUB menu.

For more information on how to activate with the GRUB menu, see [“x86: Activating a Boot Environment With the GRUB Menu” in the Solaris 10 10/08 Installation Guide: Solaris Live Upgrade and Upgrade Planning](#).



Did You Know?

If an alternate boot environment was created with the Solaris 8, 9, or 10 3/05 release, the boot environment must always be activated with the `luactivate` command. These older boot environments do not display on the GRUB menu.

Requirements and Limitations for Activating an Alternate Boot Environment

To successfully activate an alternate boot environment, that boot environment must meet the following conditions:

- The alternate boot environment must have a status of “complete.”

Note: If the alternate boot environment does not have a "complete" status, run `ludelete` and then rerun `lucreate`

- The alternate boot environment that you want to activate cannot be involved in a comparison operation.

```
# lustatus
Boot Environment
Name
-----
s10u5_be
s10u6_be
#
```

Is Complete

yes
yes

Did You Know?

- The `lucompare` command is used to check for differences between the primary boot environment and other boot environments. The `lucompare` command generates a comparison of boot environments that includes the contents of any non-global zones. The specified boot environment cannot have any partitions that are mounted with `lumount` or `mount`.
- To make a comparison, the alternate boot environment must be in a complete state and cannot have a copy job that is pending. For instructions on how to run the `lucompare` command, see "[Displaying the Status of All Boot Environments](#)" in the *Solaris 10 10/08 Installation Guide: Solaris Live Upgrade and Upgrade Planning*.

Activating an Alternate Boot Environment - Step 1: Become superuser or assume an equivalent role.

```
system01 console login: user1
Password:
Last login: Fri May 22 10:00:23 on console
Sun Microsystems Inc. SunOS 5.10 Generic January
2005
system01 {user1}: su root
Password:
May 22 10:01:38 system02 su: 'su root' succeeded
for user1 on /dev/console
#
```

- Step 2: Activate the alternate boot environment:

```
# /sbin/luactivate -s BE_name
```

Note: The `-s` forces a synchronization of files between the primary boot environment and the alternate boot environment.

```
# /sbin/luactivate -s s10u6_be
```

Activating an Alternate ZFS Boot Environment

To activate an alternate boot environments in ZFS using Solaris Live Upgrade, use the following command:

```
# luactivate new-zfsBE
```

After you receive notification that the activation of the boot environment has been successful, you can restart the system to the ZFS boot environment by entering the following command:

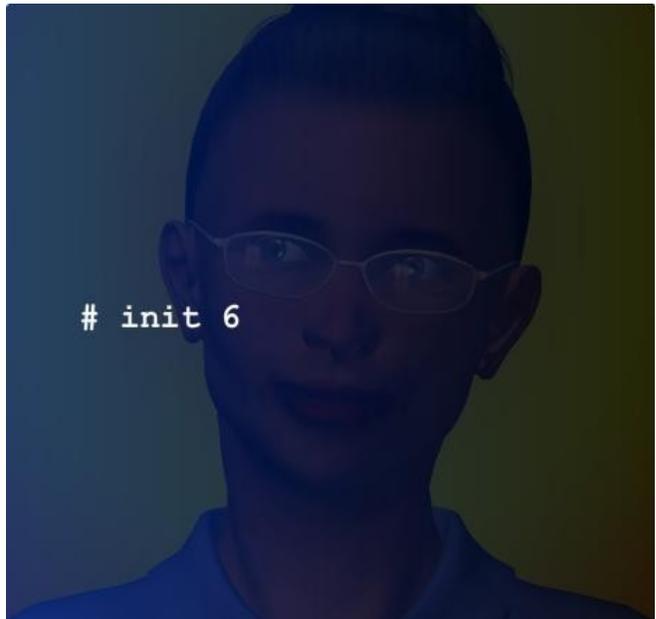
```
# init 6
```

[For more information on activating an alternate ZFS boot environment, see "Creating a Boot Environment for ZFS Root Pools" in the *Solaris 10 10/08 Installation Guide: Solaris Live Upgrade and Upgrade Planning*.](#)

Activating an Alternate Boot Environment

– Step 3: Restart

```
# init 6
```



CAUTION: Use only the `init` or `shutdown` commands to restart. If you use the `reboot`, `halt`, or `uadmin` commands, the system does not switch boot environments. The primary boot environment is booted again. The time it takes for the restart to complete will vary depending on your system configuration and setup. Consequently, you should complete this step during a maintenance window when the system is not being heavily used.

After the restart is complete, the original primary boot environment automatically becomes an alternate boot environment



Topic 1: Apply Packages and Patches to an Alternate Boot Environment

Overview of Applying Packages and Patches to an Alternate Boot Environment using Solaris Live Upgrade

Things you should know before you apply packages and patches to an alternate root boot environment:

- When you use Solaris Live Upgrade, the only downtime the system incurs is that of a reboot.
 - The `luupgrade` command is used to add packages and patches to the alternate boot environment.
 - Solaris Live Upgrade requires packages or patches that comply with the SVR4 advanced packaging guidelines.

For more information about packaging requirements, see Appendix B, [“Additional SVR4 Packaging Requirements \(Reference\)”](#) in the *Solaris 10 10/08 Installation Guide: Solaris Live Upgrade and Upgrade Planning*.



Prepare to Apply Packages and Patches

To prepare to apply packages and patches:

1. Log in to sunsolve.sun.com.
2. Accept the Software License Agreement.
3. Click Patches and Updates on SunSolve's main page.
4. Locate and download the appropriate packages and patches.
5. Save the files to a directory on the primary boot environment.
6. Unzip the files.

Add a Package to an Alternate Boot Environment

– Step 1: Become superuser or assume an equivalent role.

```
system01 console login: user2
Password: *****
Last login: Fri May 29 09:00:23 on console
Sun Microsystems Inc. SunOS 5.10 Generic January
2005
system01 {user2}: su root
Password: *****
May 29 09:01:38 system02 su: 'su root' succeeded
for user2 on /dev/console
#
```

-- Step 2: Add the package

```
# luupgrade -p -n BE_name -s
/path-to-packages package-name
```

```
# luupgrade -p -n s10u6a_be -s /export SUNWabc
```

A Closer Look at the `luupgrade` Command for Adding Packages

The following definitions describe each part of the command used to add a package to an alternate boot environment.

<code>-p</code>	Indicates to add packages to the alternate boot environment
<code>-n <i>BE_name</i></code>	Specifies the name of the alternate boot environment where the package is to be added
<code>-s <i>path-to-packages</i></code>	Specifies the path to a directory that contains the package or packages that are to be added
<code><i>package-name</i></code>	Specifies the names of the package or packages to be added. Separate multiple package names with a space

-- Step 3: Check the integrity of the newly installed package

```
# luupgrade -C -n BE_name -O "-  
v" package-name
```



A Closer Look at the `luupgrade` Command for Checking Package Integrity

The following definitions describe each part of the command used to check package integrity on an alternate boot environment.

<code>-C</code>	Indicates to run the <code>pkgchk</code> command on the named packages
<code>-n <i>BE_name</i></code>	Specifies the name of the boot environment where the check is to be performed
<code>-O</code>	Passes the options directly to the <code>pkgchk</code> command
<code>"-v"</code>	Specifies to run the command in verbose mode
<code><i>package-name</i></code>	Specifies the names of the packages to be checked. Separate multiple package names with spaces. If package names are omitted, the check is done on all packages in the specified boot environment.

Remove a Package From an Alternate Boot Environment

To remove a package from an alternate boot environment:

```
# luupgrade -P -n BE_name
package-name
```



```
# luupgrade -P -n BE_name package-name
```

Add a Patch to an Alternate Boot Environment

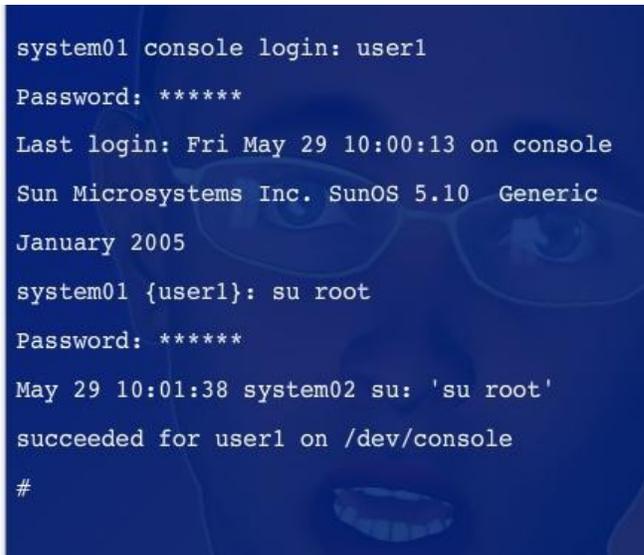
– Step 1: Become superuser or assume an equivalent role.

--Step 2: Add the patch:

```
# luupgrade -t -n BE_name -s
/path-to-patches patch-name
```

Add a patch cluster:

```
luupgrade -n
<inactive_boot_environment_name
> \                -s
<path_to_directory_containing_p
atches> \
-t `cat patch_order`
```



```
system01 console login: user1
Password: ****
Last login: Fri May 29 10:00:13 on console
Sun Microsystems Inc. SunOS 5.10 Generic
January 2005
system01 {user1}: su root
Password: ****
May 29 10:01:38 system02 su: 'su root'
succeeded for user1 on /dev/console
#
```

A Closer Look at the luupgrade Command for Adding Patches

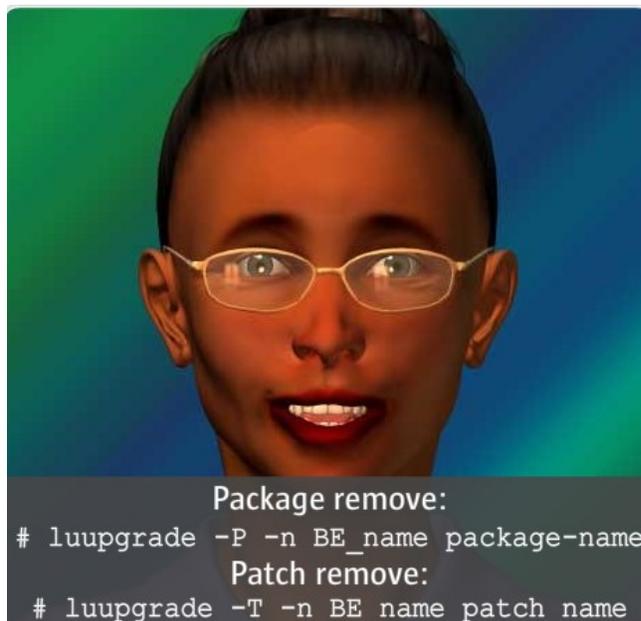
The following definitions describe each part of the command used to add a patch to an alternate boot environment.

<code>-t</code>	Indicates to add patches to the alternate boot environment
<code>-n <i>BE_name</i></code>	Specifies the name of the alternate boot environment where the patch is to be added
<code>-s <i>path-to-patches</i></code>	Specifies the path to a directory that contains the patches that are to be added
<code><i>patch-name</i></code>	Specifies the names of the patch or patches that are to be added. Separate multiple patch names with a space.

Remove a Patch From an Alternate Boot Environment

To remove a patch from an alternate boot environment:

```
# luupgrade -T -n BE_name  
patch_name
```



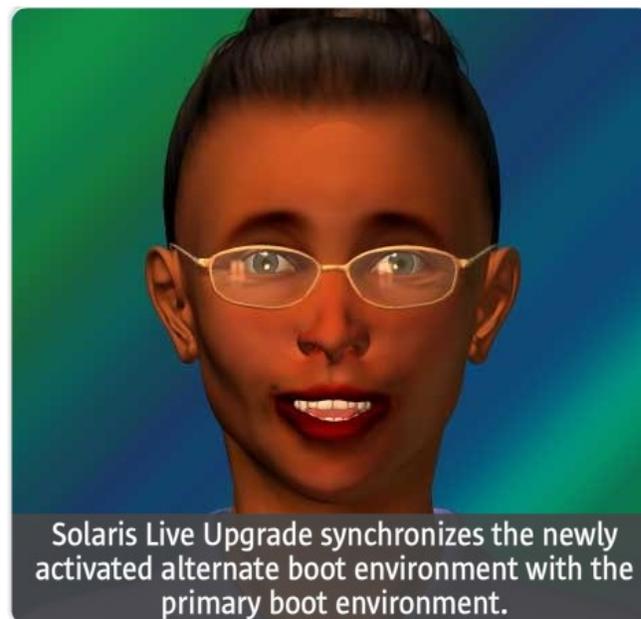
Topic 2: Activate an Alternate Boot Environment

Overview of Activating an Alternate Boot Environment

When activating an alternate boot environment for the first time, remember this:

- Activating an alternate boot environment makes it bootable on the next restart of the system.
- You can switch back quickly to the original primary boot environment if a problem occurs on booting the newly activated boot environment.
- The first time you boot from a newly activated alternate boot environment, the Solaris Live Upgrade software synchronizes the newly activated alternate boot environment with the primary boot environment.

Note: During synchronization, certain critical system files and directories are copied from the primary boot environment to the alternate boot environment.



Did You Know?

“Synchronize” means that certain critical system files and directories are copied from the primary boot environment to the alternate boot environment that is being booted. Solaris Live Upgrade does not perform this synchronization after the initial boot, unless you force synchronization with the `luactivate` command and the `-s` option.

For more information on synchronization, see “Synchronizing Files Between Boot Environments” in the *Solaris 10 10/08 Installation Guide: Solaris Live Upgrade and Upgrade Planning*.

Activating an x86-based System

Things to keep in mind when activating an x86-based system:

- The first time you activate an alternate boot environment, you must use the `luactivate` command.
- Thereafter, you can switch to this boot environment by selecting the appropriate entry in the GRUB menu.
- Files are not synchronized when you switch between boot environments with the GRUB menu.

For more information on how to activate with the GRUB menu, see [“x86: Activating a Boot Environment With the GRUB Menu” in the *Solaris 10 10/08 Installation Guide: Solaris Live Upgrade and Upgrade Planning*](#).



Did You Know?

If an alternate boot environment was created with the Solaris 8, 9, or 10 3/05 release, the boot environment must always be activated with the `luactivate` command. These older boot environments do not display on the GRUB menu.

Requirements and Limitations for Activating an Alternate Boot Environment

To successfully activate an alternate boot environment, that boot environment must meet the following conditions:

- The alternate boot environment must have a status of “complete.”

Note: If the alternate boot environment does not have a "complete" status, run `ludelete` and then rerun `lucreate`.
- The alternate boot environment that you want to activate cannot be involved in a comparison operation.

```
# lustatus
Boot Environment      Is
Name                  Complete
-----
s10u5_be              yes
s10u6_be              yes
s10u6a_be             yes
#
```

Did You Know?

The `lucompare` command is used to check for differences between the primary boot environment and other boot environments. The `lucompare` command generates a comparison of boot environments that includes the contents of any non-global zones. The specified boot environment cannot have any partitions that are mounted with `lumount` or `mount`.

To make a comparison, the alternate boot environment must be in a complete state and cannot have a copy job that is pending. For instructions on how to run the `lucompare` command, see "[Displaying the Status of All Boot Environments](#)" in the *Solaris 10 10/08 Installation Guide: Solaris Live Upgrade and Upgrade Planning*.

Activating an Alternate Boot Environment

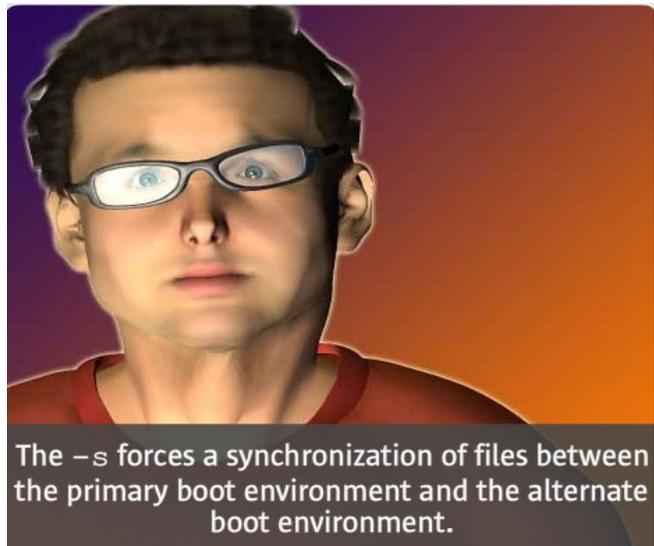
- **Step 1: Become superuser or assume an equivalent role.**

```
system01 console login: user1
Password: *****
Last login: Fri May 29 10:00:13 on console
Sun Microsystems Inc. SunOS 5.10 Generic
January 2005
system01 {user1}: su root
Password: *****
May 29 10:01:38 system02 su: 'su root'
succeeded for user1 on /dev/console
#
```

-**Step 2 : Activate the alternate boot environment:**

```
# /sbin/luactivate -s BE_name
```

Note: The `-s` forces a synchronization of files between the primary boot environment and the alternate boot environment.



Did You Know

To activate an alternate boot environments in ZFS using Solaris Live Upgrade, use the following command:

```
# luactivate new-zfsBE
```

After you receive notification that the activation of the boot environment has been successful, you can restart the system to the ZFS boot environment by entering the following command:

```
# init 6
```

For more information on activating an alternate ZFS boot environment, see "[Creating a Boot Environment for ZFS Root Pools](#)" in the *Solaris 10 10/08 Installation Guide: Solaris Live Upgrade and Upgrade Planning*.

- Step 3: Restart

```
# init 6
```

```
system01 console login: user1
Password: *****
Last login: Fri May 22 10:00:23 on console
Sun Microsystems Inc. SunOS 5.10 Generic
January 2005
system01 {user1}: su root
Password: *****
May 22 10:01:38 system02 su: 'su root'
succeeded for user1 on /dev/console
# /sbin/luactivate -s s10u6a_be
# init 6
```

CAUTION

Use only the `init` or `shutdown` commands to restart. If you use the `reboot`, `halt`, or `uadmin` commands, the system does not switch boot environments. The primary boot environment is booted again.

The time it takes for the restart to complete will vary depending on your system configuration and setup. Consequently, you should complete this step during a maintenance window when the system is not being heavily used.



Topic 1: Four Keys of an Effective Maintenance Strategy

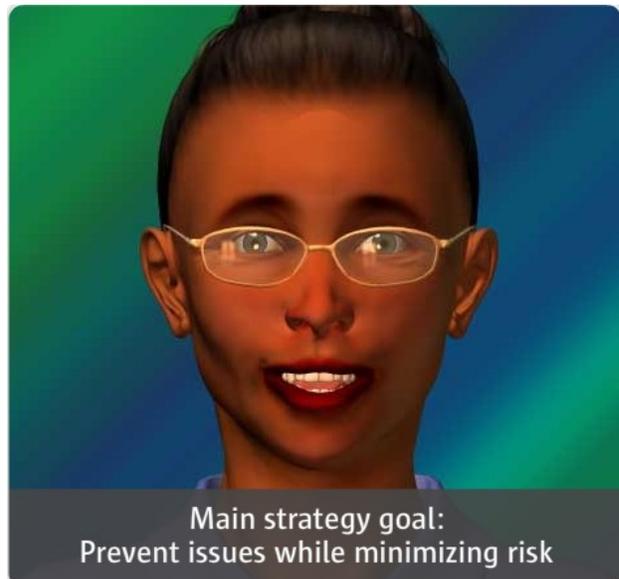
The Four Elements of a Solaris Live Upgrade Maintenance Strategy

The Solaris Live Upgrade Planning Process

- Step 1: Prepare the system for Solaris Live Upgrade.
- Step 2: Create an alternate boot environment.
- Step 3: Upgrade or update the alternate boot environment.
- Step 4: Activate the alternate boot environment.
- Step 5: Maintain the alternate boot environment.

Use Solaris Live Upgrade

- The goal of a proactive maintenance strategy is to prevent issues while minimizing risk.
- Best Practice #1: Use Solaris Live Upgrade



Upgrade to the Latest Solaris 10 Update Release

- Best Practice #2: Always upgrade to the latest Solaris 10 Update release during the next major maintenance window.
- If you can't upgrade, download the latest patch bundle to receive the essential patches without the upgraded system functionality.

Use Sun Alerts

- Best Practice #3: Use the Sun Alerts
- Plan to apply the patch according to the seriousness of the issue.
- Apply all the patches within a Sun Alert.
- Review recent Sun Alerts at the [Sun Alert Wiki](#)

Use a Test Environment

- Best Practice #4: Use a test environment.
- Conduct pre-deployment testing in a test environment that accurately replicates the production environment and includes good functional test coverage and peak load testing

→ Temporary or Interim Security Updates

- Temporary patches are developed to resolve a specific general distribution.
- Access interim security updates when notified by Security Relief (ISR) Patch is available.

Downloads

» Patch Cluster & Patch Bundle Downloads

» Sun Storage 7000 Unified Storage Systems Updates



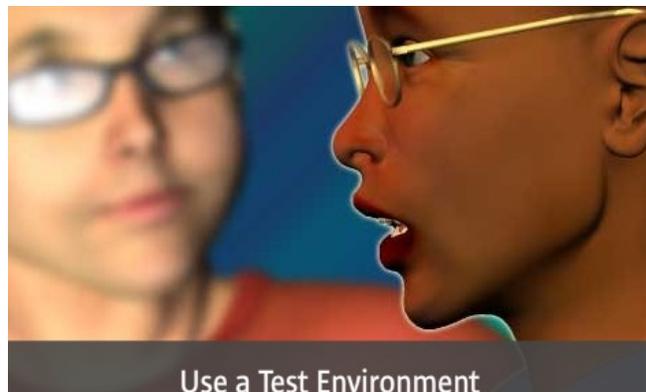
Wikis Home › Sun Alerts › Sun Alert wiki

Sun Alert wiki

Added by chriswagner, last edited by chriswagner on Apr 28, 2009

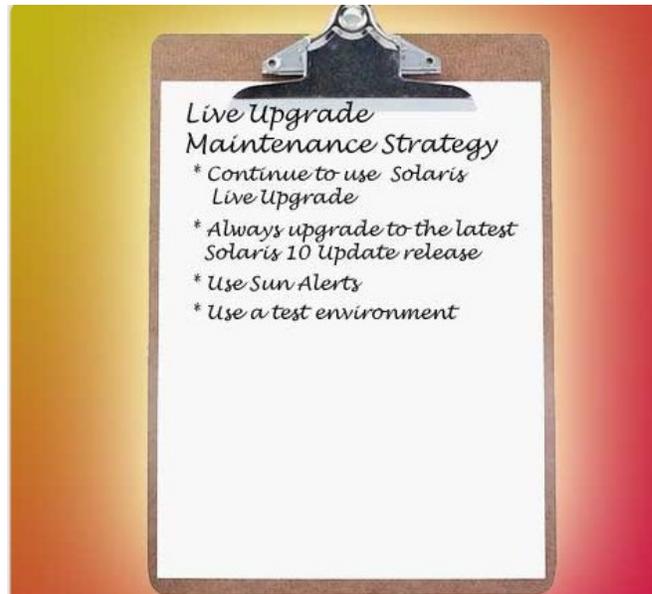
What is a Sun Alert?

A Sun Alert is a notification to customers of known product computing environments or productivity. A Sun Alert classifies issues by Availability, Security, or Data Loss. (See criteria)



Review

- Continue to use Solaris Live Upgrade to minimize downtime and risk.
- Always upgrade the system to the latest Solaris 10 Update release
- Use Sun Alerts to patch issues that could affect our system availability, security, or data loss.
- Use a test environment to see how the updates will work with our current system configuration.



Topic 2: Creating a Maintenance Plan

The Importance of a Solaris Live Upgrade Maintenance Plan (continued)

The Solaris Live Upgrade maintenance plan takes the broad strategic goals of the Live Upgrade maintenance strategy and puts them into a format where they can be scheduled and tracked.



Planning Resources

Excellent Solaris Live Upgrade maintenance planning resources include:

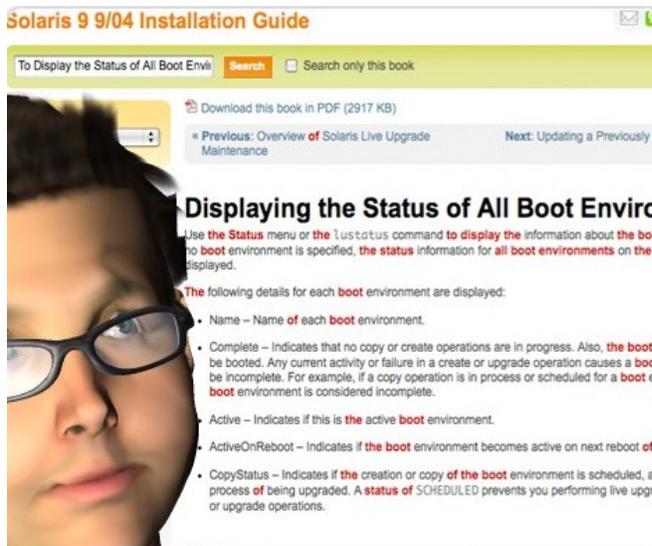
- The [Patch Management Best Practices](#) document
- The [Patch Corner Blog](#)
- The [Solaris 10 10/08 Installation Guide: Solaris Live Upgrade and Upgrade Planning](#)



Topic 3: Performing Solaris Live Upgrade Maintenance Tasks

The View Status Command

To view the status of the boot environments on a Solaris 10 system, use the `lustatus` command plus the name of the boot environment we want to see. To display the status for all the boot environments in the system, omit the name of the boot environment.



Did You Know?

The following fields are displayed when the `lustatus` command is used.

- **Name** – Name of each boot environment.
- **Complete** – Indicates that no copy or create operations are in progress. Also, the boot environment can be booted. Any current activity or failure in a create or upgrade operation causes a boot environment to be incomplete. For example, if a copy operation is in process or scheduled for a boot environment, that boot environment is considered incomplete.
- **Active** – Indicates if this is the active boot environment.
- **ActiveOnReboot** – Indicates if the boot environment becomes active on next reboot of the system.
- **CopyStatus** – Indicates if the creation or copy of the boot environment is scheduled, active, or in the process of being upgraded. A status of `SCHEDULED` prevents you from performing live upgrade copy, rename, or upgrade operations.

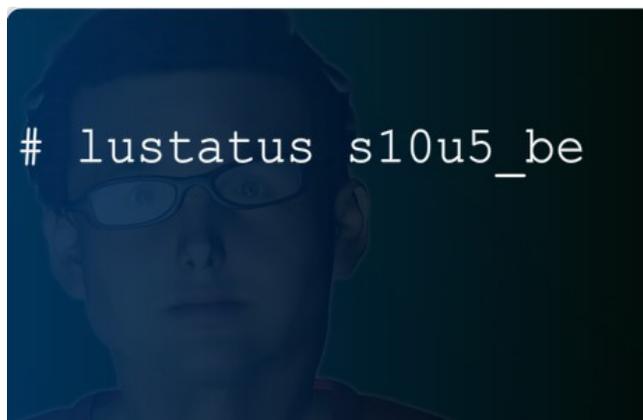
The Compare Command

To compare different boot environments, simply use the `lucompare` command. This command will allow you to view all the differences between two boot environments and should help you make sure that you won't lose any vital files when you delete an old boot environment.

The Delete Command

To delete an alternate boot environment, review the status of the alternate boot environment to make sure that it meets the following requirements:

- You can't delete the active boot environment or the boot environment that is activated on the next reboot.
- The boot environment to be deleted must be complete. A complete boot environment is not participating in an operation that will change its status.
- You cannot delete a boot environment that has file systems mounted with `lumount`.



Did You Know?

For x86 systems: Starting with the Solaris 10 1/06 release, you cannot delete a boot environment that contains the active GRUB menu. Use the `lumake` or `luupgrade` commands to reuse the boot environment.

This issue was addressed in Solaris Live Upgrade patch 121431-27 and GRUB patch 138884-01.

To determine which boot environment contains the active GRUB menu, see [Chapter 13, “Managing the Solaris Boot Archives \(Tasks\) in the Solaris 10 10/08 Installation Guide: Solaris Live Upgrade and Upgrade Planning.”](#)

The Delete Command (continued)

To delete an alternate boot environment, use the `ludelete` command plus the name of the alternate boot environment you want to delete.

For example, to delete the `s10u5_be` boot environment, you would type:

```
ludelete s10u5_be.
```

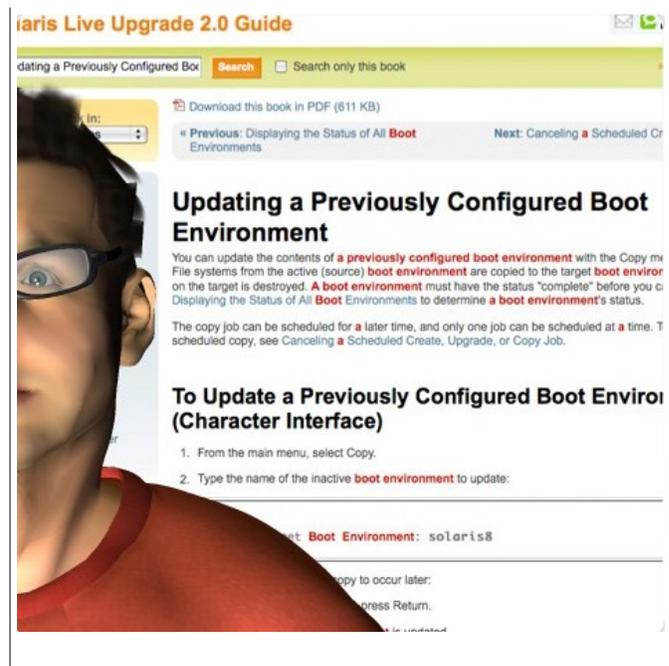
Once you've entered the correct command, you must follow up with the `lustatus` command to make sure that the alternate boot environment was deleted.



Review

Best Practices for Solaris Live Upgrade Maintenance

- Continue to use Live Upgrade to minimize downtime and risk.
- Always upgrade the system to the latest Solaris 10 update release
- Use Sun Alerts to patch issues that could affect our system availability, security, or data loss.
- Use a test environment to see how the updates will work with our current system configuration.





Topic 1: What is Deferred Activation Patching?

Deferred Activation Patching

Deferred Activation Patching (DAP) was initially delivered in the Solaris 10 patch utility patch 119254-42 for SPARC and 119255-42 for x86 to ensure system consistency during patching of an active boot environment.

The Problem with Patching a Live Boot Environment

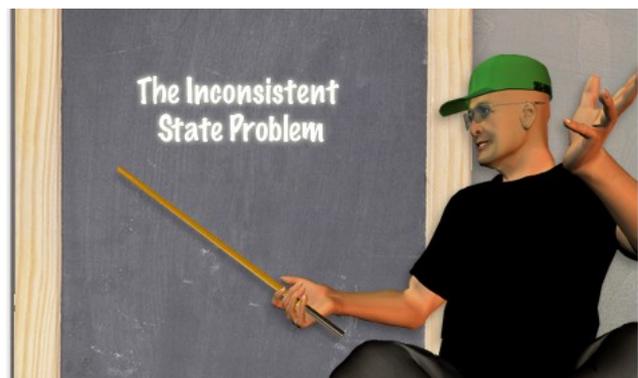
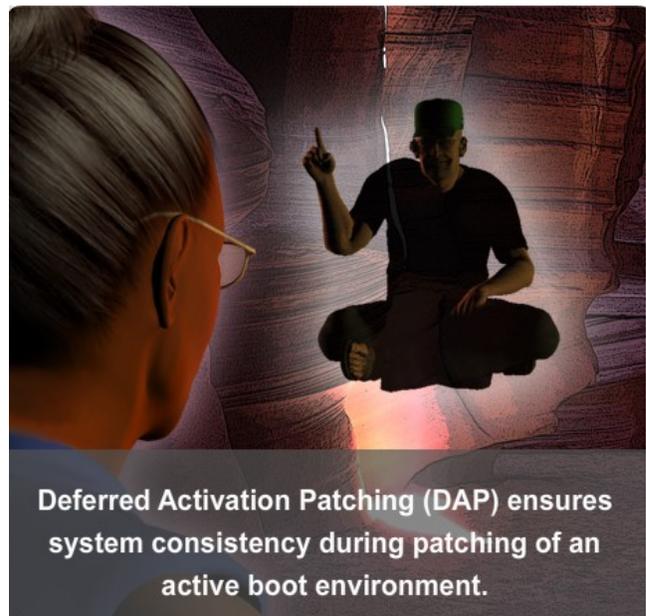
The problem with patching a live boot environment:

- Some of the changes delivered in a patch, such as shared objects, may be invoked by processes as soon as they are applied to the live boot environment.
- Other objects will only be activated when the system is rebooted.

The Inconsistent State Problem

Problems can occur where the scope of the change applied is very large compared to that which is running on the live boot environment.

- New objects that are invoked may be incompatible with the old objects running in memory. This can cause the live boot environment to get into an inconsistent state during patching.
- The problem is most acute on a system running zones, because the patch utilities need to invoke the zones utilities during patching to patch the non-global zones.

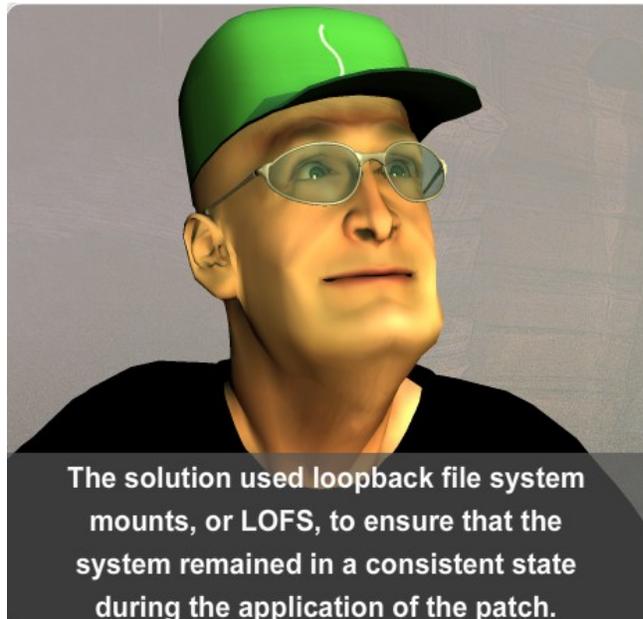


The Issue of Complex Patch Scripting and the Initial Solution

Complex patch scripting was required for kernel patches during the patch installation process to avoid the inconsistency issues between the objects the patch was delivering and the running system.

Sun introduced a solution to the patching issue that no longer required complex patch scripting.

- Loopback file system mounts, or LOFS, were used to overlay the patched objects with the original versions that were present on the system.
- The system remained in a consistent state during the application of the patch.
- A forced reboot was required before any further operation could be performed, including the application of any other patches.

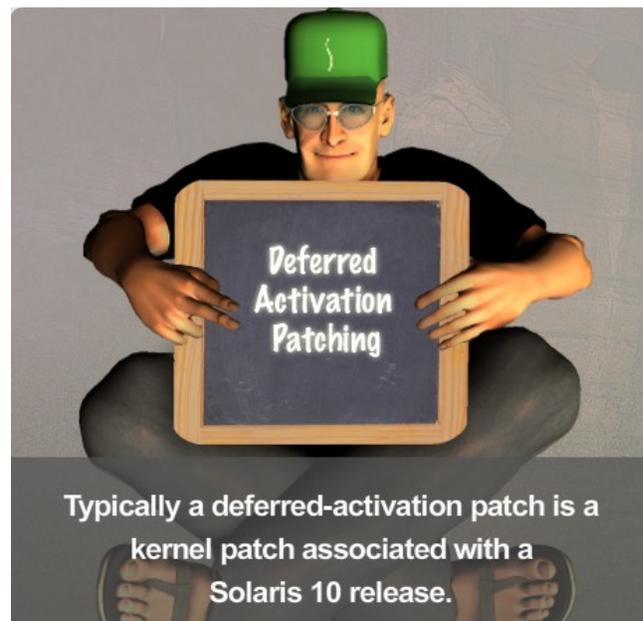


The Deferred Activation Patching Solution

- The loopback file system, or LOFS, is used to ensure the stability of the running system.
- The LOFS preserves stability during the patching process.
- The required reboot activates the changes made by the LOFS.

Deferred-Activation Patches

- Only a limited number of patches need to be designated as a deferred-activation patch.
- Typically a deferred-activation patch is a kernel patch associated with a Solaris 10 Update release.
- A deferred-activation patch has the variable `SUNW_PATCH_SAFE_MODE` set to "true" in the `pkginfo` file.



Did You Know?

Currently, the only patches that specify application in Deferred Activation Patching mode are as follows:

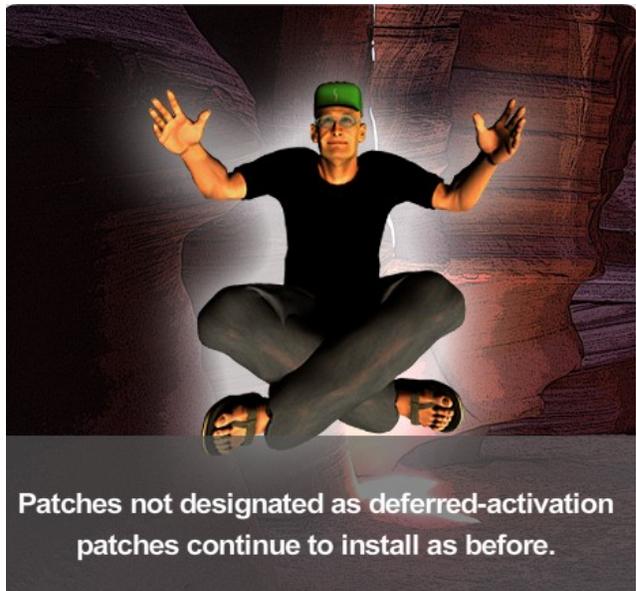
- Kernel patch 120011-14 (SPARC) / 120012-14 (x86) (which is included in Solaris 10 08/07 Update 4)
- Kernel patch 127127-11 (SPARC) / 127128-11 (x86) (which is included in Solaris 10 05/08 Update 5)
- Kernel patch 137137-09 (SPARC) / 137138-09 (x86) (which is included in Solaris 10 10/08 Update 6)
- Kernel patch 139555-08 (SPARC) / 139556-08 (x86) (which is included in Solaris 10 5/09 Update 7)

Future kernel patches included in future Solaris 10 Update releases are the likely candidates requiring application using Deferred Activation Patching.

Installing Non Deferred-Activation Patches

Patches not designated as deferred-activation patches continue to install as before.

Note: A reboot is required after installing patches 118833-36 (SPARC) / 118855-36 (x86) to the live boot environment before other patches can be installed.



Did You Know?

The only other circumstance where a reboot is required before further patching can be performed is for x86, where a potential inconsistency exists between kernel patches below 118844-14 running in memory and libc changes delivered in patch 121208-02 and -03, and 118855-xx which obsoletes it. Code in the scripts of these patches ensures that a later kernel patch, for example, 118844-20, must be active before these patches can be applied.

Deferred Activation Patching Recap

Primary difference between deferred-activation patches and non deferred-activation kernel patches:

- With deferred-activation patches the reboot is deferred until all patching operations are completed.
- With non deferred-activation kernel patches, a forced reboot is required after installing before other patches can be applied.



Topic 2: How Deferred Activation Patching Works

Deferred Activation Patching and the Patch Utilities Patch

It is important to have the latest patch utilities patches installed before installing one of the deferred-activation kernel patches.

Deferred Activation Patching was initially delivered in the Solaris 10 patch utility patch 119254-42 (SPARC) / 119255-42 (x86).

- In this patch utility patch, the patch installation utilities, patchadd and patchrm, have been modified to change the way that certain patches delivering features are handled.
- The patch utilities patches address bugs in the Deferred Activation Patching feature and provide bug fixes and feature enhancements to other features of the patch utilities.



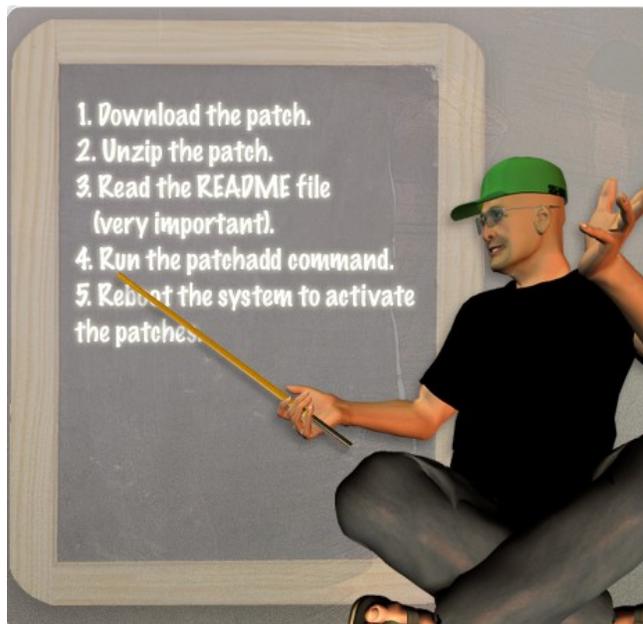
The Deferred Activation Patching Process

To apply a deferred-activation patch:

1. Download the patch.
2. Unzip the patch.
3. Read the README file.

Note: Pay special attention to the "Installation Requirements" and "Special Install Instructions" sections.

4. Run the patchadd command.
 - The deferred-activation patch is applied using Deferred Activation Patching.
 - Subsequent patches that require the deferred-activation patch are automatically installed in Deferred Activation Patching mode.
5. Reboot the system to activate the patches.



Did You Know?

If you are running non-global zones, consider these points when installing deferred-activation patches:

- All non-global zones must be in a halted state for this patch operation. You must halt the non-global zone before applying the patch.
- Deferred Activation Patching requires the loopback file system (LOFS) in order to complete safely.

Deferred Activation Patching requires the loopback file system (LOFS) in order to complete safely. With the Solaris 10 version of Sun Cluster 3.1 and 3.2 software the LOFS capability is not disabled by default. However, if you have HA for NFS configured on a highly available local file system and are running the `automountd` daemon, you might have disabled LOFS to avoid hangs. If this is the case, you will need to reenble LOFS before installing a deferred-activation patch.

To reenble LOFS you will need to either disable the `automountd` daemon or exclude from the automounter map all files that are part of the highly available local file system that is exported by Sun Cluster HA for NFS. Refer to the *Sun Cluster Software Installation Guide for Solaris OS* for instructions on how to complete these options.

Topic 3: Difference Between Deferred Activation Patching and Solaris Live Upgrade

Initial Comparison of Deferred Activation Patching and Solaris Live Upgrade

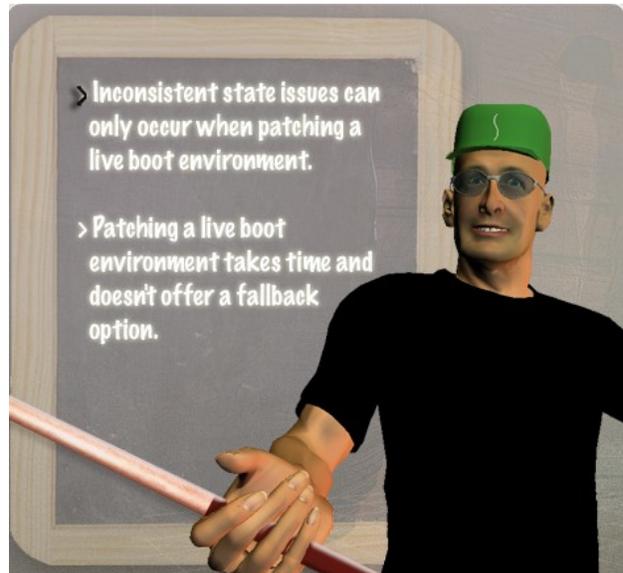
Deferred Activation Patching is performed on the active primary boot environment.

Solaris Live Upgrade is used on an inactive alternate boot environment.

Deferred Activation Patching and the Issues with Applying Patches to a Live Boot Environment

Issues with Patching a Live Boot Environment

- The problems with the system entering into an inconsistent state during patching can only occur when patching a live boot environment.
- Patching a live boot environment takes time and does not offer a fallback option.



Advantages of Using Solaris Live Upgrade to Apply Patches

Advantages of Using Solaris Live Upgrade

- Using Solaris Live Upgrade dramatically reduces the risk and downtime associated with patching.
Note: Patches may contain Special Install Instructions in their README files that users must follow when patching a live boot environment to avoid issues. Most of these do not apply to patching an alternate (inactive) boot environment. Therefore, Solaris Live Upgrade reduces the number of manual steps needed to maintain a system, thereby reducing maintenance time and costs.
- The inconsistency issues do not apply when patching an alternate boot environment because there is no interaction between the objects being patched and the processes running in memory.
- All that is required to switch the alternate boot environment into the primary boot environment is a single reboot.
- If a problem arises with the new boot environment, you can fall back into the old boot environment to enable production to resume and resolve the issues with the alternate boot environment later.

Topic 1: Overview of the Kernel Patch

What is a Kernel Patch

A kernel patch:

- Is a generally-available standard patch
- Changes the Solaris kernel and related core Solaris functionality

The Solaris 10 Update Release Kernel Patch

Overview of Solaris 10 Update Release Kernel Patch

- There is at least one kernel patch associated with each Solaris 10 Update release.
- The kernel update patch tends to be large in size and complex.
- The kernel patch contains significant feature code changes and bug fixes.

Note: Between Solaris 10 Update releases smaller and less complex kernel patches might be released. The kernel patch is the single greatest source of patching issues.



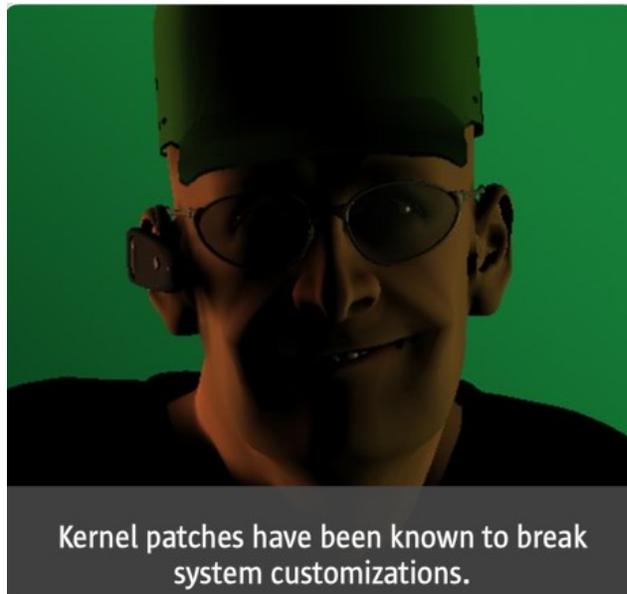
Most Common Causes of Kernel Patch Installation Issues

The most common causes of kernel patch installation issues:

- Incompletely added patches
- Having a boot archive that is not updated

The end result of a kernel patch not installing correctly could be a non bootable system.

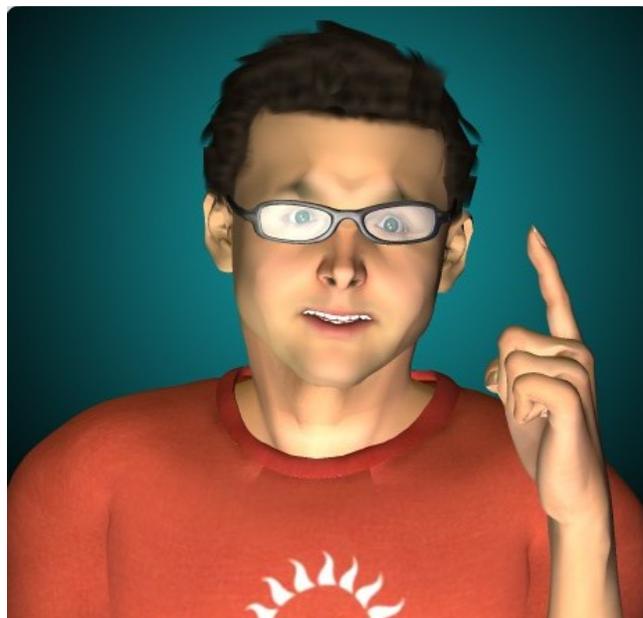
Kernel patches have been known to break system customizations.



How to Avoid Kernel Patch Issues

To avoid kernel patch issues:

- Pay attention to the "Installation Requirements" and "Special Install Instructions" sections in the kernel patch README file.
- Use Solaris Live Upgrade to install the kernel patch.
 - Ensure latest Solaris Live Upgrade software packages have been installed.
 - Ensure latest required patches have been installed. See [Infodoc 206844: Solaris™ Live Upgrade Software: Patch Requirements for the list of required patches:](#) (<http://sunsolve.sun.com/search/document.do?assetkey=1-61-206844-1>.)



Did You Know?

Regressions and other issues (often in corner case configurations) introduced by new features in Kernel patches can also cause kernel patch installation issues. Known issues will typically be noted in the "Special Install Instructions" of the patch README file.

Because the "Special Install Instructions" continue to be updated post-release as new issues are found, it is always a good idea to check the on-line patch READMEs for any updates.

A Sun Alert will be issued for Security, Data Corruption, or System Availability issues as well; therefore, it is also a good practice to subscribe to the weekly Sun Alert Report to keep abreast of the latest developments.

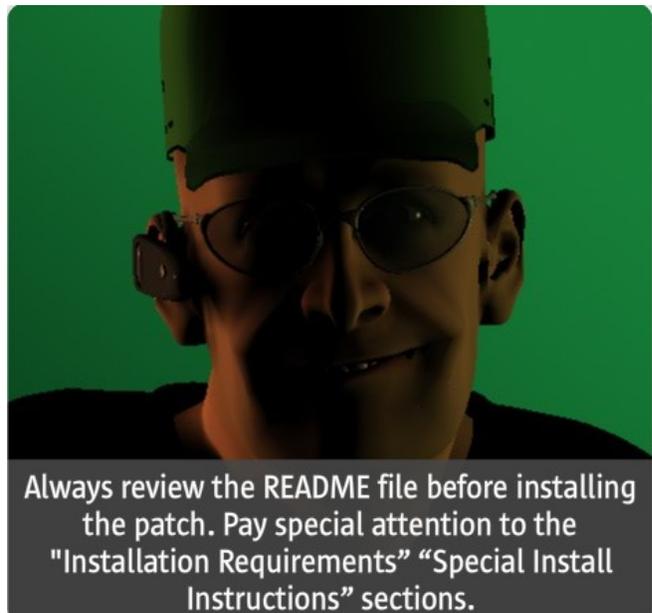
Note: As Security, Data Corruption, or System Availability issues are fixed and the resultant patches are included in the Recommended and Sun Alert patch clusters, the patches will be ordered for installation in the patch_order file in the clusters in such a way as to avoid hitting the issues. Using the cluster patch_order file as a starting point for customized clusters is a good idea in order to leverage the optimal patch install order.

Topic 2: Overview of Kernel Patch Installation

Key Points

Things you should remember when installing a kernel patch:

- Always review the README file before installing the patch. Pay special attention to the "Installation Requirements" and "Special Install Instructions" sections.
- Due to their size kernel patches take longer to install.



Installing a Kernel Patch

To install a kernel patch associated with Solaris 10 11/06 (Update 3) or earlier, use single-user mode.

Note: Applying a kernel patch in multiuser mode, significantly increases the risk of the system experiencing an inconsistent state.

The kernel patches associated with later releases of Solaris 10 (Solaris 10 08/07 Update 4 and later) are installed using the Deferred Activation Patching utility.

Sun Microsystems recommends using Solaris Live Upgrade to install kernel patches.

- Avoid potential issues encountered when installing a kernel patch on a live boot environment.
- Option of falling back to the original boot environment if something should go wrong with the installation



Did You Know?

A patch that is installed using the Deferred Activation Patching utility is designated as a deferred-activation patch. A deferred-activation patch has the variable `SUNW_PATCH_SAFE_MODE` set to "true" in the `pkginfo` file.

Previously, complex scripting was required to install kernel patches. Some of these patches also required interim reboots prior to applying subsequent patches. The kernel patches that are installed using Deferred Activation Patching use the loop back file system, or LOFS, to maintain the stability of the system during patch installation. The reboot is deferred until all the patches have been applied.

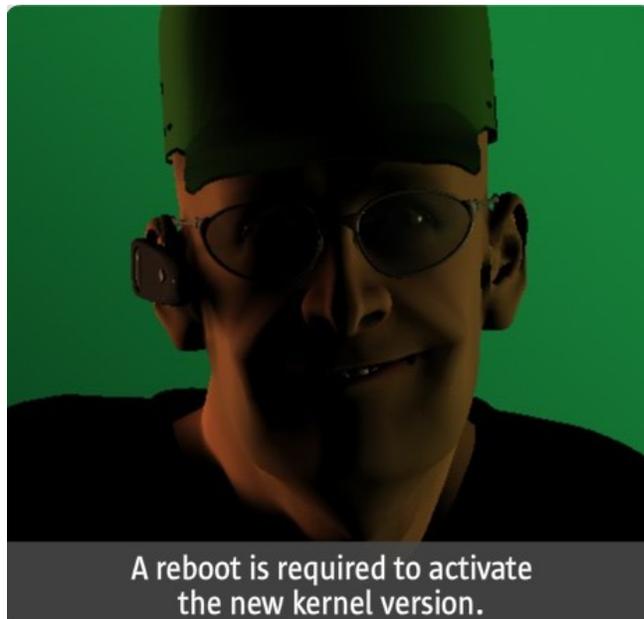
For more information on Deferred Activation Patching, see the Introduction to Deferred Activation Patching lesson (Book 11).

Rebooting the Kernel Patch

After a kernel patch installation has completed, a reboot is required to activate the new kernel version. This includes deferred-activation patches.

Note: If a "reconfigreboot" is required, the reconfigure reboot is triggered automatically.

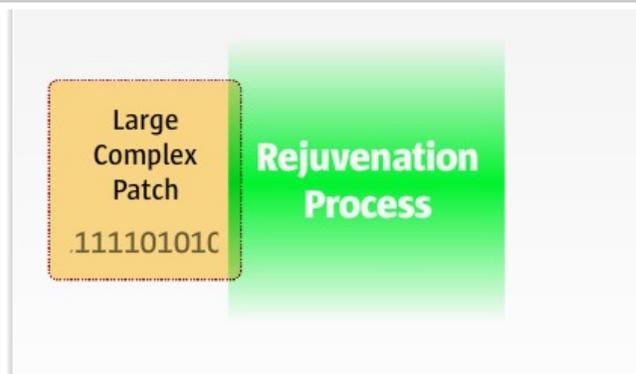
Refer to the "Special Install Instructions" section in the README file to find out what type of reboot is required.



Topic 3: Patch Rejuvenation and the Kernel Patch

What is Patch Rejuvenation?

Patch rejuvenation is the process of taking large, complex patches and freezing the code so that their complexity is not further propagated.



Why Patch Rejuvenation is Used

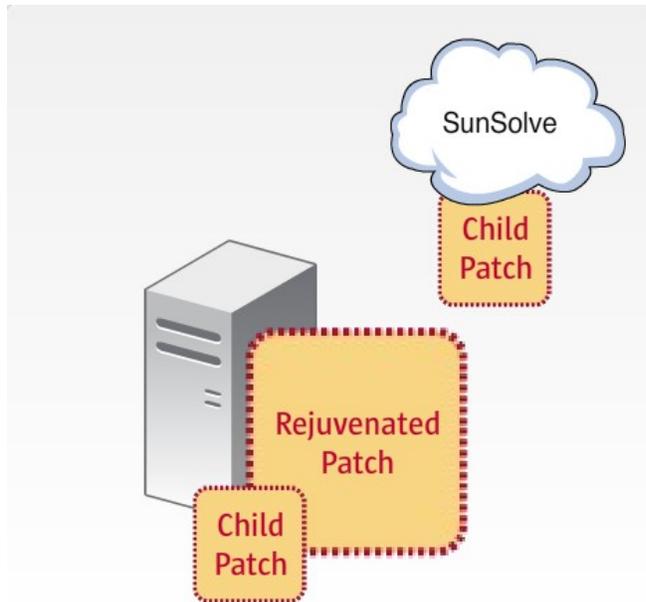
Patch rejuvenation is used because it:

- Reduces required downtime for large patch installs and revisions
- Decreases the chance of encountering issues during patch installation

Brief Overview of Patch Rejuvenation Process

- When a patch is rejuvenated, no more revisions of the patch are created.
- Further code changes are delivered in a series of new, smaller, and simpler patches called child patches.
- The child patches depend upon and require the rejuvenated patch.
- Starting with the Solaris 10 11/06 release (Update 3), the kernel patch is rejuvenated with each Solaris 10 Update release.

Note: The kernel patches used to build each Solaris Update provide stepping stones to key functionality, such as ZFS Root support, as well as contain a significant number of accumulated bug fixes. The smaller child patches in between Solaris Updates provides more discreet levels of change, primarily bug fixes.



Did You Know?

Patch rejuvenation:

- Splits non-core kernel functionality which has been accumulated into kernel patches through code dependencies out of future kernel patches and back into separate non-kernel patches going forward so that future fixes to the non-kernel functionality can be applied independent of future kernel patches.
- Reduces the size of subsequent child patches, including future Kernel patches, to aid faster download and installation.
- Reduces the complexity of subsequent child patches, including future kernel patches, thereby, reducing the need to propagate "Special Install Instructions" into future patches and decreasing the chance of re-encountering issues during the installation of future patches.

Did You Know?

For more information on the patch rejuvenation process, see the SunSolve Patch Rejuvenation Technical Instruction 209358 at <http://sunsolve.sun.com/search/document.do?assetkey=1-9-86481-1>.

See also the April 16, 2008 "Solaris 10 Kernel PatchID Sequence" blog on Patch Corner Blog at http://blogs.sun.com/patch/entry/solaris_10_kernel_patchid_progression.

For More Information

Here are additional Sun resources.

- Product documentation at <http://docs.sun.com> and the Documentation Center (<http://www.sun.com/documentation/>)
- Sun download site: <http://www.sun.com/download/>
- Sun training courses web site: <http://www.sun.com/training/>
- Discussions, such as Sun forums (<http://forums.sun.com/index.jspa>) and the BigAdmin Discussions collection (<http://www.sun.com/bigadmin/discussions/>)
- Sun wikis, such as the Sun BluePrints wiki (<http://wikis.sun.com/display/BluePrints/Main>) and the BigAdmin wiki (<http://wikis.sun.com/display/BigAdmin/Home>)
- Support:
 - Register your Sun gear: <https://inventory.sun.com/inventory/>
 - Services: <http://www.sun.com/service/index.jsp>
 - SunSolveSM: <http://sunsolve.sun.com>

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