Solaris Patch Management: Recommended Strategies

A White Paper

THE NETWORK IS THE COMPUTER™

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Solaris Patch Management: Recommended Strategies

The process of keeping your computer system up-to-date, reliable, and secure requires that you proactively perform patch management. This process can be quite complex. Therefore, this document is intended to clarify this process.

Sun recommends that you proactively perform patch management based on the following Sun strategy:

- Run the current Solaris™ operating environment consistent with business and hardware requirements
- Install Solaris Updates or Maintenance Updates as they become available
- Install applicable Sun[sm] Alert patches as they are released
- Install patches for any problems encountered between Solaris Update or Maintenance Update installations

The *Solaris Patch Management: Recommended Strategies* white paper addresses this strategy and covers the following topics:

- Patch definition and patch types
- Patch delivery mechanisms
- Benefits of performing patch management
- Risks from not performing patch management
- Patch management tools
- Delivery of the most recently released patches
- Sun's recommended strategy for patch management

What Is Patch Management?

Patch management is a process in which IT professionals manage their systems so that the most appropriate software available is installed. These patches fix known problems involving software functionality, performance, reliability, data integrity, or security.

Patch Definition

A patch is an accumulation of fixes to either a known problem or a potential problem within the Solaris operating environment or other supported third-party vendor software. A patch can also provide a new feature or enhancement that was left out of a particular software release. A patch is a collection of files and directories that replace or update existing files and directories.

The vast majority of Solaris patches are delivered in sparse package patches. That is, they contain Solaris packages with only those objects that have been altered since the package first shipped to customers.

A patch is identified using a patch identification number (patch_id) that includes the patch revision number (for example, 106934-01). This identifier consists of a six-digit base identifier and a two-digit revision number with the form xxxxxx-yy.

Solaris patches are also cumulative. Later revisions of a patch contain all of the functionality delivered in previous revisions. For example, patch 108528-14 contains all the functionality of 108528-13, plus the new bug fixes or features that have been added in revision 14 as described in the patch README file.

Patch Types

Many different types of patches exist for various conditions, including the following:

Patch Type	Patch Definition
Generic patches	Standard Solaris patches that contain bug fixes or new features. They have no special identification in the patch ID as there is with other patches, such as with Restricted and Temporary patches. However, some patches are identified using keywords in the “Keywords:” field of the patch README.<patch_id> file, including the following: • security – Identifies patches that were added to the security patch cluster • y2000 – Identifies patches that were added to the Y2K patch cluster • encryption – Identifies patches that limit distribution through SunSolve^{sm} based on the current export laws • point patch – Identifies patches that limit distribution to specific customers by using a special directory on the SunSolve web site • kernel – Identifies patches that ensure that this patch, and any patches on which it depends, are always added to the Recommended Patch Cluster
Kernel Updates (KU)	A generic patch that updates the Solaris Kernel and other core Solaris functionality. This patch is released on a regular schedule, instead of each time a new fix is introduced.
Restricted patches (R-Patch)	A special type of patch denoted with a prefix letter “R.” A restricted patch causes any package that it modifies to be locked down to prevent subsequent modification of the package by other patches.

Patch Type	Patch Definition
Point patches	Patches that are not for general use. Point patches might contain fixes for a specific customer or even a specific system. These fixes are created on a branch of the source code tree that will not be folded back into the main source code tree. Typically, Sun considers point patches to be appropriate only for the customers to whom the fix has been delivered. Point patches should be installed only after consultation with Sun support personnel and should be removed as soon as practical. These patches are accessible only to customers who have been provided with the specific point patch ID.
Non-standard patches	Patches that are not delivered in sparse package patch format. These non-standard patches include the following: • Driver update patches for x86 systems that must be released as diskette images. • Firmware / hardware patches, including OBP, controller, and disk firmware. • Flash PROM update patches that contain binary files for updating system firmware. • Some other non-operating environment software patches. • Some product patches that might not be delivered in package format. The patch README file provides the necessary installation instructions.
T-patches (Temporary patches)	Patches that have been built and are ready for testing, but have not yet completed that process. They might be made available to customers involved in active escalations to verify that the patch fixes the customer's problem. T-patches are identified by a leading "T" on the patch ID, for example, T108528-14, and by the words "(Preliminary Patch - Not Yet Released)" after the patch ID on the first line of the patch README file. Once the patch has been verified and internal Sun patch testing has been completed, the T-patch designation is removed from the patch ID, and the patch README file and the patch are then released on the SunSolve web site.

Note – Any standard patch supports automatic back out if necessary.

Patch Interrelationships

Functionality delivered in a patch, regardless of whether it has bug fixes or new features, might have interrelationships with functionality delivered in other patches. These dependencies are determined by three fields in the `pkginfo` file of the package. These three fields are:

- Patch dependencies (`SUNW_REQUIRES`)
- Patch accumulation and obsoletion (`SUNW_OBSOLETES`)
- Patch incompatibility (`SUNW_INCOMPAT`)

Patch Dependencies (`SUNW_REQUIRES`)

The functionality delivered in a patch might have a code dependency on functionality delivered in another patch or patches. That is, one patch requires another in order to function correctly.

If the patches are otherwise unrelated, the dependency can be described as one patch being required by another patch. A patch that depends on other patch or patches will specify the patch or patches it requires in the `SUNW_REQUIRES` field in the `pkginfo` file or files in the patch's sparse package or packages.

The dependency requirement is one way. If Patch A requires Patch B, then Patch B cannot require Patch A.

Because patches are cumulative, if Patch A requires Patch B-Revision xx, any revision of Patch B greater than or equal to Revision xx will also satisfy the requirement. That is, there is an implicit or later revision associated with any required patch revision specified.

The `SUNW_REQUIRES` field is used to specify straightforward, hard-coded dependencies between patches. If other types of dependencies exist, then these are specified in the Special Install Instructions in a patch README file. These can include:

- Conditional dependencies – Where a hard-coded patch dependency occurs only under specific conditions. For example, only if CDE 1.3 is installed on the target system.
- Soft dependencies – Where other patches are required to get the full bug fix for a particular issue, but the patch will otherwise work correctly without the other patches.

Patch Accumulation and Obsoletion (SUNW_OBSOLETES)

If two or more existing patches become closely intertwined as a result of bug fixes or new features, rather than specifying a dependency, it might make more sense to accumulate the functionality of the multiple patches into just one of the patches. The other patch or patches will then be obsolete.

The patch into which the other patch's functionality is accumulated specifies the patch or patches that it has obsoleted in the SUNW_OBSOLETES field in the pkginfo file or files in the patch's sparse package or packages. This is called an explicit obsoletion.

The patch accumulation is one way. That is, if Patch A accumulates Patch B, then Patch A now contains all of Patch B's functionality. Patch B is now obsolete. No further revision of Patch B will be generated.

A later revision of a patch implicitly obsoletes earlier revisions of the same patch. Implicit obsoletions are not flagged using the SUNW_OBSOLETES field. That is, there is no need for Patch A-Revision xx to explicitly obsolete Patch A - Revision(x-1) with a SUNW_OBSOLETES entry in the pkginfo file or files in the patch's sparse package or packages.

Patch Incompatibility (SUNW_INCOMPAT)

On rare occasions, typically where one of the patches is a point patch, two patches might be incompatible with each other. Such incompatibilities are specified in the SUNW_INCOMPAT field in the pkginfo file or files of the patch's sparse packages in one or both of the patches.

The patch incompatibility is two way. If either Patch A or Patch B specifies an incompatibility with the other, once one patch is already installed on the target system, it will not be possible to install the other patch.

For example, if Patch A is already installed on the target system and Patch B is incompatible with it, then the patch install utility (patchadd) will not allow Patch B to be installed. If Patch B must be installed, then Patch A must first be removed.

Patch Delivery Mechanisms

Patches are delivered using a variety of methods. The method used depends upon the type of patch being delivered or the method of installation. The following sections describe the types of patches and how they are delivered.

Patches can be found on the SunSolve[sm] patches web site at:

`http://www.sun.com/sunsolve/patches`

Recommended Patch Clusters

The Recommended Patch Clusters section on the SunSolve web site contain a set of patches for each OS/architecture combination that Sun recommends customers install.

A Recommended Patch Clusters patch meets one or more of the following criteria:

- A patch that addresses a Sun Alert issue. That is, a patch that addresses issues relating to availability, security, or data loss.
- A patch that is required for the correct operation of the patch utilities. Included are patches to the patch and package utilities themselves, or to utilities used by the patch and package utilities such as `ksh`, `sh`, `csh`, `nawk`, `fgrep`, `installf`, and `removef`.
- A patch required by either of the preceding patches. That is, a patch specified in the `SUNW_REQUIRES` field of the `pkginfo` file or files of any other patch in the Recommended Patch Clusters.

The Recommended Patch Clusters are frequently updated. Customers should check the SunSolve web site regularly for updates to the Recommended Patch Clusters.

Note – Most patches are not available to customers who do not have a current support contract. However, Recommended Patch Clusters may be downloaded from the SunSolve web site by any Solaris user.

Security T-Patches

The Security T-Patch section on the SunSolve web site provides early access to patches that address security issues. The patches are still in T-patch stage, and so have not completed the verification and patch testing process. The installation of Security T-Patches is at the user's sole discretion and risk.

Information about the issues addressed by security T-patches and possible work arounds is available through the free security Sun Alert data collection on the SunSolve web site: `http://www.sun.com/sunsolve/patches`.

Some security T-patches might require other patches to be installed first. If these other patches are not available through the free patches data collection, then these patches are available for download from the Security T-Patch section on the SunSolve web site.

Solaris Patches

The Solaris Patches section on the SunSolve web site is available to SunSpectrum[sm] contract customers only. It provides access to all current Solaris operating environment patches.

All Product Patches

The All Product Patches section on the SunSolve web site is available to SunSpectrum contract customers only.

It provides access to the current patches for other Sun products, excluding Solaris operating environment software. Patches are for hardware products, software products, and possibly some third-party software products.

Solaris Updates

A Solaris Update is a complete new Solaris image for the current Solaris Marketing Release. For example, Solaris 9 09/02 is the first Solaris Update for the Solaris 9 Marketing Release.

Solaris Updates are used to deliver new feature packages during the lifetime of the current Solaris Marketing Release. These updates might include support for new hardware as well as new software features.

Solaris Updates also contain the latest set of patches available for the current Solaris Marketing Release at the time the Solaris Update was created.

The patches in the Solaris Update are “freshbitted” into the Solaris image. That is, they are preapplied to the image. Therefore, these patches cannot be backed out.

Note – The Solaris Update might contain a couple of special “script” patches that are used to overcome limitations in the “freshbitting” process. Such script patches have no meaning outside of the Solaris Update and so are not included in the Maintenance Update, nor are they made available for download as individual patches from the SunSolve web site.

The set of patches included in a Solaris Update is almost exactly the same as the set of patches included in the corresponding Maintenance Update.

Installation of a Solaris Update is similar to the installation of a Solaris Marketing Release. There is no added delay to install the patch set as the patches have been preapplied to the Solaris image.

Note – Customers are advised to check the Recommended Patch Clusters section for patches that have been released since the content of a Solaris Update was finalized. A time gap exists to allow for testing and production between the date when the content was finalized and the release date.

Maintenance Updates

A Solaris Maintenance Update (MU) is a collection of patches for the current Solaris Marketing Release. For example, Solaris 9 MU1 is the first Maintenance Update for the Solaris 9 Marketing Release.

Maintenance Updates contain the latest set of patches available for the current Solaris Marketing Release at the time the Maintenance Update was created.

The Maintenance Update is simply a collection of patches. It is not a complete Solaris image. Therefore, the Maintenance Update must be installed on top of an existing Solaris installation. The Maintenance Update does not contain new feature packages.

The Maintenance Update includes an installation script, `install_mu`, which is a wrapper around the patch installation utility, `patchadd`. The `install_mu` script reads a “.order” file to install the collection of patches in the correct order to resolve patch dependencies.

Since the patches are applied using the `patchadd` utility, the patches can be backed out (provided that the “`-d`” `patchadd` option has not been selected). With the `patchadd` utility, the installation time depends upon the number of patches to be installed.

Maintenance Updates are available for download on the SunSolve web site to SunSpectrum contract customers.

Note – Customers are advised to check the Recommended Patch Clusters section for patches that have been released since the content of a Maintenance Update was finalized. A time gap exists to allow for testing and production between the date when the content was finalized and the release date.

Why Do Patch Management?

Benefits of Performing Patch Management

By following effective patch management techniques, you receive inherent benefits that include, but are not limited to, the following:

- Increased availability
- Decreased downtime
- Better performance
- Increased security
- Increased stability

In addition, by following effective patch management techniques, you increase Sun's ability to support your system. The vast majority of problems reported to Sun have already been resolved in an existing package. In some cases, diagnosis of a problem can proceed more quickly if the system is at a current patch revision level. By installing the appropriate patch or patches before you have problems, you can significantly reduce your downtime.

Risks From Not Performing Patch Management

The Solaris operating environment is highly secure, which is one reason why 89 percent of Tier 1 Internet Service Providers use Sun (Infonetics Research, 2000). The Solaris operating environment outperforms the competition in reliability, availability, and serviceability (according to the D.H. Brown analysis of UNIX® operating systems).

That said, Solaris, similar to all software, can occasionally be vulnerable to security, availability, and performance risks that are quickly mitigated by patches. Sun recommends following proactive patch management techniques to ensure your system is as stable as possible. Over time, problems and inconsistencies get exposed through further testing and industry use. While your system might appear to be

running effectively, you could be experiencing degraded performance or be at risk of experiencing a system outage. These issues are typically addressed with regular patching upgrades, ensuring your IT environment is operating optimally.

What Patch Management Tools Are Available?

Various tools exist to help you manage and deploy patches. Which tool you would use depends upon your system configuration and your particular environment. The following tools are discussed in subsequent sections:

Patch Management Tools

- Solaris Patch Manager Tool
- Sun Patch Check
- PatchDiag
- Sun™ Management Center System Reliability Manager

Patch Deployment Assistance

- Solaris Live Upgrade software
- Solaris Flash technology
- Sun™ Management Center Change Manager

Note – No further development or enhancements will be made to Sun Patch Check or PatchDiag tools.

Solaris Patch Manager Tool

Solaris Patch Manager Tool is available in two versions:

- Solaris Patch Manager Tool Base for Solaris 2.6, 7, and 8
- Solaris Patch Manager Tool for Solaris 9.

Note – PatchPro is the underlying patch analysis technology used by both versions of Solaris Patch Manager Tool.

Solaris Patch Manager Tool Base for Solaris 2.6, 7, and 8

Solaris Patch Manager Tool Base is available free of charge through the SunSolve program. The specific tasks performed by Patch Manager using the command-line interface (CLI) are:

- Determination of required patches for a system
- Automatic patch download
- Automatic simple patch installation
- Resolution of patch dependencies
- Installation order
- Removal of patches
- Verification of digitally signed patches

Customers can set Solaris Patch Manager Tool Base to automatically perform any or all functions on a regular basis for hands-off patch management. For users who are not comfortable with complete automation, all functions are available manually as well.

Solaris Patch Manager Tool for Solaris 9

Solaris Patch Manager Tool ships as part of Solaris 9. Patch Manager Tool has all the same features as the Base version, but adds a graphical user interface (GUI) and the ability to do the following:

- Perform remote patch management on other Solaris 9 systems
- Automatically install a patch or list of patches to identically configured multiple systems running the Solaris 9 software

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Note – To achieve full functionality, Solaris Patch Manager Tool for Solaris 9 requires a separate download of PatchPro from `http://patchpro.sun.com`.

Solaris Patch Manager Tool Features

The following table summarizes the features of both versions of Solaris Patch Manager Tool.

Feature	Solaris Patch Manager Tool	Solaris Patch Manager Tool Base
Operating environment	Solaris 9	Solaris 2.6, 2.7, & 2.8
User interface	GUI and CLI (`smpatch`)	CLI (`smpatch`)
Simultaneous patch installs?	Yes, install on multiple homogeneous systems (same architecture and Solaris level)	No, install on single system only
Patch to network?	Yes, analyze and add patch or patches to local or remote systems	No, analyze and add patch or patches to local system only
Time-saving features	• Analyzes patch requirements on a local system • Downloads recommended digitally-signed patches • Adds patches to a local or remote system • Resolves patch dependencies and installation order • Removes a patch after checking patch dependencies on other patches	• Same time-saving features as Solaris Patch Manager Tool
Security	• Authenticates the digital signature of a patch • Performs data transfer using a secure network connection with the `https` technology	• Same security features as Solaris Patch Manager Tool
Distribution	Ships with Solaris 9 as part of the Solaris Management Console	Can download free of charge from `http://www.sun/sunsolve/patches`
Additional module required?	Yes, download and install PatchPro module from `http://patchpro.sun.com` for full Solaris Patch Manager Tool functionality	No, Solaris Patch Manager Tool Base Version is the only download required

Additional Notes About Solaris Patch Manager Tool

Solaris Patch Manager Tool downloads the most current revision of a patch in Java™ archive (`.jar`) format from the SunSolve web site. Solaris Patch Manager Tool currently recognizes patches for Solaris software, Sun Enterprise™ Systems products, Network Storage products, and Sun Cluster products. In the future, Solaris Patch Manager Tool will manage patches for all Sun products.

Sun is actively engaged in reducing outages resulting from patch management. Some patches, however, must be installed in single-user mode, or require user interaction to be safely installed. Solaris Patch Manager Tool displays a dialog box to the user identifying these patches, and any patches that depend on them, for interactive installation by the user. It is highly recommended that you carefully consult the README files for these patches in order to be familiar with any special installation instructions.

PatchPro Interactive

In addition to the Patch Pro technology that is used with the Solaris Patch Manager Tool, another version of PatchPro can be found at:

`http://www.sun.com/sunsolve/patches`

This version of PatchPro, PatchPro Interactive, allows you to interactively input system information. PatchPro Interactive generates a custom patch list based upon this system information. Use this implementation to generate patch lists for systems that do not have access to the SunSolve web site.

Sun Patch Check

Sun Patch Check is a tool that analyzes which patches are installed and which patches are needed on any given system with the Solaris operating environment. Use this tool with systems running a version of the Solaris software prior to Solaris 2.6 or when you want to see more patches listed than what Solaris Patch Manager Tool lists. Sun Patch Check also includes unbundled product patches in the lists. The list generated by Sun Patch Check is in an HTML format.

Unlike Solaris Patch Manager Tool, Sun Patch Check does not tailor the patch list to the specific configuration. It also does not provide a patch installation order.

If you have a SunSpectrum^{sm} service contract, you can select patches for downloading. The selected patches are downloaded into a single compressed file.

Sun Patch Check is available free of charge. A link to the Sun Patch Check download site can be found at:

`http://www.sun.com/sunsolve/patches`

Note – No further development or enhancements will be made to the Sun Patch Check tool.

PatchDiag Tool

The PatchDiag tool enables you to examine a profile of your system patch status against the most current profiles available from Sun with respect to:

- Latest software revisions
- Recommended patches
- Security patches
- Other patches relevant to a software environment

The PatchDiag Tool is compatible with all systems running a Solaris 2.3 or later environment and with all patches installed in Solaris patch packet format. This tool is run from the command line. It generates an ASCII text format list.

The PatchDiag Tool is available only to SunSpectrum contract customers.

Note – No further development or enhancements will be made to the PatchDiag tool.

Sun Management Center System Reliability Manager

Sun Management Center software is a systems management solution that scales from a single system to thousands of servers and desktop systems, and easily integrates into heterogeneous IT environments. This software offers a single point of management for Sun systems and storage components, the Solaris operating environment, and applications running on the Solaris platform.

Sun Management Center software has an optional add-on package, System Reliability Manager. This software offers multiple features, including a patch management feature. To optimize the reliability of systems running the Solaris operating environment, this feature provides enterprise-wide identification, monitoring, and alerts on any uninstalled patches. Patch management enables you to:

- Make sure that the system is operating optimally at all times
- Receive alerts about missing patches in recommended, security, or general categories
- More easily manage and track the latest software patches and fixes

The Sun Management Center Basic Package is free and can be downloaded from the web for use on an unlimited number of nodes. The software add-on for System Reliability Manager is licensed on a per-node basis.

To learn more about Sun Management Center software, System Reliability Manager software, and other add-on products, check the following web site:

`http://www.sun.com/sunmanagementcenter`

Solaris Live Upgrade Software

Solaris Live Upgrade software is a multifaceted tool that enables you to perform a number of tasks, including patch deployment. The following sections provide a brief overview of the Solaris Live Upgrade features.

Solaris Live Upgrade software is available for download at:

`www.sun.com/solaris/liveupgrade`

Note – Non-standard patches such as patches for OpenBoot PROM (OBP), controllers, and disk firmware can not be managed using Solaris Live Upgrade software.

Reduces System Downtime

Solaris Live Upgrade software significantly reduces the downtime associated with an operating environment upgrade or maintenance. It enables the Solaris 9, 8, 7, and 2.6 operating environments to continue to run while you upgrade to the latest release of the operating environment, apply patches, or do routine maintenance on the inactive or duplicate boot environment. When ready, you simply reboot the system to run the latest or the updated operating environment.

Installs Complete System Images

Solaris Live Upgrade integration with Solaris Flash provides enterprise customers with a reliable and rapid migration solution. Using Solaris Live Upgrade software, you can rapidly flash a complete pretested, preconfigured system image on an inactive or duplicate boot environment, while the production boot environment is fully functional and unaffected by the installation of the Solaris Flash archive. When ready, you can migrate to upgraded environment with a simple reboot.

Manages Multiple Boot Environments

Solaris Live Upgrade software provides a powerful boot environment framework to create, manage, and maintain multiple boot environments on the same system. Solaris Live Upgrade software supports advanced file system operations such as splitting, merging, or sharing file systems between boot environments. You can also migrate file systems from one storage device to another. Solaris Live Upgrade software works with mirrors, RAID-5 devices, and other disk layouts.

Solaris Live Upgrade software enables you to maintain multiple installations of software packages including the Solaris operating environment, which will share user data file systems. With a simple reboot, you can use the inactive boot environment as a backup and can fall back to the original boot environment in case of disaster.

Manages Patch Updates

Solaris Live Upgrade software can be used to manage patch updates. Patches can be applied to a duplicate boot environment and, after they have been verified, be rolled out to a production or active boot environment. This feature can substantially reduce the system downtime associated with managing server farms by enabling you to install a patch and synchronize the rollouts. In addition, this feature makes it easy to fall back to an original version of the system with a simple reboot, thereby eliminating the service outages associated with the normal test and evaluation process required when introducing a new version of a patch of an operating environment.

Supports Fall Back Mechanism

Solaris Live Upgrade software also supports software migration and fallback to the previous active boot environment in case of failure with activation or reboot. You can then analyze the failure. Solaris Live Upgrade even supports synchronizing the differences between the active and inactive boot environments. This feature helps to prevent any losses while the system is in the upgrade or fallback process.

Provides Ease of Use

Solaris Live Upgrade software provides you with both a character-user interface (CUI) and a familiar command-line interface (CLI). With the CLI, the upgrade process can be automated across many systems with scripts.

Solaris Flash Technology

When doing patch management, you might have to update a large number of systems with the same patch. This process, if done manually, could take vast amounts of time. The Solaris Flash technology allows you to efficiently deploy system configuration changes, including patches.

The Solaris Flash technology allows you to create a master system that contains all the required setup and changes for a particular operating environment configuration. You then create a snapshot of the master system. This snapshot (flash archive) is then used to be installed or copied onto any number of like systems (clones). This process then requires only that the customization and verification be performed on the master system. Then, this image is simply copied to any number of the clone systems.

For more information about the Solaris Flash Technology, refer to:

`http://wwws.sun.com/software/solaris/webstartflash/`

Sun Management Center Change Manager

Sun Management Center Change Manager focuses on delivering a fast and easy way to install, configure, upgrade, provision, and audit the integrated software application payloads running on your systems. Change Manager enables today's businesses to quickly and easily provision Sun Open Net Environment (Sun ONE) software stacks or their custom software stacks to their servers by providing automated tools for installing or upgrading an individual server—or groups of hundreds of servers—as a single operational task.

Change Manager is based on the concept of managing and provisioning entire software configurations as a single, integrated software stack. Using Solaris Live Upgrade software, Change Manager enables you to roll out a software upgrade or make changes to your servers while they continue to operate. This software combination also supports rollback to the previous configuration in the case of failure or if the upgraded environment is not completely satisfactory. This feature can save your IT staff many hours of repetitive work, minimizing costly disruptions and increasing the scalability and availability of your services.

To learn more about the Sun Management Center software and Change Manager, visit:

`http://www.sun.com/sunmanagementcenter`

Key Benefits of Change Manager

Reduces Provisioning Time

Sun Management Center Change Manager provides a fast and easy way to deploy software stacks securely to a single server or groups of servers in the format of Solaris Flash archives. Change Manager enables formal IT procedures in a "construct-test-deploy-maintain" systems life cycle.

The concept is simple. Stage a prototype server that you plan to replicate. Capture the entire software stack (Solaris operating environment, middleware, applications, and configurations) as a single, integrated software image in the Solaris Flash archive format. Then, use that Solaris Flash archive to install or upgrade a single server or groups of servers simultaneously.

Provides Rapid and Flexible Reconfiguration

Using Change Manager, you can easily reconfigure a server from one type to another to respond to service level demand. For example, at peak traffic periods on a web site, you could reconfigure a cache server into a web server to increment that server pool and sustain a peak load. This strategy can be accomplished by deploying a Solaris Flash archive containing the Solaris operating environment and files to run a web server.

Reduces Downtime

Change Manager enables software updates while servers continue to run, avoiding interruptions to services. Using Solaris Live Upgrade technology, Change Manager enhances service levels by:

- Allowing software upgrades to be performed on an alternate system disk partition while the system continues running
- Enabling you to fall back to a previous configuration if an upgrade is unsatisfactory
- Managing multiple boot environments for system maintenance or software upgrades

Increases System Reliability and Security

Change Manager enables you to audit the software stack of any single server or groups of servers and compare them to a reference configuration. This functionality improves reliability and security by providing the ability to track file changes on the deployed software stack.

Provides Ease of Use

Change Manager provides an easy-to-use web browser interface as well as a command-line interface (CLI).

How Do I Find Out About Newly Released Patches?

A big part of performing patch management is learning about what patches are released that might affect your system. Sun provides a number of methods of learning about released patches, including the following:

- Patch Club Reports
- Sun Alert Patch Reports
- Solaris Patch Manager Tool

Patch Club Reports

Patch Club Reports are weekly notifications of all new and updated patches, including patches that have been withdrawn. To receive this free report, go to the following URL:

`http://www.sun.com/newsletters`

Sun Alert Patch Report

Two types of Sun Alert reports are available on SunSolve. There is the entire Sun Alert Report available on the SunSolve web site (`http://www.sun.com/sunsolve/patches`). Also on the main SunSolve page is a link to security-related Sun Alerts. These alerts are just the security related Sun Alerts.

Note – The resolution described in the Sun Alert reports might have a solution that is not a patch.

A Sun Alert notification informs you about a potential problem in three areas: data loss, security, and availability. By focusing on these three areas only, you know that you are only receiving notices of the most critical issues.

Solaris Patch Manager Tool

The Solaris Patch Manager Tool (both versions, Solaris Patch Manager Tool and Solaris Patch Manager Tool Base Version) allows you to do patch management analysis on your system. This analysis does not happen automatically, but can be scripted to run regularly. The frequency of the analysis is customizable, however, the Sun database is updated daily. The tool analyzes your system configuration and checks for any necessary patches. In addition to the analysis function, Solaris Patch Manager also downloads, installs, and removes patches.

How Do I Implement the Sun Recommended Patch Management Strategy?

Sun recommends the following patch management strategy:

- Run the current Solaris operating environment consistent with business and hardware requirements
- Install Solaris Updates or Maintenance Updates as they become available
- Install applicable Sun Alert patches as they are released
- Install patches for any problems encountered between Solaris Update or Maintenance Update installations

The following subsections describe the Sun recommendations, along with information about how each recommendation is implemented.

Run the Most Current Operating Environment Consistent with Business and Hardware Requirements

The best way to do patch management is to run the most current operating environment consistent with business and hardware requirements. Doing so has the following benefits:

- Improved stability
- Continued improvements in software development, which reduces regressions (bugs)
- Longer and more rigorous testing of the included code
- Improved security
- Improved performance
- Reduced number of patches that need to be managed

You can get the most current patches for your operating environment through the Solaris Updates or Maintenance Updates, which are released several times a year.

In some cases, it is not possible to run the most recent operating environment. In such cases, it is important that the most current version of that operating environment is being run. For example, if Solaris 8 is the operating environment being run, the most current version for that operating environment would be Solaris 8, Update 7. This version would contain all the patches available for the Solaris 8 operating environment. Also, you should continue to run Solaris Patch Manager to analyze your system for recommended patches.

Note – Solaris Updates and Maintenance Updates are released several times a year for the current marketing release only. The last released version of a Solaris Update for an older operating environment can be obtained through your Sun Sales Representative. The last Maintenance Update can be obtained through a SunSolve download.

Install Solaris Updates or Maintenance Updates as They Become Available

Periodically, Sun releases a Solaris Update and a Maintenance Update. These updates are available for the current operating environment only. For example, because Solaris 9 has already been released, no more updates will be created for Solaris 8.

Solaris Updates

Solaris Updates provide the most recent release of the Solaris image and contain all the latest patches for that release. These updates are available to SunSpectrum contract customers only. You can get Solaris Updates from the SunSolve contract access site.

Solaris Updates can be deployed using Solaris Live Upgrade and the Solaris Flash technologies.

Maintenance Updates

A Maintenance Update is a set of Solaris patches that have been tested together and packaged for a one-step installation. The installation automatically updates previously installed patches and ensures that there is no regression of the target system, regardless of the existence of later revisions of patches on the target system.

You can download Maintenance Updates from the SunSolve contract access site.

Maintenance Updates are installed using the Maintenance Update Installation script, `install_mu`. Deployment of the Maintenance Update could be accomplished using Solaris Flash to create and deploy an archive of a reference system with the Maintenance Update installed. Such an archive could be installed on an alternate boot environment using Solaris Live Upgrade software in order to minimize downtime and provide a fall back boot environment, if needed.

Install Applicable Sun Alert Patches as They Are Released

A Sun Alert notification describes specific hardware and software product issues that might pose a risk to a customer's computing environment and productivity. A Sun Alert notification informs you about a potential problem in three areas: data loss, security, and availability. By focusing on these three areas only, you should be aware that you are only receiving notices of the most critical issues.

You should install the patches indicated by these Sun Alert reports as quickly as possible. Normally, these alerts fall outside of regularly scheduled patch management processes and need to have their own patch management process applied. The process for each customer will be different, depending upon the customer's environment and customized processes. Give careful consideration to the potential risks if you decide to defer patch installation until the next patch maintenance cycle.

All operating environment related patches that resolve Sun Alert problems are included in the Recommended Patch Cluster, along with any patches on which they depend. Non-operating environment related patches that resolve Sun Alert problems should be downloaded from the SunSolve web site and installed, if appropriate to your system environment.

Customers should check the Sun Alert collections on the SunSolve web site regularly to see newly released Sun Alerts and relevant information on patches.

Install Patches for Any Problems Encountered Between Solaris Update or Maintenance Update Installations

This recommendation encompasses the vast majority of the patch management process. These patches occur between the Solaris Update or Maintenance Update installations, but do not fall into the category of being a Sun Alert patch.

Once your system has been deployed and a patch maintenance schedule has been established, any problems requiring the application of a patch between cycles should be nearly nonexistent. However, this is not a guarantee, especially if your maintenance schedules are stretched to longer periods. If a problem should occur and the solution calls for the application of a patch, you should consider very carefully the current state of the system against the desire to maintain a predetermined patch maintenance schedule.

You should ask yourself the following questions:

- Is the system currently down and inoperable?
- Is the system operating, but having errors and hindrances that are of concern?
- Is the maintenance cycle soon enough that you can risk waiting to apply the patch?

If, after considering all these questions, you decide to go ahead and do the patch installation, the steps you need to follow involve:

1. Identifying and obtaining the patch or patches
2. Identifying the applicability of the patch or patches to your environment
3. Creating the bundle of patches to apply for this patch installation iteration
4. Deploying the patches to a three-step or two-step environment for testing and validation
5. Deploying the patches into the production environment

These steps are described in the following subsections.

Identifying and Obtaining the Patch or Patches

In this step, you are identifying and obtaining any patches that have been released that might apply to your system. The methods in which you identify and obtain the patches vary.

You can use some of the Sun-supplied tools to automate the process for identifying the patches, or you can manually check the various reports. Sun provides the following tools to identify and obtain the patches:

- Solaris Patch Manager Tool
- Solaris Patch Manager Tool Base
- Sun Patch Check
- PatchDiag

You can also check the Sun Alert reports, the Patch Club reports, or the Recommended Patch Cluster README file for any patches that might affect your system.

Identifying the Applicability of the Patch or Patches to Your Environment

Once you have identified the patches that are listed for your system, you need to evaluate their applicability to your environment. In some instances, a patch could be listed for your system, but it does not necessarily apply and, therefore, does not need to be installed. For example, in a patch report or a Sun Alert, a patch might be listed for software that is not installed on your system. You do not need to install that patch. These patches can be omitted from the patch bundle as described in the next step.

Creating the Bundle of Patches to Apply for This Patch Installation Iteration

A patch bundle is a group of patches that you have packaged for the Solaris operating environment, third-party applications, and in-house applications that have been tested together and packaged for a one-step installation.

Deploying the Patches to a Three-step or Two-step Environment for Testing and Validation

Deploying patches requires that you test those patches before applying them to your production environment. Sun recommends that you create a three-step or a two-step environment for the patch management process.

The three-step environment provides the best scenario for patch management testing and stability. The three-step patch environment is shown in the following illustration.

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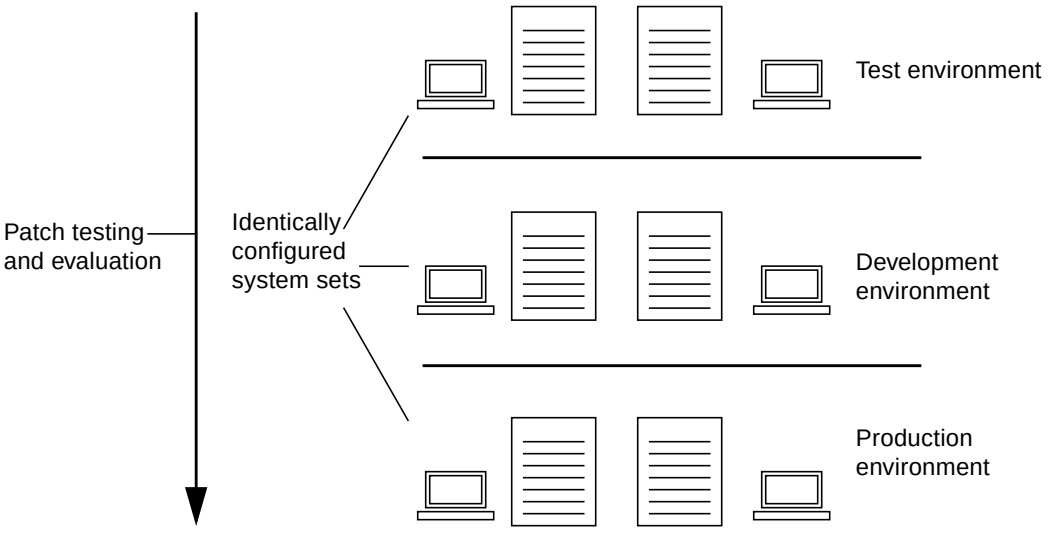
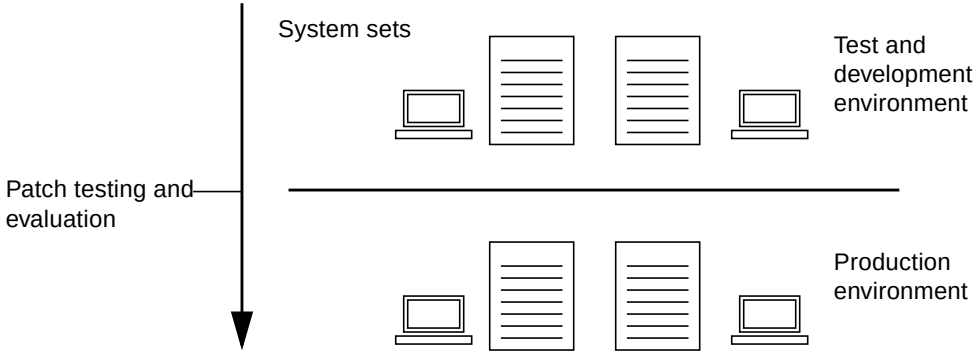


Ideally, your test system should mirror as closely as possible the architecture and configuration of your production environment. More than one system might be required to ensure accurate testing. For example, there are typically both PCI and SBus architectures in the configurations.

The system sets (servers, storage devices, desktop systems, and so on) must be identically configured in each of the three steps. The following are the core components of the three steps:

- Test environment – Basic testing to verify patch stability and operation
- Development environment – Testing patch compatibility with third-party and in-house applications
- Production environment – Installing patch bundle into a live, operational environment that is running at all times

In some cases, you might be unable to have a three-step environment due to resource and cost constraints. Sun recommends that you at least have a two-step environment so that patches are not introduced into a production environment without proper testing with your configuration. A two-step environment is shown in the following illustration.



In this environment, the patch testing is done in the test and development environment before the patches are introduced into your production environment.

Deploying the Patches into the Production Environment

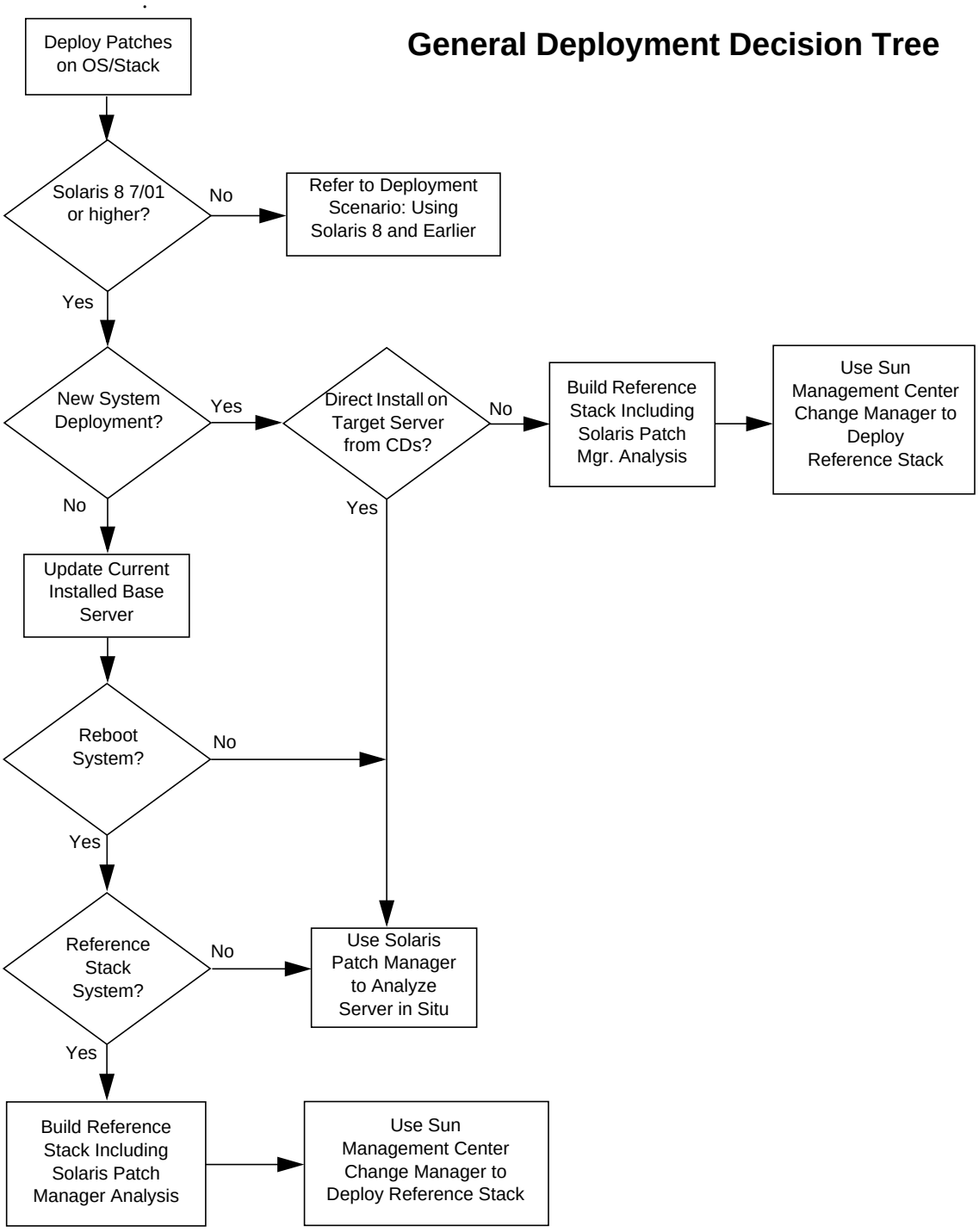
Once the patch bundle has been tested, the patches can be deployed into your production environment. You can do so using one or more of the following methods:

- Solaris Patch Manager Tool
- Solaris Flash
- Solaris Live Upgrade Software
- Sun Management Center Change Manager
- User-customized scripts

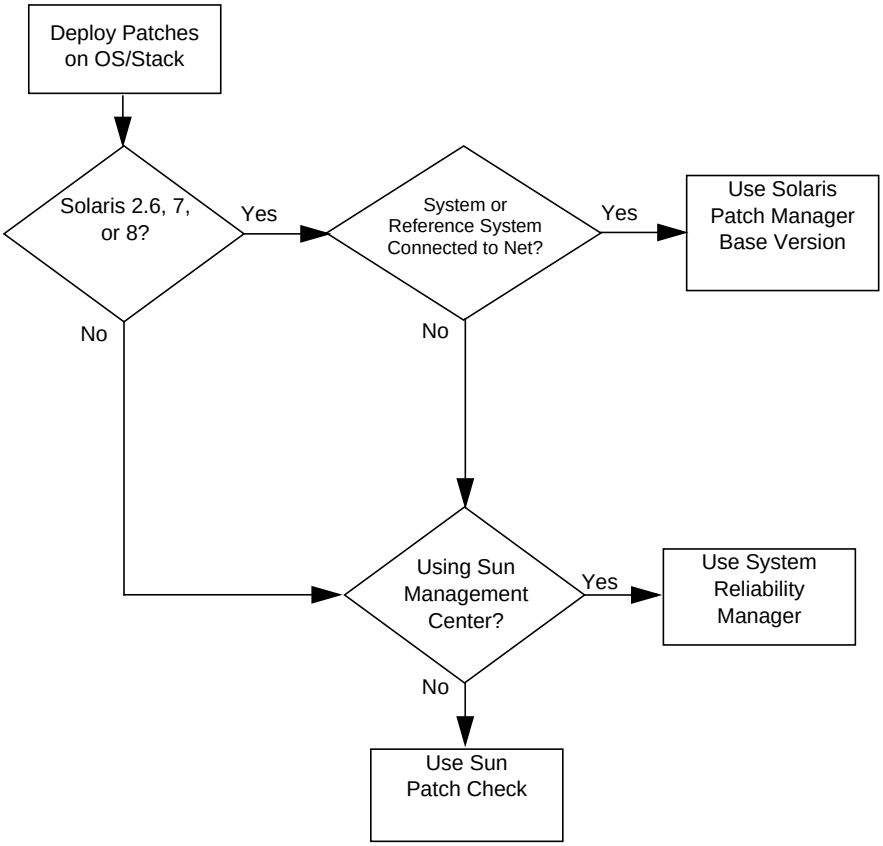
The deployment process varies, depending upon the operating environment you are running and the tools you decide to use. The following flow charts provide examples of the following deployment processes:

- General deployment decision tree
- Deployments when using the Solaris 8 or earlier operating environment
- Deployments when not using the Sun Management Center software and using Solaris 9

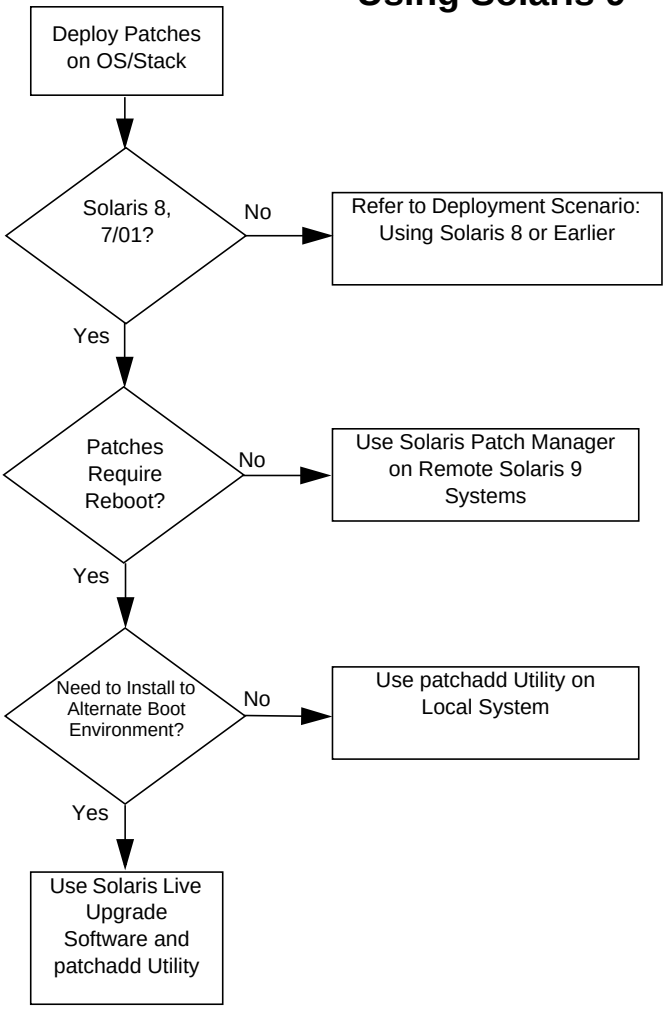
General Deployment Decision Tree



Deployment Scenario: Using Solaris 8 or Earlier



Deployment Scenario: Not Using Sun Management Center and Using Solaris 9



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