

Sun™ Management Center Change Manager

A Technical White Paper
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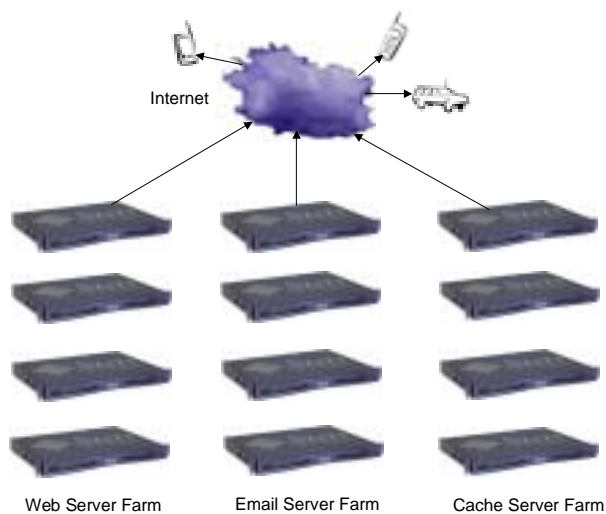
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Chapter 1

Introduction

Many of today's successful enterprise computing environments rely heavily on large, horizontally scaled server farms to provide critical, revenue-generating software services. It is quite common to see tens or even hundreds of low-cost replicated servers, each running a replicated software stack, that combine to provide a set of services such as Web services, internet caching, or streaming video. These servers are often rack-mounted and densely populated into compact areas where computing power is measured by the square foot, rather than by the individual system, as shown in Figure 1. The often-onerous task of administering and maintaining a consistent software configuration, or software stack (operating system, application, drivers, and patches) across this vast array of systems can be complex, labor-intensive, and prone to error.

Figure 1: Today's Horizontally-scaled Server Farms



As the number of deployed systems on these networks continues to rapidly grow, it becomes even more critical to increase the efficiency and productivity of the existing IT staff. There is a tremendous need for automated software tools that enable administrators to easily and efficiently install and manage many more servers with far fewer resources. They need to know precisely which software and patches are running on each system and have the ability to make changes to the software stack quickly, reliably, and in an automated fashion. In addition, they urgently require the means to install and reprovision multiple systems simultaneously from any location on the network, as faster systems deployment cuts time-to-revenue and increases profitability.

Sun's new, innovative Sun™ Management Center Change Manager software can significantly increase system administrator efficiency and productivity in computing environments using large numbers of replicated servers to provide software services. The key functions of Change Manager are:

- *Quick and easy deployment of integrated software stacks to multiple managed hosts*
- *Fast reprovisioning of systems to respond to rapidly changing business environments*
- *Performing software installations or updates on systems while they continue to run*
- *Auditing functionality enabling system and file comparisons to detect change*

Change Manager is designed to provide the administrator with potent technology to help them radically improve:

- **Manageability** — Change Manager is intended to provide quick and easy software provisioning and change management to large groups of servers simultaneously. Automating software provisioning and change management tasks can greatly reduce administrative costs by decreasing the complexity of server configurations and the amount of time spent installing and upgrading servers. Change Manager offers multiple easy-to-use interfaces, including a Java™ technology or browser-based graphical user interface (GUI) and command line interface (CLI). In addition, all of the tasks can be performed from a single remote administrator console, giving the administrator the freedom to manage systems from anywhere on the network or the Internet.
- **Reliability** — Change Manager helps administrators perform fast and safe software installs and updates on single or groups of systems at the same time. Once the install or update is complete, the administrator can use the software audit tool to generate a comprehensive report of any changes made to a server or group of servers, supplying an effective way to keep track of precisely what is on a system.
- **Availability** — Using Change Manager, administrators can dramatically minimize costly service interruptions usually associated with software updates and patch maintenance. Its powerful fall back feature allows the administrator to quickly restore previous software configurations if a software update or patch performs poorly or unexpectedly.
- **Total Cost of Ownership (TCO)** — Automating tasks across groups of similar servers has the potential benefits of significantly improving the administrator-to-system ratio, decreasing lost revenue due to update-related service interruptions, and markedly cutting installation and reprovisioning time and costs.

How is Sun Management Center Change Manager Different from Solaris™ Web Start and JumpStart™ software?

Sun offers several proven tools for installing and upgrading individual systems as described below:

- **Solaris™ Flash technology**— Captures a snapshot image of a complete system software stack in a Solaris Flash archive format, including Solaris™ Operating Environment (OE), applications, and configurations.
- **Solaris Web Start software**— An interactive GUI installer that can use both packages and Solaris Flash archives to install a single system. It is limited to installation of individual systems and must be invoked from the system being installed. A CLI is also available.
- **Solaris JumpStart software**— An enterprise solution enabling automated, hands-off installation of software. Solaris JumpStart software only supports a CLI and can perform standard package-based installations or installations using Solaris Flash archives. Installations are initiated automatically from the system being installed, and are usually serviced by a Solaris JumpStart server containing the install media, Solaris JumpStart scripts, and data.
- **Solaris™ Live Upgrade software**— Allows installation or update of a software stack while the system is fully operational. It also enables fall back to the original software configuration if the update is unsuccessful or unsatisfactory.

Change Manager builds upon these technologies to integrate a unique *aggregate* deployment technology into Sun's existing Sun™ Management Center infrastructure, making deploying software on a massive scale easier and more cost-effective. It expands the scope of deployment from one-system-at-a-time installation to a many-at-a-time, or aggregate deployment operation. In the past, using Solaris JumpStart software, the administrator would have to individually configure each system and then invoke a set of install or update commands on each of them individually. Now, the administrator can automate these tasks for one or many similar servers simultaneously, performing them at virtually any time, from anywhere on the network.

Chapter 2

Understanding How Sun Management Center Change Manager Works

Sun Management Center Change Manager utilizes Solaris Flash archives, Solaris Live Upgrade software, custom Solaris Jumpstart technology, and Software Stack Audit technology to help automate the process of installing, upgrading, and provisioning single or multiple systems simultaneously. It is therefore important to have a basic knowledge of these tools in order to understand how they are used by Change Manager.

Solaris Flash Archives

Solaris Flash technology is designed to give the administrator the ability to create a snapshot image, or Flash archive, of an entire system, including Solaris OE, applications, patches, and system configuration. Using a Solaris Flash archive within Change Manager, administrators can replicate reference server configurations, such as Web servers, onto multiple managed hosts, or client systems.

Creating and Testing Master Servers

A base configuration, containing the Solaris OE, configuration, and current patches for the type of server to be installed, needs to be created by the administrator and thoroughly tested on a master system.

To help improve the security of individual systems administrators can tailor the Solaris OE to fit their security needs. For example, a standard configuration for Web servers can be created that uses a stripped down, secure version of the Solaris OE. Since every Web server will then use the exact same configuration, and is essentially a “replica” of the original, the chances of an invasive security breach due to a configuration error can be significantly reduced. The Solaris™ 9 OE includes a new repackaging architecture feature to facilitate the removal of unnecessary software features, such as sendmail, ftp, and DNS, to further harden security for certain services.

Next, the administrator will install Change Manager agents on the master system. These agents are required for Change Manager to remotely control managed hosts once the software stack has been installed.

For a modular approach, software stacks containing specific applications can be created and added to the base configuration to create specific service images. For example: Application server, database server, web server, and cache server. Figure 2 illustrates how base configurations and applications stacks can be combined to create service images, and the resulting Solaris Flash archives.

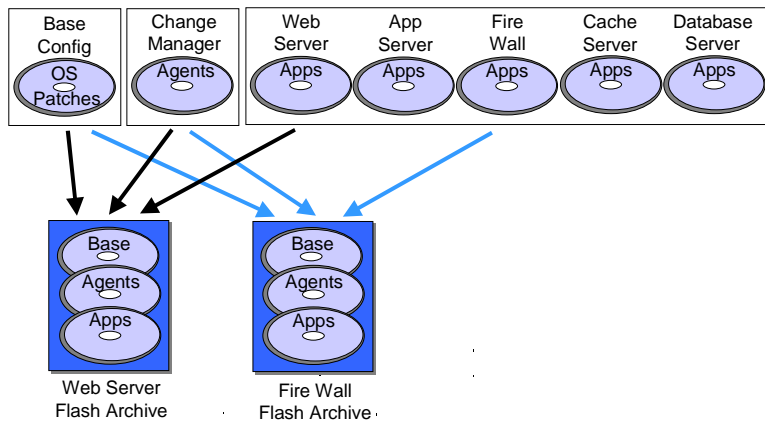


Figure 2: Base Configurations, Application Stacks, and Solaris Flash Archives

Creating Solaris Flash Archives

After the master system has been created and tested, a Solaris Flash archive can be created from it. When a Solaris Flash archive is installed on a managed host, all of the files in the archive are copied to that system. This gives the newly installed system the exact same software configuration as the original system, along with per-host customizations such as IP address and host name. The archive creation process includes not only the software on the system, but also any identifying information — such as the archive size, date of creation, or author’s name — that can be used to later identify the archive.

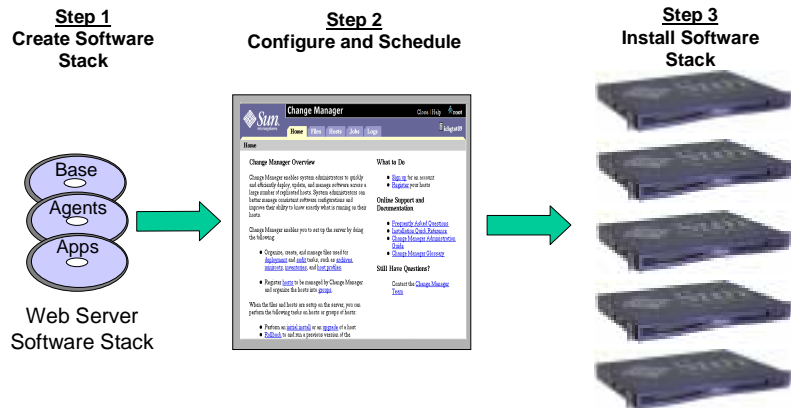
Installing a new system with Solaris Flash archives should be much faster than installing with a Solaris JumpStart software image because the files are simply copied to the target system, rather than installed individually through `pkgadd`, which must update the package database after each package is installed. Using Solaris Flash archives can reduce a four to five hour task to as little as 20 minutes, saving significant amounts of time and decreasing time-to-deployment.

When upgrading managed hosts, the administrator simply updates and reconfigures the master system, creates a new Solaris Flash archive, and deploys the new archive to the managed hosts.

Installations using Solaris Flash Archives

Change Manager employs Solaris Flash archives to perform software installations on managed hosts, allowing the administrator to select and install a software stack onto a single system or group of systems. When Solaris Live Upgrade software is used to install a Solaris Flash archive, it is basically an initial installation of the system. The initial system install creates two boot environments and installs the software stack onto the designated “active” boot environment, as illustrated in Figure 3. Change Manager uses Solaris Live Upgrade software to install Solaris Flash archives onto the alternate boot environment. Customers can optionally choose to simply reinstall updates, in which case a second, alternate boot environment would not be necessary.

Figure 3: Installation of a Group of New Systems using Solaris Flash Archives

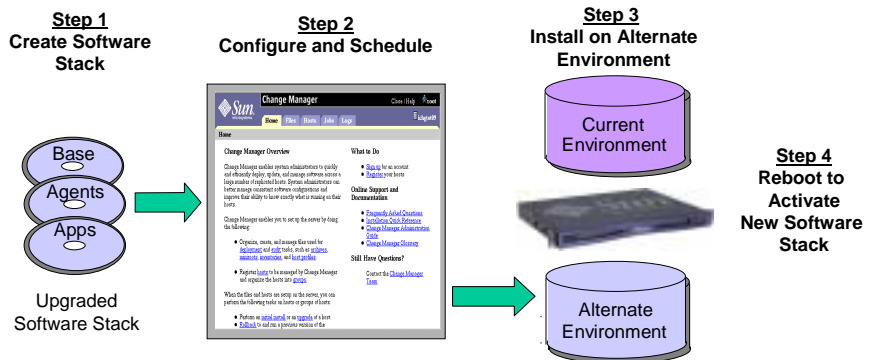


Solaris Live Upgrade Software

Performing updates to Solaris OE and other applications can impact the availability of systems and services. Solaris Live Upgrade software within Change Manager is designed to provide a method of upgrading and patching systems that can substantially reduce the usual service outage associated with these functions. It enables the system to continue to run uninterrupted while the administrator updates to the latest release of the operating environment, applies patches or performs routine maintenance on an inactive or duplicate boot environment. The original system configuration should remain fully functional and unaffected by the update, or by the installation of a Solaris Flash archive.

When satisfied with the process, the administrator simply uses Change Manager to reboot the system, making the newly updated alternate boot environment into the active boot environment in order to run the latest or updated operating environment. The process also makes the previous boot environment into the inactive boot environment. If the newly activated boot environment should fail for any reason, the administrator can fall back to the original by simply rebooting the system to make the previous environment active again. This process is shown in Figure 4.

Figure 4: Using Solaris Flash Archives and Solaris Live Upgrade Software



Custom Solaris JumpStart Technology

The custom Solaris JumpStart installation method is a script-driven, hands-off install mechanism that enables the administrator to automatically install systems, based on the Solaris JumpStart profiles that they have created. These profiles define specific software installation requirements and can also incorporate shell scripts to include pre and post installation tasks. Change Manager uses automatically-generated Solaris JumpStart profiles to perform customized installations and software updates.

Software Stack Audit Technology

The Software Stack Audit technology in Change Manager enables administrators to create a software stack manifest of one or more currently deployed servers, including master systems. A manifest is a file-level list of system contents with information about each file (size, date/time, MD5 checksum). The manifests can then be used in rule-based comparisons to check software configurations on a server or groups of servers between two points in time or between the current state and original software stack manifest, or between servers. The comparison generates reports listing file-by-file differences, helping to manage change reliably for software updates and system maintenance.

Change Manager — Automating Installations and Updates

Change Manager automates the technologies described above with an innovative, integrated Web-based interface, as well as a fully functional, scriptable command line interface (CLI). Change Manager's Java-based Web interface connects to the centralized Change Manager Server via an HTTP connection, tunneling all traffic between the browser and server. This HTTP connection enables administrators to perform all of the functions described above over the corporate network or Internet, allowing senior administrators to perform complex administrative functions from a central site. Secure HTTP support is expected to be available in a future release of Solaris 9 OE.

The Change Manager browser interface uses tabs to navigate to its four major sections: Files, Hosts, Jobs, and Logs.

When using Change Manager, the administrator works with three different types of systems:

- **Change Manager Server:** This server contains all of the Change Manager software and runs a Web server that supports the Web-based Change Manager applications. It stores information about managed hosts and stores files used for Change Manager operations, such as Solaris Flash archives, shared profiles, audit rules files and manifests, and Solaris OE boot images.
- **Managed Hosts:** Managed hosts are controlled by Change Manager commands, such as initial installation, update, and audit.
- **Master System:** These systems are used to build software stacks, from which Solaris Flash archives are created. The master systems must include the Change Manager agents and audit tools to enable the installed systems to be managed by Change Manager. The administrator can make the stack customizable by embedding a description of the software parameters and finish scripts in the archive. Software parameters can be stored in a shared profile or in a per-host profile. Profiles are discussed in more detail on page 10.

Files Tab

This tool helps administrators to easily manage the location and version of the various Solaris Flash archives needed to install, reprovise, and maintain the many different systems in today's complex enterprise networks. The Files tab manages all of the files necessary for Change Manager to operate. It enables system administrators to import previously created Solaris Flash archives, group them into folders, delete them, and search for an archive. This functionality, illustrated in Figure 5, also enables administrators to edit archive properties and manages Solaris boot images, manifests, audit rules files, shared profiles, and reports.

Figure 5: Files Tab

Change Manager Close | Help | admin

Files Hosts Jobs Logs

Files

Manage files, such as Solaris Flash archives and manifests, in the Change Manager repository. Some of these files are used as input for Change Manager actions, while others are output. For information about navigating through the Change Manager browser interface, see [Navigation](#).

Files (1 - 4 of 4)

-- File Actions --

Name	File Type	Status
Miniroots	Folder	ready
Flash Archives	Folder	ready
Templates	Folder	ready
Audit Files	Folder	ready

Page: 1 of 1

Hosts Tab

The Hosts tab is designed to provide the administrator with access controls to a single server, or group of servers, enabling them to perform group operations, such as initial installation, setup, updates, software auditing, and reproviseing on many servers simultaneously.

The Hosts tab, shown in Figure 6, gives the administrator the ability to create and manage server configuration *profiles* that can be applied to individual servers or groups of servers, reducing the complexity that currently exists with Solaris JumpStart technology. This powerful tool enables the administrator to customize installations for individual systems or groups of systems. Profiles are templates that can contain system setup information such as disk layout,

name service configuration, and software license keys. Much of the information described in profiles is similar to the information in a Solaris JumpStart installation profile.

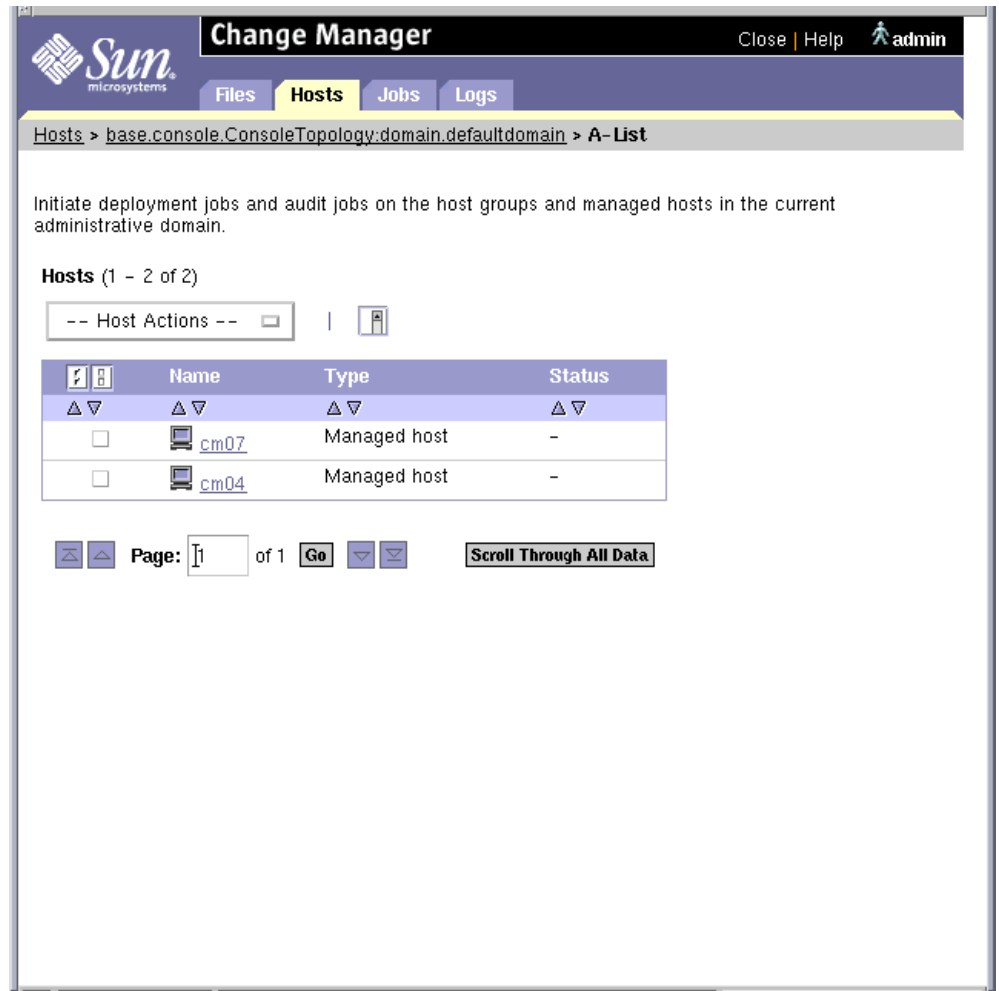
When configuring managed systems to be installed, the administrator can first choose and modify a shared profile, containing all of the parameters that are shared between the systems. They can then modify per-host profiles for each system, which will supersede the parameters in the shared profile. Profiles can save a great deal of time by allowing the administrator to customize only those parameters that are different between systems.

Change Manager uses *wizards* to help users create profiles and define managed hosts. A wizard steps the user through until a particular task is completed, easing these tasks and helping to ensure that they are performed in a unified, consistent manner.

The Hosts tab is where the administrator performs installation tasks on managed servers or groups of servers. New systems are installed with a Solaris Flash archive containing the agents and audit tools necessary to make them manageable by Change Manager. They are also configured with an alternate boot environment to prepare them for future updates. Long running operations become jobs, which are managed in the Jobs tab, discussed in a following section.

Change Manager can update by either reinstalling or Solaris Live Upgrade software. Both options result in a reboot after the software image has been installed. To update the software on a server or group of servers, or reprovision them, the administrator uses functionality in the Hosts tab to install the alternate boot environment of the managed hosts with a Solaris Flash archive, using Solaris Live Upgrade software. The administrator can then have Change Manager reboot all of the systems to activate the *new* software stack. If the update is unsatisfactory for any reason, the administrator can use Change Manager to initiate a fall back to the previous boot environment containing the original software stack on all of the systems, or only those that have problems.

Figure 6: Hosts Tab



Audit Tool

The Hosts tab contains the interface to the Software Stack Audit technology. Before creating a Solaris Flash archive of a master system, the administrator creates a manifest of the software stack. The manifest contains data entries describing the file systems, directories, and files in the software stack, as well as audit rules to monitor particular file attributes. The administrator can create manifests of managed hosts and compare them against the original or *known good* manifest to generate a manifest comparison report listing file-by-file differences. This enables administrators to keep track of exactly which software and patches are running on any given system and detect changes to the configurations, dramatically increasing the reliability of the systems they manage.

One way administrators can effectively use the Audit tool is during system administrator shift changes. In this day of 24 x 7 operations, IT departments are required to staff round-the-clock shifts. It is often difficult for the incoming shift to determine which, if any, changes were made to systems by the previous shift. Using the Audit tool, the incoming shift administrators can generate manifest reports and know exactly what has changed on the systems they are responsible for. This is a potent tool for increasing manageability and maintaining consistency and efficiency in today's fast changing environments.

Managing Jobs

The Jobs tab of Change Manager, shown in Figure 7, allows the administrator to manage tasks that have been initiated from the Files or Hosts tab, such as installations, updates, audits, and system reboots. Operations — updates and software auditing — can be scheduled on a single server or groups of servers during periods of decreased usage so as not to impact service levels. Cascading rolling updates can be scheduled to automatically update a portion of the server farm at a time, allowing the farm to operate at a slightly decreased, but unnoticeable, service level. The Jobs tab enables the administrator to reschedule or cancel pending jobs and cancel running jobs.

Figure 7: Jobs Tab

Change Manager Close | Help admin

Files Hosts **Jobs** Logs

Jobs

Monitor current and recent jobs in the Change Manager job queue. Click the job's ID to view its properties.

Jobs (1 - 10 of 13)

Cancel Job Purge Completed Jobs

Job ID	Job Name	User	Start Time	End Time	Status
IC 18	cm07 manifest	admin	2002-08-14 15:04:15	2002-08-14 15:08:15	Completed
IC 23	build cm04 manifest	admin	2002-08-14 15:33:02	2002-08-14 15:35:02	Completed
IC 24	AuditCM07vCM04	admin	2002-08-14 15:49:17	2002-08-14 15:51:17	Completed
IC 25	Audit cm04 against itself	admin	2002-08-14 17:19:51	2002-08-14 17:21:52	Completed
IC 26	Audit cm04 again	admin	2002-08-14 17:24:32	2002-08-14 17:26:34	Completed
IC 27	Import an archive	admin	2002-08-15 09:38:42	2002-08-15 09:39:43	Completed
IC 28	Import an archive	admin	2002-08-15 09:40:12	2002-08-15 09:41:22	Completed
IC 29	Setup cm07	admin	2002-08-15 09:42:36	2002-08-15 09:42:46	Completed
IC 30	Setup cm04	admin	2002-08-15 09:43:46	2002-08-15 09:43:53	Completed
IC 31	Update A-List	admin	2002-08-15 09:44:26	2002-08-15 09:59:04	Completed

Page 1 of 2 Go Scroll Through All Data

Logs Tab

The Logs tab, shown in Figure 8, allows the administrator to view the job log, containing all of the jobs started from the Files and Hosts tabs. This feature gives the IT staff a record of exactly what has occurred on each system that is managed with Change Manager.

Figure 8: Logs Tab

" data-bbox="331 125 932 591"/>

Change Manager Close | Help admin

Files Hosts Jobs **Logs**

Job Log

View the job log to see detailed information about the progress of long-running jobs. One log entry is made when the job starts and a second log entry is made when the job completes.

Job Log (1 - 10 of 253)

Job Log

Date/Time	Job ID	Command	Host	Status	Message
Aug 16 09:01:27	-	-	-	-	Job submitted
Aug 16 09:01:27	-	-	-	-	Bad name: "/>" data-bbox="331 125 932 591"/>

Using Change Manager

Using Change Manager is efficient and easy. The administrator simply performs the following steps:

1. Installing, configuring, and customizing a master system representing the managed hosts that will provide a specific service, such as e-mail server. Installing the Change Manager agent and audit tools.
2. Defining the software parameters that can be modified in the system profiles.
3. Writing customized finish scripts to process the parameters in the shared and per-host (if applicable) profiles.
4. (Optional) Creating a baseline manifest of the master system software stack to enable audits against an original system state.
5. Creating a Solaris Flash archive containing the entire contents of the master server in a single file, including Change Manager agents and audit tools.
6. Importing the archive into the Change Manager server.
7. Importing the associated Solaris OE boot image to the Change Manager server.
8. Performing an initial installation of the archive on one or a group of managed hosts.
9. Performing an update of the archive on one or a group of managed hosts.
10. Auditing one or more managed hosts.

Integration with Sun Management Center 3.0

Change Manager uses and extends the Sun Management Center 3.0 service and agent layers, but provides a separated console that only exposes Change Manager deployment functionality.

Change Manager can use existing Sun Management Center data if it exists. For example, if a customer already has Sun Management Center installed, the Change Manager console will see, and can deploy software to managed hosts and groups that were set up using the Sun Management Center console. However, Change Manager does not contain Sun Management Center functionality. In other words, it cannot be used to perform Sun Management Center management tasks such as setting alarms. Nor is it possible to perform deployment tasks via Sun Management Center. Change Manager functions as a stand-alone application, but requires Sun Management Center as a prerequisite.

Chapter 3

Putting Sun Management Center Change Manager to Work

Sun Management Center Change Manager gives administrators the ability to easily and efficiently install and manage many more servers than in the past, increasing manageability, reliability, and availability of the managed systems while decreasing TCO. It empowers them with the knowledge of precisely which software and patches are running on each system, enabling them to make changes to the software stack quickly, reliably, and in an automated fashion. In addition, administrators are able to install log into Change Manager and install multiple systems simultaneously from any location on the network.

Installing New Systems

Change Manager gives administrators the ability to easily and quickly install single, or more importantly, groups of replicated servers. This capability greatly enhances the productivity of the IT staff and enables them to respond quickly to the changing demands of their user community.

Increasing a Web Server Pool

Many businesses frequently need to increase the capacity of their Web server pool to accommodate more users. Typically, a Web server pool is a server farm, each system configured with identical hardware and software stacks. For example, a company with an on-line catalog system might decide to start running special Thursday-only sales, requiring them to add more servers in order to serve the expected increase in user activity. As is the case in many companies today, they have limited administration resources and need to increase the pool quickly and cost-effectively and be able to increase it on the fly if user demand is higher than anticipated.

Change Manager gives them the tools to do all of this, and more. If using Change Manager for the first time, the administrator uses one of the existing Web servers from the pool as a master server and creates a Solaris Flash archive and audit manifest. Next, they write any finish scripts necessary — to customize each system, i.e., create customer account, configure client/server applications, install software license keys, etc., — input the archive into Change Manager, and use the Files tab to modify the per-host profiles. The administrator then uses commands in the Files tab to schedule installation of the new systems.

Increasing the Web server pool capacity is as easy as setting up the new hardware, or turning on stand-by systems, modifying profiles, and scheduling installations. The efficacy of Change

Manager in installing new systems enables administrators to dramatically cut time-to-revenue, increasing profitability.

Installing Remote Systems

In this example, Company XYZ needs to increase server capacity or update server hardware at each of its 50 national locations and 30 international locations. In the past, they would have used one of two methods to install new servers. In the first method, they would have the new systems shipped to a central site where an administrator would install the software, test the system, and then ship it to the remote site. In the second method, they would have the systems shipped to the remote office and fly a qualified administrator to the remote site to perform the installation. Both methods are costly and time consuming.

In a future release, Change Manager should be able to make the process of installing new systems at remote sites easier, faster, and much more cost-effective. With Change Manager, the new system is shipped to the remote site where a junior administrator or hardware-knowledgeable person installs it on the network and turns it on. From the central administration site, an administrator can customize profiles and, in conjunction with Secure WAN Boot, schedule the remote system to be installed over the Internet using a secure HTTPS connection. The capability to remotely install and update systems has the potential to save significant amounts of time and money, further increasing manageability and reducing TCO. (These capabilities are expected to be supported in a future release of Solaris 9 OE.)

Field Replaceable Unit (FRU) Servers

Replacing a failed system is often much faster and efficient than trying to troubleshoot it. Change Manager enables administrators to apply an FRU approach to a complete server by installing a Solaris Flash archive from the Flash Archive Manager onto a spare server, providing a replacement server in a relatively short period of time.

To accomplish this, the IT department maintains a stock of extra hardware for common servers, such as Web, email, and cache servers. The administrator creates “backup” flash archives of common server configurations and maintains them in Change Manager. If a server fails, the administrator quickly configures a profile for that server, performs an install on the spare server, and installs it in the failed server’s place. Employing an FRU approach to replacing problematic servers can be much faster than trying to troubleshoot the problem on a live server, and gives administrators more time to properly troubleshoot the problem and hopefully institute procedures to help ensure the problem does not reoccur. Change Manager’s capacity to store and manage customizations and configurations of well-tested software stacks makes this problem management model possible, and enables the IT staff to efficiently manage more servers.

Updating Systems

Keeping track of the exact software configuration on every server on a network is one of the most difficult challenges facing today’s overburdened IT departments. And, with 24 x 7 coverage, the task becomes even more complex. The Software Stack Audit technology within Change Manager is designed to provide administrators with the tools to greatly mitigate this challenge. Change Manager gives them the ability to compare the current state of a system with a known-good state, generating a report that informs them what was on the system and what has changed. In addition, different versions of a software stack can be managed within Change Manager. Armed

with accurate information on the contents of each server, and software stack version control, administrators can efficiently plan precise, fast software updates.

Rolling Web Server Update

For example, many companies now support large Web server farms that supply application services to their internal and external customers. Since any Web-base application is now considered to be a *global* application it is impractical to take the entire server farm down simultaneously to perform updates. Instead, rolling updates need to be scheduled so that only a small percentage of the servers will be off-line at any time.

Using Change Manager, the IT staff can test the update on a master server, create a Solaris Flash archive, modify profiles, and schedule small groups of servers to be updated at regular intervals. Since Change Manager uses Solaris Live Upgrade software to install the software stacks on the alternate boot partitions, if there is a need to fall back, the administrator can do so by simply rebooting the server using Change Manager. Change Manager helps the IT staff manage change across server farms providing services, and can increase the reliability and availability of the systems they are charged with maintaining.

Installing Patches

In the past, installing patches on systems could require sizable amounts of time. Administrators had to install individual patches on each server separately, hoping the new patch wouldn't interfere with existing patches or software. The time and worry of installing patches can be virtually eliminated using Change Manager. As with the software update example above, the administrator simply installs the patch on *one* master server, tests it, creates an archive, modifies profiles, and schedules installs on the appropriate servers. The installations can happen simultaneously, while the reboots to activate the new software stack, containing the newly installed patches, can be scheduled at intervals. Again, if a problem should arise, Change Manager can be employed to reboot the managed hosts to fall back to the previous software stack. After the patch install is complete, new manifests can be created for each system, providing a current baseline for future audit purposes. The ability to perform patch installations automatically, and simultaneously across multiple servers, or entire server farms can be a significant factor in reducing TCO and increasing the ratio of managed systems per system administrator.

Reprovisioning Systems

In today's rapidly changing business environment, a critical factor to success is the flexibility to rapidly reprovision existing servers to respond to increasing demands. Companies with this capability are well positioned to take advantage of increases in user activity to maximize profitability and leap ahead of the competition.

Reprovisioning Servers Based on Changing Needs

For example, a large ISP with large server farms providing Web, email, and cache services might suddenly be faced with the immediate need for more email servers. Using Change Manager, they have up-to-date software stack versions of each server type managed in the Files tab. To quickly reprovision a cache server to email server, they can easily select the email server software stack, modify the profiles for each server to be installed, and install the new software stack on the

alternate boot environment, all from virtually anywhere on the network. The administrator then uses Change Manager to reboot the newly installed systems to effect the change.

The beauty of reprovisioning systems in this manner is that, if necessary, the systems can be returned to their previous service, in this case cache servers, by simply rebooting them. This degree of agility and flexibility in provisioning system resources to meet changing demand can dramatically reduce time-to-market and increase profitability.

Reprovisioning Unused Resources

Another way to use Change Manager is to temporarily reprovision unused servers to help service periodic demands. For example, many companies run large database operations, such as processing books, on weekends or at the end of the month. With Change Manager, servers that are unused on the weekend or late at night, such as email servers, can be temporarily reprovisioned to form a compute server farm. When the processing has completed, the systems can be rebooted to return them to email servers. Being able to utilize existing servers from differing service pools on a network during slow periods can enable IT departments to maximize resources, increase productivity, and reduce TCO.

Chapter 4

Conclusion

In today's globally competitive environment, it is imperative that IT departments have high degrees of systems manageability, reliability, and availability in order to decrease TCO and increase profitability. The ability to quickly and concisely respond to immediate changes in the environment can help companies gain and retain an edge on the competition.

As the company that *drives* the Internet with both hardware and software offerings, Sun understands the need to efficiently manage change. With products such as Change Manager, Sun offers customers tools and technologies that will help enable them to productively manage large groups of replicated servers and rapidly react to changing demands. Change Manager helps IT departments accomplish these tasks by:

- **Automating software provisioning and change management tasks:** All from a single administration console, giving the administrator the freedom to manage systems from anywhere on the network or the Internet. It greatly reduces administrative costs by decreasing the complexity of server configurations and the amount of time spent installing and upgrading servers.
- **Performing fast and safe software installs and updates:** On single or groups of systems simultaneously, enhancing system reliability by replicating tested master servers.
- **Increasing system availability:** By dramatically minimizing costly service interruptions usually associated with software updates and patch maintenance.
- **Decreasing Total Cost of Ownership:** By significantly improving the administrator-to-system ratio, decreasing lost revenue due to update-related service interruptions, and cutting installation and reprovisioning time and costs.

With the innovative capabilities of Change Manager, IT managers and their staff can feel confident that they have the tools they need to effectively and productively manage their ever-changing environments today and in the future.

Appendix A

Resources

Sun Microsystems posts complete information on Sun's hardware and software products and service offerings in the form of data sheets, specifications, and white papers on its Internet Web page at <http://www.sun.com/>.

Sun Management Center Change Manager Administration Guide

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