



Part II: Minimizing Domains for Sun Fire™ V1280, 6800, 12K, and 15K Systems

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Sun BluePrints™ OnLine—August 2003



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

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Part No. 817-3628-10
Revision 1.0, 8/29/03
Edition: August 2003

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Part II: Minimizing Domains for Sun Fire™ V1280, 6800, 12K, and 15K Systems

This article is the second part of a two-part series that provides information and recommendations for minimizing domains for Sun Fire™ V1280, 6800, 12K, and 15K systems. This part describes the package configurations needed for the various applications, describes the profiles produced for performing JumpStart installations of domains, and provides a case study as an example of applying the minimization methodology to an application. Part II provides background information, describes how to qualify a minimized Solaris™ configuration for an application, covers how to automate installations using JumpStart technology, and details a recommended methodology for minimizing a system.

This document contains the following topics:

- “Application Package Configurations” on page 2
- “Understanding Profiles and Application Dependencies” on page 29
- “Case Study: Minimizing Sun Validation Test Suite 5.1” on page 31
- “About the Authors” on page 38
- “Related Resources” on page 39
- “Ordering Sun Documents” on page 41
- “Accessing Sun Documentation Online” on page 41

Application Package Configurations

This section contains a listing of all the packages that need to be installed to allow the applications discussed in Part I, “Qualifying a Solaris Configuration,” to function on minimized domains. These are the results that were found by applying the minimization methodology.

The packages needed are structured into the areas for which they are required.

- The smallest bootable set of packages to get a domain running, error free.
- Device drivers needed for full functionality of add-in cards and hardware.
- Commonly needed packages required by most applications.
- Useful network tools that a user often needs.
- Packages needed for Sun Fire V1280, 6800, 12K, and 15K functionality to be available.
- Packages needed for support software to function.
- Packages needed for additional applications to function.

Note – We focus on Solaris 9 Operating Environment (Solaris OE) for documenting the packages; only the differences for Solaris 8 OE are documented.

The packages detailed in this article are recommended always to be installed on a minimized domain to provide a consistent baseline, unless it mentions the packages are optional. For convenience, various JumpStart profiles have been produced as a baseline for adding packages that a customer’s application would need. These profiles are detailed in the section “Understanding Profiles and Application Dependencies” on page 29.

For more information on supported configurations, see the section “What Software Is Supported?” in Part I of this article.

Solaris 9 OE

To get applications installed and working, a minimum baseline system is required to bring the system up in an operational state with configured hardware. This section describes the minimized set of packages to achieve this, and it is divided into the following subsections:

- “Solaris 9 OE Booting” on page 3
- “Hardware Device Drivers” on page 5

Solaris 9 OE Booting

The following packages define the smallest subset of 32- and 64-bit Solaris 9 OE packages that can be selected as a bootable install and that are supportable. These are all the packages that cannot be removed from metacluster `SUNWCreq` by specifying them with the `delete` keyword in a JumpStart profile.

The 32-bit packages cannot be deselected. The 64-bit versions of packages are included where available, because domains must be booted and run in 64-bit mode. The domains do not support 32-bit booting for the domain-specific software components.

Solaris 9 OE running in 64-bit mode requires the packages listed in TABLE 1.

TABLE 1 Required Packages for 64-Bit Mode Solaris 9 OE

Package Type	Description
SUNWadmr	System and network administration root
SUNWbzip	The <code>bzip</code> compression utility
SUNWcar	Core architecture (root)
SUNWcarx	Core architecture (root) (64-bit)
SUNWced	Sun GigaSwift Ethernet adapters (32-bit driver)
SUNWcedx	Sun GigaSwift Ethernet adapters (64-bit driver)
SUNWcsd	Core Solaris devices
SUNWcs1	Core Solaris (shared libs)
SUNWcs1x	Core Solaris libraries (64-bit)
SUNWcsr	Core Solaris (root)
SUNWcsu	Core Solaris (usr)
SUNWcsxu	Core Solaris (usr) (64-bit)
SUNWesu	Extended system utilities

TABLE 1 Required Packages for 64-Bit Mode Solaris 9 OE (Continued)

Package Type	Description
SUNWesxu	Extended system utilities (64-bit)
SUNWfcip	Sun FCIP IP/ARP over Fibre Channel device driver
SUNWfcipx	Sun FCIP IP/ARP over Fibre Channel device driver (64-bit)
SUNWfcp	Sun FCP SCSI device driver
SUNWfcpx	Sun FCP SCSI device driver (64-bit)
SUNWfctl	Sun Fibre Channel transport layer
SUNWfctlx	Sun Fibre Channel transport layer (64-bit)
SUNWhmd	SunSwift adapter drivers
SUNWhmdx	Core architecture (kvm) (64-bit)
SUNWi15cs	X11 ISO8859-15 codeset support
SUNWi1cs	X11 ISO8859-1 codeset support
SUNWkey	Keyboard configuration tables
SUNWkvm	Core Architecture (kvm)
SUNWkvmx	Core architecture (kvm) (64-bit)
SUNWlibms	Forte™ developer bundled shared libm
SUNWlmsx	Forte developer bundled 64-bit shared libm
SUNWloc	System localization
SUNWlocx	System localization (64-bit)
SUNWluxop	Sun Enterprise™ Network Array firmware and utilities
SUNWluxox	Sun Enterprise Network Array libraries (64-bit)
SUNWmdi	Sun Multipath I/O drivers
SUNWmdix	Sun Multipath I/O drivers (64-bit)
SUNWnamos	Northern America OS support
SUNWnamow	Northern America OW support
SUNWnamox	Northern America 64-bit OS support
SUNWp15u	Perl 5.6.1 (core)
SUNWp15v	Perl 5.6.1 (non-core)
SUNWsolnm	Solaris Naming Enabler
SUNWswmt	Install and patch utilities

In addition to the packages listed in TABLE 1, a Sun Fire 12K or 15K domain install adds the following packages automatically.

TABLE 2 Packages Installed Automatically With Sun Fire 12K and 15K Domains

Package Type	Description
SUNWnlsr	Network information system (root)
SUNWnlsu	Network information system (usr)

Note – Deselecting these packages from the `suninstall` profile will be ignored.

Hardware Device Drivers

Sun Fire V1280, 6800, 12K, and 15K domains support a wide variety of hardware. The most common hardware that is critical to the domain normally has the hardware device drivers stored in core Solaris packages, such as `SUNWkvmx` or `SUNWcarx`. However, add-on hardware normally has device drivers stored in separate packages that are part of the Solaris OE.

Add the packages listed in this section to a profile containing the Solaris 9 OE booting packages.

The audio device drivers are required to prevent console error messages when booting Solaris on the domain. TABLE 3 lists these packages.

TABLE 3 Required Audio Device Drivers

Package Type	Description
SUNWaudd	Audio drivers
SUNWauddx	Audio drivers (64-bit)

The packages listed in TABLE 4 are required for the Sun FCP SCSI Fibre Channel adapter.

TABLE 4 Required Packages for Sun FCP SCSI Fibre Channel Adaptor

Package Type	Description
SUNWses	SCSI Enclosure Services device driver
SUNWsesx	SCSI Enclosure Services device driver (64-bit)
SUNWssad	SPARCstorage® Array drivers
SUNWssadx	SPARCstorage Array drivers (64-bit)

The packages listed in TABLE 5 are required for the Sun Gigabit Ethernet adapter.

TABLE 5 Required Packages for Sun Gigabit Ethernet Adaptor

Package Type	Description
SUNWged	Sun Gigabit Ethernet adapter driver
SUNWgedx	Sun Gigabit Ethernet adapter driver (64-bit)

Note – Sun GigaSwift Ethernet adapter packages are required to get Solaris booted. These are documented in “Solaris 9 OE Booting” on page 3.

The packages listed in TABLE 6 are required for the Sun Expert3D graphics card.

TABLE 6 Required Packages for Sun Expert3D Graphics Card

Package Type	Description
SUNWifb	Sun Expert3D (IFB) graphics system software/device driver
SUNWifbcf	Sun Expert3D (IFB) graphics configuration software
SUNWifbr	Sun Expert3D (IFB) graphics system software (root)
SUNWifbw	Sun Expert3D (IFB) graphics window system support
SUNWifbx	Sun Expert3D (IFB) graphics system software/device driver (64-bit)

Note – The Sun Expert3D graphics card packages are not included in any minimized profiles. Add them if this hardware is used. Additional graphic cards may be supported in the future. These are not documented in this article.

The packages listed in TABLE 7 are required for PCI cards.

TABLE 7 Required Packages for PCI Cards

Package Type	Description
SUNWpd	PCI drivers
SUNWpdx	PCI drivers (64-bit)

The packages listed in TABLE 8 are for Sun Quad FastEthernet adapters cards.

TABLE 8 Packages for Supporting Sun Quad FastEthernet Adaptor Cards

Package Type	Description
SUNWqfed	Sun Quad FastEthernet™ adapter driver
SUNWqfedx	Sun Quad FastEthernet adapter driver (64-bit)

The packages listed in TABLE 9 are for Sun WCI RSM.

TABLE 9 Required Packages for Sun Fire Link

Package Type	Description
SUNWrsm	Remote shared memory
SUNWrsmo	RSMPI operations registration module
SUNWrsmox	RSMPI operations registration module (64-bit)
SUNWrsmx	Remote shared memory (64-bit)
SUNWrsax	WCI Remote Shared Memory API library (64-bit)
SUNWrsdx	WCI RSM DLPI driver (64-bit)
SUNWrsmx	WCI Remote Shared Memory drivers (64-bit)
SUNWrsux	WCI RSM commands and libraries (64-bit)

Note – Installation of these packages is optional, however, they are required for the Sun Fire Link to operate. Uncomment them from the JumpStart™ profiles to install them during domain installation.

Commonly Needed Packages

Solaris has some common commands and libraries that are prerequisites for many of the applications discussed in this article. These are as follows:

- “Miscellaneous Commands” on page 8
- “Library Packages” on page 8
- “Platform Information and Control Library (PICL)” on page 9
- “Java Runtime Environment” on page 10

Miscellaneous Commands

The `showrev` command is called whenever patches already installed need to be examined. This process occurs during the install process of Solaris Patch Manager and Sun Remote Services Net Connect 3.0.

Sun Management Center 3.5 requires the `/usr/ucb/whoami` command to check if the user is root during install. SRS Net Connect 3.0 requires `/usr/ucb/ps` for its install process to run properly.

The packages containing miscellaneous executables and dynamic libraries are listed in TABLE 10.

TABLE 10 Miscellaneous Executables and Dynamic Libraries

Package Type	Description
SUNWadmc	System administration core libraries
SUNWadmfw	System and network administration framework
SUNWscpu	Source Compatibility (usr)
SUNWscpux	Source Compatibility (usr, 64-bit)

Library Packages

Several packages contain dynamic libraries that are typically mandatory for executing applications.

The major one is the standard C runtime library, needed by Sun Explorer 4.1, Sun Remote Services Net Connect 3.0, Sun Validation Test Suite 5.1, ORACLE 9i, and Sun ONE Application Server 7.0.

Another important library is the mathematical library, `libm`, needed by Sun Validation Test Suite 5.1, ORACLE 9i, and Sun ONE Application Server 7.0.

The `zlib` is a compression library that is required by Solaris Secure Shell and Sun Validation Test 5.1.

The packages listed in TABLE 11 contain these libraries.

TABLE 11 Dynamic Library Packages Typically Required

Package Type	Description
SUNWlibc	Sun Workshop™ compilers bundled <code>libc</code>
SUNWlibcX	Sun WorkShop bundled 64-bit <code>libc</code>
SUNWlibms	Forte Developer bundled shared <code>libm</code>
SUNWlmsx	Forte Developer bundled 64-bit shared <code>libm</code>
SUNWzlib	The Zip compression library
SUNWzlibx	The Zip compression library (64-bit)

Platform Information and Control Library (PICL)

The `picld` is a root running daemon process that is a database repository for system configuration information.

The Sun Fire V1280 relies on `picld` running on its domain for allowing Sun Management Center 3.5 agent software to be installed. Sun Explorer 4.1 software also has a need for `picld` to be running, for information to be gathered properly on the Sun Fire range.

Sun Validation Test Suite 5.1 software requires dynamic libraries in `SUNWpiclu` to function correctly.

PICL makes use of FRU information for a domain. Each platform has its own libraries for accessing this information. These are contained in the three `SUNWfru*` packages and need to be installed.

PICL provides limited information on the Sun Fire V1280, but this might change in the future, so it is recommended that it be installed.

Add the packages listed in TABLE 12 to allow `picld` to run on a domain.

TABLE 12 Packages Necessary for `picld` to Run on a Domain

Package Type	Description
SUNWfru <code>id</code>	FRU ID Utility and Library (<code>usr</code>)
SUNWfru <code>ip</code>	FRU ID Platform Modules (<code>usr</code>)
SUNWfru <code>ix</code>	FRU ID Library (64-bit)
SUNWpic <code>lr</code>	PICL framework (<code>root</code>)
SUNWpic <code>lu</code>	PICL libraries, and plugin modules (<code>usr</code>)
SUNWpic <code>lx</code>	PICL libraries (64-bit)

Java Runtime Environment

Many Solaris programs use the Java™ Runtime Environment (JRE) for carrying out operations. Often processes open `libjvm.so` to carry out FRU diagnostics.

Sun Explorer 4.1 is one application that does this. The program `rprtfru.sparc` requires `libjvm.so` or it fails.

Sun Remote Services Net Connect 3.0 has a similar requirement for it when the install process tries to install package `SUNWfrunc`. If `libjvm.so` is missing, then the install fails.

The JRE has dependencies on the packages listed in TABLE 13.

TABLE 13 JRE Package Dependencies

Package Type	Description
SUNWct <code>pls</code>	Portable layout services for Complex Text Layout support
SUNWdt <code>cor</code>	Solaris Desktop <code>/usr/dt</code> file system anchor
SUNWj2 <code>rt</code>	JDK 1.2 run time environment
SUNWj3 <code>rt</code>	JDK 1.3 runtime environment (Solaris 8 OE) J2SDK 1.4 runtime environment (Solaris 9 OE)
SUNWj3 <code>rxt</code>	J2SDK 1.4 runtime environment (64-bit) (Solaris 9 OE only)
SUNWm <code>frun</code>	Motif RunTime Kit

Sun Validation Test Suite 5.1 requires these dependencies to be installed, because it needs `SUNWmfrun`.

Note – The package `SUNWj3rxt` is in Solaris 9 OE only.

Network Tools

This section describes the following important and useful network access tools for file transfers, secure communication, application configuration tracing, and X-Window application export over the network:

- “NFS Client” on page 11
- “ping and ftp Client” on page 12
- “sendmail” on page 12
- “truss” on page 12
- “X-Windows Basic Applications” on page 13
- “Solaris Secure Shell” on page 13

NFS Client

It is often useful to NFS mount remote server directories to a domain. TABLE 14 lists the packages required.

TABLE 14 Packages for NFS Mounting of Remote Server Directories

Package Type	Description
<code>SUNWnfscr</code>	Network file system (NFS) client support (Root)
<code>SUNWnfscu</code>	Network file system (NFS) client support (Usr)
<code>SUNWnfscx</code>	Network file system (NFS) client support (Root) (64-bit)

ping and ftp Client

For the ability to be able to ping and ftp from domain calls, the SUNWbip package (basic IP commands) is required.

Note – The FTP client is just that. It is not an FTP server and does not run an ftp daemon on the domain. Communication must be initiated from the domain to an external host.

sendmail

Often it is a requirement for an application to be able to send email. Add the packages listed in TABLE 15 for this functionality.

TABLE 15 Packages for sendmail Functionality

Package Type	Description
SUNWsndmr	Sendmail root
SUNWsndmu	Sendmail user

truss

The truss is an important tool for troubleshooting system configurations by analyzing system calls. The packages listed in TABLE 16 install truss.

TABLE 16 Packages for Installing truss

Package Type	Description
SUNWtoo	Programming tools
SUNWtoox	Programming tools (64-bit)

X-Windows Basic Applications

To run X-based applications, such as `xterm`, add the packages listed in TABLE 17.

TABLE 17 Packages for Running X-Windows Applications

Package Type	Description
SUNWc <code>pp</code>	Solaris <code>cpp</code>
SUNWl <code>ccom</code>	Localization common files
SUNWx <code>wdv</code>	X-Windows system window drivers
SUNWx <code>wfnt</code>	X-Windows system platform required fonts
SUNWx <code>wice</code>	X-Windows system inter-client exchange (ICE) components
SUNWx <code>wopt</code>	X-Windows system optional clients
SUNWx <code>wplt</code>	X-Windows system platform software

Common Desktop Environment (CDE) based packages, such as `dtterm`, are not supported in minimized profiles.

Solaris Secure Shell

Starting with Solaris 9 OE, Secure Shell is included with the software distribution. The packages listed in TABLE 18 allow Secure Shell client and server to operate in a domain.

TABLE 18 Packages for Operating Secure Shell in a Domain

Package Type	Description
SUNW <code>sshcu</code>	SSH Common (usr)
SUNW <code>sshdr</code>	SSH Server (root)
SUNW <code>sshdu</code>	SSH Server (usr)
SUNW <code>sshr</code>	SSH Client and utilities (root)
SUNW <code>sshshu</code>	SSH Client and utilities (usr)

Secure Shell can tunnel X-applications over a secure channel. This action allows insecure commands like `xterm` to be run with confidence over an unsecured network. To do this requires X-application packages to be installed.

Domain-Specific Components

The following are specialized domain-dependent components that are needed to allow a domain to be fully operational and to allow full domain functionality, such as dynamic reconfiguration (DR) and remote monitoring.

- “Common Dynamic Reconfiguration Components” on page 14
- “Sun Fire 12K and 15K Dynamic Reconfiguration” on page 15
- “Sun Fire 12K and 15K Network Console” on page 15
- “Sun Fire 6800 Packages” on page 16
- “Sun Fire V1280 Packages” on page 16
- “Capacity On Demand 2.0” on page 16
- “Sun Management Services 1.3” on page 16
- “Sun Management Center 3.5” on page 17

Common Dynamic Reconfiguration Components

The packages listed in TABLE 19 must be installed on Sun Fire V1280, 6800, 12K, and 15K domains for remote DR requests to succeed.

TABLE 19 Packages Required for Dynamic Reconfiguration Requests (All Platforms)

Package Type	Description
SUNWdcsr	Domain configuration server (root)
SUNWdcsu	Domain configuration server
SUNWefclx	Embedded FCode libraries (64-bit)
SUNWefcr	Embedded FCode interpreter (root)
SUNWefcux	Embedded FCode interpreter (64-bit)
SUNWefcx	Embedded FCode interpreter drivers (64-bit)

Sun Fire 12K and 15K Dynamic Reconfiguration

Infrastructure services for the Sun Fire 12K and 15K domains, such as DR, have core drivers and daemons that are part of Solaris OS core.

The packages listed in TABLE 20 are not required for minimized Sun Fire V1280 and 6800 domains.

TABLE 20 Additional Packages Required for Sun Fire 12K and 15K Dynamic Reconfiguration

Package Type	Description
SUNWscmr	init script and links for Sun Fire 15K key management daemon
SUNWscmu	Key management daemon for Sun Fire 15K
SUNWscmx	Key management modules for Sun Fire 15K (64-Bit)
SUNWdrctx	Dynamic reconfiguration modules for Sun Fire 15K (64-bit)

Sun Fire 12K and 15K Network Console

The packages listed in TABLE 21 are required for the network console.

TABLE 21 Packages Required for the Network Console

Package Type	Description
SUNWcvcr	Network Console daemon and rc script
SUNWcvcx	Network Console (64-bit)

Note – SUNWcvc (network console) contains drivers for Sun Enterprise 10000 only; therefore, it is not required for Sun Fire 12K and 15K systems.

Sun Fire 6800 Packages

There are no Sun Fire 6800 specific packages in Solaris OE version 8 or 9.

Sun Fire V1280 Packages

The Sun Fire V1280 uses Sun Advanced Lights Out Management 2.0 software, and there are several packages that need to be installed to use this software on the domain. These are installed from the Solaris install supplemental CD and consist of the packages listed in TABLE 22.

TABLE 22 Packages for Sun Advanced Lights Out Management 2.0 Software

Package Type	Description
SUNWlomr	LOMlite driver (root)
SUNWlomu	LOMlite utilities (usr)

Sun Fire 6800, 12K, and 15K do not support Sun Advanced Lights Out Management 2.0 software.

Note – The Sun Advanced Lights Out Management 2.0 software can either be manually installed with `pkgadd` or installed via the installer script. If installed by the installer script, then the X-applications profile must be used.

Capacity On Demand 2.0

There are no package requirements on the domain.

Sun Fire 12K and 15K Capacity On Demand 2.0 commands, for example, `showcodusage`, `showcodlicense`, and `addcodlicense`, are executed from the SC and installed as part of Sun Management Services 1.3 software.

Sun Fire Capacity On Demand 2.0 software is built into the SC firmware.

Sun Management Services 1.3

Sun Management Services 1.3 is installed on Sun Fire 12K and 15K system controllers only. It is not needed on Sun Fire V1280, 6800, 12K, or 15K domains, therefore, it should not be installed on domains.

Sun Management Center 3.5

The Sun Management Center 3.5 domain agent software is installed by executing the command `es-inst -a` from the Sun Management Center 3.5 install CD.

Sun Management Center 3.5 is made up of domain, server, and console software. Domain agent software is the only software that should be installed on the domain. All components of the agent software were installed during software qualification.

The Sun Management Center 3.5 server software should be installed and configured on another Solaris system to allow Sun Management Center 3.5 console to be invoked and to allow the domain configuration to be manipulated.

The Sun Management Center 3.5 agent software installation process installs a domain-specific component. This component is unique for a Sun Fire V1280, 6800, 12K, and 15K chassis.

The packages listed in TABLE 23 are required for Sun Management Center 3.5 agent software.

TABLE 23 Packages for Sun Management Center Software

Package Type	Description
SUNWdtdst	CDE Desktop Applications
SUNWwrsux	WCI RSM Commands and Libraries (64-bit)

Note – SUNWdtdst has substantial dependencies that include dependencies on X packages and all the dt packages. The X and dt packages are unneeded because only the shared library `/usr/dt/lib/libcsa.so.0` in SUNWdtdst is needed by `libcalendarservice.so` and `pkgcalendar.so.1`.

Support Software Components

This section lists packages for the following reliability, availability, and scalability RAS-D (Diagnostics) software.

- “Solaris Patch Manager 1.0” on page 18
- “Sun Explorer 4.1” on page 18
- “Sun Remote Services Net Connect 3.0” on page 18
- “Sun Validation Test Suite 5.1” on page 19

Solaris Patch Manager 1.0

Patch utilities `patchadd`, `patchrm`, and `unzip` are needed by Solaris Patch Manager 1.0. The Solaris Patch Manager 1.0 software installs the JRE only if it is not already installed; it does not try to display any GUI windows.

Note – The install process for Solaris Patch Manager 1.0 software flags `SUNWmfrun` as a prerequisite and the install aborts if it is not present.

The packages list installed by Solaris Patch Manager 1.0 on a full system is much less than that installed on a minimized system, because Solaris Patch Manager 1.0 requires a JRE. If one is not found, then Solaris Patch Manager 1.0 installs it with dependent packages.

Sun Explorer 4.1

There are no domain-specific packages required for Sun Explorer 4.1 to work correctly other than those detailed in “Commonly Needed Packages” on page 8. To make use of the `sendmail` capability, then the `sendmail` packages must be installed.

Note – The shared library `libfrufileaccess.so.1` is in the package `SUNWSMSOP`. This package is installed on the SC when Sun Management Services 1.3 is installed. It is not needed on a minimized domain.

Sun Remote Services Net Connect 3.0

Sun Remote Services Net Connect 3.0 installs a specific version of Sun Explorer data collector software, if it is not already installed. If a different version is installed, then it asks to replace it. Otherwise, installation of Sun Remote Services Net Connect 3.0 aborts.

Note – Sun Remote Services Net Connect 3.0 currently does not work on the Sun Fire V1280. Check for software patches or updates after the release of this article.

Installing Sun Remote Services Net Connect 3.0 software requires `SUNWstade` (storage automated diagnostic environment) or else the `SUNWsrssp` (part of Sun Remote Services Net Connect 3.0) will fail to be installed.

Note – Download the latest `SUNWstade` package from the Sun Download Center.

Sun Validation Test Suite 5.1

Sun Validation Test Suite 5.1 installs many kernel modules that perform diagnostic operations. These operations touch every part of the system hardware; for this reason, the package requirements for Sun Validation Test Suite 5.1 are substantial.

The packages listed in TABLE 24 are required for Sun Validation Test Suite 5.1

TABLE 24 Required Packages for Sun Validation Test Suite 5.1

Package Type	Description
SUNWcpc	CPU performance counter driver
SUNWcpcu	CPU performance counter libraries and utilities
SUNWcpcux	CPU performance counter libraries and utilities (64-bit)
SUNWcpcx	CPU performance counter driver (64-bit)
SUNWcpp	Solaris <code>cpp</code>
SUNWdtbas	CDE application basic runtime environment
SUNWfns	Federated Naming System
SUNWgss	GSSAPI V2
SUNWgssc	GSSAPI CONFIG V2
SUNWlxml	The XML library
SUNWlxmlx	The XML library (64-bit)
SUNWmdb	Modular Debugger
SUNWmdbx	Modular Debugger (64-bit)
SUNWrsg	RPCSEC_GSS
SUNWtltk	ToolTalk runtime
SUNWrsux	WCI RSM commands and libraries (64-bit)
SUNWxcft	X-Windows system common (not required) fonts
SUNWxdv	X-Windows system window drivers
SUNWxfnt	X-Windows system platform required fonts
SUNWxwice	X-Windows system inter-client exchange (ICE) component
SUNWxwicx	X-Windows system ICE library (64-bit)
SUNWxwopt	X-Windows system optional clients
SUNWxwplt	X-Windows system platform software

TABLE 24 Required Packages for Sun Validation Test Suite 5.1 (Continued)

Package Type	Description
SUNWxwplx	X-Windows system library software (64-bit)
SUNWxwrtl	X-Windows system and graphics runtime library links in /usr/lib
SUNWxwrtx	X-Windows system runtime compatibility package (64-bit)

Sun Validation Test Suite 5.1 is installed without Kerberos. If Kerberos is enabled during installation of Sun Validation Test Suite 5.1, then the packages listed in TABLE 25 are required.

TABLE 25 Packages Required for Kerberos

Package Type	Description
SUNWkrbr	Kerberos version 5 support (root)
SUNWkrbu	Kerberos version 5 support (usr)
SUNWkrbux	Kerberos version 5 support (usr), (64-bit)

Note – The Kerberos packages are not included in the minimized profiles.

Additional Applications

The following are the package requirements for additional applications that customers typically want installed.

- “ORACLE 9i” on page 20
- “Sun ONE Application Server” on page 21

ORACLE 9i

ORACLE9i requires the linker to be available during install. It needs `make`, `ar`, `ld`, and `nm` to be available for this purpose.

ORACLE9i does not have a client-only install, other than by supplying a configured response file. This is not supported in this article.

So, to do an interactive install, it requires a few X-packages be installed to allow the Java GUI to be displayed. ORACLE9i installs its own JRE in preference to any system-wide version.

The packages listed in TABLE 26 are required for ORACLE9i to install and work correctly.

TABLE 26 Packages Required for ORACLE9i

Package Type	Description
SUNWarc	Archive libraries
SUNWbtool	CCS tools bundled with SunOS
SUNWcpp	Solaris cpp
SUNWhea	SunOS header files
SUNWlibm	Forte Developer bundled libm
SUNWlmx	Forte Developer bundled miscellaneous 64-bit libm files
SUNWsprot	Solaris bundled tools
SUNWtoo	Programming tools
SUNWxwice	X-Windows system inter-client exchange (ICE) components
SUNWxwplt	X-Windows system platform software
SUNWxwrtl	X-Windows system and graphics runtime library links in /usr/lib

Sun ONE Application Server

The packages listed in TABLE 27 are required for a Sun ONE Application Server to function.

TABLE 27 Packages Required for Sun ONE Application Server

Package Type	Description
SUNWscpu	Source compatibility (usr)
SUNWxcu4	XCU4 utilities
SUNWxwfont	X-Windows system platform required fonts
SUNWxwice	X-Windows system inter-client exchange (ICE) components
SUNWxwplt	X-Windows system platform software
SUNWxwrtl	X-Windows system and graphics runtime library links in /usr/lib

Solaris 8 OE

Solaris 8 has limited support for minimization through package deletion from a defined package metacluster. It does not allow any packages to be deselected from metacluster `SUNWCreq`. This whole metacluster is the minimal set of packages that can be installed via `suninstall`. Due to this restriction in `suninstall`, all packages must be included in this set for it to be supported.

Note – The following sections detail only the differences between Solaris OE versions 8 and 9. Where package requirements are the same, see the equivalent section “Solaris 9 OE” on page 3.

This section describes the differences between the Solaris OE version 8 and 9 for the following topics:

- “Solaris 8 OE Booting” on page 22
- “Hardware Device Drivers” on page 26
- “NFS, ping, and FTP Client” on page 26
- “X-Windows Basic Applications” on page 27
- “Secure Shell” on page 27
- “Sun Validation Test Suite 5.1” on page 28

Solaris 8 OE Booting

Although the package clusters `SUNWCcs` and `SUNWCnis` can be deselected successfully from `suninstall`, when the system is rebooted, the packages that make up those clusters are installed regardless.

Additionally, packages such as `SUNWftpr` (FTP server root files) cannot be deselected via `suninstall`. These packages should by default not be installed on a minimized system; however, there is no option for not installing them.

These packages could be removed manually using the command `pkgrm` after the JumpStart installation of the domain has occurred or via a finish script, but this practice is not supported. TABLE 28 provides a partial set of candidates that could be deleted this way.

TABLE 28 Solaris 8 OE: Candidate Packages for Removing After Installation

Package Type	Description
SUNWftpr	FTP server (root)
SUNWftpu	FTP server (usr)
SUNWwsr2	Solaris product registry and Web Start runtime support
SUNWxwdv	X-Windows system window drivers
SUNWxwdvx	X-Windows system window drivers (64-bit)
SUNWxwmod	OpenWindows™ kernel modules
SUNWxwmox	X-Windows system kernel modules (64-bit)

TABLE 29 lists packages installed on a domain as part of metacluster `SUNWCreq`.

TABLE 29 Solaris 8 OE: Packages Installed as Part of `SUNWCreq`

Package Type	Description
SUNWadmr	System and network administration root
SUNWatfsr	AutoFS (root)
SUNWatfsu	AutoFS (usr)
SUNWauda	Audio applications
SUNWaudd	Audio drivers
SUNWauddx	Audio drivers (64-bit)
SUNWbzip	The <code>bzip</code> compression utility
SUNWcar	Core architecture (root)
SUNWcarx	Core architecture (root) (64-bit)
SUNWced	Sun GigaSwift Ethernet Adapter (32-bit driver)
SUNWcedx	Sun GigaSwift Ethernet Adapter (64-bit driver)
SUNWcg6	GX (cg6) device driver
SUNWcg6x	GX (cg6) device driver (64-bit)
SUNWcsd	Core Solaris devices
SUNWcs1	Core Solaris (shared libs)

TABLE 29 Solaris 8 OE: Packages Installed as Part of SUNWCreq (Continued)

Package Type	Description
SUNWcslx	Core Solaris libraries (64-bit)
SUNWcsr	Core Solaris (root)
SUNWcsu	Core Solaris (usr)
SUNWcsxu	Core Solaris (usr), (64-bit)
SUNWdfb	Dumb frame buffer device drivers
SUNWdtcor	Solaris Desktop /usr/dt filesystem anchor
SUNWeridx	Sun RIO 10/100 Megabyte Ethernet drivers (64-bit)
SUNWesu	Extended system utilities
SUNWfcip	Sun FCIP IP/ARP over Fibre Channel device driver
SUNWfcipx	Sun FCIP IP/ARP over Fibre Channel device driver (64 bit)
SUNWfcp	Sun FCP SCSI device driver
SUNWfcpx	Sun FCP SCSI device driver (64-bit)
SUNWfctl	Sun Fibre Channel transport layer
SUNWfctlx	Sun Fibre Channel transport layer (64-bit)
SUNWftpr	FTP server (root)
SUNWftpu	FTP server (usr)
SUNWged	Sun Gigabit Ethernet Adapter driver
SUNWhmd	SunSwift SBus Adapter drivers
SUNWhmdx	SunSwift SBus Adapter drivers (64-bit)
SUNWi15cs	X11 ISO8859-15 codeset support
SUNWilcs	X11 ISO8859-1 codeset support
SUNWkey	Keyboard configuration tables
SUNWkvm	Core architecture (kvm)
SUNWkvmx	Core architecture (kvm) (64-bit)
SUNWlibms	Sun WorkShop bundled shared libm
SUNWlmsx	Sun WorkShop bundled 64-bit shared libm
SUNWloc	System localization
SUNWlocx	System localization (64-bit)
SUNWluxdx	Sun Enterprise Network Array sf device driver (64-bit)
SUNWluxop	Sun Enterprise Network Array firmware and utilities

TABLE 29 Solaris 8 OE: Packages Installed as Part of SUNWCreq (Continued)

Package Type	Description
SUNWluxox	Sun Enterprise Network Array libraries (64-bit)
SUNWm64	M64 Graphics system software/device driver
SUNWm64x	M64 Graphics system software/device driver (64-bit)
SUNWmdi	Sun Multipath I/O drivers
SUNWmdix	Sun Multipath I/O drivers (64-bit)
SUNWnamos	Northern America OS support
SUNWnamow	Northern America OW support
SUNWnisr	Network information system (root)
SUNWnisu	Network information system (usr)
SUNWpd	PCI drivers
SUNWpdx	PCI drivers (64-bit)
SUNWp15u	Perl 5.005_03
SUNWqfed	Sun Quad FastEthernet Adapter driver
SUNWqfedx	Sun Quad FastEthernet Adapter driver (64-bit)
SUNWqlc	Qlogic ISP 2200/2202 Fibre Channel device driver
SUNWqlcx	Qlogic ISP 2200/2202 Fibre Channel device driver (64 bit)
SUNWrmodu	Realmode modules, (usr)
SUNWses	SCSI Enclosure Services device driver
SUNWsesx	SCSI Enclosure Services device driver (64-bit)
SUNWsndmr	Sendmail root
SUNWsndmu	Sendmail user
SUNWsolnm	Solaris Naming Enabler
SUNWssad	SPARCstorage Array drivers
SUNWssadx	SPARCstorage Array drivers (64-bit)
SUNWswmt	Install and patch utilities
SUNWtleux	Thai Language Environment user files (64-bit)
SUNWuaud	USB audio drivers
SUNWuaudx	USB audio drivers (64-bit)
SUNWudf	Universal disk format 1.50, (usr)
SUNWudfr	Universal disk format 1.50

TABLE 29 Solaris 8 OE: Packages Installed as Part of SUNWCreq (Continued)

Package Type	Description
SUNWudfrx	Universal disk format 1.50 (64-bit)
SUNWusb	USB device drivers
SUNWusbx	USB device drivers (64-bit)
SUNWwsr2	Solaris product registry and Web Start runtime support
SUNWxwdv	X-Windows system window drivers
SUNWxwdvx	X-Windows system window drivers (64-bit)
SUNWxwmod	OpenWindows kernel modules
SUNWxwmox	X-Windows system kernel modules (64-bit)

Hardware Device Drivers

Hardware device driver packages for Solaris 8 OE match those of Solaris 9 OE. For a list, see “Hardware Device Drivers” on page 5.

Additional Packages Needed by Solaris 8 OE

SUNWter is required by applications that manipulate the terminal. SUNWesxu is the 64-bit version of SUNWesu, and it is not included by default in SUNWCreq for Solaris 8 OE. TABLE 30 lists the additional packages.

TABLE 30 Solaris 8 OE: Additional Packages Needed

Package Type	Description
SUNWesxu	Extended system utilities (64-bit)
SUNWter	Terminal information

NFS, ping, and FTP Client

The NFS client software, ping, and FTP are mandatory for installation in Solaris 8 OE. They are installed as part of the Solaris core package SUNWcsu.

X-Windows Basic Applications

To use X-based applications such as `xterm`, add the packages listed in TABLE 31.

TABLE 31 Solaris 8 OE: Packages Required for running X-Windows Applications

Package Type	Description
SUNWt1tk	ToolTalk runtime
SUNWxi18n	X-Windows system internationalization common package
SUNWxildh	XIL loadable pipeline libraries
SUNWxilow	XIL deskset loadable pipeline libraries
SUNWxilrl	XIL Runtime Environment
SUNWxwdv	X-Windows system window drivers
SUNWxwfmt	X-Windows system platform required fonts
SUNWxwice	ICE components
SUNWxwopt	Nonessential MIT core clients and server extensions
SUNWxwplt	X-Windows system platform software

Common Desktop Environment (CDE) based packages, such as `dtterm`, are not supported in minimized profiles.

Secure Shell

Secure Shell is not part of Solaris 8 OE; however, a mechanism for logging into domains remotely is required. This mechanism is achieved with the open source version of SSH, OpenSSH. The open source version that we tested consists of OpenSSH v3.5p1 and OpenSSL v0.9.6g. Because these are third-party products, they are unsupported by Sun.

Note – OpenSSH for Solaris 8 OE can be downloaded from www.sunfreeware.com. For more information about OpenSSH, go to <http://www.openssh.org> and to the Sun BluePrints book titled *Secure Shell in the Enterprise*.

Sun Validation Test Suite 5.1

The packages listed in TABLE 32 are required for Sun Validation Test Suite 5.1.

TABLE 32 Solaris 8 OE: Packages Required for Sun Validation Test Suite

Package Type	Description
SUNWcpc	CPU performance counter driver
SUNWcpcu	CPU performance counter libraries and utilities
SUNWcpcux	CPU performance counter libraries and utilities (64-bit)
SUNWcpcx	CPU performance counter driver (64-bit)
SUNWdtbas	CDE application basic runtime environment
SUNWfns	Federated naming system
SUNWgss	GSSAPI V2
SUNWgssc	GSSAPI CONFIG V2
SUNWlxml	The XML library
SUNWlxmlx	The XML library (64-bit)
SUNWrsg	RPCSEC_GSS
SUNWtltk	ToolTalk runtime
SUNWwrsux	WCI RSM commands and libraries (64-bit)
SUNWxwcft	X-Windows system common (not required) fonts
SUNWxwice	X-Windows system inter-client exchange (ICE) component
SUNWxwicx	X-Windows system ICE library (64-bit)
SUNWxwplt	X-Windows system platform software
SUNWxwplx	X-Windows system library software (64-bit)
SUNWxwrtl	X-Windows system and graphics runtime library links in /usr/lib
SUNWxwrtx	X-Windows system runtime compatibility package (64-bit)

Note – SUNWlxml and SUNWlxmlx can be installed from the Solaris 8 OE Supplement CD or downloaded from www.sun.com/oem/products/vts at the same time as Sun Validation Test Suite 5.1 is downloaded.

As with Solaris 9 OE, Sun Validation Test Suite 5.1 is installed without Kerberos. If Kerberos is enabled during installation of Sun Validation Test Suite 5.1, then the packages listed in TABLE 33 are required.

TABLE 33 Solaris 8 OE: Packages Required for Kerberos

Package Type	Description
SUNWkrbr	Kerberos version 5 support (root)
SUNWkrbu	Kerberos version 5 support (usr)
SUNWkrbux	Kerberos version 5 support (usr), (64-bit)

Understanding Profiles and Application Dependencies

Each application covered in this two-part article has its own package requirements. These do not fit into a single profile easily.

The differences in profiles for Sun Fire 12K and 15K and for Sun Fire V1280 and 6800 are mostly in the dynamic configuration packages, so this allows all platforms to share the same profiles for the same applications.

The differences between Solaris OE versions 8 and 9 are major, such that a single profile cannot cover the same applications for the different OE versions.

The requirements for the applications fall into three categories of profiles: support applications, customer applications, and applications requiring X-based executables.

Use these profiles as a baseline for defining a minimized system for a customer's application. By adding the packages needed by an application to the most suitable profile, you can be reasonably certain that the applications detailed in the following sections will function properly.

This section details the applications in these profile groups.

- “Minimized Support Applications” on page 30
- “Customer Applications” on page 30
- “Applications Requiring X-Based Executables” on page 30

Minimized Support Applications

The following applications have no dependencies on X-based software, except where previously noted.

- Common hardware drivers
- Dynamic reconfiguration software
- Capacity On Demand 2.0
- Sun Management Services 1.3
- Net Console for Sun Fire 12K and 15K
- Solaris Secure Shell, without X tunnelling ability (Solaris 9 OE only; this requires X-application packages to be installed)
- Sun Explorer 4.1
- Sun Remote Services Net Connect 3.0
- Sun Management Center 3.5. agent software
- Solaris Patch Manager 1.0
- Sun Fire V1280 Lights Out Management 2.0

Note – Capacity On Demand 2.0 and Sun Management Services 1.3 have no domain package dependencies, but are included under this profile for completeness.

Customer Applications

The following applications have some dependencies on X-libraries, due to Java requirements:

- Sun ONE
- ORACLE 9i
- All applications listed in “Minimized Support Applications” on page 30

Applications Requiring X-Based Executables

The following applications make use of X-based programs such as `xterm`.

- X-based applications
- Solaris Secure Shell (Solaris 9 OE only)
- Sun Validation Test Suite 5.1
- All applications listed in “Minimized Support Applications” on page 30

Case Study: Minimizing Sun Validation Test Suite 5.1

This section provides a case study demonstrating how to get Sun Validation Test Suite 5.1 software functional on a minimized Solaris 9 OE domain.

The purpose of this section is to provide a detailed example of how to apply the minimization methodology to an application in a realistic scenario. (See Part I, “Minimization Methodology.”)

Although you are probably minimizing another application, you can use this case study to extrapolate how to apply the process to your application or any other supported application covered in this two-part article.

The first part of qualification involves reviewing the documentation of Sun Validation Test Suite 5.1 for any special requirements.

Sun Validation Test Suite 5.1 is available at www.sun.com/oem/products/vts and comes as three compressed tar files that need to be decompressed and extracted. These are the packages `SUNWvts`, `SUNWvtsx`, and `SUNWvtsmn`. There is also a user guide available that has installation instructions for Sun Validation Test Suite 5.1. We follow the installation procedure, which says to do a `pkgadd` with the packages.

Note – There is a note on the download Web site that XML packages `SUNWlxml` and `SUNWlxmlx` are required for Solaris 8 OE only. These packages are included as part of Solaris 9 OE, so no download is necessary for these packages.

The package `SUNWvtsmn` contains manual pages that are not installed in this example. For this case study, manual pages should not be installed on the minimized domain. The 64-bit version of the `SUNWvtsx` package is needed, because domains always run in 64-bit mode.

The user guide says to use `pkgadd` to add the packages.

The documentation makes no reference to setting the dynamic library location using `crle(1)` or `LD_LIBRARY_PATH` and `LD_LIBRARY_PATH_64` environmental variables. Also, according to the user guide, the metacluster installed must be at least `SUNWCall`. Because this is a subset of `SUNWCXall`, this condition is satisfied when installing to the full system.

Following the methodology, the next task is to install Sun Validation Test Suite 5.1 on a domain previously installed with `SUNWCXall`. Because we know the packages that are being added, there is no need to run `script` to capture a snapshot of the before and after `pkginfo` listings to figure out what these are.

Installation proceeds with the following, and Kerberos is not selected.

```
# pkgadd -d .
The following packages are available:
  1  SUNWvts      SunVTS
      (sparc) 5.1,REV=08.02.06.27,OE=5.8,5.9
  2  SUNWvtsx    64-bit SunVTS
      (sparc) 5.1,REV=08.02.06.27,OE=5.8,5.9

Select package(s) you wish to process (or 'all' to process all
packages). (default: all) [?,??,q]:
[...]
SunVTS supports Kerberos V5 network authentication protocol,
included in SEAM (Sun Enterprise Authentication Mechanism). This
protocol is designed to provide strong authentication for client/
server applications by using secret-key cryptography. In order to
use this feature, a SEAM-based Security enabled network must be
present.

Do you want to enable the Kerberos V5 based security? [y,n,?] n
[...]
```

The next task of the methodology involves running `pkg.ksh` against the application packages `SUNWvts` and `SUNWvtsx` to identify the Solaris package requirements.

```
# pkg.ksh SUNWvts SUNWvtsx
[...]
Unique packages needed:
/usr/lib/64/libCrun.so.1
/usr/lib/64/libX11.so.4
/usr/lib/64/libaio.so.1
/usr/lib/64/libc.so.1
/usr/lib/64/libdl.so.1
SUNWbip
SUNWcar
SUNWcpcu
SUNWcpp
SUNWcsd
SUNWcsl
SUNWcslx
[...]
SUNWxwrtx
SUNWzlib
SUNWzlibx
```

Here, libraries are flagged that do not belong to a package. The “64” suggests these are 64-bit libraries. This assumption is confirmed by using the following command, showing a symbolic link to `sparcv9`.

```
# ls -l /usr/lib/64
lrwxrwxrwx  1 root    root          7 Dec 19 09:05 /usr/lib/64
-> sparcv9
```

Setting `LD_LIBRARY_PATH_64` to `/usr/lib/sparcv9` before running `pkg.ksh` causes the shell to resolve these libraries to that library path. Running `pkg.ksh` again resolves the library problem.

```
# LD_LIBRARY_PATH_64=/usr/lib/sparcv9
# export LD_LIBRARY_PATH_64
# pkg.ksh SUNWvts SUNWvtsx
[...]
```

Note – The same result can be achieved by running `pkg.ksh` with the `-s` option to search for dynamic libraries in packages or directories, to set `LD_LIBRARY_PATH` and `LD_LIBRARY_PATH_64` appropriately.

The next task of the methodology is to build the minimized profile with the packages reported as needed by `pkg.ksh`. This profile will be used to install the minimized domain.

Next, the minimized Solaris configuration is installed on the domain via JumpStart installation using the minimized profile.

After the JumpStart install, the installation of the application occurs as it did on the fully installed system. During the `pkgadd` of `SUNWvts` and `SUNWvtsx`, the following warning is displayed.

```
NOTE: SUNWcpc(x) and SUNWcpcu(x) packages not installed.
Performance counters for certain CPU and memory tests will not be
displayed.
```

Only `SUNWcpcu` is already installed, so the other three packages need to be added to the minimized profile and the JumpStart installation of the domain performed again, or functionality will be missing from Sun Validation Test Suite 5.1. Performing the `pkgadd` step again will succeed.

Note – The install process for an application might execute scripts that do logic checking on the packages already installed, like the previous example. These cannot be found using automated scripts, but can be found when testing the minimized configuration, hence the importance of testing the minimized configuration.

TABLE 34 lists the missing packages.

TABLE 34 Missing Packages

Package Type	Description
SUNWcpc	CPU performance counter driver
SUNWcpcux	CPU performance counter libraries and utilities (64-bit)
SUNWcpcx	CPU performance counter driver (64-bit)

As seen on the fully installed domain, `LD_LIBRARY_PATH_64` needs to be set before running the `pkg.ksh`, as on the fully installed system, against `SUNWvts` and `SUNWvtsx`.

On a Sun Fire V1280, 6800, 12K, or 15K domain, there is no smartcard hardware, so the `SUNWocf` package (open card framework) can be removed.

Sun Validation Test Suite 5.1 requires X-packages to be installed as seen from the output of `pkg.ksh`. This requirement means that the packages for supporting Sun Validation Test Suite 5.1 have to be added to the profile for applications requiring X-based executables.

TABLE 35 lists only the packages that were needed by Sun Validation Test Suite 5.1.

TABLE 35 Packages Needed for Sun Validation Test Suite 5.1

Package Type	Description
SUNWcpc	CPU performance counter driver
SUNWcpcu	CPU performance counter libraries and utilities
SUNWcpcux	CPU performance counter libraries and utilities (64-bit)
SUNWcpcx	CPU performance counter driver (64-bit)
SUNWcpp	Solaris <code>cpp</code>
SUNWdtbas	CDE application basic runtime environment
SUNWfns	Federated naming system
SUNWgss	GSSAPI V2
SUNWgssc	GSSAPI CONFIG V2

TABLE 35 Packages Needed for Sun Validation Test Suite 5.1 (*Continued*)

Package Type	Description
SUNWlxml	The XML library
SUNWlxmlx	The XML library (64-bit)
SUNWmdb	Modular debugger
SUNWmdbx	Modular debugger (64-bit)
SUNWrsg	RPCSEC_GSS
SUNWtltk	ToolTalk runtime
SUNWwrsux	WCI RSM commands and libraries (64-bit)
SUNWxwcfnt	X-Windows system common (not required) fonts
SUNWxwdv	X-Windows system window drivers
SUNWxwfnfnt	X-Windows system platform required fonts
SUNWxwice	X-Windows system inter-client exchange (ICE) component
SUNWxwicx	X-Windows system ICE library (64-bit)
SUNWxwopt	X-Windows system optional clients
SUNWxwplt	X-Windows system platform software
SUNWxwplx	X-Windows system library software (64-bit)
SUNWxwrtl	X-Windows system and graphics runtime library links in <code>/usr/lib</code>
SUNWxwrtx	X-Windows system runtime compatibility package (64-bit)

Functionality testing of Sun Validation Test Suite 5.1 is carried out by executing `sunvts` and running the various functional tests.

The next section illustrates what happens when you attempt to install Sun Validation Test Suite 5.1 software on a domain installed with a non-X JumpStart profile; it demonstrates the reason why Sun Validation Test Suite 5.1 has a dependency on X-packages. This example points out an issue that customers might have to deal with when defining minimized systems for their applications.

Minimizing Sun Validation Test Suite 5.1 for Non-X Profile

Sun Validation Test Suite 5.1 has a console interface. In an attempt to get Sun Validation Test Suite 5.1 to be installed as part of the non-X minimal profile, by ignoring the X functionality, the packages `SUNWvts` and `SUNWvtsx` were added to a Solaris 9 OE minimized domain installed with the non-X minimal profile, which has no X-packages.

When doing a `pkgadd` of `SUNWvts`, the following is observed.

```
## Processing system information.
## Verifying package dependencies.
WARNING:
  The <SUNWxwdv> package "XWindows Window Drivers" is a
  prerequisite package and should be installed.
WARNING:
  The <SUNWxwplt> package "X Windows platform software"
  is a prerequisite package and should be installed.
WARNING:
  The <SUNWxwcft> package "X Windows common (not
  required) fonts" is a prerequisite package and should
  be installed.

Do you want to continue with the installation of <SUNWvts> [y,n,?]
```

Ignoring these warnings by selecting `y` appears to continue the installation successfully. However, upon running `sunvts`, the following is displayed.

```
iutest: fatal: libX11.so.4: open failed: No such file
```

Examining this file shows that X-dynamic libraries are linked at compile time.

```
# ldd.ksh -s `which iutest`
Couldn't find package for
    libX11.so.4 => (file not found)
[...]
```

The following table lists all the X-packages that are needed just to get Sun Validation Test Suite 5.1 installed from the non-X profile and run a simple test. It does not account for the additional testing that is needed to find the other packages required for corner-case functionality.

TABLE 36 Packages Required to Run Sun Validation Test Suite 5.1 From Non-X Profile

Package Type	Description
SUNWxwcf <code>t</code>	X-Windows system common (not required) fonts
SUNWxwdv	X-Windows system window drivers
SUNWxwpl <code>t</code>	X-Windows system platform software
SUNWxwpl <code>x</code>	X-Windows system library software (64-bit)
SUNWxwrt <code>l</code>	X-Windows system and graphics runtime library links in <code>/usr/lib</code>
SUNWxwrt <code>x</code>	X-Windows system runtime compatibility package (64-bit)

Due to the X-dynamic libraries requirement, Sun Validation Test Suite 5.1 has to be part of the X-applications profile.

About the Authors

Nicholas O'Donnell has worked in the Enterprise Server Products (ESP) group at Sun for three years, developing software on the HPC ClusterTools products and, in the last year, working on Sun Fire server security.

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Prior to his role in EE, he was a Senior Security Architect with Sun Professional Services where he worked with many Fortune 500 companies on projects that included security assessments, architecture development, architectural reviews, and policy/procedure review and development. He developed and delivered an enterprise security assessment methodology and training curriculum to be used worldwide by SunPS. His customers included major telecommunication firms, financial institutions, ISPs, and ASPs. Before joining Sun, Alex was an independent contractor specializing in network security. His clients included BTG, Inc. and Thinking Machines Corporation.

Acknowledgements

The authors would like to recognize Martin Englund for writing the `scan.pl` script.

Related Resources

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- Howard, John S. and Noordergraaf, Alex. *JumpStart™ Technology: Effective Use in the Solaris™ Operating Environment*, The Official Sun Microsystems Resource Series, Prentice Hall, October 2001.
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- *Sun Fire V1280/Netra 1280 System Administration Guide*, <http://www.sun.com/products-n-solutions/hardware/docs/html/817-0509-10>.

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- Solaris Security Toolkit software:
<http://www.sun.com/solutions/blueprints/tools>
- Solaris Security Auditing:
<http://www.sun.com/software/security/audit>
- Sun Fire 15K server:
<http://www.sun.com/servers/highend/sunfire15k/index.xml>
- Sun Fire 12K server:
<http://www.sun.com/servers/highend/sunfire12k/index.xml>
- Midframe and Midrange servers:
<http://www.sun.com/servers/midrange>
- Sun Fire V1280 server:
<http://www.sun.com/servers/midrange/sunfirev1280>
- Highend servers, dynamic reconfiguration:
http://www.sun.com/servers/highend/dr_sunfire
- Dynamic reconfiguration for Sun Fire 3800, 4800, 4810 and 6800 Midframe servers: http://www.sun.com/servers/midrange/dr_sunfire
- Capacity on Demand software: <http://www.sun.com/datacenter/cod>
- Sun Fire 15K/12K Servers System Management Services:
<http://www.sun.com/servers/highend/sms.html>
- Sun Management Center software:
<http://www.sun.com/software/solaris/sunmanagementcenter/index.html>
- Solaris Patch Manager software:
http://www.sun.com/service/support/sw_only/patchmanager.html
- Sun Explorer data collector software:
<http://sunsolve.sun.com/pub-cgi/show.pl?target=explorer/explorer>
- Sun Remote Services Net Connect software:
<http://www.sun.com/service/support/srs/netconnect>
- Sun Validation Test Suite software:
<http://www.sun.com/oem/products/vts>

- Sun ONE Advantage software:
<http://www.sun.com/software/solaris/licensing/advantage.html>
 - Recommended Patch Clusters software:
<http://sunsolve.sun.com/pub-cgi/show.pl?target=patchpage>
 - Domain minimization profiles and scripts:
<http://www.sun.com/solutions/blueprints/tools/>
 - Supplement CD: Lights Out Management 2.0. software:
<http://docs.sun.com/db/doc/816-2583-10/6m8u2cujl?a=view>
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