Sun Ray Software Installation and Configuration Guide

Version 5.2

Sun Ray Software Installation and Configuration Guide: Version 5.2

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Abstract

This guide describes how to install and configure the Sun Ray Software product, including how to upgrade an existing installation.

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Preface

The *Sun Ray Software 5.2 Installation and Configuration Guide* provides instructions for installing, upgrading, and configuring Sun Ray Software.

1. Audience

This document is intended for users with system administration experience. It is assumed that readers are familiar with Web technologies and have a general understanding of Windows and UNIX platforms.

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3. Related Documents

The documentation for this product is available at:

http://www.oracle.com/technetwork/server-storage/sunrayproducts/docs

For additional information, see the following manuals:

- *Sun Ray Software 5.2 Release Notes*

- *Sun Ray Software 5.2 Administration Guide*

4. Conventions

The following text conventions are used in this document:

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.

Convention	Meaning
italic	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
`monospace`	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

Chapter 1. Overview of the Sun Ray Environment

This chapter provides an overview of the Sun Ray technology and describes the major areas and features of the Sun Ray environment.

1.1. What is Sun Ray Computing?

Sun Ray computing is a thin client implementation that offers both desktop-like user functionality and sufficient speed and reliability for mission-critical applications. Sun Ray Software supports both hardware and software-based clients and runs on both Linux and Solaris, including Solaris Trusted Extensions.

Other client-server models typically use combinations of remote and local operating systems, applications, memory, and storage, but the Sun Ray computing model moves all computing to a server. Instead of running applications, storing data, and doing computation on a desktop device like a PC, the Sun Ray model simply passes input and output data between clients and the Sun Ray server, where the operating system and applications are located.

1.1.1. Stateless

Clients in a Sun Ray environment have no local disks, applications, or operating systems and are therefore considered *stateless*. This setup is what makes them true thin clients. Stateless devices are inexpensive to maintain because they do not require administrators or technicians to install, upgrade, or configure software or to replace mechanical components on the desktop.

A Sun Ray Client contains only a firmware module that performs a small set of tasks: it sends keyboard and mouse events and displays pixel data. If a desktop device contains an operating system that can execute code at the request of a user, it has *state* and it is not a true thin client. This type of device requires updating and maintenance at the desktop rather than server level and it is susceptible to viruses.

1.1.2. Secure

Sun Ray Clients are also extremely secure. For instance, managing USB mass storage devices, that is, controlling the ability to enable or disable their use, is done at the server or group level. This ability enables sites with particular security or intellectual property concerns to eliminate many of the risks imposed by PCs and other fat clients, which rely on local operating systems, local applications, and local data caches. Critical data can be compromised or lost when the physical device hosting the "fat" client is stolen or damaged.

1.1.3. Available

A Sun Ray session is a group of services controlled by a Session Manager and associated with a user through an authentication token. The sessions reside on a server rather than on the desktop. Because Sun Ray Clients are stateless, a session can be directed or redirected to any Sun Ray Client on the appropriate network or subnetwork when a user logs in or inserts a smart card.

Although the session continues to reside on a server, the session appears to follow the user to the new client. This functionality, called hotdesking, provides the ability of users to access their sessions from any client on their network. Hotdesking can be implimented with smart cards or without smart cards through the non-smart card session mobility (NSCM) feature.

Most large Sun Ray implementations also include one failover group of Sun Ray servers to ensure uninterrupted service whenever a server is off-line. When a failover group is configured, the Sun Ray Software optimizes performance by spreading the computing load among the servers in the group.

1.2. Parts of the Sun Ray Environment

The Sun Ray Software is the central piece of the overall Sun Ray environment. From a high-level perspective, a Sun Ray environment consists of three main areas: the clients, the physical network, and the Sun Ray server, where the Sun Ray Software is installed. Figure 1.1, "Parts of the Sun Ray Environment" shows the connections within a Sun Ray environment.

Figure 1.1. Parts of the Sun Ray Environment
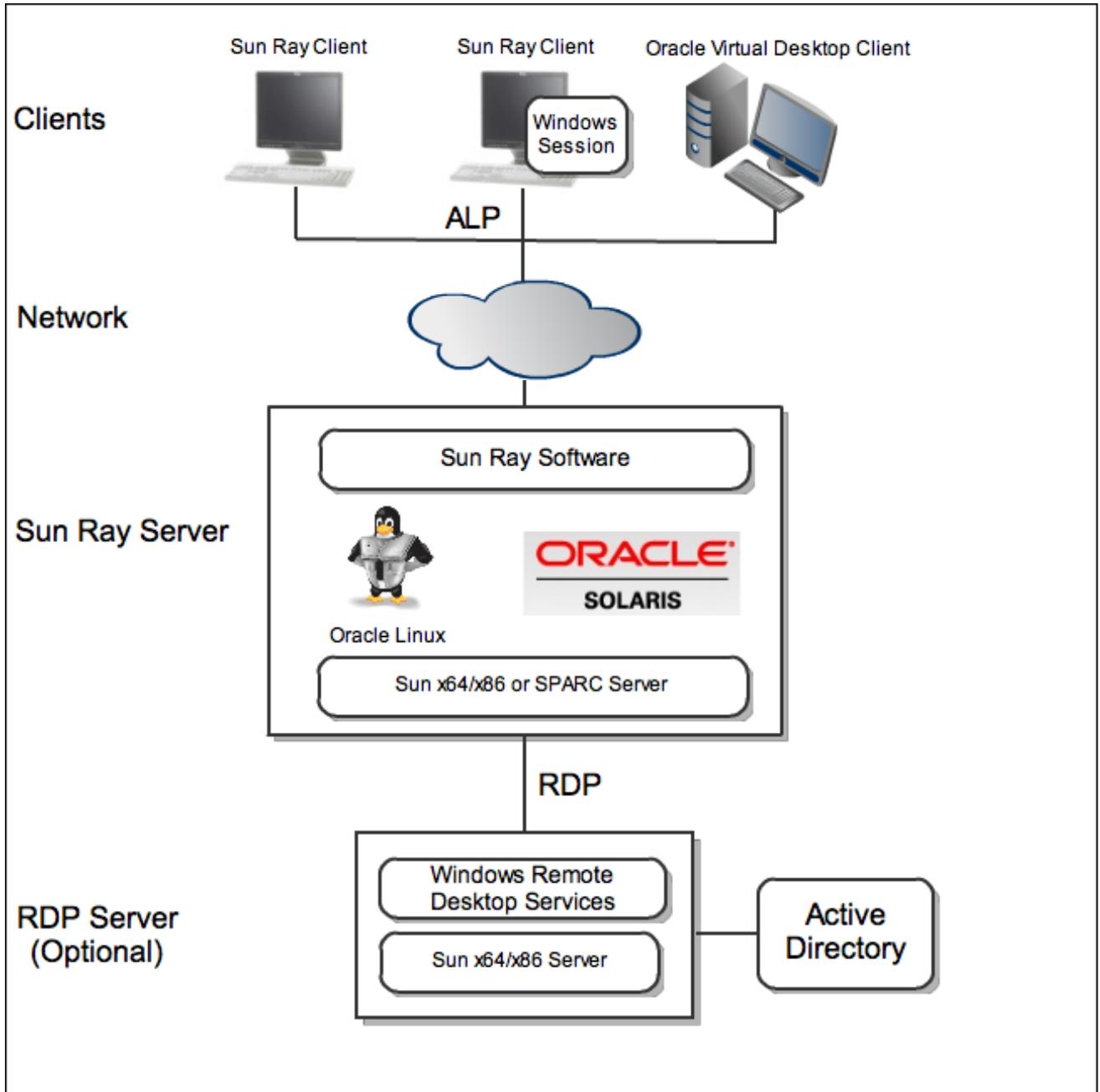
The following sections provide a high-level overview of each area.

1.2.1. Clients

Currently, there are two main types of clients: a Sun Ray Client and an Oracle Virtual Desktop Client.

1.2.1.1. Sun Ray Client

A Sun Ray Client is a hardware unit that can potentially exceed the full functionality of a desktop computer, but with less administrative and environmental costs. A Sun Ray Client acts as a frame buffer on the client side of the network. Applications run on a Sun Ray server and render their output to a virtual frame buffer. The Sun Ray Software formats the rendered output and sends it to the appropriate Sun Ray Client, where the output is interpreted and displayed.

From the point of view of network servers, Sun Ray Clients are identical except for their Ethernet mac address. If a Sun Ray Client ever fails, it can easily be replaced because no data resides on it. An IP addresses is leased to each Sun Ray Client when it is connected and it can be reused when the DTU is disconnected. IP address leasing is managed by DHCP.

Various models of Sun Ray Clients are available, differing primarily with respect to size, type, and supported monitor resolution. However, all Sun Ray Clients include a smart card reader, a keyboard, and a mouse.

For the smart card reader, the industry standard PC/SC-lite API is included for developers who want to encode custom applications or other information in their users' smart cards.

By default, a Sun Ray Client runs the same Solaris or Linux operating system as the associated Sun Ray server. However, the Windows and VMware View connectors enable users to access a Windows desktop session or a VMware View session on the client. By configuring kiosk mode, users can bypass the Sun Ray Client operating system altogether and be taken directly to the assigned connector session.

1.2.1.2. Oracle Virtual Desktop Client

An Oracle Virtual Desktop Client is a software version of a Sun Ray Client. The Oracle Virtual Desktop Client application runs on an ordinary PC or laptop computer and provides a Sun Ray session in a desktop window. It is supported and can be installed on Windows, Linux, and Mac OS X. An Oracle Virtual Desktop Client supports most of the standard Sun Ray Client functionality.

1.2.2. Physical Network

As with most networked environments, the Sun Ray environment needs a well-designed network, and it can be configured in one of several possible ways.

For detailed descriptions of the types of network configuration and instructions on configuring each network type, see Chapter 3, *Planning a Sun Ray Network Environment*.

1.2.3. Sun Ray Server

The Sun Ray server runs the Sun Ray Software and it is the foundation of the Sun Ray environment. It provides all the necessary administrative support for Sun Ray Clients and Oracle Virtual Desktop Clients.

The important first step is determining what operating system environment your users need, and then you can set up your Sun Ray environment accordingly. If your users need a Linux environment, you can install Oracle Linux on the Sun Ray servers. Vice versa for users who need a Solaris environment. If your users only plan to use a Windows desktop session, you can choose either Linux or Solaris on the Sun Ray server, since the underlying desktop will be hidden from the users. There are a few differences when using Oracle Linux versus the Solaris operating system for the Sun Ray server, so take that into consideration.

When providing your users with a Windows environment, it is also important to understand how the Sun Ray Software features are supported on different versions of the Windows operating systems in a remote desktop environment. Although most of features are provided for all of the supported Windows platforms, there are differences in how they are implemented.

Chapter 2. Product Requirements

This chapter provides the product requirements for the Sun Ray Software 5.2 release.

2.1. Operating System Requirements

Table 2.1, "Supported Sun Ray Software Operating Systems" lists the supported Sun Ray Software operating systems for the Sun Ray Software 5.2 release.

Table 2.1. Supported Sun Ray Software Operating Systems

Platform	Releases
Solaris	• Solaris 10 5/09 or later on SPARC and x86 platforms • Solaris 10 5/09 or later on SPARC and x86 platforms with Solaris Trusted Extensions
Linux	• Oracle Linux 5.5 (32-bit and 64-bit) • Oracle Linux 5.6 (32-bit and 64-bit)

> **Note**
>
> Oracle products certified on Oracle Linux are also certified and supported on Red Hat Enterprise Linux due to implicit compatibility between both distributions. Oracle does not run any additional testing on Red Hat Enterprise Linux products.

For additional operating system requirements, see Additional Software Requirement.

2.2. Windows Remote Desktop Support

The following Windows remote desktops are supported with Sun Ray Software:

• Windows XP Professional with Service Pack 2 (64-bit)

• Windows XP Professional with Service Pack 3 (32-bit)

• Windows Server 2003 R2 Enterprise Edition with Service Pack 2 (32-bit and 64-bit)

• Windows 7 Enterprise (32-bit and 64-bit)

• Windows Server 2008 R2 Enterprise (64-bit)

Table 2.2, "Supported Features for Windows OS Platforms" shows what features are supported for each Windows OS platform. Some Windows OS platforms require a Windows component to be installed for specific feature support. For detailed information, see Section 4.5, "How to Install the Windows Connector Components on a Windows System".

Table 2.2. Supported Features for Windows OS Platforms

	Windows XP SP2 (64-bit)	Windows XP SP3 (32-bit)	Windows Server 2003 R2 (32-bit/64-bit)	Windows 7 (32-bit/64-bit)	Windows Server 2008 R2 (64-bit)
Adobe Flash Accelera-	x	x	x	x	x

	Windows XP SP2 (64-bit)	Windows XP SP3 (32-bit)	Windows Server 2003 R2 (32-bit/64-bit)	Windows 7 (32-bit/64-bit)	Windows Server 2008 R2 (64-bit)
tion (1)					
Video Acceleration (2)	x	x	x	x	x
USB Redirection (3)	x	x	x	x	x
Audio Input (4)	x	x	x	x	x
Enhanced Network Security	x	x	x	x	x
Session Directory/Session Broker	N/A	N/A	x	N/A	x

(1) For Windows XP and Windows Server 2003 R2, support is provided by the Adobe Flash acceleration component.

(2) For Windows XP and Windows Server 2003 R2, support is provided by the multimedia redirection component. For Windows 7 and Windows Server 2008 R2, support is provided for Windows Media Video (wmv) playback.

(3) For all OS platforms, support is provided by the USB redirection component.

(4) For Windows XP and Windows Server 2003 R2, support is provided by the audio input component.

2.3. Oracle Virtual Desktop Client Support

The Sun Ray Software 5.2 release supports the Oracle Virtual Desktop Client 2.1.11 release or later.

2.4. Feature Differences Between Solaris and Linux Platforms

This page provides the list of Sun Ray Software features that are not supported on a Sun Ray server running the Linux platform.

- Smart Card Services (PS/SC-lite) for Sun Ray is not supported on Linux.

- The Non-Smart Card Mobile (NSCM) feature is not supported on Linux.

- Mass storage is not recommended with kiosk mode on Linux. Linux does not write the files until the device is prepared to be ejected, which the user can't easily do from Windows.

- Predefined kiosk sessions that support a collection of applications in a restricted, desktop-like environment are not supported on Linux. Solaris has CDE based and Sun Java Desktop (JDS), Release 3 based support.

- The VMware View connector feature is not supported on Linux.

2.5. Additional Software Requirements

2.5.1. Disk Space Requirements

Table 2.3, "Disk Space Requirements" lists the disk space requirements for specific directories.

Table 2.3. Disk Space Requirements

Default Installation Path	Requirements
/	1 Mbyte

Default Installation Path	Requirements
`/etc/opt/SUNWut/srds`	0.1 Mbytes
`/opt`	70 Mbytes
`/opt/SUNWut/srds`	4.6 Mbytes
`/var/adm/log` (Solaris)	5 Mbytes
`/var/log` (Linux)	2.5 Mbytes
`/var/opt/SUNWut`	Allow enough disk space for the data store and log files. For 1,000 entries, allocate roughly 1.5 Mbytes of disk space, 64 Mbytes of RAM, and 128 Mbytes of swap space.
`/var/tmp`	5 Mbytes

2.5.2. Operating System

> **Note**
>
> OpenSSL is generally installed by default on the supported operating systems. Please confirm that OpenSSL is installed before proceeding.

2.5.2.1. Solaris

- The Entire Distribution software cluster is required and must be installed.

- The latest Recommended Patch Cluster (RPC) must be installed prior to the Sun Ray Software installation.

- The Common Desktop Environment (CDE) might not be available in a future Solaris release. Users should migrate to the Java Desktop System. CDE will not be supported on future versions of Sun Ray Software when CDE is officially removed from the Solaris release.

2.5.2.2. Oracle Linux

> **Note**
>
> The following services must be disabled during the post-installation setup:
>
> - Firewall
>
> - SELinux

All the default Oracle Linux RPMs are required and must be installed on the Sun Ray server. In addition to the default RPMs, you must install the additional RPMs listed in Table 2.4, "Required Oracle Linux RPMs"

Table 2.4. Required Oracle Linux RPMs

RPM	Notes
Software Development support software	This is a group of RPMs related to software development that you can choose during the Oracle Linux installation. Figure 2.1, "Oracle Linux Software Development Installation Screen" shows the installation screen where you can choose this additional software support.

RPM	Notes
cdparanoia-libs-alpha9.8-27.2.i386.rpm	The 32-bit version of this RPM is required for both 32-bit and 64-bit systems. This RPM is needed for the Media Player.
dhcp-3.0.5-23.el5	Servers/Network Servers
glib-1.2.10-20.el5.i386.rpm	The 32-bit version of this RPM is required for both 32-bit and 64-bit systems.
libXp-1.0.0-8.1.el5.i386.rpm	The 32-bit version of this RPM is required for both 32-bit and 64-bit systems.
openldap-2.3.43-12.el5	Servers/Network Servers
openldap-clients-2.3.43-12.el5	Base System/System Tools
openmotif22-2.2.3-18.i386.rpm	The 32-bit version of this RPM is required for both 32-bit and 64-bit systems.
tftp-server-0.49-2.0.1	Servers/Legacy Network Servers
utXrandr-1.2.3-1.i686.rpm (32-bit) or utXrandr-1.2.3-1.x86_64.rpm (64-bit)	Required for Multi-monitor feature. These RPMs are provided in the `Supplemental/UTrandr/Linux` directory on the Sun Ray Software Media Pack image.

Figure 2.1. Oracle Linux Software Development Installation Screen
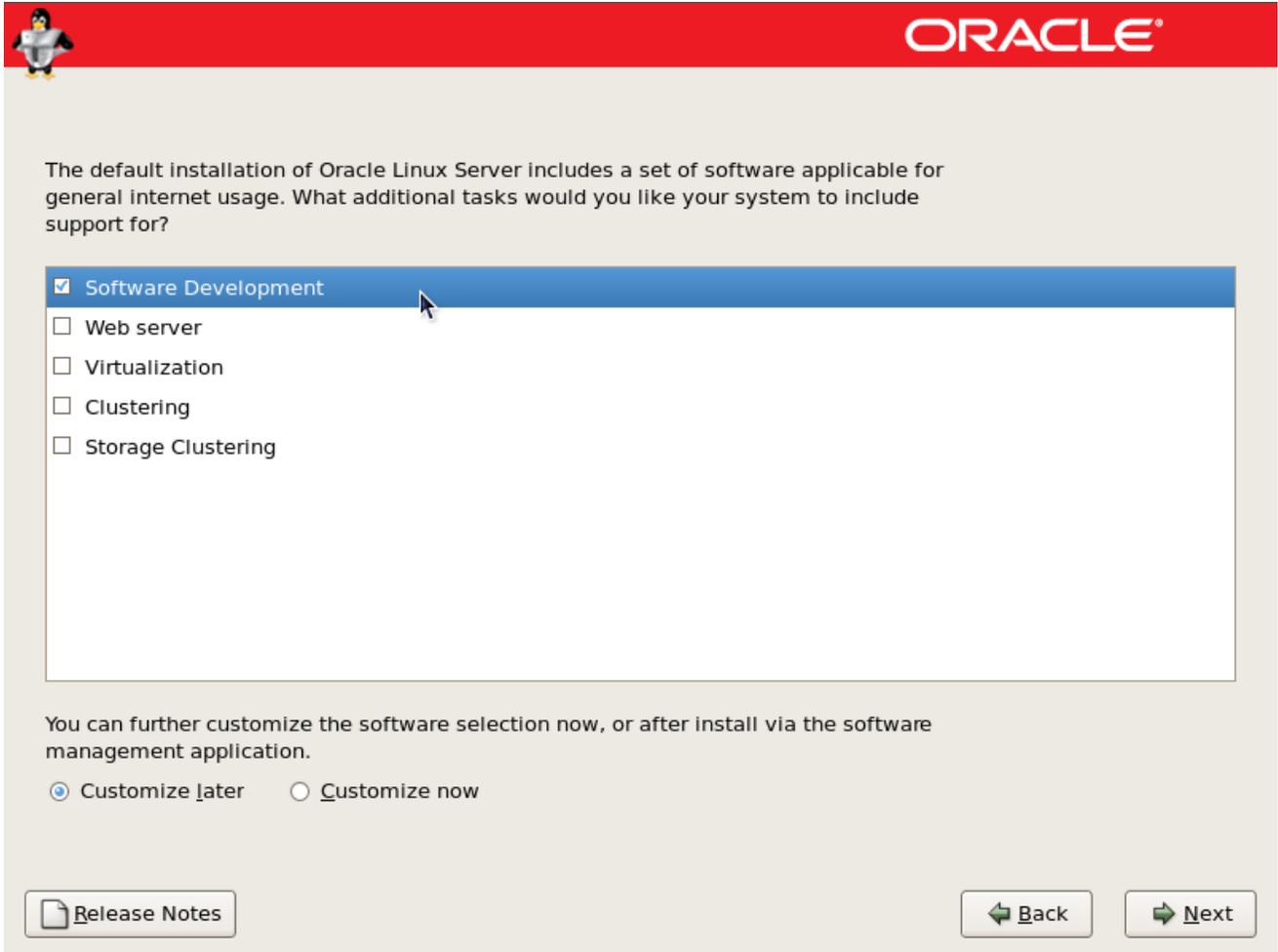
2.5.3. Java Runtime Environment (JRE)

Sun Ray Software 5.2 requires a 32-bit implementation of a Java(TM) 2 Platform, Standard Edition JRE(TM) of at least 1.6. The latest Java release is available at http://www.oracle.com/technetwork/java/javase/downloads.

To check what JRE version is installed on your system, use the following command:

```
# java -version
```

A supported version of JRE is also bundled in the Sun Ray Software media pack for Solaris and Linux systems in the `Supplemental` directory.

> **Note**
>
> A 64-bit JRE is not suitable for use with Sun Ray Software. The 32-bit JRE is required, even when the platform is capable of supporting a 64-bit JRE.

> **Note**
>
> The Sun Ray Software installation script assumes JRE is installed in the `/usr/java` directory by default. If you want to accept the default when installing the Sun Ray Software on a Linux server, install JRE 1.6 or later on the server and then create a symlink from `/usr/java` to the newly created `jre` directory. For example, the following command creates a symbolic link from the `/usr/java` directory to the `jre1.6.0_23` directory located in `/usr`.
>
> ```
> # ln -s jre1.6.0_23 /usr/java
> ```

2.5.4. Sun Ray Admin GUI Web Server Requirements

The Sun Ray Administration Tool (Admin GUI) requires that a Web server be installed and running on each Sun Ray server. The Admin GUI must be hosted in a web container that supports the JavaServlet 2.4 and JavaServer Pages 2.0 specification. The Apache Tomcat 5.5 Web container implements these standards and runs on any operating system that has a Java Runtime Environment (JRE).

The `utconfig` script prompts for the location of an Apache Tomcat HTTP Server and asks whether it should be configured automatically.

- To configure the server automatically, supply the path and answer Yes.

- To configure the HTTP server later by using the `utconfig -w` command, answer No.

An Apache Tomcat 5.5 archive is included in the Sun Ray Software Media Pack image under `Supplemental/Apache_Tomcat`. The most recent version of Tomcat 5.5 can be downloaded from http://tomcat.apache.org.

The Sun Ray configuration script uses port 1660 for the Sun Ray Administration Tool (Admin GUI) by default. If this port is unavailable, you can configure a new port while running the `utconfig` script.

See How to Install Apache Tomcat for details.

2.5.5. Web Browser Requirements

Table 2.5, "Web Browser Requirements" lists the tested and supported browsers for the Sun Ray Administration Tool (Admin GUI).

Table 2.5. Web Browser Requirements

Operating System	Browser Support
Solaris 10 5/09	Firefox 2.0.0.4 Mozilla 5.0 Mozilla 1.7 for Sun Java Desktop
Solaris 10 5/09 with Trusted Extensions	Firefox 2.0.0.19 Mozilla 5.0
Oracle Linux 5.5	Firefox 3.0.18
Oracle Linux 5.6	Firefox 3.6.13

2.5.6. Sun Ray Data Store Port Requirements

When you configure a new Sun Ray server in a failover environment that uses SRS 5.2 only, service port 7012 is used by default.

If you already have an LDAP (Lightweight Data Access Protocol) server configured on the Sun Ray server, it can coexist with the Sun Ray data store. However, it must not use port 7012, which is reserved for use by the Sun Ray data store.

If you configure a new Sun Ray server in a failover group with mixed versions of Sun Ray Software, you must make sure that the primary server is running Sun Ray Software 5.2.

If the secondary server is running SRS 5.2, no special care is required. The `utreplica` utility automatically synchronizes with the port number on the primary.

> **Note**
>
> Although configuring mixed failover groups consisting of servers running various versions of Sun Ray Server Software is

┃ possible, this practice is discouraged. For more information, see the *Failover Groups* chapter in the *Administration Guide*.

2.5.7. How to Install Apache Tomcat

If Tomcat 5.5 is already installed on your system, you can omit the steps below and specify the path, if necessary, during the Sun Ray Software configuration.

1. As superuser, open a shell window on the Sun Ray server.

   ```
   % su -
   ```

2. Change to the `Apache_Tomcat` directory. For example:

   ```
   # cd <media_pack_directory>/Supplemental/Apache_Tomcat
   ```

3. Extract the Tomcat archive into a suitable directory, such as `/opt`.

   For Solaris

   The Tomcat archive uses GNU tar extensions and must be untarred with a GNU-compatible version of the `tar` command, such as `gtar`.

   ```
   # /usr/sfw/bin/gtar -xvz -C /opt -f apache-tomcat-5.5.20.tar.gz
   ```

   For Linux

   ```
   # tar -xvz -C /opt -f apache-tomcat-5.5.20.tar.gz
   ```

   (Optional) Create a symbolic link to the default location for the Sun Ray Software installation program.

   ```
   # ln -s /opt/apache-tomcat-5.5.20 /opt/apache-tomcat
   ```

2.6. Ports and Protocols

The following section summarize Sun Ray system port and protocol usage.

The range of dynamic/UDP ports on the server is constrained to the range defined by the `utservices-low` and `utservices-high` UDP service definitions, whose default values in `/etc/services` are 40000 and 42000 respectively.

- Dynamic/TCP ports on the client are in the range 32768-65535.

- Dynamic/UDP ports on the client are in the range 4096-65535.

- ALP rendering traffic (ALP-RENDER) always uses a UDP port number greater than 32767 at the client.

2.6.1. Sun Ray Client-to-Server Ports and Protocols

Table 2.6, "Sun Ray Client-to-Server Ports and Protocols" lists the Sun Ray Client-to-server ports and protocols. In the table, a double-headed arrow in the Flow column indicates the direction of the initial packet. In most cases, the client (a Sun Ray Client or Oracle Virtual Desktop Client) initiates the interaction.

Table 2.6. Sun Ray Client-to-Server Ports and Protocols

Client Port	Flow	Pro- tocol	Flow	Server Port	Peer	Im- port- ance	Comments
66/UDP (BOOTP C/ DHCPC)	broadcast=>> uni- cast=>>	DH- CP	<=broadcast <=unicast	67/UDP (BOOTP S/ DHCPS)	DHCP Service	Man- dat- ory	Network and configura- tion parameter discov- ery
Dynam- ic/UDP	unicast=>>	TFTP	<=unicast	69/UDP (TFTP)	TFTP Service	Re- com- men- ded	Firmware download (Configuration paramet- er download)
Dynam- ic/UDP	unicast=>>	DNS	<=unicast	53/UDP (domain)	DNS Service	Op- tional	For server name look- ups
514/UDP (syslog)	unicast=>>	Sys- log	(none)	514/UD P (syslog)	Syslog Service	Op- tional	Event reporting
Dynam- ic/UDP	broadcast=>>	ALP- DIS- COV- ERY	<=unicast	7009/U DP (utauthd- gm)	Sun Ray Server	Op- tional	On-subnet Sun Ray server discovery
Dynam- ic/TCP	unicast=>>	ALP- AU- TH	<=unicast	7009/TC P (utauthd)	Sun Ray Server	Man- dat- ory	Presence, control, status
Dynam- ic/UDP with port number >= 32768	unicast=> or uni- cast=>> when NAT is in use	ALP- REN DER	<<=unicast or <=unicast when NAT is in use	Dynam- ic/UDP con- strained by utser- vices- low and utser- vices- high	Sun Ray Server	Man- dat- ory	On-screen drawing, user input, audio
5498/UD P	unicast=>>	ALP- AU- DIO- IN		Dynam- ic/UDP con- strained by utser- vices- low and utser- vices- high	Sun Ray Server	Op- tional	Inbound audio
Dynam- ic/TCP	unicast=>>	ALP- DEV MGR	<=unicast	7011/TC P (utdevm gr)	Sun Ray Server	Op- tional	Device management
7777/TC P	unicast=>	ALP- DEV DAT A	<<=unicast	Dynam- ic/TCP	Sun Ray Server	Op- tional	Device data transfer

Client Port	Flow	Pro-tocol	Flow	Server Port	Peer	Im-port-ance	Comments
7013/UDP (utquery)	unicast=>	ALP-QUE-RY	<<=unicast <<=broadcast	Dynam-ic/UDP	Any	Op-tional	utquery support

> **Note**
>
> Due to CR 6985550, the keyboard may become unresponsive to input. To work around this issue, allow ICMP messages to flow from the Sun Ray server to the client.

2.6.2. Sun Ray Server-to-Server Protocols

Table 2.7, "Sun Ray Server-to-Server Ports" lists the Sun Ray server-to-server ports.

Table 2.7. Sun Ray Server-to-Server Ports

Sun Ray Server Port	Protocol	Port	Peer	Notes
	<<=ARP=>>		All on subnet	IP-to-MAC mapping
Transient	SYSLOG/UDP unicast=>>	514 (SYSLOG)	Syslog Server	Status reporting, if required
7009 (UTAUTHD)	<<=UTAUTHD-GM/UDP=>> broadcast or multicast	7009 (UTAUTHD)	Sun Ray Server	Group discovery, if required
7011 (UTDEVMGRD)	<<=UTDEVMGRD/TCP=>>	7011 (UTDEVMGR)	SR Group Mem-ber	Device control and status
7008 (UTRCMD)	<<=UTRCMD/TCP=>	Privileged	SR Group Mem-ber	Remote execution
	<<=ICMP ECHO=>		Any	Admin: presence (a bug)
7010 (UTAUTH-CB)	<<=UTAUTH-CB/TCP=>	Transient	Any	Admin: control and status
7012 (UTDS)	<<=UTDS/TCP=>	Transient	Any	Data store, if required.
7007 (UTSESSIOND)	<<=UTSESSION/TCP=>	Transient	Any	Session members
7011 (UTDEVMGR)	<<=UTDEVMGR/TCP=>	Transient	Any	Device clients
1660 (HTTP)	<<=HTTP/TCP=>	Transient	Localhost	Web GUI, if configured
1661 (HTTPS)	<<=HTTPS/TCP=>	Transient	Localhost	Web GUI, if configured
7007 (UTSESSIOND)	<<=UTSESSION/TCP=>	Privileged	Localhost	Session management

2.6.3. Windows Connector

For basic Windows connector operations (RDP port access), the Windows server firewall needs TCP port 3389 open for inbound connections. The Sun Ray server (where the Windows connector is running) firewall needs TCP port 3389 open for outbound connections.

2.6.4. Multimedia Redirection

For multimedia redirection, the Windows server firewall must have TCP port 6000 open for inbound connections. The Sun Ray server (where the Windows connector is running) firewall must have TCP port 6000 open for outbound connections.

Chapter 3. Planning a Sun Ray Network Environment

This chapter provides detailed information about for setting up the network environment to support Sun Ray Clients and Oracle Virtual Desktop Clients. There are many options for configuring the network to support both firmware provisioning and Sun Ray server discovery, but the recommended approach is a shared network configuration, detailed below.

For other network configurations that are far less common and require advanced configuration of the Sun Ray server and network, see the *Alternate Network Configurations* chapter in the *Administration Guide*.

3.1. Using a Shared Network Configuration

By supporting various network configurations, Sun Ray Clients and Oracle Virtual Desktop Clients can be deployed virtually anywhere, subject only to a sufficient quality of network service between the clients and the Sun Ray server. The most common and recommended configuration is a shared network, where the Sun Ray server and clients are part of a Local Area Network (LAN) or Wide Area Network (WAN) and where network services such as DHCP and DNS are already provided by existing servers. The default installation and configuration procedures in this document target this configuration.

A client subnet in a typical shared network configuration meets the following criteria:

- DHCP services are available for Sun Ray Client IP/network configuration (Sun Ray Clients can be individually configured for static addressing using the Configuration GUI on the Sun Ray Client)

- DNS services are available for resolving the Sun Ray servers providing firmware (`sunray-config-servers`) and the Sun Ray servers providing sessions (`sunray-servers`)

- The subnet must be able to route to the Sun Ray servers

- Sun Ray Clients can be behind a Network Address Translation (NAT) router or firewall (Sun Ray servers must not be behind a NAT router or firewall)

- A Sun Ray server requires both a fixed host name and a static IP address. A Sun Ray server cannot be a DHCP client.

Figure 3.1, "Shared Network Configuration" shows an example of using a shared network for a Sun Ray environment.

Figure 3.1. Shared Network Configuration

Shared Network Configuration Example
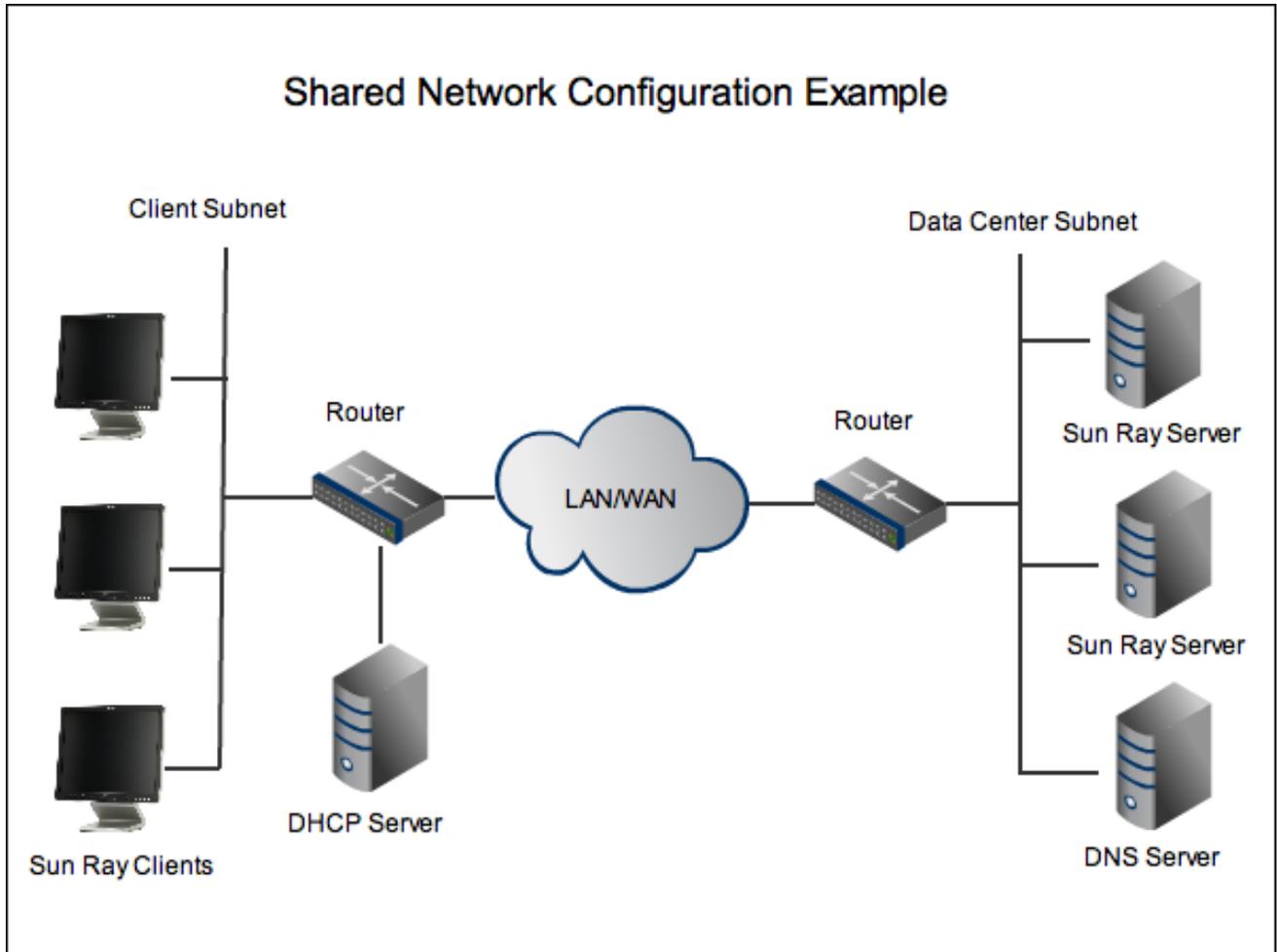
Note

Given the topology, Sun Ray traffic on shared networks is potentially exposed to an eavesdropper. Modern switched network infrastructures are far less susceptible to snooping activity than earlier shared technologies, but to obtain additional security the administrator may choose to activate the client's encryption and authentication features. These capabilities are discussed in the *Security* chapter in the *Administration Guide*.

3.1.1. Configuring a Shared Network

As part of the initial installation when using the `utsetup` command, Sun Ray Software is automatically configured to support a shared network with external DHCP/DNS services. If you choose to manually install and configure Sun Ray Software with the individual component installation commands, you need to run the `utadm -L on` command to configure a shared network. This command should be run on all servers in your failover group that will provide sessions to clients. Refer to the `utadm` man page for more details.

3.1.2. VPN Capability

Sun Ray Clients are able to provide a VPN solution for remote users. The IPsec capability in the Sun Ray Client firmware enables the Sun Ray Client to act as a VPN endpoint device. The most commonly used encryption, authentication, and key exchange mechanisms are supported, along with Cisco extensions that enable a Sun Ray Client to interoperate with Cisco gateways that support the Cisco `EzVPN` protocol. Sun Ray Clients currently support IPSec VPN concentrators from Cisco and Netscreen (Juniper).

For more information, see the *Sun Ray Client Firmware* chapter in the *Administration Guide*.

3.1.3. IPMP Support

Sun Ray Software supports arbitrary IP MultiPathing, or IPMP. IPMP provides failure detection and transparent network access failover for a system with multiple interfaces on the same IP link. IPMP also provides load spreading of packets for systems with multiple interfaces.

This feature can be very useful on a Sun Ray server by increasing its network availability and performance. IPMP is supported only on Sun Ray servers in a shared network configuration (LAN with fully-routed subnets) and running the Solaris operating system.

For more information about the IPMP feature in Solaris and how to configure it, see the Systems Administration Guide: IP Services manual.

When configuring IPMP, use the `if_mpadm` command to test NIC failure.

3.1.4. Network Performance Requirements

3.1.4.1. Packet Loss

The Sun Ray Software protocol is designed to operate well in conditions where other protocols would fail. However, if you detect sustained packet loss greater than 10 percent in the network, it may indicate other network problems. See *Performance Tuning* in the *Administration Guide* for help.

3.1.4.2. Latency

Network latency between any Sun Ray client and its server is an important determinant of the quality of the user experience. The lower the latency, the better; latencies under 50 milliseconds for round trip delay are preferred. However, like familiar network protocols such as TCP, the Sun Ray Client does tolerate higher latencies, but with degraded performance. Latencies up to 150 milliseconds provide usable, if somewhat sluggish, performance.

3.1.4.3. Out-of-Order Packets

Sun Ray Clients can tolerate small occurrences of out-of-order packet delivery, such as might be experienced on an Internet or wide-area intranet connection. Current Sun Ray firmware maintains a reordering queue that restores the correct order to packets when they are received out of order.

3.2. Configuring Sun Ray Server Discovery

There are two types of services that need to be discovered and used by a client:

• A firmware server that provides the latest firmware for a Sun Ray Client.

• A session server that provides a Sun Ray display session to to any client.

These services are by default provided by the same server but may be separated. There are many ways to configure how these servers are discovered. This section describes using pre-defined DNS entries to enable clients to find the servers. For other discovery methods that may provide more granularity or flexibility, see the *Alternate Network Configurations* chapter in the *Administration Guide*.

The On-Screen Display (OSD) shows status during a client's server discoveries. For example, during DNS lookups, a status line in the OSD window shows the name being looked up and, if one is found, the IP address.

3.2.1. Firmware Server

When you install the Sun Ray Software on a Sun Ray server or apply the latest maintenance update, the latest firmware for all supported Sun Ray Clients is also installed. Any Sun Ray server providing the latest firmware for Sun Ray Clients is considered a firmware server.

When a Sun Ray Client boots, it always checks to make sure it has the latest firmware as specified by its designated firmware server. A Sun Ray Client's firmware server is discovered as it boots by looking at the following values in order:

1. Locally configured value (configured through Configuration GUI)

2. DHCP Sun Ray vendor option (FWSrvr)

3. Generic DHCP option 66 (TftpSrvr) (IP Address or DNS name)

4. DNS lookup of `sunray-config-servers` (if mapped to multiple addresses, choose one randomly)

Each of these values are attempted in order until one succeeds. Although it is the last value attempted, the DNS lookup is the recommended firmware discovery configuration, as described below.

If the local configuration value is used and fails, none of the others are attempted. This prevents the overwriting of custom-configured firmware in a situation where the controlling firmware server happens to be temporarily unresponsive. See the *Sun Ray Client Boot Process* section in the *Administration Guide* for more details on how a Sun Ray Client finds its firmware server.

Once a firmware server is discovered by a Sun Ray Client, the client retrieves a parameter file (`.parms`) via TFTP. This file is used by the client to determine if its currently installed firmware is older than the firmware on the firmware server. If so, the newer firmware is automatically downloaded and installed on the client.

In the event of an error in the firmware download, error messages provide additional information that can be useful in diagnosing and correcting the problem. See *Sun Ray Client Troubleshooting Icons* chapter in the *Administration Guide* for details.

> **Note**
>
> By default, a client's firmware uses the configuration provided by the Sun Ray server's `.parms` file, which provides a centralized mechanism to administer firmware. However, you can enable the Configuration GUI on a client, which enables users to modify a Sun Ray Client's local configuration. See the *Sun Ray Client Firmware* chapter in the *Administration Guide* for details.

3.2.2. Session Server

Once a client resolves whether it has the latest firmware installed, the next step in the boot process is to obtain a session from a Sun Ray server. As with discovering a firmware server, the client searches for a session server in the following order:

1. Locally configured value (configured through Configuration GUI)

2. Generic DHCP option 49 (IP Address or DNS name)

3. The `servers=` key in the client's `.parms` file

4. DNS lookup of `sunray-servers` (if mapped to multiple addresses, choose one randomly)

Each of these values are attempted in order until one succeeds. Although it is the last value attempted, the DNS lookup is the recommended session server discovery, as described below.

See the *Sun Ray Client Boot Process* section in the *Administration Guide* for more details on how a Sun Ray Client finds its session server.

3.2.3. Using Domain Name Service (DNS)

Although there are multiple ways to configure server discovery, the recommended way is through DNS entries. If the Sun Ray DNS entries are defined appropriately for the Sun Ray Clients, no extra DHCP parameters are required by the Sun Ray Client except for basic network information. When DNS is used as the default server resolution, only the TFTP transport is available.

The DNS entries for Sun Ray server discovery are as follows:

*   `sunray-config-servers` for firmware servers

*   `sunray-servers` for session servers

In both cases, if the DNS entry contains multiple server addresses, one is picked randomly. And, both entries should consist of several servers in your failover group for redundancy purposes.

> **Note**

A DNS client incorporated in a Sun Ray Client's firmware allows many values to be names rather than IP addresses. Most values can be either a name or an IP address. If a name is specified, the DNS lookup appends the DHCP (or GUI) provided domain name. Components or the domain name are stripped successively until the lookup succeeds or only two components are left. If none of those lookups succeed, the name is looked up by itself. If the name itself ends with a dot character ("."), the name is taken to be a rooted name, and it is looked up without domain name components appended.

Chapter 4. Installing and Configuring

This chapter provides an overview of installing and configuring Sun Ray Software on a system, which makes it a Sun Ray server.

4.1. Using the `utsetup` Command

The `utinstall` and `utconfig` commands are the basic commands to install and configure Sun Ray software on a system. There are also a number of additional commands that you need to run to configure a basic Sun Ray server and make it ready to provide sessions to clients.

The `utsetup` command provides a way to run all the appropriate commands, including `utinstall` and `utconfig`, in the appropriate sequence to install and configure a Sun Ray server. By design, the `utsetup` command configures a Sun Ray server to use a shared network (LAN) and it generates a set of `.parms` files in the `/tftpboot` directory for managing Sun Ray client firmware. This recommended configuration is detailed in Chapter 3, *Planning a Sun Ray Network Environment*.

When you use `utsetup` command to initially install a Sun Ray server, it runs the following commands in sequence:

- `utinstall`

- `utconfig`

- `utadm -L on` (optional)

- `utfwadm -A -a -V` (optional)

- `utreplica` (if HA/failover group selected)

- `utpolicy -a -z both -g` (default for Linux)

- `utpolicy -a -z both -g -M` (default for Solaris)

- `utstart -c`

See Section 4.4, "How to Install and Configure Sun Ray Software" for installation instructions using the `utsetup` command.

4.2. Not Using the `utsetup` Command

If you need to install and configure a Sun Ray server in a different way than what the `utsetup` command provides, you must run the individual commands as noted in the previous section. The following situations may force you to do this:

- Using JumpStart (Solaris) or Kickstart (Linux) to install the software.

- Using a different network configuration besides a shared network. See the *Alternate Network Configurations* chapter in the *Administration Guide* for information about the other network configurations that are supported.

- Configuring the Sun Ray Software without the Sun Ray data store, which is known as zero administration mode.

This document does not provide detailed instructions about how to use the individual commands to install and configure Sun Ray Software without the `utsetup` command. Refer to the man pages for the following commands:

- `utinstall`

- `utconfig`

- `utpolicy`

- `utadm`

- `utfwadm`

- `utreplica`

- `utstart`

4.3. Automating Sun Ray Software Installations

The `utsetup` command enables you to clone the Sun Ray Software installation and configuration process by recording the user responses to the installation prompts and then using those responses at another time and even on another Sun Ray server. User responses are stored in the `/var/opt/SUNWut/utdialog.d/*.utdialog_responses.props` files and are known as response files.

With `utsetup` and response files, you have the ability to clone a Sun Ray server installation and configuration setup or to provide default settings for a hands-free, automated installation and configuration solution. Cloning Sun Ray servers can be helpful in many situations, including setting up a number of Sun Ray servers in a failover group.

> **Note**
>
> Using the `utsetup` command without any options performs an actual install and configuration on the server you run it on.

The following commands can use the information recorded in the response files:

- `utsetup`

- `utinstall`

- `utconfig`

- `utpolicy`

- `utpw`

- `utgroupsig`

- `utreplica`

See the following procedures for automating Sun Ray Software installations:

- Section 4.6, "How to Clone a Sun Ray Server"

- Section 4.7, "How to Install and Configure a Sun Ray Server With Default Settings"

4.4. How to Install and Configure Sun Ray Software

This procedure uses the `utsetup` command to install and configure a Sun Ray server for both the Linux or Solaris operating system.

The `utsetup` command configures a Sun Ray server to use a shared network (LAN) and it generates a set of `.parms` files in the `/tftpboot` directory for managing Sun Ray client firmware (DHCP is not configured to manage firmware downloads). This configuration is detailed in *Planning a Sun Ray Environment*.

4.4.1. Before You Begin

- Make sure the server targeted to become the Sun Ray server meets the Sun Ray Software product requirements.

- Create a dedicated UNIX group for the sole use of the Windows connector feature. By default, the `utwc` group is created and used. The first character of the name must be alphabetic. Do not add users to this group.

- A Sun Ray server requires both a fixed host name and a static IP address. A Sun Ray server cannot be a DHCP client.

4.4.2. Steps

1. Download and unzip the *Sun Ray Software 5.2 Media Pack* and make it accessible to the Sun Ray server.

2. Become superuser on the Sun Ray server.

    To avoid installation script errors that can occur if user environment settings are carried forward, use the following command:

    ```
    % su - root
    ```

3. Change directory to the downloaded media pack image.

4. Install Sun Ray Software on the Sun Ray server.

    ```
    # ./utsetup
    ```

    See the Examples section below for an example of the `utsetup` output.

    When the script ends, the log files are available at:

    Linux:

    ```
    /var/log/utinstall.year_month_date_hour:minute:second.log
    /var/log/SUNWut/utconfig.year_month_date_hour:minute:second.log
    ```

    Solaris:

    ```
    /var/adm/log/utinstall.year_month_date_hour:minute:second.log
    /var/adm/log/utconfig.year_month_date_hour:minute:second.log
    ```

    The values in the file names reflect a time stamp of when the command was started. Check these files for notices of problems.

    See Section 4.9, "Installation (utinstall) Error Messages" for a listing of `utinstall` error messages.

5. Repeat steps 2 through 4 for each secondary server if in a failover group.

    If you choose the HA group (failover group) configuration during the `utsetup` installation of the primary server, you can copy the generated response file to each secondary server and use the `utsetup` command to replicate the failover group configuration. For example, you can save the response file to the secondary's server's `/tmp` directory and then use the `utsetup -a -D /tmp` command.

    This strategy reduces the time needed to re-enter the same configuration information and can minimize configuration errors. See Section 4.6, "How to Clone a Sun Ray Server" for details.

6. Add the Sun Ray server's host name or IP address to the `sunray-config-servers` and `sunray-servers` DNS entries, which will make the server available to clients for firmware updates and Sun Ray sessions, respectively.

    See Chapter 3, *Planning a Sun Ray Network Environment* for details.

7. Reboot the Sun Ray clients to download and install the new firmware provided by the Sun Ray server.

    > **Note**
    >
    > When installing the Sun Ray Software 5.2 firmware on Sun Ray 3 Series Clients, the smart card LED will blink for approximately 40 seconds as the smart card controller firmware is being updated. This is normal.

8. If you plan to use the Windows connector, install the Windows Connector Components on your designated Windows Server. See Section 4.5, "How to Install the Windows Connector Components on a Windows System" for details.

4.4.3. Installing RandR 1.2 (Linux)

To use the enhanced multi-monitor support on Sun Ray 2FS and Sun Ray 3 Plus Clients running Linux, you must install RandR 1.2 on the Linux Sun Ray server.

1. Become superuser on the Sun Ray server.

2. Change to the `Supplemental/UTrandr/Linux` directory in the downloaded media pack.

3. Install the RandR 1.2 RPM:

    For 32-bit:

    ```
    # rpm -i utXrandr-1.2.3-1.i686.rpm
    ```

    For 64-bit:

    ```
    # rpm -i utXrandr-1.2.3-1.x86_64.rpm
    ```

Once installed, the new 1.2 version of the xrandr command is available in the `/opt/SUNWut/bin` directory. The default version remains in the `/usr/bin` directory.

4.4.4. Installing the JDS Integration Package (Solaris)

The Java Desktop System (JDS) integration package, which delivers a CLI called `uttscwrap` that improves integration of the Windows connector with the JDS desktop on Solaris 10.

1. Change to the `Supplemental` directory in the downloaded media pack.

2. Install the JDS integration package (`SUNWuttscwrap`).

    ```
    # pkgadd -d .
    ```

    The `uttscwrap` command is installed in the `/opt/SUNWuttscwrap/bin` directory. For more information about the `uttscwrap` command, see the *Sun Ray Clients* chapter in the *Administration Guide*.

4.4.5. Adding Locale Support After Installation (Linux)

The `utinstall` script asks about installing the available locale support for the Admin GUI. If you choose to install additional Admin GUI locale support after the installation, you can use the `rpm` command to install the Admin GUI locale packages provided on the installation image:

```
media_pack_directory/srss_4.3/Components/10-SRSS/Content/Sun_Ray_Core_Services_4.3/Linux/Packages
```

4.4.6. Adding Locale Support After Installation (Solaris)

The `utinstall` script asks about installing the available locale support for the Admin GUI. If you choose to install additional Admin GUI locale support after the installation, you can always use the `pkgadd` command to install the Admin GUI locale packages provided on the installation image:

```
media_pack_directory/srss_4.3/Components/10-SRSS/Content/Sun_Ray_Core_Services_4.3/Solaris_10+/sparc/Packages
media_pack_directory/srss_4.3/Components/10-SRSS/Content/Sun_Ray_Core_Services_4.3/Solaris_10+/i386/Packages
```

4.4.7. Configuring a Headless Sun Ray Server (Linux)

If you plan to use a headless Sun Ray server running Linux and Sun Ray clients using Gnome Display Manager (GDM), then this configuration will generate errors on the Sun Ray client and consume CPU processes. The errors occur because GDM assumes that the console display is present and GDM will continually attempt to (and fail to) service a non-existent console device.

The workaround is to add the `-no-console` option to the `preadm` command in the Sun Ray server's `/etc/inittab` file:

```
x:5:respawn:/etc/X11/prefdm --nodaemon --no-console
```

This workaround is not required for Oracle servers, since they have the Integrated Lights Out Manager (ILOM) Service Processor that provides a virtual console.

4.4.7.1. Example Installation Output

The following code output shows an example installing a Linux-based Sun Ray server using the `utsetup -d` command, which installs all the default settings:

```
# ./utsetup -d
==============================================================
=== Installing Sun Ray Software - utinstall ===

License Agreement

Accept? (Y/N) Y

# utinstall-srss   Version: 4.3     Fri Apr 22 16:46:54 EDT 2011

Sun Ray Server Software 4.3            not installed
Sun Ray Data Store 3.3                 not installed
Kiosk Mode 4.3                         not installed
Enter Java v1.6 (or later) location: [/usr/java] (AUTORESPONSE) /usr/java

About to Install Sun Ray Server Software 4.3
Continue? (Y/N) [Y] (AUTORESPONSE) Y

About to carry out the following operations:

Install  [ Sun Ray Server Software 4.3 ]
Install  [ Sun Ray Data Store 3.3 ]
Install  [ Sun Ray Server Software 4.3 French Admin GUI ]
Install  [ Sun Ray Server Software 4.3 Japanese Admin GUI ]
Install  [ Sun Ray Server Software 4.3 Simplified Chinese Admin GUI ]
Install  [ Sun Ray Server Software 4.3  ]
Install  [ Kiosk Mode 4.3 ]
Install  [ Kiosk Mode 4.3 localized files ]
Install  [ data for utslaunch ]
Install  [ Service Tags 1.1 ]

Installing Sun Ray Server Software version 4.3 ...

+++ SUNWuti-4.3-49.i386.rpm

+++ SUNWutid-4.3-49.i386.rpm

+++ SUNWuto-4.3-49.i386.rpm

+++ SUNWutfw-4.3-49.i386.rpm

+++ SUNWutr-4.3-49.i386.rpm

+++ SUNWutu-4.3-49.i386.rpm

+++ SUNWuta-4.3-49.i386.rpm

+++ SUNWutsto-4.3-49.i386.rpm

+++ SUNWutstr-4.3-49.i386.rpm

+++ SUNWutps-4.3-49.i386.rpm

+++ SUNWutkau-4.3-49.i386.rpm

+++ SUNWutio-4.3-49.i386.rpm

+++ SUNWutdsk-4.3-49.i386.rpm

+++ SUNWutgsm-4.3-49.i386.rpm

+++ SUNWutref-4.3-49.i386.rpm

+++ SUNWlibusbut-4.3-49.i386.rpm

Installing Sun Ray Data Store version 3.3 ...

+++ SUNWutdso-3.3-03.i386.rpm

+++ SUNWutdsr-3.3-03.i386.rpm

Installing Sun Ray Server Software version 4.3 Admin GUI ...

+++ SUNWutwa-4.3-49.i386.rpm

+++ SUNWutwar-4.3-49.i386.rpm

+++ SUNWutwh-4.3-49.i386.rpm
```

```
+++ SUNWutwl-4.3-49.i386.rpm

Installing Sun Ray Server Software version 4.3 manpages ...

+++ SUNWutm-4.3-49.i386.rpm

Installing Sun Ray Server Software version 4.3 French Admin GUI ...

+++ SUNWfuta-4.3-05.i386.rpm

+++ SUNWfutwa-4.3-05.i386.rpm

+++ SUNWfutwl-4.3-49.i386.rpm

+++ SUNWfutwh-4.3-05.i386.rpm

Installing Sun Ray Server Software version 4.3 Japanese Admin GUI ...

+++ SUNWjuta-4.3-05.i386.rpm

+++ SUNWjutwa-4.3-05.i386.rpm

+++ SUNWjutwl-4.3-49.i386.rpm

+++ SUNWjutwh-4.3-05.i386.rpm

Installing Sun Ray Server Software version 4.3 Simplified Chinese Admin GUI ...

+++ SUNWcuta-4.3-05.i386.rpm

+++ SUNWcutwa-4.3-05.i386.rpm

+++ SUNWcutwl-4.3-49.i386.rpm

+++ SUNWcutwh-4.3-05.i386.rpm

Installing Sun Ray Server Software version 4.3 Localized files ...

+++ SUNWcuto-4.3-05.i386.rpm

+++ SUNWduto-4.3-05.i386.rpm

+++ SUNWeuto-4.3-05.i386.rpm

+++ SUNWfuto-4.3-05.i386.rpm

+++ SUNWhuto-4.3-05.i386.rpm

+++ SUNWiuto-4.3-05.i386.rpm

+++ SUNWjuto-4.3-05.i386.rpm

+++ SUNWkuto-4.3-05.i386.rpm

Installing Kiosk Mode version 4.3 ...

+++ SUNWkior-4.3-49.i386.rpm

+++ SUNWkio-libs-4.3-49.i386.rpm

+++ SUNWkio-4.3-49.i386.rpm

+++ SUNWkiom-4.3-49.i386.rpm

Installing Kiosk Mode version 4.3 localized files ...

+++ SUNWckio-4.3-05.i386.rpm

+++ SUNWdkio-4.3-05.i386.rpm

+++ SUNWekio-4.3-05.i386.rpm

+++ SUNWfkio-4.3-05.i386.rpm

+++ SUNWhkio-4.3-05.i386.rpm

+++ SUNWikio-4.3-05.i386.rpm

+++ SUNWjkio-4.3-05.i386.rpm

+++ SUNWkkio-4.3-05.i386.rpm

Installing Service Tags version 1.1 ...

+++ SUNWutsvt-1.1-02.i386.rpm

Installation of Sun Ray Server Software has completed.
```

```
+++ Installing 'Sun Ray Connector 2.4'

+++ Adding 'SUNWuttsc'

+++ Adding 'SUNWuttscr'

+++ Adding 'SUNWuttscd'

+++ Adding 'SUNWuttsc-kiosk'

Please check for errors/warnings in

    /var/log/utinstall.2011_04_22_16:46:46.log

+++ Done.

==================================================================
=== Creating directory structure - utacleanup

==================================================================
=== Performing basic configuration - utconfig

Activating product
Product activation output being logged at /var/log/SUNWut/utctl.2011_04_22_16:47:28.log

Configuration of Sun Ray Server Software

This script automates the configuration of the Sun Ray Server Software
and related software products.  Before proceeding, you should have read
the Installation and Configuration Guide for planning purposes. For
your convenience, default values (where applicable) are shown in
brackets.
Continue? (Y/N) [Y] (AUTORESPONSE) Y
Enter new UT admin password:

Again: Enter new UT admin password:


Configure Sun Ray Web Administration? (Y/N) [N] (AUTORESPONSE) N

Configure Sun Ray Kiosk Mode? (Y/N) [N] (AUTORESPONSE) N

Configure this server for a failover group? (Y/N) [N] (AUTORESPONSE) N

About to configure the following software products:

Sun Ray Data Store 3.3
    Hostname: vzsrstb25
    Sun Ray root entry: o=utdata
    Sun Ray root name: utdata
    Sun Ray utdata admin password: (not shown)
    SRDS 'rootdn': cn=admin,o=utdata

Sun Ray Server Software 4.3
    Failover group: no
    Sun Ray Kiosk Mode: no
Continue? (Y/N) [Y] (AUTORESPONSE) Y

Updating Sun Ray Data Store schema ...

Updating Sun Ray Data Store ACL's ...

Creating Sun Ray Data Store ...

Restarting Sun Ray Data Store ...
.
Fri Apr 22 16:47 : utdsd starting

Loading Sun Ray Data Store ...

Executing '/usr/bin/ldapadd -h vzsrstb25 -x -p 7012 -D cn=admin,o=utdata' ...
adding new entry "o=utdata"

adding new entry "o=v1,o=utdata"

adding new entry "utname=vzsrstb25,o=v1,o=utdata"

adding new entry "utname=desktops,utname=vzsrstb25,o=v1,o=utdata"

adding new entry "utname=users,utname=vzsrstb25,o=v1,o=utdata"

adding new entry "utname=logicalTokens,utname=vzsrstb25,o=v1,o=utdata"

adding new entry "utname=rawTokens,utname=vzsrstb25,o=v1,o=utdata"

adding new entry "utname=multihead,utname=vzsrstb25,o=v1,o=utdata"

adding new entry "utname=container,utname=vzsrstb25,o=v1,o=utdata"

adding new entry "utname=properties,utname=vzsrstb25,o=v1,o=utdata"
```

```
adding new entry "cn=utadmin,utname=vzsrstb25,o=v1,o=utdata"

adding new entry "utname=smartCards,utname=vzsrstb25,o=v1,o=utdata"

adding new entry "utordername=probeorder,utname=smartCards,utname=vzsrstb25,o=v1,o=utdata"

adding new entry "utname=policy,utname=vzsrstb25,o=v1,o=utdata"

adding new entry "utname=resDefs,utname=vzsrstb25,o=v1,o=utdata"

adding new entry "utname=prefs,utname=vzsrstb25,o=v1,o=utdata"

adding new entry "utPrefType=resolution,utname=prefs,utname=vzsrstb25,o=v1,o=utdata"

adding new entry "utPrefClass=advisory,utPrefType=resolution,utname=prefs,utname=vzsrstb25,o=v1,o=utdata"


Added 18 new LDAP entries.

Creating Sun Ray Server Software Configuration ...

Unique "/etc/opt/SUNWut/gmSignature" has been generated.

Restarting Sun Ray Data Store ...
.
Fri Apr 22 16:47 : utdsd starting
Adding user admin ...
User(s) added successfully!

************************************************************
The current policy has been modified.  You must restart the
authentication manager to activate the changes.
************************************************************

Enter groupname for Windows Connector [utwc] (AUTORESPONSE) utwc
The group 'utwc' already exists.
A dedicated group should be used for SRWC.
Use existing group anyway (Y/N) [Y] (AUTORESPONSE) Y
Creating required LDAP schema ...
adding new entry "utname=remoteclient,utname=vzsrstb25,o=v1,o=utdata"

adding new entry "utname=users,utname=remoteclient,utname=vzsrstb25,o=v1,o=utdata"

Done.

***************************************************************************
A restart of Sun Ray services is required before the Sun Ray Connector for
Windows Operating Systems is used. Please run :

          /opt/SUNWut/sbin/utstart

Note that this will *NOT* terminate any sessions.
***************************************************************************

Configuration of Sun Ray Server Software has completed.  Please check
the log file, /var/log/SUNWut/utconfig.2011_04_22_16:47:28.log, for errors.

=================================================================
=== Configuring access policy - utpolicy
Enter policy specification as if on utpolicy command line: [-a -g -z both] (AUTORESPONSE) -a -g -z both

The authentication manager must be restarted for changes to take effect.
If a significant policy change has been made then a cold restart must be
initiated with the following command, note that all existing sessions
will be terminated:

        /opt/SUNWut/sbin/utstart -c

If a minor policy change was made then it is not necessary to terminate
existing sessions and a warm restart is sufficient by executing the
following command:

        /opt/SUNWut/sbin/utstart

=================================================================
=== Configuring firmware downloads - utfwadm
Do you want to configure Firmware downloads for Sun Ray clients? (Y/N) [Y] (AUTORESPONSE) Y
CoronaP1     4.3_49_2011.04.15.08.51
SunRayP10    4.3_49_2011.04.15.08.51
CoronaP2     4.3_49_2011.04.15.08.51
CoronaP3     4.3_49_2011.04.15.08.51
CoronaP4     4.3_49_2011.04.15.08.51
CoronaP5     4.3_49_2011.04.15.08.51
CoronaP6     4.3_49_2011.04.15.08.51
CoronaP7     4.3_49_2011.04.15.08.51
SunRayP8     4.3_49_2011.04.15.08.51
SunRayP9     4.3_49_2011.04.15.08.51

=================================================================
```

```
=== Enabling LAN access - utadm
Do you want to enable LAN access for Sun Ray clients at this time? (Y/N) [N] (AUTORESPONSE) N

====================================================================
=== Starting Sun Ray Software - utstart
A cold restart has been initiated... messages will be logged to /var/opt/SUNWut/log/messages.
```

4.5. How to Install the Windows Connector Components on a Windows System

The Windows connector feature enables you to provide Windows remote desktop services on Sun Ray clients. Sun Ray Software provides a number of Windows connector components that you should install on a Windows system to improve the performance and functionality of the remote desktop services.

> **Note**
>
> By default, the remote desktop services are not enabled on Windows 7. You must specifically enable remote access to the Windows system. See http://technet.microsoft.com/en-us/magazine/ff404238.aspx for details.

This procedure provides the steps to install the Windows connector components on a Windows system:

- Multimedia redirection - Enhanced performance for Windows Media Player.

- Adobe Flash acceleration - Enhanced playback capabilities for Adobe Flash content.

- Audio/video synchronization - Enhanced audio and video synchronization for multimedia content.

- USB redirection - Enables access to USB devices connected to a Sun Ray Client from a Windows session.

- Audio input - Enables audio recording on a Sun Ray Client from a Windows session.

If you want to install the Sun Ray Connector Windows components by using the `*.msi` files, you can use a 3rd-party tool to extract the `*.msi` files from the `srs-wininstaller.exe` file.

> **Note**
>
> To bypass the installation UI, you can run `srs-winstaller /S` from the command line.

4.5.1. Steps

1. Log in to the Windows system as Administrator.

2. If you plan to install the USB redirection component on a Virtual Machine (VM), you must add USB drivers on some VMs if they do not provide drivers by default. See the *How to Add USB Drivers to a Virtual Machine* section in the *Administration Guide* for details.

3. Make sure the Windows system has access to the Sun Ray Connector Windows Components installer in the downloaded Sun Ray Software media pack image.

   `media_pack_image/Components/20-SRWC/Content/Sun_Ray_Connector_Windows_Components_2.4`

4. Copy the `srs-winstaller.exe` file to the Windows system.

5. Double-click the **SRS-WINSTALLER** icon to start the Sun Ray Connector Windows Components Setup Wizard.

6. Review the License Agreement and click **I AGREE**.

7. Choose which components you want to install and click **INSTALL**.

   > **Note**

When installing the components on a Windows 7 and Windows 2008 R2 system, only the USB redirection component is available to be installed (the other components are greyed out). SRWC uses the available multimedia capabilities of Windows 7 and Windows 2008 R2, so the SRWC components are not required.

Figure 4.1. Windows Components Setup Window

8. Click FINISH once the installation has finished.

    Restart the Windows system if instructed.

9. Go to the following sections (next steps) based on the features you installed.

    • Multimedia Redirection - Next Steps

    • Adobe Flash Acceleration - Next Steps

    • Audio/Video Synchronization - Next Steps

    • USB Redirection - Next Steps

4.5.2. Multimedia Redirection - Next Steps

The multimedia redirection component does not include an audio/video demux for H.264 (MPEG-4 Part 10) video streams. To ensure

that H.264 video streams (in MP4 or any other format) are accelerated properly, you need to download and install a third-party or freeware solution, such as the MatroskaSplitter freeware: http://haali.cs.msu.ru/mkv/.

4.5.3. Adobe Flash Acceleration - Next Steps

For Adobe Flash animations, users must enable "Third party browser extensions" in their browser's Internet Options.

4.5.4. Audio/Video Synchronization - Next Steps

> **Note**
>
> For audio to work properly, the Sun Ray audio driver must be set as the default. If users have changed their default audio driver, they must perform the following procedure to make the Sun Ray audio driver the default.

1. From the Windows Desktop, choose SETTINGS->CONTROL PANEL.

2. Click **SOUNDS & AUDIO DEVICES**.

3. Click the **AUDIO** tab.

4. If the Sun Ray RDP Audio Driver is not the default, select it and click **APPLY**.

5. Close your browser and reopen it.

4.5.5. USB Redirection - Next Steps

Under MYCOMPUTER, choose PROPERTIES->HARDWARE->DEVICE MANAGER to check if the utSrServerBus entry is displayed under the System devices section. See Figure 4.2, "Verifying USB Redirection Installation" for an example.

Figure 4.2. Verifying USB Redirection Installation
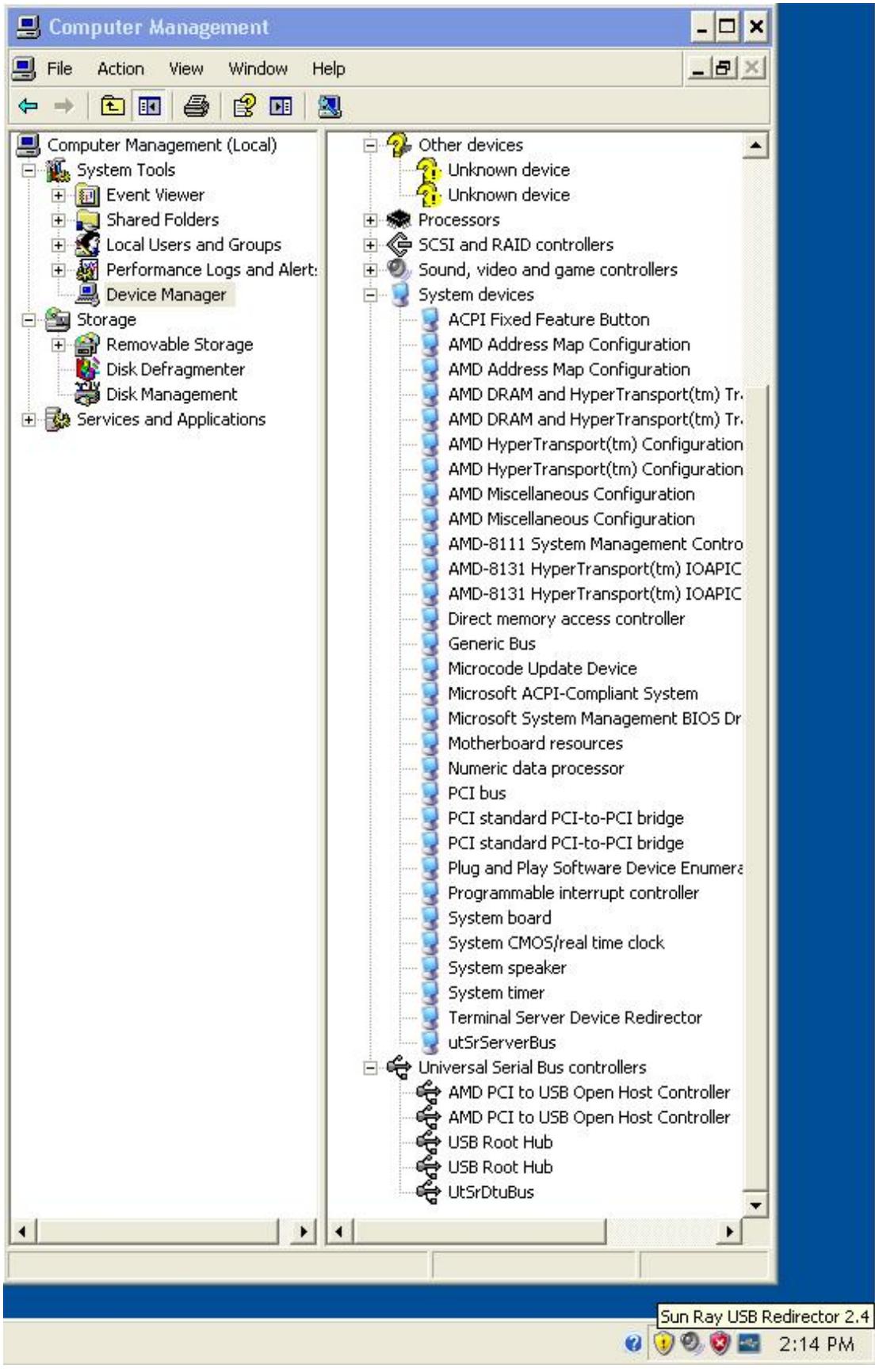
For information about how to verify that USB redirection is working from a new Windows session, see the *How to Verify that USB Redirection is Active* section in the *Administration Guide*.

4.6. How to Clone a Sun Ray Server

The `utsetup` command enables you to install and configure a Sun Ray server with the Sun Ray Software. You can then use the created response files to install and configure other servers. See Section 4.3, "Automating Sun Ray Software Installations" for more information about automating Sun Ray Sofware installations.

Figure 4.3, "Cloning a Sun Ray Server" shows how you can use the `utsetup` command to clone Sun Ray servers.

Figure 4.3. Cloning a Sun Ray Server
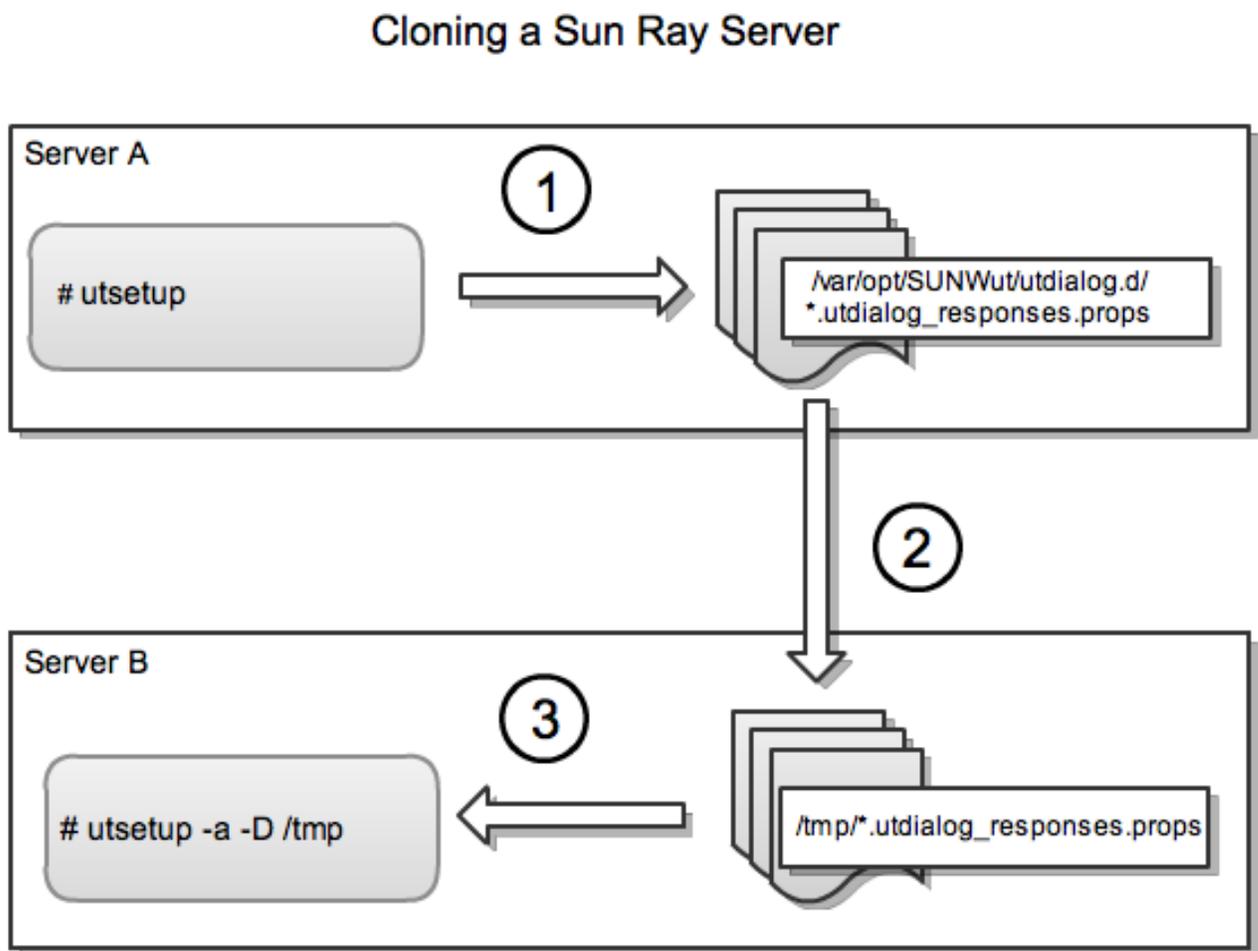
> **Note**
>
> The `*.utdialog_responses.props` files may contain passwords that a malicious user could potentially decode if read, so make sure to use sufficient security precautions when copying them. For example, the files should have secure permissions (not readable by group or "other"), and you should remove the files from their temporary locations after you

▐ complete the configuration.

1. From the Sun Ray Software media pack image, run the `utsetup` command to install and configure a Sun Ray server.

   The responses you provide are saved in the `/var/opt/SUNWut/utdialog.d/*.utdialog_responses.props` files.

2. Copy the response files to another server. In this example, the files are copied to Server B's `/tmp` directory.

3. From the media pack image, run the `utsetup -a -D /tmp` command to clone the installation and configuration on the server that you created in Step 1.

   For members of the same failover group, you can typically apply the configuration without changes. For a new failover group, you may need to edit the response files to create a new configuration (for example to specify a new primary and secondaries for replication). The `utdialog_responses.props(5)` man page gives detail about the format of the files.

4.7. How to Install and Configure a Sun Ray Server With Default Settings

Another way to use the `utsetup` command is to quickly install and configure a server with the default settings.

1. Install, configure, and activate the basic Sun Ray Software product features for standalone use (no failover group configuration) with a minimum of user interaction required (JRE 1.6 must be installed at `/usr/java` before proceeding).

   ```
   utsetup -d
   ```

2. Complete the configuration:

   a. Optionally configure the system in a failover group (if you did not specify identical administration passwords with the `utsetup` command for each system, then you must run the `utpw` command at this time).

      ```
      # utgroupsig
      ```

      ```
      # utreplica -p secondary-server1 [secondary-server2...]
      ```

      or

      ```
      # utreplica -s primary-server
      ```

   b. Optionally configure the kiosk functionality.

      ```
      # utconfig -k -d
      ```

   c. Optionally configure the browser web administration interface (Apache Tomcat must be installed at `/opt/apache-tomcat` before proceeding).

      ```
      utconfig -w -d
      ```

   d. Configure the Sun Ray network services.

      ```
      # utadm -L on
      ```

      or

      ```
      # utadm -A subnet
      ```

      or

      ```
      # utadm -a interface
      ```

e.   Start the Sun Ray services

```
# utstart
```

4.8. How to Remove Sun Ray Software

The following procedure is *not* required for installation or upgrade.

To remove Sun Ray Software in its entirety, follow this procedure.

1.   Log in as the superuser of the Sun Ray server.

2.   Open a shell window and change to the `/opt/SUNWut/sbin` directory.

```
# cd /opt/SUNWut/sbin
```

3.   If you are removing Sun Ray Software from a server in a failover group, disable Sun Ray Client firmware downloads.

For a Private Network	`# ./utfwadm -D -a -n all`
For a Shared Network	`# ./utfwadm -D -a -N all`

4.   Remove the replication configuration.

```
# ./utreplica -u
```

5.   Remove the Sun Ray network interfaces.

```
# ./utadm -r
```

6.   Unconfigure Sun Ray Software.

```
# ./utconfig -u
```

Answer y to all of the prompts.

7.   Uninstall Sun Ray Software.

```
# cd /
# /opt/SUNWut/sbin/utinstall -u
```

Answer y to all of the prompts.

8.   Repeat the steps in this procedure for all remaining Sun Ray servers.

4.9. Installation (utinstall) Error Messages

If during an installation, upgrade, or uninstall the `utinstall` script returns an error, refer to the following table for assistance.

4.9.1. All Installations

Message	Meaning	Resolution
`utinstall: fatal, media-dir is not a valid directory.`	You called the `-d` option, but *media-dir* is incomplete.	The *media-dir* directory requires relevant patches and packages for installation. The *media-dir* directory includes the Sun Ray directory.
`xxxxxx not successfully installed`	Might occur for the installation of any application or patch if relevant packages have not been properly installed.	Verify that he component xxxxxx is present in the installation media directory path and has the correct permissions, then run the `utinstall` script again.
`A different version x.x of product has been detected. The other-product Software is only compatible with product y.y. You must either upgrade or remove the current product installation before proceeding. Exiting ...`	Some of the applications provided with Sun Ray Software are compatible only with certain versions of other applications.	Compatible and necessary applications are included with Sun Ray Software. Remove older versions, then run the `utinstall` script again.
`error, no Sun Ray software packages installed.`	None of the Sun Ray components are installed on this system.	No action is required as the product is not installed.
`The following files were not successfully replaced during this upgrade. The saved copies can be found in directory`	Some files were not properly replaced as part of the upgrade.	Manually copy the listed files from the directory, overwriting the newer files if applicable.
`Partition Name Space Required Space Available` `-------------- -------------- --------------` `partition     xxx            yyy`	Not enough disk space was allocated for partition. Repartition the disk and run `utinstall` again.	

4.9.2. Linux Installations

Message	Meaning	Resolution
`The following packages were not successfully removed xxxxxx ...`	The packages listed have not been properly removed.	Use the `rpm -e` command to remove each listed rpm manually, then run `utinstall -u` again.
`Removal of product was not successfully completed. See log file for more details.`	Removal of Sun Ray Software was incomplete.	Check the log file for the package that started the problem and manually remove it with the `rpm -e` command, then run `utinstall -u` again.

4.9.3. Solaris Installations

Message	Meaning	Resolution
`Cannot open for read admin-file`	The `admin_default` file is unreadable, or you called the `-a` option and the *admin-file* is unreadable.	Verify that the installation administration file exists (`admin_default` or other) and the permissions are correct.
For SPARC platforms: `SunOS release is x.x, valid releases are:`	You are attempting to install Sun Ray Software onto a Solaris software version that	Upgrade to the supported version 10 of the Solaris OS before installing Sun Ray Soft-

Message	Meaning	Resolution
`10`	does not support the Sun Ray Software release.	ware.
For x86 platforms: `SunOS release is x.x, valid releases are: 10`	You are not running a valid OS release for this platform.	Upgrade to the supported version 10 of the Solaris OS before installing Sun Ray Software.
`Please clean up the directory /var/tmp/SUNWut.upgrade before rerunning utinstall`.	Other unrelated files were found in the `preserve` directory.	Remove unrelated files from the directory.
`Please remove the existing preserved file, pre-served_tarfilename, before rerunning utinstall`.	You decided not to restore from the indicated tar file.	Remove the tar file before running `utinstall` again.
`utpreserve: unable to preserve data. Error while creating archive file`	The `utinstall` script failed to preserve existing configuration files.	Either exit and manually preserve these files or just continue.
`The following packages were not successfully removed xxxxxx ...`	The packages listed have not been properly removed.	Use the `pkgrm` command to remove each listed package manually, then run `utinstall -u` again.
`Removal of product was not successfully completed. See log file for more details.`	Removal of Sun Ray Software was incomplete.	Check the log file for the package that started the problem and manually remove it with the `pkgrm` command, then run `utinstall -u` again.

4.9.4. Modified System Files (Solaris)

The following files are modified during `utadm`:

- `/etc/inet/hosts`

- `/etc/inet/networks`

- `/etc/inet/netmasks`

- `/etc/inet/dhcpsvc.conf` # including all DHCP-related files

- `/etc/nsswitch.conf`

- `/etc/hostname.intf`

The following files are modified during Sun Ray service startup:

- `/etc/inet/services`

- `/etc/inet/inetd.conf`

The following files are modified during `utconfig`:

- `/etc/passwd`

- `/etc/shadow`

- `/etc/group`

After installation, the following files are updated upon reboot:

- `/etc/syslog.conf`

- `/etc/pam.conf`

4.9.5. Modified System Files (Linux)

The following files are modified during `utadm`:

- `/etc/dhcpd.conf`

- `/etc/nsswitch.conf`

- `/etc/opt/SUNWut/net/dhcp/SunRay-options`

- `/etc/opt/SUNWut/net/dhcp/SunRay-interface-eth1`

- `/etc/opt/SUNWut/net/hostname.eth1`

- `/etc/opt/SUNWut/net/networks`

- `/etc/opt/SUNWut/net/netmasks`

- `/etc/hosts`

The following files are modified during `utconfig`:

- `/etc/passwd`

- `/etc/shadow`

- `/etc/group`

In addition, display files are created for each Sun Ray Client in the following directories:

- `PreSession`

- `PostSession`

- `Init`

- `PostLogin`

Chapter 5. Configuring Solaris Trusted Extensions

This chapter provides all the procedures that may need to be done when using Sun Ray Software on Solaris Trusted Extensions. For the latest Solaris Trusted Extensions information, see http://download.oracle.com/docs/cd/E19253-01/index.html.

Based on your Sun Ray environment, perform the following procedures as root from ADMIN_LOW (global zone).

5.1. How to Configure a Private Network on Solaris Trusted Extensions

This procedure is required if your Sun Ray server is configured on a private network. See the *Alternate Network Configurations* chapter in the *Administration Guide* for more information.

Use the Solaris Management Console (SMC) Security Templates to assign the `cipso` template to the Sun Ray server. Assign all other Sun Ray devices on the network an `admin_low` label. The `admin_low` template is assigned to the range of IP addresses you are planning to use in the `utadm` command.

The `/etc/security/tsol/tnrhdb` file should contain the following entries when you finish:

```
192.168.128.1:cipso
192.168.128.0:admin_low
```

1. Become root from ADMIN_LOW (global zone).

2. Start the Solaris Management Console (SMC).

   ```
   # smc &
   ```

3. Make the following selections:

   a. In the SMC, select MANAGEMENT TOOLS->SELECT hostname:SCOPE=FILES, POLICY=TSOL.

   b. Select SYSTEM CONFIGURATION->COMPUTERS AND NETWORKS->SECURITY TEMPLATES->CIPSO.

   c. From the menu bar, choose ACTION->PROPERTIES->HOSTS ASSIGNED TO TEMPLATE.

   d. Select **HOST** and type the IP Address of the Sun Ray interconnect

      (for example, 192.168.128.1).

   e. Click **ADD** and then **OK**.

   f. Select SYSTEM CONFIGURATION->COMPUTERS AND NETWORKS->SECURITY FAMILIES->ADMIN_LOW.

   g. From the menu bar, choose ACTION->PROPERTIES->HOSTS ASSIGNED TO TEMPLATE.

   h. Select Wildcard.

   i. Type the IP Address of the Sun Ray Interconnect Network (192.168.128.0).

   j. Click **ADD** and then **OK**.

4. Assign all Sun Ray servers in the failover group a `cipso` label.

   a. Select SYSTEM CONFIGURATION->COMPUTERS AND NETWORKS->SECURITY FAMILIES->CIPSO.

   b. From the menu bar, choose ACTION->PROPERTIES->HOSTS ASSIGNED TO TEMPLATE.

   c. Select Host and type the IP Address of the other Sun Ray server.

   d. Click **ADD** and then **OK**.

5. Reboot the Sun Ray server.

   ```
   # /usr/sbin/reboot
   ```

5.2. How to Configure Shared Multilevel Ports (MLP) for Sun Ray Services

A shared multilevel port has to be added to the global zone for Sun Ray services in order to have access from a labeled zone.

1. Become root from ADMIN_LOW (global zone).

2. Start the Solaris Management Console (SMC).

    ```
    # smc &
    ```

3. Go to Management Tools.

4. Select **HOSTNAME:SCOPE=FILES, POLICY=TSOL**.

5. Select SYSTEM CONFIGURATION->COMPUTERS AND NETWORKS->TRUSTED NETWORK ZONES->GLOBAL.

6. From the menu bar, choose Action->Properties.

7. Click **ADD** under **MULTILEVEL PORTS FOR SHARED IP ADDRESSES**.

8. Add 7007 as Port Number, select TCP as Protocol, and click **OK**.

9. Repeat the previous step for ports 59999, 7010, and 7015.

10. Restart network services by running the following command:

    ```
    # svcadm restart svc:/network/tnctl
    ```

11. Verify that these ports are listed as shared ports by running the following command:

    ```
    # /usr/sbin/tninfo -m global
    ```

12. Reboot the Sun Ray server.

    ```
    # /usr/sbin/reboot
    ```

5.3. How to Increase the Number of X Server Ports

The default entry in `/etc/security/tsol/tnzonecfg` makes three displays available (6001-6003). Increase the number of available X server ports per requirements.

1. Become root from ADMIN_LOW (global zone).

2. Start the Solaris Management Console (SMC).

    ```
    # smc &
    ```

3. Go to Management Tools.

4. Select **HOSTNAME:SCOPE=FILES, POLICY=TSOL** option.

5. Select SYSTEM CONFIGURATION->COMPUTERS AND NETWORKS->TRUSTED NETWORK ZONES->GLOBAL.

6. From the menu bar, choose ACTION->PROPERTIES.

7. Under **MULTILEVEL PORTS FOR ZONE'S IP ADDRESSES**, select 6000-6003/tcp.

8. Click **REMOVE**.

9. Choose ADD->ENABLE SPECIFY A PORT RANGE.

10. Type `6000` in **BEGIN PORT RANGE NUMBER** and `6050` (for 50 displays) in **END PORT RANGE NUMBER**.

11. Select TCP as the **PROTOCOL**.

12. Click **OK**.

13. Reboot the Sun Ray server.

```
# /usr/sbin/reboot
```

5.4. How to Configure the Windows Connector on Solaris Trusted Extensions

This procedure describes how to configure the Windows connector on Solaris Trusted Extensions.

For the Sun Ray Windows Connector to function properly on a Solaris Trusted Extensions server, the Windows terminal server must be made available at the desired level.

1. As superuser, open a shell window on the Sun Ray server.

   To avoid script errors that can occur if user environment settings are carried forward, use the following command:

   ```
   % su - root
   ```

2. Make a Windows system available to the `public` template.

   a. Start the Solaris Management Console.

   ```
   # smc &
   ```

   b. Make the following selections under Management Tools:

   i. Select **HOSTNAME:SCOPE=FILES, POLICY=TSOL**.

   ii. Select SYSTEM CONFIGURATION->COMPUTERS AND NETWORKS->SECURITY TEMPLATES->PUBLIC.

   c. Choose ACTION->PROPERTIES->HOSTS ASSIGNED TO TEMPLATE.

   d. Select Host.

   e. Type the IP Address of the Windows system, for example, 10.6.100.100.

   f. Click **ADD**.

   g. Click **OK**.

3. Configure port 7014 as a shared multilevel port for the `uttscpd` daemon.

   a. If the Solaris Management Console is not already running, start it:

   ```
   # smc &
   ```

   b. Select **HOSTNAME:SCOPE=FILES, POLICY=TSOL**.

   c. Select SYSTEM CONFIGURATION->COMPUTERS AND NETWORKS->TRUSTED NETWORK ZONES->GLOBAL.

   d. Choose ACTION->PROPERTIES.

   e. Enable ports by clicking **ADD** under **MULTILEVEL PORTS FOR SHARED IP ADDRESSES**.

f.   Add 7014 as **PORT NUMBER**, select TCP as the **PROTOCOL**, and click **OK**.

g.   Restart network services.

```
# svcadm restart svc:/network/tnctl
```

h.   Verify that this port is listed as a shared port.

```
# /usr/sbin/tninfo -m global
```

4.   Create entries for the `uttscpd` daemon in each local zone.

The `/etc/services` file entry for the SRWC proxy daemon is created automatically in the global zone at configuration time. Corresponding entries need to be created in the local zones.

These entries can be created manually or by loopback-mounting the global zone `/etc/services` file into the local zones for read access.

To create this entry manually, insert the following entry in the local zone file.

```
uttscpd 7014/tcp # SRWC proxy daemon
```

5.   Loopback mount the `/etc/opt/SUNWuttsc` directory in each local zone. The following example shows how to do this for a zone named `public`

```
# zoneadm -z public halt
# zonecfg -z public

zonecfg:public> add fs
zonecfg:public:fs> set dir=/etc/opt/SUNWuttsc
zonecfg:public:fs> set special=/etc/opt/SUNWuttsc
zonecfg:public:fs> set type=lofs
zonecfg:public:fs> end

# zoneadm -z public boot
```

6.   (Optional) For TLS peer verification to work, make sure the CA certificates to be trusted are available under the `/etc/sfw/openssl/certs` folder in each local zone.

7.   Reboot the Sun Ray server.

```
# /usr/sbin/reboot
```

Chapter 6. Upgrading

This chapter provides instructions on how to upgrade a previously installed Sun Ray server.

6.1. How to Upgrade Sun Ray Software

This procedure describes how to upgrade Sun Ray Software on an existing Sun Ray server. This procedure relies on a specific Sun Ray configuration. See Chapter 4, *Installing and Configuring* for details.

> **Note**
>
> Upgrades from Sun Ray Software 4 10/08 (Sun Ray Server Software 4.1) and later are supported with Sun Ray Software 5.2. You can upgrade directly to the latest Sun Ray Software 5.2.x release update, which means you do not have to upgrade to Sun Ray Software 5.2 first before upgrading to Sun Ray Software 5.2.x.

> **Note**
>
> You cannot migrate a Sun Ray server configuration to a hardware platform of a different Instruction Set Architecture. For example, you cannot migrate an existing SPARC-based Sun Ray server configuration to a new x86-based Sun Ray server.

1. Confirm that the current Sun Ray server meets the Sun Ray Software 5.2 product requirements.

   See Chapter 2, *Product Requirements* for details.

2. If you are upgrading Sun Ray servers in a failover group, consider ways to reduce downtime.

   See Section 6.2, "Planning Upgrades Using Failover Groups" for details.

3. Although the Sun Ray server configuration data is automatically preserved during an upgrade, back up the data before you upgrade.

   See Section 6.3, "How to Preserve Sun Ray Software Configuration Data" for details.

4. Inform users about the upgrade.

   Before you upgrade Sun Ray Software, inform your users of your plans, and have them terminate their sessions. An effect of the upgrade procedure is that all active and suspended sessions are lost.

5. Download and unzip the *Sun Ray Software 5.2 Media Pack* and make it accessible to the Sun Ray server.

6. Become superuser on the Sun Ray server.

   To avoid installation script errors that can occur if user environment settings are carried forward, use the following command:

   ```
   % su - root
   ```

7. If needed, use NFS, FTP, or other means to return the `/var/tmp/SUNWut.upgrade/preserve_version.tar.gz` file to the Sun Ray server.

   This step is needed only if you had to reformat the existing Sun Ray server's hard drive or replaced the current Sun Ray server with a new server. See Section 6.3, "How to Preserve Sun Ray Software Configuration Data" for details.

8. Change directory to the downloaded media pack image.

9. Upgrade the Sun Ray Software.

   ```
   # ./utsetup
   ```

   The `utsetup` script preserves the current Sun Ray Software configuration data in the `/var/tmp/SUNWut.upgrade/preserve_version.tar.gz` file and restores it after the upgrade.

   When the script ends, a log file is available at:

Linux:

```
/var/log/utinstall.year_month_date_hour:minute:second.log
```

Solaris:

```
/var/adm/log/utinstall.year_month_date_hour:minute:second.log
```

The values in the file name reflect a time stamp of when the commands are started. Check these files for notices of installation problems.

See Section 4.9, "Installation (utinstall) Error Messages" for a listing of `utinstall` error messages.

10. If necessary, update the location of the Tomcat installation.

```
# /opt/SUNWut/sbin/utconfig -w
```

See the *Admin GUI Upgrade* section in the *Administration Guide*.

11. Configure the Windows connector feature if it was not previously installed or configured properly on the Sun Ray server.

```
# /opt/SUNWut/sbin/utconfig -c
```

12. Repeat Steps 6 through 11 for each server in failover group.

13. Synchronize the updated firmware on the Sun Ray clients.

You must perform this task on a stand-alone Sun Ray server or the last Sun Ray server configured in a failover group. It takes the current firmware available on the Sun Ray server and upgrades all the firmware on the Sun Ray clients. The Sun Ray clients reboot themselves and load the new firmware.

```
# /opt/SUNWut/sbin/utfwsync
```

14. If you plan to use the Windows connector, upgrade the Windows Connector Components on your designated Windows Server.

There is no upgrade program for the Windows connector components. To upgrade a Windows system with the previous components installed, remove the current Windows connector components and install the new versions.

6.2. Planning Upgrades Using Failover Groups

By configuring two or more Sun Ray servers in a failover group, you can reduce interruption of new service availability in the event that one server fails. If you plan to combine existing Sun Ray servers into a failover group, or to upgrade an existing failover group, please consider the following:

- You should always upgrade the secondary servers first before upgrading the primary server. New functionality from the release may not work until all the servers in the failover group are upgraded.

- Before you upgrade a given server, make sure that Sun Ray Client users terminate their sessions.

> **Note**
>
> If upgrading servers in a large configuration at once is not convenient, upgrade one or two servers at a time until the entire configuration is complete.

- For best results in groups of four or more servers, configure the primary server so that it serves only the Sun Ray data store. Configure the secondary servers so that they serve users directly in addition to serving the data store.

- While upgrading the primary server, secondary servers will not be able to do any updates to the data store.

- To take advantage of the new features in this release, do not mix different Sun Ray Software versions within a failover group. Failover groups that use more than one software version revert to the functionality of the earliest version.

- Using the Admin GUI to restart or reset Sun Ray services does not work across servers with different Sun Ray releases. For example, even if you use the Admin GUI to restart all the servers in a failover group that are running the latest Sun Ray Software release, you should still restart or reset any Sun Ray servers running earlier versions of Sun Ray Software.

- Turn off all firmware updates until all the servers in a failover group are upgraded. For details, see the *How to Disable All Firmware Updates* section in the *Administration Guide*.

  > **Note**
  >
  > Even if you upgrade one or two servers per week, you must wait until all servers in the group are upgraded before you update their firmware.

- If your configuration is a dedicated private interconnect, disconnect the server from the Sun Ray interconnect.

See the *Failover Groups* chapter in the *Administration Guide* for a more general discussion of failover groups, including diagrams of failover topologies.

6.3. How to Preserve Sun Ray Software Configuration Data

When you choose an upgrade, the `utinstall` script automatically preserves your existing configuration information. You must preserve your existing configuration before running the `utinstall` script only in the following situations:

- You are upgrading the operating system on an existing Sun Ray server that requires you to reformat the server's disk.

- You are replacing an existing Sun Ray server hardware with a new server.

In both of these cases, you will need to add the `/var/tmp/SUNWut.upgrade/preserve_version.tar.gz` backup file to the newly installed server before you start the `utinstall` program. The `utinstall` program automatically restores the configuration data in the `/var/tmp/SUNWut.upgrade/preserve_version.tar.gz` after it installs the Sun Ray Software.

> **Note**
>
> If you are using the Solaris upgrade program to upgrade an existing Sun Ray server running a previous Solaris 10 release, you do not need to preserve the configuration data-the upgrade will not overwrite the server's data. However, backing up data before performing an operating system upgrade is always good practice.

The `utpreserve` script in the Sun Ray Software image directory preserves the following information:

- X user settings

- Sun Ray data store

- Authentication Manager configuration files

- `utslaunch` properties

- Failover group information

- Kiosk mode configuration

- Group name used by the Windows connector

The `utpreserve` script does **not** preserve the following information:

- The Sun Ray server's network and DHCP configuration settings (`utadm` configuration information). You must reconfigure those

settings after upgrading the Sun Ray Server Software.

• The `/etc/pam.conf` is not saved. You need to back up and restore this file manually.

6.3.1. Before You Begin

Depending on the size of your configuration, this procedure, including the operating system software upgrade, might take anywhere from five minutes to several hours or even more to complete.

> **Note**
>
> Running the `utpreserve` script stops all Sun Ray daemons and services, including the Sun Ray data store, causing users to lose all of their sessions, both active and disconnected. Make sure to inform them of your plans.

6.3.2. Steps

1. Change directory to the downloaded media pack directory.

2. Preserve the Sun Ray configuration:

    ```
    # ./utpreserve
    ```

    The `utpreserve` script warns that it will stop all Sun Ray services, consequently terminating all user sessions, and asks whether it should continue.

    If you answer `y`, the `utpreserve` script:

    • Stops the Sun Ray services and the Sun Ray data store daemon.

    • Lists the files that are saved.

    • Tars and compresses the entire list of files as the `/var/tmp/SUNWut.upgrade/preserve_version.tar.gz` file, where `version` is the currently installed version of Sun Ray Software.

    • Indicates that a log file is available at
    `/var/adm/log/utpreserve.year_month_date_hour:minute:second.log`

    where `year`, `month`, and so on are represented by numeric values reflecting the time `utpreserve` was started.

    > **Note**
    >
    > Check this log file for notices of errors.

• Recommends that the `/var/tmp/SUNWut.upgrade/preserve_version.tar.gz` file be moved to a safe location before the operating system software upgrade.

> **Note**
>
> If you have modified the `/etc/pam.conf` in a previous version of Sun Ray Software, your changes might be lost when Sun Ray Software is upgraded. To avoid losing your modifications, be sure to save a copy before performing the update, then use the saved copy to restore your earlier modifications.

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---------
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/* $KAME: des.h,v 1.7 2000/09/18 20:59:21 itojun Exp $ */
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/* $NetBSD: des_locl.h,v 1.4 2001/09/09 11:01:02 tls Exp $ */
 /* $KAME: des_locl.h,v 1.6 2000/11/06 13:58:09 itojun Exp $ */
/* crypto/des/des_locl.h */
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/* $NetBSD: des_setkey.c,v 1.8 2002/11/07 07:04:13 thorpej Exp $ */
/* $KAME: des_setkey.c,v 1.6 2001/07/03 14:27:53 itojun Exp $ */
/* crypto/des/set_key.c */
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/* $NetBSD: podd.h,v 1.1 2000/06/14 19:45:36 thorpej Exp $ */
/* $KAME: podd.h,v 1.3 2000/03/27 04:36:34 sumikawa Exp $ */
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Chapter 8. Glossary

8.1. A

Term	Description
AAC	Advanced Audio Coding, a "lossy" compression format capable of delivering relatively high quality at relatively low bit rates.
AH	Authentication headers, used as part of an IPSec implementation.
alias token	An alias token enables a card owner to access the same Sun Ray session with more than one physical token. This setup can be useful, for example, when a user needs a duplicate smart card.
ALP	The Sun Appliance Link Protocol, a suite of network protocols that enable communication between Sun Ray servers and Sun Ray Clients.
AMGH	Automatic Multigroup Hotdesking. See *regional hotdesking*.
authentication policy	The Authentication Manager, using the selected authentication modules, decides what tokens are valid and which users, as token owners, have access to the system and sessions.
authentication token	Although all tokens are used by the Authentication Manager to grant or deny access to Sun Ray sessions, this term usually refers to a user's smart card token. See *token*.

8.2. B

Term	Description
backplane bandwidth	Sometimes also referred to as switch fabric. A switch's backplane is the pipe through which data flows from an input port to an output port. Backplane bandwidth usually refers to the aggregate bandwidth available amongst all ports within a switch.
barrier mechanism	To prevent clients from downloading firmware that is older than the firmware they already have, the administrator can set a barrier mechanism. The barrier mechanism symbol BarrierLevel is defined by default in the DHCP table of Sun Ray servers running version 2.0 or later of Sun Ray Server Software.
bpp	Bits per pixel.

8.3. C

Term	Description
CABAC	Context-adaptive binary arithmetic coding, a "lossless" entropy coding technique used in H.264/MPEG-4 AVC video encoding.
CAM	Controlled Access Mode, was renamed to kiosk mode.
card reader	See token reader.

Term	Description
category 5	The most common type of wiring used in LANs. It is approved for both voice and data (at up to 100 Mhz). Also called cat 5.
client	See Sun Ray client.
client key	An automatically generated public-private key pair that represents a Sun Ray Client or an Oracle Virtual Desktop Client. A client key is used to authenticate the device when it connects to a server.
client-server	A common way to describe network services and the user processes (programs) of those services.
codec	A device or program capable of encoding or decoding a digital data stream or signal.
cold restart	Pressing the Cold Restart button terminates all sessions on a given server before restarting Sun Ray services. See restart.
Configuration GUI	A tool to modify a Sun Ray Client's local configuration for initialization and booting.
cut-through switches	The switch begins forwarding the incoming frame onto the outbound port as soon as it reads the MAC address while continuing to receive the remainder of the frame.

8.4. D

Term	Description
DHCP	Dynamic Host Configuration Protocol, which is a means of distributing IP addresses and initial parameters to the clients.
Display	A group of one or more screens, each of which shows a desktop.
domain	A set of one or more system boards that acts as a separate system capable of booting the OS and running independently of any other board.
DTU	See Sun Ray Client.

8.5. E

Term	Description
ESP	Encapsulating Security Payloads, used as part of IPSec.
Ethernet	Physical and link-level communications mechanism defined by the IEEE 802.3 family of standards.
Ethernet address	The unique hardware address assigned to a computer system or interface board when it is manufactured. See *MAC address*.
Ethernet switch	A unit that redirects packets from input ports to output ports. It can be a component of the Sun Ray interconnect fabric.

8.6. F

Term	Description
failover	The process of transferring processes from a failed server to a functional server.
failover group	Two or more Sun Ray servers configured to provide continuity of service in the event of a network or system failure. Sometimes abbreviated as FOG or HA (for *high availability*). The term *high availability* refers to the benefit of this type of configuration; the term failover group refers to the functionality.
filling station	When a client's firmware is downgraded to an earlier version because it connects to a server running the earlier version, the client needs to be connected to a filling station so that it can download newer firmware. For this purpose, a filling station can be any private network configured for Sun Ray services or any shared network in which the Sun Ray DHCP server is the only DHCP server.
firmware barrier	See barrier mechanism.
FOG	See failover group.
fps	Frames per second.
frame buffer	Video output device that drives the video display. See virtual frame buffer.

8.7. G

Term	Description
GEM	Gigabit Ethernet.
group-wide	Across a failover group.

8.8. H

Term	Description
H.264	A standard for video compression developed by MPEG and VCEG for a wide range of bit rates and resolutions. Also known as MPEG-4 AVC (Advanced Video Coding) and MPEG-4 Part 10.
HA	High availability. Sun Ray HA groups have traditionally been called failover groups.
head	Colloquial term for a screen, or display, or monitor, especially in a context where more than one is used in conjunction with the same keyboard and mouse, as in "multihead" feature.
high availability	See *failover*. The term *high availability* refers to a benefit of this type of configuration; the term failover group refers to the functionality.
hotdesking	The ability for a user to remove a smart card, insert it into any other client within a failover group, and have the user's session "follow" the user, thus allowing the user to have instantaneous access to the user's windowing environment and current applications from multiple clients.
hot key	A predefined key that causes an activity to occur. For example, a hot key is used to display the Settings screen on the Sun Ray Client.

Term	Description
hot-pluggable	A property of a hardware component that can be inserted into or removed from a system that is powered on. USB devices connected to Sun Ray Clients are hot-pluggable.

8.9. I

Term	Description
idle session	A session that is running on a Sun Ray server but to which no user (identified by a smart card token or a pseudo-token) is logged in.
IKE	Internet Key Exchange, a component of IPSec.
intranet	Any network that provides similar services within an organization to those provided by the Internet but which is not necessarily connected to the Internet.
IP address lease	The assignment of an IP address to a computer system for a specified length of time, rather than permanently. IP address leasing is managed by the Dynamic Host Configuration Protocol (DHCP). The IP addresses of Sun Ray Clients are leased.
IPSec	The Internet Protocol (Security) set of protocols seeks to secure IP communications by encoding data packets through authentication headers (*AH*) and encapsulating security payloads (ESP) and by providing a key exchange mechanism (*IKE*).

8.10. K

Term	Description
key	A random sequence of bits that is used with cryptographic algorithms for authentication or encryption.
keyboard country code	A number representing a specific USB keyboard map that can be set in the Sun Ray client firmware to provide better Non-US keyboard support. This code is used if the keyboard returns a country code of 0.
key fingerprint	A user-viewable hexadecimal string representing a public key, which is generated by an MD5 hash based on the public key data.
key pair	A pair of related keys used for authentication. Also known as a public-private key pair. The 'private key' is only known by the owner. The 'public key' is published and distributed. It is used to authenticate the owner of the private key.
Kiosk mode	A facility to deliver an almost unlimited variety of desktops or applications to users, even though the actual desktop or application may be running elsewhere. Kiosk mode bypasses the normal authentication methods of the platform and runs anything that the administrator defines. Kiosk sessions are configured through a Kiosk session type.
Kiosk session	A user session running in kiosk mode. Also called kiosk mode session.
Kiosk session type	A set of scripts and configuration files, which are described by a Kiosk session descriptor file. A Kiosk session type defines the kind of user session that will run in kiosk mode. A session type is sometimes referred to as a session configuration.

8.11. L

Term	Description
LAN	Local Area Network. A group of computer systems in close proximity that can communicate with one another through some connecting hardware and software.
layer 2	The data link layer. The OSI (Open Standards Interconnection) model has a total of seven layers. Layer 2 is concerned with procedures and protocols for operating the communication lines between networks as well as clients and servers. Layer 2 also has the ability to detect and correct message errors.
local host	The CPU or computer on which a software application is running.
local server	From the client's perspective, the most immediate server in the LAN.

8.12. M

Term	Description
MAC address	Media Access Control. A MAC address is a 48-bit number programmed into each local area network interface card (NIC) at the time of manufacture. LAN packets contain destination and source MAC names and can be used by bridges to filter, process, and forward packets. 8:0:20:9e:51:cf is an example of a MAC address. See also Ethernet address
managed object	An object monitored by the Sun Management Center software.
mobile token	If mobile sessions are enabled, a user can log into an existing session from different locations without a smart card, in which case the user name is associated with the session. This type of pseudo-token is called a mobile token.
mobility	For the purposes of the Sun Ray Server Software, the property of a session that allows it to follow a user from one client to another within a server group. On the Sun Ray system, mobility requires the use of a smart card or other identifying mechanism.
modules	Authentication modules are used to implement various site-selectable authentication policies.
MPPC	Microsoft Point-to-Point Compression protocol.
MTU	Maximum Transmission Unit, used to specify the number of bytes in the largest packet a network can transmit.
multicasting	The process of enabling communication between Sun Ray servers over their Sun Ray network interfaces in a failover environment.
multihead	A type of multiple monitor configuration that enables you to merge and control multiple Sun Ray Client screens or heads, using a single keyboard and mouse attached to a primary client. The clients must be configured into a multihead group.
multi-monitor	A type of multiple monitor configuration that supports multiple monitors connected to the dual video connectors on a Sun Ray 2FS or Sun Ray 3 Plus Client. By using RandR 1.2, the multiple monitors are managed as one display.
multiplexing	The process of transmitting multiple channels across one communications circuit.

8.13. N

Term	Description
namespace	A set of names in which a specified ID must be unique.
NAT	See *network address translation*.
network	Technically, the hardware connecting various computer systems enabling them to communicate. Informally, the systems so connected.
network address	The IP address used to specify a network.
network address translation	NAT. Network address translation typically involves the mapping of port numbers to allow multiple machines (Sun Ray Clients in this case, but not Sun Ray servers) to share a single IP address.
network interface	An access point to a computer system on a network. Each interface is associated with a physical device. However, a physical device can have multiple network interfaces.
network interface card	NIC. The hardware that links a workstation or server to a network device.
network latency	The time delay associated with moving information through a network. Interactive applications such as voice, video displays and multimedia applications are sensitive to these delays.
network mask	A number used by software to separate the local subnet address from the rest of a given Internet protocol address. An example of a network mask for a class C network is 255.255.255.0.
network protocol stack	A network suite of protocols organized in a hierarchy of layers called a stack. TCP/IP is an example of a Sun Ray protocol stack.
NIC	Network interface card.
non-smart card mobility	A mobile session on a Sun Ray Client that does not rely on a smart card. NSCM requires a policy that allows *pseudo-token*.
NSCM	See non-smart card mobility.

8.14. O

Term	Description
Oracle Virtual Desktop Client	A software application that runs on a common client operating systems and provides the ability to connect to a desktop session running on a Sun Ray server. It is a software version of a Sun Ray Client. The desktop running the application is also referred to as an Oracle Virtual Desktop Client in this document.
OSD	On-screen display. The Sun Ray Client uses OSD icons to alert the user about potential start-up or connectivity problems.
Output	A single instance of a physical monitor. Each output has a physical video connector.

8.15. P

Term	Description
PAM	Pluggable Authentication Module. A set of dynamically loadable objects that gives system administrators the flexibility of choosing among available user authentication services.
PAM session	A single PAM handle and runtime state associated with all PAM items, data, and the like.
patch	A collection of files and directories that replaces or updates existing files and directories that prevent proper execution of the software on a computer system. The patch software is derived from a specified package format and can only be installed if the package it fixes is already present.
PCM	Pulse Code Modulation.
policy	See authentication policy.
Pop-up GUI	See Configuration GUI.
port	(1) A location for passing data in and out of a computer system. (2) The abstraction used by Internet transport protocols to distinguish among multiple simultaneous connections to a single destination host.
POST	Power-on self test.
power cycling	Using the power cord to restart a client.
private network	A network configuration where Sun Ray Clients are directly connected to the Sun Ray server, that is, the server has a network interface connected to the subnet and the server is devoted entirely to carrying Sun Ray traffic. Also known as directly-connected dedicated interconnect or private interconnect.
pseudo-session	A Sun Ray session associated with a pseudo-token rather than a smart card token.
pseudo-token	A user accessing a Sun Ray session without a smart card is identified by the client's built-in type and MAC address, known as a pseudo-token. See *token*.

8.16. R

Term	Description
RDP	Microsoft Remote Desktop Protocol.
regional hotdesking	Enables users to access their sessions across wider domains and greater physical distances than was possible in earlier versions of SRSS. Administrators enable this feature by defining how user sessions are mapped to an expanded list of servers in multiple failover groups. Originally known as Automatic Multigroup Hotdesking (AMGH).
restart	Sun Ray services can be restarted either from the `utstart` command or with the Warm Restart or Cold Restart buttons through the Admin GUI. A cold restart terminates all Sun Ray sessions; a warm restart does not.
RDS	Remote Desktop Services. Formally known as Terminal Services. See Windows Terminal Services.
RHA	Remote Hotdesk Authentication, a security enhancement that requires SRSS authentication before users can reconnect to an existing session. RHA does not apply to Kiosk sessions, which are designed for anonymous access without authentication. RHA policy can be administered either through a GUI option or with the `utpolicy` command.

8.17. S

screen	A monitor or group of monitors that show a single desktop to a user. A screen can be provided by a single monitor or by multiple monitors on a Sun Ray client with dual video connectors, such as the Sun Ray 3 Plus. Multiple monitors in a multihead configuration can also show a single desktop when using Xinerama.
screen flipping	The ability to pan to individual screens that were originally created by a multihead group on a client with a single head.
server	A computer system that supplies computing services or resources to one or more clients.
service	For the purposes of the Sun Ray Server Software, any application that can directly connect to the Sun Ray Client. It can include audio, video, X servers, access to other machines, and device control of the client.
session	A group of services associated with an authentication token. A session may be associated with a token embedded on a smart card. See *token*.
session mobility	The ability for a session to "follow" a user's login ID or a token embedded on a smart card.
smart card	Generically, a plastic card containing a microprocessor capable of making calculations. Smart cards that can be used to initiate or connect to Sun Ray sessions contain identifiers such as the card type and ID. Smart card tokens may also be registered in the Sun Ray data store, either by the Sun Ray administrator or, if the administrator chooses, by the user.
smart card-based authentication	Using a smart card to authenticate a card holder based on credentials supplied by the card and authentication information from the card holder, such as a PIN or biometric data. Requires Solaris middleware.
smart card-based session mobility	Using a smart card to provide a unique token ID and token type that enables SRSS to locate the card holder's session. In some cases, card holders might be required to authenticate themselves using smart card-based authentication.
smart card token	An authentication token contained on a smart card. See *token*.
SNMP	Simple Network Management Protocol
spanning tree	The spanning tree protocol is an intelligent algorithm that enables bridges to map a redundant topology and eliminates packet looping in Local Area Networks (LAN).
store-and-forward switches	The switch reads and stores the entire incoming frame in a buffer, checks it for errors, reads and looks up the MAC addresses, and then forwards the complete good frame out onto the outbound port.
subnet	A working scheme that divides a single logical network into smaller physical networks to simplify routing.
Sun Ray Client	A hardware client that obtains a desktop session from a Sun Ray server. The software client counterpart is called an Oracle Virtual Desktop Client. Previously referred to as Sun Ray thin clients, Sun Ray virtual display terminals, and Sun Ray DTUs (Desktop Terminal Units).
Sun Ray Software core	The core part of the Sun Ray Software, which doesn't usually refer to the desktop connector or kiosk mode features. Previously referred to as Sun Ray Server Software.
system	The Sun Ray system consists of Sun Ray Clients, servers, server software, and the physical

	networks that connect them.

8.18. T

thin client	Thin clients remotely access some resources of a computer server such as compute power and large memory capacity. The Sun Ray Clients rely on the server for all computing power and storage.
tick	The time interval since a specified network event. Early versions of SRSS defined a tick as 1/50th of a second. It is now defined as 1/100th of a second, which is the usual *SNMP* convention.
timeout value	The maximum allowed time interval between communications from a client to the Authentication Manager.
token	The Sun Ray system requires each user to present a token that the Authentication Manager uses to allow or deny access to the system and to sessions. A token consists of a type and an ID. If the user uses a smart card, the smart card's type and ID are used as the token. If the user is not using a smart card, the client's built-in type and ID (the unit's Ethernet, or MAC, address) are used instead as a pseudo-token. If mobile sessions are enabled, a user can log into an existing session from different locations without a smart card, in which case the user name is associated with the session. A pseudo-token used for mobile sessions is called a mobile token. *Alias tokens* can also be created to enable users to access the same session with more than one physical token.
token reader	A Sun Ray Client that is dedicated to reading smart cards and returning their identifiers, which can be associated with card owners (that is, with users).
trusted server	Servers in the same failover group that "trust" one another through a common group signature.

8.19. U

USB	Universal Serial Bus.
user session	A session that is running on a Sun Ray server and to which a user, identified by a smart card token or a pseudo toke, is logged in.

8.20. V

VC-1	Informal name of the SMPTE 421M video codec standard, now a supported standard for Blu-ray discs and Windows Media Video 9.
virtual desktop	A virtual machine containing a desktop instance that is executed and managed within the virtual desktop infrastructure, usually a Windows XP or Vista desktop accessed through *RDP*.
VMware View connector	Enables Sun Ray Client users to connect to Windows virtual machines through the VMware View Manager. Previous to the Sun Ray Software 5.2 release, the VMware View connector was known as the Sun Ray Connector for VMWare View Manager (SRVC) add-on component. In this release, the VMware View connector is automatically installed as part of the Sun Ray Software product.
virtual frame buffer	A region of memory on the Sun Ray server that contains the current state of a user's display.
VLAN	Virtual Local Area Network.
VPN	Virtual Private Network.

8.21. W

Term	Description
WAN	Wide Area Network.
warm restart	See restart.
WMA	Windows Media Audio data compression file format and codec developed by Microsoft.
work group	A collection of associated users who exist in near proximity to one another. A set of Sun Ray Clients that are connected to a Sun Ray server provides computing services to a work group.
Windows connector	A Microsoft Remote Desktop Protocol (RDP) client that enables Sun Ray users to access applications running on remote Microsoft Windows systems. Previous to the Sun Ray Software 5.2 release, the Windows connector was known as Sun Ray Connector for Windows OS or SRWC, and it had to be separately installed. In this release, the Windows connector is automatically installed as part of the Sun Ray Software product.
Windows system	A generic term used throughout the Sun Ray Software documentation to indicate a remote desktop server running the Windows OS that can be accessed remotely from a Sun Ray Client using the Windows connector. See Windows Terminal Service for the different ways a remote desktop is provided based on the Windows OS.
Windows Terminal Service	A Microsoft Windows component that makes Windows applications and desktops accessible to remote users and clients. Depending on the Windows release, this feature may be called Terminal Services, Remote Desktop Services, or Remote Desktop Connection.

8.22. X

Term	Description
Xnewt	The new default X server for Sun Ray Server Software 4.1 and later on Solaris.
X server	A process that controls a bitmap display device in an X Window System. It performs operations on request from client applications. Sun Ray Server Software contains two X servers: Xsun, which was the default Xserver in previous versions of SRSS, and Xnewt, which is the default Xserver for SRSS 4.1 and later. Xnewt enables the latest multimedia capabilities.

8.23. Y

Term	Description
YUV	Simple, lossless mechanism to store images or a sequence of images.