Sun Ray Enterprise Server Software 1.0 Administrator's Guide

THE NETWORK IS THE COMPUTER™

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Part No.: 805-7915-10
Revision A, June 1999

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THE NETWORK IS THE COMPUTER™

Contents

Preface

The *Sun Ray Enterprise Server Software 1.0 Administrator's Guide* provides instructions for setting up, administering, and monitoring a system of Sun Ray 1 enterprise appliances. These instructions are designed for an experienced system administrator with networking knowledge.

Before You Read This Book

Read the *Sun Ray Enterprise Server Software 1.0 Installation Guide*, and the *Sun Ray Enterprise Server Software 1.0 Product Notes*.

This guide assumes that you have installed the Sun Ray server software on your server from the Sun Ray enterprise server software 1.0 CD and that you have added the required patches.

How This Book Is Organized

Chapter 1 describes the Sun Ray 1 hardware and how the Sun Ray software works.

Chapter 2 describes the hardware and software requirements for a Sun Ray system. It also gives the specifications for hardware that is compatible with the Sun Ray 1 hardware.

Chapter 3 describes how to configure the Sun Ray server software and the supporting software.

Chapter 4 describes how to configure a default Sun Ray system.

Chapter 5 details how to modify the Sun Ray system from the available options.

Chapter 6 introduces the Sun Ray administration application, which is used to manage Sun Ray users and Sun Ray 1 enterprise appliances.

Chapter 7 describes how to use the Sun Ray administration application to manage Sun Ray 1 enterprise appliances.

Chapter 8 describes how to use the Sun Ray administration application to manage Sun Ray users.

Chapter 9 describes how to remove the Sun Ray server software from the server.

Appendix A provides troubleshooting information.

Appendix B provides tips for using non-Sun web servers.

Appendix C describes the different components in the Sun Ray server software where a language selection can be made.

Appendix D lists error messages from the Authentication Manager and their meanings.

Using UNIX Commands

This document does not contain information on basic UNIX commands and procedures such as shutting down the system, booting the system, or configuring devices.

For this information, see the AnswerBook2 online documentation for the Solaris 2.6 or 7 software environment.

This document does contain information about unique Sun Ray system commands.

Typographic Conventions

The following table describes the typographic conventions used in this book.

TABLE P-1 Typographic Conventions

Typeface or Symbol	Meaning	Examples
`AaBbCc123`	The names of commands, files, and directories; on-screen computer output.	Edit your `.login` file. Use `ls -a` to list all files. `% You have mail.`
`AaBbCc123`	What you type, when contrasted with on-screen computer output.	`%` **`su`** `Password:`
AaBbCc123	Book titles, new words or terms, words to be emphasized. Command-line variable; replace with a real name or value.	Read Chapter 6 in the *User's Guide.* These are called *class* options. You *must* be `root` to do this. To delete a file, type `rm` *filename.*

Shell Prompts

The following table lists the default system prompt and superuser prompt for the C shell, Bourne shell, and Korn shell.

TABLE P-2 Shell Prompts

Shell	Prompt
C shell	*machine_name*%
C shell superuser	*machine_name*#
Bourne shell and Korn shell	$
Bourne shell and Korn shell superuser	#

Related Documentation

TABLE P-3 Related Documentation

Application	Title	Part Number
Setup, Icons, and LEDs	*Sun Ray 1 Troubleshooting Guide (English)*	805-7871-10
Safety and Compliance	*Sun Ray 1 Safety and Compliance Guide*	805-7870-10
Installation	*Sun Ray Enterprise Server Software 1.0 Installation Guide (English)*	805-7916-10
Product Notes	*Sun Ray Enterprise Server Software 1.0 Product Notes (English)*	805-7918-10

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CHAPTER 1

Sun Ray System Overview

This chapter describes the following components and how they work:

Sun Ray System

The Sun Ray system consists of a Solaris server running the Sun Ray enterprise server software, Sun Ray 1 enterprise appliances, and an *interconnect–fabric* (network) that ties the server and the appliances together (FIGURE 1-1). The software is installed on a server running the Solaris 2.6 or Solaris 7 operating environment.

With the Sun Ray server software, an end user has access to all Solaris applications and a variety of X-Windows and legacy (mainframe) applications (currently third-party emulations). With the installation of third-party applications such as WinFrame from Citrix, an end user can access Microsoft Windows NT applications.

Note – Because the Sun Ray server software is server-based technology, the ratio of appliances to servers depends on the type of applications and their access patterns.

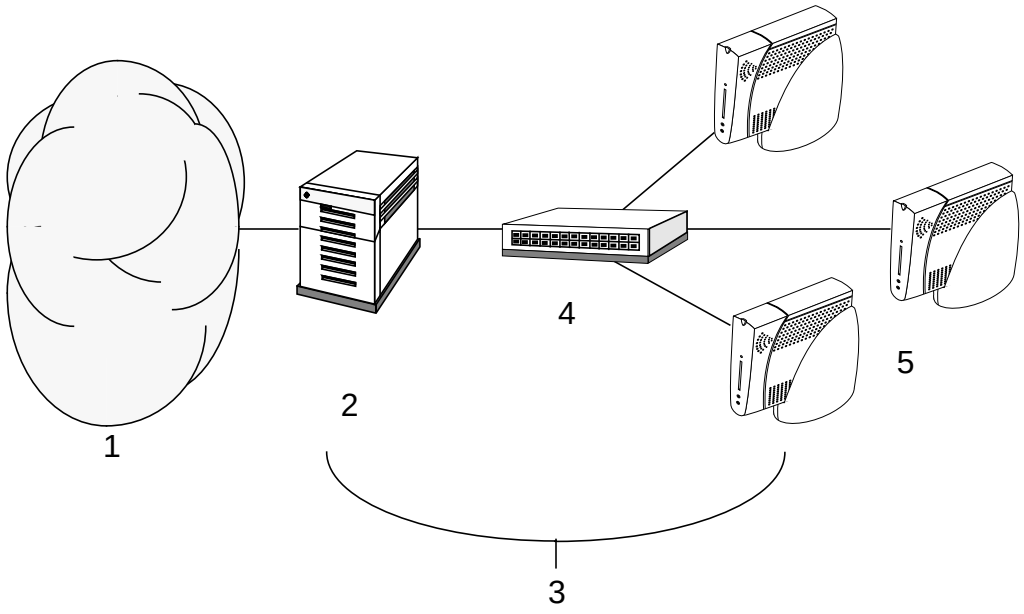


FIGURE 1-1 An Example Sun Ray System

Legend:

1. Local area network (LAN) — existing connection to intranet or internet
2. Sun Ray server — executes applications
3. Interconnect fabric — private network dedicated to Sun Ray 1 appliances (not part of the LAN)
4. Switch
5. Sun Ray 1 appliances

The Sun Ray system administrator's responsibilities are to set up, modify, and administer the Sun Ray server software and the interconnect fabric (Sun Ray network) as shown in FIGURE 1-1.

Peripheral devices such as keyboards and mice that are added to the appliances via USB are automatically recognized when attached (*hot-pluggable*). The Sun Ray server administers these peripherals.

Sun Ray Hardware

This section describes the various hardware components specific to the Sun Ray system.

- server
- appliance
- interconnect fabric

This section does not discuss the Sun Ray network configuration.

Sun Ray Server

The Sun Ray server software is designed to operate on a server running the Solaris 2.6 or Solaris 7 operating environment and is used to support the appliances. See “Sun Ray Server Software” on page 14 for more information.

Sun Ray 1 Enterprise Appliance

The Sun Ray 1 appliance is the ultimate in thin clients. It delivers the full functionality of a workstation or a multimedia PC. The key features of the units include the following:

- 24-bit, 2D accelerated graphics at up to 1280x1024 resolution at 76 Hz
- Multichannel audio input and output capabilities
- Composite video input
- Smart card reader
- USB ports that support hot-pluggable peripherals

Each appliance requires a monitor, keyboard, and mouse.

Essentially, the appliance acts as a frame buffer on the client–side of the Sun Ray network. Applications are run on the server and render their output to a *virtual frame buffer*. The Sun Ray server software formats and sends the rendered output to the appropriate appliance, where it is interpreted and displayed.

Sun Ray 1 appliances are identical, with the exception of the Ethernet address. If an appliance fails, you can just replace it with another appliance. Sun Ray 1 appliance IP addresses are leased. IP address leasing is managed by the Dynamic Host Configuration Protocol (DHCP).

Firmware Module

The Sun Ray 1 appliance has a small firmware module that can be updated from the server. This module checks the hardware with a power–on self test (POST) and boots the unit. The Sun Ray 1 appliance also contacts the server to authenticate the end user, and handles low-level input (such as keyboard, mouse, and display information) and output. If there is a problem with the appliance, the module displays an on–screen display (OSD) icon on the screen.

Front Panel Features

The two most visible connectors (FIGURE 1-2) are the headphone output and the microphone input below the smart card reader slot. The headphone connector is designed to work with low impedance stereo headphones. The end user can adjust the headphone and speaker volume using a Sun keyboard or using the Settings screen. The microphone input supports non-powered and self-powered microphones. The end user can adjust the volume level and microphone input from the Settings screen.

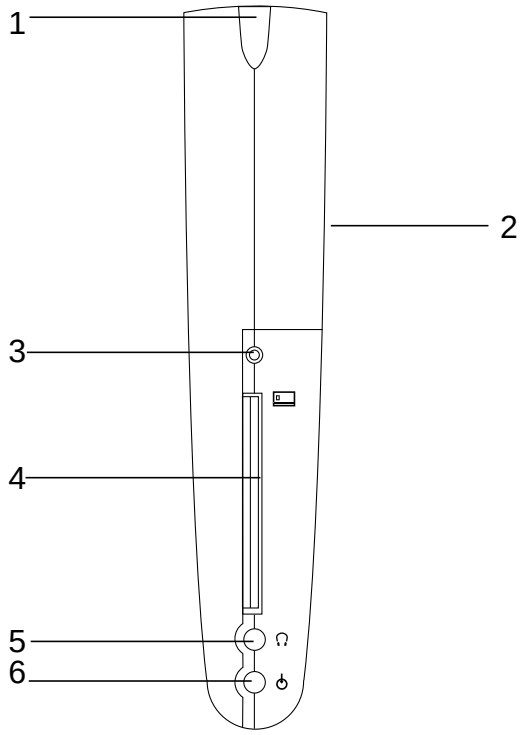


FIGURE 1-2 Front Features of the Sun Ray 1 Enterprise Appliance

Legend:

1. Power — LED illuminates when the appliance is powered on
2. Speaker — plays back a stereo audio signal mixed into a monaural signal
3. Smart card reader LED — illuminates when a smart card is inserted
4. Smart card reader — accepts a valid smart card
5. Headphone output — designed to work with low impedance stereo headphones
6. Microphone input — the microphone volume is adjustable through software

Back Panel Features

In addition to the speaker near the front of the appliance you can also attach speakers to the line-out connection on the rear of the appliance (FIGURE 1-3).

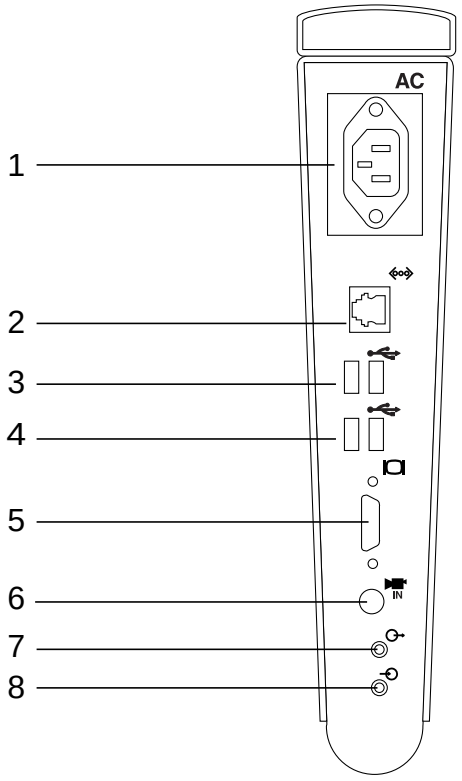


FIGURE 1-3 Rear Features of the Sun Ray 1 Enterprise Appliance

Legend:

1. Power — the power cord connects to this receptable
2. Network Connector — 100BaseT Ethernet cable receptacle (RJ-45)
3. USB port 1 and 2 — standard USB port for peripherals
4. USB port 3 and 4 — standard USB port for peripherals
5. Video — output for a standard (15-pin VGA) monitor
6. Video in — input for a device that provides a composite video signal
7. Stereo audio signal line–out 1/8 inch (3.5mm) stereo mini-plug — output to an audio device
8. Stereo audio signal line–in 1/8 inch (3.5mm) stereo mini-plug — input from an audio device

Note – USB keyboards and mice can be attached to any available USB port on a Sun Ray 1 appliance.

Video Capabilities

The video in (*composite*) connector accepts video signals supplied by standard VCRs, camcorders, video disc players, or video cameras. Stereo audio can be supplied through the line-in port. The following television video standards are compatible with the Sun Ray 1 appliance:

- NTSC M
- PAL B/G/I

Connecting Devices

The Sun Ray 1 appliance can use the SunCamera II video camera via the composite video input connector (FIGURE 1-3). You can also attach standard VCRs or camcorders using the composite video connector. The Sun Ray 1 appliance does not manipulate or edit the incoming composite video stream. Refer to your application (for example, video conferencing or video editing) documentation for details on how to bring the data into an application.

Always refer to the product manual for complete instructions about the device you want to attach.

Audio Capabilities

The Sun Ray 1 appliance can connect with other audio equipment to record and play back sound. The volume can be adjusted via the keyboard or through the Settings screen.

The Sun Ray 1 appliance senses the presence of headphone, microphone, and line-in and reflects their presence in the Settings screen. The Sun Ray server software also provides all common sample rates from 8 kHz to 48 kHz.

Adjusting Volume

The end user can use the Sun keyboard's audio keys (FIGURE 1-4) to increase or decrease the volume from the speaker or headphone. Changes can also be made and are reflected on the Settings screen. For example, pressing the Audio Volume Up key (item 3 in FIGURE 1-4) to increase the volume is also reflected via the slider on the Settings screen.

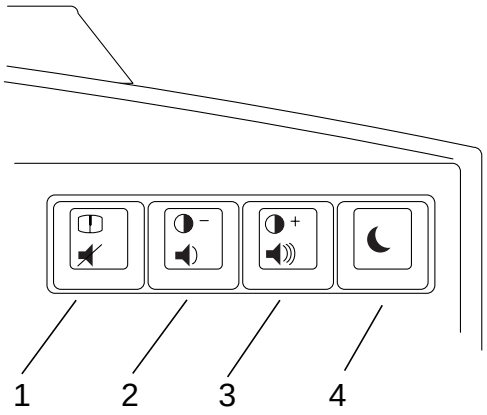


FIGURE 1-4 Audio Key Icons

Legend:

1. Mute Audio key
2. Audio Volume Down key
3. Audio Volume Up key
4. Power Control key

Audio Muting

Instant muting of audio is available either from the keyboard or the Settings screen. Pressing the Mute Audio key on an appliance's keyboard is also reflected on the Settings screen.

Audio Playback

The Sun Ray server software mixes with other protocol-based sources, such as media players and the X11 bell, at the desktop during playback. The application playback volume does not affect the desktop volume control. The Sun Ray server software uses a master volume controller (FIGURE 1-5) that allows several feeds (for example, from applications).

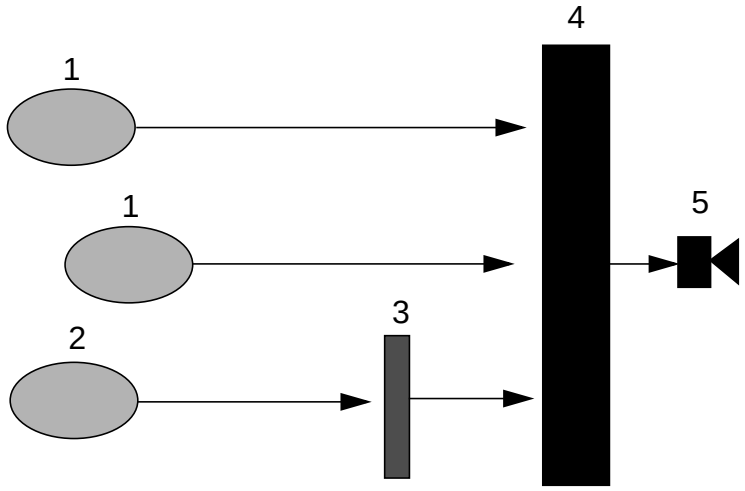


FIGURE 1-5 Sun Ray Server Software Master Volume Strategy

Legend:

1. Direct application(s) volume levels (for example, X11 bell)
2. Solaris `/dev/audio` application
3. Solaris audio device emulator volume control
4. Sun Ray master volume controller
5. Audio output

The Sun Ray 1 appliance uses an internal speaker, located on the right-hand side of the casing, to playback a stereo audio signal mixed into a monaural signal. Refer to FIGURE 1-2 for the location of the speaker.

Audio playback via headphones is also available (FIGURE 1-2). The end user can adjust the headphone volume using the Settings screen or the Sun keyboard. Keyboard beeps can be controlled through the Common Desktop Environment (CDE). Refer to the `xset` man page for additional information.

Audio Recording

Refer to your recording application's documentation for specific information on recording sound.

Connecting Devices

Audio line-in and line-out are located on the rear of the appliance. The end user can use these connections for recording standard audio output similar to VCRs, tape decks, and for external powered speakers and power amps.

Note – The audio line-out is at a fixed level and is not adjustable. Audio line input level can be adjusted through the Settings screen.

The end user can use a variety of external audio devices with a Sun Ray 1 appliance. Always refer to the product manual for complete instructions about the device the end user wants to attach.

Device Emulation Capabilities

Each time an end user logs into a Sun Ray 1 appliance, a script automatically assigns the `$AUDIODEV` environment variable to that session. One `utaudio(1)` real-time process is assigned to each session. Refer to the `audio(7i)` man page for more information.

Note – If a program is hardwired to use `/dev/audio`, there is a dynamic library supplied (directed to by the `LD_PRELOAD` environment variable in each session), which redirects requests to the Sun Ray 1 appliance audio device emulator. For more information about the library, see "Troubleshooting" on page 141.

The emulated audio device follows (moves from desktop to desktop) the end user session. The device name appears in the `$AUDIODEV` environment variable, but is transparently interpreted by audio programs for Sun systems. Device nodes currently appear in the `/tmp/SUNWut/dev/utaudio` directory.

Caution – Do not remove the /tmp/SUNWut/dev/utaudio directory. Deleting this directory prevents existing end users (with utaudio sessions) from using their audio pseudo device nodes. This directory tree is completely recreated at boot time.

If your application uses `/dev/audio`, the Sun Ray server software reroutes the audio signal appropriately.

Sun Ray Interconnect Fabric

The Sun Ray interconnect fabric is a dedicated and private network. The Sun Ray 1 appliances are connected to the server over this network using an application-specific protocol. This network is based on 10/100BaseT Ethernet technology, using unmanaged (*level-2*) switches or hubs and *category 5* wiring.

Note – Category 3 wiring using 10BaseT equipment can be used, but with reduced performance.

Each Sun Ray 1 appliance is attached to the interconnect fabric via its built-in 10/100BaseT interface.

The scenarios described in the following paragraphs are intended to be conservative methods of providing good desktop performance to Sun Ray users at a low cost. Many other network scenarios are possible.

Caution – To avoid performance degradation, do not connect Sun Ray 1 appliances to networks with other devices.

Currently, 100BaseT and gigabit Ethernet provide the lowest cost and most simple operation.

Workgroup Scenario

For small workgroups with between five and 50 Sun Ray 1 appliances, the Sun Ray server uses either single 100BaseT cards or a quad 100BaseT card to connect to small (eight to 12 port), shared 100BaseT hubs. These hubs, in turn connect to the Sun Ray 1 appliances.

For example (FIGURE 1-6), a Sun Enterprise 2 (or a similar model) server with a quad FastEthernet card and four inexpensive 100BaseT hubs can easily support 24 users. Each link from the Sun Enterprise 2 transmits the traffic for six Sun Ray 1 appliances. This example represents a 6:1 multiplexing ratio.

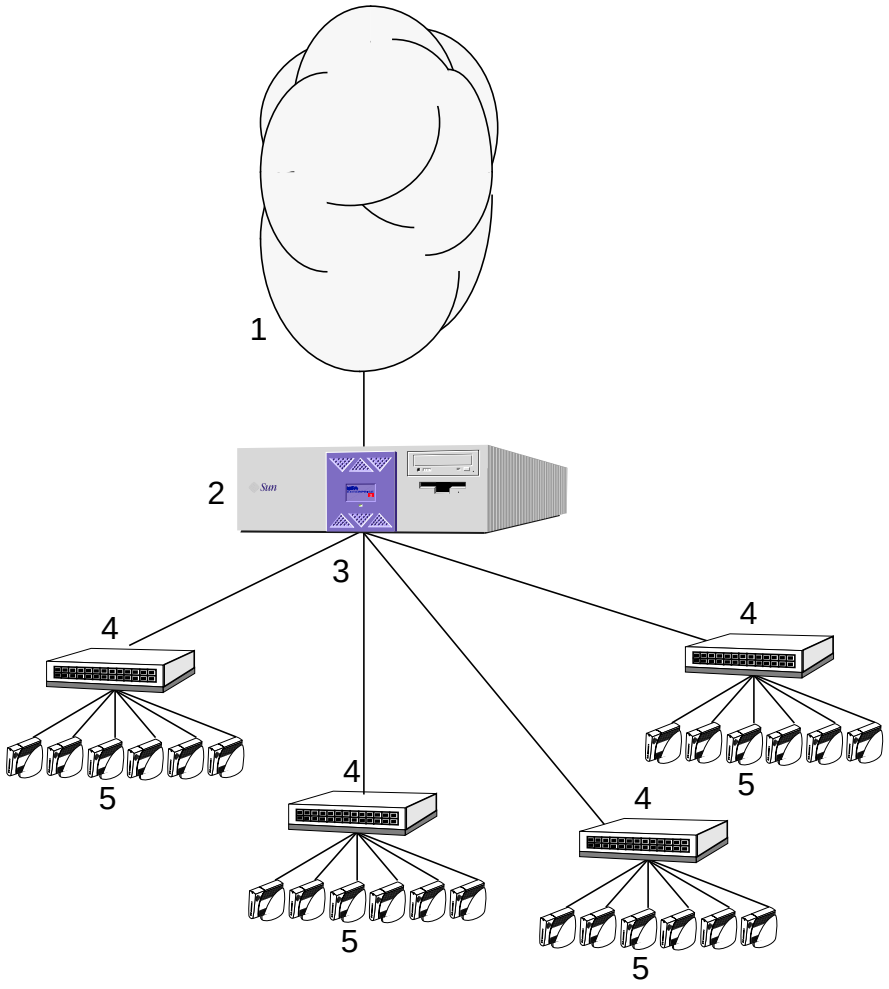


FIGURE 1-6 Workgroup Scenario

Legend:

1. Local area network (LAN) — existing connection to intranet / internet
2. Sun Enterprise 2 server
3. Quad network interface card (NIC)
4. 100BaseT hub (eight to 12 ports)
5. Sun Ray 1 appliances

Department Scenario

For departments with groups consisting of 100 or more Sun Ray 1 appliances, the Sun Ray server software uses multiple gigabit Ethernet cards to connect to large 100BaseT switches. For example, a 100 user departmental system consisting of an Sun Enterprise 450 server, two gigabit Ethernet cards, and two large (72-port) switches deliver services to the 100 Sun Ray 1 appliances (FIGURE 1-7). In this example, the gigabit links are transmitting the traffic for up to 72 Sun Ray 1 appliances. This example represents a 8:1 ratio over the end 100BaseT link speed.

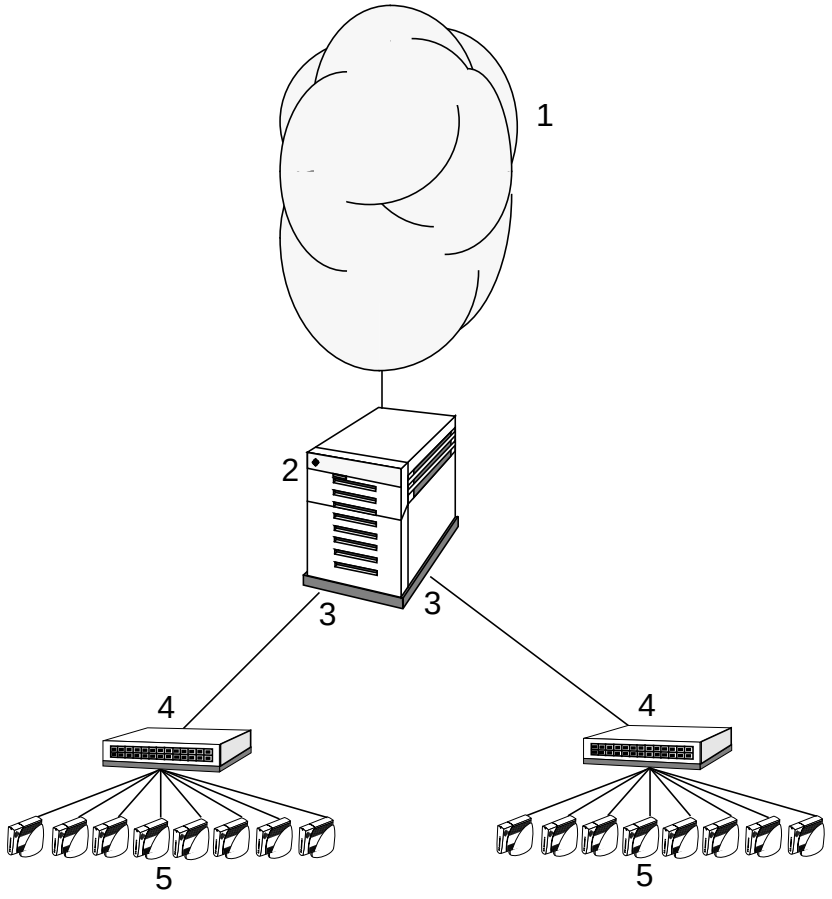


FIGURE 1-7 Department Scenario

Legend:

1. Local area network (LAN) — existing connection to intranet/internet

2. Sun Enterprise 450 server
3. Gigabit Ethernet card (`gem0` and `gem1`) or equivalent
4. 72-port, 100BaseT switch with gigabit uplink
5. Sun Ray 1 appliances

Sun Ray Server Software

Using the Sun Ray server software, you configure the network connections, select an authentication protocol, administer users, define desktop properties, and monitor the system. The Sun Ray server software includes:

- User authentication and access control
- Session management
- Device management
- System administration tools
- Virtual device drivers for all supported/optimized rendering APIs

The Sun Ray server software process consists of several stages:

1. The Sun Ray server software formats and sends the rendered output to the appropriate appliance over the Sun Ray network.
2. Each communication from the server is validated before it is interpreted.
3. Next, the information is displayed on the appliance's monitor. All input (for example, keystrokes and mouse clicks) is transmitted back to the appropriate application. FIGURE 1-8 illustrates the components and the distribution of the Sun Ray server software.
4. An end user, using the Settings screen, has control over the mouse, monitor resolution, audio, and video on the appliance.

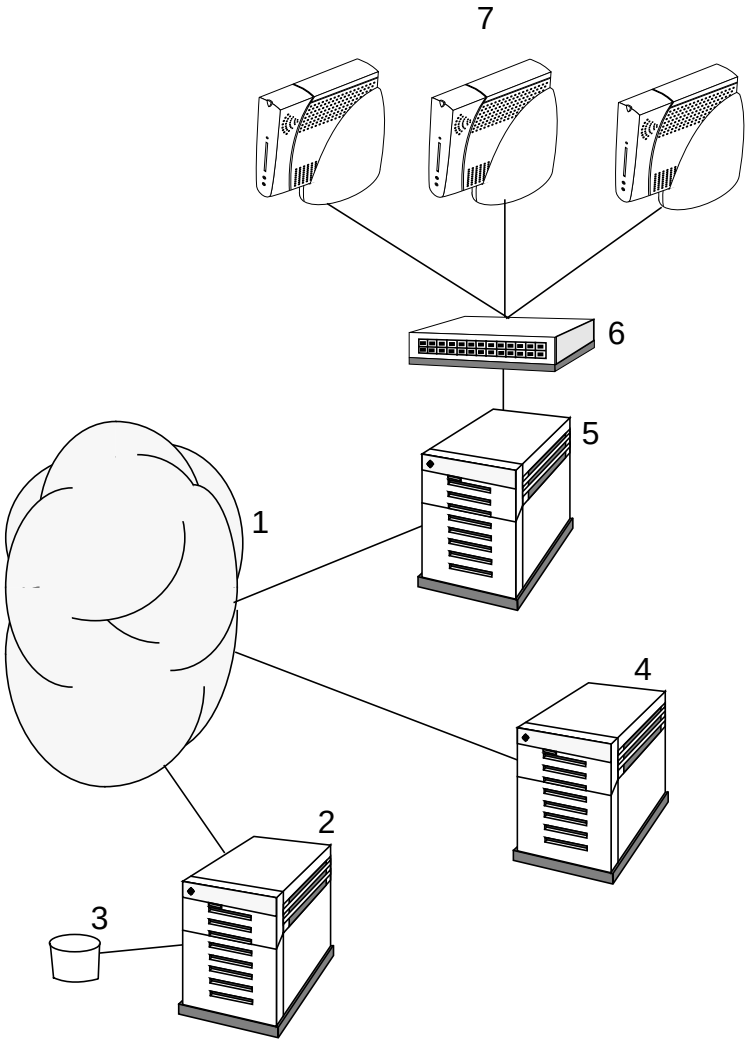


FIGURE 1-8 Distribution of Software in the Sun Ray System

Legend:

1. LAN
2. Backend server
3. Database
4. Solaris server
5. Sun Ray server
    a. Solaris operating environment
    b. Sun Ray server software daemons
    c. Windowing system
    d. Applications
6. Switch
7. Sun Ray 1 appliances

Authentication Manager

There are two unique system functions that are crucial to the proper and continued operation of the Sun Ray system. The first of these is the Authentication Manager. The second function is the Session Manager (for more information see “Session Manager” on page 19).

The Authentication Manager’s main task is to implement the chosen policies for identifying and authenticating end users at Sun Ray 1 enterprise appliances. The Authentication Manager is also responsible for verifying user identities and for implementing site access policies. It must be available any time an end user attempts to access the system using a Sun Ray 1 enterprise appliance. The Authentication Manager is not visible to the end user.

When an end user first accesses the system, the enterprise appliance takes a *token* and uses it to present credentials to the Authentication Manager to request access. If the user inserts 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 enterprise appliance’s built-in type and ID (the unit’s Ethernet address) are supplied as the token. Every token contains a type and ID that uniquely identifies the token to the Sun Ray system. For smart cards, the type is often derived from the card manufacturer. For enterprise appliances, the type is pseudo.

The Authentication Manager uses pluggable components called *modules* to implement various site-selectable authentication *policies*. The site administrator can construct a combination of the different modules and their options to implement a policy tailored to the site's needs. The modules are:

- ZeroAdmin — any type of token is accepted. Users are automatically passed through to the `dtlogin` screen. This module is designed primarily for workstation-replacement kinds of uses.
- Registered — the token is only accepted *if* the token has been registered in the Sun Ray administration database *and* the token is enabled. If the token does not meet these conditions, it is rejected. If accepted, the user is passed through to the `dtlogin` screen. This module is designed for sites that want to restrict access to only certain users or enterprise appliances.

Once the user is presented with the `dtlogin` screen, the Authentication Manager has successfully completed its tasks.

Users can be registered in two ways:

- Central Registration — one or more site administrators are responsible for assigning smart cards and/or enterprise appliances to authorized users and registering users' tokens in the Sun Ray administration database.
- Self-Registration — users are allowed to register themselves in the Sun Ray administration database. If this mode is enabled and the Authentication Manager is presented with a token that is not registered, the user is prompted with a registration screen that is similar to the information a site administrator would fill out.

Note – If self-registration is enabled, users still can be centrally registered as well.

Note – If a token has already been registered, but has been disabled, the user will *not* have an opportunity to re-register the token; the user must contact the site administrator to re-enable the token.

The interaction between the Authentication Manager and the enterprise appliance works as follows:

1. An end user accesses an enterprise appliance.
2. The enterprise appliance (item 2 in FIGURE 1-9) sends the user's token information to the Authentication Manager (item 3) and requests access. If a smart card is presented to the appliance, the smart card's type and ID are the token. If not, the appliance's built-in type (`pseudo`) and ID (the unit's Ethernet address) are sent.

3. The Authentication Manager passes the request to the first of the authentication modules (item 4) in the list that makes up the current policy. Each module can either accept responsibility or decline (which passes the request to the next module in the list). If a module accepts responsibility, it decides whether to allow or deny the user; no other modules will be consulted.

4. If the Authentication Manager runs through the entire list of modules and no module takes responsibility for the request, the user is denied.

5. If the user is accepted, the Authentication Manager starts an X Windows session (item 5) for the user, which takes the user to the `dtlogin` screen (item 6).

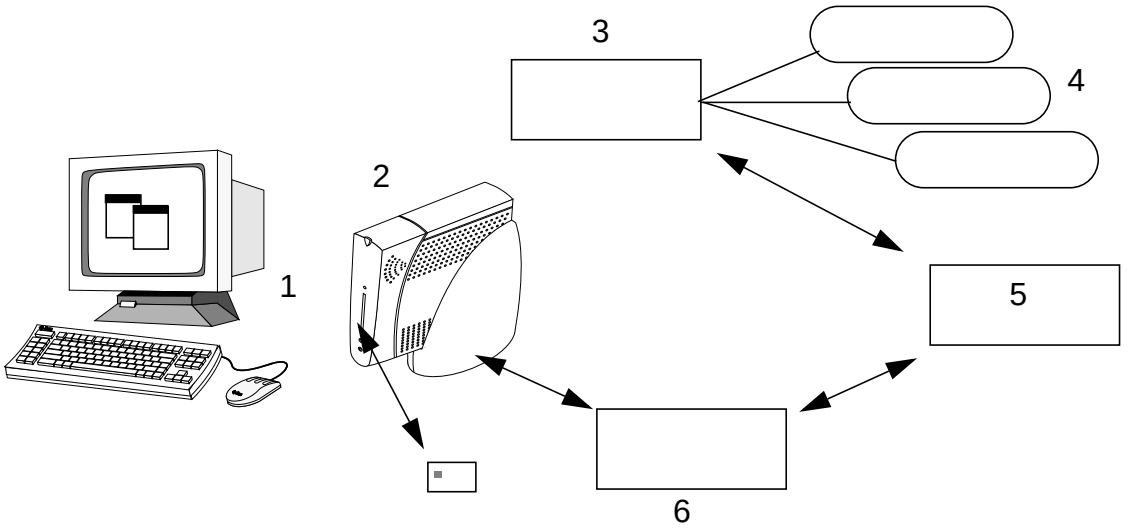


FIGURE 1-9 Authentication and Session Manager Interaction

Mobility

Depending on the authentication policy selected, users can be *mobile* within the workgroup. This means that if an end user starts a session on one appliance and moves to another, the session follows the end user to the new appliance. For more information on sessions, see “Session Manager” on page 19.

Session Manager

This section describes how the Session Manager interacts with the Authentication Manager and directs services to the end user. The Session Manager is used at start up, for services, for managing screen real estate, and as a rendezvous point for the Authentication Manager. The steps below describe how the process starts and ends:

1. After a user's token is authenticated, the Authentication Manager determines if a session exists for the token. If it does not, the Authentication Manager asks the Session Manager to create a session and then starts the appropriate service(s) for the session according to its policy. This usually involves starting an X server for the session.

2. When services are started, they explicitly join the session by contacting the Session Manager.

3. The Authentication Manager informs the Session Manager that the session associated with the token is to be connected to a specific Sun Ray 1 appliance. The Session Manager then informs each service in the session that it should connect directly to the appliance.

4. When the Authentication Manager determines that the session associated with a token should be disconnected from an appliance, it notifies the Session Manager which, in turn, notifies all the services in the session to disconnect.

5. The Session Manager mediates control of the screen real-estate between competing services in a session and notifies them of clip region changes.

Note – It is important to keep the session ID private. If the end user's session ID is revealed, unauthorized applications can connect directly to the appliance. The `xprop(1)` command can reveal an end user's secret session ID. Also, careless use of the `xhost(1)` command (for example, `xhost +`) can allow someone to use `xprop` to capture an end user's session ID. This action can expose the end user's screen images and keyboard input to anyone interested. Use `xhost username@system` to enable only those trusted by the system administrator to access the display and the end user's appliance.

Sessions and Services

A *session* consists of a group of services controlled by the Session Manager. The session is associated with an end user via an authentication token. A *service* is any application that can directly connect to the Sun Ray 1 appliance. This can include audio, video, X servers, and device control of the appliance. For example, `dtmail` is not a service because it is accessed through an X server.

The Session Manager keeps track of sessions and services by mapping services to sessions, and binding and unbinding related services to or from a specific appliance.

The Session Manager only takes authentication from authorized Authentication Managers listed in the `/etc/opt/SUNWut/auth.permit` file.

Changes in a Session

The Session Manager only gets involved if the state of the session changes, or if other services are added. When an end user's token is no longer mapped to an appliance (for example, when a card is removed), the Session Manager disconnects the services from the appliance, but the services remain active on the server. For example, programs attached to the X server continue to run, although their output is not visible.

Caution – The Session Manager daemon must be running all the time. You can verify it is running by using the ps command and looking for utsessiond.

If the Authentication Manager quits, the Session Manager disconnects all the sessions authorized by it and tells all the sessions that they will have to be re-authenticated. The services are disconnected, but still active.

If the Session Manager is disrupted, it automatically restarts. Each service contacts the Session Manager and requests being added back to a particular session. If you need to stop and restart both the Authentication Manager and Session Manager, type:

```
# /etc/init.d/utsvc stop
```

This command restarts both managers:

```
# /etc/init.d/utsvc start
```

Session Manager Port

The Session Manager is configured to accept connections on a specific TCP port (normally 7007). The Authentication Manager contacts the Session Manager to create and control the attachment and detachment of sessions to appliances by way of a callback mechanism. If the callback address matches what is in the Session Manager file (the list of permitted addresses), then the Session Manager replies to the call and the two managers can converse.

Virtual Device Drivers

All display rendering (for example, fonts, blending, overlays, compositing) is executed on the Sun Ray server software. Pixels are sent to the Sun Ray 1 appliance in an application–specific format. The Sun Ray server software does not modify or change any APIs. The Sun Ray 1 appliance uses a virtual device driver for each available rendering API (for example, the X11 interface). All rendering from Java is done from the X server (from UNIX servers), or the Win32 interface (from Microsoft Windows NT servers). Rendering output from the Win32 interface is translated to the native Sun Ray protocol through the use of Citrix clients running on Solaris servers.

Since the Sun Ray 1 appliance uses 24-bit graphics, an internal translation program translates legacy programs that require 8-bit indexed color into the 24-bit format acceptable for use by the Sun Ray 1 appliances. The default visual type is 24 *bpp* (bits per pixel). The default screen size for the Sun Ray 1 appliance is 1280x1024.

Determining 8-Bit Status

The Sun Ray 1 appliance uses 24-bit graphics. If an application uses only 8-bit visual types an error message is displayed stating that 24-bit graphics is required. For more information regarding those error messages, refer to “Troubleshooting” on page 141.

CHAPTER 2

Sun Ray Software and Hardware Requirements

This chapter describes the specifications for servers, monitors, switches, mice, keyboards, and smart cards that should be compatible with the Sun Ray interfaces. It gives guidelines for server sizing for various applications and lists the minimum sizes for the directories that are to hold the Sun Ray server software.

This chapter covers these topics:

Software Requirements

- The Sun Ray server software is designed to run with the server edition of the Solaris 2.6 or Solaris 7 operating environment.
- The Sun Ray server software must be installed on the server with the appropriate patches. See the *Sun Ray Enterprise Server Software 1.0 Installation Guide* for details.

Hardware Requirements

The Sun Ray system requires:

- A Solaris server based on the UltraSPARC processor
- At least one dedicated Ethernet interface installed on the Sun Ray server in addition to any used for a LAN

- Interconnect fabric of cables, switches, and hubs
- A monitor, keyboard, and mouse for each Sun Ray 1 enterprise appliance to be installed
- Smart cards (optional)

Note – See the following URL for a list of tested and verified peripherals: `http://www.sun.com/nc/Sun_Ray_1`

Requirements for Servers

This section describes the hardware requirements for the Sun Ray server.

Hardware Systems

The Sun Ray server runs on UltraSPARC servers supported by the Solaris 2.6 or Solaris 7 operating environment. Possible Sun Ray servers (4u platform) include:

- Sun Ultra Enterprise 5S
- Sun Enterprise Ultra 10S
- Sun Enterprise 2
- Enterprise 250/450
- Enterprise 3500/4500

Disk Space

Note – When configuring the server, suggested server configuration includes about 50-100 MB of swap space per session.

The standard installation of the Sun Ray server software requires at least 10 MB of disk space. The following table lists the disk space requirements for specific directories.

TABLE 2-1 Sun Ray Server Software Disk Space Requirements

Product	Default Installation Path	Requirements
Sun Ray core software	/ /opt /var	1MB 8MB 1MB + log files
LDAP client libraries	/usr	350K
Sun Directory Services 3.1	/opt/SUNWconn The default location for the directory database is /var.	• 25 MB disk space in /opt • 2.0MB in /var • 0.4MB in /etc You must allow enough disk space for the database. 1,000 entries require roughly 1.5MB of disk space, 64MB of RAM, and 128MB of swap.
Sun WebServer™ 2.1	/usr	• Software—9.5MB and 2MB disk space for documents and log files. • Memory—64MB minimum, 96MB is recommended. • Requires JDK 1.1.6 or compatible version.
JDK 1.1.6	/usr	31.5MB

Memory

The level of performance of a Sun Ray 1 appliance is a function of the server's resources, the number of active sessions, and the specific applications being run by the active sessions.

TABLE 2-2 Suggested System Configurations

System	Processor(s)	Memory	Number of Sessions
Enterprise 2	two 200 MHz UltraSPARCs	512 MB-2 GB	5-25 / CPU
Enterprise 450	four 300 MHz UltraSPARCs	2-4 GB	20-30 / CPU
Enterprise 4500	eight 336 MHz UltraSPARCs	4-8 GB	30-45 / CPU

Note – The suggested server configuration includes at least two processors, about 25 active sessions per CPU, 20-40 MB RAM or more for each active session (simultaneous use), and about 50-100 MB of swap space per session.

From the initial testing that Sun has done, 25-40 MB or more per session handles Netscape, Adobe Photoshop and FrameMaker, and personal information management (PIM, for example, email, calendar, and text editing) applications. Response time became noticeable to users when more than 25 active users on one CPU were running a highly interactive application. For medium interactive applications like PIM, up to 50 active users were satisfied with the response time.

Our tests show that for all applications 80% of the interconnect fabric traffic was less than 10 Mbps and the average traffic was approximately 1 Mbps per user.

Ethernet Card

A dedicated Ethernet card must be installed in the Sun Ray server for the Sun Ray interconnect fabric. The following table lists the compatible Ethernet cards for use with the Sun Ray server's interconnect fabric.

TABLE 2-3 Ethernet Interfaces

Interface	Example Device Name	Speed (Mb/s)	Comments
Gigabit Ethernet	`gem0`	1000	This high-speed interface is the ideal server to ethernet switch solution.
SunFastEthernet	`hme2`	100	
Lance Ethernet	`le1`	10	Traditional 10Mbps Ethernet is too slow for many Sun Ray services. Use at least 100BaseT interfaces.
QEC / MACE Ethernet	`qe0`	100	
Quad FastEthernet	`qfe0, qfe1, qfe2, qfe3`	100	Four individual Ethernet interfaces on one card. Ensure that the `SUNWqfed` package is installed on the system if you are using this card. The `SUNWqfed` package was not part of the original Solaris 2.6 release. There has been at least one patch released for the `SUNWqfed` package since its initial release.

Refer to the following web site for information regarding the latest driver patches and updates:

`http://access1.sun.com`

Note – 10BaseT has limited bandwidth, so rendering video and complicated web pages can overtax it. The Sun Ray interconnect fabric is intended to be run on category 5 wire, but will run on category 3 wire and 10BaseT.

Requirements for the Interconnect Fabric Components

The Sun Ray interconnect fabric is composed of all of the components (cables, switches, and hubs) that connect the Sun Ray server to the appliances.

This environment must be composed of hardware components that provide maximum bandwidth (under a variety of situations), minimize latency, and prevent high levels of congestion from occurring between the Sun Ray 1 appliance and the Sun Ray server.

This section describes the following requirements for the interconnect fabric:

- "Network Considerations" on page 27
- "Specifications for Switches" on page 28
- "Specifications for Hubs" on page 28

Network Considerations

Follow these guidelines when constructing a new Sun Ray network or modifying your existing configuration:

- Do not use a public or company network to connect Sun Ray 1 appliances to the Sun Ray server.
- Do not configure the Sun Ray server as a router.
- Always assume that moderate amounts of statistical traffic multiplexing exists (10:1 is a safe ratio; for example, 100 appliances can be connected via one gigabit link).
- Use simple network equipment that does not require extensive network management features.
- Use full duplex networks whenever possible.

Specifications for Switches

An *Ethernet switch* connects computing nodes on a local area network. Refer to the following web site for information regarding compatible switches for use in your *Sun Ray* interconnect fabric:

`http://www.sun.com/nc/Sun_Ray_1`

When selecting switches, consider the following factors:

- All ports must autonegotiate well
- Seek out switches with the following characteristics:
  - Full duplex
  - Non-blocking
  - Full bisectional bandwidth
  - Large amounts of buffering
- *A*void switches with the following characteristics:
  - Non-negotiating
  - Strict cut-through
  - Unbuffered
  - Half-duplex

Tip – You can extend the distance between your server and switch by using fiber optic cabling.

TABLE 2-4 Example Switches

Manufacturer	Model
3Com	SuperStack II Switch 3900
Foundry Networks	FastIron 24 BigIron 72
Extreme Networks	Summit/48

Specifications for Hubs

When selecting hubs, consider the following factors:

- Do not use hubs if you do not have to.
- Hubs are half-duplex; switches are full duplex.
- Use hubs only to get *fan out* (between switches and appliances).

- Do not skimp on bandwidth at the switch when using hubs (do all sharing at hubs; make switches full bandwidth).
- Do not use hubs with more than 12 ports.

You can use hubs for installations with fewer than 30 appliances.

Specifications for the Sun Ray 1 Enterprise Appliance Components

This section describes specifications for Sun Ray 1 appliance components.

Note – For a current list of tested and verified components see: `http://www.sun.com/nc/Sun_Ray_1`.

Specifications for Monitors

Sun Ray 1 appliances work with multi-sync VGA monitors that adhere to this specification.

TABLE 2-5 Monitor Requirements

Property	Value
Video data polarity	Positive going illuminates pixels. Negative going darkens pixels.
Video level (red, green, blue)	0.755 Volts peak
Black level	0.055 Volts peak
Blanking level	0.00 Volts peak
Sync type	Composite or separate horizontal and vertical, DDC definable by monitor
Sync level	TTL
Sync polarity	Positive or negative, DDC definable
Termination	75 Ohms (video and sync)

TABLE 2-5 Monitor Requirements *(Continued)*

Property	Value
Horizontal frequency range	43 kHz - 92 kHz, non-interlaced
Vertical frequency range	60Hz - 85Hz, non-interlaced
Protocols	VESA's DDC2B, EDID V1.0

The typical display rates are 1152x900 at 66Hz, 1152x900 at 76Hz, and 1280x1024 at 76Hz.

Note – To make use of the *DDC* data, the monitor must be connected to the appliance and powered on before the appliance is powered on. If no DDC data is available from the monitor, 1152x900 at 66Hz is the default resolution set by the appliance.

Specification for Keyboards and Mice

The Sun Ray 1 appliance is designed to work with the Sun Type 6 USB keyboard and the Sun "Crossbow" USB Mouse. Some non-Sun USB keyboards and mice will work with the Sun Ray 1 appliance.

Specifications for Smart Cards

See the following URL for a list of valid smart cards:

`http://www.sun.com/nc/Sun_Ray_1`

Specifications for Other Devices

SunMicrophone II works with Sun Ray 1 appliances; SunCamera II works with Sun Ray 1 appliances. The current release of the software does not include support for video input; it is planned for a later release.

Video Input Devices

TABLE 2-6 Specifications for Composite Video Devices

Property	Value
Supported standards	NTSC M, PAL B/G/I
Video level	1.0 Volt peak
Video polarity	Positive
Sync polarity	Negative
Termination	75 Ohms

USB Devices

The Sun Ray 1 appliance contains an internal four-port USB hub. This internal hub is accessible via the four USB ports on the rear of the appliance. The hub driver is internal to the firmware. The internal hub provides two amps of power shared across the four ports (providing a maximum of 500 mA per port).

The current release of the software does not include support for USB devices other than the keyboard and mouse; support is planned for later releases.

CHAPTER 3

Configuring the Software

This chapter describes how to run the configuration script or use the detailed instructions to configure SunDS 3.1, Sun WebServer 2.1, and the Sun Ray server software.

Note – If you do not configure SunDS and the Sun Ray server software, the Sun Ray administration application and other Sun Ray services will not work. The web-based interface of the Sun Ray administration application additionally requires a configured web server.

This chapter is organized as follows:

Collecting Key Configuration Parameters

Before configuring the Sun Ray server software and supporting software, you need to choose some important parameters to use throughout the configuration. If you use the automated configuration script, you are asked for these values and they are substituted in the appropriate places. If you choose to do the configuration by hand, you are instructed where to place the substitutions as you work on the files.

Please read the worksheet below; fill it out with your choices and keep it on hand as you use the automated configuration script or perform the manual configuration steps.

Many of these parameters are related to the operation of the SunDS LDAP server that stores administration data for the Sun Ray server. It is strongly recommended that you use the suggested default values (where given) unless you are experienced with LDAP data design and administration.

Configuration Worksheet

Fill out this worksheet before proceeding to either the configuration script or manual configuration steps.

Note – Many of the variables associated with the Sun Ray product have a prefix of '`ut`'.

@(HOSTNAME)

- Name: Hostname
- Description: Hostname of the Sun Ray server.
- Note: If you use the automated configuration script, this parameter is filled in for you.
- Example: `yoyodyne`

My value: _____

@(ROOTENTRY)

- Name: UT root entry
- Description: This entry is created to serve as the top-level Sun Ray entry in the LDAP data hierarchy. All Sun Ray administration data is located beneath this entry. Since the Sun Ray administration data is kept in its own data store, this is also the root entry for the data store.
- Note: This value must be of the object class type "organization." Unless you have an existing LDAP hierarchy and are experienced with LDAP data design and administration, use the default value.
- Default value: `o=utdata`
- Example: `o=utdata`

My value: _____

@(ROOTNAME)

- Name: UT root name
- Description: The portion of the *@(ROOTENTRY)* variable defined above that is after the equals sign (=). If you use the automated configuration script, this parameter is filled in for you.
- Default value: `utdata`
- Example: `utdata`

My value: _____

@(UTPASSWD)

- Name: UT administration password
- Description: Password for an entry that is created within the Sun Ray LDAP data hierarchy that LDAP client-server connections use for authentication. With this password, clients such as the Sun Ray command-line and web-based administration application can access and change Sun Ray administration data. Without this password, clients can access, but can not change the Sun Ray administration data. This is the same password that you use when you enter the web-based administration application (the UT administrator's name is "admin").

My value: _____

@(ROOTDN)

- Name: SunDS 'rootdn'
- Description: This is the name of a privileged user who has full read-write access to entries within a single SunDS data store. This value is related to the value you chose for the *@(ROOTENTRY)* above. The form of this value must be: *some_entry,@(ROOTENTRY)* where '*some_entry*' is a valid LDAP entry and *@(ROOTENTRY)* is substituted for the value you chose above. See example below.
- Default value: `cn=admin`,*@(ROOTENTRY)* (where *@(ROOTENTRY)* is substituted with the value above)
- Example: `cn=admin`, `o=utdata`

My value: _____

@(ROOTPW)

- Name: SunDS ‘rootdn’ password
- Description: Password for the ‘rootdn’ privileged user. This value and the *@(ROOTDN)* value above are only used to administer the LDAP server itself. *@(ROOTPW)* and *@(ROOTDN)* are only used during the LDAP configuration steps below (“Configuring Sun Directory Services 3.1 for Sun Ray Server Software” on page 39).

My value: _____

@(WEBSERVER_NAME)

- Name: UT administration web server instance name
- Description: This is the name of the Sun WebServer instance that is created to display the web-based administration application. The Sun WebServer supports multiple instances: each can display a different site or serve a different purpose.
- Default value: `utadmin`

My value: _____

@(WEBSERVER_PORT)

- Name: UT administration web sever port number
- Description: The web server that displays the web-based administration application runs on this port. For example, if you select port 1660, the URL you enter into your browser to use the administration application is `http://localhost:1660`.
- Note: Public web servers generally use port 80 or port 8080, so avoid using either of these or anything similar for the administration server.
- Default value: `1660`

My value: _____

@(CGI_USER)

- Name: CGI username
- Description: Unique UNIX username that the web-based administration application will be run as. The configuration script and instructions below (“Configuring Sun WebServer 2.1 for Sun Ray Server Software” on page 42) prompt you to create this user, if it does not already exist.
- Note: For security reasons, this should not be the standard `root` or `nobody` UNIX user. This should be an isolated user account that is not used by an existing user. If you already have such a user for running web servers, you can use it here.

- Default value: `www`

My value: _____

Using the Configuration Script

The configuration script configures all of the supporting software products. Use this script unless you are an experienced system administrator and need to customize the configuration.

▼ To Run the Configuration Script

1. **As superuser** `root`**, type:**

```
# cd /opt/SUNWut/sbin
# ./utconfig
```

Note – Fill out the configuration worksheet before continuing.

2. **Answer the continuation prompt:** `Continue ([y]/n)?`

   Type: **y**

   The configuration script prompts you for values (default values in brackets). For example:

```
Using hostname: yoyodyne
Enter UT root entry [o=utdata]:
Using UT root name: utdata  (derived from UT root entry)
Enter UT admin password: <value>
Re-enter UT admin password: <value>
Enter SunDS 'rootdn' [cn=admin,o=utdata]:
Enter SunDS 'rootdn' admin password: <value>
Re-enter SunDS 'rootdn' admin password: <value>
```

3. **Answer prompt for Sun WebServer.**

   Type: **n** if you do not want to configure the Sun WebServer.

   Type: **y** if you want to configure the Sun WebServer. The configuration script prompts you for values (default values in brackets). For example:

```
Enter UT admin web server instance name [utadmin]:
Enter UT admin web server port number [1660]:
Enter CGI username [www]:
```

   The values you have entered are shown. For example:

```
About to configure the following software products:

Sun Directory Services 3.1
     Hostname: yoyodyne
     UT root entry: o=utdata
     UT root name: utdata
     UT utdata admin password: (not shown)
     SunDS 'rootdn': cn=admin,o=utdata
     SunDS 'rootdn' admin password: (not shown)

Sun Web Server 2.1
     UT admin web server instance name: utadmin
     UT admin web server port number: 1660
     CGI username: www

Sun Ray enterprise server 1.0
```

4. **Answer the continuation prompt.**

```
# Continue ([y]/n)? y
```

   Once you confirm, the script begins configuring the products and outputs on the screen the various operations it performs.

5. **After the script has completed check in** `/var/tmp/utconfig.`*xxx*`.log` **to see if there were any errors. Where** *xxx* **is the process id of the script.**

6. **Once completed successfully, see "Testing the Installation and Configuration" on page 46.**

Using the Manual Configuration Instructions

This section is divided into the following subsections:

In the following instructions you will need to take the values you chose in the worksheet and substitute them in the appropriate places. For example, if you chose *@(HOSTNAME)* to be yoyodyne and *@(WEBSERVER_NAME)* to be utadmin, when substituting into this partial command:

/bin/htmap add -h *@(HOSTNAME)* **-i** *@(WEBSERVER_NAME)* **-f / -t**

the result would be:

/bin/htmap add -h yoyodyne -i utadmin -f / -t

Configuring Sun Directory Services 3.1 for Sun Ray Server Software

Note – Before beginning this section, complete the worksheet provided in "Configuration Worksheet" on page 34 since you need those parameters for this section.

Caution – Perform all of the following steps in order.

▼ To Configure SunDS for Sun Ray Server Software

1. **Add definitions specific to the Sun Ray server software to the SunDS schema:**

   a. **As superuser** root**, change to the SunDS configuration directory:**

```
# cd /etc/opt/SUNWconn/ldap/current
```

b. Add the LDAP object class definitions specific to Sun Ray server software:

```
# cp /opt/SUNWut/etc/template/ldap/dsserv.oc.ut.conf  .
```

c. Append an 'include' statement to the main object class definition file so the object classes specific to the Sun Ray server software are read in:

```
# cat /opt/SUNWut/etc/template/ldap/dsserv.oc.conf >>
dsserv.oc.conf
```

d. Add the LDAP attribute definitions that are specific to Sun Ray server software:

```
# cp /opt/SUNWut/etc/template/ldap/dsserv.at.ut.conf  .
```

e. Append an 'include' statement to the main attribute definition file so the attributes specific to the Sun Ray server software are read in:

```
# cat /opt/SUNWut/etc/template/ldap/dsserv.at.conf >>
dsserv.at.conf
```

2. Update SunDS Access Control Lists

Update the SunDS access control lists (ACLs) so changes to Sun Ray data can only be made by connections with proper credentials.

a. With a text editor, edit the `dsserv.acl.conf` **file.**

b. Find the 'Access Control List Section' in this file.

c. In the edited file, at the very top of the 'Access Control List Section,' insert the contents of the `/opt/SUNWut/etc/template/ldap/dsserv.acl.conf` **file.**

The inserted contents should appear in this file before any other access directives.

d. In the text that was just inserted, replace every instance of *@(HOSTNAME)* **and** *@(ROOTENTRY)* **with the values from your completed worksheet.**

3. Update the SunDS main configuration

Update the SunDS main configuration to create a new SunDS data store and naming context to hold Sun Ray administration data.

a. Append the Sun Ray data store and naming context configuration to the main SunDS configuration file:

```
# cat /opt/SUNWut/etc/template/ldap/dsserv.conf >> dsserv.conf
```

b. Edit `dsserv.conf` **(the main SunDS configuration file).**

Replace every instance of *@(ROOTENTRY)* and *@(ROOTDN)* with the value from your completed worksheet.

c. Create the Sun Ray data store directory:

```
# mkdir -m 775 /var/opt/SUNWconn/ldap/dbm.ut
```

4. Set the SunDS 'rootdn' password

Note – Do not run the following command in the background the first time you run it.

---

a. Set the SunDS 'rootdn' Password by running the SunDS Console administration tool, type:

```
# /opt/SUNWconn/sbin/dsadmintool
```

When prompted for an administration password, give the *@(ROOTPW)* value from your completed worksheet. This is the administration password that you give to the SunDS Console administration tool when it starts up.

b. Exit the SunDS Console as you do not need it for any of the following procedures.

5. Restart the SunDS Server, type:

```
# /etc/init.d/dsserv stop
# /etc/init.d/dsserv start
```

6. Populate the Sun Ray data store.

You need to populate the Sun Ray data store with the required base entries in order for Sun Ray services, such as the administration application, to run properly.

a. Copy the modification template file to a temporary file.

This file contains a small batch of LDAP entries that will be added.

```
# cp /opt/SUNWut/etc/template/ldap/ldap.mods /tmp/ldap.mods
```

b. Edit the `/tmp/ldap.mods` **temporary file.**

Replace every instance of *@(ROOTENTRY)*,*@(HOSTNAME)*,*@(ROOTNAME)*, and *@(UTPASSWD)* with the value from your completed worksheet.

c. Add the batch of entries contained in the temporary file by typing the command below and substituting the value for *@(ROOTDN)* **inside the pair of quotes:**

```
# /bin/ldapadd -D "@(ROOTDN)" -f /tmp/ldap.mods
```

Note – Be sure to retain the quotes when typing this command.

---

d. When prompted, enter the *@(ROOTPW)* **password.**

e. Remove the temporary file.

Since the temporary file contains the Sun Ray `utadmin` password in it, you should remove this file immediately after completing the previous step.

```
# rm /tmp/ldap.mods
```

Configuring Sun WebServer 2.1 for Sun Ray Server Software

Note – Before beginning this section, complete the worksheet provided in "Configuration Worksheet" on page 34. You need those parameters to complete the procedures in this section.

If you are not using Sun WebServer 2.1, skip this section.

▼ To Configure the Sun WebServer

1. **Become superuser** `root`**. If a UNIX user account does not already exist for the** *@(CGI_USER)* **user you specified on the worksheet, create one now with the** `/bin/admintool` **or** `/usr/sbin/useradd` **utility.**

Note – Be sure to select a unique username and user ID. The account should not have a password or home directory—it should be set up as a 'setuid only' account.

---

2. **Add a web server instance for the Sun Ray web-based administration application:**

```
# /bin/htserver add @(WEBSERVER_NAME)
```

3. **Edit the configuration file for the web server instance that was just created.**

   Edit the `/etc/http/`*@(WEBSERVER_NAME)*`.httpd.conf` file.

   In the file, change the port assignment from `80` to the *@(WEBSERVER_PORT)* you chose on your worksheet.

4. **Put symbolic links to the Sun Ray web-based administration CGI applications in the** `cgi-bin` **directory for the new web server instance:**

```
# cd /var/http/@(WEBSERVER_NAME)/websites/default_site/cgi-bin
# ln -s /opt/SUNWut/cgi-bin/user  .
# ln -s /opt/SUNWut/cgi-bin/desktop  .
# ln -s /opt/SUNWut/cgi-bin/main  .
```

5. **Put a symbolic link to the Sun Ray web-based administration HTML files in the public area for the new web server instance:**

```
# cd /var/http/@(WEBSERVER_NAME)/websites/default_site
# mv public public.orig
# ln -s /opt/SUNWut/lib/locale/html public
```

6. **Set up the Web server mappings so requests for the instance's home page are redirected to the main CGI application, while preserving the location of the images subdirectory.**

   Substitute the value of *@(HOSTNAME)* and *@(WEBSERVER_NAME)* in the two commands below with the value you chose on your worksheet.

```
# /bin/htmap add -h @(HOSTNAME) -i @(WEBSERVER_NAME) -f / -t
  /var/http/@(WEBSERVER_NAME)/websites/default_site/cgi-bin/main -c CGI
```

```
# /bin/htmap add -h @(HOSTNAME) -i @(WEBSERVER_NAME) -f /images -t
  /var/http/@(WEBSERVER_NAME)/websites/default_site/public/images
```

7. **Set up the web server instance so it only accepts connections from the local host.**

   Do this unless you have installed additional security software that encrypts connections between the browser and server. Edit the `/var/http/@(WEBSERVER_NAME)/websites/default_site/conf/access.conf` file.

   Add the following to the very bottom of the file:

```
url "/" {
        - host *
        + host 127.0.0.1
}
```

   Substitute your Sun Ray server's `localhost` IP address where `127.0.0.1` is. To get this IP address, type the command:

```
# /bin/getent hosts localhost
```

8. **Set up the web server instance so CGI applications are run as the *@(CGI_USER)* user you specified on your worksheet.**

   Edit the `/var/http/@(WEBSERVER_NAME)/websites/default_site/conf/default_site.site.conf` file.

   Add the following to the very bottom of the file:

```
cgi_user @(CGI_USER)
```

   Be sure to substitute the value of *@(CGI_USER)* from the worksheet.

9. **Set up the Sun Ray CGI tokens directory so it is owned by the *@(CGI_USER)* user and only readable and writable by that user:**

```
# chown @(CGI_USER) /var/opt/SUNWut/cgitokens
# chmod 700 /var/opt/SUNWut/cgitokens
```

10. **Enable the new web server instance.**

    'Enabling' the web server instance instructs the Sun WebServer to start this web server every time the machine is rebooted.

```
# /bin/htserver enable @(WEBSERVER_NAME)
```

11. **Start the new web server instance:**

```
# /bin/htserver start @(WEBSERVER_NAME)
```

Configuring Sun Ray Server Software

Note – Before beginning this section, complete the worksheet provided in "Configuration Worksheet" on page 34 since you need those parameters for this section.

The procedures in this section allow you to set up the Sun Ray administration configuration and password files.

▼ To Set Up the Sun Ray Administration Configuration File

1. **Copy the template configuration file into its destination location:**

```
# cp /etc/opt/SUNWut/utadmin.conf.template /etc/opt/SUNWut/utadmin.conf
```

2. **Edit the** `/etc/opt/SUNWut/utadmin.conf` **file.**

   Replace every instance of *@(ROOTENTRY)* and *@(HOSTNAME)* with the value from your completed worksheet.

3. **Make sure that the file is readable by all, but only writable by** `root`:

```
# chown root:sys /etc/opt/SUNWut/utadmin.conf
# chmod 644 /etc/opt/SUNWut/utadmin.conf
```

▼ To Set Up the Sun Ray Administration Password File

1. **Use the** `utpw` **utility to set the password file:**

```
# echo "@(UTPASSWD)" |/opt/SUNWut/sbin/utpw -f
```

Be sure to substitute the value of *@(UTPASSWD)* in the command between the quotes.

2. **Make sure that the password file is only readable and writable by root:**

```
# chown root:sys /etc/opt/SUNWut/utadmin.pw
# chmod 600 /etc/opt/SUNWut/utadmin.pw
```

Testing the Installation and Configuration

To test your installation and configuration, try running the administration application using both the command-line and web-based interfaces.

▼ To Test the Command-line Interface of the Administration Application

1. **Log into the Sun Ray server.**

2. **Run the following command**:

```
% /opt/SUNWut/sbin/utuser -l
```

If the command shows a list of users, or shows 0 users, the software is installed correctly. If the command responds with any errors, a configuration error has occurred and should be corrected. Usually, you can find informative messages detailing the problem in the `/var/adm/messages` file.

3. **Once completed successfully, see "Initial Setup" on page 49.**

▼ To Test the Web-based Interface of the Administration Application

1. **Log into the Sun Ray server.**
2. **Start up a web browser and point it to `http://localhost:1660`. You should see the web-based administration application's login page.**

   If you specified a different port number when you configured the web server, use it here.

Note – If you get a message that says you do not have permission to access a document, the web server is indicating that you tried to connect from a remote machine. Make sure that:

- You are running a browser on the Sun Ray server or one of its appliances
- The browser is *not* using a different machine as an HTTP Proxy Server to proxy the connection to the web server.

3. **Enter your administrator username ("`admin`") and Sun Ray password (this is the *UTPASSWD* from your worksheet) and click on "Log In."**
4. **Click on the "Users" link.**
5. **Click on the "List All Users (by ID)" link.**

   If you get a result page or "No Users Found" message, the software is installed correctly. If the command responds with any errors, a configuration error has occurred and should be corrected. Usually, you can find informative messages detailing the problem in the `/var/adm/messages` file.

6. **Once completed successfully, see "Initial Setup" on page 49.**

CHAPTER 4

Initial Setup

This chapter describes the initial setup of the Sun Ray system:

Note – To view any of the specific commands for Sun Ray system, type:
`% man -a -M /opt/SUNWut/man` *command*
or
`% setenv MANPATH=/opt/SUNWut/man`

Using the Default System Configuration

After installing the Sun Ray server software on your server, you need to configure the Sun Ray interconnect fabric for the network interface card you have installed (see "Configuring the Sun Ray Interconnect Fabric" on page 50). The default sets up about 225 possible appliance connections per interface. The actual sessions are not created until appliances are connected into the Sun Ray interconnect fabric, so choosing the default does not use up space or degrade performance.

At the factory, a version of the firmware is loaded into the Sun Ray 1 enterprise appliances. When an appliance is connected, the firmware in the appliance is automatically changed to the version of the firmware on the server if the versions are different. To ensure that all the units have the same firmware, you can run the `utfwadm` command (see "PROM Version Management" on page 57).

The Sun Ray 1 appliances are smart card ready. The default authorization protocol presents every user with a Solaris `dtlogin` screen and uses the regular Solaris login of userid and password. The default protocol accepts any valid smart card and creates a session for the user. The smart card user is also prompted with a Solaris `dtlogin` screen.

To add users to the Solaris system, use regular Solaris methods.

The default key sequence for the Settings screen display is Shift+Props on the Sun keyboard. See “Defining Desktop Properties” on page 63, for instructions on how to change it.

Configuring the Sun Ray Interconnect Fabric

Run the `utadm` command to configure the network interface card (NIC), the DHCP service for the interconnect fabric, and to enable the Sun Ray log management function. The default DHCP setup configures each interface for 225 hosts and uses private network addresses for the Sun Ray interconnect fabric. When you configure the interconnect fabric, the version of the firmware on the appliances is automatically changed to version of the firmware on the server if the versions are different.

Note – The Sun Ray server software works with other products that use DHCP.

Note – If you have just installed the Ethernet controller, remember to boot the server with the `-r` flag so that the system looks for the new interface and creates the appropriate device files.

▼ To Configure the Interconnect

1. **Type**:

```
# /opt/SUNWut/sbin/utadm -a interface_name {-a interface_name} ...
```

Some interface names are `hme[0-9]`, `qfe[0-9]`, or `vge[0-9]`.

For example:

```
# /opt/SUNWut/sbin/utadm -a gem0
```

A dialog similar to the following is initiated; respond **y** if the default values are acceptable.

```
Configuring the Sun Ray Interconnect Fabric

### Configuring /etc/nsswitch.conf
### Disabling Routing
### configuring gem0 interface at subnet 128
  Selected values for interface "gem0"
    host address:       192.168.128.1
    net mask:           255.255.255.0
    net address:        192.168.128.0
    host name:          yoyodyne-128
    net name:           SunRay-128
    first unit address: 192.168.128.3
    last unit address:  192.168.128.254
    firmware server:    192.168.128.1
  Accept as is? ([Y]/N): y
### successfully setup "/etc/hostname.gem0" file
### successfully setup "/etc/inet/hosts" file
### successfully setup "/etc/netmasks" file
### successfully setup "/etc/inet/networks" file
### finished install of "gem0" interface
### Building network tables - this will take a few minutes
### Configuring DHCP Service for Sun Ray
```

If the default values are unacceptable, respond **n**, and enter new values. A dialog similar to the following will be displayed. In the dialog below, the network is changed from `192.168.128` to `192.168.129` and configured for maximum of 14

sessions.

```
Configuring the Sun Ray Interconnect Fabric

### configuring /etc/nsswitch.conf
### Disabling Routing
### configuring gem0 interface at subnet 128
  Selected values for interface "gem0"
    host address:       192.168.128.1
    net mask:           255.255.255.0
    net address:        192.168.128.0
    host name:          yoyodyne-128
    net name:           SunRay-128
    first unit address:  192.168.128.3
    last unit address:   192.168.128.254
    firmware server:     192.168.128.1
Accept as is?  ([Y]/N): n
  new host address: [192.168.128.1] 192.168.129.1
  new netmask: [255.255.255.0]
  new first Sun Ray address: [192.168.129.3]
  new last Sun Ray address: [192.168.129.254] 192.168.129.16
  Selected values for interface "gem0"
    host address:       192.168.129.1
    net mask:           255.255.255.0
    net address:        192.168.129.0
    host name:          yoyodyne-129
    net name:           SunRay-129
    first unit address:  192.168.129.3
    last unit address:   192.168.129.16
    firmware server:     192.168.129.1
Accept as is?  ([Y]/N): y
### successfully setup "/etc/hostname.gem0" file
hostname "yoyodyne-129" appears in "/etc/inet/hosts" file with
another IP
address, fix? ([Y]/N): y
### successfully setup "/etc/inet/hosts" file
### successfully setup "/etc/netmasks" file
### successfully setup "/etc/inet/networks" file
### finished install of "gem0" interface
### Building network tables - this will take a few minutes
### Configuring DHCP Service for Sun Ray
```

The remaining output should be similar to the following:

```
### Configuring DHCP Service for Sun Ray

### stopped DHCP daemon
### started DHCP daemon
### Configuring firmware version for Sun Ray
        All the units served by "yoyodyne" on the 192.168.128.0
        network interface, running firmware other than version
        "1.0_4,REV=1999.02.23.20.39" will be upgraded at their next power-on.

### Configuring Sun Ray Logging Functions
syslog service starting.
```

2. **Reboot the server and power cycle the appliances.**

Note – You can type **`utadm -p`** to list the current interface configuration.

Setting System Parameters

Because there are many sessions on one server, the maximum number of processes per user (`maxuprc`) and number of terminals (`pt_cnt`) need to be increased from the default Solaris levels. Set the `pt_cnt` value to the maximum number of users multiplied by the average number of terminal windows per user (for example, software developers use 8-10 terminal windows). When you run the `utadm` command to configure the interconnect fabric, if these numbers are low, a message tells you to increase them.

▼ To Set System Parameters

1. **In `/etc/system`, as `root`, use a text editor to set these parameters. For example:**

```
set maxuprc=50
set pt_cnt=999
```

2. **Reboot the system.**

   Your Sun Ray system is ready to use. If you want to have any authentication policy other than the default, see “Choosing an Authentication Policy” on page 60. See “Adding and Deleting Users” on page 99 to add users in away that conforms with the policy you have chosen.

CHAPTER 5

Administering the Sun Ray System

This chapter provides the following information on configuration options:

Note – For more information on any specific commands for the Sun Ray system, see the corresponding man page. Sun Ray man pages are in the `/opt/SUNWut/man` directory.

Interfaces on the Sun Ray Interconnect Fabric

Use the `utadm` command to manage the Sun Ray interconnect fabric. With it you can add, delete, remove, or list interfaces.

Note – You must have superuser privileges to run `utadm`.

▼ To Add an Interface

- **Type:**

```
# /opt/SUNWut/sbin/utadm -a interface_name {-a interface_name} ...
```

This command configures the network interface {*interface_name*} as a Sun Ray interconnect. You can specify a subnet address or use the default address, which is selected from reserved private subnet numbers between 192.168.128.0 and 192.168.254.0. After an interconnect is selected, appropriate entries are made in the `hosts`, `networks`, and `netmasks` files. (These files are created if they don't exist.) The network interface is activated.

You can use any valid Solaris network interface. For example, `hme[0-9]`, `qfe[0-9]`, or `vge[0-9]`.

▼ To Delete an Interface

- **Type:**

```
# /opt/SUNWut/sbin/utadm -d interface_name {-d interface_name} ...
```

This command deletes the entries that were made in the `hosts`, `networks`, and `netmasks` files, and deactivates the interface as a Sun Ray interconnect.

▼ To Remove All Interfaces

- **Type:**

```
# /opt/SUNWut/sbin/utadm -r
```

This command removes all of the entries and all of the structure relating to all of the Sun Ray interfaces. Use the `utadm -r` command to prepare for removal of the Sun Ray software.

▼ To Print the Sun Ray Interconnect Configuration

- **Type:**

```
# /opt/SUNWut/sbin/utadm -p
```

For each interface, this command displays the hostname, network, netmask, and number of active Sun Ray connections.

PROM Version Management

This section lists the options for managing the firmware on the PROM in the Sun Ray 1 enterprise appliance. Use the `utfwadm` command primarily to keep the firmware version on the server and appliances in sync. Use the command to do the following:

- Setting and unsetting the DHCP version variable
- Upgrading selected appliances or all appliances
- Upgrading selected subnets or all subnets

Note – If you have defined the DHCP version variable, when a new appliance is plugged in and the versions of the firmware on the server and on the appliance are not the same, the appliance's firmware is changed to the version on the server.

You must have superuser privileges to run `utfwadm`. Use this command to select which appliances will be upgraded. You can make the selection appliance by appliance or by subnet.

TABLE 5-1 Options of the `utfwadm` Command

Option	Description
`-A`	Adds appliances to the list of appliances to be upgraded and also sets the appropriate DHCP version variable.
`-D`	Removes the specified appliances from the list of appliances to be upgraded. It unsets the appropriate DHCP version variable. However, the appliances are still upgraded.
`-a`	Designates all the appliances.

TABLE 5-1 Options of the `utfwadm` Command *(Continued)*

Option	Description
`-e` with a full Ethernet address (MAC address)	Gives a specific appliance with its Ethernet address. The address entered is read as hex.
`-n` *interface_name*	Specifies what subnet the appliances are on. For more than one interface, use a series of `-n` *interface_name* entries. For all interfaces, use `-n all`.
`-f` with a path	Specifies the path to where the upgrade files are located. If `-f` is not used, the upgrade is taken from the default firmware files, which are in: `/opt/SUNWut/lib/firmware`

Note – See the `utfwadm(1m)` man page for more details.

Examples

- To update all of the appliances on the `hme1` interface, type;

```
# /opt/SUNWut/sbin/utfwadm -A -a -n hme1
```

Note – Reboot the server. You must power cycle the Sun Ray 1 appliances to force a firmware upgrade.

- To update an appliance with Ethernet (MAC) address `08:00:20:4c:12:1f`, type:

```
# utfwadm -A -e 0800204c121f -n hme1
```

- To upgrade appliances with addresses of `08:00:20:4c:12:1c`, `08:00:20:4c:12:1d`, and `08:00:20:4c:12:1e`, type:

```
# utfwadm -A -e 0800204c121c -n hme1
# utfwadm -A -e 0800204c121d -n hme1
# utfwadm -A -e 0800204c121e -n hme1
```

▼ To Disable the `utload` Command

If you want to force all users to stay on the same firmware load, set this value to false. This renders the `utload` command inactive and prevents a user from downloading firmware to an appliance.

1. **Open the `/etc/opt/SUNWut/auth.props` file with a text editor.**
2. **Locate the Allow Firmload Download section (near the end of the file listing) and uncomment the entry and set the value to false.**

```
allowFWLoad = false
```

▼ To Enable the `utload` Command

The default is true. However, if you need to enable the download, follow this procedure.

1. **Open the `/etc/opt/SUNWut/auth.props` file with a text editor.**
2. **Locate the Allow Firmload Download section (near the end of the file listing), and uncomment the entry and set the value to true.**

```
allowFWLoad = true
```

Choosing an Authentication Policy

When choosing an authentication policy (for an overview see “Authentication Manager” on page 16), there are several questions you need to answer with respect to smart card (`card`) users and non-smart card (`pseudo`) users. Answer the questions by checking the appropriate boxes (multiple boxes can be checked for each question).

TABLE 5-2 Questions

Question	Smart Card Users (`card`)	Non-Smart Card Users (`pseudo`)
1. What types of users *must* be registered? (Users that are not registered are rejected by the Authentication Manager.)	[ ]	[ ]
2. Of those users chosen in question 1, which types are allowed to self-register? (Any user can still be centrally registered, regardless of your choice here.)	[ ]	[ ]
3. Of those users *not* chosen in question 1, which types (if any) are allowed to fall through to the ZeroAdmin module (that grants access to all users)?	[ ]	[ ]

The following table describes some sample authentication policies and shows how you would answer the above questions to specify them. The answers (one of these: none, card, pseudo, or both) to these questions directly correlate to options you give to the Authentication Manager configuration command described in the next section.

TABLE 5-3 Sample Authentication Policies

Sample Authentication Policy	Question 1 (`-r` option)	Question 2 (`-S` option)	Question 3 (`-Z` option)
1. Allow all kinds of users to use the system without registering. This is the default policy for the Sun Ray system.	none	none	**`both`**
2. Only allow registered smart cards that have been created by a site administrator. Self-registration is not enabled and users must insert a smart card to use an appliance.	**`card`**	none	none
3. Ignore all smart cards but allow non-card users. The appliances behave like traditional workstations.	none	none	**`pseudo`**
4. All smart cards must be registered but non-card users can still use appliances. Card users can self-register.	**`card`**	**`card`**	**`pseudo`**
5. All smart card and non-card users must be registered, but only card users are allowed to self-register.	**`both`**	**`card`**	none

Enabling an Authentication Policy

The `utpolicy` command allows you to specify the authentication policy for your Sun Ray server. The arguments you provide to this command are very similar to the questions you answered in TABLE 5-2. It takes your input and forms the necessary combinations of authentication modules to implement the desired policy.

▼ To Enable an Authentication Policy:

1. **Answer the questions in** TABLE 5-2 **and keep the answers handy for Step 2.**

2. **Type the following command:**

```
# /opt/SUNWut/sbin/utpolicy -a -r <Answer To Question 1> -s <Answer To Question 2> -z
<Answer To Question 3>
```

Where the values for each answer can be **card**, **pseudo**, or **both**. If you answered "none" for a specific question, you should omit that argument (including the flag) on the command line.

If you are using self-registration and do not want to require the user to enter a Solaris user name and password for validation, add the `-p` flag to the `utpolicy` command line. The `-p` flag can be typed anywhere in the command line.

Caution – Using the `-p` flag allows anyone with an unregistered smart card (if `-r card` or `-r both` is specified) or unregistered appliance (if `-r pseudo` or `-r both` is specified) to register.

Note – Example policy 2, 4 and 5 should be entered with the token reader configuration information to assist with the central registration of users (see "To Configure a Token Reader" on page 63).

The table below shows the command line you would type for each of the five examples given in TABLE 5-3:

TABLE 5-4 Commands Used to Set Sample Authentication Policies

Example #	Command to Type
1	# **utpolicy -a -z both**
2	# **utpolicy -a -r card**
3	# **utpolicy -a -z pseudo**
4	# **utpolicy -a -r card -s card -z pseudo**
5	# **utpolicy -a -r both -s card**

3. **Reboot your Sun Ray server.**

Note – The Authentication Manager will not start using the new policy until the server is restarted. Services being used under the old policy might not be cleaned up unless the system is restarted.

▼ To Configure a Token Reader

This command specifies an appliance for registering smart cards.

- **Select a policy and add** `-t clear -t add:`*nnnnnnnnnnnn* **to the command. For example, type:**

```
# /opt/SUNWut/sbin/utpolicy -a -r card -z pseudo -t clear -t add:nnnnnnnnnnnn
```

where *nnnnnnnnnnnn* is the full Ethernet address (for example, `0800204c121c`) of the appliance you want to use as a smart card reader. At this writing, the Ethernet address must be lower case.

User Management

Currently all users are seen as regular Solaris users. Refer to your Solaris documentation for more information on managing Solaris users. For details on managing Sun Ray users, see “Managing Sun Ray Users” on page 97.

Printer Administration

When you add a printer for use by the Sun Ray 1 appliances, you add it as a regular network or local (server) printer (use Solaris `Admintool`). You do not add it to the Sun Ray interconnect fabric. Printers attached to Sun Ray 1 appliances are not supported in this release.

Defining Desktop Properties

This section describes how to use and configure the Sun Ray 1 Settings GUI (graphic user interface), which is used to change settings on a Sun Ray 1 enterprise appliance.

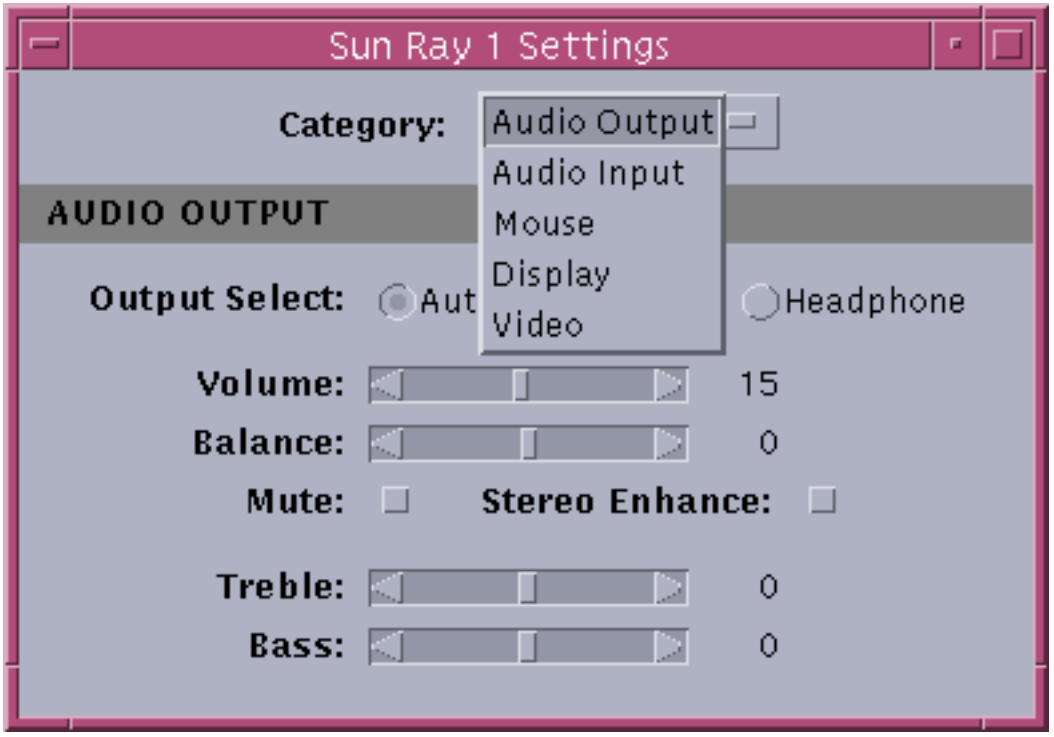


FIGURE 5-1 Settings Screen

Using Sun Ray 1 Settings

Sun Ray 1 Settings is an interactive GUI that allows the user to view and change the settings for the Sun Ray 1 enterprise appliance the user is currently logged into. It can be launched in one of two ways:

- By default, the Sun Ray server starts an instance for each session when the user logs in via `dtlogin`. The Sun Ray 1 Settings Screen (GUI) will remain hidden until the user presses the hot key (usually Shift+Props). Pressing the hot key again will cause it to hide itself again.
- Alternatively, the user can launch another instance by typing the following command:

```
% /opt/SUNWut/bin/utsettings
```

In either case, the Sun Ray 1 Settings GUI contacts the Session Manager to determine which enterprise appliance is currently being used and connects to that unit to get the current values. The GUI also keeps open a connection to the Session Manager so the Session Manager can notify the GUI if the user moves to another appliance (by removing the user's smart card and inserting it into another enterprise appliance).

If the user moves to another enterprise appliance, Sun Ray 1 Settings will "follow" the user by connecting to the new appliance and retrieving the new appliance's current settings. Although the application follows the user from appliance to appliance, the settings remain with the appliance. For example, if the user uses Sun Ray 1 Settings to set the volume on appliance #1 to 28, then moves to appliance #2, Sun Ray 1 Settings updates itself to display appliance #2's current volume. If the user returns to appliance #1 and no one else has changed its settings, Sun Ray 1 Settings again displays a volume of 28.

Once the Settings GUI is launched, the user can use the Category pulldown to see groups of Audio Output, Audio Input, Mouse, Display, and Video settings. To change a setting, the user simply moves or changes the appropriate slider, checkbox or pulldown and the appliance is updated immediately. The only exception is the "Resolution/Refresh Rate" setting, which prompts the user with confirmation dialogs before and after the change is made on the appliance.

The Sun Ray 1 Settings GUI supports the following command-line option:

TABLE 5-5 Command Line Options

Option	Description
`-H`	Starts the Settings screen in *hot key* mode. In this mode, the Settings screen is hidden and waits for the hot key to be pressed before being displayed. Press the hot key again to close the Settings screen. The hot key can be user-defined or site-defined, but defaults to Shift+Props (hold the Shift key down and then press the Props key). The Settings screen follows the use to other appliances while in this mode. For more information defining the hot key, see "Configuring Sun Ray 1 Settings" on page 66.

Note – Only one instance of Sun Ray 1 settings can be running in hot key mode per session.

Configuring Sun Ray 1 Settings

Sun Ray 1 Settings allows for the configuration of the hot key that users press to display and hide the Sun Ray 1 Settings GUI. This customization can be done on three levels:

- As a sitewide default setting
- As a user default setting
- As a sitewide mandatory setting

To support these levels of customization, the Sun Ray 1 Settings GUI looks for the following Java properties files at start-up time in the following order:

- `/etc/opt/SUNWut/utsettings_defaults.properties` (sitewide defaults)—This file is read in first and contains helpful default properties. Any properties specified here override any defaults built into the application itself.
- `/home/`*anyuser*`/.utsettings.properties` (user defaults)—This file is read second and contains the user's preferred values for the properties. Properties specified here override any application or sitewide defaults.
- `/etc/opt/SUNWut/utsettings_mandatory.properties` (sitewide mandatory defaults) — This file is read in last and contains sitewide mandatory settings that cannot be overridden by the user. Any properties specified here override any application, sitewide or user defaults.

Example uses:

- If a site has purchased PC-style keyboards that do not contain the Sun Props key, the site can use the sitewide defaults file to specify a function key instead. Users can still specify their preferences (via the user defaults file), if so desired.
- If a site has a mandatory policy for all appliances to use a standard hot key (perhaps for ease of training and support), the site could use the sitewide mandatory defaults file to specify this standard key. In this case, users would not be allowed to specify their own preferences.

The format of the hot key entry in these properties files is:

```
utsettings.hotkey=value
```

where *value* is a valid X keysym name preceded by one or more of the supported modifiers (`Ctrl`, `Shift`, `Alt`, `Meta`), in any order. Example values are shown in the following table.

TABLE 5-6 Example Hot Key Values

Example Value	Notes
`Shift SunProps`	This is the application default.
`F3`	
`Shift F4`	
`Ctrl Shift Alt F5`	

▼ To Change the Hot Key Setting (Non-Sun Keyboards) Sitewide

1. **As `root`, in a text editor open the `/etc/opt/SUNWut/utsettings_defaults.properties` file.**

Note – If you want to make the change mandatory, change the value in the `/etc/opt/SUNWut/utsettings_mandatory.properties` file.

---

2. **Locate the original hot key entry and place a # in front of that statement.**

   The # effectively nulls or remarks out the first hot key property.

```
# utsettings.hotkey=Shift SunProps
```

3. **Type in the new hot key property after the first statement. For example,**

```
utsettings.hotkey=Shift F8
```

4. **Save the `utsettings_defaults.properties` file.**

   The new hot key takes effect when the next user logs in. The next user to log in uses the new hot key to display the Sun Ray 1 Settings screen. Users that were logged in prior to changing the hot key use the old value.

▼ To Change the Hot Key Setting (Non-Sun Keyboards) for a User

1. **In the user's home directory (**`/home/`*username*`)`**, ask the user to type**:

```
% touch .utsettings.properties
```

This creates the `.utsettings.properties` file.

2. **Ask the user to edit the** `.utsettings.properties` **file. Add a line to the file with the value the user wants for the hot key. For example**:

```
utsettings.hotkey=Shift F8
```

3. **Ask the user save the** `.utsettings.properties` **file.**
4. **Ask the user log out and log back in to have the new hot key take effect.**

Session Manager

The Session Manager is a Sun Ray enterprise server software daemon. It interacts with the Authentication Managers and services. If you are using the default Sun Ray system, you do not need to change any of the Session Manager's default settings. However, if you need to, you can use the `utsessiond`, a unique Sun Ray command, to:

- Restart the Session Manager daemon
- Set the Session Manager's host name
- Set the Session Manager's listen port
- Specify allowed Authentication Managers

Note – You need to be `root` to use this command.

▼ To Restart the Session Manager

- **If the Session Manager exits and does not automatically restart, type:**

```
# /etc/init.d/utsvc stop stops all daemons
# /etc/init.d/utsvc start starts all daemons
```

System Monitoring

For the default Sun Ray system, an appliance is mapped to a session and each smart card is mapped to a session. There is a one-to-one correspondence between session numbers and X server numbers.

▼ To List All X Servers Running

- **Make your terminal window wider, then type:**

```
% ps -ef | grep Xsun
```

▼ To Search for Runaway Processes

For example, these processes may be using a large percentage of cpu or vsz, or have an application or X server using more than 100 MB.

- **Use the** `ps` **command to search for runaway processes. Type:**

```
% ps -o rss -o vsz -o pcpu -o args -e -o user
or
% ps -o rss,vsz,pcpu,args,user -e
```

For easier reading, you can save this process information to a file and sort it.

TABLE 5-7 Some Options for the `ps` Command

Option/Specification	Description
`-o`	Formats the output of this command.
`-e`	Lists every process now running.
`rss`	Gives the resident set size of the process in kilobytes.
`vsz`	Gives the total size in kilobytes for the process in virtual memory.
`pcpu`	Gives the percentage of CPU time used by the process compared to the amount of CPU time available.
`args`	Lists the complete command used to start a process.
`user`	Lists the user that started the process by userid.

There are a number of log files:

- `/var/opt/SUNWut/log/auth_log` — events from the Authentication Manager
- `/var/opt/SUNWut/log/messages` — events from the appliances
- `/var/adm/message` — normal system messages and events from the Session Manager

---

Note – DHCP parameters control the level of logging for the Sun Ray 1 appliances.

A cleanup program automatically removes unused and disconnected sessions after 15 minutes.

Other useful monitoring tools include:

- Performance meter
- `snoop` command
- `netstat` command
- `dhtadm` command

▼ To Start the OpenWindows Performance Meter for Server Statistics

- **Type:**

```
% /usr/openwin/bin/perfmeter -a -d
```

▼ To Check Network Packets

1. **To run the** `snoop` **command for network packet (DHCP) information (output to file** `/tmp/trace.snoop` **the activity of Sun Ray 1 appliance 08:00:20:af:24:1c), type:**

```
# snoop -o /tmp/trace.snoop 08:00:20:af:24:1c
```

2. **To run the** `snoop` **command for the specified network, type:**

```
# snoop -d hme1
```

▼ To Check Network Status

1. **To run the** `netstat` **command for network status, type:**

```
% netstat -i
```

This command lists loopback, internet/intranet and Sun Ray network status and level of traffic.

2. **To run the** `netstat` **command to list which ports are active, and what is listening (for example, Session Manager on 7007, and authentication on 7009 and 7010), and timeout and restart, type:**

```
% netstat -n
```

▼ To Access DHCP Information

- **To run the** `dhtadm` **command, type:**

```
# dhtadm -P
```

This command displays the DHCP table, including IP addresses.

CHAPTER 6

Administration Introduction

This chapter introduces Sun Ray administration concepts and describes how to get started with the Sun Ray administration application.

Administration Application Overview

The Sun Ray system uses UNIX concepts wherever possible and only adds functionality specific to the Sun Ray server software where needed. The Sun Ray administration application can be used to administer Sun Ray users and Sun Ray 1 enterprise appliances (desktops). Below is a brief overview of the two concepts and how they differ from traditional UNIX concepts.

Sun Ray 1 Appliances

Although Sun Ray 1 enterprise appliances have much of the same functionality as a traditional workstation, they are subtly different. Unlike traditional workstations, Sun Ray 1 appliances are not named, they are uniquely identified by their built-in Ethernet address. The appliances do not run the Solaris operating environment, rather they run a very small microkernel in firmware that allows them to connect to a Solaris server.

As each appliance's state changes, it notifies the Sun Ray administration framework, which updates the appliance's entry in the administration database. Using the administration application, administrators can list appliances, check each appliance's current properties, and assign related information to each appliance (for example, unit location and department).

For more details on managing Sun Ray appliances, please see "Managing Sun Ray 1 Appliances" on page 81.

Sun Ray Users

The concept of a Sun Ray user is a level above the traditional UNIX user concept. The Sun Ray user is identified by a token (usually a smart card, but it can also be an appliance's built-in ID), which gives the user access to an X-Windows session. This session begins with a standard `dtlogin` screen that requires the user to log in with a UNIX username and password before being presented with the user's normal desktop windowing environment. (Note that there is no formal connection between a Sun Ray user and a standard UNIX user account; a Sun Ray user can log in as any UNIX account that the user has a password for).

However, if the user started a Sun Ray session with a smart card, the user can remove the smart card, insert it in any other enterprise appliance connected to the same Sun Ray server, and the user's session "follows" the user, thus allowing the user to have instantaneous access to the user's windowing environment and current applications from multiple appliances.

The amount of Sun Ray user administration functionality that is available depends on the current authentication policy. The default policy allows all cards and all appliances access without any registration, so the administration database is not consulted or updated with regards to users. Smart card users can still take their sessions from appliance to appliance, but the cards are not named or tracked.

If an authentication policy involving registered users or appliances is enabled, the Sun Ray administration database is consulted before allowing a specific user or appliance (depending on the policy) access to a session. Sun Ray users can be created, modified, and deleted centrally by an administrator using the Sun Ray administration application. Sun Ray users can also be created by the users themselves if the current authentication policy has enabled self-registration. Tokens can be added to a user (useful if a user's card has been left at home and the user needs access to the current session) and removed from a user (useful if a user's card has been lost or damaged). Tokens can also be enabled or disabled as needed. User statistics, including lists of users, current logins, and individual user properties are also available.

For more details on the Authentication Manager and choosing an appropriate authentication policy, please see "Choosing an Authentication Policy" on page 60.

For more details on managing Sun Ray users, please see "Managing Sun Ray Users" on page 97.

Administration Data

Sun Ray administration data comes from two sources: an LDAP data store that keeps persistent administration data and the Authentication Manager, which is queried as needed for dynamic data. Sun Ray administration data is kept in its own

LDAP data store that grants read access to all LDAP clients, but only allows changes by LDAP clients that connect as the privileged “UT Admin” user. As with any other LDAP data, Sun Ray administration data is accessible via standard LDAP interfaces and applications. However, this data should not be modified by any applications other than the standard ones provided with the Sun Ray server software or else the Sun Ray system may not operate properly.

Token Readers

If you enable an authentication policy with registered users, you need to identify smart card IDs. Some manufacturers print the smart card ID on the card itself, but many do not. Since all of the administrative functions refer to this token ID, the Sun Ray server software provides a way to designate one or more specific enterprise appliances as dedicated Token Readers. These dedicated appliances can be used by site administrators to administer Sun Ray users.

The most common scenario is that of a site administrator, whose hardware configuration is shown in the figure below.

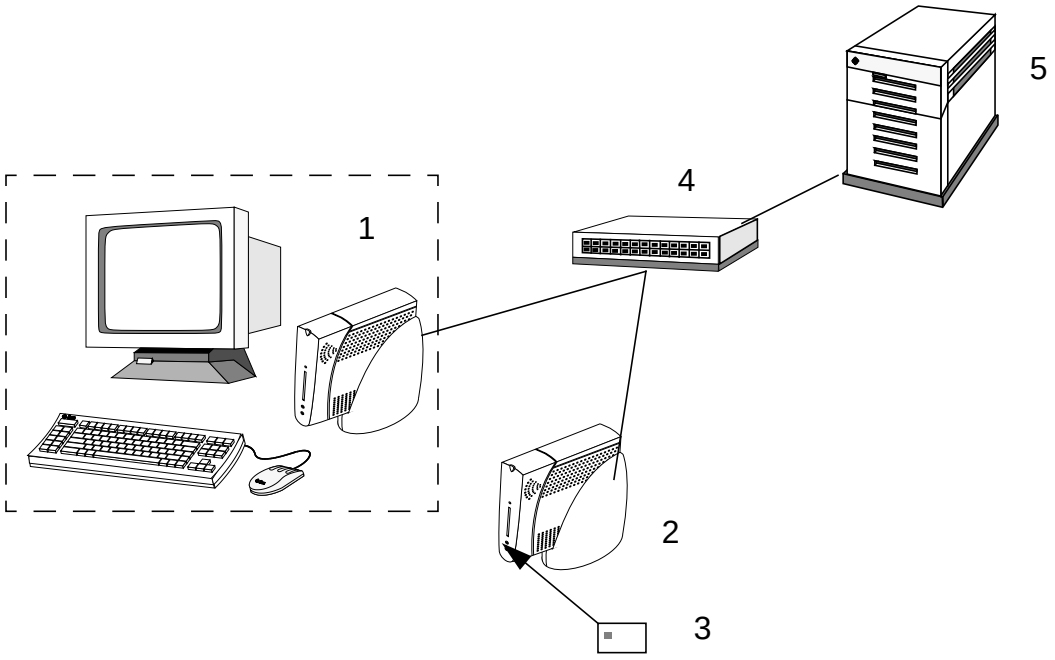


FIGURE 6-1 Using a Token Reader to Register Smart Cards

Legend:

1. Personal enterprise appliance
2. Token reader appliance
3. Smart Card
4. Switch
5. Server

The site administrator still uses a personal enterprise appliance in a normal fashion, but connects an additional appliance(s) to the same server as a Token Reader(s). Note that the Token Reader will not be used for normal Sun Ray services, so it does not need a keyboard, mouse, or monitor connected to it.

Once the Sun Ray server software has been configured so that this extra appliance(s) is designated as a Token Reader(s), the site administrator can tell the administration applications to read a smart card's ID instead of typing it in.

To Configure a Token Reader, read “Choosing an Authentication Policy” on page 60, then use the procedure, “To Configure a Token Reader” on page 63.

Using the Administration Application

The Sun Ray server software provides two ways to use the administration application: a web-based graphical interface and a command-line interface.

Web-based Interface

If you chose to install and configure the supporting software required to run the web-based interface of the administration application, you can administer your Sun Ray users and appliances from your favorite web browser.

Note – By default, the web server instance that supports the Sun Ray web-based interface of the administration application is configured to accept only local connections for security reasons.

▼ To Use the Web-based Interface

1. **Log into your Sun Ray server’s console or any enterprise appliance attached to it and start up your normal windowing environment.**
2. **Start your preferred browser, such as Netscape Communicator.**
3. **Type the following URL in the browser’s location field:**

```
http://localhost:1660
```

Note – If you chose a different port when you configured the Sun Ray supporting software, substitute it for the “1660” in the URL above.

A login screen similar to the following one is displayed:

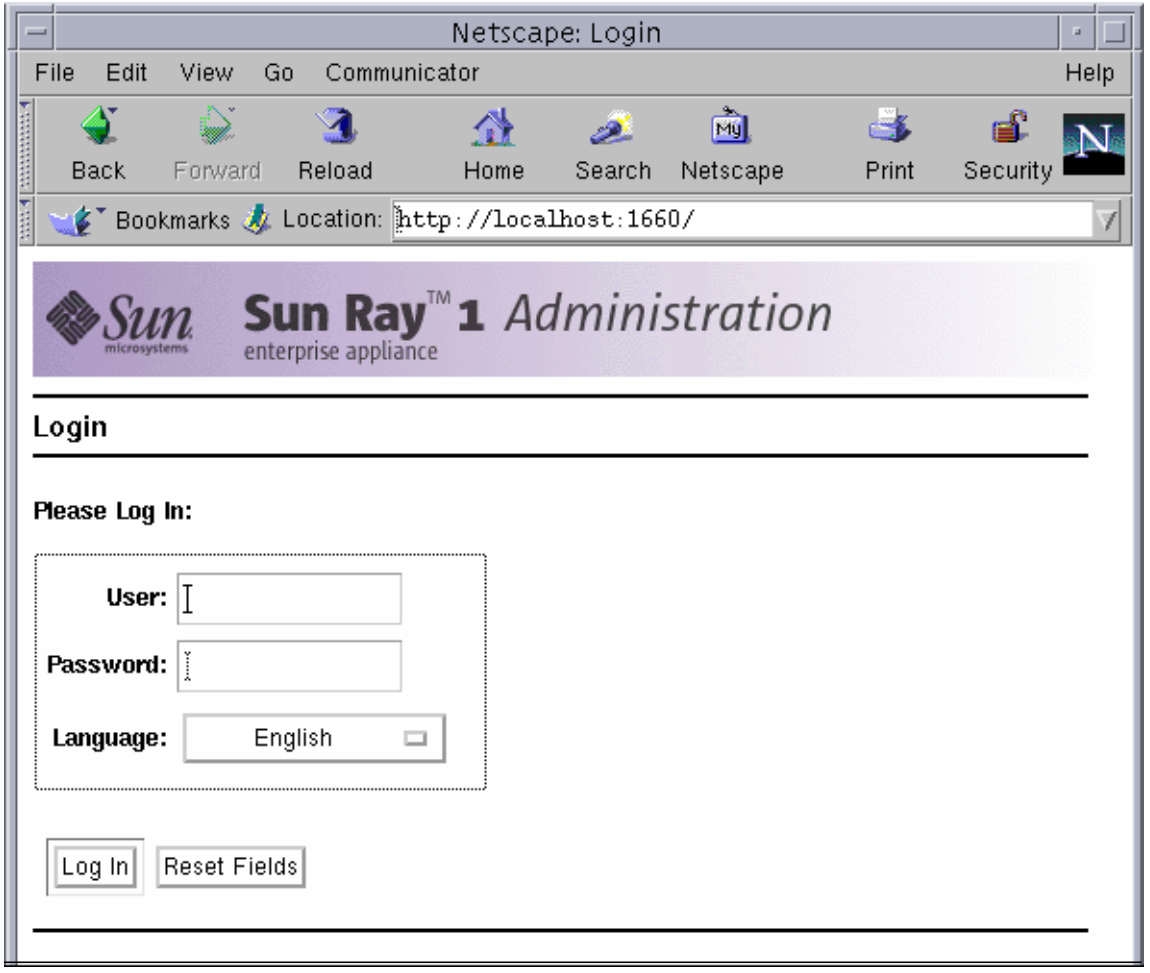


FIGURE 6-2 Login Page

If you get a message denying access, the Web server is indicating that you attempted to connect from a remote machine. Make sure that:

- You are running a browser on the Sun Ray server or one of its appliances.
- The browser is *not* using a different machine as an HTTP Proxy Server to proxy the connection to the web server.

4. **Enter the administrator username** `admin` **and the UT administration password you specified when you configured the Sun Ray server software.**

5. **If a different locale is desired, select one from the Language pulldown list.**

6. **Click the “Log In” button.**

   The Sun Ray Main Administration page displays and your administration login session begins.

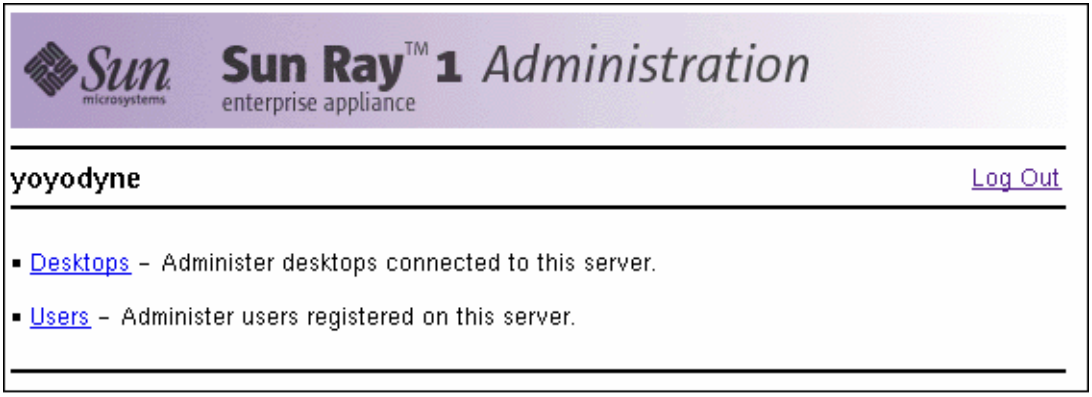


FIGURE 6-3 Main Administration Page

Administration login sessions are limited to 30 minutes for security reasons. Once this time expires, you are asked to log in again. You can log out at any time by clicking on the Log Out at the top of the page.

7. **Click on Desktops or Users.**

   See “Managing Sun Ray 1 Appliances” on page 81 and “Managing Sun Ray Users” on page 97 for further instructions on using the web-based interface.

Command-line Interface

The command-line interface of the administration application is offered through two programs, `utuser` (for managing users) and `utdesktop` (for managing desktops). These programs are both installed in `/opt/SUNWut/sbin`, which you can add to your path if you expect to use them frequently.

The command-line programs offer almost all of the functionality of their web-based equivalents and add batch operations for performing management operations on multiple users or appliances with a single command.

▼ To Use the Command-line Interface

1. **Log in to the Sun Ray server.**
2. **Become superuser.**

Note – The command-line programs can be run as root or as a normal non-privileged user. However, superuser root is required for any operations that change or delete any administration data. Other operations (for example, listing users) can be run by normal users.

---

3. **Run the appropriate** `utdesktop` **or** `utuser` **command.**

   Please see “Managing Sun Ray 1 Appliances” on page 81 and “Managing Sun Ray Users” on page 97 for further instructions on using the command-line interface.

CHAPTER 7

Managing Sun Ray 1 Appliances

This chapter describes how to use the Sun Ray web-based and command-line administration application to manage your Sun Ray 1 enterprise appliances. The following procedures for managing appliances (desktops) are covered:

Please see "Administration Introduction" on page 73, for background about Sun Ray 1 appliances and the administration application.

For the web-based interface, this chapter assumes you have already launched your browser, and logged in to the web-based application. All of the functionality detailed in this chapter can be reached from the Desktops page, as shown in the following figure.

For the command-line interface, this chapter assumes you are logged into the Sun Ray server as `root`, have `/opt/SUNWut/sbin` in your path, and are at a shell prompt.

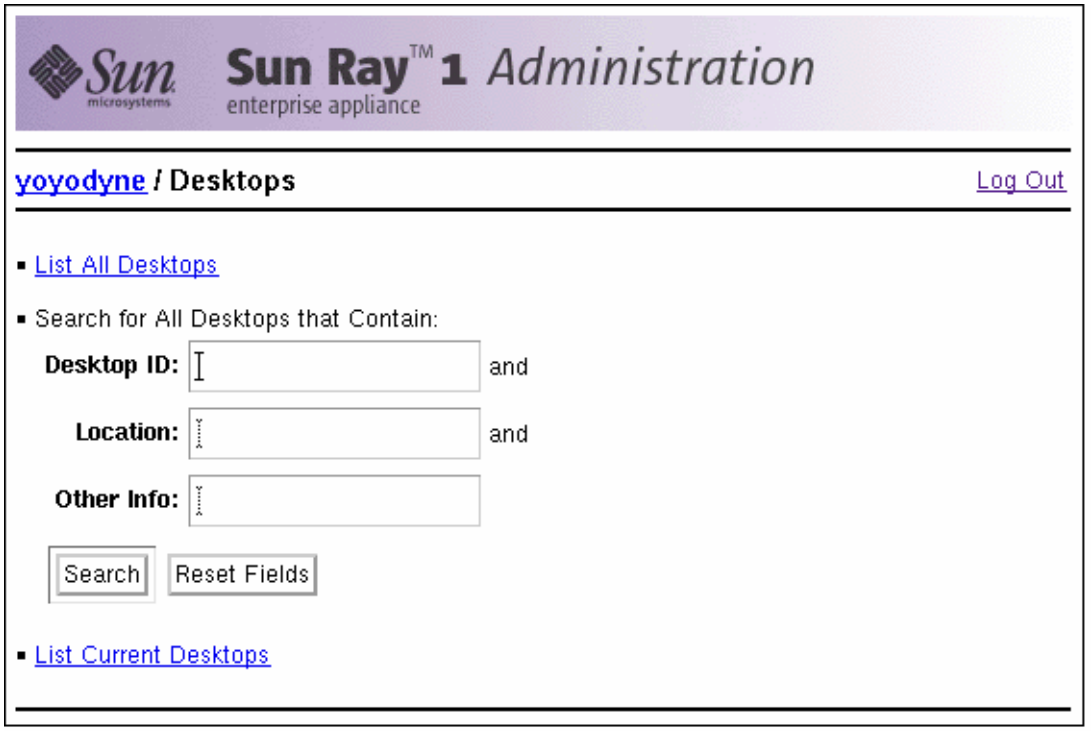


FIGURE 7-1 Desktops Page

Listing All Desktops

▼ To List All Desktops from the Web-based Interface

1. **On the Desktops page, click on List All Desktops.**

   A page similar to the following displays, with the complete list of desktops in the administration database.

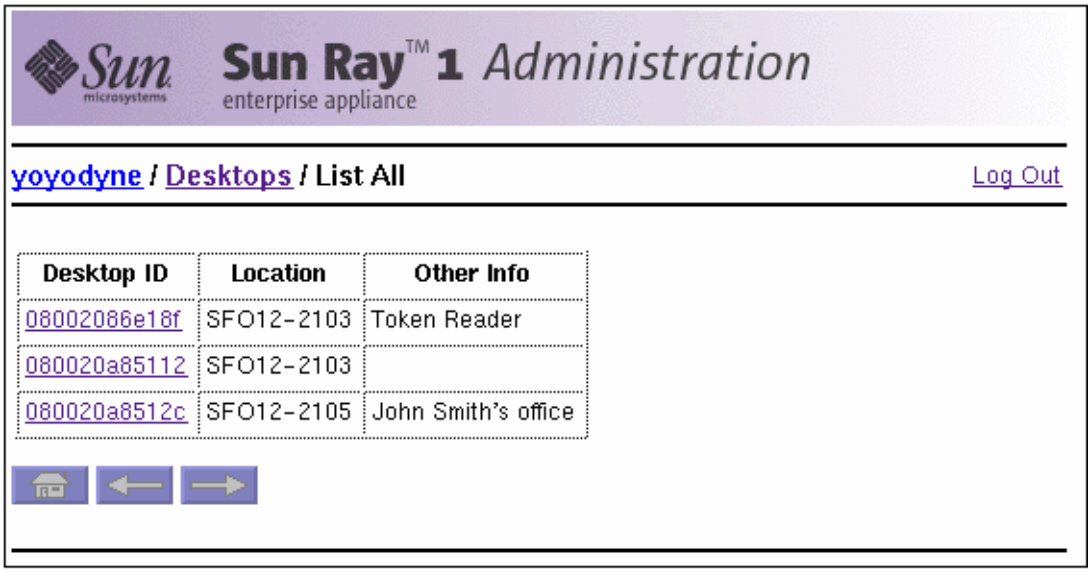


FIGURE 7-2 List All Desktops Page

2. **If your listing returned more than 20 desktops, use the navigation buttons at the bottom of the page to view additional pages of results.**

   The buttons allow you to view the next 20 desktops, previous 20 desktops, or to go back to the first page of 20 desktops.

▼ To List All Desktops from the Command-line Interface

- **Type the following command:**

```
# utdesktop -l
```

This command displays the complete list of desktops in the administration database. For example:

```
# utdesktop -l

Desktop ID      Location                  Other Info
--------------- ------------------------- ----------------------
08002086e18f    SFO12-2103                Token Reader
080020a85112    SFO12-210
080020a8512c    SFO12-2105                John Smith's office

3 desktops total.
```

Searching for Desktops

▼ To Search for Desktops from the Web-based Interface

1. **Starting at the Desktops page, fill out the Desktop ID, Location, Other Info fields with the values you want to search on.**
2. **Press the Search button.**

   A results page similar to the following is shown, displaying all matches in the administration database. If more than one search value is entered, the search performs a logical "AND." Only those results that match all the specified values are returned.

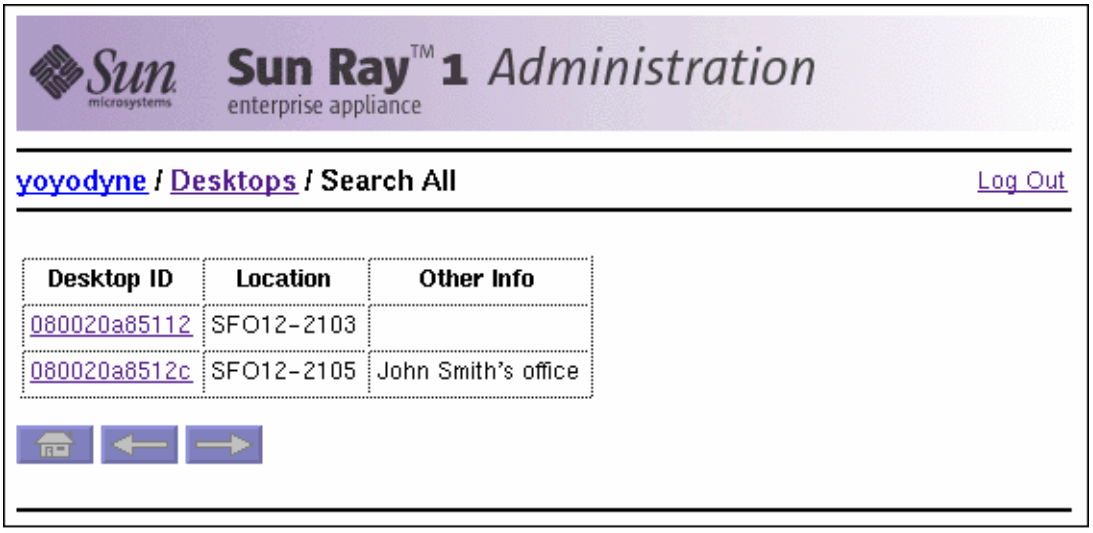


FIGURE 7-3 Search Results Page

3. **If your search returned more than 20 desktops, use the navigation buttons at the bottom of the page to view additional pages of results.**

   The buttons allow you to view the next 20 desktops, previous 20 desktops, or to go back to the first page of 20 desktops.

▼ To Search for Desktops from the Command-line Interface

- **Type the following command:**

```
# utdesktop -li <substring>
```

where <*substring*> is the full or partial Desktop ID you want to search for. This command displays the list of appliances in the administration database whose Token IDs match this substring. For example:

```
# utdesktop -li a851

Desktop ID      Location                  Other Info
--------------- ------------------------- ----------------------
080020a85112    SFO12-2103
080020a8512c    SFO12-2105                John Smith's office

2 desktops total.
```

Listing Currently Connected Desktops

▼ To List Currently Connected Desktops from the Web-based Interface

---

Note – Sun Ray services such as the Authentication Manager must be operating to perform these procedures.

---

1. **Starting at the Desktops page, click on List Current Desktops.**

   A page similar to the following displays, listing only the desktops that are currently connected to this Sun Ray server and communicating with the Authentication Manager.

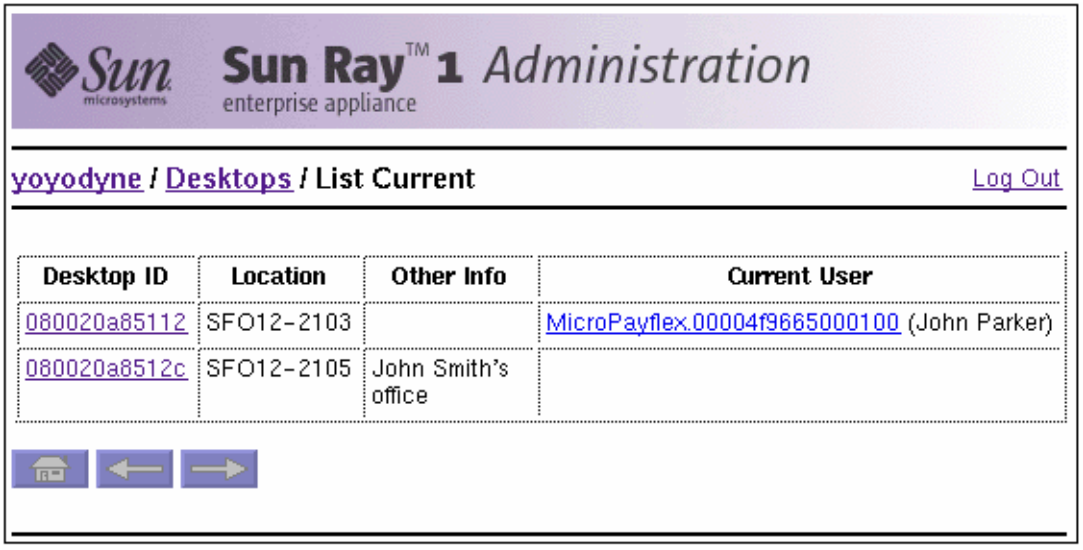


FIGURE 7-4 List of Current Desktops Page

2. **If your listing returned more than 20 desktops, use the navigation buttons at the bottom of the page to view additional pages of results.**

   The buttons allow you to view the next 20 desktops, previous 20 desktops, or to go back to the first page of 20 desktops.

▼ To List Currently Connected Desktops from the Command-line Interface:

1. **Type the following command:**

```
# utdesktop -lc
```

The command lists only the desktops that are currently connected to this Sun Ray server and communicating with the Authentication Manager. For example:

```
# utdesktop -lc

Desktop ID   Location             Current User
------------ -------------------- ------------------------------------------
080020a85112 SFO12-2103           MicroPayflex.00004f9665000100 (John Parker)
080020a8512c SFO12-2105

2 desktops currently connected.
```

2. **Or you can get a longer listing by typing the following command:**

```
# utdesktop -Lc
```

The longer listing displays the same information as the normal listing, but adds the Other Info column.

Listing Desktops in Dump Format

There is no web-based interface for this procedure.

▼ To Output the Desktop List in Dump Format Command-line Interface

- **Type the following command:**

```
# utdesktop -o
```

The command outputs the full list of desktops from the administration database in comma-delimited format. For example:

```
# utdesktop -o
08002086e18f,SFO12-2103,Token Reader
080020a85112,SFO12-2103,
080020a8512c,SFO12-2105,John Smith's office
```

The format of each line is:

```
<Desktop ID>,<Location>,<Other Info>
```

This output can be saved to a file and used later to perform a batch edit operation.

Displaying a Desktop's Current Properties

▼ To Display a Desktop's Current Properties from the Web-based Interface

1. **Starting at the Desktops page, perform a list or search operation (see** FIGURE 7-2**,** FIGURE 7-3**, or** FIGURE 7-4**).**
2. **Click on the Desktop ID hyperlink for the desktop of interest.**

   A page similar to the following displays.

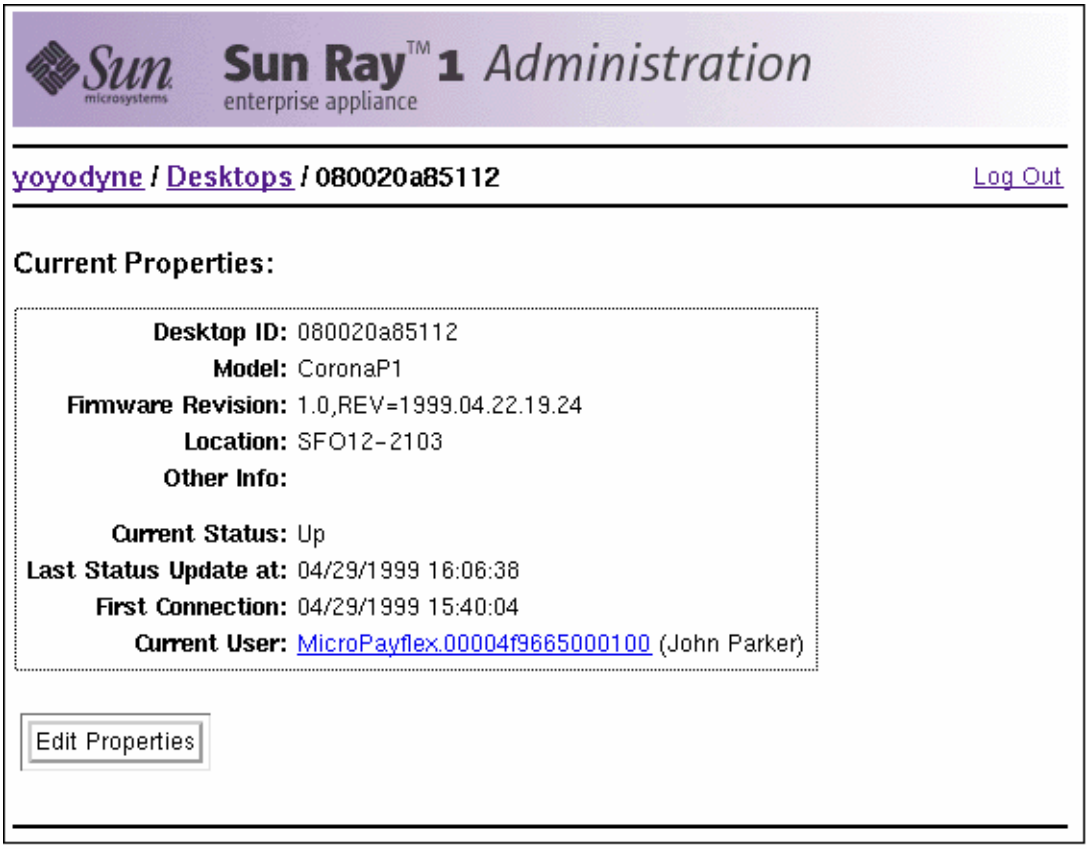


FIGURE 7-5 Desktop Properties

The page shows information about the appliance (desktop) as obtained from the administration database and Authentication Manager. The following fields are displayed:

TABLE 7-1 Desktop Properties Fields

Option	Description
Desktop ID	This is the desktop's unique ID (the appliance's Ethernet address).
Model	The desktop model.
Firmware Revision	The version of the firmware currently loaded in the desktop.
Location	An optional field that administrators can fill out to identify the appliance's location.

TABLE 7-1 Desktop Properties Fields *(Continued)*

Option	Description
Other Info	An optional field that administrators can fill out to display any additional information associated with the appliance.
Current Status	The current state of the appliance: up or down.
Last Status Update at	The date and time that the “Current Status” field was last updated.
First Connection	The date and time the appliance was first recognized by the Sun Ray server.
Current User	The Token ID of the current smart card user. If the user is registered, the user’s name is displayed as well.

▼ To Display a Desktop’s Current Properties from the Command-line Interface

- **Type the following command**:

```
# utdesktop -p <Desktop ID>
```

where *<Desktop ID>* is the ID you want to get properties for. The command displays all information about the specified desktop, as obtained from the administration database and Authentication Manager. For example:

```
# utdesktop -p 080020a85112

Current Properties:
  Desktop ID            = 080020a85112
  Model                 = CoronaP1
  Firmware Revision     = 1.0,REV=1999.04.22.19.24
  Location              = SFO12-2103
  Other Info            =

  Current Status        = Up
  Last Status Update at = 04/29/1999 16:06:38
  First Connection      = 04/29/1999 15:40:04
  Current User         = MicroPayflex.00004f9665000100 (John Parker)
```

See TABLE 7-1 for descriptions of the fields displayed.

Editing a Single Desktop's Properties

▼ To Edit A Single Desktop's Properties from the Web-based Interface

1. **Starting at the Desktop Properties page for the desktop you want to edit, click the Edit Properties button.**

   A page similar to the following displays.

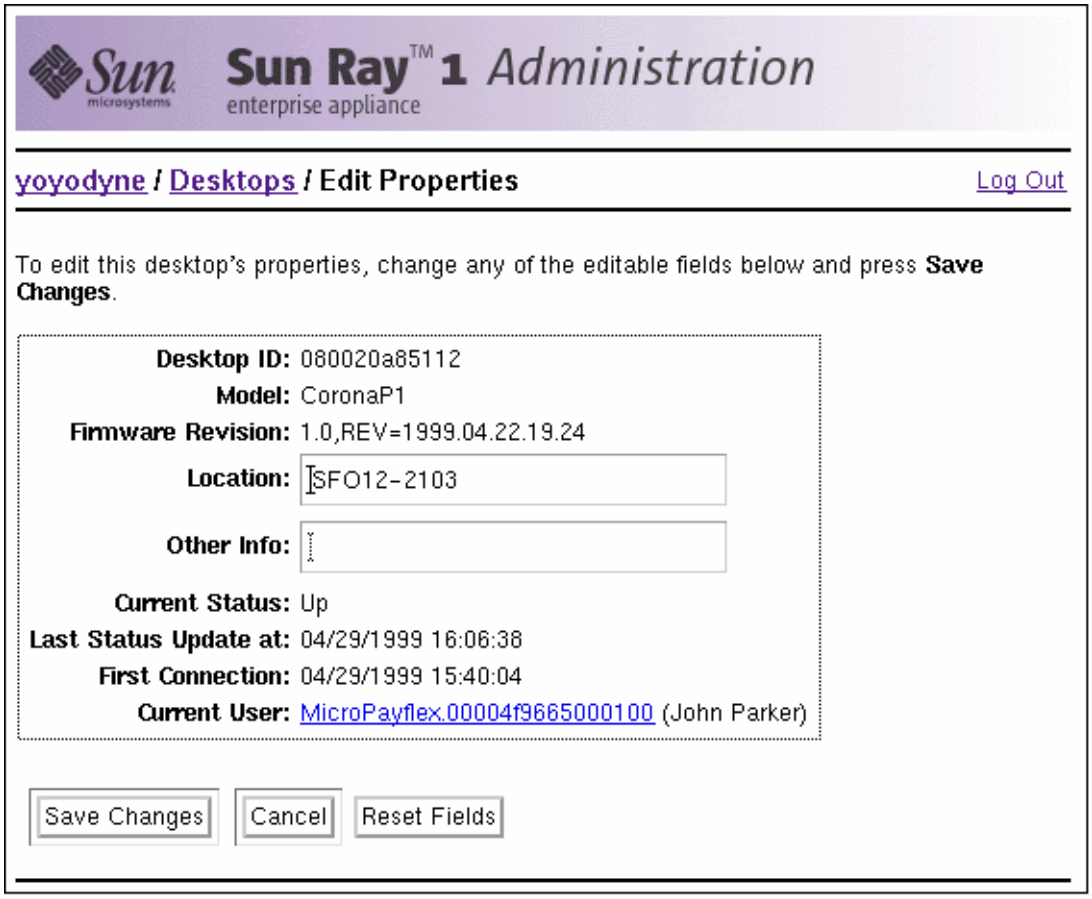


FIGURE 7-6 Edit Desktop Properties

2. **Change any of the editable fields you want.**
3. **When done, click the Save Changes button.**

   The changes are saved to the administration database.

▼ To Edit A Single Desktop's Properties from the Command-line Interface

- **Type the following command:**

```
# utdesktop -e "<Desktop ID>,<Location>,<Other Info>"
```

where <*Location*> and <*Other Info*> can be left empty if you want to clear the respective field. The command updates the desktop's information in the administration database. For example:

```
# utdesktop -e "080020a85112,SFO12-2103,John's Office"
1 Desktop Modified
```

If you choose not to specify one of the optional fields, simply put no text between the commas. The following example clears the Location field:

```
# utdesktop -e "080020a85112,,John's Office,"
1 Desktop Modified.
```

Tip – Use the output of the `utdesktop -o` command as input to this command (line by line). Remember to put quotes around the data.

Editing the Properties of Multiple Desktops

There is no web-based interface for this procedure.

▼ To Edit the Properties of Multiple Desktops from the Command-line Interface

1. **Prepare a file with the desktop information. Each desktop should be on a separate line of the form:**

```
<Desktop ID>,<Location>,<Other Info>
```

Note – You can use the output of `utdesktop -o` to create this file.

2. **Type the following command:**

```
# utdesktop -ef <filename>
```

where <*filename*> is the desktops file you created in Step 1. For each line in the specified file, the command checks to see if any modifications have been made, and when found, saves them to the administration database,

For example:

```
# utdesktop -o > desktops
# cat desktops
08002086e18f,SFO12-2103,Token Reader
080020a85112,SFO12-2103,
080020a8512c,SFO12-2105,John Smith's office
# vi desktops
# cat desktops
08002086e18f,SFO12-2103,Token Reader
080020a85112,SFO12-2103,Desktop 1
080020a8512c,SFO12-2105,Desktop 2
# utdesktop -ef desktops
No modifications necessary for 08002086e18f.
Modified 080020a85112
Modified 080020a8512c

2 desktops modified
1 desktop did not require changes
```

CHAPTER 8

Managing Sun Ray Users

This chapter describes how to use the Sun Ray web-based and command-line administration application to manage your Sun Ray users. The following procedures for managing users are covered:

- “User Fields” on page 99
- “Adding and Deleting Users” on page 99
- “Finding Users” on page 108
- “User Properties” on page 117
- “Administering Tokens” on page 124

See “Administration Introduction” on page 73, for background about Sun Ray users and the administration application.

For the web-based interface, this chapter assumes you have already launched a browser, pointed it at the web-based application and logged in. All of the functionality detailed in this chapter can be reached from the Users page.

For the command-line interface, this chapter assumes you are logged into the Sun Ray server as superuser, have `/opt/SUNWut/sbin` in your path, and are at a shell prompt.

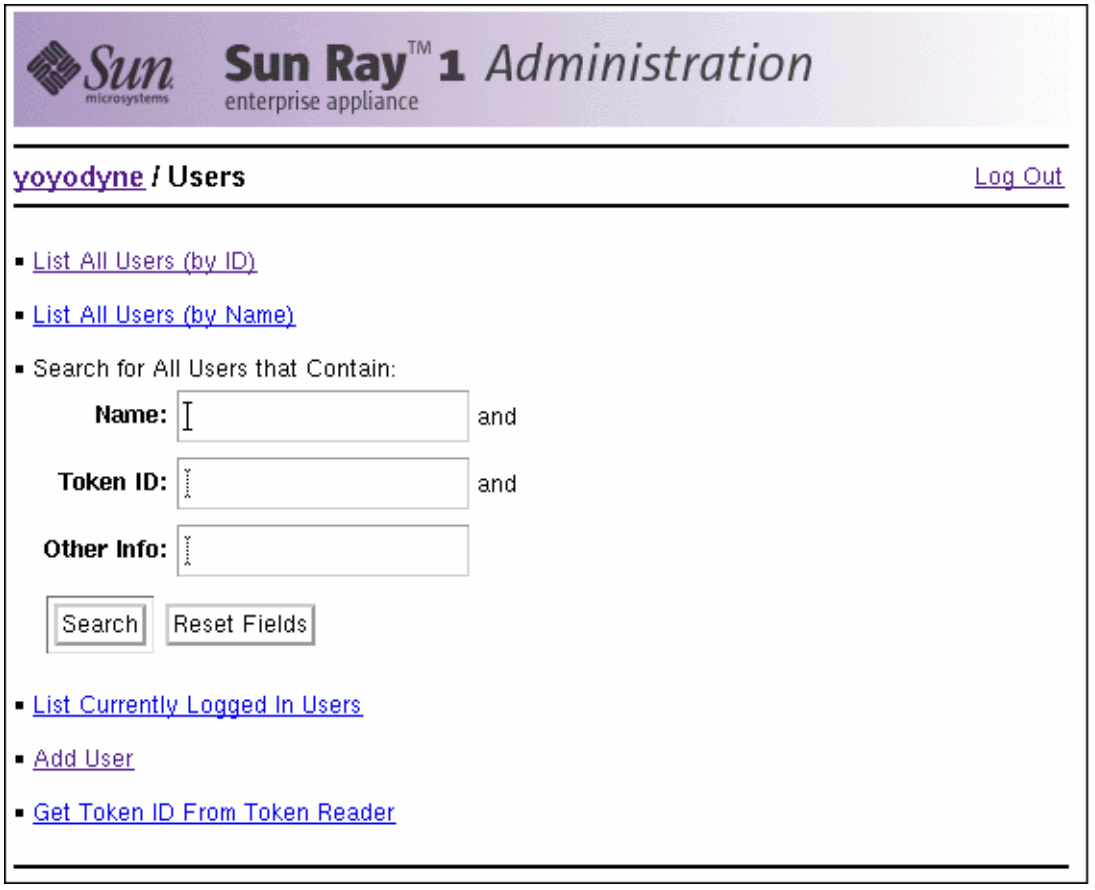


FIGURE 8-1 Users Page

User Fields

The following user fields are specifiable in the Sun Ray administration database.

TABLE 8-1 Key User Fields

Field	Description

Token ID	The user's unique token type and ID. For smart cards, this is a manufacturer type and the card's serial ID. For enterprise appliances, this is the type "`pseudo`" and the appliance's Ethernet address. Examples:
	`MicroPayflex.9998008800007526`
	`pseudo.080020861234`

Server Name	The name of the Sun Ray server the user is using. This field should generally be set to `localhost`.
Server Port	The Sun Ray server's communication port. This field should generally be set to `7007`.
User Name	The user's name.
Other Info	Any additional information you want to associate with the user (for example, an employee or department number). This field is optional.

Adding and Deleting Users

Adding a Single User

▼ To Add a Single User from the Web-based Interface

1. **Starting at the Users page, click on Add User.**

   A page similar to the following displays.

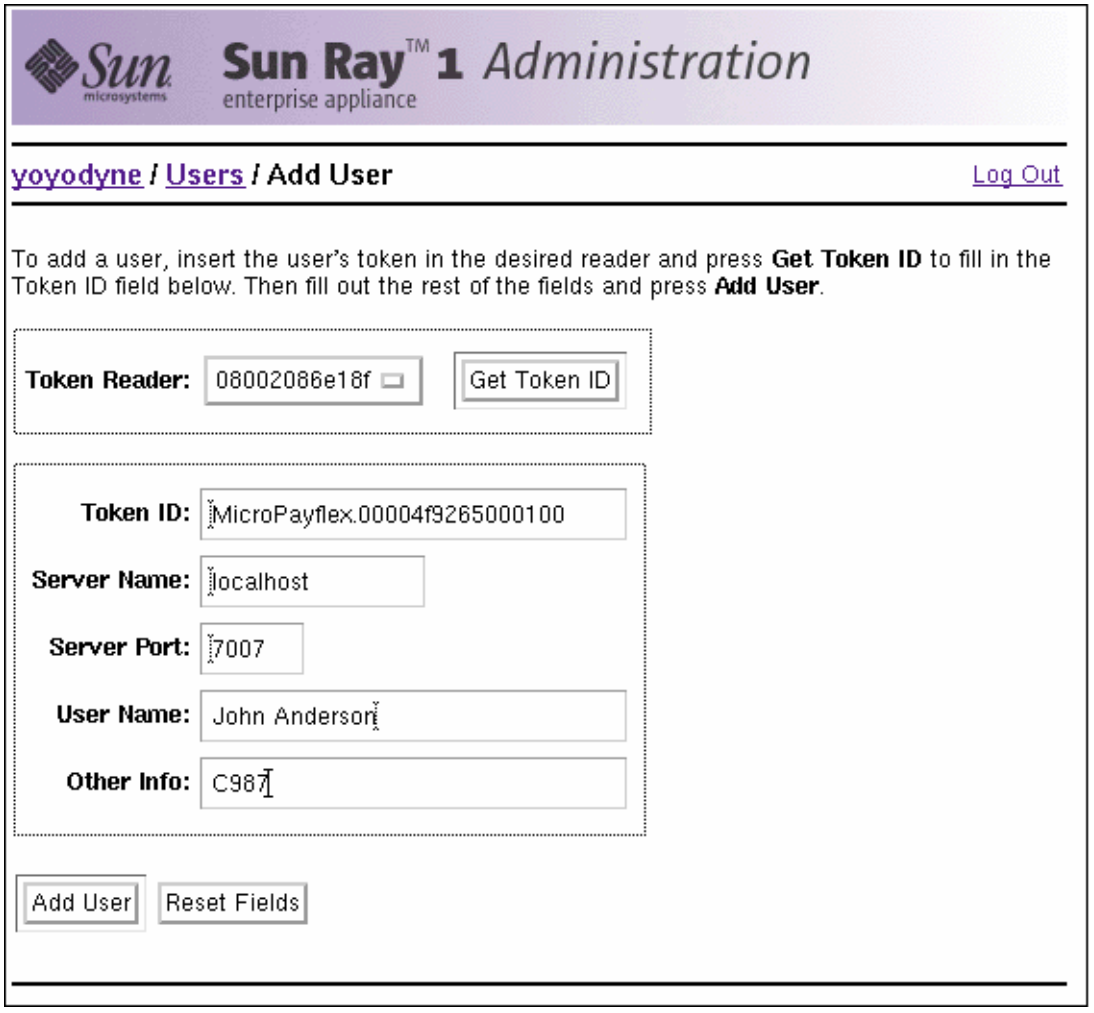


FIGURE 8-2 Add a Single User

2. **If you do not know the user's Token ID and have configured a Token Reader (see "To Configure a Token Reader" on page 63):**

   a. **Insert the user's token into the selected Token Reader.**

   b. **Choose the selected Token Reader from the pulldown list of available readers.**

   c. **Press the Get Token ID button.**

      The application queries the token reader and, if successful, redisplays the form with the Token ID field filled out.

3. **Fill out the required fields.**

   The Other Info field is optional.

4. **Press the Add User button.**

   The user and associated token are created in the administration database.

▼ To Add a Single User from the Command-line Interface

- **Type the appropriate** `utuser` **command.**

  a. If you already know the user's Token ID, type:

```
# utuser -a "<Token ID>,<Server Name>,<Server Port>,<User Name>,<Other Info>"
```

This command creates the user and associated token in the administration database. For example:

```
# utuser -a "MicroPayflex.00004f9265000100,localhost,7007,John Anderson,C987"
Added 1 user.
```

  b. If you do not know the user's Token ID and have configured a Token Reader, type:

```
# utuser -a "x,<Server Name>,<Server Port>,<User Name>,<Other Info>" -r <Token Reader>
```

where the "x" that is specified instead of the new Token ID tells the command to query *<Token Reader>* for the Token ID. You will be prompted to insert the user's token into the Token Reader when the command is ready. Then, the user and the associated token (using the ID obtained from the reader) will be created in the administration database. For example:

```
# utuser -a "x,localhost,7007,John Anderson,C987" -r
08002086e18f
Insert token into token reader '08002086e18f' and press return.
Read token ID 'MicroPayflex.00004f9265000100'
Added 1 user.
```

Note – The <*Other Info*> argument is optional.

Adding Multiple Users

There is no web-based interface for this operation.

▼ To Add Multiple Users from the Command-line Interface

1. **Prepare a file with the user information. Each user should be on a separate line:**

```
<Token ID>,<Server Name>,<Server Port>,<User Name>,<Other Info>
```

   If you do not know the Token ID for a user and have configured a Token Reader, specify an "x" for the Token ID. This tells the command to query a Token Reader for the Token ID (see "To Configure a Token Reader" on page 63).

2. **Type the appropriate `utuser` command:**

a. If you already specified all Token IDs (so you do not need to use a Token Reader), type:

```
# utuser -af <filename>
```

where <*filename*> is the user file you created in Step 1. For each line in the specified file, the command adds the user and associated token to the administration database.

For example:

```
# cat users
MicroPayflex.00004f8c65000100,localhost,7007,John Smith,E421
MicroPayflex.00004f8e65000100,localhost,7007,John Stone,C2310
MicroPayflex.00004f8f65000100,localhost,7007,John Williams,E1049

# utuser -af users
Added John Smith
Added John Stone
Added John Williams

3 users added, 0 lines skipped due to errors.
```

b. If you had to specify "x" for at least one Token ID (in other words, if you need to use a Token Reader), type the following command:

```
# utuser -af <filename> -r <Token Reader>
```

where <*filename*> is the user file you created in Step 1 and <*Token Reader*> is the enterprise appliance that you have configured as a Token Reader.

For each line that has an "x" specified, you will be prompted to insert the user's token into the reader and press return. Lines that have a Token ID already specified will not require prompting. As each line is completed, the command will add the user and associated token to the administration database.

For example:

```
# cat users
x,localhost,7007,John Smith,E421
MicroPayflex.00004f8e65000100,localhost,7007,John Stone,C2310
x,localhost,7007,John Williams,E1049

# utuser -af users -r 08002086e18f
Insert token for 'John Smith' into token reader '08002086e18f'
  and press return.
Read token ID 'MicroPayflex.00004f8c65000100'
Added John Smith
Added John Stone
Insert token for 'John Williams' into token reader '08002086e18f'
  and press return.
Read token ID 'MicroPayflex.00004f8f65000100'
Added John Williams

3 users added, 0 lines skipped due to errors.
```

Deleting a Single User

▼ To Delete a Single User from the Web-based Interface

1. **Starting at the User Properties page (see** FIGURE 8-9**) for the user you want to delete, press the Delete This User button.**

   A confirmation page similar to the following displays.

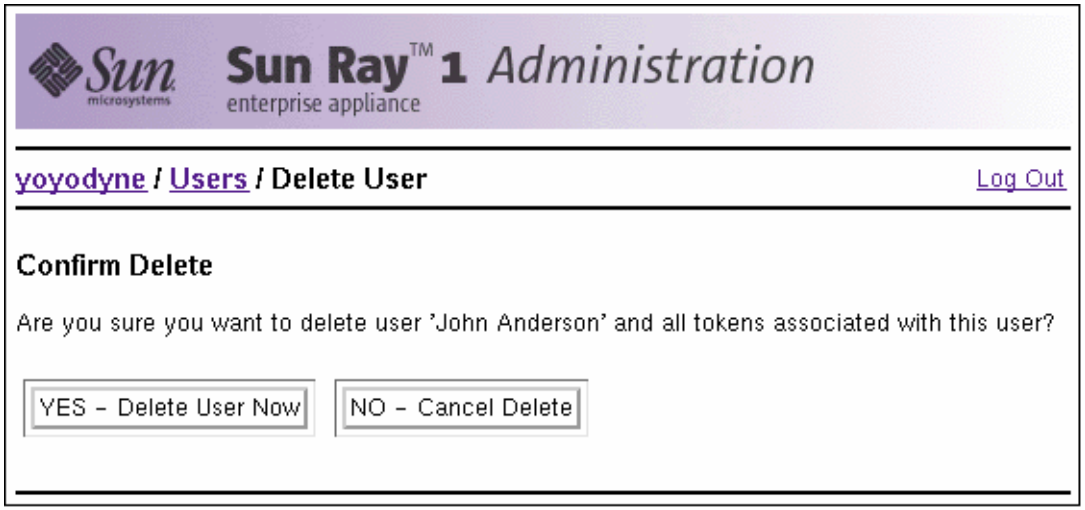


FIGURE 8-3 Confirm Deletion of a User

Caution – This operation deletes the user and all associated tokens. To delete a single token from a user, please see “To Delete a Token from a User from the Web-based Interface” on page 126.

2. **To proceed with deleting the user, press “YES - Delete User Now”. To cancel this delete operation, press “NO - Cancel Delete.”**

   If you press “YES”, the user and all associated tokens are deleted from the administration database and a confirmation of your delete operation will be displayed.

   If you press “NO”, you are returned to the User Properties page.

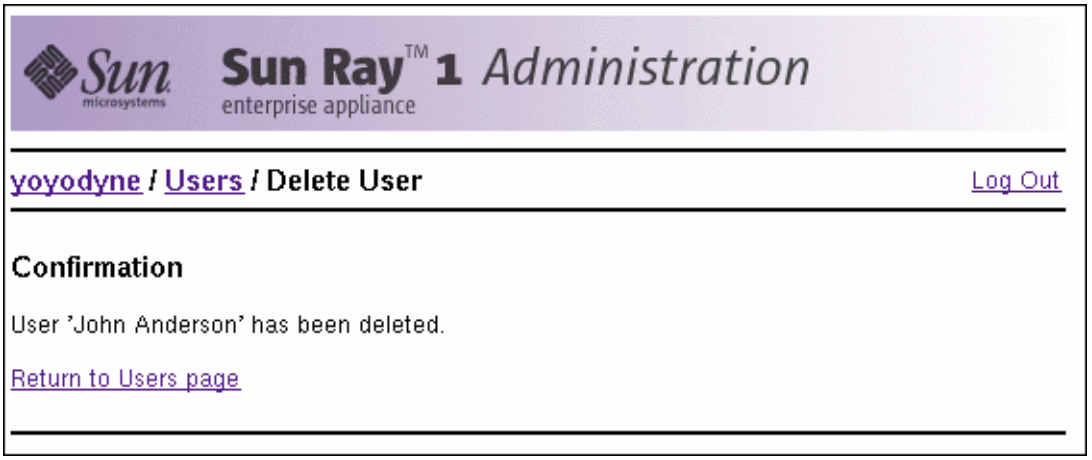


FIGURE 8-4 Confirmation Page

▼ To Delete a Single User from the Command-line Interface

- **Type the following command:**

```
# utuser -d <Token ID>
```

where <*Token ID*> is any one of the token IDs held by the user you want to delete.

Caution – This operation deletes the user and all associated tokens. To delete a single token from a user, please see “To Delete a Token from a User from the Command-line Interface” on page 126.

For example:

```
# utuser -d MicroPayflex.00004f8c65000100

Deleted 1 user.
```

Deleting Multiple Users

There is no web-based interface for this procedure.

▼ To Delete Multiple Users from the Command-line Interface

1. **Prepare a file with the users you want to delete and their new information. Each user should be on a separate line:**

```
<Token ID>
```

Note – You can use the output of `utuser -o` as input for this command since this command ignores everything after the first comma.

Caution – This operation deletes each user and all associated tokens. To delete a single token from a user, please see “To Delete a Token from a User from the Command-line Interface” on page 126.

---

2. **Type the following command:**

```
# utuser -df <filename>
```

where <*filename*> is the user file you created in Step 1. For each line in the specified file, the command deletes a user from the administration database.

For example:

```
# cat users
MicroPayflex.00004f8c65000100,localhost,7007,John Smith,E421
MicroPayflex.00004f8e65000100,localhost,7007,John Stone,C2310
MicroPayflex.00004f8f65000100,localhost,7007,John Williams,E1049

# utuser -df users
Deleted MicroPayflex.00004f8c65000100
Deleted MicroPayflex.00004f8e65000100
Deleted MicroPayflex.00004f8f65000100

3 users deleted
```

Finding Users

Listing All Users by ID

▼ To List All Users by ID from the Web-based Interface

1. **Starting at the Users page, click on List All Users (by ID).**

   A page like the following displays, listing all the users in the administration database, sorted by the Token ID field. If a user has multiple tokens, they are listed separately.

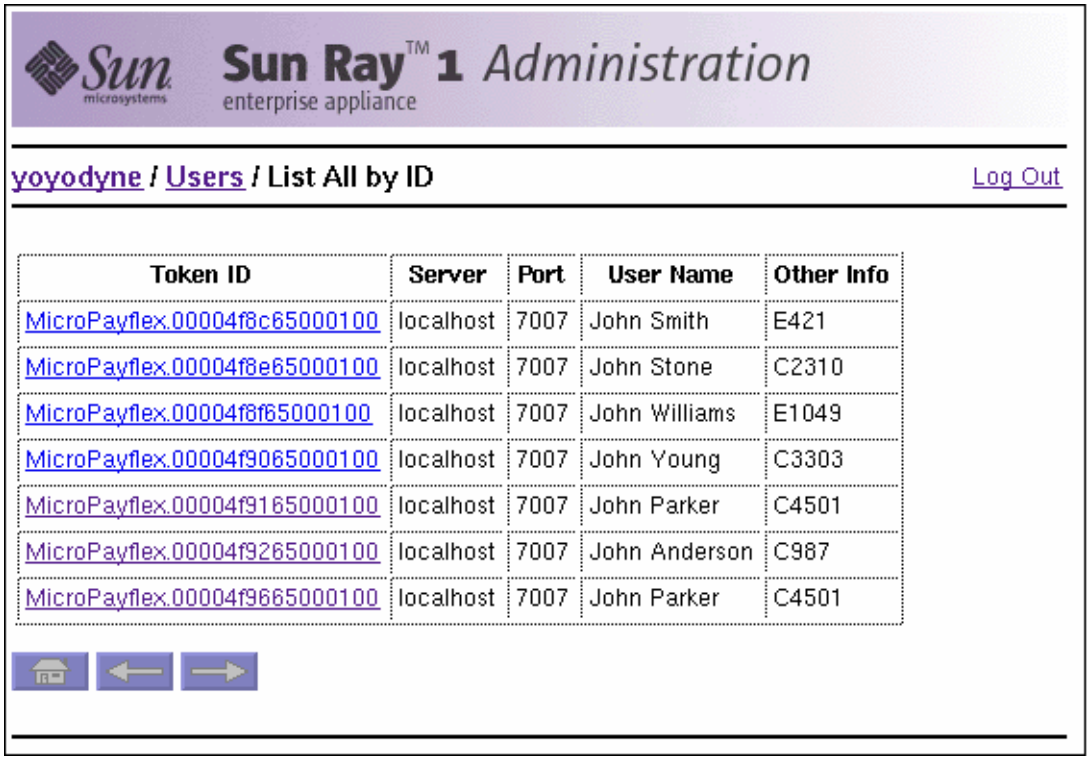


FIGURE 8-5 Results of List All Users by ID

2. **If your listing returned more than 20 users, use the navigation buttons at the bottom of the page to view additional pages of results.**

   The buttons allow you to view the next 20 users, previous 20 users, or to go back to the first page of 20 users.

▼ To List All Users by ID from the Command-line Interface

1. **Type the following command:**

```
# utuser -l
```

This command displays the complete list of users in the administration database. For example:

```
# utuser -l

Token ID                        User Name                       Other Info
------------------------------- ------------------------------- ---------------
MicroPayflex.00004f8c65000100  John Smith                      E421
MicroPayflex.00004f8e65000100  John Stone                      C2310
MicroPayflex.00004f8f65000100  John Williams                   E1049
MicroPayflex.00004f9065000100  John Young                      C3303
MicroPayflex.00004f9165000100  John Parker                     C4501
MicroPayflex.00004f9265000100  John Anderson                   C987
MicroPayflex.00004f9665000100  John Parker                     C4501

7 tokens total.
```

2. **Or you can get a longer listing by typing the following command:**

```
# utuser -L
```

The longer listing displays the same information as the normal listing, but adds the Server and Port columns.

Listing All Users by Name

There is no command-line interface for this procedure.

▼ To List All Users by Name from the Web-based Interface

1. **Starting at the Users page, click on List All Users (by Name).**

   A page similar to the following displays, listing all the users in the administration database, sorted by the User Name field. If a user has multiple tokens, they are grouped together with the name.

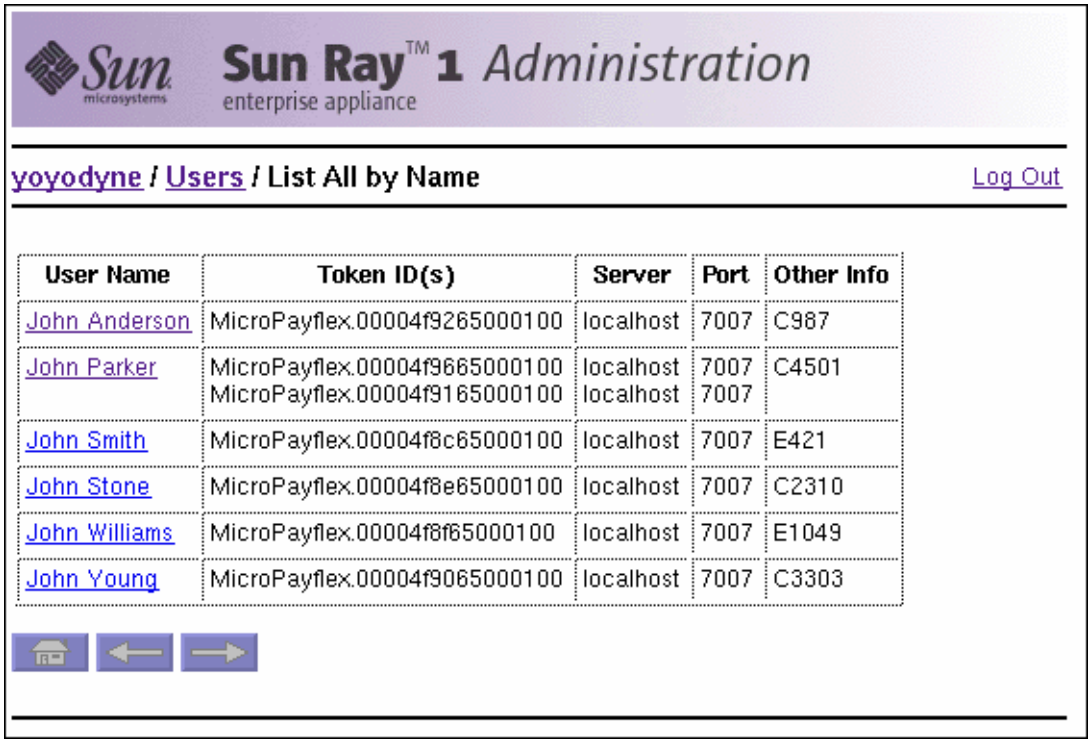


FIGURE 8-6 Results of List All Users by Name

2. **If your listing returned more than 20 users, use the navigation buttons at the bottom of the page to view additional pages of results.**

   The buttons allow you to view the next 20 users, previous 20 users, or to go back to the first page of 20 users.

▼ To Search for Users from the Web-based Interface

1. **Starting at the Users page, fill out the Name, Token ID, and Other Info fields with the values you want to search on.**

2. **Press the Search button.**

   A results page similar to the following is shown, displaying all matches from the administration database. If more than one search value is entered, the search performs a logical “AND.” Only those results that match all the specified values are returned.

   If Token ID was specified as a search value, the results are sorted by Token ID. Otherwise, they are sorted by User Name.

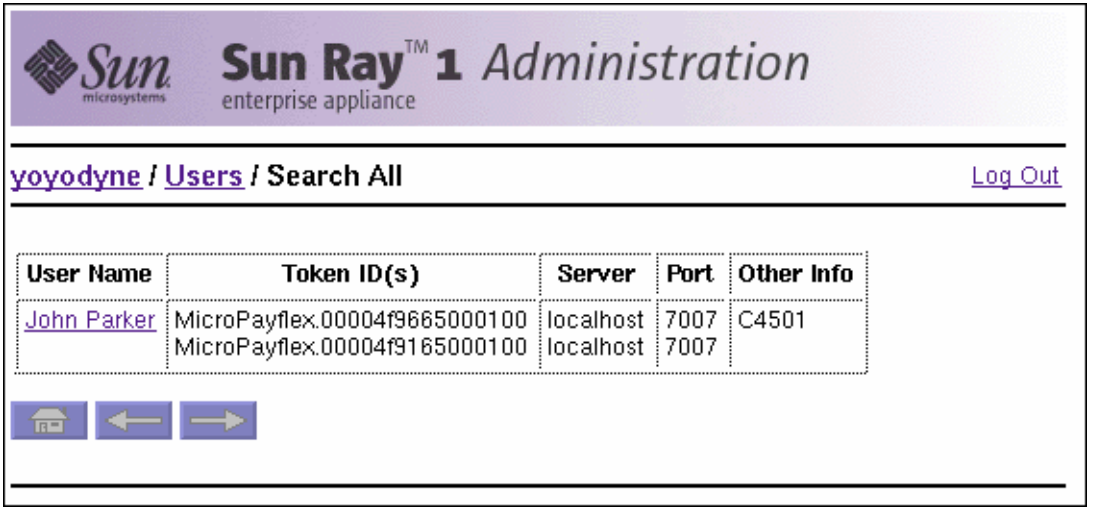


FIGURE 8-7 Results of Search by Value

3. **If your search returned more than 20 users, use the navigation buttons at the bottom of the page to view additional pages of results.**

   The buttons allow you to view the next 20 users, previous 20 users, or to go back to the first page of 20 users.

▼ To Search for Users from the Command-line Interface

1. **To search by User Name, type the following command:**

```
# utuser -ln <substring>
```

where *<substring>* is the full or partial User Name you want to search for. This command displays the list of users in the administration database whose names match this substring. For example:

```
# utuser -ln parker

Token ID                          User Name                       Other Info
------------------------------ ------------------------------ ---------------
MicroPayflex.00004f9665000100  John Parker                     C4501
MicroPayflex.00004f9165000100  John Parker                     C4501

2 tokens, 1 user total.
```

2. **Or you can search by User Name and get a longer listing by typing the following command:**

```
# utuser -Ln <substring>
```

The longer listing displays the same information as the normal listing, but adds the Server and Port columns.

3. **To search by Token ID, type the following command:**

```
# utuser -li <substring>
```

where <*substring*> is the full or partial Token ID you want to search for. This command displays the list of users in the administration database whose Token IDs match this substring. For example:

```
# utuser -li 9165

Token ID                         User Name                      Other Info
------------------------------ ------------------------------ ---------------
MicroPayflex.00004f9165000100  John Parker                    C4501

1 token total.
```

4. **Alternatively, you can search by Token ID and get a longer listing by typing the following command:**

```
# utuser -Li <substring>
```

The longer listing displays the same information as the normal listing, but adds the Server and Port columns.

Listing Current Users

Note – Sun Ray services such as the Authentication Manager must be operating to perform these procedures.

▼ To List Currently Logged In Users From the Web-based Interface

1. **Starting at the Users page, click on List Currently Logged In Users.**

A page similar to the following displays, listing only the registered users that are currently logged into an appliance (desktop) connected to this Sun Ray server.

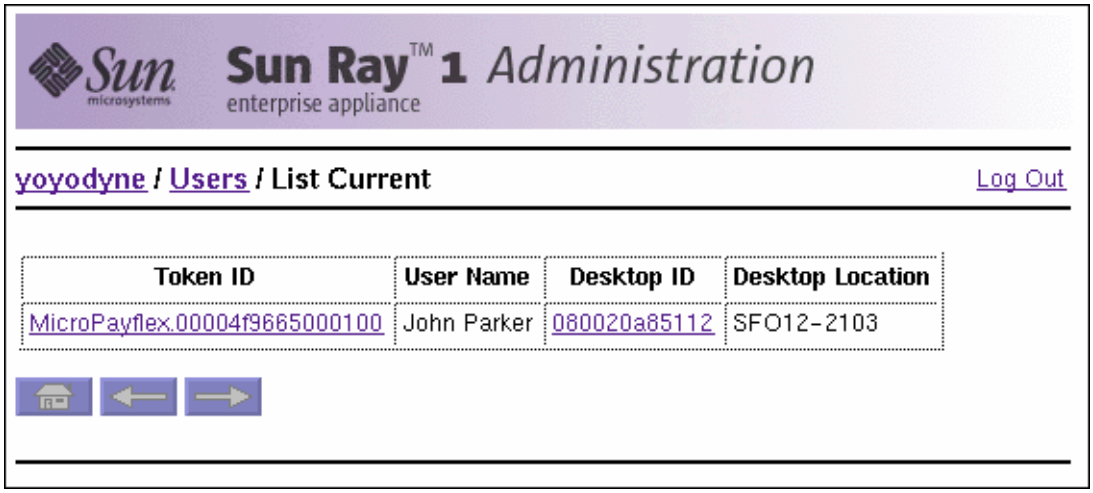


FIGURE 8-8 Currently Logged in Users

2. **If your listing returned more than 20 users, use the navigation buttons at the bottom of the page to view additional pages of results.**

   The buttons allow you to view the next 20 users, previous 20 users, or to go back to the first page of 20 users.

▼ To List Currently Logged In Users from the Command-line Interface

1. **Type the following command:**

```
# utuser -lc
```

   This command lists only the registered users that are currently logged in to an appliance connected to the Sun Ray server. For example:

```
# utuser -lc

Token ID                        User Name                       Desktop ID
------------------------------- ------------------------------- --------------
MicroPayflex.00004f9665000100  John Parker                     080020a85112
1 user currently logged in.
```

2. **Or you can get a longer listing by typing the following command:**

```
# utuser -Lc
```

The longer listing displays the same information as the normal listing, but adds the Desktop Location column.

Listing Users in Dump Format

There is no Web interface for this procedure.

▼ To Output the User List in Dump Format from the Command-line Interface

- **Type the following command:**

```
# utuser -o
```

The command outputs the full list of users from the administration database in comma-delimited format. For example:

```
# utuser -o
MicroPayflex.00004f8c65000100,localhost,7007,John Smith,E421
MicroPayflex.00004f8e65000100,localhost,7007,John Stone,C2310
MicroPayflex.00004f8f65000100,localhost,7007,John Williams,E1049
MicroPayflex.00004f9065000100,localhost,7007,John Young,C3303
MicroPayflex.00004f9165000100,localhost,7007,John Parker,C4501
MicroPayflex.00004f9265000100,localhost,7007,John Anderson,C987
MicroPayflex.00004f9665000100,localhost,7007,John Parker,C4501
```

The format of each line is:

```
<Token ID>,<Server>,<Server Port>,<User Name>,<Other Info>
```

This output can be saved to a file and used later to perform batch add, edit or delete operations.

User Properties

This section covers the following topics:

Displaying Properties

▼ To Display a User's Current Properties from the Web-based Interface

1. **Starting at the Users page, perform a list (see** FIGURE 8-5**,** FIGURE 8-6**, or** FIGURE 8-8**) or search operation (see** FIGURE 8-7**).**
2. **Click on the Token ID or User Name hyperlink for the user of interest.**

   A page similar to the following displays.

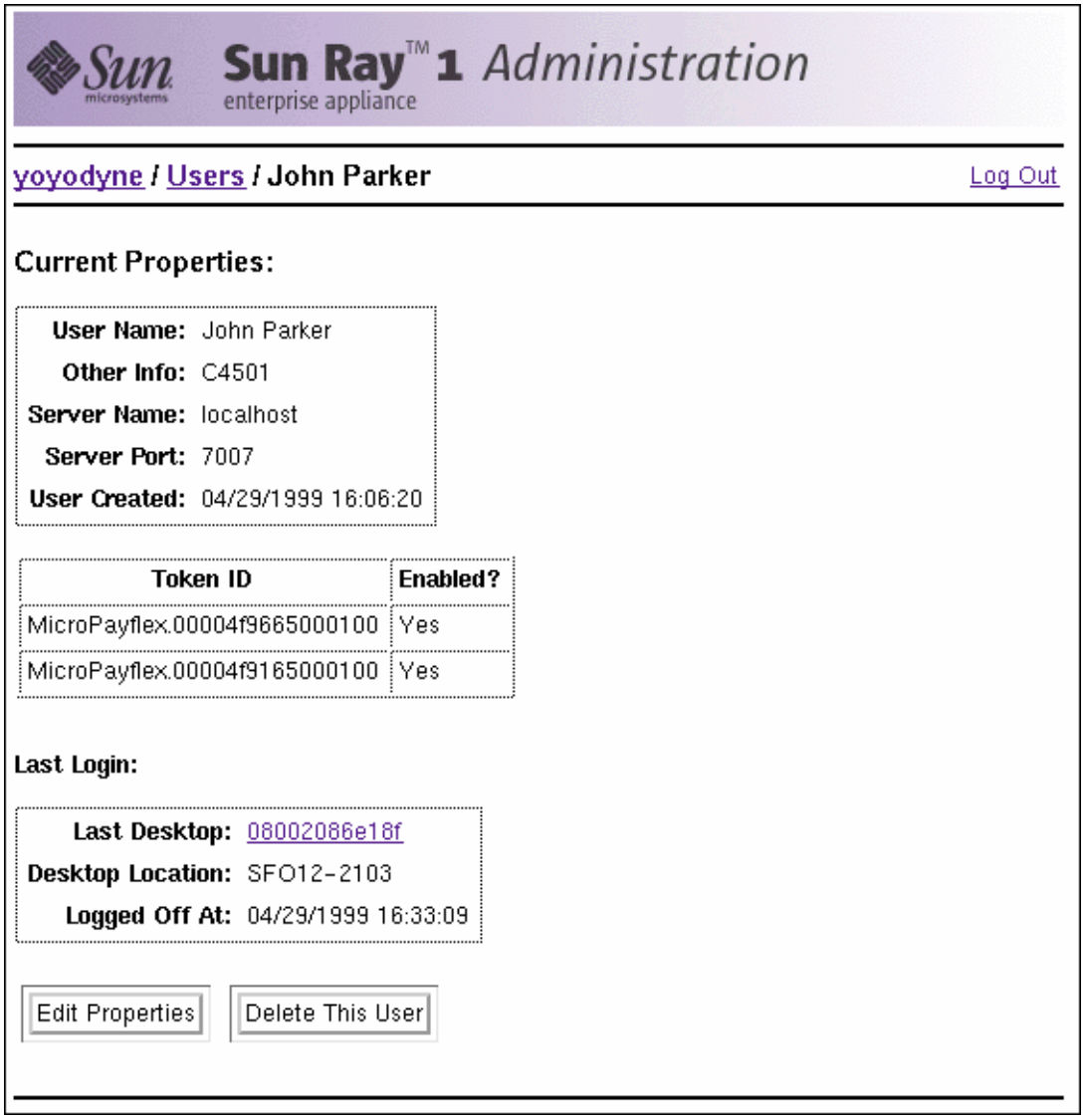


FIGURE 8-9 User's Current Properties

It shows information about the user as obtained from the administration database.

The following core fields are displayed:

TABLE 8-2 User Properties Fields

Option	Description
User Name	The user's name.
Other Info	An optional field that administrators can fill out to display any additional information associated with the user.
Server Name	The name of the Sun Ray server the user is registered on.
Server Port	The communication port used on the Sun Ray server.
User Created	The date and time that the user was created (registered) on this server.
Token ID	The IDs of one or more tokens currently associated with the user.
Enabled?	Displays "Yes" if a token is enabled, "No" otherwise. Disabled tokens are not allowed to log into Sun Ray 1 enterprise appliances that require registered tokens.

Additionally, information about the user's current login status is displayed. The possible states are:

- Never Logged In
- Currently Logged In
- Logged Off

If the user is in the either of the last two states, the following fields also are displayed:

TABLE 8-3 Login Status Fields

Option	Description
Current Desktop / Last Desktop	The current / last appliance (desktop) the user is / was logged into.
Desktop Location	The location of the appliance (desktop).
Logged In Since / Logged Off At	The date and time the user logged in / off the appliance (desktop).

▼ To Display a User's Current Properties from the Command-line Interface

- **Type the following command:**

```
# utuser -p <Token ID>
```

where <*Token ID*> is any one of the token IDs held by a user you want to get properties for. This command shows information about the user as obtained from the administration database. For example:

```
# utuser -p MicroPayflex.00004f9165000100
Current Properties:
  User Name           = John Parker
  Other Info          = C4501
  Server Name         = localhost
  Server Port         = 7007
  User Created        = 04/29/1999 16:06:20

  Token                                    Enabled?
  ---------------------------------------  --------
  MicroPayflex.00004f9665000100            Yes
  MicroPayflex.00004f9165000100            Yes

Last Login:
  Last Desktop        = 08002086e18f
  Desktop Location    = SFO12-2103
  Logged Off At       = 04/29/1999 16:33:09
```

See TABLE 8-2 and TABLE 8-3 for descriptions of the fields displayed.

Editing a Single User's Properties

▼ To Edit a Single User's Properties from the Web-based Interface

1. **Starting at the User Properties page for the user you want to edit, press the Edit Properties button.**

   A page similar to the following displays.

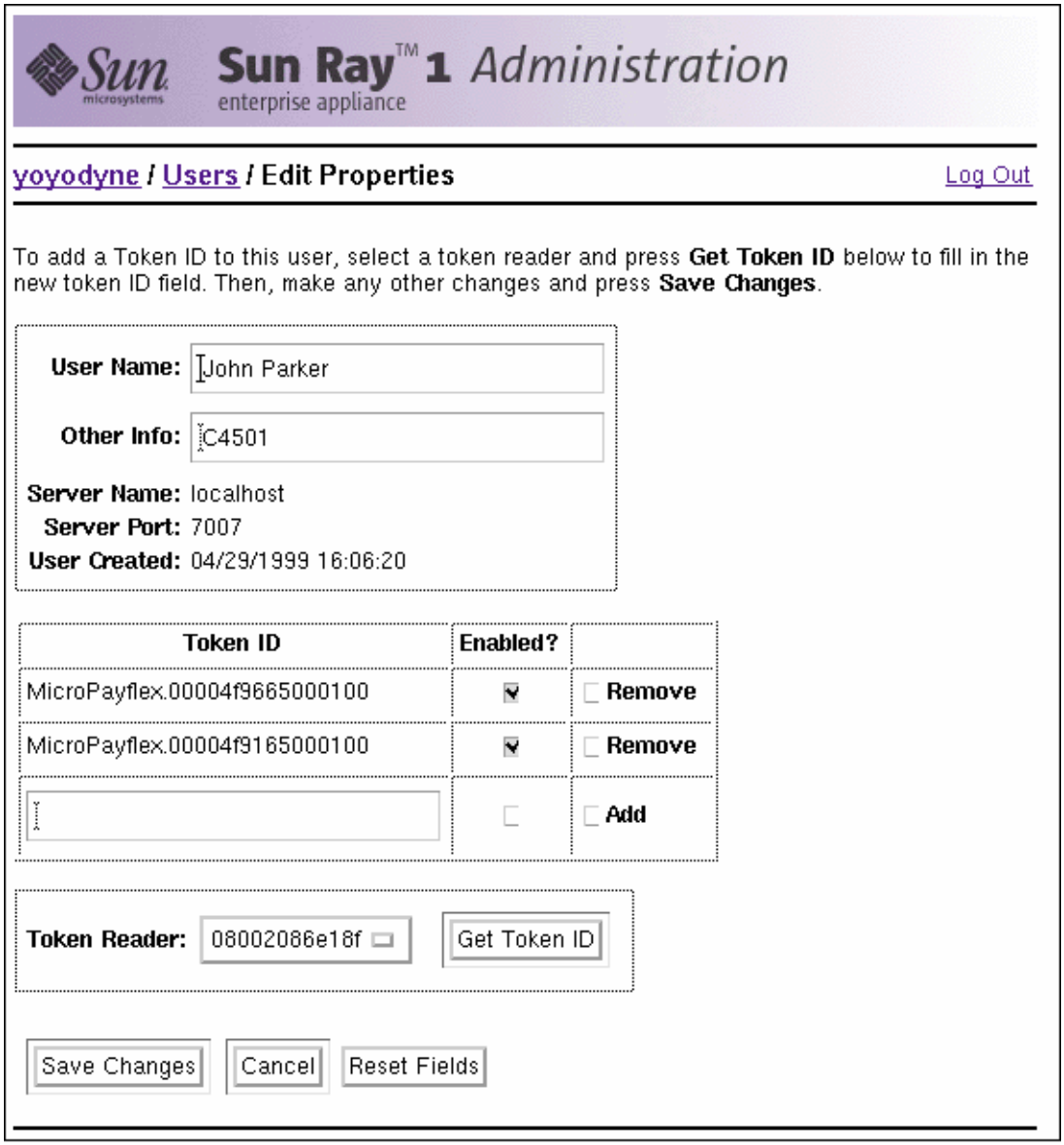


FIGURE 8-10 Edit Properties Page

2. **Change any of the editable fields you want.**

   You can also add or remove tokens from a user at the same time. See "To Add a Token to a User from the Web-based Interface" on page 124 and "To Delete a Token from a User from the Web-based Interface" on page 126 for details.

3. **When done, press the Save Changes button.**

   The changes are then made to the administration database.

▼ To Edit a Single User's Properties from the Command-line Interface

- **Type the following command:**

```
# utuser -e "<Token ID>,<Server>,<Server Port>,<User Name>,<Other Info>"
```

where <*Other Info*> can be left empty if you want to clear the field. The command updates the user's information in the administration database. For example:

```
# utuser -e "MicroPayflex.00004f9165000100,localhost,7007,John Parker,D0001"
1 User Modified.
```

If you choose not to specify the <*Other Info*> field, simply put no text after the comma. The following example clears the Other Info field:

```
# utuser -e "MicroPayflex.00004f9165000100,localhost,7007,John Parker,"
1 User Modified.
```

Tip – You can use the output of the `utuser -o` command as input to this command. Remember to put quotes around the data.

Editing Multiple User's Properties

There is no web-based interface for this procedure.

▼ To Edit Multiple User's Properties from the Command-line Interface

1. **Prepare a file listing users you want to edit and their changed information. Each user should be on a separate line of the form:**

```
<Token ID>,<Server Name>,<Server Port>,<User Name>,<Other Info>
```

Tip – You can use the output of `utuser -o`, edit it and then use the resulting file as input to this command.

Note – The Token ID must match an existing Token ID, so this field cannot be changed. To change a user's Token ID, add a new token (see "To Add a Token to a User from the Command-line Interface" on page 124) and then delete the old token (see "To Delete a Token from a User from the Command-line Interface" on page 126).

---

2. **Type the following command:**

```
# utuser -ef <filename>
```

where *<filename>* is the user file you created in Step 1. For each line in the specified file, the command checks for any modifications, and if any are found, saves the changes to the administration database.

For example:

```
# cat users
MicroPayflex.00004f8c65000100,localhost,7007,John Smith,D0002
MicroPayflex.00004f8e65000100,localhost,7007,John Stone,C2310
MicroPayflex.00004f8f65000100,localhost,7007,John Williams,D0003

# utuser -ef users
Modified John Smith
No modifications necessary for John Stone.
Modified John Williams

2 users modified
1 user did not require changes
```

Administering Tokens

Adding a Token to a Single User

▼ To Add a Token to a User from the Web-based Interface

1. **Starting from the User Properties page for the user for whom you want to add a token, press the Edit Properties button.**

   The Edit Properties page displays. See FIGURE 8-10.

2. **If you know the new Token ID, type it into the empty Token ID textfield.**

3. **If you do not know the new Token ID and have configured a Token Reader (see "To Configure a Token Reader" on page 63):**

   a. **Insert the user's token into the selected Token Reader.**

   b. **Choose the selected Token Reader from the pulldown list of available readers.**

   c. **Press the Get Token ID button.**

      The application queries the token reader and, if successful, redisplays the form with the Token ID text field filled out.

4. **Check the Enabled checkbox next to the new Token ID.**

5. **Check the Add checkbox next to the new Token ID.**

   You can also make any other edits to the user at the same time. See "To Edit a Single User's Properties from the Web-based Interface" on page 120.

6. **Press the Save Changes button.**

   The changes are then made to the administration database.

▼ To Add a Token to a User from the Command-line Interface

- **Type the appropriate `utuser` command:**

a. If you already know the user's new Token ID, type the following command:

```
# utuser -ai <Current Token ID> <New Token ID>
```

where <*Current Token ID*> is any of the user's existing Token IDs and <*New Token ID*> is the ID of the token you want to add. The command adds the new token to the user in the administration database.

For example:

```
# utuser -ai MicroPayflex.00004f9165000100 MicroPayflex.00004f9165000101

1 Token ID added to user.
```

b. If you do not know the user's new Token ID and have configured a Token Reader, type the following command:

```
# utuser -ai <Current Token ID> x -r <Token Reader>
```

where <*Current Token ID*> is any of the user's existing Token IDs. The "x" that is specified instead of the new Token ID tells the command to query <*Token Reader*> for the Token ID. You will be prompted to insert the user's token into the Token Reader when the command is ready. Then, the command will add the new token to the user in the administration database. For example:

```
# utuser -ai MicroPayflex.00004f9165000100 x -r 08002086e18f
Insert token into token reader '08002086e18f' and press return.
Read token ID 'MicroPayflex.00004f9165000101'

1 Token ID added to user.
```

Deleting a Token from a Single User

▼ To Delete a Token from a User from the Web-based Interface

1. **Starting from the User Properties page for the user you want to remove a token from, press the Edit Properties button.**

   The Edit Properties page displays. See FIGURE 8-10.

2. **Check the Remove checkbox for any Token IDs you want to remove.**

Note – You cannot remove all of a user's tokens. If you want to delete the user and all associated tokens, see "To Delete a Single User from the Web-based Interface" on page 104.

---

3. **Press the Save Changes button.**

   The changes are then made to the administration database.

▼ To Delete a Token from a User from the Command-line Interface

- **Type the following command:**

```
# utuser -di <Token ID>
```

where <*Token ID*> is the token you want to remove from the user that currently holds it. The command deletes the token from the user in the administration database.

Note – You cannot remove all of a user's tokens. If you want to delete the user and all associated tokens, see "To Delete a Single User from the Command-line Interface" on page 106.

For example:

```
# utuser -di MicroPayflex.00004f9165000101

1 Token ID removed from user.
```

Enabling or Disabling a User's Token

▼ To Enable or Disable a User's Token from the Web-based Interface

1. **Starting from the User Properties page for the user whose token you want to enable or disable, press the Edit Properties button.**

   The Edit Properties page displays. See FIGURE 8-10.

2. **Check the Enabled? checkbox for any Token IDs you want to enable.**
3. **Uncheck the Enabled? checkbox for any Token IDs you want to disable.**
4. **Press the Save Changes button.**

   The changes are then made to the administration database.

▼ To Enable or Disable a User's Token from the Command-line Interface

1. **To enable a user's token, type the following command:**

```
# utuser -ei <Token ID> enable
```

where <*Token ID*> is the ID of the token you want to enable. This command updates the token's information in the administration database.

2. **To disable a user's token, type the following command:**

```
# utuser -ei <Token ID> disable
```

where <*Token ID*> is the ID of the token you want to disable. This command updates the token's information in the administration database.

Getting a Token ID from a Token Reader

▼ To Get a Token ID from a Token Reader from the Web-based Interface

1. **Starting at the Users page, click on the Get Token ID From Token Reader (see "To Configure a Token Reader" on page 63).**

   A page similar to the following displays.

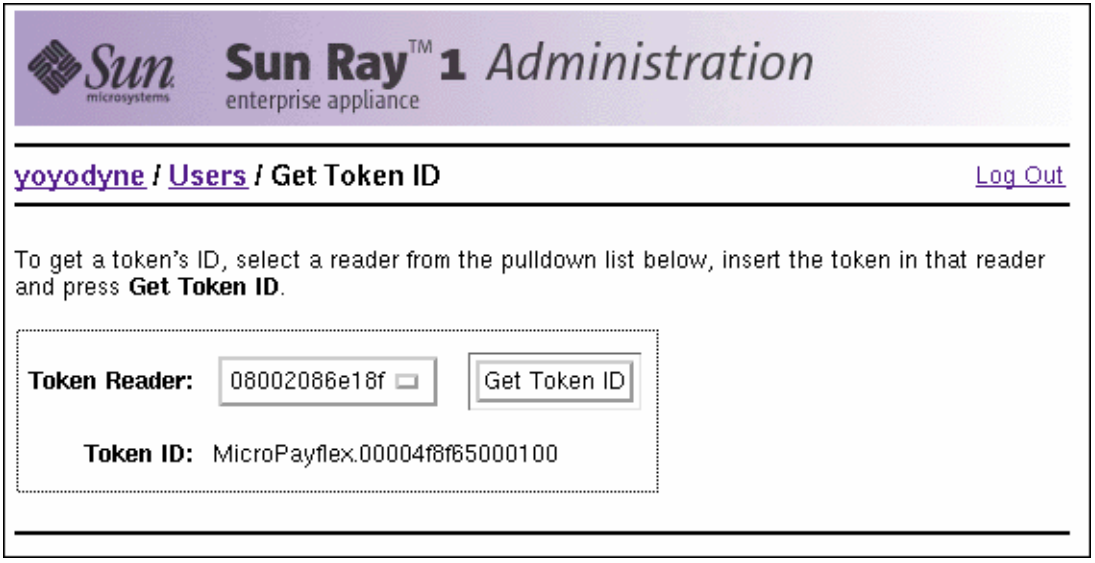


FIGURE 8-11 Get Token ID Page

2. **Insert the token you want to read into the selected Token Reader.**

3. **Choose the selected Token Reader form the pulldown list of available readers.**

4. **Press the Get Token ID button.**

   The application queries the token reader and, if successful, redisplays the page with the Token ID field filled out.

▼ To Get a Token ID from a Token Reader from the Command-line Interface

- **Type the following command:**

```
# utuser -r <Token Reader>
```

where <*Token Reader*> is the reader you want to read the ID from. You will be prompted to insert the token into the Token Reader when the command is ready. The command will then query the Token Reader for the token's ID and, if successful, display it. For example:

```
# utuser -r 08002086e18f
Insert token into token reader '08002086e18f' and press return.
Read token ID 'MicroPayflex.00004f8f65000100'
```

CHAPTER 9

Removing the Sun Ray Software

This chapter explains how to remove the Sun Ray software from your server. Both script-based and manual uninstallation procedures are provided. This chapter is organized as follows:

Using Scripts to Uninstall the Software

A system administrator can use an unconfig script, and uninstall script to remove the Sun Ray server software.

This section describes how to unconfigure and uninstall the Sun Ray server software.

Note – You must unconfigure the Sun Ray server software before you can use `uninstall -u` to remove the server software.

In the following instructions you will need to take the values you chose in the worksheet and substitute in the appropriate places. For example, if you chose @(WEBSERVER_NAME) to be `utadmin`, when substituting into this partial command:

`htserver stop` *@(WEBSERVER_NAME)*

the result would be:

`htserver stop utadmin`

▼ To Unconfigure the Sun Ray Server Software

1. **As root, type:**

```
# cd /etc/init.d
```

2. **Stop the server:**

```
# ./utsvc stop
```

The server is stopped.

3. **Type:**

```
# htserver stop @(WEBSERVER_NAME)
```

The Sun WebServer instance is stopped. *@(WEBSERVER_NAME)* is the name of the WebServer instance that supports the administration application. Refer to the value you chose on your worksheet (see “Configuration Worksheet” on page 34).

4. **Stop SunDS:**

```
# ./dsserv stop
Stopping SunDS daemon
SunDS daemon stopped
```

5. **Type:**

```
# /opt/SUNWut/sbin/utadm -r
```

All of the entries and all of the structure relating to all of the Sun Ray interfaces are removed. This command prepares the system for the removal of the Sun Ray server software.

```
### Removing interface "<interface>"
```

6. **Begin the unconfiguration process:**

```
# /opt/SUNut/sbin/utconfig -u
Un-configuration of Sun Ray enterprise server Software
```

7. **Answer the question:** `Unconfigure Sun Web Server 2.1 ([y]/n)?`

   This script gives you the option of unconfiguring the Sun Web Server 2.1 or not. Yes is the default.

```
Unconfigure Sun Web Server 2.1 ([y]/n)y
```

8. **Answer the question as follows:**

Note – The web server instance name, @(WEBSERVER_NAME), and the CGI username, @(CGI_USER), in this example, use the default values: utadmin and www). If you entered different values, enter them here. Refer to your configuration worksheet for your original values (see "Configuration Worksheet" on page 34).

```
Enter UT admin web server instance name [utadmin]:

Delete CGI username account ([y]/n)y
# Enter CGI username [www)]: www

About to un-configure the following software products:

Sun Directory Services 3.1
Sun Web Server 2.1
Sun Ray enterprise server 1.0

Continue ([y]/n)y
```

The Sun Ray server un-configuration process begins. The following message is displayed.

```
Removing Sun Ray enterprise server Configuration ...

Removing Sun Web Server 'utadmin' instance ...
utadmin : Not running.
utadmin : Deleted.

Deleting user account for 'www' ...
www:x:130001:10:ut admin web server cgi user:/tmp:/bin/sh

Unloading Sun Directory Services Datastore ...

Removing Sun Directory Services Datastore ...

Downdating Sun Directory Services ACL's ...

Downdating Sun Directory Services schema ...
Starting SunDS daemon .
Tue Apr 20 16:58 : dsservd starting

Un-configuration of Sun Ray enterprise server has completed.  Please
check the log file, /var/tmp/utconfig.xxxxx.log, for errors.
```

9. **After the script has completed check in** `/var/tmp/utconfig.`*xxx*`.log` **to see if there were any errors. Where** *xxx* **is the process id of the script.**

▼ To Uninstall the Sun Ray Software

This section describes how to use `utinstall -u` to remove the Sun Ray server software.

Note – Your current working directory must not be within any of the directories to be removed. Ensure that you perform a `cd /` to your working directory for verification.

---

1. **Type**:

```
# cd /
```

2. **Start the removal process**:

```
# /opt/SUNWut/sbin/utinstall -u
# Removal of Sun Ray enterprise server Software
```

3. **Answer the questions as follows:**

```
#Remove Sun Web Server 2.1 ([y]/n)? y
#Remove Sun Directory Services 3.1 ([y]/n)? y

About to remove the following software products:

Sun Ray enterprise server 1.0
Sun Web Server 2.1
Sun Directory Services 3.1

# Continue ([y]/n)y
```

The packages are removed. The following message is displayed:

```
Removing Sun Ray enterprise server version 1.0 ...

Removal of <SUNWuta> was successful.

Removal of <SUNWutj> was successful.

Removal of <SUNWutm> was successful.

Removal of <SUNWuto> was successful.

Removal of <SUNWutr> was successful.
### successfully removed Sun Ray audio pseudo driver (utadem)
### successfully removed Sun Ray pseudo driver

Removal of <SUNWutk> was successful.

Removal of <SUNWutu> was successful.

Removing Sun Web Server version 2.1 ...
No running servers found.

Removing SWS does not remove your websites or configurations.
Server instances and websites are typically found in /var/http,
although they may be placed anywhere you choose.  See "/etc/http/
httpd-instances.conf" for the master list of server configurations.

Checking installed packages and patches...
...Removal of <SUNWsds> was successful.

Removal of <SUNWsdsc> was successful.

Removal of Sun Ray enterprise server has completed, see /var/tmp/
utinstall.xxxxx.log
#
```

4. **After the script has completed check in** `/var/tmp/utconfig.`*xxx*`.log` **to see if there were any errors. Where** *xxx* **is the process id of the script.**

Manually Uninstalling the Software

Use these procedures to uninstall the Sun Ray server software by using `pkgrm`. For procedures on how to remove the software using a script, see “Using Scripts to Uninstall the Software” on page 131.

▼ To Remove the Sun Ray Server Software

1. **Become** `root` **and stop the server:**

```
# /etc/init.d/utsvc stop
```

2. **Remove all of the network interconnects:**

```
# /opt/SUNWut/sbin/utadm -r
```

3. **Remove the software packages:**

```
# pkgrm SUNWuta SUNWutm SUNWuto SUNWutr SUNWutux SUNWutu SUNWutkx SUNWutk
SUNutj
```

Respond **y** to each package removal query. The output is similar to the following:

```
The following package is currently installed:
   SUNWuto      Sun Ray enterprise server Core Software
                      (sun4m,sun4u,sun4d) Alpha4

Do you want to remove this package? y

## Removing installed package instance <SUNWuto>
## Verifying package dependencies.
## Processing package information.
## Removing pathnames in class <none>
/tftpboot/view
/tftpboot/tftpboot
/tftpboot <non-empty directory not removed>
/opt/SUNWut/lib/tftpboot
/opt/SUNWut/lib <shared pathname not removed>
/opt/SUNWut/bin/utfwupgrade
/opt/SUNWut/bin/esdl
/opt/SUNWut/bin <shared pathname not removed>
/opt/SUNWut <shared pathname not removed>
## Updating system information.

Removal of <SUNWuto> was successful.
```

SunDS 3.1 and Sun WebServer 2.1

Refer to the supporting software's documentation (included on the Sun Ray enterprise server software 1.0 CD) for uninstall and unconfigure information.

APPENDIX **A**

Troubleshooting

This chapter has two sections:

Troubleshooting the Server

Q: Which files are added, removed, or modified by the installation process?

A: The following files are affected by the Sun Ray software installation:

```
/etc/nsswitch.conf
/etc/hostname.{hme,qfe,gem}[0-9]
/etc/inet/hosts
/etc/inet/netmasks
/etc/inet/networks
/var/dhcp
/var/dhcp/dhcptab
/etc/default/dhcp
/etc/init.d/dhcp
/etc/default/sys-suspend
/usr/dt/config/sessionetc
```

Changes are marked with a project identification string (at this writing the strings are: "SUNRAY ADD", "SUNRAY DEL", "SUNRAY BEGIN", and "SUNRAY END").

Q: Does the Sun Ray software support the Direct Graphics Access (DGA) extension to X11?

A: No. The Sun Ray server software does not support the SunDGA (Direct Graphics Access) extension to X11. The Sun Ray server software correctly reports that DGA is not supported to any application that initiates an inquiry. Normally applications make use of DGA through libraries (for example, XIL) that deal with the inability to use DGA and use an alternate path.

Troubleshooting the Appliance

Q: A user calls and describes the OSD (on-screen display). What do I do for each one?

A: Take the following steps for each of the following icons.

Startup Icon

Startup icon: under the hourglass there are dashes to indicate progress.

- waiting for interconnect

-- DHCP pending

--- waiting to connect to the Authentication Manager

- Startup 1—Waiting for the Interconnect

Meaning: The appliance has passed the power-on self test but has not detected an Ethernet signal yet. This icon is displayed as part of the normal startup phase and usually is displayed for only a few seconds.

Actions to take if this icon stays on for more than 10 seconds:

- Check that the Ethernet cable is correctly plugged into the back of the appliance and the other end into the correct hub, switch, or network outlet.
- If the appliance is connected via a hub or switch, make sure that the hub or switch is powered on and configured correctly.
- Check that the Sun Ray server is up and running.
- Startup 2—DHCP Pending

Meaning: The appliance has detected the Ethernet carrier but has not received its initial parameters from DHCP yet. This icon is displayed as part of the normal startup phase and usually is displayed for only a few seconds.

Actions to take if this icon stays on for more than 10 seconds:

- Make sure that DHCP on the Sun Ray server is configured correctly, is up and running and has not run out of IP addresses to assign to clients.
- To restart DHCP as `root` type:

```
# /etc/init.d/dhcp stop
```

```
# /etc/init.d/dhcp start
```

- Startup 3—Waiting to Connect to Authentication Manager

Meaning: The appliance has received its initial parameters from DHCP but has not connected to the Sun Ray Authentication Manager yet. This icon is displayed as part of the normal startup phase and usually is displayed for only a few seconds. Once this icon disappears, the connection has been made and the user can insert their smart card and/or log in.

Actions to take if the icon displays for more than a few seconds:

- Make sure that the Sun Ray services, including the Authentication Manager are up and running on the Sun Ray server.

`Appliance Failure`

Appliance failure: this icon is called hardware failure in the *Sun Ray 1 Troubleshooting Guide*.

Meaning: The appliance tried to load new PROM software from the Sun Ray server, but failed.

Actions to take if icon displays for more than a few seconds:

1. Examine the Sun Ray server software logs for any error messages that might indicate the cause.
2. Check that DHCP on the Sun Ray server is configured correctly and is up and running.
3. Check `/tftpboot` on the Sun Ray server to see if the new PROM software exists and is ready to be downloaded to the appliance.
4. Once any problems are corrected, power cycle the appliance so it can try to reload the PROM software.

`No Ethernet`

No Ethernet: check to see if everything is plugged in correctly.

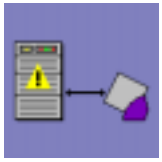
The last six hexadecimal digits of the Ethernet address are shown.

Meaning: The appliance has lost the Ethernet signal. This icon will only be displayed after the appliance has successfully booted and then loses its Ethernet signal.

Actions to take:

1. Check that the Ethernet cable is correctly plugged into the back of the appliance and the other end into the correct hub, switch, or network outlet.
2. If the appliance is connected via a hub or switch, make sure that the hub or switch is on and configured correctly.
3. Check that the Sun Ray server is up and running.

`Software Failure`



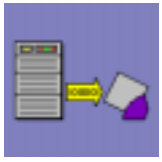
Software or server failure:

Meaning: The appliance has lost its connection to the Sun Ray Authentication Manager or DHCP was unable to renew its lease for an IP address.

Actions to take:

1. Check that the Sun Ray server is up and running.
2. Check that the Sun Ray services, including the Authentication Manager are up and running on the Sun Ray server.
3. Check that DHCP on the Sun Ray server is configured correctly, is up and running and has not run out of IP addresses to assign to clients.

`Firmware Download`



Firmware download: under the machines there are dashes to indicate progress.

- downloading PROM software

-- saving PROM software

- Firmware 1—Downloading PROM Software

Meaning: The appliance is currently downloading new flash PROM software from the Sun Ray server.

Actions to take:

- Please wait until the download is done. Downloading and saving the new PROM software usually takes less than a minute. If you interrupt the download, the appliance will have to download new PROM software the next time it reboots.
- Firmware 2— Saving PROM Software

Meaning: The appliance has just downloaded new PROM software from the Sun Ray server and is saving it to the appliance's PROM.

Actions to take:

- Please wait until the download is done. Downloading and saving the new PROM software usually takes less than a minute. If you interrupt the download, the appliance will have to download new PROM software the next time it reboots.

Ethernet Address

Ethernet address:

When the three audio volume control keys are pressed simultaneously, the last six hexadecimal digits of the Ethernet address are shown. This uniquely identifies the appliance. Displays from 5-15 seconds. If the user has a non-Sun keyboard, have the user disconnect and reconnect the Ethernet wire.

LEDs

TABLE A-1 Power LED

State of LED	Action to take
Off	Check to see if the appliance is plugged in. There are two fuses that could blow. Replace the appliance.
Yellow	Hardware fault. Replace appliance.
Blinking	PROM is corrupted. Use `utadm` to restore the firmware.

Q: The user's screen locked up. What do I do?

A: There are two possibilities:

1. Symptom: All the windows that had been iconified are restored and the user cannot move or resize them, but can move the mouse pointer.

Cause: The window manager `dtwm` or `olwm` has died.

Solution: Use a terminal window if available or rlogin with the DISPLAY variable set correctly to restart `dtwm` or `olwm`. For example:

```
% rlogin machine_name -l user_name
% setenv DISPLAY xxxx
% /usr/dt/bin/dtwm &
```

2. Symptom: The server freezes and the user cannot resize or move any window. The user can move the mouse, but none of the windows highlight.

Cause: Usually the user's last application has locked the server and will not release it.

Solution:

a. Determine the last application used by the user and kill it.

b. Try power cycling the appliance. If the user is using a smart card, ask the user to remove the smart card. If the user removes the smart card and the screen does not go blank, the Sun Ray 1 enterprise appliance needs to be replaced.

c. As a last resort you can kill the X server.

i. To identify the X server's PID, type:.

```
% ps -ef | grep xsun | grep <username>
```

ii. Next, kill the process associated with the X server. Type:

```
% kill <pid>
```

Q: Where do I look if an appliance is not working?

A: There are log files in `/var/opt/SUNWut/log`. For example, if the appliance is in Authentication mode, there may be log messages in `auth_log`.

1. Check the on-screen display (OSD).

2. If there is no Ethernet, check all of the connectors.

3. Verify that DHCP is running on the server.

```
% ps -ef | grep dhcp
```

4. If there is still a problem contacting the Authentication Manager, check for the Session Manager.

```
% ps -ef | grep utsessiond
```

5. Check to see if the Authentication Manager is running.

```
% ps -ef | grep utauthd
```

The Authentication Manager creates log files -/var/opt/SUNWut/log/auth_log.

Q: How can a user check to see if the Sun Ray 1 appliance can play audio files (*.au)?

A: Ask the user to type:.

```
% cat /usr/demo/SOUND/sounds/whistle.au >/dev/audio
```

The Sun Ray software is designed to work with $AUDIODEV. Some applications use /dev/audio. There is a Sun Ray preloaded library that translates access to /dev/audio and /dev/audioct/ to the appropriate filesnames for the audio device on the Sun Ray 1 appliance. To determine if this feature is enabled, type:

```
% echo $LD_PRELOAD
```

The output should contain a file name such as libc-ut.so. This translation is enabled by default.

Note – ShowMe TV™ 1.2.1 is known not to work properly with this workaround. ShowMe TV 1.3 works.

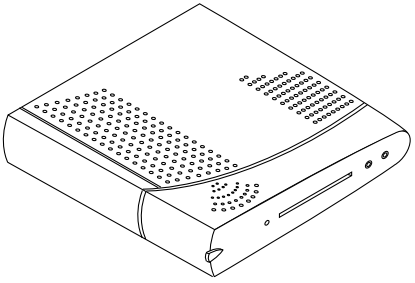
Q: I want to use the Sun Ray 1 appliance in a kiosk. What options do I have?

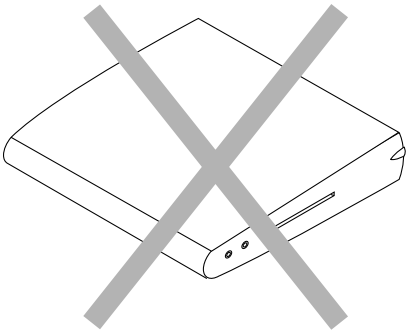
A: For information on kiosk mounting for the Sun Ray 1 appliance see:

http://www.sun.com/nc/Sun_Ray_1

Q: What if a user has broken or misplaced the Sun Ray 1 appliance's base?

A: The appliance must lie on a desk speaker-side up. It will overheat if it is placed speaker-side down.





Q: A user's session is timing out and not connecting. What do I do?

A: Change the time-out value.

If your server is under a heavy load, increasing the amount of time the Authentication Manager waits to receive a request from the Sun Ray 1 appliance will keep the session from timing out.

The *time-out* value is the maximum allowed time interval between communications from an appliance to the Authentication Manager. The Authentication Manager waits the prescribed time as defined in the `auth.props` file (60 seconds). If 60 seconds passes and no message is received, the Authentication Manager queries the appliance. If there is still no response after another 60 seconds, the Authentication Manager closes the TCP connection to the appliance.

Tip – If you have a server that is highly loaded, you can change the time-out value to a much higher number than the default of 60 seconds.

▼ To Modify the Time-Out Value

1. **As** `root`**, open the** `/etc/opt/SUNWut/auth.props` **file with a text editor.**

```
# Copyright (c) 04/03/99 Sun Microsystems, Inc. All Rights Reserved
# @(#)auth.props.txt1.22 99/04/03

# Timeout
#Terminals are required to send a message to the authentication manager
#at least once every {timeout} seconds.
timeout = 60

# Workers
#This is the target number of spare threads to maintain to handle
#new terminal connections.
workers = 3
             :
             :
             :
# Service port
#The authentication manager listens on this port for connections from
#terminals.
port = 7009

# Admin/LDAP configuration file.
#Uncomment the following line to
#enable raw to logical token name mapping, logical token record lookup,
#and desktop status reporting.
#The “RegisteredDistributed” authentication policy depends on a
#properly configured LDAP database.
#This property has no default value.
#
#adminConfigFile = utadmin.conf

# Module Directory
#All authentication modules must be located in the following directory
moduleDir = /opt/SUNWut/lib/modules

# Policy
#The active authentication policy determines which tokens and terminals
#are accepted and granted access to system services.
policy = ZeroAdmin
# policy = RegisteredDistributed
             :
             :
             :
```

2. **Locate the default time out value (near the beginning of the code listing).**

```
timeout=60
```

3. **Comment out the default value and enter a new value, better suited to your server conditions. (The value must be in seconds.)**

```
#timeout=60
timeout=120
```

4. **Save the file and reboot the Sun Ray server.**

Note – The `/etc/opt/SUNWut/auth.props` file also contains authentication policy information.

Q: A user is receiving an `Unable to get pty` **error message. What is wrong?**

A: The Sun Ray server has exhausted the number of pseudo terminals defined. If a system does not have enough pseudo terminals defined, users can not bring up a shell window and will not be able to login. For example, a network consists of 50 Sun Ray 1 appliances and the `pty` entry is set to 40. When the 41st user tries to open a shell window, this error message displays. As `root`, edit the `/etc/systems` file `pt_cnt` value to increase the number of available pseudo terminals. Change the `pt_cnt` entry to a higher number (at least four or five times the number of users). You must reboot. For example:

```
# set pt_cnt=40
set pt_cnt=100
```

Q: The server's hard drive is constantly being accessed. Why is the Sun Ray server swapping so often?

A: You may need to increase your server's memory. At least 256MB of RAM is recommended for most network environments with 40-60MB per user. If you have less, your server relies upon any available swap space on your hard drive. Use the `wsinfo` command to review your system's resources.

```
% /usr/openwin/bin/wsinfo &
```

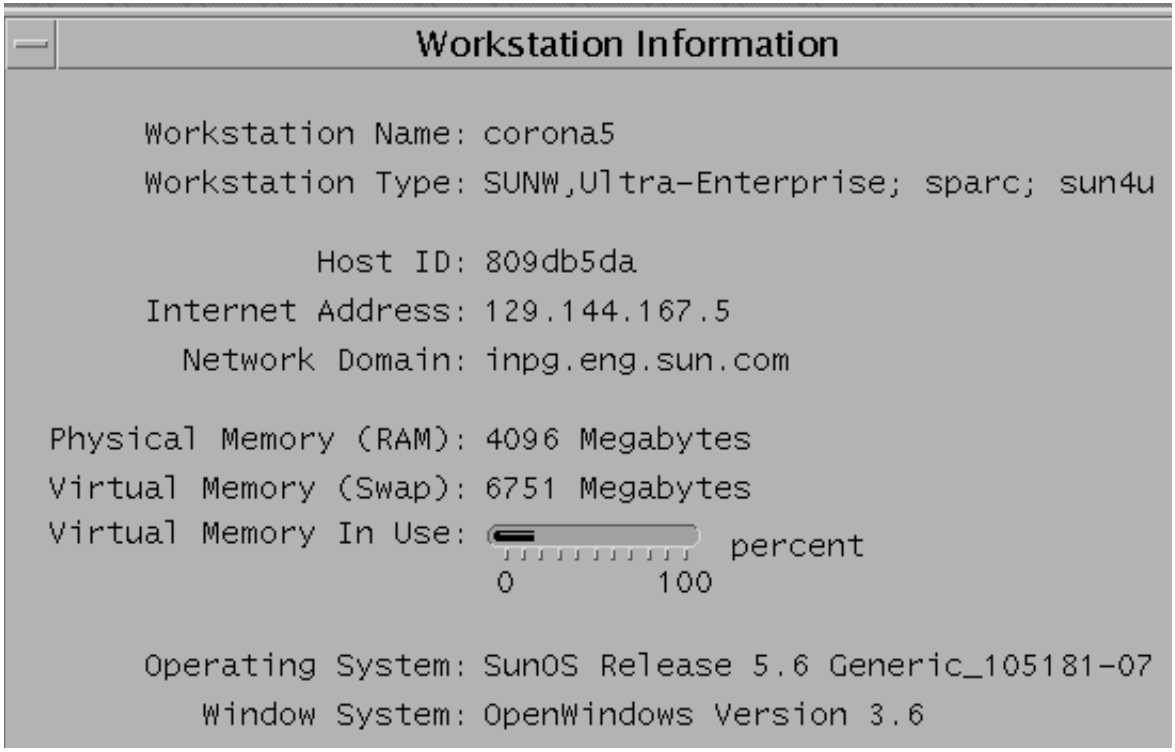


FIGURE A-1 Accessing Workstation Resource Information

To tell if swapping is happening type:

```
% vmstat 5
```

If the column marked `sr` is larger that 10 (a noticeable amount of time), you should consider adding memory.

Q: A user gets one of the following (or similar) errors when starting an application.

```
/usr/openwin/bin/xcolor: unable create colormap (8)

Application initialization failed: couldn't find an appropriate visual

could not get visual

X Error of failed request: BadValue (integer parameter out of range for operation)
Major opcode of failed request: 91 (X_QueryColors)
Value in failed request: 0xc3b2ae
Serial number of failed request: 82
```

A: The application may be written to use only 8-bit PseudoColor graphics. Many older programs require an 8-bit PseudoColor visual.

Sun Ray software supports an 8-bit visual, but enabling it requires more memory for the X server and causes some graphics performance degradation. The general use of the 8-bit visual support reduces the scalability of the Sun Ray server.

If an important application fails for a user or set of users, the `utxconfig(1M)` command can be used to enable the 8-bit support and/or make it the default visual for them.

Unless needed, 8-bit visuals should be disabled. Try enabling the 8-bit support before making it the default visual. This is because using the 8-bit visual as the default visual causes a greater negative impact on performance and scalability than just enabling it. However, some applications do not search for the visual they require and blindly assume that the default visual is what they should use. For such programs, using the 8-bit visual as the default visual is the only choice.

To allow 8-bit PseudoColor visual to be enabled, as `root` type:

```
# utxconfig -d $DISPLAY -p on
```

To make 8-bit PseudoColor visual the default, as `root` type:

```
#  utxconfig -d $DISPLAY -p default
```

Note – See the `utxconfig` command man pages for more information about this command.

A normal user can run the `utxconfig` command for a session so long as they have access to the Xdisplay for the session. Only `root` can make a change for someone else or change the default values.

Although the display specification is used to identify the X server configuration that should be changed, `utxconfig` stores the configuration based on the token that provides access to the session. Therefore, the configuration will stay with the user (for smart-card tokens) or the appliance (for default tokens) even if a different display number is allocated in the future.

Q: All (or most of) the monitors at our site can only support 1152x900 resolution. The X server comes up in 1280x1024 resolution, so users have to scroll around the larger screen. What can I do?

A: The user can use the Settings screen.

The `utxconfig(1M)` command can be used to set the default X server resolution to match the majority of monitors attached to the appliances. For individual users with different requirements, `utxconfig(1M)` can create specific parameters for one user. (This is based on the user's authentication token. In workstation replacement mode, the token is the Ethernet address of the appliance itself. Otherwise, it is based on the smart card ID.)

To set the resolution, as `root` type:

```
# utxconfig -a -r 1152x900
```

Q: I have a non-smart card user whose appliance just failed in the middle of a session. I replaced the appliance. How do I get the user reconnected to their session?

A: Find and kill the users X server and have the user login again. For this release, there is no mechanism available to save the data.

Q: A user is working in a CAD program with complex graphics. When the user is scrolling the graphic, it is jerky. Is there anything I can do?

A: Make sure the enterprise desktop is using a 100Mb full duplex link. Also check the system's configuration and the application's requirements. Possible remedies on the server include: Adjust process priorities, add more memory, add a CPU, or add more disk space.

Q: A user can start commands from menus and the CDE bar, but cannot start them from terminal windows. What is wrong?

A: The user's startup scripts (`.cshrc`, `.login`, `.profile`, or `.dtprofile`) probably set the DISPLAY variable. The scripts should be changed to only set DISPLAY if it is not already set or to retain the display number (the part after the :). For example:

```
% echo $DISPLAY
% yoyodyne:62.0
```

Q: The users at my company work from 8am - 5pm. Is there any way I can ping the appliances at 7:45am to see if they are all functional?

A: Ping the appliances in the usual manner using their IP addresses. Get the active IP addresses from the DHCP table.

Use the Sun Ray administration application to list currently connected appliances (see "Listing Currently Connected Desktops" on page 86).

Q: Is there any way to reset an appliance? How does a user power cycle the appliance?

A: To reset the appliance, power cycle it.

▼ To Power Cycle a Sun Ray 1 Appliance

1. **Ask the user to press the <Control> key simultaneously with the <power> key.**

   If the user has a Sun USB keyboard or has a keyboard with a power control key, the user can press the <Control> key simultaneously with the <power> key to reset the appliance. The power key on Sun USB keyboards is typically marked with a crescent moon and is in the upper right corner of the keyboard (see FIGURE 1-4 on page 8).

2. **The other way to power cycle an appliance is to have the user disconnect and reconnect the power cord.**

APPENDIX **B**

Web-based Administration Application Notes

Tips for Using Non-Sun Web Servers

The web-based interface of the Sun Ray administration application is designed to run with the Sun WebServer 2.1. However, if you want to run it under a different web server, the following general tips are provided.

- Make sure that your web server's document root is either set to `/opt/SUNWut/lib/locale/html` or is a symbolic link to it (the better choice).
- Make sure that your web server's `cgi-bin` directory contains copies of the executables in `/opt/SUNWut/cgi-bin` or contains individual symbolic links to them (the better choice).
- If you used symbolic links for the document root or CGI executables, make sure your web server is configured to allow symbolic links.
- Set up your web server's mappings so all requests for the top-level document (the "/" document) are mapped to `/cgi-bin/main`. You can do this through HTTP redirects, aliases, or similar mechanisms.
- Set up your web server so it only accepts connections from the local host unless you have installed additional security software that encrypts connections between the browser and server.
- Set up your web server so CGI applications are run as the `@(CGI_USER)` you specified on your worksheet (see "Configuring the Software" on page 33) and that the `/var/opt/SUNWut/cgitokens` subdirectory is owned by this same user and is only readable, writable, and executable by this user.

APPENDIX C

Tips for Language Selection

This section describes all the interfaces where the language (locale) can be changed in the Sun Ray server software.

Language Selection for System Administrators

Sun Ray Web-based Interface of the Administration Application

The web-based administration application is localized in the following four languages:

- English — en_US
- French — fr
- Japanese — ja
- Simplified Chinese — zh

When you log in to the web-based administration application, the login page (see FIGURE 6-2) defaults to the server's default locale as specified in the Sun Ray configuration file `/etc/opt/SUNWut/utadmin.conf`.

You can override this default locale for your current administration login session by selecting a different locale from the Language pulldown menu on the login page (see FIGURE 6-2). For more detail, see the `utadmin.conf(4)` man page.

Self-Registration GUI

When the Sun Ray server is configured with an authentication policy that enables self-registration, the self-registration GUI that is displayed to the user is localized in the following 10 languages:

- English — en_US
- French — fr
- German — de
- Spanish — es
- Italian — it
- Swedish — sv
- Japanese — ja
- Korean — ko
- Simplified Chinese — zh
- Traditional Chinese — zh_TW

The self-registration GUI detects the locale to use from the operating system's default locale via some environment variables. To change the locale that is displayed, edit the `/etc/default/init` file and specify the desired locale using the `LC_ALL` or `LC_CTYPE` variable. Reboot the server for the change to take effect. See the `init(1M)` man page for the default values and more information.

Note – Note that this file specifies the default environment variables that are passed to any process started on this server.

Language Selection for Users

Users can choose in which language to view the Sun Ray 1 Settings GUI.

The Sun Ray 1 Settings GUI is localized in the following 10 languages:

- English — en_US
- French — fr
- German — de
- Spanish — es
- Italian — it
- Swedish — sv
- Japanese — ja
- Korean — ko
- Simplified Chinese — zh
- Traditional Chinese — zh_TW

When the user starts an X-windows session on the `dtlogin` page, the user can select a different language from Options ->Language pulldown menu. The selection the user makes here is automatically detected by the Sun Ray 1 Settings GUI. See the `utsettings(1)` man page for more information.

APPENDIX **D**

Errors from the Authentication Manager

This appendix lists the errors you can receive from the Authentication Manager and what they mean.

Message Format

The general format of the log messages is:

`timestamp thread_name message_class message`

For example:

```
1999.04.15 21:46:33.909 PDT Client6 NOTICE: SESSION_OK user.924231680-8477
```

In the above example, a session was successfully initialized for the authentication token "`user.924231680-8477`".

Message components are defined as follows:

- `timestamp` is of the form:

year.month.day hours:minutes:seconds.milliseconds timezone

- `thread_name`

There are several different types of threads. The most common is the thread that handles appliance authentication, access control and session monitoring. These threads are named "Client" + number. The Client# thread names are reused when a connection terminates. Other threads are:

- SessionManager#—These threads communicate with `utsessiond` on behalf of a Client# thread.
- AdminJobQ—This thread is used in the implementation to wrap a library that would not otherwise be thread safe.
- CallBack#—These threads communicate with applications such as `utload`.
- Control—This thread listens for connections from `utsessiond` as well as the initial communications with applications such as `utload`.

Note – Messages with the same thread name are related. The exception to this is when a Client# thread disconnects an appliance and then purges the connection information from memory. After a Client# DESTROY message, the next use of that Client# thread name will have no relation to previous uses of the thread name (in other words the thread names are reused).

- `message_class`
  - `CLIENT_ERROR`—indicates unexpected behavior from an appliance. These messages can be generated during normal operation if an appliance is rebooted.
  - `CONFIG_ERROR`—indicates a system configuration error. The Authentication Manager generally exits after one of these errors is detected.
  - `NOTICE`—logs normal events.
  - `UNEXPECTED`—logs events or conditions that were not anticipated for normal operation but are generally not fatal. Some of these errors should be brought to the attention of the Sun Ray product development team.
  - `DEBUG`—beneficial to developers and only occur if they are explicitly enabled. Debug messages can reveal session IDs, which must be kept secret to ensure proper security.

Error Messages

TABLE D-1 Possible Errors

Error class	Message	Description
CLIENT_ERROR	...Exception ... : cannot send keepAliveInf	Error encountered while attempting to send a keep alive message to an appliance.
	...keepAlive timeout	An appliance has failed to respond within the allotted time. The session is being disconnected.
	duplicate key:	Appliance does not properly implement the authentication protocol.
	invalid key:	Appliance does not properly implement the authentication protocol.
CONFIG_ERROR	attempt to instantiate CallBack 2nd time.	Program error.
	AuthModule.load	Problem encountered while loading configuration module.
	Cannot find module	Program or installation error.
	Cannot get AdminImpl methods:	Installation error.
	Cannot open call back socket on port ...	Runtime error. Is `cbport` busy?
	Cannot read properties file: ...	Installation or configuration error.
	cannot read properties file: ...	Installation or configuration error, check file.
	Cannot read session types	Check file, usually `/etc/opt/SUNWut/sessionTypes.props`
	during status:	Program error or Java VM error.
	Error while reading policy file ...	Installation or configuration error.
	Invalid configuration. Exiting	Check value of `auth.props:policy` and the contents of the file indicated by the policy property.
	Invalid option	Program error in the `/opt/SUNWut/lib/utauthd` script.

TABLE D-1 Possible Errors *(Continued)*

Error class	Message	Description
CONFIG_ERROR	No policy specified	A policy must be specified using the `utpolicy` command. Check the "policy" keyword in the `/etc/opt/SUNWut/auth.props` file.
	Policy file does not exist: ...	Installation or configuration error.
	refreshProperties: file non-existent: ...	Installation or configuration error, check file name.
	refreshProperties: no filename	Configuration error, check the `/etc/opt/SUNWut/auth.props` file.
	SessionManager.initiateCallback: ... claims to be already connected	Possible configuration error.
	sessionTypesFile not specified	The required parameter "sessionTypesFile" is missing from `/etc/opt/SUNWut/auth.props` file.
	UNCONFIGUED MODULE	An authentication module is not configured and will not be offered a token. This can be a serious problem and should probably be a fatal error. However, none of the currently implemented authentication modules should ever fail this test.
	utjadmin.so or configuration error in ...	Check installation.
	XXX CANNOT instantiate module instance=	Program, configuration, or installation error.
NOTICE	"discarding response: " + param	No controlling application is present to receive appliance response.
	"NOT_CLAIMED PARAMETERS: " + param	A token was not claimed by any authentication module.
	...authentication module(s) loaded.	Notification that authentication modules have loaded.
	...DISCONNECT ...	Normal notification of disconnection.
	...finalize lifetime=	An authentication record has been garbage collected by the Java Virtual Machine.
	...null session in redirect	Not seen in normal operation.
	CLAIMED by	A token has been claimed by an authentication module.
	CONNECT ...	Normal indication of session connection.

TABLE D-1 Possible Errors *(Continued)*

Error class	Message	Description
NOTICE	`Control established on ...`	Normal notification that a program has been granted control over a session.
	`DESTROY ... lifetime= ...`	Normal cleanup of disconnected session.
	`DISCONNECT ...`	Normal notification of disconnection.
	`Invalid call back attempt: ...`	Bad call back attempt from a `utsessiond`.
	`Loaded module`	Notification of authentication module loading.
	`SESSION_OK`	Normal startup of a new session or verification of an existing session.
	`SessionManager.getSessionManager: Initiate callback to utsessiond at ...`	Normal.
	`SessionManager.initiateCallback... established communication`	Normal.
	`TERMINATE ...`	Normal notification of session termination.
	`TERMINATE: empty session cleanup is disabled`	The `auth.props:terminateEnable` feature is not fully functional in this release and is not enabled by default. This message indicates that `utsessiond` notified `utauthd` that a session has no members. Future releases may use this information to cleanup empty sessions. It is normal to receive this message when a user exits their X session. `Dtlogin` normally will restart the session and present a login screen.
	`TERMINATE: inactive session`	Terminate message received from `utsessiond` on a session that has already been purged from `utauthd`.
	`TIMEOUT connection dropped ...`	An appliance is not responding.
UNEXPECTED	`“CallBack: malformed command”`	Bad syntax from a user application such as `utload` or `utidle`.
	`.../ ... read/0:” + ie`	Possible program error.
	`.../ ... read/1: ... Exception ...`	Error encountered while reading messages from appliance.
	`.../... protocolError: ...`	Various protocol violations are reported with this message. This is also a way for `utauthd` to force the appliance to reset.

TABLE D-1 Possible Errors *(Continued)*

Error class	Message	Description
UNEXPECTED	`cannot send connInf, disconnecting session`	Session was disconnected during connection due to a problem in communicating with the appliance.
	`Cannot set socket timeout: ... Exception ...`	Program error.
	`connect failed: ...`	Problem encountered while attempting to connect appliance to a session.
	`Error while closing socket: ... Exception ...`	Possible program error.
	`Error while processing protocolError: ...`	An error was encountered while attempting to send a `protocolError` message to an appliance.
	`Exception ... on ... / ...`	Error while trying to read input from appliance.
	`null session in disconnect`	Possible program error.
	`adminEvent strange event=`	Program error.
	`attempt to instantiate CallBack()`	Program error.
	`AuthReader: “`	Java runtime error or normal IO error due to appliance reboot.
	`AuthRecord.connect: ... already connected”`	Possible program error.
	`AuthRecord.disconnect: Null Client`	Possible program error.
	`AuthRecord.send: no connection.`	Possible program error.
	`CallBack.attach: cookie NOT consumed`	Bad call back attempt from a `utsessiond`.
	`Callback.control: cannot begin: ...`	Possible program error while trying to start a thread to handle a program such as `utload`.
	`CallBack.print: ...`	IO error while trying to send an appliance response back to the controlling application.
	`CallBack.run init in: ...`	IO error.
	`Callback: malformed command`	Syntax error from program attempting to control a session.
	`Callback: malformed session id`	Syntax error from program attempting to control a session.
	`Cannot accept on socket: ...`	Runtime error. Is `cbport` busy?

TABLE D-1 Possible Errors *(Continued)*

Error class	Message	Description
UNEXPECTED	`Cannot accept on socket: ... Exception ...`	Possible program error.
	`Cannot connect on port change`	Check `utsessiond` log file.
	`Cannot derive BufferedOutputStream: ... Exception ...`	Program error.
	`Cannot derive BufferedReader: ... Exception ...`	Program error.
	`cannot get socket inputStream from ... / ...`	Error while trying to read input from appliance.
	`Cannot open socket: ... Exception ...`	Cannot open the socket specified by `auth.props:port`. Is there another `utauthd` running? `utauthd` should only be started by running `/etc/init.d/utsvc`.
	`cannot pushback`	Possible program error.
	`Cannot send protocolError to terminal on failed port change`	IO problem encountered while trying to reset appliance.
	`Cannot set socket timeout: ... Exception ...`	Program error.
	`Control.annotate: bad key: ...`	Annotations are not allowed in the `/etc/opt/SUNWut/auth.props` file.
	`Control.annotate: bad value: ...`	Only true or false are allowed as values for this parameter.
	`Control.destroy: unable to clear controller: " + e`	Session has already disconnected.
	`Control.load: extraneous parameters: ...`	Syntax error from controlling application.
	`Control.load: invalid file param ...`	File might not be present and readable in `/tftpboot`.
	`Control.load: invalid flash param`	Syntax error from controlling application.
	`Control.parse: invalid parameter`	Syntax error from controlling application.
	`Control.response: out=null"`	No controlling application is present to receive appliance response.

TABLE D-1 Possible Errors *(Continued)*

Error class	Message	Description
UNEXPECTED	`Control.run: ar: " + arex`	Only one controlling application allowed or session not connected.
	`Control.setParam failed: ...`	Only one controller allowed or session is not connected.
	`Control.setParam null ar`	Possible program error.
	`Control.setParam null in/out`	Possible program error or early exit of controlling command.
	`Control: ...`	Possible program error or early exit of controlling command.
	`Control: input error: ...`	Syntax or IO error from controlling application.
	`Control: recv`	Error while reading input from controlling application.
	`Control: unknown command: ...`	Syntax error from controlling application.
	`Control: unknown command: ...`	Syntax error from controlling application.
	`createClient:`	Program, installation or runtime error.
	`desktopExists`	Likely program error.
	`destroy error: " + e`	Error while trying to tell `utsessiond` to destroy a session.
	`during send to:`	Loss of connection to appliance.
	`Error ...\nwhile instantiating module. instance=`	Program, configuration, or installation error.
	`exception in async job:`	Program error.
	`Impossible error in putCanonical`	Possible program error.
	`JobQueue.run:`	Program or installation error.
	`JobQueue.submit:`	If `auth.props:terminateEnable` is true then this can occur in normal operation, otherwise it may occur due to a program error.
	`logicalTokenExists`	Likely program error.
	`No controller available to handle message:`	Normal if controlling application (`utload`, etc.) exited before results were received.
	`rawTokenExists`	Likely program error.

TABLE D-1 Possible Errors *(Continued)*

Error class	Message	Description
UNEXPECTED	`Resolve error on`	Program or installation error.
	`revoke error: ... Exception ...`	Error while trying to disconnect an appliance from a session.
	`SESSION_ERROR`	Possible program error.
	`SESSION_ERROR ... exitCode=`	It was not possible to start the first program in a session. The `exitCode` is helpful in determining the exact cause.
	`SessionManager.confirmation : ... Exception ...`	If `auth.props:terminateEnable` is true then this can occur in normal operation, otherwise it may occur due to a program error or a problem in `utsessiond`.
	`SessionManager.getSessionManager: ... InterruptedException`	Possibly normal message.
	`SessionManager.initiateCallback: ... is not configured to talk to this utauthd`	The configuration file `/etc/opt/SUNWut/auth.permit` does allow this `utauthd` to talk to the `utsessiond`.
	`SessionManager.initiateCallback: ... unknown response: ...`	Program error.
	`SessionManager.initiateCallback: ... was not able to talk to this utauthd`	Possible configuration error.
	`SessionManager.initiateCallback: during send: ...`	Error while communicating to `utsessiond`.
	`SessionManager.permit: ... Exception ...`	Error while attempting to connect an appliance to a session.
	`SessionManager.permit: line="..."`	`utsessiond` did not allow the appliance to session connection.
	`SessionManager.run: ... Exception ...`	Error while reading input from `utsessiond`.
	`SessionManager.run: No job to match with "..." ... Exception ...`	Program error.
	`SessionManager.run: readLine returns null`	Error while reading input from `utsessiond`.
	`SessionManager.sessionFactory: ... Exception ...`	Possible program error.

TABLE D-1 Possible Errors *(Continued)*

Error class	Message	Description
UNEXPECTED	SessionManager.sessionFactory: Cannot send create: ... Exception ...	Communication problem with utsessiond.
	SessionManager.sessionFactory: Empty file: ...	Possible program error.
	SessionManager.sessionFactory: unable to create new session: ...	utsessiond did not create a new session ID as requested.
	SessionManager.sessionFactory:invalid SID from utsessiond: ...	Program error in utsession.
	SessionManager.terminate: bad argument: "..."	Could not parse message from utsessiond. Possible program error.
	SessionManager.terminate: invalid SessionId	Possible program error.
	socket + "Handleclient, AuthRecord: ... Exception ...	Possible program error.
	Terminal sent "..." as first message after TcpOpen, reports connected	Appliance and utauthd are out of sync. This situation should correct itself.
	userExists	Likely program error.
	utauthd: ... Exception ...	Error encountered while listening for appliances.
	Worker: ... Exception ...	Possible program error.

Glossary

bpp Bits per pixel.

category 5 The most common type of wiring used in LANs. It is approved for both voice and data (at up to 100Mhz). Also called cat 5.

client-server A common way to describe network services and the user processes (programs) of those services.

composite video Refers to a type of video signal in which all of the information is transmitted on the same wire.

DDC This standard defines I^2C-based communication protocol with various levels of complexity which operate over the DDC channel for the purpose of controlling the monitor and optional annex devices. Also, see EDID.

DHCP Dynamic Host Configuration Protocol. DHCP is a means of distributing IP addresses and initial parameters to the appliances.

EDID The EDID data format as a compact method to specify the capabilities of various types of monitors as well as integrated displays. This standard defines data formats to carry configuration information to allow optimum use of displays.

Ethernet switch A unit that redirects packets from input ports to output ports. Can be a component of the Sun Ray interconnect fabric.

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.

fan out Connections that radiate out from a hub or switch.

FTP File Transfer Protocol. The name of the Internet protocol and the program used to transfer files between hosts.

hot key A pre-defined key that causes something to appear on your screen. A hot key is used to bring up the Settings screen on the Sun Ray enterprise appliance.

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 appliances are hot-pluggable.

Interconnect fabric All the cabling, switches, or hubs that connect Sun Ray server's network interface cards to the Sun Ray appliances.

internet A collection of networks interconnected by a set of routers that enable them to function as a single, large virtual network.

Internet (Note the capital "I") The largest internet in the world consisting of large national backbone nets (such as MILNET, NSFNET, and CREN) and a myriad of regional and local campus networks all over the world. It is a global collection of networks connecting a wide range of computers using a common protocol to communicate and share services.

intranet Any network that provides similar services within an organization to those provided by the Internet outside it but which is not necessarily connected to the Internet.

IP address A unique number that identifies each host or other hardware system on a network. An IP address is composed of four integers separated by periods. Each decimal integer must be in the range 0-255 (for example, 129.144.0.0).

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). Sun Ray appliance IP addresses are leased.

LAN Local area network. A group of computer systems in close proximity that can communicate with one another via some connecting hardware and software.

layer 2 The data link layer. In the OSI (Open Standards Interconnection) model, there are 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.

login The process of gaining access to a computer system.

login name The name by which the computer system knows the user.

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.

mobility For the purposes of the Sun Ray software, the property of a session that allows it to follow a user from one appliance to another within a work 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.

multiplexing The process of transmitting multiple channels across one communications circuit.

namespace A set of names in which a specified ID must be unique.

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 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 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.

OSD On-screen display. The Sun Ray appliance uses small OSD icons to alert the user of potential start-up problems.

patch A collection of files and directories that replace or update 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.

policies Authentication Manager, using the selected authentication modules, decides what tokens are valid and which users have access.

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.

root user A user name that grants special privileges to the person who logs in with that ID.

server A computer system that supplies computing services or resources to one or more clients.

service For the purposes of the Sun Ray software, any application that can directly connect to the Sun Ray appliance. It can include audio, video, X servers, access to other machines, and device control of the appliance.

session A group of services associated with a single user.

subnet A working scheme that divides a single logical network into smaller physical networks to simplify routing.

token In the Sun Ray system, a token must be presented by the user. It is required by the Authentication Manager to consider allowing a user to access the system. It consists of a type and an ID. If the user inserted 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 enterprise appliance's built-in type (pseudo) and ID (the unit's Ethernet address) are supplied as the token.

thin client Thin clients remotely access some resources of a computer server, such as compute power and large memory capacity. The Sun Ray appliances rely on the server for all computing power and storage.

time-out value The maximum allowed time interval between communications from an appliance to the Authentication Manager.

TCP-IP Transmission Control Protocol/Internet Protocol (TCP/IP) is a networking protocol that provides communication across interconnected networks, between computers with diverse hardware architectures and operating systems.

URL Uniform Resource Locator. A standard for writing a textual reference to an arbitrary piece of data in the World Wide Web (WWW). The syntax of a URL is `protocol://host/localinfo` where `protocol` specifies a protocol to use to fetch the object (like HTTP or FTP), `host` specifies the Internet name of the host on which to find it, and `localinfo` is a string (often a file name) passed to the protocol handler on the remote host.

user name The name a computer system uses to identify a particular user. Under UNIX this is a text string of up to eight characters composed of letters (a-z and A-Z), digits (0-9), hyphens (-), and underscores (_) (for example, jpmorgan). The first character must be a letter.

virtual frame buffer A region of memory on the Sun Ray server that contains the current state of a user's display.

work group A collection of associated users who exist in near proximity to one another. A set of Sun Ray appliances that are connected to a Sun Ray server provides computing services to a work group.

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