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Sun Ray™ Connector for Windows OS, Version 2.0 Installation and Administration Guide

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Preface

This volume provides instructions for installing, using, and administering the Sun Ray™ Connector for Windows OS, a Sun-supported terminal services client based on the Microsoft Remote Desktop Protocol (RDP).

Audience

This manual is intended for system and network administrators who are already familiar with Windows operating systems and the Sun Ray™ computing paradigm. In particular, this document should provide Windows administrators with what they need to install, set up, and administer the Sun Ray Connector. For information on administering Sun Ray servers, please see the *Sun Ray Server Software 4.0 Administrator's Guide for the Solaris Operating System* or the *Sun Ray Server Software 4.0 Administrator's Guide for the Linux Operating System*.

For information on administering Windows terminal services, see www.microsoft.com.

Scope

This manual is written from the point of view of the Sun Ray Connector software and the Solaris™ and Linux operating systems. Although the Sun Ray Connector is a Windows terminal services client, this manual does not give any instructions for administering Windows Terminal Servers or other Microsoft products.

Before You Read This Book

This guide assumes that you have access to a Sun Ray Desktop Unit (DTU) attached to a Sun Ray Server running version 4.0 of the Sun Ray Server Software and have a network connection to at least one Microsoft Windows Terminal Server.

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. This document does, however, contain information about specific Sun Ray system commands as they pertain to management of the Sun Ray Connector.

Typographic Conventions

Typeface	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	Read Chapter 6 in the *User's Guide*. These are called *class* options. You *must* be superuser to do this.
	Command-line variable; replace with a real name or value	To delete a file, type `rm` *filename*.

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

Application	Title	Part Number
Administration	*Sun Ray Server Software 4.0 Administrator's Guide for the Solaris Operating System*	820-9411
Administration	*Sun Ray Server Software 4.0 Administrator's Guide for the Linux Operating System*	820-0412
Installation	*Sun Ray Server Software 4.0 Installation and Configuration Guide for the Solaris Operating System*	820-0413
Installation	*Sun Ray Server Software 4.0 Installation and Configuration Guide for the Linux Operating System*	820-0414
Release Notes	*Sun Ray Server Software 4.0 Release Notes for the Linux Operating System*	820-0416
Release Notes	*Sun Ray Server Software 4.0 Release Notes for the Solaris Operating System*	820-0417
Release Notes	*Sun Ray Connector for Windows OS, Version 2.0 Release Notes*	820-0420

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

Introduction

The Sun Ray™ Connector for Windows OS is a Sun-supported terminal services client, based on the Microsoft Remote Desktop Protocol (RDP), that enables Sun Ray users to access applications running on remote Windows Terminal Servers. It is especially useful to those who are accustomed to Windows-based applications or who wish to access documents in certain formats from a Sun Ray thin client. The Sun Ray Connector for Windows OS is often referred to as the Sun Ray Connector or simply as the Connector.

The Sun Ray Connector gives users access to a Windows desktop, either occupying the entire Sun Ray screen or running in a window in a Solaris™ or Linux environment.

Architectural Overview

From a user point of view, the Sun Ray Connector mediates between the Sun Ray desktop and the Microsoft Windows Terminal Server. Residing on the Sun Ray server, it uses the Remote Desktop Protocol (RDP) to communicate with the Windows Terminal Server and the Appliance Link Protocol™ (ALP) to communicate with the Sun Ray desktop, as suggested in FIGURE 1-1. Once installed, the Sun Ray Connector requires only that a user type a simple command to connect to a Windows Terminal Server where the usual applications reside. The command can be modified to accommodate a variety of preferences, or options, for instance to specify screen size or a list of available printers.

FIGURE 1-1 Sun Ray-Windows Connectivity
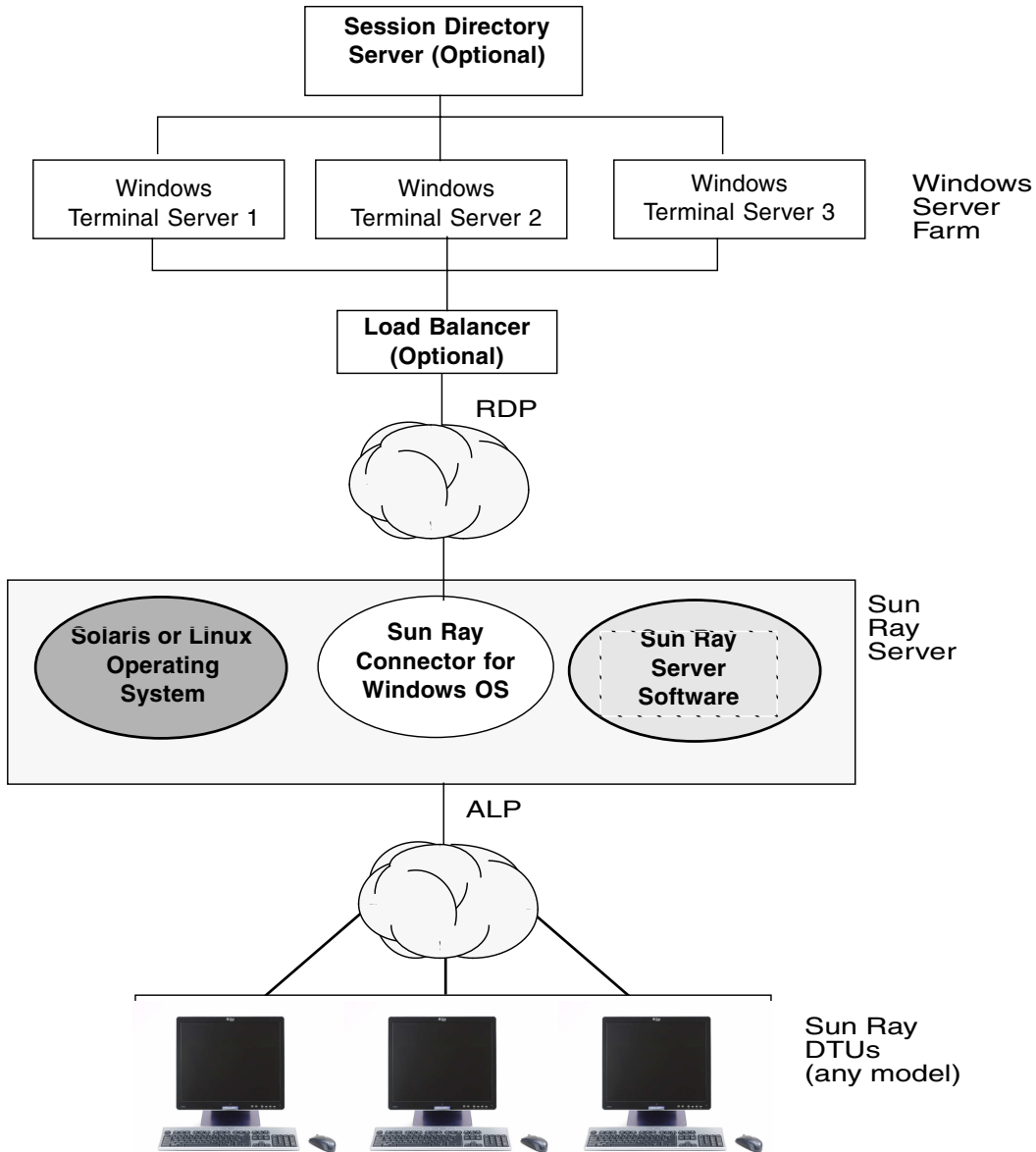
Features

The Sun Ray Connector supports:

- compression
- encryption
- smart cards
- session directory
- local drives
- audio devices
- serial devices
- printer redirection
- clipboard

These features are described in the following sections.

Compression

The Sun Ray Connector uses Microsoft Point-to-Point Compression (MPPC) to compress data between the Sun Ray Server, which runs the Sun Ray Connector, and the Windows Terminal Server.

Encryption

The Sun Ray Connector uses RSA Security's RC4 cipher, which encrypts data of varying size with a 56-bit or a 128-bit key, to secure all data being transferred to and from the Windows server.

Four levels of encryption can be configured at the Windows Terminal Server:

- Low

  All data from client to server is encrypted based on maximum key strength supported by the client.

- Client-compatible

  All data between client and server in both directions is encrypted based on the maximum key strength supported by the client.

- High

All data between the client and server in both directions is encrypted based on the server's maximum key strength. Clients that do not support this strength of encryption cannot connect.

■ FIPS-Compliant

FIPS-compliant encryption is not supported[1].

Note – Data encryption is bidirectional except at the Low setting, which encrypts data only from the client to the server.

Smart Cards

The Sun Ray Connector uses the PC/SC framework to allow applications on the Windows Terminal Server to access smart cards inserted in the Sun Ray DTU. Typically, this feature is used to provide two-factor authentication with digital certificates or to permit the use of electronic signatures or other information stored on a smart card. See "Smart Cards" on page 25.

Note – Smart Cards and the PC/SC framework are supported on the Solaris Operating System but not on Linux.

Session Directory

The Sun Ray Connector supports server session reconnection based on Session Directory, a database that keeps track of which users are running which sessions on which Windows Terminal Servers, and load balancing information. Session Directory functionality enables Sun Ray Connector users to reconnect not only to an existing Sun Ray session but also to be reconnected automatically to the right Windows session.

Both IP address-based and token-based reconnection are supported; however, token-based redirection requires the use of a hardware-based load balancer for Windows Terminal Servers configured as a server farm. The capacity to utilize server farms and load balancing allows Windows Terminal Servers to accommodate a larger number of Sun Ray users and DTUs.

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1. FIPS is an acronym for the Federal Information Processing Standards defined by the National Institute of Standards and Technology.

> **Note –** To participate in a Session Directory-enabled server farm, Windows Terminal Servers must run Windows Server 2003 Enterprise Edition or Windows Server 2003 Data Center edition. Session Directory is an optional component that can be configured to use Microsoft proprietary or third-party load balancing products.

For details of setup, configuration, and operation, please see Microsoft's documentation, for instance at:

http://www.microsoft.com/windowsserver2003/techinfo/overview/sessiondirectory.mspx

Local Drive Mapping

File systems from removable media devices, such as flash drives or ZIP drives, connected to Sun Ray USB ports can be mapped to the Windows environment, where they appear as locally mounted drives. Any file can be mounted and mapped from the Sun Ray environment to the Windows environment.

> **Caution –** Windows filenames cannot contain the following characters: / : * ? " <> |. Make sure that redirected UNIX folders do not contain any files that use these characters in their names.

Audio Support

Users can play sound files on their Sun Ray desktops (downstream audio) with audio applications located on the Windows Terminal Server; however, recording from the Sun Ray desktop unit to the Windows Terminal Server (upstream audio) is not supported by the RDP Protocol and has therefore not been implemented.

Serial Port Mapping

Users can access serial devices connected to a Sun Ray DTU from their Windows sessions. Serial devices can be connected either directly to the serial ports on a Sun Ray DTU or by means of a serial adapter.

Printing

Once a connection is established, a user can print from Windows applications using any of the following:

- a network printer or a locally-attached printer on the Windows Terminal Server
- a network printer or a locally-attached printer on the Sun Ray server
- a local printer attached to the Sun Ray DTU

Network printing is recommended over locally-attached printing.

Clipboard

The Sun Ray Connector enables cut-and-paste text functionality between Windows applications and applications running on the Sun Ray desktop, whether Linux or Solaris versions. Copying and pasting is enabled for all supported languages, including double-byte languages, such as Chinese, Japanese, and Korean. The Sun Ray Connector does not support copying and pasting functionality for Rich Text format.

Licensing

The Sun Ray Connector supports both per-user and per-device Terminal Server Client Access Licenses (TS-CAL). When per-device licensing is configured for Windows Terminal Server, each Sun Ray DTU is granted a new license from the licensing server. Implications of these licensing modes are discussed under "Hotdesking and Licensing Modes" on page 17.

Licensing information is stored in the Sun Ray data store and can be retrieved and presented each time a Windows connection is made.

For information on administering licenses, see the `utlicenseadm` man page. See also the Note on page 8.

Limitations

Certain limitations, listed below, are caused by dependencies on other products. Limitations in the current implementation of the Sun Ray Connector are documented in the *Sun Ray Connector for Windows OS, Version 2.0 Release Notes*.

Windows Limitations

The following features are not supported on Windows 2000:

- Audio
- Drive mapping
- Serial port redirection
- Session Directory
- Smart card redirection

Other Limitations

Copy-and-Paste, Cut-and-Paste

The following behaviors, although similar, are caused by limitations in different applications:

- Once a copy-and-paste operation has been performed from a `dtterm` window, subsequent copy-and-paste operations from the same window to a Windows application always show the data from the first such operation.
- Cut-and-paste operations do not work from `dtpad` to Windows applications.
- Cut-and-paste menu options do not work correctly in transfers from StarOffice applications.

USB Disk

Removing a USB disk from a Sun Ray DTU while it is still being accessed by a Windows application leaves a stale mount point on the Sun Ray server.

CHAPTER **2**

Installation

The Sun Ray Connector for Windows OS Version 2.0 requires Sun Ray Server Software 4.0 or later on any supported operating system.

TABLE 2-1 Supported Operating System Versions for the Sun Ray Connector

Operating System	Version
SuSE Linux Enterprise Server (SLES)	9 Service Pack 3
Red Hat Enterprise Linux Advanced Server (RHEL AS)	4 Update 3
Solaris (SPARC and x86)	Solaris 10 11/06
Solaris Trusted Extensions(SPARC and x86)	Solaris 10 11/06

The Sun Ray Connector software must *always* be installed and configured on the primary data store server, otherwise Terminal Server licenses and printer configurations will not be stored. This is the case even if the primary data store server is not used to host Sun Ray sessions.

Additional installation requirements include:

- OpenSSL

  OpenSSL is generally installed by default on Solaris 10 as well as on Red Hat and SuSE. Please confirm that OpenSSL is installed before proceeding.

- Windows 2000 Server with Service Pack 4 Rollup 1 or
  Windows 2003 Server with Service Pack 2 Rollup 2 or
  Windows XP Professional with Service Pack 2 or
  Windows Vista

- All necessary Microsoft licenses for accessing Windows Terminal Services

> **Note –** If you access terminal server functionality provided by Microsoft operating system products, you need to purchase additional licenses to use such products. Consult the license agreements for the Microsoft operating system products you are using to determine which licenses you must acquire. Currently, information regarding Terminal Services can be found in the following URL:
> `http://www.microsoft.com/windowsserver2003/howtobuy/licensing/ts2003.mspx`

Installation Procedure (Solaris)

● **Before running the installer, create a dedicated UNIX group for the sole use of the Sun Ray Connector.**

```
# groupadd <group-name>
```

where *group-name* is the name you assign to this group. The first character of the name must be alphabetic. Do not add users to this group. Once you have created and named the group, follow the steps below to install the Sun Ray Connector.

If you have already mounted the Sun Ray Connector CD-ROM, locally or from a remote server, or extracted the ESD files to an image directory, begin at Step 4.

1. **Open a shell window as superuser on the Sun Ray server.**

   To avoid installation script errors that can occur if user environment settings are carried forward, use one of the following commands for superuser login instead of using the su command without arguments:

```
% su -
```

```
% su - root
```

2. **Insert the Sun Ray Connector for Windows OS CD-ROM.**

   If a File Manager window opens, close it. The File Manager CD-ROM window is not necessary for installation.

3. **Change to the image directory, for example:**

```
# cd /cdrom/cdrom0
```

4. **Install the Sun Ray Connector software.**

```
# ./installer
```

The installer prompts for the name of the group you want to use for the Sun Ray Connector.

```
Enter the name of a pre-existing group for use by Sun Ray
Connector:
```

5. **Enter the name of the group you created for this purpose at the beginning of this procedure, as below, then press Enter or Return to continue.**

```
Enter the name of a pre-existing group for use by Sun Ray
Connector: group-name
```

6. **Run the automatic configuration script.**

```
# /opt/SUNWuttsc/sbin/uttscadm -c
```

The `uttscadm` script launches the SRWC proxy daemon `uttscpd` and adds an entry for `uttscpd` in the `/etc/services` file, using port 7014 as the default. `uttscpd` is described under "Proxy Daemon" on page 21.

7. **Restart Sun Ray services if the script asks you to do so.**

```
# /opt/SUNWut/sbin/utrestart
```

Note – It is not necessary to restart Sun Ray services if the `uttscadm` script does not ask you to do so.

Installation Procedure (Linux)

If you have already mounted the Sun Ray Connector CD-ROM locally or from a remote serve or extracted the ESD files to an image directory, begin at Step 4.

1. **Open a shell window as superuser on the Sun Ray server.**

   To avoid installation script errors that can occur if user environment settings are carried forward, use one of the following commands for superuser login instead of using the su command without arguments:

   ```
   % su -
   ```

   ```
   % su - root
   ```

2. **Insert the Sun Ray Connector for Windows OS CD-ROM.**

   If a File Manager window opens, close it. The File Manager CD-ROM window is not necessary for installation.

3. **Change to the image directory, for example:**

   ```
   # cd /cdrom/cdrom0
   ```

4. **Install the Sun Ray Connector software.**

   ```
   # ./installer
   ```

5. **Run the automatic configuration script.**

   ```
   # /opt/SUNWuttsc/sbin/uttscadm -c
   ```

   The uttscadm script may prompt you for a path to the OpenSSL libraries.

6. **Accept the default path, or supply a different path, if applicable.**

7. **Restart Sun Ray services if the script asks you to do so.**

   ```
   # /opt/SUNWut/sbin/utrestart
   ```

> **Note –** It is not necessary to restart Sun Ray services if the `uttscadm` script does not ask you to do so.

Uninstallation Procedure

1. **Before uninstalling the Sun Ray Connector, use the following command to unconfigure it:**

```
# /opt/SUNWuttsc/sbin/uttscadm -u
```

   On Solaris, the `uttscpd` entry is removed from the `/etc/services` file and the SRWC proxy daemon is stopped.

2. **To remove the Sun Ray Connector software, type the following command:**

```
# /opt/SUNWuttsc/sbin/uninstaller
```

3. **Answer Y or N to the Accept (Y/N) prompt.**

   a. **Answer N to leave the existing installation in place.**

   or

   b. **Answer Y to uninstall the old version of Sun Ray Connector software.**

Upgrade Procedure

Note – To upgrade from an earlier version of the Sun Ray Connector, you must run the installer and the `uttscadm` configuration script, as described in this procedure.

1. **Change to the image directory of the Sun Ray Connector CD-ROM, for example:**

```
# cd /cdrom/cdrom0
```

2. **Install the Sun Ray Connector software.**

```
# ./installer
```

The installer script indicates what Sun Ray Connector software is already installed on your system, for example:

```
Sun Ray Connector 1.1 is currently installed.
Do you want to uninstall it
and install Sun Ray Connector 2.0?
Accept (Y/N):
```

3. **Answer Y or N to the Accept (Y/N) prompt.**

   a. **Answer N to leave the existing installation in place.**

   or

   b. **Answer Y to uninstall the old version of Sun Ray Connector software. and install the newer version.**

   The existing Sun Ray data store is not removed or touched by the upgrade procedure.

4. **Run the automatic configuration script again.**

```
# /opt/SUNWuttsc/sbin/uttscadm -c
```

Using the Sun Ray Connector

Once the Sun Ray Connector software has been installed, type the following command to connect to the desired Windows Terminal Server:

```
% /opt/SUNWuttsc/bin/uttsc <options> <hostname.domain>
```

If the Windows Terminal Server is in the same domain as the Sun Ray desktop, it is not necessary to specify the domain name; however, you may specify the full IP address instead of *hostname.domain* if you prefer.

Command Line Options

The uttsc command specifying no options but the name or address of a Windows Terminal Server displays a Windows session on the Sun Ray DTU (See FIGURE 3-1). The default screen size is 640 x 480 pixels.

To display a session in full screen mode or to modify it in other ways, see the command line options listed in the uttsc man page.

To allow your users to access the man command directly, add the following entry to your users' man path:

```
/opt/SUNWuttsc/man
```

They can then display the man page by typing:

```
% man uttsc
```

FIGURE 3-1   Windows Vista Session on a Solaris Desktop
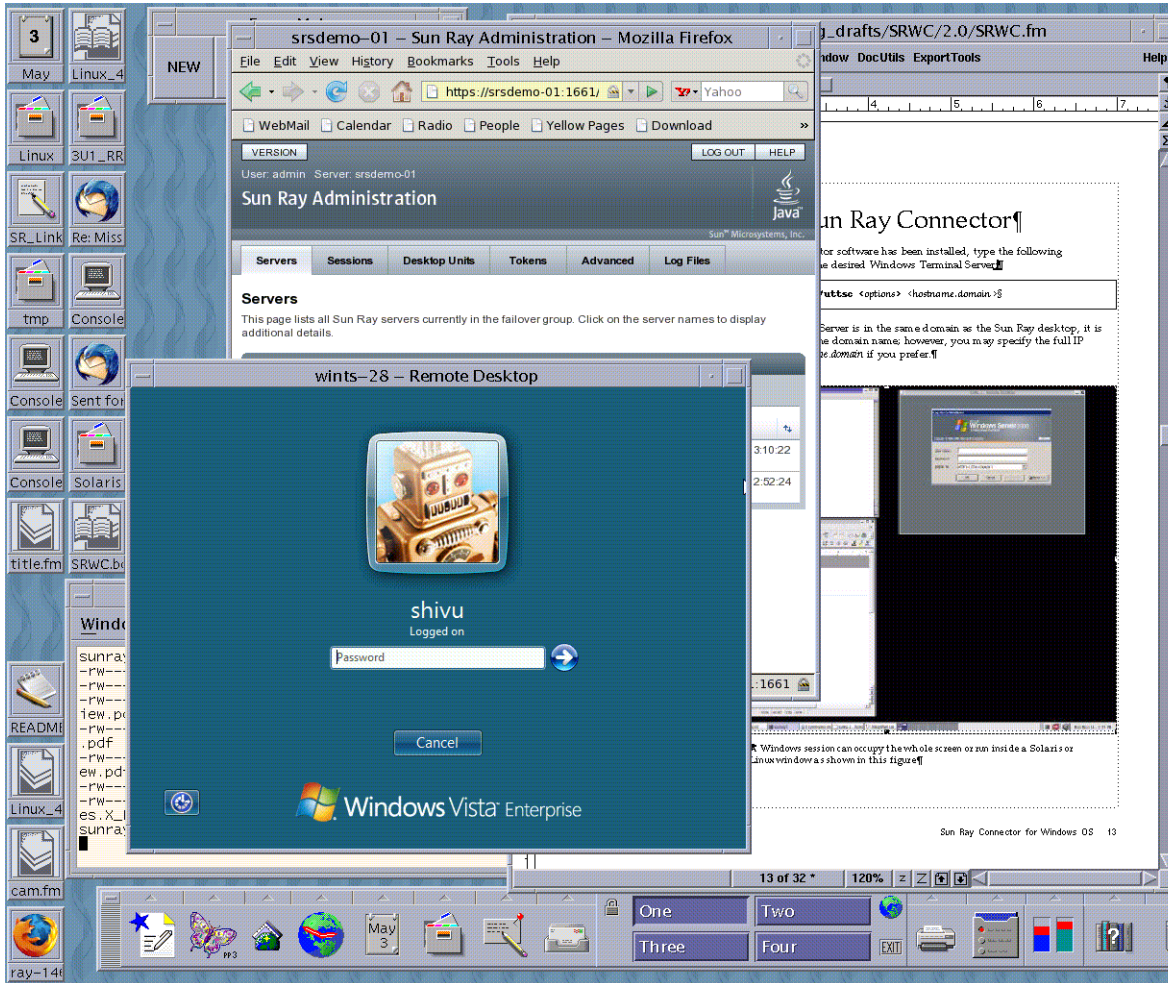
A Windows session can occupy the whole screen or run inside a Linux window or, as shown in this figure, a Solaris window.

Graphical User Interface (GUI)

No graphical user interface is available for the Sun Ray Connector at this time; however, launchers can be set up to provide users with desktop icons or menu items to connect to the Windows session.

For details on how to set up launchers, please consult the desktop documentation for your operating system.

Hotdesking and Licensing Modes

Terminal Server Client Access Licenses can be configured in two modes on the Windows Terminal Server: per-user and per-device. In per-user mode, the user's hotdesking experience is virtually seamless. In per-device mode, however, to ensure correct TS-CAL license handling, users must re-authenticate every time they hotdesk to a different DTU.

The differences in the user's hotdesking experience are summarized below.

Per-user Mode

The user logs into a Sun Ray session with a smart card and opens a connection to a Windows session.

1. The user removes the smart card and reinserts it in the same DTU.

2. The user removes the smart card and inserts it in a different DTU.

In both cases, the user is instantly reconnected to the existing Windows session, and other features and services are unaffected.

Per-device Mode

The user logs into a Sun Ray session with a smart card and opens a connection to a Windows session.

1. The user removes the smart card and reinserts it in the same DTU.

    The user is instantly reconnected to the existing Windows session.

2. The user removes the smart card and inserts it in a different DTU.

   The Windows login screen prompts the user for username and password, after which the user is reconnected to the existing Windows session. Other features and services are similarly affected. For example:

   - Windows Media Player stops playing audio, although the application is still active on the Windows session. The user needs to replay the audio.

   - Any serial port transfer is stopped.

   However, all the command line options specified remain valid.

Note – The `uttsc` command provides a CLI option (`-O`) that can be used to prevent the Sun Ray Connector from disconnecting upon detection of hotdesking events. Please see the `uttsc` man page for details.

Administration

The Sun Ray Connector requires very little administration; however, administrators should be aware of the following issues, suggestions, and configuration instructions.

Compression and Encryption

Compression is enabled by default. It can be disabled on a per-connection basis with a CLI option. For example, to disable compression:

```
% /opt/SUNWuttsc/bin/uttsc -z <hostname.domain>
```

For encryption, the administrator needs to decide which of the available levels to use, after which the Windows Terminal Server can be configured accordingly. (See "Encryption" on page 3.)

JDS Integration Package

The Sun Java™ Desktop System (JDS) integration package for the Solaris Operating System delivers a CLI called uttscwrap, which improves integration of the Sun Ray Connector with the JDS desktop on Solaris 10. The JDS integration package is included in the Supplemental folder of the Sun Ray Connector software image.

uttscwrap provides a login dialog that allows input of credentials for password-based authentication (*username/domain/password*). The credentials can be saved through the dialog for subsequent invocations. At the next launch, the dialog is pre-filled with the credentials.

> **Note –** `uttscwrap` is designed for credential caching for password-based authentication only. It cannot be used with smart card authentication. For smart card authentication, please use the Sun Ray Connector directly (`/opt/SUNWuttsc/bin/uttsc`).

Credentials are saved separately for each Windows server/application combination. This allows you to save different credentials the following ways:

- For different applications on the same server
- For different applications on different servers
- For different server sessions with no applications launched

Any new credentials saved for a server/application replace previously saved credentials.

Use `uttscwrap` when desktop or menu launchers are defined to launch either Windows Terminal Services sessions or Windows applications on various Windows servers.

To launch the Sun Ray Connector through `uttscwrap`, specify the same parameters on the `uttscwrap` command line as you would use on the `uttsc` command line.

Licensing

Licenses can be administered with the `utlicenseadm` CLI. Administrative functions for licenses include listing and deleting. See the `utlicenseadm` man page for details.

Microsoft Terminal Services licensing information is stored in the Sun Ray data store automatically upon Windows session startup, using the existing LDAP schema. No administrator setup or intervention is required.

Load Balancing

Terminal services session load balancing is handled transparently by the Windows Terminal Server. For more detailed information, please refer to Microsoft documentation at:
`http://www.microsoft.com/windowsserver2003/technologies/clustering/default.mspx`

Proxy Daemon

On Solaris only, the Sun Ray Connector uses a daemon process named `uttscpd` to act as a proxy for interactions with the Sun Ray data store. It uses port 7014 by default. A corresponding command, `uttscrestart`, allows the administrator to restart `uttscpd`.

At install time, the installer asks for a valid, existing UNIX group under which to install the proxy daemon and the Connector binaries. This group is used to establish a secure connection between the Connector and the proxy. The proxy validates and allows connections from a binary only if it belongs to this group.

Note – Do not use this group for any users or other components.

Note – Restarting the `uttscpd` daemon does not affect existing Sun Ray Connector sessions.

Printing

The Sun Ray Connector supports printing to:

■ network printers visible on the Windows server
■ local printers attached to the Windows server
■ local printers attached to the Sun Ray server
■ network printers visible on the Sun Ray server
■ local printers attached to the DTU

Note – Network printers are not affected by hotdesking. Printers connected to DTUs are available for printing from any DTU connected to the same Sun Ray server.

Printer Configuration Caching

The Sun Ray server maintains a cache, in the Sun Ray data store, of printer configurations that users set up on the Windows Terminal Server. The Sun Ray server presents the appropriate configuration to the Windows Terminal Server when a user reconnects using the Sun Ray Connector.

The `uttscprinteradm` CLI helps administrators to maintain this information. It can be used to list the available information and to perform cleanup in case of user or printer deletion. See the `uttscprinteradm` man page for further information.

Setting Up Print Queues

Printer setup in Windows environments is beyond the scope of this document; however, printer setup requirements for Solaris and Linux are described below.

The Windows Terminal Server session is aware only of the print queues specified in the command line when the Sun Ray Connector is started. To change print queues, restart the Sun Ray Connector with the relevant print queues specified on the command line.

Note – These instructions pertain to raw print queues.[1] Please consult your operating system documentation for instructions on setting up queues for PostScript drivers. See also the `lp` and `lpadmin` man pages.

Solaris Printing

To set up a raw print queue on a Sun Ray server running Solaris:

1. **Specify the printer and printer device node using the** `lpadmin` **command.**

```
# /usr/sbin/lpadmin -p <printer-name> -v \
/tmp/SUNWut/units/IEEE802.<mac-address>/dev/printers/<device node>
```

2. **Enable the print queue.**

```
# /usr/bin/enable <printer-name>
```

---

1. When a Solaris or Linux print queue is configured with a print driver, the `lp` utility sends print data to the driver for processing before redirecting it to the printer. When a print queue is configured without a driver, lp sends unprocessed, or *raw* data to the printer. A print queue configured without a printer driver is called a raw queue.

3. **Accept the print queue.**

```
# /usr/sbin/accept <printer-name>
```

Linux Printing

To set up a raw print queue on a Sun Ray server running any supported flavor of Linux:

1. **Uncomment the following line from the** `/etc/cups/mime.convs` **file:**

```
application/octet-stream          application/vnd.cups-raw          0 -
```

2. **Uncomment the following line from the** `/etc/cups/mime.types` **file:**

```
application/octet-stream
```

3. **Restart the** `cups` **daemon.**

```
# /etc/init.d/cups restart
```

4. **Create a soft link to the Sun Ray printer node in** `/dev/usb`**.**

   For example, if the device node is
   `/tmp/SUNWut/units/IEEE802.<mac-address>/dev/printers/<device node>`,
   then use the following command:

```
# ln -s \
/tmp/SUNWut/units/IEEE802.<mac-address>/dev/printers/<device node> \
/dev/usb/sunray-printer
```

   Use this soft link (`/dev/usb/sunray-printer`) as the Device URI while creating the print queue.

Note – On Red Hat, it may be necessary to create the `/dev/usb` directory as well as to re-create the soft link after rebooting.

---

5. **To complete the procedure, set up a raw print queue.**

```
# /usr/sbin/lpadmin -p <printer-name> -E -v usb:/dev/usb/sunray-
printer
```

6. **To complete this procedure for SuSE Linux:**

   a. **Update** `/etc/cups/cupsd.conf` **to set the RunAsUser property to No.**

   b. **Restart the** `cups` **daemon.**

   ```
   # /etc/init.d/cups restart
   ```

Making Sun Ray Printers Available to Windows

To make Sun Ray-attached printers available to a Windows session, specify the corresponding raw Sun Ray print queues on the command line. Printer data is created on the Windows server, so it is important to specify the name of the printer's Windows driver and install it on the Windows server. If you make a printer available without specifying a driver, the Sun Ray Connector defaults to a PostScript driver.

Tip – To find the printer driver name, check the Windows Registry key
MyComputer/HKEY_LOCAL_MACHINE/System/CurrentControlSet/Control
/Print/Environments/Windows NT x86/Drivers/Version-3.
All printer drivers installed on the system appear on this list.

● **To specify a printer's Windows driver, type:**

   ```
   # uttsc -r printer:<printername>=<driver name> <Windows server>
   ```

● **To make a printer available without specifying a driver, type:**

   ```
   # uttsc -r printer:<printername> <Windows server>
   ```

● **To make multiple printers available, type:**

   ```
   # uttsc -r printer:<printer1>=<driver1>,<printer2>=<driver2> <Windows server>
   ```

Session Directory

The Session Directory feature requires no configuration or administration by the Sun Ray administrator. The Windows administrator has several configuration options, such as whether to allow users to connect to a Windows Terminal Server directly or through a load balancer; however, these options are beyond the scope of this document. Please refer to Microsoft documentation for details.

Smart Cards

In addition to normal Sun Ray smart card functionality, such as hotdesking, the Sun Ray Connector enables additional smart card functionality, such as:

- strong, two-factor authentication for access control
- PIN-based logins
- digital signing, encrypting, and decrypting of email messages from Windows-based email clients

For this purpose, it uses the Sun Ray PC/SC framework on the Sun Ray server and smart card middleware on the Windows Terminal Server.

Smart card redirection is disabled by default. It can be enabled on a per-connection basis with the following CLI option:

```
% /opt/SUNWuttsc/bin/uttsc -r scard:on <hostname.domain>
```

To set up Smart Card login for Windows with the Sun Ray Connector:

1. **Set up Active Directory and Certification Authority (CA) on the Windows Server.**

2. **Install the PC/SC framework.**

   See the *Sun Ray Server Software 4.0 Release Notes* for further details.

3. **Install Smart Card middleware product on the Windows Terminal Server.**

Note – If you use ActivClient middleware, set "Disable PIN Obfuscation" to Yes through ActivClient user console on the Windows Server.

---

4. **Enroll the necessary Certificate(s) onto the Smart Card, using either a Sun Ray Token Reader or an External Smart Card Reader connected to the Windows Server.**

Configuring Solaris Trusted Extensions

For the Sun Ray Connector to function properly on a Solaris Trusted Extensions server, the Windows Terminal Server which is to be accessed must be made available at the desired level. Use the following procedure to configure Solaris Trusted Extensions:

1. **Make a Windows Terminal Server available to the** `public` **template.**

   a. **Start the Solaris Management Console (SMC):**

   ```
   # smc &
   ```

   b. **Make the following selections under Management Tools:**

      i. **Select hostname:Scope=Files, Policy=TSOL.**

      ii. **Select System Configuration->Computers and Networks ->Security Templates->public.**

   c. **From the menu bar, select Action->Properties->Hosts Assigned to Template.**

   d. **Select Host.**

   e. **Enter the IP Address of the Windows Terminal Server (e.g., 10.6.100.100).**

   f. **Click Add.**

   g. **Click OK.**

2. **Configure port 7014 as a multi-level port for the** `uttscpd` **daemon**

   a. **Select hostname:Scope=Files, Policy=TSOL.**

   b. **Select System Configuration->Computers and Networks ->Trusted Network Zones->global.**

c. **From the menu bar, select Action->Properties.**

d. **Under Multilevel Ports for Shared IP Addresses, click Add.**

e. **Add 7014 as Port Number, Select TCP as Protocol, and click OK.**

f. **Verify that this port is listed as a shared port by running the following command:**

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

3. **Create entries for the** `uttscpd` **daemon.**

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

a. **Create a corresponding entry in each local zone where the Sun Ray Connector will be launched.**

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

b. **To create this entry manually, edit the local zone file by inserting the following entry:**

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

4. **Reboot the Sun Ray server.**

Kiosk Session

The Sun Ray Connector's Kiosk Mode[1] Session enables the administrator to set up groups of DTUs to access a restricted set of applications, typically in settings where users are expected to use only one application, or where security is an especially important consideration. In Kiosk Mode, the Sun Ray DTU behaves like a Windows Based Terminal, and users do not interact with the Solaris login.

The core components of the Kiosk Mode Session are:

- a Kiosk Session Service session descriptor (`/etc/opt/SUNWkio/sessions/uttsc.conf`)
- a Kiosk Session Service session script (`/etc/opt/SUNWkio/sessions/uttsc/uttsc`).

Added applications are not supported.

Session Descriptor

The session descriptor defines a number of attributes useful for the administration and launching of the session. These include the following:

TABLE A-1   Kiosk Session Descriptors

Descriptor	Description
KIOSK_SESSION_EXEC	Identifies the location of the session script.
KIOSK_SESSION_LABEL KIOSK_SESSION_DESCRIPTION	Identify a label and description respectively to be used by the Sun Ray Admin GUI.
KIOSK_SESSION_ARGS	Identifies default session script arguments.

For more details, see .

---

1. An earlier implementation of similar functionality was called Controlled Access Mode (CAM).

Session Script

The session script is responsible for launching the Sun Ray Connector. The script provides a simple wrapper on the Sun Ray Connector executable, `/opt/SUNWuttsc/bin/uttsc`.

A two-minute timeout is imposed on Windows sessions that remain at the Windows login screen. When this timeout elapses, the associated Windows session is terminated, and the Sun Ray Connector terminates subsequently. This can result in a user experience where, assuming no Windows login takes place, a desktop unit appears to reset every two minutes. To avoid this, the session script supports its own timeout, which affects its behavior when it detects that the Sun Ray Connector has terminated. If the timeout interval has not elapsed, the session script relaunches the Sun Ray Connector. If the timeout has elapsed, the session script terminates, and the Kiosk session also terminate as a result. The timeout may be specified as a session script argument. It has a default value of 30 minutes.

Session Script Arguments

A number of arguments are supported by the session script. These may be specified using the Sun Ray Admin GUI. The list of supported arguments may be split into Sun Ray Connector and non-Sun Ray Connector arguments. Sun Ray Connector arguments are not processed in any way by the session script and are simply passed directly to the Sun Ray Connector. Non-Sun Ray Connector arguments are processed by the session script itself.

The complete argument list should be formatted according to the following example:

```
[<Non Sun Ray Connector arguments>] [ "--" <Sun Ray Connector arguments>]
```

Non-Sun Ray Connector Arguments

Currently, only a single non-Sun Ray argument, `-t`, is supported. It is defined as follows:

`-t` *<timeout>* sets the value of a timeout interval (in seconds) after which the session script will terminate in the event of a Sun Ray Connector termination. If Sun Ray Connector terminates before the timeout has elapsed it will be restarted by the session script. The default value for *<timeout>* is 1800 (30 minutes). Values less than or equal to 0 indicate that the session script should never restart the Sun Ray Connector.

Sun Ray Connector Arguments

You may specify any valid `uttsc(1)` arguments here. The `-m` and `-b uttsc(1)` arguments are used by default. These arguments enable full-screen mode and disable the pull-down header respectively.

Note – The Sun Ray Connector requires at least a *server* argument. As previously mentioned, you may use the Sun Ray Admin GUI to include this server argument in the session script argument list.

Installation and Configuration

The Sun Ray Connector Kiosk Session is installed automatically as part of Sun Ray Connector installation. The package name is `SUNWuttsc-kio`. With the Sun Ray Connector Kiosk Session is installed, the user no longer needs to specify the `uttsc` command.

To configure a Kiosk implementation for the Sun Ray Connector, follow the instructions in "Kiosk Mode" in the *Sun Ray Server Software 4.0 Administration Guide*. Select Predefined Descriptor, choosing Sun Ray Connector for Windows OS from the drop-down menu on the Kiosk Mode page, which is located under the Advanced tab in the Sun Ray Administration tool.

The user then must add session arguments to the Arguments field at the bottom of the same page (see "Session Script Arguments" on page 30). The minimal required argument is the host name, so the field content should have at least:
<myhost.mydomain>`.com`

A timeout option (`-t` *<timeout>*) can be added before the `--`, and further `uttsc` options can be added after the `--`. For example, the example line below specifies:

- a 10-minute timeout (specified in seconds) until the session is cycled if the user does not log in
- printer forwarding
- smart card redirection
- optimized SRWC hotdesking behavior

```
-t 600 -- -r printer:officelaser -r scard:on -O
myhost.mydomain.com
```

FIGURE A-1   Selecting a Kiosk Session
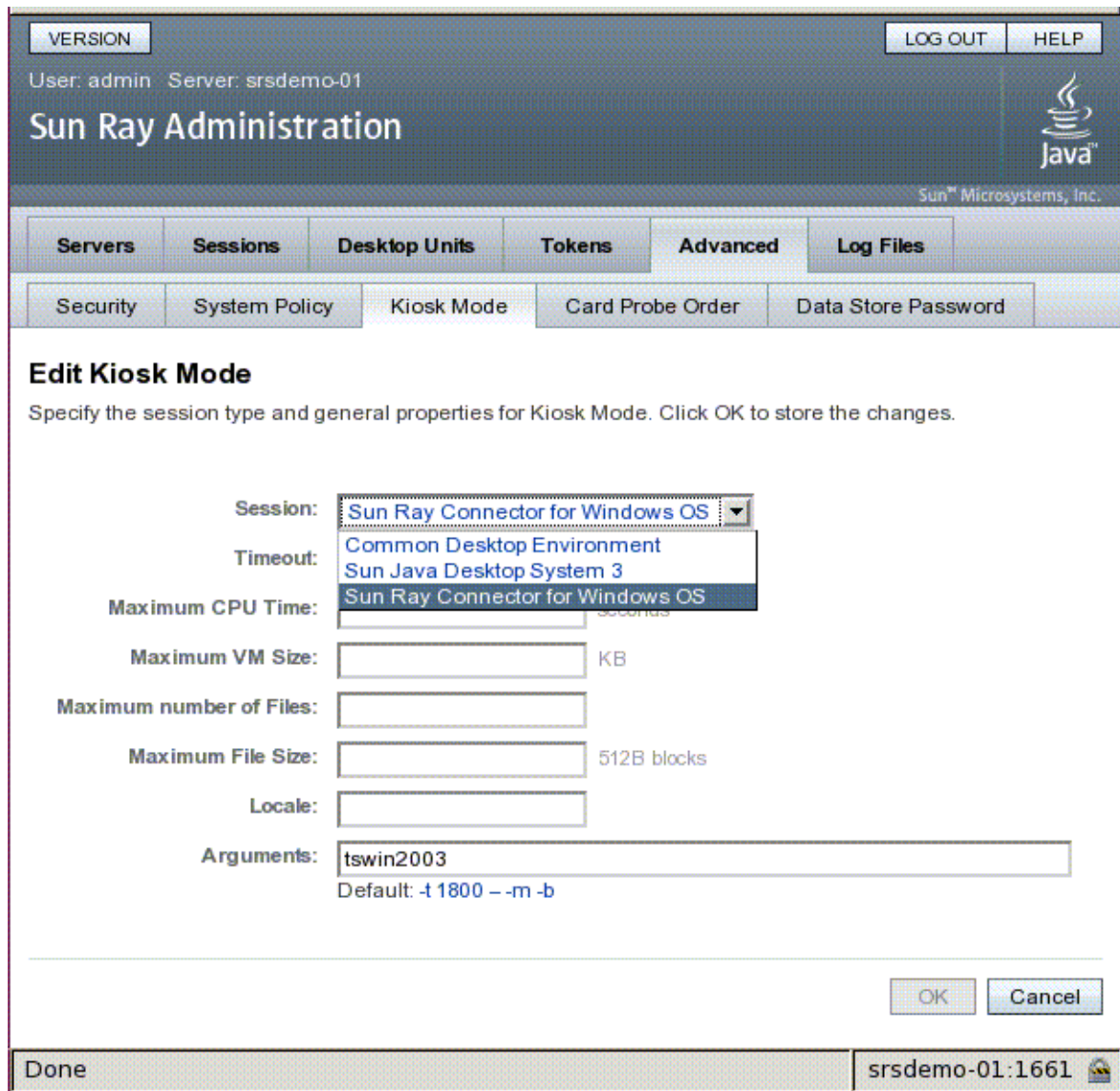
Note – When the SRWC session is selected, there is nothing to edit on the main Kiosk page. The Applications list is not available because the SRWC session does not support adding applications arbitrarily.

Supplemental Information

Two features linked to Sun Ray Connector are commonly implemented at customer sites: Follow-Me-Printing and Windows Session Locking. Implementations of these features rely on technology not available by default and non-public Sun Ray interfaces as well as the use of certain public Sun Ray interfaces for purposes other their intended use. For these reasons, these features are not provided as supported elements of this session; however, descriptions of how these features are commonly implemented are provided in the following sections.

Follow-Me Printing

This feature is used to allow the default printer for a given Windows session to appear to move with a user from one Sun Ray DTU to another. Use the following steps to provide this feature.

1. **For each Sun Ray of interest, specify an associated printer in the Sun Ray Data Store.**

   This may be done by navigating to the relevant Desktop Unit in the Sun Ray Admin GUI and setting its Other Information field to the name of the relevant printer.

2. **Provide a shell script which queries the printer name stored in the Sun Ray Data Store for the current Sun Ray DTU and writes that name to the user's** $HOME/.printers **file.**

   For example:

```
#!/bin/sh
if [ `uname` = Linux ] ; then
 theFlag="-P"
fi
theMACAddress=`cd $theFlag $UTDEVROOT ; pwd | sed
's/.*<............>/\1/'`
thePrinter=`/opt/SUNWut/sbin/utdesktop -o |
           grep $theMACAddress        |
           /usr/bin/awk -F, '{print $3}'`
echo "_default $thePrinter" > $HOME/.printers
```

3. **Use utaction(1) to invoke the script above on an initial connection and subsequently whenever a user moves from one Sun Ray DTU to another.**

This can be done by providing an `Xsession.d script` if you are using `dtlogin` as your login manager or an `xinitrc.d script` if you are using Gnome Display Manager (GDM) as your login manager. For example, you might create the script `/usr/dt/config/Xsession.d/1100.SUNWut` for `dtlogin` or `/etc/X11/xinit/xinitrc.d/1100.SUNWut` for GDM as follows:

```
#!/bin/sh
/opt/SUNWut/bin/utaction -i -c <path-to-script> &
```

where *<path-to-script>* is the path to the script you created to retrieve the printer name.

Note – The name `1100.SUNWut` is chosen purposely in this case to ensure that the script is run or sourced after the existing script `0100.SUNWut`. This is required as `0100.SUNWut` is responsible for setting `$UTDEVROOT` which is needed by the first sample script above.

Note – For information on the bundled `gdmgreeter`, see the `kiosk` man page.

---

4. **Modify your Kiosk session script arguments to redirect the printer to Windows.**

You may modify these arguments using the Sun Ray Admin GUI. In this example you need to add the argument `-r printer:_default` to the existing arguments, resulting in an argument list similar to the following:

```
-t 1800 -- -m -b -r printer:_default myHost
```

where *myHost* corresponds to the server argument passed to `uttsc(1)`.

Windows Session Locking

It may be preferable that a Windows session be locked when a user's session moves away from a given Sun Ray DTU. A commonly used approach to implement this is to send the lockscreen keystrokes to the Windows Session using `xvkbd` (invoked by `utaction`).

As with the previous example, you may invoke `utaction` from an `Xsession.d` or `xinitrc.d` script as follows:

```
#!/bin/sh
XVKBD=/usr/openwin/bin/xvkdb
/opt/SUNWut/bin/utaction  -d "$XVKBD -text '\Ml'" &
```

Note – `xvkbd` is not available by default, so you should modify the `XVKBD` setting above so that it correctly identifies the installation location of `xvkbd` in your case.

Note – The keystroke sequence `\Ml` activates the Windows lock for Windows 2003/XP sessions. You may need to modify it for other Windows versions.

Troubleshooting

Printer Caching

If a user changes the driver for a printer, the settings are not restored.

To restore the settings, use the same printer driver that was used when the settings were changed.

⚠ **Caution –** Using a different driver, even without changing any settings, can invalidate stored settings for that printer with any previous driver.

Printer Not Visible in Windows

If a Sun Ray printer specified on the Solaris or Linux command line is not available on Windows (not visible in the Printers and Faxes View), the user should confirm that the printer driver name is correct and installed on the Windows server. See "Making Sun Ray Printers Available to Windows" on page 24.

Windows Printing

If a Windows job does not print, whether on a local or a network printer, the user should contact the Windows system administrator.

Solaris or Linux Printing

If a job fails and cannot be diagnosed and fixed with the ordinary Unix remedies (`lpq`, `lprm`, etc.), the user should contact the appropriate system administrator.

Sun Ray DTU Local Printing

Users can continue to send jobs from Solaris or Linux applications to printers locally attached to their Sun Ray DTU. To enable access to printers attached to the Sun Ray DTU for Windows jobs, the user must specify the printer with the `uttsc` CLI. See "Printing" on page 21 and the `uttsc` man page.

Error Messages

Sun Ray Connector error messages and their meanings are listed in .

TABLE B-1   uttsc Error Messages

Message	Comments
Error (%d): Unable to establish data store connection.	The Sun Ray Connector was unable to open a connection to the Sun Ray Data Store. Ensure that the SRDS has been configured for Sun Ray software and is reachable. Also, ensure that the Sun Ray Connector has been successfully configured before launching it.
Error(%d): Unable to determine SRSS version.	SRWC could not determine SRSS version information. Ensure that SRSS 4.0 or above is installed and configured successfully.
Error(%d): Unable to launch Sun Ray Connector. Only SRSS 4.0 and above are supported.	SRWC 2.0 is supported only on SRSS 4.0 and above. Ensure that the correct version of SRSS is installed.
Sun Ray session is not connected, please try again.	Ensure that SRWC is being launched from a valid connected Sun Ray session.
Cannot obtain DTU MAC address.	SRWC was unable to contact the Sun Ray Authentication Manager to retrieve the DTUs MAC address. Ensure that this daemon is reachable.
Error: Sun Ray Token ID cannot be determined. Sun Ray Connector can only be launched from a Sun Ray session.	SRWC was launched from a non-Sun Ray session (e.g., telnet or console). It can only be launched from a connected DTU session.
Unable to create new audio device. Using default audio device.	utaudio failed to create a new audio device. Check the messages logged by utaudio for more information. SRWC will try to use the default audio device for the session.
Device <device_name> is not allocated. Audio will not work in this session. Continuing..	On Solaris Trusted Extensions platforms, if the default audio device is not allocated, then SRWC will not be able to use any new audio device or the default audio device. In this case, the SRWC session will proceed but without audio support.
Warning. Printer preferences will not be stored. Please run uttscadm to complete configuration before launching Sun Ray Connector.	If uttscadm has not been run before the Sun Ray Connector is launched, the printer preferences as sent by the Windows Terminal Server will not be stored and hence cannot be later reused. This is not a fatal error; the session will continue to be launched.
Unable to connect to Sun Ray Connector Proxy. Please ensure uttscadm has been run before launching the Sun Ray Connector.	Make sure the proxy daemon (uttscpd) is up and running. If the Sun Ray Connector is launched before uttscadm has been run to configure it, then the Sun Ray Connector Proxy is not reachable. This message can be seen on Solaris systems only.
Unable to launch Sun Ray Connector. Please ensure utconfig has been run before launching the Sun Ray Connector.	If Sun Ray Connector is launched without having configured Sun Ray Data Store using utconfig (from Sun Ray Server Software), then the connector cannot be used.

Glossary

ALP   The Sun Appliance Link Protocol, a suite of network protocols that enable communication between Sun Ray servers and DTUs.

CAM   An earlier implementation of Sun Ray Server Software controlled access mode. The current implementation is known as *kiosk mode*.

client   Normally, this term refers both to the physical hardware, such as a Sun Ray thin client desktop unit, and the process that accesses resources such as compute power, memory, and applications from a server. The server may be located remotely or locally. In the present context, the Sun Ray DTU is a client of the Sun Ray server; the Sun Ray Connector software is a Windows Terminal Server client.

client-server   A common way to describe network services and the user processes of those services. Although this term can apply to a wide range of interactions between desktops and larger computing facilities, the thin client model suggests that all, or nearly all, computing be performed on the server.

data store   The Sun Ray data store is a repository for information needed to administer several aspects of the Sun Ray server software, such as failover groups, for example. The Sun Ray Connector utilizes it to store licensing information and printer preferences.

downstream audio   The capability for using applications located on a server to play audio files on a client. For example, `.wmv` files can be played on a remote Windows Terminal Server and heard on a Sun Ray DTU.

DTU   Sun Ray desktop units (originally known as Desktop Terminal Units).

hotdesking   The ability for a user to remove a smart card, insert it into any other DTU within a server group, and have the user's session "follow" the user, thus allowing the user to have instantaneous access to the user's windowing environment and current applications from multiple DTUs.

kiosk mode	Used interchangeably with *CAM* in earlier versions of Sun Ray Server Software. As of SRSS version 4.0, this module, now called Kiosk Mode, has been completely rewritten.
MPPC	Microsoft Point-to-Point Compression protocol.
raw print queue	A print queue enabled without a print driver having been specified. Instead of processing data before sending it to a printer, the lp utility sends raw, unprocessed data to the printer.
RDP	Microsoft Remote Desktop Protocol.
server	Generically defined as a network device that manages resources and supplies services to a client. This manual refers in particular to the Sun Ray server(s), which host Sun Ray sessions and DTUs, and to Windows Terminal Servers, which act as hosts for Windows applications that can be reached by RDP clients, of which the Sun Ray Connector is an example. The Sun Ray DTU is a client of the Sun Ray server; the Sun Ray Connector is a Windows Terminal Server client.
server farm	A cluster of servers linked with load balancing software.
service	For the purposes of the Sun Ray Server Software, any application that can directly connect to the Sun Ray DTU. It can include audio, video, X servers, access to other machines, and device control of the DTU.
session	A group of services associated with a single user.
session directory	A database that keeps track of which users are running which sessions on which Windows Terminal Servers, which makes it possible for users to reconnect to their previously disconnected Windows sessions.
session mobility	The ability for a session to "follow" a user's login ID or a token embedded on a smart card.
Sun Ray DTU	The desktop unit, originally known as the desktop terminal unit, is the physical appliance used to transmit keystrokes and mouse events to and receive display information from the Sun Ray server. The Sun Ray DTU hardware has a built-in smart card reader, and most models also contain a flat-panel display.
Terminal Server client	The client software used to access remote sessions hosted on a Windows Terminal Server, in this case, the Sun Ray Connector.
thin client	Thin clients remotely access some resources of a computer server, such as compute power and large memory capacity. The Sun Ray DTUs rely on the server for all computing power and storage. Within the client-server computing model, thin clients are distinguished from fat clients by the absence of local operating systems, applications, disc drives, fans, or other devices that fat clients need in order to operate.

upstream audio	The capability for recording sound from the client to the server.
URI	Uniform Resource Identifier, the generic term for all types of names and addresses that refer to objects on the World Wide Web.
URL	Uniform Resource Locator, the global address of documents and other resources on the World Wide Web. A URL is a specific type of URI.
Windows terminal	Any device used to access Windows applications residing on a Windows Terminal Server.
Windows Terminal Server	A server that hosts Microsoft applications for remote terminals or clients.

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