



Sun Java System Portal Server 7 Installation Guide



Sun Microsystems, Inc.
4150 Network Circle
Santa Clara, CA 95054
U.S.A.

Part No: 819-3027

Copyright 2006 Sun Microsystems, Inc. 4150 Network Circle, Santa Clara, CA 95054 U.S.A. All rights reserved.

This product or document is protected by copyright and distributed under licenses restricting its use, copying, distribution, and decompilation. No part of this product or document may be reproduced in any form by any means without prior written authorization of Sun and its licensors, if any. Third-party software, including font technology, is copyrighted and licensed from Sun suppliers.

Parts of the product may be derived from Berkeley BSD systems, licensed from the University of California. UNIX is a registered trademark in the U.S. and other countries, exclusively licensed through X/Open Company, Ltd.

Sun, Sun Microsystems, the Sun logo, docs.sun.com, AnswerBook, AnswerBook2, and Solaris are trademarks or registered trademarks of Sun Microsystems, Inc. in the U.S. and other countries. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. in the U.S. and other countries. Products bearing SPARC trademarks are based upon an architecture developed by Sun Microsystems, Inc.

The OPEN LOOK and Sun™ Graphical User Interface was developed by Sun Microsystems, Inc. for its users and licensees. Sun acknowledges the pioneering efforts of Xerox in researching and developing the concept of visual or graphical user interfaces for the computer industry. Sun holds a non-exclusive license from Xerox to the Xerox Graphical User Interface, which license also covers Sun's licensees who implement OPEN LOOK GUIs and otherwise comply with Sun's written license agreements.

U.S. Government Rights – Commercial software. Government users are subject to the Sun Microsystems, Inc. standard license agreement and applicable provisions of the FAR and its supplements.

DOCUMENTATION IS PROVIDED "AS IS" AND ALL EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS AND WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT, ARE DISCLAIMED, EXCEPT TO THE EXTENT THAT SUCH DISCLAIMERS ARE HELD TO BE LEGALLY INVALID.

Copyright 2006 Sun Microsystems, Inc. 4150 Network Circle, Santa Clara, CA 95054 U.S.A. Tous droits réservés.

Ce produit ou document est protégé par un copyright et distribué avec des licences qui en restreignent l'utilisation, la copie, la distribution, et la décompilation. Aucune partie de ce produit ou document ne peut être reproduite sous aucune forme, par quelque moyen que ce soit, sans l'autorisation préalable et écrite de Sun et de ses bailleurs de licence, s'il y en a. Le logiciel détenu par des tiers, et qui comprend la technologie relative aux polices de caractères, est protégé par un copyright et licencié par des fournisseurs de Sun.

Des parties de ce produit pourront être dérivées du système Berkeley BSD licenciés par l'Université de Californie. UNIX est une marque déposée aux Etats-Unis et dans d'autres pays et licenciée exclusivement par X/Open Company, Ltd.

Sun, Sun Microsystems, le logo Sun, docs.sun.com, AnswerBook, AnswerBook2, et Solaris sont des marques de fabrique ou des marques déposées, de Sun Microsystems, Inc. aux Etats-Unis et dans d'autres pays. Toutes les marques SPARC sont utilisées sous licence et sont des marques de fabrique ou des marques déposées de SPARC International, Inc. aux Etats-Unis et dans d'autres pays. Les produits portant les marques SPARC sont basés sur une architecture développée par Sun Microsystems, Inc.

L'interface d'utilisation graphique OPEN LOOK et Sun a été développée par Sun Microsystems, Inc. pour ses utilisateurs et licenciés. Sun reconnaît les efforts de pionniers de Xerox pour la recherche et le développement du concept des interfaces d'utilisation visuelle ou graphique pour l'industrie de l'informatique. Sun détient une licence non exclusive de Xerox sur l'interface d'utilisation graphique Xerox, cette licence couvrant également les licenciés de Sun qui mettent en place l'interface d'utilisation graphique OPEN LOOK et qui en outre se conforment aux licences écrites de Sun.

CETTE PUBLICATION EST FOURNIE "EN L'ETAT" ET AUCUNE GARANTIE, EXPRESSE OU IMPLICITE, N'EST ACCORDEE, Y COMPRIS DES GARANTIES CONCERNANT LA VALEUR MARCHANDE, L'APTITUDE DE LA PUBLICATION A REpondre A UNE UTILISATION PARTICULIERE, OU LE FAIT QU'ELLE NE SOIT PAS CONTREFAISANTE DE PRODUIT DE TIERS. CE DENI DE GARANTIE NE S'APPLIQUERAIT PAS, DANS LA MESURE OU IL SERAIT TENU JURIDIQUEMENT NUL ET NON AVENU.

Contents

Preface	13
1 Pre Installation Requirements for the Sun Java System Portal Server 7 Software	17
Introduction	17
Pre-Installation Requirements	17
Hardware and Operating System Requirements	17
Software Requirements	18
Before You Begin	19
2 Installing the Sun Java System Portal Server 7 Software	21
Installing the Portal Server Software	21
▼ To Install the Portal Server Software	21
▼ To Install on a Second Machine	26
▼ To Verify the Installation	27
3 Installing and Configuring Mobile Access	29
Pre-install steps for Mobile Access on Java Enterprise System 3	29
▼ To Install Mobile Access on Java Enterprise System 3	29
Manual Steps to Enable Mobile Access in Portal Server 7	30
▼ To Install Mobile Access on Java Enterprise System 4	30
▼ To Enable Mobile Access functionality in Portal Server 7	30
Manual Steps to Add Mobile Comms Channels	31
▼ To manually add Mobile Comms Channels	31
4 Post Installation Tasks	33
Configuring Secure Remote Access	33
▼ To Configure Search Archive	33

- ▼ To Configure Secure Remote Access 33
- ▼ To Enable Access to the Portal Server Through the Gateway 34
- ▼ To Configure Gateway Standalone Installation on a Separate Host 35

- 5 Configuring After the Installation 37**
 - Overview 37
 - Using the Sample Configuration XML File 37
 - Constructing a Configuration XML File 38
 - Required Configuration 39
 - Portal Server Configuration 42
 - Basic Portal Configuration 42
 - Sample Portal Configuration 43
 - Web Container Configuration 44
 - Search Server Configuration 47
 - Secure Remote Access Configuration 47
 - Gateway Configuration 48
 - Netlet Proxy Configuration 49
 - Rewriter Proxy Configuration 50
 - Establishing Trust Between Cacao Servers 52
 - ▼ Installing the Cacao Server and Derby 52
 - ▼ Installing Cacao Certificates into Other Instances 52
 - Unconfiguring Portal Server 53
 - Building an Unconfiguration XML file 53
 - Tokens To Replace 53

- 6 Un-installing Sun Java System Portal Server 7 Software 55**
 - Uninstalling the Software 55
 - ▼ To Uninstall the Portal Server Software 55

- 7 Upgrading to Sun Java System Portal Server 7 57**
 - Pre-Upgrade Requirements 57
 - Hardware and Operating System Requirements 57
 - Software Requirements 58
 - Before You Begin 59
 - Instructions to Upgrade and Verify Upgrade 60
 - ▼ To Upgrade to Portal Server 7 Software on Solaris 60

- ▼ To Upgrade to Portal Server 7 Software on Linux 61
- ▼ To Upgrade A Gateway-Only Node 62
- ▼ To Ensure Upgrade to Portal Server 7 was Successful 63

- Index** 65

Figures

Tables

TABLE 1-1	Hardware and Operating System Requirements	17
TABLE 7-1	Hardware and Operating System Requirements for Upgrade	57

Examples

Preface

The *Sun Java System Portal Server 7 Installation Guide* explains how to install the Sun Java System Portal Server 7 software.

Who Should Use This Book

This guide is intended for any evaluator, system administrator, or software technician who wants to install the Sun Java™ System Portal Server 7 software.

This guide assumes that you are familiar with the following:

- Solaris™ Operating System.
- UNIX command-line utilities and administrative tasks.
- Sun Java System Directory Server.
- Sun Java System Access Manager.
- Sun Java System Web Server or Sun Java System Application Server.

Before You Read This Book

Before using this book you should be familiar with the following books:

- *Sun Java System Enterprise 4 Installation Guide*
- *Sun Java System Portal Server 7 Deployment Planning Guide*

How This Book Is Organized

This guide includes the following chapters:

[Chapter 1](#) provides an overview of the Portal Server product and describes pre-installation tasks and requirements.

[Chapter 2](#) provides installation procedures and information for the Portal Server software.

[Chapter 3](#) provides installation and configuration tasks for the Mobile Access component.

[Chapter 4](#) provides post installation tasks for Secure Remote Access.

[Chapter 5](#) provides instructions for using the sample configuration XML file or construct a configuration XML file for the desired portal set up.

[Chapter 6](#) provides instructions for uninstalling the Portal Server 7 software.

[Chapter 7](#) provides information for upgrading the Portal Server software.

Related Books

The <http://docs.sun.com> web site enables you to access Sun technical documentation online. You can browse the archive or search for a specific book title or subject.

In addition, the following resources published for this release of Portal Server might be useful:

- *Sun Java System Portal Server 7 Release Notes*
- *Sun Java System Portal Server 7 Configuration Guide*
- *Sun Java System Portal Server 7 Command Line Reference*
- *Sun Java System Portal Server 7 Technical Overview*

Related Third-Party Web Site References

Third-party URLs are referenced in this document and provide additional, related information.

Note – Sun is not responsible for the availability of third-party web sites mentioned in this document. Sun does not endorse and is not responsible or liable for any content, advertising, products, or other materials that are available on or through such sites or resources. Sun will not be responsible or liable for any actual or alleged damage or loss caused or alleged to be caused by or in connection with use of or reliance on any such content, goods, or services that are available on or through such sites or resources.

Documentation, Support, and Training

Sun Function	URL	Description
Documentation	http://www.sun.com/documentation/	Download PDF and HTML documents, and order printed documents
Support and Training	http://www.sun.com/supporttraining/	Obtain technical support, download patches, and learn about Sun courses

Typographic Conventions

The following table describes the typographic changes that are used in this book.

TABLE P-1 Typographic Conventions

Typeface or Symbol	Meaning	Example
AaBbCc123	The names of commands, files, and directories, and onscreen computer output	Edit your <code>.login</code> file. Use <code>ls -a</code> to list all files. <code>machine_name%</code> you have mail.
AaBbCc123	What you type, contrasted with onscreen computer output	<code>machine_name%</code> su Password:
<i>aabbcc123</i>	Placeholder: replace with a real name or value	The command to remove a file is <i>rm filename</i> .
<i>AaBbCc123</i>	Book titles, new terms, and terms to be emphasized	Read Chapter 6 in the <i>User's Guide</i> . Perform a <i>patch analysis</i> . Do <i>not</i> save the file. [Note that some emphasized items appear bold online.]

Shell Prompts in Command Examples

The following table shows 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 prompt	<code>machine_name%</code>
C shell superuser prompt	<code>machine_name#</code>
Bourne shell and Korn shell prompt	<code>\$</code>
Bourne shell and Korn shell superuser prompt	<code>#</code>

Pre Installation Requirements for the Sun Java System Portal Server 7 Software

This chapter contains the following sections:

- [“Introduction” on page 17](#)
- [“Pre-Installation Requirements” on page 17](#)

Introduction

The Sun Java System Portal Server 7 software uses the Sun Java Enterprise System 4 install wizard to install the Portal Server software and associated components.

With this release, the Secure Remote Access component has to be installed along portal in the same session. Some post-installation configuration is required for the Secure Remote Access component.

Pre-Installation Requirements

This section contains the following information:

- [“Hardware and Operating System Requirements” on page 17](#)
- [“Software Requirements” on page 18](#)
- [“Before You Begin” on page 19](#)

Hardware and Operating System Requirements

TABLE 1-1 Hardware and Operating System Requirements

Component	Platform Requirement
Supported Platforms	Sun Ultra™ 60 or Sun Blade comparable or better workstation or server

TABLE 1-1 Hardware and Operating System Requirements (Continued)

Component	Platform Requirement
Operating System	Solaris™ 8 or Solaris 9 U6 or Solaris 10 on SPARC Solaris 9 or Solaris 10 on x86 Red Hat Enterprise Linux 2.1 or 3.0 Update 3 on x86
RAM	1024 Mbytes of RAM for evaluation install 1.5 Gbytes of RAM for regular deployment on Sun Java System Web Server 2.0 Gbytes of RAM for regular deployment on Sun Java System Application Server
Disk Space	1 Gbyte of disk space for Portal Server and associated applications
Swap Space	The swap space of the machine should be twice the amount of physical memory. For example, if the machine has 2.0 Gbytes RAM, the swap space should be 4.0 Gbytes.

Note – The Sun Java Enterprise System 4 Directory Server installation fails on Red Hat Enterprise Linux 3.0 Update 2 leading to Portal Server installation failure.

Software Requirements

The Portal Server software requires the following stack components:

- Sun Java System Directory Server 5.2 P4
- Sun Java System Access Manager 7 installed in legacy mode.

Portal Server requires Access Manager and Directory Server and a web container for its install and configuration. If you are performing a fresh install, Access Manager and Directory Server do not have to be pre-installed. Access Manager, Directory Server and Portal Server can all be installed at the same time. If you have Access Manager and Directory Server installed already, point the portal install and configuration to the existing Directory Server and Access Manager servers.

Note – Apply the Access Manger 7.0 Patch 1 before the Portal Server Installation. For all web containers, including, BEA WebLogic or IBM WebSphere, apply the patch before installing Portal Server software. The patch number depends on the operating system.

For Sparc, use patch 120954-01

For Linux, use 120956-01

For x86, use 120955-01

-
- Sun Java System Web Server 6.1 SP5 or Sun Java System Application Server 8.1 (including the patches).

The sun-soarsdk rpm (registry server SDK rpm) is not re-locatable; so, do not choose non-default locations for registry on Linux.

Note – Sun Java System Portal Server 7 software does not support Sun Java System Access Manager 7 installed in realm mode. Access Manager must be installed in legacy mode before installing Portal Server 7 software.

For detailed instructions for installing the stack components, see the *Sun Java Enterprise System 2005Q4 Installation Reference*.

Before You Begin

This sections includes the following:

- [“Miscellaneous Checks” on page 19](#)
- [“Installing On Linux” on page 20](#)
- [“Installing on an Application Server” on page 20](#)

Miscellaneous Checks

1. If the install system does not have direct connectivity to the internet, an HTTP proxy needs to be specified. For example, for Sun Java System Application Server, specify the following in the `domain.xml` file:

```
<jvm-options>-Dhttp.proxyHost=Proxy-Host</jvm-options>
<jvm-options>-Dhttp.proxyPort=Proxy-Port</jvm-options>
<jvm-options>-Dhttp.nonProxyHosts="PortalServer-Host"</jvm-options>
```

Here, *Proxy-Host* is the fully-qualified domain name of the proxy host, *Proxy-Port* is the port on which the proxy is run, and *PortalServer-Host* is the fully-qualified domain name of the Portal Server software host.

2. Execute the command `prtconf | grep Memory` to check RAM.

3. Use the command `df -lk` to see how much swap space your machine has. To temporarily increase your swap space by 4 Gbytes, you can use the following instructions:

```
> mkfile 4g /fourGigXtraSwap
> swap -a /fourGigXtraSwap
```

Installing On Linux

- Remove the link `/usr/share/bdb/db.jar` before installation, if it exists.
- Check if a version of `ant` below 1.5.4 exists on the system by running the following command:

```
rpm -qa | grep ant
```

The `ant` version 1.5.2 interferes with portal configuration. If an earlier version of `ant` is found installed, remove it by running the following command:

```
rpm -e ant-1.5.2-23 ant-libs-1.5.2-23
```

Installing on an Application Server

If you are configuring the Sun Java System Application Server for session failover (see *Sun Java System Application Server Enterprise Edition 8.1 2005Q2 High Availability Administration Guide*), note that the Portal Server software must be installed on a non-default server. To install on a non-default server, see instructions below.

Installing the Sun Java System Portal Server 7 Software

This chapter provides installation information and instructions for the Portal Server software.

Installing the Portal Server Software

This section contains the following procedures:

- “To Install the Portal Server Software” on page 21
- “To Install on a Second Machine” on page 26
- “To Verify the Installation” on page 27

▼ To Install the Portal Server Software

Before You Begin

Tip – Some post-install configuration tasks require you to use values that you entered during the install. Keep these values available for future use.

- 1 Unzip the download bits and go to the *OS-arch* directory, where *OS-arch* can be *Solaris_sparc*, or *Solaris_x86*, or *Linux_x86*.**
- 2 Type `./installer` to invoke the wizard to install the software.**
- 3 Select Next (at the Welcome Screen), and Accept License.**
- 4 Select the language support you want to install and the components you wish to install on this system.**
To install Portal Server software, select Sun Java System Portal Server 7.
- 5 Specify the installation directory for the following software.**

Note – Access Manager must be installed in Legacy Mode.

Directory Preparation Tool	By default, this is installed in /opt/SUNWcomds
Access Manager	By default, this is installed in /opt
Web Server	By default, this is installed in /opt/SUNWwbsvr
Portal Server	By default, this is installed in /opt

Portal Server Secure Remote Access core cannot be installed on the same machine as Portal Server in different sessions. If Portal Server is selected without Secure Remote Access, a warning is displayed saying that Secure Remote Access core cannot be installed or configured in the second session.

6 Specify whether or not you wish to configure now.

The installer only supports adding one portal and one instance; for any other configuration, the configure later option must be selected. If the configure now option is selected, after the packages are installed, the configuration is immediately started; otherwise, the configuration can be done by selecting the configure later option. See [Chapter 5](#) for more information.

If you selected configure now option, proceed to the next step; otherwise, skip to [step 24](#).

7 Specify the following common server settings:

Host Name, DNS Domain Name, Host IP Address
Host name, domain, and IP address of the system.

Administrator User ID and Password
User ID and password of the top-level administrator (typically amadmin).

System User and Group
System user name and group ID.

Values you enter here appear as default values during the rest of the installation.

8 Specify the web container settings for administration and default web container Instance.

For more information about configuring Web Server, see the “Web Server Configuration Information” in *Sun Java Enterprise System 2005Q4 Installation Reference*.

For more information about configuring Application Server, see the *Sun Java Enterprise System 2005Q4 Installation Reference*

9 Specify the Directory Server administration settings, server settings, configuration information, data storage location, populate data information.

For more information, see the “Directory Server Configuration Information” in *Sun Java Enterprise System 2005Q4 Installation Reference*.

10 Specify the Access Manager administration information, web container information, services information, directory server information, and provisioned directory information.

For more information, see the “Access Manager Configuration Information” in *Sun Java Enterprise System 2005Q4 Installation Reference*.

11 Select a web container for Portal Server software.

You can select one of the following:

- Sun Java System Web Server
- Sun Java System Application Server

12 Specify the information for you web container information.

Your selection in Step 8 affects the information you provide. For:

- Sun Java System Web Server

Installation Directory	Specifies the Web Server directory. By default, this is installed in <code>/opt/SUNWwbsvr</code>
Server Instance and Server Instance Port	Specifies the server instance ID and port number. By default, the server instance is the fully qualified host name of the system and 80 is the instance port.
Server Document Root	Specifies the document root directory. By default, <code>/opt/SUNWwbsvr/https-<i>hostname.domain</i>/docs</code> is the document root
Secure Server Instance Port	Specifies the secure server instance port number. Port number of the secure server instance

- Sun Java System Application Server

Installation Directory	specifies the installation directory of the Sun Java System Application Server. By default, this is <code>/opt/SUNWappserver/appserver</code> .
Domain Name	Specifies the domain name for the Application Server. By default, <code>domain1</code> .
Server Instance Directory and Port	Specifies the Application Server instance directory and port number. By default, the instance directory is <code>/var/opt/SUNWappserver/domains/domain1</code> and port is 8080.
Document Root Directory	Specifies the document root directory. By default, <code>/var/opt/SUNWappserver/domains/domain1/docroot</code> .
Administration Port	Specifies the administration port for Application Server. By default, 4849.

Administrator User ID and Password	Specifies the Access Manager User ID and password. By default, <code>admin</code> .
Secure Server Instance Port	Specifies the secure server instance port. Port number of the secure server instance.
Secure Administration Server Port	Specifies the port number of the secure administration server.

13 Specify the following to deploy in to the web container:

Portal Access URL By default, this is `protocol://hostname.domain:port/portal`.

Note – The Portal Access URL and the Deployment URI must be the same. For example, if the Portal Access URL is `protocol://hostname.domain:port/portal`, the Deployment URI must be `/portal`

Portal ID By default, this is `portal1`.

Search ID By default, this is `search1`.

Deployment URI By default, this is `/portal`.

14 Specify whether or not you wish to configure all sample portals.

You can select one or more sample portals to configure.

15 To install Secure Remote Access also, specify the following; otherwise, skip to [step 24](#).

Protocol The protocol can be HTTP or HTTPS.

Host and Port By default, host is the `hostname.domain` and port is 80.

Deployment URI By default, `/portal`.

16 Specify the following information to install the Gateway:

Gateway Protocol Specifies the protocol by which the gateway communicates. By default, this is HTTPS.

Portal Server Domain Specifies the domain in which the Portal Server is installed. By default, this is the domain name of the system.

Gateway Domain and Port Specifies the domain in which the gateway is installed and the port used by the gateway. By default, the domain is the default domain of the system and port is 443.

Gateway Profile Name Specifies the profile name of the gateway. By default, this is `default`.

Log User Password	Specifies the password for the log user. Log user password
Host Name, Subdomain, and Domain	Specifies the host name subdomain and domain name for the gateway. By default, this is the host name, sub domain, and domain of the system on which you are installing the Gateway.
Host IP Address and Access Port	Specifies the host IP address and access port for the gateway. By default, this is the IP address of the system on which you are installing the Gateway and the port is, by default, 443.
Gateway Profile Name and Log User Password	Specifies the gateway profile name and log user password. By default, the gateway profile name is default.

17 Specify whether or not you wish to start Gateway after installation.

18 Specify the following information for the Netlet Proxy.

Host Name, Subdomain, and Domain	Specifies the name, subdomain, and domain name of the machine on which the Netlet proxy resides. By default, the system values are used.
Host IP Address and Access Port	Specifies the host IP address and access port of the machine on which the Netlet Proxy resides. By default, the IP address is the IP address of the system and port is 10555
Gateway Profile Name and Log User Password	Specifies the gateway profile name and log user password that the Netlet Proxy uses. By default, the gateway profile name is default.

19 Specify whether or not you wish to start Netlet Proxy after installation.

20 Specify the following information to install the Rewriter Proxy.

Host Name, Subdomain, and Domain	Specifies the host name, subdomain, and domain name of the machine on which the Rewriter Proxy resides. By default, the system values are used.
Host IP Address and Access Port	Specifies the Host IP address and access port of the machine on which the Rewriter Proxy resides. By default, the IP address is the IP address of the system and port is 10443.
Gateway Profile Name and Log User Password	Specifies the gateway profile name and log user password that Rewriter Proxy uses. By default,

the gateway profile name is default.

21 Specify whether or not you wish to start Rewriter Proxy after installation.

22 Specify the following proxy information for the Secure Remote Access software.

Note – Based on whether or not you wish to work with Portal Server software on another host, the ability to edit this page varies. If the proxy server being installed are to work with an instance of Portal Server installed on a different host, select the option to Work with Portal Server on another host, and specify the following information.

Portal Server Protocol, Host, Port, and Deployment URI

By default, host is the *hostname.domain* of the system where Portal Server is installed, port is 81, and URI is /portal.

Organization DN

Organization distinguished node.

Access Manager Service URI and Encryption Key

By default, the URI is /amserver.

23 Specify the following certificate information for the Secure Remote Access software:

Organization, Division, City/Locality, State/Province

Specify your organization name, division, city, and state information.

Country Code

Use the two character format.

Certificate Database Password

The certificate database password must be at least eight characters.

24 Specify whether or not you are ready to install by selecting the Next.

25 Specify whether or not you wish to open the registration window during installation and select Install to install the software.

▼ To Install on a Second Machine

The GUI installer cannot be used for multi portal installation. Follow the instructions in this section to install Portal Server on a second machine.

1 Install Access Manager SDK and web container first.

2 Start the web container and then invoke the Portal Server software GUI installer to install the software in configure later mode.

- 3 **Copy the `/etc/opt/SUNWcacao/security` directory from the machine where the first portal resides to the second machine.**
- 4 **Restart the CACAO server on the second machine.**
 For Solaris, use the command `/opt/SUNWcacao/bin/cacaoadm restart`.
 for Linux, use the command `/opt/sun/cacao/bin/cacaoadm restart`.
- 5 **Complete the Portal Server installation by running the `psconfig --config example-config-xml-file` command.**
 The `psconfig` utility is located in `PortalServer7-base/bin`. By default, `PortalServer7-base` is `/opt/SUNWportal`.
 The example files are located in the following directories:
 For Solaris: `PortalServer7-base/samples/psconfig`
 For Linux: `PortalServer7-base/samples/psconfig`. By default, `PortalServer7-base` for Linux is `/opt/portal`.
- 6 **Edit the configuration xml example files to specify the configuration details.**
 For more details on constructing a config xml file, see [“Constructing a Configuration XML File” on page 38](#).

▼ To Verify the Installation

Verify the Portal Server software installation by:

- Accessing the Samples.
- Accessing the Portal Server software administration console.
- (Optional) Verifying the Gateway port and running the Portal Server in secure mode.

- 1 **Type `protocol://fully-qualified-hostname:port/portal-URI` in the browser.**

When you type the URL, the welcome page, a short description of Portal server and links to sample portals that you selected for installation is displayed. Click on one of the links and access the anonymous portal desktop for the sample portal. If the sample Portal desktop displays without any exception, then your Portal Server installation was successful.

- 2 **Type `protocol://fully-qualified-hostname:port/psconsole` in the browser.**

- 3 **Run the following command to check if the gateway is running on the specified port (the default port is 443):**

```
netstat -an | grep port-number
```

If the gateway is not running, use the following command to start the gateway:

```
PortalServer7-base/bin/psadmin start-sra-instance -u amadmin -f amadmin-password-file  
--instance-type gateway --instance-name GatewayInstanceName
```

By default the *PortalServer7-base* is `/opt/SUNWportal`

Note – Create a file and add `amadmin` password in plain text and pass it as an input to the `-f` option above.

Also view the log files. The log file name is picked up from the property called `debug.com.sun.portal.handler.java.util.logging.FileHandler.pattern` in the `platform.conf` file.

4 Run the Portal Server in secure mode by typing the gateway URL in your browser:

`https://gateway-machine-name:portnumber`

If you have chosen the default port (443) during installation, you need not specify the port number.

Installing and Configuring Mobile Access

This chapter contains the following:

- “Pre-install steps for Mobile Access on Java Enterprise System 3” on page 29
- “Manual Steps to Enable Mobile Access in Portal Server 7” on page 30
- “Manual Steps to Add Mobile Comms Channels” on page 31

Pre-install steps for Mobile Access on Java Enterprise System 3

▼ To Install Mobile Access on Java Enterprise System 3

Perform the following pre-installation steps manually before installing Mobile Access packages. These steps must be performed before installing Java Enterprise System 3.

On a machine without Java Enterprise Server or Portal Server 7 packages, replace some Java Enterprise System 3 installation packages with Portal Server 7 installation packages.

- 1 In the Java Enterprise System 3 installer location, replace SUNWamma and SUNWammae packages with SUNWamma and SUNWammae packages from Portal Server 7 installer. The path to the folder is *JES3-bits-location/Solaris_sparc/Product/identity_svr/Packages/*.**
- 2 Similarly, Replace Java Enterprise System 3 SUNWma and SUNWmae packages with Portal Server 7 SUNWma and SUNWmae packages in the location *JES3-location/Solaris_sparc/Product/shared_components/Packages/*.**

After performing the preceding manual replacement of packages, you can proceed with the installation of JES 3 components followed by Portal Server 7 installation and configuration.

Manual Steps to Enable Mobile Access in Portal Server 7

This section contains the following:

- “To Install Mobile Access on Java Enterprise System 4” on page 30
- “To Enable Mobile Access functionality in Portal Server 7” on page 30

▼ To Install Mobile Access on Java Enterprise System 4

You must perform the following pre-installation steps manually before installing Mobile Access packages. These steps must be performed before installing Java Enterprise System 4. On a machine without any Java Enterprise Server or Portal Server 7 packages, replace some JES4 installation packages with Portal Server 7 installation packages.

- ▶ **In the Java Enterprise System 4 installer location, replace SUNWamma and SUNWammae packages with SUNWamma and SUNWammae packages from Portal Server 7 installer. The path to the folder is *JES4-location/Solaris_sparc/Product/identity_svr/Packages/*.**

After performing the preceding manual replacement of packages, you can proceed with installation of JES 4 components followed by Portal Server 7 installation and configuration.

▼ To Enable Mobile Access functionality in Portal Server 7

You must perform the following manual steps to enable Mobile Access functionality in Portal Server 7.

- 1 In the Portal Server console, click **Portals**
- 2 Click **portal1** in the list of portals.
- 3 In the **Current Location** drop-down menu, select **DeveloperSample**.

Note – If the user creates own organization, then select the user-created organization.

- 4 In the **Desktop Attributes** section, change the default value of **Parent Container** to **WirelessDesktopDispatcher**.
- 5 Ensure the value of **Edit Container** is set to **JSPEditContainer**.
- 6 Ensure the value of **Desktop Type** is set to **developer_sample**.
- 7 Click **Save**.

Manual Steps to Add Mobile Comms Channels

▼ To manually add Mobile Comms Channels

You must perform the following steps to enable JSPComms Channels to work with Mobile Access application.

- 1 From the Portal Server console, click **Manage Channels and Containers**.
- 2 In the pop-up window, select **DeveloperSample** from **Select Directory** drop-down menu.
- 3 From **View Type**, select **JSPRenderingContainer** or **JSPNativeContainer**.
- 4 From **Container Task** select **MobileAddressBook**, **MobileCalendar**, and **MobileMail** channels and click **Add**.
- 5 On the portal desktop, configure the **Communications Express Address Book**, **Communications Express Calendar**, and **Communications Express Mail** channels, which are available by default.

After you add the Comms Channels to either the **JSPRenderingContainer** or **JSPNativeContainer**, they can be accessed from a mobile device.

Post Installation Tasks

This chapter discusses the tasks needed to configure Secure Remote Access for use after installation.

Configuring Secure Remote Access

This chapter contains the following:

- “To Configure Secure Remote Access” on page 33
- “To Enable Access to the Portal Server Through the Gateway” on page 34
- “To Configure Gateway Standalone Installation on a Separate Host” on page 35

▼ To Configure Search Archive

If the search server name is different from the default name of the machine on which the search server resides, you must manually configure the Search the Search Archive and Instant Messaging functionality.

▶ Manually edit the `IMArchiveDisplay.jsp` file located in

`par-src/default-portal/pbfiles/templateBaseDir/default/IMProviderfile` to replace the existing `rdmServer` attribute with the search server URL you are using.

The following section of the `IMArchiveDisplay.jsp` file shows the section that you edit. Replace the string between `<%=` and `%>` with the URL that you are using.

```
<search:setRDMServer rdmServer ='<%= request.getScheme() +  
    "://" + request.getServerName() + ":" +  
    request.getServerPort()+"/search1/search" %>' />
```

▼ To Configure Secure Remote Access

If you have installed Secure Remote Access, use the following procedure to enable the gateway.

- 1 **Specify the complete protocol and fully qualified domain name for Non Authenticated URL list in *PortalServer7-base/export/request/enableSRAForPortal.xml* file. By default, *PortalServer7-base* is */opt/SUNWportal*. Use the following `amadmin` command:**

```
./amadmin --runasdn ADMIN_DN --password ampassword --verbose --continue --data file
```

- 2 **Do the following if Gateway is configured:**

```
cd /etc/opt/SUNWportal/default
chmod -R 755 *
```

- 3 **To enable access to the Portal Server via the Gateway, see 4 Enabling Access to the Portal Server Via the Gateway.**

- 4 **To enable Gateway to access the Portal Server administration console, modify *enablePSConsoleForGW.xml* file and use the following `amadmin` command to load the file.**

```
AccessManager-base/bin/amadmin -u amadmin -w amadmin-pwd -t
enablePSConsoleForGW.xml. By default, AccessManager-base is /opt/SUNWam
```

▼ To Enable Access to the Portal Server Through the Gateway

- 1 **Modify the following tokens in the *PortalServer7-base/export/request/enableSRAForPortal.xml* file to suit your deployment. By default, *PortalServer7-base* is */opt/SUNWportal*.**

%INST_GWNAME%	Gateway Profile you are modifying
%FULLY_QUALIFIED_PORTAL_SERVER_URI%	Fully qualified portal URL
%PORTAL_SERVER_DOMAIN%	Domain in which the portal server resides
%DEPLOY_URI%	Deploy URL for the portal web application

- 2 **Save the file after making the changes.**

- 3 **Load the file into the directory server using the Sun Java System Access Manager's `amadmin` command as follows:**

```
AccessManager-base/bin/amadmin -u amadmin -w amadmin-pwd -t enableSRAForPortal.xml
```

- 4 **Log in to the Portal Server administration console and navigate to Secure Remote Access —> Profiles —> default —> Core —> Basic Options — Portal Servers and remove `INST_PS_SERVER_LIST`.**

- 5 **Add `http://PS-HOST:PS-PORT` and restart the Gateway.**

▼ To Configure Gateway Standalone Installation on a Separate Host

- 1 **In the installer Select Directory Server and Access Manager SDK and install the gateway with the “configure later” option.**

The Directory Server is used to run cacao mbeans.

- 2 **Manually copy the cacao “security” folder (/etc/opt/SUNWcacao/security) from the Portal Server machine.**

The security folder needs to be copied to communicate with remote mbeans running inside portal machine.

- 3 **Restart cacao of gateway machine.**

- 4 **Start the Directory Server.**

- 5 **If you are installing the gateway in the DMZ, open the following ports:**

- http port: port 80
- jmx admin ports on the firewall: 10161, 10162 and 10163
- Portal Server’s port to the Directory server port: 389 (default)

- 6 **Edit the `example10.xml` file under the `PortalServer7-base/samples/psconfig` directory. Go to the directory `PortalServer7-base/bin` and run**

```
./psconfig --config example10.xml
```

By default, `PortalServer7-base` is `/opt/SUNWportal`.

- 7 **Edit the `AMConfig.properties` to make the directory host point to the local Directory Server.**

Configuring After the Installation

This chapter contains the following:

- “Overview” on page 37
- “Using the Sample Configuration XML File” on page 37
- “Constructing a Configuration XML File” on page 38
- “Unconfiguring Portal Server” on page 53

Overview

The Sun Java System Portal Server 7 software can be installed using the installer in one of the two modes: the `config now` mode, where installation and configuration take place simultaneously, or the `config later` mode, which requires you to run the `PortalServer7-base/bin/psconfig --config config-xml-file` command after installing the software. By default, `PortalServer7-base` is `/opt/SUNWportal`.

This chapter describes how to use the sample configuration XML file or construct a configuration XML file for the desired portal set up. A basic understanding of the structure of XML is required to construct a custom configuration file.

Using the Sample Configuration XML File

The Sun Java System Portal Server software includes twenty sample configuration XML files at:

`/opt/SUNWportal/samples/psconfig` directory for SPARC and x86
`/opt/sun/portal/samples/psconfig` directory for Linux

Note – The location of the files depend on the install location. If portal is installed in a non-default location, these locations vary.

The *PortalServer7-base/samples/psconfig/ReadMe.txt* file describes each example file. By default the *PortalServer7-base* is */opt/SUNWportal*. Read through this file to see which configuration example best suits your set up and replace the @TAGS@ (marked by @. . .@) after reviewing the default values specified in the example file. Create the required configuration XML file for the desired portal setup by modifying a selected configuration example.

Any of the configuration examples for the Web Server container can be adapted for Sun Java System Application Server by replacing the <WebContainerProperties> element section and the @TAGS@ tokens after reviewing the default values. For example:

Examples 1, 3 to 9, and 13 are common configurations for the Sun Java System Web Server container. Example 14 is a configuration for the Sun Java System Application Server 8.1 container

Multi portal configurations (see example 15) can be customized by:

1. Including multiples instances of <PortalServer>, <Instance>, and <SearchServer> elements.
2. Replacing the @TAGS@ tokens after reviewing the default values.

Constructing a Configuration XML File

If the sample configuration file does not suit your desired setup and if a custom configuration XML file is to be constructed, follow the instructions in this section. In order to set up your custom configuration file, you must:

1. Begin by constructing the “Required Configuration” on page 39.
This basic configuration is required to make the portal psadmin command useable.
2. Construct the <ComponentsToConfigure> element depending on which components are to be configured on this host. See “Portal Server Configuration” on page 42 for more information.
3. Construct the following configuration information based on the components to configure on this host:

- “Basic Portal Configuration” on page 42
- “Sample Portal Configuration” on page 43
- “Web Container Configuration” on page 44
- “Search Server Configuration” on page 47
- “Secure Remote Access Configuration” on page 47
- “Gateway Configuration” on page 48
- “Netlet Proxy Configuration” on page 49
- “Rewriter Proxy Configuration” on page 50

4. Run the `./psconfig --config configfile.xml` command.

Required Configuration

This section describes the overall Portal Server, header/footer, shared components, and the Access Manager elements in the configuration file. See `example2.xml` file.

For Solaris on SPARC and x86

```
<?xml version = "1.0" encoding = "UTF-8"?>
<PortalServerConfiguration xmlns:xsi=
  "http://www.w3.org/2001/XMLSchema-instance"
  xsi:noNamespaceSchemaLocation=
    "file:///opt/SUNWportal/lib/psconfig.xsd" SchemaVersion="1.0">
  <Configure ConfigurationHostName=
    "@HOST.DOMAIN@" SystemUser="root" SystemGroup="other" Validate="true">
    <SharedComponents
      JavaHome="/usr/jdk/entsys-j2se"
      CacaoProdDir="/opt/SUNWcacao"
      CacaoConfigDir="/etc/opt/SUNWcacao"
      SharedLibDir="/usr/share/lib"
      PrivateLibDir="/usr/share/lib"
      JMKLibDir="/opt/SUNWjdmk/5.1/lib"
      NSSLibDir="/usr/lib/mps/secv1"
      JSSJarDir="/usr/share/lib/mps/secv1"
      WebNFSLibDir="/opt/SUNWebnfs"
      DerbyLibDir="/usr/share/lib/Derby"
      AntLibDir="/usr/sfw/lib/ant"
      AntHomeDir="/usr/sfw"
      RegistryLibDir="/opt/SUNWsoar/lib"
    />
    <AccessManager>
      <InstallationDirectory
        ProdDir="/opt/SUNWam"
        DataDir="/var/opt/SUNWam"
        ConfigDir="/etc/opt/SUNWam/config"
        ConfigFile="AMConfig.properties"
      />
      <UserCredentials
        AdministratorUID="amadmin"
        AdministratorUserPassword="@AMADMIN.PASSWORD@"
        LDAPUserId="amldapuser"
        LDAPUserIdPassword="@AMLDAUSER.PASSWORD@"
        DirectoryManagerDn="cn=Directory Manager"
        DirectoryManagerPassword="@DIRMGR.PASSWORD@" />
      </AccessManager>
    </PortalConfiguration>
```

```

        <InstallationDirectory
            ProdDir="/opt/SUNWportal"
            DataDir="/var/opt/SUNWportal"
            ConfigDir="/etc/opt/SUNWportal"/>
        <ComponentsToConfigure>
            .
            .
            .
        </ComponentsToConfigure>
        .
        .
        .
    </PortalConfiguration>
    .
    .
    .
</Configure>
</PortalServerConfiguration>

```

For Linux

```

<?xml version = "1.0" encoding = "UTF-8"?>
<PortalServerConfiguration xmlns:xsi=
    "http://www.w3.org/2001/XMLSchema-instance"
    xsi:noNamespaceSchemaLocation=
    "file:///opt/sun/portal/lib/psconfig.xsd" SchemaVersion="1.0">
    <Configure ConfigurationHostName=
        "@HOST.DOMAIN@" SystemUser="root" SystemGroup="other" Validate="true">
        <SharedComponents
            JavaHome="/usr/jdk/entsys-j2se"
            CacaoProdDir="/opt/sun/cacao"
            CacaoConfigDir="/etc/opt/sun/cacao"
            SharedLibDir="/opt/sun/share/lib"
            PrivateLibDir="/opt/sun/private/share/lib"
            JDMKLibDir="/opt/sun/jdk/5.1/lib"
            NSSLibDir="/opt/sun/private/lib"
            JSSJarDir="/opt/sun/private/share/lib"
            WebNFSLibDir="/opt/sun/webnfs"
            DerbyLibDir="/opt/sun/share/lib/Derby"
            AntHomeDir="/opt/sun/share"
            AntLibDir="/opt/sun/share/lib"
            RegistryLibDir="/opt/sun/SUNWsoar/lib"
        />
        <AccessManager>
            <InstallationDirectory
                ProdDir="/opt/sun/identity"
                DataDir="/var/opt/sun/identity"
                ConfigDir="/etc/opt/sun/identity/config"

```



```

        ConfigFile="AMConfig.properties"
    />
    <UserCredentials
        AdministratorUID="amadmin"
        AdministratorUserPassword="@AMADMIN.PASSWORD@"
        LDAPUserId="amldapuser"
        LDAPUserIdPassword="@AMLDAUSER.PASSWORD@"
        DirectoryManagerDn="cn=Directory Manager"
        DirectoryManagerPassword="@DIRMGR.PASSWORD@" />
</AccessManager>
<PortalConfiguration>
    <InstallationDirectory
        ProdDir="/opt/sun/portal"
        DataDir="/var/opt/sun/portal"
        ConfigDir="/etc/opt/sun/portal"/>
    <ComponentsToConfigure>
        .
        .
        .
    </ComponentsToConfigure>
    .
    .
    .
</PortalConfiguration>
    .
    .
    .
</Configure>
</PortalServerConfiguration>

```

Tokens to Replace

@HOST.DOMAIN@	The host and domain name of the machine on which configuration is occurring.
@AMADMIN.PASSWORD@	Administrator's password for the Access Manager instance with which Portal is to be configured.
@AMLDAUSER.PASSWORD@	Internal LDAP User password for the Access Manager instance with which Portal is to be configured.
@DIRMGR.PASSWORD@	Administrator's password of the Directory Server with which Portal is to be configured.

Values to Modify

PortalServerConfiguration xsi:noNamespaceSchemaLocation

If portal is installed in a non-default location, then this location needs to be changed accordingly.

SharedComponents JCIFS LibDir

JCIFS is an optional 3rd party component that is required only by the Netfile component. Install the JCIFS package and specify the lib location here.

SharedComponents JChardet

JChardet is an optional 3rd party component that is required only by the Netfile component. Install the JChardet package and specify the lib location here.

AccessManager InstallationDirectory ProdDir, DataDir, ConfigDir

Specify the installation location of Access Manager software here if it was not installed in the default location.

PortalConfiguration InstallationDirectory ProdDir, DataDir, ConfigDir

Specify the installation location of Portal Server software here if it was not installed in the default location.

Portal Server Configuration

Different Portal Server components that can be installed and configured across different nodes include the core Portal Server, Secure Remote Access (SRA), Gateway, Netlet Proxy, and Rewriter Proxy. Depending on which components are configured on this host, the `<ComponentsToConfigure>` element can be constructed.

If all components are to be configured this host, include the following:

```
<ComponentsToConfigure>
  <component>portalserver</component>
  <component>sracore</component>
  <component>gateway</component>
  <component>netletproxy</component>
  <component>rewriterproxy</component>
</ComponentsToConfigure>
```

To exclude components, remove the corresponding `<component>` element.

Basic Portal Configuration

XML Fragment

```
<PortalConfiguration>
  <PortalServer PortalAccessURL="http://@HOST.DOMAIN@:@PORT@/portal"
    PortalID="portal1"
    PortalWebappURI="/portal"
    SearchServerID="search1">
    <Instance InstanceID="myInstance">
      <WebContainerProperties
```

```

        .
        .
        .
    />
    </Instance>
</PortalServer>
</PortalConfiguration>

```

Tokens to Replace

@HOST.DOMAIN@ The host and domain name of the machine on which portal is to be configured.

@PORT@ Web container port at which portal has to be deployed

Values to Modify

PortalConfiguration PortalServer PortalAccessURL (optional)

If the DEPLOY URI is non-default, change /portal to the changed URI value.

PortalConfiguration PortalServer PortalWebappURI (optional)

If the DEPLOY URI is non-default, change, /portal to the changed URI value. In case of non-default DEPLOY URI, ensure that both PortalAccessURL and PortalWebappURI are specified in the configuration XML file.

PortalConfiguration PortalServer PortalID

Change portal1 to the required portal ID, which should be unique.

PortalConfiguration PortalServer Instance InstanceID

Change myInstance to the required instance ID, which should be unique.

PortalConfiguration PortalServer SearchServerID (optional)

Specifies which Search Server this portal samples are configured with. This is needed only if samples are configured.

Sample Portal Configuration

Portal Server software supports three types of sample portals: the Developer Sample, Enterprise Sample, and Community Sample. Each of these samples are created under its own sub-org for ease of management. Configuring any or all of these samples is supported.

```

<PortalConfiguration>
  <PortalServer
    .
    .
    .
  >
  <SamplePortal>
    <Sample Name="DeveloperPortal"/>

```

```

        <Sample Name="EnterprisePortal"/>
        <Sample Name="CommunityPortal"/>
    </SamplePortal>
    .
    .
    .
</PortalServer>
</PortalConfiguration>

```

Web Container Configuration

The Web container configuration varies with the container to be configured. In the configuration XML file, there is one `<WebContainerProperties>` element specified for the web container under the `<PortalServer><Instance>` element and one under the `<SearchServer>` element.

Sun Java System Web Server Configuration

Tip – See `example1.xml`, `examples 3 to 9`, and `example13.xml` files.

XML Fragment For Solaris on SPARC and x86

```

<WebContainerProperties
  Host="@HOST.DOMAIN@"
  Port="@PORT@"
  Scheme="http"
  WebContainerInstallDir="/opt/SUNWwbsvr"
  WebContainerInstanceName="@INSTANCENAME@"
  WebContainerInstanceDir="/opt/SUNWwbsvr/https-@INSTANCENAME@"
  WebContainerDocRoot="/opt/SUNWwbsvr/docs"
  WebContainerAdminHost=""
  WebContainerAdminPort="@ADMIN.PORT@"
  WebContainerAdminScheme="http"
  WebContainerAdminUid="admin"
  WebContainerAdminPassword="@PASSWORD@"
  WebContainerCertificateDBPassword=""
  WebContainerType="SJSWS6"
/>

```

For Linux

```

<WebContainerProperties
  Host="@HOST.DOMAIN@"
  Port="@PORT@"
  Scheme="http"
  WebContainerInstallDir="/opt/sun/webserver"

```

```

WebContainerInstanceName="@INSTANCENAME@"
WebContainerInstanceDir="/opt/sun/webserver/https-@INSTANCENAME@"
WebContainerDocRoot="/opt/sun/webserver/docs"
WebContainerAdminHost=""
WebContainerAdminPort="@ADMIN.PORT@"
WebContainerAdminScheme="http"
WebContainerAdminUid="admin"
WebContainerAdminPassword="@PASSWORD@"
WebContainerCertificateDBPassword=""
WebContainerType="SJSWS6"
/>

```

Tokens to Replace

@HOST.DOMAIN@	The host and domain name of the machine on which portal instance is to be configured
@PORT@	Web server port
@INSTANCENAME@	Web server instance name
@ADMIN.PORT@	Web server administration port
@PASSWORD@	Web server administrator's password

Values to Modify

WebContainerInstallDir, WebContainerInstanceDir, WebContainerDocRoot
If the web server is installed in a non-default location.

WebContainerAdminScheme, WebContainerCertificateDBPassword
If web server is installed in secure mode (https).

Sun Java System Application Server Configuration

Tip – See example14.xml file.

XML Fragment For Solaris on SPARC and x86

```

<WebContainerProperties
  Host="@HOST.DOMAIN@"
  Port="@PORT@"
  Scheme="http"
  WebContainerInstallDir="/opt/SUNWappserver/appserver"
  WebContainerInstanceName="server"
  WebContainerDomainName="domain1"
  WebContainerInstanceDir="/var/opt/SUNWappserver/domains/domain1"
  WebContainerDocRoot="/var/opt/SUNWappserver/domains/domain1/docroot"

```

```

WebContainerAdminHost="@HOST.DOMAIN@"
WebContainerAdminPort="@ADMIN.PORT@"
WebContainerAdminScheme="https"
WebContainerAdminUid="admin"
WebContainerAdminPassword="@PASSWORD@"
WebContainerMasterPassword="@MASTER.PASSWORD@"
WebContainerType="SJSAS81"
/>

```

XML Fragment For Linux

```

<WebContainerProperties
  Host="@HOST.DOMAIN@"
  Port="@PORT@"
  Scheme="http"
  WebContainerInstallDir="/opt/sun/appserver"
  WebContainerInstanceName="server"
  WebContainerDomainName="domain1"
  WebContainerInstanceDir="/var/opt/sun/appserver/domains/domain1"
  WebContainerDocRoot="/var/opt/sun/appserver/domains/domain1/docroot"
  WebContainerAdminHost="@HOST.DOMAIN@"
  WebContainerAdminPort="@ADMIN.PORT@"
  WebContainerAdminScheme="https"
  WebContainerAdminUid="admin"
  WebContainerAdminPassword="@PASSWORD@"
  WebContainerMasterPassword="@MASTER.PASSWORD@"
  WebContainerType="SJSAS81"
/>

```

Tokens to Replace

@HOST.DOMAIN@	The host and domain name of the machine on which portal instance is to be configured
@PORT@	Application server port
@ADMIN.PORT@	Application server administration port
@PASSWORD@	Application server administrator's password
@MASTER.PASSWORD@	Application server Master Password if specified

Values to Modify

WebContainerInstallDir

If application server is installed at a non-default location

WebContainerDomainName, WebContainerInstanceDir, WebContainerDocRoot

If deploying to a non-default application server domain

WebContainerInstanceName

Instance name within the Application Server domain. The server is the name of the first instance which is created by default at the same time the Application Server 8.1 domain is created. This can be changed to the name of any other created instance within that domain.

Search Server Configuration

The Search Server is deployed to a specific web container instance which is defined by a `<WebContainerProperties>` element. Multiple Search servers can be specified by having multiple `<SearchServer>` elements within a `<PortalConfiguration>` section, each with a unique ID. A Portal may be associated with a specific search server by specifying the `SearchServerID` attribute within the `<PortalServer>` element.

```
<PortalConfiguration>
  <SearchServer SearchServerID="search1">
    <WebContainerProperties
      .
      .
      .
    />
  </SearchServer>
  <PortalServer
    SearchServerID="search1">
    .
    .
    .
  </PortalServer>
</PortalConfiguration>
```

Secure Remote Access Configuration

The SRA core component can only be installed and configured on the same node as the portal server component. Further the portal server and SRA core components have to be configured at the same time. That is, the SRA core component cannot be configured on a host that already has an existing portal server.

XML Fragment

Secure remote access support can be added to portal by adding the `<component>sracore</component>` to the `<ComponentsToConfigure>` section. In addition add the following section to the `<PortalConfiguration>` section:

```
<PortalConfiguration>
  .
  .
```

```

    <SecureRemoteAccessCore
      GatewayProtocol="https"
      PortalServerDomain="@DOMAIN@"
      GatewayPort="@GATEWAY.PORT@"
      GatewayProfileName="default"
      LogUserPassword="@SRA.LOGUSER.PASSWORD@" />
  </PortalConfiguration>

```

Tokens to Replace

@DOMAIN@	Domain name of the machine on which portal is to be configured
@GATEWAY.PORT@	Port on which Gateway is to run
@SRA.LOGUSER.PASSWORD@	SRA log user password

Values to Modify

GatewayProfileName	Change this if the default profile is not to be used
--------------------	--

Gateway Configuration

Tip – See example10.xml file.

XML Fragment

```

<ComponentsToConfigure>
  <component>gateway</component>
</ComponentsToConfigure>
<PortalServer PortalAccessURL="http://@PSHOST.DOMAIN@:@PORT@/portal">
</PortalServer>
<Gateway Profile="default">
  <SRAInstance
    Protocol="https"
    Host="@HOST.DOMAIN@"
    Port="@GATEWAY.PORT@"
    IPAddress="@IPADDRESS@"
    LogUserPassword="@SRA.LOGUSER.PASSWORD@"
    StartInstance="true"/>
</Gateway>
<CertificateInformation
  Organization="Sun Microsystems"
  Division="Software"
  CityOrLocality="Santa Clara"

```



```

    StateProvince="CA"
    CountryCode="US"
    CertificateDatabasePassword="@SRA.CERTDB.PASSWORD@"/>

```

Tokens to Replace

@HOST.DOMAIN@	The host and domain name of the machine on which gateway is to be configured
@GATEWAY.PORT@	Port on which Gateway is to run
@IPADDRESS@	IP address of the machine on which Gateway is run
@PSHOST.DOMAIN@	The host and domain name of the machine on which portal instance is to be configured.
@PORT@	Port on which portal instance is to run
@SRA.LOGUSER.PASSWORD@	SRA log user password
@SRA.CERTDB.PASSWORD@	SRA Certificate database password

Values to Modify

Gateway Profile	Change this if the default profile is not to be used
Gateway SRAInstance StartInstance	Change if start on install is not required
CertificateInformation	Change attributes in this section accordingly

Netlet Proxy Configuration

Tip – See example11.xml file.

XML Fragment

```

<ComponentsToConfigure>
  <component>netletproxycomponent>netletproxy</component>
</ComponentsToConfigure>
<PortalServer PortalAccessURL="http://@PSHOST.DOMAIN@:@PORT@/portal">
</PortalServer>
<NetletProxy Profile="default">
  <SRAInstance
    Protocol="https"
    Host="@HOST.DOMAIN@"
    Port="@NETLET.PROXY.PORT@"
    IPAddress="@IPADDRESS@"
  </SRAInstance>
</NetletProxy>

```

```

        LogUserPassword="@SRA.LOGUSER.PASSWORD@"
        StartInstance="true"/>
</NetletProxy>
<CertificateInformation
    Organization="Sun Microsystems"
    Division="Software"
    CityOrLocality="Santa Clara"
    StateProvince="CA"
    CountryCode="US"
    CertificateDatabasePassword="@SRA.CERTDB.PASSWORD@"/>

```

Tokens to Replace

@HOST.DOMAIN@	The host and domain name of the machine on which Netlet Proxy is to be configured
@NETLET.PROXY.PORT@	Port on which Netlet Proxy is to run
@IPADDRESS@	IP address of the machine on which Netlet Proxy is to run
@PSHOST.DOMAIN@	The host and domain name of the machine on which portal instance is to be configured.
@PORT@	Port on which portal instance is to run
@SRA.LOGUSER.PASSWORD@	SRA log user password
@SRA.CERTDB.PASSWORD@	SRA Certificate database password

Values to Modify

NetletProxy Profile	Change this if the default profile is not to be used
NetletProxy SRAInstance StartInstance	Change if start on install is not required
CertificateInformation	Change attributes in this section accordingly

Rewriter Proxy Configuration

Tip – See example12.xml file.

XML Fragment

```

<ComponentsToConfigure>
    <component>rewriterproxycomponent</component>rewriterproxy
</ComponentsToConfigure>
<PortalServer PortalAccessURL="http://@PSHOST.DOMAIN@:@PORT@/portal">

```

```

</PortalServer>
<RewriterProxy Profile="default">
  <SRAInstance
    Protocol="https"
    Host="@HOST.DOMAIN@"
    Port="@REWRITER.PROXY.PORT@"
    IPAddress="@IPADDRESS@"
    LogUserPassword="@SRA.LOGUSER.PASSWORD@"
    StartInstance="true"/>
</RewriterProxy>
<CertificateInformation
  Organization="Sun Microsystems"
  Division="Software"
  CityOrLocality="Santa Clara"
  StateProvince="CA"
  CountryCode="US"
  CertificateDatabasePassword="@SRA.CERTDB.PASSWORD@" />

```

Tokens to Replace

@HOST.DOMAIN@	The host and domain name of the machine on which Rewriter Proxy is to be configured
@REWRITER.PROXY.PORT@	Port on which Rewriter Proxy is to run
@IPADDRESS@	IP address of the machine on which Rewriter Proxy is to run
@PSHOST.DOMAIN@	The host and domain name of the machine on which portal instance is to be configured.
@PORT@	Port on which portal instance runs.
@SRA.LOGUSER.PASSWORD@	SRA log user password.
@SRA.CERTDB.PASSWORD@	SRA Certificate database password.

Values to Modify

RewriterProxy Profile	Change this if the default profile is not to be used
RewriterProxy SRAInstance StartInstance	Change if start on install is not required
CertificateInformation	Change attributes in this section accordingly

Establishing Trust Between Cacao Servers

The following instructions detail how to share a common certificate between two cacao servers.

▼ Installing the Cacao Server and Derby

- 1 **Navigate to the `/opt/SUNWportal/bin` directory on the second Portal system.**
- 2 **Copy the `example2.xml` file from `/opt/SUNWportal/samples/psconfig` to the current file (`/opt/SUNWportal/bin`).**
- 3 **Replace the tokens in the file and run the `psconfig` command.**

```
./psconfig config example2.xml
```

The cacao server and Derby on the system are installed.

- 4 **When cacao and Derby are installed, go to the `/opt/SUNWcacao/bin` directory.**
- 5 **Get the list of certificates available in the default instance of cacao server.**

```
./cacaoadm list-trusted-certs -i default
```
- 6 **Extract the certificate from the default system.**

```
./cacaoadm show-trusted-cert -i default cacao_ca
```
- 7 **Cut and paste this certificate into a file and name it `ps2.cert`.**
- 8 **Follow the same procedure for the first portal system and save the file as `ps1.cert`.**

▼ Installing Cacao Certificates into Other Instances

- 1 **Follow the same procedure for the first portal system and save the file as `ps1.cert`.**
- 2 **Navigate to the `/opt/SUNWcacao/bin` directory and execute the command.**

```
./cacaoadm add-trusted-cert -f ps1.cert ps1
```
- 3 **Add the certificate to the instance. Perform this step on both the portal servers.**
- 4 **Restart the cacao servers.**

```
./cacaoadm stop  
./cacaoadm start
```

Unconfiguring Portal Server

The example files 18-20 under *PortalServer7-base/samples/psconfig* directory can be used for unconfiguring portalserver and its subcomponents. By default, *PortalServer7-base* is `/opt/SUNWportal`.

Building an Unconfiguration XML file

This section describes the information required in the example file required for `psadmin -unconfig` to work.

```
<?xml version = "1.0" encoding = "UTF-8"?>
<PortalServerConfiguration
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="file:///opt/SUNWportal/lib/psconfig.xsd"
SchemaVersion="1.0">
  <Unconfigure ConfigurationHostName="@HOST.DOMAIN@"
Validate="true" UnconfigureAll="false">
    <AccessManager>
      <UserCredentials
AdministratorUID="amadmin"
AdministratorUserPassword="@AMADMIN.PASSWORD@"
LDAPUserId="amldapuser"
LDAPUserIdPassword="@AMLDAUSER.PASSWORD@"
DirectoryManagerDn="cn=Directory Manager"
DirectoryManagerPassword="@DIRMGR.PASSWORD@" />
    </AccessManager>
    <PortalConfiguration>
      <ComponentsToConfigure>
        . . .
        . . .
        . . .
      </ComponentsToConfigure>
    </PortalConfiguration>
  </Unconfigure>
</PortalServerConfiguration
```

Tokens To Replace

@HOST.DOMAIN@	The host and domain name of the machine on which configuration is occurring.
@AMADMIN.PASSWORD@	Administrator's password for the Access Manager instance with which Portal is to be configured.

@AMLDAUSER.PASSWORD@ Internal LDAP User password for the Access Manager instance with which Portal is to be configured.

@DIRMGR.PASSWORD@ Administrator's password of the Directory Server with which Portal is to be configured.

If Portal Server is installed in a non-default directory, the file:///opt/SUNWportal/lib/psconfig.xsd must be modified accordingly in the <PortalServerConfiguration ...> tag.

If UnconfigureAll="false" then the components specified in the <ComponentsToConfigure> . . . </ComponentsToConfigure> is unconfigured.

Specific instances of the components can be unconfigured. For example, the following portion of code removes the SearchServer "search1," the instance "myInstance" of the portal "MyFirstPortal," all instances of the portal "MySecondPortal" and the instance "default" of Gateway, Netlet Proxy and Rewriter Proxy.

```
<PortalConfiguration>
  <ComponentsToConfigure>
    <component>portalserver</component>
    <component>sracore</component>
    <component>gateway</component>
    <component>netletproxy</component>
    <component>rewriterproxy</component>
  </ComponentsToConfigure>
  <SearchServer SearchServerID="search1">
  </SearchServer>
  <PortalServer PortalID="MyFirstPortal">
    <Instance InstanceID="myInstance">
    </Instance>
  </PortalServer>
  <PortalServer PortalID="MySecondPortal">
  </PortalServer>
  <Gateway Profile="default"/>
  <NetletProxy Profile="default"/>
  <RewriterProxy Profile="default"/>
</PortalConfiguration>
```

Un-installing Sun Java System Portal Server 7 Software

This chapter includes instructions for uninstalling the Portal Server software.

Uninstalling the Software

▼ To Uninstall the Portal Server Software

- 1 **Log in to the machine running the Portal Server software and become root.**
- 2 **Change directories to:**
 - `/var/sadm/prod/SUNWps7_0-entsys/` on Solaris.
 - `/var/sadm/prod/sun-ps7_0-entsys/` on Linux.
- 3 **Type `./uninstall` to uninstall the Portal Server software.**

The Sun Java Enterprise System Uninstall Wizard is displayed.
- 4 **Select the components to uninstall and select Next.**

If you are uninstalling the Secure Remote Access component, you are asked to provide the portal administrator, Access Manager administrator, and LDAP passwords.
- 5 **Select Uninstall to uninstall the software.**

Upgrading to Sun Java System Portal Server 7

This chapter contains the following:

- “Pre-Upgrade Requirements” on page 57
- “Before You Begin” on page 59
- “Instructions to Upgrade and Verify Upgrade” on page 60

Pre-Upgrade Requirements

This section includes the following:

- “Hardware and Operating System Requirements” on page 57
- “Software Requirements” on page 58

Hardware and Operating System Requirements

The following hardware and software are required to upgrade from Portal Server 6 2005Q1 software on Solaris to this release.

TABLE 7-1 Hardware and Operating System Requirements for Upgrade

Component	Platform Requirements
Supported Platforms	Sun Ultra™ 60, or Sun Blade, or better workstation or server
Operating System	Solaris 8 or Solaris 9 U6 or Solaris 10 on SPARC Solaris 9 or Solaris 10 on x86 Red Hat Enterprise Linux 2.1 or 3.0 Updated 3 on x86

TABLE 7-1 Hardware and Operating System Requirements for Upgrade (Continued)

Component	Platform Requirements
RAM	1024 Mbytes of RAM for evaluation install 1.2 Gbytes of RAM for regular deployment on Sun Java System Web Server 2.0 Gbytes of RAM for regular deployment on Sun Java System Application Server Sun Java system Application Server
Disk space	1 Gbyte of disk space for Portal Server software and associated applications
Swap Space	The swap space of the machine should be twice the amount of physical memory. For example, if the machine has 2.0 Gbytes of RAM, the swap space should be 4.0 Gbytes.

Software Requirements

Note – The stack components must be upgraded to their respective Java Enterprise System 4 versions prior to executing the psupgrade script.

The Portal Server software requires the following stack components:

- Sun Java System Directory Server 5.2 P4
- Sun Java System Access Manager 7 installed in legacy mode.

Note – Apply the Access Manger 7.0 Patch 1 before or after the Portal Server Installation. Apply this patch for all web containers including BEA WebLogic, or IBM WebSphere. The patch number depends on the operating system.

- For Sparc, use patch 120954-01
- For Linux, use 120956-01
- For x86, use 120955-01
- Sun Java System Web Server 6.1 SP5 or Sun Java System Application Server 8.1 (including the patches).

The sun-soarsdk rpm (registry server SDK rpm) is not re-locatable; so, do not choose non-default locations for registry on Linux.

Note – Sun Java System Portal Server 7 software does not support Sun Java System Access Manager 7 installed in realm mode. Access Manager must be installed in legacy mode before installing Portal Server 7 software.

Web Containers

Portal Server 7 software supports the following web containers:

Java Enterprise System Application Server 8.1
 Java Enterprise System Web Server 6.1
 BEA Weblogic Server 8.1 sp2
 BEA Weblogic Server 8.1 sp4
 IBM Websphere Server 5.1

Sun Java System Access Manager Software

Portal Server software can be upgraded on machines with:

Access Manager software previously installed and configured on the same physical machine using Java Enterprise System 3.

Access Manager software previously installed and configured on a separate machine using Java Enterprise System 3. The Java Enterprise System 3 Access Manager software SDK must be installed on the Portal Server software host.

Java Enterprise System 3 Access Manager software SDK installed on the machine where Portal Server Gateway is previously installed.

Before You Begin

Before upgrading to Portal Server 7 software on the Solaris platform, perform the following pre-upgrade steps:

1. Verify that the web container and web container Admin Server are running.
2. Verify that the following values are set:
 - ANT_HOME is set to a valid Ant installation path.
 - JAVA_HOME is set to a Java Development Kit (JDK) v1.4.2 or higher.
 - AM and AM SDK are at the Java Enterprise System Release 4 level.
3. On Solaris, after Access Manager upgrade to Java Enterprise System 4, verify that the revision of SUNWamsdkconfig is 7.0 by issuing the command `pkginfo -x SUNWamsdkconfig`. If value is not set to 7.0, edit file `/var/sadm/pkg/SUNWamsdkconfig/pkginfo` file. Set the version as 7.0 (`VERSION=7.0,...`). Reset to the original value after upgrade.
4. If you upgrade the gateway, the Netlet Proxy, or the Rewriter Proxy, verify that these components are stopped before starting the upgrade.
5. On a node on which Portal Server is not installed—that is, the gateway, Netlet Proxy, or Rewriter Proxy only node—edit `PortalServer6.3.1-base/lib/SRAversion.properties`. Change the line with `productversion=` to `with version=`. Reset to the original value after the upgrade.
6. See to perform an upgrade on a gateway-only node.

Instructions to Upgrade and Verify Upgrade

This section contains the following:

- “To Upgrade to Portal Server 7 Software on Solaris” on page 60
- “To Ensure Upgrade to Portal Server 7 was Successful” on page 63

▼ To Upgrade to Portal Server 7 Software on Solaris

1 Go to the directory where you have downloaded the software and unzip the Portal Server zip file.

2 Go to `Product/portal_svr/Tools/upgrade/bin` directory and type `./psupgrade`.

The upgrade script requires you to provide the following:

- Access Manager server administrator’s password.
- Access Manager ldapuser password
- Directory Server Directory Manager password.
- Web container administrator’s password.
- Web container Master Password in case of Application Server 8.1 for Portal Server software installation.
- Secure remote access certificate database password if Secure Remote Access was previously installed on this machine.
- Secure Remote Access log user password if Secure Remote Access or its constituents were previously installed on this machine.

When you upgrade, the upgraded Portal Server installation is located at *PortalServer6.3.1-base/SUNWportal* directory, where *PortalServer6.3.1-base* is the name of the directory in which the Java Enterprise System 3 Portal Server was installed.

3 Restart the Portal Server web container and Gateway (if Gateway was installed and upgraded).

4 If you performed an upgrade on Application Server 8.1, do the following:

- Remove any line breaks in the server classpath value.
- Remove the classpath entry corresponding to `jss3.jar`.

5 If you performed an upgrade on Web Server 6.1, do the following after Access Manager upgrade and before starting Portal Server upgrade:

- Edit Web Server’s `server.xml` file.
- Modify `classpathsuffix` entry `jss3.jar` to `jss4.jar`.
- Add *PortalServer6.3.1-base/lib/* to `serverclasspath`.
- Add *PortalServer6.3.1-base/lib/* to `nativelibraryprefix`.

▼ To Upgrade to Portal Server 7 Software on Linux

1 Go to the directory where you have downloaded the software and unzip the software file.

2 Go to `Product/portal_svr/Tools/upgrade/bin` directory and type `./psupgrade`.

The upgrade script requires you to provide the following:

- Access Manager server administrator's password.
- Access Manager ldapuser password
- Directory Server Directory Manager password.
- Web container administrator's password.
- Web container Master Password in case of Application Server 8.1 for Portal Server software installation.
- Secure Remote Access certificate database password if Secure Remote Access was previously installed on this machine.
- Secure Remote Access log user password if Secure Remote Access or its constituents were previously installed on this machine.

3 Restart the Portal Server web container and Gateway (if you installed and upgraded the gateway).

4 If you performed an upgrade on Application Server 8.1, do the following:

- Remove any line breaks in the server classpath value.
- Remove the classpath entry corresponding to `jss3.jar`.

5 If you performed an upgrade on Web Server 6.1, do the following after Access Manager upgrade and before starting Portal Server upgrade:

- Edit Web Server's `server.xml` file.
- Modify `classpathsuffix` entry `jss3.jar` to `jss4.jar`.
- Add `PortalServer6.3.1-base/lib/` to `serverclasspath`.
- Add `PortalServer6.3.1-base/lib/` to `nativelibraryprefix`.

6 Install `sun-mobileaccess` rpms from the installer after the upgrade if they are missing. Use the following command to see if the `sun-mobileaccess` rpms are missing:

```
rpm -qa | grep sun-mobileaccess
```

▼ To Upgrade A Gateway-Only Node

1 **Install Directory server from the Java Enterprise System stack.**

2 **Perform the following:**

a. **cd to** `Product/portal_svr/Tools/upgrade/resource/jes3`

b. **Issue the following command:**

```
/usr/jdk/entsys-j2se/bin/jar --xf upgraderesource.jar upgrade.xml
```

c. **Edit the** `upgrade.xml` **file.**

After the line:

```
<replace file="${PS_70_PRODUCT_DIR}/lib/ServiceLDIFMap.properties"
token="psWSRPConsumer2.ldif" value=""/>
```

Include the following two lines in the `upgrade.xml` file.

```
<replace file="${PS_70_PRODUCT_DIR}/template/PortalDomainConfig.properties"
token="domain.data.host=" value="GATEWAY_HOST_NAME"/>
```

```
<replace file="${PS_70_PRODUCT_DIR}/template/PortalDomainConfig.properties"
token="domain.data.port=" value="LOCAL_DIRECTORY_SERVER_PORT"/>
```

d. **Modify the following lines:**

Change `<target name="fetchGlobalDP" >` to `<target name="fetchGlobalDP" if="PORTAL_INSTALLED">`

Change `<target name="fetchOrgDP" >` to `<target name="fetchOrgDP" if="PORTAL_INSTALLED">`

Change `<target name="uploadGlobalDP" >` to `<target name="uploadGlobalDP" if="PORTAL_INSTALLED">`

Change `<target name="uploadOrgDP" >` to `<target name="uploadOrgDP" if="PORTAL_INSTALLED">`

e. **Issue the following command:**

```
/usr/jdk/entsys-j2se/bin/jar -uf upgraderesource.jar upgrade.xml
```

3 **Copy the security folder from** `/etc/opt/SUNWcacao/security` **from the Portal Server machine to the Gateway machine.**

4 **Start Directory Server.**

5 **Start the cacao server.**

- 6 **Run the command** `./psupgrade`.
A failure occurs. You can ignore.
- 7 **Copy the psconfig file from** `/var/tmp/pconfigupgradeXXXXX.xml` **to** `/tmp/psconfig.xml`.
- 8 **Replace the following unreplaced tokens in the** `psconfig.xml` **file:**
 - `JAVA_BASE_DIR`. For example, use `/usr/jdk/entsys-j2se`.
 - `HOSTNAME.DOMAIN:PORTNO`
 - `mydomain.com` with the gateway domain
- 9 **Run the command** `/opt/SUNWportal/bin/psconfig --config /tmp/psconfig.xml`
- 10 **Restart the web container.**

▼ To Ensure Upgrade to Portal Server 7 was Successful

- 1 **Access the Access Manager software administration console from your browser. To access, type**
`http://hostname/amconsole`.
- 2 **Access the Portal Server Desktop. To access, type**
`protocol://fully-qualified-hostname:port/portal-URI`.
If the sample Portal desktop displays without any exception, then your upgrade was successful. Try logging in as a user to ensure that the sample Portal desktop displays without errors.
- 3 **Access the Portal Server software administration console. To access, type**
`protocol://fully-qualified-hostname:port/psconsole`.
Verify that it displays information about Portal Server7 software. Ensure that a Portal with portal-id Upgraded is created.

Index

C

Configuring Gateway, 35
Configuring Mobile Access, 29-31
Configuring Portal Server, 37-54
Configuring Secure Remote Access, 33-35
Constructing XML file, 38-51

H

Hardware Requirements, 17-18

I

Installing Mobile Access, 29-31
Installing on second machine, 26-27
Installing Portal Server, 21-26

O

Operating System Requirements, 17-18

P

Pre-installation tasks, 19-20

S

Sample XML file, 37-38

Secure Remote Access, 17
Software Requirements, 18-19

U

Uninstalling Portal Server, 55
Upgrading Portal Server, 57-63

V

Verifying installation, 27-28

