



ChorusOS 4.0 Installation Guide for Solaris Hosts

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Contents

	Preface	5
1.	Obtaining the ChorusOS 4.0 Product	9
2.	Installing on the Host	11
3.	Setting Up a Boot Server	17
4.	Patching Installed Software	23
5.	Uninstalling on the Host	25
6.	Where to Go from Here	27
A.	Default File Locations and Directory Contents	29
	Index	31

Preface

This document describes how to install the ChorusOS 4.0 product on a host workstation running the Solaris[™] operating environment. It also describes how to set up a boot server running the Solaris operating environment.

See the appropriate document in the *ChorusOS 4.0 Target Family Documentation Collection* for instructions explaining how to build and run the ChorusOS operating system on supported hardware.

Tip - In order to complete the entire installation process quickly, make sure you have:

- The Java[™] Runtime Environment, version 1.2, on the host workstation
- The hostnames of the host workstation, boot server and target system
- The root passwords for the host workstation and boot server
- The IP addresses of the host workstation, boot server and target system
- The Ethernet address of the target system.

In order for installation to proceed as smoothly as possible, make sure your Java[™] Runtime Environment is properly patched. Patches can be downloaded at the same time you download the software from <http://www.sun.com>.

Who Should Use This Book

This document is intended primarily for system administrators managing host workstations and boot servers running the Solaris operating environment.

Ordering Sun Documents

Fatbrain.com, an Internet professional bookstore, stocks selected product documentation from Sun Microsystems, Inc.

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Typographical Conventions

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

TABLE P-1 Typographical Conventions

Typeface or Symbol	Meaning	Example
AaBbCc123	The names of commands, files, and directories; on-screen computer output	Edit your <code>.login</code> file. Use <code>ls -a</code> to list all files. <code>machine_name% you have mail.</code>
AaBbCc123	What you type, contrasted with on-screen computer output	<code>machine_name% su</code> Password:

TABLE P-1 Typographical Conventions *(continued)*

Typeface or Symbol	Meaning	Example
<i>AaBbCc123</i>	Command-line placeholder: replace with a real name or value	To delete a file, type rm <i>filename</i> .
<i>AaBbCc123</i>	Book titles, new words, or terms, or words to be emphasized.	Read Chapter 6 in <i>User's Guide</i> . These are called <i>class</i> options. You must be <i>root</i> to do this.

Shell Prompts

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>

Directory Conventions

The following table describes several of the directory conventions used in this book.

TABLE P-3 Directory Conventions

Name	Meaning	Example
<i>download_dir</i>	Directory into which you download the delivery of the ChorusOS 4.0 product.	/home/user/downloads/ ChorusOS_4.0
<i>extract_dir</i>	Directory containing sufficient space to extract the entire delivery before installation.	/home/user/tmp
<i>install_dir</i>	Directory into which you install the ChorusOS 4.0 product.	/opt/SUNWconn/SEW

Obtaining the ChorusOS 4.0 Product

When you purchase the ChorusOS 4.0 product, your customer service representative sends you instructions detailing how to obtain the files required for installation.

Installing on the Host

This chapter explains how to install the ChorusOS 4.0 product development environment on a host workstation running the Solaris operating environment.

Follow the instructions provided by your customer service representative in order to download the files required for installation.

This installation guide assumes that you have already saved the necessary files in a download directory such as `/home/user/downloads/ChorusOS_4.0`. For the rest of this document, we refer to this directory as *download_dir*.

Performing an Interactive Installation

Note - You may perform the installation procedure as many times as necessary. This is especially useful if you want to install extra components after the initial installation.

If you install any packages of the core delivery — not including documentation or third-party software — subsequent installations always place files under the *install_dir/4.0*, where *install_dir* is the directory you select during the first installation.

In other words, if you decide to reinstall core software packages elsewhere, you must first remove all the installed packages. Chapter 5 describes how to remove packages.

1. **Change to a directory in which you have write permission, not `/tmp`, where you have enough space to uncompress all the files in the delivery:**

```
$ cd extract_dir
```

The minimum amount of free space required is specified in `readme.html`.

2. Run the `extract.sh` script to extract the files required for installation:

```
$ sh download_dir/extract.sh
```

3. Enter the root password for the host workstation when prompted.

```
Please enter this system's root user password.  
Password: root_password
```

The installation wizard in this release uses the Solaris package system, including utilities such as `pkgadd(1M)`, to manage installation and dependencies. Solaris package tools require that you become root in order to install packages.

After initialization finishes, the Solaris Web Start Wizard™ is displayed.

4. Follow the instructions displayed on the Web Start Wizard screens.

Note that if you choose a “Default Install” for the binary delivery, the following components of the ChorusOS 4.0 product are installed for the standard delivery:

- Documentation in PDF format
- On-line man pages
- The Kernel component, required to build a kernel system image
- The OS component, required to build a system image with POSIX-compatible APIs
- The IOM component, required to build the system actor that manages input and output
- The Tools component, required to use the cross-development tool chain for building target system executables on the host workstation
- BSP sources, required source files needed for board-specific support
- The XRAY Debugger component, the reference debugger for use with ChorusOS systems.

In order to install other components, such as extra components that you did not select during initial installation, select “Custom Install”.

5. Exit the Web Start Wizard after you have finished installing the software.

The Web Start Wizard creates log files during installation in the directory `/var/sadm/install/logs`.

6. Use the information in the following table to set environment variables on the host workstation.

Environment variable	Add...	Description
MANPATH	<i>install_dir</i> /4.0/chorus-doc/man	Contains the path to on-line manual pages
PATH	<i>install_dir</i> /4.0/chorus- <i>family</i> /tools/host/bin	Enables access to the host tool chain for target <i>family</i> architectures

7. Make sure the environment variables MANPATH and PATH are correctly positioned:

```
$ man ChorusOSMkMf
Reformatting page.  Wait... done

Misc. Reference Manual Pages              ChorusOSMkMf(1CC)

NAME
    ChorusOSMkMf - Create a Makefile from an Imakefile for
    ChorusOS
...
$ ChorusOSMkMf
usage: ChorusOSMkMf config-file [-s source-dir] [-b build-dir] [-d dist-dir]
```

Installing the AnswerBook2™ Documentation Collections

The AnswerBook2 product is Sun's online documentation system. It uses a web-browser interface that lets you view and print a variety of information, including the ChorusOS 4.0 product documentation and man pages.

The AnswerBook2 product provides a search engine that lets you find information throughout the documentation library. You can install AnswerBook2 document collections on a centralized documentation server or on a local server. See "Installing AnswerBook2 Server Software" in *Installing and Administering an AnswerBook2 Server* for details.

The following procedure describes one method of installing the AnswerBook2 documentation collections provided with the ChorusOS 4.0 product. See "Installing

Document Collections” in *Installing and Administering an AnswerBook2 Server* for a more complete explanation of the process.

1. Use the table below to determine which AnswerBook2 packages you want to install:

Compressed Package	AnswerBook2 Collection
SUNWewcab.zip	The <i>ChorusOS 4.0 Common Documentation Collection</i> contains general product documentation common to all host/target product combinations.
SUNWewmab.zip	The <i>ChorusOS 4.0 Reference Manual Collection</i> contains the AnswerBook2 collection of the on-line manual pages.
SUNWewsab.zip	<p>The <i>ChorusOS 4.0 Target Family Documentation Collection</i> contains precise definitions of supported target family architectures and lists the functionality supported for each target family.</p> <p>This collection also contains information on how to build the ChorusOS operating system for specific targets and run it on supported target hardware.</p>

2. Extract the AnswerBook2 packages you want to install:

```
$ cd download_dir
$ unzip SUNWewcab.zip -d extract_dir
$ unzip SUNWewmab.zip -d extract_dir
$ unzip SUNWewsab.zip -d extract_dir
```

3. Log in to the system on which the AnswerBook2 server is located and become root:

```
$ rlogin ab2_server
$ su -
Password: root_password
```

4. Use the `pkgadd` utility to install the AnswerBook2 packages on the system:

```
# pkgadd -d extract_dir
```

Each package includes a post-install script that adds the collection to the server's database and restarts the server. At this point, the AnswerBook2 collections should be visible through your web browser at `http://ab2_server:8888`, where *ab2_server* is the hostname of the system on which you installed the documentation collections.

Setting Up a Boot Server

A boot server system runs services that allow a ChorusOS target system to obtain a system image at boot time over the network.

This chapter explains how to configure a boot server running on the Solaris operating environment to respond to RARP requests from target systems and deliver ChorusOS system images to targets through TFTP. Both services should run on the same server.

Note - The following procedures apply to a system using NIS[™], not NIS+[™].

If you want to use DHCP, see the *TCP/IP and Data Communications Administration Guide* at <http://docs.sun.com>.

The following figure shows how the boot process occurs, in chronological order from top to bottom.

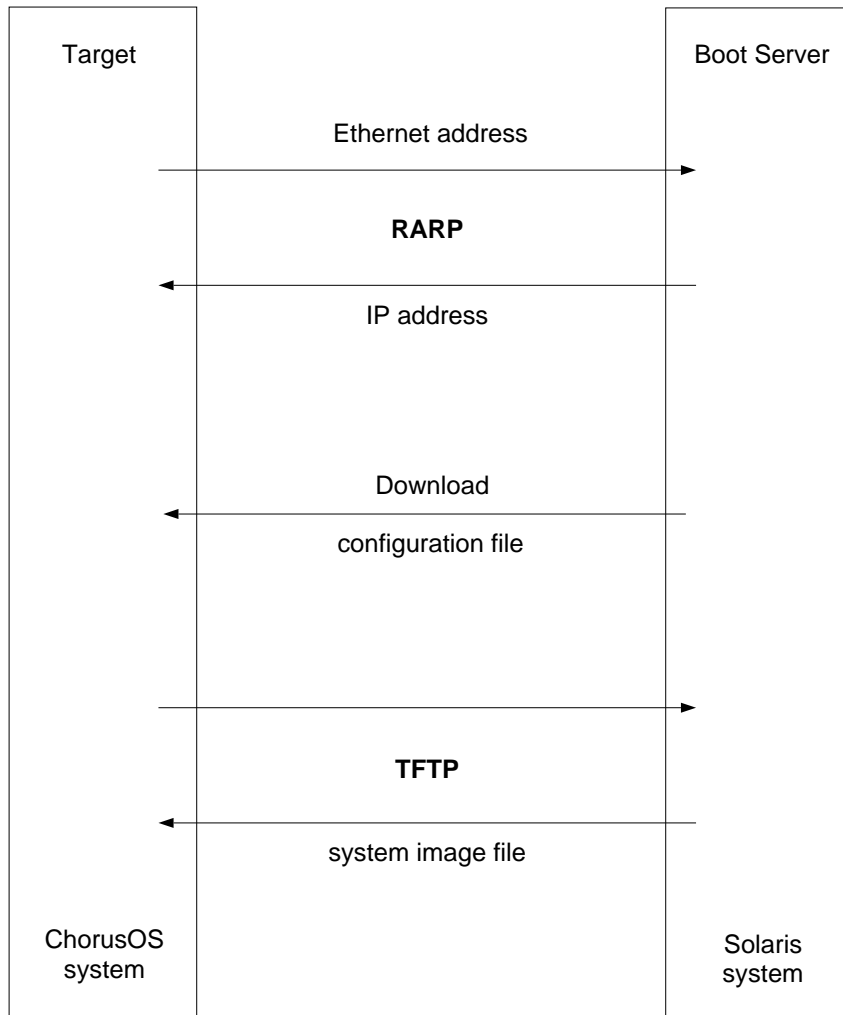


Figure 3-1 The Boot Process

Typically (though not for all targets), the target system bootstraps, and then broadcasts a Reverse Address Resolution Protocol (RARP) request that says something like, “My Ethernet address is 8:0:20:a7:d6:f3. Could some system please tell me my IP address?” A boot server then responds to the target with the IP address that it learned through `/etc/ethers`, NIS, DNS or some other service.

Note - If the target system cannot obtain its IP address through RARP, it tries using a Bootstrap Protocol (BOOTP) or Dynamic Host Configuration Protocol (DHCP) request.

If RARP returns an IP address successfully, the target then attempts to download the configuration file, `/tftpboot/target_IP_address_in_hexadecimal_form`, from the boot

server that responded to the RARP request. This file identifies the *system.image* file that the target needs to request. For example, if the target has IP address 129.157.197.88, the boot server address is 129.157.197.144 and the system image file is `/tftpboot/chorus.bmon`, the configuration file, `/tftpboot/819DC558`, would contain the following:

```
AUTOBOOT=YES
BOOTFILE=chorus.bmon
BOOTSERVER=129.157.197.144
```

After reading the configuration file, the target sends a TFTP request to the boot server saying, “Send me my system image file, *system.image*,” where *system.image* is the path to the system image file. The boot server responds by downloading the system image onto the target system.

The `bootMonitor(1CC)` man page also describes the boot process.

The procedures below assume that you set up only one boot server that does everything.

Setting Up RARP Services

The Reverse Address Resolution Protocol (RARP) service allows the target system to obtain its IP address over the Ethernet from the boot server.

Note - If `/tftpboot` exists at boot time, a system running the Solaris operating environment starts the RARP daemon as part of normal system initialization.

The RARP daemon should run on a boot server whose IP network is the same as that of the target. See the *TCP/IP and Data Communications Administration Guide* and `in.rarpd(1M)` for details.

1. Check `/etc/nsswitch.conf` on the boot server for lines starting with `ethers`:

```
$ grep ^ethers /etc/nsswitch.conf
```

If the output starts with...	Then...
ethers: nis as in ethers: nis [NOTFOUND=return] files	Proceed to Step 2 on page 20.
ethers: files as in ethers: files nis [NOTFOUND=return]	Proceed to Step 3 on page 20.
something other than the choices above	Ask your NIS administrator for help.

2. Verify whether the target is listed in the map `ethers.byname`:

```
$ ypmatch target_hostname ethers
```

If the output is...	Then...
<i>target_Ethernet_address target_hostname</i>	Proceed to Step 4 on page 20.
Can't match key <i>target_hostname</i> in map <code>ethers.byname</code> . Reason: no such key in map.	Verify the target Ethernet address, and then proceed to Step 3 on page 20.

3. Add the following line to `/etc/ethers` on the boot server:

```
target_Ethernet_address                    target_hostname
```

4. Start the RARP daemon on the boot server:

```
$ su
Password: root_password
```

(continued)

```
# /usr/sbin/in.rarpd -a
```

Setting Up TFTP Services

The Trivial File Transfer Protocol (TFTP) service allows the target system to obtain a ChorusOS system image from the boot server at boot time.

Note - Due to limitations in the Trivial File Transfer Protocol, you may encounter difficulties when downloading large system images through TFTP. See *RFC 1350* for a full description of TFTP.

Do not download images larger than 16 Megabytes.

1. Create a `/tftpboot` directory on the boot server *unless it already exists*:

```
$ ls /tftpboot
/tftpboot: No such file or directory
$ su
Password: root_password
# mkdir /tftpboot
# chown user:group /tftpboot
# exit
$ chmod 664 /tftpboot
```

The above commands allow *user* and *group* to write system images and boot configuration files to `/tftpboot`.

2. Remove the comment character, `#`, from the TFTP daemon line in `/etc/inetd.conf` on the boot server to enable TFTP services as part of normal system initialization:

```
tftp  dgram  udp    wait  root    /usr/sbin/in.tftpd    in.tftpd -s /tftpboot
```

3. Restart `inetd` in order to start the TFTP daemon on the boot server:

```
$ su
Password: root_password
# ps -aef | grep inetd
   root      pid      1  0   Dec 15 ?           0:00 /usr/sbin/inetd -s
# kill -1 pid
# exit
```

Patching Installed Software

This chapter discusses how to patch the software you have installed.

Some time after you install the ChorusOS 4.0 product, you may choose to patch the installation at some point with Solaris patches provided by Sun. Patches are managed using the `patchadd(1M)` and `patchrm(1M)` utilities. See the on-line manual pages for details on how to use the utilities.

Tip - We recommend that you apply at least the following patches on your host workstation running the Solaris operating environment before applying patches to the ChorusOS 4.0 product:

Solaris 2.6 Apply patch 106125-08.

Solaris 7 Apply patch 107171-04.

In order to download the patch or patches you need for the host workstation, visit <http://sunsolve.Sun.COM>.

One of the advantages of using the standard Solaris tools to manage installations and patches is that the utilities prevent you from applying patches in the wrong order. One of the constraints of using the standard tools is that the utilities prevent you from applying patches to installations that you have modified “by hand”, that is, without using the tools.

Resist the urge to “fix” an installation of the product “by hand”.

The ChorusOS `configure(1CC)` utility detects inconsistently patched installations and refuses to let you build a ChorusOS system image until patch levels for all components involved are equivalent.

When you receive a patch, follow the instructions in the `README` file provided with the patch. Remember that it is important to apply patches in the correct order.

Uninstalling on the Host

This chapter describes how to uninstall the ChorusOS 4.0 product from the host workstation.

Uninstalling with `pkgrm`

In order to remove part or all of the ChorusOS 4.0 product from the host workstation, you must use the `pkgrm(1M)` command line utility.

Note - You must know the root password for your system in order to be able to use `pkgrm`.

1. See the appropriate document in the *ChorusOS 4.0 Target Family Documentation Collection* for the complete list of packages available for your host/target combination.
2. Check that the packages you want to remove are installed:

```
$ pkginfo | egrep "(Sun Embedded Workshop | ChorusOS)"
```

3. Become root and remove packages using `pkgrm`:

```
$ su
Password: root_password
```

```
# pkgrm list of packages to remove
```

4. **Note that even after all packages are removed, a few HTML files such as `readme.html` and `release.html` remain in `install_dir/4.0`. You may remove these HTML files by hand.**

Where to Go from Here

After you have installed the ChorusOS 4.0 product on your host workstation and prepared a boot server that can download system images to the target system, proceed to the appropriate document in the *ChorusOS 4.0 Target Family Documentation Collection*. There you will find instructions on how to build a system image on your host workstation that you can place on the boot server and download to the ChorusOS target system at boot time.

Once you have managed to boot the target system, you can configure and build a system image that supports exactly what you need to develop applications. *Introducing ChorusOS 4.0* presents the features and components of ChorusOS systems. It explains how to use ChorusOS 4.0 and how to create an application that runs on a ChorusOS system. It also explains how to debug the system. The XRAY Debugger documentation from Mentor Graphics explains how to debug a ChorusOS application. XRAY is the reference debugger for use with ChorusOS systems.

To port the ChorusOS 4.0 product to your specific hardware. The *ChorusOS 4.0 Porting Guide* explains how to port the ChorusOS system to another target board. If you have developed new drivers for your hardware, the *ChorusOS 4.0 Device Driver Framework Guide* describes the device driver architecture of the ChorusOS system and explains how to add a new driver.

For system administration tasks the *ChorusOS 4.0 File Systems User's Guide* describes how to use the file systems supported by the ChorusOS 4.0 product, including NFS and the *ChorusOS 4.0 Network Administration Guide* details how to use the networking capabilities of the ChorusOS 4.0 product.

For those designing and developing highly available applications, the *ChorusOS 4.0 Hot Restart Guide* describes how to develop applications to use the hot restart functionality of the ChorusOS 4.0 product.

Finally, the *ChorusOS 4.0 Reference Manual Collection* contains all of the on-line manual pages for the ChorusOS 4.0 product.

Default File Locations and Directory Contents

The table below briefly describes the contents of the directories created on the host workstation where you install the ChorusOS 4.0 product.

By default *install_dir* is `/opt/SUNWconn/SEW/4.0`.

family is an affix such as `mpc8260`, `powerpc`, `usparc` or `x86`, specific to the target family architecture.

TABLE A-1 Default File Locations and Directory Contents

Directory or File	Contains
<code>/opt/answerbooks/english/SEW</code>	Product documentation in AnswerBook2™ format
<code>install_dir/4.0/chorus-doc</code>	Product documentation in HTML, PDF and PostScript format, Reference manual pages
<code>install_dir/4.0/chorus-family/kernel</code>	Binary files for the ChorusOS kernel and drivers
<code>install_dir/4.0/chorus-family/opt/jvm</code>	Java virtual machine for ChorusOS target systems
<code>install_dir/4.0/chorus-family/opt/x11</code>	Binary files for X Windows

TABLE A-1 Default File Locations and Directory Contents *(continued)*

Directory or File	Contains
<i>install_dir</i> /4.0/chorus-family/opt/XRAY	XRAY debugger for ChorusOS (requires separate installation)
<i>install_dir</i> /4.0/chorus-family/os	Binary files for the ChorusOS operating system
<i>install_dir</i> /4.0/chorus-family/src	Source files including driver and IOM sources and examples
<i>install_dir</i> /4.0/chorus-family/src/nucleus/bsp	Board support package source files
<i>install_dir</i> /4.0/chorus-family/tools	Development tools
<i>install_dir</i> /4.0/readme.html	Important information concerning this release
<i>install_dir</i> /4.0/release.html	Notes concerning this release

Index

E

environment variable
 see also MANPATH
 see also PATH

M

MANPATH 13

O

online documentation 6

P

PATH 13

pkgrm 25

R

RARP daemon 19, 20

Reverse Address Resolution Protocol
 (RARP) 19

root password 12

T

TFTP daemon 21, 22

Trivial File Transfer Protocol (TFTP) 21