



ChorusOS 4.0 MPC8xx Target Family Guide

Sun Microsystems, Inc.
901 San Antonio Road
Palo Alto, CA 94303-4900
U.S.A.

Part Number 806-3964-10
December 1999

Copyright 1999 Sun Microsystems, Inc. 901 San Antonio Road, Palo Alto, California 94303-4900 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, Sun Embedded Workshop, ChorusOS, Solstice, JDK and Solaris are trademarks, registered trademarks, or service marks 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.

RESTRICTED RIGHTS: Use, duplication, or disclosure by the U.S. Government is subject to restrictions of FAR 52.227-14(g)(2)(6/87) and FAR 52.227-19(6/87), or DFAR 252.227-7015(b)(6/95) and DFAR 227.7202-3(a).

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 1999 Sun Microsystems, Inc. 901 San Antonio Road, Palo Alto, California 94303-4900 Etats-Unis. 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, Sun Embedded Workshop, ChorusOS, Solstice, JDK et Solaris sont des marques de fabrique ou des marques déposées, ou marques de service, 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 REPOUDRE 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

1.	ChorusOS 4.0 MPC8xx Target Family Guide	5
	Preface	5
	How This Guide is Organized	5
	Related Books	6
	Typographical Conventions	6
	Shell Prompts	6
	Ordering Sun Documents	7
	Accessing Sun Documentation Online	7
	Obtaining Technical Support	7
	Development Environment	8
	SPARC™/Solaris™ Reference Host Environments	8
	Cross Compiler	8
	Graphical Debugger	8
	ChorusOS 4.0 Supported Features	9
	Libraries	12
	Utilities	13
	Target Utilities	13
	Host Utilities	15
	Reference Hardware	15

Reference Processors and BSPs	16
mpc8xxADS Reference BSP	16
Reference Target Platforms	18
Validated Reference Targets	18
How to Build and Boot a System Image on the Target	19
▼ Building a ChorusOS 4.0 System Image	19
▼ Placing the System Image on the Boot Server	21
How to Boot the Target System Using Motorola's mpc8bug Host Debugger	22
▼ Booting with the mpc8bug Host Debugger	22
How to Boot the Target System from Flash Memory Using bootMonitor	25
▼ Creating a bootMonitor Image	25
▼ Flashing the Target System with the bootMonitor Image	27
▼ Booting the Target System	28
A. ChorusOS 4.0 for MPC8xx Product Packages and Part Numbers	29
Binary Product — for Solaris Host	29
Flite Add-on for Solaris Host	30
Source Add-on for Solaris Host	31
Documentation for Solaris Host	31

ChorusOS 4.0 MPC8xx Target Family Guide

This guide describes how to run the ChorusOS™ 4.0 product for the MPC8xx processor family.

Preface

How This Guide is Organized

ChorusOS 4.0 MPC8xx specific information is provided in the following major sections:

- “Development Environment” on page 8, includes supported hosts, host operating systems and development systems.
- “ChorusOS 4.0 Supported Features” on page 9, includes kernel components and POSIX components.
- “Libraries” on page 12.
- “Utilities” on page 13, includes host and target utilities.
- “Reference Hardware” on page 15, includes supported reference platforms, supported devices, and validated reference platforms.
- “How to Build and Boot a System Image on the Target” on page 19.
- Appendix A, details the list of Solaris packages in the product components, and the associated part numbers.

Related Books

See the *ChorusOS 4.0 Installation Guide for Solaris Hosts* for a description of the installation process of the ChorusOS 4.0 product on a host workstation running the Solaris™ operating environment. This document also describes how to set up a boot server running the Solaris operating environment.

See the *ChorusOS 4.0 Introduction* for a complete description of the ChorusOS 4.0 features.

Typographical Conventions

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

TABLE 1-1 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. machine_name% you have mail.
AaBbCc123	What you type, contrasted with on-screen computer output	machine_name% su Password:
<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 1-2 Shell Prompts

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

Ordering Sun Documents

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

For a list of documents and how to order them, visit the Sun Documentation Center on Fatbrain.com at <http://www1.fatbrain.com/documentation/sun>.

Accessing Sun Documentation Online

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

Obtaining Technical Support

Sun Support Access offerings are available exclusively to members of the Sun Developer Connection Program. To get free membership in the Sun Developer Connection Program, go to <http://www.sun.com/developers>. For more information or to purchase Sun Support Access offerings, visit: <http://www.sun.com/developers/support> or contact the Sun Developer Connection Program office near you.

Development Environment

The ChorusOS 4.0 product provides a host-target development environment. Applications are developed on a workstation (the host), and then downloaded and executed on a specific board (the target).

A cross development system is needed to build the applications that execute on the target board (see Section “Utilities” on page 13).

SPARC™/Solaris™ Reference Host Environments

Prerequisites for the Solaris host reference configuration are the following:

- Sun SPARCstation™
- Solaris 2.6, or Solaris 7
- JDK™ 1.1.3 to 1.1.8, for the installation tool
- JDK 1.2, for the graphical configuration tool

Cross Compiler

This development environment component is bundled with the ChorusOS 4.0 for MPC8xx product:

- Chorus Cross Development System 5.0, target PowerPC ELF

The Chorus Cross Development System is based on the Experimental GNU Compiler System egcs 1.1.2 and binutils 2.9.1 and additional patches.

Graphical Debugger

This development environment component is bundled with the ChorusOS 4.0 for MPC8xx product:

- XRAY Debugger from Mentor Graphics, target PowerPC ELF version 4.4crb and additional patches.

ChorusOS 4.0 Supported Features

The following table shows the ChorusOS kernel and operating system optional features that are available for the MPC8xx processor family. The availability status of a feature, can be one of:

- Y** The feature is supported, and is configurable with the `configurator(1CC)` command, or with the `ews` GUI configuration tool.
- Please refer to the note at the end of the table for information about specific conditions, or restrictions, for a given supported feature.
- Some of the features (such as MSDOSFS, FLASH, FS_MAPPER, for example) require specific low-level drivers. These features operate only on platforms which provide these drivers.
- N** The feature is not supported.

Feature Description	Feature Name	Availability
Actor management		
Dynamic actor loading management	ACTOR_EXTENDED_MNGT	Y
User-mode extension support	USER_MODE	Y
Dynamic libraries	DYNAMIC_LIB	Y ¹
Compressed file management	GZ_FILE	Y
Scheduling		
POSIX round-robin scheduling class	ROUND_ROBIN	Y
Memory management		
Virtual (user and supervisor) address space	VIRTUAL_ADDRESS_SPACE	Y
On-demand paging	ON_DEMAND_PAGING	N
Hot restart and persistent memory		
Hot restart	HOT_RESTART	Y
Inter-thread communication		

Feature Description	Feature Name	Availability
Semaphores	SEM	Y
Event flag sets	EVENT	Y
Mutual exclusion lock supporting thread priority inversion avoidance	RTMUTEX	Y
Time management		
Periodic timers	TIMER	Y
Thread and actor virtual timer	VTIMER	Y
Date and time of day	DATE	Y
Real-time clock	RTC	Y
Inter-process communication		
Location-transparent inter-process communication	IPC	Y
Remote (inter-site) IPC support	IPC_REMOTE	Y
Remote IPC communications medium	IPC_REMOTE_COMM	Y
Mailbox-based communications mechanism	MIPC	Y
POSIX 1003.1-compliant message queues	POSIX_MQ	Y
POSIX 1003.1-compliant shared memory objects	POSIX_SHM	Y
LAP		
Local name server for LAP binding	LAPBIND	Y
LAP validity-check option	LAPSAFE	Y
Tools support		
Message logging	LOG	Y
Profiling and benchmark support	PERF	Y
System Monitoring	MON	Y
System debugging	DEBUG_SYSTEM	Y ²
C_INIT		
Basic command interpreter on target	LOCAL_CONSOLE	Y

Feature Description	Feature Name	Availability
Remote shell	RSH	Y
File system options		
Named pipes	FIFOFS	Y
MS-DOS file system	MSDOSFS	Y
NFS client	NFS_CLIENT	Y
NFS server	NFS_SERVER	Y
UFS file system	UFS	Y
I/O management		
Network packet filter	BPF	Y
Swap support	FS_MAPPER	N
Driver for IDE disk	IDE_DISK	N
/dev/mem, /dev/kmem, /dev/null, /dev/zero	DEV_MEM	Y
Support for RAM disk	RAM_DISK	Y
Support for FLASH media	FLASH	Y
Virtual TTY	VTTY	Y
Driver for SCSI disk	SCSI_DISK	N
Support for IPC	IOM_IPC	Y
Support for OSI	IOM_OSI	Y
Networking		
Serial link IP	SLIP	Y
POSIX 1003.1g-compliant sockets	POSIX_SOCKETS	Y
Point-to-point protocols	PPP	Y
Local sockets and pipes	AF_LOCAL	Y
Administration		
ChorusOS statistics	ADMIN_CHORUSSTAT	Y
ifconfig administration command	ADMIN_IFCONFIG	Y
mount administration command	ADMIN_MOUNT	Y
rarp administration command	ADMIN_RARP	Y
route administration command	ADMIN_ROUTE	Y

Feature Description	Feature Name	Availability
shutdown administration command	ADMIN_SHUTDOWN	Y
netstat administration command	ADMIN_NETSTAT	Y

1. Limitation: the binaries making up the executing image of an actor (main program and dynamic libraries) must fit into a 32MB address range. Even if their total size is less than 32 MB, this is not guaranteed in flat mode or for supervisor actors.
2. A flashed system image configured with DEBUG_SYSTEM enabled does not boot. The DEBUG_SYSTEM feature must be disabled.

Libraries

The ChorusOS operating system provides the elementary libraries indicated in the following list:

ChorusOS embedded library ¹	libebd.a
ChorusOS extended library ¹	libcx.a
C++ library	libC.a
X11 related client libraries (not thread safe)	libX11.a, libXaw.a, libXext.a, libXmu.a, libXt.a
Specific BSD APIs (not thread safe)	libbsd.a
The SunRPC library	librpc.a
The mathematical library	libm.a
The “embedded” C library ²	stdc.a
The microkernel “visu” library ³	visu.a

1. The libebd.a, libcx.a, libm.a and libC.a libraries have been made thread-safe in order to support multithreaded actors.
2. Included in libebd.a
3. This library is provided for the sake of backwards compatibility only. It is not documented. Its use is strongly discouraged.

Utilities

Target Utilities

The following utilities may be run on the target ChorusOS operating system:

chorusStat(1CC)

cp(1CC)

cs(1CC)

date(1CC)

dd(1CC)

df(1CC)

domainname(1CC)

ftp(1CC)

hostname(1CC)

ls(1CC)

mkdir(1CC)

mkfifo(1CC)

mv(1CC)

netstat(1CC)

nfsstat(1CC)

pax(1CC)

PROF(1CC)

profctl(1CC)

rdbc(1CC)

rm(1CC)

rmdir(1CC)

touch(1CC)

uname(1CC)

ypcat(1CC)

ypmatch(1CC)
ypwhich(1CC)
arp(1M)
chat(1M)
chorusNS(1M)
chorusNSinet(1M)
chorusNSSite(1M)
dhclient(1M)
disklabel(1M)
flashdefrag(1M)
format(1M)
fsck(1M)
fsck_dos(1M)
ftpd(1M)
inetNS(1M)
inetNSdns(1M)
inetNShost(1M)
inetNSien116(1M)
inetNSnis(1M)
mkfd(1M)
mkfs(1M)
mount(1M)
mount_msdos(1M)
mount_nfs(1M)
mountd(1M)
newfs(1M)
newfs_dos(1M)
nfsd(1M)
portmap(1M)
shutdown(1M)
slattach(1M)

syncd(1M)
sysctl(1M)
telnetd(1M)
umount(1M)
ypbind(1M)

Host Utilities

The following utilities may be run on the host machine:

chadmin(1CC)
chconsole(1CC)
chlog(1CC)
chls(1CC)
ChorusOSMkMf(1CC)
chserver(1CC)
configurator(1CC)
configure(1CC)
ews(1CC)
mkmerge(1CC)
*rdb*s(1CC)
profrpg(1CC)

Reference Hardware

ChorusOS 4.0 targets are described in this section from three different points of view:

Reference Processors and BSPs:

This subsection describes the processors on which the ChorusOS 4.0 product can run as well as the details of the BSPs included in the delivery.

Reference Target Platforms:

This section describes all the target platforms which can be used as references in the context of Sun support contracts.

Validated Reference Targets:

This section describes the precise platforms used to run the Sun QA tests; this may be useful, in case of bugs, as a hint or guide to help in identifying issues which are closely hardware related.

Reference Processors and BSPs

The ChorusOS 4.0 system for MPC8xx supports the following processors:

- Motorola PowerPC MPC860
- Motorola PowerPC MPC821
- Motorola PowerPC MPC823

The ChorusOS 4.0 system for MPC8xx supports the following reference BSP:

- mpc8xxADS Reference BSP

mpc8xxADS Reference BSP

Systems

The mpc8xxADS reference BSP supports the following boards:

- MPC860 FADS – Motorola SPS
- MPC821 FADS – Motorola SPS
- MPC823 FADS – Motorola SPS

Devices

The mpc8xxADS reference BSP supports the following MPC860/821 FADS on board devices:

Device Id	ChorusOS Driver
cpu (time base and decrementer)	sun:powerpc-(tb,dec)-timer
flash (FLASH memory)	sun:bus-amd29xxx-flash
quicc-8xx (QUICC bus)	sun:powerpc-mpc8xx-(bus, quicc)
quicc-8xx/smc-1 (RS232)	sun:-smc-dbglink (console)
quicc-8xx/smc-2 (RS232)	sun:quicc-smc-uart
quicc-8xx/scc-1 (Ethernet 10BT)	sun:quicc-scc-ether
quicc-8xx/scc-2	not supported
quicc-8xx/scc-3	not supported
quicc-8xx/scc-4	not supported

The mpc8xxADS reference BSP supports the following MPC823 FADS on board devices:

Device Id	ChorusOS Driver
cpu (time base and decrementer)	sun:powerpc-(tb,dec)-timer
flash (FLASH memory)	sun:bus-amd29xxx-flash
quicc-8xx (QUICC bus)	sun:powerpc-mpc8xx-(bus, quicc)
quicc-8xx/smc-1 (RS232)	sun:-smc-dbglink (console)
quicc-8xx/smc-2	not supported
quicc-8xx/scc-1 (USB)	not supported
quicc-8xx/scc-2 (Ethernet 10BT)	sun:quicc-scc-ether

Reference Target Platforms

This section describes all the target platforms which can be used as references in the context of Sun support contracts.

MPC821/823 FADS (Motorola/SPS)

Type:	Evaluation/Development Board
Processors:	MPC821/823 (50 Mhz)
Main memory:	16-32 MB
Devices:	Asynchronous serial ports (38.4 Kbaud), 10BaseT Ethernet, Timers, Flash memory (AMD 29040 chip)
Host debugger:	mpc8bug v1.5 (via ADI Port)

MPC860 FADS (Motorola/SPS)

Type:	Evaluation/Development Board
Processor:	MPC860 PowerQUICC (50 Mhz)
Main memory:	16-32 MB
Devices:	Asynchronous serial ports (38.4 Kbaud), 10BaseT Ethernet, Timers, Flash memory (AMD 29040 chip)
Host debugger:	mpc8bug v1.5 (via ADI Port)

Validated Reference Targets

This section describes the precise platforms used to run the Sun QA tests.

- MPC821/823 FADS: MPC8xxFADS Rev. PILOT with MPC821/823FADSDB Rev. PILOT

How to Build and Boot a System Image on the Target

▼ Building a ChorusOS 4.0 System Image

The following procedure assumes that the ChorusOS 4.0 product has already been correctly installed on the host workstation. See the *ChorusOS 4.0 Installation Guide for Solaris Hosts*.

1. Create and change to a build directory where you will build system images:

```
$ mkdir build_dir
$ cd build_dir
```

2. Set an environment variable to use with the `configure(1CC)` command as a shortcut to the base directory.

For example:

Set the environment variable...	To the family-specific product directory. The default value is...
DIR	/opt/SUNWconn/SEW/4.0/ chorus-mpc860

3. Make sure your `PATH` has been set correctly to include the directory `install_dir/4.0/chorus-mpc860/tools/host/bin`, where the default **`install_dir`** is `/opt/SUNWconn/SEW`. Also make sure that your `PATH` includes `/usr/openwin/bin`, which contains the `imake` utility.

4. Configure the build directory, using the `configure(1CC)` command:

If you are building from a binary distribution:

```
$ configure -b $DIR/kernel \
$DIR/os \
$DIR/tools \
-s $DIR/src/nucleus/bsp/drv \
$DIR/src/nucleus/bsp/powerpc \
$DIR/src/nucleus/bsp/powerpc/mpc8xxADS \
$DIR/src/iom
```

Note - The above command configures the build directory to include components installed during a “Default Install”. It does not include optional components, such as the X library or code examples, that you may choose to install separately on Solaris host workstations. For example, in order to include everything in your build environment:

```
$ configure -b $DIR/kernel \
$DIR/os \
$DIR/opt/X11 \
$DIR/tools \
-s $DIR/src/nucleus/bsp/drv \
$DIR/src/nucleus/bsp/powerpc \
$DIR/src/nucleus/bsp/powerpc/mpc8xxADS \
$DIR/src/iom \
$DIR/src/opt/examples
```

If you are building from the source distribution, see the *ChorusOS 4.0 Production Guide*.

As a result of configuration, *build_dir* now contains a *Makefile*, which is used to generate the build environment, and a *Paths* file, which specifies paths to files required by and created in the build environment.

5. Generate the build environment:

```
$ make
```

6. Build a system image:

```
$ make chorus
```

The resulting system image file is located in the build directory, *build_dir* and is called *chorus.RAM*.

Note - You can also make a smaller system image that includes only the operating system kernel:

```
$ make kernonly
```

▼ Placing the System Image on the Boot Server

See the *ChorusOS 4.0 Installation Guide for Solaris Hosts* for instructions on how to configure the boot server.

1. Copy the system image to the boot server.

For example, on a Solaris host workstation:

```
$ rcp chorus.RAM boot_server:/tftpboot
```

2. Verify that everyone has at least read access to the system image on the boot server.

For example:

```
$ rlogin boot_server
Password: password_for_user
$ ls -l /tftpboot/chorus.RAM
-rwxr-xr-x  1 user  group      1613824 Dec 15 17:33 chorus.RAM*
```

3. While logged in to the boot server, create a configuration file for the target.

For a target system with IP address 129.157.173.199 using a boot server with IP address 129.157.173.144, the configuration file contains the following:

```
AUTOBOOT=YES
BOOTFILE=chorus.RAM
BOOTSERVER=129.157.173.144
```

The configuration file is named `/tftpboot/819DADC7.ChorusOS.4.0`, which is constructed from the target system IP address 129.157.173.199 as a concatenation of the following:

- 129 in decimal translates to 81 in hexadecimal
- 157 in decimal translates to 9D in hexadecimal
- 173 in decimal translates to AD in hexadecimal
- 199 in decimal translates to C7 in hexadecimal
- (optional) `.ChorusOS.4.0` identifies the release, and is appended to the concatenation of the IP address expressed in hexadecimal.

Note - The system first attempts to find the configuration file with the `.ChorusOS.4.0` extension. If it fails to find one, however, it attempts to find a configuration file without the `.ChorusOS.4.0` extension.

How to Boot the Target System Using Motorola's mpc8bug Host Debugger

▼ Booting with the mpc8bug Host Debugger

The following procedure concerns mpc8xx FADS target systems reference platforms.

1. Install Motorola's ADI host debugger (mpc8bug) on the boot host.

The *MPC8XX ADS Software(MPC8bug v 1.5)* package contains the mpc8bug monitoring tool, configuration files for all reference targets, and documentation explaining how to install and use the tool.

See the mpc8bug installation manual for details about installation.

2. Append a "ChorusOS load" macro to the .mpctcl.cfg configuration file.

The following TCL macro should be appended at the end of the `.mpctcl.cfg` file that is provided as part of the mpc8bug package:

```
a chload reset :h \; load \ $1 \; rms der decie 0 \; rms der extie 0 \; rms der prie 0 \;
rms der sysie 0 \; rms der trie 0 \; rms der mcie 0 \; rms der itlbmse 0 \;
rms der dtlbmse 0 \; rms der itlbere 0 \; rms der dtlbere 0 \; go
```

The above `rms der xx 0` commands allow the ChorusOS kernel to handle the corresponding exceptions.

3. Connect the Host ADI and Target Debug ports.

The MPC8xx[F]ADS board must be installed and configured to operate in Host Controlled configuration mode via its ADI port. Therefore, you must plug an ADI board into one of the SBus or ISA slots of the boot host and connect to the MPC8xx[F]ADS through a 37-pin flat cable.

See the section “Installation Instructions” in the *MPC8xx[F]ADS User's Manual* for details about installing the ADI board and configuring the target to boot from the Debug port.

Once this is done, you can start the mpc8bug monitor utility on the boot host as follows:

4. Connect the target system and boot system RS232 ports.

Connect the target system RS232 port on SMC1 to the boot system serial port for the ChorusOS debug agent link and system console.

5. Restart the target system.

6. Start the mpc8bug monitor:

```
$ mpc8bug ADI ADS
```

Where:

- **ADI** is the number, from 0 to 3, of the SBus expansion slot for the ADI board on the SPARCstation host system, or the address of the ADI card divided by 0x100 for a PC/AT host.
- **ADS** is the ADI address, from 0 to 3, of the MPC8xx[F]ADS target board, as determined by the ADDR switches on the DS1 Dip-Switch of the MPC8xx[F]ADS board.

When started, the mpc8bug monitor automatically executes the commands included in the configuration files:

```
mpc8bug version 1.5  May 18 98
Copyright 1998 Motorola, Inc.  All Rights Reserved.

  Initializing memory controller and UPM for 50MHZ
    DRAM delay set to 60ns
    DRAM size set to 16Mbytes
Executing .mpctcl.cfg file from the current directory.
Executing .mpc8xx.cfg file from the current directory.
Executing .mpc860.cfg file from the current directory.
Executing .mpcsdram.cfg file from the current directory.
f860Bug>
```

Make sure the MPC8xx[F]ADS hardware is in a working state by running the diagnostic tests T1, T2, T3 and T4 that are provided by the mpc8bug monitor. See the mpc8bug documentation for details about using mpc8bug and associated diagnostic programs.

7. Load the system image through mpc8bug:

```
f860Bug> chload chorus.RAM
( reset :h ; load chorus.RAM ; rms der decie 0 ; rms der extie 0 ; rms der prie 0 ;
rms der sysie 0 ; rms der trie 0 ; rms der mcie 0 ; rms der itlbmse 0 ; rms der dtlbmse 0 ;
rms der itlbere 0 ; rms der dtlbere 0 ; go )
  Initializing memory controller and UPM for 50MHZ
    DRAM delay set to 60ns
    DRAM size set to 16Mbytes
  Loading ELF file . . .
Entry point set to 001cf000
Loading section 1 (.Chorus0) : 001ce000 bytes at 00004000
Heap start address set to 00000001
No symbol table
r3 and r5 are set to 0
  Use Ctrl-C to abort execution !
```

The following messages are displayed on the target system console:

```
..... Booting Chorus .....

ChorusOS r4.0.0 for PowerPC - Motorola MPC8xx[F]ADS
Copyright (c) 1999 Sun Microsystems, Inc. All rights reserved.

Kernel modules : CORE SCHED_FIFO SEM MIPC IPC_L MEM_PRM KDB TICK MON ENV ETIMER
LOG LAPSAFE MUTEX EVENT UI DATE PERF TIMEOUT LAPBIND DKI
MEM: memory device 'sys_bank' vaddr 0x7ec22000 size 0x1ce000
/cpu: sun:powerpc-(timebase,dec)-timer driver started
/quicc-8xx: sun:powerpc-mpc8xx-(bus,quicc) driver started
/quicc-8xx/smc-2: sun:quicc-smc-uart driver started
/quicc-8xx/scc-1: sun:quicc-scc-ether driver started
/quicc-8xx/scc-1: Ethernet address 08:00:3e:00:00:06
/quicc-8xx/on-board-flash: error -- wrong (unsupported) CHIP/VENDOR ID
/flash-emul: started as 'One bank of AMD29F040x4 (64k erase block)'
DATE: warning -- svDeviceLookup(rtc) failed (-7)
IOM: SOFTINTR DISABLED (-31). Using an Interrupt thread
IOM Init cluster space from: 0x7ebff000 to: 0x7ec1f800 [65 items of size: 2048]
IOM Init io-buf pool from: 0x7ec1f850 to: 0x7ec1fd70 [8 items of size: 164]
IOM Init raw io-buffer pool from: 0x7ec1fd70 to: 0x7ec211f0 [32 items of size: 164]
Copyright (c) 1992-1998 FreeBSD Inc.
Copyright (c) 1982, 1986, 1989, 1991, 1993
    The Regents of the University of California. All rights reserved.

max disk buffer space = 0x10000
/rd: sun:ram--disk driver started
```

(continued)


```

/quicc-8xx/on-board-flash: error -- wrong (unsupported) CHIP/VENDOR ID
C_INIT: started
C_INIT: /image/sys_bank mounted on /dev/bd00
C_INIT: found /image/sys_bank/sysadm.ini
C_INIT: executing start-up file /image/sys_bank/sysadm.ini
bpf: ifeth0 attached
IOM: ifnet ifeth0 bound to device /quicc-8xx/scc-1
bpf: lo0 attached
C_INIT: Internet Address: 129.157.173.199
ifeth0: flags=88437<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
        inet 129.157.173.199 netmask 0xffff0000 broadcast 129.157.255.255
        ether 08:00:3e:00:00:06
lo0: flags=8049<UP,LOOPBACK,RUNNING,MULTICAST> mtu 16384
        inet 127.0.0.1 netmask 0xff000000
C_INIT: rshd started

```

How to Boot the Target System from Flash Memory Using bootMonitor

In order to boot the target from flash memory you must perform the following procedures.

▼ Creating a bootMonitor Image

See `bootMonitor(ICC)` for details about how bootMonitor works.

1. Create a build directory where you will build a bootMonitor image:

```

$ mkdir bootmon
$ cd bootmon

```

Note that this build directory is different from the directory where you build system images.

2. Configure the bootMonitor build directory based on the binary distribution:

```
$ configure -b $DIR/kernel \  
$DIR/os \  
$DIR/tools \  
-s $DIR/src/nucleus/bsp/drv \  
$DIR/src/nucleus/bsp/powerpc \  
$DIR/src/nucleus/bsp/powerpc/mcp8xxADS \  
$DIR/src/iom
```

3. Generate the build environment:

```
$ make
```

4. Edit the special *bootmon/conf/mini* profile so that it reads:

```
#  
# Mini Profile  
#  
  
#  
# Kernel features  
#  
-set USER_MODE=false  
-set VIRTUAL_ADDRESS_SPACE=false  
-set SEM=false  
-set EVENT=false  
-set MONITOR=false  
-set TIMER=false  
-set DATE=false  
-set RTC=false  
-set PERF=false  
-set IPC=false  
-set MIPC=false  
-set LAPBIND=true # Change this from 'false' to 'true'  
-set LAPSAFE=true # Change this from 'false' to 'true'  
-set MON=false  
-set LOG=false
```

5. Configure the build environment for bootMonitor:

```
$ configurator -p conf/mini  
$ configurator -set BOOT_MODE=ROM
```

(continued)

```
$ configurator -setenv ETHER_ADDR=xx:xx:xx:xx:xx:xx
```

As you enter the commands above, replace `xx:xx:xx:xx:xx:xx` with the target system Ethernet address.

6. Build a bootMonitor image:

```
$ make bootMonitor
```

The resulting system image file is located in the build directory, *bootmon* and is called `bootMonitor.ROM`.

▼ Flashing the Target System with the bootMonitor Image

1. Restart the target system.
2. Start the mpc8bug tool. See Step 6 on page 23 for details.
3. Use the `loadf` command to flash the bootMonitor:

```
f860Bug> reset :h ; loadf full_path/bootMonitor.ROM 0x100000
Initializing memory controller and UPM for 50MHZ
DRAM delay set to 60ns
DRAM size set to 4Mbytes
loadf: Loading ELF file . . .
Loading flash mapped sections to ram memory buffer:
Loading section 1 ( ) : 00039000 bytes at 00100000
Programming flash :00039000 bytes at 02800000-02838fff
Flash programming completed
```

4. Power off the target board.
5. Unplug the ADI cable.

▼ Booting the Target System

- ◆ **Restart the target system.**

See Step 7 on page 24 for an example of the messages displayed on the target system console.

ChorusOS 4.0 for MPC8xx Product Packages and Part Numbers

The tables below list the Solaris packages available in this release and indicate the part number for each distinct product component.

Binary Product — for Solaris Host

Part Number	CLX400-SG70
Package Name	Description
SUNWewbm	Sun Embedded Workshop for MPC8xx BSP source
SUNWewcd	Sun Embedded Workshop PDF Format Common Documentation
SUNWewch	Sun Embedded Workshop HTML Format Common Documentation
SUNWewcp	Sun Embedded Workshop PostScript Format Common Documentation
SUNWewdm	Sun Embedded Workshop for MPC8xx XRAY Debugger
SUNWewgm	Sun Embedded Workshop for MPC8xx GUI Tools
SUNWewim	Sun Embedded Workshop for MPC8xx IOM source
SUNWewkm	Sun Embedded Workshop for MPC8xx Kernel

Part Number	CLX400-SG70
Package Name	Description
SUNWewm	Sun Embedded Workshop On-Line Manual Pages
SUNWewom	Sun Embedded Workshop for MPC8xx OS
SUNWewpm	Sun Embedded Workshop for MPC8xx Examples
SUNWewsd	Sun Embedded Workshop PDF Format Specific Documentation
SUNWewsh	Sun Embedded Workshop HTML Format Specific Documentation
SUNWewsp	Sun Embedded Workshop PostScript Format Specific Documentation
SUNWewtm	Sun Embedded Workshop for MPC8xx Build Tools
SUNWewum	Sun Embedded Workshop for MPC8xx Debugger and Profiling Support
SUNWewxm	Sun Embedded Workshop for MPC8xx X11 Library
SUNWewzm	Sun Embedded Workshop for MPC8xx egcs Toolchain

Flite Add-on for Solaris Host

Part Number	FLT400-SG70
Package Name	Description
SUNWewfm	Sun Embedded Workshop for MPC8xx Flite

Source Add-on for Solaris Host

Part Number	CLX400-SG70-S
Package Name	Description
SUNWewhm	Sun Embedded Workshop for MPC8xx OS source
SUNWewlm	Sun Embedded Workshop for MPC8xx Kernel source

Documentation for Solaris Host

Part Number	CLX400-SAA0-D1N
Package Name	Description
SUNWewcd	Sun Embedded Workshop PDF Format Common Documentation
SUNWewch	Sun Embedded Workshop HTML Format Common Documentation
SUNWewcp	Sun Embedded Workshop PostScript Format Common Documentation
SUNWewm	Sun Embedded Workshop On-Line Manual Pages
SUNWewsd	Sun Embedded Workshop PDF Format Specific Documentation
SUNWewsh	Sun Embedded Workshop HTML Format Specific Documentation
SUNWewsp	Sun Embedded Workshop PostScript Format Specific Documentation