ChorusOS 4.0 PowerPC 60x/750 Target Family Guide

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Contents

ChorusOS 4.0 PowerPC 60x/750 Target Family Guide

This guide describes how to run the ChorusOS™ 4.0 product for the PowerPC 60x/750 processor family.

Preface

How This Guide is Organized

ChorusOS 4.0 PowerPC 60x/750 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 16, includes supported reference platforms, supported devices, and validated reference platforms.

- "How to Build and Boot a System Image on the Target" on page 22.

- 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 Installation Guide for Windows NT Hosts* for a description of the installation process of the ChorusOS 4.0 product on a host workstation running Windows NT 4.0.

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 `.login` file. Use `ls -a` to list all files. `machine_name% you have mail.`
`AaBbCc123`	What you type, contrasted with on-screen computer output	`machine_name%` **`su`** `Password:`
AaBbCc123	Command-line placeholder: replace with a real name or value	To delete a file, type **`rm`** *filename*.
AaBbCc123	Book titles, new words or terms, or words to be emphasized.	Read Chapter 6 in *User's Guide*. These are called *class* options. You must be *root* 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	`#`

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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

PC/Windows NT Reference Host Environment

The Windows NT host reference configuration is as follows:

- PC Windows NT 4.0 workstation or server, with Service Pack 5.
- Solstice Network Client™ SNC 3.1 is required as an NFS server for ChorusOS 4.0. Only NT FAT file system partitions are validated.
- A Solaris system providing TFTP and RARP daemons in order to allow booting of the ChorusOS 4.0 product.
- JDK 1.2, for the graphical configuration tool.

Note - The serial line used for debugging with XRAY can only be used at 9600 bauds.

Cross Compiler

This development environment component is bundled with the ChorusOS 4.0 for PowerPC 60x/750 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 PowerPC 60x/750 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 PowerPC 60x/750 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

Feature Description	Feature Name	Availability
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 [2]
On-demand paging	ON_DEMAND_PAGING	Y [2]
Hot restart and persistent memory		
Hot restart	HOT_RESTART	Y
Inter-thread communication		
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

Feature Description	Feature Name	Availability
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 [3]
C_INIT		
Basic command interpreter on target	LOCAL_CONSOLE	Y
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	Y
Driver for IDE disk	IDE_DISK	Y
/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	Y
Support for IPC	IOM_IPC	Y
Support for OSI	IOM_OSI	Y

Feature Description	Feature Name	Availability
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
`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 hold in a 32MB address range. Even if their total size is less than 32 MB, this is not garanteed in flat mode or for supervisor actors.
2. If the value for VIRTUAL_ADDRESS_SPACE is `true`, the value for ON_DEMAND_PAGING is `true`. If the value for VIRTUAL_ADDRESS_SPACE is `false`, the value for ON_DEMAND_PAGING is `false`.
3. 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)

rdbs(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 PowerPC 60x/750 supports the following processors:

- Motorola PowerPC 603[e/v]
- Motorola PowerPC 604[e/v]
- Motorola PowerPC 750

The ChorusOS 4.0 system for PowerPC 60x/750 supports the following reference BSPs:

- genesis2 Reference BSP
- mcp750 Reference BSP

genesis2 Reference BSP

Systems

The genesis2 reference BSP supports the following VME CPU boards (with additional MVME712 or MVME761 transition module – Motorola MCG), and ATX mother boards:

MVME2300 – Motorola MCG

MVME2600 – Motorola MCG

MVME2700 – Motorola MCG

MVME3600 – Motorola MCG

MTX603 – Motorola MCG

MTX604 – Motorola MCG

Devices

The genesis2 reference BSP supports the following on board devices:

Device Id	ChorusOS Driver
/cpu (time base and decrementer)	sun:powerpc-(tb,dec)-timer
/flash (FLASH memory)	not supported
/raven (PCI bridge)	sun:powerpc-raven-pci
/raven/cl-gd54xx (VGA) [1]	not supported
/raven/dec21140 (on board ethernet)	sun:pci-dec21x4x-ether
/raven/ncr53c825 (SCSI HBA)	sun:pci-ncr53c8xx-scsi_hba
/raven/ncr53c825/disk@t,l (SCSI disks) where t is the SCSI TARGET number where l is the LUN number	sun:scsi_hba-generic-scsi sun:scsi-disk-BSD

Device Id	ChorusOS Driver
/raven/ncr53c825/xxx (SCSI other)	not supported
/raven/universe (VME bridge) [2] [3]	not supported
/raven/w83c553 (ISA bridge)	sun:pci-w83c553-isa
/raven/w83c553-ide (IDE disk)	sun:pci-w83c553-ide_hba
/raven/w83c553-ide (IDE other)	not supported
/raven/w83c553/fdd (floppy)	not supported
/raven/w83c553/kbd (keyboard)	not supported
/raven/w83c553/lpt (parallel)	not supported
/raven/w83c553/m48t559 (RTC)	sun:bus-m48txx-(nvram, rtc)
/raven/w83c553/m48t559 (NVRAM)	sun:bus-m48txx-(nvram, rtc)
/raven/w83c553/mouse (mouse)	not supported
/raven/w83c553/ns16550-1(UART)	sun:bus-ns16550-uart
/raven/w83c553/ns16550-2 (UART)	sun:bus-ns16550-uart
/raven/w83c553/z85230-1 (UART)	sun:bus-z85230-uart
/raven/w83c553/z85230-1 (HDLC)	not supported
/raven/w83c553/z85230-2 (UART)	sun:bus-z85230-uart
/raven/w83c553/z85230-2 (HDLC)	not supported

1. VGA is only present on MVME3600.
2. The genesis2 BSP does not provide general purpose VME bus support. However, a minimal subset of the VME functionality is exported to the IPC layer for the sole purpose of enabling Chorus/IPC communication over the VME backplane.
3. VME bridge is not present on MTX boards.

mcp750 Reference BSP

Systems

The mcp750 reference BSP supports the following CompactPCI CPU board:

MCP750 – Motorola MCG

Devices

The mcp750 reference BSP supports the following on board devices:

Device Id	ChorusOS Driver
/cpu (time base and decrementer)	sun:powerpc-(tb,dec)-timer
/flash (FLASH memory)	not supported
/raven (PCI bridge)	sun:powerpc-raven-pci
/raven/dec21140 (on board ethernet)	sun:pci-dec21x4x-ether
/raven/dec21154 (PCI-PCI bridge)	sun:pci-dec2115x-pci
/raven/vt82c586b (ISA bridge)	sun:pci-vt82c586-(bus,isa)
/raven/vt82c586b/m48t559 (RTC)	sun:bus-m48txx-(nvram,rtc)
/raven/vt82c586b/m48t559 (NVRAM)	sun:bus-m48txx-(nvram,rtc)
/raven/vt82c586b/fdd (floppy)	not supported
/raven/vt82c586b/kbd (keyboard)	not supported
/raven/vt82c586b/lpt (parallel)	not supported
/raven/vt82c586b/mouse (mouse)	not supported
/raven/vt82c586b/ns16550-1 (UART)	sun:bus-ns16550-uart
/raven/vt82c586b/ns16550-2 (UART)	sun:bus-ns16550-uart
/raven/vt82c586b/z85230-1 (UART)	not supported
/raven/vt82c586b/z85230-1 (HDLC)	not supported

Device Id	ChorusOS Driver
/raven/vt82c586b/z85230-2 (UART)	not supported
/raven/vt82c586b/z85230-2 (HDLC)	not supported
/raven/vt82c586b-usb	not supported
/raven/vt82c586b-ide (IDE disk)	not supported
/raven/vt82c586b-ide (IDE other)	not supported

Reference Target Platforms

Reference target platforms are configurations to be used by customers covered by a Sun support contract.

MVME2300/2600/3600 Series (Motorola/MCG)

Type:	VME Board
Processors:	MPC603/604 (200-333 MHz)
Main memory:	16-64 MB
L2 cache:	0-512 KB
Bus bridges:	Processor to PCI, PCI to VME, PCI to ISA
Devices:	Asynchronous serial ports (38.4 Kbaud), 10/100BaseT Ethernet, SCSI-2, Real-time clock, Timers
Firmware:	PPC1-Bug version 3.2/3.3

MTX603/604 Series (Motorola/MCG)

Type:	ATX Motherboard

Processors:	MPC603e/604e (100-300 MHz)
Main memory:	16-32 MB
L2 cache:	0-256 KB
Bus bridges:	Processor to PCI, PCI to ISA
Devices:	Asynchronous serial ports (38.4 Kbaud), 10/100BaseT Ethernet, SCSI-3, Real-time clock, Timers
Firmware:	PPC1-Bug version 3.3

MVME2700 (Motorola/MCG)

Type:	VME Board
Processor:	MPC750 (233-366 Mhz)
Main memory:	16-64 MB
L2 cache:	1 MB
Bus bridges:	Processor to PCI, PCI to VME, PCI to ISA
Devices:	Asynchronous serial ports (38.4 Kbaud), 10/100BaseT Ethernet, SCSI-2, Real-time clock, Timers
Firmware:	PPC1-Bug version 3.3

MCP750 (Motorola/MCG)

Type:	CompactPCI System Board
Processor:	MPC750 (233-366 Mhz)
Main memory:	32-64 MB

L2 cache:	1 MB
Bus Bridges:	Processor to PCI, PCI to cPCI, PCI to ISA
Devices:	Asynchronous serial ports (38.4 Kbaud), 10/100BaseT Ethernet, Real-time clock, Timers
Firmware:	PPC1-Bug version 3.7

Validated Reference Targets

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

- MVME2300/2600/3600: MVME2301, MVME2604-4331, MVME3604-5342A

- MTX603/604: MTX 603-003A, MTX 604-003A

- MVME2700: MVME2700-4351, MVME2700-4441

- MCP750: MCP750-1232A-F

How to Build and Boot a System Image on the Target

The procedures below concern PowerPC target systems such as genesis2 or mcp750 reference platforms.

▼ Building a ChorusOS 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* or the *ChorusOS 4.0 Installation Guide for Windows NT Hosts* for instructions.

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:**

Set the environment variable…	To the family-specific product directory. The default value is…
DIR	/opt/SUNWconn/SEW/4.0/ chorus-powerpc on a Solaris host
DIR	/c/cygnus/cygwin-b20/Chorus/opt/ SUNWconn/SEW/4.0/chorus-powerpc on a Windows NT host

3. **Make sure your PATH has been set correctly to include the directory** *install_dir*/4.0/chorus-powerpc/tools/host/bin **where the default** *install_dir* **is** /opt/SUNWconn/SEW**.**

   If your host is running the Solaris operating environment, also make sure that your PATH includes /usr/openwin/bin, which contains the imake utility.

   If your host is running Windows NT, also make sure that your PATH includes /usr/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/genesis2 \
$DIR/src/iom
```

Depending on the target system architecture, you may need to enter `$DIR/src/nucleus/bsp/powerpc/mcp750` instead of `$DIR/src/nucleus/bsp/powerpc/genesis2` as the next to last argument.

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/opt/jvm \
$DIR/tools \
-s $DIR/src/nucleus/bsp/drv \
$DIR/src/nucleus/bsp/powerpc \
$DIR/src/nucleus/bsp/powerpc/genesis2 \
$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`.

```
$ make kernonly
```

▼ Placing the System Image on 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
   ```

   Or, on a Windows NT host workstation, using the Cygwin tools:

   ```
   $ rcp -b chorus.RAM boot_server.user:/tftpboot
   ```

   The –b option causes rcp to transfer the system image as a binary file rather than an ASCII file, which is the default.

   It is assumed that the *user* has access to perform this copy on the Solaris *boot_server* system and therefore that the *user* is the same on the Windows NT host and on the Solaris boot server .

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

   For example, on a Solaris host workstation:

   ```
   $ 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*
   ```

   (continued)

```
                                                                        
                                                                        
                                                                        
```
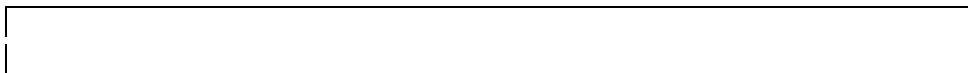
As rlogin(1) is not available as part of the Cygwin tools, you should use the
Windows NT Telnet application to log in from the Windows NT host to the boot
server. You can run Telnet by selecting Start | Programs | Accessories |
Telnet from the Start menu.

▼ Booting the Target System Using PPC1-Bug Firmware

1. Restart the target system.

2. Change the network configuration of the target system through the target system console:

```
PPC1-Bug> niot
Controller LUN =00?
Device LUN     =00?
Node Control Memory Address =01F9E000?
Client IP Address       =129.157.196.64?        <- target IP
Server IP Address       =129.157.196.1?         <- boot server IP
Subnet IP Address Mask =255.255.255.0?
Broadcast IP Address   =129.157.196.255?
Gateway IP Address     =0.0.0.0?
Boot File Name ("NULL" for None)      =chorus.RAM?      <- file to load
Argument File Name ("NULL" for None) =?
Boot File Load Address        =00400000?        <- configured start
Boot File Execution Address   =00400000?        <- addr of the system Bank
Boot File Execution Delay     =00000000?
Boot File Length              =00000000?
Boot File Byte Offset         =00000000?
```

3. Disable PReP-Boot mode and then update NVRAM through the target system console:

```
PPC1-Bug> env
…
Network PReP-Boot Mode Enable [Y/N] =N?          <- must be turned off
```

4. Load and boot the ChorusOS system image:

```
PPC1-Bug> nbo
Network Booting from: DEC21140, Controller 0, Device 0
Device Name: /pci@80000000/pci1011,9@e,0:0,0
Loading: chorus.RAM

Client IP Address      = 129.157.173.193
Server IP Address      = 129.157.196.1
Gateway IP Address     = 0.0.0.0
Subnet IP Address Mask = 255.255.255.0
Boot File Name         = chorus.RAM
Argument File Name     =

Network Boot File load in progress... To abort hit <BREAK>

Bytes Received =&1875968, Bytes Loaded =&1875968
Bytes/Second   =&208440, Elapsed Time =9 Second(s)
>
..... Booting Chorus .....

ChorusOS r4.0.0 for PowerPC - Motorola Genesis 2 family
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Kernel modules : CORE SCHED_FIFO SEM MIPC IPC_L MEM_VM KDB TICK MON ENV ETIMER
LOG LAPSAFE MUTEX EVENT MEM_DFPXM UI DATE PERF TIMEOUT LAPBIND DKI
MEM: memory device 'sys_bank' vaddr 0xfaaf3000 size 0x1c9000
/cpu: sun:powerpc-(timebase,dec)-timer driver started
/raven: sun:powerpc-raven-(bus,pci) driver started
/raven/w83c553: sun:pci-w83c553-(bus,isa) driver started
/raven/w83c553/i8254: sun:bus-i8254-timer driver started
/raven/w83c553/m48t559: sun:bus-m48txx-(nvram,rtc) driver started
/raven/w83c553/ns16550-2: sun:bus-ns16550-uart driver started
/raven/w83c553-ide: sun:pci-w83c553-ide driver started
/raven/dec-21140: 10BaseT (Twisted Pair) link auto-detected
/raven/dec-21140: Ethernet address 08:00:3e:28:38:97
/raven/dec-21140: sun:pci-dec21x4x-ether driver started
MEM: VM resource manager daemon starts
MEM: PXM mapper daemon starts (site 0x1)
MEM: PXM fs flush daemon starts
IOM: SOFTINTR DISABLED (-31). Using an Interrupt thread
IOM Init cluster space from: 0xfaacf000 to: 0xfaaef800 [65 items of size: 2048]
IOM Init io-buf pool from: 0xfaaef850 to: 0xfaaefd70 [8 items of size: 164]
IOM Init raw io-buffer pool from: 0xfaaefd70 to: 0xfaaf11f0 [32 items of size: 164]
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```

(continued)

```
max disk buffer space = 0x10000
/rd: sun:ram--disk driver started
C_INIT: started
C_INIT: /image/sys_bank mounted on /dev/bd01
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 /raven/dec-21140
bpf: lo0 attached
C_INIT: Internet Address: 129.157.173.193
C_INIT: RARP Network Initialization OK
ifeth0: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
        inet 129.157.173.193 netmask 0xffff0000 broadcast 129.157.255.255
        ether 08:00:3e:28:38:97
lo0: flags=8049<UP,LOOPBACK,RUNNING,MULTICAST> mtu 16384
        inet 127.0.0.1 netmask 0xff000000
  C_INIT: rshd started
```

ChorusOS 4.0 for PowerPC 60x/750 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-SG80
Package Name	**Description**
SUNWewbp	Sun Embedded Workshop for PowerPC 60x/750 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
SUNWewdp	Sun Embedded Workshop for PowerPC 60x/750 XRAY Debugger
SUNWewgp	Sun Embedded Workshop for PowerPC 60x/750 GUI Tools
SUNWewip	Sun Embedded Workshop for PowerPC 60x/750 IOM source
SUNWewjp	Sun Embedded Workshop for PowerPC 60x/750 JVM

Part Number	CLX400-SG80
Package Name	**Description**
SUNWewkp	Sun Embedded Workshop for PowerPC 60x/750 Kernel
SUNWewm	Sun Embedded Workshop On-Line Manual Pages
SUNWewop	Sun Embedded Workshop for PowerPC 60x/750 OS
SUNWewpp	Sun Embedded Workshop for PowerPC 60x/750 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
SUNWewtp	Sun Embedded Workshop for PowerPC 60x/750 Build Tools
SUNWewup	Sun Embedded Workshop for PowerPC 60x/750 Debugger and Profiling Support
SUNWewxp	Sun Embedded Workshop for PowerPC 60x/750 X11 Library
SUNWewzp	Sun Embedded Workshop for PowerPC 60x/750 egcs Toolchain

Flite Add-on for Solaris Host

Part Number	FLT400-SG80
Package Name	**Description**
SUNWewfp	Sun Embedded Workshop for PowerPC 60x/750 Flite

Source Add-on for Solaris Host

Part Number	CLX400-SG80-S
Package Name	**Description**
SUNWewhp	Sun Embedded Workshop for PowerPC 60x/750 OS source
SUNWewlp	Sun Embedded Workshop for PowerPC 60x/750 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

Binary Product — for Windows NT Host

Part Number	CLX400-TG80
Package Name	**Description**
SUNWewbp	Sun Embedded Workshop for PowerPC 60x/750 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
SUNWewdp	Sun Embedded Workshop for PowerPC 60x/750 XRAY Debugger
SUNWewgp	Sun Embedded Workshop for PowerPC 60x/750 GUI Tools
SUNWewip	Sun Embedded Workshop for PowerPC 60x/750 IOM source
SUNWewjp	Sun Embedded Workshop for PowerPC 60x/750 JVM
SUNWewkp	Sun Embedded Workshop for PowerPC 60x/750 Kernel
SUNWewop	Sun Embedded Workshop for PowerPC 60x/750 OS
SUNWewpp	Sun Embedded Workshop for PowerPC 60x/750 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
SUNWewtp	Sun Embedded Workshop for PowerPC 60x/750 Build Tools
SUNWewup	Sun Embedded Workshop for PowerPC 60x/750 Debugger and Profiling Support
SUNWewxp	Sun Embedded Workshop for PowerPC 60x/750 X11 Library
SUNWewzp	Sun Embedded Workshop for PowerPC 60x/750 egcs Toolchain

Flite Add-on for Windows NT Host

Part Number	FLT400-TG80
Package Name	**Description**
SUNWewfp	Sun Embedded Workshop for PowerPC 60x/750 Flite

Source Add-on for Windows NT Host

Part Number	CLX400-TG80-S
Package Name	**Description**
SUNWewhp	Sun Embedded Workshop for PowerPC 60x/750 OS source
SUNWewlp	Sun Embedded Workshop for PowerPC 60x/750 Kernel source

Documentation for Windows NT Host

Part Number	CLX400-TAA0-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
SUNWewsd	Sun Embedded Workshop PDF Format Specific Documentation

Part Number	CLX400-TAA0-D1N
Package Name	**Description**
SUNWewsh	Sun Embedded Workshop HTML Format Specific Documentation
SUNWewsp	Sun Embedded Workshop PostScript Format Specific Documentation