CHORUS/ClassiX

Release 1

Real-Time Execution and Development Environment for Distributed Embedded Systems

CHORUS/ClassiX™ combines the CHORUS Nucleus open microkernel standard with a powerful UNIX-based remote development and debugging environment that is ideal for building open, distributed, embedded systems. CHORUS/ClassiX brings transparent access to UNIX in a highly scalable and flexible distributed execution environment. Operating systems and embedded application developers serving the telecommunications, internetworking and embedded systems markets can now take full advantage of the open systems benefits offered by the CHORUS/ClassiX combination of CHORUS Nucleus and UNIX programming interfaces.

FEATURES	BENEFITS
► CHORUS open microkernel standard widely used in computer and telecommunication systems	► Mature operating system technology and industry-proven robustness
► High performance real-time executive	► Real-time response to external events, and determinism
► Fast, local and remote Transparent Connectivity services (Inter Process Communication)	► Easy transparent programming of distributed or clustered systems
► Supports both system space and user space processes	► Allows users to switch from development to deployment without compromising performance
► Dynamic migration, evolution, and reconfiguration of user as well as system processes, including dynamically loadable device drivers	► Enables customization of hardware and software resources for improved performance, reliability, and cost optimization
► Enabling technologies for building fault-tolerant services	► Increased availability and guaranteed continuity of service for mission-critical applications
► Fully portable on all hardware platforms	► Hardware platform independence
► Easily tailored to specific hardware and software configurations	► Flexibility and scalability of system configuration
► TCP/IP, NFS, and many other UNIX utilities	► Transparent integration of real-time remote targets into open UNIX environments

Chorus SYSTEMS

SYSTEM SPECIFICATIONS

Real-time Executive
- Light-weight threads
- Pre-emptive priority-based scheduler
- 256 priority levels
- Multiple scheduling classes
- Synchronization by mutexes, semaphores, and mini-messages
- Execution control
- Timers
- Dynamic kernel resource management

Hardware Supervisor
- Dynamic (de)installation of interrupt and trap handlers
- User-level handlers installable in system space
- Multiple priority-ordered handlers
- Dynamic resource allocation and management

Distributed Virtual Memory
- Dynamic allocation/ deallocation of memory
- Separate, protected address spaces
- Can share memory between different processes

Transparent Connectivity
- Fast, location-transparent asynchronous and synchronous (RPC) Inter Process Communication (IPC) services
- Optimized local and remote communication
- Unique "Light-Weight RPC" performance optimization
- Small untyped messages for fastest processing by network interfaces
- Efficient low-overhead internal protocols
- Automatic localization of distributed objects providing transparent remote access to remote objects as if they were local
- High-level network interface independent of specific network protocols
- Facilities for managing and broadcasting to groups of destinations
- At-most-once RPC semantics
- Thread abort propagated through RPC's

c_actor Programming Interface

The c_actor programming interface is an extension to the CHORUS Nucleus native programming interface:

- ANSI thread-safe C library (100 functions)
- POSIX I/O interfaces (60 System Calls)
- Transparent remote host access (BSD Sockets, TCP/IP, NFS)
- Transparent distributed execution control (spawn, kill, list)
- Debugging support (trace, wait, symbols)

CROSS DEVELOPMENT ENVIRONMENT

- Target Operating System Build: CHORUS Cross Development and Configuration Systems allowing to produce, modify, and dynamically configure target systems from a UNIX host
- Distributed Development Environment: ANSI-C cross development system; user and supervisor application and system programming interfaces
- Multiple Targets Remote Control: network target boot (TFTP); target configuration control (rsh), mount file systems, c_actor list and status
- Symbolic Debugging: CHORUS KDB (CHORUS Nucleus structures, interrupt handlers debugging); CHORUS GDB (source level debugging, multi-threaded application; remotely activated from UNIX host)

SYSTEM REQUIREMENTS

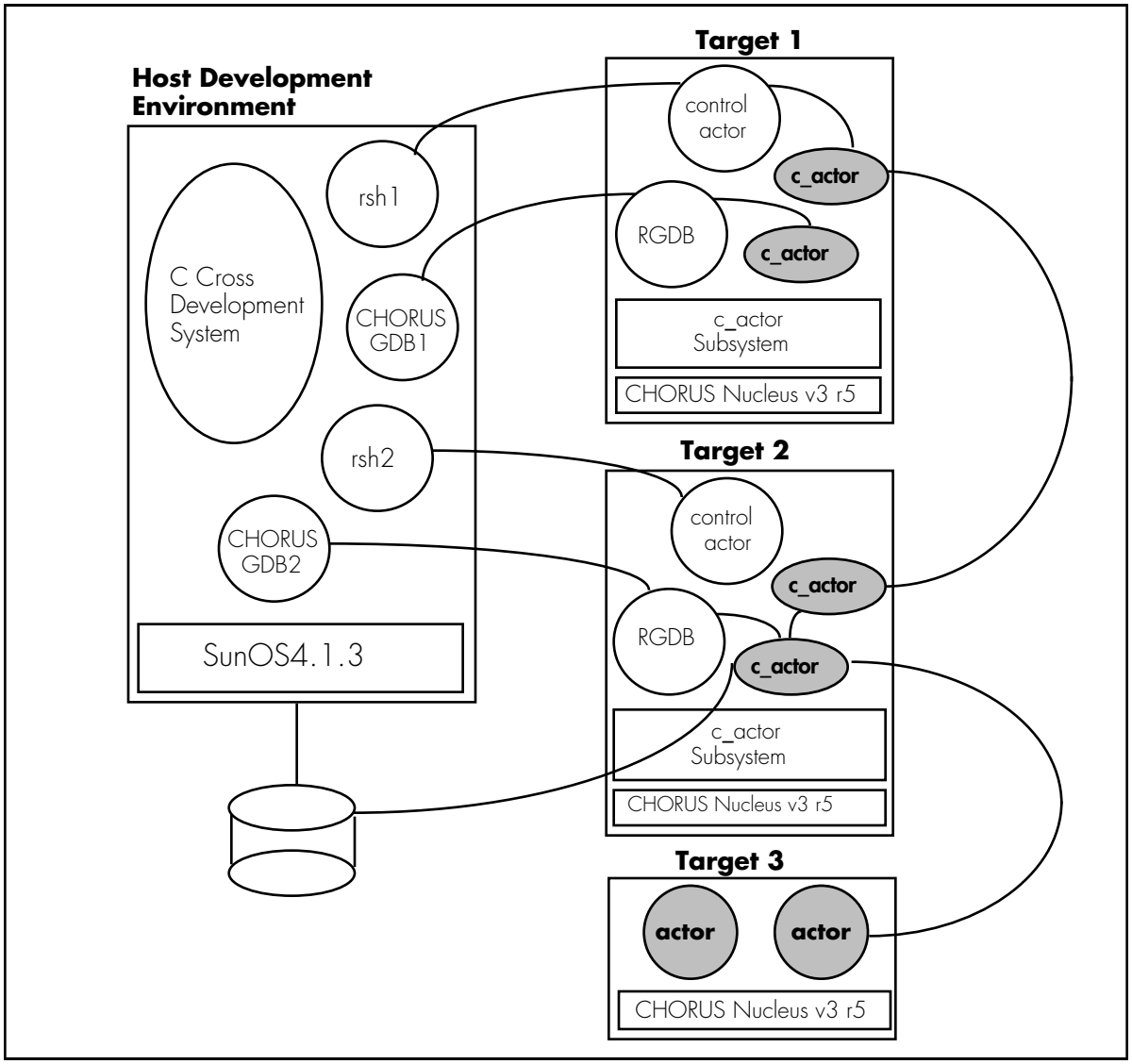
- Host System: SunOS4.1.3
- Target ix86-based hardware: Any standard computer system based on 386/486 CPUs and Industry Standard Architecture (ISA), Extended Industry Standard Architecture (EISA), VESA
- Display: Monochrome, VGA, Super VGA, XGA, and higher resolution megapixel adapters
- Network: SMC Ethercard Elite Ethernet (WD)
- RAM: 6 Mbytes
- Media: 3.5" diskette

PRODUCT COMPONENTS

- CHORUS/ClassiX Runtime System
- CHORUS/ClassiX Development and Configuration System
- CHORUS Netboot Network Boot
- CHORUS GDB Remote Symbolic Debugger

CONFIGURATIONS

Source development kits are available for various host-target configurations. Intel x86, Motorola 68K or Sun SPARC-based target platforms with SunOS-based hosts are currently supported. Binaries for ix86 platforms can be provided under specific evaluation programs.



CHORUS/ClassiX Distributed Embedded Application

DOCUMENTATION

- CHORUS/ClassiX Product Description
- CHORUS/ClassiX Release Notes
- CHORUS/ClassiX Source Installation Guide
- CHORUS/ClassiX Evaluation Binary Installation Guide
- CHORUS/ClassiX Programmer's Guide
- CHORUS/ClassiX Programmer's Reference Manual
- CHORUS/ClassiX Performance Report
- Moving from CHORUS/MiX V.4 r3 to CHORUS/ClassiX
- CHORUS/ClassiX extensions to GDB
- Using GDB (standard GNU documentation)
- Reporting Problems to Chorus Systems with "send-pr"

CUSTOMER SERVICE AND SUPPORT

Chorus Systems provides extensive customer support services, including training, design and/or implementation consultancy, and on-site assistance to help customers integrate CHORUS/ClassiX quickly and easily into their specific environment. In addition, Chorus Systems provides updates and new releases of product under maintenance contracts.

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