A Realtime Open Systems Solution for Distributed Embedded Applications

Outline

- Realtime and Open Systems Computing
- CHORUS/Fusion for SCO Components
- A Typical Application

Realtime Embedded Process

Hard realtime constraints

- Limited Unix requirements
- Embedded configurations
  - Limited memory
  - Dedicated devies
  - No file system attached
- Drive devices
- Interact with other process levels

Realtime Unix Process

- Soft/Hard realtime constraints depending on:
  - Data rate from embedded processes
  - Required response time to user interactions
  - Data processing time
- Unix requirements
  - File systems
  - Graphical interfaces
  - High level interactions

Unix Functionality

SCO Open Systems Software

- SCO UNIX source and binary compatibility
  - ❑ UNIX SVR3.2/POSIX 1003.1 system calls
  - ❑ Networking: Sockets, TCP/IP, etc.
  - ❑ C-Library
  - ❑ X-Clients, X-Client libraries
  - ❑ S5, AFS file systems
- Native SCO ODT applications supported
  - ❑ Data base management applications
  - ❑ Development tools: compilers, linkers, debuggers, etc.
  - ❑ User interface tools: xterm, etc.
  - ❑ Third party software

Realtime functionality

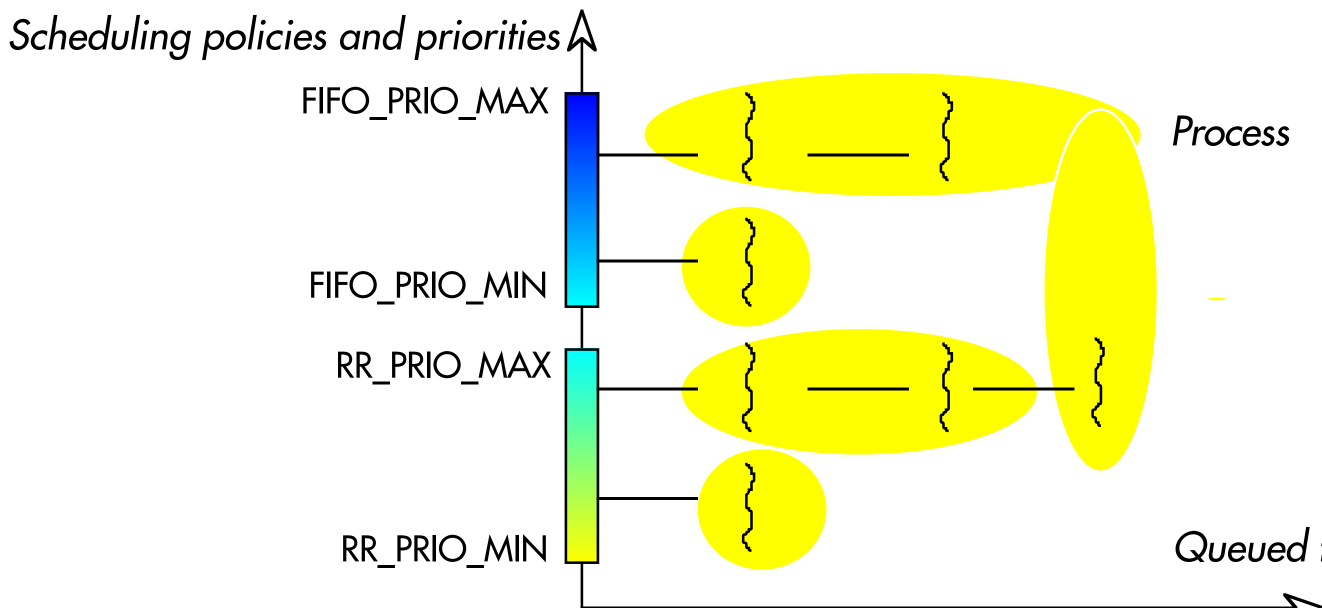
POSIX 1003.1/b and 1003.1/c

- Realtime extensions to POSIX 1003.1
  - _POSIX_MEMLOCK, _POSIX_MEMLOCK_RANGE
  - _POSIX_MEMORY_PROTECTION
  - _POSIX_MESSAGE_PASSING
  - _POSIX_PRIORITY_SCHEDULING
  - _POSIX_SEMAPHORES
  - _POSIX_SHARED_MEMORY_OBJECTS
- Multi-thread extensions to POSIX 1003.1
  - _POSIX_THREADS
  - _POSIX_REENTRANT_FUNCTIONS
  - _POSIX_THREADS_ATTR_STACKSIZE
  - _POSIX_THREADS_PRIORITY_SCHEDULING

Thread Scheduling

Threads mapped onto CHORUS/Nucleus threads

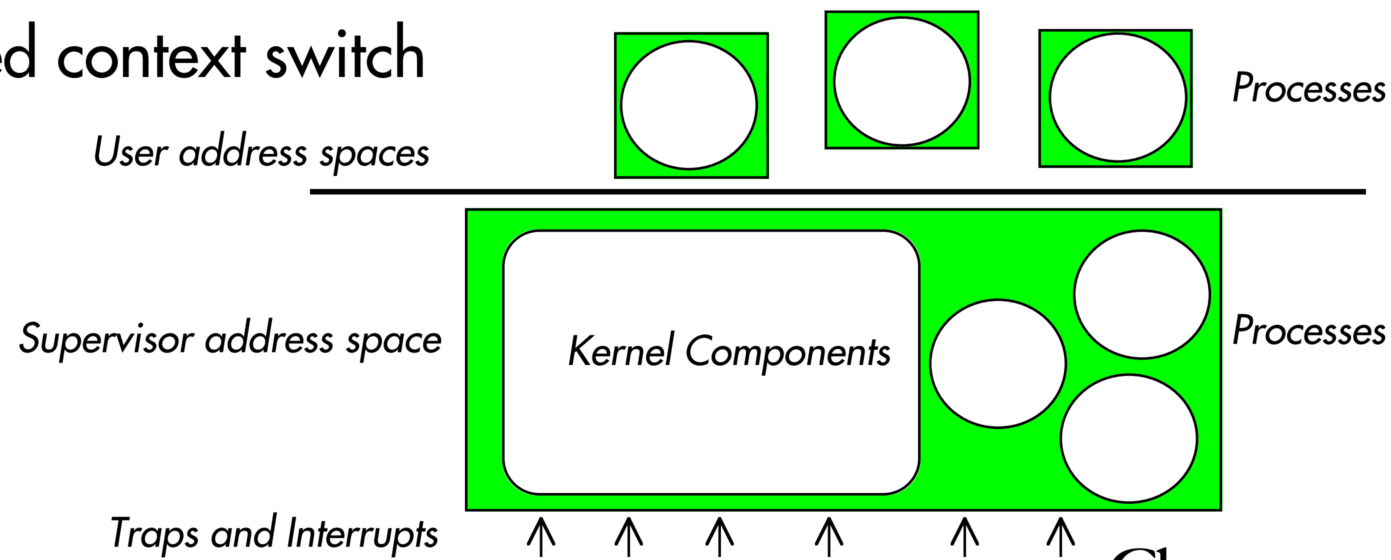
- Each thread is associated with a scheduling policy
- Each thread is associated with a scheduling priority



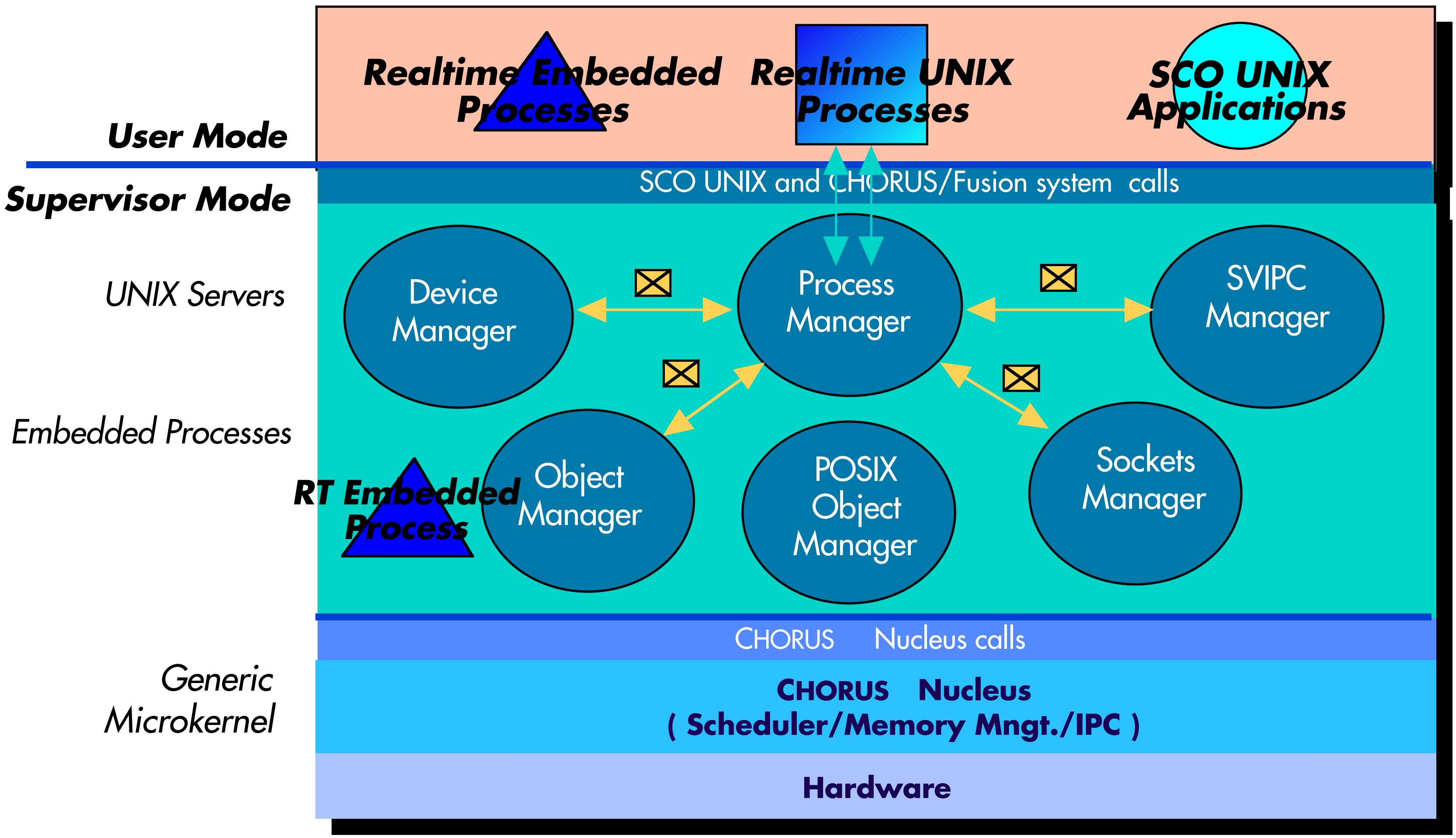
Realtime functionality

Supervisor execution mode (dynamic)

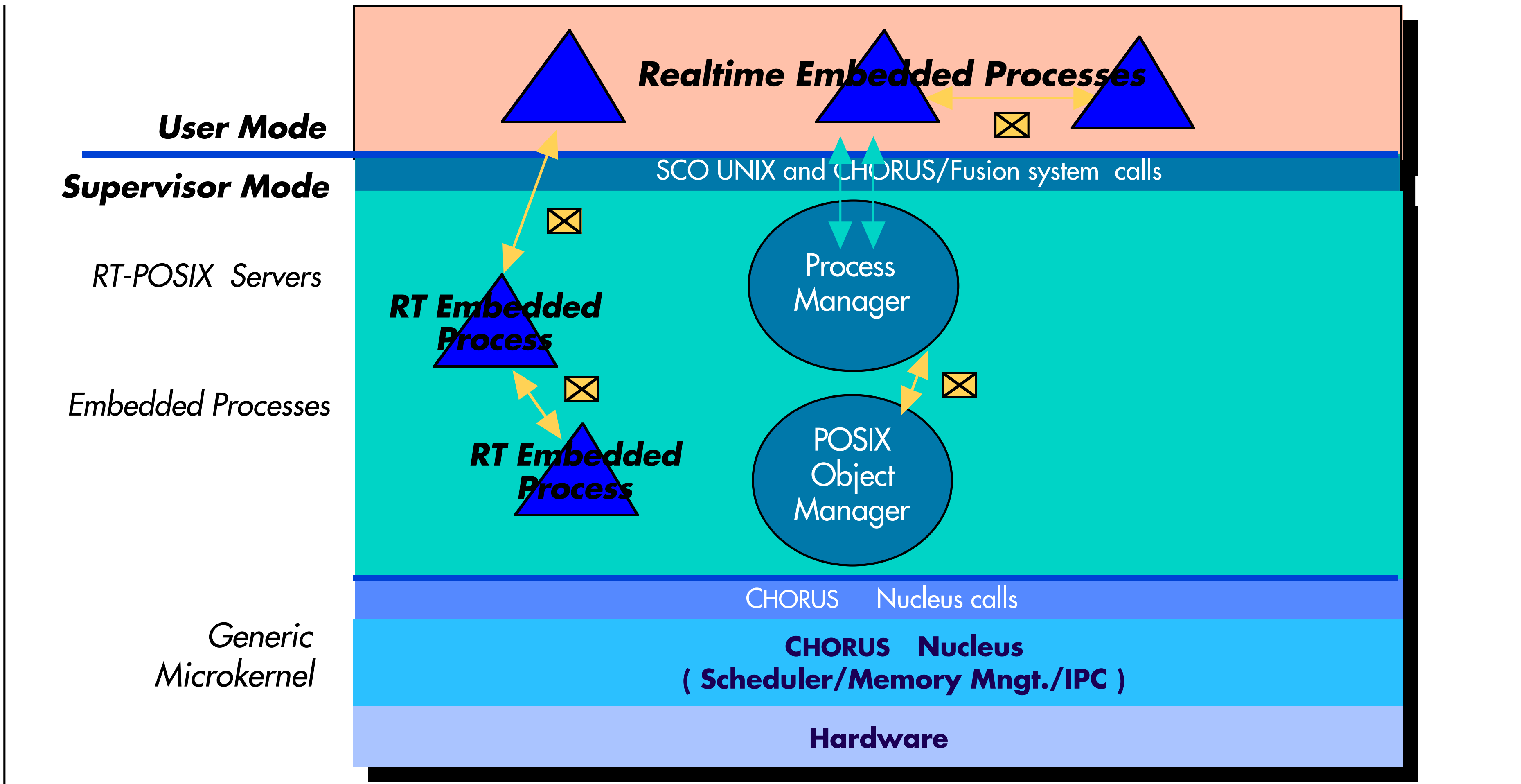
- Run in supervisor address space
- Handle hardware events (traps, interrupts)
- Access to memory locations and priviledged instructions
- Optimized context switch



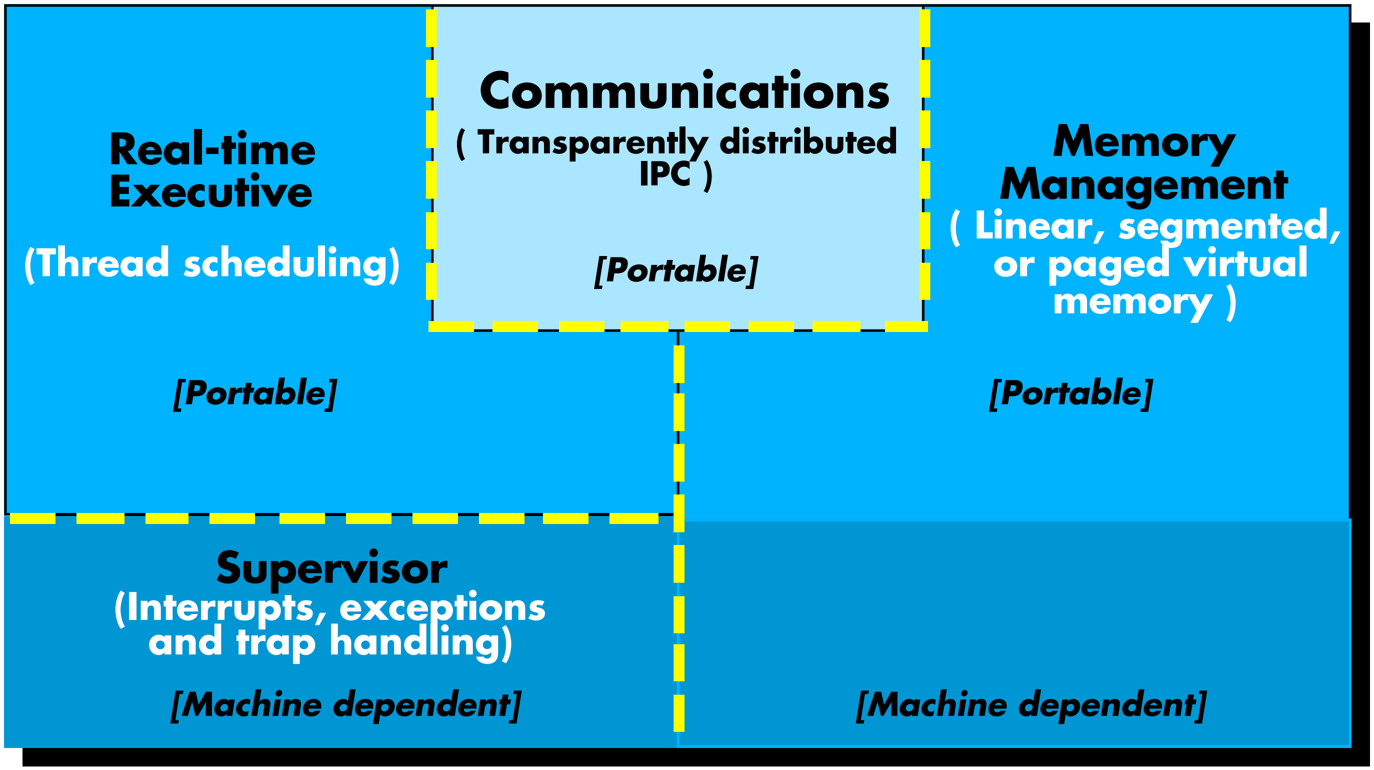
CHORUS/Fusion Realtime Server



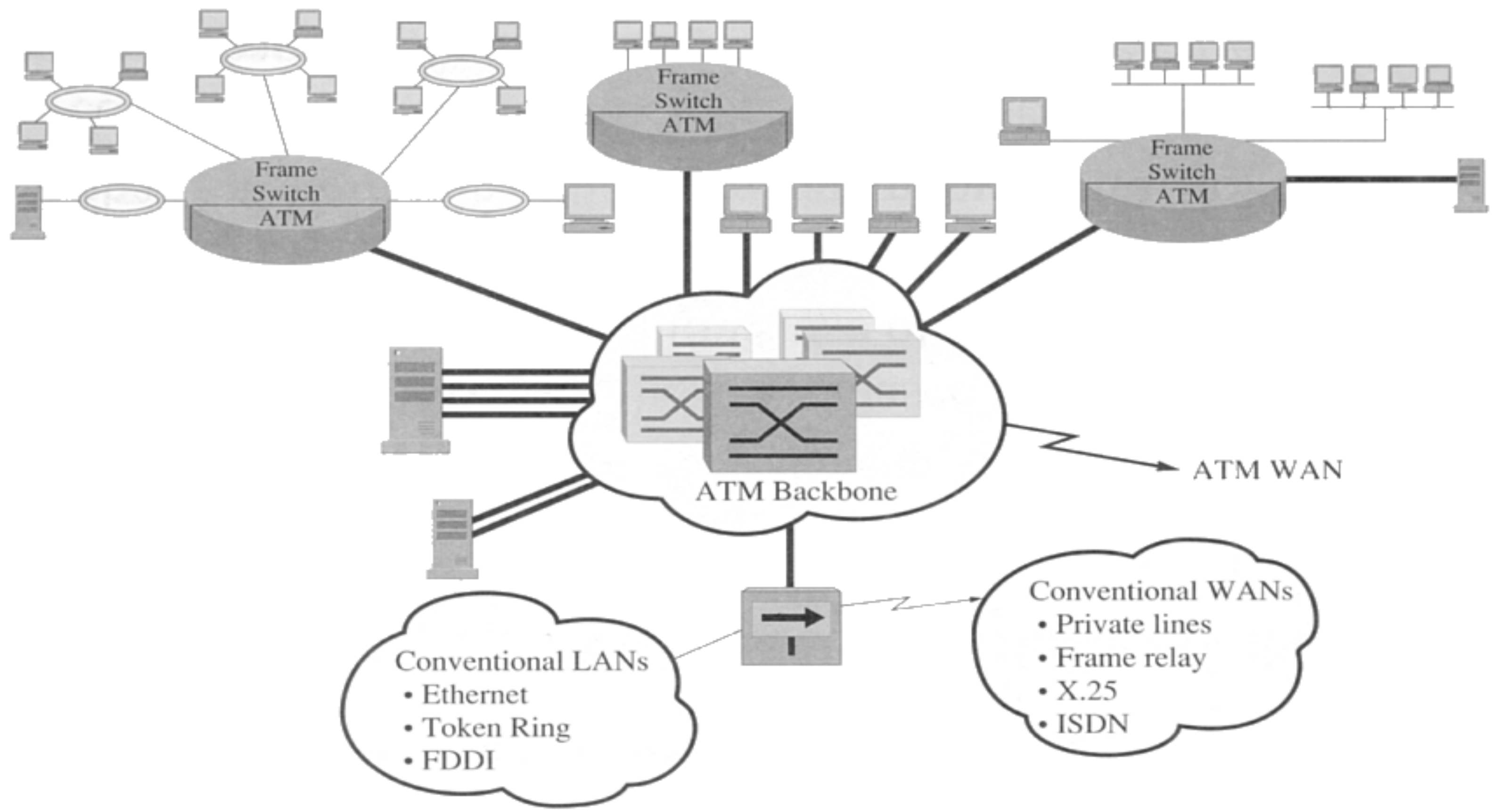
CHORUS/Fusion Realtime Node



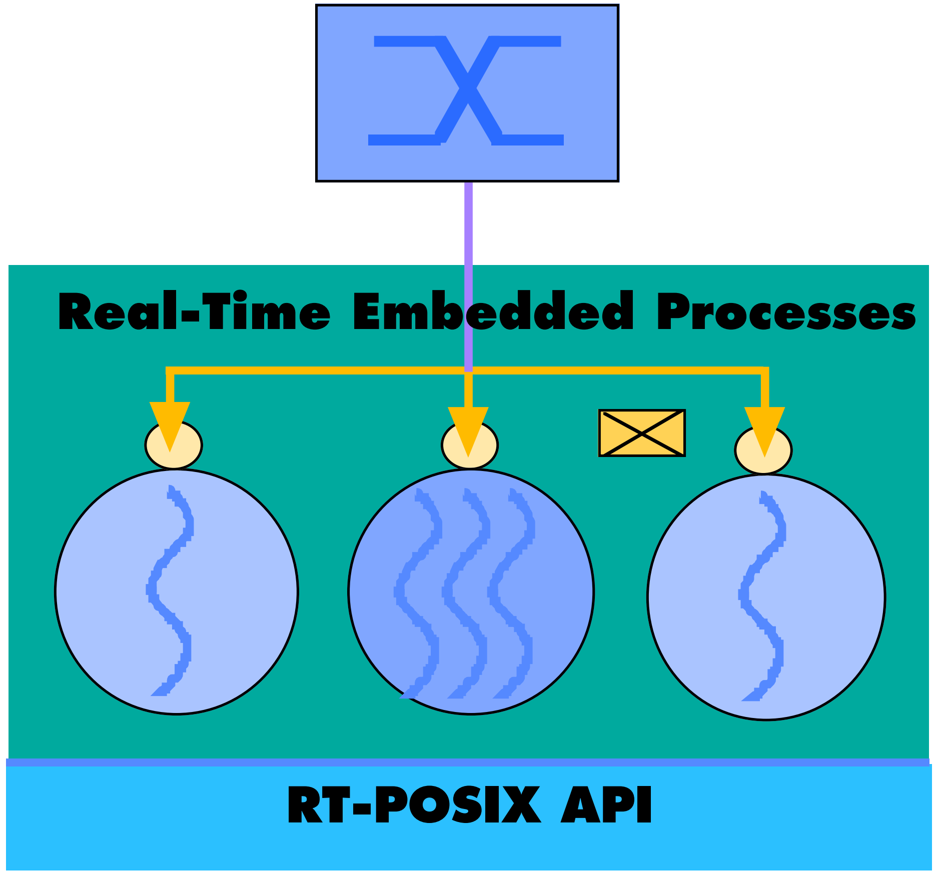
CHORUS/Nucleus



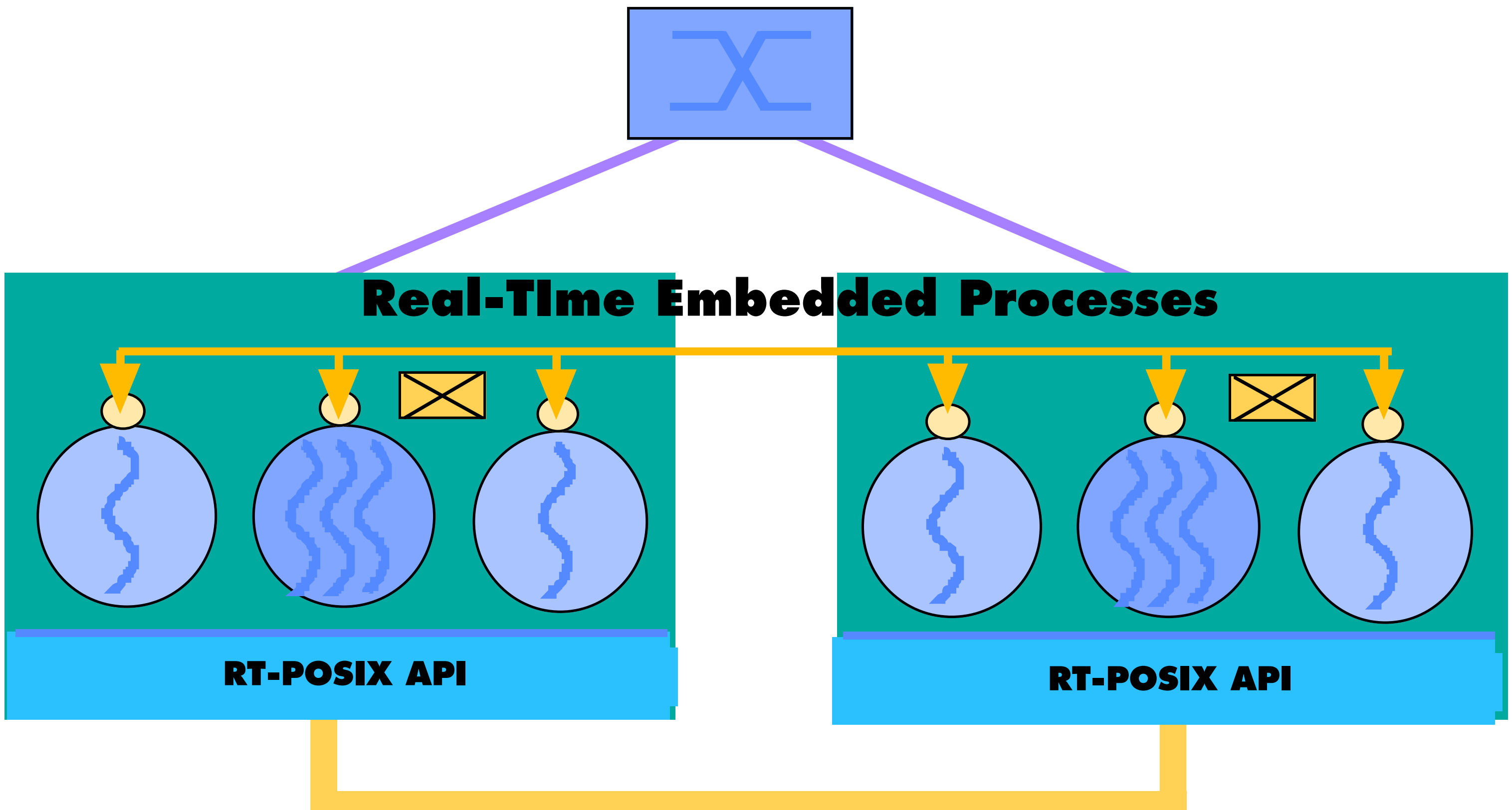
Application: Internetworking System



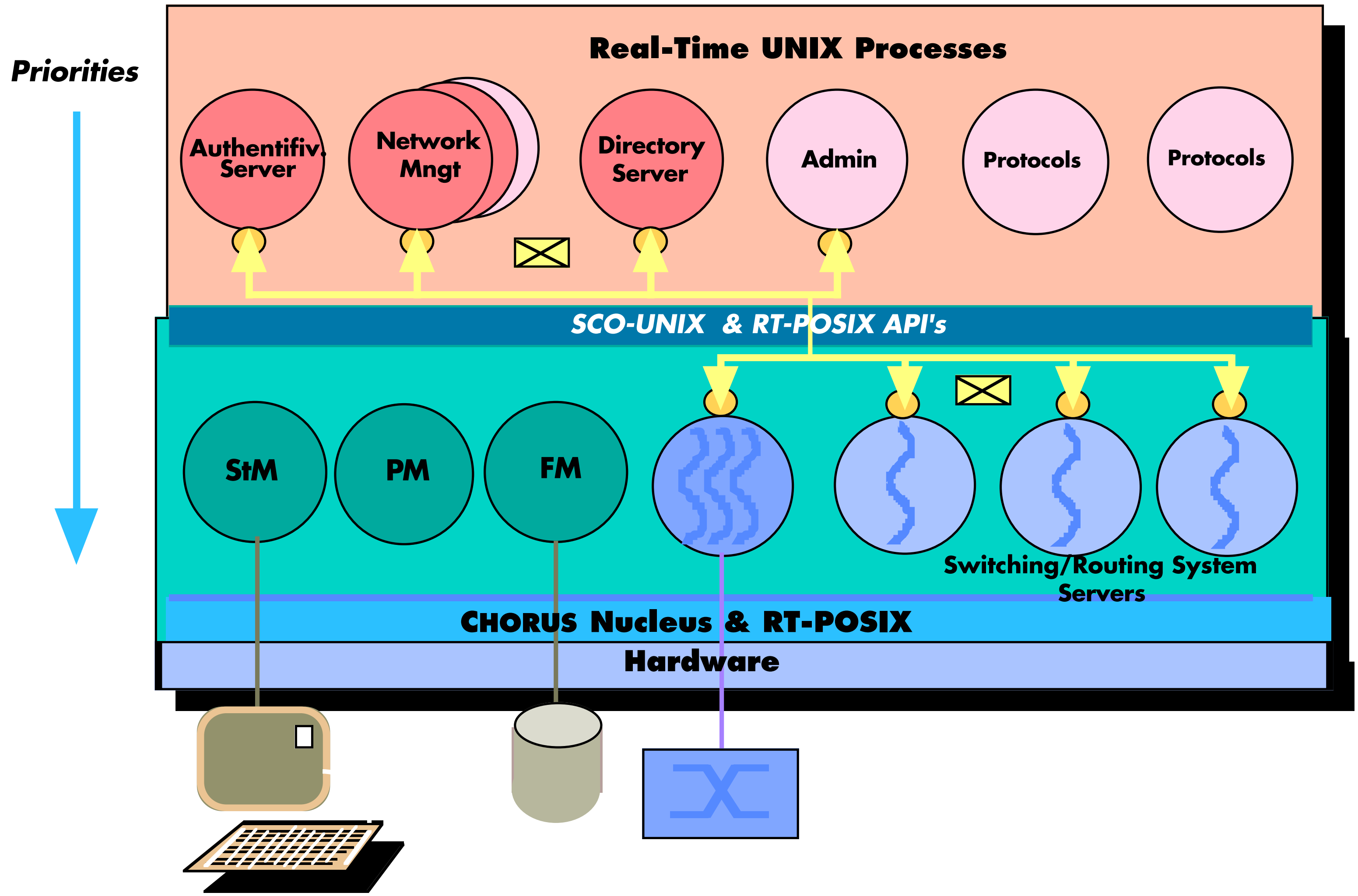
CHORUS/Fusion Application



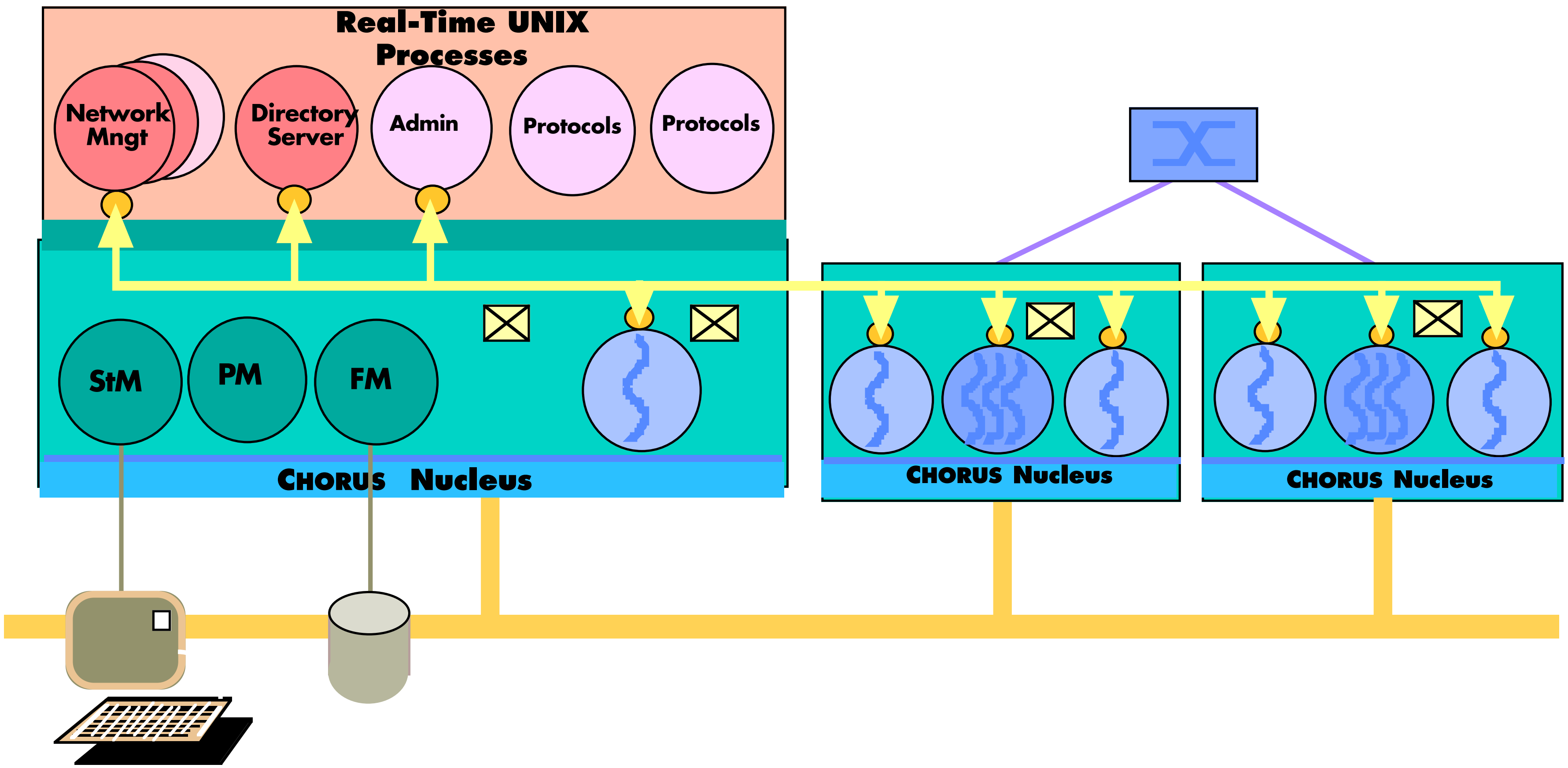
CHORUS/Fusion Application



CHORUS/Fusion Application



CHORUS/Fusion Application



Chorus SYSTEMS

Chorus

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