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- Sony

Multimedia

- Delphi
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- Cisco
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The Unicoi Advantage

- **One-stop-shop** for all of your embedded IP product development needs
- **20+ year track record** of delivering embedded software to the developer market

Proven

- Fusion TCP/IP Stack is the **most widely deployed** in the world



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Fusion RTOS

The Fusion RTOS is a priority-based, preemptive, multitasking, real-time operating system designed and optimized for high performance DSPs and media-centric microprocessors.

Fusion RTOS Features

- Tasks
- Mailboxes
- Mutexes
- Hardware interrupt controller
- Software interrupt controller (SWI)
- Stack sharing for HWI, SWI and the background task
- Nested interrupts
- Mutex priority inversion protection
- 250 priorities for tasks & SWIs
- Heap-free design
- Optional timeouts on all suspends
- Pre-emptible tasks
- Small footprint, re-entrant, thread safe Fusion C Library
- Supports ARM, Analog Devices Blackfin®, Starcore and Freescale 56800E DSP®

Tasks

Tasks are individual units of software with a dedicated purpose that share common system resources. The RTOS grants access to the shared system resource based upon a task's request for the resource, compared to other pending requests. Individual tasks are assigned a priority level according to their importance within the system. Each task has its own dedicated stack.

Task Communications & Synchronization Features

- Suspend/Resume
- Semaphores
- Mutexes
- Events
- Mailboxes
- Queues
- Packet Handlers

Each task is created independently of other tasks since tasks may need to communicate with other tasks.

Time Management

Most embedded systems require some form of time management. Fusion RTOS provides an extensive set of time management capabilities. All Fusion RTOS objects with task suspension capability have an optional time-out value to limit the suspension time. A complete suite of software timers is also available to handle timed events. Timers can be configured as one-shot or periodic timers. Fusion RTOS also tracks system time in seconds. This, along with the Time section of the Fusion Standard C library, provides a complete time management solution.

Memory Management

The Fusion RTOS features a completely dynamic memory management system. Users can specify any number of independent memory pools. These pools provide variable memory allocation capabilities. Any task may suspend on a memory pool when memory is not available. Memory pools have statistical tracking capabilities to determine current and worst-case memory usage. The Fusion memory manager uses a method of contiguous memory recombination to reduce/eliminate memory fragmentation.

Packet Management

Many of today's embedded designs must process streamed data. Fusion RTOS provides several methods for handling streaming data while minimizing processor loading. Fixed-size streaming data packets are handled using packet pools (pre-allocated packets that are the same size and managed in a pool). The time to allocate/de-allocate a packet is deterministic, and is of an order of magnitude faster than a memory pool. Packet handlers are used to synchronize interrupts and the tasks processing the data. These Fusion objects only pass the pointer to the packet, not the actual packet to the waiting task. This significantly reduces processor loading by creating systems that utilize zero data copies.

Stack Sharing

To reduce total memory usage and improve performance, Fusion RTOS is designed to share a common stack for Hardware Interrupts, Software Interrupts and the background task.

Unicoi Fusion Product Suite

Fusion Reference Designs

- VoIP Gateway/Terminal Adaptor
- IP Phone

Fusion Net

- TCP/IPv4/v6 Dual-Mode Stack
- DHCP
- DNS
- FTP
- NAT
- OSPFv2
- RTSP
- RTP
- SIP
- SDP
- SNMP
- SNTP
- Telnet
- POP3
- SMTP

Fusion RTOS

- Real-Time Operating System optimized for high-performance DSPs and media-centric microprocessors

Fusion File Systems

- Flash File System
- CIFS

Fusion Web

- HTTP
- XML
- Microbrowser
- GUI Toolkit

Fusion Secure

- IPsec
- IKEv1
- HTTPS

Fusion Algorithms & Codecs

- Please call for details



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System Diagnostics

Fusion RTOS provides extensive internal diagnostic capabilities.

Statistical Tracking for Memory Usage (current and worst case usage)

- All Stacks
- Packet Handlers
- Memory Pools
- Circular Buffers
- Packet Pools
- Queues

Data Logging Capabilities

- Interrupts
- Error Conditions
- Task Switches
- User specific logging
- RTOS Object calls

Standard C Library

Fusion RTOS provides an extensive, re-entrant, thread-safe, small footprint, integer-based, POSIX-style Fusion Standard C library.

Standard C Library Capabilities

- Time
- Stdlib
- Stdio
- String
- Stdlib
- Character

Command Line Debug SHELL

Fusion RTOS includes a UART-driven interface from the PC to the embedded product running Fusion RTOS. Fusion SHELL provides general commands such as reading and writing to memory. It also provides mechanisms for the user to add additional commands. Fusion SHELL is also used when additional Fusion products are integrated with Fusion RTOS. Each product has command lists useful for debugging the specific Fusion Software Product.

Name Server

Fusion RTOS Name Server associates character strings with a pointer value. Pass in a name, and the name server returns the pointer associated with that name. This feature helps users track Fusion objects and is designed so users can use it to track pointers in their systems.

Interrupt Control

Fusion RTOS provides a flexible interrupt control mechanism that is fast and deterministic. Users can create their interrupt handler in C or Assembly, and all interrupts can call any Fusion RTOS object that does not try to suspend. Task synchronization can therefore occur directly from a Fusion RTOS managed interrupt.

Interrupt Control Features

- Optional Interrupt logging
- Support for nested interrupts
- Dedicated interrupt stack shared with SWIs and the background task.
- Supports delayed task rescheduling
- Provides a method to bypass Fusion Interrupt Dispatcher for very high-speed interrupts

Driver Model I/O Management

The Fusion Driver Model (FDM) is an extensible, portable ANSI-C compatible model that provides a framework for organizing peripheral devices into a common subsystem. Since it is not directly tied to any specific hardware, its architecture is simple to use, easily adaptable and is reusable across any platform. The Fusion FDM abstracts this mechanism through objects that the user to integrate a front-end and back-end specific to their environment.

Build diverse, intelligent devices that get to market quickly with Unicoi Systems.

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