CodeWarrior Development Studio
SmartDSP OS

Overview

Real-time operating system (RTOS) for Freescale DSPs built on StarCore technology.

Benefits

- Real-time responsiveness
- Royalty free
- C/C++ support
- Source code provided
- Small memory footprint
- Integrated with CodeWarrior software tools designed for StarCore DSPs
- Supports the StarCore-based MSC815x, MSC825x, MSC814x and other legacy StarCore devices from Freescale
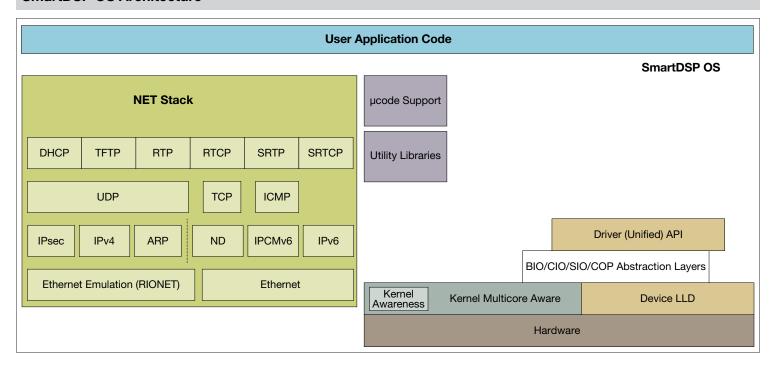
Includes

- Kernel
- Peripheral drivers
- UDP/TCP/IP stack
- Runtime enablement tools (Kernel awareness, SmartDSP HEAT, eCLI)
- Documentation
- Demos

Kernel

- Multi-task RTOS tailored for DSP multicore processors and applications
- Both user and OS code can be executed in hardware and software interrupts as well as in tasks
- Single-core, priority-based, preemptive, event-driven scheduler designed to make SmartDSP OS predictable and real-time oriented
- Most of the OS is written in ANSI C. Time critical functions have been optimized in assembly
- Hardware and software interrupts
- Tasks and task events
- MMU and cache management
- Hardware timers
- Software timers
- Queues
- Memory manager
- Inter-core messages (mailbox and multicast)
- Multicore synchronization (spinlocks, barriers)

SmartDSP OS Architecture

Peripheral Drivers

- Unified cross-device API for generic hardware drivers
- Device-specific API for device-specific hardware
- Cache and MMU handling in (most) drivers
- Drivers abstracted by underlying software:
  1. DMA
  2. Buffered IO (BIO) provides a unified API for buffered based peripherals
  3. Coprocessor (COP) provides a unified API for all coprocessors
  4. Synchronized IO (SIO) provides a unified API for devices where both receive and transmit processes are clock synchronized
  5. Character IO (CIO) provides a unified API for devices which are not frame based and in which there is no logical division of the data into frames or packets

UDP/TCP/IP Stack

- SmartDSP OS IPv4 stacks support the following:
  - DHCP
  - RTP/SRTP
  - RTCP/SRTCP
  - TCP
  - UDP
  - IPCMP
  - IPsec
  - ARP
  - ICMP
- SmartDSP OS IPv6 stacks support the following:
  - UDP
  - Neighbor Discovery
  - ICMPv6
- Provides callbacks for user-defined functionality
- Supports any frame-based protocol. Current implementations:
  1. Ethernet
  2. RapidIO® (with SmartDSP OS RIONET headers)

Runtime Enablement Tools

Kernel Awareness

- Runtime event logging
- Post-mortem and runtime event viewing (GUI in CodeWarrior)
- Task awareness

SmartDSP HEAT

- File I/O over Ethernet
- Supports stdio
- Supports low level directives
- SmartDSP HEAT server for Windows® and Linux®

eCLI

- Allows evaluation of any global symbol (variable or function) remotely over a standard Telnet (TCP) connection
- Allows for user-defined functionality and callback function
- Provides ability for one device to act as proxy to other devices on the board and reroute traffic over another physical layer (e.g. RapidIO)

Debug Print

- Non-intrusive offloading of virtual trace buffer by QUICC Engine
- Remote host supervision, configuration and management
- Filtering of debug print messages offloaded from core
- Built-in error handling
- Gigabit Ethernet line rate output to host

Learn More: For more information about Freescale DSP products, please visit **freescale.com/DSP**.

For more information about Freescale's CodeWarrior software solutions, please visit **freescale.com/CodeWarrior**.

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