EECS 221: System-on-Chip Software Synthesis Lecture 8

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Lecture 8: Overview

- Embedded Operating Systems
  - General requirements
  - Real-time Operating Systems (RTOS)
  - Middleware
- Example: MicroC/OS-II
  - Overview
  - Structure
  - Kernel Services

Embedded Operating Systems

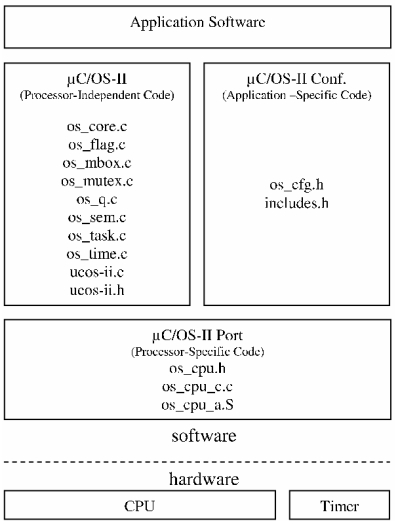
- Chapter 4, part 3, of
  "Embedded System Design"
  by P. Marwedel (Univ. of Dortmund, Germany),
  Kluwer Academic Publishers, 2003.
  - **`es-marw-4c-rtos.ppt`**

Embedded Operating Systems

- Example: MicroC/OS-II
  - Overview
    - multi-tasking real-time kernel
    - real-time support (most kernel functions deterministic)
    - task management
    - priority scheduling
    - preemption
    - ROM'able (executable from firmware)
      - memory footprint about 20 KB
    - portable (to over 40 different processor architectures, 8-64bit)
      - about 5500 lines of ANSI-C source code
      - small amount of processor-specific assembly code

Embedded Operating Systems

- Example: MicroC/OS-II
  - Structure



Embedded Operating Systems

- Example: MicroC/OS-II
  - Kernel Services
    - Task management
      - up to 56 application tasks
      - priority-based scheduling
    - Time management
      - system timer interrupt (10ms – 100ms)
      - 32-bit tick counter
    - Semaphore management
      - inter-task communication through shared memory
      - semaphore API
    - Mutex management
      - binary semaphore
    - Memory management
      - dynamic memory allocation (with fixed block size)