Introduction to Embedded and Real Time systems

Course Content 4828 – 40 Hours

Overview

A Real Time system is any information processing system which has to respond to externally generated input stimuli within a finite and specified period. The computer is a component in a larger engineering system – Embedded Computer System.
This course introduces the development process for such systems, the basic problems and solutions and special considerations involved.
Key topics:

- Basic Principles in Real Time systems
- Basic Principles in Embedded systems
- Developing without Operating system
- Hardware and software design and development
- RTOS API

On Completion, Delegates will be able to

- Understand the Components of Embedded System
- Develop using Real Time Operating System API

Who Should Attend

- C/ C++ Developers who works in Embedded system Environments

Prerequisites

- Delegates should have a working knowledge of C/C++

Course Contents

Introduction
- Real Time systems overview
- Time constraints

Programming Languages
- C considerations
- C++ considerations
- Common pitfalls

Hardware Design of RTE systems
- Hardware Design basic
- SPLD/CPLD devices
- FPGAs and ASICs
- Soft processors
- Integration with the software

Software Design of RTE systems
- Using procedural methods
- Object Oriented Design
- Design and CASE tools

Embedded Systems without OS
- Design consideration
- Typical systems
- Evaluation boards
- Accessing Hardware devices
- Interrupts
- The Development process
- Simulating and debugging
- Common tools
- Case study: ARM 7 and keil tools

Using Operating systems

- Design considerations
- Typical systems
- Hard/soft real time systems
- Configuration
- Accessing hardware
- Handling software and hardware interrupts
- The Development process
- Simulating and Debugging
- Case study: windows CE
- Case study: Embedded Linux

Fault Tolerance

- Fault types
- Monitoring
- Recovering

Time and deadlines

- Using timers
- Using RTC
- Deadline handling

Networking

- TCP/IP
- RS232 and other serial protocols

Programming in Real-Time operating systems

- RTOS basics
- Task management
- Synchronizations
- Other OS objects
- Examples