

# Basics of Embedded Real-Time Operating Systems (RTOS)

24 Hours

## Course Description

Explore the intricate world of Real-Time Operating Systems (RTOS) in this comprehensive tutorial. Dive into the principles, types, and applications of RTOS, and gain practical insights into designing and implementing systems that demand real-time responsiveness.

## Audience

This course is designed for software engineers, system architects, and embedded systems developers who want to deepen their understanding of Real-Time Operating Systems. It is also suitable for students and enthusiasts eager to explore the nuances of RTOS in various applications.

## Pre-requisite Knowledge/Skills

Participants should have a solid understanding of general operating system concepts and basic programming skills. Familiarity with C/C++ programming languages is recommended.

## Course Objectives

- Understand the fundamentals of Real-Time Operating Systems.
- Differentiate between various types of operating systems and their applications.
- Explore the unique challenges and requirements of real-time systems.
- Learn the principles of multi-tasking and its implementation in RTOS.
- Compare and contrast standard operating systems with Real-Time Operating Systems.
- Gain practical skills in designing and implementing real-time systems.
- Explore embedded operating systems and their significance in modern applications.

## Course Outline

### Module 1: RTOS Basics Tutorial

- System
- Operating System
- The Need for Operating System
- Computer System Components
- Abstract View of System Components
- Functions of Operating Systems
- Four main tasks of OS
- Shell
- Kernel

## Module 2: Types of OS

- Batch Processing OS
- Time-Sharing Systems – Interactive Computing
- Real-Time Operating System

## Module 3: Types of Embedded RTOS

- Embedded OS

## Module 4: Types of System

- What is a Real-Time System?
- Multi-Tasking

## Module 5: OS VS RTOS

- Types of RTS
- Soft real-time
- Hard real-time
- Real-Time Spectrum
- What is the need for an RTOS?

## Module 6: Polled Loop Systems

- Advantages
- Disadvantages

## Module 7: Interrupt Driven Modules

- Overview of Interrupt-driven Programming
- Types of Interrupts
- Hardware Interrupts
- Software Interrupts
- Interrupt Service Routines (ISRs)
- Interrupt Vector Table (IVT)
- Enabling and Disabling Interrupts
- Priority Handling in Interrupts