

# Developing Embedded Solutions with Windows Embedded Compact 7/2013

**Dauer: 5 Tage**

## Kursbeschreibung

Our course „Developing Embedded Solutions With Windows Embedded Compact 7/2013” is an enhanced and updated version of our highly successful “Windows Embedded CE System Generation and Drivers”-course. After the course the participant is able to compile Microsoft system and third party components such as drivers as well as a hardware-specific Windows Embedded Compact 7/2013 kernel. The participant is thus able to develop an Embedded Compact 7/2013 system driver and to test it by using the platform builder kernel debugger.

After an overview of the component architecture of the CE OS the attendee will be introduced into the essential steps of the build process. All of the important tools of the up-to-date Platform Builder will be discussed, so that the participant will be able to understand all the phases (Windows Embedded Compact 7/2013, cesysgen, buildrel, makeimg) of the build process, to adapt the environment parameters and configuration files for his or her necessities and to perform the build process stand alone. The various download- and debugging- techniques will be mediated. In order to create an adapted kernel, there are kernel specific libraries that are necessary. The creation and the export of these SDK libraries is a topic of this course. Furthermore, the addition of a proprietary application into the kernel will be discussed.

First focus is a profound overview to Windows Embedded Compact 7/2013 RTOS its architecture and components, tools for image generation, the complete build process as well as image generation troubleshooting.

Next focus is a short introduction to the multithreading- and synchronization model of Windows Embedded Compact 7/2013. The differences between Windows 7/8/10 will be covered as well, on demand. The thereof derived real-time behavior will be discussed intensively.

Another focus is the driver programming. An introduction into memory architecture and the Windows Embedded Compact model of the dynamic linking (DLL programming) will be provided. After discussion of the device manager the development of stream drivers will be learned. One completely thread safe device driver will be implemented. Other driver types will be referenced as well. Additional topics that are covered are the BOOT-Loader, the BSP (Board Support Package) and implementing the power management in the driver.

## Themenschwerpunkte

- **Module 1: Introduction and Operating System Concepts**
  - Embedded Devices Overview
  - Windows Embedded Family

- Challenges of Embedded Development
- Windows Embedded Jargon
- Embedded Operating System Concepts
- Windows Embedded Compact 7 Features
- Windows Embedded Compact Workflow
- **Module 2: Operating System Overview**
  - Architecture
  - Memory Management
  - Scheduler
  - Synchronization
  - Filesystem
  - Databases
- **Module 3: Creating an OS Design**
  - Platform Builder
  - LAB 3.1 Select elements from catalog
  - Configuration Files
  - Binary Image Builder files (BIB)
  - Registry files (REG)
  - Filesystem configuration files (DAT)
  - Internal databases configuration files (DB)
  - LAB 3.2 Add a file to the OSImage
  - LAB 3.3 Configure the OSImage registry
  - LAB 3.4 Configure the filesystem
- **Module 4: Building an OS Design**
  - Build Process Overview
  - LAB 4.1 Build an OS Design
  - Pre-Sysgen
  - Sysgen
  - Build
  - Buildrel
  - Make Image
  - Building From the Command Line
  - LAB 4.2 Set-up command line build environment
  - IDE and Command Line Mappings
  - Speed Up and Troubleshoot Builds
  - LAB 4.3 Review the contents of an OS image
- **Module 5: Debugging an OS Design**
  - OS Image Download
  - LAB 5.1 OS Image Download
  - Interactive Debugger Features
  - LAB 5.2 Interactive debugger
  - Memory Debug Tools
  - LAB 5.3 Memory Tools
  - Remote Tools
  - LAB 5.4 Remote Tools
  - Profiler
  - LAB 5.5 Profiler
  - Timeline Viewer
  - LAB 5.6 Timeline viewer
  - Post Mortem Debugger
  - LAB 5.7 Post-Mortem debugger

- **Module 6: Windows Embedded Compact Source Code**
  - Shared Source
  - Directory Structure
  - LAB 6.1 Clone public code
- **Module 7: The Board Support Package**
  - BSP Overview
  - LAB 7.1 Cloning a BSP
  - Bootloader
  - OAL
  - LAB 7.2 Adding a custom IOCTL
  - Drivers
  - Streaming Interface Drivers
  - Driver Debugging
  - Driver Troubleshooting
  - Buffers and Memory Access
  - Kernel Mode vs User Mode Drivers
  - Hardware Access
  - USB Drivers
  - SD Drivers
- **Module 8: Advanced features**
  - Networking Features
  - Windows Sockets
  - LAB 8.1 Winsock Programming
  - Bluetooth
  - Internet Explorer
  - Servers
  - LAB 8.2 HTTP server
  - Adobe Flash Player
  - Office Viewers
  - Multimedia Features
  - DirectShow
  - LAB 8.4 DirectShow application
  - DLNA and DRM
  - Windows Media Player
  - Power Management
  - Internationalization
- **Module 9: Application Development**
  - Application Development Overview
  - SDK
  - LAB 9.1 Generate an SDK
  - Visual Studio Application Debugging
  - LAB 9.2 Visual Studio Debugger
  - Windows Compositor
  - Silverlight for Windows Embedded
  - LAB 9.3 Silverlight for Windows Embedded Tools
  - LAB 9.4 Silverlight for Windows Embedded Application
  - XAML Based OS Customization
  - LAB 9.5 XAML customization
  - .NET Compact Framework
  - LAB 9.6 .NET Compact Framework development
- **Module 10: Testing and Deployment**

- Windows Embedded Compact Test Kit
  - Create a Custom Test
  - LAB 10.1 Creating a custom test
  - Other Test Tools
  - Distribution
- **Additional resources**
  - Windows Embedded Website
  - Technet Wiki
  - Books
  - Blogs

## Voraussetzungen

Adequate C or C++ knowledge; knowledge about OS architectures are useful; hardware as well as Win32-API knowledge is of advantage; experience with previous Windows Embedded CE versions or Windows Embedded Compact 7/2013 is not necessary

## Zielgruppe

System, BSP, driver designers and developers who want to generate their own optimized Windows Embedded Compact 7/2013 system kernel or want to develop driver and kernel mode programs for a purchased Windows Embedded Compact 7/2013 system kernel, but also for application developers as well as test and QA engineers who want to get a deeper understanding of Windows Embedded Compact 7/2013 and how it works. This seminar is the perfect preparation for MCTS exam 70-181