



EDUCATION SERVICES

VXWORKS 7 BOARD SUPPORT PACKAGES AND DEVICE DRIVERS

COURSE DESCRIPTION

The VxWorks® 7 Board Support Packages and Device Drivers course provides engineers with a fast, cost-effective way to acquire the knowledge necessary to port VxWorks to customer hardware.

After this course, participants will be able to perform the following:

- Explain the architecture of the VxWorks 7 board support package (BSP)
- Create a flattened device tree file
- Boot VxWorks 7 with VxBL and U-Boot boot loaders
- Explain the kernel initialization sequence and its routines
- Create and make add-on VxWorks kernel components available in the kernel configuration editor
- Implement a VxWorks I/O system driver and access I/O devices from both user and kernel space
- Explain the VxBus general architecture and describe how VxBus device drivers are managed and integrated
- Explain the roles of ttyDrv, tyLib, and implement and integrate a serial driver
- Implement and integrate a timer driver
- Initialize, configure and integrate END drivers

Hands-on exercises are included, utilizing the Wind River Simics® virtual target.

PRODUCTS SUPPORTED

- VxWorks 7
- Wind River Workbench 4 for VxWorks 7

COURSE FORMAT

- This three-day expert-led course consists of lectures and lab sessions.
- Attendees use VxWorks 7, Workbench 4, and Simics to gain experience with the topics presented.
- Participants receive individual guidance from an expert engineer who has extensive experience with Wind River technologies.

Course title:	VxWorks 7 Board Support Packages and Device Drivers
Duration:	Three days
Format:	Instructor-led lectures and hands-on lab sessions; instructor-led Live Remote delivery available
Content:	Day 1: Introduction to VxWorks BSPs; Flattened Device Tree; Boot Loaders for VxWorks 7; VxWorks 7 BSP Infrastructure Day 2: Kernel Initialization; Component Description Language; VxWorks I/O Interface Day 3: VxBus and Device Driver Fundamentals; Serial Driver; Timer Driver; VxWorks Network Driver

AUDIENCE

- Developers planning to write a BSP for a new board on a supported architecture
- Device driver developers
- Application programmers interested in learning what occurs at the hardware level of a VxWorks image
- Senior engineers who will decide on a final production image of their product

PREREQUISITE SKILLS

- C programming, including experience with structures, pointers, pointers to structures, typedefs, macros, and bitwise operators
- Functional knowledge of Linux or Windows host operating systems
- Experience using the Workbench debugger to debug target code

PREREQUISITE COURSES

- Real-Time Programming for Embedded Systems
- VxWorks 7 and Workbench Essentials

RELATED COURSES

- VxWorks 6.9 to VxWorks 7 Migration

SYLLABUS

Day 1

INTRODUCTION TO VXWORKS 7 BSP

- BSP overview
- BSP high level architecture
- **LAB: Getting Started with VxWorks BSPs and Device Drivers**

FLATTENED DEVICE TREE

- Flattened device tree overview
- Flattened device tree syntax
- Flattened device tree initialization
- Device discovery
- **LAB: Porting a BSP to Support a Board Variant**

BOOT LOADERS FOR VXWORKS 7

- VxBL for PowerPC and ARM
- VxWorks boot application
- U-Boot for PowerPC and ARM
- Boot Loaders for Intel
- **LAB: Building a U-Boot Boot Loader**
- **LAB: Building a VxBL**

VXWORKS 7 BSP INFRASTRUCTURE

- Overview
- BSP board layer
- Processor support library (PSL)
- Board subsystem
- Quick steps for BSP development

Day 2

KERNEL INITIALIZATION

- Pre-kernel initialization overview
- Pre-kernel early debug options
- Kernel initialization overview

- The kernelInit() function
- The usrRoot() function
- Hardware initialization
- **LAB: Browsing VxWorks Initialization Code**

COMPONENT DESCRIPTION LANGUAGE

- Language and file essential
- Adding components
- **LAB: Adding VxWorks 7 Components**

VXWORKS I/O INTERFACE

- VxWorks I/O system
- I/O system structure
- User space and I/O facilities
- **LAB: Creating a VxWorks I/O Device Driver**

Day 3

VXBUS AND DEVICE DRIVER FUNDAMENTALS

- VxBus architecture
- The VXB_DRV structure
- Device driver methods
- VxBus initialization sequence
- Device discovery
- Resource management
- Dealing with device interdependency
- Driver debug aids
- Using I/O system with VxBus-compatible drivers
- **LAB: Integrating a VxWorks I/O Device Driver with VxBus**

SERIAL DRIVERS

- Overview
- High level serial driver architecture
- Serial driver data structures
- Header file
- Serial driver routines
- VxBus driver routines
- Configuring and initializing serial driver
- Implementing driver routines
- **LAB: Creating a Serial Driver**

TIMER DRIVERS

- Overview
- Timers

- VxBus driver routines
- Timer driver routines
- Header file
- Configuring and initializing timer driver
- Integrating timer drivers
- Implementing driver routines
- **LAB: Creating a Timer Driver**

VXWORKS NETWORK DRIVERS

- Overview
- VxBus driver methods
- END
- Network framing
- Receiving packets
- Sending packets
- Contexts of execution
- MDIO
- **LAB: Adding Polling Mode to the VxBus Network Driver**

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GLOBAL REACH OF WIND RIVER EDUCATION SERVICES

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