



# DATA PLANE DEVELOPMENT KIT

## COURSE DESCRIPTION

This course presents Data Plane Development Kit (DPDK), a powerful set of highly optimized user space libraries and drivers that enable users to consolidate control and data plane platforms and execute efficient data path packet processing on Intel® architecture general purpose processors. The course covers DPDK architecture, the application programming interface (API), integration with Linux, and several data plane packet processing labs.

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

- Understand the architecture of DPDK
- Integrate and configure DPDK with Linux
- Use the DPDK libraries and APIs
- Implement the DPDK packet flow in a multi-core environment
- Deploy several different data path processing applications

## PRODUCTS SUPPORTED

- DPDK 1.7

## COURSE FORMAT

- This two-day instructor-led course consists of lectures and lab sessions.
- Students gain hands-on experience and receive personal guidance from expert Wind River® instructors.
- Students examine and exercise simulated network topologies in hands-on labs.
- Specific questions are addressed.

## AUDIENCE

- Developers involved in data plane packet processing on Intel architecture general purpose processors
- System architects and system integrators involved with the design of control and data plane systems

Course title:	<b>Data Plane Development Kit</b>
Duration:	Two days
Format:	<b>Day 1:</b> Introduction to DPDK; DPDK Position in the System; Libraries; System Initialization; Life of a Packet; DPDK Applications  <b>Day 2:</b> Integration of DPDK with Wind River Linux; Configuration and Building; Deploying DPDK Systems; Benchmarking and Performance Optimization

## PREREQUISITE SKILL

- Intermediate knowledge of data plane IP packet processing
- Intermediate knowledge of x86 Intel architecture
- Intermediate knowledge of Linux

## PREREQUISITE COURSES

- None

## RELATED COURSES

- Wind River Linux Device Drivers
- Wind River Linux User Space Programming

## SYLLABUS

### Day 1

#### INTRODUCTION TO DPDK

- Benefits of using DPDK and general purpose architecture over NPU
- Data plane/control plane consolidation

- Processor architectures and platforms supported
- **LAB: DPDK virtualized environment—running DPDK on QEMU-KVM virtualized machines**
- **LAB: Configuration and Hello World—DPDK integration with Linux, with multi-core Hello World example**

## DPDK POSITION IN THE SYSTEM

- Architectural overview
- Environment abstraction layer (EAL)
- Data flow processing on multi-core architectures
- Memory management on multi-core architectures
- Inter-core communication on multi-core architectures
- DPDK virtualization —SR-IOV, virtual functions, KVM, IVSHMEM
- **LAB: L2 forwarding—L2 forwarding application, forwarding packets between two Ethernet ports**
- **LAB: DPDK SR-IOV—Setting up virtual ports with SR-IOV**

## LIBRARIES

- Memory, ring, buffer, packet, time, queue managers, flow and packet classification
- Poll mode, emulated devices, bonding drivers, QoS, power management
- TAP and KNI interfaces to Linux
- DPDK API overview

## SYSTEM INITIALIZATION

- Memory, cores, PCI, NIC initialization
- I/O and application workload distribution over cores

## LIFE OF A PACKET

- Packet reception and transmission

## DPDK APPLICATIONS

- Hello World on multi-core
- L2 and L3 forwarding, LPM and hash libraries
- Deep packet inspection (DPI)
- **LAB: Client-server—Multiprocess application: I/O and data processing operations divided between several Linux processes running on different cores**

## Day 2

### INTEGRATION OF DPDK WITH WIND RIVER LINUX

- Integration of DPDK with Wind River Linux
- **LAB: Linux TAP—DPDK code transmits and receives control plane data packets between Linux kernel and Ethernet ports via TAP interfaces**
- **LAB: Linux KNI—DPDK code transmits and receives control plane data packets between Linux kernel and Ethernet ports via KNI interfaces**

### CONFIGURATION AND BUILDING

- Native environment set-up
- **LAB: L3 forwarding—Forwarding decision based on data packet header content processed by longest prefix match (LPM) or hash functions**

### DEPLOYING DPDK SYSTEMS

- System configuration
- Networking configuration
- System debugging

### BENCHMARKING AND PERFORMANCE OPTIMIZATION

- Comparison on results achieved with and without DPDK
- Tools and methods used in DPDK performance optimization
- Intel VTune™
- **LAB: Workbench debugging—How to use Wind River Workbench to debug DPDK-based applications**

### GLOBAL REACH OF WIND RIVER EDUCATION SERVICES

With more than 30 years of device software experience, Wind River provides education services in every region of the world. Our private classes can be tailored to your needs by adding or removing topics from multiple courses. If you have more specific project challenges, Wind River Mentoring provides coaching by experienced engineers to help you integrate Wind River solutions into your environment. And when you're too busy to attend a whole class, our On-Demand Learning options provide around-the-clock access to advanced and specialized

topics. All of our education services are led by expert engineers who are closely connected to the Wind River technical community for access to specific expertise.

## CONTACT US

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