

Course Description

This two-day course is structured to provide software developers with a catalog of OS implementation options, including hypervisors, various Linux implementations, booting and configuring a system, and power management for the Zynq UltraScale+™ MPSoC family.

Level – Embedded Software 3

Course Duration – 2 days

Price – \$1,600 or 16 Xilinx Training Credits

Course Part Number – EMBD-ZUPSW-ILT

Who Should Attend? – Software developers interested in understanding the OS and other capabilities of the Zynq UltraScale+ MPSoC device.

Prerequisites

- General understanding of embedded and real-time operating systems
- Familiarity with issues related to implementing a complex embedded system

Software Tools

- Vivado® Design Suite 2018.1
 - May require special Zynq UltraScale+ MPSoC family license
- Hardware emulation environment:
 - VirtualBox
 - QEMU
 - Ubuntu desktop
 - PetaLinux

Hardware

- Host computer for running the above software*

* This course focuses on the Zynq UltraScale+ MPSoC architecture. This version of the class does not use a physical board, but rather a local emulation environment and the Vivado Design Suite.

** Check with [Morgan Advanced Programmable Systems, Inc.](http://www.morgan-aps.com) for the specifics of the in-class lab board or other customizations.

After completing this comprehensive training, you will have the necessary skills to:

- Distinguish between asymmetric multi-processing (AMP) and symmetric multi-processing (SMP) environments
- Identify situations when the ARM® TrustZone technology and/or a hypervisor should be used
- Effectively use power management strategies and leverage the capabilities of the platform management unit (PMU)
- Define the boot sequences appropriate to the needs of the system
- Define the underlying implementation of the application processing unit (APU) and real-time processing unit (RPU) to make best use of their capabilities

Course Outline

Day 1

- Zynq UltraScale+ MPSoC Application Processing Unit {Lecture, Lab}
- Zynq UltraScale+ MPSoC Real-Time Processing Unit {Lecture, Demo, Lab}
- ARM TrustZone Technology {Lecture}
- QEMU {Lecture, Demo, Lab}
- Zynq UltraScale+ MPSoC HW-SW Virtualization {Lecture, Demo, Lab}
- MultiProcessor Software Architecture {Lecture}
- Hypervisors {Lecture, Demo, Lab} (pairs with OpenAMP, but not SMP)
- OpenAMP {Lecture, Lab} (pairs with the Xen Hypervisor, but not SMP)
- Linux {Lecture, Demo}

Day 2

- Yocto {Lecture, Demo, Lab}
- Open Source Library (Linux) {Lecture, Demo, Lab}
- FreeRTOS {Lecture, Demo, Lab}
- Zynq UltraScale+ MPSoC Software Stack {Lecture, Demo}
- Zynq UltraScale+ MPSoC PMU {Lecture, Lab}
- Zynq UltraScale+ MPSoC Power Management {Lecture, Lab}
- Zynq UltraScale+ MPSoC Booting {Lecture, Lab}
- First Stage Boot Loader {Lecture, Demo, Lab}

Topic Descriptions

Day 1

- Zynq UltraScale+ MPSoC Application Processing Unit – Introduction to the members of the APU, specifically the Cortex™-A53 processor and how the cluster is configured and managed.
- Zynq UltraScale+ MPSoC Real-Time Processing Unit – Introduction to the various elements within the RPU and different modes of configuration.
- ARM TrustZone Technology – Illustrates the use of the ARM® TrustZone technology.
- QEMU – Introduction to the Quick Emulator, which is the tool used to run software for the Zynq UltraScale+ MPSoC device when hardware is not available.
- Zynq UltraScale+ MPSoC HW-SW Virtualization – Covers the hardware and software elements of virtualization. The lab demonstrates how hypervisors can be used.
- MultiProcessor Software Architecture – Introduces several potential architectures and illustrate the strengths of each.
- Hypervisors – Description of generic hypervisors and discussion of some of the details of implementing a hypervisor using Xen.
- OpenAMP – Introduction to the concept of OpenAMP.
- Linux – Discussion and examples showing how to configure Linux to manage multiple processors.

Day 2

- Yocto – Compares and contrasts the kernel building methods between a "pure" Yocto build and the PetaLinux build (which uses Yocto "under-the-hood").
- Open Source Library – Introduction to open-source Linux and the effort and risk-reducing PetaLinux tools.
- FreeRTOS – Overview of FreeRTOS with examples of how it can be used.
- Zynq UltraScale+ MPSoC Software Stack – Introduction to what a software stack is and a number of stacks used with the Zynq UltraScale+ MPSoC.
- Zynq UltraScale+ MPSoC PMU – Investigation into the the tools and techniques for debugging a Zynq UltraScale+ MPSoC device.
- Zynq UltraScale+ MPSoC Power Management – Overview of the PMU and the power-saving features of the device.
- Zynq UltraScale+ MPSoC Booting – How to implement the embedded system, including the boot process and boot image creation. Also how to detect a failed boot.
- First Stage Boot Loader – Introduction to the FSBL, its importance, and how it can be implemented and debugged.

Register Today

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Visit morgan-aps.com/training, for full course schedule and training information.



You must have your tuition payment information available when you enroll. We accept credit cards (Visa, MasterCard, or American Express) as well as purchase orders and Xilinx training credits.

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- Students cancellations received more than 7 days before the first day of class are entitled to a 100% refund. Refunds will be processed within 14 days.
- Student cancellations received less than 7 days before the first day of class are entitled to a 100% credit toward a future class.
- Student cancellations must be sent [here](#).

MAPS Inc. Course Cancellation Policy

- We regret from time to time classes will need to be rescheduled or cancelled.
- In the event of cancellation, live on-line training may be offered as a substitute.
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