

## EMBEDDED LINUX DEVELOPMENT + YOCTO PROJECT

20 - 21 - 22 Giugno 2017 | 09:00 – 18:00

Prezzo: 1.200,00 euro + IVA

Sede del corso: T3LAB – via Sario Bassanelli 9/11 - Bologna

### OVERVIEW

- Understanding the Linux filesystem
- Setup TFTP and NFS services
- Understanding bootloaders
- u-boot bootloader
- Understanding the Linux kernel
- Configuring and building the Linux kernel
- Linux Device Tree
- OpenEmbedded and Yocto Project overview
- Using it to build a root filesystem and run it on your target
- Writing and extending recipes
- Creating layers
- Practical labs with ARM-based board

### DAY 1

#### Lecture - Setup and Introduction

- Virtual machine setup
- Introduction to embedded linux
- Advantages of using linux
- Systems running linux
- Typical embedded hardware
- System architecture

#### Lecture - Linux commands and Cross compilation

- Linux commands
- Linux filesystem
- Virtual filesystems
- Understanding the development process

#### Lab - Using linux (Using the Virtual Machine)

- Using the Unix command line
- Using the vi text editor
- Discovering procs and sysfs
- Using TFTP and NFS connect the board to development PC



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### **Lecture - Configuring, compiling and booting the Linux kernel**

- Busybox
- Bootloaders
- u-boot
- Autotools concepts
- Booting the kernel using TFTP and NFS

### **Lab - Kernel configuration, crosscompiling and booting on NFS (Using the Virtual Machine)**

- Configuring TFTP server on the host machine
- Configuring NFS server on the host machine
- Flash a Linux image on a SDCard
- Booting the target board using TFTP and NFS

## **DAY 2**

### **Lecture - Linux kernel**

- Linux kernel sources structure
- Details about the API provided to kernel drivers
- Cross compiler toolchains
- Cross-compiling the kernel for the target
- Device Tree

### **Lecture - Linux kernel details**

- Linux kernel introduction
- Linux versioning
- Generating patches with diff
- Understanding the kernel development process

### **Lab - Using linux (Using the Virtual Machine)**

- Extracting a generic linux kernel
- Applying patches to the kernel with patch
- Configuring the kernel

### **Lecture - Lecture - Configuring, compiling and booting the Linux kernel**

- Linux kernel configuration
- Kernel booting parameters
- Native and cross-compilation generated files
- CPU pin muxing
- Device Tree
- The init process

### **Lab - Kernel configuration, cross-compiling and booting on NFS (Using the Virtual Machine)**

- Cross compile a customized kernel
- Run a modified Linux image on your target board
- Play around with Embedded Linux on your board

## **DAY 3**

### **Lecture - Yocto Project introduction**

- Yocto Project overview
- How to setup the Yocto Project build system
- Organization of the project source tree
- Building a root filesystem image using the Yocto Project

### **Lecture - OpenEmbedded and Yocto Project**

- General concepts of a build system
- Origin of Yocto Project
- Yocto Project recipes
- Yocto Project meta layers
- Configuring the build system
- Customizing the package selection

### **Lab - Running Yocto on the host (Using the Virtual Machine)**

- Setup the Poky reference build system
- Building a system image
- Creating a meta layer with Yocto Project
- Creating an example recipe with Yocto Project

### **Lecture - Yocto Project**

- Writing a minimal recipe
- Adding dependencies
- Development workflow with bitbake
- Meta layers customization

### **Lab - Running linux on the target (Using the ARM board)**

- Create a custom recipe for a new package nInvaders
- Flash a new Linux image on a SDCard
- Writing a recipe for nInvaders
- Adding nInvaders to the final image
- Play around with generated image on your board