

2<sup>nd</sup>  
edition

# EMBEDDED LINUX DEVELOPMENT + YOCTO PROJECT

18\_19\_20 May 2016 | 09:00-18:00

Price: 1.200,00 euro

T3LAB - via Sario Bassanelli 9/11 - Bologna



UNDERSTANDING THE LINUX KERNEL | BUILDING THE LINUX KERNEL |  
DEVELOPING WITH YOCTO PROJECT | DEVELOPING LINUX DEVICE DRIVERS |  
LINUX APPLICATION DEBUGGING | 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

- Toolchain components
- Understanding the development process
- C libraries
- Toolchain options

### Lab

#### USING LINUX (USING THE VIRTUAL MACHINE)

- Using the Unix command line
- Using the vi text editor
- Using the apt package manager
- Discovering procs and sysfs

### Lecture

#### CONFIGURING, COMPILING AND BOOTING THE LINUX KERNEL

- Embedded linux development environments
- Linux kernel features
- Linux versioning schemes

### Lab

#### KERNEL CONFIGURATION, CROSSCOMPILING AND BOOTING ON NFS (USING THE VIRTUAL MACHINE)

- Get the kernel sources from the official location
- Check the authenticity of the kernel sources

## DAY 2

### Lecture

#### YOCTO PROJECT INTRODUCTION

- Yocto Project overview
- How to setup the Yocto Project build system

### Lecture

#### YOCTO PROJECT

- Yocto Project meta layers
- Yocto Project recipes

### Lab

#### RUNNING YOCTO ON THE HOST (USING THE VIRTUAL MACHINE)

- Setup a Yocto Project build system
- Creating a meta layer with Yocto Project
- Creating a recipe with Yocto Project

### Lecture

#### LINUX KERNEL AND DEVICE DRIVERS

- Linux kernel configuration
- Kernel booting parameters
- Booting the kernel using NFS
- Native and cross-compilation generated files

### Lab

#### RUNNING LINUX ON THE TARGET (USING THE ARM BOARD)

- Configure the TFTP and the NFS server
- Flash a Linux image on a SDCard
- Launch the Linux image on your target board
- Play around with Embedded Linux on your board

## DAY 3

### Lecture

#### KERNEL INIT AND BOOTLOADERS

- Cross-compiling the kernel for the target
- Linux kernel sources structure
- Linux driver development
- Details about the API provided to kernel drivers

### Lecture

#### LINUX FILESYSTEMS - BUSYBOX

- Kernel initialization
- Bootloaders
- Boot sequence
- u-boot
- Linux root filesystem

### Lab

#### DEVICE DRIVER (USING THE ARM BOARD)

- Creating a basic device driver
- Creating a simple character driver

### Lecture

#### APPLICATION DEBUGGING

- Block filesystems
- Flash filesystems
- Virtual filesystems
- Busybox

### Lab

#### RUNNING LINUX ON THE TARGET (USING THE ARM BOARD)

- Debugging user space applications
- Remote debugging user space applications

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#### NOTE:

Participants must have their own PC laptop.  
The hardware platform used for the practical Labs is the BeagleBone Black revC