

# Linux embedded training (LEVEL 2)

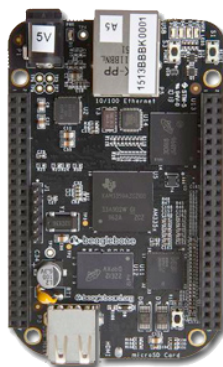
<b>Title</b>	Linux embedded training
<b>Overview</b>	Understanding the Linux kernel Configuring the Linux kernel Building the Linux kernel Linux Device Tree Practical labs with ARM-based board
<b>Duration</b>	<b>ONE</b> day - 8 hours. 50% of lectures, 50% of practical labs (approx.)
<b>Trainer</b>	Marco Cavallini m.cavallini (AT) koansoftware.com
<b>Language</b>	Oral lectures: English or Italian Materials: English.
<b>Audience</b>	People that need to learn how to configure and build a whole Linux kernel People developing Linux kernel and user-space applications.
<b>Prerequisites</b>	<b>Knowledge of Linux commands</b> as covered in our Linux training (LEVEL 1) ( <a href="http://koansoftware.com/en/content/linux-embedded-course">http://koansoftware.com/en/content/linux-embedded-course</a> ) <b>Knowledge and practice of Unix or GNU/Linux commands</b> <b>Knowledge of TFTP and NFS</b> <b>Knowledge of u-boot bootloader</b> People lacking experience on this topic should not attend this course.

<b>Required equipment</b>	<p><b>For public sessions</b> Everything is supplied by KOAN in public sessions except the PC. Participants must have <b>their own PC laptop computer</b> with:</p> <ul style="list-style-type: none"> <li>• PC computers with at least <b>2GB of RAM</b>, and <b>40GB</b> of free disk space.</li> <li>• <b>VMWare Player &gt; 6.x</b> installed.</li> <li>• We will work with <b>Lubuntu Desktop 14.04 (64 bit)</b> We don't support other distributions, because we can't test all possible package versions.</li> <li>• <b>Connection to the Internet</b> (direct or through the company proxy).</li> <li>• <b>PC computers with valuable data must be backed up</b> before being used in our sessions. Some people have already made mistakes during our sessions and damaged work data.</li> </ul> <p><b>For on-site sessions</b> please add the following</p> <ul style="list-style-type: none"> <li>• Video projector</li> <li>• <b>Connection to the Internet</b> (direct or through the company proxy).</li> </ul>
<b>Materials</b>	<p>Print and electronic copies of presentations and labs. Electronic copy of lab files.</p>

## Hardware

The hardware platform used for the practical labs of this training session is the **BeagleBone Black** board, which features:

- An ARM AM335x processor from Texas Instruments (Cortex-A8 based), 3D acceleration, etc.
- 512 MB of RAM
- 4 GB of on-board eMMC storage (4 GB in Rev C)
- USB host and device
- HDMI output
- 2 x 46 pins headers, to access UARTs, SPI buses, I2C buses



Note:

Content and order of this agenda may slightly vary between sessions and will be determined by the participants and the specific needs of the class.

## Day 1 - Morning

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### 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

## Day 1 - Afternoon

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

- Linux kernel configuration
- Kernel booting parameters
- Booting a modified kernel
- 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