



## **G1 - Android Installation**

### **Android installation on a hardware platform**

#### **Objectives**

- Understanding the specifics of the Android system.
- Knowing the use of GIT manager version to download sources.
- Learn how to install Linux on your hardware and create a BSP
- Learn to configure and compile the Linux kernel for Android.
- How to configure and compile the Android sources to get a working system.
- Control the operation of the Android emulator.
- Understand how to test an Android image before flashing the system.
- Detail the different flash file system image generation procedures.

*Labs are conducted on target boards:*

*Dual Cortex/A9-based "SnowBall" boards from ST-Ericsson, with Lauterbach JTAG probes.*

*We use the last linux open source version of Android, as delivered by Google.*

#### **Course environment**

- Printed course material (in English).
- One Linux PC for two trainees.
- One target platform for two trainees.
- Lauterbach JTAG probe for debug.
- Documentation and exercise solutions on CDROM.

#### **Prerequisite**

- User-mode Linux usage

#### **Plan**

#### **First Day**

#### **Android overview**

- Linux
  - History
  - Version management

- Android
  - History
  - The Open Handset Alliance
  - Existing ports (HTC Dream, Magic...)
- The various licenses used by Android (GPL, LGPL, etc.)

## Cross-development

- The EABI specification
  - Differences between the EABI and OABI
  - Standard toolchains or specific toolchains
  - Building a standard toolchain (crosstool-ng or buildroot)
- The Android toolchain

*Exercise : Building an EABI toolchain*

## The GIT distributed source management system

- Installation and general usage.
  - Creating and using a local repository
  - Connecting to a remote repository

*Exercise : Managing several versions of a program with GIT*

- Working with branches
  - Creation of a new branch
  - Merging branches

*Exercise : Working with vendor branches*

- Team functions
  - Creating configuring and managing a public repository
  - Working with patches

*Exercise : Creating a shared project repository*

## Second Day

### The Android Linux kernel

- Downloading source code
- The Android-specific drivers for kernels 2.6.29 and beyond
  - Binder
  - Logger
  - Low\_memory\_killer
  - Timer\_gpio
  - Timed\_output
- Configuring an Android Linux kernel
- Building the kernel

*Exercise : Configuration and build of the Android kernel for the target board*

*Exercise : Checking the first phases of kernel boot*

### The Linux BSP

- Linux BSP architecture
  - Overall structure
  - The ARM BSP

- The Linux build system
- Defining and initializing the board
- Android specifics
  - Standard Android button management
- The Linux driver model
  - Kernel objects
  - Devices
  - Hotplug events

### **Embedded file systems**

- Flash memories and Linux MTDs
- The various filesystem formats
  - JFFS2, UBIFS, YAFFS2
  - Differences between JFFS2 and YAFFS2
  - Patching the Linux kernel
  - The unyaffs tool

*Exercise : Building JFFS2 and YAFFS2 filesystems*

- Ramdisks and initrd

*Exercise : Building an Android initrd*

### **Third Day**

#### **Booting Android**

- The various kinds of boot
- U-Boot
  - Configuration and build
  - Porting U-Boot
- RedBoot
- Le Linux boot process
- The Android boot sequence

#### **The Android System**

- Downloading sources
- Exploring the Android system
- The Android source tree
  - The Bionic library
  - The Dalvik Java virtual machine
  - The basic packages
- Building the Android system

*Exercise : Compiling the full Android system*

- The Android initialisation language

*Exercise : Modifying the Android init sequence*

### **Fourth Day**

#### **The Android BSP**

- The Android build system

- The Android.mk files
- Creating a new Android platform
  - Declaring a new vendor
  - Creation of platform-specific parameter files
  - Choosing platform-dependent compilation options

*Exercice : Compiling a new Android platform*

- Adding native components
  - Defining Java methods in C++
  - The Android NDK
  - JNI for Android
  - Using SWIG
- The Android binder
  - Writing services in C++
  - The binder's C++ interface

*Exercice : Recompiling a single component*

## The Android SDK

- Overview and installation of the Software Development Kit (SDK)
- The Android Virtual Devices
  - Creation
  - Configuration
  - Basic Use
- The Eclipse Android Development Toolset (ADT)
  - Developing and testing and Android application
  - Deploying Android Applications
- The Android Debug Bridge (adb) tool
  - Basic use
  - Connecting to a remote Android target (real or virtual)

*Exercice : Building and testing a simple Android application*

## Finalization of the Android platform

- Testing the kernel and the system :
  - Using an NFS-mounted root file system
  - Updating the initialisation script for NFS use
- Flash memory partitioning
- Flashing the system
  - Flashing through u-boot
  - Flashing from Linux
- \_ Updating the initialisation script when booting in flash
- Starting and using the platform in standalone mode

*Exercice : Deploying a finalized Android system*

## Renseignements pratiques

**Durée : 4 jours**  
**Prix : 2050 € HT**



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