

## G1 - Android Installation

### Android installation on a hardware platform

#### Objectives

- ▶ Understanding the specifics of the Android system.
- ▶ 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 i.MX6 or i.MX8 boards*

*We use the last open source version of Android, as available on the board.*

*For on-site trainings, if suitable Linux workstations are not available, we provide virtual machine images for VirtualBox; the only requisite is then a recent 64bit PC with at least 8Gb of RAM and 100Gb of free disk space.*

#### Course environment

- ▶ Printed course material (in English).
- ▶ One Linux PC for two trainees.
- ▶ One target platform for two trainees.
- ▶ Documentation and exercise solutions.

#### Prerequisite

- ▶ Embedded Linux installation and kernel usage

#### Plan

##### First Day

#### Android overview

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

#### 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***The Android Linux kernel**

- ▶ Downloading source code
- ▶ Configuring the Android-specific drivers
  - Binder
  - Logger
  - Low\_memory\_killer
  - Timed\_output
  - Timed\_gpio
- ▶ 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***Second 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***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

*Exercise: 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*

## **Third Day**

### **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 an 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**

**Duration : 3 days**  
**Cost : 2180 € HT**