

Android AOSP: Build System, Kernel & ADB

X-day session

9

MODULES

31

TOPICS

15

HANDS-ON ACTIVITIES

X days - X hours (X hours per day). % of lectures, % of practical labs.

COURSE OVERVIEW

Understanding the Android Internals (Architecture, Partitions, Filesystems, ADB, Boot, Backup, Recovery, Init, security, emulation etc.,) Understanding the Android Build System Customizing Android for a specific hardware Extending the Android framework Practical labs with the ARM-based Architecture (Ex Raspberry pi) board.

WHO THIS COURSE IS FOR

Engineers porting Android to new boards

Engineers developing products with Android

PREREQUISITES

- Linux Commands
- Please specify additional inputs as per vendor

TOOLS AND REQUIREMENTS

Materials

- Check that the course contents correspond to your needs
- To be shared later by Vendor, Print and electronic copies of presentations and labs. Electronic copy of lab files.
- The hardware platform to be used for the practical labs of this training session is the Raspberry pi board

LEARNING OBJECTIVES

- Describe the Android architecture and the actors involved
- Explain how to access sources with git, repo and gerrit
- Compile Android and boot it on the Android Emulator
- Explain the role and architecture of the Linux kernel
- Identify changes Google introduced in the Android kernel
- Compare bootloader examples and the fastboot specification
- Apply ADB commands to transfer files and debug devices
- Analyse the Android build system and its Makefiles

9 Modules, 31 Topics

PART 1 Compiling and Booting Android

01

Introduction to Android

TOPICS

History · Actors involved · Introduction to the Android architecture

02

2 Activities

Android Source Code and Compilation

TOPICS

- How to use git, repo and gerrit to access sources
- How to find one's way in the code base
- How to compile Android (tools, targets, etc.)

03

3 Activities

Introduction to the Linux Kernel

TOPICS

- Role and general architecture of the kernel
- Kernel features
- Understanding the development process
- Legal constraints with device drivers
- Kernel user interface (/proc and /sys)
- Kernel configuration
- Native and cross-compilation. Generated files.

PART 2 Porting Android to a New Board

04

Changes Introduced in the Android Kernel

TOPICS

Major functional changes introduced by Google · Additions to the kernel · Mainline kernel status of these patches

05

4 Activities

Android Bootloaders

TOPICS

What is a bootloader · Bootloader examples · The fastboot specifications from Android

06

Activity

Developing and Debugging with ADB

TOPICS

- Presentation of ADB
- **Available commands:** transfer files, install packages, executing remote commands, log access, networking... all this done from the development machine.
- Examples of commands and combinations useful to debug

07

Android Filesystem Layout

TOPICS

- Know where the various software components are installed and mounted, and why it matters

08

2 Activities

Android Build System

TOPICS

Concepts introduced in the build system · Architecture of the Makefiles · Variables and functions available · Compilation steps · Add a new device to the build system

System Customization

2 Activities

09

Activity

Android Native Layer

TOPICS

- Discover the daemons handling the radio, external storage, launching applications, etc.
- Get to know the different components involved in the Android runtime, from the virtual machine to the media framework: StageFright, Flingers, Dalvik...
- Learn how hardware abstraction is done in Android

NOTES

- Trainer: One of the engineers listed on
- Language - Oral lectures: English. Materials: English.

Practise What You Learn

#	MODULE	ACTIVITY
01	Introduction to Android	LAB - SETUP ■ Install the tools required to compile ■ Fetch the source code ■ Get used to Android specific tools
02	Android Source Code and Compilation	LAB - FIRST COMPILATION ■ Using the Android Emulator ■ Compile a first root filesystem for the emulator
03	Introduction to the Linux Kernel	LAB - COMPILE AND BOOT AN ANDROID KERNEL ■ Using the Android Emulator ■ Compile and Boot an Android Kernel ■ Extract the patches from the Android Kernel
05	Android Bootloaders	LAB - SUPPORTING A BOARD ■ Using the Raspberry pi board ■ Use the Android's build for the Raspberry pi ■ Boot Android on a real board ■ Troubleshoot the glitches on the board
06	Developing and Debugging with ADB	Lab - Use ADB: Learn how to get the system log, to gain access to a shell on the device, push and pull files, etc.
08	Android Build System	LAB - ADD A NATIVE LIBRARY TO THE BUILD ■ Create an external library to control a USB/SD based example ■ Add this library to the default Android build
	System Customization	LAB - SYSTEM CUSTOMIZATION ■ Add a device to the build system ■ Customize the "About" info, build ID, boot and home screens in your system
09	Android Native Layer	Lab - Add a native binary to the build: Get to know the build system and the C library (Bionic) specifics

WHAT IS INCLUDED

Everything You Need to Succeed

- Koenig course material for every module
- Delivery by certified instructors and subject matter experts
- Hands-on exercises throughout the course
- Course completion certificate from Koenig

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Who We Are

Established in 1993, Koenig Solutions is a globally recognised training provider with 35+ technology partnerships, 5,000+ training programmes and a network of certified instructors and subject matter experts, supporting individuals and enterprise teams worldwide.

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