Android Internals

Introduction:

This 5-day course gives developers an internal tour of the Android platform.

At Course Completion

At the end of the course, students should be able to describe the architecture and design of the Android platform, including:

- ❑ Understand the Android architecture
- ❑ Identify the components & roles of the Android OS
- ❑ Understand how Java applications are developed for Android
- ❑ Understand how drivers are written or incorporated
- ❑ Understand the graphics architecture of Android
- ❑ Understand the input model
- ❑ Explain the porting process of Android to a new platform
- ❑ Understand the SQLite database
- ❑ Explain the Media architecture of Android
- ❑ Understand power management on Android
- ❑ Show how test cases are written and run on Android

Prerequisites

Before taking this course, students should have the following skills:

- ❑ C Programming Language competency
- ❑ Basic Linux experience (at least as user-level)
- ❑ Knowledge of basic hardware terms

Course Outline

Introduction to Android
- What is Android?
- Android & Linux
- Android Software Stack
- Android SDK
- Android Applications

The Android Kernel
- Components of the kernel
- Scheduler
- Virtual Memory Management
- I/O Processing
- Virtual File System

Driver Architecture
- User Requests
- Driver request handlers
- Driver Events
- Module init and exit
- Device registration
- Announcing entry points

Java Applications
- Java language introduction
- Java virtual machine
- Structure of a Java app
- JNI

Native Development
- What is the NDK
- Installing the NDK
- Building the native code
- Invoking the native code

Android Permissions
- Permissions on Android
- Types of Permissions
- How Apps Request Permissions

Porting Android
- Hardware requirements
- Porting development environment
- Build environment
- Bring up

Android Boot Process
- The Startup Process

- Boot
- Kernel Initialization
- Device Driver Initialization
- File System Initialization
- /init

Graphics on Android
- Linux & Graphics
- Frame buffer architecture
- Surfaces
- 2D Drawing API
- OpenGL

Touch Input
- Keypad driver
- InputManager
- Android Touchscreen requirements
- Input event process

Media Framework
- OpenMax
- Application Layer
- Integration Layer
- Development Layer
- Stagefright

SQLite
- Android's integrated database engine
- Data type limitations
- Quick tutorial on SQLite
- Java and SQLite
- Data storage
- Shell access

Android Power Management
- Power strategy
- PM Driver
- Registering with the PM Driver
- Wake Locks
- Application power management
- Battery consumption expectations

Logging and Tracing
- Log Files & Tracing Mechanisms
- dmesg
- Logcat
- /dev/log
- Where is syslog

- Systrace tool

Android Testing Environment

- Instrumentation Framework
- The "am" tool
- Writing test cases
- Running test cases
- Log output