Android Technology

Guide
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Outline:

• What is Android?
• Architecture of Android
• Development for Android
What is Android:

• Android is a automated machine designed to look and act like a human
• Android is a combination of human brain and mechanism, which in turn we call Android Technology.
Android™ delivers a complete set of software for mobile devices: an operating system, middleware and key mobile applications.

- Open
- All application and Created equal
- Breaking down application boundaries
- Fast & easy application development
Open

- Android is built on the open Linux Kernel.
All applications are created equal:

1. Android does not differentiate between the phone's core applications.
2. With devices built on the Android Platform, users are able to fully tailor the phone to their interests.
Breaking down application boundaries:

- Android breaks down the barriers to building new and innovative applications.

- A developer can combine information from the web with data on an individual's mobile phone -- such as the user's contacts, calendar, or geographic location.
Fast & easy application development:

- Android provides access to a wide range of useful libraries and tools that can be used to build rich applications.

- For example, Android enables developers to obtain the location of the device, and allows devices to communicate with one another enabling rich peer-to-peer social applications.
HISTORY OF ANDROID

- 2001 search service for wireless device
- 2005 Andrew Rubin started work on Android Technology.
- 2007 Nov 5: Android announced.
- 2008 Nov: Android Phone (G1 Phone by HTC/T-mobile)
- 2008 Nov: Full Source Open.
- 2009 July: HTC Hero, Samsung i7500, Android Netbook, Set-top......
Open:

- **Industry**
  - Software stack open-sourced under Apache 2.0 license
  - Source available after first handsets ship
  - Anyone will be able to build a system image

- **Users**
  - Users have control of their experience
  - They control what gets installed
  - They choose the defaults

- **Developer**
  - Don not need permission to ship an application
  - No hidden or privileged framework APIs
  - Can integrate, extend and replace existing component
Introduction to Android

- Open software platform for mobile development
- A complete stack – OS, Middleware, Applications
- An Open Handset Alliance (OHA) project
- Powered by Linux operating system
- Fast application development in Java
- Open source under the Apache 2 license
Android Architecture

- Application Layer
- Application Framework
- Libraries
- Linux Kernel
Linux Kernel

- Works as a HAL
- Device drivers
- Memory management
- Process management
- Networking
Libraries

- C/C++ libraries
- Interface through Java
- Surface manager – Handling UI Windows
- 2D and 3D graphics
- Media codecs, SQLite, Browser engine
Android Runtime

• Dalvik VM
  – Dex files
  – Compact and efficient than class files
  – Limited memory and battery power
• Core Libraries
  – Java 5 Std edition
  – Collections, I/O etc…
Application Framework

- API interface
- Activity manager – manages application life cycle.
Applications

- Built in and user apps
- Can replace built in apps
Agenda

- Mobile Application Development (MAD)
- Intro to Android platform
- Platform architecture
- **Application building blocks**
- Development tools
- Hello Android
Application Building Blocks

- Activity
- IntentReceiver
- Service
- ContentProvider
Activities

• Typically correspond to one UI screen
• But, they can:
  – Be faceless
  – Be in a floating window
  – Return a value
Intent Receivers

- Components that respond to broadcast ‘Intents’
- Way to respond to external notification or alarms
- Apps can invent and broadcast their own Intent
Intents

• Think of Intents as a verb and object; a description of what you want done
  – E.g. VIEW, CALL, PLAY etc..

• System matches Intent with Activity that can best provide the service

• Activities and IntentReceivers describe what Intents they can service
Intents

Client component makes a request for a specific action. System picks best component to act on existing functionality.

“Pick photo”
Services

• Faceless components that run in the background
  – E.g. music player, network download etc…
ContentProviders

• Enables sharing of data across applications
  – E.g. address book, photo gallery
• Provides uniform APIs for:
  – querying
  – delete, update and insert.
• Content is represented by URI and MIME type
Agenda

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Development Tools

• Eclipse

• Android SDK 1.0-2.0
developer.android.com
The Emulator

- QEMU-based ARM emulator
- Runs the same image as the device

Limitations:
- No Camera support
Devices
Hello World


- Generating UIs
  - Views – building blocks
  - E.g. TextView, EditText, Button
  - Placed into Layouts
  - E.g. LinearLayout, TableLayout, AbsoluteLayout
Application Lifecycle

- Application run in their own processes (VM, PID)
- Processes are started and stopped as needed to run an application's components
- Processes may be killed to reclaim resources
Lifecycle

- System Process
- Home
- Mail
- Browser

- Home
- Contacts
- GMail
- Map
Location Manager

Where Are My Friends?

Mike (48.511395km)
Tony (20.396315km)
XMPP Services

- Allows any app to send device-to-device messages to other android users
- Data Messages are Intents with name/value pairs
- Works with any gmail account…
- Can also build servers to deliver server-to-device messages
Notification Manager
Notification Manager

- How background app interact with users
- Consistent notification presentation
Views

Hello LinearLayout
red, green, blue, yellow
row one, row two, row three, row four

Hello Form Stuff
check it out
Red, Blue
OFF

Hello GridView

Views
Location Manager