ITW202: Mobile Application

Unit IV: Developing for Android

Ms. Sonam Wangmo

Gyalpozhing College of Information Technology
Royal University of Bhutan

February 16, 2021

What is Android?

Google's android is the world's most popular mobile platform.

definition

Android is an open source operating system, created by Google specifically for use on mobile devices (cell phones and tablets)

Background of Android

Android Inc. was founded in October 2003 by Andy Rubin, Rich Miner, Nick Sears and Chris White to develop,

in Rubin's words

"Smarter Mobile Devices that are more aware of its owner's location and preferences"

Background of Android

- Android Inc. acquired by Google in August, 2005
- Open Handset Alliance(OHA), a group of several companies was formed -5th November 2007

Background of Android

Figure 1: Open Handset Alliance

Background of Android

- Allows writing and managing code in JAVA

Android Versions

- Android is released in series of Versions. Starting from 1.0 version.
- Google name these versions with some food items like ice cream, jelly bean, sandwich, etc which is one of the speciality of android versions.

Android Versions

Android Platform

Software Stack for mobile devices

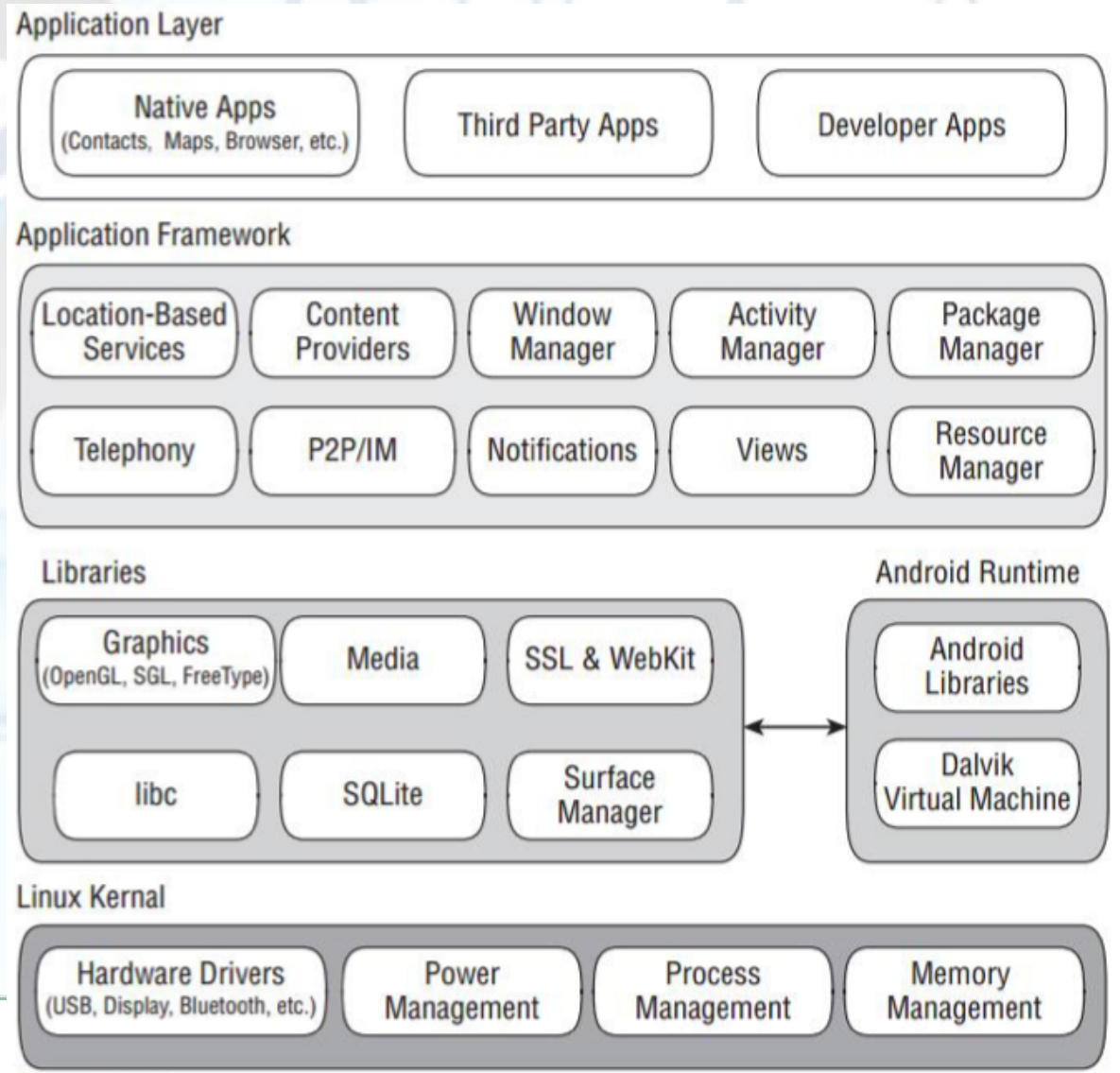
Example: This stack has several layers, going all the way from low level operating system services that manage the device itself upto sample applications(Phone dialer, etc). OS Kernel, System Libraries, Application Framework and Key Apps.

Android Platform

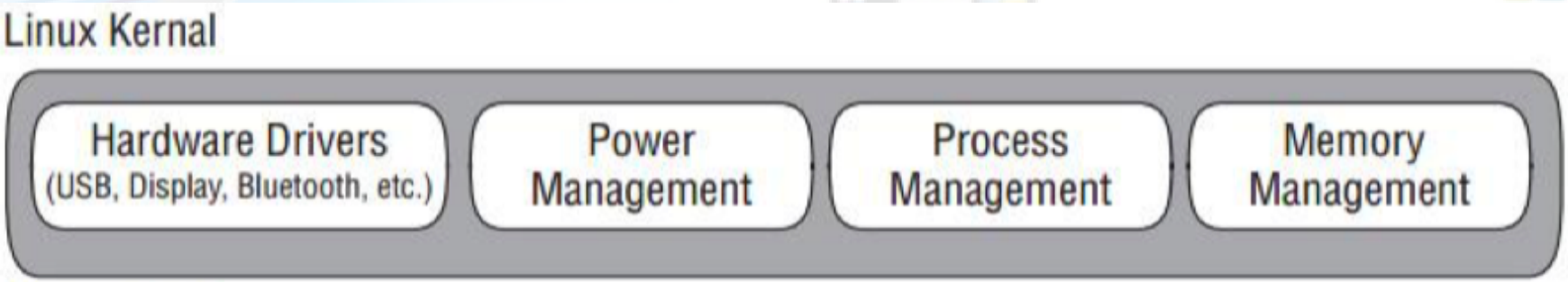
Android SDK for Creating Apps

Example: Libraries and Devlopment tools. Lots of Documentation tools.

Android Software Stack



Android Software Stack: Linux Kernel



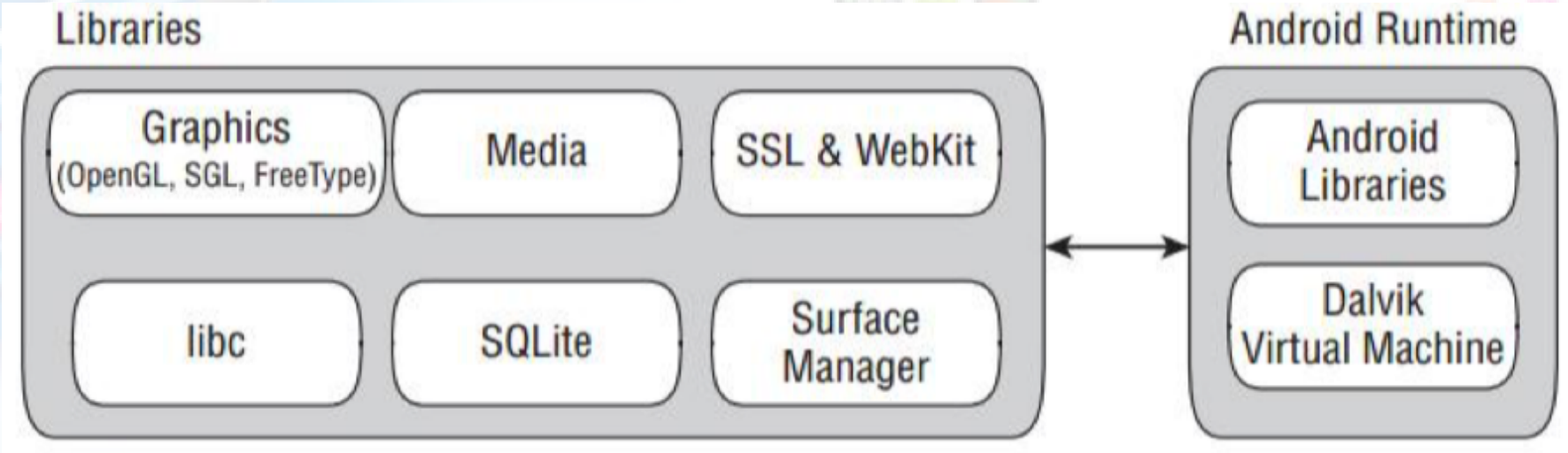
Android Software Stack: Linux Kernel

Linux Kernel Layer

- Is the lowest layer of software in android platform.
- This layer provides the core services that any Android computing device willrely on.
- It Provides generic operating system services.

  Example: Security, Memory and Process Management, Files and Network I/O, Device Drivers, Power Management

Android Software Stack: Libraries



Android Software Stack: Libraries

Libraries

- Includes a varities of system libraries and are typically written in C and C++ and for that reason they are often referred to as native libraries.
- This native libraries handles the core performance sensitive activities on your device.
- Andorid has its own System C Library, which implements the standard OS system calls (Process, thread creation, mathematical computation and much more.)

Android Software Stack: Libraries

Libraries

- Surface Manager(For updating the display)
- Media Framework(Playingback audio and video files)
- Webkit(Browser engine: For rendering and displaying web pages)
- OpenGL(Graphics Engine: High Performace Graphics)
- SQLite(Relationa Database Engine: For managing in-memory relational databases)

Android Software Stack: Android Runtime

Android Runtime

- Supports writing and running android applications.
  Two Components of Android runtime
  1. The core Java Libraries
  2. Dalvik Virtual Machine

Android Software Stack: Android Runtime

Core Java Libraries

- Provides number of reusable Java building blocks.

  Example: Basic Java Classes – JAVA.*, JAVAX.*
  APP Lifecycle – ANDROID.*
  Unit Testing – JUNIT.*
  Internet/web services – ORG.*

Android Software Stack: Android Runtime

Dalvik Virtual Machine

- Is a software that acutally exceutes the android applications.

  It is a Virtual Machine(VM)

Android Software Stack: Android Runtime

Typical Workflow

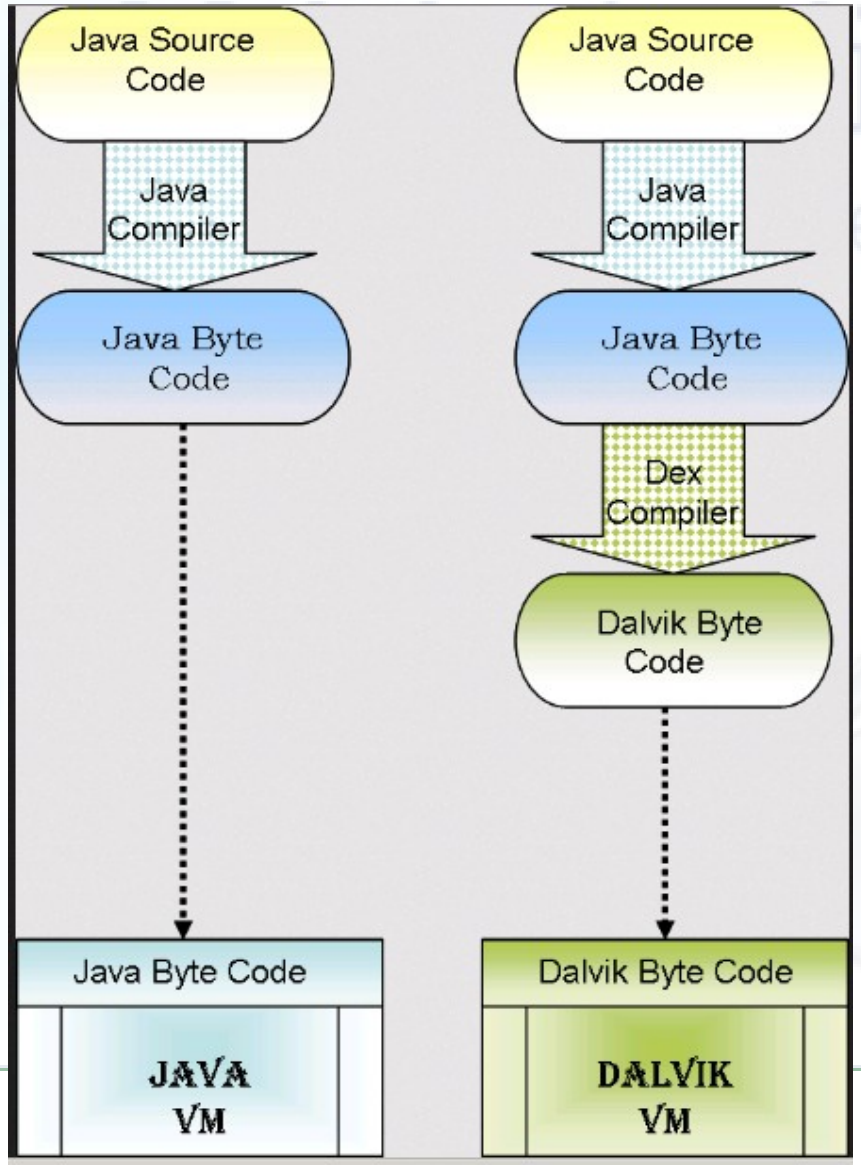
- Apps written in Java
- Compiled to Java Bytecode files
- DX converts Java Bytecode files to a single DEX Bytecode file(CLASSES.DEX)
- Dalvik Virtual Machine Executes the DEX bytecode file.

Android Software Stack: Android Runtime

Dalvik Virtual Machine

- Developed for resource constrained environments.

Android Software Stack: Android Runtime



Android Software Stack: Application Framework

Application Framework

- The application framework contains reusable software that many mobile applications are likely to need.

  Example: The view system contains common graphical elements, things like buttons and icons that many applications include in their user interfaces.

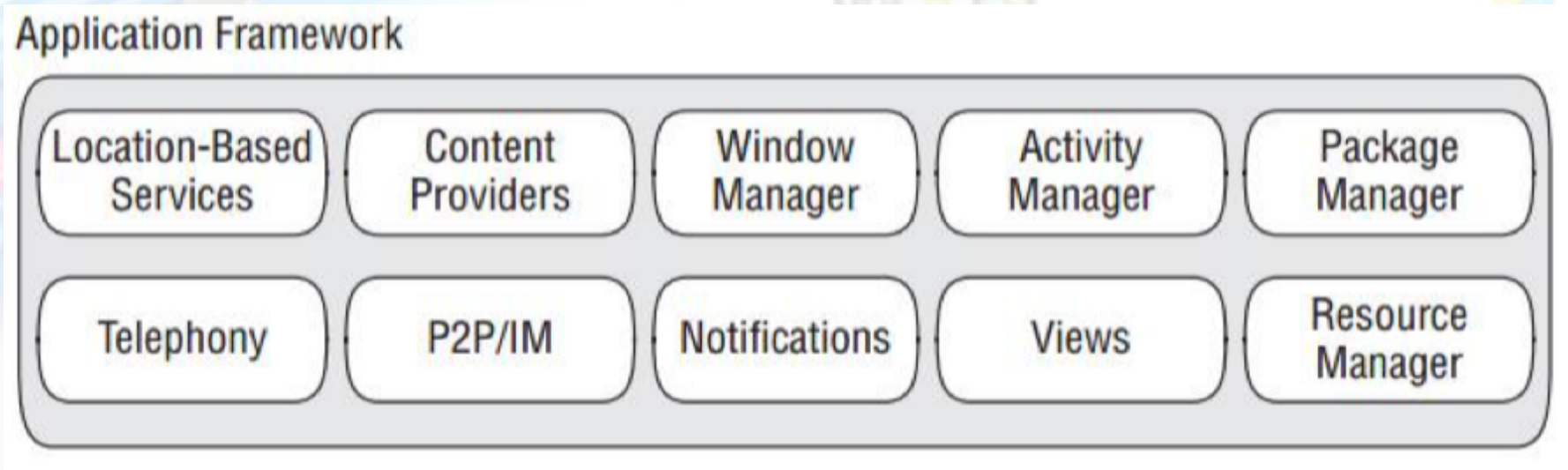
Android Software Stack: Application Framework

- Package Manager : Keeps track of app packages on device.
- Window Manager: Manages the windows comprising an app.
- Resource manager: Manages non-compiled resources. Ex: Strings, graphics, layout files
- Activity Manager: Manages app lifecycle and navigation stack.

Android Software Stack: Application Framework

- Content Providers: Databases that allows applications to store and share structured infromation.
- Location Manager: Provides location and movement information.
- Notification Manager: Place notification icons in the status bar when important events occur.

Android Software Stack: Application Framework

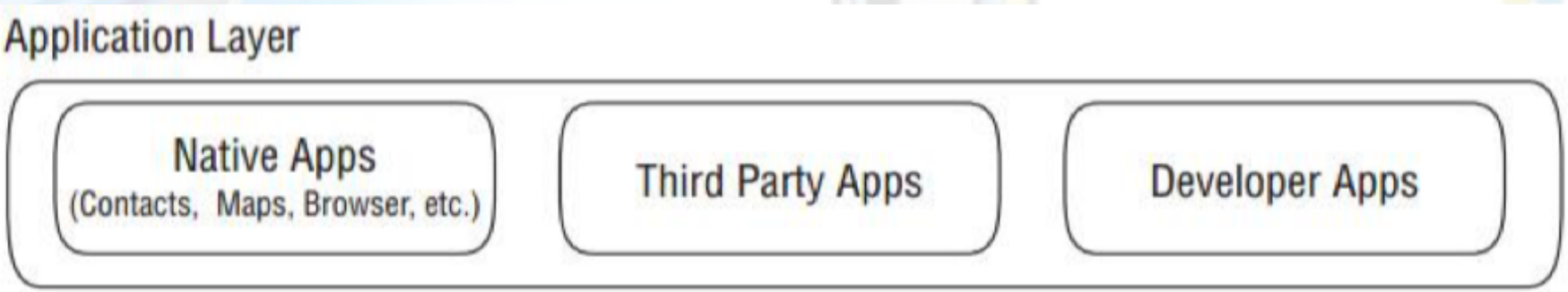


Android Software Stack: Application Layer

Application Layer

- Android comes with built-in applications. Standard apps include
  - HOME: Main Screen
  - CONTACTS: Contacts database
  - PHONE: Dial Phone Numbers
  - BROWSER: View Web Pages
  - EMAIL READER: Compose and read email messages.

Android Software Stack: Application Layer



Android Development Environment

- Pre-requisite
  - Supported Operating System
    - Microsoft Windows 7/8/Vista/2003
    - MAC OS X10.8.5 to 10.9
    - Linux (Tested on Ubuntu 14.04)
  - Java Development kit(JDK)

Android Development Environment

- Pre-requisite(Google recommendations)
  - 2 GB RAM Min, 4GB RAM rec
  - 1 GB+ for android SDK, emulator
  - 400 MB hard disk space
  - 1280 x 800 min screen resolution

Android Development Environment

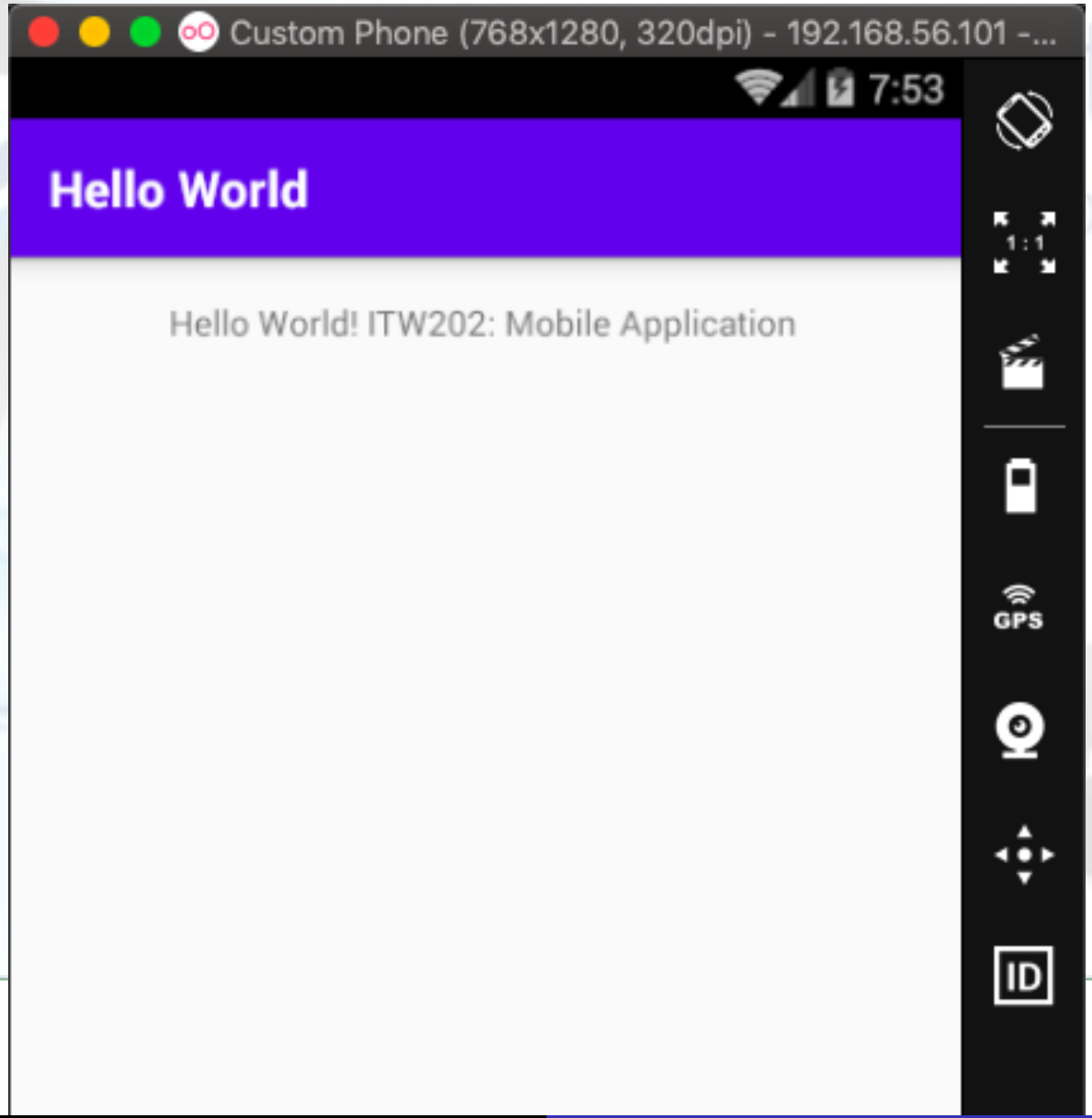
GETTING STARTED

- Download and Install ANDROID SDK

Android Development Environment

- Android SDK Bundle
- Android Platform
- Android Studio IDE
- System Image for Emulators

Android Development Environment



Android Development Environment

Android Emulators

It is a Android Virtual Devices.

Set up Android Virtual Device(AVD)

Android Development Environment

Android Emulators

Pros

- Doesn't require actual Devices
- Hardware is configurable
- Changes are non-destructable.

Android Development Environment

Android Emulators

Cons

- Can be Very Slow
- Some features are un-available. Ex: No support for bluetooth, USB.
- Performance/ User Experience can be misleading.

Android Development Environment

Android Emulators: Advanced Features

Can emulate many different device/user characteristics such as

- Network speed(Ex: network speed edge)
- Battery Power(Ex: power capacity 10)
- Location Coordinates(geo fix -77.04 38.897)
- Emulate Phone calls or sms messages(sms send 17001700 "Hi Sonam Wangmo")


Mobile Application
Development
Thank You!!!