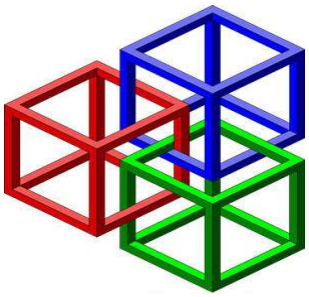
Mobile Applications

Lecture 2

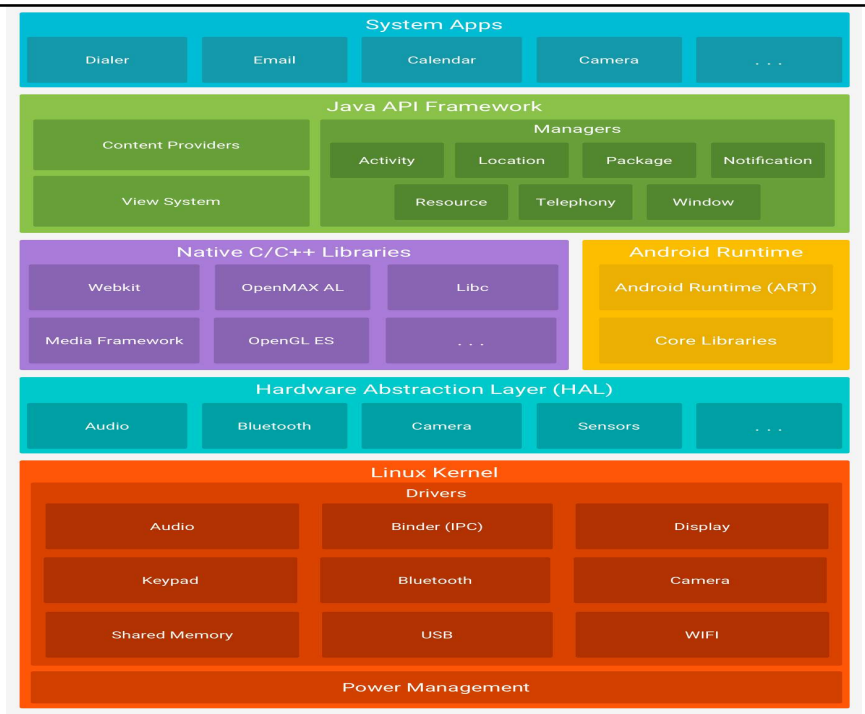
Android Framework



Android Platform

- 'android' signifies "being human".
- Open, free designed primarily for touch screen devices.
- Designed in 2003, by Rich Miner, Nick Sears, and Chris White, in Palo Alto, California.
- In 2005, Android was purchased by Google.
- Operating system based on the Linux 2.6 kernel

Android Framework



Android Framework

- **Linux kernel**
- The foundation of the Android platform is the Linux kernel.
- Using a Linux kernel allows Android to take advantage of *key security features* and allows device manufacturers to develop hardware drivers for a well-known kernel.

- *Where does Android platform security come from?*

Android Framework

- **Hardware Abstraction Layer (HAL)**
- Provides standard interfaces that expose device hardware capabilities to the higher-level Java API framework.
- Consists of multiple library modules, each of which implements an interface for a specific type of hardware component, such as the camera or Bluetooth module. When a framework API makes a call to access device hardware, the Android system loads the library module for that hardware component.

Android Framework

- **Android Native Libraries**
- All are written in C/C++
- ***Media Framework***: media library and media codes (playback of audio and video media)
- ***OpenMAX AI:*** performing multimedia output work with Android NDK.
- ***SQLite:*** database support
- ***OpenGL | ES:*** graphics libraries for 2D and 3D graphics
- ***Libc:*** C++ library support work with Android NDK.
- ***WebKit:*** kernel for web browser and Internet security.

Android Framework

- **Android Runtime**
- ***Android Runtime (ART):*** To run multiple virtual machines on low-memory devices.
- Prior to Android version 5.0 (API level 21), Dalvik was the Android runtime. If your app runs well on ART, then it should work on Dalvik as well, ***but the reverse may not be true***.
- There are two approaches to test applications: virtual machine and the real device. ***Which one is better and why***?
- ***Core Libraries:*** provides the functionality of the Java Programming Language.

Android Framework

- **Java API Framework**
- Written in .....?
- ***View System:*** to build an app's UI, including lists, grids, text boxes, buttons.
- ***Resource Manager:*** providing access to non-code resources such as localized strings, graphics, and layout files.
- ***Notification Manager:*** that enables all apps to display custom alerts in the status bar.
- ***Activity Manager:*** that manages the lifecycle of apps and provides a common navigation back stack.
- ***Content Providers:*** that enable apps to access data from other apps, such as the Contacts app, or to share their own data. Any other examples?

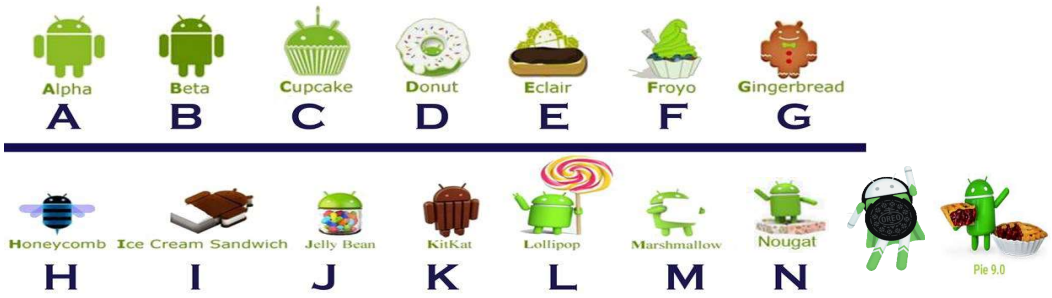
Android Framework

- **System Apps**

- Core apps included with the platform have no special status among the apps the user chooses to install.
- email, SMS messaging, calendars, internet browsing, contacts, and more.

Android Versions

- Alpha and beta were the earliest versions of Android. Then, when Google bought Android, it was decided to use a code name for each new version based on dessert items in alphabetical order.



Android SDK

- Android Software Development Kit (SDK) is a set of development tools that allows developers to build, test, and debug applications for the Android platform.

Android NDK

- The Native Development Kit (NDK) is a set of tools that allows you to use C and C++ code with Android.
- Provides platform libraries you can use to manage native activities and access physical device components, such as sensors and touch input.
- Not be appropriate for most novice Android programmers.
- Squeeze extra performance out of a device to achieve low latency or run computationally intensive applications, such as games or physics simulations.
- Examples apps use NDK



SDK and NDK

- *Similarities…..*

- *Differences…..*
- Programming language
- Performance
- Features