SLIIT
Discover Your Future

Mobile Application Design and Development

Lecture 4 - Introduction to Android Operating System

"When the opportunities comes, this is like aligning the stars"

-Andy Rubin-
Co-funder of Android

Learning Outcomes of the Lecture

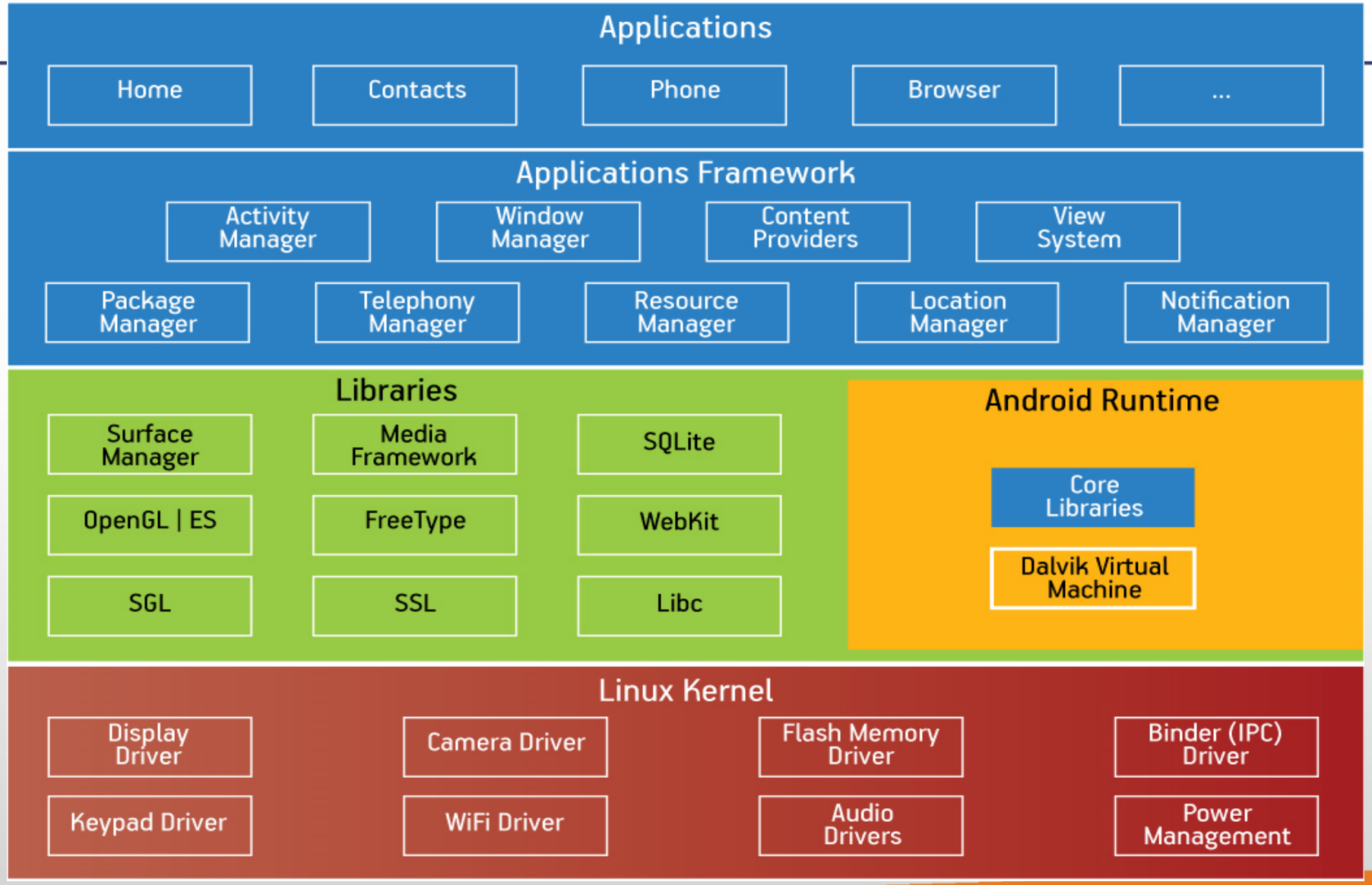
At the end of this Lecture students will be able to

- Illustrate the architecture of android
- Describe the life cycle of android application
- Recognize the folder hierarchy and components of android application project

Features of Android

- Attractive UI (User Interface)
- Connectivity
- Storage
- Media support
- Messaging
- Web browser
- Multi-tasking
- Multi-touch
- Resizable widgets
- GCM (Google Cloud Messaging)
- Wi-Fi Direct
- Android Beam
- Multi language

Android Architecture



1. Linux Kernel

- This layer provides a level of abstraction between the hardware of the device and contains all the essential hardware drivers, such as the camera, keyboard, screen, etc.

- Kernel handles networks and a wide range of device drivers, which eliminate interference with hardware peripherals.

- Why it's Linux?
  - Portability
  - Security
  - Features

2. Libraries

- This layer operates on top of Linux kernel

- This layer includes,
  - Open source web browser engine Webkit
  - SQLite database
  - Libraries to play and record (video & audio)
  - SSL libraries and etc.

Cont'd...

Android Runtime

This is a section of second layer. Consists of,

1. **Core Libraries** –
   - These libraries enable developers to develop android applications using Java programming language

Cont'd…

2. **Dalvik Virtual Machine** –
   - Kind of Java Virtual Machine specially designed and optimized for Android
   - Makes use of Linux core features like memory management and multi-threading, which is fundamental in the Java language
   - Enables the application to run in its own process, with its own instance

Android Run Time

Today, the Android use ART because,

- Compilation Approach
- Boot time
- Space usage
- Fast

3. Application Framework

- Set of activities that forms the environment in which apps are run and managed.

- This layer provides higher-level services to applications in the form of Java classes. So that they can be reused by other application development process.

Key services;

- Activity Manager
- Content Providers
- Resource Manager
- Notifications Manager
- View System

4. Applications

- This layer contains, native apps provided with the OS and the third party apps installed by the users will get installed here.

Market store for android apps

- Google Play
- SlideME
- Opera Mobile Store
- Mobango
- F-droid A
- mazon Appstore

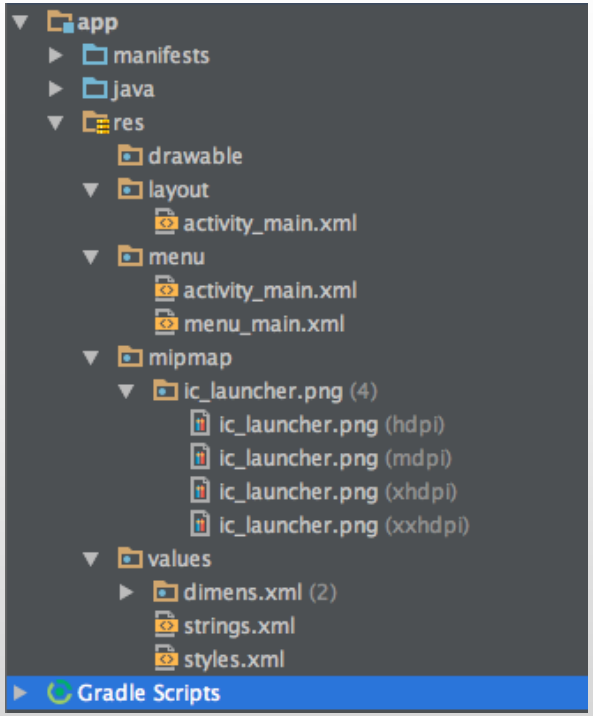
Mobile Application Development Life cycle

Cont'd

Video Reference: 6 Steps of Mobile App Development Lifecycle.mp4

Reference: https://www.youtube.com/watch?v=z3NsfhqAmnA

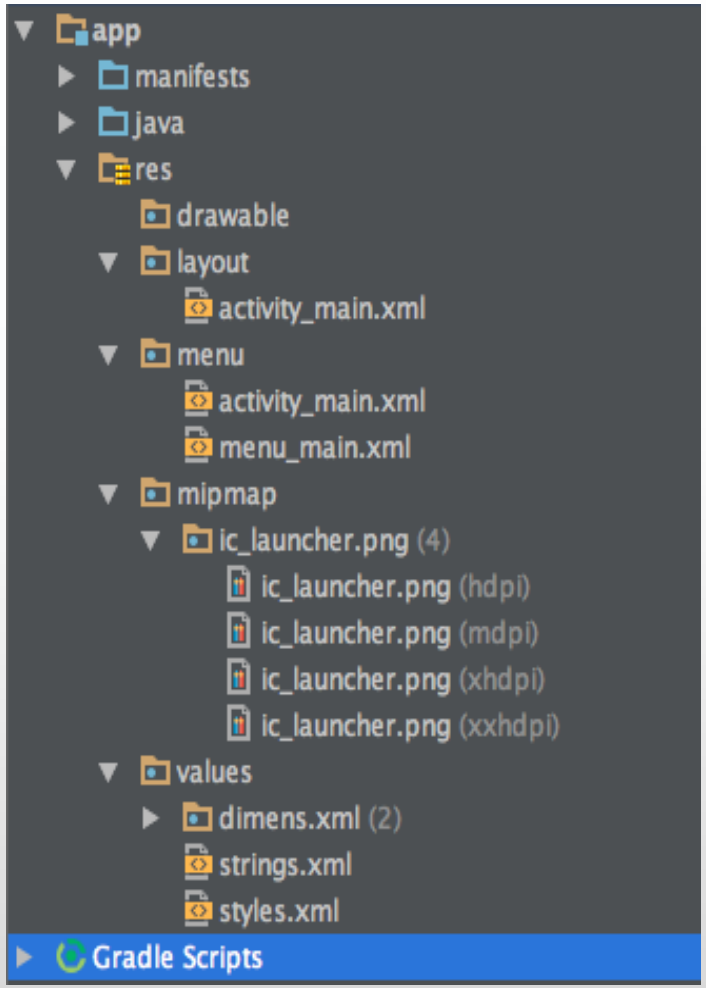
Android Application Project Structure



Project File Structure (based on Android Studio)

- Once a project is created in Android Studio, the project view will content all the project files (as shown in the the image)

- Here, the files are organized into directories



Reference: https://developer.android.com/images/tools/projectview-p2.png

Cont'd…

Some important directories are,

- **src** - Contains all source files (code) and resource files in subdirectories such as,
  - androidTest
  - **Main**
  - build.gradle (module)

- **gradle (project) -** This defines your build configuration that apply to all modules.

Cont'd… (src/main)

main directory contain subdirectories within it,

- **java** - contains Java code sources
- **AndroidManifest.xml** - Describes the nature of the application and each of its components.
- **res** - Contains all non-code resources
  - The XML files here can be divided into corresponding sub-directories
    - **drawable** –
      consists of Bitmap files or XML files
      Ex:
        - bitmap files,
        - shapes,
        - animation drawables
        - other drawable

Cont'd…

layout –
XML files that define a user interface layout

menu – XML files that define app menus (context menu, options menu)

mipmap – Drawable files for different launcher icon densities

values – XML files that contain simple values such as, string, style, color

R.Java file

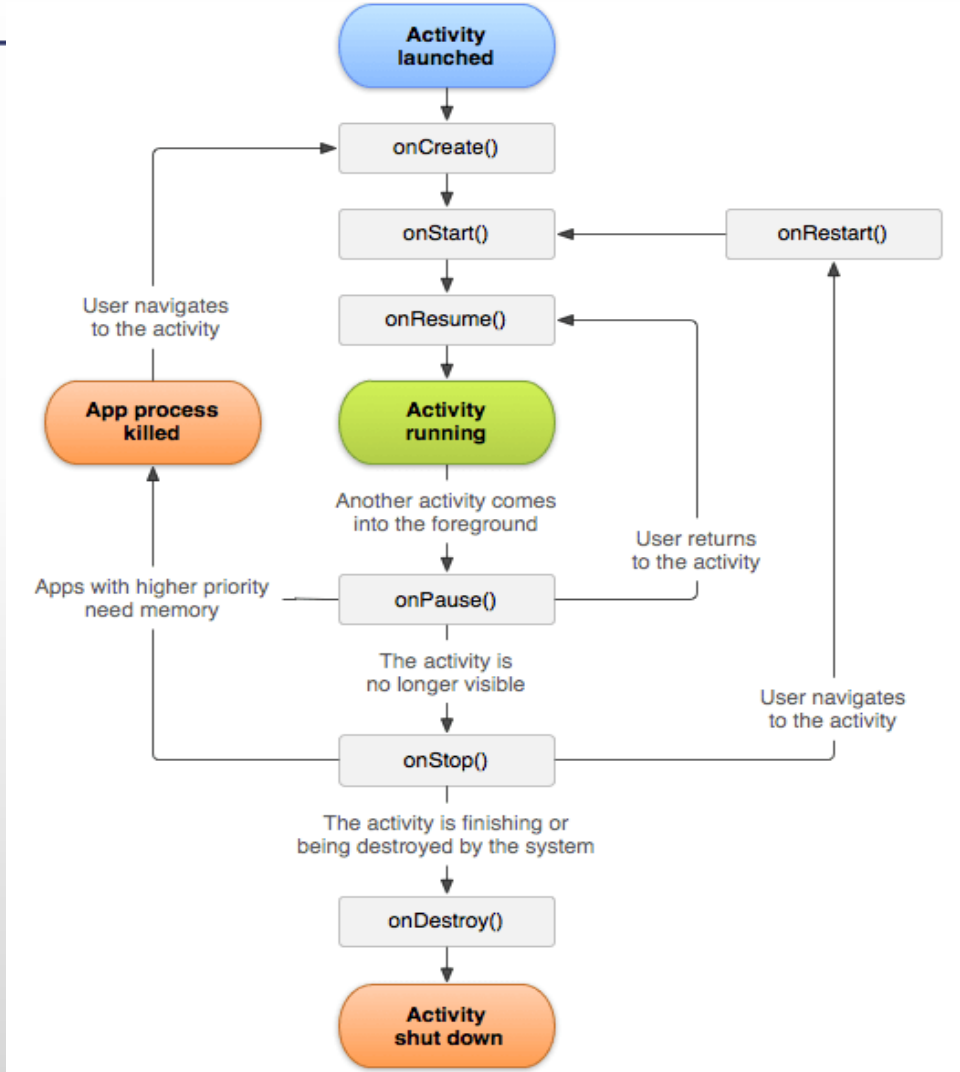
- Resource file that contains resource IDs for all the resources of res/ directory.
- This is an abstraction between different resources (XML file, any UI component [icon], audio & etc. and the java file)
- Auto generated file by AAPT (Android Asset Packaging Tool).

Activity & Activity Life Cycle

Activity

- An activity is like a frame or window in java that represents GUI
- It represents one screen of android
- They perform actions on the screen

Activity Life Cycle



Reference: https://www.javatpoint.com/images/androidimages/Android-Activity-Lifecycle.png

Cont'd…

- **onCreate():** called when activity is first created
- **onStart():** called when activity is becoming visible to the user
- **onResume():** called when activity will start interacting with the user
- **onPause():** called when activity is not visible to the user
- **onStop():** called when activity is no longer visible to the user
- **onRestart():** called after your activity is stopped, prior to start
- **onDestroy():** called before the activity is destroyed

References

1. https://developer.android.com/

2. https://www.tutorialspoint.com/

3. https://www.javatpoint.com

Summary

1. Overview to Android system
2. Android architecture & Android application architecture
3. Mobile App development life cycle
4. Android app development life cycle
5. Android app project structure
6. Activity & Activity life cycle

Thank You!!!