

Beginning Android Apps Development Workshop

Talha Hasan Zia

BSCS, University of Karachi (2015).

Junior Software Engineer, Android Apps ,

Mujadidia Inc.

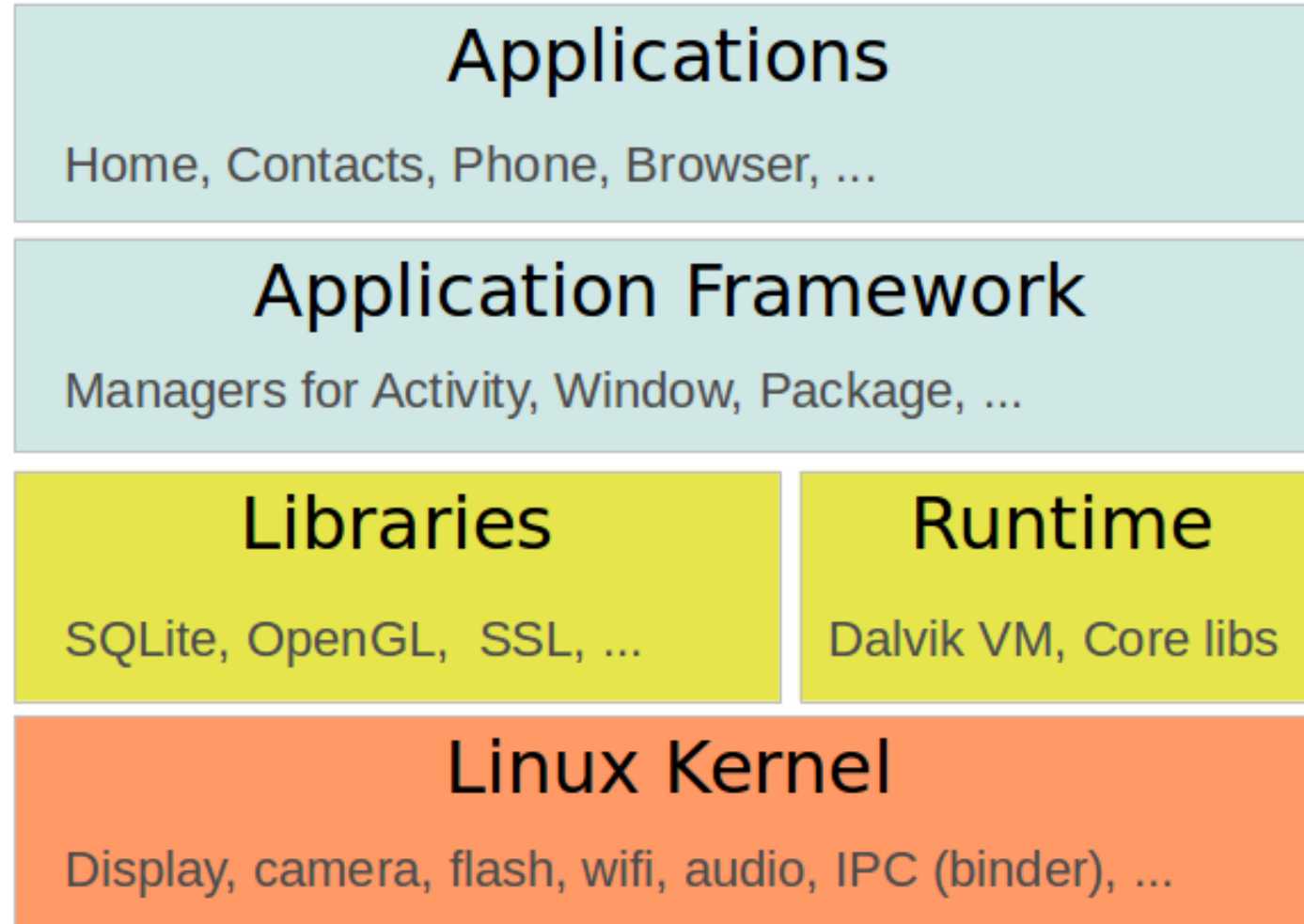
What is Android?

- Open source mobile OS based on Linux Kernel, developed by Android Inc.
- Runs on mobile, watch, TV , cars, refrigerators, digital camera etc.
- Has 7 OS versions, with 24 releases. (Latest is Nougat)
- Apps developed on Android Studio
- Languages: Java and C++
- Scope:
 - Continuously developed and new features added, also new platform support.
 - Most installed OS on mobile devices (66% globally - August 2016).
 - 6th most required career skill (mobile development) according to LinkedIn.com (2015).

Pre-requisites

- **Java OOP is a must.**
- Familiarity with xml.
- Other Mobile App platforms is a plus.
- Concepts of build system like Maven and Gradle is a plus.
- Knowledge of design pattern is a plus (for advance level).

The Android System



Environment Setup

- JDK (from Oracle).
- Android Studio (from Google).
- Android SDKs.
- Testing:
 - Emulator
 - Device

Development Environment

- Project window – show files and folders
- Editor – Code editor to write code
- Android Monitor – Shows errors, exceptions, etc
- Messages – Shows build messages and error.
- Toolbar : Run, Build, Debug, AVD, SDK Manager.

Project Structure

- ***src*** Folder - All source code and resource folders.
- ***java*** Folder - All source code files.
- ***res*** Folder - resource folders that contains images, layouts etc.
- ***libs*** Folder - private or local library files.
- ***build*** Folder - apk* files.
- ***values*** Folder
 - ***colors***: define color variables.
 - ***strings***: define constant strings.
 - ***styles***: Define app styles.

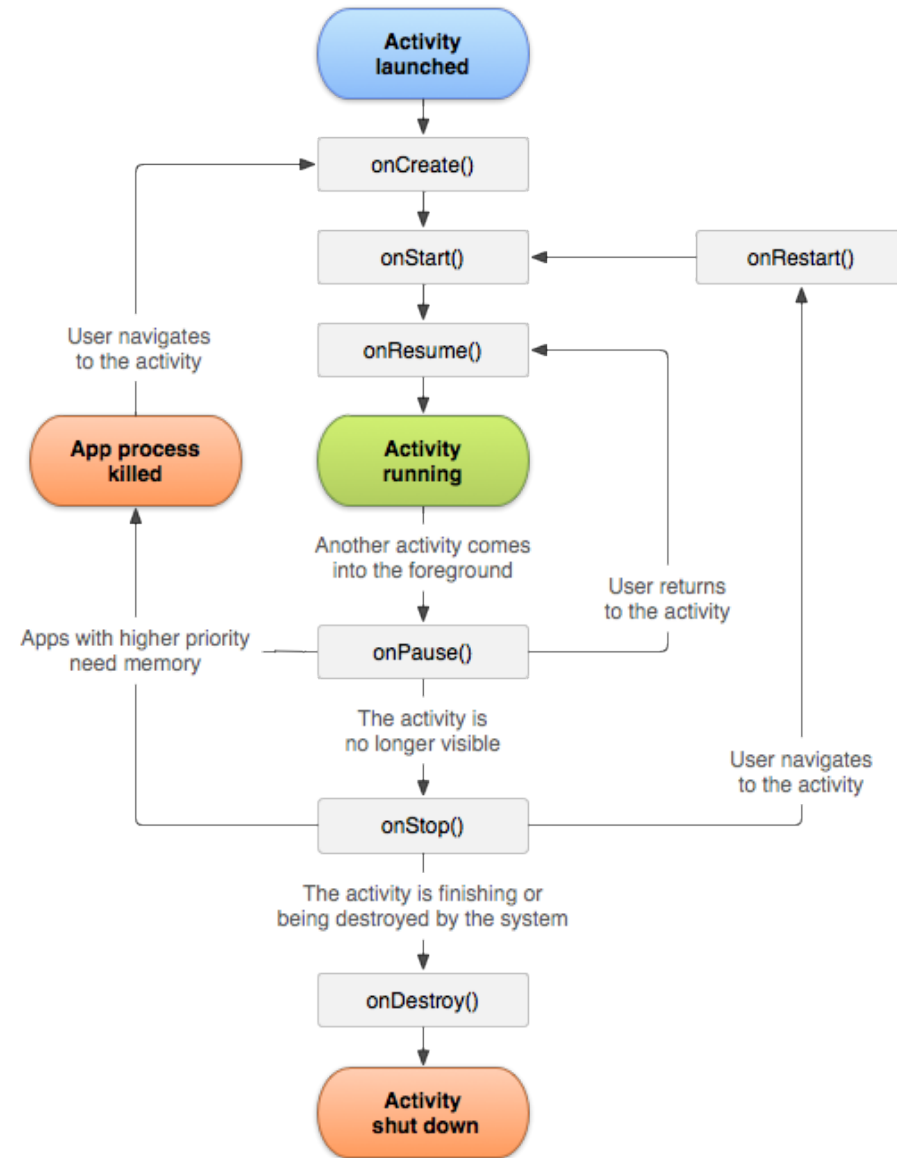
Terminologies

- **Activity** – One page of app that can be used to display controls like text, buttons etc.
- **Resource** – Images, Audio, UIs
- **Module** – Collection of classes and resources
- **Widgets** – View, Controls in Android are called widgets like ImageView, Button, TextView etc
- **ViewGroups** – are containers where widgets are placed. Each layout provides its own rules to place views (widgets or other viewgroups) inside.
- **Listener** – Are events or callbacks that are triggered on some action
- **Inflation** - The process of showing (inflating) UI from xml file on the screen.
- **Layout** – Xml code (file) for displaying UI elements.
- **Refactoring** – The process of renaming the variable or file or any resource.

App Overview

- App starts finds ***Launcher Activity***
- OnCreate method is called, this method loads (inflates) layout file to be shown on the screen.
- Activity is running.
- Adding behaviors.
- Activity lifecycle.

Lifecycle



Views and ViewGroup

- Everything is a View, Button, TextView, ImageView etc.
- Views that manage other view inside them are ViewGroups.
- ViewGroups are like containers that have rules to place other views.
- By default, there is always a ViewGroup element declared in layout file.

Adding Interactivity (1/2): Hello World App

- Use of ID in xml file to give views unique id. (unique in same file)
- Main Activity setContentView method
- Add id to TextView.
- Create TextView object in java code.
- Use findViewById() method to access TextView reference that is displayed on the screen.
- Use setText() method to change text.
- OnCreate code is executed when Activity is **being created**.

Adding Interactivity (2/2) : Button

- OnClick events.
- Adding new View : Button
- XML Attributes
- Create TextView object in java code.
- Use findViewById() method to access TextView reference that is displayed on the screen.
- Adding onClick event using OnClickListener
- Change text of the TextView when button is clicked.
- The onClick implementation:
 - Anonymous Class
 - Instance object
 - Implement interface in Activity

Running the app

- SDK Requirements
- Running on Emulator
 - Using AVD Manager.
 - Open AVD
 - Select Create New device
 - Select Resolution
 - Select system image
 - Click finish
- Running on device
 - USB debugging feature.
 - Goto Settings -> About Device -> Click on **Build Number** 9 times

Common Errors and Exceptions

- Java is case sensitive.
- For UI elements - Reference to an object that is not declared in xml, or is not inflated:
NullPointerException
- ClassCastException: when casting into wrong class type - e.g Button into TextView.
- NumberFormatException: when input was text not number then calling *.parse* methods will result in this exception.
- Security Exception: Using a feature of which the permission was not declared in the AndroidManifest.xml file.
- ActivityNotFoundException: Accessing activity that was not declared, or may have been deleted.
- InflateException : This exception is thrown When an error conditions are occurred during creating views.
- StackOverflowError: Infinite recursion/loops.
- OutOfMemoryError: Asking system to allocate more memory that was allowed.
- Application Not Responding (ANR) : Mainly comes when you are making network function, or some long process.

Resources

- Udacity Android development course
- Android Developer Resources