

ANDROID

CH - 1

Introduction to Android & Android Application Design

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POINTS TO BE LEARN :

- **1.1** Basic Introduction
- **1.2** What is Android ?
- **1.3** The OHA
- **1.4** The Android Platform
- **1.5** Android SDK
- **1.6** Steps to Download and Install Android SDK
- **1.7** Building a Sample Android Application
- **1.8** AVD Creation Steps



BASIC INTRODUCTION

- Mobile phones are now a regular choice for consumers, Stylish and versatile phones packing hardware features like GPS, touch screens are an enticing platform upon which to create innovative mobile applications.
- Android hardware will be designed to attract consumers, but the real win is for developers.
- With existing mobile development built on proprietary operating systems that restrict third-party applications, Android offers an open and equal alternative.

WHAT IS ANDROID ?

- Android is an **Operating system** based on the Linux kernel, and designed primarily for touch screen mobile devices such as smart phones and tablet computers.
- **Andy Rubin** has been credited as the father of the Android platform.
- Android is a Linux-based OS for smart phones and tablets. It includes a touch screen user interface, widget, camera, network data monitoring and all the other features that enable a cell phone to be called Smartphone.

FEATURES OF ANDROID

- The important features of android are given below:
- 1) It is open-source.
- 2) AnyOne can customize the Android Platform.
- 3) There are a lot of mobile applications that can be chosen by the consumer.
- 4) It provides many interesting features like weather details, opening screen etc.



CATEGORIES OF ANDROID APPLICATIONS

- There are many android applications in the market. The top categories are:
 - Entertainment (Hotstar TV, SonyLive)
 - Tools (Antivirus, Applock)
 - Communication(telegram, Wechat etc..)
 - Productivity (MyJio, Rout Finder)
 - Personalization (Wallpaper, color keypad)
 - Music and Audio (Wynk music, gaana Bollyw etc)
 - Social (Facebook lite, Funny jokes)
 - Media and Video (MX player, Ringtone maker)
 - Travel and Local etc. (Train Enquiry, Bus ticket)

THE OPEN HANDSET ALLIANCE

- OHA is a group of 84 companies such as Google, Samsung, HTC, Sony, KDDI, Garmin, Teleca, Ebay, Intel etc.
- The OHA was established on 6th November 2007, led by Google with 47 members including mobile handset makers, application developers, some carriers and chip makers.
- It is committed to advance open standards, provide services and deploy handsets using the Android Platform.

HISTORY OF ANDROID

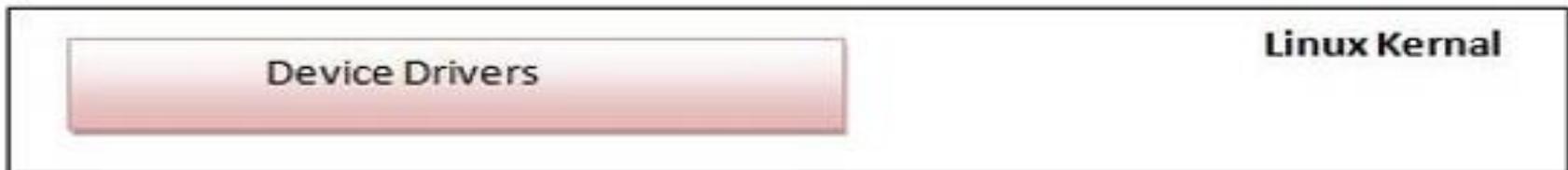
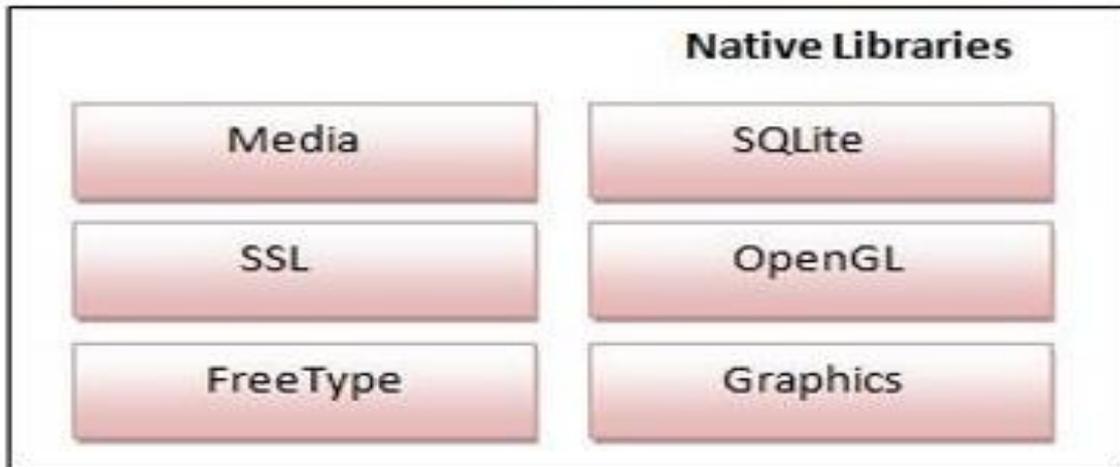
- Let's understand the android history in a sequence.
 - 1) Initially, Andy Rubin founded Android Incorporation in Palo Alto, California, United States in October, 2003.
 - 2) In 17th August 2005, Google acquired android Incorporation.
 - 3) Android is the nick name of Andy Rubin.
 - 4) In 2007, Google announces the development of android OS.
 - 5) In 2008, HTC launched the first android mobile.
- 

ANDROID ARCHITECTURE

- Android architecture or Android software stack is categorized into five parts:
 - 1. Linux kernel
 - 2. Native libraries (middleware),
 - 3. Android Runtime
 - 4. Application Framework
 - 5. Applications

- Let's see the android architecture first.





ANDROID ARCHITECTURE...

○ Linux kernel :

- At the bottom of the layers is Linux. This provides basic system functionality like process management, memory management, device management like camera, keypad, display etc.

○ Libraries :

- On top of Linux kernel there is a set of libraries including open-source Web browser engine webkit, well known library libc, SQLite database which is a useful repository for storage and sharing of application data, libraries to play and record audio and video. 

○ 3) Android Runtime

- In android runtime, there are core libraries and DVM (Dalvik Virtual Machine) which is responsible to run android application. DVM is like JVM it is optimized for mobile devices.

○ 4) Android Framework

- On the top of Native libraries and android runtime, there is android framework. Android framework includes Android API's such as UI (User Interface), telephony, resources, locations, Content Providers (data) and package managers.



○ 5) Applications

- On the top of android framework, there are applications. All applications such as home, contact, settings, games, browsers are using android framework that uses android runtime and libraries. Android runtime and native libraries are using linux kernel.



ANDROID VERSIONS, AND CODENAME

- Let's see the android versions and codenames provided by Google.

Version	Code name
1.5	Cupcake
1.6	Donut
2.1	Eclair
2.2	Froyo
2.3	Gingerbread
3.1 and 3.3	Honeycomb
4.0	Ice Cream Sandwich
4.1, 4.2 and 4.3	Jelly Bean
4.4	KitKat
5.0	Lollipop

- The android platform was launched in 2007 by the Open Handset Alliance, an alliance of famous companies that includes Google, HTC, Motorola, Texas Instruments and others.
- Although most of the applications that run on the Android Platform are written in Java, there is no **Java Virtual Machine**.
- Instead, the Java classes are first compiled into what are known as Dalvik Executables and run on the **Dalvik Virtual Machine**.



○ 1) Android 1.0 (API level 1) :

- Android 1.0, the first commercial version of the software, was released on 23 September 2008. the first commercially available Android device was the HTC Dream. Android 1.0 incorporated the following **features** :
- Android Market application download and updates through the Market application.
- Other application include : Alarm, Clock, Calculator, Picture Gallery etc...



○ 2) Android 1.1 (API level 2) :

- On 9 February 2009, the android 1.1 update was released, initially for the HTC Dream only, Android 1.1 was known not used officially, The update resolve bugs, changes the Android API and needed a number of **feature** :
 - Ability to save attachments in messages.
 - Longer in-call screen timeout default when using the speakerphone, plus ability to show/hide dialpad.
- 

○ 3) Android 1.5 Cupcake (API level 3) :

- On 27 April 2009, the Android 1.5 update was released, based on Linux kernel.
- This was the first released to officially use a codename based on a dessert item (“Cupcake”), The update includes several new features and UI :
 - Support for third-party virtual keyboards with text prediction and user dictionary for custom words.

○ 4) Android 1.6 Donut (API level 4) :

- On 15 September 2009, the Android 1.6 SDK – donut was released, based on Linux kernel 2.6.29. included in the update were numerous new **features** :
 - Easier searching and ability to view app screenshots in Android Market.
 - Gallery and camera are fully integrated, with faster camera access.



○ 5) Android 2.0 Éclair (API level 5) :

- On 26 October 2009, the Android 2.0 SDK Eclair was released based on Linux kernel 2.6.29. changes included :
 - Expanded Account sync, allowing users to add multiple accounts to a device for synchronization of email and contact.
 - Bluetooth 2.1 support
 - Optimized hardware speed and UI.
- 

○ 6) Android 2.0.1 Éclair (API level 6) :

- On 3 December 2009, the Android 2.1 Eclair was released. changes included :
 - Minor API changes, bug fixes and framework behavioural changes.

○ 7) Android 2.1 Eclair (API level 7) :

- Released on 12 January 2010. Changes include:
 - Minor amendments to the API and bug fixes.
- 

○ 8) Android 2.2 Froyo (API level 8) :

- On 20 May 2010, the SDK for Android 2.2 was released. Included many features :
 - Speed, memory, and performance optimizations.
 - Additional application speed improvements, implementation through JIT compilation.
 - USB tethering and Wi-Fi hotspot functionality.

○ 9) Android 2.3 Gingerbread (API level 8) :

○ On 6 December 2010, the Android 2.3 (Gingerbread) SDK was released, changes included:

- Update user interface design with increased simplicity and speed.
- Support for multiple camera on the device, including a front-camera.



○ 10) Android 3.0 Honeycomb (API level 11) :

- On 22 February 2011, the Android 3.0 Honeycomb was released. The update's features included :
- Added System Bar, featuring quick access to notification, status, and navigation buttons.
- Ability to encrypt all user data.



○ 11) Android 4.0 Ice Cream Sandwich (API level 14) :

- Released on 19 October 2011. included feature :
- Easier-to-create folder, with a drag-and-drop style.
- Pinch to zoom functionality in the calendar.
- Integrated screenshot capture.
- Ability to access application directly from lock screen.

○ 12) Android 4.1 Jelly Bean (API level 16) :

- Google announced Android 4.1 at the Google I/O conference on 27 June 2012.
- Jelly Bean was an incremental update with the primary aim of improving the functionality and performance of the user interface. Include following features :
 - Ability to turn off notifications on an application-specific basis.



○ 12) Android 4.4 Kitkat (API level 19) :

- Google announced Android 4.4 Kitkat on 3 September 2013. following features included :
 - Public API for developing and managing text messaging clients.
 - Shortcuts and widgets can automatically be re-arranged .
 - Provides more security.
 - Provides sensor for sensing a device.
- 

ANDROID SDK

- The Android SDK (Software Development Kit) includes a set of development tool.
- These includes a debugger, libraries, sample code, Documentation and handset emulator.
- The officially supported integrated development environment (IDE) is Eclipse using the Android Development Tool (ADT).



STEPS TO DOWNLOAD AND INSTALL ANDROID SDK

○ **System Requirement :**

● **Operating Systems :-**

- Windows XP(32-bit), Vista (32 or 64 bit), or Windows 7 (32 or 64 bit).
- Mac OS
- Linux 64-bit (Tested on Ubuntu Linux).

● **Hardware :-**

- Dual-core CPU.
- Minimum 2 GB RAM.
- And other standard hardware.



STEPS TO DOWNLOAD AND INSTALL ANDROID SDK

- **Steps to Download:-**

- 1) Open your web Browser and type following URL in it,

<http://developer.android.com/com/sdk/index.html>.

- 2) Next screen is for license agreement, in that agree to their rules and provide your OS-bit.

- 3) Now Click on “Download SDK” button.



STEPS TO DOWNLOAD AND INSTALL ANDROID SDK

- **Steps to Install Android SDK:-**

- 1) Go to the location where you had stored Downloaded .Zip file.
- 2) Extract it to your desired location.
- 3) Now open eclipse folder and find eclipse.exe in it.



- 4) Double click on it and it will be started.
- 5) Next screen it will ask you to set up workspace path.(this is the path where your all projects are going to store).
- 6) It will perform this process every time you start Android. If you want to set it once and for all then click on check box.
- 8) And it's done now you are ready to develop your first android application.



BUILDING A SAMPLE ANDROID APPLICATION

- **1)** Click New in the folder.
- **2)** In the window that appears, open the Android folder, select Android Application Project, and click Next.

OR

- Click file -> New-> Android Application Project.





New Android Application



 The application name for most apps begins with an uppercase letter

Application Name: 

Project Name: 

Package Name: 

Minimum Required SDK:  

Target SDK:  

Compile With:  

Theme:  

 The application name is shown in the Play Store, as well as in the Manage Application list in Settings.



< Back

Next >

Finish

Cancel

- **4)** On the next screen to configure the project, leave the default selections and click Next.
- **5)** The next screen can help you create a launcher icon for your app.
- **6)** now you can select an activity template from which to begin building your app. For this project, select `BlankActivity` and click Next.



- **7)** Leave all the details for the activity in their default state and click Finish.
- **8)** your First Basic Application is ready to run.
- **9)** If you have already created AVD then just Right Click on project in project Explorer and select RunAs->Android Application.



- **10)** If you do not created AVD then first Create AVD using following Steps :

- **Steps to Create AVD :**

- **1)** To Execute your Application this or next all, you need a virtual device (Emulator) that work as phone in your system and give you put that will be very much same in your original device.
 - **2)** Now let's create our own emulator that will give us output.
- 

- 3) Start eclipse and go to windows-> Android Virtual Device Manager.
- 4) Just click on new to create your device.
- 5) Now click on Ok and your AVD is done.
- 6) Now you are ready to execute your first Project.



Create new Android Virtual Device (AVD)

Name:

Target:

CPU/ABE:

SD Card:

Size:

File:

Snapshot:

Enabled

Skin:

Built-in:

Resolution: x

Hardware:

Property	Value	
Abstracted LCD density	240	<input type="button" value="New..."/>
Max VM application hea...	48	<input type="button" value="Delete"/>
Device ram size	512	

Override the existing AVD with the same name

Android Virtual Device

List of existing Android V

AVD Name	
...	

✓ A valid Android Virtu

✗ An Android Virtual D

POINTS OF LEARN :

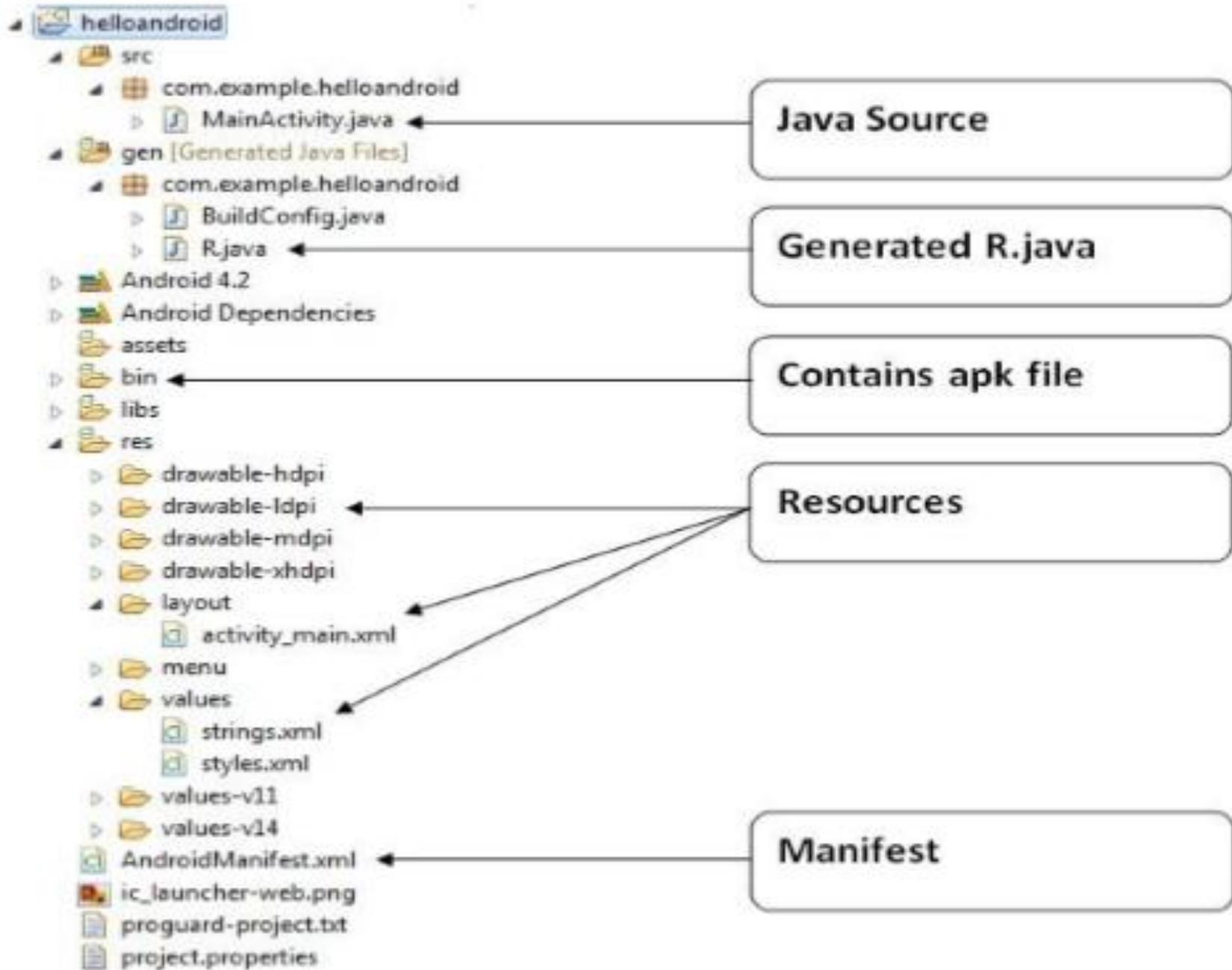
- **2.1** Anatomy (Structure) of an Android Application.
- **2.2** Android Terminologies.
- **2.3** Application Context, Activities, Services And Intents.
- **2.4** Android Manifest File and its Common Settings.



ANATOMY(STRUCTURE) OF ANDROID APPLICATION

- Android application contains components such as java source code, string resources, images, manifest file, apk file etc...
- Let's understand structure of android application :





- **1) SRC** : Java source code files will be available here.
- **2) Gen** : The gen directory in an Android project contains auto generated files.
- **3) Res** : Android supports resource like image and creating XML configuration files these can be keeping separate from the source code.
- **4) /res/values** : Used to define strings, colors, dimensions, styles and static arrays of strings or integers.



○ **5) /res/values-v11** : is the values of the API version 11, and **res/values/v-14** the values of API version 14.

- **res/ values** – layout for normal screen size or default.
- **res/ values- small** – layout for small screen size.
- **res/ values- large** – layout for large screen size.
- **res/ values- xlarge** – layout for Extra-large screen size.



- **6) /res/layout** : This folder contains the layouts to be used in the application.
 - **7) /res/menu** : This folder contains menu resource to be used in the application (Option Menu, Context Menu or sub Menu).
 - **8) /res/drawable** : Drawable folders are resource directories in an application that provides different bitmap drawable for medium, high, and extra high density screen.
 - **/res/drawable-ldpi** – bitmap for lower density.
 - **/res/drawable-mdpi** – bitmap for medium density.
 - **/res/drawable-hdpi** - bitmap for high quality.
- 

- **9) libs** : External library files will be placed in this folder. If you want to any external library in your project place the library jar inside this folder and it will be added to the classpath automatically.
- **10) assests** : This folder contains raw hierarchy of files and directories, with no other capabilities. It is just an unstructured hierarchy of files.
- **11) bin**: Bin folder is the area used by the compiler to prepare the files to be finally packaged to the application's APK file.



- **12) AndroidManifest.xml:** All the android application will have an AndroidManifest.xml file in the root directory.
- This file will contain essential information about the application to the Android system.
- **13) project properties:** project properties is the main project's properties file containing information such as the build platform target and the library dependencies has been renamed from default properties in the folder SDK versions.



ANDROID TERMINOLOGIES

- How Android applications function and interact with one another.
- **Context:**
 - The context is the central command center for an Android application.
 - All application-specific functionality can be accessed through the context.
- **Activity:**
 - An Android application is a collection of tasks, each of which is called an Activity.
 - Each Activity within an application has a unique task or purpose.

○ Intent:

- The Android operating system uses an asynchronous messaging mechanism to match task requests with the appropriate Activity.
- Each request is packaged as an Intent.

○ Service:

- An object of class Service that runs in the background to perform various persistent actions, such as playing music or monitoring network activity. ●

- **.apk file** : Android application package file. Each Android application is compiled and package in a single file includes all of the application's code resources, assests, and manifest file.
- **.dex file** : Compiled Android application code file. Android programs are compiled into .dex(Dalvik Executable) files, which are in turn zipped into a single .apk file on the device.
- **adb** : Android Debugger Bridge, a command-line debugging application included with the SDK. It provides tools to browse the device, copy tools on the device, and forwards ports for debugging.

- **Application** : From a component viewpoint, an Android application consists of one or more activities, services, listeners, and intent receivers.
- **Canvas** : Canvas is the simplest, easiest way to draw 2D objects on the screen.
- **Content Provider** : A content provider is built on the `ContentProvider` class, which handles content query strings of a specific format.
- **DDMS** : Dalvik Debug Monitor Service, a GUI debugging application included with the SDK



- **Dialog** : A floating window that acts as a lightweight form. A dialog can have button controls only and is intended to perform a simple action and return value.
- **Drawable** : A drawable is typically into another UI element, for example as a background image. Drawable resource are compiled into subclasses of `android.graphics.drawable`.
- **Theme** : A set of properties bundled together to define various default display settings. Android provides a new standard themes.



- **View** : A view is a base class for most layout components of an Activity or Dialog screen.
 - **Viewgroup** : A container object that groups a set of child Views. The viewgroup is responsible for deciding where child views are positioned and how large they can be, as well as for calling each to draw itself when appropriate.
 - **Window**: In an Android application, an object derived from the abstract class Window that specifies the elements of a generic window, such as the look and feel.
- 

APPLICATION CONTEXT, ACTIVITIES, SERVICES , INTENTS

○ Context:

- Is probably the most used element in android applications.(All functionality can be accessed through the context.)

○ Application:

- The application object is created whenever one of your Android components is started. This object provides the following lifecycle methods:

- **onCreate()** : called before the first components of the application starts.



- **onLowMemory()** : called when the Android system request that the application cleans up memory.
- **OnTerminate()** : only for testing, not called in production.
- **onConfigurationChanged()** : called whenever and runs at least as long as another component of the application runs.



○ **Activity lifecycle :**

- An activity can be in different state which are described by the following state.

○ **Activity state :**

- **1) Running :** Activity is visible and interacts with the user.
- **2) Paused :** Activity is still visible but partially obscured, instance is running but might be killed by the system.
- **3) Stopped :** Activity is not visible, instance is running but might be killed by system.
- **4) killed :** Activity has been terminated by the system or by a call to its finish() method.

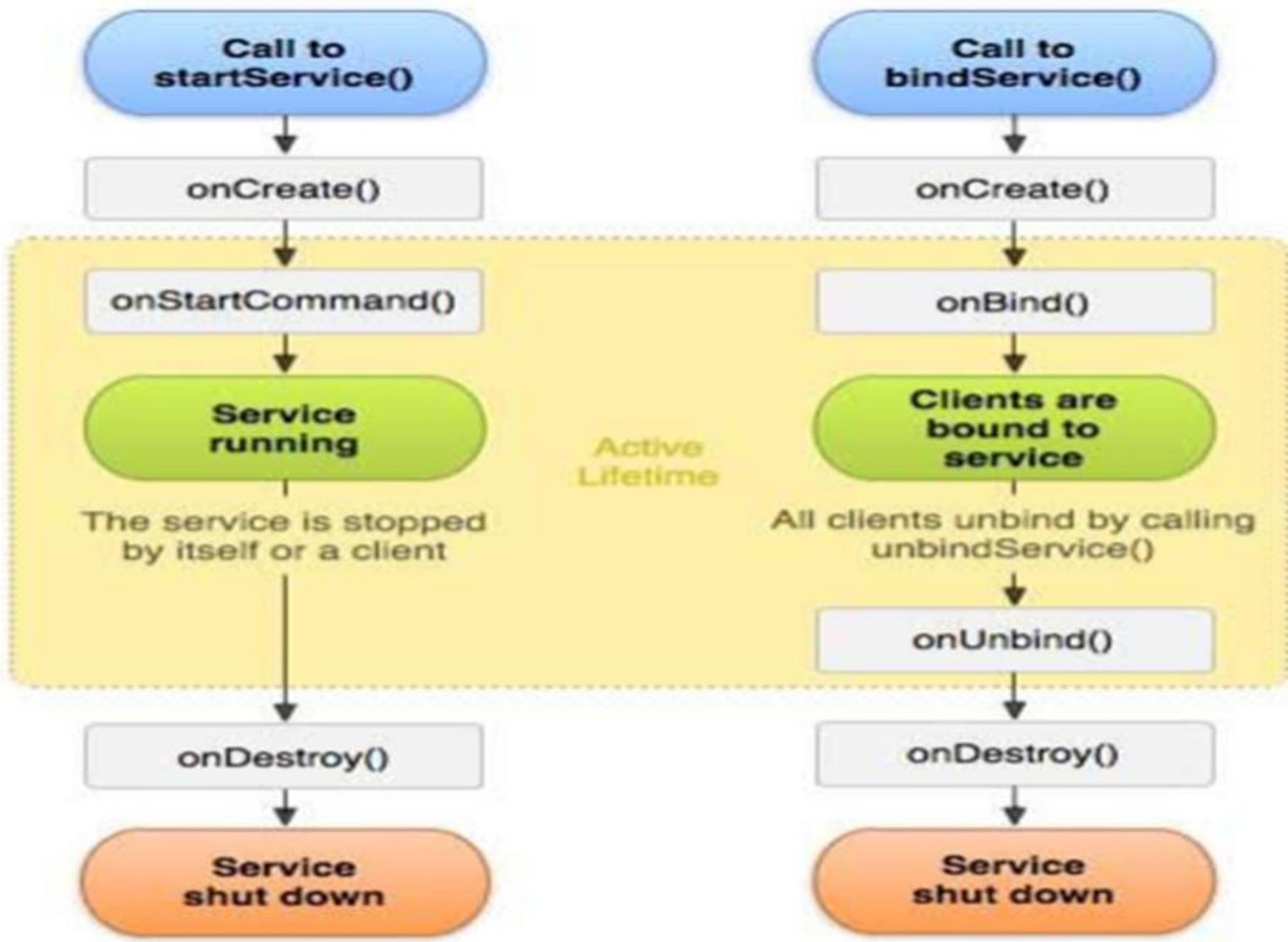
- The Android system define a lifecycle for activities via predefined (lifecycle) methods. The most important method are :
- **1) onCreate()** : Called when the activity is created. Used to initialize the activity, for example create the user interface.
- **2) onResume()** : Called if the activity gets visible again and the user starts interfacing with the activity again. Used to initialize fields, register listeners, bind services, etc.



- **3) onPause()** : Called once another activity gets into the foreground. Always called before the activity is not visible anymore. Used to release resources or save application data.
 - For example you unregister listener, intent receivers, unbind from service or remove system service listener.
 - **4) onStop()** : Called once the activity is no longer visible. Time or CPU intensive shut-down operations, such as writing information to a database should be done in the onStop() method.
- 

- **Services** : A service is a component that runs in the background to perform long-running operations without needing to interact with the user.
 - For example, a service might play music in the background while the user is in a different application. A service can essentially take two states:
 - **Started** :
 - A service is started when an application component, such as an activity, starts it by calling `startService()`.
- 

- Once started, a service can run in the background indefinitely, even if the component that started it is destroyed.
 - **Bound :**
 - A service is bound when an application component binds to it by calling `bindService()`.
 - A bound service offers a client-server interface that allows components to interact with the service, send requests, get results, and even do so across processes with interprocess communication (IPC).
- 



- To create an service, you create a Java class that extends the Service base class.
- The **Service** base class defines various callback methods and the most important are given below.
- **onStartCommand()** : The system calls this method when another component, such as an activity, requests that the service be started, by calling startService().



- **onBind()** : The system calls this method when another component wants to bind with the service by calling `bindService()`.
- **onUnbind()** : The system calls this method when all clients have disconnected from a particular interface published by the service.
- **onRebind()** : The system calls this method when new clients have connected to the service, after it had previously been notified that all had disconnected in its `onUnbind(Intent)`.



- **onCreate()** : The system calls this method when the service is first created using `onStartCommand()` or `onBind()`.
- **onDestroy()** : The system calls this method when the service is no longer used and is being destroyed. Your service should implement this to clean up any resources such as threads, registered listeners, receivers, etc.



○ Intents and Intent Filters :

- Intent is messaging object you can use to request an action from another app component there are three fundamental use -cases :
- **1 To start an activity (Context.startActivity()) :**
The Intent object is passed to this method to launch a new activity or get an existing activity to do something new.
- **2 To start a service (Context.startService()) :**
The Intent object is passed to this method to initiate a service or deliver new instructions to an ongoing service.

○ 3 To deliver a broadcast

(Context.sendBroadcast()) : The Intent object is passed to this method to deliver the message to all interested broadcast receivers.

○ Intent Objects :

- An Intent object is a bundle of information which is used by the component that receives the intent plus information used by the Android system.
- The primary information contained in Intent is the following :

○ Action :

- A string that the generic action to perform (such as view or pick). You can specify your own action for use by intents within your app (or for use by other apps to invoke components in your app).
- The action in an Intent object can be set by the `setAction()` method and read by `getAction()`.

○ Data :

- When creating intent, it's often important to specify the type of data. So specifying the MIME type of your data helps the Android system find the best component to receive your intent.

○ Category

- The category is an optional part of Intent object and it's a string containing additional information about the kind of component that should handle the intent. The `addCategory()` method places a category in an Intent object, `removeCategory()` deletes a category previously added, and `getCategories()` gets the set of all categories currently in the object.

○ Extras

- This will be in key-value pairs for additional information that should be delivered to the component handling the intent. The extras can be set and read using the `putExtras()` and `getExtras()` methods respectively.

○ **Flags**

- These flags are optional part of Intent object and instruct the Android system how to launch an activity, and how to treat it after it's launched etc.

○ **Component Name**

- This optional field is an android ComponentName object representing either Activity, Service or BroadcastReceiver class.
 - The component name is set by `setComponent()`, `setClass()`, or `setClassName()` and read by `getComponent()`.
- 

○ **Types of Intents :**

- There are following two types of intents :

- **(1) Explicit Intents**

- These intents designate the target component by its name and they are typically used for application-internal messages.

- **(2) Implicit Intents**

- These intents do not name a target and the field for the component name is left blank. Implicit intents are often used to activate components in other applications.



ANDROID MANIFEST FILE AND ITS COMMON SETTINGS

- Manifest file for an android application is a resource file which contains all the details needed by the android system about the application.
 - It is a key file that works as a bridge between the android developer and the android platform.
 - Element of AndroidManifest.xml :
 - <action>
 - <activity>
 - <activity-alias>
 - <application>
 - <category>
 - <data>
 - <grant-uri-permission>
 - <insrtumentation>
- 

- <intent-filter>
- <manifest>
- <meta-data>
- <permission>
- <permission-group>
- <uses-configuration>
- <provider>
- <uses-library>
- <receiver>
- <service>
- <supports-screens>
- <uses-permission>
- <uses-feature>
- <uses-sdk>
- <permission-tree>

○ Element for Application Properties :

- **Uses-permission** : used to specify permission that are requested for the purpose of security.

- **Permission** : used to set permissions to provide access control for some specific component of the application.
- **Permission-tree** : refer one specific name of the component which is the owner or parent of the set of component.
- **Instrumentation** : enable to know interaction between Android system and application.
- **Uses-sdk** : specifies the platform compatibility of the application.

- **Uses-configuration** : specifies set of hardware and software requirement of the application.
- **Uses-feature** : specifies single hardware and software requirement and their related entity.
- **Activity** : has the set of attributes based on user interface.
- **Activity-alias** : specifies target activity.
- **Provider** : provides some structure to access application data.

- **Structure of AndroidManifest.xml :**

<manifest>

<elements for app properties should come here>

<application>

<elements for app components
should come here>

</application>

</manifest>



RESOURCES OVERVIEW

- You should always externalize resources such as image and string from your application code, so that you can maintain them independently.
 - For any type of resources, you can specify default and multiple alternative resources for your application :
 - Default resources are those that should be used regardless of the device configuration or when there are no alternative resources that match the current configuration.
- 

RESOURCES TYPES

- You should place each type of resource in a specific subdirectory of your project's res/directory. For example, here's the file hierarchy for a simple project :

Myproject/

src/

Myactivity.java

res/

drawable/

icon.png

layout/

main.xml

info.xml



- **Resource directories supported inside project res/directory.**

Directory	Resource Type
anim/	XML files that define property animations. They are saved in res/anim/ folder and accessed from the R.anim class.
color/	XML files that define a state list of colors. They are saved in res/color/ and accessed from the R.color class.
drawable/	Image files like .png, .jpg, .gif or XML files that are compiled into bitmaps, state lists, shapes, animation drawables. They are saved in res/drawable/ and accessed from the R.drawable class.
layout/	XML files that define a user interface layout. They are saved in res/layout/ and accessed from the R.layout class.

menu/	XML files that define application menus, such as an Options Menu, Context Menu, or Sub Menu. They are saved in res/menu/ and accessed from the R.menu class.
raw/	Arbitrary files to save in their raw form. You need to call <i>Resources.openRawResource()</i> with the resource ID, which is
values/	<p>XML files that contain simple values, such as strings, integers, and colors. For example, here are some filename conventions for resources you can create in this directory:</p> <ul style="list-style-type: none">• arrays.xml for resource arrays, and accessed from the R.array class.• integers.xml for resource integers, and accessed from the R.integer class.

- bools.xml for resource boolean, and accessed from the **R.bool** class.
- colors.xml for color values, and accessed from the **R.color** class.
- dimens.xml for dimension values, and accessed from the **R.dimen** class.
- strings.xml for string values, and accessed from the **R.string** class.
- styles.xml for styles, and accessed from the **R.style** class.

xml/

Arbitrary XML files that can be read at runtime by calling *Resources.getXML()*. You can save various configuration files here which will be used at run time.

ACCESSING RESOURCES IN CODE

- When your Android application is compiled, a R class gets generated, which contains resource IDs for all the resources available in your res/ directory. You can use R class to access that resource using sub-directory and resource name or directly resource ID.
- Example:
- To access res/drawable/myimage.png and set an ImageView you will use following code:

```
ImageView imageView = (ImageView)
findViewById(R.id.myimageview);
imageView.setImageResource(R.drawable.myi
mage);
```