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INTRODUCTION

WHAT IS ANDROID?

- A Software platform and operating system for mobile.
- Based on the Linux kernel.
- Android was found way back in 2003.
- It was developed in Palo Alto, California.
- Android was developed by the Andy Rubin, Rich Miner, Nick Sears and Chris White.
- Android was purchased by the GOOGLE in AUGUST,2005 for 50 million $.

E-Book Link

https://books.google.co.in/books?id=P6yDPLVEfsEC&pg=PA67&lpg=PA67&dq=developing+UC+with+eclipse&source=bl&ots=r5Et7BxkaB&sig=ACfU3U1zKDooMhPv8FwgEUUAQD-xsbm4dA&hl=en&sa=X&ved=2ahUKEwiarsff-JHnAhXFpOkKHcRjBbsQ6AEwCXoECAoQAQ#v=onepage&q&f=false

Mobile Operating Systems

- A mobile OS is an operating system for smartphones, tablets, PDAs, or other mobile devices.
- Mobile OSs combine features of a personal computer OS with other features useful for mobile or handheld use; usually including, and most of the following considered essential in modern mobile systems;
  - touchscreen, cellular, Bluetooth, Wi-Fi, GPS mobile navigation, camera, video camera, speech recognition, voice recorder, music player, etc.

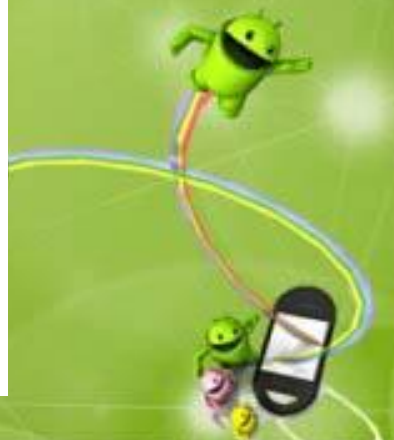
Some Current software platforms

- **Android** (based on the Linux Kernel) is from Google Inc.
- **CyanogenMod** and **Cyanogen OS** are based on the open source Android Open Source Project(AOSP).
- **Fire OS** is an operating system launched by Amazon based on Google's AOSP.
- **iOS** (previously known as iPhone OS) is from Apple Inc.
- **Windows Phone** (Soon to be Windows 10 Mobile) is from Microsoft.
- **BlackBerry 10** (based on the QNX OS) is from BlackBerry.
- **Firefox OS** is from Mozilla.

OPEN HANDSET ALLIANCE(OHA)

What is OHA?

- It's consortium of several companies.
- This group of companies are allowed to use source code of Android and develop applications.
- Reason for Nokia not to develop Android Mobiles is Nokia is not part of OHA.



FEATURES OF ANDROID

- Android is not a single piece of hardware.
- Android supports wireless communication using:-
  - 3G Networks
  - 4G Networks
  - 802.11 Wi-Fi Networks
  - Bluetooth Connectivity
- Android is a multi-process system, in which each application (and parts of the system) runs in its own process.

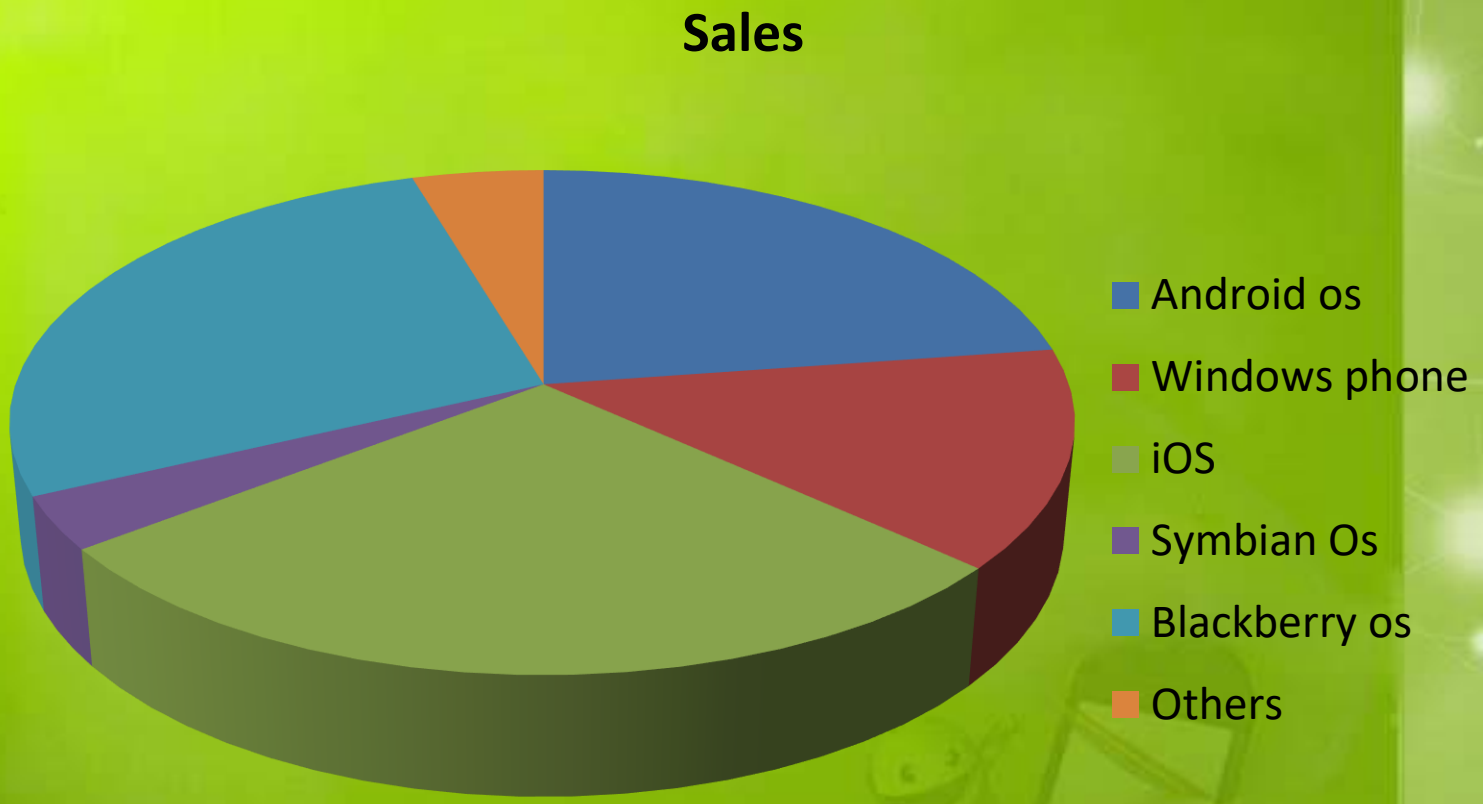
FEATURES OF ANDROID

- Interface that is better then the previous touch screen mobiles.
- User gets millions of applications that user can not get in any other mobile operating system.
- Android supports advanced audio/video/still media formats such as MPEG-4, H.264, MP3, and AAC, AMR, JPEG, PNG, GIF.
- Developing an android application is not tough using SDK(standard development kit) and java emulator we can easily develop applications that we want.

COMPARISON WITH OTHER OPERATING SYSTEMS

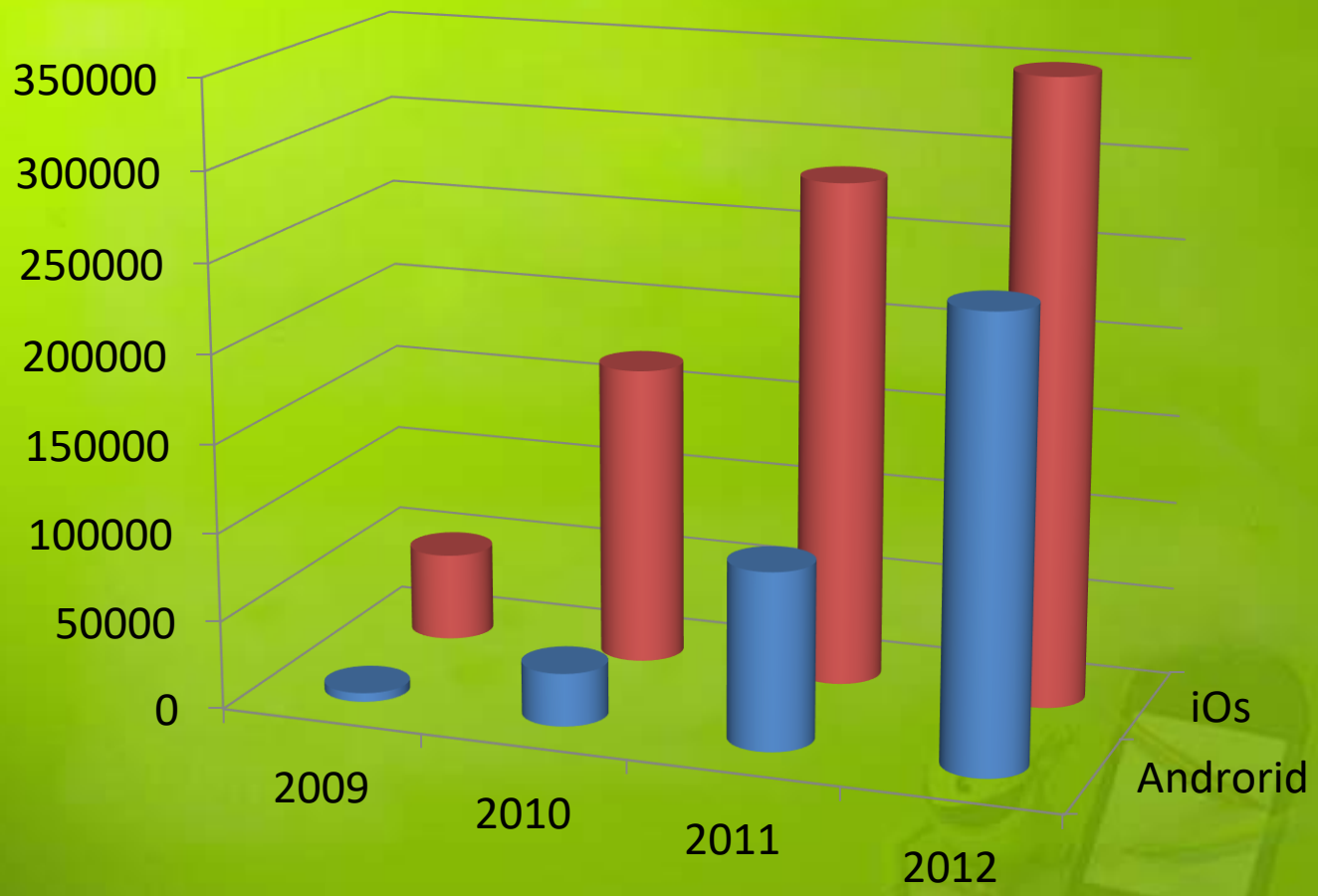
- Other then Android there are several other mobile operating system which is used.
- Symbian, iOS, windows this are one of the most used mobile operating systems.

SALES COMPARISON OF OS:-



FEATURE	ANDROID	iOS
Ease of use		
Voice to text		
Gaming		
Customizable		
Music Player		
Notification system		
Google voice		

iOS vS Android Applications:-



VERSIONS OF ANDROID

Android 1.5: Android Cupcake
Android 1.6: Android Donut
Android 2.0: Android Eclair
Android 2.2: Android Froyo
Android 2.3: Android Gingerbread
Android 3.0: Android Honeycomb
Android 4.0: Android Ice Cream Sandwich
Android 4.1 to 4.3.1: Android Jelly Bean
Android 4.4 to 4.4.4: Android KitKat
Android 5.0 to 5.1.1: Android Lollipop
Android 6.0 to 6.0.1: Android Marshmallow
Android 7.0 to 7.1: Android Nougat
Android 8.0 to Android 8.1: Android Oreo
Android 9.0: Android Pie

VERSIONS OF ANDROID

➢ Android Beta

- ✓ First Version of Android.
- ✓ The focus of Android beta is testing incorporating usability.
- ✓ Android beta will generally have many more problems on speed and performance.

➢ Android Astro 1.0

- ✓ First full version of android.
- ✓ Released on September 23, 2008.
- ✓ Wi-Fi and Bluetooth support.
- ✓ Quite slow in operating.
- ✓ copy and paste feature in the web browser is not present.

Android Cupcake 1.5

- ✓ Released on April 30, 2009.
- ✓ Added auto-rotation option.
- ✓ Copy and Paste feature added in the web browser.
- ✓ Increased speed and performance but not upto required level.

Android Donut 1.6

- ✓ Released on September 15, 2009.
- ✓ Voice search and Search box were added.
- ✓ Faster OS boot times and fast web browsing experience.
- ✓ Typing is quite slower.

Android Éclair 2.0/2.1

- ✓ Released on October 26, 2009.
- ✓ Bluetooth 2.1 support.
- ✓ Improved typing speed on virtual keyboard, with smarter dictionary.
- ✓ no Adobe flash media support.

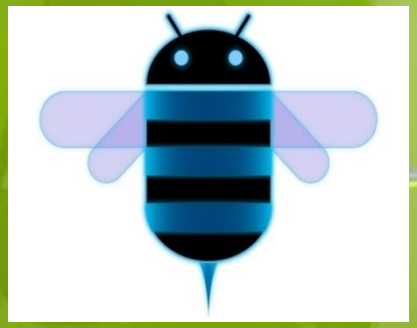
➢ Android Froyo 2.2

- ✓ Released on May 20, 2010.
- ✓ Support for Adobe Flash 10.1
- ✓ Improved Application launcher with better browser
- ✓ No internet calling.

➢ Android Gingerbread 2.3

- ✓ Released on December 6, 2010.
- ✓ Updated User Interface with high efficiency and speed
- ✓ Internet calling
- ✓ One touch word selection and copy/paste.
- ✓ New keyboard for faster word input.
- ✓ More successful version of Android than previous versions.
- ✓ not supports multi-core processors.

➢ Android Honeycomb 3.0



- ✓ Released on February 22, 2011.
- ✓ Support for multi-core processors
- ✓ Ability to encrypt all user data.
- ✓ This version of android is only available for tablets.

Android IceCreamSandwich(ICS) 4.0

- ✓ Released on November 14, 2011.
- ✓ Virtual button in the UI.
- ✓ A new typeface family for the UI, Roboto.
- ✓ Ability to shut down apps that are using data in the background.

Android JellyBean 4.1

- ✓ Released on June 27, 2012.
- ✓ Latest version of Android.
- ✓ Smoother user interface.

LIMITATIONS:-

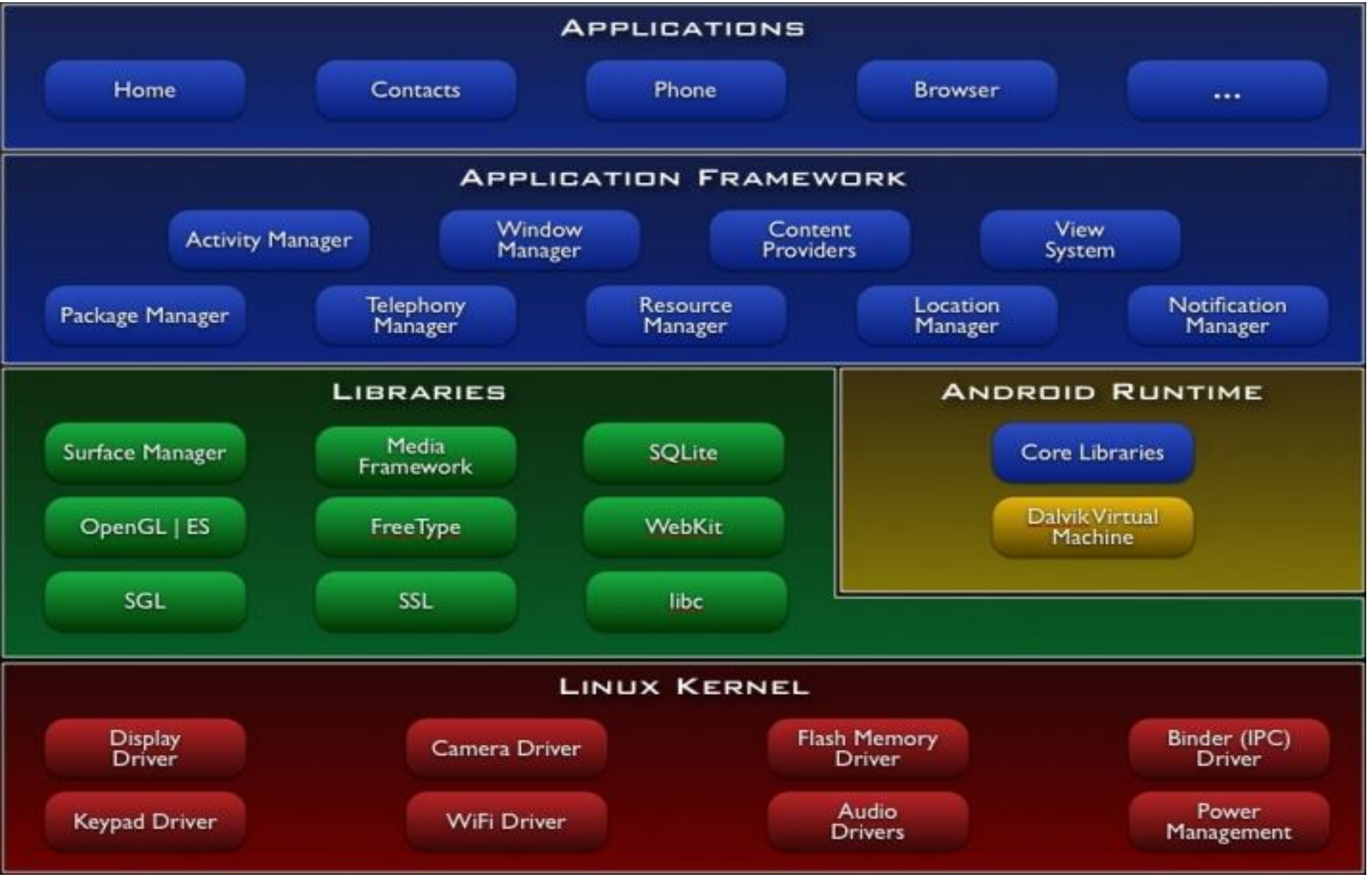
- Making source code available to everyone inevitably invites the attention of hackers.
- Android operating system uses more amount of battery as compared to normal mobile phones.
- As there are so many user sometimes it becomes difficult to connect all the users.
- As we call Android is world of applications we continuously need to connected with the internet which is not possible for all the users.

CONCLUSION AND FUTURE SCOPE:-

- Android is now stepping up in next level of mobile internet.
- There are chances of Android Mobile sales becomes more then iPhone in next two years.
- Google may launch another version of android that starts K because Google is launching all the android versions in the alphabetical order.
- There are chances of Android may become the widely used operating system in world.

Android Architecture

Android Operating System



OS Components

- **Linux Kernel**

  Android relies on Linux version 2.6 for core system services such as

- **Security**
- **Memory management**
- **Process management**
- **Network stack**
- **Driver model.**

  The kernel also acts as an abstraction layer between the hardware and the rest of the software stack.

OS Components

Android Runtime

- Android includes a set of core libraries
- The functionality available in the core libraries are Java programming language.
- Every Android application runs in its own process, with its own instance of the Dalvik virtual machine.
- Dalvik has been written so that a device can run multiple VMs efficiently.

OS Components

Android Runtime

- The Dalvik VM executes files in the Dalvik Executable (.dex) format which is optimized for minimal memory footprint.
- The **Dalvik Virtual Machine (DVM)** is an android virtual machine optimized for mobile devices.
- It optimizes the virtual machine for ***memory***, ***battery life*** **and** ***performance***
- The VM is register-based, and runs classes compiled by a Java language compiler that have been transformed into the .dex format by the included "dx" tool.
- The Dalvik VM relies on the Linux kernel for underlying functionality such as threading and low-level memory management.

OS Components

Libraries

Android includes a set of C/C++ libraries used by various components of the Android system. These capabilities are exposed to developers through the Android application framework. Some of the core libraries are listed below:

- **System C library** - a BSD-derived implementation of the standard C system library (libc), tuned for embedded Linux-based devices
- **Media Libraries** - based on PacketVideo's OpenCORE; the libraries support playback and recording of many popular audio and video formats, as well as static image files, including MPEG4, H.264, MP3, AAC, AMR, JPG, and PNG
- **Surface Manager** - manages access to the display subsystem and seamlessly composites 2D and 3D graphic layers from multiple applications

OS Components

Libraries

- **LibWebCore** - a modern web browser engine which powers both the Android browser and an embeddable web view
- **SGL** - the underlying 2D graphics engine
- **3D libraries** - an implementation based on OpenGL ES 1.0 APIs; the libraries use either hardware 3D acceleration (where available) or the included, highly optimized 3D software rasterizer
- **FreeType** - bitmap and vector font rendering
- **SQLite** - a powerful and lightweight relational database engine available to all applications

OS Components

Application Framework

Developers are free to take advantage of the

- **Device hardware**
- **Access location information**
- **Run background services**
- **Set alarms**
- **Add notifications to the status bar, etc.**
- Developers have full access to the same framework APIs used by the core applications.
- The application architecture is designed to simplify the reuse of components; any application can publish its capabilities and any other application may then make use of those capabilities (subject to security constraints enforced by the framework). This same mechanism allows components to be replaced by the user.

OS Components

Application Framework

- Underlying all applications is a set of services and systems, including:
- A rich and extensible set of Views that can be used to build an application, including lists, grids, text boxes, buttons, and even an embeddable web browser
- Content Providers that enable applications to access data from other applications (such as Contacts), or to share their own data
- A Resource Manager, providing access to non-code resources such as localized strings, graphics, and layout files
- A Notification Manager that enables all applications to display custom alerts in the status bar
- An Activity Manager that manages the lifecycle of applications and provides a common navigation back stack

App Package

- **Application package (software package)** A collection of programs or modules that is directed at some generic application and can be tailored (perhaps with some additions) to the needs of a specific instance of that application.

The basic components of any android application are the following:

- **Activities**
- **Intent and broadcast receivers**
- **Services**
- **Content Providers**
- **Widgets and Notifications**

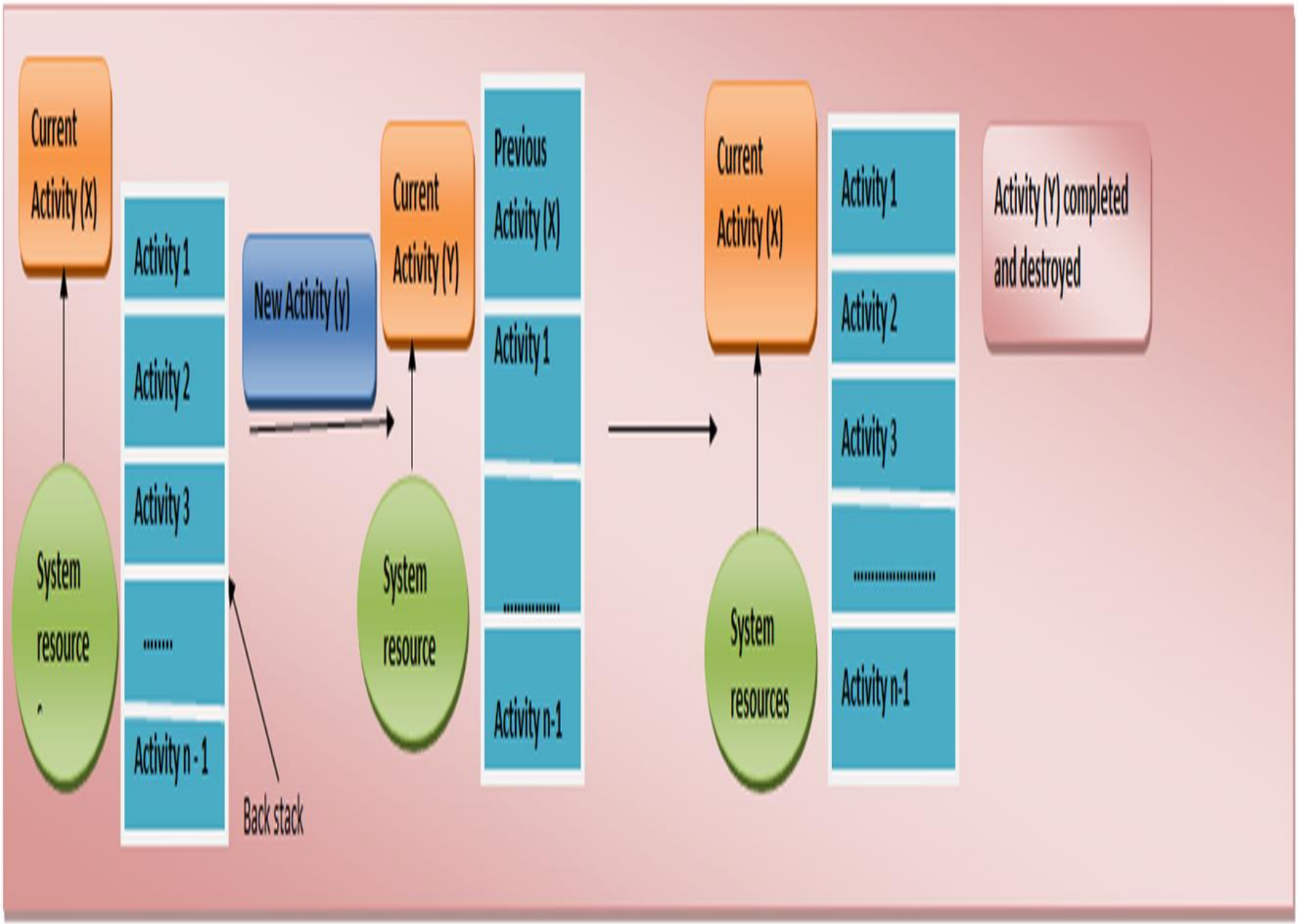
There are four different types of app components:

- **Activities**
- **Services**
- **Broadcast receivers**
- **Content providers**

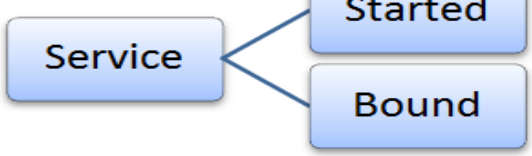
ACTIVITY

- An activity is the first stepping stone is building an Android user application.
- It provides the space to the user for doing anything and everything.
- For example, opening a contact, dialing a caller, etc.
- Everything is done by interacting with a window and that every window is provided by an activity.
- A window is provided to each activity where user interfacing is done.
- Generally, every Android application has more than one activity.
- There is one “main” activity. All other activities are child activities. There is a stack called back stack.
- Whenever, there is a new window is started, previous activity is pushed to the back stack and it is stopped until the new activity is done.
- As soon as the back key of your device is pressed, new activity is popped out of stack and destroyed. Now previous activity resumes.
- For example, when you send SMS, you open the messenger and send message. Assume this to be your current activity. When you press back key, it should resume the previous activity right!! Previous activity was your own home screen. Let us understand it diagrammatically.

ACTIVITY


Current Activity (X)
Activity 1
Activity 2
Activity 3
.....
Activity n - 1
System resource
Back stack
New Activity (y)
Current Activity (Y)
System resource
Previous Activity (X)
Activity 1
.....
Activity n-1
Current Activity (X)
System resources
Activity 1
Activity 2
Activity 3
.....
Activity n-1
Activity (Y) completed and destroyed

services



- Another important component of an android application is **service.**
- It does not provide user interface.
- It does long running operations in background. S
- Service doesn't terminate even if the component which initiated it got terminated or switched to another application.
- A service can be connected to a component which can even do inter process communication (IPC).
- For example, when you receive your email updates in inbox it is a service. You get the notification of new e-mail even if you are not using the e-mail app or doing something else.

A service can take two forms:

- **Started:** After a service starts, it can run indefinitely and usually performs single operation.
- No result is returned to user.
- For example, uploading a file. After the task is completed, it should terminate itself.
- **Bound:** In this case, a component is bound to a service so that a particular task can be completed. This type of service provides a client-server like interface. Requests can be send, receive requests, and return result to the user. Inter process communication is achieved through this service. App component can bind to a service. Multiple components can be bound to this type of service. After the destruction of component, service terminates.

Content Providers

- These Android components bring the object oriented functionality to the system.
- Content Providers encapsulate data.
- Content providers as the name indicates provides content of one process to another hence it acts as an interface.
- It provides gateway to access data from a structured set.
- For accessing data in a content provider an object has to be created and this object acts as a client whereas content provider act as a server.
- It is this object which is going to receive the requests retrieves the results and returns the result.
- Android has content providers which manages video, audio, etc.
- These content providers are internal to android applications.
- For example, custom searches on device require content providers.

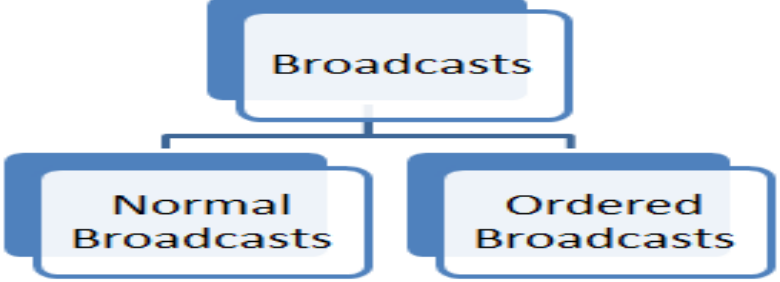
Intents

- **Android Intents** are the communication medium
- App components send messages to one another like you do with your friends.
- It is a messaging object. It can be used to query an action from another app component.
- Android Intent can be used to instantiate a new activity or get result from another activity.
- A service can be started by passing intent to perform a single operation.
- A broadcast can be sent to other apps by passing intents.

Intents are of two types:

- **Implicit Intents:** These are used to declare general actions to be performed so that part of another app can handle it.
- **Explicit intents:** These are generally used to start a new element of your own application.
- These elements are started by their name i.e. fully qualified class name.
- For example, if you want to call your best friend you would do it by name and if he/she is not with you then you would definitely know the residential address. Now this is residential address is what we refer to be as fully qualified name

Broadcast



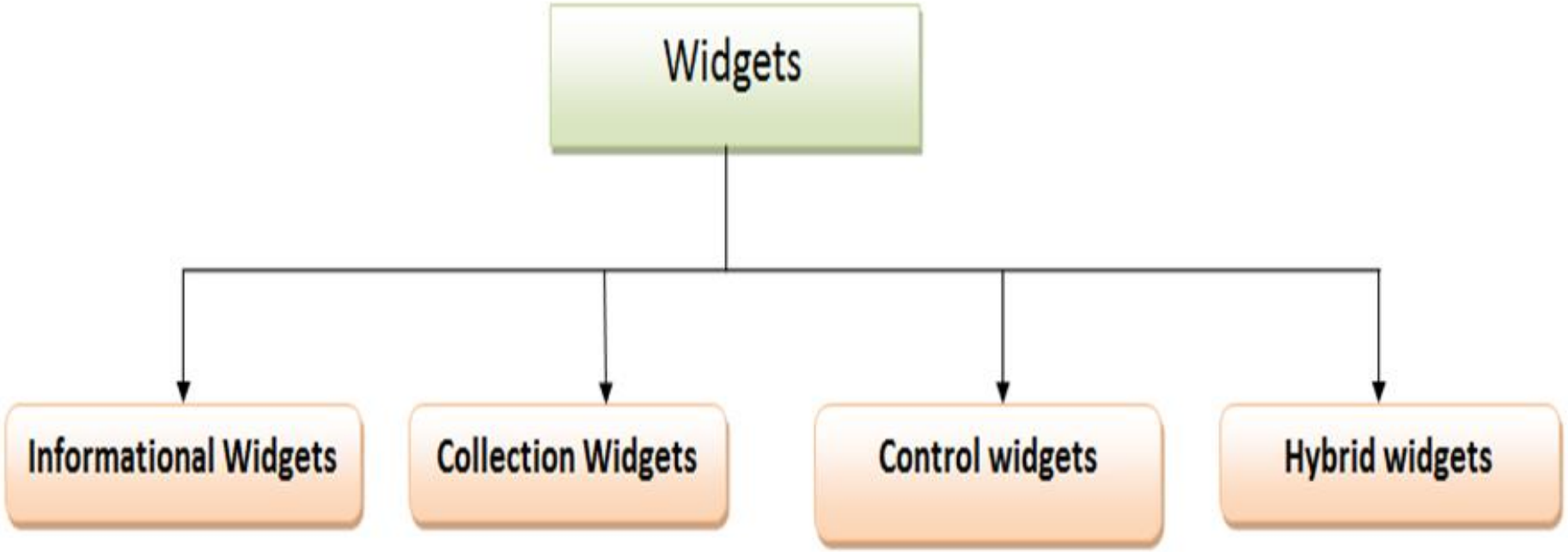
- Android **Broadcast** is a message which spreads out when any event occurs. They are received by apps.
- Android Intents can be used to deliver broadcasts to other apps.
- For example, when your device boots up or switched on system generates a broadcast to all apps. There should be a procedure or should be something which can receive these broadcasts. These receptors are called broadcast receivers.
- For this you need to register a receiver in the activity which we shall deal while programming for the same.
- There are two types of broadcasts:
- **Normal Broadcasts:** These are asynchronous in nature. Many receivers can be activated at the same time which doesn't have any defined order. But they are very efficient.
- **Ordered Broadcasts:** They are synchronous in nature. Broadcast received by one receiver passes it to other receivers.
- Broadcasts are delivered to receiver on one-to-one and sequential basis. Either receiver will pass result to another receiver or it may completely destroy the broadcast.

Widgets

- A **widget** is a quick view of your app's functionality and data.
- This view is accessible from home screen of your device
- **Android App widgets** are the small application views.
- These views can be embedded into other applications.
- They can receive updates on periodic basis.

Widgets

widgets are of following types:



Widgets

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- **Android App widgets** are the small application views.
- These views can be embedded into other applications.
- They can receive updates on periodic basis.
- . Now widgets are of following types:
-

Four types of Widgets

· **Informational Widget:** These Android widgets are going to display only that information to user which is important and dynamic in nature.

Example the information displayed on your home screen saying time and weather condition is a widget of this type.

· **Collection Widgets:** These Android widgets scroll in top-to-down direction. Collection of information of same type and then enabling user to open any one of them to full detail.

Example is your e-mail app which will display all the mails in your inbox and then allow you to open any one of them.

· **Control Widgets:** Displays the most frequently used functionalities which user might want to control from home screen.

For example in a video app, you can pause, play, stop, go to previous track, move to next track is an example of control widget.

· **Hybrid Widgets:** These Android widgets combine features of all of the above three. Notification, as the name says keeps the user aware of events going on. User is kept informed like any news channel.

For e.g, everyone of us know about facebook or whatsapp, now notification system of app is responsible for informing you about any new friend request, chat request, or a new message from say, dvs or xyz, etc.

Manifest

- A **manifest file** in computing is a **file** containing metadata for a group of accompanying **files** that are part of a set or coherent unit.
- For example, the **files** of a computer program may have a **manifest** describing the name, version number, license and the constituting **files** of the program.
- It is in .XML format

Introduction about UC

- **UC Browser** is an alternative to the many Internet **browsers** you can find for **Android**.
- **UC Browser** is a powerful **browser** and has a decent set of features, but it doesn't surpass the best **browsers for Android**, such as Firefox, Chrome, or Dolphin **Browser**.

UC Browser Features

- Fast downloader with pause/resume option.
- Compresses website for fast browsing and upto 50% data saving.
- Integrated in-app ad blocker.
- Supports Night Mode for better browsing experience.
- A light weight version – Mini – is available for slow internet connection.
- News, viral contents and videos are available.

How to download UC Browser for various platforms

- **Download UC Browser for Android**
- **Download APK File**.
- Go to ‘Settings’ and toggle on ‘Unknown Source’.
- Open the APK file.
- Tap on ‘Install’ to give the necessary permissions to the app.
- Wait for the installation process to be completed.
- **Download UC Browser for iOS**
- **Download iOS File** *(Supports iPhone, iPad, iPod Touch).*
- Locate the downloaded file and then tap on the icon.
- Tap on ‘Install’ to proceed.
- Enter the password of your phone to proceed *(You can also simply use the Touch ID to proceed with the installation procedure).*
- **Download UC Browser for PC**
- **Download EXE File** *(Supports Windows 10, 8.1, 8, 7, XP, Vista)*.
- Find the downloaded file on your PC and open it.
- Install the file on your PC.
- Start Browsing.