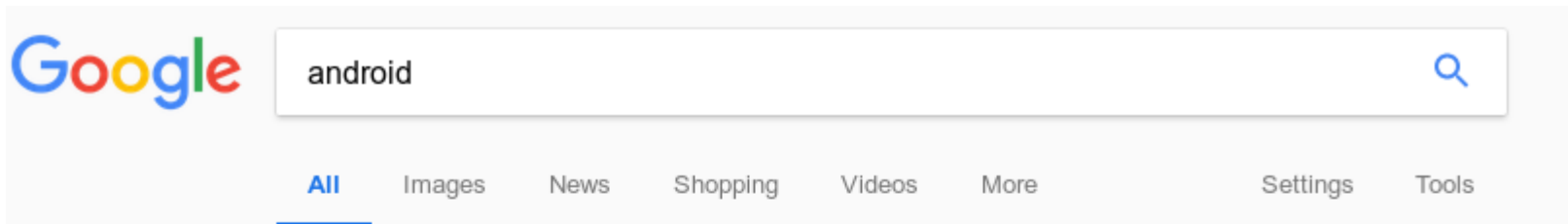


# Short Introduction to Android

# Android..



About 2,760,000,000 results (0.53 seconds)

## Android

<https://www.android.com/> ▼

See what's new with **Android** - from phones to watches and more. Visit the official site to explore and learn.

[Android Phones](#) · [8.0 Oreo](#) · [Android One](#) · [Go edition](#)

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## Android (operating system) - Wikipedia

[https://en.wikipedia.org/wiki/Android\\_\(operating\\_system\)](https://en.wikipedia.org/wiki/Android_(operating_system)) ▼

**Android** is a mobile operating system developed by Google, based on a modified version of the Linux kernel and other open source software and designed primarily for touchscreen mobile devices such as smartphones and tablets. In addition, Google has further developed **Android TV** for televisions, **Android Auto** for cars, ...



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## Android (operating system)

From Wikipedia, the free encyclopedia

*For other things called "android", see [Android \(disambiguation\)](#).*

**Android** is a [mobile operating system](#) developed by [Google](#), based on a modified version of the [Linux kernel](#) and other [open source](#) software and designed primarily for [touchscreen](#) mobile devices such as [smartphones](#) and [tablets](#). In addition, Google has further developed [Android TV](#) for televisions, [Android Auto](#) for cars, and [Wear OS](#) for wrist watches, each with a specialized user interface. Variants of Android are also used on [game consoles](#), [digital cameras](#), [PCs](#) and other electronics.



<b>Developer</b>	<a href="#">Google</a> <a href="#">Open Handset Alliance</a>
<b>Written in</b>	<a href="#">Java (UI)</a> , <a href="#">C (core)</a> , <a href="#">C++</a> and more <sup>[1]</sup>
<b>OS family</b>	<a href="#">Unix-like</a>
<b>Working state</b>	<a href="#">Current</a>
<b>Source model</b>	<a href="#">Open source</a> (most devices include <a href="#">proprietary</a> components, such as <a href="#">Google Play</a> )
<b>Initial release</b>	<a href="#">September 23, 2008</a> ; 9 years ago <sup>[2]</sup>
<b>Latest release</b>	<a href="#">8.1.0 "Oreo"</a> / <a href="#">December 5, 2017</a> ; 3 months ago
<b>Latest preview</b>	<a href="#">Android P</a> / <a href="#">March 7, 2018</a> ; 20 days ago <sup>[3]</sup>
<b>Marketing target</b>	<a href="#">Smartphones</a> , <a href="#">tablet computers</a> , <a href="#">smartTVs (Android TV)</a> , <a href="#">Android Auto</a> and <a href="#">smartwatches (Wear OS)</a>
<b>Available in</b>	<a href="#">100+</a> languages <sup>[4]</sup>
<b>Package manager</b>	<a href="#">APK</a> (primarily through <a href="#">Google Play</a> ; installation of <a href="#">APKs</a> also possible locally or from alternative sources such as <a href="#">F-Droid</a> )
<b>Platforms</b>	<a href="#">32-</a> and <a href="#">64-bit ARM</a> , <a href="#">x86</a> , <a href="#">x86-64</a> , <a href="#">MIPS</a> and <a href="#">MIPS64</a>
<b>Kernel type</b>	<a href="#">Monolithic (modified Linux kernel)</a>
<b>Userland</b>	<a href="#">Bionic libc</a> , <sup>[5]</sup> <a href="#">mksh shell</a> , <sup>[6]</sup> <a href="#">Toybox</a> as core utilities beginning with <a href="#">Android 6.0</a> , <sup>[7][8]</sup> previously native core utilities with a few from <a href="#">NetBSD</a> <sup>[9][10]</sup>
<b>Default user interface</b>	<a href="#">Graphical (multi-touch)</a>
<b>License</b>	<a href="#">Apache License 2.0</a> <a href="#">GNU GPL v2</a> for the <a href="#">Linux kernel modifications</a> <sup>[11]</sup>
<b>Official website</b>	<a href="#">android.com</a> <a href="#">↗</a>

# https://developer.android.com/

## Android Developers

<https://developer.android.com/index.html> ▾

The official site for **Android developers**. Provides the **Android SDK** and documentation for app developers and designers.

## Develop Apps

Guides - Download Android Studio -  
Android Design - Distribute - ...

## Developer Guides

Welcome to the Android developer guides. The documents listed in ...

## Android Design

Android uses a new design metaphor inspired by paper and ...

[More results from android.com](#) »

## Download Android Studio

Download the official Android IDE and developer tools to build ...

## Google Play Console


Success  
quality.

## Wear OS

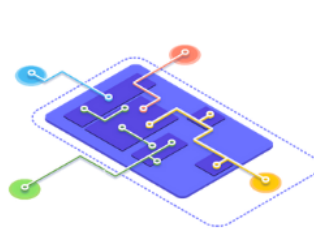
The off  
Develop

The screenshot shows the Android Developers website interface. At the top, there is a green navigation bar with the text 'Open navigation developers' and tabs for 'DESIGN', 'DEVELOP', and 'DISTRIBUTE'. Below this, a sidebar menu is visible with the following items: '← Guides', 'App Basics', 'Introduction', 'Build Your First App' (highlighted), 'Create an Android Project' (highlighted in blue), 'Run Your App', 'Build a Simple User Interface', 'Start Another Activity', 'App Fundamentals', 'App Resources', 'App Manifest File', 'App Permissions', 'Devices', 'Device Compatibility', and 'Wear'. The main content area displays the breadcrumb 'Develop > Guides > Build Your First App' and the title 'Create an Android Project'. Below the title, it says 'This lesson shows you how to create a new Android project with Android Studio and describe it. First, be sure you have installed the latest version of Android Studio. [Download Android Studio here.](#)' and a numbered list starting with '1. In the **Welcome to Android Studio** window, click **Start a new Android Studio project**.' Below this text is a screenshot of the 'Welcome to Android Studio' window, which shows the Android Studio logo and the text 'Android Studio Version 3.0'. The window lists several options: 'Start a new Android Studio project' (highlighted with a yellow star), 'Open an existing Android Studio project', 'Check out project from Version Control', 'Profile or debug APK', 'Import project (Gradle, Eclipse ADT, etc.)', and 'Import an Android code sample'. At the bottom right of the window, there are links for 'Configure' and 'Get Help'. Below the screenshot, it says 'Or if you have a project opened, select **File > New Project**.'

# https://source.android.com

 Source   Setup   Security   Porting   Tuning   Compatibility   >      [GO TO CODE](#)

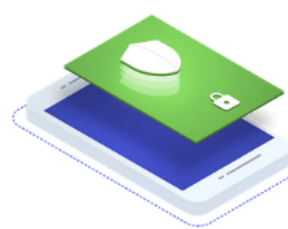
Android unites the world! Use the open source Android operating system to power your device. [GET SOURCE](#)



## 8.1 interfaces and architecture

Port the latest Android platform using simple HIDL interfaces to create compelling devices for your customers.

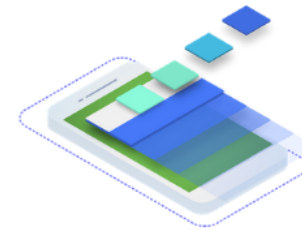
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## Securing Android is essential

Find out how the Android security program works and learn how to implement the latest features.

[IMPLEMENT SECURITY](#)



## Get compatible, get apps

Offer a consistent experience with other Android-powered devices and get the ability to include more apps.

[TEST DEVICES](#)

## About the Android Open Source Project

Android is an open source software stack for a wide range of mobile devices and a corresponding open source project led by Google. This site and the Android Open Source Project (AOSP) repository offer the information and source code you need to create custom variants of the Android stack, port devices and accessories to the Android platform, and ensure your devices meet compatibility requirements.



# Training

<https://developers.google.com/training/android/>



[Setup](#)

[Security](#)

[Porting](#)

[Tuning](#)

[Compatibility](#)

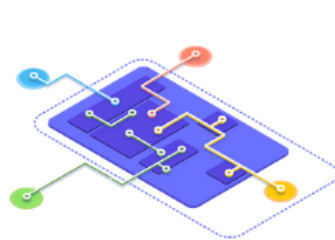


Search

[GO TO CODE](#)

Android unites the world! Use the open source Android operating system to power your device.

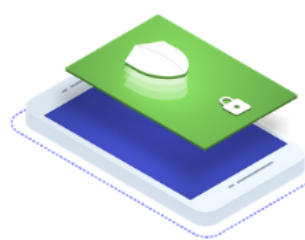
[GET SOURCE](#)



## 8.1 interfaces and architecture

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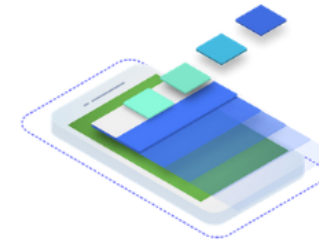
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# https://www.tutorialspoint.com/android

The screenshot shows the website's header with the logo "tutorialspoint SIMPLY EASY LEARNING" and navigation links for Jobs, Examples, Whiteboard, Net Meeting, HOME, Q/A, LIBRARY, VIDEOS, and TUTORS. The main content area features a large banner with the Android logo and the text "LEARN ANDROID simply easy learning". Below the banner are navigation buttons for "Previous Page" and "Next Page". The main title is "Android Tutorial", followed by buttons for "PDF Version", "Quick Guide", "Resources", "Job Search", and "Discussion". The main text describes Android as an open source, Linux-based operating system for mobile devices, developed by the Open Handset Alliance. It states that the tutorial will teach basic Android programming and advanced concepts. Below this is a section titled "Audience" which explains that the tutorial is for beginners to help them understand basic Android programming and reach a moderate level of expertise. The next section is "Prerequisites", which states that Android programming is based on Java programming language and that a basic understanding of Java is required. At the bottom, there are "Previous Page", "Print", and "Next Page" buttons, and an "Advertisements" section.

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## Android Tutorial

PDF Version Quick Guide Resources Job Search Discussion

Android is an open source and Linux-based operating system for mobile devices such as smartphones and tablet computers. Android was developed by the Open Handset Alliance, led by Google, and other companies. This tutorial will teach you basic Android programming and will also take you through some advance concepts related to Android application development.

### Audience

This tutorial has been prepared for the beginners to help them understand basic Android programming. After completing this tutorial you will find yourself at a moderate level of expertise in Android programming from where you can take yourself to next levels.

### Prerequisites

Android programming is based on Java programming language so if you have basic understanding on Java programming then it will be a fun to learn Android application development.

Previous Page Print Next Page

Advertisements

# History



2003  
Startup..



2005  
bought by  
Google



2010  
Nexus  
phone



2014  
Android TV



Wear OS



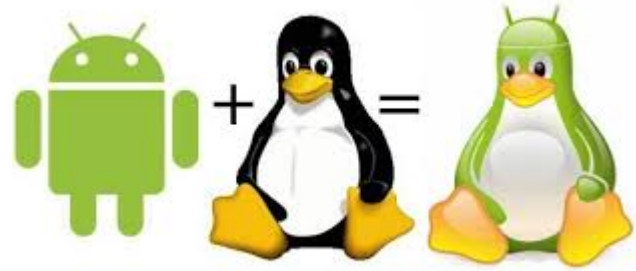


# Architecture Overview



Core Concept 1 :

# Linux



\$ V

```
pr_warn("The discrete card could not be enabled by a _cam
call\n");
pci_restore_state(&dis_dev);
if (pci_enable_device(&dis_dev))
pr_warn("failed to enable device (&dis_dev->dev));
pci_set_master(dis_dev);
}

/* power button driver
static void dis_dev_
if (dis_dev->bus &
pm_runtime_get(&dis_dev->self->dev);
}

static void dis_dev_
if (dis_dev->bus &
pm_runtime_put_sync(&dis_dev->self->dev);
}

static ssize_t bbswitch_pr
ite(str &fp, const char __user
stuff
```

A large green Android robot icon with a Linux penguin icon inside its body.

# Base Linux Kernel Security



System User Account (uid/gid)

All app files are protected by unix chmod  
All process run with current uid

Security Permission checked in System Calls  
= standard kernel linux security

“Root” user 0 can do everything ...  
Only Android low-level services run as root

# 1 Running App = 1 Process (Linux JVM)



# Adb Shell .. PS

```
arnaud@arn:~/Android/Sdk$ ./platform-tools/adb shell
shell@V2510:/ $
shell@V2510:/ $ ps
USER      PID   PPID  VSIZE  RSS   WCHAN          PC   NAME
root      1     0    1152   532   Sys_epoll      00000000 S  /init
root      2     0     0     0     kthreadd      00000000 S  kthreadd
root      3     2     0     0     smpboot_th    00000000 S  ksoftirqd/0
root      5     2     0     0     worker_thr   00000000 S  kworker/0:0H
root      7     2     0     0     smpboot_th    00000000 S  migration/0
root      8     2     0     0     rcu_gp_kth    00000000 S  rcu_preempt
root      9     2     0     0     rcu_gp_kth    00000000 S  rcu_bh
root     10     2     0     0     rcu_gp_kth    00000000 S  rcu_sched
root     11     2     0     0     smpboot_th    00000000 S  watchdog/0
root     12     2     0     0     __kthread_    00000000 R  watchdog/1
root     13     2     0     0     __kthread_    00000000 R  migration/1
root     14     2     0     0     __kthread_    00000000 R  ksoftirqd/1
root     15     2     0     0     worker_thr    00000000 S  kworker/1:0
root     16     2     0     0     worker_thr    00000000 S  kworker/1:0H
root     17     2     0     0     __kthread_    00000000 R  watchdog/2
root     18     2     0     0     __kthread_    00000000 R  migration/2
root     19     2     0     0     __kthread_    00000000 R  ksoftirqd/2
root     20     2     0     0     worker_thr    00000000 S  kworker/2:0
root     21     2     0     0     worker_thr    00000000 S  kworker/2:0H
root     22     2     0     0     __kthread_    00000000 R  watchdog/3
root     23     2     0     0     __kthread_    00000000 R  migration/3
root     24     2     0     0     __kthread_    00000000 R  ksoftirqd/3
root     25     2     0     0     worker_thr    00000000 S  kworker/3:0
root     26     2     0     0     worker_thr    00000000 S  kworker/3:0H
root     27     2     0     0     rescuer_th    00000000 S  khelper
root     28     2     0     0     rescuer_th    00000000 S  suspend sys syn
```

# Sample User App (Calculator)



Calculator

```
shell      8645   1     4700   200    poll_sched 00000000 R /sbin/adbd
u0_a79     8651  246   966444 15252  Sys_epoll_ 00000000 S com.android.gallery3d
u0_a19     8740  246   655600 26272  Sys_epoll_ 00000000 S com.android.contacts
u0_a10     8814  246   656132 30400  Sys_epoll_ 00000000 S com.ape.calculator2
shell      8845  8645  1984   828    sigsuspend b6e630cc S /system/bin/sh
root       8870   2     0       0     worker_thr 00000000 S kworker/u8:2
root       8871   2     0       0     worker_thr 00000000 S kworker/u8:4
shell      8892  8845  2156   712    0 b6dce920 R ps
```



UID = u0\_a10

```
shell@V2510:/system/app $ ls
ApeCalculator
ApeMyosVersion
ApeResetUserData
ApeSaletracker
ApeSystemUpdate
ApeTorch
AppSettingsPlugin
```

```
shell@V2510:/system/TLUI $ ls
com.ape.calculator2
com.ape.filemanager
com.ape.launcher3
com.ape.led
com.ape.music
com.ape.myseneschal
```

```
shell@V2510:/system/app/ApeCalculator $ find
.
./ApeCalculator.apk
./oat
./oat/arm
./oat/arm/ApeCalculator.odex
```

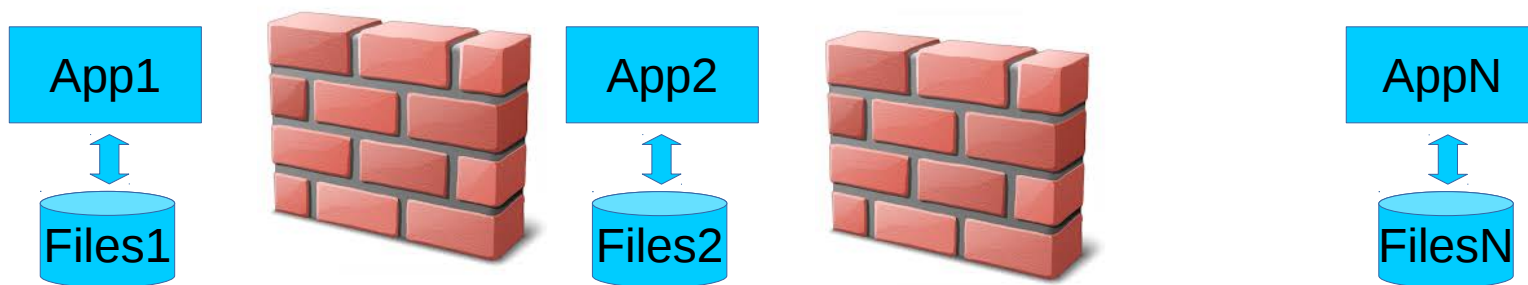


# 1 Installed App = 1 UID

Install 1 App => create a new UID !!

Files owned by 1 App => files owned by UID

All Apps (Files) are ISOLATED







# No “Root” access

Apps are installed by “apk” / MarketStore  
... similar to “sudo apt-get install ”

BUT

- forcing a new uid/gid for each app
- apps (files) are not owned to “root”
- no command “sudo”, no root access

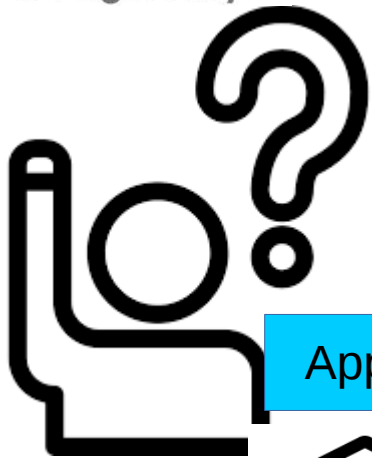
No apps can be root, only by jailbreaking your phone

# Installing App = Accepting “Manifest” Permissions



Google Play

Each App as a “Manifest” Permission required files  
When You install = You accept permissions



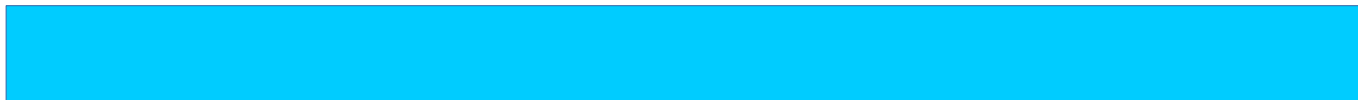
App1



App2



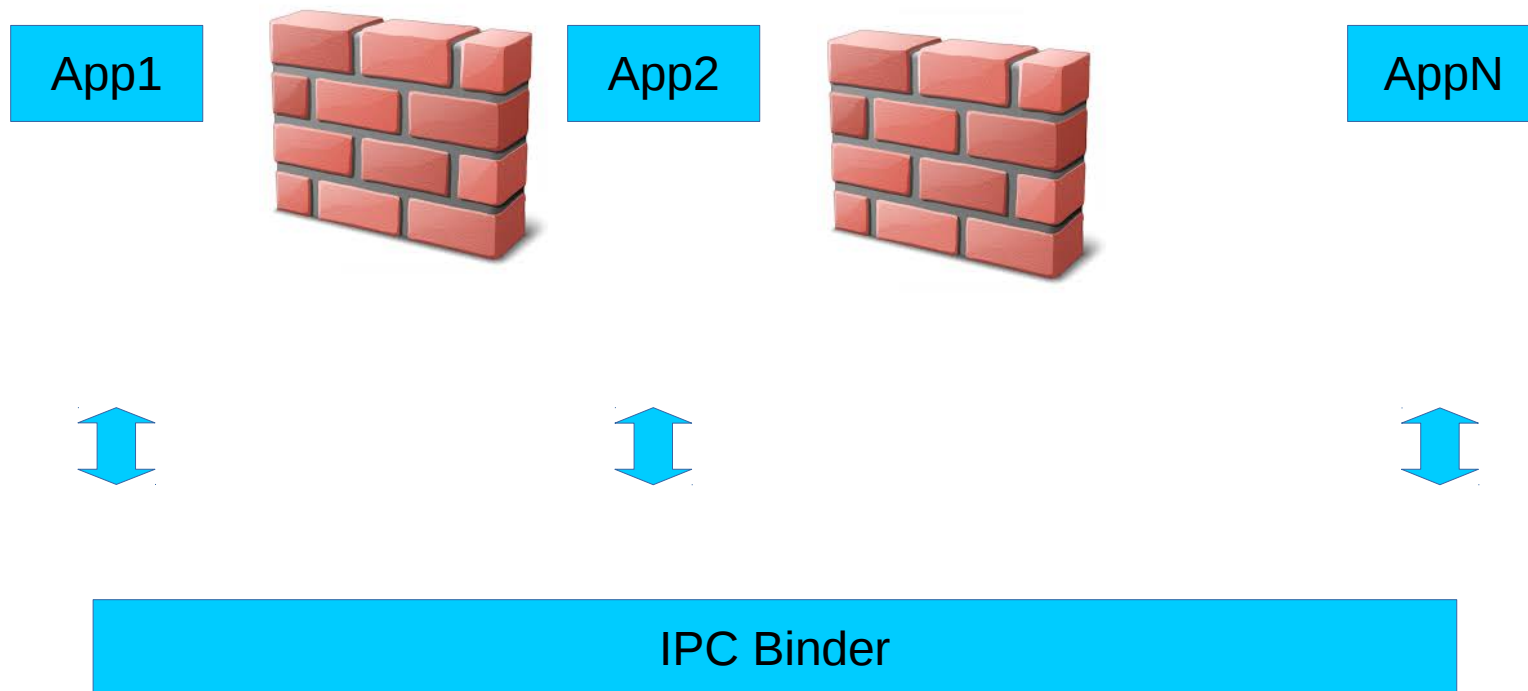
AppN



# Core Concept 2

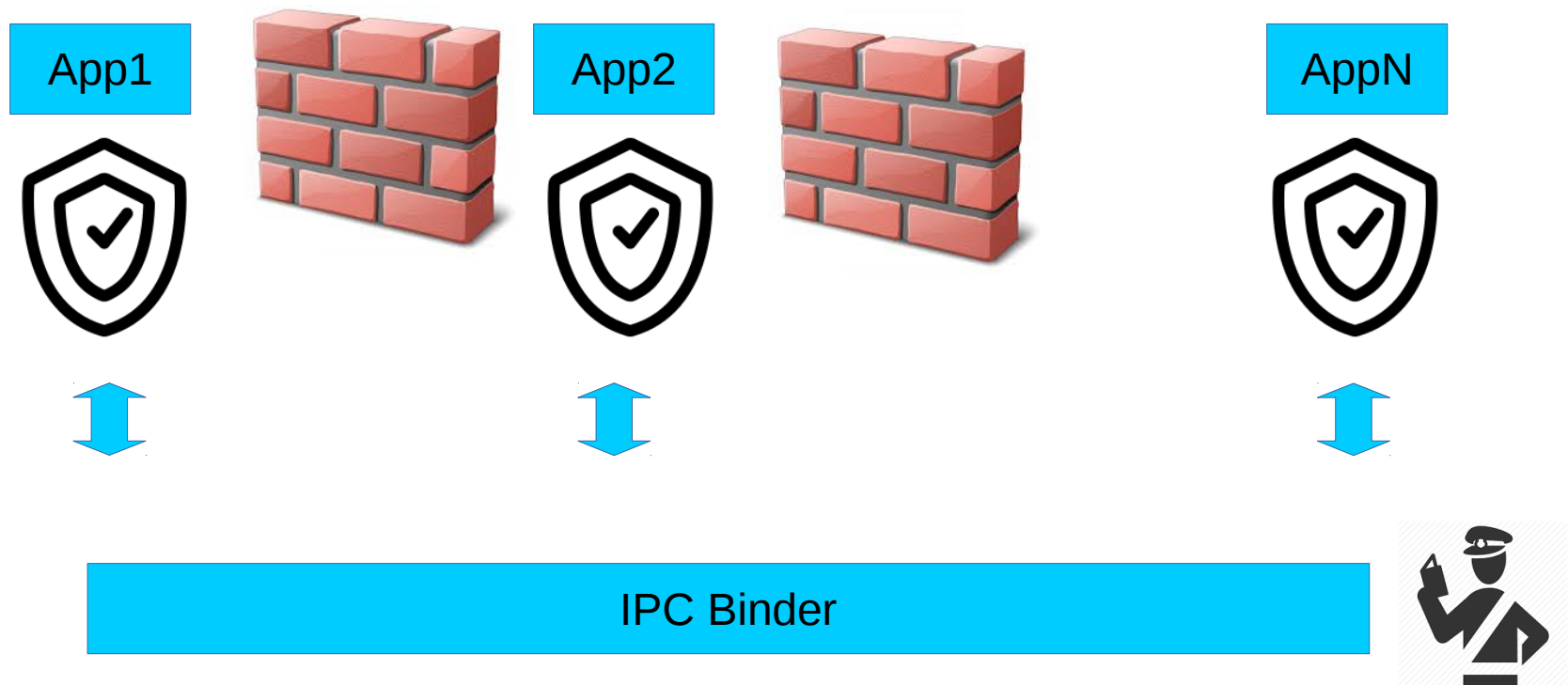
# Communications between Apps

Communication between Apps  
= Using IPC Binder messages (service)

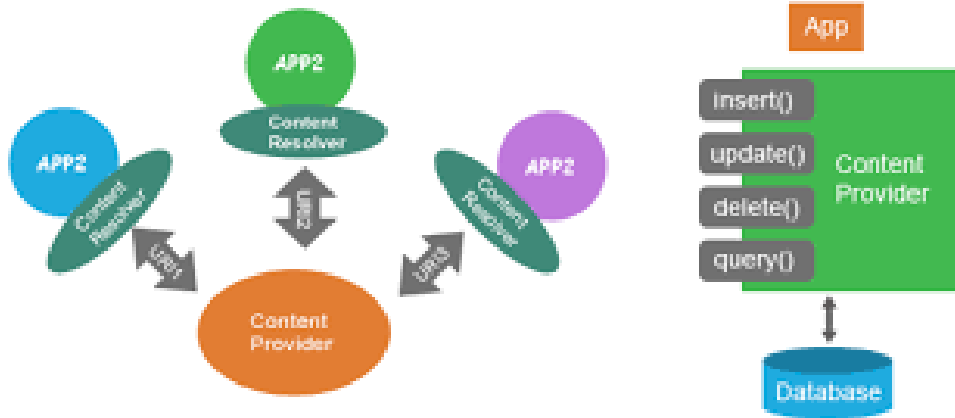


# Permissions + Communications between Apps

IPC Binder messages (service)  
+ Permissions (Manifest file per App)

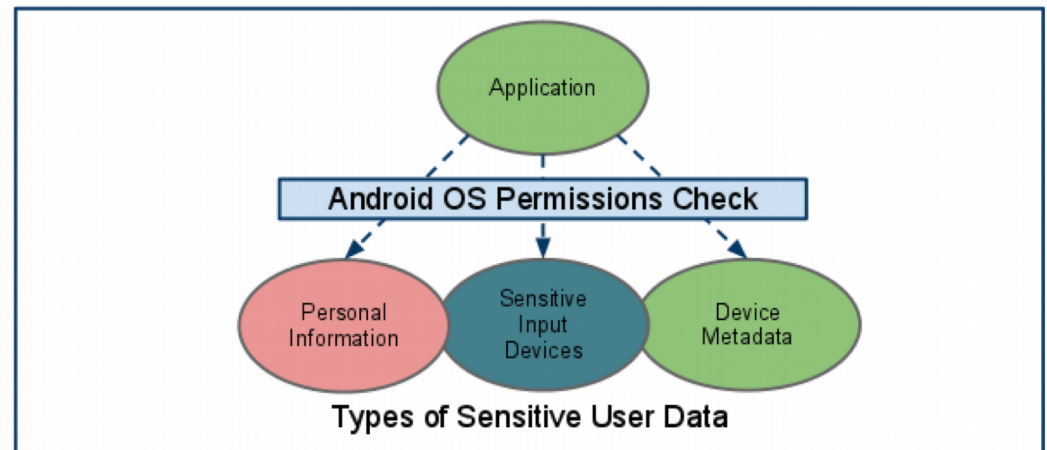


# Apps Isolations / Data



## Data Between Apps

## System Data

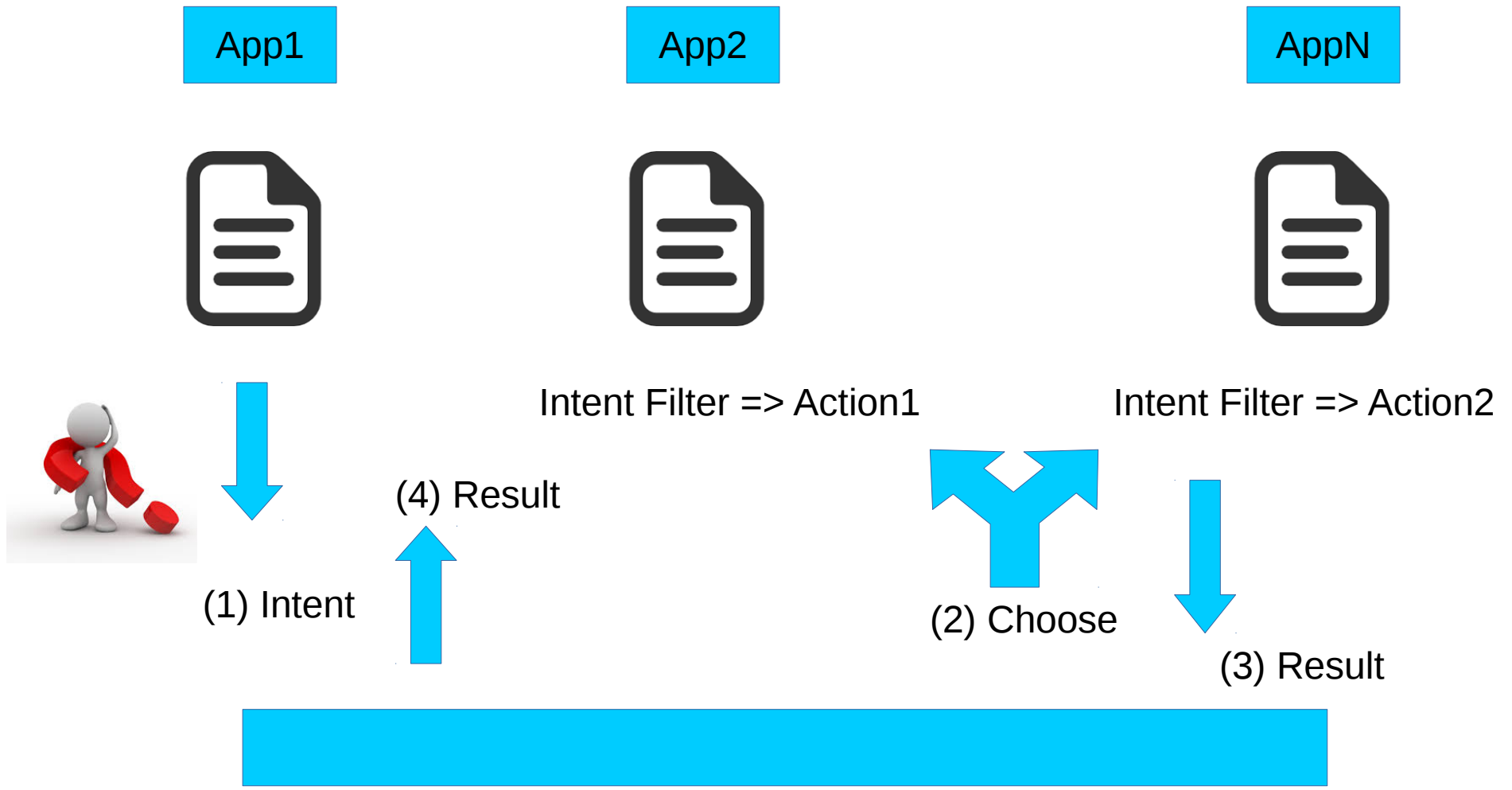


# Core Concept 3 : Intent



Your **INTENT** influences your **ACTIONS**  
which influences your **RESULTS**.

# Manifest – Intent Capabilities





# Manifest – Intent Filter

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="com.example.myapplication" >

    <application
        android:allowBackup="true"
        android:icon="@drawable/ic_launcher"
        android:label="@string/app_name"
        android:theme="@style/AppTheme" >

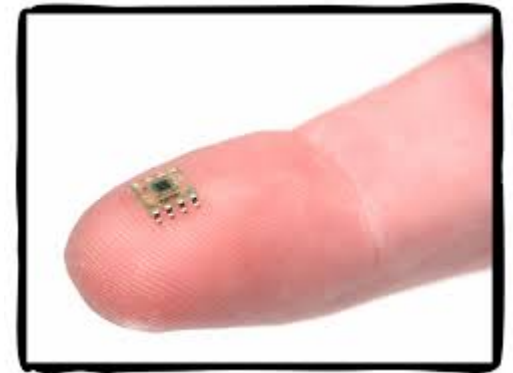
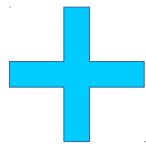
        <activity
            android:name="com.example.myapplication.MainActivity"
            android:label="@string/app_name" >

            <intent-filter>
                <action android:name="android.intent.action.MAIN" />
                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>

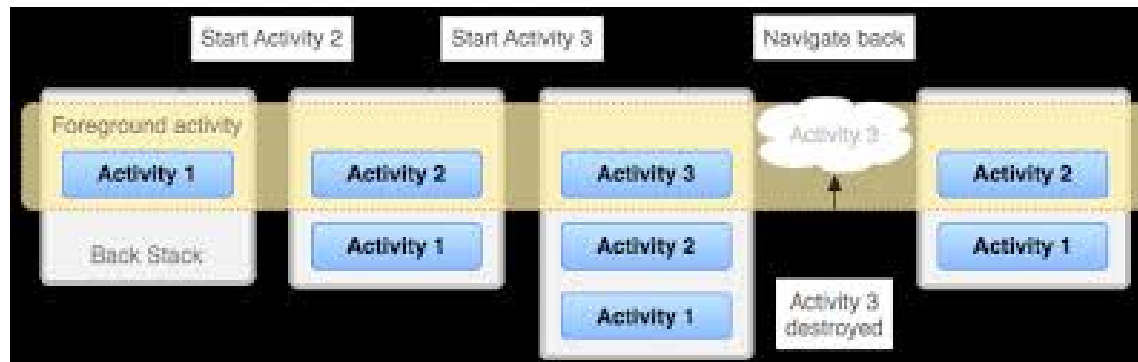
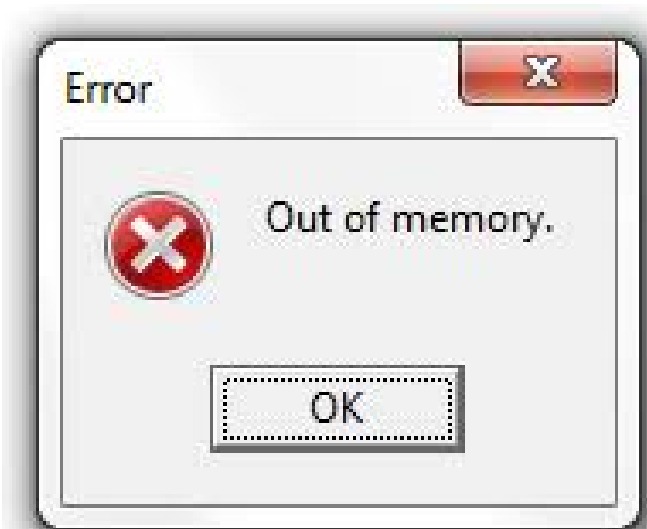
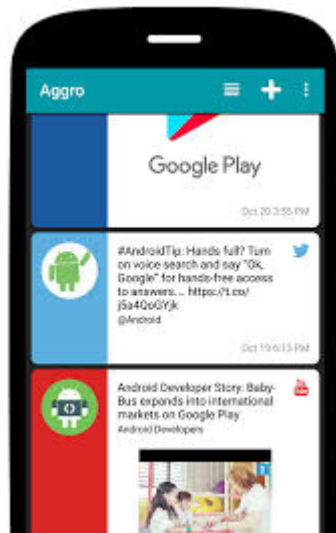
        </activity>

    </application>
</manifest>
```

# Core Concept 3 : RAM Start / Kill / Resume App



# Multiple Activities – Small RAM ...



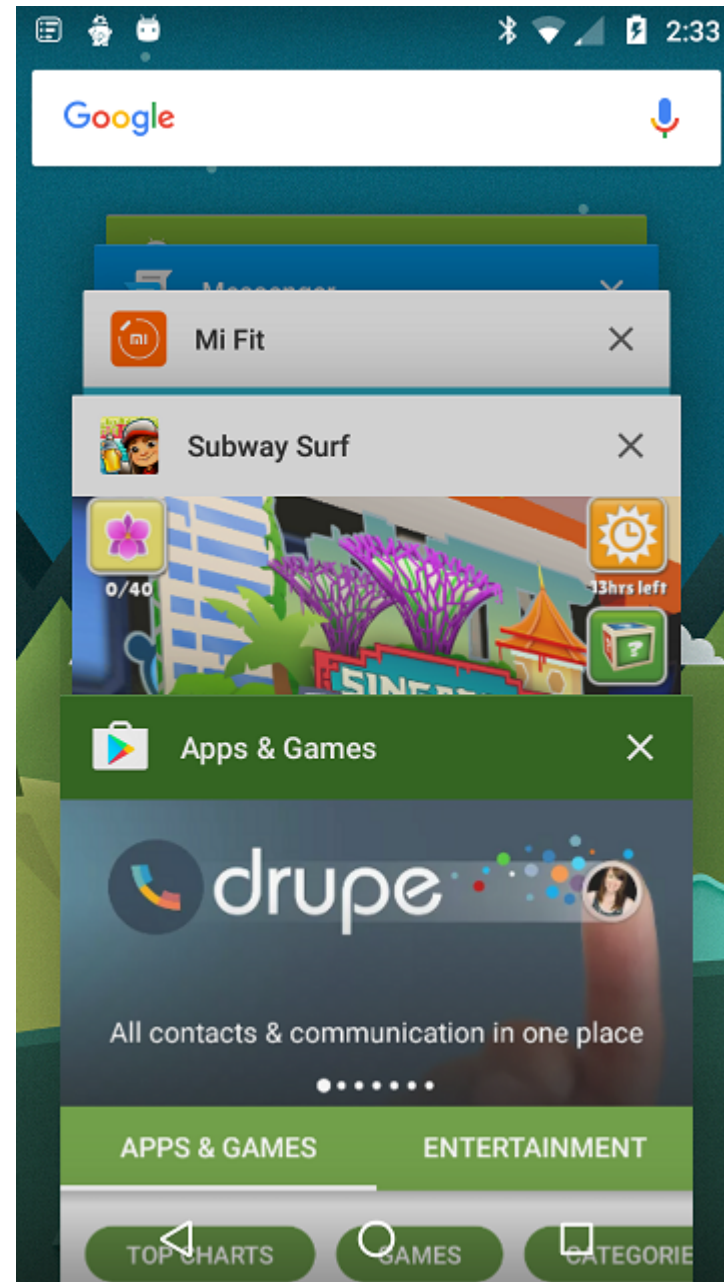
# Activities Stack & Recent



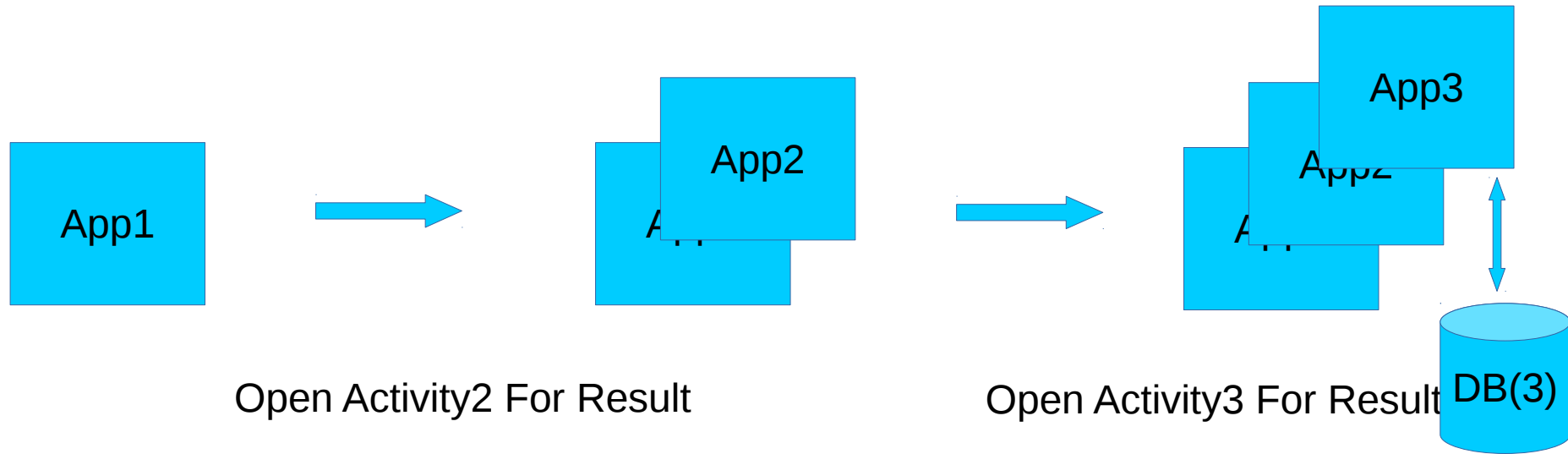
BACK

HOME

RECENTS



# Activities Stack (Open Modal Dialog.. Return)

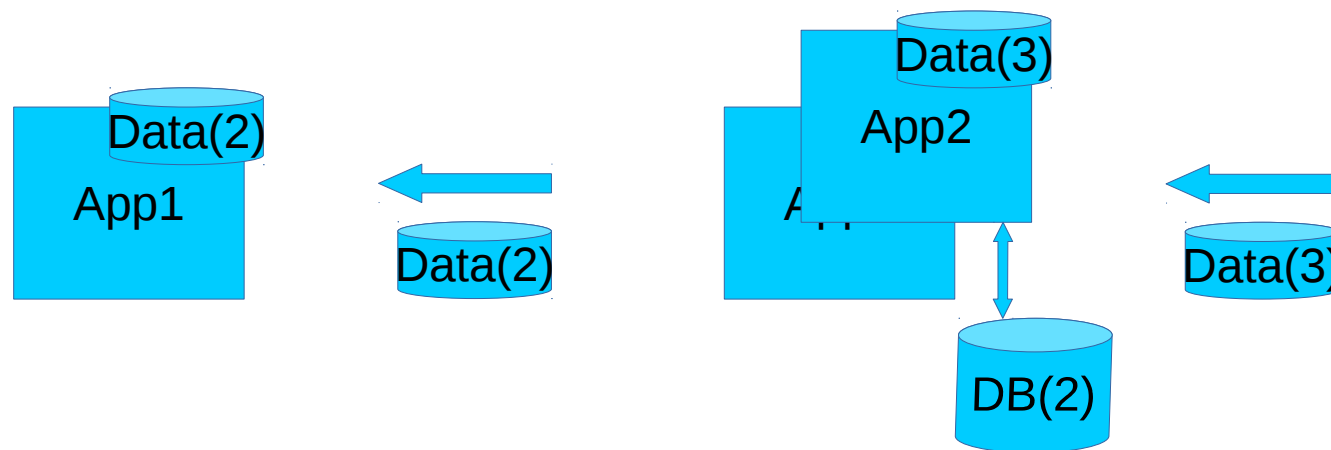


Open Activity2 For Result

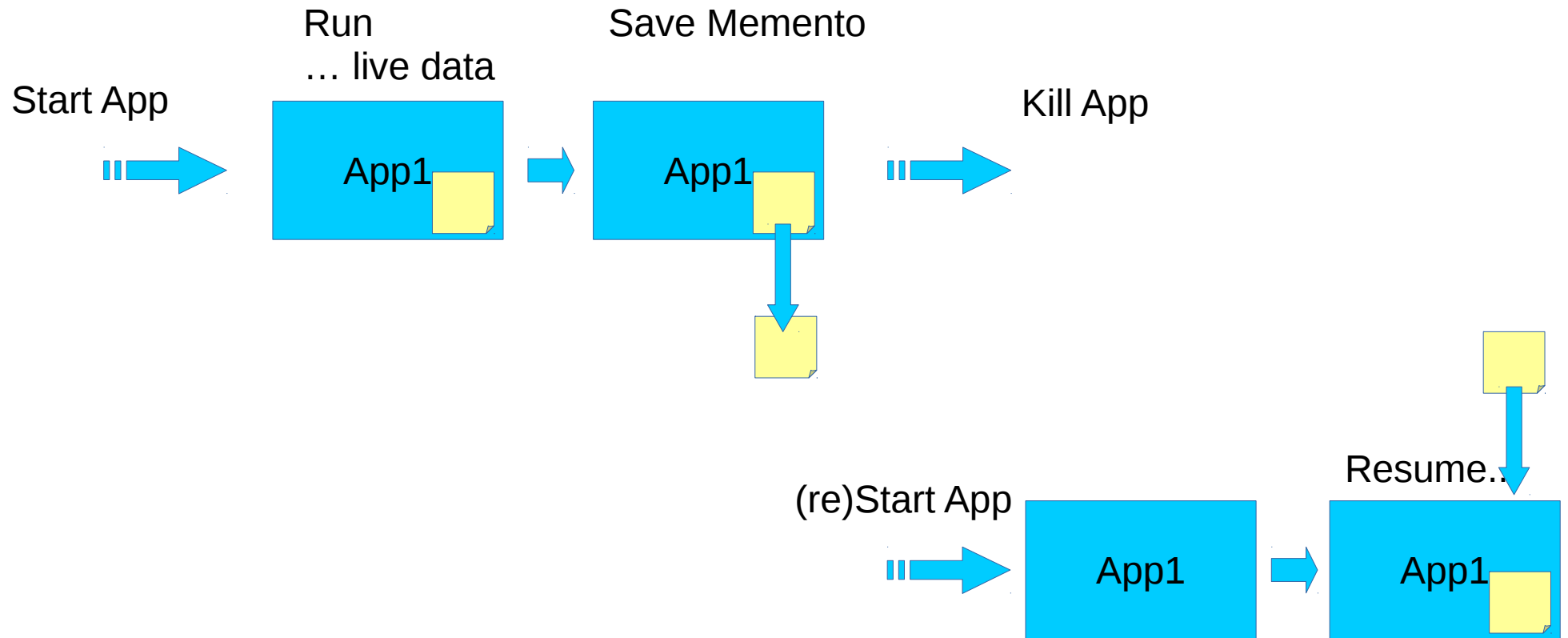
example:  
take photo  
=> open "Photo" application

Open Activity3 For Result

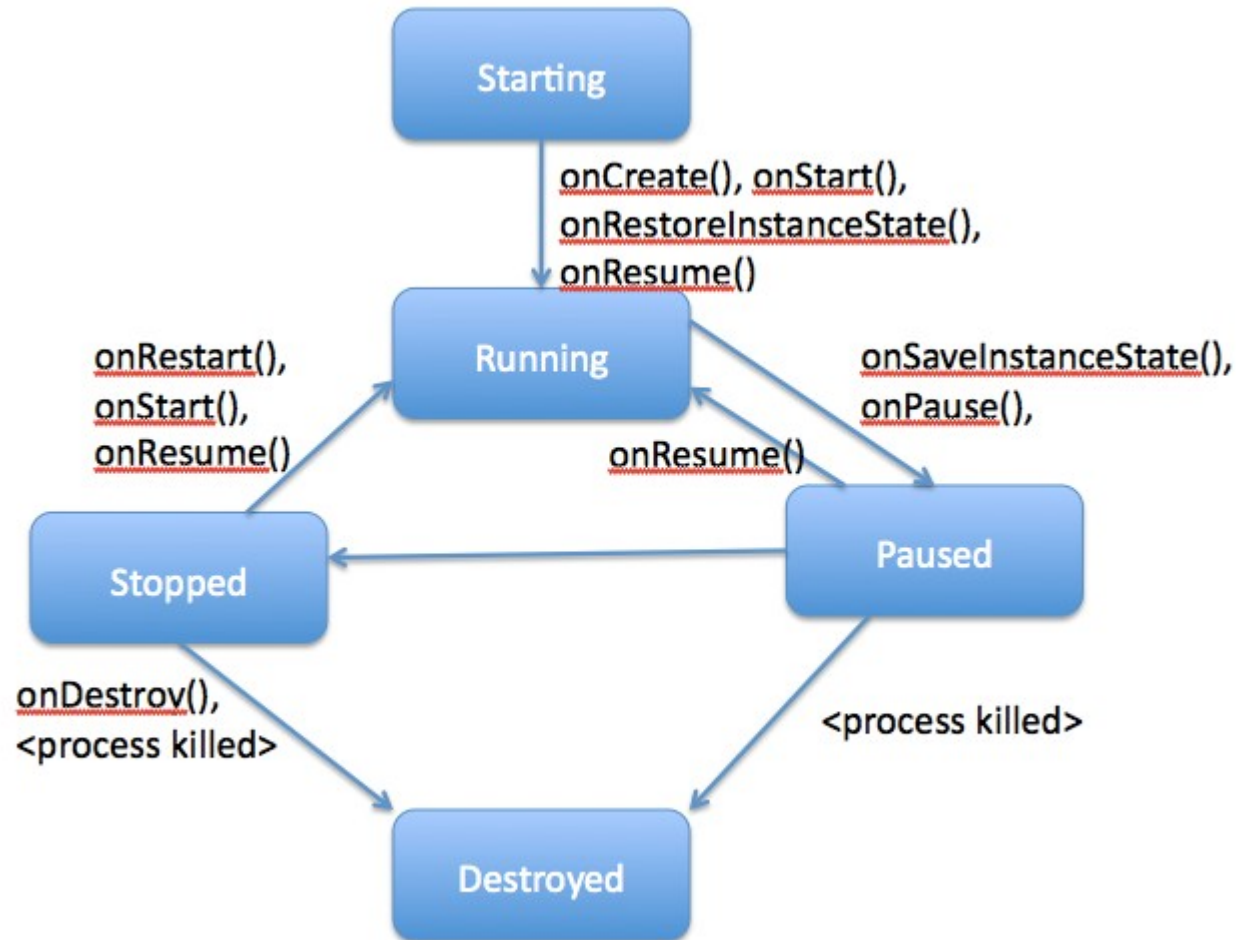
example:  
send.. select Contact  
=> open "Contact" application



# Activity Memento



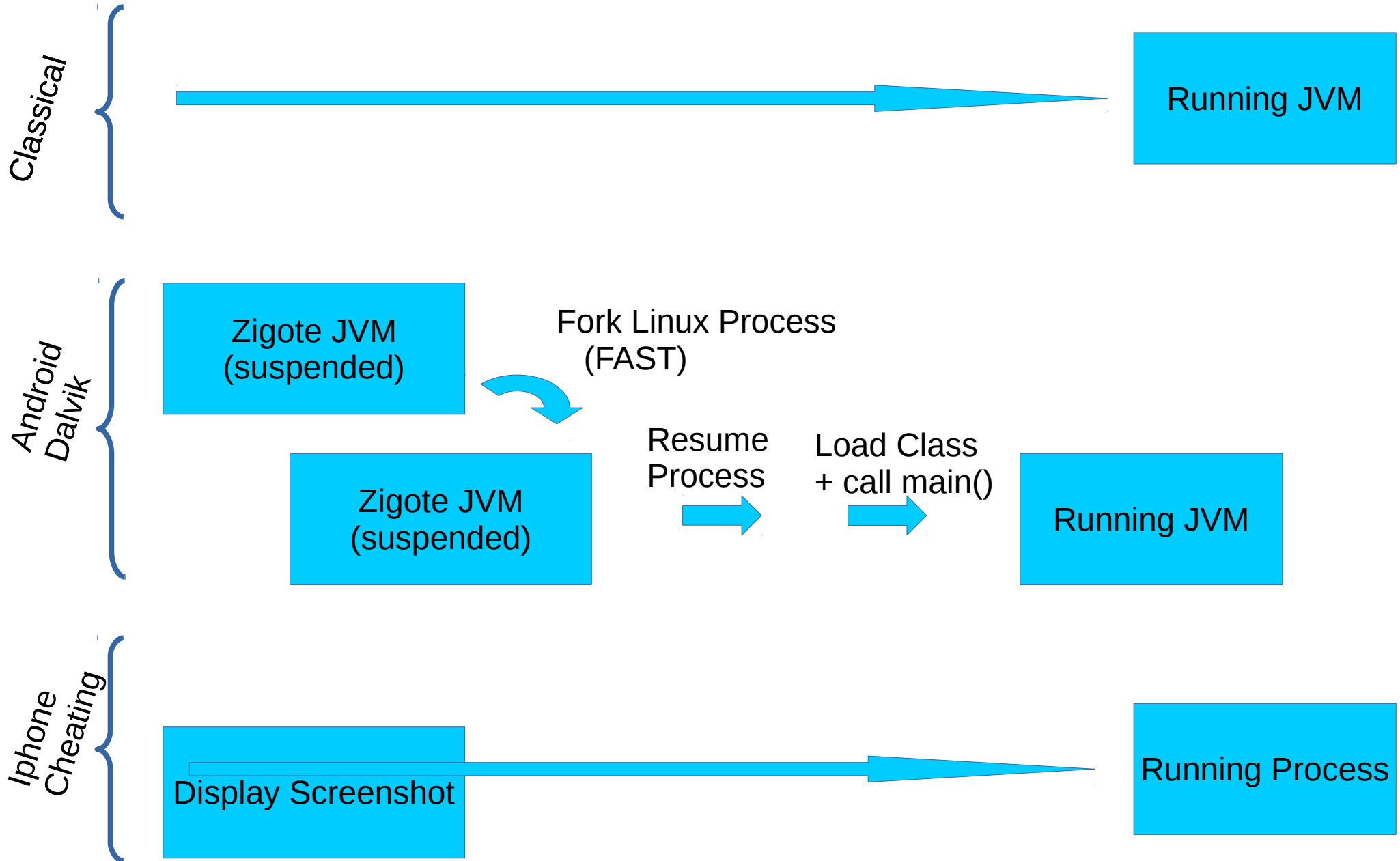
# Activity State Diagram







# Fast JVM Start Time



Core Concept : Framework / APIs

# HAL = Hardware Abstraction Layer

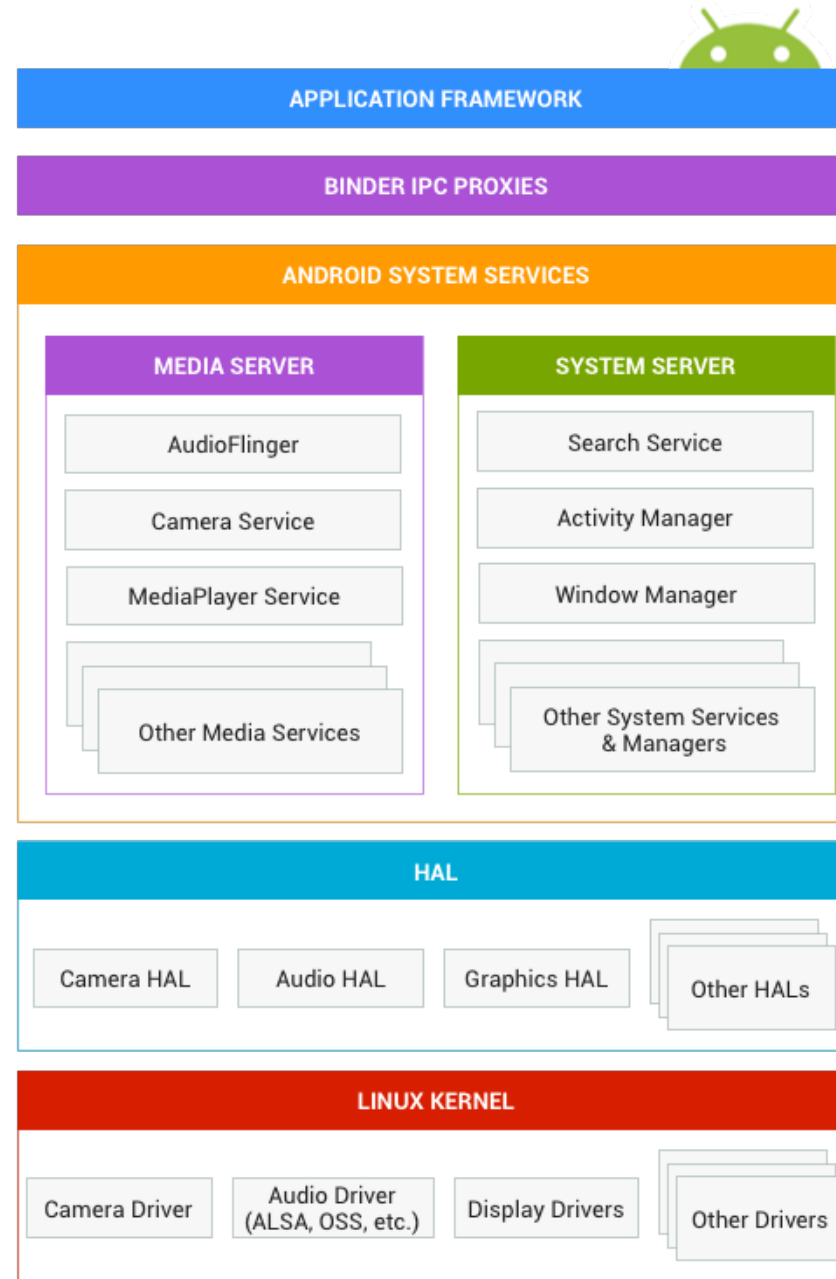
<https://source.android.com/devices/architecture/hal>

## Hardware Abstraction Layer (HAL)

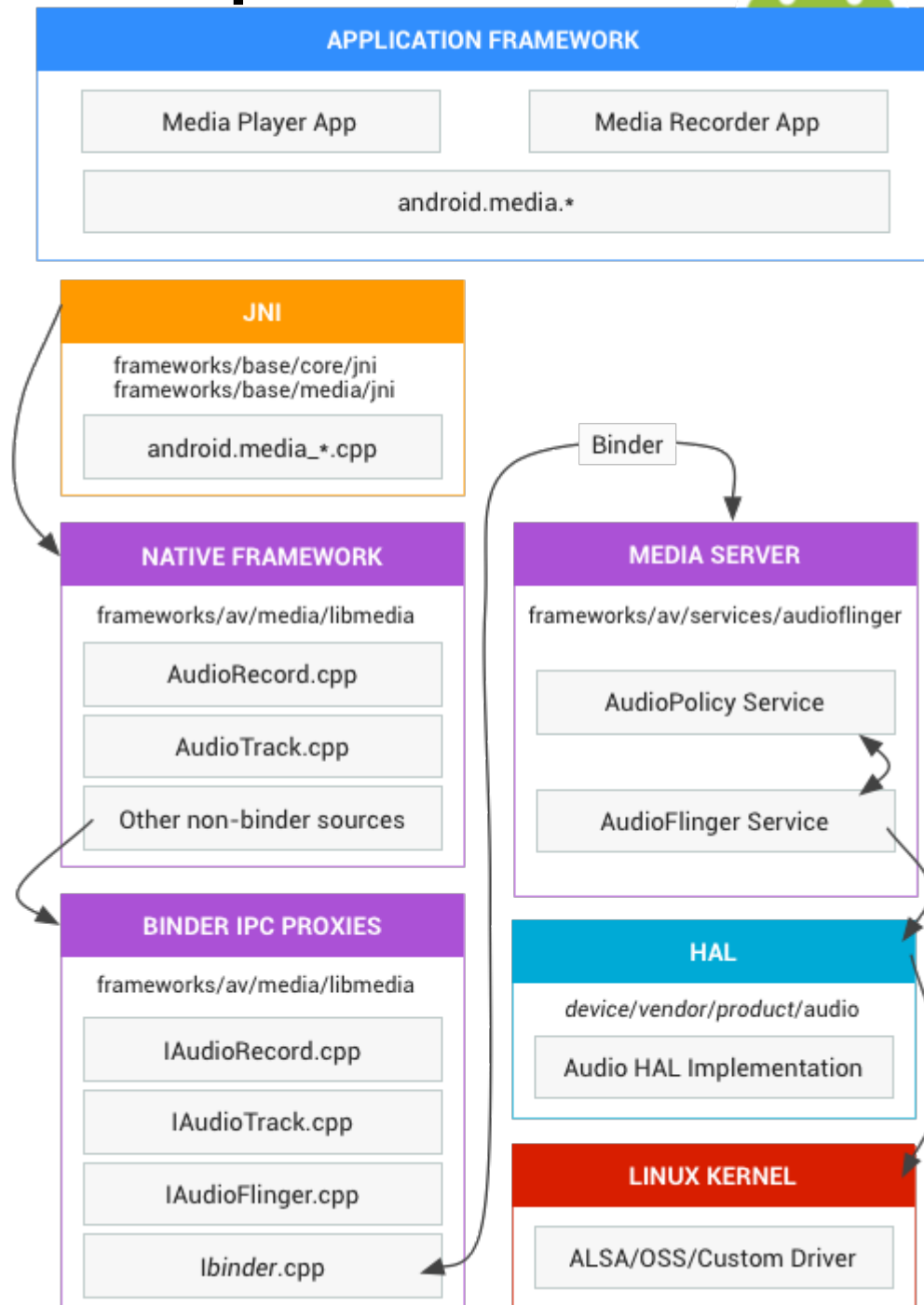
A HAL defines a standard interface for hardware vendors to implement, which enables Android to be agnostic about lower-level driver implementations. Using a HAL allows you to implement functionality without affecting or modifying the higher level system. HAL implementations are packaged into modules and loaded by the Android system at the appropriate time.



# Kernel < HAL < API



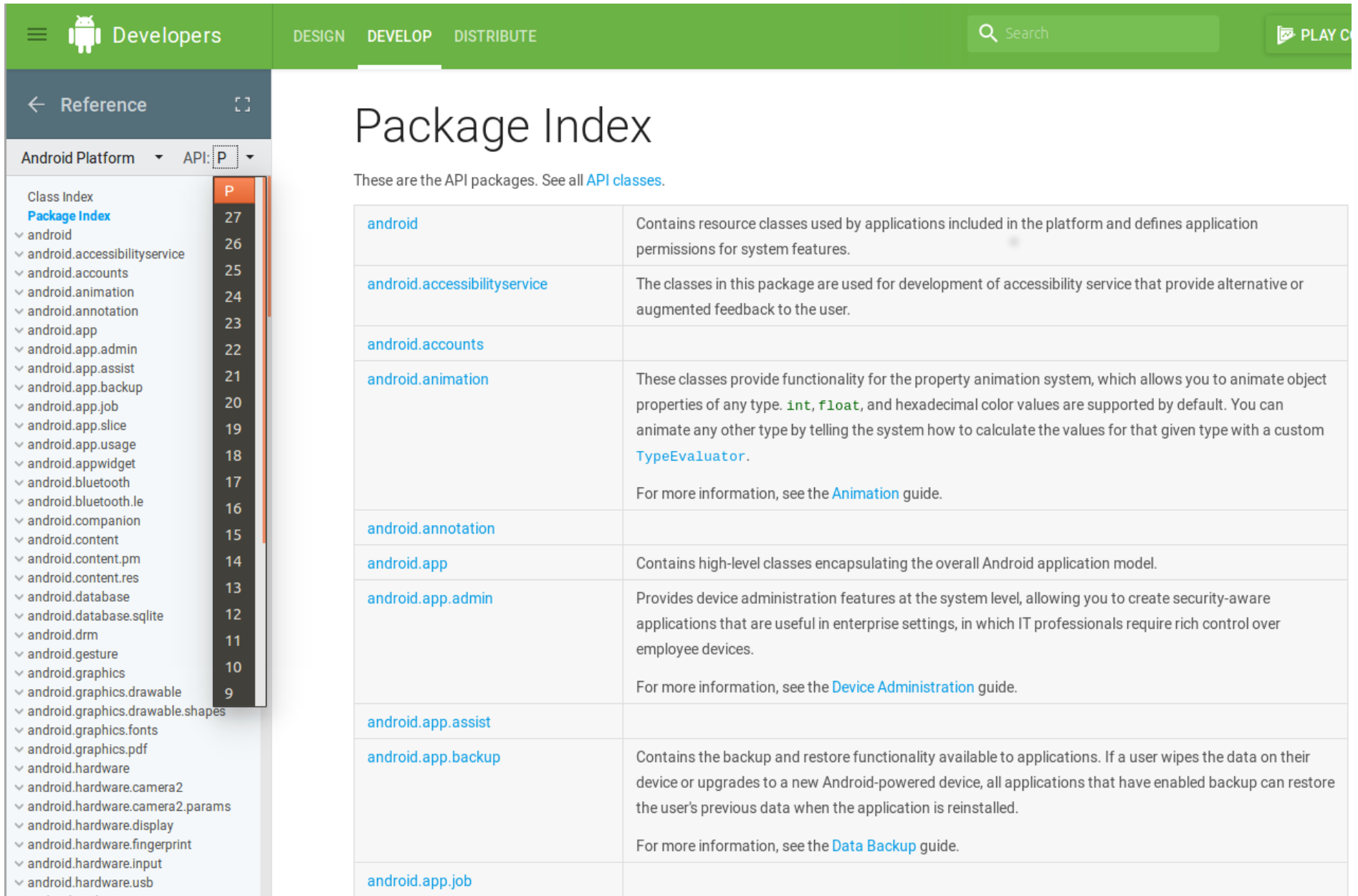
# Example: Audio



# Core Concept API – Services

# APIs ... (current API level=27)

<https://developer.android.com/reference/>



The screenshot shows the Android Developer website interface. At the top, there is a green navigation bar with the Android logo and the word "Developers". Below this, there are tabs for "DESIGN", "DEVELOP", and "DISTRIBUTE". A search bar is visible on the right side of the navigation bar. The main content area is titled "Package Index" and contains a list of API packages with their descriptions. On the left side, there is a sidebar menu with a "Reference" header and a "Class Index" section. The "Package Index" section is currently selected, and the API level is set to "P".

Android Platform ▾ API: P ▾

- Class Index
- Package Index**
- android
- android.accessibilityservice
- android.accounts
- android.animation
- android.annotation
- android.app
- android.app.admin
- android.app.assist
- android.app.backup
- android.app.job
- android.app.slice
- android.app.usage
- android.appwidget
- android.bluetooth
- android.bluetooth.le
- android.companion
- android.content
- android.content.pm
- android.content.res
- android.database
- android.database.sqlite
- android.drm
- android.gesture
- android.graphics
- android.graphics.drawable
- android.graphics.drawable.shapes
- android.graphics.fonts
- android.graphics.pdf
- android.hardware
- android.hardware.camera2
- android.hardware.camera2.params
- android.hardware.display
- android.hardware.fingerprint
- android.hardware.input
- android.hardware.usb

## Package Index

These are the API packages. See all [API classes](#).

<a href="#">android</a>	Contains resource classes used by applications included in the platform and defines application permissions for system features.
<a href="#">android.accessibilityservice</a>	The classes in this package are used for development of accessibility service that provide alternative or augmented feedback to the user.
<a href="#">android.accounts</a>	
<a href="#">android.animation</a>	These classes provide functionality for the property animation system, which allows you to animate object properties of any type. <code>int</code> , <code>float</code> , and hexadecimal color values are supported by default. You can animate any other type by telling the system how to calculate the values for that given type with a custom <a href="#">TypeEvaluator</a> . For more information, see the <a href="#">Animation</a> guide.
<a href="#">android.annotation</a>	
<a href="#">android.app</a>	Contains high-level classes encapsulating the overall Android application model.
<a href="#">android.app.admin</a>	Provides device administration features at the system level, allowing you to create security-aware applications that are useful in enterprise settings, in which IT professionals require rich control over employee devices. For more information, see the <a href="#">Device Administration</a> guide.
<a href="#">android.app.assist</a>	
<a href="#">android.app.backup</a>	Contains the backup and restore functionality available to applications. If a user wipes the data on their device or upgrades to a new Android-powered device, all applications that have enabled backup can restore the user's previous data when the application is reinstalled. For more information, see the <a href="#">Data Backup</a> guide.
<a href="#">android.app.job</a>	

# Example API : Text To Speech

<https://developer.android.com/reference/android/speech/tts/TextToSpeech.html>

The screenshot shows the Android Developer website's API reference for the `TextToSpeech` class. The page is organized into several sections:

- Navigation:** A green header bar contains the Android logo, the word "Developers", and navigation tabs for "DESIGN", "DEVELOP", and "DISTRIBUTE". A search bar and a "PLAY C" button are also present.
- Breadcrumbs:** A dark blue bar shows the path "Reference" with a back arrow and a square icon.
- Platform and API Level:** A dropdown menu shows "Android Platform" and "API: P".
- Class Hierarchy:** A sidebar on the left lists various Android packages. The path `android.speech.tts` is expanded, showing sub-entries for "Overview", "Interfaces", and "Classes". Under "Classes", `TextToSpeech` is highlighted in blue.
- Constructor:** The main content area shows two constructors:
  - `TextToSpeech(Context context, TextToSpeech.OnInitListener listener)`: The constructor for the `TextToSpeech` class, using the default TTS engine.
  - `TextToSpeech(Context context, TextToSpeech.OnInitListener listener, String engine)`: The constructor for the `TextToSpeech` class, using the given TTS engine.
- Public Methods:** A table lists several public methods with their return types, signatures, and descriptions:

Return Type	Method Signature	Description
<code>int</code>	<code>addEarcon(String earcon, String packageName, int resourceId)</code>	Adds a mapping between a string of text and a sound resource in a package.
<code>int</code>	<code>addEarcon(String earcon, String filename)</code>	<i>This method was deprecated in API level 21. As of API level 21, replaced by <code>addEarcon(String, File)</code>.</i>
<code>int</code>	<code>addEarcon(String earcon, File file)</code>	Adds a mapping between a string of text and a sound file.
<code>int</code>	<code>addSpeech(CharSequence text, File file)</code>	Adds a mapping between a <code>CharSequence</code> (may be spanned with <code>TtsSpans</code> ) and a sound file.
<code>int</code>	<code>addSpeech(String text, String packageName, int resourceId)</code>	Adds a mapping between a string of text and a sound resource in a package.
<code>int</code>	<code>addSpeech(CharSequence text, String packageName, int resourceId)</code>	Adds a mapping between a <code>CharSequence</code> (may be spanned with <code>TtsSpans</code> ) of text and a sound resource in a package.
<code>int</code>	<code>addSpeech(String text, String filename)</code>	Adds a mapping between a string of text and a sound file.
<code>boolean</code>	<code>areDefaultsEnforced()</code>	Checks whether the user's settings should override settings requested by the calling application.
<code>Set&lt;Locale&gt;</code>	<code>getAvailableLanguages()</code>	Query the engine about the set of available languages.
<code>String</code>	<code>getDefaultEngine()</code>	Gets the package name of the default speech synthesis engine.
<code>Locale</code>	<code>getDefaultLanguage()</code>	<i>This method was deprecated in API level 21. As of API level 21, use <code>getDefaultVoice()</code>, <code>getLocale()</code></i>



# Example TTS Code ..

```
TextToSpeech tts =
    new TextToSpeech(getApplicationContext(),
        new TextToSpeech.OnInitListener() {
            @Override
            public void onInit(int status) {
                if(status != TextToSpeech.ERROR) {
                    t1.setLanguage(Locale.UK);
                }
            }
        });

String toSpeak = "Hello Android";

tts.speak(toSpeak, TextToSpeech.QUEUE_FLUSH, null);
```

Core Concept  
Services / Job API – No Threads

# Core Concept : UI

Resources  
+ Layouts  
+ Components  
+ Fragments  
+ ...

# Defining UI Resources

## Simple Resources

```
<?xml version="1.0" encoding="utf-8"?>
<resources>
    <color name="red">#f00</color>
    <color name="highlight">@color/red</color>
</resources>
```

```
MyProject/
  src/
    MainActivity.java
  res/
    drawable/
      graphic.png
    layout/
      main.xml
      info.xml
    mipmap/
      icon.png
    values/
      strings.xml
```

## Layout Resources

In Java: `R.layout.filename`

In XML: `@[package:]layout/filename`

SYNTAX:

```
<?xml version="1.0" encoding="utf-8"?>
<ViewGroup
    xmlns:android="http://schemas.android.com/apk/res/android"
    android:id="@+[package:]id/resource_name"
    android:layout_height=["dimension" | "match_parent" | "wrap_content"]
    android:layout_width=["dimension" | "match_parent" | "wrap_content"]
    [ViewGroup-specific attributes] >
    <View
        android:id="@+[package:]id/resource_name"
        android:layout_height=["dimension" | "match_parent" | "wrap_content"]
        android:layout_width=["dimension" | "match_parent" | "wrap_content"]
        [View-specific attributes] >
        <requestFocus/>
    </View>
    <ViewGroup >
        <View />
    </ViewGroup>
    <include layout="@layout/layout_resource"/>
</ViewGroup>
```

# Using Resources in Java

[<package\_name>.]R.<resource\_type>.<resource\_name>

```
// Load a background for the current screen from a drawable resource
getWindow().setBackgroundDrawableResource(R.drawable.my_background_image) ;

// Set the Activity title by getting a string from the Resources object, because
// this method requires a CharSequence rather than a resource ID
getWindow().setTitle(getResources().getText(R.string.main_title));

// Load a custom layout for the current screen
setContentView(R.layout.main_screen);

// Set a slide in animation by getting an Animation from the Resources object
mFlipper.setInAnimation(AnimationUtils.loadAnimation(this,
    R.anim.hyperspace_in));

// Set the text on a TextView object using a resource ID
TextView msgTextView = (TextView) findViewById(R.id.msg);
msgTextView.setText(R.string.hello_message);
```

# Using Resources in Xml

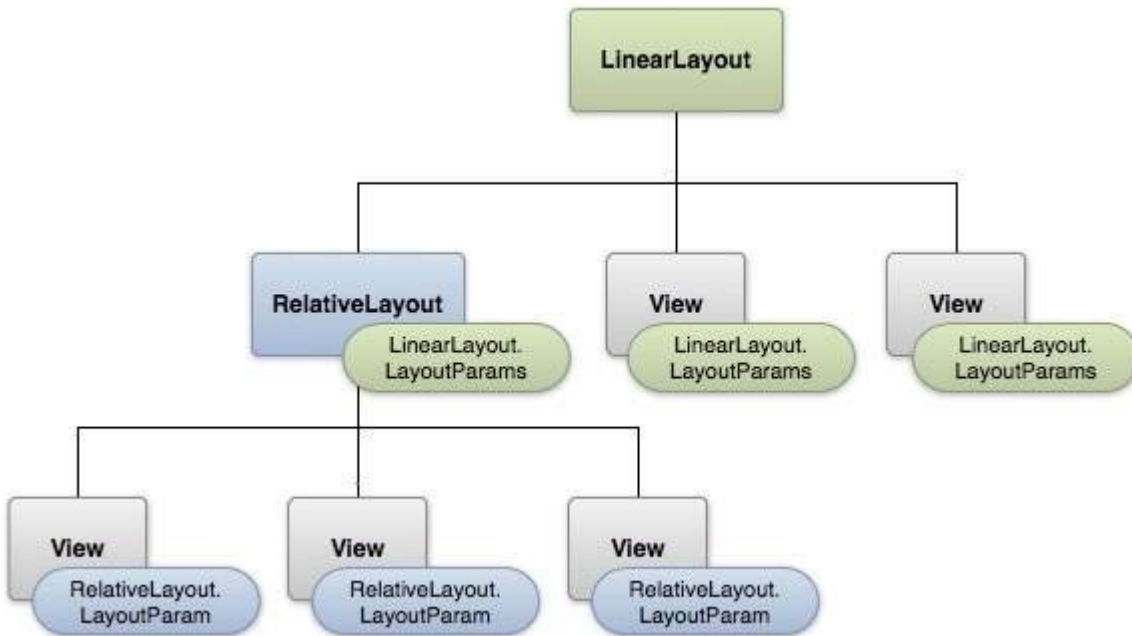
```
<Button  
    android:layout_width="fill_parent"  
    android:layout_height="wrap_content"  
    android:text="@string/submit" />
```

## Syntax

Here is the syntax to reference a resource in an XML resource:

```
@[<package_name>:]<resource_type>/<resource_name>
```

# UI Layouts



```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="fill_parent"
    android:layout_height="fill_parent"
    android:orientation="vertical" >

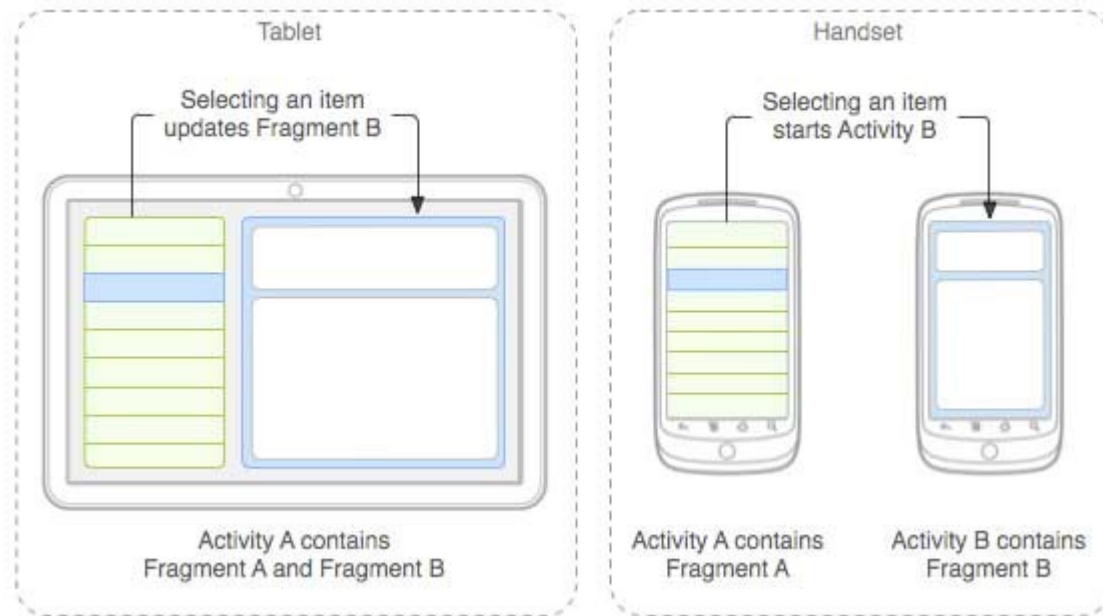
    <TextView android:id="@+id/text"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="This is a TextView" />

    <Button android:id="@+id/button"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="This is a Button" />

    <!-- More GUI components go here -->

</LinearLayout>
```

# UI Fragments





Questions