App Development

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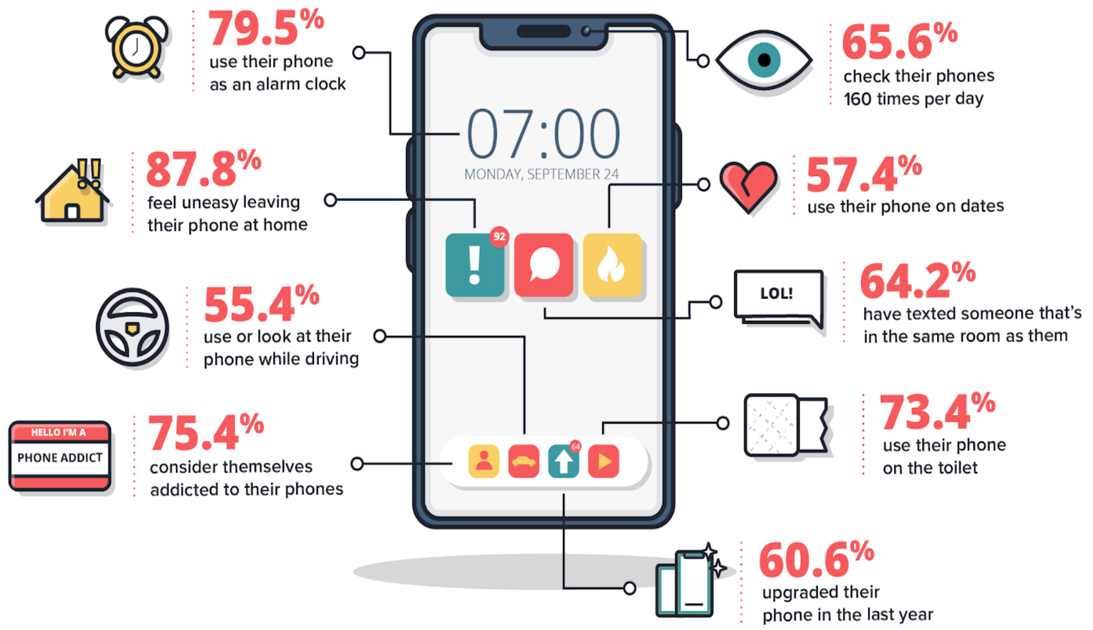
roshan.jathanna@manipal.edu

American Survey 2022



79.5% use their phone as an alarm clock

87.8% feel uneasy leaving their phone at home

55.4% use or look at their phone while driving

75.4% consider themselves addicted to their phones

65.6% check their phones 160 times per day

57.4% use their phone on dates

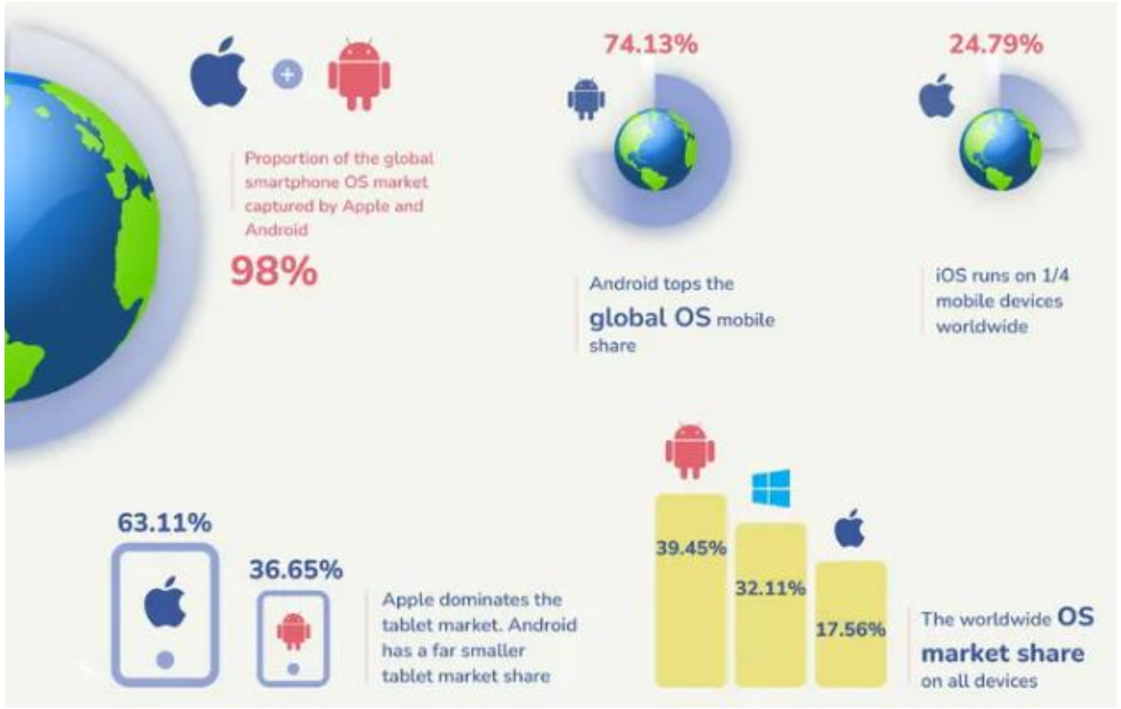
64.2% have texted someone that's in the same room as them

73.4% use their phone on the toilet

60.6% upgraded their phone in the last year

Ref: https://www.digitalinformationworld.com/2020/03/smartphone-addiction-statistics.html

Mobile Platforms & OSs



Ref: https://root-nation.com/en/news-en/en-android-ios-market-share/

App Development Approaches

iOS:

XCode AppCode Atom

Android:

Android Studio Android IDE Intellij IDEA

1. Native

Artsy Pinterest iOS calculator

React Native Xamarin Flutter

2. Cross Platform

Bloomberg Insightly Reflectly

Ionic Apache Cordova Visual Studio

3. Hybrid

Just Watch NHS Airbus Helicopters

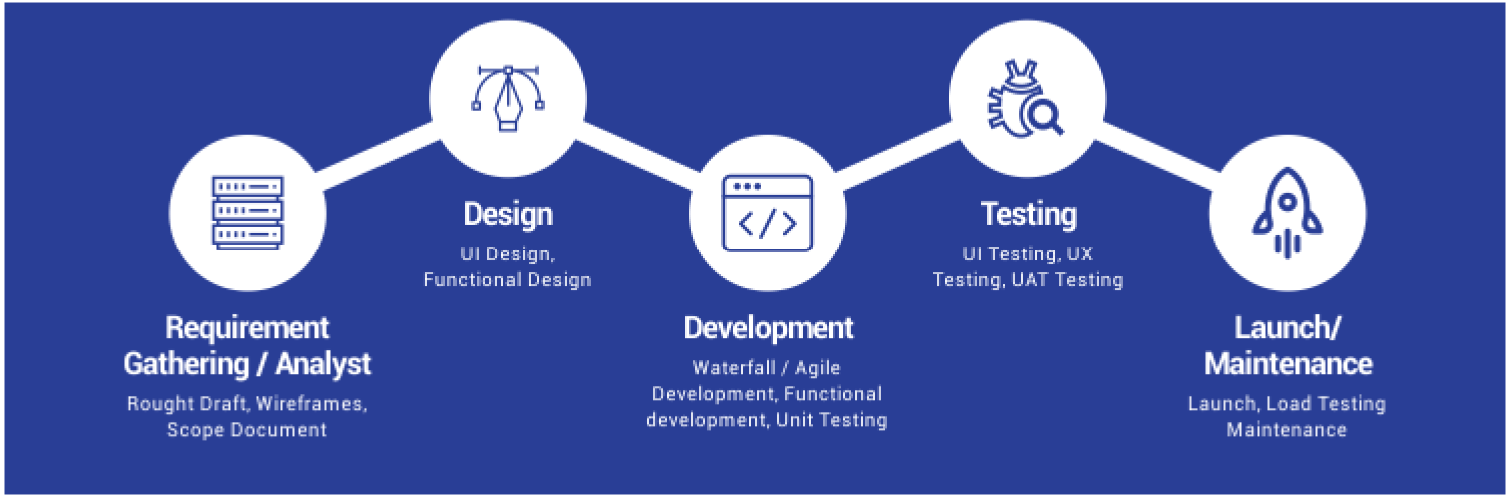
Angular React Polymer

4. Progressive Web

Flipkart Forbes AliExpress

Ref: https://railsware.com/blog/native-vs-hybrid-vs-cross-platform/amp/

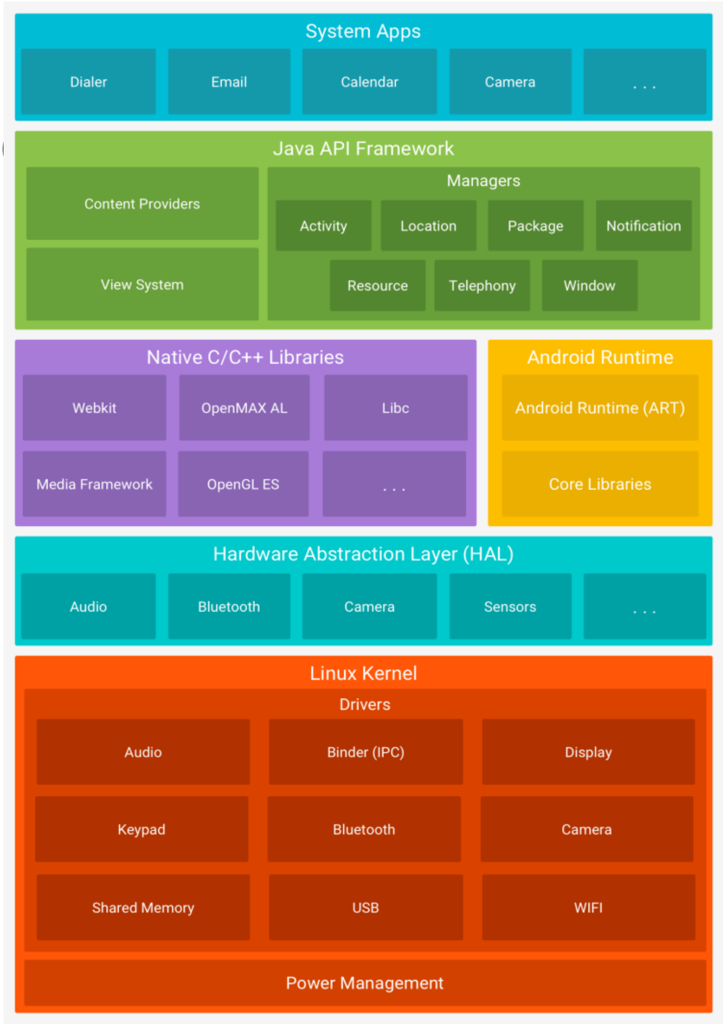
App Development Lifecycle


Requirement Gathering / Analyst
Rought Draft, Wireframes, Scope Document
Design
UI Design, Functional Design
Development
Waterfall / Agile Development, Functional development, Unit Testing
Testing
UI Testing, UX Testing, UAT Testing
Launch/ Maintenance
Launch, Load Testing Maintenance

Ref: https://www.itrobes.com/mobile-app-development-lifecycle

Android Softwar Stack

- The Linux Kernel
- Hardware Abstraction Layer (HAL)
- Android Runtime
- Native C/C++ Libraries
- Java API Framework
- System Apps



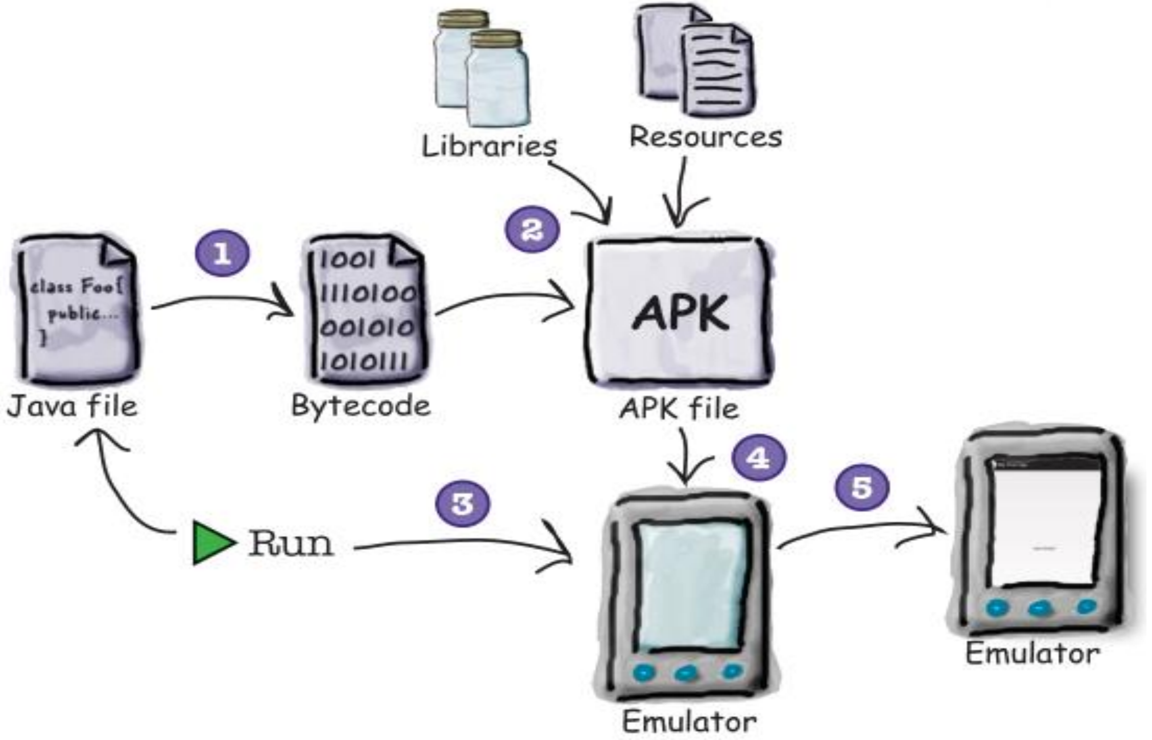
Ref: https://developer.android.com/guide/platform

Hello World

Demo Repository:

https://github.com/gurvinder-singh-yadav/DS208

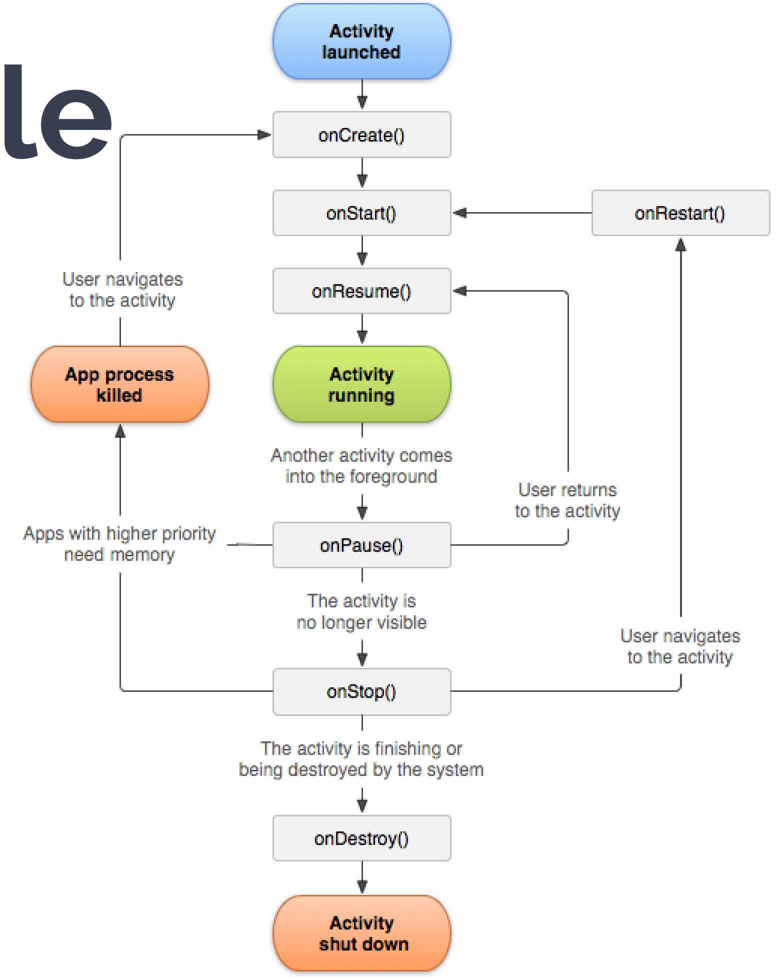
Behind the Scenes



Ref: https://www.oreilly.com/library/view/head-first-android/9781491974049/

Activity lifecycle

- onCreate - created
- onStart - visible to the user
- onResume - interacting with the user
- onPause - paused
- onStop - no longer visible
- onDestroy - destroyed
- onRestart - restarting



Activity launched
onCreate()
onStart()
onRestart()
onResume()
User navigates to the activity
App process killed
Activity running
Another activity comes into the foreground
User returns to the activity
Apps with higher priority need memory
onPause()
The activity is no longer visible
User navigates to the activity
onStop()
The activity is finishing or being destroyed by the system
onDestroy()
Activity shut down

Ref: https://developer.android.com/guide/components/activities/activity-lifecycle

density-independent pixels (dp)

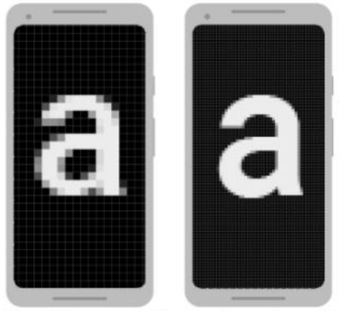
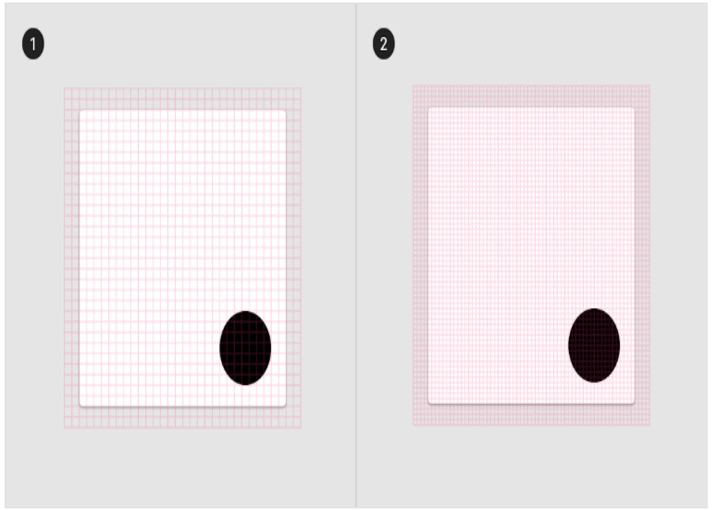


Figure 1. Two screens of the same size may have a different number of pixels

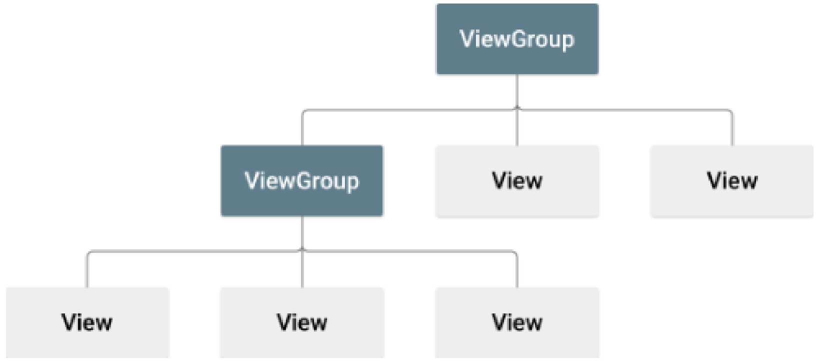
- Different screen sizes (handsets, tablets, TVs, and so on)
- Screens have different pixel sizes
- One device has 160 pixels per square inch, another device fits 480 pixels in the same space
- One dp is a virtual pixel unit that's roughly equal to one pixel on a medium-density screen (160dpi; the "baseline" density)
- Actual pixel = dp * dpi/160
- For text sizes use scalable pixels (sp) as your units. The sp unit is the same size as dp, by default, but it resizes based on the user's preferred text size.



1. Low-density screen displayed with density independence
2. High-density screen displayed with density independence

Layout

- Structure for UI
- View - User sees and interacts
- ViewGroup - Container

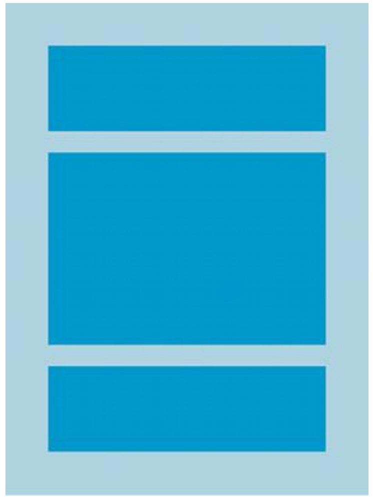


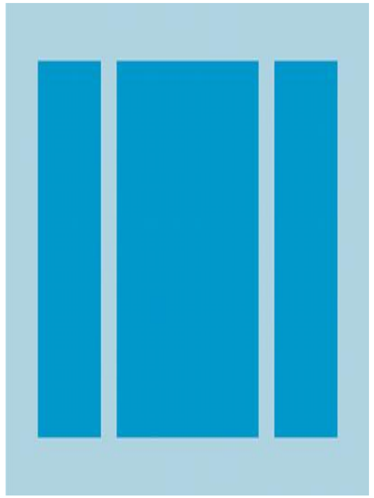
Ref: https://developer.android.com/develop/ui/views/layout/declaring-layout

Linear Layout

Aligns all children in a single direction

- orientation
- gravity
- layout_weight

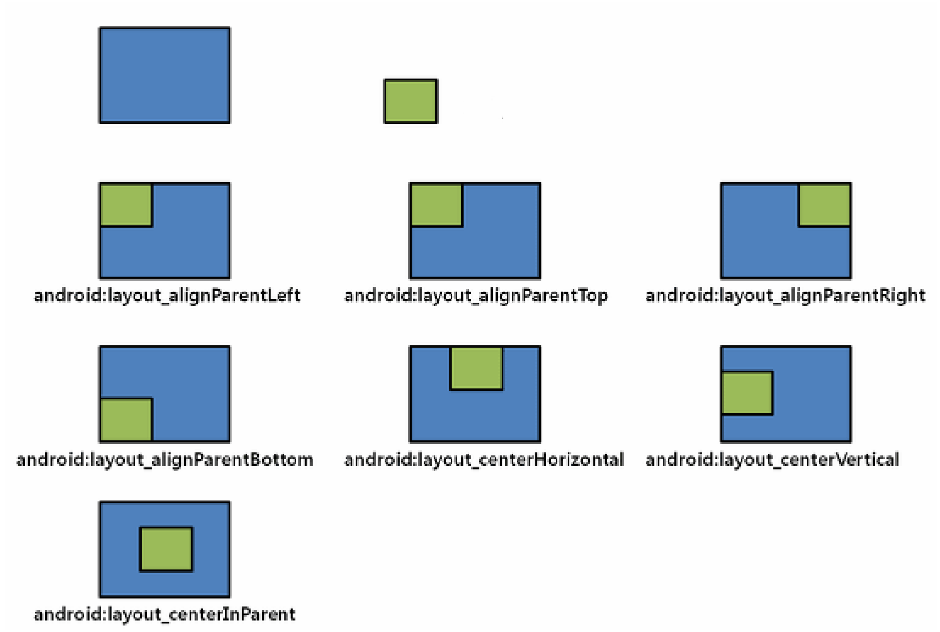




Ref: https://developer.android.com/develop/ui/views/layout/linear

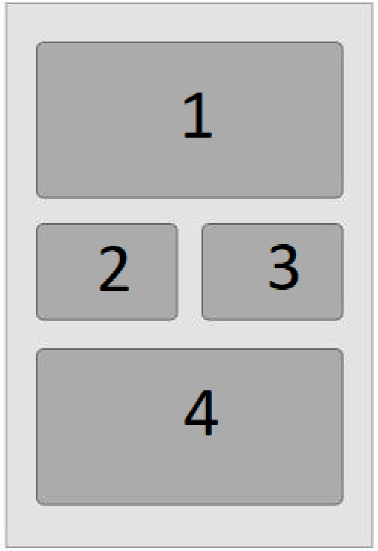
Relative Layout

positions UI components based on relative sibling or parent

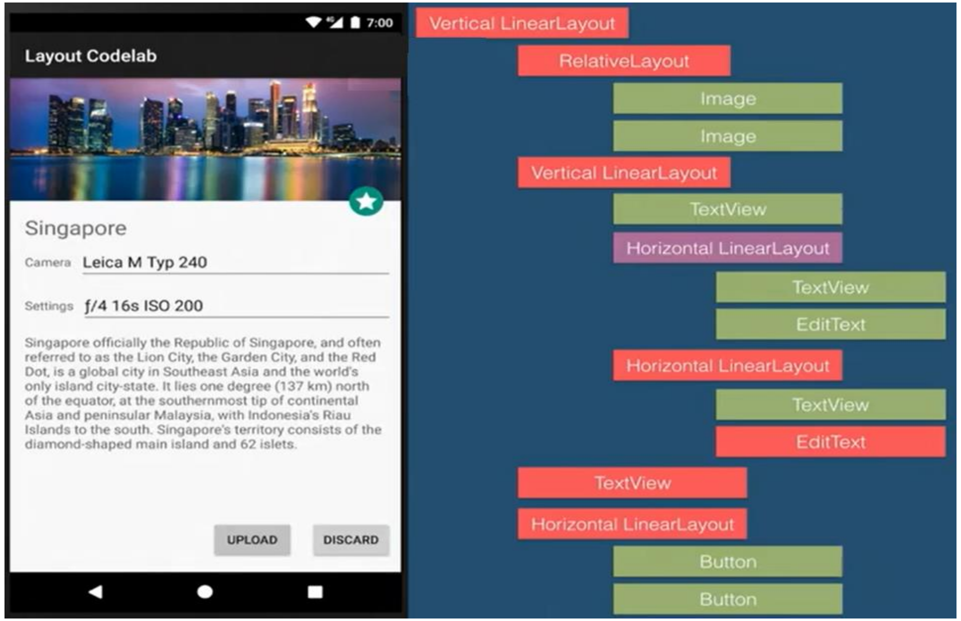

android:layout_alignParentLeft
android:layout_alignParentTop
android:layout_alignParentRight
android:layout_alignParentBottom
android:layout_centerHorizontal
android:layout_centerVertical
android:layout_centerInParent

Tutorial

- Design this layout with only LinearLayouts where 1,2,3 and 4 are textviews
- Design this layout with a RelativeLayout and a LinearLayout where 1,2,3 and 4 are textviews
- Design this layout with only RelativeLayouts where 1,2,3 and 4 are textviews



Why Constraint Layout



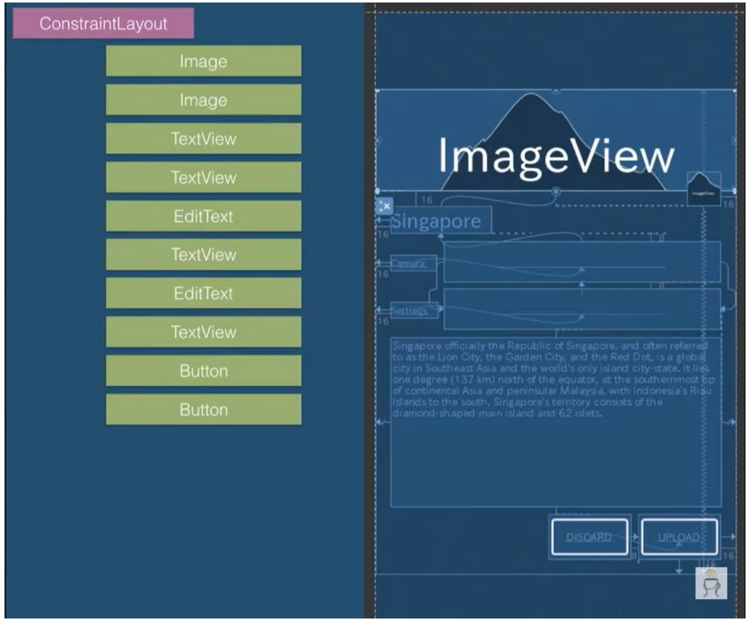
Layout Codelab

Singapore

Camera Leica M Typ 240

Settings ƒ/4 16s ISO 200

Singapore officially the Republic of Singapore, and often referred to as the Lion City, the Garden City, and the Red Dot, is a global city in Southeast Asia and the world's only island city-state. It lies one degree (137 km) north of the equator, at the southernmost tip of continental Asia and peninsular Malaysia, with Indonesia's Riau Islands to the south. Singapore's territory consists of the diamond-shaped main island and 62 islets.



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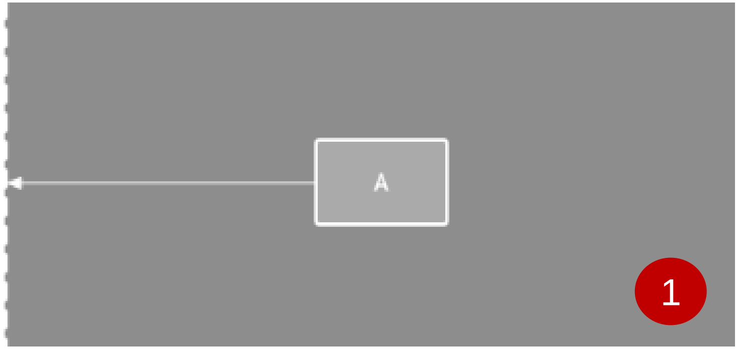
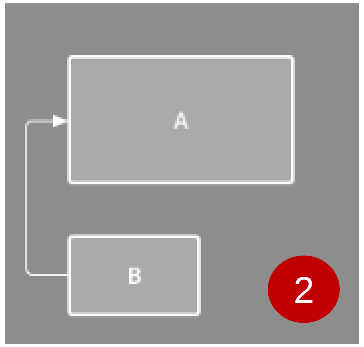
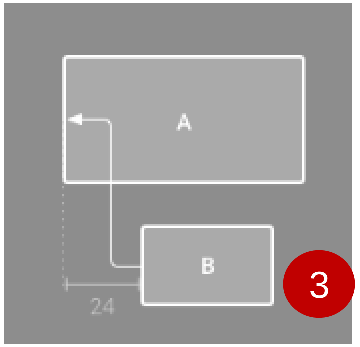
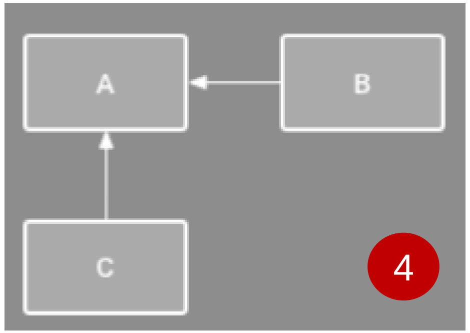
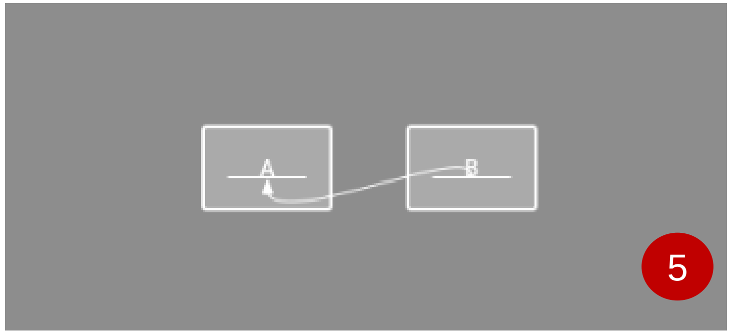
Constraint Layout





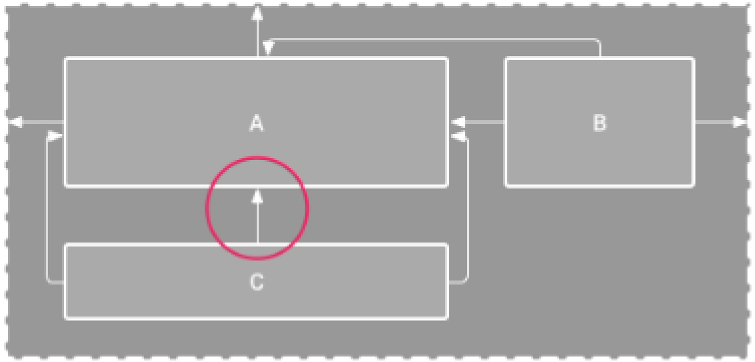






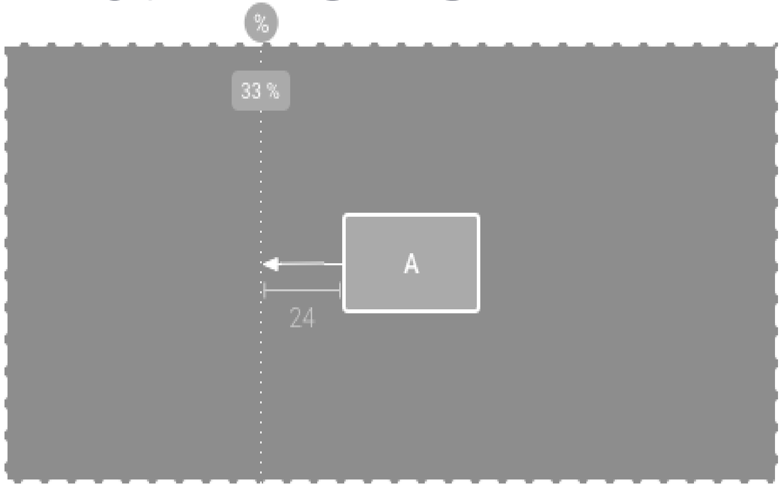
Ref: https://developer.android.com/develop/ui/views/layout/constraint-layout

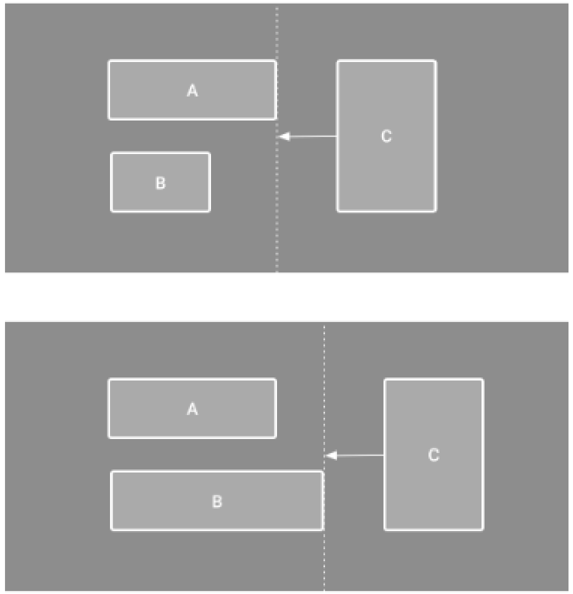
Constraint Layout



Ref: https://developer.android.com/develop/ui/views/layout/constraint-layout

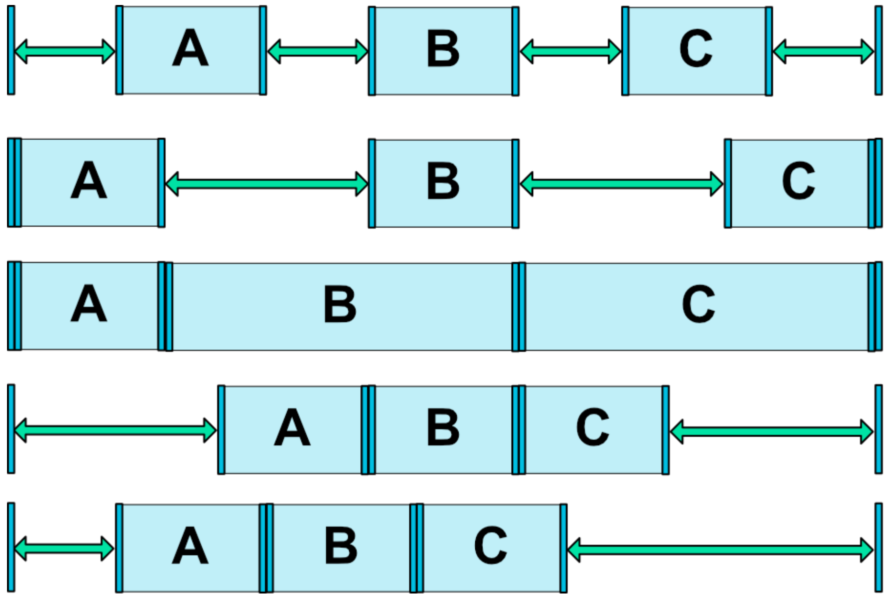
Constraint Layout Guidelines & Barriers





Ref: https://developer.android.com/develop/ui/views/layout/constraint-layout

Constraint Layout Chains



Spread Chain

Spread Inside Chain

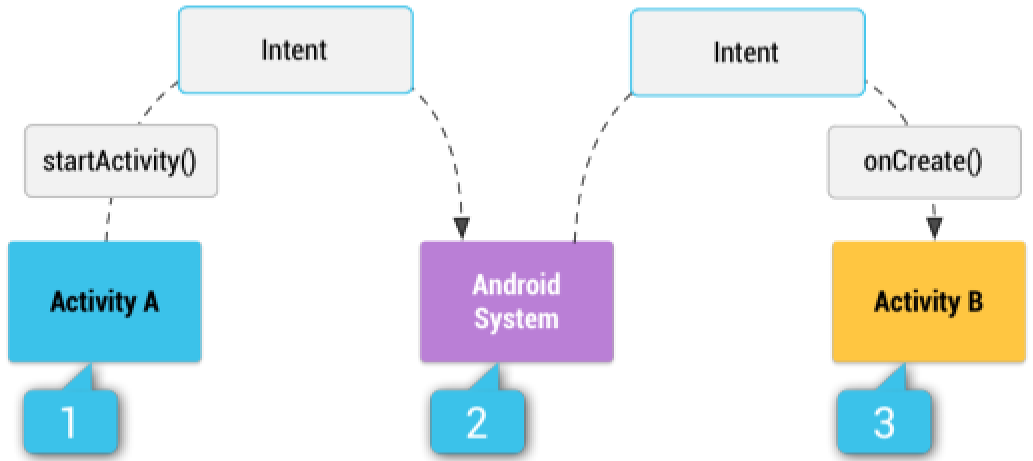
Weighted Chain

Packed Chain

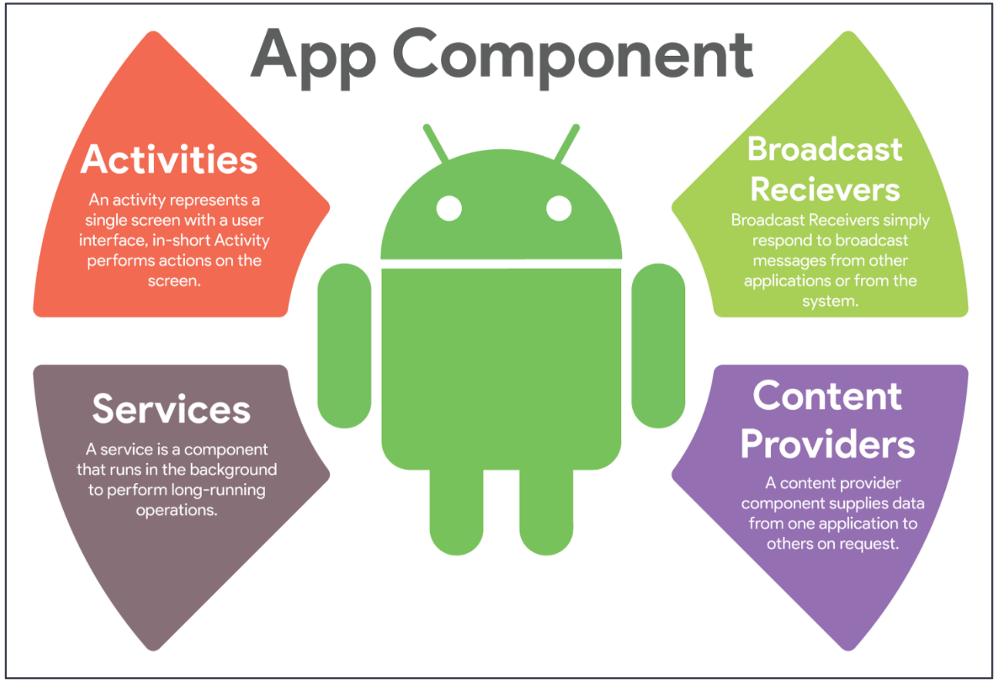
Packed Chain with Bias

Ref: https://developer.android.com/develop/ui/views/layout/constraint-layout

Implicit Intent



App components - activity


App Component

Activities

An activity represents a single screen with a user interface, in-short Activity performs actions on the screen.

Broadcast Recievers

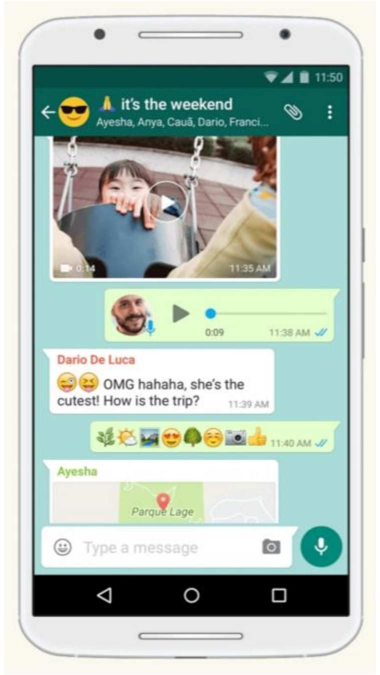
Broadcast Receivers simply respond to broadcast messages from other applications or from the system.

Services

A service is a component that runs in the background to perform long-running operations.

Content Providers

A content provider component supplies data from one application to others on request.


it's the weekend

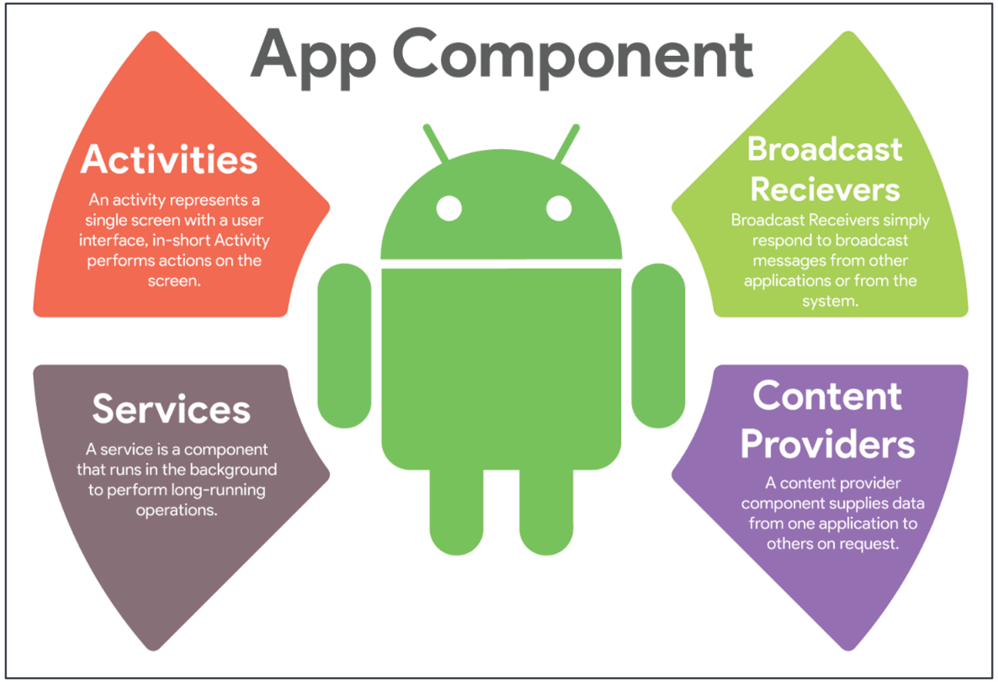
Ayesha, Anya, Cauã, Dario, Franci...

Dario De Luca

OMG hahaha, she's the cutest! How is the trip? 11:39 AM

Ayesha

App components - services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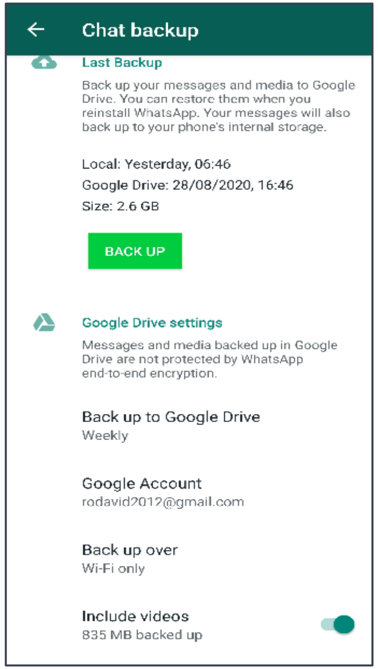


Last Backup

Back up your messages and media to Google Drive. You can restore them when you reinstall WhatsApp. Your messages will also back up to your phone's internal storage.

Local: Yesterday, 06:46
Google Drive: 28/08/2020, 16:46
Size: 2.6 GB

Google Drive settings

Messages and media backed up in Google Drive are not protected by WhatsApp end-to-end encryption.

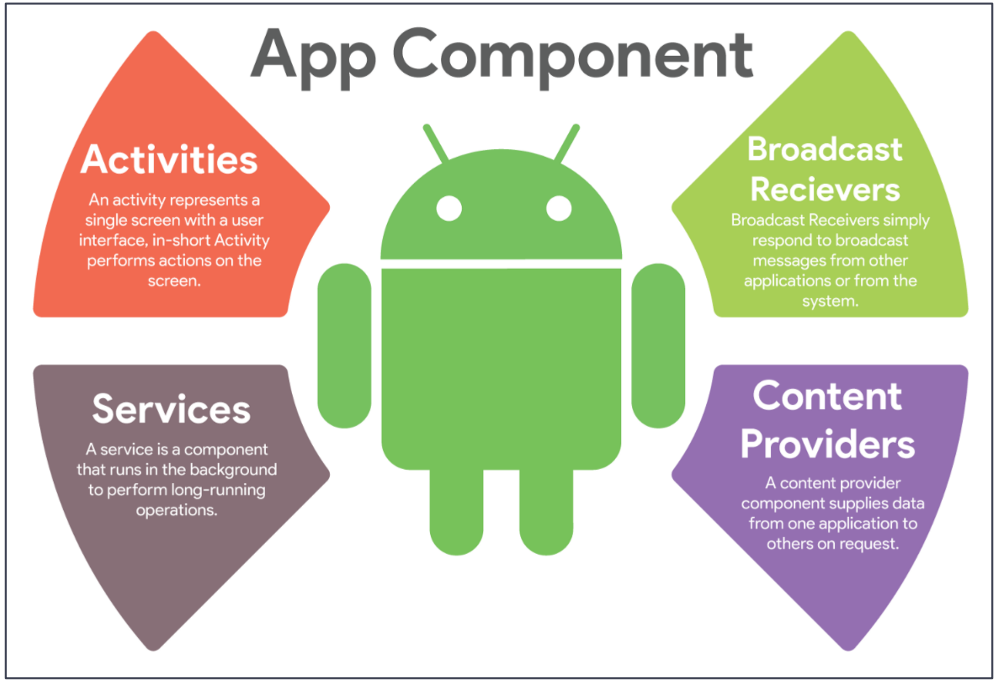
Back up to Google Drive
Weekly

Google Account
rodavid2012@gmail.com

Back up over
Wi-Fi only

Include videos
835 MB backed up

App components – broadcast recievers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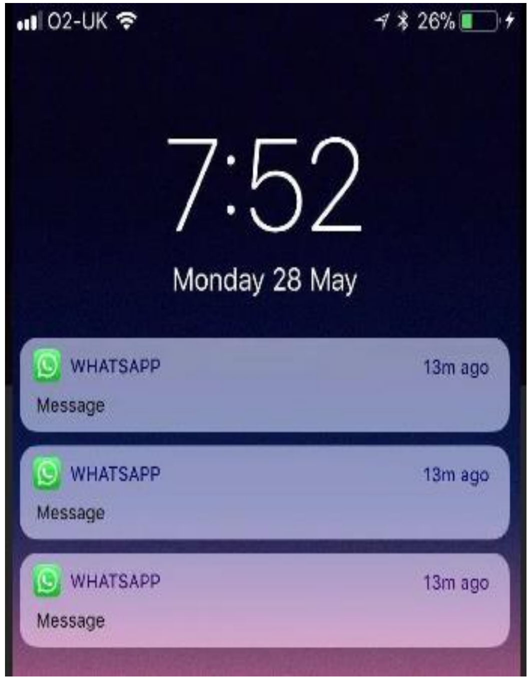
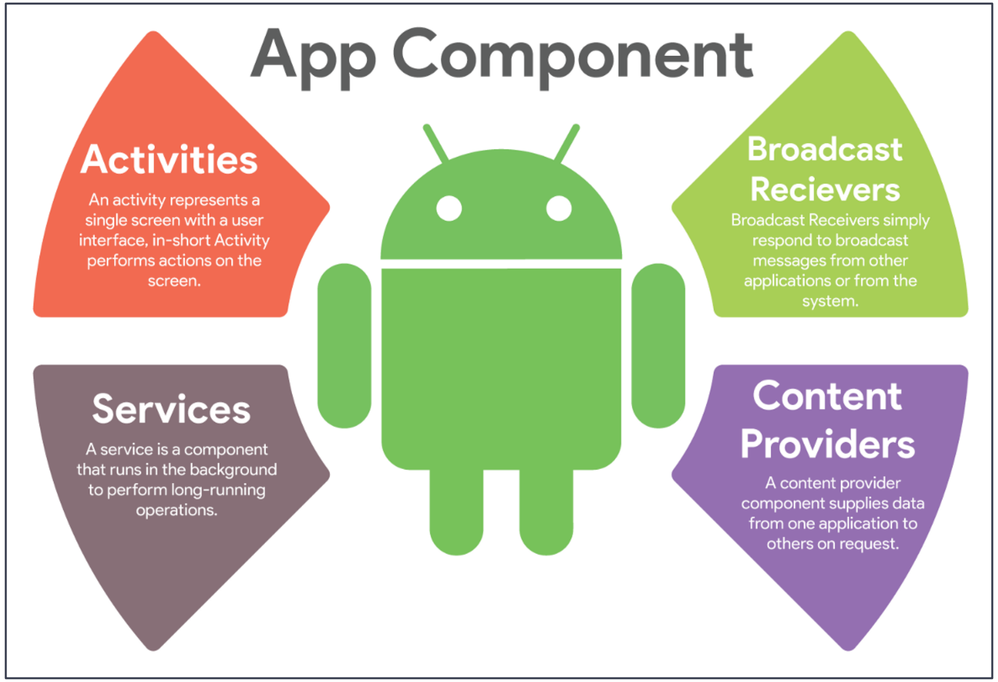


App components – content providers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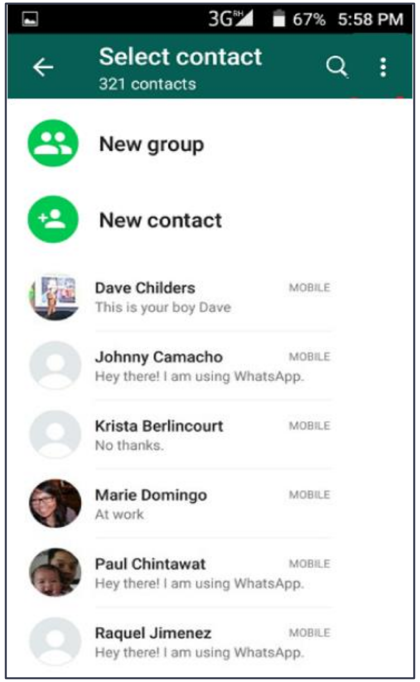

3G 67% 5:58 PM

Select contact
321 contacts

New group

New contact

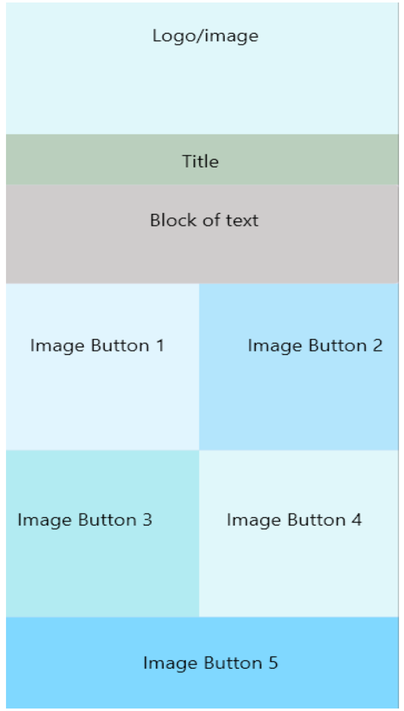
Dave Childers This is your boy Dave	MOBILE
Johnny Camacho Hey there! I am using WhatsApp.	MOBILE
Krista Berlincourt No thanks.	MOBILE
Marie Domingo At work	MOBILE
Paul Chintawat Hey there! I am using WhatsApp.	MOBILE
Raquel Jimenez Hey there! I am using WhatsApp.	MOBILE

Material Design Guidelines

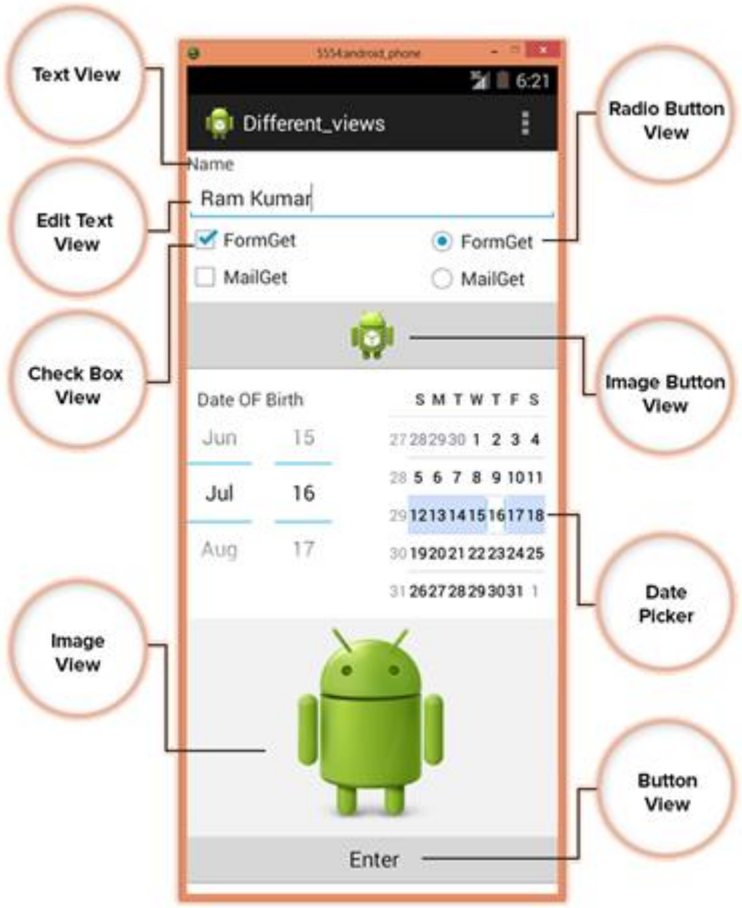
- https://material.io/
- **Color**: https://material.io/design/color/the-color-system.html
- **Icon**: https://material.io/design/iconography/system-icons.html
- https://learnui.design/tools/data-color-picker.html

Ref: https://developer.android.com/guide/platform

Tutorial


Logo/image
Title
Block of text
Image Button 1
Image Button 2
Image Button 3
Image Button 4
Image Button 5

UI



Ref: https://www.formget.com/android-views/

XML

- XML documents must start with an XML declaration like

```
<?xml version="1.0"?>
```

- XML elements are case sensitive
- All elements must be nested in a single root element.
- Every element must be fully enclosed.

```
<Product><ID></ID></Product> is valid, but
<Product><ID></Product></ID> isn’t
```

- Attributes contain values that are associated with an element

```
<element attribute=”value”></element>
```

JSON

- Data is represented as field name (in double quotes), followed by a colon, followed by a value
- Value can be a string, a number, an object, an array, a boolean or null
- Data is separated by commas
- Curly braces hold objects
- Square brackets hold arrays