Android Layouts

- Simple Layouts
    - Linear Layout
    - Frame Layout
    - Table Layout
- Complex Layouts
    - Relative Layout
    - Grid Layout
- In Complex Layouts there is deep Nesting but there will be performance problems
    - Also create Shallow hierarchy
    - Difficult to keep them stable
- **Linear Layout**
    - Linear Layout is used to align the UI elements either horizontally or vertically.
    - Only in one direction (horizontal or vertical).
    - **android:orientation** attribute should be used.

Linear layout in vertical orientation	Linear layout in horizontal orientation
	
android:**orientation**="vertical"	android:**orientation**="horizontal"

    - Source:- https://www.codzify.com/Android/linearLayouts

o **Example:-**

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:paddingLeft="12dp"
    android:paddingRight="12dp"
    android:orientation="vertical" >
    <EditText
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:hint="Email" />
    <EditText
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:hint="Password" />

    <Button
        android:layout_width="100dp"
        android:layout_height="wrap_content"
        android:layout_gravity="right"
        android:text="login" />
</LinearLayout>
```

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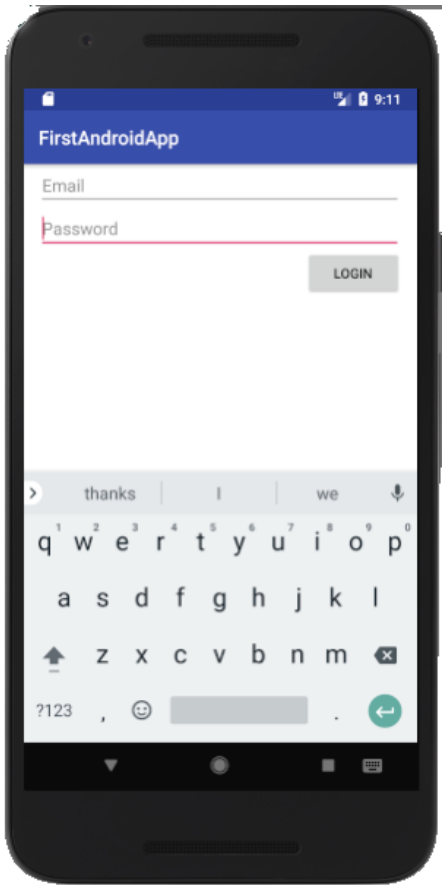

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- **Frame Layout**

- Frame Layout is designed to block out an area on the screen to display a single item.

- However, add multiple children to a FrameLayout and control their position within the FrameLayout by assigning gravity to each child, using the **android:layout_gravity** attribute.

- Child views are drawn in a **stack**, with the most recently added child on top.

- The size of the FrameLayout is the **size of its largest child** (plus padding).

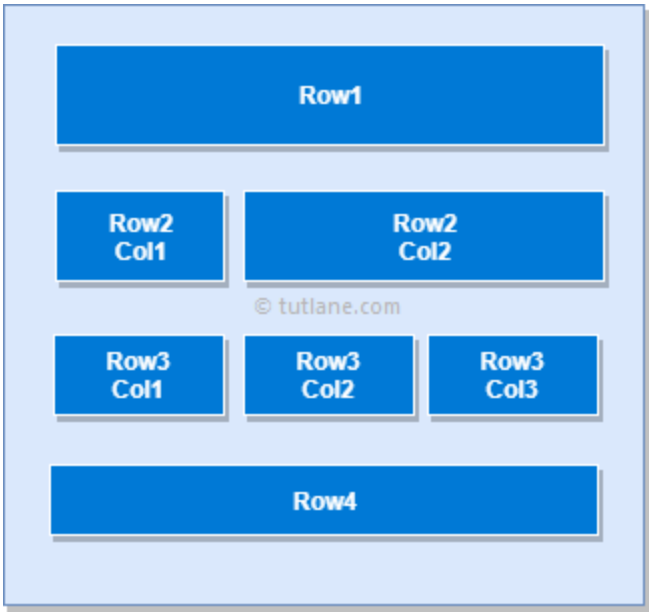
- **Example:-**

activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<FrameLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:orientation="vertical">
    <ImageView
        android:id="@+id/imgvw1"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:scaleType="centerCrop"
        android:src="@drawable/flimg" />
    <TextView
        android:id="@+id/txtvw1"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_marginTop="40dp"
        android:background="#4C374A"
        android:padding="10dp"
        android:text="Grand Palace, Bangkok"
        android:textColor="#FFFFFF"
        android:textSize="20sp" />
    <TextView
        android:id="@+id/txtvw2"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_gravity="right|bottom"
        android:background="#AA000000"
        android:padding="10dp"
        android:text="21/Aug/2017"
        android:textColor="#FFFFFF"
```

```
        android:textSize="18sp" />
</FrameLayout>
```

- **Source:-** **https://www.tutlane.com/tutorial/android/android-framelayout-with-examples**
- **Table Layout**
  - A layout that arranges its children into rows and columns.
  - A TableLayout consists of a number of `TableRow` objects, each defining a row
  - Do not display border lines for their rows, columns, or cells.
  - Each row has zero or more cells;
  - Each cell can hold one `View` object.
  - Width(of a child) is always `MATCH_PARENT`.
  - We can specify certain columns as shrinkable or stretchable by calling `setColumnShrinkable()` or `setColumnStretchable()`
  - stretchable -to fit any extra space
  - shrinkable - shrunk to fit the table into its parent object



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```
<?xml version="1.0" encoding="utf-8"?>
<TableLayout xmlns:android="http://schemas.android.com/apk/res
/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:layout_marginTop="100dp"
    android:paddingLeft="10dp"
    android:paddingRight="10dp" >

<TableRow android:background="#0079D6" android:padding="5dp">
        <TextView
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_weight="1"
            android:text="UserId" />
        <TextView
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_weight="1"
            android:text="User Name" />
        <TextView
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_weight="1"
            android:text="Location" />
    </TableRow>

<TableRow android:background="#DAE8FC" android:padding="5dp">
```

```
        <TextView
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_weight="1"
            android:text="1" />
        <TextView
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_weight="1"
            android:text="Suresh Dasari" />
        <TextView
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_weight="1"
            android:text="Hyderabad" />
    </TableRow>

<TableRow android:background="#DAE8FC" android:padding="5dp">
        <TextView
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_weight="1"
            android:text="2" />
        <TextView
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_weight="1"
            android:text="Rohini Alavala" />
        <TextView
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_weight="1"
            android:text="Guntur" />
    </TableRow>

<TableRow android:background="#DAE8FC" android:padding="5dp">
        <TextView
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_weight="1"
            android:text="3" />
        <TextView
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
```

```
            android:layout_weight="1"
            android:text="Trishika Dasari" />
        <TextView
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_weight="1"
            android:text="Guntur" />
    </TableRow>
</TableLayout>
```

- **Source:-** https://www.tutlane.com/tutorial/android/android-tablelayout-with-examples

RelativeLayout

- A Layout where the positions of the children can be described in relation to each other or to the parent.

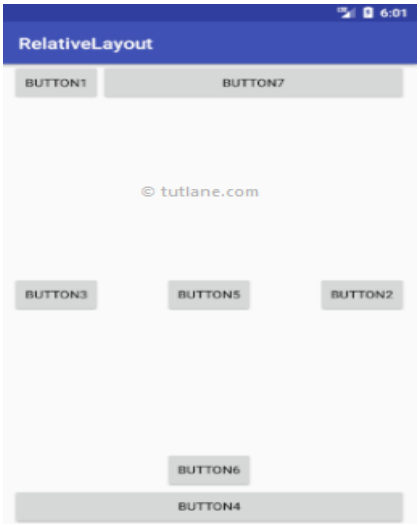
Attribute	Description
layout_alignParentTop	If it specified "true", the top edge of view will match the top edge of parent.
layout_alignParentBottom	If it specified "true", the bottom edge of view will match the bottom edge of parent.
layout_alignParentLeft	If it specified "true", the left edge of view will match the left edge of parent.
layout_alignParentRight	If it specified "true", the right edge of view will match the right edge of parent.

layout_centerInParent	If it specified “true”, the view will be aligned to centre of parent.
layout_centerHorizontal	If it specified “true”, the view will be horizontally centre aligned within its parent.
layout_centerVertical	If it specified “true”, the view will be vertically centre aligned within its parent.
layout_above	It accepts another sibling view id and places the view above the specified view id.
layout_below	It accepts another sibling view id and places the view below the specified view id.
layout_toLeftOf	It accepts another sibling view id and places the view left of the specified view id.
layout_toRightOf	It accepts another sibling view id and places the view right of the specified view id.
layout_toStartOf	It accepts another sibling view id and places the view to start of the specified view id.
layout_toEndOf	It accepts another sibling view id and places the view to end of the specified view id.

- **Example:-**
  -
```
<?xml version="1.0" encoding="utf-8"?>
<RelativeLayout xmlns:android="http://schemas.android.com/apk/
res/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:paddingLeft="10dp"
    android:paddingRight="10dp">
    <Button
        android:id="@+id/btn1"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentLeft="true"
        android:text="Button1" />
    <Button
        android:id="@+id/btn2"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentRight="true"
        android:layout_centerVertical="true"
```

```
        android:text="Button2" />
    <Button
        android:id="@+id/btn3"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentLeft="true"
        android:layout_centerVertical="true"
        android:text="Button3" />

    <Button
        android:id="@+id/btn4"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_alignParentBottom="true"
        android:text="Button4" />
    <Button
        android:id="@+id/btn5"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignBottom="@+id/btn2"
        android:layout_centerHorizontal="true"
        android:text="Button5" />
    <Button
        android:id="@+id/btn6"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_above="@+id/btn4"
        android:layout_centerHorizontal="true"
        android:text="Button6" />
    <Button
        android:id="@+id/btn7"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_toEndOf="@+id/btn1"
        android:layout_toRightOf="@+id/btn1"
        android:layout_alignParentRight="true"
        android:text="Button7" />
</RelativeLayout>
```



- **Source:- https://www.tutlane.com/tutorial/android/android-relativelayout-with-examples**

- **GridLayout**
  - The grid is composed of a set of infinitely thin lines that separate the viewing area into *cells*.
  - A grid with `N` columns has `N + 1` grid indices that run from `0` through `N` inclusive.

```
 <GridLayout
xmlns:android="http://schemas.android.com/apk/res/android"
 xmlns:tools="http://schemas.android.com/tools"
 android:layout_width="match_parent"
 android:layout_height="match_parent"
 android:columnCount="4"
 android:rowCount="3"
 tools:context="com.android_examples.com.gridlayout.MainActivity"
>
 <TextView
 android:id="@+id/textView1"
 android:layout_row="0"
 android:layout_column="0"
 android:text="A"
 android:textAppearance="?android:attr/textAppearanceLarge"
 android:padding="30dp"/>
 <TextView
 android:id="@+id/textView2"
 android:layout_row="0"
 android:layout_column="1"
 android:text="B"
 android:padding="30dp"
 android:textAppearance="?android:attr/textAppearanceLarge" />
```

```
<TextView
android:id="@+id/textView3"
android:layout_row="0"
android:layout_column="2"
android:text="C"
android:padding="30dp"
android:textAppearance="?android:attr/textAppearanceLarge" />

<TextView
android:id="@+id/textView4"
android:layout_row="0"
android:layout_column="3"
android:text="D"
android:padding="30dp"
android:textAppearance="?android:attr/textAppearanceLarge" />

//2nd row starts from here.
<TextView
android:id="@+id/textView5"
android:layout_row="1"
android:layout_column="0"
android:text="E"
android:textAppearance="?android:attr/textAppearanceLarge"
android:padding="30dp"/>

<TextView
android:id="@+id/textView6"
android:layout_row="1"
android:layout_column="1"
android:text="F"
android:padding="30dp"
android:textAppearance="?android:attr/textAppearanceLarge" />

<TextView
android:id="@+id/textView7"
android:layout_row="1"
android:layout_column="2"
android:text="G"
android:padding="30dp"
android:textAppearance="?android:attr/textAppearanceLarge" />

<TextView
android:id="@+id/textView8"
android:layout_row="1"
android:layout_column="3"
android:text="H"
android:padding="30dp"
android:textAppearance="?android:attr/textAppearanceLarge" />
```

```
//3rd row starts from here.

<TextView
android:id="@+id/textView9"
android:layout_row="2"
android:layout_column="0"
android:text="I"
android:textAppearance="?android:attr/textAppearanceLarge"
android:padding="30dp"/>

<TextView
android:id="@+id/textView10"
android:layout_row="2"
android:layout_column="1"
android:text="J"
android:padding="30dp"
android:textAppearance="?android:attr/textAppearanceLarge" />

<TextView
android:id="@+id/textView11"
android:layout_row="2"
android:layout_column="2"
android:text="K"
android:padding="30dp"
android:textAppearance="?android:attr/textAppearanceLarge" />

<TextView
android:id="@+id/textView12"
android:layout_row="2"
android:layout_column="3"
android:text="L"
android:padding="30dp"
android:textAppearance="?android:attr/textAppearanceLarge" />
</GridLayout>
```

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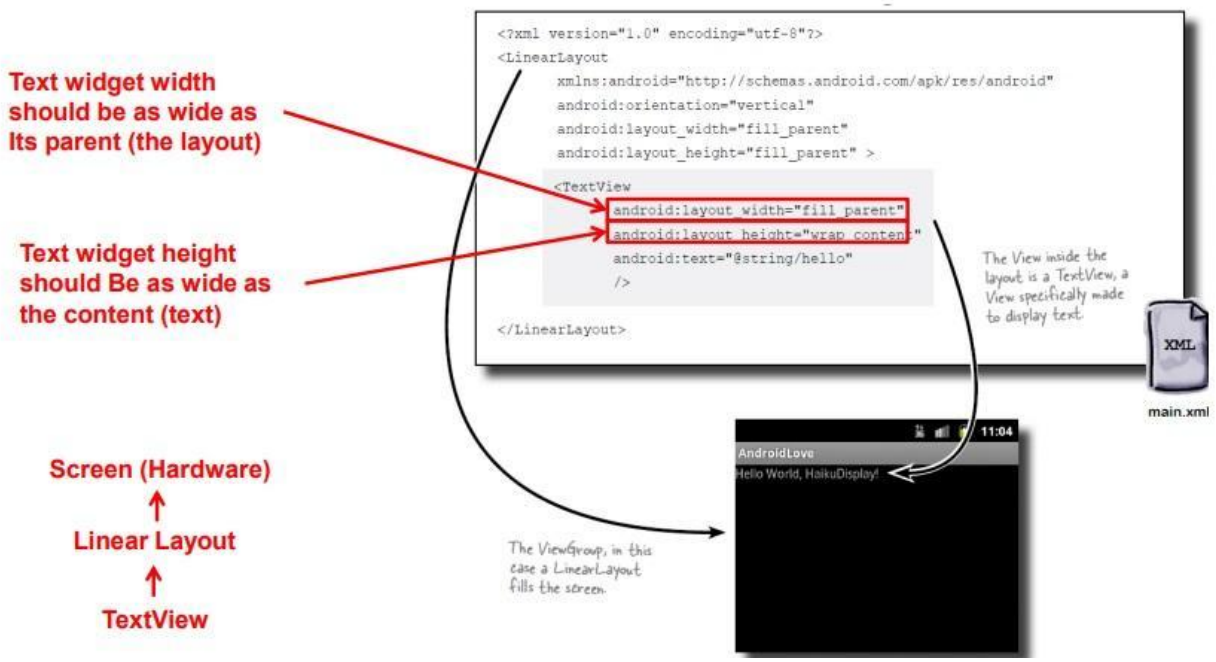
About Layout Attributes

Layout Width and Height Attributes

- **wrap_content:** widget as wide/high as its content (e.g. text)
- **match_parent:** widget as wide/high as its parent layout box
- **fill_parent:** older form of **match_parent**



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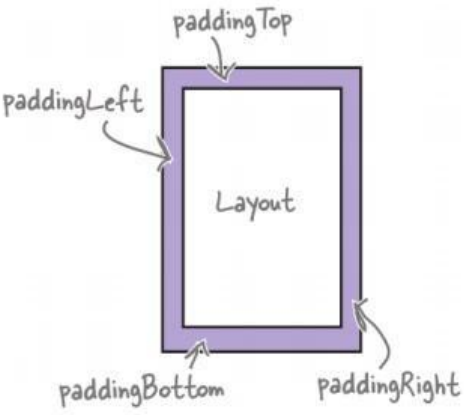
Adding Padding

- Paddings sets space between layout sides and its parent

```
<RelativeLayout ...
    android:paddingBottom="16dp"
    android:paddingLeft="16dp"
    android:paddingRight="16dp"
    android:paddingTop="16dp">
    ...
</RelativeLayout>
```

Add padding of 16dp.



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Linear Layout Weight Attribute

- Specifies "importance", larger weights takes up more space
- Can set width, height = 0 then
  - weight = percent of height/width you want element to cover

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

  <Button
    android:layout_width="match_parent"
    android:layout_height="0dip"
    android:layout_weight="50"
    android:text="@string/fifty_percent"/>

  <Button
    android:layout_width="match_parent"
    android:layout_height="0dip"
    android:layout_weight="30"
    android:text="@string/thirty_percent"/>

  <Button
    android:layout_width="match_parent"
    android:layout_height="0dip"
    android:layout_weight="20"
    android:text="@string/twenty_percent"/>

</LinearLayout>
```

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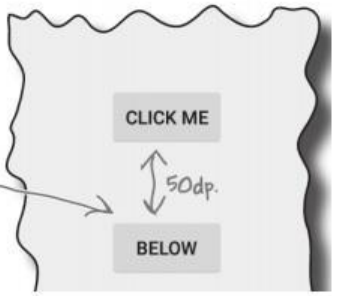
Setting Margins

- Can increase gap (margin) between adjacent widgets
- E.g. To add margin between two buttons, in declaration of bottom button

```
<Button
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_alignLeft="@+id/button_click_me"
    android:layout_below="@+id/button_click_me"
    android:layout_marginTop="50dp"
    android:text="@string/button_below" />
</RelativeLayout>
```

Adding a margin to the top of the bottom button adds extra space between the two views.



- Other options

android:layout_marginLeft

android:layout_marginRight

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