# Programming with Android: Layouts

Luca Bedogni Marco Di Felice
Dipartimento di Scienze dell'Informazione
Università di Bologna

## Views: outline

- Main difference between a Drawable and a View is reaction to events
- Could be declared in an XML file
- Could also be declared inside an Activity
- Every view has a unique ID
- Use findViewById(int id) to get it
- Views can be customized

## Some useful methods

- getLeft()
- getTop()
- getMeasuredWidth()
- getMeasuredHeight()
- getWidth()
- getHeight()
- requestLayout()
- invalidate()

## ViewGroup and layout

- ViewGroup is a view container
- It is responsible for placing other views on the display
- Every layout must extend a ViewGroup
- Every view needs to specify:
  - android:layout_height
  - android:layout_width
  - A dimension or one of match_parent or wrap_content

## Layouts

- Some layouts are pre-defined by Android
- Some of these are
  - LinearLayout
  - RelativeLayout
  - TableLayout
  - FrameLayout
  - AbsoluteLayout
- A layout could be declared inside another layout

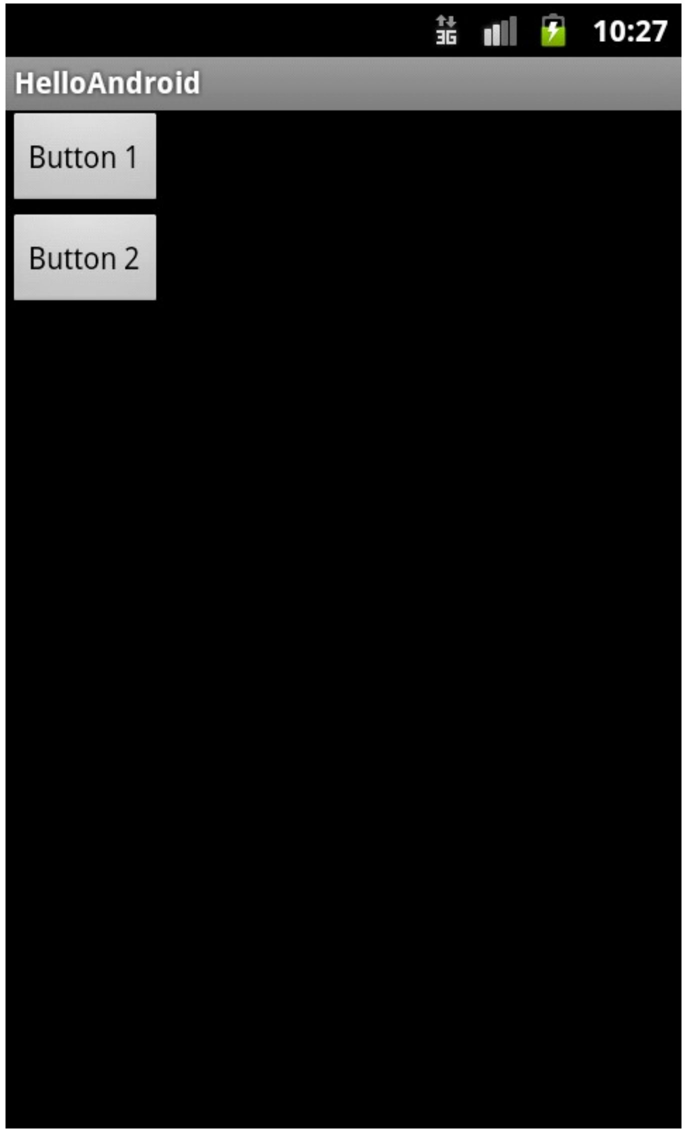
## LinearLayout

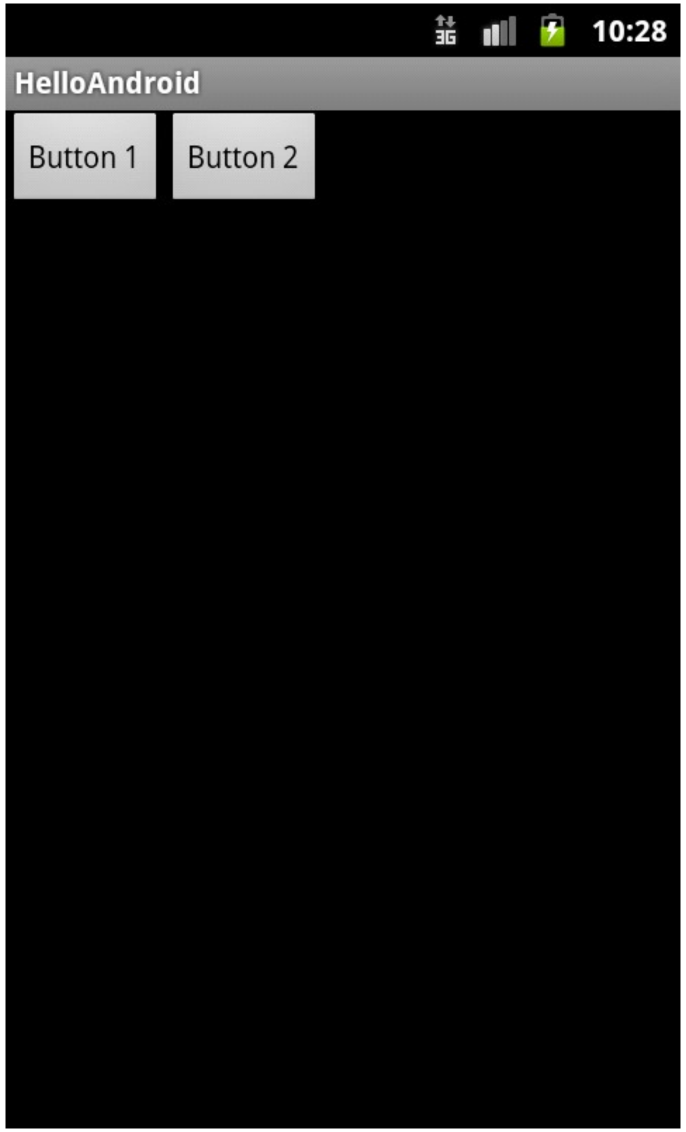
- Dispose views on a single row or column, depending on android:layout_orientation
- The orientation could also be declared via setOrientation(int orientation)
  - orientation is one of HORIZONTAL or VERTICAL
- Has two other attributes:
  - gravity
  - weight

# LinearLayout

```
<?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" >                <!-- Also horizontal -->

   <Button
      android:id="@+id/button1"
      android:layout_width="wrap_content"
      android:layout_height="wrap_content"
      android:text="@string/buttonString1" />

   <Button
      android:id="@+id/button2"
      android:layout_width="wrap_content"
      android:layout_height="wrap_content"
      android:text="@string/buttonString2" />
</LinearLayout>
```

# LinearLayout

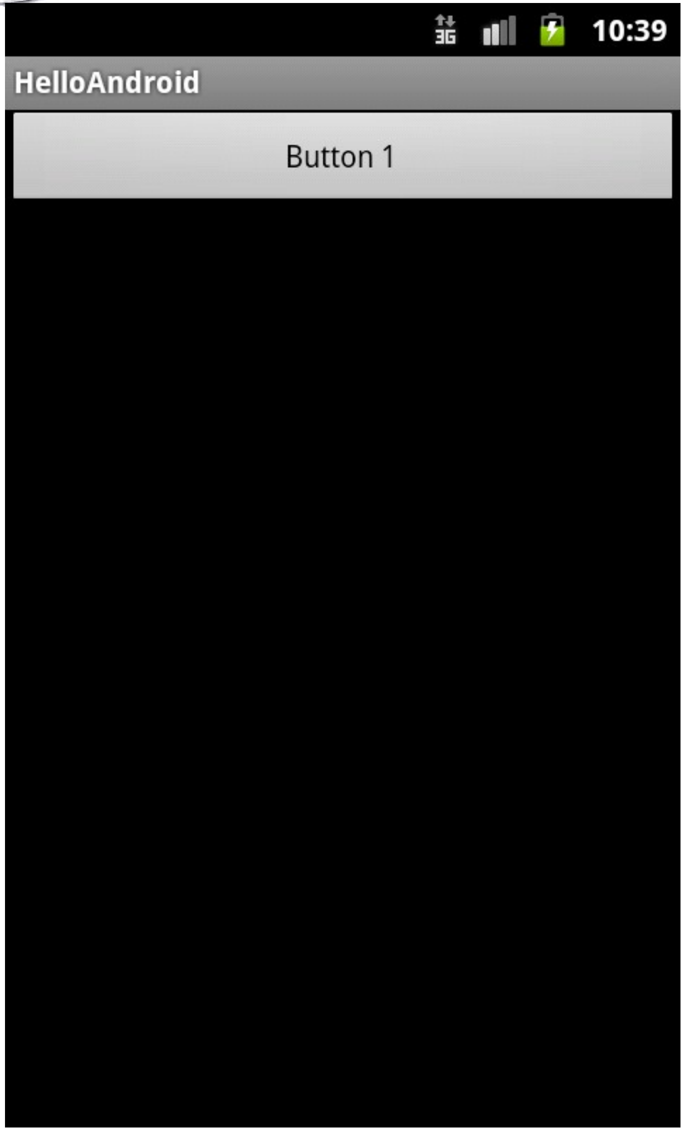


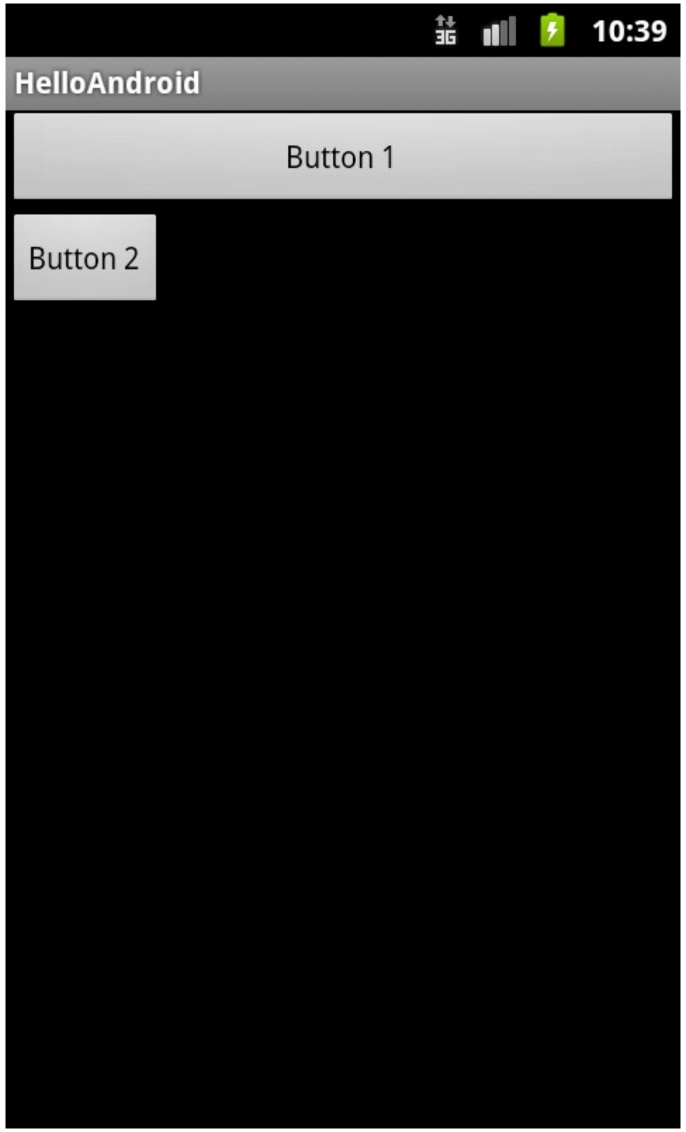


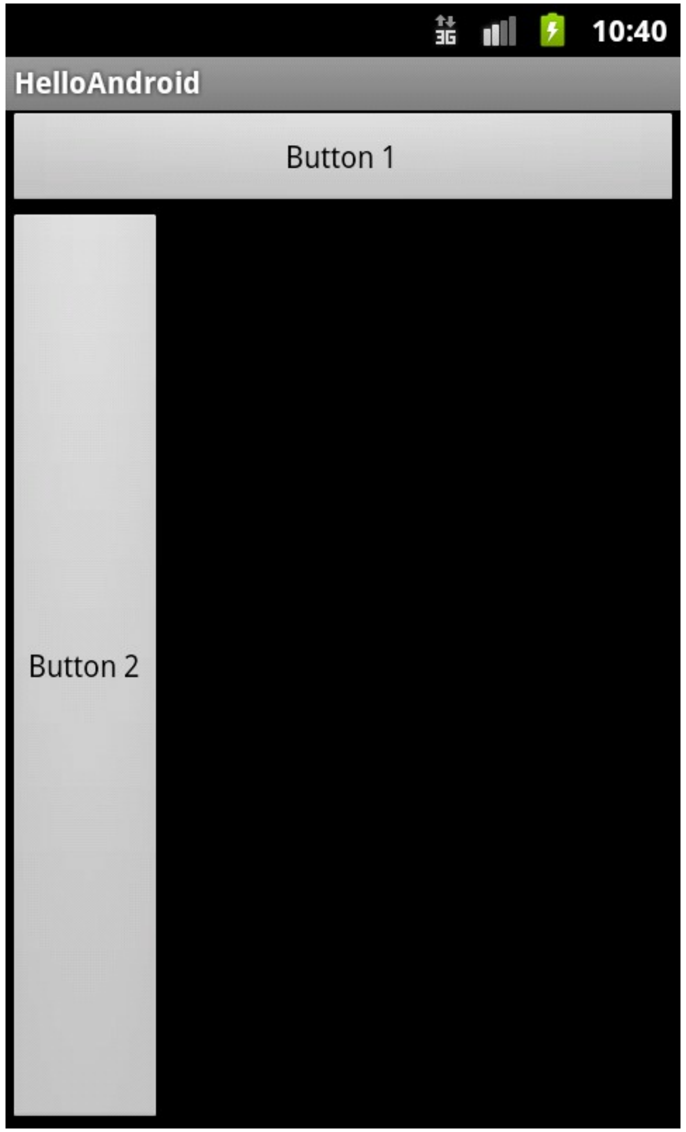
# LinearLayout

```
<?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" >

    <Button
        android:id="@+id/button1"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:text="@string/buttonString1" />

    <Button
        android:id="@+id/button2"
        android:layout_width="wrap_content"
        android:layout_height="match_parent"
        android:text="@string/buttonString2" />
</LinearLayout>
```

# LinearLayout



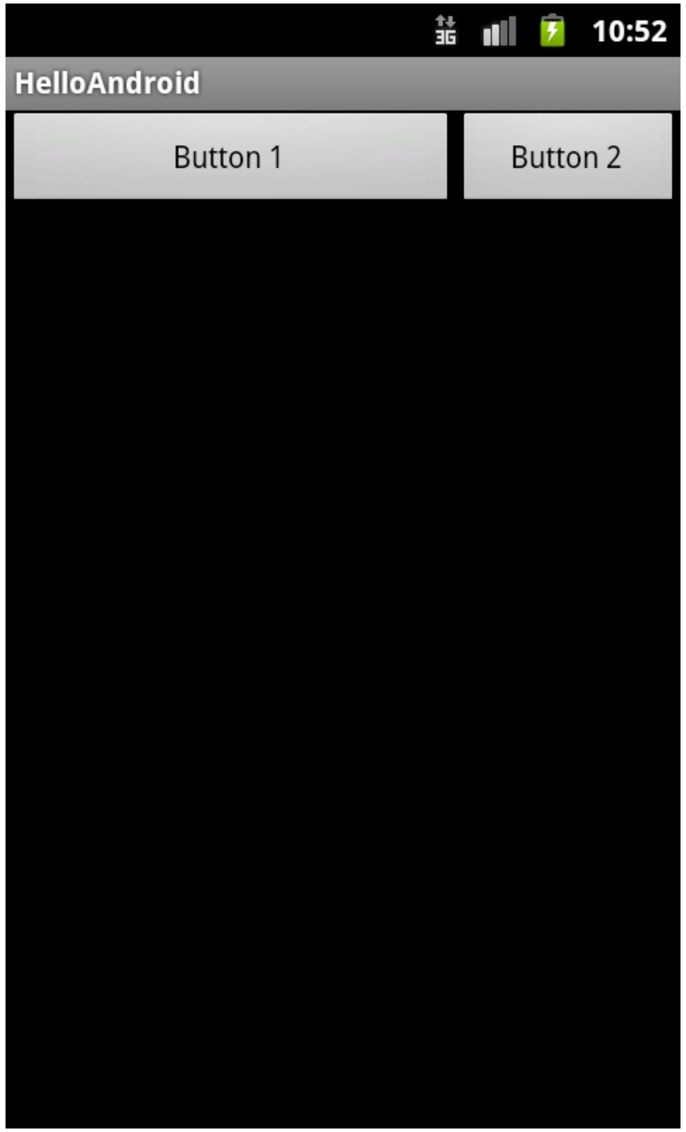


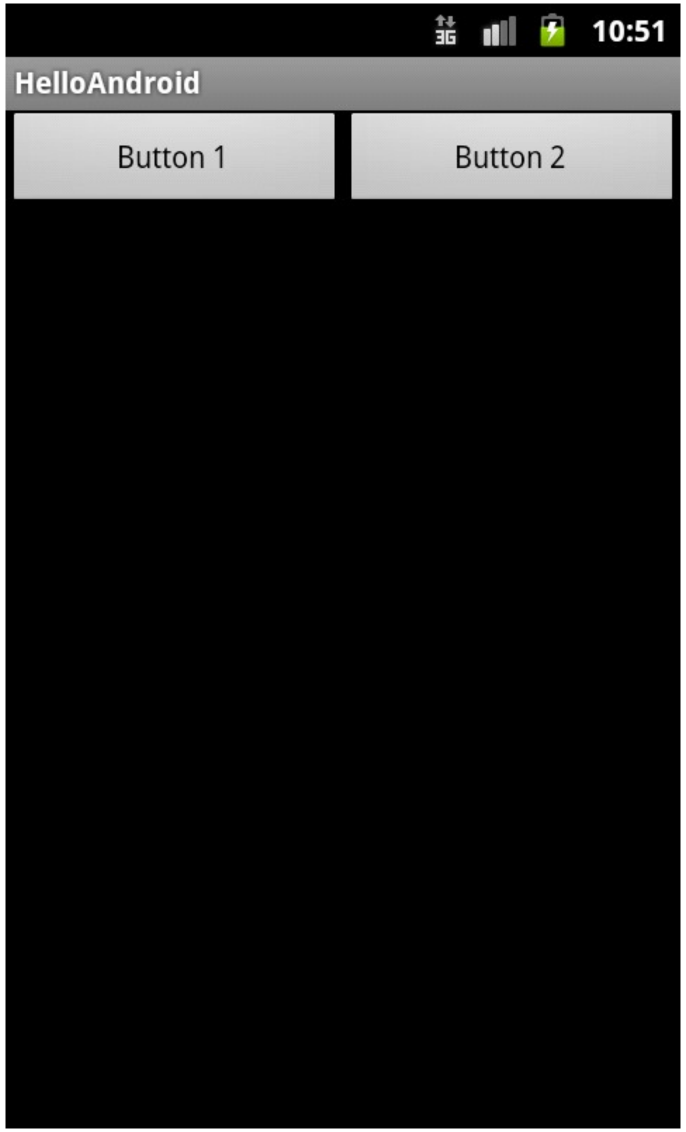


# LinearLayout weight

```
<?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="horizontal" >

    <Button
        android:id="@+id/button1"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:text="@string/buttonString1"
        android:layout_weight="1" />

    <Button
        android:id="@+id/button2"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:text="@string/buttonString2"
        android:layout_weight="2"       />
</LinearLayout>
```

# LinearLayout **weight**

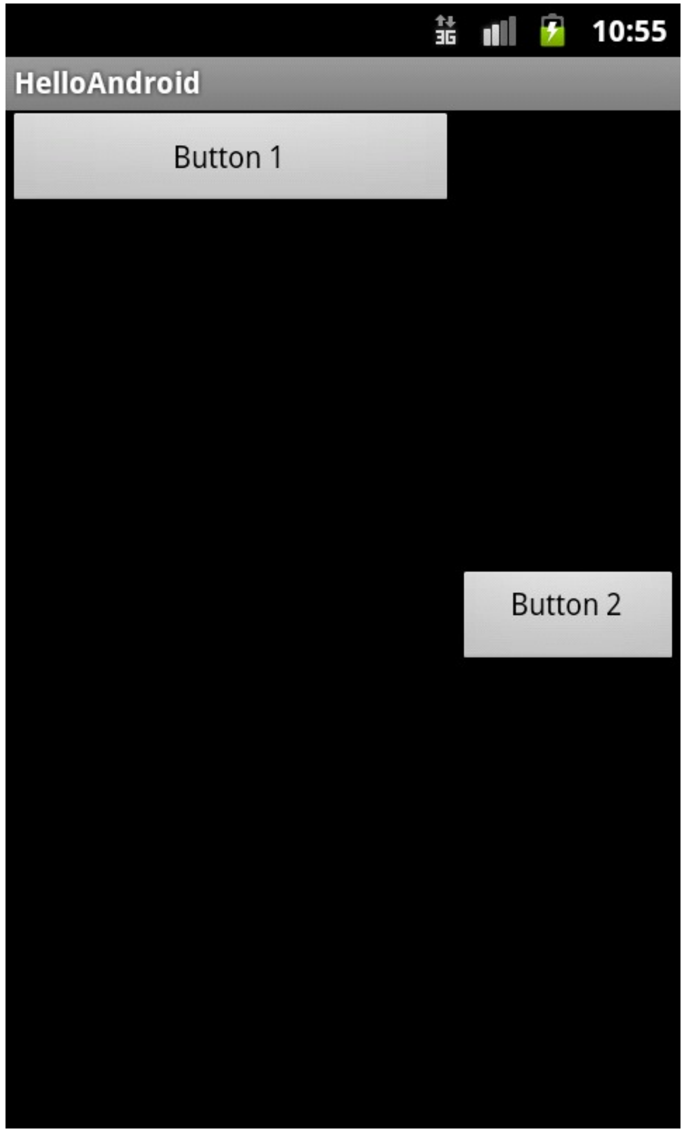




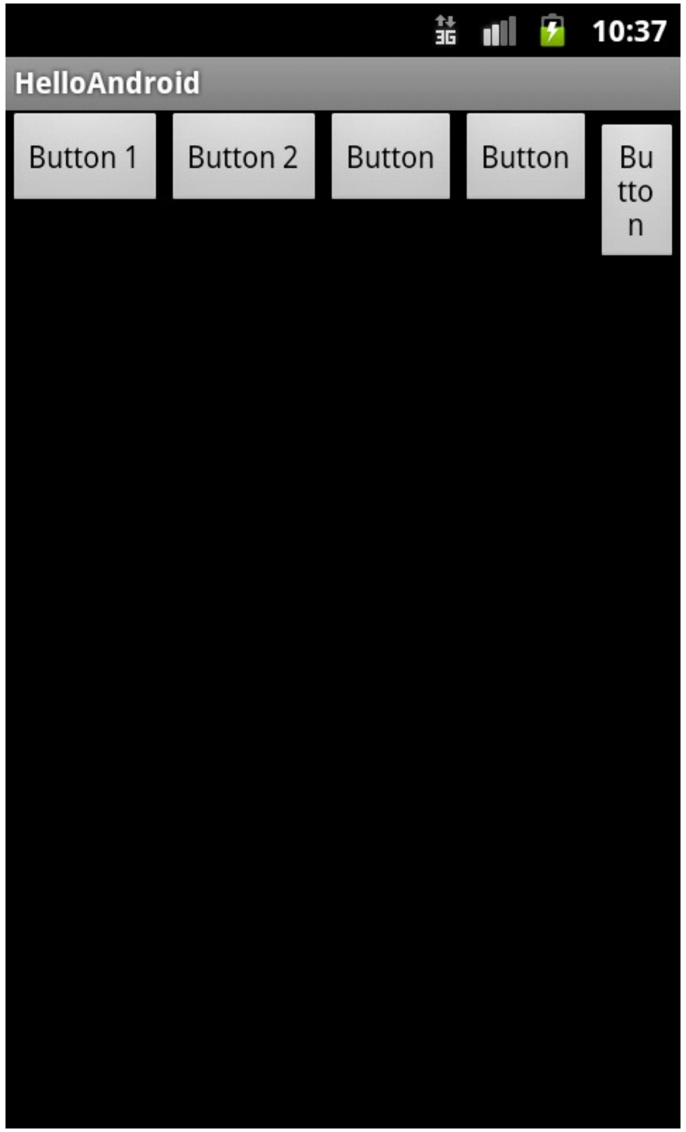
## LinearLayout gravity

```
<?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="horizontal" >


    <Button
        android:id="@+id/button1"
        android:layout_width="match_parent"       android:layout_height="wrap_content"
        android:text="@string/buttonString1"
        android:layout_weight="1" />
    <Button
        android:id="@+id/button2"
        android:layout_width="match_parent"       android:layout_height="wrap_content"
        android:text="@string/buttonString2"
        android:layout_weight="2"
        android:layout_gravity="center_vertical"
        android:gravity="top|center" />


</LinearLayout>
```

## LinearLayout gravity



## LinearLayout problem



## RelativeLayout

- Disposes views according to the container or according to other views
- The gravity attribute indicates what views are more important to define the layout
- Useful to align views

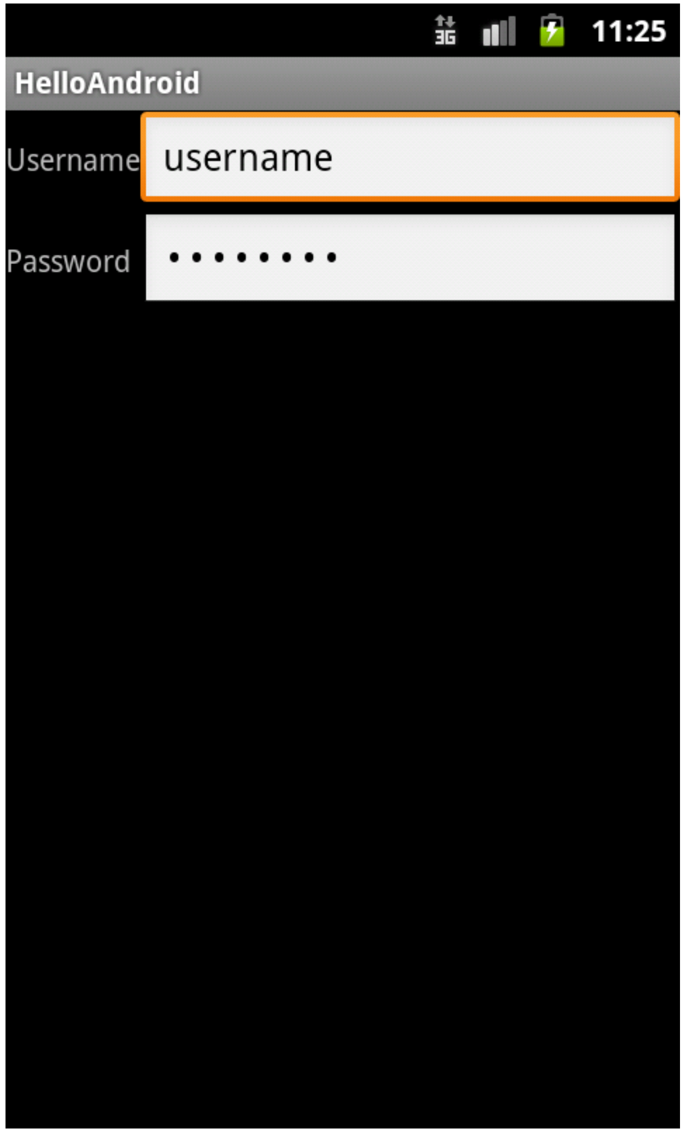
## RelativeLayout

```
<?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" >

   <EditText
      android:id="@+id/username"       android:text="username"
      android:inputType="text"
      android:layout_width="wrap_content"       android:layout_height="wrap_content"
      android:layout_alignParentRight="true"
      android:layout_toRightOf="@+id/usernameLabel" >
   </EditText>

   <TextView
      android:id="@+id/usernameLabel"
      android:layout_width="wrap_content"
      android:layout_height="wrap_content"
      android:layout_alignBaseline="@+id/username"
      android:text="Username" />
```

## RelativeLayout

```
<EditText
    android:id="@+id/password"      android:text="password"
    android:inputType="textPassword"
    android:layout_below="@+id/username"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_alignLeft="@+id/username"
    android:layout_alignParentRight="true"
    android:layout_toRightOf="@+id/usernameLabel" >
  </EditText>

  <TextView
    android:id="@+id/passwordLabel"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_alignBaseline="@+id/password"
    android:text="Password" />
</RelativeLayout>
```

# RelativeLayout



## TableLayout

- As the name say, similar to a Table
- Has some attributes to customize the layout:
  - android:layout_column
  - android:layout_span
  - android:stretchColumns
  - android:shrinkColumns
  - android:collapseColumns
- Each row is inside a <TableRow> element

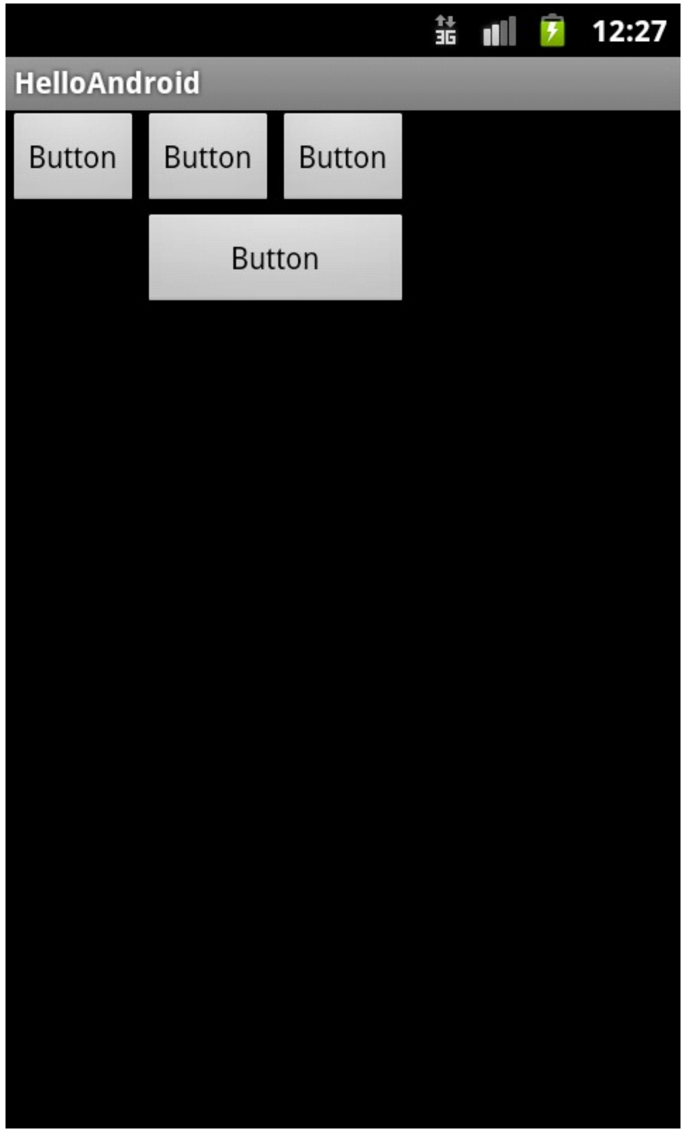
# TableLayout

```
<?xml version="1.0" encoding="utf-8"?>
<TableLayout android:layout_width="fill_parent"
    android:layout_height="fill_parent" xmlns:android="http://schemas.android.com/apk/res/android"     android:id="@+id/tableLayout">

  <TableRow android:layout_width="wrap_content" android:layout_height="wrap_content“ android:id="@+id/firstRow">
    <Button       android:id="@+id/button1“
                  android:layout_width="wrap_content“
                  android:layout_height="wrap_content“
          android:text="Button" />
    <Button android:id="@+id/button2“
          android:layout_width="match_parent"
                  android:layout_height="match_parent"
                  android:text="Button" />
    <Button android:id="@+id/button3"
          android:layout_width="match_parent"
                  android:layout_height="match_parent"
                  android:text="Button" />
  </TableRow>
```

# TableLayout

```
<TableRow
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:id="@+id/secondRow">

   <Button  android:layout_column="1"
            android:layout_span="2"
            android:id="@+id/button4"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:text="Button">
   </Button>
</TableRow>

</TableLayout>
```

# TableLayout



## FrameLayout and AbsoluteLayout

- FrameLayout
  - Adds an attribute, android:visibility
  - Makes the user able to define layouts managing the visibility of views
- AbsoluteLayout
  - Deprecated
  - Specify position with x and y
  - Pay attention to different resolutions

## Adapters

- Used to visualize data
- Make a ViewGroup to interact with data
- Some methods:
  - isEmpty()
  - getItem(int position)
  - getCount()
  - getView()

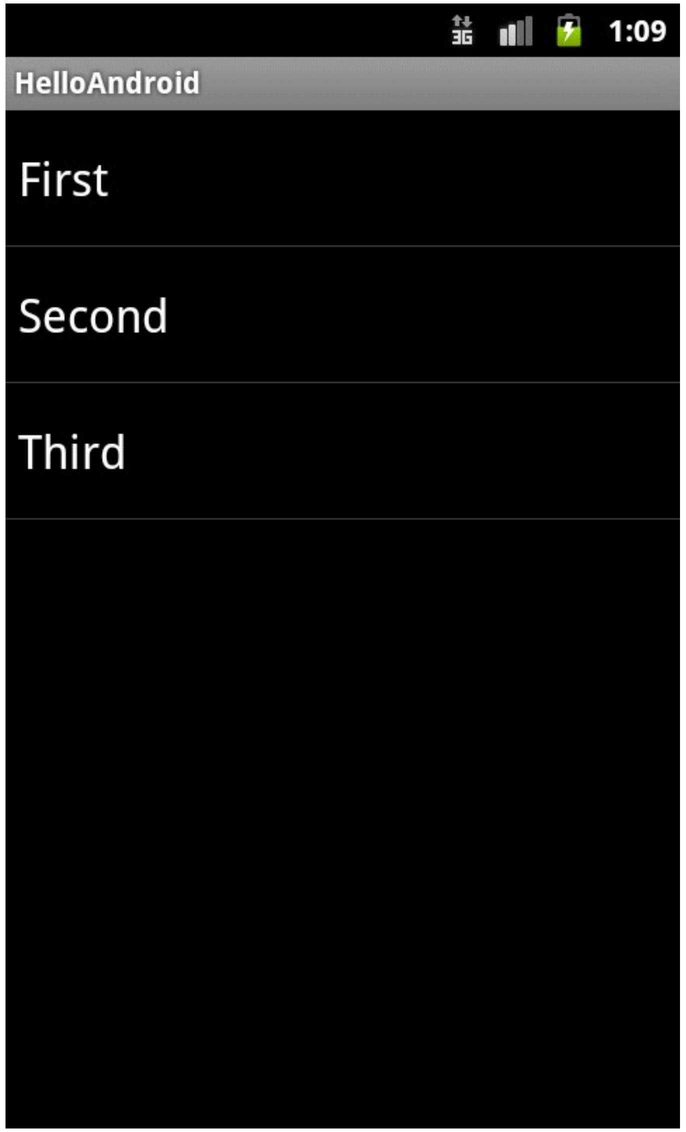
## AdapterView

- A ViewGroup subclass
- Its subchilds are determined by an Adapter
- Some subclasses:
  - ListView
  - GridView
  - Spinner
  - Gallery

# ListView example

```
public class HelloAndroidActivity extends Activity {

    @Override
    public void onCreate(Bundle savedInstanceState) {
       super.onCreate(savedInstanceState);
       setContentView(R.layout.list);

       String[] data = {"First", "Second", "Third"};
       ListView lv = (ListView)findViewById(R.id.list);
        lv.setAdapter(new ArrayAdapter<String>(this, android.R.layout.simple_list_item_1, data));
    }
}

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

## ListView



First

Second

Third

## Other views/adapters

- Spinner, selection of multiple items
- Gallery, images
- ExpandableListView, list with hidden values
- TabWidget, tabbed layouts