mid

CLICK BUTTON

```
import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.widget.TextView;
import androidx.appcompat.app.AppCompatActivity;

public class MainActivity extends AppCompatActivity {
    private TextView textView;
    private int clickCount = 0;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);

        // Initialize views
        Button button = findViewById(R.id.button);
        textView = findViewById(R.id.textView);

        // Set click listener for the button
        button.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View view) {
                // Increment click count and update text
                clickCount++;
                textView.setText("Button clicked " + clickCount + " times");
            }
        });
    }
}
```

activities example:

```
import android.app.Activity;
import android.os.Bundle;
import androidx.appcompat.app.AppCompatActivity;

public class MainActivity extends AppCompatActivity {

  @Override
  protected void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_main);
```

```
    // UI element interaction logic can be placed here
  }
}
```

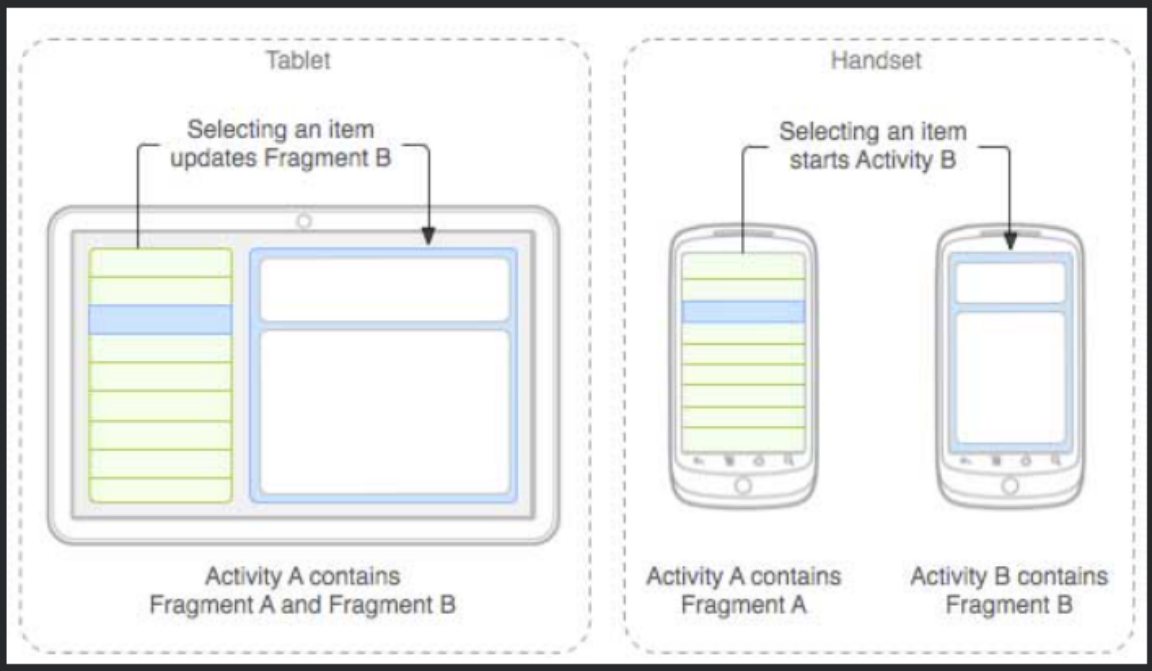
activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
  xmlns:android="..."
  xmlns:app="..."
  xmlns:tools="..."
  android:layout_width="match_parent"
  android:layout_height="match_parent">

  <TextView
      android:id="@+id/text_view"
      android:layout_width="wrap_content"
      android:layout_height="wrap_content"
      android:text="Hello from Android!"
      app:layout_constraintBottom_toBottomOf="parent"
      app:layout_constraintLeft_toLeftOf="parent"
      app:layout_constraintRight_toRightOf="parent"
      app:layout_constraintTop_toTopOf="parent" />

</androidx.constraintlayout.widget.ConstraintLayout>
```

Fragment (kinda like subactivity)

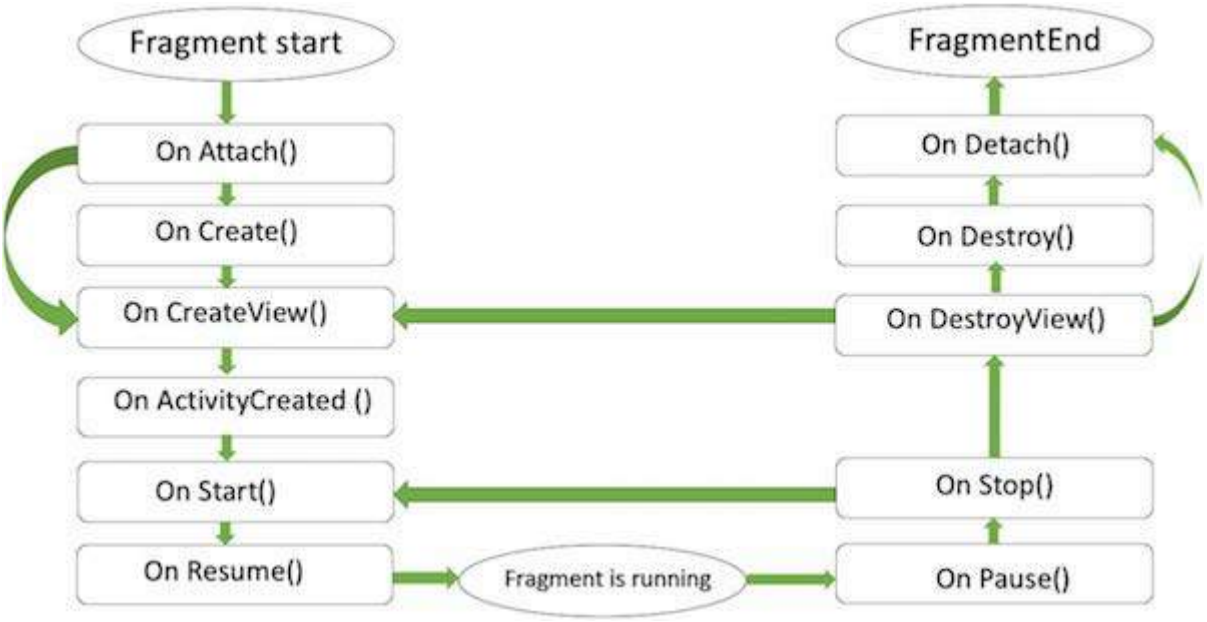
- represent reusable portions of a user interface (UI) within an activity
- provide a modular approach to building dynamic and complex UIs
- Modular UI Design
- Lifecycle Management
- Dynamic UI Changes

Following is a typical example of how two UI modules defined by fragments can be combined into one activity for a tablet design, but separated for a handset design.



The application can embed two fragments in Activity A, when running on a tablet-sized device. However, on a handset-sized screen, there's not enough room for both fragments, so Activity A includes only the fragment for the list of articles, and when the user selects an article, it starts Activity B, which includes the second fragment to read the article.

Lifecycle



No.	Method	Description
1)	onAttach()	it is called only once when it is attached with activity.
2)	onCreate( )	It is used to initialize the fragment.
3)	onCreateView( )	creates and returns view hierarchy.
4)	onActivityCreated( )	It is invoked after the completion of onCreate() method.
5)	onViewStateRestored( )	It provides information to the fragment that all the saved state of fragment view hierarchy has been restored.
6)	onStart( )	makes the fragment visible.
7)	onResume( )	makes the fragment interactive.
8)	onPause( )	is called when fragment is no longer interactive.
9)	onStop( )	is called when fragment is no longer visible.
10)	onDestroyView( )	allows the fragment to clean up resources.
11)	onDestroy( )	allows the fragment to do final clean up of fragment state.

WHY NEED FRAGMENT

- Parallel Execution
- Separation of Concerns - each frag. -> its own thing

Intents

- Intents serve as messengers that coordinate communication and task execution between various components
- They act as a bridge, allowing activities, services, broadcast receivers, and even content providers to interact and exchange information.

Intent Components:

1. Action: A string that describes the general action to be performed. Examples include android.intent.action.VIEW (to view content), android.intent.action.SEND (to send content), or custom actions defined within your app.

2. Data: Optional data associated with the action, often a URI representing the content to be viewed, edited, or shared.

Types:

Explicit Intents:

Clearly specify the target component (activity, service, etc.) to interact with by mentioning its class name. This is useful when you know exactly which component needs to handle the action.

MainActivity.xml

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
xmlns:android="http://schemas.android.com/apk/res/android"
  xmlns:app="http://schemas.android.com/apk/res-auto"
  xmlns:tools="http://schemas.android.com/tools"
  android:layout_width="match_parent"
  android:layout_height="match_parent">

  <Button
      android:id="@+id/launch_button"
      android:layout_width="wrap_content"
      android:layout_height="wrap_content"
      android:text="Launch Second Activity"
      app:layout_constraintBottom_toBottomOf="parent"
      app:layout_constraintLeft_toLeftOf="parent"
      app:layout_constraintRight_toRightOf="parent"
      app:layout_constraintTop_toTopOf="parent" />

</androidx.constraintlayout.widget.ConstraintLayout>
```

```
import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.content.Intent;
```

```
import androidx.appcompat.app.AppCompatActivity;

public class MainActivity extends AppCompatActivity {

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);

        Button launchButton = findViewById(R.id.launch_button);

        launchButton.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                Intent intent = new Intent(MainActivity.this,
SecondActivity.class);
                startActivity(intent);
            }
        });
    }
}
```

Explanation:

- We create a new Intent object, explicitly mentioning SecondActivity.class as the target component using the constructor Intent(Context context, Class<?> cls).
- The startActivity(intent) method launches the SecondActivity.

Implicit Intents:

Broadcast an action without specifying a particular receiver. The system then identifies potential receivers based on their capabilities and delivers the intent to the most suitable one. This is useful for generic actions like opening a web page or sharing content.

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
xmlns:android="http://schemas.android.com/apk/res/android"
  xmlns:app="http://schemas.android.com/apk/res-auto"
  xmlns:tools="http://schemas.android.com/tools"
  android:layout_width="match_parent"
  android:layout_height="match_parent">

  <Button
      android:id="@+id/open_web_button"
      android:layout_width="wrap_content"
      android:layout_height="wrap_content"
      android:text="Open Website"
      app:layout_constraintBottom_toBottomOf="parent"
      app:layout_constraintLeft_toLeftOf="parent"
      app:layout_constraintRight_toRightOf="parent"
      app:layout_constraintTop_toTopOf="parent" />
```

```
</androidx.constraintlayout.widget.ConstraintLayout>
```

```
import android.content.Intent;
import android.net.Uri;
import android.view.View;
import android.widget.Button;
import androidx.appcompat.app.AppCompatActivity;

public class MainActivity extends AppCompatActivity {

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);

        // ... rest of your code for button click handling and opening a website
        Button openWebButton = findViewById(R.id.open_web_button);

        openWebButton.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                // Similar functionality to open a website as before
                Intent intent = new Intent(Intent.ACTION_VIEW,
Uri.parse("https://www.example.com"));
                startActivity(intent);
            }
        });
    }
}
```

Explanation:

- We create a new Intent object with Intent.ACTION_VIEW as the action, indicating we want to view something.
- We provide the data URI (Uri.parse("https://www.example.com")) specifying the website URL to be opened.
- The system identifies apps that can handle web browsing (e.g., the default web browser) and launches the most suitable one to open the website.

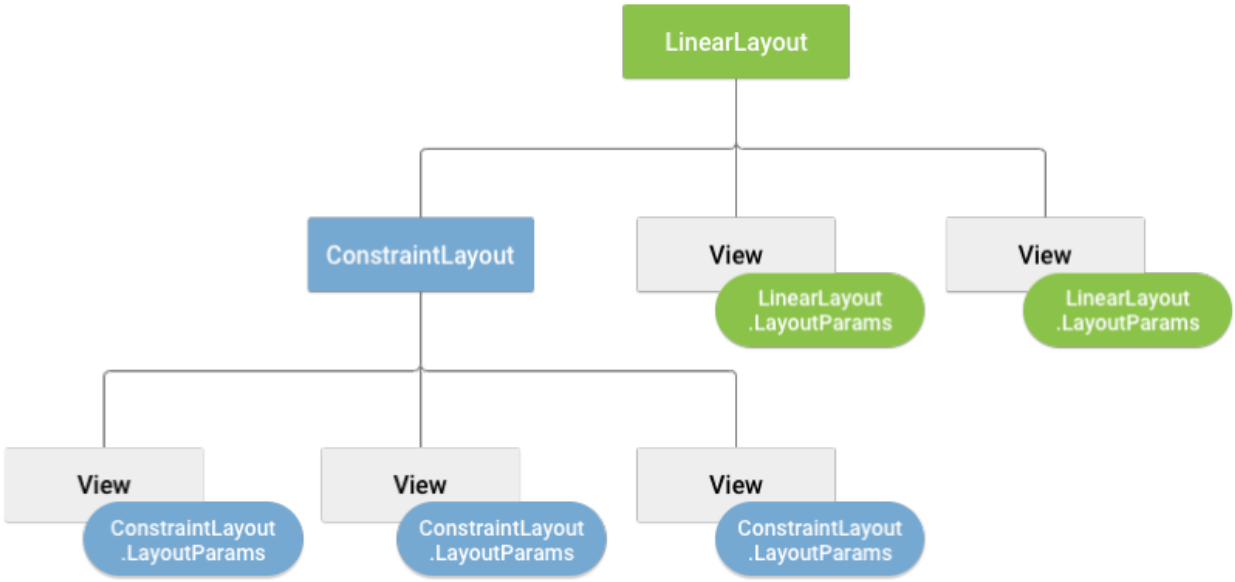
Similiarity

Imagine a house as your UI.

- Bricks (Views): Individual bricks represent the Views, the basic building blocks.
- Rooms (ViewGroups): Rooms act like ViewGroups, containing and organizing the bricks (Views) within them.
- House Blueprint (Layout): The house blueprint is similar to the layout file, defining the overall structure and room placement (ViewGroup positions).

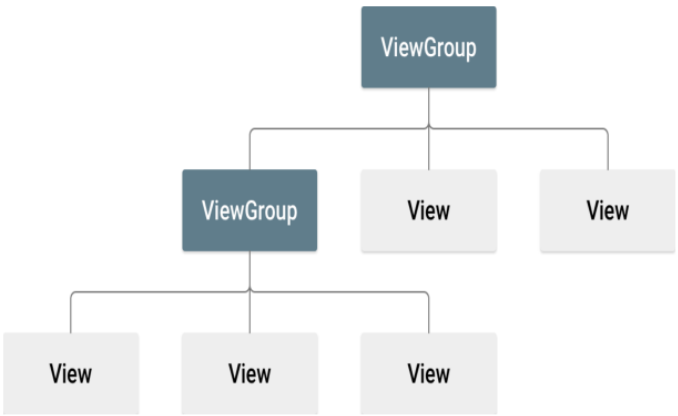
Layout

- A layout defines the structure for a user interface in your activity.
- All elements in the layout are built using a hierarchy of View and ViewGroup objects.
- define view
- Layout(View Group) is an invisible container that defines the layout structure for View and other Layout(View Group) objects.
- It provide a different layout structure, such as LinearLayout or ConstraintLayout.



View Group

- A ViewGroup is a special view that can contain other views (called children.)
- The view group is the base class for layouts and views containers.
- It's child can be **Views** or **View Group**.



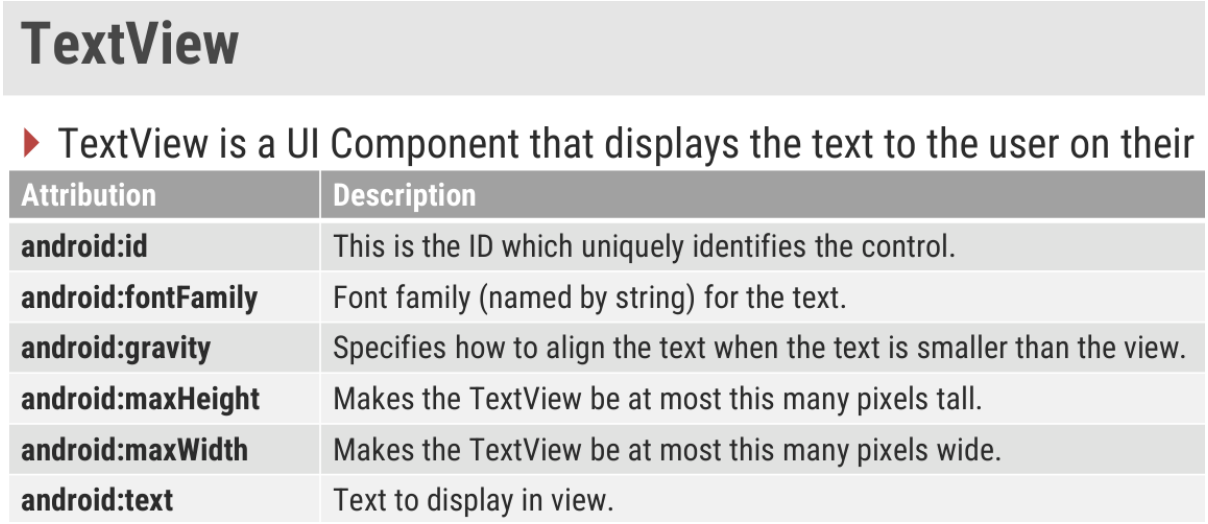

```
public class MainActivity extends AppCompatActivity {

   @Override
   protected void onCreate(Bundle savedInstanceState) {
      super.onCreate(savedInstanceState);
      setContentView(R.layout.activity_main);

LinearLayout    linearLayout =
findViewById(R.id.linearLayout);

      // Create a Button
      Button button = new Button(this);
      button.setText("Ready for Mid sem. Exam");
```

```
import android.os.Bundle;
import android.widget.Button;
import android.widget.LinearLayout;
import androidx.appcompat.app.AppCompatActivity;
```

```
public class MainActivity extends AppCompatActivity {

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);

        // Find the LinearLayout by its ID
        LinearLayout linearLayout = findViewById(R.id.linearLayout);

        // Create a Button with proper text formatting
        Button button = new Button(this);
        button.setText("Ready for Mid-sem. Exam"); // Use double-quotes for string
literals

        // Add the Button to the LinearLayout
        linearLayout.addView(button);
    }
}
```

Views

- the fundamental building blocks that make up the UI of your application.
- They are the interactive elements that users see and interact with on the screen
- Common View Types:
  - TextView: Displays text content.



  - Button: Represents a clickable button for user interaction.

- A Button which can be pressed, or clicked, by the user to perform an action.
- To specify an action when the button is pressed, set a click listener on the button obje corresponding activity code.
- Every button is styled using the system's default button background it can customize.

Attribute	Description
android:text	This is used to display text on button.
android:background	This is a drawable to use as the background.
android:id	This supplies an identifier name for this view.
android:onClick	This is the name of the method in this View's context to invoke when the view is clicked.

- EditText: Allows users to enter text.

EditText

- A EditText is an overlay over TextView that configures itself to be editable.
- It is the predefined subclass of TextView that includes rich editing capabilities.

Attribute	Description
android:autoText	TextView has a textual input method and automatically corrects some common spelling
android:drawableBottom	This is the drawable to be drawn below the text.
android:editable	If set, specifies that this TextView has an input method.
android:background	This is a drawable to use as the background.
android:inputType	The type of data being placed in a text field. Phone, Date, Time, Number, Password etc.

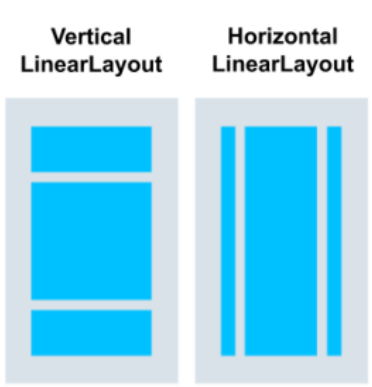
- ImageView: Displays images.
- LinearLayout: Arranges child views horizontally or vertically.
- RelativeLayout: Positions child views relative to each other or the parent view.
- ConstraintLayout: Provides flexible layout rules using constraints for precise positioning.

Example: same as activity

Some Layout

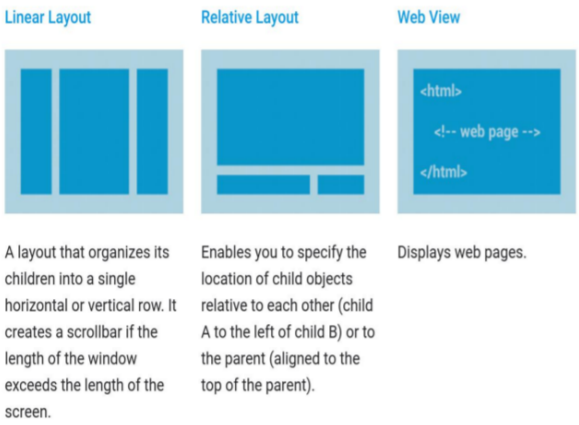
Linear Layout

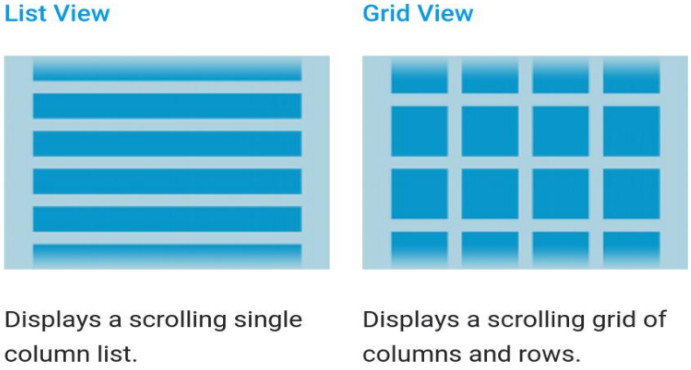
- LinearLayout is a view group that aligns all children in a single direction, vertically or horizontally.
- You can specify the layout direction with the **android:orientation** attribute.
- Linear Layout can be created in two direction: **Horizontal** & **Vertical**.
- LinearLayout also supports assigning a **weight** to individual children with the **android:layout_weight** attribute.
- This attribute assigns an important value to a view in terms of how much space it should occupy on the screen.
- A larger weight value allows it to expand to fill any remaining space in the parent view.



Relative Layout

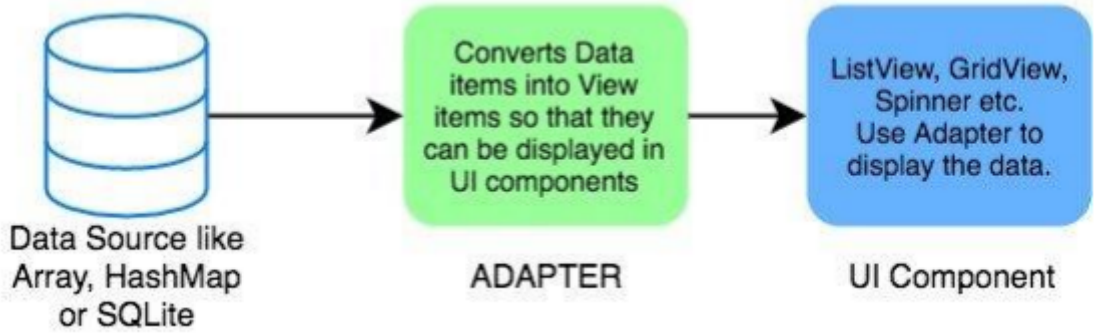
- RelativeLayout is a view group that displays child views in relative positions.
- The position of each view can be specified as relative to sibling elements or in positions relative to the parent RelativeLayout area.
- As it allows us to position the component anywhere, it is considered as most flexible layout.
- Relative layout is the most used layout after the Linear Layout in Android.
- In Relative Layout, you can use “above, below, left and right” to arrange the component’s position in relation to other component.
- In this view group child views can be layered on top of each other.





Built from data using an Adapter

Adaptor



Adapter

- An Adapter object acts as a bridge between an AdapterView and the underlying data for that view.
- In Android development, any time we want to show a vertical list of scrollable items we will use a ListView which has data populated using an Adapter.
- The simplest adapter to use is called an ArrayAdapter because the adapter converts an ArrayList of objects into View items loaded into the ListView container.
- The ArrayAdapter fits in between an ArrayList (data source) and the ListView (visual representation)
- When your ListView is connected to an adapter, the adapter will instantiate rows until the ListView has been fully populated with enough items to fill the full height of the screen. At that point, no additional row items are created in memory.

```
ArrayAdapter<String> itemsAdapter = new ArrayAdapter<String>(this, android.R.layout.simple_list_item_1, items);
```

AdapterView:

- An AdapterView is a UI component in Android that is capable of displaying a collection of data items, usually obtained through an adapter.
- Examples of AdapterView include ListView, GridView, Spinner, and RecyclerView.
- AdapterView is responsible for managing the layout and display of the items provided by the adapter. It relies on the adapter to provide data and views to be shown.
- When an item in an AdapterView is clicked, selected, or otherwise interacted with, the AdapterView communicates with the associated adapter to handle the underlying data.

In summary, the adapter acts as a bridge between the data source and the UI component (AdapterView), while the AdapterView is the UI component responsible for displaying the data items provided by the adapter. They work together to facilitate the presentation of data in a user interface.

Example:

```
// MainActivity.java
import android.os.Bundle;
import android.app.Activity;
import android.widget.ArrayAdapter;
import android.widget.ListView;

public class MainActivity extends Activity {
    ListView listView;
    String[] items = {"Item 1", "Item 2", "Item 3", "Item 4"};

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);

        listView = (ListView) findViewById(R.id.list_view);
        ArrayAdapter<String> adapter = new ArrayAdapter<String>(this,
android.R.layout.simple_list_item_1, items);
        listView.setAdapter(adapter);
    }
}
```

```
<!-- activity_main.xml -->
<ListView
    android:id="@+id/list_view"
    android:layout_width="match_parent"
    android:layout_height="match_parent" />
```

Menu

Menus in Android development are a key user interface component that present user actions and other options within an app. Here's a detailed breakdown:

1. **Types of Menus**:
    - **Options Menu**: The primary collection of menu items, typically found in the app bar.
    - **Context Menu**: A floating menu that appears upon long-pressing an element.
    - **Popup Menu**: A vertical list of items anchored to the view that invoked it.
2. **Defining Menus**:
    - Menus are defined in XML within the `res/menu` directory.
    - The `<menu>` element is the root, containing `<item>` and `<group>` elements.
3. **Menu Items**:
    - Each `<item>` represents a single action with attributes like `id`, `icon`, `title`, and `showAsAction`.
4. **Inflating Menus**:

- Menus are inflated in activities or fragments using `MenuInflater`.

5. **Handling Click Events**:
   - Override `onOptionsItemSelected()` for options menu.
   - Use `onCreateContextMenu()` for context menus.

Event Handling and Listeners

Event Handling:

- Events are actions performed by the user, such as touches or clicks.
- The Android framework manages events in a FIFO (First In, First Out) manner.
- Event handling involves responding to these actions with the desired task.

Event Listeners:

- These are interfaces in the View class that contain callback methods.
- They are triggered by user interaction, and the associated event handler performs the task.

Common Event Listeners:

- OnClickListener: Responds to click events.
- OnLongClickListener: Responds to long click events.
- OnTouchListener: Responds to touch events.

```
// MainActivity.java
import android.os.Bundle;
import android.app.Activity;
import android.view.View;
import android.widget.Button;
import android.widget.Toast;

public class MainActivity extends Activity {
    Button button;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);

        button = (Button) findViewById(R.id.my_button);
        button.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                // This is the event handler for the click event
                Toast.makeText(getApplicationContext(), "Button Clicked",
Toast.LENGTH_SHORT).show();
            }
        });
    }
}
```