CO1: Set up the Android development environment and debug apps using emulator and Logcat.

Experiment 1: First Run App

Objective: To successfully set up a basic android project and run it on either an android emulator or a physical android device

Question: create a new empty view activity Android project in android studio without making any code changes, successfully run this default empty app on an android emulator.take a screenshot of the app running on the emulator.if you have a physical Android phone,also try to run the app on your phone and take a screenshot

MainActivity.java

```
package com.example.application1;
import android.os.Bundle;
import androidx.activity.EdgeToEdge;
import androidx.appcompat.app.AppCompatActivity;
import androidx.core.graphics.Insets;
import androidx.core.view.ViewCompat;
import androidx.core.view.WindowInsetsCompat;
public class MainActivity extends AppCompatActivity {
   @Override
   protected void onCreate(Bundle savedInstanceState) {
      super.onCreate(savedInstanceState);
      EdgeToEdge.enable(this);
      setContentView(R.layout.activity_main);
      ViewCompat.setOnApplyWindowInsetsListener(findViewById(R.id.main), (v,
insets) -> {
         Insets systemBars =
insets.getInsets(WindowInsetsCompat.Type.systemBars());
         v.setPadding(systemBars.left, systemBars.top, systemBars.right,
systemBars.bottom);
         return insets;
      });
   }
}
```

activity_main.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:id="@+id/main"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context=".MainActivity">

    <TextView
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Hello World!"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

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

Output

Experiment 2: "Logcat Debugging Basics"

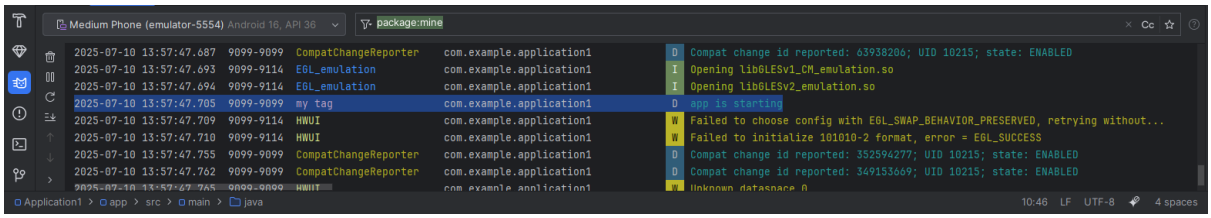
Objective: To learn how to use Logcat in Android Studio to view application messages and system logs for basic debugging.

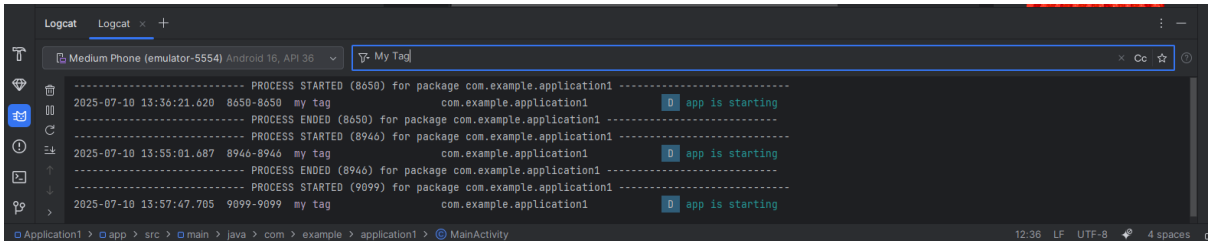
Question: Open your "Hello, Interactive World!" app from CO1. In your MainActivity.java file, inside the onCreate () method, add a simple log message using Log.d("MyTag", "App is starting!"); Run the app. Then, open the Logcat window in Android Studio and find your custom log message. Demonstrate how to filter Logcat to show only messages from your app using the tag "MyTag

MainActivity.java

```
package com.example.application1;
import android.os.Bundle;
import android.util.Log;
import androidx.activity.EdgeToEdge;
import androidx.appcompat.app.AppCompatActivity;
import androidx.core.graphics.Insets;
import androidx.core.view.ViewCompat;
import androidx.core.view.WindowInsetsCompat;
public class MainActivity extends AppCompatActivity {
   @Override
   protected void onCreate(Bundle savedInstanceState) {
      super.onCreate(savedInstanceState);
      EdgeToEdge.enable(this);
      setContentView(R.layout.activity_main);
      ViewCompat.setOnApplyWindowInsetsListener(findViewById(R.id.main), (v,
insets) -> {
         Insets systemBars =
insets.getInsets(WindowInsetsCompat.Type.systemBars());
         v.setPadding(systemBars.left, systemBars.top, systemBars.right,
systemBars.bottom);
         return insets;
      });
      Log.d("my tag","app is starting");
   }
}
```

Output


Medium Phone (emulator-5554) Android 16, API 36
package:mine
2025-07-10 13:57:47.687 9099-9099 CompatChangeReporter com.example.application1 D Compat change id reported: 63938206; UID 10215; state: ENABLED
2025-07-10 13:57:47.693 9099-9114 EGL_emulation com.example.application1 I Opening libGLESv1_CM_emulation.so
2025-07-10 13:57:47.694 9099-9114 EGL_emulation com.example.application1 I Opening libGLESv2_emulation.so
2025-07-10 13:57:47.705 9099-9099 my tag com.example.application1 D app is starting
2025-07-10 13:57:47.709 9099-9114 HWUI com.example.application1 W Failed to choose config with EGL_SWAP_BEHAVIOR_PRESERVED, retrying without...
2025-07-10 13:57:47.710 9099-9114 HWUI com.example.application1 W Failed to initialize 101010-2 format, error = EGL_SUCCESS
2025-07-10 13:57:47.755 9099-9099 CompatChangeReporter com.example.application1 D Compat change id reported: 352594277; UID 10215; state: ENABLED
2025-07-10 13:57:47.762 9099-9099 CompatChangeReporter com.example.application1 D Compat change id reported: 349153669; UID 10215; state: ENABLED
Application1 app src main java
10:46 LF UTF-8 4 spaces


Logcat
Logcat
Medium Phone (emulator-5554) Android 16, API 36
My Tag
---------- PROCESS STARTED (8650) for package com.example.application1 ----------
2025-07-10 13:36:21.620 8650-8650 my tag com.example.application1 D app is starting
---------- PROCESS ENDED (8650) for package com.example.application1 ----------
---------- PROCESS STARTED (8946) for package com.example.application1 ----------
2025-07-10 13:55:01.687 8946-8946 my tag com.example.application1 D app is starting
---------- PROCESS ENDED (8946) for package com.example.application1 ----------
---------- PROCESS STARTED (9099) for package com.example.application1 ----------
2025-07-10 13:57:47.705 9099-9099 my tag com.example.application1 D app is starting
Application1 app src main java com example application1 MainActivity
12:36 LF UTF-8 4 spaces

CO2: Understand Android components, app structure, and activity lifecycle.

Experiment 3: "Hello, Interactive World!“

Objective: To learn how to make a button change text on the screen and show a quick message.

Question: Make a simple Android app. Design its main screen (activity_main.xml) to include a TextView that initially displays "Hello World!" and a Button labelled "Change Greeting". Write the code
(MainActivity.java) so that when the "Change Greeting" button is clicked, the TextView updates its text to "Welcome to Android!"

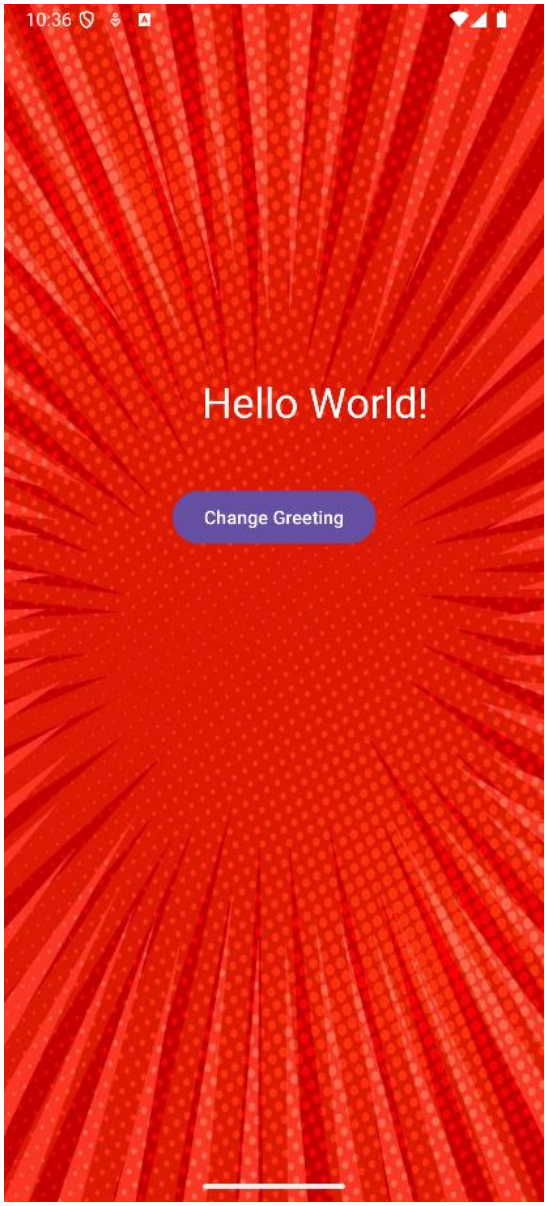
MainActivity.java

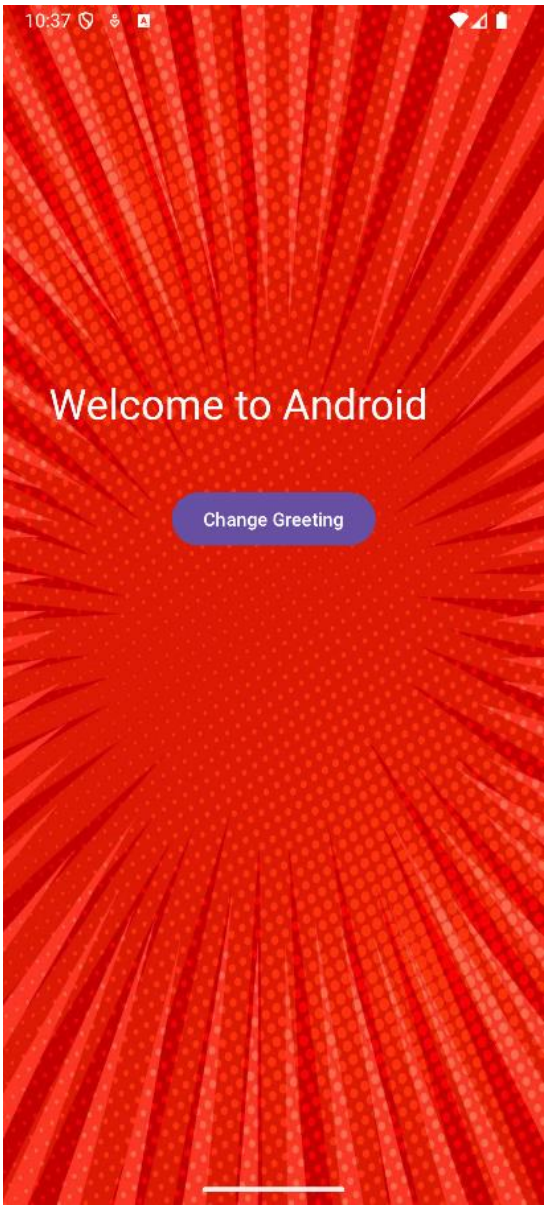
```
package com.example.application1;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.widget.TextView;
import androidx.appcompat.app.AppCompatActivity;
public class MainActivity extends AppCompatActivity {
   private TextView Message ;
   private Button Click;
   @Override
   protected void onCreate(Bundle savedInstanceState) {
      super.onCreate(savedInstanceState);
      setContentView(R.layout.activity_main);
      Message = findViewById(R.id.textViewGreeting);
      Click = findViewById(R.id.button);
     Click.setOnClickListener(new View.OnClickListener() {
        @Override
        public void onClick(View v) {
           Message.setText("Welcome to Android");
        }
     });
   }
}
```

activity_main.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:id="@+id/main"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:background="@drawable/img2"
    tools:context=".MainActivity">

    <TextView
        android:id="@+id/textViewGreeting"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginTop="282dp"
        android:layout_marginEnd="88dp"
        android:text="Hello World!"
        android:textColor="@color/white"
        android:textSize="32dp"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

    <Button
        android:id="@+id/button"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginTop="43dp"
        android:layout_marginEnd="40dp"
        android:text="Change Greeting"
        app:layout_constraintEnd_toEndOf="@+id/textViewGreeting"
        app:layout_constraintTop_toBottomOf="@+id/textViewGreeting" />

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

Output


10:36
Hello World!
Change Greeting


10:37
Welcome to Android
Change Greeting

Experiment 4: "Understanding Activity Lifecycle“

Objective: To understand the various states an Android Activity goes through during its lifetime (its lifecycle) and to observe these transitions using Logcat.

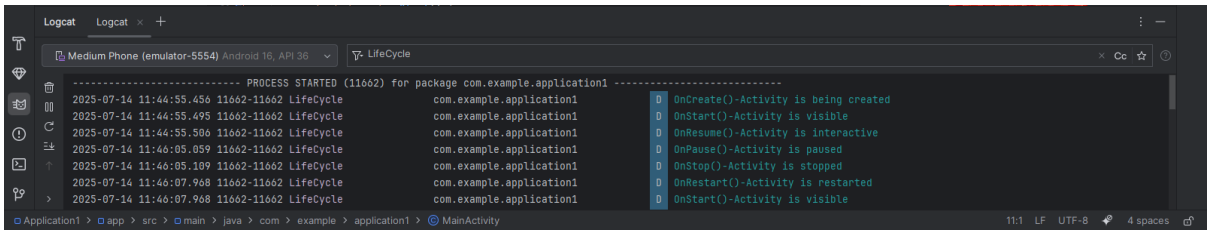
Question: Write an Android program that demonstrates the Activity lifecycle

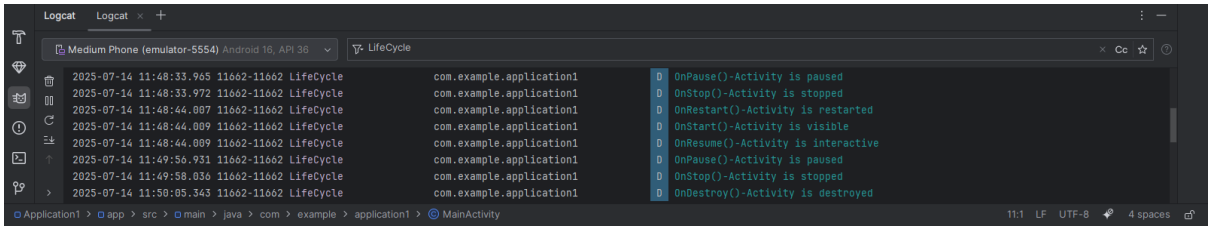
MainActivity.java

```
package com.example.application1;
import android.os.Bundle;
import android.util.Log;
import androidx.appcompat.app.AppCompatActivity;
public class MainActivity extends AppCompatActivity {
   private static final String TAG ="LifeCycle";

   @Override
   protected void onCreate(Bundle savedInstanceState) {
      super.onCreate(savedInstanceState);
      setContentView(R.layout.activity_main);
      Log.d(TAG,"OnCreate()-Activity is being created");
   }

   @Override
   protected void onStart() {
      super.onStart();
      Log.d(TAG,"OnStart()-Activity is visible");
   }

   @Override
   protected void onResume() {
      super.onResume();
      Log.d(TAG,"OnResume()-Activity is interactive");
   }

   @Override
   protected void onPause() {
      super.onPause();
      Log.d(TAG,"OnPause()-Activity is paused");
   }
```

```
    @Override
    protected void onStop() {
        super.onStop();
        Log.d(TAG,"OnStop()-Activity is stopped");
    }

    @Override
    protected void onDestroy() {
        super.onDestroy();
        Log.d(TAG,"OnDestroy()-Activity is destroyed");
    }

    @Override
    protected void onRestart() {
        super.onRestart();
        Log.d(TAG,"OnRestart()-Activity is restarted");
    }
}
```

Output


Logcat
Logcat
Medium Phone (emulator-5554) Android 16, API 36
LifeCycle
---------- PROCESS STARTED (11662) for package com.example.application1 ----------
2025-07-14 11:44:55.456 11662-11662 LifeCycle com.example.application1 D OnCreate()-Activity is being created
2025-07-14 11:44:55.495 11662-11662 LifeCycle com.example.application1 D OnStart()-Activity is visible
2025-07-14 11:44:55.506 11662-11662 LifeCycle com.example.application1 D OnResume()-Activity is interactive
2025-07-14 11:46:05.059 11662-11662 LifeCycle com.example.application1 D OnPause()-Activity is paused
2025-07-14 11:46:05.109 11662-11662 LifeCycle com.example.application1 D OnStop()-Activity is stopped
2025-07-14 11:46:07.968 11662-11662 LifeCycle com.example.application1 D OnRestart()-Activity is restarted
2025-07-14 11:46:07.968 11662-11662 LifeCycle com.example.application1 D OnStart()-Activity is visible
Application1 app src main java com example application1 MainActivity
11:1 LF UTF-8 4 spaces


Logcat
Logcat
Medium Phone (emulator-5554) Android 16, API 36
LifeCycle
2025-07-14 11:48:33.965 11662-11662 LifeCycle com.example.application1 D OnPause()-Activity is paused
2025-07-14 11:48:33.972 11662-11662 LifeCycle com.example.application1 D OnStop()-Activity is stopped
2025-07-14 11:48:44.007 11662-11662 LifeCycle com.example.application1 D OnRestart()-Activity is restarted
2025-07-14 11:48:44.009 11662-11662 LifeCycle com.example.application1 D OnStart()-Activity is visible
2025-07-14 11:48:44.009 11662-11662 LifeCycle com.example.application1 D OnResume()-Activity is interactive
2025-07-14 11:49:56.931 11662-11662 LifeCycle com.example.application1 D OnPause()-Activity is paused
2025-07-14 11:49:58.036 11662-11662 LifeCycle com.example.application1 D OnStop()-Activity is stopped
2025-07-14 11:50:05.343 11662-11662 LifeCycle com.example.application1 D OnDestroy()-Activity is destroyed
Application1 app src main java com example application1 MainActivity
11:1 LF UTF-8 4 spaces

CO3: Design basic and advanced user interfaces using layouts, widgets, dialogs, and fragments

Experiment 5: "TextView vs. Toast: Message Display“

Objective: To clearly demonstrate and differentiate between the characteristics and appropriate use cases of a TextView (for persistent UI display) and a Toast message (for transient, non-intrusive feedback) in an Android application.

Question: Design an Android application to demonstrate the differences between TextView and Toast messages in terms of how they display information.

MainActivity.java

```
package com.example.experiment5;
import android.os.Bundle;
import android.view.View;
import android.widget.TextView;
import android.widget.Toast;
import androidx.appcompat.app.AppCompatActivity;
public class MainActivity extends AppCompatActivity {
   @Override
   protected void onCreate(Bundle savedInstanceState) {
      super.onCreate(savedInstanceState);
      setContentView(R.layout.activity_main);
      TextView textView = findViewById(R.id.textView);
      textView.setText("This is a text displayed on textview");
   }
   // Button click handler
   public void showToastMessage(View view) {
      Toast.makeText(this, "This is a tost notification",
      Toast.LENGTH_LONG).show();
   }
}
```

activity_main.xml

```
<?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"
```

```
    android:padding="16dp"
    android:gravity="center">
    <TextView
        android:id="@+id/textView"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:textSize="18sp"
        android:padding="12dp"
        android:background="#E0E0E0"
        android:layout_marginBottom="32dp"/>
    <Button
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="show toast message"
        android:onClick="showToastMessage"
        android:backgroundTint="#6200EE"
        android:textColor="#FFFFFF"/>
</LinearLayout>
```

Output


This is a text displayed on textview
show toast message


This is a text displayed on textview
show toast message
This is a tost notification

Experiment 6: "Basic Login and Input Display“

Objective: To learn how to use EditText for user input, arrange UI elements using LinearLayout, and retrieve input data to display in aToast message.

Question: Design a basic Login Form with places for username and password. Use a Linear Layout to arrange them, and show a message using a Toast.

MainActivity.java

```
package com.example.experiment6;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.widget.EditText;
import android.widget.Toast;
import androidx.appcompat.app.AppCompatActivity;
public class MainActivity extends AppCompatActivity {
   EditText username;
   EditText password;
   Button loginButton;
   @Override
   protected void onCreate(Bundle savedInstanceState) {
      super.onCreate(savedInstanceState);
      setContentView(R.layout.activity_main);
      username=findViewById(R.id.username);
      password=findViewById(R.id.password);
      loginButton=findViewById(R.id.loginButton);
      loginButton.setOnClickListener(new View.OnClickListener() {
         @Override
         public void onClick(View view) {
            if(username.getText().toString().equals("user")&&
password.getText().toString().equals("1234"))
            {
               Toast.makeText(MainActivity.this,"Login
Success",Toast.LENGTH_SHORT).show();
            }
            else {
               Toast.makeText(MainActivity.this,"Login
Failed",Toast.LENGTH_SHORT).show();
            }
            }
```

```
        });
    }
}
```

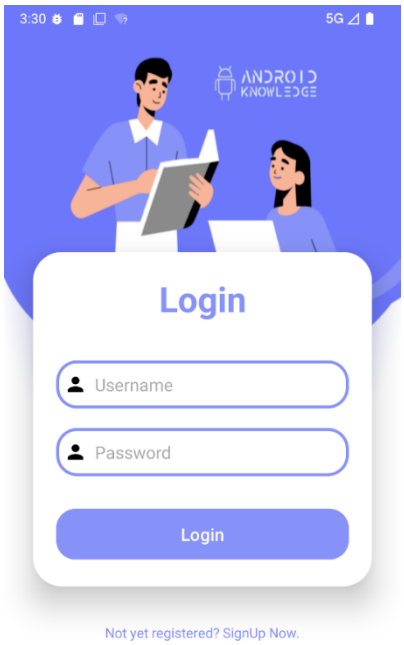
activity_main.xml

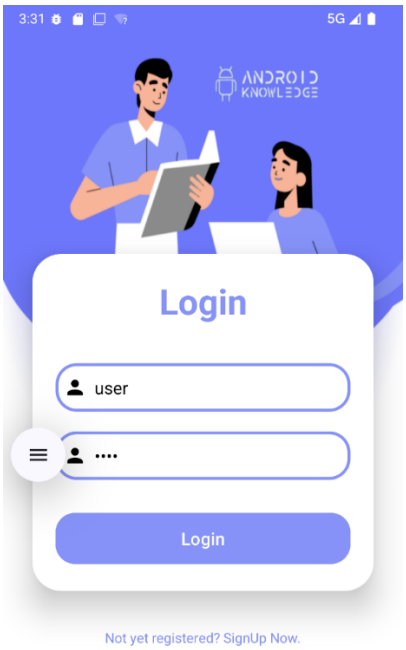
```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    xmlns:card_view="http://schemas.android.com/apk/res-auto"
    android:id="@+id/main"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:orientation="vertical"
    android:gravity="center"
    android:background="@drawable/loginbkg"
    tools:context=".MainActivity">

    <androidx.cardview.widget.CardView
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_margin="30dp"
        app:cardCornerRadius="30dp"
        app:cardElevation="20dp"
        android:background="@drawable/custom_edittext">

        <LinearLayout
            android:layout_width="match_parent"
            android:layout_height="wrap_content"
            android:orientation="vertical"
            android:layout_gravity="center_horizontal"
            android:padding="24dp">

            <TextView
                android:layout_width="match_parent"
                android:layout_height="wrap_content"
                android:text="Login"
                android:id="@+id/logintext"
                android:textSize="36sp"
```

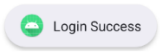
```
    android:textAlignment="center"
    android:textStyle="bold"
    android:textColor="@color/purple"/>

<EditText
    android:layout_width="match_parent"
    android:layout_height="50dp"
    android:id="@+id/username"
    android:background="@drawable/custom_edittext"
    android:drawableLeft="@drawable/baseline_person_24"
    android:drawablePadding="8dp"
    android:hint="Username"
    android:padding="8dp"
    android:textColor="@color/black"
    android:textColorHighlight="@color/cardview_dark_background"
    android:layout_marginTop="40dp"/>

<EditText
    android:layout_width="match_parent"
    android:layout_height="50dp"
    android:id="@+id/password"
    android:background="@drawable/custom_edittext"
    android:drawableLeft="@drawable/baseline_person_24"
    android:drawablePadding="8dp"
    android:hint="Password"
    android:padding="8dp"
    android:inputType="textPassword"
    android:textColor="@color/black"
    android:textColorHighlight="@color/cardview_dark_background"
    android:layout_marginTop="20dp"/>

<Button
    android:layout_width="match_parent"
    android:layout_height="60dp"
    android:id="@+id/loginButton"
    android:text="Login"
    android:textSize="18sp"
    android:layout_marginTop="30dp"
    android:backgroundTint="@color/purple"
    app:cornerRadius="20dp"/>
```

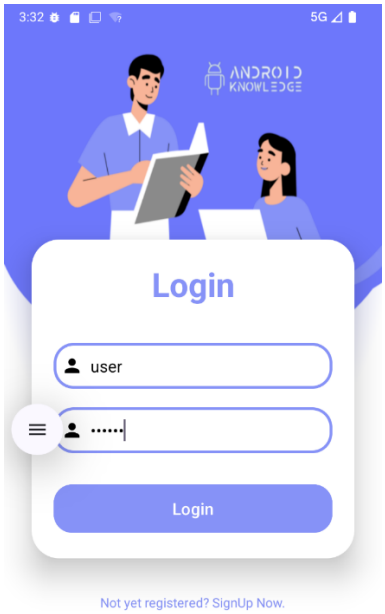
```
        </LinearLayout>

    </androidx.cardview.widget.CardView>

    <TextView
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:padding="8dp"
        android:text="Not yet registered? SignUp Now."
        android:textSize="14sp"
        android:textAlignment="center"
        android:id="@+id/signupText"
        android:textColor="@color/purple"
        android:layout_marginBottom="20dp"/>

</LinearLayout>
```

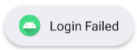
Output


3:30
5G
ANDROID KNOWLEDGE
Login
Username
Password
Login
Not yet registered? SignUp Now.


3:31
5G
ANDROID KNOWLEDGE
Login
user
Login
Not yet registered? SignUp Now.


Login Success


3:32
5G
ANDROID KNOWLEDGE
Login
user
Login
Not yet registered? SignUp Now.


Login Failed

Experiment 7: " Basic Number Addition “

Objective: To learn how to get two numerical inputs from EditText fields and display their sum in a TextView on the screen.

Question: Design an Android screen where a user can type two numbers into two separate input boxes (EditText). Add a Button labeled "Add Numbers" and a TextView below it. When the "Add Numbers" button is clicked, add the two numbers typed by the user and display the total sum in the TextView on the screen.

MainActivity.java

```
package com.example.experiment7;
import android.os.Bundle;
import android.widget.Button;
import android.widget.EditText;
import android.widget.TextView;
import androidx.activity.EdgeToEdge;
import androidx.appcompat.app.AppCompatActivity;
import androidx.core.graphics.Insets;
import androidx.core.view.ViewCompat;
import androidx.core.view.WindowInsetsCompat;
public class MainActivity extends AppCompatActivity {

    EditText editTextNumber1, editTextNumber2;
    TextView textViewResult;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        editTextNumber1 = findViewById(R.id.editTextNumber1);
        editTextNumber2 = findViewById(R.id.editTextNumber2);
        Button buttonAdd = findViewById(R.id.buttonAdd);
        textViewResult = findViewById(R.id.textViewResult);
        buttonAdd.setOnClickListener(view -> {
            String num1Str = editTextNumber1.getText().toString().trim();
            String num2Str = editTextNumber2.getText().toString().trim();

            if (!num1Str.isEmpty() && !num2Str.isEmpty()) {
                try {
                    int num1 = Integer.parseInt(num1Str);
```

```
                int num2 = Integer.parseInt(num2Str);
                int sum = num1 + num2;
                textViewResult.setText("Sum: " + sum);
            } catch (NumberFormatException e) {
                textViewResult.setText("Invalid number format");
            }
        } else {
            textViewResult.setText("Please enter both numbers");
        }
    });
  }
}
```

activity_main.xml

```
<?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"
  android:padding="24dp">

  <EditText
    android:id="@+id/editTextNumber1"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:hint="Enter first number"
    android:inputType="number"
    android:padding="12dp" />

  <EditText
    android:id="@+id/editTextNumber2"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:hint="Enter second number"
    android:inputType="number"
    android:padding="12dp"
    android:layout_marginBottom="16dp" />

  <Button
    android:id="@+id/buttonAdd"
```

```
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:text="Add Numbers" />

    <TextView
        android:id="@+id/textViewResult"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:textSize="18sp"
        android:padding="12dp"
        android:layout_marginTop="16dp" />

</LinearLayout>
```

Output


Enter first number
Enter second number
Add Numbers


15
17
Add Numbers
Sum: 32

Experiment 8: " Image Toggle “

Objective: To learn how to use FrameLayout to stack UI elements and toggle their visibility.

Question: Develop an application that toggles an image using FrameLayout. When a button is clicked, make one image disappear and another appear in its place.

MainActivity.java

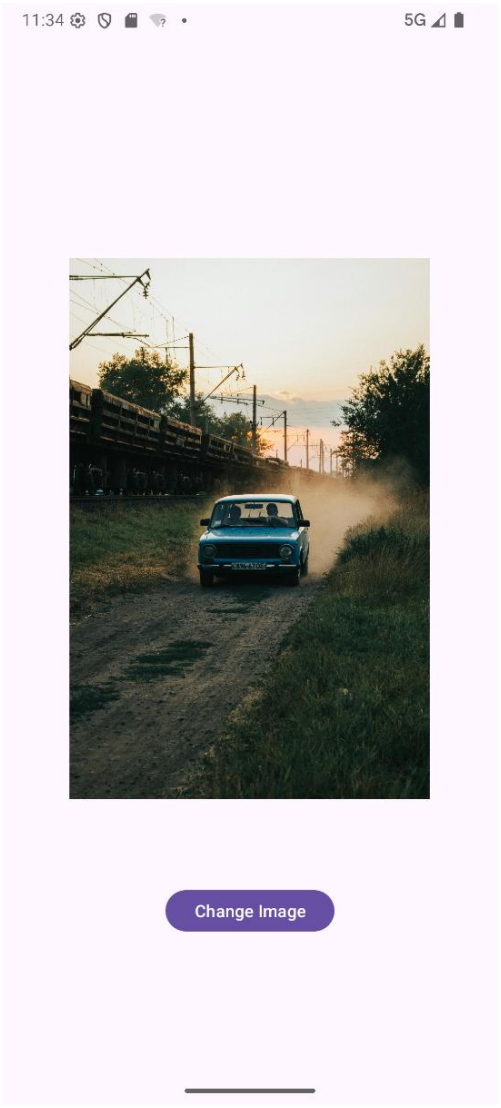
```
package com.example.experiment8;
import android.media.Image;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.widget.ImageView;
import androidx.activity.EdgeToEdge;
import androidx.appcompat.app.AppCompatActivity;
import androidx.core.graphics.Insets;
import androidx.core.view.ViewCompat;
import androidx.core.view.WindowInsetsCompat;
public class MainActivity extends AppCompatActivity implements
View.OnClickListener {
   ImageView Img;
   boolean flg;
   @Override
   protected void onCreate(Bundle savedInstanceState) {
      super.onCreate(savedInstanceState);
      EdgeToEdge.enable(this);
      setContentView(R.layout.activity_main);
      Button btn=(Button)findViewById(R.id.btn);
      Img=(ImageView)findViewById(R.id.img);
      btn.setOnClickListener((View.OnClickListener) this);
      flg=true;
   }

   @Override
   public void onClick(View view) {
      if(flg){
         Img.setImageResource(R.drawable.image1);
         flg=false;
      }
```

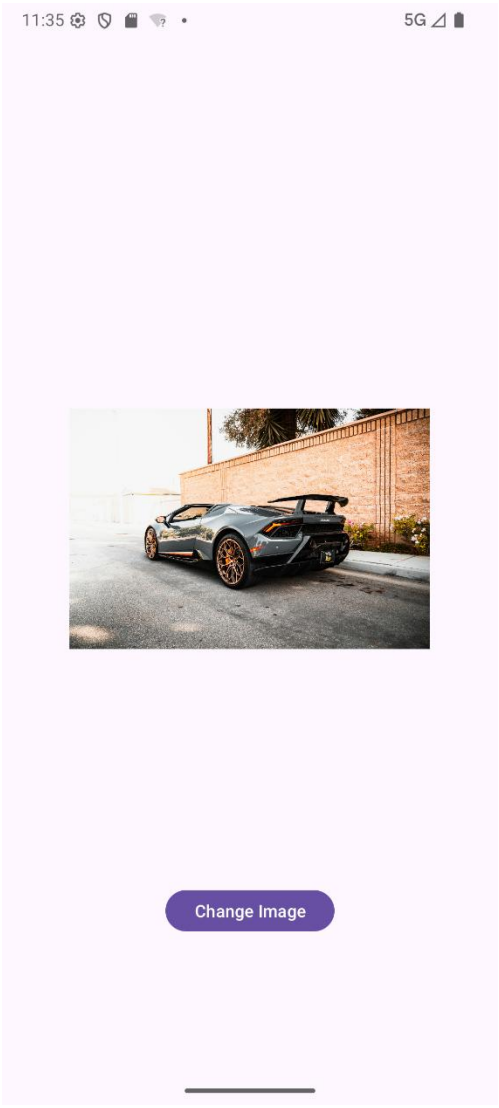
```
        else{
            Img.setImageResource(R.drawable.image2);
        }
    }
}
```

activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout 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:id="@+id/main"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:orientation="vertical"
    android:gravity="center"
    tools:context=".MainActivity">

    <ImageView
        android:id="@+id/img"
        android:layout_width="299dp"
        android:layout_height="592dp"
        android:src="@drawable/image1"
        android:text="Hello World!" />

    <Button
        android:id="@+id/btn"
        android:layout_width="wrap_content"
        android:layout_height="42dp"
        android:text="Change Image" />

</LinearLayout>
```

Output





Experiment 9: " Full-Featured Calculator with Layout Design “

Objective: To learn how to build a complete, working calculator combining arithmetic logic with advanced layout techniques using GridLayout and LinearLayout.

Question: Build a complete calculator app. Design its entire screen using GridLayout for all the number buttons (0-9) and operation buttons (+, -, *, /, equals, clear). Use a LinearLayout for the display area at the top where numbers are typed and results are shown. Make sure the calculator can perform all basic math operations correctly, and displays the answers in the top display area.

MainActivity.java

```
package com.example.experiment9;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.widget.EditText;
import androidx.activity.EdgeToEdge;
import androidx.appcompat.app.AppCompatActivity;
import androidx.core.graphics.Insets;
import androidx.core.view.ViewCompat;
import androidx.core.view.WindowInsetsCompat;
public class MainActivity extends AppCompatActivity {
    EditText editText;
    String oldNumber = "";
    String operator = "";
    boolean isNewOp = true;
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        EdgeToEdge.enable(this);
        setContentView(R.layout.activity_main);

        editText = findViewById(R.id.editText);
        editText.setShowSoftInputOnFocus(false); // disables keyboard popup
    }
    // Handles all button clicks
    public void operatorEvent(View view) {
        Button btn = (Button) view;
        String btnText = btn.getText().toString();
        String number = editText.getText().toString();
```

```
switch (btnText) {
    case "C":
        editText.setText("0.0");
        isNewOp = true;
        oldNumber = "";
        operator = "";
        break;
    case "+":
    case "-":
    case "*":
    case "/":
        oldNumber = number;
        operator = btnText;
        editText.setText(number + operator);
        isNewOp = false;
        break;
    case "=":
        String[] parts = number.split("[" + "\\+\\-\\*/" + "]");
        if (parts.length < 2) return;
        double first = Double.parseDouble(parts[0]);
        double second = Double.parseDouble(parts[1]);
        double result = 0.0;
        switch (operator) {
            case "+": result = first + second; break;
            case "-": result = first - second; break;
            case "*": result = first * second; break;
            case "/":
                if (second != 0) result = first / second;
                else {
                    editText.setText("Error");
                    return;
                }
                break;
        }
        editText.setText(String.valueOf(result));
        isNewOp = true;
        break;
    default: // digits
        if (isNewOp || number.equals("0.0")) {
            editText.setText(btnText);
```

```
                isNewOp = false;
            } else {
                editText.setText(number + btnText);
            }
            break;
        }
    }
}
```

activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout
    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"
    android:orientation="vertical"
    android:padding="10dp"
    tools:context=".MainActivity">
    <EditText
        android:layout_width="match_parent"
        android:layout_height="421dp"
        android:id="@+id/editText"
        android:layout_marginLeft="20dp"
        android:layout_marginRight="20dp"
        android:layout_marginTop="10dp"
        android:layout_marginBottom="20dp"
        android:layout_weight="1"
        android:textColor="@color/orange"
        android:ems="10"
        android:layout_gravity="right|center"
        android:text="0.0"
        android:textSize="100dp"
        android:inputType="number"/>
    <GridLayout
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:rowCount="4"
        android:columnCount="4"
```

```
android:layout_marginLeft="20dp"
android:layout_marginRight="20dp"
android:layout_marginBottom="10dp">
<Button
   android:layout_width="35pt"
   android:layout_height="50pt"
   android:id="@+id/b1"
   android:layout_marginRight="10dp"
   android:layout_weight="1"
   android:onClick="operatorEvent"
   android:text="C"
   android:textSize="40dp"
   tools:ignore="OnClick" />
<Button
   android:layout_width="35pt"
   android:layout_height="50pt"
   android:id="@+id/b2"
   android:layout_marginRight="10dp"
   android:layout_weight="1"
   android:onClick="operatorEvent"
   android:text="0"
   android:textSize="40dp"
   tools:ignore="OnClick" />
<Button
   android:layout_width="35pt"
   android:layout_height="50pt"
   android:id="@+id/b3"
   android:layout_marginRight="10dp"
   android:layout_weight="1"
   android:onClick="operatorEvent"
   android:text="*"
   android:textSize="40dp"
   tools:ignore="OnClick" />
<Button
   android:layout_width="35pt"
   android:layout_height="50pt"
   android:id="@+id/b4"
   android:layout_marginRight="10dp"
   android:layout_weight="1"
   android:onClick="operatorEvent"
```

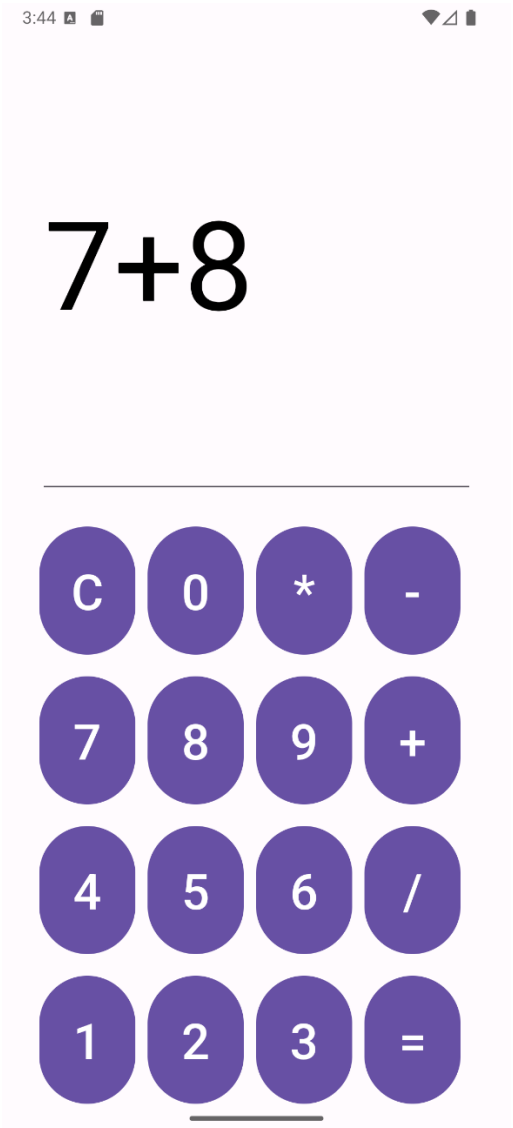
```
        android:text="-"
        android:textSize="40dp"
        tools:ignore="OnClick" />

    </GridLayout>
    <GridLayout
      android:layout_width="wrap_content"
      android:layout_height="wrap_content"
      android:rowCount="4"
      android:columnCount="4"
      android:layout_marginLeft="20dp"
      android:layout_marginRight="20dp"
      android:layout_marginBottom="10dp">
      <Button
        android:layout_width="35pt"
        android:layout_height="50pt"
        android:id="@+id/b5"
        android:layout_marginRight="10dp"
        android:layout_weight="1"
        android:onClick="operatorEvent"
        android:text="7"
        android:textSize="40dp"
        tools:ignore="OnClick" />
      <Button
        android:layout_width="35pt"
        android:layout_height="50pt"
        android:id="@+id/b6"
        android:layout_marginRight="10dp"
        android:layout_weight="1"
        android:onClick="operatorEvent"
        android:text="8"
        android:textSize="40dp"
        tools:ignore="OnClick" />
      <Button
        android:layout_width="35pt"
        android:layout_height="50pt"
        android:id="@+id/b7"
        android:layout_marginRight="10dp"
        android:layout_weight="1"
        android:onClick="operatorEvent"
```

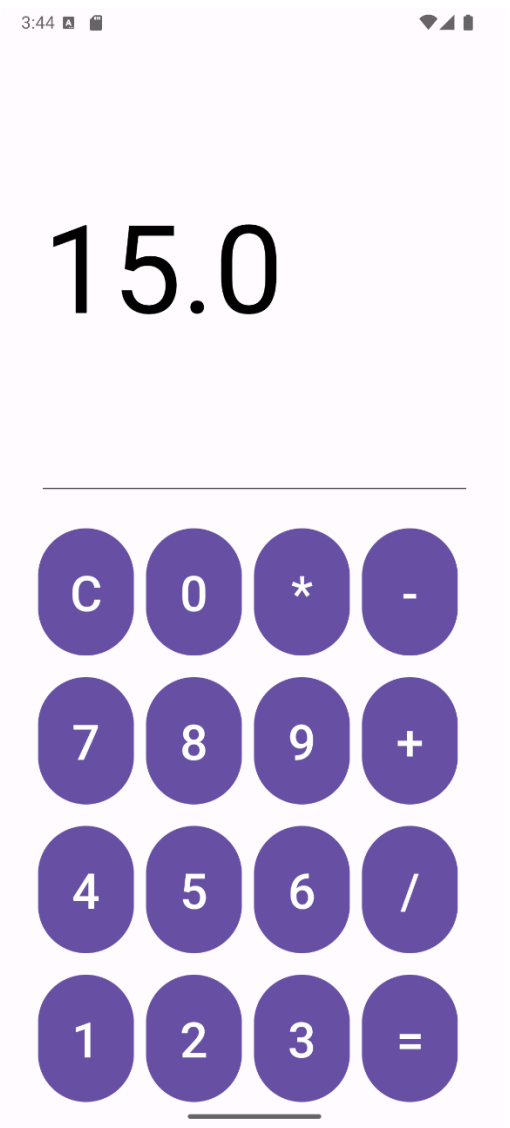
```
        android:text="9"
        android:textSize="40dp"
        tools:ignore="OnClick" />
    <Button
        android:layout_width="35pt"
        android:layout_height="50pt"
        android:id="@+id/b8"
        android:layout_marginRight="10dp"
        android:layout_weight="1"
        android:onClick="operatorEvent"
        android:text="+"
        android:textSize="40dp"
        tools:ignore="OnClick" />
</GridLayout>
<GridLayout
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:rowCount="4"
    android:columnCount="4"
    android:layout_marginLeft="20dp"
    android:layout_marginRight="20dp"
    android:layout_marginBottom="10dp">
    <Button
        android:layout_width="35pt"
        android:layout_height="50pt"
        android:id="@+id/b9"
        android:layout_marginRight="10dp"
        android:layout_weight="1"
        android:onClick="operatorEvent"
        android:text="4"
        android:textSize="40dp"
        tools:ignore="OnClick" />
    <Button
        android:layout_width="35pt"
        android:layout_height="50pt"
        android:id="@+id/b10"
        android:layout_marginRight="10dp"
        android:layout_weight="1"
        android:onClick="operatorEvent"
        android:text="5"
```

```
        android:textSize="40dp"
        tools:ignore="OnClick" />
    <Button
        android:layout_width="35pt"
        android:layout_height="50pt"
        android:id="@+id/b11"
        android:layout_marginRight="10dp"
        android:layout_weight="1"
        android:onClick="operatorEvent"
        android:text="6"
        android:textSize="40dp"
        tools:ignore="OnClick" />
    <Button
        android:layout_width="35pt"
        android:layout_height="50pt"
        android:id="@+id/b12"
        android:layout_marginRight="10dp"
        android:layout_weight="1"
        android:onClick="operatorEvent"
        android:text="/"
        android:textSize="40dp"
        tools:ignore="OnClick" />
</GridLayout>
<GridLayout
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:rowCount="4"
    android:columnCount="4"
    android:layout_marginLeft="20dp"
    android:layout_marginRight="20dp"
    android:layout_marginBottom="10dp">
    <Button
        android:layout_width="35pt"
        android:layout_height="50pt"
        android:id="@+id/b13"
        android:layout_marginRight="10dp"
        android:layout_weight="1"
        android:onClick="operatorEvent"
        android:text="1"
        android:textSize="40dp"
```

```
        tools:ignore="OnClick" />
    <Button
        android:layout_width="35pt"
        android:layout_height="50pt"
        android:id="@+id/b14"
        android:layout_marginRight="10dp"
        android:layout_weight="1"
        android:onClick="operatorEvent"
        android:text="2"
        android:textSize="40dp"
        tools:ignore="OnClick" />
    <Button
        android:layout_width="35pt"
        android:layout_height="50pt"
        android:id="@+id/b15"
        android:layout_marginRight="10dp"
        android:layout_weight="1"
        android:onClick="operatorEvent"
        android:text="3"
        android:textSize="40dp"
        tools:ignore="OnClick" />
    <Button
        android:layout_width="35pt"
        android:layout_height="50pt"
        android:id="@+id/b16"
        android:layout_marginRight="10dp"
        android:layout_weight="1"
        android:onClick="operatorEvent"
        android:text="="
        android:textSize="40dp"
        tools:ignore="OnClick" />

  </GridLayout>
</LinearLayout>
```

Output





Experiment 10: " Student Registration Form with Checks “

Objective: Learn to build a form with different input fields and check if the information typed is correct.

Question: Design a student sign-up form. Include boxes for Name, Email, Password, and Phone Number. Add a "Register" button. When clicked, check if each box has corrected info (e.g., email has "@", phone is 10 digits, password isn't empty). If everything is good, show a message "Signed Up!". If something is wrong, show a message saying what needs fixing.

MainActivity.java

```
package com.example.experiment10;
import android.os.Bundle;
import android.view.View;
import android.widget.EditText;
import android.widget.Toast;
import androidx.activity.EdgeToEdge;
import androidx.appcompat.app.AppCompatActivity;
import androidx.core.graphics.Insets;
import androidx.core.view.ViewCompat;
import androidx.core.view.WindowInsetsCompat;
import com.google.android.material.button.MaterialButton;
public class MainActivity extends AppCompatActivity {

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

        // 1. Initialize all EditText and Button views
        EditText username = findViewById(R.id.username);
        EditText useremail = findViewById(R.id.useremail);
        EditText phoneNumber = findViewById(R.id.phonenumber);
        EditText password = findViewById(R.id.password);
        // Based on your XML, cpassword is the fourth EditText, so we'll assume it's for
the phone number.
        MaterialButton regbtn = findViewById(R.id.signupbtn);

        // 2. Set an OnClickListener for the registration button
```

```
        regbtn.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View view) {
                // 3. Get the text from each input field and trim whitespace
                String name = username.getText().toString().trim();
                String email = useremail.getText().toString().trim();
                String phone = phoneNumber.getText().toString().trim();
                String pass = password.getText().toString().trim();

                // 4. Perform validation checks
                if (name.isEmpty()) {
                    Toast.makeText(MainActivity.this,"Name cannot be empty.",
Toast.LENGTH_SHORT).show();
                } else if (!email.contains("@")) {
                    Toast.makeText(MainActivity.this, "Please enter a valid email address.",
Toast.LENGTH_SHORT).show();
                } else if (phone.length() != 10) {
                    Toast.makeText(MainActivity.this, "Phone number must be 10 digits.",
Toast.LENGTH_SHORT).show();
                } else if (pass.isEmpty()) {
                    Toast.makeText(MainActivity.this, "Password cannot be empty.",
Toast.LENGTH_SHORT).show();
                } else {
                    // 5. If all validations pass, show a success message
                    Toast.makeText(MainActivity.this, "Signed Up! Welcome, " + name +
".", Toast.LENGTH_LONG).show();
                }
            }
        });
    }
}
```

activity_main.xml

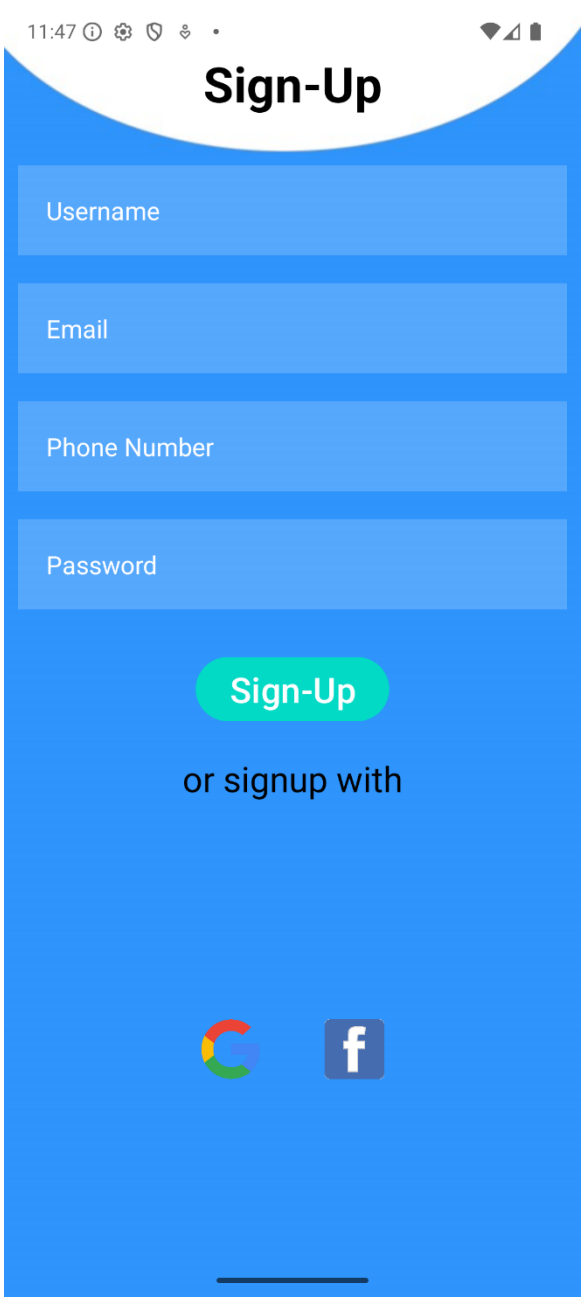
```
<?xml version="1.0" encoding="utf-8"?>
<RelativeLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:id="@+id/main"
    android:layout_width="match_parent"
```

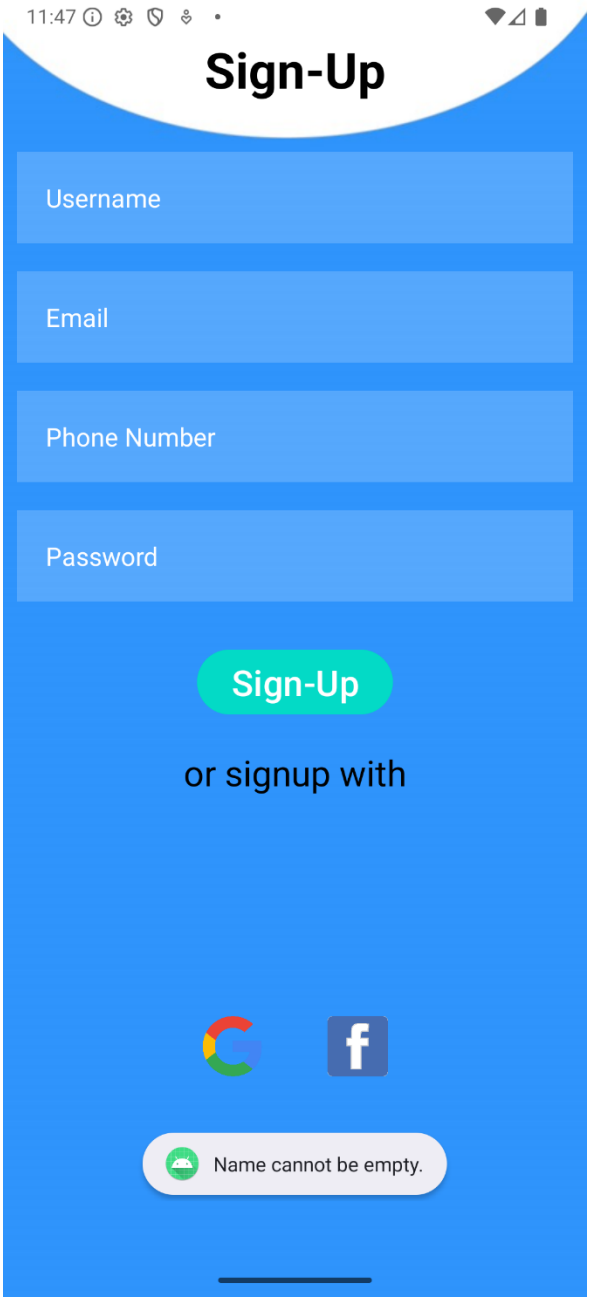
```
    android:layout_height="match_parent"
    android:background="@drawable/rbgg"
    tools:context=".MainActivity">

    <TextView
        android:id="@+id/signuptitle"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_margin="25dp"
        android:layout_marginTop="25dp"
        android:layout_marginBottom="25dp"
        android:gravity="center"
        android:text="Sign-Up"
        android:textColor="@color/black"
        android:textSize="35dp"
        android:textStyle="bold" />

    <EditText
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:id="@+id/username"
        android:layout_below="@+id/signuptitle"
        android:background="#30ffffff"
        android:hint="Username"
        android:textColorHint="@color/white"
        android:textColor="@color/white"
        android:layout_margin="10dp"
        android:padding="20dp"/>

    <EditText
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:id="@+id/useremail"
        android:layout_below="@+id/username"
        android:background="#30ffffff"
        android:hint="Email"
        android:textColorHint="@color/white"
        android:textColor="@color/white"
        android:layout_margin="10dp"
        android:padding="20dp"/>
```

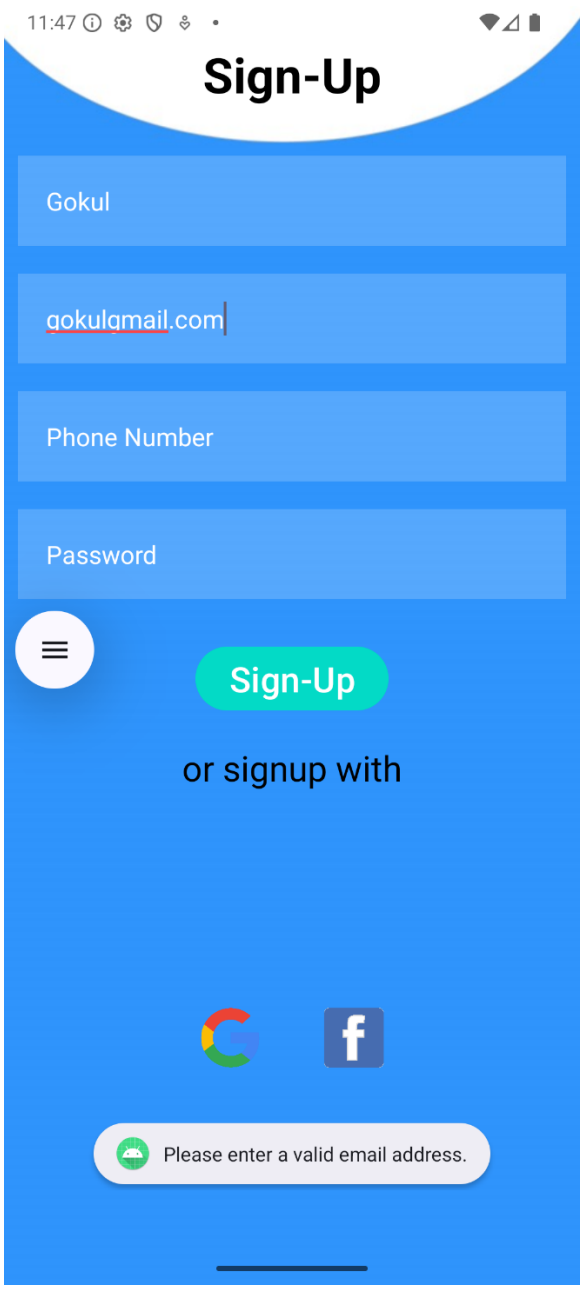
```
<EditText
    android:id="@+id/phonenumber"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:layout_below="@+id/useremail"
    android:layout_margin="10dp"
    android:layout_marginTop="129dp"
    android:layout_marginBottom="10dp"
    android:background="#30ffffff"
    android:hint="Phone Number"
    android:padding="20dp"
    android:textColor="@color/white"
    android:textColorHint="@color/white" />

<EditText
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:id="@+id/password"
    android:layout_below="@+id/phonenumber"
    android:background="#30ffffff"
    android:hint="Password"
    android:textColorHint="@color/white"
    android:textColor="@color/white"
    android:layout_margin="10dp"
    android:padding="20dp"/>



<com.google.android.material.button.MaterialButton
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:id="@+id/signupbtn"
    android:text="Sign-Up"
    android:textSize="25dp"
    android:layout_below="@+id/password"
    android:layout_centerHorizontal="true"
    android:backgroundTint="@color/design_default_color_secondary"
    android:layout_margin="20dp"/>
```

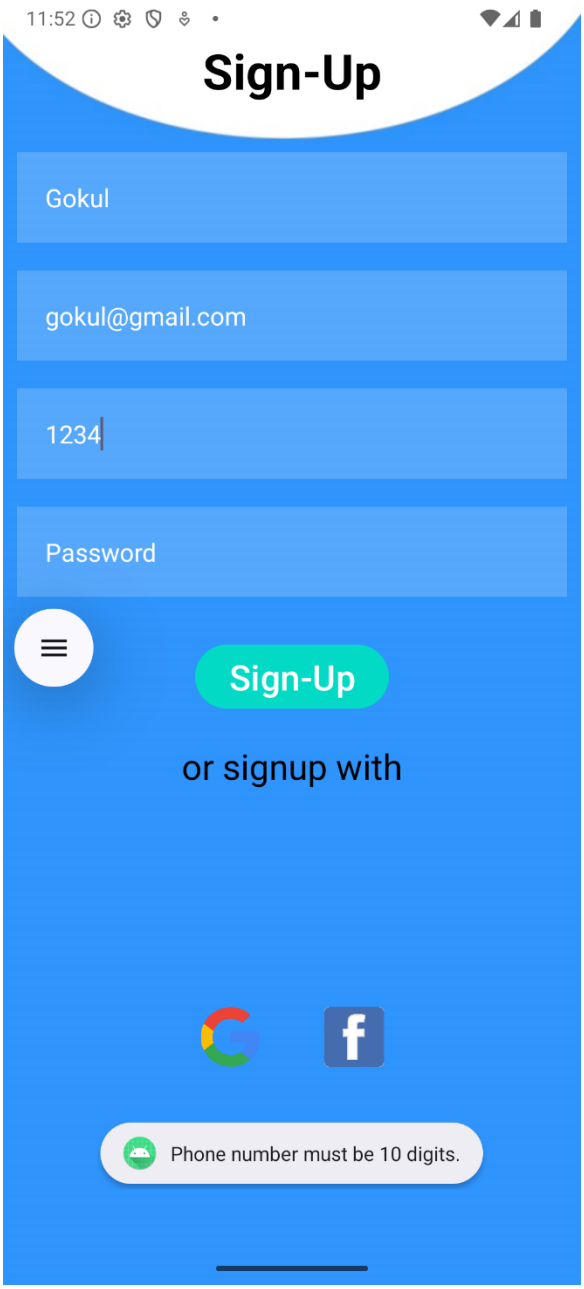
```
    <TextView
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:id="@+id/info"
        android:text="or signup with"
        android:textSize="25dp"
        android:textColor="@color/black"
        android:layout_below="@+id/signupbtn"
        android:layout_centerHorizontal="true"/>

    <LinearLayout
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:id="@+id/socialicons"
        android:gravity="center"
        android:layout_below="@+id/info"
        android:layout_alignParentBottom="true">

        <ImageView
            android:layout_width="48dp"
            android:layout_height="48dp"
            android:layout_margin="20dp"
            android:src="@drawable/googleicon"/>
        <ImageView
            android:layout_width="48dp"
            android:layout_height="48dp"
            android:layout_margin="20dp"
            android:src="@drawable/facebookicon"/>

    </LinearLayout>

</RelativeLayout>
```

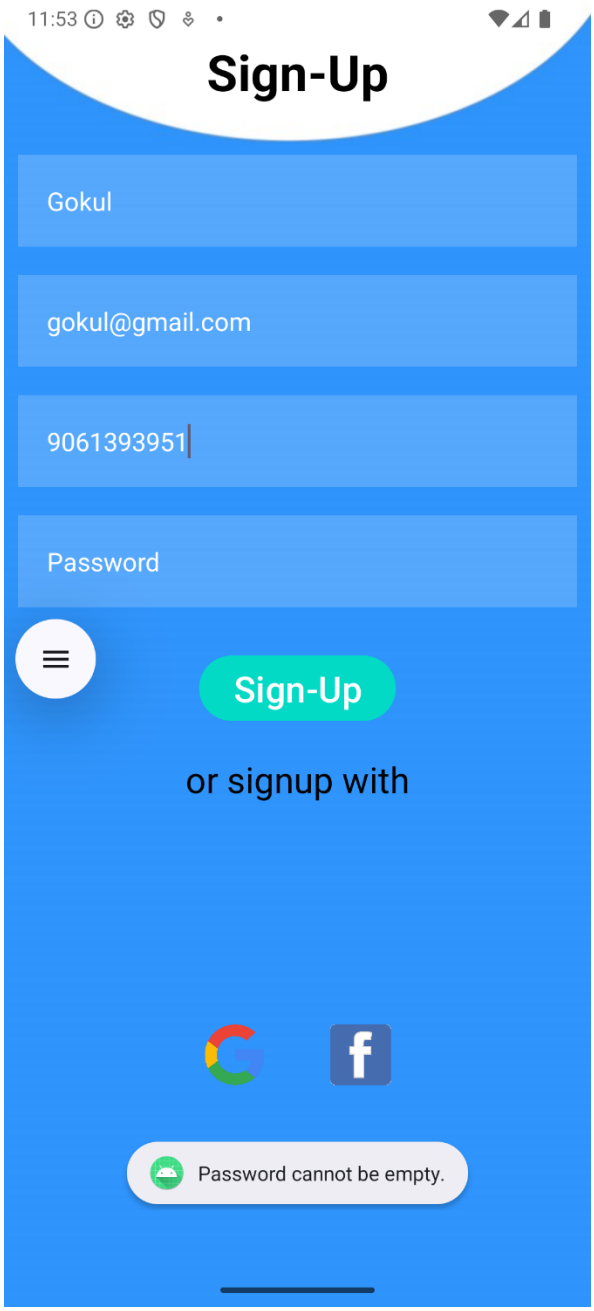
Output

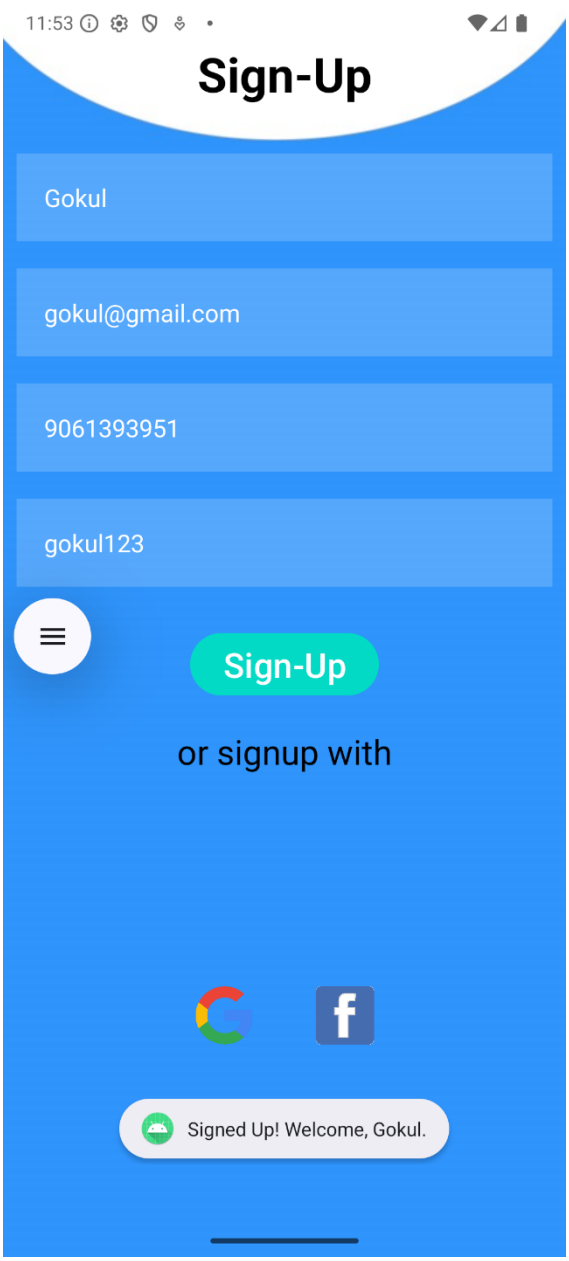

11:47
Sign-Up
Username
Email
Phone Number
Password
Sign-Up
or signup with


11:47
Sign-Up
Username
Email
Phone Number
Password
Sign-Up
or signup with
Name cannot be empty.


11:47
Sign-Up
Gokul
gokulgmail.com
Phone Number
Password
Sign-Up
or signup with
Please enter a valid email address.


11:52
Sign-Up
Gokul
gokul@gmail.com
1234
Password
Sign-Up
or signup with
Phone number must be 10 digits.


11:53
Sign-Up
Gokul
gokul@gmail.com
9061393951
Password
Sign-Up
or signup with
Password cannot be empty.


11:53
Sign-Up
Gokul
gokul@gmail.com
9061393951
gokul123
Sign-Up
or signup with
Signed Up! Welcome, Gokul.

Experiment 11: "Interest Selection Profile Page"

Objective: Learn to use CheckBox for multiple selections and ListView to display selected items dynamically in a profile settings layout.

Question:Design a profile settings page for a user. Add several CheckBoxes with options like "Music", "Sports", "Travel", "Movies", etc., representing the user's interests. Below the CheckBoxes, add a "Submit" button. When the button is clicked, display the selected interests in a TextView below.

MainActivity.java

```
package com.example.experiment11;
import android.os.Bundle;
import android.widget.Button;
import android.widget.CheckBox;
import android.widget.TextView;
import androidx.activity.EdgeToEdge;
import androidx.appcompat.app.AppCompatActivity;
import androidx.core.graphics.Insets;
import androidx.core.view.ViewCompat;
import androidx.core.view.WindowInsetsCompat;
public class MainActivity extends AppCompatActivity {
   CheckBox cbMusic, cbSports, cbTravel, cbMovies, cbReading;
   Button btnSubmit;
   TextView tvResult;
   @Override
   protected void onCreate(Bundle savedInstanceState) {
      super.onCreate(savedInstanceState);
      setContentView(R.layout.activity_main);
      cbMusic = findViewById(R.id.cbMusic);
      cbSports = findViewById(R.id.cbSports);
      cbTravel = findViewById(R.id.cbTravel);
      cbMovies = findViewById(R.id.cbMovies);
      cbReading = findViewById(R.id.cbReading);
      btnSubmit = findViewById(R.id.btnSubmit);
      tvResult = findViewById(R.id.tvResult);
      btnSubmit.setOnClickListener(v -> {
         StringBuilder selected = new StringBuilder("Your Interests: ");  if
(cbMusic.isChecked()) selected.append("Music, ");
         if (cbSports.isChecked()) selected.append("Sports, ");
         if (cbTravel.isChecked()) selected.append("Travel, ");
```

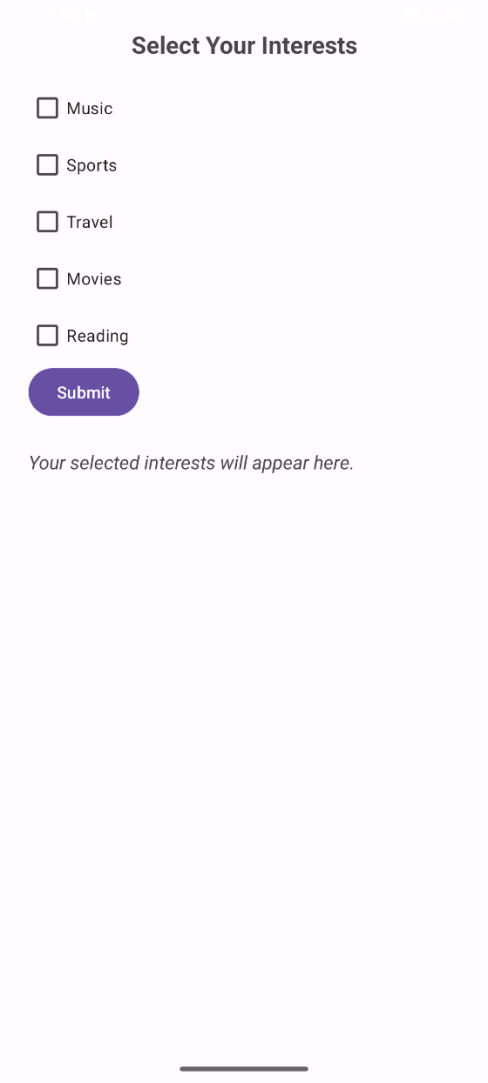
```
        if (cbMovies.isChecked()) selected.append("Movies, ");
        if (cbReading.isChecked()) selected.append("Reading, ");
        if (selected.toString().equals("Your Interests: ")) {
            tvResult.setText("No interests selected.");
        } else {
            selected.setLength(selected.length() - 2);
            tvResult.setText(selected.toString());
        }
    });
  }
}
```

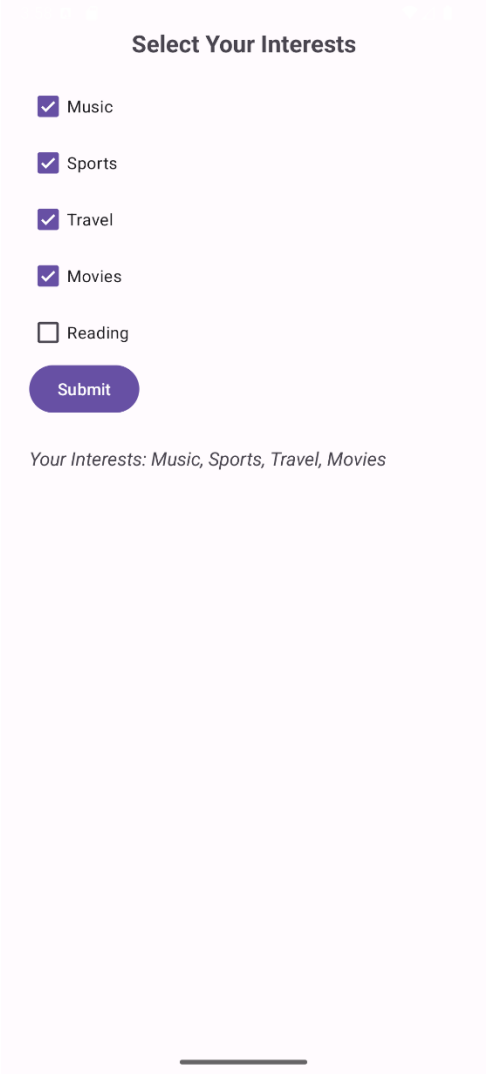
activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<ScrollView xmlns:android="http://schemas.android.com/apk/res/android"
android:layout_width="match_parent"
  android:layout_height="match_parent">
  <LinearLayout
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:orientation="vertical"
    android:padding="24dp">
    <TextView
      android:id="@+id/tvTitle"
      android:layout_width="match_parent"
      android:layout_height="wrap_content"
      android:text="Select Your Interests"
      android:textSize="20sp"
      android:textStyle="bold"
      android:gravity="center"
      android:layout_marginBottom="16dp" />
    <CheckBox
      android:id="@+id/cbMusic"
      android:layout_width="wrap_content"
      android:layout_height="wrap_content"
      android:text="Music" />
    <CheckBox
      android:id="@+id/cbSports"
      android:layout_width="wrap_content"
```

```
        android:layout_height="wrap_content"
        android:text="Sports" />
    <CheckBox
        android:id="@+id/cbTravel"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Travel" />
    <CheckBox
        android:id="@+id/cbMovies"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Movies" />
    <CheckBox
        android:id="@+id/cbReading"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Reading" />
    <Button
        android:id="@+id/btnSubmit"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Submit"/>

    <TextView
        android:id="@+id/tvResult"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:textSize="16sp"
        android:layout_marginTop="24dp"
        android:textStyle="italic"
        android:text="Your selected interests will appear here." /> </LinearLayout>
</ScrollView>
```

Output


Select Your Interests
Music
Sports
Travel
Movies
Reading
Submit
Your selected interests will appear here.


Select Your Interests
Music
Sports
Travel
Movies
Reading
Submit
Your Interests: Music, Sports, Travel, Movies

Experiment 12: "Image Slider with Button Clicks"

Objective : Learn to switch between multiple images (more than two) using FrameLayout and control their visibility using Next/Previous buttons.

Question: Design an Android app that displays one image at a time using a FrameLayout. Place at least inside the layout, one on top of the other. Add two buttons: and . When the user clicks , show the next image; clicking shows the previous image. The images should loop correctly from last to first and vice versa.

MainActivity.java

```
package com.example.experiment12;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.widget.ImageView;
import androidx.activity.EdgeToEdge;
import androidx.appcompat.app.AppCompatActivity;
import androidx.core.graphics.Insets;
import androidx.core.view.ViewCompat;
import androidx.core.view.WindowInsetsCompat;
public class MainActivity extends AppCompatActivity {
   private ImageView[] images;
   private int current = 0; // Index of currently visible image
   @Override
   protected void onCreate(Bundle savedInstanceState) {
      super.onCreate(savedInstanceState);
      setContentView(R.layout.activity_main);

      images = new ImageView[]{
            findViewById(R.id.image1),
            findViewById(R.id.image2),
            findViewById(R.id.image3)
// Add more if you have more images
      };
      Button nextBtn = findViewById(R.id.btnNext);
      Button prevBtn = findViewById(R.id.btnPrev);
      nextBtn.setOnClickListener(new View.OnClickListener() {
         @Override
```

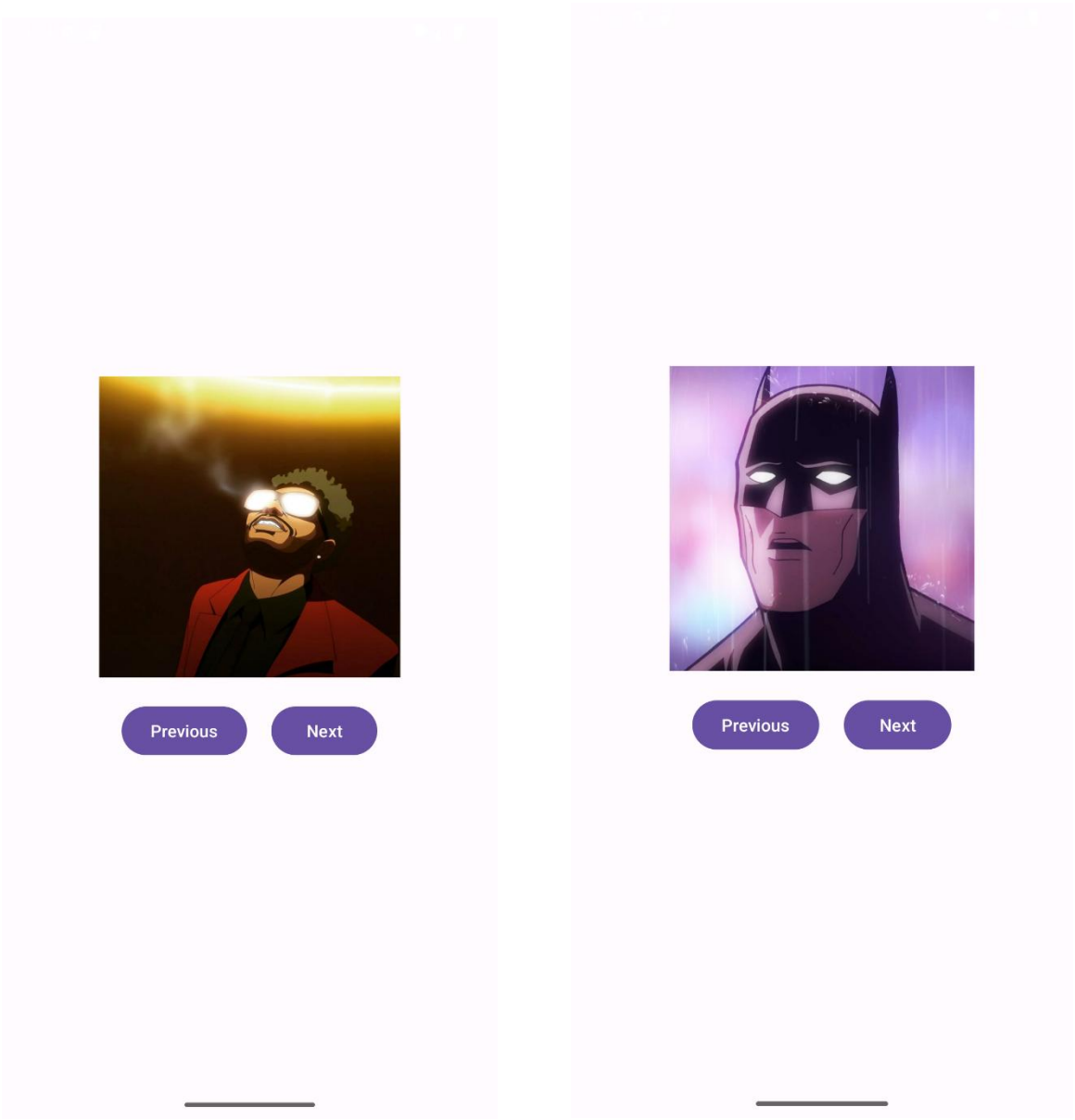
```
        public void onClick(View v) {
            images[current].setVisibility(View.GONE);
            current = (current + 1) % images.length;
            images[current].setVisibility(View.VISIBLE);
        }
    });
    prevBtn.setOnClickListener(new View.OnClickListener() {
        @Override
        public void onClick(View v) {
            images[current].setVisibility(View.GONE);
            current = (current - 1 + images.length) % images.length;
            images[current].setVisibility(View.VISIBLE);
        }
    });
  }
}
```

activity_main.xml

```
<?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"
  android:gravity="center"
  android:padding="16dp">
  <!-- Image container -->
  <FrameLayout
    android:id="@+id/frameLayout"
    android:layout_width="250dp"
    android:layout_height="250dp">
    <ImageView
      android:id="@+id/image1"
      android:layout_width="match_parent"
      android:layout_height="match_parent"
      android:src="@drawable/img1"
      android:scaleType="centerCrop"
      android:visibility="visible" />
    <ImageView
      android:id="@+id/image2"
      android:layout_width="match_parent"
```

```
        android:layout_height="match_parent"
        android:src="@drawable/img2"
        android:scaleType="centerCrop"
        android:visibility="gone" />
    <ImageView
        android:id="@+id/image3"
        android:layout_width="match_parent"
        android:layout_height="match_parent"
        android:src="@drawable/img3"
        android:scaleType="centerCrop"
        android:visibility="gone" />
  </FrameLayout>
  <LinearLayout
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:orientation="horizontal"
        android:layout_marginTop="20dp">
    <Button
        android:id="@+id/btnPrev"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Previous" />
    <Button
        android:id="@+id/btnNext"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Next"
        android:layout_marginStart="20dp" />
    </LinearLayout>
</LinearLayout>
```

Output



Previous Next

Previous Next

Experiment 13: "Colour Picker with ListView"

Objective: Learn to change the background color of an app's screen based on user selection from a ListView (ListBox).

Question: Create an app with a main screen that serves as the background. Add a ListView (ListBox) displaying at least three color options — for example: Red, Green, and Blue. When the user taps on a color from the list, change the background color of the screen to the selected color.

MainActivity.java

```
package com.example.experiment13;
import android.annotation.SuppressLint;
import android.graphics.Color;
import android.os.Bundle;
import android.widget.ArrayAdapter;
import android.widget.LinearLayout;
import android.widget.ListView;
import androidx.activity.EdgeToEdge;
import androidx.appcompat.app.AppCompatActivity;
import androidx.core.graphics.Insets;
import androidx.core.view.ViewCompat;
import androidx.core.view.WindowInsetsCompat;
public class MainActivity extends AppCompatActivity {
   private LinearLayout mainLayout;
   private ListView colorList;
   private String[] colors = {"Red", "Green", "Blue"};
   @SuppressLint("MissingInflatedId")
   @Override
   protected void onCreate(Bundle savedInstanceState) {
      super.onCreate(savedInstanceState);
      setContentView(R.layout.activity_main);
      mainLayout = findViewById(R.id.mainLayout);
      colorList = findViewById(R.id.colorList);
      ArrayAdapter<String> adapter = new ArrayAdapter<>(this,
            android.R.layout.simple_list_item_1, colors);
      colorList.setAdapter(adapter);
      colorList.setOnItemClickListener((parent, view, position, id) -> {
         switch (colors[position]) {
```

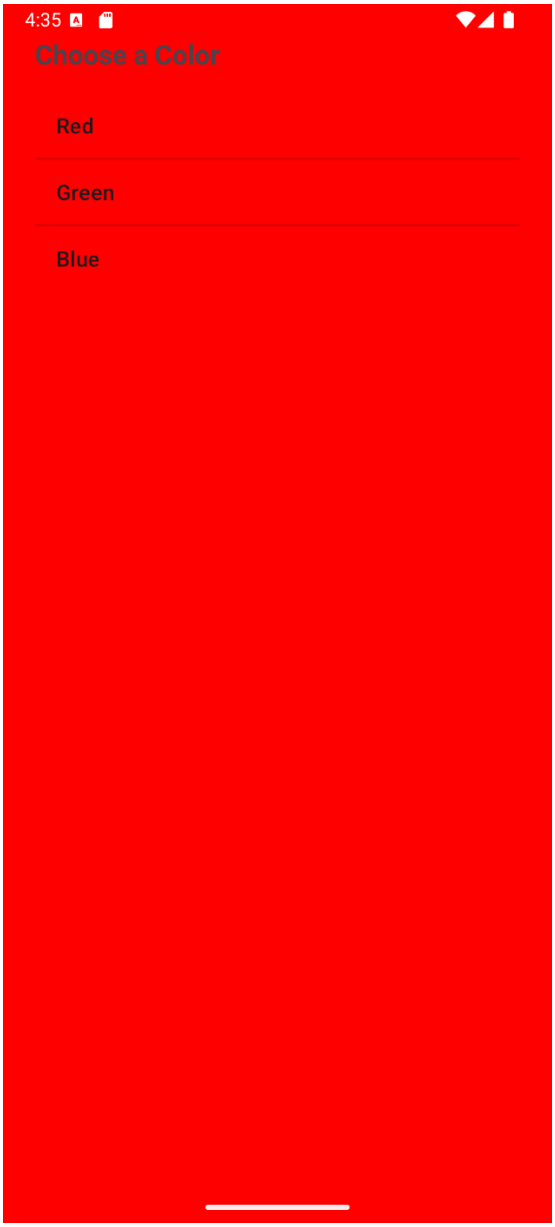
```
            case "Red":
                mainLayout.setBackgroundColor(Color.RED);
                break;
            case "Green":
                mainLayout.setBackgroundColor(Color.GREEN);
                break;
            case "Blue":
                mainLayout.setBackgroundColor(Color.BLUE);
                break;
        }
    });
  }
}
```

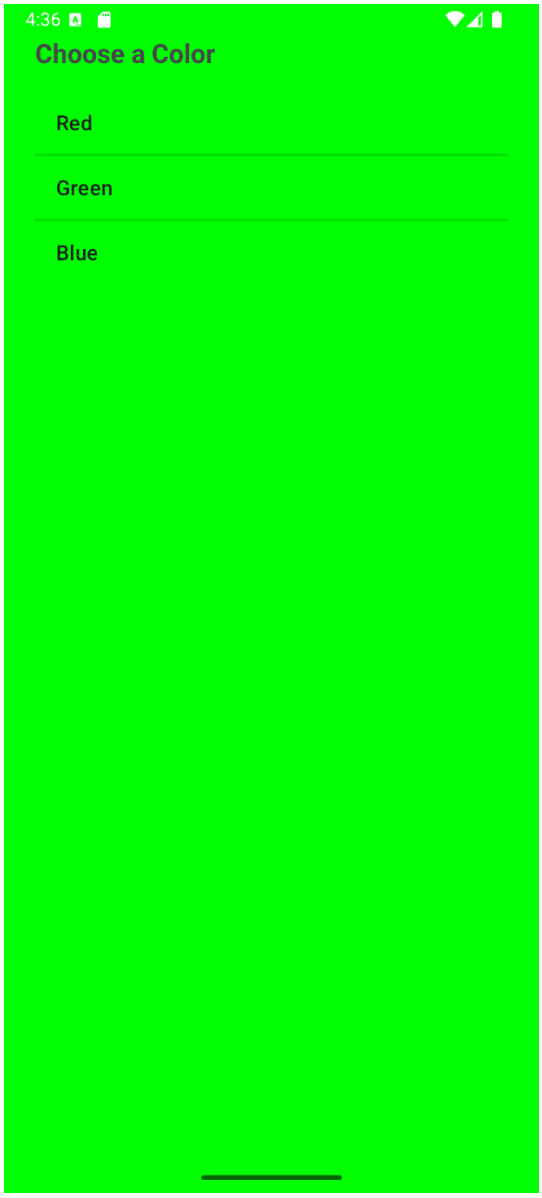
activity_main.xml

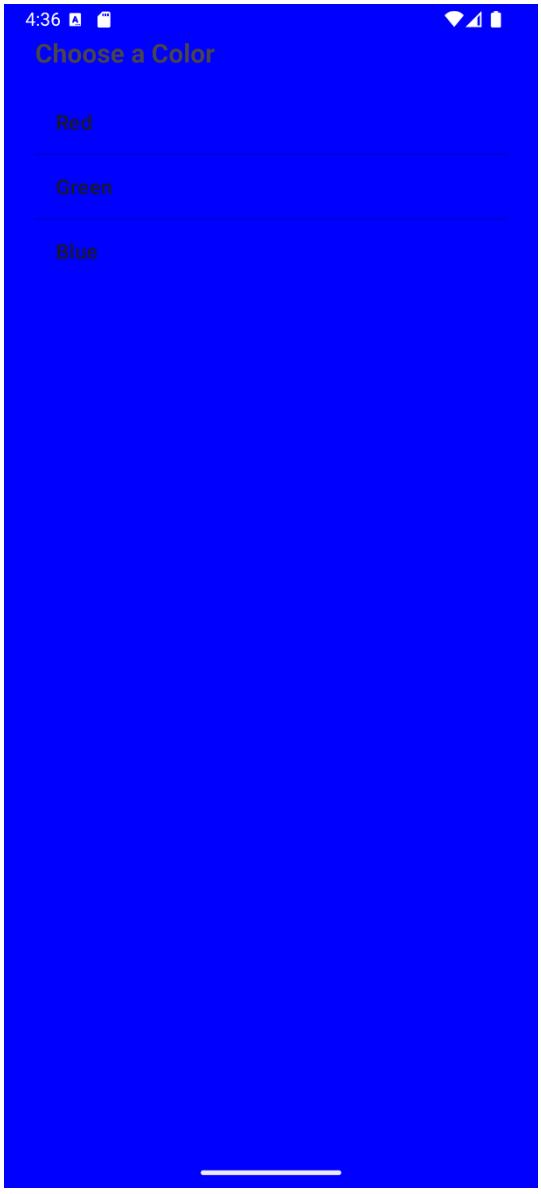
```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
  android:id="@+id/mainLayout"
  android:layout_width="match_parent"
  android:layout_height="match_parent"
  android:orientation="vertical"
  android:padding="24dp">
  <TextView
    android:id="@+id/title"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="Choose a Color"
    android:textSize="20sp"
    android:textStyle="bold"
    android:layout_marginBottom="16dp" />
  <ListView
    android:id="@+id/colorList"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:dividerHeight="2dp" />
</LinearLayout>
```

Output


Choose a Color
Red
Green
Blue


4:35
Choose a Color
Red
Green
Blue


4:36
Choose a Color
Red
Green
Blue


4:36
Choose a Color
Red
Green
Blue

CO4: Intents, menus, inter-component navigation

Experiment 14: "Multi-Activity Navigation"

Objective: To learn how to navigate between different activities (screens) in an application using Intents.

Question: Implement Intents to navigate between multiple activities in login application.

MainActivity.java

```
package com.example.experiment14;
import android.annotation.SuppressLint;
import android.content.Intent;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.widget.EditText;
import android.widget.Toast;
import androidx.appcompat.app.AppCompatActivity;
public class MainActivity extends AppCompatActivity {
   EditText username;
   EditText password;
   Button loginButton;
   @SuppressLint("MissingInflatedId")
   @Override
   protected void onCreate(Bundle savedInstanceState) {
      super.onCreate(savedInstanceState);
      setContentView(R.layout.activity_main);
      username=findViewById(R.id.username);
      password=findViewById(R.id.password);
      loginButton=findViewById(R.id.loginButton);
      loginButton.setOnClickListener(new View.OnClickListener() {
         @Override
         public void onClick(View view) {
            if(username.getText().toString().equals("user")&&
                  password.getText().toString().equals("1234"))
            {
               Intent intent = new Intent(MainActivity.this, MainActivity2.class);
```

```
                startActivity(intent);
            }
            else {
                Toast.makeText(MainActivity.this,"Login
Failed",Toast.LENGTH_SHORT).show();
            }
        }

    });
  }
}
```

activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout
  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"
  xmlns:card_view="http://schemas.android.com/apk/res-auto"
  android:id="@+id/main"
  android:layout_width="match_parent"
  android:layout_height="match_parent"
  android:orientation="vertical"
  android:gravity="center"
  android:background="@drawable/lbg"
  tools:context=".MainActivity">
  <androidx.cardview.widget.CardView
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:layout_margin="30dp"
    app:cardCornerRadius="30dp"
    app:cardElevation="20dp"
    android:background="@drawable/custom_edittext">
    <LinearLayout
      android:layout_width="match_parent"
      android:layout_height="wrap_content"
      android:orientation="vertical"
      android:layout_gravity="center_horizontal"
      android:padding="24dp">
```

```
<TextView
   android:layout_width="match_parent"
   android:layout_height="wrap_content"
   android:text="Login"
   android:id="@+id/logintext"
   android:textSize="36sp"

   android:textAlignment="center"
   android:textStyle="bold"
   android:textColor="@color/black"/>
<EditText
   android:layout_width="match_parent"
   android:layout_height="50dp"
   android:id="@+id/username"
   android:background="@drawable/custom_edittext"

   android:drawablePadding="8dp"
   android:hint="Username"
   android:padding="8dp"
   android:textColor="@color/black"
   android:textColorHighlight="@color/cardview_dark_background"
   android:layout_marginTop="40dp"/>
<EditText
   android:layout_width="match_parent"
   android:layout_height="50dp"
   android:id="@+id/password"
   android:background="@drawable/custom_edittext"

   android:drawablePadding="8dp"
   android:hint="Password"
   android:padding="8dp"
   android:inputType="textPassword"
   android:textColor="@color/black"
   android:textColorHighlight="@color/cardview_dark_background"
   android:layout_marginTop="20dp"/>
<Button
   android:layout_width="match_parent"
   android:layout_height="60dp"
   android:id="@+id/loginButton"
   android:text="Login"
```

```
            android:textSize="18sp"
            android:layout_marginTop="30dp"
            android:backgroundTint="@color/black"
            app:cornerRadius="20dp"/>

    </LinearLayout>
  </androidx.cardview.widget.CardView>
  <TextView
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:padding="8dp"
    android:text="Not yet registered? SignUp Now."
    android:textSize="14sp"
    android:textAlignment="center"
    android:id="@+id/signupText"
    android:textColor="@color/purple"
    android:layout_marginBottom="20dp"/>
</LinearLayout>
```

MainActivity2.java

```
package com.example.experiment14;
import android.os.Bundle;
import androidx.appcompat.app.AppCompatActivity;

public class MainActivity2 extends AppCompatActivity {
  @Override
  protected void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_main2); // Home screen layout
  }
}
```

activity_main2.xml

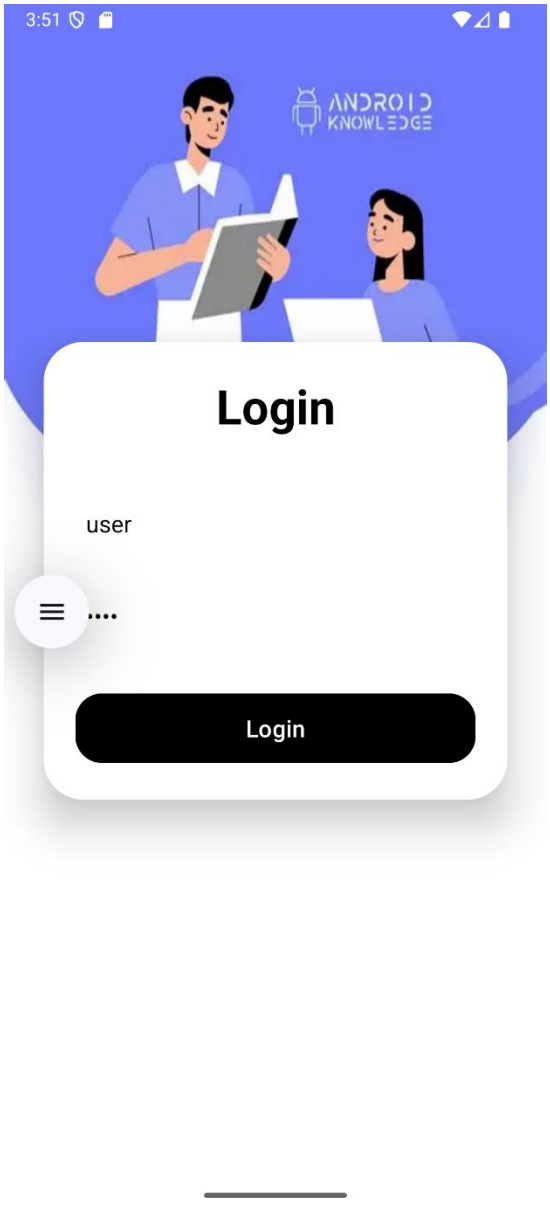
```
<!-- res/layout/activity_main2.xml -->
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
  android:layout_width="match_parent"
  android:layout_height="match_parent"
  android:gravity="center"
  android:orientation="vertical">
```

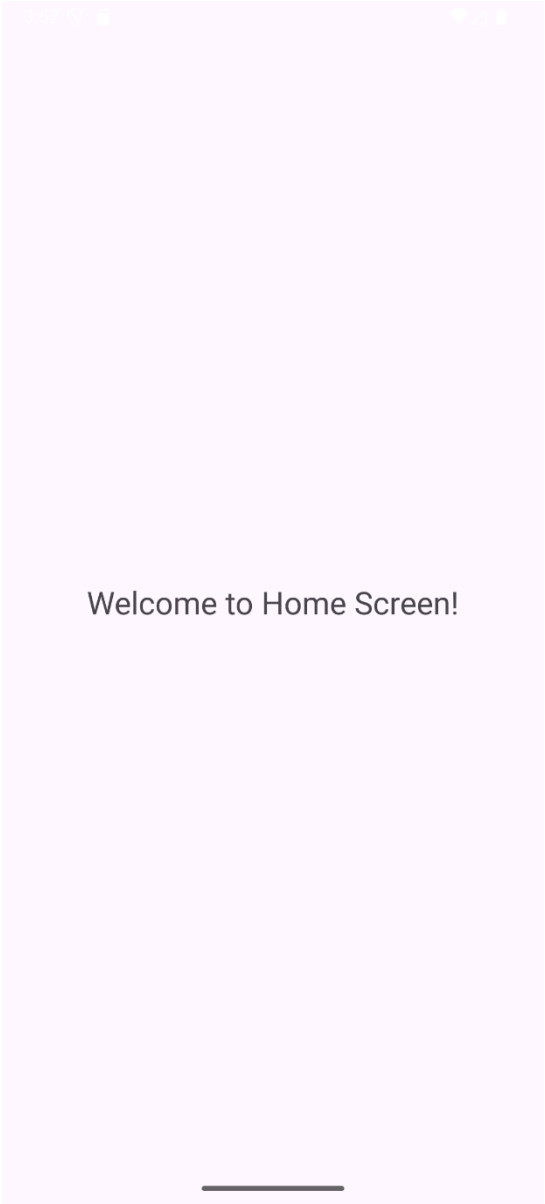
```
    <TextView
        android:id="@+id/tvWelcome"
        android:text="Welcome to Home Screen!"
        android:textSize="24sp"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content" />
</LinearLayout>
```

AndroidManifest.xml

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

    <application
        android:allowBackup="true"
        android:dataExtractionRules="@xml/data_extraction_rules"
        android:fullBackupContent="@xml/backup_rules"
        android:icon="@mipmap/ic_launcher"
        android:label="@string/app_name"
        android:roundIcon="@mipmap/ic_launcher_round"
        android:supportsRtl="true"
        android:theme="@style/Theme.Experiment14">

        <!-- Second Activity (MainActivity2) -->
        <activity android:name=".MainActivity2" />

        <!-- Main / Launcher Activity -->
        <activity
            android:name=".MainActivity"
            android:exported="true">
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />
                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>

    </application>

</manifest>
```

Output


3:51
ANDROID KNOWLEDGE
Login
user
....
Login


Welcome to Home Screen!

Experiment 15: "Options Menu Navigation"

Objective: To learn how to implement an Options Menu and use it to navigate to different activities.

Question: Implement an Options Menu in your application. Use the menu items to navigate to different activities.

MainActivity.java

```
package com.example.experiment15;
import android.content.Intent;
import android.os.Bundle;
import android.view.Menu;
import android.view.MenuInflater;
import android.view.MenuItem;
import androidx.appcompat.app.AppCompatActivity;
import androidx.appcompat.widget.Toolbar;
public class MainActivity extends AppCompatActivity {
   @Override
   protected void onCreate(Bundle savedInstanceState) {
      super.onCreate(savedInstanceState);
      setContentView(R.layout.activity_main);
      Toolbar toolbar = findViewById(R.id.toolbar);
      setSupportActionBar(toolbar);
   }
   @Override
   public boolean onCreateOptionsMenu(Menu menu) {
      MenuInflater inflater = getMenuInflater();
      inflater.inflate(R.menu.options_menu, menu);
      return true;
   }
   @Override
   public boolean onOptionsItemSelected(MenuItem item) {
      int id = item.getItemId();
      if (id == R.id.menu_first) {
         startActivity(new Intent(this, FirstActivity.class));
         return true;
      } else if (id == R.id.menu_second) {
         startActivity(new Intent(this, SecondActivity.class));
         return true;
```

```
        }
        return super.onOptionsItemSelected(item);
    }
}
```

FirstActivity.java

```
package com.example.experiment15;
import android.os.Bundle;
import androidx.appcompat.app.AppCompatActivity;
public class FirstActivity extends AppCompatActivity {
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_first);
    }
}
```

SecondActivity.java

```
package com.example.experiment15;
import android.os.Bundle;
import androidx.appcompat.app.AppCompatActivity;
public class SecondActivity extends AppCompatActivity {
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_second);
    }
}
```

activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:orientation="vertical">
    <androidx.appcompat.widget.Toolbar
        android:id="@+id/toolbar"
        android:layout_width="match_parent"
```

```
        android:layout_height="?attr/actionBarSize"
        android:background="?attr/colorPrimary"
        app:title="Main Page"
        android:theme="@style/ThemeOverlay.AppCompat.Dark.ActionBar"
        app:popupTheme="@style/PopupMenuOverlayBlack" />
</LinearLayout>
```

activity_first.xml

```
<?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:gravity="center"
    android:orientation="vertical">
    <TextView
        android:id="@+id/textFirst"
        android:text="This is First Activity"
        android:textSize="24sp"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content" />
</LinearLayout>
```

activity_second.xml

```
<?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:gravity="center"
    android:orientation="vertical">
    <TextView
        android:id="@+id/textSecond"
        android:text="This is Second Activity"
        android:textSize="24sp"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content" />
</LinearLayout>
```

Options_menu.xml

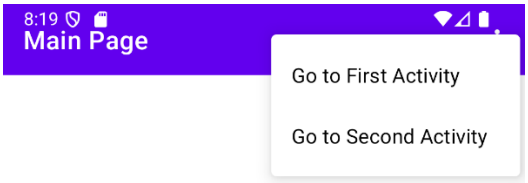
```
<?xml version="1.0" encoding="utf-8"?>
<menu xmlns:android="http://schemas.android.com/apk/res/android">
   <item
      android:id="@+id/menu_first"
      android:title="Go to First Activity" />
   <item
      android:id="@+id/menu_second"
      android:title="Go to Second Activity" />
</menu>
```

AndroidManifest.xml

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
   xmlns:tools="http://schemas.android.com/tools">
   <application
      android:allowBackup="true"
      android:dataExtractionRules="@xml/data_extraction_rules"
      android:fullBackupContent="@xml/backup_rules"
      android:icon="@mipmap/ic_launcher"
      android:label="@string/app_name"
      android:roundIcon="@mipmap/ic_launcher_round"
      android:supportsRtl="true"
      android:theme="@style/Theme.Experiment15">
      <activity android:name=".FirstActivity" />
      <activity android:name=".SecondActivity" />
      <activity
         android:name=".MainActivity"
         android:exported="true">
         <intent-filter>
            <action android:name="android.intent.action.MAIN" />
            <category android:name="android.intent.category.LAUNCHER" />
         </intent-filter>
      </activity>
   </application>
</manifest>
```

Output


8:19
Main Page


8:19
Main Page
Go to First Activity
Go to Second Activity


This is First Activity


This is Second Activity

CO5: Styles, themes, drawable resources, responsive design patterns

Experiment 16: "Working with Styles and Themes in Android"

Objective: To learn how to apply to Android applications in order to maintain a consistent and attractive UI design.

Question: Design an Android application with multiple UI components (e.g., TextView, Button, EditText). Create custom in styles.xml to define properties such as . Apply a global (light or dark) to the entire app. Demonstrate how changing the theme updates the look and feel of all UI components consistently.

MainActivity.java

```
package com.example.exp16;
import android.content.SharedPreferences;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import androidx.activity.EdgeToEdge;
import androidx.appcompat.app.AppCompatActivity;
import androidx.core.graphics.Insets;
import androidx.core.view.ViewCompat;
import androidx.core.view.WindowInsetsCompat;
public class MainActivity extends AppCompatActivity {
   private boolean isDarkTheme;
   @Override
   protected void onCreate(Bundle savedInstanceState) {
// Load theme preference before setting content view
      SharedPreferences prefs = getSharedPreferences("ThemePrefs",
MODE_PRIVATE);
      isDarkTheme = prefs.getBoolean("isDarkTheme", false);
// Apply the selected theme
      setTheme(isDarkTheme ? R.style.AppTheme_Dark : R.style.AppTheme_Light);
      super.onCreate(savedInstanceState);
      setContentView(R.layout.activity_main);
// Theme toggle button logic
      Button toggleButton = findViewById(R.id.themeToggleButton);
      toggleButton.setOnClickListener(new View.OnClickListener() {
         @Override
         public void onClick(View v) {
```

```
            isDarkTheme = !isDarkTheme;
            prefs.edit().putBoolean("isDarkTheme", isDarkTheme).apply();
            recreate(); // Recreate activity to apply new theme
        }
    });
  }
}
```

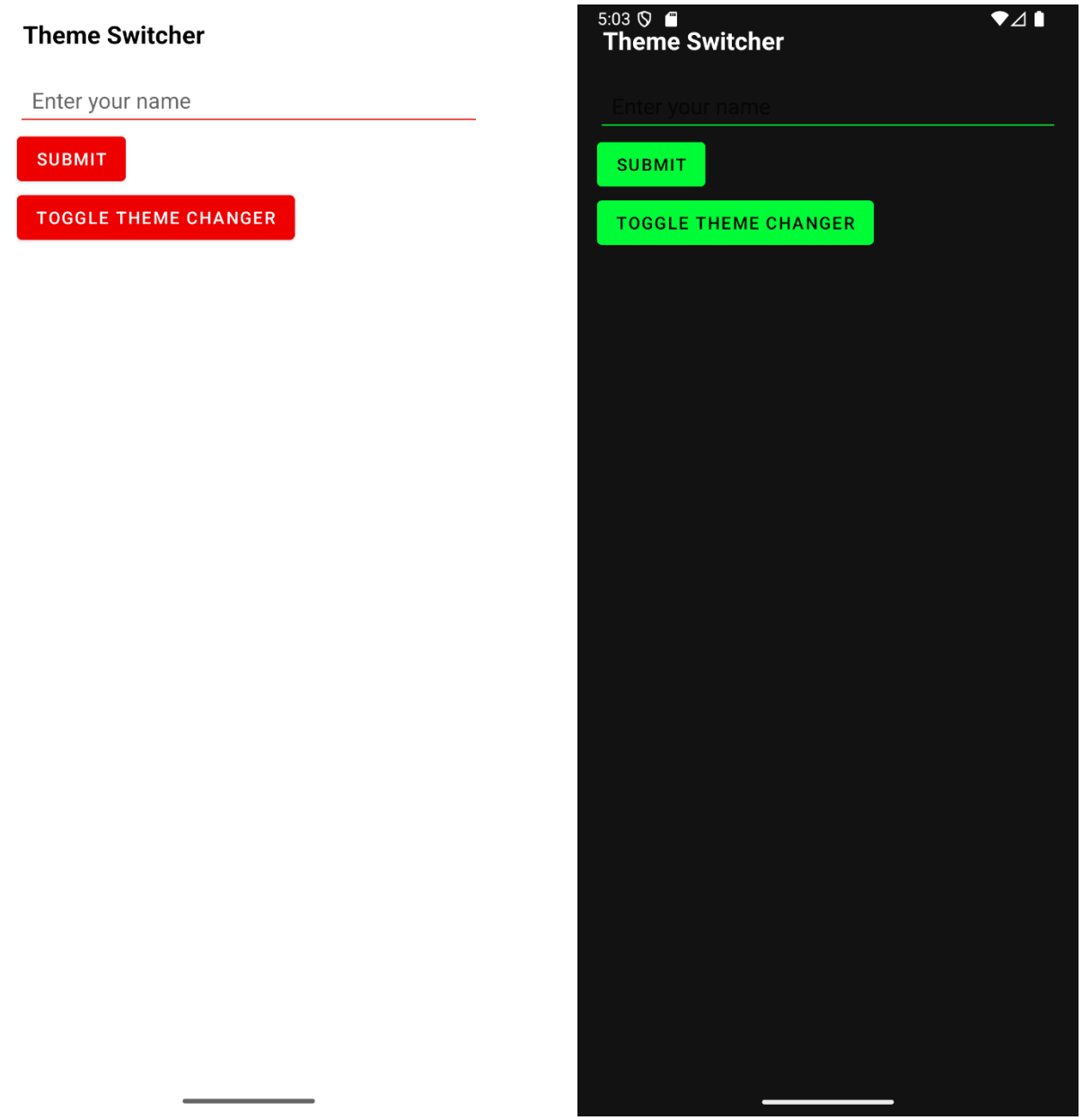
activity_main.xml

```
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
  android:layout_width="match_parent"
  android:layout_height="match_parent"
  android:orientation="vertical"
  android:padding="16dp">
  <TextView
    style="@style/CustomTextView"
    android:text=" Theme Switcher"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content" />
  <EditText
    style="@style/CustomEditText"
    android:hint="Enter your name"
    android:layout_width="match_parent"
    android:layout_height="wrap_content" />
  <Button
    style="@style/CustomButton"
    android:text="Submit"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content" />
  <Button
    android:id="@+id/themeToggleButton"
    android:text="Toggle Theme Changer"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content" />
</LinearLayout>
```

styles.xml

```
<resources>
   <!-- Base application theme -->
   <style name="AppTheme.Light"
parent="Theme.MaterialComponents.DayNight.NoActionBar">
      <item name="colorPrimary">#EE0000</item>
      <item name="colorPrimaryVariant">#B30000</item>
      <item name="colorOnPrimary">#FFFFFF</item>
      <item name="android:textColor">#000000</item>
      <item name="android:background">#FFFFFF</item>
   </style>
   <style name="AppTheme.Dark"
parent="Theme.MaterialComponents.DayNight.NoActionBar">
      <item name="colorPrimary">#00FB37</item>
      <item name="colorPrimaryVariant">#00FF6F</item>
      <item name="colorOnPrimary">#000000</item>
      <item name="android:textColor">#FFFFFF</item>
      <item name="android:background">#121212</item>
   </style>
   <!-- Custom UI component styles -->
   <style name="CustomTextView">
      <item name="android:textSize">20sp</item>
      <item name="android:textStyle">bold</item>
      <item name="android:layout_marginBottom">16dp</item>
   </style>
   <style name="CustomEditText">
      <item name="android:padding">12dp</item>
      <item name="android:backgroundTint">?attr/colorPrimary</item>
   </style>
   <style name="CustomButton">
      <item name="android:backgroundTint">?attr/colorPrimary</item>
      <item name="android:textColor">?attr/colorOnPrimary</item>
   </style>
</resources>
```

Output


Theme Switcher
Enter your name
SUBMIT
TOGGLE THEME CHANGER
5:03
Theme Switcher
Enter your name
SUBMIT
TOGGLE THEME CHANGER

Experiment 17: "Grid View & Alert Box"

Objective: To learn how to display images in a GridView and show an Alert Box when an item is selected.

Question: Develop an application that uses a GridView with images. When an image is selected, display an Alert Box.

MainActivity.java

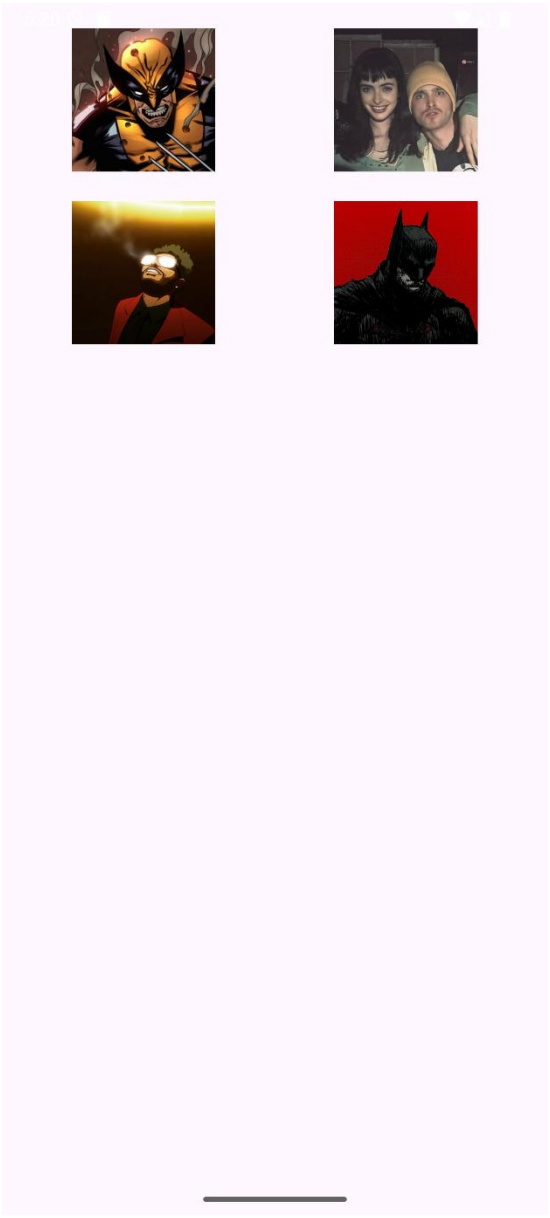
```
package com.example.exp17;
import android.content.Context;
import android.os.Bundle;
import android.view.View;
import android.widget.AdapterView;
import android.widget.BaseAdapter;
import android.widget.GridView;
import android.widget.ImageView;
import androidx.activity.EdgeToEdge;
import androidx.appcompat.app.AlertDialog;
import androidx.appcompat.app.AppCompatActivity;
import androidx.core.graphics.Insets;
import androidx.core.view.ViewCompat;
import androidx.core.view.WindowInsetsCompat;
public class MainActivity extends AppCompatActivity {
   int[] imageIds = {
         R.drawable.image1,
         R.drawable.image2,
         R.drawable.image3,
         R.drawable.image4,
   };
   @Override
   protected void onCreate(Bundle savedInstanceState) {
      super.onCreate(savedInstanceState);
      setContentView(R.layout.activity_main);
      GridView gridView = findViewById(R.id.gridView);
      gridView.setAdapter(new ImageAdapter(this));
      gridView.setOnItemClickListener(new AdapterView.OnItemClickListener() {
         @Override
         public void onItemClick(AdapterView<?> parent, View view, int position,
long id) {
```

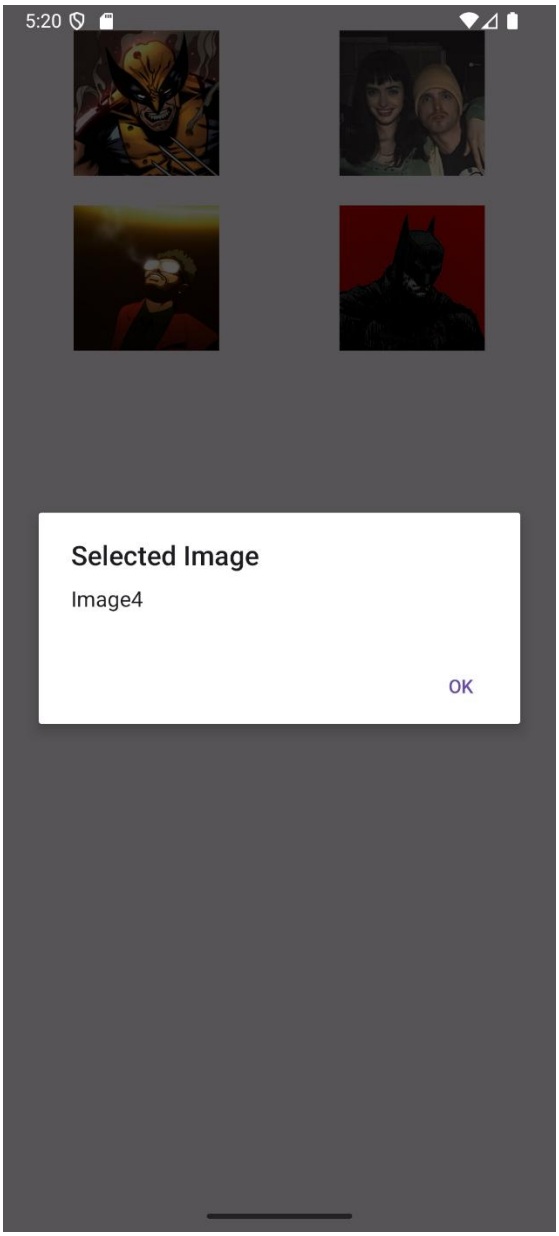
```
            showAlert(position);
        }
    });
}
private void showAlert(int position) {
    new AlertDialog.Builder(this)
            .setTitle("Selected Image")
            .setMessage("Image" + (position + 1))
            .setPositiveButton("OK", null)
            .show();
}
class ImageAdapter extends BaseAdapter {
    private Context context;
    ImageAdapter(Context c) {
        context = c;
    }
    public int getCount() {
        return imageIds.length;
    }
    public Object getItem(int position) {
        return imageIds[position];
    }
    public long getItemId(int position) {
        return position;
    }
    public View getView(int position, View convertView, android.view.ViewGroup
parent) {
        ImageView imageView;
        if (convertView == null) {
            imageView = new ImageView(context);
            imageView.setLayoutParams(new GridView.LayoutParams(300, 300));
            imageView.setScaleType(ImageView.ScaleType.CENTER_CROP);
            imageView.setPadding(8, 8, 8, 8);
        } else {
            imageView = (ImageView) convertView;
        }
        imageView.setImageResource(imageIds[position]);
        return imageView;
    }
}}
```

activity_main.xml

```
<GridView xmlns:android="http://schemas.android.com/apk/res/android"
    android:id="@+id/gridView"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:numColumns="auto_fit"
    android:verticalSpacing="16dp"
    android:horizontalSpacing="16dp"
    android:padding="16dp"
    android:gravity="center"
    android:stretchMode="columnWidth" />
```

Output





Experiment 18: "Spinner Component with Event Handling"

Objective: To learn how to implement a Spinner component (dropdown menu) and handle the user's selection.

Question: Develop an application that implements a Spinner component. Populate it with items and perform an action (event handling) when an item is selected.

MainActivity.java

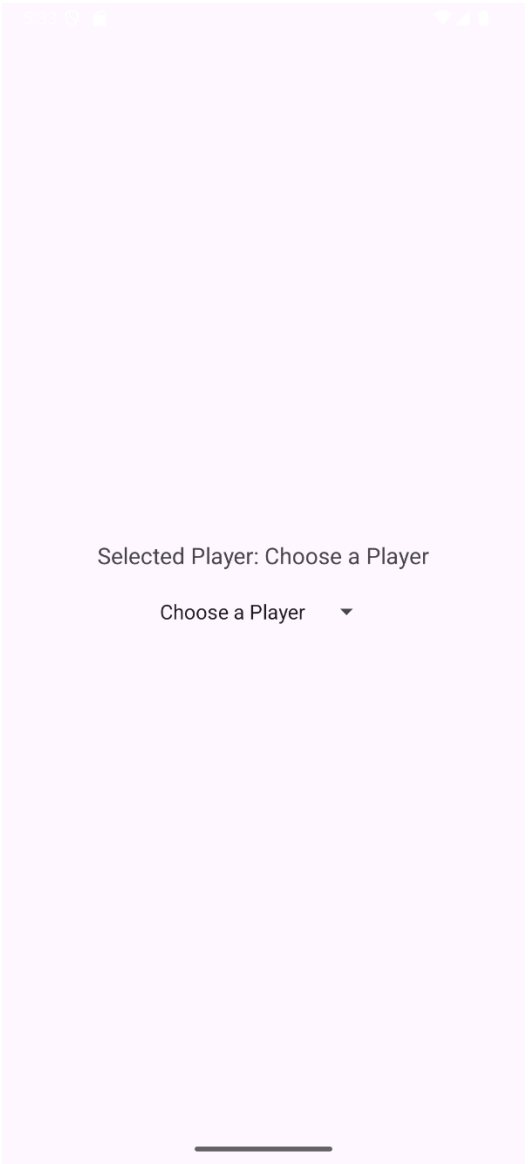
```
package com.example.exp18;
import android.os.Bundle;
import android.view.View;
import android.widget.AdapterView;
import android.widget.ArrayAdapter;
import android.widget.Spinner;
import android.widget.TextView;
import androidx.activity.EdgeToEdge;
import androidx.appcompat.app.AppCompatActivity;
import androidx.core.graphics.Insets;
import androidx.core.view.ViewCompat;
import androidx.core.view.WindowInsetsCompat;
public class MainActivity extends AppCompatActivity {
   String[] items = { "Choose a Player","Messi", "Ronaldo", "Neymar", "Xavi",
"Iniesta" };
   @Override
   protected void onCreate(Bundle savedInstanceState) {
      super.onCreate(savedInstanceState);
      setContentView(R.layout.activity_main);
      Spinner spinner = findViewById(R.id.mySpinner);
      TextView selectedText = findViewById(R.id.selectedItemText);
      ArrayAdapter<String> adapter = new ArrayAdapter<>(
            this, android.R.layout.simple_spinner_item, items
      );
adapter.setDropDownViewResource(android.R.layout.simple_spinner_dropdown_ite
m);
      spinner.setAdapter(adapter);
      spinner.setOnItemSelectedListener(new AdapterView.OnItemSelectedListener()
{
         @Override
```

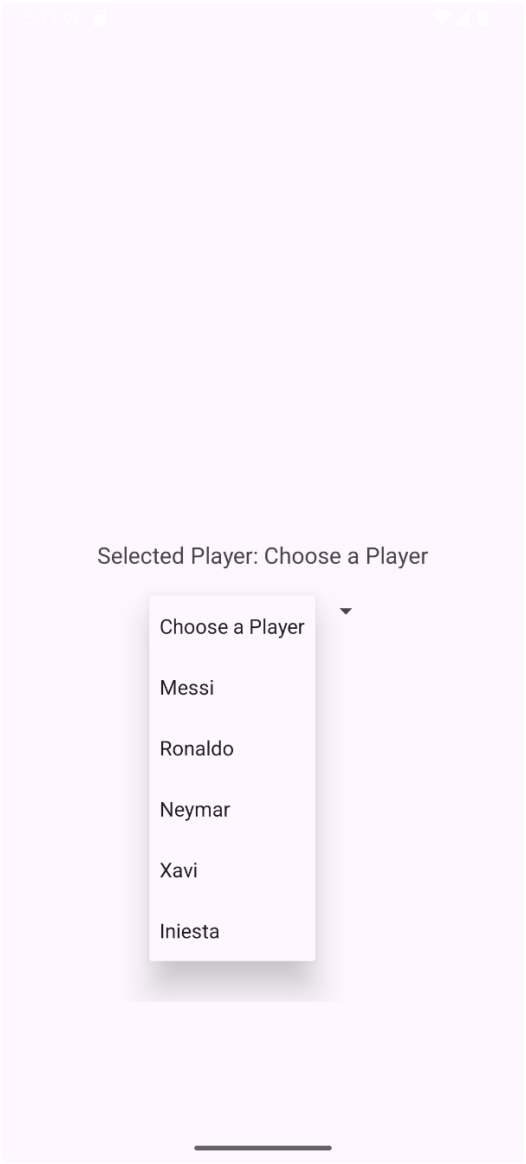
```
        public void onItemSelected(AdapterView<?> parent, View view, int position,
long id) {
            String selected = items[position];
            selectedText.setText("Selected Player: " + selected);
        }
        @Override
        public void onNothingSelected(AdapterView<?> parent) {
            selectedText.setText("No player selected");
        }
    });
  }
}
```

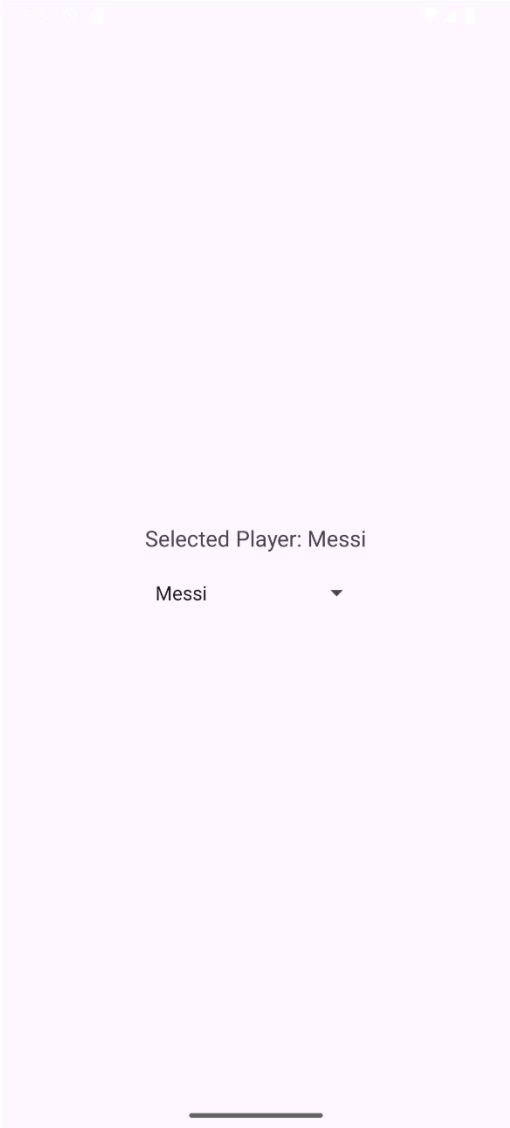
activity_main.xml

```
<?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"
  android:padding="24dp"
  android:gravity="center">
  <TextView
    android:id="@+id/selectedItemText"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="Player Selected:"
    android:textSize="18sp"
    android:layout_marginBottom="20dp" />
  <Spinner
    android:id="@+id/mySpinner"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:spinnerMode="dropdown" />
</LinearLayout>
```

Output


Selected Player: Choose a Player
Choose a Player


Selected Player: Choose a Player
Choose a Player
Messi
Ronaldo
Neymar
Xavi
Iniesta


Selected Player: Messi
Messi

Experiment 19: "Date and Time Picker Dialogs"

Objective: To learn how to implement DatePickerDialog and TimePickerDialog to allow users to select dates and times.

Question: Create an application with buttons to open a DatePickerDialog and a TimePickerDialog. Display the selected date and time in TextViews.

MainActivity.java

```
package com.example.exp19;
import android.app.DatePickerDialog;
import android.app.TimePickerDialog;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.widget.DatePicker;
import android.widget.TextView;
import android.widget.TimePicker;
import androidx.activity.EdgeToEdge;
import androidx.appcompat.app.AppCompatActivity;
import androidx.core.graphics.Insets;
import androidx.core.view.ViewCompat;
import androidx.core.view.WindowInsetsCompat;
import java.util.Calendar;
public class MainActivity extends AppCompatActivity {
   Button btnDate, btnTime;
   TextView tvDate, tvTime;
   @Override
   protected void onCreate(Bundle savedInstanceState) {
      super.onCreate(savedInstanceState);
      setContentView(R.layout.activity_main);
      btnDate = findViewById(R.id.btnDate);
      btnTime = findViewById(R.id.btnTime);
      tvDate = findViewById(R.id.tvDate);
      tvTime = findViewById(R.id.tvTime);
      btnDate.setOnClickListener(new View.OnClickListener() {
         @Override
         public void onClick(View view) {
            openDatePicker();
         }
```

```
        });
        btnTime.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View view) {
                openTimePicker();
            }
        });
    }
    private void openDatePicker() {
        final Calendar calendar = Calendar.getInstance();
        int year = calendar.get(Calendar.YEAR);
        int month = calendar.get(Calendar.MONTH);
        int day = calendar.get(Calendar.DAY_OF_MONTH);
        DatePickerDialog datePickerDialog = new DatePickerDialog(
                MainActivity.this,
                new DatePickerDialog.OnDateSetListener() {
                    @Override
                    public void onDateSet(DatePicker view, int year, int month, int
dayOfMonth) {
                        String date = dayOfMonth + "/" + (month + 1) + "/" + year;
                        tvDate.setText("Selected Date: " + date);
                    }
                }, year, month, day);

        datePickerDialog.show();
    }
    private void openTimePicker() {
        final Calendar calendar = Calendar.getInstance();
        int hour = calendar.get(Calendar.HOUR_OF_DAY);
        int minute = calendar.get(Calendar.MINUTE);
        TimePickerDialog timePickerDialog = new TimePickerDialog(
                MainActivity.this,
                new TimePickerDialog.OnTimeSetListener() {
                    @Override
                    public void onTimeSet(TimePicker view, int hourOfDay, int minute) {
                        String time = String.format("%02d:%02d", hourOfDay, minute);
                        tvTime.setText("Selected Time: " + time);
                    }
                }, hour, minute, true);
```

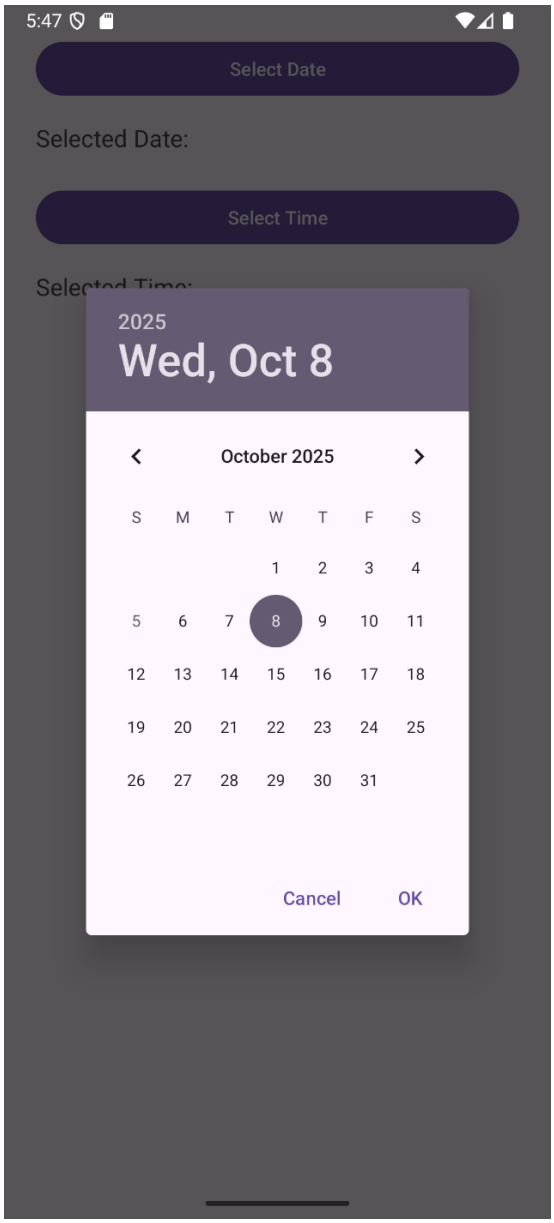
```
        timePickerDialog.show();
    }
}
```

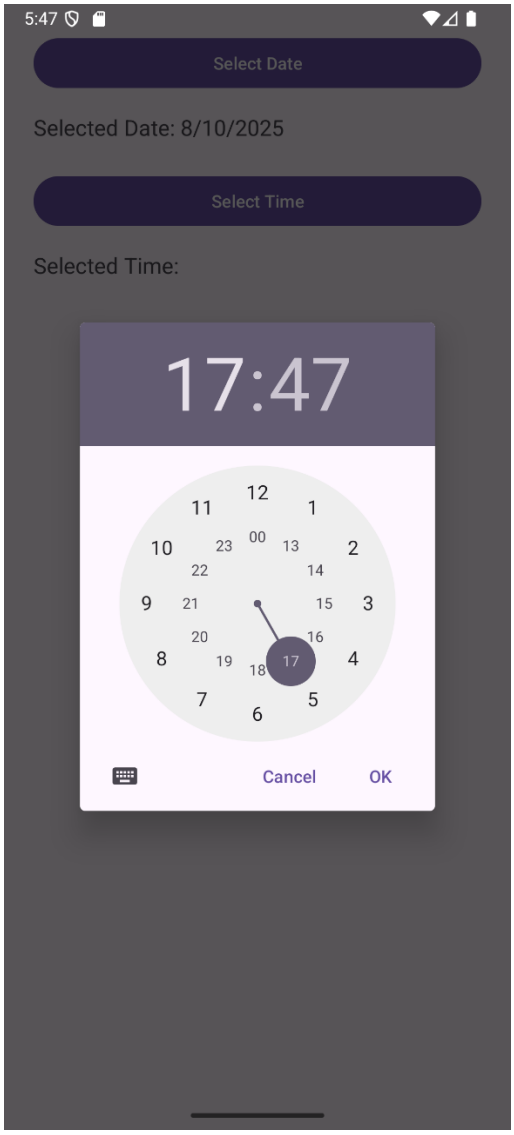
activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    android:orientation="vertical"
    android:padding="24dp"
    android:layout_width="match_parent"
    android:layout_height="match_parent">
    <Button
        android:id="@+id/btnDate"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:text="Select Date" />
    <TextView
        android:id="@+id/tvDate"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:text="Selected Date: "
        android:textSize="18sp"
        android:paddingTop="16dp" />
    <Button
        android:id="@+id/btnTime"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:text="Select Time"
        android:layout_marginTop="24dp" />
    <TextView
        android:id="@+id/tvTime"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:text="Selected Time: "
        android:textSize="18sp"
        android:paddingTop="16dp" />
</LinearLayout>
```

Output


Select Date
Selected Date:
Select Time
Selected Time:


5:47
Select Date
Selected Date:
Select Time
2025
Wed, Oct 8
October 2025
S M T W T F S
1 2 3 4
5 6 7 8 9 10 11
12 13 14 15 16 17 18
19 20 21 22 23 24 25
26 27 28 29 30 31
Cancel
OK


5:47
Select Date
Selected Date: 8/10/2025
Select Time
Selected Time:
17:47
12
1
2
3
4
5
6
7
8
9
10
11
00
13
14
15
16
17
18
19
20
21
22
23
Cancel
OK


Select Date
Selected Date: 8/10/2025
Select Time
Selected Time: 17:47

Experiment 20: "Fragments Application"

Objective: To learn how to develop an application using Fragments to manage different parts of UI.

Question: Develop an application using Fragments to show different content areas within a single activity.

MainActivity.java

```
package com.example.exp20;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import androidx.activity.EdgeToEdge;
import androidx.appcompat.app.AppCompatActivity;
import androidx.core.graphics.Insets;
import androidx.core.view.ViewCompat;
import androidx.core.view.WindowInsetsCompat;
import androidx.fragment.app.Fragment;
import androidx.fragment.app.FragmentTransaction;
public class MainActivity extends AppCompatActivity {
   Button btnFragmentOne, btnFragmentTwo;
   @Override
   protected void onCreate(Bundle savedInstanceState) {
      super.onCreate(savedInstanceState);
      setContentView(R.layout.activity_main);
      btnFragmentOne = findViewById(R.id.btnFragmentOne);
      btnFragmentTwo = findViewById(R.id.btnFragmentTwo);
      loadFragment(new FragmentOne());
      btnFragmentOne.setOnClickListener(new View.OnClickListener() {
         @Override
         public void onClick(View view) {
            loadFragment(new FragmentOne());
         }
      });
      btnFragmentTwo.setOnClickListener(new View.OnClickListener() {
         @Override
         public void onClick(View view) {
            loadFragment(new FragmentTwo());
         }
```

```
        });
    }
    private void loadFragment(Fragment fragment) {
        FragmentTransaction transaction =
getSupportFragmentManager().beginTransaction();
        transaction.replace(R.id.fragmentContainer, fragment);
        transaction.commit();
    }
}
```

FragmentOne.java

```
package com.example.exp20;
import android.os.Bundle;
import androidx.fragment.app.Fragment;
import android.view.LayoutInflater;
import android.view.View;
import android.view.ViewGroup;
import android.widget.ImageView;
import android.widget.TextView;
public class FragmentOne extends Fragment {
    @Override
    public View onCreateView(LayoutInflater inflater, ViewGroup container,
                             Bundle savedInstanceState) {
        View view = inflater.inflate(R.layout.fragment_one, container, false);
        TextView tv = view.findViewById(R.id.tvFragment);
        tv.setText("This is Fragment One");
        ImageView img = view.findViewById(R.id.imgFragment);
        img.setImageResource(R.drawable.image3);

        return view;
    }
}
```

FragmentTwo.java

```
package com.example.exp20;
import android.os.Bundle;
import androidx.fragment.app.Fragment;
import android.view.LayoutInflater;
import android.view.View;
```

```
import android.view.ViewGroup;
import android.widget.ImageView;
import android.widget.TextView;
public class FragmentTwo extends Fragment {
   @Override
   public View onCreateView(LayoutInflater inflater, ViewGroup container,
                            Bundle savedInstanceState) {
      View view = inflater.inflate(R.layout.fragment_two, container, false);
      TextView tv = view.findViewById(R.id.tvFragment);
      tv.setText("This is Fragment Two");

      ImageView img = view.findViewById(R.id.imgFragment);
      img.setImageResource(R.drawable.image4);
      return view;
   }
}
```

activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout
   xmlns:android="http://schemas.android.com/apk/res/android"
   android:orientation="vertical"
   android:layout_width="match_parent"
   android:layout_height="match_parent"
   android:padding="16dp">
   <LinearLayout
      android:orientation="horizontal"
      android:layout_width="match_parent"
      android:layout_height="wrap_content"
      android:gravity="center">
      <Button
         android:id="@+id/btnFragmentOne"
         android:layout_width="wrap_content"
         android:layout_height="wrap_content"
         android:text="Fragment One" />
      <Button
         android:id="@+id/btnFragmentTwo"
         android:layout_width="wrap_content"
         android:layout_height="wrap_content"
         android:text="Fragment Two"
```

```
        android:layout_marginStart="16dp" />
    </LinearLayout>
    <FrameLayout
        android:id="@+id/fragmentContainer"
        android:layout_width="match_parent"
        android:layout_height="0dp"
        android:layout_weight="1"
        android:layout_marginTop="16dp" />
</LinearLayout>
```

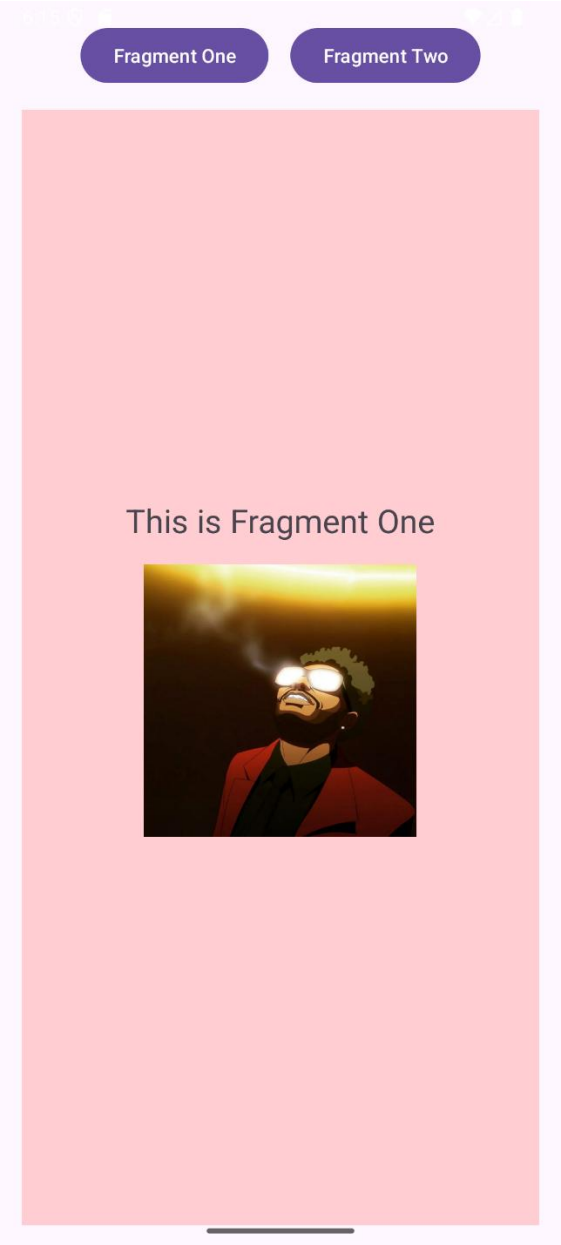
fragment_one.xml

```
<?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:background="#FFCDD2"
    android:padding="16dp">
    <LinearLayout
        android:layout_width="match_parent"
        android:layout_height="match_parent"
        android:orientation="vertical"
        android:gravity="center">
        <TextView
            android:id="@+id/tvFragment"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:text="Fragment One"
            android:textSize="24sp"
            android:layout_marginBottom="16dp"/>
        <ImageView
            android:id="@+id/imgFragment"
            android:layout_width="200dp"
            android:layout_height="200dp"
            android:src="@drawable/image3"
            android:contentDescription="Fragment One Image"
            android:scaleType="centerCrop"/>
    </LinearLayout>
</FrameLayout>
```

fragment_two.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:background="#C8E6C9"
    android:padding="16dp">
    <LinearLayout
        android:layout_width="match_parent"
        android:layout_height="match_parent"
        android:orientation="vertical"
        android:gravity="center">
        <TextView
            android:id="@+id/tvFragment"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:text="Fragment Two"
            android:textSize="24sp"
            android:layout_marginBottom="16dp"/>
        <ImageView
            android:id="@+id/imgFragment"
            android:layout_width="200dp"
            android:layout_height="200dp"
            android:src="@drawable/image4"
            android:contentDescription="Sample Image"
            android:scaleType="centerCrop"/>
    </LinearLayout>
</FrameLayout>
```

Output


Fragment One
Fragment Two
This is Fragment One


Fragment One
Fragment Two
This is Fragment Two

Experiment 21: "Navigation Drawer Implementation”

Objective: To learn how to implement a Navigation Drawer for app navigation.

Question: Implement a Navigation Drawer in your application to allow users to navigate between different sections.

MainActivity.java