1. Installing the Java Development Kit

The Android SDK was developed using the Java programming language. Similarly, Android

applications are also developed using Java. As a result, the Java Development Kit (JDK) is the first

component that must be installed. Android development requires the installation of either version 6 or 7 of

the Standard Edition of the Java Platform Development Kit. Java is provided in both development (JDK)

and runtime (JRE) packages. For the purposes of Android development, the JDK must be installed.

2. Downloading the Android Studio Package

Most of the work involved in developing applications for Android will be performed using the Android

Studio environment. Android Studio may be downloaded from the following web page:

http://developer.android.com/sdk/index.html

From this page, either click on the download button if it lists the correct platform (for example on a

Windows based web browser the button will read "Download Android Studio for Windows"), or select the

"Other Download Options" link to manually select the appropriate package for your platform and operating

system. On the subsequent screen, accept the terms and conditions to initiate the download.

3. Installing Android Studio

Locate the downloaded Android Studio installation executable file (named android-studio-bundle-

<version>.exe) in a Windows Explorer window and double click on it to start the installation process,

clicking the Yes button in the User Account Control dialog if it appears.

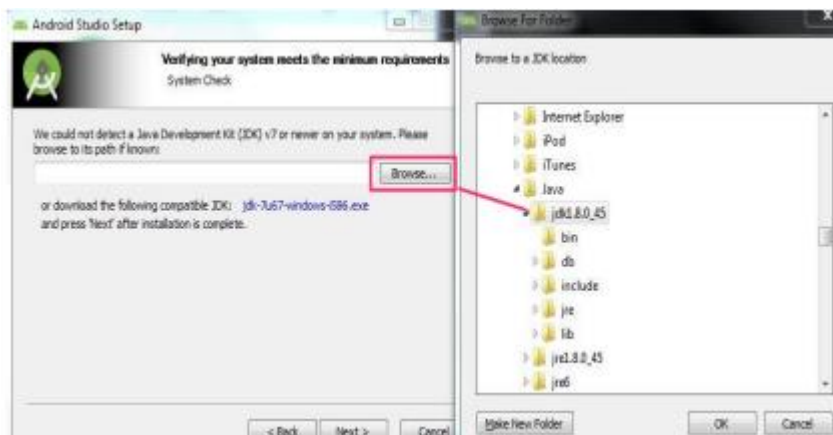Once the Android Studio setup wizard appears, work through the various screens to configure the

installation to meet your requirements in terms of the file system location into which Android Studio should

be installed and whether or not it should be made available to other users of the system. Although there are

no strict rules on where Android Studio should be installed on the system, the remainder of this book will

assume that the installation was performed into a sub-folder of the user's home directory named androidstudio. Once the options have been configured, click on the Install button to begin the installation process.

4. The Android Studio Setup Wizard

The first time that Android Studio is launched after being installed, a dialog will appear providing the

option to import settings from a previous Android Studio version. If you have settings from a previous

version and would like to import them into the latest installation, select the appropriate option and location.

Alternatively, indicate that you do not need to import any previous settings and click on the OK button to

proceed.

After Android Studio has finished loading, the setup wizard will appear as shown
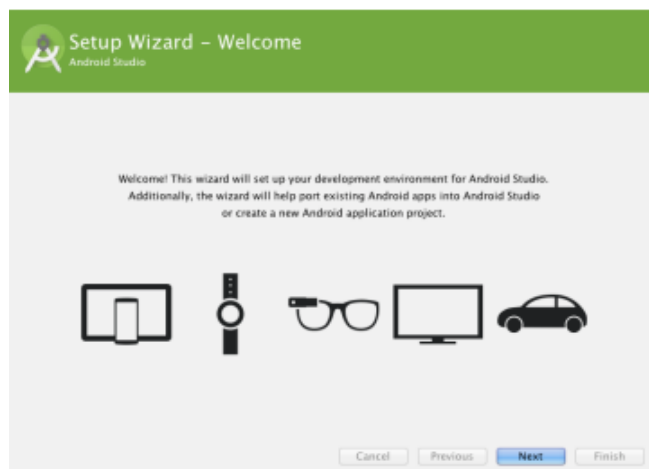
Click on the Next button, choose the Standard installation option and click on Next once again. On the

license agreement screen, select and accept each of the licenses listed before clicking on Finish to complete

the setup process. The Welcome to Android Studio screen should then appear:

5. Installing the Latest Android SDK Packages

The steps performed so far have installed Java, the Android Studio IDE and the current set of default

Android SDK packages. Before proceeding, it is worth taking some time to verify which packages are

installed and to install any missing packages.

This task can be performed using the Android SDK Manager, which may be launched from within

the Android Studio tool by selecting the Configure -> SDK Manager option from within the Android Studio

welcome dialog. Once invoked, the SDK Manager tool will appear as illustrated in Figure
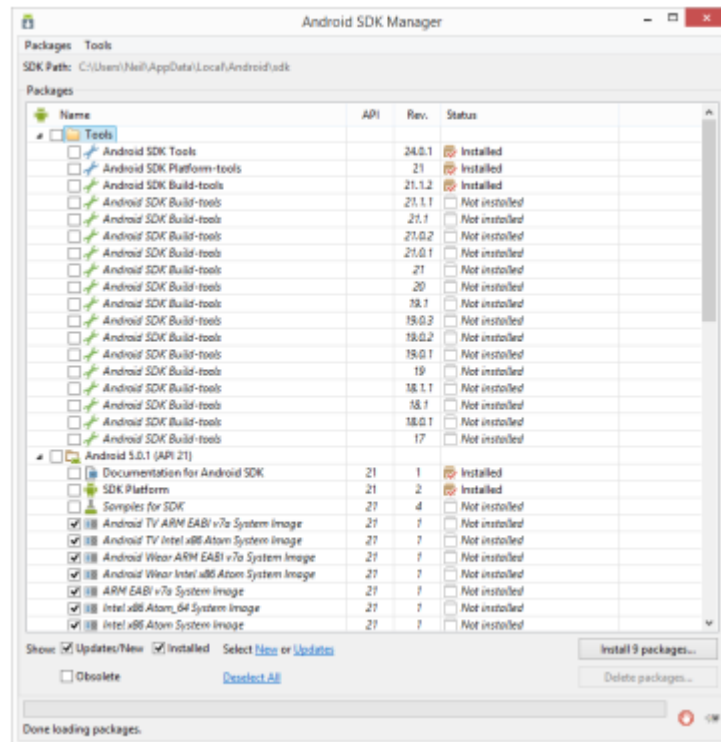
Within the Android SDK Manager, make sure that the following packages are listed as Installed in the

Status column:

- Tools > Android SDK Tools
- Tools > Android SDK Platform-tools
- Tools > Android SDK Build-tools
- SDK Platform (most recent version) > SDK Platform
- SDK Platform (most recent version) > ARM EABI v7a System Image
- Extras > Android Support Repository
- Extras > Android Support Library
- Extras > Google Repository
- Extras > Google USB Driver (Required on Windows systems only)
- Extras > Intel x86 Emulator Accelerator (HAXM installer)

In the event that any of the above packages are listed as Not Installed, simply select the checkboxes

next to those packages and click on the Install packages button to initiate the installation process. In the

resulting dialog, accept the license agreements before clicking on the Install button. The SDK Manager

will then begin to download and install the designated packages. As the installation proceeds, a progress

bar will appear at the bottom of the manager window indicating the status of the installation.

Once the installation is complete, review the package list and make sure that the selected packages

are now listed as Installedin the Status column. If any are listed as Not installed, make sure they are selected

and click on the Install packages… button again.

6. Creating a New Android Project

The first step in the application development process is to create a new project within the Android

Studio environment. Begin, therefore, by launching Android Studio so that the "Welcome to Android

Studio" screen appears as illustrated in Figure
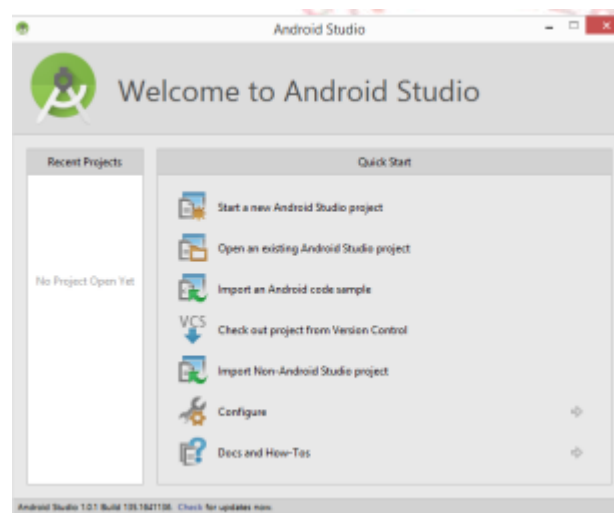
Once this window appears, Android Studio is ready for a new project to be created. To create the new

project, simply click on the Start a new Android Studio project option to display the first screen of the New

Project wizard as shown in Figure

7. Defining the Project and SDK Settings

In the New Project window, set the Application name field to EXNO1. The application name is the
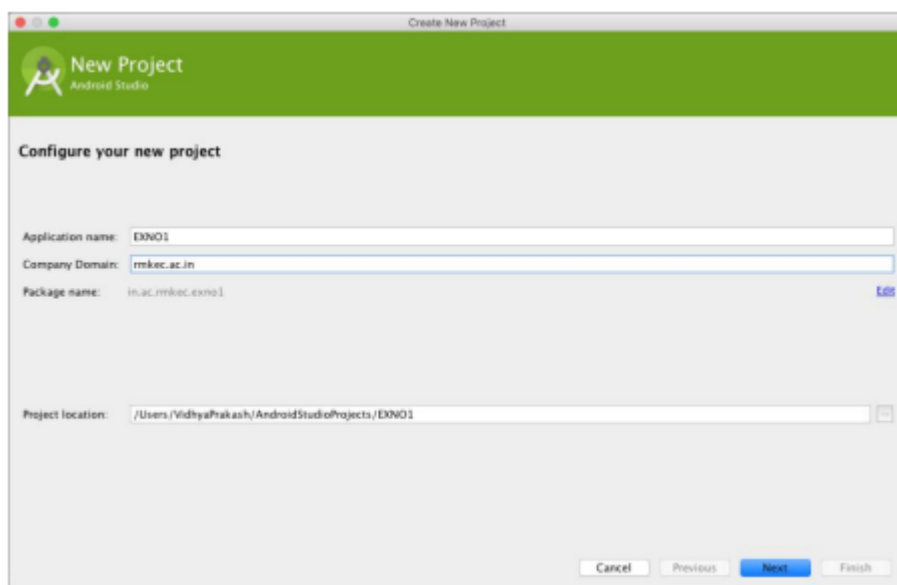
name by which the application will be referenced and identified within Android Studio and is also the name

that will be used when the completed application goes on sale in the Google Play store.

The Package Name is used to uniquely identify the application within the Android application

ecosystem. It should be based on the reversed URL of your domain name followed by the name of the

application. For example, if your domain is rmkec.ac.in, and the application has been named EXNO1, then

the package name might be specified as follows:

Next select Android package SDK we need to build

PROGRAM 2

Main_Activity.java:

```java
package com.example.fontcolorapp;

import android.graphics.Color;
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 {

    TextView textView;
    Button sizeBtn, colorBtn;
    float fontSize = 20f;
    int colorIndex = 0;
    int[] colors = {Color.BLUE, Color.GREEN, Color.RED, Color.MAGENTA};

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

        textView = findViewById(R.id.textView);
        sizeBtn = findViewById(R.id.sizeButton);
        colorBtn = findViewById(R.id.colorButton);

        sizeBtn.setOnClickListener(v -> {
            textView.setTextSize(fontSize);
```

```java
            fontSize += 4;

            if (fontSize > 40) fontSize = 20;

        });


        colorBtn.setOnClickListener(v -> {

            textView.setTextColor(colors[colorIndex]);

            colorIndex = (colorIndex + 1) % colors.length;

        });

    }

}
```

Activity.xml:

```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:gravity="center"

    android:padding="20dp">


    <TextView

        android:id="@+id/textView"

        android:text="Hello World!"

        android:textSize="20sp"

        android:textColor="#000000"

        android:layout_width="wrap_content"

        android:layout_height="wrap_content"

        android:padding="20dp"/>
```

```xml
    <Button
        android:id="@+id/sizeButton"
        android:text="Change Font Size"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginTop="30dp"/>

    <Button
        android:id="@+id/colorButton"
        android:text="Change Font Color"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginTop="20dp"/>
</LinearLayout>
```
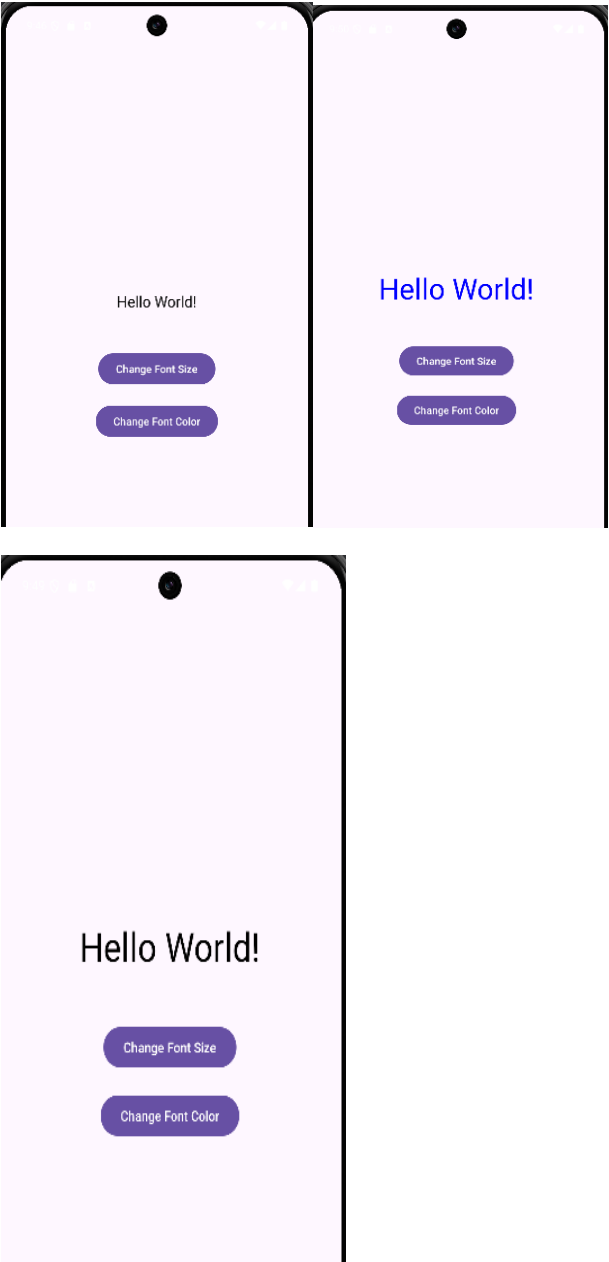
PROGRAM 3

Main_Activity.java:

```java
package com.example.simpleadder;

import android.app.NotificationChannel;

import android.app.NotificationManager;

import android.os.Build;

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;

import androidx.core.app.NotificationCompat;


public class MainActivity extends AppCompatActivity {

    EditText edit1, edit2;

    Button addButton;

    final String CHANNEL_ID = "simple_channel";

    @Override
    protected void onCreate(Bundle savedInstanceState) {

        super.onCreate(savedInstanceState);

        setContentView(R.layout.activity_main);

        edit1 = findViewById(R.id.editText1);

        edit2 = findViewById(R.id.editText2);

        addButton = findViewById(R.id.button1);

        createNotificationChannel();
```

```java
addButton.setOnClickListener(v -> {
    try {
        int num1 = Integer.parseInt(edit1.getText().toString());
        int num2 = Integer.parseInt(edit2.getText().toString());
        int sum = num1 + num2;


        String message = "Sum is: " + sum;
        Toast.makeText(MainActivity.this, message, Toast.LENGTH_LONG).show();


        // Push-style notification
        NotificationCompat.Builder builder = new
NotificationCompat.Builder(MainActivity.this, CHANNEL_ID)
                .setSmallIcon(android.R.drawable.ic_dialog_info)
                .setContentTitle("Addition Result")
                .setContentText(message)
                .setPriority(NotificationCompat.PRIORITY_DEFAULT);


        NotificationManager manager = (NotificationManager)
getSystemService(NOTIFICATION_SERVICE);
        manager.notify(1, builder.build());


    } catch (Exception e) {
        Toast.makeText(MainActivity.this, "Enter valid numbers",
Toast.LENGTH_SHORT).show();
    }
});
}


// Notification Channel required for Android 8.0+
private void createNotificationChannel() {
    if (Build.VERSION.SDK_INT >= Build.VERSION_CODES.O) {
        CharSequence name = "SimpleChannel";
        String description = "For Addition Notifications";
```

```java
        int importance = NotificationManager.IMPORTANCE_DEFAULT;

        NotificationChannel channel = new NotificationChannel(CHANNEL_ID, name,
importance);

        channel.setDescription(description);


        NotificationManager notificationManager =
getSystemService(NotificationManager.class);

        notificationManager.createNotificationChannel(channel);

    }

  }

}
```

Activity.xml:

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

  android:layout_width="match_parent"

  android:layout_height="match_parent"

  android:padding="24dp">


  <EditText

    android:id="@+id/editText1"

    android:layout_width="match_parent"

    android:layout_height="wrap_content"

    android:hint="Enter Number 1"

    android:inputType="number" />


  <EditText

    android:id="@+id/editText2"

    android:layout_width="match_parent"

    android:layout_height="wrap_content"

    android:hint="Enter Number 2"

    android:inputType="number"
```

```
            android:layout_below="@id/editText1"

            android:layout_marginTop="16dp" />


        <Button

            android:id="@+id/button1"

            android:layout_width="match_parent"

            android:layout_height="wrap_content"

            android:text="Add Numbers"

            android:layout_below="@id/editText2"

            android:layout_marginTop="24dp"/>

</RelativeLayout>
```

Output:
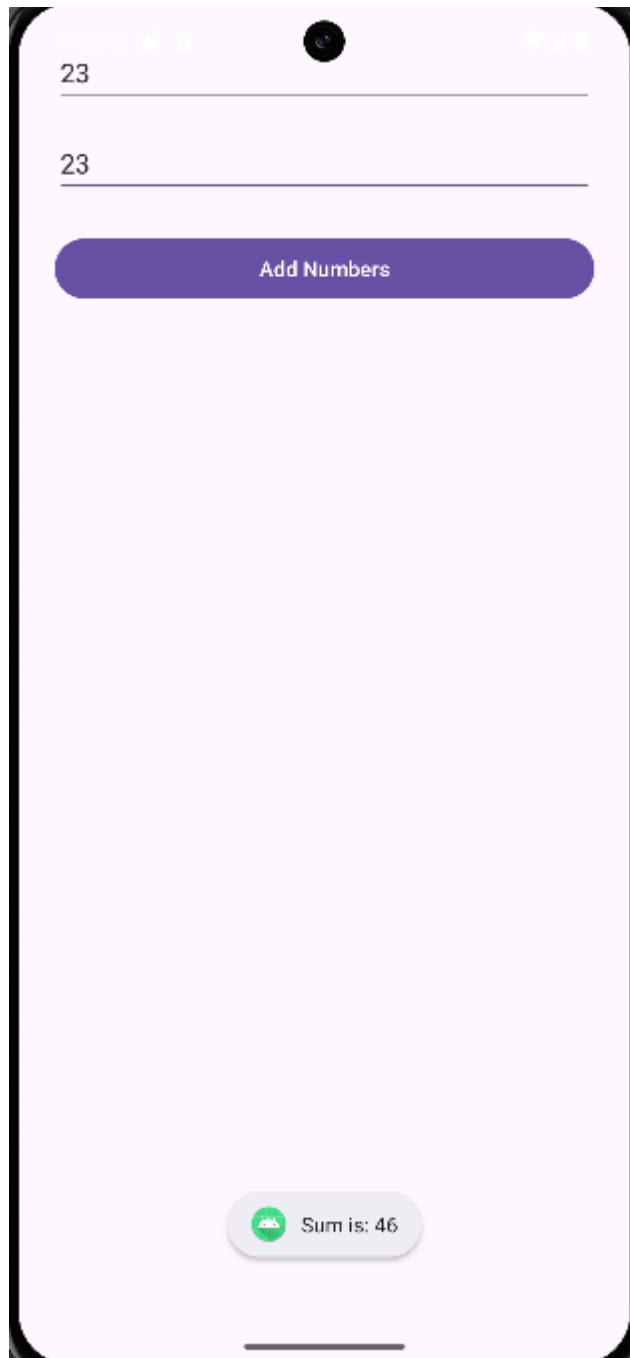
PROGRAM 4

Main_Activity.java:

```java
package com.padma.myapplication4;

import android.os.Bundle;

import android.view.View;

import android.widget.Button;

import android.widget.EditText;

import androidx.appcompat.app.AppCompatActivity;

public class MainActivity extends AppCompatActivity {
    private EditText editText;
    private StringBuilder input;

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

        editText = findViewById(R.id.editTextText);
        input = new StringBuilder();

        int[] buttonIds = {
                R.id.button7, R.id.button8, R.id.button9, R.id.button10,
                R.id.button11, R.id.button12, R.id.button13, R.id.button15,
                R.id.button16, R.id.button17, R.id.button18, R.id.button19,
                R.id.button20, R.id.button21, R.id.button22, R.id.button23
        };

        for (int id : buttonIds) {
            Button button = findViewById(id);
            button.setOnClickListener(new View.OnClickListener() {
```

```java
        @Override
        public void onClick(View v) {
            String text = ((Button) v).getText().toString();
            if (text.equals("=")) {
                calculateResult();
            } else {
                input.append(text);
                editText.setText(input.toString());
            }
        }
    });
    }
}


private void calculateResult() {
    try {
        double result = eval(input.toString());
        editText.setText(String.valueOf(result));
        input.setLength(0);
    } catch (Exception e) {
        editText.setText("Error");
        input.setLength(0);
    }
}


private double eval(String expression) {
    return new Object() {
        int pos = -1, ch;

        void nextChar() {
            ch = (++pos < expression.length()) ? expression.charAt(pos) : -1;
        }
```

```java
boolean potta (int charToEat) {

    while (ch == ' ') nextChar();

    if (ch == charToEat) {

        nextChar();

        return true;

    }

    return false;

}


double parse() {

    nextChar();

    double x = parseExpression();

    if (pos < expression.length()) throw new RuntimeException("Unexpected: " + (char)
ch);

    return x;

}


double parseExpression() {

    double x = parseTerm();

    while (true) {

        if (potta('+')) x += parseTerm();

        else if (potta('-')) x -= parseTerm();

        else return x;

    }

}


double parseTerm() {

    double x = parseFactor();

    while (true) {

        if (potta('*')) x *= parseFactor();

        else if (potta('/')) x /= parseFactor();
```

```java
            else return x;
        }
    }


    double parseFactor() {
        if (potta('+')) return parseFactor();
        if (potta('-')) return -parseFactor();


        double x;
        int startPos = this.pos;
        if ((ch >= '0' && ch <= '9') || ch == '.') {
            while ((ch >= '0' && ch <= '9') || ch == '.') nextChar();
            x = Double.parseDouble(expression.substring(startPos, this.pos));
        } else {
            throw new RuntimeException("Unexpected: " + (char) ch);
        }


        return x;
    }
    }.parse();
    }
}
```

Activity.xml:

```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"
```

```xml
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context=".MainActivity">

    <TextView
        android:id="@+id/textView"
        android:layout_width="106dp"
        android:layout_height="21dp"
        android:layout_marginTop="50dp"
        android:text="Native calculator"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.5"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

    <EditText
        android:id="@+id/editTextText"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginStart="16dp"
        android:layout_marginBottom="7dp"
        android:ems="10"
        android:inputType="text"
        android:text="Enter the number:"
        app:layout_constraintBottom_toTopOf="@+id/button7"
        app:layout_constraintStart_toStartOf="parent" />

    <Button
        android:id="@+id/button"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginEnd="11dp"
```

```xml
            android:layout_marginBottom="9dp"

            android:text="calculate"

            app:layout_constraintBottom_toTopOf="@+id/button9"

            app:layout_constraintEnd_toEndOf="parent" />


    <Button

            android:id="@+id/button7"

            android:layout_width="wrap_content"

            android:layout_height="wrap_content"

            android:layout_marginStart="7dp"

            android:layout_marginTop="155dp"

            android:text="1"

            app:layout_constraintStart_toStartOf="parent"

            app:layout_constraintTop_toTopOf="parent" />


    <Button

            android:id="@+id/button8"

            android:layout_width="wrap_content"

            android:layout_height="wrap_content"

            android:layout_marginTop="10dp"

            android:layout_marginEnd="9dp"

            android:text="2"

            app:layout_constraintEnd_toStartOf="@+id/button9"

            app:layout_constraintTop_toBottomOf="@+id/editTextText" />


    <Button

            android:id="@+id/button9"

            android:layout_width="wrap_content"

            android:layout_height="wrap_content"

            android:layout_marginEnd="2dp"

            android:text="3"

            app:layout_constraintBaseline_toBaselineOf="@+id/button8"
```

```xml
        app:layout_constraintEnd_toStartOf="@+id/button" />


    <Button
        android:id="@+id/button10"

        android:layout_width="wrap_content"

        android:layout_height="wrap_content"

        android:layout_marginTop="12dp"

        android:layout_marginEnd="10dp"

        android:text="+"

        app:layout_constraintEnd_toEndOf="parent"

        app:layout_constraintTop_toBottomOf="@+id/button" />


    <Button
        android:id="@+id/button11"

        android:layout_width="wrap_content"

        android:layout_height="wrap_content"

        android:layout_marginStart="11dp"

        android:text="4"

        app:layout_constraintBaseline_toBaselineOf="@+id/button12"

        app:layout_constraintStart_toStartOf="parent" />


    <Button
        android:id="@+id/button12"

        android:layout_width="wrap_content"

        android:layout_height="wrap_content"

        android:layout_marginStart="8dp"

        android:text="5"

        app:layout_constraintBaseline_toBaselineOf="@+id/button13"

        app:layout_constraintStart_toStartOf="@+id/button8" />


    <Button
        android:id="@+id/button13"
```

```xml
        android:layout_width="wrap_content"

        android:layout_height="wrap_content"

        android:layout_marginTop="15dp"

        android:layout_marginEnd="6dp"

        android:text="6"

        app:layout_constraintEnd_toStartOf="@+id/button23"

        app:layout_constraintTop_toBottomOf="@+id/button10" />


    <Button

        android:id="@+id/button15"

        android:layout_width="wrap_content"

        android:layout_height="wrap_content"

        android:layout_marginStart="11dp"

        android:text="7"

        app:layout_constraintBaseline_toBaselineOf="@+id/button16"

        app:layout_constraintStart_toStartOf="parent" />


    <Button

        android:id="@+id/button16"

        android:layout_width="wrap_content"

        android:layout_height="wrap_content"

        android:layout_marginStart="8dp"

        android:layout_marginTop="20dp"

        android:text="8"

        app:layout_constraintStart_toStartOf="@+id/button12"

        app:layout_constraintTop_toBottomOf="@+id/button12" />


    <Button

        android:id="@+id/button17"

        android:layout_width="wrap_content"

        android:layout_height="wrap_content"

        android:layout_marginTop="20dp"
```

```
    android:layout_marginEnd="4dp"

    android:text="9"

    app:layout_constraintEnd_toStartOf="@+id/button18"

    app:layout_constraintTop_toBottomOf="@+id/button13" />


<Button

    android:id="@+id/button18"

    android:layout_width="wrap_content"

    android:layout_height="wrap_content"

    android:layout_marginStart="11dp"

    android:text="*"

    app:layout_constraintBaseline_toBaselineOf="@+id/button17"

    app:layout_constraintStart_toStartOf="@+id/button23" />


<Button

    android:id="@+id/button19"

    android:layout_width="wrap_content"

    android:layout_height="wrap_content"

    android:layout_marginStart="16dp"

    android:text="0"

    app:layout_constraintBaseline_toBaselineOf="@+id/button20"

    app:layout_constraintStart_toStartOf="parent" />


<Button

    android:id="@+id/button20"

    android:layout_width="wrap_content"

    android:layout_height="wrap_content"

    android:layout_marginStart="19dp"

    android:text="."

    app:layout_constraintStart_toEndOf="@+id/button19"

    app:layout_constraintTop_toTopOf="@+id/button21" />
```

```xml
<Button
    android:id="@+id/button21"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginTop="28dp"
    android:layout_marginEnd="2dp"
    android:text="="
    app:layout_constraintEnd_toStartOf="@+id/button22"
    app:layout_constraintTop_toBottomOf="@+id/button17" />

<Button
    android:id="@+id/button22"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="/"
    app:layout_constraintBaseline_toBaselineOf="@+id/button21"
    app:layout_constraintStart_toStartOf="@+id/button18" />

<Button
    android:id="@+id/button23"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginEnd="7dp"
    android:text="-"
    app:layout_constraintBaseline_toBaselineOf="@+id/button13"
    app:layout_constraintEnd_toEndOf="parent" />

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

Output:

PROGRAM 5a

Main_Activity.java:

```java
package com.example.graphics;

import android.app.Activity;

import android.content.Context;

import android.graphics.Canvas;

import android.graphics.Color;

import android.graphics.Paint;

import android.os.Bundle;

import android.view.View;

public class MainActivity extends Activity {

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(new MyView(this));
    }

    private class MyView extends View {

        public MyView(Context context) {
            super(context);
        }

        @Override
        protected void onDraw(Canvas canvas) {
            super.onDraw(canvas);

            int canvasWidth = canvas.getWidth();
            int canvasHeight = canvas.getHeight();
```

```java
        int rectWidth = 300;
        int rectHeight = 200;

        int left = (canvasWidth - rectWidth) / 2;
        int top = (canvasHeight - rectHeight) / 2;
        int right = left + rectWidth;
        int bottom = top + rectHeight;

        Paint myPaint = new Paint();
        myPaint.setColor(Color.GREEN);
        myPaint.setStyle(Paint.Style.STROKE);
        myPaint.setStrokeWidth(5);

        canvas.drawRect(left, top, right, bottom, myPaint);
    }
  }
}
```
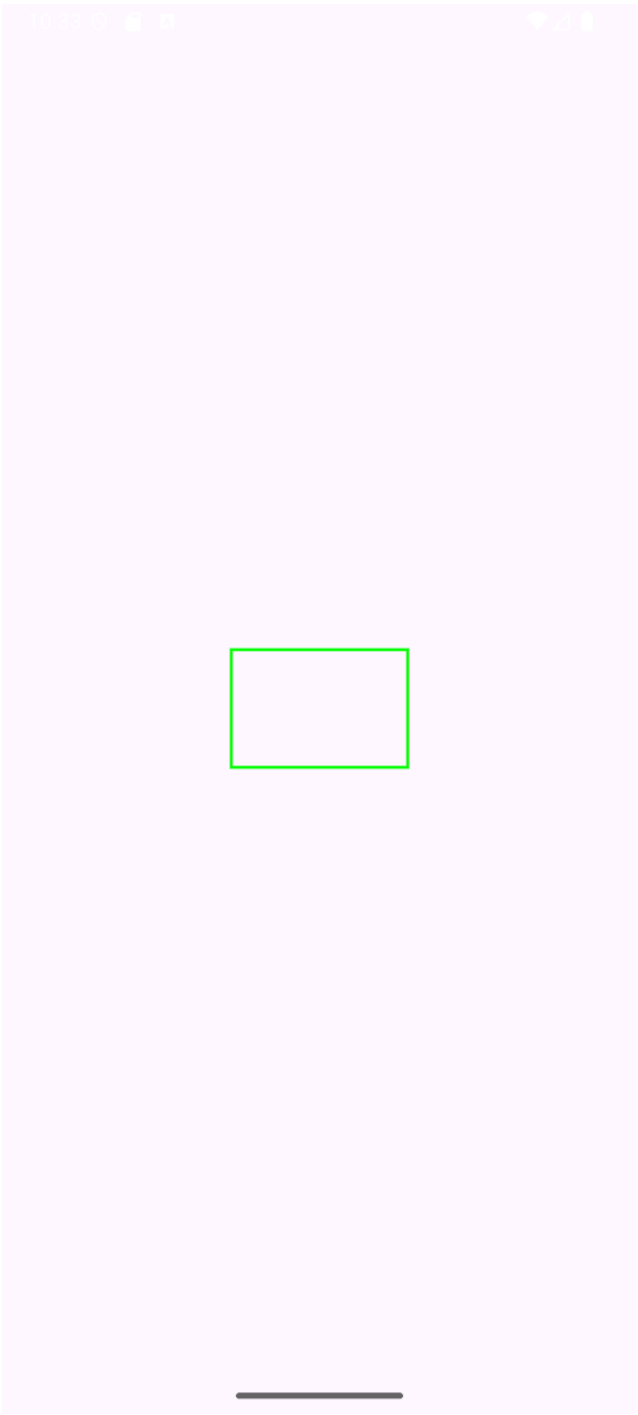
Output:

PROGRAM 5b

Main_Activity.java:

```java
package com.example.circle;

import android.app.Activity;

import android.content.Context;

import android.graphics.Canvas;

import android.graphics.Color;

import android.graphics.Paint;

import android.os.Bundle;

import android.view.View;


public class MainActivity extends Activity {

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(new MyView(this));
    }

    private class MyView extends View {

        public MyView(Context context) {
            super(context);
        }

        @Override
        protected void onDraw(Canvas canvas) {
            super.onDraw(canvas);

            int canvasWidth = canvas.getWidth();
            int canvasHeight = canvas.getHeight();
```

```java
        int centerX = canvasWidth / 2;

        int centerY = canvasHeight / 2;

        int radius = 150;  // Radius of the circle


        Paint paint = new Paint();

        paint.setAntiAlias(true);           // Smooth edges

        paint.setStyle(Paint.Style.FILL);      // Fill the circle

        paint.setColor(Color.parseColor("#00FF00"));  // Bright green


        canvas.drawCircle(centerX, centerY, radius, paint);
    }
  }
}
```
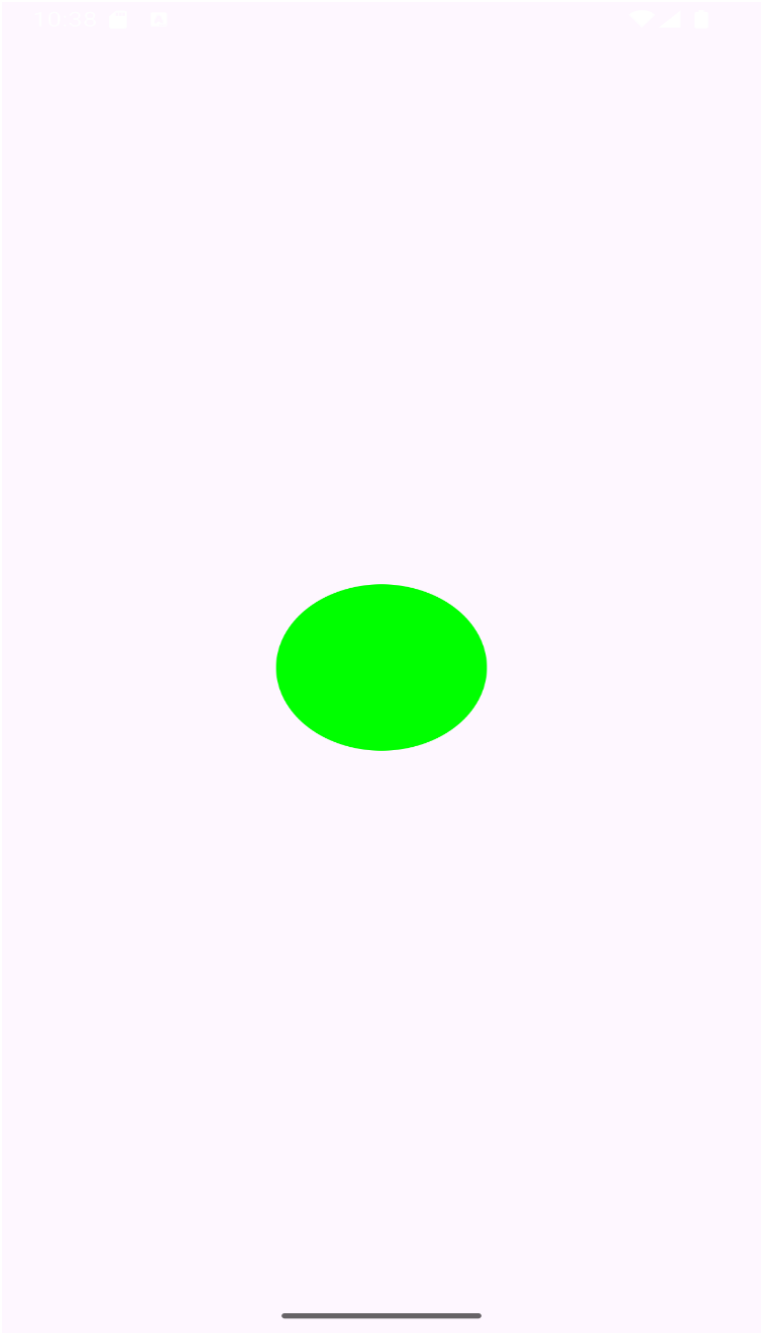
Output:

PROGRAM 6

Main_Activity.java:

```java
package com.example.databaseapp;

import android.app.Activity;

import android.app.AlertDialog;

import android.content.Context;

import android.database.Cursor;

import android.database.sqlite.SQLiteDatabase;

import android.os.Bundle;

import android.view.View;

import android.widget.Button;

import android.widget.EditText;

public class MainActivity extends Activity {

    EditText Rollno, Name, Marks;

    Button Insert, Delete, Update, View, ViewAll;

    SQLiteDatabase db;

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

        // Initialize Views

        Rollno = findViewById(R.id.Rollno);

        Name = findViewById(R.id.Name);

        Marks = findViewById(R.id.Marks);

        Insert = findViewById(R.id.Insert);

        Delete = findViewById(R.id.Delete);

        Update = findViewById(R.id.Update);
```

```java
        View = findViewById(R.id.View);

        ViewAll = findViewById(R.id.ViewAll);


        // Create database and table

        db = openOrCreateDatabase("StudentDB", Context.MODE_PRIVATE, null);

        db.execSQL("CREATE TABLE IF NOT EXISTS student(rollno VARCHAR, name
VARCHAR, marks VARCHAR);");


        // Set Click Listeners

        Insert.setOnClickListener(v -> executeDbOperation("insert"));

        Delete.setOnClickListener(v -> executeDbOperation("delete"));

        Update.setOnClickListener(v -> executeDbOperation("update"));

        View.setOnClickListener(v -> executeDbOperation("view"));

        ViewAll.setOnClickListener(v -> executeDbOperation("view_all"));
    }


    private void executeDbOperation(String operation) {

        String rollno = Rollno.getText().toString();

        String name = Name.getText().toString();

        String marks = Marks.getText().toString();


        switch (operation) {

            case "insert":

                if (isEmpty(rollno, name, marks)) {

                    showMessage("Error", "Please fill all fields");

                    return;

                }

                db.execSQL("INSERT INTO student VALUES('" + rollno + "', '" + name + "', '" +
marks + "');");

                showMessage("Success", "Record Inserted");

                break;
```

```
case "delete":
    if (rollno.isEmpty()) {

        showMessage("Error", "Please enter Rollno");

        return;

    }

    Cursor c = db.rawQuery("SELECT * FROM student WHERE rollno='" + rollno + "'",
null);

    if (c.moveToFirst()) {

        db.execSQL("DELETE FROM student WHERE rollno='" + rollno + "'");

        showMessage("Success", "Record Deleted");

    } else {

        showMessage("Error", "Invalid Rollno");

    }

    break;


case "update":
    if (isEmpty(rollno, name, marks)) {

        showMessage("Error", "Please fill all fields");

        return;

    }

    c = db.rawQuery("SELECT * FROM student WHERE rollno='" + rollno + "'", null);

    if (c.moveToFirst()) {

        db.execSQL("UPDATE student SET name='" + name + "', marks='" + marks + "'
WHERE rollno='" + rollno + "'");

        showMessage("Success", "Record Updated");

    } else {

        showMessage("Error", "Invalid Rollno");

    }

    break;


case "view":
    if (rollno.isEmpty()) {
```

```java
                showMessage("Error", "Please enter Rollno");

                return;

            }

            c = db.rawQuery("SELECT * FROM student WHERE rollno='" + rollno + "'", null);

            if (c.moveToFirst()) {

                Name.setText(c.getString(1));

                Marks.setText(c.getString(2));

            } else {

                showMessage("Error", "Invalid Rollno");

                clearText();

            }

            break;


        case "view_all":

            c = db.rawQuery("SELECT * FROM student", null);

            if (c.getCount() == 0) {

                showMessage("Error", "No records found");

                return;

            }

            StringBuilder buffer = new StringBuilder();

            while (c.moveToNext()) {

                buffer.append("Rollno: ").append(c.getString(0)).append("\n")

                        .append("Name: ").append(c.getString(1)).append("\n")

                        .append("Marks: ").append(c.getString(2)).append("\n\n");

            }

            showMessage("Student Details", buffer.toString());

            break;

    }


    clearText();

}
```

```java
    private boolean isEmpty(String rollno, String name, String marks) {

        return rollno.isEmpty() || name.isEmpty() || marks.isEmpty();

    }


    private void showMessage(String title, String message) {

        new AlertDialog.Builder(this)

                .setCancelable(true)

                .setTitle(title)

                .setMessage(message)

                .show();

    }


    private void clearText() {

        Rollno.setText("");

        Name.setText("");

        Marks.setText("");

        Rollno.requestFocus();

    }
}
```

Activity.xml:

```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="20dp">


    <TextView

        android:id="@+id/titleText"
```

```xml
        android:layout_width="wrap_content"

        android:layout_height="wrap_content"

        android:text="Student Details"

        android:textSize="24sp"

        android:layout_gravity="center" />


    <TextView

        android:layout_width="wrap_content"

        android:layout_height="wrap_content"

        android:text="Enter Rollno:"

        android:textSize="18sp" />



<EditText

        android:id="@+id/Rollno"

        android:layout_width="match_parent"

        android:layout_height="wrap_content"

        android:inputType="number" />


    <TextView

        android:layout_width="wrap_content"

        android:layout_height="wrap_content"

        android:text="Enter Name:"

        android:textSize="18sp" />


    <EditText

        android:id="@+id/Name"

        android:layout_width="match_parent"

        android:layout_height="wrap_content"

        android:inputType="text" />


    <TextView
```

```xml
        android:layout_width="wrap_content"

        android:layout_height="wrap_content"

        android:text="Enter Marks:"

        android:textSize="18sp" />


    <EditText

        android:id="@+id/Marks"

        android:layout_width="match_parent"

        android:layout_height="wrap_content"

        android:inputType="number" />
<Button

        android:id="@+id/Insert"

        android:layout_width="match_parent"

        android:layout_height="wrap_content"

        android:text="Insert" />


    <Button

        android:id="@+id/Delete"

        android:layout_width="match_parent"

        android:layout_height="wrap_content"

        android:text="Delete" />


    <Button

        android:id="@+id/Update"

        android:layout_width="match_parent"

        android:layout_height="wrap_content"

        android:text="Update" />


    <Button

        android:id="@+id/View"

        android:layout_width="match_parent"

        android:layout_height="wrap_content"
```

```
        android:text="View" />

    <Button

        android:id="@+id/ViewAll"

        android:layout_width="match_parent"

        android:layout_height="wrap_content"

        android:text="View All" />

</LinearLayout>
```
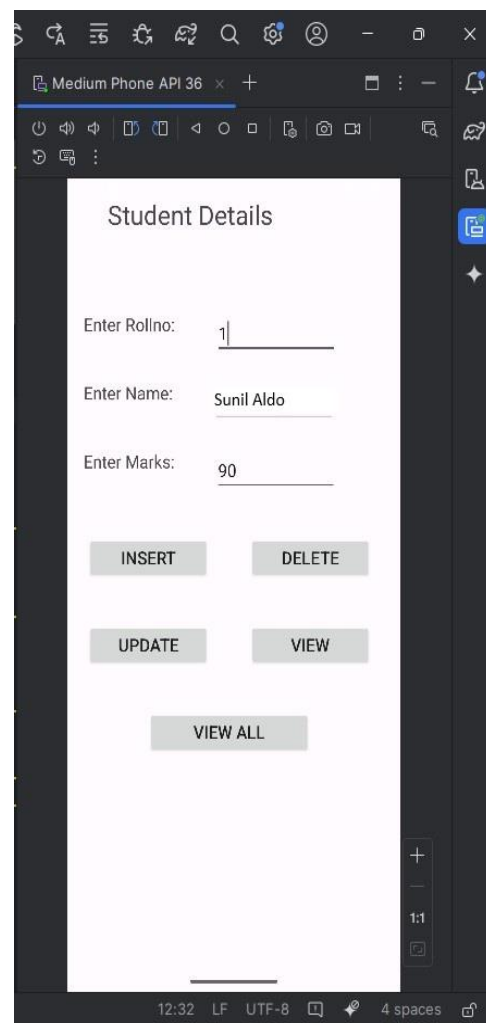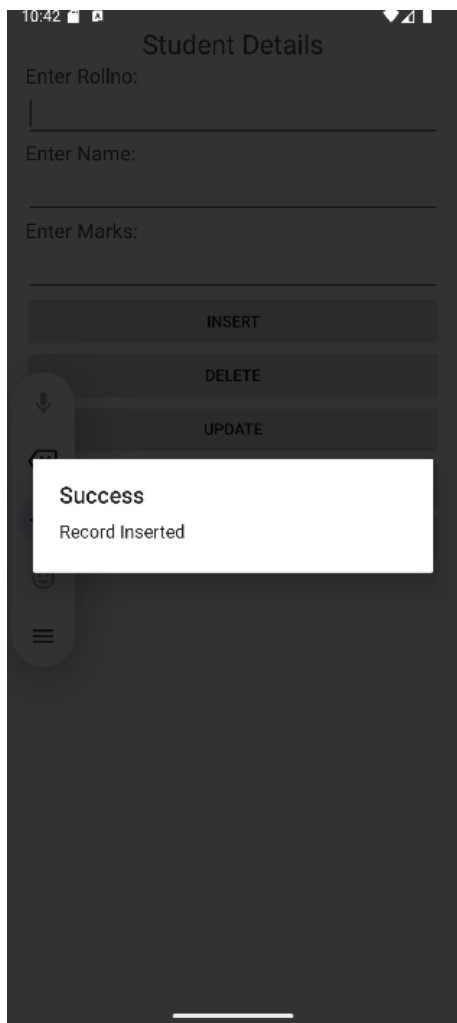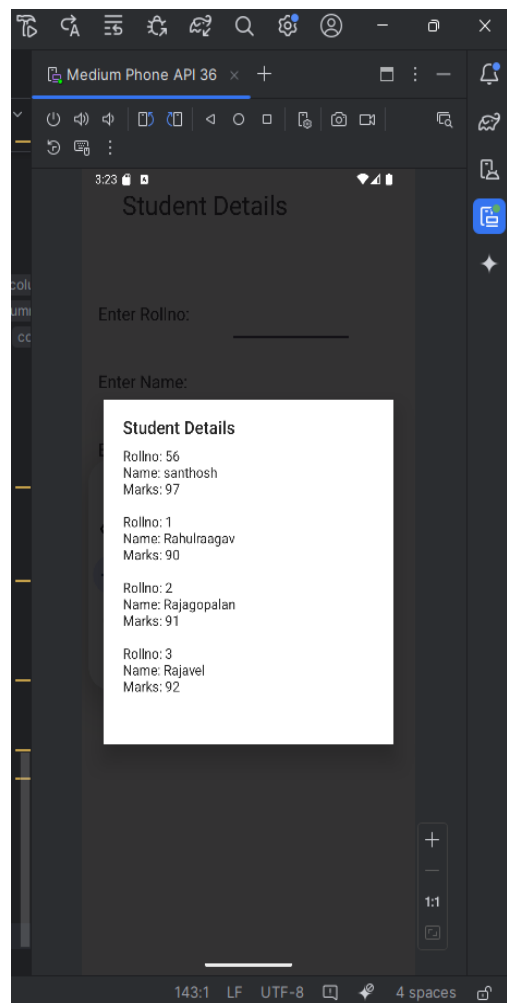
Output:
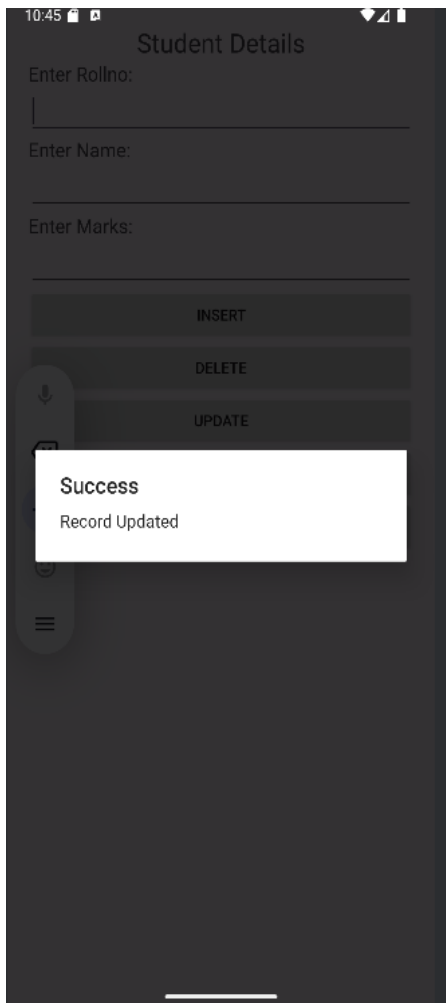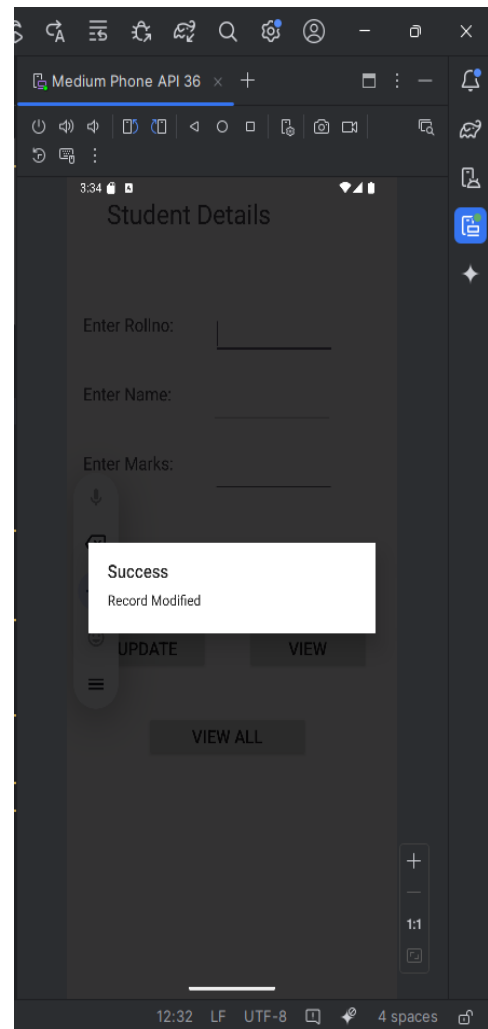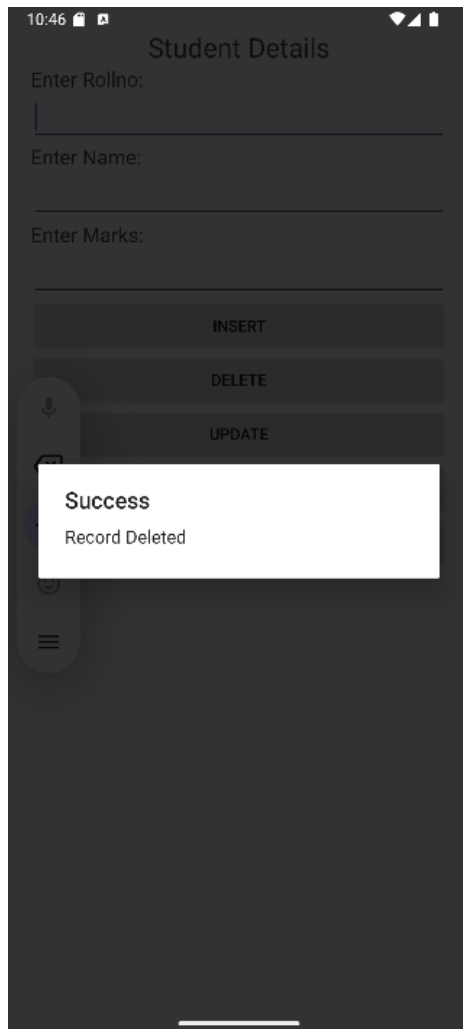
PROGRAM 7

Android_manifest.xml:

```xml
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools"
    package="com.padma.studentchatapp">

    <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.StudentChatApp"
        tools:targetApi="31">

        <!-- Set LoginActivity as launcher -->
        <activity
            android:name=".LoginActivity"
            android:exported="true">
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />
                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>

        <activity android:name=".RegisterActivity" android:exported="true" />
        <activity android:name=".UserListActivity" android:exported="true" />
        <activity android:name=".ChatActivity" android:exported="true" />
        <activity android:name=".MainActivity" android:exported="false" />
    </application>
```

</manifest>

Activity_register.xml:

```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:padding="24dp"
    android:orientation="vertical"
    android:gravity="center"
    android:background="#FF6F6F">

    <EditText
        android:id="@+id/editTextEmail"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:hint="Email"
        android:inputType="textEmailAddress"
        android:padding="10dp"
        android:background="@android:drawable/editbox_background" />

    <EditText
        android:id="@+id/editTextPassword"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:hint="Password"
        android:inputType="textPassword"
        android:padding="10dp"
```

```xml
        android:background="@android:drawable/editbox_background"

        android:layout_marginTop="12dp"/>


    <Button

        android:id="@+id/buttonRegister"

        android:layout_width="match_parent"

        android:layout_height="wrap_content"

        android:text="Register"

        android:layout_marginTop="20dp"

        android:background="#FF4081"

        android:textColor="#FFFFFF"/>
</LinearLayout>
```

Activity_login.xml:

```xml
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"

    android:layout_width="match_parent" android:layout_height="match_parent"

    android:padding="20dp" android:orientation="vertical">


    <EditText android:id="@+id/editTextEmail"

        android:hint="Email" android:inputType="textEmailAddress"

        android:layout_width="match_parent" android:layout_height="wrap_content"/>


    <EditText android:id="@+id/editTextPassword"

        android:hint="Password" android:inputType="textPassword"

        android:layout_width="match_parent" android:layout_height="wrap_content"/>


    <Button android:id="@+id/buttonLogin"

        android:text="Login" android:layout_width="match_parent"
android:layout_height="wrap_content"/>


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

```
          android:text="Go to Register" android:layout_width="match_parent"
android:layout_height="wrap_content"/>

</LinearLayout>
```

Activity_chat.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">

    <androidx.recyclerview.widget.RecyclerView
        android:id="@+id/recyclerViewMessages"
        android:layout_width="match_parent"
        android:layout_height="0dp"
        android:layout_weight="1"
        android:padding="10dp" />

    <LinearLayout
        android:orientation="horizontal"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:padding="8dp">

        <EditText
            android:id="@+id/editTextMessage"
            android:layout_width="0dp"
            android:layout_height="wrap_content"
            android:layout_weight="1"
            android:hint="Type a message" />

        <ImageButton
```

```xml
            android:id="@+id/buttonSend"

            android:layout_width="wrap_content"

            android:layout_height="wrap_content"

            android:src="@android:drawable/ic_menu_send" />

    </LinearLayout>

</LinearLayout>
```

RegisterActivity.java:

```java
package com.padma.studentchatapp;


import android.content.Intent;

import android.os.Bundle;

import android.widget.Button;

import android.widget.EditText;

import android.widget.Toast;


import androidx.appcompat.app.AppCompatActivity;


import com.google.firebase.auth.FirebaseAuth;

import com.google.firebase.database.FirebaseDatabase;


public class RegisterActivity extends AppCompatActivity {

    EditText editTextEmail, editTextPassword;

    Button buttonRegister;

    FirebaseAuth mAuth;


    @Override

    protected void onCreate(Bundle savedInstanceState) {

        super.onCreate(savedInstanceState);

        setContentView(R.layout.activity_register);
```

```java
// Initialize Firebase Authentication
mAuth = FirebaseAuth.getInstance();

// Bind UI elements
editTextEmail = findViewById(R.id.editTextEmail);
editTextPassword = findViewById(R.id.editTextPassword);
buttonRegister = findViewById(R.id.buttonRegister);

// Register button click listener
buttonRegister.setOnClickListener(view -> {
    String email = editTextEmail.getText().toString().trim();
    String password = editTextPassword.getText().toString().trim();

    // Basic input validation
    if (email.isEmpty() || password.isEmpty()) {
        Toast.makeText(this, "Email and Password cannot be empty",
Toast.LENGTH_SHORT).show();
        return;
    }

    // Firebase create user
    mAuth.createUserWithEmailAndPassword(email, password)
        .addOnCompleteListener(task -> {
            if (task.isSuccessful()) {
                // Get UID and save user to database
                String uid = mAuth.getCurrentUser().getUid();
                User newUser = new User(uid, email);

                FirebaseDatabase.getInstance().getReference("users")
                    .child(uid)
                    .setValue(newUser)
                    .addOnCompleteListener(dbTask -> {
```

```java
                        if (dbTask.isSuccessful()) {
                            Toast.makeText(this, "Registration Successful!",
Toast.LENGTH_SHORT).show();


                            // ✅ Redirect to UserListActivity

                            startActivity(new Intent(RegisterActivity.this,
UserListActivity.class));

                            finish();
                        } else {
                            Toast.makeText(this, "Database Error: " +
dbTask.getException().getMessage(), Toast.LENGTH_LONG).show();

                        }
                    });
                } else {
                    Toast.makeText(this, "Error: " + task.getException().getMessage(),
Toast.LENGTH_LONG).show();

                }
            });
        });
    }
}
```

ChatActivity.java:

```java
package com.padma.studentchatapp;


import android.os.Bundle;

import android.widget.EditText;

import android.widget.ImageButton;

import androidx.annotation.NonNull;

import androidx.appcompat.app.AppCompatActivity;

import androidx.recyclerview.widget.LinearLayoutManager;

import androidx.recyclerview.widget.RecyclerView;
```

```java
import com.google.firebase.auth.FirebaseAuth;

import com.google.firebase.database.*;


import java.util.ArrayList;

import java.util.HashMap;

import java.util.List;


public class ChatActivity extends AppCompatActivity {


    EditText editTextMessage;

    ImageButton buttonSend;

    RecyclerView recyclerViewMessages;

    MessageAdapter messageAdapter;

    List<Message> messageList;


    String receiverId, senderId, chatRoomId;

    DatabaseReference chatRef;


    @Override
    protected void onCreate(Bundle savedInstanceState) {

        super.onCreate(savedInstanceState);

        setContentView(R.layout.activity_chat);


        editTextMessage = findViewById(R.id.editTextMessage);

        buttonSend = findViewById(R.id.buttonSend);

        recyclerViewMessages = findViewById(R.id.recyclerViewMessages);


        receiverId = getIntent().getStringExtra("receiverId");

        senderId = FirebaseAuth.getInstance().getCurrentUser().getUid();


        // Create common chat room ID regardless of sender or receiver order
```

```java
        if (senderId.compareTo(receiverId) < 0) {
            chatRoomId = senderId + "_" + receiverId;
        } else {
            chatRoomId = receiverId + "_" + senderId;
        }


        chatRef =
FirebaseDatabase.getInstance().getReference("chats").child(chatRoomId).child("messages");


        messageList = new ArrayList<>();
        messageAdapter = new MessageAdapter(this, messageList, senderId);


        recyclerViewMessages.setLayoutManager(new LinearLayoutManager(this));
        recyclerViewMessages.setAdapter(messageAdapter);


        buttonSend.setOnClickListener(v -> {
            String messageText = editTextMessage.getText().toString().trim();
            if (!messageText.isEmpty()) {
                sendMessage(senderId, receiverId, messageText);
                editTextMessage.setText("");
            }
        });


        readMessages();
    }


    private void sendMessage(String sender, String receiver, String message) {
        HashMap<String, String> msg = new HashMap<>();
        msg.put("sender", sender);
        msg.put("receiver", receiver);
        msg.put("message", message);
```

```java
        chatRef.push().setValue(msg);

    }


    private void readMessages() {
        chatRef.addValueEventListener(new ValueEventListener() {
            @Override
            public void onDataChange(@NonNull DataSnapshot snapshot) {
                messageList.clear();
                for (DataSnapshot dataSnapshot : snapshot.getChildren()) {
                    Message msg = dataSnapshot.getValue(Message.class);
                    messageList.add(msg);
                }
                messageAdapter.notifyDataSetChanged();
                recyclerViewMessages.scrollToPosition(messageList.size() - 1);
            }


            @Override
            public void onCancelled(@NonNull DatabaseError error) {
            }
        });
    }
}
```

OUTPUT:

alexmcc@gmail.com

akashsrmvec@gmail.com

elumalai@gmail.com

hii akash

how are you?

I'm fine Alex

what are you doing ?

Type a message

PROGRAM 8

Android manifest.xml

```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"
    package="com.example.ex8"> <!-- Change this to match your actual package name -->

    <!-- Permissions for reading/writing to external storage -->
    <uses-permission android:name="android.permission.WRITE_EXTERNAL_STORAGE" />
    <uses-permission android:name="android.permission.READ_EXTERNAL_STORAGE" />

    <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.Ex8"
        tools:targetApi="31">

        <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>
```

ActivityMain.xml

```xml
<RelativeLayout xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:paddingBottom="16dp"
    android:paddingLeft="16dp"
    android:paddingRight="16dp"
    android:paddingTop="16dp"
    tools:context=".MainActivity">

    <TextView
        android:id="@+id/textView1"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Saved Data Will Appear Here" />

    <EditText
        android:id="@+id/editText1"
        android:layout_width="200dp"
        android:layout_height="wrap_content"
        android:layout_above="@id/button1"
        android:layout_toRightOf="@id/textView1"
        android:layout_marginBottom="50dp"
        android:hint="Enter data"
        android:ems="10" >
        <requestFocus />
```

```xml
        </EditText>

        <Button
            android:id="@+id/button1"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_alignLeft="@+id/textView1"
            android:layout_centerVertical="true"
            android:layout_marginLeft="32dp"
            android:text="Save Data" />

        <Button
            android:id="@+id/button2"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_toRightOf="@id/button1"
            android:layout_centerVertical="true"
            android:layout_marginLeft="36dp"
            android:text="Show Data" />
</RelativeLayout>
```

MainActivity.java

```java
package com.example.My Application8;

import android.Manifest;
import android.app.Activity;
import android.content.pm.PackageManager;
import android.os.Bundle;
import android.os.Environment;
import android.view.View;
import android.widget.Button;
import android.widget.EditText;
import android.widget.TextView;
import android.widget.Toast;

import androidx.core.app.ActivityCompat;
import androidx.core.content.ContextCompat;

import java.io.File;
import java.io.FileInputStream;
import java.io.FileOutputStream;
import java.io.IOException;

public class MainActivity extends Activity {

    Button b1, b2;
    EditText e;
    TextView tv;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
```

```java
        setContentView(R.layout.activity_main);

        tv = findViewById(R.id.textView1);
        b1 = findViewById(R.id.button1);
        b2 = findViewById(R.id.button2);
        e = findViewById(R.id.editText1);

        // Request storage permissions at runtime
        if (ContextCompat.checkSelfPermission(this,
Manifest.permission.WRITE_EXTERNAL_STORAGE)
                != PackageManager.PERMISSION_GRANTED) {
            ActivityCompat.requestPermissions(this,
                new String[]{Manifest.permission.WRITE_EXTERNAL_STORAGE}, 1);
        }

        // Save data to SD card
        b1.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View view) {
                String text = e.getText().toString();
                if (isExternalStorageWritable()) {
                    File file = new File(getExternalFilesDir(null), "myfile.txt");
                    try (FileOutputStream fos = new FileOutputStream(file, true)) {
                        fos.write((text + "\n").getBytes());
                        Toast.makeText(getApplicationContext(), "Data saved to SD card",
Toast.LENGTH_SHORT).show();
                        e.setText(""); // Clear after saving
                    } catch (IOException ex) {
                        Toast.makeText(getApplicationContext(), "Save failed",
Toast.LENGTH_SHORT).show();
                        ex.printStackTrace();
                    }
                }
            }
```

```java
            }
        });


        // Show data from SD card
        b2.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View view) {
                File file = new File(getExternalFilesDir(null), "myfile.txt");
                if (isExternalStorageReadable()) {
                    try (FileInputStream fis = new FileInputStream(file)) {
                        int ch;
                        StringBuilder builder = new StringBuilder();
                        while ((ch = fis.read()) != -1) {
                            builder.append((char) ch);
                        }
                        tv.setText(builder.toString());
                        Toast.makeText(getApplicationContext(), "File read",
Toast.LENGTH_SHORT).show();
                    } catch (IOException ex) {
                        Toast.makeText(getApplicationContext(), "Read failed",
Toast.LENGTH_SHORT).show();
                        ex.printStackTrace();
                    }
                }
            }
        });
    }
    private boolean isExternalStorageWritable() {
        return Environment.MEDIA_MOUNTED.equals(Environment.getExternalStorageState());
    }


    private boolean isExternalStorageReadable() {
```
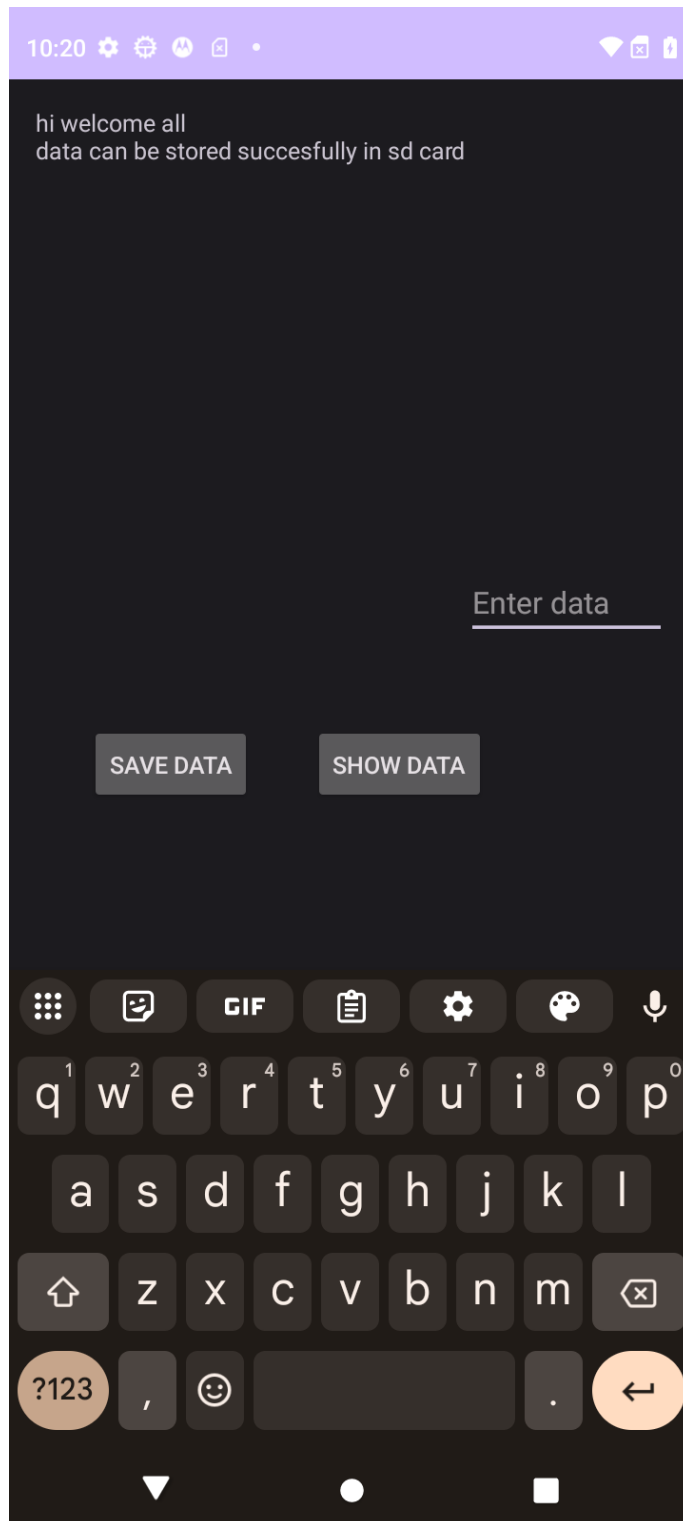
```java
        String state = Environment.getExternalStorageState();
        return Environment.MEDIA_MOUNTED.equals(state) ||
            Environment.MEDIA_MOUNTED_READ_ONLY.equals(state);
    }
}
```

OUTPUT:

PROGRAM 9

Android Manifest.xml:

```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"
    package="com.example.gpstrackingapp">
    <uses-permission android:name="android.permission.ACCESS_FINE_LOCATION"/>
    <uses-permission android:name="android.permission.ACCESS_COARSE_LOCATION"/>
    <uses-permission android:name="android.permission.INTERNET" />
    <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.GPSTrackingApp"
        tools:targetApi="31">
        <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>
```

Activity_main.xml:

```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="20dp"
    android:gravity="center">


    <Button
        android:id="@+id/btnShowLocation"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Show My Location"/>
</LinearLayout>
```

Main Activity.java:

```java
package com.example.gpstrackingapp;
import android.Manifest;
import android.content.pm.PackageManager;
import android.location.Location;
import android.os.Bundle;
import android.widget.Button;
import android.widget.Toast;
import androidx.annotation.NonNull;
import androidx.appcompat.app.AppCompatActivity;
import androidx.core.app.ActivityCompat;
import com.google.android.gms.location.FusedLocationProviderClient;
import com.google.android.gms.location.LocationServices;
import com.google.android.gms.tasks.OnSuccessListener;
public class MainActivity extends AppCompatActivity {
    Button btnShowLocation;
```

```java
FusedLocationProviderClient fusedLocationClient;

private static final int LOCATION_PERMISSION_CODE = 101;

@Override

protected void onCreate(Bundle savedInstanceState) {

    super.onCreate(savedInstanceState);

    setContentView(R.layout.activity_main);

    btnShowLocation = findViewById(R.id.btnShowLocation);

    fusedLocationClient = LocationServices.getFusedLocationProviderClient(this);

    btnShowLocation.setOnClickListener(view -> {

        if (ActivityCompat.checkSelfPermission(this,
Manifest.permission.ACCESS_FINE_LOCATION) !=
PackageManager.PERMISSION_GRANTED) {

            ActivityCompat.requestPermissions(this, new
String[]{Manifest.permission.ACCESS_FINE_LOCATION},
LOCATION_PERMISSION_CODE);

        } else {

            getLastLocation();

        }

    });

}

private void getLastLocation() {

    fusedLocationClient.getLastLocation()

        .addOnSuccessListener(this, location -> {

            if (location != null) {

                double lat = location.getLatitude();

                double lon = location.getLongitude();

                Toast.makeText(getApplicationContext(),

                    "Latitude: " + lat + "\nLongitude: " + lon,

                    Toast.LENGTH_LONG).show();

            } else {

                Toast.makeText(getApplicationContext(), "Location not available",
Toast.LENGTH_SHORT).show();

            }
```

```java
            });
    }
    // Handle permission result
    @Override
    public void onRequestPermissionsResult(int requestCode, @NonNull String[] permissions,
                        @NonNull int[] grantResults) {
        super.onRequestPermissionsResult(requestCode, permissions, grantResults);
        if (requestCode == LOCATION_PERMISSION_CODE) {
            if (grantResults.length > 0 && grantResults[0] ==
PackageManager.PERMISSION_GRANTED) {
                getLastLocation();
            } else {
                Toast.makeText(this, "Permission denied", Toast.LENGTH_SHORT).show();
            }
        }
    }
}
```

OUTPUT:

Show My Location

Latitude: 37.4220936
Longitude: -122.083922
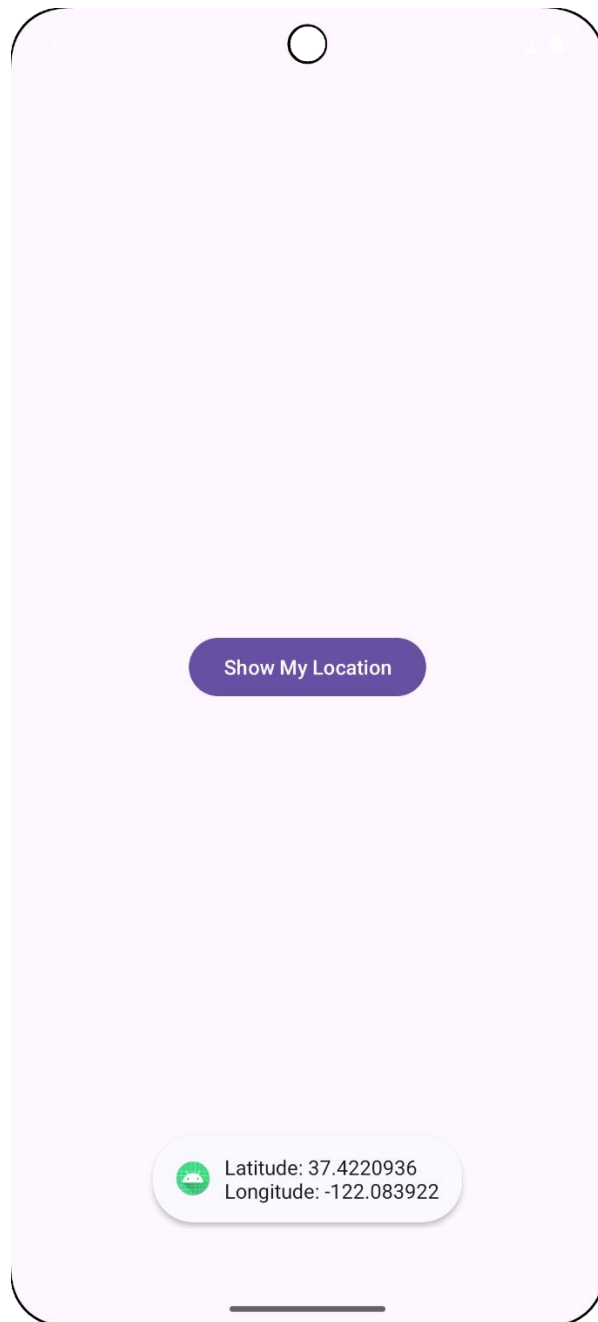
PROGRAM 10

Activity.xml:

```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">

    <!-- Drag & Drop UI -->
    <LinearLayout
        android:layout_width="match_parent"
        android:layout_height="match_parent"
        android:orientation="horizontal"
        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintEnd_toEndOf="parent">

        <!-- Draggable Emoji -->
        <TextView
            android:id="@+id/emoji1"
            android:layout_width="100dp"
            android:layout_height="100dp"
            android:text="🍎"
            android:textSize="30sp"
            android:layout_gravity="center_vertical"
```

```
            android:layout_marginStart="20dp"/>


        <!-- Drop Target -->
        <TextView
            android:id="@+id/target1"
            android:layout_width="200dp"
            android:layout_height="100dp"
            android:background="#4CAF50"
            android:text="Drop Here"
            android:layout_gravity="center_vertical"
            android:layout_marginStart="40dp"
            android:gravity="center"/>
    </LinearLayout>
</androidx.constraintlayout.widget.ConstraintLayout>
```

MainActivity.java:

```java
package com.example.dragdrop;


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


public class MainActivity extends AppCompatActivity {
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);


        // Set drag listeners
```

```java
findViewById(R.id.emoji1).setOnLongClickListener(v -> {

    View.DragShadowBuilder shadow = new View.DragShadowBuilder(v);

    v.startDragAndDrop(null, shadow, v, 0);

    return true;

});


findViewById(R.id.target1).setOnDragListener((v, event) -> {

    if (event.getAction() == DragEvent.ACTION_DROP) {

        TextView dropped = (TextView) event.getLocalState();

        TextView target = (TextView) v;

        target.setText("Correct!");

    }

    return true;

});
    }
}
```

OUTPUT:
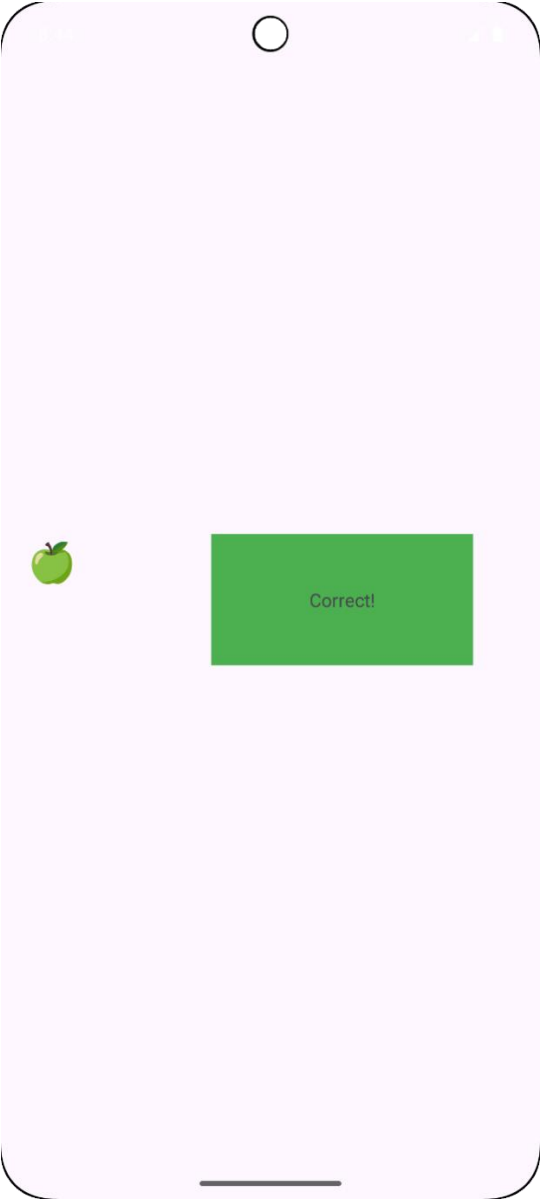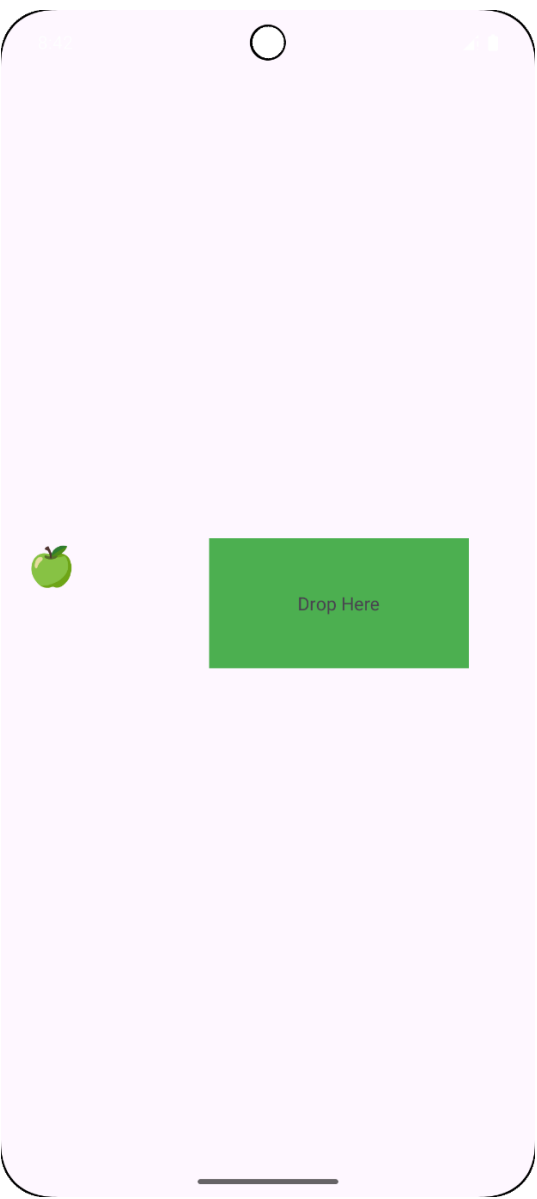
PROGRAM 11

Step 1: Verify Docker Installation
docker –version

Step 2: Pull the Hello World Container
docker pull hello-world

Step 3: Run the Hello World Container
docker run hello-world

Step 4: Display the container
docker ps

Step 5: Pull the Ubuntu Container
docker pull ubuntu

Step 6: Run a Command Using the Ubuntu Image
docker run ubuntu echo "Hello MAD Lab"

Step 7: View the Runned Containers
docker inspect container_id

Step 8: View Downloaded Images
docker images

Step 9: Start an Interactive Ubuntu Container
docker run -it Ubuntu
ls
pwd

OUTPUT:

```
Microsoft Windows [Version 10.0.26100.3775]
(c) Microsoft Corporation. All rights reserved.

C:\Users\MCALAB1>docker --version
Docker version 28.0.4, build b8034c0

C:\Users\MCALAB1>docker run hello-world
Unable to find image 'hello-world:latest' locally
latest: Pulling from library/hello-world
e6590344b1a5: Pull complete
Digest: sha256:c41088499908a59aae84b0a49c70e86f4731e588a737f1637e73c8c09d995654
Status: Downloaded newer image for hello-world:latest

Hello from Docker!
This message shows that your installation appears to be working correctly.

To generate this message, Docker took the following steps:
 1. The Docker client contacted the Docker daemon.
 2. The Docker daemon pulled the "hello-world" image from the Docker Hub.
    (amd64)
 3. The Docker daemon created a new container from that image which runs the
    executable that produces the output you are currently reading.
 4. The Docker daemon streamed that output to the Docker client, which sent it
    to your terminal.

To try something more ambitious, you can run an Ubuntu container with:
 $ docker run -it ubuntu bash

Share images, automate workflows, and more with a free Docker ID:
 https://hub.docker.com/

For more examples and ideas, visit:
 https://docs.docker.com/get-started/


C:\Users\MCALAB1>docker run ubuntu echo "Hello MAD Lab"
Unable to find image 'ubuntu:latest' locally
latest: Pulling from library/ubuntu
0622fac788ed: Pull complete
Digest: sha256:6015f66923d7afbc53558d7ccffd325d43b4e249f41a6e93eef074c9505d2233
Status: Downloaded newer image for ubuntu:latest
Hello MAD Lab
```

```
C:\Users\MCALAB1>docker images
REPOSITORY      TAG       IMAGE ID        CREATED        SIZE
ubuntu          latest    6015f66923d7    7 days ago     117MB
hello-world     latest    c41088499908    3 months ago   20.4kB

C:\Users\MCALAB1>docker run -it ubuntu
root@b66beab77981:/# ls
bin  boot  dev  etc  home  lib  lib64  media  mnt  opt  proc  root  run  sbin  srv  sys  tmp  usr  var
root@b66beab77981:/# pwd
/
root@b66beab77981:/# exit
exit
```

PROGRAM 12

Step 1: Install Google Cloud SDK (gcloud CLI)

Step 2: gcloud init

Step 3: gcloud projects create engine-ex12-2025

Step 4: gcloud config set project engine-ex12-2025

Step 5: gcloud app create --region=us-central

Step 6: gcloud app deploy

Step 7: gcloud app browse

Main.py:

```python
from flask import Flask, request

app = Flask(_name_)

@app.route('/')
def form():
    return '''
        <form action="/add" method="post">
            <input type="text" name="a"> +
            <input type="text" name="b">
            <input type="submit">
        </form>
    '''

@app.route('/add', methods=['POST'])
def add():
    try:
        a = int(request.form['a'])
        b = int(request.form['b'])
        return f'The sum is: {a + b}'
    except Exception as e:
        return f'Error: {e}'
```

app.yaml:
runtime: python39

```
entrypoint: gunicorn -b :$PORT main:app

automatic_scaling:
  max_instances: 1
```

requirements.txt:

```
Flask==2.2.5
Werkzeug==2.2.3
gunicorn==20.1.0
```

OUTPUT:

```
Your Cloud Platform project in this session is set to ethereal-mind-459613-d3.
Use `gcloud config set project [PROJECT_ID]` to change to a different project.
akashsrmvec@cloudshell:~ (ethereal-mind-459613-d3)$ cd gae_hello_addition_app
akashsrmvec@cloudshell:~/gae_hello_addition_app (ethereal-mind-459613-d3)$ gcloud app deploy
Services to deploy:

descriptor:               [/home/akashsrmvec/gae_hello_addition_app/app.yaml]
source:                   [/home/akashsrmvec/gae_hello_addition_app]
target project:           [ethereal-mind-459613-d3]
target service:           [default]
target version:           [20250512t134816]
target url:               [https://ethereal-mind-459613-d3.el.r.appspot.com]
target service account:   [ethereal-mind-459613-d3@appspot.gserviceaccount.com]


Do you want to continue (Y/n)?  y


Beginning deployment of service [default]...
Uploading 0 files to Google Cloud Storage
100%
File upload done.
Updating service [default]...done.
Setting traffic split for service [default]...done.
Deployed service [default] to [https://ethereal-mind-459613-d3.el.r.appspot.com]

You can stream logs from the command line by running:
  $ gcloud app logs tail -s default

To view your application in the web browser run:
  $ gcloud app browse
akashsrmvec@cloudshell:~/gae_hello_addition_app (ethereal-mind-459613-d3)$ gcloud app browse
Did not detect your browser. Go to this link to view your app:
https://ethereal-mind-459613-d3.el.r.appspot.com
akashsrmvec@cloudshell:~/gae_hello_addition_app (ethereal-mind-459613-d3)$ ▯
```
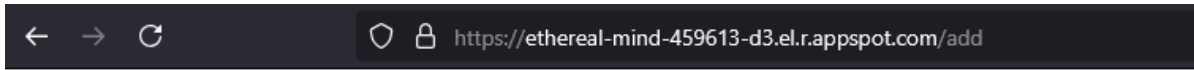
← → C   🛡 🔒 https://ethereal-mind-459613-d3.el.r.appspot.com

| 10 | + | 5 | Submit Query |

The sum is: 15

PROGRAM 13

Main_activity.java:

```java
package com.example.alarmclock;

import android.app.AlarmManager;

import android.app.PendingIntent;

import android.content.Intent;

import android.os.Bundle;

import android.widget.TextView;

import android.widget.TimePicker;

import android.widget.ToggleButton;

import android.view.View;

import androidx.appcompat.app.AppCompatActivity;

import java.util.Calendar;


public class MainActivity extends AppCompatActivity {

    private AlarmManager alarmManager;

    private PendingIntent pendingIntent;

    private TimePicker alarmTimePicker;

    private TextView alarmText;

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

        alarmTimePicker = findViewById(R.id.alarmTimePicker);
```

```java
        alarmText = findViewById(R.id.alarmText);

        alarmManager = (AlarmManager) getSystemService(ALARM_SERVICE);

    }


    public void onToggleClicked(View view) {

        ToggleButton toggle = (ToggleButton) view;


        if (toggle.isChecked()) {

            int hour = alarmTimePicker.getHour();

            int minute = alarmTimePicker.getMinute();


            Calendar calendar = Calendar.getInstance();

            calendar.set(Calendar.HOUR_OF_DAY, hour);

            calendar.set(Calendar.MINUTE, minute);

            calendar.set(Calendar.SECOND, 0);


            Intent intent = new Intent(this, AlarmReceiver.class);

            pendingIntent = PendingIntent.getBroadcast(this, 0, intent,
PendingIntent.FLAG_IMMUTABLE);

            alarmManager.set(AlarmManager.RTC_WAKEUP, calendar.getTimeInMillis(),
pendingIntent);


            alarmText.setText("Alarm set for: " + hour + ":" + String.format("%02d", minute));

        } else {

            if (pendingIntent != null) {

                alarmManager.cancel(pendingIntent);

            }

            alarmText.setText("Alarm canceled");

        }

    }
```

}

AlarmService.java:

```java
package com.example.alarmclock;

import android.app.IntentService;

import android.app.NotificationManager;

import android.app.PendingIntent;

import android.content.Context;

import android.content.Intent;

import androidx.core.app.NotificationCompat;


public class AlarmService extends IntentService {

    public AlarmService() {
        super("AlarmService");
    }


    @Override
    protected void onHandleIntent(Intent intent) {
        sendNotification("Wake Up! Alarm is ringing!");
    }


    private void sendNotification(String msg) {
        NotificationManager manager = (NotificationManager)
getSystemService(Context.NOTIFICATION_SERVICE);


        Intent intent = new Intent(this, MainActivity.class);
        PendingIntent contentIntent = PendingIntent.getActivity(this, 0, intent,
PendingIntent.FLAG_IMMUTABLE);
```

```java
NotificationCompat.Builder builder = new NotificationCompat.Builder(this, "default")
    .setSmallIcon(R.drawable.ic_launcher_foreground)
    .setContentTitle("Alarm Clock")
    .setContentText(msg)
    .setContentIntent(contentIntent)
    .setAutoCancel(true);


    manager.notify(1, builder.build());
    }
}
```

AlarmReceiver.java:

```java
package com.example.alarmclock;

import android.content.BroadcastReceiver;

import android.content.Context;

import android.content.Intent;

import android.media.Ringtone;

import android.media.RingtoneManager;

import android.net.Uri;


public class AlarmReceiver extends BroadcastReceiver {

    @Override
    public void onReceive(Context context, Intent intent) {
        Uri alarmUri = RingtoneManager.getDefaultUri(RingtoneManager.TYPE_ALARM);
        if (alarmUri == null) {
```

```
            alarmUri =
RingtoneManager.getDefaultUri(RingtoneManager.TYPE_NOTIFICATION);

        }

        Ringtone ringtone = RingtoneManager.getRingtone(context, alarmUri);

        ringtone.play();


        Intent service = new Intent(context, AlarmService.class);

        context.startService(service);

    }

}
```

AndroidManifest.xml:

```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">
    <uses-permission android:name="android.permission.WAKE_LOCK" />


    <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.AlarmClock"
        tools:targetApi="31">
        <activity
```

```xml
                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>

            <!-- Register the broadcast receiver for alarm -->

            <receiver android:name=".AlarmReceiver" />

            <!-- Register the service to handle alarm notification -->

            <service android:name=".AlarmService" />

        </application>

</manifest>
```

Activity.xml:

```xml
<RelativeLayout xmlns:android="http://schemas.android.com/apk/res/android"

    xmlns:tools="http://schemas.android.com/tools"

    android:layout_width="match_parent"

    android:layout_height="match_parent"

    tools:context=".MainActivity">


    <TimePicker

        android:id="@+id/alarmTimePicker"

        android:layout_width="wrap_content"

        android:layout_height="wrap_content"

        android:layout_centerHorizontal="true"

        android:layout_marginTop="50dp"/>
```

```xml
<ToggleButton
    android:id="@+id/alarmToggle"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="Alarm On/Off"
    android:onClick="onToggleClicked"
    android:layout_below="@id/alarmTimePicker"
    android:layout_centerHorizontal="true"
    android:layout_marginTop="30dp"/>

<TextView
    android:id="@+id/alarmText"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="No Alarm Set"
    android:layout_below="@id/alarmToggle"
    android:layout_centerHorizontal="true"
    android:layout_marginTop="20dp"/>
</RelativeLayout>
```

OUTPUT: