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Practical: 1

Problem Statement:

To Study Android Architecture and Installing Android Studio on Windows Platform.

Explanation :

Android architecture contains different number of components to support any android device needs. Android software contains an open-source Linux Kernel having collection of number of C/C++ libraries which are exposed through an application framework services. Among all the components Linux Kernel provides main functionality of operating system functions to smartphones and Dalvik Virtual Machine (DVM) provide platform for running an android application.

The main components of android architecture are following:-

- Applications
- Application Framework
- Android Runtime
- Platform Libraries
- Linux Kernel

Pictorial representation of android architecture with several main components and their sub components:-
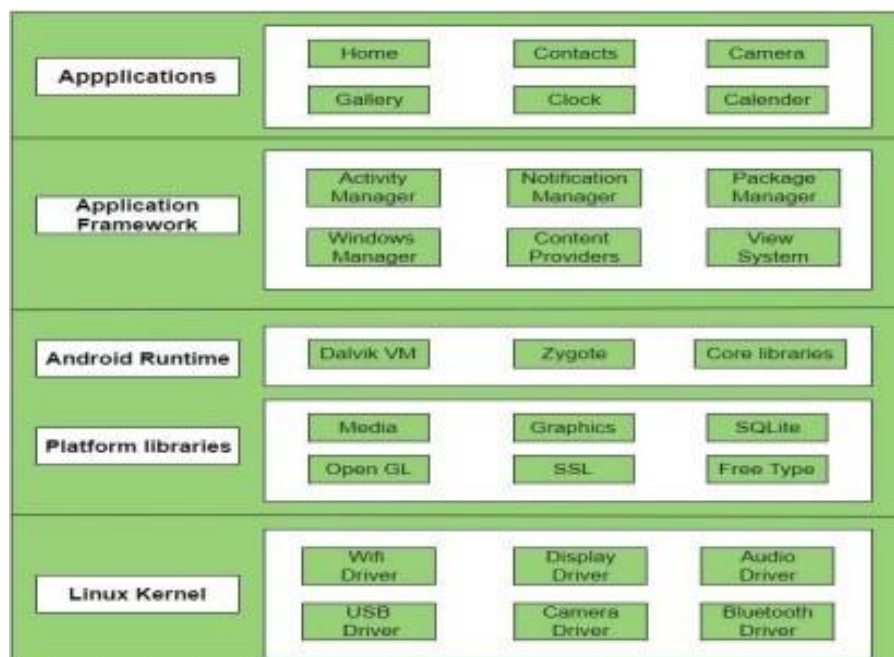
Applications:-

Applications is the top layer of android architecture. The pre-installed applications like home, contacts, camera, gallery etc and third party applications downloaded from the play store like chat applications, games etc. will be installed on this layer only. It runs within the Android run time with the help of the classes and services provided by the application framework.

Application framework :-

Application Framework provides several important classes which are used to create an Android application. It provides a generic abstraction for hardware access and also helps in managing the user interface with application resources. Generally, it provides

the services with the help of which we can create a particular class and make that class helpful for the Applications creation.

It includes different types of services activity manager, notification manager, view system, package manager etc. which are helpful for the development of our application according to the prerequisite.

The Android Runtime environment is one of the most important part of Android. It contains components like core libraries and the Dalvik virtual machine(DVM). Mainly, it provides the base for the application framework and powers our application with the help of the core libraries.

Like Java Virtual Machine (JVM), Dalvik Virtual Machine (DVM) is a register-based virtual machine and specially designed and optimized for android to ensure that a

device can run multiple instances efficiently. It depends on the layer Linux kernel for threading and low-level memory management. The core libraries enable us to implement android applications using the standard JAVA or Kotlin programming languages.

Platform libraries :-

The Platform Libraries includes various C/C++ core libraries and Java based libraries such as Media, Graphics, Surface Manager, OpenGL etc. to provide a support for android development.

- Media library provides support to play and record an audio and video formats.
- Surface manager responsible for managing access to the display subsystem.
- SGL and OpenGL both cross-language, cross-platform application program interface (API) are used for 2D and 3D computer graphics.
- SQLite provides database support and FreeType provides font support.
- Web-Kit This open source web browser engine provides all the functionality to

- display web content and to simplify page loading.
- SSL (Secure Sockets Layer) is security technology to establish an encrypted link between a web server and a web browser.

Linux Kernel :-

Linux Kernel is the heart of the android architecture. It manages all the available drivers such as display drivers, camera drivers, Bluetooth drivers, audio drivers, memory drivers, etc. which are required during the runtime.

The Linux Kernel will provide an abstraction layer between the device hardware and the other components of android architecture. It is responsible for management of memory, power, devices etc.

The features of Linux kernel are:

- Security: The Linux kernel handles the security between the application and the system.
- Memory Management: It efficiently handles the memory management thereby providing the freedom to develop our apps
- Process Management: It manages the process well, allocates resources to processes whenever they need them.
- Network Stack: It effectively handles the network communication.
- Driver Model: It ensures that the application works properly on the device and hardware manufacturers responsible for building their drivers into the Linux build.

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Practical: 2

Problem Statement:

Develop an android app which displays "Hello (Your name), welcome to Android Lab" message. Also study Different Files generated by App.

Program:

Main_activity.java:

```java
package com.example.p1;
import androidx.appcompat.app.AppCompatActivity;
import android.os.Bundle;

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

Activity_main.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:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context=".MainActivity">
    <TextView
        android:layout_width="397dp"
        android:layout_height="57dp"
        android:gravity="center"
```

android:text="Hello Krushang Rajeshkumar Vachhiyat,\nwelcome to Android Lab"

android:textSize="20dp"

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:-

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Practical: 3

Problem Statement:

Develop an android app which displays "Hello (Your name), welcome to Android Lab" message. Also study Different Files generated by App.

Program:

Main_activity.java:

```
package com.example.practical_3;

import androidx.appcompat.app.AppCompatActivity;

import android.os.Bundle;
import android.util.Log;

public class MainActivity extends AppCompatActivity {

  @Override
  protected void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_main);
    Log.d("lifecycle","200420107058");
    Log.d("lifecycle","onCreate invoked");

  }
    @Override
  protected void onStart() {
  super.onStart();
      Log.d("lifecycle","200420107058");
  Log.d("lifecycle","onStart invoked");
  }
  @Override
```

```java
    protected void onResume() {
    super.onResume();
        Log.d("lifecycle","200420107058");
    Log.d("lifecycle","onResume invoked");
    }
    @Override
    protected void onPause() {
    super.onPause();
        Log.d("lifecycle","200420107058");
    Log.d("lifecycle","onPause invoked");
    }
    @Override
    protected void onStop() {
    super.onStop();
        Log.d("lifecycle","200420107058");
    Log.d("lifecycle","onStop invoked");
    }
    @Override
    protected void onRestart() {
    super.onRestart();
        Log.d("lifecycle","200420107058");
    Log.d("lifecycle","onRestart invoked");
    }
    @Override
    protected void onDestroy() {
    super.onDestroy();
        Log.d("lifecycle","200420107058");
    Log.d("lifecycle","onDestroy invoked");
    }
}
```

Activity_main.xml:-

```xml
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
```

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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"

   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:-

```
D/lifecycle: 200420107058
D/lifecycle: onCreate invoked
D/lifecycle: 200420107058
D/lifecycle: onStart invoked
D/lifecycle: 200420107058
D/lifecycle: onResume invoked
D/HostConnection: HostConnection::get() New Host Connection established 0xec5ce860, tid 15239
D/HostConnection: HostComposition ext ANDROID_EMU_CHECKSUM_HELPER_v1 ANDROID_EMU_native_sync_v2
W/OpenGLRenderer: Failed to choose config with EGL_SWAP_BEHAVIOR_PRESERVED, retrying without...
D/EGL_emulation: eglCreateContext: 0xec5ced30: maj 2 min 0 rcv 2
D/EGL_emulation: eglMakeCurrent: 0xec5ced30: ver 2 0 (tinfo 0xbda765f0) (first time)
I/Gralloc4: mapper 4.x is not supported
D/HostConnection: createUnique: call
D/HostConnection: HostConnection::get() New Host Connection established 0xec5cf2e0, tid 15239
D/goldfish-address-space: allocate: Ask for block of size 0x100
D/goldfish-address-space: allocate: ioctl allocate returned offset 0x3efffe000 size 0x2000
D/HostConnection: HostComposition ext ANDROID_EMU_CHECKSUM_HELPER_v1 ANDROID_EMU_native_sync_v2
D/lifecycle: 200420107058
D/lifecycle: onPause invoked
D/lifecycle: 200420107058
D/lifecycle: onStop invoked
D/lifecycle: 200420107058
D/lifecycle: onDestroy invoked
```

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Practical: 4.1

1. Problem Statement:

Implicit intent(Create one activity contain textbox and button. Enter URL of any Webpage in textbox and click button will open that URL)

Program:

Main_activity.java:

```
 package com.example.practical_4;

import androidx.appcompat.app.AppCompatActivity;

import android.content.Intent;
import android.net.Uri;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.widget.EditText;

public class MainActivity extends AppCompatActivity
{

  @Override
  protected void onCreate(Bundle savedInstanceState)
  {
    Button button;
    EditText editText;
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_main);
    button = findViewById(R.id.button);
    editText = findViewById(R.id.editText);
      button.setOnClickListener(new View.OnClickListener()
    {
    @Override
    public void onClick(View view)
    {
    String url;
```

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```
        url = editText.getText().toString();
        if(!url.startsWith("https://"))
        {
           url="https://"+url;
        }
        Intent intent=new Intent(Intent.ACTION_VIEW, Uri.parse(url));
     startActivity(intent);
        }


   });
 }
```

Activity_main.xml:-

```xml
<?xml version="1.0" encoding="utf-8"?>
<androidx.appcompat.widget.LinearLayoutCompat
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"
   tools:context=".MainActivity">
   <EditText
     android:id="@+id/editText"
     android:layout_width="wrap_content"
     android:layout_height="wrap_content"
     android:ems="10"
     android:inputType="textPersonName"
     android:text="Enter url"
     android:translationX="100dp"
     android:translationY="200dp"
     tools:layout_editor_absoluteX="50dp"
     tools:layout_editor_absoluteY="50dp" />
   <Button
     android:id="@+id/button"
     android:layout_width="wrap_content"
     android:layout_height="wrap_content"
     android:text="Button"
```

    android:translationX="150dp"

    android:translationY="300dp" />

</androidx.appcompat.widget.LinearLayoutCompat>

Output:-

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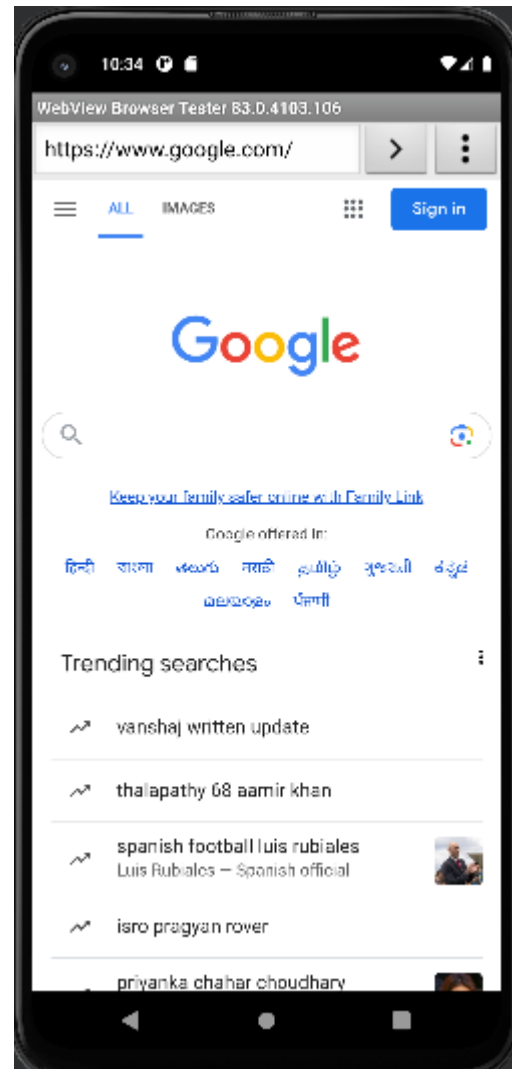
2. Problem Statement:

Explicit Intent(Create first activity with button named callsecondactivity, clicking on this button it will open second activity page which contain anther button name callfirstactivity, clicking on it will redirect to again first activity page).

Program:

Main_activity.java:

```
package com.example.practical_41_2;
import androidx.appcompat.app.AppCompatActivity;
import android.content.Intent;
import android.os.Bundle;
public class MainActivity extends AppCompatActivity {
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        Intent i=new Intent(getApplicationContext(), FirstActivity.class);
        startActivity(i);
    }
}
```

FirstActivity.java:-

```
package com.example.practical_41_2;
import androidx.appcompat.app.AppCompatActivity;
import android.content.Intent;
import android.os.Bundle;
import android.view.View;
public class FirstActivity extends AppCompatActivity {
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_first);
    }
    public void callSecondActivity(View view)
    {
        Intent i=new Intent(getApplicationContext(), SecondActivity.class);
        startActivity(i);
```

```
    }
}
```

Activity_first.xml:

```xml
<?xml version="1.0" encoding="utf-8"?>
<androidx.appcompat.widget.LinearLayoutCompat
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"
    tools:context=".FirstActivity">
    <TextView
        android:id="@+id/textView2"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="First Activity"
        android:textSize="25dp"
        android:translationX="100dp"
        android:translationY="250dp"/>
    <Button
        android:id="@+id/b1"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:onClick="callSecondActivity"
        android:text="Goto Second Activity"
        android:translationX="-50dp"
        android:translationY="350dp"/>
</androidx.appcompat.widget.LinearLayoutCompat>
```
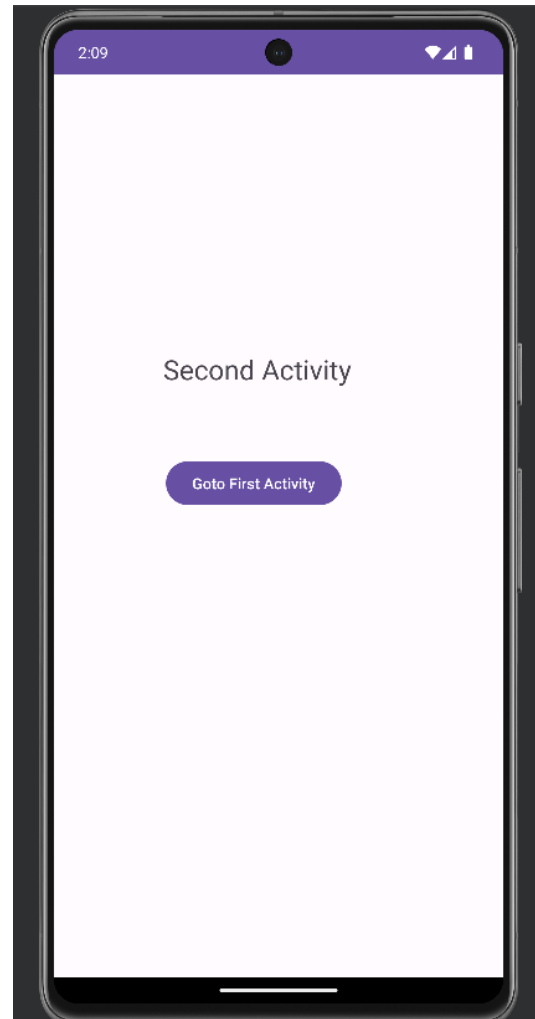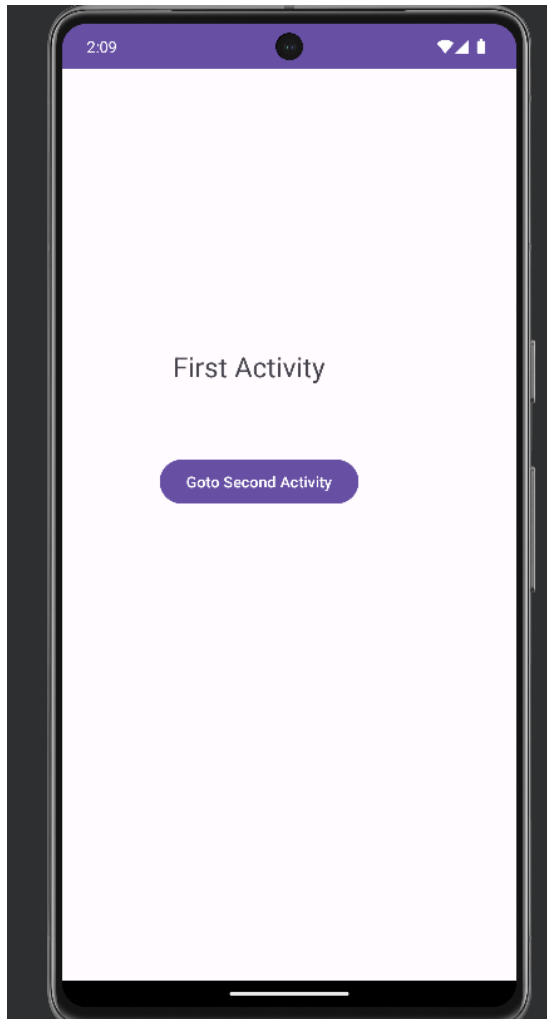
SecondActivity.java:-

```java
package com.example.practical_41_2;
import androidx.appcompat.app.AppCompatActivity;
import android.content.Intent;
import android.os.Bundle;
import android.view.View;
public class SecondActivity extends AppCompatActivity
    @Override
    protected void onCreate(Bundle savedInstanceState) {
```

```
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_second);
  }
  public void callFirstActivity(View view)
  {
    Intent i=new Intent(getApplicationContext(), FirstActivity.class);
    startActivity(i);
  }
}
```

Actovity_second.xml:-

```xml
<?xml version="1.0" encoding="utf-8"?>
<androidx.appcompat.widget.LinearLayoutCompat
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"
  tools:context=".SecondActivity">
  <TextView
    android:id="@+id/textView2"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="Second Activity"
    android:textSize="25dp"
    android:translationX="100dp"
    android:translationY="250dp"/>
  <Button
    android:id="@+id/b2"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:onClick="callFirstActivity"
    android:text="Goto First Activity"
    android:translationX="-70dp"
    android:translationY="350dp”/>
</androidx.appcompat.widget.LinearLayoutCompat>
```

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Output:-

Practical: 4.2

1. Problem Statement:

Create Activities & implement mobile app and demo StartActivity For Result. (Create Two different activity - first contains two edittext for input numbers from user and one submit button. second contains two button- ADD & SUBTRACT. When user click on submit button both numbers send to second activity, based on user input on second activity ADD/SUBSTRACT result will be send back to first activity and display it.)

Program:

Main_activity.java:

```
package com.example.p42;
import androidx.appcompat.app.AppCompatActivity;
import android.content.Intent;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.widget.EditText;
import android.widget.TextView;
import android.widget.Toast;
public class MainActivity extends AppCompatActivity {
    private TextView mTextViewResult;
    private EditText mEditTextNumber1;
    private EditText mEditTextNumber2;
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        mTextViewResult = findViewById(R.id.text_view_result);
        mEditTextNumber1 = findViewById(R.id.edit_text_number1);
        mEditTextNumber2 = findViewById(R.id.edit_text_number2);
        Button buttonOpenActivity2 = findViewById(R.id.button_open_activity2);
        buttonOpenActivity2.setOnClickListener(new View.OnClickListener() {
            @Override
```

_____

```java
        public void onClick(View v) {
            if (mEditTextNumber1.getText().toString().equals("")
                || mEditTextNumber2.getText().toString().equals("")) {
                Toast.makeText(MainActivity.this, "Please insert numbers",
Toast.LENGTH_SHORT).show();
            } else {
                int number1 = Integer.parseInt(mEditTextNumber1.getText().toString());
                int number2 = Integer.parseInt(mEditTextNumber2.getText().toString());
                Intent intent = new Intent(MainActivity.this, activity2.class);
                intent.putExtra("number1", number1);
                intent.putExtra("number2", number2);
                startActivityForResult(intent, 1);
            }
        }
    });
}
@Override
protected void onActivityResult(int requestCode, int resultCode, Intent data) {
    super.onActivityResult(requestCode, resultCode, data);
  if (requestCode == 1) {
        if (resultCode == RESULT_OK) {
            int result = data.getIntExtra("result", 0);
            mTextViewResult.setText("" + result);
        }
        if (resultCode == RESULT_CANCELED) {
            mTextViewResult.setText("Nothing selected");
        }
    }
}
}
```

Activity2.java:-

```java
package com.example.p42;
import androidx.appcompat.app.AppCompatActivity;
import android.content.Intent;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;
```

```java
import android.widget.TextView;
public class activity2 extends AppCompatActivity {
  @Override
  protected void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_2);
    setTitle("Activity 2");
    Intent intent = getIntent();
    final int number1 = intent.getIntExtra("number1", 0);
    final int number2 = intent.getIntExtra("number2", 0);
    TextView textViewNumbers = findViewById(R.id.text_view_numbers);
    textViewNumbers.setText("Numbers: " + number1 + ", " + number2);
    Button buttonAdd = findViewById(R.id.button_add);
    Button buttonSubtract = findViewById(R.id.button_subtract);
    buttonAdd.setOnClickListener(new View.OnClickListener() {
      @Override
      public void onClick(View v) {
        int result = number1 + number2;
        Intent resultIntent = new Intent();
        resultIntent.putExtra("result", result);
        setResult(RESULT_OK, resultIntent);
        finish();
      }
    });
    buttonSubtract.setOnClickListener(new View.OnClickListener() {
      @Override
      public void onClick(View v) {
        int result = number1 - number2;
        Intent resultIntent = new Intent();
        resultIntent.putExtra("result", result);
        setResult(RESULT_OK, resultIntent);
        finish();
      }
    });
  }
}
```

Activity_main.xml:-

```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:gravity="center"
    android:orientation="vertical"
    android:padding="16dp"
    tools:context="MainActivity">
    <EditText
        android:id="@+id/edit_text_number1"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:hint="Number 1"
        android:inputType="number" />
    <EditText
        android:id="@+id/edit_text_number2"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:hint="Number 2"
        android:inputType="number" />
    <TextView
        android:id="@+id/text_view_result"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:text="Result"
        android:textSize="30sp" />
    <Button
        android:id="@+id/button_open_activity2"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="open activity 2" />
</LinearLayout>
```

Activit_2.xml:-

```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:gravity="center"
android:orientation="vertical"
android:padding="16dp"
tools:context=".activity2">
<TextView
    android:id="@+id/text_view_numbers"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:text="Numbers: "
    android:textSize="30sp" />
<Button
    android:id="@+id/button_add"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="add" />
<Button
    android:id="@+id/button_subtract"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="subtract" />
</LinearLayout>
```

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Output:-