Experiment No.: 1 GUI

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Aim: Develop an application that uses GUI components.

Theory:

A typical user interface of an android application consists of an action bar and the application content area.

- Main Action Bar
- View Control
- Content Area
- Split Action Bar

The basic unit of android application is the activity. A UI is defined in an xml file. During compilation, each element in the XML is compiled into an equivalent Android GUI class with attributes represented by methods.

View and ViewGroups

An activity consists of views. A view is just a widget that appears on the screen. It could be a button etc. One or more views can be grouped together into one GroupView. Example of ViewGroup includes layouts.

Types of layout

There are many types of layout. Some of which are listed below −

- Linear Layout
- Absolute Layout
- Table Layout
- Frame Layout
- Relative Layout

The basic building block for user interface is a **View** object which is created from the View class and occupies a rectangular area on the screen and is responsible for drawing and event

handling. View is the base class for widgets, which are used to create interactive UI components like buttons, text fields, etc.

The **ViewGroup** is a subclass of **View** and provides invisible containers that hold other Views or other ViewGroups and define their layout properties.

At third level we have different layouts which are subclasses of ViewGroup class and a typical layout defines the visual structure for an Android user interface and can be created either at run time using **View/ViewGroup** objects or you can declare your layout using simple XML file **main_layout.xml** which is located in the res/layout folder of your project.

Code:
MainActivity.java

```java
package com.example.simpleloginapp;
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 {

  /* Define the UI elements */
  private EditText eName;
  private EditText ePassword;
  private TextView eAttemptsInfo;
  private Button eLogin;
  private int counter = 5;
```

```java
String userName = "";
  String userPassword = "";


  /* Class to hold credentials */



 class Credentials
  {

     String name = "Admin";
     String password = "123456";
  }


  boolean isValid = false;


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


     /* Bind the XML views to Java Code Elements */
     eName = findViewById(R.id.etName);
     ePassword = findViewById(R.id.etPassword);
     eAttemptsInfo = findViewById(R.id.tvAttempts);
     eLogin = findViewById(R.id.btnLogin);


     /* Describe the logic when the login button is clicked */
     eLogin.setOnClickListener(new View.OnClickListener() {
       @Override
       public void onClick(View view) {


         /* Obtain user inputs */
         userName = eName.getText().toString();
         userPassword = ePassword.getText().toString();
```

```java
/* Check if the user inputs are empty */
if(userName.isEmpty() || userPassword.isEmpty())
  /* Display a message toast to user to enter the details */
{




    Toast.makeText(MainActivity.this, "Please enter name and password!", Toast.LENGT


    }else {


        /* Validate the user inputs */
        isValid = validate(userName, userPassword);


        /* Validate the user inputs */


        /* If not valid */
        if (!isValid) {


            /* Decrement the counter */
            counter--;


            /* Show the attempts remaining */
            eAttemptsInfo.setText("Attempts Remaining: " + String.valueOf(counter)


            /* Disable the login button if there are no attempts left */
            if (counter == 0) {
                eLogin.setEnabled(false);
                Toast.makeText(MainActivity.this, "You have used all your attempts tr
Toast.LENGTH_LONG).show();
            }
            /* Display error message */
```

```java
            else {
                Toast.makeText(MainActivity.this, "Incorrect credentials, please try aga
Toast.LENGTH_LONG).show();
            }
        }
        /* If valid */
        else {




/* Allow the user in to your app by going into the next activity */
            startActivity(new Intent(MainActivity.this, HomePageActivity.class));
        }



        }
      }
    });
  }


  /* Validate the credentials */
  private boolean validate(String userName, String userPassword)
  {
    /* Get the object of Credentials class */
    Credentials credentials = new Credentials();


    /* Check the credentials */
    if(userName.equals(credentials.name) && userPassword.equals(credentials.passwor
    {
      return true;
    }


    return false;
  }
}
```

HomePageActivity.java

```java
package com.example.simpleloginapp;
```

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

import android.os.Bundle;

public class HomePageActivity extends AppCompatActivity {

    @Override


    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_home_page);
    }
}
```

activity_home_page.xml

```xml
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://schemas.and
    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=".HomePageActivity">

    <TextView
        android:id="@+id/tvSuccessInfo"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Welcome to my App"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent" />
</androidx.constraintlayout.widget.ConstraintLayout>
```

activity_main.xml

```xml
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://schemas.and
```

```xml
    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">

    <EditText
        android:id="@+id/etPassword"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:autofillHints=""
        android:ems="10"



android:hint="@string/input_text_hint"
        android:inputType="numberPassword"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"


        app:layout_constraintTop_toBottomOf="@+id/etName"
        app:layout_constraintVertical_bias="0.064" />

    <Button
        android:id="@+id/btnLogin"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="@string/login"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.498"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/etPassword"
        app:layout_constraintVertical_bias="0.098" />

    <TextView
        android:id="@+id/tvAttempts"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="@string/attempts_remaining_5"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/btnLogin"
```
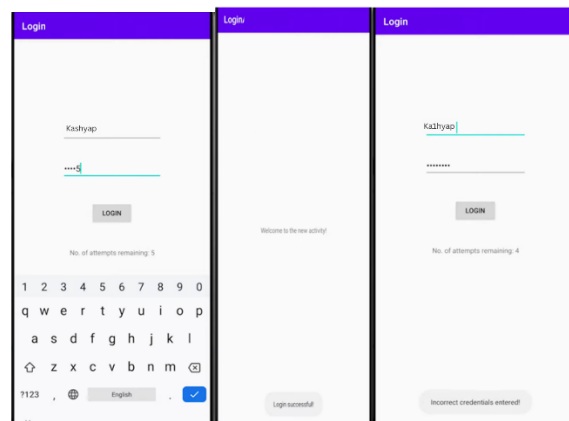
app:layout_constraintVertical_bias="0.084" />

```
    <EditText
        android:id="@+id/etName"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:ems="10"
        android:hint="@string/enter_name"
        android:inputType="textPersonName"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"


app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintVertical_bias="0.326"
        android:autofillHints="" />

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

Output:

GitHub: https://github.com/jayparekh1290/Mobile-Computing-Lab/tree/main/01%20GUI

Conclusion: The experiment was about building GUI on android studio, this experiment was verified and implemented successfully.