Assignment No. 5

Aim

Mobile Application for Calculator

Problem Definition

Design, Implement and Test Mobile Application for Calculator having trigonometry functionality. The data storage uses 1.text files, 2. XML. Use latest open source software modeling, Designing and testing tool/Scrum-it. Implement the design using HTML-5/Scala/ Python/Java/C++/Rubi on Rails. Perform Positive and Negative testing. Use Android toolkit, Celinium, Monkey Talk.

Learning Objectives

- Learn how to develop Mobile Applications.
- Implement Mobile Application for Calculator and learn how to test the Mobile Application.
- Learn about USE-CASE modeling in Modelio Software.

Learning Outcome

- Learnt about developing Mobile Applications.
- Implemented Mobile Application for Calculator.
- Learnt USE-CASE modeling in Modelio Software.

Software And Hardware Requirements

- Latest 64-BIT Version of Linux Operating System
- Android Studio
- Modelio Software

Mathematical Model

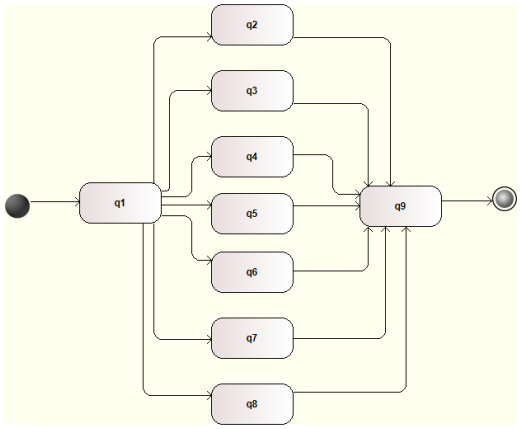
S = {s, e, I, o, f, DD, NDD, success, failure}
s = { start android sdk}
e = end of system
I = {R+,op}
op={+,-,*,/}
o = {I1 op I2}

DD = { input numbers }
NDD = {Textual Data }

f = {add(),sub(),mul(),div(),mod()}
add()= {I1 + I2}
sub()= {I1 - I2}
mul()= {I1 * I2}
div()= {I1 / I2}
mod()= {I1 % I2}

Success = Correct output is displayed.
Failure = Incorrect output is displayed.

State Diagram



where,
q1 = function f1
q2 = function f2
q3 = function f3
q4 = function f4
q5 = function f5
q6 = function f6
q7 = function f7
q8 = function f8
q9 = function f9

Theory

Mobile Applications

A mobile app is a computer program designed to run on mobile devices such as smartphones and tablet computers. Most such devices are sold with several apps bundled as pre-installed software, such as a web browser, email client, calendar, mapping program, and an app for buying music or other media or more apps. Some pre-installed apps can be removed by an ordinary uninstall process, thus leaving more storage space for desired ones. Where the software does not allow this, some devices can be rooted to eliminate the undesired apps. Mobile native apps stand in contrast to software applications that run on desktop computers, and to web applications which run in mobile web browsers rather

than directly on the mobile device.

Android is an open source and Linux-based Operating System for mobile devices such as smartphones and tablet computers. Android was developed by the Open Handset Alliance, led by Google, and other companies. Android offers a unified approach to application development for mobile devices which means developers need only develop for Android, and their applications should be able to run on different devices powered by Android. The first beta version of the Android Software Development Kit (SDK) was released by Google in 2007 where as the first commercial version, Android 1.0, was released in September 2008.

Android

Android is a mobile operating system (OS) currently developed by Google, based on the Linux kernel and designed primarily for touchscreen mobile devices such as smartphones and tablets. Android's user interface is mainly based on direct manipulation, using touch gestures that loosely correspond to real-world actions, such as swiping, tapping and pinching, to manipulate on-screen objects, along with a virtual keyboard for text input.

Applications ("apps"), which extend the functionality of devices, are written using the Android software development kit (SDK) and, often, the Java programming language that has complete access to the Android APIs. The SDK includes a comprehensive set of development tools, including a debugger, software libraries, a handset emulator based on QEMU, documentation, sample code, and tutorials. Initially, Google's supported integrated development environment (IDE) was Eclipse using the Android Development Tools (ADT) plugin; in December 2014, Google released Android Studio, based on IntelliJ IDEA, as its primary IDE for Android application development.

Android Studio

Android Studio is the official integrated development environment (IDE) for Android platform development. It was announced on May 16, 2013 at the Google I/O conference. Android Studio is freely available under the Apache License 2.0. Based on JetBrains' IntelliJ IDEA software, Android Studio is designed specifically for Android development. It is available for download on Windows, Mac OS X and Linux, and replaced Eclipse Android Development Tools (ADT) as Google's primary IDE for native Android application development.

Program

Main Activity.java

```
import android.os.Bundle;
import android.support.design.widget.FloatingActionButton;
import android.support.design.widget.Snackbar;
import android.support.v7.app.AppCompatActivity;
import android.support.v7.widget.Toolbar;
import android.util.Log;
import android.view.View;
import android.view.Menu;
import android.view.MenuItem;
import android.widget.Button;
import android.widget.TextView;

import java.io.File;
import java.io.FileOutputStream;
import java.io.FileReader;
import java.io.FileWriter;
import java.util.ArrayList;

import static java.lang.String.valueOf;

public class MainActivity extends AppCompatActivity {

    public TextView textView;
    double calc;
    double temp;
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        Toolbar toolbar = (Toolbar) findViewById(R.id.toolbar);
        setSupportActionBar(toolbar);
        calc=0;
        textView = (TextView) findViewById(R.id.textView);

    }
    ArrayList<String> arrayList =new ArrayList<String>();
    String string= "";
    String string1= "";

    //this function accepts the equation and sorts it
    public void onClick1(View v)
    {
        TextView textView2= (TextView) findViewById(R.id.textView2);
        Button button = (Button) v;
        string= (String) button.getText().toString();
```

```
    if ( !string.contains("+") && !string.contains("-")
    && !string.contains("*") && !string.contains("/"))
    {
        string1= string1+ string;
        if(arrayList.size()>0)
        {


            arrayList.remove(arrayList.size()-1);


        }
        arrayList.add(string1);

    }
    else
    {
        arrayList.add(string);
        arrayList.add(string);
        string1="";
    }

    textView2.setText(textView2.getText().toString()+ string);

    //textView2.setText(arrayList.toString());
}


//this function performs the actual calculation
public void onClick (View v)
{

    //int calc=0;
    int c= arrayList.size();
    while(c!=1)
    {
        if (c>3)
        {
            if(arrayList.get(3).contains("*")
            ||arrayList.get(3).contains("/"))
            {
                if(arrayList.get(3).contains("*"))
                { calc= Double.parseDouble(arrayList.get(2))
                * Double.parseDouble(arrayList.get(4));}
                if(arrayList.get(3).contains("/"))
                { calc= Double.parseDouble(arrayList.get(2))
```

```
        / Double.parseDouble(arrayList.get(4));}

        arrayList.remove(2);
        arrayList.remove(2);
        arrayList.remove(2);
        arrayList.add(2, Double.toString(calc));
        c=arrayList.size();
    }
    else
    {
        if (arrayList.get(1).contains("+"))
        {calc= Double.parseDouble(arrayList.get(0))
        +Double.parseDouble(arrayList.get(2));}
        if (arrayList.get(1).contains("-"))
        {calc= Double.parseDouble(arrayList.get(0))
        - Double.parseDouble(arrayList.get(2));}
        if (arrayList.get(1).contains("*"))
        {calc= Double.parseDouble(arrayList.get(0))
        * Double.parseDouble(arrayList.get(2));}
        if (arrayList.get(1).contains("/"))
        {calc= Double.parseDouble(arrayList.get(0))
         / Double.parseDouble(arrayList.get(2));}

        arrayList.remove(0);
        arrayList.remove(0);
        arrayList.remove(0);
        arrayList.add(0, Double.toString(calc));
        c=arrayList.size();

    }

}
else
{
    if (arrayList.get(1).contains("+"))
    {calc= Double.parseDouble(arrayList.get(0)) +
    Double.parseDouble(arrayList.get(2));}
    if (arrayList.get(1).contains("-"))
    {calc= Double.parseDouble(arrayList.get(0)) -
    Double.parseDouble(arrayList.get(2));}
    if (arrayList.get(1).contains("*"))
    {calc= Double.parseDouble(arrayList.get(0)) *
    Double.parseDouble(arrayList.get(2));}
    if (arrayList.get(1).contains("/"))
    {calc= Double.parseDouble(arrayList.get(0))
    / Double.parseDouble(arrayList.get(2));}
```

```
            arrayList.remove(0);
            arrayList.remove(0);
            arrayList.remove(0);
            arrayList.add(0, Double.toString(calc));
            c=arrayList.size();
        }
    }
    if(arrayList.size()==1)
    {
        calc= Double.parseDouble(arrayList.get(0));
    }
    textView.setText(""+calc);
}
public void sinFunct(View v)
{

    textView.setText("" + Math.sin(calc));

}

public void cosecfn(View v)
{

    textView.setText("" + 1/(Math.sin(calc)));

}

public void secfn(View v)
{

    textView.setText("" + 1/(Math.cos(calc)));

}

public void cosfn(View v)
{

    textView.setText("" + Math.cos(calc));

}

public void sqrtfn(View v)
{

    textView.setText("" + Math.sqrt(calc));
```

```
}

public void storeres(View v)
{
    try {
        FileWriter f = new FileWriter("result.txt");
        f.write("" + calc);
        textView.setText("");
        FileReader r= new FileReader("result.txt");

        //f.close();
    }
    catch(Exception e)
    {

    }
}
public void ansres(View v) {
    TextView textView2= (TextView) findViewById(R.id.textView2);
    temp = calc;
    textView2.setText(""+temp);
}
@Override
public boolean onCreateOptionsMenu(Menu menu) {
    // Inflate the menu; this adds items to the action bar if it is present.
    getMenuInflater().inflate(R.menu.menu_main, menu);
    return true;
}

@Override
public boolean onOptionsItemSelected(MenuItem item) {
    // Handle action bar item clicks here. The action bar will
    // automatically handle clicks on the Home/Up button, so long
    // as you specify a parent activity in AndroidManifest.xml.
    int id = item.getItemId();

    //noinspection SimplifiableIfStatement
    if (id == R.id.action_settings) {
        return true;
    }

    return super.onOptionsItemSelected(item);
}
//this function is used whith the clear key to clear the text view and result tab
public void clear(View v)
```

```
    {
        TextView textView = (TextView) findViewById(R.id.textView);
        TextView textView2 =(TextView) findViewById(R.id.textView2);

        string1="";
        string="";
        textView.setText("0");
        textView2.setText("");
        arrayList.clear();
    }
}
```

activity$_main.xml$

```
  <?xml version="1.0" encoding="utf-8"?>
<RelativeLayout xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:paddingBottom="@dimen/activity_vertical_margin"
    android:paddingLeft="@dimen/activity_horizontal_margin"
    android:paddingRight="@dimen/activity_horizontal_margin"
    android:paddingTop="@dimen/activity_vertical_margin"
    app:layout_behavior="@string/appbar_scrolling_view_behavior"
    tools:context="com.example.khadija.khadii.MainActivity"
    tools:showIn="@layout/activity_main">

    <Button
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="1"
        android:id="@+id/num1"
        android:layout_above="@+id/num4"
        android:layout_alignParentStart="true"
        android:onClick="onClick1"/>

    <Button
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="2"
        android:id="@+id/num2"
        android:layout_alignTop="@+id/num1"
        android:layout_toEndOf="@+id/num1"
        android:onClick="onClick1"/>
```

```
<Button
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="3"
    android:id="@+id/num3"
    android:layout_alignTop="@+id/num2"
    android:layout_toEndOf="@+id/num2"
    android:onClick="onClick1"/>

<Button
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="4"
    android:id="@+id/num4"
    android:layout_above="@+id/num7"
    android:layout_toStartOf="@+id/num8"
    android:onClick="onClick1"/>

<Button
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="5"
    android:id="@+id/num5"
    android:layout_alignTop="@+id/num4"
    android:layout_alignStart="@+id/num8"
    android:onClick="onClick1"/>

<Button
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="6"
    android:id="@+id/num6"
    android:layout_below="@+id/num3"
    android:layout_toEndOf="@+id/num2"
    android:onClick="onClick1"/>

<Button
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="7"
    android:id="@+id/num7"
    android:layout_above="@+id/num0"
    android:layout_alignParentStart="true"
    android:onClick="onClick1"/>
```

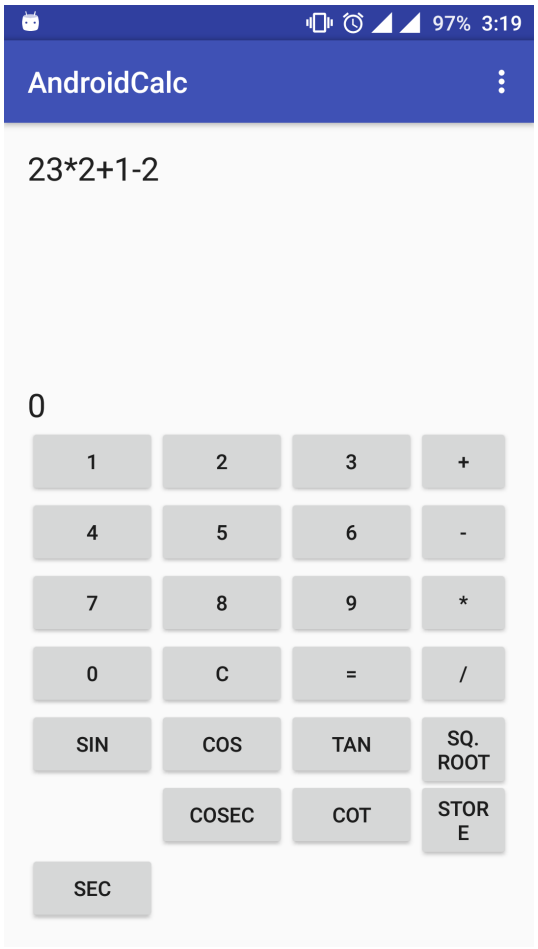
```
<Button
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="8"
    android:id="@+id/num8"
    android:layout_above="@+id/clearFunct"
    android:layout_alignStart="@+id/cosFunct"
    android:onClick="onClick1"/>

<Button
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="9"
    android:id="@+id/num9"
    android:layout_alignTop="@+id/num8"
    android:layout_toEndOf="@+id/num8"
    android:onClick="onClick1"/>

<Button
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="0"
    android:id="@+id/num0"
    android:layout_above="@+id/sinFunct"
    android:layout_toStartOf="@+id/cosFunct"
    android:onClick="onClick1"/>

<Button
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="C"
    android:id="@+id/clearFunct"
    android:layout_alignBottom="@+id/num0"
    android:layout_alignStart="@+id/num8"
    android:onClick="clear"/>

<Button
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="SEC"
    android:id="@+id/secFunct"
    android:layout_alignParentBottom="true"
    android:layout_alignParentStart="true"
   android:layout_marginBottom="50dp"
    android:onClick="secfn" />
```

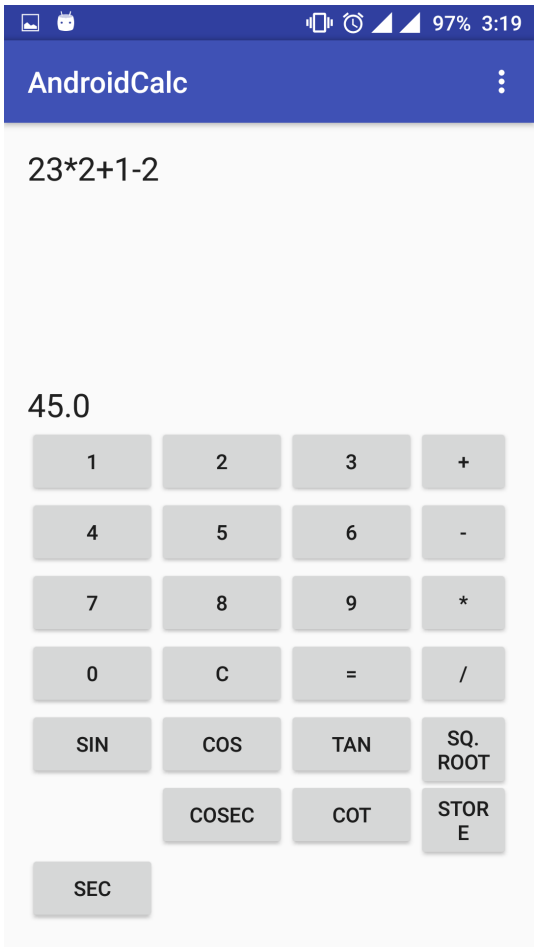
```
<Button
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="Cosec"
    android:id="@+id/cosecFunct"
    android:layout_alignTop="@+id/secFunct"
    android:layout_alignStart="@+id/clearFunct"
    android:onClick="cosecfn" />

<Button
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="COT"
    android:id="@+id/cotFunct"
    android:layout_below="@+id/tanFunct"
    android:layout_alignStart="@+id/tanFunct"
    android:onClick="cotfn" />

<Button
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="SIN"
    android:id="@+id/sinFunct"
    android:layout_above="@+id/secFunct"
    android:layout_alignParentStart="true"
    android:onClick="sinFunct" />

<Button
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="COS"
    android:id="@+id/cosFunct"
    android:layout_alignBottom="@+id/sinFunct"
    android:layout_toEndOf="@+id/sinFunct"
    android:onClick="cosfn" />

<Button
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="TAN"
    android:id="@+id/tanFunct"
    android:layout_alignTop="@+id/cosFunct"
    android:layout_toEndOf="@+id/cosecFunct"
    android:onClick="tanfn" />

<Button
```

```
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="="
    android:id="@+id/calcRes"
    android:layout_below="@+id/num8"
    android:layout_toEndOf="@+id/num8"
    android:onClick="onClick" />

<Button
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="+"
    android:id="@+id/addFunct"
    android:layout_alignTop="@+id/num3"
    android:layout_toEndOf="@+id/num3"
    android:onClick="onClick1"/>

<Button
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="-"
    android:id="@+id/subFunct"
    android:layout_above="@+id/num9"
    android:layout_toEndOf="@+id/num3"
    android:onClick="onClick1"/>

<Button
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="*"
    android:id="@+id/mulFunct"
    android:layout_below="@+id/num6"
    android:layout_toEndOf="@+id/num6"
    android:onClick="onClick1"/>

<Button
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="/"
    android:id="@+id/divFunct"
    android:layout_alignTop="@+id/calcRes"
    android:layout_toEndOf="@+id/tanFunct"
    android:onClick="onClick1"/>

<TextView
    android:layout_width="wrap_content"
```

```
        android:layout_height="wrap_content"
        android:textAppearance="?android:attr/textAppearanceLarge"
        android:text="0"
        android:id="@+id/textView"
        android:layout_above="@+id/num1"
        android:layout_alignEnd="@+id/addFunct"
        android:layout_toEndOf="@+id/textView2"
        android:layout_alignParentStart="true" />

    <TextView
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:textAppearance="?android:attr/textAppearanceLarge"
        android:id="@+id/textView2"
        android:layout_alignParentTop="true"
        android:layout_alignParentStart="true"
        android:layout_alignEnd="@+id/addFunct" />

    <Button
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Sq. Root"
        android:id="@+id/brOpen"
        android:layout_below="@+id/calcRes"
        android:layout_toEndOf="@+id/cotFunct"
        android:onClick="sqrtfn" />

    <Button
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="STORE"
        android:id="@+id/brClose"
        android:layout_below="@+id/tanFunct"
        android:layout_toEndOf="@+id/cotFunct"
        android:onClick="storeres" />
    <Button
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Ans"
        android:id="@+id/ans"
        android:layout_below="@+id/cotFunct"
        android:layout_alignStart="@+id/cotFunct"
        android:onClick="ansres" />
</RelativeLayout>
```

Output

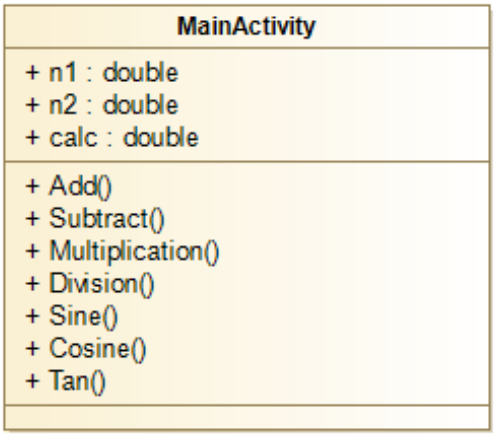

97% 3:19
AndroidCalc
23*2+1-2
0
1
2
3
+
4
5
6
-
7
8
9
*
0
C
=
/
SIN
COS
TAN
SQ. ROOT
COSEC
COT
STOR E
SEC



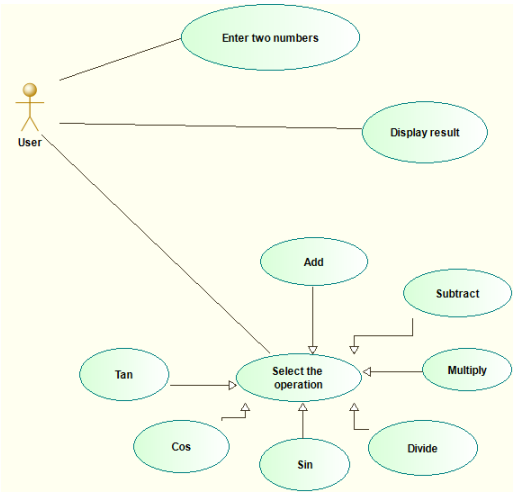
Testing

```
    import org.junit.Test;

import static org.junit.Assert.*;

/**
 * To work on unit tests, switch the Test Artifact in the Build Variants view.
 */
public class ExampleUnitTest {
    @Test
    public void addition_isCorrect() throws Exception {
        assertEquals(4, 2 + 2);

    }
```

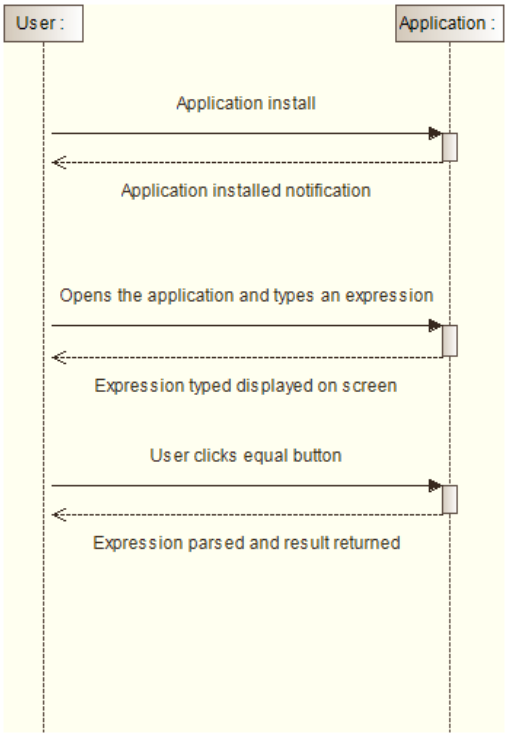
Class Diagram



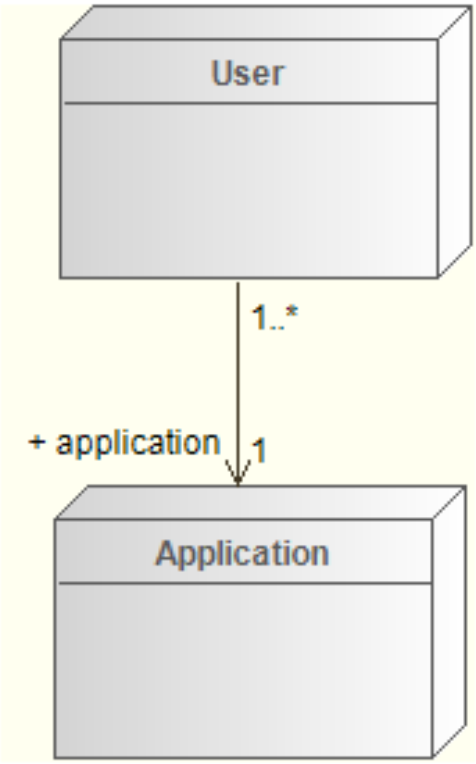
Use-Case Diagram



Sequence Diagram



Deployment Diagram



Positive Testing

Sr No.	Test Condition	Steps to be executed	Expected Result	Actual Result
1.	Enter value of which trigonometric function is to be calculate	Press Enter	Result of trigonometric function	Same as Expected Result
2.	Enter the button "="	Click on the equal to Button	Display the final Result	Same as Expected Result
3.	1/0	Click on "=" button	Display Result "infinity"	Same as Expected Result

Negative Testing

Sr No.	Test Condition	Steps to be executed	Expected Result	Actual Result
1.	Enter Imaginary value	Press Enter	Error Messages	Same as Expected Result
2.	Without "(", ")"	Press Enter	Error	Same as Expected Result
3.	Press "=" without any input	Press "="	undefined	Same as Expected Result

Conclusion

Thus we have successfully implemented a mobile application for calculator on Android platform