# Assignment Number : B 3

## Problem Statement:

Write a mobile application to generate a Scientific calculator using J2ME/ Python/ Scala/ C++/ Android.

## Objective:

· To understand how to create Mobile Application for Scientific Calculator program.

## Theory

Building Android Application

Event Handling

Events are a useful way to collect data about a user's interaction with interactive components of your app, like button presses or screen touch etc. The Android framework maintains an event queue into which events are placed as they occur and then each event is removed from the queue on a first-in, first-out (FIFO) basis. One can capture these events in program and take appropriate action as per requirements.

There are following three concepts related to Android Event Management:

· Event Listeners:

The View class is mainly involved in building up a Android GUI, same View class provides a number of Event Listeners. The Event Listener is the object that receives notification when an event happes.

· Event Listeners Registration:

Event Registration is the process by which an Event Handler gets registered with an Event Listener so that the handler is called when the Event Listener fires the event.

· Event Handlers:

When an event happens and have registered the event, the event listener calls the Event Handlers, which is the method that actually handles the event.

Example:

1. onClick():

OnClickListener() is called when the user either clicks or touches or focuses upon any widget like button, text, image etc. It uses onClick() event handler to handle such event.

Java Math Class

The java.lang.Math class contains methods for performing basic numeric operations such as the elementary exponential, logarithm, square root, and trigonometric functions.

· Math.pow():

The java.lang.Math.pow(double a, double b) returns the value of the first argument raised to the power of the second argument

· Math.tan():

The java.lang.Math.tan(double a) returns the trigonometric tangent of an angle.

· Math.cos():

The java.lang.Math.cos(double a) returns the trigonometric cosine of an angle.

· Math.sin():

The java.lang.Math.sin(double a) returns the trigonometric sine of an angle.

· Math.sqrt():

The java.lang.Math.sqrt(double a) returns the correctly rounded positive square root of a double value.

· Math.log():

The java.lang.Math.log(double a) returns the natural logarithm (base e) of a double value.

· Math.log10():

The java.lang.Math.log(double a) returns the common logarithm (base 10) of a double value.

## Mathematical Model

Let S be the System that represents the Scientific Calculator Application.

Initially,

S = {Ø}

Let,

S = {I,O, F}

Where:-

I = Represents Input Set

O = Represents Output Set.

F = Represents Function set.

Input Set – I:

Two Numbers on which the operations are to be carried out.

Output Set – O:

Result of operation.

Function Set – F:

F= { F1 }

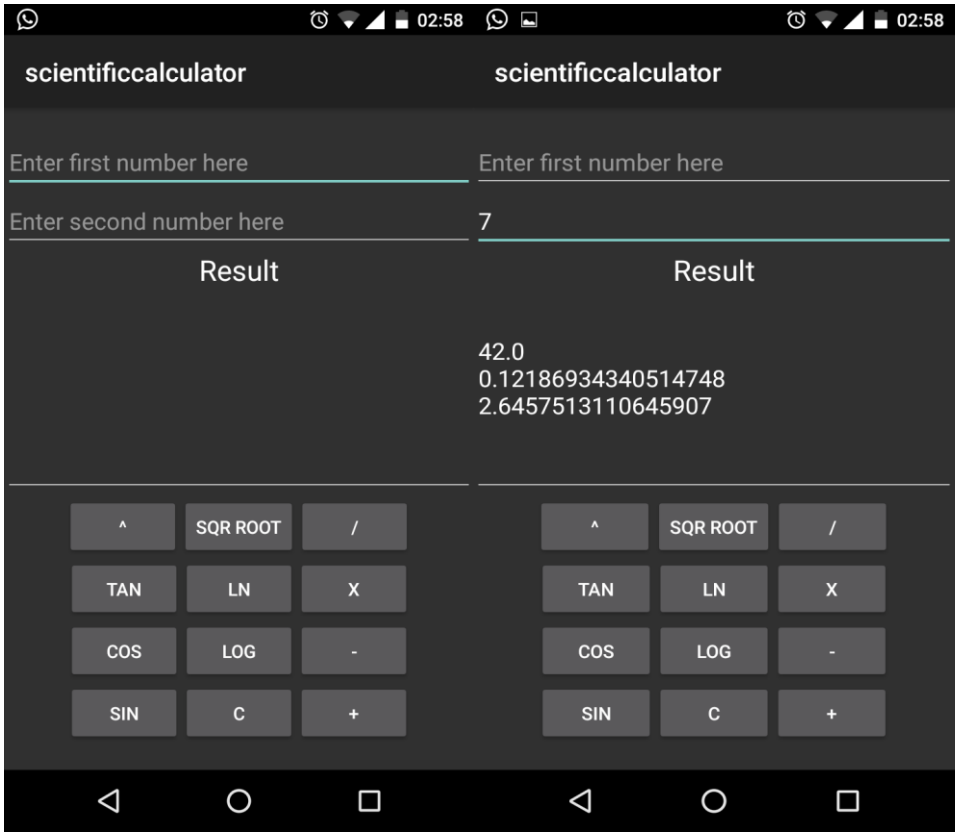
Where:

F1= Represents the onClickexp function to carry exponential operation.
F1(E) –> { O1, O2 ..... On }
Where,
· E: Event handler
· Oi: ith arithematic operation.
Finally,
S = {I,O, F}

## Conclusion

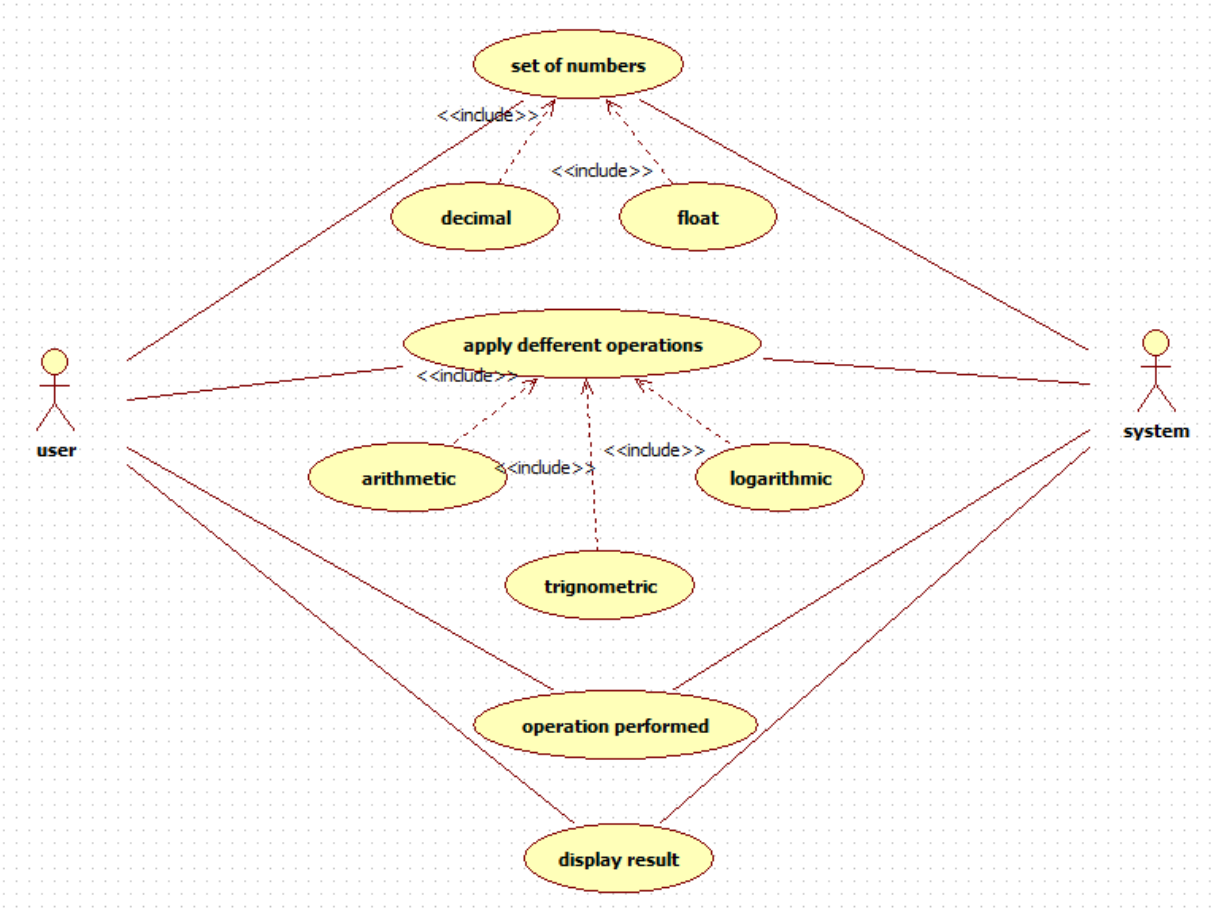
Thus, studied how to create Scientific Calculator Application in Android.

## Output:

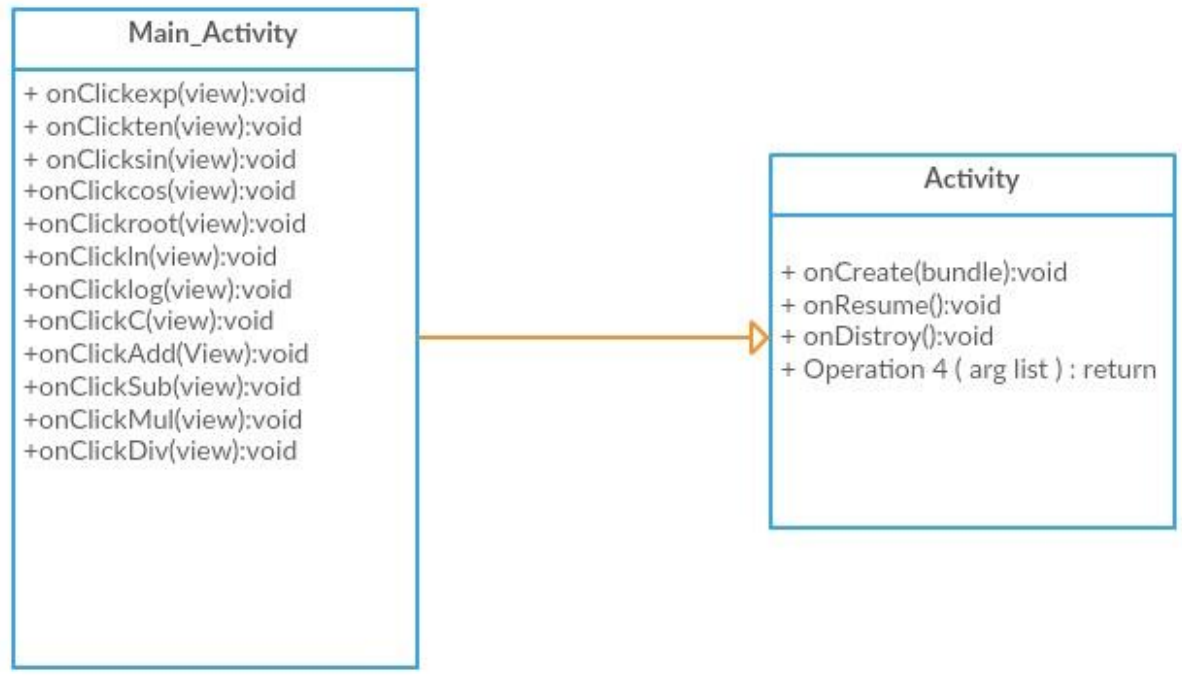


UML:

USE CASE:




CLASS DIAGRAM:



Design Patterns:
1. Observer pattern.

2. Strategy pattern.

## Test Cases: Positive Test cases

| Test ID | Test case Description | Actual Value | Expected Value | Result |
|---|---|---|---|---|
| 1 | Check the addition of two numbers | Addition Result | Addition result | True |
| 2 | Any number multiply by Zero. | zero | zero | True |
| 3 | Multiplication of two negative numbers | Result must be positive | Result must be positive | True |
| 4 | Sin 0 | 0 | 0 | True |
| 5 | Sin 90 | 1 | 1 | True |
| 6 | Cos 0 | 1 | 1 | True |
| 7 | Cos 90 | 0 | 0 | True |
| 8 | Sin 30 | 0.5 | 0.5 | True |
| 9 | Cos 60 | 0.5 | 0.5 | True |

## Negative Test cases

| Test ID | Test case Description | Actual Value | Expected Value | Result |
|---|---|---|---|---|
| 1 | Check the division of a number by zero. | Error | Error | False |
| 2 | press = button | Error | Error | False |
| 3 | expression starts with * or / | Error | Error | False |
| 4 | Tan 90 | Invalid Input | Invalid Input | |