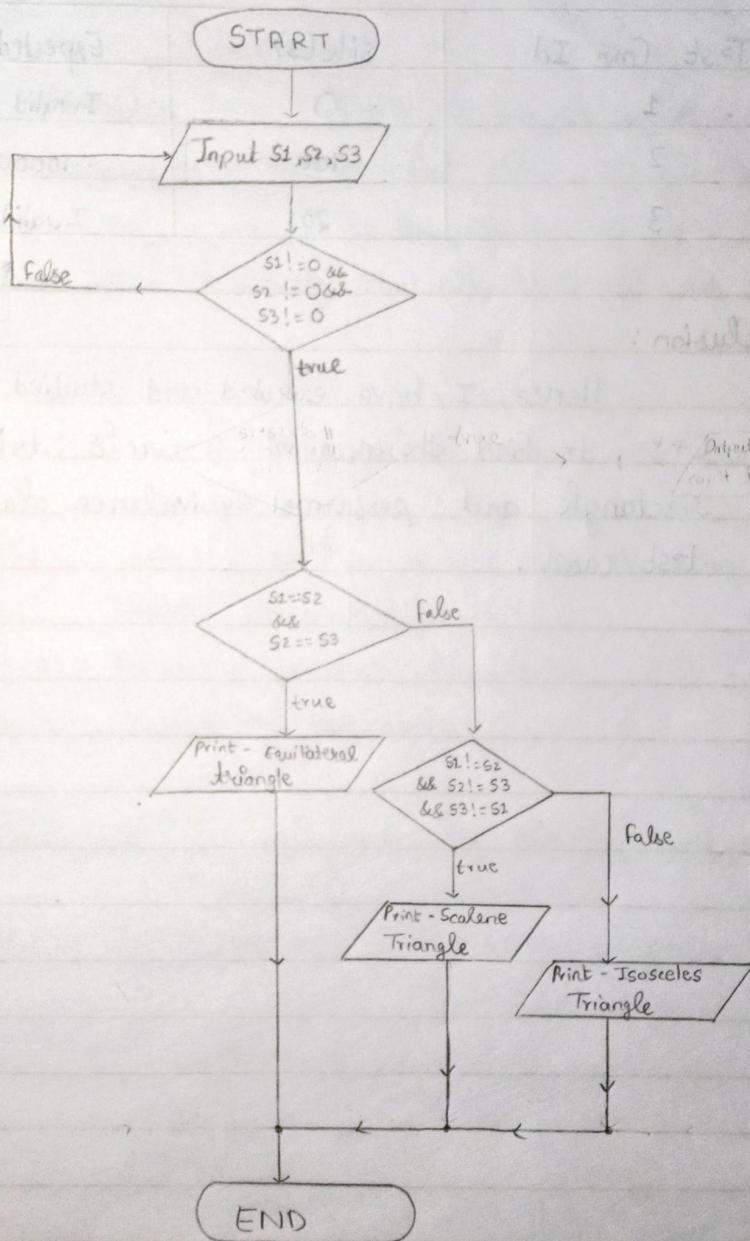


Practical No. 04

Aim: Write a program in C/C++ to read 3 sides of a triangle & to determine whether they form scalene, isosceles or equilateral triangle and test the same thing using basis path testing and find its $V(G)$ by all the three methods

Flowchart:



Aim: Write a program in C/C++ to read 3 sides of a triangle and to determine whether they form scalene, isosceles or equilateral triangle and test the same using basis path testing and find its $v(G)$ by all the three methods.

Theory:

Basis path testing helps a tester to compute logical complexity measures, $v(G)$, of the code. This value of $v(G)$, defines the maximum number of test cases to be designed by identifying basis set of execution paths to ensure that all statements are executed at least once.

Steps to compute the complexity measure, $v(G)$ are as under

- Step-1: Construct the flow graph from the source code or flowcharts.
- Step-2: Identify independent graph.
- Step-3: Calculate Cyclomatic Complexity.
- Step-4: Design the test cases.

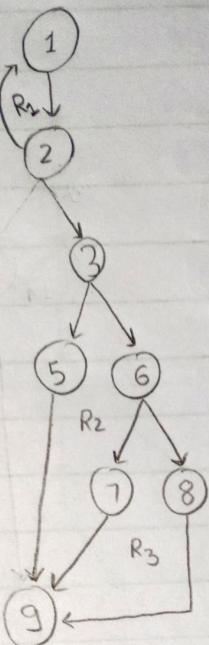
Calculation of cyclomatic complexity $v(G)$ by three methods:

$$\text{Method-1: } v(G) = E - N + 2 \quad (E = \text{No. of EDGES}) \\ (N = \text{NO. of Nodes})$$

$$v(G) = 11 - 9 + 2$$

$$v(G) = 4$$

Graph:



1 (Outer Region)

Directed Graph

N: Number of Nodes = 9

E: Number of Edges = 11

D: Decision point = 3

	Index
R1	Region 1
R2	Region 2
R3	Region 3

Method - 2 :

$$v(G) = p+1 \quad (P - \text{No. of predicate nodes with out degree} = 2)$$

$$v(G) = 3+1 \quad (\text{Nodes } 2, 3, 6 \text{ are predicate nodes with two outgoing edges.})$$

$$v(G) = 4$$

Method-3:

$$v(G) = \text{Number of enclosed regions} + 1$$

$$= 3 + 1$$

$$v(G) = 4 \quad (\text{Here, } R_1, R_2, R_3 \text{ are the enclosed regions and } 1 \text{ corresponds to the outer region.})$$

$\therefore v(G) = 4$ is same by all the three methods.

The test cases for each path are:

	Test case	Valid Input	Expected Results
1	Enlist 1 st path	a,b,c : valid input	if $a=b$ or $b=c$ or $a=c$, then message "isosceles triangle" is displayed.
2	Enlist 2 nd path	a,b,c : valid input	if $a \neq b \neq c$ then message "Scalene triangle" is displayed.
3	Enlist 3 rd path	a,b,c : valid input	if $a=b=c$, message "Equilateral triangle" is displayed.
4	Enlist 4 th path	a,b,c : invalid path	Go to, enter values of a,b,c.

Example

Code for triangle

Output

Explanation

3 types of conditions in switch case

Case 1

Case 2

Case 3

else

else if

Conclusion:

Thus we have studied and executed program to read 3 sides of a triangle and to determine whether they form scalene, isosceles or equilateral triangle and tested the same using basis path testing calculated $v(G)$ by all the three methods.

```
D:\_3rdYrNotes\IT-3rd-year-notes\Software Testin...
Input sides of triangle :
Input side 1 : 10
Input side 2 : 15
Input side 3 : 10
The given side are of an isosceles triangle
-----
Process exited after 10.84 seconds with return value 0
Press any key to continue . . .
```

Test case 1

```
D:\_3rdYrNotes\IT-3rd-year-notes\Software T...
Input sides of triangle :
Input side 1 : 10
Input side 2 : 15
Input side 3 : 20
The given sides are of an Scalene triangle
-----
Process exited after 3.135 seconds with return value 0
Press any key to continue . . .
```

Test case 2

```
D:\_3rdYrNotes\IT-3rd-year-notes\Software Testin...
Input side 1 : 15
Input side 2 : 15
Input side 3 : 15
The given sides are of an equilateral triangle
-----
Process exited after 3.933 seconds with return value 0
Press any key to continue . . .
```

Test case 3

```
D:\_3rdYrNotes\IT-3rd-year-notes\Software Testing\Practicals\Practical 4\code.cpp.exe
Input sides of triangle :
Input side 1 : 0
Input side 2 : 1
Input side 3 : 2
Input sides of triangle :
Input side 1 : 1
Input side 2 : 2
Input side 3 : 3
The given sides are of an Scalene triangle
-----
Process exited after 3.908 seconds with return value 0
Press any key to continue . . .
```

Test case 4

Conclusion :

Thus we have studied and executed program to read 3 sides of a triangle & to determine whether they form scalene, isosceles, or equilateral triangle and tested the same using basis path testing calculated $v(G)$ by all the three methods.