Programming for Problem Solving

2ES104

Practical-4.1

- Write a program to solve Quadratic Equation.
- The standard form of a quadratic equation is: $ax^2 + bx + c = 0$, where a, b and c are real numbers and $a != 0$.
- Discriminant=$b^2 - 4ac$ of a quadratic equation tells the nature of the roots

Practical-4.1

- ***Formulas to be used:***

  If the discriminant > 0, the roots are real and different.

$$root1 = \frac{-b+\sqrt{b^2-4ac}}{2a} \quad , \quad root2 = \frac{-b-\sqrt{b^2-4ac}}{2a}$$

If the discriminant = 0, the roots are real and equal. $root1 = root2 = \frac{-b}{2a}$

If the discriminant < 0, the roots are complex and different.

$$root1 = \frac{-b}{2a} + \frac{\mathrm{i}\sqrt{-(b^2-4ac)}}{2a} \quad , \quad root2 = \frac{-b}{2a} - \frac{\mathrm{i}\sqrt{-(b^2-4ac)}}{2a}$$

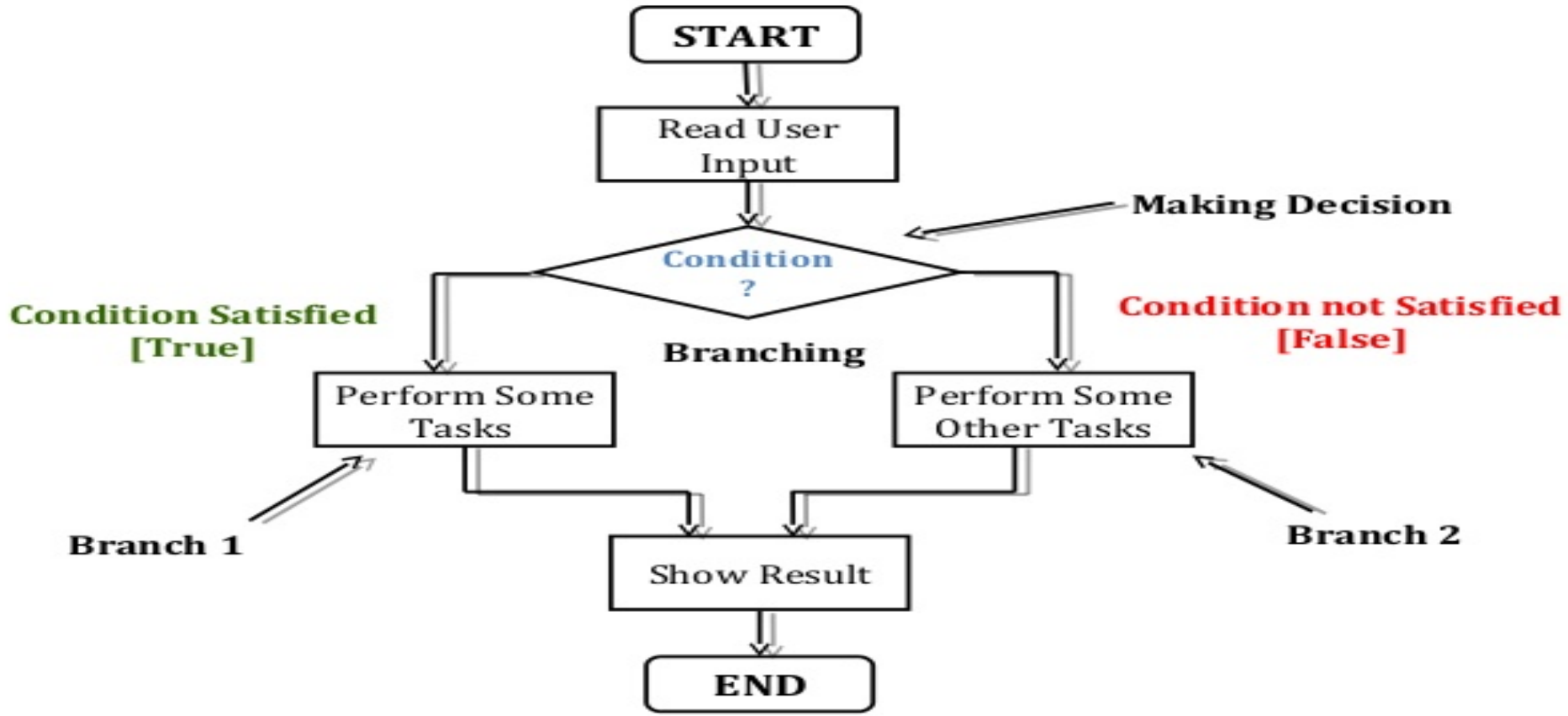
Decision Making and Branching

- Decision making is about deciding the order of execution of statements based on certain conditions

OR

- repeat a group of statements until certain specified conditions are met.

Decision Making and Branching



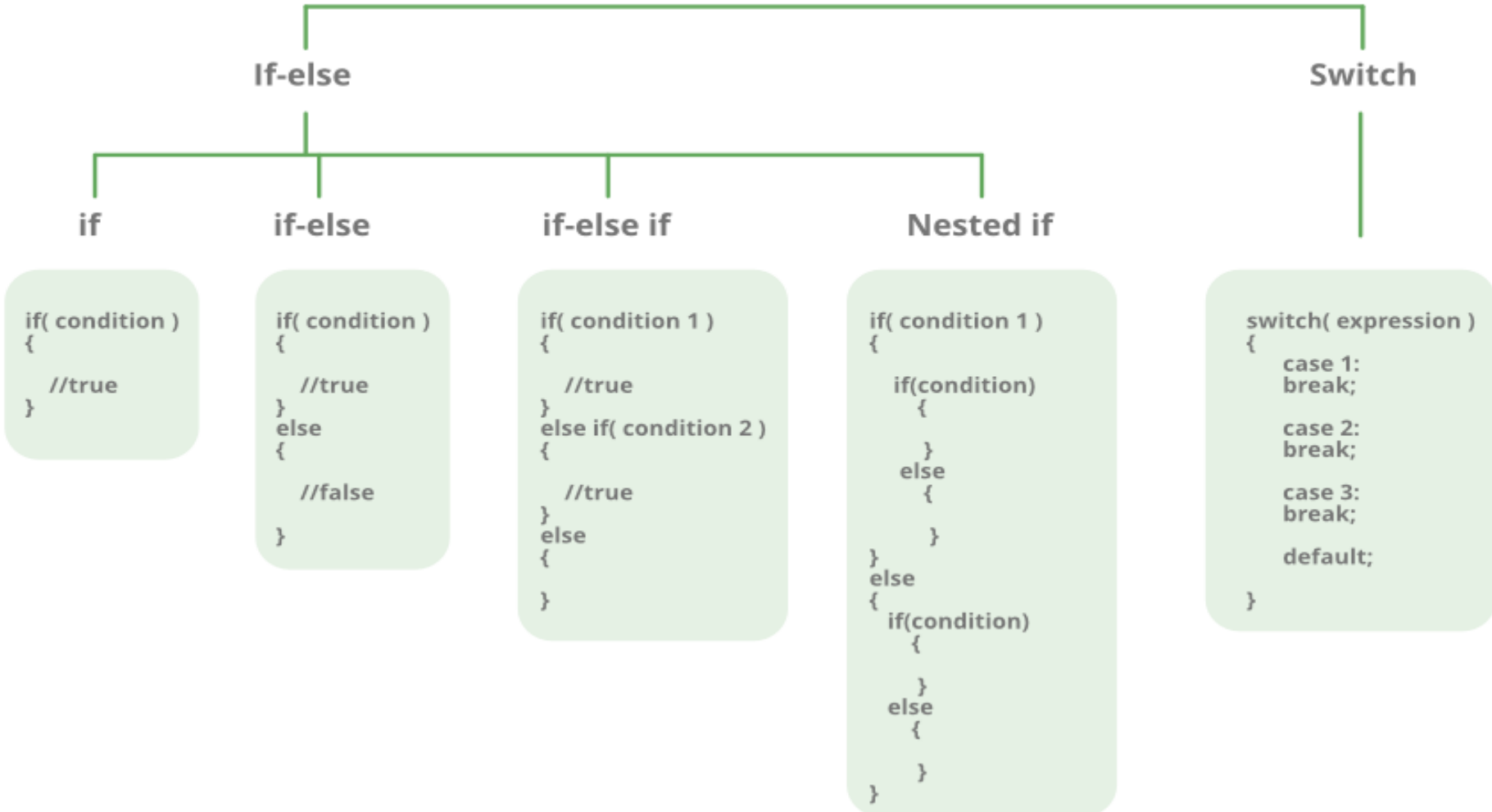
Decision Making and Branching

- The main important decision-making statements in c are.
  - If statement
  - Switch statement
  - conditional operator statement (? : operator)
  - goto statement

Decision making with if statement

- The if statement may be implemented in different forms depending on the complexity of conditions to be tested.
- The different forms are,
    1. Simple if statement
    2. if....else statement
    3. Nested if....else statement
    4. Using else if statement

Decision Making



If Statement

```
int main()
{
int no;
if(no>0)
        {
                printf(“positive Number”);
        }
return 0;
}
```

IF STATEMENT

Expression is true.

```
int test = 5;

if (test < 10)
{
  // codes
}

// codes after if
```

Expression is false.

```
int test = 5;

if (test > 10)
{
  // codes
}

// codes after if
```

If.. Else statement

```
if (age >18)
    {
    Printf(“Eligible for Voting”);//true
    }
else
    {
        Printf(“Not Eligible For Voting”);//false
    }
```

IF....ELSE STATEMENT

Expression is true.

```
int test = 5;

if (test < 10)
{
   // body of if
}
else
{
   // body of else
}
```

Expression is false.

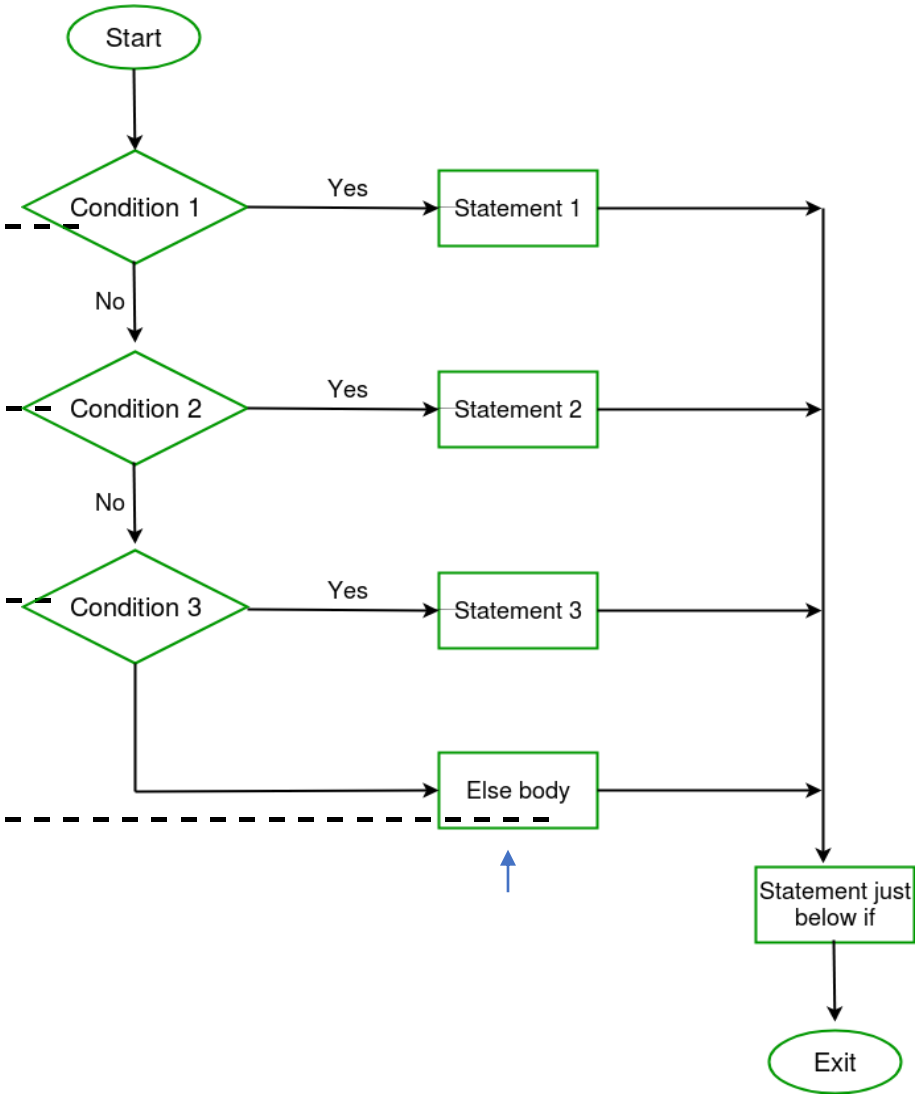
```
int test = 5;

if (test > 10)
{
  // body of if
}
else
{
  // body of else
}
```

Else if statements(**if...else Ladder)**

```
if (condition)

statement;

else if (condition)

statement;

. .

else statement;
```

Else if statements(**if...else Ladder)**

```
if (condition) ----------------------
statement;
else if (condition) -----------------
statement;
else if (condition) -----------------
statement;
……
else statement;----------------------------------
```



Example

```
int main()
{
        int marks;
        scanf(“%d”, &marks);
        if ( marks > 70)
                printf(“Distinction");
        else if (marks > 60 &&  marks<70 )
                printf(“First Class");
        else if (marks > 50 && marks < 60)
                printf(“Second Class");
        else
                printf(“Pass”);     }
```

Practical-4.2

- Write two separate program to check eligibility of a person to cast the vote (using simple if and if…else).

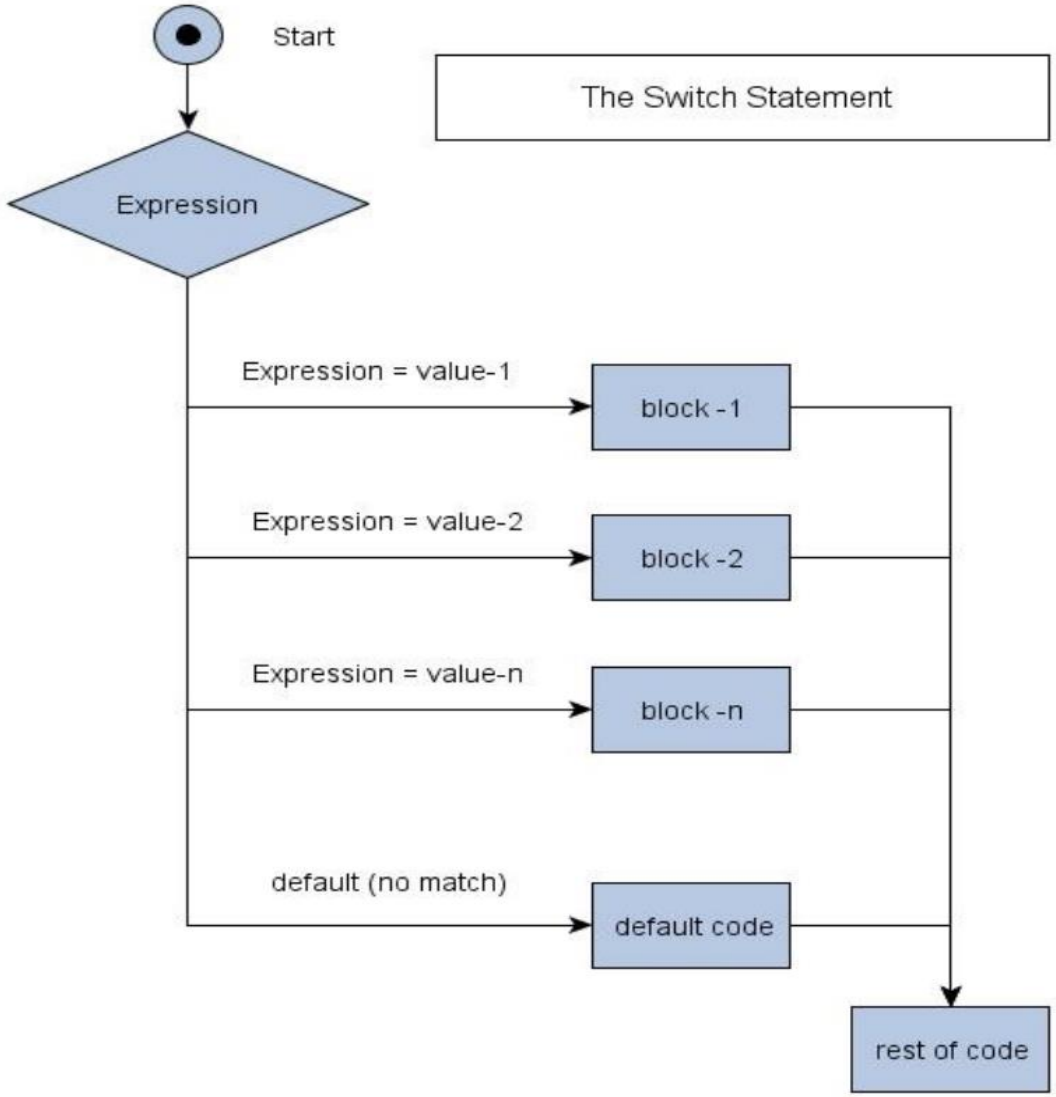
Enter your age: 15 You are not eligible to vote. Wait for 3 more years.	Enter your age: 21 You are eligible to vote	Enter your age: 12 You are not eligible to vote. Wait for 6 more years.

Practical-4.3

- Write a separate program using each of following to find maximum from two numbers scanned from keyboard (consider the case where both can be equal):
  - if…else
  - switch()
  - Conditional operator (?:)

Switch statement

```
switch(expression or variable)
        {
            case val-1: // colon not semicolon
            statement-1;
            break;

            case val-2: // colon not semicolon
            statement-2;
            break;
            - - - - - -
            - - - - - -
            case val-n:
            statement-n;
            break;
            default:   // colon not semicolon
            statement;
        }
```



Switch statement

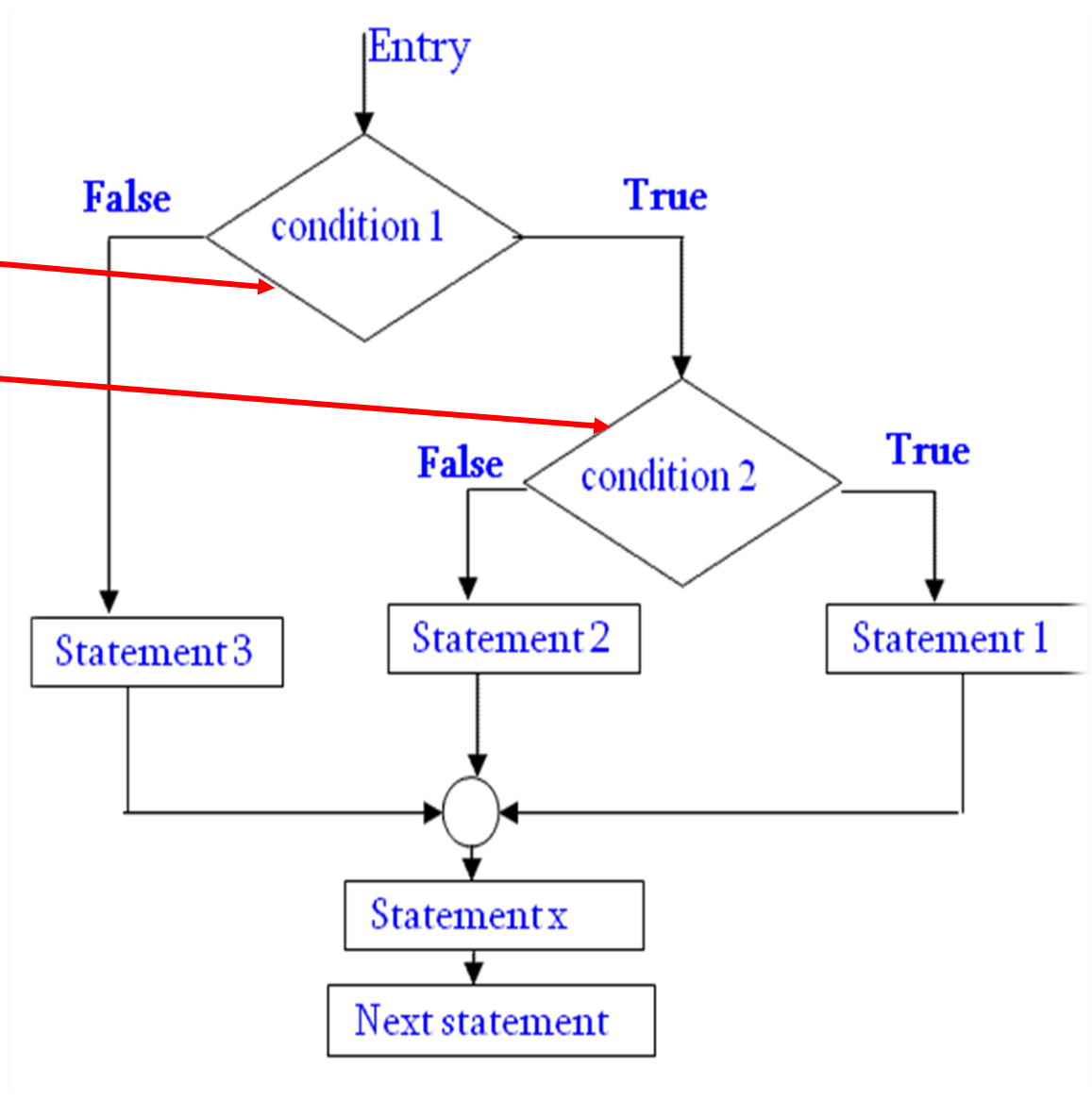
```c
#include <stdio.h>

int main()
{
    char a;
    printf("Enter any character from 'a' to 'd' : ");
    scanf("%c",&a);
    switch(a)
    {
        case 'a':
            printf("Its a");
            break;
        case 'b':
            printf("Its b");
            break;
        case 'c':
            printf("Its c");
            break;
        case 'd':
            printf("Its d");
            break;
        default :
            printf("Invalid Character !");
            break;
    }
    return 0;
}
```

Practical-4.4

- Rewrite the same program 4.3 using nested if…else for finding maximum out of three variables.

Nested if statement

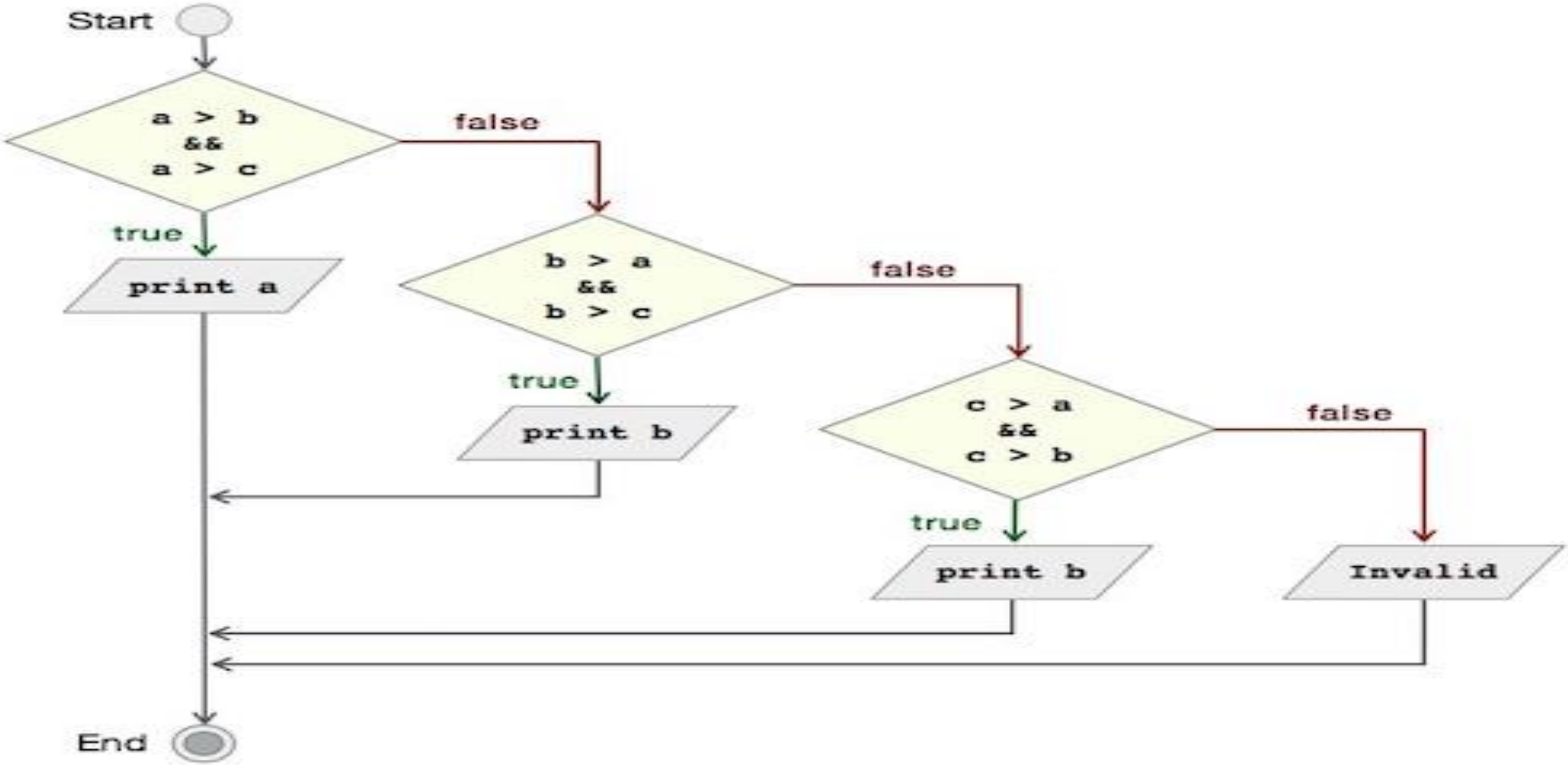
```
if (test condition - 1)
  {
  if (test condition - 2)
    {
      statement 1;
    }
   else
    {
      statement 2;
    }
  }
else
  {
  statement 3;
  }
statement x;
```



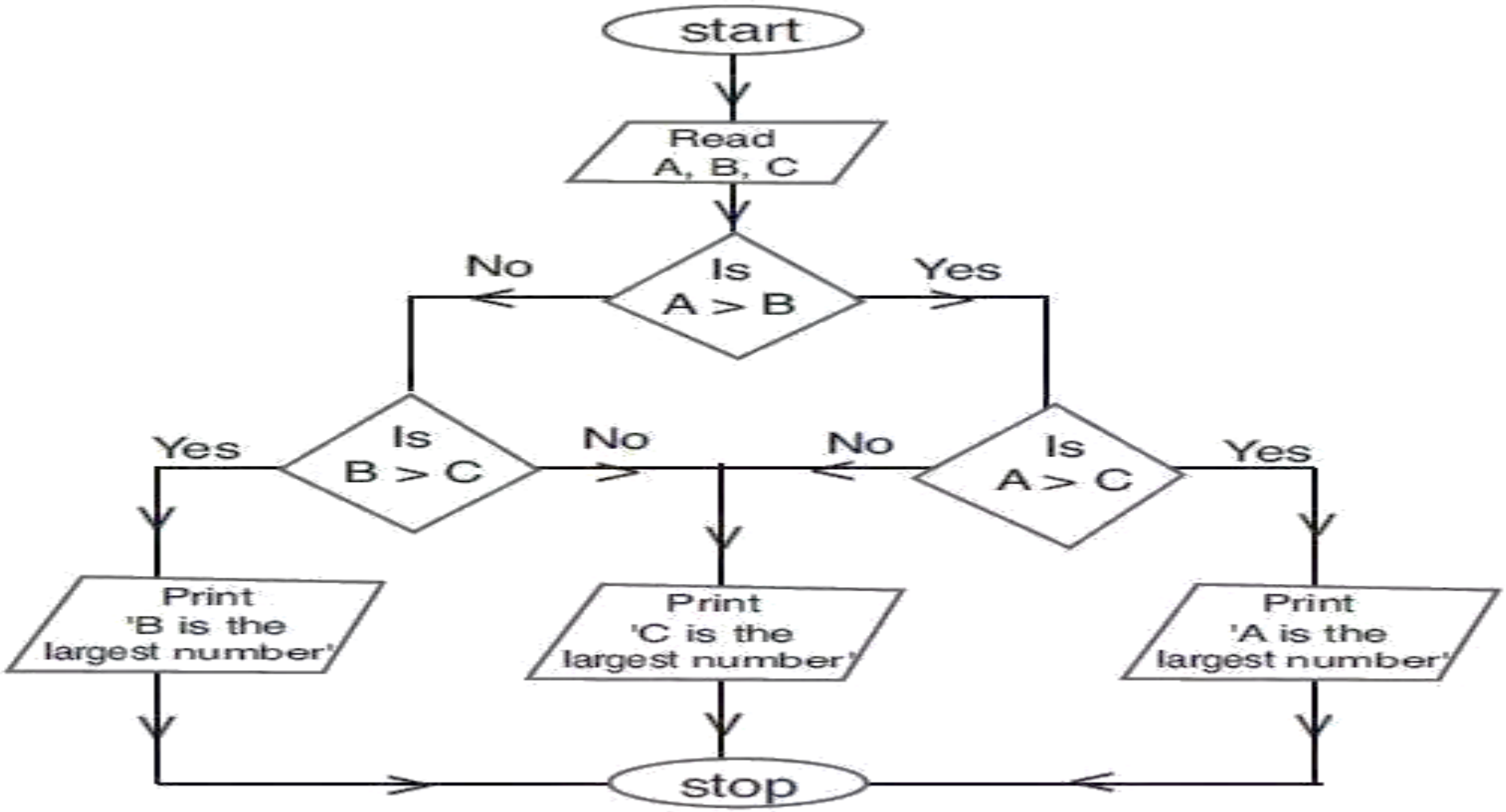
Nested if statement: Example

```
if ( age < 18 )
        {
                printf("Not Eligible to Work");
         }
else
        {
                if (age >= 18 && age <= 60 )
                        {
                                printf("You are Eligible to Work \n");
                        }
                else
                        {
                                printf("You are too old to work as per rules\n");
                        }
          }
```

Practical-4.4(else …if statement)



Practical-4.4 (nested if –else)

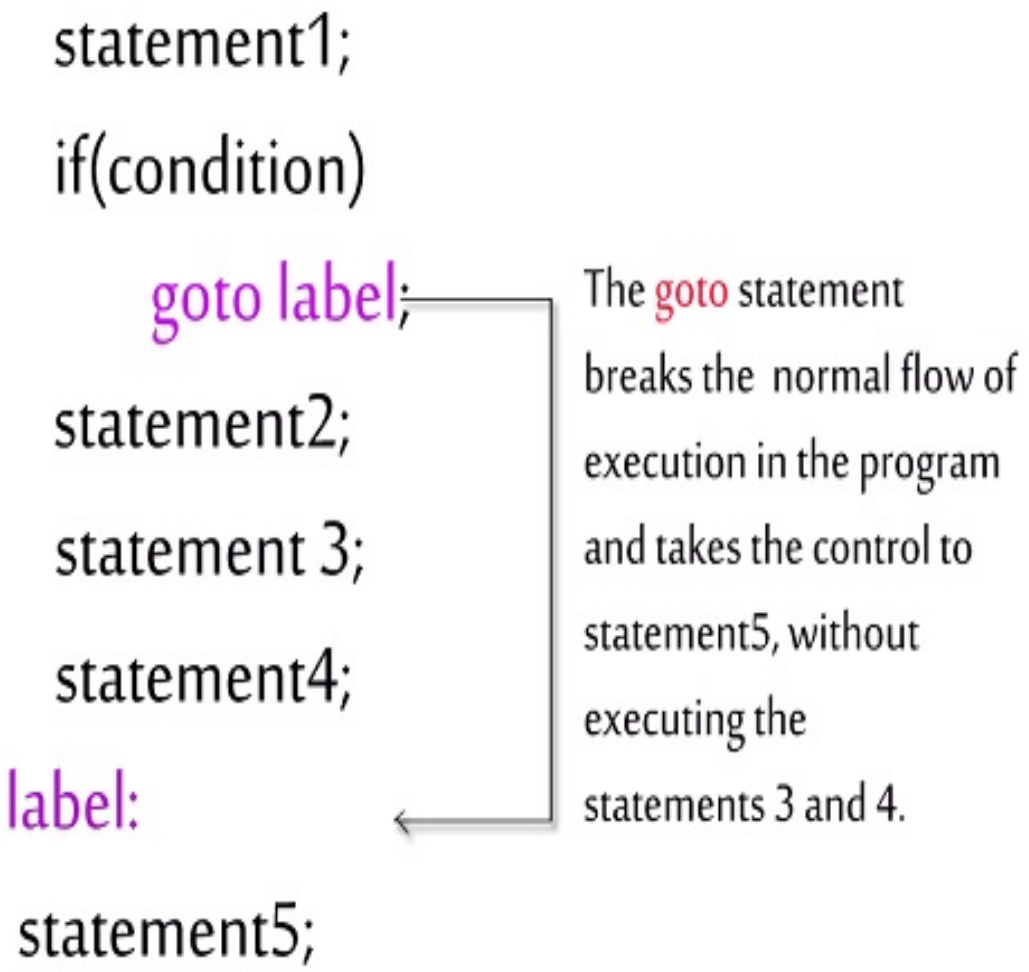


Practical-4.5

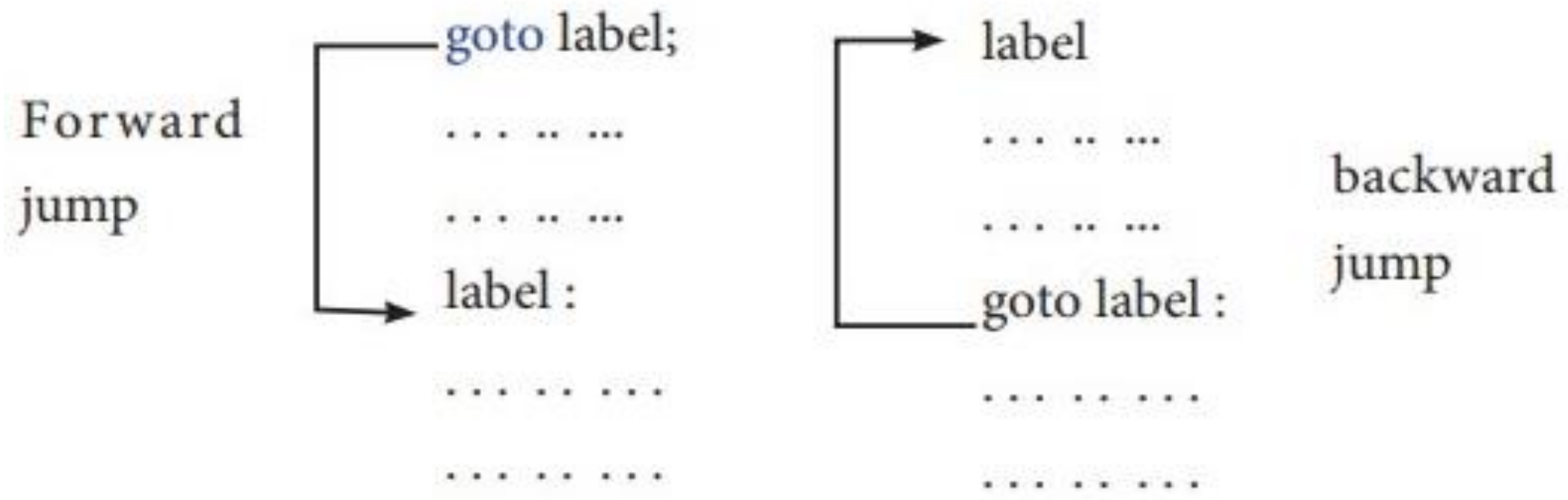
- Rewrite the same program 4.4 for the condition that if three numbers are same then prompt user to enter it again.
- (make a use of else if ladder and GOTO statement)

goto statement

- The goto statement is a jump statement which is sometimes also referred to as unconditional jump statement.
- The goto statement can be used to jump from anywhere to anywhere within a function.



goto statement



goto statement

```
int a=6
label:
    printf("Good Afternoon!");
    If(a==6)
    {
        a++;
        goto label;
    }
printf("out of the loop");
```

Practical-4.6

- Write a program to check that entered number is odd or even.
- Also print appropriate message if 0 is entered.

Practical-4.7

- Write a program to check case of an entered character like following:

  Note: do not use any character test functions.

Enter any character: a Entered character is in lowercase	Enter any character: A Entered character is in uppercase
Enter any character: 6 Entered character is digit	Enter any character: ? Not an alphanumeric character

Practical-4.7

- **Uppercase Letters** –
- A - Z having ASCII values from 65 - 90
- **Lowercase Letter** –
- a - z having ASCII values from 97 - 122
- **Numeric values** –
- 0 - 9 having ASCII values from 48 - 57