BCA – 401: Java Programming

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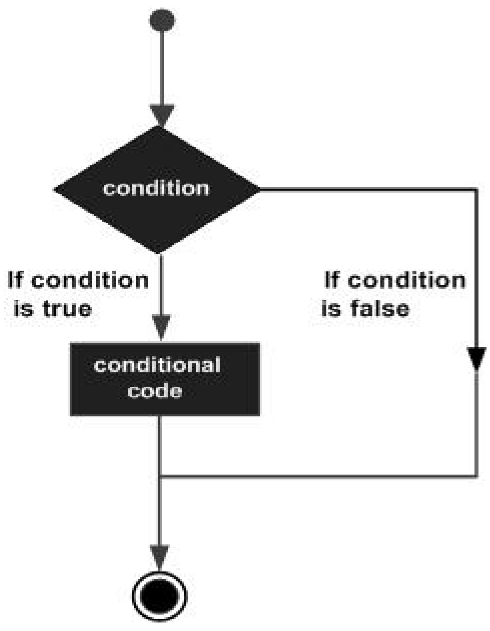
In today's Class we have discussed on Decision-Making statements in Java.

Decision-Making statements:-

Decision making structures have one or more conditions to be evaluated or tested by the program, along with a statement or statements that are to be executed if the condition is determined to be true, and optionally, other statements to be executed if the condition is determined to be false.

Decision-making statements decide which statement to execute and when. Decision-making statements evaluate the Boolean expression and control the program flow depending upon the result of the condition provided.

Following is the general form of a typical decision making structure found in most of the programming languages –



Types of Decision-Making statements:-

Java programming language provides following types of decision making statements.

1) if statement
2) if-else statement
3) if-else-if ladder
4) Nested if-statement
5) Switch Statement
6) ? : (conditional) Operator

If statement:-

An if statement consists of a Boolean expression followed by one or more statements.

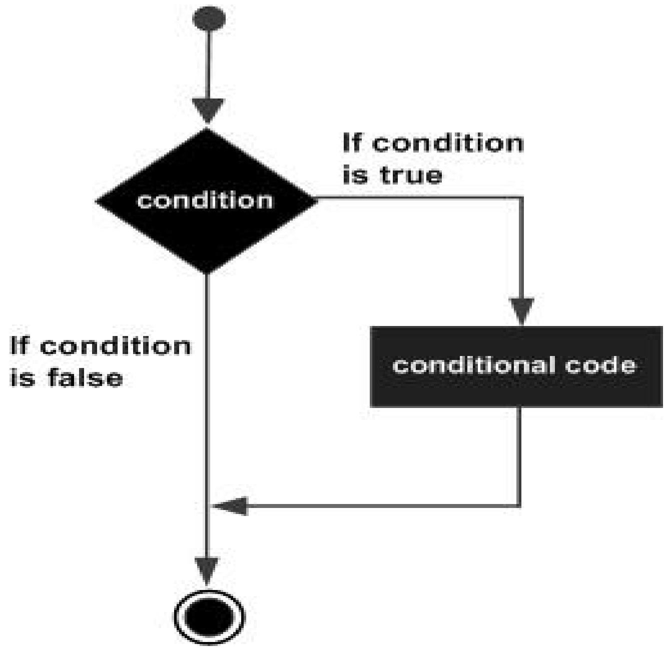
In Java, the "if" statement is used to evaluate a condition. The control of the program is diverted depending upon the specific condition. The condition of the If statement gives a Boolean value, either true or false.

Syntax:- Following is the syntax of an if statement –

```
if(Boolean_expression)
{
  // Statements will execute if the Boolean expression is
true
}
```

If the Boolean expression evaluates to true then the block of code inside the if statement will be executed. If not, the first set of code after the end of the if statement (after the closing curly brace) will be executed.

Flow Diagram of if statement:-



Example

```
public class Test
{
  public static void main(String args[])
{
    int x = 10;
    if( x < 20 )
   {
         System.out.print("This is if statement");
      }
   }
}
```

Output:- This will produce the following result –

```
This is if statement.
```

If else statements:-

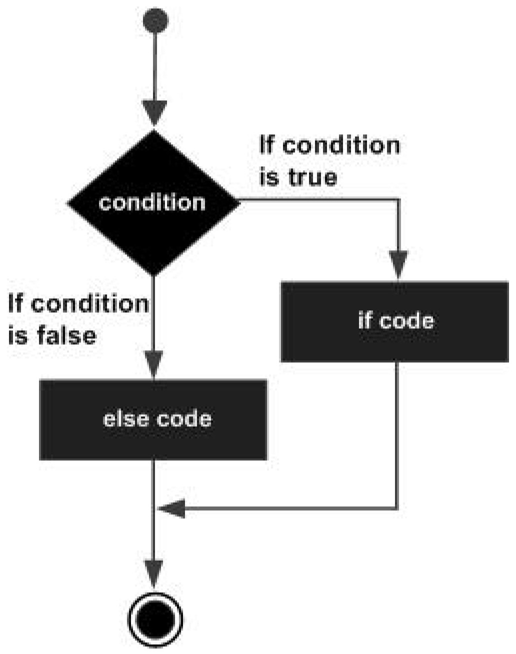
An if statement can be followed by an optional else statement, which executes when the Boolean expression is false.

Syntax:- Following is the syntax of an if...else statement –

```
if(Boolean_expression)
{
   // Executes when the Boolean expression is true
}
else
{
   // Executes when the Boolean expression is false
}
```

If the boolean expression evaluates to true, then the if block of code will be executed, otherwise else block of code will be executed.

Flow Diagram:-



Example:-

```
public class Test
{
  public static void main(String args[])
{
    int x = 30;
    if( x < 20 )
    {
      System.out.print("This is if statement");
     }
    else
    {
      System.out.print("This is else statement");
    }
  }
}
```

Output:- This will produce the following result –

```
This is else statement
```

if-else-if ladder/if...else if...else Statement:-

The if-else-if statement contains the if-statement followed by multiple else-if statements. In other words, we can say that it is the chain of if-else statements that create a decision tree where the program may enter in the block of code where the condition is true. We can also define an else statement at the end of the chain.

An if statement can be followed by an optional else if...else statement, which is very useful to test various conditions using single if...else if statement.

When using if, else if, else statements there are a few points to keep in mind.

- An if can have zero or one else's and it must come after any else if's.

- An if can have zero to many else if's and they must come before the else.
- Once an else if succeeds, none of the remaining else if's or else's will be tested.

Syntax:-

Following is the syntax of an if...else statement −

```
if(Boolean_expression 1)

{

  // Executes when the Boolean expression 1 is true

}

else if(Boolean_expression 2)

{

  // Executes when the Boolean expression 2 is true

}

else if(Boolean_expression 3)

{

  // Executes when the Boolean expression 3 is true

}

else
```

```
{
   // Executes when the none of the above condition is true.
}
```

Example:-

```
public class Test
{
   public static void main(String args[])
{
      int x = 30;
      if( x == 10 )
      {
         System.out.print("Value of X is 10");
      }
      else if( x == 20 )
     {
         System.out.print("Value of X is 20");
      }
      else if( x == 30 )
     {
        System.out.print("Value of X is 30");
     }
    else
    {
        System.out.print("This is else statement");
     }
  }
}
```

Output:- This will produce the following result –

```
Value of X is 30
```

Nested if statement:-

In nested if-statements, the if statement can contain a if or if-else statement inside another if or else-if statement.

It is always legal to nest if-else statements which means you can use one if or else if statement inside another if or else if statement.

Syntax:- The syntax for a nested if...else is as follows –

```
if(Boolean_expression 1)
{
  // Executes when the Boolean expression 1 is true
  if(Boolean_expression 2)
{
    // Executes when the Boolean expression 2 is true
  }
}
```

You can nest else if...else in the similar way as we have nested if statement.

Example:-

```
public class Test
{
  public static void main(String args[])
 {
    int x = 30;
    int y = 10;
    if( x == 30 )
    {
      if( y == 10 )
      {
          System.out.print("X = 30 and Y = 10");
        }
      }
    }
}
```

Output:- This will produce the following result –

```
X = 30 and Y = 10
```

Switch Statement:-

A switch statement allows a variable to be tested for equality against a list of values. Each value is called a case, and the variable being switched on is checked for each case.

Syntax:- The syntax of enhanced for loop is –

```
switch(expression)
{
  case value :
    // Statements
    break; // optional
  case value :
    // Statements
```

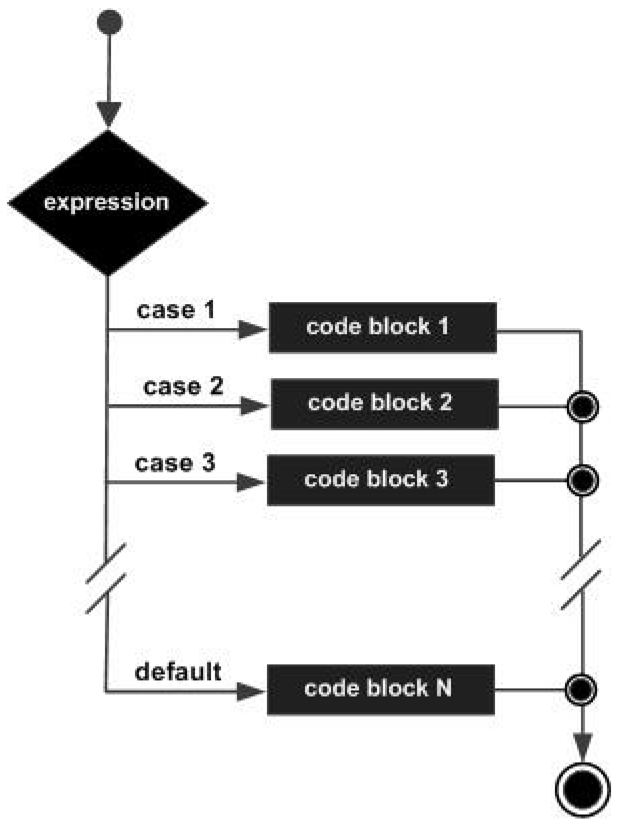
```
      break; // optional
   // You can have any number of case statements.
   default : // Optional
      // Statements
}
```

The following rules apply to a switch statement –

- The variable used in a switch statement can only be integers, convertable integers (byte, short, char), strings and enums.
- You can have any number of case statements within a switch. Each case is followed by the value to be compared to and a colon.
- The value for a case must be the same data type as the variable in the switch and it must be a constant or a literal.
- When the variable being switched on is equal to a case, the statements following that case will execute until a break statement is reached.
- When a break statement is reached, the switch terminates, and the flow of control jumps to the next line following the switch statement.
- Not every case needs to contain a break. If no break appears, the flow of control will fall through to subsequent cases until a break is reached.

- A switch statement can have an optional default case, which must appear at the end of the switch. The default case can be used for performing a task when none of the cases is true. No break is needed in the default case.

Flow Diagram:-



Example:-

```
public class Test
{
  public static void main(String args[])
{
    // char grade = args[0].charAt(0);
```

```
   char grade = 'C';
   switch(grade)
  {
     case 'A' :
        System.out.println("Excellent!");
        break;
     case 'B' :
     case 'C' :
        System.out.println("Well done");
        break;
     case 'D' :
        System.out.println("You passed");
     case 'F' :
        System.out.println("Better try again");
        break;
     default :
        System.out.println("Invalid grade");
   }
   System.out.println("Your grade is " + grade);
}
```

```
}
```

Output:- Compile and run the above program using various command line arguments. This will produce the following result −

```
Well done

Your grade is C
```

The ? : Operator:-

Conditional operator ? : can be used to replace if...else statements.

It has the following general form −

```
Exp1 ? Exp2 : Exp3;
```

Where Exp1, Exp2, and Exp3 are expressions. Notice the use and placement of the colon.

To determine the value of the whole expression, initially exp1 is evaluated.

- If the value of exp1 is true, then the value of Exp2 will be the value of the whole expression.
- If the value of exp1 is false, then Exp3 is evaluated and its value becomes the value of the entire expression.