

DON BOSCO SCHOOL, RANCHI

COMPUTER APPLICATIONS

CLASS – 9

JAVA PROGRAMMING LANGUAGE

What is JAVA?

A JAVA is a third generation object oriented high level programming language used for development of applications. It is developed by James Gosling at Sun Microsystems. Java was released in 1995.

Features of Java Language

- It is an Object Oriented.
- It is a robust programming language.
- It is compiled and interpreted.
- It is a platform independent language.
- It is distributed language.
- It uses multithreading.
- It is secured language.
- It is available free of cost.

What is Java Virtual Machine (JVM)?

Java Virtual Machine is an environment created above the existing processor for the execution of Java programs. The presence of JVM makes it possible for any Java application to run on any machine regardless of its platform and architecture.

What is a Java Development Kit (JDK)?

It is a pack of large number of development tools. JDK has hundreds of predefined classes and methods, which are grouped into several packages. Most commonly used tools in JDK are: javac, java, javadoc, appletviewer etc.

Basics of Java Programming Language

What is a Token?

A token is a smallest unit in Java Programming language. Each individual unit in Java language statement, i.e., character, symbol, punctuators, etc., is considered as a token.

Tokens are divided into 5 parts:

- (i) **Keywords**
- (ii) **Identifiers**
- (iii) **Operators**
- (iv) **Punctuators/Separators**
- (v) **Literals**

(i) **Keywords:** It is a reserved word in java language which has a special meaning to the compiler and cannot be used as an identifiers. Total 32 keyword are reserved in Java Programming language. It represent a specific task that has to be performed. e.g., int, float, for, while, import etc. are the reserved keyword.

(ii) **Identifiers:** Identifiers are the names given to different parts of a Java Program. It is the name given for variables, functions, objects, constants etc. It is defined by the Java programmer.

Rules for naming identifiers:

- a) An identifiers must be started with an alphabets and can be continued with digits. e.g., total, label7, num_boxes etc. are all valid identifiers.
- b) It cannot begin with a digit.
- c) It may be of any length.
- d) No whitespace is allowed.
- e) In special characters, only underscore (_) is used.

(iii) **Operators:** An Operators are the symbol that perform specific operations on operands. Operands are the data values involved in an operation. The operands can be variables or constants and are evaluated from the left to the right.

The following is a list of various operators used in Java:

- a) Assignment operators (=)
- b) Arithmetic operators +, - , * , / , % (mod)
- c) Relational operators/Conditional Operators > , < , <= , >= , = , !=
- d) Logical operators && (and), || (or), ! (not)

(iv) **Punctuators/Separators:** A punctuators or separators are the symbol which is used for some special purpose but not for the calculations. It is used for grouping and separating the data values written in the java program.

- | | | |
|-----------|------------------|--|
| e.g., () | -parenthesis | used in function |
| { } | -braces | used for defining the block |
| [] | -square brackets | used for declare array |
| ; | - semicolon | used to terminate statements |
| , | -comma | used for multiple variable declarations |
| . | -period | used to access data members and methods etc. |

(v) **Literals:** A literals are the constants value that remains fixed itself during the execution of a program and used for assignment into some variables. e.g., 10, 25, "India" etc.

Types of Literals:

- a) Integer Literals : +78, 0 , -54 etc.
- b) Float Literals : 56.34, 3.14, 12E+9 etc.
- c) Character Literals : 'D', '6' etc.
- d) String Literals : "ABC", "Ravi", "134" etc.

e) Boolean Literals : true, false

Data Types and Variables

What is Data Type?

Data types are defined as the data storage format that a variable can store a specific operation. The size of a variable and a constant are determined by data types.

Types of Data Types:

(i) Primitive Data Types

(ii) Reference Data Types

(i) Primitive Data Types: It is a fundamental data types that are predefined and integral part of Java language. Java defines following primitive data types:

a) byte

e) char

b) short

f) float

c) int

g) double

d) long

h) boolean

(ii) Reference Data Types: This data type contains reference (address) of the location where the value is stored, rather than the value itself. Reference data types are also known as composite data types. It is created using the primitive data types. Any class in java are reference data types. e.g., String, Student, Cuboid etc.

What is a Variable?

A variable is a location in the memory, which has been assigned a name and is used to store data temporarily. The word variable means changing, i.e., we can change the value of any variable during the execution of a program.

A variable are declared using primitive data types.

Syntax for defining variable

<Data Type> <Variable name> ;

e.g., int age ;

float percentage ;

char name ;

Variable Scope

Every variable has its own scope that defines its boundary. Scope refers to the program area within which a variable is accessible. A variable is accessible within the set of braces it is declared in. It is also called a block.

```
{  
    int m ;  
    ..... //variable m will be accessible within this braces only not outside.  
}
```

What are Comments?

A comments are the extra statements which are written in program code. It is usually added for the reference for the programmer to understand about the lines of code. Comments are ignored by the compiler and do not affect the execution of the program.

Types of comments in Java:

- a) Single Line Comments: This type of comment begins with a double slash (//) and continues to the end of the line.
e.g., // This is a single line comment
- b) Multiple Line Comments: Anything written between the initial slash-asterisk (/*) and the terminating asterisk-slash (*/) is part of the multiple line comments.
e.g., /* This is one comment
that is written in
multiple lines. */

Simple Java Program Example:

```
import java.io.*;
import java.util.*;
class Example
{
    public static void main(String arg[ ])
    {
        System.out.println("This is the testing program.");
        System.out.println("Simple Java Program.");
    }
}
```

All the java programs are starting with **import java.io.*;** and **import java.util.*;**. It is a package which is predefined in Java language. All the java program are written inside class statement and used **public static void main(String arg[])** for the execution.

System.out.println(" ") statement is used for the output in computer console.

How to take input from keyboard in Java:

In java, values for the variable is accepting from the keyboard using Scanner class. Scanner class is defined in java.util package. The following statements are used for the declarations and accepting input from the user:

Scanner sc = new Scanner (System.in);

Example code to accept integer values:

int x = sc.nextInt();

Example code to accept long values:

long x = sc.nextLong();

Example code to accept float values:

```
float x = sc.nextFloat( );
```

Example code to accept double values:

```
double x = sc.nextDouble( );
```

Example code to accept String values:

```
String name = sc.nextLine( );
```

Simple Example Questions:

1. Write a Java Program to accept values of length and breadth of rectangle and calculate area.

Ans :

```
import java.io.*;
import java.util.*;

class Rectangle
{
    public static void main (String arg [ ])
    {
        Scanner sc = new Scanner (System.in);
        int l = 0, b = 0, area=0 ;
        System.out.println("Enter length =");
        l = sc.nextInt( );
        System.out.println("Enter breadth =");
        b = sc.nextInt( );
        area = l * b ;
        System.out.println("Area of Rectangle =" + area );
    }
}
```

2. Write a Java Program to accept the values of radius and calculate the area of Circle.

Ans:

```
import java.io.*;
import java.util.*;

class Circle
{
    public static void main (String arg [ ])
    {
        Scanner sc = new Scanner (System.in);
        int r = 0 ;
        double area=0 ;
        System.out.println("Enter radius =");
    }
}
```

```
l = sc.nextInt( );  
area = 3.14 * r * r ;  
System.out.println("Area of Circle =" + area );  
}  
}
```

Solved the following questions based of functions:

1. Write a Java Program to print your name, class, roll number, school name.
2. Write a Java Program to accept values of two number and calculate addition, subtraction, multiplication and division.
3. Write a Java Program to accept values of P, R, T and calculate simple interest. (SI = $(P*R*T)/100$)
4. Write a Java Program to accept values of five numbers and calculate sum and average.
5. Write a Java Program to accept values of base and height of Triangle and calculate area using base formula.