Java

Java is a popular programming language, created in 1995.

It is owned by Oracle, and more than 3 billion devices run Java.

It is used for:

- Mobile applications (specially Android apps)
- Desktop applications
- Web applications
- Web servers and application servers
- Games
- Database connection
- And much, much more!

Syntax

```
public class Main {
  public static void main(String[] args) {
    System.out.println("Hello World");
  }
}
```

- **public class Main -** Starting point of a java program, from here only the java program starts executing.
- **public static void main** - Here the word **'public'** is referred to as an access modifier means when it is public you can use the method wherever from the program. Now the word **'static'** helps to use functions without creating objects. And the word **'void'** means the function doesn't have a return value.
  'String[] args' means the string arguments which the program will obtain.
- The **System.out.println();** is a function used to print data on the screen.
- **'println'** adds a new line while only '**print'** doesn't adds a new line.

Naming Conventions

- For classes we use PascalConvention.
- For functions we use camelCaseConvention.

We use naming conventions because we can't use spaces in between functions, classes and variables.

NOTE
The name of the java file must match the class name. When saving the file, save it using the class name and add ".java" to the end of the filename.

Variables

Variables are containers for storing data values.

In Java, there are different types of variables, for example:

- **String** - stores text, such as "Hello". String values are surrounded by double quotes.

- **int** - stores integers (whole numbers), without decimals, such as 123 or -123.
- **float** - stores floating point numbers, with decimals, such as 19.99 or -19.99.
- **char** - stores single characters, such as 'a' or 'B'. Char values are surrounded by single quotes.
- **boolean** - stores values with two states: true or false.

Data Types

- **Primitive** - int, float, bool, char, long, double, byte, short.
- **Non-Primitive** -

```
public class Main {
   public static void main(String[] args) {

    int num1 = 5;
    int num2 = 10;
    int num3 = 10;
    int sum = num1 + num2 + num3;

    System.out.println(sum);
   }
}
```

```
public class Main {
   public static void main(String[] args) {

    int num1 = 5;
    float num2 = 5.9f;    // Here we used f at the end of the numbers to define that this is a floating point value
    double num3 = 7.997;
    char ch = 'A';
    byte num4 = 34;
    boolean a = true;
    short num5 = 25;
    long num6 = 657888888;
    String name = "Sudipto";

    System.out.println("The value of int is : " +num1);
    System.out.println("The value of float is : " +num2);
    System.out.println("The value of double is : " +num3);
    System.out.println("The value of char is : " +ch);
    System.out.println("The value of byte is : " +num4);
    System.out.println("The value of boolean is : " +a);
    System.out.println("The value of short is : " +num5);
    System.out.println("The value of long is : " +num6);
    System.out.println("The value of string is : " +name);
   }
}
```

Taking Input From User

To take input from user we can use **scanner** class in java.

Here we imported a java file **(java.util.Scanner)** to use the scan function.

```
import java.util.Scanner;

public class Main {
   public static void main(String[] args) {
    System.out.println("Taking input form user");
    Scanner sc = new Scanner(System.in);        // Here System.in means telling the computer to read from the keyboard
    System.out.print("Enter no. 1 : ");
    int a = sc.nextInt();
    System.out.print("Enter no. 2 : ");
    int b = sc.nextInt();

    int sum = a + b;
    System.out.println("The sum of number 1 and 2 is :" +sum);

   }
}
```

Here we wrote a program to check whether an input is stored or not.

```
import java.util.Scanner;

public class Main {
   public static void main(String[] args) {

    Scanner sc = new Scanner(System.in);        // Here System.in means telling the computer to read from the keyboard
    System.out.print("Enter no. : ");

    boolean b1 = sc.hasNextInt();
    System.out.println(b1);

   }
}
```

Here we wrote a program to print a string

```
import java.util.Scanner;

public class Main {
   public static void main(String[] args) {

    System.out.println("Enter a string");
    Scanner sc = new Scanner(System.in);
    String str = sc.next();
    System.out.println(str);

   }
}

---------------------------------------------------

***Output :***

Enter a string
New york city

New
```

Here we saw that the output line has only came with one with and it ignored the other words, so to print the entire line use can **nextLine()** method.

```
import java.util.Scanner;

public class Main {
   public static void main(String[] args) {

    System.out.println("Enter a string ");
    Scanner sc = new Scanner(System.in);
    String str = sc.nextLine();
    System.out.println(str);

   }
}
```

Here's a more detail explanation.

```
import java.util.Scanner;

public class ScannerExample {
   public static void main(String[] args) {
      // Create a Scanner object to read from the console (System.in)
      Scanner scanner = new Scanner(System.in);

      // Prompt the user to enter some input
      System.out.print("Enter your name: ");

      // Read a line of text from the console and store it in a variable
      String name = scanner.nextLine();

      // Prompt the user to enter an integer
      System.out.print("Enter your age: ");

      // Read an integer from the console and store it in a variable
      int age = scanner.nextInt();

      // Display the entered values
      System.out.println("Hello, " + name + "! You are " + age + " years old.");

      // Close the scanner when you're done with it (optional but recommended)
      scanner.close();
   }
}
```

- **import java.util.Scanner**;: Import the Scanner class from the **java.util** package.
- **public class ScannerExample** {: Define a class named ScannerExample.
- **public static void main(String[] args)** {: Start the main method, which is the entry point of the program.
- **Scanner scanner = new Scanner(System.in)**;: Create a new Scanner object named scanner that reads input from the console **(System.in)**.
- **System.out.print("Enter your name: ");**: Print a prompt asking the user to enter their name.

- **String name = scanner.nextLine();**: Read a line of text (including spaces) from the console and store it in the variable name.
- **System.out.print("Enter your age: ");**: Print a prompt asking the user to enter their age.
- **int age = scanner.nextInt()**;: Read an integer from the console and store it in the variable age.
- **System.out.println("Hello, " + name + "! You are " + age + " years old.")**;: Display a message using the values entered by the user.
- **scanner.close()**;: Close the Scanner object to release system resources (optional but recommended when you're done with it).

Exercise 1

Here is a program to calculate marks and percentage of a student of in 5 subjects out of 100 each.

```
import java.util.Scanner;

public class Main {
 public static void main(String[] args) {

  Scanner sc = new Scanner(System.in);

  int Full_Marks = 100;

  System.out.print("Enter marks of computer : ");
  int Computer = sc.nextInt();
  System.out.print("Enter marks of science : ");
  int Science = sc.nextInt();
  System.out.print("Enter marks of english : ");
  int English = sc.nextInt();
  System.out.print("Enter marks of history : ");
  int History = sc.nextInt();
  System.out.print("Enter marks of geography : ");
  int Geography = sc.nextInt();

  int Total_Marks = (History + Geography + English + Computer + Science);
  int Percentage =(Total_Marks*Full_Marks/500);
  System.out.println("Your Total Marks is : " +Total_Marks);
  System.out.println("Your Percentage is : " +Percentage +"%");

 }
}
```

Operators

Operators are used to perform operations on variables and values.

Arithmetic Operators

+	Addition	x + y
-	Subtraction	x - y
*	Multiplication	x * y

/	Division	x / y
%	Modulus	x % y
++	Increment	++x
--	Decrement	--x

Assignment Operators

Operator	Example	Same As
=	x = 5	x = 5
+=	x += 3	x = x + 3
-=	x -= 3	x = x - 3
*=	x *= 3	x = x * 3
/=	x /= 3	x = x / 3
%=	x %= 3	x = x % 3

Comparison Operators

==	Equal to	x == y
!=	Not equal	x != y
>	Greater than	x > y
<	Less than	x < y
>=	Greater than or equal to	x >= y
<=	Less than or equal to	x <= y

Logical Operators

Operator	Name	Description	Example
&&	Logical and	Returns true if both statements are true	x < 5 && x < 10
||	Logical or	Returns true if one of the statements is true	x < 5 || x < 4
!	Logical not	Reverse the result, returns false if the result is true	!(x < 5 && x < 10)

String

A string is a sequence of characters.

```
public class Main {
 public static void main(String[] args) {

  String name = new String("New York City ");
  System.out.println(name);

 }
}
```

Or,

```
public class Main {
 public static void main(String[] args) {

  String name = "New York City";
  System.out.println(name);

 }
```

```
}
```

String Methods

```
public class Main {
 public static void main(String[] args) {

 String name = "Sudipto";
 System.out.println(name.length());

 }
}
```

- name.length() - Returns the length of the string.
- name.toLowerCase() - Returns the string in complete lower case.
- name.toUpperCase() - Returns the string in complete upper case.
- Name.replace() - Replaces a character with another one.

```
public class Main {
 public static void main(String[] args) {

 String name = "Sudipto";
  System.out.println(name);
  System.out.println(name.replace('o', 'a'));

 }
}
```

If-else

```
import java.util.Scanner;

public class IfElse {
   public static void main (String[] args){

 Scanner sc = new Scanner(System.in);

 System.out.print("Enter a number : ");
 int num = sc.nextInt();

 if(num > 18){
    System.out.println("Congrats! You are an adult now.");
 }
 else{
    System.out.println("Sorry! You are still underage");
 }

   }
}
```

```
import java.util.Scanner;

public class IfElse {
   public static void main (String[] args){
```

```
 Scanner sc = new Scanner(System.in);

System.out.print("Enter your marks to check grade : ");
float marks = sc.nextFloat();

if(marks >= 75 && marks <= 100){
   System.out.println("You got grade A ");
}
else if(marks >= 50 && marks <= 75){
   System.out.println("You got grade B ");
      }
else if(marks >= 25 && marks <= 50){
   System.out.println("You got grade C ");
      }
if(marks >= 0 && marks <= 25){
   System.out.println("You got grade D ");
      }
else{
   System.out.println("Please enter valid marks.");
}

   }
}
```

Switch Case

Enhanced switch case

```
import java.util.Scanner;

public class SwitchCase {
 public static void main(String[] args) {
  Scanner sc = new Scanner(System.in);

  System.out.print("Enter the number of day : ");
  int days = sc.nextInt();

 switch (days){
  case 1 -> System.out.println("Monday");
  case 2 -> System.out.println("Tuesday");
  case 3 -> System.out.println("Wednesday");
  case 4 -> System.out.println("Thursday");
  case 5 -> System.out.println("Friday");
  case 6 -> System.out.println("Saturday");
  case 7 -> System.out.println("Sunday");
  default -> System.out.println("Please enter a valid number between 1 - 7 ");
 }

 }
}
```

For loop

```
public class ForLoop {
```

```
 public static void main(String[] args) {

  for (int i = 1; i <= 10; i++) {
   System.out.println(i*2);
  }

 }
}
```

Write a program to print the table of 2

```
public class ForLoop {
 public static void main(String[] args) {

  for(int i = 1 ; i <= 10 ; i ++) {
   System.out.println("2 x " +i + " = " +i*2);
  }

 }
}
```

Write a program to take input of a number from user and print it's table

```
Import java.util.Scanner;

Public class Main{
Public static void main(String[] args){
Scanner sc = new Scanner(System.in);

Int i;
System.out.print("Enter the number you want to print table of:");
Int num=sc.nextInt();

for(i=1; i<=10; i++){
System.out.println(num +" x " +i +" = " +num*i);
}

}
}
```

Taking Input From User

```
import java.util.Scanner;
public class Scan {
   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);        // Here System.in means telling the computer to read from the keyboard
      System.out.println("Taking input form user");
      System.out.print("Enter no. 1 : ");
      int a = sc.nextInt();
      System.out.print("Enter no. 2 : ");
      int b = sc.nextInt();
      int sum = a + b;
      System.out.println("The sum of number 1 and 2 is :" +sum);
   }
}
```

If-else

```
import java.util.Scanner;
```

```
public class IfElse {
   public static void main (String[] args){
      Scanner sc = new Scanner(System.in);
      System.out.print("Enter a number : ");
      int num = sc.nextInt();
      if(num > 18){
         System.out.println("Congrats! You are an adult now.");
      }
      else{
         System.out.println("Sorry! You are still underage");
      }
   }
}
```

```
import java.util.Scanner;
public class IfElse2 {
   public static void main (String[] args){
      Scanner sc = new Scanner(System.in);
      System.out.print("Enter your marks to check grade : ");
      float marks = sc.nextFloat();
      if(marks >= 75 && marks <= 100){
         System.out.println("You got grade A ");
      }
      else if(marks >= 50 && marks <= 75){
         System.out.println("You got grade B ");
      }
      else if(marks >= 25 && marks <= 50){
         System.out.println("You got grade C ");
      }
      if(marks >= 0 && marks <= 25){
         System.out.println("You got grade D ");
      }
      else{
         System.out.println("Please enter valid marks.");
      }
   }
}
```

Switch Case

```
import java.util.Scanner;
public class SwitchCase {
   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);
      System.out.print("Enter the number of day : ");
      int days = sc.nextInt();
      switch (days){
         case 1 :
            System.out.println("Monday");
            break;
         case 2 :
            System.out.println("Tuesday");
            break;
         case 3 : System.out.println("Wednesday");
            break;
         case 4 : System.out.println("Thursday");
            break;
```

```
        case 5 : System.out.println("Friday");
           break;
        case 6 : System.out.println("Saturday");
           break;
        case 7 : System.out.println("Sunday");
           break;
        default : System.out.println("Please enter a valid number between 1 - 7 ");
           break;
     }
  }
}
```

Enhanced Switch Case

```
import java.util.Scanner;
public class EnhancedSwitchCase {
   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);
      System.out.print("Enter the number of day : ");
      int days = sc.nextInt();
      switch (days){
         case 1 -> System.out.println("Monday");
         case 2 -> System.out.println("Tuesday");
         case 3 -> System.out.println("Wednesday");
         case 4 -> System.out.println("Thursday");
         case 5 -> System.out.println("Friday");
         case 6 -> System.out.println("Saturday");
         case 7 -> System.out.println("Sunday");
         default -> System.out.println("Please enter a valid number between 1 - 7 ");
      }
   }
}
```

For Loop

```
public class ForLoop {
   public static void main(String[] args) {
      for (int i = 1; i <= 10; i++) {
         System.out.println(i*2);
      }
   }
}

public class ForLoop2 {
   public static void main(String[] args) {
      for(int i = 1 ; i <= 10 ; i ++) {
         System.out.println("2 x " +i + " = " +i*2);
      }
   }
}
import java.util.Scanner;
public class ForLoop3{
   public static void main(String[] args){
      Scanner sc = new Scanner(System.in);
      int i;
      System.out.print("Enter the number you want to print table of:");
      int num=sc.nextInt();
      for(i=1; i<=10; i++){
         System.out.println(num +" x " +i +" = " +num*i);
```

```
    }
  }
}
```