

JAVA - Program Structure

A JAVA program has the following form:

1. Documentation Section
2. Package Statement
3. Import Statements
4. Interface Statement
5. Class Section Definition
6. Main Method Definition Class
7. Variables and Constant
8. Built-in class Methods/Functions
9. Statements & Expressions
10. Semi colon

1. Documentation Section

You can write a comment in this section. Comments are beneficial for the programmer because they help them understand the code. These are optional, but we suggest you use them because they are useful to understand the operation of the program, so you must write comments within the program.

- Used to give additional useful information inside a JAVA Program.
- For Single line comment : `//`
- For Multiple Lines Comment: `/*.....*/`

Example1 `// this is a single line comment`

Example2 `/* this is a multiline comments
Here start main function */`

2. Package statement

You can create a package with any name. A package is a group of classes that are defined by a name. That is, if you want to declare many classes within one element, then you can declare it within a package. It is an optional part of the program, i.e., if you do not want to declare any package, then there will be no problem with it, and you will not get any errors. Here, the package is a keyword that tells the compiler that package has been created.

It is declared as: `package package_name;`

3. Import statements

This line indicates that if you want to use a class of another package, then you can do this by importing it directly into your program.

Example1 `import java.util.scanner`

4. Interface statement

Interfaces are like a class that includes a group of method declarations. It's an optional section and can be used when programmers want to implement multiple inheritances within a program.

5. Class section definition

A Java program may contain several class definitions. Classes are the main and essential elements of any Java program.

Class

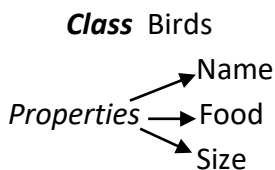
A class is a user-defined data type that we can use in our program. Class is a description or blueprint of any kind for creating objects. In object-oriented programming, a class is a template definition of the methods and variables in a particular kind of object.

Object

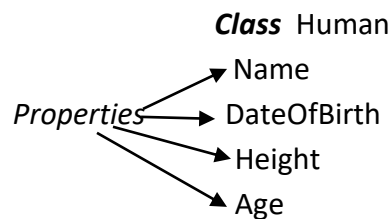
An Object is an instance of a Class and An Object is a describe entity with some characteristics and behavior. When a class is defined, no memory is allocated but when it is instantiated (i.e. an object is created) memory is allocated.

Example

In real life we see some kind of birds like parrot, duck, eagle and sparrow they have birds class. One properties is same that is flying but other properties are different like food, color and size.



Parrot, Duck and Eagle
(These are Objects of Birds class)



Ali, Asif & Sara
(These are Objects of Human Class)

6. Main Method Section

Every Java stand-alone program requires the main method as the starting point of the program. This is an essential part of a Java program. There may be many classes in a Java program, and only one class defines the main method. Methods contain data type declaration and executable statements.

Example of Structure of Java Program

Documents Section

```
/*
 * To change this license header, choose License Headers in Project Properties.
 * Description of the Project, file, choose Tools etc
 * And open the template in the editor.
 */
```

Package Section

```
package test12;
/**
 * Date : 99/99/9999
 * Name  xxxxxxxx xxxxxxx
 * import any Class library files here
 */
```

Import Section

```
* import any Class library files here
```

Interface section

Class section

```
public class Test12
```

```
{
```

```
/**
 * Data member variables Constructor and data member function
 * @parameter arguments the command line arguments
 */
```

Main method definition section

```
public static void main(String[] args)
{
    // TODO code application logic here
}
}
```

7. Variables and Constant

Variables are used to hold numbers, strings and complex data for manipulation. Variable is a name of memory addresses, where store data. Variable can be change during execution of program even Constant data cannot be change during the execution of program. Constant assign should be in single or double quotation.

8. Built-in Class methods

The **Methods** are main building blocks of any JAVA Program like print(), println() and nextLine() etc. The term methods refers to a subroutine or individual statements grouped into a logical unit that performs a specific task. You will work with built-in JAVA Methods/function.

9. Statements & Expressions

- The individual lines of code that make up a JAVA line is called statement.
- Expressions, combine variables and constants to create new values.
- Statements are expressions, assignments, function calls, or control flow statements, which make up the JAVA programs.

10. Semi Colon

In Java each statement must be terminate or completed by ";" (semicolon).

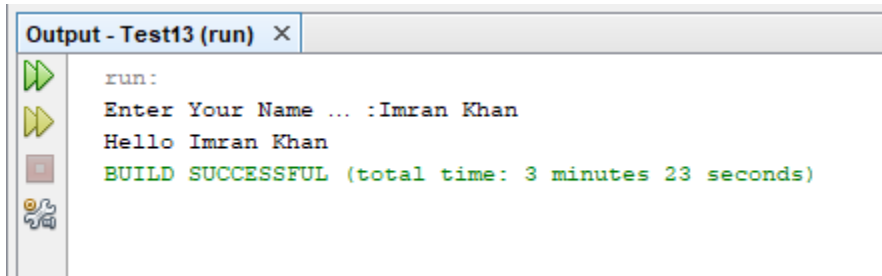
Example Sample java structure of program

```
// Documentation section
//Name of this file will be "Hello.java"
/* Author: www.sirmasood.com
    Date: 1-21-11
    Description:  Input Your name and display given on the screen */
Package InputandOutputName // Package section
import java.util.Scanner; // import class library

public class InputandOutputName // class section
{
    /* if we have here declare data member variables and methods
    Date: 1-21-11
    Description:  Input Your name and display given on the screen */

    public static void main(String[] args) // main method section
    {
        Scanner input = new Scanner(System.in); // built-in class
        String Name; // string variables
    }
}
```

```
System.out.print("Enter Your Name ... :"); // Constant data display
Name = input.nextLine(); // object and built-in method nextLine()
System.out.println("Hello "+Name); // Operator
}
}
```



```
Output - Test13 (run) x
run:
Enter Your Name ... :Imran Khan
Hello Imran Khan
BUILD SUCCESSFUL (total time: 3 minutes 23 seconds)
```

Some basic syntax rule for JAVA program

- JAVA is a case sensitive language so all JAVA keywords must be written in lower case letter and built-in classes names or method according to given case.
- All JAVA statement must be end with a semicolon.
- Variables name declare with data types by requirement (`int` salary or `String` name etc)

What is Syntax?

The rules for using a programming language are called syntax. Syntax refers to the spelling and grammar of a programming language. Computers are inflexible machines that understand what you type only if you type it in the exact form that the computer expects. The expected form is called the syntax.

print(string) and println(string) method differences:

This **print(string)** method prints the text on the console and the cursor remains at the end of the text at the console. The next printing takes place from just here.

This **println(string)** method prints the text on the console and the cursor remains at the start of the next line at the console. The next printing takes place from next line.

Exercise

Theory Questions

1. What do you understand by the term "*Java Case Sensitive Language*"?
2. What difference between the class and object?
3. Identify the two types of comments available in JAVA and indicate when each would be used.
4. What is difference between the **print(string)** and **println(string)** methods in JAVA?
5. Write names list of JAVA program structure.

Practical Questions

1. Write a simple JAVA program to print your BIODATA on the console screen.
2. Elaborate the Error(s) in the code below (if any).

```
Class abc
{
    /* here start main function
       This is multiple line comments
    Public void main(String[] args)
    {
        / This is a comment for JAVA program
        System.out.print("Display first line ) ";
        System.out.println("Display second line ")
        system.Out.println("Display third line ");
    }
}
```

3. Write down the correct code of above program.
4. Mention the output of above code.
5. Write structure of java program (sample structure) .

Objective and MCQ's

1. What do you use to separate multiple argument that are passed to a function
 - a) A period (.)
 - b) A comma (,)
 - c) A forward slash (/)
 - d) A backward slash (\)
2. You create line comments in JAVA code by adding ____ to a line you want to use a comment.
 - a) ||
 - b) **
 - c) /*
 - d) //

3. Block comments begin with /* and end with ____
 - a) */
 - b) /*
 - c) //
 - d) **

4. print(string) method print String data on the console screen.
 - a) The next printing takes place from just here.
 - b) The next printing takes place from next line.
 - c) Print nothing
 - d) Not all above

5. The rules for using a programming language are called _____.
 - a) Protocols
 - b) Syntax
 - c) Variables
 - d) Comments

6. The group of classes that are defined by a name is.
 - a) import
 - b) package
 - c) methods
 - d) functions

7. All JAVA statements must be end with a _____.
 - a) Semicolon
 - b) Commas
 - c) Double quotations
 - d) Single quotations

8. Combine variables and constants to create new values that are called _____.
 - a) Variables
 - b) Statement
 - c) Expression
 - d) Concatenation

9. JAVA keywords or function must be used in _____ case
 - a) Upper case
 - b) Camel case
 - c) Sentence case
 - d) Lower case

- 10 The name of memory addresses, where store data that is called
 - a) function
 - b) commands
 - c) variables
 - d) Constant