Java-Variables

### Instance variable in Java

A variable which is created inside the class but outside the method is known as an instance variable. Instance variable doesn't get memory at compile time. It gets memory at runtime when an object or instance is created. That is why it is known as an instance variable.

**Main outside class**

We can have multiple classes in different Java files or single Java file. If you define multiple classes in a single Java source file, it is a good idea to save the file name with the class name which has main() method.

**CONSTRUCTORS IN JAVA**

In [Java](https://www.javatpoint.com/java-tutorial), a constructor is a block of codes similar to the method. It is called when an instance of the [class](https://www.javatpoint.com/object-and-class-in-java) is created. At the time of calling constructor, memory for the object is allocated in the memory.

Every time an object is created using the new() keyword, at least one constructor is called.

### Rules for creating Java constructor

There are two rules defined for the constructor.

1. Constructor name must be the same as its class name
2. A Constructor must have no explicit return type
3. A Java constructor cannot be abstract, static, final, and synchronized

#### we can have private, protected, public or default constructor in Java

**TYPES OF CONSTRUCTORS IN JAVA**

We have two types of constructors in java:

1.Default constructor

2.Parameterized constructor

### Q) What is the purpose of a default constructor?

The default constructor is used to provide the default values to the object like 0, null, etc., depending on the type.

**Constructor overloading**

A constructor can be overloaded by the use of different number of parameters in the constructor.

**STATIC KEYWORD IN JAVA**

The **static keyword** in [Java](https://www.javatpoint.com/java-tutorial) is used for memory management mainly. We can apply static keyword with [variables](https://www.javatpoint.com/java-variables), methods, blocks and [nested classes](https://www.javatpoint.com/java-inner-class). The static keyword belongs to the class than an instance of the class.

The static can be:

1. Variable (also known as a class variable)
2. Method (also known as a class method)
3. Block
4. Nested class

## 1) Java static variable

If you declare any variable as static, it is known as a static variable.

* The static variable can be used to refer to the common property of all objects (which is not unique for each object), for example, the company name of employees, college name of students, etc.
* The static variable gets memory only once in the class area at the time of class loading.

### Advantages of static variable

It makes your program **memory efficient** (i.e., it saves memory).

### **Characteristics**

1. **Class-level Scope**:
   * Static variables belong to the class rather than any particular instance of the class. This means all instances of the class share the same static variable.
2. **Single Copy**:
   * Only one copy of a static variable exists, regardless of the number of instances of the class. This single copy is shared among all instances.
3. **Memory Allocation**:
   * Memory for static variables is allocated only once when the class is loaded into the JVM. This is in contrast to instance variables, where memory is allocated each time an instance is created.
4. **Access**:

Static variables can be accessed directly by the class name and do not require an instance of the class. For example:  
java  
Copy code  
Example.staticVariable = 10;

They can also be accessed through an instance, though this is less common and not recommended for clarity:  
java  
Copy code  
Example obj = new Example();

obj.staticVariable = 10;

## 2) Java static method

If you apply static keyword with any method, it is known as static method.

* A static method belongs to the class rather than the object of a class.
* A static method can be invoked without the need for creating an instance of a class.
* A static method can access static data member and can change the value of it.

### Restrictions for the static method

There are two main restrictions for the static method. They are:

1. The static method can not use non static data member or call non-static method directly.
2. this and super cannot be used in static context.

### Q) Why is the Java main method static?

Ans) It is because the object is not required to call a static method. If it were a non-static method, [JVM](https://www.javatpoint.com/jvm-java-virtual-machine) creates an object first then call main() method that will lead the problem of extra memory allocation.

## 3) Java static block

* Is used to initialize the static data member.
* It is executed before the main method at the time of classloading.

