Java static Keyword

The static keyword in Java is mainly used for memory management.

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 we declare any variable as static, it is known as a static variable.

1.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.

2.The static variable gets memory only once in the class area at the time of class loading.

In this example, we have created an instance variable named name and a constructor to initialize the value of the instance variable name. Every time an object of the class is created, each object will have its own name variable. If 100 objects are created, then 100 different name variables will be created.

static variable will get the memory only once, if any object changes the value of the static variable, it will retain its value.

2) Java static method

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

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

The most common example of a static method is the main( ) method.
As discussed above, any static member can be accessed before any objects of its class are created, and without reference to any object.

Syntax to declare the static method:

```
Access_modifier static void methodName()
    {
        // Method body.
    }
```

Why use Static Methods?

1. To access and change static variables and other non-object-based static methods.
2. Utility and assist classes frequently employ static methods.

Restrictions in Static Methods:

1. Non-static data members or non-static methods cannot be used by static methods, and static methods cannot call non-static methods directly.
2. In a static environment, this and super aren't allowed to be used.

Why is the main method in Java static?

It's because calling a static method isn't needed of the object. If it were a non-static function, JVM would first build an object before calling the main() method, resulting in an extra memory allocation difficulty.

Instance Methods	Static Methods
It requires an object of the class.	It doesn't require an object of the class.
It can access all attributes of a class.	It can access only the static attributes of a class.
The methods can be accessed only using object reference.	The method is only accessed by class name.
Syntax: ClassOfTestName().	Syntax: classname.methodName()
It's an example of pass-by-value programming.	It's an example of pass-by-reference programming.

3) Java static block

1. To assist to initialize the static data member.
2. It's executed before the main method at the time of classloading.

4) Static Classes

A class can be made static only if it is a nested class. We cannot declare a top-level class with a static modifier but we can declare nested classes as static. Such types of classes are called nested static classes. Nested static class doesn't need a reference of Outer class. In this case, a static class cannot access non-static members of the Outer class.

1. A static nested class may be instantiated without instantiating its outer class.

2. Inner classes can access both static and non-static members of the outer class. A static class can access only the static members of the outer class.