## 1. What is a Constructor?

A **constructor** is a special method in Java used to initialize an object when it is created. It has the same name as the class and does not have a return type (not even `void`).

**Example:**

java
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```
class Car {
    String model;

    // Constructor
    Car(String m) {
        model = m;
    }

    void display() {
        System.out.println("Car Model: " + model);
    }
}

public class Main {
    public static void main(String[] args) {
        Car car = new Car("Tesla Model S");
        car.display();
    }
}
```

**Output:**

```
Car Model: Tesla Model S
```

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## 2. What is Constructor Chaining?

**Constructor Chaining** is the process of calling one constructor from another within the same class or from a parent class.

- **Within the same class:** Using `this()`

- **From a parent class:** Using `super()`

**Example:**

java
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```
class A {
    A() {
        System.out.println("Constructor of A");
    }
}

class B extends A {
    B() {
        super(); // Calls constructor of A
        System.out.println("Constructor of B");
    }
}

public class Main {
    public static void main(String[] args) {
        B obj = new B();
    }
}
```

**Output:**

css
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```
Constructor of A
Constructor of B
```

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## 3. Can we call a subclass constructor from a superclass constructor?

No, a superclass constructor **cannot** call a subclass constructor directly. However, a subclass constructor **implicitly** calls the superclass constructor using `super()` (even if not written explicitly).

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## 4. What happens if you keep a return type for a constructor?

If you specify a return type in a constructor, it will be treated as a **normal method**, not a constructor.

**Example:**

java
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```
class Test {
    Test() { // Correct Constructor
        System.out.println("Constructor called");
    }

    void Test() { // This is NOT a constructor (it has a return type)
        System.out.println("This is a method, not a constructor");
    }
}

public class Main {
    public static void main(String[] args) {
        Test obj = new Test(); // Calls the constructor
        obj.Test(); // Calls the method
    }
}
```

**Output:**

pgsql
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```
Constructor called
This is a method, not a constructor
```

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## 5. What is a No-arg Constructor?

A **No-argument (No-arg) constructor** is a constructor that does not take any parameters.

**Example:**

java

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```
class Example {
    Example() { // No-arg constructor
        System.out.println("No-arg constructor called");
    }
}

public class Main {
    public static void main(String[] args) {
        Example obj = new Example();
    }
}
```

**Output:**

```
No-arg constructor called
```

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## 6. How is a No-argument Constructor Different from a Default Constructor?

| No-arg Constructor | Default Constructor |
| --- | --- |
| Explicitly defined by the user. | Created by Java if no constructor is defined. |
| Can contain custom logic. | Only initializes an object with default values. |
| Can have `System.out.println()` or other statements. | Does nothing except object creation. |

**Example of Default Constructor (implicitly created by Java):**

java
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```
class Example {
    // No constructor is defined, so Java provides a default
constructor.
}

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

```
        Example obj = new Example(); // Java provides a default
constructor
    }
}
```

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## 7. When do we need Constructor Overloading?

**Constructor Overloading** is needed when we want to create multiple constructors with different parameters to initialize objects in different ways.

**Example:**

java
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```
class Student {
    String name;
    int age;

    // No-arg constructor
    Student() {
        name = "Unknown";
        age = 0;
    }

    // Parameterized constructor
    Student(String n, int a) {
        name = n;
        age = a;
    }

    void display() {
        System.out.println("Name: " + name + ", Age: " + age);
    }
}

public class Main {
    public static void main(String[] args) {
        Student s1 = new Student(); // Calls no-arg constructor
```

```
        Student s2 = new Student("John", 22); // Calls parameterized
constructor

        s1.display();
        s2.display();
    }
}
```

**Output:**

yaml
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```
Name: Unknown, Age: 0
Name: John, Age: 22
```

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## 8. What is a Default Constructor? Explain with an Example

A **default constructor** is an automatically provided constructor by Java **only if no other constructor is defined** in the class.

**Example:**

java
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```
class Example {
    // No constructor defined, Java provides a default constructor
}

public class Main {
    public static void main(String[] args) {
        Example obj = new Example(); // Calls the default constructor
        System.out.println("Object created successfully");
    }
}
```

**Output:**

```
Object created successfully
```

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## Conclusion

- A **constructor** initializes an object.
- **Constructor Chaining** allows calling another constructor within the same class (`this()`) or a parent class (`super()`).
- A **No-arg constructor** has no parameters, while a **default constructor** is created by Java when no constructor is defined.
- **Constructor Overloading** helps create multiple constructors with different parameters.
- **A constructor cannot have a return type**, else it will be treated as a method.