**Java Methods**

**1. Overview:**

A method in Java is a block of code designed to perform a specific task. Methods allow for code reusability and organization within a program.

**2. Types of Java Methods**

**a. Predefined Methods**

* These are built-in methods provided by Java, such as System.out.println() for printing to the console.

**b. User-Defined Methods**

* These are custom methods created by the developer to perform specific tasks.

**Example:**

public void greetUser(String name) {

System.out.println("Hello, " + name);

}

**c. Static Methods**

* Defined using the static keyword, static methods belong to the class rather than an instance of the class.

**Example:**

public static void printMessage() {

System.out.println("This is a static method.");

}

**d. Instance Methods**

* These methods belong to an instance of a class and require an object to be called.

**Example:**

public class MyClass {

public void displayMessage() {

System.out.println("This is an instance method.");

}

}

**3. Recursion in Java**

Recursion occurs when a method calls itself to solve smaller instances of the same problem.

**Example:**

public int factorial(int n) {

if (n == 0) {

return 1;

} else {

return n \* factorial(n - 1);

}

}

**4. Calling Methods:**Methods are invoked using their names followed by parentheses. If the method requires parameters, arguments are passed inside the parentheses.

**a. Calling a Static Method**

public class Example {

public static void main(String[] args) {

printMessage(); // Calling static method

}

public static void printMessage() {

System.out.println("Hello from a static method!");

}

}

**b. Calling an Instance Method**

public class Example {

public static void main(String[] args) {

Example example = new Example(); // Creating an object

example.displayMessage(); // Calling instance method

}

public void displayMessage() {

System.out.println("Hello from an instance method!");

}