JAVA BASICS AND OOPs

ASSIGNMENT QUESTIONS

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1.JAVA BASICS

Q.1. What is Java? Explain its features.

ANSWER:

Java is a **high-level, object-oriented, and platform-independent** programming language developed by **Sun Microsystems** in **1995**. It follows the principle of **"Write Once, Run Anywhere"**, meaning compiled Java code can run on any system with a **Java Virtual Machine (JVM)**.

Key Features:

Platform Independent – Java code runs on any device using the JVM.

Object-Oriented – Follows OOP principles like inheritance and polymorphism.

Simple – Easy to learn with a clean and readable syntax.

Secure – Provides built-in security features and avoids unsafe operations.

Robust – Strong memory management and exception handling.

Multithreaded – Supports multiple threads for concurrent execution.

High Performance – Uses JIT compiler to improve execution speed.

Distributed – Supports network-based programming (e.g., RMI).

Dynamic – Loads classes at runtime and supports reflection.

Q.2. Explain the Java program execution process.

ANSWER:

The execution of a Java program involves several steps from writing code to running it. Here's a clear explanation of the **Java program execution process**:

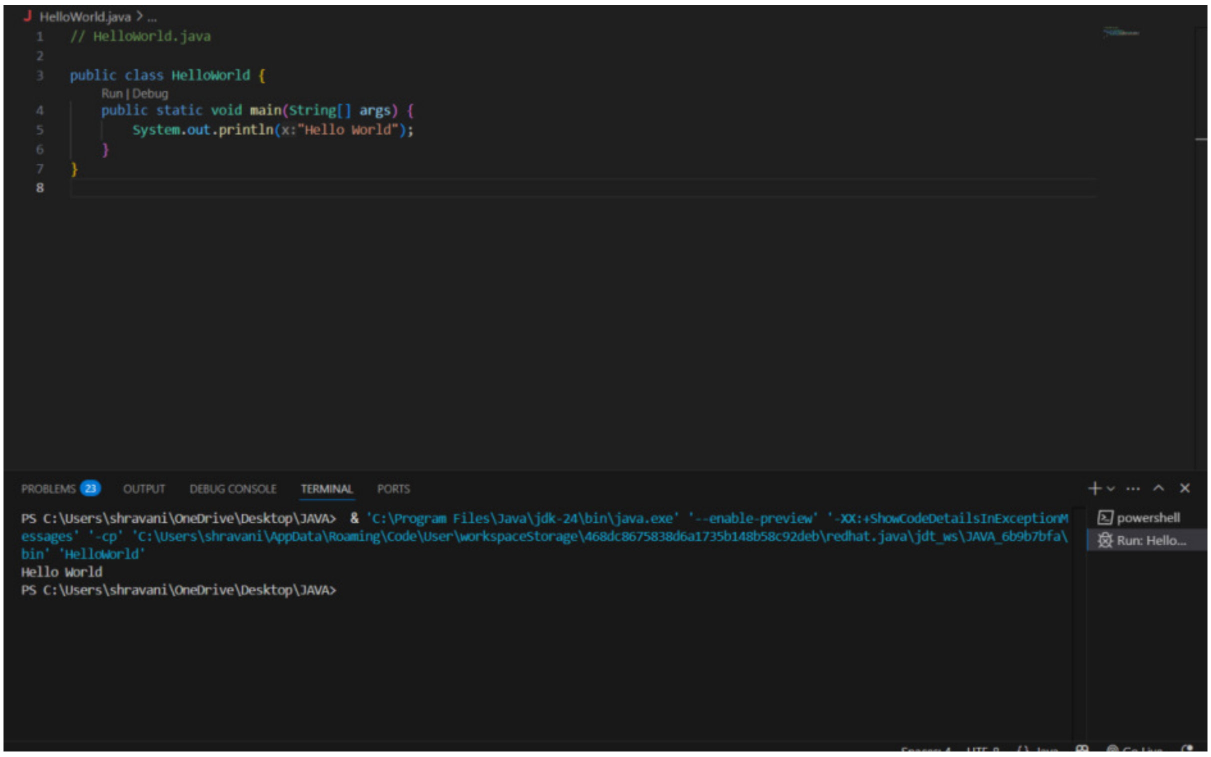
🔄 **Step-by-Step Execution Process:**

1. **Writing the Code**
   - Java code is written in a .java file using a text editor or IDE like IntelliJ or Eclipse.
2. **Compilation**
   - The .java file is compiled using the **Java Compiler (javac)**, which converts the source code into **bytecode** and stores it in a .class file.
   - Example: javac HelloWorld.java → generates HelloWorld.class
3. **Bytecode**
   - This .class file contains **platform-independent bytecode**, which is not readable by the machine directly.
4. **Class Loader**
   - The **Class Loader** loads the .class file into memory when you run the program.
5. **Bytecode Verification**
   - The **Bytecode Verifier** checks the bytecode for security and correctness before execution.
6. **Java Virtual Machine (JVM)**
   - The JVM interprets or compiles the bytecode into **machine code** specific to the operating system and hardware.
7. **Execution**
   - Finally, the machine code is executed by the **CPU**, and the program runs with output shown in the console.

Q.3. Write a simple Java program to display 'Hello World'.

ANSWER:

Code & Output given



```java
// HelloWorld.java

public class HelloWorld {
    public static void main(String[] args) {
        System.out.println(x:"Hello World");
    }
}
```

```
PS C:\Users\shravani\OneDrive\Desktop\JAVA>  & 'C:\Program Files\Java\jdk-24\bin\java.exe' '--enable-preview' '-XX:+ShowCodeDetailsInExceptionM
essages' '-cp' 'C:\Users\shravani\AppData\Roaming\Code\User\workspaceStorage\468dc8675838d6a1735b148b58c92deb\redhat.java\jdt_ws\JAVA_6b9b7bfa\
bin' 'HelloWorld'
Hello World
PS C:\Users\shravani\OneDrive\Desktop\JAVA>
```

Q.4What are data types in Java? List and explain them.

ANSWER:

In Java, **data types** define the type of data a variable can hold. They determine the size, kind of values, and operations allowed on the data. Java has two main types of data types:

1. Primitive Data Types:

Java provides 8 built-in primitive data types:

Data Type	**Description**	**Size**	**Example**
byte	Small integer value	1 byte	byte a = 10;
short	Short-range integer	2 bytes	short s = 1000;
int	Default integer type	4 bytes	int i = 50000;
long	Large integer values	8 bytes	long l = 100000L;
float	Decimal number (single precision)	4 bytes	float f = 5.6f;
double	Decimal number (double precision)	8 bytes	double d = 99.99;
char	Single Unicode character	2 bytes	char c = 'A';
boolean	Logical values (true/false)	1 bit	boolean b = true;

2. Non-Primitive (Reference) Data Types:

These refer to objects and can store multiple values or complex data. They include:

- **String** – Stores a sequence of characters
  String name = "Java";
- **Array** – Stores multiple values of the same type
  int[] numbers = {1, 2, 3};
- **Class** – User-defined blueprint for objects
  Student s = new Student();
- **Interface** – Defines abstract methods for classes to implement

Q.5 What is the difference between JDK, JRE, and JVM?

ANSWER:

Component	**Full Form**	**Description**	**Contains**
JVM	Java Virtual Machine	JVM is a runtime environment that executes Java bytecode (.class files).	Only the **engine** to run Java code
JRE	Java Runtime Environment	JRE provides libraries and JVM to run Java applications (but not develop).	**JVM + Core Libraries + Tools**
JDK	Java Development Kit	JDK is a complete package for Java development including JRE and compilers.	**JRE + javac + debugger + tools**

Simple Explanation:

- **JVM**: Executes Java programs. It is **platform-dependent** but provides **platform independence** to Java.
- **JRE**: Allows you to **run** Java applications but not write or compile them.
- **JDK**: Needed to **develop** Java programs. It includes everything in JRE plus development tools.

Q.6 What are variables in Java? Explain with examples.

ANSWER:

In Java, a **variable** is a **name given to a memory location** that stores a value. It is used to store data that can be used and modified during program execution.

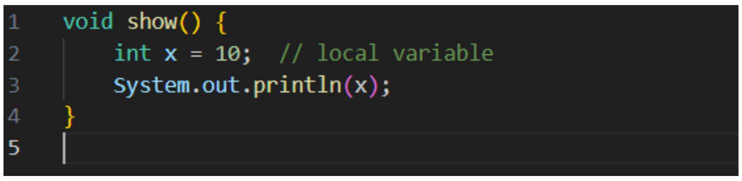
Types of Variables in Java:

2.Local Variable

Declared inside a method or block.

Scope is limited to that method or block.

Example:



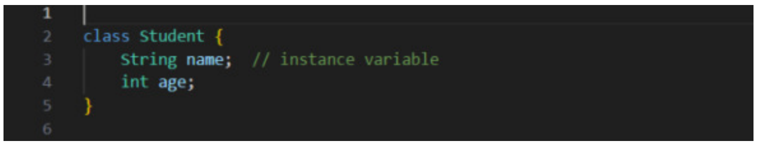
```java
void show() {
    int x = 10;  // local variable
    System.out.println(x);
}
```

2.Instance Variable

Declared inside a class but outside any method.

Each object has its own copy.

Example:



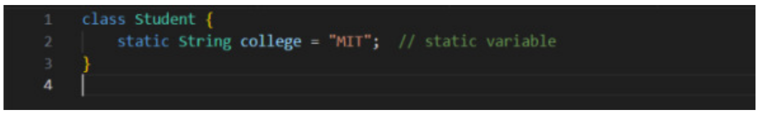
```java

class Student {
    String name;  // instance variable
    int age;
}
```

3.Static Variable

Declared using the static keyword.

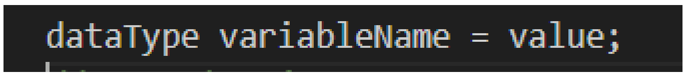
Shared among all objects of the class.

Example:

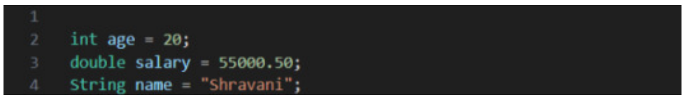


```java
class Student {
    static String college = "MIT";  // static variable
}
```

Variable Declaration Syntax:



```
dataType variableName = value;
```



```java

int age = 20;
double salary = 55000.50;
String name = "Shravani";
```

Q.7 What are the different types of operators in Java?

ANSWER:

In Java, **operators** are special symbols used to perform operations on variables and values. Java supports several types of operators:

1. Arithmetic Operators

Used to perform basic mathematical operations.

- + : Addition (a + b)
- - : Subtraction (a - b)
- * : Multiplication (a * b)

- / : Division (a / b)
- % : Modulus (remainder) (a % b)

2. Relational (Comparison) Operators

Used to compare two values.

- == : Equal to (a == b)
- != : Not equal to (a != b)
- > : Greater than (a > b)
- < : Less than (a < b)
- >= : Greater than or equal to (a >= b)
- <= : Less than or equal to (a <= b)

3. Logical Operators

Used to combine multiple conditions.

- && : Logical AND (a > 5 && b < 10)
- || : Logical OR (a > 5 || b < 10)
- ! : Logical NOT (!(a == b))

4. Assignment Operators

Used to assign values to variables.

- = : Assign (a = b)
- += : Add and assign (a += b → a = a + b)
- -= : Subtract and assign (a -= b)
- *= : Multiply and assign (a *= b)
- /= : Divide and assign (a /= b)
- %= : Modulus and assign (a %= b)

5. Unary Operators

Operate on a single operand.

- + : Unary plus (+a)
- - : Unary minus (-a)
- ++ : Increment (a++ or ++a)
- -- : Decrement (a-- or --a)
- ! : Logical NOT (!true)

6. Bitwise Operators

Operate at the bit level.

- & : Bitwise AND (a & b)
- | : Bitwise OR (a | b)
- ^ : Bitwise XOR (a ^ b)
- ~ : Bitwise Complement (~a)
- << : Left shift (a << 2)
- >> : Right shift (a >> 2)

7.Ternary Operators

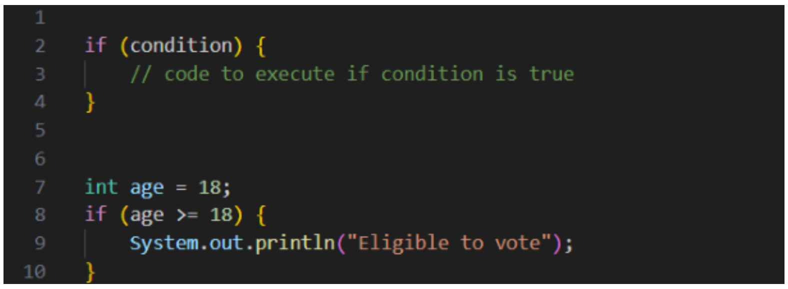
- Used as a shortcut for if-else conditions.
- Syntax: `condition ? value_if_true : value_if_false;`

Q.8 Explain control statements in Java (if, if-else, switch).

ANSWER:

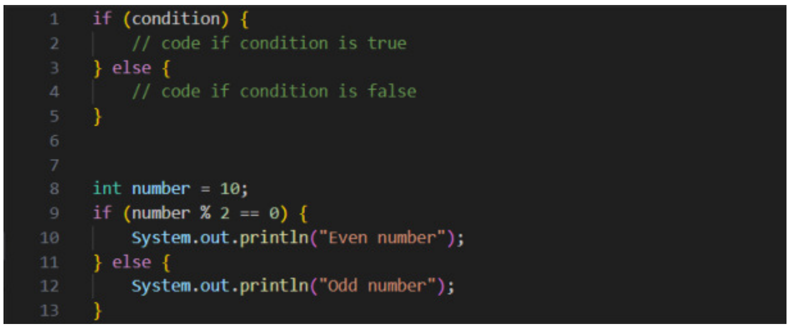
In Java, **control statements** are used to control the flow of execution based on certain conditions. The most commonly used decision-making control statements are:

1.if Statement



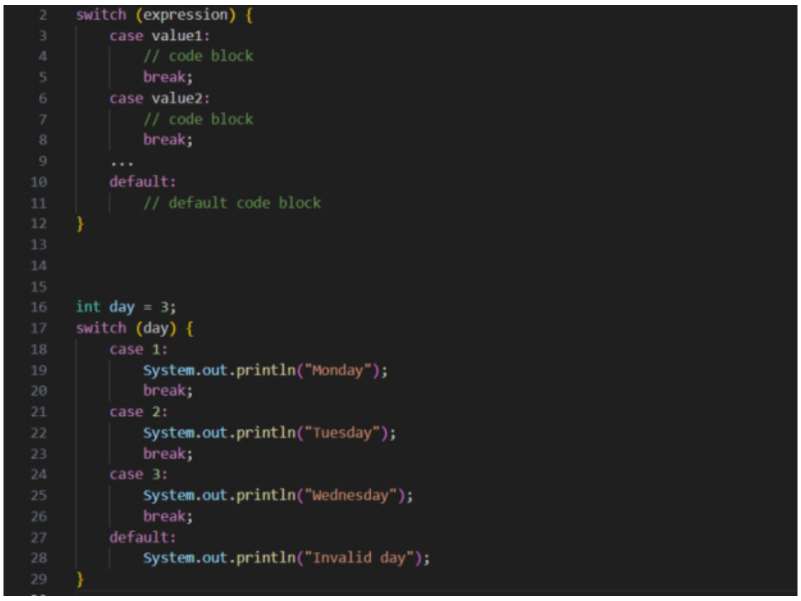
```java

if (condition) {
    // code to execute if condition is true
}


int age = 18;
if (age >= 18) {
    System.out.println("Eligible to vote");
}
```

2. if-else Statement



```java
if (condition) {
    // code if condition is true
} else {
    // code if condition is false
}


int number = 10;
if (number % 2 == 0) {
    System.out.println("Even number");
} else {
    System.out.println("Odd number");
}
```

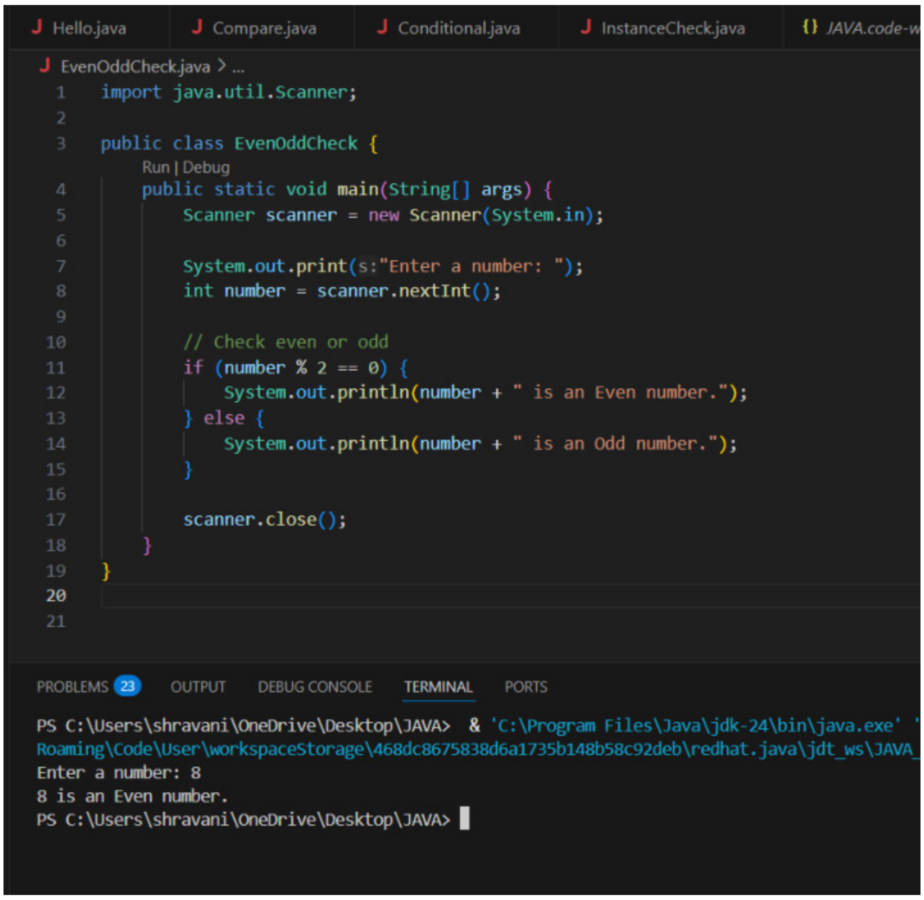
3. switch Statement



```java
switch (expression) {
    case value1:
        // code block
        break;
    case value2:
        // code block
        break;
    ...
    default:
        // default code block
}



int day = 3;
switch (day) {
    case 1:
        System.out.println("Monday");
        break;
    case 2:
        System.out.println("Tuesday");
        break;
    case 3:
        System.out.println("Wednesday");
        break;
    default:
        System.out.println("Invalid day");
}
```

Q.9 . Write a Java program to find whether a number is even or odd.

ANSWER:



```java
import java.util.Scanner;

public class EvenOddCheck {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print(s:"Enter a number: ");
        int number = scanner.nextInt();

        // Check even or odd
        if (number % 2 == 0) {
            System.out.println(number + " is an Even number.");
        } else {
            System.out.println(number + " is an Odd number.");
        }

        scanner.close();
    }
}
```

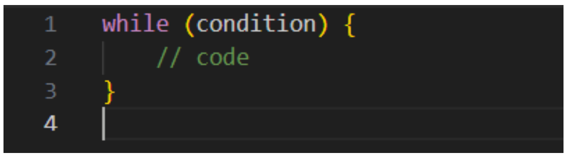
```
PS C:\Users\shravani\OneDrive\Desktop\JAVA>  & 'C:\Program Files\Java\jdk-24\bin\java.exe' '
Roaming\Code\User\workspaceStorage\468dc8675838d6a1735b148b58c92deb\redhat.java\jdt_ws\JAVA_
Enter a number: 8
8 is an Even number.
PS C:\Users\shravani\OneDrive\Desktop\JAVA>
```

Q.10 What is the difference between while and do-while loop?

ANSWER:

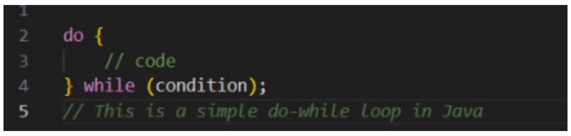
Feature	while Loop	do-while Loop
Condition Check	Condition is checked **before** the loop runs	Condition is checked **after** the loop runs
Minimum Execution	May **not execute** even once if condition is false	Executes **at least once** even if condition is false

SYNTAX FOR WHILE LOOP:



```
while (condition) {
    // code
}
```

SYNTAX FOR DO WHILE LOOP:



```
do {
    // code
} while (condition);
// This is a simple do-while loop in Java
```

2. Object-Oriented Programming (OOPs)

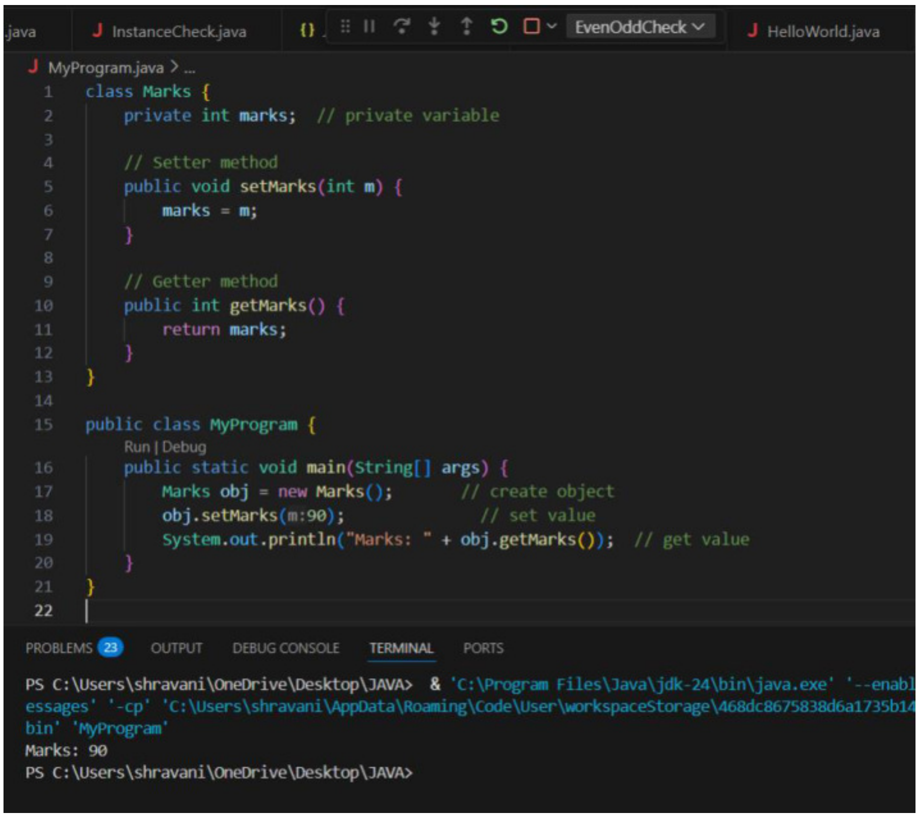
Q.11 . What are the main principles of OOPs in Java? Explain each.

ANSWER:

Java is an **Object-Oriented Programming (OOP)** language. The four main principles of OOP in Java are:

1. Encapsulation

Encapsulation is the process of **wrapping data (variables) and code (methods)** into a single unit, called a **class**. It helps to protect data from unauthorized access using **private access modifiers** and provides public methods (getters/setters) to access or modify the data.

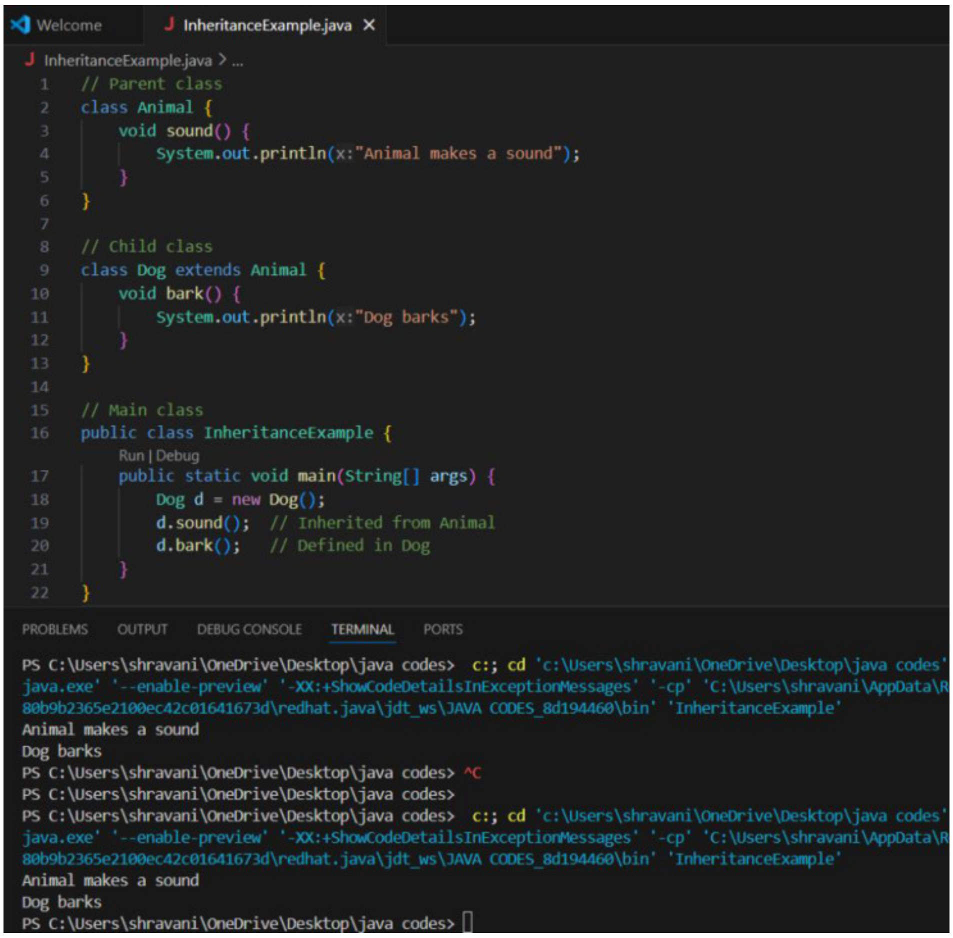


```java
class Marks {
    private int marks;  // private variable

    // Setter method
    public void setMarks(int m) {
        marks = m;
    }

    // Getter method
    public int getMarks() {
        return marks;
    }
}

public class MyProgram {
    public static void main(String[] args) {
        Marks obj = new Marks();        // create object
        obj.setMarks(m:90);               // set value
        System.out.println("Marks: " + obj.getMarks());  // get value
    }
}

```

```
PS C:\Users\shravani\OneDrive\Desktop\JAVA>  & 'C:\Program Files\Java\jdk-24\bin\java.exe' '--enabl
essages' '-cp' 'C:\Users\shravani\AppData\Roaming\Code\User\workspaceStorage\468dc8675838d6a1735b14
bin' 'MyProgram'
Marks: 90
PS C:\Users\shravani\OneDrive\Desktop\JAVA>
```

2. Inheritance

Inheritance allows a class (**subclass**) to inherit properties and behaviors (fields and methods) from another class (**superclass**). It promotes **code reuse** and represents **IS-A** relationships.



```java
// Parent class
class Animal {
    void sound() {
        System.out.println(x:"Animal makes a sound");
    }
}

// Child class
class Dog extends Animal {
    void bark() {
        System.out.println(x:"Dog barks");
    }
}

// Main class
public class InheritanceExample {
    public static void main(String[] args) {
        Dog d = new Dog();
        d.sound();  // Inherited from Animal
        d.bark();   // Defined in Dog
    }
}
```

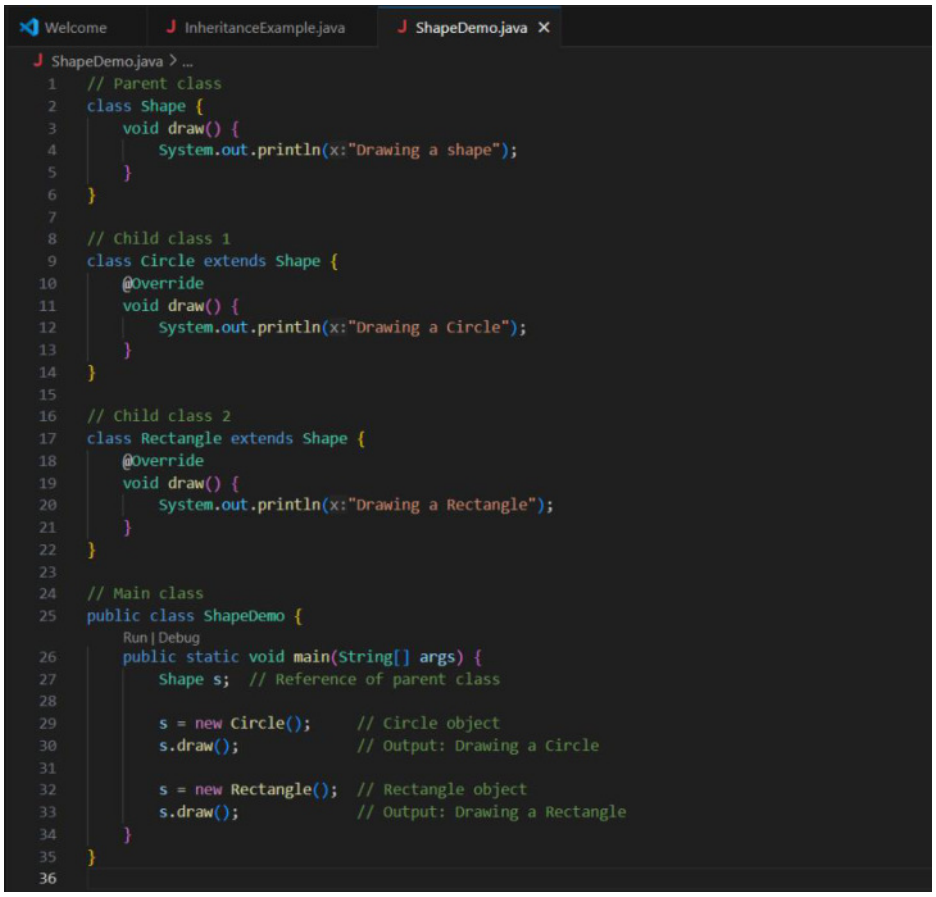
```
PS C:\Users\shravani\OneDrive\Desktop\java codes>  c:; cd 'c:\Users\shravani\OneDrive\Desktop\java codes'
java.exe' '--enable-preview' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\shravani\AppData\R
80b9b2365e2100ec42c01641673d\redhat.java\jdt_ws\JAVA CODES_8d194460\bin' 'InheritanceExample'
Animal makes a sound
Dog barks
PS C:\Users\shravani\OneDrive\Desktop\java codes> ^C
PS C:\Users\shravani\OneDrive\Desktop\java codes>
PS C:\Users\shravani\OneDrive\Desktop\java codes>  c:; cd 'c:\Users\shravani\OneDrive\Desktop\java codes'
java.exe' '--enable-preview' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\shravani\AppData\R
80b9b2365e2100ec42c01641673d\redhat.java\jdt_ws\JAVA CODES_8d194460\bin' 'InheritanceExample'
Animal makes a sound
Dog barks
PS C:\Users\shravani\OneDrive\Desktop\java codes>
```

3. Polymorphism

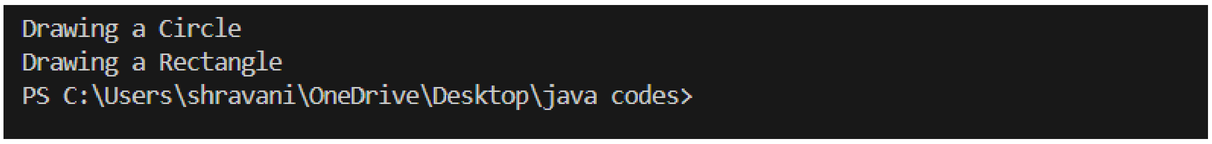
Polymorphism means **one name, many forms**. It allows the same method or function to behave differently based on the object that calls it. It is of two types:

Compile-time Polymorphism (Method Overloading)

Runtime Polymorphism (Method Overriding)



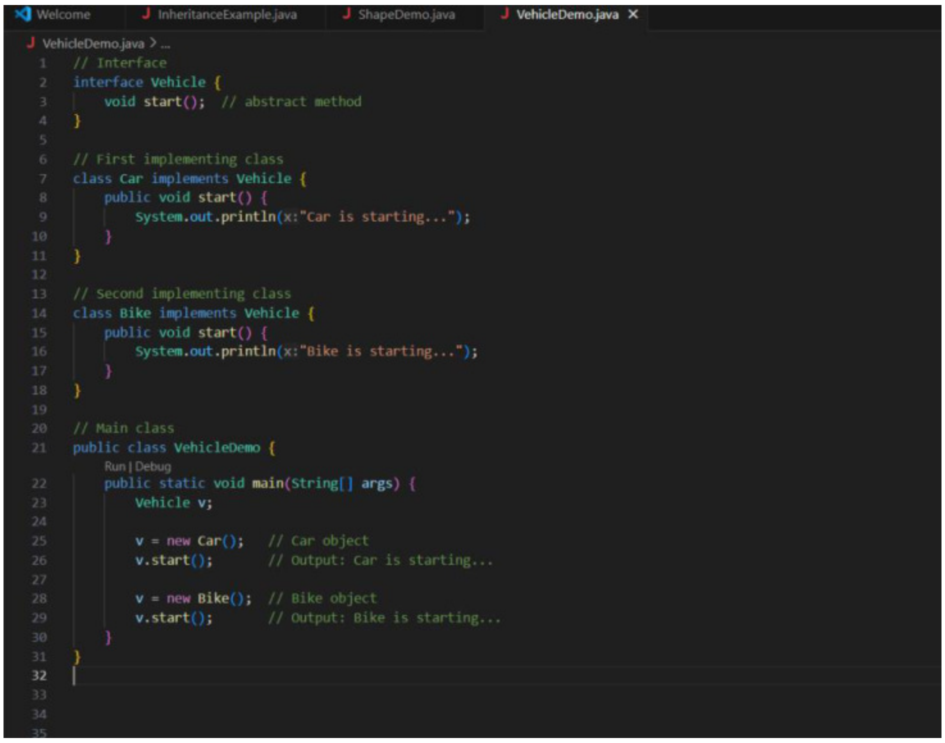
```java
// Parent class
class Shape {
    void draw() {
        System.out.println(x:"Drawing a shape");
    }
}

// Child class 1
class Circle extends Shape {
    @Override
    void draw() {
        System.out.println(x:"Drawing a Circle");
    }
}

// Child class 2
class Rectangle extends Shape {
    @Override
    void draw() {
        System.out.println(x:"Drawing a Rectangle");
    }
}

// Main class
public class ShapeDemo {
    public static void main(String[] args) {
        Shape s;  // Reference of parent class

        s = new Circle();     // Circle object
        s.draw();             // Output: Drawing a Circle

        s = new Rectangle();  // Rectangle object
        s.draw();             // Output: Drawing a Rectangle
    }
}
```



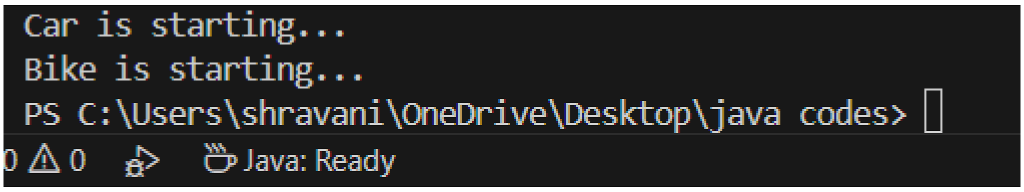
```
Drawing a Circle
Drawing a Rectangle
PS C:\Users\shravani\OneDrive\Desktop\java codes>
```

4. Abstraction

Abstraction is the process of **hiding internal details** and showing only essential features. It can be achieved using **abstract classes** or **interfaces** in Java.



```java
// Interface
interface Vehicle {
    void start();  // abstract method
}

// First implementing class
class Car implements Vehicle {
    public void start() {
        System.out.println(x:"Car is starting...");
    }
}

// Second implementing class
class Bike implements Vehicle {
    public void start() {
        System.out.println(x:"Bike is starting...");
    }
}

// Main class
public class VehicleDemo {
    public static void main(String[] args) {
        Vehicle v;

        v = new Car();   // Car object
        v.start();       // Output: Car is starting...

        v = new Bike();  // Bike object
        v.start();       // Output: Bike is starting...
    }
}
```



```
Car is starting...
Bike is starting...
PS C:\Users\shravani\OneDrive\Desktop\java codes>
```

Q.12 What is a class and an object in Java? Give examples.

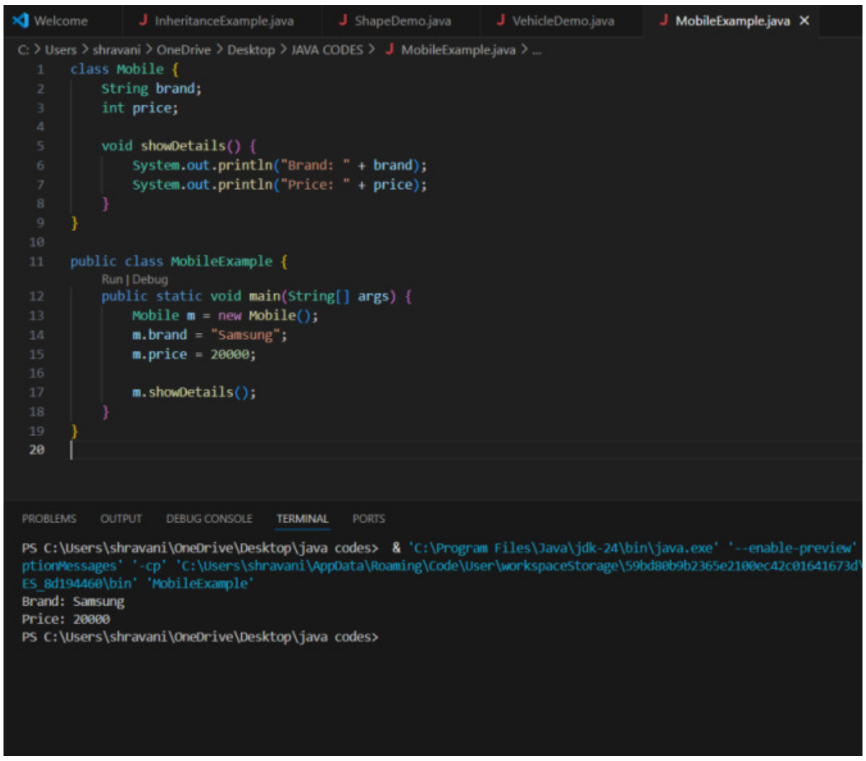
ANSWER:

🔷 **Class**

A **class** is a blueprint or template for creating objects. It defines the structure (data/variables) and behavior (methods) of objects.

🔷 **Object**

An **object** is an instance of a class. It has **state** (data) and **behavior** (methods). Multiple objects can be created from one class.



Welcome
InheritanceExample.java
ShapeDemo.java
VehicleDemo.java
MobileExample.java
C: > Users > shravani > OneDrive > Desktop > JAVA CODES > MobileExample.java > ...

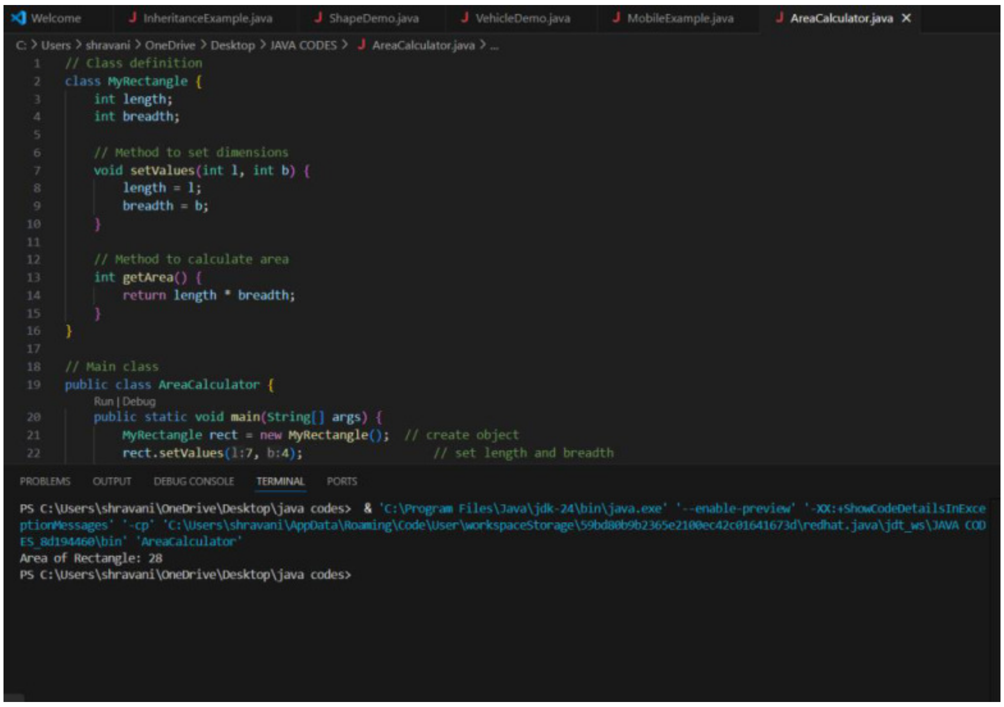
```java
class Mobile {
    String brand;
    int price;

    void showDetails() {
        System.out.println("Brand: " + brand);
        System.out.println("Price: " + price);
    }
}

public class MobileExample {
    Run | Debug
    public static void main(String[] args) {
        Mobile m = new Mobile();
        m.brand = "Samsung";
        m.price = 20000;

        m.showDetails();
    }
}
```

```
PS C:\Users\shravani\OneDrive\Desktop\java codes>  & 'C:\Program Files\Java\jdk-24\bin\java.exe' '--enable-preview'
ptionMessages' '-cp' 'C:\Users\shravani\AppData\Roaming\Code\User\workspaceStorage\59bd80b9b2365e2100ec42c01641673d\
ES_8d194460\bin' 'MobileExample'
Brand: Samsung
Price: 20000
PS C:\Users\shravani\OneDrive\Desktop\java codes>
```

Term	**Meaning**
Class	Blueprint for objects
Object	Real-world instance of the class

Q.13. Write a program using class and object to calculate area of a rectangle.

ANSWER:



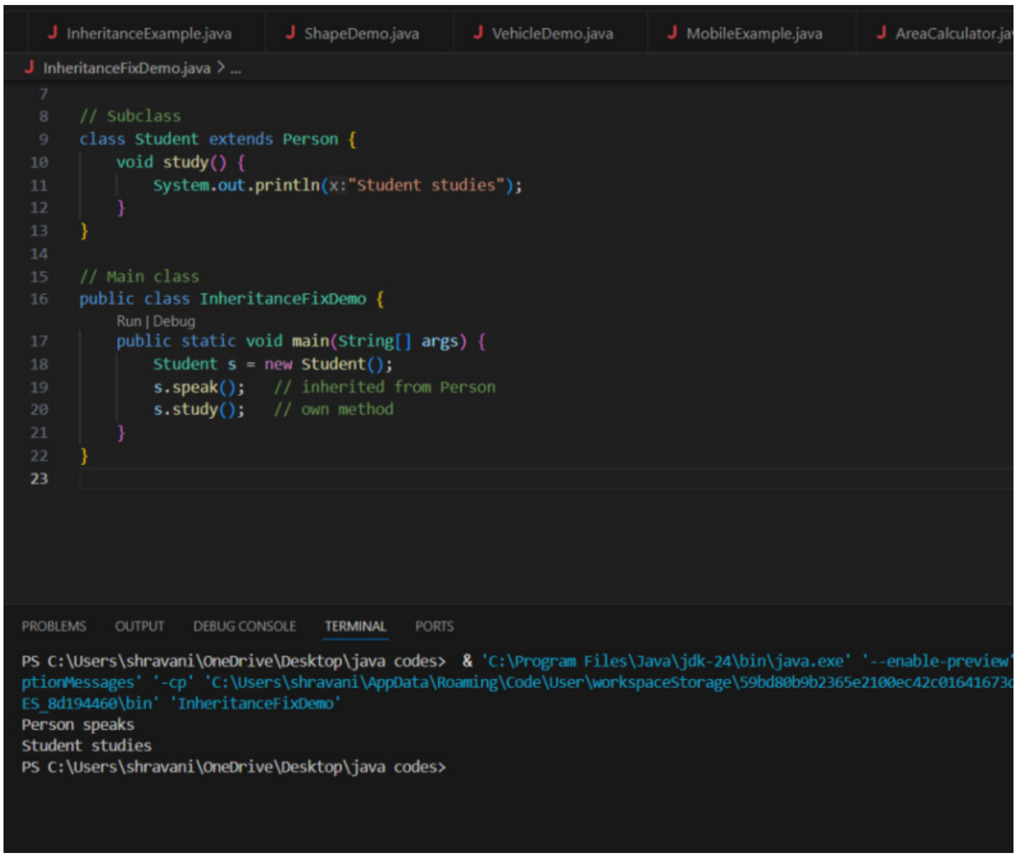
```java
// Class definition
class MyRectangle {
    int length;
    int breadth;

    // Method to set dimensions
    void setValues(int l, int b) {
        length = l;
        breadth = b;
    }

    // Method to calculate area
    int getArea() {
        return length * breadth;
    }
}

// Main class
public class AreaCalculator {
    Run | Debug
    public static void main(String[] args) {
        MyRectangle rect = new MyRectangle();  // create object
        rect.setValues(l:7, b:4);                // set length and breadth
```

```
PS C:\Users\shravani\OneDrive\Desktop\java codes>  & 'C:\Program Files\Java\jdk-24\bin\java.exe' '--enable-preview' '-XX:+ShowCodeDetailsInExce
ptionMessages' '-cp' 'C:\Users\shravani\AppData\Roaming\Code\User\workspaceStorage\59bd80b9b2365e2100ec42c01641673d\redhat.java\jdt_ws\JAVA COD
ES_8d194460\bin' 'AreaCalculator'
Area of Rectangle: 28
PS C:\Users\shravani\OneDrive\Desktop\java codes>
```

Q.14 . Explain inheritance with real-life example and Java code.

ANSWER:

Inheritance is a concept in Java where **one class (child)** acquires the **properties and behaviors** (fields and methods) of **another class (parent)**.



```java

// Subclass
class Student extends Person {
    void study() {
        System.out.println(x:"Student studies");
    }
}

// Main class
public class InheritanceFixDemo {
    public static void main(String[] args) {
        Student s = new Student();
        s.speak();   // inherited from Person
        s.study();   // own method
    }
}

```

```
PS C:\Users\shravani\OneDrive\Desktop\java codes>  & 'C:\Program Files\Java\jdk-24\bin\java.exe' '--enable-preview'
ptionMessages' '-cp' 'C:\Users\shravani\AppData\Roaming\Code\User\workspaceStorage\59bd80b9b2365e2100ec42c01641673c
ES_8d194460\bin' 'InheritanceFixDemo'
Person speaks
Student studies
PS C:\Users\shravani\OneDrive\Desktop\java codes>
```

Q.15 What is polymorphism? Explain with compile-time and runtime examples.

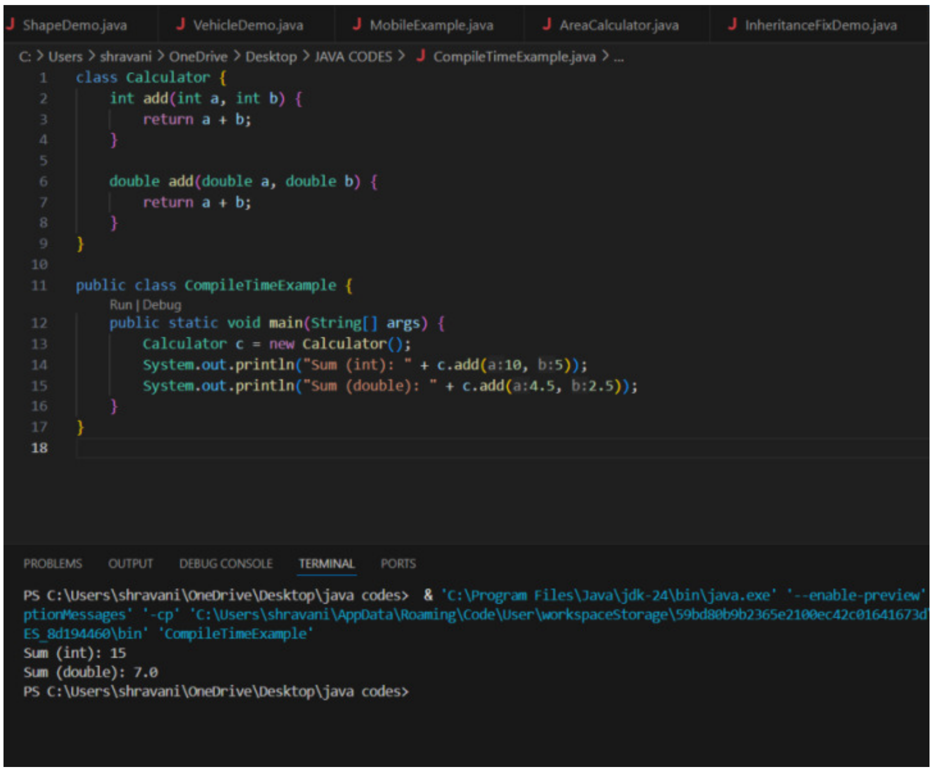
ANSWER:

Polymorphism in Java means **"many forms"**. It allows the same method or operation to behave differently based on the object or context.

🔶 **Types of Polymorphism:**

Type	**Also Called**	**Achieved By**
Compile-time	Static Polymorphism	Method Overloading
Runtime	Dynamic Polymorphism	Method Overriding

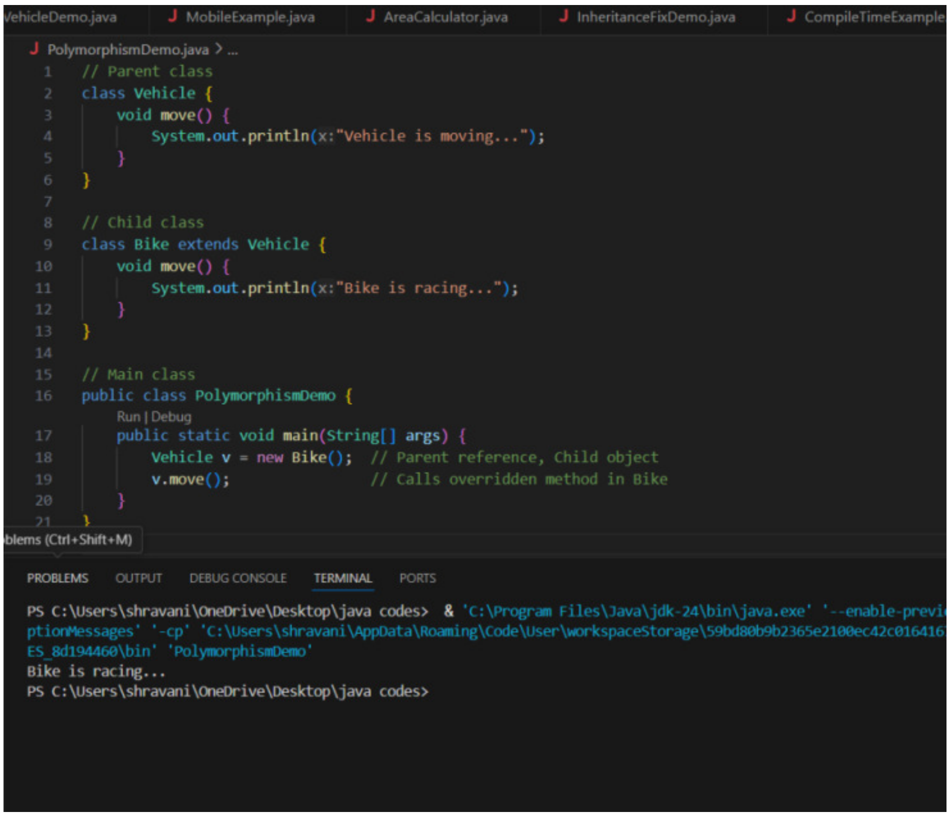
Compile-Time Polymorphism (Method Overloading)



```java
class Calculator {
    int add(int a, int b) {
        return a + b;
    }

    double add(double a, double b) {
        return a + b;
    }
}

public class CompileTimeExample {
    public static void main(String[] args) {
        Calculator c = new Calculator();
        System.out.println("Sum (int): " + c.add(a:10, b:5));
        System.out.println("Sum (double): " + c.add(a:4.5, b:2.5));
    }
}
```

```
PS C:\Users\shravani\OneDrive\Desktop\java codes>  & 'C:\Program Files\Java\jdk-24\bin\java.exe' '--enable-preview'
ptionMessages' '-cp' 'C:\Users\shravani\AppData\Roaming\Code\User\workspaceStorage\59bd80b9b2365e2100ec42c01641673d
ES_8d194460\bin' 'CompileTimeExample'
Sum (int): 15
Sum (double): 7.0
PS C:\Users\shravani\OneDrive\Desktop\java codes>
```

Runtime Polymorphism (Method Overriding)



```java
// Parent class
class Vehicle {
    void move() {
        System.out.println(x:"Vehicle is moving...");
    }
}

// Child class
class Bike extends Vehicle {
    void move() {
        System.out.println(x:"Bike is racing...");
    }
}

// Main class
public class PolymorphismDemo {
    public static void main(String[] args) {
        Vehicle v = new Bike();  // Parent reference, Child object
        v.move();                // Calls overridden method in Bike
    }
}
```

```
PS C:\Users\shravani\OneDrive\Desktop\java codes>  & 'C:\Program Files\Java\jdk-24\bin\java.exe' '--enable-previ
ptionMessages' '-cp' 'C:\Users\shravani\AppData\Roaming\Code\User\workspaceStorage\59bd80b9b2365e2100ec42c016416
ES_8d194460\bin' 'PolymorphismDemo'
Bike is racing...
PS C:\Users\shravani\OneDrive\Desktop\java codes>
```

Summary:

Type	**Polymorphism**	**How?**	**Decided At**
Compile-time	Overloading	Same method, diff args	Compile time
Runtime	Overriding	Inherited method, redefined	Run time

Q.16 What is method overloading and method overriding? Show with examples

ANSWER:

1. Method Overloading (Compile-Time Polymorphism)

Definition:
Multiple methods with the **same name** but **different parameters** (number or type) in the **same class**.

Method Overriding (Runtime Polymorphism)

Definition:
When a **subclass provides its own version** of a method that is already defined in the **superclass**.

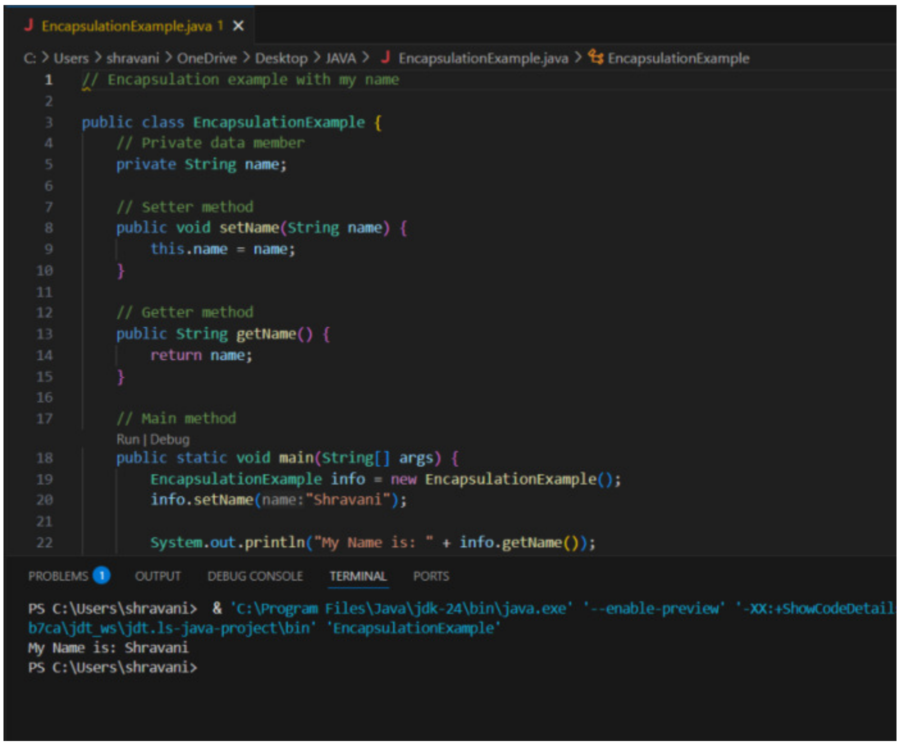
Key Point: Resolved at **runtime** using object type.

CODE EXAMPLES SHOWN IN ABOVE QUE

Q.17 What is encapsulation? Write a program demonstrating encapsulation.

ANSWER:

Encapsulation is the process of **binding data (variables)** and **methods (functions)** that operate on the data into a single unit, called a **class**.
It also means **restricting direct access** to some components, usually by using **private** variables and **public** getter/setter methods.


EncapsulationExample.java 1
C: > Users > shravani > OneDrive > Desktop > JAVA > EncapsulationExample.java > EncapsulationExample
Run | Debug
PROBLEMS 1
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS

```java
// Encapsulation example with my name

public class EncapsulationExample {
    // Private data member
    private String name;

    // Setter method
    public void setName(String name) {
        this.name = name;
    }

    // Getter method
    public String getName() {
        return name;
    }

    // Main method
    public static void main(String[] args) {
        EncapsulationExample info = new EncapsulationExample();
        info.setName(name:"Shravani");

        System.out.println("My Name is: " + info.getName());
```

```
PS C:\Users\shravani>  & 'C:\Program Files\Java\jdk-24\bin\java.exe' '--enable-preview' '-XX:+ShowCodeDetail
b7ca\jdt_ws\jdt.ls-java-project\bin' 'EncapsulationExample'
My Name is: Shravani
PS C:\Users\shravani>
```

Q.18 What is abstraction in Java? How is it achieved?

ANSWER:

Abstraction is the process of **hiding internal implementation details** and **showing only the essential features** of an object.

It helps in focusing on **what an object does**, instead of **how it does it**.

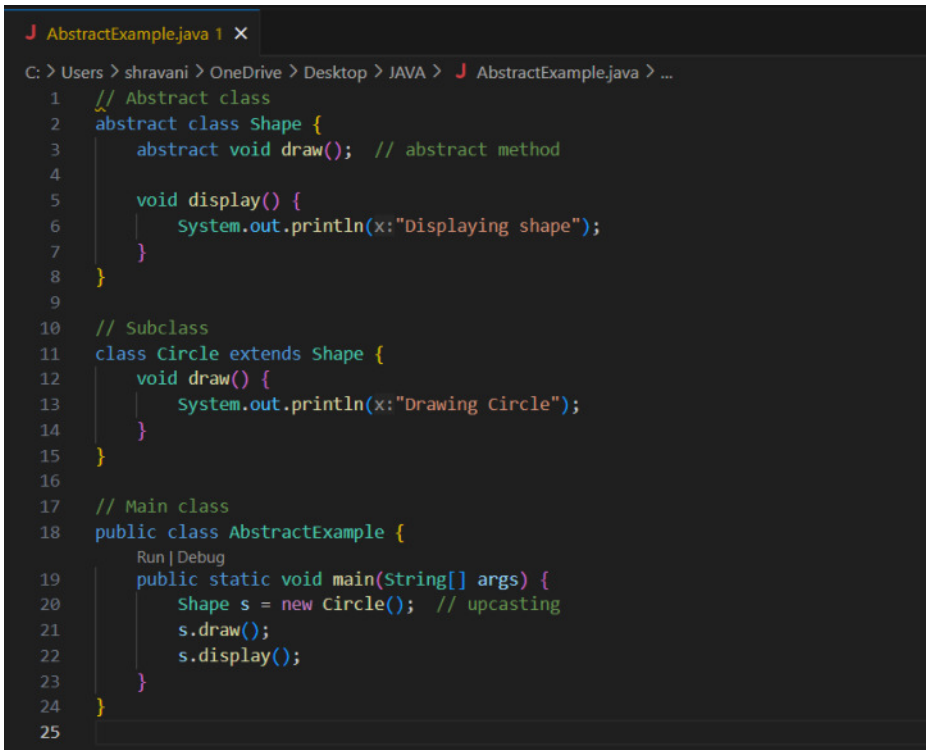
How is Abstraction Achieved in Java?

Abstraction in Java is achieved using:

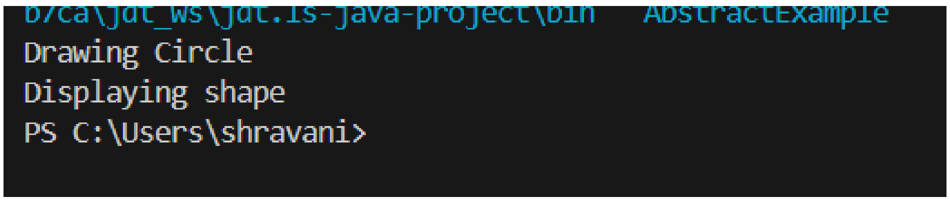
1. **Abstract Classes**
2. **Interfaces**

1. Using Abstract Class

- Contains one or more abstract methods (methods without body).
- Cannot be instantiated directly.
- Subclasses must provide implementations.



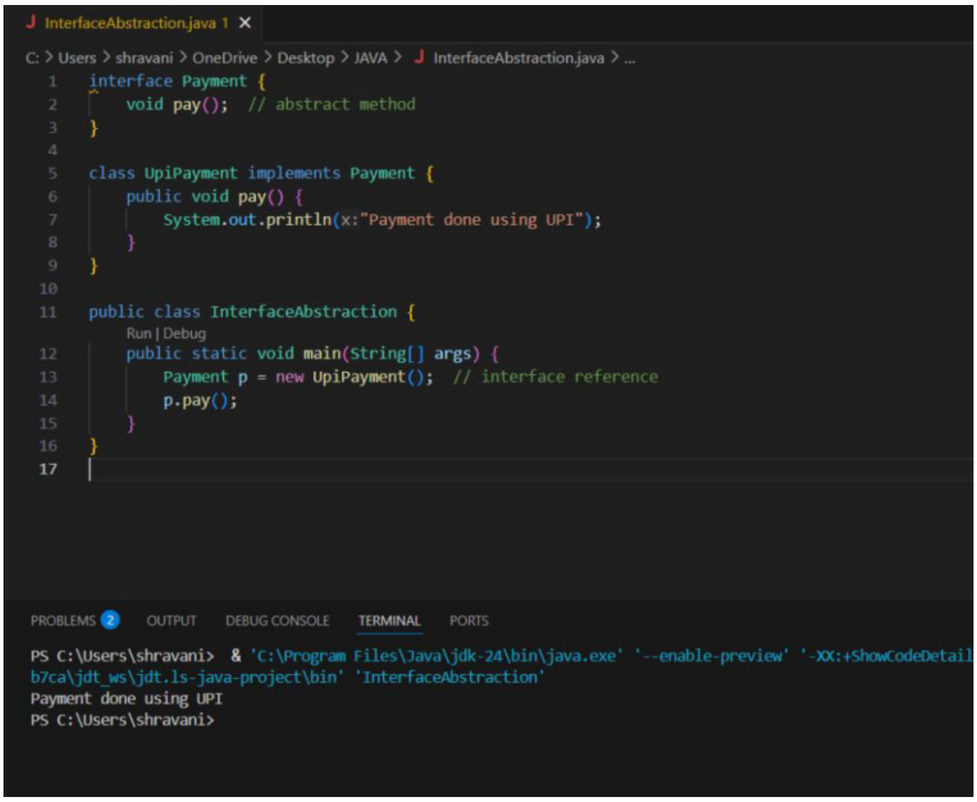
```
AbstractExample.java 1
C: > Users > shravani > OneDrive > Desktop > JAVA > AbstractExample.java > ...
// Abstract class
abstract class Shape {
    abstract void draw();  // abstract method

    void display() {
        System.out.println(x:"Displaying shape");
    }
}

// Subclass
class Circle extends Shape {
    void draw() {
        System.out.println(x:"Drawing Circle");
    }
}

// Main class
public class AbstractExample {
    Run | Debug
    public static void main(String[] args) {
        Shape s = new Circle();  // upcasting
        s.draw();
        s.display();
    }
}
```



```
b7ca\jdt_ws\jdt.ls-java-project\bin  AbstractExample
Drawing Circle
Displaying shape
PS C:\Users\shravani>
```

2. Using Interface

- All methods are **implicitly abstract and public** (Java 8+ can also have default/static methods).
- A class implements the interface and provides method definitions.


InterfaceAbstraction.java 1
C: > Users > shravani > OneDrive > Desktop > JAVA > InterfaceAbstraction.java > ...
Run | Debug
PROBLEMS 2
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS

```java
interface Payment {
    void pay();  // abstract method
}

class UpiPayment implements Payment {
    public void pay() {
        System.out.println(x:"Payment done using UPI");
    }
}

public class InterfaceAbstraction {
    public static void main(String[] args) {
        Payment p = new UpiPayment();  // interface reference
        p.pay();
    }
}
```

```
PS C:\Users\shravani>  & 'C:\Program Files\Java\jdk-24\bin\java.exe' '--enable-preview' '-XX:+ShowCodeDetail
b7ca\jdt_ws\jdt.ls-java-project\bin' 'InterfaceAbstraction'
Payment done using UPI
PS C:\Users\shravani>
```

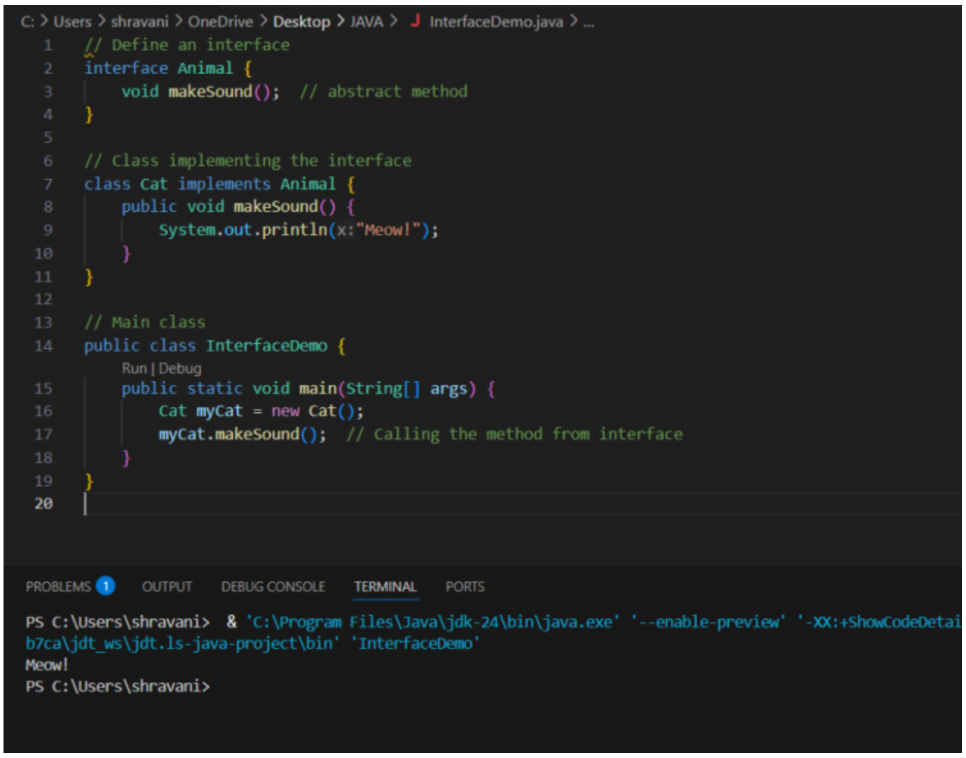
Q.19 Explain the difference between abstract class and interface.

ANSWER:

Feature	**Abstract Class**	**Interface**
Purpose	To provide partial abstraction	To provide full abstraction
Keyword Used	abstract	interface
Method Type	Can have abstract **and** non-abstract methods	Only abstract methods (Java 7), can have default, static (Java 8+)
Constructor	Yes, can have constructors	❌ No constructors
Multiple Inheritance	❌ Not supported (single inheritance only)	✅ Supported (a class can implement multiple interfaces)
Access Modifiers	Can use private, protected, public	All methods are public and abstract by default (Java 7)
Variables	Can have instance variables	Only public static final constants
Usage Example	Use when classes are closely related	Use to define common behavior across classes

Q.20 Create a Java program to demonstrate the use of interface.

ANSWER:



C: > Users > shravani > OneDrive > Desktop > JAVA > InterfaceDemo.java > ...

```java
// Define an interface
interface Animal {
    void makeSound();  // abstract method
}

// Class implementing the interface
class Cat implements Animal {
    public void makeSound() {
        System.out.println(x:"Meow!");
    }
}

// Main class
public class InterfaceDemo {
    Run | Debug
    public static void main(String[] args) {
        Cat myCat = new Cat();
        myCat.makeSound();  // Calling the method from interface
    }
}
```

```
PS C:\Users\shravani>  & 'C:\Program Files\Java\jdk-24\bin\java.exe' '--enable-preview' '-XX:+ShowCodeDetai
b7ca\jdt_ws\jdt.ls-java-project\bin' 'InterfaceDemo'
Meow!
PS C:\Users\shravani>
```