



EXPERIMENT-1

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SUBJECT: OOPS

SUBMITTED TO: Dr Satyam Tiwari

INTRODUCTION TO JAVA

JDK, JRE, and JVM: Their Roles and Differences

When working with Java, you'll frequently encounter three essential components: **JDK (Java Development Kit)**, **JRE (Java Runtime Environment)**, and **JVM (Java Virtual Machine)**. Each of these plays a distinct role in Java development and execution.

1. Java Virtual Machine (JVM)

Role: Executes Java bytecode on different operating systems.

Key Responsibilities:

- Converts **Java bytecode (.class files)** into machine code for execution.
- Ensures **platform independence** through the “Write Once, Run Anywhere” concept.
- Manages memory through **automatic garbage collection**.
- Provides security features like the **ClassLoader** and **Bytecode Verifier**.

Components of JVM:

- **ClassLoader** – Loads Java classes into memory.

- **Runtime Memory (Heap, Stack, Method Area, PC Register, Native Method Stack)** – Manages memory allocation.
- **Execution Engine** – Converts bytecode into machine code using an **interpreter** or **Just-In-Time (JIT) compiler**.

JVM is platform-dependent but provides platform independence to Java applications.

2. Java Runtime Environment (JRE)

Role: Provides the necessary libraries and dependencies to run Java applications.

What JRE Includes:

- **JVM** – To execute Java bytecode.
- **Core Libraries** – Essential classes for Java programs (`java.lang`, `java.io`, etc.).
- **Supporting Files** – Configuration files, properties files, etc.

JRE ≠ JDK

- **JRE is for running Java applications, not developing them.**
 - If you just want to execute Java programs (not write or compile them), JRE is enough.
-

3. Java Development Kit (JDK)

Role: The complete software package for Java development.

What JDK Includes:

- **JRE** – To run Java programs.
- **Development Tools:**
 - **javac (Java Compiler)** – Converts Java source code into bytecode.
 - **jar (Java Archive Tool)** – For packaging Java programs.
 - **javadoc (Documentation Generator)** – Creates API documentation.
 - **JDB (Java Debugger)** – For debugging Java programs.

JDK = JRE + Development Tools

If you're coding in Java, you **must install the JDK**.

2. Install the latest available JDK and verify the Java Environment.

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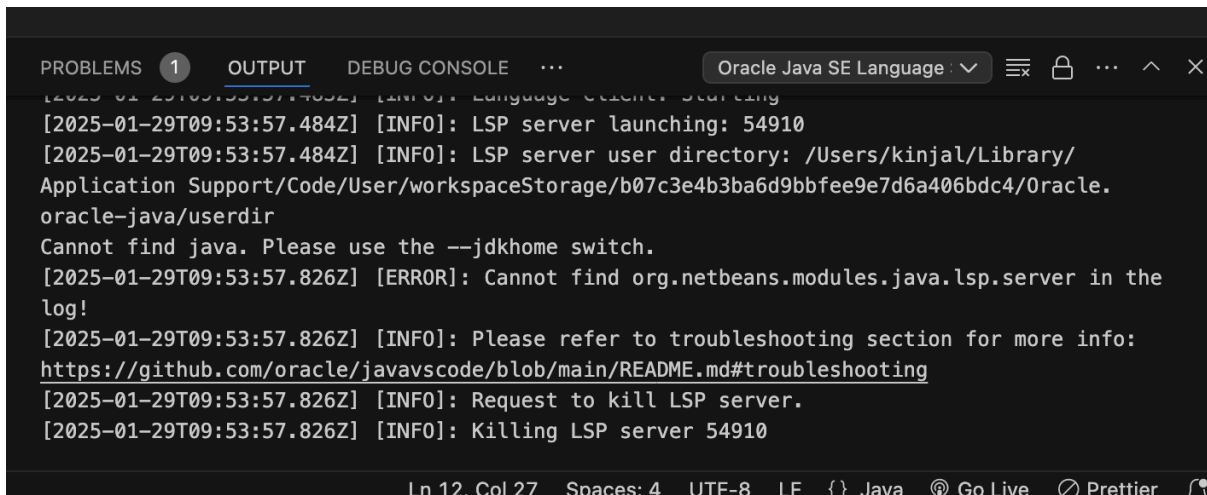
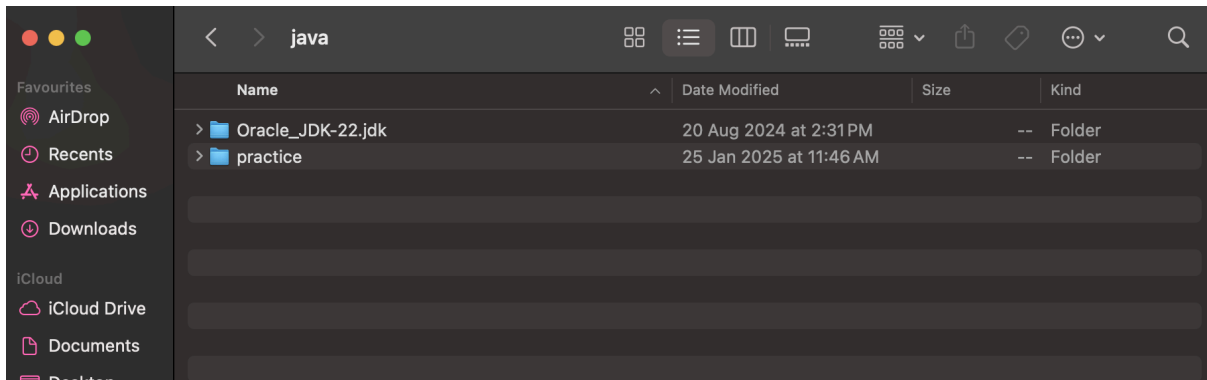
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Create a Sample Hello World Program using simple text editor (e.g. Notepad) and show the steps to compile and execute the program using command prompt.

```
public class abc{
    Run | Debug
    public static void main(String[] args)
    {
        System.out.println(x:"Hello, World!");
        int money = 100;
        int apple = 65;
        int mango = 20;

        int rem = money - (apple+mango);

        System.out.println(rem);
    }
}
```

```
7c3e4b3ba6d9bbfee9e7d6a406bdc4/redhat.java/jdt_w
Hello, World!
15
kinjal@Kinjals-MacBook-Air practice %
```

4.Display your name and complete address in different lines.

```
J address.java > ...
1  public class address
2  {
3
4      Run | Debug
      public static void main(String[] args)
5      {
6          System.out.println(x:"Kinjal");
7          System.out.println(x:"Visram Resort, Near College");
8          System.out.println(x:"Bidholi, India");
9      }
10 }
11
12
13
```

PROBLEMS 1 OUTPUT DEBUG CONSOLE TERMINAL PORTS

```
kinjal@Kinjals-MacBook-Air practice % /usr/bin/env /Library/Java/JavaVirtualMac
hines/temurin-17.jdk/Contents/Home/bin/java -XX:+ShowCodeDetailsInExceptionMessa
ges -cp /Users/kinjal/Library/Application\ Support/Code/User/workspaceStorage/b0
7c3e4b3ba6d9bbfee9e7d6a406bdc4/redhat.java/jdt_ws/practice_1152ccd8/bin adres
Kinjal
Visram Resort, Near College
Bidholi, India
kinjal@Kinjals-MacBook-Air practice %
```