WEEK-2

Introduction and software requirements for HTML/Javascript PHP programs:

1# What are the softwares that helps to run java programs.

To run Java programs effectively, a combination of software tools is used. These tools aid in writing, compiling, debugging, and executing Java code. Below is a comprehensive explanation of the essential software components required to run Java programs:

1. Java Development Kit (JDK)

The **Java Development Kit (JDK)** is the core software required to develop and run Java programs.

- **What it includes:**
  - **Java Compiler (javac)**: Converts .java source files into bytecode (.class files).
  - **Java Virtual Machine (JVM)**: Executes the compiled bytecode.
  - **Java Runtime Environment (JRE)**: Required for running Java applications.
  - Other tools like javadoc, javap, jdb (debugger), etc.
- **Why it's needed:** JDK is necessary for both **compiling** and **executing** Java code.
- **Available from:** Oracle, OpenJDK, Amazon Corretto, Eclipse Temurin, etc.

- **Installation Requirement:** Must be installed and properly configured (with JAVA_HOME and system PATH).

2. Java Runtime Environment (JRE)

The **Java Runtime Environment (JRE)** provides the libraries, Java Virtual Machine (JVM), and other components to run applications written in Java.

- **Purpose:** It is used only for **running** Java programs, not for developing or compiling them.
- **Note:** JRE is part of the JDK package, so if the JDK is installed, the JRE is already included.

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3. Java Virtual Machine (JVM)

The **Java Virtual Machine (JVM)** is a part of the JRE responsible for executing Java bytecode.

- **Function:** It provides platform independence by running the same compiled bytecode on different operating systems.
- **Working:** It interprets or compiles bytecode into machine code specific to the host operating system.

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4. Integrated Development Environments (IDEs)

IDEs are powerful tools that make writing, compiling, debugging, and running Java programs much easier by combining all necessary tools in one interface.

Commonly Used Java IDEs:

IDE Name	Features
IntelliJ IDEA	Advanced code suggestions, refactoring, debugging, GUI support
Eclipse	Widely used in enterprises, plugin support, project management
NetBeans	Supports GUI design, web applications, and academic purposes
BlueJ	Simple and educational, designed for beginners
JGrasp	Lightweight IDE with auto-visualization and simple interface

- **Advantages of using IDEs:**
  - Auto-complete features
  - Syntax highlighting
  - Debugging tools
  - Integrated terminal and console
  - Error tracking

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5. Text Editors and Code Editors

For basic Java programming, simple text editors can be used along with manual compilation via command line.

Editor Name	Description
Notepad (Windows)	Very basic, no syntax highlighting
Notepad++	Lightweight, supports syntax highlighting and plugins

Editor Name	Description
Visual Studio Code (VS Code)	Highly customizable with Java extensions and debugging support

- These editors require using the command line to compile and run programs using javac and java.

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6. Command Line Tools

The **Command Prompt (Windows)** or **Terminal (macOS/Linux)** is used to manually compile and run Java programs.

Commands:

- **Compile:** javac MyProgram.java
- **Run:** java MyProgram
- These tools are especially useful when working on simple programs or in academic environments.

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7. Online Java Compilers

For quick testing or for users who cannot install Java locally, online compilers are available.

Website	Description
JDoodle	Online compiler and executor with input support
Programiz	Beginner-friendly interface with explanations
Replit	Full IDE in the browser with file/project management
OnlineGDB	Online debugger and compiler with code sharing options

2# What is JDK and JRE.

◇ JDK – Java Development Kit

Definition:
The **Java Development Kit (JDK)** is a complete software development kit used to develop, compile, debug, and run Java applications.

Key Features:

- It is a **superset of JRE** (Java Runtime Environment).
- It provides tools necessary for developing Java programs.

Main Components of JDK:

1. **Java Compiler (javac)** – Converts Java source code (.java files) into bytecode (.class files).
2. **Java Virtual Machine (JVM)** – Executes Java bytecode on your computer.
3. **Java Runtime Environment (JRE)** – Contains the libraries and environment to run Java programs.
4. **Development Tools** – Debuggers (jdb), document generator (javadoc), disassembler (javap), etc.

Purpose:
Used by **Java developers** to write and build Java programs.

Example Use:

- Writing code in IntelliJ or Eclipse.
- Compiling with javac MyProgram.java.
- Running with java MyProgram.

◇ JRE – Java Runtime Environment

Definition:
The **Java Runtime Environment (JRE)** is a software package that provides the minimum requirements to **run** Java applications.

Key Features:

- Includes the **JVM** and **Java class libraries**.
- Does **not include the compiler** or development tools.

Main Components of JRE:

1. **JVM (Java Virtual Machine)** – Runs the bytecode.
2. **Class Libraries** – Pre-written Java classes (e.g., for GUI, file handling, networking).
3. **Other Supporting Files** – For memory management, security, and performance.

Purpose:
Used by **end users** who only want to **run** Java applications, not develop them.

Example Use:

- Running Java games or applications without writing code.

3# What is eclipse IDE.

Eclipse IDE is a **free, open-source, and powerful Integrated Development Environment (IDE)** used for writing, compiling, debugging, and running Java programs. It is developed and maintained by the **Eclipse Foundation** and supports multiple programming languages through plugins, with Java being its most popular and widely supported language.

Key Features of Eclipse IDE:

1. **Code Editor**
    - Offers syntax highlighting, code completion, auto-formatting, and error detection.
2. **Compiler and Debugger Integration**
    - Allows you to compile Java programs with a single click.
    - Built-in debugger helps track down and fix bugs easily.
3. **Project Management**
    - Supports project-based development, helping you organize your files and code efficiently.
4. **Plugin Support**
    - Highly customizable. You can install plugins for other languages like C, C++, Python, PHP, etc.
5. **GUI Design Support**
    - You can build Java GUIs using plugins like **WindowBuilder**.
6. **Version Control Integration**
    - Built-in support for Git and other version control systems.

7. **Maven & Gradle Integration**
    - Easily manage external libraries and dependencies using build tools.

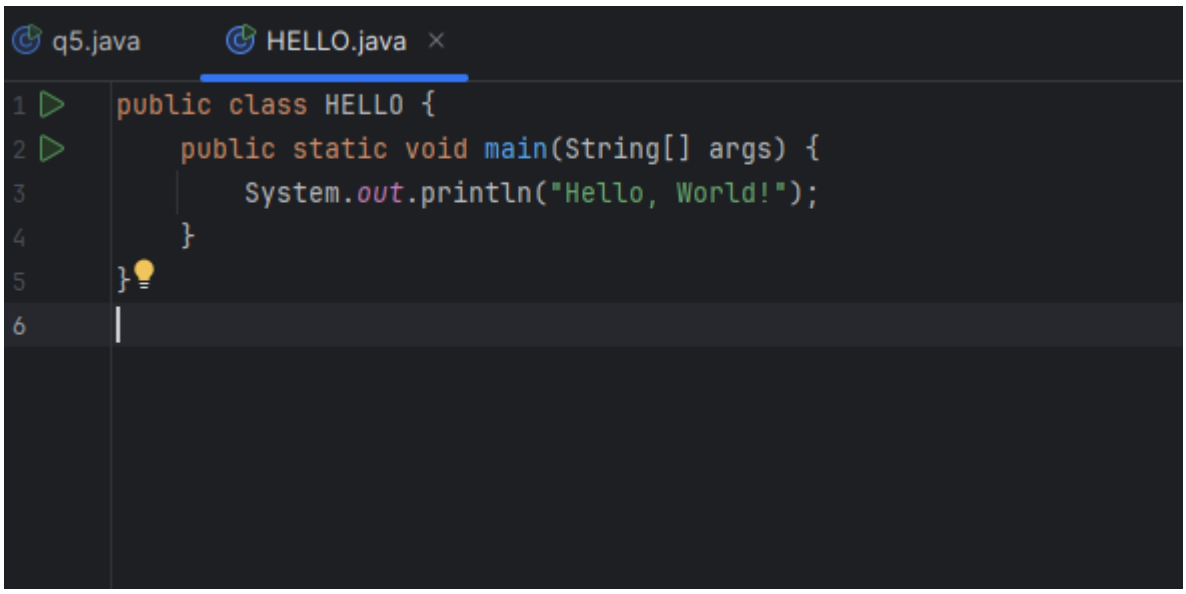
4# How to run the java program in eclipse/netbeans IDE.

◇ Running a Java Program in NetBeans IDE

1. Install JDK and NetBeans IDE

- Download and install the **JDK**.
- Download **NetBeans IDE** from https://netbeans.apache.org/download/index.html.

1. **Open NetBeans**
    - Launch the application.
2. **Create a New Java Project**
    - Go to **File → New Project**.
    - Choose **Java → Java Application**.
    - Click **Next**.
    - Enter the project name (e.g., MyFirstJavaApp).
    - Uncheck the box "Create Main Class" if you want to write it manually.
    - Click **Finish**.
3. **Create a Java Class**
    - Right-click on the Source Packages folder.
    - Select **New → Java Class**.
    - Give it a name (e.g., HelloWorld) and click **Finish**.
4. **Write Java Code**



5. **Run the Program**
    - Right-click on the file → **Run File**, or click the **green play button** on the top toolbar.
    - The output will be displayed in the **Output window** at the bottom.

Both **Eclipse** and **NetBeans IDE** make it easy to develop and run Java programs through graphical tools, automatic build systems, and console integration. While Eclipse is widely used in professional settings, NetBeans is especially beginner-friendly and ideal for students and learners.