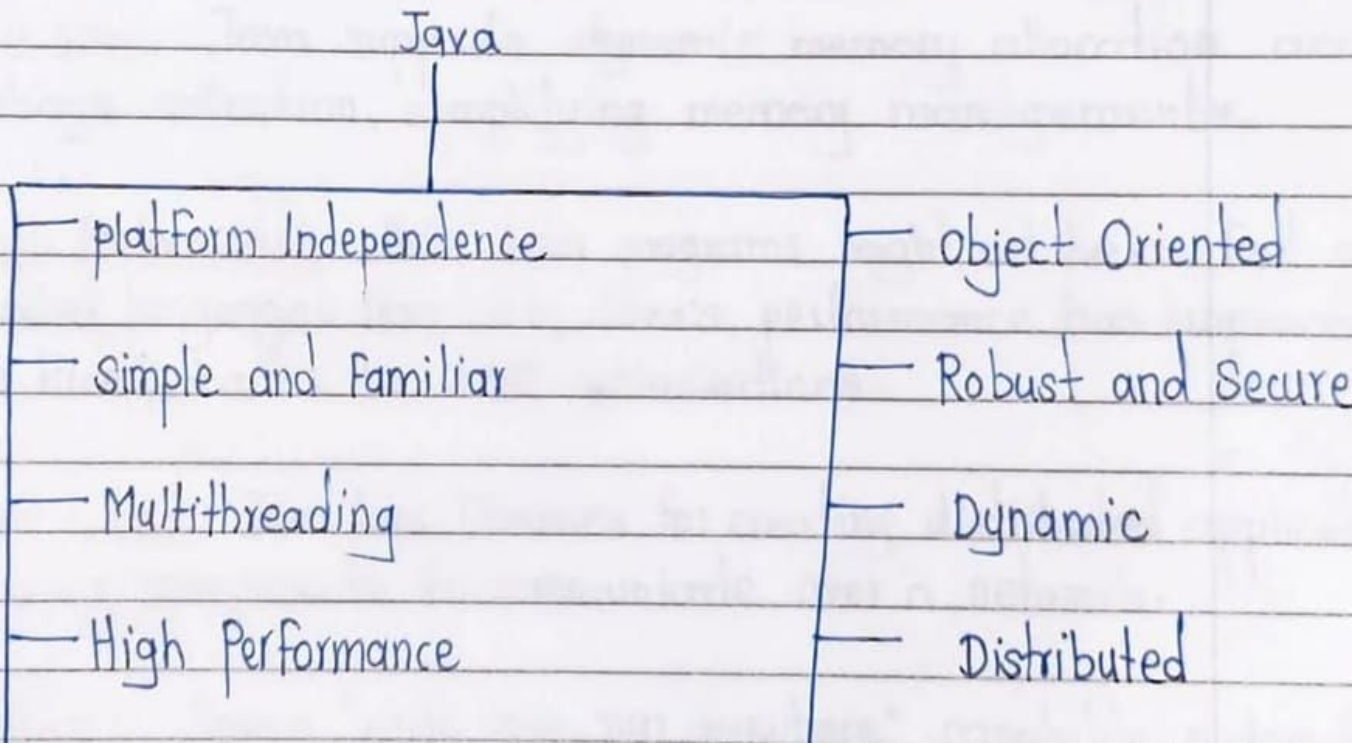
1.1 What is Java?

Java is a high-level, object-oriented programming language initially developed by Sun-Microsystems (Now owned by Oracle Corporation). It was designed to be platform-independent, meaning that java programs can run on any device or operating system that has a Java Virtual Machine (JVM) installed. This platform independence is achieved. This platform independence is achieved through a "write once, run anywhere" approach, where code written in java can be compiled into bytecode that is then executed on any system with a compatible JVM.

1.2 Features of Java:



1. Platform Independence: Java's bytecode can be executed any platform with the appropriate JVM.

2. Object Oriented: Java follows the object-oriented programming paradigm, emphasizing encapsulation, inheritance, and polymorphism.

3. Simple and Familiar: Java's syntax is inspired by C++ and C, making it familiar to many programmers.

4. Robust and Secure: Java has feature like memory management, strong type checking, and exception handling to ensure robust and secure programs.

5. Multithreading: Java supports multithreading, allowing multiple tasks to be executed concurrently.

6. Dynamic: Java supports dynamic memory allocation and garbage collection, simplifying memory management.

7. High Performance: While Java programs might not be as fast as compiled languages like C++, Java's performance has improved over time, thanks to JVM optimizations.

8. Distributed: Java has libraries for creating distributed applications allowing components to communicate over a network.

9. Portable: Java's "write once, run anywhere" capability makes it

for various tasks, from data structures to network communication.

1.3 Applications of Java:

1. Web Applications: Java is commonly used for building web applications using frameworks, Javaserver faces (JSF) and servelets.

2. Mobile Applications: Java is used for developing Android applications.

3. Desktop Applications: Java Swing and JavaFX are used to create graphical user interfaces for desktop applications.

4. Embedded Systems: Java's portabillity makes it suitable for embedded systems and internet of Things (IoT) devices.

5. Enterprise Applications: Java EE (Java platform, Enterprise Edition) is used for building - large scale enterprise applicatio

6. Scientific and Research Applications: Java's flexibility and libraries makes it useful for scientific simulations and research projects.

1.4 Java Installation:

To install Java, you need to follow these general

your operating system from the official Oracle Website or adopt Open JDK

2. Run the installer and follow the installations instructions.

3. Set the 'JAVA_HOME' environment variable to point to the JDK installation directory.

4. Update your system's 'PATH' environment variable to include the 'bin' directory within the JDK installation.

1.5 Java Program :

A simple Java program looks like this :

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

1.6 Internal Details : JVM, JRE, JDK:

1. JVM (Java Virtual Machine) :

JVM is a crucial part of the JAVA platform. It executes JAVA bytecode, providing platform independence.

2. JRE (Java Runtime Environment):

JRE is the environment required to run Java applications. It includes the JVM, class libraries, and other supporting files. JRE allows users to run Java applications without needing the development tools.

3. JDK (Java Development kit):

JDK is the software package that includes the tools and libraries necessary for developing JAVA applications. It includes the JRE, development tools like the JAVA compiler ('javac'), debugger, and other utilities.

In summary, Java is a versatile programming language known for its platform independence, object oriented nature, and extensive standard library. It finds applications in web, mobile, desktop, enterprise, and scientific domains. The Java ecosystem includes components like JVM, JRE, and JDK that collectively enable the creation and execution of JAVA programs.