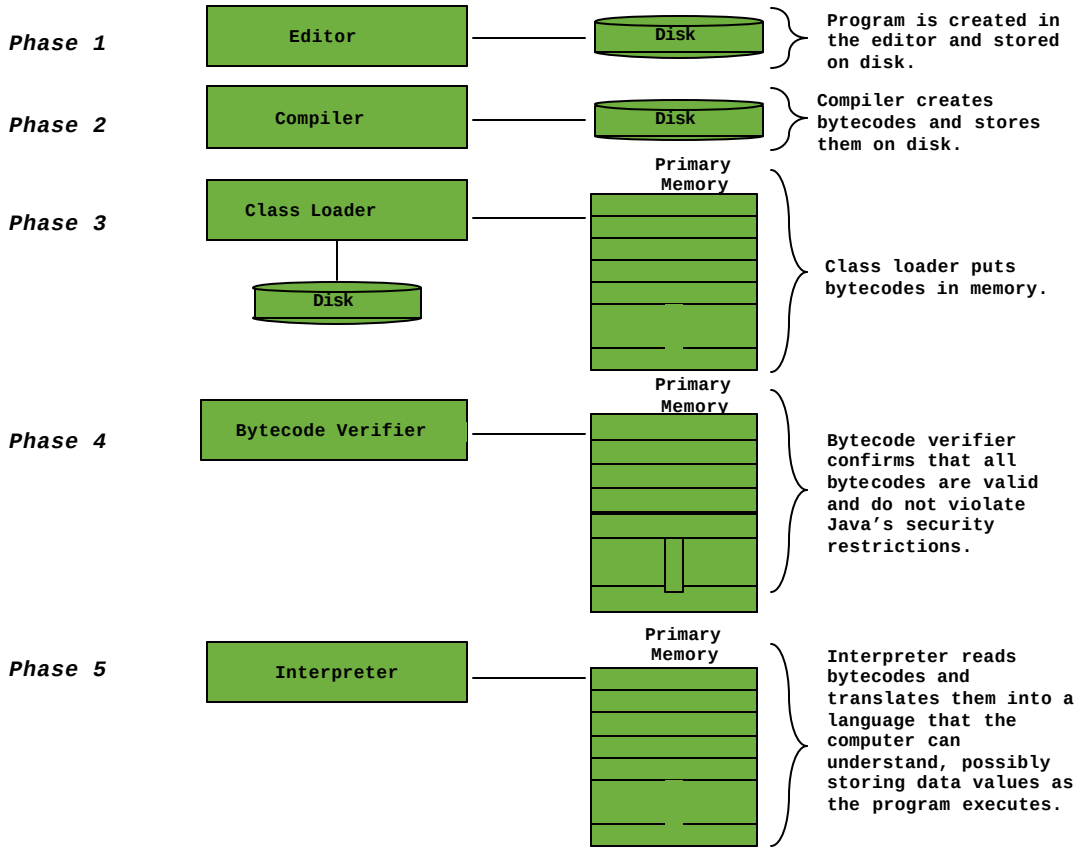
Java Program Development and Execution Steps

Java program normally go through five phases. These are

1. Edit,
2. Compile,
3. Load,
4. Verify and
5. Execute

We look over all the above mentioned phases in a bit detail. First consider the following figure that summarizes the all phases of a java program.



Phase 1: Edit

Phase 1 consists of editing a file. This is accomplished with an editor program. The programmer types a java program using the editor like notepad, and make corrections if necessary.

When the programmer specifies that the file in the editor should be saved, the program is stored on a secondary storage device such as a disk. Java program file name ends with a `.java` extension.

On Windows platform, notepad is a simple and commonly used editor for the beginners. However java integrated development environments (IDEs) such as NetBeans, Borland JBuilder, JCreator and IBM's Ecllipse hava built-in editors that are smoothly integrated into the programming environment.

Phase 2: Compile

In Phase 2, the programmer gives the command javac to compile the program. The java compiler translates the java program into bytecodes, which is the language understood by the java interpreter.

To compile a program called Welcome.java, type

```
javac Welcome.java
```

at the command window of your system. If the program compiles correctly, a file called Welcome.class is produced. This is the file containing the bytecodes that will be interpredted during the execution phase.

Phase 3: Loading

In phase 3, the program must first be placed in memory before it can be executed. This is done by the *class loader*, which takes the .class file (or files) containing the bytecodes and transfers it to memory. The .class file can be loaded from a disk on your system or over a network (such as your local university or company network or even the internet).

Applications (Programs) are loaded into memory and executed using the *java interpreter* via the command java. When executing a Java application called Welcome, the command

```
Java Welcome
```

Invokes the interpreter for the Welcome application and causes the class loader to load information used in the Welcome program.

Phase 4: Verify

Before the bytecodes in an application are executed by the java interpreter, they are verified by the *bytecode verifier* in Phase 4. This ensures that the bytecodes for class that are loaded form the internet (referred to as *downloaded classes*) are valid and that they do not violate Java's security restrictions.

Java enforces strong security because java programs arriving over the network should not be able to cause damage to your files and your system (as computer viruses might).

Phase 5: Execute

Finally in phase 5, the computer, under the control of its CPU, interprets the program one bytecode at a time. Thus performing the actions specified by the program.

Programs may not work on the first try. Each of the preceding phases can fail because of various errors. This would cause the java program to print an error message. The programmer would return to the edit phase, make the necessary corrections and proceed through the remaining phases again to determine id the corrections work properly.

References

- Java™ How to Program 5th edition by Deitel & Deitel
- Sun Java online tutorial: http://java.sun.com/docs/books/tutorial/java/index.html