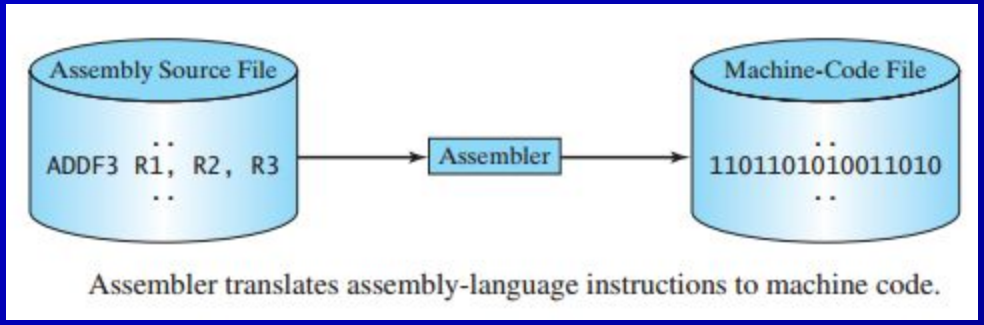
Introduction to Java

Computer Programming

- A computer program is a set of instructions to the computer telling it what to do. Programming is the creation of a program executable by a computer and performs the required tasks
- Computers do not understand human languages, so we need to use computer languages in computer programs
- A computer's native language is a set of built-in primitive instructions. The instruction set is in the form of binary code and differs among different types of computers
- Programming in machine language is a tedious process. Moreover, the programs are highly difficult to read and modify
- To add two numbers, we might have to write an instruction in binary like this 1101101010011010

Assembly Language

- Assembly language is a mid-level programming language in which a mnemonic is used to represent each of the machine language instructions. For example, to add two numbers, we might write an instruction in assembly code like this: ADDF3 R1, R2, R3
- Since the computers cannot understand assembly language, a program called an assembler is used to convert assembly-language programs into machine code

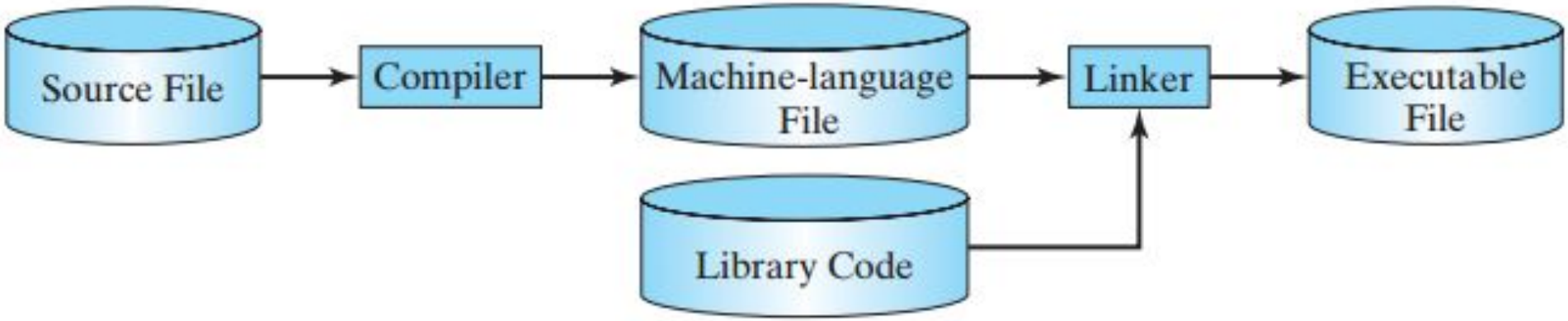


Assembler translates assembly-language instructions to machine code.

High Level Programming Languages

- As program size grows, assembly program becomes unmanageable
- The high-level languages are English-like and easy to learn and program. Here, for example, is a high-level language statement that computes the area of a circle with radius 5:

  area = 5 * 5 * 3.1415;



Prominent High Level Programming Languages

- COBOL (COmmon Business Oriented Language)
- FORTRAN (FORmula TRANslation)
- BASIC (Beginner's All-purpose Symbolic Instruction Code)
- Pascal (named for Blaise Pascal)
- Ada (named for Ada Lovelace)
- C (developed by the designer of B, Dennis Ritchie at Bell Labs)
- Visual Basic (Basic-like visual language by Microsoft)
- Delphi (Pascal-like visual language developed by Borland)
- C++ (an object-oriented language, based on C)
- C# (a Java-like language developed by Microsoft)
- Java

Why Java?

- The answer is that Java enables users to develop and deploy applications on the Internet for servers, desktop computers, and small hand-held devices
- The future of computing is being profoundly influenced by the Internet, and Java promises to remain a big part of that future. Java is the Internet programming language
- Java is a general purpose programming language as well as the Internet programming language
- Java is purely Object Oriented Programming Language

History of Java

- James Gosling, Mike Sheridan, and Patrick Naughton initiated the Java language project in June 1991 in Sun Microsystem
- Java was originally designed for interactive television, but it was too advanced for the digital cable television industry at the time
- The language was initially called Oak after an oak tree that stood outside Gosling's office
- It went by the name Green later, and was later renamed Java, from Java coffee said to be consumed in large quantities by the language's creators
- Public in Sun World: May 20, 1995

Java Development Kit (JDK) Versions

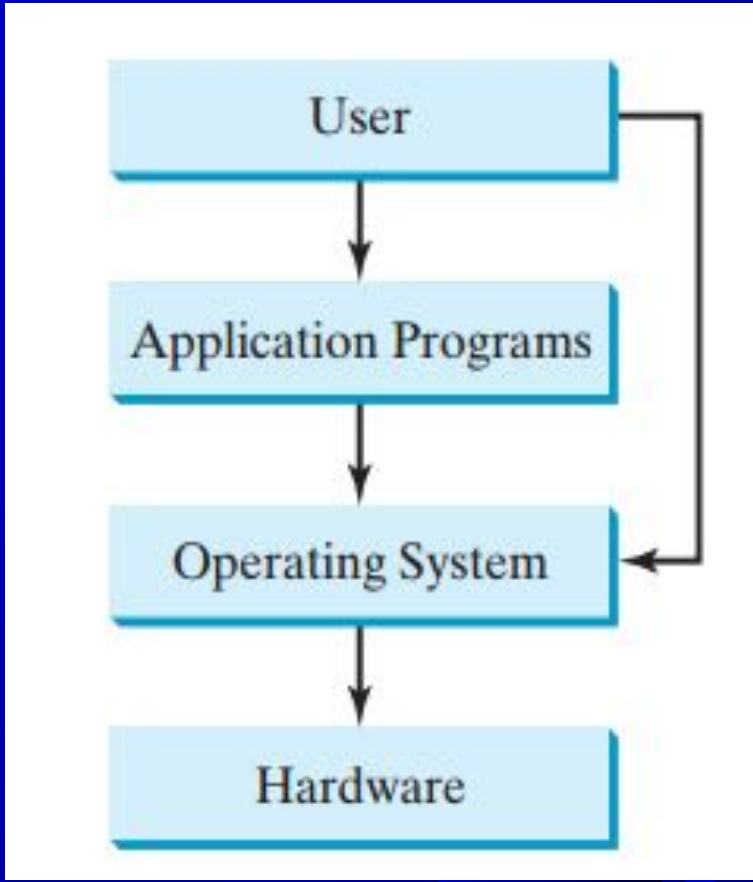
- JDK 1.02 (1995)
- JDK 1.1 (1996)
- JDK 1.2 (1998)
- JDK 1.3 (2000)
- JDK 1.4 (2002)
- JDK 1.5 (2004) a. k. a. JDK 5 or Java 5
- JDK 1.6 (2006) a. k. a. JDK 6 or Java 6
- JDK 1.7 (2011) a. k. a. JDK 7 or Java 7
- JDK 1.8 (2014) a. k. a. JDK 8 or Java 8

JDK Editions

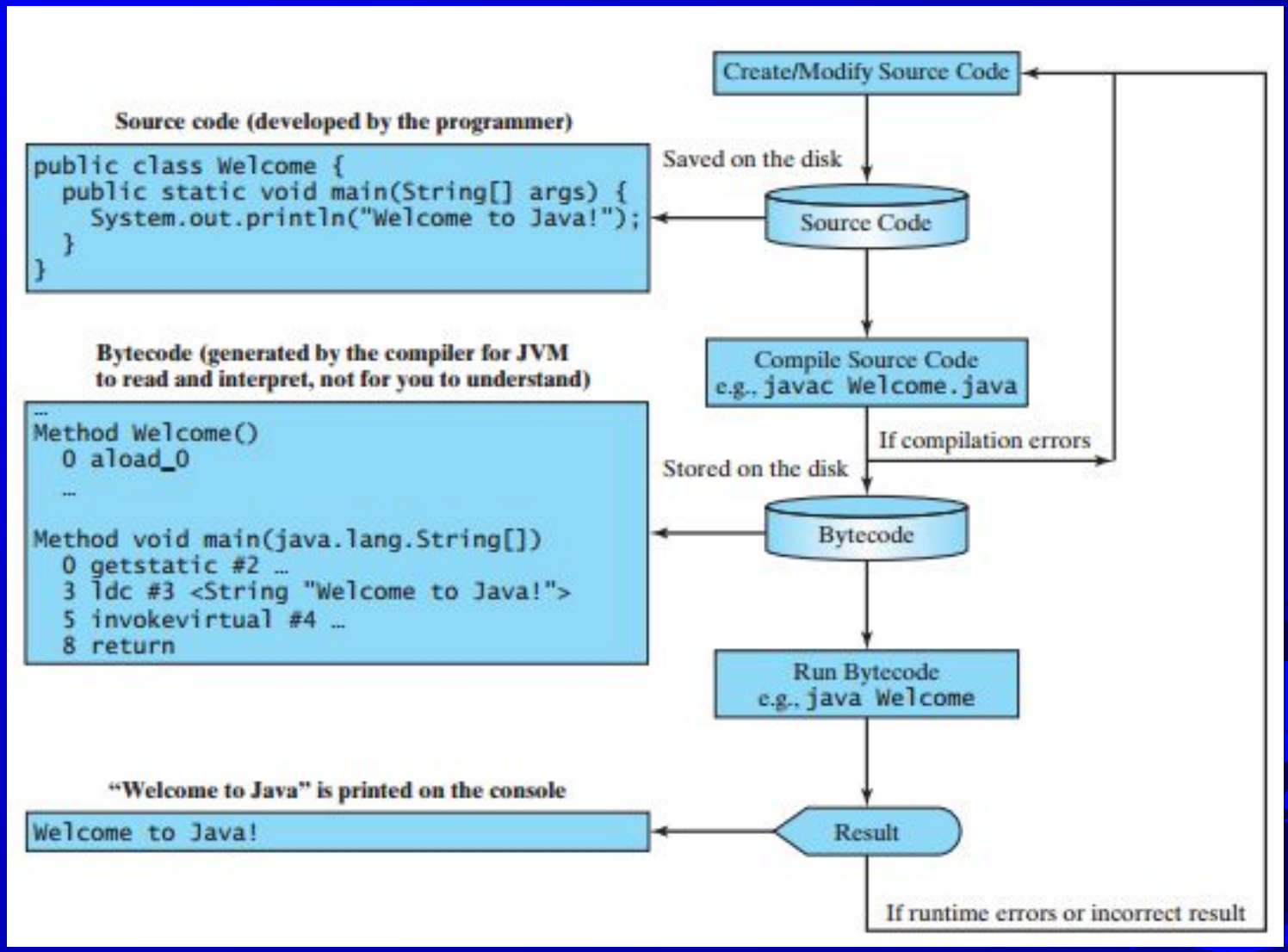
- Java Standard Edition (J2SE)
- J2SE can be used to develop client-side standalone applications or applets.
- Java Enterprise Edition (J2EE)
- J2EE can be used to develop server-side applications such as Java servlets and Java ServerPages.
- Java Micro Edition (J2ME).
- J2ME can be used to develop applications for mobile devices such as cell phones.
- We use J2SE to introduce Java programming.

Application Program and Operating Systems (OS)

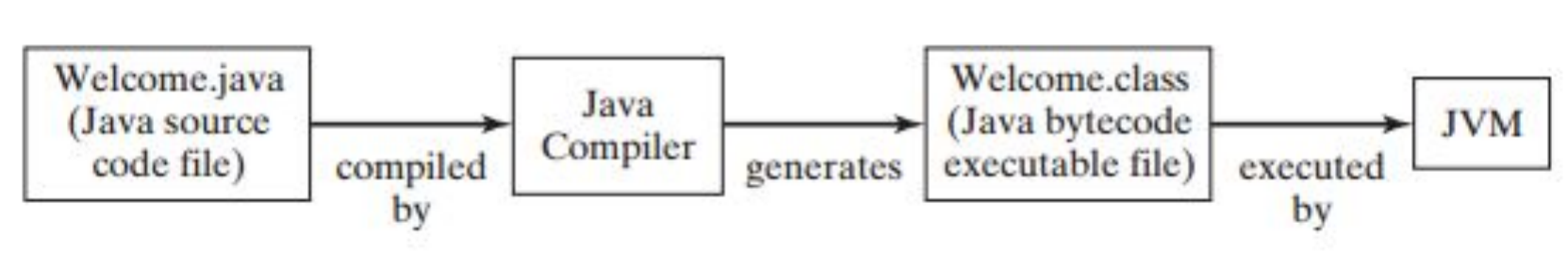
- The operating system(OS) is the most important program that runs on a computer, which manages and controls a computer's activities
- OS abstracts the hardware from the users
- Users do not need to know the details of the HW
- Using application programs such as a web browser or a word processor, users utilize hardware components through OS



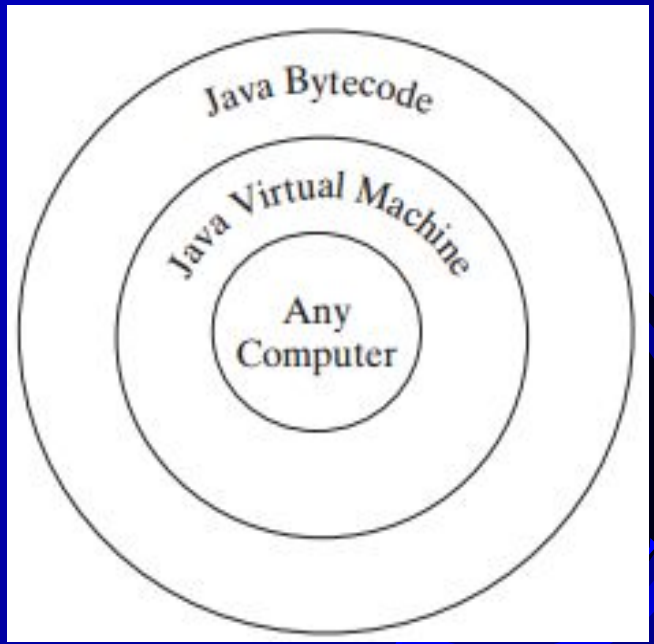
Java Program Execution



Java Bytecode and JVM



- Java source file using any text editor such as Eclipse, NetBeans, TextPad or Notepad++
- Compile the source codes (i.e. javac source.java) and execute java source
- Integrated Development Environment (IDE): Netbeans / Eclipse
- JVM for every platform
- Compile once, run anywhere



A Sample Java Program

```
//This program prints Welcome to Java!
public class Welcome {
  public static void main(String[] args) {
    System.out.println("Welcome to Java!");
  }
}
```

- The name of the source file must be Welcome.java
- This program prints: Welcome to Java!

Anatomy of a Java Program

- Comments
- Reserved words
- Modifiers
- Statements
- Blocks
- Classes
- Methods
- The main method

Smallest Java Program

```
public  class Smallest
{
    public static void main(String[] args)
    {
    }
}
```

IDE

- Eclipse
- Command Prompt
  - javac program_name.java
  - Java program_name