Chapter 1 Introduction to Java programming

1.1 Introduction to Java

- Java was developed by a team led by James Gosling at Sun Microsystems. Sun Microsystems was purchased by Oracle in 2010.
- Oak (1991) embedded chips -> Java (1995) Web applications
- Java is a full-featured, general-purpose programming language that can be used to develop robust mission-critical applications:
  - Web application
  - standalone applications across platforms on servers, desktop computers, and mobile devices
  - applications on Web servers

1.1 Introduction to Java

- Java syntax is defined in the Java language specification.
- Java library is defined in the Java API (application program interface).
- The JDK is the software for developing and running Java programs.
- An IDE is an integrated development environment for rapidly developing programs.

1.2 A Simple Java Program

A Java program is executed from the main method in the class.

```java
1  public class Welcome {
2    public static void main(String[] args) {
3      // Display message Welcome to Java! on the console
4      System.out.println("Welcome to Java!");
5    }
6  }
```

(1): Every Java program must have at least one class. Each class has a name.

(2): The program is executed from the main method. A class may contain several methods.

(3): A comment that documents what the program is and how it is constructed.

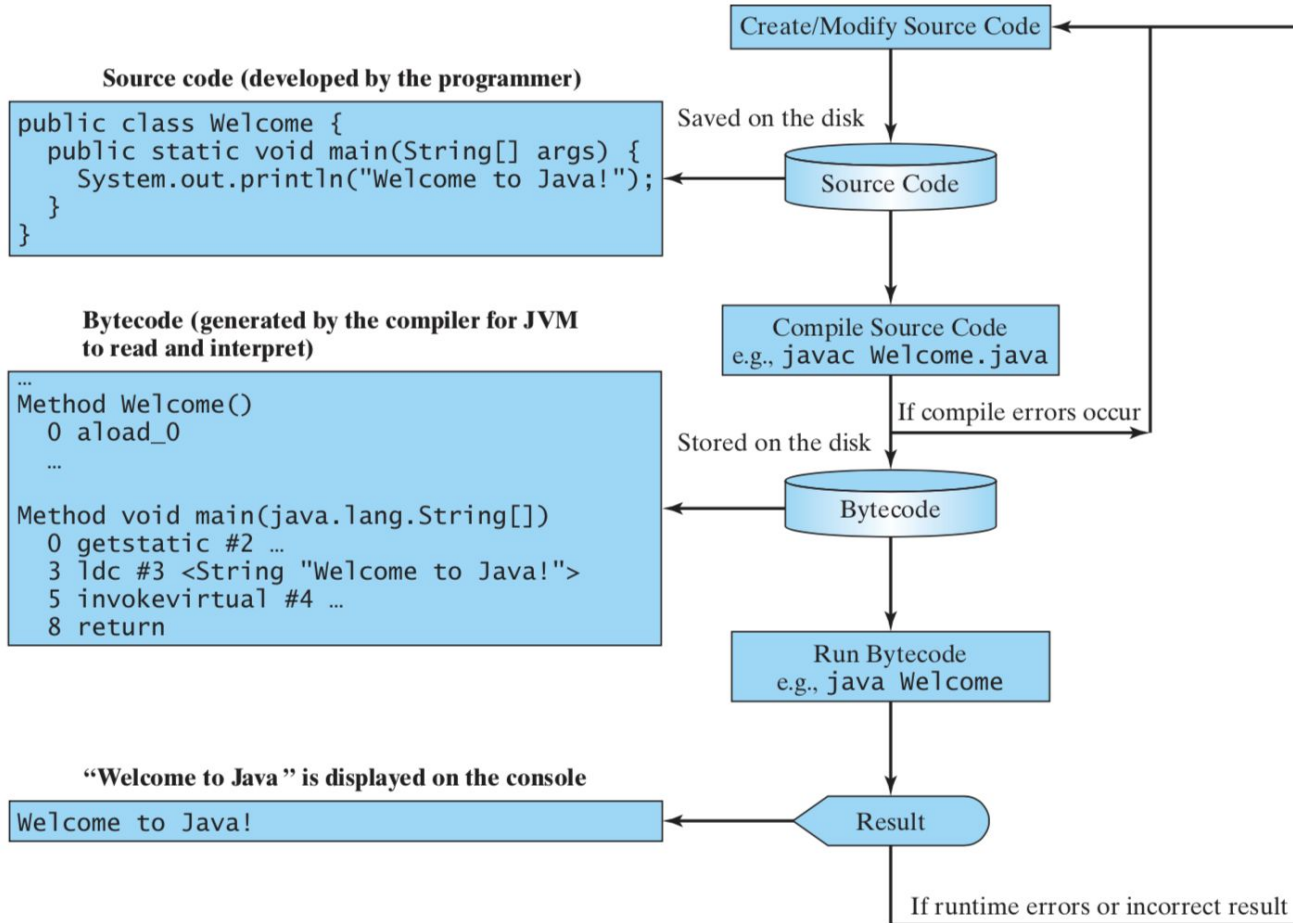(4): System.out.println() displays the string *Welcome to Java!* on the console.

1.2 A Simple Java Program

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

Class block

Method block

1.3 Compile and run

Source code (developed by the programmer)

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

Bytecode (generated by the compiler for JVM to read and interpret)

```
...
Method Welcome()
  0 aload_0
  ...

Method void main(java.lang.String[])
  0 getstatic #2 ...
  3 ldc #3 <String "Welcome to Java!">
  5 invokevirtual #4 ...
  8 return
```

"Welcome to Java" is displayed on the console

```
Welcome to Java!
```

Create/Modify Source Code

Saved on the disk

Source Code

Compile Source Code
e.g., `javac Welcome.java`

If compile errors occur

Stored on the disk

Bytecode

Run Bytecode
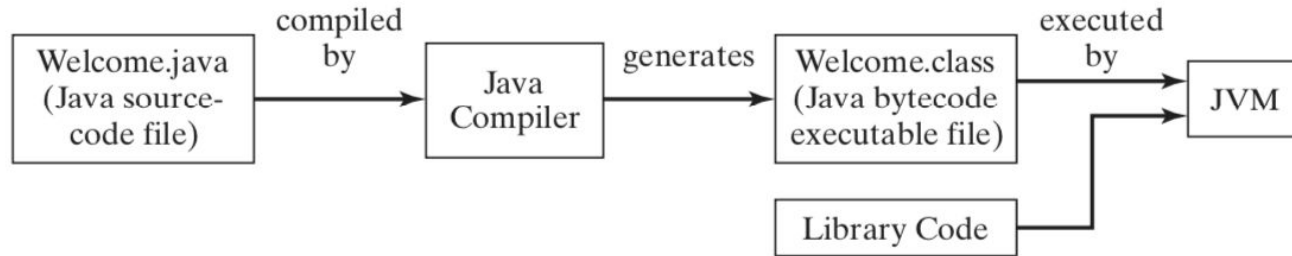e.g., `java Welcome`

Result

If runtime errors or incorrect result

The Java program-development process consists of repeatedly **creating/modifying source code**, **compiling**, and **executing** programs.
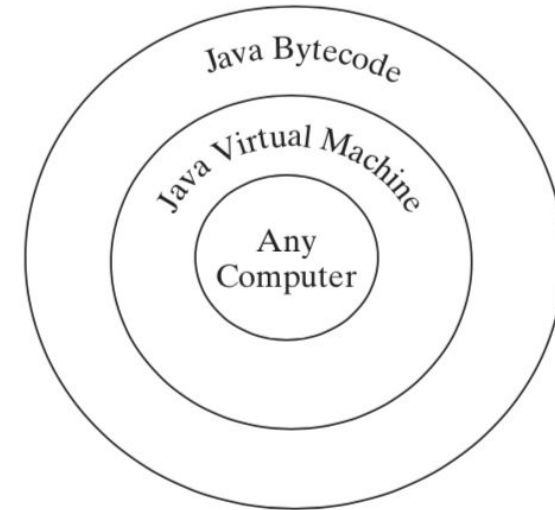
1.3 Compile and run

(a) Java source code is translated into bytecode.

(b) Java bytecode can be executed on any computer with a Java Virtual Machine.

(a)

(b)