Chapter 1 Self-Review Exercises 1.1

Fill in the blanks in each of the following statements:

a) Computers process data under the control of sets of instructions called **programs.**

b) The key logical units of the computer are the **input unit, output unit, memory unit**, **arithmetic and logic unit, control unit** and **central processing unit**.

c) The three types of languages they are **machine language, assembly language** and **high-level language.**

d) The programs that translate high-level language programs into machine language are called **compilers**.

e) **Android** is an operating system for mobile devices based on the Linux kernel and Java.

f) **Release software** is generally feature complete, (supposedly) bug free and ready for use by the community.

g) The Wii Remote, as well as many smartphones, use a(n) **accelerometer** which allows the device to respond to motion.

1.2 Fill in the blanks in each of the following sentences about the Java environment:

a) The **java** command from the JDK executes a Java application.

b) The **javac** command from the JDK compiles a Java program.

c) A Java source code file must end with the .**java** file extension.

d) When a Java program is compiled, the file produced by the compiler ends with the **.class** file extension.

e) The file produced by the Java compiler contains **(jvm)** that are executed by the Java Virtual Machine.

1.3 Fill in the blanks in each of the following statements

a) Objects enable the design practice of **encapsulation** —although they may know how to communicate with one another across well-defined interfaces, they normally are not allowed to know how other objects are implemented.

b) Java programmers concentrate on creating **classes,** which contain fields and the set of methods that manipulate those fields and provide services to clients.

c) The process of analyzing and designing a system from an object-oriented point of view is called **object-oriented design.**

d) A new class of objects can be created conveniently by **inheritance** —the new class (called the subclass) starts with the characteristics of an existing class (called the superclass), possibly customizing them and adding unique characteristics of its own.

e) **Unified modeling** **language** is a graphical language that allows people who design software systems to use an industry-standard notation to represent them.

f) The size, shape, color and weight of an object are considered **attributes** of the object’s class.

Exercises 1.4 Fill in the blanks in each of the following statements:

a) The logical unit that receives information from outside the computer for use by the computer is the **input unit.**

b) The process of instructing the computer to solve a problem is called **programming.**

c) **Assembly language** is a type of computer language that uses English-like abbreviations for machine-language instructions.

d) **Output unit** is a logical unit that sends information which has already been processed by the computer to various devices so that it may be used outside the computer.

e) **Memory unit** and **secondary storage unit** are logical units of the computer that retain information.

f) **Arithmetic and logic unit** is a logical unit of the computer that performs calculations.

g) **Arithmetic and logic unit** is a logical unit of the computer that makes logical decisions.

h) **High level languages** are most convenient to the programmer for writing programs quickly and easily.

i) The only language a computer can directly understand is that computer’s **machine language**

j) **Control unit** is a logical unit of the computer that coordinates the activities of all the other logical units.

1.5 Fill in the blanks in each of the following statements:

a) The **java** programming language is now used to develop large-scale enterprise applications, to enhance the functionality of web servers, to provide applications for consumer devices and for many other purposes.

b) **C** initially became widely known as the development language of the UNIX operating system.

c) The **transmission** control protocol ensures that messages, consisting of sequentially numbered pieces called bytes, were properly routed from sender to receiver, arrived intact and were assembled in the correct order.

d) The **C++** programming language was developed by Bjarne Stroustrup in the early 1980s at Bell Laboratories.

1.6 Fill in the blanks in each of the following statements:

a) Java programs normally go through five phases—**edit, compile, load, verify** and **execute.**

b) A(n) **integrated development environment** provides many tools that support the software development process, such as editors for writing and editing programs, debuggers for locating logic errors in programs, and many other features.

c) The command java invokes the **java virtual machine**, which executes Java programs.

d) A(n) **virtual machine** is a software application that simulates a computer, but hides the underlying operating system and hardware from the programs that interact with it.

e) The **class loader** takes the .class files containing the program’s bytecodes and transfers them to primary memory.

f) The **bytecode** verifier examines bytecodes to ensure that they’re valid.

1.7 Explain the two compilation phases of Java programs.

Java compilation involves two main phases:

1. Compilation: In this phase, the Java compiler (javac) translates the Java source code (.java file) into an intermediate format called bytecode (.class file). This bytecode is platform-independent, meaning it can run on any device that has a Java Virtual Machine (JVM) installed.

2. Execution: When the Java program is run, the JVM loads the bytecode and performs a second compilation step called Just-In-Time (JIT) compilation. During JIT compilation, the JVM translates the bytecode into native machine code that's specific to the underlying platform. This native code is then executed by the CPU.

These two phases enable Java's "Write Once, Run Anywhere" (WORA) capability, allowing Java programs to run on multiple platforms without modification.