Geekahmed1@gmail.com

Introduction to Programming using JAVA (Liang)

Check Points Answers

Chapter 1

1.1 What are hardware and software?

** **Hardware:** Hardware comprises the visible, physical elements of the computer.

** **Software:** Software provides the invisible instructions that control the hardware and make it perform specific tasks.

1.2 List five major hardware components of a computer.

1. A central processing unit (CPU).
2. Memory (main memory).
3. Storage devices (such as disks and CDs).
4. Input devices (such as the mouse and keyboard).
5. Output devices (such as monitors and printers).

1.3 What does the acronym "CPU" stand for?

Central Processing Unit.

1.4 What unit is used to measure CPU speed?

The unit of measurement of clock speed is the hertz (Hz).

1.5 What is a bit? What is a byte?

** **Bit:** 0s and 1s are interpreted as digits in the binary number system and are called bits (binary digits).

** **Byte:** A byte is composed of eight bits.

1.6 What is memory for? What does RAM stand for? Why memory is called RAM?

Geekahmed1@gmail.com

The computer's work area for executing a program. A program and its data must be moved into the computer's memory before they can be executed by the CPU.

Since the bytes in the memory can be accessed in any order, the memory is also referred to as random-access memory (RAM).

1.7 What unit is used to measure memory size?

Byte and its multiplies.

1.8 What unit is used to measure disk size?

GigaByte.

1.9 What is the primary difference between memory and a storage device?

Computer's memory (RAM) is a volatile form of data storage: any information that has been stored in memory (i.e., saved) is lost when the system's power is turned off. Programs and data are permanently stored on storage devices and are moved, when the computer actually uses them, to memory, which operates at much faster speeds than permanent storage devices can.

1.10 What language does the CPU understand?

Machine Language, which is a combination of 0s and 1s.

1.11 What is an assembly language?

Assembly language uses a short descriptive word, known as a mnemonic, to represent each of the machine-language instructions.

1.12 What is an assembler?

An assembler is used to translate assembly-language programs into machine code.

Geekahmed1@gmail.com

1.13 What is a high-level programming language?

High-level languages are platform independent, which means that you can write a program in a high-level language and run it in different types of machines. High-level languages are English-like and easy to learn and use. The instructions in a high-level programming language are called statements.

1.14 What is a source program?

A program written in a high-level language is called a source program or source code.

1.15 What is an interpreter?

An interpreter reads one statement from the source code, translates it to the machine code or virtual machine code, and then executes it right away. Note that a statement from the source code may be translated into several machine instructions.

1.16 What is a compiler?

A compiler translates the entire source code into a machine-code file, and the machine-code file is then executed.

1.17 What is the difference between an interpreted language and a compiled language?

The difference between an interpreted and a compiled language lies in the result of the process of interpreting or compiling. An interpreter produces a result from a program, while a compiler produces a program written in assembly language. The assembler of architecture then turns the resulting program into binary code. Assembly language varies for each individual computer, depending upon its architecture.

Geekahmed1@gmail.com

Consequently, compiled programs can only run on computers that have the same architecture as the computer on which they were compiled.

1.18 What is an operating system? List some popular operating systems.

An operating system (OS) is software that manages computer hardware and software resources and provides common services for computer programs. The operating system is an essential component of the system software in a computer system. Application programs usually require an operating system to function.

Some currently popular operating systems are Windows, Linux, and Android.

1.19 What are the major responsibilities of an operating system?

Controlling and monitoring system activities.

Allocating and assigning system resources.

Scheduling operations.

1.20 What are multiprogramming, multithreading, and multiprocessing?

**** MultiProgramming: Multiprogramming allows multiple programs to run simultaneously by sharing the same CPU.**

**** MultiThreading: Multithreading allows a single program to execute multiple tasks at the same time.**

**** MultiProcessing: Multiprocessing, or parallel processing, uses two or more processors together to perform subtasks concurrently and then combine solutions of the subtasks to obtain a solution for the entire task.**

Geekahmed1@gmail.com

1.21 Who invented Java? Which company owns Java now?

Java was developed by a team led by James Gosling at Sun Microsystems. Sun Microsystems was purchased by Oracle in 2010.

1.22 What is a Java applet?

Applets employ a modern graphical interface with buttons, text fields, text areas, radio buttons, and so on, to interact with users on the Web and process their requests. Applets make the Web responsive, interactive, and fun to use. Applets are embedded in an HTML file.

1.23 What programming language does Android use?

The software for Android cell phones is developed using Java.

1.24 What is the Java language specification?

The Java language specification is a technical definition of the Java programming language's syntax and semantics.

1.25 What does JDK stand for?

The JDK (Java Development toolkit) consists of a set of separate programs, each invoked from a command line, for developing and testing Java programs.

1.26 What does IDE stand for?

IDE is an acronym for Integrated Development Environment. Software that provides an integrated development environment (IDE) for developing Java programs quickly. Editing, compiling, building, debugging, and online help are integrated in one graphical user interface.

Geekahmed1@gmail.com

1.27 Are tools like NetBeans and Eclipse different languages from Java, or are they dialects or extensions of Java?

NetBeans and Eclipse are two different integrated development environments that can be helpful when developing Java programs.

1.28 What is a keyword? List some Java keywords.

Reserved words, or keywords, have a specific meaning to the compiler and cannot be used for other purposes in the program. For example, when the compiler sees the word class, it understands that the word after class is the name for the class. Other reserved words in this program are public, static, and void.

1.29 Is Java case sensitive? What is the case for Java keywords?

Java is case sensitive. All keywords are written in lower case.

1.30 What is a comment? Is the comment ignored by the compiler? How do you denote a comment line and a comment paragraph?

Comments help programmers to communicate and understand the program. They are not programming statements and thus are ignored by the compiler. In Java, comments are preceded by two slashes (//) on a line, called a line comment, or enclosed between /* and */ on one or several lines, called a block comment or paragraph comment. When the compiler sees //, it ignores all text after // on the same line. When it sees /*, it scans for the next */ and ignores any text between /* and */.

1.31 What is the statement to display a string on the console?

The following statement will display a string on the console:

```
System.out.println("A string that will appear on the console.");
```

Geekahmed1@gmail.com

1.32 Show the output of the following code:

```
public class Test {
  public static void main(String[] args) {
    System.out.println("3.5 * 4 / 2 - 2.5 is ");
    System.out.println(3.5 * 4 / 2 - 2.5);
  }
}
```

3.5 * 4 / 2 - 2.5 is

4.5

1.33 What is the Java source filename extension, and what is the Java byte-code filename extension?

The Java source file-name extension is ".java".

The Java bytecode file-name extension is ".class".

1.34 What are the input and output of a Java compiler?

The input to a Java compiler is a source file that shall have the ".java" extension.

The output of a Java compiler is a bytecode file that will have a ".class" extension.

1.35 What is the command to compile a Java program?

The command used to compile a Java program in the console is "javac" followed by the name of the source file.

1.36 What is the command to run a Java program?

The command used to run a Java program in the console is "java" followed byte the name of bytecode file. Note that the ".class" extension shall not be included in the command.

Geekahmed1@gmail.com

1.37 What is the JVM?

JVM stands for Java Virtual Machine. This is a program that can translate bytecode into machine code and in this way run a Java program.

1.38 Can Java run on any machine? What is needed to run Java on a computer?

Java cannot be run on any machine.

There must be a JVM installed on a machine if a Java program shall be able to run.

1.39 If a NoClassDefFoundError occurs when you run a program, what is the cause of the error?

A NoClassDefFoundError indicates a class file that does not exist.

1.40 If a NoSuchMethodError occurs when you run a program, what is the cause of the error?

A NoSuchMethodError can be a indication that the class to be executed does not have a proper main method.

1.41 Reformat the following program according to the programming style and documentation guidelines. Use the end-of-line brace style.

```
public class Test
{
  // Main method
  public static void main(String[] args) {
  /** Display output */
  System.out.println("Welcome to Java");
  }
}
```

Geekahmed1@gmail.com

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

1.42 What are syntax errors (compile errors), runtime errors, and logic errors?

**** Syntax Error:** Syntax errors result from errors in code construction, such as mistyping a keyword, omitting some necessary punctuation, or using an opening brace without a corresponding closing brace. These errors are usually easy to detect because the compiler tells you where they are and what caused them.

**** Runtime Error:** Runtime errors are errors that cause a program to terminate abnormally. They occur while a program is running if the environment detects an operation that is impossible to carry out. Input mistakes typically cause runtime errors.

**** Logic Error:** Logic errors occur when a program does not perform the way it was intended to.

1.43 Give examples of syntax errors, runtime errors, and logic errors.

Examples of syntax errors are misspelling of keywords, missing a terminating brace, or not ending a statement with a semicolon.

Examples of runtime errors are not being able to handle incorrect user input. For example if a number is expected and the user writes "five" instead of 5. Or the user enters 0 and we use this to divide later on.

Geekahmed1@gmail.com

Examples of logical errors are using the wrong formula for calculating something. Or not having full understanding of how some language feature actually works

1.44 If you forget to put a closing quotation mark on a string, what kind error will be raised?

Forgetting to put a closing quotation mark on a string will raise a syntax error when compiling the code.

1.45 If your program needs to read integers, but the user entered strings, an error would occur when running this program. What kind of error is this?

A program that needs to read integer, but the user enter strings will raise a runtime error, assuming we have not included special code to handle this situation.

1.46 Suppose you write a program for computing the perimeter of a rectangle and you mistakenly write your program so that it computes the area of a rectangle. What kind of error is this?

Mistakenly using the wrong code, like calculating the area of a triangle instead of the area of a rectangle, introduces a logical error.

Geekahmed1@gmail.com

1.47 Identify and fix the errors in the following code:

```
1  public class Welcome {
2    public void Main(String[] args) {
3      System.out.println('Welcome to Java!);
4    }
5  }
```

```
public class Welcome {

    public static void main(String[] args) {

        System.out.println("Welcome to Java!");

    }

}
```