1.4

1. Input Unit
2. Programming
3. Assembly language
4. Output Unit
5. Memory storage and Secondary storage unit
6. Arithmetic and logical unit
7. Arithmetic and logical unit
8. High level language
9. Machine language
10. Central processing unit

1.5

1. Java byte codes
2. Standard edition, Enterprise edition, Micro edition
3. Bandwidth
4. Assembler

1.6

1. Edit, compile, load, verify, execute
2. Java development kit
3. Java virtual machine
4. Virtual machine
5. Java virtual machine class loader
6. Bytecode verifier

1.7

The just in time compiler of java compiles byte codes during execution and not before like the traditional compiler. Once the byte codes to be executed by JVM are being interpreted, the JVM analyzes the bytecode for those parts that are repeatedly executed and the JIT compiler translates these codes to the machine language of the computer. Therefore whenever the JVM comes across this compiled code, the machine language executes instead of undergoing interpretation again.

1.8

The wristwatch as an object

The wristwatch has its own attributes and behaviors/methods. These attributes and properties are derived from the class which is the blueprint for any object of that class. The different wrist watches(object) derived from a class are the types of a particular class.

Attributes

These are the properties of the watch such as the color, name, materials e.t.c. These are the watch(object) variables.

Behavior

These are the methods of the watch (object). Performing any tasks such as “time telling” requires the method. The method houses the statement that performs the tasks.

Class

The class of the object houses the attributes and methods of the object. In the case of this watch, this would mean the blueprint of wristwatch design.

Inheritance

The class(super class) from which this wristwatch(object) is instantiated can be used to create another class(subclass) that would have all of the attributes and methods of this initial class and additional attributes and methods to make it unique and customized.

Modeling

Developing the object program using graphical language.

Messaging

A method call to any of the methods in the object e.g the time telling method would cause a call to be made to the object(wristwatch) task to be performed

Encapsulation

The object(wristwatch) is allowed to be encapsulated i.e it can communicate with other watches(objects) created from the same class but the implementation of each object is hidden within the object itself. This is also the same as information hiding.

Interface

A basic wristwatch time telling interface could contain a number of methods that are required for the objects of a class to perform tasks that are not defined but will be implemented differently in each class for the objects

Java Compilation Process

The Java compilation process takes place using the javac command which converts the Java code to a .Class file. The Java source code is converted to byte codes by the compiler and interpreted/ executed by the Java virtual machine and it is loaded into the secondary storage. Any error in the compilation process causes the whole process of execution to start again from the beginning(phase1). The byte code represents the tasks that should be executed in the execution(last) phase. The Java byte codes are platform independent unlike the machine language and can be run on any other platform that has a JVM without having to recompile. The JVM is invoked by the “Java” command.

Difference between JDK and JRE

The JDK is the Java development kit and it contains both the JRE and other development tools such as the compiler, interpreter, archiver and document generator. Its primary functionality is development. Although it is platform dependent just like the JRE.

The JRE on the other hand is the Java runtime environment and it contains the JVM(Java virtual machine) which is primarily concerned with execution, libraries and other supporting documents required for execution. If one is concerned with only execution and not development, the JRE alone is all that is required to run the code.

Why does the computer need a compiler?

Every computer /machine has a language (machine language) which is made up of numbers. This language is understood fully by the computer but not understood by programmers. This brought about the development of a language that is used to write statements that can be fully understood by programmers. This language is called high level language. Although fully understood by humans , it is not understood by the machine. Therefore the computer/machine requires a compiler to convert it to what it can understand and execute

Summary of the entire chapter.

The chapter with developments in the computer field. The various editions of Java i.e standard, enterprise and micro and how they are used. The evolution of computer software and hardware and the various logical units of the computer which include the input, output, arithmetic and logical, memory, central processing and secondary storage units alongside their functions. The chapter also speaks about how data processed by a computer forms a hierarchy, from bits to character to fields to records to files to database to big data. We move to the various languages programmers write instructions in. This includes the machine language that the computer understands on its own and the assembly and high level language for which it requires intermediate translation steps through the assembler and compiler respectively. Introduction object oriented programming was done using an automobile as an example. Different concepts in OOP such as class, methods, instantiation, reuse, attributes, encapsulation, inheritance, interfaces, object oriented analysis and design, modeling and the use of the unified modeling language were discussed. There are various operating systems for personal computers which include Windows, MacOS which are proprietary operating systems and Linux which is open source. Android and IOS for phones and for some other devices such as healthcare devices, game consoles, NASA satellites, smart watches e.t.c. Also there are various programming languages, some are object oriented while some are not. Some are also used for other paradigms of programming such as Functional programming, structured programming, procedural programming. Java language is a C++based object-oriented programming language developed by James Gosling that writes programs that will run on a great variety of computer systems and computer-controlled devices. The Java development environment is where we create and execute Java applications. This process occurs in five phases through certain commands they include; edit, compile, load, verify and execute. Only through these processes can the Java application be executed.