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Assignments: Chapter 1

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1. Computer scientists follows three techniques to solve the problem which takes less time operate and consumes the least amount of memory. Those techniques are as follows:

1. **Design an algorithm**: It is a sequential approach for solving any computable problems. Hence, it fails to solve problems that are not computable.
2. **Algorithm Analysis:** We do analyses when a problem is either unsolvable by any algorithm or finding the best algorithm that doesn’t consume too much memory and takes less time to operate.
3. **Experimentation**: Computer scientist depend on “Experimentation” When it becomes hard to analyze. It’s the approach to verify the resulting behavior of analyzing.

2. (a) **Hardware**: Physical parts of the computer are called hardware. It is constructed using physical materials or components. One can touch, see and feel hardware. It cannot be transferred from one place to another electronically through network. Examples of hardware includes: CD-ROM, RAM, monitor, mouse, keyboard etc.

**Software**: A set of instructions given to the computer is called software. It is developed by writing instruction in programming language. One cannot touch and feel software. It can be transferred from one place to another electronically through network. Examples of software are: Internet Explorer, MS Office, Adobe Acrobat Reader etc.

**(b) Program**: A program is a detailed set of instructions for a computer that follows the rules of a specific programming language. Those instructions can be executed by a processor. It is the implementation in programming syntax for solution to a problem based on the algorithm.

**Algorithm**: It is an abstract concept that describes how to solve a problem. It describes the step-by-step procedure required to solve a problem. Implementation of an algorithm to solve a specific problem is done by a computer program.

**(c) Programming Language**: A set of instruction given to a computer which is later on interpreted or compile so that computer can understand the command. A programming language has to done by following that specific language rules, otherwise it won’t be executed. Programming languages are procedural rather than declarative.

**Natural Language**: Natural language is easily used and understood by humans, which consist of sentences, usually declarative sentences expressing information in a sequence. In computing, natural language refers to a human language such as English, Russian etc which is different from programming language that talks to a computer.

**(d) Machine Language**: It is the language in the form of binary bits known as “0” and “1” which represents the electric signals ‘OFF’ and the ‘ON’ case respectively. It is being translated from high level language by using compiler or interpreter. It is easier for the machine to understand the language, however hard for humans.

**High**-**level Language:** It is more like human language and less like machine language. It is also know as ‘Source Code’. However, for a computer to understand and run a program created with a high-level language, it must be compiled or interpreted into machine language. It is more of a human readable.

**(e) Interpreter:** It reads each line of code and executes right after reading a line of code. It takes less amount of time to analyze the source code, but the overall execution time is slower. It is used every time the program needs to run. For example, ‘Python’ uses interpreter to execute a program.

**Compiler:** A compiler reads the whole source code and translates whole code to machine language. It takes large amount of time to analyze the source code but the overall execution time is comparatively faster. It is no longer needed once a program is done with compiling. For example, ‘C’ uses compiler to execute a program.

**(f) Syntax:** Syntax is referring to the grammatical structure. It defines how it is being expressed in the form of characters. Syntax can match between two languages. For instance, %, // and other operators are its syntax**.**

**Semantics:** Semantics refers to the meaning of the particular object. There should not be more than one meaning associated with any statement otherwise computer will fail to understand different meanings. Semantically two languages can be different. It is used for describing the logical entities of a programming language.