

Computer Programming: Lecture 1

Computation

Computation is a sequence of **well-defined operations** that lead from a **starting point** to the desired **final outcome**.

Computers

Computer is a device that stores and processes data.

Computers has two components:

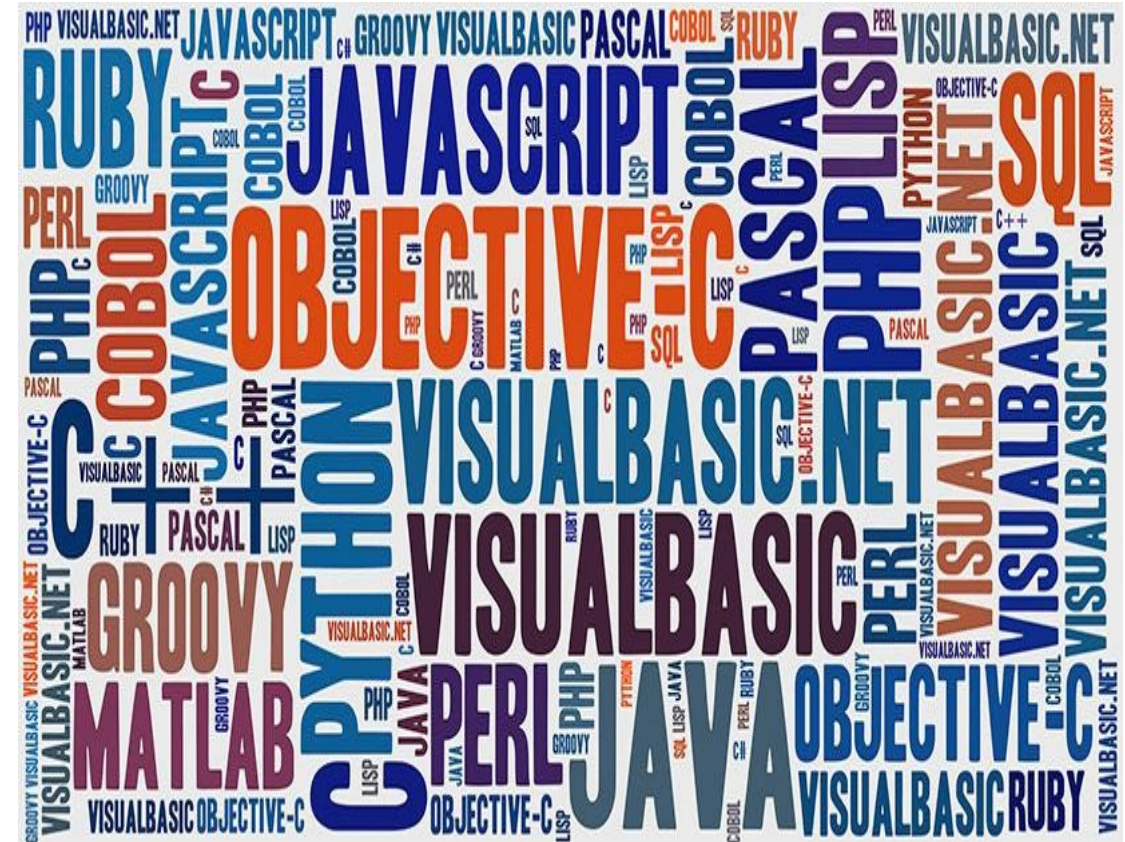
- Hardware: physical components of a computer.
- Software: a set programs that provides instructions that a computer carries out.



Programs

A program is a sequence of instructions that specifies how to perform a computation.

We use programming languages to write programs.



Formal and Natural Languages

Natural languages are the languages that people speak, such as English, Spanish, and French.

Formal languages are languages that are designed by people for specific applications.

Chemical symbols and mathematical symbols

Formal Language Vs Natural Language

Ambiguity

Redundancy

Literalness

Programming Languages

Programming languages are formal languages that have been designed to express computations.

Programming Language Constructs

Syntax: refers to the structure of a program and the rules about that structure.

Static semantics: syntactically correct programs are correct with respect to statically checkable features

Semantics: refers to the meaning of a program.

Common things in all programming

Input

Output

Conditionals

Repetition

Programming Languages

```
let total = 0
```

```
for each number x in the set {2, 4, 6, 8, 10}:
```

```
    let total = total + x
```

```
average = total / 5
```

An **algorithm** is a list of actions that describe how to perform a task or solve a problem.

Programming language types

Low-level

Machine language: a set of built-in primitive instructions. These instructions are in the form of binary Code. E.g. 0001 110001 001011 - 0001 (add) 110001 (memory address 1) 001011 (memory address 2)

Assembly language: Assembly language uses a short descriptive word to represent each of the machine language instructions.

E.g. add 2, 3, result

High-level: English-like and easy to learn and use.

E.g: $\text{sum} = 2 + 3$

Programming language types

Interpreted

Compiled

