




Algorithm Practice

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- **Basic understanding**
 - **Problem solving using computers**
 - **What is algorithm**
 - **Why we need to study algorithms**
 - **Fundamental questions about algorithms**



Basic

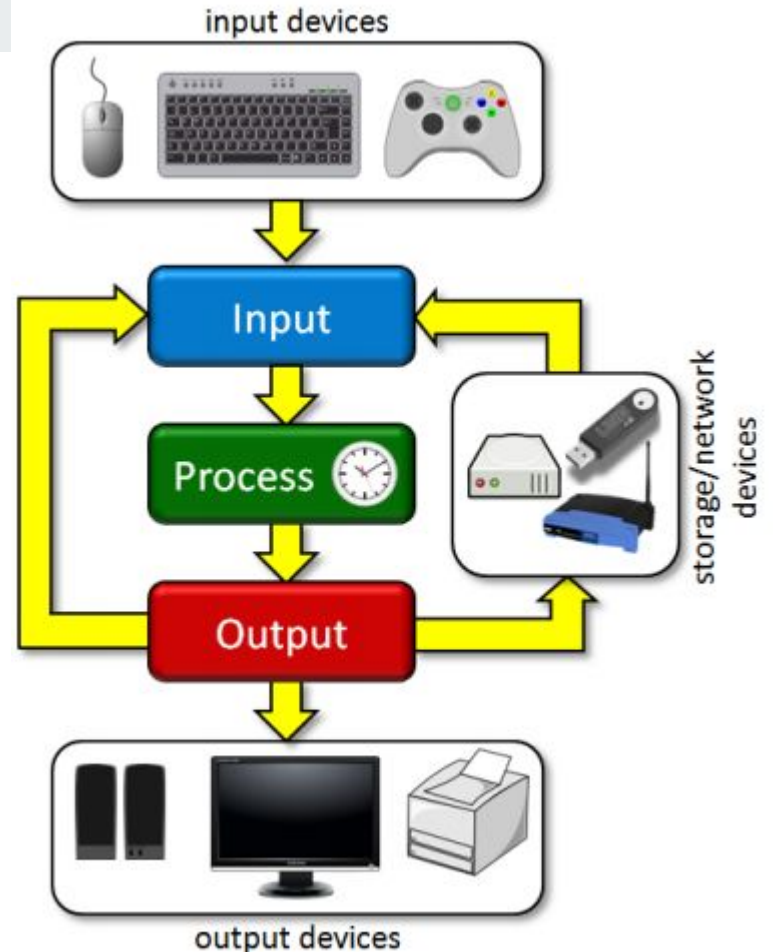
Computer science is the study of the theoretical foundations of information and computation, and of practical techniques for their implementation and application in computer systems (Wikipedia).

A program is a sequence of instructions that can be executed by a computer to solve some problem or perform a specified task.

A programming language is an artificial language designed to automate the task of organizing and manipulating information, and to express problem solutions precisely.

Problem Solving

"Problem Solving is the sequential process of analyzing information related to a given situation and generating appropriate response options"





What is algorithm



What is algorithm

A process or set of rules to be followed in calculations or other problem-solving operations, especially by a computer.

Fundamental questions about algorithms

Given an algorithm to solve a particular problem, we are naturally led to ask:

1. What is it supposed to do?
2. Does it really do what it is supposed to do?
3. How efficiently does it do it?

The technical terms normally used for these three aspects are:

1. Specification.
2. Verification.
3. Performance analysis



Describing Algorithms

The skills required to effectively design and analyze algorithms are entangled with the skills required to effectively describe algorithms. At least in my classes, a complete description of any algorithm has four components:

- **What:** A precise specification of the problem that the algorithm solves.
- **How:** A precise description of the algorithm itself.
- **Why:** A proof that the algorithm solves the problem it is supposed to solve.
- **How fast:** An analysis of the running time of the algorithm.



Example

Example: Calculate the average grade for all students in a class.

- 1. Input:** get all the grades ... perhaps by typing them in via the keyboard or by reading them from a USB flash drive or hard disk.
- 2. Process:** add them all up and compute the average grade.
- 3. Output:** output the answer to either the monitor, to the printer, to the USB flash drive or hard disk ... or a combination of any of these devices



6 steps to solve a problem


There are 6 steps that you should follow in order to solve a problem:

1. Understand the Problem
2. Formulate a Model
3. Develop an Algorithm
4. Write the Program
5. Test the Program
6. Evaluate the Solution



Class work : problem solving and approaching for algorithm writing

Understand the Problem : Improve maths grade in school

Step	Variables	Comments
 Understand the Problem		
Formulate a Model		
Develop an Algorithm		
Write the Program		
Test the Program		
Evaluate the Solution		



References

<https://www.cs.bham.ac.uk/~jxb/DSA/dsa.pdf>

http://www.mff.cz/data/ADS_BA.pdf

<http://jeffe.cs.illinois.edu/teaching/algorithms/book/Algorithms-JeffE.pdf>

http://people.scs.carleton.ca/~lanthier/teaching/ProcessingNotes/COMP1405_Ch1_IntroductionToComputerScience.pdf

<https://www.processing.org/>



Next class

How to write algorithms

Algorithm in Programming and examples