Fundamentals of Data Structures in C (Horowitz Sahni)

Chapter 1: Basic Concepts

Algorithm Specification

Defn: An algorithm is a finite set of instructions that, if followed, accomplishes a particular task. In addition, all algorithms must satisfy the following criteria:

(1) **Input:** There are zero or more quantities that are externally supplied.

(2) **Output:** At least one quantity is produced.

(3) **Definiteness:** Each instruction is clear and unambiguous

(4) **Finiteness:** If we trace out the instructions of an algorithm, then for all cases, the algorithm terminates after a finite no. of steps.

(5) **Effectiveness:** Every instruction must be basic enough to be carried out, in principle, by a person using only pencil and paper. It is not enough that each operation be definite as in (3); it must also be feasible. □

(a) How to translate a problem into an algorithm?

Ex: (Selection Sort) Suppose must devise a program that sorts a set of $n \geq 1$ integers. A simple solution is given by the following:

From those integers that are currently unsorted, find the smallest and place it next in the sorted list.

(b) Where and how the integers are initially stored?
Where we should place the result?

Ans: We assume that the integers are stored in an array list, such that the ith integer is stored in the ith posn, list[i], $0 \leq i < n$.