Let’s Go with Algo

By Melakesleam Moges

28-10-2023

BLAST FROM THE PAST

REVIEW

Understanding Algorithms

1. What is **Algorithm**?
2. Explain what a Divide and Conquer strategy is using an example. ?
3. What are the two Algorithm writing techniques?

LECTURE 3

Algorithms Writing Workshop

Writing Algorithms - Objectives

To be able to

1. Practice Writing algorithms using
    a. Psudo code
    b. Flow chart

Writing Algorithms - the Steps

Pseudo code - Example for Finding Max element in a List

Algorithm listMax(*L*, *n*)
    INPUT list *L* of *n* integers
    OUTPUT maximum element of L

    currentMax ← L[0]
    FOR i ← 1 **TO** n-1 **DO**
        IF L[i] > currentMax **THEN**
            currentMax ← L[i]

    RETURN currentMax

Algorithm listMax(*L*, *n*)
    INPUT list *L* of *n* integers
    OUTPUT maximum element of L

    currentMax **ASSIGN** L[0]
    FOR each index of list L
        IF L[index] > currentMax **THEN**
            currentMax **ASSIGN** L[index]

    RETURN currentMax

Writing Algorithms - the Steps

Pseudo code - common syntax

Assigning value to variable/container in memory - initializing

container ← value

Conditional selections

IF condition THEN

… tasks …

ELSE

… tasks …

Writing Algorithms - Writing the Steps

Pseudo code - common syntax

Looping through a set of tasks

FOR i ← 1 **TO** n-1 **DO**
    … tasks …

WHILE condition **DO**
    … tasks …

REPEAT
    … tasks …
UNTIL condition

Writing Algorithms - Writing the Steps

Pseudo code - common syntax

Method declaration

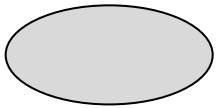
Algorithm methodName(*parameters passed to it*)
INPUT define prime input types
OUTPUT define prime output types

Concluding the steps of the algorithm by returning or not an expected value

return [value]

Writing Algorithms - Writing the Steps

Flow Chart - Basic symbols



Terminal

indicates Start, Stop and Halt in a program's logic flow.

Input/Output

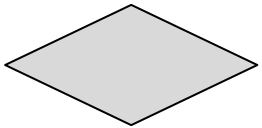
indicates instructions that take input from input devices and display output on output devices

Processing

indicates arithmetic processes such as adding, subtracting, multiplication and division

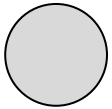
Writing Algorithms - Writing the Steps

Flow Chart - Basic symbols



Decision

indicates operations such as yes/no question or true/false



Connectors

Whenever flowchart becomes complex or it spreads over more than one page, connectors are used to avoid any confusions.

Writing Algorithms - Demo

Exercise(Pseudo code): Write pseudo code for Binary Search algorithm.

(team work) [10min]

Sample input list: [8 , 12 , 15 , 21 , 45]

Search for element: 12

Writing Algorithms - Demo

Exercise(Flow Chart): Write a flow chart of an algorithm to calculate two numbers provided by the user and display back their sum. You can use any graphics tools you know. Recommended: Google Slides, Visio,...

(team work) [10min]

Sites to use

Pseudo code - https://pseudocode.deepjain.com/

Flowchart - https://lucid.app/

Understanding Algorithms - Writing the Steps

PRACTICE WRITING AS MAY ALGORITHMS AS YOU CAN USING THESE TWO TECHNIQUES TO MASTER IT.

Site: https://leetcode.com/problemset/all/?difficulty=EASY&page=1

- END OF LECTURE -