

Data Structures and Algorithms: LAB ONE [1]

Aims

- To refresh the knowledge of Simple data structures such as arrays and structs
- To introduce the concept of UML notations used for ADT specification
- To cement knowledge of ADT specification and implementation.

Task One (1)

Define two functions: summation and maximum both of which take an integer array of length $0 \leq n \leq \infty$. The summation function gets the sum of the integers while the maximum function obtains the largest integer in the array.

Within the main function; declare an array of length n, obtain the n from the user, then allow the user to enter these n integers storing them in the array. Call the two functions in turns and display their outputs.

Task two (2)

Given that a student has the following details:

- i. registration number (a string of at most 20 characters)
- ii. name (A string of at most 50 characters)
- iii. age (and integer)
- iv. course (An object of a defined type course)
- v. grades (An object of a defined type Grade)

A course has two major attributes namely:

- i) course_code: a string.
- ii) Course_name: a string

A grade has the following components:

- i) Mark: an integer between 0 and 100.
- ii) the_grade: a character obtained from the mark through a grading system (if mark > 69 the_grade is A, if mark > 59 but less than 70, the grade is B, if mark > 49 but less than 60 the grade is C, if mark > 39 but less than 50 then grade is D otherwise grade is E)

Using arrays and structures (structs), design this system and implement in C/C++ and be able to:

- i) Add at most 40 students.
- ii) Edit a student's details
- iii) Add marks and calculate grades.
- iv) Ensure the grades, once calculated, can not be altered.

Task Three (3)

Use C++ classes to represent the scenario above

Task Four (4)

Carry out a specification of ADT List using UML diagrams.