EML 2032 Programming for Mechanical Engineers

Fall 2020 semester

Final Project

Submission deadline: 11:59pm on December 3, 2020

For the final project you need to design, implement, and test a program that will support search and sorting of different types of data stored in vectors. In particular, you need to *implement* functions that perform:

1. Linear search in a vector:
    a. This function should be implemented as a template function allowing processing different types of data.
    b. The function should use default parameters for start and end positions.
    c. The function should allow search in both directions: from the beginning of the array and from its end.
    d. Function should return the index of the element, if found; or -1 otherwise
2. Sorting using bubble sort algorithm:
    a. This function should be implemented as a template function allowing processing different types of data.
3. Sorting using selection sort algorithm:
    a. This function should be implemented as a template function allowing processing different types of data.
4. Binary search algorithm to search in fully sorted vector:
    a. This function should be implemented as a template function allowing processing different types of data.
    b. Function should return the index of the element, if found; or -1 otherwise

The main function should provide the following functionality:

1. Provide a menu that contains the following items:
    - Choice of type of the data:
        i. double
        ii. int
        iii. string
    - Input data from standard input stream (keyboard)
    - Linear search (if item is found, the index in the vector should displayed; if not – a message that item was not found)

- Binary search (this item should be available only after used performs sorting) (if item is found, the index in the vector should displayed; if not – a message that item was not found)
- Sorting using bubble sort algorithm
- Sorting using selection sort algorithm
- Displaying the data on the screen

Test plan

You should test your program using the following data:

Integer data

Double data

String data