

Assignment No 8

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Batch: - E-1

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Title: > Demonstrate function template for sorting algorithm.

Problem Statement: > Write a function template selection sout. Write a program that inputs, souts and outputs an integer array and a float array.

Learning Objectives: - if To learn and understand templates 2) To demonstrate function template for selection sort.

Learning Outcomes: - After completion of this assignment, students will be able to:

Displement the concept of function template.

Displement the agorithm for selection sort.

SIW or HIW requirements:

1] 64-bit open source known Windows

2) Open source C++ programming tool like

Templates are a feature of the C++ programming language that allows functions and classes to operate with generie types. This allows a function or class to work on many different data types without being rewritten for



each one. Templates are the foundation of generic programming, which involves writing code in a way that is independent of any particular type. A template is a bluepeint or formula for creating a generic class or a function. The library containers like iterators and algorithms are examples of generic programming and have been developed using template concept. There is a single defination of each container, such

as vector, but we can define many different kinds of vector for example, Vector <int> or vector <string>

You can use templates to define functions as well as classes, let us see how they work:

function Template: The general form of a template function defination is shown here:

template < typename type> return type func-name (parameter list)

I body of function

Here, type is a placeholder name for a data type used by the function. This name can be used within the function defination.

A function template behaves like a function except that the template can have arguements of many different types. In other words, a function template represent a family of functions. The format for declaring function templates with type parameters is:



template < class identifier >

neturn-type func-name (arglist with atteast one-type as dass identifice);

template < typename identifier >

return: type func-name (arglist with atteast one-type as type-identifier);

Both expressions have the same meaning and behave in exactly the same way. The latter form was introduced to avoid confusion, since a type parameter need not be a class (it can also be a basic type such as int or double).

for example, the C++ Standard Library contains the function template max (x, y) which returns the larger of x and y. That function template could be defined like this: template < typename T>

inline T max (Ta, Tb) & return a>b?aib;

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This single function defination works with marry data types. The usage of a tem function template saves space in the source code file in addition to limiting changes to one function description and making the code easier to read.

A template does not produce smaller object code, though, compared to writing separate functions for all the different data types used in a specific

are the different data types used in a specific program. For example, if a program uses both an int and a double version of the max() function template shown above, the compiler will

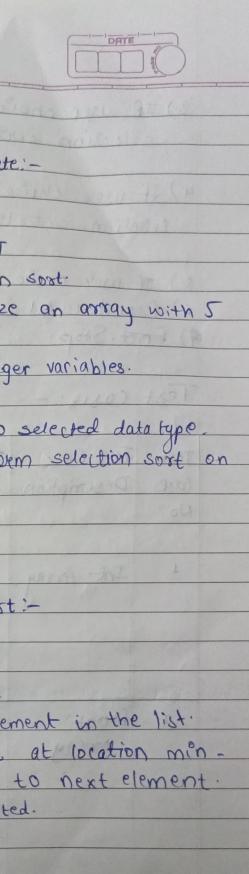


create an object code version of max() that operates on int arguements and another object code version that operates on double arguements. The compiler output will be identical the what would have been produced if the source code had contained two separate non-templated version of max(), one written to handle int and one written to handle double.

Selection Bort: — It is a simple sorting algorithm This sorting algorithm is a in-place comparison based algorithm in which the list is divided into 2 parts a sorted path at left end and unsorted part at wight end smitially sorted part is empty and suspected part is empty and suspected part is empty and suspected from the unsorted array and swapped with the leftmost element and that element becomes part of sorted array this process continues moving unsorted array boundary by one element to the right.

This algorithm is not suitable for large data sets as its average and worst case complexity are of $O(n^2)$ where n are no of items.

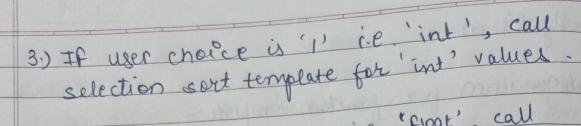
Step 1:- Set min to location o Step 2:- Search the minimum element in the list. Step 8:- Swap with value at location Min. Step 4:- Increment Min to point to next element step 5:- Repeat until light is tooked.



Algorithm:> >Algorithm for function template: 1) Start 2.7 Define template of class T 3) Define function for selection sort 4) In selection-sort(), initialize an array with 5 element. 5.) Declare i, i min as integer variables. 6) Declare template temp. 7-) Accept 5 nos. according to selected data type 8) Using Algorithm (2), perform selection sort on the accepted array. 9.) Display the sorted array 10.) Stop .0 2.) Afgorithm for selection sort: 1.) Start 2.) Set men to location o. 3.) Search the minimum element in the list. 4.) Swap the minimum value at location min 5.) In coment min to point to next element. 6.) Repeat until list is sorted. 7.) Stop! 3.> Algorithm for main():-

1) Start

2.) Display menu and accept wer's charce.



- 4) If user choice is '2' i.e. 'float', call selection sort template for 'float' values.
- 5) If user choice is 3', Exit from code.
- 6.) Repeat until user enters 3 as choice.
- 4) End. Stop.

Test case: -

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Conclusion: - we have demonstrated and understood the use of function template for selection sout