

Lab 03 - Ordered Arrays

Direction: Submit typed work in the Labs directory of your github repository and/or as an attachment on Google classroom under the accurate Lab03 assessment. All submissions should have their appropriate extensions (either txt, xls, cpp).

Part A: In class

Your objective is to write a complete program that

1. defines a `ulong` function named `OutOfPlace()` whose header is

```
template <typename T>
ulong OutOfPlace(Array<T>& data)
```

Given that the elements of *data* are sorted in ascending order except for one of its elements, the function returns the index of the out of place element.

2. in the main function, it performs two call of the function with different arguments and displays the results of the calls.

Part B: Take home

Your objective is to define the generic class named **OrderedSet** which represents a set with a maximum capacity of 100 where a set is a collection of distinct objects. For the class, you must include the following:

- ☐ A private generic **Array** field of size 100 that represents the set.
- ☐ A private `ulong` field that represents the current size of the set.
- ☐ A public default constructor that assigns 0 to the `ulong` field.
- ☐ A public copy constructor.
- ☐ A public assignment operator.
- ☐ A public empty destructor.
- ☐ A public void method named `Insert()` that takes a constant generic reference parameter. It adds the parameter to the set if it is not already a member of the set.
- ☐ A public void method named `Remove()` that takes a constant generic reference parameter. It removes the element of the set that is equal to the parameter if the parameter is a member of the set.
- ☐ A public bool constant method named `IsFull()` that takes no parameters. It returns true if the set is full; otherwise, it returns false.
- ☐ A public bool constant method named `IsEmpty()` that takes no parameters. It returns true if the set is empty; otherwise, it returns false.
- ☐ A public `ulong` constant method named `Count()` that takes no parameters. It returns the count of the set.
- ☐ A public bool constant method named `Contains()` that takes a constant generic reference parameter. It returns true if the parameter is a member of the set; otherwise, it returns false.
- ☐ A public constant method named `ToString()` that takes no parameters. It returns a string of elements of the set separated by commas all enclosed in curly braces in ascending order.
- ☐ A friend overloaded ostream operator. It displays the elements of the set in the same format as `ToString()`.