

National University of Computer and Emerging Sciences



Lab Manual
for
Data Structure

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Lab Manual 02

Objectives:

After performing this lab, students shall be able to learn:

- ✓ Arrays
- ✓ Vector
- ✓ Oop concepts

Problem

Given an array of size “**n**”, we insert “**n**” element in array and we want to insert “**n+1**” element in array but array is filled. We create another array of size “**n+1**”, copy all “**n**” elements in new array and then insert (n+1)th element in new array.

If we want to insert 10 new elements one by one in array, if array is filled we make 10 times n+1 size new arrays to do desire work.

That is bad approach.

To solve that problem instead to increasing size one by one, we increase array size double when the array is filled.

Two cpp files are given [My Vector Code.cpp](#) and [My Vector Code Bad.cpp](#).

Task 1

In [My Vector Code.cpp](#) you write code on function **push_back (T val)** and **pop_back (void)**. In **push_back (T val)** function if the array size is filled, you increase array size double. In **pop_back (void)** function you delete element, if the array capacity is half the size of array then reduce the size of array by double.

- Copy constructor (should make a deep copy)
- Destructor (if the array is allocated then deallocate it)
- Get function for total capacity...(think of other get functions)
- + operator that takes an integer variable as parameter. This method should adds integer to every element of array.
- + operator that takes any Vector object as argument. What should be the exact type of that parameter? This operator should return a new array which has all the elements of the current object (lhs) and the array passed as parameter (rhs).
- = operator which should make a deep copy. Make sure if lval is already allocated then it should be deallocated and allocated again with the size of the rval
- [] operator which should place the value of an element at index in the parameter. If the index is out of bound then return false otherwise return true.
- << operator which takes as input the elements of myVector.
- >> operator which prints the elements of myVector.

Task 2

In [My Vector Code Bad.cpp](#) you write code on function **push_back** (T val) and **pop_back** (void). In **push_back** (T val) function if the array size is filled increase array size by one, copy all elements of array to new array of size “n+1”. In **pop_back** (void) function you delete element one by one, you make each time new array of size “n-1”.

- Copy constructor (should make a deep copy)
- Destructor (if the array is allocated then deallocate it)
- Get function for total capacity...(think of other get functions)
- + operator that takes an integer variable as parameter. This method should add integer to every element of array.
- + operator that takes any Vector object as argument. What should be the exact type of that parameter? This operator should return a new array which has all the elements of the current object (lhs) and the array passed as parameter (rhs).
- = operator which should make a deep copy. Make sure if lval is already allocated then it should be deallocated and allocated again with the size of the rval
- [] operator which should place the value of an element at index in the parameter. If the index is out of bound then return false otherwise return true.
- << operator which takes as input the elements of myVector.
- >> operator which prints the elements of myVector.