CSE 241 Assigment #4 - IntArray Class Spring 2015

Due date: Apr. 7 20:00

IntArray Class

Write `IntArray` class, an array of integers class. It must have the following members:

```
//
// IntArray class: Feel free to add additional member functions to this class
//
class IntArray{
  private:
     int nelements;
     int *elements;
  public:
     int pop();
     bool empty() const;
     int top() const;
     void push(int);
     int& operator[](int);
     void appendCopyAtEnd(const IntArray&);

     friend ostream& operator<<(ostream& os, const IntArray& arg){
         for (int i=0;i<arg.nelements;i++) {
           os << arg.elements[i] << ' ';
         }
 return os;
     }
};
```

In addition to the member functions listed above, `IntArray` class must have a constructor, a copy constructor, a destructor, operator= in your class implementation. Otherwise your class will have memory problems.

Note the followings:

1. `operator=` should reuse existing memory spaces when possible.
2. top() function returns the first element in the array, and pop() function removes the first element in the array. Suppose intArrayOb is an instance of IntArray class. intArrayObj[0] should return the same result as in intArrayObj.top().
3. pop() function removes the first element in the array. That is, the second element will be moved to the first element, the third element will be moved to the second element, and so on.
4. For error conditions, i.e., `top()` called on an empty list, `operator[]` called with out of bound index, your program should print out "Error: invalid memory". A better way of handling such an error is to throw an execption, but we haven't covered the C++ exception yet.

Test Driver

The file ~`cse241/assign4/driver.cpp` will contain the function main(). The purpose of this file is to make various calls to the functions in your classes to test them as thoroughly as possible. How you choose to use this file is entirely up to you. Keep in mind that any functions included in this file are for your own basic testing purposes only. You should continually make changes to this file so that it tests your code while you are making chnages to your class.

driver.cpp

```
#include "IntArray.h"
#include <iostream>
using namespace std;

void empty(IntArray& il) {
  while(!il.empty())
      il.pop();    // no need to deallocate memory space
}

int main() {
  cout<<"------------- test 1--------------"<<endl;
  IntArray s1;

  for(int i = 0; i < 10; i++)
               s1.push(i);

  cout << s1 << endl; // 9 8 7 6 5 4 3 2 1 0

  for(int i = 0; i < 10; i++)
               s1[i] = i;   // this should not reallocate memory space

  cout << s1 << endl; // 0 1 2 3 4 5 6 7 8 9

  IntArray s2(s1);

  empty(s1);

  s1.appendCopyAtEnd(s2); //appended by an empty list

  cout << s1 << endl; // 0 1 2 3 4 5 6 7 8 9

  s1[100] = 100; // print out "Error: invalid memory access" and terminate.
}
```

For this assignment you must implement IntArray class in IntArray.h only. Note that IntArray.h must be included in driver.cpp so that the driver.cpp knows the class.

Submitting Your Code

You should submit "IntArray.h" file only. Please do not submit the executable file of your program. Turn in your project using the "oopsubmit" command as follows:

```
$ oopsubmit assign4 IntArray.h
```

Late submissions will lose 20 points per day.

If you do not follow this submission guideline, you will lose 10 points out of 100.

You should also submit a hard copy of your code to TA. Your report must have a cover page with your student ID and name. In the report, your code must be well commented to explain your algorithm. Also, the sample input and the output of your program must be included in the report.