

**Course: ENSF 614–Fall2021**

**Lab #: Lab 4**

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**Submission Date: 2021-10-19**

## Exercise A

Our code output was this:

```
PS C:\Users\grayd\OneDrive\Documents\School\MEng\Semester 3\ENSF 614\Labs\Lab 4\GH> g++ .\MyArray.cpp, .\lab4ExA.cpp
PS C:\Users\grayd\OneDrive\Documents\School\MEng\Semester 3\ENSF 614\Labs\Lab 4\GH> ./a.exe
Elements of a: 0.5 1.5 2.5 3.5 4.5
(Expected: 0.5 1.5 2.5 3.5 4.5)

Elements of b after first resize: 10.5 11.5 12.5 13.5 14.5 15.5 16.5
(Expected: 10.5 11.5 12.5 13.5 14.5 15.5 16.5)

Elements of b after second resize: 10.5 11.5 12.5
(Expected: 10.5 11.5 12.5)

Elements of b after copy ctor check: 10.5 11.5 12.5
(Expected: 10.5 11.5 12.5)

Elements of c after copy ctor check: -1.5 11.5 12.5
(Expected: -1.5 11.5 12.5)
```

## Exercise B

### Function definition

```
/* File Name: Lab4ExB.cpp
 * Lab # and Assignment #: Lab #4 Exercise B
 * Lab section: 1
 * Completed by: Graydon Hall and Jared Kraus
 * Submission Date: 2021-10-19
 */
String_Vector transpose (const String_Vector& sv) {

    int sv_rows = sv.size();
    int sv_cols = sv.at(0).size();

    int vs_rows = sv_cols;
    int vs_cols = sv_rows;

    String_Vector vs;
    vs.resize(vs_rows);

    for(int i=0; i<vs_rows; i++){
        for(int j=0; j<vs_cols; j++){
            vs.at(i).push_back(sv.at(j).at(i));
        }
    }

    return vs;
}
```

### Program Output

```
ABCD
EFGH
IJKL
MNOP
QRST

Transposed vector:
AEIMQ
BFJNR
CGKOS
DHLPT
```

## Exercise C

### Function definition

```
/* File Name: Lab4ExC.cpp
 * Lab # and Assignment #: Lab #4 Exercise C
 * Lab section: 1
 * Completed by: Graydon Hall and Jared Kraus
 * Submission Date: 2021-10-19
 */

void print_from_binary(char* filename) {

    // open input file stream we get cities from
    ifstream is(filename, ios::binary);
    if(is.fail()){
        cerr << "failed to open file: " << filename << endl;
        exit(1);
    }

    // output file we will write to
    ofstream ofs("output.txt", std::ofstream::trunc);
    if(ofs.fail()){
        cerr << "failed to open file: " << filename << endl;
        exit(1);
    }

    // read cities from input file
    City* cityHolder;

    // find number of cities, help from https://www.cppstories.com/2019/01/filesize/
    int begin = is.tellg(); // beginning value
    is.seekg(0, ios::end); // go to end of file
    int end = is.tellg(); // find end value
    int num_cities = (end-begin)/sizeof(City); // total number of cities
    is.seekg(0, ios::beg); // go to beginning of stream again

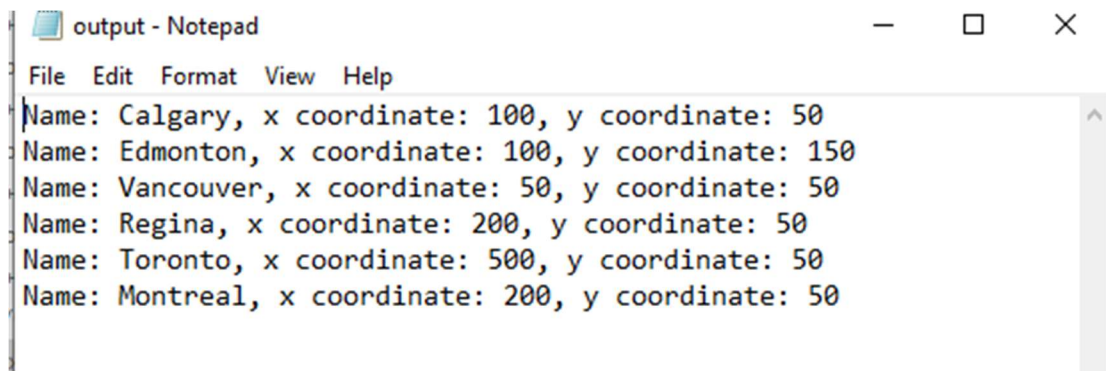
    // read cities from file into array
    cityHolder = new City[num_cities];
    for(int i=0; i<num_cities; i++){
        is.read((char*)&cityHolder[i], sizeof(City));
    }
}
```

```
// write to ouptput file
for(int i=0; i< num_cities; i++){
    cout << "Name: " << cityHolder[i].name << ", x coordinate: "
    << cityHolder[i].x << ", y coordinate: " << cityHolder[i].y << endl;

    ofs << "Name: " << cityHolder[i].name << ", x coordinate: "
    << cityHolder[i].x << ", y coordinate: " << cityHolder[i].y << endl;
}

// close our files
is.close();
ofs.close();
}
```

The content of our generated text file (called output.txt)



The screenshot shows a Notepad window with the following text:

```
Name: Calgary, x coordinate: 100, y coordinate: 50
Name: Edmonton, x coordinate: 100, y coordinate: 150
Name: Vancouver, x coordinate: 50, y coordinate: 50
Name: Regina, x coordinate: 200, y coordinate: 50
Name: Toronto, x coordinate: 500, y coordinate: 50
Name: Montreal, x coordinate: 200, y coordinate: 50
```