

COMP 371 Computer Graphics

Assignment 1

Summer 2024

The purpose of this assignment is to get you started with / refresh your memory about C++ and its pointers and its memory management.

This assignment must be done in a group of a minimum 2 and a maximum 4.

Part 1:

Create a Dynamic Array:

Write a function `createArray` that takes an integer size and dynamically allocates an array of that size. The function returns a pointer to the newly created array.

Initialize the Array:

Write a function `initializeArray` that takes a pointer to an array and its size, then initializes the array with values from 0 to size-1.

Print the Array:

Write a function `printArray` that takes a pointer to an array and its size, and prints the elements of the array.

Delete the Array:

Write a function `deleteArray` that takes a pointer to an array and deallocates the memory.

Main Function:

In the main function, use the above functions to:

Create a dynamic array of a size that is read from the user.

Initialize the array.

Print the array.

Delete the array.

Part 2:

Develop a class **Point**. A point is represented by 3 coordinates: x, y, and z. The class must provide the following functions:

translate (int d, char axis). d is the distance the point will move in the given axis. axis can have one of the following 3 values: 'x', 'y', and 'z'. If any other value is given, the function should do nothing and return -1. If an invalid value is given for d, the function should do nothing and return -2. Invalid values for d could be anything other than an integer value. The function returns 0 if everything is valid and the point is translated.

Develop a class **Triangle**. A triangle consists of 3 Points. In the implementation of the attributes of the triangle class, you must represent the three points as pointers to Point. You may name them vertex_1, vertex_2, and vertex_3.

Implement a method translate (int d, char axis) that translates the three vertices of the triangle by d in the direction of the given axis.

Implement a function to calculate the area of the triangle. Name it calcArea(). You decide its return type.

Develop a constructor that takes three points as parameters.

Develop a default constructor that sets the three pointers to the three points to null.

Feel free to add any other functions that you see fit. **Maybe a display function in Point or Triangle??!!** You decide 😊 .

*Both the Point class and the Triangle class must have **destructors**.*

Develop a driver class that allows the user to create a triangle and to translate the triangle. You need to provide a menu option to display the triangle coordinates on the screen.

Grading:

- Quality of the code is very important 20%
- Good OO Design 30%
- Functionality and proper use of C++ constructs 50%

Submission:

On Moodle, you need to submit:

- the complete C++ code.
- a sample run in pdf format that shows all the functionality of your code.

Only **one submission per group**. Make sure to write the names and ID numbers of all team members on all submitted documents.

Have fun 😊