Actividad 3.3: Memoria Dinamica en atributos de clase
CECS2222 Computer Programming II

Nombre: Group 6 Sec: _22

Instrucciones para el estudiante:
1. Diseñar una clase, donde sus atributos son apuntadores
2. Implementar la función miembro copy constructor,
3. Crear un arreglo dinámico unidimensional formado por objetos de la clase.
4. Tabla Descriptiva
5. Diagrama UML
6. Salida de programa con los datos originales del problema.
7. Envíe su solución en formato PDF.

Descripción de los problemas:
1. (Gaddis) Programming Challenger 10. Number Array Class, pág. 805, Cap 13.

    1. Use de ejemplo la clase IntegerList pág. 782 Cap 13.
    2. Pruebe su programa con el siguiente arreglo <38,64,18,45,29,44,95>

Valor Total = 100 pts.

Variable	**Descripción**
*array	Variable tipo puntero que guarda valores de tipo float.
ArrSIZE	Variable tipo entero que guarda el valor de elementos del arreglo
Función Miembro	**Descripción**
NumArray()	Constructor por defecto es iniciado cuando no hay parámetros en la definición de objeto de la clase NumArray.
NumArray(int SIZE) :	Constructor con parámetros inicial de tipo int.
NumArray(obj : const NumArray&) :	Copy Constructor con parámetro inicial de objeto.
~NumArray () :	Función destructor que libera memoria dinámica.
setElement(numElem: int, value: float) : void	Función que guarda los elementos del arreglo.
getElement(numElem: int) : float	Función que retorna elementos del arreglo.
findHighestValue() : float	Función que retorna el valor mas alto del arreglo.
findLowestValue() : float	Función que retorna el valor mas bajo del arreglo.
findAverage() : float	Función que retorna el valor promedio del arreglo.
bubbleSort() : void	Función que sortea el arreglo de menor a mayor.
display(n: int) : int	Función que imprime el arreglo.

NumArray
-*array: float -ArrSIZE : int
+NumArray() : +NumArray(int SIZE) : +NumArray(obj : const NumArray&) : + ~NumArray () : +setElement(numElem: int, value: float) : void +getElement(numElem: int) : float +findHighestValue() : float +findLowestValue() : float +findAverage() : float +bubbleSort() : void +display(n: int) : int

NumArray.h

```
#pragma once
#include <iostream>

using namespace::std;

class NumArray {

private:
	float* array;
	int ArrSIZE;

public:
	//constructors
	NumArray();
	NumArray(int SIZE);
	NumArray(const NumArray &obj);
	//destructor
	~NumArray();
	//*****************Mutators member functions*************************
	//member function that sets the number of elements in the array
	void setElement(int numElem, float value);

	//*****************Accessors member functions**********************
	//member function that returns the number of elements in the array
	float getElement(int numElem) const;
	//member function that return the highest value of the array
	float findHighestValue();
	//member function that return the lowest value of the array
	float findLowestValue();
	//member function that sorts the array
```

```
	void bubbleSort();
	//member function tha displays the contents of the array
	void display(int n) const;
};
```

NumArray.cpp

```
#include <iostream>
#include "NumArray.h"

using namespace::std;

//constructors
NumArray::NumArray() {
	//initialize to 0
	const int SIZE = 10;
	array = new float[SIZE];
	ArrSIZE = SIZE;
	for (int i = 0; i < SIZE; i++) {
		array[i] = 0;
	}//end for
}
NumArray::NumArray(int SIZE) {
	ArrSIZE = SIZE;
	array = new float[SIZE];
	for (int i = 0; i < SIZE; i++) {
		array[i] = 0;
	}//end for
}
NumArray::NumArray(const NumArray &obj) {
	ArrSIZE = obj.ArrSIZE;
	array = new float[ArrSIZE];
	for (int i = 0; i < ArrSIZE; i++) {
		array[i] = obj.array[i];
	}//end for
}
//destructor
NumArray::~NumArray() {
	delete[] array;
	array = nullptr;
}
//***************Mutators member functions*********************************
//member function that sets the number of elements in the array
void NumArray::setElement(int numElem, float value) {
	*(array + numElem) = value;
}
//member function that returns the number of elements in the array
float NumArray::getElement(int numElem) const {
	return array[numElem];
```

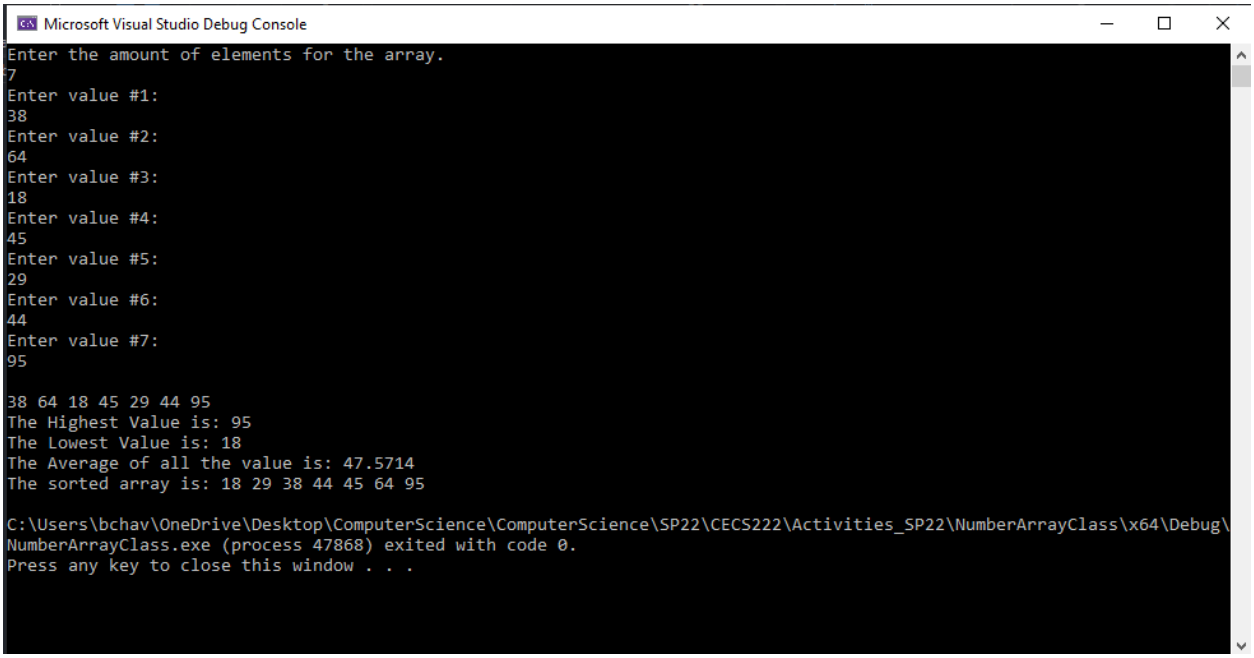
```
}
//member function that returns the highest value of the array
float NumArray::findHighestValue() {
	bubbleSort();
	return array[ArrSIZE - 1];
}
//member function that returns the lowest value of the array
float NumArray::findLowestValue() {
	bubbleSort();
	return array[0];
}
//member function that sorts the array
void NumArray::bubbleSort() {
	bool swap;
	int temp;
	do{
		swap = false;
		for (int count = 0; count < (ArrSIZE - 1); count++){
			if (array[count] > array[count + 1]){
				temp = array[count];
				array[count] = array[count + 1];
				array[count + 1] = temp;
				swap = true;
			}//end if
		}//end for
	} while (swap);
}
//member function that displays the contents of the array
void NumArray::display(int n) const {
	cout << getElement(n) << " ";
}
```

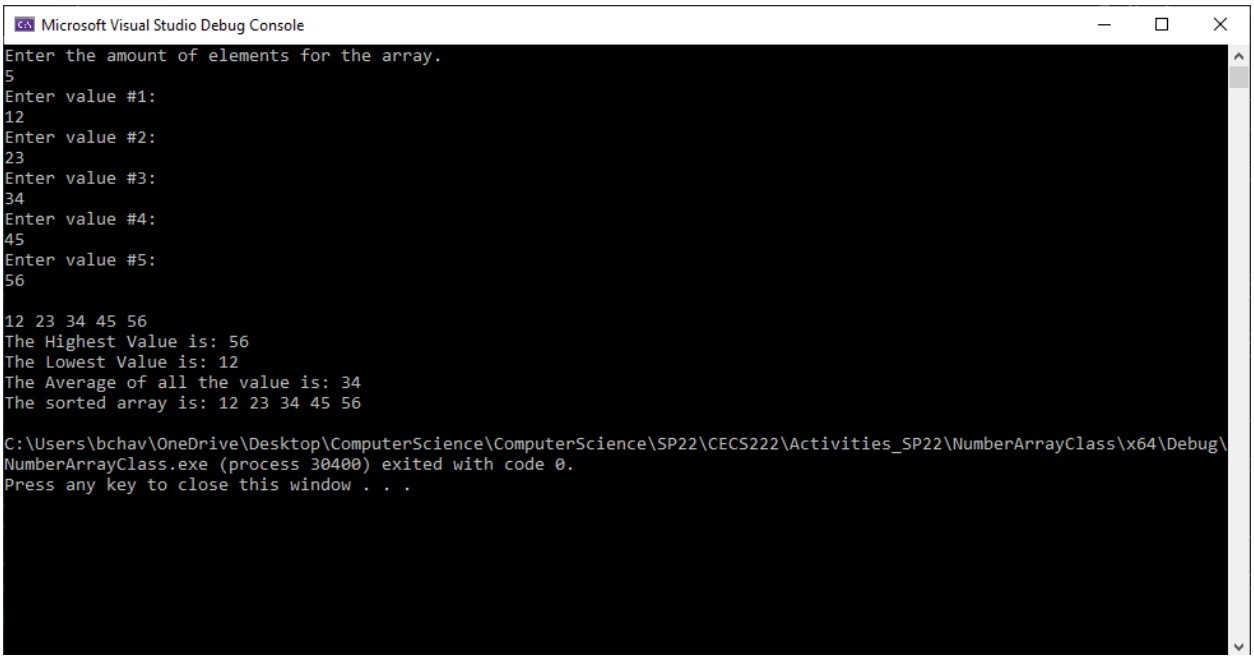
Main.cpp

```
#include <iostream>
#include "NumArray.h"

using namespace::std;
//prototypes
int arraySize();
void storeValuesArray(NumArray&, int);
void displayArr(NumArray, int);

int main() {
	int SIZE;
	int highestValue;
	float value = 0;
	//ask user for the number of elements in the array
	SIZE = arraySize();
	//create NumArray object
	NumArray myNumArray(SIZE);
	//store values in array
	storeValuesArray(myNumArray, SIZE);
	cout << endl;
	//display the array elements
	displayArr(myNumArray, SIZE);
```

```
	cout << endl;
	//find the highest value of the array
	cout << "The Highest Value is: " << myNumArray.findHighestValue() << endl;
	//find the highest value of the array
	cout << "The Lowest Value is: " << myNumArray.findLowestValue() << endl;
	//print the sorted array
	cout << "The sorted array is: ";
	displayArr(myNumArray, SIZE);
	cout << endl;

	return 0;
}
//function that ask user the size of the array
int arraySize () {
	int arrSize;
	cout << "Enter the amount of elements for the array." << endl;
	cin >> arrSize;
	while (arrSize <= 0.0) {
		cout << "Invalid entry please try again." << endl;
		cin >> arrSize;
	}//end while
	return arrSize;
}
//function that stores the values entered from the user to the array
void storeValuesArray(NumArray& myNumArray, int SIZE) {
	float value;
	for (int i = 0; i < SIZE; i++) {
	cout << "Enter value #" << i + 1 << ": " << endl;
	cin >> value;
	myNumArray.setElement(i,value);
	}//end for
}
//funtion that displays the array
void displayArr(NumArray myNumArray, int SIZE) {
	for (int i = 0; i < SIZE; i++) {
		myNumArray.display(i);
	}//end for
}
```

Salida


Microsoft Visual Studio Debug Console
Enter the amount of elements for the array.
7
Enter value #1:
38
Enter value #2:
64
Enter value #3:
18
Enter value #4:
45
Enter value #5:
29
Enter value #6:
44
Enter value #7:
95
38 64 18 45 29 44 95
The Highest Value is: 95
The Lowest Value is: 18
The Average of all the value is: 47.5714
The sorted array is: 18 29 38 44 45 64 95
C:\Users\bchav\OneDrive\Desktop\ComputerScience\ComputerScience\SP22\CECS222\Activities_SP22\NumberArrayClass\x64\Debug\
NumberArrayClass.exe (process 47868) exited with code 0.
Press any key to close this window . . .


Microsoft Visual Studio Debug Console
Enter the amount of elements for the array.
5
Enter value #1:
12
Enter value #2:
23
Enter value #3:
34
Enter value #4:
45
Enter value #5:
56
12 23 34 45 56
The Highest Value is: 56
The Lowest Value is: 12
The Average of all the value is: 34
The sorted array is: 12 23 34 45 56
C:\Users\bchav\OneDrive\Desktop\ComputerScience\ComputerScience\SP22\CECS222\Activities_SP22\NumberArrayClass\x64\Debug\
NumberArrayClass.exe (process 30400) exited with code 0.
Press any key to close this window . . .