**C++ Part II (INFO1-CE9265) Spring 2015 – Homework 8**

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**Question 4:**

Vector.cpp

#include <iostream>

#include <vector>

#include <algorithm>

#include <cstring>

using namespace std;

struct Studentinfo{

string name;

int grade;

Studentinfo(string the\_name, int the\_grade) : name(the\_name), grade(the\_grade){};

};

struct name\_ascend{

bool operator()(const Studentinfo &rhs, const Studentinfo &lhs){

return (rhs.name < lhs.name);

};

};

struct name\_descend{

bool operator()(const Studentinfo &rhs, const Studentinfo &lhs){

return (rhs.name > lhs.name);

};

};

int max\_grade(vector<Studentinfo> &arr, int size){

int max\_grade = 0;

int temp\_grade;

int i = 0;

while(i < size){

temp\_grade = arr[i].grade;

if(max\_grade == 0){

max\_grade = temp\_grade;

}

else if(temp\_grade > max\_grade){

max\_grade = temp\_grade;

}

i++;

}

return max\_grade;

}

int min\_grade(vector<Studentinfo> &arr, int size){

int min\_grade;

int temp\_grade;

int i = 0;

while(i < size){

temp\_grade = arr[i].grade;

if(i == 0){

min\_grade = temp\_grade;

}

else if(temp\_grade < min\_grade){

min\_grade = temp\_grade;

}

i++;

}

return min\_grade;

}

double average\_grade(vector<Studentinfo> &arr, int size){

double ave\_grade = 0;

int temp\_grade;

int i = 0;

while(i < size){

temp\_grade = arr[i].grade;

ave\_grade += temp\_grade;

i++;

}

return ave\_grade / size;

}

int main() {

vector<Studentinfo> StudInf;

StudInf.push\_back(Studentinfo("Clement",80));

StudInf.push\_back(Studentinfo("Portia",100));

StudInf.push\_back(Studentinfo("Mike",60));

StudInf.push\_back(Studentinfo("John",100));

StudInf.push\_back(Studentinfo("Alex",50));

StudInf.push\_back(Studentinfo("Mary",85));

sort(StudInf.begin(), StudInf.end(), name\_descend());

int size = StudInf.size();

cout << "The size of the vector is: " << size << endl;

cout << "The Maximum Grade of the whole list is: " << max\_grade(StudInf, size) <<

endl;

cout << "The Minimum Grade of the whole list is: " << min\_grade(StudInf, size) <<

endl;

cout << "The Average Grade of the whole list is: " << average\_grade(StudInf, size)

<< endl;

cout << "The Full List of Grade is: " << endl;

while(!StudInf.empty()){

cout<<StudInf.back().name<<" "<< StudInf.back().grade<<endl;

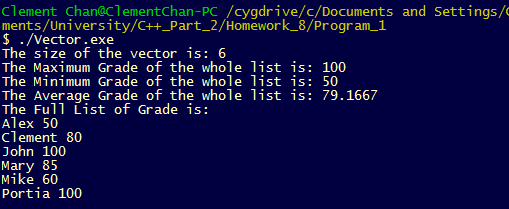
StudInf.pop\_back();

}

return 0;

}

**Output**

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**Question 11:**

Histogram\_Vector.cpp

#include <iostream>

#include <vector>

#include <map>

using namespace std;

void add\_count(map<int,int> &the\_map, int loc){

char flag = 'c';

if(loc >= 0 && loc < 100){

the\_map[loc] += 1;

}

else if(loc > 100){

the\_map[101] +=1;

}

else if(loc < 0 && loc != -1){

the\_map[102] +=1;

}

}

void Histogram(int arr[], int size){

for(int i=0; i<size; i++){

int count = arr[i];

if(i < 10){

cout<< 10\*i << " to " << 10\*(i+1) << " |";

}

else if (i == 10){

cout << "Greater than 100 " << " | ";

}

else if (i == 11){

cout << " Less than 0 " << " | ";

}

for(int j=0; j < count; j++){

cout << "\*";

}

cout << " " << endl;

}

}

int main(){

//Create the final bucket array

int stat\_table[12];

int gradetable[102];

int enter\_grade;

vector<int> classgrade;

map<int, int> grades;

for(int i=0; i<12; i++){

stat\_table[i] = 0;

}

for(int i=0; i<102; i++){

gradetable[i] = i;

}

//Map grades to count

for(int i=0; i < 102; i++){

grades[i] = 0;

}

while(enter\_grade != -1){

cout << "Please enter the grade of student ... " << endl;

cin >> enter\_grade;

classgrade.push\_back(enter\_grade);

add\_count(grades, enter\_grade);

if(enter\_grade != -1 && enter\_grade >=0 && enter\_grade < 100){

gradetable[enter\_grade] = 1;

}

else if(enter\_grade > 100){

gradetable[101] = 1;

}else if(enter\_grade < 0 && enter\_grade != -1){

gradetable[102] = 1;

}

}

cout<<"The size is: "<<classgrade.size()<<endl;

cout<<" "<<endl;

cout<<"The list for initial entered grade is : " << endl;

for(int i=0; i < classgrade.size(); i++){

if(classgrade[i]>=0 && classgrade[i] < 100){

cout << "Count of " << classgrade[i] << " is: " << grades[classgrade[i]] << endl; //Map all the grades entered in the vector into buckets

}

else if(classgrade[i] > 100){

cout << "Count of > 100 is : " << grades[101] <<endl;

}

else if(classgrade[i] < 0){

cout << "Count of < 0 is : " << grades[102] <<endl;

}

}

for(int i=0; i < classgrade.size(); i++){

if(classgrade[i] >= 0 && classgrade[i] < 10 && gradetable[classgrade[i]] == 1){

stat\_table[0] += grades[classgrade[i]];

gradetable[classgrade[i]] -= 1;

}

else if(classgrade[i] >= 10 && classgrade[i] < 20 && gradetable[classgrade[i]] == 1){

stat\_table[1] += grades[classgrade[i]];

gradetable[classgrade[i]] -= 1;

}

else if(classgrade[i] >= 20 && classgrade[i] < 30 && gradetable[classgrade[i]] == 1){

stat\_table[2] += grades[classgrade[i]];

gradetable[classgrade[i]] -= 1;

}

else if(classgrade[i] >= 30 && classgrade[i] <40 && gradetable[classgrade[i]] == 1){

stat\_table[3] += grades[classgrade[i]];

gradetable[classgrade[i]] -= 1;

}

else if(classgrade[i] >= 40 && classgrade[i] <50 && gradetable[classgrade[i]] == 1){

stat\_table[4] += grades[classgrade[i]];

gradetable[classgrade[i]] -= 1;

}

else if(classgrade[i] >= 50 && classgrade[i] <60 && gradetable[classgrade[i]] == 1){

stat\_table[5] += grades[classgrade[i]];

gradetable[classgrade[i]] -= 1;

}

else if(classgrade[i] >= 60 && classgrade[i] <70 && gradetable[classgrade[i]] == 1){

stat\_table[6] += grades[classgrade[i]];

gradetable[classgrade[i]] -= 1;

}

else if(classgrade[i] >= 70 && classgrade[i] <80 && gradetable[classgrade[i]] == 1){

stat\_table[7] += grades[classgrade[i]];

gradetable[classgrade[i]] -= 1;

}

else if(classgrade[i] >= 80 && classgrade[i] <90 && gradetable[classgrade[i]] == 1){

stat\_table[8] += grades[classgrade[i]];

gradetable[classgrade[i]] -= 1;

}

else if(classgrade[i] >= 90 && classgrade[i] <100 && gradetable[classgrade[i]] == 1){

stat\_table[9] += grades[classgrade[i]];

gradetable[classgrade[i]] -= 1;

}

else if(classgrade[i] > 100 && gradetable[101] == 1){

stat\_table[10] += grades[101];

gradetable[101] -= 1;

}

else if(classgrade[i] < 0 && classgrade[i] !=1 && gradetable[102] == 1){

stat\_table[11] += grades[102];

gradetable[102] -= 1;

}

}

cout<<" " << endl;

cout<<"The bucketed list is as follow : " << endl;

for(int i=0; i < 12; i++){

if(i >= 0 && i <10){

cout << "Count of bucket " << 10\*(i) << " to " << 10\*(i+1) << " is: " << stat\_table[i] << endl; //Map all the grades entered in the vector into buckets

}

else if (i == 10){

cout << "Count of bucket " << " > 100 is: " << stat\_table[10] << endl;

}

else if (i == 11){

cout << "Count of bucket " << " < 0 is: " << stat\_table[11] << endl;

}

}

cout<<" " << endl;

cout<<"The graphical representation is as follow : " << endl;

//Print the information with graphical features

Histogram(stat\_table,12);

cout<<"Deleting the vector ..." << endl;

while(!classgrade.empty()){

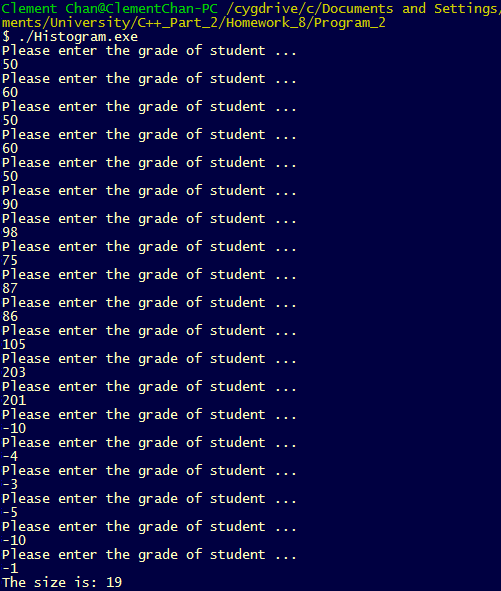
classgrade.pop\_back();

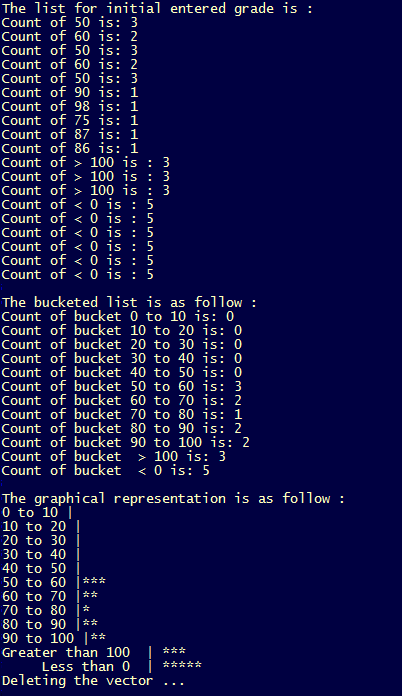
}

return 0;

}

**Output**

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