Assignment 04

Task 01:

Implement binary search algorithm in C++, you have to create a function which takes an array and search value as parameters and returns true if the value was found and false otherwise.

Code	Console

``cpp
#include <iostream>
using namespace std;
int binary_searching(int array[]){
int n,first_index=0,last_index=9,location=-1,mid_index;
cin>>n;
while(first_index<=last_index){
    mid_index=(first_index+last_index)/2;
    if(array[mid_index]==n){
        location=mid_index;break;}
    else if(n<array[mid_index])
    last_index=mid_index-1;
    else
    first_index=mid_index+1;}
if(location== -1){
    cout<<n<<" not found in array"<<endl;}else
cout<<n<<" Found in Array at Index "<<location;}
int main(){
int array[10]={1,2,3,4,5,6,7,8,9,10};
binary_searching(array);return 0;}
``
	``
	5
	5 Found in Array at Index 4
	------------------------------- 	
	``

By *Ahtisham Shaikh*.

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Task 02:

Write C++ code to implement bubble sort algorithm in C++, you will implement this inside a function which will take an array as a parameter and print the values of array in sorted order with the help of bubble sort algorithm.

Code	Console

<pre>#include <iostream>
using namespace std;
void bubbleSort(int arr[], int size){
    for (int i=0; i<size-1; i++){
        for (int j=0; j<size-i-1; j++){
            if (arr[j]>arr[j+1]){
                int swap=arr[j];
                arr[j]=arr[j+1];
                arr[j+1]=swap;}}}}
int main(){
int arr[]={24,5, 3, 8, 11, 1};
int size=sizeof(arr)/sizeof(arr[0]);
bubbleSort(arr,size);
cout<<"Sorted array: ";
for(int i=0; i<size; i++) {
    cout<<arr[i]<<" ";}
return 0;}</pre>
	```Sorted array: 1 3 5 8 11 24```

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Task 03:

Write C++ code which does the following:

a. Creates a function called add student, which takes string value as an input and adds it to an array of student names and increments the array index by one.

b. Creates a function called add marks, which takes an array as a parameter and adds the marks of students in a 2D array of student marks, now we will assume that first row of this array contains marks for the first student from student names array, second row of this array contain marks for the second student from student names array and so on.

c. Creates a function called calculate average (), which takes the name of student as parameter and then calculates the average marks of the student from the student marks array.

d. Creates a function called display_students_and_marks which will display the name of the student and the marks they obtained in a beautiful manner.

Console
| ```
Enter marks of Ahtisham:
Subject 1: 95
Subject 2: 85
Subject 3: 75
Enter marks of Arham:
Subject 1: 65
Subject 2: 75
Subject 3: 90
Enter marks of Ghufran:
Subject 1: 83
Subject 2: 92
Subject 3: 64

Student Details:
Student: Ahtisham Marks: 95 85 75
Student: Arham Marks: 65 75 90
Student: Ghufran Marks: 83 92 64

Average marks of student Ahtisham: 85
Average marks of student Arham: 76.6667
Average marks of student Ghufran: 79.6667
--------------------------------
``` |

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```cpp
#include <iostream>
#include <string>
using namespace std;
const int max_student= 5;
const int max_subject= 3;

string student_names[max_student];
int student_marks[max_student][max_subject];
int index= 0;

void add_student(string student_name) {
    if (index < max_student){
        student_names[index]= student_name;
        index++;}
    else {
        cout<<"Array Full!" << endl;}
}
void add_marks() {
    for (int i=0; i<index; i++) {
        cout << "Enter marks of " << student_names[i] << ":\n";
        for (int j=0; j<max_subject; j++) {
            cout << "Subject " <<j+1 <<": ";
            cin >> student_marks[i][j];}
    }
}

double calculate_average(string student_name) {
    int student_index= -1;

    for (int i=0; i<index; i++){
        if (student_names[i] == student_name) {
            student_index = i;
            break;}
    }
```

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Code

```cpp
    if (student_index != -1) {
        double sum= 0;
        for (int i=0; i<max_subject; i++){
            sum+= student_marks[student_index][i];}
        return sum / max_subject;
    }
    else{
        cout<<"Student not found." <<endl;}
}
void display_students_and_marks() {
    cout << "\nStudent Details:\n";
    for (int i=0; i<index; i++){
        cout<<"Student: " <<student_names[i] <<" Marks: ";
        for (int j=0; j<max_subject; j++){
            cout<<student_marks[i][j] <<" ";}
        cout<<endl;}
}

int main() {
add_student("Ahtisham");add_student("Arham");add_student("Ghufran");
add_marks();
display_students_and_marks();cout<<endl;
string student_average= "Ahtisham";
double average= calculate_average(student_average);
cout<<"Average marks of student " <<student_average <<": " <<average<<endl;

student_average= "Arham";
    average= calculate_average(student_average);
    cout<<"Average marks of student " <<student_average <<": " <<average<<endl;

student_average= "Ghufran";
    average= calculate_average(student_average);
    cout<<"Average marks of student " <<student_average <<": " <<average;
    return 0;}
```

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Completed