

## Lab 1: Arrays and structures – struct (Revision)

Objective:

Student should be able to develop the programs using arrays and structures

Exercise 1: Using a suitable one dimensional array, write a program to input data for 3 students with their IDs, names and marks. Find the average of the marks and display the status of the average marks obtained.

Average marks	Status
<70	Need improvements
70-80	Good
>80	Excellence

Algorithm:

Step 1: Start the program

Step 2: Create an array, declare variables needed and initialize the variables with appropriate values

Step 3: Obtain the students's ID, names and marks.

Step 4: Calculate the average of marks and its status

Step 5: Obtain the result of the average and status

Step 6: Display the result

Step 7: Stop

Example output:

Input:

Enter number of students: 3

Enter ID : 123

Name: Rahimah

Mark of students: 81

Enter ID : 222

Name: Yogesh

Mark of students: 70

Enter ID : 445

Name: Khong

Mark of students: 81

Output:

The Students Record:

123    Rahimah    80

222    Yogesh    70

445    Khong    81

Average of Marks : 77 Good

**Answer:**

```
#include<iostream.h>

struct STUDENT{
    string name[3];
    string student_ID[3];
    int marks[3];
    float average;
};

struct STUDENT st;

void main()
{
    //int marks;
    //string name[3];
    //string student_ID[3];
    int sum=0;

    for(int i=0;i<3;i++){

        cout<<"Enter student ID: ";
        cin>>st.student_ID[i];
        cout<<"Enter student name: ";
        cin>>st.name[i];

        cout<<"Enter student mark: ";
        cin>>st.marks[i];
        sum=sum+st.marks[i];

    }

    st.average = sum/3;
    cout<<"\nThe Students Record: \n";
    if(st.average<70){
        for(int j=0;j<3;j++){
```

```

        cout<<st.student_ID[j]<<"    "<<st.name[j]<<"
"<<st.marks[j]<<endl;
    }

    cout<<"Average of Marks: "<<st.average<<" -----
-----Need Improvement\n\n";
    }
else if(st.average>=70 && st.average<80) {
    for(int j=0;j<3;j++){
        cout<<st.student_ID[j]<<"    "<<st.name[j]<<"
"<<st.marks[j]<<endl;
    }

    cout<<"Average of Marks: "<<st.average<<" -----
-----Good\n\n";
    }
if(st.average>=80) {
    for(int j=0;j<3;j++){
        cout<<st.student_ID[j]<<"    "<<st.name[j]<<"
"<<st.marks[j]<<endl;
    }

    cout<<"Average of Marks: "<<st.average<<" -----
-----Excellent\n\n";
    }

}

```

Exercise 2: A structure **Pelajar** is created with the following definition:

```
struct Pelajar {  
    string status; string ID, name, course[3]  
    double mark[3];  
    double average;  
  
};  
  
Pelajar Pel[10]; // a variable called Pel[10] is created from struct Pelajar
```

This exercise is an expansion from Exercise 1.

Write a program to input data for 10 students with their IDs, names, three courses names and marks for each course. You are required to use the struct definition above. For each student, find the average of the marks for the three courses taken and display the status of the average marks obtained. In this exercise, a struct concept is used.

Algorithm:

Step 1: Start the program

Step 2: Create a structure Pelajar, declare variables average and status, and initialize the variables

Step 3: Obtain the students' IDs, names, courses names and marks for each course.

Step 4: Calculate average marks for each course and display appropriate status

Step 5: Obtain the result

Step 6: Display the result

Step 7: Stop

Input:

Enter ID : 123

Name: Rahimah

Course 1: Biology

Marks: 80

Course 2: Fizik

Marks: 70

Course 3: Chemistry

Marks: 75

Course 3: Add math

Marks: 60

Enter ID: 222

Name: Yogesh

Course 1: Fizik

Marks: 85

Course 2: Chemistry

Marks: 75

Course 3: Add Math

Marks: 80

Enter ID: 445

Name: Khong

Course 1: Biology

Marks: 75

Course 2: Fizik

Marks: 60

Course 3: Add Math

Marks: 55

Output:

NO ID	Name	Subject	Marks	
123	Rahimah	Biologi	80	
		Fizik	70	
		Chemistry	75	
		Add math	60	
		Average	71.25	Good
NO ID	Name	Subject	Marks	
222	Yogesh	Fizik	85	
		Chemistry	75	
		Add math	80	
		Average	80.00	Excellence

NO ID	Name	Subject	Marks	
445	Khong	Biology	95	
		Fizik	60	
		Add math	55	
		Average	70	Good

**Answer:**

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

```
struct PELAJAR{
    string ID[10];
    string name[10];
    string course[3];
    double mark[3];
    double average[10];
    string status[10];
};
```

```
struct PELAJAR pel;
```

```
void main()
{
```

```
    for (int i=0;i<10;i++){
        int sum=0;
```

```
        cout<<"\nEnter students's ID: ";
        cin>>pel.ID[i];
        cout<<"Enter student's name: ";
        cin>>pel.name[i];
```

```
        for (int j=0;j<3;j++){
```

```
            cout<<"Enter student's subject: ";
            cin>>pel.course[j];
            cout<<"Enter student's mark: ";
            cin>>pel.mark[j];
            sum=sum+pel.mark[j];
        }
```

```
        pel.average[i] = sum/3;
    }
```

```
    for(int k=0;k<10;k++){
        if (pel.average[k]<70){
```

```

        cout<<"\nID.NUMBER: "<<pel.ID[k];
        cout<<"\nNAME: "<<pel.name[k];
    for(int l=0;l<3;l++){
        cout<<"\n    SUBJECT: "<<pel.course[l];
        cout<<"\n        MARKS: "<<pel.mark[l];
    }
        cout<<"\nAverage    "<<pel.average[k]<<"    Need
improvement.\n\n";
    }
    else if (pel.average[k]>=70 && pel.average[k]<80){

        cout<<"\nID.NUMBER: "<<pel.ID[k];
        cout<<"\nNAME: "<<pel.name[k];
    for(int l=0;l<3;l++){
        cout<<"\n    SUBJECT: "<<pel.course[l];
        cout<<"\n        MARK: "<<pel.mark[l];
    }
        cout<<"\nAverage    "<<pel.average[k]<<"    Good.\n\n";
    }
    else{

        cout<<"\nNUMBER.ID: "<<pel.ID[k];
        cout<<"\nNAME: "<<pel.name[k];
    for(int l=0;l<3;l++){
        cout<<"\n    SUBJECT: "<<pel.course[l];
        cout<<"\n        MARK: "<<pel.mark[l];
    }
        cout<<"\nAverage    "<<pel.average[k]<<"
Excellence.\n\n";
    }
}
}

```