

# **Mastering Embedded System Online Diploma**

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**First Term (Final Project 2)**

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# Student Management System

## ➤ Problem Statement

Write a program to build a simple software for student information management system which can perform the following operations:

1. Store the first name of the student.
2. Store the Last name of the student.
3. Store the unique Roll number for every student.
4. Store the GPA of every student.
5. Store the courses registered by the student.

## ➤ Approach

The idea is to form an individual functions for every operation. All the functions are unified together to form software.

1. Add Student Details From File
2. Add Student Details Manually
3. Find the student by the given roll number
4. Find the student by the given first name
5. Find the students registered in a course
6. Count of students
7. Delete a student
8. Update Student

## ➤ Implementation

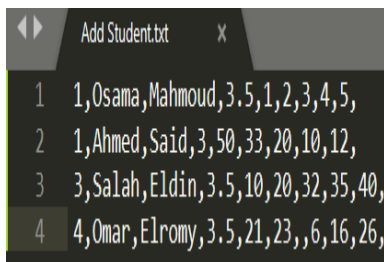
### ➤ Add Student Details From File

Get data from file and add a student to the list of students. While adding the students into the list check for the uniqueness of the roll number.

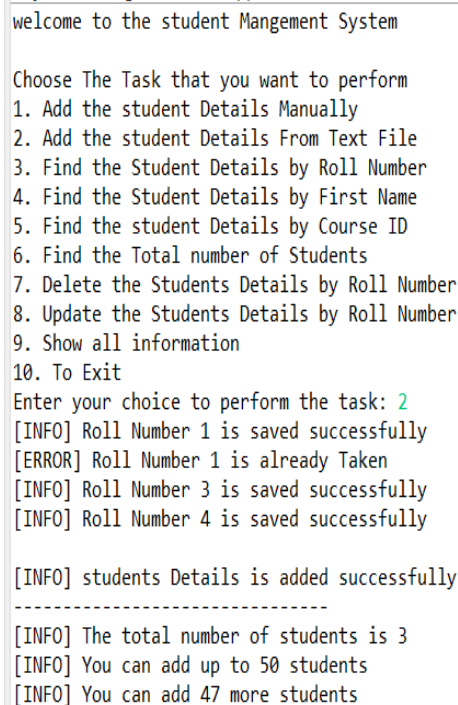
```
void Add_Student_File(FIFO_Buf_t* FIFOBuf){
    FILE* fp = fopen("Add Student.txt","r");

    int Rec_no = 0 , Field_no = 0 , Student_Count = 0;
    char Line[50];
    const char* Taken;

    while(fgets(Line,sizeof Line,fp) != NULL){
        Rec_no++;
        Taken = strtok(Line,"");
        Field_no = 0;
        while(Taken != NULL){
            Field_no++;
            if(Field_no == 1){
                if(Check_RollNum(FIFOBuf, atoi(Taken)) == 0){
                    DPRINTF("[ERROR] Roll Number %d is already Taken\n",atoi(Taken));
                    Student_Count++;
                    break;
                }
                else{
                    FIFOBuf->Head->Roll = atoi(Taken);
                    DPRINTF("[INFO] Roll Number %d is saved successfully\n",atoi(Taken));
                }
            }
            else if(Field_no == 2){
                strcpy(FIFOBuf->Head->Fname , Taken);
            }
            else if(Field_no == 3){
                strcpy(FIFOBuf->Head->Lname , Taken);
            }
            else if(Field_no == 4){
                FIFOBuf->Head->GPA = atof(Taken);
            }
            else if(Field_no == 5){
                FIFOBuf->Head->CourseID[0] = atoi(Taken);
            }
        }
    }
}
```



```
1,Osama,Mahmoud,3.5,1,2,3,4,5,
1,Ahmed,Said,3.50,33,20,10,12,
3,Salah,Eldin,3.5,10,20,32,35,40,
4,Omar,Elromy,3.5,21,23,,6,16,26,
```

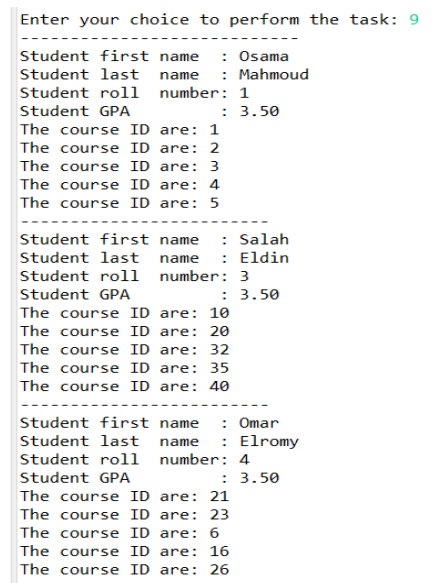


```
welcome to the student Mangement System

Choose The Task that you want to perform
1. Add the student Details Manually
2. Add the student Details From Text File
3. Find the Student Details by Roll Number
4. Find the Student Details by First Name
5. Find the student Details by Course ID
6. Find the Total number of Students
7. Delete the Students Details by Roll Number
8. Update the Students Details by Roll Number
9. Show all information
10. To Exit

Enter your choice to perform the task: 2
[INFO] Roll Number 1 is saved successfully
[ERROR] Roll Number 1 is already Taken
[INFO] Roll Number 3 is saved successfully
[INFO] Roll Number 4 is saved successfully

[INFO] students Details is added successfully
-----
[INFO] The total number of students is 3
[INFO] You can add up to 50 students
[INFO] You can add 47 more students
```



```
Enter your choice to perform the task: 9
-----
Student first name : Osama
Student last name : Mahmoud
Student roll number: 1
Student GPA : 3.50
The course ID are: 1
The course ID are: 2
The course ID are: 3
The course ID are: 4
The course ID are: 5
-----
Student first name : Salah
Student last name : Eldin
Student roll number: 3
Student GPA : 3.50
The course ID are: 10
The course ID are: 20
The course ID are: 32
The course ID are: 35
The course ID are: 40
-----
Student first name : Omar
Student last name : Elromy
Student roll number: 4
Student GPA : 3.50
The course ID are: 21
The course ID are: 23
The course ID are: 6
The course ID are: 16
The course ID are: 26
-----
```

## ➤ Add Student Details Manually

Get data from user and add a student to the list of students. While adding the students into the list check for the uniqueness of the roll number.

```
void Add_Student_Manually(FIFO_Buf_t* FIFOBuf){
    char Temp[50];
    int RollNum = 0;

    /* check if the buffer created or not */
    if(FIFOBuf->Base == NULL || FIFOBuf->Head == NULL || FIFOBuf->Tail == NULL)
        DPRINTF("FIF Not Found\n");
    /* Check if FIFO is full or not */
    if(FIFO_EIsFull(FIFOBuf) == FIFO_FULL)
        DPRINTF("FIFO Is Full\n");

    DPRINTF("Enter the Roll Number: ");
    gets(Temp);
    RollNum = atoi(Temp);

    if( Check_RollNum(FIFOBuf, RollNum) == 0 ){
        DPRINTF("Roll Number is taken before\n");
        DPRINTF("Enter the Roll Number: ");
        gets(Temp);
    }
    FIFOBuf->Head->Roll = atoi(Temp);

    DPRINTF("Enter the first Name of Student:");
    gets(FIFOBuf->Head->Fname);
    DPRINTF("Enter the Last Name of Student:");
    gets(FIFOBuf->Head->Lname);
    DPRINTF("Enter the GPA you obtained:");
    gets(Temp);
    FIFOBuf->Head->GPA = atof(Temp);

    DPRINTF("Enter the Course ID of each course:\n");
    for(int i=0; i<5; ++i){
        DPRINTF("Course %d ID: ", i+1);
        gets(Temp);
        FIFOBuf->Head->CourseID[i] = atoi(Temp);
    }
}
```

Enter your choice to perform the task: 1

=====

Add the student Details

=====

Enter the Roll Number: 3  
Enter the first Name of Student:Salah  
Enter the Last Name of Student:Eldin  
Enter the GPA you obtained:3.5  
Enter the Course ID of each course:  
Course 1 ID: 3  
Course 2 ID: 10  
Course 3 ID: 40  
Course 4 ID: 45  
Course 5 ID: 70

[INFO] students Details is added successfully

-----

[INFO] The total number of students is 3  
[INFO] You can add up to 50 students  
[INFO] You can add 47 more students

Enter your choice to perform the task: 1

=====

Add the student Details

=====

Enter the Roll Number: 4  
Enter the first Name of Student:Omar  
Enter the Last Name of Student:Elromy  
Enter the GPA you obtained:3.5  
Enter the Course ID of each course:  
Course 1 ID: 17  
Course 2 ID: 19  
Course 3 ID: 10  
Course 4 ID: 30  
Course 5 ID: 32

[INFO] students Details is added successfully

-----

[INFO] The total number of students is 4  
[INFO] You can add up to 50 students  
[INFO] You can add 46 more students

-----

Student first name : Salah  
Student last name : Eldin  
Student roll number: 3  
Student GPA : 3.50  
The course ID are: 3  
The course ID are: 10  
The course ID are: 40  
The course ID are: 45  
The course ID are: 70

-----

Student first name : Omar  
Student last name : Elromy  
Student roll number: 4  
Student GPA : 3.50  
The course ID are: 17  
The course ID are: 19  
The course ID are: 10  
The course ID are: 30  
The course ID are: 32

-----

➤ Find the student by the given roll number

This function is to find the student record for the given roll number and print details.

```
12 void Find_r1(FIFO_Buf_t* FIFOBuf){
13
14     int Roll_Num = 0 , flag = 0;
15     Sinfo* ptr= FIFOBuf->Base;
16
17     DPRINTF("Enter the roll number of the student: ");
18     scanf("%d",&Roll_Num);
19
20     for(int i=0; i<FIFOBuf->Count; ++i){
21
22         if(ptr->Roll == Roll_Num){
23             DPRINTF("The students Details are\n");
24             DPRINTF("The First name is :%s\n",ptr->Fname);
25             DPRINTF("Student last name : %s\n",ptr->Lname);
26             DPRINTF("Student roll number: %d\n",ptr->Roll);
27             DPRINTF("Student GPA : %0.2f\n",ptr->GPA);
28             DPRINTF("Enter the course ID of each course\n");
29             for(int j=0 ;j < 5; ++j){
30                 DPRINTF("The course ID are: %d\n",ptr->CourseID[j]);
31             }
32             flag = 0;
33             break;
34         }
35         else{
36             flag = 1;
37         }
38         ptr++;
39     }
40
41     if(flag == 1){
42         DPRINTF("[ERROR] Roll Number %d not found\n",Roll_Num);
43     }
44 }
45 }
```

Enter your choice to perform the task: 3

Enter the roll number of the student: 4

The students Details are

The First name is :Omar

Student last name : Elromy

Student roll number: 4

Student GPA : 3.50

Enter the course ID of each course

The course ID are: 17

The course ID are: 19

The course ID are: 10

The course ID are: 30

The course ID are: 32

Enter your choice to perform the task: 3

Enter the roll number of the student: 8

[ERROR] Roll Number 8 not found

## ➤ Find the student by the given first name

This function is to find all the students with the given first name and print their details for the given roll number and print details.

```
void Find_fn(FIFO_Buf_t* FIFOBuf){
    char Fname_Temp[50];
    Sinfo* Ptr = FIFOBuf->Base;
    int Count = 0;

    DPRINTF("Enter the First Name of the student: ");
    gets(Fname_Temp);

    for(int i=0; i<FIFOBuf->Count; ++i){
        if(strcmp(Ptr->Fname , Fname_Temp) == 0){
            DPRINTF("The students Details are\n");
            DPRINTF("The First name is   : %s\n",Ptr->Fname);
            DPRINTF("Student last  name   : %s\n",Ptr->Lname);
            DPRINTF("Student roll  number: %d\n",Ptr->Roll);
            DPRINTF("Student GPA      : %0.2f\n",Ptr->GPA);
            DPRINTF("Enter the course ID of each course\n");
            for(int j=0 ;j < 5; ++j){
                DPRINTF("The course ID are: %d\n",Ptr->CourseID[j]);
            }
        }
        else{
            Count++;
        }
        Ptr++;
    }
    if(FIFOBuf->Count == Count){
        DPRINTF("[ERROR] First Name %s not found\n",Fname_Temp);
    }
}
```

Enter your choice to perform the task: 4

Enter the First Name of the student: Osama

The students Details are

The First name is : Osama

Student last name : Mahmoud

Student roll number: 1

Student GPA : 3.50

Enter the course ID of each course

The course ID are: 1

The course ID are: 2

The course ID are: 3

The course ID are: 4

The course ID are: 5

The students Details are

The First name is : Osama

Student last name : Ahmed

Student roll number: 6

Student GPA : 3.00

Enter the course ID of each course

The course ID are: 2

The course ID are: 5

The course ID are: 6

The course ID are: 7

The course ID are: 8

Enter your choice to perform the task: 4

Enter the First Name of the student: Mohsen

[ERROR] First Name Mohsen not found

## ➤ Find the students registered in a course

This function is to find all the students who have registered for a given course.

```
void Find_c(FIFO_Buf_t* FIFOBuf){
    int CID , Count = 0;
    Sinfo* Ptr = FIFOBuf->Base;

    DPRINTF("Enter the course ID: ");
    scanf("%d",&CID);

    for(int i=0; i<FIFOBuf->Count; ++i){
        for(int j=0; j<5; ++j){
            if(Ptr->CourseID[j] == CID){
                Count++;
                DPRINTF("The students Details are\n");
                DPRINTF("The First name is   : %s\n",Ptr->Fname);
                DPRINTF("Student last  name : %s\n",Ptr->Lname);
                DPRINTF("Student roll  number: %d\n",Ptr->Roll);
                DPRINTF("Student GPA      : %0.2f\n",Ptr->GPA);
            }
            Ptr++;
        }
        if(Count == 0){
            DPRINTF("[ERROR] Course ID %d not found\n",CID);
        }
        DPRINTF("[INFO] Total Number of Students Enrolled: %d\n",Count);
    }
}
```

Enter your choice to perform the task: 5

Enter the course ID: 30

The students Details are

The First name is : Ahmed

Student last name : Said

Student roll number: 2

Student GPA : 3.00

The students Details are

The First name is : Omar

Student last name : Elromy

Student roll number: 4

Student GPA : 3.50

[INFO] Total Number of Students Enrolled: 2

Enter your choice to perform the task: 5

Enter the course ID: 100

[ERROR] Course ID 100 not found

[INFO] Total Number of Students Enrolled: 0

## ➤ Count of students

This function to print the total number of students in the system.

```
void Tot_s(FIFO_Buf_t* FIFOBuf){  
    DPRINTF("[INFO] The total number of student is %d\n",FIFOBuf->Count);  
    DPRINTF("[INFO] You can add up to 50 students\n");  
    DPRINTF("[INFO] You can add %d more students\n",50-FIFOBuf->Count);  
}
```

```
Enter your choice to perform the task: 6
```

```
-----
```

```
[INFO] The total number of student is 5
```

```
[INFO] You can add up to 50 students
```

```
[INFO] You can add 45 more students
```



## ➤ Delete a student

This function to delete the student record for the given roll number.

```

84 void Del_s(FIFO_Buf_t* FIFOBuf){
85     int Num , flag = 0;
86     Sinfo* Ptr = FIFOBuf->Base;
87
88     DPRINTF("Enter the Roll Number which you want to delete: ");
89     scanf("%d",&Num);
90
91     for(int i=0; i<FIFOBuf->Count; ++i){
92         if(Ptr->Roll == Num){
93             *Ptr = *(FIFOBuf->Tail);
94             FIFOBuf->Count--;
95             /* For circular Queue */
96             if(FIFOBuf->Tail == (Sinfo*)(FIFOBuf->Length * sizeof(Sinfo))){
97                 FIFOBuf->Tail = FIFOBuf->Base;
98             }
99             else{
100                 FIFOBuf->Tail++;
101             }
102             flag = 0;
103             break;
104         }
105         else{
106             flag = 1;
107         }
108         Ptr++;
109     }
110     if(flag == 0){
111         DPRINTF("[INFO] The Roll Number is removed successfully\n");
112     }
113     else{
114         DPRINTF("[ERROR] This Roll Number %d not found\n",Num);
115     }
116 }

```

Enter your choice to perform the task: 7

Enter the Roll Number which you want to delete: 1  
[INFO] The Roll Number is removed successfully

Enter your choice to perform the task: 7

Enter the Roll Number which you want to delete: 8  
[ERROR] This Roll Number 8 not found

```

Enter your choice to perform the task: 9
-----
Student first name   : Ahmed
Student last name    : Said
Student roll number  : 2
Student GPA          : 3.00
The course ID are: 50
The course ID are: 33
The course ID are: 20
The course ID are: 10
The course ID are: 12
-----
Student first name   : Salah
Student last name    : Eldin
Student roll number  : 3
Student GPA          : 3.50
The course ID are: 10
The course ID are: 20
The course ID are: 32
The course ID are: 35
The course ID are: 40
-----
Student first name   : Omar
Student last name    : Elromy
Student roll number  : 4
Student GPA          : 3.50
The course ID are: 21
The course ID are: 23
The course ID are: 6
The course ID are: 16
The course ID are: 26
-----
Student first name   : Osama
Student last name    : Ahmed
Student roll number  : 5
Student GPA          : 3.50
The course ID are: 2
The course ID are: 7
The course ID are: 6
The course ID are: 5
The course ID are: 4
-----

```

## ➤ Update Student

This function is to update the student records. This function does not ask for new details for all fields but the user should be able to pick and choose what he wants to update.

```
317=void Up_s(FIFO_Buf_t* FIFOBuf){
318
319     int Roll_Num , Choice , flag = 0;
320     char Temp[50];
321     Sinfo* Ptr = FIFOBuf->Base;
322
323     DPRINTF("Enter the roll number to update the entry: ");
324     scanf("%d",&Roll_Num);
325
326     for(int i=0; i<FIFOBuf->Count && flag == 0; ++i){
327         if(Ptr->Roll == Roll_Num){
328             flag = 1;
329             DPRINTF("1.first name\n");
330             DPRINTF("2.last name\n");
331             DPRINTF("3.roll no\n");
332             DPRINTF("4. GPA\n");
333             DPRINTF("5. courses\n");
334
335             scanf("%d",&Choice);
336             switch(Choice)
337             {
338                 case 1:
339                     DPRINTF("Enter the new first name: ");
340                     gets(Ptr->Fname);
341                     break;
342                 case 2:
343                     DPRINTF("Enter the new last name: ");
344                     gets(Ptr->Lname);
345                     break;
346                 case 3:
347                     DPRINTF("Enter the new roll number: ");
348                     gets(Temp);
349                     Ptr->Roll = atoi(Temp);
350                     break;
351                 case 4:
352                     DPRINTF("Enter the new GPA: ");
353                     gets(Temp);
```

Enter your choice to perform the task: 8

-----

Enter the roll number to update the entry: 4

1.first name

2.last name

3.roll no

4. GPA

5. courses

1

Enter the new first name: Osama

[INFO] UPDATED SUCCESSFULLY.

-----

Student first name : Osama

Student last name : Elromy

Student roll number: 4

Student GPA : 3.50

The course ID are: 21

The course ID are: 23

The course ID are: 6

The course ID are: 16

The course ID are: 26

-----