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# Learn-in-depth

## First Term Project 2

## Student Management System

### Problem Statement

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

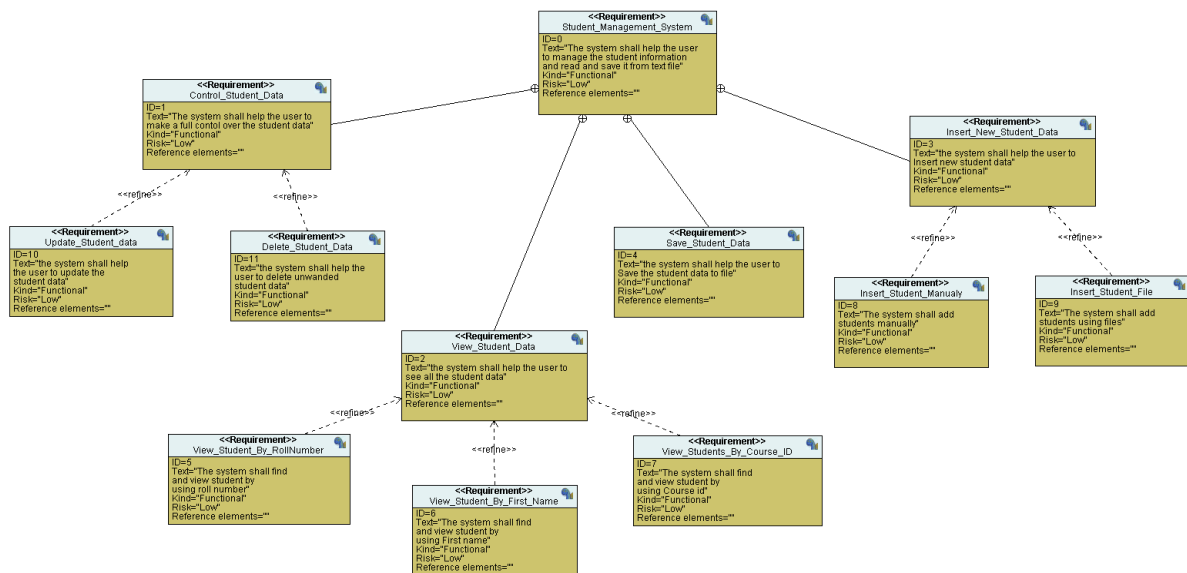
1. Store the first name of the student.
2. Store the last name of the student.
3. Store the unique roll number for every student.
4. Store the GPA of every student.
5. Store the courses registered by the student.

### Approach

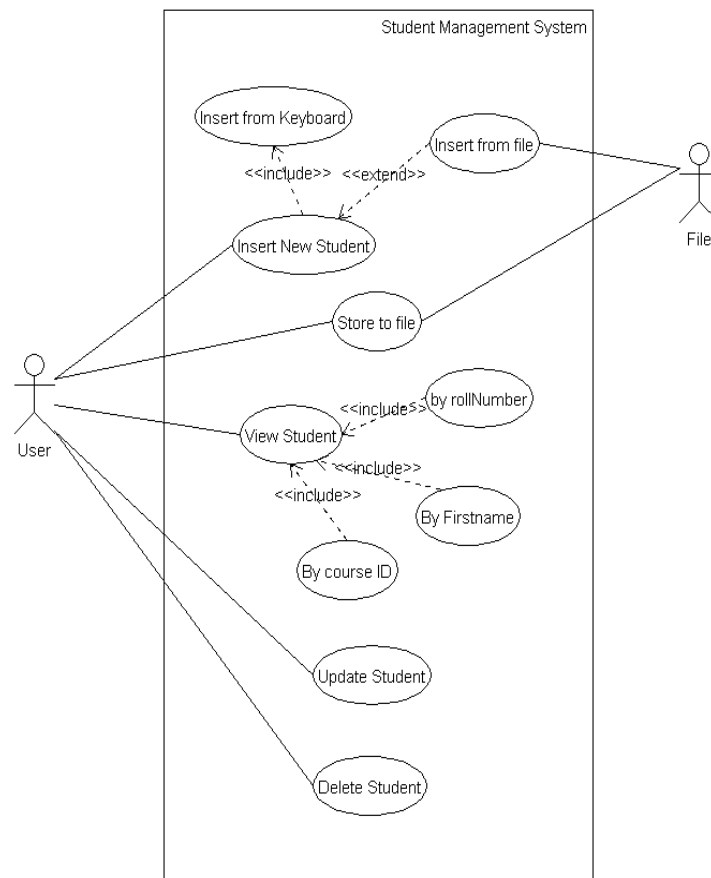
The idea is to form individual functions for every operation. All the functions are unified to form software. All data of students are stored in generic circular queue.

1. Add student details manually.
2. Add student details from text file.
3. Find the student by the given roll number.
4. Find the student by the given first name.
5. Find the students enrolled in a course by given course id.
6. View all students
7. Count of the student.
8. Update student by given roll number.
9. Delete student by given roll number.
10. Save all student to text file.

## Requirement Diagram



## Use case diagram



## Implementation

The student data stored in structure called SStudent and I use the generic circular queue to make a circular queue of 50 element of student as a maximum number of students.

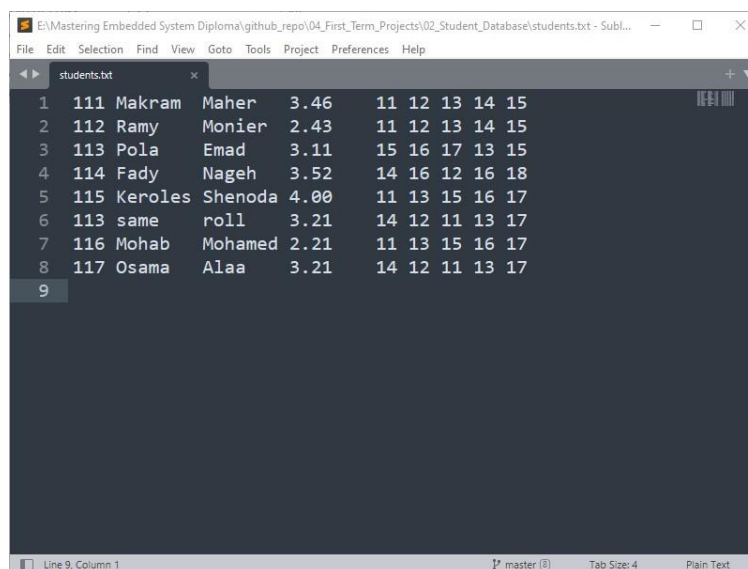
```
typedef struct SStudent
{
    uint16_t    rollNumber;
    char        fName[50];
    char        lName[50];
    float        GPA;
    uint16_t    CourseID[5];
} student_t;
```

The software consists of 5 source code files {main.c, student.c, student.h, queue.c, queue.h}

- main.c is just for getting the option from the user and to execute the selected function.
- student.c contains the function that handle the student queue.
- queue.c contain the implementation of the queue data structure.

## Students file

This file contains the data of the students in this form



```
1 111 Makram Maher 3.46 11 12 13 14 15
2 112 Ramy Monier 2.43 11 12 13 14 15
3 113 Pola Emad 3.11 15 16 17 13 15
4 114 Fady Nageh 3.52 14 16 12 16 18
5 115 Keroles Shenoda 4.00 11 13 15 16 17
6 113 same roll 3.21 14 12 11 13 17
7 116 Mohab Mohamed 2.21 11 13 15 16 17
8 117 Osama Alaa 3.21 14 12 11 13 17
9
```

Each student has a line and this line is contains all the data for this student using space character to split each attribute and the attribute order is

[roll number] [First name] [Last name] [GPA] [Courses IDs]

## Compilation

Using GNU GCC native tool chain

```
gcc.exe -std=c89 -ansi -g -Wall -I . main.c queue.c student.c -o main.exe
```

## Execution

Start screen let the user to choose one of the following options

```
$ ./main.exe

=====
Welcome to the student management system
=====
Choose one of the following options

1 : Add a Student Manually
2 : Add Students From Text File
3 : View Students Details by (Roll Number)
4 : View Students Details by (First Name)
5 : View Students Details by (Course ID)
6 : View All Students Details
7 : View Total Number of Students
8 : Update a Student Details by (Roll Number)
9 : Delete a Student Details by (Roll Number)
10: Save Student Details To Text File
Enter Option Number:
```

The software gives the user 10 options

1. Add a student manually
2. Add students from text file
3. View students details by (roll number)
4. View students details by (first name)
5. View students details by (course ID)
6. View all students' details
7. View total number of students
8. Update a student detail by (roll number)
9. Delete a student detail by (roll number)
10. Save student details to text file

## 1) Add student manually

```
/cygdrive/e/Mastering Embed X + v
3 : View Students Details by (Roll Number)
4 : View Students Details by (First Name)
5 : View Students Details by (Course ID)
6 : View All Students Details
7 : View Total Number of Students
8 : Update a Student Details by (Roll Number)
9 : Delete a Student Details by (Roll Number)
10: Save Student Details To Text File
Enter Option Number: 1
-----

-----
Add a Student Manually
-----

Enter The RollNumber: 110
Enter The FirstName: Makram
Enter The LastName: Maher
Enter The GPA: 3.48
Enter the course ID for each course:
Course 1 id :11
Course 2 id :12
Course 3 id :13
Course 4 id :14
Course 5 id :15

[INFO]: Adding new student Successfully
[INFO]: The total number of students is 1
[INFO]: The maximum number of students can be added is 50
[INFO]: The number of students can be added is 49
=====
Choose one of the following options

1 : Add a Student Manually
2 : Add Students From Text File
3 : View Students Details by (Roll Number)
4 : View Students Details by (First Name)
5 : View Students Details by (Course ID)
6 : View All Students Details
7 : View Total Number of Students
8 : Update a Student Details by (Roll Number)
9 : Delete a Student Details by (Roll Number)
10: Save Student Details To Text File
Enter Option Number:
```

## 2) Add students from text file

```
/cygdrive/e/Mastering Embed x + v

=====
Welcome to the student management system
=====
Choose one of the following options

1 : Add a Student Manually
2 : Add Students From Text File
3 : View Students Details by (Roll Number)
4 : View Students Details by (First Name)
5 : View Students Details by (Course ID)
6 : View All Students Details
7 : View Total Number of Students
8 : Update a Student Details by (Roll Number)
9 : Delete a Student Details by (Roll Number)
10: Save Student Details To Text File
Enter Option Number: 2

-----
Add Students From Text File
-----
[INFO]: Adding new student Successfully with RollNumber 111
[INFO]: Adding new student Successfully with RollNumber 112
[INFO]: Adding new student Successfully with RollNumber 113
[INFO]: Adding new student Successfully with RollNumber 114
[INFO]: Adding new student Successfully with RollNumber 115
[ERROR]: RollNumber 113 is already taken
[INFO]: Adding new student Successfully with RollNumber 116
[INFO]: Adding new student Successfully with RollNumber 117
=====
Choose one of the following options

1 : Add a Student Manually
2 : Add Students From Text File
3 : View Students Details by (Roll Number)
4 : View Students Details by (First Name)
5 : View Students Details by (Course ID)
6 : View All Students Details
7 : View Total Number of Students
8 : Update a Student Details by (Roll Number)
9 : Delete a Student Details by (Roll Number)
10: Save Student Details To Text File
Enter Option Number:
```

```
E:\Mastering Embedded System Diploma\github_repo\04_First_Term_Projects\02_Student_Database\students.txt - Subl...
File Edit Selection Find View Goto Tools Project Preferences Help

students.txt x + v
1 111 Makram Maher 3.46 11 12 13 14 15
2 112 Ramy Monier 2.43 11 12 13 14 15
3 113 Pola Emad 3.11 15 16 17 13 15
4 114 Fady Nageh 3.52 14 16 12 16 18
5 115 Keroles Shenoda 4.00 11 13 15 16 17
6 113 same roll 3.21 14 12 11 13 17
7 116 Mohab Mohamed 2.21 11 13 15 16 17
8 117 Osama Alaa 3.21 14 12 11 13 17
9
```

### 3) View student by roll number

```
/cygdrive/e/Mastering Embed X + v

=====
Choose one of the following options

1 : Add a Student Manually
2 : Add Students From Text File
3 : View Students Details by (Roll Number)
4 : View Students Details by (First Name)
5 : View Students Details by (Course ID)
6 : View All Students Details
7 : View Total Number of Students
8 : Update a Student Details by (Roll Number)
9 : Delete a Student Details by (Roll Number)
10: Save Student Details To Text File
Enter Option Number: 3

-----

View Students Details by (Roll Number)
-----

Enter The RollNumber: 119

[ERROR]: RollNumber 119 not found
=====
```

```
/cygdrive/e/Mastering Embed X + v

Choose one of the following options

1 : Add a Student Manually
2 : Add Students From Text File
3 : View Students Details by (Roll Number)
4 : View Students Details by (First Name)
5 : View Students Details by (Course ID)
6 : View All Students Details
7 : View Total Number of Students
8 : Update a Student Details by (Roll Number)
9 : Delete a Student Details by (Roll Number)
10: Save Student Details To Text File
Enter Option Number: 3

-----

View Students Details by (Roll Number)
-----

Enter The RollNumber: 111

The Student details are:
Index:      0
RollNumber: 111
FirstName:  Makram
LastName:   Maher
GPA:        3.46
Courses:    [ 11 - 12 - 13 - 14 - 15 ]
-----
```



#### 4) View student by first name

```
/cygdrive/e/Mastering Embed x + v
=====
Choose one of the following options

1 : Add a Student Manually
2 : Add Students From Text File
3 : View Students Details by (Roll Number)
4 : View Students Details by (First Name)
5 : View Students Details by (Course ID)
6 : View All Students Details
7 : View Total Number of Students
8 : Update a Student Details by (Roll Number)
9 : Delete a Student Details by (Roll Number)
10: Save Student Details To Text File
Enter Option Number: 4
-----

View Students Details by (First Name)
-----
Enter The FirstName: ahmed

[ERROR]: FirstName ahmed not found
=====
```

```
/cygdrive/e/Mastering Embed x + v
=====
Choose one of the following options

1 : Add a Student Manually
2 : Add Students From Text File
3 : View Students Details by (Roll Number)
4 : View Students Details by (First Name)
5 : View Students Details by (Course ID)
6 : View All Students Details
7 : View Total Number of Students
8 : Update a Student Details by (Roll Number)
9 : Delete a Student Details by (Roll Number)
10: Save Student Details To Text File
Enter Option Number: 4
-----

View Students Details by (First Name)
-----
Enter The FirstName: Keroles

The Student details are:
Index:      4
RollNumber: 115
FirstName:  Keroles
LastName:   Shenoda
GPA:        4.00
Courses:    [ 11 - 13 - 15 - 16 - 17 ]
=====
```



## 5) View students by course ID

```
/cygdrive/e/Mastering Embed x + v
=====
Choose one of the following options
1 : Add a Student Manually
2 : Add Students From Text File
3 : View Students Details by (Roll Number)
4 : View Students Details by (First Name)
5 : View Students Details by (Course ID)
6 : View All Students Details
7 : View Total Number of Students
8 : Update a Student Details by (Roll Number)
9 : Delete a Student Details by (Roll Number)
10: Save Student Details To Text File
Enter Option Number: 5
-----
View Students Details by (Course ID)
-----
Enter The CourseID: 20
[ERROR]: CourseID 20 not found
=====
```

```
/cygdrive/e/Mastering Embed x + v
7 : View Total Number of Students
8 : Update a Student Details by (Roll Number)
9 : Delete a Student Details by (Roll Number)
10: Save Student Details To Text File
Enter Option Number: 5
-----
View Students Details by (Course ID)
-----
Enter The CourseID: 14

The Student details are:
Index:      0
RollNumber: 111
FirstName:  Makram
LastName:   Maher
GPA:        3.46
Courses:    [ 11 - 12 - 13 - 14 - 15 ]
-----

The Student details are:
Index:      1
RollNumber: 112
FirstName:  Ramy
LastName:   Monier
GPA:        2.43
Courses:    [ 11 - 12 - 13 - 14 - 15 ]
-----

The Student details are:
Index:      3
RollNumber: 114
FirstName:  Fady
LastName:   Nageh
GPA:        3.52
Courses:    [ 14 - 16 - 12 - 16 - 18 ]
-----

The Student details are:
Index:      6
RollNumber: 117
FirstName:  Osama
LastName:   Alaa
GPA:        3.21
Courses:    [ 14 - 12 - 11 - 13 - 17 ]
-----

[INFO]: 4 Students Enrolled in CourseID 14
=====
```

## 6) View all students

```
6 : View All Students Details
7 : View Total Number of Students
8 : Update a Student Details by (Roll Number)
9 : Delete a Student Details by (Roll Number)
10: Save Student Details To Text File
Enter Option Number: 6
```

### View All Students Details

```
-----
Index:      0
RollNumber: 111
FirstName:  Makram
LastName:   Maher
GPA:        3.46
Courses:    [ 11 - 12 - 13 - 14 - 15 ]
-----
```

```
Index:      1
RollNumber: 112
FirstName:  Ramy
LastName:   Monier
GPA:        2.43
Courses:    [ 11 - 12 - 13 - 14 - 15 ]
-----
```

```
Index:      2
RollNumber: 113
FirstName:  Pola
LastName:   Emad
GPA:        3.11
Courses:    [ 15 - 16 - 17 - 13 - 15 ]
-----
```

```
Index:      3
RollNumber: 114
FirstName:  Fady
LastName:   Nageh
GPA:        3.52
Courses:    [ 14 - 16 - 12 - 16 - 18 ]
-----
```

```
Index:      4
RollNumber: 115
FirstName:  Keroles
LastName:   Shenoda
GPA:        4.00
Courses:    [ 11 - 13 - 15 - 16 - 17 ]
-----
```

```
GPA:        3.52
Courses:    [ 14 - 16 - 12 - 16 - 18 ]
-----
```

```
Index:      4
RollNumber: 115
FirstName:  Keroles
LastName:   Shenoda
GPA:        4.00
Courses:    [ 11 - 13 - 15 - 16 - 17 ]
-----
```

```
Index:      5
RollNumber: 116
FirstName:  Mohab
LastName:   Mohamed
GPA:        2.21
Courses:    [ 11 - 13 - 15 - 16 - 17 ]
-----
```

```
Index:      6
RollNumber: 117
FirstName:  Osama
LastName:   Alaa
GPA:        3.21
Courses:    [ 14 - 12 - 11 - 13 - 17 ]
-----
```

## 7) View total number of students

```
1 : Add a Student Manually
2 : Add Students From Text File
3 : View Students Details by (Roll Number)
4 : View Students Details by (First Name)
5 : View Students Details by (Course ID)
6 : View All Students Details
7 : View Total Number of Students
8 : Update a Student Details by (Roll Number)
9 : Delete a Student Details by (Roll Number)
10: Save Student Details To Text File
Enter Option Number: 7
-----

View Total Number of Students
-----

[INFO]: The total number of students is 7
[INFO]: The maximum number of students can be added is 50
[INFO]: The number of students can be added is 43
```

## 8) Update student by roll number

```
/cygdrive/e/Mastering Embed  X + v
=====
Choose one of the following options

1 : Add a Student Manually
2 : Add Students From Text File
3 : View Students Details by (Roll Number)
4 : View Students Details by (First Name)
5 : View Students Details by (Course ID)
6 : View All Students Details
7 : View Total Number of Students
8 : Update a Student Details by (Roll Number)
9 : Delete a Student Details by (Roll Number)
10: Save Student Details To Text File
Enter Option Number: 8
-----

Update a Student Details by (Roll Number)
-----

Enter The RollNumber: 112

The Student details are:
Index:      1
RollNumber: 112
FirstName:  Ramy
LastName:   Monier
GPA:        2.43
Courses:    [ 11 - 12 - 13 - 14 - 15 ]
-----

Choose one of the following options

1: Update RollNumber
2: Update FirstName
3: Update LastName
4: Update GPA
5: Update Courses
Enter Option Number:
```

```
/cygdrive/e/Mastering Embed x + v
-----
Update a Student Details by (Roll Number)
-----
Enter The RollNumber: 112

The Student details are:
Index:      1
RollNumber: 112
FirstName:  Ramy
LastName:   Monier
GPA:        2.43
Courses:    [ 11 - 12 - 13 - 14 - 15 ]
-----

Choose one of the following options

1: Update RollNumber
2: Update FirstName
3: Update LastName
4: Update GPA
5: Update Courses
Enter Option Number: 4
Enter The New GPA: 2.88
```

```
/cygdrive/e/Mastering Embed x + v
-----
6 : View All Students Details
7 : View Total Number of Students
8 : Update a Student Details by (Roll Number)
9 : Delete a Student Details by (Roll Number)
10: Save Student Details To Text File
Enter Option Number: 6
-----

View All Students Details
-----

Index:      0
RollNumber: 111
FirstName:  Makram
LastName:   Maher
GPA:        3.46
Courses:    [ 11 - 12 - 13 - 14 - 15 ]
-----

Index:      1
RollNumber: 112
FirstName:  Ramy
LastName:   Monier
GPA:        2.88
Courses:    [ 11 - 12 - 13 - 14 - 15 ]
-----

Index:      2
RollNumber: 113
FirstName:  Pola
LastName:   Emad
GPA:        3.11
Courses:    [ 15 - 16 - 17 - 13 - 15 ]
-----

Index:      3
RollNumber: 114
FirstName:  Fady
LastName:   Nageh
```

### 9) Delete student by roll number

```

    Choose one of the following options

1 : Add a Student Manually
2 : Add Students From Text File
3 : View Students Details by (Roll Number)
4 : View Students Details by (First Name)
5 : View Students Details by (Course ID)
6 : View All Students Details
7 : View Total Number of Students
8 : Update a Student Details by (Roll Number)
9 : Delete a Student Details by (Roll Number)
10: Save Student Details To Text File
Enter Option Number: 9
-----

Delete a Student Details by (Roll Number)
-----
Enter The RollNumber: 117

[INFO]: The Student with rollNumber 117 Deleted Successfully
=====

```

10) Save students to file

```

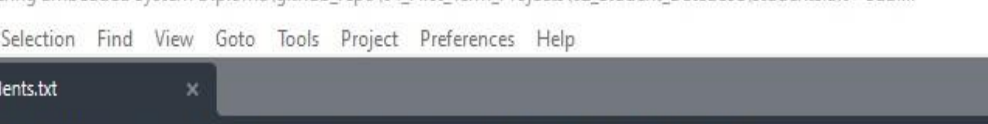
Choose one of the following options

1 : Add a Student Manually
2 : Add Students From Text File
3 : View Students Details by (Roll Number)
4 : View Students Details by (First Name)
5 : View Students Details by (Course ID)
6 : View All Students Details
7 : View Total Number of Students
8 : Update a Student Details by (Roll Number)
9 : Delete a Student Details by (Roll Number)
10: Save Student Details To Text File
Enter Option Number: 10
-----

-----

Save Student Details To Text File
-----

```



The screenshot shows a Sublime Text editor window with the file 'students.txt' open. The file contains a table with 7 rows of student data. The second row is highlighted. The table has columns for ID, Name, Surname, GPA, and a list of five numbers.

ID	Name	Surname	GPA	Numbers	
1	111	Makram	Maher	3.46	11 12 13 14 15
2	112	Ramy	Monier	2.88	11 12 13 14 15
3	113	Pola	Emad	3.11	15 16 17 13 15
4	114	Fady	Nageh	3.52	14 16 12 16 18
5	115	Keroles	Shenoda	4.00	11 13 15 16 17
6	116	Mohab	Mohamed	2.21	11 13 15 16 17
7					