Mastering Embedded System Online Diploma

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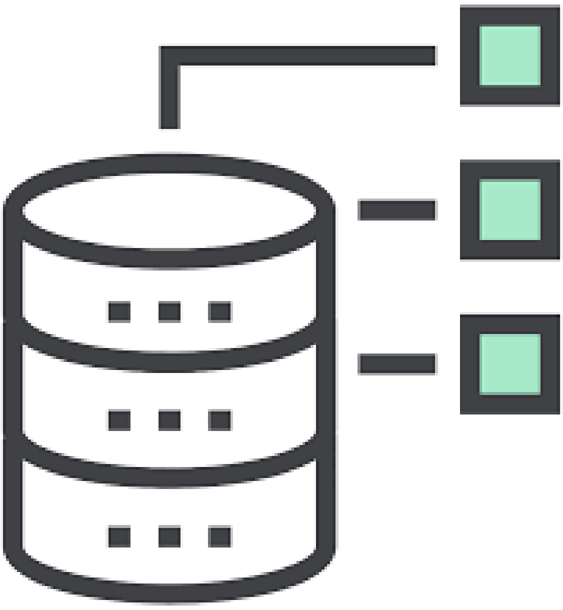
First Term Project 2

Student Database System



BY :
Eng. Mohamed Kamel Aly

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Email: mohamed.kamel.m73@gmail.com
Github Code: https://github.com/Kamelz70/LID_Diploma/tree/main/First_Term_Projects/Project_2

Contents

Problem Statement

Write a program to build a simple Software for Student Information Management

System which can perform the following operations:

- Store the First name of the student.
- Store the Last name of the student.
- Store the unique Roll number for every student.
- Store the GPA of every student.
- 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.

- Add Student Details From File
- Add Student Details Manually
- Find the student by the given roll number
- Find the student by the given first name
- Find the students registered in a course
- Count of students
- Delete a student
- Update Student

Configuration

In students.h, there are some config options to se

```
// //////////////////////////////////////////
// Configuration
// //////////////////////////////////////////
#define BUFFER_LENGTH 50
#define MAX_NUM_OF_COURSES 10
#define MAX_NAME_CHARACTERS 50
#define FILENAME "studentsDB.txt"
```

`BUFFER_LENGTH:`

Sets the maximum number of students to save in the DB

`MAX_NUM_OF_COURSES:`

Sets the maximum No. of courses each single student can take

`MAX_NAME_CHARACTERS:`

Sets the maximum first/last name No. of characters

Code APIs And Helper Methods

Github Code: https://github.com/Kamelz70/LID_Diploma/tree/main/First_Term_Projects/Project_2

APIs

These are the main APIs used to provide functionality

addManually

```
void addManually(FIFO_Buf_t *S_FIFO);
```

This API adds a student manually, it uses helper methods of **FIFO_validator, enterStudentInfo, countStudents**

addFromFile

```
void addFromFile(FIFO_Buf_t *S_FIFO);
```

This API adds students from an existing text file, it uses helper methods of **FIFO_validator ,isUniqueID**

printStudentByID

```
void printStudentByID(FIFO_Buf_t *S_FIFO);
```

This API prints a student by ID, it uses helper methods of **FIFO_validator, getStudentByID, printStudentInfo**

printByFirstName

```
void printByFirstName(FIFO_Buf_t *S_FIFO);
```

This API prints a student by ID, it uses helper methods of **FIFO_validator, printStudentInfo**

printCourseStudents

```
void printCourseStudents(FIFO_Buf_t *S_FIFO);
```

This API prints students taking a certain course ID, it uses helper methods of **FIFO_validator, printStudentInfo**

printAll

```
void printAll(FIFO_Buf_t *S_FIFO);
```

This API prints All students, it uses helper methods of **FIFO_validator, printStudentInfo**

deleteByID

```
void deleteByID(FIFO_Buf_t *S_FIFO);
```

This API deletes a student by ID, it uses helper methods of **FIFO_validator, printStudentInfo, getStudentByID**

updateByID

```
void updateByID(FIFO_Buf_t *S_FIFO);
```

This API updates a student by ID, it uses helper methods of **FIFO_validato, getStudentByID, enterStudentInfo**

countStudents

```
void countStudents(FIFO_Buf_t *S_FIFO);
```

This API counts all students, it uses the helper method **FIFO_validator**

HelperMethods

These are the helper methods used by the main APIs to enhance code readability/maintainability

isUniqueID

```
bool isUniqueID(FIFO_Buf_t *S_FIFO, uint32 ID);
```

This method is called to check if a given ID input is unique or not, it uses the helper method **getStudentByID**

getStudentByID

```
Student *getStudentByID(FIFO_Buf_t *S_FIFO, uint32 ID, int
*studentListingNumP);
```

This method iterates on student IDs to return a pointer to the student with the ID, if not found, it returns NULL, it uses the helper method **FIFO_validator**

printStudentInfo

```
void printStudentInfo(Student *s);
```

This method prints a given student’s information

FIFO_validator

```
bool FIFO_validator(FIFO_Buf_t *S_FIFO, bool isEmptyValidate, bool
isFullValidate);
```

This method is used to validate the FIFO buffer and its’ data to check if it’s invalid, empty, or full

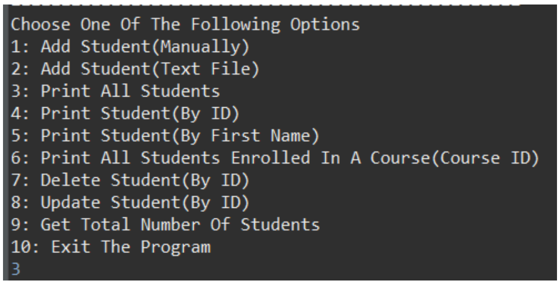
enterStudentInfo

```
void enterStudentInfo(FIFO_Buf_t *S_FIFO, Student *targetStudent, uint8
choice);
```

This method is used to enter student data and save it the student pointer

Tests

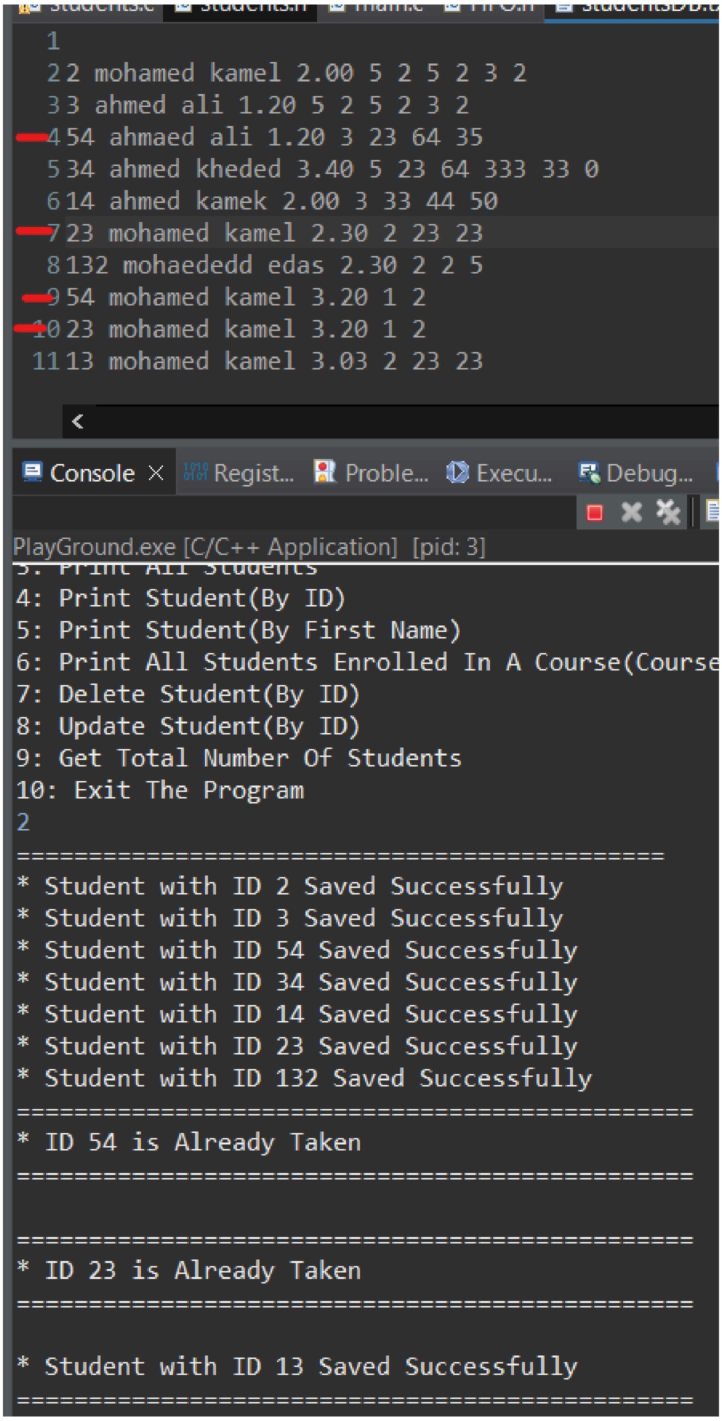
These are the options which are presented to the user upon starting the program



```
Choose One Of The Following Options
1: Add Student(Manually)
2: Add Student(Text File)
3: Print All Students
4: Print Student(By ID)
5: Print Student(By First Name)
6: Print All Students Enrolled In A Course(Course ID)
7: Delete Student(By ID)
8: Update Student(By ID)
9: Get Total Number Of Students
10: Exit The Program
3
```

Add students from file:

While reading each line, any non-unique ID entry is skipped and the program continues saving from the next line



```

2 mohamed kamel 2.00 5 2 5 2 3 2
3 ahmed ali 1.20 5 2 5 2 3 2
54 ahmaed ali 1.20 3 23 64 35
34 ahmed kheded 3.40 5 23 64 333 33 0
14 ahmed kamek 2.00 3 33 44 50
23 mohamed kamel 2.30 2 23 23
132 mohaededd edas 2.30 2 2 5
54 mohamed kamel 3.20 1 2
23 mohamed kamel 3.20 1 2
13 mohamed kamel 3.03 2 23 23
```

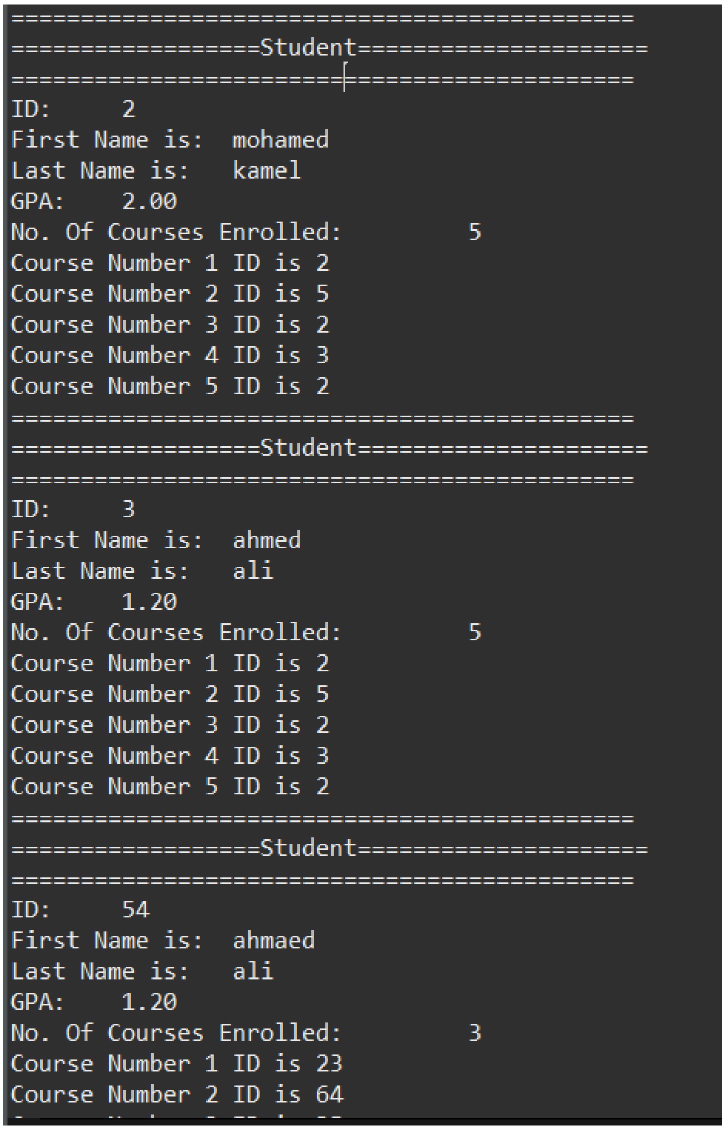
```
PlayGround.exe [C/C++ Application]  [pid: 3]
3: Print All Students
4: Print Student(By ID)
5: Print Student(By First Name)
6: Print All Students Enrolled In A Course(Course
7: Delete Student(By ID)
8: Update Student(By ID)
9: Get Total Number Of Students
10: Exit The Program
2
=============================================
* Student with ID 2 Saved Successfully
* Student with ID 3 Saved Successfully
* Student with ID 54 Saved Successfully
* Student with ID 34 Saved Successfully
* Student with ID 14 Saved Successfully
* Student with ID 23 Saved Successfully
* Student with ID 132 Saved Successfully
===============================================
* ID 54 is Already Taken
===============================================


===============================================
* ID 23 is Already Taken
===============================================

* Student with ID 13 Saved Successfully
===============================================
```

Print All Students

The Students added from the previous file are present when choosing option 3 (PrintAll)

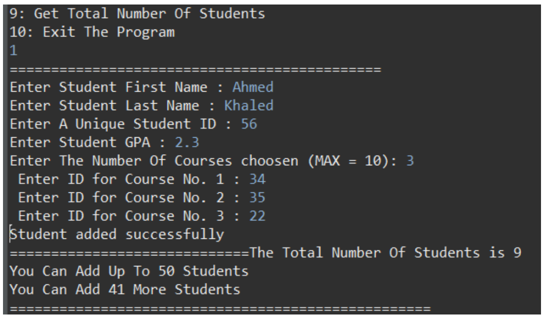


```
=============================================
==================Student=====================
=============================================
ID:      2
First Name is:   mohamed
Last Name is:    kamel
GPA:     2.00
No. Of Courses Enrolled:         5
Course Number 1 ID is 2
Course Number 2 ID is 5
Course Number 3 ID is 2
Course Number 4 ID is 3
Course Number 5 ID is 2
=============================================
==================Student=====================
=============================================
ID:      3
First Name is:   ahmed
Last Name is:    ali
GPA:     1.20
No. Of Courses Enrolled:         5
Course Number 1 ID is 2
Course Number 2 ID is 5
Course Number 3 ID is 2
Course Number 4 ID is 3
Course Number 5 ID is 2
=============================================
==================Student=====================
=============================================
ID:      54
First Name is:   ahmaed
Last Name is:    ali
GPA:     1.20
No. Of Courses Enrolled:         3
Course Number 1 ID is 23
Course Number 2 ID is 64
```

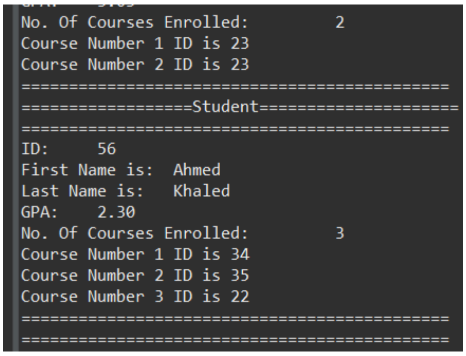
Add Student Manually

The left screenshot show the process of adding the student

, and the right one shows it’s been added by printing all students



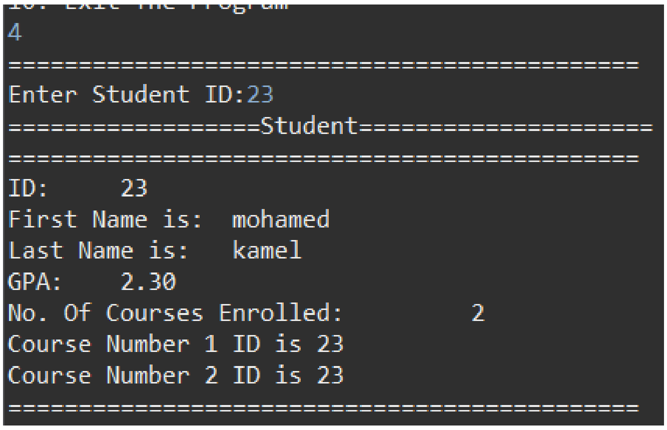
```
9: Get Total Number Of Students
10: Exit The Program
1
==============================================
Enter Student First Name : Ahmed
Enter Student Last Name : Khaled
Enter A Unique Student ID : 56
Enter Student GPA : 2.3
Enter The Number Of Courses choosen (MAX = 10): 3
 Enter ID for Course No. 1 : 34
 Enter ID for Course No. 2 : 35
 Enter ID for Course No. 3 : 22
Student added successfully
=============================The Total Number Of Students is 9
You Can Add Up To 50 Students
You Can Add 41 More Students
===================================================
```



```
No. Of Courses Enrolled:         2
Course Number 1 ID is 23
Course Number 2 ID is 23
=============================================
==================Student=====================
=============================================
ID:      56
First Name is:   Ahmed
Last Name is:    Khaled
GPA:     2.30
No. Of Courses Enrolled:         3
Course Number 1 ID is 34
Course Number 2 ID is 35
Course Number 3 ID is 22
=============================================
=============================================
```

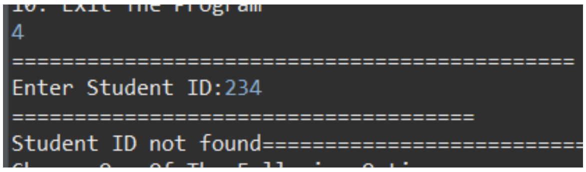
Print Student by ID

From the above added students, searching for a student with an ID prints the target correctly



```
10: Exit The Program
4
=============================================
Enter Student ID:23
=================Student====================
=============================================
ID:     23
First Name is:  mohamed
Last Name is:   kamel
GPA:    2.30
No. Of Courses Enrolled:         2
Course Number 1 ID is 23
Course Number 2 ID is 23
=============================================
```

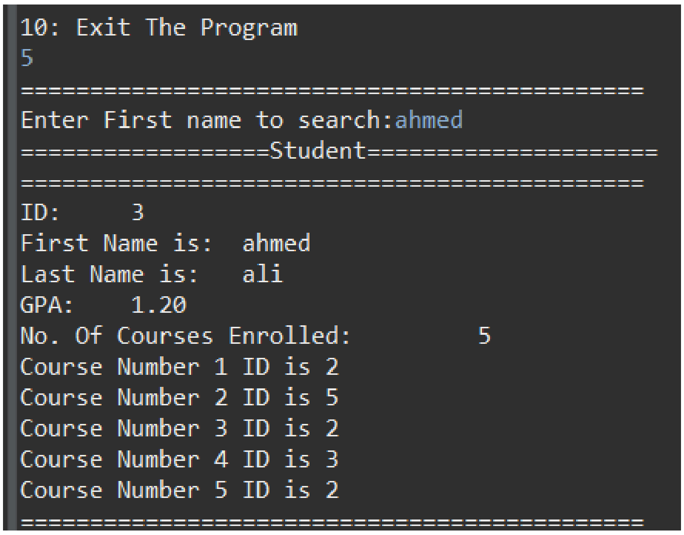
Non-existing IDs print the following



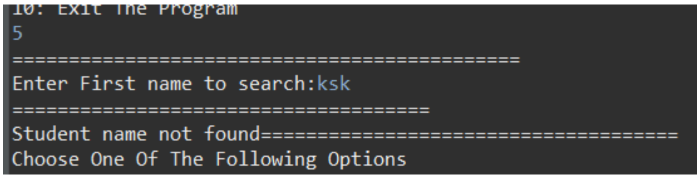
```
10: Exit The Program
4
=============================================
Enter Student ID:234
===================================
Student ID not found==========================
Choose One Of The Following Options
```

Print Student By First Name

This also works by entering the name, then the found student is printed, entering a non-existing name is shown in the right screenshot



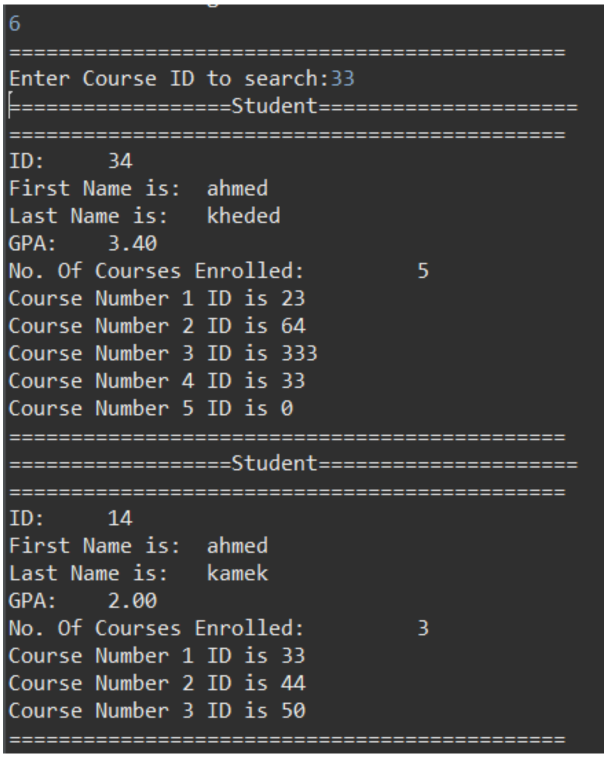
```
10: Exit The Program
5
=============================================
Enter First name to search:ahmed
=================Student====================
=============================================
ID:     3
First Name is:  ahmed
Last Name is:   ali
GPA:    1.20
No. Of Courses Enrolled:         5
Course Number 1 ID is 2
Course Number 2 ID is 5
Course Number 3 ID is 2
Course Number 4 ID is 3
Course Number 5 ID is 2
=============================================
```



```
10: Exit The Program
5
=============================================
Enter First name to search:ksk
===================================
Student name not found===================================
Choose One Of The Following Options
```

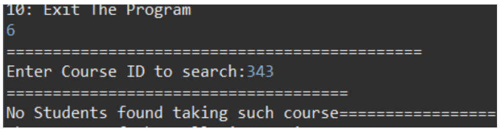
Print Students In Course

The students taking course No 33 are all printed as intended



```
6
=============================================
Enter Course ID to search:33
==================Student=====================
=============================================
ID:     34
First Name is:  ahmed
Last Name is:   kheded
GPA:    3.40
No. Of Courses Enrolled:        5
Course Number 1 ID is 23
Course Number 2 ID is 64
Course Number 3 ID is 333
Course Number 4 ID is 33
Course Number 5 ID is 0
=============================================
==================Student=====================
=============================================
ID:     14
First Name is:  ahmed
Last Name is:   kamek
GPA:    2.00
No. Of Courses Enrolled:        3
Course Number 1 ID is 33
Course Number 2 ID is 44
Course Number 3 ID is 50
=============================================
```

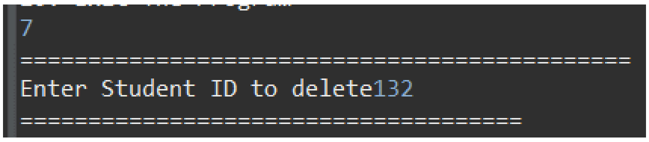
Entering a non-existing course will print the following message:



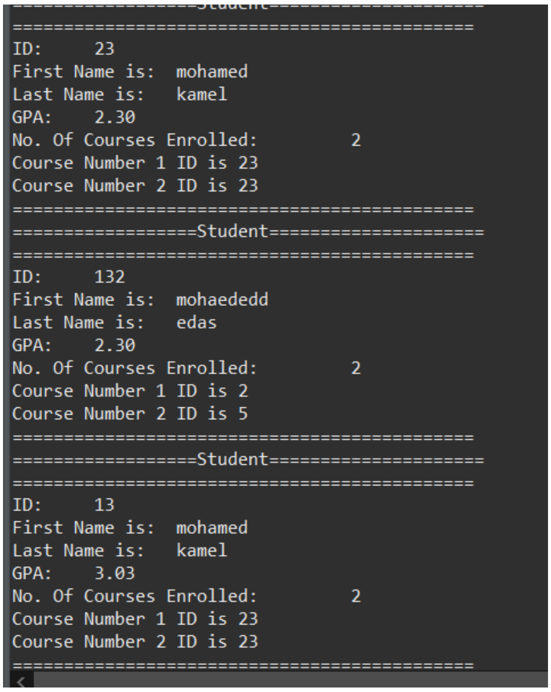
```
10: Exit The Program
6
=============================================
Enter Course ID to search:343
=====================================
No Students found taking such course=================
```

Delete Student By ID

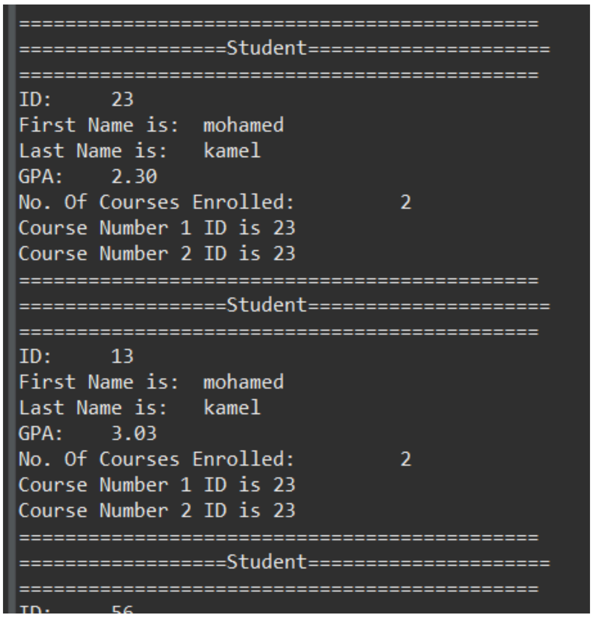
In this test, we delete the student with the ID 132, the lower screenshots show the DB before and after the deletion



```
7
============================================
Enter Student ID to delete132
=====================================
```



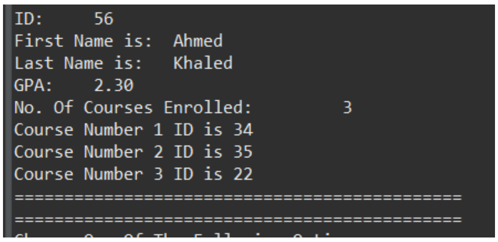
```
============================================
ID:     23
First Name is:  mohamed
Last Name is:   kamel
GPA:    2.30
No. Of Courses Enrolled:        2
Course Number 1 ID is 23
Course Number 2 ID is 23
============================================
=================Student====================
============================================
ID:     132
First Name is:  mohaededd
Last Name is:   edas
GPA:    2.30
No. Of Courses Enrolled:        2
Course Number 1 ID is 2
Course Number 2 ID is 5
============================================
=================Student====================
============================================
ID:     13
First Name is:  mohamed
Last Name is:   kamel
GPA:    3.03
No. Of Courses Enrolled:        2
Course Number 1 ID is 23
Course Number 2 ID is 23
============================================
```



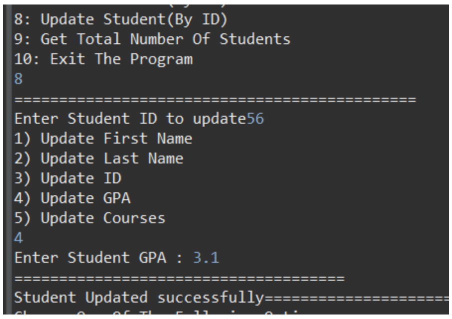
```
============================================
=================Student====================
============================================
ID:     23
First Name is:  mohamed
Last Name is:   kamel
GPA:    2.30
No. Of Courses Enrolled:        2
Course Number 1 ID is 23
Course Number 2 ID is 23
============================================
=================Student====================
============================================
ID:     13
First Name is:  mohamed
Last Name is:   kamel
GPA:    3.03
No. Of Courses Enrolled:        2
Course Number 1 ID is 23
Course Number 2 ID is 23
============================================
=================Student====================
============================================
ID:     56
```

Update Student By ID

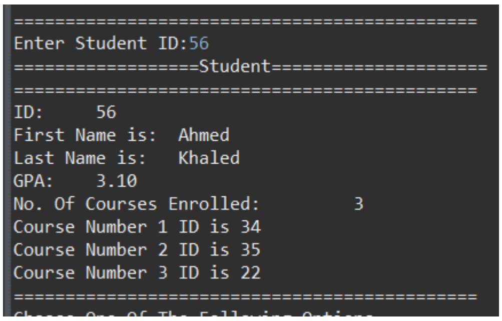
The left-most Screen shows a student we will update, upon entering student ID, we choose what we want to update, the right-most screen shows that the student has been updated successfully



```
ID:     56
First Name is:  Ahmed
Last Name is:   Khaled
GPA:    2.30
No. Of Courses Enrolled:        3
Course Number 1 ID is 34
Course Number 2 ID is 35
Course Number 3 ID is 22
============================================
============================================
```



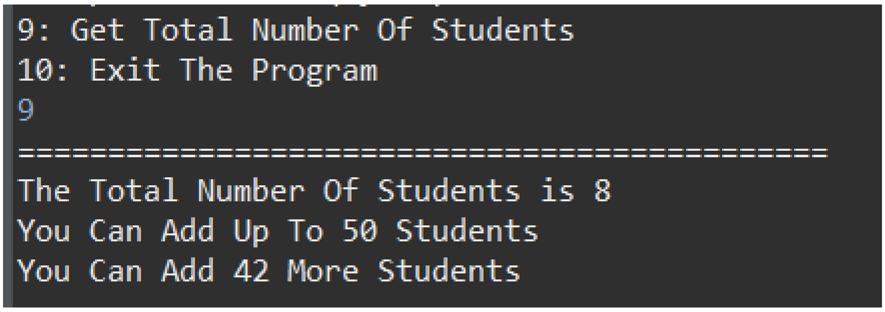
```
8: Update Student(By ID)
9: Get Total Number Of Students
10: Exit The Program
8
============================================
Enter Student ID to update56
1) Update First Name
2) Update Last Name
3) Update ID
4) Update GPA
5) Update Courses
4
Enter Student GPA : 3.1
=====================================
Student Updated successfully===================
```



```
============================================
Enter Student ID:56
=================Student====================
============================================
ID:     56
First Name is:  Ahmed
Last Name is:   Khaled
GPA:    3.10
No. Of Courses Enrolled:        3
Course Number 1 ID is 34
Course Number 2 ID is 35
Course Number 3 ID is 22
============================================
Choose One Of The Following Options
```

Get Total Number Of Students

This functionality shows the number of students in our database



```
9: Get Total Number Of Students
10: Exit The Program
9
=============================================
The Total Number Of Students is 8
You Can Add Up To 50 Students
You Can Add 42 More Students
```