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Design and Implement a Novel Student Information Management System – *Case Study*

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Abstract – There were a number of problems associated with adopted manual methods to manage student information in the Department of Student Affairs in the College of Medicine – University of Diyala, these followed regulations caused delay in the delivery of services to students, inaccuracies in the completion of tasks and so on. A new system designed and implemented by using the tools of Microsoft Visual Studio 2010 (.Net Framework Environment) and Microsoft SQL Server 2008 R2 to solve most of the problems and obstacles resulting from the use of the old methods and techniques. The main work of the software design process included requirements analysis, database description and logical structure design of the data. Database System test results show that the database system meets the requirements of each module with a graphical user interface and simple procedures. Student data can be updated by the administrator of the system efficiently, accurately in a short time and in a flexible manner. Finally concluded that adopted this new database student information management system helps to accomplish the tasks at high speed and accuracy, also helps the management of the college in speed of decision-making, which helps raise the level of performance of the college in general.

Keywords – Database Management System, Student Information System, Graphical User Interface, University of Diyala.

I. INTRODUCTION

Most businesses began, especially in developed countries, to store and save files on the computer since 1960, the experts of computing in the development of theories and methods of how to re-use of files that are stored in the computer, these files are called computerized, that expresses the uses of these files and methods were used to deal with these files. Store large files as a large base and containing all the recorded data, which can be used at a later time, this is called a database (DB). A DB is a shared collection of logically related data and its description, designed to meet the information needs of an organization [1]. Because of the databases are important and influential in all areas and main activities, so it is necessary to adopt a certain system to organize and manage the data stored, therefore this system is called Database Management System, this is a collection of programs that enable to enter, organize and select data in a database [2] and abbreviated as the DBMS. Almost all universities and

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colleges have introduced educational computer systems designed to process their information [3], where the Universities are the main pillar in scientific research and education, and well as in the development and promotion of new talents. The Department of Student Affairs DSA is one of the important sections in college and is a measure of the level of management of the college. Some routine and burdensome works need accuracy and does not contain errors, such as basic information for students, course management, and degree management etc. Staff specialists in this department spend a long time and high efforts in case managing these actions manually. There are unmatched features through the use of computers to manage the information of the student, for instance the speed of the search, security, large memory space, long life, low cost, great reliability and find proper, which can improve the effectiveness of student information management .

The number of students in College of Medicine – University of Diyala increased from a few dozen in previous years to several hundred at the present time, this increase is urged to use modern means in order to manage student information, these modern means and methods represented by using a database system, transforming the work from the traditional and manual ways to a computer-based system. Therefore, in this thesis will take "College of medicine - University of Diyala" one of the public universities in the Republic of Iraq to suggest using DBMS tools and applications to design and implement of student information management system in order to make the process of administration of the DSA much easier and reduce the time needed to carry out its orders in a short time and more efficient that help management of faculty in faster decision-making effectively and efficiently.

A. The Purpose of the Study:

The main purpose from this study is to design database to construct student information management system in the department of student affairs – college of medicine, this system will solve most of the problems and obstacles resulting from the old methods and techniques that have been previously mentioned. Thus transform the work in this department from manually to a computer based-system, which leads to provide accuracy, efficiency, security and so on.

B. The questions that arising from the purpose are:

- How can reduce the errors and inaccuracies in the process of administration students' information.
- How can reduce the time and effort required to do routine operations of the DSA.
- How can support the administration of the college in the decision-making process.
- How can reduce the number of staff that required to implement the tasks of the DSA.

C. The benefit of this study is to achieve the following objectives:

- Raise the level of services provided to students.
- Making all information and data relating to students in one place.
- Speed in completing the tasks of the department.
- Give each student identification number which facilitates the process of administration of information.
- Support the administration of college the ability to speed decision-making.
- This system provides a kind of protection to the data by preventing unauthorized users from accessing to the data stored in the system.
- Since the department suffers from a lack of staff, the adoption of this system does not require a large number of employees.
- All of these goals mentioned above lead to the upgrading of education at the college, which is the main objective of the study.

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II. LITERATURE REVIEW

Literature reviews represent the art of locating substantive information which is unbiased and valid [10]. In the review of the scientific references, whether books or articles that specialized in design and implement of student information management system and database systems design, founded many of the studies and research, including the establishment of an information system for students and following is a summary of each study in terms of its goals and the conclusions reached by.

A. Ahmad, Khan, Abd Alla & Beg, 2010 [4]:

Suggested to design a novel system for students, where alternative and essential solutions was given to solve various problems. Presented the design of the database for student information system, the computerization of the system means to change from manual to a computer-based system, to automate the work and provide precision, efficiency, timelessness, economy and security. Then concluded that a comprehensive database (AMCSIS) for the students was introduced, this system is able to store vast data of the student and generate the report according to the necessity. As well, this system enables to manage the information that carries the feature of easy to use and effective data control. The approach of this system enables the user to get access to data in a flexible way through a graphical user interface an easy to use.

B. Liu, Wang & Zan , 2010 [5]:

This study demonstrates the functional and architecture design of the system, highlights the functionality of the system, database design and functional modules. They concluded that general functions and global variables could be stored in public module throughout projects in Visual Basic and it can be greatly improve the efficiency of the code by calling module functions, variables in the project. The system modules use varieties data in the database often it requires a public data manipulation function to achieve a variety of SQL statements.

C. Eluder, 2011 [6]:

Explained some of problems that related to the management of academic records for students, these problems include faulty registry of the courses, the delay in the results of the students and a lack of precision because of the tedious and manual calculations. Finally, concluded that this system can be of great help in solving some of the problems that have been identified in the management of student affairs and course registration in the academic institution of higher education.

D. Norasiah & Norhayati, 2003 [7]:

Aimed for designing the software for Management 'academic data of students such as status (Fail, Pass, Dismiss,' Cuti Khas') so that it can be generated GPA and CGPA. This information can help the students in the next semester in planning their academic performance. This system is the solution of ineffective student's data and planning study at the faculty of electrical engineering. This technique will increase the effectiveness for the management of academic students in the faculty. In addition, to improve the current manual student's data management.

E. Yu-fang & Yong-sheng , 2009 [8]:

Proposed design and implementation of student information management system in School of Information Science & Engineering of Shandong Normal University. Provides specific realization of each function module, design of database and main techniques used in this system, using ASP.NET technology, Java Script and Visual C# as programing language and these languages in the .NET environment. Concluded that Students can enter personal information on a database college student information management system in accurately and real-timely. Enquire the personal information easily and timely. Decreases the workload on administrators to enter information and enables them to focus on auditing and consulting information.

F. Bharamagoudar, Geeta & Totad, 2013 [9]:

This study proposed to build student information management system, this system has some features, Provides a simple interface for maintenance of student information, It can be used by educational institutes or colleges to maintain the records of students easily, Student information system deals with college details, batch details, academic related reports, and curriculum, and It tracks all the details of a student from the first day to the last day of the course. After that concluded this system can be monitored and controlled remotely, reduces the manpower required, provides accurate information always, and the data which are stored in the repository helps in taking intelligent decisions by the management.

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III. METHODOLOGY

Before starting the process of collecting data for the purpose of analysis and using it in the design of an information system based on the computer, it must first determine the objectives for which this system was found, also determine the necessary requirements in the design of the system. Thus there is a good analysis results in successful design meets with the requirements of the beneficiary body. After having a full awareness of the obstacles and problems facing the staff responsible for the administration of the in the College of Medicine - University of Diyala.

A. Elements of the DBMS Environment:

It has been identified in the DBMS environment five major elements: people, procedures, data, software and hardware.

- **People:** The first component is the people involved with the system. There are four different types of people who are involved in the environment of a DBMS, application developers, database administrators, end-user and database designers.
- **Procedures:** This component refers to the rules and instructions which manages the design and use of the database. The staff and the user of the system who run the database need to document the procedures on how to use or operation of the system. This may be composed of instructions on how to:
    - Use of a particular database management system or application program.
    - Start and stop database management systems.
    - Create backups of the database.
    - Dealing with the failure of software and hardware.
    - Highlight the database across multiple disks, change a table structure, store data to secondary storage and improve performance.
- **Data:** Maybe the most significant part of the DBMS environment is the data, where data is a collection of facts stored in the database**.**
- **Software:** Software element consists of database management system software and application software, in addition to the operating system and contains software network in the case that the DBMS used through the network.
- **Hardware:** The applications and the DBMS need the hardware to run. Hardware can range from a single personal computer to a single central or the network of computers. Hardware depends on the specific requirements of the organization and database management systems are used. In some DBMSs run only on specific operating systems or hardware, while others run on a variety of operating systems and hardware.

B. Requirements Analysis of the System:

After talking with the employee who responsible for the administration of the Department of Student Affairs at the college, it has been determined the required information in the system. This determination is according to the actual needs of the college, the information required for the student database information system are described as follows:

- Student main information.
- Student identity information.
- Student information about secondary (high) school.
- Course information.
- Other information.

Where, student main information includes, student's name (the name of a student consist of first name, father name, grandfather name and the tribe name, these are the components of the name of any citizen in Iraq), birthdate, gender, residence information, race (Iraq is composed of three major ethnic groups of Arab, Kurdish and Turkoman), nationality, religion and contact information (e-mail and phone number). For student identity information (any citizen in Iraq must have a four documents) include, document nationality Information, document certificate of nationality information, ration card information (this document is used for government food aid for citizens) and residence card

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information (this document is used in order to prove the permanent address of the citizen), it is worth mentioning that these documents are used only in Iraq. While student information of secondary school include, school name, exam number, attempt success and secondary certificate information. Course information includes, course name, course units, academic year, year (year is two semesters) and degree.

C. The System Administrator Roles:

As long as the student information management system is a windows application and not on the Internet, the system administrator (the system administrator is an employee of the DSA) holds all rights in the process of adding and modifying the information of the system. These amendments include, information adding, modifying and deleting on students' information, in addition making modifications on course management that including, adding, modifying and deleting courses information also. Figure (1) shows the UML use case diagram for the system administrator roles.

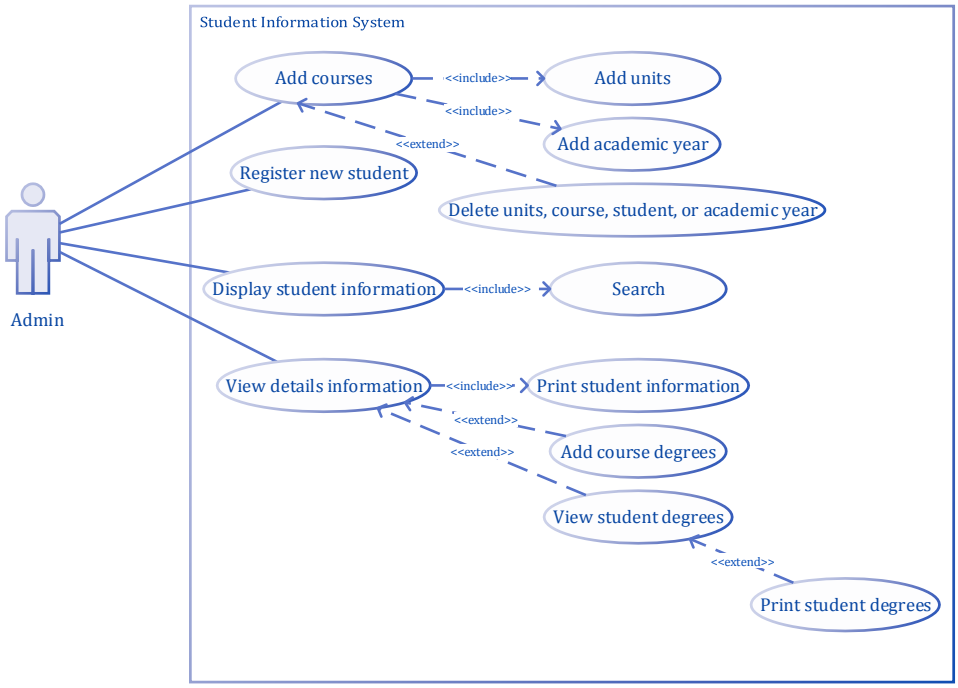

Fig. 1 UML use case diagram for admin roles

D. Database Description:

According to identify the requirements of database student information system, a database of the system consists of four entities “student entity, high school entity, documents entity and course entity”. Entities and their relationship must be designed to meet various types of student information and to design basis for the logical structure later. These entities include varied specific information and interaction each other as information flow. In the following figure (2) shows the ERD of the entities and their relationships.

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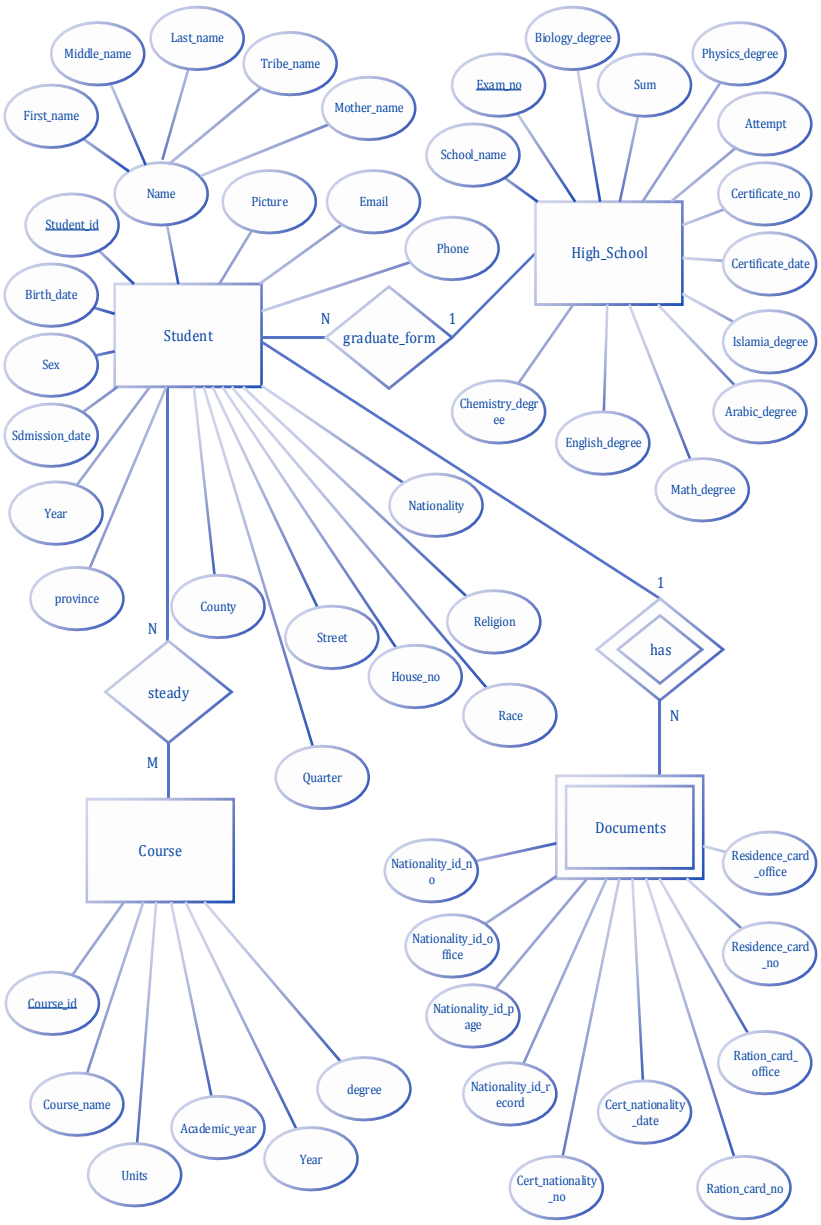

Fig. 2 ER diagram

E. Logical Structure Design of the Data:

In the following tables show the logical construction of the data for the main tables "student basic information, student identity information, student information of secondary school, course, degree", student basic information table shown in table (1), student identity information table shown in table (2), student information of secondary school table shown in table (3) and course table show in table (4):

TABLE 1
STUDENT BASIC INFORMATION

Column name	Data type	Null or Not null	Description
student_id	numeric(18, 0)	not null	enrollment number (pk)
first_name	nchar(10)	not null	student first name
middle_name	nchar(10)	not null	student father's name
last_name	nchar(10)	not null	student grandfather's name
tribe_name	nchar(10)	null	student tribe name
mother_name	nchar(20)	not null	student mother's name
birthdate	date	not null	student's date of birth
sex	nchar(6)	not null	student's gender
admission_date	date	not null	date of registration
year	nchar(10)	not null	student's stage

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province	nchar(10)	not null	name of governorate
county	nchar(10)	Null	name of county
quarter	nchar(10)	Null	name of quarter
street	nchar(10)	Null	name of street
house_no	numeric(18, 0)	Null	number of house
race	nchar(10)	Null	student's race
religion	nchar(10)	Null	student's religion
nationality	nchar(10)	not null	student's nationality
phone	nchar(20)	Null	student's phone number
email	nchar(20)	Null	student's email
picture	image	Null	student's picture

TABLE 2
STUDENT IDENTITY INFORMATION (DOCUMENTS)

Column name	**Data type**	**Null or Not null**	**Description**
nationality_id_no	numeric(18, 0)	null	nationality document number
nationality_id_office	nchar(10)	null	nationality document office
nationality_id_page	nchar(10)	null	nationality document page
nationality_id_record	nchar(10)	null	nationality document record
cert_nationality_no	numeric(18, 0)	null	certificate nationality number
cert_nationality_date	nchar(10)	null	certificate nationality date
ration_card_no	numeric(18, 0)	null	ration card number
ration_card_office	nchar(10)	null	ration card office
residence_card_no	numeric(18, 0)	null	residence card number
residence_card_office	nchar(10)	null	residence card office

TABLE 3
STUDENT INFORMATION OF HIGH SCHOOL

Column name	Data type	Null or Not null	Description
school_name	nchar(30)	not null	student's school name
exam_no	numeric(18, 0)	not null	student's exam number (pk)
attempt	nchar(10)	not null	student's attempt success
certificate_no	numeric(18, 0)	not null	student's certificate number
certificate_date	Date	not null	student's certificate date
islamia_degree	numeric(3, 0)	not null	islamia course degree
arabic_degree	numeric(3, 0)	not null	arabic course degree
math_degree	numeric(3, 0)	not null	mathematics course degree
english_degree	numeric(3, 0)	not null	english course degree
chemistry_degree	numeric(3, 0)	not null	chemistry course degree
physics_degree	numeric(3, 0)	not null	physics course degree
biology_degree	numeric(3, 0)	not null	biology course degree
sum	numeric(3, 0)	not null	total average

TABLE 4
COURSES

Column name	Data type	Null or Not null	Description
course_id	nchar(10)	not null	course number (pk)
course_name	nchar(10)	not null	course name
units	numeric(2, 0)	not null	number of units course
academic_year	nchar(10)	not null	academic year
year	nchar(10)	not null	course stage
degree	numeric(18, 0)	not null	course degree

F. Technologies Chosen to Design and Develop the System:

To design a computer-based system, it must use some modern techniques of computer programs used for this purpose. In the following topics will illustrate these techniques and how to use them to build a student information management system.

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1. *Microsoft SQL Server 2008 R2:*

Microsoft SQL Server 2008 R2 is the most advanced, trusted and scalable data platform released as argued by [10] as of 2010. Building on the success of the original SQL Server 2008 release, SQL Server 2008 R2 has made an impact on organizations worldwide with its innovative capabilities, empowering end users through self-service business intelligence (BI), bolstering efficiency and collaboration between database administrators (DBAs) and application developers and scaling to accommodate the most demanding data workloads. It is a powerful system used to create and manage Relational Database Management System or RDBMS, this system has a lot of features which make it one of the most powerful systems used to create and manage databases. In most relational databases such as SQL Server data is accessed using a query language SQL, or Structured Query Language, this language allows users to query data in addition to the ability to add, change and drop records databases [11].

2. *Microsoft Visual Studio 2010:*

Microsoft Visual Studio 2010 (VS) is an integrated development environment (IDE), it is a set of tools in a single application that help to write programs [12]. Without VS, will be needed to open a text editor, write all of the code and then run a command-line compiler to create an executable application. The issue with the text editor and command-line compiler is that will lose a lot of productivity through manual processes.

IV. RESULTS

In this part will design Graphical User Interface (GUI) to facilitate entering student data by the administrator of the system "The system administrator is an employee of the Department of Student Affairs in the college", also illustrate and design sub interfaces that regarding courses, grades and other student information including information about address, contact and so on.

A. *Main Graphical User Interface:*

The graphical user interface is important to make the user an easy to understand what he need to do in order to use the program. To make the GUI functions work properly, must insert Microsoft Visual Studio coding of its elements. The main interface of the system contains all the sub- interfaces, sub-interfaces are three admin form, register new student and display student information. Figure (3) shows the main interface of the student information system.

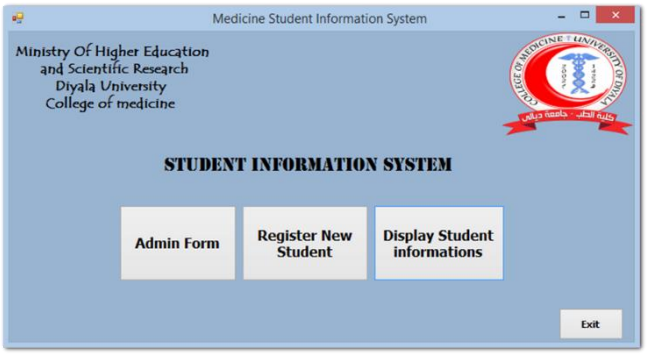

Fig. 3 Main interface

B. *Admin Form:*

The sub-interface "Admin Form" consist of three tabs, first one named as "courses", this tab for adding courses for each stage and all academic years, also contains a button called "show all course" to show all the courses that has entered by an administrator ,the following figure (4) shows this tab.

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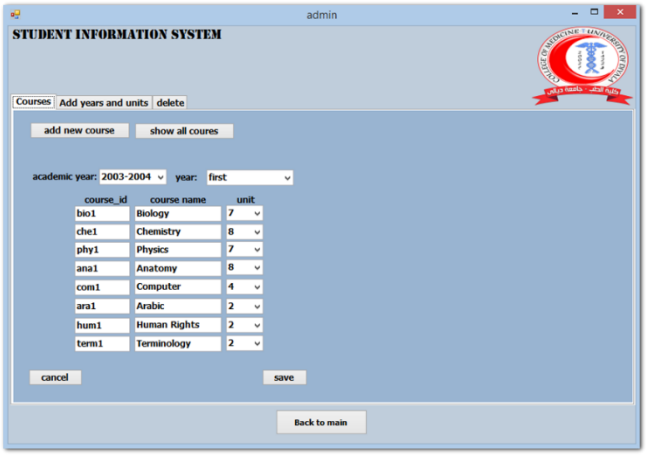

Fig. 4 Admin form

C. Register New Student:

This sub-interface consists of several forms prepared to insert the new student information, these information includes:

- Student basic information.
- Identity and contact information.
- Previous school information.
- Picture of student.

The following figures (5), (6), (7) and (8) show the four forms that mentioned above respectively:

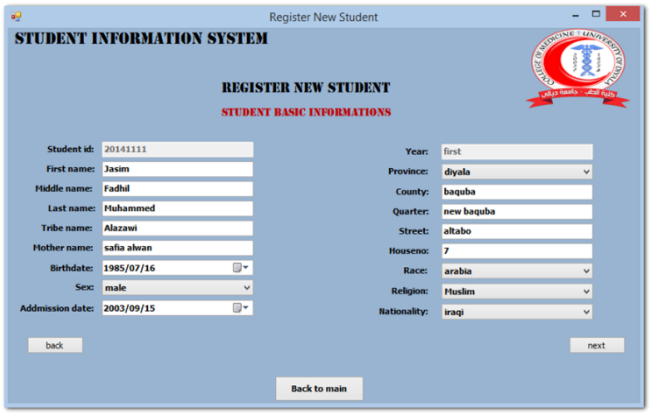

Fig. 6 Student basic information form

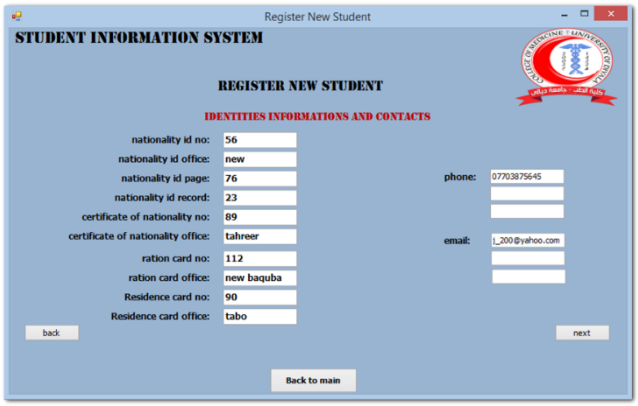

Fig. 6 Student identity information form

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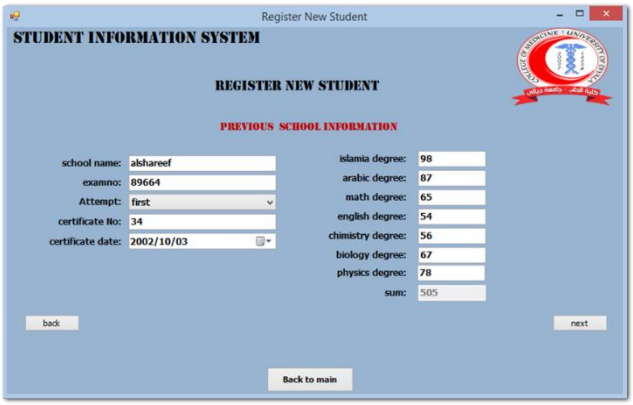

Fig. 7 Previous school information form

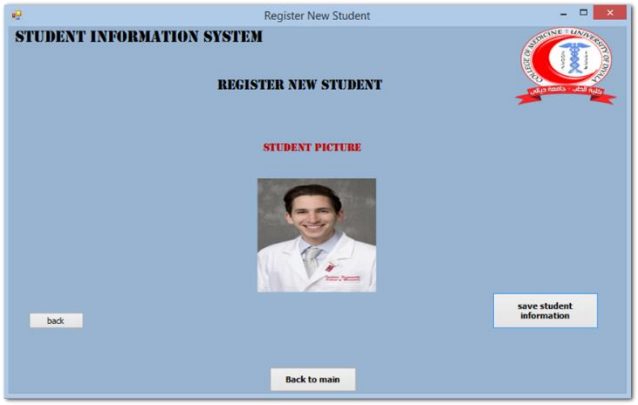

Fig. 8 Adding student picture form

D. Display Student Information:

The last sub-interface of the system is for displaying and printing student information, in addition to enter some information related to the student degrees in the courses that he studied. Figure (9) shows a list of all students, besides to the possibility of the search for any student in the system. This search is done by student ID or by the name of the student, with the addition of another way to search named as filtering, these filtering through student stage and admission date for the student.

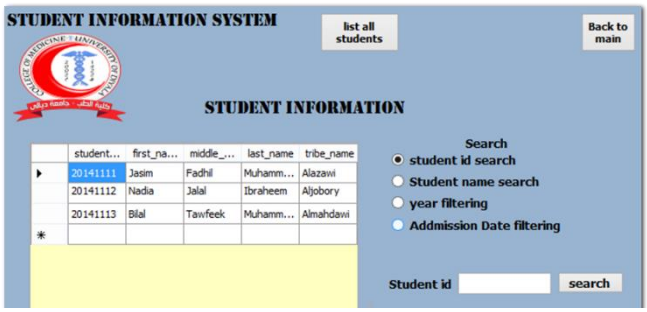

Fig. 9 List of all students

In case we want to display the details of the student information, that include student basic information, identity and contact information and previous school information that has been inserted previously, press on a student ID to open those details for student information as shown as in the figure (10).

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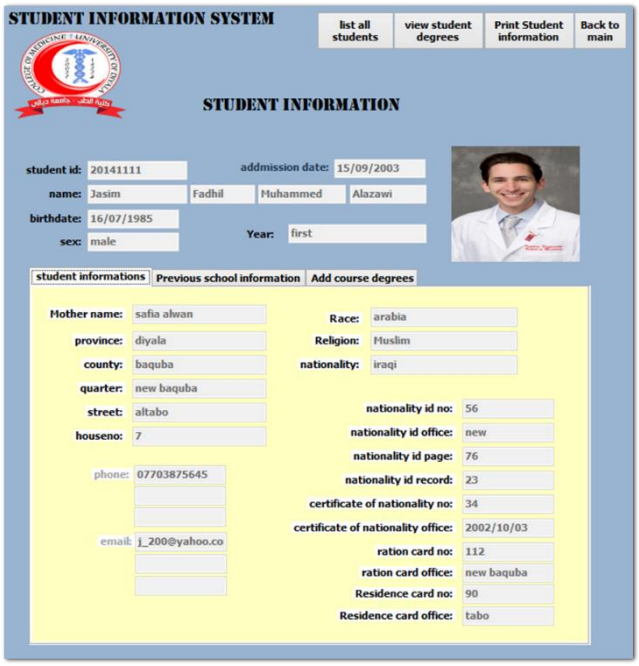

Fig. 10 Student details information

V. CONCLUSION

In this study we have introduced a database management system for students in College of Medicine - University of Diyala. The main objective to design and carry out this system is to collect students' data in one place and making various transactions and modifications on it and retrieve this data according to the need of generating the report, this objective as well as the functions for which they were designed this system has been achieved. This system will transfer the work in this department from the manual to the computer-based system and is able to store huge data of the students, also enables the user to get access to data through a user-friendly interface. In addition, this system can promote the management of college to carry out its tasks high efficiently

.

Student Information System can reduce time and effort required in the process of management students' information, also the need for a large number of staff to carry out the functions of the DSA, where the management of this system needs to only one employee, furthermore it will help the administration of the college to speed decision-making, where this system has made it possible for the administration of the college to use real-time data when making decisions, which flows into the benefit of the college. The characteristics of this system is the answer for all the questions raised from the purpose of this study.

For further recommendations, linking Student Information Management System (SIMS) with the college's website enable the student to directly access all aspects of his academic study through the online interface embedded on the college website. This online system can use a user authentication, where every student has a username and password to display his information and give requests online thus reducing time processing. Additionally, students can be involved in operations of updating and modifying his information, which leads to faster order fulfillment.

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REFERENCES

1. **Connolly T. M. and Begg C. E., (2010),** Dabases Systems: A Practical Approach to Design, Implementation and Management, 5th ed., Boston: Pearson, pp. 340-344.
2. http://www.webopedia.com. (Data Download Date: 3 Nisan 2014).
3. **Shimozono K., Itsukiy M., Harasaka Y. and Furukawa Z., (2010)**, "User Management in an Educational Computer System: Personal Information Management," Fukuoka, Japan, pp. 1-6.
4. **Ahmad N. A., Khan N., Abd Alla A. N. and Beg A. H., (2010)**, "A Novel Database Design for Student Information System," Journal of Computer Science, Pahang, Malaysia, vol. 6, no. 1, pp. 43-46 .
5. **Liu Z., Wang H. and Zan H., (2010)**, "Design and Implementation of Student Information Management System," International Symposium on Intelligence Information Processing and Trusted Computing, China, pp. 607-610 .
6. **Eludire A., (2011)**, "The Design and Implementation of Student Academic Record Management System," Research Journal of Applied Sciences, Engineering and Technology, Osun State, Nigeria, vol. 3, no. 8, pp. 707-712 .
7. **Norasiah M. A. and Norhayati A., (2003)**, "Intelligent Student Information System," in 4th National Conference on Telecommunication Technology Proceedings, Shah Alam, Malaysia, pp. 212-215.
8. **Yu-fang T. and Yong-sheng Z., (2009)**, "Design and Implementation of College Student Information Management System Based on Web Services," IEEE, China, pp. 1044-1048.
9. **Bharamagoudar S. R., Geeta R. B. and Totad S. G., (2013)**, "Web Based Student Information Management System," International Journal of Advanced Research in Computer and Communication Engineering, vol. 2, no. 6, pp. 2342-2348.
10. **Mistry R. and Misner S., (2010)**, "Introducing Microsoft Sql Server 2008 R2", Redmond, Washington: Microsoft Corporation, pp. 3-10 .
11. http://www.pclabacademy.com. (Data Download Date: 15 May 2014).
12. **Mayo J., (2010), "Microsoft Visual Studio 2010"**, New York, United States: The McGraw-Hill Companies, pp. 3-5.

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