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Graduate Student Management System: Enhancing Organization in the Academic Department

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***Abstract* - Academic institutions face difficulties with their graduate student management systems since these operations rely on old systems that limit effective decision-making while preventing student tracking and reducing organizational performance. A comprehensive Graduate Student Management System (GSMS) has been designed to simplify administrative procedures throughout higher education institutions per this study. The digital platform provides students and administrators with an effective means to handle data for all three academic levels: diplomas, masters and doctoral studies. The system's client-server foundation guarantees its large-scale capabilities as well as long-term sustainability and encryped security capabilities through strong user verification methods. The GSMS's capability to automate fundamental operations from registration processing to academic tracking and report manufacturing decreases administrative pressure and strengthens tracking functions while optimizing decision capabilities. The system design provides immediate access to crucial student data which enables both faculty members and administrators to provide instant direction to students. The system runs on a structured relational database which combines essential student records to deliver effortless access to database information. The deployment of SQL Server creates both fast system performance and reliable data security whereas easy-to-use navigation elements make the system easy for users to exploit. The research shows digital transformation plays a vital role in academic management through its ability to create efficiently designed student management systems which ultimately improve both organizational productivity and system-wide resource efficiency and student satisfaction. Future research needs to investigate the potential benefits of implementing AI analysis solutions to strengthen student assistance programs.**

Keywords: Graduate Student Management System; Organization; Quality; and Student Management.

I. INTRODUCTION

Defects in student affairs management systems plague the graduate studies department at many institutions, making it challenging to monitor the status of the educational process and give students the help they need. The goal of this project is to create a complete and integrated management system for graduate student affairs, encompassing master's, doctoral, and certificate programs. In order to improve the overall student experience and make it easier for academic staff to guide and monitor each student, the suggested system aims to offer an efficient and user-friendly method for recording crucial administrative data.

This technology is regarded as a cutting-edge technical fix for an ongoing administrative issue in settings related to higher education. Effective technical solutions are needed to address the growing issues in academic data management. Can enhance student satisfaction with the services received and the effectiveness of administrative procedures. The management of student data presents comparable difficulties for many colleges, which leads to the hunt for more effective technical solutions. Because of its scalability and maintainability, the client-server architecture is a commonly used paradigm for web applications, and this is what the system will use [5]. This design divides data processing and storage (back-end) from the user interface (front-end). User interaction and information presentation will be managed by the front-end, which is available through web browsers on various platforms (desktops, laptops, tablets, and smartphones). The web server's back-end will handle database interactions, system logic, and data processing. The front-end and back-end components may be developed and updated independently because to this division, which improves modularity. Additionally, effective client-server architecture makes it simpler to scale to handle an increase in the volume of data and the number of users [1]. The client-server architectural selection ensures flexibility and maintainability and is also consistent with contemporary best practices in web application development [2]. Security will be given top priority in the system architecture, which will include robust authorization and authentication procedures to safeguard student data [18]. To further improve security, data encryption will be used both in transit and at rest.

1.1 The problem

The primary issue is the scientific department's absence of an integrated computerized system for handling graduate student matters, which results in a number of administrative and instructional difficulties:

Tracking administrative data may be challenging: Tracking crucial administrative information for every student, including registration dates, exam results, extension dates, and administrative permissions, is a challenge for the department. Delays in making crucial choices pertaining to pupils and information shortages result from this. Monitoring and assessing pupils is made more difficult in the absence of an integrated system.

Decision-making that moves slowly: Delays in student-related decision-making, such allowing extensions, upgrading registration, or authorizing the discussion of scientific theses, result from a lack of data in an easily accessible and organized format. The pace at which administrative duties are completed is adversely affected by this delay.

Weakness in the advice and monitoring process: The lack of an integrated system makes it more difficult for academic staff to guide and monitor students, which have an impact on their academic performance and academic advancement. This shortcoming makes it challenging to give kids the assistance they require.

Not giving students a satisfying experience: The total student experience is impacted by the administrative system's inefficiency, which might result in a decline in satisfaction with the services received as well as a detrimental effect on motivation and study zeal. Achieving success in educational institutions requires offering a favorable student experience.

Increased workload: Managing student matters through traditional means puts more strain on staff members, which lowers their productivity and efficiency. An integrated management system eases this load and gives workers more time to concentrate on other duties.

1.2 Objectives

The creation of a complete and integrated management system: With an emphasis on usability, effectiveness, and security, develop an integrated electronic system to oversee the affairs of postgraduate students enrolled in master's, doctorate, and certificate programs.

Provide a user-friendly interface: Provide academic staff with an intuitive and simple-to-use user interface that makes it easier to manage students' administrative information and check in on their status.

Enhance the process of monitoring and guiding: Report student performance in a thorough and accurate manner, assisting academic staff in offering the assistance and direction they require.

Improve the educational experience for students: Make information and services easier to obtain, and provide a more productive and encouraging learning environment.

Boost administrative procedures' effectiveness: Staff members can devote more time to their other responsibilities if they spend less time and effort on student affairs.

II. THE THEORETICAL BASES

We improve the entire educational experience for students. This system is a cutting-edge technology fix for a higher education administrative issue. The growing demands of academic data management necessitate efficient technical solutions. This support improved satisfaction with the services received and efficient administrative procedures.

This study adds to: Offering a suitable solution: addressing the issue of graduate student affairs with a workable technical solution that satisfies the demands of the scientific department and boosts productivity.[3]

Enhancing productivity: Increasing the effectiveness of administrative procedures and cutting down on the time and effort required for them results in increased worker productivity.

Improving supervision and direction: enhancing the process of student supervision and guiding, which helps students perform better academically and advance in their studies.

A satisfying experience for students: establishing a more efficient and encouraging learning environment and making it easier for students to obtain information and services in order to improve their overall experience. Contributing to the advancement of the educational system is the addition of new knowledge in the field of information technology in higher education. [4].

III. THE PROPOSED METHODOLOGY

This chapter aims to present a detailed analysis of the graduate student affairs management system in the scientific department, starting from defining the objectives and requirements, through designing the database and explaining its components.

3.1 SQL Server was chosen to store student data for the (diploma, master's, and doctoral) programs, ensuring easy access to them, and performing operations on them quickly and efficiently. A reporting system supported by a special table (counter) was also developed to ensure tracking and accurately managing report releases.

3.2 Building the database

In order to provide an integrated system, it was necessary to design a central database that collects data for the three programs, in addition to an additional table dedicated to managing reports.

3.2.1 Report control table (counter)

- Table name: counter
- Purpose: Tracking the release of reports, and recording the current number of report releases.
- Columns:
  1. I: Serial identifier (automatic) used as a basic number for each entry.
  2. Count: To save the current report number, and it is automatically incremented when a new report is issued.

This table provides a flexible mechanism for managing report numbers, and helps prevent duplication or overlap between them, which makes it easier to archive reports and refer to them later.

3.2.2 Tables of the three study programs

(1) Diploma Table DIP

- Table name: DIP
- Purpose: To store academic and administrative data for diploma students.
- Columns (most important):
  1. **StudentID:** The unique student number (primary key).
  2. **StartDate:** The date the student started in the department.
  3. **AdminOrderNumberDate:** The number and date of the administrative order to start.
  4. **AdmissionYear:** The year of admission.
  5. **AdmissionChannel:** The admission channel (general/private…).
  6. **Course1Result / Course2Result:** The result of the first and second semesters.
  7. **SecondRoundResult:** The result of the second round (if any).
  8. **CancelOrderNumberDate:** The number and date of the administrative order to promote the registration (if any).
  9. **SupervisorOrderNumberDate / SupervisorName:** The supervisor’s name data.
  10. **StudyEndDate:** The date of completion of studies in the diploma.
  11. **ExtensionOrder1 / ExtensionOrder2 / ExtensionOrder3:** Extension orders.
  12. **DiscussionOrderNumberDate / DiscussionCommittee:** Discussion data.
  13. **CertificateOrderNumberDate:** Number and date of the administrative order granting the certificate.
  14. **Student_name:** Student name

(2) MASTER Schedule

- Table name: MASTER
- Purpose: Preserving academic and administrative data for master's students.
- Columns (The most important):
  1. **StudentID:** The master key for each student.
  2. **StartDate,AdminOrderNumberDate,AdmissionYear,AdmissionChannel:** Direct data of the student, channel and year of admission.
  3. **Course1Result/ Course2Result / SecondRoundResult:** Course results, including second round.
  4. **CancelOrderNumberDateUpgrade** the record, if any.
  5. **SupervisorOrderNumberDate/SupervisorName:** Supervisor name information.
  6. **StudyEndDate:** Master's degree completion date.
  7. **ExtensionOrder1/ExtensionOrder2/ExtensionOrder3:** Extensions.
  8. **DiscussionOrderNumberDate/DiscussionCommittee:** Discussion details.
  9. **CertificateOrderNumberDateAdministrative** order to grant the certificate.
  10. **Student_name:** Student's full name.

(3) Doctoral Schedule

- Table name:DOCTOR
- Purpose: Maintaining PhD student data, which includes additional details about comprehensive exams.
- The most important columns:
  1. **StudentID:** Master key.
  2. **StudentStartDate/AdminOrderNumberDate / AdmissionYear / AdmissionChannel:** Admission and admission data.
  3. **Course1Result/ Course2Result / SecondRoundResult:** Course results.

4. **ComprehensiveExamOrder1/ ComprehensiveExamResult1 / ComprehensiveExamOrder2 / ComprehensiveExamResult2:** Comprehensive exam data (first and second terms).
5. **CancelOrderNumberDateAdministrative** order to upgrade the registration, if any.
6. **SupervisorOrderNumberDate/SupervisorName:** Supervisor name details.
7. **StudyEndDate:** End of study date.
8. **ExtensionOrder1/ExtensionOrder2/ExtensionOrder3:** Extension orders.
9. **DiscussionOrderNumberDate/DiscussionCommittee:** Discussion information.
10. **CertificateOrderNumberDateAdministrative** order to grant the certificate.
11. **Student_name:** Student's name.

3.3 Design the relational model of relationships

The relational model is based on separating data into different tables according to their subject (diploma, master's, doctorate, reports), with linking them to primary keys.(StudentID) to ensure data integrity and facilitate query operations.

- Data for a specific student is requested from the appropriate table according to the program (Diploma/Master's/PhD).
- Stores table counter Automatic numbering of reports, thanks to columns (I, count).

3.4 Interface Design (System Analysis Summary)

The design concluded that there should be a separate interface for each table:

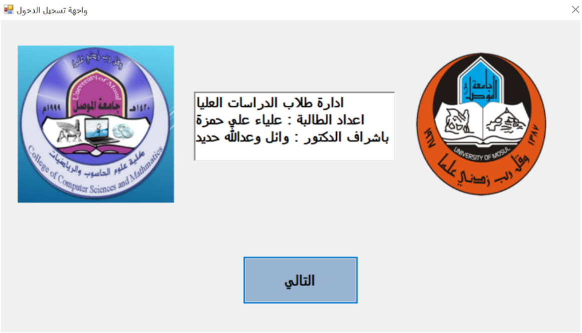
1. Diploma Management InterfaceView, add, edit, and delete diploma student data.
2. Master Management Interface: Similar to a diploma, with additional research details if applicable.
3. PhD Management InterfaceIncludes comprehensive exam fields and results.
4. Reports interface: Generate reports with updated counter table value.

These interfaces are used to link tables together within a single integrated system that maintains the confidentiality and privacy of each table according to the program.

3.5 System Interfaces

The system consists of several interfaces designed to facilitate dealing with the system's functions.

3.5.1 The login interface contains the college and department logo, information about the student and supervisor, and contains a (Next) button that takes the user to the main interface.



ادارة طلاب الدراسات العليا
اعداد الطالبة : علياء علي حمزة
باشراف الدكتور : وائل وعدالله حديد

Figure (3.1): Login interface

3.5.2 Main interface of the application

The interface contains five buttons named (Diploma, Master's, Doctorate, Reports, Log Out).

Each of these buttons takes the user to a specific interface that performs the functions of adding, displaying, and modifying students according to the stage we have moved to, or performs the functions of search filters and reports if we have chosen search filters. There is also a logout button that stops the program from running when pressed.

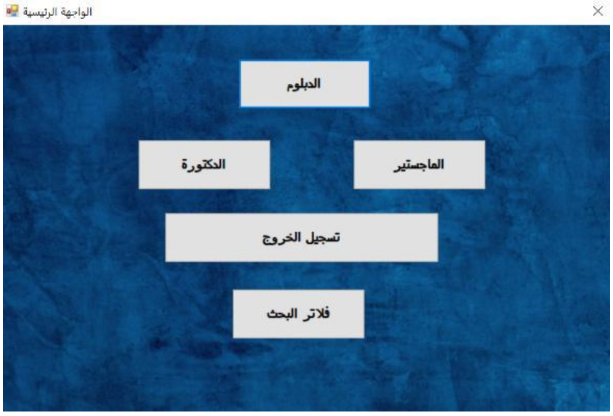


Figure (3.2): The main interface that connects all sections of the application

3.5.3 Main interface for managing diploma students

This interface contains an Add Student button that takes us to a new interface that allows us to add a new student and save his data in the database, an interface to display all diploma students that allows us to display and view all students, and an interface to modify diploma students that allows us to search for the student and update his data, and there is a button to return to the home page.

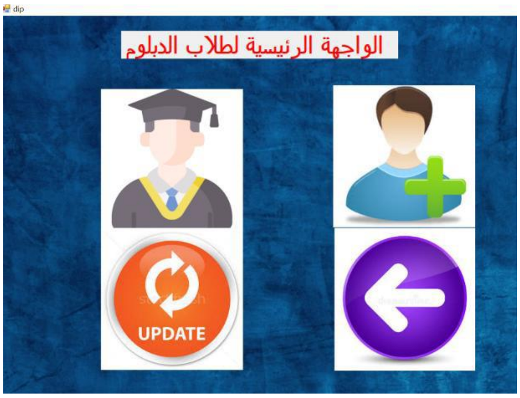


Figure (3.3): Diploma Student Management Interface

3.5.4 Diploma Students Addition Interface

The Diploma Student Addition interface is used to enter and save new student data in the database in an organized and fast manner. It contains an add button and a return button to the diploma students management interface.

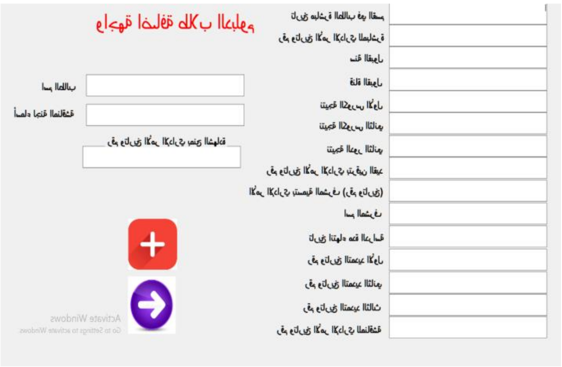


Figure (3.4): Interface for adding diploma students

3.5.5 All Diploma Students Display Interface

The View All Diploma Students interface is used to display a complete list of enrolled students.

Figure (3.5): Diploma students display interface

3.5.6 Diploma Students Editing Interface

The Diploma Students Editing Interface allows searching for a specific student using his unique number, with the ability to update his data or delete him from the database.

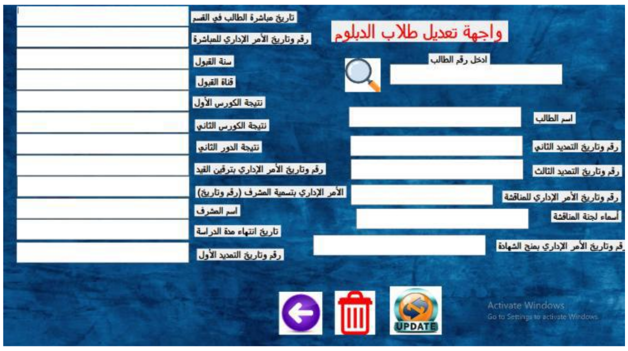

واجهة تعديل طلاب الدبلوم
ادخل رقم الطالب
اسم الطالب
رقم وتاريخ التمديد الثاني
رقم وتاريخ التمديد الثالث
رقم وتاريخ الأمر الإداري للمناقشة
أسماء لجنة المناقشة
رقم وتاريخ الأمر الإداري بمنح الشهادة
تاريخ مباشرة الطالب في القسم
رقم وتاريخ الأمر الإداري للمباشرة
سنة القبول
قناة القبول
نتيجة الكورس الأول
نتيجة الكورس الثاني
نتيجة الدور الثاني
رقم وتاريخ الأمر الإداري بترقين القيد
الأمر الإداري بتسمية المشرف (رقم وتاريخ)
اسم المشرف
تاريخ انتهاء مدة الدراسة
رقم وتاريخ التمديد الأول
UPDATE

Figure (3.6): Diploma students' modification interface

3.5.7 Main interface for managing master's students

The interface contains an Add Student button that takes us to a new interface that allows us to easily add a master's student and save him in the database. It also contains a Show All Students button that enables us to view and watch all students, an Edit Master's Students interface that enables us to update the data of master's students or delete them from the database, and a Back button that takes us back to the main interface of the application.

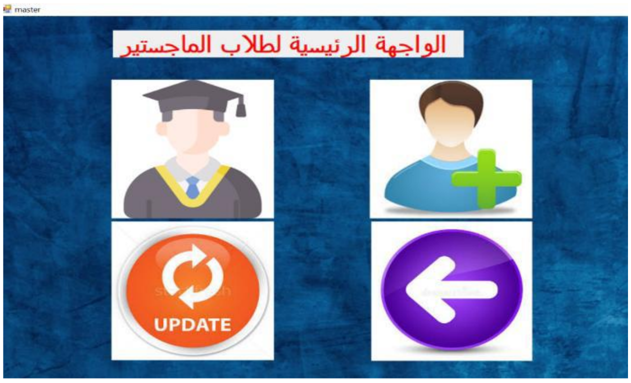


Figure (3.7): The main interface for managing master's students

3.5.8 Masters Students Addition Interface

Where the Masters Student Addition interface allows you to enter new student data, such as personal information, admission data, and research details, and then save it in the database.

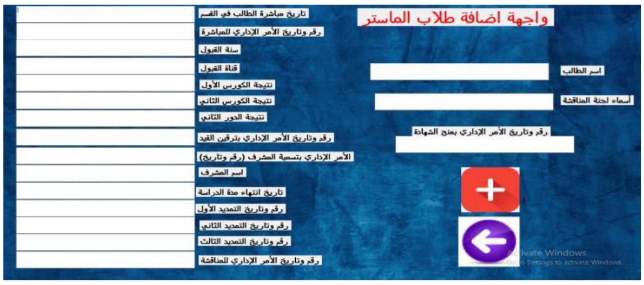
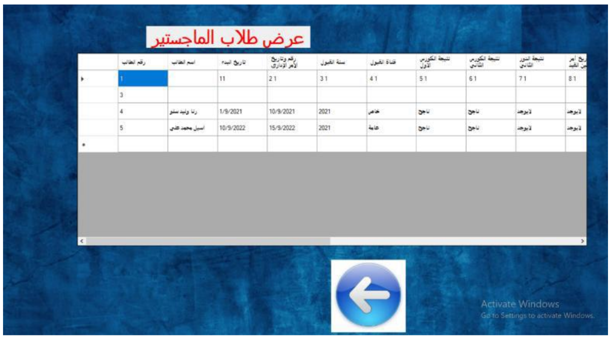

واجهة اضافة طلاب الماستر
اسم الطالب
أسماء لجنة المناقشة
رقم وتاريخ الأمر الإداري بمنح الشهادة
تاريخ مباشرة الطالب في القسم
رقم وتاريخ الأمر الإداري للمباشرة
سنة القبول
قناة القبول
نتيجة الكورس الأول
نتيجة الكورس الثاني
نتيجة الدور الثاني
رقم وتاريخ الأمر الإداري بترقين القيد
الأمر الإداري بتسمية المشرف (رقم وتاريخ)
اسم المشرف
تاريخ انتهاء مدة الدراسة
رقم وتاريخ التمديد الأول
رقم وتاريخ التمديد الثاني
رقم وتاريخ التمديد الثالث
رقم وتاريخ الأمر الإداري للمناقشة

Figure (3.8): Interface for adding master's students

3.5.9 Masters Students Display Interface

The Masters Students View interface allows viewing of all registered students' data. And watching them



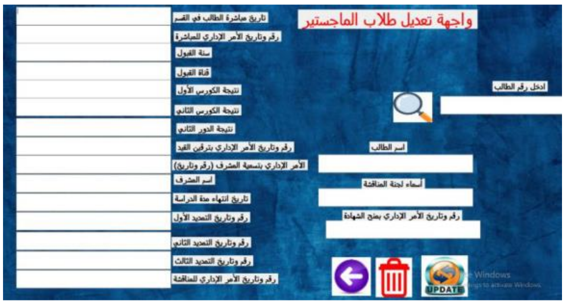
عرض طلاب الماجستير

رقم الطالب	اسم الطالب	تاريخ البدء	رقم وتاريخ الأمر الإداري	سنة القبول	قناة القبول	نتيجة الكورس الأول	نتيجة الكورس الثاني	نتيجة الدور الثاني	ريخ أمر ين القيد
1		11	21	31	41	51	61	71	81
3									
4	رنا وليد سلو	1/9/2021	10/9/2021	2021	خاص	ناجح	ناجح	لايوجد	لايوجد
5	أسيل محمد علي	10/9/2022	15/9/2022	2021	عامة	ناجح	ناجح	لايوجد	لايوجد

Figure (3.9): Master's students' display interface

3.5.10 Master's Students Editing Interface

The Master's Students Editing interface allows you to search for a specific student, update his academic and administrative data, or delete him from the system when needed.



واجهة تعديل طلاب الماجستير
تاريخ مباشرة الطالب في القسم
رقم وتاريخ الأمر الإداري للمباشرة
سنة القبول
قناة القبول
نتيجة الكورس الأول
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رقم وتاريخ الأمر الإداري بترقين القيد
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رقم وتاريخ التمديد الثالث
رقم وتاريخ الأمر الإداري للمناقشة
ادخل رقم الطالب
اسم الطالب
أسماء لجنة المناقشة
رقم وتاريخ الأمر الإداري بمنح الشهادة
UPDATE

Figure (3.10): Master's students' modification interface

3.5.11 The main interface for managing doctoral students

The main interface for managing PhD students allows full control over student data, as it contains buttons to add a new student, view all students, and modify or delete student data, with a button to return to the home page..

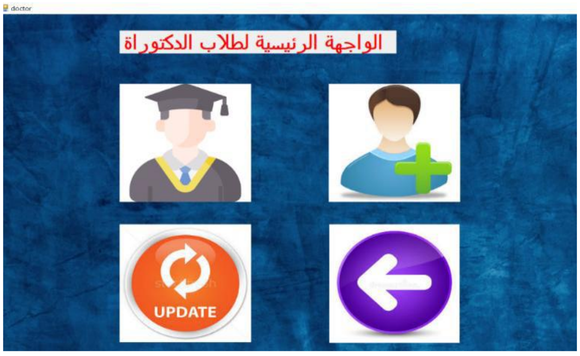
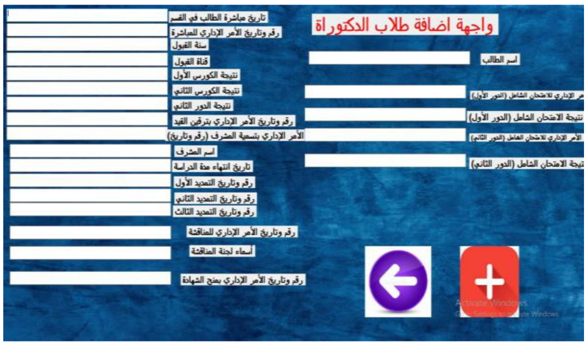


Figure (3.11): The main interface for managing doctoral students

3.5.12 Add PhD Student Interface

The PhD student add interface allows for the entry of basic student data, including admission information, supervisor, comprehensive exam, extensions, discussion orders and certificate, with the option to save data in the database.



واجهة اضافة طلاب الدكتوراة
تاريخ مباشرة الطالب في القسم
رقم وتاريخ الأمر الإداري للمباشرة
سنة القبول
قناة القبول
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رقم وتاريخ الأمر الإداري بترقين القيد
الأمر الإداري بتسمية المشرف (رقم وتاريخ)
اسم المشرف
تاريخ انتهاء مدة الدراسة
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رقم وتاريخ التمديد الثاني
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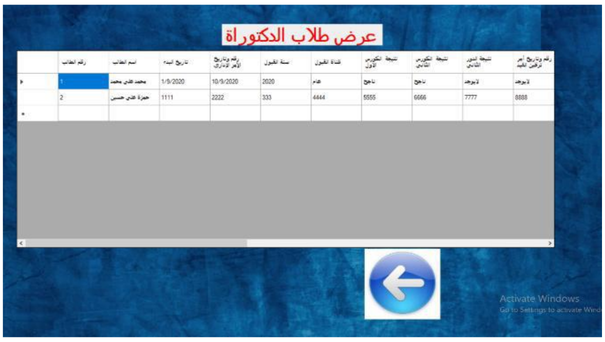
أسماء لجنة المناقشة
رقم وتاريخ الأمر الإداري بمنح الشهادة
اسم الطالب
مر الإداري للامتحان الشامل (الدور الأول)
نتيجة الامتحان الشامل (الدور الأول)
الأمر الإداري للامتحان الشامل (الدور الثاني)
تيجة الامتحان الشامل (الدور الثاني)
Activate Windows

Figure (3.12): Interface for adding doctoral students

3.5.13 PhD Student Display Interface

The PhD Students View interface allows the user to view all PhD students registered in the system.



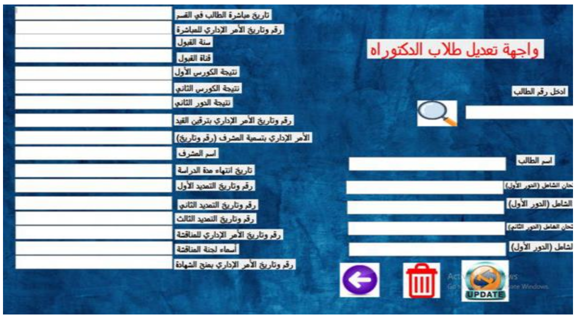
عرض طلاب الدكتوراة

رقم الطالب	اسم الطالب	تاريخ البدء	رقم وتاريخ الأمر الإداري	سنة القبول	قناة القبول	نتيجة الكورس الأول	نتيجة الكورس الثاني	نتيجة الدور الثاني	رقم وتاريخ أمر ترقين القيد
1	محمد علي محمد	1/9/2020	10/9/2020	2020	عام	ناجح	ناجح	لايوجد	لايوجد
2	حمزة علي حسين	1111	2222	333	4444	5555	6666	7777	8888

Figure (3.13): PhD students' display interface

3.5.14 PhD Student Editing Interface

The Edit PhD Student interface allows the user to search for a specific student using the unique number, and then update his data or delete his record from the database as needed.



واجهة تعديل طلاب الدكتوراه
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الأمر الإداري بتسمية المشرف (رقم وتاريخ)
اسم المشرف
تاريخ انتهاء مدة الدراسة
رقم وتاريخ التمديد الأول
رقم وتاريخ التمديد الثاني
رقم وتاريخ التمديد الثالث
رقم وتاريخ الأمر الإداري للمناقشة
أسماء لجنة المناقشة
رقم وتاريخ الأمر الإداري بمنح الشهادة
ادخل رقم الطالب
اسم الطالب
حان الشامل (الدور الأول)
الشامل (الدور الأول)
حان الشامل (الدور الثاني)
الشامل (الدور الأول)
UPDATE

Figure (3.14): PhD students' modification interface

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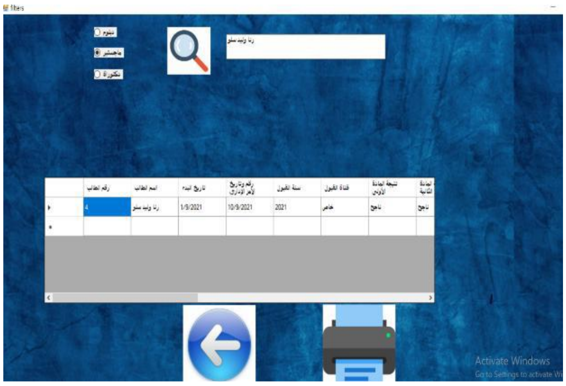
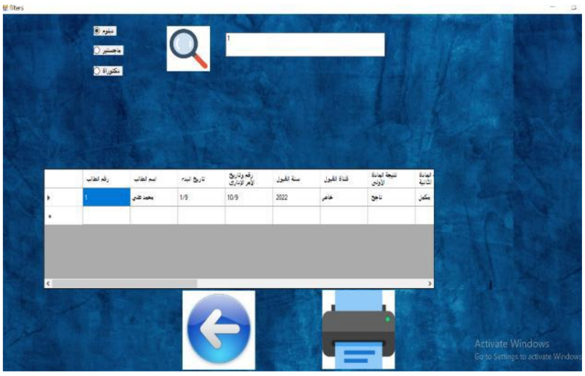
3.5.15 Search and filter interface

The search and filter interface allows the user to enter the student's name or unique number, then select the academic program (diploma, master's, doctorate) to retrieve his data and display it in an organized manner in DataGridView, making it easy to access the required information quickly and accurately. The result can be printed as a neat and approved report.



رقم الطالب	اسم الطالب	تاريخ البدء	رقم وتاريخ الأمر الإداري	سنة القبول	قناة القبول	نتيجة المادة الأولى	المادة الثانية
4	رنا وليد سلو	1/9/2021	10/9/2021	2021	خاص	ناجح	ناجح

Figure (3.15): Search and filter interface by student name



رقم الطالب	اسم الطالب	تاريخ البدء	رقم وتاريخ الأمر الإداري	سنة القبول	قناة القبول	نتيجة المادة الأولى	المادة الثانية
1	محمد علي	1/9	10/9	2022	خاص	ناجح	مكمل

Figure (3.16): Search and filter interface by student number

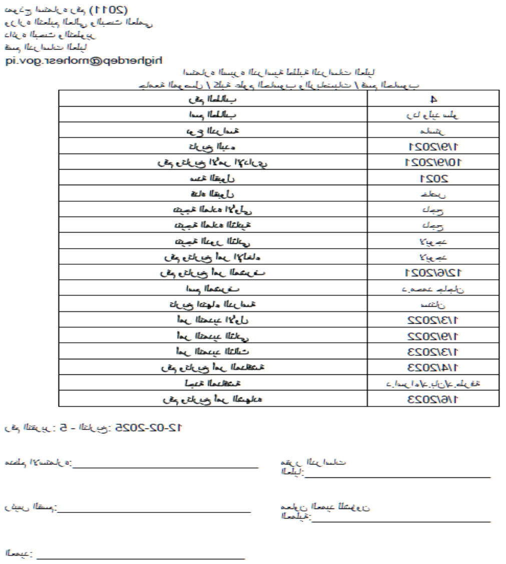


Figure (3.17): Saving the student report as a document to print it later in paper form

IV. IMPLEMENTING THE SYSTEM AND DISCUSSING THE RESULTS

4.1 Introduction

This chapter focuses on the practical side of the system, where the steps for actually creating tables are reviewed.SQL Server, and link it to the application C#, creating user interfaces and enabling them to perform searches and generate reports. The chapter concludes with a discussion of the results obtained and the benefits gained.

4.2 Database Implementation

4.2.1 Creating tables

UsingSQL Server, the following steps were followed:

1. Create a database student:

```
sql
CopyEdit
CREATE DATABASE student;
```

2. Create a table counter:

```
sql
CopyEdit
CREATE TABLE [student].[dbo].[counter] (
   [I] INT IDENTITY(1,1) PRIMARY KEY,
   [cont] INT NULL,
   [count] INT NULL
);
```

3. Create a table DIP:

```
sql
CopyEdit
CREATE TABLE [student].[dbo].[DIP] (
   [StudentID] INT PRIMARY KEY,
   [StartDate] DATE NULL,
   [AdminOrderNumberDate] VARCHAR(50) NULL,
   ...
   [Student_name] VARCHAR(100) NULL
);
```

Each field is defined by the appropriate size and type. Tables are similar. MASTER and DOCTOR in their structure with minor changes

4.2.2 Filling in the data

- Manual entry: Through the SQL Server Management Studio interface or the (INSERT) commands.

- Import external filesIf you have ready-made data in Excel or CSV, you can import it after matching the columns.
- Connect with appC#I used ADO.NET technology to connect to the database and perform addition, modification and deletion operations.

4.3 Linking tables with a C# application

4.3.1 Diploma, Masters and Doctorate Interfaces

Each program has its own interface that includes tools.(Labels, TextBoxes, DataGridView, ...) to display and manage data:

- Diploma interface: Allows the user to search for a student by name or number, then display the results in a DataGridView with edit and delete buttons.
- Master's interface: Adds additional fields to display the research project if necessary.
- PhD interface: Displays the comprehensive exam fields and results.

4.3.2 Reports Interface

1. Choose the program (Diploma, Master, PhD) or general research.
2. Execute a dynamic query: Depends on the type of research (student name/student number).
3. Library calliTextSharp: To create a PDF report, where data is fetched from the appropriate table.
4. Update table counter: When the report is generated, the value of the [count] field is automatically increased by 1, and the value of this number is saved in the report as a reference for archiving reports.

4.4 Discussion of results

1. Data documentation: The system allows organizing student records and unifying input channels, thus reducing data duplication.
2. Query speed: The structure of the tables (Diploma, Masters, Doctorate) made it easy to select the required table without complications.
3. Report Management: The counter table ensures sequential versions of reports, making subsequent review easier.
4. Scalability: New tables or columns can be added as needed by the academic department, or linked to advanced data mining tools to predict student performance or monitor the most overworked supervisors.

In this chapter, the practical procedures for creating a database are reviewed.(student) and details of its four tables (counter, DIP, MASTER, DOCTOR), in addition to how to link them to the C# application and the interfaces used to display and manage data. We also discussed the mechanism for issuing documented reports with a unique number stored in the counter table. The system demonstrated clear efficiency in organizing graduate student data, reducing administrative errors, and providing an integrated platform for creating and retrieving reports. Its scalable design allows for the addition of future features, which enhances the performance of the scientific department and supports decision-making.

V. CONCLUSION

Enhancing the student experience and increasing the effectiveness of administrative procedures need the development of an integrated management system for postgraduate student affairs. With an emphasis on usability, effectiveness, and security, this study will provide a comprehensive design for a student affairs management system. In later chapters, the system's numerous technical facets will be covered, along with a more thorough description of its primary phases and constituent parts. The purpose of this study is to offer a workable model that may be used in several colleges and educational establishments.

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Let this research help ongoing postgraduate student affairs management improvements alongside supplying

valuable resources to those who research the field in the future.

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