Electronic Leave Documentation System for College

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Abstract

Manually managed leave (paper-based) policies are intricate, records of staff leaves are not adequately maintained, which causes important data and information to be lost. Also it requires time and effort from administrator to find out who has leave, how long it lasts, and what time it expires. Complicated eligibility and entitlement criteria frequently prevent supervisors from promptly responding to leave requests and decision making. We have developed an application program using the C# programming language, as it has easy and safer interfaces with the SQL server database, which is characterized by receiving millions of data and processing it accurately and quickly. The database was designed and programmed by SQL Server 2014. This paper proposed a Leave managements system to facilitate the work of the colleges, where the system characterized by efficiency, flexibility, speed, and accuracy to manage and organize various types of Leaves Also that increase data security, reliability, accessibility and confidentiality, to make it easier for the administrator to make decisions and manage the assignment (Teaching Staff, Permanent Employees, Contract Employees) smoothly and without confusion in work. The system represents a promising step toward (E-College).

Keywords: Electronic leave documentation, Interfaces Design, C# programming language, SQL server database

نظام الكتروني لتوثيق الاجازات في كلية

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الخلاصة

تعد سياسات الإجازات المُدارة يدويًا معقدة، ولا يتم الاحتفاظ بسجلات إجازات الموظفين بشكل كافٍ، مما يتسبب في فقدان البيانات والمعلومات المهمة. كما يتطلب الأمر وقتًا وجهدًا من المسؤول لمعرفة من لديه إجازة، ومدة استمرارها، ووقت انتهاء صلاحيتها. كثيراً ما تمنع معايير الأهلية والاستحقاق المعقدة المشرفين من الاستجابة السريعة لطلبات الإجازة واتخاذ القرارات.لقد قمنا بتطوير برنامج تطبيقي باستخدام لغة البرمجة C#، حيث تتمتع هذه اللغة بواجهات سهلة وآمنة مع قاعدة بيانات SQL Server، والتي تتميز بقدرتها على استقبال الملايين من البيانات ومعالجتها بدقة وسرعة. تم تصميم وبرمجة قاعدة البيانات باستخدام SQL Server 2014. هذه الورقة تقترح نظام إدارة الإجازات لتسهيل عمل الكليات، حيث يتميز النظام بالكفاءة والمرونة والسرعة والدقة في إدارة وتنظيم مختلف أنواع الإجازات، كما أنه يعزز أمان البيانات وموثوقيتها وسهولة الوصول إليها وسرية المعلومات، لتسهيل عمل المسؤول في اتخاذ القرارات وإدارة تعيين (الهيئة التدريسية، الموظفون الدائمون، الموظفون بالعقد) بسلاسة وبدون ارتباك في العمل. يمثل النظام خطوة واعدة نحو (الجامعة الإلكترونية).

الكلمات المفتاحية: توثيق الإجازات الإلكترونية، تصميم الواجهات ، لغة البرمجةC# ، قاعدة بيانات SQL Server

1. Introduction

Most of the documentation used today is still in a conventional book format and takes no advantage of the facilities offered by modern computer systems and networks, Furthermore, with the advent of databases that combine numerous sources of information and are updated daily, the need for systems that provide quick access to the right information for the users, and fast update mechanisms for the authors of these databases is now urgent.[1].

Usually every system is implemented manually, so it is invalid with many problems will arise from manual registration[2]. Leave management refers to the management of staff leave processes, information, records and documents. Manually administered leave programs are complex, costly to manage, and often result in errors[3].

This system can help the college department in managing the daily activities of the employees by Speed in completing work, assisting in the decision-making by providing permanent information in the hands of the Decision makers. By reducing the costs of administrative work, Increase the efficiency of management personnel, this can also limitation of data loss because all the information will be kept in the database systematically and effectively. Also, this data will be available to department heads and management assistants to know the date of employees' Leave s from start and end. The database was designed and programmed by SQL Server 2014 for SQL Server Database and Associated with Microsoft Visual Studio interfaces as per C# language has been shown to desire. The system is the documentation of information and data on Leave s for employees and teachers.

The subsequent sections of the paper include: Related Work in section 2, the Problem Statements in section 3, the System Design and Implementation in section 4, and ultimately the Conclusions and Recommendations.

2. Related Works

In [4], an intranet-based E-leave application system was developed, allowing COE staff to conveniently apply for leave within their institution. Utilizing the software development life cycle architecture, the system automates leave requests, approvals, and balances, maintaining accurate records within the intranet network. Meanwhile, [5] presents a Leave Management System that automates tracking and management of various leave types. Employees can monitor transactions, check request statuses, and generate personalized reports. However, despite its functionality, security measures are lacking, requiring some employees to resort to traditional time cards, posing technological challenges. An intranet-based E-leave application system was specifically tailored for COE staff, offering customized solutions [6]. Furthermore, the implementation of a Leave Management System automated the meticulous tracking and management of various leave types [7]. Similarly, the introduction of a Time-off Management Platform streamlined the arduous leave request processes while ensuring automated tracking of employee absences [8]. Moreover, an Employee Attendance System was established to provide real-time monitoring of employee attendance and leave balances, enhancing organizational efficiency [9]. These systems, each with its unique set of features and functionalities, have paved the way for more efficient and streamlined leave management processes.

Each system operates within its own privacy and work environment. The presented system is designed to operate within an Iraqi college, specifically in the College of Computer Science & Information Technology at the University of Sumer

3. Problem Statements

Manual paper-based leave management system can present several challenges:

1) Time-Consuming Process: Manual leave management demands significant time from college staff.
2) Error-Prone Practices: Miscalculations and misplaced paperwork are frequent in manual systems.
3) Limited Accessibility: Physical records restrict remote access to leave information.
4) Visibility Challenges: Manual systems hinder workforce planning and scheduling due to a lack of visibility.
5) Delayed Approvals: Manual routing and signatures lead to delays in leave request approvals.
6) Security Risks: Paper records are vulnerable to loss, damage, and unauthorized access.
7) Inefficient Audits: Retrieving historical data for audits is labor-intensive and inefficient with manual systems.

4. System Design and Implementation

Determining the architecture, parts, modules, interfaces, and data necessary for a system to meet predetermined criteria is known as systems design. It is a methodical and exacting process to create a system that satisfies every requirement in terms of functionality, security, and efficiency. Here we should refer to the bellow points:

1) The system designed and built using an HP laptop and the following specifications: (Core i5,Hard Disk: 500 GB, RAM 4096 MB)
2) The system programmed and designed using: SQL Server 2014 database is designed. Connect them to interfaces by Microsoft Visual Studio by Language C#
3) The system was designed ,built and presented based on the requirements prepared by the Administrative Division in the College of Computer Science and Information Technology,
4) A number of meetings were held with the Administrative Division.

4.1. Database Design

A database is often an ordered collection of linked data. A choice can be made by further identifying or processing the data, or by retrieving desired information from the organized information or database. Individuals utilize multiple databases in their daily lives.

The relational database model is used by PMS. A digital database that is structured according to the relational model of data is called a relational database. Data is arranged using this approach into one or more tables with rows and columns. The relation is in these tables here.

The distinct key defined in every row upholds the relation. Depending on how they are connected, the key may be primary or foreign. Structured query language (SQL) is the standard user and application program interface to a relational database. SQL statements are used for data collection for reports as well as interactive queries to retrieve information from relational databases [9]. Some of these trends depend on in-memory databases, which have the potential to increase efficiency and performance. This ability has most certainly been affected by the sharp decline in memory costs. The Operations on Database:

- The majority of database applications make it simple to import or export text files produced by word processors, spreadsheets, or other databases.
- These information recordings can be perused in the same way as paper records in a notebook.
- You can submit an information query, or request, to the database. A query might be as basic as a search for a single record, a collection of items that satisfy certain requirements, or both.
- You can use a sort command to put records in numerical or alphabetical order according to the values in one or more fields.
- The most popular kinds of database printouts are reports.

The program programming and design of SQL Server 2014 database is designed and connect them to interfaces Microsoft Visual Studio by Language C# [10].

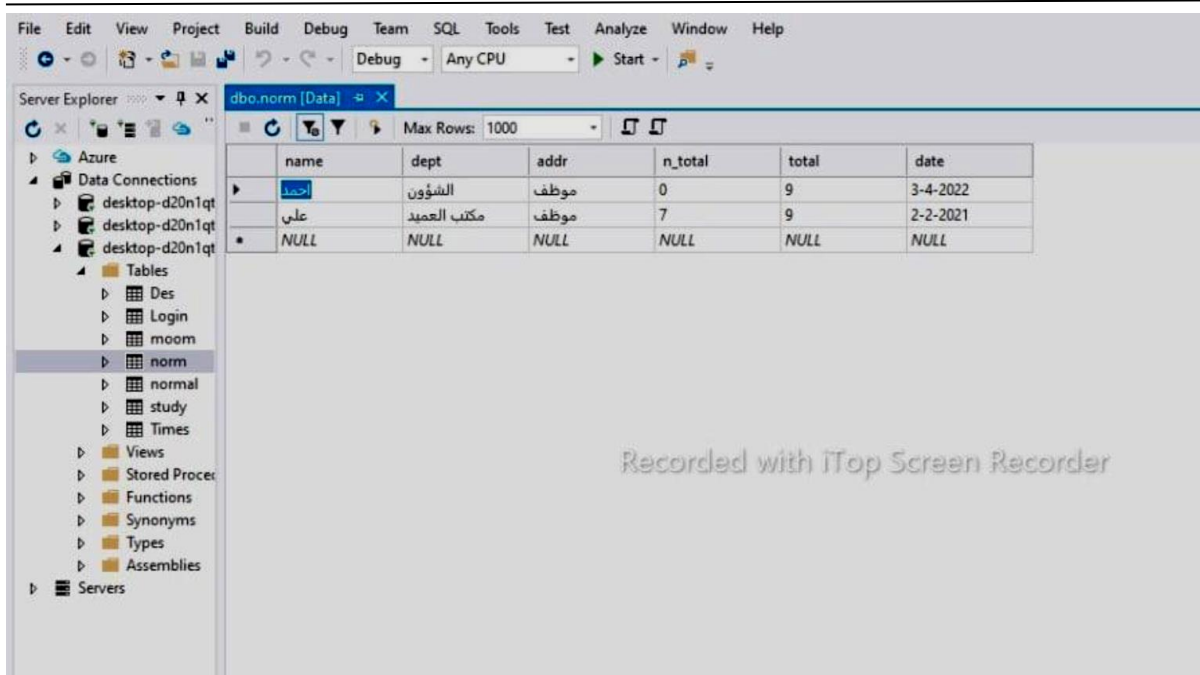**Figure -1** Ordinary Leave for contract employee's data base.

Figure -2 Ordinary Leave for employees' data base.

4.2. Interfaces Design

Well-defined processes and user-friendly interfaces characterize the proposed Leave documentation System. The program programming and design of SQL Server 2014 database is designed and connects them to interfaces Microsoft Visual Studio by Language C#.

4.2.1. Login interface

The home screen contains the login page, the users can login to the system using valid username and password. When filling in the login information, the main interface of the system will open as show in figure
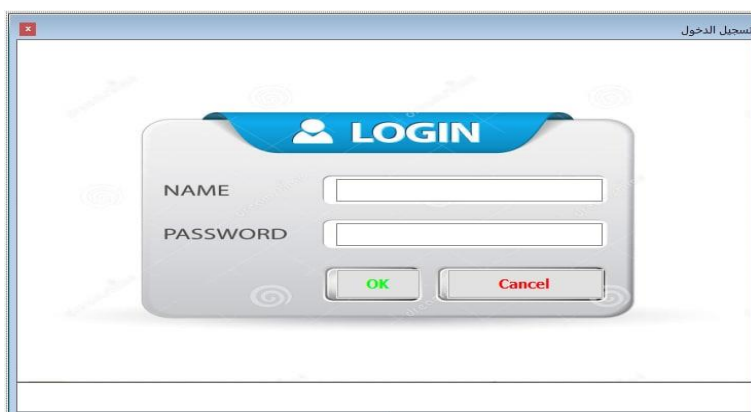

Figure -3. login interface window.

As shown in figure (3) the Login interface which consists of the username field and password field. In this module admin can create user profile, also admin can create login username and password for the relevant user

4.2.2. The main window

When we fill this form text box with default info for login and press on the login button the main interface of the system will show, the figure (4) shows the main interface of the project. This page in the project is the starting interface of the system, which contains the name of the system and the types of Leaves in the college, as well as the settings and laws for each Leave.

Figure -4 The main window.

This interface includes the types of leaves: The title of the project name (electronic leave documentation system) & the interface includes a pictureBox as a background for the interface when you click on any pictureBox, it will transfer to another interface.

The pictureBox and the leaves label which include:
- Ordinary Leave.
- Time off Sick Leave.
- Maternity Leave.
- Settings.
- Leave Laws.
-

4.2.3. Ordinary Leave interface for employee and contracts

This interface includes the name of the metaphor, as well as the name of the substitute for it, the period and the date. It includes the add, search, delete and edit button , A interface appears for adding faculty and teaching data submitted to the College of Computer Science, showing user control that includes searching for employee by name and contains buttons for:

- New to clear all fields.

- Add to add new employees to the database.
- Delete to delete the entire user.
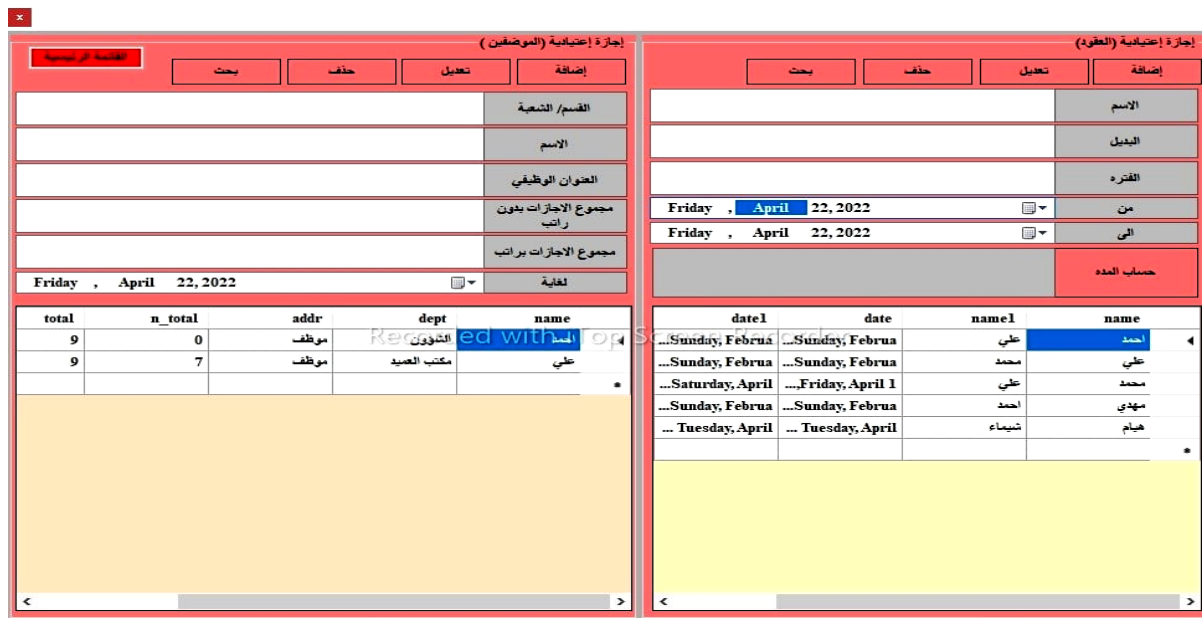- Including Leave time end
- Back button to main menu

Figure -5 Ordinary Leave interface for employee and contracts

The information filling interface includes:

- The name of the employee.
- Alternate name.
- Duration (number of days).
- The period of leave to and from
- The information filling interface includes:
- The name of the employee.
- Alternate name.
- Duration (number of days).
- The period of leave to and from

When pressing the command, store(add), the data will be added to the database. As for the command update, it means a modification to some of the staff's data, and also the command to delete. Once the staff identification number is written and the command is chosen, the entire deletion will be from the database. This leave includes a maximum of one day to a month. The database table is displayed using the dataGridView tool as shown in figure 1.

This interface contains the name, department/division, job title, total unpaid leaves, total unpaid leaves, and the date from and to. Add, Search, Delete, Edit A interface appears for adding faculty and faculty data submitted to the College of Computer Science, a user control appears that includes searching for an employee by name and contains buttons for:

- New to clear all fields.
- Add to add new employees to the database.
- Delete to delete the entire user.

- Including leave calculation and expiry time

When you press the command, store (add), the data will be added to the database. As for updating the order, it means modifying some data of the work team, as well as deleting it. Once you type the employee identification number and choose the command, it will be completely delete from the database. The database table is displayed using the dataGridView tool shown in figure 2

4.2.4. Time Leave Window

A interface appears to add faculty and teaching data in an introduction to the College of Computer Science, which describes the user's control that includes the search for the employee and contains buttons for:

- New To Clear All Fields.
- Add New Students To The Database.
- Delete To Delete The Entire User.
- Back Button To Main Menu
- This Leave Is Determined By Hours Or Half A Day.
- It Contains The Information Filling Interface:
- The Employee's Name.
- Duration (Number Of Hours).
- And Letter Time And Date.

Figure -6 Time Leave Window

4.2.5. Sick Leave Window

This interface contains the name and type of work (teaching or employee), the date from and to, the administrative number, and a copy of a medical examination. It includes the add, search, delete and modify button, a interface appears to add the data of the faculty and teaching staff submitted to the College of Computer Science, the user control that includes the search for the employee by name appears and contains buttons for:

- New to clear all fields.
- Add to add new employees to the database.
- Delete to delete the entire user.
- Including calculating Leave time and when it ends.
- Back button to main menu
- The information filling interface includes the following:
- Employee Name.
- Employee work.
- Administrative No
- The duration of the leave to and from.
- Attach a medical examination.

When you press the command, store (add), the data will be added to the database. As for updating the order, it means modifying some data of the work team, as well as deleting it. Once you type the employee identification number and choose the command, it will be completely delete from the database.
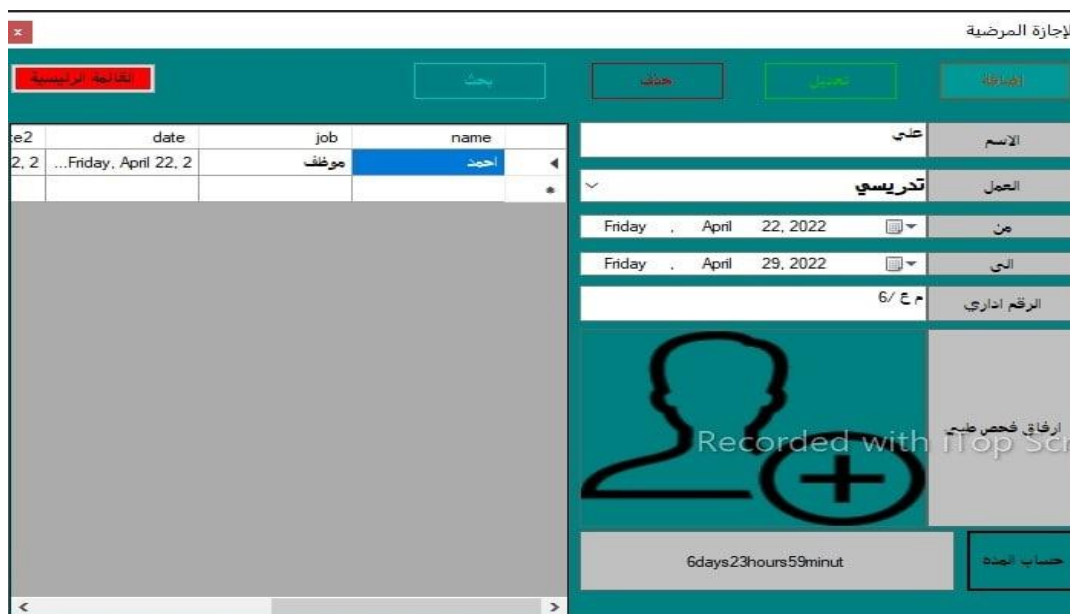

Figure -7 Sick Leave Window

4.2.6. Study Leave window

This interface contains the name and type of study (1.inside Iraq. 2.outside Iraq scholarship, special expense, study fellowship), the name of the university, type of certificate (Master's, Higher Diploma, Ph.D.) and attach the administrative order number, the name of the country and the extension of the study (yes or no) and the date from and to, and attach the study acceptance order that includes the add, search, delete and modify buttons, a interface appears to add the data of faculty and faculty members submitted to the College of Computer Science, a user control appears that includes searching for the employee by name and contains buttons for:

- New to clear all fields.
- Add to add new employees to the database.
- Delete to delete the entire user.

- Including calculating leave and its expiry time.

Figure8: Study Leave window

When you press the command, store (add), the data will be added to the database. As for updating the order, it means modifying some data of the work team, as well as deleting it. Once you type the employee identification number and choose the command, it will be completely delete from the database.

4.2.7. Maternity leaves Window

This interface contains the name, maternity leave (1. before birth, 2. after birth) and leave period (before delivery 52 days, 6 months, 6 months) attach the administrative order number and the date from and to. Add, search, delete and modify, a interface appears for adding faculty and faculty data submitted to the College of Computer Science, a user control appears that includes searching for an employee by name and contains buttons for
New to clear all fields.

- Add to add new employees to the database.
- Delete to delete the entire user.
- Including leave calculation and expiry time.
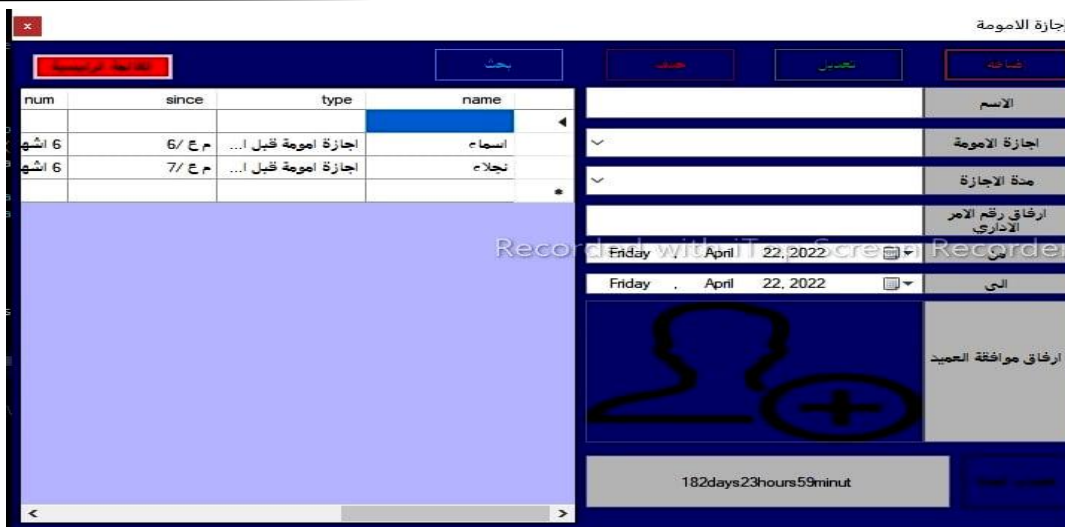- Back button to main men

Figure -9 Maternity leave Window

When you press the command, store (add), the data will be added to the database. As for updating the order, it means modifying some data of the work team, as well as deleting it. Once you type the employee identification number and choose the command, it will be completely delete from the database. The database table is displayed using the dataGridView tool.

4.2.8. Settings window

It means entering the current password with which to enter the system and typing a new password for the change to take place and also create a backup copy by choosing the file or folder in which we want to save the copy or import the backup from the same file in which it was stored.
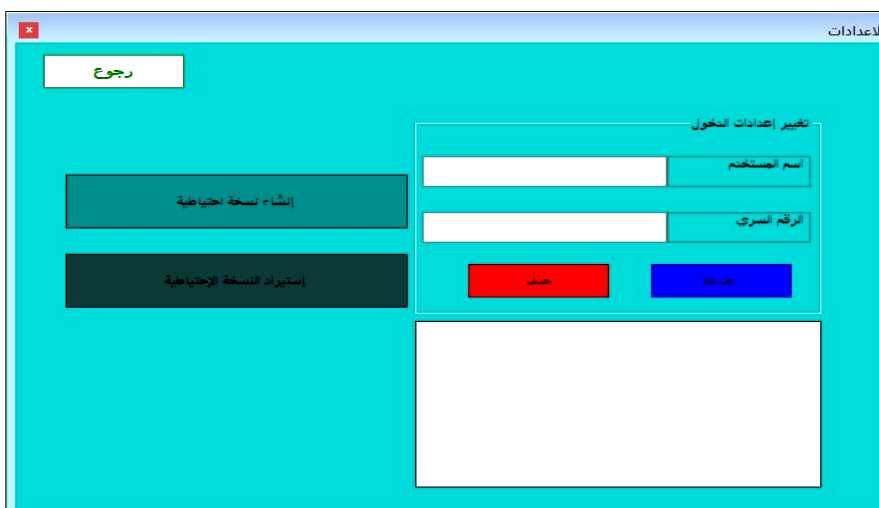

Figure -10 Settings window

5. Comparison with related work

This table provides a structured comparison of the systems described in each reference, highlighting their system types, target users, key features and security measures,

Reference	System Type	Target Users	Key Features	Security Measures
[4]	Intranet-based E-leave application system	COE staff	• Automation of leave requests, approvals, and balances • Utilization of software development life cycle architecture	Strong security measures within the intranet network
[5]	Leave Management System	Not specified	• Automation of tracking and management of various leave types • Ability to monitor transactions, check request statuses, and generate personalized reports	Lacks adequate security measures, leading some employees to use traditional time cards
[6]	Intranet-based E-leave application system	COE staff	Customized solutions	Not specified
[7]	Leave Management System	Not specified	Automation of meticulous tracking and management of various leave types	Not specified
[8]	Time-off Management Platform	Not specified	• Streamlining leave request processes • Ensuring automated tracking of employee absences	Not specified
[9]	Employee Attendance System	Not specified	• Real-time monitoring of employee attendance and leave balances • Enhancing organizational efficiency	Not specified
Proposed system	Electronic Leave Documentation System for Collage	College of Computer Science & Information Technology, University of Sumer,	• Smooth and intuitive interface for easy understanding of system procedures. • Ensures reliable and error-free operations with very high precision. • Significantly reduces time compared to traditional paper systems, increasing productivity. • Expedites search and modification of employee information, reducing time for data updates. • Adapts and evolves to meet organizational needs, enhancing flexibility and efficiency.	Strong security measures within the intranet network

6. Conclusion

Our project provides a software system used to manage leave data for employees. The system provides ease, accuracy and high speed to the user. It was designed and built using an HP laptop and the following specifications: (Core i5, Hard Disk: 500 GB, RAM 4096 MB) (C#) in the Visual Studio environment to create the overall structure of the system, and uses the SQL language used in it. The system, during the design and construction stages we used software engineering methods and databases. Future update of information, and backups to ensure that data is not lost, and against hacking. The proposed Leave system provides a set of services that can be summarized as follows:

a) Usability: The system provides a smooth and simple working environment for the user to be able to understand system procedures and mechanisms.
b) High Accuracy: With very high precision, the system ensures reliable and error-free operations.
c) Time and Effort: Working on the proposed system saves a very difficult time compared to the old system
d) Data recovery: the process of searching for and modifying a specific employee It only takes a few seconds compared to searching through paper records which takes longer.
e) The possibility of modernization: The system has the ability to modernize and develop Commensurate with what is required by the response or to modify the necessary procedures.

Future works may involve adding new techniques to the systems, such as the use of drop-down menus, the use of automatic text completion technology, the speed up of the search process, it might be necessary to include SMS notifications to make notification easier and faster, and the users' feedback should be added to make the suitable update to the system .

Reference

[1] V. Konstantinou and P. Morse, "Electronic documentation system," no. January 1992, pp. 1–6, 1992, doi: 10.1145/147001.147002.

[2] S. R. Hiyam Hatem Raed Majeed, "ELECTRONIC HEART CLINIC MANAGEMENT SYSTEM," *Int. J. Innov. Eng. Emerg. Technol.*, vol. 6, no. 3, p. Page--No, 2020.

[3] A. J. Ikuomola, "Adaptive Electronic-Leave Management System Advances in Multidisciplinary &," *Aims Res. J. Ref. Format*, vol. 3, no. 1, pp. 81–92, 2017, [Online]. Available: https://www.researchgate.net/publication/340926188

[4] M. Ramanan and S. Lanka, "Web Based Leave Management System for University College of Jaffna," vol. 2, no. 3, pp. 106–113, 2021.

[5] H. PATEL, "LEAVE MANAGEMENT SYSTEM," 2001.

[6] A. J. Ikuomola, "Adaptive Electronic-Leave Management System Advances in Multidisciplinary &," Aims Res. J. Ref. Format, vol. 3, no. 1, pp. 81–92, 2017, [Online]. Available: https://www.researchgate.net/publication/340926188

[7] M. Ramanan and S. Lanka, "Web Based Leave Management System for University College of Jaffna," vol. 2, no. 3, pp. 106–113, 2021.

[8] A. Smith and B. Johnson, "Streamlining Leave Request Processes: A Time-off Management Platform," Journal of Human Resource Management, vol. 10, no. 2, pp. 45-58, 2020,

[9] C. Garcia and D. Lee, "Real-time Monitoring of Employee Attendance: An Employee Attendance System," International Conference on Information Technology, pp. 120-135, 2019,

[10] A. Beaulieu, *Learning SQL*. 2009. [Online]. Available: http://books.google.com/books?id=1PgCCVryjOQC

[11] D. U. Unitbv, *Programming C / C ++.*