Unicom TIC Management System

Project Documentation

1. Introduction

The Unicom TIC Management System is a Windows Forms application designed to streamline and automate the management of academic operations for an educational institution. The system provides a user-friendly interface for administrators, teachers, and students to manage users, students, courses, exams, marks, and timetables efficiently.

2. Objective

- Provide a centralized platform for managing academic records and operations.
- Automate routine administrative tasks, reducing manual effort and errors.
- Enable secure and role-based access to sensitive academic data.
- Improve the overall efficiency and transparency of academic management.

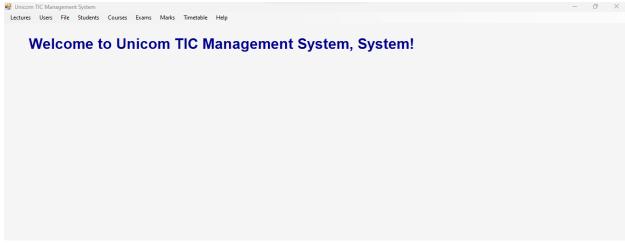
3. Scope

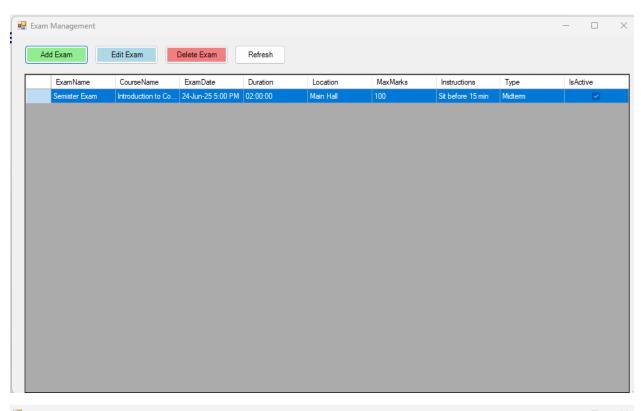
- ·User management (Admin, Teacher, Student roles)
- ·Student registration and management
- ·Course creation and enrollment management
- Exam scheduling and marks entry
- ·Timetable management for courses and students
- ·Secure login and authentication
- Data persistence using SQLite database

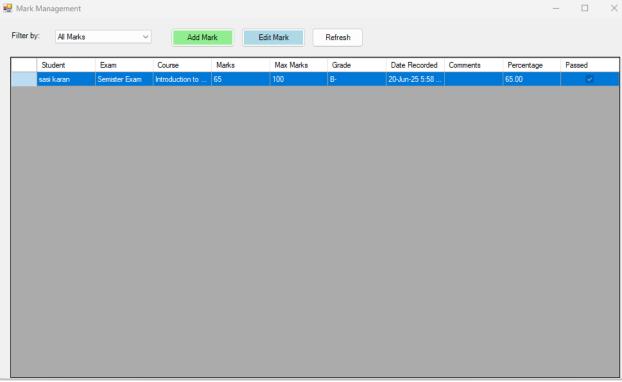
4. System Overview

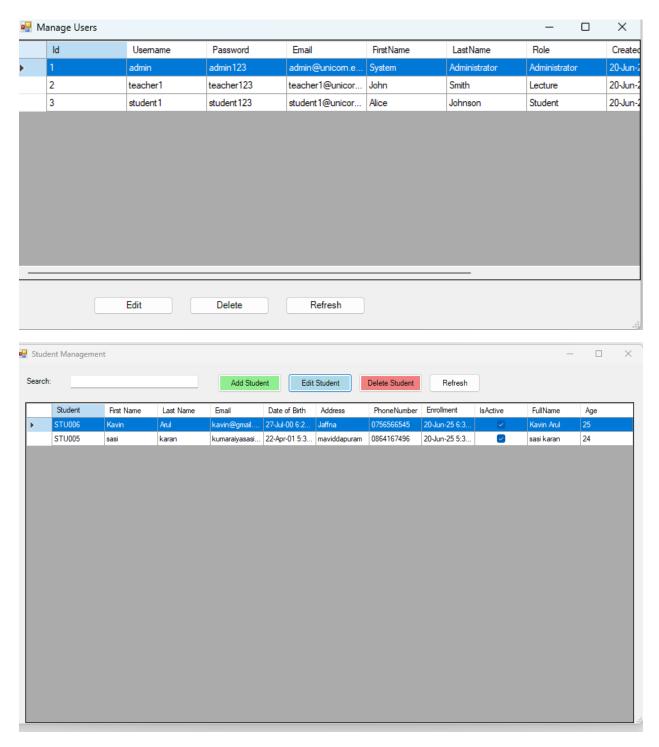
The system is a desktop application built using C# and Windows Forms, targeting the .NET Framework 4.8. It uses SQLite as the backend database for data storage. The application follows a modular structure with clear separation between data access (repositories), business logic (controllers), and user interface (views/forms).











Key Modules:

- ·Authentication: Login form for secure access.
- ·User Management: Admin can manage users and assign roles.
- •Student Management: Register, edit, and soft-delete students.
- •Course Management: Create, update, and manage courses and enrollments.

• Exam Management: Schedule exams and record marks.

·Timetable Management: Manage and view course timetables.

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5. Features

·Role-Based Login: Secure authentication for admin, teachers, and students.

- •Student Registration: Auto-generates unique student numbers; supports editing and soft deletion.
- ·Course Management: Add, update, and soft-delete courses; manage student enrollments.
- Exam & Marks Management: Schedule exams, record and update marks, view marks by student or course.
- ·Timetable Management: Add, edit, delete, and view course timetables.
- ·Soft Delete: Records are not physically deleted, preserving data integrity.
- ·Data Validation: Ensures required fields are filled and unique constraints are maintained.
- ·User-Friendly UI: Intuitive forms for all major operations.

6. Technologies Used

• **Programming Language:** C# (C# 8.0/10.0)

Framework: .NET Framework 4.8

UI: Windows Forms (WinForms)

Database: SQLite (System.Data.SQLite)

· IDE: Visual Studio 2022

NuGet Packages:

System.Data.SQLite

· Microsoft.Data.Sqlite

7. Challenges Faced

·Unique Constraints with Soft Delete:

Ensuring unique fields (like StudentNumber) remain unique even after soft deletion, as SQLite enforces uniqueness on all rows, not just active ones.

·-Assign Role Based Funtions

Limiting functions according to user Role is hard to sync

Designer Limitations:

Using code-only UI construction limits the use of the Visual Studio Designer, making design-time visualization and drag-and-drop editing unavailable.

Data Consistency:

Maintaining referential integrity and preventing orphaned records when using soft deletes.

Async Programming in WinForms:

Integrating asynchronous database operations with the synchronous WinForms event model required careful use of **async/await** to keep the UI responsive.

·Migration and Upgrades:

Adapting to newer C# features while remaining compatible with .NET Framework 4.8.

8. Conclusion

The UnicomTIC Management System provides a robust, extensible, and user-friendly solution for academic management in educational institutions. By leveraging C#, WinForms, and SQLite, the system achieves a balance between performance, maintainability, and ease of use. The modular architecture allows for future enhancements, such as reporting, notifications, or migration to web or cloud platforms.
