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).

Unicom TIC Management System - Login

Unicom TIC Management System

Username: admin

Password: ••••••••

[Login] [Exit]

Unicorn TIC Management System

Lectures   Users   File   Students   Courses   Exams   Marks   Timetable   Help

Welcome to Unicom TIC Management System, System!

Exam Management

[Add Exam] [Edit Exam] [Delete Exam] [Refresh]

	ExamName	CourseName	ExamDate	Duration	Location	MaxMarks	Instructions	Type	IsActive
	Semister Exam	Introduction to Co...	24-Jun-25 5:00 PM	02:00:00	Main Hall	100	Sit before 15 min	Midterm	✓

Mark Management

Filter by: [All Marks ▾] [Add Mark] [Edit Mark] [Refresh]

	Student	Exam	Course	Marks	Max Marks	Grade	Date Recorded	Comments	Percentage	Passed
	sasi karan	Semister Exam	Introduction to ...	65	100	B-	20-Jun-25 5:58 ...		65.00	✓

Manage Users

	Id	Username	Password	Email	FirstName	LastName	Role	Created
▶	1	admin	admin123	admin@unicom.e...	System	Administrator	Administrator	20-Jun-...
	2	teacher1	teacher123	teacher1@unicor...	John	Smith	Lecture	20-Jun-...
	3	student1	student123	student1@unicor...	Alice	Johnson	Student	20-Jun-...

Edit   Delete   Refresh

Student Management

Search: [_____]   Add Student   Edit Student   Delete Student   Refresh

	Student	First Name	Last Name	Email	Date of Birth	Address	PhoneNumber	Enrollment	IsActive	FullName	Age
▶	STU006	Kavin	Arul	kavin@gmail....	27-Jul-00 6:2...	Jaffna	0756566545	20-Jun-25 6:3...	☑	Kavin Arul	25
	STU005	sasi	karan	kumaraiyasasi...	22-Apr-01 5:3...	maviddapuram	0864167496	20-Jun-25 5:3...	☑	sasi karan	24

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.

----

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.