FINAL REPORT

EDU CERTIFY

RESULT SHEET & CERTIFICATE GENERATOR

DECLARATION

I, Safeeya Munawwar, hereby declare that this project report entitled "Edu Certify – Result Sheet and Certificate Generator" is the result of my independent work and has been carried out under the supervision and guidance of my project advisor. This report has not been submitted, in whole or in part, to any other academic institution or examination body for the award of a degree, diploma, or other qualification.

I further declare that this report is a record of original work and does not contain any material previously published or written by another person, except where due reference is made in the text. All data and information used in this project have been obtained and presented in accordance with academic rules and ethical conduct.

Any contributions made by other individuals or institutions have been clearly acknowledged in the appropriate sections of the report. I take full responsibility for the accuracy of the facts and data presented in this work.

……………………………….   2024.08.05

       Signature   Date

   M.M.Safeeya

ACKNOWLEDGEMENT

First and foremost, I would like to express my sincere gratitude to the Almighty for giving me the strength, patience, and knowledge to successfully complete this project.

I extend my heartfelt thanks to my supervisor, for their continuous support, guidance, and constructive feedback throughout the development of this project. Their encouragement and expertise greatly contributed to the successful completion of this work.

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CHAPTER 1

1.0 INTRODUCTION

In the modern academic landscape, timely and accurate certification of student achievements plays a crucial role in both institutional reputation and student progression. With the increasing number of students and growing complexity in managing academic records, manual processes for generating result sheets and certificates are prone to errors, delays, and inefficiencies.

Edu Certify – Result Sheet and Certificate Generator is a web-based system designed to automate and streamline the process of generating academic result sheets and certificates. This solution eliminates the manual burden on lecturers and administrative staff by enabling automated GPA calculations, performance classifications, and instant document generation in a downloadable PDF format.

The system offers role-based access for students, lecturers, institute admins, and super admins, ensuring data privacy and accountability. Students can view and download their result sheet and certificate. Lecturers can manage student marks, generate result sheets, and produce certificates based on predefined GPA classifications (e.g., First Class, Second Upper, etc.), while institute admins oversee institution-specific data such as departments, students, and courses. Super admins manage the global system structure and settings.

This report outlines the development process, technologies used, system design, and implementation strategy for Edu Certify, aiming to demonstrate how digital transformation can significantly enhance educational certification workflows.

1.1 BACKGROUND AND MOTIVATION

1.1.1 BACKGROUND

In many educational institutions, the process of calculating grades, compiling result sheets, and issuing academic certificates is often performed manually or through fragmented systems. This traditional approach is time-consuming, error-prone, and lacks consistency, especially when dealing with large volumes of student data.

The need for a centralized and automated solution has become increasingly critical with the growing number of students and courses offered across various departments and institutes. Manual handling of results not only increases the workload of lecturers and administrative staff but also risks data inaccuracies, delayed certificate issuance, and inconsistent grading.

Edu Certify was conceptualized to address these challenges by offering a digital platform that automates the core aspects of academic certification. By integrating functions such as GPA calculation, performance classification, and PDF certificate/result sheet generation, the system simplifies the entire evaluation and documentation process.

This platform provides a structured and secure environment where different user roles students, lecturers, institute admins, and super admins can efficiently manage academic data, ensuring accuracy, timeliness, and accessibility. It is especially beneficial for institutes looking to modernize their academic processes without the complexity and cost of enterprise-grade software.

1.1.2 MOTIVATION

The motivation for developing Edu Certify – Result Sheet and Certificate Generator stems from the urgent need to overcome inefficiencies in the traditional methods of academic result management within educational institutions. Manual processing of student results and certificate generation is not only time-consuming but also susceptible to human errors, which can affect the accuracy and reliability of student records.

With the rapid advancement of technology and the increasing demand for digital transformation in the education sector, institutes require robust, user-friendly, and secure tools that can automate administrative tasks. This project aims to meet that demand by creating a centralized platform that streamlines result processing, reduces administrative burden, and ensures timely availability of certificates and result sheets.

Furthermore, the motivation includes enabling customization for multiple institutions, allowing each to maintain its unique branding and academic standards while using a shared platform. The project also seeks to provide role-based access to safeguard sensitive information and maintain data integrity.

Ultimately, this solution strives to improve the overall academic administration process, enhance the experience of students, lecturers, and administrators, and align educational institutions with modern technological trends.

1.2 AIM, OBJECTIVES, AND SCOPE

1.2.1 AIM

The primary aim of this project is to develop an automated, secure, and user-friendly web-based system Edu Certify – Result Sheet and Certificate Generator that enables educational institutions to efficiently generate personalized academic result sheets and certificates for students. This system will support multiple institutes with their own branding, provide role-based access for administrators, lecturers, and students, and automate key processes such as GPA calculation and certificate classification.

The project intends to streamline and standardize the administrative workflow related to academic performance evaluation, reduce manual errors, and provide instant generation and downloading of result sheets and certificates in a professional PDF format.

1.2.2 OBJECTIVES

The objectives of the Edu Certify – Result Sheet and Certificate Generator project are as follows:

- **Develop a customizable platform** that allows each educational institute to display its unique branding elements such as logos, names, and other relevant details on result sheets and certificates.
- **Implement role-based access control** to provide secure and appropriate permissions for different user types, including super admins, institute admins, lecturers, and students.
- **Enable efficient management of academic data** by allowing lecturers to add and edit student information, subjects, and marks with validation features.
- **Automate the calculation of GPA and class classifications** based on marks entered, reducing manual calculation errors.
- **Provide PDF generation functionality** for result sheets and certificates that can be downloaded or printed by authorized users.
- **Support multi-institute data management**, ensuring data segregation and privacy among various educational organizations using the system.
- **Design a responsive and intuitive user interface** for seamless usage across different devices by admins, lecturers, and students.

1.2.3 SCOPE

The scope of the Edu Certify – Result Sheet and Certificate Generator project covers the development of a comprehensive web-based system aimed at automating academic result and certificate generation for educational institutions of various sizes. The system will:

- **Support multiple educational institutes** by allowing each to maintain their unique branding elements, including logos and institute names.
- **Provide role-based dashboards** tailored for super admins, institute admins, lecturers, and students, each with specific access rights and functionalities.
- **Enable lecturers to manage academic data**, including student enrollment, subjects, and marks entry within their respective departments.
- **Automate GPA calculation and performance classification** based on marks, ensuring accuracy and consistency.
- **Generate downloadable and printable PDF result sheets and certificates**, customized for each institute.
- **Facilitate administrative oversight**, allowing institute admins to review, approve, and manage data related to students, courses, and lecturers.
- **Ensure data security and privacy** through secure login, encrypted data transmission, and role-based access control.
- **Offer a responsive user interface** accessible on desktop and mobile devices for ease of use.

Limitations:

- The system will not handle payment processing or fee management.
- Real-time integration with external institute management systems is outside the initial scope but considered for future enhancements.
- The project will focus on academic results and certificate generation only and will not cover broader academic management functionalities such as attendance or timetabling.

CHAPTER 2

2.0 PROPOSED SOLUTIONS

The proposed solution, Edu Certify – Result Sheet and Certificate Generator, is a full-stack web application designed to automate the generation of academic result sheets and certificates for students across multiple educational institutions. This system addresses the challenges of manual result processing by providing a secure, scalable, and user-friendly platform that streamlines administrative tasks and improves accuracy.

Key Components of the Solution:

- **Role-Based Access Control:**
  The system implements distinct user roles—Super Admin, Institute Admin, Lecturer, and Student—with specific permissions to ensure data security and proper management. Super Admins oversee the entire system, Institute Admins manage data within their institutions, Lecturer's input and manage student marks, and Students can view and download their own results and certificates.

- **Multi-Institute Support and Customization:**
  Each educational institute can maintain its unique identity through customized branding on result sheets and certificates, including institute name, logo, and department details. This allows the system to serve diverse institutions while preserving their individuality.

- **Automated GPA and Classification Calculation:**
  Marks entered by lecturers are processed automatically to calculate Grade Point Averages (GPA) per semester and overall. The system applies predefined classification rules (such as First Class, Second Upper, etc.) to generate appropriate certificates reflecting student performance.

- **PDF Generation for Result Sheets and Certificates:**
  The platform uses PDF generation libraries to create downloadable and printable documents. These professional-grade PDFs include all necessary academic details, institute branding, and classification information.

- **Data Management and Approval Workflow:**

  Lecturers can add and edit student marks, which are then subject to review and approval by Institute Admins. This two-step validation ensures data integrity and accountability.

- **Responsive and Intuitive User Interface:**

  Built with React and Next.js, the frontend provides a seamless experience across devices, enabling easy navigation for all user roles. Tailwind CSS is used for styling, ensuring modern and responsive layouts.

- **Robust Backend and Database Design:**

  The backend, developed with Node.js and Express, manages API requests, authentication, and business logic. A MySQL/MariaDB relational database stores all institutional, academic, and user data securely.

Benefits of the Proposed Solution:

- Significant reduction in administrative workload and manual errors.
- Fast and accurate generation of academic documents.
- Enhanced data security through role-based permissions and encrypted communications.
- Scalability to accommodate multiple institutions and growing student numbers.
- Improved accessibility for students to view and download their academic records anytime.

This system thus transforms the traditional result and certificate management process into a modern, efficient, and reliable digital workflow tailored for educational institutions.

CHAPTER 3

3.0 RESORCE REQUIREMENTS

The development and deployment of the Edu Certify – Result Sheet and Certificate Generator system require both hardware and software resources to ensure efficient functioning, testing, and maintenance.

3.1 HARDWARE REQUIREMENTS

- **Development Machine:**
  A laptop or desktop computer with sufficient processing power, 4GB RAM or higher, and at least 256GB storage to handle software development tools, databases, and testing environments.

- **Server/Hosting Environment:**
  A reliable server with adequate CPU, memory, and storage to host the backend application, database, and frontend services.

- **Network:**
  Stable internet connectivity with sufficient bandwidth for development, testing, and access by multiple users concurrently.

3.2 SOFTWARE REQUIREMENTS

- **Development Tools:**
  - Integrated Development Environment (IDE): Visual Studio Code.
  - Version Control System: Git and GitHub for source code management.
- **Frontend Technologies:**
  - React.js and Next.js frameworks for building the user interface.
  - Tailwind CSS for styling and responsive design.

- **Backend Technologies:**
  - Node.js runtime environment.
  - Express.js framework for API development.
- **Database:**
  - MySQL for relational data storage.
  - Tools for database management such as phpMyAdmin or MySQL Workbench.
- **Supporting Libraries and Tools:**
  - JWT (JSON Web Tokens) for secure authentication and authorization.
  - jsPDF for generating downloadable PDF documents.
  - Axios for HTTP client requests from frontend to backend.
- **Environment:**
  - XAMPP or similar local server environment for initial development and testing.

3.3 HUMAN RESOURCES

- **Project Supervisor:** Guidance and review throughout the development lifecycle.
- **Developer (Me):** Responsible for full-stack development including design, coding, testing, and documentation.
- **Tester (Me):** Individuals or groups to perform unit and integration testing, ensuring system reliability.

3.4 OTHER RESOURCES

- **Documentation Resources:** Access to online tutorials, official documentation for technologies used, and reference materials for academic report writing.
- **Cloud Storage:** For storing institute logos, certificates, and other media files securely.

CHAPTER 4

4.0 TECHNOLOGY ADAPTED

The development of Edu Certify – Result Sheet and Certificate Generator involved the adoption of modern, reliable, and widely supported technologies that ensure performance, scalability, and maintainability of the system.

4.1 FRONTEND TECHNOLOGIES

- **React.js & Next.js:**
  React.js is a popular JavaScript library for building interactive user interfaces. Next.js, built on top of React, offers server-side rendering and optimized routing, improving performance and SEO. Together, they provide a seamless and dynamic experience for users across different roles.

- **Tailwind CSS:**
  Tailwind CSS is a utility-first CSS framework that enables rapid UI styling and responsive design. It helps maintain consistent styling throughout the application while simplifying customization.

- **Axios:**
  Axios is used as an HTTP client to handle API requests between the frontend and backend, providing promise-based communication.

- **jsPDF:**
  This library allows client-side generation of PDF documents, enabling users to download result sheets and certificates instantly without server-side rendering.

4.2 BACKEND TECHNOLOGIES

- **Node.js:**
  Node.js is a JavaScript runtime built on Chrome's V8 engine, enabling efficient and scalable server-side development.

- **Express.js:**
  Express is a lightweight and flexible web application framework for Node.js, facilitating API route management, middleware integration, and request handling.

- **MySQL:**
  A relational database system used to store structured data such as user information, academic records, institutes, courses, and results.

- **JWT (JSON Web Token):**
  Used for secure user authentication and authorization, JWT ensures that only authorized users can access protected routes based on their roles.

4.3 OTHER TOOLS

- **XAMPP:**
  Used during development for running the MySQL database server locally.

- **Version Control – Git & GitHub:**
  For managing source code, versioning, and collaboration.

- **Postman:**
  For testing backend API endpoints during development.

CHAPTER 5

5.0 DESIGN

The design of the Edu Certify – Result Sheet and Certificate Generator project focuses on creating a robust, user-friendly, and efficient system architecture. The design phase involved conceptualizing the overall system structure, user interface layouts, database schema, and workflows to meet the project objectives and user requirements.

5.1 SYSTEM ARCHITECTURE

The system follows a client-server architecture with clear separation between the frontend and backend components:

- **Frontend:** Developed using React.js and Next.js, responsible for rendering the user interface, handling user interactions, and communicating with the backend via RESTful APIs.
- **Backend:** Built with Node.js and Express.js, managing business logic, database interactions, authentication, and PDF generation.
- **Database:** A MySQL/MariaDB relational database stores all persistent data, including institutes, departments, students, courses, marks, and user roles.

The architecture ensures scalability, maintainability, and security by enforcing role-based access and modular development.

5.2 USER INTERFACE DESIGN

The user interface was designed to be intuitive and responsive to provide seamless interaction across devices:

- **Dashboard Views:** Separate dashboards for Super Admin, Institute Admin, Lecturer, and Student, each tailored with relevant functionalities and data.
- **Navigation:** A consistent sidebar and header navigation for quick access to modules like student management, marks entry, result generation, and certificate viewing.
- **Forms:** User-friendly forms with validation for entering marks, adding students, and managing institutes.
- **PDF Viewer:** Embedded or downloadable PDF resultsheets and certificates with institute branding.

5.3 DATABASE DESIGN

The database schema was designed to efficiently organize and link the following entities:

- **Users:** Including admins, lecturers, and students with role identifiers.
- **Institutes:** Holding institute-specific details like name, logo, and departments.
- **Departments & Courses:** Categorizing academic programs within institutes.
- **Students:** Linked to departments and courses.
- **Subjects & Marks:** Subjects are assigned per department; marks are recorded per student per subject.
- **Result Sheets & Certificates:** Generated dynamically based on stored data.

Referential integrity and foreign key constraints enforce data consistency across related tables.

5.4 WORKFLOWS

- **User Authentication and Authorization:** Users log in with credentials; access is granted based on roles using JWT tokens.
- **Marks Entry & Approval:** Lecturers input student marks, which are then reviewed and approved by institute admins before being finalized.
- **Result Sheet Generation:** Upon approval, the system calculates GPA and classifies results, generating downloadable PDF documents.
- **Certificate Generation:** Certificates are generated automatically based on student classifications, incorporating institute branding.

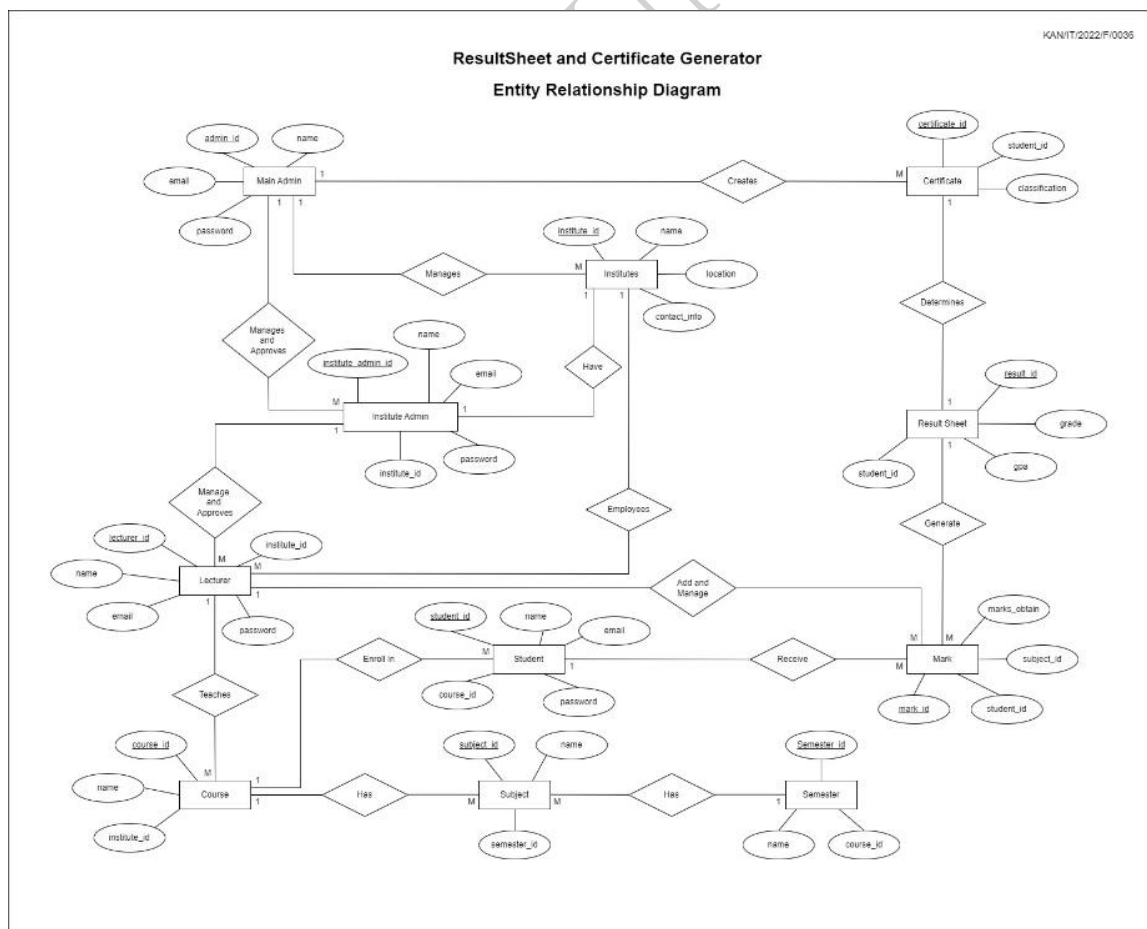## 5.5 DIAGRAMS, WIREFRAMES & USER INTERFACE
5.5.1. DIAGRAMS

- **ER Diagram**
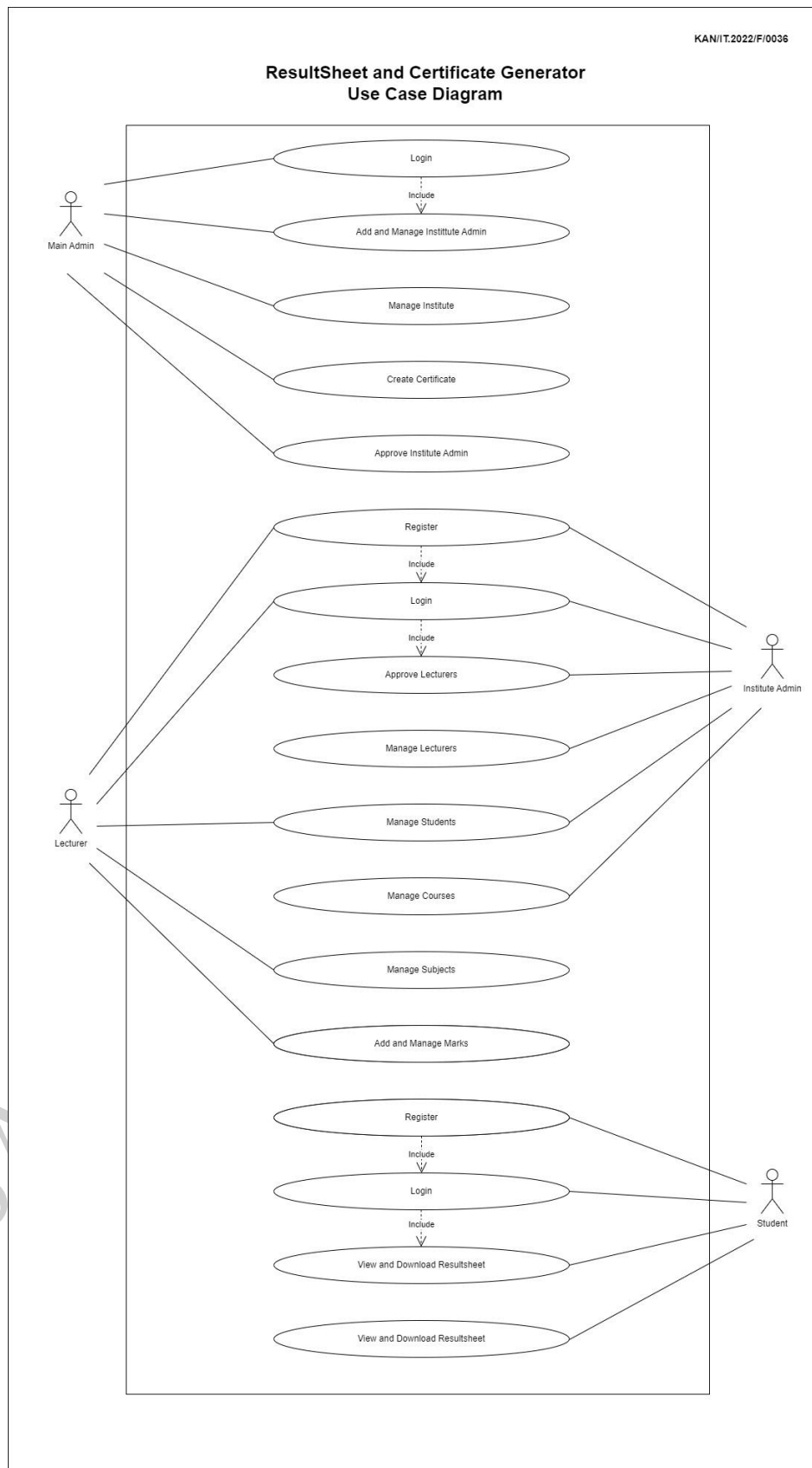

FIGURE 1.1 – ER Diagram

- **Use-Case Diagram**

FIGURE 2.1 – Use Case Diagram

5.5.2 WIREFRAMES

FIGURE 3.1 – Register Page Wireframe

FIGURE 4.1 – Login Page Wireframe

Main Dashboard

Logo

EduCertify

Result Sheet & Certificate Generator

| Login | Register |

Login to your account

Enter your credentials to access your account

Select Your Role

| Select Role ▼ |

FIGURE 5.1 – Main Dashboard Wireframe

Admin Dashboard

| | Admin Profile | Notification | Admin Contact | Logout |

| Dashboard |
| Institutes |
| Lecturers |
| Students |
| Courses |
| Subjects |
| Approvals |
| Settings |

Admin Dashboard

Welcome to the Admin Dashboard! Here you can manage institutes, lecturers, students, courses, subjects and more.

| Total Institutes | Total Lecturers | Total Students | Total Courses |
| 0 | 0 | 0 | 0 |

Recent Activities

New Institute Admin Approval Request
0 new requests

Latest Institute Admin Enrollments
0 new enrollments

FIGURE 6.1 – Super Admin Dashboard Wireframe

Institute Admin Dashboard

	Institute Admin Profile	Notification	Admin Profile	Admin Contact	Logout

Sidebar:
- Dashboard
- Lecturers
- Students
- Courses
- Subjects
- Marks
- Approvals
- Settings

Institute Admin Dashboard

Welcome to the Institute Admin Dashboard! Here you can manage lecturers, students, courses, subjects and more.

Total Lecturers	Total Students	Total Courses
0	0	0

Recent Activities

New Lecturer Approval Requests
0 new requests

Latest Lecturer Enrollments
0 new enrollments

Recently Approved Marks
0 marks approved

FIGURE 7.1 – Institute Admin Dashboard Wireframe

Lecturer Dashboard

	Lecturer Profile	Admin Profile	Admin Contact	Logout

Sidebar:
- Dashboard
- Courses
- Students
- Subjects
- Add Marks
- Result Sheet
- Certificate
- Settings

Lecturer Dashboard

Welcome to the Lecturer Dashboard! Here you can manage students, courses, subjects and more.

Total Courses Assigned
0

Total Students
0

Pending Marks Approved
0

FIGURE 8.1 – Lecturer Dashboard Wireframe
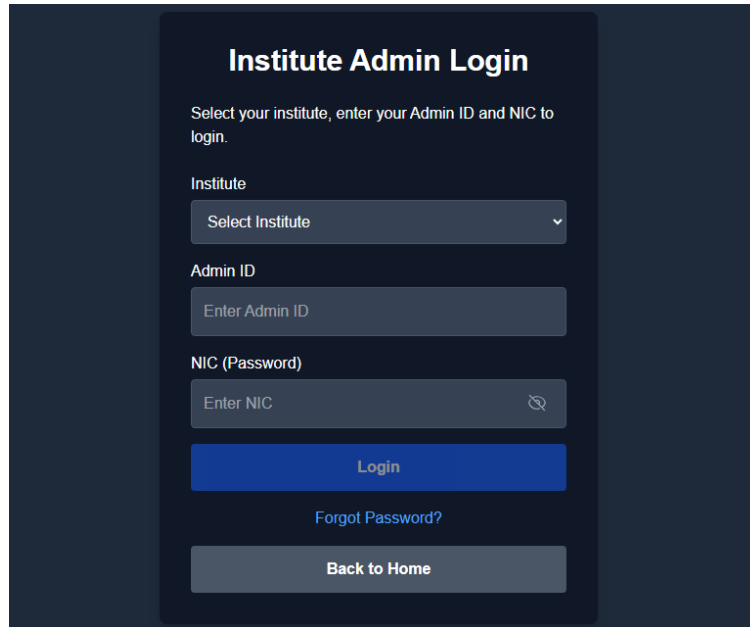
FIGURE 9.1 – Student Dashboard Wireframe

5.5.3 USER INTERFACES

- **Homepage:** Landing page with login options.

FIGURE 10.1 – Home Page

19

- **Login Page:**

FIGURE 11.1 – Institute Admin Login

- **Admin Dashboard:** Manage institutes, users, and approvals.
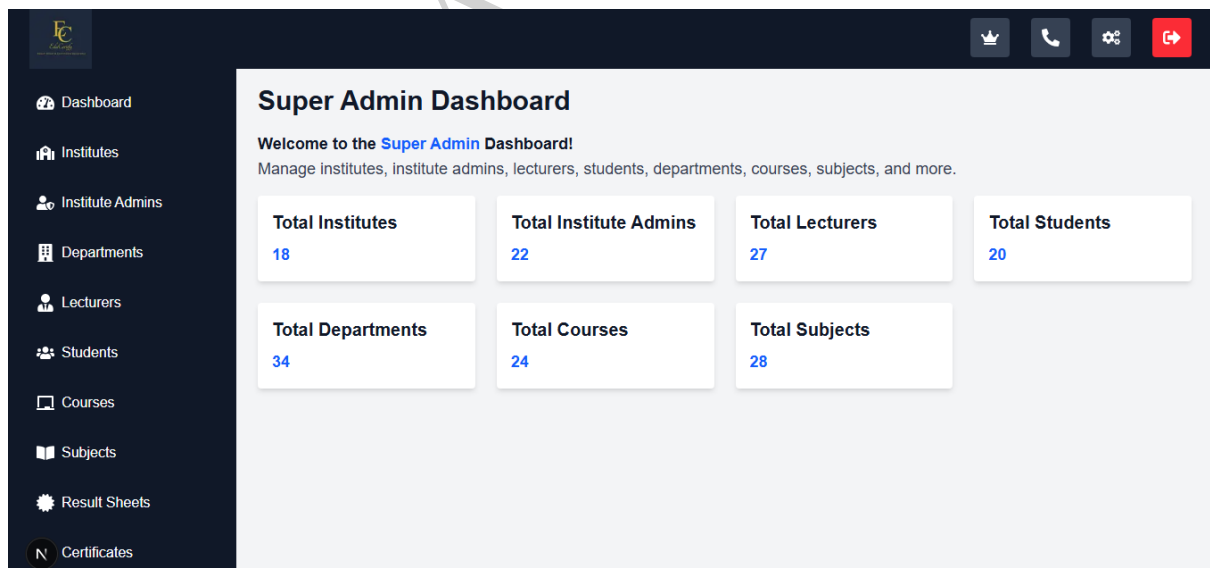
FIGURE 12.1 – Super Admin Dashboard

- **Manage Institutes Page:**

FIGURE 13.1 – Manage Institute Page

- **Institute Admin Dashboard:** Manage lecturer, courses, and students.

FIGURE 14.1 – Institute Admin Dashboard

- **Add Lecturer Form:**

Lecturer Management - Edu Lanka Institute

Add New Lecturer

Lecturer Id

Name

Nic

Email

Contact

Address

Department
Select Department

Add Lecturer

FIGURE 15.1 – Add Lecturer Form

- **Lecturer Dashboard:** Marks entry and result generation.

Edu Lanka Institute - Lecturer Dashboard

Welcome to the Computer Science department's lecturer dashboard Dr. A.M.N. Silva !
Here you can manage your department students & marks. Also you can view your institute's departments, courses, subjects, and more.

Total Students	Total Departments	Total Courses
20	34	24

Total Subjects
6

Dashboard
Departments
Students
Courses
Subjects
Marks
Result Sheets
Certificates

FIGURE 16.1 – Lecturer Dashboard

- **Marks Entry Page:**

FIGURE 17.1 – Marks Entry Page

- **Student Dashboard:** View and download result sheets and certificates

FIGURE 18.1 – Student Dashboard

- Result Sheet:

Edu Lanka Institute
Department: Computer Science

Resultsheet
Student: Q.R.I.Queeni (ELI/CS/2023/0001)

Semester 1

Subject Name	Subject Code	Marks	Grade
ITPM	CS/ITPM/1004	87	A
Operating System	CS/OS/1003	98	A+
Software Engineering	CS/SE/1001	45	F
Web Programming	CS/WP/1002	78	B

Semester GPA: 2.51

Semester 2

Subject Name	Subject Code	Marks	Grade
Object Oriented Programming	CS/OOP/2001	89	A

Semester GPA: 3.70

Semester 3

Subject Name	Subject Code	Marks	Grade
Java Programming	CS/JP/3001	76	B

Semester GPA: 3.00

Date Issued: 6/18/2025

FIGURE 19.1 – Sample Result Sheet

- **Certificate:**

Certificate of Completion

This is to certify that

N.R.Nila

has successfully completed the program in
Computer Science

at Edu Lanka Institute with a GPA of 2.44 (Second Class Lower).

Student ID: ELI/CS/2020/0001

_____
Authorized Signature

Date Issued: 6/18/2025

FIGURE 20.1 – Sample Certificate

24

CHAPTER 6

6.0 CONCLUSION AND FURTHER WORKS

6.1 CONCLUSION

The Edu Certify – Result Sheet and Certificate Generator project successfully delivers a streamlined, role-based digital platform for educational institutions to automate the management of student results and the generation of certificates. Through the use of modern web technologies such as React.js, Node.js, and MySQL, the system ensures accuracy, efficiency, and accessibility in handling academic data.

This system minimizes the need for manual result processing, reduces human error, and enhances the overall experience for administrators, lecturers, and students alike. By implementing dynamic GPA calculations, classification logic, and PDF generation, the platform supports key academic workflows from data entry to final documentation.

Moreover, the platform's scalable design and modular architecture ensure it can be extended in the future to accommodate additional features like attendance tracking, student analytics, and online verification systems.

Overall, this project demonstrates the power of full-stack web development in solving real-world educational challenges and offers a practical, secure, and user-friendly solution for modern academic institutions.

6.2 FURTHER WORKS

While the current version of the Edu Certify – Result Sheet and Certificate Generator successfully meets its intended goals, there are several areas where future improvements and additional features can further enhance the system's usability, scalability, and effectiveness:

1. **QR Code Verification**

   Integrate a QR code on certificates for instant authenticity verification by third parties, ensuring trust in the digital documentation.

2. **Automated Email Delivery**

   Add functionality to automatically email result sheets and certificates to students upon generation.

3. **Mobile Responsiveness**

   Optimize the platform for mobile devices to allow access on smartphones and tablets.

4. **Advanced Analytics**

   Include analytics features for institute admins to visualize trends in performance, success rates, and GPA distributions.

5. **Cloud Storage Integration**

   Store all generated certificates and result sheets securely in the cloud (e.g., Google Drive or AWS S3) for easy backup and retrieval.

6. **Multilingual Support**

   Provide support for multiple languages to make the platform accessible to a wider range of users.

7. **AI-based Classification and Recommendations**

   Use machine learning to suggest classifications and flag unusual mark patterns for administrative review.

CHAPTER 7

7.0 SUMMARY

The Edu Certify – Result Sheet and Certificate Generator project was developed to address the need for a streamlined, accurate, and efficient academic results and certification management system. Traditional methods of manually preparing student result sheets and certificates are time-consuming and prone to human error. This system resolves these issues through automation, centralization, and digital access.

The platform provides role-based functionalities for super admins, institute admins, and lecturers to manage academic data effectively. It allows lecturers to enter marks, calculates GPA and classifications, and enables the automatic generation of result sheets and certificates in PDF format. Each document is customized with institute branding to ensure authenticity and professionalism.

By leveraging modern technologies such as React, Node.js, Express.js, and MySQL, the system offers a responsive and scalable solution that can adapt to multiple institutions and departments. The proposed solution not only enhances operational efficiency but also lays the groundwork for future integrations and features such as online verification and analytics.

In conclusion, Edu Certify demonstrates the potential of digital transformation in education by replacing manual tasks with intelligent automation, thus ensuring speed, accuracy, and reliability in academic documentation processes.

REFERENCES

1. **ReactJS Documentation** – https://reactjs.org/docs/getting-started.html
   (Used for frontend UI development and component architecture)

2. **Node.js Documentation** – https://nodejs.org/en/docs
   (Used for building the backend server-side logic)

3. **Express.js Guide** – https://expressjs.com/
   (Used to build RESTful APIs for backend communication)

4. **MySQL Documentation** – https://dev.mysql.com/doc/
   (Used for managing relational database structures and queries)

5. **jsPDF Library** – https://github.com/parallax/jsPDF
   (Used for generating downloadable PDF resultsheets and certificates)

6. **W3Schools** – https://www.w3schools.com/
   (General reference for HTML, CSS, and JavaScript basics)

7. **Stack Overflow** – https://stackoverflow.com/
   (Used to resolve technical coding issues during development)

8. **GitHub** – https://github.com/
   (Used for version control and project repository management)

APPENDIXES

APPENDIX – A

1. Admin Dashboard

- Displays all institutes, departments, and access to student results.
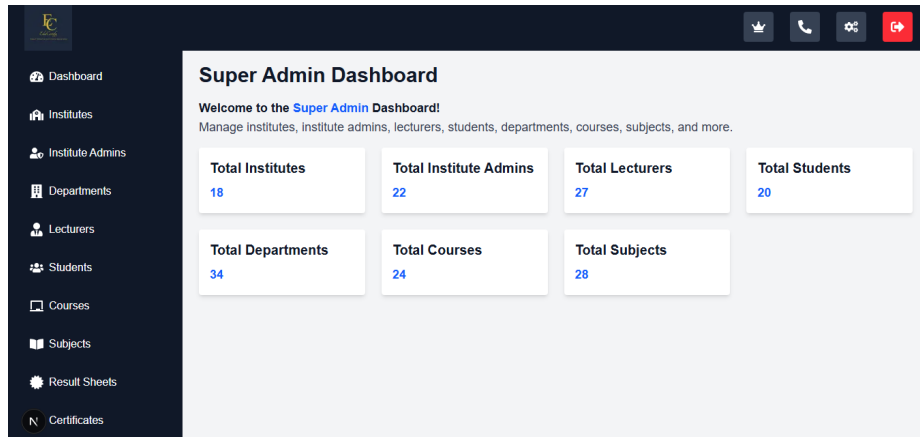
FIGURE 21.1 – Super Admin Dashboard

2. Lecturer Login Page

- Secure login with institute and department selection.

FIGURE 22.1 – Lecturer Login

3. Marks Entry Page (Lecturer Panel)

- Interface to enter and update student marks.

FIGURE 23.1 – Marks Entry Page

4. Certificate Preview and Download

- Auto-generated certificates with student details and GPA class.

FIGURE 24.1 - Certificate

APPENDIX -B

1. institutes

```
MariaDB [results_db]> desc institutes;
+----------------+--------------+------+-----+---------+----------------+
| Field          | Type         | Null | Key | Default | Extra          |
+----------------+--------------+------+-----+---------+----------------+
| id             | int(11)      | NO   | PRI | NULL    | auto_increment |
| name           | varchar(255) | NO   |     | NULL    |                |
| location       | varchar(255) | YES  |     | NULL    |                |
| establishedYear| year(4)      | YES  |     | NULL    |                |
| logoUrl        | varchar(500) | YES  |     | NULL    |                |
+----------------+--------------+------+-----+---------+----------------+
5 rows in set (0.033 sec)
```

TABLE 1.1 – Institutes Database

2. departments

```
MariaDB [results_db]> desc departments;
+-------------+--------------+------+-----+---------+----------------+
| Field       | Type         | Null | Key | Default | Extra          |
+-------------+--------------+------+-----+---------+----------------+
| id          | int(11)      | NO   | PRI | NULL    | auto_increment |
| name        | varchar(255) | NO   |     | NULL    |                |
| description | text         | YES  |     | NULL    |                |
| institute   | varchar(255) | NO   |     | NULL    |                |
+-------------+--------------+------+-----+---------+----------------+
4 rows in set (0.018 sec)
```

TABLE 2.1 – Departments Database

3. courses

```
MariaDB [results_db]> desc courses;
+-------------+--------------+------+-----+---------+----------------+
| Field       | Type         | Null | Key | Default | Extra          |
+-------------+--------------+------+-----+---------+----------------+
| id          | int(11)      | NO   | PRI | NULL    | auto_increment |
| name        | varchar(255) | NO   |     | NULL    |                |
| course_code | varchar(50)  | NO   |     | NULL    |                |
| description | text         | YES  |     | NULL    |                |
| institute   | varchar(255) | NO   |     | NULL    |                |
| department  | varchar(255) | NO   |     | NULL    |                |
| duration    | varchar(100) | NO   |     | NULL    |                |
+-------------+--------------+------+-----+---------+----------------+
7 rows in set (0.027 sec)
```

TABLE 3.1 – Courses Database

31

4. subjects

```
MariaDB [results_db]> desc subjects;
+-------------+--------------+------+-----+-------------------+-------------------------------+
| Field       | Type         | Null | Key | Default           | Extra                         |
+-------------+--------------+------+-----+-------------------+-------------------------------+
| id          | int(11)      | NO   | PRI | NULL              | auto_increment                |
| name        | varchar(255) | NO   |     | NULL              |                               |
| code        | varchar(100) | NO   |     | NULL              |                               |
| credits     | int(11)      | NO   |     | NULL              |                               |
| department  | varchar(255) | NO   |     | NULL              |                               |
| course      | varchar(255) | NO   |     | NULL              |                               |
| semester    | int(11)      | NO   |     | NULL              |                               |
| institute   | varchar(255) | NO   |     | NULL              |                               |
| createdAt   | datetime     | YES  |     | current_timestamp() |                             |
| updatedAt   | datetime     | YES  |     | current_timestamp() | on update current_timestamp() |
+-------------+--------------+------+-----+-------------------+-------------------------------+
10 rows in set (0.023 sec)
```

TABLE 4.1 – Subjects Database

5. students

```
MariaDB [results_db]> desc students;
+----------------+--------------+------+-----+---------+----------------+
| Field          | Type         | Null | Key | Default | Extra          |
+----------------+--------------+------+-----+---------+----------------+
| id             | int(11)      | NO   | PRI | NULL    | auto_increment |
| student_id     | varchar(100) | NO   | UNI | NULL    |                |
| name           | varchar(255) | NO   |     | NULL    |                |
| nic            | varchar(20)  | NO   |     | NULL    |                |
| department     | varchar(100) | NO   |     | NULL    |                |
| email          | varchar(255) | NO   | UNI | NULL    |                |
| contact_number | varchar(20)  | NO   |     | NULL    |                |
| address        | text         | NO   |     | NULL    |                |
| institute      | varchar(255) | NO   |     | NULL    |                |
| course         | varchar(255) | NO   | MUL | NULL    |                |
| year           | int(11)      | NO   |     | NULL    |                |
| status         | varchar(20)  | YES  |     | active  |                |
+----------------+--------------+------+-----+---------+----------------+
12 rows in set (0.024 sec)
```

TABLE 5.1 – Students Database

6. marks

```
MariaDB [results_db]> desc marks;
+------------+----------+------+-----+---------+----------------+
| Field      | Type     | Null | Key | Default | Extra          |
+------------+----------+------+-----+---------+----------------+
| id         | int(11)  | NO   | PRI | NULL    | auto_increment |
| student_id | int(11)  | NO   | MUL | NULL    |                |
| marks      | float    | NO   |     | NULL    |                |
| subject_id | int(11)  | NO   | MUL | NULL    |                |
+------------+----------+------+-----+---------+----------------+
4 rows in set (0.019 sec)
```

TABLE 6.1 – Marks Database

7. lecturers

```
MariaDB [results_db]> desc lecturers;
+-------------+--------------+------+-----+---------+----------------+
| Field       | Type         | Null | Key | Default | Extra          |
+-------------+--------------+------+-----+---------+----------------+
| id          | int(11)      | NO   | PRI | NULL    | auto_increment |
| name        | varchar(255) | NO   |     | NULL    |                |
| email       | varchar(255) | NO   | UNI | NULL    |                |
| lecturer_id | varchar(50)  | NO   |     | NULL    |                |
| nic         | varchar(20)  | NO   |     | NULL    |                |
| contact     | varchar(20)  | NO   |     | NULL    |                |
| address     | text         | NO   |     | NULL    |                |
| institute   | varchar(255) | NO   |     | NULL    |                |
| department  | varchar(255) | YES  |     | NULL    |                |
+-------------+--------------+------+-----+---------+----------------+
9 rows in set (0.019 sec)
```

TABLE 7.1 – Lecturers Database