"EduTrackPro Secure: A Comprehensive, Secure Platform for Managing Records That Ensures Encrypted Data Storage, With Robust Authentication and Authorization Controls by Providing Seamless Communication Between Community"

Prof. Shrikant S Gurav, Saurabh P Manikeri, Dhiraj Y Jadhav, Prachi G Lad, Amruta P Jodagudri, Mrunali S Karade

Sant Gajanan Maharaj College of Engineering, Mahagaon, Kolhapur, Maharashtra, India

Abstract: *EduTrackPro Secure is a digital platform designed to modernize and secure the management of educational records in schools and colleges by digitizing student records, assignments, and communication between teachers, students, and parents. It supports both remote and in-person learning environments with tailored modules for each user group. To enhance data security and efficiency, the platform implements advanced measures such as the Blowfish encryption algorithm, utilizing a 128-bit salt and a 128-bit hash value for secure data storage and transmission, along with Brotil, a data compression algorithm by Google, to optimize data storage and reduce bandwidth usage while safeguarding academic and personal records.*

Keywords: Secure, Data Transmission, Compression, Remote, Control

I. INTRODUCTION

In today's increasingly digital and interconnected educational landscape, ensuring the security, integrity, and accessibility of academic records is a top priority for institutions. *EduTrackPro Secure* is an advanced web-based platform designed to modernize and streamline the management of educational records while prioritizing data security and operational efficiency. This system provides a centralized interface that consolidates critical academic information, including student records, assignments, attendance, and communication between educators, students, and parents.

To enhance security, *EduTrackPro Secure* employs a multi-layered approach integrating the Blowfish encryption algorithm with a 128-bit salt and a 128-bit hash value for secure data storage and transmission. Additionally, it incorporates Brotli, a cutting-edge data compression algorithm developed by Google, to optimize storage efficiency and minimize bandwidth consumption while preserving data integrity.

By unifying disparate data sources into a single, secure platform, *EduTrackPro Secure* simplifies administrative workflows, improves decision-making, and enhances the overall academic experience. Its seamless integration of encryption and compression techniques ensures that sensitive educational data remains protected from unauthorized access, making it a robust solution for institutions aiming to modernize and safeguard their academic record management systems.

II. LITERATURE REVIEW

Digital Transformation in Educational Institutions: Enhancing Security and Management:

Abstract: It shows us different ways to keep educational data safe. We can usethese methods to make sure that all the information in EduTrackPro Secure is well-protected from unauthorized access. We can apply these ideas to make sure

our login process is secure. This paper offers us that, we can strengthen the authentication mechanisms in EduTrackPro Secure, ensuring that only authorized users-students, teachers, and

parents-can access sensitive information

Challenges and Solutions in Implementing Secure Educational Management System:

Abstract: It outlines the common problems faced when setting up secure educational management systems. By studying these challenges, we can anticipate potential issues in our project and find ways to address them before they become problems. It also provides practical solutions to these challenges. We can use this to anticipate and mitigate potential problems in our project, ensuring that EduTrackPro Secure remains both secure and user-friendly.

Data-Driven Management in Educational Institutions: The Role of Security:

Abstract: It emphasizes how important security is when managing data in educational institutions. This is directly relevant to EduTrackPro Secure because it highlights the need to integrate strong security measures to protect the data we handle. The article provides insights into best practices for securing data. We can use these best practices to enhance the security features in EduTrackPro Secure, making sure that our system meets high standards and provides reliable protection.

III. PROPOSED SYSTEM

EduTrackPro Secure is a comprehensive SaaS-based education management platform designed to securely maintain and manage **educational** records for students, faculty, and parents. It streamlines academic tracking, attendance management, and user authentication while ensuring scalability, security, and efficiency through modern web technologies.

System Modules

The platform consists of the following core modules:

Student Module

- Provides students access to dashboards, attendance records, and personal academic information.
- Enables students to view faculty-provided updates and reports.

Faculty Module

- Allows faculty members to manage student records, attendance, and evaluations.
- Provides access to a dedicated dashboard for monitoring academic progress.

Parent Module

- Enables parents to view their child's academic progress, attendance, and other relevant details.
- Provides secure login and controlled access to specific records.

Authentication Module

- Handles user verification and role-based access control for students, faculty, and parents.
- Ensures data security through encryption and multi-factor authentication (MFA).

College Information Module

- Central hub for all educational data, including student and faculty dashboards.
- Provides structured access to information based on user roles.

Attendance Management Module

- Tracks and updates attendance records in real time.
- Allows faculty and students to view and modify attendance (based on permissions).

Update Module

- Facilitates updates to student records, attendance, and academic reports.
- Ensures that modifications are logged for security and auditing.

Settings & User Management Module

- Provides account settings, security configurations, and user role management.
- Ensures compliance with data protection policies and privacy regulations.

IV. SYSTEM ARCHITECTURE
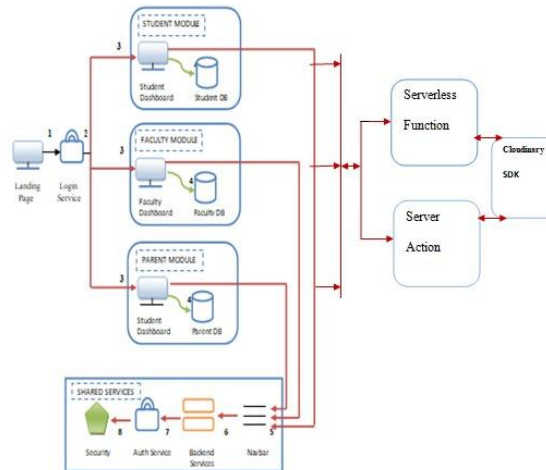
This system architecture represents a role-based modular web application with authentication and backend services.

Login & Authentication:
- Users access the system via a Landing Page.
- The Login Service authenticates users through Shared Services, which include Security, Auth Service, and Backend Services.

Role-Based Modules:
- **Student Module**: Student dashboard accesses Student DB.
- **Faculty Module**: Faculty dashboard accesses Results DB.
- **Parent Module**: Parent dashboard accesses Student DB.

Backend Processing:
- Requests from the modules interact with either Serverless Functions or Server Actions for processing.

V. METHODOLOGY

5.1 User Interaction Workflow
- User Login: Secure authentication via role-based access control (RBAC).
- Dashboard Navigation: Users access personalized dashboards (Student, Faculty, or Parent).
- Record Management: Users can view, update, and manage attendance, student data, and academic information.
- Access Control: Different roles have specific permissions to ensure data security.
- Data Updates & Tracking: Faculty can modify records, and updates are logged for audit purposes.
- Security & Logout: Secure session management to protect user data.

5.2 Data Handling & Security
- **Authentication & Authorization:** Multi-layer security with encryption and secure access policies.

- **Attendance & Academic Tracking:** Real-time updates for student performance monitoring.
- **Data Integrity & Compliance:** Ensures confidentiality and compliance with educational data protection standards.

VI. RESULTS AND EVALUATION

EduTrackPro Secure demonstrates significant advantages in educational record management:

- **Efficiency:** Automates student record management, reducing manual workload.
- **Scalability:** Supports institutions of all sizes with cloud-based architecture.
- **Data Security:** Implements encryption and role-based access control for privacy.
- **User Experience:** Intuitive dashboards ensure seamless navigation and accessibility.
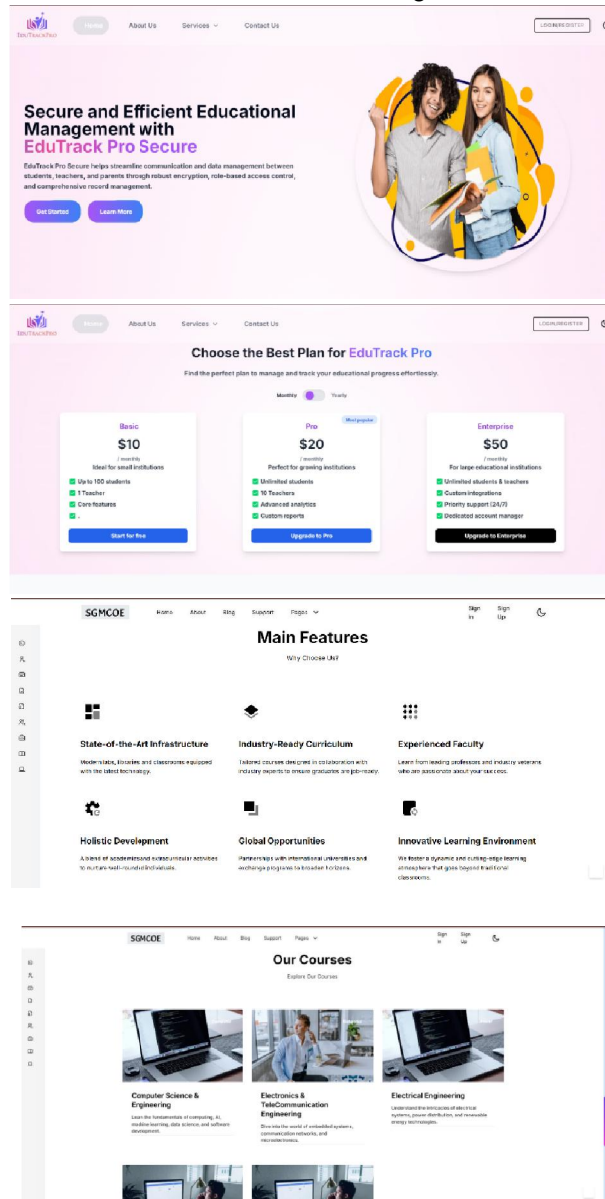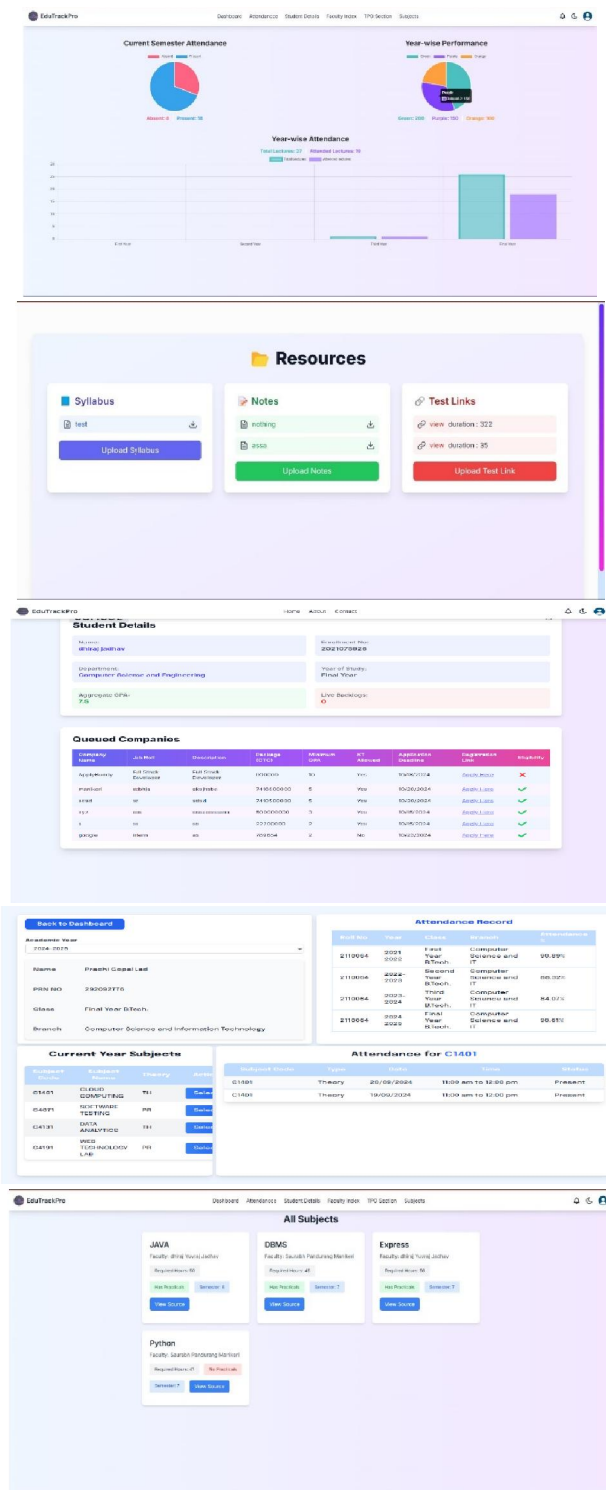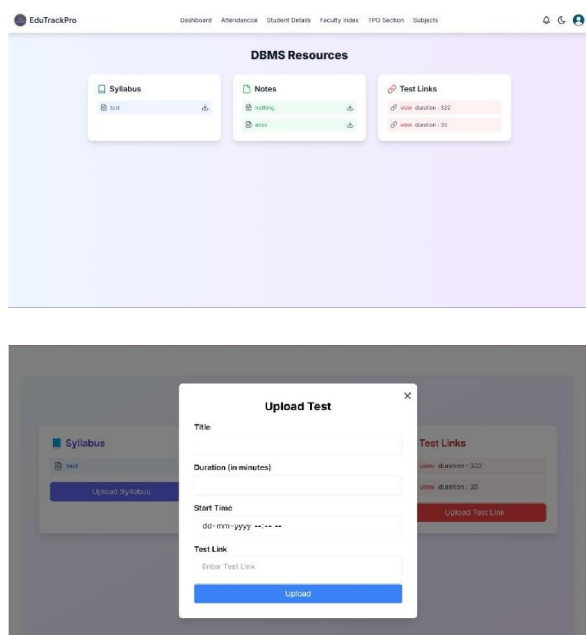
1. Home:

The Home module provides a user-friendly dashboard for easy navigation. It offers a quick overview of academic activities, attendance summaries, and important notifications. Users can access key features based on their role

2. Biling:

The Pricing module presents flexible subscription plans tailored to different user needs. It displays three tiers—Basic, Pro, and Enterprise—each with specific features and pricing. Users can easily compare plans and select the best option with clear call-to-action buttons for upgrades and subscriptions.

3. Features:

The Features module highlights the key advantages of the platform, showcasing its state-of-the-art infrastructure, industry-ready curriculum, and experienced faculty. It also emphasizes holistic development, global opportunities, and an innovative learning environment. This section helps users understand why the platform stands out and how it benefits them.

4. Our Courses:

The Courses module showcases a variety of academic programs, including Computer Science &Engineering, Electronics &Telecommunication Engineering, and Electrical Engineering. Each course description provides a brief overview of its core focus areas, helping students explore and select the best program for their interests and career goals.

5. Student Dashboard:

The Dashboard provides a visual representation of student performance and attendance through interactive charts and graphs. It includes current semester attendance, year-wise performance, and attendance trends, enabling users to track progress efficiently. This module helps in data-driven decision-making for both students and faculty.

6. Student Resource:

The Resources provides a centralized space for managing academic materials, including syllabus, notes, and test links. Users can easily upload and access essential study materials, ensuring seamless organization and quick retrieval of learning resources

7. Student Placement Section:

The Student Placement Section provides an overview of student details, academic performance, and placement opportunities. It displays key information such as enrolment year, department, aggregate percentage, and rank, along with a list of queued companies, their eligibility criteria, package details, and application deadlines. This module helps students track job opportunities efficiently.

8. Faculty Attendance:

This provides a detailed record of student attendance, including overall attendance percentage, subject-wise records, and attendance history. It allows students to track their presence in different courses and review past attendance logs, ensuring better academic monitoring and discipline.

9. Faculty Subjects:

The Subjects module provides an organized list of all enrolled subjects along with assigned faculty members. It includes course names, faculty details, and options to view subject sources and materials. This module helps students easily access subject-related resources and track required prerequisites.

10. Subject Resources:

The Subject Resources module provides a structured repository for course-specific materials, including syllabus, notes, and test links. It ensures students have easy access to essential learning resources, helping them stay organized and prepared for their studies.

11. Faculty Create Test:

This allows faculty to add new test details, including title, duration, start time, and test link. This feature streamlines the process of scheduling and sharing tests, ensuring efficient exam management for both students and faculty.

VII. FUTURE SCOPE

1. AI & ML Integration:

- **Intelligent Search** – Advanced search with natural language processing.
- **Predictive Analytics** – Data-driven insights for decision-making.
- **Automated Classification** – AI-based record categorization.

2. Enhanced Security:

- **Biometric Authentication** – Fingerprint & facial recognition.
- **Blockchain Technology** – Ensuring data integrity & transparency.
- **Advanced Encryption** – Latest encryption techniques for data security.

3. Mobile Accessibility:

- **Dedicated Mobile Apps** – Seamless access on smartphones & tablets.
- **Offline Mode** – Essential features available without internet.

4. System Integration:

- **IoT Integration** – Capturing & storing sensor data.
- **Third-Party Apps** – Expanding system compatibility.

VIII. CONCLUSION

A comprehensive, secure record management platform offers significant benefits for organizations of all sizes. By providing encrypted data storage, robust authentication and authorization controls, and seamless communication features, such a platform can enhance efficiency, improve security, and facilitate collaboration within communities. While there may be initial costs and challenges associated with implementation, the long-term benefits, including improved data management, reduced risks, and enhanced decision-making, often outweigh the drawbacks.

REFERENCES

[1]. "A Framework for Secure Data Management in Educational Institutions", IEEE Transactions on Dependable and Secure Computing, 2023: The primary author is Dr. S. Mukherjee with co-authors M. Patel and T. Robinson.

[2]. "Implementing Role-Based Access Control in Educational Management Systems", IEEE Security & Privacy, 2022: Written by A. Thomas, N. Singh, and J. Lee.

[3]. "Enhancing Student Information Systems with Advanced Encryption Techniques", IEEE Transactions on Information Forensicsand Security, 2023: Authored by L. Nguyen, P. Ramirez, and D. Walker