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E-Learning Platform

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Abstract: *E-Learning Platform is a comprehensive web-based learning management system designed to support digital education by enabling seamless interaction between students and faculty. The platform provides centralized access to learning resources such as lecture notes, video content, assignments, and assessments. Faculty members can upload materials, manage courses, and monitor student performance, while students can access content anytime and submit assignments online. The system enhances flexibility, accessibility, and continuity of learning in academic institutions. Built using modern web technologies, the platform ensures scalability, security, and reliability across multiple devices.*

Keywords: E-Learning, Learning Management System, Online Education, Digital Learning, Web Application

I. INTRODUCTION

The rapid expansion of digital communication and remote collaboration has significantly increased the demand for efficient and secure online learning systems. Users frequently need to transfer learning materials quickly without creating accounts or relying on paid platforms. Existing online learning solutions often impose restrictions such as limited free storage, mandatory authentication, complex interfaces, or long-term retention of user data. These limitations create challenges related to privacy, storage management, and ease of use.

E-Learning Platform is designed to address these issues by offering a lightweight and temporary online learning solution that emphasizes simplicity, security, and accessibility. The system enables users to upload learning materials and generate shareable links instantly without requiring registration. Password protection and secure access enhance security and convenience, especially for mobile users. The automatic deletion of learning materials after 24 hours ensures privacy and prevents unnecessary storage accumulation. This approach makes E-Learning Platform suitable for academic, professional, and personal use cases where temporary online learning is sufficient. In addition, the platform minimizes user effort by eliminating complex configuration steps and reducing dependency on long-term cloud storage accounts. The overall design focuses on providing a seamless user experience while maintaining data confidentiality and efficient resource utilization.

II. RELATED WORK

Several popular online learning platforms such as Google Drive, Dropbox, and WeTransfer provide cloud-based storage and digital learning delivery services. While these platforms are reliable and feature-rich, they often require user accounts, impose storage limits, or offer advanced features only through paid plans. In addition, long-term data retention can raise privacy concerns, especially when learning materials are intended for short-term use.

Temporary online learning platforms attempt to address these concerns by limiting file availability. However, many of these systems lack advanced security options such as password protection or do not support large content accesss. Some platforms also restrict access to certain file types or fail to provide preview functionality. E-Learning Platform differentiates itself by combining large file support, temporary storage, password protection, QR code-based sharing, and preview capabilities into a single, free, and user-friendly system. Furthermore, E-Learning Platform ensures efficient storage management through automatic file expiration, reducing server load and improving system

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performance. The platform's simplified workflow and cross-device compatibility make it a practical solution for users seeking quick and secure online learning without long- term commitments.

III. SYSTEM ARCHITECTURE

The E-Learning Platform system follows a client-server architecture that integrates a web-based frontend with a cloud-based backend. The frontend is responsible for user interaction, file selection, preview rendering, QR code generation, and countdown timer display. It provides a clean and responsive interface that works consistently across devices and browsers. The use of modern frontend frameworks ensures efficient state management and smooth user experience during content access and access operations. Additionally, responsive design ensures consistent user experience across different devices.

The backend manages file storage, metadata management, access control, and automated cleanup operations. Uploaded learning materials are stored in secure cloud storage buckets, while metadata such as file name, size, type, password, creation time, and expiry time are stored in a relational database. The backend enforces security policies and ensures that expired learning materials are automatically deleted from both storage and the database. Communication between frontend and backend is handled through secure APIs, ensuring reliable data transfer and system scalability.

IV. SOFTWARE ENVIRONMENT

The E-Learning Platform application is developed using modern web technologies to ensure performance, scalability, and ease of maintenance. The frontend is built using HTML5, CSS3, JavaScript, and React, enabling dynamic user interfaces and efficient state management. React's component-based architecture simplifies the development of reusable UI components such as upload forms, preview panels, and timers. This approach improves code maintainability and reduces development complexity by promoting modular design practices.

The backend infrastructure is implemented using Supabase, which provides cloud storage, PostgreSQL database services, and built-in security mechanisms. Supabase eliminates the need for manual server setup and domain registration, making the application cost-effective and easy to deploy. The PostgreSQL database efficiently stores file metadata and supports scheduled operations for automatic deletion. Development and testing are performed using Visual Studio Code and modern web browsers such as Google Chrome and Mozilla Firefox.

V. IMPLEMENTATION

The implementation of E-Learning Platform begins when a user selects or drags a file into the upload interface. The frontend validates the file size and type before sending it to cloud storage. Once the upload is successful, metadata associated with the file is stored in the database along with a unique identifier and expiry timestamp set to 24 hours.

If the user enables password protection, the password is securely stored and validated during file access. A shareable link and corresponding QR code are generated automatically, allowing recipients to access the file easily. The countdown timer displayed on the interface continuously updates to show the remaining time before file expiration. A scheduled backend function periodically checks for expired learning materials and removes them from storage and database, ensuring efficient resource management.

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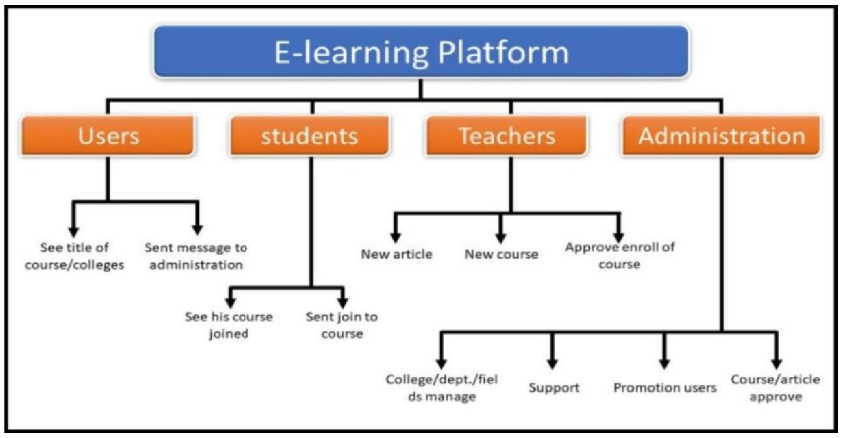

Fig.1.System Implementation Interface

VI. TESTING

Testing plays a crucial role in ensuring the reliability and correctness of the E-Learning Platform application. Functional testing verifies that all features, including content access, preview, download, password validation, secure access, and countdown timers, operate as expected. Security testing ensures that password-protected learning materials cannot be accessed without proper authentication and that expired links do not expose any data.

Performance testing evaluates the system's ability to handle large content accesss and multiple concurrent users. Compatibility testing confirms that the application works consistently across different browsers and devices. Stress testing is conducted to observe system behavior under peak load conditions and to identify potential bottlenecks.

VII. RESULTS AND DISCUSSION

The implementation of E-Learning Platform successfully meets all design objectives. The system provides fast uploads, reliable downloads, and seamless sharing through links and QR codes. Automatic file deletion effectively reduces storage usage while enhancing user privacy. The application performs well across different platforms and supports a wide range of file formats. Compared to traditional online learning platforms, E-Learning Platform offers a simpler and more privacy-focused solution for temporary online learning.

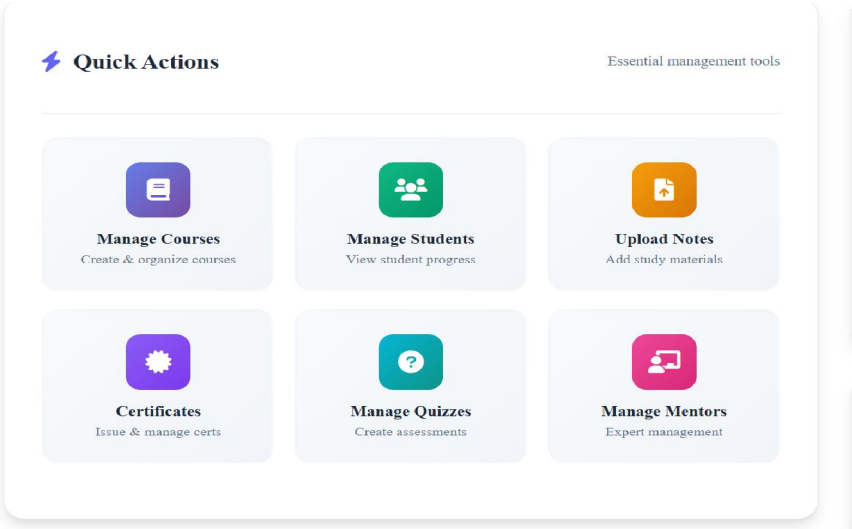

Fig.2.File Upload Area

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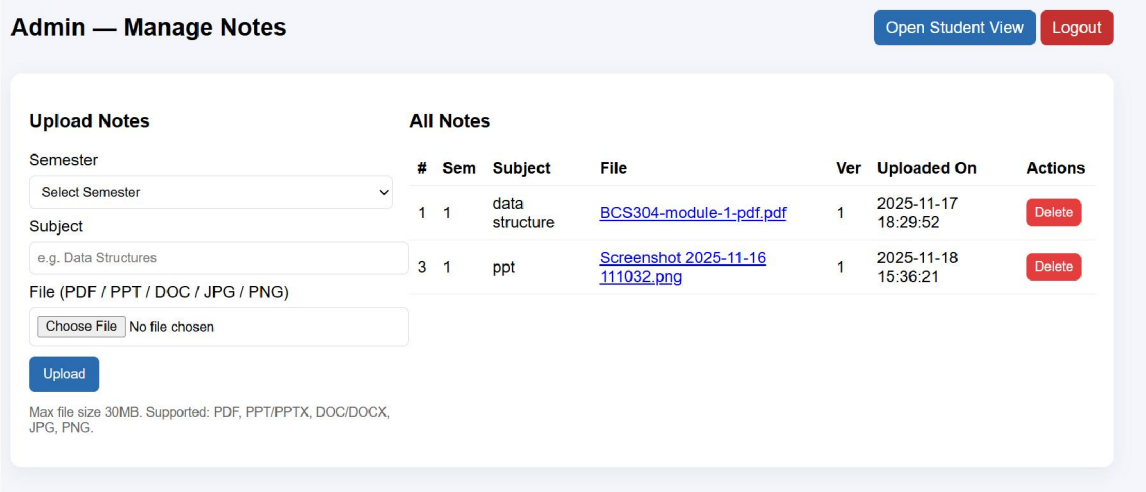

Fig.3. Uploaded file

VIII. CONCLUSION

E-Learning Platform is a secure, efficient, and cost-free online learning application designed for temporary data transfer. By integrating cloud storage, password protection, secure access, and automatic content lifecycle management, the system addresses key challenges associated with modern online learning. The project demonstrates the effective use of cloud-based technologies to build scalable and privacy-aware web applications. Future enhancements may include user authentication, customizable expiry durations, and detailed file access analytics.

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