Attendease - Student Leave Management System

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***Abstract*—Attendease is a full-stack web-based Student Leave Management System developed to streamline and digitize the leave and on-duty (OD) approval process within academic institutions. The platform replaces traditional paper-based workflows with an automated and transparent system that enhances communication between students, tutors, and Heads of Departments (HODs). Built using React and TypeScript for the frontend, Supabase for backend services including authentication and data storage, and designed with Figma UI components, Attendease ensures a seamless user experience and real-time data synchronization. The system offers role-based dashboards for students, tutors, and HODs each tailored to their specific responsibilities. Students can submit leave and OD requests, view attendance percentages, and track approval status in real-time. Tutors can review and approve requests, monitor attendance trends, and identify frequent defaulters. HODs have access to department-wide analytics, attendance insights, and on-duty approval statistics. Key features include secure Supabase authentication, automated email notifications, GPS based OD verification, attendance analytics, and report generation for administrative use. The architecture follows a modular client-server model with responsive UI design for accessibility across devices. By integrating smart analytics and digital approval workflows, Attendease enhances institutional efficiency, minimizes manual errors, and fosters accountability and transparency in attendance and leave management across departments.**

***Index Terms*—Attendease, Authorization, PostgreSQL, Real-time Synchronization, Leave Request, Approval Workflow, Role-based Access**

I. INTRODUCTION

Managing student leaves and on-duty (OD) requests in educational institutions is often a manual and time-consuming process. Traditional paper-based methods lead to delays, misplaced applications, and a lack of transparency between students, tutors, and Heads of Departments (HODs). As institutions grow, handling numerous leave requests manually becomes inefficient and error-prone. Attendease is a full stack web-based Student Leave Management System designed to automate and simplify this process. It provides a centralized digital platform where students can easily submit leave or OD requests, tutors can review and approve them instantly, and HODs can monitor attendance trends in real time. Built using React and TypeScript for the frontend and Supabase for backend services, the system ensures secure authentication, smooth data management, and responsive access across all devices. Attendease supports role-based access, automated notifications, and report generation, ensuring accuracy and accountability. By replacing manual workflows with a smart digital system, Attendease promotes transparency, reduces paperwork, and saves valuable administrative time. It empowers institutions to adopt an efficient, eco-friendly, and reliable approach to student leave management.

II. LITERATURE SURVEY

1. Soni G., Nagar K., Fumakiya M., Raghuvanshi N., KadamK. (2016). Study Paper on Student Leave Management Application. International Journal of Engineering Sciences & Research Technology, Vol. 5, No. 12, pp. 1-5. This study explores the challenges students face with attendance and leave tracking such as losing eligibility due to delays, lack of coordination, or missing event notifications. The authors propose an online leave-management application to address these issues. While the system successfully automates leave submissions and status tracking, it remains relatively regarding analytics, role-based dashboards, and mobile accessibility.

2. Kaushik V.K., Gupta A., Kumar A., Prasad A.K. (2017). Student Leave Management System. International Journal of Advanced Research in Innovative Ideas in Education (IJARIIE), Vol. 3, Issue 5, pp. 124-131. In this paper, the authors design a web-based system for students and faculty to replace manual leave workflows. The system allows users to apply for leave, track approval processes, and maintain records in a centralized database. The paper highlights the reduction in paperwork and the improved transparency of approvals. However, it focuses mostly on the application workflow rather than deeper analytics or mobile optimization.

3. Haumshini R. (2020). Digitalized Hostel Leave Management System. SSRN. Haumshini's work centers on automating hostel leave procedures residents can request leave digitally, approvals are managed online, and administrative tasks are simplified. The study emphasizes user convenience and system efficiency. Although it covers a specialized domain (hostel leave), it does not integrate full attendance analytics or institutional-level dashboards.

4. Singh M., Tripathi D., Pandey A., Singh R.K. (2017). Mobile based Student Attendance Management System. International Journal of Computer Applications, Vol. 165, No. 3, pp.37-40. This research presents a mobile-friendly attendance and leave management system designed for ease of access and use by students and staff. It emphasizes the mobility advantage and instant notifications/updates. The limitation lies in its narrow focus on attendance capture rather than broader leave workflows, multi-role dashboards, or substantial reporting features.

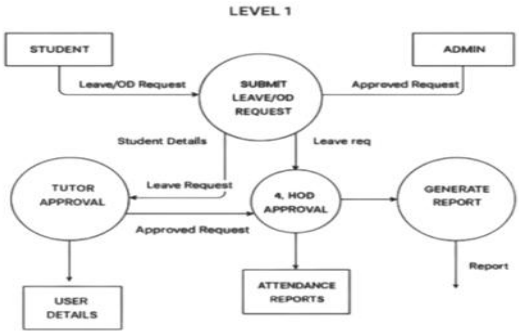
III. PROPOSED SYSTEM

Attendease – Student Leave Management System, aims to replace the traditional manual leave approval process with a fully digital, transparent, and efficient platform. This web-based application simplifies the workflow by allowing students to apply for leave online, enabling tutors and HODs to review and approve requests instantly from their dashboards. The system maintains all leave records in a centralized database, ensuring that data is secure, easily retrievable, and accessible anytime. Attendease introduces real-time status tracking, so students can immediately view whether their leave request is pending, approved, or rejected. The platform also integrates automated notifications, sending alerts to students and faculty whenever an update occurs by automating these interactions, the system saves time, minimizes paperwork, and eliminates confusion or delays. The system is built using React and TypeScript for the frontend to ensure a modern and responsive user experience, while Supabase handles backend operations such as authentication and database management. Role-based access control ensures that each user student, tutor, or HOD interacts only with relevant features. Additionally, it offers analytical insights such as attendance trends, frequent leave patterns, and defaulter tracking to support administrative decisions. By implementing Attendease, institutions can foster greater transparency and accountability while drastically improving efficiency. The proposed system reduces human error, promotes a paperless environment, and ensures that leave management becomes a seamless digital process accessible from anywhere, at any time.

IV. PROPOSED SOLUTION

The proposed solution for the Attendease Student Leave Management System is to develop a user-friendly, paperless platform that completely automates the process of applying for, reviewing, and approving student leaves and on-duty (OD) requests. The system addresses the delays, errors, and confusion often caused by traditional manual methods by creating a transparent, centralized, and efficient digital workflow. Through Attendease, students can submit leave or OD requests online, attach supporting documents, and instantly track their approval status. Tutors and HOD's can review these requests from their dashboards, approve or reject them with remarks, and view attendance insights all in real time. The system also sends automated notifications, ensuring that everyone stays updated at each stage of the process. Built using React and TypeScript for a responsive and modern interface and Supabase for backend services like authentication and data management, the platform ensures security, scalability, and smooth user experience. Role-based

access ensures that each user student, tutor, or HOD can interact only with relevant features, maintaining data privacy and system integrity. Overall, the proposed solution promotes transparency, reduces paperwork, and saves time while creating a more organized and accountable academic environment. By digitizing the leave management workflow, Attendease empowers institutions to manage attendance efficiently, make data-driven decisions, and move toward a smarter, more connected campus experience.

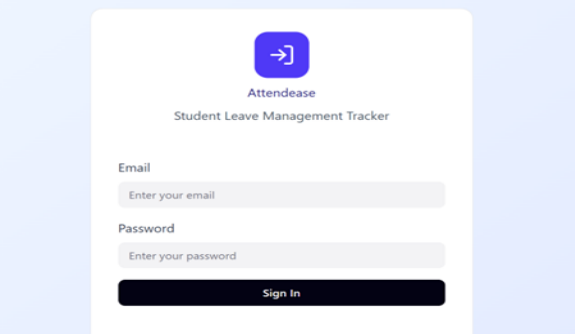


V. IMPLEMENTATION

The implementation of Attendease was carried out as a modular full-stack web application integrating modern frontend and backend technologies to ensure scalability, responsiveness, and data security. The system follows a client server architecture where the frontend interacts with the backend through secure APIs, and all user data is persisted in the Supabase database.

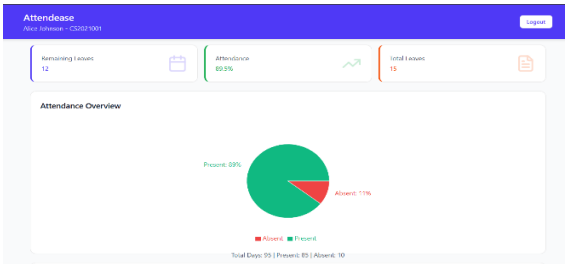
1. Login Module

The login page of the Student Leave Management System (Attendease)is a React-based authentication interface designed to provide secure and user-friendly access to the platform for different user roles students, tutors, HODs, and administrators. It uses React hooks (use State) to manage form states like email, password, loading, and error handling, while integrating with Supabase for backend authentication via a serverless function API call. The interface, styled with Tailwind CSS and Shaden UI components, features a visually appealing layout with a gradient background and a central login card. Users can either log in using their credentials or quickly access the system using predefined demo accounts that autofill the login fields for testing different roles



2. Student Dashboard

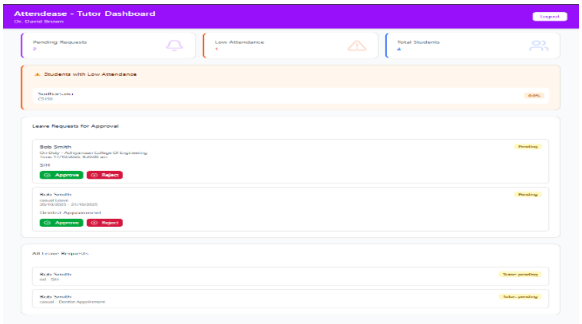
The Student Dashboard of the Student Leave Management System (Attendease) serves as an interactive interface that allows students to manage their attendance, leave balance, and leave or on-duty (OD) requests efficiently. Built using React and styled with Tailwind CSS and Shadcn UI components, it dynamically fetches and displays data such as remaining leaves, total allowed leaves, and attendance percentage through Supabase serverless API integrations. The dashboard features interactive cards for quick insights, an attendance visualization chart, and a detailed list of submitted leave requests with real-time approval statuses from tutors and HODs. Students can easily apply for casual, sick, or on-duty leaves through a responsive dialog-based form that captures all relevant details like dates, reasons, destinations, and allocated times. The component also provides visual status badges for approval stages, ensuring transparency and easy tracking. Overall, it enhances user experience by offering a centralized, intuitive, and automated leave management environment for students.



3. Tutor Dashboard

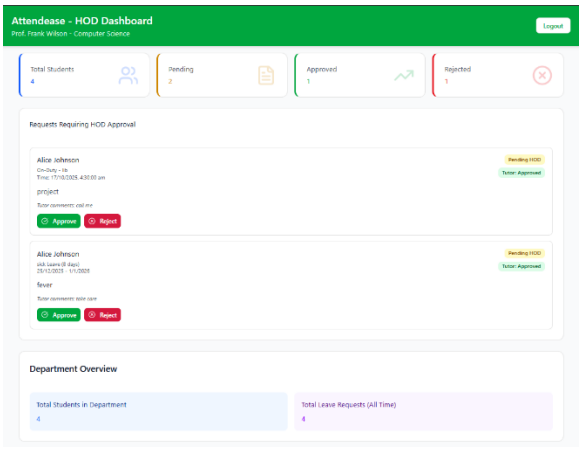
The Tutor Dashboard in the Student Leave Management System (Attendease) serves as a comprehensive control panel for tutors to efficiently monitor and manage student leave requests and attendance records. Built using React, Tailwind CSS, and Shaden UI components, the dashboard integrates with Supabase serverless APIs to provide real-time data on student attendance, pending leave approvals, and low-attendance alerts. Tutors can view detailed statistics through summary cards showing the number of pending requests, students with low attendance, and total enrolled students. A dedicated section lists students whose attendance falls below75%, allowing tutors to take proactive measures.

The Leave Requests section enables tutors to review, approve, or reject pending leave or on-duty (OD) requests directly within the interface. Each request displays key details such as student name, leave type, reason, and date/duration, accompanied by a dialog-based confirmation form where tutors can optionally add comments before finalizing their decision. Additionally, the dashboard maintains an All-Requests History view that summarizes both current and past leave applications along with their approval statuses from tutors and HODs, visually distinguished by color-coded status badges for quick interpretation. This streamlined interface ensures accountability, transparency, and efficiency in academic leave management by providing tutors with the tools to handle requests, monitor attendance, and support students within a unified and responsive environment.



4. HOD Dashboard

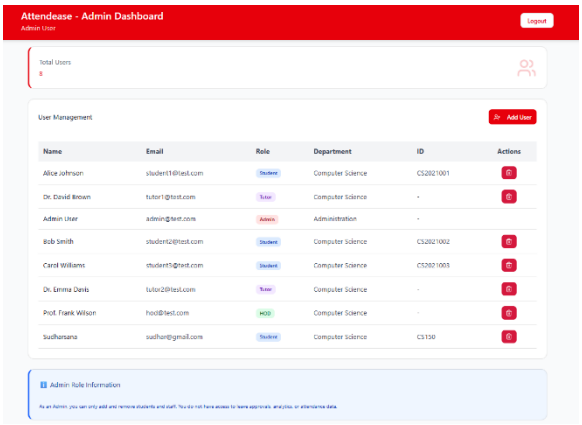
The HOD Dashboard in the Attendease Student Leave Management System is a dedicated interface that helps Heads of Departments efficiently track and manage student leave requests. Built using React, Tailwind CSS, and Shadcn UI, it connects with Supabase APIs to provide real-time departmental data and instant status updates. The dashboard displays key metrics such as total students, pending, approved, and rejected requests through clear, visually distinct cards. HODs can review each leave or on-duty request with full details, including student name, duration, reason, and tutor comments. With a single click, they can approve or reject requests, add remarks, and update records instantly. A department over view section gives insights into overall leave trends and student statistics, ensuring informed decision-making. Overall, this dashboard brings simplicity, transparency, and speed to departmental management while offering a smooth and responsive user experience



5. Admin Dashboard

The Admin Dashboard in the Student Leave Management System (Attendease) serves as the central hub for managing user accounts across the platform. Built using React, Tailwind CSS, and Shadcn UI components, it leverages Supabase serverless APIs for performing user management operations such as adding, fetching, and deleting users in real time. The dashboard interface displays the total number of users through a summary card and provides a complete list of registered students, tutors, HODs, and admins in a structured, searchable table format. The User Management section enables administrators to create new accounts by opening a dialog form that collects user details including name, email, password, role, and department. If the selected role is “Student,” an additional field for entering the student ID is shown. Upon submission, the system validates and adds the user via a secure API call, refreshing the user list

dynamically. Similarly, administrators can delete existing users (except other admins) using the delete action button beside each entry, ensuring controlled access and data consistency. An information card at the bottom clarifies role boundaries, emphasizing that the admin's privileges are limited to user creation and removal, without access to attendance analytics or leave approvals. Overall, this dashboard ensures streamlined, secure, and efficient management of institutional user accounts within a simple and intuitive interface.



6.Software Environment

Frontend–

The frontend of Attendease was developed using React, TypeScript, and Tailwind CSS to achieve a clean, responsive, and modular interface. Each user type Student, Tutor, HOD, and Admin has a customized dashboard tailored to their tasks. The component-based architecture of React ensured reusability and consistency, while TypeScript provided type safety and reduced runtime errors. The UI, designed using Shadcn UI and Lucide Icons, offers a modern and accessible experience. Client- and server-side validations were implemented to ensure accurate data entry, with real-time updates managed via RESTful API communication with Supabase.

Backend–

The backend was implemented using Supabase, which provides authentication, database management, and serverless functions within a secure and scalable environment. It handles login authentication, leave approval workflows, and automated notifications. The JWT-based authentication enforces role-specific access students submit requests, tutors review them, HODs provide final approval, and admins manage users. The RESTful API ensures real-time synchronization between the frontend and backend. The serverless model reduces hosting costs and supports scalability for future feature extensions.

Database–

The database is managed using Supabase PostgreSQL, chosen for its robustness, reliability, and security. Structured tables for Users, Leave Requests, and Approvals ensure efficient data organization and retrieval. Role-based permissions safeguard sensitive academic data, while Supabase's built-in API enables instant CRUD operations and real-time synchronization. Once a leave request is approved, the status is instantly updated on the student dashboard. Automated backups, encryption, and analytics support make the database dependable and scalable for institutional use.

IDE–

Visual Studio Code (VS Code) served as the primary integrated development environment (IDE) for implementing Attendease – Student Leave Management System. It provided a lightweight yet powerful environment for both frontend and backend development. With built-in support for JavaScript, TypeScript, and Python, VS Code ensured smooth integration of React and Supabase modules. Key extensions such as ESLint, Prettier, and Tailwind CSS IntelliSense improved code quality and design accuracy. The integrated Git tools enabled version control and seamless collaboration across modules, while the REST Client extension allowed direct testing of Supabase APIs.

7. CODE IMPLEMENTATION

Step 1: Authentication System Implements secure user login and registration using Supabase Authentication with JWT (JSON Web Tokens). Each user Student, Tutor, HOD, and Admin is verified before accessing the system. Authentication ensures encrypted data flow and maintains session security between the frontend and backend.

Step 2: Role-Based Dashboards The application provides custom dashboards based on user roles.

- Students can submit leave and on-duty (OD) requests, view attendance, and track approval status.

- Tutors can review and approve requests.
- HODs have access to departmental analytics and leave statistics. This structure ensures efficient workflow and data segregation across all users.

Step 3: Leave Request and Approval System Implements Automated email notifications are triggered using Supabase functions whenever a request is submitted, approved, or rejected. This feature ensures that all stakeholders are informed instantly without manual follow-up. Real-time updates reflect immediately on all dashboards.

Step 4: Notification and Communication Module Automated email notifications are triggered using Supabase functions whenever a request is submitted, approved, or rejected. This feature ensures that all stakeholders are informed instantly without manual follow-up. Real-time updates reflect immediately on all dashboards.

Step 5: Attendance Analytics Module Integrates attendance tracking and visualization using dynamic charts and tables. Tutors and HODs can monitor attendance trends, identify frequent defaulters, and export reports. The analytics module helps in improving institutional monitoring and decision-making.

Step 6: Deployment and Testing The frontend is deployed on Vercel, connected securely to the Supabase backend via environment variables. All modules were tested using mock data to ensure functionality, security, and performance before production release.

8. RESULT AND DISCUSSION

The Attendease system demonstrates a fully functional, secure, and efficient web-based platform for managing student leaves and on-duty (OD) approvals within academic institutions. It effectively replaces manual paperwork with a streamlined digital workflow that enhances transparency, communication, and accountability among students, tutors, and Heads of Departments (HODs).

Functional outcomes

- Student Dashboard: Enables students to submit leave and OD requests, view attendance percentages, and track approval status in real time.
- Tutor Dashboard: Allows tutors to review, approve, or reject leave applications and monitor student attendance performance.
- HOD Dashboard: Provides department-level analytics, OD approval tracking, and attendance insights to support data-driven decisions.
- Admin Panel: Offers complete control over user management, role assignments, and system configuration for institutional administration.

Performance and Usability

- The application features a fully responsive design, ensuring accessibility across desktops, tablets, and mobile devices.
- Supabase authentication with JWT ensures secure access control and data protection for all users.
- Automated email notifications instantly inform users about leave application and approval status, reducing delays in communication.
- PostgreSQL database integration ensures reliable, real-time synchronization and consistent data management.
- Dynamic analytics and charts enable tutors and HODs to monitor attendance trends and identify defaulters effectively.

Overall, Attendease achieves its primary objectives of digitizing leave management, enhancing institutional transparency, and improving operational efficiency. The system successfully bridges communication gaps between students and faculty while promoting accountability and reducing administrative workload.

VI. CONCLUSION

The Student Leave Management System successfully demonstrates the development of a comprehensive digital platform designed to streamline and automate the leave management process within academic institutions. By integrating modern web technologies such as React, Node.js, Express, and PostgreSQL, the system ensures a secure, responsive, and user-friendly experience for students, tutors, HODs, and administrators. Through its role-based dashboards and automated workflows, the system effectively bridges the communication gap between students and faculty. Features like real-time notifications, leave tracking, and status updates enhance transparency and

accountability, significantly reducing manual workload and approval delays. The inclusion of an organized database structure enables efficient data retrieval, audit tracking, and record maintenance for administrative purposes. The project highlights the potential of digital transformation in academic management systems by addressing challenges such as time-consuming paperwork, lack of communication, and errors in leave approval. The SLMS improves operational efficiency, ensures fair processing of requests, and provides a reliable record of student attendance and leave history. In conclusion, the Student Leave Management System serves as a scalable and efficient solution that simplifies institutional workflows, promotes transparency, and supports effective communication between stakeholders. Its successful implementation showcases how technology can enhance administrative processes in educational environments, contributing to a more organized and accountable academic ecosystem.

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