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Campus Hub: Streamlining Departmental Activities using MERN Stack

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Abstract: ***CampusHub is a web-based, centralized platform that was created to remove inefficiencies in the management of departmental activity on campuses. Silos of digital tools and manual records are the standard and end up leading to inconsistent data, delayed decisions, and poor communication. CampusHub makes event management, tracking of participation, and reporting easy through an easy-to-use dashboard and role-based access by administrators and students. Developed on the secure and scalable MERN stack, the website provides high security, real-time updates, and flexibility for institutions of varying sizes. Here, we introduce the architecture and implementation, of CampusHub and how it can enhance greater transparency, efficiency, and collaboration between administrative processes in campuses.***

I. INTRODUCTION

Departmental activity management in schools is usually inefficient because of over-reliance on manual processes and extensive records or files that must be managed using isolated digital tools. The traditional methods interfere with efficient communication, decelerate the process of decision-making, have no search query features and fragment data systems. By embracing the strengths of the MERN (MongoDB, Express.js, React.js, Node.js) stack, CampusHub was designed to streamline event management, student engagement tracking, and reporting for college departments. Through the provision of solid software engineering practices and role-based access control approaches, CampusHub facilitates live data handling, secure authentication, and user-friendly dashboards for administrators and students. The system architecture integrates advanced database management and easy-to-use interfaces, eliminating the shortcomings that currently exist in departmental transparency, operational efficiency, and cross-learning. With its modular design and adherence to Agile development principles, CampusHub showcases how technology can reshape administrative processes in schools and universities.

II. LITERATURESURVEY

1) Leveraging MERN Stack for Modern E-Commerce Platforms

In their 2022 study, Shukla et al. explored how the MERN stack could be used to build a scalable and user-friendly e-commerce platform. Their work demonstrated the effectiveness of integrating MongoDB, Express.js, React.js, and Node.js to handle real-time data and support high user traffic. Although the focus was on retail applications, the modular and scalable architecture they proposed is highly relevant to systems like CampusHub, which aim to manage dynamic and expanding datasets within academic institutions.

2) Digital Transformation in College Administration

Taylor and Patel (2019) highlighted the critical role digital platforms can play in enhancing college administration. They introduced a MERN-based centralized system designed to streamline event management, boost efficiency, and support data-driven decision-making. Their research reinforces the value of integrated dashboards and real-time data management — key features adopted in CampusHub to modernize and simplify departmental operations.

3) *Optimizing Project Management through MERN Technologies*

Kanthi et al. proposed a Project Tracking System that utilizes the MERN stack to automate task management, budget tracking, and team coordination. Their work underlined the importance of real-time updates and centralized data access for improving workflow efficiency. CampusHub draws inspiration from this approach, particularly in providing administrators with organized dashboards and seamless access to event and participation records.

4) Building Intelligent Academic Solutions through Digital Campuses

The concept of a “Digital Campus,” presented by Jain and Chande, envisions a centralized, web-driven environment where academic, administrative, and extracurricular functions converge.

Their research emphasizes real-time event tracking, resource management, and user engagement, which aligns perfectly with CampusHub's aim to streamline departmental management and foster a collaborative academic atmosphere.

5) Enhancing Education Management Systems in Pacific Island Countries

Badru et al. (2022) designed a modern Education Management Information System (EMIS) using the MERN stack, aimed at improving data-driven planning and monitoring in educational institutions. Their emphasis on real-time data handling and flexible reporting greatly influenced the development of CampusHub's event tracking and participation monitoring features, ensuring better visibility and quicker decision-making for administrators.

III. METHODOLGY

The development of CampusHub followed a modular, Agile-driven methodology designed to ensure scalability, security, and user-friendly performance. The system was implemented in distinct phases:

A. DataCollection:

1) Event and Participation Data Sources:

- Departmental event details were gathered manually from academic records and past event archives.
- Participation sheets and student lists were compiled from Excel files shared by department coordinators

2) Admin and Student Profiles:

- Dummy datasets were created initially for testing admin and student profiles.
- Later, real user data was incorporated securely following authentication and authorization protocols

B. Preprocessing:

1) Data Formatting and Standardization:

- All event and participation records were standardized to JSON format.
- Excel participation sheets were parsed and mapped into a MongoDB schema

2) Data Validation:

- Checks were implemented to verify event dates, participation validity, and duplication removal to maintain data integrity

C. SystemArchitecture

1) Frontend Interface (React.js + Tailwind CSS):

- Dynamic, responsive web pages were developed for admins and students
- Separate dashboards with role-based content delivery were created, ensuring personalized user experiences

2) Backend Services (Node.js + Express.js):

- RESTful APIs were built to handle CRUD operations for events, student participation uploads, authentication, and dashboard data retrieval.
- JWT-based authentication was integrated to enforce secure access for different user roles

3) Database Management (MongoDB):

- A NoSQL schema was designed with collections for Admins, Students, Events, Clubs, and Participation Records.
- Relationships were enforced via references, ensuring efficient querying and retrieval of event-participation data.

D. Implementation

1) Authentication and Authorization Module:

- Role-based login was implemented with JWTs.
- Passwords were securely hashed using bcrypt before database storage.

2) Event Management Module (Admin Side):

- Admins can create, update, delete, and filter events by academic year.
- Admins can upload student participation sheets, which are automatically linked to the corresponding events.

3) Student Dashboard Module:

- Students can view their participation records, upcoming events, and related club activities.
- Real-time updates ensure students always access the most recent event information.

E. Deploymentand Integration

1) Deployment:

- The complete system was deployed using cloud hosting services, ensuring 24/7 availability.
- Backend and database services were configured for auto-scaling based on load.

2) Real-Time Feature:

- Instant updates after event creation or participation uploads are reflected on user dashboards without delay.
- Notifications for new events and updates are handled via a real-time messaging module (future upgrade planned).

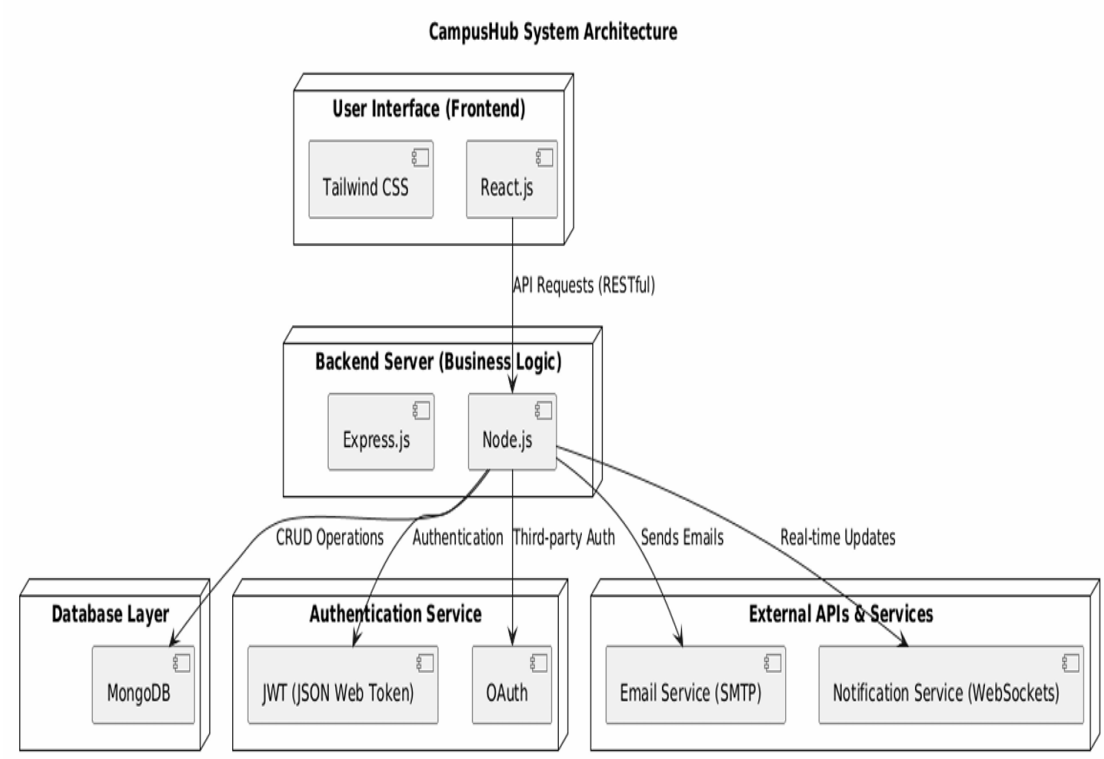

Fig.1ProposedSystemArchitecture

The proposed architecture integrates user-friendly frontend interfaces with a powerful backend API system and a scalable NoSQL database, ensuring secure and efficient departmental activity management.

The design emphasizes modularity, secure access control, real-time data handling, and optimized user interactions, making CampusHub an ideal platform for streamlining academic event and participation tracking within institutions.

IV. RESULTS AND DISCUSSION

This research focuses on streamlining departmental event management within academic institutions through the development of CampusHub, a centralized, web-based platform. The system follows a structured methodology combining modern web technologies (MERN stack), real-time data handling, and role-based access control to enhance efficiency, transparency, and engagement. By integrating automated event tracking, Excel-based participation uploads, and personalized dashboards, CampusHub addresses traditional challenges in departmental activity management, fostering smoother administrative operations and improved student involvement.

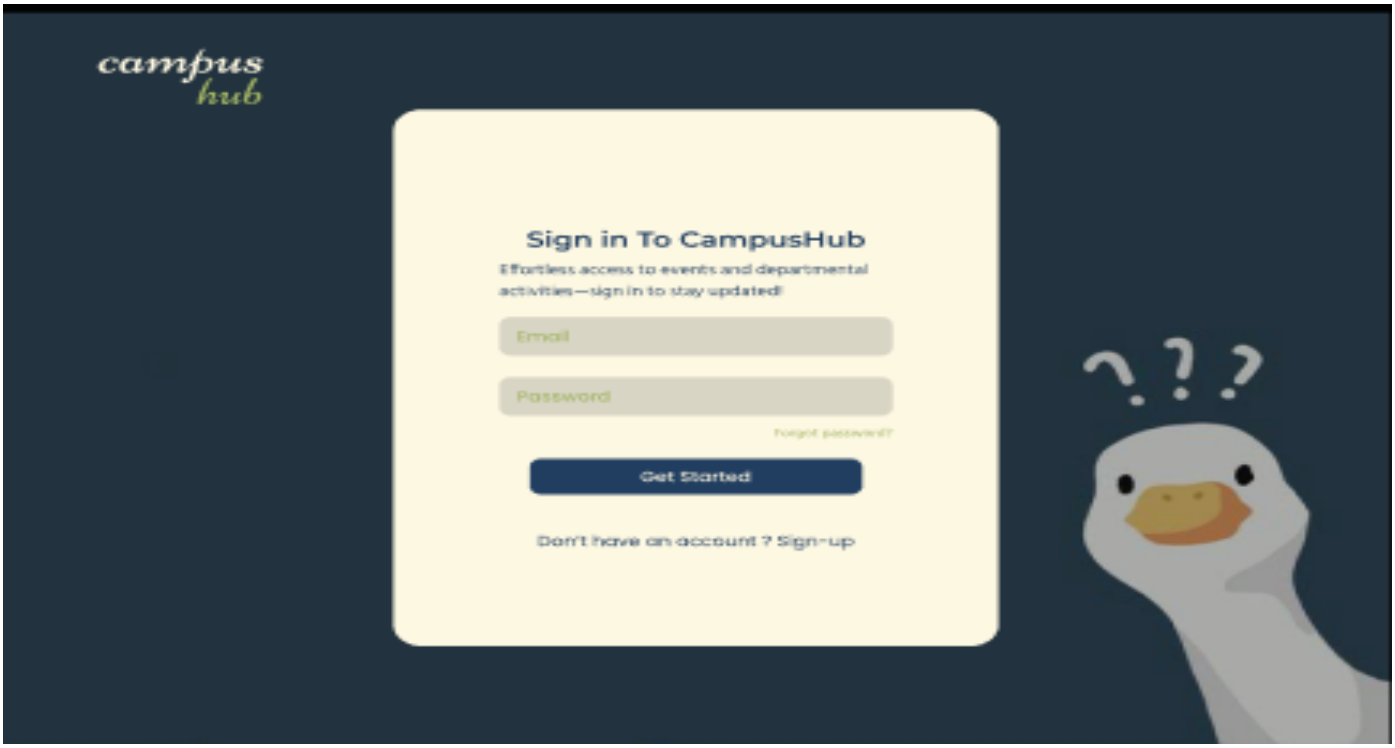

Fig.1Signin

The Sign in page acts as the primary security gateway, requiring administrators and students to authenticate before accessing platform functionalities. This layer of protection ensures that sensitive data — including student participation records and departmental reports — remains secure. The Sign in process is streamlined and secure, balancing ease of access with robust authentication protocols, thus maintaining the system's integrity and privacy standards.

Fig.2UserSignupScreen

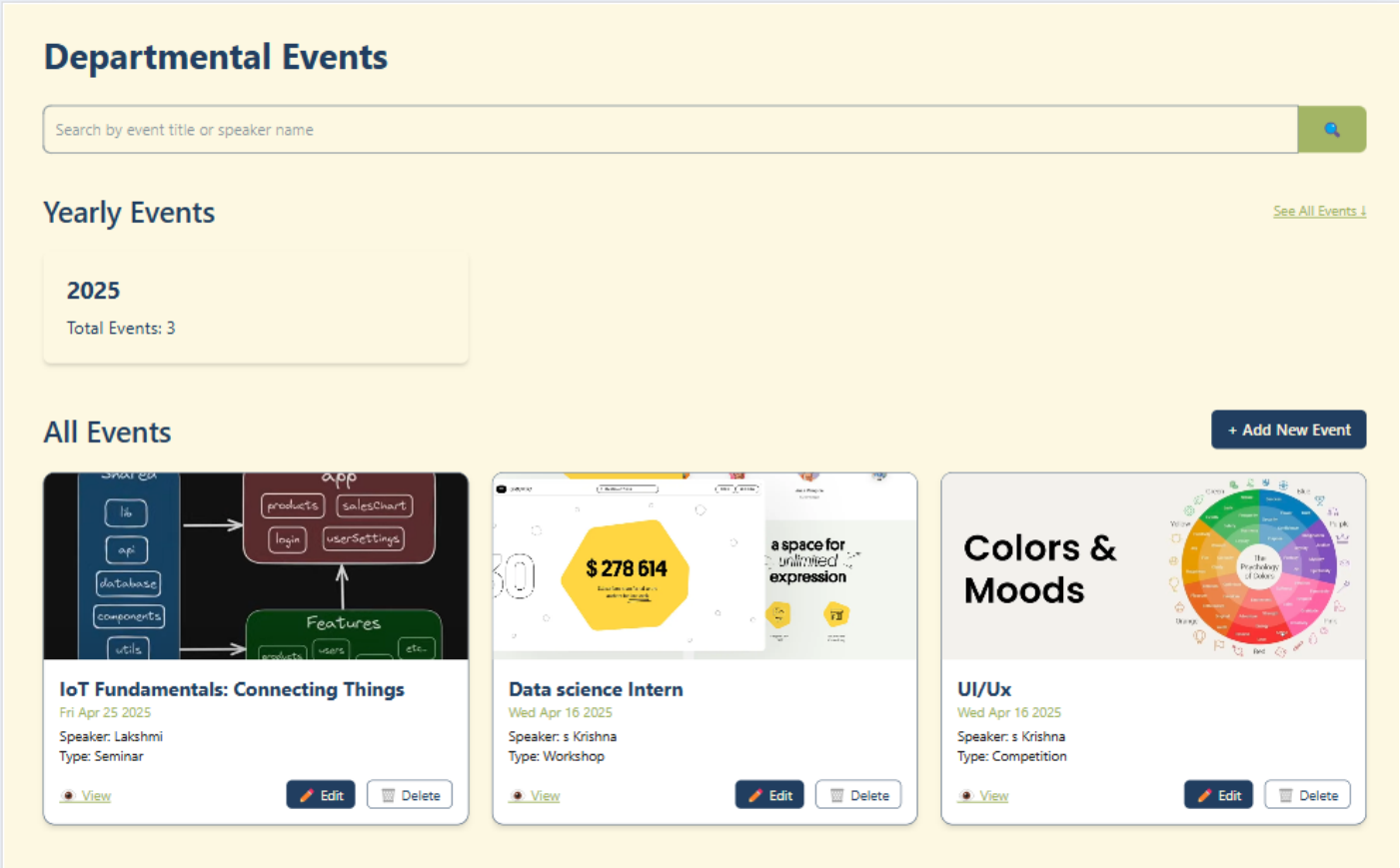

Fig.3All Events Screen

Administrators can check all events in a single page with a clean and simple UI which provides easy navigation to yearly evenst or ability to search through all the events available. Administrators can add a new Event or search through existing events easily with just a single click. They can even viewany individual event or Delete them if not needed anymore.

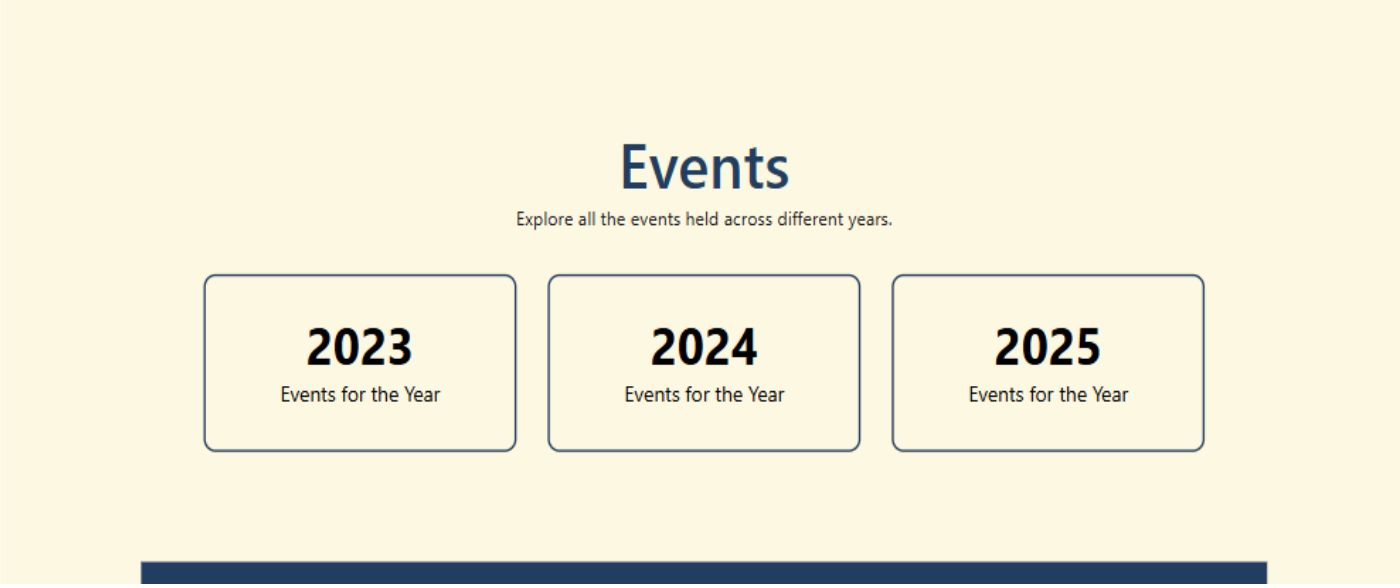

Fig.4Events Screen

CampusHub allows administrators to filter and view events based on specific academic years. This functionality simplifies the task of tracking historical and upcoming events, providing a structured overview that supports departmental planning and reporting. Administrators can easily search events by title, year, or speaker name, ensuring that large volumes of event data remain organized and accessible without the need for manual sorting.

Fig.5Add EventPage

Administrators can add any Event where they can select the club it belongs to add start and end dates and give title and speaker for each event.

They can also choose a Main Event Image that will be displayed on the top and the Event Full Report that can be downloaded later and all the Images of the Event and the Bills of that Event so that can be viewed and managed at one place later if need. They can also Attach student participation list and later check if any student participated or not by entering their roll.no.

Fig.6 Edit EventsPage

An Event once created can be modified by the Administrator.They can verify all the fields and check and update any if needed. They can also change the Images or add bills whenever a change happens and this will immediately be reflected in the individual event page.

Fig.7IndividualEventPage

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The Individual Events Page consists of the Event Details like the Title, Speaker name and type of Workshop.With the main image at the top and all the other images and bills below the summary. The summary report can be auto generated by the AI from the document that is uploaded and the Administrators can also choose to view the full report by clicking on view full report button to download.

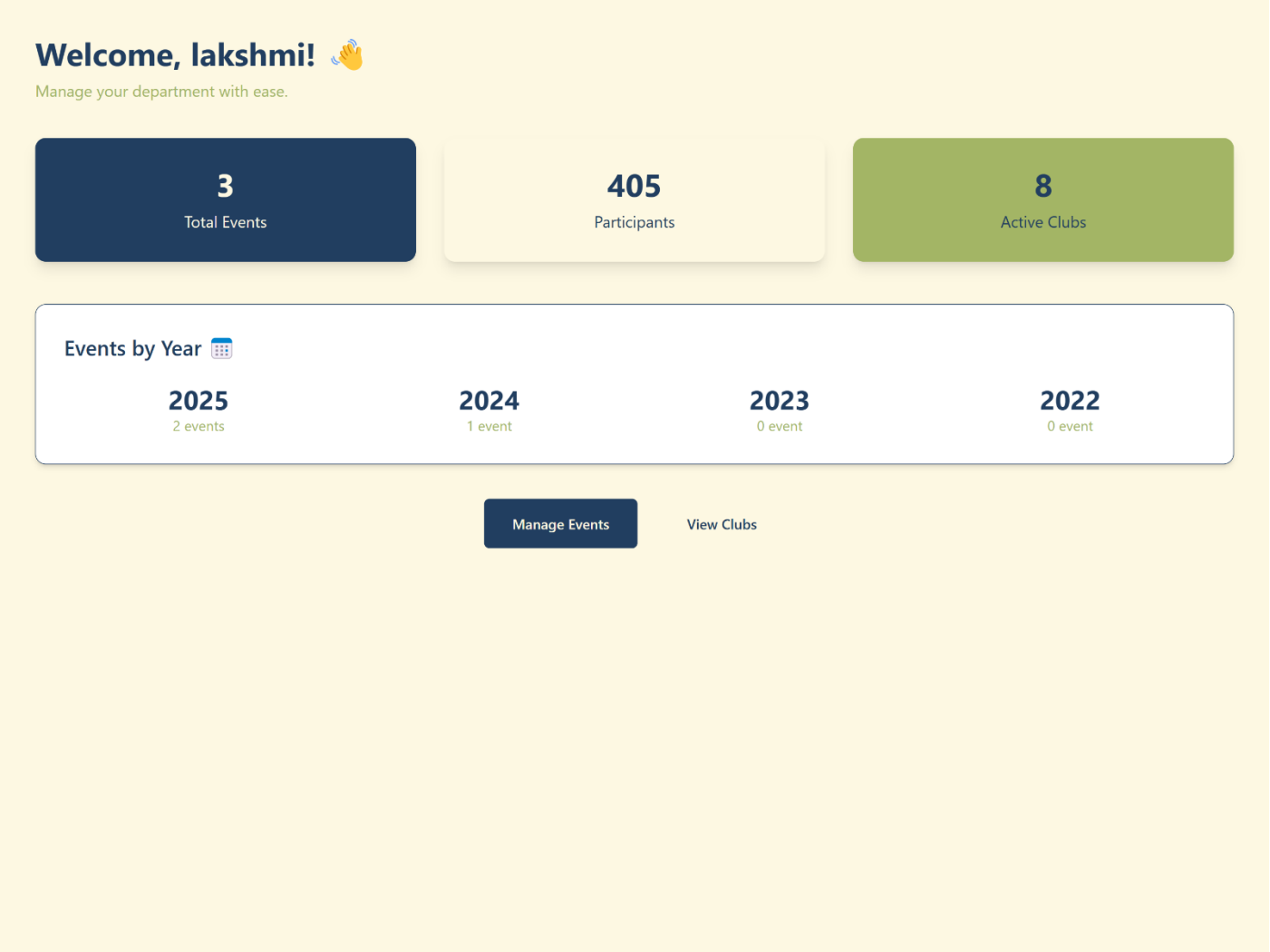

Fig.9Admin DashboardPage

CampusHub provides an intuitive and clean admin dashboard from where they can navigate to the events and the clubs pages. It lists out the total no. of Events that happened in each year along with the no. of participants in all the events and the total no. of Clubs to help administrators make quick decisions. This intuitive dashboard takes insights from all the events and clubs and makes changes to the data dynamically. .

Overall, CampusHub shows how a centralized, web-based platform can greatly transform the management of departmental activities in academic institutions. The system's user-oriented design, secure access control, and real-time event management functionality result in streamlined administrativeworkflows, increased student engagement, and increased trust and transparency of reporting and planning.

V. CONCLUSION

CampusHub effectively solves the issues of academic institutions in terms of departmental events and student involvement. By aggregating all activities related to events into a centralized, web-based system, the system dramatically increases efficiency, transparency, and decision-making capabilities. Utilizing the MERN stack provides an environment that is scalable, secure, and responsive to the changing needs of both administrators and students.

Through features like automated event tracking, Excel-based participation uploads, real-time dashboards, and role-based access controls, CampusHub minimizes manual effort and improves data accessibility across departments. The modular design and Agile development approach enabled continuous feedback integration and rapid adaptability to user requirements.

Overall, CampusHub stands out as a modern solution for streamlining departmental management processes in educational institutions. Its real-time capabilities, secure architecture, and user-friendly interfaces make it a valuable tool for fostering better engagement, collaboration, and organizational efficiency within campus environment.

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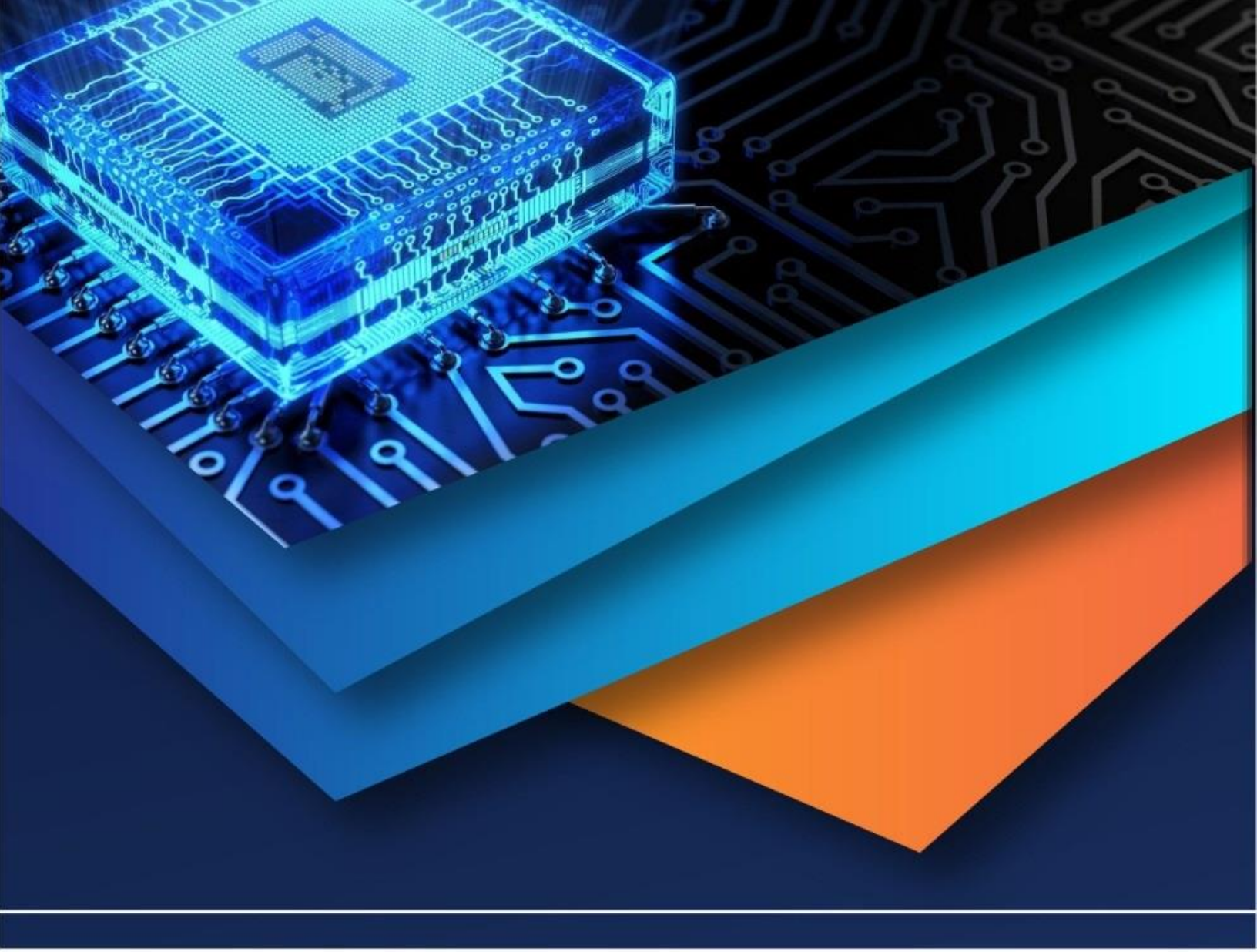

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