Centralized Platform for AICTE Activity Tracking and Event Management for Faculty and Student Development

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ABSTRACT

The AICTE Activity Management System is a progressive web application designed to streamline the tracking and management of activity points for students in compliance with AICTE guidelines. Addressing limitations in existing systems, the project incorporates role-based access control for various stakeholders, including students, faculty, and department heads, to ensure tailored interactions. Key features include automated activity points verification, dynamic page generation, and real-time notifications for event registration and program updates.

General Terms

AICTE Activity, Event Management, Centralized Activity Management, Dynamic Page Generation.

Keywords

File handling, enterprise-level design, user scalability, Request handling.

1. INTRODUCTION

The All-India Council for Technical Education (AICTE) plays a crucial role in regulating and enhancing technical education in India. Engineering colleges must secure AICTE approval to offer their programs and be recognized as top institutions. AICTE not only sets educational standards but also emphasizes the importance of students acquiring soft skills, leadership qualities, and a sense of social responsibility alongside their technical knowledge.

To ensure the overall development, AICTE has implemented an Activity Points system. Students in a four-year degree program must earn a minimum of 100 activity points, in addition to their academic requirements, to graduate. However, the current process for tracking and verifying these activities is cumbersome. Faculty coordinators manually manage and verify activities for approximately 60 students per batch, a method that is both time-consuming and inefficient.

Moreover, AICTE offers various development programs for faculty and students, such as the Faculty Development Programme (FDP). Unfortunately, many intended beneficiaries miss out on these opportunities due to a lack of effective communication channels and notification systems.

To address these issues, we are developing a progressive web application designed to streamline the management of activity points and enhance communication regarding AICTE programs. This application will reduce manual workload, cut costs, and save time by digitizing the tracking and verification process. It will also send real-time notifications, enabling students and faculty to stay informed about and register for AICTE programs. The platform will feature role-based access, providing customized interfaces for principals, HODs, faculty, coordinators, and students, thereby ensuring efficient and tailored user experiences.

2. RELATED WORK

Campus Sync-One Central Hub for Attendance, Events, and On-Duty Management, in this Dr. M. Rohini proposes a comprehensive application for managing attendance, events, and on-duty assignments within college administration. It consists of three core modules: Attendance Management, Event Management, and On-Duty Management, which address the limitations of existing systems that lead to inefficiencies in managing various college activities. The application is built using Flutter, which supports multiple platforms, including mobile devices, tablets, and PCs, ensuring ease of use for all users involved in campus activities. The Attendance Management module enhances attendance tracking with real-time updates and detailed statistics, significantly improving effectiveness compared to traditional systems. Furthermore, the paper has a plan for future enhancements, including the integration of advanced technologies like machine learning and AI, which is aimed at further automating administrative tasks and improving decision-making processes within educational institutions [1].

The paper "Web-based conference management system for higher learning institutions" is about a conference management online system that was developed exclusively for the International Islamic University Malaysia to improve conference organizing processes through an easy-to-use platform for event organizers, authors, and reviewers. This system aims to simplify the submission and review process. It allows authors to easily register and submit their papers and provides corresponding updates on the status of their submission. It also provides information regarding the ongoing and future conferences. It also makes it efficient to share tasks among reviewers according to their expertise so that a systemic assessment of submitted papers is achieved. This system is compared with some other existing solutions, such as EasyChair and OpenConf, which clearly show what specific features the proposed system possesses to achieve the unique needs of IIUM. The system follows the structured approach of development using the Waterfall Model, giving clarity to various roles and responsibilities in the lifecycle of the system. Future development aspects that make it more user-friendly will include incorporating an edit function and developing user profiles that will support better management of events and communication. Generally, the Conference Management Online System is viewed as an essential component for boosting the efficiency of conference management and effectiveness at IIUM and inviting authors and event managers to participate more [2].

In "PeerConnect-Live virtual event platform by using a web server," it highlights the limitations of existing web conferencing solutions like Zoom and Microsoft Teams, which, while offering video and audio chat features, lack integrated event management capabilities, which forces the users to rely on external platforms for event information and connections. This addresses this gap by providing a dedicated platform that combines social media functionalities with video conferencing, allowing users to create, manage, and promote events directly within the application. This integration facilitates a streamlined user experience, enabling attendees to filter and register for events based on their interests with just one click, thus enhancing engagement and community building. Additionally, the technical implementation of PeerConnect using the MERN stack ensures scalability and efficient data management, crucial for handling virtual events effectively. Overall, PeerConnect aims to create a comprehensive solution for virtual event management, fostering meaningful connections among users and organizers alike [3].

A web-based college event management system and notification sender is designed to streamline event registration and management for students and organizers. The system allows users to register for events remotely, significantly improving accessibility and efficiency in managing event-related data. It utilizes a Model View Controller (MVC) framework, ensuring a structured approach to application development, where the controller handles business logic and Java Server Pages (JSP) are used for the user interface design. The system has an ability to automatically send confirmation emails to users upon registration, which saves time compared to traditional methods of communication. The authors can also integrate social media connections to enhance local event visibility and provide real-time alerts to organizers when users interact with the event. Overall, the paper contributes valuable insights into the development of efficient event management systems in educational settings, addressing both user needs and administrative challenges [4].

Review on Student's Project Management System for Faculty of Engineering & Technology is designed to streamline project management processes within educational institutions, particularly for engineering faculties. It automates several traditional, manual tasks such as group formation, project topic selection, guide allocation, and document submission. By offering a collaborative platform, this enables students and guides to interact more efficiently, allowing guides to assign tasks, provide feedback, and track project progress in real-time. The system also offers features like uploading and downloading project documents, enabling users to access previous years' projects to avoid redundancy in topic selection. Additionally, this system maintains a comprehensive record of each student's progress, which is used for academic evaluation and grading. Overall, the system reduces the time and effort involved in managing projects while improving communication and organization [5].

The Centrally College Event Management System (CEMS) is a web-based platform designed to enhance the efficiency of college event management by replacing manual processes with a more streamlined approach. This system grants students, faculty, and administrators access to comprehensive event information, including details on upcoming and past events such as location, theme, participants, and chief guests. It also simplifies event scheduling and attendance tracking. The system consists of four key modules: the Student Module, which allows students to register and view event details; the Faculty Module, where faculty members can schedule and monitor events; the Principal Module, enabling principals to oversee and manage events and users; and the Admin Module, where administrators manage the overall system, including event scheduling and user accounts. By reducing paper usage and automating processes, the system saves time, allows simultaneous access for multiple users, and ensures easy access to event details for students. Ultimately, the CEMS offers a user-friendly interface that improves event coordination and resolves communication and operational issues for college event organizers [6].

The Exploration of Modes for College Design Workshops Based on Cloud Platform by Li Ruohui proposes Design workshops are critical in college-level design education, offering practical training and fostering collaboration among students. Traditionally, two types of workshops have emerged: one hosted by colleges during academic conferences and the other organized by creative industrial parks. However, these models face challenges such as limited time, location constraints, and inadequate collaboration between students and companies. Li Ruohui proposes a new model for design workshops that leverages cloud technology to overcome these limitations. The cloud platform enhances workshop efficiency through information sharing, remote collaboration, and data storage. It supports two phases: the conventional phase, which incorporates cloud technology into existing workshop processes (e.g., application management, design guidance), and the normalized phase, which enables ongoing collaboration among students from different regions via the cloud, extending the workshop beyond the initial event. This model addresses current challenges by improving workshop management and communication, facilitating continuous learning, and fostering closer ties between students and industry. While promising, this approach faces potential obstacles such as the high costs of cloud infrastructure and the need for sustained funding. Despite these issues, cloud-based workshops could significantly

enhance the effectiveness of college design education by providing a more flexible, collaborative, and scalable framework [7].

3. PROPOSED SYSTEM

The All-India Council for Technical Education (AICTE) plays a crucial role in regulating and enhancing technical education in India. Engineering colleges must secure AICTE approval to offer their programs and be recognized as top institutions. AICTE not only sets educational standards but also emphasizes the importance of students acquiring soft skills, leadership qualities, and a sense of social responsibility alongside their technical knowledge.
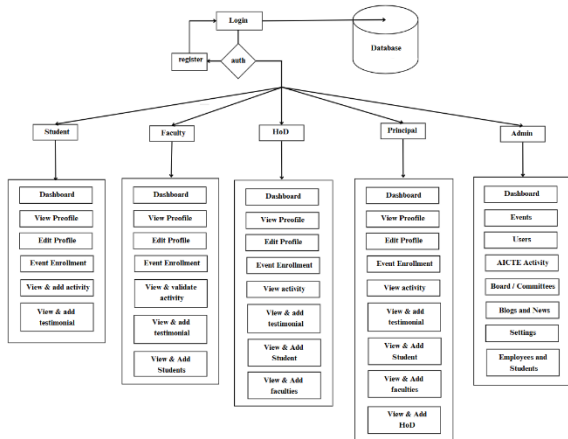
Fig 1: System Modules

The above figure represents system modules that outline the role-based architecture of the platform, designed to cater to various user roles: student, faculty, HOD, principal, and admin. Each module is structured to provide specific functionalities based on the role's responsibilities, ensuring a seamless user experience and streamlined operations.

1. Student Module
2. Faculty Module
3. HOD Module
4. Principal Module

3.1 Student Module

The student module enables students to manage their AICTE activity and student development activities effectively. It allows them to access a personalized dashboard where they can view and edit their profiles, enroll in student development programs, submit activity reports, and view their activity history. Additionally, students can add testimonials to share their experiences, fostering a sense of community.

3.2 Faculty Module

This module includes a dashboard for managing faculty tasks. Faculty can validate by approving or rejecting submitted student activity reports, view and edit their profiles, and enroll in faculty development activities. Furthermore, faculty members can add or update student details, ensuring that student data remains accurate and current. The module ensures that faculty have all the tools they need to guide and evaluate students effectively.

3.3 HoD Module

The HoD module is tailored for leadership, enabling HoDs to manage both faculty and student information within their departments. HoDs can view and edit their profiles, validate activities, oversee event enrollment, and enroll in faculty development activities. The module also allows them to add or update details for students and faculty, ensuring that departmental data is up-to-date and well-organized.

3.4 Principal Module

The principal module has all the features of the HoD module; additionally, it centralizes the management of HoDs and their departments. Principals can view the profiles of all HoDs, view student activity, and manage student and faculty information institution-wide.

3.5 Admin Module

The admin module serves as the core of the system, designed for overarching institutional management. Administrators can manage events, track user information, oversee AICTE activities, and maintain board or committee records. Additionally, the module includes features for managing blogs, news updates, and other institutional communications. Admins can configure system settings and policies, ensuring smooth operations and alignment with regulatory standards.

4. IMPLEMENTATION

4.1 Microservices Architecture

For the Event Management System project, a microservices architecture with elastic load balancing ensures scalability, resilience, and efficient resource allocation. This setup contrasts with a traditional monolithic architecture by dividing the application into independent services, each handling specific functionalities like user authentication, notification management, and activity tracking, which improves flexibility and deployment. Its key components are:

1. Request-Based Page Generation: Each request to a specific route (e.g., /student/activity/123) triggers a server-side process that gathers the latest data related to that specific context (in this case, activity ID 123 for a student). Instead of rendering a static page, the system dynamically creates a new page with up-to-date information.

2. Vue.js Frontend: Using Vue.js, the frontend is designed to handle dynamic components that fetch and render data based on route parameters. For instance, when a student accesses their activity record, Vue.js will render a page with information pulled directly from the backend based on the unique ID specified in the route.

3. Backend Integration with Laravel: Laravel, as the backend framework, serves as the endpoint handler, responding to route-specific requests and supplying the relevant data needed to dynamically populate each page. Laravel uses route parameters to fetch data from MySQL and push it to the frontend.

4. Microservices Communication: Each microservice (e.g., activity tracking, notifications) can generate data specifically for the requested page. This ensures that each dynamically generated page is specific to the request context, enhancing personalization and relevance.

This dynamic routing setup is highly beneficial for this system, where each user's view often depends on live data and personalized content, and each user sees content tailored to their actions or queries, improving the user experience. Users access the latest data, which is dynamically fetched and rendered with each page load, and generating pages only when accessed reduces the need for pre-loaded pages, optimizing server resources.

4.2 File Handling

Effective file handling is a crucial component in digital platforms designed to manage events, projects, and educational

activities. Systems like [6] and [5] illustrate the role of structured file management in educational contexts, allowing users to seamlessly access, upload, and retrieve documents related to events, projects, or evaluations.

By implementing robust file handling practices, such systems enhance document accessibility, reduce administrative workload, and support real-time feedback and iterative documentation processes. The use of enterprise-grade file handling mechanisms enables simultaneous access for multiple users, facilitating efficient coordination among students, faculty, and administrators. Additionally, effective file storage and retrieval methods allow platforms to support a high volume of data transactions, essential for scalability in college-wide applications and large-scale event management systems.

4.3 Database Design

Database management is fundamental to the integrity and performance of event and project management systems, particularly in handling extensive user interactions and data storage needs. Utilizing normalized databases, like the 3NF structure, as seen in systems like [6] and [5], enhances data accuracy and redundancy elimination, contributing to efficient query processing and storage optimization. For instance, [5] utilizes a centralized database for managing project documents and group information, which provides a streamlined approach for tracking student progress and offering academic evaluations. The use of MySQL and SQLite databases allows these systems to maintain flexibility, facilitating access to stored information while ensuring data security and integrity. As educational institutions increasingly adopt these systems, adherence to a well-structured database model remains a core requirement to support scalability, ensure data consistency, and uphold efficient data transactions across various modules.

4.4 Cloud Services (AWS)

Cloud technology is becoming indispensable in modern educational platforms due to its scalability and remote accessibility benefits, as highlighted in the exploration of cloud-based workshop models. In the context of event management systems like AICTE Activity Management, AWS cloud services (such as EC2 for computation, S3 for storage, and Lambda for serverless functions) provide a robust infrastructure for managing a diverse range of tasks, from real-time user interactions to secure file storage. Cloud platforms facilitate seamless, remote access to workshop content and event materials, which aligns with the needs of modern educational institutions aiming to deliver interactive learning experiences across geographical boundaries. Furthermore, the integration of services like Elastic Load Balancing ensures that high traffic and concurrent access demands are met without compromising system performance. By leveraging cloud capabilities, educational management systems can efficiently handle dynamic workloads, automate resource scaling, and provide students and faculty with uninterrupted access to learning resources and event information.

5. RESULTS AND DISCUSSIONS

Table 1 highlights the gap in the existing system by evaluating each system based on specific features and the implementation of those lacking features in the proposed system.

Table 1. System comparison

Feature lacking in existing systems	Features of the proposed system
Comprehensive Activity Points Monitoring	Tracks and verifies AICTE-specific activity points, easing administrative processes.
Dynamic Page Generation	Creates pages in real time based on parameters, ensuring current and relevant content.
Cloud-Based Scalability (AWS)	Integrates AWS (Elastic BeanStalk) to handle high volumes of data and users seamlessly.
3NF Database Structuring	Implements 4NF form for data accuracy and minimal redundancy.
Low performance and slower response.	Caching on frequently accessed data and rate limiting for API.

This system introduces several innovative features that significantly enhance its functionality compared to existing models like [1], [3], [5], and [6]. Unlike these models, the AICTE system stands out by incorporating cloud infrastructure using AWS, ensuring scalability, reliability, and efficient resource management. The use of advanced database normalization (4NF) further ensures optimized data handling, which is not fully implemented in most existing systems. In terms of feature diversity, the AICTE system offers unique functionalities such as dynamic page creation and comprehensive role-based access control, which enhance both usability and security. While systems like SPAM focus heavily on monitoring activity points and advisor assignments, the proposed system provides a more holistic approach by integrating features like event registration, instant notifications, and report validation within a unified platform. This integration eliminates the need for multiple systems, reducing operational complexity and improving user experience. The below figures represent the user interfaces for the proposed web application.
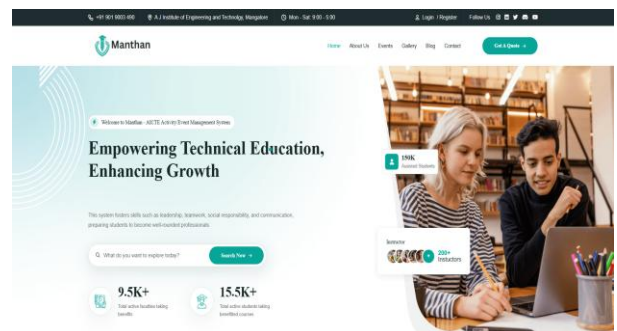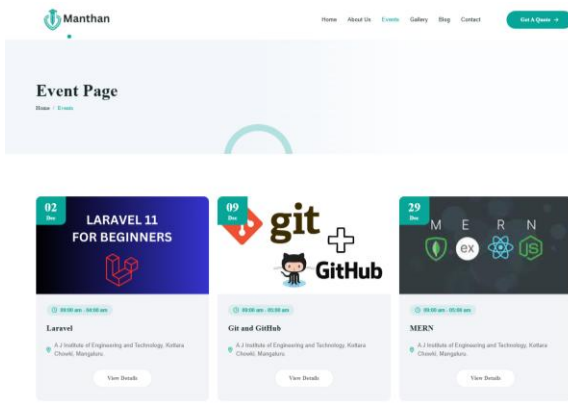

Fig 2: Home page

Fig 3: Events page

The real-time event listings, direct registration links, filters for easy navigation, and automated reminders as shown in Figure 3 eliminates delays and missing of events due to institutional dependencies.
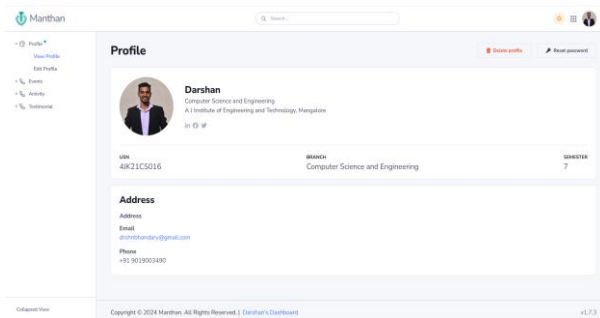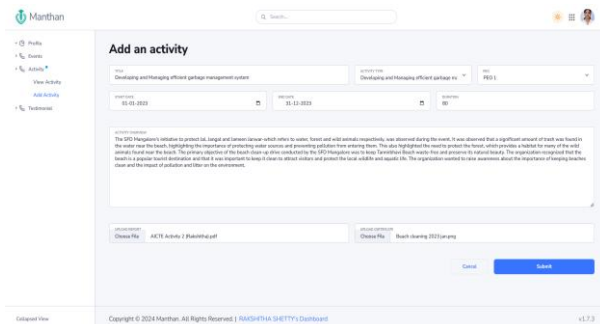

Fig 4: Student profile page

Fig 5: Add activity interface

The Figure 5 shows the implementation of the S3 Multipart Upload algorithm, where large files are uploaded efficiently to Amazon S3 by breaking them into smaller parts and uploading them in parallel or sequentially. This approach reduces upload time, handles network interruptions gracefully, and provides better resource utilization.
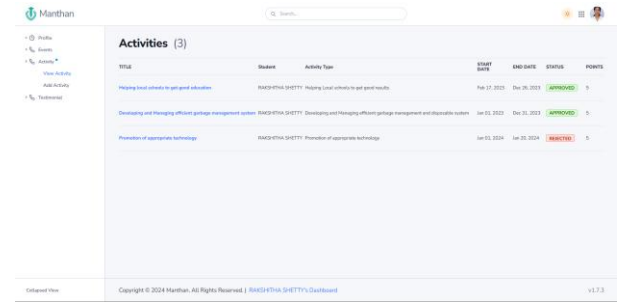
Fig 6: Activity overview page
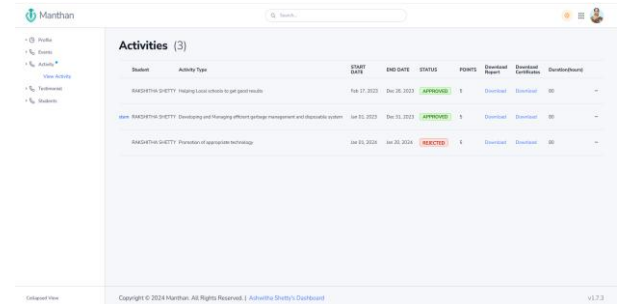
Fig 7: Activity report validation page

Figure 7 demonstrates the feature of validating the activity reports, which reduces paperwork and enhances maintenance efficiency.
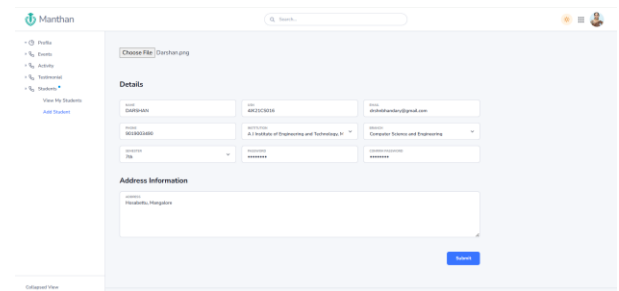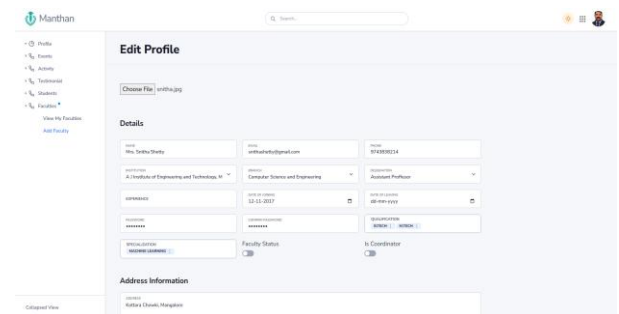

Fig 8: Add student interface

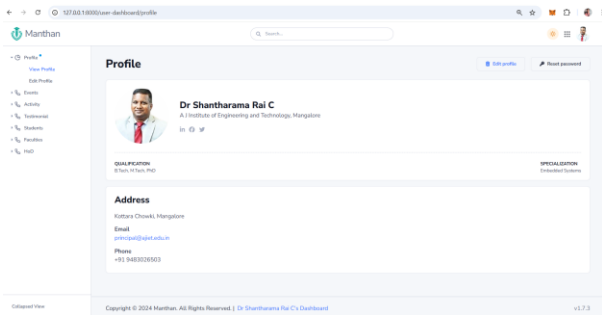
Fig 9: Add/Edit faculty interface
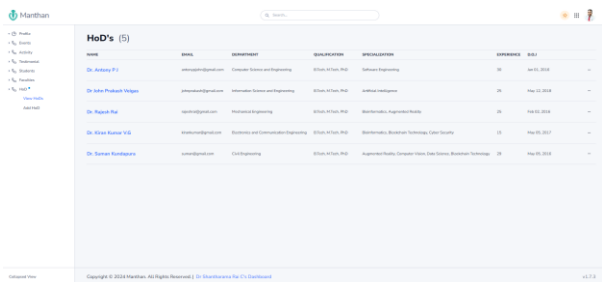
Fig 10: Profile page
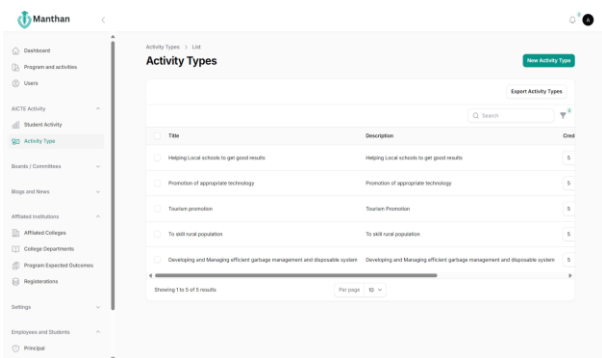

Fig 11: View HOD's by Principal

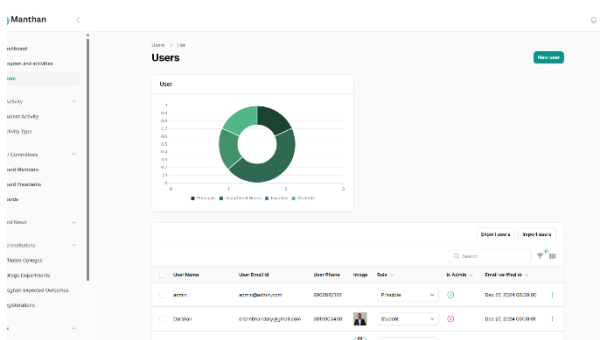**Fig 12: Activity management by admin**

Fig 13: Interface to manage users

6. CONCLUSION

This paper presents a significant advancement in institutional activity management by centralizing processes such as file management, event registration, and activity report validation. The system eliminates redundancies, enhances efficiency, and ensures scalability through AWS cloud infrastructure and MySQL database handling. A key highlight is its user-centric approach, featuring dynamic page creation, instant notifications, and role-based access control. The inclusion of 4NF database normalization improves data integrity, while the intuitive design enhances usability across all stakeholders. Looking ahead, the system can be enhanced with AI-driven analytics for predictive decision-making and machine learning to automate repetitive tasks like activity approval and report generation. Future improvements may also include auto-scaling capabilities, mobile app development, and multilingual support for broader accessibility. These advancements will ensure the system remains scalable, adaptive, and efficient for evolving institutional needs.

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