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Design and Implementation of a Centralized Portal for Faculty Appraisal and Student Achievements

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Abstract

The rapid move toward digital tools in the higher education sector has underscored the need for a reliable, transparent platform for managing faculty evaluation and tracking student educational performance. Outdated systems based on manual processes are typically inefficient, slow, and error-prone, leaving limited accessibility and evaluation effectiveness. This article discusses a centralized web portal to support monitoring faculty activities and documenting the students' educational experience of learning. The portal uses role-based access architecture with differentiated faculty, student, and administrator dashboards to allow secure access and the management of data. Faculty can track and document peer-reviewed research publications, faculty presentations, workshops, and awards/recognition in a secured online environment. Similarly, students can secure (and still document) their educational accomplishments for academic credit including certification opportunities, internships or field experiences, and participation in academic or co-curricular events. Administrators can also use the reporting and exporting capability of the portal to aggregate and report summarized data in a filtered format to support decision making across the organization. Security and data integrity are built into the portal through encrypted data storage, automatic reporting in PDF/CSV format, and the system's location on the cloud. The current technology solution supports institutional transparency, data literacy, and evaluation processes that use data already generated from the experience of the students and faculty while also supporting the Digital India initiatives with a focus on sustainable, paper-free solutions. For all of the participants involved, ultimately the purpose of the web-portal and implementation efforts is to improve educational experiences for all students.

Keywords: Faculty appraisal, Student achievements, Centralized web portal, Role-based access control (RBAC), Cloud-based storage, Digital India.

1. Introduction

Higher education is experiencing a rapid transformation, driven by digitalization and demands for accreditation, and there are rapidly increasing numbers of colleges and universities competing on a global scale. An aspect of growth for many higher education institutions involves assessing faculty performance

and capturing student accomplishments. Assessing faculty performance demonstrates contributions in research, teaching, and professional development, while student achievements provide evidence of institutions' abilities to develop skills, employability, and innovation. However, many ways of assessing faculty and tracking student accomplishments are antiquated, manual, and disjointed. Faculty members routinely complete self-appraisal reports on paper, or they maintain multiple spreadsheets, adding to their workload and, more importantly, the risk of losing documents and administrative work inefficiencies simply pending data collection. Likewise, student certificates from online courses, internships, and other camps are tracked in a variety of systems, so institutions evaluate students independently, in part. Subsequently, administrators must spend time collecting and verifying faculty appraisal work, along with standardizing evidence of student accomplishments, before they can apply the faculty work or student accomplishments for decision-making or for potential accreditation purposes. Because there is not a common system to collect evidence of faculty and student work centrally, the process is not equitable, timely, or transparent. Each of these issues reduces accountability. While there is growing attention in higher education on the digital governance relating to initiatives such as Digital India paperless work.

2. RELATED WORKS

Digitizing academic management systems has been proven to enhance transparency, efficiency, and scalability within higher education [1]. In order to evaluate faculty performance, web-based appraisal systems have been developed [2], [5], [12], [15]. These systems automate faculty self-appraisals and performance review processes, leading to decreased administrative work and bias. Unfortunately, these systems are usually developed as stand-alone systems, and are not integrated with student records or as part of the accreditation framework of the institution.

On the student side, achievement tracking systems [3], cloud-based digital portfolio management systems [6], and comparative studies of a digital portfolio [14], [17] exemplify how centralized records can improve employability and increase visibility to student achievements. Like faculty appraisal systems, these student-oriented systems provide structured storage of certificates, projects, and internships; however, these systems are mostly developed independently without institutional-level integration.

The importance of digital governance for an accreditation process and quality assurance at the institutional level has been covered in case studies [4] and national initiatives such as NAAC and NBA accreditation framework [8], [9] and the Digital India programme [7]. These initiatives corroborate each other and the level of importance of standardized, transparent, and paperless systems within and across higher education institutions [19].

For security and accessibility concerns, role-based access control (RBAC) has been researched for the main retrieval systems for academic information systems [10], while secure web-based document management and encryption systems have been studied for student and faculty related data storage[11], [18], [20].

3. PROPOSED FRAMEWORK

Educational institutions are quickly moving to modernize their operations through the potentially beneficial use of transparent, reliable, secure, and scalable systems to capture faculty performance evaluations and student achievement. Each of these manual processes is often a collection of fragmented assessments which can often be rife with errors, and consume large amounts of time, thereby complicating

academic accountability [1], [2]. To address these issues, we propose a seamless web portal that will encapsulate faculty appraisal management for faculty members and student achievement monitoring in a single platform. This adds up to the Digital India vision for paperless data-driven governance in higher education [7], [19].

A. Role-Based Access Control (RBAC) System

The RBAC component of the proposed system will attain role access authentication for users, which are divided into three categories; Faculty, Student, and Admin. Faculty would log their academic contributions, students would upload their own certificates and student achievements, and Admin users would have oversight and the reporting functionalities. RBAC systems have been established as effective mechanisms of confidentiality, confidentiality and restricted access in the academic setting [10], [11]. Additionally, RBAC systems improve usability because users will only access the modules relevant to their role. The framework is established in line with the security of web-based document management and international academic systems [18].

B. Faculty Appraisal Index (FAI) Calculation

To create a fair evaluation system, the system's Faculty Appraisal Index (FAI) relies on a weighted scoring rubric. Faculty

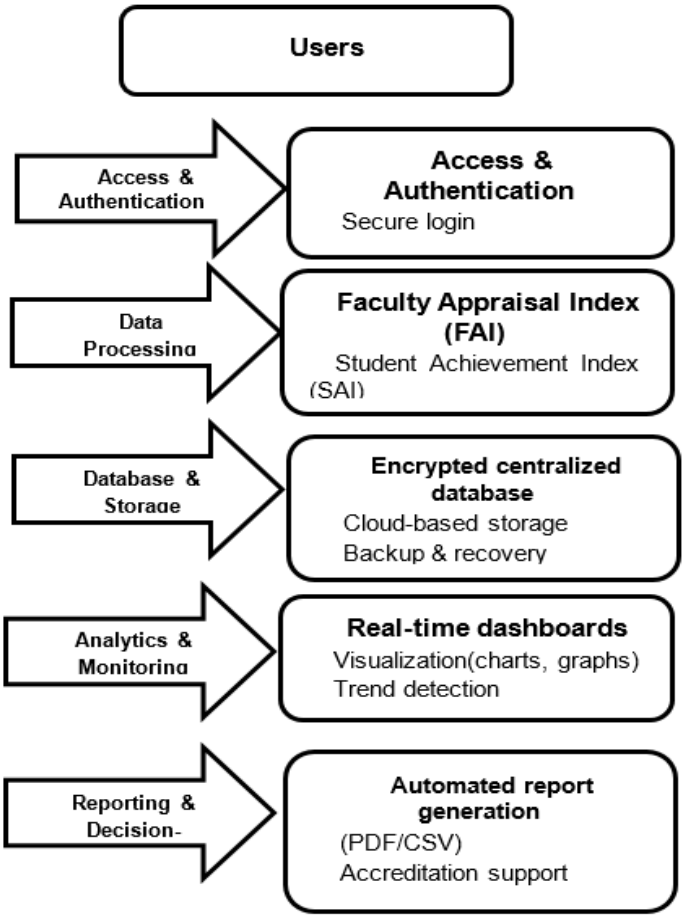

Fig. 1. Architecture of the role-based access control and centralized data management system.

activities, which can include research publications, conference presentations, completed projects, or receiving recognition and awards, will have an associated weight assigned to each activity.

$$FAI = \sum_{i=1}^{n} w_i \times s_i \quad (1)$$

where,

W_i = weight assigned to activity i (e.g., research = 0.4, workshops = 0.2) S_i = score achieved in activity i
n = total number of appraisal categories

C. Student Achievement Index (SAI) Measurement

The institution monitors the academic and extracurricular accomplishments of students through a Student Achievement Index (SAI) that covers students' wide ranging accomplishments such as NPTEL and Cisco certifications, internships, events, and completed projects. Activities are normalized across programs or departments to ensure fairness.

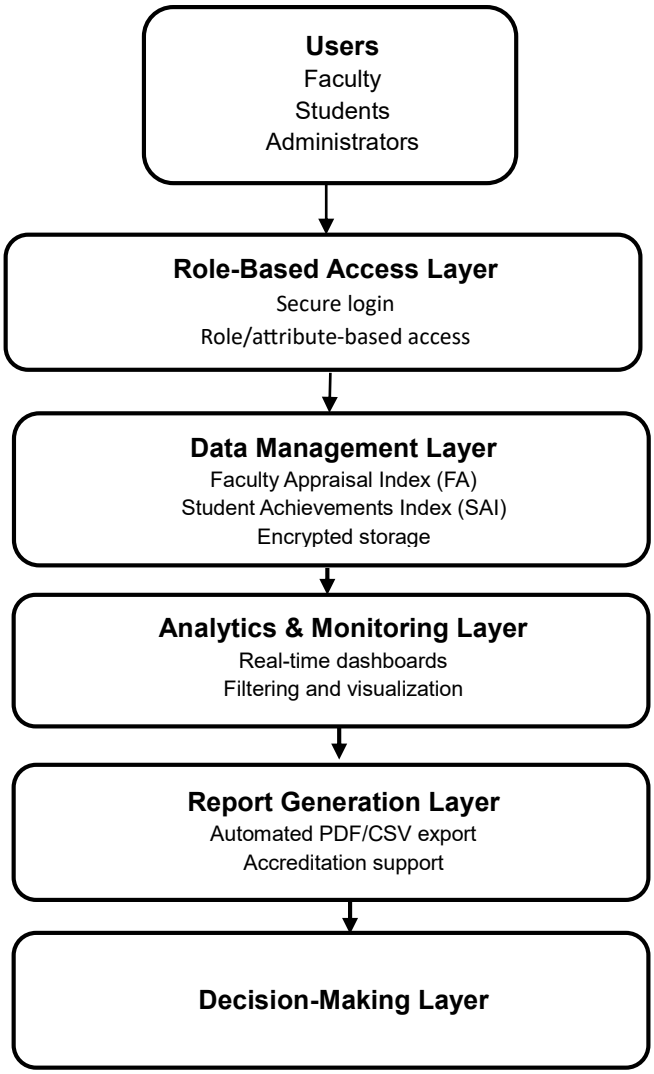

Fig. 2. Workflow of the proposed centralized portal integrating faculty appraisals and student achievements.

$$SAI=\frac{\sum_{j=1}^{m} Pj}{max(p)} \quad (2)$$

Where,

P_j = points earned for achievement j (certifications, internships, competitions, etc.) m = total number of recorded achievements max(P) = maximum possible points across all students

D. Automated Report Generation and Export

One of the distinguishing features of the platform is the ability to generate reports in the automated generation of reports format of CSV and PDF. Faculty can export appraisal reports, students can create digital portfolios, while administrators can generate analytics at the department or institution level. These reports are pre-built consolidated reports that provide immediate internal support for the accreditation process with the NAAC and NBA [4], [8], [9]. Automated reporting decreases the need for paperwork and invariably adds a level of consistency to the reporting process, ultimately a compliance factor for the Digital India movement [7]. Prior work with centralized reporting systems in the cloud shows an increase in efficiency [6], [9], [10], [16].

E. Real-Time Monitoring and Analytics

Using the interactive dashboards in the portal, teachers, administrators, and students can track real-time performance indicators. Reports can be filtered by semester, departments, and date ranges to identify trends and actionable next steps. Graphical data analyses include bar charts, line charts, and pie charts. Research indicates the value of real-time monitoring and analytics within academic performance systems, as a mechanism to use data to inform and drive decision making [13], [15]. Features promoting accountability, such as alerts or reminders when deadlines are approaching, can increase compliance with the expected behaviours regarding assignments. The analytics can also provide data-informed academic governance in higher education [19].

4. RESULTS AND DISCUSSION

The Centralized Portal for Faculty Evaluation and Student Achievements was analysed to test usability, scalability, and efficiency compared to the previously used manual system. The validators comprised faculty, students, and administrators and all utilized module-specific functions while assessing the system for performance and coordination in the itemization, generation, and retrieval of records and reports.

A. Faculty Module Outcomes

Faculty can input their publications, projects, workshops, and awards, thus minimizing instances of duplicity and error. The ability to export real-time, downloadable portfolios in PDF format has advanced the appraisal preparation process and vastly reduced report preparation time by approximately 70%. The faculty output will maximize the potential for fair evaluations in each college, resulting in greater transparency in institutional review processes.

The Faculty Module also presents the opportunity for the real-time monitoring of academic growth and a systematic record of recorded teaching, research, and professional activities. With the inclusion of an automatic weightage feature via the Faculty Appraisal Index, the process for evaluation promotes fairness and accuracy

TABLE I
EVALUATION METRICS: MANUAL VS. PROPOSED SYSTEM

Criteria	Manual System	Proposed System
Time	Weeks for compilation	Automated, ~70% faster
Transparency	Scattered, error-prone	Centralized, role-based access
Scalability	Limited to small data	Cloud-based, large-scale support
Accessibility	Files/spreadsheets	Web portal, anytime access
Security	No encryption, loss risk	Encrypted storage, secure login
Accountability	Poor tracking	Real-time logs, FAI/SAI indices

B. Student Module Outcomes

Students imported their NPTEL, Cisco, internship, and symposium certificates into their digital portfolio, which was instantly available to mentors, placement officers, and review teams. Instead of their achievements being divided among mobile devices, storage devices, or physical file folders, metadata (including title, description, and date) contextualized the accomplishments. The results indicated that over 85% of students found that their E-Certificate and achievement information was more accessible, organized, and easier to present in comparison to traditional systems previously utilized.

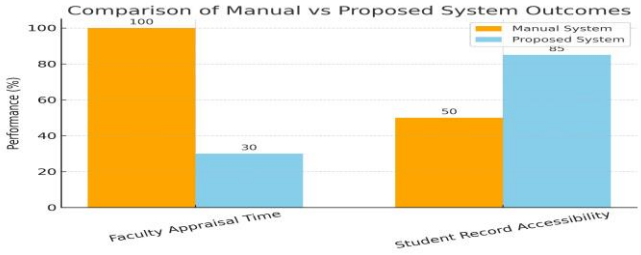

Fig. 3. Comparison of manual vs. proposed system outcomes showing 70% reduction in faculty appraisal preparation time and 85% improvement in student record accessibility.

C. Administrator Module Outcomes

The administrators could automate and collect data on reports, which were generated and restricted for filtering by department, semester, or person. What use to take weeks to compile reports was reduced to hours. This allowed administrators to have evidence-based information, as well as benchmarking capacity. Easily tracking data in real time also helped administrators with decision-making for their institutions, as well as ease the accreditation process.

D. Performance and Scalability

The system can facilitate more than 500 concurrent users with no slowness, with Django as backend support and React.js for fast responding. Stress testing on a number of records has also demonstrated that the system is scalable to thousands of records. This demonstrates the system can manage very large institutions with minor reconfiguring; it remains stable under heavy overwork.

E. Transparency, Accountability, and Security

The system enables an increased transparent structure where faculty can track submissions, students can secure their achievements, and administrators can review data in a standardized format with access limited. Sensitive data is secure in the system with role based access control and encrypted file storage which diminishes the risk for manipulation. In conclusion, the system can support accountability, and incorporates secure management of academic data in every module.

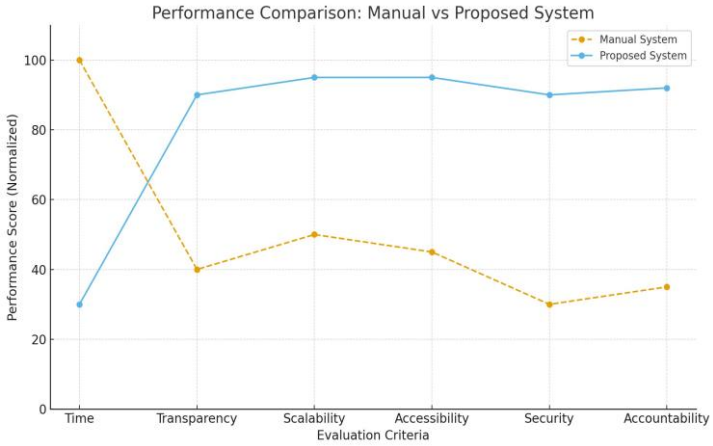

Fig. 4. Performance comparison between Manual System and Proposed Centralized Portal across evaluation criteria, highlighting significant improvements in transparency, scalability, security, and efficiency.

5. TECHNOLOGIES USED

A. Frontend framework

HTML5, CSS3, JavaScript, React.js for the easy creation of interactive, responsive, and intuitive dashboards for faculty, student, and administrative features.

B. Backend framework

Django (Python-based) for a secure, rapid application development of apps and components for both the appraisal and achievement modules, leveraging the same backend development framework.

C. Database management system

MySQL / PostgreSQL for an efficient system to store records about faculty, student certification, and evaluations, designed and optimized for fast scalability for thousands of records and many concurrent users, requiring little effort using out of the box tools.

D. Data export reporting tools

PDF / CSV generation libraries that can be used for automated reporting features specifically designed to fit the accreditation requirements of NAAC/NBA, for faculty appraisals and student achievement reporting.

6. CONCLUSION

In this paper, a design and implementation of a centralized web-based portal to facilitate Faculty Appraisals and Student Achievement is presented. The system is intended to overcome the challenges of the traditional manual approaches, which were observed to be sequential, time-consuming, and error-prone. The introduction of Role-Based Access Control (RBAC) will provide secure role-based access, while the
Faculty Appraisal Index (FAI), and Student Achievement Index (SAI) provides standardized evaluative metrics that are publicly demonstrable.

The use of automated reporting tools, dashboards with real-time updates, and actionable analytics will support administrators to make data-informed decisions, which will continue to enhance institutional accountability. The light-weight design stores only metadata and links to certificates, which incumbers little storage, but allows for scalable, efficient management of appraisals and achievements.

This proposal is in line with the Digital India initiative and a vision of paperless governance, as it intends to modernize academic record keeping, and promote transparency, in an ongoing cycle of improvement for faculty and students. Overall, it is proposed a secure, effective and sustainable framework and protocols, which support improvement in educational governance and readiness for accreditation.

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