

Faculty Milestone Manager and Appraisal System: A Web-Based Solution Part 1

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ABSTRACT

The appraisal form till now are being filled manual using paper forms and spreadsheet also the data is being stored in excel or in an book where it being noted the information of the requirement for the appraisal form like lectures condetected , seminar , conference ,and certificates also etc so this creates forgetting about the appraisal form and where the data is being stored and while filling the appraisal form the data, certificates are being misplaced or can't find it creates delay ,inefficiencies and data repetition. In this paper we present the design and implementations of an solution for appraisal form an web based solution which will give mountly , weekly remainder to the faculty which are automatically remind the faculty to fill the form and how much its reaming also the web based system is automated the performance evaluation process with the faculty will register in the system with their login credintatiols after that theyu can put their milestones like conference , publication,certificates, activitys , lectures etc alos they can fill out the appraisal form in the web based solution of appraisal sytem know as faculty milestone manager. The admins can see all the activitys of the the faculty like how much the appraisal form is being filled their achivements into there dashboard also they can give sore ,grade and generate report , we used and 3 tier architecture in it there is an web browser , server , database . we have created an responsive interface , secure data handling with the data in an centralized database from which the data is being found fast , the work flow is being automated this improves transparency,, acuracy and decision making in faculty evaluation and from which we have reduced processing time and data integrity went up compared to manual methods . future enchancements include ai driven analytics and mobile access.the faculty milestone manager and appraisal system is an partial website there are futher improvement is to be done in future work and more feature is to be add and also to test the website with the faculty is to be done in future work like user evaluation and user acceptance testing and there feedback and surveys the system can be improved and more feature can be added .

Keywords- faculty appraisal, performance evaluation, web application, academic management, database system, milestone tracking.

INTRODUCTION

Faculty achievement and appraisal records are of paramount importance for educational institutions as it helps in evaluating faculty performance, deciding faculty promotion, fulfilling the requirements of accreditation, and developing the institution. The faculty performance assessment is used as the groundwork for determining the efficacy of teaching, the contribution of research, faculty development, and institutional improvement [2].In many colleges and universities, the departments are mandated to provide information on the teaching activities, research publications, conferences, workshops, certifications, patents and other academic activities of the faculty members which need to be appraised periodically. These records are usually kept by manual documentation, spreadsheet or on several different software systems which are not interconnected, which is tedious, time-consuming and prone to error. These often lead to data duplication, inconsistent data, slow approvals and administrative burden [3].

As digital technologies have become more common in higher education, there are opportunities to automate faculty evaluation and milestone management. Past research has shown that digital assessment systems can increase transparency, continuous assessment and timely feedback, and thereby increase the effectiveness of academic management [1]. Moreover, it is possible to achieve better accuracy, completeness and reliability of faculty performance record and it is able to reduce manual work through centralized information system [3].

To tackle these challenges the planned faculty milestone manager and appraisal system aim to create a unified web application to manage faculty's profiles, academic milestone, achievements and appraisal activities. Through a user-friendly interface, the faculty can log in to the website and put or record their accomplishments, achievements, their lecture conducted, what new they have learned, upskilled them, and can put their certificates, can upload documents of lecture, activities and track their submission in real time. Also, they can evaluate themselves and wait for the score or grade. On the admin side, they can see all the faculty on their dashboard, how much form they have filled, their progress, achievements. The admin can approve or reject the appraisal form based on the input data and certificates and give remarks based on the information uploaded by faculty, and also the admin can put together department and institution reports. Admins can also remove or put a new faculty into the website. We have used for our website for our fullstack architecture: for frontend we have used React.js, for backend services we have used React.js and Express.js for RESTful API, for database we have used PostgreSQL as a relational database system. We have made a user-friendly interface with a secure RESTful API, scalable backend processing, and centralized data storage is good for institutional settings. Unlike earlier research and approach, the focused on isolated evaluation algorithms or data validation approaches [1]-[3], our website unifies profile tracking, workflow approvals, report generation and analytics, time to time reminder also to the faculty to fill the appraisal form within a single secure system ecosystem. This integration eliminates or removes time-taking paper trails, misplacement of certificates, forgetting about the appraisal form, improves decision making, and reduces administrative load. The rest of the paper discusses the literature survey, objectives, system architecture, system design, implementation and usage, future work and conclusion of the proposed faculty milestone manager.

LITERATURE SURVEY

TATL-360° Assessment for Teaching and Learning: A Case Study in Digital Electronics Lab The study by Joao Victor Daher Daibes and Rainer Zanghi presents the TATL-360° Assessment methodology, which integrates self-assessment, peer assessment, and instructor feedbacks to improve teaching and learning outcomes. The research demonstrates that continuous assessment supported by digital technologies enhances feedback quality, student engagement, and transparency in the evaluation process [1]. The proposed Faculty Milestone Manager and Appraisal System shares the objective of improving transparency and efficiency in academic performance management. However, unlike the TATL-360° Assessment system, which focuses on educational assessment and feedback, the proposed system provides a complete web-based platform for faculty profile management, milestone tracking, appraisal submission, administrative approvals, report generation, and dashboard analytics. The system also supports secure authentication and centralized data management using React.js, Node.js, Express.js, and PostgreSQL.

The Application of Genetic Algorithm and Fuzzy Evaluation Method in Teachers' Performance Appraisal

The research by Yue Zhang and Shengying Yang proposes a teacher performance appraisal model based on Genetic Algorithms (GA) and Fuzzy Comprehensive Evaluation. The study emphasizes that teachers' evaluation should consider multiple factors such as teaching quality, academic achievements, research activities, and institutional objectives. The proposed algorithm improves the accuracy and fairness of teacher performance evaluation by combining qualitative and quantitative assessment methods [2]. The presented Faculty Performance Appraisal System is to evaluate based on academic achievements and professional activities. Although we have put forward an idea of using Genetic Algorithms and Fuzzy Logic, which are elements of Artificial Intelligence in the process, we did in fact go with a weighted appraisal which put together score calculation, milestone management, approval processes, and reports generation. We put forth a

more simpler, scalable and institutional wide accepted solution which also we did not trade off for transparency and ease of use.

Software Module for Data Correctness and Completeness Control in the Academic Staff Performance Appraisal System

The study titled Software Module for Data Correctness and Completeness Control in the Academic Staff Performance Appraisal System introduces a software module that validates faculty's appraisal data before evaluation. The system focuses on ensuring data correctness, completeness, and consistency, by reducing errors during their appraisal process and improving its reliability for institutional records [3]. The proposed Faculty Milestone Manager and Appraisal System incorporates similar concepts of securing data management and centralized record keeping to keep them secure. However, the proposed system extends beyond the data validation by providing complete faculty profile management, milestone submission, appraisal form management, document upload, admin approval, report generation, and performance dashboards within a unified web application. This integrated approach reduces paperwork, improves admin efficiency, and provides a comprehensive solution for faculty performance management.

Objectives

The proposed system should have the following objectives: The main aim of the proposed Faculty Milestone Manager and Appraisal System is to streamline, automate and improve the Faculty Appraisal System using a centralized web-based solution to record, manage and monitor academic achievements during the academic year. The purpose of the system is to ease the difficulty of preparing manual PBAS (Performance Based Appraisal System) forms and improve the accuracy of the data, its access and administrative efficiency. The proposed system is aimed at achieving the following objectives:

1. To create a web platform that allows faculty to record teaching activities, research activities, certifications, workshops, publications, patents and other academic activities during the year, allowing for continuous and easy management of faculty activities.
2. To avoid the last minute data collection and minimize human errors; by regularly updating of faculty records by faculty members, the chances of missing, incorrect and incomplete data would be reduced during the appraisal period.
3. To structure the data entry process in the official structure of PBAS, so that all the parts of the data entry process, such as Part A & B, are systematically organized and maintained following the institutional evaluation rules.
4. To ensure secure storage and management of faculty records and supporting documents: To keep academic records, certificates, publications and other relevant documents in a centralized database with proper security and access controls.
5. To make the process of report generation of PBAS automatic and printable with standard format so that formatting work can be reduced, reporting can be done efficiently and quickly.
6. To create an administrative dashboard for verification and monitoring, for authorized administrators to quickly access faculty submissions, check uploaded documents, track appraisal progress and manage faculty records effectively.
7. Add an automated notification and reminder system to remind faculty of missing or outstanding sections, pending submissions or missing documents; prompt timely submissions and maintain uniformity across the appraisal cycle.

8. To build a transparent, efficient and accessible faculty performance management process that is integrated in a secure web application built with React.js, Node.js, Express.js and PostgreSQL and where profile management, milestone tracking, appraisal submission, document verification and report generation are all under a single roof.

System Architecture

The system adopts a standard three-tier browser–server–database architecture. Faculty and administrators use web browsers (the presentation layer) to interact with the system’s frontend (built with React.js). The application server the backend handles business logic like submitting milestones, calculating scores and enforcing access control. Data is being stored in an relational database that is built with postgresq on the database server. This separation of the backend ,frontend and database allows scalability and maintainability and improve efficiency and data integrity.

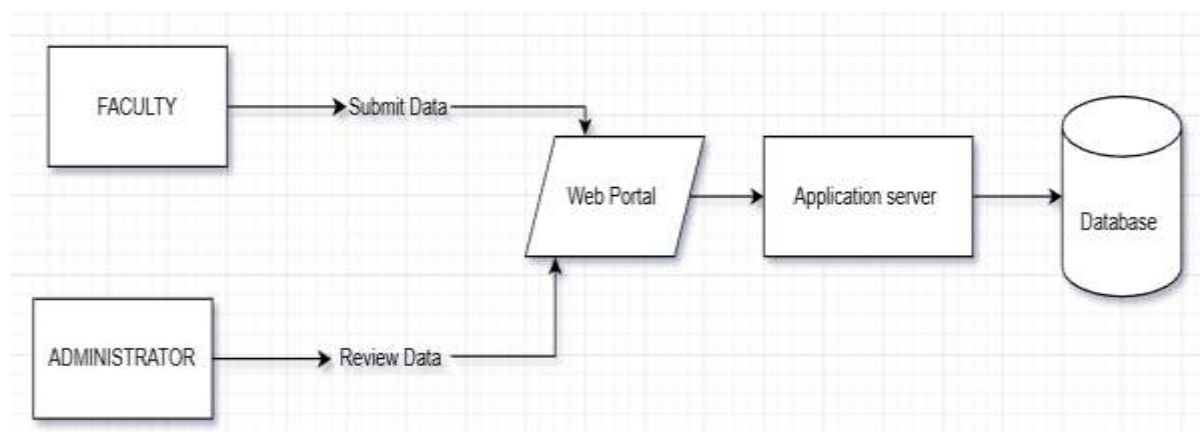


Figure 1: System Architecture

System Design

Data Flow Diagrams

Level 0 context diagram Shows the system boundarys showing how primary user admin and faculty interact directly with the main application portal .

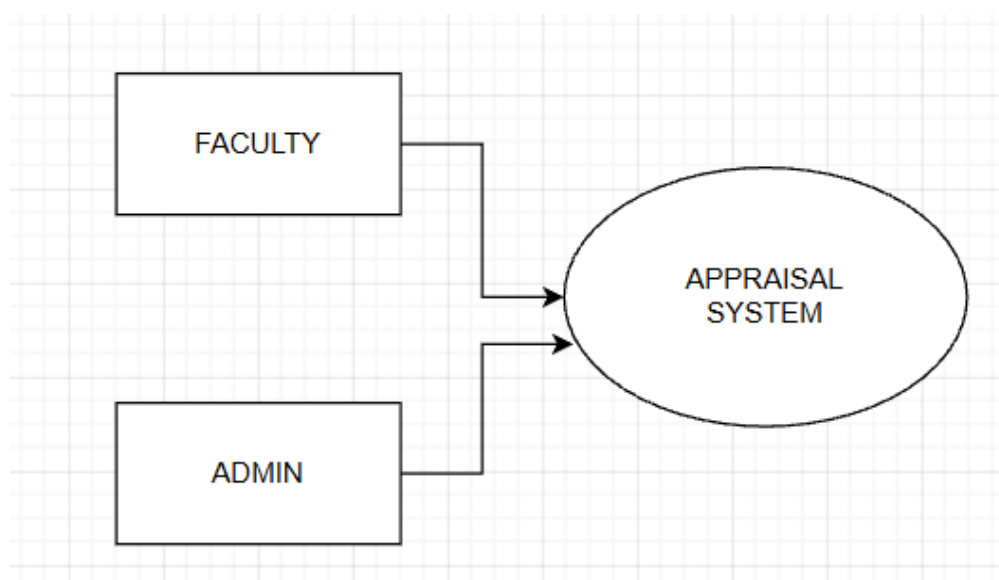


Figure 2: DFD Level 0 – Faculty and Admin interactions with the application system

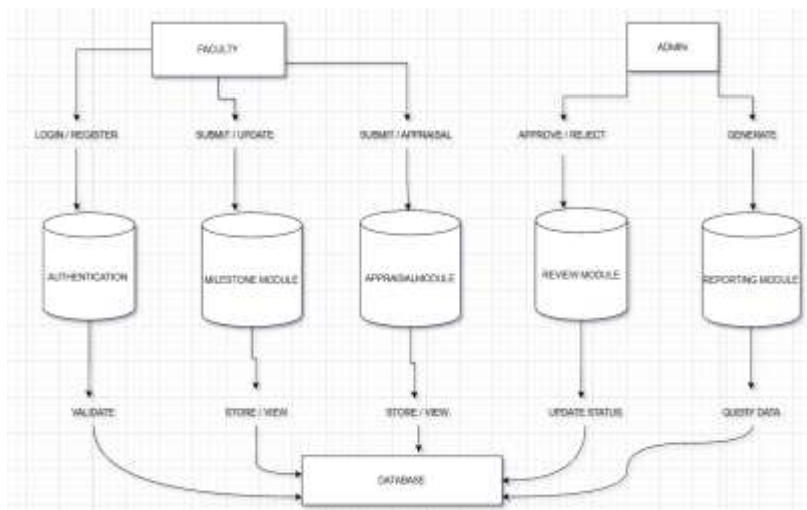


Figure 3: DFD Level 1 shows system core functional model and its interaction with the postgresql (database)

In this data flow diagram 1, the system breaks into system and subsystems and their different operational subprocess unified around a database. Each module's specific task it reads and writes to the central database. For example, like the Appraisal Module calculates scores and saves them in the database, and the Reporting Module queries these verified records to generate institutional summaries or reports.

Entity-Relationship Diagram

We have structured our postgresql database relational model around this key entity (like, faculty, admin, department, milestones, appraisal, reports) that track users management, milestone management, and review their workflow.

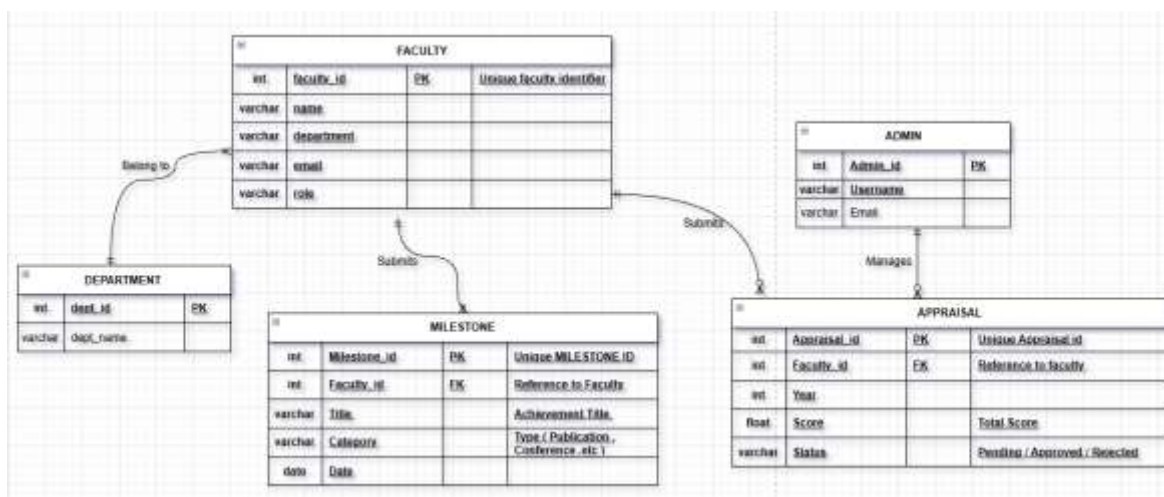


Figure 4: Simplified ER diagram

PROPOSED SYSTEM

By shifting from manual process like paper and spreadsheets to a centralized web-based platform, our proposed system transforms how academic institutes track faculty achievements, accomplishments, and performance-based appraisal system submissions. The web-based application automates the documents verification, report generation of the appraisal form, and status tracking, drastically cutting down the administrative and institutional workloads. Its 3-tier architecture stack, it delivers fast processing, security, multi-role access, and scalability. The results are more transparent, accurate, and fast increasing institutional efficiency.

Home Page

The home page is the entry point of the faculty milestone manager here the faculty can register if they are new faculty and also the existing faculty or admin can login using there credintentials .it has an secure authentication feature,upon successfully login they are taking to there designated ,personalized dashboard based on the role.

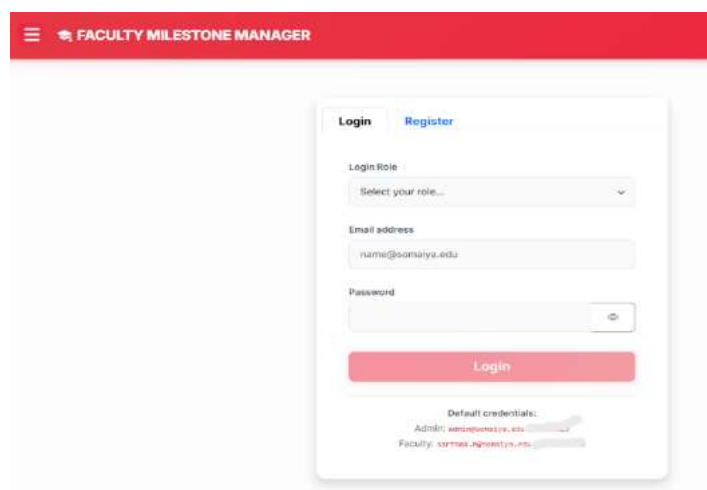


Figure 5:Home Page

Faculty Dashboard

The Faculty Dashboard is a workspace customized for the specific needs of its users in the efficient management of academic profiles and appraisal activities. A user can update personal information, document academic milestones, upload supporting materials, monitor the progress of appraisals, and receive notifications on outstanding activities. It also has summary screens for appraisals and recent academic achievements.

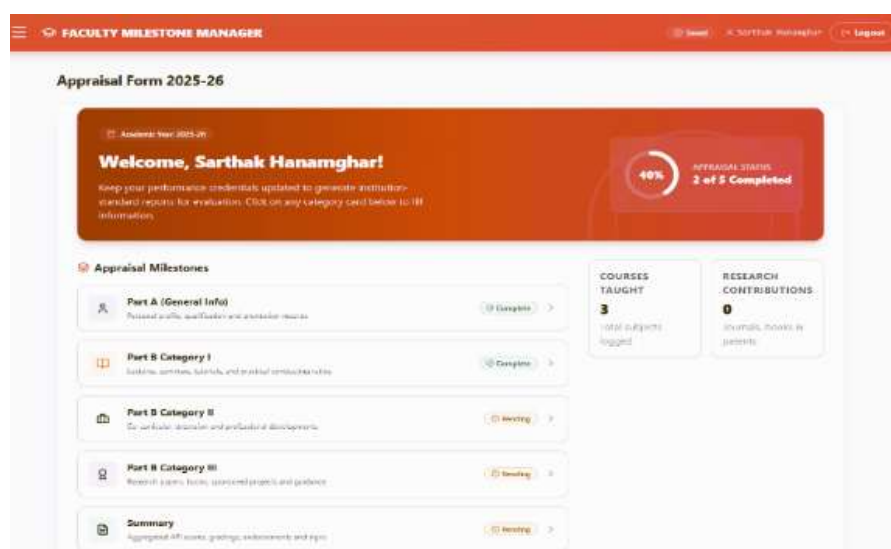


Figure 6:Faculty Dashboard

Milestone Management

This module helps in the continuous recording and organization of academic achievements by faculty members during the year. Publications, conferences, workshops, certifications, patents, research projects, awards, consultancy work, and other professional contributions can be added, edited, updated, or deleted by

the faculty members. Supporting documents can also be uploaded for verification. In part A of the form the general information of the faculty is to be added and filled. In part B Category 1 of the form the information about the lectures, seminar, Tutorials, practicals are being conducted and the API score is also being calculated. In part B category 2 the information about the Co-curricular activities and Professional Development activities are being added by the faculty. In part B category 3 the information about the journal, project, conference, guidance, awards and patents the faculty has obtained. In part C of the appraisal form the whole form summary and category details and its score is being shown and final api score is also being calculated and also the hod and principal will review the faculty performance based appraisal form and give remark and sign.



Appraisal Form 2025-26

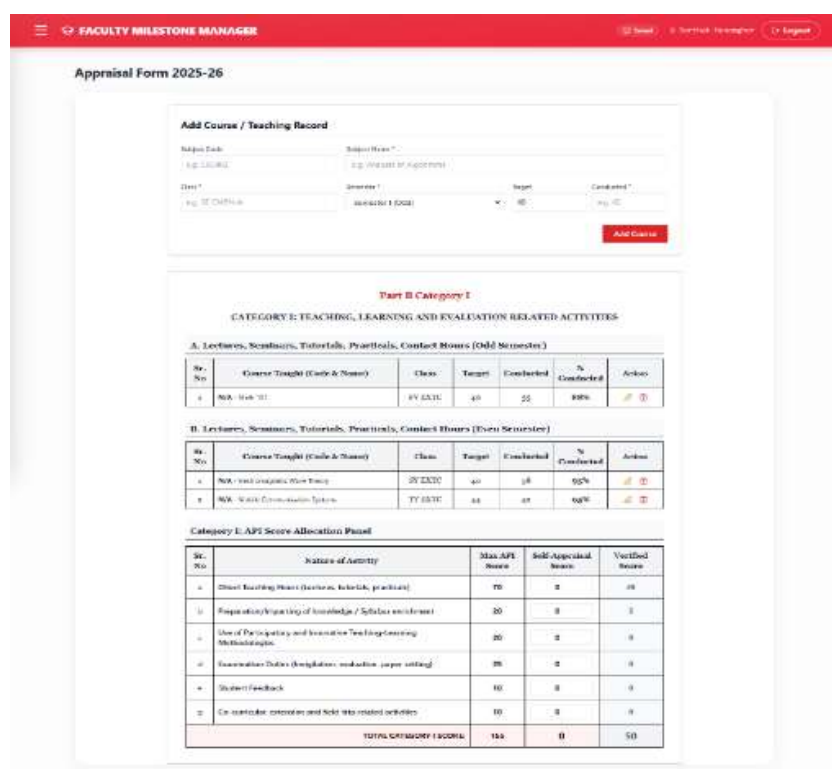
K.J. Somaiya Institute of Technology (KJSIT), Sion
Performance for Annual Self-Assessment of Faculty based on Performance Based Appraisal System
Academic Year: 2025-26

Part A: General Information

Name (in BLOCK letters)	SARTHAK HANAMGHAR
Department to which you belong	ETEC (Electronics & Telecommunication)
Current designation and grade pay	Professor
Date of last promotion	
Address for correspondence	
Highest academic qualification	
Telephone No / Mobile No	
Whether acquired any degrees or fresh qualifications during the year	

Note: This form auto-saves your changes in the server when T pressed at the top right of the screen. Check status at the top right of the screen.

Figure 7: Appraisal form part a



Appraisal Form 2025-26

Add Course / Teaching Record

Subject Code: Subject Name:
 e.g. 1001002 e.g. Web site for Appointments
 Class: Semester: Target: Completed:
 e.g. 1001002 e.g. 2025-26 (DOB) e.g. 40 e.g. 80 e.g. 100

Part B Category 1

CATEGORY 1: TEACHING, LEARNING AND EVALUATION RELATED ACTIVITIES

A. Lectures, Seminars, Tutorials, Practicals, Contact Hours (Odd Semesters)

Sl. No.	Course Taught (Code & Name)	Class	Target	Completed	% Completed	Action
1	NRN - Web Site	ETEC	40	25	62.5%	

B. Lectures, Seminars, Tutorials, Practicals, Contact Hours (Even Semesters)

Sl. No.	Course Taught (Code & Name)	Class	Target	Completed	% Completed	Action
1	NRN - Web site (even semesters)	ETEC	40	18	45%	
2	NRN - Web site (even semesters)	ETEC	40	45	112.5%	

Category I: API Score Allocation Panel

Sl. No.	Nature of Activity	Max API Score	Self Appraisal Score	Verified Score
1	Direct Teaching Hours (Lectures, Seminars, Tutorials, Practicals)	70	0	0
2	Preparation/Updating of knowledge / Syllabus enrichment	20	0	0
3	Use of Technology and Innovative Teaching/Learning Methodologies	20	0	0
4	Examination Duties (Designation, evaluation, paper setting)	20	0	0
5	Student Feedback	10	0	0
6	Co-curricular activities and Self initiated activities	10	0	0
TOTAL CATEGORY I SCORE		140	0	0

Figure 8: Appraisal form part b category 1

FACULTY MILESTONE MANAGER Home Logout Logout

Appraisal Form 2025-26

Add Category II Activity

Activity Name / Details: (e.g. Conventional Researcher Award given to A) Activity Date:

Avg. Hours per Week (Optional): Self-Appraisal API Score: 1. Lecture & Co-ordinator

Add Activity

Part B Category II

CATEGORY II - CO-CURRICULAR, EXTENSION AND PROFESSIONAL DEVELOPMENT RELATED ACTIVITIES

1. Extension, Co-curricular & Field based Activities (NDR, NCC, Sports, etc.)

Sr. No.	Nature of Activity/Event	Avg. Hours/Week	API Score Claimed	Action
No activities added under this category.				

2. Contribution to Corporate Life & Management of Dept./Institution

Sr. No.	Nature of Activity/Event	Avg. Hours/Week	API Score Claimed	Action
No activities added under this category.				

3. Professional Development Related Activities (Seminars, Workshops, FDPs)

Sr. No.	Nature of Activity/Event	Avg. Hours/Week	API Score Claimed	Action
No activities added under this category.				

4. Institutional Development / Placement Duties / Exam Cells

Sr. No.	Nature of Activity/Event	Avg. Hours/Week	API Score Claimed	Action
No activities added under this category.				

Category II Score Summary Panel

Sr. No.	Activity Group	Max API Score	Self-Appraisal Score	Verified Score
1	Extension & Co-curricular activities	10	0	0
2	Corporate Life & Institutional Management	10	0	0
3	Professional Development Related Activities	10	0	0
4	Institutional Development / Placement Duties / Exam Cells	10	0	0
TOTAL CATEGORY II SCORE (Max 40)		40	0	0

Figure 9: Appraisal form part B category 2

FACULTY MILESTONE MANAGER Home Logout Logout

Appraisal Form 2025-26

Part B Category III

RESEARCH AND ACADEMIC CONTRIBUTIONS

III (A): Research Papers in Peer Reviewed/Refereed Journals

Paper Title: Journal Name:

Volume / Page No: Year / Date:

Working API Score (0-10): Are you Guide/Mentor? ☐

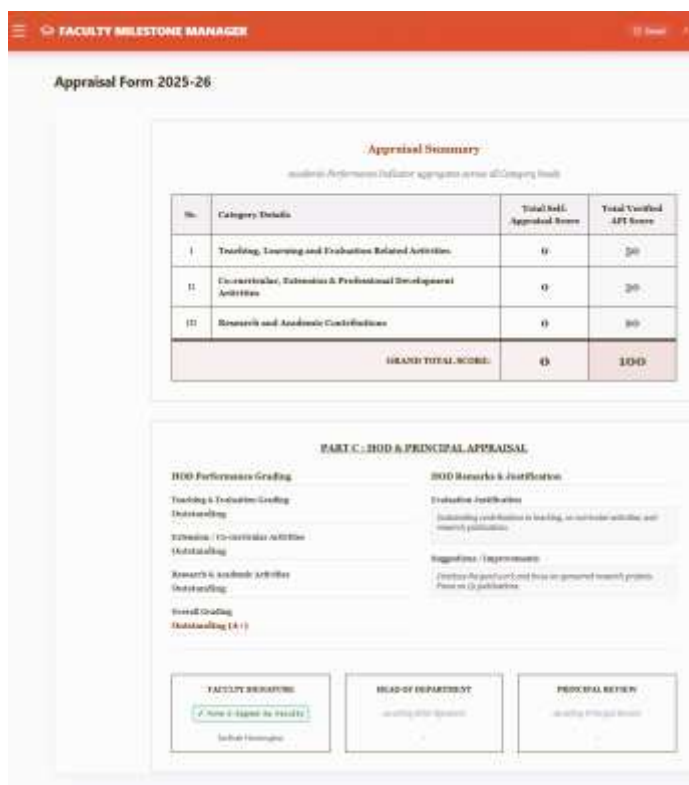
Category Score (0-10): **Add record**

Title	Journal	STATUS	Working	Score	Action
No publications added.					

Category III Score Summary Panel

Sr. No.	Academic Contribution Group	Self-Appraisal Score	Verified Score
III (A)	Research Papers in Refereed Journals	0	0
III (B)	Books / Chapters other than Journals	0	0
III (C)	Sponsored Research Projects	0	0
III (D)	Research Guidance (Ph.D. / M.E.)	0	0
III (E)	Refresher Courses, FDPs, workshops (organized/attended)	0	0
III (F)	Papers presented in Conferences / Seminars	0	0
III (G)	Invited Lectures / Keynotes	0	0
III (H)	Awards, Fellowships, Patents	0	0
TOTAL CATEGORY III SCORE		0	0

Figure 10: Appraisal form part B category 3



Appraisal Form 2025-26

Appraisal Summary
Academic Performance Indicator aggregation across all Category Results

No.	Category Details	Total Self-Appraised Score	Total Verified APT Score
I	Teaching, Learning and Evaluation Related Activities	0	30
II	Curriculum, Evaluation & Professional Development Activities	0	30
III	Research and Academic Contributions	0	30
GRAND TOTAL SCORE:		0	90

PART C: HOD & PRINCIPAL APPRAISAL

HOD Performance Grading

Teaching & Evaluation Grading
Outstanding

Evaluation & Curriculum Activities
Outstanding

Research & Academic Activities
Outstanding

Overall Grading
Outstanding (4+)

HOD Remarks & Justification

Evaluation Justification
Outstanding evaluation in teaching, so-outstanding activities, and research publications.

Suggestions / Improvements
Continue the performance and focus on proposed research projects. Focus on (3) publications.

FACULTY SIGNATURE
I, **Sumit K. Singh** do hereby certify that the above information is true and correct.

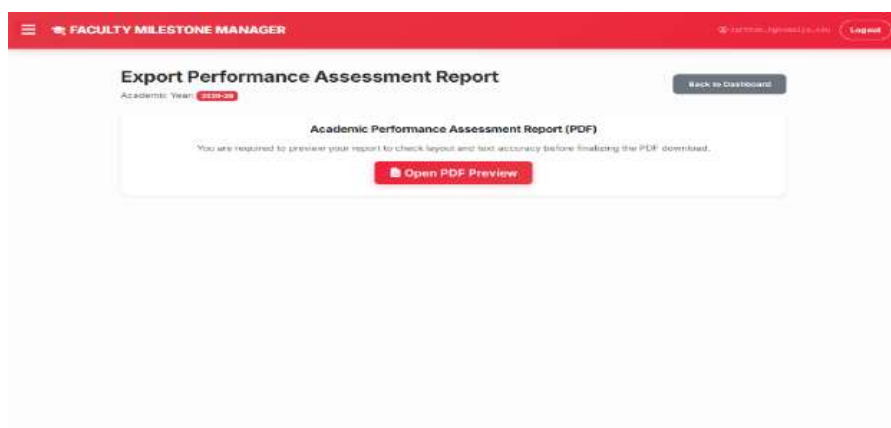
HEAD OF DEPARTMENT
Dr. **Sumit K. Singh**

PRINCIPAL REVIEW
Dr. **Sumit K. Singh**

Figure 11: Appraisal form summary and part c hod and principal appraisal

PBAS/Appraisal Form Management and Report Generation

The system automatically organizes faculty information according to the institutional PBAS structure. Based on the milestones entered by faculty members, appraisal forms are generated automatically, minimizing manual data entry and reducing the possibility of errors the faculty can review there appraisal form information and submit them for administrative verification process.the application will automatically generate an faculty appraisal report once they are verified and the verified record stored in database will get pull the verified data to auto generate reports that can be view online or can be downloadable report files that can be used for official documentation ,faculty promotion workflow,accreditation process.



Export Performance Assessment Report

Academic Year: **2024-25**

Academic Performance Assessment Report (PDF)

You are required to preview your report to check layout and text accuracy before finalizing the PDF download.

Open PDF Preview

Back to Dashboard

Figure 12: Performance assessment report

Admin Control Panel

The admin dashboard is the main dashboard where all the faculty are been shown and how much of the form is being filled that is shown using bar chart,pie chart and also the admin can see individual filled form of the

faculty also it can be review and verify it and as per the input information the admin evaluates the faculty appraisal form and also can give remarks . the admin can approve or deny the appraisal form or certificates .the admin can add or delete an faculty.



Figure 13: Admin dashboard

Notification and Reminder System.

The faculty milestone manager has an notification and remainder system feature that send email remainder and notification to the faculty regarding the appraisal form is remaining and specific part is not being filled and is incomplete or some certificates ,paper, activits are not being filled or upload .the faulty will get and notification and remainder to fill the form.



Figure 14: Email Notification and Reminder System

Implementation And Usage

Transition from manual PBAS management to an modern digital web based solution it requires systematic execution ,planning ,design .the system is built on 3 tier architecture react.js is used for frontend,node.js and express.js is used for backed and for database postgresql is used.this application provides an secure,scalable framework which is specifically made foe automating the task ,storing data in an centralized system and also for faculty evaluation

User Interfaces: The faculty milestone manager an appraisal system has an user friendly interface which is carefully made so its easy to use for faculty and admin workflows .it has role based access control ensures that user are taking to there designated dashboard as per there role with specific authorization and authentication ,ensure security for the data and simplifying daily task management.

Administrator Interface

The admin dashboard is the main dashboard where all the faculty are been shown and how much of the form is being filled that is shown using bar chart,pie chart and also the admin can see individual filled form of the faculty also it can be review and verify it and as per the input information the admin evaluates the faculty appraisal form and also can give remarks . the admin can approve or deny the appraisal form or certificates .the admin can add or delete an faculty

Login: login will allow the administrators to log into the application using their secure credentials for proper authentication into the system based on their role .

Dashboard: On successful login, the administrator should be able to see an dashboard with faculty statistics using pie chart and bar chart , pending approvals, notifications, and system summaries and what part of the appraisal form is reaming of the faculty. And the admin can review and verify the forms and pdf.

Faculty Management: It enables the full CRUD (create,update,update,delete) This operation on the faculty user account and department profiles .

Milestone Verification: It allows the admin to review the uploaded data and certificates and all the other information before the approval of the appraisal form and its data .

Appraisal Management: it provides the tools for the admin to review ,approve,deny, or return the submitted pbas form for changes.

Report Generation: It will generate and appraisal reports once it being verified the faculty can review it online and alos they can download an pdf.

Notification Management: admin can send and remainder using the email to the faculty regarding it form being incomplete and alos the deadline of appraisal form .

Faculty Interface

The Facultys Interface supports and facilities year around logging and manage the academic achivements,milestone and its documentation for an annual performance based appraisal system which also automatically remainder them if its incomplete to fill it.

Login: The faculty can login using there institutional credentials.

Dashboard: The faculty dashboard shows the academic year and the form various parts like part A and part b and its various catogerry the faculty can click on the specific category part and fill the required data it also show how much courses taken, publication done and lastly summary .

Profile Management: It enables the faculty to maintain up to date personal records, their academic achievements, designation, and which department. The faculty can update their information.

Milestone Management: Faculty can logging, editing, updating, and removing of its publications, conference, workshops, research project and other academic activities.

Document Upload: Allows direct upload of the documents like certificates, research papers, for verification and validation for the appraisal form.

PBAS Submission: Faculty can review online and also the automatically generated appraisal form pdf can submitted for official documentation, faculty promotion workflow, accreditation process.

Status Tracking: Faculty can monitor its appraisal form approval status and also they can get notification of more document required, some remark, correction and approval of the submitted appraisal form.

Security aspects used in system

Security aspects used :-

The proposed faculty milestone manager and appraisal system integrates security architecture to ensure the confidentiality, integrity, and availability of academic records and appraisal data. The security measures are implemented across all the three layers of the three tier architecture.

Authentication and identity management:- the system will authenticate the faculty and admin using the secure login credentials. Passwords are being protected by the bcrypt hashing algorithm with the salted hashes before storing in the postgresql database, ensuring the plaintext passwords are never stored. The secure authentication tokens and authenticated sessions are used to verify the user identity and prevent the unauthorized access to the website or data.

Role based access control:- The authorization is implemented using the role based access control where the user, the faculty and admin are given access as per their role. The faculty cannot access the admin info and its dashboard along with the confidential appraisal records.

Database security:- The postgresql serves as the centralized database of the faculty milestone manager and appraisal system. In this relational database, all the information of the appraisal records, data, users records and its profiles, milestone information, uploaded documents and certificates and the administrative logs. The database security is reinforced through using role based privileges, schema isolations, primary and foreign key constraints, and also the ACID transactions support to maintain and ensure the data consistency, integrity and reliability.

Sql injection and mass assignment prevention – the sql injection attacks, if they occur, they are prevented by utilizing the prisma ORM which automatically generates the parameterized sql queries. The user input is treated as data or literal values rather than an executable sql command. Therefore, if the user enters malicious sql code, it is stored as a plain text rather than executed by the database. The mass assignment attacks are prevented by explicitly destructing only the required fields from incoming traffic request bodies before performing database operations with the Prisma ORM. Rather than passing the full request object directly to the database, only authorized attributes are being processed. This approach will prevent unauthorized modification of the sensitive fields, such as user roles or administrative privileges, thereby protecting the integrity of application data and appraisal data.

Password protection :- the user's password are encrypted using the bcrypt with the salting hashing before storage. During the authentication, the password verification is performed using the secure hashing comparison techniques. Encrypted password and confidential credentials remain protected.

Secure communication and cross site scripting – the communication between the react.js frontend ,the express.js backend and the postgresql database is designed to operate over the secure HTTPS connection.the transports layer security protects the sensitive data form the interception and modification of the data and alos the man in the middle attacks. The cross site scripting (XSS) attcks are prevented through the automatic escaping mechanisms provided by the react.js and ejs templates or tags . the user generated content is made in plain text rather then executable javascript ensuring that the malicious scripts cannot execute within the website and protect the sensitive sessions and application data . the secret key isolation (.env using dotenv) is used to protect the confidentials information like users credentials, postgresql connection url ,jwt security key ,api keys etc are being stored in environment using the dotenv packages this files are kept away from the version control system through .gitignore , preventing accidental exposures of confidentials credentials .

Session and token security – The system uses the json web tokens and secure users session to verifyfy the identity of users after login json web tokens are generated with an secure secrets key and it remain valid for an 24 hours and sessions cokies are configured using the https only attributes , whivh will prevent javascript still running in the browser from accessing them this will reduce the risk of session attack and hijacks the unauthorized account access,

Strict domain access filtering – The system allow only the users with an official @somaiya.edu email address are allowed to register or log in during the authentication the system checks the entered email address if the email address does not belong to the institute domain then the access is denied in the application.

Database Implementation

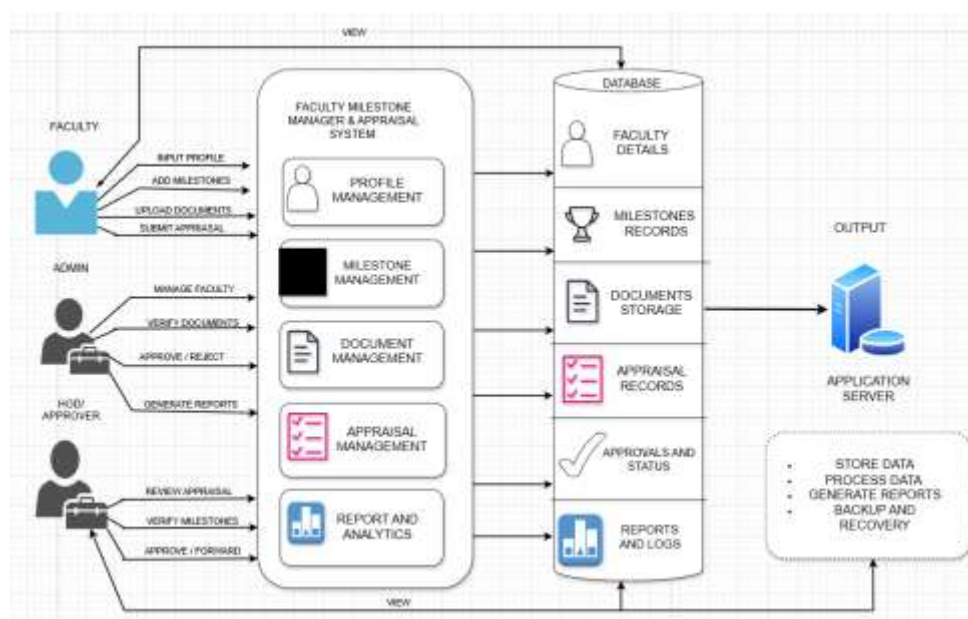


Figure 15: Database Implementation

The proposed faculty milestone manager relies on an postgresql database to centralized information in the application ,serving as the main data store ,postgresql handles and has profile attributes ,milestone logs ,appraisal submitted data ,digital files,and approval logs. This relational database architecture ensure the data integrity,transperancy ,fast query and secure data .management of approval data and evaluation record of thr institutional.

Database Design: The implemented system will have an database system as the main backbone of the system unifying the faculty and admin profiles ,academic achivements ,and evaluation of the appraisal forms the main domain entities are faculty records ,milestone logs , certificates, paper publication,status of the

appraisal form and admin activity logs. by apply the foreign key and primary keys in the table the realtions are being established the schema can ensures the data integrity, consistency and efficient quires.

Data Integration: The centralizing the data within an relational database model which establishes a single source of data and information across all the user and roles .by linking submissions , admin reviews and verified proofs through the foreign key relationships the database will eliminate data redundancy,,referential integrity,and fast retrieval of data for processing the appraisal and for the report generation.

Data Independence: The proposed system is based and implemented using three tier architecture which separates the frontend which is presentation layer ,backend which is application or business logic and database which is data layer. The separation will give data independence using properties like transcation , acid property, lock manager and the 3 schema architecture the data separation is achieved at the view level (user interface) and logical level (business logic).if changes on any level of schema and storage methods will not affect other level (layer).

Data Security: The postgresql database secure the data at multiple levels security using the builtin mechanisams like role based access control ,schema isolation,encryption and view so the data is secure using the autenticationa and authorization through which based on the role the data can be accessed or modify and multi step administrative approval workflow ensures data unchangeable or alter proof which prevent unauthorization data modification.

CONCLUSION

The faculty milestone manager and appraisal system is designed to make the faculty appraisal process more efficient and organized in universities , college and higher educational institutes .rather relying on manual paper work and misplacing the data and certificates the proposed web based system and solution provides and single platform for the where the faculty can manage profiles ,upload documents ,also can record academic achivements and all appraisal related activities .admin can review ,verify ,and approve the data and record through the same web based system by digitization of the performance based appraisal system it will improve data accuracy, transparency ,and reduce the time and effort of the admin and faculty this application also automates the task such as report generation ,evaluation process ,milestone tracking ,automated monthly remainder usig email and documents verification improves the appraisal evaluation process.the system is being developed using an three tier architecture for react.js for frontend,node.js and express.js for backend and postgresql for backend. demonstrates using this technology and combine it to buld an secure ,scalable and user friendly application. The proposed solution supports better faculty appraisal management and improving the efficiency of the institute appraisal process .

Future Work

However the proposed faculty milestone manager and appraisal system which automate the appraisal process and its milestone management it can be enhanced in future updates or version to insert more features and there is always room for more features and improvement such as:

Mobile Application Support:In future the the system can be made into an mobile app development for ios and android platforms this will alow the faculty to add there achievements ,appraisal data,academic milestones,upload document from there smartphones. An mobile application will give the access to user to use the appraisal based web application from anywhere and anytime.

AI-Based Performance Analytics: In future the integration of ai and machine learning will give improve predictive analytics of faculty productivity trends over time .by evaluating historical teaching and research the system can generate the users with the development recommendations ,course ,suggest conference ,publications and provide actionable feedback during filling the annual appraisal reviews.

Plagiarism and Research Profile Integration: Links to Google Scholar, ORCID, Scopus, Web of Science and Turnitin can be integrated with the system for easy retrieval of publication data, citation metrics, H-index, and plagiarism reports to ensure less manual data entry.

Users evaluation and user acceptance testing:- the user acceptance of the system is to be conducted in the future work with giving them the system to use and see what challenges they face while using the system and based on there feedback given by them like the usability testing , questionnaires and the users satisfaction surveys to evaluate the system performance .through the collected survey system can be improved .

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