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## **FACULTY APPRAISAL SYSTEM**

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**For**

**ITSE 498**

**Senior Project**

**Academic Year 2025-2026-Semester 1**

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**1/12/2025**

## **Abstract**

The Faculty Appraisal System is a web-based platform created to make the annual evaluation process for faculty members at the University of Bahrain faster, easier, and more organized. It was developed to overcome the problems in the current manual process, which often takes a long time, leads to mistakes, and makes it difficult to follow up on evaluations. This system allows faculty members, department heads, and deans to complete and review appraisal forms online, with performance results displayed in easy-to-understand dashboards. Feedback from surveys and interviews was used to shape the system, so it truly reflects what users need. In the end, it provides a smoother and more accurate evaluation process that supports better decision-making and improves overall performance.

## **Acknowledgments**

We would like to express our gratitude and appreciation to our supervisor, Dr. Abdulla Al-Asaadi, for his continuous support, guidance, and encouragement throughout this project. We are also grateful to our family who believed in us and given us unconditional love and support, and to our faculty members who have dedicated their time and effort during the requirements gathering phase. Their support played an important role in accomplishing the graduation project successfully.

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# **Chapter 1**

## **Introduction**

The University of Bahrain (UoB) conducts annual performance reviews for faculty to support their career growth. This process ensures that all academic and professional development needs are met while also upholding the university's mission and faculty development standards.

As part of the evaluation, faculty must fill out an achievements form. This form includes criteria such as teaching quality, scientific activities, research activities, university service, and community service. The department head uses performance rubrics to evaluate how well faculty complete this form. The dean also assesses department heads based on these rubrics. Unfortunately, much of this process relies on manual methods, leading to delays and inefficiencies in gathering, processing, and reporting evaluation results.

The project aims to create a web-based faculty performance evaluation system. This system will automate data collection, streamline the evaluation process, and assist decision-makers in making informed choices. To ease the shift from manual to digital data collection, the system will provide a digital version of the current Word template evaluation form, making it easier for faculty to complete. Additionally, the system will analyze the data gathered, assess performance metrics, and display results in interactive dashboards. These dashboards will provide a complete view of departmental and faculty performance, enabling informed decision-making and continuous improvement.

## **1.1. Problem Statement**

The existing annual faculty appraisal system contains some issues that require attention, including:

- Each year, faculty members must re-enter the same details to complete the appraisal form, which requires more effort and time to fill.
- Problems like duplicated/ missing data are possible to occur.
- Due to only being able to update achievements at a specific time of the year, most faculty members tend to forget some achievements.
- In the current system, appraisal data gathered are not utilized enough in decision making, monitoring faculty performance, and future enhancement areas.

## **1.2. Project Objectives**

- The objective of our project is to develop a web application for the University of Bahrain faculty appraisal system for the evaluation process that happens at the end of the year. This process is currently done manually, so our purpose is to digitalize this process by developing web-based systems.
- To study how the current manual appraisal process works, identify its problems, and find out what the new system needs to fix those issues.
- To review other existing appraisal systems and include new features that make this platform more efficient and easier to use.
- To plan, design, build, test, and deploy the system, ensure it works well and meets the university's requirements.
- To provide a secure, simple, and effective tool that improves performance management, increases transparency, and speeds up the evaluation process.
- The scope of this system will be limited to the faculty appraisal process at the University of Bahrain.

## **1.3. Relevance/Significance of the project**

This significance is crucial because it highlights the inefficiencies in the current faculty evaluation process that administrators, evaluators, and faculty member influence. By developing an automated, data-driven platform, the proposed project will minimize the time, effort and errors that might occur during this process as well as maximize the use of the collected data to improve performance on an individual and institutional level.

Moreover, this solution is applicable to be part of the University of Bahrain Student Information System (UoB SIS) to modernize the administrative process and assist in continuous professional development.

#### **1.4. Report Outline**

As it's mandatory for all studies, the second chapter presents the literature review relating to the problem being studied, the current manual process, the faculty appraisal process, and the automated appraisal management systems. In Chapter 3, we describe the research model used in this study, as well as the specific hypotheses that will be tested. Chapter 4 describes how data was collected, how the surveys were initiated, and how the data was compiled from the surveys and other data sources. Based on the requirements, functional and non-functional requirements are stated. System design is explained in detail in Chapter 5, including the design architecture, user interface, and the tools used. The implementation phase is covered in Chapter 6. Finally, chapter 7 concludes the report with a summary of findings, future work, and limitations.

## **Chapter 2**

### **Literature Review**

The evaluation process through the appraisal form in the university is a very important process to maintain academic performance standards for the faculty and support them in reaching their goals. Despite this, a lot of colleges continue to rely on manual, conventional evaluation techniques. The research in our literature review shows clearly the limitations and the problems that the universities are facing with the traditional method for evaluation. This study highlights the need for developing web-based systems; it reduces the limitations of the traditional way.

#### **2.1. Performance Appraisal of Faculty Members in Higher Educational Institutions: A Study**

In their article "Performance Appraisal of Faculty Members in Higher Educational Institutions," Sharma and Jain (2025) discussed the difficulties and issues that arise when faculty members in academic institutions are evaluated. They emphasized the significance of a precise and well-defined framework for evaluating faculty performance and coordinating it with institutional goals based on their experience at Rungta College of Science & Technology, Bhilai.

According to the authors, a successful evaluation system should take into account a variety of important factors, including academic engagement, teaching, research output, student assessment, and administrative tasks. The authors' research highlights some major difficulties with standard assessment methods, i.e., inconsistency, subjectivity, poor participation by those concerned, and excessive reliance on manual processes. Faculty appraisals that are inefficient, inconsistent, and confusing are usually caused by these problems.

Sharma and Jain (2025) provide several solutions to these challenges, including the use of both qualitative and quantitative performance measurements, the deployment of multi-source feedback systems, and the publication of precise and uniform assessment rules. These findings show that more methodical and impartial professor performance evaluations must be implemented by universities and colleges.

The same assessment criteria are considered at the University of Bahrain; however, the current procedure is still mostly manual and inconsistent, which increases the administrative burden and limits

the system's scalability and reliability. The solution in development will overcome such obstacles by introducing an automated data-driven faculty appraisals system. This system will be equipped with a centralized dashboard, role-based access, auto-scoring, and real-time analytics, thereby enabling more objective, efficient, and evidence-based decision-making. According to the recommendations provided by Sharma and Jain (2025), this project seeks to enhance the accuracy, transparency, and effectiveness of the faculty evaluation process.

## **2.2. Faculty Members' Performance Appraisal System: A Bibliometric Analysis of Scientific Literature**

Evaluating the performance of workers is an important aspect of running academic institutions. It has a big effect on promotions, skill development, and the overall health of the institution. Historically, many higher education institutions have relied on manual, paper-based evaluation systems that primarily focus on research yield (Aslam, 2011). However, since workforce components have expanded to include education, benefits, and community involvement, these out-of-date approaches do not fully capture the breadth of workforce responsibilities. A subsequent analysis by Janavi and Abdi (2024) brought to light a few problems with the evaluation frameworks in use today, including the requirement for computerized frameworks and defined criteria.

According to their analysis, manual systems are prone to data duplication, missing entries, and inefficiencies, which make analysis and decision-making challenging. These problems are most apparent in places like the University of Bahrain, where a large portion of the appraisal process is still carried out by hand. To address these drawbacks, academics have pushed for a shift to digital solutions. Elena and Leona (2015) suggested that faculty evaluations should take into account interpersonal dynamics, teaching innovation, ethical issues, and academic production.

Similarly, Cabrera et al. (2018) emphasized the increasing importance of independent assessments, such as computerized involvement and social factors, which provide a greater comprehension of a worker's roles. Using a centralized, web-based workforce evaluation system offers a practical solution in light of these experiences. Those steps can advance accuracy, promote real-time updates, enhance information section competency, and offer decision-makers robust analytics. According to Janavi and Abdi (2024), data-driven phases provide a simpler and more effective approach to workforce appraisal, ultimately leading to improved regulatory outcomes.

### 2.3. Study of Performance Appraisal System for Faculty Members in Selected Management Institutes Affiliated to Shivaji University Kolhapur

Hasure and Jadhav (2019) investigated how instructor performance was evaluated in Shivaji University's management colleges. The purpose of their study was to evaluate the effectiveness of the current evaluation system and pinpoint areas that could be improved. They pointed out that assessing industrial jobs, where results are more obvious and easier to measure, is far simpler than measuring teaching and academic work. Because teaching, mentoring, and research effects are often non-quantifiable, evaluating academic jobs is particularly challenging. Because of this, assessments in the field of education might occasionally seem ambiguous or inconsistent.

The authors contend that evaluating faculty members' contributions requires a more thoughtful and methodical approach.

Factor	Level Of Importance →						Total
	Very Important	Moderately Important	Neutral	Slightly Important	Less Important		
Subject Knowledge	F 65	10	9	3	1	88	
	P 73.9	11.4	10.2	3.4	1.1	100	
Qualification	F 30	49	8	1	0	88	
	P 34.1	55.7	9.1	1.1	0	100	
Experiences	F 49	17	15	5	2	88	
	P 55.7	19.3	17.0	5.7	2.3	100	
Feedback from students	F 26	50	6	6	0	88	
	P 29.5	56.8	6.8	6.8	0	100	
Appearances and Personality	F 40	31	10	4	3	88	
	P 45.5	35.2	11.4	4.5	3.4	100	
Relationship with other faculties	F 47	27	8	5	1	88	
	P 53.4	30.7	9.1	5.7	1.1	100	
Relationship with authorities	F 28	50	10	0	0	88	
	P 31.8	56.8	11.4	0	0	100	
Guest Lectures conducted	F 35	31	14	8	0	88	
	P 39.8	35.2	15.9	9.1	0	100	
Workshops, Seminars, Conferences conducted / attended	F 26	49	11	1	1	88	
	P 29.5	55.7	12.5	1.1	1.1	100	
Research Publications	F 41	29	16	2	0	88	
	P 46.6	33.0	18.2	2.3	0	100	
Cooperative Nature	F 34	40	14	0	0	88	
	P 38.6	45.5	15.9	0	0	100	
Character of concerned faculty	F 42	34	7	5	0	88	
	P 47.7	38.6	8.0	5.7	0	100	
Initiative in performing task	F 35	34	15	3	1	88	
	P 39.8	38.6	17.0	3.4	1.1	100	

Figure 3.1.1: Importance Levels of Faculty Evaluation Factors Adapted from Hasure and Jadhav (2019)

Thirteen factors including teaching experience, subject knowledge, research publications, student feedback, and professional relationships within the institution are frequently used in faculty evaluations, according to their research. A survey of 88 faculty members was used to evaluate these factors; Figure 2.3.1 (Hasure and Jadhav, 2019) summarizes the findings. Academic credentials and

subject-matter expertise were deemed particularly significant, but the study also highlights the importance of soft skills like teamwork and initiative in tasks.

Statement	Level of Agreeableness		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total
	F	P						
Satisfied with existing performance appraisal system	F	48	32	7	1	0	0	88
	P	54.5	36.4	8.0	1.1	0	0	100
Management fixes pay scale through the performance rating	F	22	48	13	5	0	0	88
	P	25.0	54.5	14.8	5.7	0	0	100
Good sponsorship for faculty for participation in FDP's, Seminars, Conferences, Refresher Courses given by our institute	F	42	22	16	8	0	0	88
	P	47.7	25.0	18.2	9.1	0	0	100
Impartial Appraisal policy for performance of faculty is adopted by our institute	F	28	42	16	2	0	0	88
	P	31.8	47.7	18.2	2.3	0	0	100
Transfer, demotion, suspension and dismissal is based on performance appraisal	F	29	22	32	5	0	0	88
	P	33.0	25.0	36.4	5.7	0	0	100
Appraisal system monitors major strong points and weakness of work	F	20	45	17	4	2	0	88
	P	22.7	51.1	19.3	4.5	2.3	0	100
Impartial appraisal system gives motivation to faculty in our institute	F	40	30	17	0	1	0	88
	P	45.5	34.1	19.3	0	1.1	0	100
Our institute's performance appraisal systems gives clear cut ideas to faculties about what is expected from them by management	F	31	41	16	0	0	0	88
	P	35.2	46.6	18.2	0	0	0	100
By using performance appraisal system, management clearly understands the needs of faculties	F	35	37	11	5	0	0	88
	P	39.8	42.0	12.5	5.7	0	0	100
The appraisal system provides an opportunity for self-review and reflection	F	44	39	3	2	0	0	88
	P	50.0	44.3	3.4	2.3	0	0	100
Periodic orientation programs are conducted to explain the objective and other details of appraisal system	F	26	36	20	4	2	0	88
	P	29.5	40.9	22.7	4.5	2.3	0	100
The appraisal data are used as inputs for recognition and encouragement for high performers.	F	26	36	20	4	2	0	88
	P	29.5	40.9	22.7	4.5	2.3	0	100
Whether management gives you sufficient time to bring improvement in your day to day official activity.	P	36	34	14	3	1	0	88
	F	40.9	38.6	15.9	3.4	1.1	0	100

Figure 3.1.1: Faculty Opinions on the Appraisal System

The majority of faculty members expressed satisfaction with the appraisal system. They appreciated that it helped them better understand the institution's expectations and inspired them to think critically about their job. However, some faculty members expressed concern that the findings might not be used equitably, particularly with regard to decisions regarding compensation and career promotion (Hasure and Jadhav, 2019, see Table Figure 2.3.2).

The study emphasizes the need for a more transparent and uniform evaluation procedure that takes into account both quantifiable outcomes and more intangible factors, all the while fostering confidence between educators and assessors. All things considered, it offers helpful information about how faculty assessments are now carried out and makes recommendations for how to enhance the system to better assist employees and the organization.

# Chapter 3

## Project Management

The framework used during this project is the Agile framework, as it best suits the nature of our work. This chapter presents the definition of Agile, key reasons for choosing Agile, the phases followed, and how risk was managed. Moreover, the project activities plan emphasizes how tasks have been distributed throughout the project.

### 3.1. Process Model

The Faculty Appraisal System's Agile Process Model is described in this section. It emphasizes how its methodical, flexible approach enables us to modify the system in response to continuous input from users.

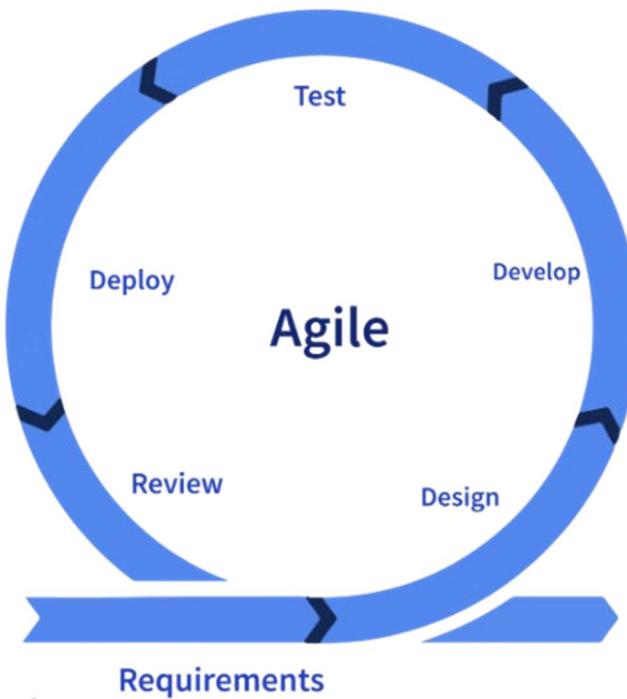


Figure 3.1.1: Agile process model

Figure 3.1.1 Illustrates the Agile Process Model followed in this project, highlighting its iterative cycle of requirement gathering, design, development, testing, deployment, and stakeholder review for continuous enhancement (InterviewBit, 2022).

We decided to go with the Agile model for the Faculty Appraisal System because it gave us flexibility, and we needed to work closely with stakeholders like faculty, HODs and deans. Since they frequently updated the rubric weights and evaluation criteria, Agile allowed us to easily incorporate their feedback and adjust the system in real-time. Meeting their changing needs and continuously enhancing the system became simpler as a result.

### **3.1.1. Below are the key reasons Agile was the best fit for the development of the Faculty Appraisal System:**

- The model is very flexible, which is important since we often get feedback from HODs and Deans who update rubric weights or evaluation criteria.
- Communication is key in Agile, which helps us address changes quickly and keep everyone on the same page.
- Breaking the project down into smaller phases, starting with planning, designing, development, testing, and feedback, makes it easier for us to focus on each phase carefully.
- Issues and problems are reduced by following this technique because of constant testing and feedback.
- Agile helps us keep things time-effective by making smaller, incremental changes rather than doing big overhauls later in the project.

### **3.1.2. The following phases are in the Agile method (TPointTec):**

1. Requirements gathering: In this phase, the project's scope, stakeholders' needs, and business objectives are identified.
2. Requirements Analysis: In this phase, everything from the requirements gathering will be analyzed. And the main functionalities are identified.
3. System Design: In this phase, the design of the system architecture is planned, alongside prototyping the user interfaces.
4. System Testing: Each function in the system must be tested to ensure that it aligns with the functional requirements.
5. Feedback: It is critical to consider the stakeholders' feedback to further enhance the system.

### **3.2. Risk Management**

The possibilities of risks that might occur during the project and how to prevent them from occurring are stated in this section.

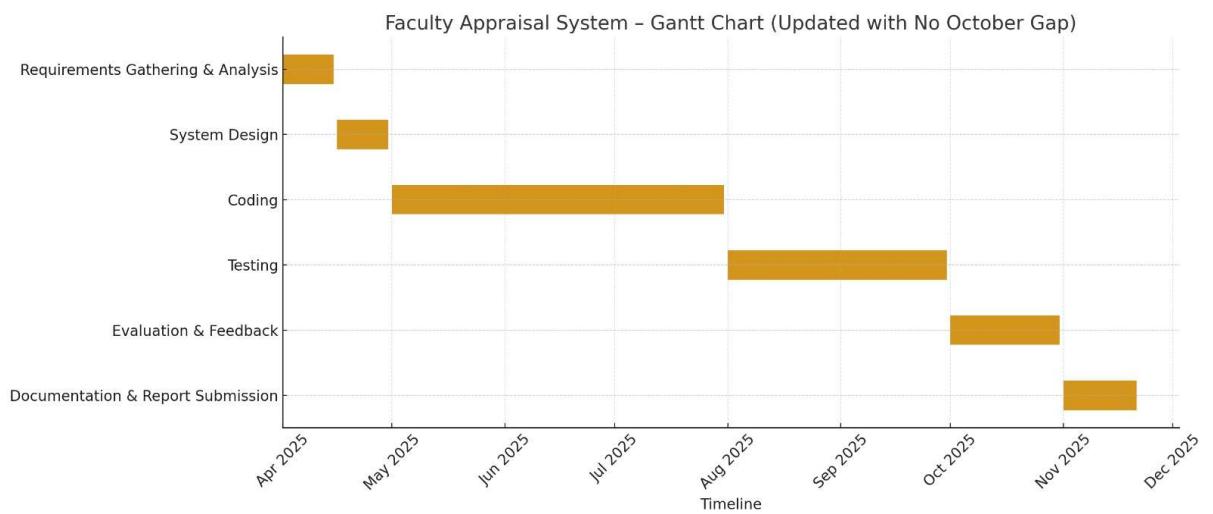
- Communication: misunderstanding internally between the project team and externally with the users (Faculty members, HoDs, Deans). Regular meetings and feedback will help keep everyone on the same page.
- Technology: Due to integration limitations with Student Information System (SIS) of the university, automatic data retrieval won't be possible. To handle this, the system will work independently.
- Time: time may be limited. A fixed timeframe must be developed to follow and prevent any delays.
- Resources: Incomplete or Inaccurate appraisal and users Historical Data

### **3.3. Project Activities Plan**

The project went through 6 main phases:

- Requirements
- Design
- Implementation
- Testing
- Documentation
- Presentation

Each phase of the project was broken down into tasks within a specific timeframe, as shown in the following Figure 3.3:



*Figure 3.1.2: Gantt Chart of the Project Development Phases*

# Chapter 4

## Requirement Collection and Analysis

This chapter explains how the requirements for the Faculty Appraisal System were gathered and examined, demonstrating the significance of having precise criteria to guarantee the system functions properly and satisfies user needs. In order to fully comprehend the appraisal process, data was gathered through key stakeholder interviews, document reviews, and extra research. We address non-functional needs, which deal with how the system should operate and include aspects like security, usability, and dependability, as well as functional requirements, which specify what the system should accomplish.

### 4.1. Requirement Elicitation

The most critical and important stage of the project is understanding all the system requirements. A thorough understanding of these requirements helps us deliver the final system that meets all the necessary specifications and satisfies all stakeholders.

To build this project, we used various methods to gather these requirements and understand all the necessary elements for building a comprehensive system. One of the most prominent methods was a meeting with Dr. Abdulla Al-Asaadi, who explained the current evaluation process and how it is conducted by all members of the college. To further broaden our understanding, we conducted a survey, which was completed by faculty members to clarify their preferences regarding the system's development.

#### 4.1.1. Survey Questions

##### Q1: How often do you face challenges when completing the Faculty Achievements Form?

1. How often do you face challenges when completing the Faculty Achievements Form?

[More details](#)

- Never 1
- Rarely 2
- Often 1
- Always 3

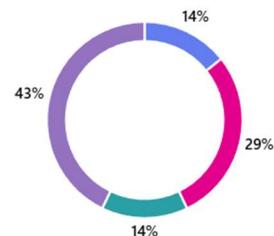


Figure 4.1.1.1: How often do you face challenges when completing the Faculty Achievements Form?

As shown in the figure, more than half of the responses face challenges with the current system.

## Q2: What are the main challenges in the current appraisal process? (select all that apply)

2. What are the main challenges in the current appraisal process? (select all that apply) [More details](#)



Figure 4.1.1.2: What are the main challenges in the current appraisal process? (select all that apply)

This figure supports the problem statement of the project by the faculty members, ensuring that the current appraisal process is time-consuming, prone to human errors, and has no valuable utilization of the data.

## Q3: What aspects of the current appraisal system process need the most improvement? (select all that apply)

3. What aspects of the current appraisal system process need the most improvement? (select all that apply) [More details](#)

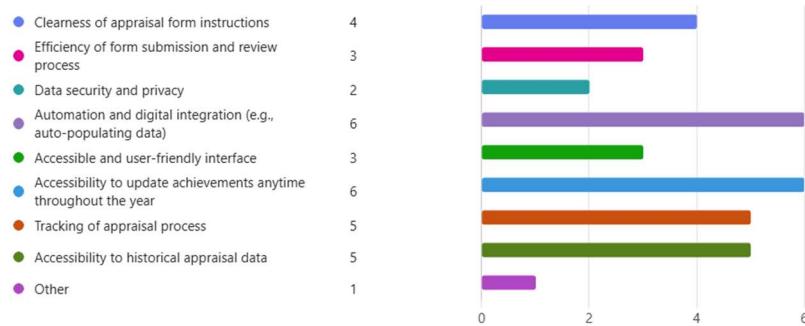


Figure 4.1.1.3: What aspects of the current appraisal system process need the most improvement? (select all that apply)

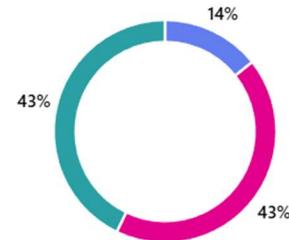
The figure responses vary in this question, but most users agreed on “automation and digital integration” and “accessibility to update achievements anytime throughout the year.” Which is one of the main functions of the system.

#### **Q4: How long does it typically take you to complete the Faculty Achievements Form?**

4. How long does it typically take you to complete the Faculty Achievements Form?

[More details](#)

- Less than 1 hour      1
- 1-5 hours      3
- More than 5 hours      3



*Figure 4.1.1.4: How long does it typically take you to complete the Faculty Achievements Form?*

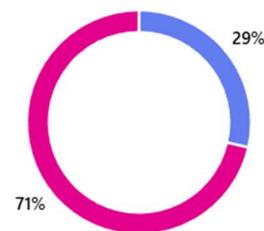
This figure shows that 43% require more than five hours of completing the faculty achievement form; most responders believe the current Faculty Achievements Form is time-consuming. This emphasizes the necessity for an automated, more effective appraisal method.

#### **Q5: Do you find the current process of filling appraisal form (manual entry, attaching documents, etc.) convenient**

5. Do you find the current process of filling appraisal form (manual entry, attaching documents, etc.) convenient?

[More details](#)

- Yes      2
- No      5



*Figure 4.1.1.5: Do you find the current process of filling appraisal form (manual entry, attaching documents, etc.) convenient?*

The above figure demonstrates that more than 50% of the respondents agreed that the appraisal process in the current system is not convenient for them.

## **Q6: How easy it is to access past appraisal records?**

6. How easy it is to access past appraisal records?

[More details](#)



*Figure 4.1.1.6: How easy it is to access past appraisal records?*

The above figure shows that most of the faculty see that it is hard to access past appraisal records. In our system, the faculty can search for their past achievements.

## **Q7: Do you think it would be helpful to update your achievements new activities throughout the year (instead of waiting until the annual appraisal period)?**

7. Do you think it would be helpful to update your achievements new activities throughout the year (instead of waiting until the annual appraisal period)?

[More details](#)



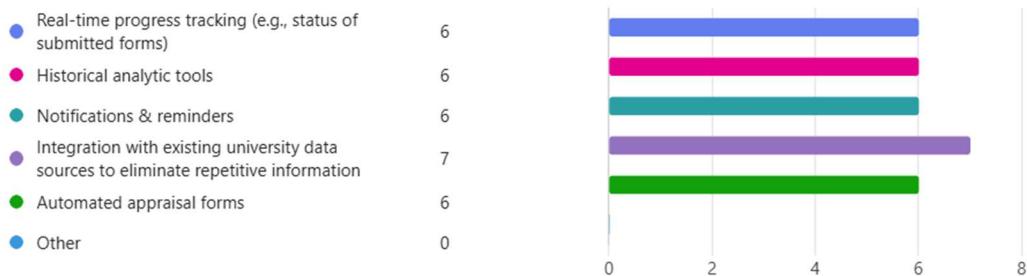
*Figure 4.1.1.7: Do you think it would be helpful to update your achievements new activities throughout the year (instead of waiting until the annual appraisal period)?*

This figure shows that the majority of responders (86%) concurred that it would be beneficial to update accomplishments throughout the year, which supports the requirement for a system that enables ongoing, real-time changes.

## **Q8: What features would you like in the proposed faculty appraisal system? (select all that apply)**

8. What features would you like in the proposed faculty appraisal system ? (select all that apply)

[More details](#)



*Figure 4.1.1.8: What features would you like in the proposed faculty appraisal system? (select all that apply)*

The main recommendations made by respondents to enhance the faculty appraisal system are displayed in this figure, emphasizing the need for data integration, real-time tracking, analytics, notifications, and automated forms.

## **4.2. System Requirements**

This section describes in detail the functional and non-functional requirements of the system.

### **4.2.1. Functional Requirements**

*Table 4.2.1.1: Login functional requirements*

Requirement ID	SRS-FAS-001
Title	Login
Priority	High priority (“Core requirements”)
Description	All users must be able to securely log in using their credentials. Based on their role (Faculty, HoD, Dean, Admin), users will be directed to a role-specific dashboard.
Version	1.0

*Table 4.2.1.2: Generate report functional requirement*

Requirement ID	SRS-FAS-002

<b>Title</b>	Generate Report
<b>Priority</b>	Medium priority
<b>Description</b>	The system will be able to generate different types of reports for Faculty members, HODs, and Deans.
<b>Version</b>	1.0

*Table 4.2.1.3: View/Update appraisal functional requirement*

<b>Requirement ID</b>	<b>SRS-FAS-003</b>
<b>Title</b>	View/Update Appraisal
<b>Priority</b>	High priority (“Core requirements”)
<b>Description</b>	Faculty members must be able to fill out and update their own appraisal forms. Forms can be edited until the submission deadline.
<b>Version</b>	1.0

*Table 4.2.1.4: View evaluation results functional requirement*

<b>Requirement ID</b>	<b>SRS-FAS-004</b>
<b>Title</b>	View Evaluation Results
<b>Priority</b>	High priority (“Core requirements”)
<b>Description</b>	Faculty should be able to see the final results of their appraisal once the evaluations are finished and the system has published them.
<b>Version</b>	1.0

*Table 4.2.1.5: Approve appraisal functional requirement*

<b>Requirement ID</b>	<b>SRS-FAS-005</b>
<b>Title</b>	Approve Appraisal
<b>Priority</b>	Medium

<b>Description</b>	Faculty and HoDs can review and either accept or reject appraisal results.
<b>Version</b>	1.0

*Table 4.2.1.6: Personal analytics functional requirement*

<b>Requirement ID</b>	<b>SRS-FAS-006</b>
<b>Title</b>	Personal Analytics
<b>Priority</b>	Medium priority
<b>Description</b>	Faculty members should be able to check analytics about their performance, like trends and comparisons from different semesters.
<b>Version</b>	1.0

*Table 4.2.1.7: Evaluate appraisal functional requirement*

<b>Requirement ID</b>	<b>SRS-FAS-007</b>
<b>Title</b>	Evaluate Appraisal
<b>Priority</b>	High priority (“Core Requirements”)
<b>Description</b>	HoDs must be able to evaluate the appraisal forms submitted by faculty. Deans must be able to evaluate forms submitted by HoDs.
<b>Version</b>	1.0

*Table 4.2.1.8: View faculty appraisal functional requirement*

<b>Requirement ID</b>	<b>SRS-FAS-008</b>
<b>Title</b>	View Faculty Appraisal
<b>Priority</b>	High priority (“Core Requirements”)

<b>Description</b>	HoDs and Deans should be able to access and view the appraisal data submitted by the faculty members.
<b>Version</b>	1.0

*Table 4.2.1.9: View Department performance functional requirement*

<b>Requirement ID</b>	<b>SRS-FAS-009</b>
<b>Title</b>	View Department Performance
<b>Priority</b>	High priority
<b>Description</b>	HODs should be able to view summarized analytics for the department's performance.
<b>Version</b>	1.0

*Table 4.2.1.10: College performance functional requirement*

<b>Requirement ID</b>	<b>SRS-FAS-010</b>
<b>Title</b>	College Performance
<b>Priority</b>	Medium priority
<b>Description</b>	Deans should be able to view summarized analytics for the college's performance.
<b>Version</b>	1.0

*Table 4.2.1.11: Add data functional requirement*

<b>Requirement ID</b>	<b>SRS-FAS-011</b>
<b>Title</b>	Add Data
<b>Priority</b>	High priority (“Core Requirements”)
<b>Description</b>	Admin users should be able to add new data to the system, like user profiles, departments, evaluation criteria, colleges, and academic years.

<b>Version</b>	1.0
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*Table 4.2.1.12: Delete data functional requirement*

<b>Requirement ID</b>	<b>SRS-FAS-012</b>
<b>Title</b>	Delete Data
<b>Priority</b>	Medium priority
<b>Description</b>	Admins should be able to remove outdated or incorrect data from the system to keep the database accurate and tidy.
<b>Version</b>	1.0

*Table 4.2.1.13: Update data functional requirement*

<b>Requirement ID</b>	<b>SRS-FAS-013</b>
<b>Title</b>	Update Data
<b>Priority</b>	Medium priority
<b>Description</b>	Admin must be able to update records such as faculty position and departmental details for institutional changes.
<b>Version</b>	1.0

## 4.2.2. Non-Functional Requirements

*Table 4.2.2.1: Security non-functional requirement*

<b>Requirement ID</b>	SRS-FAS-001
<b>Title</b>	Security
<b>Priority</b>	High priority
<b>Description</b>	To ensure the security of users' information, the system should be safeguarded using an appropriate login procedure.
<b>Version</b>	1.0

*Table 4.2.2.2: Maintenance non-functional requirement*

<b>Requirement ID</b>	SRS-FAS-002
<b>Title</b>	Maintenance
<b>Priority</b>	High priority
<b>Description</b>	After it is developed, the system must be maintained. It's important to find bugs and problems as soon as possible and fix them.
<b>Version</b>	1.0

*Table 4.2.2.3: Usability non-functional requirement*

<b>Requirement ID</b>	SRS-FAS-003
<b>Title</b>	Usability
<b>Priority</b>	High priority
<b>Description</b>	All users of the system would find it simpler to operate because of its design. Also, anyone with even a little experience would have no trouble using the system.
<b>Version</b>	1.0

*Table 4.2.2.4: Portability non-functional requirement*

<b>Requirement ID</b>	SRS-FAS-004
<b>Title</b>	portability
<b>Priority</b>	High priority
<b>Description</b>	The system should function throughout many platforms.
<b>Version</b>	1.0

*Table 4.2.2.5: Availability non-functional requirement*

<b>Requirement ID</b>	SRS-FAS-005
<b>Title</b>	Availability
<b>Priority</b>	High priority
	Users should have constant access to the system.

<b>Description</b>	
<b>Version</b>	1.0

*Table 4.2.2.6: Reliability non-functional requirement*

<b>Requirement ID</b>	SRS-FAS-006
<b>Title</b>	Reliability
<b>Priority</b>	High priority
<b>Description</b>	Almost 90% of use scenarios should have the system operating faultlessly.
<b>Version</b>	1.0

*Table 4.2.2.7: Efficiency non-functional requirement*

<b>Requirement ID</b>	SRS-FAS-007
<b>Title</b>	Efficiency
<b>Priority</b>	High priority
<b>Description</b>	The system will use the least amount of time and storage space possible to print the findings and obtain the data. Moreover, the system will function and provide results more quickly and with fewer resources.
<b>Version</b>	1.0

*Table 4.2.2.8: Scalability non-functional requirement*

<b>Requirement ID</b>	SRS-FAS-008
<b>Title</b>	Scalability
<b>Priority</b>	High priority
<b>Description</b>	Scaling the system to a large number of users.
<b>Version</b>	1.0

*Table 4.2.2.9: Integrity non-functional requirement*

<b>Requirement ID</b>	SRS-FAS-009
<b>Title</b>	Integrity
<b>Priority</b>	High priority
<b>Description</b>	Data integrity should be assured by limiting access to the database and by appropriate synchronization, and backup functionalities
<b>Version</b>	1.0

*Table 4.2.2.10: Performance non-functional requirement*

<b>Requirement ID</b>	SRS-FAS-010
<b>Title</b>	Performance
<b>Priority</b>	High priority
<b>Description</b>	The system should provide a higher level of performance for the user. The system should be able to store the data accurately and provide error-free results. In addition to that, the system should also have an effective capacity for data identification
<b>Version</b>	1.0

## 4.3. Personas

This section describes the characteristics of system users.

### Admin



Figure 4.2.2: Admin persona

### Scenario:

At the start of each academic year, Mr. Youssef Abdulla logs into the Faculty Appraisal System to update faculty, department, and rubric records. He adds new users and sets up the academic year to ensure accurate data. His responsibility is to ensure that the appraisal process effectively operates and minimizes the workload for the staff. Also, if any problem or issue happens to the system, such as missing or duplicates entries, he fixes them directly.

### Faculty Member



Figure 4.2.2: Faculty member persona

### Scenario:

Dr. Sara needs a system that streamlines the process of filling out the faculty's appraisal form. In the faculty appraisal system of the University of Bahrain, she signs in and fills her form smoothly. The evaluator receives the form and evaluates it accordingly. Once the score is done, it is sent automatically to Sara. She opens the system, checks her scores, and has the right to either approve or appeal against the appraisal score.

### Head of Department



Figure 4.2.2: Head of department persona

### Scenario:

Dr. Mohammed logs into the evaluation system to assess the faculty members in his department. He navigates to the evaluation list page to evaluate faculty performance and capabilities, and saves the results. This dashboard uses the results to display the department's overall performance. This helps him identify strengths and areas to improve department performance. He can also use the system to generate a report detailing the evaluation results and the department's achievements.

### Dean



Figure 4.2.2: Dean persona

### Scenario:

Dr. Fatma is a dean at the University of Bahrain. She logs into the system to view the appraisal of the HoDs, and she evaluates them. She can also view the faculty college performance dashboard that will help her in monitoring performance and in decision-making.

## 4.4. System Models

This section will include the system models to show how the system operates.

### 4.4.1. UML Use Case

A use-case diagram is a UML diagram that shows how users, or actors, interact with a system. Instead of focusing on the system's internal workings, it shows what the system does for its users. It helps to understand the main features of the system, the roles of different users, and how they use it. This kind of diagram is especially helpful early in development to define the system's boundaries and make sure everyone involved understands it clearly (IBM Knowledge Center, 2021).

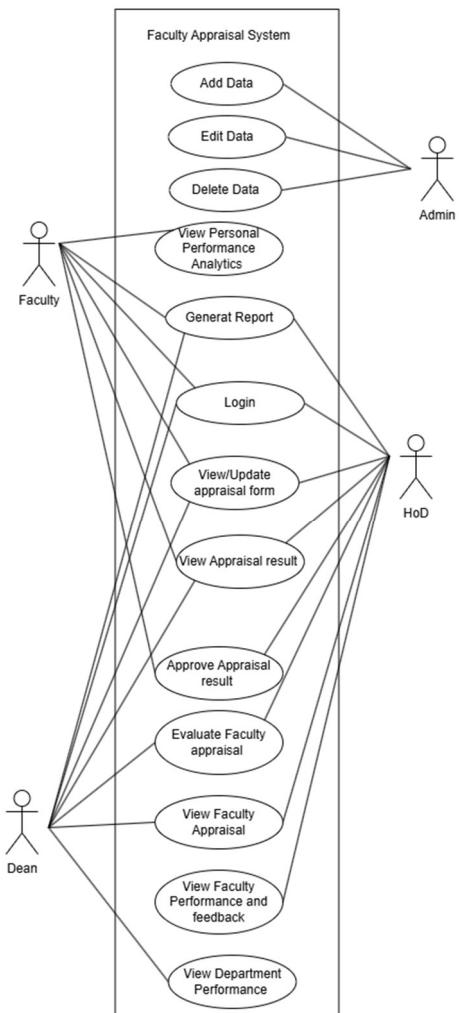


Figure 4.4.1.1: UML use case diagram

The use of a case diagram illustrates the different roles in the system. Derived from the main roles, there are faculty members, HoDs, and Deans. Since they are all considered faculty members, they are all able to perform the basic tasks like logging in, updating their profiles, filling out the appraisal form, viewing performance, and checking results.

However, because of their higher responsibilities, they also have access to additional features. The Dean can evaluate HoDs, and HoDs can evaluate faculty appraisals; both can view appraisal data for others. The HoD can see the performance of all faculty members across the department. Since the Dean has the highest level of responsibility, they also have access to tools that let them review how departments are performing and give feedback across the entire college. This approach helps keep the system organized and user-friendly by eliminating redundant functions and ensuring that each user has access only to the features they need, based on their role.

## 4.4.2. Process Specification

Below are the specifications of each process in the Faculty Appraisal System alongside their diagrams.

### 4.4.2.1. Login Function

*Table 4.4.2.1.1.1: Login function use case description*

<b>Use Case</b>	<b>Login</b>
<b>Use Case ID</b>	UC-FAS-001
<b>Related Requirements</b>	SRS-FAS-001
<b>Actors</b>	All Users (Faculty Members, HODs, Deans, Admins)
<b>Priority</b>	High priority (“Core Requirements”)
<b>Description</b>	All users must be able to securely log in using their credentials. Based on their role (Faculty, HoD, Dean, Admin), users will be directed to a role-specific dashboard.
<b>Preconditions</b>	<ul style="list-style-type: none"><li>• Internet connection needed</li><li>• The user must have a valid account.</li><li>• The login page must be accessible.</li></ul>
<b>Postconditions</b>	<ul style="list-style-type: none"><li>• The user is successfully authenticated.</li><li>• The system redirects the user to their appropriate dashboard (Faculty, HOD, Dean, or Admin).</li></ul>
<b>Main Flow</b>	<ol style="list-style-type: none"><li>1. The user opens the login page.</li><li>2. User enters username and password.</li><li>3. System verifies credentials.</li><li>4. If valid, the system identifies the user’s role.</li><li>5. Users are redirected to their specific page (Faculty, HoD, Dean, or Admin).</li><li>6. If invalid, an error message is displayed.</li></ol>
<b>Alternative Flows</b>	<ul style="list-style-type: none"><li>• If the credentials are invalid, the system displays an “Invalid username or password” message.</li><li>• If the account is disabled or inactive, a warning message appears.</li></ul>

	<ul style="list-style-type: none"> <li>• If an internal system error occurs, the user is notified, and the issue is logged.</li> </ul>
<b>Quality Requirements</b>	The system should reliably authenticate users and redirect them to the correct dashboard.

## Sequence Diagram

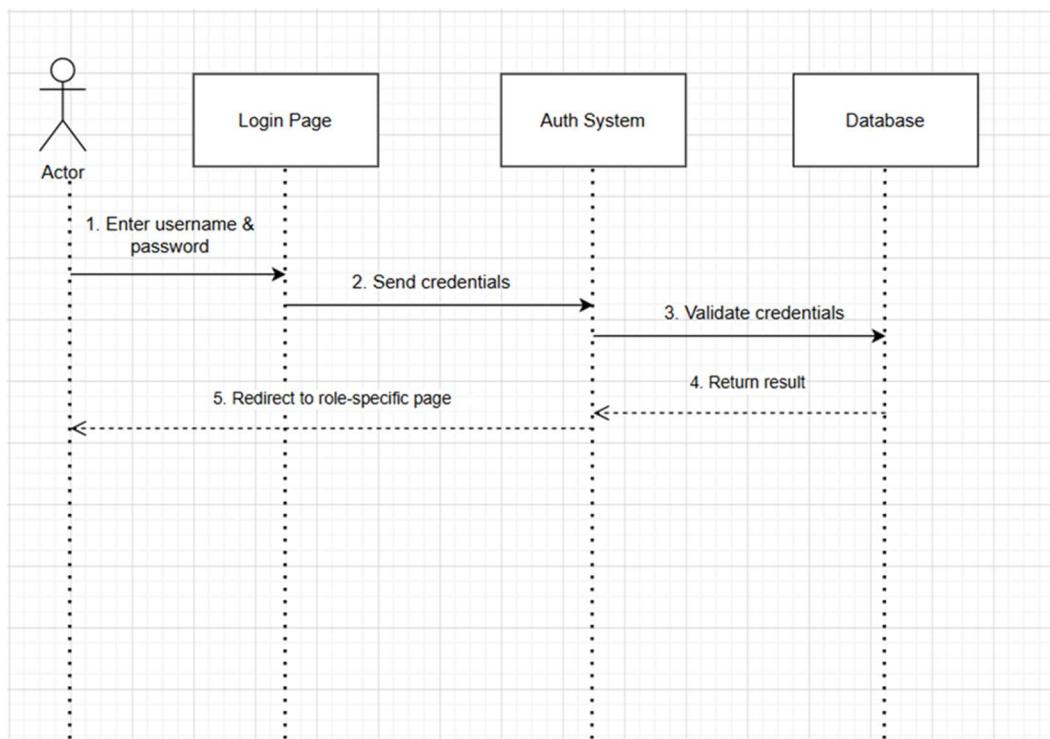
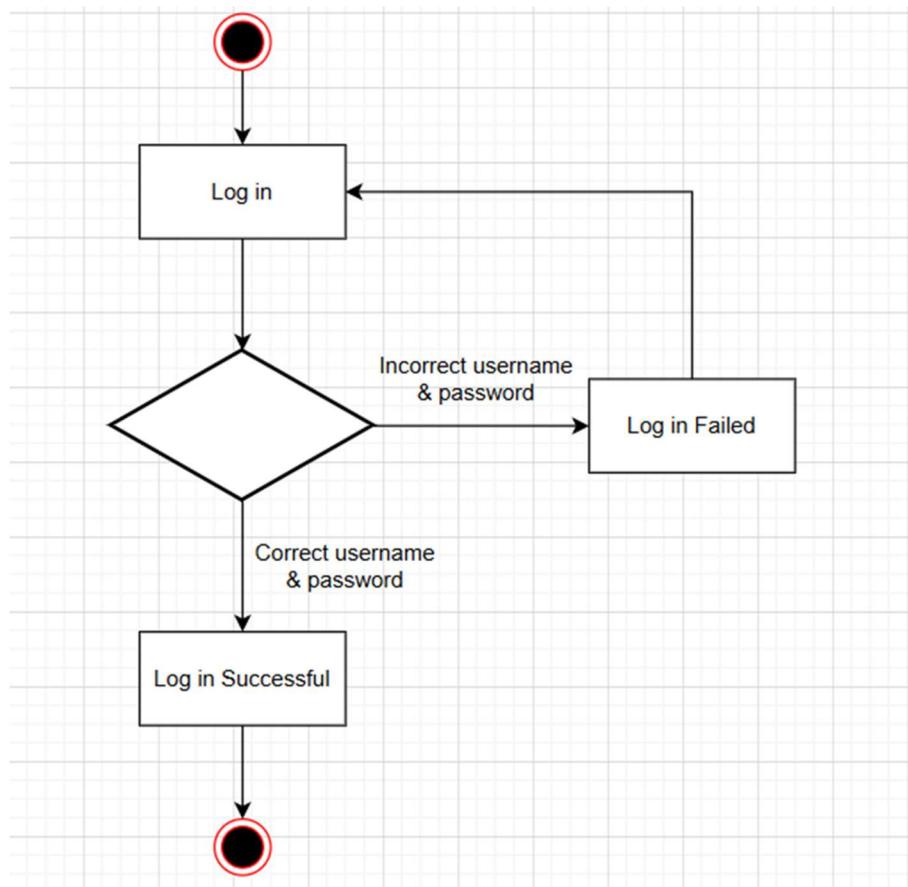


Figure 4.4.2.1.2.1: Login Sequence Diagram

This figure represents the sequence diagram that shows how the user logs in by entering credentials; the system verifies them and then redirects the user to their role-specific dashboard or displays an error if the login fails.

## Activity Diagram



*Figure 4.4.2.1.3.2: Login Activity Diagram*

The activity diagram shows the steps faculty follow to view evaluation results, from logging in and accessing the results page to viewing, downloading, or printing their performance report.

## State Diagram

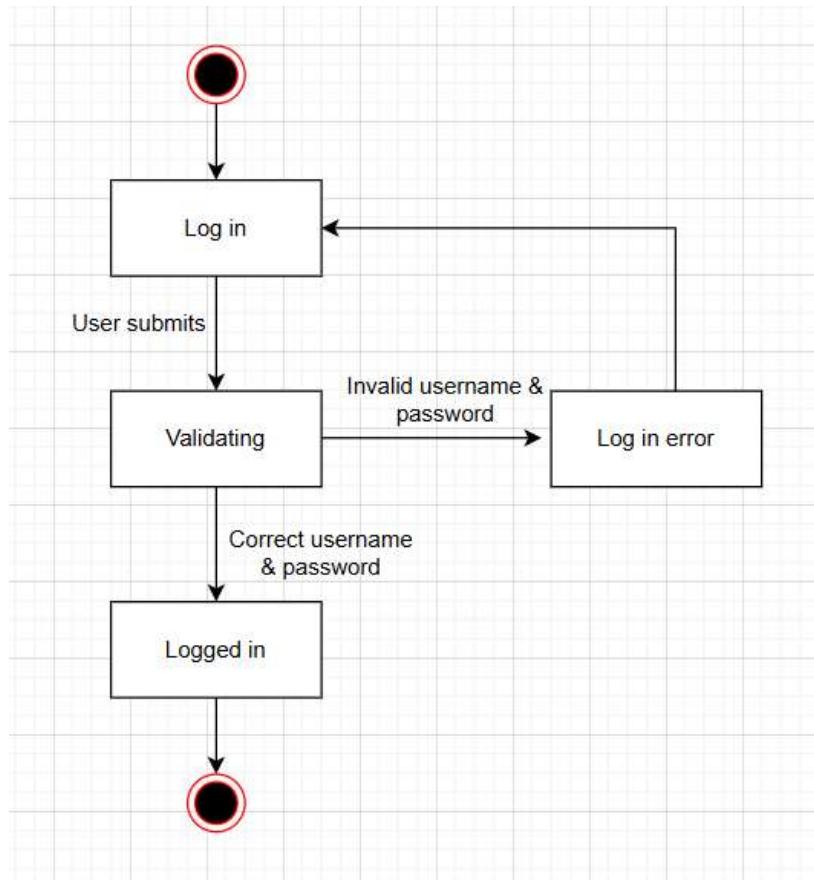


Figure 4.4.2.1.4.3: Login state diagram

The figure represents the different status (correct and incorrect) of credentials in the log-in process.

#### 4.4.2.2. View/Update Appraisal

Table 4.4.2.2.1: View/Update appraisal use case description

Use Case	View/Update Appraisal
Use Case ID	UC-FAS-002
Related Requirements	SRS-FAS-003
Actors	Faculty
Priority	High priority (“Core Requirements”)
Description	Faculty members can fill out, update, and review their own appraisal forms. Edits are allowed only before the submission deadline.
Preconditions	<ul style="list-style-type: none"> <li>• Faculty must be registered users and logged into the system.</li> </ul>

	<ul style="list-style-type: none"> <li>• The appraisal form for the current academic year exists in the system.</li> <li>• The submission deadline has not yet passed (for edits to be allowed).</li> </ul>
<b>Postconditions</b>	<ul style="list-style-type: none"> <li>• The appraisal form is updated and saved in the system (if edits were made before the deadline).</li> <li>• After the deadline, the form becomes read-only and cannot be modified.</li> <li>• Faculty can view their submitted appraisal form at any time.</li> </ul>
<b>Main Flow</b>	<ol style="list-style-type: none"> <li>1. Faculty logs in and navigates to “My Appraisal.”</li> <li>2. System displays the appraisal form for the current academic year.</li> <li>3. Faculty fill out or update the required sections.</li> <li>4. System saves updated data.</li> <li>5. Once the deadline passes, the form becomes read-only.</li> </ol>
<b>Alternative Flows</b>	<ol style="list-style-type: none"> <li>1. Invalid Login: If the faculty enters incorrect credentials, the system displays an error message and prompts a retry.</li> <li>2. Form Not Available: If the appraisal form for the current academic year is not yet created, the system notifies the faculty.</li> <li>3. Deadline Passed: If the faculty tries to edit after the submission deadline, the system allows only view access.</li> </ol>
<b>Quality Requirements</b>	<ul style="list-style-type: none"> <li>• The system must ensure that only authorized faculty can access and update their appraisal forms.</li> <li>• Updates to appraisal forms should be saved securely and accurately in the database.</li> <li>• The system must allow access to appraisal forms during the appraisal period without downtime.</li> <li>• The interface must clearly indicate editable sections and deadline restrictions.</li> </ul>

- The system must handle errors gracefully and provide informative messages to the user.

## Sequence Diagram

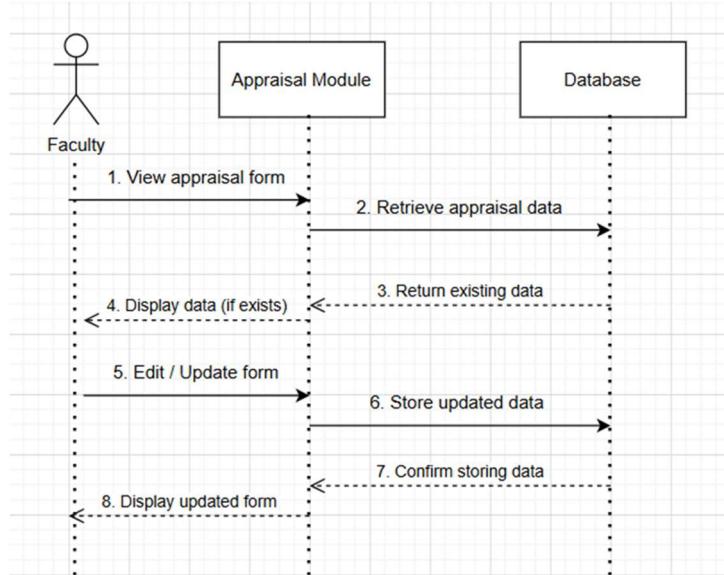


Figure 4.4.2.1: View/Update appraisal sequence diagram

The figure illustrates the steps as faculty open, update, and the system saves or locks the appraisal form after the deadline.

## Activity Diagram

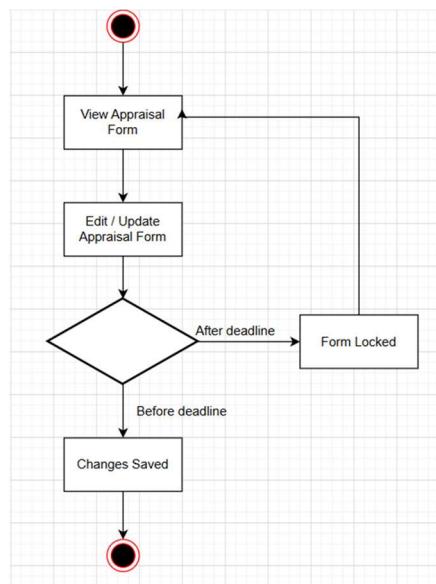


Figure 4.4.2.2.2: View/Update appraisal activity diagram

The figure illustrates the steps as faculty open, update, and the system saves or locks the appraisal form after the deadline.

### State Diagram

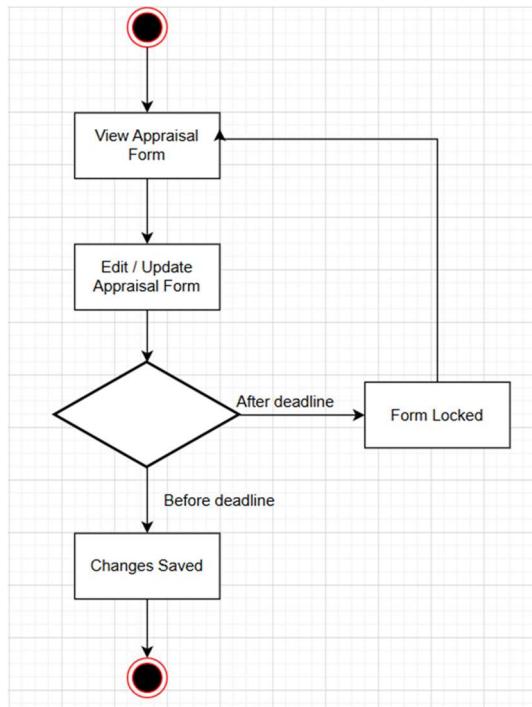


Figure 4.4.2.2.3: View/ Update appraisal state diagram

This figure shows the flow of how the faculty access, edit, and save their appraisal form until it becomes read-only after the deadline.

#### 4.4.2.3. View Evaluation

*Table 4.4.2.3.1: View evaluation results use case description*

Use Case	View Evaluation Results
<b>Use Case ID</b>	UC-FAS-003
<b>Related Requirements</b>	SRS-FAS-004
<b>Actors</b>	Faculty
<b>Priority</b>	High priority (“Core Requirements”)
<b>Description</b>	After the appraisal period ends and evaluations are completed, faculty members can view their results through the system to approve or reject the result score.
<b>Preconditions</b>	<ul style="list-style-type: none"> <li>• Faculty must be registered users and logged into the system.</li> <li>• The appraisal period must be completed, and evaluation results are finalized.</li> <li>• The evaluation results for the faculty must exist in the system.</li> </ul>
<b>Postconditions</b>	<ul style="list-style-type: none"> <li>• Faculty can view their finalized evaluation results.</li> <li>• Faculty may download or print the report.</li> <li>• Faculty cannot modify the finalized evaluation results.</li> </ul>
<b>Main Flow</b>	<ol style="list-style-type: none"> <li>1. Faculty logs in and navigates to “Evaluation Results.”</li> <li>2. System retrieves finalized results from the database.</li> <li>3. Results are displayed with performance scores and feedback.</li> <li>4. Faculty may download or print the report generated by the system.</li> </ol>
<b>Alternative Flows</b>	<ul style="list-style-type: none"> <li>• Invalid Login: If the faculty enters incorrect credentials, the system displays an error and prompts retry.</li> <li>• Results Not Available: If evaluation results are not finalized, the system notifies the faculty.</li> </ul>

	<ul style="list-style-type: none"> <li>• Download Failure: If the report fails to generate or print, the system displays an error and allows a retry.</li> </ul>
<b>Quality Requirements</b>	<ul style="list-style-type: none"> <li>• The system must ensure that only authorized faculty can access their evaluation results.</li> <li>• Results should be retrieved accurately and displayed without delay.</li> <li>• Downloaded and printed reports must match the finalized results.</li> <li>• The interface must clearly show scores, feedback, and available actions.</li> <li>• The system must handle errors gracefully and provide informative messages to the user.</li> </ul>

### Sequence Diagram

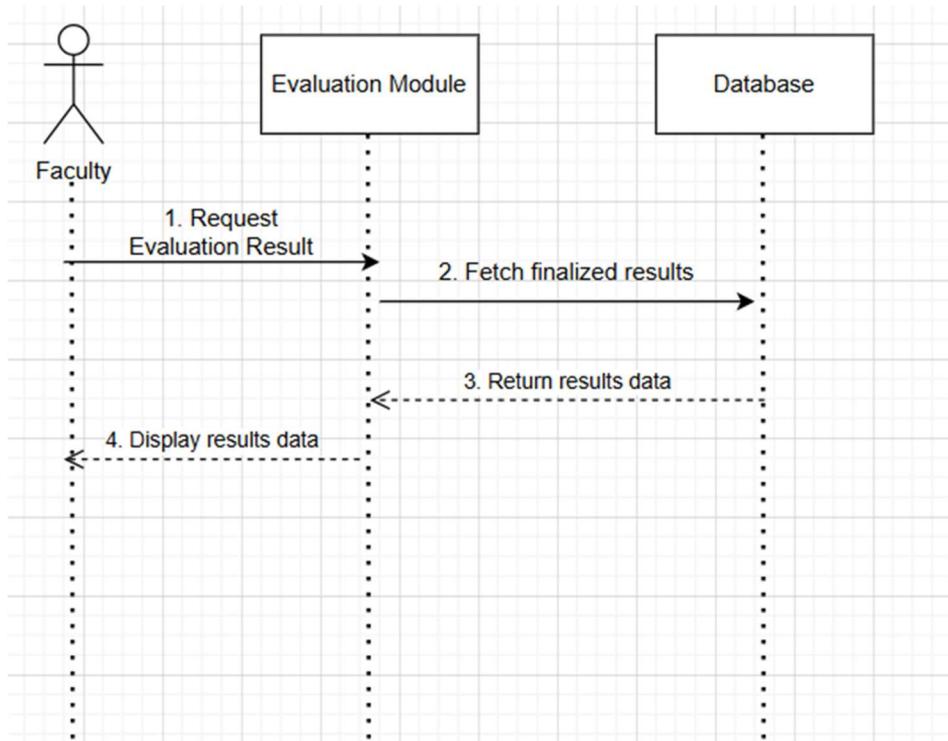


Figure 4.4.2.31: View evaluation results sequence diagram

The figure demonstrates the sequence of how the view evaluation process happens.

## Activity Diagram

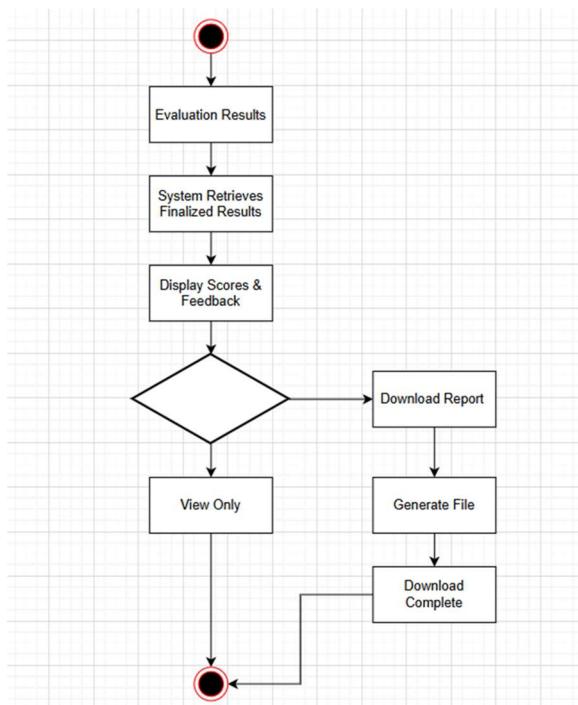


Figure 4.4.2.32: View evaluation results activity diagram

The figure represents the logic of the “View Evaluation Results” function.

## State Diagram:

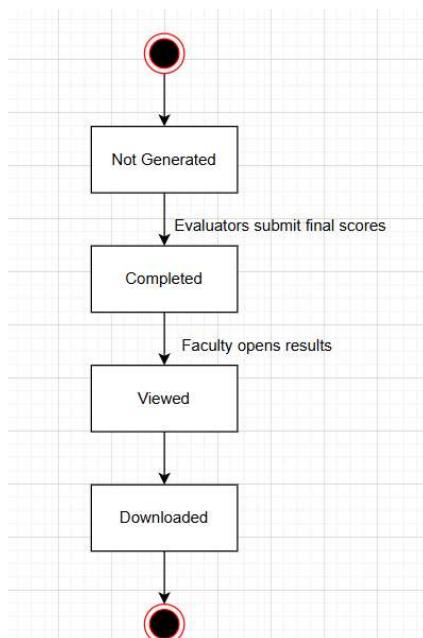


Figure 4.4.2.3.3.3: View evaluation result state diagram

The figure represents the different states of the “Evaluation results” through the function.

#### 4.4.2.4. Evaluate Appraisal

*Table 4.4.2.4.4.1: Evaluate appraisal use case description*

Use Case	Evaluate Appraisal
Use Case ID	UC-FAS-004
Related Requirements	SRS-FAS-008
Actors	Head of department (HoD), Dean
Priority	High priority (“Core Requirements”)
Description	This use case allows the HOD to evaluate the appraisal forms submitted by faculty members and the Dean to evaluate the appraisal forms submitted by HODs. Evaluators can assign scores, write comments, and submit their evaluations.
Preconditions	<ul style="list-style-type: none"> <li>- The HOD or Dean must be logged into the system.</li> <li>- Appraisal forms must be submitted and available for evaluation.</li> </ul>
Postconditions	<ul style="list-style-type: none"> <li>- The evaluation is recorded and saved in the system.</li> <li>- The appraisal form status changes to “Sent.”</li> </ul>
Main Flow	<ol style="list-style-type: none"> <li>1. The HOD or Dean log into the system.</li> <li>2. The evaluator navigates to the “Evaluation” page.</li> <li>3. The system displays a list of submitted forms based on their role (Faculty forms for HOD, HOD forms for Dean).</li> <li>4. The evaluator opens a form to review details.</li> <li>5. The evaluator selects the scores and fills in the comments based on the rubric.</li> <li>6. The evaluator submits the evaluation.</li> <li>7. The system saves the evaluation and updates the status to “Sent.”</li> </ol>
Alternative Flows	<ul style="list-style-type: none"> <li>• If there are no achievements, the system will automatically give 0 scores.</li> </ul>
Quality Requirements	<ul style="list-style-type: none"> <li>- The system must ensure only authorized evaluators (HOD/Dean) can perform evaluations.</li> <li>- Evaluations should be stored securely and processed without delay.</li> </ul>

## Sequence Diagram

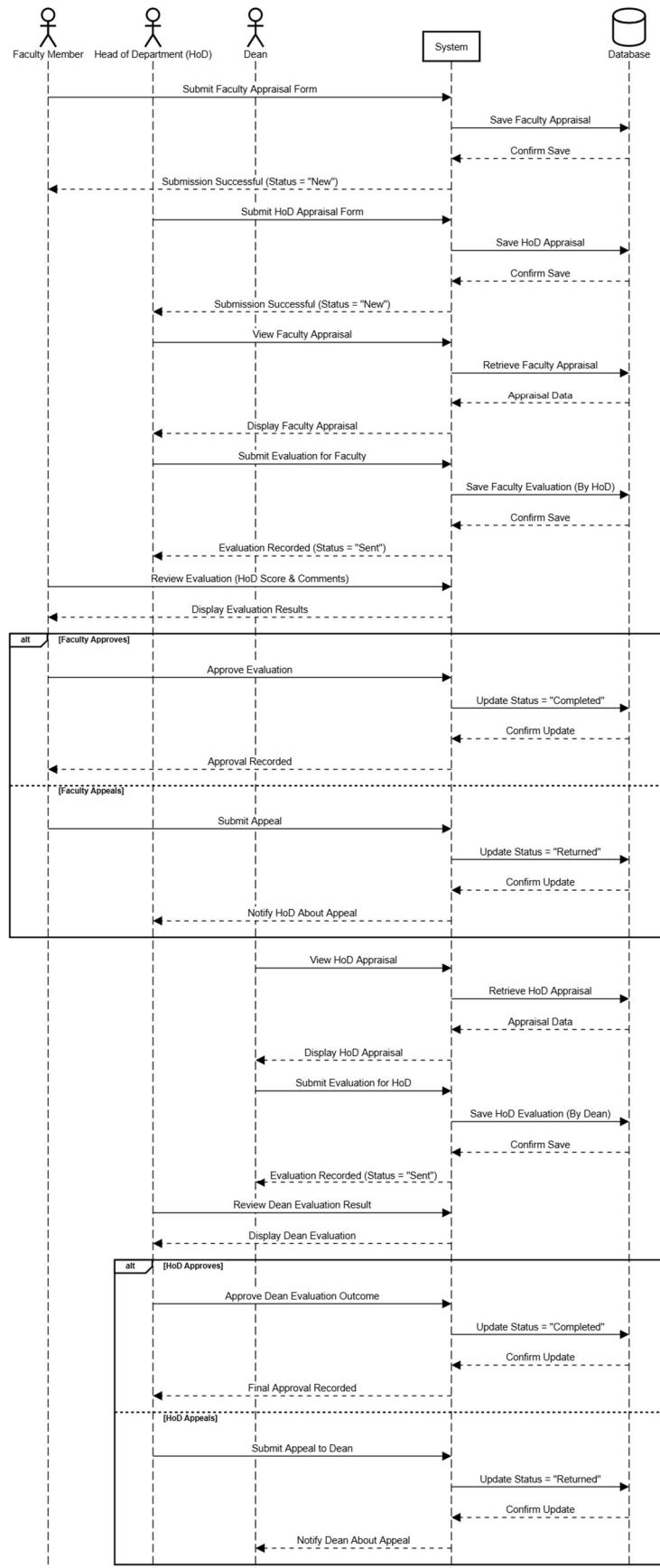


Figure 4.4.2.4.4.1: Evaluate appraisal sequence diagram

The figure above shows evaluation steps: evaluator selects a form, adds scores and comments, submits evaluation, system updates status.

## Activity Diagram

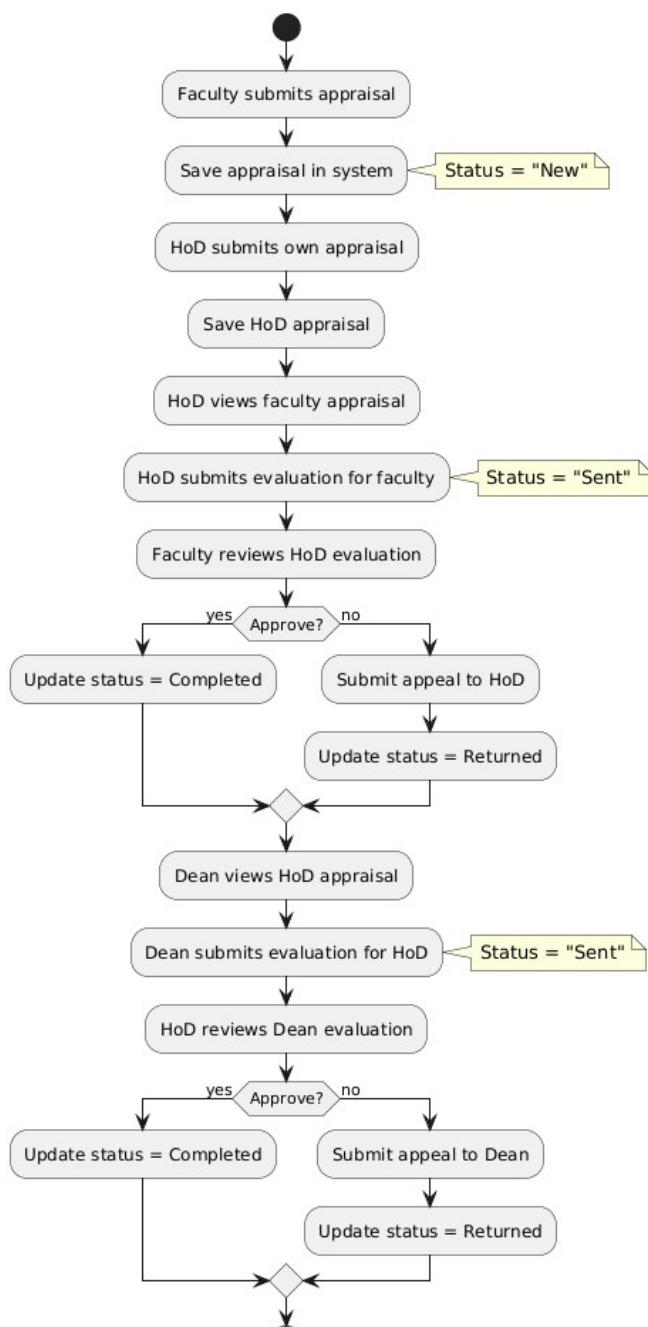


Figure 4.4.2.4.4.2: Evaluate appraisal activity diagram

This figure shows the evaluation workflow from opening the form to completing and submitting the evaluation.

### State Diagram

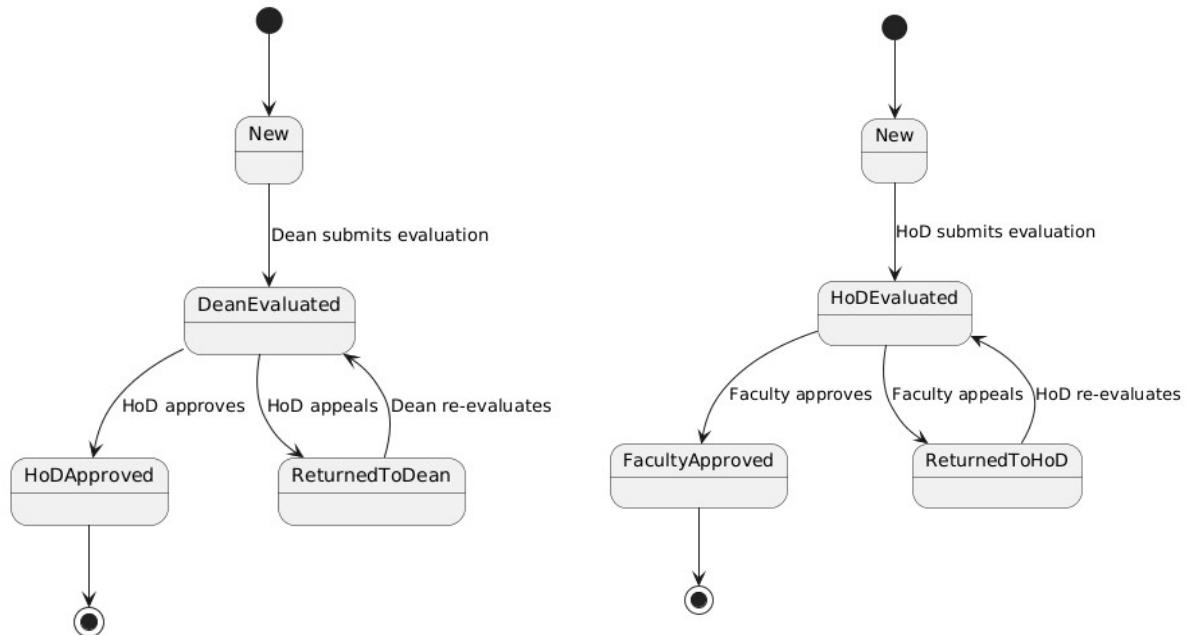


Figure 4.4.2.4.4.3: Evaluate appraisal state diagram

Figure 4.5.4.3 shows status changes of an appraisal during evaluation: “Submitted, Evaluating, Sent, Returned.”

### 4.4.2.5. View Faculty Appraisal

Table 4.4.2.5.5.1: View faculty appraisal use case description

Use Case	View Faculty Appraisal
Use Case ID	UC-FAS-005
Related Requirements	SRS-FAS-008
Actors	Head of department (HoD), Dean
Priority	High priority

<b>Description</b>	This use case allows HODs to view faculty appraisal submissions and Deans to view appraisal submissions from HODs. It provides access to form details, evaluation results, and status tracking.
<b>Preconditions</b>	<ul style="list-style-type: none"> <li>- The user must be logged into the system.</li> <li>- Appraisal data must exist in the system.</li> </ul>
<b>Postconditions</b>	<ul style="list-style-type: none"> <li>- The user can view all related appraisals and their statuses.</li> <li>- The user can use the data for monitoring or decision-making.</li> </ul>
<b>Main Flow</b>	<ol style="list-style-type: none"> <li>1. The HOD or Dean log into the system.</li> <li>2. The user navigates to the “View Appraisals” page.</li> <li>3. The system displays a list of submitted appraisals.</li> <li>4. The user selects a record to view full details.</li> <li>5. The system shows the form of details and evaluation results.</li> </ol>
<b>Alternative Flows</b>	<ul style="list-style-type: none"> <li>- If no appraisals are found, the system displays a “No Appraisals Found” message.</li> </ul>
<b>Quality Requirements</b>	<ul style="list-style-type: none"> <li>- The system must load and display appraisal data accurately and quickly.</li> <li>- Only authorized users (HODs and Deans) can view the appraisals.</li> </ul>

### Sequence Diagram

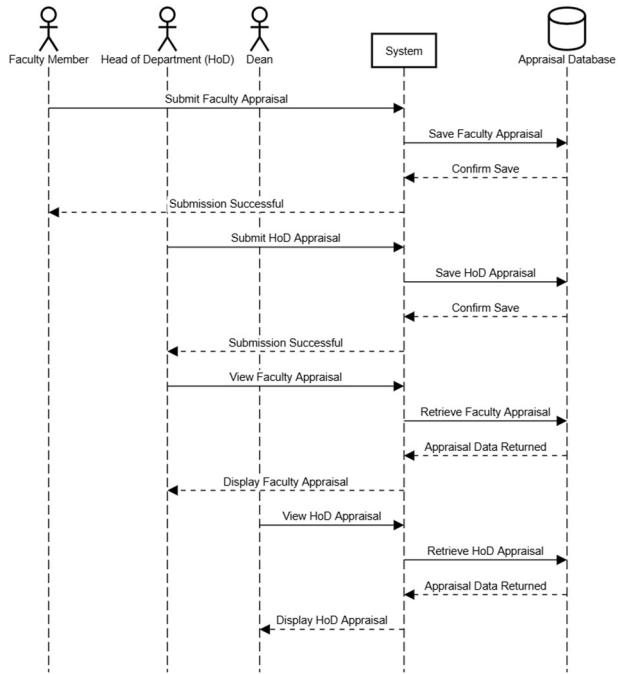


Figure 4.4.2.54.4.2.5.5.1: View faculty/HoD/dean appraisal sequence diagram

Above figure shows the steps when an HOD or Dean selects a faculty appraisal, and the system retrieves and displays the appraisal details from the database.

## Activity Diagram

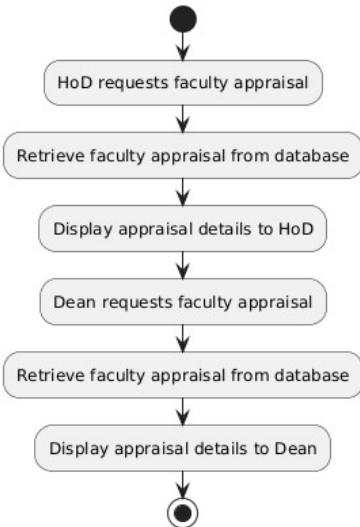


Figure 4.4.2.52: View faculty/HoD/dean appraisal activity diagram

This figure shows the flow from opening the appraisal list, selecting a faculty member, and then viewing detailed appraisal data.

## State Diagram

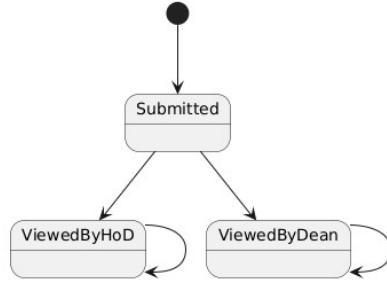


Figure 4.4.2.5.5.3: View faculty/HoD/dean appraisal state diagram

This figure represents the appraisal form moving through states such as “Submitted → Viewed,” showing that the form has been opened and reviewed.

### 4.4.2.6. View Department Performance

Table 4.4.2.6.6.1: View Department performance use case description

Use Case	View Department Performance
Use Case ID	UC-FAS-006
Related Requirements	SRS-FAS-009
Actors	Head of Department (HoD)
Priority	High priority
Description	HODs should be able to view summarized analytics for the department's performance.
Preconditions	<ul style="list-style-type: none"><li>The HOD must be logged into the system.</li></ul>
Postconditions	<ul style="list-style-type: none"><li>The department's performance summary is displayed with key metrics and visual insights.</li><li>The HOD can use this information for analysis or decision-making.</li></ul>
Main Flow	<ol style="list-style-type: none"><li>The HOD logs into the system.</li><li>They navigate to the Department Performance page.</li><li>The system retrieves and processes the department's evaluation results.</li><li>The system generates summary numeric and charts.</li></ol>

	<p>5. The HOD views the analytics of the department's overall performance.</p>
<b>Alternative Flows</b>	<ul style="list-style-type: none"> <li>If there's no performance records, the system displays empty visuals.</li> </ul>
<b>Quality Requirements</b>	The system should load performance reports quickly, within a few seconds

### Sequence Diagram

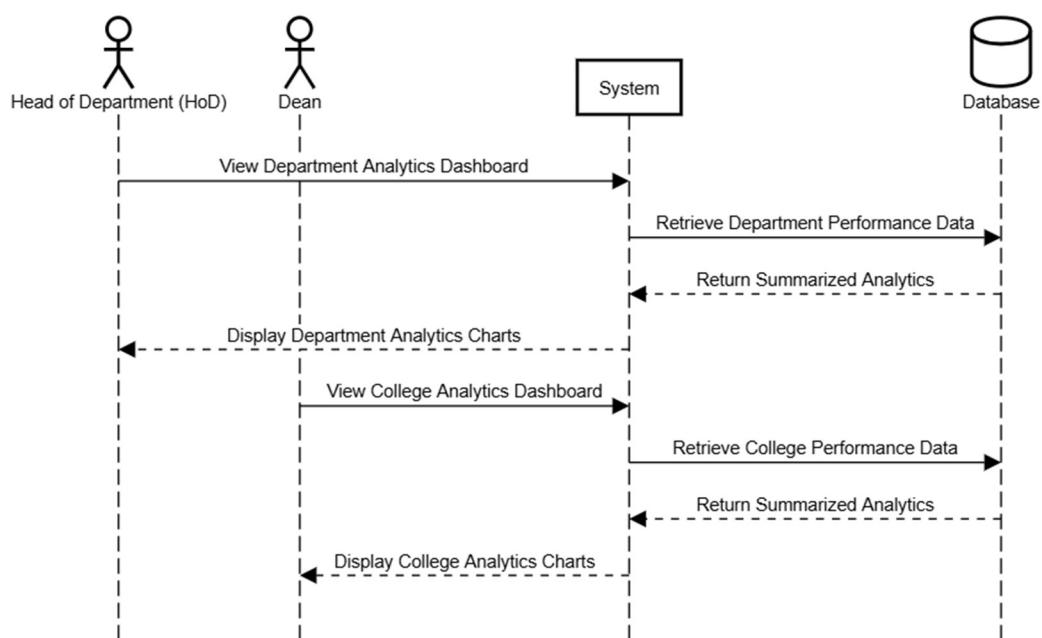
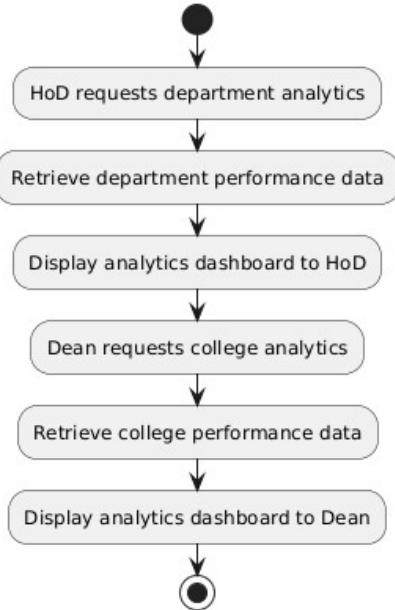


Figure 4.4.2.6.6.1: Veiw Department performance sequence diagram

Figure 4.5.6.1 Shows the steps when the HOD requests department analytics, and the system retrieves data, processes it, and displays charts and summaries.

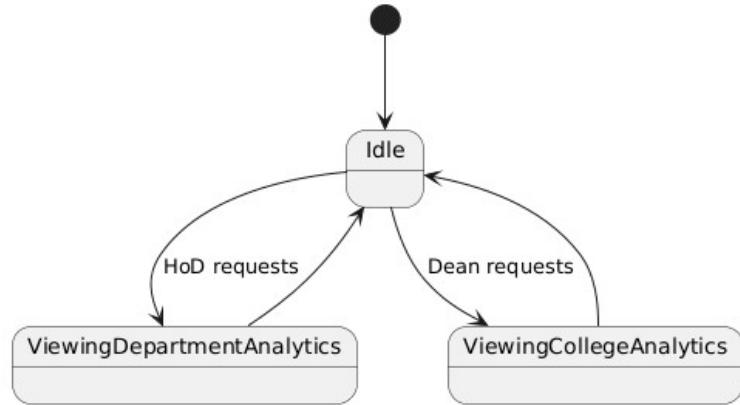
### Activity Diagram



*Figure 4.4.2.6.6.2: View Department performance activity diagram*

The above figure Shows the steps when the HOD requests department analytics, and the system retrieves data, processes it, and displays charts and summaries.

### State Diagram



*Figure 4.4.2.6.6.3: View Department performance state diagram*

### Description:

In figure 4.5.6.3 it is shows how the analytics report moves through states like “Requested, Loading, Processed, and Displayed.”

#### 4.4.2.7. Add Data

*Table 4.4.2.7.7.1: Add data use case description*

Use Case	Add Data
Use Case ID	UC-FAS-007
Related Requirements	SRS-FAS-011
Actors	Admin
Priority	High priority (“Core Requirements”)
Description	Admin users should be able to add new data to the system, like user profiles, departments, evaluation criteria, colleges, and academic years.
Preconditions	<ul style="list-style-type: none"> <li>The admin must be logged in.</li> <li>The admin must have permission to add data.</li> </ul>
Postconditions	<ul style="list-style-type: none"> <li>If no performance data is available, the system loads the page but displays empty charts.</li> </ul>
Main Flow	<ol style="list-style-type: none"> <li>The admin opens the sidebar menu and selects User.</li> <li>The admin clicks on the add icon to add new users.</li> <li>A form appears for the selected data type.</li> <li>The admin fills in the required details.</li> <li>The admin clicks Save.</li> <li>The system validates the input and stores it in the database.</li> <li>A confirmation message appears once the data is added successfully.</li> </ol>
Alternative Flows	<ul style="list-style-type: none"> <li>If a system or database error occurs, an error message is displayed and logged.</li> <li>No internet connection</li> </ul>
Quality Requirements	<ul style="list-style-type: none"> <li>The system should allow only authorized Admins to add new data.</li> <li>The system should reliably save all data without loss or corruption.</li> </ul>

## Sequence Diagram

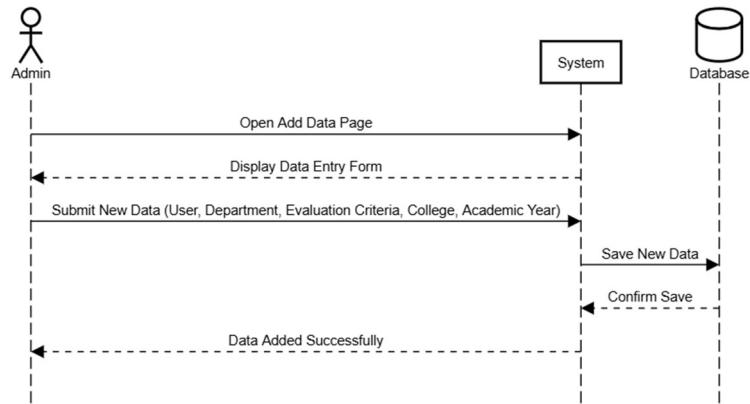


Figure 4.4.2.7.7.1: Add data sequence diagram

Above figure shows the steps when the admin opens the Add Data page, fills in a form, submits it, and the system saves the data into the database.

## Activity Diagram

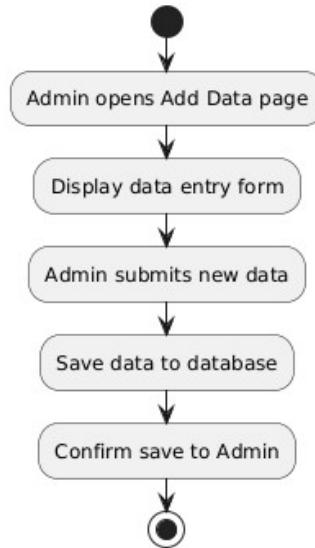


Figure 4.4.2.7.7.2: Add data activity diagram

This figure Shows the workflow from selecting a data type, entering details, submitting, and then the system will validate and save the new data.

## State Diagram

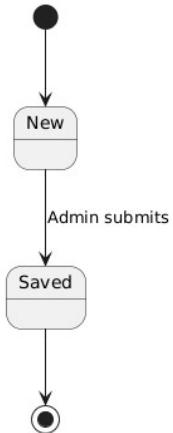


Figure 4.4.2.7.7.3: Add data state diagram

This figure shows how the new data moves through states like “Entered, Validated, Saved, and finally Confirmed.”

### 4.4.3. UML Class Diagram

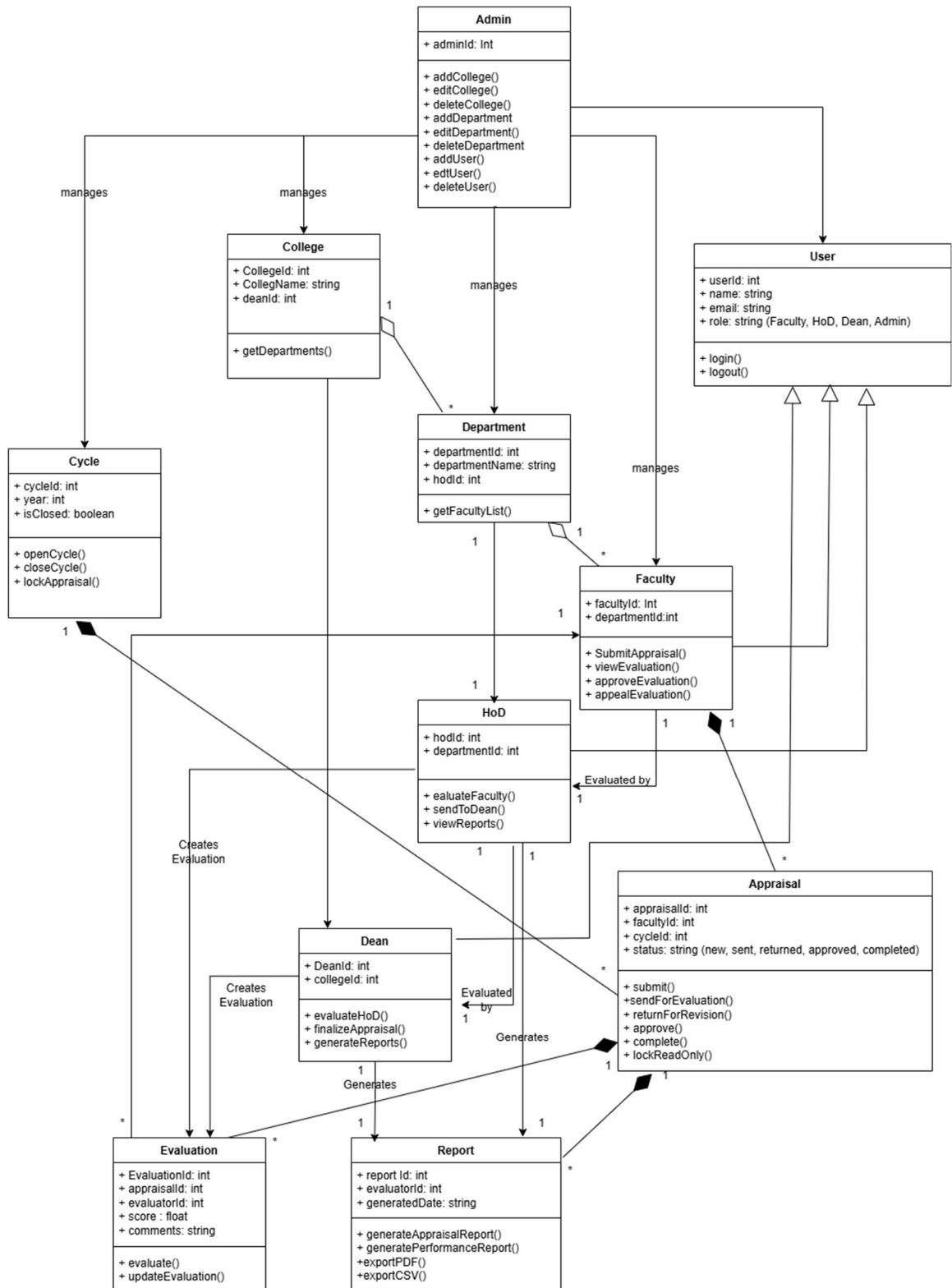
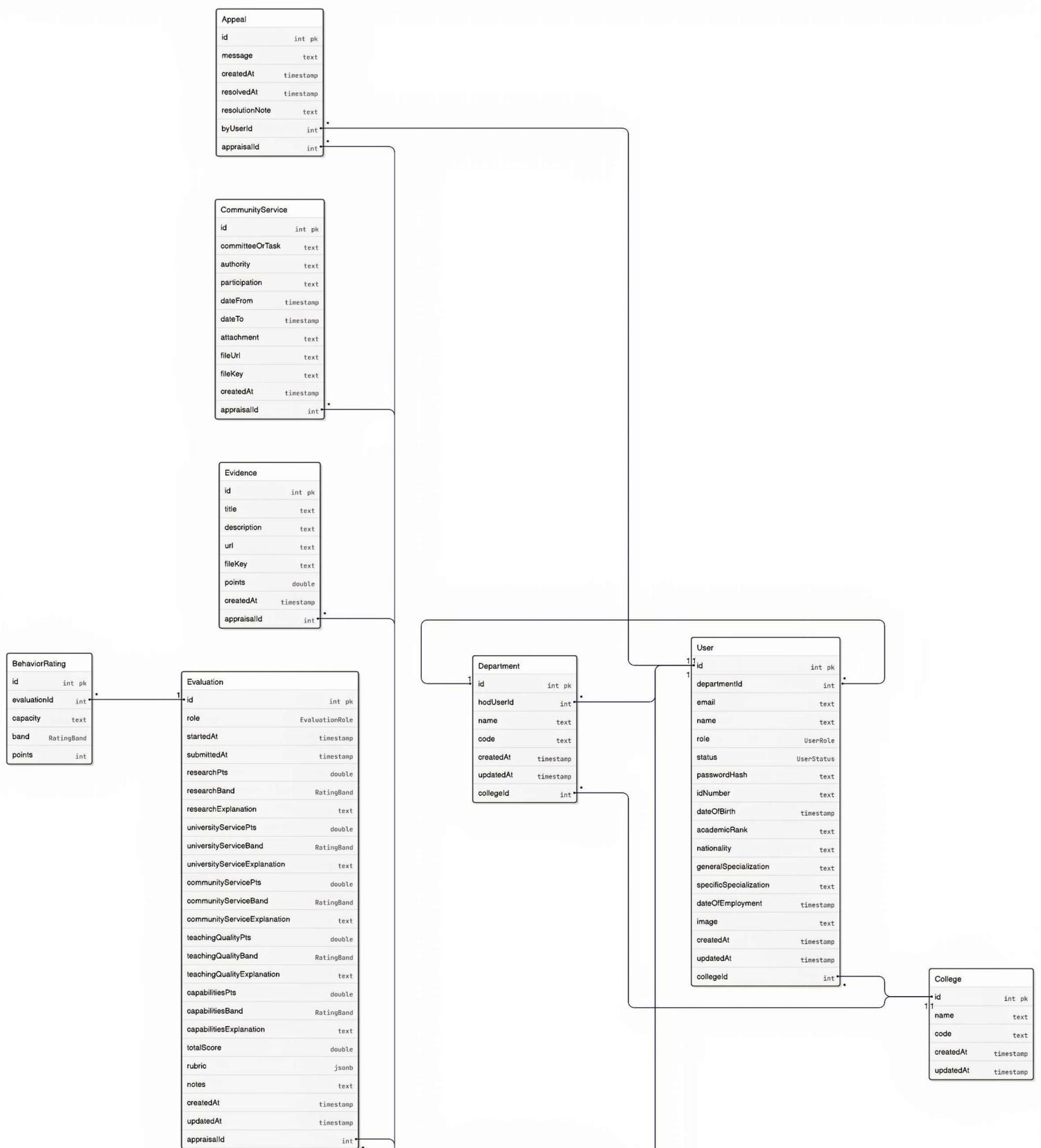


Figure 4.4.3.1: UML class diagram

The UML class diagram figure shows the structure of the university faculty appraisal system, including all users (Faculty, HoD, Dean, Admin), appraisals, evaluations, departments, colleges, and appraisal cycles. It illustrates the relationships, including inheritance, associations, and aggregations, as well as the key actions each role can perform, like submitting, evaluating, managing, and generating reports.

#### 4.4.4. ERD Diagram



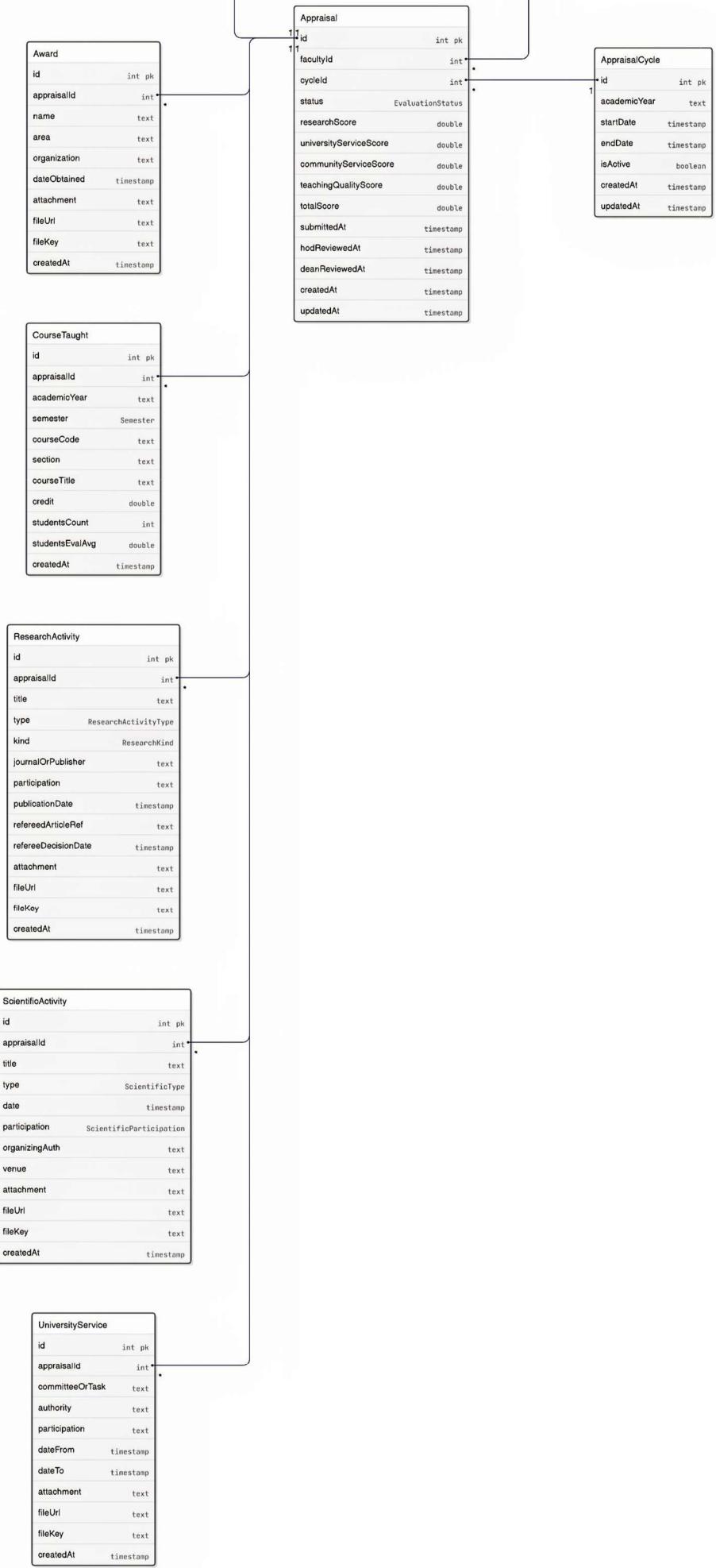


Figure 4.4.4.1: ERD diagram

The Faculty Appraisal System database is built around the appraisal process, where each faculty member (user) is linked to one or more appraisals that record their performance for a specific evaluation cycle. The most important relationship is between the User and Appraisal tables, as every appraisal belongs to a single faculty member but can include many related records such as teaching activities, research work, university and community service, and awards. These appraisals are then evaluated by department heads and deans, creating a complete and organized structure for tracking and assessing faculty performance.

# **Chapter 5**

## **System Design**

Chapter 5 provides a detailed illustration of the system design process for the faculty appraisal system. It contains database schema, interface design prototypes, design architecture, system flow, and system algorithms. This chapter helps simplify the functions of the system to be understandable before moving to the implementation phase, to know exactly what to build and how to build.

### **5.1. Database Schema**

The University of Bahrain's Faculty Appraisal System database is well-designed, which captures the entire academic performance evaluation lifecycle. The structure follows the university's academic hierarchy: College → Department → Faculty → HOD → Dean, ensuring that each appraisal is processed and reviewed according to the correct authority.

The system begins with colleges assigned by one dean. Each college has many Departments. Every department has one assigned Head of Department (HOD) with many faculty members. All users of the system are stored on the User table, which will include their role and personal information.

The evaluation process starts in the Appraisal Cycles tables, which will include the academic year and its active period. Each faculty member has one Appraisal per cycle to evaluate them for performance and capabilities. The appraisal workflow is tracked with a status field, which includes new, sent, returned, or complete.

The review process is managed through the Evaluation table. Faculty members' appraisals are reviewed by HOD of their department, while HODs' appraisals are reviewed by the Dean of the college. The Dean only evaluates the HOD and can add his achievements.

Faculty members can provide supporting documentation and add evidence in their appraisal form through specialized tables:

- Award – academic awards and recognition.
- CourseTaught – teaching activities and student evaluations per semester.
- ResearchActivity – research outputs such as journal articles, conferences, and projects.

- ScientificActivity – participation in conferences, seminars, workshops, or training.
- UniversityService – internal committees or other university service activities.
- CommunityService – contributions to the community outside the university.

Each record captures important metadata, including attachments, file URLs, keys, dates, and detailed descriptions, providing a comprehensive evidence base for appraisals.

To maintain fairness and transparency, the system allows faculty to Appeal or approve their evaluation results. Each appeal is linked to the related appraisal and faculty member's message.

Data integrity is preserved by using a strong foreign key. To maintain data consistency, deleting an appraisal automatically eliminates all associated records, including awards, activities, courses, services, evidence, assessments, and signatures. While deleting a user department or college setting the matching field to NULL, maintaining historical records, and deleting a department cascade to its users.

Enums are crucial because they specify permitted possibilities for specific fields, prevent invalid values, and ensure consistency. Which also makes the database safer, more comprehensible, and streamlining workflow logic.

In the end, the schema accurately reflects the academic hierarchy and effectively models every step of the faculty appraisal process, from submitting appraisal form to scoring, evaluating, and reviewing, ensuring a systematic, transparent, and traceable performance evaluation.

## 5.2. Interface Design

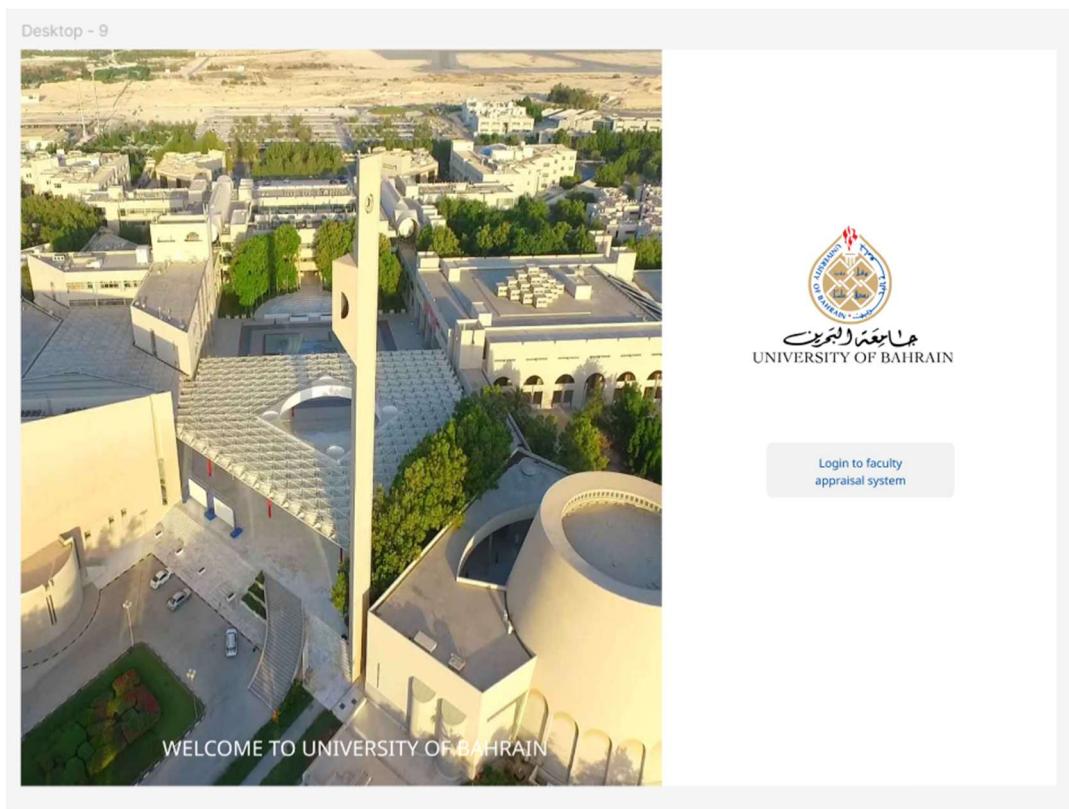


Figure 4.4.4: Welcome page interface prototype

In the figure, the welcoming interface of the system is showing a high-quality view image of the University of Bahrain with the official logo of the university. Below the logo, there is a designed button that will clearly direct the user attention to lead him to the login page of the faculty appraisal system.

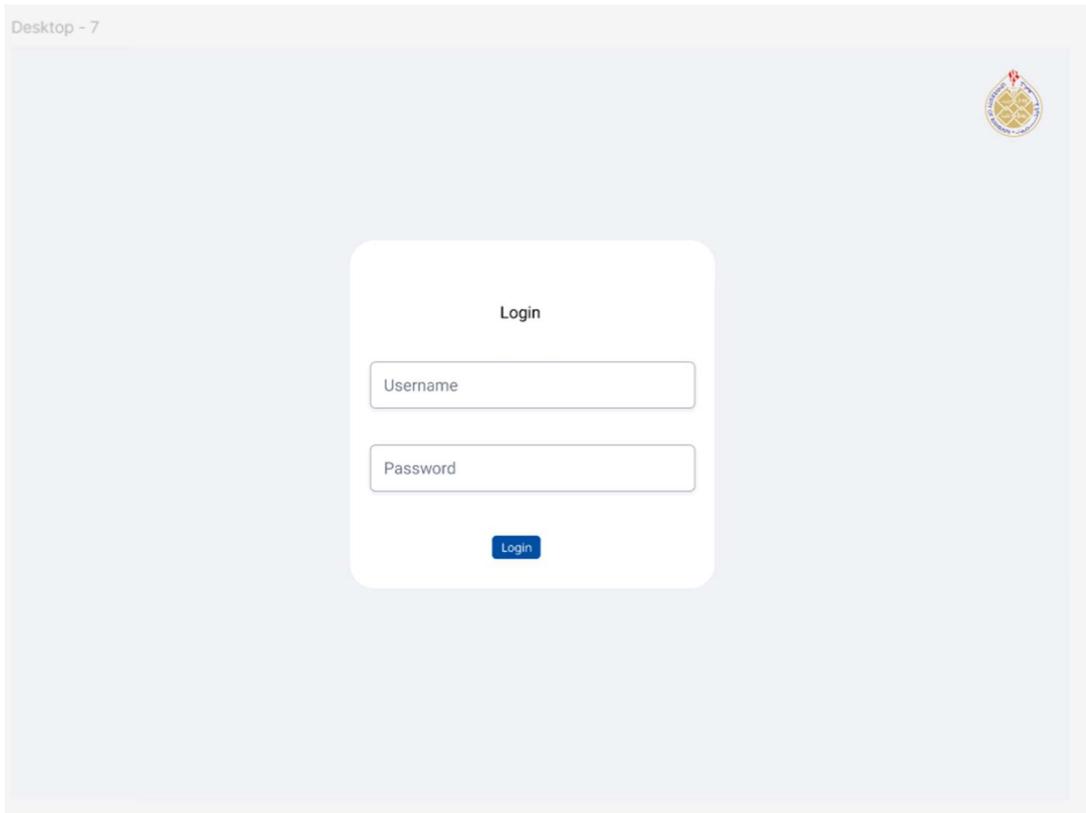
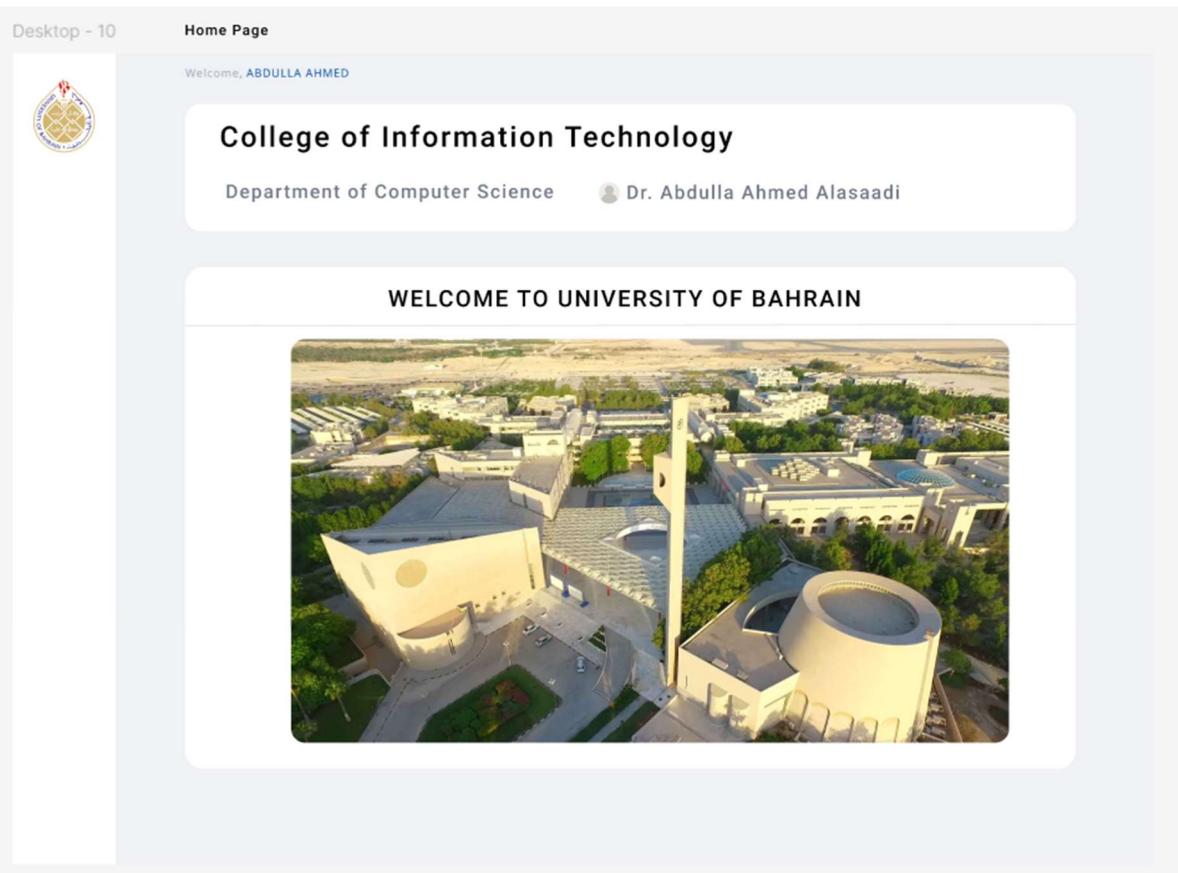


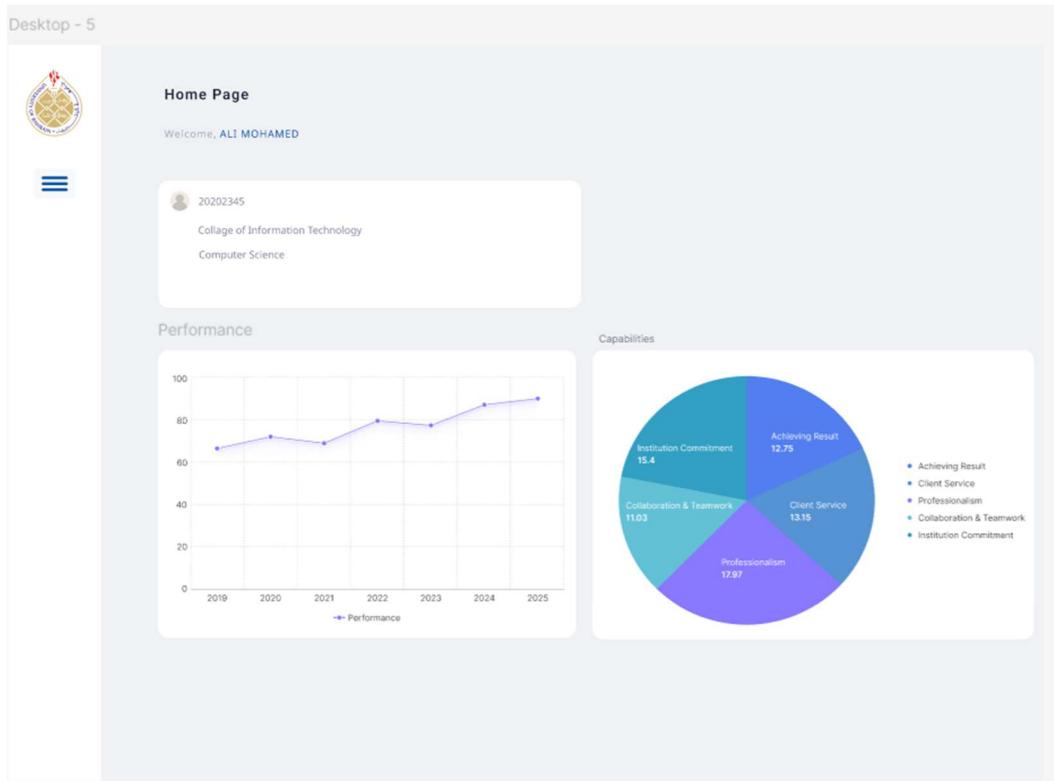
Figure 4.4.4: Login user interface prototype

This figure shows the login interface of the Faculty Appraisal System. Users log into the system by entering their username and password. The interface is clear and simple, allowing users to secure access to the system.



*Figure 4.4.4: Home page user interface prototype*

The above figure shows the home page of the system displays the university's picture and the names of the college, department, and faculty members, creating a welcoming experience for users.



*Figure 4.4.4: Faculty home page interface prototype*

The figure illustrates the home page of the faculty member that contains basic personal information, and personalized charts that will help users in monitoring their performance.

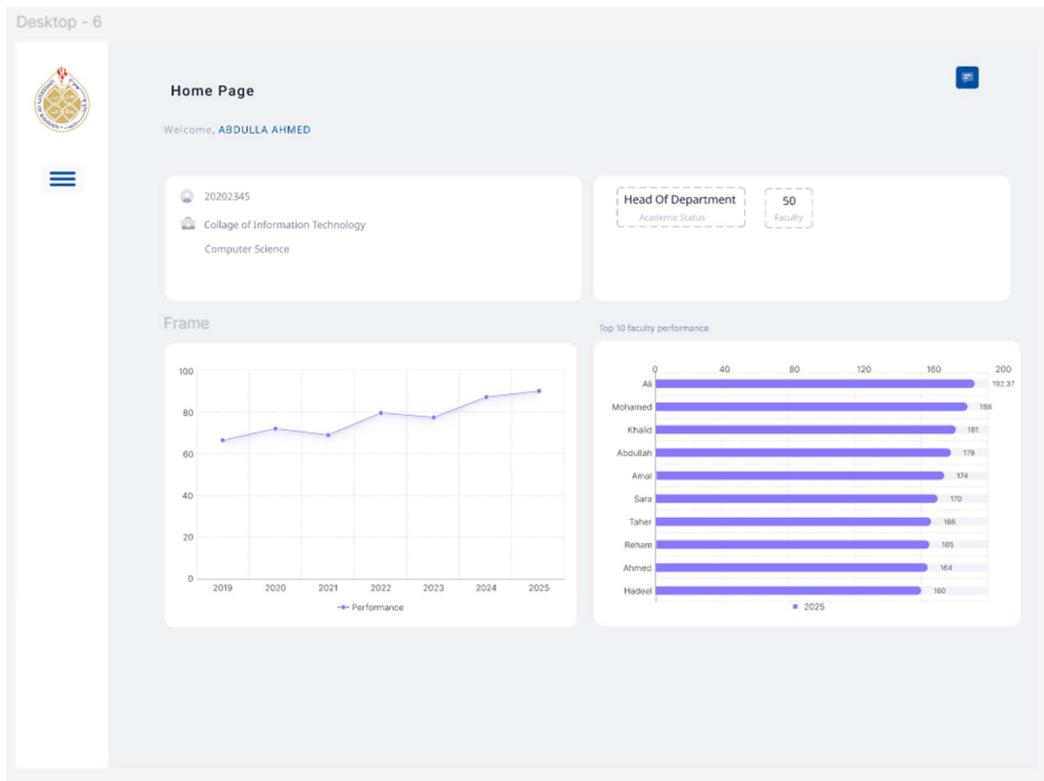


Figure 4.4.4: HoD home page interface prototype

This figure shows the Head of Department's home page. It includes personal information on the HoD and displays a personalized dashboard of insights and graphs for the faculty member's department. This interface also includes the top 10 faculty performances, allowing the HoD to make decisions easily and recognize the best performance in the department.



Department of Computer Science

College of Information Technology Dr. Abdulla Ahmed Alasaadi

College/Center/Deanship	College of Information Technology
Academic Department	Computer Science
Name	
ID Number	
Academic Rank	
General Specialization	
Specific Area of Specialization	
Date of Employment at UOB	
Last scientific certificate	

Figure 4.4.4: User personal information interface prototype

The above figure shows that all users are required to fill in their personal information to save it in the system. So, each appraisal cycle, this information will be in the system.

Desktop - 4

The screenshot shows a web-based faculty appraisal form. At the top, there's a logo and the title "Faculty Appraisal List". Below that, it says "College of Information Technology" and "Department of Computer Science". A user profile is shown with the name "Dr. Abdulla Ahmed Alasaadi". The main area has a section titled "Awards and acknowledging certificates" which is currently expanded. It contains fields for: Name of award/ Acknowledgement certificate (ACM Distinguished Speaker), Area for which the award/acknowledgement certificate was granted (Software Engineering), Granting organization (Association for Computing Machinery (ACM)), Date obtained (20-03-2023), Classification (Recognition), and Upload (ACM.PDF). There's also an "Add" button. Below this section, another one titled "Research Activities" is partially visible.

Figure 4.4.4: Faculty appraisal list interface prototype

The figure demonstrates that the faculty appraisal form is for each faculty member to fill in to be evaluated. The form is divided into sections in a well-structured and neatly displayed for users to fill in smoothly.

Desktop - 12

Activity	Select
Delivering public lectures that serve the community	<input type="checkbox"/>
Participating in activities organized by an official professional/cultural society	<input type="checkbox"/>
Membership of technical or ad-hoc committees, or boards	<input type="checkbox"/>
Providing scientific consultation or conducting workshops or seminars	<input type="checkbox"/>
Participating in media activities (articles, TV, radio interviews)	<input type="checkbox"/>
Participating as judge/referee in official local, regional, or international contests	<input type="checkbox"/>
Participating in other community service activities	<input type="checkbox"/>

**Community Service (Total Weight: 20 Points)**

Activity	Select
Delivering public lectures that serve the community	<input type="checkbox"/>
Participating in activities organized by an official professional/cultural society	<input type="checkbox"/>
Membership of technical or ad-hoc committees, or boards	<input type="checkbox"/>
Providing scientific consultation or conducting workshops or seminars	<input type="checkbox"/>
Participating in media activities (articles, TV, radio interviews)	<input type="checkbox"/>
Participating as judge/referee in official local, regional, or international contests	<input type="checkbox"/>
Participating in other community service activities	<input type="checkbox"/>

**Quality of Teaching (Total Weight: 30 Points)**

Enter score (0-30):

**Research and Scientific Activities (Total Weight: 30 Points)**

Enter score (0-30):

**Calculate Score**

Total Score : 000/100

Figure 4.4.4: Performance evaluation page user interface prototype

This figure shows the performance evolution interface. This page will be used by the Hod and Dean to evaluate the performance of the faculties. The evaluator in the first part will select manually the activities in the criteria done by the faculty and the second part the evaluator will enter the scores based on the submitted achievement to calculate the score.

The screenshot shows a user interface for a faculty appraisal system. At the top left is a circular logo with text around it. To its right is the title "Home Page" and a welcome message "Welcome, ABDULLA AHMED". Below this is a horizontal menu bar with three horizontal lines. The main content area starts with "Faculty ID:20251467". Under "Awards and Acknowledging Certificates", there is a table with one row showing an ACM Distinguished Speaker award in Software Engineering from the Association for Computing Machinery (ACM) on March 20, 2023, categorized as Recognition, with a file upload field showing "No file chosen". The next section, "Research Activities", contains a table with one row for AI research in Artificial Intelligence, funded by the National Science Foundation from May 1, 2022, to December 31, 2023. The "Courses Taught" section has a table with one row for the 2025 academic year, 1st Semester, ITC105 - 3 course, titled "Introduction to Programming", with 3 credit hours, 30 students, and a 90% evaluation rate. The "Scientific Activities" section has a table with one row for an AI in Education seminar at the University of Bahrain, presented online. At the bottom right of the content area is a blue "Evaluate" button.

*Figure 4.4.4: View appraisal form page interface prototype*

The figure shows the view appraisal form page user interface displays the full faculty appraisal form. The evaluator can view the form, containing each section with the appraisal details.

Desktop - 8

The screenshot displays a web-based application for evaluating capabilities. At the top left is a circular logo with text around it. To its right is the title "Home Page" and a welcome message "Welcome, ABDULLA AHMED". Below this is a sidebar icon consisting of three horizontal lines. The main content area has a header "Capabilities Evaluation Rubrics" and a sub-header "Faculty ID:20251467".  
  
The first section, titled "Institutional Commitment (20%)", contains a table with three columns: "Criteria", "Score", and "Explanation". The "Criteria" column lists the section name. The "Score" column contains five buttons: "Highly Exceeds" (green), "Exceeds" (light green), "Fully Meets" (yellow), "Partially Meets" (orange), and "Needs Improvement" (red). The "Explanation" column provides a numbered list of six items.  
  
The second section, titled "Customer Service (20%)", also contains a table with the same three columns. It lists six items under the "Explanation" column. The "Score" column for this section includes the same five buttons as the first section.  
  
At the bottom right of the main content area is a blue "Calculate Score" button. Below it, the text "Total Score : 000/100" is displayed.

Figure 4.4.4: Capabilities evaluation rubric interface prototype

The figure shows the capabilities evaluation rubrics presents the explanation of the evaluation button score in each section of the appraisal form; each button weights a different score.

Desktop - 2

Faculty ID	Faculty Member Name	Position	Status	Score	More
20042158	Ali Mohammed Al-Farsi	Associate Professor	Completed	87%	⋮
20156734	Emily Grace Harris	Assistant Professor	Returned	72%	⋮
20202381	Layla Noor Al-Sabah	Professor	Completed	94%	⋮
20251467	Daniel Joseph Clark	Associate Professor	New		⋮
20093514	Omar Ziad Al-Mansoori	Associate Professor	Sent	81%	⋮

Figure 4.4.4: Appraisal list interface prototype

As shown in the figure, the appraisal list from the evaluator's point of view displays the list of faculties who have appraisals with the color-coded status to easily see the progress of each appraisal.

## **5.3. System Architecture**

### **5.3.1. What is Object Oriented?**

For our system, we choose an object-oriented approach for the way that the software is designed around objects; it is like how the real world is designed. Each object will include its attributes and functions.

Encapsulation is the main idea of the OO approach that helps keep the data and methods together, inheritance, abstraction (showing only what is required), and polymorphism (using things in many ways). Programs are simpler to comprehend, arrange, reuse, and maintain with this method (GeeksforGeeks, 2023).

### **5.3.2. Why did we choose OO.**

- Main entities of the system such as faculty members, colleges, departments are all considered objects with each containing specific attributes and functions.
- The OO approach makes the code easy to understand and reuse in the future.
- The OO approach makes it easy to describe the relationships between objects, especially faculty appraisal system relationships are important e.g. appraisal and faculty members, faculty members and college, and more.
- The OO approach keeps the code secure.
- Based on our studies and previous course work we are used to OO.

### **5.3.3. How did we implement it into our system**

By building the system on actual objects like Users, Departments, and Appraisals, we implemented the Object-Oriented approach in our Faculty Appraisal System. Every user is saved in a user database with a role of property designating them as Administrator, Faculty, Hod, or Dean. This enables the system to regulate what each user is able to see and do.

Evaluation criteria, ratings, and scores are managed by the Appraisal class. Additionally, it has a Calculate Score method that automatically adds all of the evaluation ratings.

To protect our private information and make sure it can only be accessible via particular channels, we employ encapsulation. Faculty, HOD, and Dean can have their own role-specific actions while sharing common functionality from the User class through inheritance. Certain functions, such as calculateScore(), can behave differently based on the role of the user by using polymorphism.

In general, the system's components work together naturally: a faculty member provides an appraisal, the head of department evaluates it for the faculty, and the dean evaluates it for the HoD. This design allows for future extensions, maintains system organization, is easy to maintain, and mirrors real-world processes

## 5.4. Software Architecture

The system follows a three-tier layered architecture

### 5.4.1. Presentation Layer (UI)

This layer presents the user interface of the faculty appraisal system, the part where the user interacts directly with the system. This layer focuses on how the information is distributed on the pages.

It is important that the interfaces in this layer: log in, appraisal form, and evaluation results are designed to be clean, organized, and easy to understand and use. And to consider a smooth user experience. This layer also handles user inputs and sends them to the underlying layers for processing.

### 5.4.2. Business Layer (Application layer)

All the main work of the faculty appraisal system happened in the business application layers. This layer controls and monitors how the appraisal form is moving in the system through several steps, starting from when a faculty member fills and submits the appraisal form until the evaluation, result, approval, or appeal.

This layer will ensure that all users follow the proper procedure. Additionally, it generates performance data and analytics for decision making, as well as manages score computations and validation.

#### Core System Functions:

- Manages faculty appraisal submissions.
- Handles HoD evaluations of faculty appraisals.
- Handles Dean evaluations of HoD appraisals.
- Controls the approval and appeal process for faculty and HoDs.
- Calculates evaluation scores using rubrics and criteria.

- Updates appraisal statuses (New, Not Evaluated, Sent, Complete, Returned).
- Manages faculty achievement updates throughout the year.
- Generates department and college performance analytics.
- Applies the correct workflow based on user roles.
- Validates all input before saving.

#### **5.4.3. Data Layer (Database layer)**

The Data Layer serves as the framework for our Faculty Appraisal System, storing, organizing, and managing all of the system's data. It comprises the database and all of the tables that contain faculty information, departmental details, user profiles, and each appraisal record. The Data Layer is crucial because it guarantees:

- Data Integrity: Errors or incorrect data can be avoided by establishing clear linkages across tables, such as connecting each faculty member to their department and appraisal records.
- Security: Only authorized system processes can access sensitive data, such as login passwords and appraisal results, which are securely kept.
- Effective Data Access: The system can quickly and easily retrieve and update data by using well-structured queries, which facilitates the smooth completion of duties by faculty, HODs, and deans.

In general, the Data Layer serves as the system's structural foundation. Throughout the evaluation process, it enables the application to reliably interact with the data while preserving correctness, consistency, and security.

### **5.5. Flow of the System**

The system workflow is organized and clear to ensure that every evaluation goes through smooth and correct stages.

#### **1. User Login**

Users log in → The system check their credentials and identify their role → Each user is redirected to their specific dashboard.

## **2. Admin**

Admin logs in → Admin can add new users → Admin can add or edit departments and colleges  
Admin can create appraisal cycles → Admin can manage appraisal forms and rubrics → Admin can monitor system data and generate reports.

## **3. Faculty Submits Appraisal**

Faculty opens the appraisal form → They enter their achievements and required details  
→ The system validates the information → The form is saved to the database  
→ Status becomes "Pending HoD Evaluation".

## **4. HoD Evaluation**

All submitted faculty appraisals are viewed by HoD → The evaluation done based on rubrics criteria  
→ HoD calculates and saves the scores → Status updates to "Sent".

## **5. Faculty Approval or Appeal**

The faculty receives the HoD's evaluation result → Faculty can either approve or appeal  
If the faculty approves the result → The status changes to "Approved."  
If the faculty appeals the result → The status changes to "Returned".

## **6. Dean Evaluation**

Dean reviews HoD appraisals → They evaluate using rubrics → Evaluation results are submitted → Status changes to "Sent".

## **7. HoD Approval or Appeal (for Dean Evaluation)**

HoD reviews the Dean's evaluation → They can approve or appeal the decision → Final status is stored for reporting and record keeping.

## **8. Analytics and Reporting**

The system aggregates all completed evaluations → Performance summaries are generated for departments and colleges → Dashboards present visual analytics to support decision making and future planning.

## **5.6. System Algorithms**

This section describes the main algorithms used in the Faculty Appraisal System. Each algorithm represents the internal core logic that supports the system's workflows, including appraisal submission, evaluation, approval, and analytics generation.

### **1. Appraisal Submission Algorithm**

Input: Faculty appraisal details and achievement

Process:

1. Accept required information entered by the faculty member.
2. Validate that all mandatory fields are completed.
3. Store the submission in the database.
4. Update the form status to “Pending HoD Evaluation.”
5. Notify the HoD of the new submission.

Output: Successful submission stored with updated status.

### **2. Evaluation Algorithm**

Input: Appraisal form data and rubric score

Process:

1. Appraisal form retrieved.
2. Each section of the form is evaluated based on specific evaluation criteria.
3. All scores are summarized to get the final appraisal score.
4. Appraisal scores are saved in the database.
5. The status is updated to “pending faculty approval”.

Output: Evaluation score and updated appraisal status.

### **3. Approval and Appeal Algorithm**

Input: Evaluation results and user decision (Approve / Appeal)

Process:

1. Faculty member decisions are received.
2. Change the form’s status to “Compete” if it is approved.

3. Return the form if it is appealed to re-evaluate.
4. Update the status to “Returned.”

Output: Updated appraisal results.

#### 4. Analytics Generation Algorithm

**Input:** All appraisal and evaluation data across departments or college

**Process:**

1. Collect all evaluation results and records
2. Store the data by department, college, or user role.
3. Generate summary, including score, performance, and averages.
4. Visualize the outputs in charts for the analytics dashboard.
5. Display insights to help with decision making and monitoring performance.

Output: visual analysis dashboards.

#### 5.7. Deployment Diagram

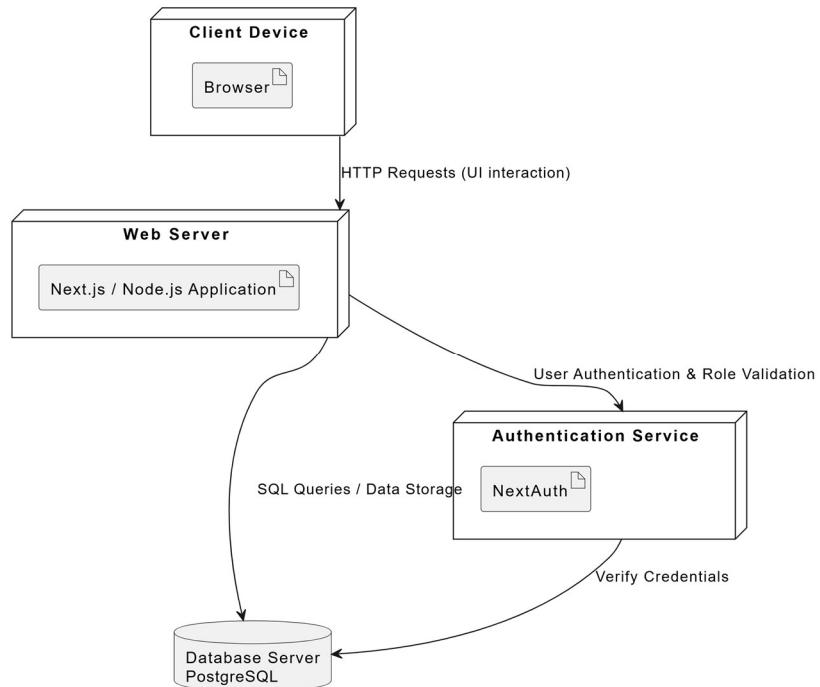


Figure 5.4.3: Deployment diagram of the Faculty Appraisal System

The figure represents how users access the system through the browser, as illustrated in the above deployment diagram. PostgreSQL handles the database, and Next.js/Node.js handles the requests and system authentication.

# Chapter 6

## System Implementation and Testing

Chapter 6 describes in detail the steps taken to implement the faculty appraisal systems. It answers several questions, including: what tools were chosen? Why were they chosen? And how were they implemented? Moreover, how the different modules of the system were connected.

On the other hand, this chapter also demonstrates the different types of testing that have been conducted to ensure that we meet the system requirements carefully and that each function is working accurately.

### 6.1. System Implementation

#### 6.1.1. Tools Used

**Visual Studio:** An integrated development environment (IDE) is used to write and compile the system's code. It was selected as we had previous experience with it from our previous courses (GeeksforGeeks, 2025).

**GitHub:** GitHub is an online platform that supports Git version control and collaborative software development. The team utilized it to track and manage the project's source code (GeeksforGeeks, 2025).

**Google Forms:** Google offers a web-based survey tool called Google Forms. It was employed to make and distribute surveys to get consumer input and requirements.

**Canva:** Canva is an online design tool that was used to create and format the system's user personas. It helped present each persona's details in a clear, organized, and visually appealing way.

**Draw.io:** A free web-based diagramming tool used in this project to create flowcharts, process diagrams, state diagrams, and UML diagrams. It helped visualize system processes and represent the system's structure in a clear and organized way.

**Eraser:** Eraser is an online diagramming tool that is used to design and organize the Entity–Relationship Diagram (ERD) for the system. It helped us clearly map out the database structure and understand how all the tables connect to each other.

**Figma:** Used to design and visualize interface prototypes. It is widely used for UI/UX design and is easy for us to work with.

**SequenceDiagram.org:** Sequence diagrams were made for this project using this free web application. The program creates the sequence diagram, which makes it simple to visualize system communication, and it permits writing short texts to describe interactions.

**DiagrammingAI.com:** the deployment diagram was made using DiagrammingAI.com, a diagramming application. Drag-and-drop shape support made it simple to construct the system's architecture and display the components and their relationships.

**PlantUML (Editor.plantuml.com):** State and activity diagrams can be created using PlantUML, a text-based UML tool. The program generates clear diagrams that clearly show the workflow, states, and transitions of the system by typing brief scripts.

## 6.1.2. Language Used

### 6.1.2.1 Front-End

- Next.js / React

#### What it is:

React is a JavaScript library used for developing dynamic user interface elements. Next.js is a React-based framework for producing modern online apps (Vercel, 2025; Meta, 2025).

#### Where it's used:

It is used to develop the frontend of the Faculty Appraisal System, including dashboards, forms, navigation menus, and all dynamic UI components.

#### Why was it used?

This framework was selected because of its quick performance, clean component-based structure, and improved maintainability. Additionally, it enables engaging and responsive interfaces, improving the user experience overall (Vercel, 2025).

### 6.1.2.2 Back-End

- **Node.js:**

#### What it is:

A free and open-source JavaScript runtime, Node.js is compatible with Linux, Mac, Windows, and other operating systems. It enables us to create server-side apps by running JavaScript outside of the browser (W3Schools, n.d.).

#### Where it is used:

Node.js is used in the backend for our faculty appraisal system. Where it:

- Fetches and shows faculty appraisals for HODs and the Dean.
- Updates faculty achievements and evaluation scores.
- Generates reports and summaries of faculty performance.
- Manages login, sessions, and user roles for Dean, HOD, Faculty, and Admin.

#### Implementation details:

- **Backend API Routes:** Allows the frontend to send and receive data dynamically by Node.js running all backend routes,
- **Integration with Prisma:** To work with the PostgreSQL database, Node.js uses Prisma.
- **Authentication with NextAuth:** NextAuth is used for Node.js to handle login and sessions carefully. User credentials (such as username and password) are securely verified, and NextAuth ensures that only authorized users can access certain parts of the system.

#### Why was it used:

We use Node.js because it is fast, can handle lots of users at the same time, and works easily with our database and login system.

- **Prisma ORM**

#### What is Prisma?

It is a tool that interacts directly with the database. It reads, adds, and updates data without the need for complicated SQL queries. (Prisma, n.d.-a).

#### Where is it used?

It is used whenever interacting with data. For example:

- Storing and retrieving data.
- Managing appraisal forms, scores, and appraisal cycles.
- Organizing relationships between colleges, departments, and more.

### **Why do we use Prisma?**

It is considered the best fit for PostgreSQL. It reduces the percentage of errors in the code, and it simplifies the process when dealing with database operations. (Prisma, n.d.-b).

### **6.1.3. Database**

#### **PostgreSQL**

##### **What it is:**

Relational (SQL) and non-relational (JSON) queries are supported by PostgreSQL, a free and open-source database system. It is frequently utilized as a back-end database for online apps and dynamic webpages (W3Schools, n.d.).

##### **Where it's used:**

It is used to store all data related to the Faculty Appraisal System, including user accounts, appraisal forms, evaluation results, and analytics data.

##### **Why was it used?**

Since the faculty appraisal system mainly uses database queries and retrieves a huge amount of data. PostgreSQL offers system safety for data storage. It guarantees data integrity and enables complicated queries, both of which are critical for system management.

#### 6.1.4. System UI

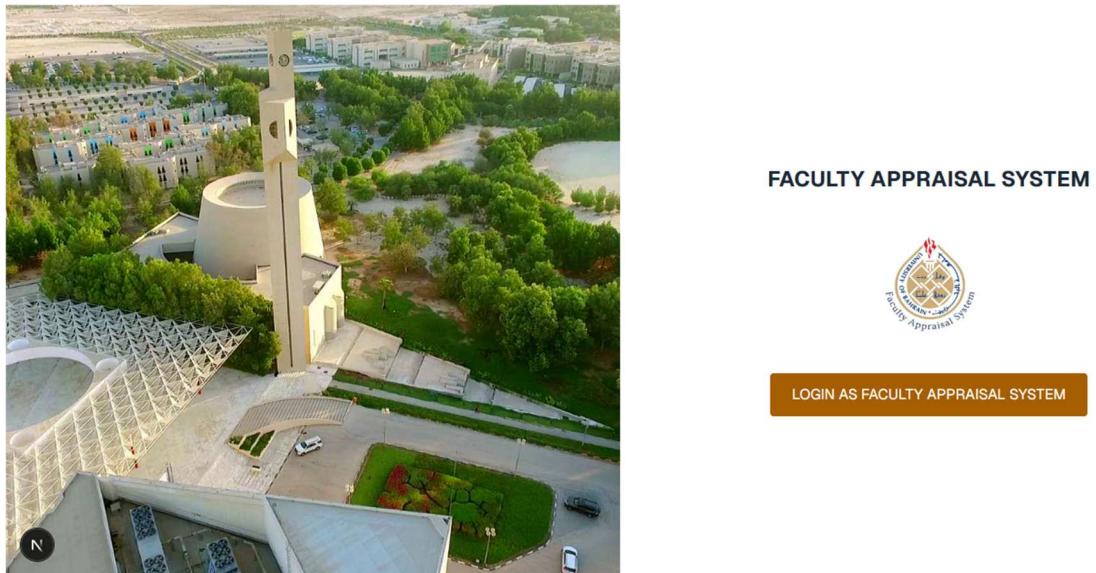


Figure 6.1.4.1: Welcome page

This figure shows the welcoming page of the Faculty Appraisal System, as it serves as the entry point to the system. It shows a high-quality image of the University of Bahrain with the official logo of the system. Below the logo, there is the designated button that will direct the user to the login page of the faculty appraisal system.

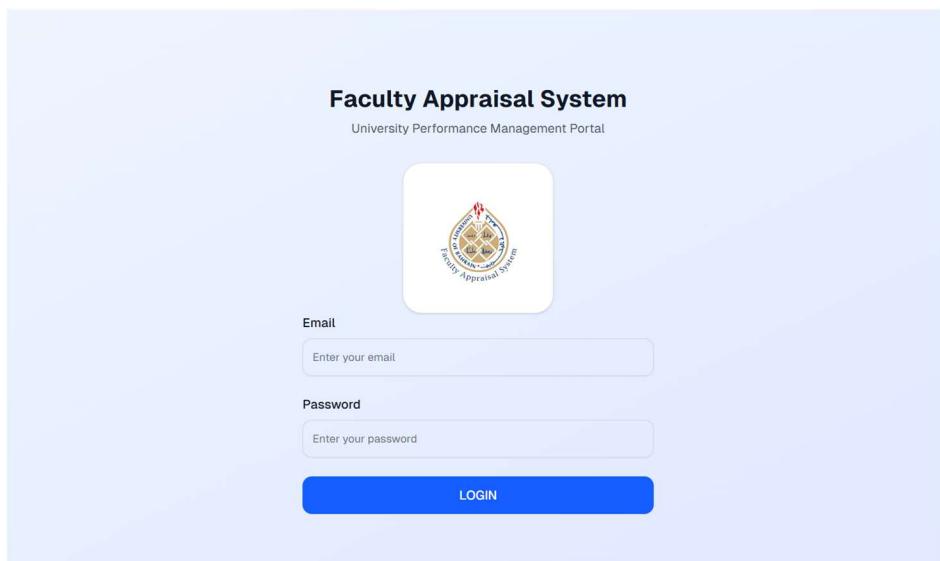


Figure 6.1.4.2: Login page

In the login page figure, users can sign in by entering their Email and password. The screen is neat and focused only on the simple form.

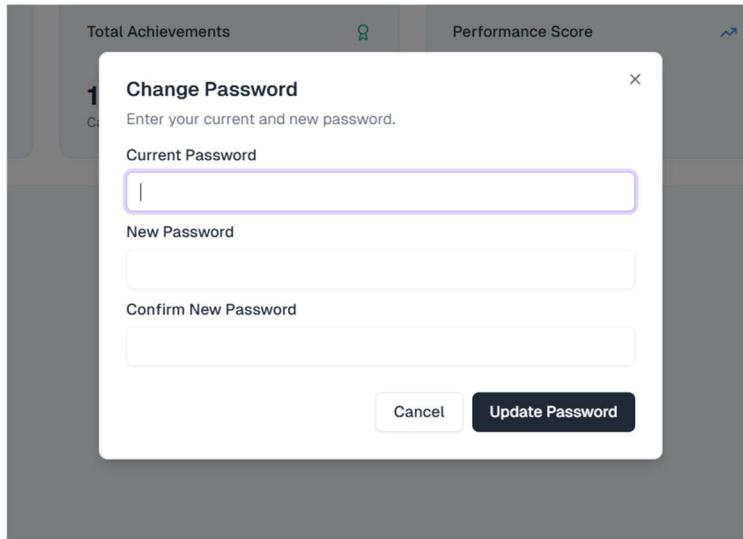


Figure 6.1.4.3: Change Password Page

This change of password pop-up in this figure lets the user enter their current password and new password. This pops up in the sidebar menu so the user can change the password after they log in to the system.

Total Colleges	Total Majors	Total Users	Total Achievements
2 Active colleges in the system	0 Academic majors available	18 Faculty and staff members	0 Recorded achievements

Quick Actions		System Status	
Add College Create new college	Add User Create new user	Connected	2 hours ago
		Database Status	12
		Last Backup	
		Active Sessions	

Figure 6.1.4.4: Admin dashboard page

The admin dashboard page in this figure displays valuable insights on the total number of colleges, majors, users, and achievements. There are also quick links for fast access to important tasks, and the system status.

The screenshot shows a web application interface titled "Colleges & Departments". At the top left is a logo, followed by a three-line menu icon. Below the title, it says "CRUD for academic hierarchy". There are two tabs: "Colleges" (selected) and "Departments". A purple button on the right says "+ Create College". The main content area has a header "Colleges" with a count of "2 colleges in the system". A table lists the colleges:

Name	#Departments	#HODs	#HOD Appraisals (this cycle)	Actions
College of Business	2	0	0	
College of Engineering	5	3	0	

Figure 6.1.4.5: Colleges & Departments page

This figure shows a page that allows administrators to add, edit, and delete colleges and departments, which form the university's main structure. Basic numerical analysis is displayed for each college, such as department numbers.

The screenshot shows a "Faculty Dashboard". At the top left is a logo, followed by a three-line menu icon. The title is "Faculty Dashboard" with the sub-instruction "Welcome back, noora! Track your performance and achievements.". Below the title are four cards:

- Current Appraisal**: sent (2025 Academic Year)
- Total Achievements**: 3 (Career achievements)
- Performance Score**: 160 (Current year score)
- Last Updated**: 11/26/2025 (Appraisal last modified)

Below these cards is a section titled "Recent Achievements" with the sub-instruction "Your latest accomplishments". It lists two items:

- cs Course - 11/17/2025 (0 pts)
- award Award - 11/7/2025 (0 pts)

Figure 6.1.4.6: Faculty dashboard Page

On the Faculty dashboard in this figure, there are important card visuals related to faculty appraisal and performance. The recent achievements list the achievements of the faculty, and quick actions include links to important common tasks for faculty members.

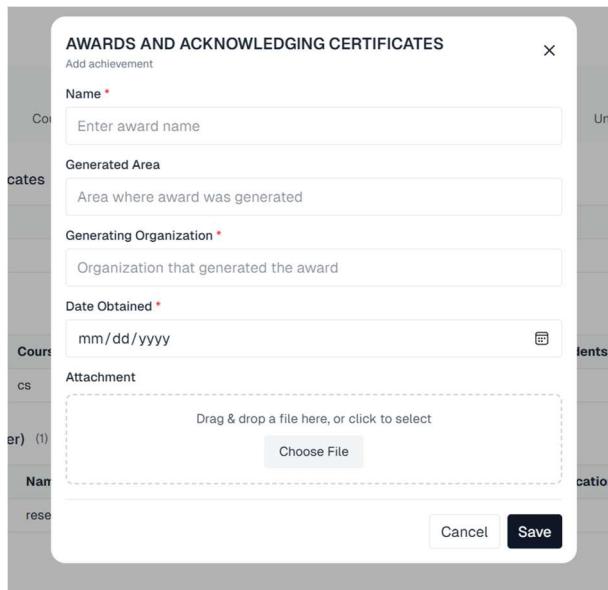


Figure 6.1.4.7: Appraisal Form Page

This figure shows the popup modal of the appraisal form, each table in the achievement form include its own fields to fill in. It is designed to be used by faculty, Heads of Department (HoDs), and dean, allowing them to complete or edit their appraisal forms before they are submitted for evaluation. The layout ensures that users can easily perform the updating achievement process.

The screenshot shows the "Achievements" page with the following sections:

- Awards And Acknowledging Certificates (1)**: Shows 1 record with columns: Name, Generated Area, Generating Organization, Date Obtained, Attachment, and Action. The record is: malak, malak, malak, 11/1/2025, —, and a row of icons.
- Courses Taught (1)**: Shows 1 record with columns: Academic Year, Semester, Course Code, Section, Course Title, Course Credit, Number Of Students, Student Evaluation, and Action. The record is: 2025/2026, FALL, ITC5101, 1, malak, 3, 40, 40, and a row of icons.
- Research Activities (Published Paper) (1)**: Shows 1 record with columns: Title, Type, Name Of The Journal, Nature Of Participation, Date Of Publication, Attachment, and Action. The record is: malak, JOURNAL, malak, malak, 11/12/2025, and a row of icons.

Figure 6.1.4.8: Update Achievements Page

This achievements page in the figure for the faculty appraisal form to add, edit, deleting their achievements, and the faculty can upload attachments for the evidence.

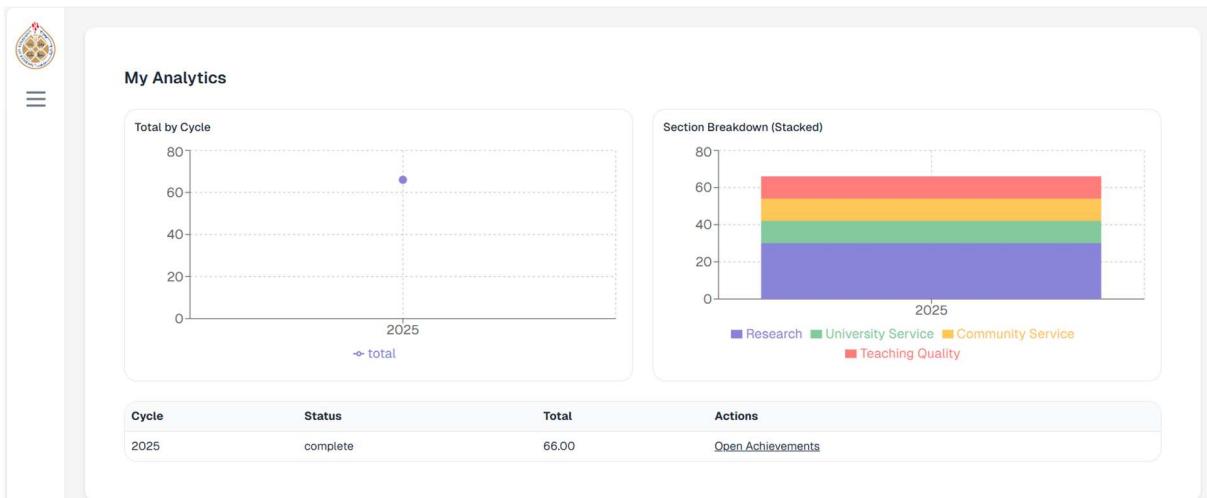


Figure 6.1.4.9: My Analytics Page

In this figure, the analytics page displays valuable insights into the performance of the faculty members to help users monitor their personal performance and compare their scores across cycles.

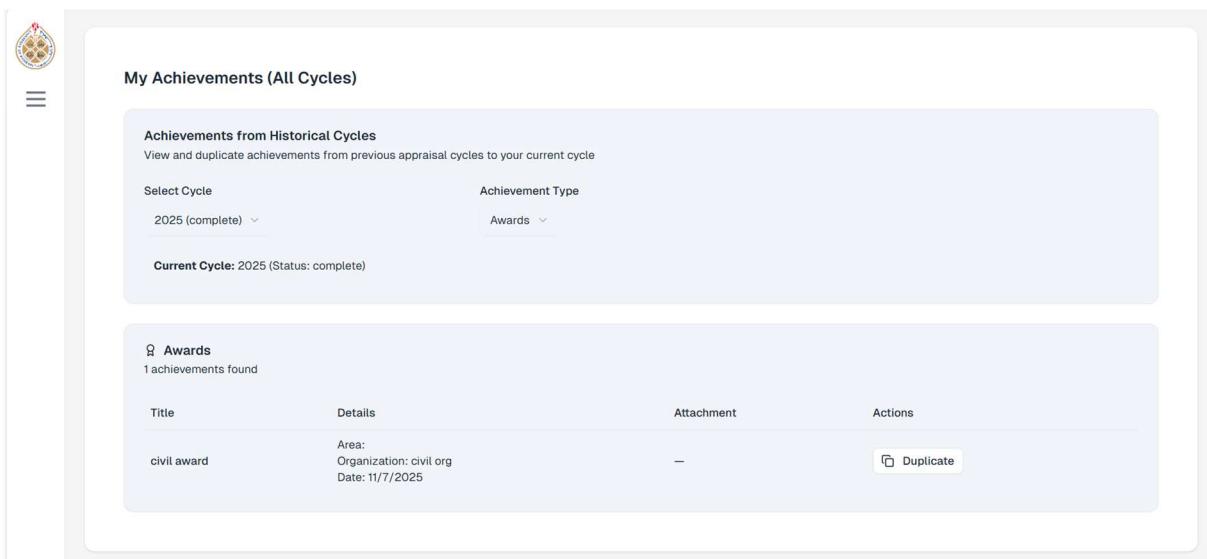


Figure 6.1.4.10: My Achievements Page

This figure shows a page that represents the My Achievement page for the faculty, so they can see all the types of achievements over the cycle. Also, they can duplicate the achievements to add it to the current active cycle.

The screenshot shows a web-based application for generating appraisal reports. At the top left is a logo of a university or college. To its right is a vertical sidebar with three horizontal lines indicating a menu. The main content area has a title "Reports & Downloads" and a subtitle "Generate PDF reports for your appraisal cycles". Below this is a section titled "Generate Appraisal Report" with a sub-instruction "Create a comprehensive PDF report containing your scores and achievements for a selected cycle". A dropdown menu "Select Appraisal Cycle" shows "2025 (2025 - 2025) (Active)". Underneath is a "Report Preview" section showing faculty details: Faculty: fatma, Department: College of Civil, Cycle: 2025, Status: complete, Total Score: 166%, and Total Achievements: 7. There is a checkbox "Include attachment list in report" and a prominent dark blue button at the bottom labeled "Generate & Download PDF Report" with a downward arrow icon.

*Figure 6.1.4.11: Reports and downloads Page*

This figure shows that the faculty can download PDF for their performance for the selected cycle from the Reports and Downloads page.

The screenshot shows a modal window titled "Research Activities - View Achievements" with an "X" button in the top right corner. The modal is overlaid on a larger background screen which includes a sidebar with "Achievements" and "Evaluation" tabs, and a progress bar showing "30%". The modal itself has columns for Title, Type, Kind, Journal/Publisher, Publication Date, and Description. It lists six entries, all of which are "malak" under Title, "JOURNAL" under Type, and "REFEREED\_PAPER" under Kind. The publication dates are all "11/22/2022". The descriptions mention "malak" as the journal/publisher and "malak" as the author. A scroll bar is visible at the bottom of the modal.

Title	Type	Kind	Journal/Publisher	Publication Date	Description
malak	JOURNAL	REFEREED_PAPER	malak	11/22/2022	malak
malak	JOURNAL	REFEREED_PAPER	malak	11/22/2022	malak
malak	JOURNAL	REFEREED_PAPER	malak	11/22/2022	malak
malak	JOURNAL	REFEREED_PAPER	malak	11/22/2022	malak
malak	JOURNAL	PUBLISHED	malak	11/12/2022	malak
malak	JOURNAL	REFEREED_PAPER	malak	11/22/2022	malak

*Figure 6.1.4.12: View buttons pop up*

This is a pop-up modal of the “View” button figure on the evaluation page of the first section of evaluation of performance. It shows all of the faculty related achievements to the selected table added in the achievement form.



Figure 6.1.4.13: Rubric button pop-up

This is a figure of a page that allows HoD to view the details and explanation for each achievement by displaying the rubric button.

5) Achieving Results		Max 20% 20 pts	
<b>Highly Exceeds</b>	<b>Exceeds</b>	<b>Fully Meets</b>	<b>Partially Meets</b>
<b>Needs Improvement</b>			
<b>Explanation</b> Highly Exceeds (20 pts) Work characterized by a very high degree of professionalism (90%-100%): 1) Submits a comprehensive portfolio on taught courses. 2) Gives feedback on tests & assignments. 3) Participates in accreditation/institutional review (ETQA). 4) Keeps contact with graduates & conveys proposals. 5) Reports on conferences & uses recommendations.			
<b>Note</b> <small>Write an optional note...</small>			
Capability score: 20 / 20			
<b>Overall</b> <small>Sum of Section 1 (100) + Section 2 (100).</small>		<b>Overall Total: 100 / 200</b>	
		<a href="#">Calculate Score</a> <a href="#">Save</a>	

Figure 6.1.4.14: Evaluation page

This page enables the HoD/dean to evaluate faculty /HoD in the evaluation process, through a two-part assessment: performance evaluation and capabilities evaluation. The page also includes a "View" button to display relevant tables and select the appropriate score. Different results will appear when the evaluator clicks the score buttons. At the end, the evaluator can calculate the score and save it.

The screenshot shows the 'Instructor Appraisal Review' page. At the top right, it says '2025 (2025 - 2025)' and has a 'returned' button. Below that is a navigation bar with 'Achievements' and 'Evaluation'. The main section is titled 'Achievements' with a subtitle 'Read-only view of the instructor's submitted achievements.' It lists categories: 'Awards (3)', 'Courses Taught (1)', 'Research Activities (2)', 'Scientific Activities (1)', 'University Services (0)', and 'Community Services (0)'. Each category has a dropdown arrow to its right.

Figure 6.1.4.15: Instructor appraisal review

Instructor appraisal review figure displays the sections in detail of the faculty member's appraisal, which allows the evaluator to view the details and assign the score accordingly.

The screenshot shows the 'Faculty Achievements (Department)' page. At the top right are search, filter, and export buttons. The table lists achievements for various faculty members, categorized by type (Award). The columns are: Faculty, Type, Title, Status, Date, and Source. The status column uses color-coded icons: red for 'returned', orange for 'sent', green for 'complete', blue for 'new', and grey for '-'.

Faculty	Type	Title	Status	Date	Source
noor	Award	aa	returned	11/13/2025	
noora	Award	award	sent	11/7/2025	
fatma	Award	civil award	complete	11/7/2025	
noor	Award	da	returned	11/6/2025	
samaa	Award	malak	returned	11/1/2025	
Hassan Reyadh Aljaidah	Award	award	new	-	
Hassan Reyadh Aljaidah	Award	award	returned	-	
noor	Award	awards	sent	-	
noor	Award	award	returned	-	

Showing 9 items • type: Award

Figure 6.1.4.16: Faculty achievements (Departments) page

This is the faculty achievements of the department's page figure. It displays a list of all achievements of all the faculty members of a specified department, along with their statuses, which reflects the progress of the appraisal. It allows the HoD to view any achievement submitted in any year.

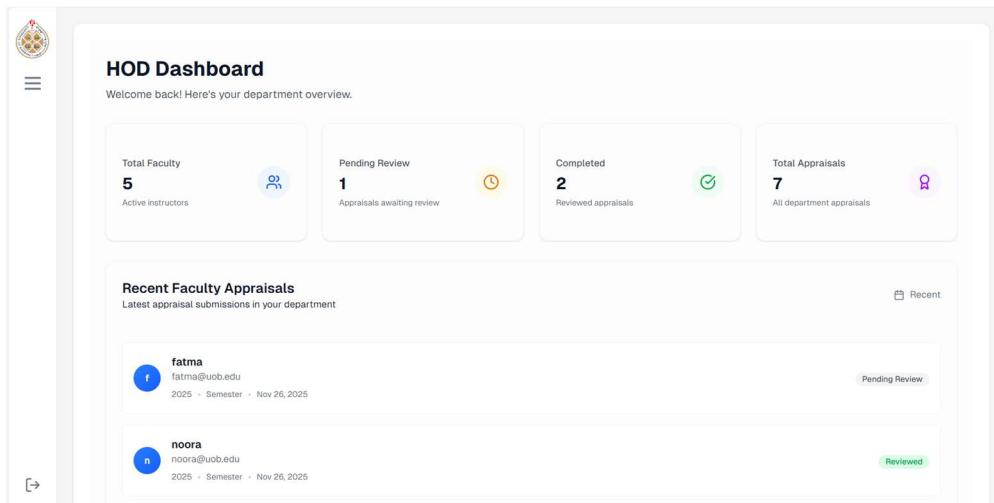


Figure 6.1.4.17: HoD dashboard page

The HoD dashboard page figure presents important numbers of the department, the latest appraisal submissions, and quick actions for easy and fast access to important common tasks. Similarly, for the dean dashboard, but on the college level.

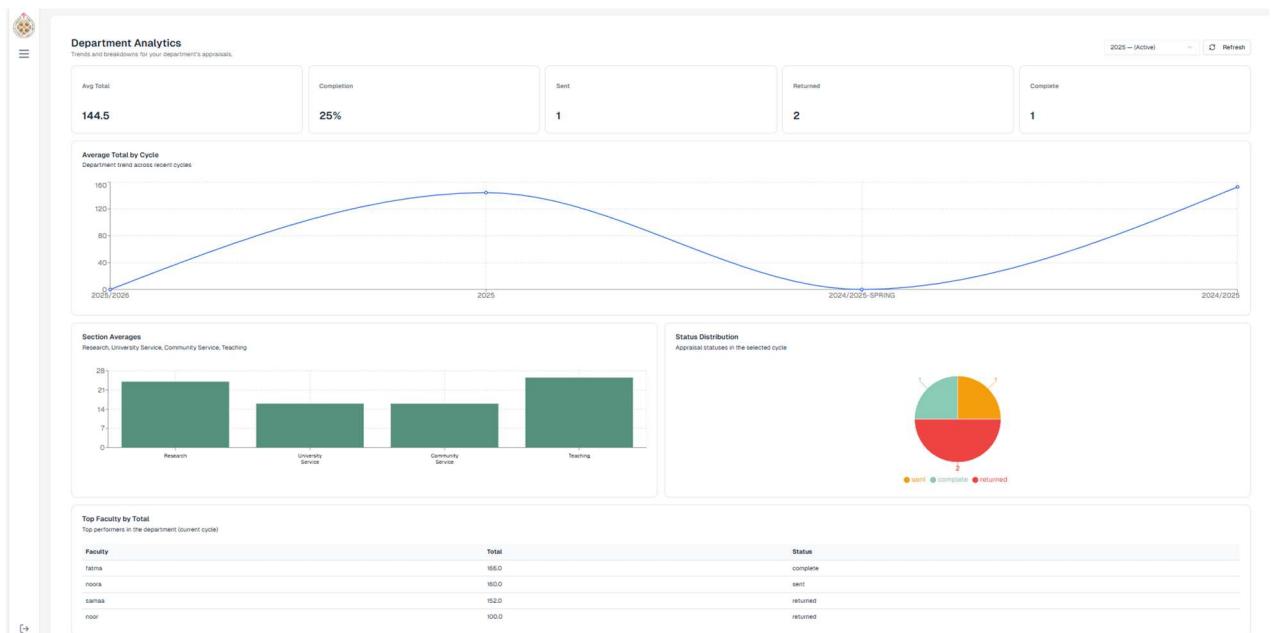


Figure 6.1.4.18: Department analytics page

This page figure presents a visual chart of the department's performance based on faculty/HoD results and achievements across different appraisal cycles. This helps the HoD/dean monitor faculty/HoD performance, maintain high standards, identify weaknesses, and work towards improvement.

Figure 6.1.4.19: Reports & Downloads page

This is the Reports and Downloads page figure; it allows the HoDs and deans to generate different types of reports like appraisal summaries, achievements, and performance evaluation. These reports can be downloaded as CSV or JSON formats, providing flexibility for analysis and sharing records with other staff.

Figure 6.1.4.20: Appraisal Result Page

The appraisal result page figure displays the score details of the appraisal sections for the faculty member. The action section has 2 buttons: either approve to update the status of the appraisal to “complete” or appeal to be updated to “Returned”.

Instructor	Status	Total Score	Last Updated	Actions
fatma	complete	166.00	11/26/2025	
noora	sent	160.00	11/26/2025	
samaa	returned	152.00	11/19/2025	
noor	returned	132.00	11/16/2025	

Figure 6.1.4.21: Appraisal List Page

This page figure represents the list of the faculties, and it includes their appraisal status, total score, last updated date, and quick action options such as print achievement PDF, view, and evaluate. The export CSV button will print all the score details for all the faculty for the active cycle.

## 6.2. Testing

One of the critical phases in the software development lifecycle is the testing phase. After development, it is important to ensure that each function implemented is mapped to the right requirement. And that the system behaves in the expected way, smoothly and accurately. Moreover, a summary of some test cases scenario sheets is presented below in Appendix A for reference.

### 6.2.1. Unit Testing

Unit testing is a method that focuses on testing individual modules or units of a software system to ensure they function correctly. A unit is the smallest testable part of the software and typically has one or a few inputs and a single output. In procedural programming, a unit may correspond to an individual procedure or function (Tabnine Team, 2024).

The unit testing for the Faculty Appraisal System was done for most of its functions. Below is a table showing the tested unit case scenarios with expected and actual results:

*Table 6.2.1.1: Unit testing cases*

<b>Test No.</b>	<b>Test Cases</b>	<b>Expected Result</b>	<b>Actual Result</b>
1	Log in using the correct password and email	The user should log in to the system based on their role.	The system opens the home page based on the user's role.
2	Log in using an incorrect password.	The system should display an error message for an invalid email or password	The system displays error messages for "Invalid email or password".
3	Log in using an incorrect email.	The system should display an error message for an invalid email or password	The system displays error messages for "Invalid email or password".
4	The user tries to save an empty achievement form	The form should not be added, and an error message "Failed to add" should be shown	"Failed to add" message is displayed on the page
5	The user tries to save achievement form with an empty field.	The form should not be added, and an error message "Failed to add" should be shown	"Failed to add" message is displayed on the page
6	User fills the form to add achievements	The form should be successfully saved in the achievements, and the status becomes "New".	The form of achievements is successfully added, and the status has been changed to "New."
7	User tries to delete an achievement	The delete function should check if valid achievement ID is	The achievement is deleted successfully

		<p>provided.</p> <p>If confirmed programmatically, the function should delete achievement.</p> <p>The achievement is deleted successfully.</p>	
8	User tries to delete an achievement	<p>The delete function should check if a valid achievement ID is provided. If confirmed programmatically, the function should delete achievement.</p> <p>The achievement is deleted successfully.</p>	<p>The achievement is not deleted.</p>
9	Appeal function on the appraisal result page	<p>The status of the appraisal should change to "Returned", and a message should indicate that the appraisal is read-only in the status.</p>	<p>The status has been changed to "Returned," and the appraisal is read-only in the status.</p>
10	Approved Function on the appraisal result page	<p>The status of the appraisal should change to "Completed", and a message should indicate that the appraisal is read-only.</p>	<p>The status has been changed to "Completed," and the appraisal form is read-only.</p>
11	For the Hod/Dean, appraisal forms are fetched.	<p>The function will return all the submitted appraisal records for the requested faculty.</p>	<p>Function successfully returns all submitted appraisal records.</p>
12	For the Hod/Dean achievement records are fetched.	<p>A table of all the achievements of the specified faculty is returned.</p>	<p>All the achievement records for the faculty are retrieved successfully.</p>

13	Score calculation and update	The function calculates appraisal scores accurately and updates the status.	Scores are calculated, and the status is successfully updated.
14	Score explanation retrieval	The function retrieves the explanation for the appropriate score.	The right explanations are retrieved and displayed.
15	Admin manages the system database	The admin adds, deletes, and edits data into the system successfully.	The data has been added, deleted, or edited successfully.
16	Faculty members generate a report	Function generates reports containing appraisal details.	The PDF is downloaded successfully with the current performance score.
17	Hod/Dean generates a report	Function generates a report with different report types and file type "CSV / JSON"	The CSV/JSON file is downloaded successfully.

### 6.2.2. Function Testing

Functional testing verifies that an application's features work according to specified requirements, focusing on inputs and expected outputs rather than internal code (Powell and Smalley, n.d.).

#### Achievements Form Submission:

The screenshot shows the 'Achievements' section of the Faculty Appraisal form. It displays six categories with their respective counts: Awards (1), Courses (1), Published (1), Articles (1), University (1), and Community (1). Below these categories are three tables:

- Awards And Acknowledging Certificates (1)**: A table with columns Name, Generated Area, Generating Organization, Date Obtained, Attachment, and Action. One row is listed: 'civil award' under 'Generated Area' and 'civil org' under 'Generating Organization'. The date obtained is '11/7/2025'. The attachment column has a file icon and a delete icon.
- Courses Taught (1)**: A table with columns Academic Year, Semester, Course Code, Section, Course Title, Course Credit, Number Of Students, Student Evaluation, and Action. One row is listed: '2024/2025' under 'Academic Year' and 'SPRING' under 'Semester'. The course code is 'CE', section is '3', title is 'CE101', credit is '3', and student evaluation is '-'.
- Research Activities (Published Paper) (1)**: A table with columns Title, Type, Name Of The Journal, Nature Of Participation, Date Of Publication, Attachment, and Action. One row is listed: 'civil research' under 'Title' and 'CONFERENCE' under 'Type'. The journal name is 'civil journal'.

Figure 6.2.2.1: Form Fields

The modal dialog is titled 'AWARDS AND ACKNOWLEDGING CERTIFICATES'. It contains fields for 'Name \*' (with placeholder 'Enter award name'), 'Generated Area' (with placeholder 'Area where award was generated'), 'Generating Organization \*' (with placeholder 'Organization that generated the award'), and 'Date Obtained \*' (with placeholder 'mm/dd/yyyy'). There is also a 'Attachment' section with a file upload area labeled 'Drag & drop a file here, or click to select' and a 'Choose File' button. At the bottom right are 'Cancel' and 'Save' buttons.

Figure 6.2.2.2: Form pop up

In this test, the Faculty Appraisal achievements form is displayed to the user as shown in Figure 6.2.2.1. The user fills in the required fields for each section and clicks Submit in Figure 6.2.2.2. Upon submission, the system stores the data correctly in the database. The sequence of this function is illustrated in the above figures.

### Appraisal Evaluation:



Instructor Appraisals				
Browse and evaluate instructor appraisals in your department.				
				Export CSV
Search by instructor name...				2025 ▾ All Statuses ▾
Instructor	Status	Total Score	Last Updated	Actions
fatma	complete	166.00	11/26/2025	

Figure 6.2.2.3: Appraisal list page



### Instructor Appraisal Review

2025 (2025 - 2025)

noora - College of Civil

Achievements	Evaluation
<b>Achievements</b> Read-only view of the instructor's submitted achievements.	
Awards (1)	
Courses Taught (1)	
Research Activities (1)	
Scientific Activities (0)	
University Services (0)	
Community Services (0)	

Figure 6.2.2.4: Achievement page



Section Total  
Research (30) + University (20) + Community (20) + Teaching (30)

Section 1 Total: 60 / 100

**1) Research & Scientific Activities** 30% 30 pts View 1

Highly Exceeds  Exceeds  Fully Meets  Partially Meets  Needs Improvement

Explanation

1. Highly Exceeds (30 pts)  
 2. Completion of one of the following:  
 3. Publishing 3 or more international research papers.  
 4. Publishing 2 or more international books.  
 5. Completing 3 or more contract projects.  
 6. 2 international papers + an international book + a contract project + reviewing an international paper.  
 7. One or more internationally registered patents.  
 8. 3 of the items mentioned in the "exceeds expectations" column.

Note  
Write an optional note...

Section item score: 30 / 30

Figure 6.2.2.5: Evaluation rubric page

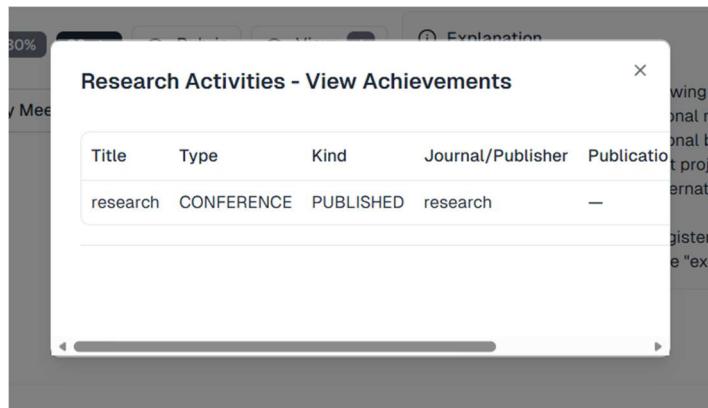


Figure 6.2.2.6: View buttons pop up

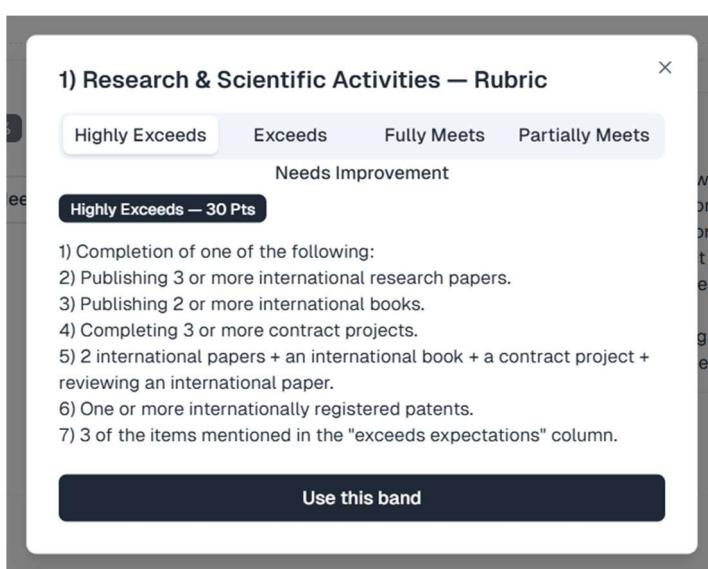


Figure 6.2.2.7: Rubric score button pop up

The screenshot shows the evaluation page for section 5) Achieving Results. The page includes a note section, a detailed explanation of the 'Highly Exceeds' rating, and an overall summary with a total score of 160 / 200.

5) Achieving Results	
	Max 20% 20 pts
<b>Highly Exceeds</b>	Exceeds Fully Meets Partially Meets Needs Improvement

**Note**  
Write an optional note...

**Overall**  
Sum of Section 1 (100) + Section 2 (100).

**Overall Total: 160 / 200**

**Buttons:** Calculate Score, Save

Figure 6.2.2.8: Evaluation page

Functional testing was conducted to ensure that all features of the Faculty Appraisal System work according to the specified requirements. In this functional testing, the assessment page with all of the appraisal sections appears when the HoD selects the Evaluate action button in figure 6.2.2.3. This button will open the instructor's appraisal review achievement page, as shown in figure 6.2.2.4 and the evaluation rubric page on the other side of the page, as shown in figure 6.2.2.5. The "View" option in Figure 6.2.2.6 allows the evaluator to check specific faculty accomplishments, "Rubrics" button option in Figure 6.2.2.7 shows a popup with the score rubrics, and the rubric buttons allow the evaluator to view each part and add points. After clicking Calculate in Figure 6.2.2.8, the assessment status is changed to "Sent," the overall appraisal score is calculated, and it is saved to the database. This test ensures that the evaluation process operates properly by confirming that the system manages data input, score computation, and status updates.

### Appraisal Result:

The screenshot shows the appraisal result page with two tables: Performance Evaluations and Capabilities Evaluations.

Performance Evaluations						Status: complete
Evaluator	Research	University Service	Community Service	Teaching	Total	
Aggregated Scores	30.00	12.00	12.00	12.00	66.00	

Capabilities Evaluations						
Evaluator	Institutional Commitment	Collaboration Teamwork	Professionalism	Client Service	Achieving Results	Total
Aggregated Scores	20.00	20.00	20.00	20.00	20.00	100.00

This appraisal is read-only in the current status.

Figure 6.2.2.9: Appraisal result page



Figure 6.2.2.10: Faculty dashboard page

In the appraisal result page, as shown in Figure 6.2.2.9, it displays for each section the score and the total appraisal score. After viewing the score, the faulty member should either approve or appeal against the evaluation, and the appraisal status will be updated accordingly. In this test, we have ensured that scores are displayed accurately then the status will be updated with either "Completed" or "Returned" as shown in figure 6.2.2.10.

### Generate and Download Reports:

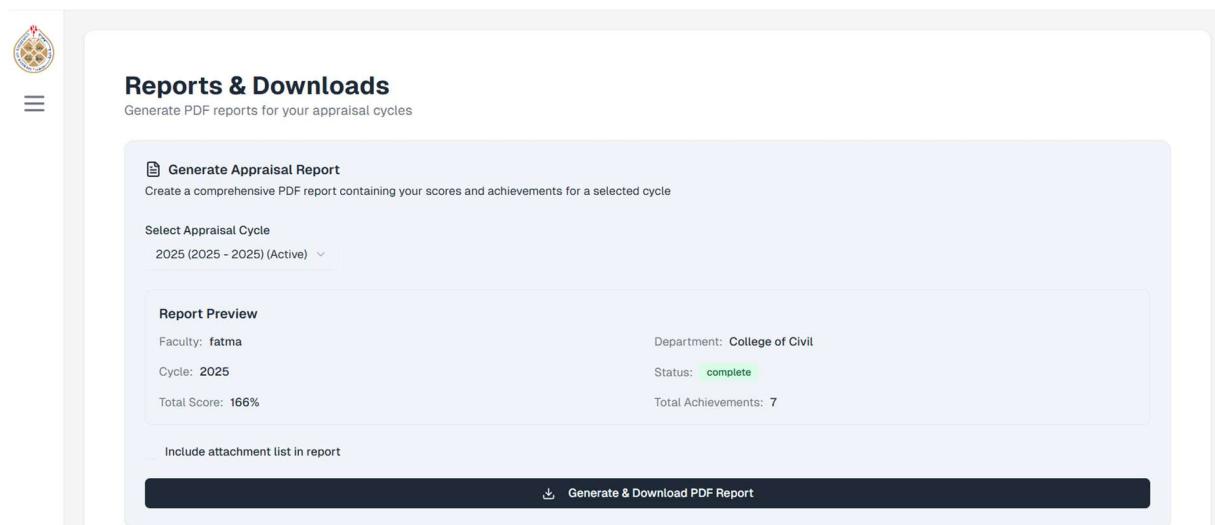


Figure 6.2.2.11: Report and download page

For generating and downloading reports, users can generate different types of reports based on their role. The faculty has the ability to generate performance reports in PDF, while HoD and deans can generate more types of reports, such as appraisal reports and achievements of reports in CSV/JSON format as shown in figure 6.2.2.11.

## View Analytical Dashboard

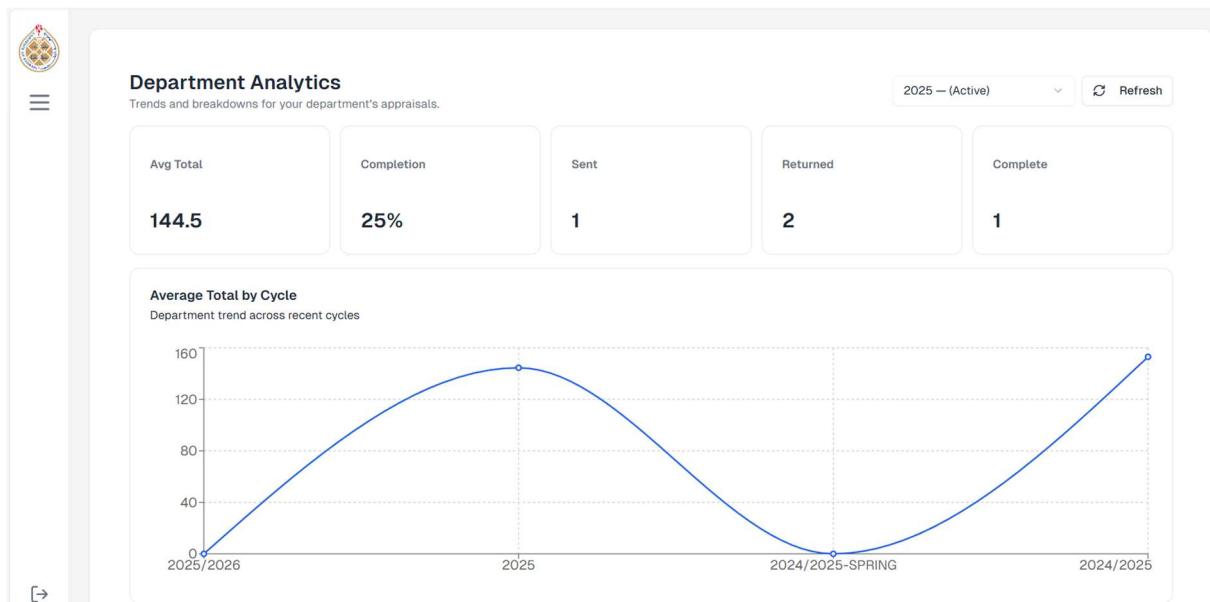


Figure 6.2.2.12: Department analytic page



Figure 6.2.2.13: Performance analytic page

Faculty members can easily see their accomplishments and appraisal scores on the Performance and Department Analytics page. They are able to view their performance in a variety of categories, including research, teaching quality, community service, and university service, as shown in Figure 6.2.2.12. A stacked bar chart illustrates how each area affects their overall performance, while a line chart shows their cumulative ratings over many assessment cycles as represented in Figure 6.2.2.13.

For Hods, the page provides an overview of the entire department, and the dean provides an overview of the entire college. The distribution of appraisal statuses, average scores for each part, trends throughout cycles, and top-performing faculty members can all be seen. Because the charts are dynamic, users may examine specific accomplishments, track appraisal progress, and keep updated on completion rates.

### 6.2.3. Integration Testing

One of the main testing stages is integration testing. In this stage, different functions are combined and tested as a group. The main idea behind this type of testing is to monitor the flow of the system and how different functions work together as one in smooth operations (Powell & Smalley, 2024).

#### Integration Testing - Appraisal Scores Retrieval

The screenshot shows a web-based application interface titled "Instructor Appraisals". The title bar includes a logo and a three-line menu icon. The main content area has a header "Instructor Appraisals" with the sub-instruction "Browse and evaluate instructor appraisals in your department.". Below this is a search bar labeled "Search by instructor name..." and a date range selector showing "2025" and "All Statuses". A large table lists four faculty members: fatma (complete, 166.00, 11/26/2025), noora (sent, 160.00, 11/26/2025), samaa (returned, 152.00, 11/19/2025), and noor (returned, 132.00, 11/16/2025). Each row has an "Actions" column with three icons: a magnifying glass, a pencil, and a trash can.

Figure 6.2.3.1: Appraisal list page

The screenshot shows a web-based application interface titled "Instructor Appraisal Review" for "noora - College of Civil". The title bar includes a logo and a three-line menu icon. The main content area has a header "Instructor Appraisal Review" and a date range selector "2025 (2025 - 2025)" with a "sent" button. Below this is a navigation bar with tabs "Achievements" (selected) and "Evaluation". The "Achievements" tab displays a list of categories with counts: Awards (1), Courses Taught (1), Research Activities (1), Scientific Activities (0), University Services (0), and Community Services (0). Each category has a collapse/expand arrow to its right.

Figure 6.2.3.2: Achievement page

In the appraisal list page, the evaluator clicks on the appraisal of a specific faculty member from the screen of Figure 6.2.3.1; the achievement records page will be displayed with the details of the appraisal submitted, as illustrated in 6.2.3.2. All scores of each section must be displayed, ensuring correct integration between the evaluation interface and the database.

The screenshot shows a user interface for evaluation. At the top, it says "Overall Sum of Section 1 (100) + Section 2 (100)." Below that is a dark button with the text "Overall Total: 160 / 200". To the right are two buttons: "Calculate Score" and "Save".

Figure 6.2.3.3: Evaluation page

noora	sent	160.00	11/26/2025

Figure 6.2.3.4: Appraisal list page

### Integration Testing – Evaluation and Database

Implemented integration testing between the evaluation module and the database to ensure proper interaction between them. The system updates the scores and appraisal status when the evaluator submits the evaluation score as shown in figure 6.2.3.3. This testing validates that the data entered through the evaluation interface is correctly stored, retrieved, and reflected across the system, ensuring that the evaluation process is accurately synchronized with the backend database as illustrated in figure 6.2.3.4.

The first screenshot shows the "Reports & Downloads" section with a "Generate Appraisal Report" button. It lists the faculty (noora), cycle (2025), total score (160%), and department (College of Civil). The second screenshot shows a confirmation dialog box stating "PDF report downloaded successfully!" with an "OK" button.

Figure 6.2.3.5: Generate report integration testing

### Integration Testing – Report Generation and Database

Integration testing was done for the database and the generating reports module to verify how they work together. Depending on the user's role, many report formats and types can be produced, as shown in Figure 6.2.3.5. Based on the type of report for different users, the test verifies that the database is retrieving accurate data. Additionally, ensuring that the reports are produced in an appropriate format.

#### 6.2.4. Validation Testing

During the testing phase, it is important to not only focus on the question “did we build the product correctly?” but also to answer the question “did we build the right product?”. In validation testing, we validate that what we built is exactly what we wanted.

##### Login Validation Testing:

The figure consists of two side-by-side screenshots of a web application interface. Both screenshots have a header "Faculty Appraisal System" and "University Performance Management Portal". A logo is centered above the input fields. The left screenshot shows an empty "Email" field with a placeholder "Enter your email" and a red error message box below it containing the text "Please fill out this field.". The right screenshot shows an empty "Email" field with a placeholder "admin" and a red error message box below it containing the text "Please include an '@' in the email address. 'admin' is missing an '@'." Below the "Email" field is a "Password" field with a placeholder "Enter your password". At the bottom of each screenshot are "FORGOT PASSWORD? RESET PASSWORD" links.

Figure 6.2.4.1: Username and Password validation

User email and password are validated in this testing. Figure 6.2.4.1 shows that if the email or the password field is empty, an error message will pop up: “Please fill out this field,” indicating where the missing in the inputs. Also, if the user enters an email without “@” symbol, an error message will pop up: “Please include an ‘@’ in the email address. ‘Email input’ is missing an ‘@’” indicating a specific issue in the email input.

##### Add New User Validation

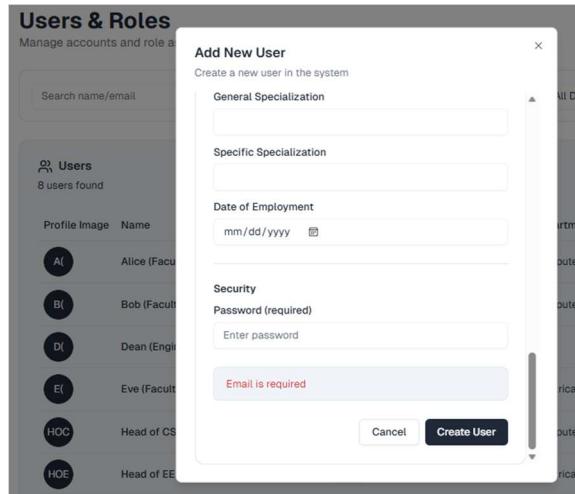


Figure 6.2.4.2: Add new user validation

During validation testing from the admin perspective, the system ensures that the email field is mandatory when creating a new user. If this field is left empty, the system displays an error message stating "Email is required." as demonstrated in Figure 6.2.4.2.

#### Add New College Pop Up Validation:

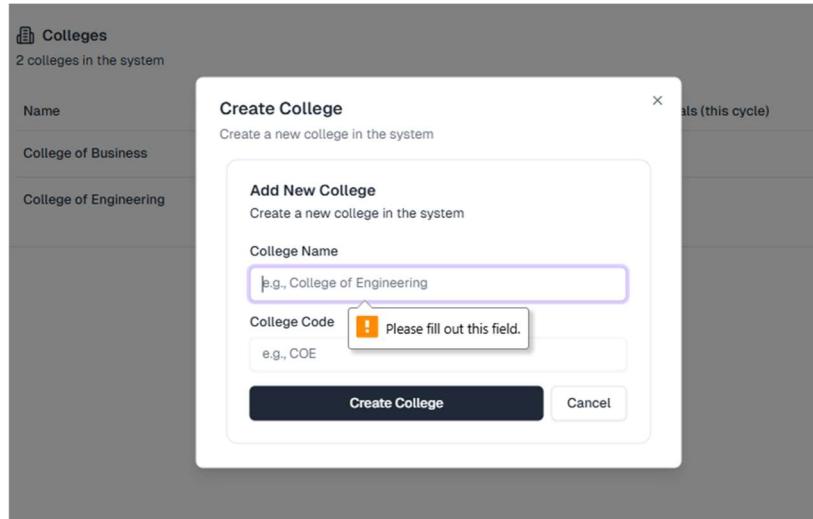


Figure 6.2.4.3: Create college validation

Figure 6.2.4.3 illustrated that when an admin adds a new college, the college name field is mandatory and cannot be left blank. If this field is left empty, a pop-up message appears saying "Please fill out this field ". as it is essential for identifying each college within the system.

## Empty Form Field Validation:

This screenshot shows the 'Awards' section of the application. A modal dialog box from 'localhost:3000 says' displays validation errors: 'Validation error: Name is required. Organization is required'. The 'Name' field is highlighted in red, and the 'Organization' field is also highlighted in red. Other fields like 'Generated Area' and 'Date Obtained' are shown but not highlighted.

Figure 6.2.4.4: Awards form Validation

This screenshot shows the 'Courses Taught' section of the application. A modal dialog box from 'localhost:3000 says' displays validation errors: 'Validation error: Academic Year is required. Semester is required. Course Code is required. Course file is required'. The 'Semester' dropdown is highlighted in red, and the 'Course Code' field is also highlighted in red. Other fields like 'Section' and 'Number Of Students' are shown but not highlighted.

Figure 6.2.4.5: Course form Validation

This screenshot shows the 'Research Activities (Published Paper)' section of the application. A modal dialog box from 'localhost:3000 says' displays validation errors: 'Validation error: Title is required. Type is required. Journal/Publisher is required'. The 'Title' field is highlighted in red, and the 'Type' dropdown is also highlighted in red. Other fields like 'Name Of The Journal' and 'Date Of Publication' are shown but not highlighted.

Figure 6.2.4.6: Research Activities" Published Paper" Validation

This screenshot shows the 'Research Activities (Published Article)' section of the application. A modal dialog box from 'localhost:3000 says' displays validation errors: 'Validation error: Title is required. Type is required. Journal/Publisher is required'. The 'Title' field is highlighted in red, and the 'Type' dropdown is also highlighted in red. Other fields like 'Name Of The Journal' and 'Date Of Submission' are shown but not highlighted.

Figure 6.2.4.7: Research Activities" Article"Validation

This screenshot shows the 'Research Activities (Published Article)' section of the application. A modal dialog box from 'localhost:3000 says' displays validation errors: 'Validation error: Title is required. Type is required. Date is required. Participation type is required'. The 'Title' field is highlighted in red, and the 'Type' dropdown is also highlighted in red. Other fields like 'Name Of Participation' and 'Date From' are shown but not highlighted.

Figure 6.2.4.8: Scientific Activities form Validation

This screenshot shows the 'University Service Activities' section of the application. A modal dialog box from 'localhost:3000 says' displays validation errors: 'Validation error: Committee/Task is required. Authority is required. Participation type is required. Date From is required. Date To is required'. The 'Committee Or Task' field is highlighted in red, and the 'Authority' dropdown is also highlighted in red. Other fields like 'Nature Of Participation' and 'Date From' are shown but not highlighted.

Figure 6.2.4.9: University Service form Validation

This screenshot shows the 'Community Service Activities' section of the application. A modal dialog box from 'localhost:3000 says' displays validation errors: 'Validation error: Committee/Task is required. Authority is required. Participation type is required. Date From is required. Date To is required'. The 'Committee Or Task' field is highlighted in red, and the 'Authority' dropdown is also highlighted in red. Other fields like 'Nature Of Participation' and 'Date From' are shown but not highlighted.

Figure 6.2.4.4: Community Service form Validation

When submitting any form in the system, all fields marked as required must be completed before the form can be saved. If the user leaves any mandatory field empty, the system displays a validation message listing the missing information, such as: “Validation error: [Field Name] is required.” as shown in Figures 6.2.4.4 to 6.2.4.10. This ensures that all essential data is properly entered, prevents incomplete submissions, and maintains the accuracy and reliability of information across all forms in the system.

### Change Password Validation:

The image consists of two side-by-side screenshots of a "Change Password" dialog box. Both screenshots show a form with four fields: "Current Password", "New Password", "Confirm New Password", and a note above them stating "Enter your current and new password." In the left screenshot, a red error message "Current password is incorrect" is displayed above the "Current Password" field. In the right screenshot, a red error message "New passwords do not match" is displayed above the "New Password" field. Both dialogs have "Cancel" and "Update Password" buttons at the bottom.

Figure 6.2.4.5: Password does not match validation

Figure 6.2.4.6: Old password validation

A screenshot of a "Change Password" dialog box. The form contains fields for "Current Password", "New Password", and "Confirm New Password". A green success message "Password updated successfully!" is displayed above the fields. The dialog has "Cancel" and "Update Password" buttons at the bottom. The background shows a course management interface with a list of courses and student names.

Figure 6.2.4.7: successful change password validation

As part of the validation testing, the login functionality was thoroughly tested to ensure it behaves correctly under all scenarios. This included verifying the process of changing passwords by selecting the “Change Password” option as illustrated in Figures 6.2.4.11 and 6.2.4.12 and entering different new passwords to confirm that the system handles each case appropriately, as shown in Figure 6.2.4.13.

# **Chapter 7**

## **Conclusion and Future Work**

In conclusion, this project was developed to improve the way faculty members at the University of Bahrain are evaluated by creating a digital Faculty Appraisal System that replaces the old manual process. We collected requirements from faculty, department heads, and deans to understand their needs and challenges, and we followed all the main software development stages throughout the project. To make the review process simpler and more structured, this assisted us in determining what features were most crucial and how the system should operate.

Then, in order to gain an understanding of the common features and design of assessment tools, we examined comparable systems. We developed system design, user interface layouts, and development-guiding diagrams using the information gathered. Modern web technologies including Next.js, PostgreSQL, and Prisma were used in the system's implementation. After the installation was finished, we tested the system to ensure that the primary features operated as intended and that the assessment procedure could be carried out without any issues. Overall, the project's objective was met, and we were able to create a system that reduces work, decreases errors, and facilitates a more effective and transparent appraisal process.

### **7.1. Future Work**

Although we have accomplished the system implementation successfully, there are more features that we wish to implement, due to time limitations and the complexity of the functions, it has not been done. But it is important to address them in this chapter.

The future work of the Faculty Appraisal System includes:

- Implement the Faculty Appraisal System into the University of Bahrain's Student Information System (SIS) to enable faculty members to easily access the system and improve performance by storing and retrieving their data automatically.
- API integration with the Civil Service Bureau (CSB) in Bahrain. This integration allows automatic retrieval of the appraisal evaluation score for each employee, which is required by CSB as part of the national appraisal workflow. Implementing this feature would streamline the evaluation process and ensure compliance with governmental requirements.

- To guarantee safe recovery, incorporate a Forgot Password function connected to the university system that enables users to obtain an authentication code prior to changing their password.
- Build a customizable dashboard and UoB-based reporting templates.
- Implement a notification and alert function that benefits users by reminding them of important cycle deadline dates.
- Improve system responsiveness on mobile devices and iPads to provide a smoother and more user-friendly experience for faculty and administrators who prefer using tablets or phones.
- Incorporate automated testing tools. Since all current testing was performed manually, adding automated tests in the future would help identify issues more efficiently and maintain the system's stability after updates.

## **7.2. Limitations**

In any software development project, there must be limitations that affect the timeline and implementation of additional features. The key limitations are:

- Limited time during the semester with the internship, graduation project, and semester course. But with consistency and time management, everything works.
- Complex features required more research, implementation, and testing, which made it harder to implement during this semester.
- Due to a lack of accurate data and historical data records, this limited the system's ability to fully validate certain functionalities, generate analytics dashboards, and test features that rely on comprehensive datasets.

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# Appendix A

## Test Cases

<b>Test Case ID</b>	FAS_001	<b>Test Case Description</b>	Test if email is empty.
<b>Created By</b>	Samaa	<b>Reviewed By</b>	Hala
<b>QA Tester's Log</b>			Review comments from Hala
<b>Tester's Name</b>	Samaa	<b>Date Tested</b>	November 13, 2025
<b>Test Case (Pass/Fail/Not Executed)</b>			Pass
<b>S #</b>	<b>Prerequisites:</b>	<b>S #</b>	<b>Test Data</b>
1	Access to faculty appraisal system	1	Email = ""
2	Open login page	2	
3	Enter email	3	
4		4	

**Test Scenario:** Verify an empty email. the user will not log in to the system and alert message will display for the user.

<b>Step #</b>	<b>Step Details</b>	<b>Expected Results</b>	<b>Actual Results</b>	<b>Pass / Fail / Not executed / Suspended</b>
1	User will enter to login	Login page should open	As Expected	Pass
2	User will not enter any email	The user will not enter email	As Expected	Pass
3	Click LOGIN Button	The message will display for the user, "Please fill out this field."	As Expected	Pass

*Figure A.1: Email empty test case*

<b>Test Case ID</b>	FAS_002	<b>Test Case Description</b>	Test if the password is incorrect.
<b>Created By</b>	Hala	<b>Reviewed By</b>	Malak
<b>QA Tester's Log</b>			Review comments from Malak
<b>Tester's Name</b>	Hala	<b>Date Tested</b>	November 13, 2025
<b>Test Case (Pass/Fail/Not Executed)</b>			Pass
<b>S #</b>	<b>Prerequisites:</b>	<b>S #</b>	<b>Test Data</b>
1	Access to faculty appraisal system	1	Email = "samaa@uob.edu"
2	open login page	2	Password="samaa123"
3	Enter email	3	
4	Enter password	4	

**Test Scenario:** Verify that a user cannot log in with an incorrect password. An alert message should display for the user.

<b>Step #</b>	<b>Step Details</b>	<b>Expected Results</b>	<b>Actual Results</b>	<b>Pass / Fail / Not executed / Suspended</b>
1	User will enter to login	Login page should open	As Expected	Pass
2	User will enter valid email	Email field accepts input	As Expected	Pass
3	User enter incorrect password	Password field accepts input	As Expected	Pass
4	Click LOGIN Button	Alert message appears: "Invalid email or password"	As Expected	Pass

*Figure A.2: Incorrect password test case*

Test Case ID	FAS_003	Test Case Description	Test if the password and email are correct.		
Created By	Samaa	Reviewed By	Malak	Version	1.0
QA Tester's Log	Review comments from Malak				
Tester's Name	Samaa	Date Tested	November 13, 2025	Test Case (Pass/Fail/Not Executed)	Pass
S #	Prerequisites:		S #	Test Data	
1	Access to faculty appraisal system		1	Email = "samaa@uob.edu"	
2	open login page		2	Password = "samaa2003"	
3	Enter email		3		
4	Enter password		4		
Test Scenario	Verify that a user can login with a correct email and password. Dashboard should open based on the user role.				
Step #	Step Details	Expected Results	Actual Results	Pass / Fail / Not executed / Suspended	
1	User will enter to login	Login page should open	As Expected	Pass	
2	User will enter valid email	Email field accepts input	As Expected	Pass	
3	User enter correct password	Password field accepts input	As Expected	Pass	
4	Click LOGIN Button	User will login successfully and dashboard will open depend in the user role.	As Expected	Pass	

Figure A.3: Correct password and email test case

Test Case ID	FAS_004	Test Case Description	Test if the Award form will not save correctly.		
Created By	Hala	Reviewed By	Malak	Version	1.0
QA Tester's Log	Review comments from Malak				
Tester's Name	Hala	Date Tested	November 13, 2025	Test Case (Pass/Fail/Not Executed)	Pass
S #	Prerequisites:		S #	Test Data	
1	Access to faculty appraisal system		1	Name = ""	
2	User is logged in		2	Generating Organization = ""	
3	Navigate to the achievement page .		3		
4	Navigate to the Awards form		4		
5	Awards form is displayed				
Test Scenario	Verify that the user cannot submit the Awards form when required fields (Name, Generating Organization) are empty. The system should show "Validation error: Name is required, Organization is required" messages.				
Step #	Step Details	Expected Results	Actual Results	Pass / Fail / Not executed / Suspended	
1	User opens the Awards form	Awards form loads	As Expected	Pass	
2	User leaves Name empty	Email field accepts input	As Expected	Pass	
3	User leaves Generating Organization empty	Password field accepts input	As Expected	Pass	
4	User clicks Save	System displays the validation error.	As Expected	Pass	

Figure A.4: Unsaved Award from test case

Test Case ID	FAS_005	Test Case Description	Test if the Award form will save successfully		
Created By	Hala	Reviewed By	Malak	Version	1.0
QA Tester's Log	Review comments from Malak				
Tester's Name	Hala	Date Tested	November 13, 2025	Test Case (Pass/Fail/Not Executed)	Pass
S #	Prerequisites:		S #	Test Data	
1	Access to faculty appraisal system		1	Name = "Award"	
2	User is logged in		2	Generating Area = ""	
3	Navigate to the achievement page .		3	Generating Organization = "University of Bahrain"	
4	Navigate to the Awards form		4	Date Obtained = ""	
5	Awards form is displayed		5	Attachment = ""	
Test Scenario	Verify that the user can submit the Awards form when required fields (Name, Generating Organization) are filled. The system should show a loading indicator while the data is being saved.				
Step #	Step Details	Expected Results	Actual Results	Pass / Fail / Not executed / Suspended	
1	User opens the Awards form	Awards form loads successfully	As Expected	Pass	
2	User enters Name	Field accepts input	As Expected	Pass	
3	User leaves Generating Area empty	Field accepts input	As Expected	Pass	
4	User enters Generating Organization	Field accepts input	As Expected	Pass	
5	User leaves Date Obtained empty	Field accepts input	As Expected	Pass	
6	User leaves Attachment empty.	Field accepts input	As Expected	Pass	
7	User clicks Save.	Save button shows a loading indicator and Awards form closes after save	As Expected	Pass	

Figure A.5: Save Award form test case

## **Appendix B**

### **Survey Questions**

1. How often do you face challenges when completing the Faculty Achievements Form?
  - Never
  - Rarely
  - Often
  - Always
2. What are the main challenges in the current appraisal process? (select all that apply)
  - Time-consuming
  - Difficulty in tracking performance history
  - Delayed feedback
  - Data loss/error
  - Data entry repetitive
3. What aspects of the current appraisal system process need the most improvement? (select all that apply).
  - Clearness of appraisal form instructions
  - Efficiency of form submission and review process
  - Data security and privacy
  - Automation and digital integration (e.g., auto-populating data)
  - Accessible and user-friendly interface
  - Accessibility to update achievements anytime throughout the year
  - Tracking of appraisal process
  - Accessibility to historical appraisal data
4. How long does it typically take you to complete the Faculty Achievements Form?
  - Less than 1 hour
  - 1-5 hours

- More than 5 hours
- 5. Do you find the current process of filling appraisal form (manual entry, attaching documents, etc.) convenient?
  - Yes
  - No
- 6. How easy it is to access past appraisal records?

Very easy

- 1
- 2
- 3
- 4
- 5

Not easy

- 7. Do you think it would be helpful to update your achievements new activities throughout the year (instead of waiting until the annual appraisal period)?
  - Yes
  - No
- 8. What features would you like in the proposed faculty appraisal system ? (select all that apply)
  - Real-time progress tracking (e.g., status of submitted forms)
  - Historical analytic tools
  - Notifications & reminders
  - Integration with existing university data sources to eliminate repetitive information
  - Automated appraisal forms