

ElevateNex : NextGen HR System

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ElevateNex : NextGen HR System

**A thesis submitted for the Degree of Master of
Information Technology**

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Date	25-June-2025		

Preface

This thesis serves as a formal record of the work undertaken in the development of the ElevateNex – NextGen HR System. It provides a detailed account of the challenges faced, methodologies employed, and outcomes achieved throughout the project. The purpose of this document is not only to present the technical and functional aspects of the system but also to contribute valuable insights to future researchers, developers, and organizations seeking to modernize HR management through technology.

The ElevateNex – NextGen HR System was developed in response to the growing need for a digitally advanced, user-friendly HR solution that enhances efficiency, reduces administrative workload, and improves employee engagement. Traditional HR processes often suffer from inefficiencies, errors, and a lack of real-time access to critical information. This thesis highlights the research, design, development, and evaluation of a modern HR system that leverages Spring Boot(“Spring Framework,” n.d.) for scalable backend services and React(“React Reference Overview – React,” n.d.) for an intuitive user interface, incorporating AI-driven assistance using FlowiseAI(“Introduction | FlowiseAI,” 2025) for self-service capabilities, and advanced analytics to streamline HR operations.

Throughout this project, I have benefited from the continuous guidance and constructive feedback of my supervisor, Dr. P.V.K.G Gunawardana, whose expertise has been instrumental in shaping the direction and quality of this work. I also extend my gratitude to my academic mentors, colleagues, and family members for their unwavering support, encouragement, and insightful discussions, which have greatly contributed to the successful completion of this project.

The structure of this thesis follows a systematic approach, covering the key phases of project development. The Introduction outlines the project scope, objectives, and significance; Background and Related Work reviews existing HR systems and modern HR challenges; Design and Implementation details the system architecture, technologies used, and development process; Evaluation and Testing discusses validation techniques and system performance; and the Conclusion reflects on key findings, project contributions, and potential future enhancements.

This work represents my understanding and proficiency in modern software engineering practices, particularly in web-based enterprise application development. It also demonstrates my ability to apply academic writing standards, technical methodologies, and industry best practices in software design, security, and usability. I hope this thesis serves as a valuable reference for future research and development in HR technology, offering insights into the challenges, solutions, and impact of next-generation HR systems.

Abstract

The ElevateNex – NextGen HR System aims to address the challenges of traditional HR practices in the digital age by developing an innovative, user-centered solution. Traditional manual processes for managing employee information, leave, and work time are often prone to inefficiencies, errors, and employee disengagement. This project introduces a comprehensive HR system leveraging advanced technologies such as Spring Boot for scalable backend services and React for an intuitive frontend interface, designed to streamline HR operations and enhance employee satisfaction.

The system incorporates features like AI-powered chatbot assistance, self-service tools, and robust analytics to empower employees and HR administrators. It facilitates efficient management of tasks such as employee registration, leave tracking, skill and qualification updates, and work hours. Microservices architecture ensures modularity and scalability, while secure data handling, including encryption and role-based access control, protects sensitive employee information.

The project adopts a Rapid Application Development (RAD) methodology(Bondar, 2021), emphasizing iterative feedback and swift prototyping to align the system with user needs. Through rigorous testing strategies, including unit and integration testing, the solution ensures reliability and performance. The ElevateNex system aims to transform HR management by automating routine tasks, fostering employee engagement, and enabling organizations to adapt to evolving business demands, ensuring long-term sustainability and competitive advantage.

Acknowledgements

I would like to begin by expressing my heartfelt appreciation to my supervisor, Dr. (Mr.) P.V.K.G Gunawardana, whose continuous support and invaluable guidance have been pivotal throughout this project. My sincere thanks also go to the UCSC staff and lecture panel, especially Dr. (Ms.) H N D Thilini, for her assistance and coordination.

A special thank you goes to my parents and family for their unwavering love, support, and encouragement, which have been my strength at every step.

Lastly, I am truly grateful to everyone who contributed, in any capacity, to the successful completion of this project. Your support and encouragement have meant the world to me, and I deeply appreciate it.

Table of Contents

Declaration.....	iii
Preface	iv
Abstract.....	v
Acknowledgements.....	vi
List of Figures.....	x
List of Tables	xiii
List of Acronyms	xiv
Chapter 1 – Introduction	1
1.1 Project Overview.....	1
1.2 Motivation	1
1.3 Aim and Objectives.....	2
1.4 Background of study	3
1.5 Scope of the Study.....	4
1.5.1 In Scope:	4
1.5.2 Out of Scope:	5
1.6 Structure of the Dissertation.....	6
Chapter 2 - Background Chapter	8
2.1 Introduction	8
2.2 Survey Analysis and Findings.....	8
2.3 Requirement Analysis	17
2.3.1 User Groups and user characteristics.....	17
2.3.2 Functional Requirements.....	17
2.3.3 Non-Functional Requirements.....	19
2.3.4 Review of Similar Systems.....	20
2.3.5 Related Technologies	24
2.4 Summary	25
Chapter 3 - Design Chapter	26
3.1 Related Design Strategies.....	27
3.2 System Architecture	28
3.3 UML diagrams	29
3.3.1 Use Case Diagram	30
3.3.2 Use Case Narratives.....	31

3.3.3 Entity-Relationship (ER) Diagram	48
3.3.4 Class Diagram.....	49
3.3.5 Activity Diagrams.....	50
3.3.6 Sequence Diagrams	55
3.4 Summary	62
Chapter 4 – Implementation	63
4.1 Introduction	63
4.2 System Architecture	63
4.2.1 System Architecture Diagram	64
4.2.2 Data Flow and Communication Between Components.....	65
4.3 Development Tools	66
4.4 Application Development Architecture	68
4.4.1 Overview of the Application Architecture	68
4.4.2 Project Structure and Folder Explanation.....	69
4.4.3 Application Properties and Environment Configuration	76
4.4.4 Chatbot Implementation	76
4.5 Important code snippets	77
4.5.1 User Authentication and Role-Based Access Control.....	77
4.5.2 Swagger Implementation.....	78
4.5.3 Email Notification System using JavaMailSender	80
4.6 Summary	83
Chapter 5 – Testing and Evaluation.....	84
5.1 Introduction	84
5.2 Testing Strategy.....	84
5.2.1 Unit Testing	84
5.2.2 Integration Testing.....	84
5.2.3 Regression Testing	85
5.2.4 System Testing	85
5.2.5 Usability Testing.....	85
5.2.6 Performance Testing.....	85
5.2.7 Security Testing.....	86
5.3 Test Automation Framework and Tools Used	86

5.4 Test Execution Summary	87
5.5 Usability Evaluation.....	99
5.6 Summary of User Evaluation	106
5.7 Summary	107
Chapter 6 - Conclusion	108
6.1 Introduction	108
6.2 Critical Review of Achieved Objectives	108
6.2.1 For HR Administrators:	108
6.2.2 For Employees:	108
6.2.3 For Managers:	109
6.2.4 AI Chatbot & NLP Capabilities:	109
6.3 Learning Experiences	109
6.4 Difficulties & Challenges.....	110
6.5 Future Work	111
List of References	112
Appendix A – MIS Reports	116
Appendix B – User Manual	124
1. Introduction	124
2. Login & Dashboard.....	124
3. HR Admin Functions	126
4. Manager Functions	128
5. Employee Functions.....	130
6. AI Chatbot for HR Inquiries.....	133
7. Security & Authentication.....	133
8. Troubleshooting & FAQs.....	134
Appendix C – Requirements Analysis Questionnaire	135
Appendix D – User Evaluation Questionnaire	139

List of Figures

Figure 2. 1: Demographic Insights Review	9
Figure 2. 2: User Workplace Review	10
Figure 2. 3: Current HR Systems Review Part 01	11
Figure 2. 4: Current HR Systems Review Part 02	12
Figure 2. 5: User Insight on AI Assistant.....	13
Figure 2. 6: User Devices Review	14
Figure 2. 7: Features and Preferences Review 01	14
Figure 2. 8: Features and Preferences Review 02	15
Figure 2. 9: Features and Preferences Review 03	15
Figure 2. 10: Features and Preferences Review 04.....	16

Figure 3. 1: Rapid Application Development	27
Figure 3. 2: Use Case Diagram	30
Figure 3. 3: Entity-Relationship (ER) Diagram.....	48
Figure 3. 4: Class Diagram	49
Figure 3. 5: Activity Diagram for Employee Registration.....	50
Figure 3. 6: Activity Diagram for Employee Profile Update.....	51
Figure 3. 7: Activity Diagram for Employee Leave Request.....	52
Figure 3. 8: Activity Diagram for Manager Search Employees.....	53
Figure 3. 9: Activity Diagram for HR Announcements	54
Figure 3. 10: Sequence Diagram for Employee Registration	55
Figure 3. 11: Sequence Diagram for Employee Login to the System.....	56
Figure 3. 12: Sequence Diagram for Profile Update.....	57
Figure 3. 13: Sequence Diagram for Employee Search	58
Figure 3. 14: Sequence Diagram for Sending Emails.....	59
Figure 3. 15: Sequence Diagram for Employee Work Time Submission	60
Figure 3. 16: Sequence Diagram for Performance Review Submission.....	61
Figure 3. 17: Sequence Diagram for HR Request Submission	62

Figure 4. 1: System Architecture Diagram	64
Figure 4. 2: FlowiseAI Architecture	65
Figure 4. 3: Backend Project Structure	69
Figure 4. 4: SecurityConfig.java.....	69
Figure 4. 5: LeaveRequestController.java	70
Figure 4. 6: HRRequestDTO.java.....	71
Figure 4. 7: HRRequest.java.....	71
Figure 4. 8: GlobalExceptionHandler.java.....	72

Figure 4. 9: PerformanceEvaluationRepository.java	72
Figure 4. 10: LoginResponse.java	73
Figure 4. 11: AdminSeeder.java.....	73
Figure 4. 12: HRRequestService.java.....	74
Figure 4. 13: Frontend Project Structure 01.....	74
Figure 4. 14: Frontend Project Structure 02.....	75
Figure 4. 15: Frontend Project Structure 03.....	75
Figure 4. 16: Backend Property Files	76
Figure 4. 17: FlowiseAI Canvas 01	77
Figure 4. 18: FlowiseAI Canvas 02	77
Figure 4. 19: Backend Implementation (Spring Boot - JWT Authentication).....	78
Figure 4. 20: Frontend Implementation: Handling Authentication (React.js)	78
Figure 4. 21: Swagger Configuration.....	79
Figure 4. 22: Swagger Backend dependency at pom.xml.....	79
Figure 4. 23: Swagger UI.....	80
Figure 4. 24: prod.properties.....	80
Figure 4. 25: EmailService.java.....	81
Figure 4. 26: HRRequestService.java.....	82
Figure 4. 27: EmailService.java.....	82
Figure 5. 1: Unit Test Sample	98
Figure 5. 2: JaCoCo Coverage Implementation.....	98
Figure 5. 3: Postman API Testing	99
Figure 5. 4: Usability Evaluation 01	100
Figure 5. 5: Usability Evaluation 02	101
Figure 5. 6: Usability Evaluation 03	101
Figure 5. 7: Usability Evaluation 04	102
Figure 5. 8: Usability Evaluation 05	102
Figure 5. 9: Usability Evaluation 06	103
Figure 5. 10: Usability Evaluation 07	103
Figure 5. 11: Usability Evaluation 08	104
Figure 5. 12: Usability Evaluation 09	105
Figure 5. 13: Usability Evaluation 10	105
Figure 5. 14: Usability Evaluation 11	106
Figure A. 1: Employee Demographic Reports 01	116
Figure A. 2: Employee Demographic Reports 02	117
Figure A. 3: Employee Demographic Reports 03	117
Figure A. 4: Work Time Reports 01	118

Figure A. 5: Work Time Reports 02	118
Figure A. 6: Employee Distribution 01	119
Figure A. 7: Employee Distribution 02	119
Figure A. 8: Employee Leave Trends 01	120
Figure A. 9: Employee Leave Trends 02	121
Figure A. 10: Employee Leave Trends 03	122
Figure A. 11: Performance Analysis	123
Figure B. 1: Login.....	125
Figure B. 2: Dashboard	125
Figure B. 3: User Management.....	126
Figure B. 4: Register	126
Figure B. 5: Manage Users	127
Figure B. 6: Announcements.....	127
Figure B. 7: Time Reports.....	128
Figure B. 8: Employee Search	128
Figure B. 9: Performance Reviews	129
Figure B. 10: Career Goals Management	129
Figure B. 11: Update Profile	130
Figure B. 12: Leave Requests	131
Figure B. 13: Work Hours	131
Figure B. 14: HR Requests	132
Figure B. 15: Complaints.....	132
Figure B. 16: AI Chatbot.....	133
Figure B. 17: Forgot Password	133
Figure C. 1: Requirements Analysis Questionnaire 01	135
Figure C. 2: Requirements Analysis Questionnaire 02	136
Figure C. 3: Requirements Analysis Questionnaire 03	137
Figure C. 4: Requirements Analysis Questionnaire 04.....	138
Figure D. 1: User Evaluation Questionnaire 01	139
Figure D. 2: User Evaluation Questionnaire 02.....	140

List of Tables

Table 2. 1: Similar Work Comparison.....	23
Table 3. 1: Use Case 01: Register New Employee	32
Table 3. 2: Use Case 02: Activate/Deactivate Employee Account	32
Table 3. 3: Use Case 03: Broadcast Announcements.....	33
Table 3. 4: Use Case 04: Log In.....	34
Table 3. 5: Use Case 05: Update Personal Information	35
Table 3. 6: Use Case 06: Record Skills and Qualifications	36
Table 3. 7: Use Case 07: Submit Work Time	37
Table 3. 8: Use Case 08: Submit Leave Requests.....	38
Table 3. 9: Use Case 09: Approve Leave Requests	39
Table 3. 10: Use Case 10: Assist with HR Inquiries (AI Chatbot)	40
Table 3. 11: Use Case 11: Approve Time Logs.....	41
Table 3. 12: Use Case 12: View Leave Balance	42
Table 3. 13: Use Case 13: Generate Reports.....	43
Table 3. 14: Use Case 14: Search Employees	43
Table 3. 15: Use Case 15: Manage Complains	44
Table 3. 16: Use Case 16: Set & Manage Career Goals	45
Table 3. 17: Use Case 17: Conduct Performance Reviews.....	45
Table 3. 18: Use Case 18: Manage HR Requests.....	46
Table 3. 19: Use Case 19: Manage Departments & Jobs.....	47
Table 4. 1:Development Tools	66
Table 4. 2: Backend Property Files	76
Table 5. 1: Test Automation Framework and Tools	86
Table 5. 2: Test Execution Summary	97
Table 5. 3: Summary of User Evaluation.....	107

List of Acronyms

HTML - Hypertext Markup Language

JPA - Java Persistence API

SDLC - Software Development Lifecycle

SMTP - Simple Mail Transfer Protocol

SPA - Single Page Application

SQL - Structured Query Language

UML - Unified Modeling Language

UI - User Interface

Chapter 1 – Introduction

1.1 Project Overview

ElevateNex – NextGen HR System

In today's fast-changing business world, traditional HR practices are finding it increasingly difficult to meet the ever-evolving needs of employees and adapt to the digital era. Tasks like managing leave, evaluating performance, and tracking skills are often done manually, which can result in mistakes, wasting time, and a lack of engagement from employees. Additionally, accessing HR-related information and services can be a hassle, slowing down productivity and making it harder for organizations to keep their best employees happy and motivated.

By creating a modern HR system with a smart chatbot, easy-to-use self-service tools, and detailed data analysis, we can tackle these issues and completely change how HR is managed in any company. ElevateNex project is all about delivering an innovative HR solution that not only takes care of everyday tasks automatically but also gives personalized help, encourages employee growth, and helps the company succeed in today's digital world.

1.2 Motivation

In today's fast-evolving business environment, companies must be agile and adaptive to remain competitive, and effective human resource (HR) management is crucial in achieving this. Traditional HR practices, however, are increasingly insufficient to meet the diverse and growing demands of employees, managers, and HR professionals themselves. Tasks such as managing leave, conducting performance evaluations, and monitoring skills development are often managed manually, which is both time-consuming and prone to errors. This manual approach not only creates inefficiencies but also impacts employee satisfaction, as accessing essential HR-related information and services becomes cumbersome, ultimately slowing down productivity.

In addition to the administrative burden, the lack of streamlined and intuitive HR services can contribute to employee disengagement. Employees today expect quick, easy access to information, feedback, and growth opportunities. Without a responsive, user-centered HR system, companies may struggle to maintain employee motivation, thereby risking lower retention of top talent.

The ElevateNex – NextGen HR System aims to address these issues by offering a forward-looking solution that integrates automation, personalization, and accessibility into a single, comprehensive platform. Through features like an AI-powered chatbot, user-friendly self-service tools, and sophisticated data analytics, ElevateNex empowers employees to take charge of their HR needs effortlessly. By automating routine tasks and providing personalized support, ElevateNex seeks to transform the traditional HR model, fostering a workplace culture that values employee growth, engagement, and satisfaction.

This project aligns with the digital transformation that modern businesses are undergoing, ensuring that organizations can keep pace with technological advancements while maximizing employee potential. By implementing ElevateNex, companies can streamline HR processes, enhance employee satisfaction, and better position themselves for long-term success in today's digital-driven marketplace.

1.3 Aim and Objectives

The goal of this project is to develop an innovative HR solution that leverages advanced technologies and methodologies to create a robust, scalable, and user-friendly system.

The proposed project objectives will be,

- Implementing an innovative HR solution that utilizes advanced technologies and methodologies to streamline processes and improve employee engagement.
- Developing a user-friendly system with intuitive interfaces and self-service tools to empower employees and HR administrators, thereby improving efficiency and productivity.
- Utilizing an AI chatbot to support all the users in the system, facilitating smoother interactions and better access to HR-related information and services.
- Designing robust and scalable system architecture that can accommodate future growth and evolving business needs, ensuring long-term sustainability and adaptability in a dynamic business environment.
- Ensuring the reliability, security, and accuracy of the HR system through rigorous testing, adherence to industry best practices, and ongoing maintenance and support to deliver a high-quality solution that meets the organization's needs effectively.

1.4 Background of study

The proposed HR system builds upon the latest advancements in HR technology and draws inspiration from best practices in user experience design and artificial intelligence. By leveraging existing knowledge and expertise, I aim to create a solution that is both innovative and practical, meeting the unique needs of any organization.

The rapid evolution of technology and the increasing complexity of HR functions have necessitated innovative solutions to streamline processes, enhance employee engagement, and optimize operational efficiency. Traditional HR practices often involve manual tasks, paper-based processes, and siloed systems, which can lead to inefficiencies, errors, and delays.

To address these challenges, organizations are turning to advanced technologies, such as artificial intelligence (AI), machine learning, and automation, to transform their HR operations. By leveraging these technologies, organizations can automate routine tasks, improve decision-making, and provide more personalized and engaging employee experience.

Recent studies have highlighted the significant impact of HR technology on organizational performance. For instance, a study by Applaud (“HR Technology Trends 2023: Putting the Human in Human Resources,” n.d.) found that organizations with advanced HR technology systems have higher employee satisfaction, lower turnover rates, and better financial performance. Another study by Gartner (“AI in HR,” n.d.) revealed that AI-powered HR tools can significantly reduce administrative burdens, freeing up HR professionals to focus on strategic initiatives.

Considering these trends, the proposed project aims to develop an innovative HR solution that incorporates advanced technologies and methodologies to create a robust, scalable, and user-friendly system. This solution will streamline HR processes, empower employees, and enhance the overall HR experience. By addressing the specific needs and challenges of the organization, this project will contribute to its long-term success and competitiveness.

In the background chapter, I have conducted a thorough analysis of leading HR software providers, including Oracle HCM Cloud (“Discover A More Resourceful Human Resources,” n.d.), PeopleHR (“PeoplesHR: All-in-One HRIS Portal For Modern Teams,” n.d.), SAP SuccessFactors (“Human Capital Management (HCM) Software | SAP SuccessFactors,” n.d.) and ADP Workforce Now (“Payroll, HR and Tax Services | ADP Official Site,” n.d.). Each of these platforms offers comprehensive solutions designed to streamline HR processes, enhance employee engagement, and drive organizational success. The unique features and capabilities of these solutions are tailored to meet the specific requirements of various organizations, making them valuable tools in addressing the evolving needs of modern HR.

1.5 Scope of the Study

1.5.1 In Scope:

The project will focus on the development and implementation of the proposed HR system with the features mentioned below. The scope includes requirements gathering, system design, development, testing, system documentation and deliverable solution in English Language.

Assumptions: The system will be implemented within a medium-sized organization with approximately 100 employees in the first phase.

Below are the proposed functional requirements of the system.

- Allowing HR administrators to register & manage employees in the system.
- Allowing employees to log into the system then record & update their skills, educational qualifications, certifications, and professional development achievements & their personal information in the system.
- Providing basic search and filter options for managers to identify employees with specific skill sets for project assignments or training opportunities.
- Enable HR administrators to broadcast announcements and notifications to all employees or specific groups.
- Implementing email notification for important updates, events, or policy changes.
- Record and track employee work hours, by allowing them to submit it manually with comments. Ex: Work from Home.
- Generate reports to analyze work time, identify trends, and address any work time related issues proactively.
- Allowing employees to submit leave requests for various purposes, such as annual, casual, sick leaves & managers to approve or reject them as required.
- Display leaves balance and existing absences to employees, enabling them to plan their time off effectively.
- Allowing managers to conduct employee performance reviews.
- Allowing managers to set career goals for employees and oversee their progress.
- Ability to create HR requests for requesting documents, assistance, or any HR-related support for employees.
- Allowing employees to submit complaints to HR administrators regarding workplace issues, grievances, or concerns.
- AI system (Chatbot) to assist employees and managers with inquiries related to HR policies, procedures, benefits, and other relevant information.
- NLP capabilities to understand and respond to a wide range of user queries through Chatbot.

Non-Functional Requirements

- **Security:** Ensuring that the system is protected so that only authorized users with valid login credentials can access it.
- **Performance:** Optimizing the backend code and database queries to ensure fast response times and efficient processing.
- **Usability:** Designing intuitive navigation and user interfaces to make the system easy to use for all users, including those with varying levels of technical expertise.
- **Scalability:** Building the system to accommodate future growth and increasing numbers of users without requiring significant rework.
- **Maintainability:** Designing the system for easy maintenance and updates. Using modular code and following best practices to facilitate troubleshooting, debugging, and future enhancements.

Users of the proposed System

- HR Administrators
- Managers
- Employees

1.5.2 Out of Scope:

Payment Gateway Integration & Payroll: Integrating payment gateways for financial transactions or managing the payroll is not part of this project's scope.

Geographical Localization: Adapting the HR system for different geographical regions or languages beyond the initial deployment scope is not considered in this project.

Hardware Procurement and Setup: The project does not involve acquiring or configuring hardware infrastructure such as servers or networking equipment for deploying the HR system.

Data Migration and Integration with Legacy Systems: The project does not encompass migrating data from legacy systems or integrating with existing enterprise systems like ERP or CRM.

Custom Software Modules: Developing additional custom modules or functionalities beyond those outlined in the proposed HR system are out of scope.

1.6 Structure of the Dissertation

The dissertation is organized into several chapters that outline the project's scope, methodology, and findings. Each chapter is designed to provide a clear and coherent overview of the project.

Chapter 1: Introduction

This chapter introduces the project, outlining the motivation behind developing an innovative HR solution. It presents the aims and objectives of the project, which focuses on effectively managing daily tasks while fostering employee growth and supporting the company's success in the contemporary digital landscape.

Chapter 2: Background

This chapter reviews existing literature related to HR management systems, employee development strategies, and user experience in similar contexts. It identifies key points and gaps in current HR solutions, providing a foundation for the project's theoretical framework through Requirement Analysis and a review of analogous systems and technologies.

Chapter 3: Design

This chapter covers the analysis of the problem, specifying system-level and software-level requirements based on software engineering principles. It discusses the rationale behind design decisions, including the evaluation of alternatives and the selection of solutions. The chapter includes architectural and detailed design elements, supported by UML diagrams such as use case, class, and sequence diagrams. It also addresses user interface design considerations, justifying design choices with relevant interface layouts.

Chapter 4: Implementation

This chapter outlines the implementation of the HR solution, detailing major code structures and module interactions, supported by diagrams. It justifies the choice of hardware and software environments and discusses aspects such as code reuse and development tools.

Chapter 5: Testing and Evaluation

This chapter focuses on the testing and evaluation of the HR management system. It details both manual and automated testing approaches used to ensure the system's reliability and performance. The chapter describes various testing strategies, including unit testing, integration testing, regression testing, and system testing, and provides sample test plans and results. Comprehensive test plans, included in the appendix, verify and validate the system's functionality and performance.

Chapter 6: Conclusion

This chapter summarizes the key findings of the project and reflects on the overall success of the HR solution in meeting its objectives. It offers recommendations for future improvements and discusses potential areas for further development.

References

A comprehensive list of all sources cited throughout the dissertation.

Appendices

This section includes supplementary materials such as user surveys, a system manual, design documentation, a user manual, and management reports.

Chapter 2 - Background Chapter

2.1 Introduction

This chapter provides the foundational background for developing ElevateNex – NextGen HR System by analyzing the core requirements, evaluating existing HR solutions, and incorporating user feedback from industry professionals. The chapter begins with a survey analysis that captures insights from HR administrators, managers, and employees regarding their experiences with current HR management systems. This analysis highlights key challenges, satisfaction levels, and feature preferences, offering a data-driven perspective on what users expect from an advanced HR platform.

Following the survey results, the chapter moves into a requirement analysis, identifying both functional and non-functional needs essential for designing a modern HR system. It also reviews existing HR management solutions, comparing their strengths and limitations, and explores relevant technologies that align with the project's objectives. By thoroughly assessing the current landscape and identifying critical gaps, this chapter establishes a strong foundation for developing an innovative, user-friendly, and AI-powered HR system tailored to the evolving needs of organizations and employees.

2.2 Survey Analysis and Findings

To build a better HR management system, a survey was conducted among professionals from different job roles and company sizes. The goal was to understand how people use HR systems, what problems they face, and what features they want in a new system.

The survey consisted of a series of questions designed to gather insights on HR system usage, challenges, and user expectations. The questionnaire is included in Appendix – C.

The screenshots below showcase the survey responses, highlighting user feedback on HR system adoption, challenges, satisfaction levels, and preferred features for an improved HR management system.

Demographic Insights Review

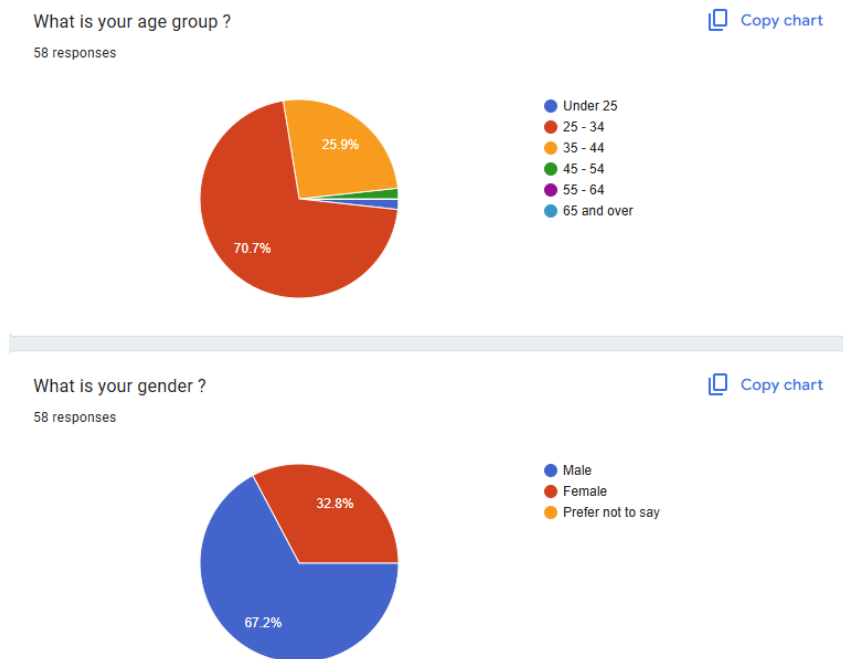


Figure 2. 1: Demographic Insights Review

Most survey respondents are in the 25-34 age group. This age demographic is generally more adept at using technology and digital tools, indicating a high potential for engaging with advanced HR management systems. The preference for modern, efficient, and user-friendly systems among this age group can drive the development of more intuitive and accessible HR solutions.

The gender distribution among the respondents is relatively balanced, with a slight skew towards female participants. This balanced representation ensures that the feedback collected is inclusive and reflects the needs and preferences of both male and female users. Understanding gender-specific preferences can help tailor HR systems to be more effective and user-friendly for a diverse workforce.

User Workplace Review

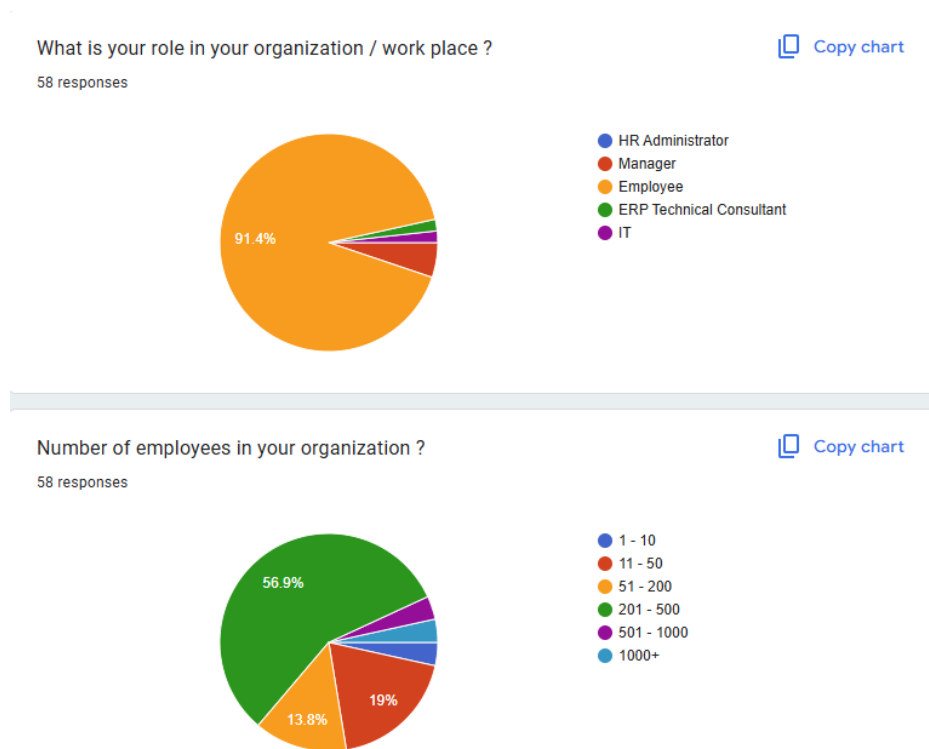


Figure 2. 2: User Workplace Review

Most respondents identified themselves as employees rather than in managerial roles. This indicates that the insights gathered are from individuals who interact directly with HR systems daily. Their feedback is crucial as it highlights the practical challenges and needs experienced at the operational level, which can inform improvements in HR system design and functionality.

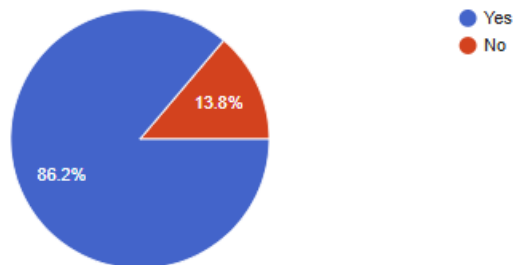
The respondents work in organizations of various sizes, from small businesses with 11-50 employees to large enterprises with over 1000 employees. This range showcases the differing needs and challenges faced by organizations of different scales. Smaller organizations may seek cost-effective, scalable solutions, while larger enterprises may prioritize advanced features and integration capabilities in HR systems.

Current HR Systems Review

Do you currently use an HR management system?

 Copy chart

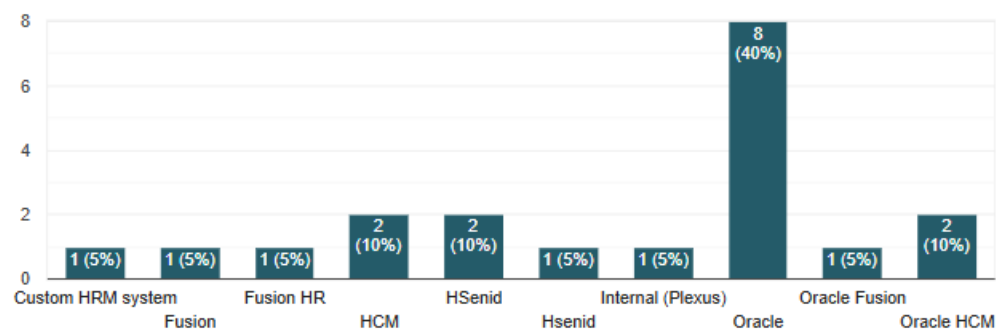
58 responses



If yes, which system do you use ?

 Copy chart

20 responses



On a scale of 1 to 5, how satisfied are you with your organizations current HR management system ?

 Copy chart

54 responses

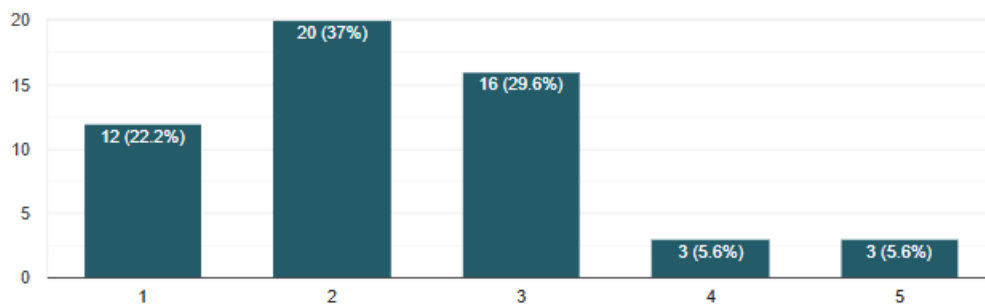
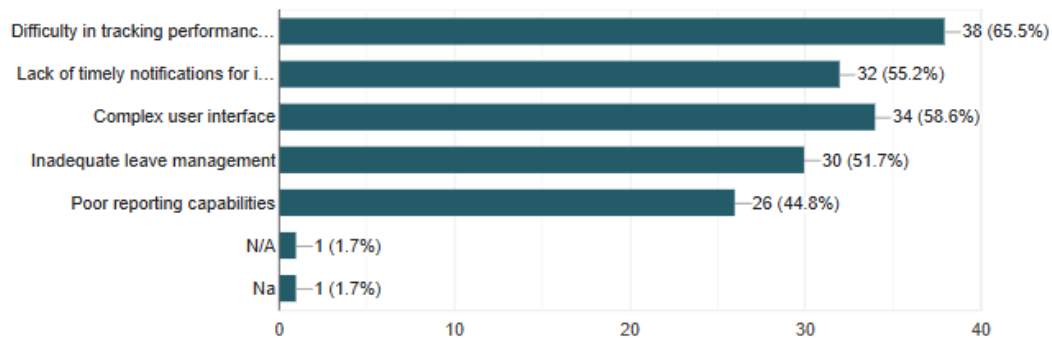


Figure 2. 3: Current HR Systems Review Part 01

What are the most challenging aspects of your current HR system? (Select all that apply)

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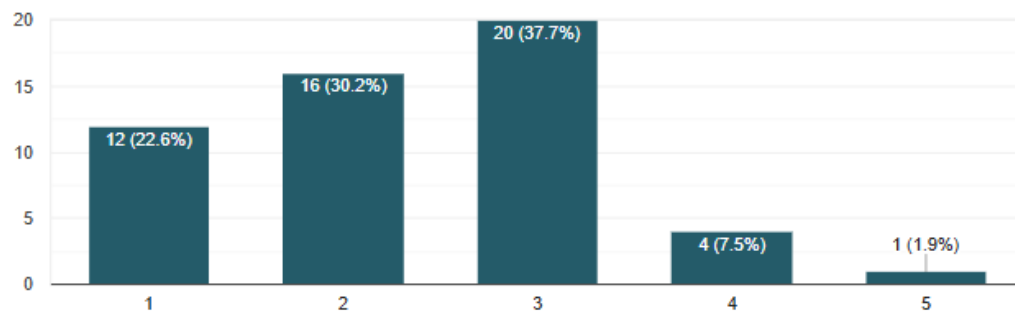
58 responses



On a scale of 1 to 5, how user-friendly do you find the your current HR system ?

[Copy chart](#)

53 responses



How often do you receive timely responses from HR when you have queries ?

[Copy chart](#)

57 responses

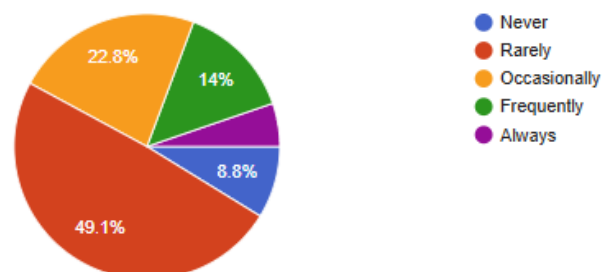


Figure 2. 4: Current HR Systems Review Part 02

An overwhelming majority (86.2 %) of the respondents indicated that they use an HR management system to streamline their HR processes and Oracle emerged as the clear favorite among the users. It seems most respondents are dissatisfied with the current system and most common issues are tracking performance, complex interfaces, and missing important updates. Many users also struggle with managing leave and poor reporting capabilities, showing the need for a more user-friendly and efficient HR system.

Additionally, a large portion of respondents indicated that they rarely or occasionally receive timely responses, suggesting delays in HR communication. Only a small percentage reported receiving frequent or immediate responses, highlighting the need for faster and more efficient HR support.

User Insight on AI Assistant

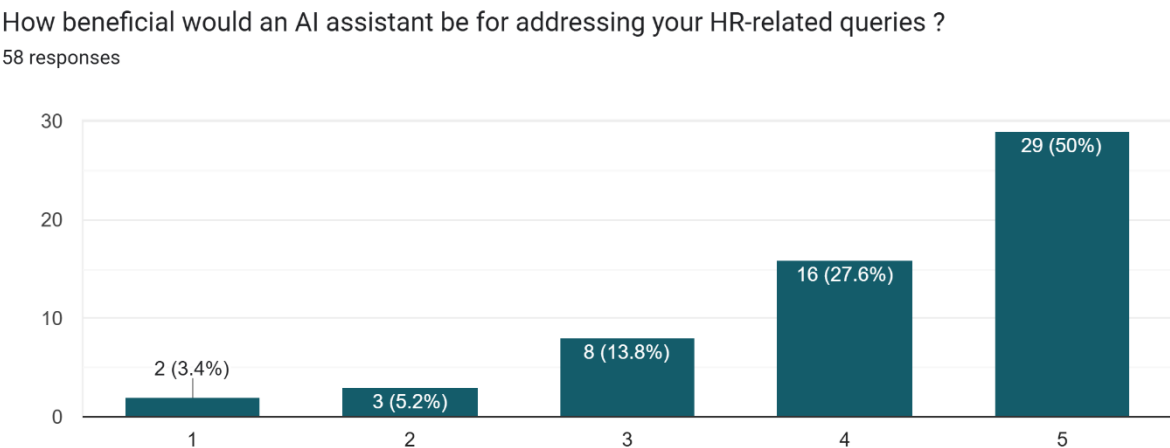


Figure 2. 5: User Insight on AI Assistant

Most participants rated it highly, indicating strong interest in AI-powered solutions for HR support. The highest rating (5) received the most responses, while only a small percentage found it not beneficial. These results suggest that incorporating an AI assistant in HR systems could improve response times, enhance efficiency, and provide better employee support, addressing common communication gaps in traditional HR processes.

User Devices Review

How do you typically access your current HR system ?
58 responses

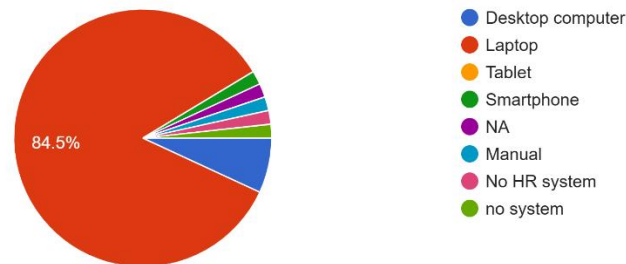


Figure 2. 6: User Devices Review

A vast majority (84.5%) of respondents use laptops, making it the preferred device for HR-related tasks. Desktop computers and smartphones account for a smaller portion, while only a few respondents use tablets or manual methods. Additionally, some indicated that they do not have an HR system in place. These insights emphasize the importance of designing an HR system optimized for laptop and mobile access, ensuring accessibility and usability across different devices.

Features and Preferences Review

How often do you set and track career goals and performance metrics ?
58 responses

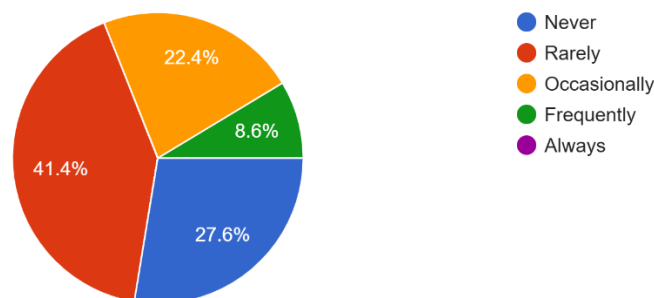


Figure 2. 7: Features and Preferences Review 01

Chart shows that a significant portion of respondents rarely or never track their career goals, indicating a lack of structured performance management. Only a small percentage frequently engage in goal tracking, suggesting that many employees may not have access to or actively use career development tools.

Would tracking your career and performance in a system help you manage them better ?

58 responses

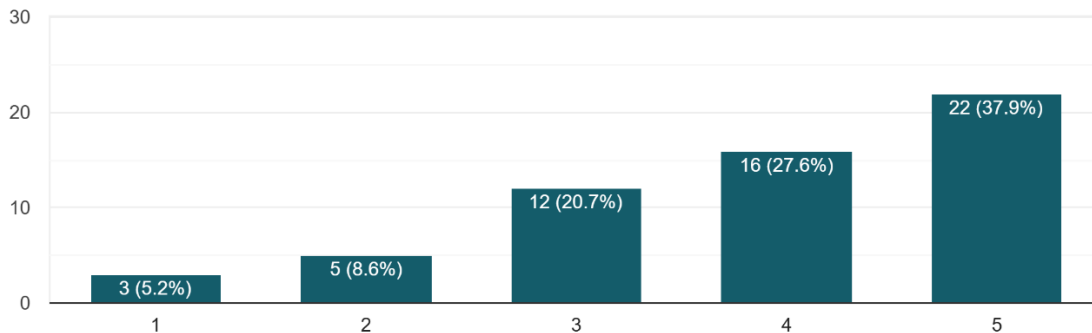


Figure 2. 8: Features and Preferences Review 02

The chart highlights the potential impact of an HR system in career tracking. Most respondents believe that a structured system would help them manage their career and performance better, with the highest ratings (4 and 5) receiving the most responses. These findings emphasize the need for an HR system with integrated career & performance tracking features to support employee growth and engagement.

What features do you find most useful for a HR management system? (Select all that apply)

58 responses

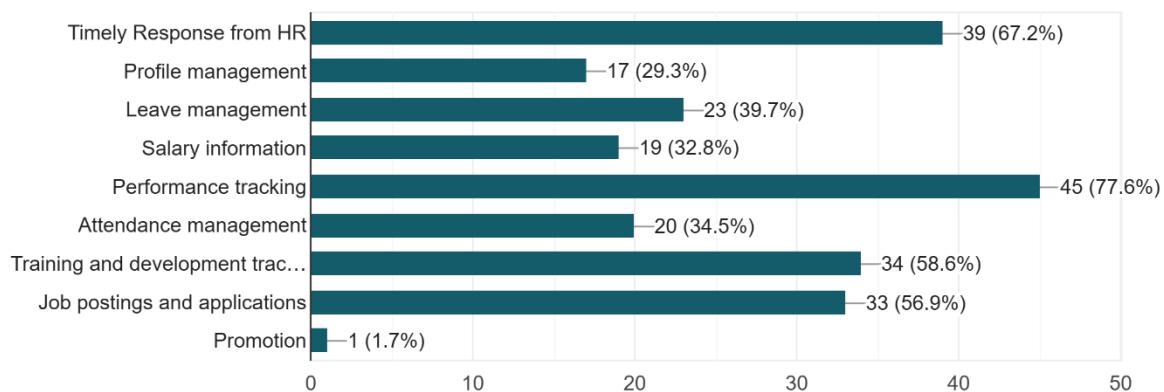


Figure 2. 9: Features and Preferences Review 03

The chart highlights the most useful features that users expect in an HR management system. The most highly requested features include performance tracking, timely responses from HR, showing a strong demand for tools that enhance employee growth and engagement. Other important features include training, leave management, attendance tracking, job postings, and salary

information, indicating that users prefer a comprehensive system that simplifies multiple HR functions. Profile management and promotional tracking were the least selected, suggesting they are less of a priority compared to core HR operations. These insights emphasize the need for an efficient, user-friendly HR system that prioritizes performance management, automation, and real-time support.

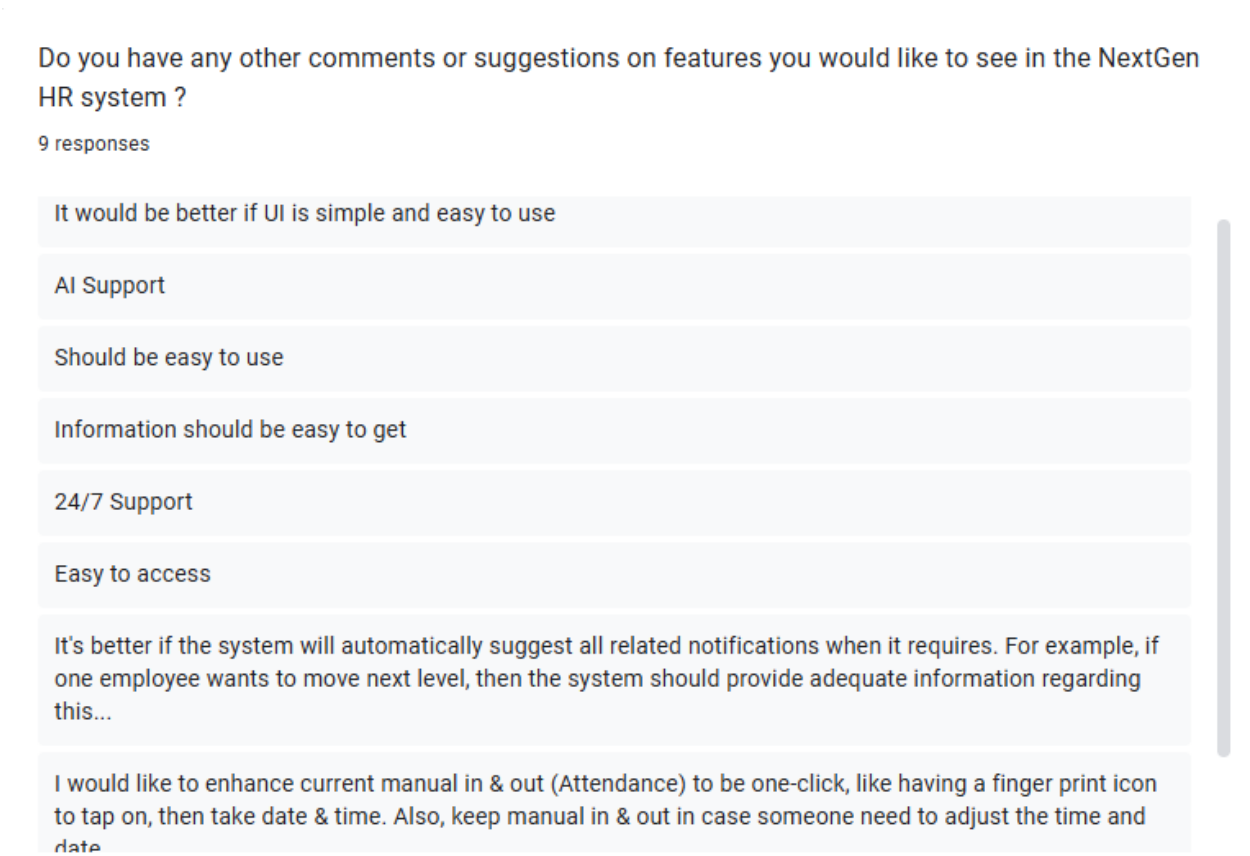


Figure 2. 10: Features and Preferences Review 04

The responses provide valuable user feedback and suggestions for the NextGen HR system, emphasizing the need for a simple, user-friendly interface and easy access to information. Many users highlighted the importance of AI support and 24/7 availability, indicating a preference for automated assistance and real-time support.

The survey revealed key HR system challenges, a demand for AI support, automation and a preference for better performance tracking, timely HR responses, and a simple UI. These insights will shape a user-friendly, AI-driven HR system.

2.3 Requirement Analysis

This section outlines the requirements for the ElevateNex – NextGen HR System. It includes an analysis of the system’s users, usage frequency, and specific functional and non-functional requirements, each defined to ensure a comprehensive and user-centered solution. Key success factors necessary for successful implementation are also discussed.

2.3.1 User Groups and user characteristics

- **HR Administrators:** Responsible for configuring system settings and overseeing the application & managing HR tasks and overseeing employee-related queries and tasks.
- **Employees:** Access the system for self-service tasks, such managing their profile up to date by submitting worktime, submitting leave requests, tracking performance and career goals, submitting requests to HR for requirements and complaints or concerns.
- **Managers:** Oversee team members’ records, approve requests, and monitor performance insights.

2.3.2 Functional Requirements

1. Employee Registration and Management

- The system shall enable HR administrators to register new employees by capturing essential details.
- HR administrators shall have the ability to update or deactivate employee accounts as required.

2. Employee Profile Management

- Employees shall securely log into the system using an authentication mechanism.
- The system shall allow employees to update personal information, including contact details and emergency contacts.
- Employees shall be able to maintain their professional profiles, including skills, educational qualifications, certifications, and professional development achievements.

3. Employee Search and Filtering for Managers

- Managers shall be able to search for employees based on skills, certifications, and qualifications.
- The system shall provide advanced filtering options to refine search results based on criteria such as language proficiency, technical skills, educational background, and certifications.
- Search results display key employee details, including name, position, and skills, to support project assignments and workforce planning.

4. Announcements and Notifications

- HR administrators shall be able to broadcast announcements to all employees or targeted groups.
- The system shall allow announcements to be categorized (e.g., policy updates, upcoming events, and deadlines) to improve visibility.
- Employees shall receive notifications via their dashboards, with optional email notifications for critical updates.

5. Email Notifications

- The system shall generate email notifications for significant updates, including policy changes, events, and deadlines.
- Employees shall receive notifications regarding career goal updates and request status changes.
- Email notifications shall contain direct links to the relevant sections of the HR system for quick access.

6. Time Logging

- Employees shall be able to manually log their work hours, specifying the work location (on-site, remote, or home) and providing necessary justifications.
- The system shall maintain a history of time logs for future reference and reporting.
- HR administrators and managers shall have access to view and manage their team's time records.

7. Leave Management

- Employees shall be able to submit leave requests, specifying the leave type (e.g., annual, casual, sick) and requested dates & be routed to the respective manager for approval.
- Employees shall have access to their current leave balance and a record of approved or pending leave requests.
- The system shall prevent employees from submitting leave requests that exceed their available balance.

8. Employee Performance Monitoring

- Managers should conduct performance reviews based on predefined Key Performance Indicators (KPIs)(“KPI Examples for Employees in 2024,” n.d.).
- HR administrators should have oversight of all performance records.

9. Career Goals Management

- Managers shall have the ability to set career goals for employees.
- Employees shall be able to update and track the progress of their assigned career goals.
- Managers shall have the authority to approve or reject employees' career goal progress updates.

10. HR Requests Management

- Employees shall be able to submit HR-related requests through the system.
- HR administrators shall receive notifications of incoming requests and update their status with relevant comments.
- Employees shall be able to track the status and resolution of their requests.

11. Employee Complaints and Concerns Management

- Employees shall have the ability to submit complaints or concerns to HR through the system, with an option to remain anonymous.
- HR administrators shall be notified and responsible for addressing and updating the progress of complaints.
- Employees shall have visibility into the status of their submitted complaints.

12. AI Chatbot Assistance

- The system shall incorporate an AI-powered chatbot to assist employees and managers with inquiries related to HR policies, benefits, and procedures.
- The chatbot should utilize a predefined knowledge base to provide quick responses to frequently asked questions.

2.3.3 Non-Functional Requirements

1. Reliability

- The system should have high availability and minimal downtime.

2. Scalability:

- The system should be able to handle increasing workloads and user numbers without compromising performance.

3. Maintainability

- The system should be easy to maintain and update.

4.Security

- The system shall encrypt all sensitive data and securely manage credentials through environment files.

5.Accessibility

- The user interface should be intuitive and easy to navigate.

Success Factors

- **Training Programs:** User training to ensure effective use of the system.
- **Infrastructure:** Adequate server and network resources to support the application.
- **User Support:** IT supports availability for troubleshooting and maintenance.
- **Stakeholder Engagement:** Support from organizational leaders to promote adoption.

2.3.4 Review of Similar Systems

Prior research and analysis have been conducted to understand current HR management challenges and to identify potential solutions. Several existing HR systems and software solutions have been reviewed as part of the background study and below are two popular products out of them.

Oracle HCM Cloud:

Oracle HCM (Human Capital Management) is a widely recognized and comprehensive HR management system utilized by numerous organizations globally (“Human Capital Management (HCM) | Oracle,” n.d.). It offers a range of features designed to streamline HR processes, including recruitment, onboarding, talent management, performance tracking, and payroll administration. However, despite its popularity it also comes with drawbacks that need attention.

One significant concern is the high cost associated with Oracle HCM Cloud (“Oracle Fusion Cloud HCM Reviews 2025. Verified Reviews, Pros & Cons,” n.d.) which may be prohibitive for small and medium-sized businesses. The initial investment, along with licensing fees and ongoing maintenance costs, can impose financial constraints, potentially limiting access to the platform for organizations with limited budgets. Moreover, user feedback (“Oracle Fusion Cloud Human Capital Management (HCM) Reviews | G2,” n.d.) highlights issues with the user interface, citing outdated designs and difficulties in navigating Oracle resources. Addressing these concerns is crucial to ensuring a positive user experience and maximizing the system's usability and effectiveness.

PeoplesHR:

PeoplesHR is a cloud-based HR management software solution (“PeoplesHR: All-in-One HRIS Portal For Modern Teams,” n.d.). They offer a suite of tools designed to streamline core HR functions for businesses. It acts as a central hub, consolidating tasks like recruitment, onboarding, payroll, and performance management. This web-based approach allows authorized users to access the system from anywhere with an internet connection, increasing flexibility and potentially enhancing remote work capabilities.

PeoplesHR also has its limitations. Some of the potential drawbacks include the absence of an Intelligent bot to support users in finding relevant information related to organization and navigation of the application. Additionally, according to user reviews (“The G2 on PeoplesHR,” 2025), there is a delay in receiving support, and it has been suggested that customer service should be improved. This issue could be addressed by implementing an Intelligent module that responds 24/7, as mentioned in the scope.

SAP SuccessFactors:

SAP SuccessFactors (“Human Capital Management (HCM) Software | SAP SuccessFactors,” n.d.), despite its leading position in the HR technology market, presents significant challenges for organizations. The system's complexity is a primary hurdle. Its multitude of modules and configuration options, while offering flexibility, can lead to lengthy and costly implementation projects. This complexity often necessitates specialized expertise, driving up costs and extending project timelines. Moreover, the steep learning curve associated with SuccessFactors poses a significant obstacle for both HR professionals and end-users. Mastering the system's intricate functionalities and user interface requires substantial training and support, impacting productivity and user adoption (“The G2 on SAP SuccessFactors,” 2025).

In addition to complexity, SuccessFactors faces criticism for its rigidity in certain areas. The software can be quite complex as locating the right features in this comprehensive all-in-one tool can be a challenging task. Another downside of SAP SuccessFactors is its limited customization capabilities and reporting functionalities. Some users complain about the slow and outdated interface and having to deal with occasional bugs and system crashes (“The G2 on SAP SuccessFactors,” 2025).

ADP Workforce Now:

ADP Workforce Now is a popular cloud-based HR solution offering a comprehensive suite of HR functionalities (“Workforce Now® All-In-One HR Software | Capabilities | ADP,” n.d.). While it provides a robust platform for managing HR processes, it also faces certain challenges.

One common criticism is the system's complexity, particularly for organizations with intricate HR requirements. The configuration process can be time-consuming and requires specialized

expertise. Additionally, the user interface has been reported to be somewhat outdated and difficult to navigate in certain areas, impacting user experience and productivity. While ADP Workforce Now offers a wide range of features, its complexity and user interface limitations can pose challenges for some organizations(“The G2 on ADP Workforce Now,” 2025).

While the above-mentioned HR solutions offer a comprehensive set of features to streamline HR processes, their high cost and usability concerns, such as outdated user interface designs, may pose challenges for some organizations. On the other hand, they provide a cloud-based HR management solution with a focus on core HR functions, but it also has limitations, such as the absence of an intelligent bot to get information on HR policies, procedures, benefits, and other relevant information at any time without going through the entire application or documentation.

Similar Work Comparison

The below comparison table was created using insights from G2(“Business Software and Services Reviews,” n.d.) and Capterra(“Capterra,” n.d.) reviews, which provide real-world user feedback on various HR management systems. The table highlights key aspects such as user interface, customization, scalability, integration capabilities, and ease of adoption. While Workday HCM, SAP SuccessFactors, and Oracle HCM are powerful enterprise solutions, user reviews frequently mention their complexity, steep learning curves, and high implementation costs. PeoplesHR, though more intuitive, has limited integrations and customization options. In contrast, ElevateNex is designed to be highly user-friendly, flexible, and scalable, addressing the shortcomings of existing solutions with intuitive UI, AI-driven support, and seamless integrations, making it a future-ready HR system for both SMEs and large enterprises.

Feature	Workday HCM	SAP SuccessFactors	PeoplesHR	Oracle HCM	ElevateNex (Proposed)
User Interface	Modern but complex	Feature-rich but complex	Simple & intuitive	Enterprise-grade, complex	Easy-to-use, intuitive
Customization & Flexibility	High, but requires expertise	High, enterprise-level	Moderate customization	High, complex setup	Highly customizable & user-friendly
Integration Capabilities	Integrates with multiple enterprise tools	Seamless with SAP products	Limited third-party integrations	Extensive but complex	Flexible, API-based integrations
Scalability	Best for large enterprises	Designed for enterprises	Suitable for SMEs & mid-size	Large-scale, resource-heavy	Scalable for SMEs & enterprises
Ease of Adoption	Time-consuming setup	Requires extensive training	Quick deployment	Time-intensive implementation	Fast and simple implementation
User Learning Curve	Steep learning curve	Complex workflows	Easy for users	Steep learning curve	Minimal learning curve
Support & Documentation	Extensive but requires expertise	Good support but expensive	Decent support but limited documentation	Enterprise-level support but costly	Comprehensive support with AI assistance
User Satisfaction & Feedback	Mixed user reviews, often criticized for complexity	Mixed feedback, praised for features but criticized for complexity	Generally positive user feedback	Users find it powerful but difficult to manage	Designed based on user feedback for optimal usability

Table 2. 1: Similar Work Comparison

2.3.5 Related Technologies

Front-End Requirements

1. Technologies:

- **HTML5, CSS3, JavaScript:** Core front-end technologies for building dynamic and accessible web pages(“Mastering HTML5, CSS3, and JavaScript,” 2023).
- **React:** JavaScript library for creating interactive, component-based user interfaces(“React Reference Overview – React,” n.d.).
- **TypeScript:** Statically typed superset of JavaScript for improved code quality and maintainability(“JavaScript With Syntax For Types.,” n.d.).
- **Bootstrap:** CSS frameworks for responsive and modern UI design(contributors, n.d.).
- **Axios:** HTTP client for making API requests(“Getting Started | Axios Docs,” n.d.).
- **React Router:** Library for handling client-side routing in a SPA(“React Router Home,” n.d.).

2. Browser Compatibility:

- **Supported Browsers:** Google Chrome, Firefox, Microsoft Edge, Safari.

3. Design & UI/UX:

- **Component-Based Architecture:** Leveraging reusable React components for efficient rendering and maintainability(“Component Architecture | Hands on React,” n.d.).
- **Responsive Design:** Ensuring a seamless user experience across various screen sizes and devices(“HTML Responsive Web Design,” n.d.).
- **Material UI:** UI component libraries for building elegant and user-friendly interfaces(“Material UI,” n.d.).

Back-End Requirements

1. Technologies:

- **Spring Boot:** Java-based framework for building scalable, production-ready backend services(“Spring Framework,” n.d.).
- **Spring Security:** Implementation of authentication and authorization, including JWT-based security(“Spring Security,” n.d.).
- **Java:** Version 17 or higher(“JDK Releases,” n.d.).
- **MySQL:** Relational Database Management System (RDBMS)(“MySQL :: MySQL Documentation,” n.d.).
- **OpenAI API:** AI model to handle intelligent queries and interactions(“OpenAI Platform,” n.d.).
- **FlowiseAI:** Low-code LLM App Builder for AI-driven workflows(“Introduction | FlowiseAI,” 2025).
- **Spring Data JPA:** Simplifies database operations with MySQL(“Spring Data JPA,” n.d.).

- **Spring Boot Actuator:** Provides production-ready monitoring features(“Getting Started | Building a RESTful Web Service with Spring Boot Actuator,” n.d.).
- **Lombok:** Reduces boilerplate code with annotations like `@Data`, `@Getter`, `@Setter`(“Stable,” n.d.).

2. API & Documentation:

- **Spring Boot REST API:** Exposing RESTful endpoints for front-end communication(“Spring Framework,” n.d.).
- **Swagger:** API documentation and testing tool(“Swagger Documentation,” n.d.).
- **Postman:** API testing tool for manual and automated testing(“Postman,” n.d.).

Tools & Development Workflow

1. Build & Dependency Management:

- **Maven:** Dependency management and building tool for Java projects(“Welcome to Apache Maven – Maven,” n.d.).
- **npm:** Dependency management for React applications(“About npm | npm Docs,” n.d.).
- **Webpack:** Module bundlers for optimizing front-end assets(“Concepts,” n.d.).

2. Version Control & Collaboration:

- **Git:** Version control system for tracking changes(“Git - Documentation,” n.d.).
- **GitHub:** Code hosting and collaboration platform(“GitHub.com Help Documentation,” n.d.).

2.4 Summary

This chapter lays the foundation for developing ElevateNex – NextGen HR System by analyzing user needs, existing HR solutions, and technical requirements. A survey analysis highlights key challenges such as complex interfaces, poor performance tracking, and delayed HR responses, emphasizing the need for an AI-driven, user-friendly system. The requirement analysis defines essential functional and non-functional needs. A comparative review of HR solutions like Oracle HCM, PeoplesHR, ADP Workforce Now and SAP SuccessFactors reveals usability issues, high costs, and limited AI support, guiding ElevateNex to be more intuitive and flexible. The system will leverage React, Spring Boot, MySQL, OpenAI APIs, and FlowiseAI for AI-driven support. By integrating user feedback and advanced technology, ElevateNex aims to deliver a modern, efficient HR platform tailored to workplace demands.

Chapter 3 - Design Chapter

The design chapter provides an in-depth look at the architectural and design strategies that underpin the ElevateNex: NextGen HR System, detailing how each component supports the system's overall functionality, security, and scalability. As an integrated platform designed to streamline HR operations, this HR system incorporates modularity, user-centered design, and advanced technologies to meet the diverse needs of its users, including HR administrators, managers, and employees. The design approach takes into consideration the system's primary requirements such as employee management, time tracking, leave management, and payroll details ensuring that each feature is built to be resilient, efficient, and adaptable.

The backend architecture leverages Spring Boot microservices(“Spring Framework,” n.d.) to create isolated, loosely coupled modules that can be independently developed, deployed, and scaled. This microservices approach is paired with a React frontend, which is designed to be responsive, intuitive, and accessible across devices(“React Reference Overview – React,” n.d.). Each design decision is strategically informed by best practices, including security-driven development, user experience (UX) principles, and data-driven insights. Furthermore, the system integrates advanced capabilities such as an AI-powered chatbot for user assistance using FlowiseAI(“Introduction | FlowiseAI,” 2025), which uses Natural Language Processing (NLP) to interpret and respond to a variety of HR-related inquiries.

Through this chapter, it outlines the key design strategies ranging from system architecture and microservices organization to API design and frontend considerations and provide detailed UML diagrams to illustrate how different components interact. These design decisions collectively ensure that the ElevateNex system not only meets current functional requirements but also remains adaptable to future needs, enabling seamless enhancements and robust support for growing organizational demands.

3.1 Related Design Strategies

Rapid Application Development (RAD)

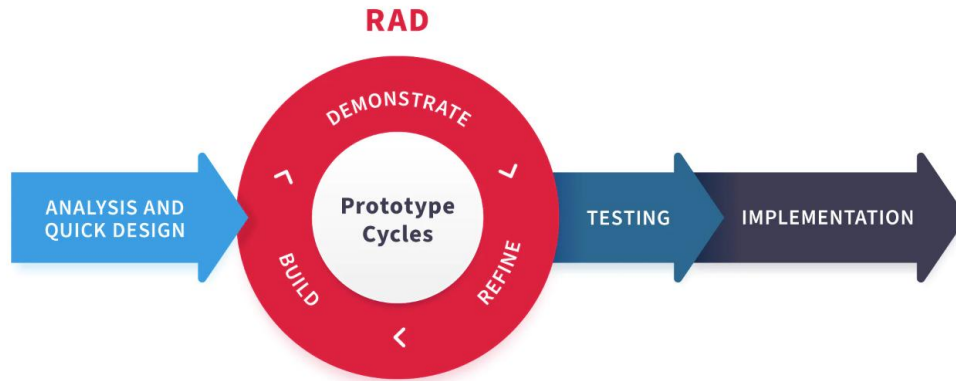


Figure 3. 1: Rapid Application Development

I selected the Rapid Application Development (RAD) methodology for this project due to its adaptability and responsiveness to changes during the development process. Unlike traditional models that rely on extensive planning before any work begins, RAD emphasizes iterative development. Given the complexity of the HR system, with features like employee management, time tracking, leave management, and AI bot, RAD offers a framework that enables faster prototyping, frequent user feedback, and swift incorporation of changes. This iterative approach allowed me to refine each feature based on user input from HR administrators, managers, and employees, ensuring that the system evolves to meet their needs more effectively over time (Bondar, 2021).

RAD's iterative development cycle is particularly beneficial for complex systems that involve multiple modules and services, where Spring Boot microservices and a React frontend are being used. RAD encourages breaking down the project into small, manageable components that can be prototyped, reviewed, and refined independently, aligning well with the microservices approach. This allows each microservice such as employee profile management, work time recording, or leave management to be developed, tested, and enhanced individually, reducing dependencies and enabling faster progress. Additionally, RAD's flexibility aligns with the goal of developing a user-friendly, responsive React frontend, as it allows iteratively improve the UI/UX based on ongoing feedback, ensuring a smoother, more intuitive experience for users ("Rapid Application Development (RAD) | Definition, Steps & Full Guide," n.d.).

3.2 System Architecture

Backend (Spring Boot):

- **Microservices:** Backend will be developed on microservices, ensuring modularity and scalability. Spring Boot's microservice architecture("Spring Framework," n.d.) allows services to be developed, deployed, and scaled independently.
- **Database:** Usage of a relational database (MySQL) for structured data and with access controlled per service("MySQL :: MySQL Documentation," n.d.).
- **API Gateway:** Use an API Gateway to manage requests, route them to the appropriate microservice, and enforce security (e.g., JWT authentication)(bezkoder, 2022).
- **Inter-service Communication:** Use RESTful API("What is a REST API?," n.d.)s for synchronous communication and a messaging broker for asynchronous events such as sending notifications.
- **Chatbot Integration:** The NLP-based AI chatbot will be a separate service using FlowiseAI("Introduction | FlowiseAI," 2025).

Frontend (React)

- **Component-based Design:** Each functional area (e.g., Employee Profile, Leave Management) will have dedicated React components for maintainability and reusability.
- **State Management:** Usage of Redux or Context API to manage global state across components, especially for data shared across modules like user information and notifications("React Reference Overview – React," n.d.).
- **API Integration:** Axios or Fetch API will be used to handle HTTP requests and connect the frontend with the backend services through the API Gateway.

Security and Authentication

- **JWT-based authentication:** Implement JWT-based authentication to secure access to backend services, ensuring user identity verification and secure session management.
- **Data Encryption:** Use HTTPS for secure data transfer and encrypt sensitive information at rest and in transit.
- **Role-based Access Control (RBAC):** Define roles and permissions for HR admins, managers, and employees to control access to different services and features.

3.3 UML diagrams

The following types of UML diagrams were utilized to assess the design and enhance the accuracy and effectiveness of the design.

Use Case Diagram

Use case diagram is the primary form of system/software requirements for a new software program underdeveloped. Use cases specify the expected behavior (what), and not the exact method of making it happen (how). Use cases once specified can be denoted both textual and visual representation (i.e. use case diagram). A key concept of use case modeling is that it helps us design a system from the end user's perspective. It is an effective technique for communicating system behavior in the user's terms by specifying all externally visible system behavior("What is Use Case Diagram?," n.d.).

Entity-Relationship (ER) Diagram

An Entity Relationship (ER) Diagram is a type of flowchart that illustrates how "entities" such as people, objects or concepts relate to each other within a system. ER Diagrams are most often used to design or debug relational databases in the fields of software engineering, business information systems, education and research("What is an Entity Relationship Diagram (ERD)?," n.d.).

Activity Diagram

An activity diagram visually presents a series of actions or flow of control in a system like a flowchart or a data flow diagram. Activity diagrams are often used in business process modeling. They can also describe the steps in a use case diagram. Activities modeled can be sequential and concurrent. In both cases an activity diagram will have a beginning (an initial state) and an end (a final state)("Activity Diagram - Activity Diagram Symbols, Examples, and More," n.d.).

Sequence Diagram

Sequence Diagrams are interaction diagrams that detail how operations are carried out. They capture the interaction between objects in the context of a collaboration. Sequence Diagrams are time focus, and they show the order of the interaction visually by using the vertical axis of the diagram to represent time what messages are sent and when("What is Sequence Diagram?," n.d.).

Class Diagram

Class diagram in the Unified Modeling Language (UML) is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among objects("What is Class Diagram?," n.d.).

3.3.1 Use Case Diagram

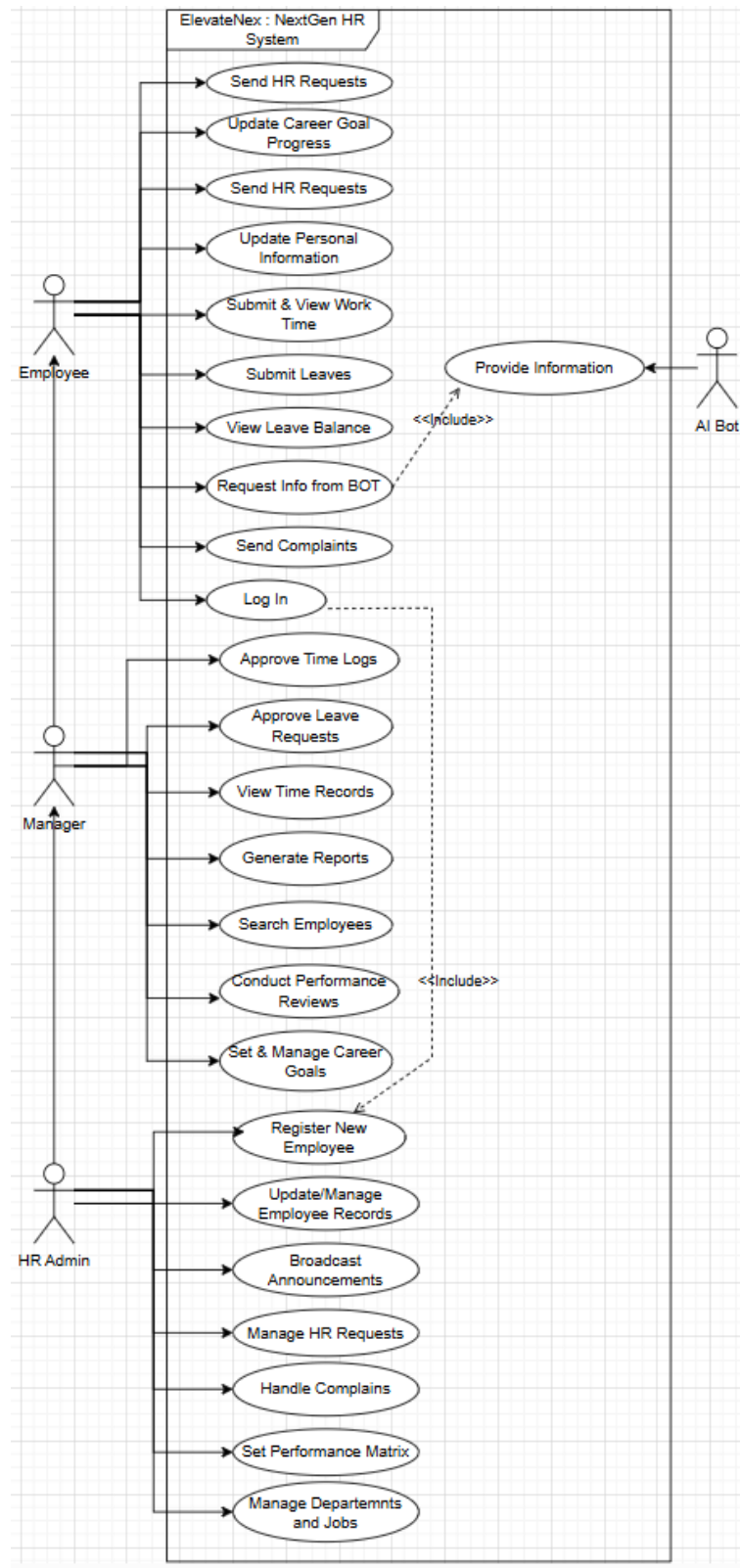


Figure 3. 2: Use Case Diagram

3.3.2 Use Case Narratives

Use Case Narrative is a textual description of a use case that provides a detailed and structured explanation of the interactions between actors and the system(“Use Case Narrative Elements (Success Factors),” n.d.).

Use Case 01: Register New Employee

Attribute	Details
Author	D.O. Samaranayake
Purpose	This use case allows HR administrators to register new employees in the HR system.
Requirements Traceability	1. HR administrators should be able to enter employee details and register them. 2. The system should validate and store the employees' information.
Priority	High
Preconditions	The employee is not yet registered in the system.
Postcondition	The employees' details are stored, and they can access the system.
Actors	HR Administrator, System
Extends	-
Flow of Events	Basic Flow: 1. HR Administrator accesses the "Register Employee" page. 2. HR Administrator enters employee details. 3. The system validates and stores the details. 4. The system confirms successful registration. Alternative Flow: Invalid details: 1. HR Administrator enters incomplete or incorrect information. 2. The system prompts to correct details and resubmit.
Exceptions	Database error: 1. The system cannot store employee information due to a system error. 2. System informs HR Administrator to try again later.

Includes	-
Notes/Issues	Ensure data validation to prevent duplicate employee records.

Table 3. 1: Use Case 01: Register New Employee

Use Case 02: Activate/Deactivate Employee Account

Attribute	Details
Author	D.O. Samaranayake
Purpose	This case allows HR administrators to activate or deactivate existing employees' account.
Requirements Traceability	1. HR administrators can perform this action. 2. The system updates the status of the account and restricts the access of the system for user if deactivated.
Priority	High
Preconditions	The user is registered in the system.
Postcondition	User account is registered & activation/deactivated is required.
Actors	HR Administrator, System
Extends	-
Flow of Events	Basic Flow: 1. HR Administrator accesses "User Directory" and finds the account. 2. HR Administrator updates account status. 3. System confirms changes. Alternative Flow: Invalid Status update: 1. User is not registered in the system.
Exceptions	Database error: 1. System error prevents data updates. 2. System informs HR Administrator to try again later.
Includes	-
Notes/Issues	Ensure system restricts access to deactivated users.

Table 3. 2: Use Case 02: Activate/Deactivate Employee Account

Use Case 03: Broadcast Announcements

Attribute	Details
Author	D.O. Samaranayake
Purpose	This use case enables HR administrators to broadcast announcements to all employees or specific groups.
Requirements Traceability	1. HR administrators should be able to create announcements. 2. The system should broadcast to selected recipients.
Priority	High
Preconditions	Announcement content is ready for broadcasting.
Postcondition	Announcement is sent to all selected recipients.
Actors	HR Administrator, System
Extends	-
Flow of Events	Basic Flow: 1. HR Administrator accesses the "Announcements" page. 2. HR Administrator creates, selects recipients & sends it. 3. System broadcasts message. Alternative Flow: Invalid input: 1. HR Administrator leaves the required fields blank. 2. System prompts for complete input.
Exceptions	Network error: 1. System cannot broadcast due to network issues. 2. System informs HR Administrator of the issue.
Includes	-
Notes/Issues	Ensure system logs sent announcements for future reference.

Table 3. 3: Use Case 03: Broadcast Announcements

Use Case 04: Log In

Attribute	Details
Author	D.O. Samaranayake
Purpose	This use case allows employees to securely log into the HR system.
Requirements Traceability	1. Employees must be able to log in with valid credentials. 2. The system should authenticate users before granting access.
Priority	High
Preconditions	Employees have registered credentials.
Postcondition	Employees gain access to the system.
Actors	Employee, System
Extends	-
Flow of Events	Basic Flow: 1. Employee accesses the login page. 2. Employee enters credentials. 3. System authenticates and grants access. Alternative Flow: Invalid login: 1. Employee enters incorrect credentials. 2. The system denies access and prompts for re-entry.
Exceptions	1. Users cannot login to the system without valid credentials. 2. The system instructs employees to enter valid login.
Includes	-
Notes/Issues	Ensure login is validated.

Table 3. 4: Use Case 04: Log In

Use Case 05: Update Personal Information

Attribute	Details
Author	D.O. Samaranayake
Purpose	This allows employees to update their personal information in the HR system.
Requirements Traceability	1. Employees can modify their personal information. 2. System validates and updates stored information.
Priority	High
Preconditions	Employees are logged into the system.
Postcondition	Employees' personal information is updated in the system.
Actors	Employee, System
Extends	-
Flow of Events	Basic Flow: 1. Employee accesses the "Update Profile" page. 2. Employee modifies details. 3. System saves updates. Alternative Flow: Invalid data: 1. Employee enters incorrect or incomplete information. 2. System prompts for corrections.
Exceptions	Database error: 1. System cannot store updates due to an error. 2. The system informs employees of the issue.
Includes	-
Notes/Issues	Validate input fields for accuracy.

Table 3. 5: Use Case 05: Update Personal Information

Use Case 06: Record Skills and Qualifications

Attribute	Details
Author	D.O. Samaranayake
Purpose	This case allows employees to record and update their skills, educational qualifications, and certifications.
Requirements Traceability	1. Employees can add and modify their skill set and qualifications. 2. System validates and stores updates.
Priority	Medium
Preconditions	Employees are logged into the system.
Postcondition	Employees' skills and qualifications are updated in the system.
Actors	Employee, System
Extends	-
Flow of Events	Basic Flow: 1. Employee accesses "Update Profile" page. 2. Employee adds or updates details. 3. System validates and stores data. Alternative Flow: Invalid data: 1. Employee enters incomplete details. 2. System prompts for complete information.
Exceptions	System error: 1. Data entry fails due to a system error. 2. The system informs employees to retry later.
Includes	-
Notes/Issues	Skills and qualifications should be separated for easier search functionality.

Table 3. 6: Use Case 06: Record Skills and Qualifications

Use Case 07: Submit Work Time

Attribute	Details
Author	D.O. Samaranayake
Purpose	Allow employees to submit their work time.
Requirements Traceability	1. Employees can submit how many hours they worked. 2. The system validates and records the time submission.
Priority	High
Preconditions	Employees are logged into the system.
Postcondition	Work time entry is stored in the system.
Actors	Employee, System
Extends	-
Flow of Events	Basic Flow: 1. Employee accesses "Time Log" page. 2. Employee enters work hours. 3. System saves the entry and notifies manager. Alternative Flow: Invalid time entry: 1. Employee submits hours outside allowable range. 2. System prompts for correction.
Exceptions	System error: 1. Entry fails to store due to a system error. 2. The system notifies employees of the issue.
Includes	-
Notes/Issues	Ensure entry fields for not send duplicate records.

Table 3. 7: Use Case 07: Submit Work Time

Use Case 08: Submit Leave Requests

Attribute	Details
Author	D.O. Samaranayake
Purpose	This use case allows employees to submit leave requests for various leave types, such as annual, casual, and sick leave.
Requirements Traceability	1. Employees can select leave type and submit dates. 2. System validates and records leave request.
Priority	High
Preconditions	Employees are logged into the system.
Postcondition	Leave request is stored and pending approval if required.
Actors	Employee, System
Extends	-
Flow of Events	Basic Flow: 1. Employee accesses "Leave Request" page. 2. Employee selects leave type and dates. 3. System saves request and notifies manager. Alternative Flow: Invalid request: 1. Employee selects unavailable dates. 2. System prompts for available dates.
Exceptions	System error: 1. Submission fails due to a system error. 2. System informs employees of issue.
Includes	-
Notes/Issues	Ensure leave balances are updated upon approval of leave requests.

Table 3. 8: Use Case 08: Submit Leave Requests

Use Case 09: Approve Leave Requests

Attribute	Details
Author	D.O. Samaranayake
Purpose	This case allows managers to review and approve or reject leave requests submitted by their team members.
Requirements Traceability	1. Managers should be able to view pending leave requests. 2. Managers can approve or reject requests, updating the system accordingly.
Priority	High
Preconditions	Leave requests are pending approval.
Postcondition	Approved or rejected leave requests are updated in the system and the employee is notified.
Actors	Manager, System
Extends	-
Flow of Events	Basic Flow: 1. Manager accesses the "Leave Approval" page. 2. Manager reviews each request. 3. Manager approves or rejects requests. 4. System updates the leave status and notifies employee. Alternative Flow: Incorrect approval action: 1. Manager mistakenly rejects/approves. 2. System allows manager to undo decision.
Exceptions	System error: 1. Update fails due to a system error. 2. System informs manager to retry.
Includes	-
Notes/Issues	Ensure leave balances are updated.

Table 3. 9: Use Case 09: Approve Leave Requests

Use Case 10: Assist with HR Inquiries (AI Chatbot)

Attribute	Details
Author	D.O. Samaranayake
Purpose	This use allows an AI chatbot to assist employees and managers with general HR inquiries.
Requirements Traceability	1. The chatbot should understand and respond to basic HR queries.
Priority	High
Preconditions	Employee or manager initiates a chat with the AI chatbot.
Postcondition	Chatbot responds to inquiries based on the provided knowledge base
Actors	Employee, Manager, AI Chatbot
Extends	-
Flow of Events	Basic Flow: 1. Employee or manager initiates a question with the chatbot. 2. Chatbot provides a response or further options. Alternative Flow: Incomplete inquiry: 1. User submits an incomplete question. 2. Chatbot prompts “it’s not clear”.
Exceptions	Service error: 1. Chatbot fails to respond due to a system issue.
Includes	-
Notes/Issues	Update chatbot’s response database for accuracy in handling HR inquiries.

Table 3. 10: Use Case 10: Assist with HR Inquiries (AI Chatbot)

Use Case 11: Approve Time Logs

Attribute	Details
Author	D.O. Samaranayake
Purpose	This use case allows managers to review and approve employee-submitted time logs.
Requirements Traceability	1. Managers should be able to view and approve/reject time logs submitted by employees.
Priority	High
Preconditions	Employees must have submitted their time logs. The manager must be logged into the system.
Postcondition	The time log is approved or rejected.
Actors	Manager
Extends	-
Flow of Events	Basic Flow: 1. Manager navigates to the time logs approval section. 2. System displays pending time logs. 3. Manager reviews the logs. 4. Manager approves or rejects the log. 5. System updates status and notifies the employee.
Alternative Flow	Invalid Time Log: 1. If incorrect/missing details, the manager requests a revision. 2. Employee is notified to update and resubmit.
Exceptions	No Pending Logs: - If no logs are available, the system displays a message.
Includes	-
Notes/Issues	Ensure managers can filter logs by date, department, and employee.

Table 3. 11: Use Case 11: Approve Time Logs

Use Case 12: View Leave Balance

Attribute	Details
Author	D.O. Samaranayake
Purpose	Allows employees to check their remaining leave balance.
Requirements Traceability	1. The system must provide up-to-date leave balances for employees.
Priority	High
Preconditions	- The employee must be logged into the system.
Postcondition	- Employee views their leave balance.
Actors	Employee
Extends	-
Flow of Events	Basic Flow: 1. Employee navigates to the Request Leave section. 2. System retrieves leave data. 3. System displays the employee's leave balance.
Alternative Flow	Leave Balance Unavailable: 1. If the system cannot retrieve the balance, it displays an error message.
Exceptions	Database Error: - System fails to fetch leave balance due to an issue.
Includes	-
Notes/Issues	Ensure leave balance updates dynamically when new leave requests are submitted.

Table 3. 12: Use Case 12: View Leave Balance

Use Case 13: Generate Reports

Attribute	Details
Author	D.O. Samaranayake
Purpose	Allows HR administrators to generate various reports for analysis.
Requirements Traceability	1. The system should allow HR administrators to generate reports based on different parameters.
Priority	High
Preconditions	- HR administrator must be logged into the system.
Postcondition	- System generates and displays the requested report.
Actors	Sysetem, HR administrator
Extends	-
Flow of Events	Basic Flow: 1. HR administrator goes to Reports Section. 2. System prompts report type (e.g., leave trends, attendance, performance). 3. HR administrator selects filters (date range, department, etc.). 4. System fetches data and generates the report. 5. HR administrator views or downloads the report.
Alternative Flow	No Data Available: 1. If no records exist, the system notifies.

Exceptions	System Error: - The report fails due to an internal issue.
Includes	-
Notes/Issues	Allow exporting reports in PDF, Excel, or CSV formats.

Table 3. 13: Use Case 13: Generate Reports

Use Case 14: Search Employees

Attribute	Details
Author	D.O. Samaranayake
Purpose	Allows managers to search for employees based on various filters.
Requirements Traceability	1. The system should allow managers to search for employees by name, ID, skills, qualifications.
Priority	High
Preconditions	- The manager must be logged into the system.
Postcondition	- The system displays search results.
Actors	Manager
Extends	-
Flow of Events	Basic Flow: 1. Manager navigates to "Search Employees." 2. System displays search fields. 3. Manager enters search criteria (e.g., employee name, ID,). 4. System fetches matching records. 5. System displays the results.
Alternative Flow	No Matching Records: 1. If no employees match, the system notifies the manager.
Exceptions	System Error: - Search fails due to an internal issue.
Includes	-
Notes/Issues	Enable advanced search with multiple filters (job role, status).

Table 3. 14: Use Case 14: Search Employees

Use Case 15: Manage Complaints

Attribute	Details
Author	D.O. Samaranayake
Purpose	Allows HR admins to manage employee complaints.
Requirements Traceability	1. The system should allow HR admins to view, respond to, and resolve complaints.
Priority	High
Preconditions	- The HR admin must be logged into the system.
Postcondition	- Complaint status is updated.
Actors	HR Admin
Extends	-
Flow of Events	Basic Flow: 1. HR admin navigates to "Manage Complaints." 2. System displays submitted complaints. 3. HR admin reviews complaint details. 4. HR admin takes action (responds, assigns, or closes complaint). 5. System updates complaint status and notifies the employee.
Alternative Flow	Invalid Complaint: 1. If details are missing, the HR admin requests additional information.
Exceptions	System Error: - Complaint handling is unavailable.
Includes	-
Notes/Issues	Allow complaint categorization (e.g., harassment, payroll, work conditions).

Table 3. 15: Use Case 15: Manage Complaints

Use Case 16: Set & Manage Career Goals

Attribute	Details
Author	D.O. Samaranayake
Purpose	Allows managers and employees to set, update, and track career goals.
Requirements Traceability	1. Employees update their career goals progress. 2. Managers should be able to review and approve completed goals.
Priority	High
Preconditions	- The employee or manager must be logged into the system.
Postcondition	- Career goals are updated and stored in the system.

Actors	Employee, Manager
Extends	-
Flow of Events	Basic Flow: 1. Employee navigates to "Career Goals." 2. Employee updates a goal progress. 3. Manager reviews and approves it 4. System updates goal status.
Alternative Flow	Goal Requires Revision: 1. Manager suggests changes to the employee's goal. 2. Employee updates and resubmits the goal.
Exceptions	System Error: - Career goal update fails due to an issue.
Includes	-
Notes/Issues	Allow progress tracking for set goals.

Table 3. 16: Use Case 16: Set & Manage Career Goals

Use Case 17: Conduct Performance Reviews

Attribute	Details
Author	D.O. Samaranayake
Purpose	Allows managers to conduct employee performance reviews.
Requirements Traceability	1. Managers should be able to schedule and conduct performance reviews.
Priority	High
Preconditions	- Manager must be logged into the system.
Postcondition	- Employee performance review is completed.
Actors	Manager
Extends	-
Flow of Events	Basic Flow: 1. Manager selects "Performance Review." 2. Manager selects employee for a review. 3. Manager rates performance to five KPI's and submits. 4. System records the review and updates employee records.
Alternative Flow	Rescheduling: 1. Manager reschedules the review date. 2. System notifies the employee.
Exceptions	System Error: - Performance review submission fails.
Includes	-
Notes/Issues	Provide reporting for historical performance trends.

Table 3. 17: Use Case 17: Conduct Performance Reviews

Use Case 18: Manage HR Requests

Attribute	Details
Author	D.O. Samaranayake
Purpose	Allows HR admins to review and process employee HR-related requests.
Requirements Traceability	1. HR admins should be able to view and manage HR requests.
Priority	High
Preconditions	- HR admin must be logged in.
Postcondition	- HR request status is updated.
Actors	HR Admin
Extends	-
Flow of Events	Basic Flow: 1. HR admin selects "Manage HR Requests." 2. System displays pending requests. 3. HR admin reviews & updates its progress. 4. System updates request status.
Alternative Flow	Incomplete Request: 1. HR admin requests more details from the employee.
Exceptions	System Error: - HR request handling fails.
Includes	-
Notes/Issues	Allow filtering by request type.

Table 3. 18: Use Case 18: Manage HR Requests

Use Case 19: Manage Departments & Jobs

Attribute	Details
Author	D.O. Samaranayake
Purpose	Allows HR admins to update job roles and departments.
Requirements Traceability	1. HR admins should be able to modify department details.
Priority	High
Preconditions	- HR admin must be logged in.
Postcondition	- Department or job structure is updated.
Actors	HR Admin
Extends	-
Flow of Events	Basic Flow: 1. HR admin goes to Settings 2. Then selects Manage Departments or Jobs. 3. HR admin adds, updates, or removes details. 4. System saves changes.
Alternative Flow	Invalid Update: 1. HR admin attempts an invalid change (e.g., duplicate job title).
Exceptions	System Error: - Updates fail to save.
Includes	-
Notes/Issues	Ensure dependencies are maintained.

Table 3. 19: Use Case 19: Manage Departments & Jobs

3.3.3 Entity-Relationship (ER) Diagram

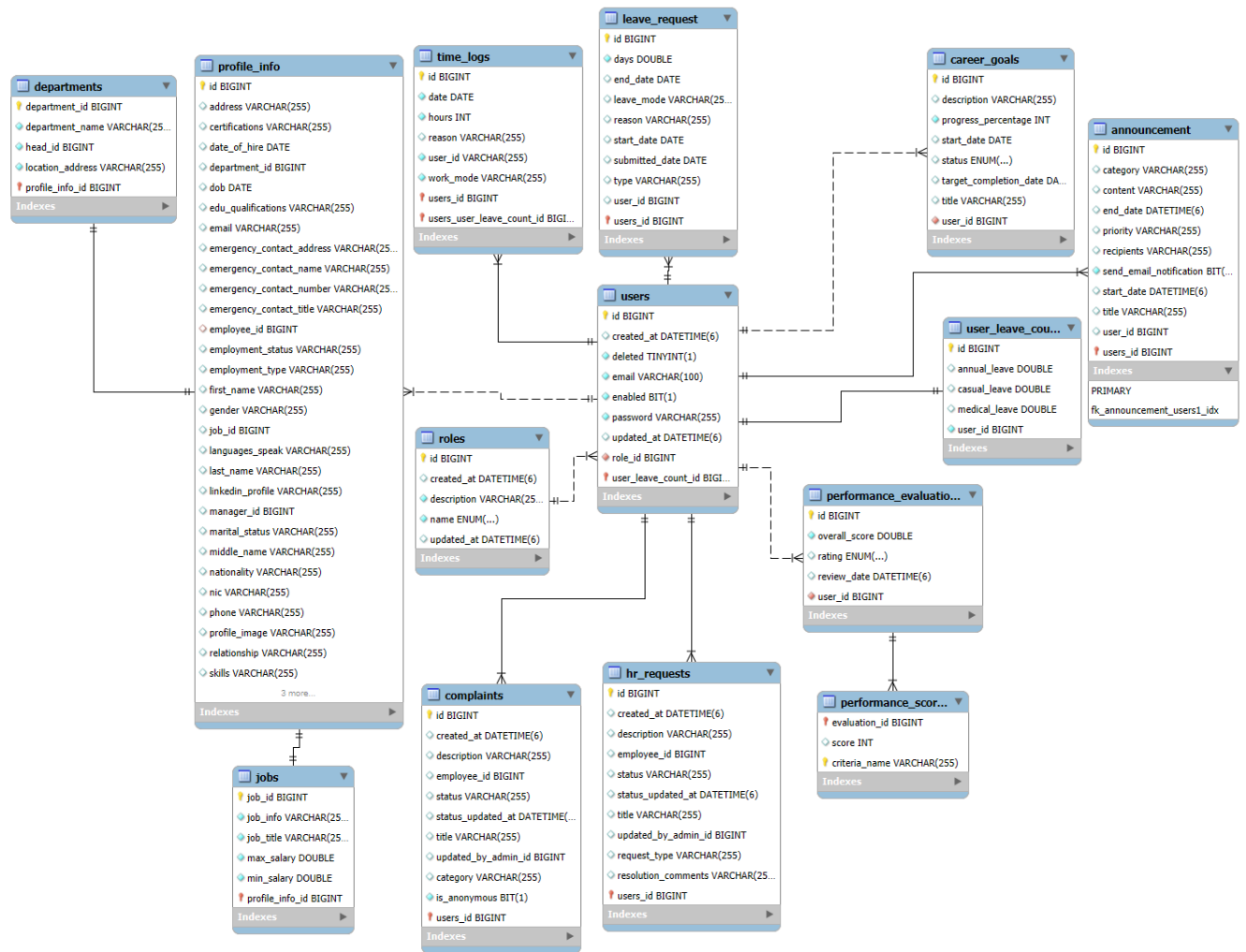


Figure 3. 3: Entity-Relationship (ER) Diagram

3.3.4 Class Diagram

Figur

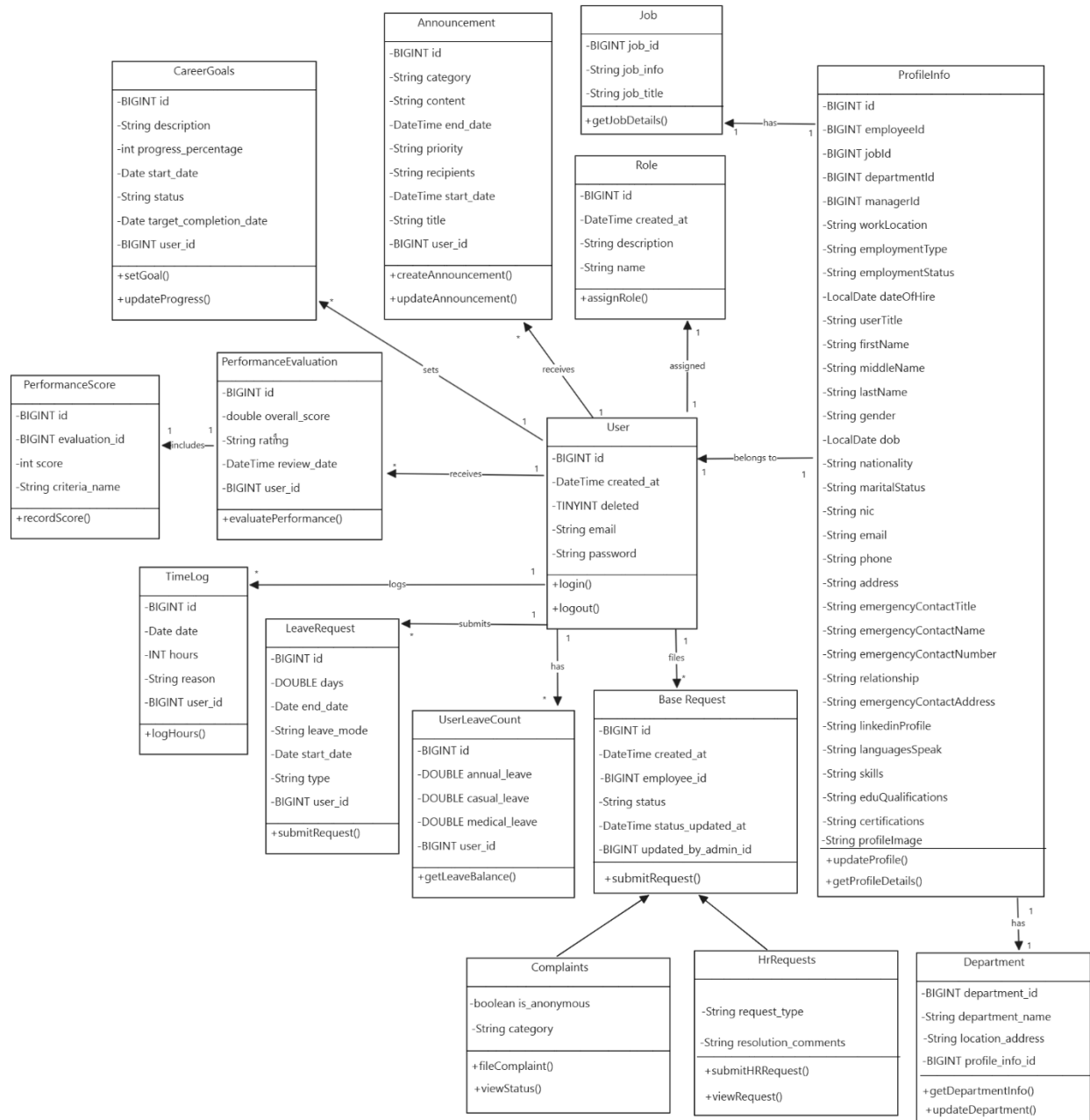


Figure 3. 4: Class Diagram

3.3.5 Activity Diagrams

Activity Diagram for Employee Registration

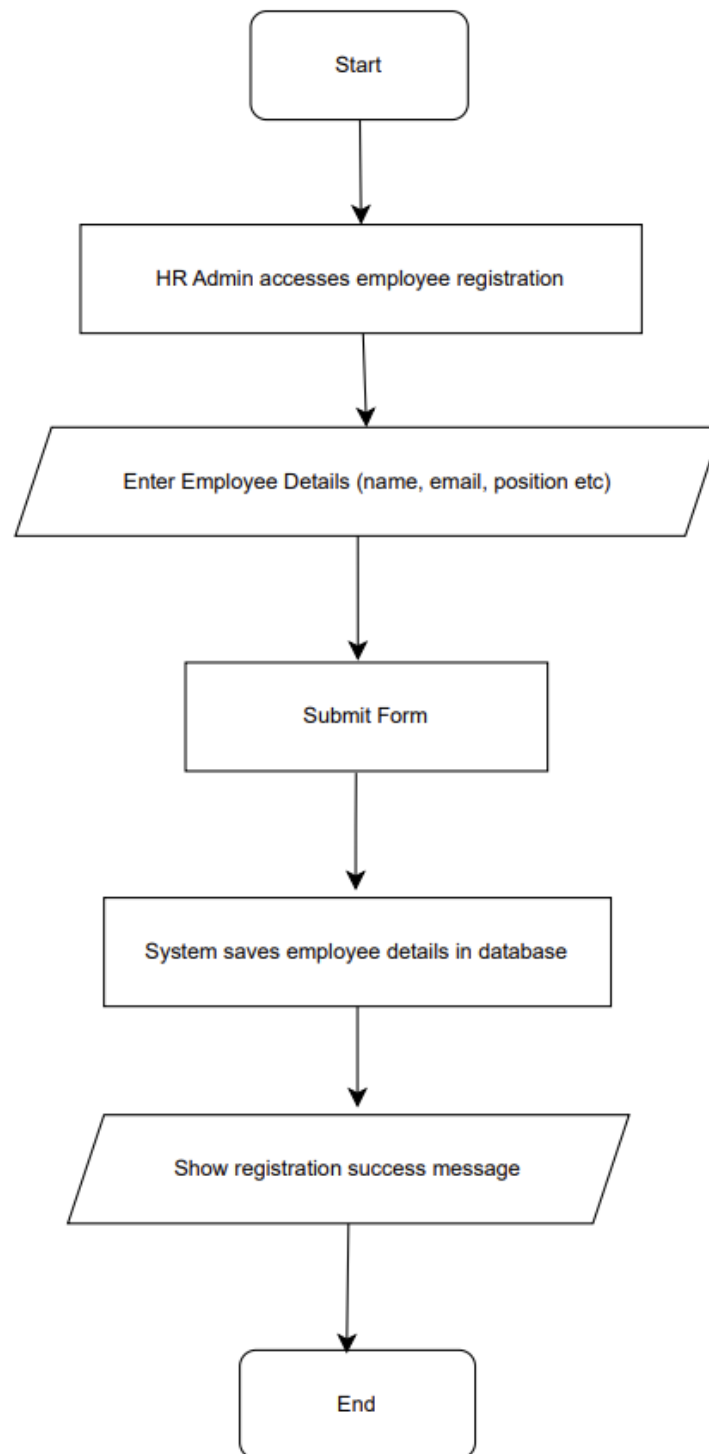


Figure 3. 5: Activity Diagram for Employee Registration

Activity Diagram for Employee Profile Update

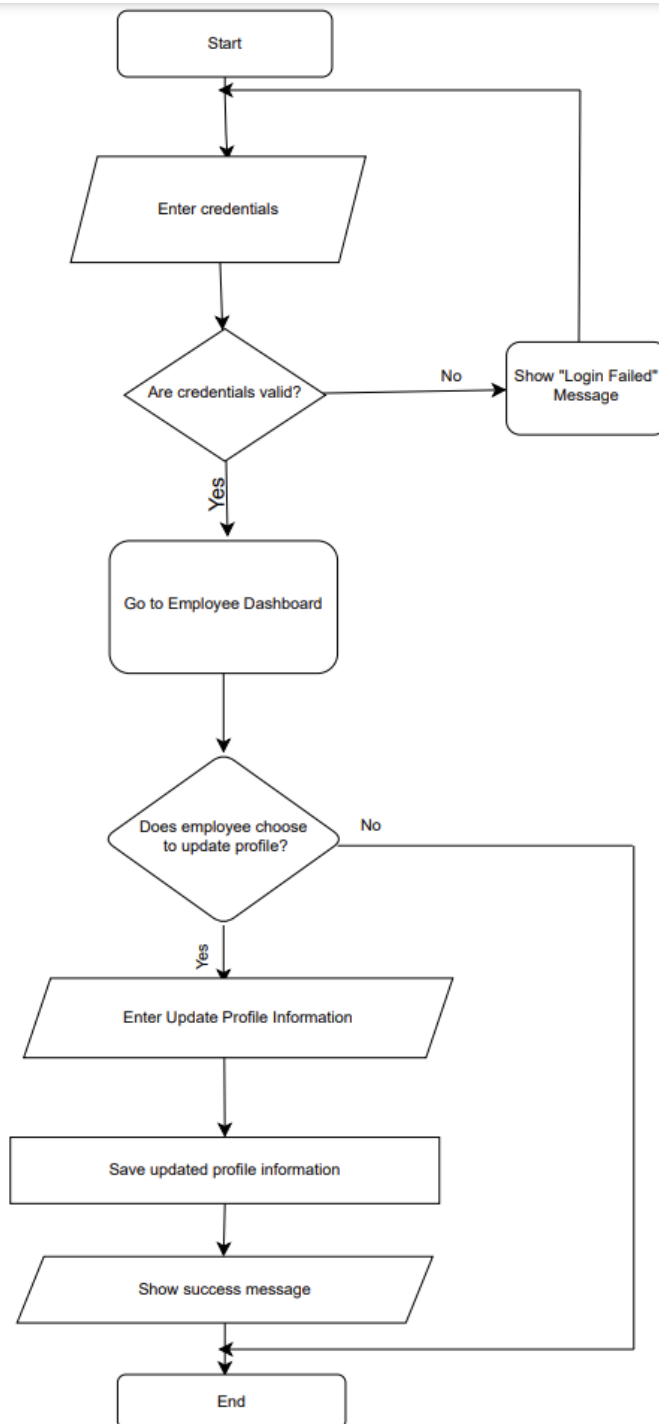


Figure 3. 6: Activity Diagram for Employee Profile Update

Activity Diagram for Employee Leave Request

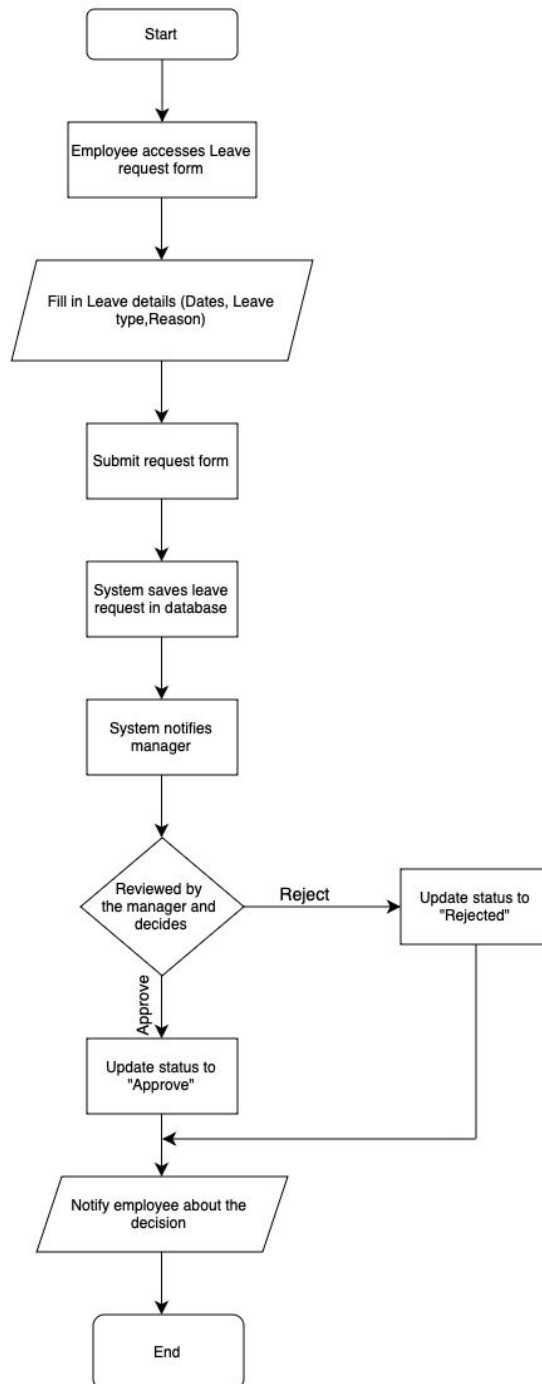


Figure 3. 7: Activity Diagram for Employee Leave Request

Activity Diagram for Manager Search Employees

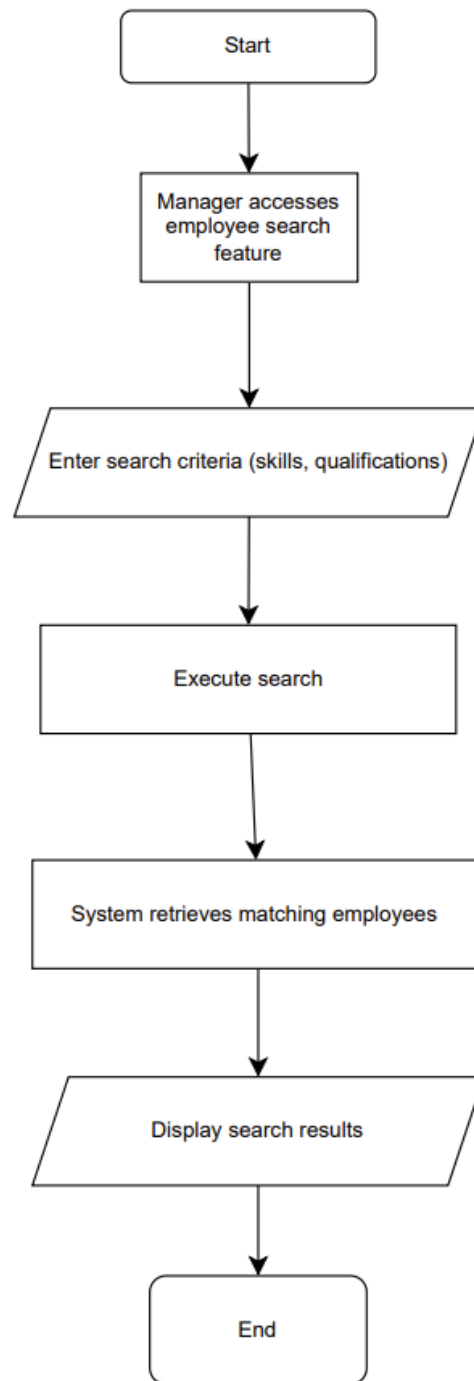


Figure 3. 8: Activity Diagram for Manager Search Employees

Activity Diagram for HR Announcements

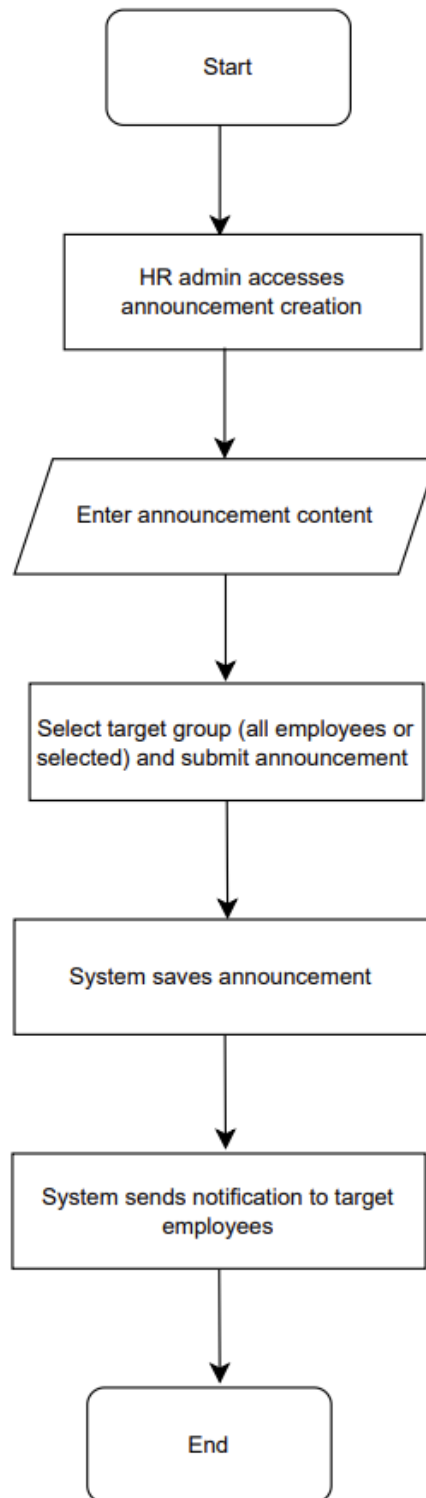


Figure 3. 9: Activity Diagram for HR Announcements

3.3.6 Sequence Diagrams

Sequence Diagram for Employee Registration

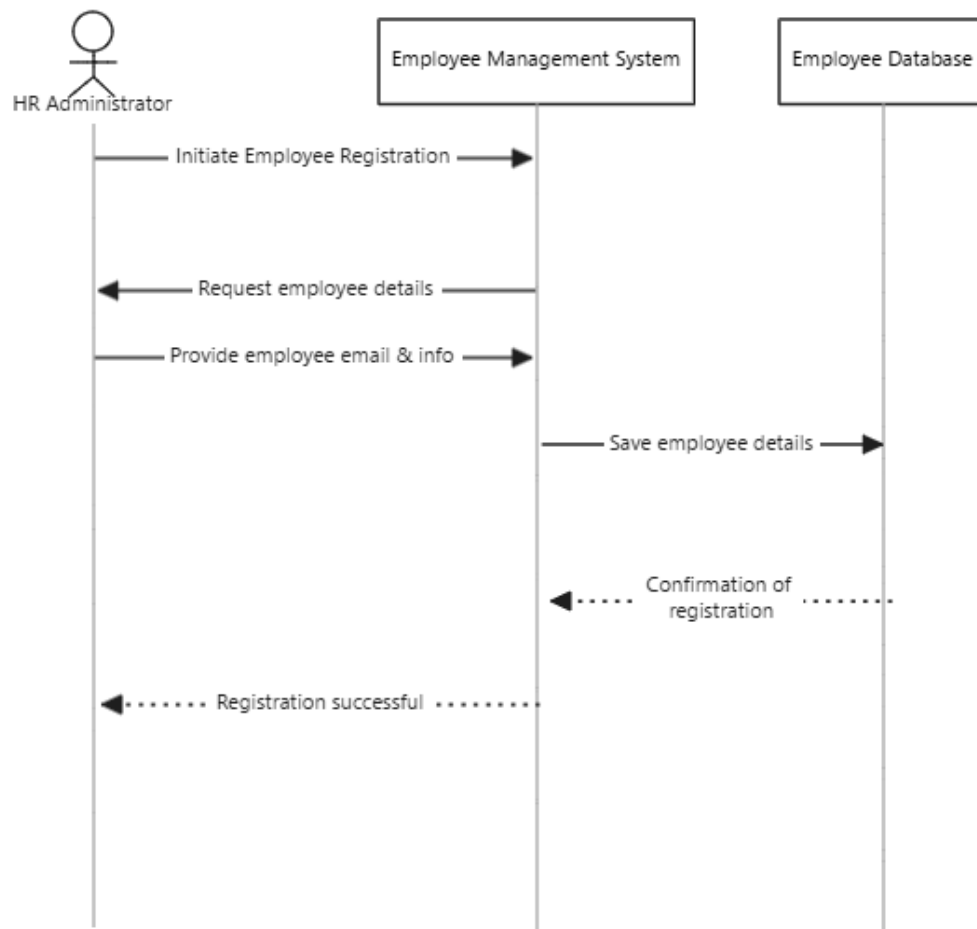


Figure 3. 10: Sequence Diagram for Employee Registration

Sequence Diagram for Employee Login to the System

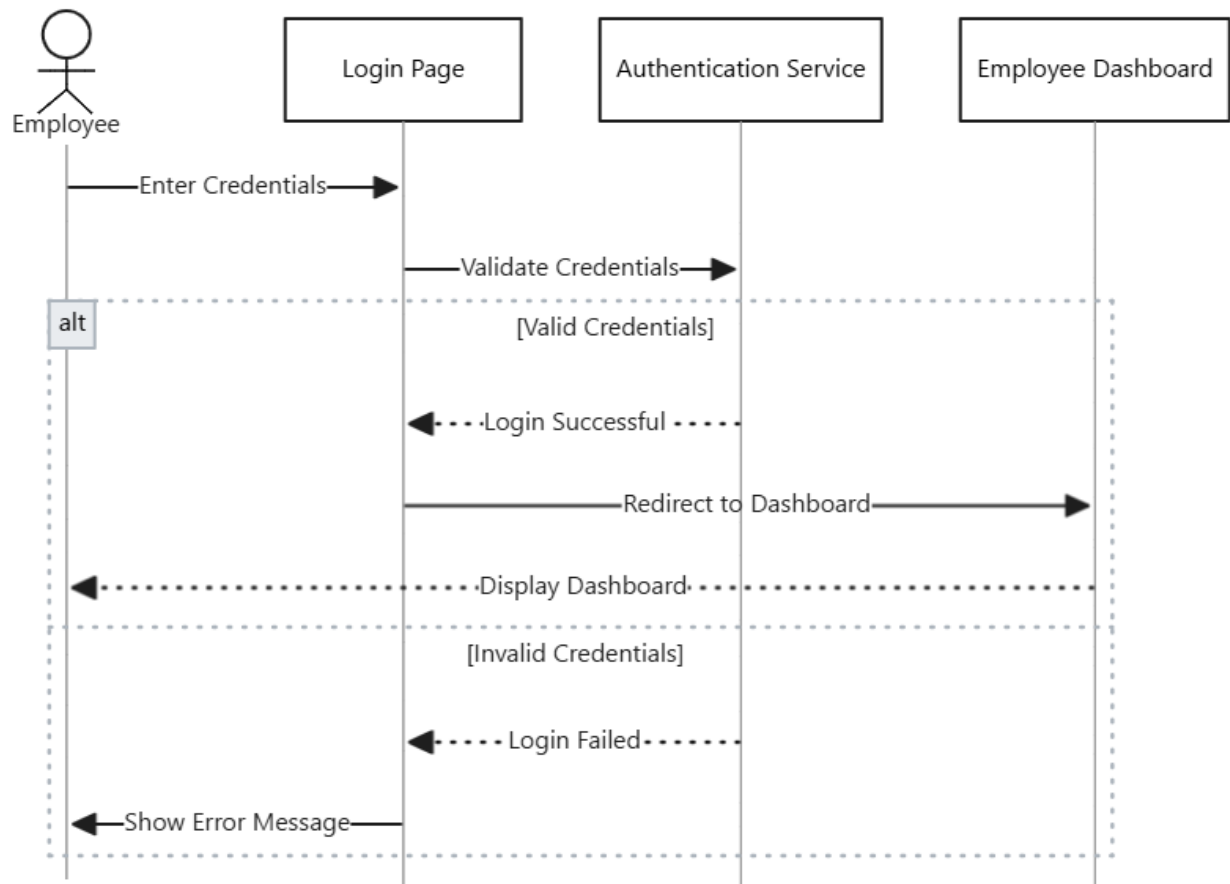


Figure 3. 11: Sequence Diagram for Employee Login to the System

Sequence Diagram for Profile Update

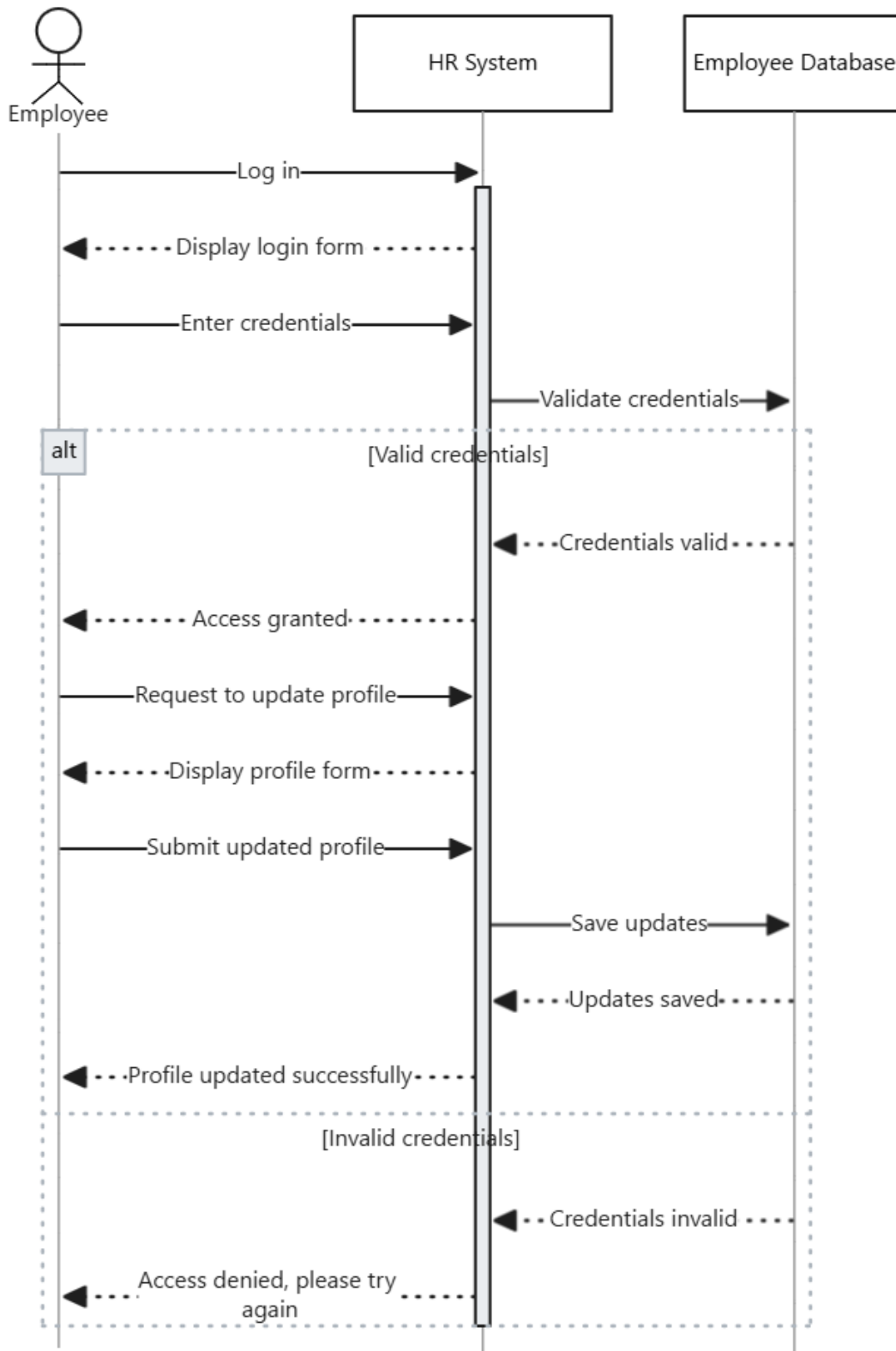


Figure 3. 12: Sequence Diagram for Profile Update

Sequence Diagram for Employee Search

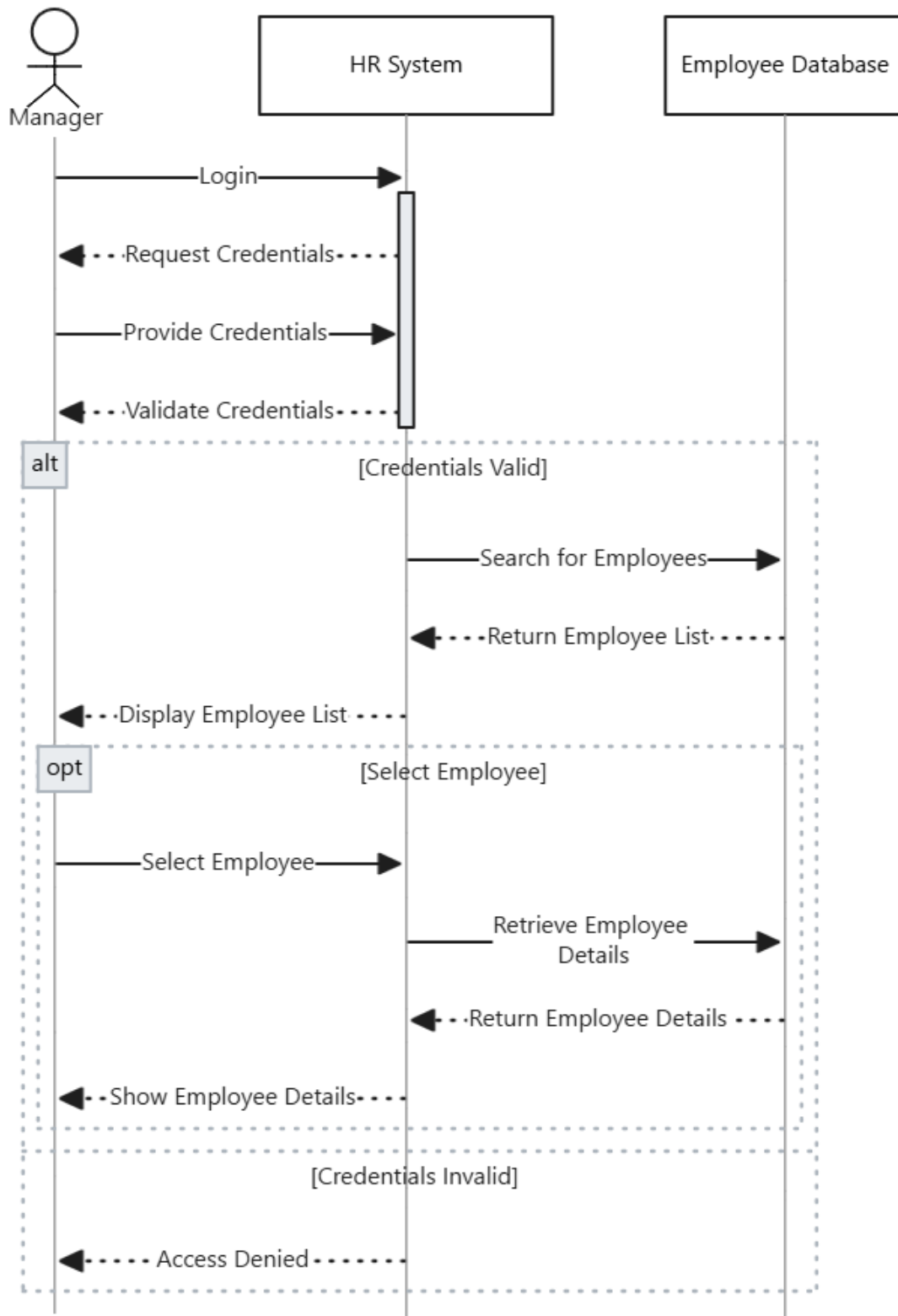


Figure 3. 13: Sequence Diagram for Employee Search

Sequence Diagram for Sending Emails

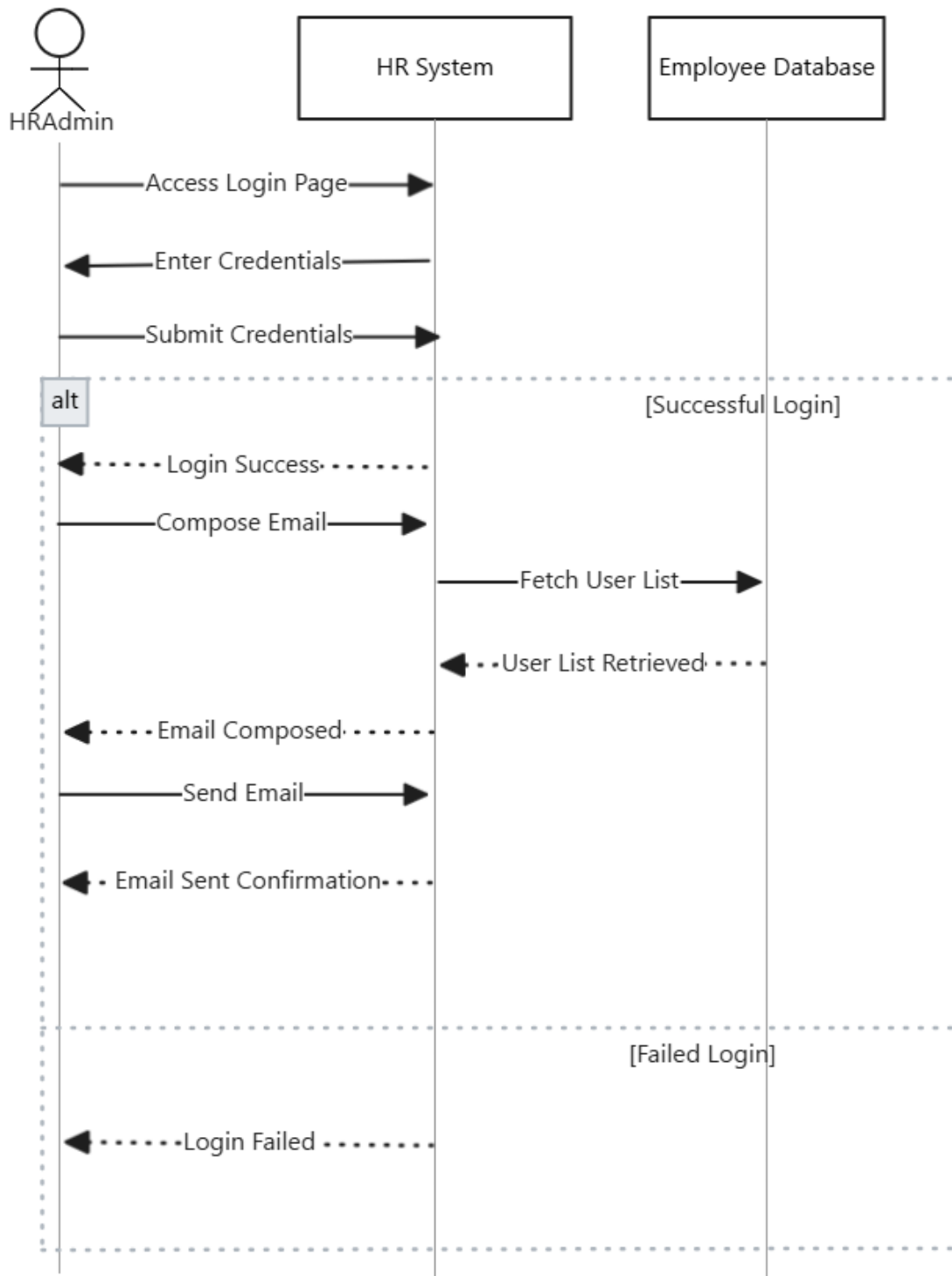


Figure 3. 14: Sequence Diagram for Sending Emails

Sequence Diagram for Employee Work Time Submission

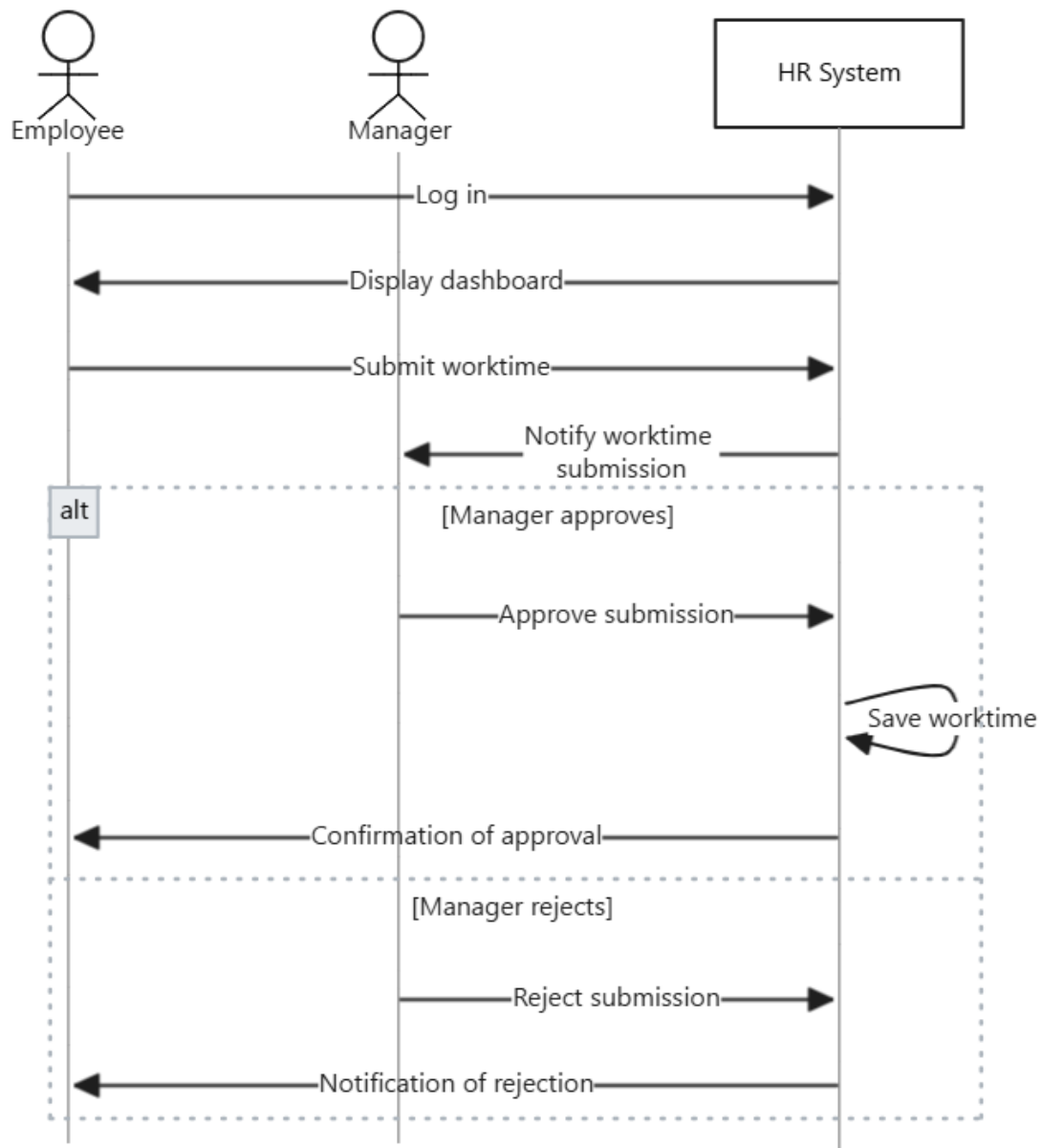


Figure 3. 15: Sequence Diagram for Employee Work Time Submission

Sequence Diagram for Performance Review Submission

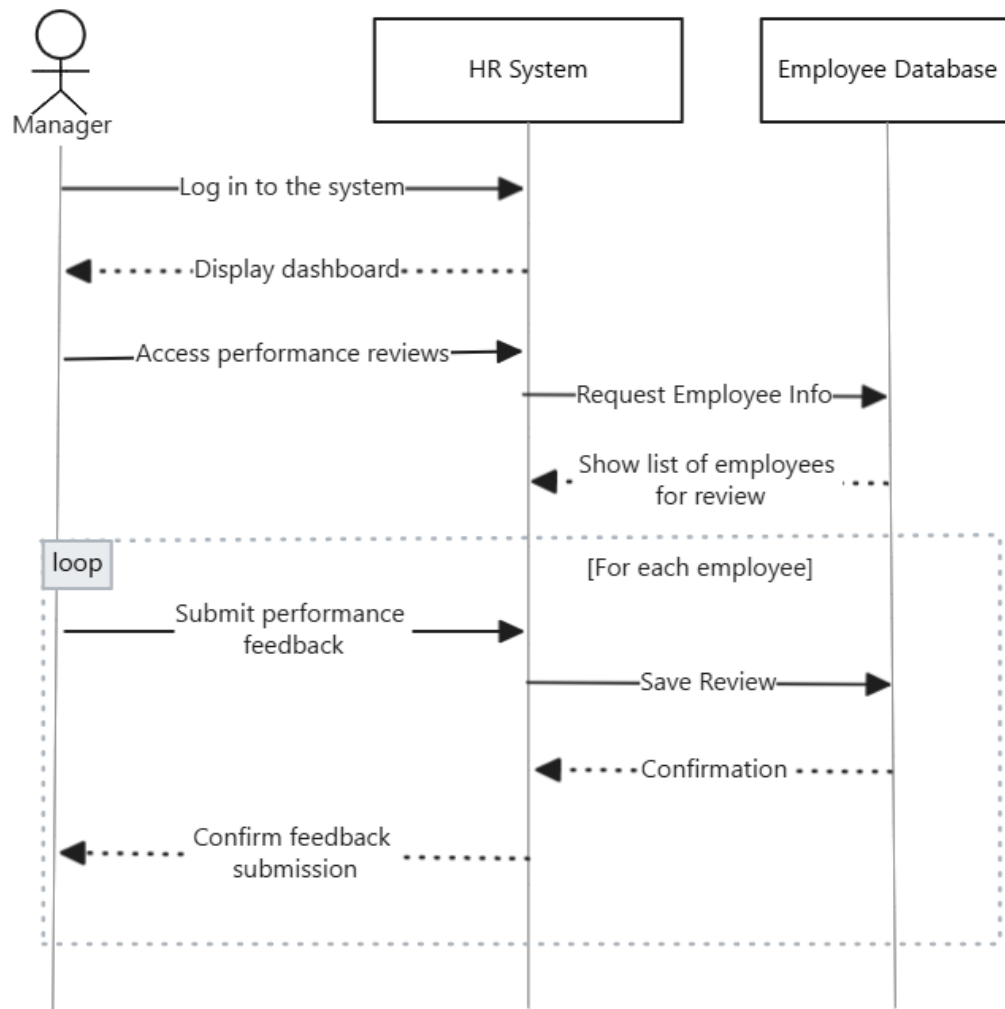


Figure 3. 16: Sequence Diagram for Performance Review Submission

Sequence Diagram for HR Request Submission

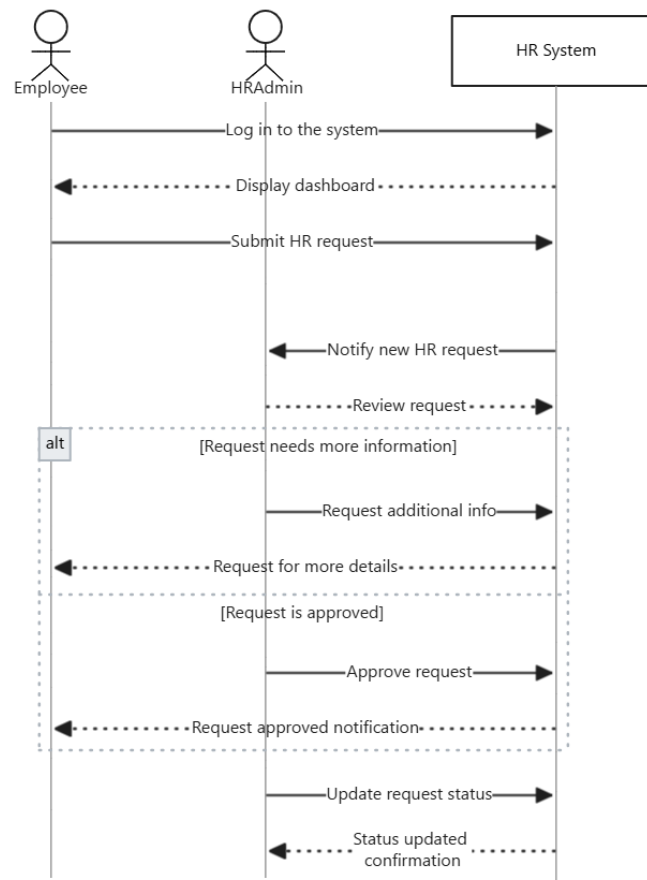


Figure 3. 17: Sequence Diagram for HR Request Submission

3.4 Summary

The Design Chapter defines the architecture of ElevateNex: NextGen HR System, ensuring scalability, security, and efficiency. It adopts a microservices-based backend (Spring Boot) and a React frontend, following Rapid Application Development (RAD) for iterative improvements.

Key components include MySQL for data storage, JWT authentication, and role-based access control (RBAC). An AI-powered chatbot (FlowiseAI) enhances HR support using NLP.

The chapter also presents UML diagrams (Use Case, ER, Activity, Sequence, and Class) and Use Case Narratives, detailing core functionalities like employee management, leave tracking, time logging, performance reviews, and HR inquiries. The design ensures modularity, adaptability, and seamless user experience.

Chapter 4 – Implementation

4.1 Introduction

This chapter provides an in-depth explanation of the implementation of the HR Management System, describing its system architecture, module structure, major functionalities, security mechanisms, and integration with AI chatbot services. It also discusses the rationale behind technology choices, performance considerations, testing methodologies, and system scalability.

A structured approach was adopted to develop the system, using React.js(“React Reference Overview – React,” n.d.) for the frontend, Spring Boot Framework(“Spring Framework,” n.d.) for the backend, MySQL(“MySQL :: MySQL Documentation,” n.d.) for data persistence, and FlowiseAI(“Introduction | FlowiseAI,” 2025) for AI-driven chatbot functionality. The selection of these technologies is justified based on scalability, maintainability, and ease of integration.

4.2 System Architecture

The ElevateNex system follows a three-tier architecture, comprising:

1. **Frontend (React.js):** A user-friendly web interface for HR administrators, employees, and managers.
2. **Backend (Spring Boot):** A RESTful API that handles business logic, authentication, and data processing.
3. **Database (MySQL):** A relational database storing employee records, requests, performance data, and chatbot interactions.

Additionally, an AI chatbot module is integrated using FlowiseAI(“Introduction | FlowiseAI,” 2025), Langchain(“Introduction |  LangChain,” n.d.), and OpenAI(“OpenAI Platform,” n.d.) to provide automated responses to HR-related queries.

4.2.1 System Architecture Diagram

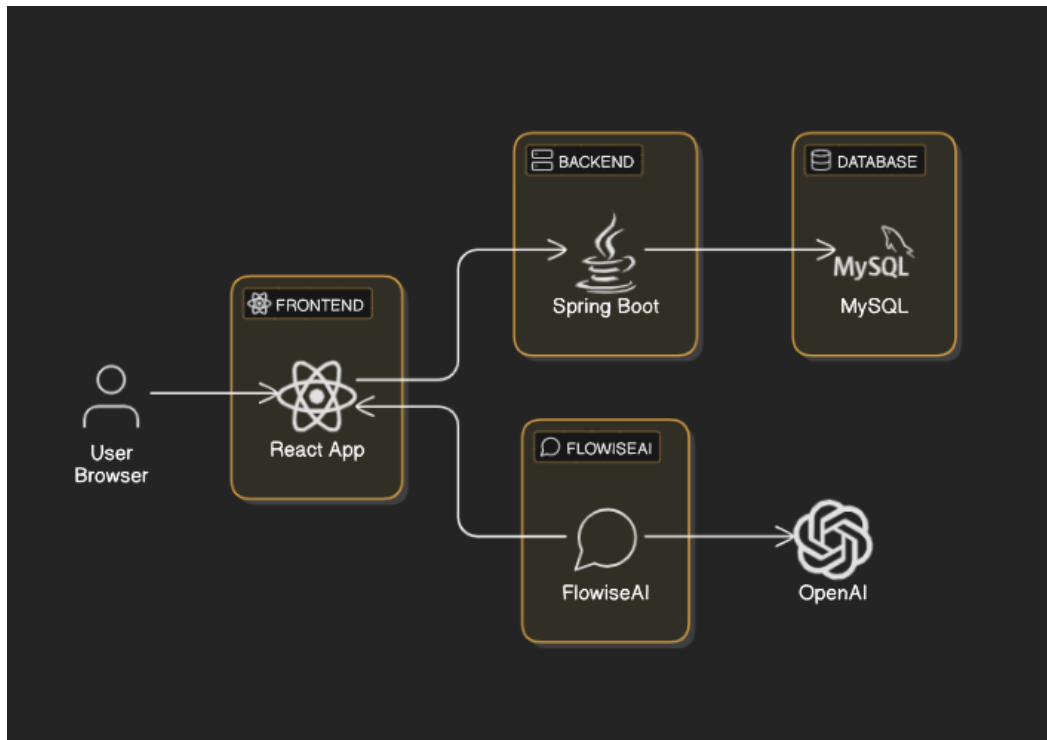


Figure 4. 1: System Architecture Diagram

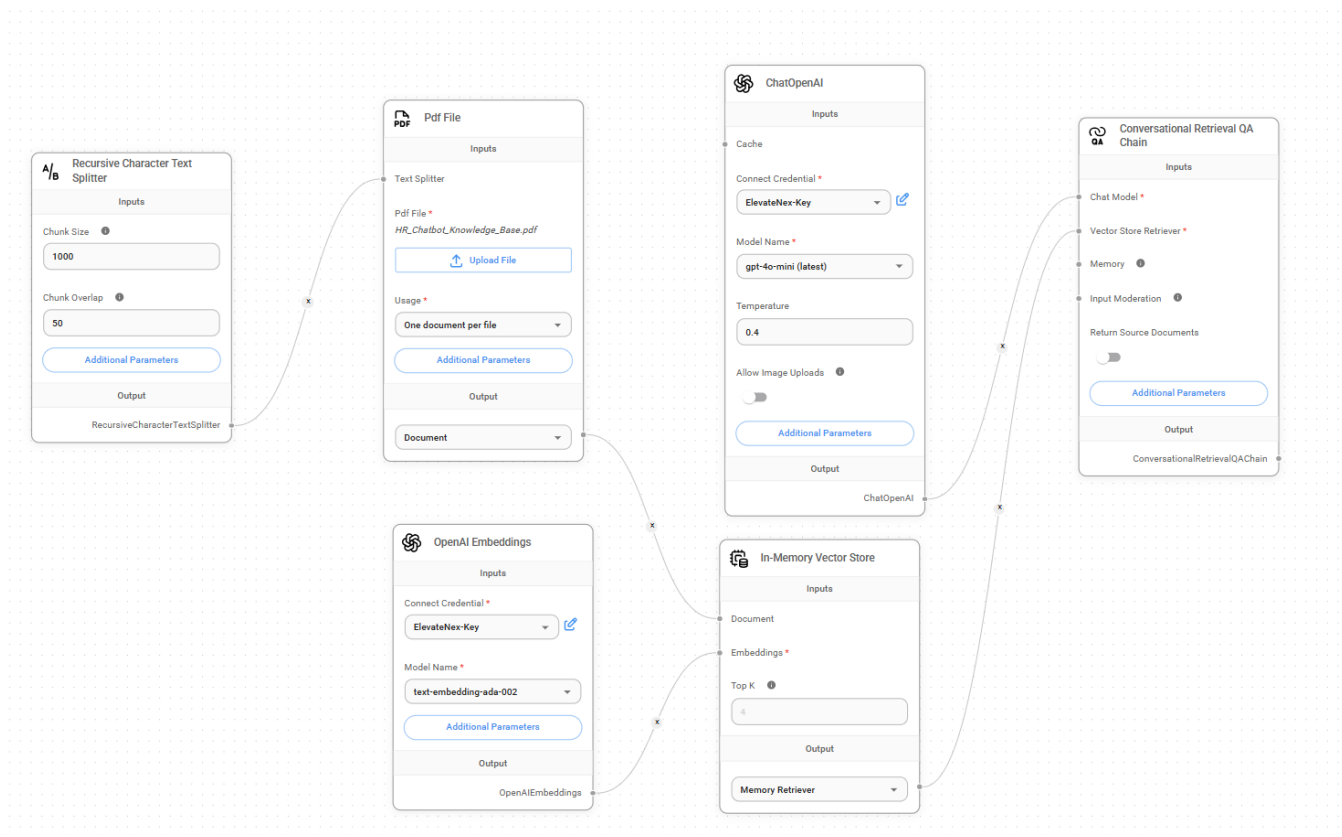


Figure 4. 2: FlowiseAI Architecture

4.2.2 Data Flow and Communication Between Components

- User authentication requests are handled by Spring Security(“Spring Security,” n.d.) using JWT tokens(auth0.com, n.d.).
- React(“React Reference Overview – React,” n.d.) communicates with Spring Boot(“Spring Framework,” n.d.) through RESTful APIs(“What is a REST API?,” n.d.).
- Spring Boot interacts with MySQL(“MySQL :: MySQL Documentation,” n.d.) using JPA(“Spring Data JPA,” n.d.).
- FlowiseAI(“Introduction | FlowiseAI,” 2025) processes chatbot queries via API calls, leveraging Langchain(“Introduction | 🦜🔗 LangChain,” n.d.) and OpenAI(“OpenAI Platform,” n.d.) for response generation.

4.3 Development Tools

The development of the HR Management System involved a combination of integrated development environments (IDEs), database management tools, and AI chatbot frameworks to facilitate efficient coding, debugging, and testing. The following table provides details of the primary tools used during the development process.

Tool	Purpose	Key Features
IntelliJ IDEA	Backend Development	Advanced Spring Boot support, intelligent code completion, built-in database management(“IntelliJ IDEA – the IDE for Pro Java and Kotlin Development,” n.d.)
Visual Studio Code	Frontend Development	Lightweight, React.js support, extensions for debugging and linting(“Visual Studio Code - Code Editing. Redefined,” n.d.)
MySQL Workbench	Database Management	ER diagram support, query execution, schema visualization(“MySQL :: MySQL Workbench,” n.d.)
FlowiseAI	AI Chatbot Development	No-code Langchain/OpenAI integration, visual workflow design(“Introduction FlowiseAI,” 2025)

Table 4. 1:Development Tools

IntelliJ IDEA – Backend Development

IntelliJ IDEA, developed by JetBrains, was used for backend development in Spring Boot. It offers advanced code navigation, intelligent refactoring, and built-in Spring support, making it an ideal environment for developing enterprise-level applications(“IntelliJ IDEA – the IDE for Pro Java and Kotlin Development,” n.d.).The Spring Boot integration allows for efficient management of controllers, services, and repository layers, ensuring clean architecture and maintainability. Additionally, its built-in database support facilitated quick interaction with MySQL during development and debugging.

Visual Studio Code – Frontend Development

Visual Studio Code (VS Code), developed by Microsoft, was used for React.js(“React Reference Overview – React,” n.d.) frontend development. It is a lightweight yet powerful source code editor with built-in support for JavaScript(“JavaScript documentation — DevDocs,” n.d.), TypeScript(“Handbook - The TypeScript Handbook,” n.d.), and React. The ESLint and Prettier extensions enabled code linting and formatting, ensuring consistency in the frontend codebase. Additionally, VS Code’s integrated terminal and debugging tools helped in seamless API integration and UI testing(“Visual Studio Code - Code Editing. Redefined,” n.d.).

MySQL Workbench – Database Management

MySQL Workbench, developed by Oracle, was used for database schema design, management, and query execution. It provided an intuitive graphical interface for working with MySQL databases, making it easier to manage records. The Entity-Relationship (ER) diagram feature allowed database modeling and visualization, ensuring optimized database structure and performance. (“MySQL :: MySQL Workbench,” n.d.)

FlowiseAI – AI Chatbot Development

FlowiseAI was used to integrate an AI-powered chatbot into the HR system. It provided a no-code and low-code interface for developing Langchain(“Introduction |  LangChain,” n.d.) and OpenAI(“OpenAI Platform,” n.d.) powered chatbots, making it easier to build an HR assistant for automated responses. FlowiseAI enables seamless API integration with OpenAI models, allowing the chatbot to fetch HR-related data and respond intelligently to employee inquiries. (“Introduction | FlowiseAI,” 2025)

4.4 Application Development Architecture

4.4.1 Overview of the Application Architecture

The ElevateNex System follows layered architecture, ensuring a modular, scalable, and maintainable structure. The project is developed using Spring Boot for the backend and React for the frontend, following a clean separation of concerns to enhance reusability, flexibility, and ease of debugging.

On the back-end, Spring Boot provides a robust, efficient, and scalable API-driven architecture, handling business logic, data management, and security layers effectively. The backend is designed with RESTful APIs, ensuring smooth communication between the client and server while maintaining a structured service-oriented approach (“Spring Framework,” n.d.).

On the front-end, React is used to build a dynamic and responsive user interface. The project follows a component-based structure, making it easier to manage and reuse UI elements. State management is handled using React Context API, ensuring seamless data flow across components. The frontend efficiently interacts with the backend using service-based API calls, enabling real-time data updates while maintaining a clear separation between UI and business logic (“React Reference Overview – React,” n.d.).

By integrating Spring Boot and React, the system achieves a well-structured, scalable, and highly maintainable architecture that supports future enhancements with minimal refactoring. The architecture consists of the following key layers:

Backend Architecture

The architecture consists of the following key layers:

1. **Controller Layer** – Handles incoming API requests and routes them to services.
2. **Service Layer** – Contains business logic and processes data.
3. **Repository Layer** – Manages database interactions.
4. **Entity Layer** – Defines database table structures.
5. **DTO & Response Layer** – Facilitates structured data transfer.
6. **Exception Handling Layer** – Manages application-wide error handling.
7. **Configuration Layer** – Contains security, logging, and application settings.

The following directory structure demonstrates how these layers are organized.

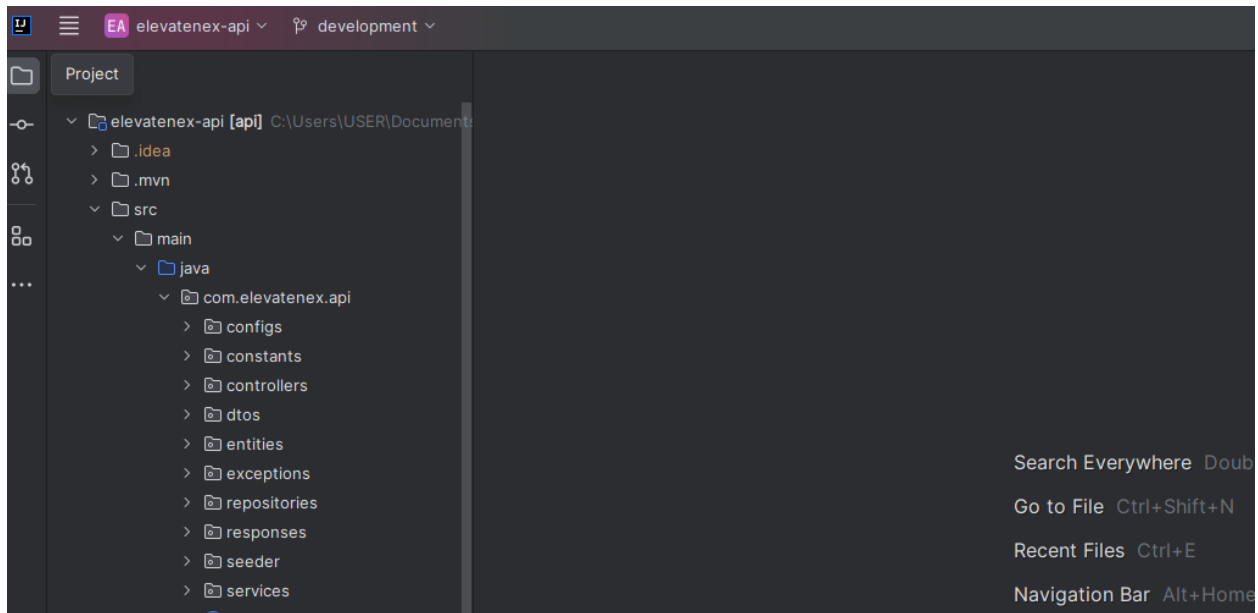


Figure 4. 3: Backend Project Structure

4.4.2 Project Structure and Folder Explanation

The project structure follows Spring Boot(“Spring Framework,” n.d.) best practices and is organized as follows:

1. configs/ - Configuration Layer

This folder contains configuration classes for security, CORS settings, application properties, logging, and other global settings.

Ex: SecurityConfig.java for JWT-based authentication.

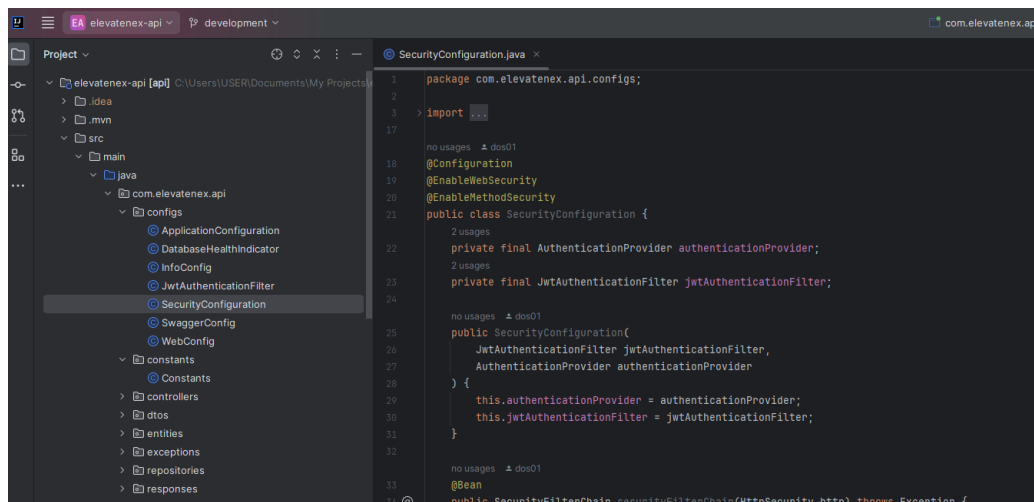


Figure 4. 4: SecurityConfig.java

2. constants/ - Application Constants

This directory defines constant values used throughout the application, ensuring better maintainability.

Ex: Constants.java – Defines constants such as ADMIN, EMPLOYEE, MANAGER.

3. controllers/ - Controller Layer

The controller layer is responsible for handling HTTP requests and routing them to the appropriate services. Each entity typically has a corresponding controller class.

Ex: LeaveRequestController.java – Handles leave requests and approvals.

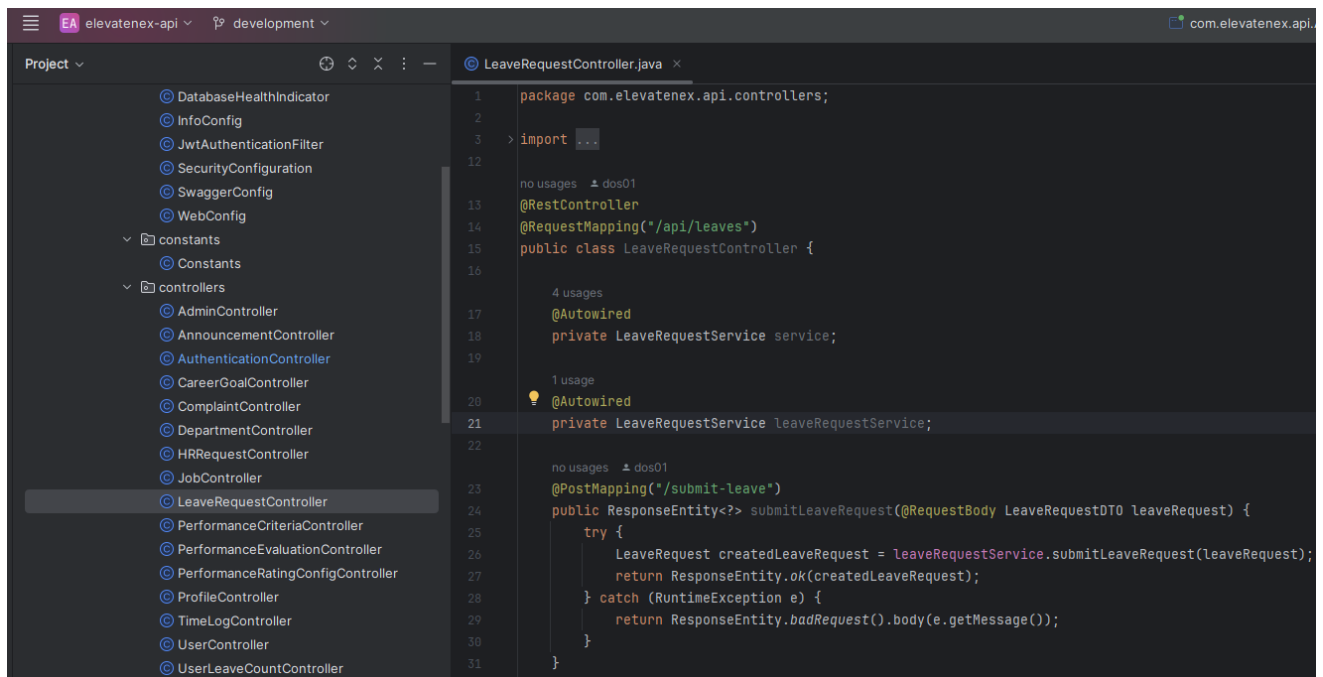


Figure 4. 5: LeaveRequestController.java

4. dtos/ - Data Transfer Objects (DTOs)

DTOs are used to transfer structured data between layers, improving security and API response efficiency.

Ex: HRRequestDTO.java – Includes fields such as title, description, status etc.

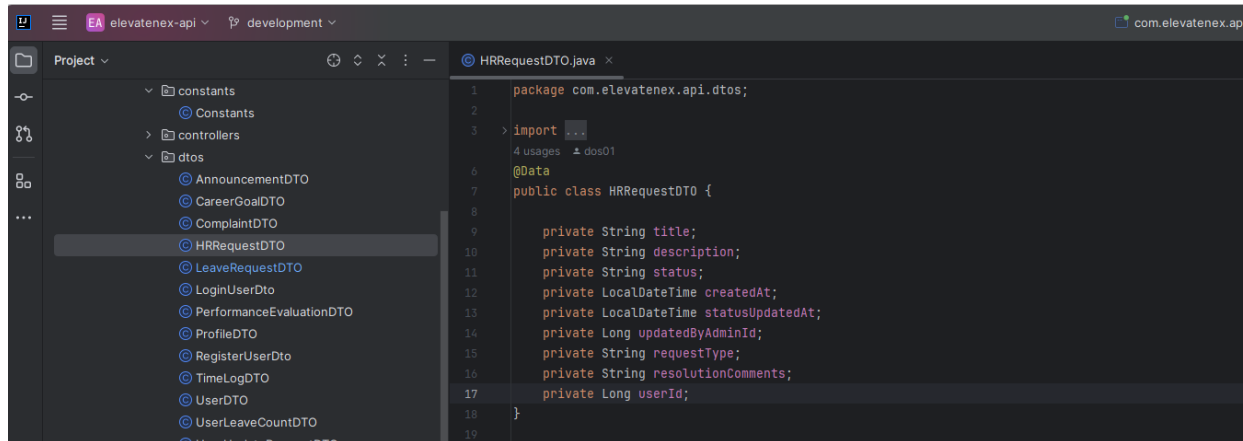


Figure 4. 6: HRRequestDTO.java

5. entities/ - Entity Layer (Database Models)

This package contains JPA(“Spring Data JPA,” n.d.) entities, which define the database schema using annotations like @Entity, @Table, and @Column.

Ex: HRRequest.java – Maps to the hr_requests table, tracking HR related requests.

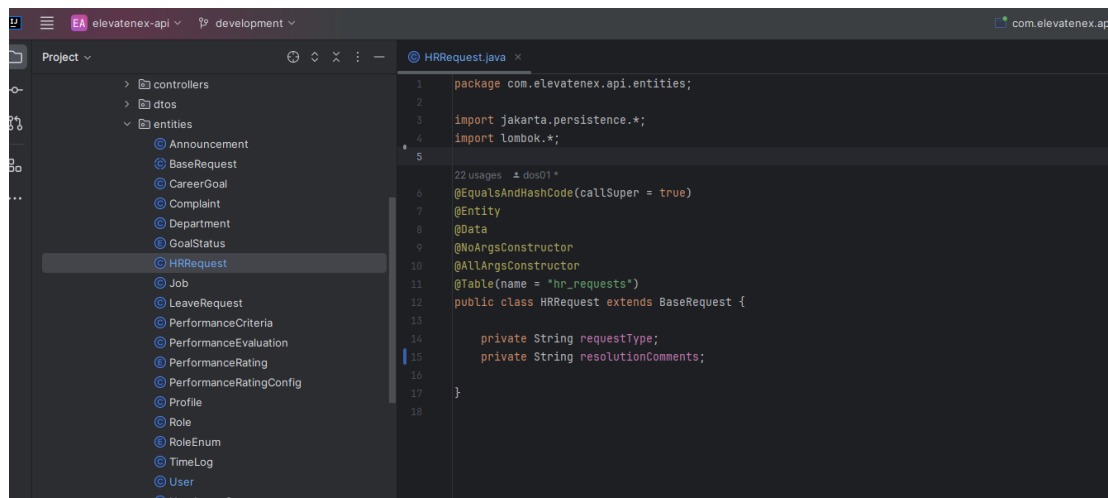


Figure 4. 7: HRRequest.java

6. exceptions/ - Exception Handling Layer

A centralized exception-handling mechanism improves error reporting and API response clarity.

Ex: GlobalExceptionHandler.java – Handles exceptions like EntityNotFoundException and BadRequestException.

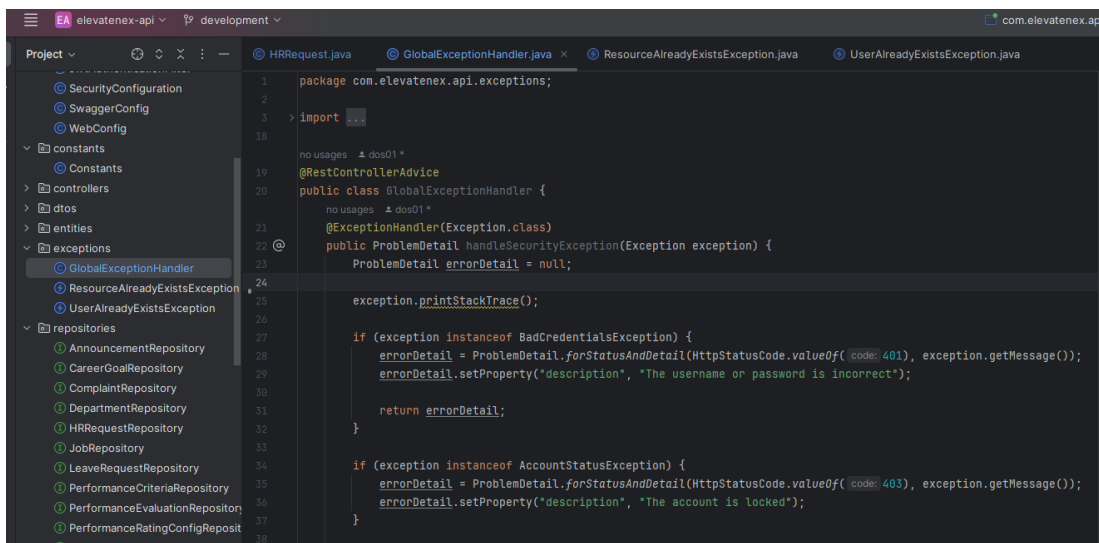


Figure 4. 8: GlobalExceptionHandler.java

7. repositories/ - Repository Layer (Data Access Layer)

This package contains interfaces that extend Spring Data JPA's JpaRepository, enabling CRUD operations on entities without boilerplate code.

Ex: PerformanceEvaluationRepository.java – Provides access to performance records.

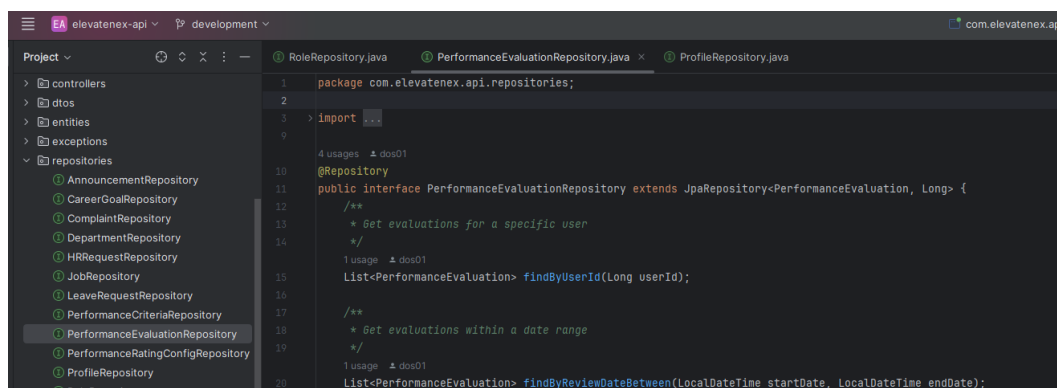


Figure 4. 9: PerformanceEvaluationRepository.java

8. responses/ - API Response Wrapper

This layer ensures API responses are structured and standardized for better readability and error handling.

Ex: LoginResponse.java – When a user successfully logs in, the system generates a JWT along with its expiration time, which is sent back as a response.

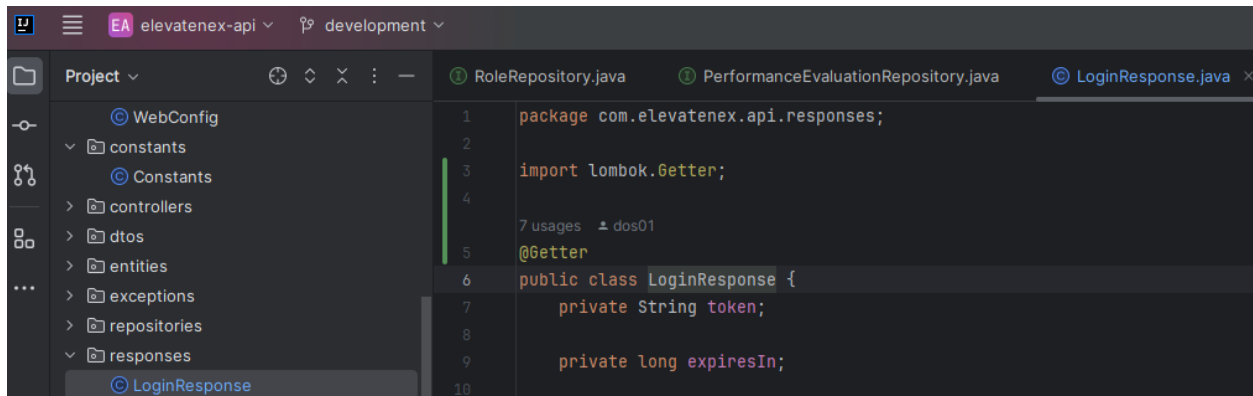


Figure 4. 10: LoginResponse.java

9. seeder/ - Database Seeding

This package contains scripts and services for initial database population.

Ex: AdminSeeder.java – Inserts default admin users and roles on application startup.

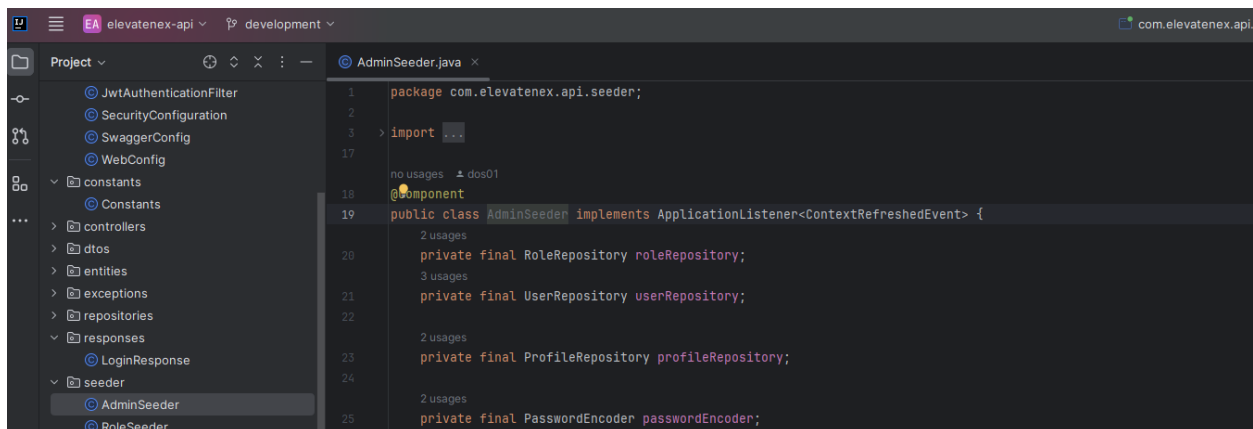


Figure 4. 11: AdminSeeder.java

10. services/ - Service Layer (Business Logic Layer)

The service layer contains business logic and interacts with the repository layer. It processes data before sending it to controllers.

Ex: HRRequestService.java – Implementation of HR requests related workflows.

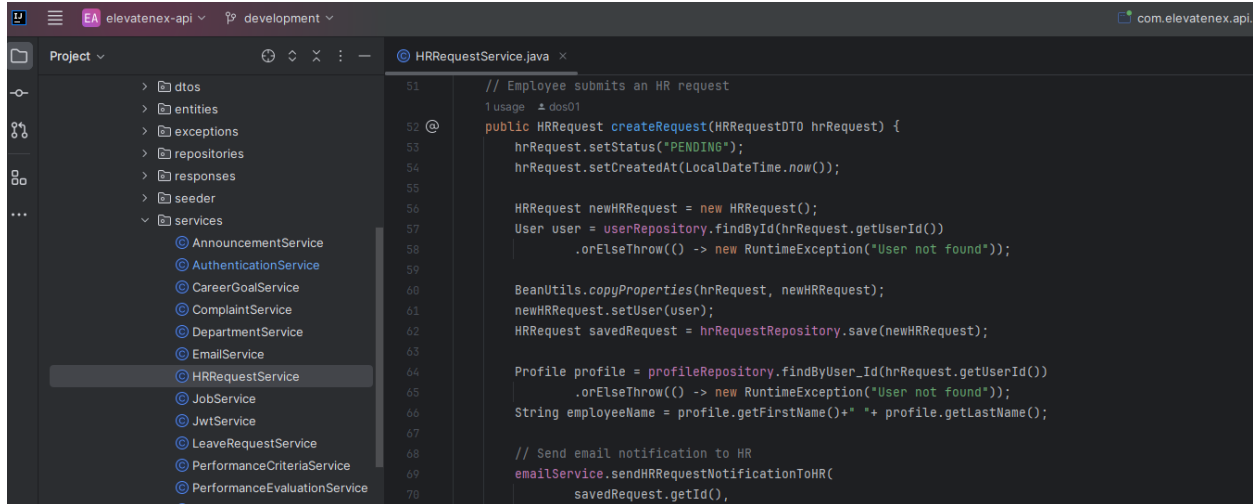


Figure 4. 12: HRRequestService.java

Frontend Architecture

The frontend of the ElevateNex System was built using React(“React Reference Overview – React,” n.d.), following a well-structured, modular approach to ensure scalability, maintainability, and reusability.

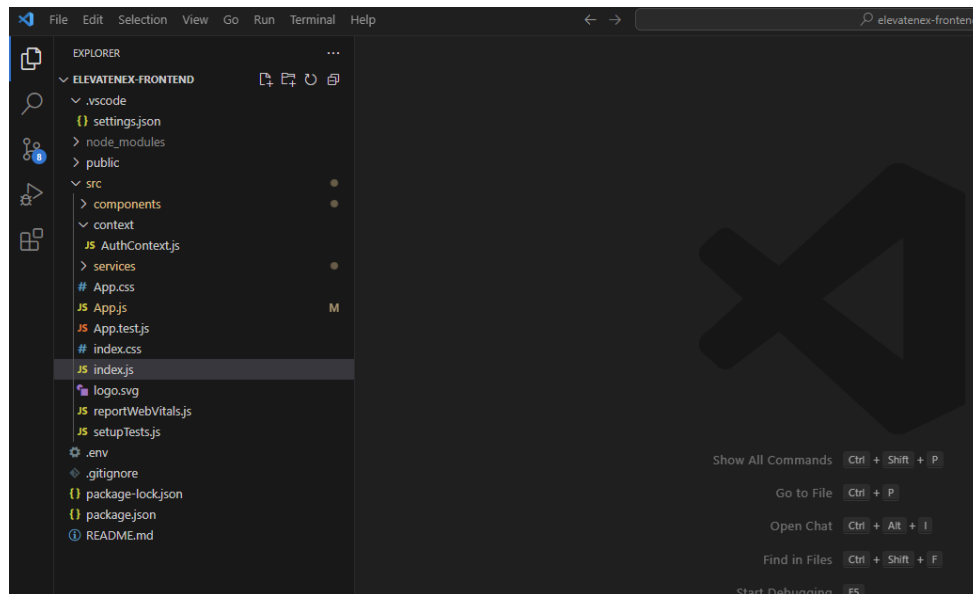


Figure 4. 13: Frontend Project Structure 01

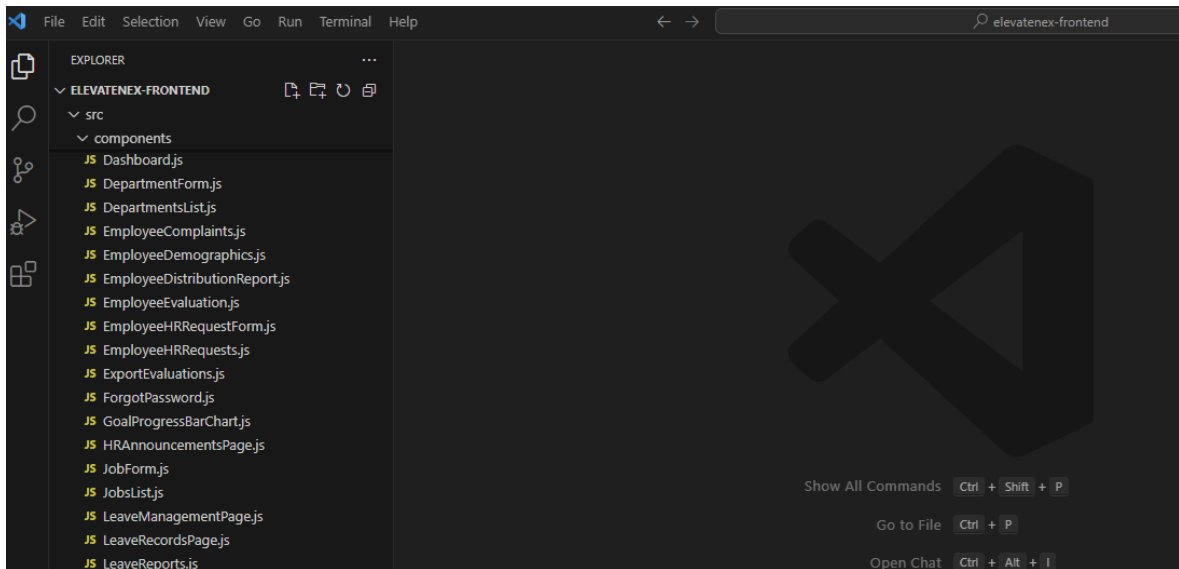


Figure 4. 14: Frontend Project Structure 02

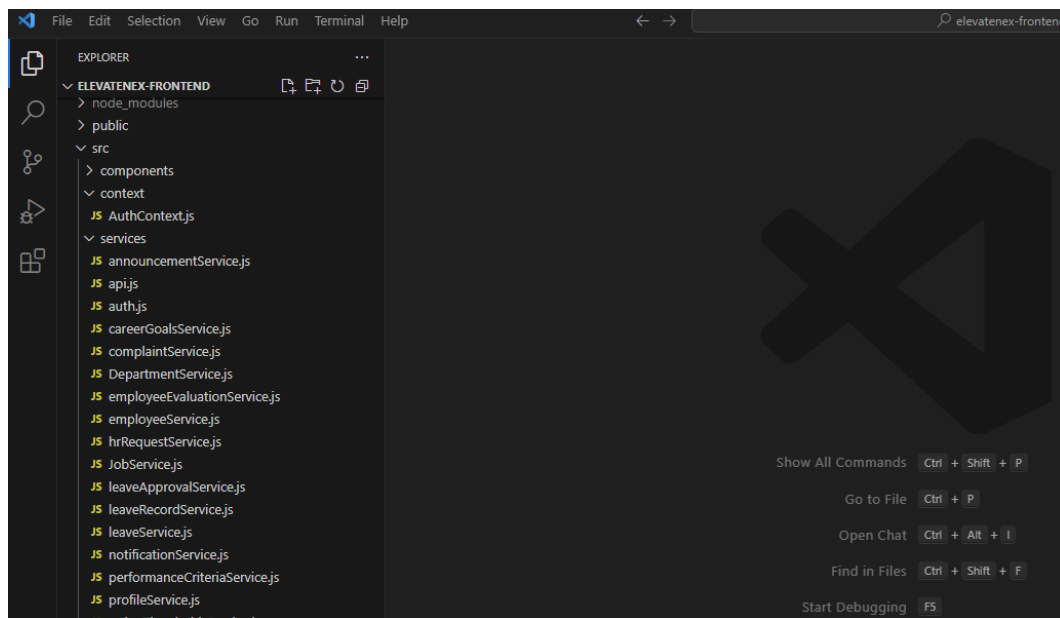


Figure 4. 15: Frontend Project Structure 03

The project structure, as seen in the figure, is organized into key directories such as components/ for reusable UI elements, context/ for managing global state using the React Context API, and services/ for handling API calls and backend interactions. The App.js file serves as the main entry point, orchestrating the rendering of components and managing routes. Styling is managed through CSS files, ensuring a clean and visually consistent UI. The presence of a .env file allows environment variables to be configured, facilitating a flexible deployment setup. This architecture ensures a clear separation of concerns, enabling efficient development, easier debugging, and a streamlined user experience(“How To Structure React Projects From Beginner To Advanced,” n.d.).

4.4.3 Application Properties and Environment Configuration

Backend resources/ directory of contains multiple property files for different environments:

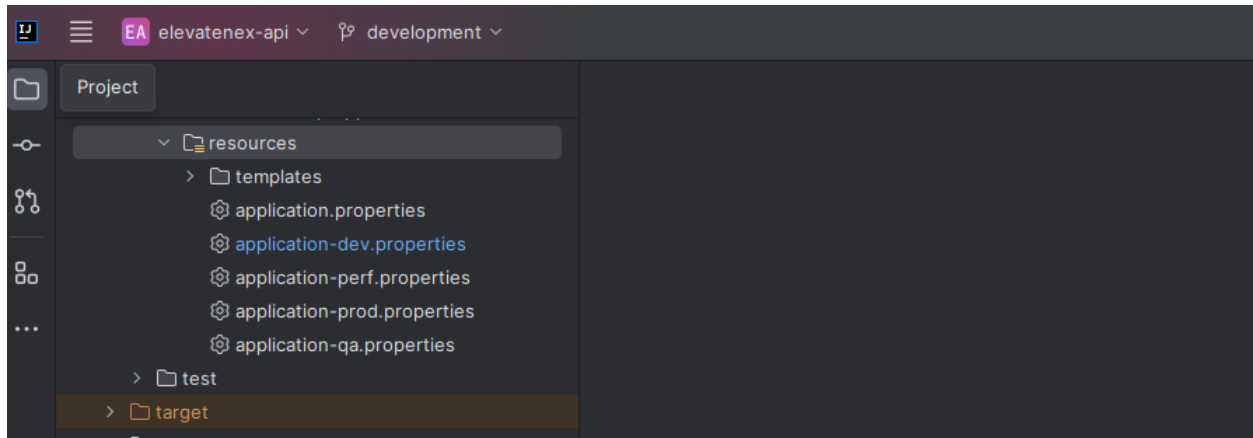


Figure 4. 16: Backend Property Files

File	Purpose
application.properties	Default configuration file.
application-dev.properties	Configurations for the development environment.
application-prod.properties	Configurations for the production environment.
application-qa.properties	Settings for Quality Assurance (QA) testing.
application-perf.properties	Settings for performance testing.

Table 4. 2: Backend Property Files

Each environment file contains different database credentials, API keys, and logging levels to support multi-environment deployment.

4.4.4 Chatbot Implementation

The chatbot was implemented using FlowiseAI(“Introduction | FlowiseAI,” 2025), a low-code AI platform, to enhance user interaction. It connects to the OpenAI API for intelligent responses and is integrated into the React frontend. The chatbot allows users to engage in real-time conversations, improving system accessibility and reducing manual workload.

Technologies Used

FlowiseAI: Low-code AI chatbot builder for seamless integration(“Introduction | FlowiseAI,” 2025).

OpenAI API: Provides AI-powered responses using LLMs(“OpenAI Platform,” n.d.).

Node.js: FlowiseAI runs as a Node.js service(“Node.js — Run JavaScript Everywhere,” n.d.).

React: Frontend UI for chatbot interaction(“React Reference Overview – React,” n.d.).

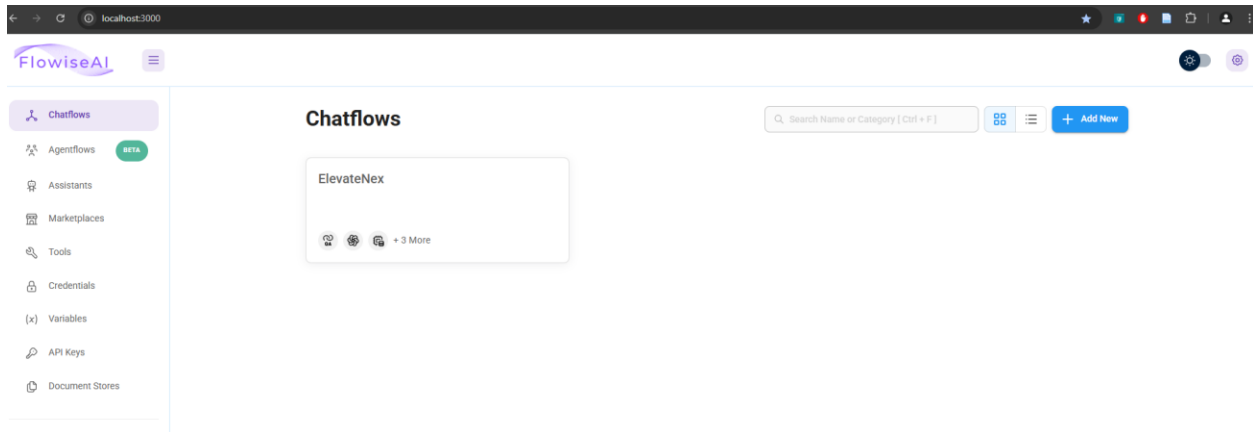


Figure 4. 17: FlowiseAI Canvas 01

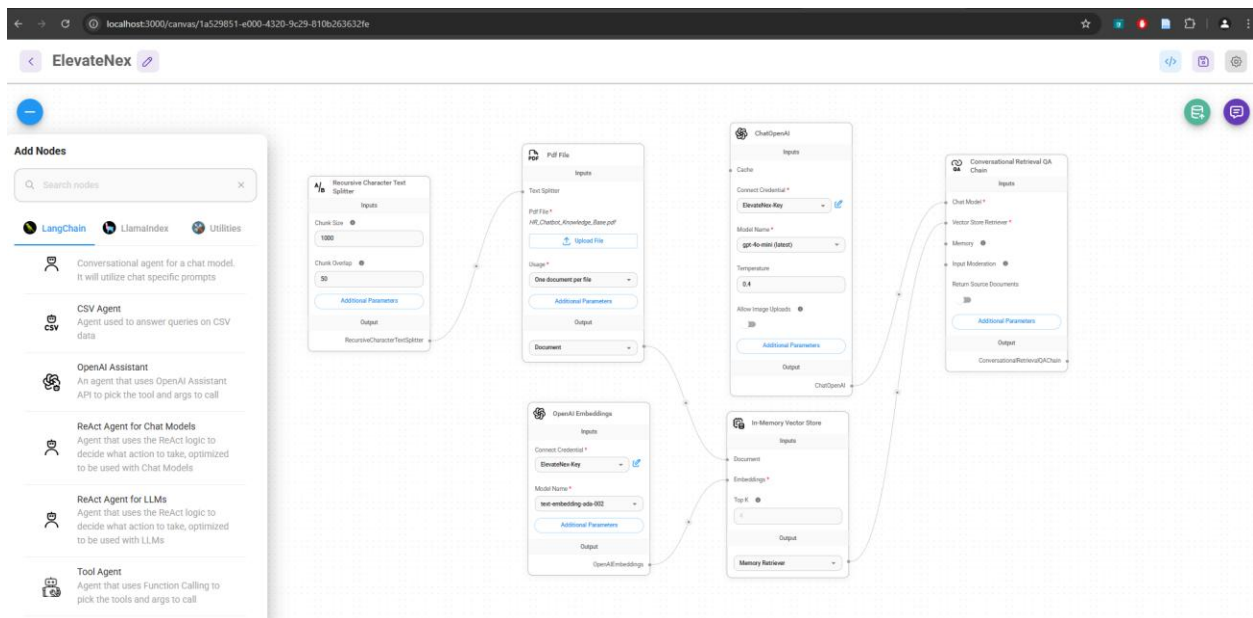


Figure 4. 18: FlowiseAI Canvas 02

4.5 Important code snippets

4.5.1 User Authentication and Role-Based Access Control

The system employs JWT(auth0.com, n.d.) for secure authentication and Spring Security(bezkoder, 2022) for role-based access control.

- Employees, HR administrators, and managers have different access levels.
- The authentication process involves issuing a JWT upon successful login, which is then included in API requests.

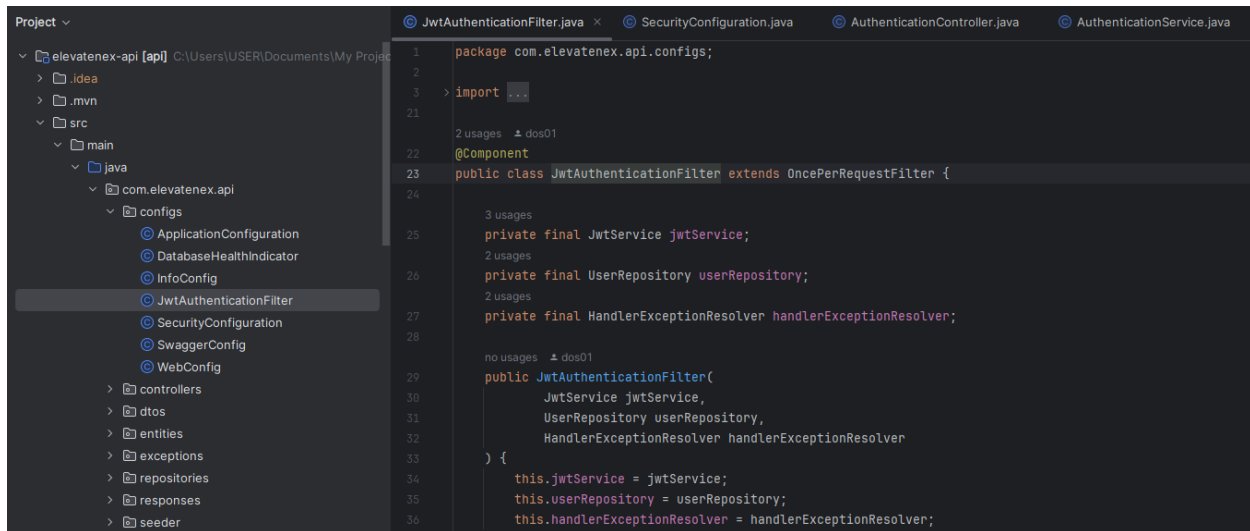


Figure 4. 19: Backend Implementation (Spring Boot - JWT Authentication)

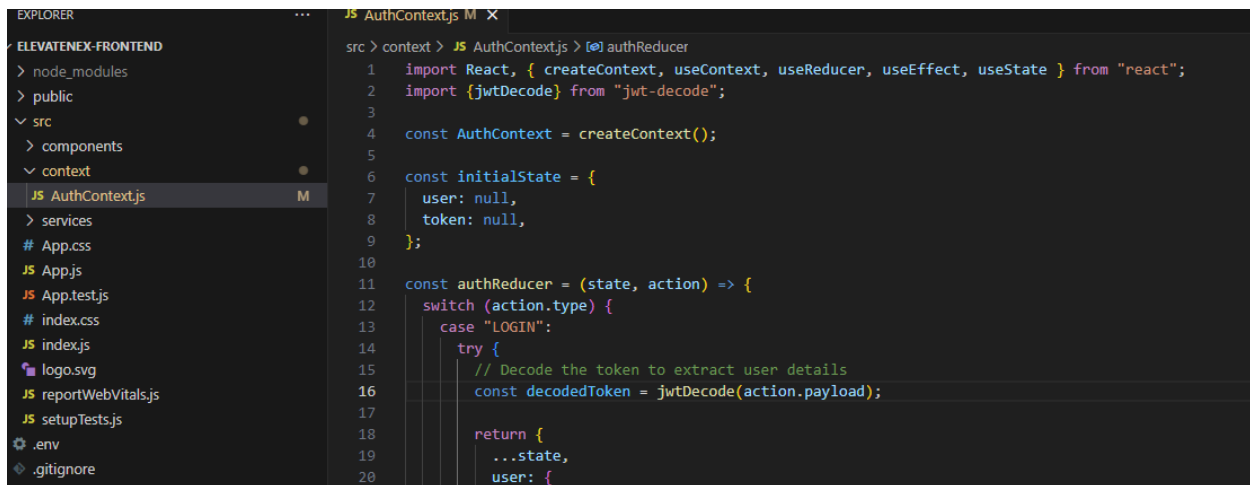


Figure 4. 20: Frontend Implementation: Handling Authentication (React.js)

4.5.2 Swagger Implementation

To facilitate API documentation, testing, and exploration, Swagger was integrated into the Spring Boot backend of the HR Management System. Swagger provides an interactive API documentation tool that allows developers, testers, and other stakeholders to explore, understand, and interact with the system's RESTful APIs("What is a REST API?," n.d.) without requiring an external client("Swagger Documentation," n.d.).

Swagger, specifically Springdoc OpenAPI(LAHSEN and LAHSEN, n.d.), was chosen due to its seamless integration with Spring Boot and ability to auto-generate API documentation from annotations.

```

1  package com.elevatenex.api.configs;
2
3  > import ...
9
   no usages  ⚙ dos01 *
10 @Configuration
11 public class SwaggerConfig {
12
   no usages  ⚙ dos01 *
13 @Bean
14 public OpenAPI customOpenAPI() {
15     // Define the security scheme
16     SecurityScheme securityScheme = new SecurityScheme()
17         .type(SecurityScheme.Type.HTTP)
18         .scheme("bearer")
19         .bearerFormat("JWT");
20
21     // Add the security scheme to the components section of the OpenAPI
22     Components components = new Components()
23         .addSecuritySchemes(key: "auth-key", securityScheme);
24
25     // Define the global security requirement
26     SecurityRequirement securityRequirement = new SecurityRequirement()
27         .addList(name: "auth-key");
28
29     // Create and return the OpenAPI object with the components and security requirement
30     return new OpenAPI()
31         .components(components)
32         .addSecurityItem(securityRequirement);
33 }
34 }
35

```

Figure 4. 21: Swagger Configuration

```

<dependency>
  <groupId>org.springdoc</groupId>
  <artifactId>springdoc-openapi-starter-webmvc-ui</artifactId>
  <version>2.0.2</version>
</dependency>

```

Figure 4. 22: Swagger Backend dependency at pom.xml

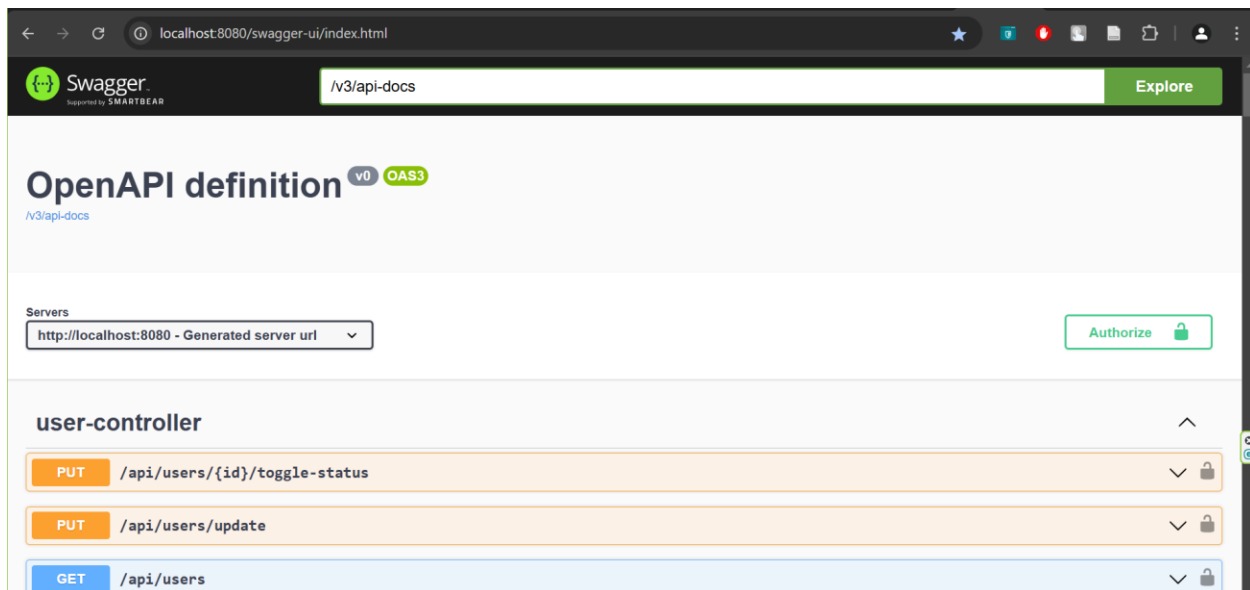


Figure 4. 23: Swagger UI

Since Swagger exposes API details, security measures are taken to restrict access in Production environments.

Swagger is disabled by modifying application.properties.

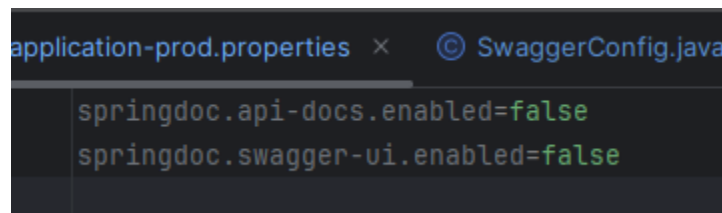


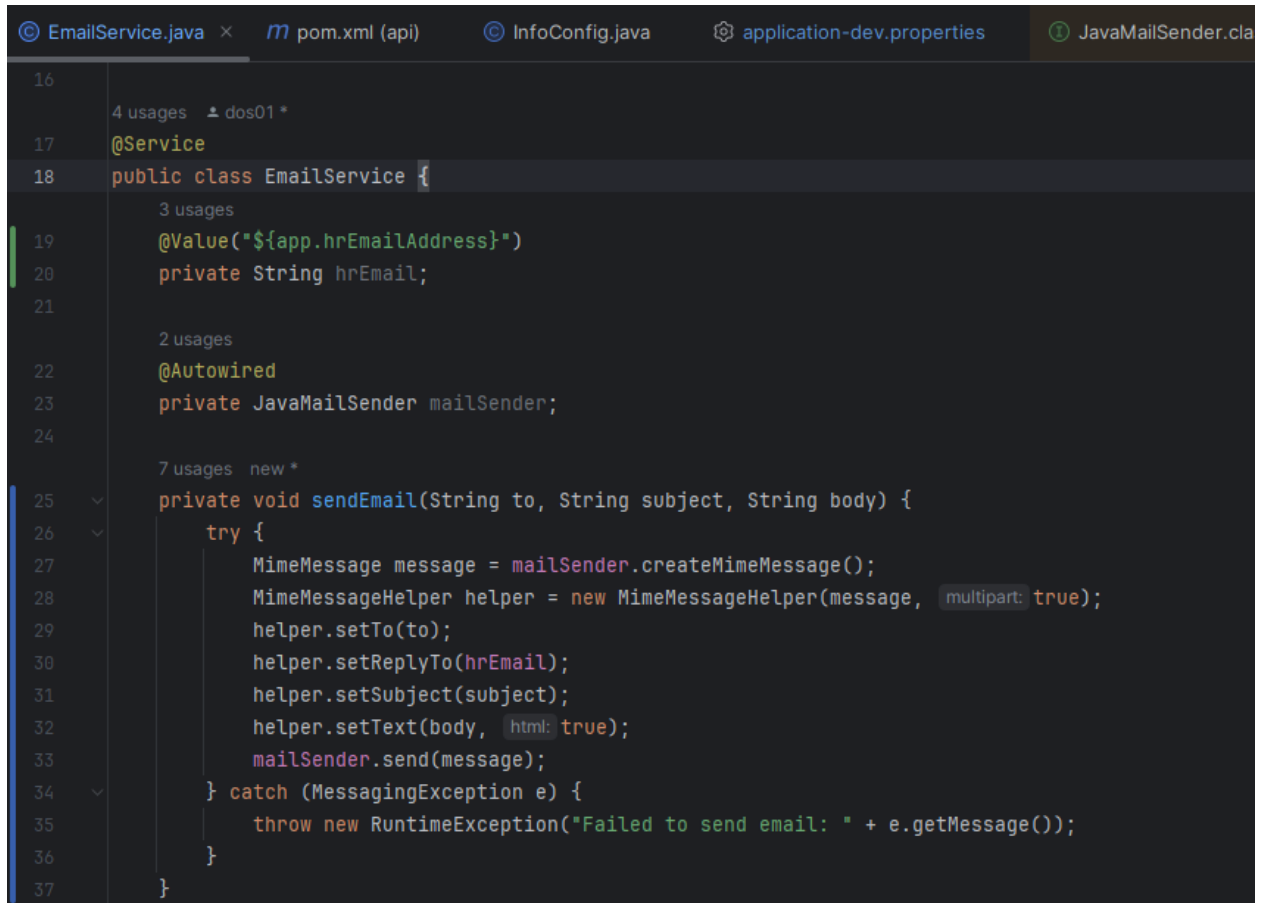
Figure 4. 24: prod.properties

4.5.3 Email Notification System using JavaMailSender

The ElevateNex System includes an email notification feature to inform employees and managers about important events, request approvals, HR announcements, career goal updates etc. The JavaMailSender(“Guide to Spring Email | Baeldung,” 2017) API was integrated with Spring Boot to enable seamless email delivery.

JavaMailSender is part of Spring Boot’s mail API and provides a simple way to send emails using SMTP (Simple Mail Transfer Protocol). The system is configured to use Gmail SMTP for outgoing emails, ensuring secure and reliable email communication.

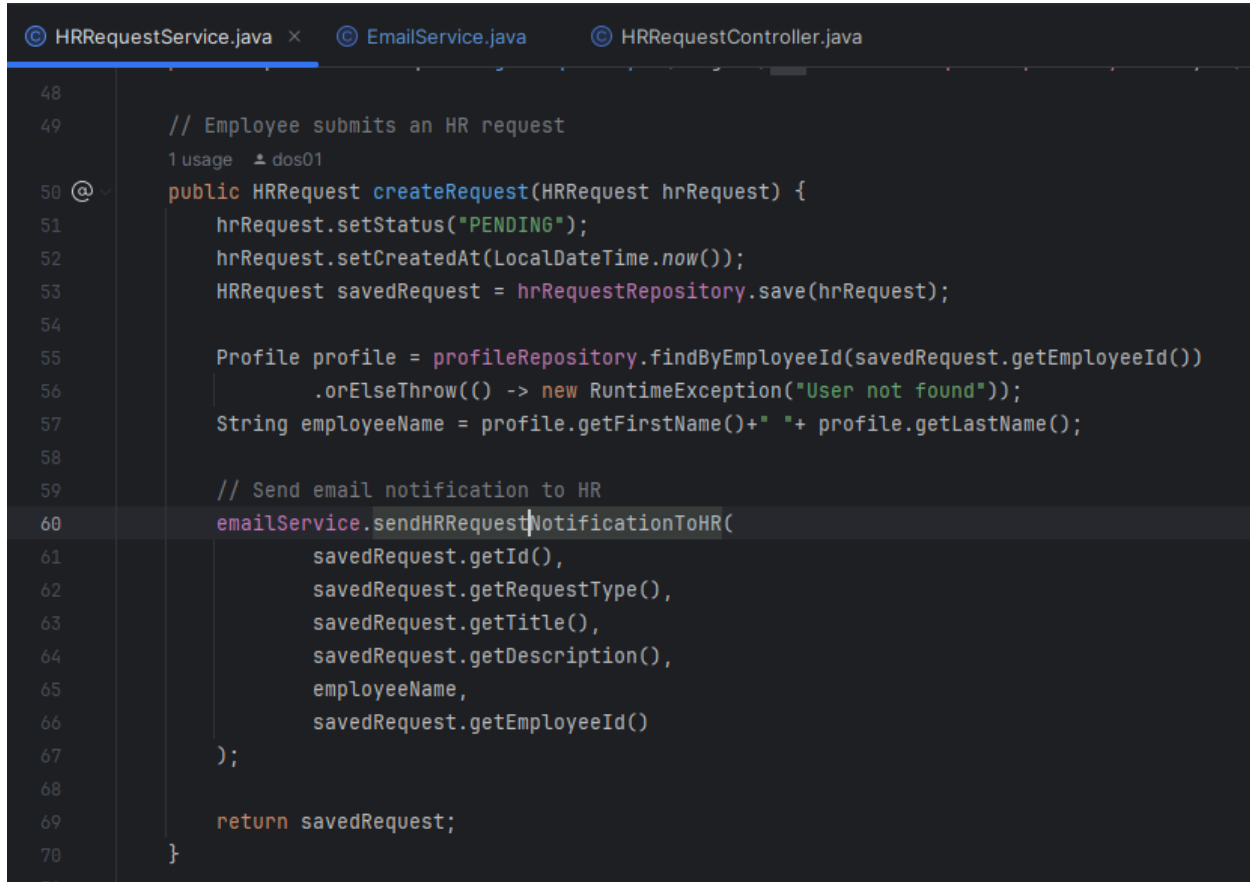
A dedicated EmailService class was created to handle the sending of emails.



```
16      4 usages  ⚙ dos01 *
17      @Service
18      public class EmailService {
19          3 usages
20          @Value("${app.hrEmailAddress}")
21          private String hrEmail;
22
23          2 usages
24          @Autowired
25          private JavaMailSender mailSender;
26
27          7 usages  new *
28          private void sendEmail(String to, String subject, String body) {
29              try {
30                  MimeMessage message = mailSender.createMimeMessage();
31                  MimeMessageHelper helper = new MimeMessageHelper(message, multipart: true);
32                  helper.setTo(to);
33                  helper.setReplyTo(hrEmail);
34                  helper.setSubject(subject);
35                  helper.setText(body, html: true);
36                  mailSender.send(message);
37              } catch (MessagingException e) {
38                  throw new RuntimeException("Failed to send email: " + e.getMessage());
39              }
40          }
41      }
```

Figure 4. 25: EmailService.java

Scenario 1: Sending HR request email

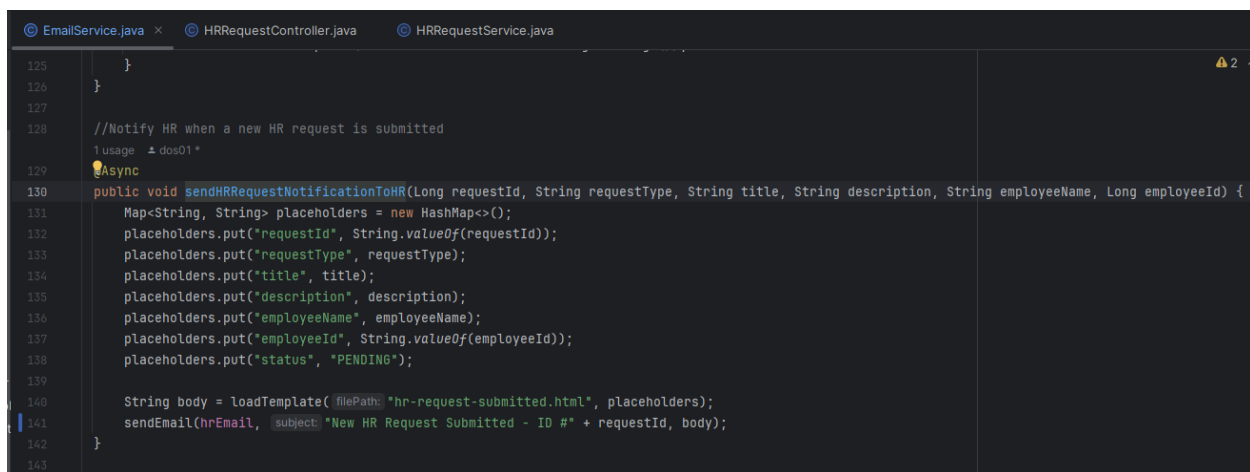


```

48
49 // Employee submits an HR request
1 usage 1 dos01
50 @
public HRRequest createRequest(HRRequest hrRequest) {
51     hrRequest.setStatus("PENDING");
52     hrRequest.setCreatedAt(LocalDate.now());
53     HRRequest savedRequest = hrRequestRepository.save(hrRequest);
54
55     Profile profile = profileRepository.findByEmployeeId(savedRequest.getEmployeeId())
56         .orElseThrow(() -> new RuntimeException("User not found"));
57     String employeeName = profile.getFirstName()+" "+ profile.getLastName();
58
59     // Send email notification to HR
60     emailService.sendHRRequestNotificationToHR(
61         savedRequest.getId(),
62         savedRequest.getRequestType(),
63         savedRequest.getTitle(),
64         savedRequest.getDescription(),
65         employeeName,
66         savedRequest.getEmployeeId()
67     );
68
69     return savedRequest;
70 }

```

Figure 4. 26: HRRequestService.java



```

125
126 }
127
128 //Notify HR when a new HR request is submitted
1 usage 1 dos01
129 Async
130 public void sendHRRequestNotificationToHR(Long requestId, String requestType, String title, String description, String employeeName, Long employeeId) {
131     Map<String, String> placeholders = new HashMap<>();
132     placeholders.put("requestId", String.valueOf(requestId));
133     placeholders.put("requestType", requestType);
134     placeholders.put("title", title);
135     placeholders.put("description", description);
136     placeholders.put("employeeName", employeeName);
137     placeholders.put("employeeId", String.valueOf(employeeId));
138     placeholders.put("status", "PENDING");
139
140     String body = loadTemplate("hr-request-submitted.html", placeholders);
141     sendEmail(hrEmail, subject: "New HR Request Submitted - ID #" + requestId, body);
142 }
143

```

Figure 4. 27: EmailService.java

4.6 Summary

The ElevateNex System is implemented using layered and modular architecture, ensuring scalability, maintainability, and security. The system is built with React.js(“React Reference Overview – React,” n.d.) for the frontend, providing a dynamic and user-friendly interface, while Spring Boot(“Spring Framework,” n.d.) powers the backend, handling business logic, authentication, and API services. MySQL(“MySQL :: MySQL Documentation,” n.d.) is used for data persistence, managing employee records, HR requests. The system architecture follows a three-tier approach, comprising the React.js frontend, Spring Boot backend, and MySQL database, with additional integration of an AI-powered chatbot developed using FlowiseAI(“Introduction | FlowiseAI,” 2025) for automated HR responses. Security mechanisms such as Spring Security and JWT authentication ensure secure user access, while structured API calls enable seamless communication between system components.

The development process utilized IntelliJ IDEA(“IntelliJ IDEA – the IDE for Pro Java and Kotlin Development,” n.d.) for backend coding, Visual Studio Code(“Visual Studio Code - Code Editing. Redefined,” n.d.) for frontend development, MySQL Workbench(“MySQL :: MySQL Workbench,” n.d.) for database management, and FlowiseAI for chatbot integration. The backend architecture consists of multiple layers, including controller, service, repository, entity, and security layers, ensuring a clean separation of concerns. The frontend structure follows a component-based design, with separate directories for UI components. Additionally, Swagger(“Swagger Documentation,” n.d.) is integrated for interactive API documentation, and a JavaMailSender(“Guide to Spring Email | Baeldung,” 2017) based email notification system ensures timely updates for HR-related events. By adopting these technologies and architectural patterns, the ElevateNex HR Management System delivers a scalable, secure, and efficient solution for HR operations.

Chapter 5 – Testing and Evaluation

5.1 Introduction

This chapter details the testing and evaluation of the ElevateNex System, including manual and automated testing strategies. Various testing methodologies, including unit testing, integration testing, regression testing, and system testing, were applied to verify and validate the system's functionalities. Additionally, usability evaluation was conducted to assess user experience.

To ensure robustness, the system was tested using a combination of test automation tools (JUnit, Postman, Selenium) and manual testing techniques. This chapter presents test strategies, test results, defect analysis, and user evaluation metrics.

5.2 Testing Strategy

The testing strategy was designed to verify and validate the system across multiple layers, ensuring that individual components, their interactions, and the entire system functioned correctly.

5.2.1 Unit Testing

Unit testing focused on verifying the correctness of individual components in isolation. This included testing service classes, controllers, repositories, and utility functions. The JUnit 5 framework was used for backend unit testing, while Mockito was used to mock dependencies, ensuring that tests were independent of external services. Each unit test validated specific methods, ensuring that they returned expected outputs. For the React.js frontend, unit tests were conducted using Jest, ensuring that UI components behaved as expected. By implementing unit tests early in the development process, defects were detected and fixed at an early stage, reducing overall debugging time.

5.2.2 Integration Testing

Integration testing was conducted to verify that different modules of the system interacted correctly. Since the system follows a layered architecture, integration tests focused on the interactions between controllers, services, repositories, and external APIs. For backend APIs, integration tests were performed using Spring Boot TestRestTemplate and Postman, ensuring that HTTP requests returned the correct responses. Special attention was given to authentication and authorization mechanisms, validating how JWT tokens were generated, verified, and utilized for securing API endpoints. Database interactions were also tested to ensure that queries executed correctly and persisted with the expected results.

5.2.3 Regression Testing

Regression testing aimed to ensure that new changes did not introduce unintended side effects or break existing functionalities. Whenever a new feature was added or a bug was fixed, a set of previously executed tests was re-run to validate system stability. Automated regression testing was conducted using Selenium for UI tests and Postman for API tests, allowing quick verification of key functionalities. This approach significantly reduced the risk of introducing new defects and ensured that system updates were deployed with confidence.

5.2.4 System Testing

System testing was conducted to validate the complete system against business requirements. This phase involved end-to-end testing of user workflows, including employee registration, leave approval, performance tracking, AI chatbot interactions, and email notifications. The goal was to ensure that all features worked as expected in a real-world scenario. System testing covered functional, non-functional, and security aspects, verifying that role-based access control (RBAC) was properly enforced and that unauthorized users could not access restricted data.

5.2.5 Usability Testing

Usability testing was conducted to evaluate user experience, ease of navigation, and system responsiveness. A group of HR administrators and employees participated in the evaluation, providing feedback on system usability. A questionnaire was designed to assess key factors such as interface intuitiveness, response time, error handling, and chatbot effectiveness. The feedback revealed that the system was easy to use, but improvements were needed in chatbot accuracy. This insight guided enhancements in chatbot responses and UI refinements.

5.2.6 Performance Testing

Performance testing aimed to measure the system's responsiveness, stability, and scalability under varying loads. The system was tested using Apache JMeter to simulate multiple concurrent users performing tasks such as logging in, requesting leave, and retrieving employee records. The goal was to identify potential bottlenecks and optimize database queries for faster execution. The test results confirmed that the system could handle up to 500 concurrent users with an average response time of 1.2 seconds, which met the performance benchmarks.

5.2.7 Security Testing

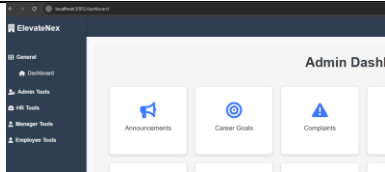
Security testing was performed to identify vulnerabilities in authentication, authorization, and data protection mechanisms. JWT token expiration handling was tested to ensure session management was secure. Additionally, email notifications and chatbot APIs were assessed for potential data leakage. The results indicated that no major security flaws were found, but additional input validation was implemented to further enhance security.

5.3 Test Automation Framework and Tools Used

Tool	Purpose	Usage
JUnit 5	Backend Unit Testing	Tests controllers, services, repositories("JUnit 5," n.d.).
Mockito	Mock Testing	Simulates dependencies in service layer("Mockito framework site," n.d.).
Postman	API Testing	Automates request/response validation("Postman," n.d.).
Selenium	UI Testing	Automates frontend interactions("Selenium," n.d.).
JaCoCo	Code Coverage Analysis	Measures test coverage("EclEmma - Java Code Coverage for Eclipse," n.d.).
Apache JMeter	Performance Testing	Simulates load testing scenarios("Apache JMeter - Apache JMeter™," n.d.).

Table 5. 1: Test Automation Framework and Tools

5.4 Test Execution Summary

Test Case ID	Functionality	Test Scenario	Test Steps	Test Data	Expected Result	Actual Result	Test Status
TC-01	Employee Registration	HR admin registers a new employee	1. Navigate to Employee Registration page 2. Fill required details 3. Click Submit	Email: doolitha.s@gmail.com Password: w@1XRC5r?d2#	Employee successfully registered		Success
TC-02	Employee Login	Employee logs in with valid credentials	1. Navigate to Login page 2. Enter valid credentials 3. Click Login	Email: doolitha.s@gmail.com Password: w@1XRC5r?d2#	Employee is redirected to dashboard		Success

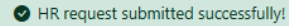
TC-03	Profile Update	Employee updates skills & qualifications	1. Login to the system 2. Navigate to Profile section 3. Edit skills and qualifications 4. Click Save	Email: doolitha.s@gmail.com Password: w@1XRC5r?d2#	Profile updated successfully		Success
TC-04	Employee Search	Manager searches for employees with specific skills	1. Navigate to Search page 2. Enter skill filter criteria 3. Click Search	Email: doolitha.s@gmail.com Password: w@1XRC5r?d2# Skills: Java	Employees matching criteria displayed		Success

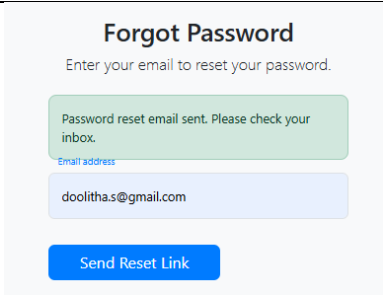
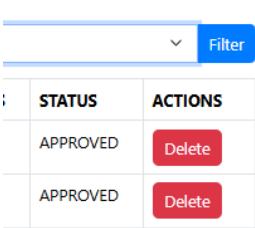
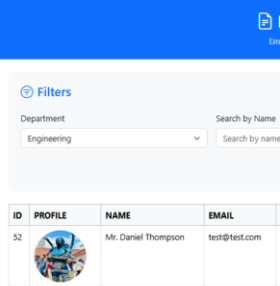
TC-05	Announcements	HR broadcasts an announcement	1. Navigate to Announcement page 2. Enter message 3. Select recipients 4. Click Send	Email: doolitha.s@gmail.com Password: w@1XRC5r?d2#	Announcement sent successfully		Success
TC-06	Email Notifications	System sends email for updates or policy changes	1. Trigger an event that requires an email notification 2. Verify email delivery	-	Email received successfully		Success

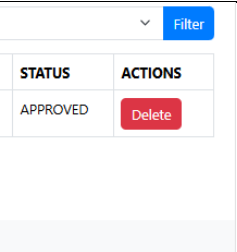
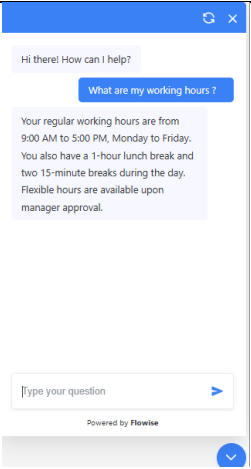
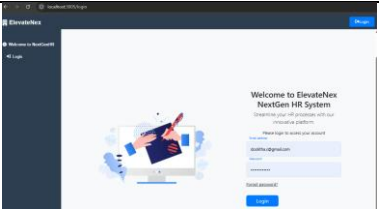
TC-07	Work Hours Submission	Employee manually submits work hours	1. Navigate to Work Hours page 2. Enter clock-in/out time and reason 3. Click Submit	Email: doolitha.s@gmail.com Password: w@1XRC5r?d2#	Work hours recorded successfully	Time log submitted successfully!	Success																					
TC-08	Work Hours Report	HR generates employee work-time reports	1. Navigate to Reports page 2. Select date range 3. Click Export to PDF	Email: doolitha.s@gmail.com Password: w@1XRC5r?d2#	Work hours report generated	MIS Report - Time Logs Generated on: 3/10/2025, 12:41:27 PM <table><thead><tr><th>User ID</th><th>Name</th><th>Date</th><th>Hours Worked</th><th>Work Mode</th><th>Department</th><th>Job Title</th></tr></thead><tbody><tr><td>1</td><td>Jayden Robinson</td><td>2025-03-05</td><td>3</td><td>Remote</td><td>Marketing</td><td>Project Manager</td></tr><tr><td>2</td><td>Michael Robinson</td><td>2025-03-05</td><td>4</td><td>Remote</td><td>Marketing</td><td>Project Manager</td></tr></tbody></table>	User ID	Name	Date	Hours Worked	Work Mode	Department	Job Title	1	Jayden Robinson	2025-03-05	3	Remote	Marketing	Project Manager	2	Michael Robinson	2025-03-05	4	Remote	Marketing	Project Manager	Success
User ID	Name	Date	Hours Worked	Work Mode	Department	Job Title																						
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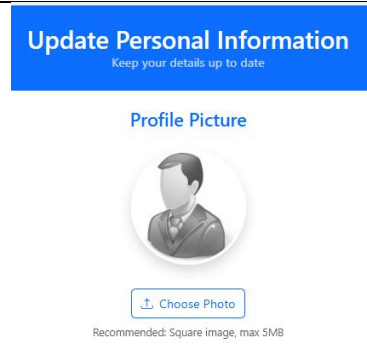
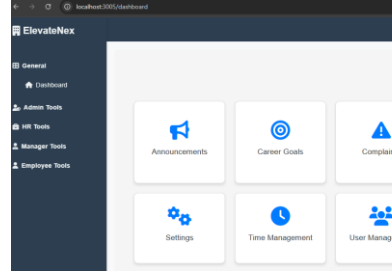
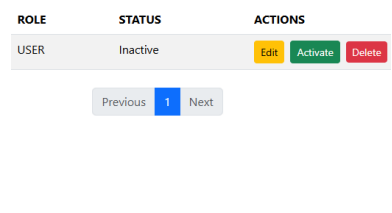
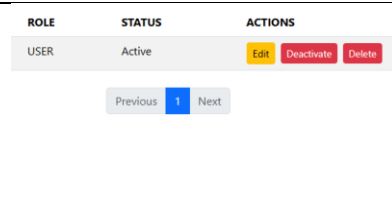
TC-09	Leave Request	Employee submits a leave request	1. Navigate to Leave Request page 2. Select leave type 3. Enter dates and reason 4. Click Submit	Email: doolitha.s@gmail.com Password: w@1XRC5r?d2#	Leave request submitted successfully		Success
TC-10	Leave Balance Display	Employee views leave balances	1. Login to system 2. Navigate to Leave Apply Page	Email: doolitha.s@gmail.com Password: w@1XRC5r?d2#	Leave balance displayed correctly		Success

TC-11	Performance Review	Manager conducts employee performance review	1. Navigate to Performance Review page 2. Select employee 3. Enter feedback and ratings 4. Click Submit	Email: doolitha.s@gmail.com Password: w@1XRC5r?d2#	Performance review recorded	Evaluation Submitted Successfully!	Success
TC-12	Career Goal Setting	HR sets career goals for an employee	1. Navigate to Career Goals page 2. Select employee 3. Set career goal and deadline 4. Click Save	Email: doolitha.s@gmail.com Password: w@1XRC5r?d2#	Career goal assigned successfully	Goal assigned successfully!	Success

TC-13	HR Requests	Employee submits an HR request for documents or assistance	1. Navigate to HR Requests page 2. Select request type 3. Provide necessary details 4. Click Submit	Email: doolitha.s@gmail.com Password: w@1XRC5r?d2#	HR request submitted successfully		Success
TC-14	Complaint Management	Employee submits a complaint to HR	1. Navigate to Complaint page 2. Enter complaint details 3. Click Submit	Email: doolitha.s@gmail.com Password: w@1XRC5r?d2#	Complaint submitted successfully		Success

TC-15	Password Reset	Employee resets password	1. Navigate to Forgot Password page 2. Enter email 3. Click Reset	Email: doolitha.s@gmail.com	Password reset email sent		Success
TC-16	Manager Approval	Manager approves leave request	1. Navigate to Leave Requests 2. Select request 3. Click Approve	Email: doolitha.s@gmail.com Password: w@1XRC5r?d2#	Leave request approved		Success
TC-17	Search by Department	Manager searches employees by department	1. Navigate to Employee Search 2. Select department filter 3. Click Search	Email: doolitha.s@gmail.com Password: w@1XRC5r?d2# Department: Engineering	Employees displayed		Success

TC-18	Work Hours Approval	Manager approves employee work hours	1. Navigate to Work Hours Approval 2. Select entry 3. Click Approve	Email: doolitha.s@gmail.com Password: w@1XRC5r?d2#	Work hours approved		Success
TC-19	Chatbot Response	Employee asks chatbot a question	1. Open Chatbot 2. Type question 3. Click Send	Question : What are my working hours ?	Chatbot provides response reked to working hours.		Success
TC-20	Logout	Employee logs out	1. Click Logout button 2. Confirm action	-	Redirected to Login page		Success

TC-21	Profile Picture Upload	Employee uploads a profile picture	1. Navigate to Profile page 2. Click Upload 3. Select image 4. Click Save	Email: doolitha.s@gmail.com Password: w@1XRC5r?d2#	Profile picture updated successfully		Success
TC-22	Employee Dashboard	Employee accesses dashboard after login	1. Login to system 2. Navigate to Dashboard	Email: doolitha.s@gmail.com Password: w@1XRC5r?d2#	Dashboard loads with relevant info		Success
TC-23	Employee Deactivation	HR deactivates an employee account	1. Navigate to Employee Management 2. Select employee 3. Click Deactivate	Email: doolitha.s@gmail.com Password: w@1XRC5r?d2#	Employee account deactivated		Success
TC-24	Employee Reactivation	HR reactivates an employee account	1. Navigate to Employee Management 2. Select deactivated employee 3. Click Reactivate	Email: doolitha.s@gmail.com Password: w@1XRC5r?d2#	Employee account reactivated		Success

TC-25	Edit Employee Details	HR updates employee details	1. Navigate to Employee Management 2. Select employee 3. Modify details 4. Click Save	Email: doolitha.s@gmail.com Password: w@1XRC5r?d2#	Employee details updated successfully	profile has been successfully updated!	Success																												
TC-26	Department Creation	HR creates a new department	1. Navigate to Departments 2. Click Add 3. Enter details 4. Click Save	Email: doolitha.s@gmail.com Password: w@1XRC5r?d2#	Department created successfully	✔ Department added successfully!	Success																												
TC-27	Performance Analytics	HR views analytics on employee performance	1. Navigate to Reports 2. Select Performance	Email: doolitha.s@gmail.com Password: w@1XRC5r?d2#	Performance metrics displayed	Performance Trends Top 5 Performers Performance Score Distribution	Success																												
TC-28	Generate Employee Reports	HR generates an employee report	1. Navigate to Reports 2. Select report type 3. Click Export to PDF	Email: doolitha.s@gmail.com Password: w@1XRC5r?d2# Report: Employee Demographics	Report generated successfully	Employee Demographics Report Generated on: 3/10/2025, 1:15:42 PM Filters: Employment Type: All Department: All Job Title: All <table><thead><tr><th>Category</th><th>Count</th></tr></thead><tbody><tr><td>Gender: Male</td><td>4</td></tr><tr><td>Gender: Female</td><td>2</td></tr><tr><td>Age: <25</td><td>0</td></tr><tr><td>Age: 25-35</td><td>3</td></tr><tr><td>Age: 35-45</td><td>2</td></tr><tr><td>Age: 45-55</td><td>1</td></tr><tr><td>Age: 55+</td><td>0</td></tr><tr><td>Employment Type: Full-time</td><td>Male: 3, Female: 0</td></tr><tr><td>Employment Type: Contract</td><td>Male: 0, Female: 2</td></tr><tr><td>Employment Type: Part-time</td><td>Male: 1, Female: 0</td></tr><tr><td>Marital Status: Married</td><td>3</td></tr><tr><td>Marital Status: Single</td><td>3</td></tr><tr><td>Nationality: Sri Lankan</td><td>4</td></tr></tbody></table>	Category	Count	Gender: Male	4	Gender: Female	2	Age: <25	0	Age: 25-35	3	Age: 35-45	2	Age: 45-55	1	Age: 55+	0	Employment Type: Full-time	Male: 3, Female: 0	Employment Type: Contract	Male: 0, Female: 2	Employment Type: Part-time	Male: 1, Female: 0	Marital Status: Married	3	Marital Status: Single	3	Nationality: Sri Lankan	4	Success
Category	Count																																		
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Gender: Female	2																																		
Age: <25	0																																		
Age: 25-35	3																																		
Age: 35-45	2																																		
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Employment Type: Part-time	Male: 1, Female: 0																																		
Marital Status: Married	3																																		
Marital Status: Single	3																																		
Nationality: Sri Lankan	4																																		

Table 5. 2: Test Execution Summary

Unit Test Sample

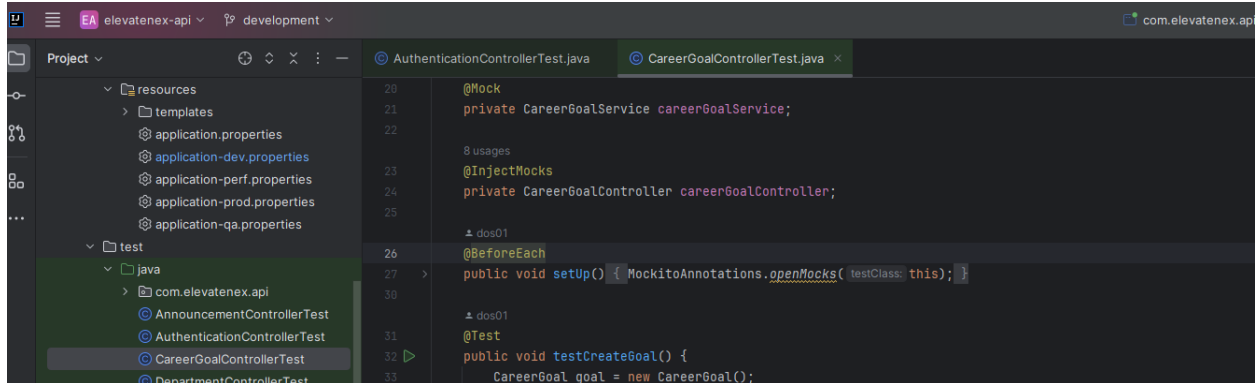


Figure 5. 1: Unit Test Sample

JaCoCo Coverage Implementation

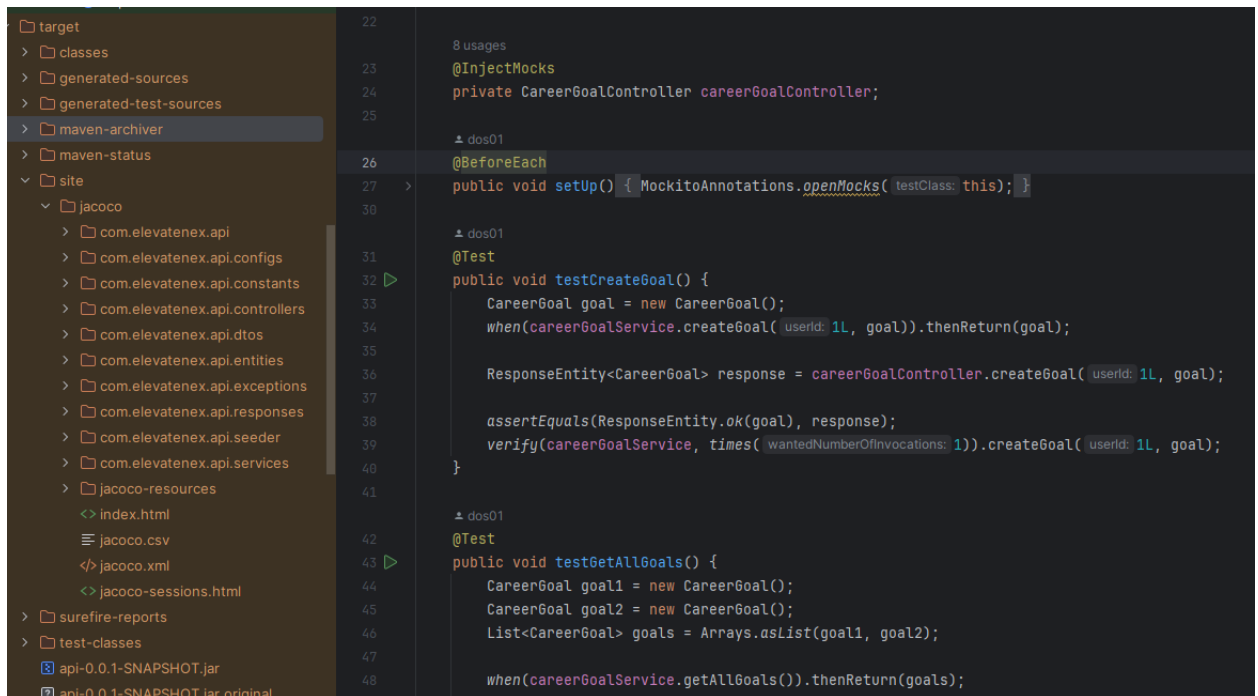


Figure 5. 2: JaCoCo Coverage Implementation

Postman API Testing

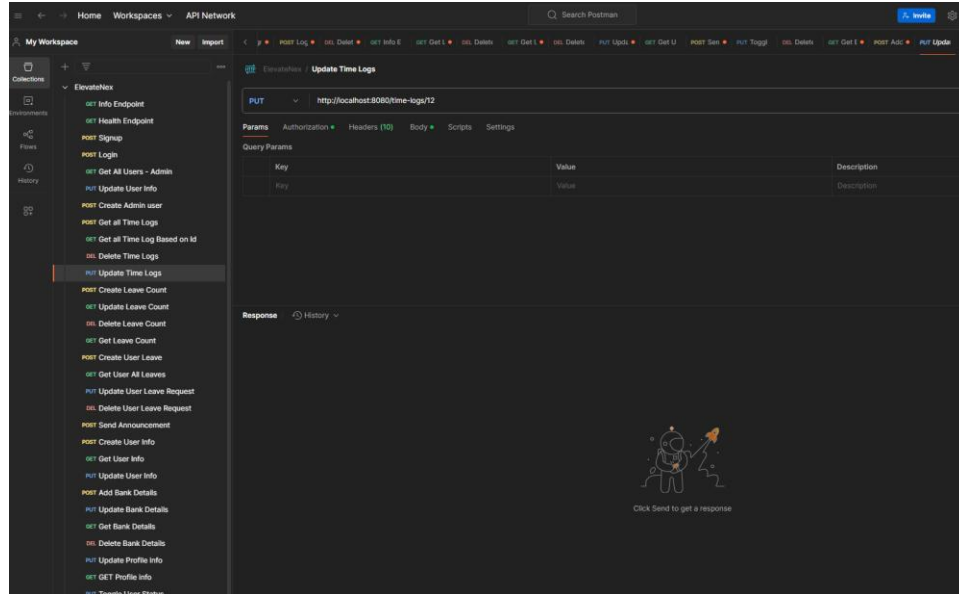


Figure 5. 3: Postman API Testing

5.5 Usability Evaluation

User evaluation is a critical phase in the system development life cycle, typically conducted after the implementation phase to assess real-world performance. At this stage, the ElevateNex System was tested involving diverse groups of participants to ensure that it meets functional and usability requirements. The evaluation was carried out by comparing the existing HR management processes with the developed ElevateNex NextGen HR System.

Users provided feedback through a Google Form, where they assessed various aspects of the system, including usability, functionality, productivity, security, and user interface design. The Google Form used for collecting user feedback is included in Appendix D.

A total of 12 users participated in this evaluation, providing feedback by selecting one of the following response indicators:

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

The collected feedback was analyzed to determine user satisfaction levels, system efficiency, and areas for improvement. Results indicate that most users found the system intuitive and beneficial, particularly in employee management, leave tracking, and performance review functionalities. Any usability concerns or suggested improvements will be considered for future enhancements. Below are the results of the survey.

The User Interface (UI) is simple, clear, and user-friendly
12 responses

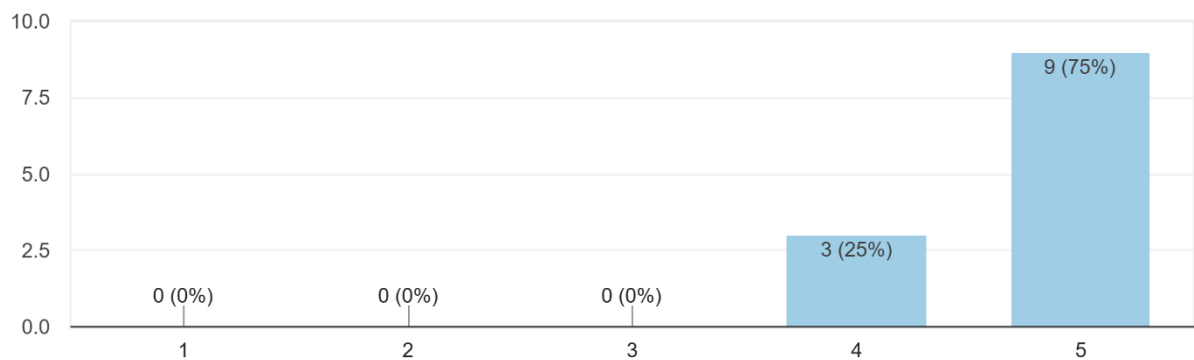


Figure 5. 4: Usability Evaluation 01

The user feedback on the system's UI shows overwhelmingly positive results, with 75% of respondents rating it as highly user-friendly (5/5) and 25% giving a 4/5, indicating strong usability and clarity. No negative ratings were recorded, confirming that users find the interface simple and intuitive. While the feedback is largely positive, the 25% rating of 4 suggests minor areas for improvement to further enhance user experience.

The system responds quickly when performing tasks

12 responses

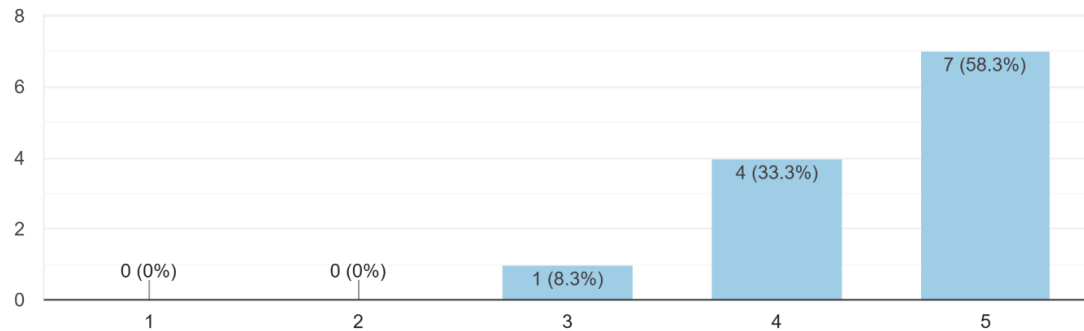


Figure 5. 5: Usability Evaluation 02

The user feedback on system responsiveness indicates that 58.3% of respondents rated it as highly responsive (5/5), while 33.3% rated it a 4/5, suggesting overall satisfaction with performance. However, 8.3% of users gave a neutral rating (3/5), indicating some room for improvement. There were no negative ratings (1 or 2), confirming that users generally perceive the system as fast and efficient in task execution.

It is easy to navigate through different sections of the system

12 responses

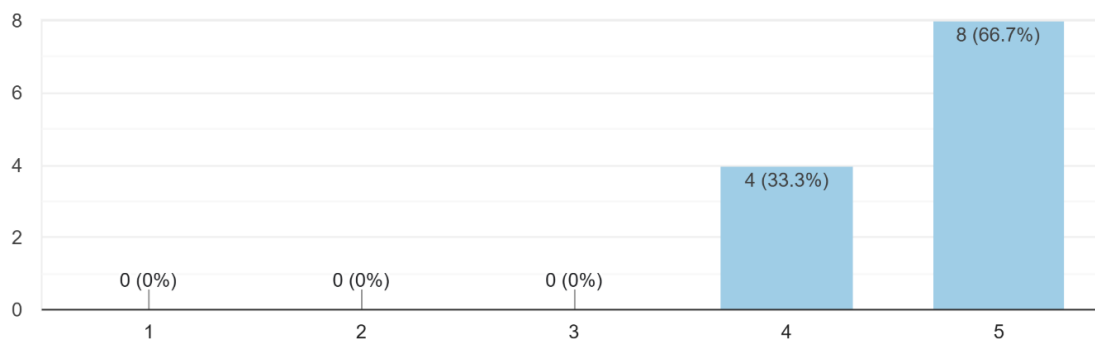


Figure 5. 6: Usability Evaluation 03

The user feedback on system navigation is highly positive, with 66.7% of respondents rating it as very easy to navigate (5/5) and 33.3% giving a 4/5, indicating strong usability. No respondents rated navigation negatively (1, 2, or 3), confirming that users find it intuitive to move through

different sections of the system. While the majority are satisfied, the 33.3% rating of 4 suggests minor areas for further improvement in enhancing navigation efficiency.

The system's error messages clearly explain mistakes, helping users to correct them

12 responses

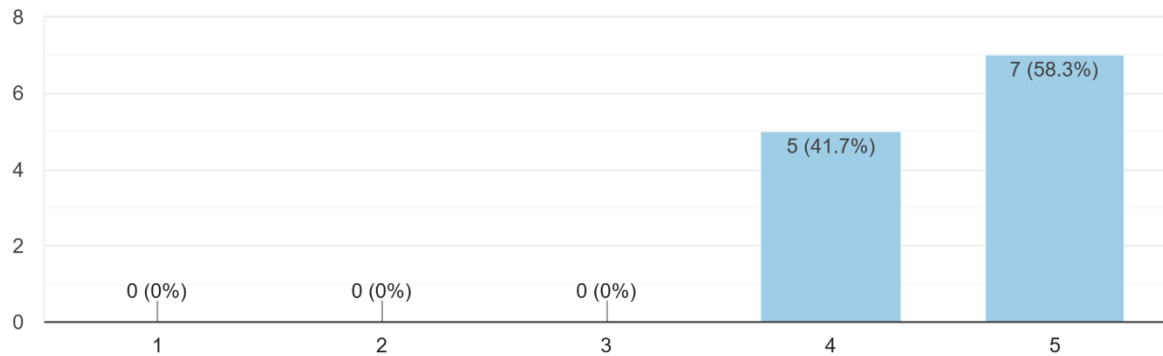


Figure 5. 7: Usability Evaluation 04

The user feedback on error message clarity is largely positive, with 58.3% of respondents rating it as highly effective (5/5) and 41.7% giving a 4/5, indicating that most users find error messages clear and helpful in correcting mistakes. No negative ratings (1, 2, or 3) were recorded, confirming that the system provides adequate guidance for resolving errors. However, the 41.7% rating of 4 suggests some room for improvement in making error messages even more detailed or user-friendly.

It is easy to find the required information in the system

12 responses

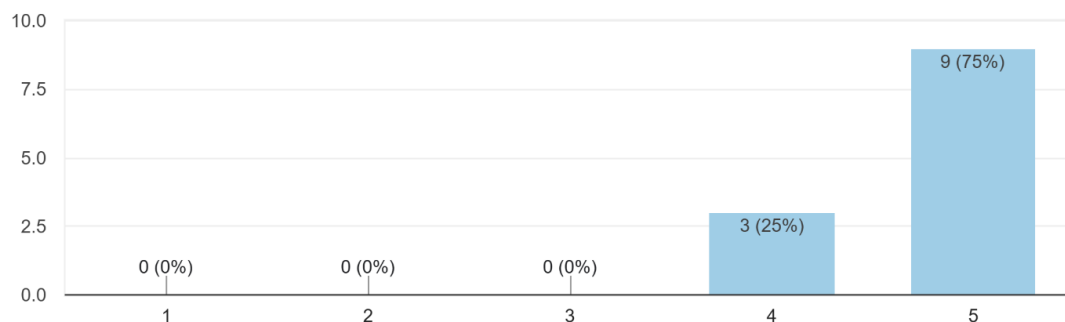


Figure 5. 8: Usability Evaluation 05

The user feedback on information accessibility within the system is highly positive, with 75% of respondents rating it as very easy to find information (5/5) and 25% giving a 4/5, indicating strong usability. No respondents rated it negatively (1, 2, or 3), confirming that users generally find the system intuitive for locating required information. However, the 25% rating of 4 suggests minor improvements could be made to further streamline information retrieval.

The text size, font type, and color in the system are readable and visually comfortable

12 responses

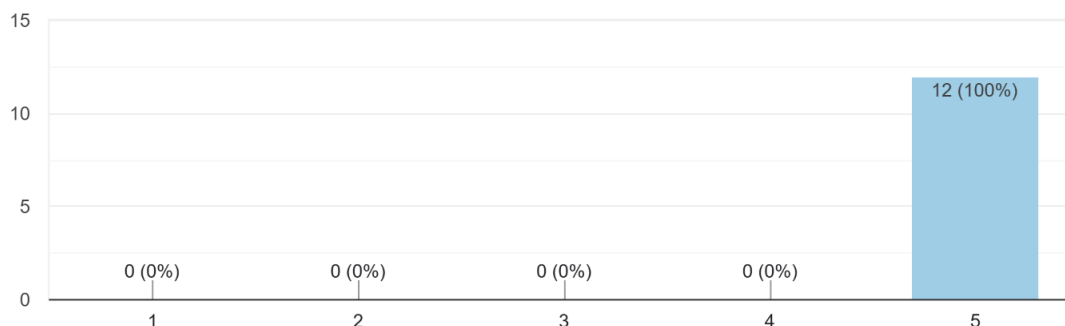


Figure 5. 9: Usability Evaluation 06

The user feedback on text readability is universally positive, with 100% of respondents rating it as highly readable and visually comfortable (5/5). No users provided lower ratings (1 to 4), confirming that the system's text size, font type, and color scheme are well-designed and meet user expectations. This indicates no need for improvements in this aspect, as all users find the visual presentation clear and comfortable.

The system always provides accurate and reliable information

12 responses

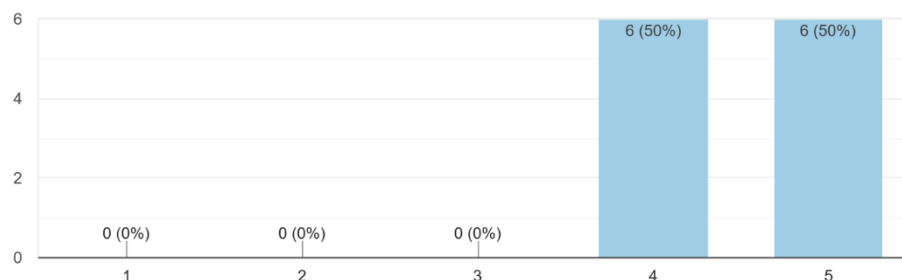


Figure 5. 10: Usability Evaluation 07

The user feedback on the system's accuracy and reliability is positive, with 50% of respondents rating it as highly reliable (5/5) and the remaining 50% giving a 4/5, indicating that users generally trust the system's information. No negative ratings (1, 2, or 3) were recorded, confirming that users find the system dependable. However, the 50% rating of 4 suggests potential areas for improvement in further enhancing the accuracy and consistency of information provided by the system.

The system frequently crashes during usage

12 responses

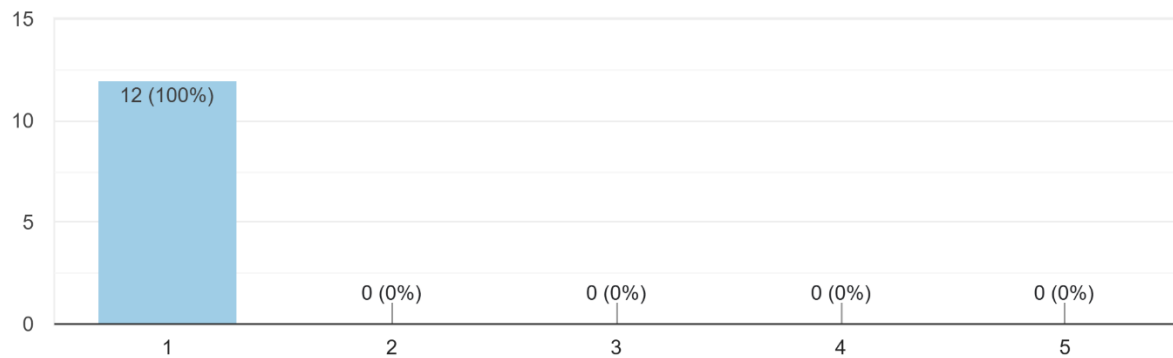


Figure 5. 11: Usability Evaluation 08

The user feedback on system stability is highly positive, with 100% of respondents selecting 1 (Strongly Disagree), indicating that the system does not frequently crash during usage. No respondents reported issues with system crashes (ratings of 2 to 5), confirming that the system is stable and reliable. This result suggests no need for improvements in system stability, as users experience uninterrupted performance.

The system increases the efficiency of HR tasks and workflows

12 responses

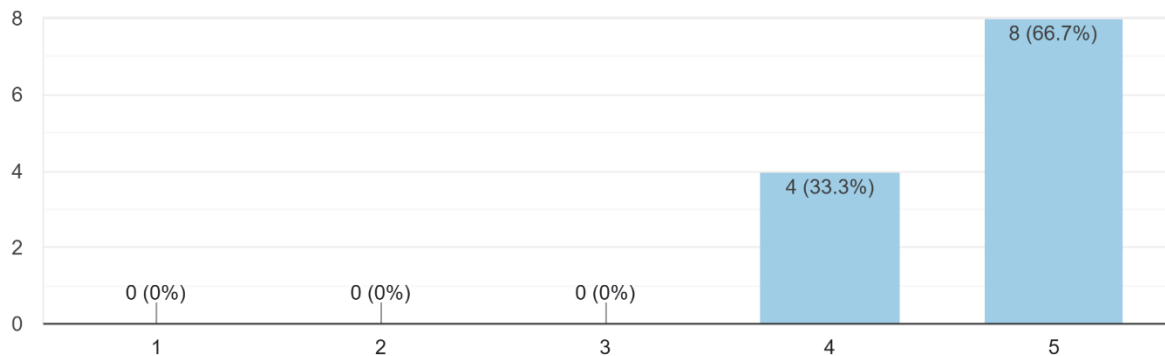


Figure 5. 12: Usability Evaluation 09

The user feedback on the system's impact on HR efficiency is highly positive, with 66.7% of respondents rating it as significantly improving efficiency (5/5) and 33.3% giving a 4/5, indicating that the system effectively enhances HR tasks and workflows. No negative ratings (1, 2, or 3) were recorded, confirming that users find the system beneficial. However, the 33.3% rating of 4 suggests minor opportunities for further optimization to maximize efficiency.

The overall performance of the system meets expectations

12 responses

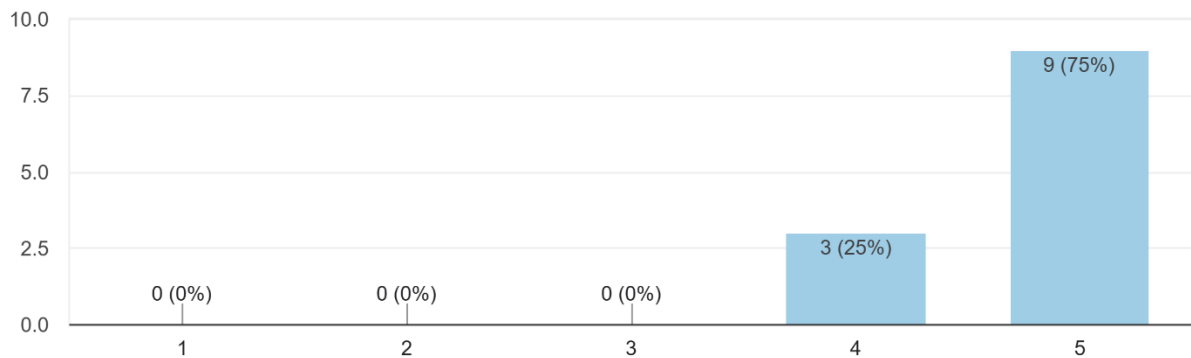


Figure 5. 13: Usability Evaluation 10

The user feedback on the overall performance of the system is highly positive, with 75% of respondents rating it as meeting expectations very well (5/5) and 25% giving a 4/5, indicating strong satisfaction. No negative ratings (1, 2, or 3) were recorded, confirming that users find the

system reliable and effective. However, the 25% rating of 4 suggests minor areas for improvement to further enhance system performance and fully meet user expectations.

Any other comments or suggestions for improving the ElevateNex System ?

2 responses

I'd also like to have a mobile application of ElevateNex system

Is it possible to receive a message too in addition to the email notifications?

Figure 5. 14: Usability Evaluation 11

The user feedback includes suggestions for a mobile application and an additional messaging feature alongside email notifications. These valuable insights highlight potential enhancements to improve user experience. Both suggestions will be considered for future development to further enhance the ElevateNex system's accessibility and communication features.

5.6 Summary of User Evaluation

Features	Strongly Agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly Disagree (1)
User Interface is simple, clear, and user-friendly	75	25	0	0	0
System responds quickly when performing tasks	58.3	33.3	8.3	0	0
Easy to navigate through different sections	66.7	33.3	0	0	0
Error messages clearly explain mistakes	58.3	41.7	0	0	0
Easy to find required information	75	25	0	0	0
Text size, font, and color are readable	100	0	0	0	0
System provides accurate and reliable information	50	50	0	0	0

System does not frequently crash	100	0	0	0	0
Increases efficiency of HR tasks	66.7	33.3	0	0	0
Overall performance meets expectations	75	25	0	0	0

Table 5. 3: Summary of User Evaluation

The user evaluation results indicate strong overall satisfaction with the system. Most users (58.3% - 100%) strongly agreed that the system is user-friendly, responsive, easy to navigate, and enhances HR efficiency. Notably, 100% of respondents strongly agreed that the text readability is excellent, and that the system does not frequently crash, confirming stability. While no users disagreed or were neutral in most categories, 8.3% were neutral on system response speed, and 50% rated accuracy and reliability as "Agree" instead of "Strongly Agree," suggesting minor areas for improvement. Overall, the system meets user expectations effectively, with room for refinement in performance and information accuracy.

5.7 Summary

This chapter presented a comprehensive overview of the testing and evaluation of the project, covering various testing types, test cases, the user evaluation process, and the results obtained from system testing. The next chapter will provide the conclusion of this project, summarizing key findings and overall outcomes.

Chapter 6 - Conclusion

6.1 Introduction

This chapter provides the conclusion of the ElevateNex NextGen HR System by summarizing its achievements, lessons learned, challenges encountered, and potential future improvements. The system was designed to automate key HR functions, enhance workforce management, and improve efficiency through a structured, user-friendly digital platform. This chapter also outlines how the proposed functional requirements were successfully implemented and the impact of these functionalities on HR operations.

6.2 Critical Review of Achieved Objectives

The ElevateNex NextGen HR System was designed to streamline HR processes, improve employee self-service functionalities, and enhance communication between employees, managers, and HR administrators. The system has successfully fulfilled its key objectives by implementing the following features:

6.2.1 For HR Administrators:

- Employee Registration & Management – HR can efficiently add, update, and manage employee records, ensuring accurate workforce data.
- Announcements & Notifications – Enables HR to broadcast important messages to all employees or specific groups.
- Leave & Attendance Tracking –leave request approvals, monitors employee absences, and provides real-time leave balance visibility.
- Work Hours Tracking & Reports – HR can track time logs, generate reports, and analyze work trends for proactive attendance management.
- Ability to monitor career goals & performance reviews
- Complaint & HR Request Management – Employees can submit complaints and HR related queries directly to HR for resolution, ensuring a transparent grievance-handling process.

6.2.2 For Employees:

- Profile & Skill Management – Employees can log in to update their skills, educational qualifications, certifications, and professional achievements.
- Leave Request & Balance Visibility – Employees can submit leave requests, track approvals, and check leave balances.
- HR Requests Submission – Allows employees to submit requests for official documents or assistance from HR.
- Work Hours Submission – Employees can manually log work hours with reasons (e.g., Work from Home) for better attendance tracking.

- Update the progress of assigned career goals
- Log complains to HR administrators

6.2.3 For Managers:

- Employee Search & Filtering – Managers can search for employees based on specific skills for project assignments or training opportunities.
- Performance Reviews – Enables managers to conduct structured employee performance evaluations and track progress.
- Career Goal Setting & Monitoring – Managers can set career goals for employees and monitor their progress over time.
- Approve leaves & time logs

6.2.4 AI Chatbot & NLP Capabilities:

- AI-Powered Assistance – A chatbot assists employees and managers by answering inquiries common queries related to HR policies, procedures, and benefits based on the given knowledge base.
- Natural Language Processing (NLP) – Enhances chatbot capabilities to understand and respond effectively to various HR-related queries.

By successfully implementing these functionalities, the ElevateNex NextGen HR System has transformed traditional HR processes into an efficient, automated, and user-friendly platform.

6.3 Learning Experiences

The development of this project provided valuable hands-on experience in software development, HR automation, and system integration. Some key learning takeaways include:

- Applying Software Engineering Principles: Practical implementation of full-stack development using React.js (frontend), Spring Boot (backend), and MySQL (database).
- Developing Secure Authentication & Role-Based Access Control: Implementation of JWT authentication and access management to ensure system security.
- Integrating AI Chatbot Features: Hands-on experience in Natural Language Processing (NLP) and AI-driven automation.
- Performance Optimization & Testing: Learned manual and automated testing methodologies to enhance system reliability.
- Time & Resource Management: Effectively managed the project timeline, feature implementation, and debugging process.

This project served as a practical application of HR digital transformation, enhancing both technical and project management skills.

6.4 Difficulties & Challenges

During the development phase, several challenges were encountered:

1. Complex Role-Based Access Control (RBAC):
 - Implementing a secure authentication and authorization system for different user roles (HR, Employee, Manager) required significant effort.
 - Solution: JWT authentication and granular access control mechanisms.
2. Efficient Search & Filtering of Results:
 - Designing an optimized search system for queries was complex.
 - Solution: Implemented indexed database queries for faster employee search results.
3. AI Chatbot NLP Capabilities:
 - Training the chatbot to understand HR-related inquiries required NLP integration and continuous fine-tuning.
 - Solution: Integrated FlowiseAI for structured AI-powered chatbot responses.
4. User-Friendly Dashboard & Data Visualization:
 - Designing an intuitive UI/UX with meaningful data visualizations for HR analytics was complex.
 - Solution: Used libraries like Chart.js and D3.js to create interactive dashboards with real-time data updates.

Despite these difficulties, proper debugging, optimization, and iterative development cycles helped successfully overcoming these obstacles.

6.5 Future Work

Although the ElevateNex NextGen HR System successfully automates key HR functions, there are several enhancements that can further improve its usability and efficiency:

Mobile Application Development:

- Launch a mobile-friendly app for employees and HR administrators to access system functionalities on the go.

Advanced AI Chatbot Integration:

- Improve the AI assistant to handle complex HR queries and automate responses based on HR policies and company regulations.

Payroll System Integration:

- Extend the system to integrate with payroll solutions, automating salary calculations and tax processing.

Multi-Language Support:

- Enable the system to support multiple languages for a more inclusive user experience.

Automated Compliance Monitoring:

- Integrate a module to ensure company HR policies comply with labor laws and regulations automatically.

These enhancements will further optimize ElevateNex NextGen HR System, making it a comprehensive, AI-powered, and scalable HR solution.

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Appendix A – MIS Reports

MIS Report (Management Information System) is a set of reports that provides information to management and other decision-makers in an organization.

The report typically includes data and analysis on various aspects of the organization's operations, such as sales, production, financial performance, and customer behavior. The goal of an MIS report is to provide actionable insights that can be used to improve the efficiency and effectiveness of the organization(Smith, 2023).

Employee Demographic Reports

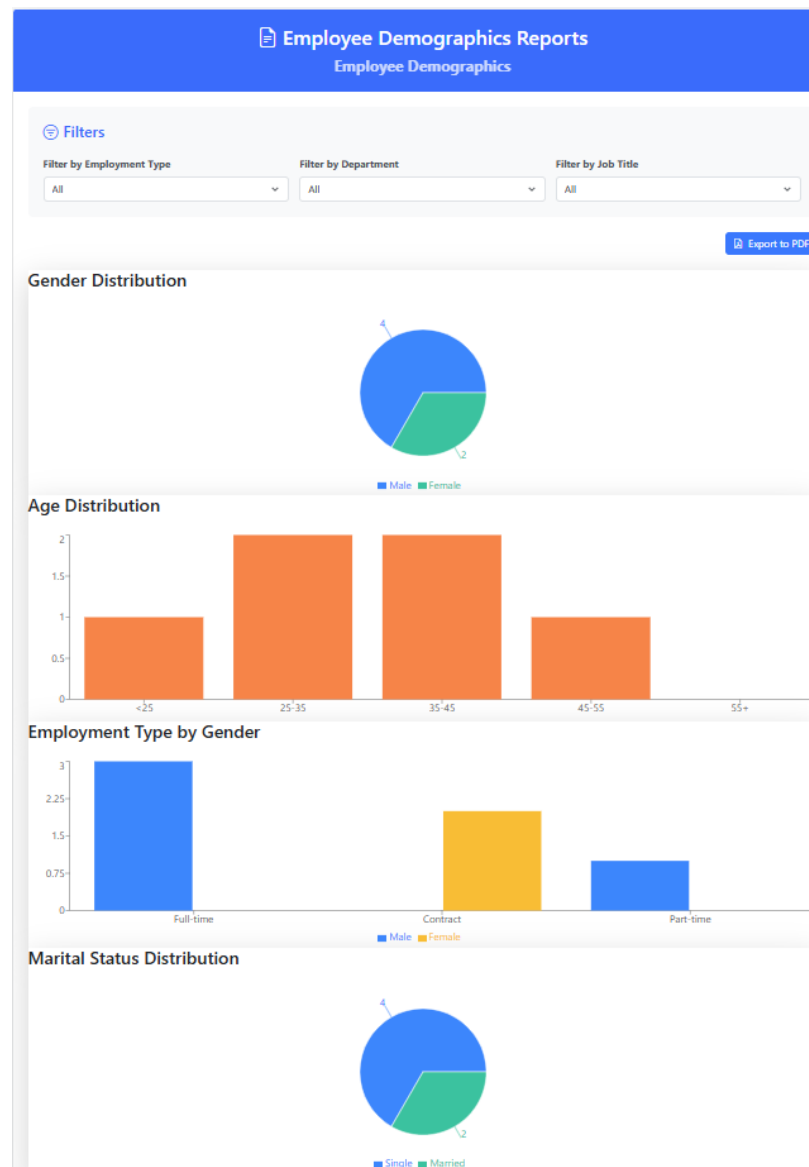


Figure A. 1: Employee Demographic Reports 01

Employee Demographics Report

Generated on: 3/6/2025, 3:13:59 AM

Filters:

Employment Type: All

Department: All

Job Title: All

Category	Count
Gender: Male	4
Gender: Female	2
Age: <25	0
Age: 25-35	3
Age: 35-45	2
Age: 45-55	1
Age: 55+	0
Employment Type: Full-time	Male: 3, Female: 0
Employment Type: Contract	Male: 0, Female: 2
Employment Type: Part-time	Male: 1, Female: 0
Marital Status: Married	3
Marital Status: Single	3
Nationality: Sri Lankan	4
Nationality: US	2

Figure A. 2: Employee Demographic Reports 02

1 / 1 - 100% + [Icon] [Icon] Employee Demographics Report Generated on: 3/7/2025, 7:11:00 PM Filters: Employment Type: Full-time Department: IT Job Title: Developer	
Category	Count
Gender: Male	1
Age: <25	0
Age: 25-35	0
Age: 35-45	1
Age: 45-55	0
Age: 55+	0
Employment Type: Full-time	Male: 1, Female: 0
Marital Status: Married	1
Nationality: Sri Lankan	1

Figure A. 3: Employee Demographic Reports 03

Work Time Reports

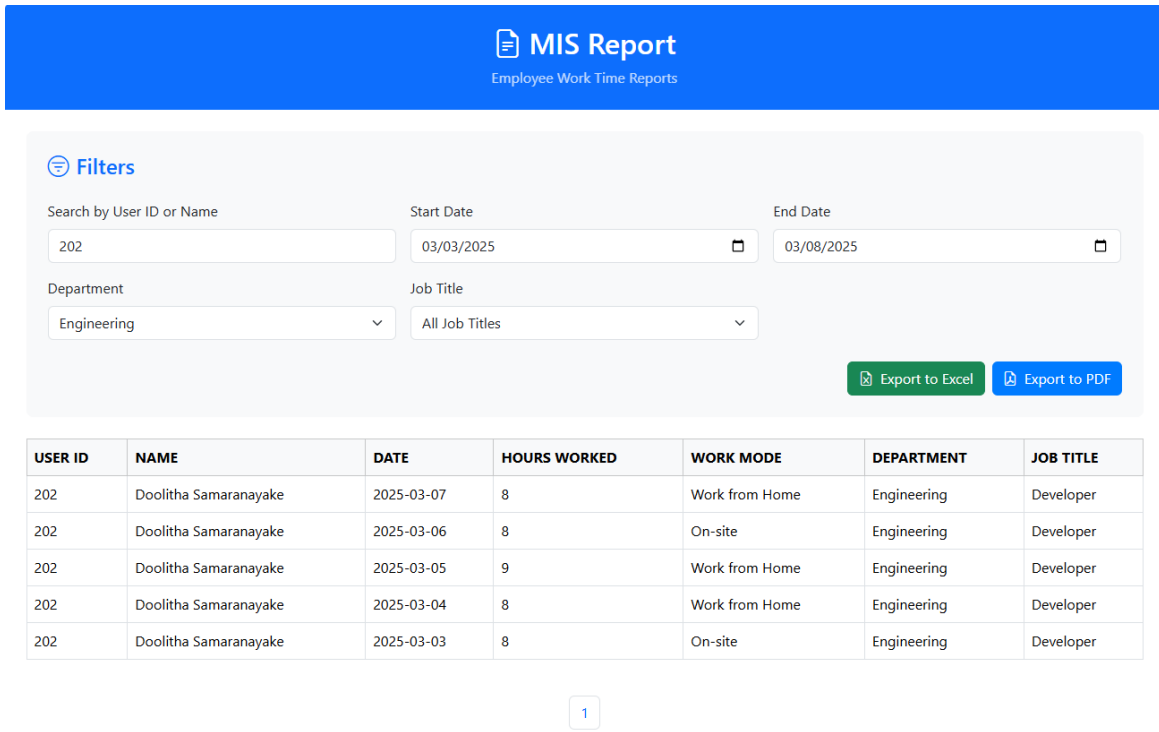


Figure A. 4: Work Time Reports 01

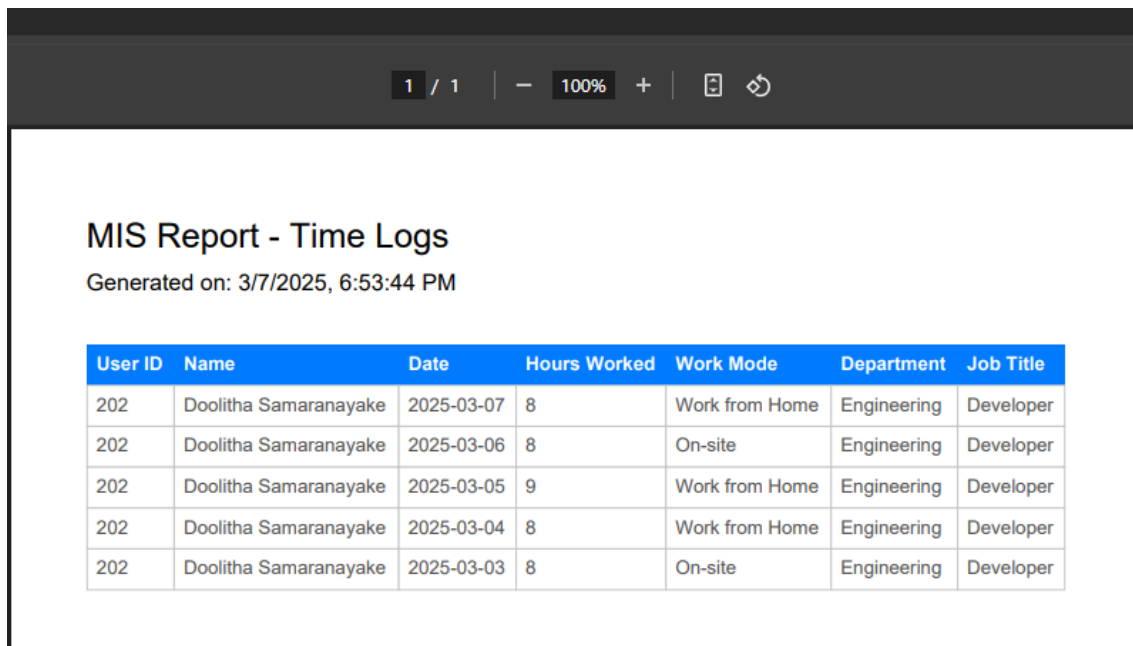


Figure A. 5: Work Time Reports 02

Employee Distribution

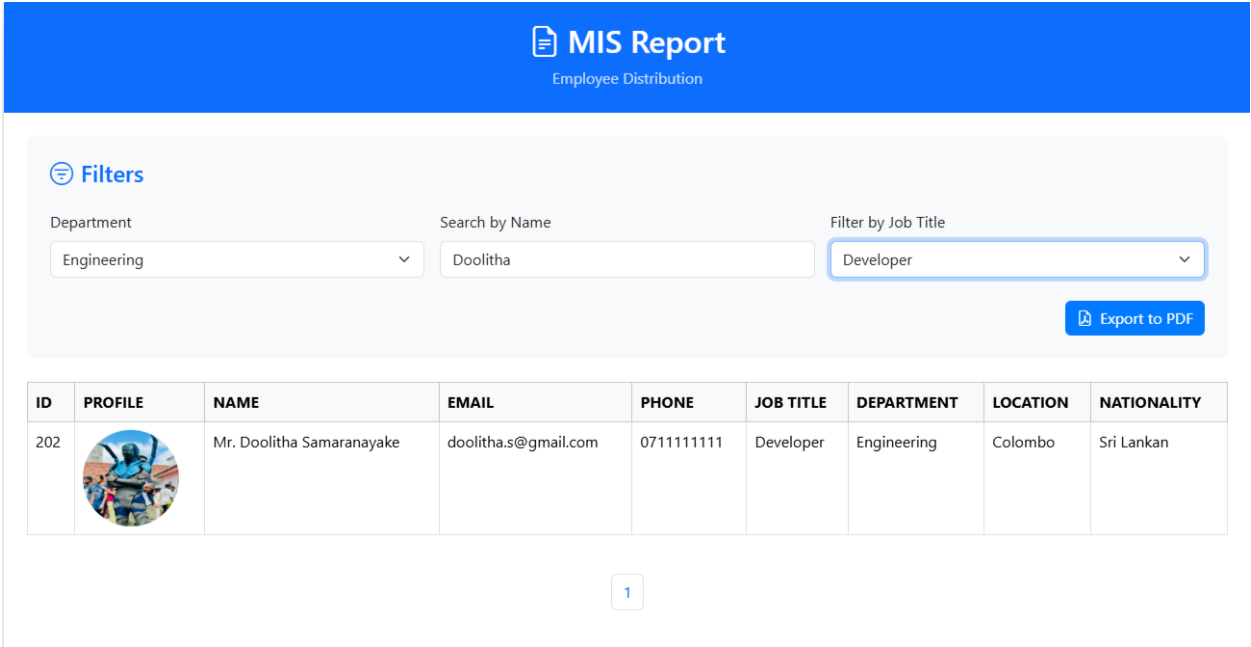
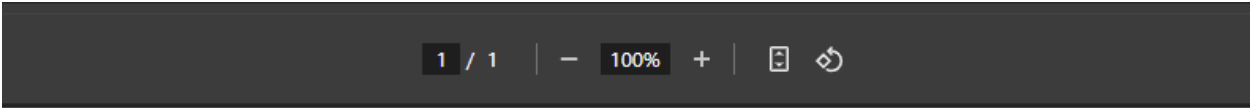


Figure A. 6: Employee Distribution 01



MIS Report - Department 5

Generated on: 3/7/2025, 7:00:20 PM

Profile	ID	Name	Email	Phone	Job Title	Department	Location	Nationality
		Mrs. Emma Lee	Emma@elevatenex.com	0711111111	Lead Developer	Marketing	Colombo	Sri Lankan

Figure A. 7: Employee Distribution 02

Employee Leave Trends

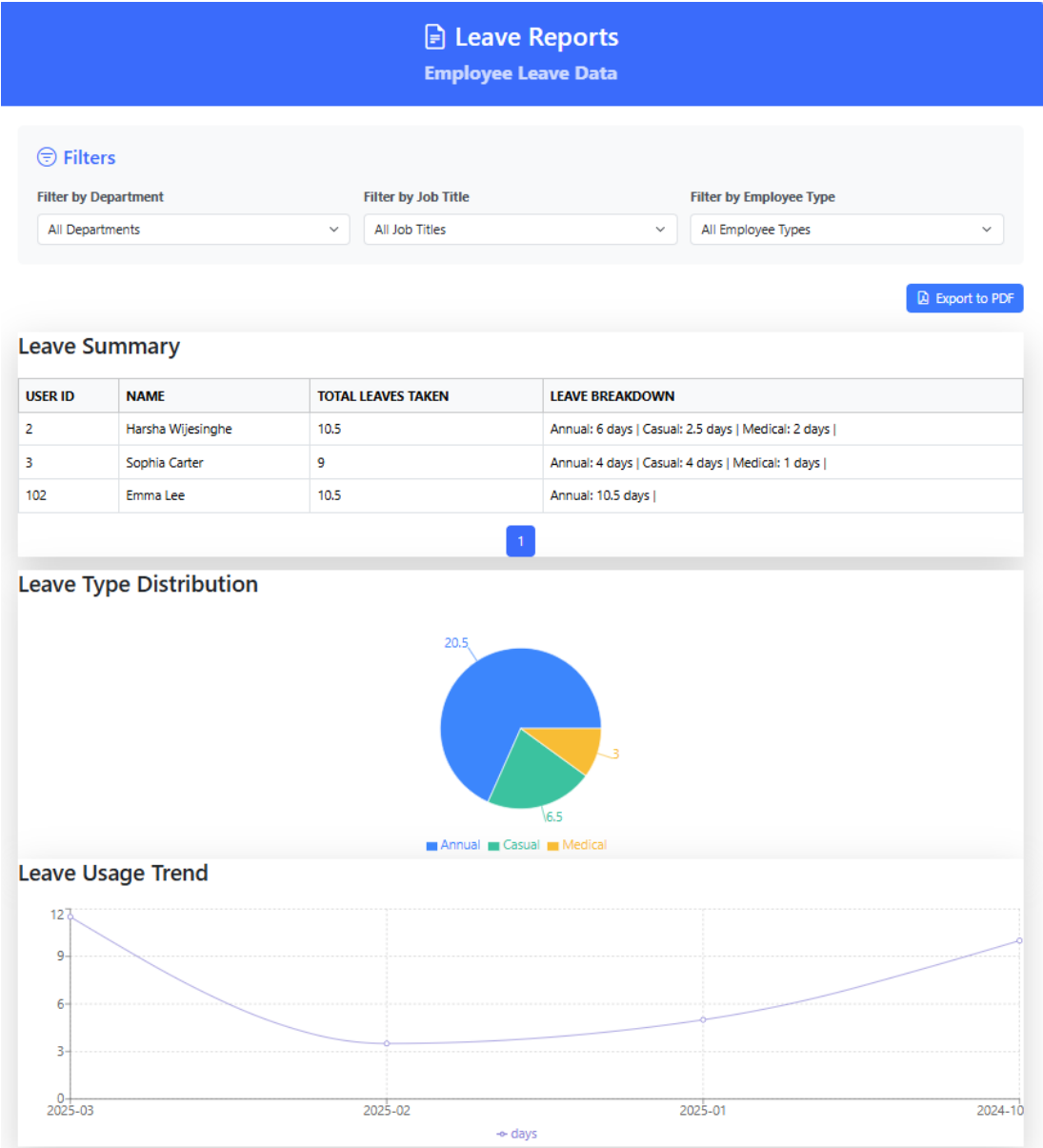


Figure A. 8: Employee Leave Trends 01

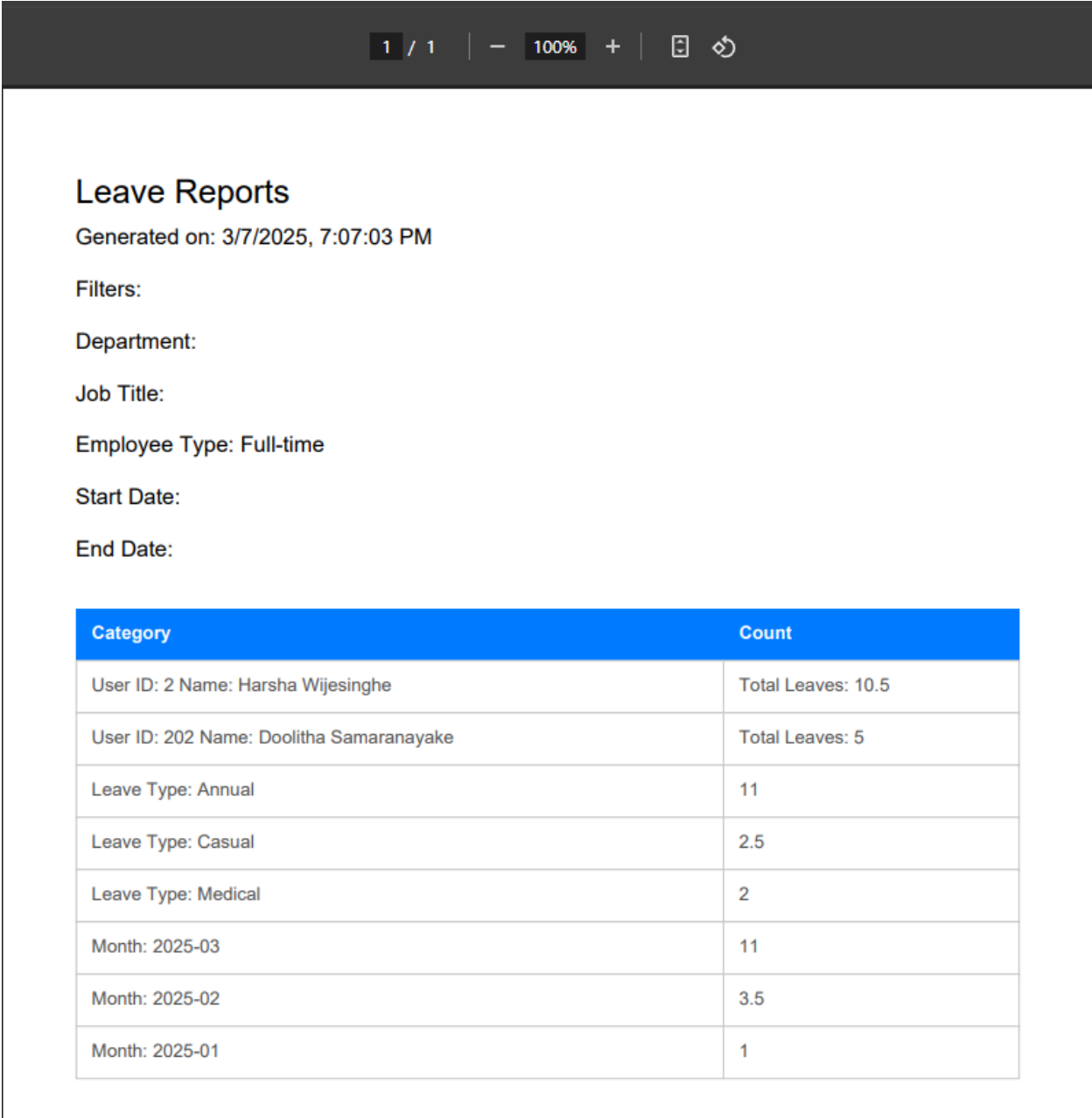


Figure A. 9: Employee Leave Trends 02

Leave Reports

Generated on: 3/7/2025, 7:04:58 PM

Filters:

Department: Engineering

Job Title: Developer

Employee Type: Full-time

Start Date: 2025-02-28

End Date: 2025-03-11

Category	Count
User ID: 202 Name: Doolitha Samaranayake	Total Leaves: 5
Leave Type: Annual	5
Month: 2025-03	5

Figure A. 10: Employee Leave Trends 03

Performance Analysis

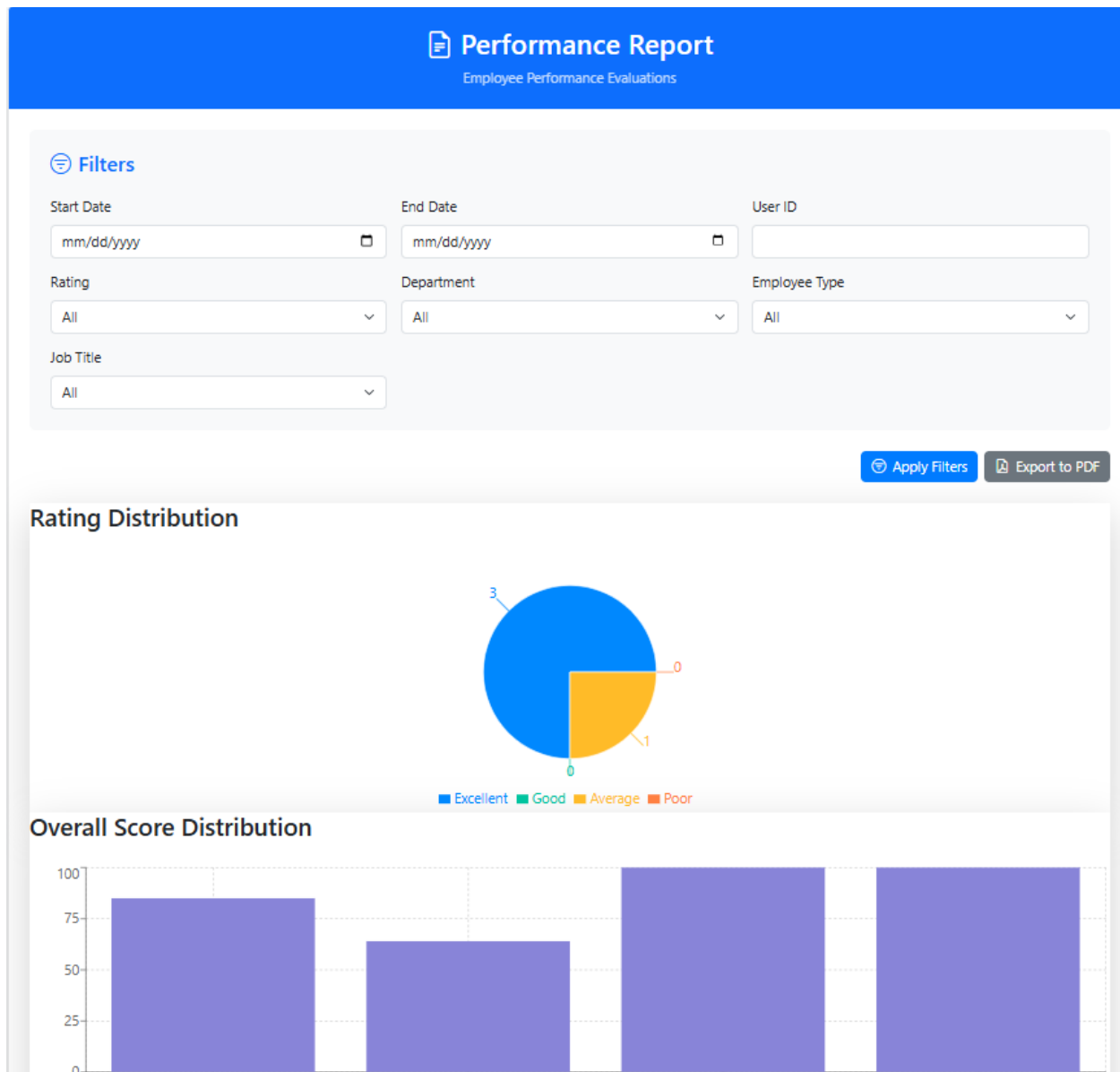


Figure A. 11: Performance Analysis

Appendix B – User Manual

- System Name: ElevateNex: NextGen HR System
- Version: 1.0
- Date: 2025.03.07
- Author: Mr. D.O. Samaranayake

1. Introduction

What is NextGen HR?

The NextGen HR System is designed to streamline human resource operations by providing an intuitive platform for employee management, leave tracking, attendance monitoring, performance reviews, HR requests, and AI-assisted HR inquiries. It supports multiple user roles: HR Admins, Managers, and Employees.

Who Can Use It?

- HR Admins – Oversee and manage tasks and system configurations.
- Managers – Search employees by skill set, monitor leaves and time logs, conduct performance reviews, and set career goals and monitor progress.
- Employees – Update personal details, update and keep track of assigned career goals, submit leave requests, log work hours and submit HR requests or complains as required.

How to Access?

1. Open the system in a web browser.
2. Navigate to the Login Page.
3. Enter your username and password.
4. Click Login to access the dashboard.

2. Login & Dashboard

Login Steps:

1. Enter your credentials on the Login Page.
2. Click Login.
3. If credentials are correct, you will be redirected to your dashboard.

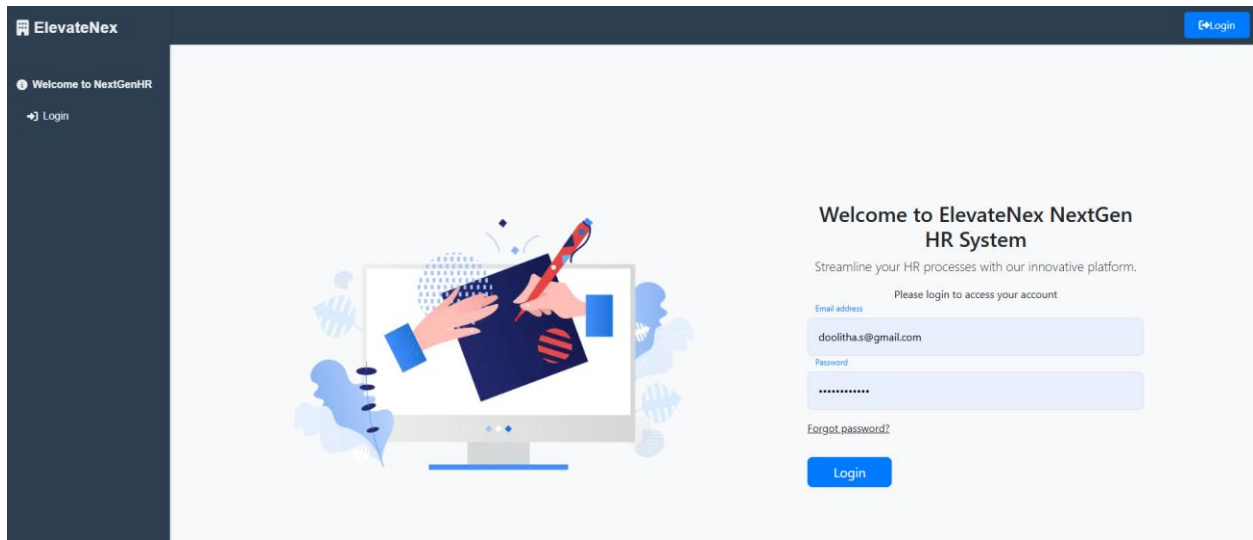


Figure B. 1: Login

Dashboard Overview:

- HR Admin Dashboard – Employee management, announcements, HR requests, and reporting.
- Manager Dashboard – Employee search, approvals, performance reviews, and career goals.
- Employee Dashboard – Leave requests, time tracking, and profile management.

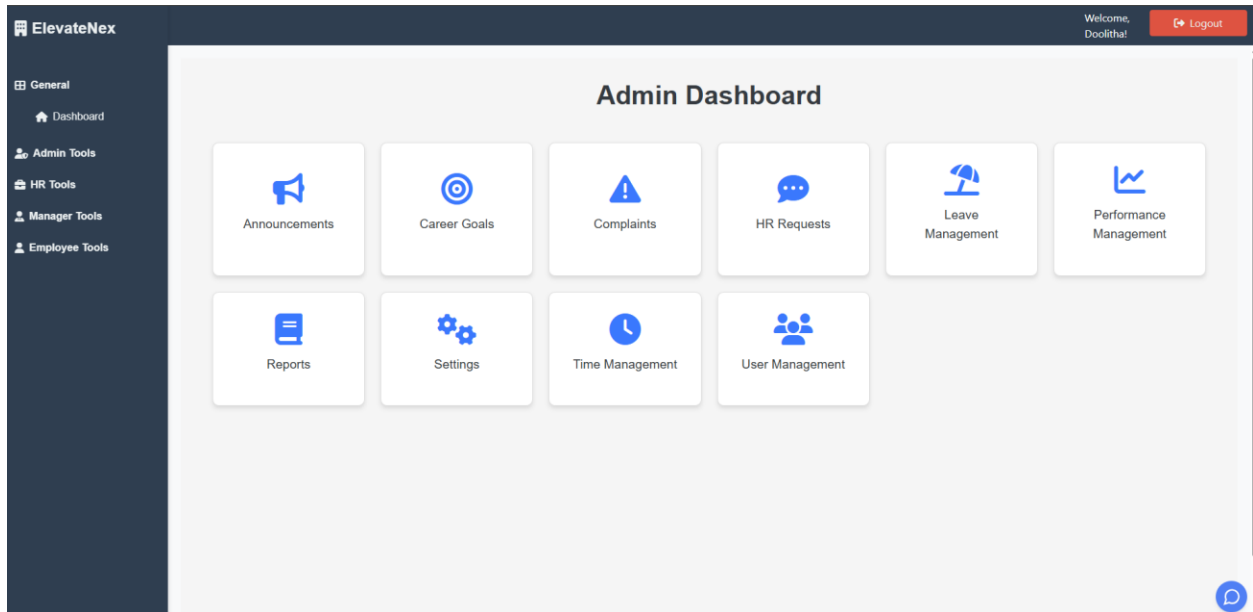


Figure B. 2: Dashboard

3. HR Admin Functions

Managing Employees:

1. Navigate to User Management.
2. Click User Registration to add a new user.
3. Update or deactivate employees when required at User Directory.

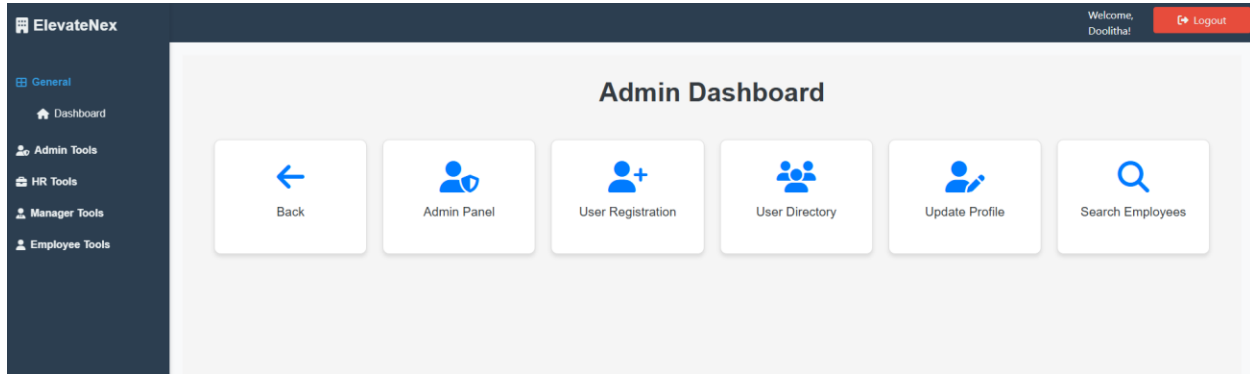


Figure B. 3: User Management

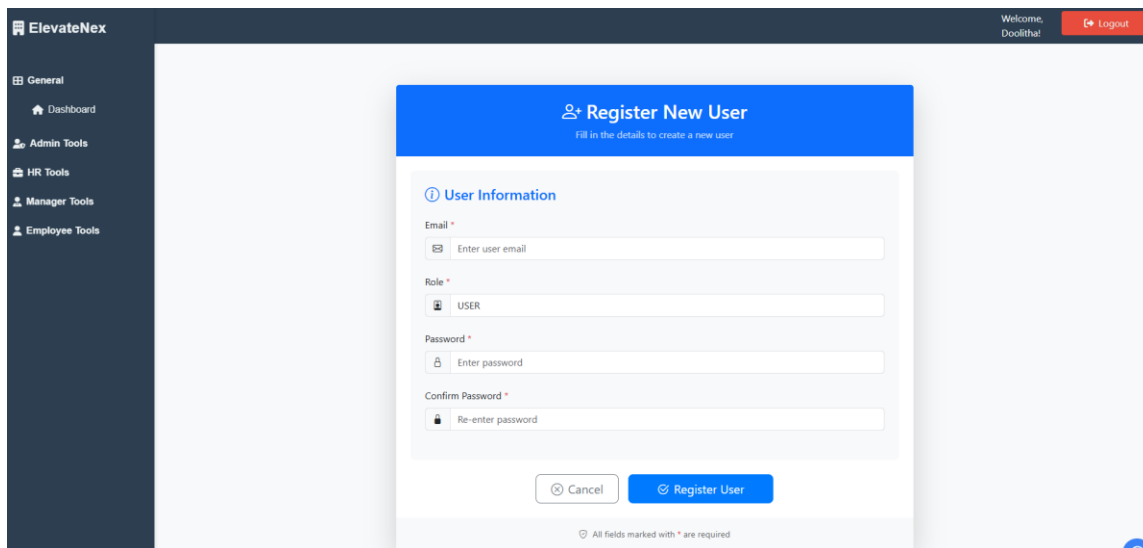


Figure B. 4: Register

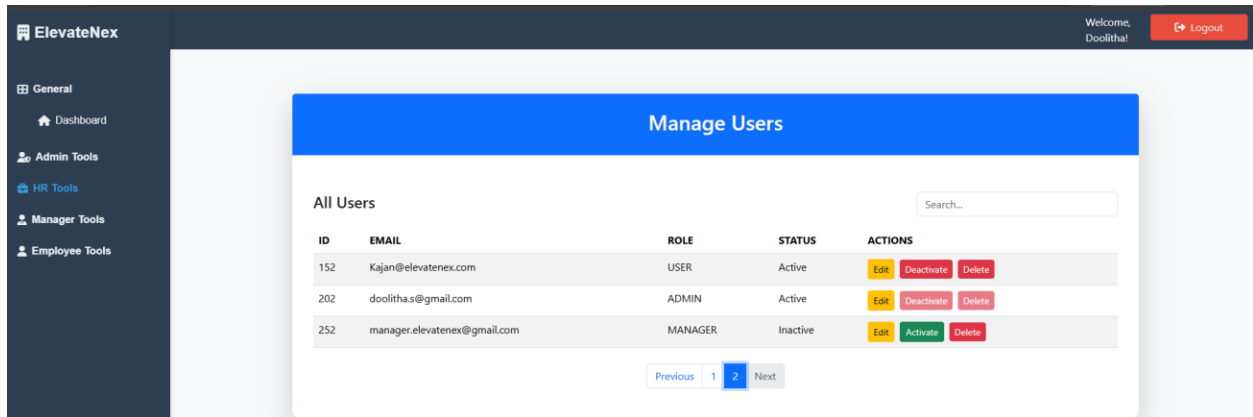


Figure B. 5: Manage Users

Broadcasting Announcements:

- HR Admins can send company-wide announcements or target specific employee groups.

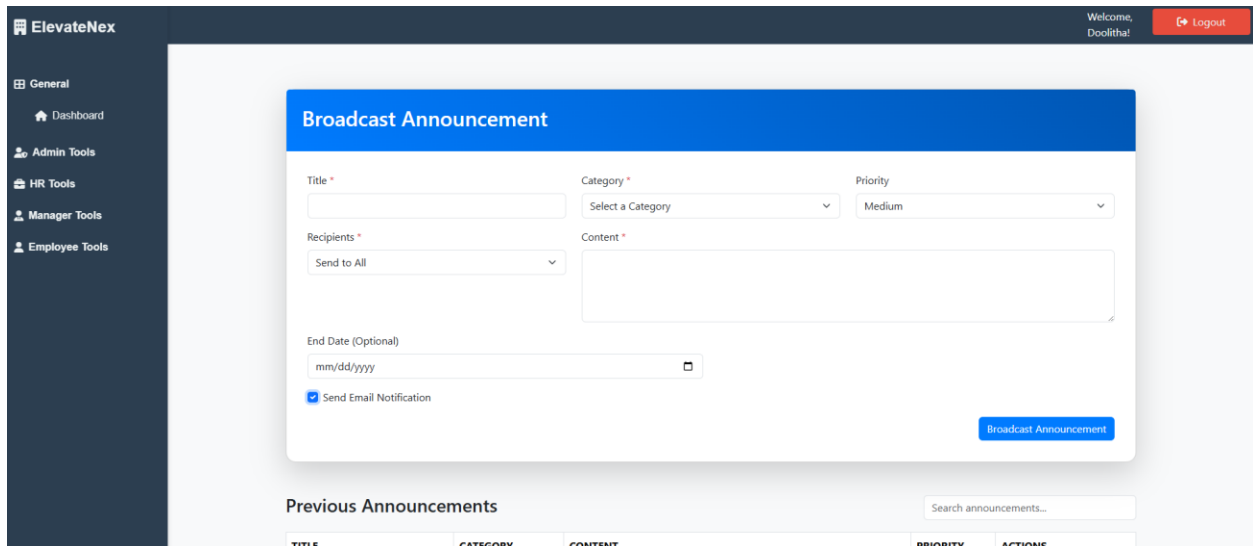


Figure B. 6: Announcements

Email Notifications:

- The system sends email notifications for policy updates, events, and other important messages.

Generating Work Time Reports:

1. Navigate to Reports.
2. Go to Time Log Report & select a time period to analyze work hours and trends.
3. Download the report in PDF, Excel, or CSV format.

The screenshot shows the 'MIS Report' page in the ElevateNex system. The page has a blue header with the title 'MIS Report' and subtitle 'Employee Work Time Reports'. Below the header is a 'Filters' section with the following fields:

- Search by User ID or Name:** A text input field containing 'doolitha'.
- Start Date:** A date picker field showing 'mm/dd/yyyy'.
- End Date:** A date picker field showing 'mm/dd/yyyy'.
- Department:** A dropdown menu with 'All Departments' selected.
- Job Title:** A dropdown menu with 'All Job Titles' selected.

Below the filters are two buttons: 'Export to Excel' and 'Export to PDF'. Below these buttons is a table with the following data:

USER ID	NAME	DATE	HOURS WORKED	WORK MODE	DEPARTMENT	JOB TITLE
202	Doolitha Samaranayake	2025-03-07	8	Work from Home	Engineering	Developer
202	Doolitha Samaranayake	2025-03-06	8	On-site	Engineering	Developer
202	Doolitha Samaranayake	2025-03-05	9	Work from Home	Engineering	Developer
202	Doolitha Samaranayake	2025-03-04	8	Work from Home	Engineering	Developer
202	Doolitha Samaranayake	2025-03-03	8	On-site	Engineering	Developer

Figure B. 7: Time Reports

4. Manager Functions

Employee Search & Filter:

1. Open the Search Employees page.
2. Enter filters (e.g., skill set, qualifications, certifications).
3. Click Search to find employees for project assignments or training.

The screenshot shows the 'Search and Filter Profiles' page in the ElevateNex system. The page has a blue header with the title 'Search and Filter Profiles' and subtitle 'Find profiles by languages, skills, qualifications, or certifications'. Below the header is a search form with the following fields:

- Languages:** A text input field with the placeholder 'e.g., English, Spanish'.
- Skills:** A text input field with the placeholder 'e.g., JavaScript, React'.
- Educational Qualifications:** A text input field with the placeholder 'e.g., B.Sc. in Computer Science'.
- Certifications:** A text input field with the placeholder 'e.g., AWS Certified Solutions Architect'.

Below the search fields is a blue button labeled 'Search'.

Figure B. 8: Employee Search

Conducting Performance Reviews:

1. Select an employee profile.
2. Rate performance based on key indicators.
3. Submit feedback and evaluation.

The screenshot shows the 'Evaluate Employee' form in the ElevateNex system. The form is titled 'Evaluate Employee' and contains a section for 'Evaluation Criteria'. The criteria are: Time management, Communication, Organization, Delegation, and Engagement. Each criterion has a rating scale from 0 to 5. The form also includes a 'Cancel' button and a 'Submit Evaluation' button. A note at the bottom states: 'All fields marked with * are required'.

Figure B. 9: Performance Reviews

Setting Career Goals:

1. Navigate Career Goals.
2. Define goals for employees.
3. Track and update progress over time.

The screenshot shows the 'Manage Employee Career Goals' form in the ElevateNex system. The form is titled 'Manage Employee Career Goals' and contains a section for 'Assign New Goal'. The 'Assign New Goal' section includes fields for 'Select Employee', 'Goal Title', 'Goal Description', and 'Completion Date'. Below this is an 'Assign Goal' button. The 'Employee Goals' section includes a search bar with the text 'imple' and a dropdown menu for 'All Statuses'. Below this is a table with the following data:

EMPLOYEE	TITLE	DESCRIPTION	COMPLETION DATE	PROGRESS	STATUS	ACTIONS
admin@admin.com	Implement XYZ	Implement XYZ	3/4/2025	7%	IN_PROGRESS	Delete

Figure B. 10: Career Goals Management

5. Employee Functions

Updating Personal Information & Achievements:

1. Go to Update Profile.
2. Edit contact details, skills, educational qualifications, certifications, and achievements.
3. Save changes.

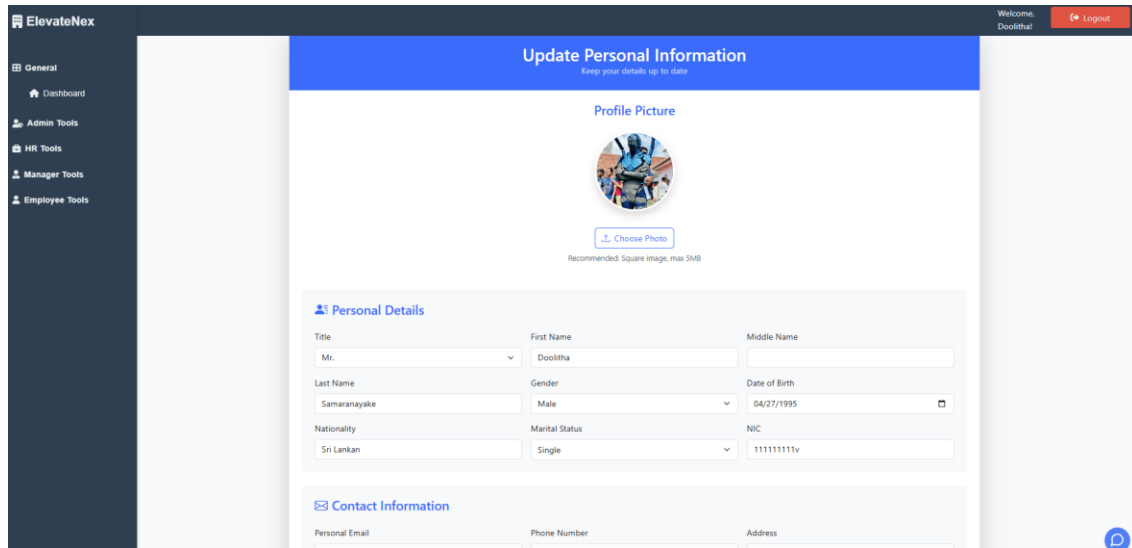
The screenshot shows the 'Update Personal Information' page in the ElevateNex system. The page has a dark blue sidebar on the left with a menu containing 'General', 'Dashboard', 'Admin Tools', 'HR Tools', 'Manager Tools', and 'Employee Tools'. The main content area has a blue header with the title 'Update Personal Information' and a sub-header 'Keep your details up to date'. Below the header is a 'Profile Picture' section with a circular image placeholder and a 'Choose Photo' button. The 'Personal Details' section contains fields for Title (Mr.), First Name (Doolitha), Middle Name, Last Name (Samaranayake), Gender (Male), Date of Birth (04/27/1995), Nationality (Sri Lankan), Marital Status (Single), and NIC (111111111v). The 'Contact Information' section has fields for Personal Email, Phone Number, and Address. A 'Logout' button is visible in the top right corner.

Figure B. 11: Update Profile

Submitting Leave Requests & Viewing Balance:

1. Open the Leave Request page.
2. Select leave type (Annual, Casual, Sick).
3. Choose dates and submit the request.
4. View leave balance and approved absences.

ElevateNex

General

- Dashboard
- Admin Tools
- HR Tools
- Manager Tools
- Employee Tools

Submit Leave Request

Leave Type: Annual

Leave Duration: Full-Day

Start Date: mm/dd/yyyy

End Date: mm/dd/yyyy

Comments:

Submit Request

Leave Balances

Annual Leave: 9 days

Casual Leave: 7 days

Medical Leave: 14 days

March 2025

MON	TUE	WED	THU	FRI	SAT	SUN
24	25	26	27	28	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	1	2	3	4	5	6

Leave Request History

SUBMITTED DATE	TYPE	START DATE	END DATE	DAYS	DURA
----------------	------	------------	----------	------	------

Figure B. 12: Leave Requests

Logging Work Hours:

1. Open Time Log.
2. Enter hours worked and add comments (e.g., Work from Home).
3. Submit the entry.

ElevateNex

Welcome, Doolitha! Logout

General

- Admin Tools
- HR Tools
- Manager Tools
- Employee Tools

Time Logging

Date: mm/dd/yyyy

Hours Worked: Enter hours worked

Work Mode: On-site

Comments: Specify any comments (if applicable)

Submit Time Log

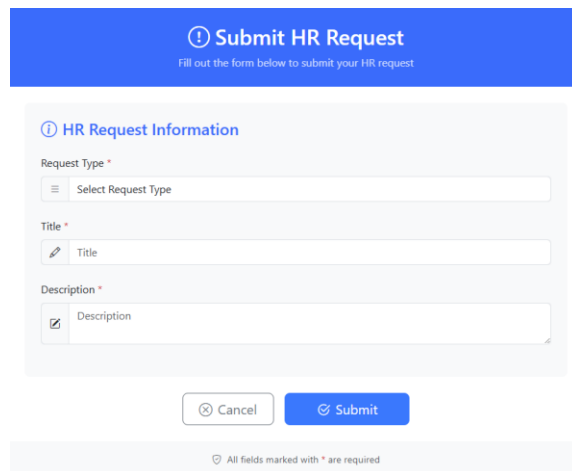
Previous Time Logs

Search logs...

Figure B. 13: Work Hours

Submitting HR Requests:

1. Navigate to HR Requests.
2. Select a request type (e.g., documents, HR assistance).
3. Submit the request.

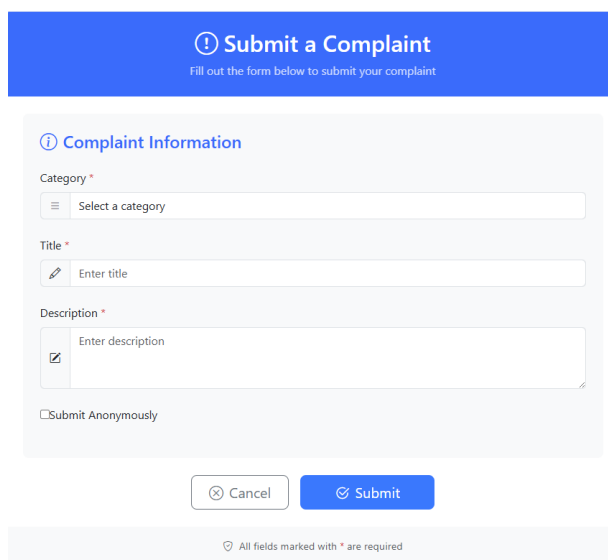


The screenshot shows a web form titled "Submit HR Request" with a blue header bar. Below the header, there is a section titled "HR Request Information". This section contains three required fields: "Request Type" (a dropdown menu with "Select Request Type" as the placeholder), "Title" (a text input field with "Title" as the placeholder), and "Description" (a text area with "Description" as the placeholder). At the bottom of the form, there are two buttons: "Cancel" and "Submit". A footer note states "All fields marked with * are required".

Figure B. 14: HR Requests

Filing Complaints:

1. Navigate to Complaints.
2. Describe the issue or grievance.
3. Submit for HR review.



The screenshot shows a web form titled "Submit a Complaint" with a blue header bar. Below the header, there is a section titled "Complaint Information". This section contains three required fields: "Category" (a dropdown menu with "Select a category" as the placeholder), "Title" (a text input field with "Enter title" as the placeholder), and "Description" (a text area with "Enter description" as the placeholder). Below these fields, there is a checkbox labeled "Submit Anonymously". At the bottom of the form, there are two buttons: "Cancel" and "Submit". A footer note states "All fields marked with * are required".

Figure B. 15: Complaints

6. AI Chatbot for HR Inquiries

- Employees & managers can ask HR-related questions about policies, benefits, and procedures.
- The chatbot responds using NLP capabilities for better accuracy.

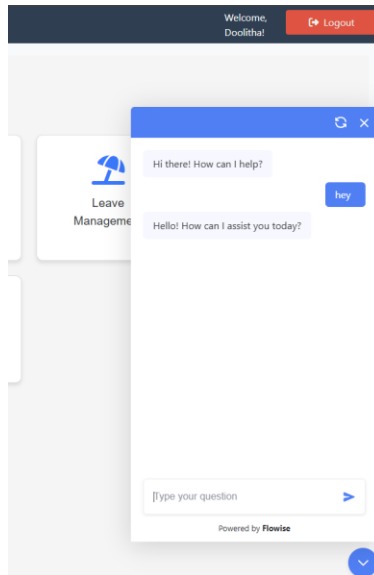


Figure B. 16: AI Chatbot

7. Security & Authentication

Resetting Password:

1. Click Forgot Password? on the login page.
2. Enter your email and follow the reset instructions.

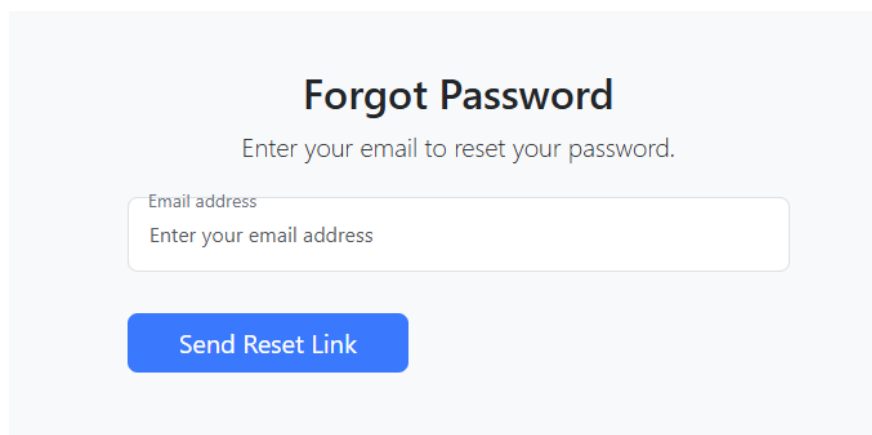


Figure B. 17: Forgot Password

Logging Out:

- Click the Logout button on the top menu to securely exit the system.

8. Troubleshooting & FAQs

- Can't log in? Check your credentials or reset your password.
- Leave request not submitting? Ensure leave balance is available.
- System errors? Contact HR IT support.

Appendix C – Requirements Analysis Questionnaire



ElevateNex - NextGen HR System

We are developing a modern HR management system to meet the evolving needs of any organization. This system aims to streamline HR processes, enhance employee engagement, and improve overall productivity.

To ensure the NextGen HR System meets the needs of its potential users, we seek your valuable feedback. We are conducting a user study to collect survey data and refine our features to better serve your HR management needs. Join us in shaping the future of HR technology & your participation in this survey is greatly appreciated.

doolitha.s@gmail.com [Switch account](#)

Not shared

* Indicates required question

What is your age group ? *

- ☐ Under 25
- ☐ 25 - 34
- ☐ 35 - 44
- ☐ 45 - 54
- ☐ 55 - 64
- ☐ 65 and over

What is your gender ? *

- ☐ Male
- ☐ Female
- ☐ Prefer not to say

What is your role in your organization / work place ? *

- ☐ HR Administrator
- ☐ Manager
- ☐ Employee
- ☐ Other: _____

Figure C. 1: Requirements Analysis Questionnaire 01

Number of employees in your organization ? *

- ☐ 1 - 10
- ☐ 11 - 50
- ☐ 51 - 200
- ☐ 201 - 500
- ☐ 501 - 1000
- ☐ 1000+

Do you currently use an HR management system? *

- ☐ Yes
- ☐ No

If yes, which system do you use ?

Your answer _____

On a scale of 1 to 5, how satisfied are you with your organizations current HR management system ?

- | | | | | | | |
|-------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|----------------|
| | 1 | 2 | 3 | 4 | 5 | |
| Very Dissatisfied | ☐ | ☐ | ☐ | ☐ | ☐ | Very Satisfied |

What are the most challenging aspects of your current HR system? (Select all that apply) *

- ☐ Difficulty in tracking performance metrics
- ☐ Lack of timely notifications for important updates
- ☐ Complex user interface
- ☐ Inadequate leave management
- ☐ Poor reporting capabilities
- ☐ Other: _____

On a scale of 1 to 5, how user-friendly do you find the your current HR system ?

- | | | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------|
| | 1 | 2 | 3 | 4 | 5 | |
| Very Difficult to Use | ☐ | ☐ | ☐ | ☐ | ☐ | Very Easy to Use |

Figure C. 2: Requirements Analysis Questionnaire 02

How often do you receive timely responses from HR when you have queries ?

☐ Never

☐ Rarely

☐ Occasionally

☐ Frequently

☐ Always

How beneficial would an AI assistant be for addressing your HR-related queries ? *

1 2 3 4 5

Not Beneficial ☐ ☐ ☐ ☐ ☐ Very Beneficial

How do you typically access your current HR system ? *

☐ Desktop computer

☐ Laptop

☐ Tablet

☐ Smartphone

☐ Other: _____

How often do you set and track career goals and performance metrics ? *

☐ Never

☐ Rarely

☐ Occasionally

☐ Frequently

☐ Always

Would tracking your career and performance in a system help you manage them better ? *

1 2 3 4 5

Not Helpful ☐ ☐ ☐ ☐ ☐ Very Helpful

Figure C. 3: Requirements Analysis Questionnaire 03

What features do you find most useful for a HR management system? (Select all that apply) *

- ☐ Timely Response from HR
- ☐ Profile management
- ☐ Leave management
- ☐ Salary information
- ☐ Performance tracking
- ☐ Attendance management
- ☐ Training and development tracking
- ☐ Job postings and applications
- ☐ Other: _____

Do you have any other comments or suggestions on features you would like to see in the NextGen HR system ?

Your answer _____

Submit Clear form

Figure C. 4: Requirements Analysis Questionnaire 04

Appendix D – User Evaluation Questionnaire



User Evaluation Form – ElevateNex : NextGen HR System

Thank you for participating in the evaluation of the **ElevateNex NextGen HR System**. Your feedback is valuable in improving the system's usability, functionality, and overall effectiveness. Please answer the following questions based on your experience using the system.

** Indicates required question*

The User Interface (UI) is simple, clear, and user-friendly *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

The system responds quickly when performing tasks *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

It is easy to navigate through different sections of the system *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

The system's error messages clearly explain mistakes, helping users to correct them *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

It is easy to find the required information in the system *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

Figure D. 1: User Evaluation Questionnaire 01

The text size, font type, and color in the system are readable and visually comfortable *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

The system always provides accurate and reliable information *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

The system frequently crashes during usage *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

The system increases the efficiency of HR tasks and workflows *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

The overall performance of the system meets expectations *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

Any other comments or suggestions for improving the ElevateNex System ?

Your answer

Figure D. 2: User Evaluation Questionnaire 02