THE STATE UNIVERSITY OF ZANZIBAR SCHOOL OF BUSINESS (SOB)

DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

FINAL PROJECT REPORT

PROJECT TITTLE:	**UNIDOCS – DOCCUMENTS MANAGEMENT SYSTEM FOR UNIVERSITIES.**
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Declaration

I confirm that this report is my own original work. To the best of my knowledge, it does not include material from other sources unless properly cited. No part of this work has been submitted for any other degree or diploma at any institution.

Signature:	**Date:**
R.Y.Ramadhani	06/02/2025

Abstract

UNIDOCS - Integrated Document Management System for Universities is built to simplify the process of creating, handling, and managing official documents in higher learning institutions. The existing manual system is slow, prone to mistakes, and inefficient, causing unnecessary delays. UNIDOCS incorporates a chatbot for instant assistance and a structured document library for better access and management. This system automates document requests, keeps track of progress, and sends notifications, making processes smoother and more transparent. Built with Angular for the frontend, Spring Boot for the backend, and Postgres for data storage, UNIDOCS aims to make university administration more efficient, secure, and accessible. This report covers the purpose, challenges, and methods used in developing the system, focusing on improving administrative workflows in universities.

Dedication

I dedicate this work to my family, friends, and mentors, who have continuously supported and motivated me. Their encouragement has been my driving force throughout this journey.

Acknowledgement

I sincerely thank my supervisor for his valuable guidance and support. I also appreciate my colleagues and friends for their encouragement. A special thank you to the university administration and students for sharing their insights, which have played a crucial role in shaping UNIDOCS into a practical solution for document management.

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CHAPTER 1: INTRODUCTION

1.1 Introduction

UNIDOCS - Integrated Documents Management System for Universities is designed to simplify the way universities manage and process official documents. The current system in most institutions is largely manual, leading to inefficiencies, long processing times, and increased chances of human errors. Students and staff often struggle with delays in obtaining important documents, such as transcripts, recommendation letters, and administrative approvals.

By implementing an advanced digital platform, UNIDOCS will automate document processing, reduce administrative burdens, and improve accessibility. The system will also feature an AI-powered chatbot to assist users with inquiries and a structured digital library for better document storage and retrieval. With a user-friendly design, UNIDOCS will enhance efficiency, transparency, and accuracy in university document management.

1.2 Project Background and Motivation

Universities handle thousands of documents every academic year. Traditional document management systems rely on physical paperwork, making the process time-consuming and prone to misplacement or delays. Staff members often find it difficult to track document requests, and students experience frustration when following up on approvals.

The increasing digital transformation in education has highlighted the need for modern, automated solutions to streamline administrative processes. Many sectors have adopted AI-driven tools to optimize operations, but university document management remains largely outdated. UNIDOCS is motivated by the need to bridge this gap by providing an intelligent, automated, and secure document management system tailored for university environments.

1.3 Problem Statement

The current document handling system in universities presents several challenges:

- Heavy reliance on manual paperwork, causing delays and inefficiencies.
- Lack of a centralized platform for tracking and managing document requests.
- Difficulty in retrieving and verifying documents due to disorganized storage.
- Absence of an automated system for answering student and staff inquiries about document processing.

These issues create administrative bottlenecks, leading to dissatisfaction among students and staff. There is a clear need for a digital solution that enhances document processing, storage, and retrieval while providing instant support through AI-driven assistance.

1.4 Proposed Solution and Scope

UNIDOCS aims to solve these problems by developing an Integrated Documents Management System with the following key features:

- **Automated Document Processing**: Streamlines request submissions, approvals, and retrievals.
- **AI-Powered Chatbot**: Provides real-time assistance to students and staff regarding document-related inquiries.
- **Notification and Tracking System**: Keeps users updated on the status of their document requests.

The scope of this project includes system design, development, testing, and deployment, ensuring a scalable and user-friendly platform for university administration.

General Objective: To modernize university document management by developing an automated, AI-driven platform that enhances efficiency, accessibility, and accuracy.

Specific Objectives:

1. Develop an AI-powered chatbot using Angular framework to automate responses to document-related inquiries.
2. Implement a document request and tracking system to streamline university administrative processes.
3. Design a secure and organized digital document library for easy access and management.
4. Ensure system scalability and user-friendliness for university-wide adoption.

1.5 Feasibility Study

- **Economic Feasibility**: The project utilizes open-source technologies (Angular, Spring Boot and Postgres) to minimize costs while maintaining efficiency.

- **Technical Feasibility**: The development team has experience in web technologies, ensuring the successful implementation of the system.
- **Operational Feasibility**: UNIDOCS addresses real administrative challenges faced by universities, making it highly practical and beneficial for users.

By implementing UNIDOCS, universities will transition from slow, manual processes to an intelligent, automated document management system, ultimately enhancing productivity and user satisfaction.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter provides an in-depth review of existing literature on document management systems, particularly in university settings. By analyzing past research, related projects, and existing systems, we aim to identify gaps and establish a foundation for UNIDOCS. The review focuses on automated document management, AI-powered chatbots for administrative support, and best practices in digital record-keeping. This chapter is divided into five sections: Related Work, Previous Systems, Lessons Learned, Critique of the Review, and Conclusion.

2.2 Related Work

Universities and educational institutions worldwide rely on document management systems to handle administrative tasks efficiently. Various platforms exist to assist in managing student records, faculty documentation, and official communications. However, many of these systems lack real-time interaction features, automation, or integration with AI-driven assistance.

Research indicates that document management solutions enhance efficiency by reducing paperwork and streamlining workflows (Smith et al., 2021). AI-based systems, such as chatbots, have also proven effective in reducing administrative workloads by handling frequently asked questions and guiding users through processes (Jones & Patel, 2020). However, existing university-based document management systems still suffer from fragmented services and poor user experience.

Some widely used document management systems in universities include:

- **DocuWare** – A cloud-based system for digital document storage and workflow automation.
- **M-Files** – Focuses on metadata-driven organization but lacks AI integration for student support.
- **Ellucian Banner** – A comprehensive ERP for university administration but complex and expensive for many institutions.
- **EduSec** – A student information system that includes document management features, though it lacks AI-driven automation and chatbot integration.

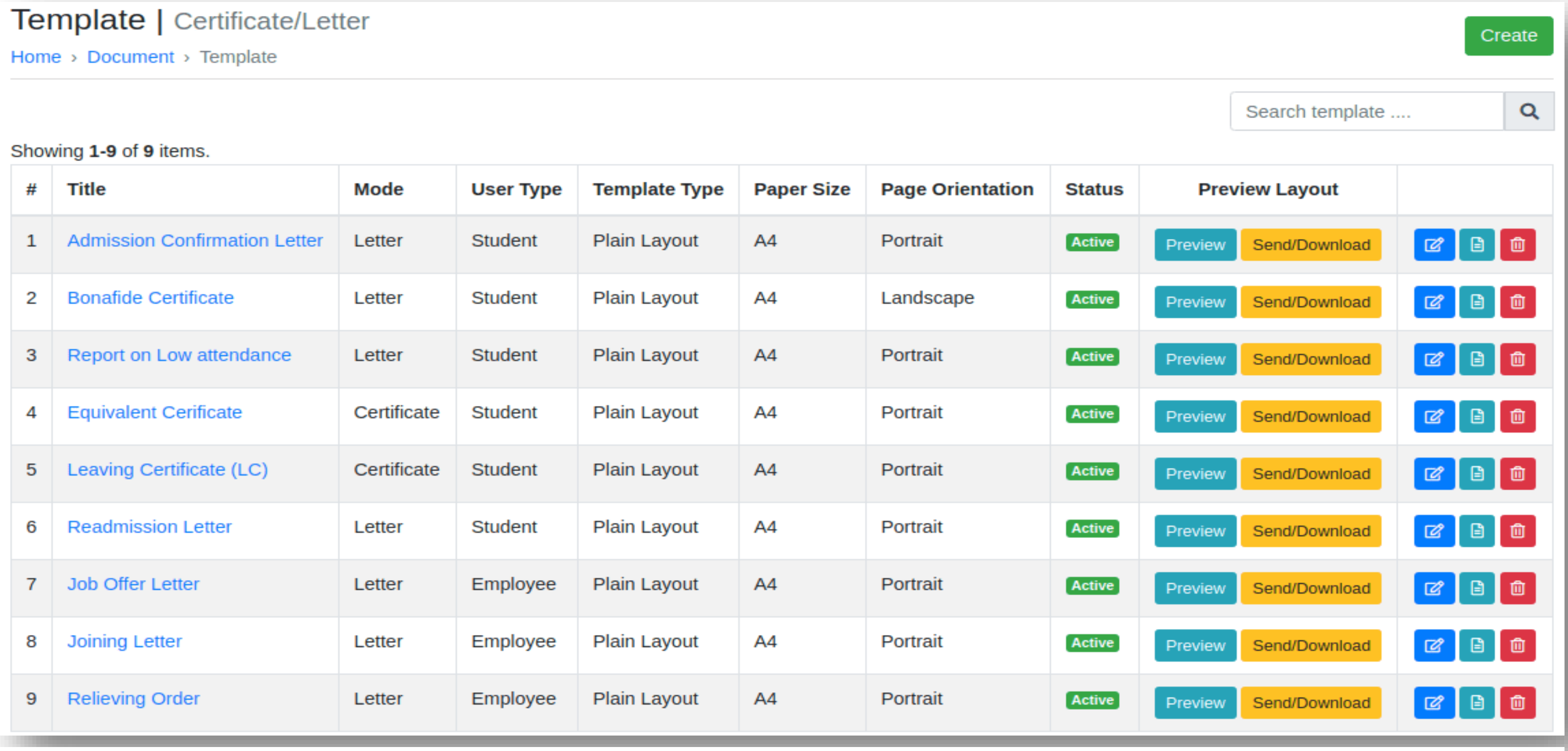
These platforms have improved document management but still leave gaps in accessibility, automation, and user interaction, which UNIDOCS aims to address.

2.3 Previous Systems

Several document management systems have been developed to help universities streamline administrative processes, manage student records, and improve workflow efficiency. These systems aim to reduce paperwork, enhance document security, and provide seamless access to critical academic and administrative documents. While some platforms focus on simple document storage, others incorporate advanced features like automation, AI assistance, and integration with university databases. The following platforms represent significant advancements in university document management:

2.3.4 EduSec

- **URL**: https://www.edusec.org
- **Platform**: Web-based



Template | Certificate/Letter

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#	Title	Mode	User Type	Template Type	Paper Size	Page Orientation	Status	Preview Layout	
1	Admission Confirmation Letter	Letter	Student	Plain Layout	A4	Portrait	Active	Preview Send/Download	✎ 🗎 🗑
2	Bonafide Certificate	Letter	Student	Plain Layout	A4	Landscape	Active	Preview Send/Download	✎ 🗎 🗑
3	Report on Low attendance	Letter	Student	Plain Layout	A4	Portrait	Active	Preview Send/Download	✎ 🗎 🗑
4	Equivalent Cerificate	Certificate	Student	Plain Layout	A4	Portrait	Active	Preview Send/Download	✎ 🗎 🗑
5	Leaving Certificate (LC)	Certificate	Student	Plain Layout	A4	Portrait	Active	Preview Send/Download	✎ 🗎 🗑
6	Readmission Letter	Letter	Student	Plain Layout	A4	Portrait	Active	Preview Send/Download	✎ 🗎 🗑
7	Job Offer Letter	Letter	Employee	Plain Layout	A4	Portrait	Active	Preview Send/Download	✎ 🗎 🗑
8	Joining Letter	Letter	Employee	Plain Layout	A4	Portrait	Active	Preview Send/Download	✎ 🗎 🗑
9	Relieving Order	Letter	Employee	Plain Layout	A4	Portrait	Active	Preview Send/Download	✎ 🗎 🗑

Figure 1: EduSec

EduSec is a student information system that incorporates basic document management features. It provides tools for managing academic records and administrative documents. However, it lacks automation and AI-powered functionalities, which limits its ability to enhance efficiency in document processing.

2.3.1 DocuWare

- **URL**: https://www.docuware.com
- **Platform**: Web-based

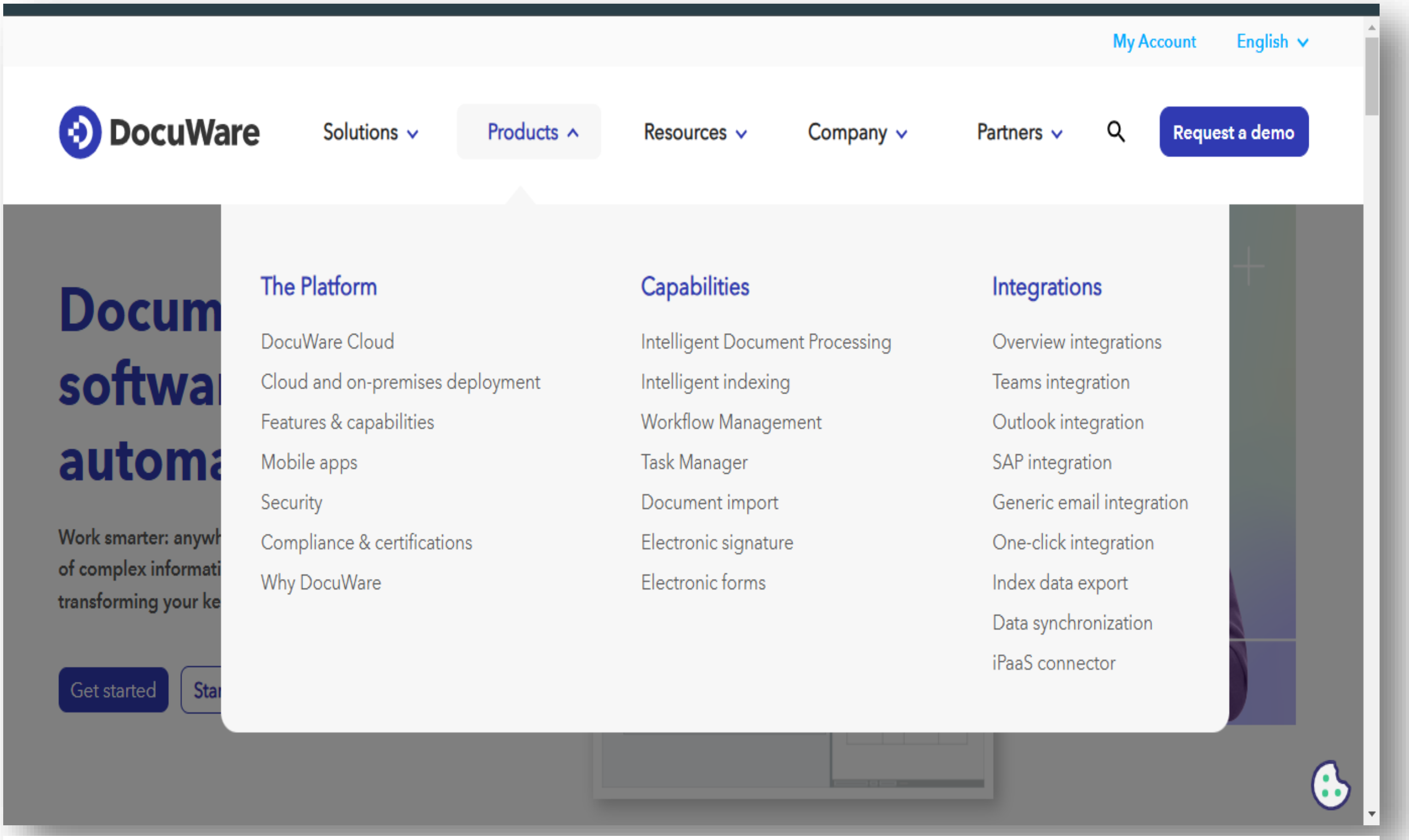
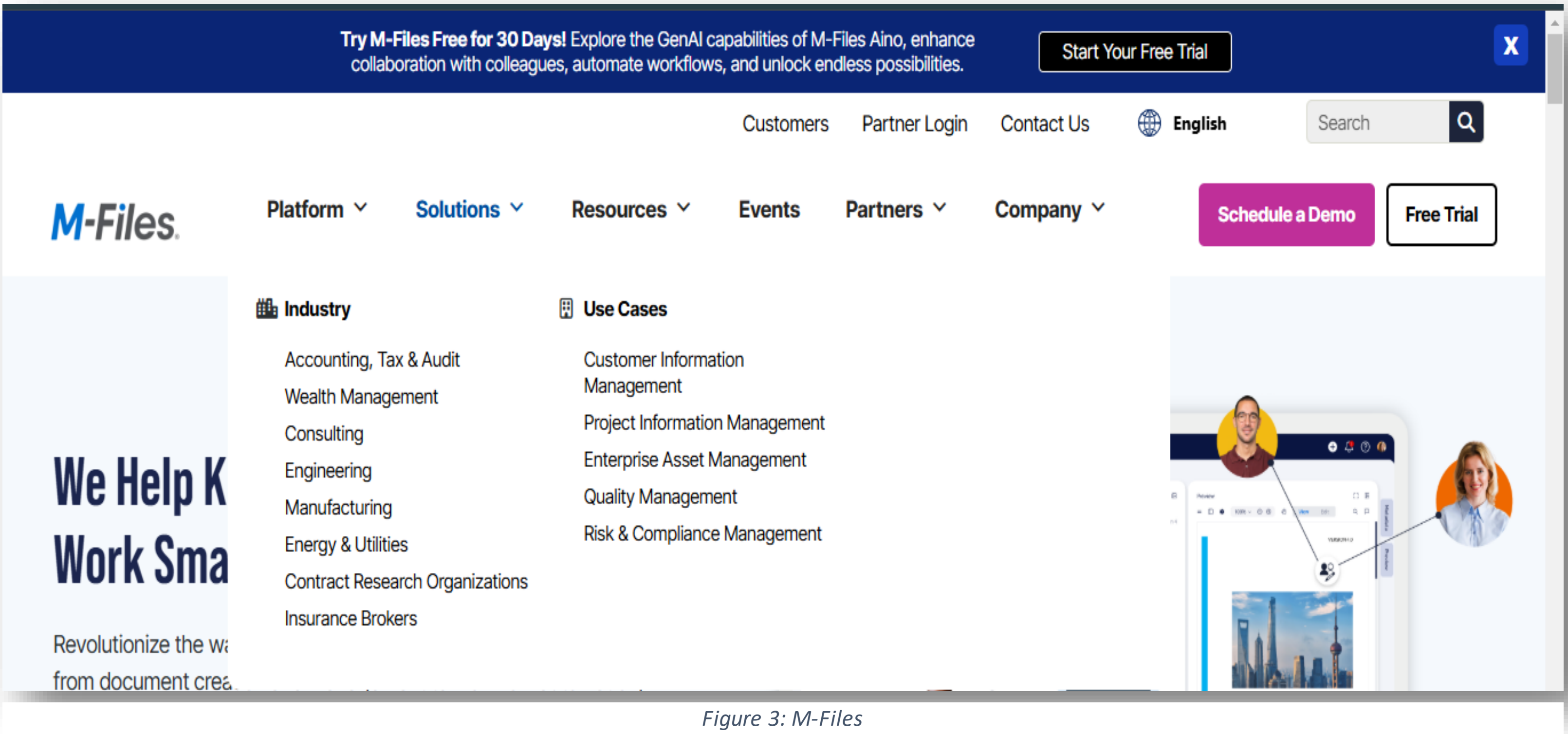


Figure 2: DocuWave

DocuWare is a cloud-based document management system that offers workflow automation and digital storage solutions. It enables universities to digitize paper-based processes, improving accessibility and reducing human errors. However, DocuWare lacks AI-driven assistance, making user interactions more manual and less responsive.

2.3.2 M-Files

- **URL**: https://www.m-files.com
- **Platform**: Web and Mobile



Try M-Files Free for 30 Days! Explore the GenAI capabilities of M-Files Aino, enhance collaboration with colleagues, automate workflows, and unlock endless possibilities.

Figure 3: M-Files

M-Files is another widely used system that organizes documents based on metadata rather than traditional folder structures. This approach simplifies document retrieval and reduces the chances of misplacement. However, M-Files does not provide real-time AI chatbot support, which could assist students and staff in document-related queries.

2.4 Lessons Learned.

From reviewing existing literature and systems, we can conclude the following:

1. **Need for Automation** – Many current university document management systems still require manual processes, leading to inefficiencies.
2. **Integration of AI Chatbots** – AI-powered chatbots can enhance user experience by providing instant assistance for document-related queries.
3. **Accessibility and User-Friendly Design** – Most platforms lack intuitive user interfaces, making navigation difficult for students and staff.
4. **Scalability** – Many existing systems are rigid and do not easily adapt to growing user demands.

2.5 Critique of the Review

While existing document management solutions improve efficiency, they often lack essential features such as AI-driven support, automation, and a centralized platform for all administrative documents. Many systems focus solely on document storage but fail to integrate tools that enhance user engagement and self-service capabilities. Additionally, security and compliance remain concerns in many systems, as universities deal with sensitive student and faculty information. The need for enhanced access control and verification mechanisms is essential for a secure and trustworthy document management system.

2.6 Conclusion

This literature review highlights the need for an integrated, AI-powered document management system tailored for universities. Existing systems offer partial solutions but fail to address automation, real-time support, and user accessibility. UNIDOCS seeks to bridge these gaps by providing a scalable, efficient, and intelligent platform for university document handling, ensuring a seamless experience for students and staff alike.

CHAPTER 3: PROJECT METHODOLOGY

3.1 Introduction

This chapter details the methodology used in the development of the UNIDOCS - Integrated Document Management System for Universities. The chosen approach ensures a systematic and structured process for system development, covering information gathering, system analysis, requirements specification, and design choices. This methodology helps in delivering a scalable, efficient, and user-friendly solution for document automation and management within university environments.

3.2 Software Development Approach

The development of UNIDOCS follows an **Object-Oriented Approach (OOA)** to enhance modularity, maintainability, and scalability. The system is structured into independent yet interconnected modules, including **User Management, Document Processing, AI Chatbot, Request Tracking, and Notifications**. Each module operates autonomously while seamlessly integrating through RESTful APIs and a well-structured Postgres database for efficient data storage and retrieval.

A **Bottom-Up Approach** is being adopted, where individual components such as classes and objects were developed first and later integrated into a fully functional system. Unified Modeling Language (UML) diagrams, including **Use Case, Class, and Sequence Diagrams**, were utilized to visualize system interactions and structure. The AI-powered chatbot, implemented using **CHATBASE API**, enhances user experience by providing real-time document-related assistance. This structured methodology ensures that UNIDOCS remains flexible, scalable, and ready for future enhancements while maintaining high performance, security, and reliability.

3.3 Software Development Life Cycle Model (SDLC)

The **Agile Model** is being selected for this project due to its iterative and flexible nature, allowing for continuous user feedback and frequent improvements. The key phases of the development process include:

- **Requirement Analysis**: Gathering functional and non-functional system requirements through surveys, interviews, and literature reviews.
- **Design**: Developing system architecture diagrams and defining data flows to ensure a seamless structure.
- **Implementation**: Developing the frontend using **Angular** and the backend with **Spring Boot**, ensuring system functionality as planned.
- **Testing**: Conducting **unit, integration, and system testing** to identify and resolve issues early in the development cycle.
- **Deployment & Maintenance**: Deploying the system and providing ongoing updates to maintain performance, security, and scalability.

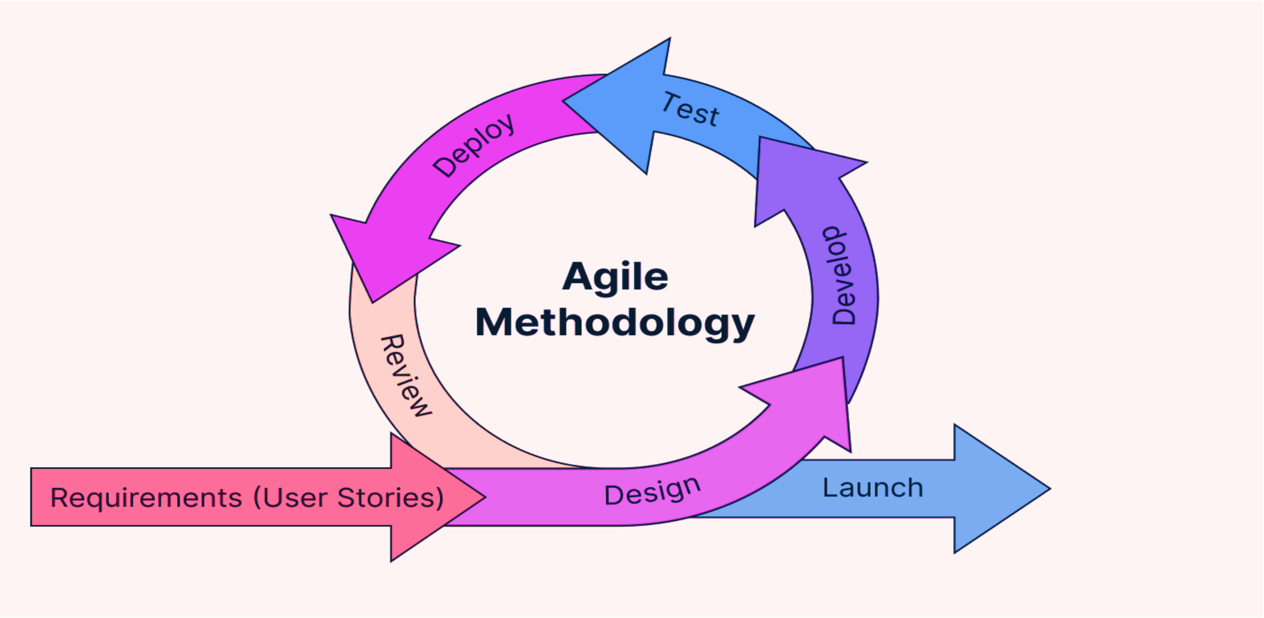


Figure 4: Agile Methodology

3.4 Software Development Tools

To ensure the successful completion of UNIDOCS, the following software tools were employed during different phases:

Design:

- **Tools**: Figma
- **Purpose**: Figma is being used for wireframe design of the user interface.

Implementation:

- **Frontend Development**: Angular, HTML5, CSS3, TypeScript
- **Backend Development**: Spring Boot, Java
- **Database**: PostgreSQL
- **Version Control**: Git, GitHub
- **Purpose**: Angular is being chosen for a dynamic and interactive frontend, while Spring Boot is being used for developing robust backend services. GitHub facilitated collaboration and version control.

Testing:

- **Integration Testing**: Postman, Thunder Client
- **Purpose**: Used for testing API endpoints by sending requests and verifying responses, ensuring that different software components integrate and function correctly together.

System Development Platform

UNIDOCS is being developed using a combination of software tools, programming environments, and hardware units to ensure **optimal performance and scalability**:

Hardware Units:

- **Server**: Yatosha for hosting backend services and database.
- **Development Machines**: Standard workstations with high CPU and RAM configurations for coding, testing, and running simulations.

Programming Environment:

- **Frontend**: Angular.js for creating dynamic and responsive user interfaces.
- **Backend**: Spring Boot for developing scalable RESTful APIs.
- **Database**: Postgres for structured data management.
- **Version Control**: Git and GitHub for source code management.
- **Containerization**: Docker for ensuring a consistent environment across development, testing, and production.

3.5 Information Gathering and Analysis

To gain a comprehensive understanding of the problem, multiple data collection techniques were employed:

- **Interviews**: Conducted with university staff and students to understand document management challenges.
- **Literature Review**: Examined best practices and previous research on document automation.
- **Questionnaires**: Surveys were distributed to collect feedback on system functionality and ease of use.

- **Observations**: Analyzed current university document handling processes to identify inefficiencies.

Requirements Analysis

The process of requirement analysis involved:

- Identifying key stakeholders and their objectives.
- Defining both functional and non-functional system requirements.
- Validating system specifications to align with university document management needs.

3.6 System Analysis

System analysis involves refining system requirements and using graphical tools to define system functionality. Both **Structured and Object-Oriented Approaches** were used to ensure clear data management and user functionality.

3.6.1. Object-Oriented Diagrams

- Used to represent the system as a collection of interacting objects, ideal for managing dynamic user interactions and AI-driven processes.
- Includes **Class Diagrams and Sequence Diagrams** to model the structure and interactions between system components.

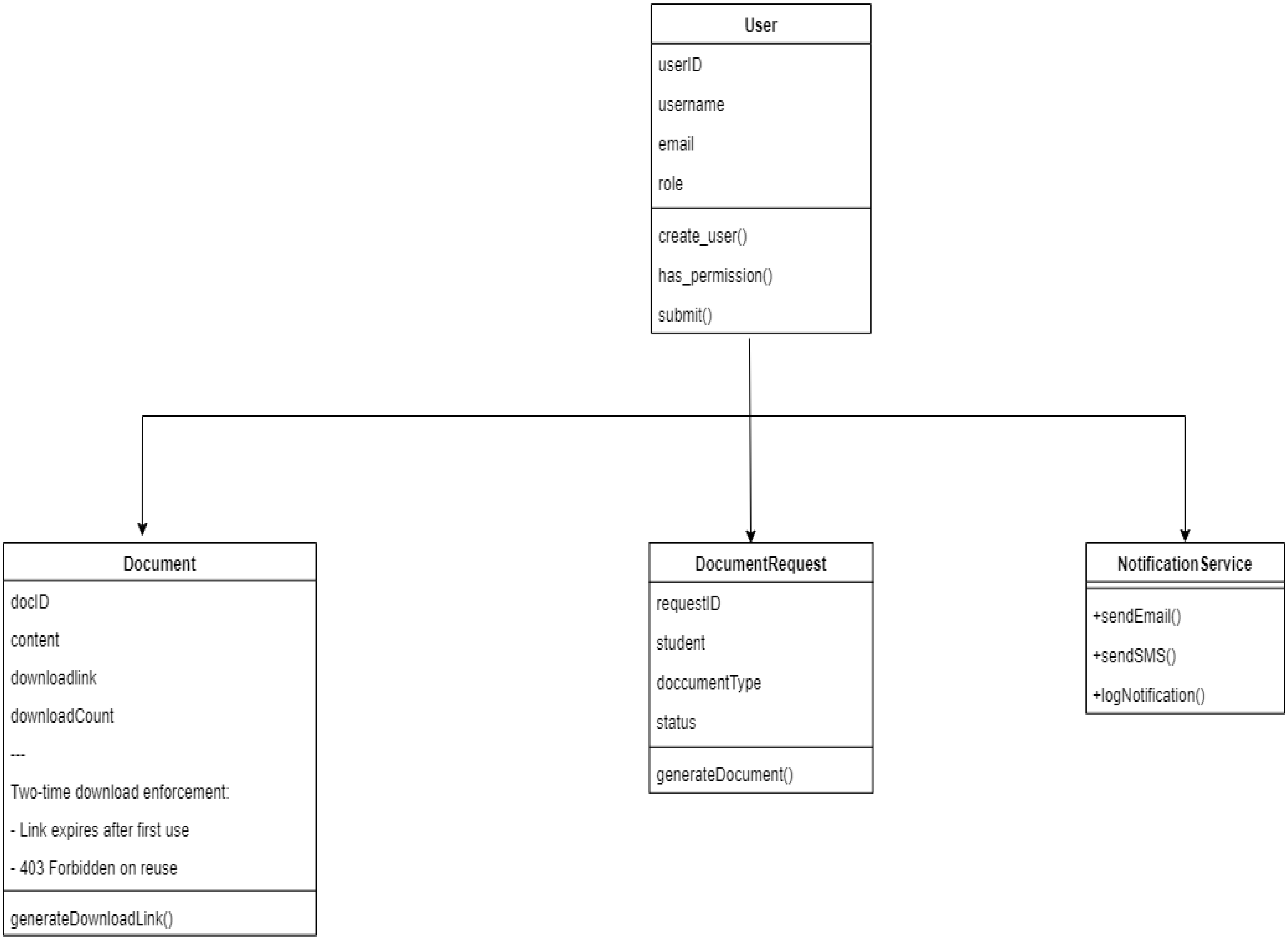


Figure 5: Class Diagram

3.6.2. Entity-Relationship (ER) Diagrams

- Used to model database relationships for storing student requests, document approvals, and tracking data.

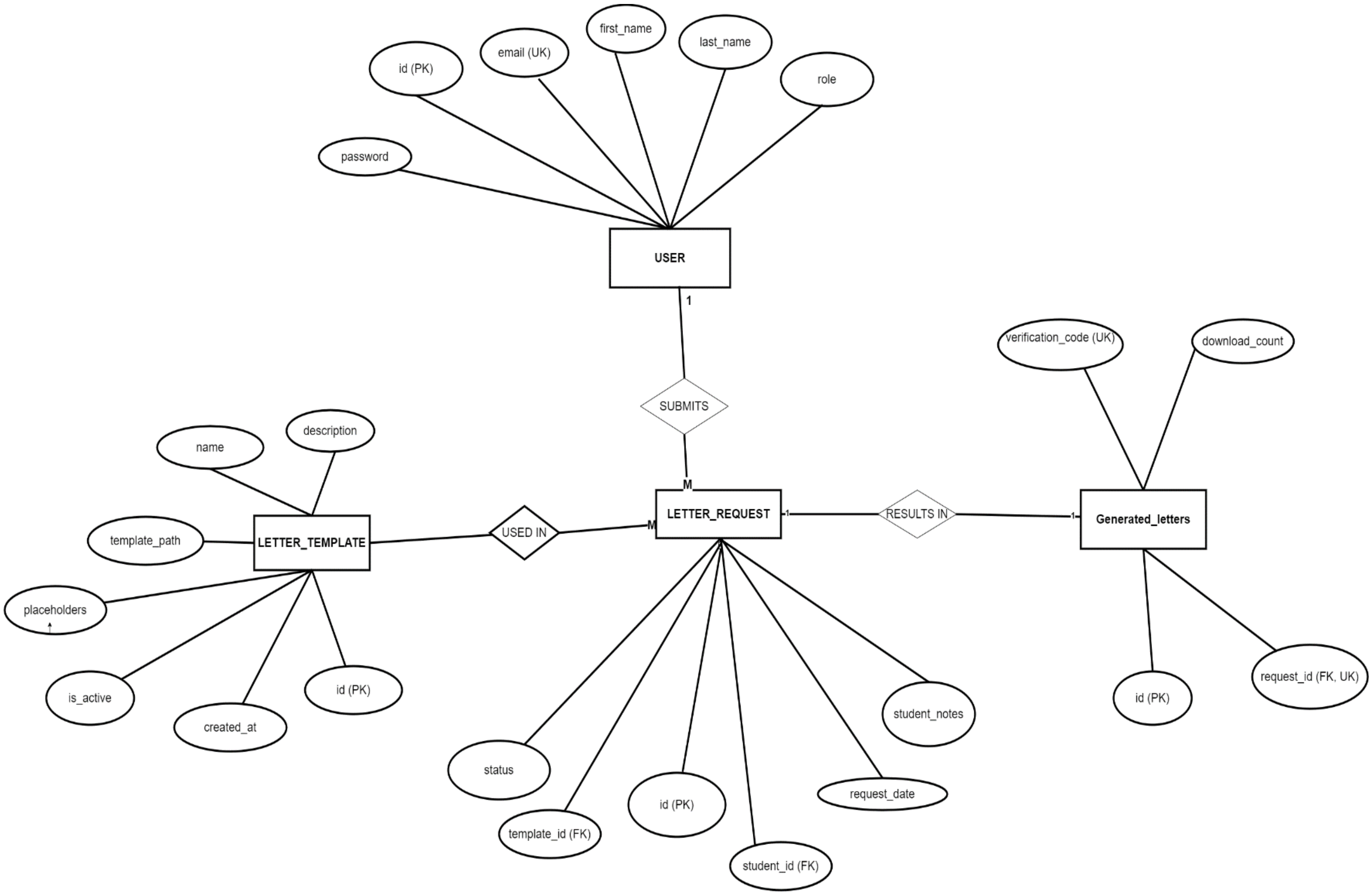


Figure 6: Entity Relationship Diagram

3.7 System Modeling Approach

A combination of Structured and Object-Oriented Approaches is being used to balance effective data management with system functionality. The Structured Approach helps in defining data flows and relationships within the document management process, ensuring seamless document processing and retrieval. Meanwhile, the Object-Oriented Approach provides a clear and scalable structure for modeling system interactions, enabling flexibility in future enhancements and feature expansions.

3.7.1. Structured Approach:

- This approach focuses on how data flows through the system and how different components interact with the data. In UNIDOCS, data related to document requests, approvals, and notifications are structured systematically to improve efficiency and minimize redundancy.
- Tools such as **Data Flow Diagrams (DFD)** and **Entity-Relationship Diagrams (ERD)** are used to illustrate how data is stored, processed, and transferred between system modules.

3.7.2. Object-Oriented Approach:

This approach models system functionalities by treating different components as objects that interact with each other, promoting modularity and scalability.

- **Class Diagrams:** - Class diagrams define the core system components and their relationships. - In UNIDOCS, classes such as **User, Document, Request, and Notification** represent key entities within the system. - Attributes and methods are specified for each class, ensuring that the responsibilities of different system modules are well-defined.

- **Sequence Diagrams:** - Sequence diagrams illustrate the interactions between different system components over time. - For example, in UNIDOCS, a **document request sequence** would show how a student submits a request, how it is processed by the system, and how the response is delivered through notifications. - This helps in understanding the flow of messages between different actors (students, admin, AI chatbot) and system processes.
- **Use Case Diagrams:** - These diagrams depict the various functionalities of the system from a user's perspective. - In UNIDOCS, a **use case diagram** highlights major actions like **document submission, request approval, chatbot assistance, and notification tracking**. - Actors (such as students, faculty, and administrators) are connected to system functionalities, illustrating their interactions with different system modules.

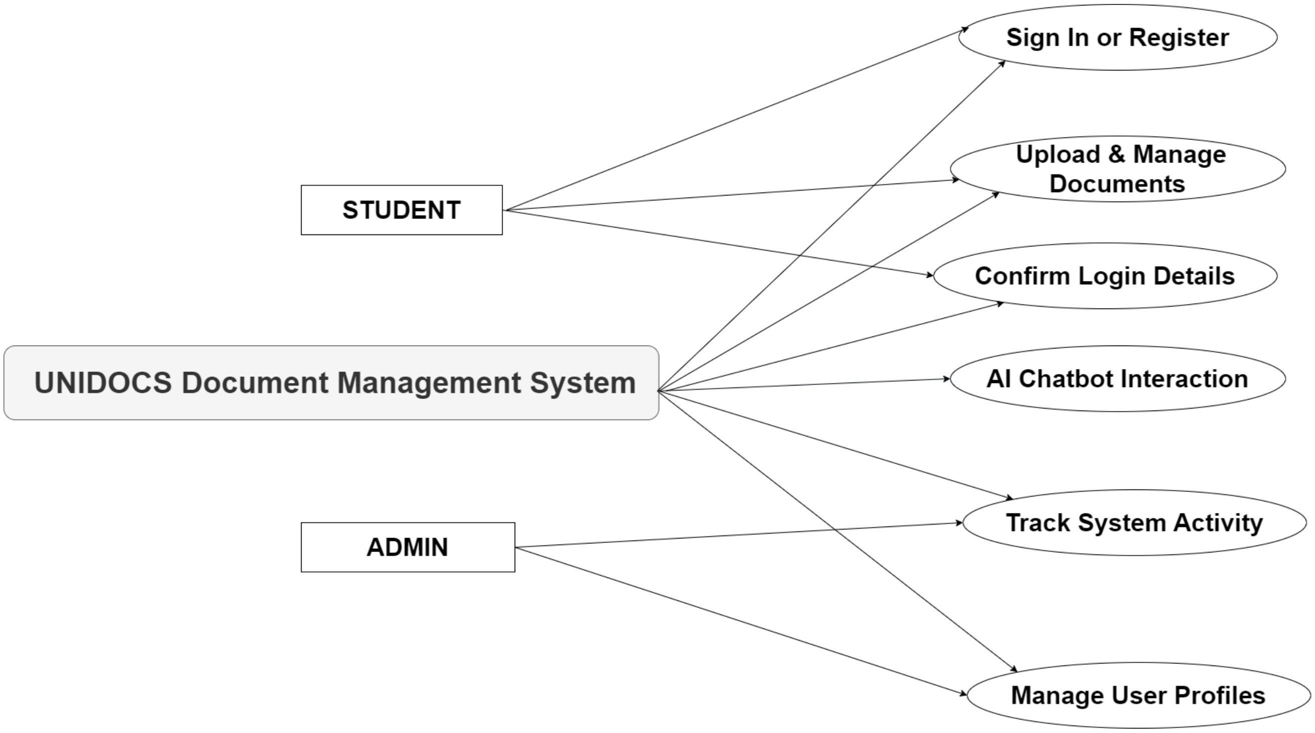


Figure 7: Use Case Diagram

CHAPTER 4: SYSTEM ANALYSIS

4.1 Existing System Description

The current system for document management in universities is highly reliant on manual processes, which results in inefficiencies and delays. Document requests, approvals, and storage are handled through physical paperwork or scattered digital files, leading to difficulties in tracking and retrieval. Students and staff must visit administrative offices in person to request official documents, such as transcripts and recommendation letters, which can take days or even weeks to process.

Additionally, communication between students and administrative personnel is slow and unstructured, relying on emails or physical visits. The absence of a **centralized digital platform** causes delays in processing requests and creates a high workload for administrative staff. There is no **automated verification system**, making it challenging to confirm document authenticity and track request statuses in real time.

Key limitations of the existing system include:

- **Manual document handling:** Requests and approvals are paper-based, increasing processing time and risk of document misplacement.
- **Lack of a centralized system:** Students, staff, and administrators do not have a unified platform to manage document requests and approvals efficiently.
- **Limited automation:** Processes such as document verification, request tracking, and notifications are performed manually.
- **Slow communication:** Students must follow up on requests in person or through email, often leading to miscommunication and delays.

4.1.1 Business Rules

The current document management system follows these operational rules:

- Students must submit paper-based forms or emails to request official documents.
- Document requests are reviewed manually by administrators before approval.
- Communication about document status is done through email or physical notice boards.
- Approved documents are stored physically or in unstructured digital folders without a centralized retrieval system.
- Any modification or update to a document requires manual review and approval by the administrative office.

4.2 Requirements Specification

4.2.1 Functional Requirements

The proposed **UNIDOCS system** aims to address the challenges of the current system by incorporating the following key functionalities:

1. **User Registration and Authentication:**
    - Secure login system for students, staff, and administrators.
    - Different access levels to ensure appropriate permissions for each user role.
2. **Document Request and Processing:**
    - Students can submit document requests through an online portal.
    - Administrators can review, approve, or reject requests digitally.
3. **Automated Credential Verification:**
    - The system verifies student details before processing requests to prevent fraudulent applications.
    - Secure encryption ensures document authenticity.
4. **Real-time Request Tracking and Notifications:**

- Students receive automatic status updates via email and SMS.
- The dashboard provides real-time tracking of request progress.

5. **AI-Powered Chatbot:**
   - Assists students with document-related inquiries and request procedures.
   - Provides instant responses to frequently asked questions.
6. **Secure Document Storage and Retrieval:**
   - Digital documents are stored in an encrypted database for easy retrieval.
   - Administrators can search and retrieve archived documents efficiently.
7. **Reporting and Analytics:**
   - Generates reports on document requests, processing times, and system usage.
   - Helps identify areas for process improvement.

4.2.2 Non-functional Requirements

1. **Usability:**
   - The system interface must be intuitive and easy to navigate for all users.
2. **Reliability:**
   - The system must maintain an uptime of **99.9%**, with minimal downtime for maintenance.
3. **Security:**
   - All user data must be encrypted and protected against unauthorized access.
   - Multi-factor authentication should be implemented for sensitive actions.
4. **Scalability:**
   - The system must support increasing numbers of users and document requests without performance degradation.

5. **Performance:**

- Requests should be processed within **3 seconds** to ensure a smooth user experience.

4.2.3 Performance Requirements

1. **System Responsiveness:**
   - All key actions (document uploads, request approvals) must be completed within **3 seconds**.
2. **Concurrent Users:**
   - The system must support at least **500 simultaneous users** without slowing down.
3. **Data Storage Capacity:**
   - The database must accommodate a minimum of **1TB of documents** securely.

4.2.4 Software and Hardware Requirements

- **Hardware Requirements:**
  - Server with **16GB RAM**, **1TB SSD storage**, and cloud-based backup.
  - Client devices (PCs, tablets, smartphones) with internet access.
- **Software Requirements:**
  - **Operating System:** Ubuntu 22.04 or later.
  - **Database:** Postgres for secure document storage.
  - **Frontend Framework:** Angular for a responsive user interface.
  - **Backend Framework:** Spring Boot for efficient backend processing.
  - **AI Chatbot:** CHATBASE based chatbot for instant student support.

4.2.5 Preliminary Product Description

The new system will be a **web-based platform** that centralizes document request handling, approval workflows, credential verification, and AI-powered assistance. It will ensure:

- **Automation** of document submission, approval, and retrieval.
- **Enhanced security** through encryption and access control.
- **Instant notifications** to keep students informed about request statuses.
- **AI-based chatbot assistance** to reduce administrative workload.

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