Software Requirements Specification

For

E- Filing System of NSTU

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Contents

1. Introduction

The policy, scope, references, and summary of Software Requirements Specification (SRS) are all included in the SRS introduction. By presenting the problem statement in detail, the purpose of this document is to collect, evaluate, and provide a deeper understanding of the whole **"E-Filing"** system. **"E-Filing System of NSTU"** is a web-based application designed to automate and streamline the process of managing official documents within a university. The system aims to enhance efficiency, transparency, and collaboration by providing a centralized platform for tracking the movement of documents across various departments. It enables users to submit, review, process, verify, and track the status of documents, such as leave applications, financial forms, and notices, as they progress through different stages of approval.

1.1 Problem Statement

The manual management of official documents within the university poses several challenges and inefficiencies. The existing paper-based processes result in cumbersome workflows, delays, and potential errors. These challenges highlight the need for a Web-Based Document Tracking and Transfer System to address the following problems:

- **Tedious and Time-consuming Processes:** The current manual handling of documents involves numerous manual tasks, such as physical submission, routing, and tracking. This process is time-consuming, prone to human errors, and leads to delays in document processing and decision-making.
- **Lack of Transparency and Visibility:** With paper-based systems, it is difficult for users and departments to track the status and whereabouts of documents. This lack of transparency results in a lack of accountability, as there is no clear visibility into the progress of document processing or the responsible departments.
- **Inefficient Collaboration and Communication:** Collaboration between users and departments is hindered by physical document transfers and reliance on email or in-person communication. This leads to delays in obtaining necessary approvals, clarifications, or additional information, causing inefficiencies in the overall document processing workflow.
- **Data Inaccuracy and Loss:** Manual handling of documents increases the risk of data inaccuracies, loss, or damage. Paper documents can be misplaced or destroyed, leading to the loss of critical information. Additionally, manual data entry increases the likelihood of typographical errors, compromising the accuracy and integrity of the document information.
- **Lack of Standardization and Consistency:** Inconsistencies in document formats, procedures, and approval processes are common in paper-based systems. This lack of standardization and consistency can result in confusion, misinterpretation, and delays in document processing and decision-making.
- **Limited Document Accessibility and Retrieval:** Paper documents stored in physical files or cabinets make it difficult to retrieve and access information quickly. Searching for specific documents or historical records becomes time-consuming and may result in delays in providing necessary information to stakeholders.

- **Compliance and Audit Challenges:** Paper-based document management makes it challenging to maintain compliance with regulatory requirements and audit trails. The lack of systematic tracking and documentation of document activities hinders the ability to demonstrate compliance or conduct efficient audits.

1.2 Purpose

The purpose of the Web-Based Document Tracking and Transfer System is to provide a reliable and efficient solution for managing the lifecycle of official documents within the university. The system aims to replace traditional paper-based processes with a digital platform that enables users to submit documents electronically, track their progress, collaborate with departments, and receive real-time updates on the status of their submissions. By automating document workflows and providing a transparent system, the project aims to improve productivity, reduce processing time, and enhance the overall user experience.

1.3 Project Scope

- The system will cover the entire document lifecycle within the university environment.
- The system will support multiple document formats.
- The system will facilitate the seamless flow of documents among departments.
- The system will allow for document review, processing, verification, and approval.
- Real-time status updates will be provided to users.
- The system will ensure data security and privacy.
- The system will enhance transparency and accountability.
- The system will streamline and automate document handling.
- The system will improve communication and coordination among departments.
- The system will improve overall document management efficiency within the university.

1.4 Glossary

This section provides definitions for all document names, acronyms, and abbreviations. The application domain's terms and concepts are defined.
API – Application Programming Interface
SRS – Software Requirement Specification
UI – User Interface
SDLC – Software Development Life Cycle
MB – Megabytes
XML – Extensible Markup Language
RESTful – Representational State Transfer
HTML – Hyper Text Markup Language
PHP – Hypertext Preprocessor
CSS – Cascading Style Sheets

1.5 References

- IEEE. IEEE Std 830-1998 IEEE Recommended Practice for Software Requirements

- Specifications. IEEE Computer Society, 1998.
- Software Engineering 9th Edition by Lan Sommerville.
- Requirements Engineering Fundamentals by Klaus Pohl.
- Database System Concepts 6th Edition by Abraham Silber Schatz.

1.6 Overview

The Web-Based Document Tracking and Transfer System will be developed as a web application accessible via standard web browsers. Users will access the system through a secure login process, ensuring proper authentication and authorization. The system will feature a centralized repository for storing and retrieving documents, employing appropriate security measures to protect sensitive information. Users will interact with the system through an intuitive and user-friendly interface that allows them to submit documents, track their progress, view comments and annotations, and collaborate with relevant departments. The system will incorporate workflow management, notifications, and reporting capabilities to facilitate efficient document processing and enhance user productivity.

2. Stakeholders and Characteristics

2.1Teachers: Teachers are the primary stakeholders of the platform. They edit or initiate a form for application to the department head. The key characteristics of Teachers are:-

- They select a form or initiate a new form.
- They sent their application form to the destination department and submit the form.
- They get the approval notification.
- They can check the status of the file.

2.2 Section officer: Section officer are also the primary stakeholders of the platform. The key characteristics of Section officer are:

- They select a form or initiate a new form.
- They select the destination and submit the form.
- They get the notification of the file.
- They can see the status of the file.

2.3 Department Heads: Department Heads are the secondary stakeholder of the system. The key characteristics of department heads are:

- They get the notification and check the notification.
- They check the file and verify the file.
- They can comment or attest file if needed.
- They select the destination and submit the file.
- They can check the status of the file.

2.4 Section officer of registrar office: Section officer of registrar office is the secondary stakeholder of the system. The key characteristics of Section officer of registrar office are:

- S/HE gets the notification and check the notification.
- S/HE checks the file and verifies the file.
- S/HE can comment or attest file if needed.
- S/HE selects the destination and submit the file.
- S/HE can check the status of the file.

2.5 Deputy Registrar: Deputy Registrar is the secondary stakeholder of the system. The key characteristics of Deputy Registrar are:

- S/HE gets the notification and checks the notification.
- S/HE checks the file and verifies the file.
- S/HE can comment or attest file if needed.
- S/HE selects the destination and submits the file.
- S/HE can check the status of the file.

2.6 Registrar: Registrar is the secondary stakeholder of the system. The key characteristics of Registrar are:

- S/HE gets the notification and checks the notification.
- S/HE checks the file and verifies the file.
- S/HE can comment or attest file if needed.
- S/HE selects the destination and submits the file.
- S/HE can check see the status of the file.

2.7 Treasurer: Treasurer is the secondary stakeholder of the system. The key characteristics of Treasurer are:

- S/HE gets the notification and check the notification.
- S/HE checks the file and verifies the file.
- S/HE can comment or attest file if needed.
- S/HE selects the destination and submits the file.
- S/HE can see the status of the file.

2.8 Vice Chancellor: VC is the secondary stakeholder of the system. The key characteristics of VC are:

- S/HE gets the notification and check the notification.
- S/HE checks the file and verifies the file.
- S/HE can comment or attest file if needed.
- S/HE selects the destination and submits the file.
- S/HE can see the status of the file.

3. Design and Implementation Constrains

We have employed design and implementation constraints to ensure the success of this project. It also refers to a tool that allows developers and testers to inspect and interact with the application's user interface (UI) elements.
The design and implementation constraints for the E-Farm platform:

Scalability: The platform needs to be designed to handle a large number of users, transactions, and data. It should be able to scale easily and efficiently as the user base and demand grow.

Security: The platform needs to be secure to protect sensitive information such as user data, financial information, and transaction details. This includes measures such as data encryption, secure payment gateways, and secure user authentication.

Availability: The platform needs to be highly available and reliable to ensure users can always access the platform and its services. This includes measures such as redundancy, load balancing, and disaster recovery.

User Experience: The platform needs to provide a seamless and intuitive user experience for all stakeholders, including farmers, consumers, agro-solution providers, agricultural equipment providers, logistics providers, and financial institutions. This includes features such as easy navigation, responsive design, and personalized recommendations.

Data Management: The platform needs to be designed to manage and store large amounts of data related to users, products, transactions, and other relevant information. This includes measures such as database design, data security, and data backup.

Integration: The platform needs to integrate with various third-party services such as payment gateways, logistics providers, and other relevant services. This requires an API-based architecture that can easily integrate with other systems.

Technology Stack: The platform needs to be built using appropriate technology stacks that can support its features and requirements. This may include programming languages such as Python, JavaScript, and Java, frameworks such as Django and Node.js, and databases such as PostgreSQL and MongoDB.

Testing: The platform needs to be thoroughly tested to ensure its functionality, security, and performance. This includes unit testing, integration testing, and acceptance testing.

Compliance: The platform needs to comply with relevant laws and regulations related to data protection, financial transactions, and other relevant areas. This includes measures such as GDPR compliance, PCI DSS compliance, and other relevant regulations.

These are the key design and implementation constraints for the E-Filing platform.

3.1 User Interface Technology

The visual layout of the components that a user could interact with a website or technical product is referred to as user interface design, or UI design. In other terms, it is a website's visual design.

3.1.1 Programming Language

PHP: The general-purpose programming language (GPPL) is PHP. It is mostly used as a server-side scripting language for the creation of websites. Web development is also simplified by the PHP frameworks. This framework makes it easier to reuse existing code and eliminates the need to create lengthy, intricate code for web apps. The majority of PHP frameworks are free source and simple to use. Because PHP is open-source and cost-free, developers may install it easily and utilize it right away. All major operating systems, including Windows, Unix, Linux, etc., support PHP. Web applications created using PHP may simply operate on any platform. PHP makes a safe connection with databases and connects to them with ease. It features an integrated module that may be used to quickly connect to the database. The primary purposes of the PHP framework are to simplify the construction of web applications and to automatically maintain the code. The builtin tools and features of PHP frameworks make it simpler to defend online applications from outside assaults and security risks.

3.1.2 CSS Framework

Cascading Style Sheets (CSS) is a language for specifying the appearance of a document written in a markup language like HTML. Along with HTML and JavaScript, CSS is a key component of the World Wide Web. Semantic UI is a website using UI component framework. Developers may use Semantic UI to create websites with quick and clear HTML, as well as a fully mobile responsive experience. Semantic UI offers a React-integrated version called Semantic UI React, which includes the following functionalities:

- Bootstraps,
- Declarative API.
- Augmentation.
- Shorthand Props.
- Sub Components.
- Auto Controlled State

3.1.3 Bootstrap

Bootstrap is a sizable repository of reusable code that comes in handy for developers. It is a JavaScript, CSS, and HTML frontend development framework. Using Bootstrap, web developers and designers can easily create fully responsive websites. It might be regarded as the most wellliked CSS framework for creating mobile-first and responsive applications.

3.2 Server-Side Technology

Server-side development refers to the actions that take place behind the scenes when an application is used. It primarily focuses on databases, scripting, website architecture, backend logic, APIs, and Servers.

3.2.1 Application Server

In the context of the E-Filing System, the application server plays a crucial role in facilitating the operation and management of the system. It provides the runtime environment necessary for running the web-based application and handling the processing of requests from users. An application server is a modern form of platform middleware. It is system software that resides between the operating system (OS) on one side, the external resources (such as a database management system [DBMS], communications and Internet services) on another side and the users' applications on the third side. The function of the application server is to act as host (or container) for the user's business logic while facilitating access to and performance of the business application. The application server must perform despite the variable and competing traffic of client requests, hardware and software failures, the distributed nature of the larger-scale applications, and potential heterogeneity of data and processing resources required to fulfill the business requirements of the applications.

4. Requirement Specification

All the requirements based on the elicitation process are described in this section.

4.1 Functional Requirement

Functional requirements are those requirements that are used to illustrate the internal working nature of the system, the description of the system, and explanation of each subsystem. It consists of what task the system should perform, the processes involved, which data the system should hold and the interfaces with the user.

4.1.1 Role Based Access Control

FR-1	Role Based User Login to registered account		
Description	User should log in his/her account for the first time by using provided one time password and be able to change his password.		
Stakeholders	Teacher, Section officer, department head, VC	**Priority**	High

4.1.2 Document Initiation

FR-2	User initiates the document by using application format or newly creates the document.

Description	User first select document format. He initiates the document providing related information.		
Stakeholders	Teacher, Section officer.	**Priority**	High

4.1.3 Select Destination

FR-3	User select the destination to send the document		
Description	The user selects the destination before submitting the document, where he wants to send the document. The selected destination would be the upper level or lower level.		
Stakeholders	Teacher, Section officer, department head, VC	**Priority**	High

4.1.4 Attach File

FR-4	Allow user to attach another document		
Description	The system allows users to attach another document for processing and storage in the central repository. The documents should be assigned a unique identifier and stored securely.		
Stakeholders	Teacher, Section officer, department head, VC	**Priority**	Low

4.1.5 Add Comment

FR-5	Allow user to add comment		
Description	The system allows users to add comment. The user can add comment with the document if he wants.		
Stakeholders	Teacher, Section officer, department head, VC	**Priority**	Medium

4.1.6 Document Submission

FR-6	Allow user to submit document		
Description	The system should allow users to submit documents for processing and storage in the central repository. The documents should be assigned a unique identifier and stored securely.		
Stakeholders	Teacher, Section officer.	**Priority**	High

4.1.7 Document Routing

FR-7	System should route the document		
Description	The system should route the document to the appropriate department or user for processing based on predefined rules and criteria.		
Stakeholders	Teacher, Section officer, department head, VC	**Priority**	Medium

4.1.8 Document review and processing

FR-8	Document review and processing		
Description	The system should allow users and departments to review and process documents. This includes adding comments or annotations, requesting additional information, verifying data, and signing documents.		
Stakeholders	Teacher, Section officer, department head, VC	**Priority**	Medium

4.1.9 Document tracking and status updates

FR-9	Track the document and update it		
Description	The system should allow users to track the status of their documents and receive updates on any changes or progress		
Stakeholders	Teacher, Section officer, department head, VC	**Priority**	High

4.1.10 Document Security and access control

FR-10	Document transmitted securely		
Description	The system should ensure that documents are stored and transmitted securely and that access is restricted to authorized users and departments		
Stakeholders	Teacher, Section officer, department head, VC	**Priority**	High

4.1.11 Document archiving and retention

FR-11	Mechanism for archiving and retaining document		
Description	The system should have a mechanism for archiving and retaining documents for a specified period, in compliance with legal and regulatory requirements		
Stakeholders	System	**Priority**	High

4.1.12 User Logout

FR-12	User logout from their account		
Description	The system will provide a logout button, manage user sessions, provide a confirmation message, clear the user's session, delete the session cookie, and redirect the user after logging out. The system should also restrict access to sensitive information and allow users to provide feedback. This feature is critical for maintaining the trust and confidence of users and promoting a positive user experience.		
Stakeholders	Teacher, Section officer, department head, VC	**Priority**	Low

4.2 Data Requirement

Based on the description of your project, it seems that your system would require several types of data to function effectively. Here are some potential data requirements for each of the three main services you are providing

Requirement Name	Requirement Description	Stakeholders	Priority
4.2.1 User Information	Information about the user as he/she is a teacher, section officer, department head, treasurer, or VC.	Teacher, Section officer, department head, VC	High
4.2.2 Teacher Information	Information about the teachers, including their name, email, teacher id, and department name.	Teachers	High
4.2.3 Document Information	Information about document title, type, status etc.	Teachers, Department Heads, Administrators and System Administrator.	High
4.2.4 Department Information	The system must store and manage department-related information, including department name, department head.	System Administrator, users.	Low
4.2.5 Notification Information	The system must store and manage the following information related to notifications: Sender, Recipient, Subject, Content, Timestamp	System Administrator, users.	Medium

In addition to the above, your system would also require data on the usage of the platform, such as the number of users, active sessions, and engagement metrics, to help you understand how the system is being used and to make improvements over time. It's important to ensure that all the data is collected ethically, stored securely, and used in compliance with privacy regulations.

4.3 Performance Requirement

It is important to maintain the performance of the software system. To ensure performance we maintain these steps:

Requirement Name	Requirement Description	Stakeholders	Priority
4.3.1 Response Time	The system must respond to user requests within 2 seconds for 90% of the time.	users	High
4.3.2 Concurrent User	The system must support a minimum of 500 concurrent users at any given time.	users	High
4.3.3 Scalability	The system must be scalable to handle increased traffic and users over time.	System Administrator	High
4.3.4 Availability	The system must have an uptime of 99.99% to ensure users can access it at any time.	System Administrator	High
4.3.5 Security	The system must ensure that customer data is secure and protected from unauthorized access or data breaches.	Users, System Administrator	High
4.3.6 Data Backup	The system must regularly back up data to prevent data loss in case of hardware or software failures.	System Administrator	Medium
4.3.7 System Maintenance	The system must undergo regular maintenance and updates to ensure optimal performance and minimize downtime.	System Administrator	Medium
4.3.8 Load Testing	The system must undergo regular load testing to identify and address performance issues.	System Administrator	Low
4.3.9 Resource Utilization	The system must utilize system resources efficiently to minimize hardware and infrastructure costs.	System Administrator	Low

4.3.10 Capacity Requirement

Here are some capacity requirements for our project:

4.3.2.1 Bandwidth
The system must have sufficient bandwidth to support high traffic volume.

4.3.2.2 Storage Capacity
The system must have sufficient storage capacity to store document information, users' data.

4.3.2.3 Processing Power
The system must have sufficient processing power to handle large volumes of data, including transactions, searches, and analytics.

4.3.2.4 Server Capacity
The system must have sufficient server capacity to handle user requests and ensure that the system runs smoothly.

4.3.2.5 Network Capacity
The system must have sufficient network capacity to support multiple user connections and ensure that the system is accessible from different locations.

4.3.3 Safety Critical Requirement
There are no safety critical requirements for our project.

4.3.4 Robustness or Fault-Tolerance Requirements

4.3.4.1 Error Handling
The system must have proper error handling mechanisms in place to handle unexpected errors or exceptions and prevent the system from crashing or becoming unresponsive.

4.3.4.2 Redundancy
The system must have redundant components, such as servers, databases, or network connections, to ensure that critical functions are available even in case of failures.

4.3.4.3 Failover
The system must have a failover mechanism that automatically switches to a backup system or component in case of a failure to ensure that the system remains operational.

4.3.4.4 Load Balancing
The system must have load balancing mechanisms that distribute the load across multiple servers to ensure that no single server is overwhelmed with requests and that the system remains responsive.

4.3.4.5 Performance Monitoring
The system must have performance monitoring mechanisms that track system performance and alert administrators if the system falls below defined thresholds.

4.3.4.6 Recovery Time Objectives (RTO)

The system must have defined RTOs for each critical component or system function, specifying the maximum acceptable downtime and the required recovery time in case of a failure.

4.3.4.7 Backups

The system must have a backup mechanism that regularly backs up critical data to ensure that data can be recovered in case of a catastrophic failure

4.4 Maintainability and Supportability

4.4.4 Maintenance Requirements

4.4.4.1 Regular Software Updates

The system must have a mechanism to update the software to the latest version, which includes bug fixes, performance improvements, and security enhancements.

4.4.4.2 Regular Hardware Maintenance

The system must have regular hardware maintenance, which includes cleaning, inspection, and repair or replacement of faulty components.

4.4.4.3 Data Backup and Recovery

The system must have a regular data backup mechanism to ensure that critical data is not lost in case of hardware or software failures.

4.4.4.4 System Monitoring

The system must have a system monitoring mechanism that tracks system performance, usage patterns, and error logs to identify potential issues and optimize system performance.

4.4.4.5 User Support

The system must have a user support mechanism to help users troubleshoot issues, provide guidance, and resolve user complaints or issues.

4.4.4.6 Training

The system must provide training to administrators and users to ensure that they are familiar with the system's features and capabilities, and can use the system effectively.

4.4.4.7 Documentation

The system must have documentation that outlines the system architecture, design, and usage, which is helpful for troubleshooting, maintenance, and training purposes.

4.5 Supportability Requirements

This system meets Testability, Maintainability, Compatibility, Configurability, Serviceability, and install ability which are related to supportability requirements.

4.5.4 Authentication and Authorization

The system must have a mechanism to authenticate users and authorize access to system resources based on the user's role and level of access.

4.5.5 Encryption
The system must use encryption mechanisms to secure sensitive data, such as login credentials, financial data, and personal information, during transmission and storage.

4.5.6 Access Control
The system must have access control mechanisms to restrict access to sensitive data and system resources to authorized personnel only.

4.5.7 Network Security
The system must have network security mechanisms, such as firewalls and intrusion detection systems, to protect against network attacks and unauthorized access to the system.

4.5.8 Audit Trails
The system must have audit trail mechanisms that log user activity and system events, to enable the identification and investigation of security breaches and unauthorized access attempts.

4.5.9 Data Backup and Recovery
The system must have a data backup and recovery mechanism to ensure that critical data can be restored in case of data loss or corruption.

4.5.10 System Monitoring
The system must have system monitoring mechanisms that detect and alert administrators of any suspicious or malicious activity on the system.

4.5.11 Incident Response
The system must have an incident response plan in place to handle security breaches or attacks and minimize the impact of such incidents.

4.6 Usability and Human Integrity Requirements
This system will provide more user-friendly environment

4.6.4 Ease of Use Requirements
Our system will be easier to use by any type of people and they don’t need any training to use the system.

4.6.5 Accessibility Requirements
To get access to the application, the application provides authorization/authentication. This application will use various modules.

4.6.5.1 Navigation
The system must have a clear and consistent navigation mechanism, which includes keyboard shortcuts, to help users navigate the system effectively.

4.6.5.2 Text Size and Font
The system must have options to increase or decrease the text size and change the font style to help users with visual impairments read the content easily.

4.6.5.3 Color Contrast

The system must have sufficient color contrast between the background and foreground elements to help users with visual impairments distinguish between different elements on the screen.

4.6.5.4 Alternative Text

The system must provide alternative text for images, videos, and other multimedia elements to help users with visual impairments understand the content.

4.6.5.5 Audio and Video Transcripts

The system must provide transcripts for audio and video content to help users with hearing impairments understand the content.

4.6.5.6 Forms and Input Fields

The system must have accessible forms and input fields, which include labels, hints, and error messages, to help users with disabilities fill out the forms accurately.

4.6.5.7 Assistive Technology Compatibility

The system must be compatible with assistive technologies, such as screen readers, text-to-speech software, and voice recognition tools, to help users with disabilities access the system effectively.

5. Requirement Engineering Process

Requirements Engineering (RE) determines software requirements according to customer requirements or needs. Requirements engineering process includes requirements elicitation, needs modeling, requirements analysis, requirements assurance & validation, and requirements management.

5.1 Requirement Elicitation Techniques

Requirements elicitation is the practice of researching and finding system requirements for users, customers, and other stakeholders, also referred to as "requirement gathering". Requirement elicitation can be done by contacting participants directly or by doing some research, analysis and testing.

5.1.1 Hold Interviews

For the E-Filing System, we will be holding individual or small group discussions to gather requirements. Our goal is to gather important requirements for the program in a timely and efficient manner.

During the interview, we will focus on the following areas:

- First, we identified our all stakeholders
- We prepared interview’s question and short description of the goals and objectives of the E-Filing System
- Then we conducted interview in a comfortable and distraction-free environment and used the prepared questions as a guide, but also allow for flexibility to explore additional topics that arise during the conversation.
- Took detailed notes during the interview to capture the stakeholders' responses accurately and recorded important insights, requirements, constraints, and any potential conflicts or trade-offs identified during the conversation.
- After each interview, we reviewed the notes and clarify any ambiguous points or seek additional information if necessary.
- At last, we shared the synthesized requirements with the stakeholders to validate their accuracy and completeness. Seek feedback and incorporate any necessary revisions based on the stakeholders' input.

5.1.2 Designing Surveys or Questionnaire

We design a Questionnaire for stakeholders to capture their feedback, preferences and requirements.

5.1.3 Prototyping

We develop prototype of the system to demonstrate its functionality and collect feedback from stakeholders.

5.1.4 User observation

Observing the users while they perform tasks and collect feedback to identify the requirements.

5.1.5 Focus groups

We Conduct focus groups to understand requirements and get feedback from stakeholders.

5.1.6 Use case analysis

Analyze the use cases to identify the requirements of the system.

5.2 Requirement Validation

Requirement validation ensures that the requirements are correct and reflect the quality you want from this program. In the beginning, our requirements looked good but when we read them and tried to work with them, they came out having ambiguities and gaps.

5.2.1 Review the Requirements

Negative peer review, especially the type of rigorous review called evaluation, is unique among the highest quality software processes available. We had a team of reviewers representing different perspectives and carefully examined written needs, analysis models, and related information on disability.

5.2.2 Test the Requirements

The test creates another view of the requirements. We also performed writing tests regarding assurance of whether the expected performance was found or not. Getting tested by the user needs to document the expected product behavior under specified conditions.

5.2.3 Simulate the requirements

To stimulate requirements, trading tools are available that we have used to simulate a proposed system in place or to add details of written requirements. The simulation takes prototyping to the next level..

5.2.4 Walk-through

A walkthrough is a review of the requirement documents conducted by a team of stakeholders, developers, and experts. They review the requirements and provide feedback on their completeness, correctness, and consistency.

5.2.5 Prototyping

A prototype is a working model of the system. It can be used to validate the requirements by allowing stakeholders and users to interact with the system and provide feedback on its functionality and usability

5.2.6 User Acceptance Testing (UAT)

UAT is a testing process where end-users test the system to verify if it meets their requirements. This process can help validate the requirements and ensure that the system meets the needs of the users.

5.2.7 Beta testing

Beta testing is a type of testing conducted by a group of end-users who are not part of the development team. This testing helps to validate the requirements and identify any remaining defects before the system is released to the public.

6. Use Case Diagram

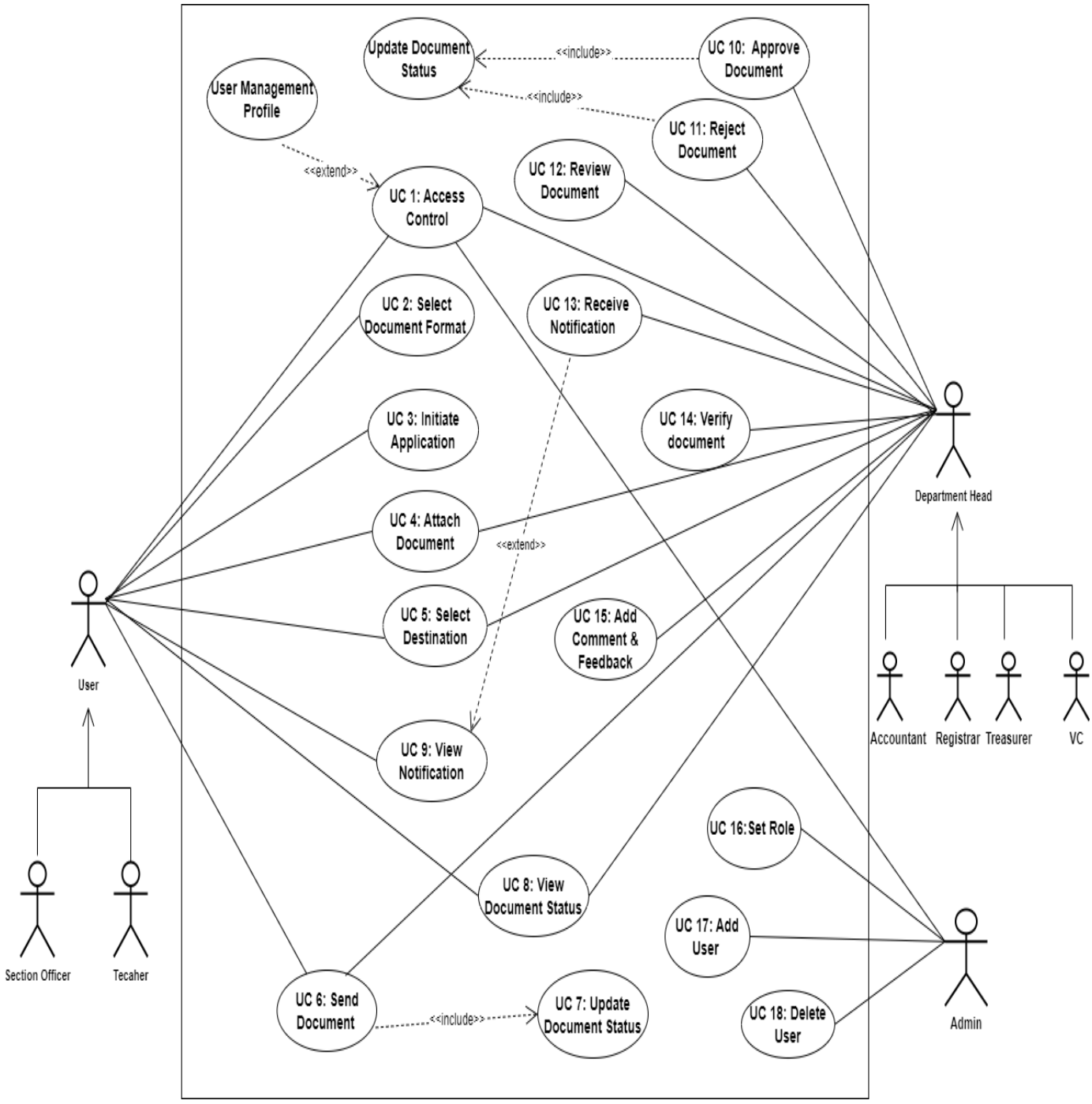

Figure 1: Use Case Diagram

7. Use Case Description

UC-01: Access Control

Use Case	Access Control
Goal	Allow users to log in to their account in the E-Filing System
Precondition	The user must have an existing account in the system
Success End Condition	User is logged in and has access to their account information
Failed End Conditions	1)The user enters incorrect login credentials, 2) The user's account has been deactivated
Primary Actor	Teacher, section officer
Secondary Actor	Department Head, Admin
Trigger	"Login" Button needed to be clicked.
Main Success Flow	1)The user enters their username and password, 2)The user clicks the "Log in" button 3)The system validates the customer's login credentials, 4) The system logs the customer in and grants access to their account information
Alternative Flow	1a)If the user enters incorrect login credentials, the system displays an error message and asks the user to re-enter their credentials 4a) If the user's account has been deactivated, the system displays an error message and asks the user to contact user support
Quality Requirements	1) The system should be able to fix forgotten password problem. 2) The system should be able to handle many simultaneous login requests without crashing or slowing down.

UC-02: Select Document Format

Use Case	Select Document Format
Goal	The goal of this use case is to allow the user to select the desired document format
Precondition	The user is logged into the system and has initiated the document submission process
Success End Condition	The user has successfully selected a valid document format
Failed End Conditions	The user cancels the document submission process or fails to select a valid document format.
Primary Actor	Teacher, Section officer.
Secondary Actor	N/A
Trigger	"Document format" Button needs to be clicked
Main Success Flow	1)The system presents the user with a list of available document formats for selection. 2)The user reviews the list of document formats. 3)The user selects the desired document format from the available options. 4)The system validates the selected document format. 5)The system proceeds with the document submission process, considering the selected document format for further processing.
Alternative Flow	4a.) If the selected document format is not valid or not supported by the system: The system displays an error message indicating that the selected document format is invalid. 4b) The user is prompted to select a different document format. 4c) The user either selects a valid document format or cancels the document submission process.
Quality Requirements	1) The response time should be fast.

UC-03: Initiate Documents

Use Case	Initiate Documents
Goal	Allow users to initiate the process of submitting a new document
Preconditions	The user is logged into the system and has access to the document submission functionality.
Success end condition	The user successfully initiates the document submission, and the document is stored in the system for further processing..
Failed end condition	The user cancels the document initiation process or encounters an error during the submission.
Primary Actor	Teacher, Section Officer.
Secondary Actor	N/A
Trigger	The users click on the “Initiate” button.
Main Success Flows	1) The user fills in the necessary information for the document, such as document title, type, description, and any relevant attachments. 2) The user confirms the document initiation.
Alternative Flow	N/A.
Quality Requirements	1) The response time should be fast.

UC-04: Attach Document

Use Case	Attach Document
Goal	The goal of this use case is to allow users to attach a document to an existing record.
Preconditions	The user is logged into the system and has access to the document attachment functionality.
Success end condition	The user successfully attaches the document to the designated record or process within the system
Failed end condition	The user cancels the document submission process or fails to select a valid document format.
Primary Actor	Teacher, Section Officer
Secondary Actor	Department Head
Trigger	The users click on the "Attach" button.
Main Success Flows	1)The user reviews the list of document formats. 2)The user selects the desired document format from the available options. 3)The system validates the selected document format. 4)The system proceeds with the document submission process, considering the selected document format for further processing.
Alternative Flow	3a) If the selected document file is not valid or exceeds the allowed size 3b) The system displays an error message indicating that the file format is invalid or the size exceeds the limit. 3c) The user is prompted to select a different document file or resize the file to meet the requirements. 3d)The user either selects a valid document file or cancels the attachment process.
Quality Requirements	Attached Document will be attached within 3 seconds

UC-05: Select Destination

Use Case	Select Destination
Goal	Allow users to select the destination department
Preconditions	The user is logged into the system and has initiated the document routing process.
Success end condition	The user has successfully selected a valid department or recipient as the document destination, and the system proceeds with routing the document accordingly.
Failed end condition	The user cancels the document routing process or fails to select a valid destination.
Primary Actor	Teacher, Section Officer
Secondary Actor	Department Head
Trigger	The users click on the "Select Destination" button.
Main Success Flows	1)The user selects the desired department or recipient from the available options. 2)The system validates the selected destination. 3)The system proceeds with routing the document to the selected department or recipient for further processing.
Alternative Flow	2a. If the selected destination is not valid or not available 2b) The system displays an error message indicating that the selected destination is invalid or unavailable. 2c) The user is prompted to select a different department or recipient as the document destination. 2d) The user either selects a valid destination or cancels the document routing process.
Quality Requirements	1) The system should provide a clear and intuitive interface for the user to select the document destination. 2) Error messages presented to the user in case of an invalid or unavailable destination should be informative and user-friendly.

UC-06: Send Document

Use Case	Send Document
Goal	Allow users to submit a document for processing in the E-Filing System
Precondition	The user is logged into the system and has initiated the document sending process.
Success End Condition	The user has successfully sent the document, and the system has recorded and stored it for further processing.
Failed End Conditions	The user cancels the document sending process or encounters an error during the submission.
Primary Actor	Teacher, Section Officer
Secondary Actor	Department Head
Trigger	Users click on the "Send Document" Button.
Main Success Flow	1) The system presents the user with a form or interface for uploading the document and providing relevant information. 2) The user attaches the document file to the submission form. 3) The user fills in any required information about the document, such as document title, description, and any additional details. 4) The user confirms the document submission. 5) The system validates the submitted information and files, checking for any errors or missing details. 6) The system stores the document in the appropriate repository or location for further processing.
Alternative Flow	3a) If the user identifies any incorrect or missing information: The user updates the relevant fields with the correct or missing information. 3b) The user proceeds to review and confirm the document submission.
Quality Requirements	1) Initiated Documents will be sent within 10 second. 2) The system should provide accurate evaluation results.

UC-07: Update Document Status

Use Case	Update Document Status
Goal	The goal of this use case is to automatically update the status of a document when it is transferred from one department to another within the E-Filing System.
Preconditions	The user is logged into the E-Filing System with appropriate permissions.
Success end condition	The document status is successfully updated upon transfer to another department.
Failed end condition	The document transfer is canceled or encounters an error, and the status is not updated.
Primary Actor	System Administrator
Secondary Actor	N/A
Trigger	The user initiates the transfer of a document from one department to another within the E-Filing System.
Main Success Flows	1) The user selects a document for transfer from the current department. 2) The system retrieves the current status of the document. 3) The user selects the target department for the document transfer. 4) The system validates the transfer and updates the document status to "In Progress" or equivalent. 5) The system transfers the document to the target department. 6) The system updates the document status to "Transferred" or equivalent upon successful transfer.
Alternative Flow	N/A
Quality Requirements	The system should ensure real-time updates of the document status upon transfer, maintaining data integrity and security throughout the process.

UC-08: View Document Status

Use Case	View Document Status
Goal	Allow users to view the status and progress of a document in the “E-Filing" System
Preconditions	The user is logged into the system and has the necessary permissions to access document status information.
Success end condition	The user successfully views the status and progress of the selected document.
Failed end condition	The user cancels the document status checking process or encounters an error during the search.
Primary Actor	Section Officer, Teacher
Secondary Actor	Department Head
Trigger	The users click on the "Document Status" button.
Main Success Flows	1) The user enters relevant search criteria, such as document title, unique identifier, or other identifying information. 2) The system retrieves the matching documents based on the provided search criteria. 3) The user selects the desired document from the search results. 4) The system displays the document status, including its current location, departments involved, and any associated comments or updates. 5) The user can review the document's status, verifying its progress and any pending actions.
Alternative Flow	2a. If no matching document is found based on the provided search criteria: 1) The system notifies the user that no document matching the search criteria was found. 2) The user can refine the search criteria or perform a new search.
Quality Requirements	The system should reflect the real-time status of documents, ensuring that the information is up to date.

UC-09: View Notification

Use Case	View Notification
Goal	The goal of this use case is to allow users to view notifications.
Preconditions	The users are logged into the system and have the necessary permissions to access notifications.
Success end condition	The users successfully view the content of the selected notification
Failed end condition	There are no new notifications for the users to view.
Primary Actor	Teacher , Section Officer
Secondary Actor	Department Head
Trigger	The users click on the "View Notification" button.
Main Success Flows	1) The system displays a list of notifications, including the sender, subject, and timestamp. 2) The user selects a specific notification to view its content in detail. 3) The system presents the full content of the selected notification, including any attachments or additional information. 4) The user reads the notification and takes any necessary actions as specified within the notification. .
Alternative Flow	N/A.
Quality Requirements	1) The system should support the display of notification content in a readable format, accommodating attachments if present.

UC-10: Approve Document

Use Case	Approve Document
Goal	To allow users to review and approve a document.
Preconditions	The user is logged into the system and has the necessary permissions to approve documents.
Success end condition	The user successfully reviews and approves the document, updating its status within the system.
Failed end condition	The user cancels the document approval process or encounters an error during the approval action.
Primary Actor	Department Head
Secondary Actor	N/A
Trigger	Users click on the “Approve” Button.
Main Success Flows	1) The user receives a notification or identifies a document that requires approval. 2) The user navigates to the document details or approval section within the system. 3) The system presents the document details, including its title, type, current status, and any relevant attachments or comments. 4) The user reviews the document content, ensuring its compliance with relevant policies, regulations, or criteria. 5) Based on the document's content and purpose, the user evaluates its accuracy, completeness, and adherence to required standards. 6) If the document meets the necessary criteria, the user selects the "Approve" option within the system. 7) The system updates the document's status as "Approved" and records the user's approval action, including a timestamp.
Alternative Flow	6a. If the user determines that the document does not meet the required criteria: 1) The user selects the "Reject" option within the system. 2) The system updates the document's status as "Rejected" and records the user's rejection action, including a timestamp. 3) The system may prompt the user to provide comments or reasons for the rejection.
Quality Requirements	The system should provide a user-friendly interface for adding comments/feedback, ensure data security, and support moderation and filtering options if needed.

UC-12: Review Document

Use Case	Review Document
Goal	To enable authorized users to review a document.
Preconditions	The user is logged into the system and has the necessary permissions to review documents.
Success end condition	The user successfully completes the review process, providing feedback or recommendations if necessary.
Failed end condition	The user cancels the document review process or encounters an error during the review action.
Primary Actor	Department Head
Secondary Actor	N/A
Trigger	User click on the "review" Button.
Main Success Flows	1) The system presents the document details, including its title, type, current status, and any relevant attachments or comments. 2) The user reviews the document content, ensuring its accuracy, completeness, and adherence to relevant policies or standards. 3) Based on the review outcome, the user may recommend changes, corrections, or improvements to the document. 4) If necessary, the user may provide feedback or comments to the document creator or initiator for further action. 5) The user completes the review process by submitting their review or marking it as complete within the system.
Alternative Flow	3a) If the user identifies issues or areas for improvement in the document: 1) The user makes comments or notes highlighting the specific concerns or suggestions within the system. 2) The user may choose to reject the document or initiate a feedback loop for further revisions.
Quality Requirements	The system should handle errors or exceptions gracefully, providing appropriate error messages and notifications when necessary.

UC-13: Verify Document

Use Case	Verify Document
Goal	The goal of this use case is to allow authorized users to verify the authenticity and accuracy of a document within the E-Filing System.
Preconditions	The user is logged into the E-Filing System with appropriate permissions.
Success end condition	The document is successfully verified and confirmed to be authentic and accurate.
Failed end condition	The document verification process is canceled or encounters an error.
Primary Actor	Department Head
Secondary Actor	N/A
Trigger	The user selects a specific document and requests to verify its authenticity and accuracy.
Main Success Flows	. 1) The user navigates to the document management section of the E-Filing System. 2) The user selects the desired document to verify. 3) The system retrieves the document and presents its details and content to the user. 4) The user carefully examines the document for authenticity and accuracy. 5) The user performs necessary checks, such as verifying signatures, watermarks, or document metadata. 6) The user confirms the authenticity and accuracy of the document.
Alternative Flow	N/A.
Quality Requirements	The system should ensure the integrity and security of the document, provide a clear and user-friendly interface for verification, and support advanced verification techniques if applicable.

UC-14: Add Comment & Feedback

Use Case	Add Comment & Feedback
Goal	To allow users to add comments and provide feedback on a specific document.
Preconditions	The user is logged into the E-Filing System with appropriate permissions.
Success end condition	The user successfully adds a comment or feedback to the document.
Failed end condition	The comment or feedback addition process is canceled or encounters an error.
Primary Actor	Department Head
Secondary Actor	N/A
Trigger	The user selects a specific document and chooses to add a comment or feedback within the E-Filing System.
Main Success Flows	1) The user navigates to the document management section of the E-Filing System. 2) The user selects the desired document to add a comment or feedback. 3) The system retrieves the document and displays its details, including title and current comments/feedback. 4) The user writes a comment or provides feedback in the designated input area. 5) The user submits the comment or feedback. 6) The system verifies and saves the comment/feedback, associating it with the respective document.
Alternative Flow	N/A
Quality Requirements	The system should provide a user-friendly interface for adding comments/feedback, ensure data security, and support moderation and filtering options if needed.

8. Activity Diagram

Activity Diagram (Access Control)

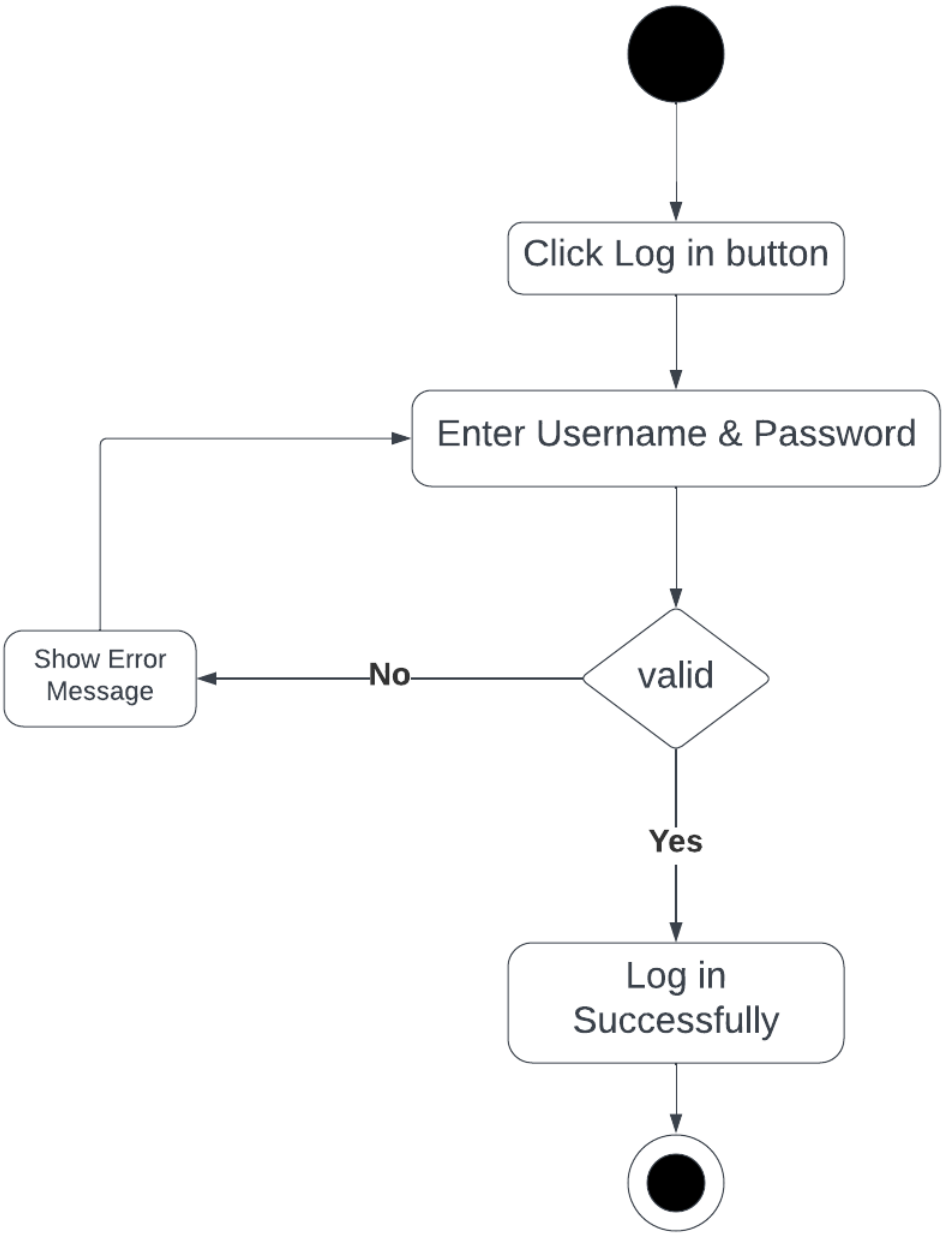

Figure 2: Access Control

Activity Diagram (Select Document Format)

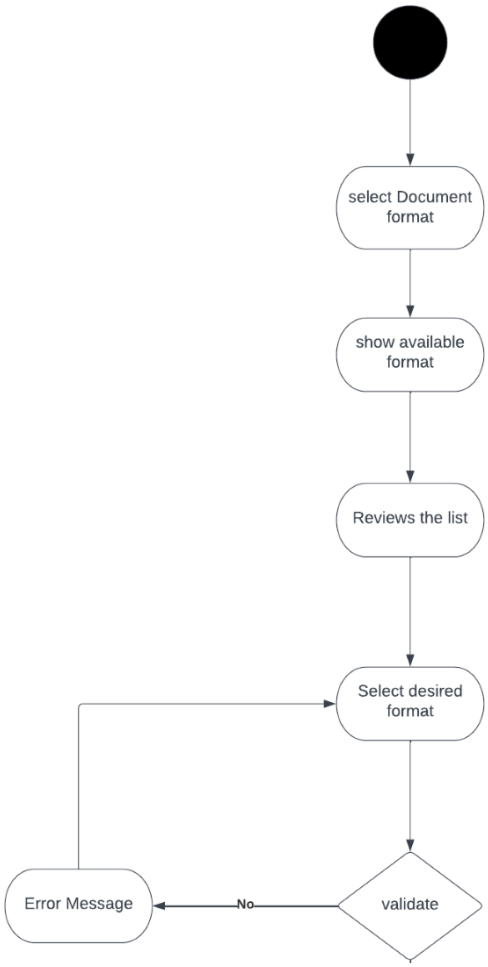

Figure 4: Initiate Format

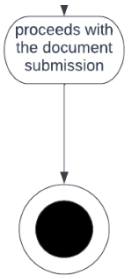

Figure 3: Select Document Format

Activity Diagram (Initiate Document)

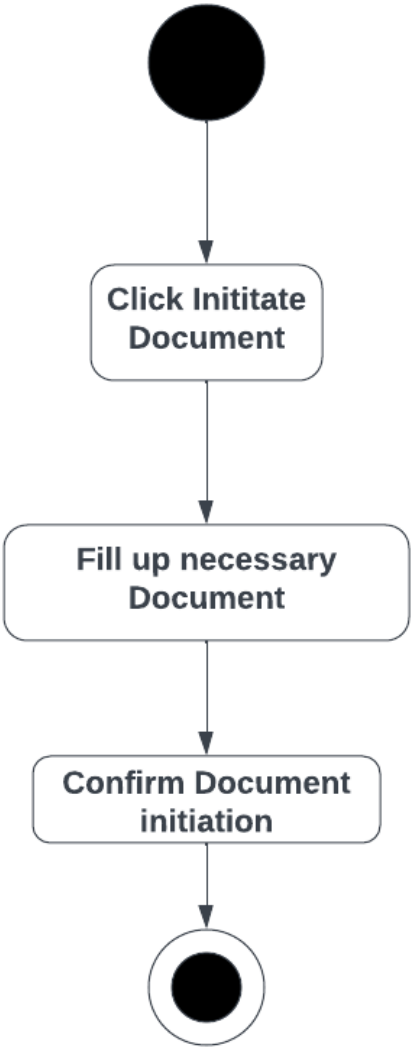

Figure 4: Initiate Document

Activity Diagram (Attach Document)

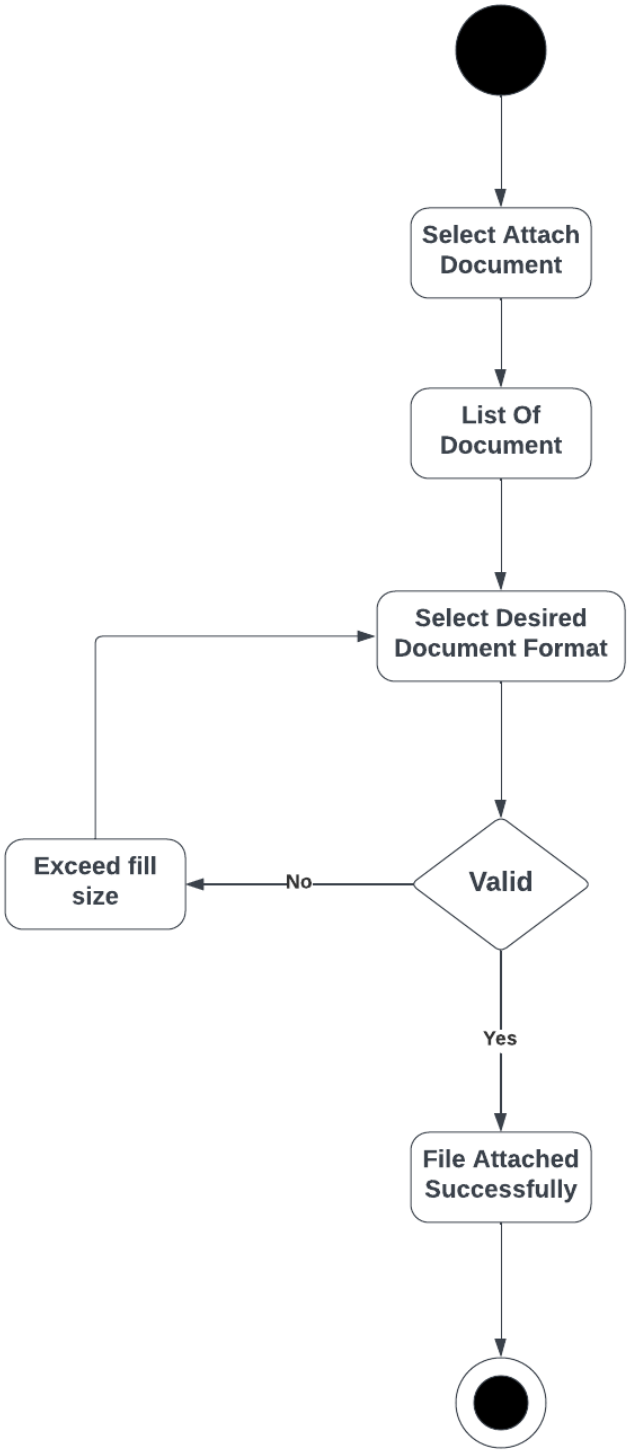

Figure 5: Attach Document

Activity Diagram (Select Destination)

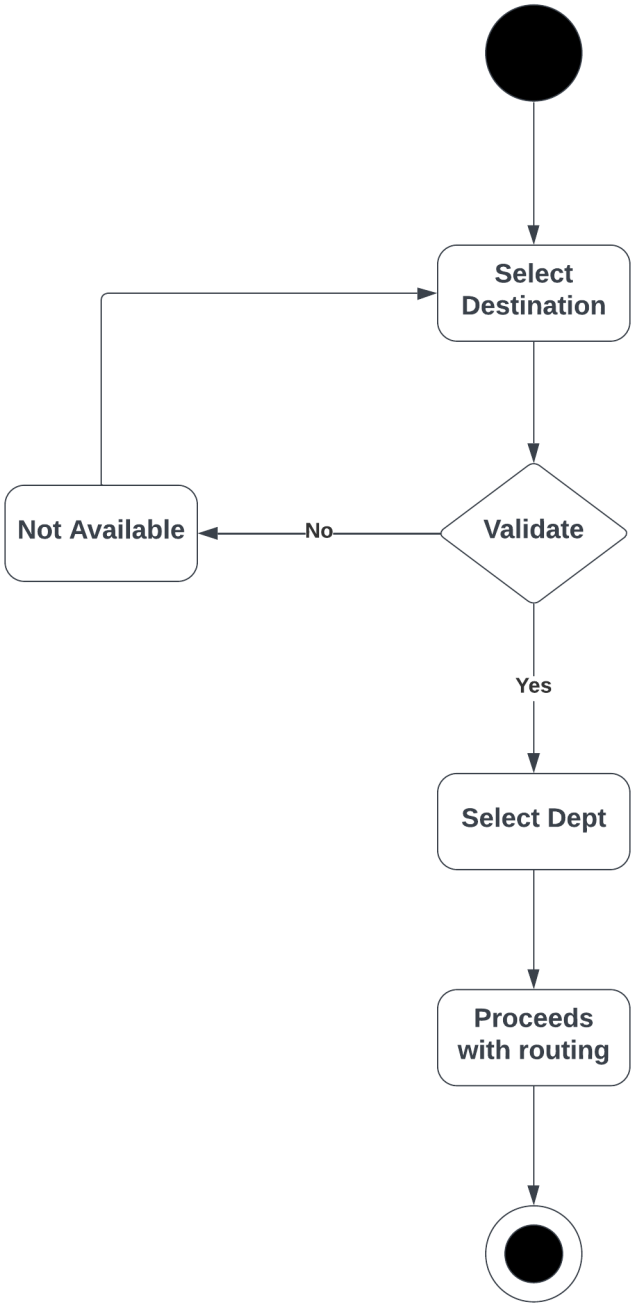

Figure 6: Select Destination

Activity Diagram (Update Document Status)

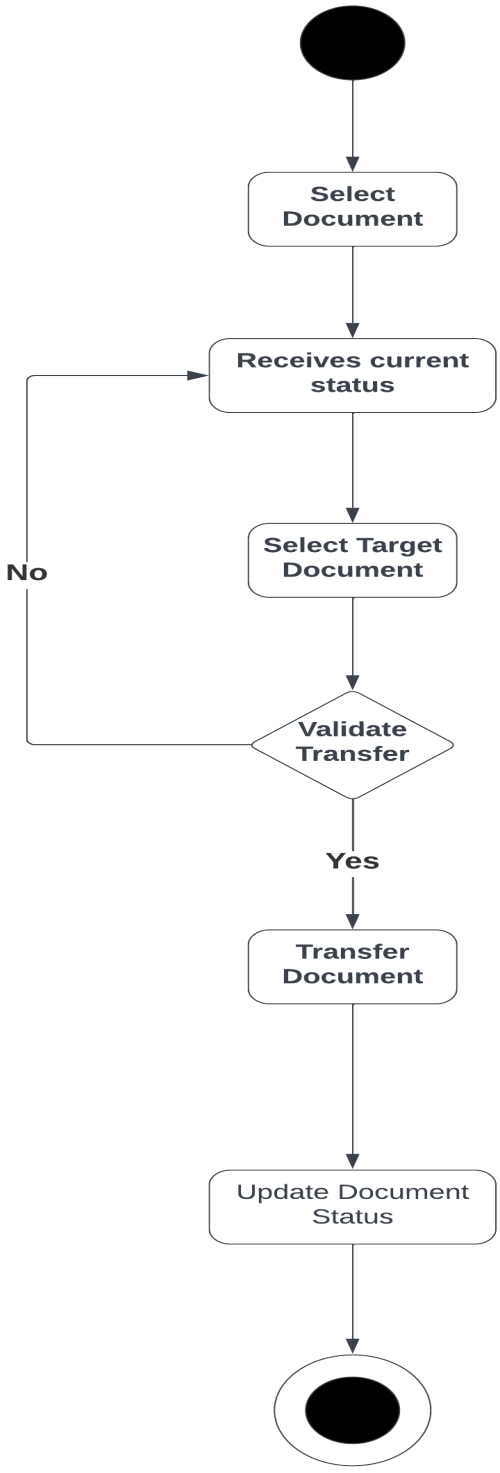

Figure 7: Update Document Status

Activity Diagram (View Document Status)

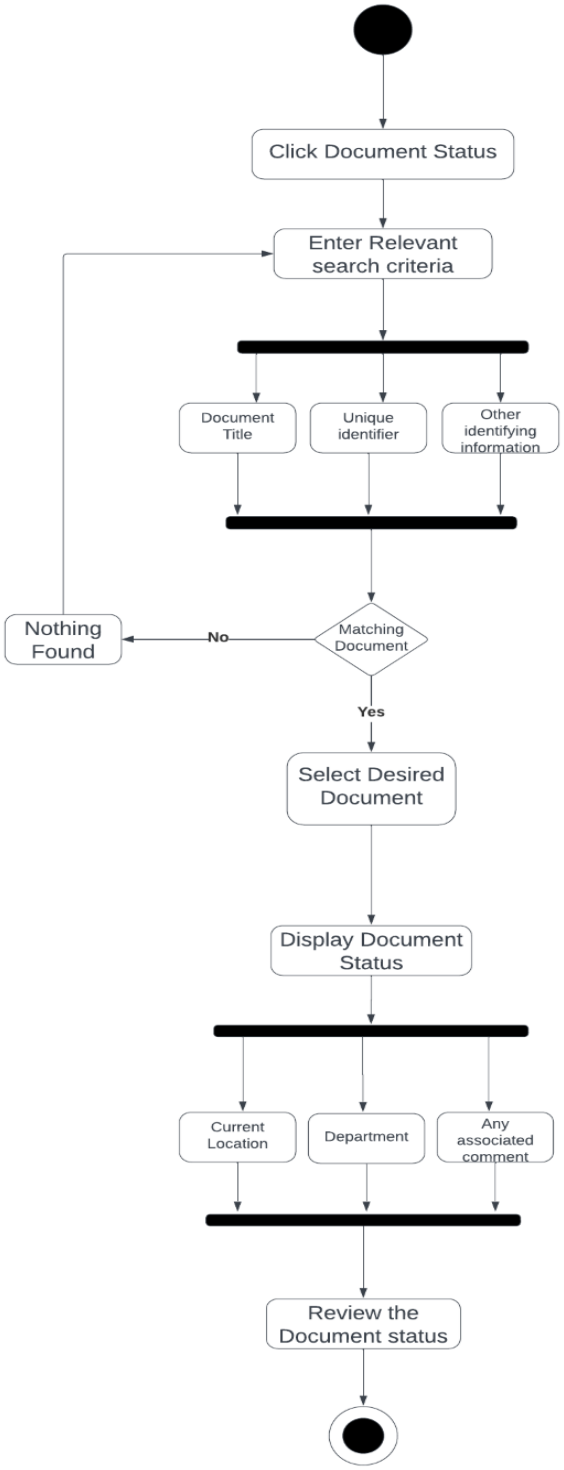

Figure 8: View Document Status

Activity Diagram (View Notification)

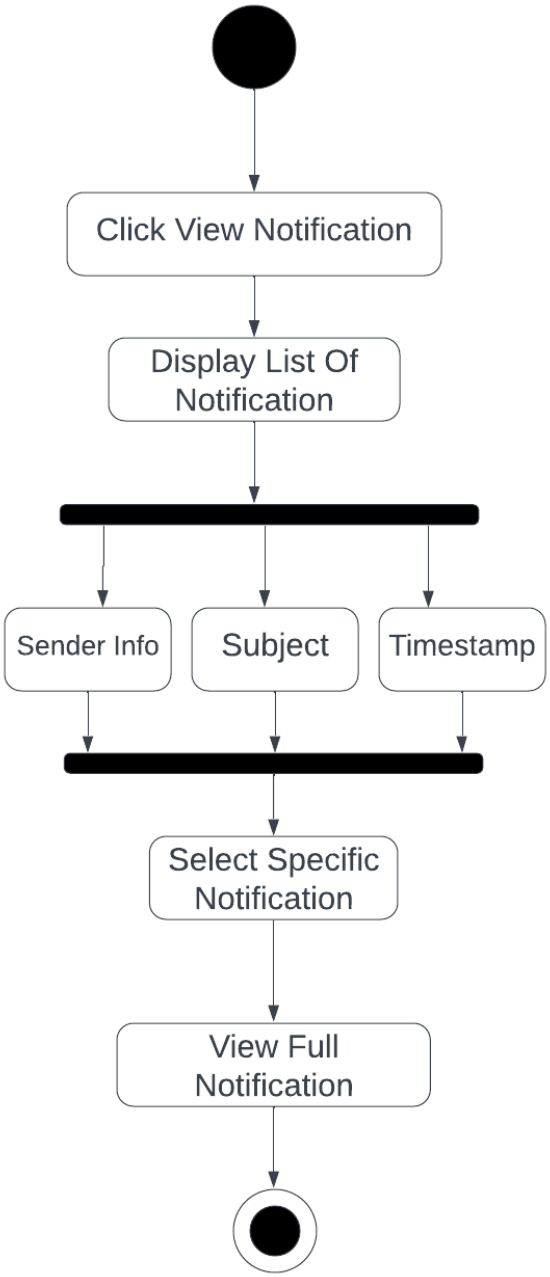

Figure 9: View Notification

Activity Diagram (Approve Document)

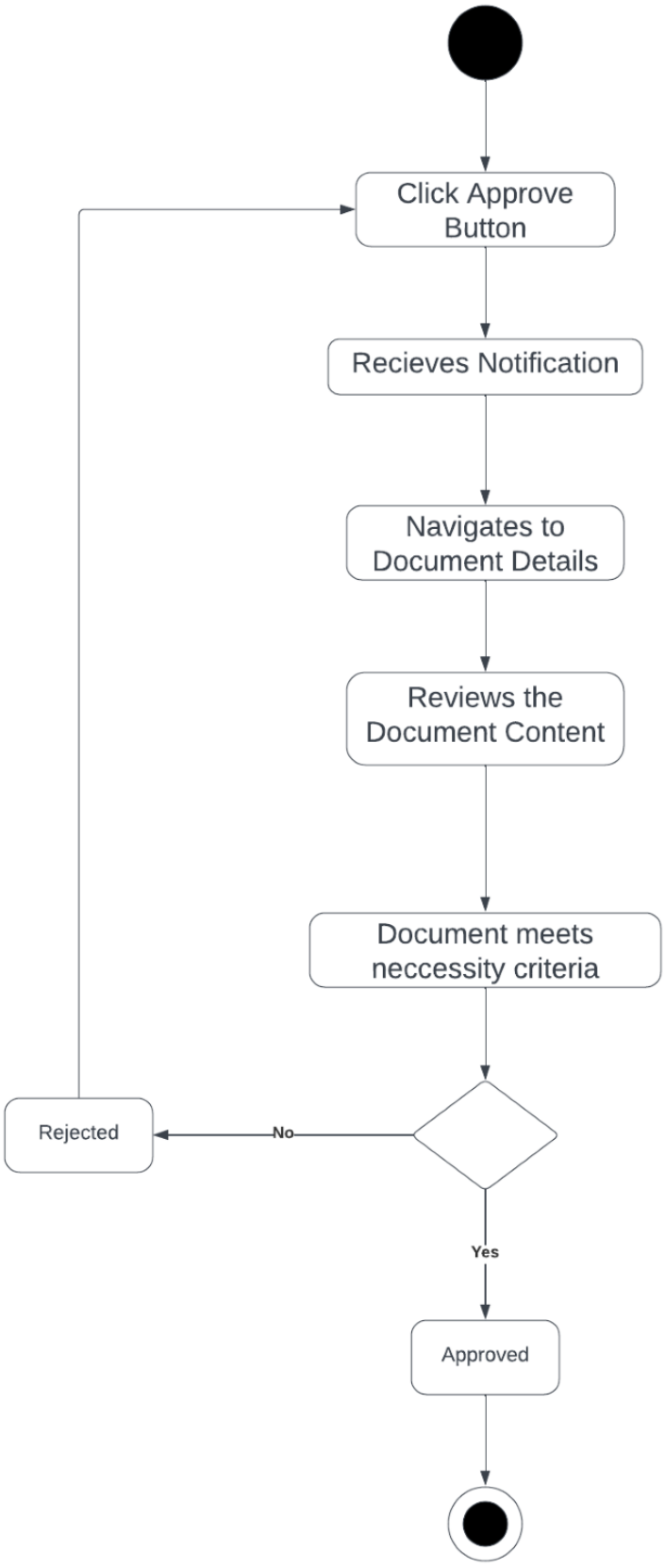

Figure 10: Approve Document

Activity Diagram (Review Document)

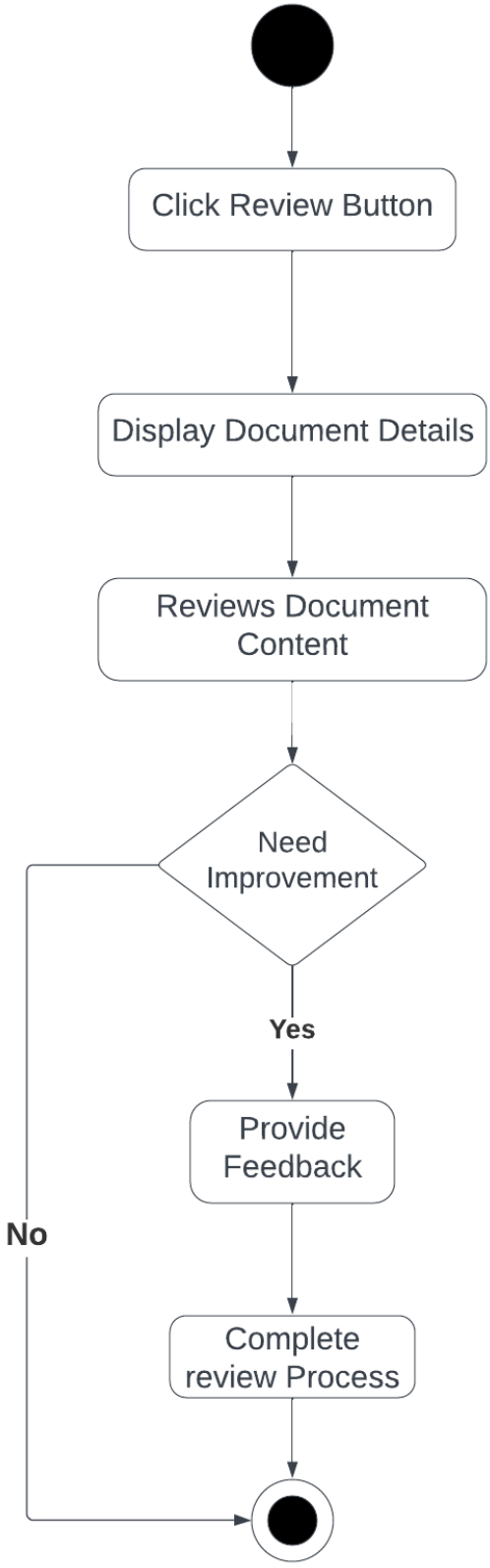

Figure 11: Review Document

Activity Diagram (Verify Document)

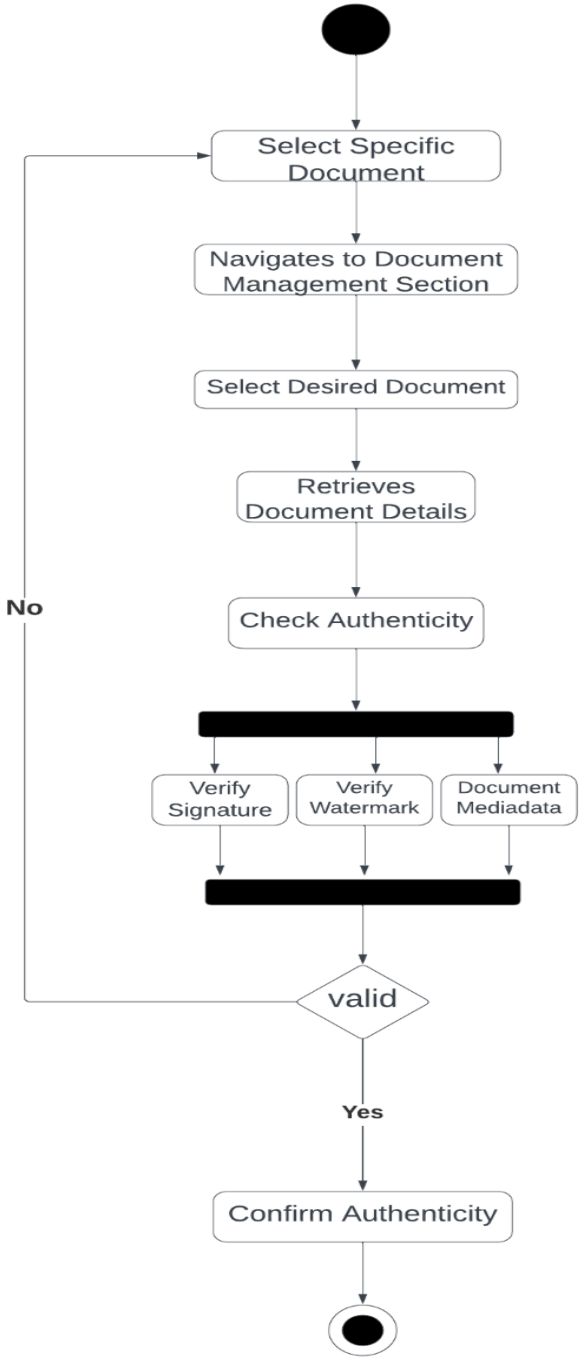

Figure 12: Verify Document

Activity Diagram (Add Comment and Feedback)

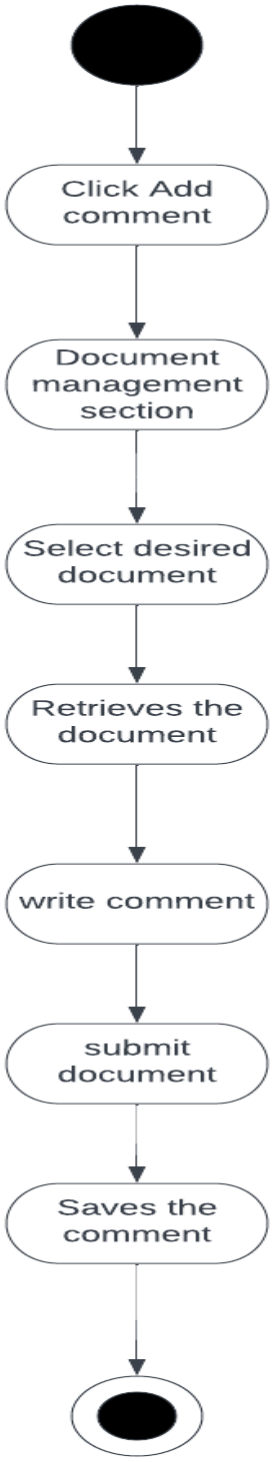

Figure 13: Add Comment and Feedback

9. Requirement Traceability Matrix

A traceability matrix is a document, usually in the form of a table, used to assist in determining the completeness of a relationship by correlating any two baselined documents using a many-to-many relationship comparison. It is often used with high-level requirements (these often consist of marketing requirements) and detailed requirements of the product to the matching parts of high-level design, detailed design, test plan, and test cases.

Requirements Traceability Matrix					
Project Name	**E-Filing System of NSTU**	**Business Area**		**Local**	
Functional Activity	**Use Case Reference**	**Design Document Reference**	**Code Module/ Reference**	**User Acceptance Validation**	**Comments**
FR1	UC1			Verified	
FR2	UC2, UC3			Pass	
FR3	UC3			Verified	
FR4	UC3, UC4			Pass	
FR5	UC12, UC14			Pass	
FR6	UC5, UC6			Pass	
FR7	UC6			Verified	
FR8	UC12			Verified	
FR9	UC6, UC10, UC11, UC14			Pass	
FR10	UC1			Verified	
FR11	UC12			Verified	
FR12	UC1			Verified	

10. Appendix

We use a three-level prioritization technique for our project.
Level 1: These are critical requirements that must be implemented for the system to be considered successful. They are essential for the core functionality, usability, or compliance of the system.

Level 2: These requirements are important but not critical for the system's basic functionality. They enhance usability, user experience, or system efficiency. While they may not be mandatory, implementing them would significantly improve the system's overall value.

Level 3: These requirements are desirable but not essential for the system's basic functionality. They add additional features, convenience, or customization options that may enhance the user experience but are not crucial to the system's core purpose.:
Level 1:

- User authentication and access control
- Document upload and storage
- Document routing and tracking
- Commenting and collaboration on documents
- Document approval workflow

Level 2:

- Document search and retrieval
- Notification system for document updates
- Document versioning and revision control
- Document categorization and tagging
- Reporting and analytics on document activities

Level 3:

- Integration with external systems (e.g., email, calendar)
- Advanced document search filters and sorting options
- Document archiving and retention policies
- Customizable user interface and preferences