

Hamdard University
Department of Computing
Final Year Project



StudyMate – AI Powered Advanced Quiz Creator
(FYP-037/FL24)

Software Design Specifications

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Document Sign off Sheet

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Definition of Terms, Acronyms, and Abbreviations

Term	Description
StudyMate	The name of the project, an AI-powered educational platform for quiz and Q&A generation.
Google Vision OCR	Optical Character Recognition tool used for extracting text from handwritten notes.
LLaMA 3.1	A language model by Meta used for text structuring and quiz/Q&A generation.
Django	A Python-based web framework used for backend development and integrating front-end templates.
Frontend Templates	Pre-designed HTML and CSS files used to create the user interface for the web application.
Quiz & Q&A Generation	A core feature of the platform that enables users to generate quizzes and Q&A content.
User Authentication	The process of verifying user credentials to provide secure access to the system.
API	Application Programming Interface; allows communication between software components or systems.
HTTP Protocol	A protocol used for communication between the client and server.
Spiral Methodology	A software development approach focusing on iterative refinement and risk management.

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1 Introduction

1.1 Purpose of Document

The purpose of this document is to provide a comprehensive design specification for the StudyMate project. It outlines the structural and object-oriented design methodology used, along with detailed descriptions of system functions, interfaces, and requirements. This document serves as a blueprint for developers, designers, testers, and stakeholders, ensuring all parties have a unified understanding of the project.

The StudyMate project utilizes a spiral development methodology, which focuses on iterative design, prototyping, and risk assessment, enabling incremental enhancements to the system while managing potential challenges effectively.

1.2 Intended Audience

The intended audience for this document includes:

- **Project Developers:** Responsible for implementing the design specifications into a functional system.
- **Project Designers:** Ensuring the application aligns with the design principles stated in this document.
- **Quality Assurance Team:** Testing the system against the documented requirements and design criteria.
- **Stakeholders:** Reviewing the design to ensure it meets their expectations and needs.
- **Supervisors:** Monitoring the project to ensure it aligns with the proposed goals and milestones.

1.3 Document Convention

This document follows these formatting conventions:

- **Font Style:** Times New Roman, Arial (For Headings)
- **Font Size:** 12 pt (Headings: 14 pt, bold)
- **Paragraph Spacing:** 1.15 line spacing
- **Section Headings:** Bold, numbered, and left-aligned

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1.4 Project Overview

StudyMate is an AI-powered educational platform that automates the process of quiz and Q&A creation from handwritten notes. The system leverages advanced technologies like Google Vision OCR for text extraction and the LLaMA 3.1 language model for text refinement and content generation.

Key functionalities include:

- Extracting text from handwritten notes using Google Vision OCR.
- Enhancing the extracted text for better structure, spelling, and grammar.
- Generating quizzes and Q&A content based on user preferences.

The application is developed using Django for the backend, with integrated front-end templates to provide a user-friendly interface. The project adopts a spiral methodology, allowing iterative development, risk management, and stakeholder feedback integration throughout the process.

1.5 Scope

In Scope:

- Automated text extraction from handwritten notes.
- Grammar correction and text structuring using LLaMA 3.1.
- Quiz and Q&A generation based on user-defined preferences.
- Web-based platform with front-end templates for ease of use.
- Integration of user authentication and role-based access in future iterations.

Not In Scope:

- Offline functionality of the system.
- Manual entry of handwritten notes.
- Real-time collaboration or multi-user features.
- Extensive natural handwriting recognition for illegible or extremely poor-quality notes.

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2 Design Considerations

This section sets the groundwork for the StudyMate system design by addressing key considerations that must be resolved to ensure a successful implementation. These considerations are specific to the design phase and do not reiterate issues discussed in the SRS.

2.1 Assumptions and Dependencies

While some assumptions and dependencies were documented in the SRS, the following issues are specific to the design phase:

Third-Party API Dependency:

- The design assumes stable and continuous availability of third-party APIs like Google Vision OCR.
- Contingency: A fallback mechanism or notification system will be designed to handle API downtime gracefully.

Modular and Scalable Architecture:

- It is assumed that the design will follow a modular structure to support scalability and ease of maintenance.
- Dependency: Modular design depends on clear definition and separation of functionalities during implementation.

Resource Constraints:

- It is assumed that the available computing resources will suffice for the system's performance requirements during text extraction and content generation.
- Contingency: Design will include a queue or batch-processing system to manage high-load scenarios.

Front-End Framework Compatibility:

- Dependencies exist between Django's backend and integrated front-end templates.
- Contingency: Testing and documentation for interface compatibility will be emphasized during the design phase.

2.2 Risks and Volatile Areas

The following risks and potential sources of change could impact the system design:

Evolving User Requirements:

- Risk: Stakeholders might request new features (e.g., multi-user collaboration or offline functionality).
- Contingency: The system will adopt a modular and iterative design approach, allowing future enhancements without overhauling existing components.

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Handwriting Recognition Quality:

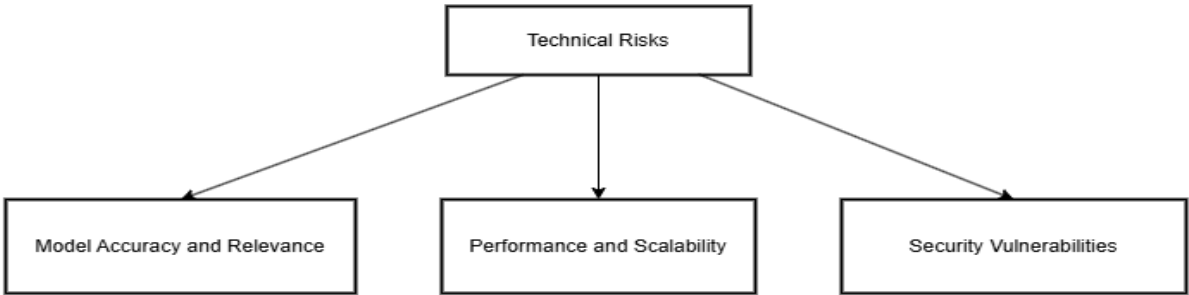
- Risk: Low-quality handwritten notes might reduce OCR accuracy.
- Contingency: Implement a feedback loop where users can review and edit extracted text before further processing.

Third-Party API Limitations:

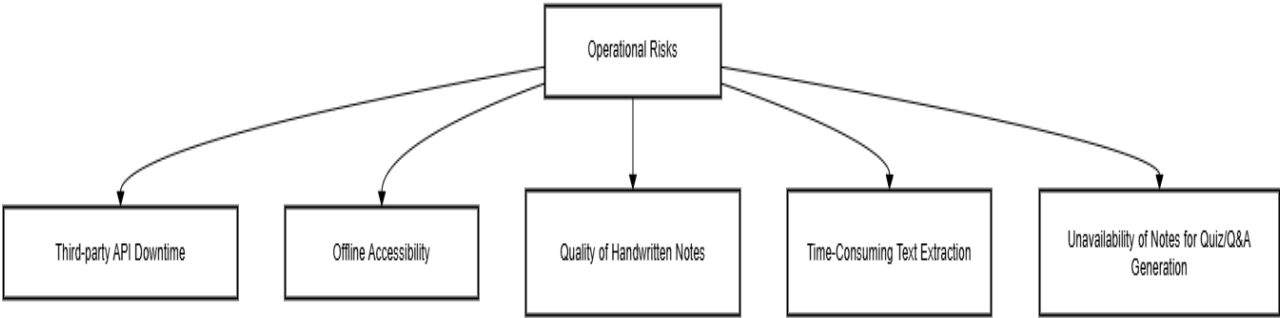
- Risk: Google Vision OCR or LLaMA 3.1 API may introduce unexpected changes in response formats or performance.
- Contingency: Wrapper modules will be designed to handle API updates or changes in input/output formats seamlessly.

Risk Breakdown Structure (RBS):

Technical Risks



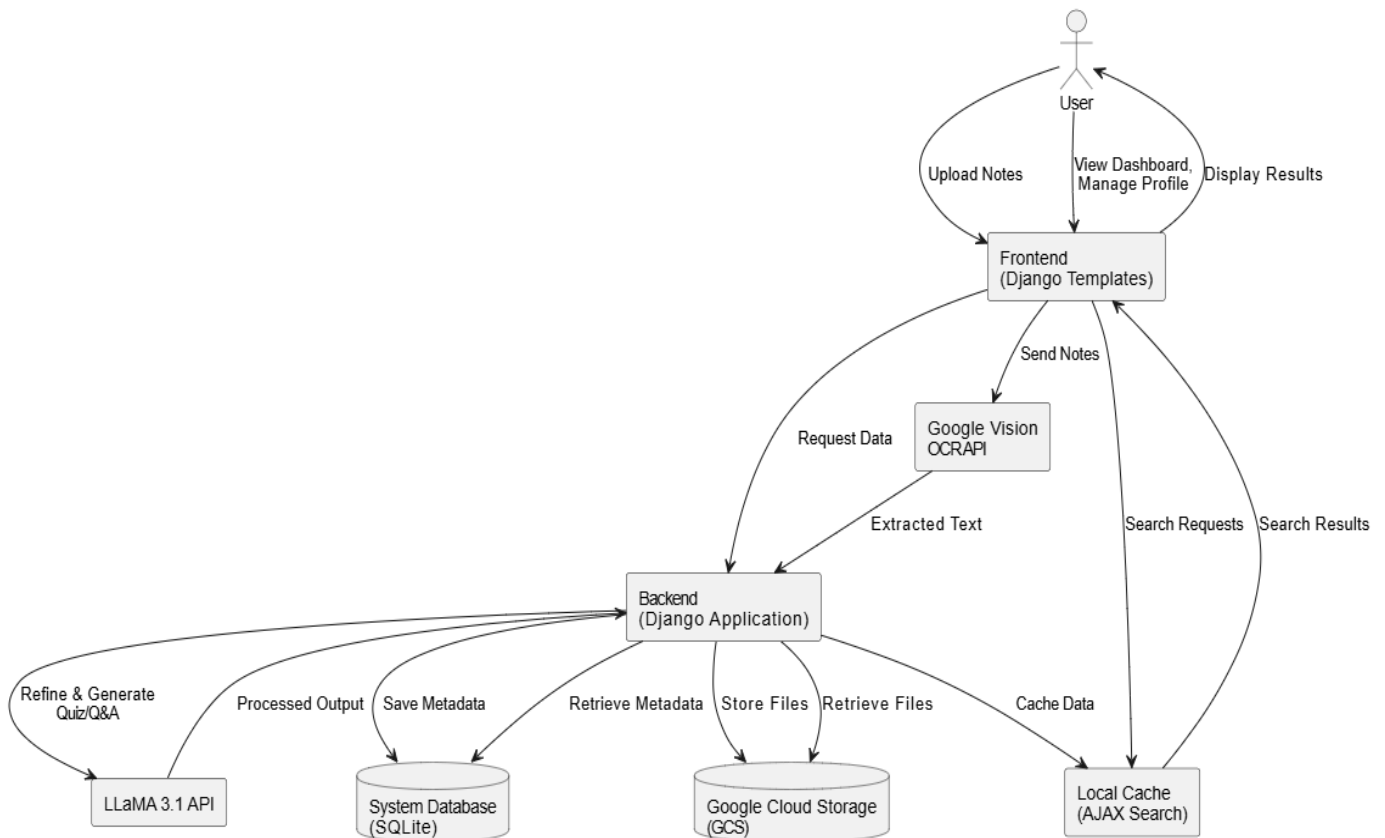
Operational Risks



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3 System Architecture

The StudyMate system architecture is designed using a modular and layered approach to enhance scalability, maintainability, and ease of integration. The system is decomposed into components that interact through well-defined interfaces to deliver the desired functionalities. Below is a high-level overview of the system's architecture:



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3.1 System Level Architecture

The system-level architecture for StudyMate is designed to ensure modularity, scalability, and maintainability. The system is composed of distinct subsystems, each with well-defined roles and interfaces. Below is an overview of the top-level decomposition and relationships between the subsystems.

System Decomposition

User Interface Subsystem:

- Handles interactions with end-users, including note uploads, quiz/Q&A viewing, and user authentication.
- Interface: Accessible via web-based frontend using Django templates.

Processing Subsystem:

- Orchestrates communication between Google Vision OCR, LLaMA 3.1 API, and database for text extraction and quiz/Q&A generation.
- Interface: RESTful APIs for communication between external services and the backend.

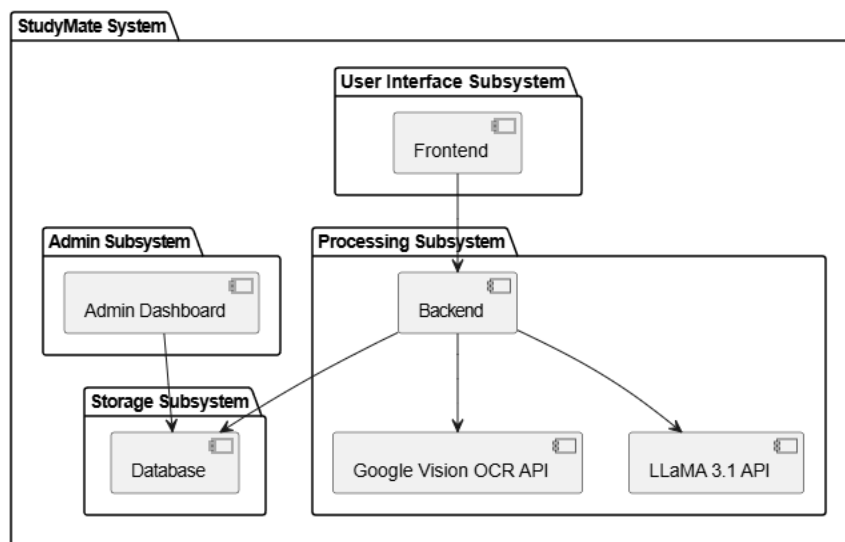
Storage Subsystem:

- Provides persistent storage for user profiles, uploaded notes, extracted text, and generated outputs.
- Interface: Database management using Django ORM.

Admin Subsystem:

- Enables administrative tasks such as user and system monitoring.
- Interface: Dedicated admin dashboard for role-based access management.

Package Diagram



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Interfaces to External Systems

- Google Vision OCR API: Interface for text extraction from handwritten notes.
- LLaMA 3.1 API: Interface for generating quizzes and Q&A from refined text.

Major Physical Design Issues

- Execution: The frontend and backend subsystems will execute on a cloud-based server, with APIs hosted on secure endpoints.
- Data Security: Sensitive user data will be encrypted during transmission and storage.
- Error Handling: Global exception handling mechanisms in Django to ensure smooth user experience even in case of failures.

Global Design Strategies

Error Handling:

- Retry mechanisms for API calls to external services.
- User-friendly error messages on frontend for any failures.

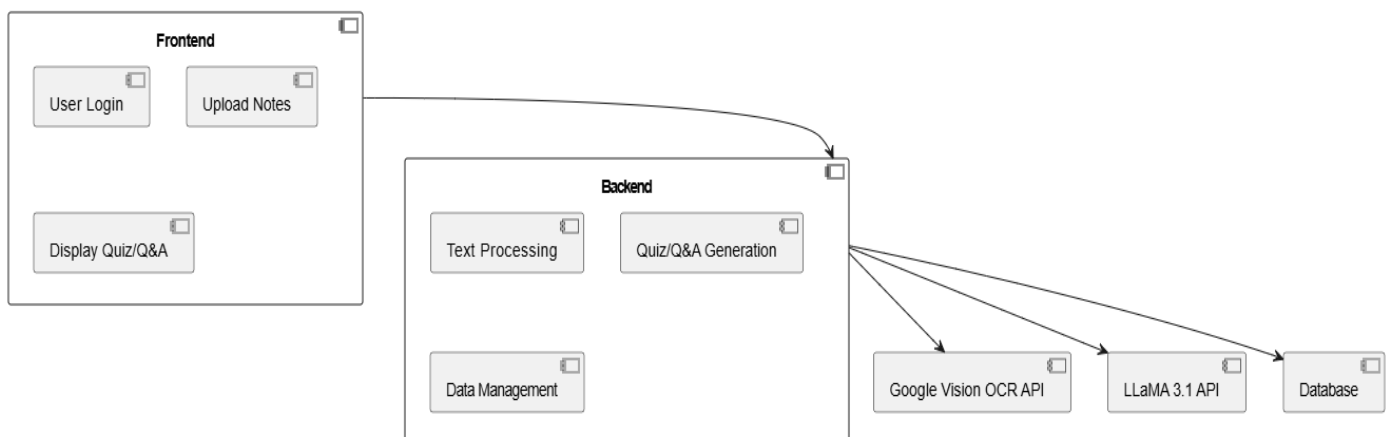
Scalability:

- Modular architecture to support additional APIs or features in the future.
- Database indexing for efficient query processing.

Security:

- Role-based access control for user and admin functionalities.
- HTTPS for secure communication between components

Component Diagram



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3.2 Software Architecture

The software architecture for StudyMate is organized into a three-tier architecture model, ensuring a clear separation of concerns, modularity, and maintainability. The layers include:

1. User Interface Layer

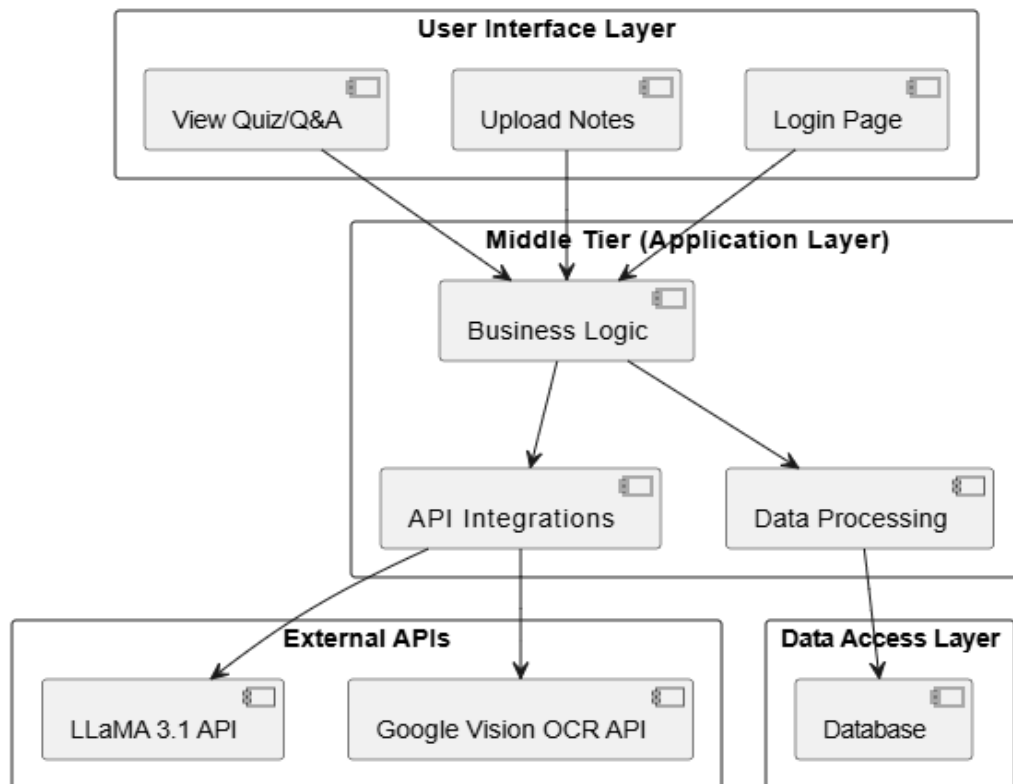
- Built using Django templates and forms for a seamless user experience.
- Sends HTTP requests (via forms and AJAX calls) to the Middle Tier for processing.
- Displays responses such as generated quizzes/Q&A and extracted text.

2. Middle Tier (Application Layer)

- Developed using Django's views and services for implementing the core business logic.
- Orchestrates communication with external APIs like Google Vision OCR and LLaMA 3.1.
- Interacts with the Data Access Layer to persist and retrieve data as needed.

3. Data Access Layer

- Manages the database using Django's ORM (Object-Relational Mapping).
- Ensures efficient storage and retrieval of user data, extracted text, and generated outputs.



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4 Design Strategy

The design strategy for StudyMate focuses on creating a modular, scalable, and maintainable system that aligns with the project's goals of efficient quiz and Q&A generation from handwritten notes. The strategy emphasizes extensibility, reusability, user-friendly interaction, robust data management, and concurrency handling to ensure smooth operation in real-world scenarios.

4.1 Future System Extension or Enhancement

- **Modular Design:** The system is structured into distinct layers (User Interface, Middle Tier, and Data Access), allowing for independent upgrades or replacement of components without affecting the entire application.
- **API Abstraction:** By abstracting external API integrations, the system can accommodate alternative APIs in the future, such as enhanced OCR tools or quiz-generation models.
- **Plug-and-Play Models:** The architecture supports adding new AI models or modules for generating other educational content, such as flashcards or summaries.

4.2 System Reuse

- **Component Reusability:** Core components like the Middle Tier's API integration logic and Data Access Layer can be reused in other projects requiring similar functionality.
- **Code Libraries:** Custom-built libraries for text preprocessing, data validation, and response handling can be modularized for use in other educational platforms.
- **Template Reuse:** Django templates for login, registration, and dashboard pages are designed for adaptability across similar web applications.

4.3 User Interface Paradigms

- **Responsive Design:** The User Interface follows a responsive design approach, ensuring accessibility across devices such as desktops, tablets, and mobile phones.
- **Interactive Features:** AJAX and JavaScript enhance user interactivity, providing dynamic feedback during text upload and quiz/Q&A generation.
- **Ease of Use:** The interface prioritizes simplicity and intuitiveness to cater to a wide audience, including non-technical users like students and educators.

4.4 Data Management (Storage, Distribution, Persistence)

- **Centralized Database:** The system uses a relational database (e.g., PostgreSQL) managed through Django's ORM for structured data storage.
- **Data Integrity:** Validation rules at both the Middle Tier and database ensure consistency and integrity.
- **Backup and Recovery:** Regular database backups and recovery mechanisms are in place to safeguard against data loss.
- **Data Distribution:** APIs handle data exchange between the User Interface and the backend, ensuring secure and efficient data transfer.

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4.5 Concurrency and Synchronization

- **Concurrent User Support:** The system is designed to handle multiple users simultaneously through efficient session and state management in Django.
- **Synchronization:** Mutex locks and database transactions ensure that concurrent requests do not lead to data inconsistencies, such as duplicate records or inventory mismatches.
- **Scalability:** Future enhancements could include the use of message queues (e.g., RabbitMQ) to manage high-concurrency scenarios effectively.

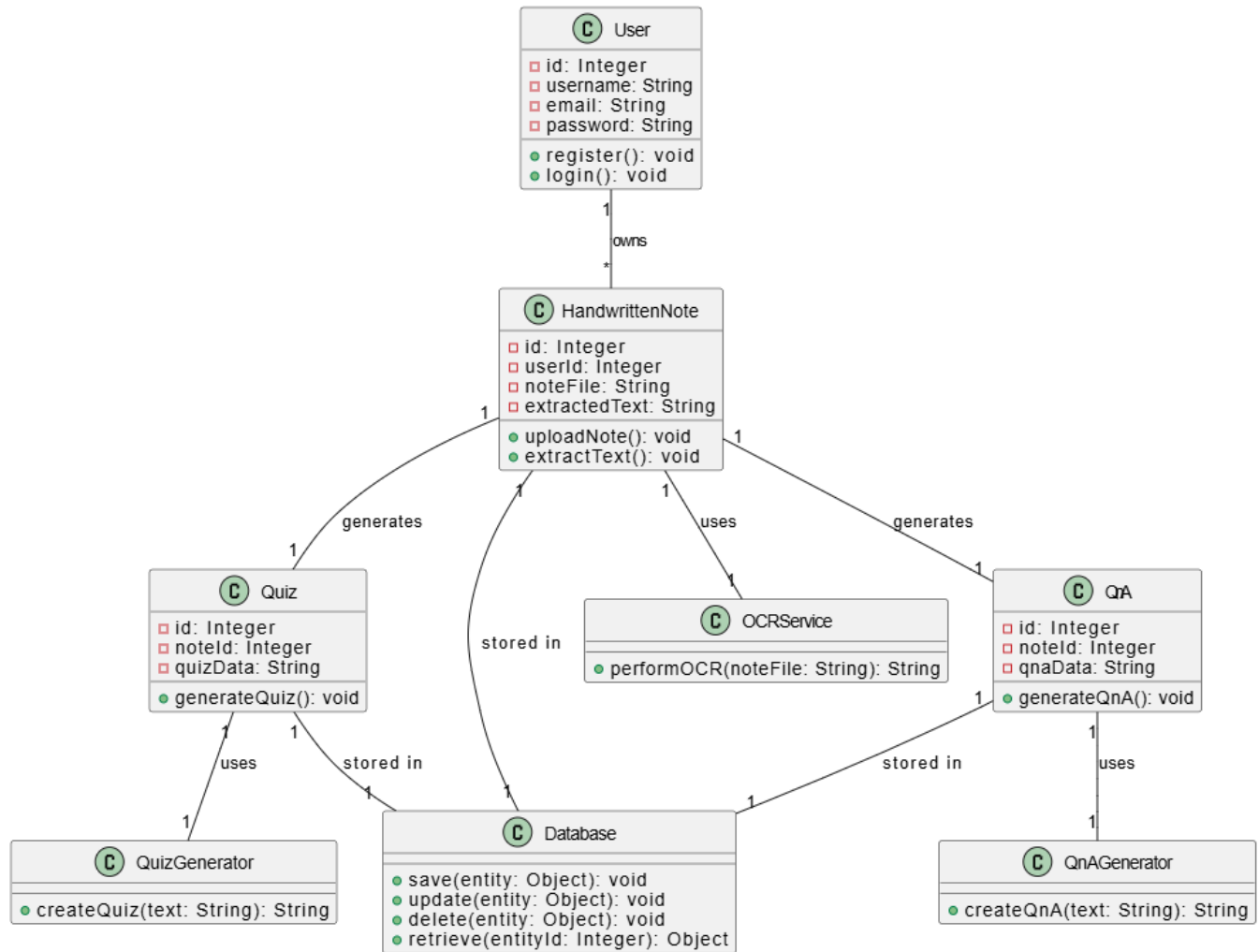
4.6 Design Trade-offs

- **Modularity vs. Complexity:** A highly modular design increases initial development complexity but ensures long-term scalability and maintainability.
- **Real-Time Features vs. Performance:** Dynamic features like real-time text processing enhance user experience but require optimization to minimize delays.
- **API Dependence vs. Flexibility:** Leveraging powerful third-party APIs accelerates development but introduces reliance on external services. Contingency mechanisms, such as fallback logic, mitigate this risk.

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5 Detailed System Design

5.1 Design Class Diagram



Detailed GUI Description

Login Page:

- Fields: Username, Password
- Buttons: Login, Register
- Links: Forgot Password?

Registration Page:

- Fields: Username, Email, Password
- Buttons: Register

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Dashboard:

- Sections: Upload Note, View Past Notes, Generate Quiz/QnA
- Buttons: Upload, Generate Quiz, Generate QnA

Note Upload Page:

- Field: File Upload
- Button: Submit

Quiz/QnA Generation Page:

- Text Display: Extracted Text
- Buttons: Generate Quiz, Generate QnA

Results Page:

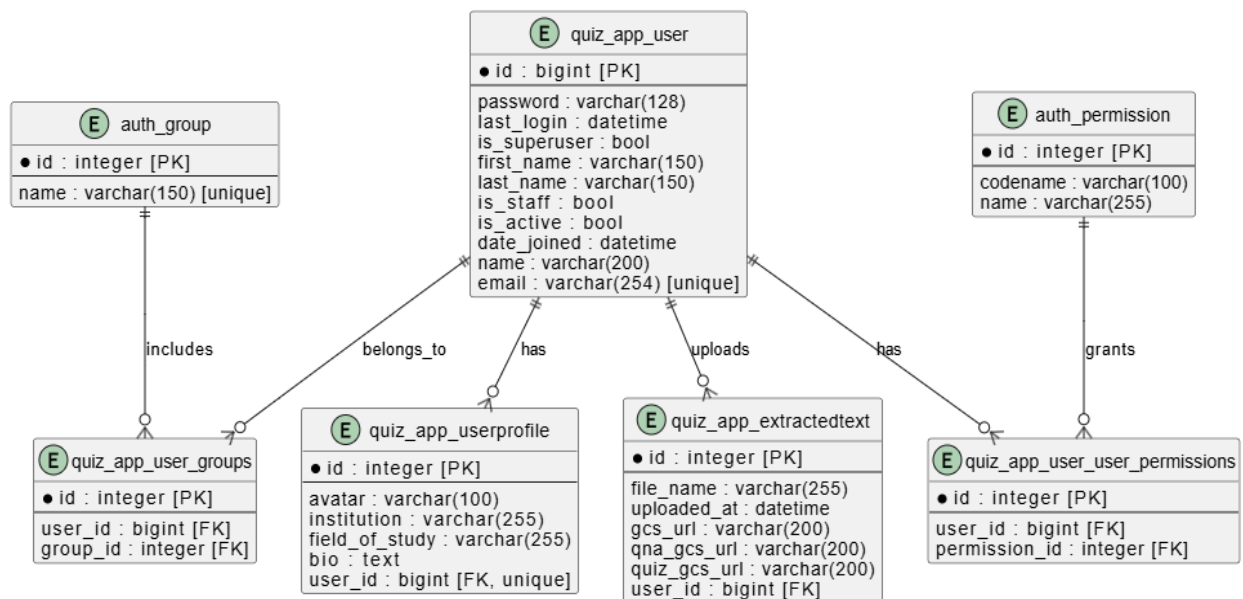
- Display: Generated Quiz or Q&A in interactive format
- Buttons: Save, Export to PDF

5.2 Database Design

This section presents a detailed database design for StudyMate, including a logical data model and the Entity Relationship (ER) Diagram.

5.2.1 ER Diagram

Below is the Entity Relationship (ER) diagram for the system. It represents the relationships between entities such as Users, Notes, Quizzes, and Q&A. Each entity is described with its attributes and relationships to other entities.



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5.2.2 Data Dictionary

This section provides a detailed description of data elements, including their name, aliases, usage, and structure. Each data element is documented following the provided template.

5.2.2.1 Data 1

User						
Name	User					
Alias	Account Holder, Registered User					
Where-used/how-used	<ul style="list-style-type: none"> Input to processes: User registration, authentication, activity logging. Output from processes: Profile retrieval, dashboard display. 					
Content description	User = { user_id + username + email + password }					
Column Name	Description	Type	Length	Null able	Default Value	Key Type
user_id	Unique identifier for user	UUID	-	No	-	PK
username	Name of the user	String	100	No	-	
email	Email address of the user	String	255	No	-	
password	Encrypted password for login	String	255	No	-	

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5.2.2.2 Data 2

HandwrittenNotes						
Name	HandwrittenNotes					
Alias	Notes, Uploaded Files					
Where-used/how-used	<ul style="list-style-type: none"> Input to processes: Uploading, text extraction. Output from processes: Quiz and Q&A generation. 					
Content description	HandwrittenNotes = { note_id + user_id + upload_date + extracted_text }					
Column Name	Description	Type	Length	Null able	Default Value	Key Type
note_id	Unique identifier for each note	UUID	-	No	-	PK
user_id	Identifier for note uploader	UUID	-	No	-	FK
upload_date	Date and time of upload	DateTime	-	No	CURRENT_TIMESTAMP	
extracted_text	Extracted text from note	Text	-	Yes	-	

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5.2.2.3 Data 3

Quiz						
Name	Quiz					
Alias	Assessment, Test					
Where-used/how-used	<ul style="list-style-type: none"> Input to processes: Quiz generation. Output from processes: Quiz retrieval, display. 					
Content description	Quiz = { quiz_id + note_id + creation_date + quiz_title }					
Column Name	Description	Type	Length	Nullable	Default Value	Key Type
quiz_id	Unique identifier for quiz	UUID	-	No	-	PK
note_id	Identifier linking to notes	UUID	-	No	-	FK
creation_date	Date of quiz creation	DateTime	-	No	CURRENT_TIMESTAMP	
quiz_title	Title of the quiz	String	150	No	-	

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5.2.2.4 Data 4

Question						
Name	Question					
Alias	Quiz Question					
Where-used/how-used	<ul style="list-style-type: none"> Input to processes: Question creation, editing. Output from processes: Display in quizzes. 					
Content description	Question = { question_id + quiz_id + question_text + correct_answer + distractors } Distractors = { distractor_1 + distractor_2 + distractor_3 }					
Column Name	Description	Type	Length	Null able	Default Value	Key Type
question_id	Unique identifier for question	UUID	-	No	-	PK
quiz_id	Identifier linking to quiz	UUID	-	No	-	FK
question_text	Text of the question	Text	-	No	-	
correct_answer	Correct answer for question	String	255	No	-	
distractor_1	First incorrect answer	String	255	No	-	
distractor_2	Second incorrect answer	String	255	No	-	
distractor_3	Third incorrect answer	String	255	No	-	

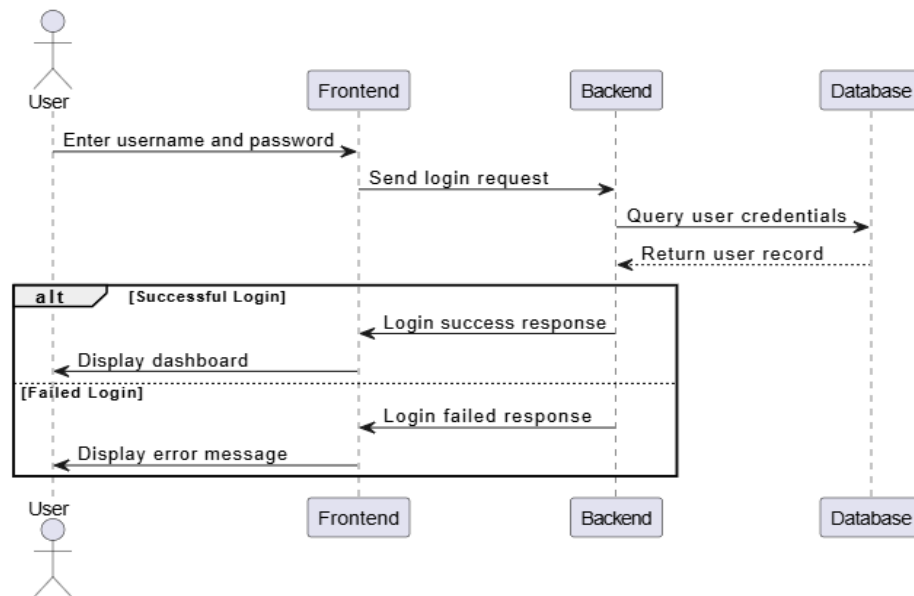
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5.3 Application Design

This section illustrates the sequence diagrams that demonstrate the interaction between different system components. Each sequence diagram represents a specific system functionality with an explanation of the interaction steps.

5.3.1 Sequence Diagram

5.3.1.1 Sequence Diagram 1: User Login

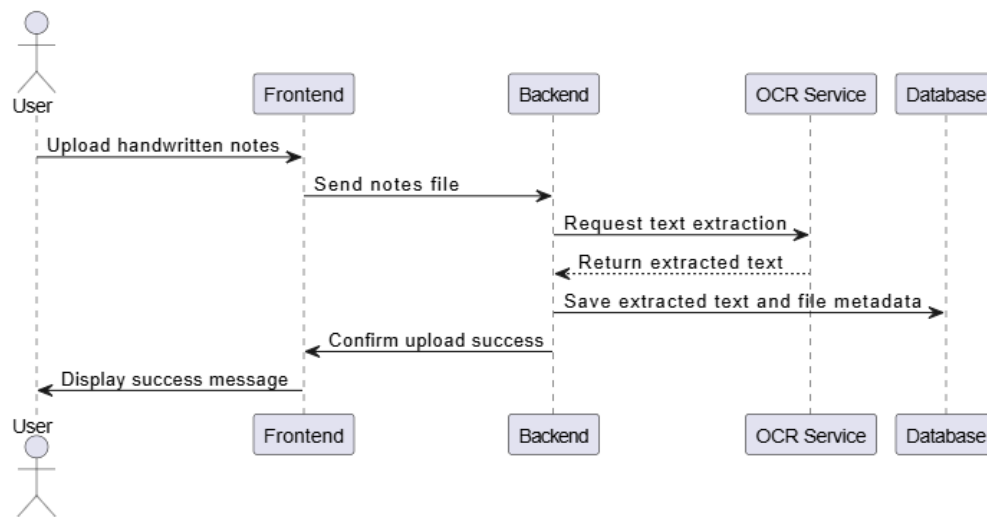


Description

- The user provides login credentials via the frontend.
- The frontend sends a request to the backend to validate credentials.
- The backend queries the database to retrieve user information.
- Based on the result, the system either logs the user in or displays an error message.

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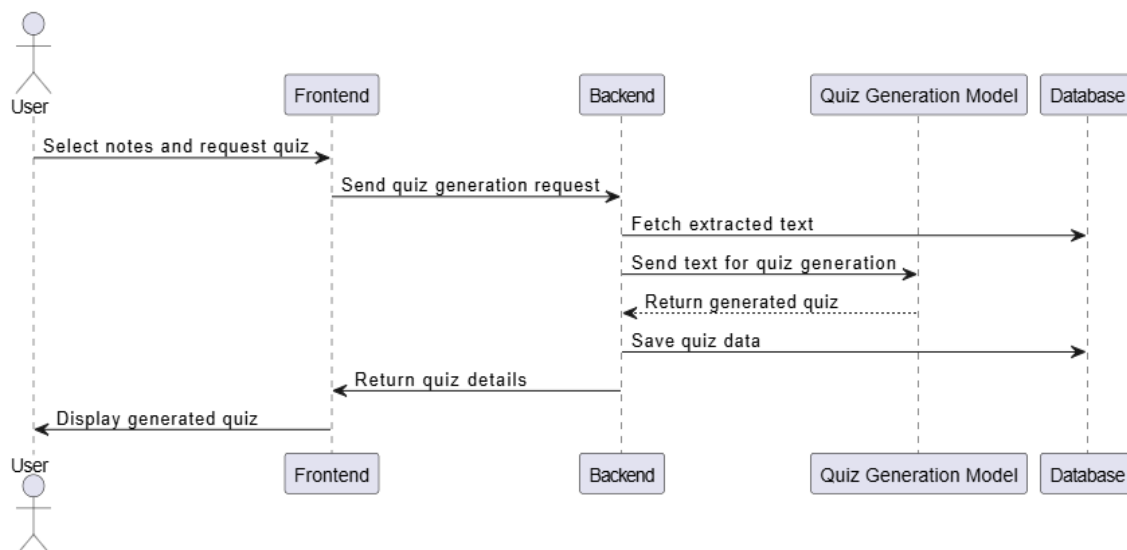
5.3.1.2 Sequence Diagram 2: Upload Handwritten Notes



Description

- The user uploads handwritten notes through the frontend.
- The backend sends the file to an OCR service for text extraction.
- Extracted text and metadata are stored in the database.
- The user is notified of the successful upload.

5.3.1.3 Sequence Diagram 3: Generate Quiz



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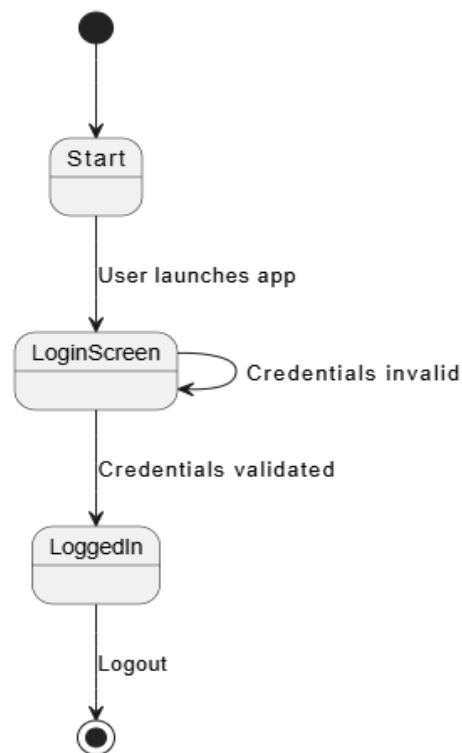
Description

- The user selects a set of notes and requests quiz generation.
- The backend retrieves text from the database and sends it to the quiz generation model.
- Generated quiz data is stored in the database and displayed to the user.

5.3.2 State Diagram

State diagrams depict the various states a system or component can occupy and the transitions between them based on events or conditions. Below are state diagrams for different parts of the system.

5.3.2.1 State Diagram 1: User Authentication

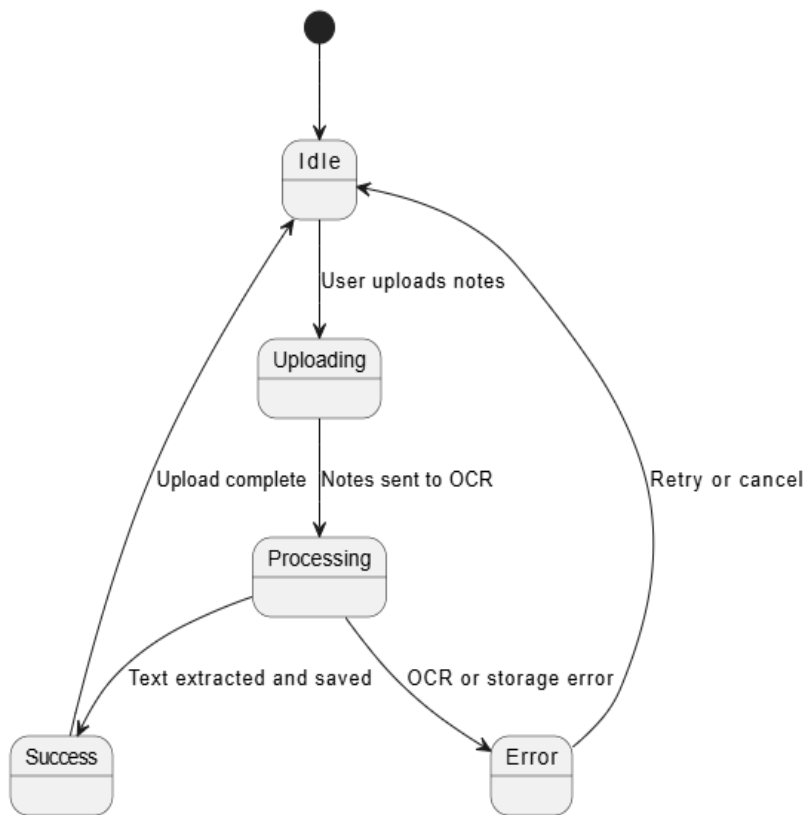


Description

- The initial state is the app start.
- The system transitions to the login screen where the user enters credentials.
- If valid credentials are provided, the system transitions to the logged-in state.
- If invalid credentials are provided, the system remains on the login screen.
- Logging out transitions the system back to the initial state.

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5.3.2.2 State Diagram 2: Note Upload Process

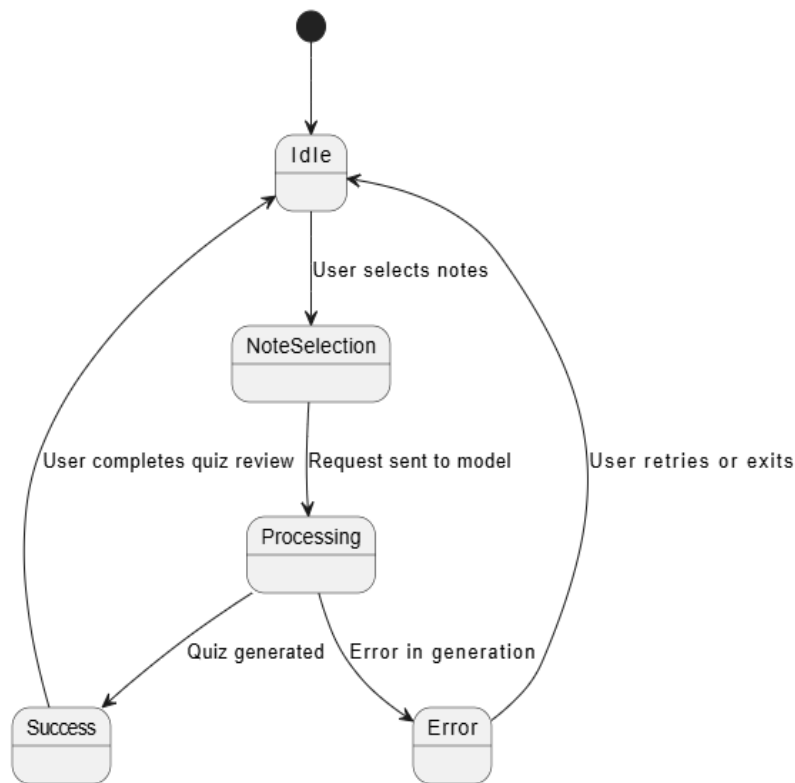


Description

- The system begins in an idle state.
- The user uploads notes, moving the system to the uploading state.
- Once uploaded, the notes are processed by the OCR, transitioning to a processing state.
- Success results in extracted text being saved and the system returning to idle.
- Errors prompt a retry or cancel option, bringing the system back to idle.

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5.3.2.3 State Diagram 3: Quiz Generation



Description

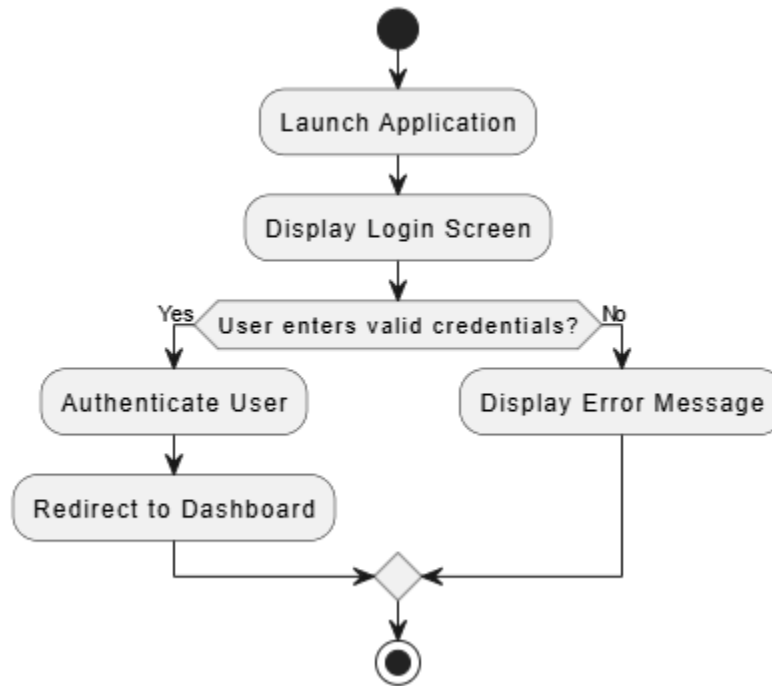
- The system starts in an idle state.
- The user selects notes to generate a quiz, transitioning the system to the note selection state.
- The system processes the input, leading to either a success or an error.
- On success, the system transitions back to idle after the user reviews the quiz.
- On error, the user can retry or exit, returning to the idle state.

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5.3.3 Activity Diagram

Activity diagrams show the flow of control or activities within the system. Below are activity diagrams for different parts of the system.

5.3.3.1 Activity Diagram 1: User Authentication

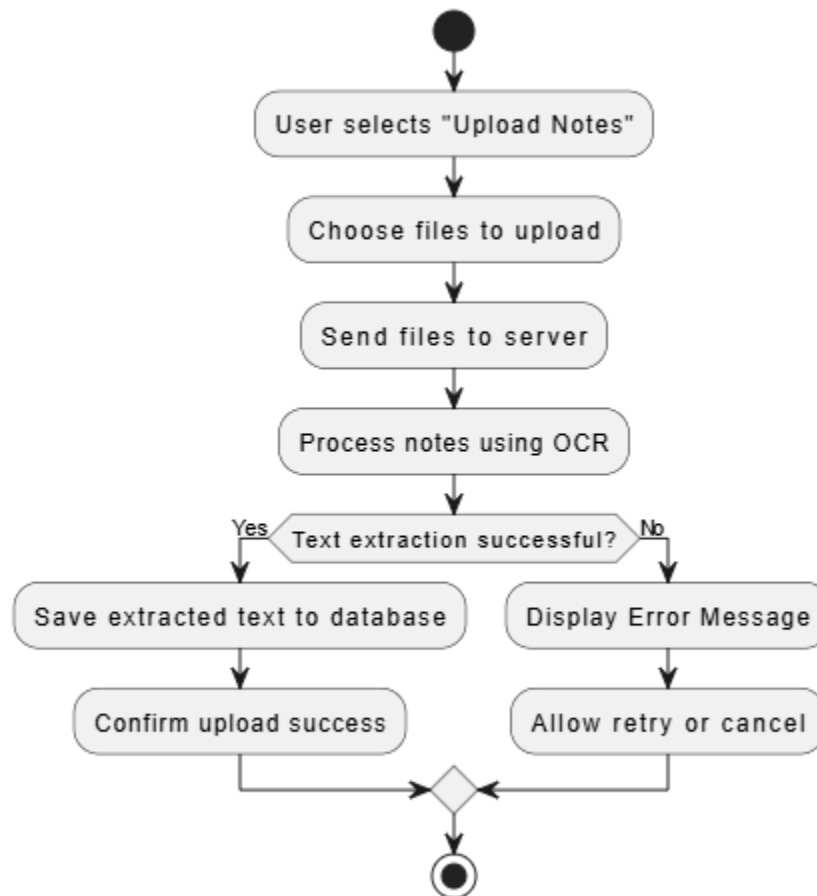


Description

- The user launches the application, which displays the login screen.
- If valid credentials are entered, the system authenticates the user and redirects them to the dashboard.
- If credentials are invalid, the system displays an error message and awaits user input.

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5.3.3.2 Activity Diagram 2: Note Upload Process

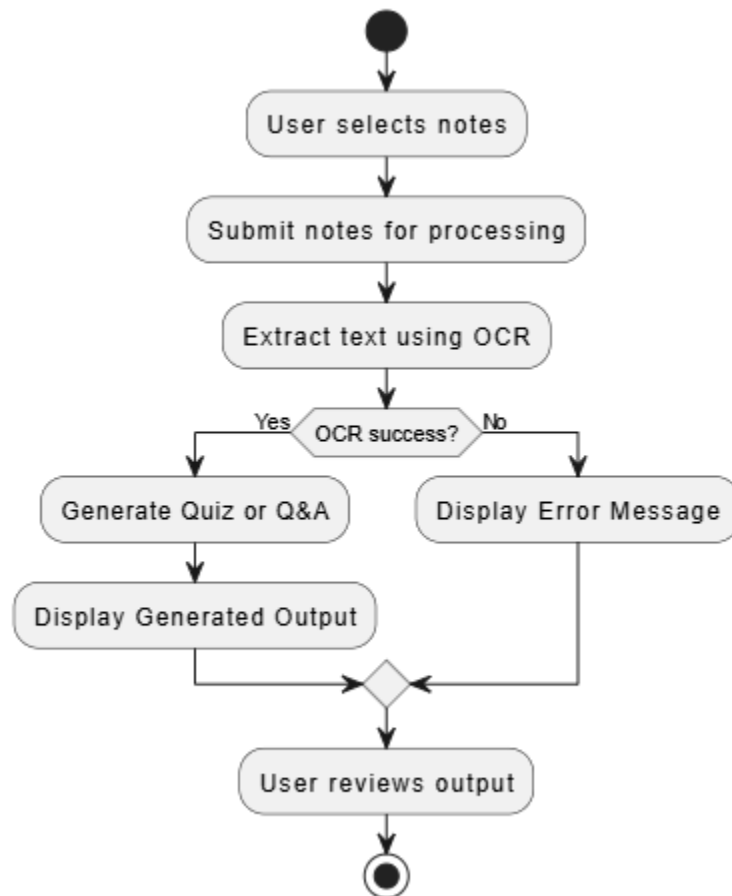


Description

- The user initiates the upload process by selecting "Upload Notes" and choosing files.
- The files are sent to the server, and OCR processes the notes to extract text.
- If extraction is successful, the text is saved to the database, and a success message is displayed.
- If there's an error, the system shows an error message and allows the user to retry or cancel.

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5.3.3.3 Activity Diagram 3: Quiz Generation



Description

- The process begins with the user selecting and submitting notes for processing.
- OCR extracts text from the notes.
- If OCR is successful, the system generates quizzes or Q&A and displays the results.
- If OCR fails, an error message is shown.
- The user then reviews the generated output.

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5.4 GUI Design

5.4.1 Home Page

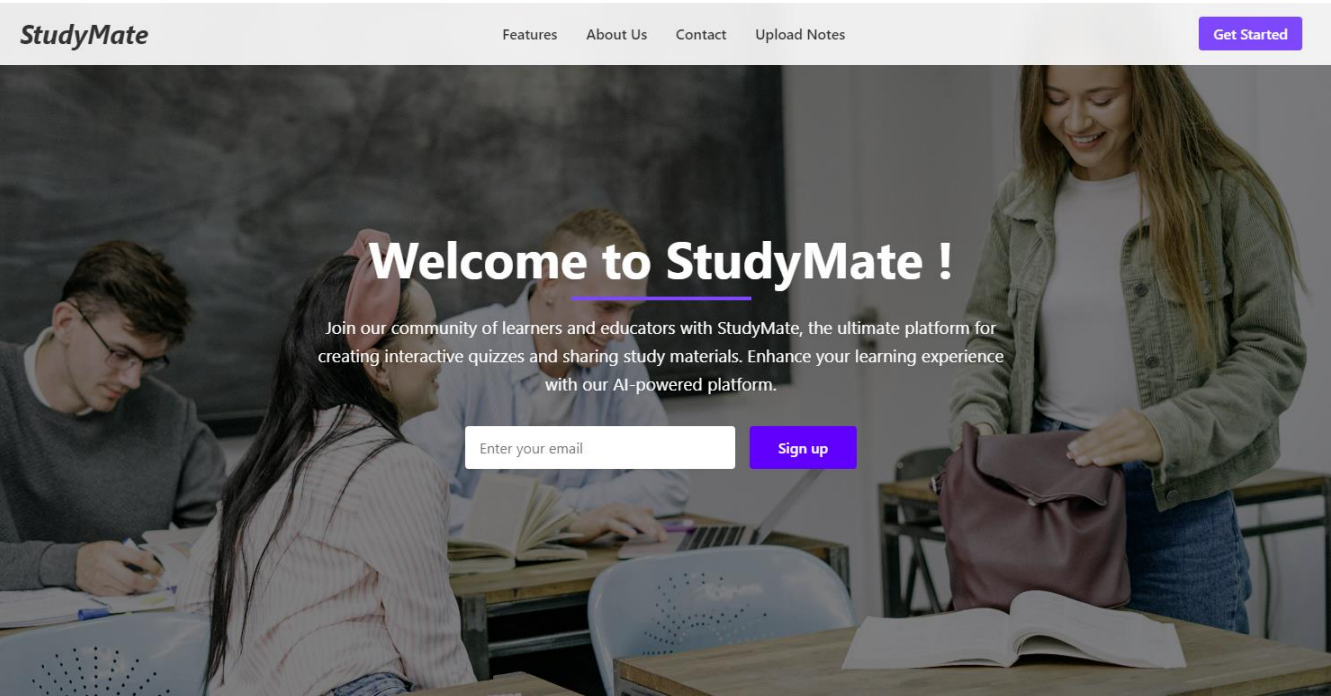
Purpose:

The Home Page serves as the entry point of the application, introducing users to the system and its core functionalities.

Elements and Functions:

Contains the application name/logo and navigation links (e.g., Home, Login, Register).

A visually engaging section with a welcome message, highlighting key features of the system like quiz generation and Q&A creation.



A features section highlighting the key features the application will provide.

Explore Our Key Features

Discover how StudyMate can transform your learning experience with our innovative features. From creating personalized quizzes to uploading and sharing notes, our platform is designed to enhance your study sessions. Track your progress and engage with interactive tools that make learning both effective and enjoyable.



AI-Powered Quiz Creator

Our AI-Powered Quiz Creator allows you to generate quizzes based on your study materials. Enhance your learning with interactive features.

[Learn More](#)



Note Uploading Made Easy

Easily upload and share your notes with our drag and drop feature. Access a library of shared notes and collaborate with peers to enhance your study sessions.

[Learn More](#)



AI-Powered Q&A Creator

Create Q&A's for your exams. Stay motivated and see how far you've come in your learning journey.

[Learn More](#)

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A contact us section that the user can use to collaborate, give feedback and ask queries.

Get in Touch

We'd love to hear from you! Reach out anytime.

Name

Enter your name

Email

Enter your email

Message

Type your message


☐ I accept the Terms

Submit

An about us section that includes the details of the developers.

Our Team

Meet the dedicated individuals behind StudyMate, committed to enhancing education.




Abubakar Zaidi

Team Leader

Abubakar has a background in technology and is passionate about creating tools that enhance learning.

in



Hanzala

Team Member

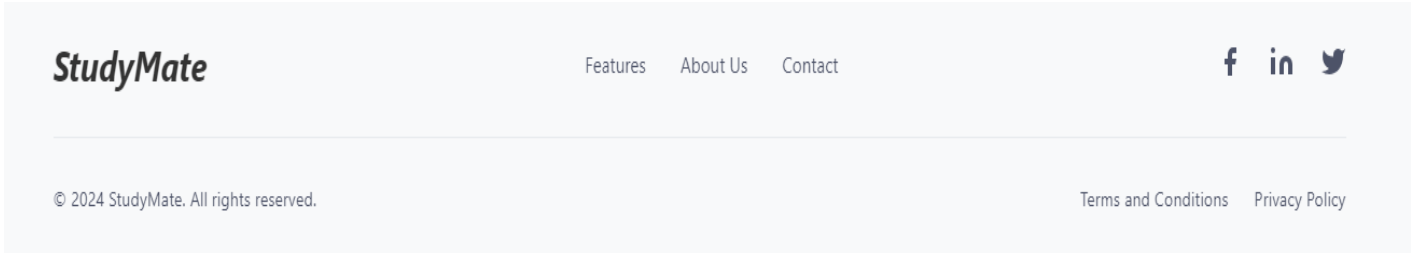
Hanzala is a software engineer with expertise in AI and machine learning, driving the technical development of StudyMate.

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A footer that includes links to About, Contact Us, Privacy Policy, and social media icons.



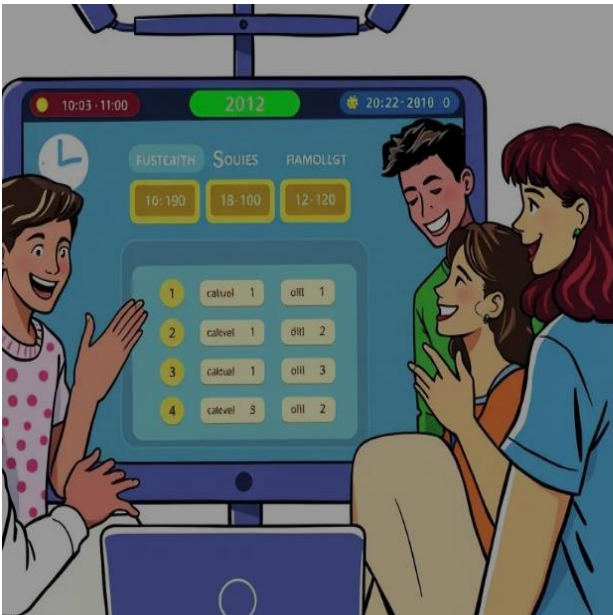
5.4.2 Login Page

Purpose:

Allows registered users to authenticate themselves and access the system’s features.

Elements and Functions:

- Input field for the user’s unique identifier.
- Input field with masking for user passwords.
- Submits credentials for verification.
- Redirects users to a password recovery page.
- A shortcut for new users to create an account.



Login

Welcome back! Please enter your details.

Email

Enter your email

Password

Enter your password

☐ Remember me

Forgot password?

Login

Don't have an account? [Sign up](#)

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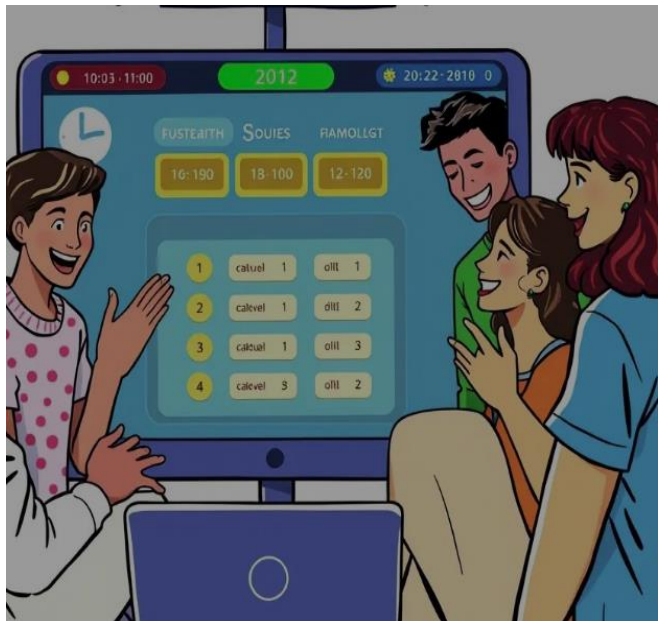
5.4.3 Sign Up Page

Purpose:

Allows new users to create an account by providing their details.

Elements and Functions:

- Name
- Email Address
- Password (with strength indicator)
- Submits user details to create an account.
- Redirects existing users back to the Login Page.



Sign Up

Create an account to get started.

Full Name

Email

Password

☐ Remember me [Forgot password?](#)

[Sign Up](#)

Already have an account? [Login](#)

5.4.4 Quiz/QnA Generation Page

Purpose:

Enables users to generate quizzes or Q&A based on provided handwritten notes or text input.


Elements and Functions:

- A drag-and-drop area or file chooser to upload handwritten notes or documents.
- Text box for users to show extracted text.
- Buttons to select between Quiz and Q&A generation.
- Processes the input or uploaded file and generates the desired output.
- Displays the generated quiz or Q&A along with options to save or download.

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Effortlessly Upload Your Study Notes

Transform your study materials into interactive learning resources. Upload your notes and let our AI generate quizzes and Q&A pairs to enhance your learning experience.



Drag and drop your files here

or

Browse Files

Upload File

Cancel

Extracted text will appear here...

Generate Quiz

Generate Q&A

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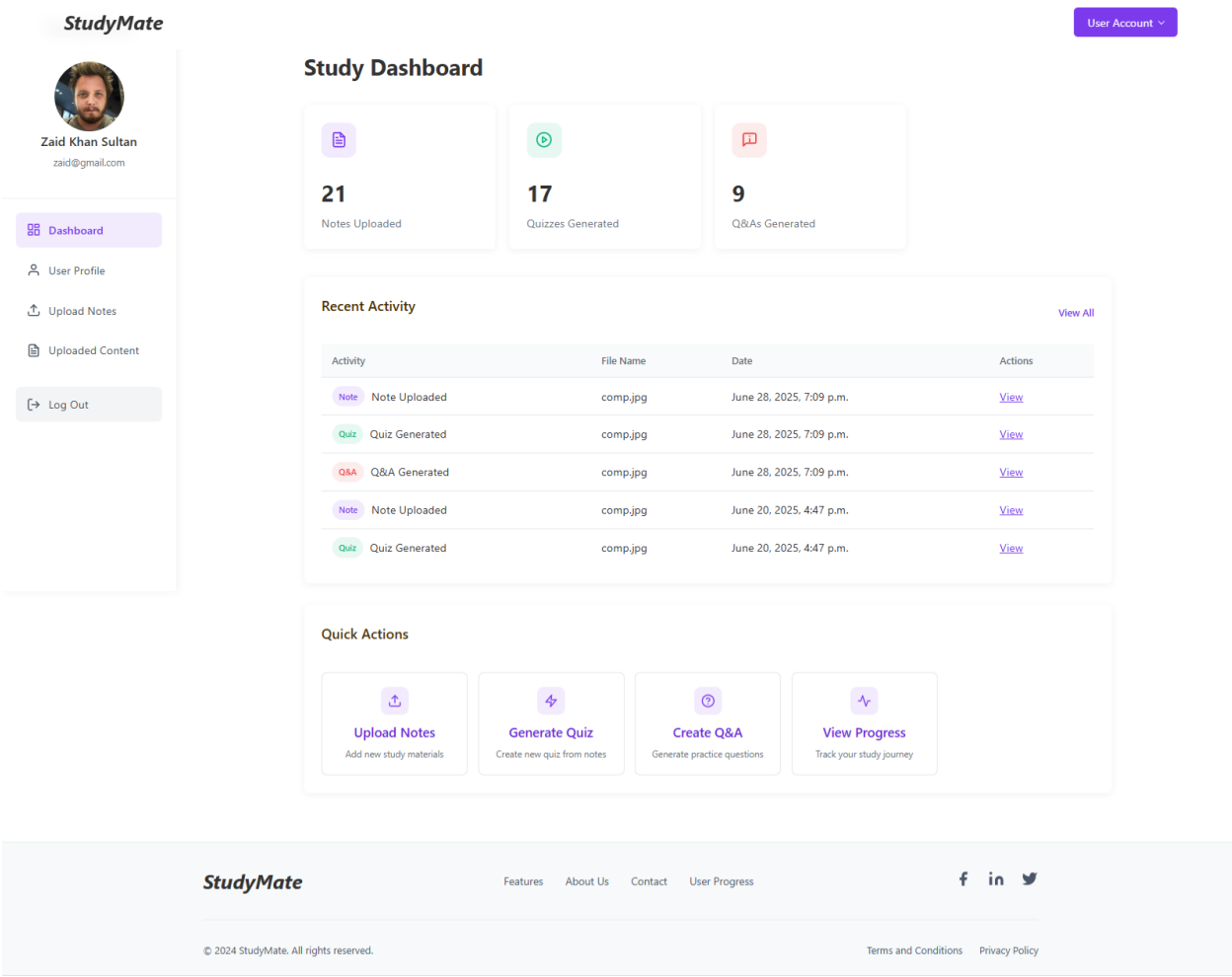
5.4.5 Dashboard Page

Purpose:

Provides users with a centralized overview of their activity, including uploaded notes, generated quizzes, Q&A statistics, and recent actions.

Elements and Functions:

- A summary section displaying counts of notes uploaded, quizzes generated, and Q&As created.
- A recent activity table showing the file name, date, and quick access to view details.
- A sidebar navigation menu for easy access to all features (Dashboard, User Profile, Upload Notes, Uploaded Content).
- Quick action buttons enabling users to upload notes, generate quizzes, create Q&A pairs, or view their progress.
- User account controls for logging out and profile management.



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5.4.6 User Profile Page:

Purpose:

Allows users to manage their personal information, preferences, and account credentials.

Elements and Functions:


- An editable form displaying user details such as full name, email, educational institution, field of study, and bio.
- Upload button to change the profile picture with recommended size guidelines.
- Password update fields for setting a new password securely.
- Save Changes button to persist updated profile information.
- Cancel button to discard changes and return to the dashboard.

StudyMate

User Account

User Profile

Manage your account information and preferences to customize your StudyMate experience.



Upload Photo

Recommended size: 200x200 pixels

Full Name

Zaid Khan Sultan

Email Address

zaid@gmail.com

Educational Institution

Bahria University

Field of Study

Computer Science

Bio

Eager to learn.

New Password

Confirm New Password

Cancel

Save Changes

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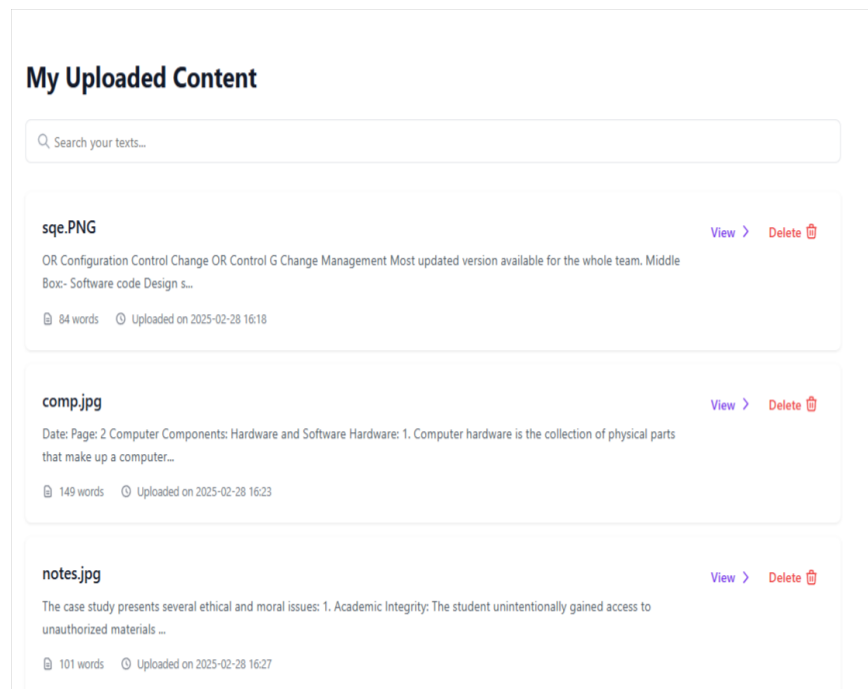
5.4.7 Uploaded Content Page:

Purpose:

Provides a searchable list of all notes the user has uploaded and processed, along with options to manage them.

Elements and Functions:

- A search bar to filter uploaded content by keywords or titles in real-time.
- A list displaying each uploaded file with a snippet of extracted text, word count, and upload date.
- Action buttons to view the detailed page for each file or delete it permanently.
- Clear icons and labels to improve usability and navigation.



5.4.8 Uploaded Content Detail Page:

Purpose:

Displays the full extracted text from a selected note and provides options to generate quizzes or Q&A content.

Elements and Functions:

- A text panel showing the extracted content with formatting preserved.

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- Buttons to generate quizzes or Q&A pairs from the text.
- Options to view already generated quizzes and Q&A materials for the note.
- A link or button to navigate back to the main generation page if needed.
- Clear labels and instructions guiding the user through next steps.

comp.jpg

Review your extracted content and choose what you'd like to generate next. You can view your generated quizzes and Q&A pairs below.

Extracted Content

Date:

Page: 2

Any kind of computer consists of two main components: hardware and software.

HARDWARE:

1. Computer hardware is the collection of physical parts that make up a computer system.

Components of a computer such as the monitor, mouse, keyboard, computer data storage, hard drive, disk, and system units, as well as graphic cards, sound cards, motherboards, and chips, are all physical objects.

All of these components work together to enable a computer to function.

INPUT DEVICES:

Input devices, also known as Input/Output Devices (IoD), are devices that translate data into a form that can be understood by a computer.

Any peripheral input device can translate data from humans into a format that a computer can understand.

The most common input devices are:

Go to Generation Page

Show Generated Quizzes

Show Generated Q&As

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6 References

Software Engineering: A Practitioner's Approach

- Author: Roger S. Pressman
- Edition: 8th Edition
- Publisher: McGraw-Hill Education
- Date: 2014
- Description: A comprehensive guide on software engineering processes and methodologies, which was referred to for project planning and design strategies.

Django Documentation

- Title: Django 4.0 Documentation
- Publishing Organization: Django Software Foundation
- URL: <https://docs.djangoproject.com/>
- Date: Accessed December 2024
- Description: Used to implement the backend framework for the project, including user authentication and database management.

Google Cloud Vision API Documentation

- Title: Google Vision API Overview
- Publishing Organization: Google Cloud
- URL: <https://cloud.google.com/vision/docs>
- Date: Accessed November 2024
- Description: Used for OCR integration to extract text from handwritten notes.

Meta-LLaMA API Documentation

- Title: Meta-LLaMA 3.1 API Documentation
- Publishing Organization: Meta AI Research
- URL: <https://ai.meta.com/llama3>
- Date: Accessed December 2024
- Description: Used for quiz and Q&A generation within the project.

IEEE Standard for Software Design Descriptions

- Title: IEEE Std 1016-2009
- Publishing Organization: IEEE Standards Association
- Date: June 2009
- Description: Provided guidelines for structuring and documenting the software design specification (SDS).

Streamlit Documentation

- Title: Streamlit API Documentation
- Publishing Organization: Streamlit Inc.
- URL: <https://docs.streamlit.io/>
- Date: Accessed December 2024
- Description: Provided guidance for building the application's interface during initial prototyping.

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Spiral Model in Software Engineering

- Title: Spiral Model Overview
- Author: Barry Boehm
- Publishing Organization: IEEE Computer Society
- Date: 1988
- Description: Referenced for understanding the iterative and risk-driven development model used in the project.

Database Design for Mere Mortals

- Author: Michael J. Hernandez
- Edition: 3rd Edition
- Publisher: Addison-Wesley Professional
- Date: 2013
- Description: Provided insights into effective database design principles and normalization techniques.

HCI Design Guidelines

- Title: Human-Computer Interaction Handbook
- Author: Andrew Sears and Julie A. Jacko
- Edition: 3rd Edition
- Publisher: CRC Press
- Date: 2012
- Description: Used as a reference for creating user-friendly and accessible GUI designs.

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7 Appendices

This section provides supplementary information that supports the main content of the document but would be too detailed or distracting if included in the main sections.

7.1 Appendix A: Glossary of Terms

A comprehensive list of terms and their definitions used throughout the document.

- **OCR:** Optical Character Recognition, a technology used to convert different types of documents, such as scanned paper documents, into editable and searchable data.
- **LLaMA:** A family of Large Language Models developed by Meta AI, used for natural language processing tasks.
- **Spiral Model:** A software development methodology combining iterative development with systematic risk assessment.

7.2 Appendix B: User Interface Mockups

Detailed screenshots or wireframes for:

- Home Page
- Login Page
- Register Page
- Quiz & QnA Generation Page
- Dashboard Page
- Uploaded Content Page
- User Profile Page
- Uploaded Content Detail Page

Each mockup is annotated to describe the purpose and functionality of its elements.

7.3 Appendix C: Database Schema

A detailed schema of the database including:

- Table names
- Column names and data types
- Relationships and foreign key constraints

Example:

Table Name	Description
users	Stores user credentials and profiles
generated_quizzes	Stores quizzes created by the system

7.4 Appendix D: System Requirements

Detailed hardware and software requirements for running the application.

Requirement	Minimum Specification	Recommended Specification
Processor	Intel i3	Intel i5 or above
Memory (RAM)	4 GB	8 GB or above

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Storage	10 GB free space	20 GB free space
Operating System	Windows 10/Linux	Windows 11/Linux

7.5 Appendix E: Test Cases

Examples of functional and non-functional test cases used for validating the system.

Test Case ID	Test Description	Expected Outcome	Result
TC001	User login with valid credentials	Redirects to home page	Pass
TC002	Generate a quiz from sample notes	Successfully creates a quiz file	Pass

7.6 Appendix F: Error Handling Strategy

A detailed guide on how the system handles different errors.

Error Type	Description	Resolution
Invalid Login	Incorrect username or password	Display error message and retry
API Downtime	Third-party API unavailable	Notify the user; retry later
Low-Quality Handwritten Notes	OCR fails to extract text	Prompt user to upload clear notes