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FLASHLEARN

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ABSTRACT

FlashLearn is an innovative educational web application designed to enhance learning efficiency by automating the creation of flashcards from diverse content formats such as text, PDFs, images, and documents. Leveraging advanced AI technologies and natural language processing, FlashLearn extracts key information from uploaded files and generates concise question-and-answer flashcards that facilitate active recall and retention. The platform supports both manual flashcard creation and AI-assisted generation, providing users with a versatile study tool tailored to individual learning preferences. Built with a modern tech stack including Flask for backend, React for frontend, MySQL for data management, and integrated OpenAI API services, FlashLearn aims to simplify study preparation, improve knowledge retention, and empower learners to master subjects more effectively and efficiently.

1. INTRODUCTION

In today's digital age, managing and comprehending large amounts of information from diverse file formats like PDFs, text documents can be overwhelming. This project introduces a web application designed to simplify and streamline this process. Leveraging the power of OpenAI, the application extracts and summarizes text from user-uploaded files and generates interactive flashcards. These flashcards provide concise key points and associated questions to enhance learning and retention.

The application offers personalized user dashboards to store and access previously generated flashcards, enabling users to revisit and download their study materials. Additionally, an admin dashboard allows administrators to manage user accounts efficiently, including the ability to view and delete users as necessary.

Built with modern technologies like Python, React for the frontend, Node.js for the backend, and MySQL for database management, this project aims to provide a seamless and user-friendly experience. By automating the extraction and summarization process, this application not only saves time but also enhances productivity and learning outcomes.

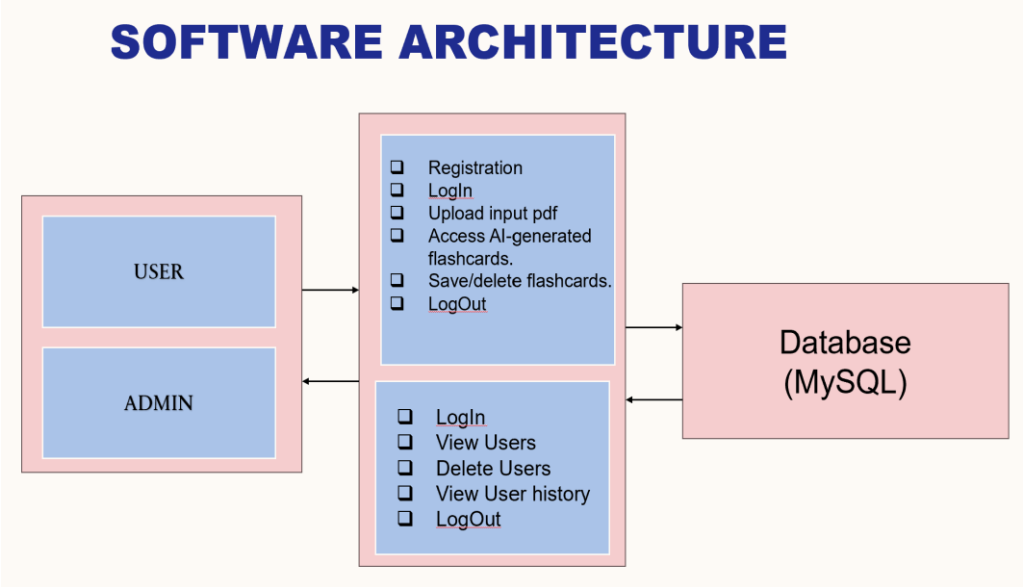
2-LITERATURE REVIEW

Automated text summarization and knowledge extraction have evolved significantly with advancements in machine learning and natural language processing (NLP), particularly through transformer models like OpenAI's GPT. Research highlights the effectiveness of tools like flashcards in improving memory retention and comprehension, leveraging educational theories such as the testing effect. Integrating AI-driven summarization with active recall methods, this project combines file handling technologies and scalable databases like MySQL to provide an efficient solution for extracting and summarizing content from diverse file formats. By presenting key points and questions in flashcard form, the application enhances learning while ensuring secure user management and seamless accessibility through modern web technologies.

3. METHODOLOGY

Methodology / Block Diagram

The project employs a structured methodology to integrate AI-driven text summarization with a user-friendly web application. The process begins with requirement analysis to define core functionalities, followed by the selection of technologies like React.js for the frontend, Python and Node.js for backend logic, and MySQL for secure data storage. The system design follows a modular architecture, enabling seamless file uploads, text extraction, and flashcard generation using OpenAI's GPT API integrated with Python. Key features include JWT-based user authentication, admin tools for user management, and dashboards for users to access, save, and download flashcards. Implementation is supported by rigorous unit, integration, and user acceptance testing to ensure functionality and reliability. The application is deployed on cloud platforms with MySQL Atlas, ensuring scalability, with ongoing maintenance and iterations driven by user feedback.



ALGORITHM

1. Initialization

a. Start the application server.

b. Connect to the MySQL database.

2. User Registration and Authentication

a. Users register with email and password, which are stored securely in MySQL.

b. Generate and verify JWT tokens for user sessions.

3. File Upload and Processing

a. User uploads a file (PDF, text, etc.).

b. The file is stored temporarily on the server.

c. Identify the file type and extract text using appropriate Python libraries (e.g., PyPDF2 for PDFs).

4. Text Summarization and Flashcard Generation

a. Pass the extracted text to OpenAI's GPT API for summarization.

b. Generate flashcards containing key points and questions using AI.

5. Data Management

a. Save generated flashcards to the MySQL database.

b. Associate flashcards with the user profile.

6. User Dashboard

a. Fetch and display flashcards for each user.

b. Allow users to save, download, or delete flashcards.

7. Admin Functions

a. Provide an interface for admins to view and manage user accounts.

b. Allow admins to delete users if needed.

8. Error Handling and Logging

a. Monitor system activity and log errors.

b. Provide meaningful error messages to the user.

9. Testing and Deployment

a. Perform testing to ensure stability and functionality.

b. Deploy the application to a cloud service.

4-TESTING

The testing of the Flashcard Generator Application was conducted in various stages to ensure the system is reliable, accurate, and user-friendly.

Stages of Testing:

Unit Testing: Checked individual modules like file upload, text extraction, and flashcard generation logic.

Integration Testing: Verified that different components (frontend, backend, and database) work together seamlessly.

System Testing: Tested the entire application as a unified system.

Acceptance Testing: Validated by end users to ensure it meets the functional requirements.

Phases of Testing:

Requirement Validation: Confirmed that the application aligns with the project's objectives.

Test Planning: Designed test cases for each feature and component.

Test Execution: Conducted tests on all features, logging results and identifying issues.

Bug Fixing: Resolved identified bugs and retested affected features.

Final Validation: Ensured the application functions as expected after fixes.

Types of Testing:

Functional Testing: Verified all features, including flashcard generation, user authentication, and dashboard functionality.

Usability Testing: Ensured the UI is intuitive and user-friendly for all users.

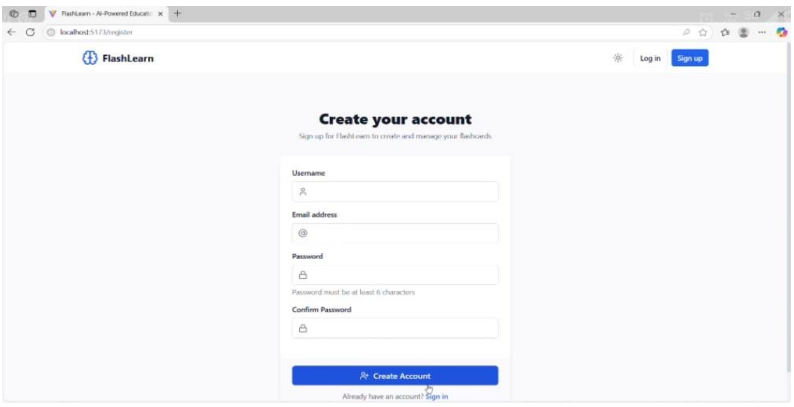
Performance Testing: Tested the speed and efficiency of text extraction and flashcard generation.

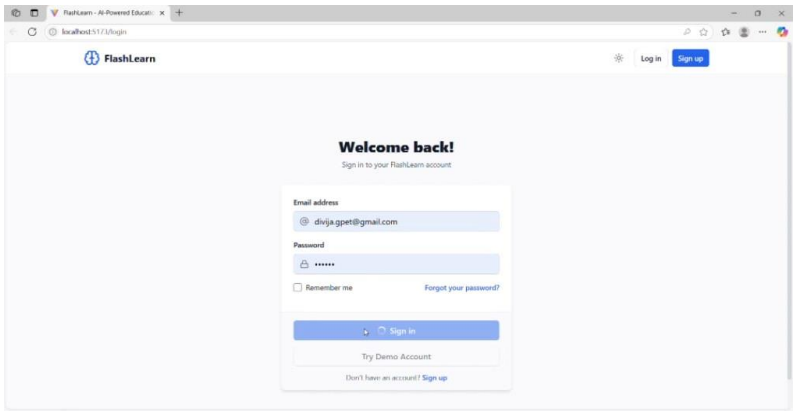
Black Box Testing: Focused on input-output validation without delving into the internal code.

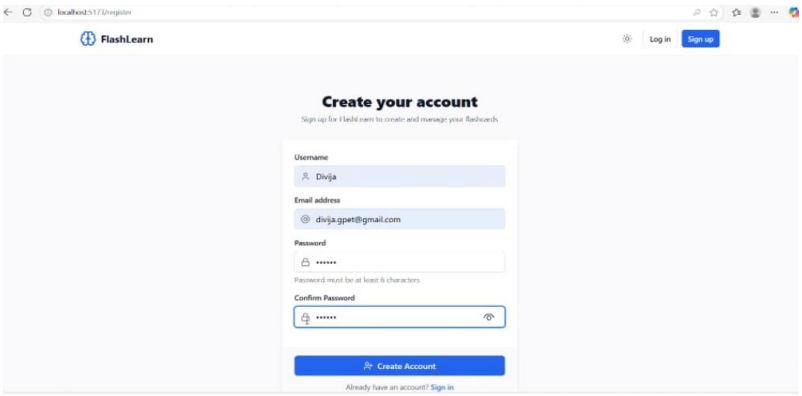
Regression Testing: Ensured previously implemented features remain functional after updates.

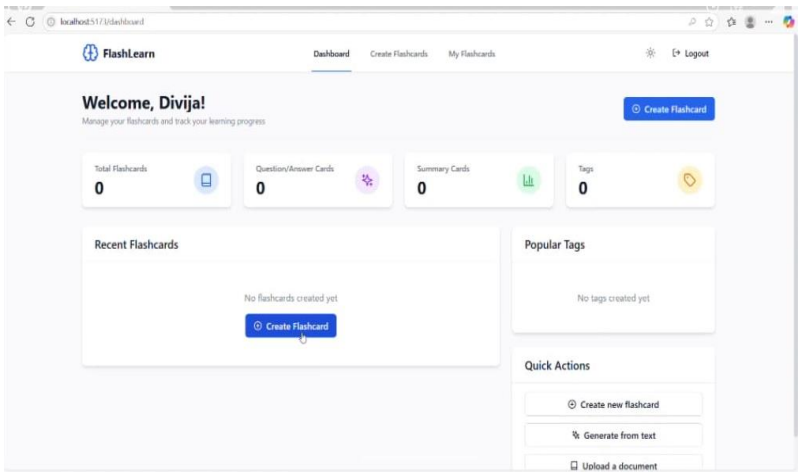
This structured testing ensured the system performs well, is efficient, and delivers accurate results with MySQL as the database backend.

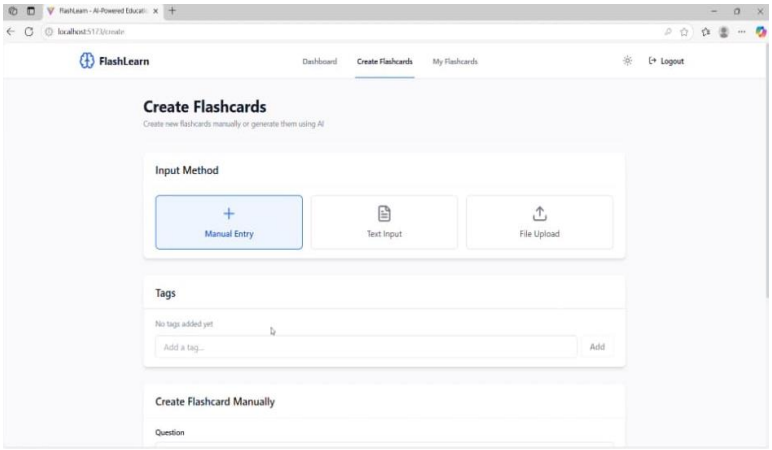
5-SCREENSHOTS

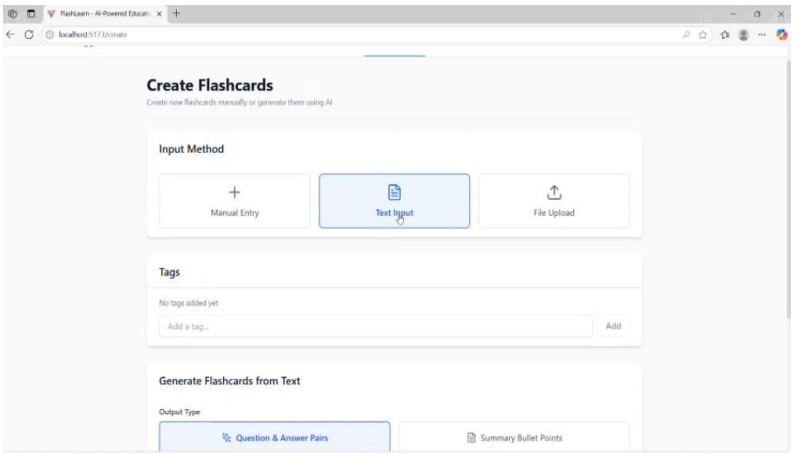


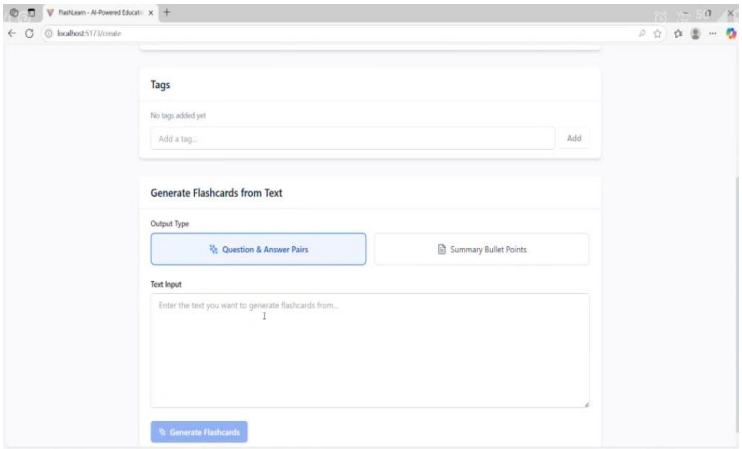

FlashLearn
Log in
Sign up
Welcome back!
Sign in to your FlashLearn account
Email address
divija.gpet@gmail.com
Password
Remember me
Forgot your password?
Sign in
Try Demo Account
Don't have an account? Sign up

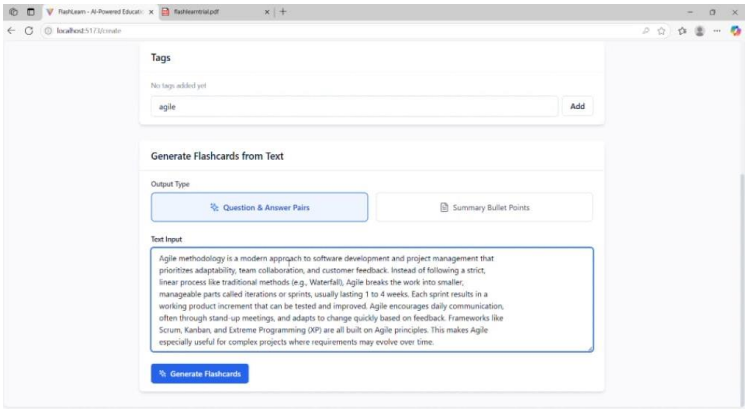

FlashLearn
Log in
Sign up
Create your account
Username
Divija
Email address
divija.gpet@gmail.com
Password
Confirm Password
Create Account
Already have an account? Sign in

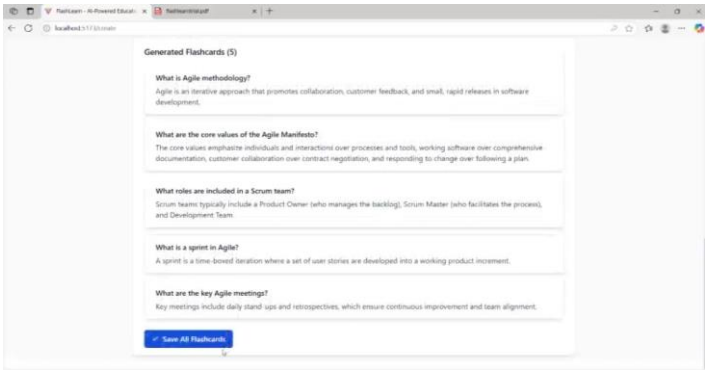

FlashLearn
Dashboard
Create Flashcards
My Flashcards
Logout
Welcome, Divija!
Manage your flashcards and track your learning progress
Create Flashcard
Total Flashcards
0
Question/Answer Cards
0
Summary Cards
0
Tags
0
Recent Flashcards
No flashcards created yet
Create Flashcard
Popular Tags
No tags created yet
Quick Actions
Create new flashcard
Generate from text
Upload a document

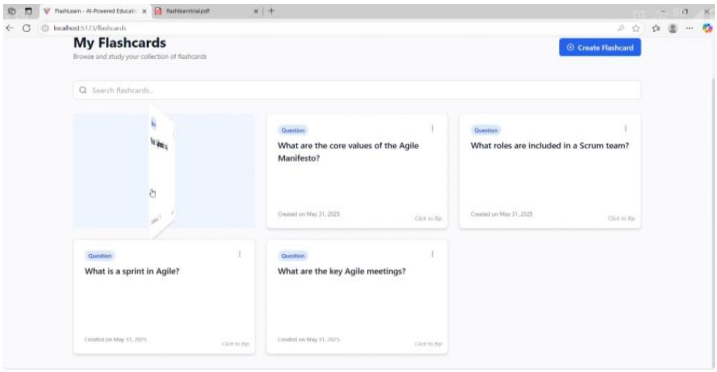

FlashLearn
Dashboard
Create Flashcards
My Flashcards
Logout
Create Flashcards
Input Method
Manual Entry
Text Input
File Upload
Tags
No tags added yet
Add a tag...
Add
Create Flashcard Manually
Question

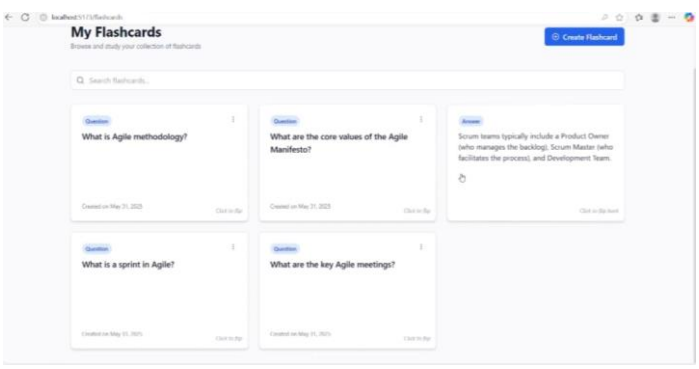

Create Flashcards
Create new flashcards manually or generate them using AI
Input Method
Manual Entry
Text Input
File Upload
Tags
No tags added yet
Add a tag...
Add
Generate Flashcards from Text
Output Type
Question & Answer Pairs
Summary Bullet Points

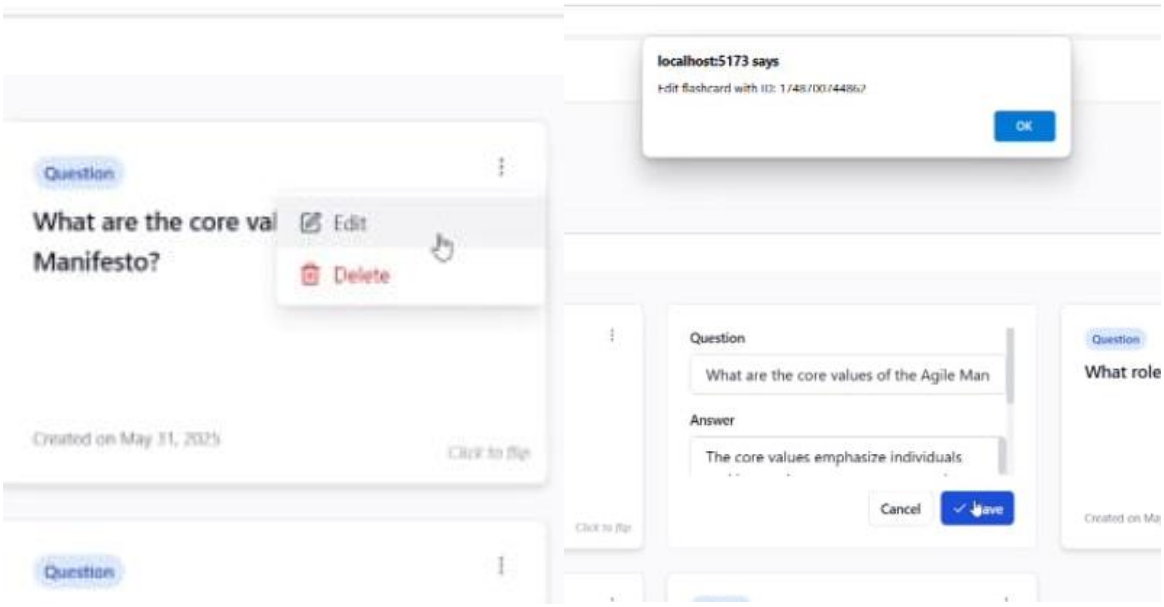

Tags
No tags added yet
Add a tag...
Add
Generate Flashcards from Text
Output Type
Question & Answer Pairs
Summary Bullet Points
Text Input
Enter the text you want to generate flashcards from...
Generate Flashcards

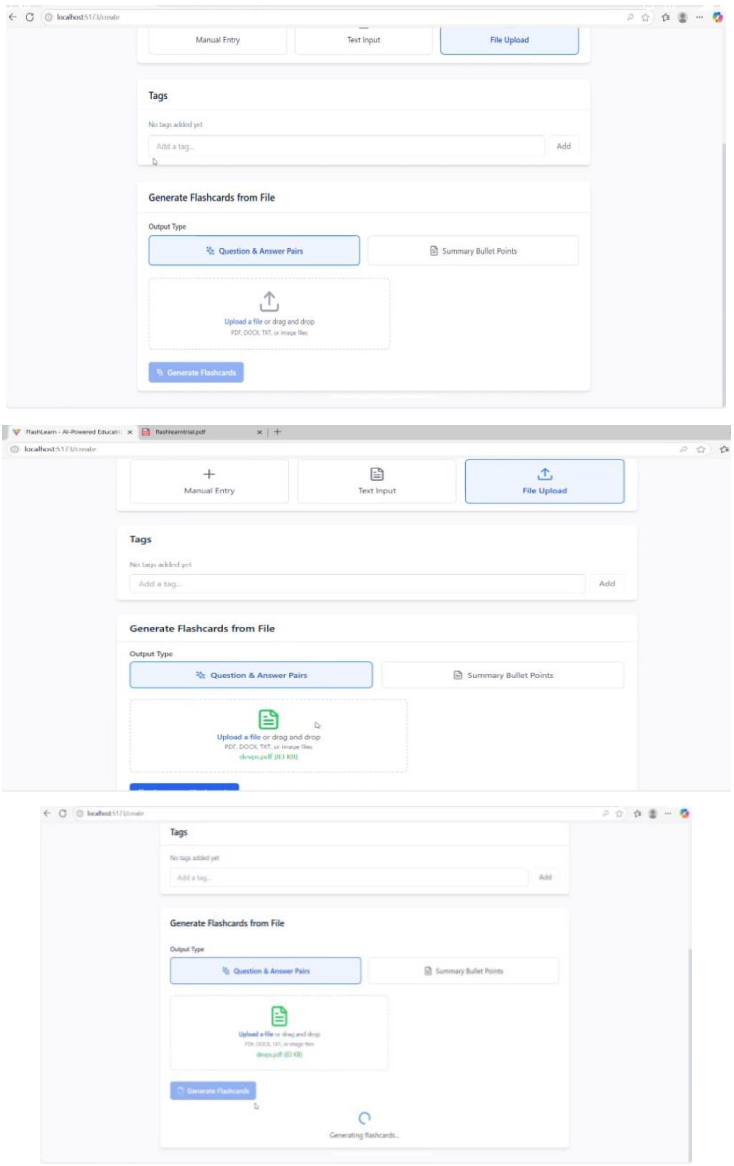

Tags
No tags added yet
agile
Add
Generate Flashcards from Text
Output Type
Question & Answer Pairs
Summary Bullet Points
Text Input
Agile methodology is a modern approach to software development and project management that prioritizes adaptability, team collaboration, and customer feedback. Instead of following a strict, linear process like traditional methods (e.g., Waterfall), Agile breaks the work into smaller, manageable parts called iterations or sprints, usually lasting 1 to 4 weeks. Each sprint results in a working product increment that can be tested and improved. Agile encourages daily communication, often through stand-up meetings, and adapts to change quickly based on feedback. Frameworks like Scrum, Kanban, and Extreme Programming (XP) are all built on Agile principles. This makes Agile especially useful for complex projects where requirements may evolve over time.
Generate Flashcards


Generated Flashcards (5)
What is Agile methodology?
Agile is an iterative approach that promotes collaboration, customer feedback, and small, rapid releases in software development.
What are the core values of the Agile Manifesto?
The core values emphasize individuals and interactions over processes and tools, working software over comprehensive documentation, customer collaboration over contract negotiation, and responding to change over following a plan.
What roles are included in a Scrum team?
Scrum teams typically include a Product Owner (who manages the backlog), Scrum Master (who facilitates the process), and Development Team.
What is a sprint in Agile?
A sprint is a time-boxed iteration where a set of user stories are developed into a working product increment.
What are the key Agile meetings?
Key meetings include daily stand-ups and retrospectives, which ensure continuous improvement and team alignment.
Save All Flashcards


My Flashcards
Create Flashcard
What are the core values of the Agile Manifesto?
What roles are included in a Scrum team?
What is a sprint in Agile?
What are the key Agile meetings?


My Flashcards
Create Flashcard
What is Agile methodology?
What are the core values of the Agile Manifesto?
What is a sprint in Agile?
What are the key Agile meetings?


localhost:5173 says
OK
Question
What are the core val
Manifesto?
Edit
Delete
Created on May 31, 2025
Click to flip
Question
What are the core values of the Agile Man
Answer
The core values emphasize individuals
Cancel
Save
Question
What role



6.CONCLUSION

"FlashLearn" simplifies learning by automatically generating flashcards from uploaded documents, making studying more efficient and engaging.By combining AI-powered summarization and an intuitive interface, it provides a seamless experience for users to enhance knowledge retention.

REFERENCES

"Flask Web Development: Developing Web Applications with Python" by Miguel Grinberg (2nd Edition, 2018)Covers Flask framework fundamentals, user authentication, and scalable web app development.

"The New and Improved Flask Mega-Tutorial" by Miguel Grinberg (2025 Edition) This comprehensive guide offers an in-depth journey through Flask web development, covering topics like user authentication, database management, and deployment strategies. The 2025 edition includes updates on the latest features and best practices in Flask. pragprog.com

"Transformers for Natural Language Processing" by Denis Rothman (2nd Edition, 2023)

This book delves into transformer models, including GPT, BERT, and T5, and their applications in NLP tasks such as text summarization, sentiment analysis, and content generation. The second edition provides updated content on the latest transformer architectures and their practical implementations.

https://quizlet.com/ . ,https://www.ankify.ai/ -are mostly used Ai web applications with very attractive and interactive User Interfaces.