IdeaForge

Waterfall Methodology

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Project Overview – IdeaForge

IdeaForge is an AI-powered platform where users can input unclear or unstructured ideas. The AI helps clarify and refine these ideas, suggests ways to develop them, and transforms them into structured formats such as visual mind maps, actionable tasks, or project plans. Users can collaborate, customize their workspace, and export their ideas.

In this project, I followed the **Waterfall model**, where each stage was completed in sequence before moving on to the next, ensuring a clear and structured development process.

The development process started with:

1. Requirements Definition
2. System and Software Design
3. Implementation and Unit Testing
4. Integration and System Testing
5. Operation and Maintenance

1. Requirements Definition:

The project started by identifying the needs of the users. I gathered both Functional and Non functional requirements

Functional Requirements

1. User Authentication and Authorization

- The system shall allow users to register, log in, and reset their password
- The system shall support login via Google and LinkedIn
- The system shall authenticate users using email or username & password
- The system shall classify users into categories such as students, entrepreneurs, custom users, experts, and project managers

2. Idea Input and Management

- Users shall be able to enter ideas in text or voice format
- The system shall allow users to view, add, delete, and edit their ideas
- The system shall use AI to analyze and refine user ideas into clear concepts
- The system shall automatically break down refined ideas into tasks and deadlines
- The system shall manage tasks and generate creative and structured outputs to assist the user
- The system shall provide dynamic mind map creation and updates

3. Dashboard and UI Customization

- The system shall allow users to customize their dashboard layout, colors, fonts, and themes
- The system shall allow users to add, remove, and rearrange dashboard widgets
- The system shall provide a simple, clean UI with soft colors for user comfort
- The UI shall include diagrams, charts, images, and organizational schemes to visualize ideas and plans

4. AI-powered Features and Suggestions

- The system shall provide an AI assistant chatbot to help users
- The system shall generate “what-if” scenarios for idea execution
- The system shall display potential risks and estimated success rates
- The system shall provide a daily inspiration board with AI-recommended content
- The system shall provide creative suggestions for improving ideas and plans

5. Collaboration and Sharing

- The system shall allow users to invite others to collaborate on ideas in small rooms
- The system shall provide collaboration rooms for group brainstorming
- The system shall allow exporting prototypes as PDF, image, website, or shareable link
- Users shall be able to export their generated ideas or plans into PDF, image files, or slides

6. Subscription and Payment

- Students shall have access to a free subscription plan with full features
- The system shall provide a premium plan with extra features such as prototyping, advanced customization, and collaboration
- Users shall receive a 15% discount on their first payment and 10% monthly discount for each friend they invite
- The system shall automatically cancel membership if the user's payment method fails
- The system shall integrate with PayPal API to verify payment methods and handle subscriptions and discounts

Non-Functional Requirements

1. Performance and Scalability

- The system shall process inputs within 3 seconds
- The system shall handle at least 300 concurrent sessions
- The system shall respond quickly after page load
- The system shall complete tasks and generate ideas within 5 minutes
- The system shall have a maximum downtime of 3 minutes per month

2. Security and Data Protection

- All user chats, ideas, thoughts, and inputs shall be encrypted
- The system shall provide secure storage of user data
- The system shall not lose user data during internet outages

3. Usability and User Experience

- The system shall provide a simple and intuitive UI
- The UI shall use soft colors to enhance user comfort and ease of use
- The system shall be responsive and support devices such as mobile phones, tablets, and laptops

4. Storage and Recovery

- The system shall provide 2GB of storage per user, expandable as needed
- The system shall allocate 2GB storage for user history
- The system shall recover from failures within 7 minutes

5. Availability and Support

- Support services shall be available 24/7
- The system shall support both Windows and Mac desktop versions

6. Localization and Internationalization

- The system shall support Arabic and English languages and be extensible to additional languages

7. Code Quality and Testing

- The system shall provide unit testing for all components
- The system code shall be clean, maintainable, and extensible for future updates
- The system shall undergo system testing before the first release

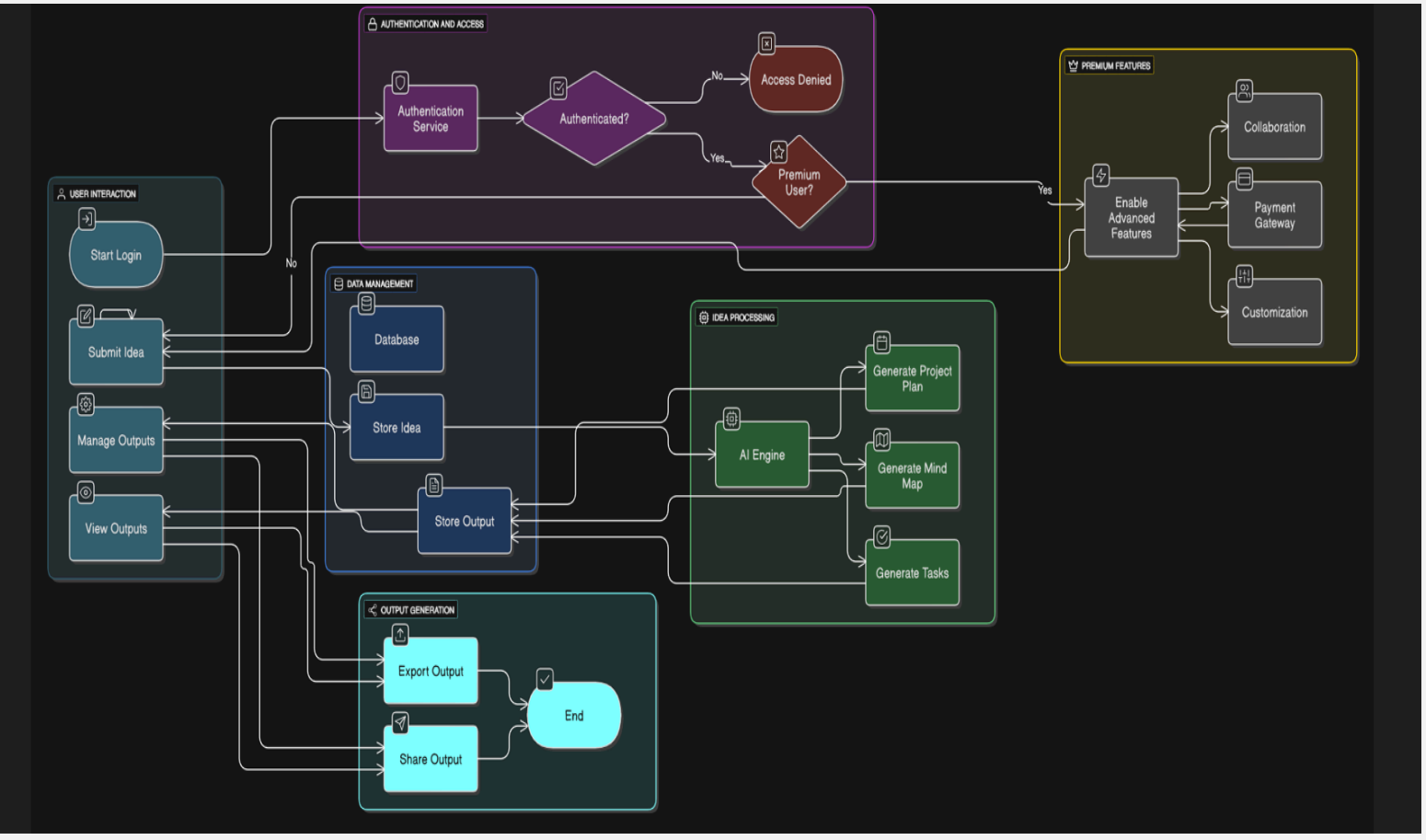
2. System and Software Design:

Requirements → Design

after gathering and documenting all system requirements, I moved to the design stage. At this point, the requirements acted as the foundation, guiding how the system architecture and components should be structured.

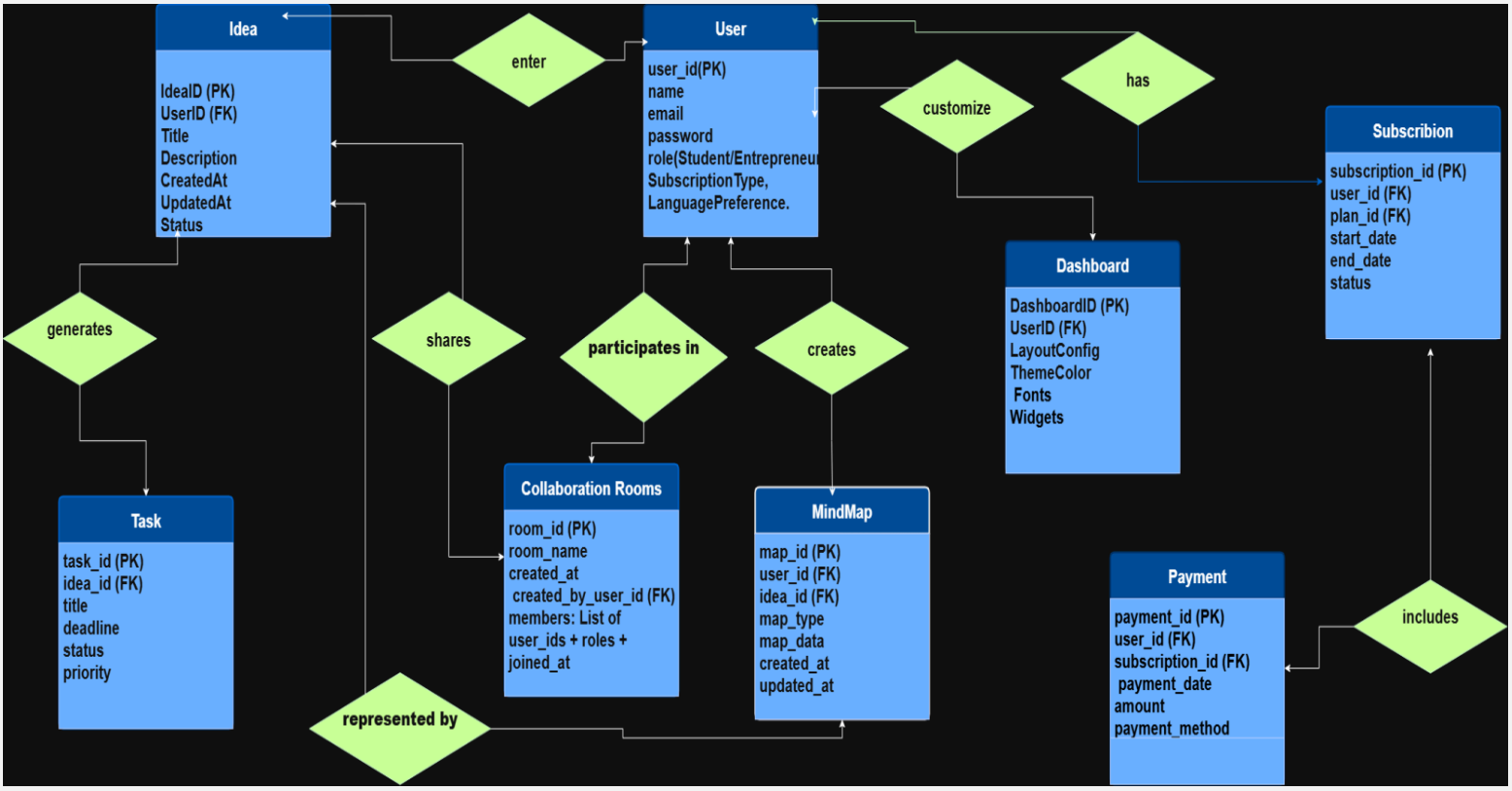
Data Flow Diagram : created using Eraser

First, I draw the Data Flow Diagram to illustrate the main processes, data stores, external entities, and data flows within the system.



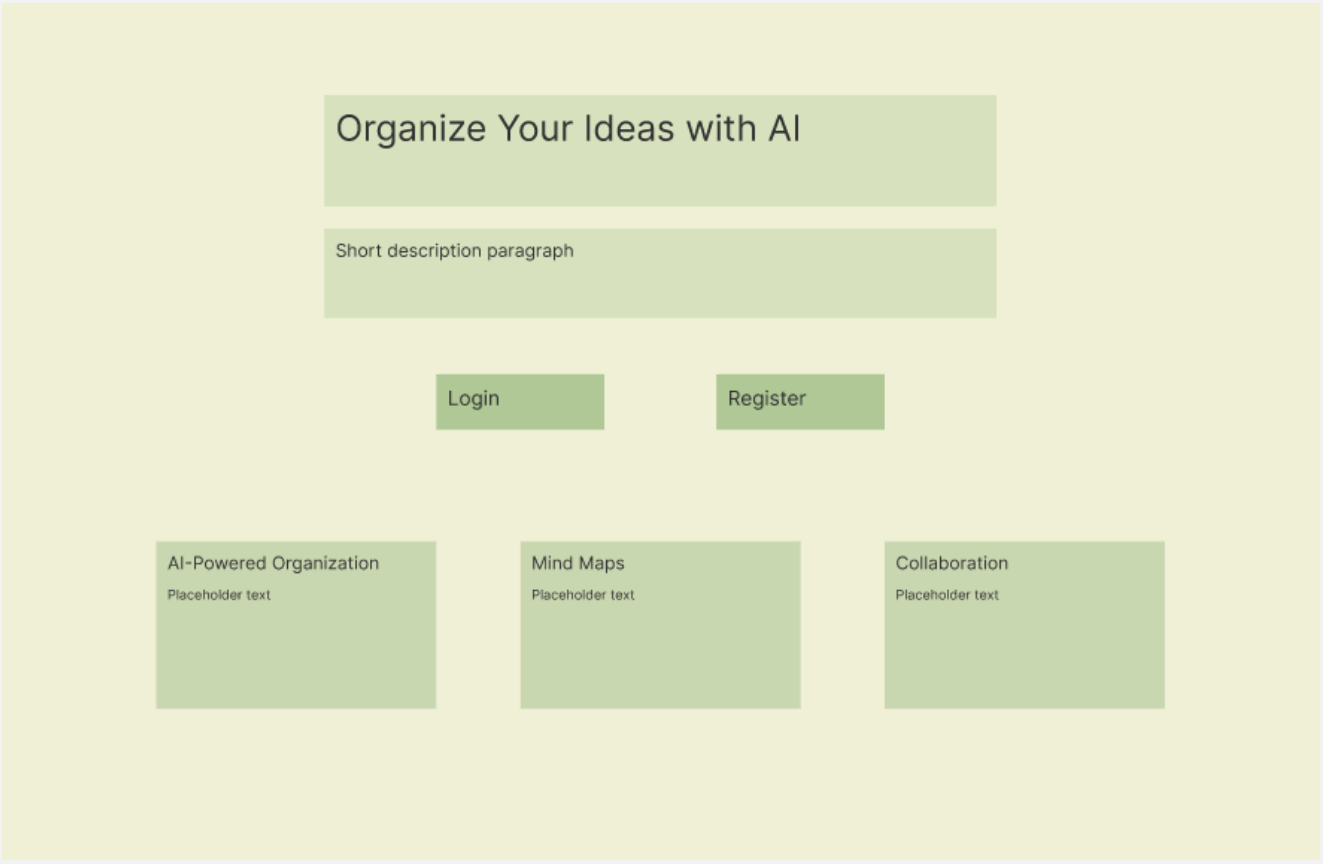
ERD: created using draw.io

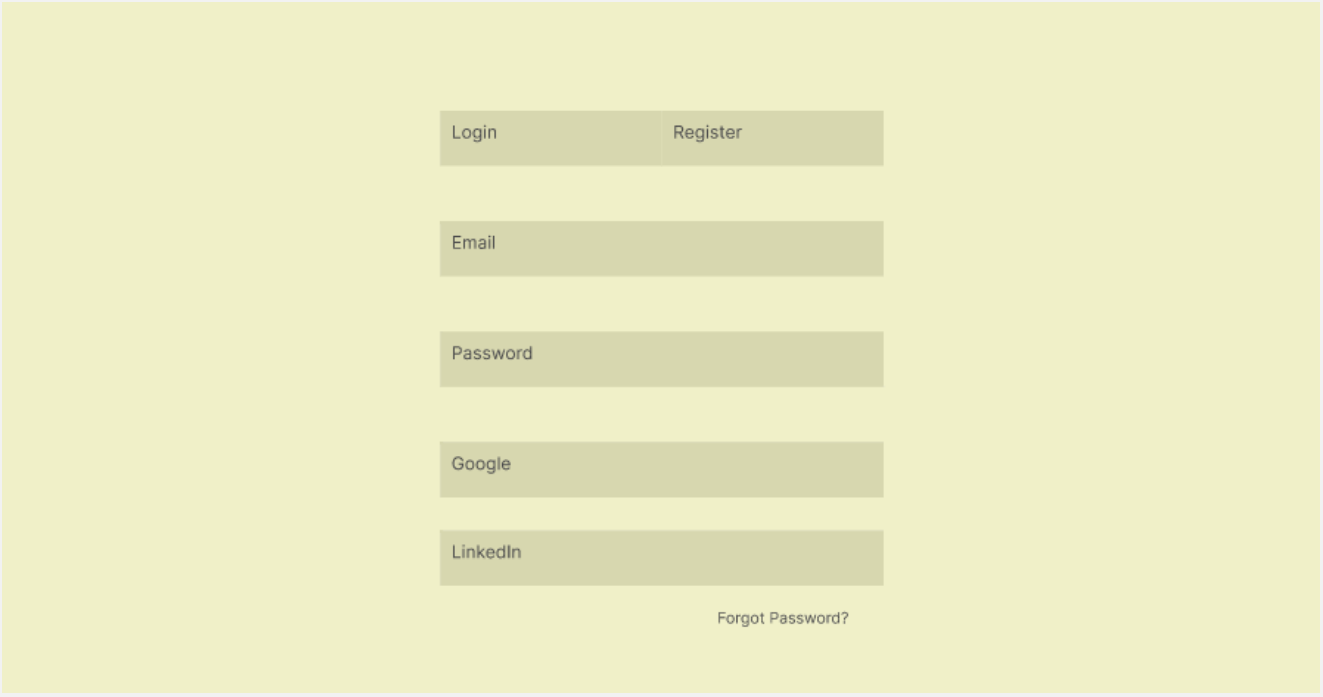
I created the Entity-Relationship Diagram to define the database structure, including entities, ttributes, and relationships, ensuring proper storage and organization of user data, ideas, tasks,...

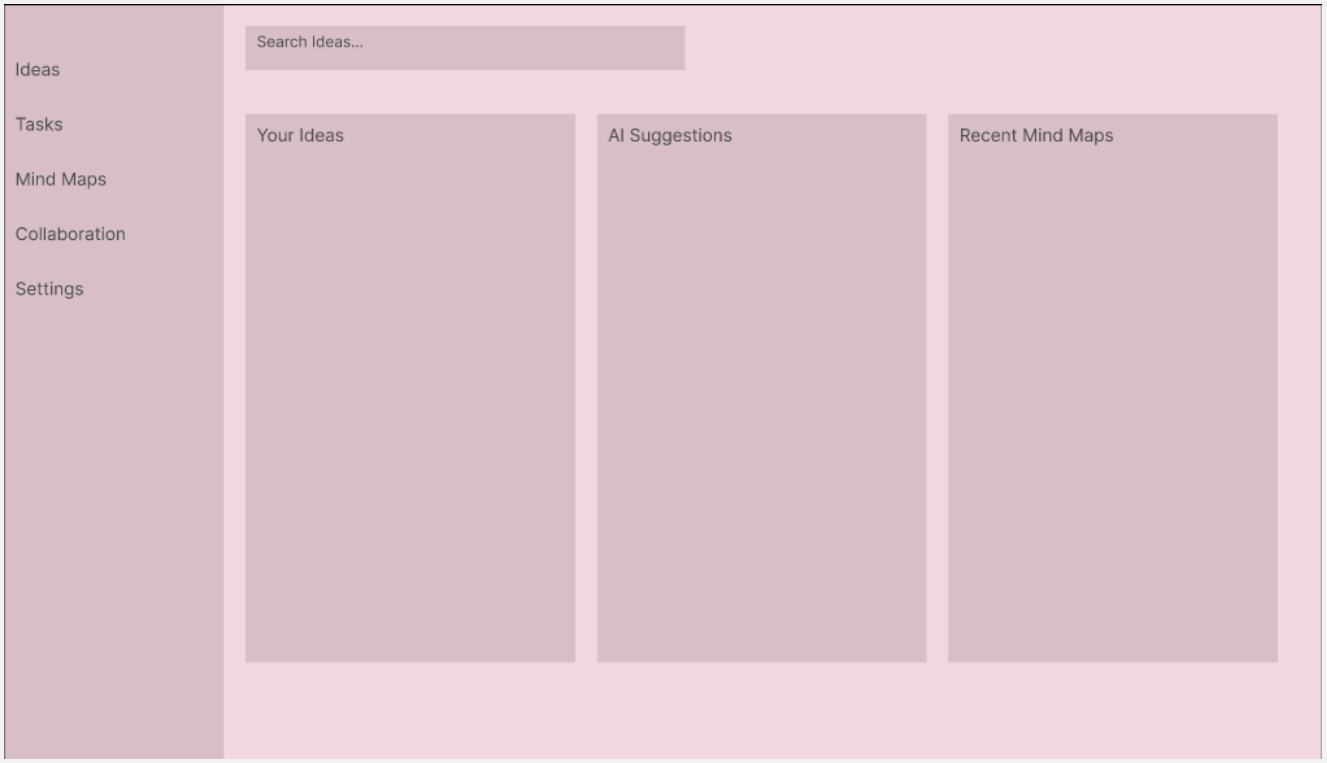


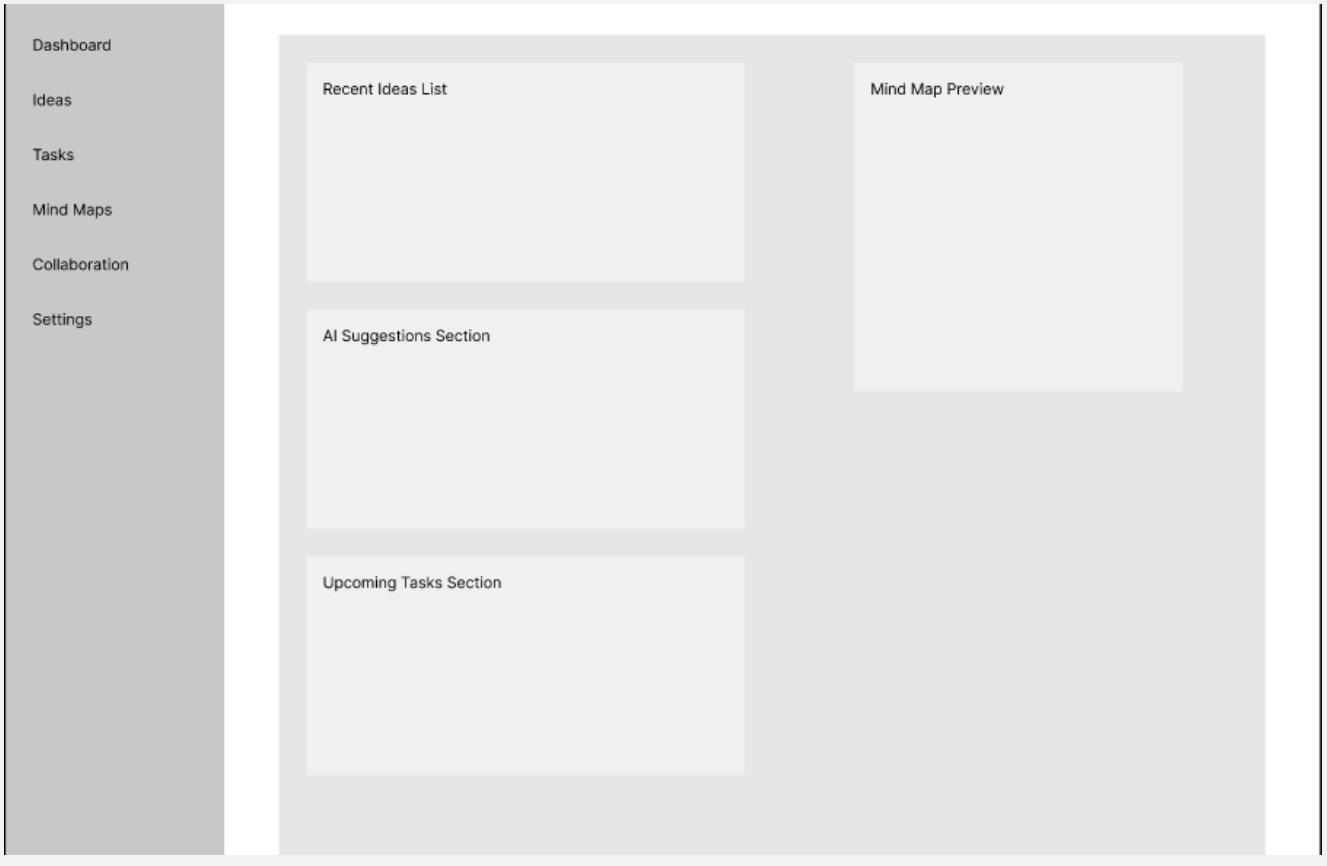
Wire Frame: designed using **Figma**

Finally, I designed the UI wireframes to visually represent the user interface, focusing on screens for login, idea submission, AI-generated outputs, task management, and premium features.






Ideas
Tasks
Mind Maps
Collaboration
Settings
Search Ideas...
Your Ideas
AI Suggestions
Recent Mind Maps


Dashboard
Ideas
Tasks
Mind Maps
Collaboration
Settings
Recent Ideas List
Mind Map Preview
AI Suggestions Section
Upcoming Tasks Section

Type your idea here...

Voice Input

AI Response

User Message

Ideas

Tasks

Mind Maps

Collaboration

Settings

Recent Ideas

AI Suggestions

Upcoming Tasks

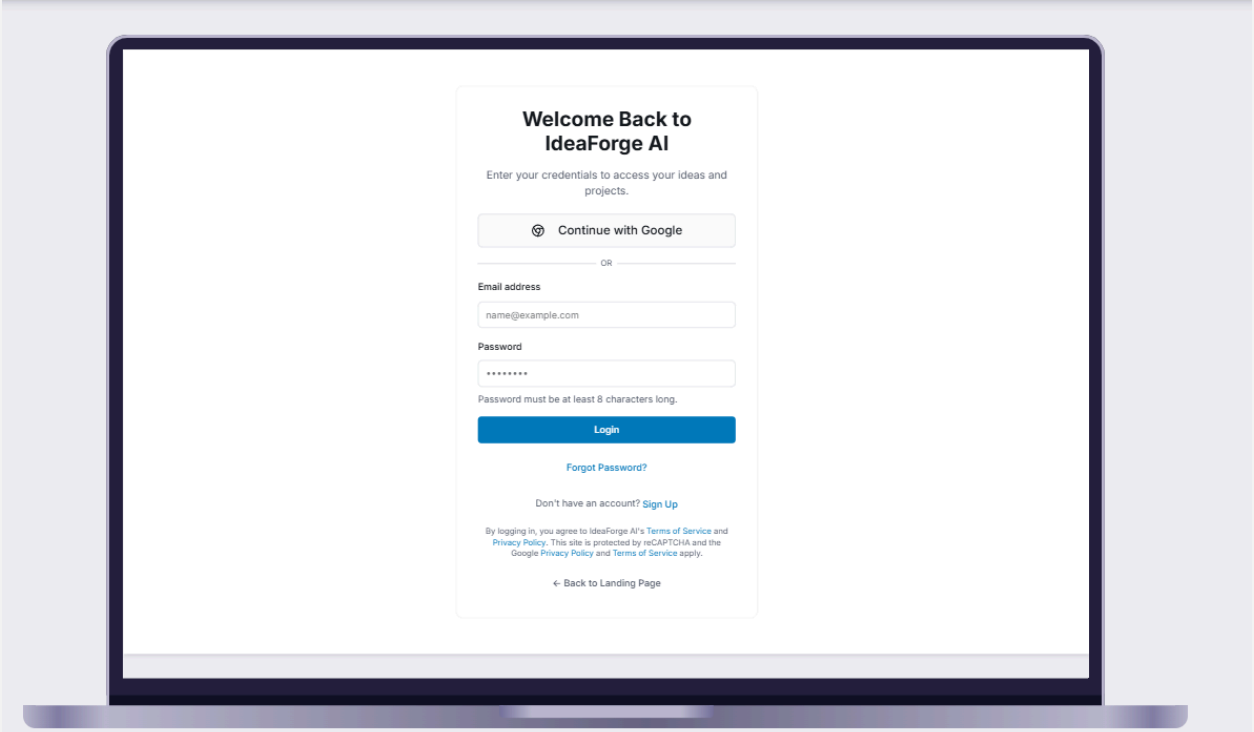
Mind Map Preview

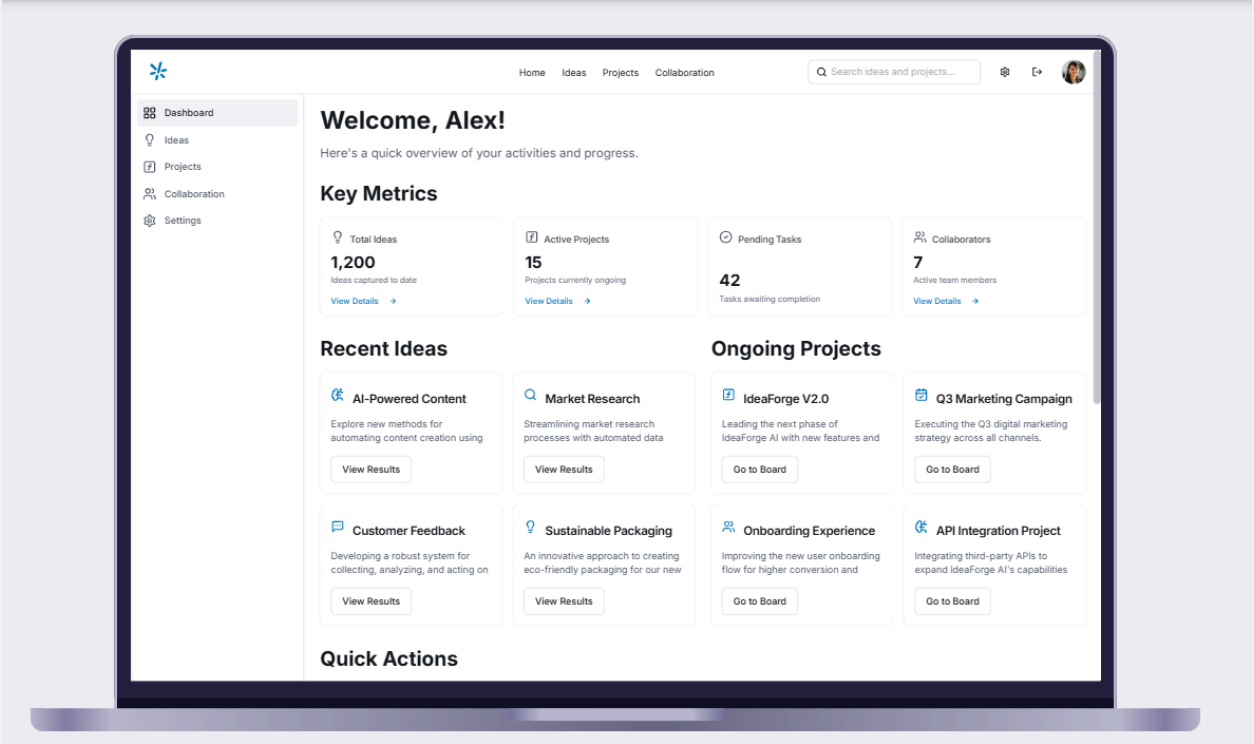
3. Implementation and Unit Testing:

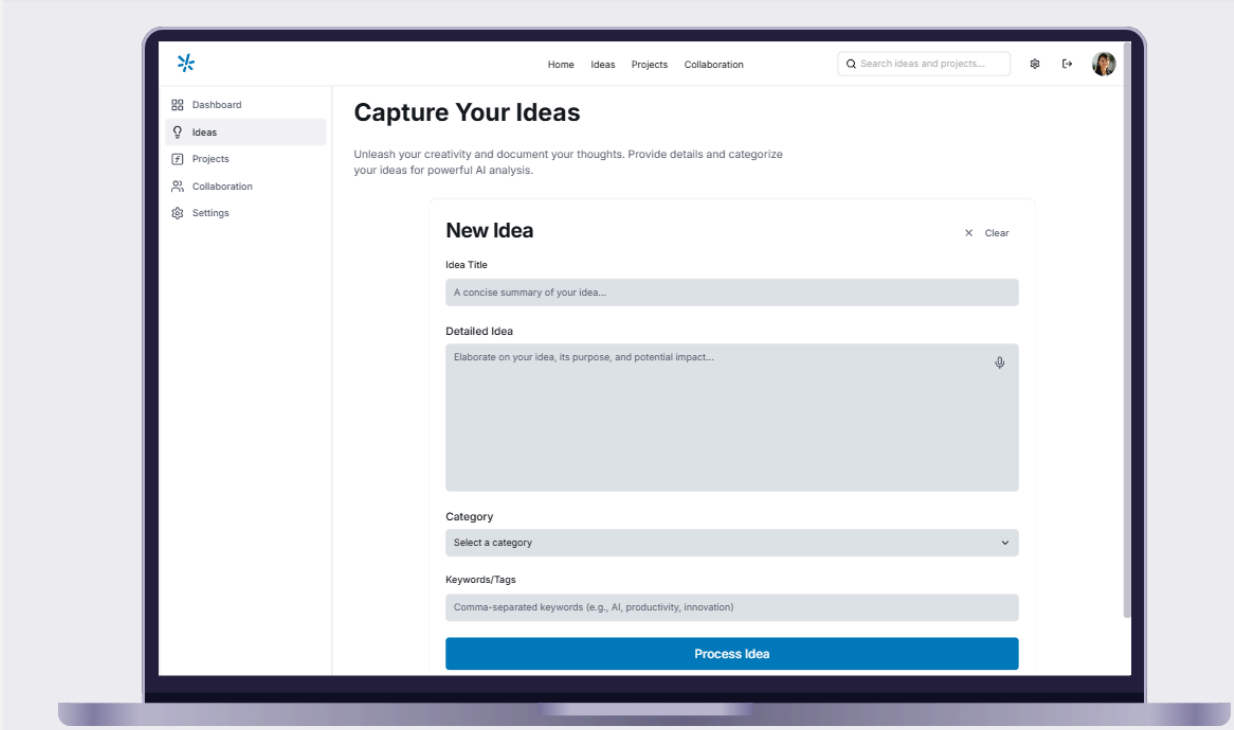
Design → Implementation

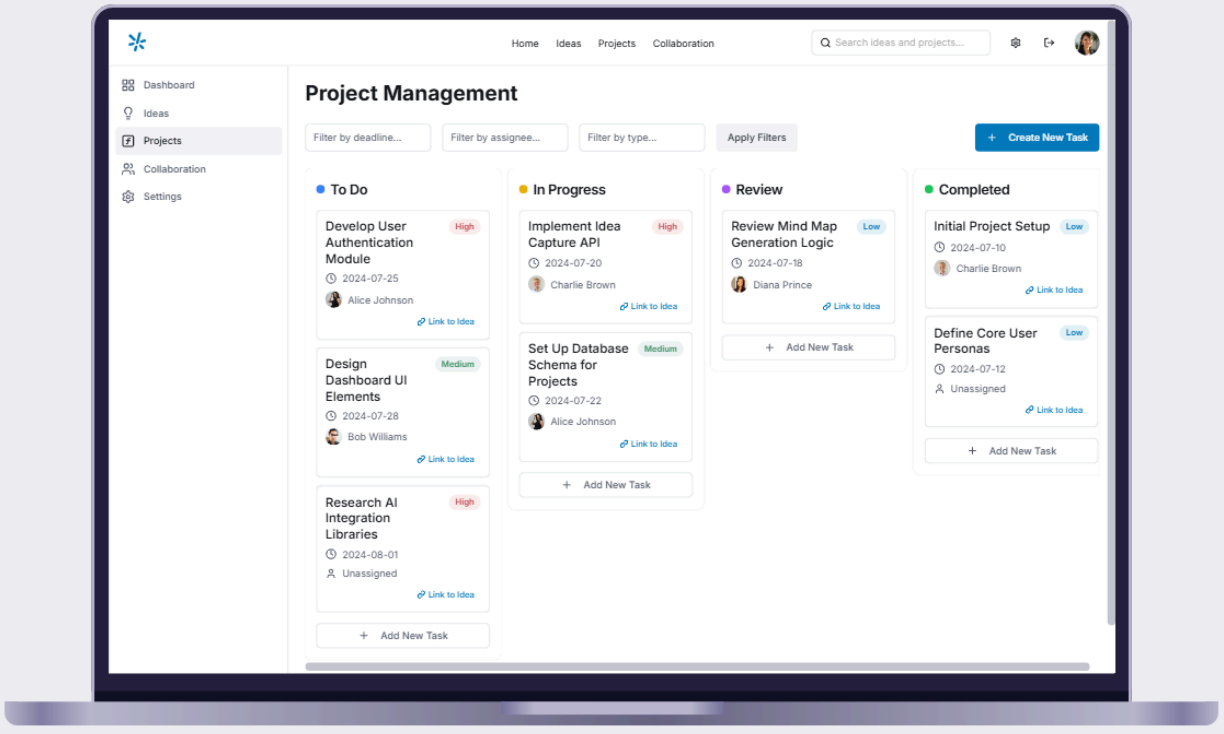
Once the design was completed and approved, I moved to implementation. The detailed design provided a prototype , making it easier to translate the system plan into an actual working program.

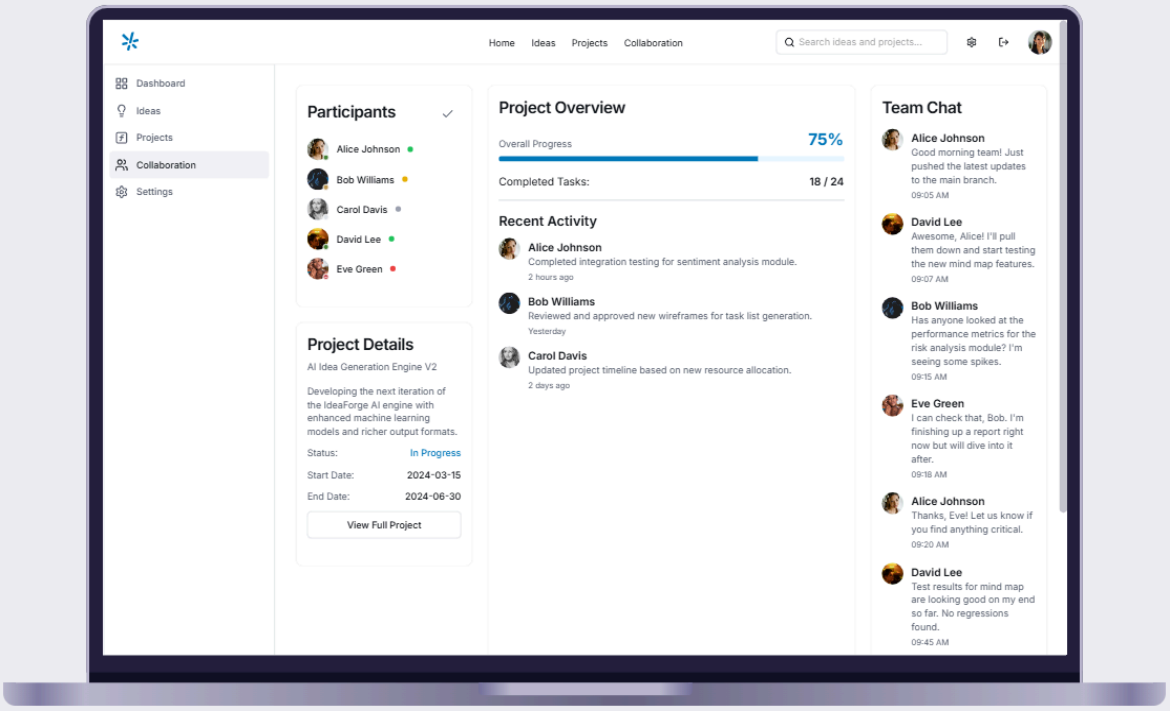
Prototype: created using **Visily** , To View full prototype **click here**

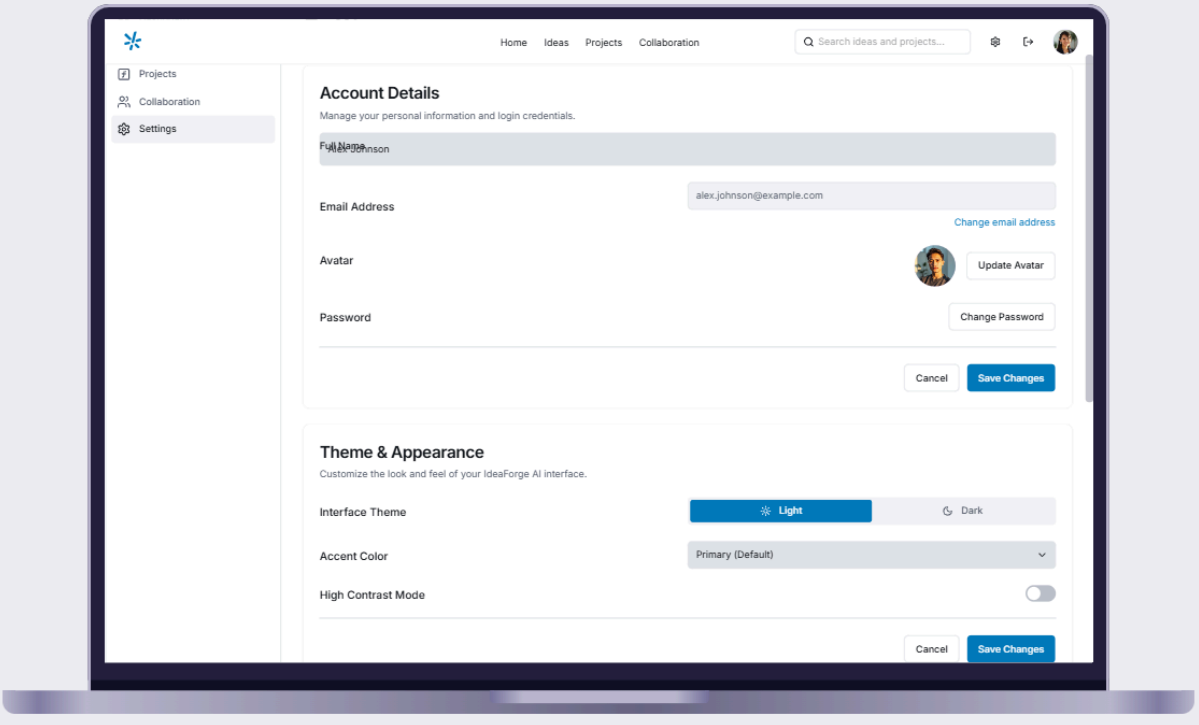





Home
Ideas
Projects
Collaboration
Search ideas and projects...
Dashboard
Ideas
Projects
Collaboration
Settings
Capture Your Ideas
Unleash your creativity and document your thoughts. Provide details and categorize your ideas for powerful AI analysis.
New Idea
Clear
Idea Title
A concise summary of your idea...
Detailed Idea
Elaborate on your idea, its purpose, and potential impact...
Category
Select a category
Keywords/Tags
Comma-separated keywords (e.g., AI, productivity, innovation)
Process Idea


Home
Ideas
Projects
Collaboration
Search ideas and projects...
Dashboard
Ideas
Projects
Collaboration
Settings
Project Management
Filter by deadline...
Filter by assignee...
Filter by type...
Apply Filters
Create New Task
To Do
Develop User Authentication Module
High
2024-07-25
Alice Johnson
Link to Idea
Design Dashboard UI Elements
Medium
2024-07-28
Bob Williams
Link to Idea
Research AI Integration Libraries
High
2024-08-01
Unassigned
Link to Idea
Add New Task
In Progress
Implement Idea Capture API
High
2024-07-20
Charlie Brown
Link to Idea
Set Up Database Schema for Projects
Medium
2024-07-22
Alice Johnson
Link to Idea
Add New Task
Review
Review Mind Map Generation Logic
Low
2024-07-18
Diana Prince
Link to Idea
Add New Task
Completed
Initial Project Setup
Low
2024-07-10
Charlie Brown
Link to Idea
Define Core User Personas
Low
2024-07-12
Unassigned
Link to Idea
Add New Task


Home
Ideas
Projects
Collaboration
Search ideas and projects...
Dashboard
Ideas
Projects
Collaboration
Settings
Participants
Alice Johnson
Bob Williams
Carol Davis
David Lee
Eve Green
Project Details
AI Idea Generation Engine V2
Developing the next iteration of the IdeaForge AI engine with enhanced machine learning models and richer output formats.
Status: In Progress
Start Date: 2024-03-15
End Date: 2024-06-30
View Full Project
Project Overview
Overall Progress 75%
Completed Tasks: 18 / 24
Recent Activity
Alice Johnson
Completed integration testing for sentiment analysis module.
2 hours ago
Bob Williams
Reviewed and approved new wireframes for task list generation.
Yesterday
Carol Davis
Updated project timeline based on new resource allocation.
2 days ago
Team Chat
Alice Johnson
Good morning team! Just pushed the latest updates to the main branch.
09:05 AM
David Lee
Awesome, Alice! I'll pull them down and start testing the new mind map features.
09:07 AM
Bob Williams
Has anyone looked at the performance metrics for the risk analysis module? I'm seeing some spikes.
09:15 AM
Eve Green
I can check that, Bob. I'm finishing up a report right now but will dive into it after.
09:18 AM
Alice Johnson
Thanks, Eve! Let us know if you find anything critical.
09:20 AM
David Lee
Test results for mind map are looking good on my end so far. No regressions found.
09:45 AM


Home
Ideas
Projects
Collaboration
Search ideas and projects...
Projects
Collaboration
Settings
Account Details
Manage your personal information and login credentials.
Full Name
Alex Johnson
Email Address
alex.johnson@example.com
Change email address
Avatar
Update Avatar
Password
Change Password
Cancel
Save Changes
Theme & Appearance
Customize the look and feel of your IdeaForge AI interface.
Interface Theme
Light
Dark
Accent Color
Primary (Default)
High Contrast Mode
Cancel
Save Changes

4. Integration and System Testing:

Implementation → Testing

After building the system, I transitioned to testing. This stage ensured that the implemented features matched the requirements and design specifications.test plan was prepared and executed, covering some test cases to ensured that all modules worked correctly as a whole system.

Test Case 1: Social Login via LinkedIn/Google
Test Case ID: TC-001
Objective: Verify that the user can successfully log in using LinkedIn or Google authentication.

Preconditions:

- Valid LinkedIn or Google account exists.
- Platform supports OAuth integration with LinkedIn and Google.

Test Steps:

1. Open the platform login page.
2. Click on **"Login with LinkedIn"** or **"Login with Google"**.
3. Authenticate using valid credentials on the chosen platform.
4. Grant permissions if prompted.
5. Verify redirection to the platform dashboard with an active session.

Expected Result:
The system should authenticate the user via LinkedIn or Google, log them in, and redirect them to their dashboard without requiring manual username/password entry.

Test Case 2: Idea Feasibility Analysis
Test Case ID: TC-002
Objective: Verify that the AI can assess a clearly submitted idea for feasibility, identifying strengths, weaknesses, required resources, and suggesting next steps.
Test Steps:

1. Log in with a valid user account.
2. Navigate to "New Idea" or "AI Chat" section.
3. Enter an idea, e.g., "Start an online handmade jewelry shop."
4. Submit the idea for AI feasibility analysis.

5. Verify that the AI provides:
    - Strengths and opportunities
    - Potential challenges or risks
    - Required resources (tools, skills, budget)
    - Suggested actionable next steps (mind map, tasks, or project plan)

Expected Result: The AI generates a structured feasibility report, guiding the user on how to proceed with the idea.

Test Case 3: Voice Input – From Unclear Idea to Task Creation
Test Case ID: TC-003
Objective: Verify that the platform can take an unclear spoken idea, refine it into a clear concept, and generate a relevant task list.

Test Steps:

1. Log in to the platform using a valid account .
2. Navigate to the **"New Idea"** section and enable the **voice input** feature.
3. Speak an unclear idea, for example:
   "I want to start a handmade shop but I'm not sure what to sell or how to start."
4. The AI processes the voice input and refines it into a **clear project concept** (e.g., "An online handmade shop focusing on customized jewelry and home decor items").
5. Verify that the AI also suggests **key components** of the project, such as:
6. Verify that a **task list** is generated.

Expected Result: AI correctly understands speech, refines the idea, and creates logical tasks.

Test Case 4: Premium Feature - Collaboration Room Functionality

Objective: Verify the functionality of collaboration rooms within the premium features.
Test Case ID: TC-004
Pre-conditions:

- Two user accounts available (user1@gmail.com, user2@gmail.com)
- Both users have premium access
- Microphone permissions granted
- WebSocket connections supported

Test Steps:

1. Log in with a premium user account.
2. Create a new collaboration room.

3. Invite another user to the collaboration room.
4. Verify that the invited user receives an invitation and can join the room.
5. Within the collaboration room, both users should simultaneously show same workspace contains projects ,tasks ,ideas and mind maps.
6. Verify that changes made by one user are immediately visible to the other user.
7. Test the chat functionality within the collaboration room.

Expected Result: Users should be able to create and join collaboration rooms, and changes made by one user should be immediately visible to other users in the room. The chat functionality should be working correctly.

Test Case 5: Export Functionality - PDF, Images, and Shareable Links

Test Case ID: TC-005
Objective: Verify the platform's export functionality for PDFs, images, and shareable links.

Test Steps:

1. Log in to the platform with a valid user account.
2. Navigate to an existing mind map or project.
3. Attempt to export the mind map or project as a PDF file.
4. Attempt to export the mind map or project as an image file (e.g., PNG, JPG).
5. Attempt to generate a shareable link for the mind map or project.
6. Verify that the PDF and image files are generated correctly and contain the expected content.
7. Verify that the shareable link is generated correctly has a public or private link and allows access to the mind map or project.

Expected Result: The platform should successfully export mind maps and projects as PDFs and images, and generate shareable links that allow access to the content.

5. Operation and Maintenance:

Testing → Deployment

Once the system was fully tested and validated, I moved to deployment. At this stage, the software was delivered to the user environment for actual use.

Deployment → Maintenance

Finally, after deployment, I entered the maintenance stage. Here, updates, bug fixes, and improvements were made based on user feedback and evolving needs.

Deployment:

- The platform will be deployed on Microsoft Azure's secure cloud infrastructure, ensuring scalability and high availability.
- A connected database will store user data and project information.
- AI capabilities will be integrated through reliable APIs to process, refine, and visualize user ideas.
- Stripe will be implemented as the primary payment gateway for premium subscriptions.
- Social login via OAuth will be configured for LinkedIn and Google, providing fast and secure user authentication.

Maintenance:

- Regular maintenance will include software updates, AI model enhancements, and database optimization.
- System monitoring will cover server performance, API connections, and payment gateway availability.
- Security audits will be conducted periodically to protect user data.
- A dedicated support channel will handle issues such as login errors, payment failures, or AI processing glitches.
- Comprehensive backup and disaster recovery procedures will ensure data integrity and service continuity