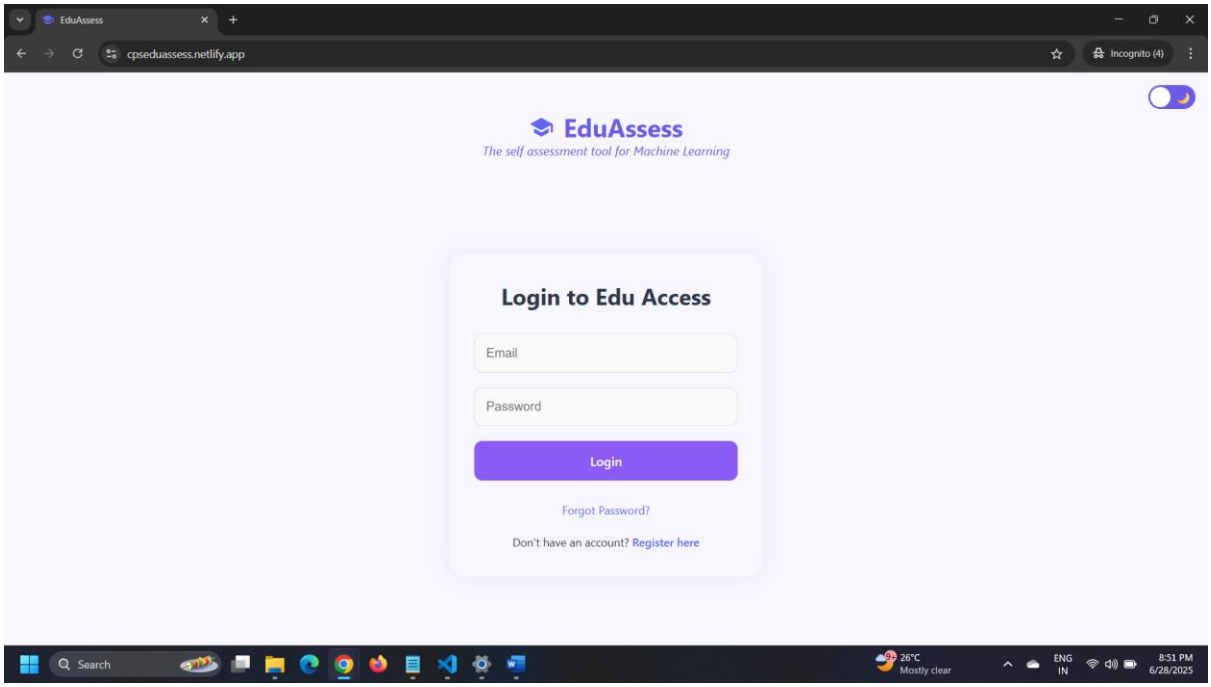
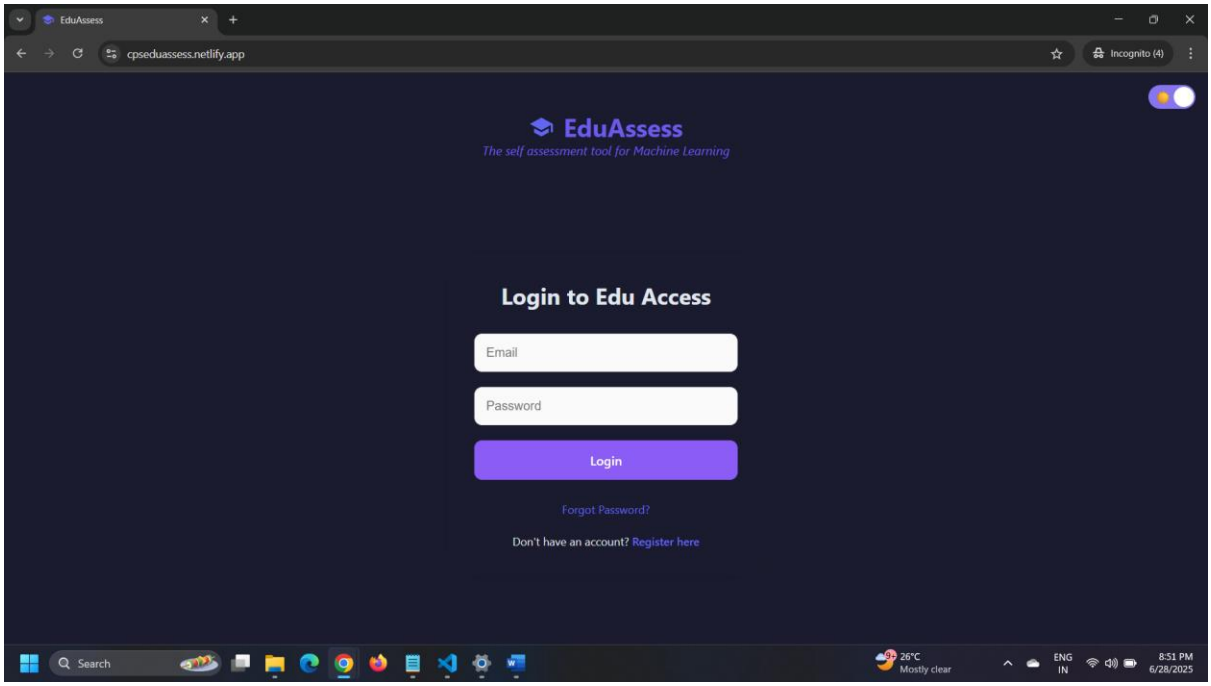
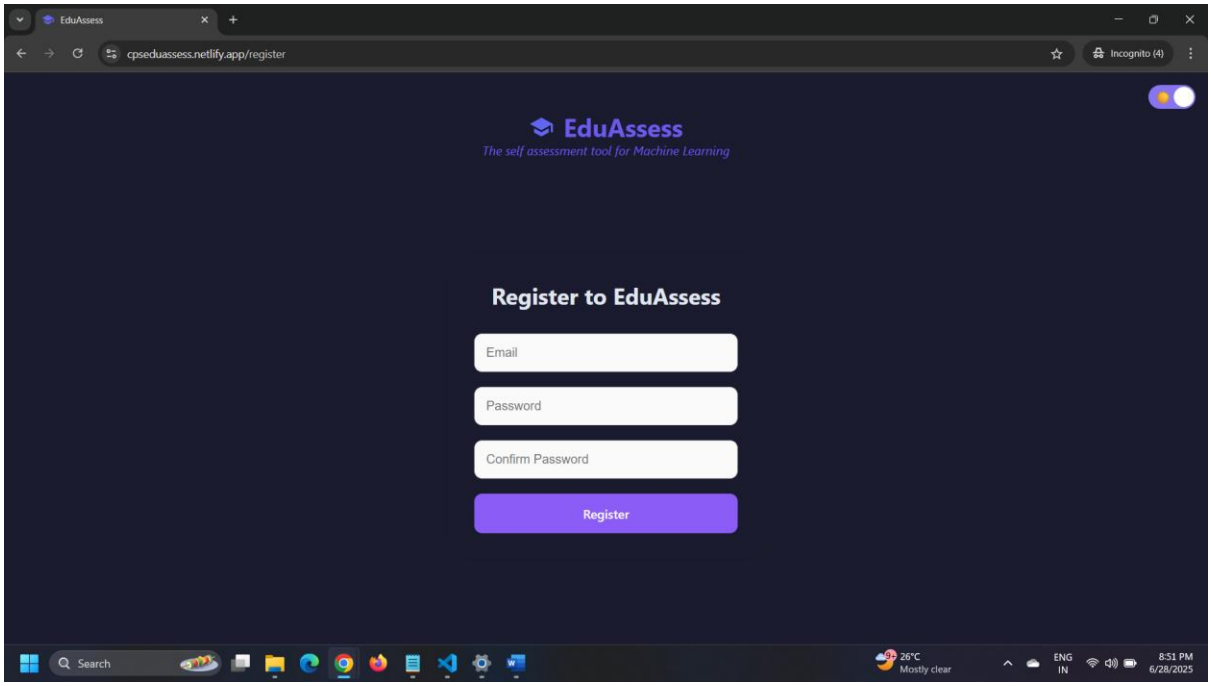
Design Documentation

User interface Design






EduAssess
cpseduassess.netlify.app/register
Incognito (4)
EduAssess
The self assessment tool for Machine Learning
Register to EduAssess
Email
Password
Confirm Password
Register
Search
26°C
Mostly clear
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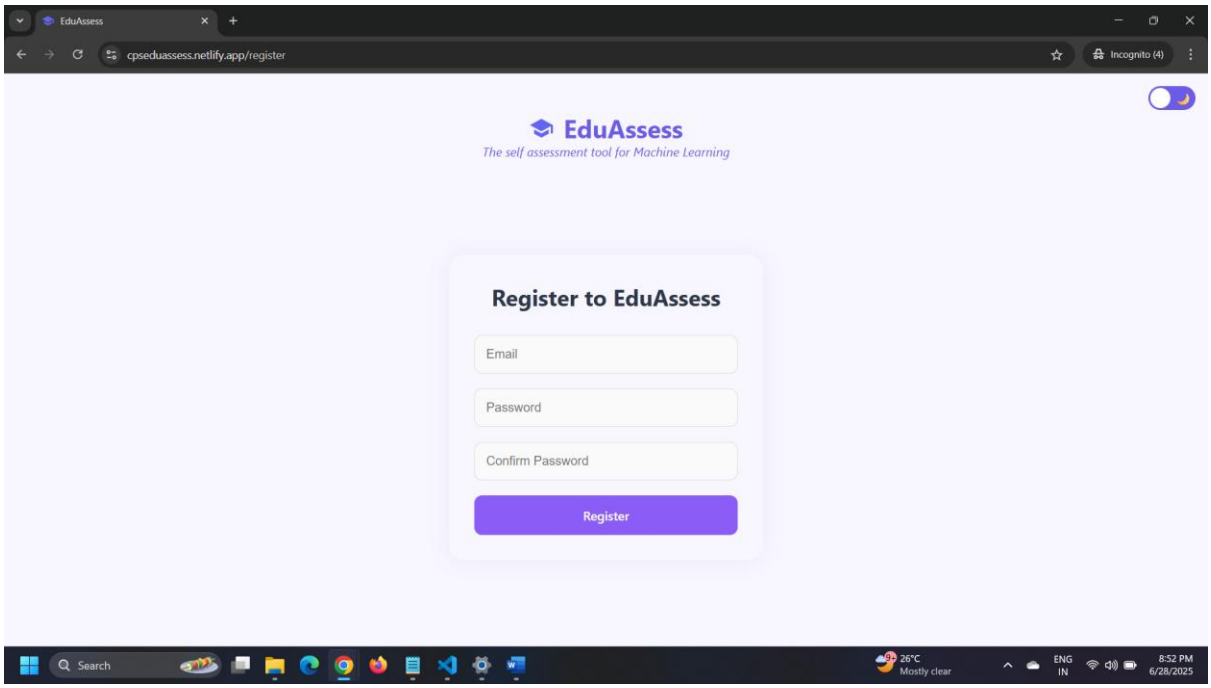
6/28/2025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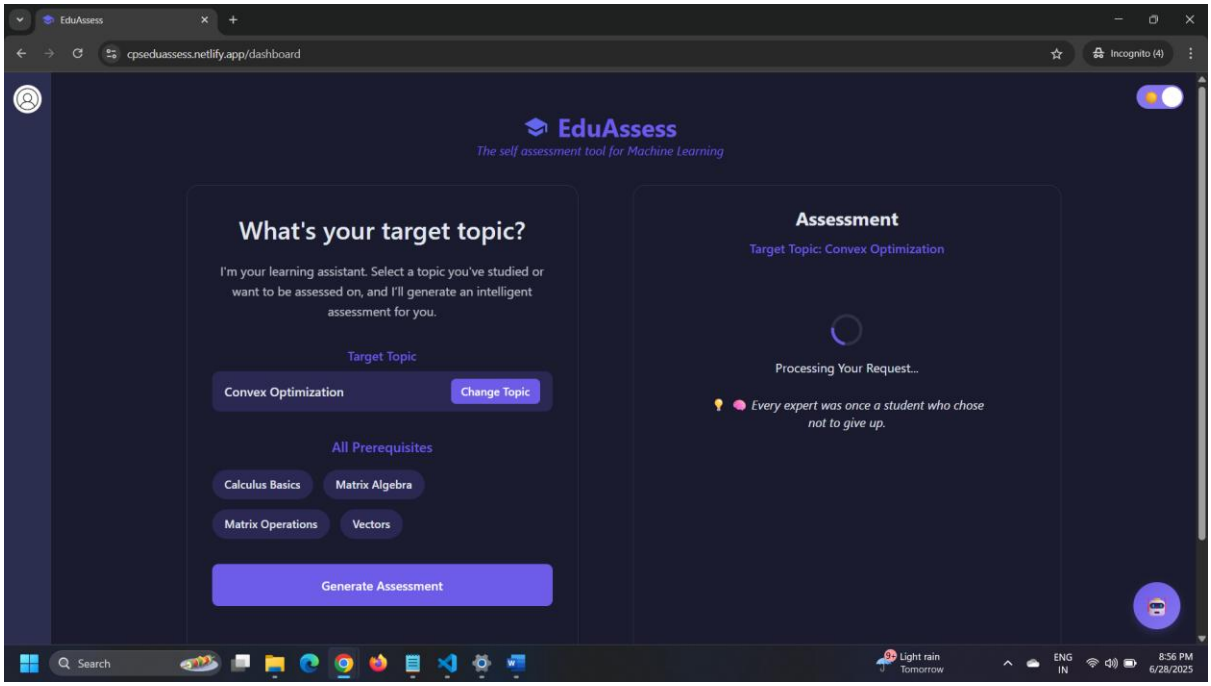
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cpseduassess.netlify.app/dashboard
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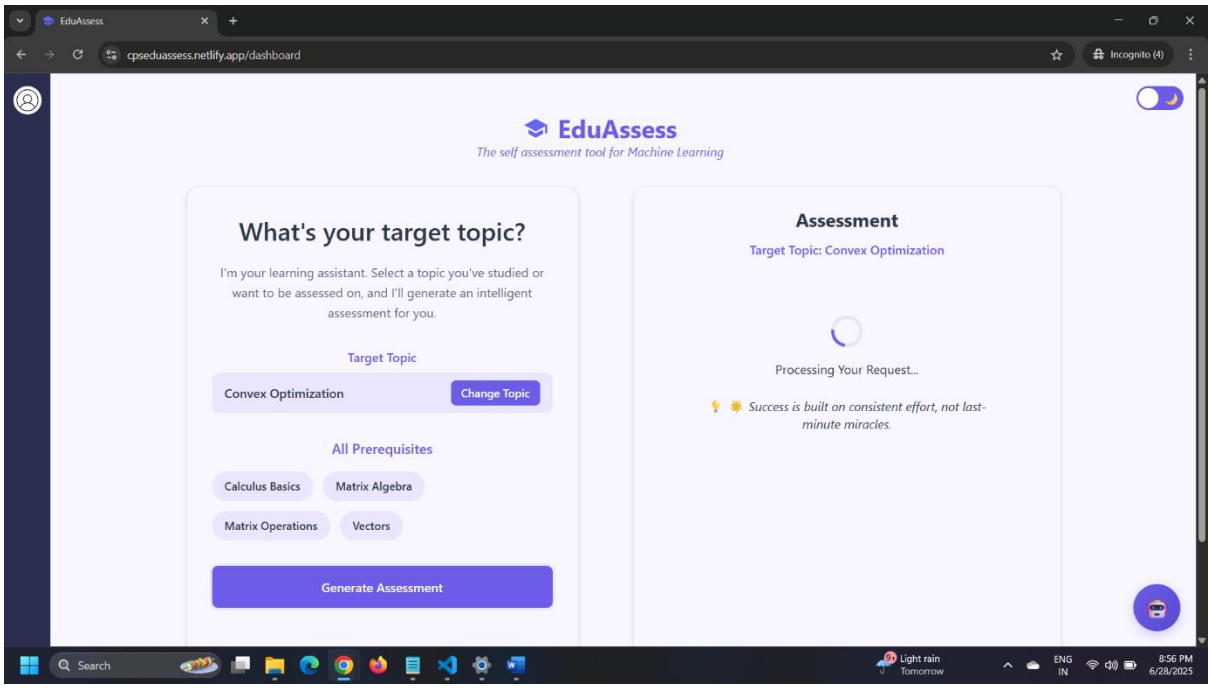
The self assessment tool for Machine Learning
What's your target topic?
I'm your learning assistant. Select a topic you've studied or want to be assessed on, and I'll generate an intelligent assessment for you.
Target Topic
Convex Optimization
Change Topic
All Prerequisites
Calculus Basics
Matrix Algebra
Matrix Operations
Vectors
Generate Assessment
Assessment
Target Topic: Convex Optimization
Processing Your Request...
Every expert was once a student who chose not to give up.
Search
Light rain
Tomorrow
ENG
IN
8:56 PM
6/28/2025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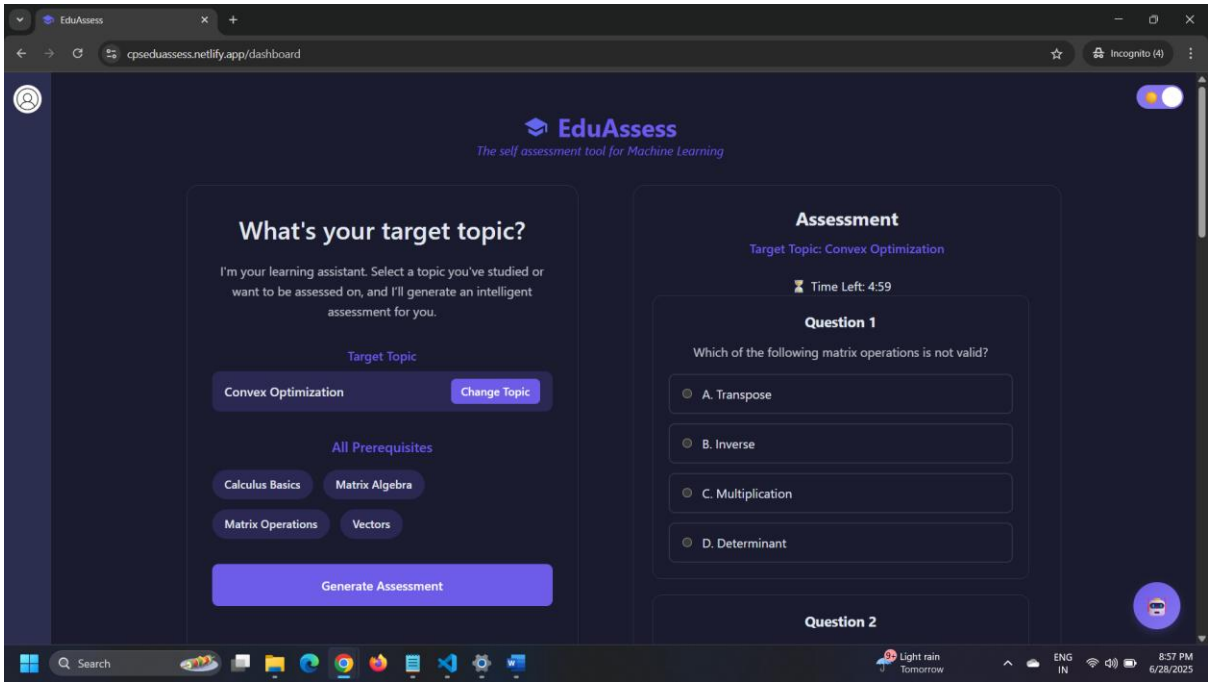
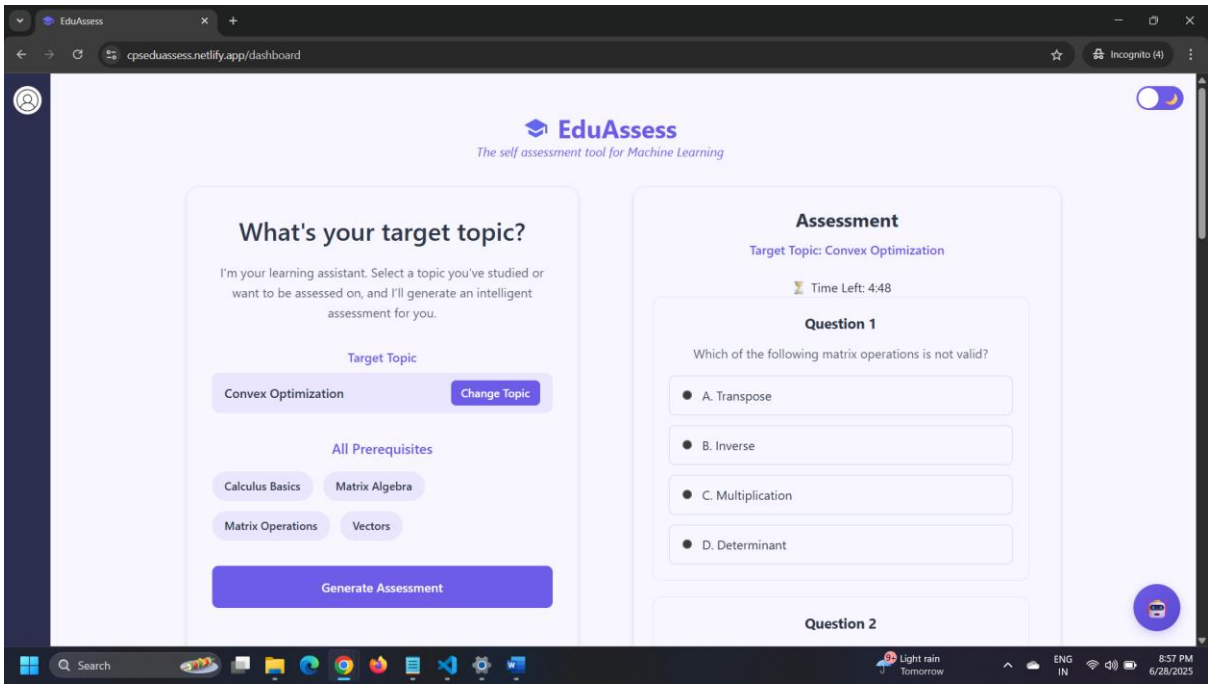
6/28/2025





Software API Interfaces

Interface for Quiz Generation

POST https://openrouter.ai/api/v1/chat/completions

This API call is used to send the prompt including the prerequisites and target concept to the LLM in order to generate appropriate quiz questions to determine the understanding.

Header: Authorization, Content-Type

Parameters: Model and Messages[role, content]

Sample Output


```
{
  "targetTopic": "Convex Optimization",
  "questions": [
    {
      "question": "Which of the following matrix operations is not valid?",
      "options": ["A. Transpose", "B. Inverse", "C. Multiplication", "D. Determinant"],
      "correct_answer": ["D. Determinant"],
      "type": "single-correct-mcq",
      "topic_tested": "Matrix Operations",
      "concept_area": "Linear Algebra",
      "difficulty": "Easy",
      "insight_if_wrong": "Determinant is a scalar value calculated from a square matrix and cannot be performed as an operation on a non-square matrix.",
      "estimated_time_min": 1
    }
}
```


Interface for Chatbot

POST https://openrouter.ai/api/v1/chat/completions

This API call is used to send the prompt including the user's query, and our knowledge base to the LLM in order to generate an answer to their query.

Header: Authorization, Content-Type

Parameters: Model and Messages[{role, content}], temperature, max_tokens, return_full_text

Interface to gmail to send the forgot password mail

When sending the mail the parameters include to, subject and the text.

The transporter is defined as a standard utility:

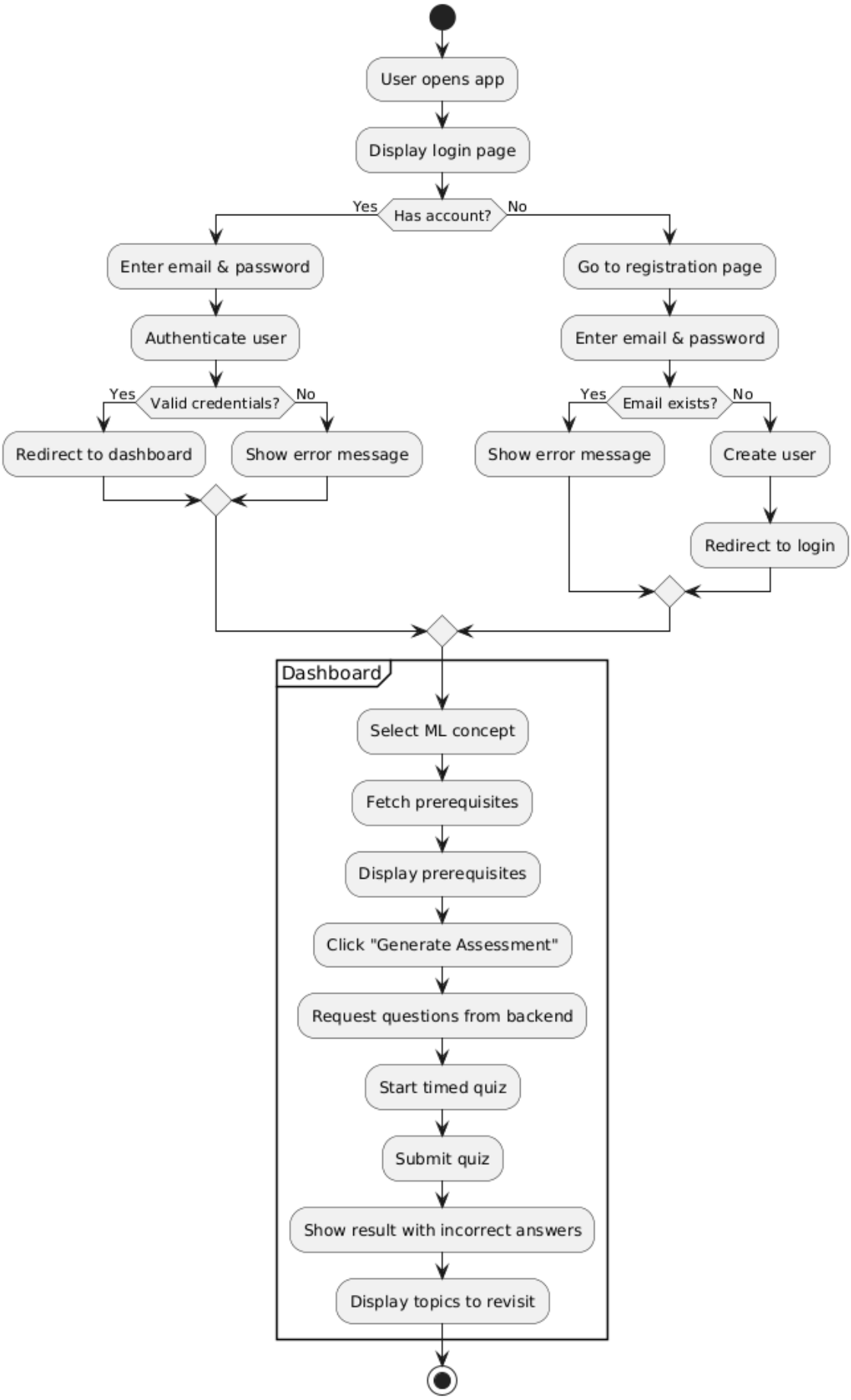
```
const transporter = nodemailer.createTransport({
  service: 'Gmail',
  auth: {
    user: process.env.EMAIL_USER,
    pass: process.env.EMAIL_PASS,
  },
});
```

External Dependencies

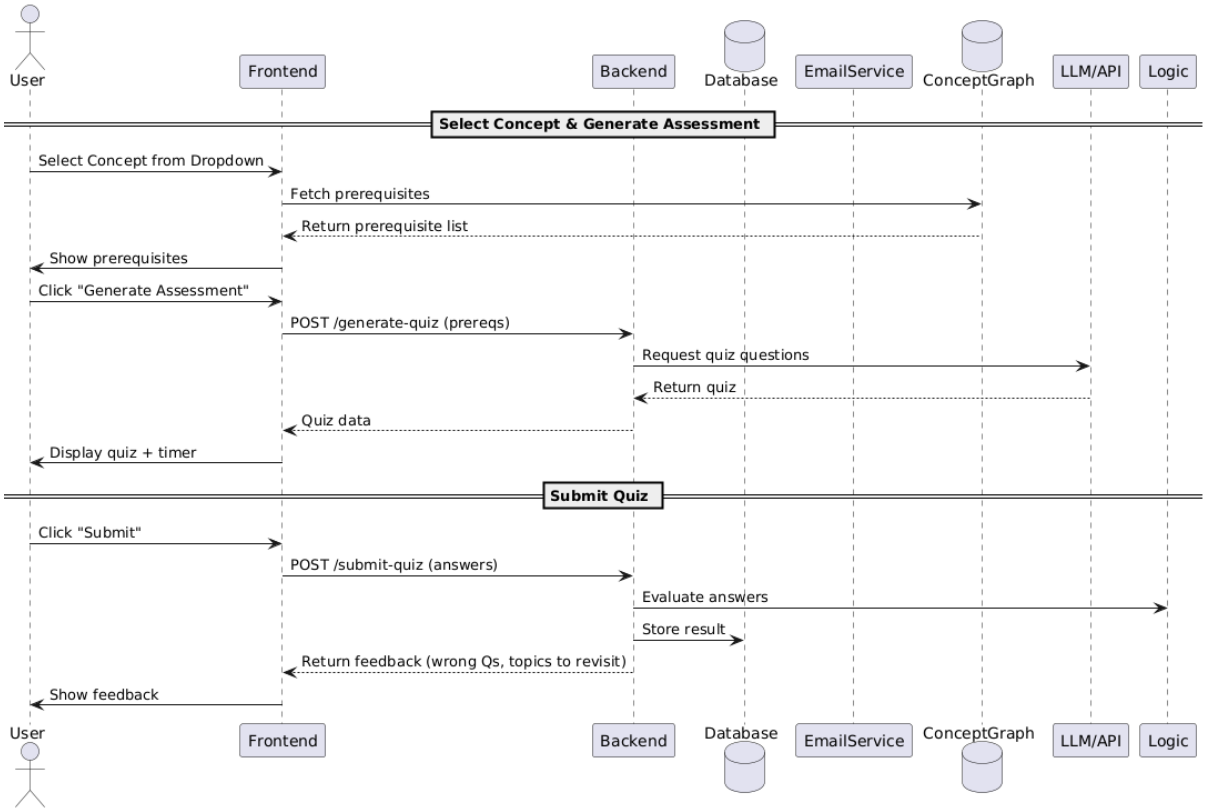
1. Mistral 7B Instruct LLM is being called using an API key for both quiz generation and Chatbot support.
2. Gmail is being used to send mails to the user if they forget their password.

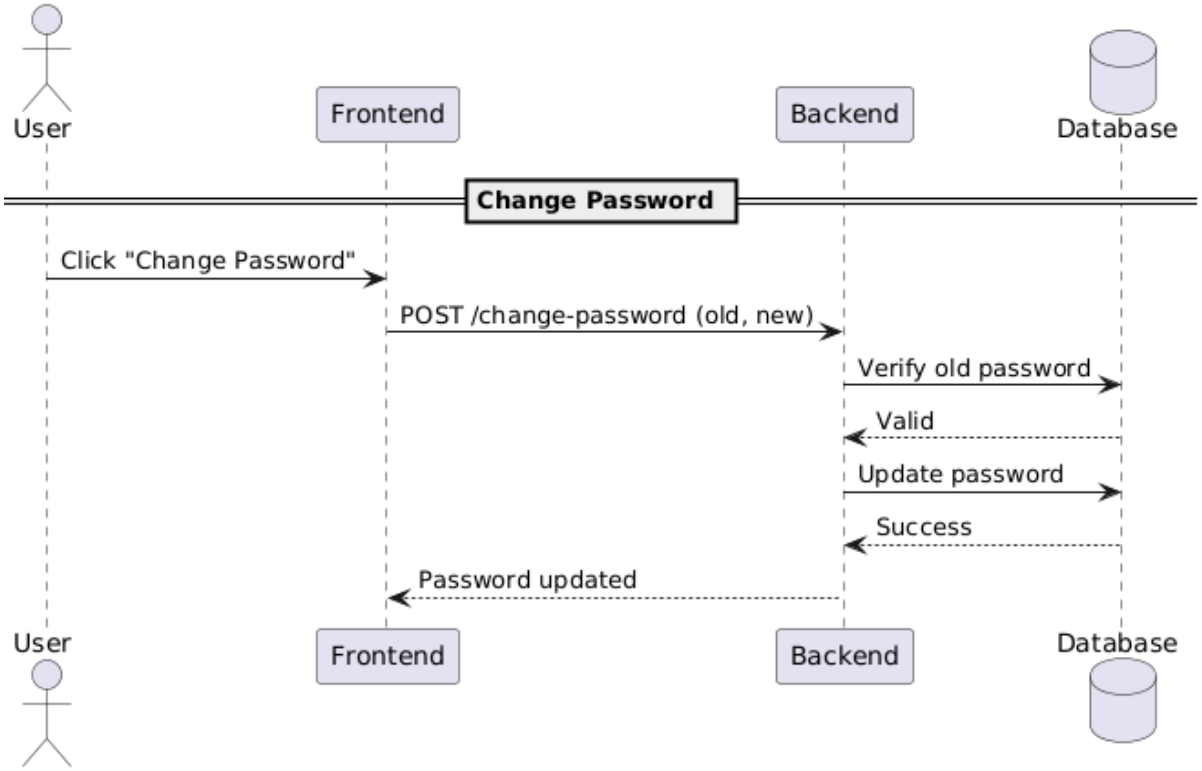
UML Diagrams

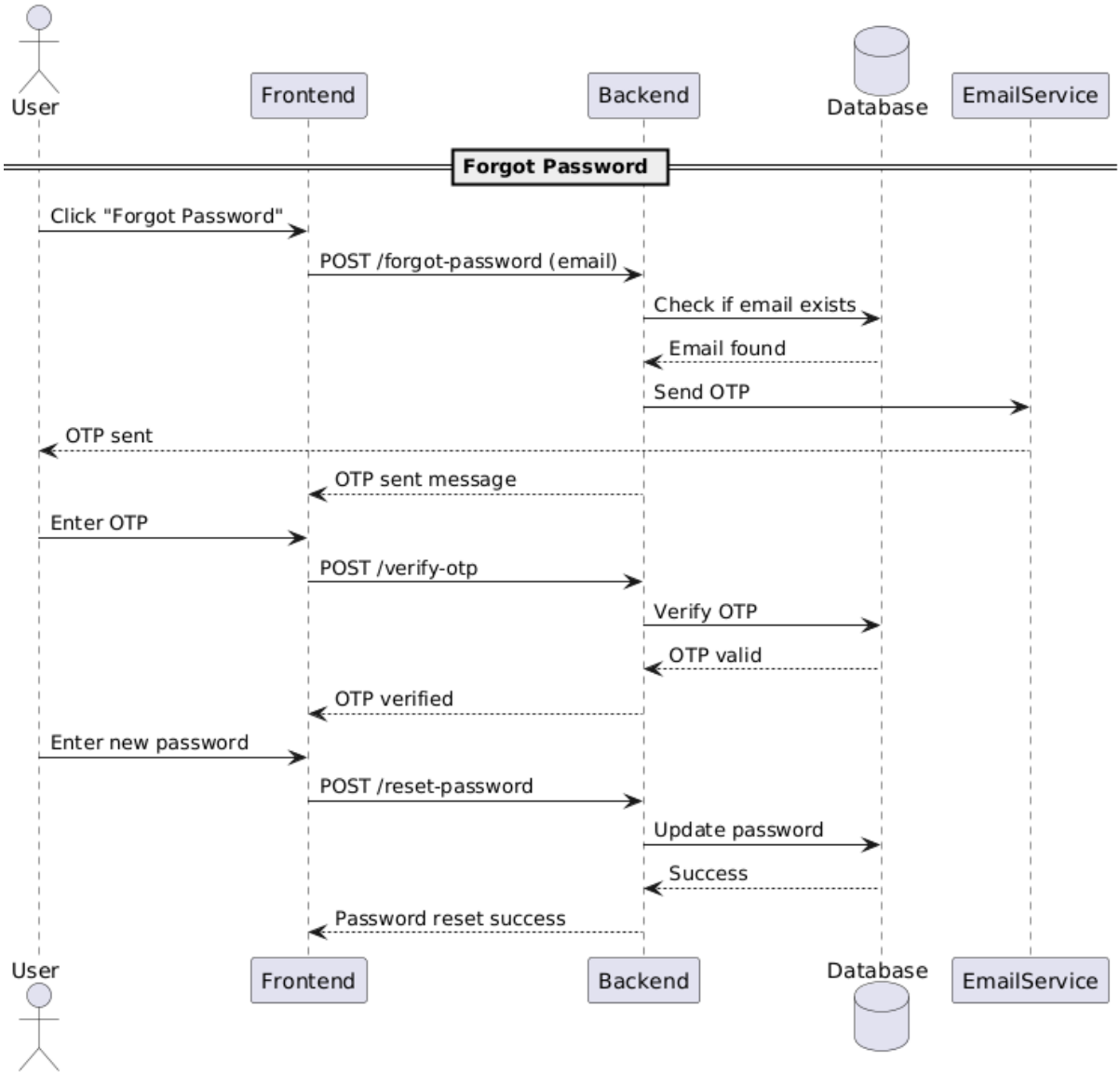
Activity Diagram

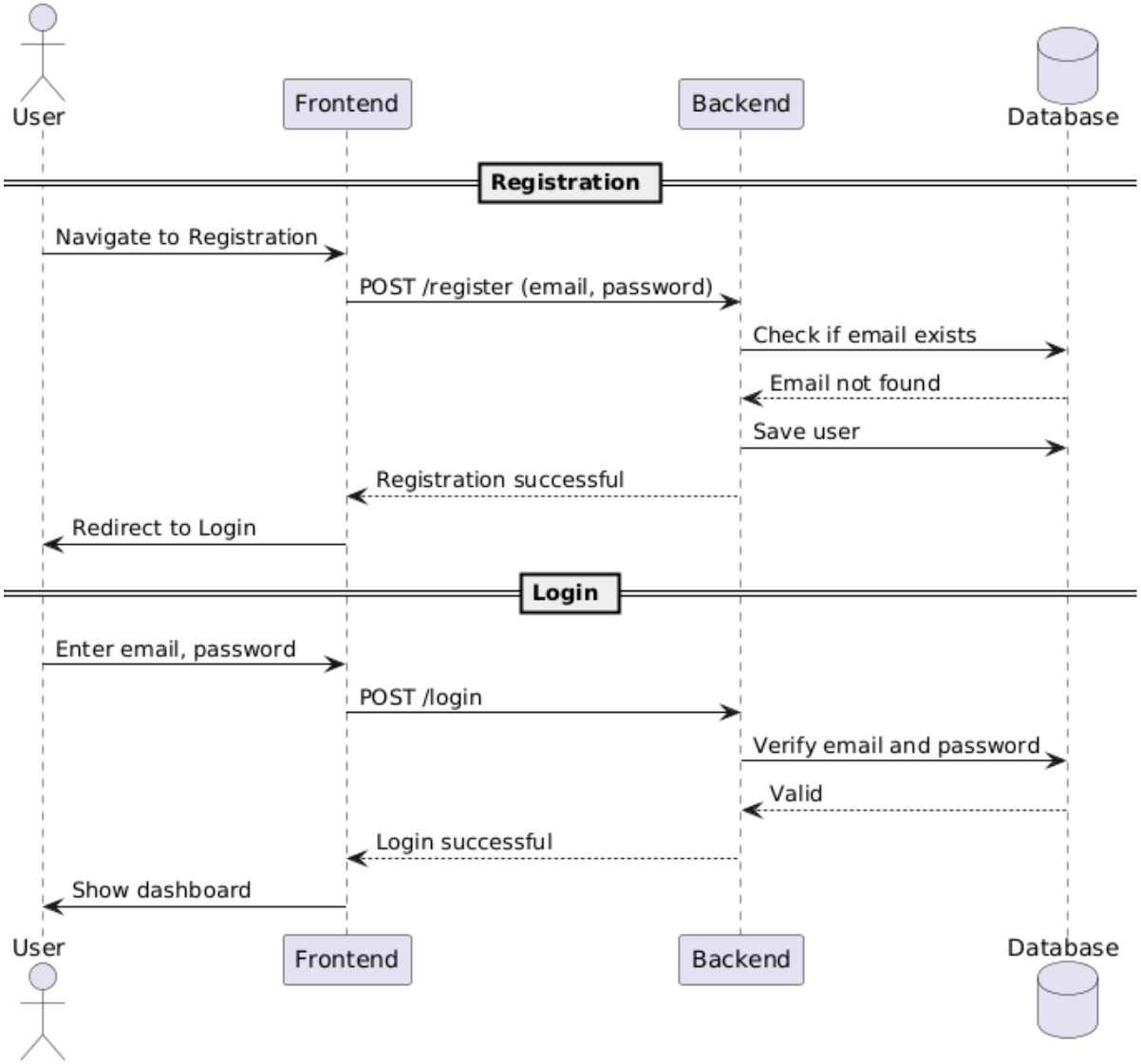

User opens app
Display login page
Has account?
Yes
No
Enter email & password
Authenticate user
Valid credentials?
Yes
No
Redirect to dashboard
Show error message
Go to registration page
Enter email & password
Email exists?
Yes
No
Show error message
Create user
Redirect to login
Dashboard
Select ML concept
Fetch prerequisites
Display prerequisites
Click "Generate Assessment"
Request questions from backend
Start timed quiz
Submit quiz
Show result with incorrect answers
Display topics to revisit

Sequence Diagram

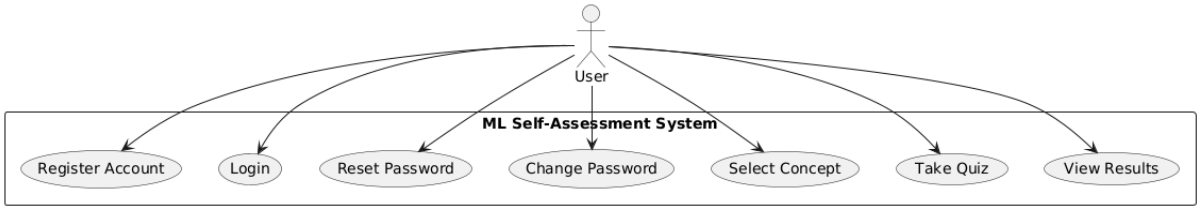





User
Frontend
Backend
Database
EmailService
Forgot Password
Click "Forgot Password"
POST /forgot-password (email)
Check if email exists
Email found
Send OTP
OTP sent
OTP sent message
Enter OTP
POST /verify-otp
Verify OTP
OTP valid
OTP verified
Enter new password
POST /reset-password
Update password
Success
Password reset success
User
Frontend
Backend
Database
EmailService



Use Case Diagram and Description



Use Case Description

U1: Register User

Using this use case, a new user can register themselves by providing a valid email and password.

Scenario 1: Mainline Sequence

1. User: selects the **Register** option.

2. System: displays prompt to enter email and password.
3. User: enters email and password.
4. System: checks if email is already in use.
5. System: creates the user and redirects to login page.

Scenario 2: At step 4 of mainline sequence

4. System: displays the message "User already exists".

Scenario 3: At step 3 of mainline sequence

3. System: displays message "All fields are required" if email or password is missing.

U2: Login User

Using this use case, a registered user can log in using their email and password.

Scenario 1: Mainline Sequence

1. User: selects the **Login** option.
2. System: displays prompt to enter email and password.
3. User: enters valid credentials.
4. System: verifies credentials.
5. System: grants access and redirects to the dashboard.

Scenario 2: At step 4 of mainline sequence

4. System: displays "Invalid email or password".

U3: Reset Password

Using this use case, a user who has forgotten their password can reset it using an OTP sent to their email.

Scenario 1: Mainline Sequence

1. User: selects **Forgot Password** option.
2. System: prompts for email.
3. User: enters email.
4. System: checks if email exists in database.

5. System: sends OTP to email.
6. User: enters OTP and new password.
7. System: verifies OTP and updates password.

Scenario 2: At step 4 of mainline sequence

4. System: displays "Email not found".

Scenario 3: At step 7 of mainline sequence

7. System: displays "Invalid or expired OTP".

U4: Change Password

Using this use case, a logged-in user can change their password by providing the old one.

Scenario 1: Mainline Sequence

1. User: selects **Change Password** option.
2. System: prompts for old and new passwords.
3. User: enters both values.
4. System: verifies old password.
5. System: updates password and shows success message.

Scenario 2: At step 4 of mainline sequence

4. System: displays "Incorrect current password".

U5: Select ML Concept

Using this use case, the user can choose a machine learning concept for self-assessment.

Scenario 1: Mainline Sequence

1. User: selects **Concept** from dropdown.
2. System: loads and displays list of prerequisite concepts from local JSON.

U6: Generate & Take Quiz

Using this use case, the user generates a quiz and attempts it.

Scenario 1: Mainline Sequence

1. User: clicks **Generate Assessment** button.
2. System: fetches quiz questions from backend API based on prerequisites.
3. User: takes timed quiz.
4. User: submits quiz.
5. System: evaluates and shows incorrect answers and list of topics to revisit.