

EduTutor AI: Personalized Learning with Generative AI and LMS Integration

Project description:

EduTutor AI is an AI-powered personalized education platform that revolutionizes the way students learn and educators assess progress. It provides dynamic quiz generation, student evaluation, Google Classroom integration, and real-time feedback—all powered by IBM Watsonx and Granite foundation models. Designed with modular architecture, this platform streamlines personalized education and enhances learning outcomes for students across academic levels.

Scenario 1: Personalized Learning Experience

A student logs into EduTutor AI and synchronizes their courses using their Google Classroom credentials. The platform analyzes course data, generates quizzes on key topics using the Granite LLM, and assesses responses for instant feedback—creating a highly personalized and engaging learning journey.

Scenario 2: Educator Dashboard & Performance Insights

Educators can log in to view real-time quiz performance of all students. The dashboard highlights quiz history, scores, last topics attempted, and insights fetched from the Pinecone vector database. This empowers teachers to monitor learning progress and personalize their instruction based on data.

Scenario 3: Diagnostic Testing and Adaptive Quizzing

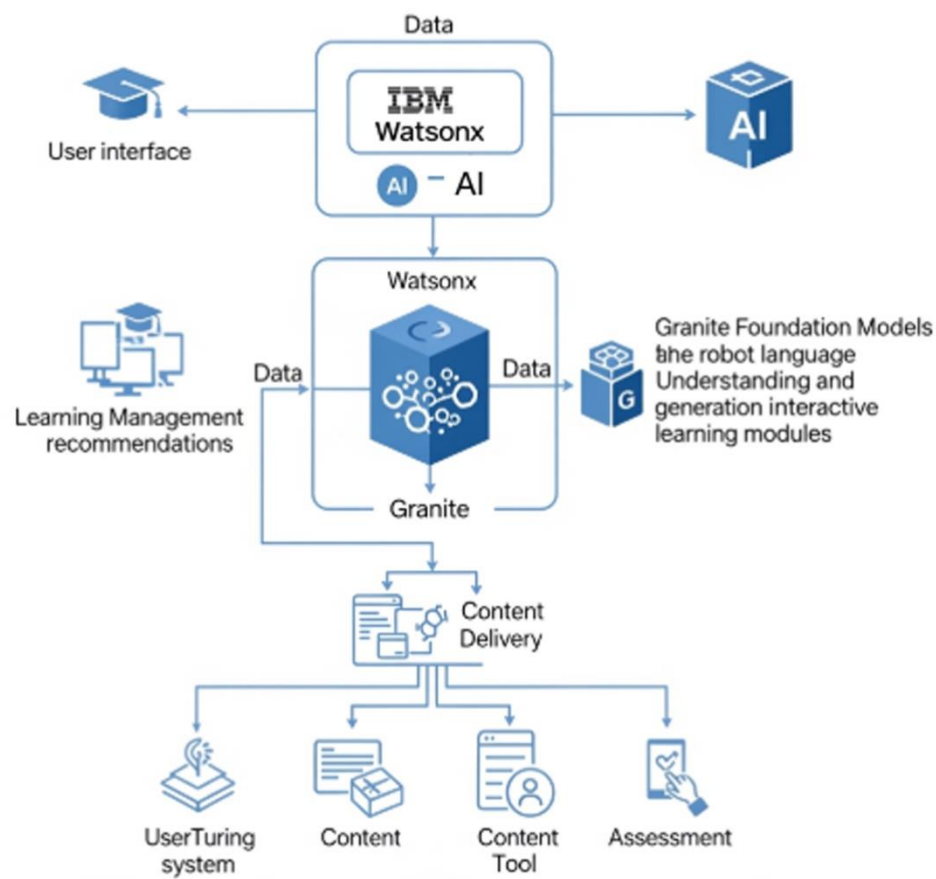
Upon registration, students undergo a diagnostic test generated by IBM Watsonx models. Based on the results, the platform adapts quiz difficulty and topic relevance, ensuring students are challenged at the right level.

Scenario 4: Google Classroom Integration

EduTutor AI syncs courses directly from Google Classroom, allowing seamless access to student data, class names, and subjects. This enables automatic quiz topic generation and helps maintain consistent alignment with the academic curriculum.

Architecture:

EduTutor AI



project flow:

1. User Input:

Students log in using credentials or Google Classroom and request a quiz by selecting topic and difficulty.

2. AI Quiz Generation:

Watsonx+Granite models generate MCQs, stored temporarily without answers in the frontend and with answers in the backend

3. User Quiz Submission:

Students submit answers via UI. The backend evaluates the answers, scores the quiz, and stores it in Pinecone DB. But Some errors couldnt built the frontend part of it

4. Feedback Loop

5. Educators access this data in the dashboard.

Milestone 1: Requirements Specification:

- [fastapi](#)
- [uvicorn](#)
- [langchain_ibm](#)
- [pinecone](#)
- [streamlit](#)
- [google-auth-oauthlib](#)
- [google-api-python-client](#)
- [python-dotenv](#)

Installation:

```
pip install -r requirements.txt
```

Requirements:

- `fastapi`
- `uvicorn`
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- `python-dotenv`

Installation:

`pip install -r requirements.txt`

Milestone 2: Initialization of Environment Variables:

Create a `.env` file with:

`env`

`WATSONX_MODEL_ID=granite-13b-instruct-v2`

`WATSONX_API_KEY=your_ibm_watsonx_api_key`

`WATSONX_ENDPOINT=https://us-south.ml.cloud.ibm.com`

`WATSONX_PROJECT_ID=your_project_id`

`PINECONE_API_KEY=your_pinecone_api_key`

`PINECONE_INDEX_NAME=edututor`

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Milestone 3: AI Integration with IBM Watsonx:

- **Model Setup:** Granite model is loaded via **langchain_ibm.WatsonxLLM**.
- **Prompt Template:** Dynamically generates quiz questions using LangChain's PromptTemplate.
- **Quiz Parsing:** Watsonx output is parsed into structured JSON for display and evaluation.

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Milestone 4: Google Classroom Sync:

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Milestone 5: Pinecone Vector DB Integration:

- **Stores each user's profile with embeddings.**
- **Quiz metadata (score, topic, date) is updated after submission.**
- **Allows educators to fetch student data and analyze progress.**

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Milestone 6: Streamlit Frontend UI:

- **Student Panel:**
 - **Login (Manual or Google)**
 - **Dashboard**
 - **Take Quiz**
 - **Quiz History**
- **Educator Panel:**
 - **Dashboard (all student analytics)**

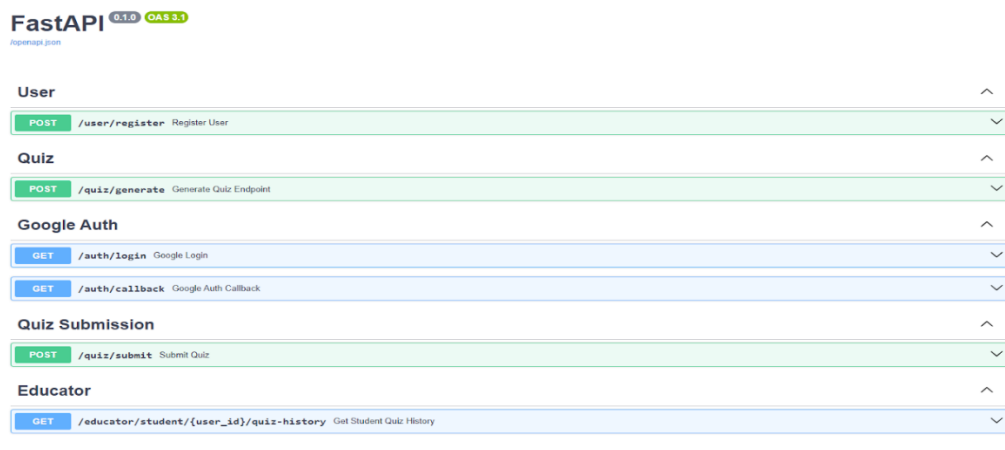
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Milestone 7 : functional verification:

Modular AI-Powered Architecture

- **FastAPI Backend**
Handles student/educator login, quiz generation, answer evaluation, classroom sync, and metadata updates.

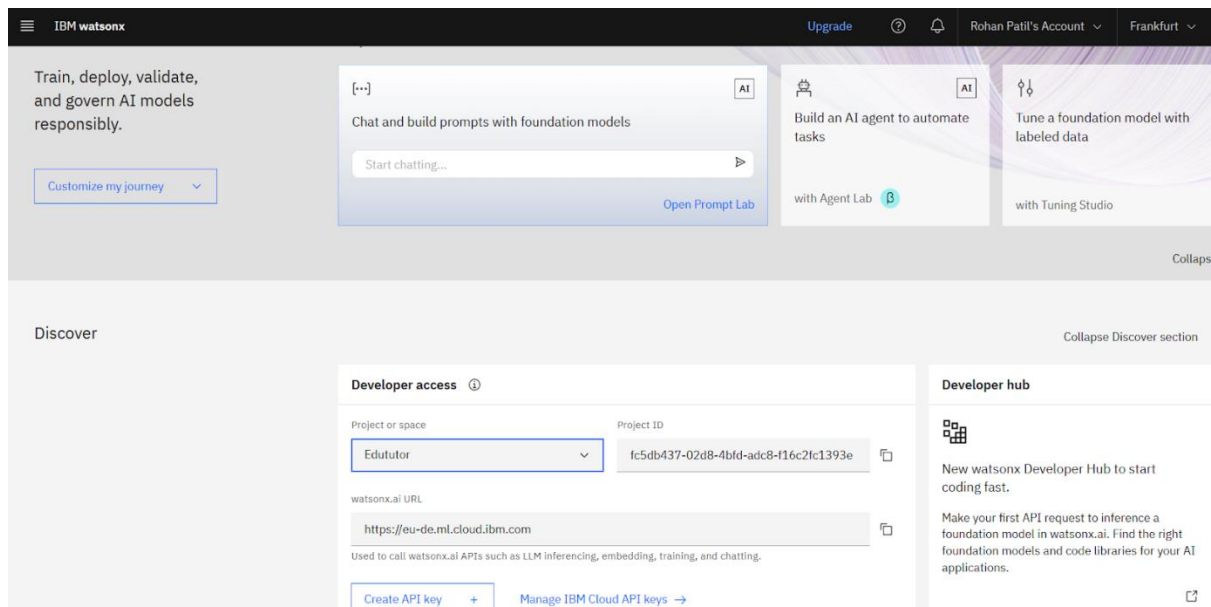


FastAPI 0.109.0 OpenAPI 3.1

User		^
POST	/user/register	Register User
Quiz		^
POST	/quiz/generate	Generate Quiz Endpoint
Google Auth		^
GET	/auth/login	Google Login
GET	/auth/callback	Google Auth Callback
Quiz Submission		^
POST	/quiz/submit	Submit Quiz
Educator		^
GET	/educator/student/{user_id}/quiz-history	Get Student Quiz History

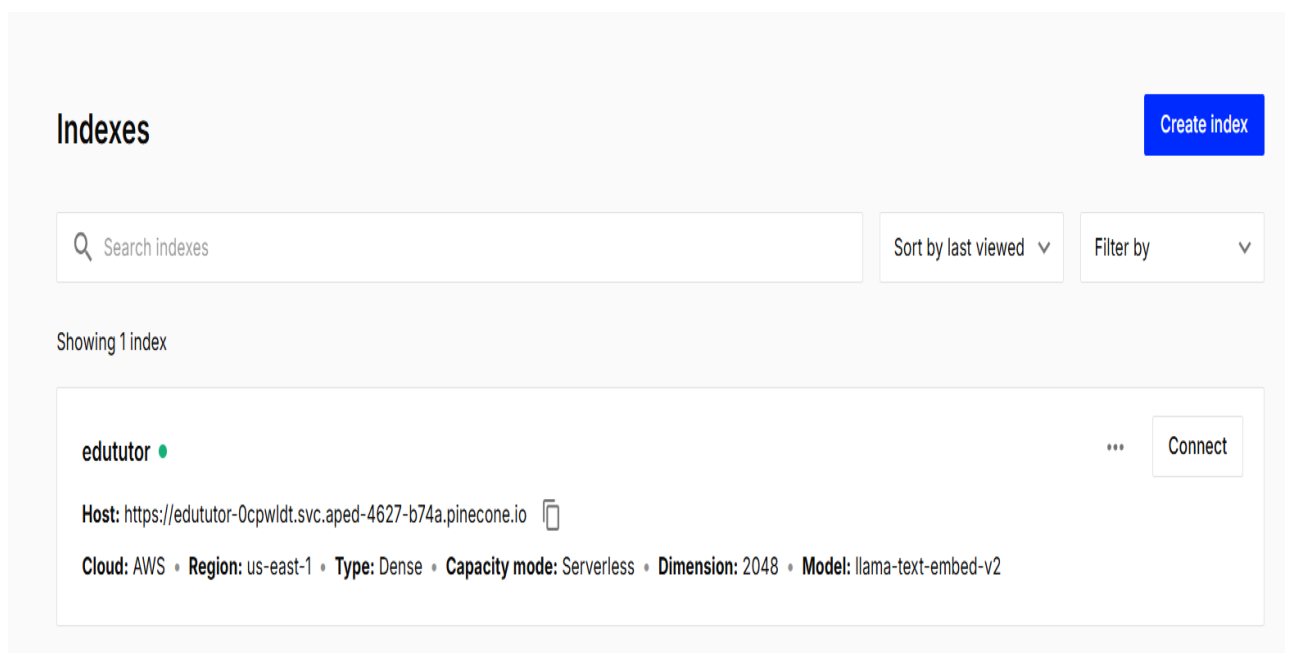
Watsonx + Granite Models:

Generates MCQs dynamically from topic input. Provides instruction-tuned inference via LangChain Watsonx integration.



- **Pinecone Vector DB:**

stores user profile embeddings, quiz history metadata, and similarity search for adaptive learning.



[BROWSER](#) [METRICS](#) [NAMESPACES \(1\)](#) [CONFIGURATION](#)

Records

SearchList/FetchAdd a record

Namespace

(Default)

Search by

Text

Text

Example text

×

Top K

10

Search

+ Filter

+ Rerank

Showing 1 hit

1

ID: user123
last_quiz_id: "602af2fb-582e-450c-95b4-289dc0c7230c"
last_score: 2
last_topic: "Photosynthesis"
last_total: 19
last_updated: "2025-04-12T11:36:46.987775"


...

SCORE
0.0087

- **Streamlit Frontend:**

provides dashboards for both students and educators with role-based UI, quiz submission forms, and OAuth-based login.

Deploy

 **EduTutor AI Login** ©2025

Select Role

student

Enter User ID

Login

Or

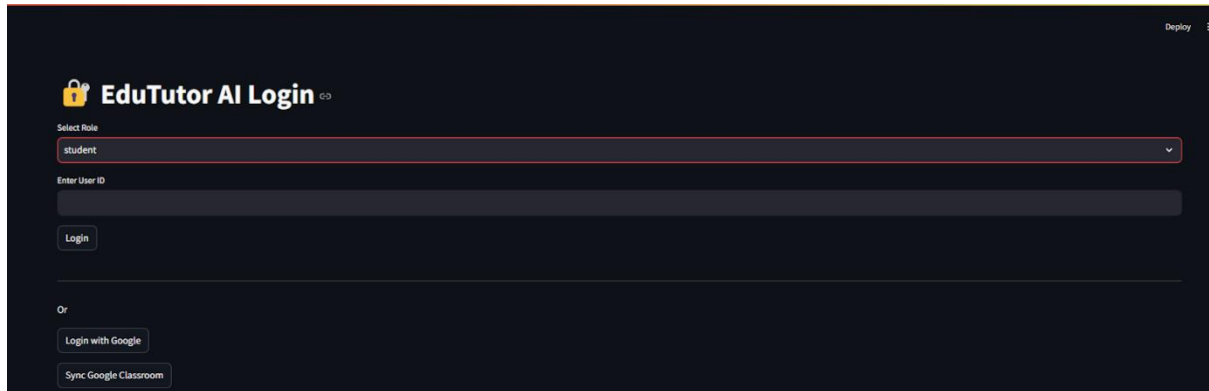
Login with Google

Sync Google Classroom

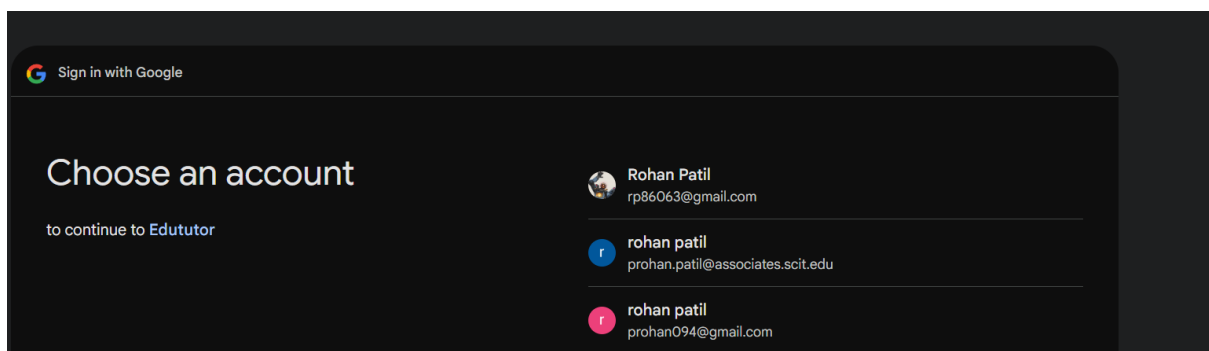
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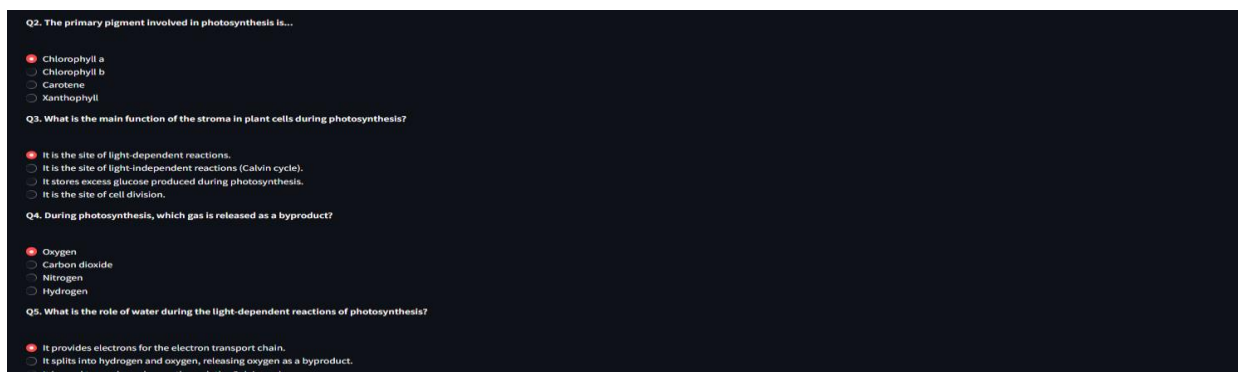
The login interface for EduTutor AI. It features a dark blue background with a lock icon and the text 'EduTutor AI Login'. Below this, there is a 'Select Role' dropdown menu with 'student' selected. A text input field for 'Enter User ID' is present, followed by a 'Login' button. Below the login section, there is an 'Or' separator, followed by 'Login with Google' and 'Sync Google Classroom' buttons. A 'Deploy' button is visible in the top right corner.



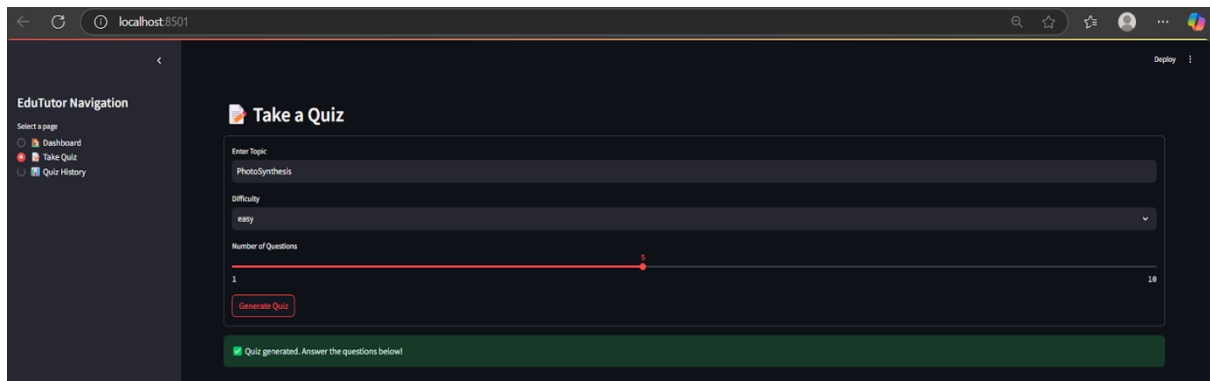
The Google sign-in interface. It shows the 'Sign in with Google' button at the top. Below it, the text 'Choose an account' is displayed, followed by 'to continue to Edututor'. Three account options are listed: 'Rohan Patil' (rp86063@gmail.com), 'rohan patil' (prohan.patil@associates.scit.edu), and 'rohan patil' (prohan094@gmail.com). Each account has a circular profile picture icon.

2.AI Quiz Generation:

Watsonx+Granite models generate MCQs, stored temporarily without answers in the frontend and with answers in the backend.



The AI Quiz Generation interface. It displays five multiple-choice questions (MCQs) related to photosynthesis. Each question has a list of options, with the correct answer highlighted by a red dot. The questions are: Q2. The primary pigment involved in photosynthesis is... (Chlorophyll a), Q3. What is the main function of the stroma in plant cells during photosynthesis? (It is the site of light-dependent reactions), Q4. During photosynthesis, which gas is released as a byproduct? (Oxygen), and Q5. What is the role of water during the light-dependent reactions of photosynthesis? (It provides electrons for the electron transport chain).



3.User Quiz Submission:

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Showing 1 hit

1	ID: user123
	last_quiz_id: "02af2fb-582e-450c-95b4-289dc0c7230c"
	last_topic: "Photosynthesis"
SCORE	last_topic: "Photosynthesis"
0.0087	last_total: 19
	last_updated: "2025-04-12T11:36:46.987775"