

Project Design Phase-II

Technology Stack (Architecture & Stack)

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Team ID: LTVIP2025TMID35893

Project Name: edututor ai: personalized learning with generative ai and lms

Maximum Marks: 4 Marks

Technical Architecture

The EduTutor AI platform is an intelligent educational assistant built using FastAPI and Python on Google Colab. It integrates IBM Granite LLM (granite-3.3-2b-instruct) via Hugging Face for real-time quiz generation and adaptive learning. The platform supports Google Classroom integration, dynamic student dashboards (via Pinecone), and diagnostic testing powered by Watsonx. The solution is deployable via public links and supports cloud extensibility for scalable academic use.

Table-1: Components & Technologies

S. No	Component Description	Technology
1	User Interface - Student & Teacher UI to interact with EduTutor AI	HTML, CSS (served via Colab or FastAPI)
2	Application Logic-1 - Handles prompt formatting and subject-wise query routing	Python
3	Application Logic-2 - Quiz generation, learning adaptation, and feedback logic	Python
4	Application Logic-3 - LLM-based question answering, personalized learning	IBM Granite 3.3-2b-instruct via Hugging Face API
5	Database (Temporary) - Stores in-memory user progress	Python Dictionaries
6	Cloud Vector DB - Stores embeddings for progress tracking and concept understanding	Pinecone
7	File Storage - Supports student resume uploads and	Local Filesystem (Colab)

	result PDF generation	
8	External API-1 - Google Classroom API integration for auto-grading and scheduling	Google Classroom API
9	External API-2 (Optional) - IBM Watsonx for adaptive test intelligence	IBM Watsonx
10	Machine Learning Model - LLM model for real-time contextual learning	IBM Granite via Hugging Face
11	Infrastructure (Cloud) - Hosted using Colab with FastAPI + Ngrok / Hugging Face Spaces	Google Colab / Hugging Face / Ngrok

Table-2: Application Characteristics

S. No	Characteristics	Description	Technology
1	Open-Source Frameworks	Built using open-source educational and AI tools	Python, FastAPI, Colab, Hugging Face Transformers
2	Security Implementations	No login currently; future support includes OAuth, JWT, and class codes	SHA-256 (planned), Google OAuth
3	Scalable Architecture	Modular architecture that can grow to LMS-level platform	2-tier (UI + API), scalable to 3-tier
4	Availability	Deployed using Google Colab or Hugging Face Spaces with public URL access	Hugging Face Spaces / Google Colab