

Project Design Phase-II
Technology Stack (Architecture & Stack)

Date	26 JUNE 3035
Team ID	LTVIP2025TMID29388
Project Name	Edu-Tutor AI: Personalized Learning with Generative AI and LMS Integration
Maximum Marks	4 Marks

Technical Architecture

The Edu-Tutor AI system is a personalized e-learning platform using advanced AI technologies. It integrates natural language processing, voice interactions, and cloud infrastructure to deliver personalized, secure, and scalable education.

Architecture Diagram:

- [Architecture Diagram – Edu-Tutor AI System Flow (C4 Style & Cloud Demarcation)] (To be inserted)

Table-1: Application Characteristics

S.No	Characteristics	Description	Technology
1	Open-Source Frameworks	Gradio, Flask, FastAPI, ReactJS	MIT Licensed Components
2	Security Implementations	SHA-256 password encryption, JWT, IAM, OAuth2	OpenSSL, IBM IAM, OAuth2.0
3	Scalable Architecture	Microservices architecture + containerized deployment	Docker, Kubernetes, Helm
4	Availability	Load balancers + cloud multi-zone deployments	IBM Cloud Load Balancer, NGINX
5	Performance	CDN for asset delivery, Redis cache for API speed	Redis, IBM CDN, FastAPI

Table-2: Components & Technologies

S.No	Component	Description	Technology
1	User Interface	Chatbot + Web UI interface	ReactJS, TailwindCSS, Gradio
2	Application Logic-1	Adaptive content delivery system	Python (Flask), FastAPI
3	Application Logic-2	Speech-to-text for voice commands	IBM Watson STT
4	Application Logic-3	Natural language dialogue assistant	IBM Watson Assistant, OpenAI GPT-4
5	Database	Store user profile and learning logs	MySQL (local), MongoDB (content)
6	Cloud Database	Persistent content storage	IBM Cloudant
7	File Storage	LMS resources, PDFs, Audio files	IBM Object Storage
8	External API-1	Fetch local weather to adjust scheduling	IBM Weather API
9	External API-2	User authentication with ID	Aadhar API
10	Machine Learning Model	User personalization + Question classification model	Fine-tuned BERT / GPT-4
11	Infrastructure	Hybrid cloud architecture	IBM Cloud (Kubernetes), Local Dev Env

Chart 1: Technology Stack Distribution (Bar Graph)

- ReactJS, Flask, IBM Watson, GPT-4, IBM Cloudant

Chart 2: API Usage (Pie Chart)

- IBM Weather API: 40%
- Aadhar API: 60%

References

- <https://c4model.com/>
- <https://developer.ibm.com/patterns/online-order-processing-system-during-pandemic/>
- <https://www.ibm.com/cloud/architecture>
- <https://aws.amazon.com/architecture>
- <https://medium.com/the-internal-startup/how-to-draw-useful-technical-architecture-diagrams-2d20c9fda90d>