# CAPSTONE PROJECT

# LEARNMATE: AN AGENTIC AI FOR PERSONALIZED LEARNING ROADMAPS

**Presented By:**
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***A project developed during the IBM SkillBuild Internship program in collaboration with Edunet Foundation.***

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# OUTLINE

- **Problem Statement**
- **Proposed System/Solution**
- **System Development Approach** (Technology Used)
- **Algorithm & Deployment**
- **Result (Output Image)**
- **Conclusion**
- **Future Scope**
- **References**

# PROBLEM STATEMENT

In today's digital age, students are overwhelmed by a vast ocean of online courses. This abundance, paradoxically, creates significant barriers:

- **Choice Paralysis:** The sheer volume of options leads to confusion and indecision.
- **Unstructured Learning:** Without clear guidance, students often jump between resources, resulting in fragmented knowledge and inefficient skill development.
- **Lack of Personalization:** Generic learning paths fail to account for an individual's unique career goals, existing skills, or learning pace, leading to disengagement and wasted effort.

# PROPOSED SOLUTION

LearnMate is an intelligent agent designed to cut through the noise, acting as a personal AI learning coach.

- **How It Works:** LearnMate engages students through a simple, interactive interface to understand three key inputs:
- **Career Aspiration:** What is your target role? (e.g., *Frontend Developer*)
- **Current Proficiency:** What skills do you already possess? (e.g., *HTML, CSS*)
- **Time Commitment:** How many hours can you dedicate weekly? (e.g., *8 hours*)

Based on this, the AI generates a comprehensive, **12-week personalized roadmap** that is both actionable and realistic.

# SYSTEM APPROACH

We adopted a modern, serverless architecture to ensure scalability, maintainability, and low operational overhead.

- **Frontend:** A lightweight, static web application built with **HTML, CSS, and vanilla JavaScript**. Hosted globally via **GitHub Pages** for fast, reliable access.
- **Backend (CORS Proxy):** A **Flask API** deployed as a web service on **Render.com**. Its primary role is to securely handle requests from the frontend, manage API keys, and communicate with the IBM Watsonx service, effectively bypassing browser-based CORS restrictions.
- **AI Engine:** The core intelligence is powered by **IBM Watsonx**, which provides access to state-of-the-art **Granite Foundation Models**.

# AI MODEL & DEPLOYMENT STRATEGY

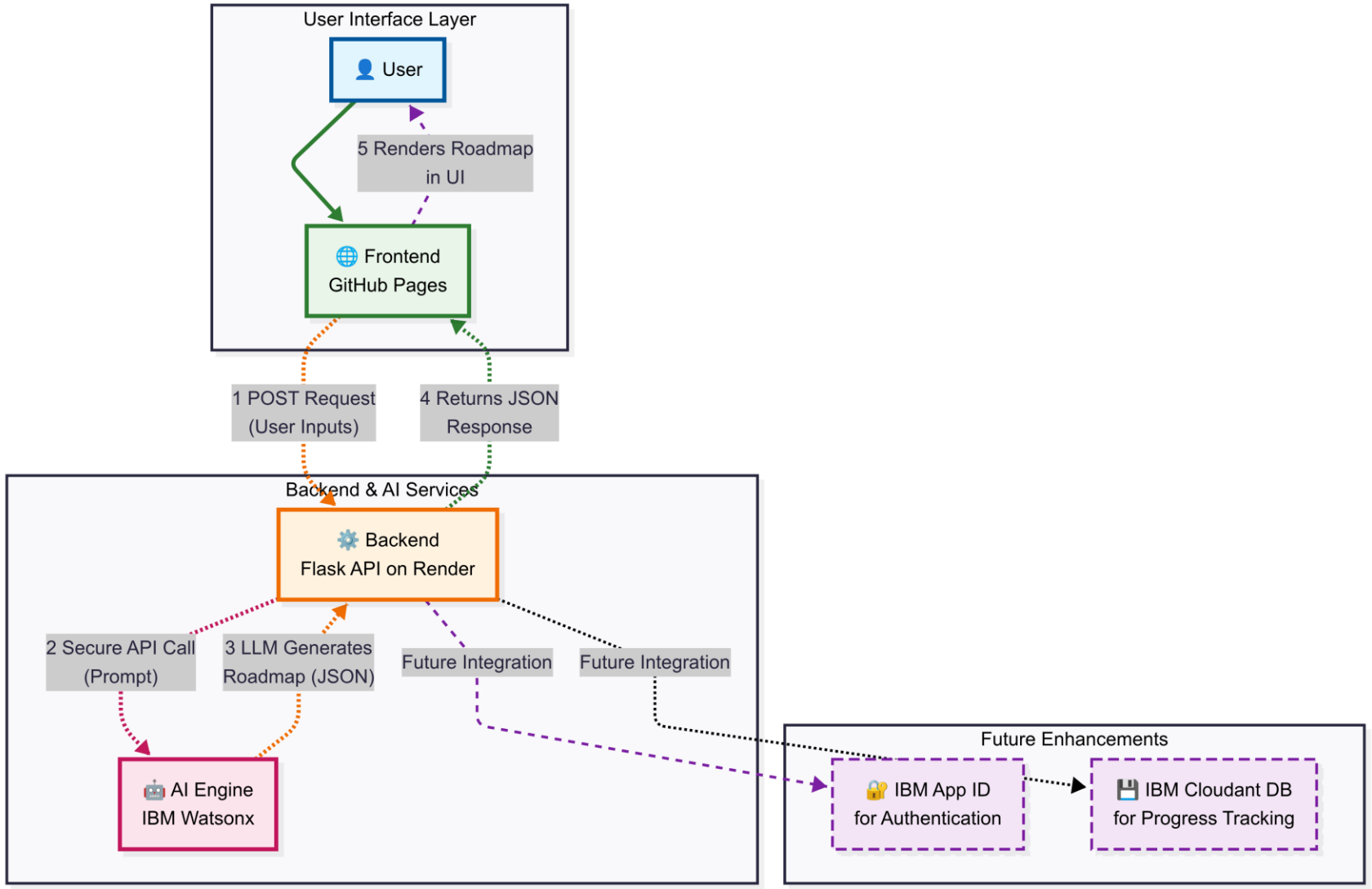
## Model Selection & Prompt Engineering:

- **Model:** I utilized the **Mistral Large** model available through IBM Watsonx for its strong instruction-following capabilities and nuanced language generation.
- **Algorithm:** The system is driven by **dynamic prompt engineering**. User inputs are programmatically inserted into a carefully structured prompt template, which instructs the LLM to generate a response in a clean, predictable **JSON format**. This ensures the data can be easily parsed and rendered by the frontend.

## Deployment Pipeline:

1. The Flask API is containerized and deployed on **Render**, which automatically builds and serves the application upon a git push.
2. The static frontend is deployed via **GitHub Pages**, which triggers a rebuild whenever changes are pushed to the main branch.

# AI MODEL & DEPLOYMENT STRATEGY

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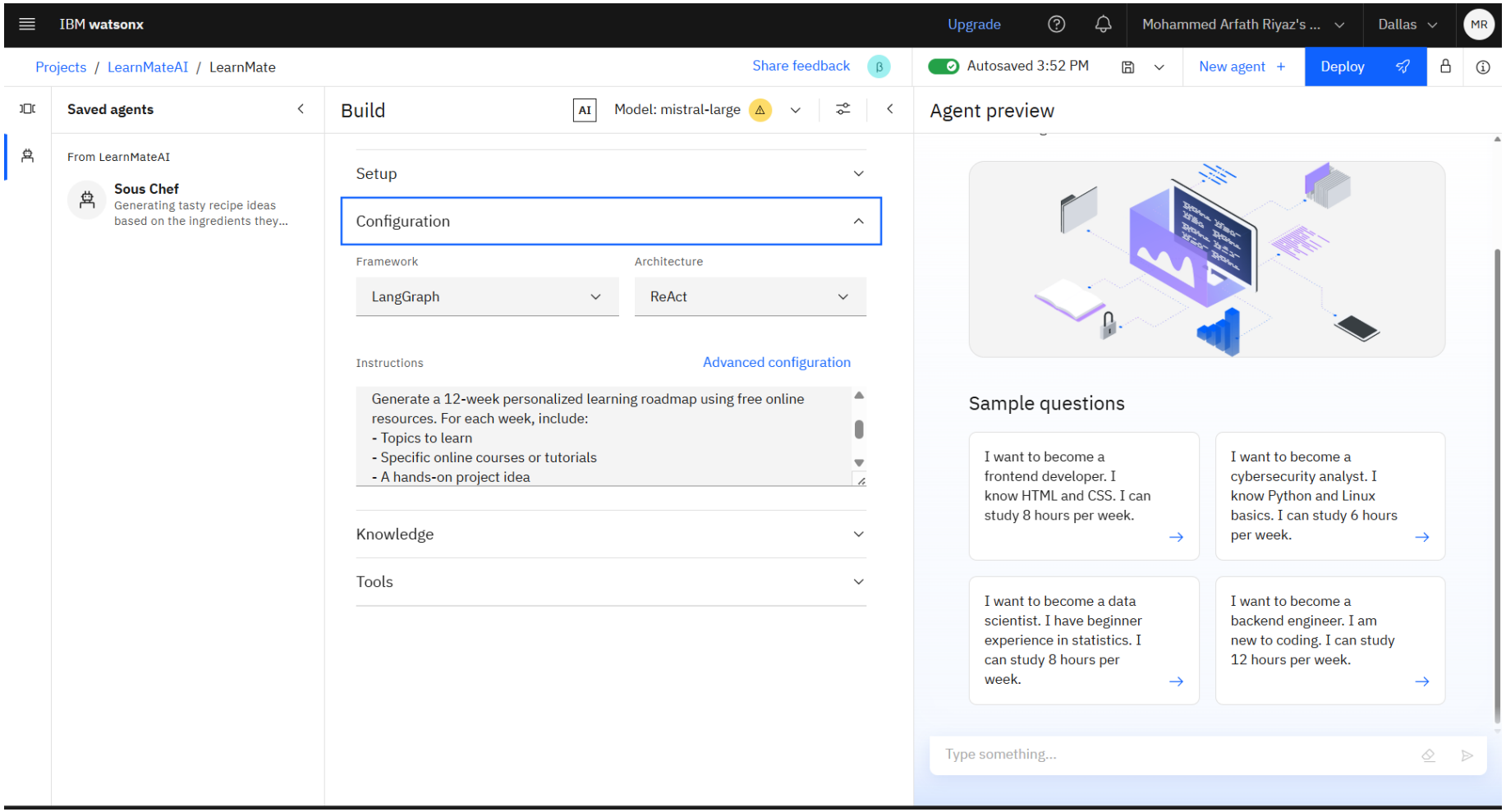
# RESULT

The system successfully generates a detailed, week-by-week learning plan tailored to the user's inputs.

- **Key Output Features:**
- **Weekly Modules:** Clear topics are assigned for each week.
- **Curated Resources:** Links to high-quality, free resources like MDN Docs, freeCodeCamp, etc.
- **Project-Based Milestones:** Actionable mini-projects to solidify learning (e.g., "Build a JavaScript To-Do List").
- **Time Allocation:** Estimated hours to complete the week's tasks, aligned with the user's availability.

**Demo Video:** https://drive.google.com/file/d/1WmqrihObiQvXc6gn8cVsubUEes883tvh/view?usp=sharing

# RESULT

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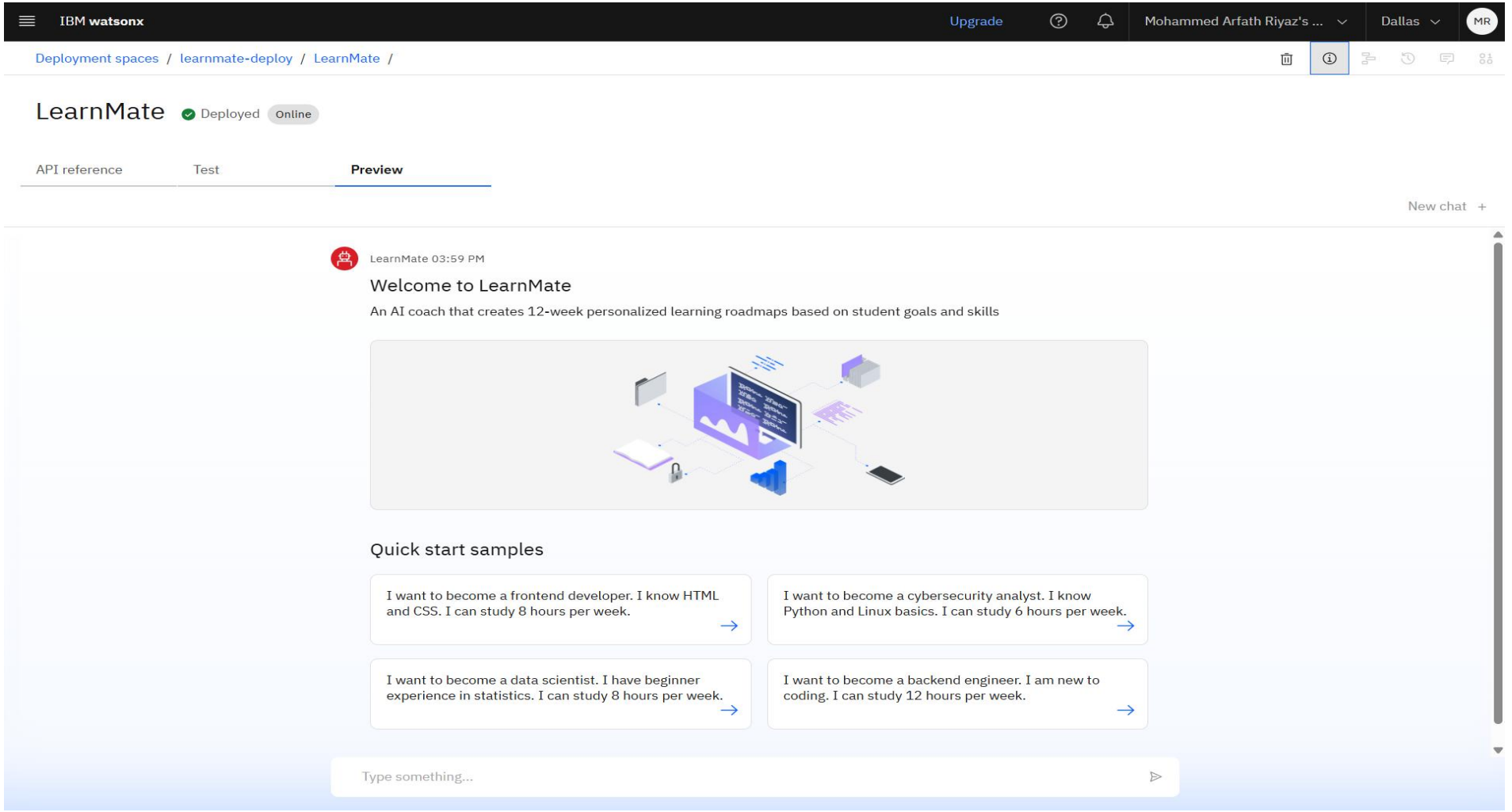
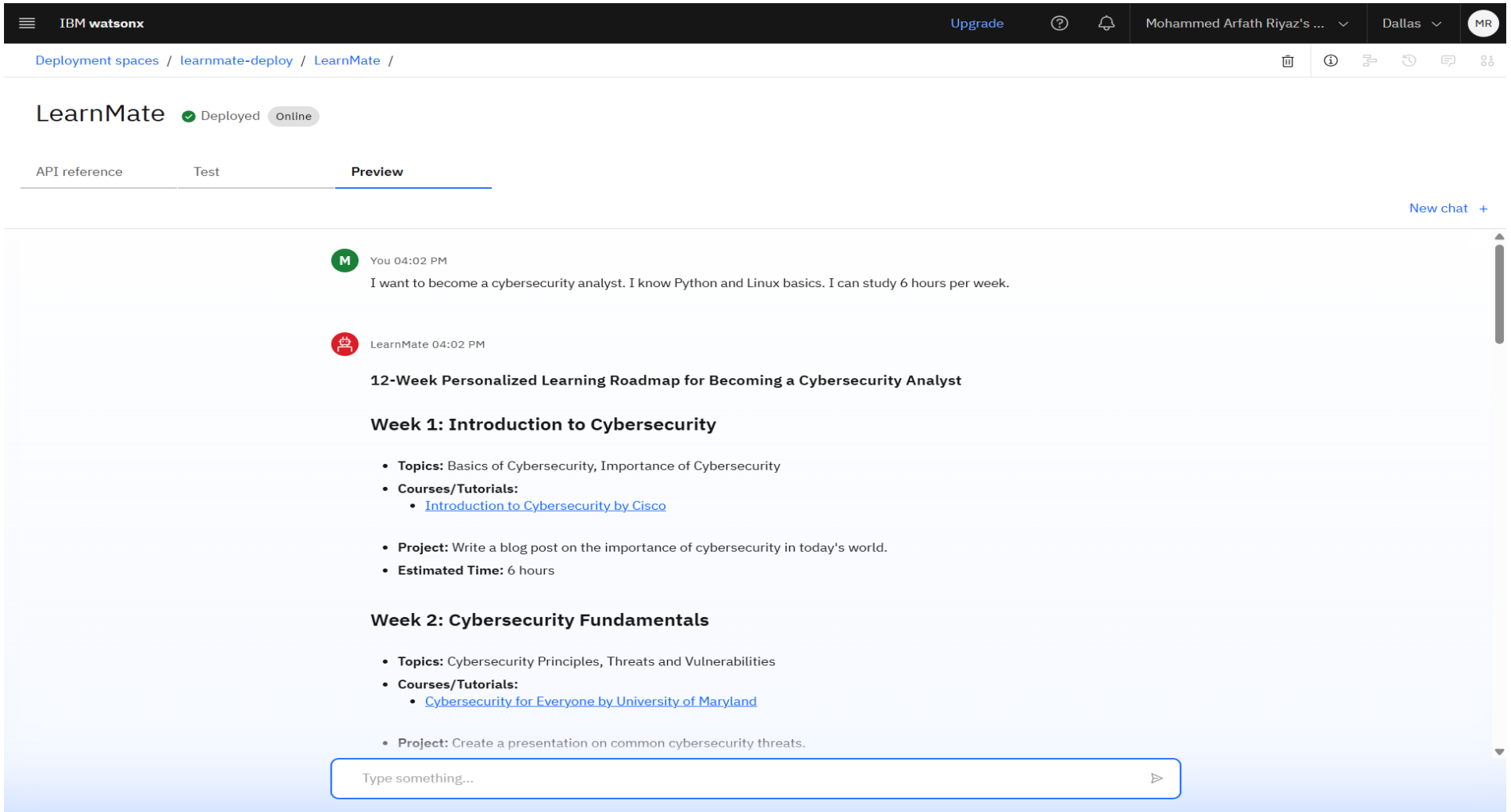
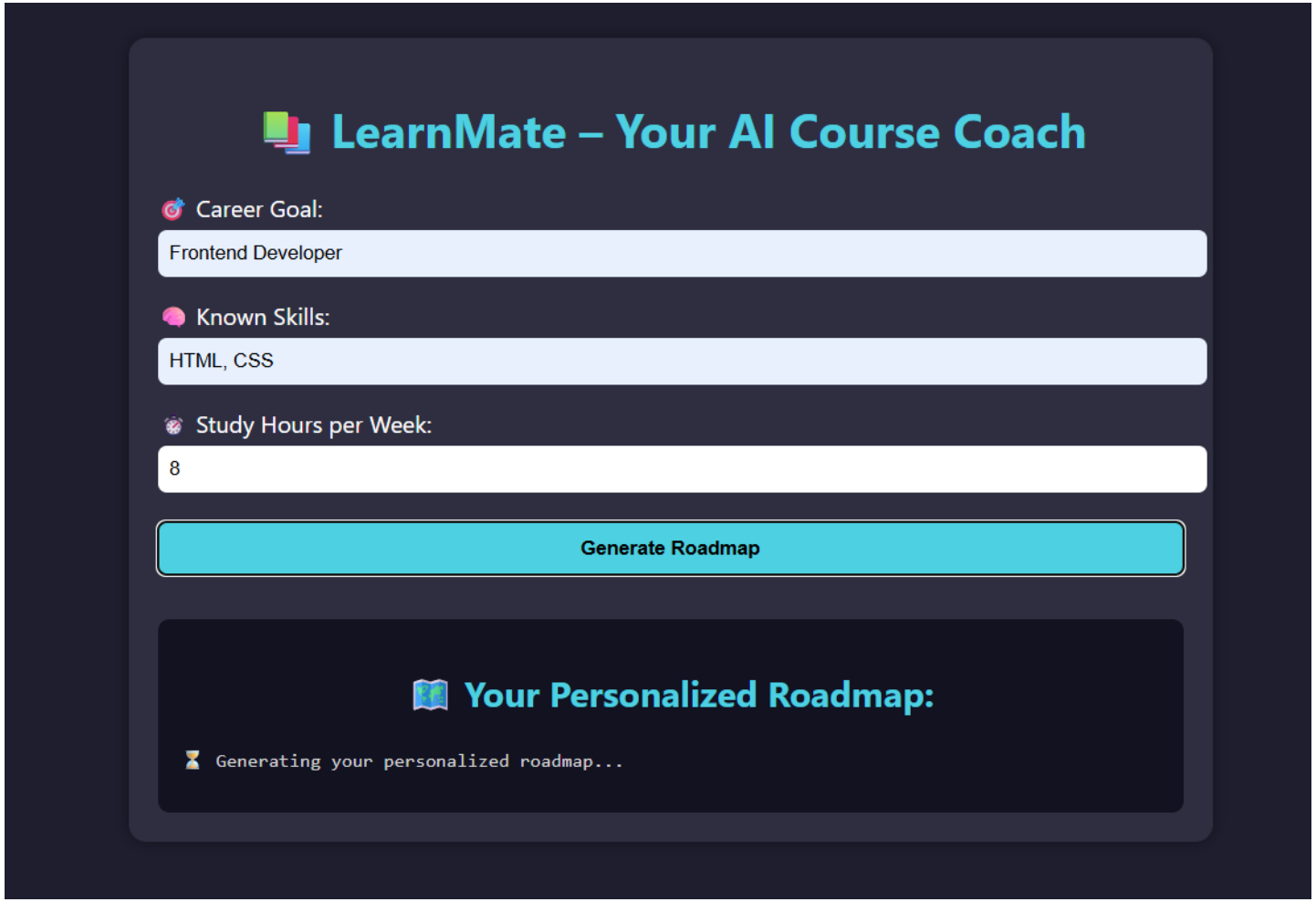
# RESULT



# RESULT



# RESULT


LearnMate – Your AI Course Coach
Career Goal:
Frontend Developer
Known Skills:
HTML, CSS
Study Hours per Week:
8
Generate Roadmap
Your Personalized Roadmap:
Generating your personalized roadmap...

# CONCLUSION

- LearnMate successfully demonstrates the power of Agentic AI in creating truly personalized educational experiences. By integrating powerful IBM Granite LLMs with a scalable cloud architecture, this project provides a tangible solution to a common challenge faced by modern learners.
- The key achievement is not just generating a plan, but providing a **structured, motivating, and efficient pathway** that empowers students to take control of their learning journey and achieve their career goals faster.

# FUTURE SCOPE

This project serves as a strong foundation for several high-impact enhancements:

- **Stateful User Profiles:** Integrate **IBM Cloudant DB** to store user roadmaps and track progress over time.
- **Secure Authentication:** Implement user login and registration using **IBM App ID** to create a persistent, secure user experience.
- **Adaptive Learning:** Allow the roadmap to dynamically update based on user feedback (e.g., "this topic was too easy" or "I need more resources on X").
- **Enhanced Functionality:** Add features like **PDF export** for offline access and expand into other learning domains like Data Science or DevOps.

# REFERENCES

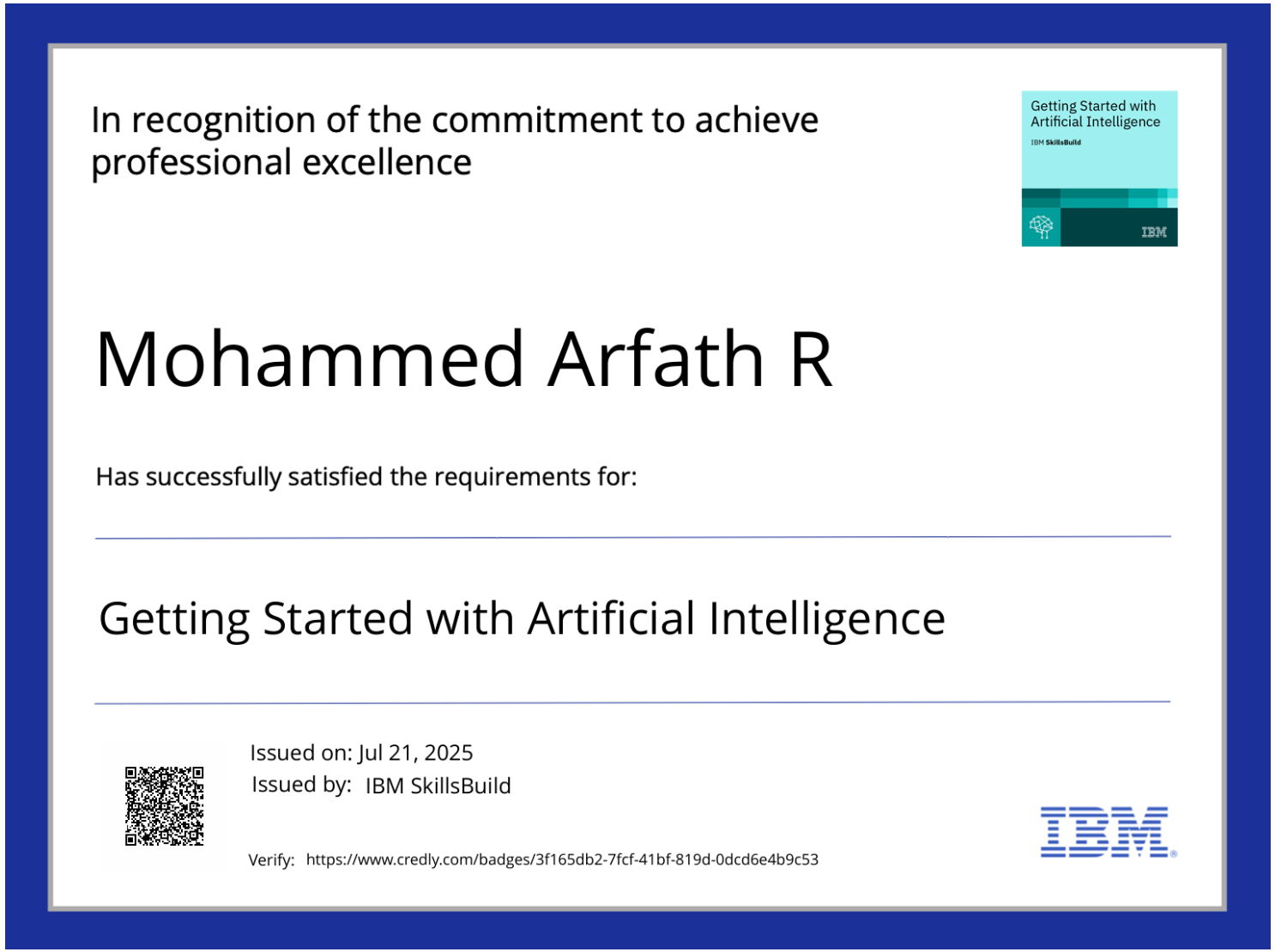

**Technical Documentation:**

- IBM Watsonx.ai Documentation
- Render.com Deployment Guides
- GitHub Pages Official Documentation
- Flask & Flask-CORS Documentation

**Guidance & Opportunity:**

- Edunet Foundation & The IBM SkillBuild Internship Program

# IBM CERTIFICATIONS



In recognition of the commitment to achieve professional excellence

Getting Started with Artificial Intelligence
IBM SkillsBuild

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Has successfully satisfied the requirements for:

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# IBM CERTIFICATIONS

IBM **SkillsBuild** Completion Certificate

This certificate is presented to

Mohammed Arfath R

for the completion of

**Lab: Retrieval Augmented Generation with LangChain**

(ALM-COURSE_3824998)

According to the Adobe Learning Manager system of record

**Completion date:** 21 Jul 2025 (GMT) **Learning hours:** 20 mins

# THANK YOU

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