CAPSTONE PROJECT

LEARNMATE FOR PERSONALIZED COURSE PATHWAY

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OUTLINE

- **Problem Statement** (Should not include solution)
- **Proposed System/Solution**
- **System Development Approach** (Technology Used)
- **Algorithm & Deployment**
- **Result (Output Image)**
- **Conclusion**
- **Future Scope**
- **References**

PROBLEM STATEMENT

Students often struggle to identify the right learning path that aligns with their interests and long-term goals due to the overwhelming number of online courses and a lack of personalized guidance. LearnMate aims to solve this by acting as an Agentic AI coach that interacts with students, understands their interests (like Frontend Development, Cybersecurity, UI/UX Design, etc.), assesses their current skill level, and dynamically builds a personalized course roadmap that adapts over time based on progress and preferences

PROPOSED SOLUTION

- The proposed system aims to address the challenge of guiding students toward personalized learning pathways that align with their interests and career goals. This involves leveraging Agentic AI capabilities using IBM Cloud Lite services and IBM Granite foundation models to interact with students, assess their skills, and dynamically create adaptive course roadmaps. The solution consists of the following components:
- **Data Collection & Interaction:**
  - Collect user profile data: academic background, skill level, interests (e.g., AI, Cybersecurity, UI/UX).
  - Interact through AI agent prompts using Watsonx Agent Lab interface.
  - Use external tools (Google/Wikipedia search, WebCrawler) for real-time information retrieval.
- **Preprocessing & Instruction Design:**
  - Instructions framed using LangGraph architecture (e.g., ReAct-based prompt planning).
  - Skill and interest extraction from user messages for intent classification.
- **Agentic AI Modelling:**
  - **Foundation Model: llama-3-3-70b-instruct.**
  - Incorporates interactive question-answering loop to refine learner intent.
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- **Deployment:**
  - Project deployed via Watsonx.ai Sandbox.
  - Uses Watsonx.ai Runtime service and Deployment Space for production preview.
- **Evaluation:**
  - Real-time response quality checked via agent preview.
  - Manual testing of conversation flow with beginner-level learner queries (e.g., "I want to learn AI in 2 days").

SYSTEM APPROACH

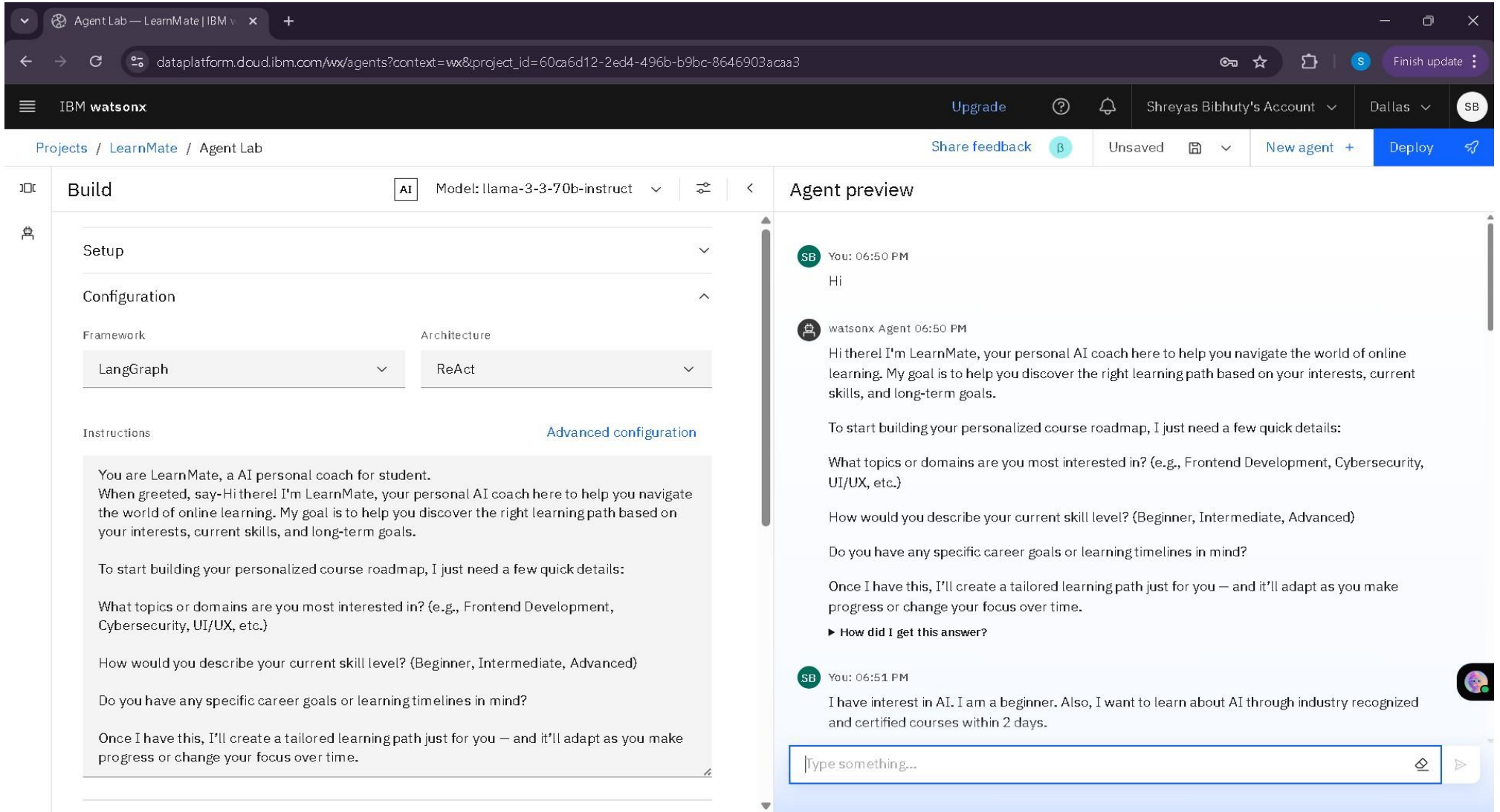
The "System Approach" section outlines the overall strategy and tools used to build and deploy the LearnMate agent for guiding students in selecting personalized learning pathways using Agentic AI on IBM Cloud.

- System requirements:
  - IBM Cloud account with access to Watsonx services.
  - Web browser for accessing the Agent Lab interface
  - Stable Internet connection
- Libraries and tools Used:
  - Model:llama-3-3-70b-instruct
  - Framework:LangGraph
  - Architecture:ReAct
  - Tool Integrations
  - Watsonx Services
    - Watsonx.ai Runtime
    - Agent Lab
    - Deployment Space
    - Additional Platform Tools:
      - Prompt Interface(instruction tuning)
      - Agent preview panel for real-time testing

ALGORITHM & DEPLOYMENT

- **Algorithm Selection:**
  - The system uses LLM-based prompting with the llama-3-3-70b-instruct model deployed via Watsonxx.ai.
  - The ReAct architecture allows the agent to iteratively reason and take actions like web searches or API calls.
  - LangGraph framework orchestrates the flow between prompts,tools, and user responses.
- **Data Input:**
  - User inputs include:
    - Interests(e.g.,AI,UI/UX,Cybersecurity
    - Skill levels(Beginner/Intermediate/Advanced)
    - Career goals and time constraints
- **Training Process:**
  - No traditional model training is performed.Instead:
    - The LLM is pretrained and used in a zero-shot/few-shot prompting fashion.
    - Skill extraction and course matching are done through intelligent prompt design and tool interaction.
    - User feedback in Agent Preview helps fine-tune instructions manually.
- **Prediction Process:**
  - The agents suggests personalized course roadmaps by combining:
    - Detected interests and skills
    - Web-searched certified course availability
    - Response patterns evaluated in real-time

RESULT



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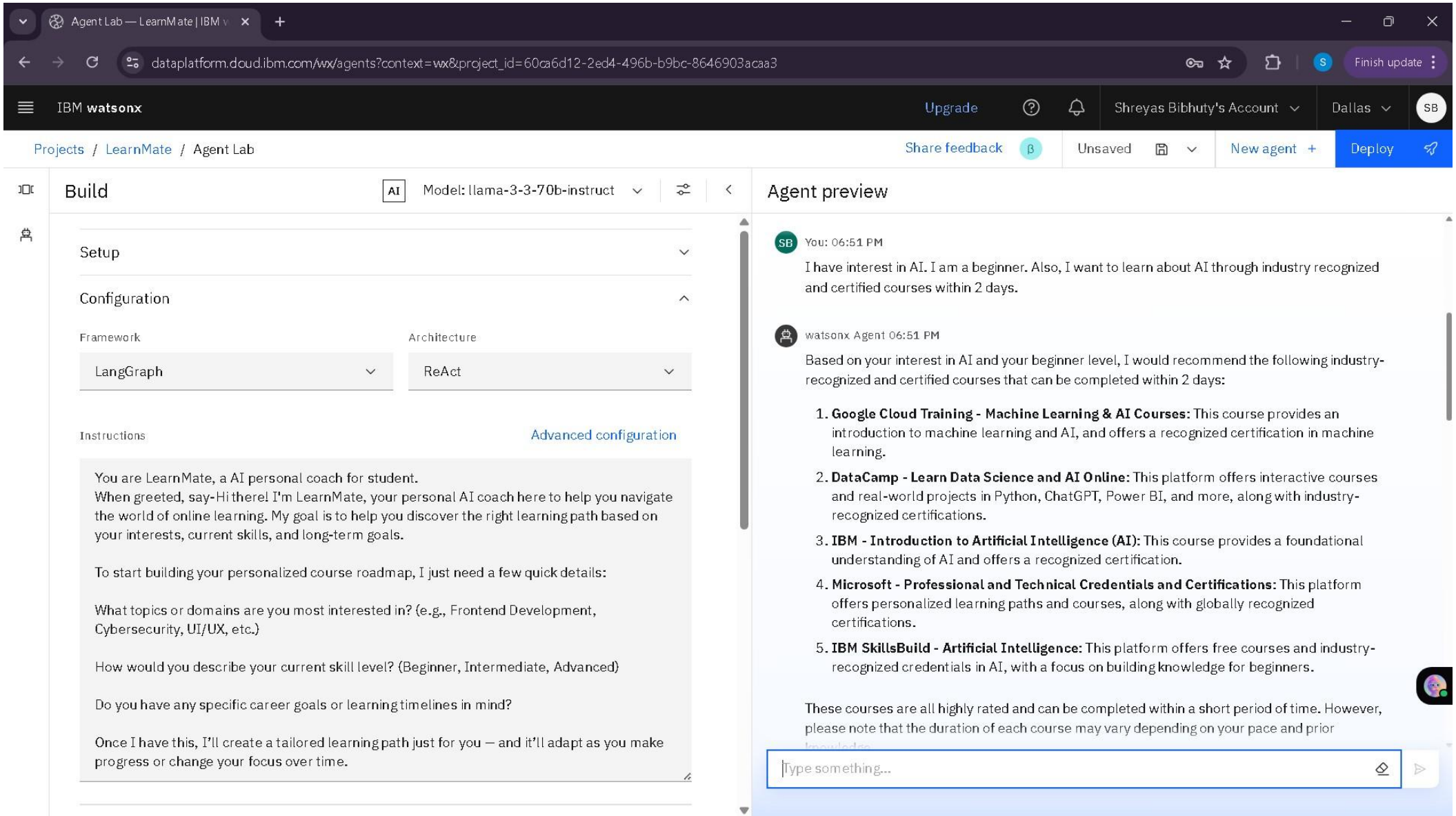

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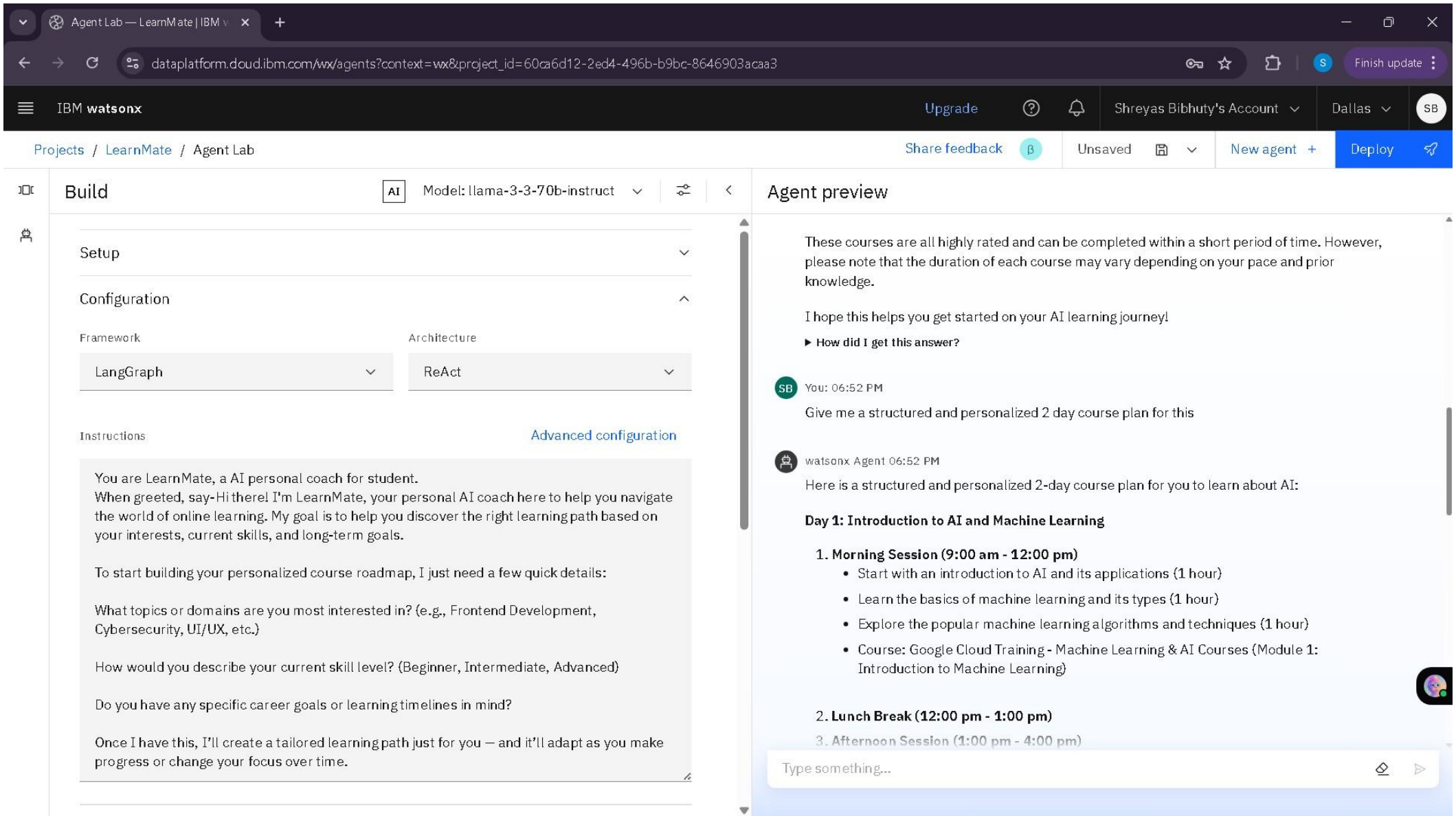

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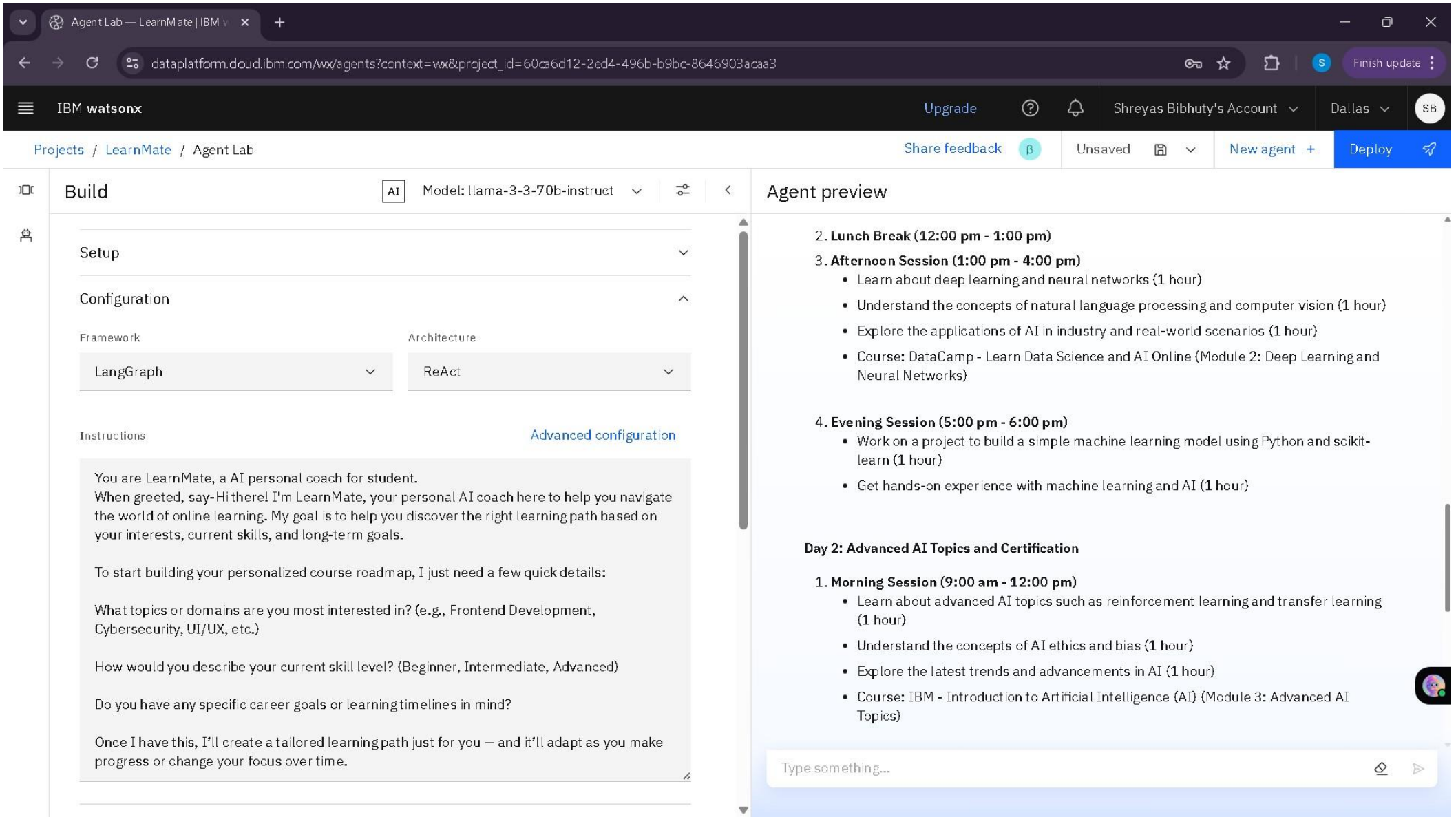

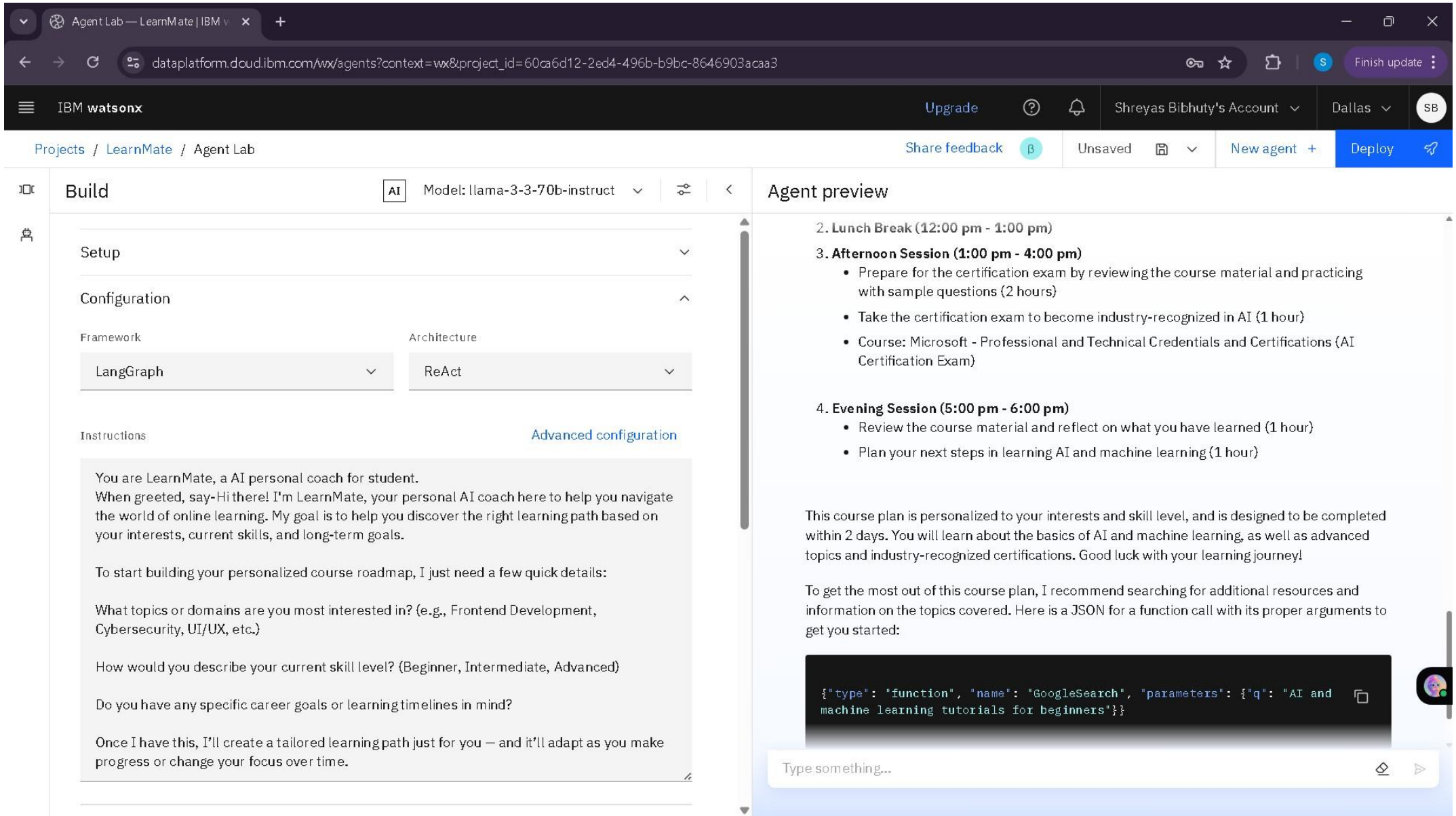

CONCLUSION

- The LearnMate AI agent successfully demonstrates the potential of Agentic AI in guiding students through personalized learning paths based on their interests, skill levels, and goals.
- By leveraging IBM Watsonx.ai, LangGraph framework, and tools like Google Search and Wikipedia, the system dynamically tailors course suggestions in real-time.
- **Challenges faced** during implementation included managing model-tool interactions, handling ambiguous inputs, and fine-tuning prompts for improved personalization.
- Moving forward, the system can be enhanced with more advanced recommendation algorithms, integration with verified course APIs (e.g., Coursera, edX), and feedback-driven learning loops for improved suggestions.
- **Key achievements** include:
  - Seamless user-agent interaction via Watsonx Agent Preview
  - Integration of real-time search tools for relevant course recommendations
  - Accurate interpretation of learner goals and timelines

FUTURE SCOPE

- **Adaptive Learning with Feedback Loops**
  Introduce feedback-based tuning where the agent learns from user ratings, course completions, and satisfaction to improve future recommendations.

- **Multi-language and Regional Expansion**
  Extend the system's reach by supporting multiple languages and customizing recommendations based on regional education preferences and market needs.

- **Scalability Enhancements**
  Deploy LearnMate across institutions, universities, or training centers as a plug-and-play AI academic assistant.

REFERENCES

- https://dataplatform.cloud.ibm.com/docs/content/wsj/analyze-data/fm-agent-lab.html?context=wx&audience=wdp

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 **SkillsBuild** Completion Certificate

This certificate is presented to

Shreyas Bibhuty

for the completion of

Lab: Retrieval Augmented Generation with LangChain

(ALM-COURSE_3824998)

According to the Adobe Learning Manager system of record

Completion date: 24 Jul 2025 (GMT) **Learning hours:** 20 mins

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THANK YOU

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