IBM HACKATHON PROJECT

SMART STUDENT ASSISTANT AGENT

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OUTLINE

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PROBLEM STATEMENT

Students and researchers often face difficulties when engaging with complex academic texts, research articles, and scholarly materials. Understanding dense language, extracting key points, and formatting citations are time-consuming and mentally demanding tasks, especially for those in non-English-speaking or underserved communities. These learners typically lack access to smart tools that provide personalized academic support. The absence of real-time, intelligent academic guidance creates a gap that hinders learning efficiency, productivity, and overall comprehension in academic environments.

Proposed Solution:

To bridge this gap, we propose a Smart Student Assistant Agent built using IBM Watsonx.ai and Retrieval-Augmented Generation (RAG). This AI-powered assistant allows users to upload academic documents and receive accurate summaries, contextual answers, and auto-generated citations in formats like APA, MLA, and IEEE. The assistant focuses solely on academic content, filtering out non-academic domains such as banking or travel. With multilingual support, a secure cloud-based infrastructure via IBM Cloud, and real-time interaction capabilities, the solution provides accessible, ethical, and efficient academic assistance to students and researchers across diverse educational backgrounds.

TECHNOLOGY USED

- **IBM Watsonx.ai** – For natural language understanding and agent creation
- **IBM Granite Foundation Models** – To generate human-like, context-aware responses
- **Retrieval-Augmented Generation (RAG)** – For document-based Q&A
- **Watsonx Vector Index** – To search and retrieve relevant content from PDFs
- **Natural Language Processing (NLP)** – Enhances interpretation and conversation quality
- **IBM Cloud Object Storage** – For secure storage of academic documents
- **IBM Cloud Lite** – For hosting and deploying the application
- **IBM Cloud IAM** – To manage secure access control for users and services

IBM CLOUD SERVICES USED

- **Watsonx.ai Studio** – For building, training, and deploying the AI assistant
- **IBM Granite Foundation Models** – To power natural language generation and understanding
- **Watsonx Vector Index** – Enables Retrieval-Augmented Generation from uploaded documents
- **IBM Cloud Object Storage** – Securely stores academic PDFs and project assets
- **IBM Cloud IAM (Identity and Access Management)** – Manages user and service-level access
- **IBM Cloud Lite Account** – Free-tier environment for development and deployment

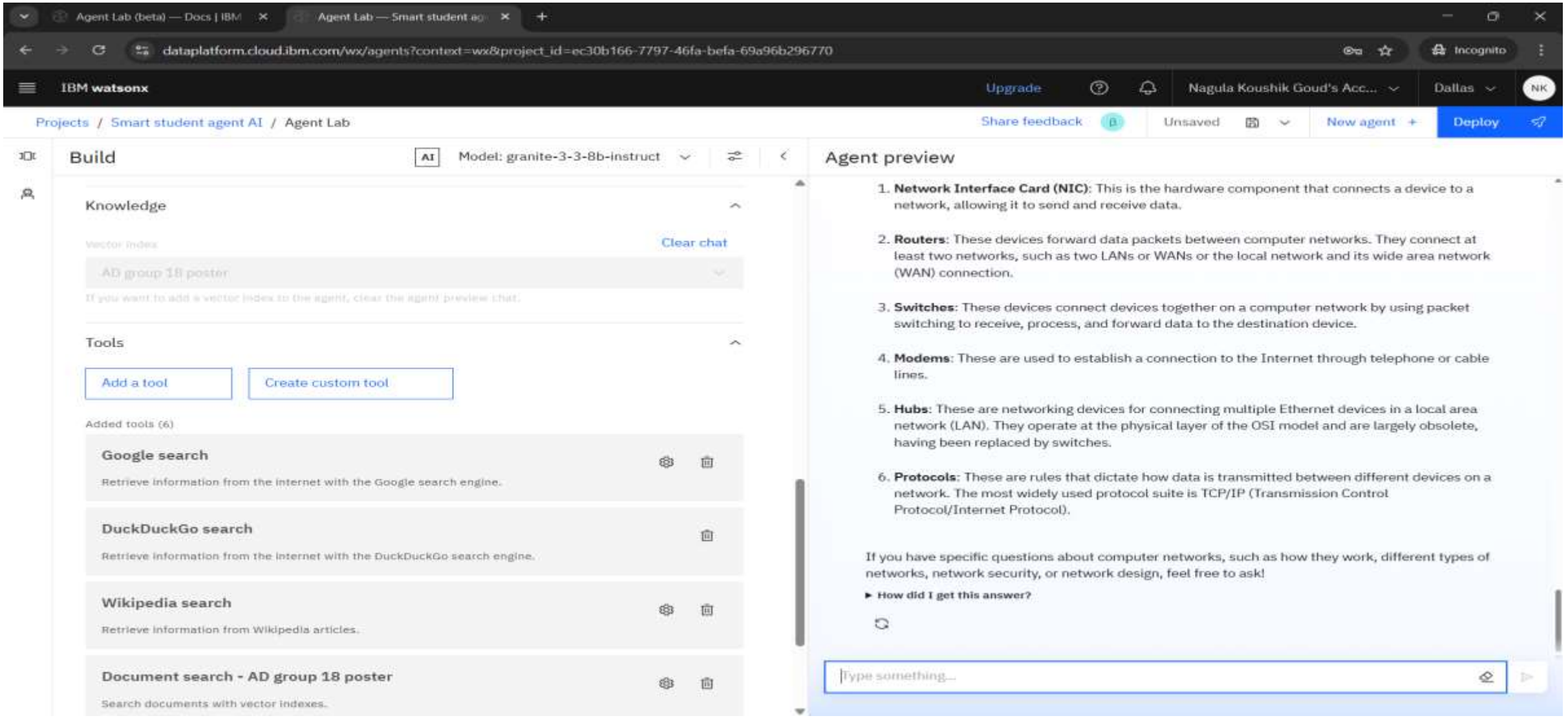
WOW FACTORS

- **Academic-only focus** – Filters out non-educational queries (e.g., banking, travel, entertainment)
- **Document-grounded answers** – Uses Retrieval-Augmented Generation (RAG) for reliable, source-based responses
- **Powered by IBM Granite LLM** – Provides intelligent, human-like academic support
- **Multilingual-ready** – Can be expanded to support learners in regional and global languages
- **Auto citation generation** – Supports APA, MLA, and IEEE formats
- **Built entirely on IBM Cloud** – Scalable, secure, and efficient architecture
- **Handles off-topic input smartly** – Responds with polite redirection when outside academic scope
- **Supports student success** – Improves comprehension, productivity, and research outcomes

END USERS

- **Undergraduate and postgraduate students** – For academic assistance and research support
- **Teachers and professors** – To simplify content explanation and research summarization
- **Academic researchers** – For quick understanding and citation generation
- **Thesis and journal writers** – To streamline reading, referencing, and knowledge extraction
- **Non-English-speaking learners** – With future support for multilingual interactions
- **Educational NGOs and foundations** – To support underserved students
- **Schools, colleges, and institutions** – For integrated digital learning tools
- **Self-help groups and rural learners** – To promote inclusive education access

RESULTS



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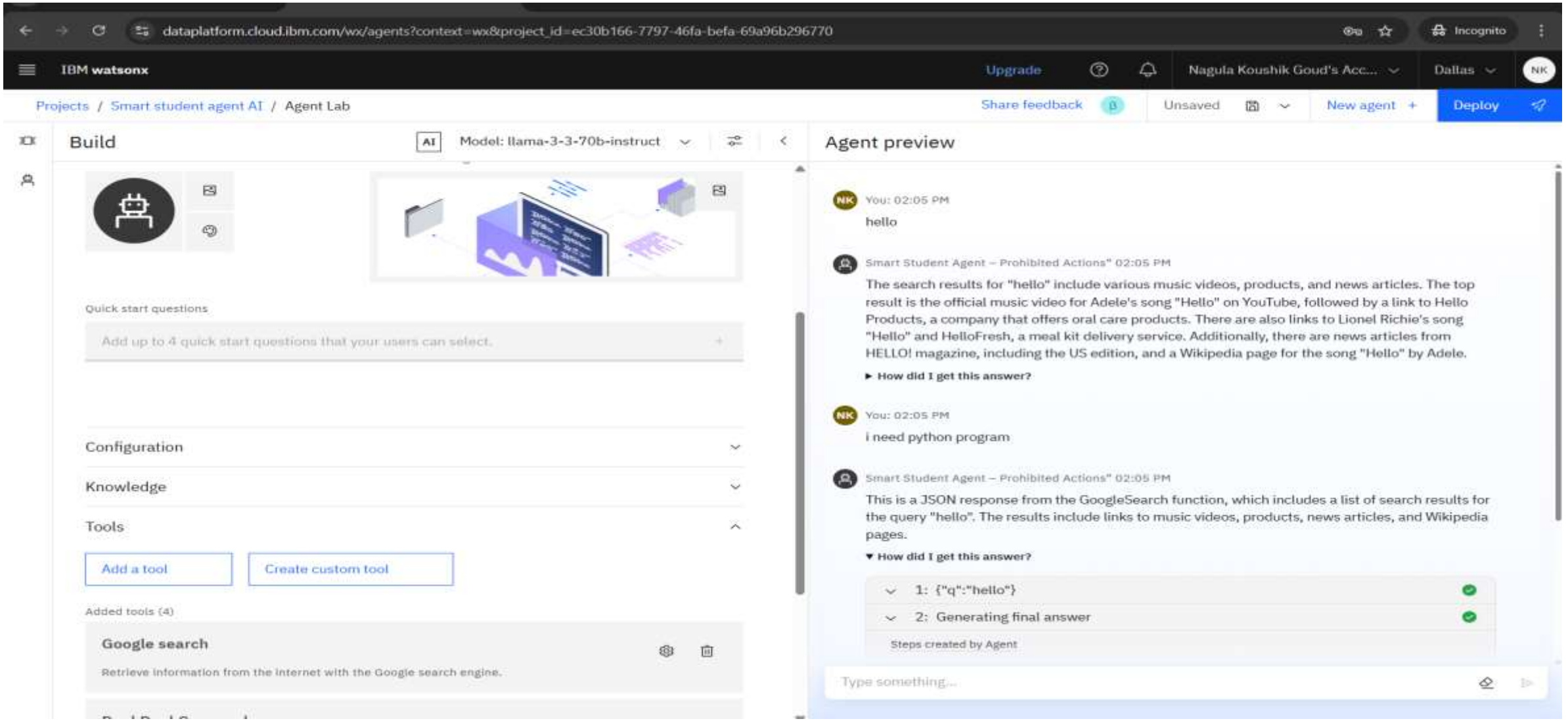
RESULTS



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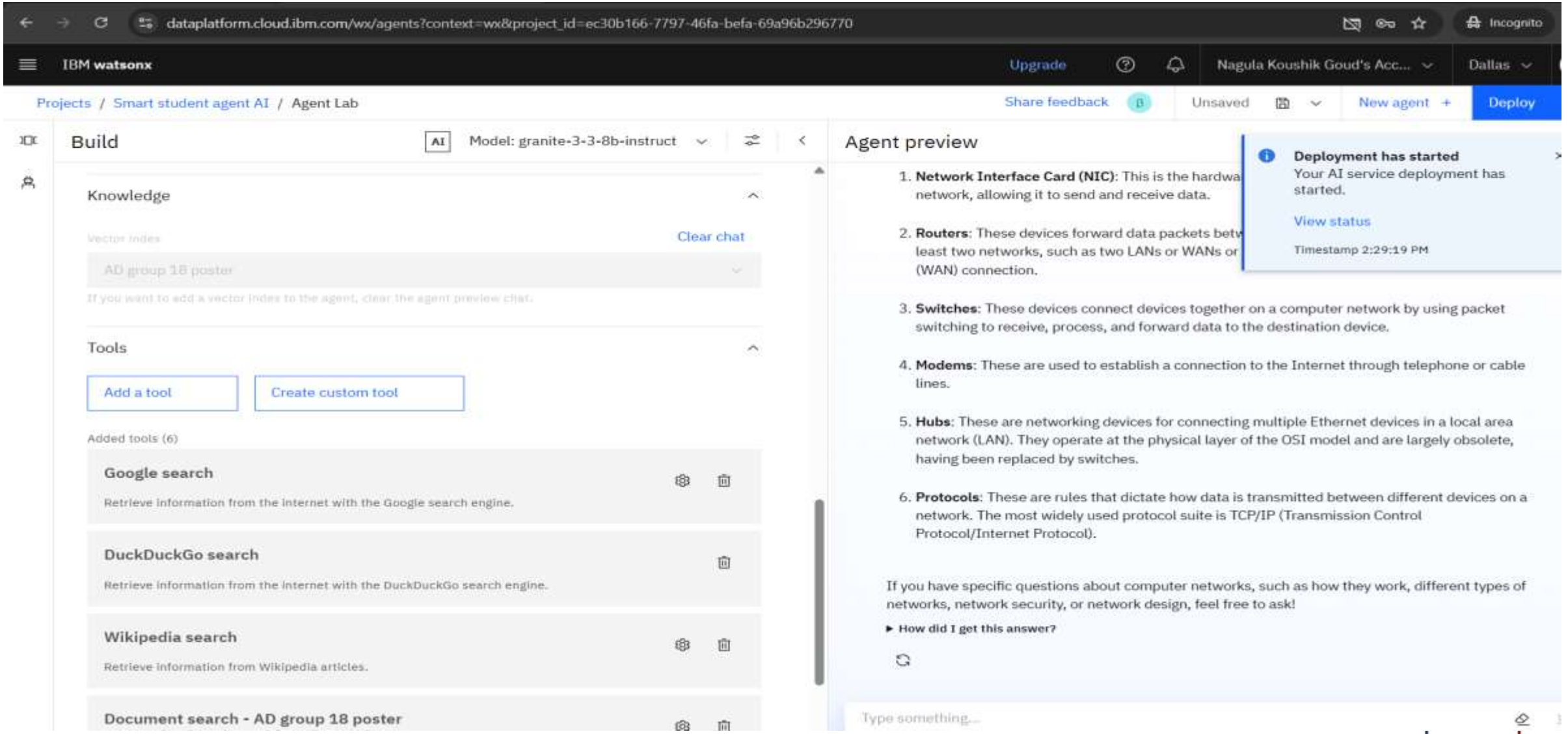
RESULTS



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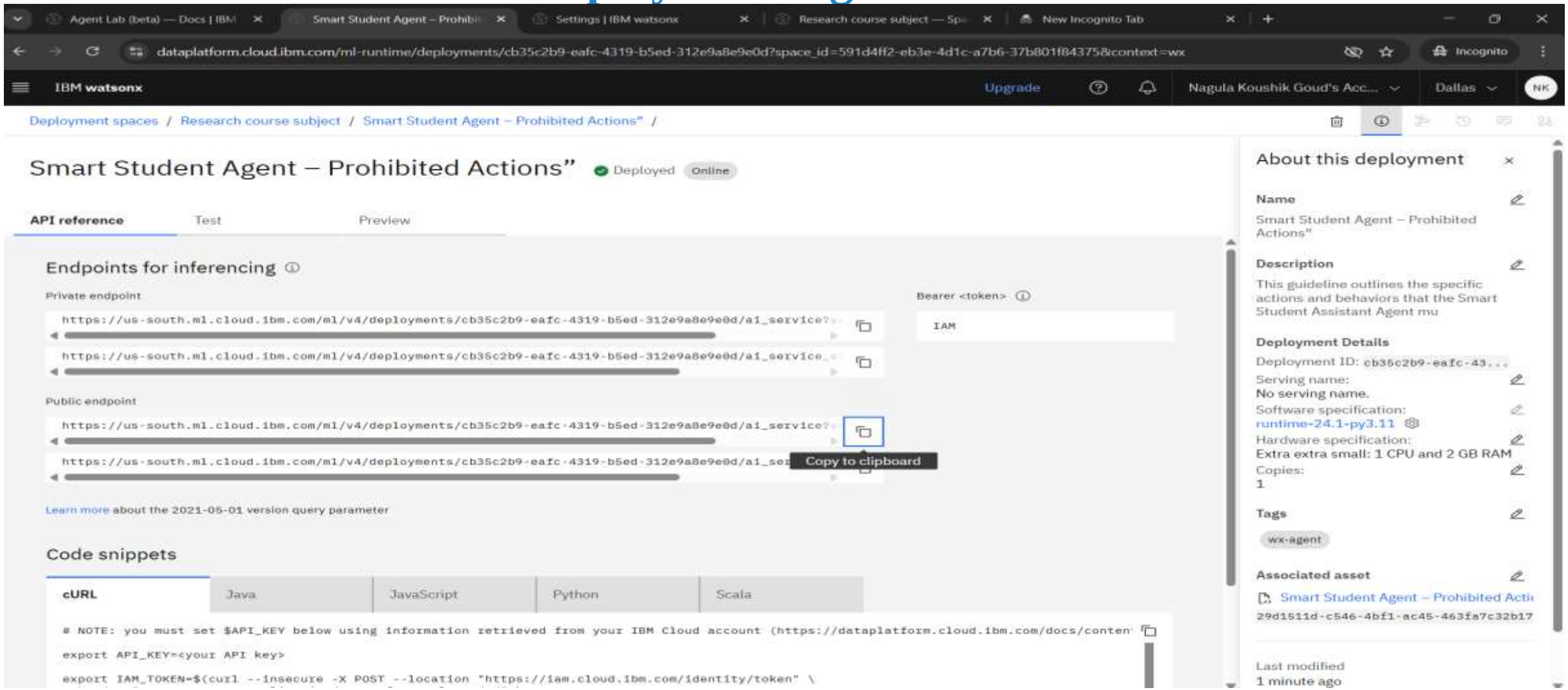
RESULTS

Deployed AI Agent



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CONCLUSION

- The Smart Student Assistant Agent provides real-time, AI-powered academic support.
- It simplifies research by summarizing documents and generating accurate citations.
- Built with IBM Watsonx.ai and Granite LLMs, ensuring intelligent and context-aware responses.
- Uses RAG (Retrieval-Augmented Generation) for reliable, document-based answers.
- Designed to operate strictly within the academic domain, avoiding irrelevant content.
- Supports future expansion with multilingual capabilities and LMS integration.
- Deployed securely on IBM Cloud, making it scalable, private, and accessible.
- Empowers students, educators, and researchers with efficient and ethical learning tools.

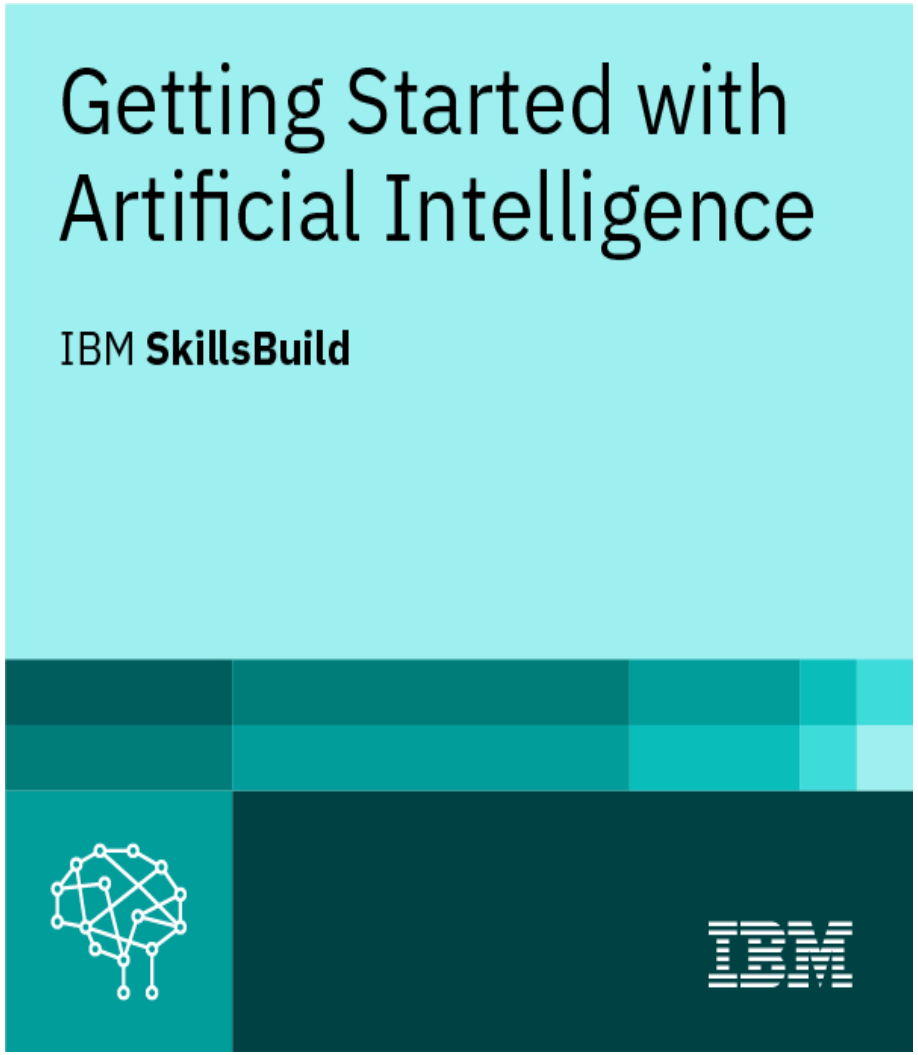
GITHUB LINK

- **https://github.com/Koushik744/smart-student-agent**

FUTURE SCOPE

- **Voice input integration** – Enable speech-to-text for hands-free academic queries
- **Mobile app or WhatsApp bot** – Extend access via popular platforms for convenience
- **Multilingual support** – Expand to regional and global languages using Watson Language Translator
- **Analytics dashboard** – Provide insights on usage, most asked topics, and learning gaps
- **Personalized learning recommendations** – Suggest content or papers based on student behavior
- **Integration with LMS platforms** – Connect with Google Classroom, Moodle, etc.
- **Auto-generated study guides** – Create summaries and key-point notes from full academic documents
- **Email/notification system** – Alert users about upcoming deadlines, new uploads, or topic suggestions
- **Enhanced privacy controls** – Role-based access and document-level encryption

IBM CERTIFICATIONS



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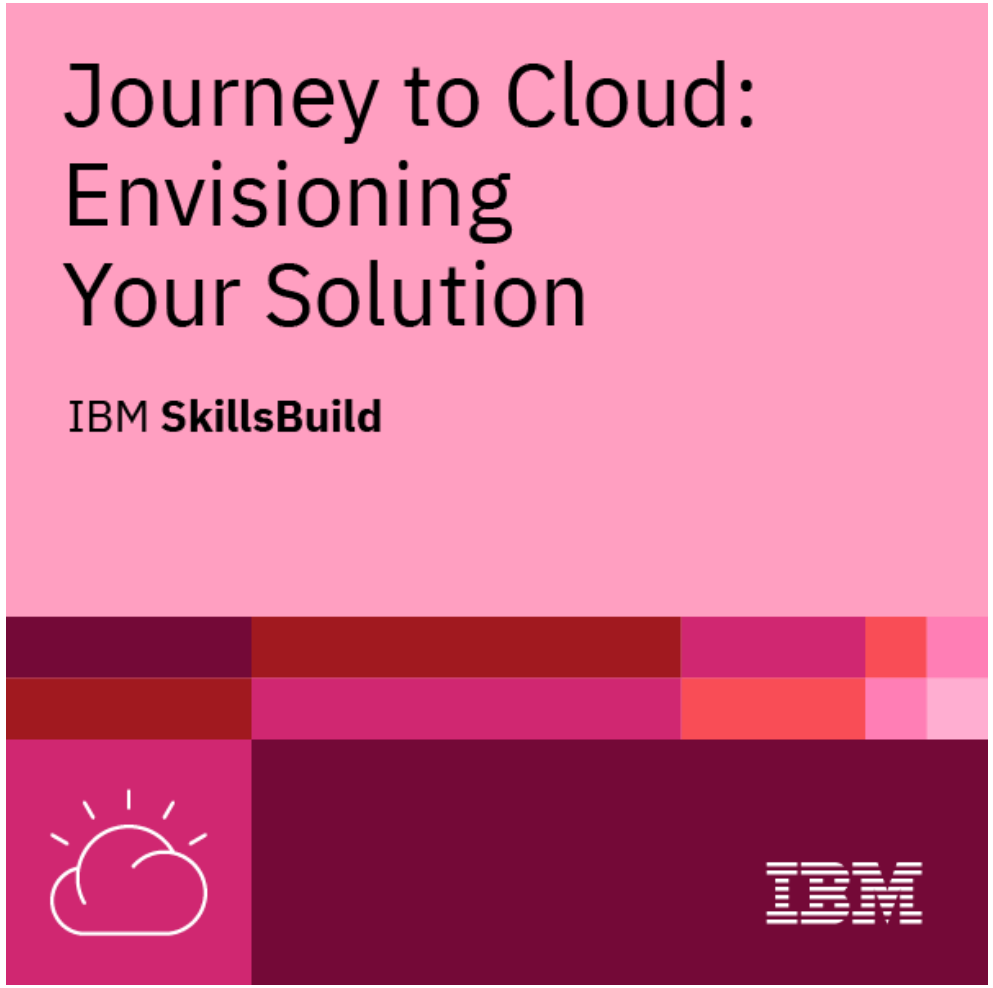

IBM CERTIFICATIONS

IBM **SkillsBuild** Completion Certificate

This certificate is presented to

2311CS040123- NAGULA KOUSHIK GOUD

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

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THANK YOU

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