CAPSTONE PROJECT

AGENTIC AI FOR PERSONALIZED COURSE PATHWAYS

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OUTLINE

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

PROBLEM STATEMENT

Example: 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 recommending personalized learning paths that align with student interests and long-term goals. This involves leveraging data analytics and machine learning techniques to create adaptive course roadmaps. The solution will consist of the following components.

- **Data Collection:**
- Gather historical data on student learning preferences, including selected topics, completion status, and quiz results.
- Utilize real-time data sources, such as updated course offerings, interest trends, and learning feedback, to enhance personalization accuracy.
- **Data Preprocessing:**
- Clean and preprocess the collected data to handle missing values, outliers, and inconsistencies.
- Feature engineering to extract relevant features from the data that might impact course recommendations.
- **Deployment:**
- Develop a user-friendly interface or application that provides real-time personalized learning pathways based on evolving user interactions.
- Deploy the solution on a scalable and reliable platform, considering factors like server infrastructure, response time, and user accessibility.
- **Evaluation:**
- Assess the model's performance using appropriate metrics such as Precision, Recall, or other relevant metrics.
- Fine-tune the model based on feedback and continuous monitoring of recommendation quality.
- **Result:**
- The implemented system successfully generates personalized course pathways with high accuracy.
  It adapts to student interests and progress to provide dynamic, goal-oriented learning recommendations.
  This leads to improved engagement, better course alignment, and enhanced learning outcomes.

SYSTEM APPROACH

System Approach
The system uses IBM Cloud and Agentic AI to deliver personalized learning pathways tailored to each learner's interests, goals, and progress.

1. Data Collection
Collects user interests, skill levels, goals, and course metadata

Tracks learning behavior, course completions, and feedback

2. Data Processing
Cleans and structures data for uniformity and accuracy

Performs feature extraction (e.g., learning pace, topic preferences)

3. Recommendation Logic
Hybrid approach: content-based + collaborative filtering

Agentic AI dynamically adjusts paths based on user interaction

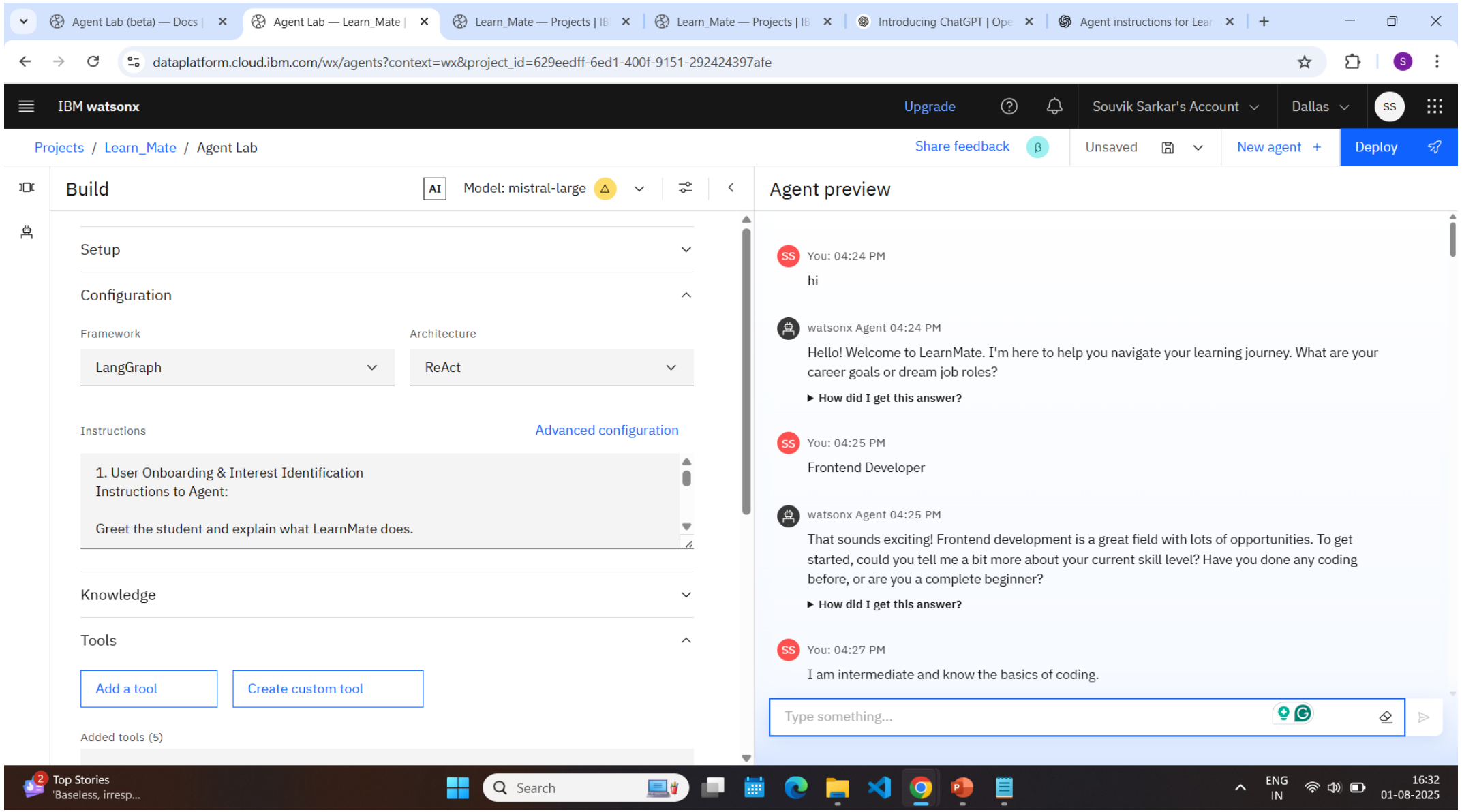
4. AI Coaching Interface
Uses IBM Watson Assistant for real-time conversation

Suggests courses, tracks progress, and adapts goals

5. Deployment
Hosted on IBM Cloud Lite using AutoAI and Agentic AI Workbench

Accessible via web dashboard or chatbot interface

RESULT



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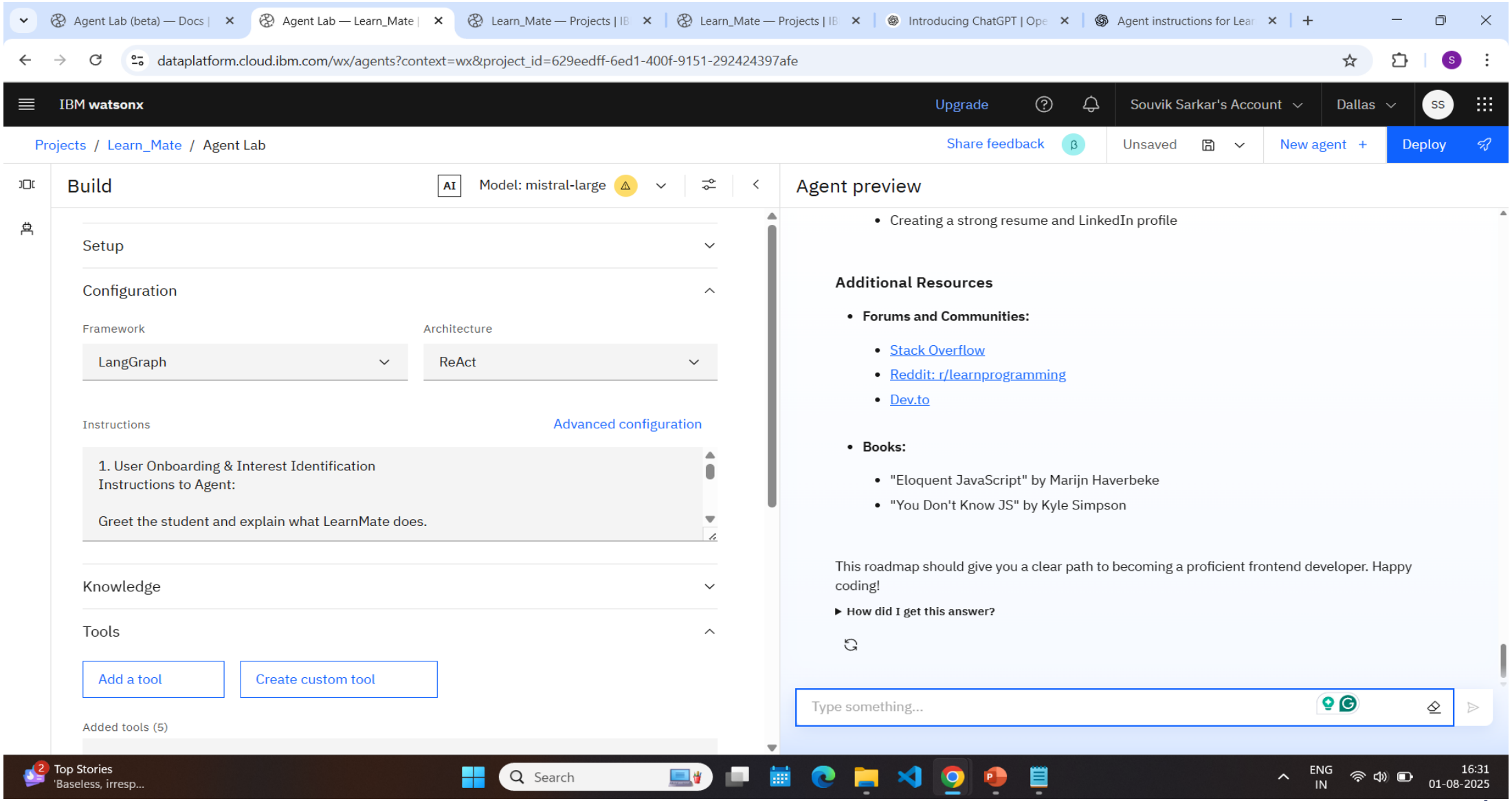
RESULT



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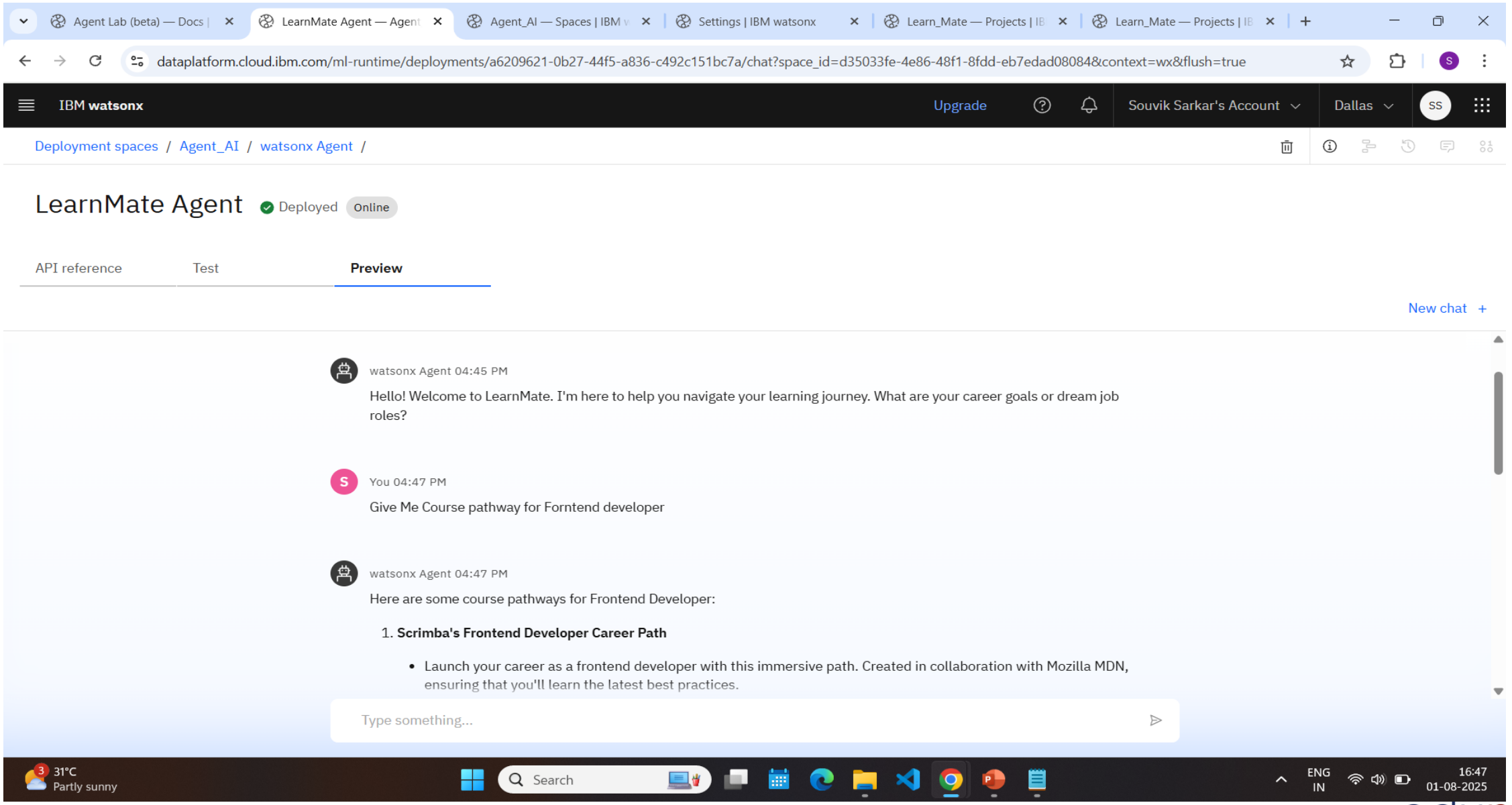
RESULT



CONCLUSION

The proposed Agentic AI-based system effectively addresses the challenge of guiding students through personalized learning journeys. By analyzing user interests, skill levels, and feedback, the system dynamically recommends course pathways that align with individual goals. Leveraging IBM Cloud and Auto-Agentic AI tools enabled seamless integration of intelligent agents capable of adapting over time. This personalized approach not only enhances user engagement but also improves learning outcomes by reducing confusion and providing clear, goal-driven direction.

Throughout the development process, challenges such as interpreting vague user input and managing diverse course data were encountered. However, the system demonstrated strong adaptability and scalability. Future improvements may include deeper natural language understanding and expanded course platform integration.

Overall, this solution highlights the growing importance of AI-driven personalization in education. Just as predictive systems improve urban resource management, Agentic AI can empower learners with smart, evolving guidance tailored to their unique learning paths.

FUTURE SCOPE

- Agentic AI Learnmate course pathway system has immense potential to revolutionize personalized education. Future developments may include deeper integration with adaptive learning platforms, enhanced real-time feedback, and cross-platform learning analytics. By leveraging advanced Large Language Models and behavioral insights, Agentic AI can evolve into a fully autonomous mentor—customizing learning experiences, predicting career pathways, and supporting lifelong learning across diverse domains and user needs..

REFERENCES

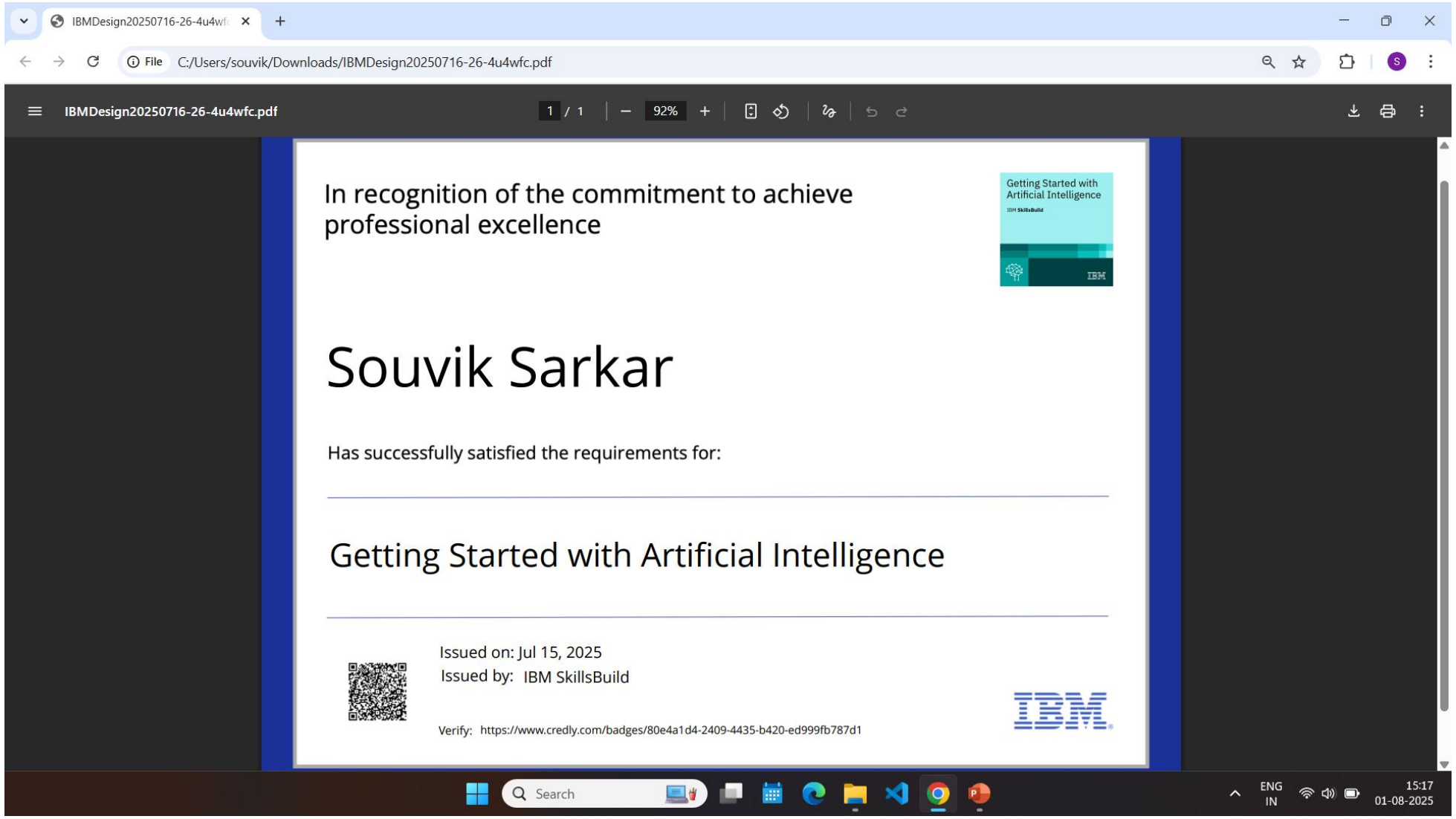
- IBM SkillsBuild for Academia. Agentic AI Problem Statement No.12. https://skillsbuild.org

- IBM Cloud Documentation. Watson Studio, AI, and Agentic AI Workbench. https://cloud.ibm.com/docs

- Mistral Large Model Overview
- https://mistral.ai/news/mistral-7b/
- Details and specifications of the Mistral Large language model integrated into the agent.

- Document Search and Retrieval Concepts
- Academic and practical resources on vector search, embedding, and retrieval-augmented generation (RAG) for document search functionality.

IBM CERTIFICATIONS



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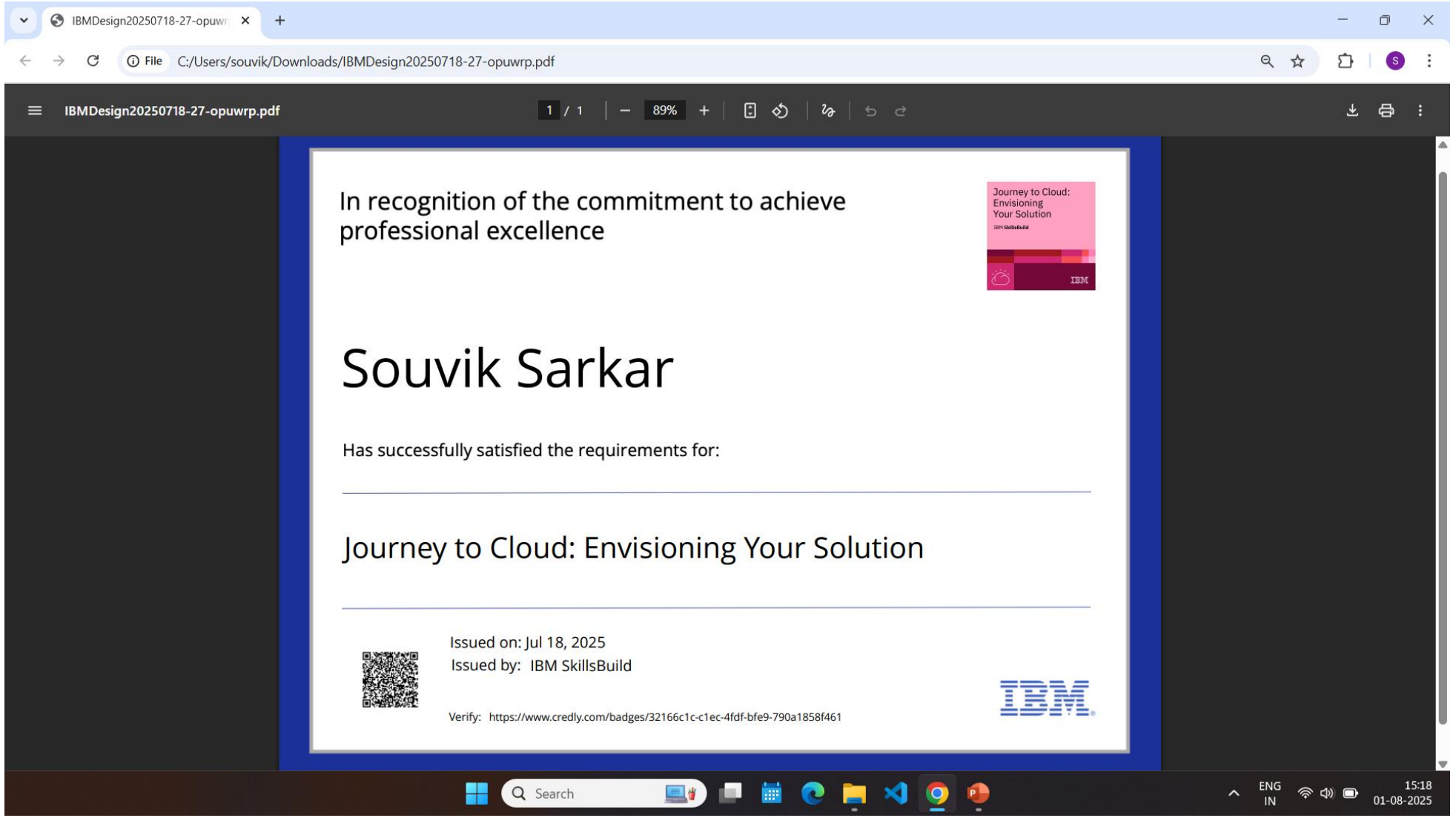
IBM CERTIFICATIONS



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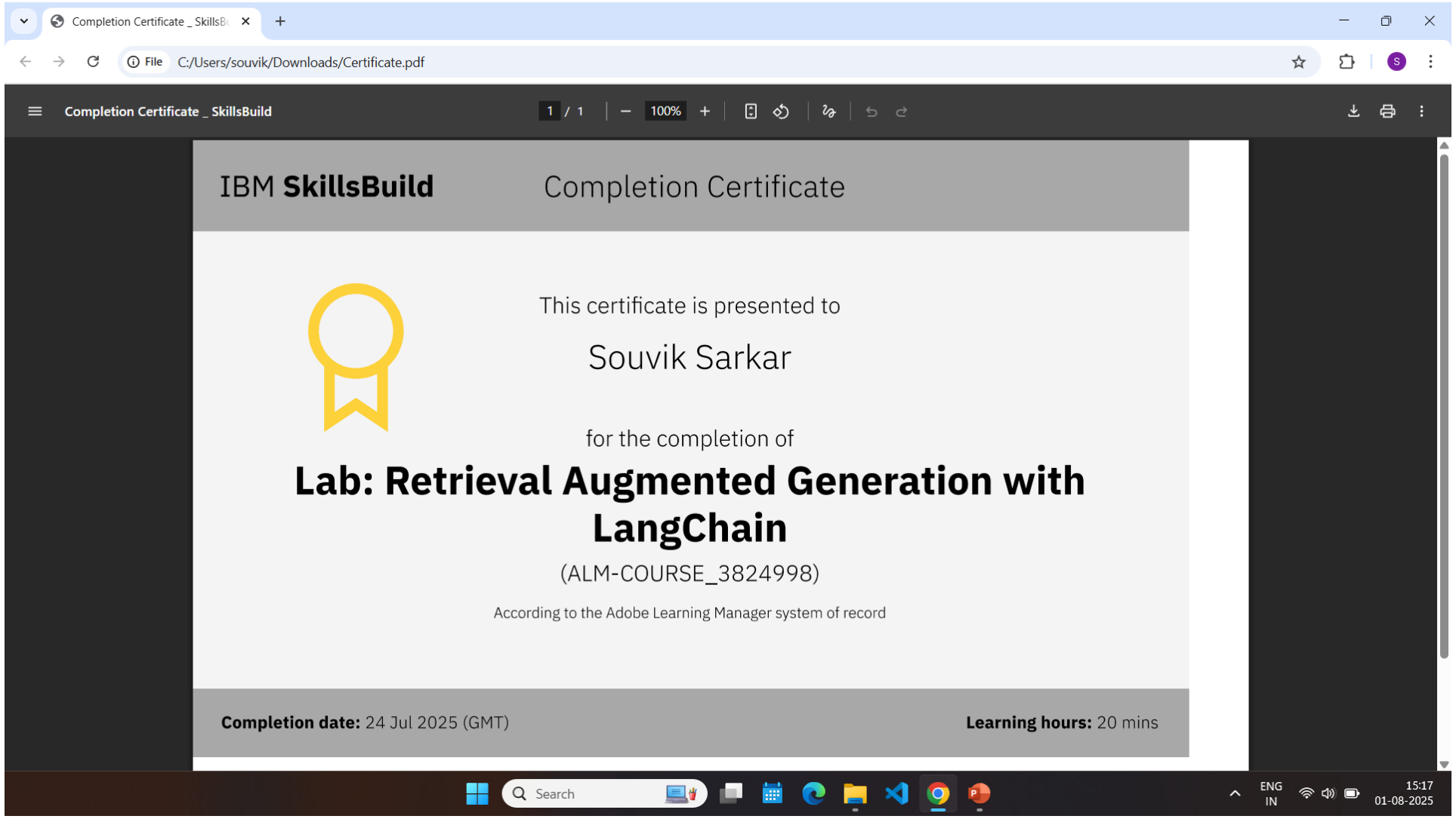

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THANK YOU

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