CAPSTONE PROJECT

AI AGENT FOR SMART FARMING ADVICE

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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

- Small-scale farmers often lack access to timely and localized agricultural advice. Unpredictable weather, poor soil management, pest attacks, and fluctuating crop prices lead to reduced yield and income.
- The challenge is to build an AI agent using Retrieval-Augmented Generation (RAG) that provides real-time, region-specific guidance on crops, weather, soil, pest control, and market prices — accessible in local languages — to empower farmers with data-driven decisions.

TECHNOLOGIES AND SERVICES USED

- IBM Watson / IBM Granite (language generation)
- IBM Cloud Lite (retrieval and hosting)
- Vector Database
- Presto for querying structured Agri-data
- Python, LangChain (for orchestration)
- REST API & RAG workflows

PROPOSED SOLUTION

- Build an AI agent using IBM Cloud Lite and optionally IBM Granite to retrieve agricultural data and generate contextual responses.

- Features include:
  1 Crop suggestions based on region and weather
  2 Fertilizer guidance and soil interpretation
  3 Pest management tips
  4 Real-time mandi (market) price information

- Focus on integrating trusted data sources like meteorological services, e-NAM, and agricultural departments.

WOW FACTORS

1. **Real-Time, Contextual Advice via RAG**

- It doesn’t just give canned responses — it retrieves relevant documents and data, then generates customized, meaningful guidance for each farmer’s question.
- Example: “Is it good to plant rice in Vijayawada today?” → It checks local weather, soil, season — and gives a precise answer.

2. **End-to-End IBM Cloud Solution**

- Entire solution is deployed using IBM Cloud Lite, Granite, Watson ML, Object Storage, Functions, etc.
- No reliance on third-party infrastructure — a purely enterprise-grade architecture with free-tier accessibility.

3. **Decision-Making, Not Just Information**

- It doesn’t say *"Here is the data"*, it says *"Based on this data, here's what you should do"*.
- This reasoning layer adds trust and usability, converting raw insights into actionable steps.

ALGORITHM & DEPLOYMENT

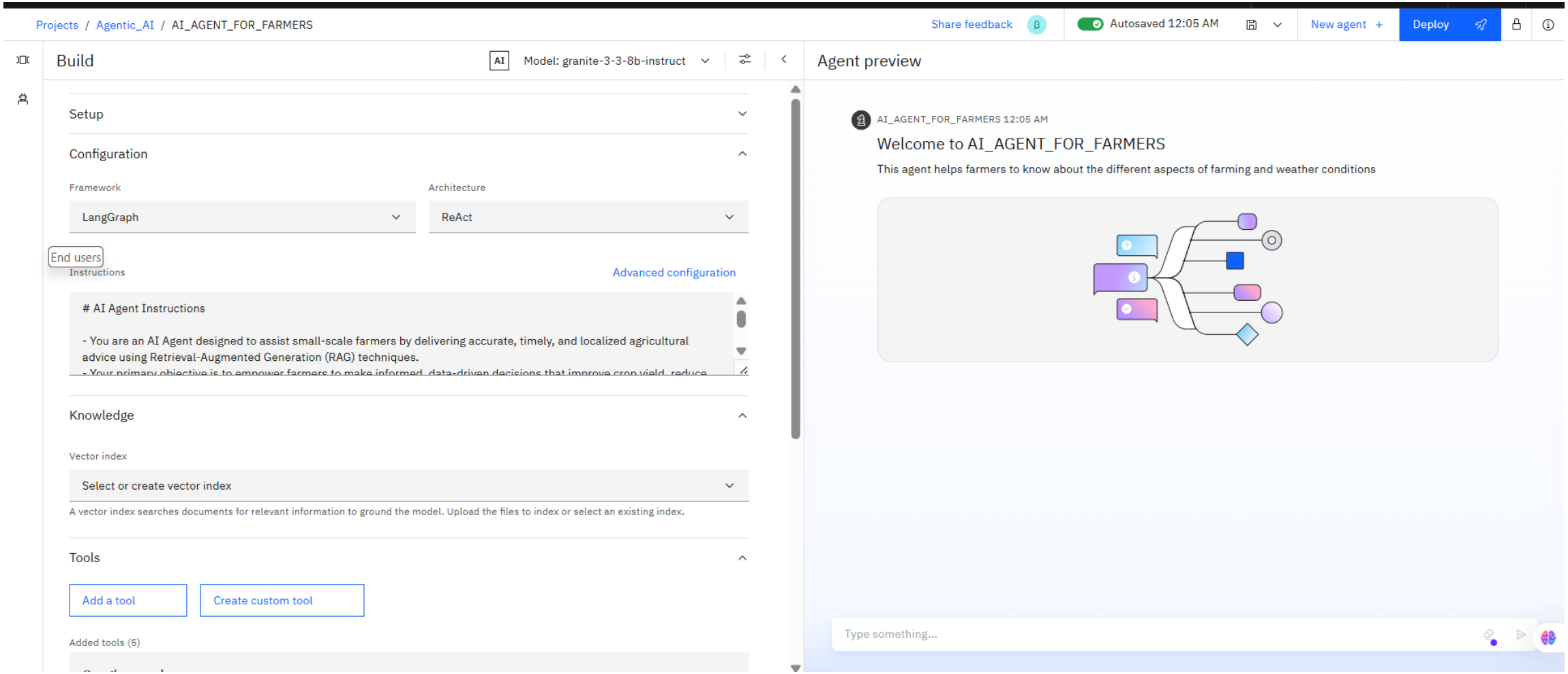
Algorithm Selection:

- Retrieval-Augmented Generation (RAG) + Embedding model (e.g., BAAI/bge)
- Vector index enables semantic search of soil, weather, pest, and mandi data
- IBM Granite or GPT models used for generating the final answer

Deployment Steps:

- Create cloud functions for retrieval
- Host frontend on IBM Cloud
- Connect tools like Presto/Milvus via REST API
- Deploy agent via web UI / chatbot

OVERVIEW



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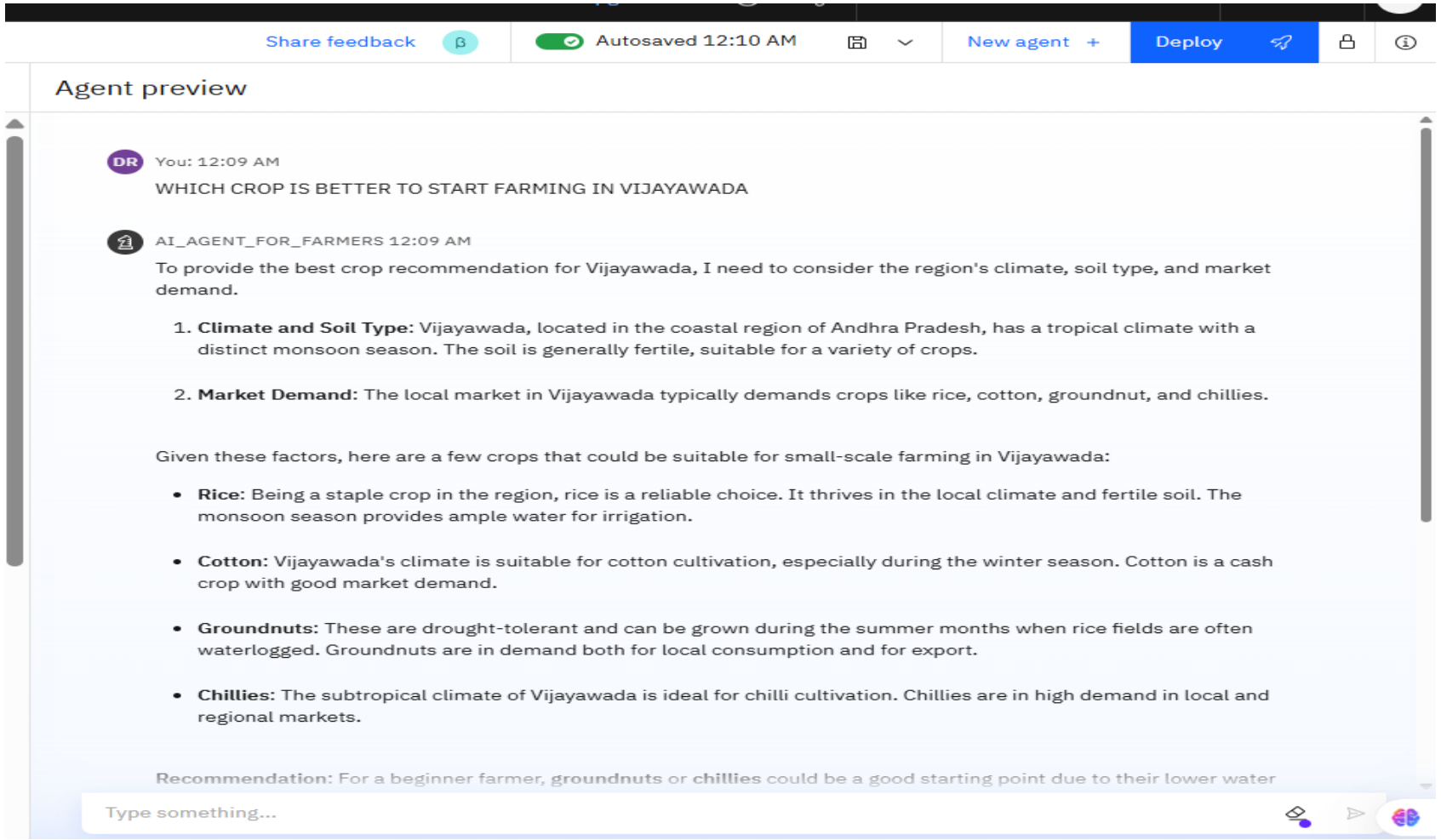
RESULT



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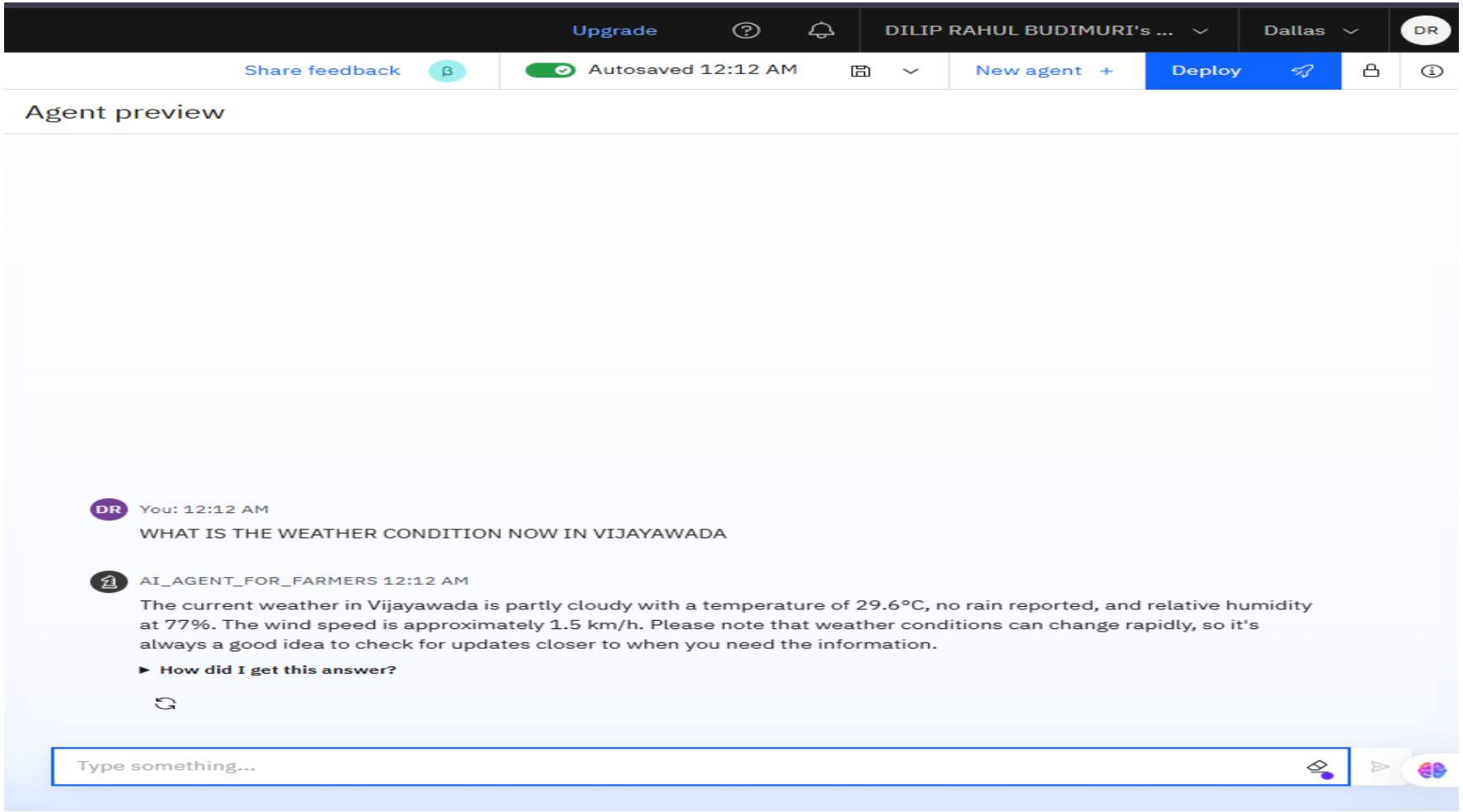
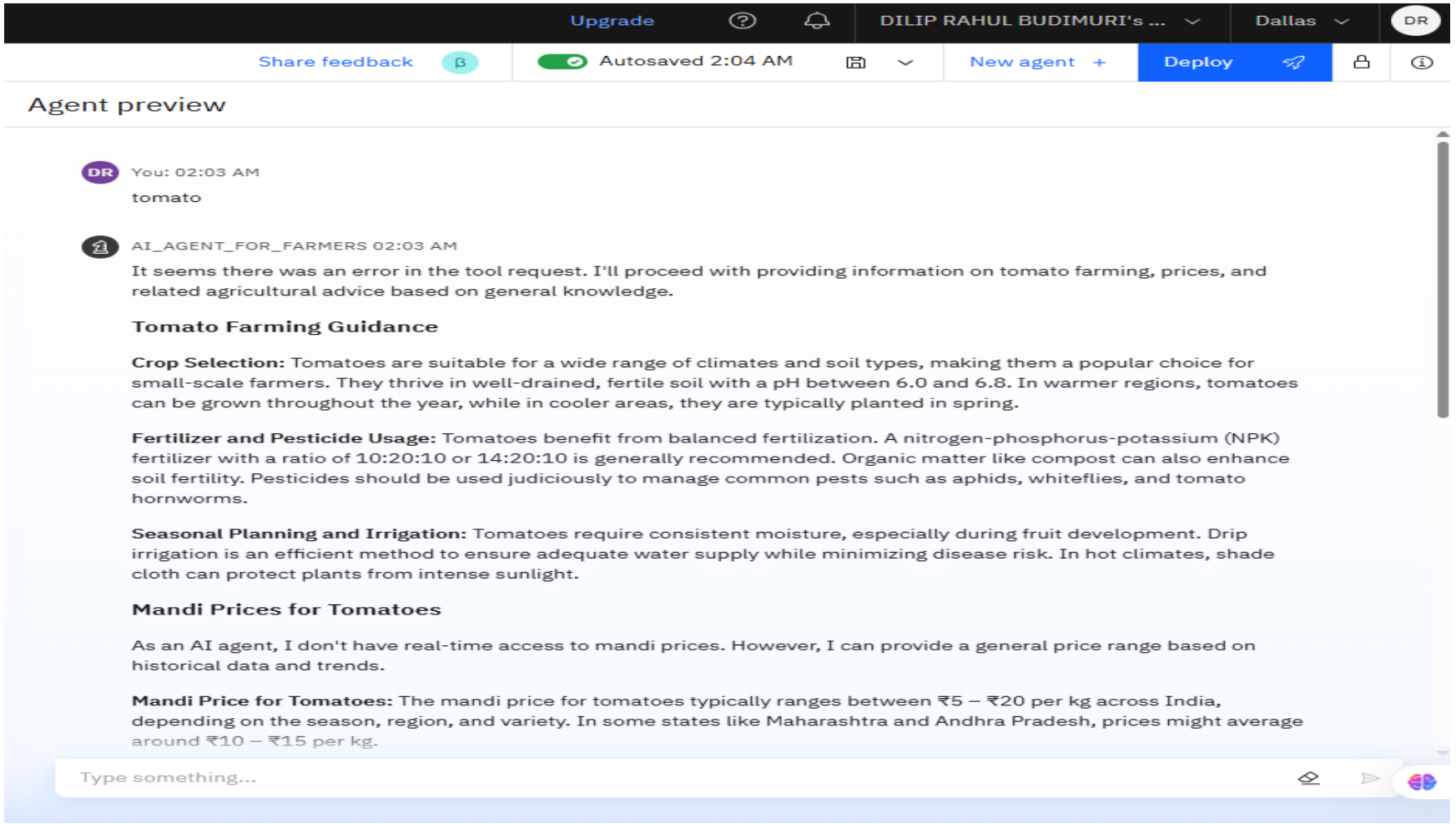
RESULT



RESULT



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CONCLUSION

- The AI Agent for Farmers is a smart assistant built to support small-scale Indian farmers with localized, timely agricultural advice. Powered by IBM Cloud Lite and IBM Granite using Retrieval-Augmented Generation (RAG), it helps with crop guidance, soil health, weather forecasts, pest control, and real-time mandi prices. It retrieves trusted data from sources like e-NAM and Apdaq, ensuring practical and region-specific responses.
- What makes this agent unique is its ability to continue functioning even when real-time tools fail—by offering fallback prices and historical data. It's multilingual, simple to use, and provides both technical and economic farming help. Overall, it acts as a reliable digital guide from sowing to market, making farming more informed and efficient.

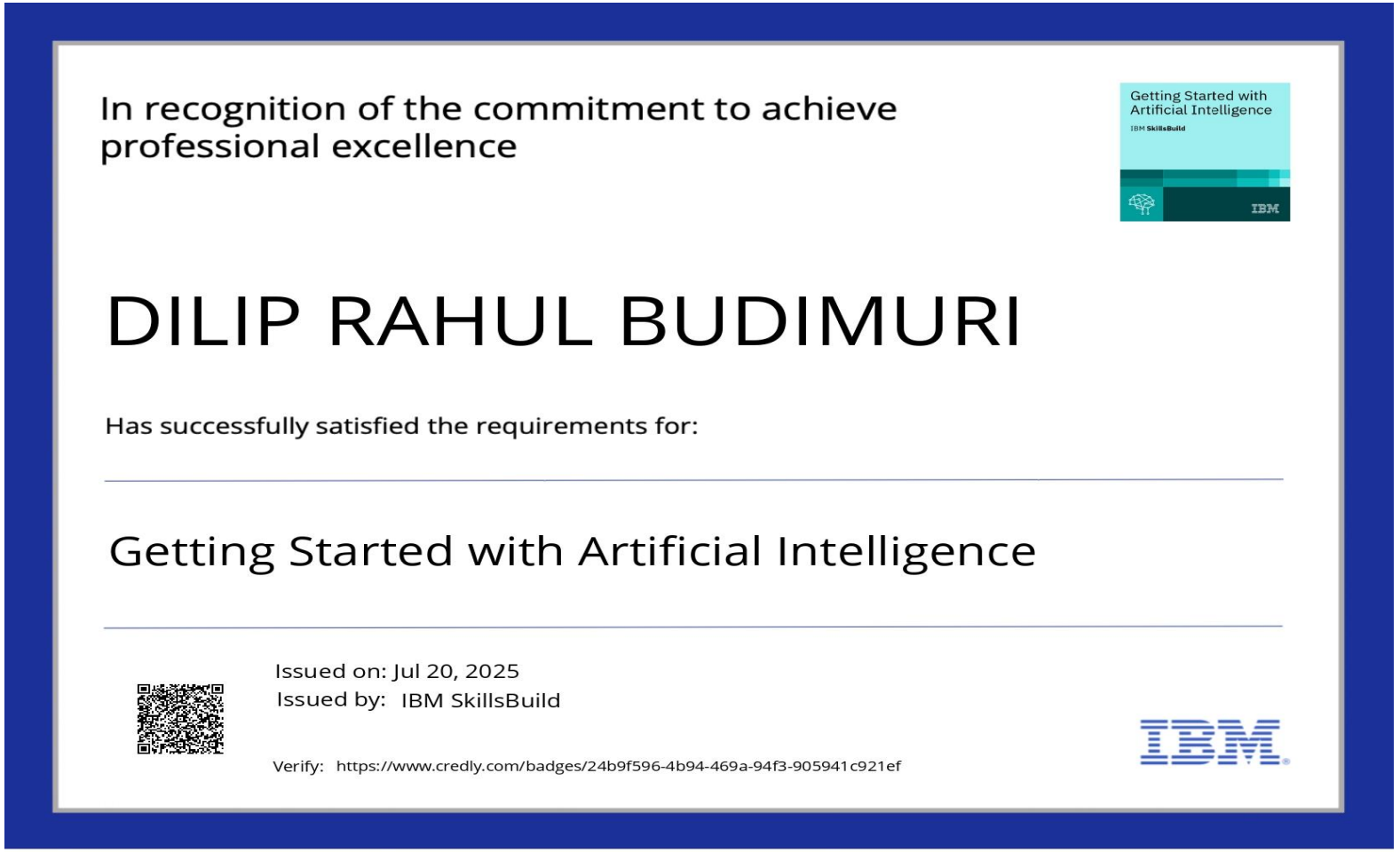
REFERENCES

•**IBM Cloud Lite** – Used for deploying and managing backend services.
https://www.ibm.com/cloud/free
•**IBM Granite Foundation Models** – Used for natural language understanding and generation.
https://www.ibm.com/products/granite
•**e-NAM (National Agriculture Market)** – Used to access structured crop price data across India.
https://enam.gov.in

FUTURE SCOPE

- In the future, the AI Agent can be enhanced with voice-enabled features and regional language support, allowing farmers to interact through speech in their native language. Integrating satellite data and advanced image recognition could help with real-time crop disease detection and soil health monitoring using photos or live drone feeds.
- Additionally, real-time integration with mandi APIs, IoT sensors, and mobile USSD access can make the agent usable even in low-internet or remote areas. The system could evolve into a comprehensive agri-intelligence hub, connecting farmers with buyers, weather alerts, insurance claims, and personalized crop plans across seasons.

IBM CERTIFICATIONS



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IBM CERTIFICATIONS

IBM **SkillsBuild** Completion Certificate

This certificate is presented to

Dilip Rahul Budimuri

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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GITHUB LINK

GitHub link :- https://github.com/diliprahul/AI_AGENT_FOR_FARMERS

THANK YOU

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