CAPSTONE PROJECT

RESEARCH AGENT

Presented By:
1. JEELUGU JAGADEESH – Raghu Institute of Technology – CSE (AI & ML)

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OUTLINE

- Problem Statement
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- Future Scope
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PROBLEM STATEMENT

A Research Agent is an AI system designed to assist with academic and scientific research tasks. It autonomously searches for literature, summarizes papers, and organizes references. Using natural language processing, it understands research questions, retrieves relevant information, and can generate reports, suggest hypotheses, and draft research paper sections. It saves time by automating repetitive tasks like citation management and data extraction, enhancing efficiency, accuracy, and innovation in research.

PROPOSED SOLUTION

We propose a **Research Agent**, an AI system that:

- Understands natural language queries.
- Searches for academic papers and news articles.
- Summarizes and organizes research findings.
- Generates hypotheses and drafts report content.
- Automates citation management and data extraction.

Key Tools:

- IBM Watsonx
- LangGraph + ReAct
- Web Search APIs (Google, DuckDuckGo, Wikipedia, Webcrawler)

SYSTEM APPROACH

System Requirements:

- IBM Cloud Lite
- IBM Watsonx Studio
- LangGraph Framework
- ReAct Architecture
- Tools: Google, DuckDuckGo, Wikipedia, Webcrawler

Libraries Used:

- Python (Requests, BeautifulSoup)
- OpenAI LangGraph SDK
- JSON/XML APIs for Web Crawling

ALGORITHM & DEPLOYMENT

Architecture: ReAct (Reasoning + Action)

•Combines reasoning and tool usage.

•Modular execution via LangGraph workflows.

Flow:

1.Accepts natural language queries.

2.Uses web search tools to fetch info.

3.Summarizes or lists findings.

4.Generates citations and formats.

Deployment Details:

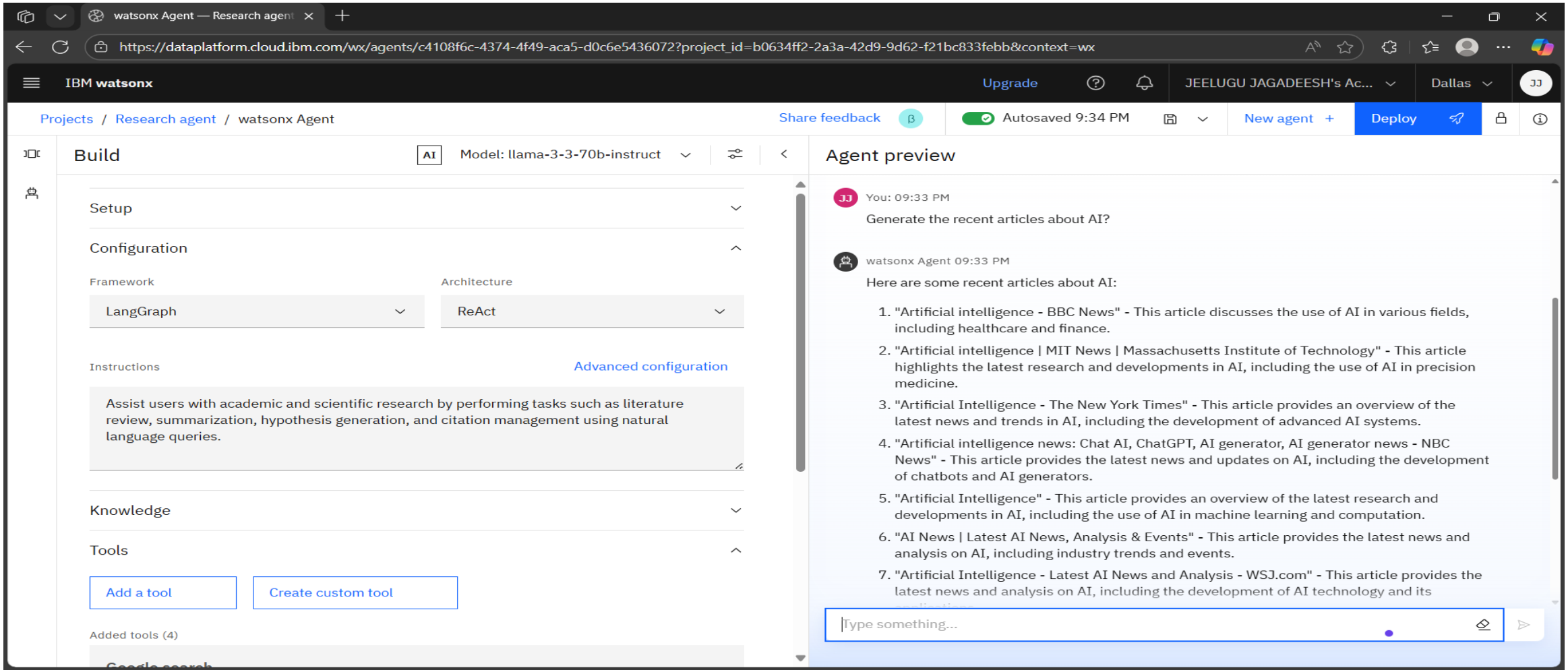
•IBM Watsonx Cloud

•Model: llama-3-3-70b-instruct

•Runtime: Python 3.11

•Deployed Agent: watsonx Agent

RESULT 1.1



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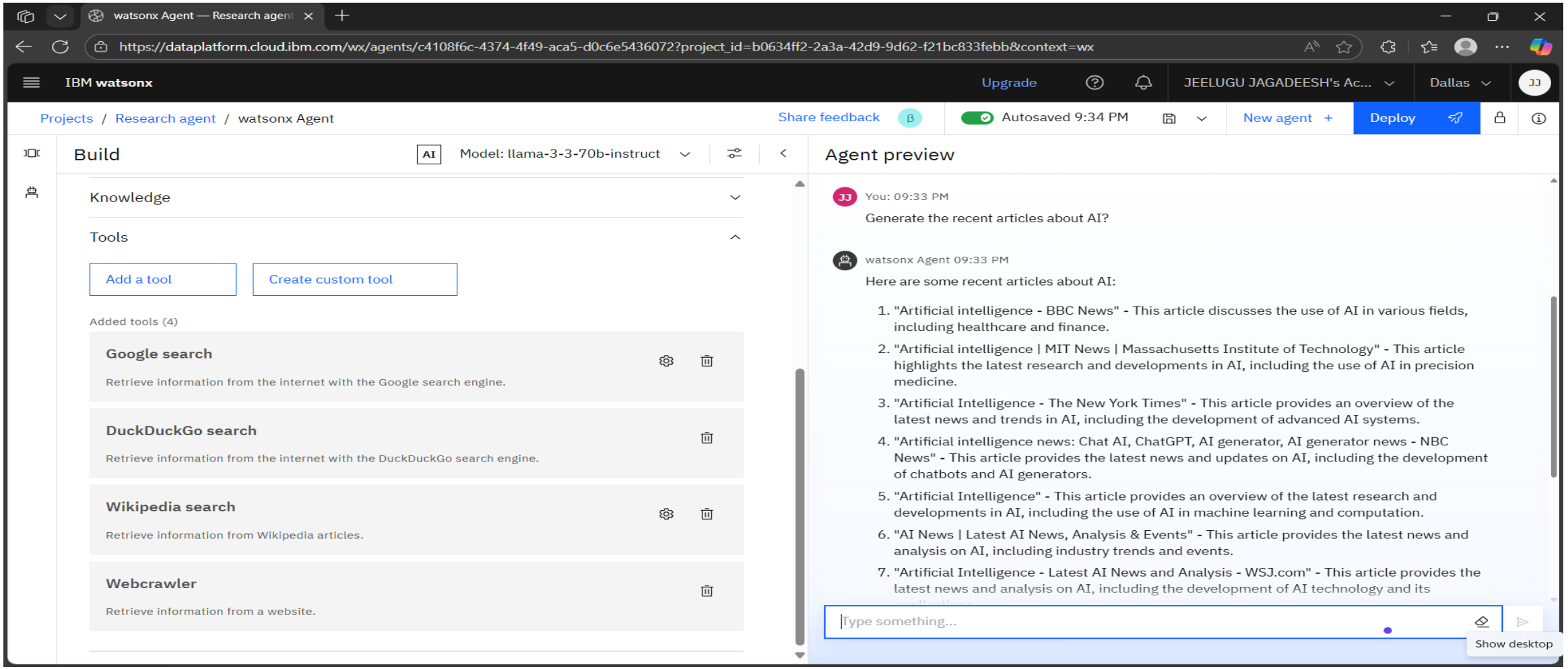
RESULT 1.2



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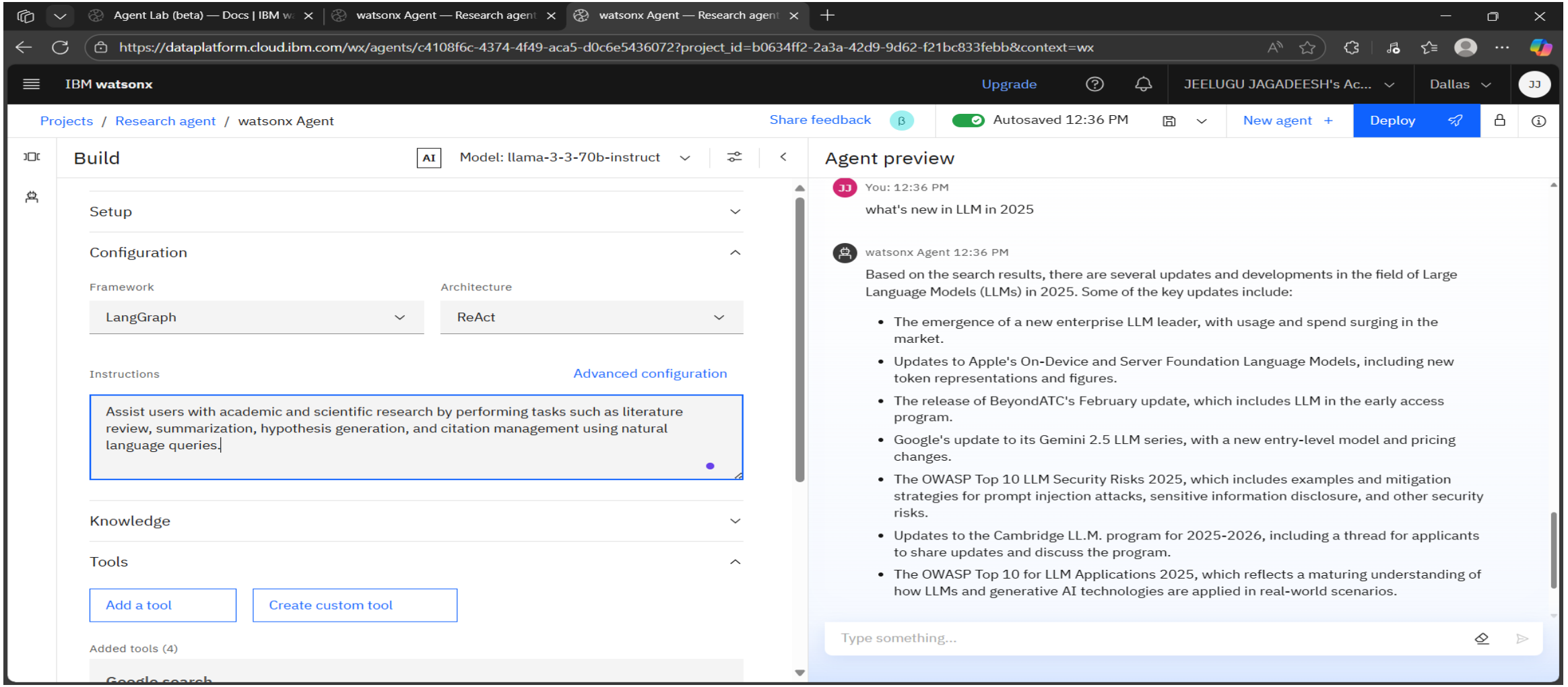
RESULT 1.3



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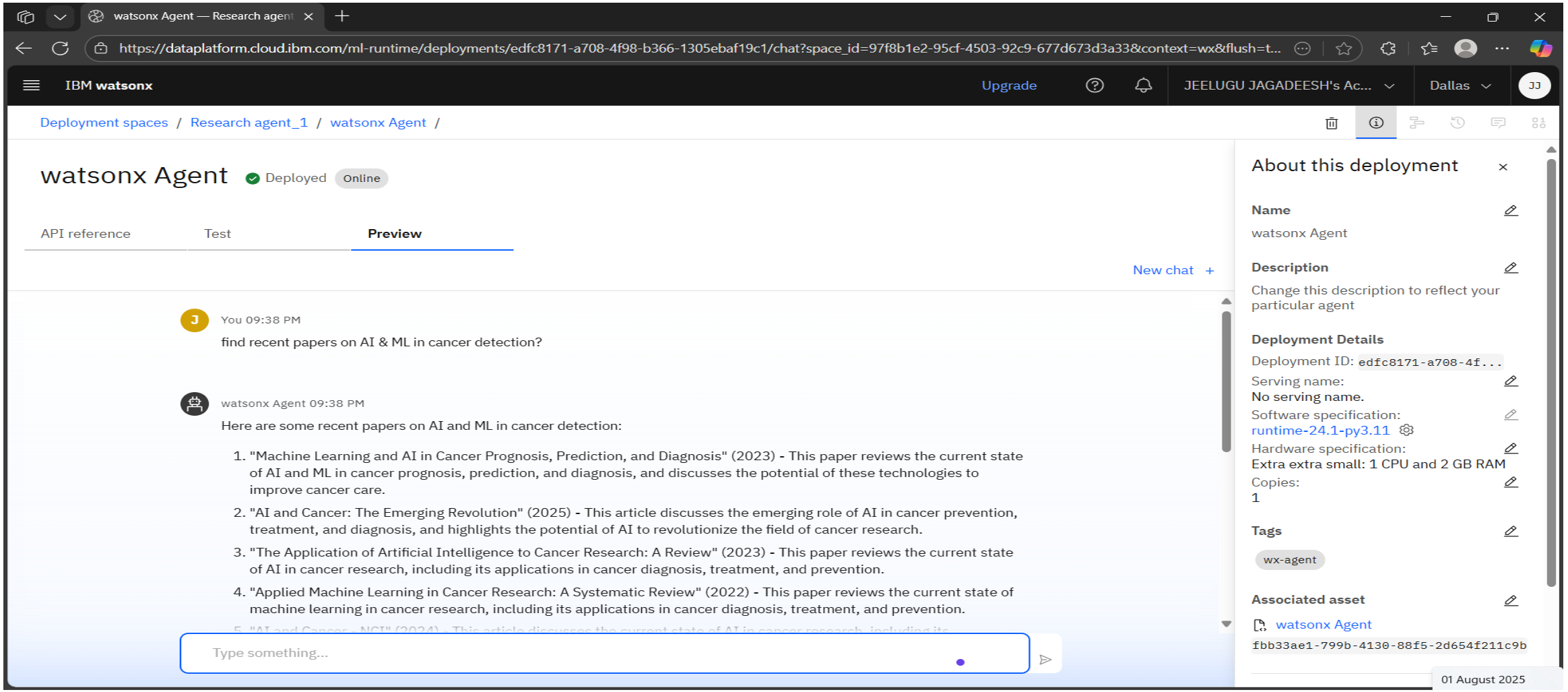
RESULT 1.4



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CONCLUSION

- The Research Agent demonstrates the capability to assist with academic queries using natural language.
  It efficiently retrieves and processes research content, generating human-like responses with references.
  The system greatly reduces time and effort for students, educators, and researchers.

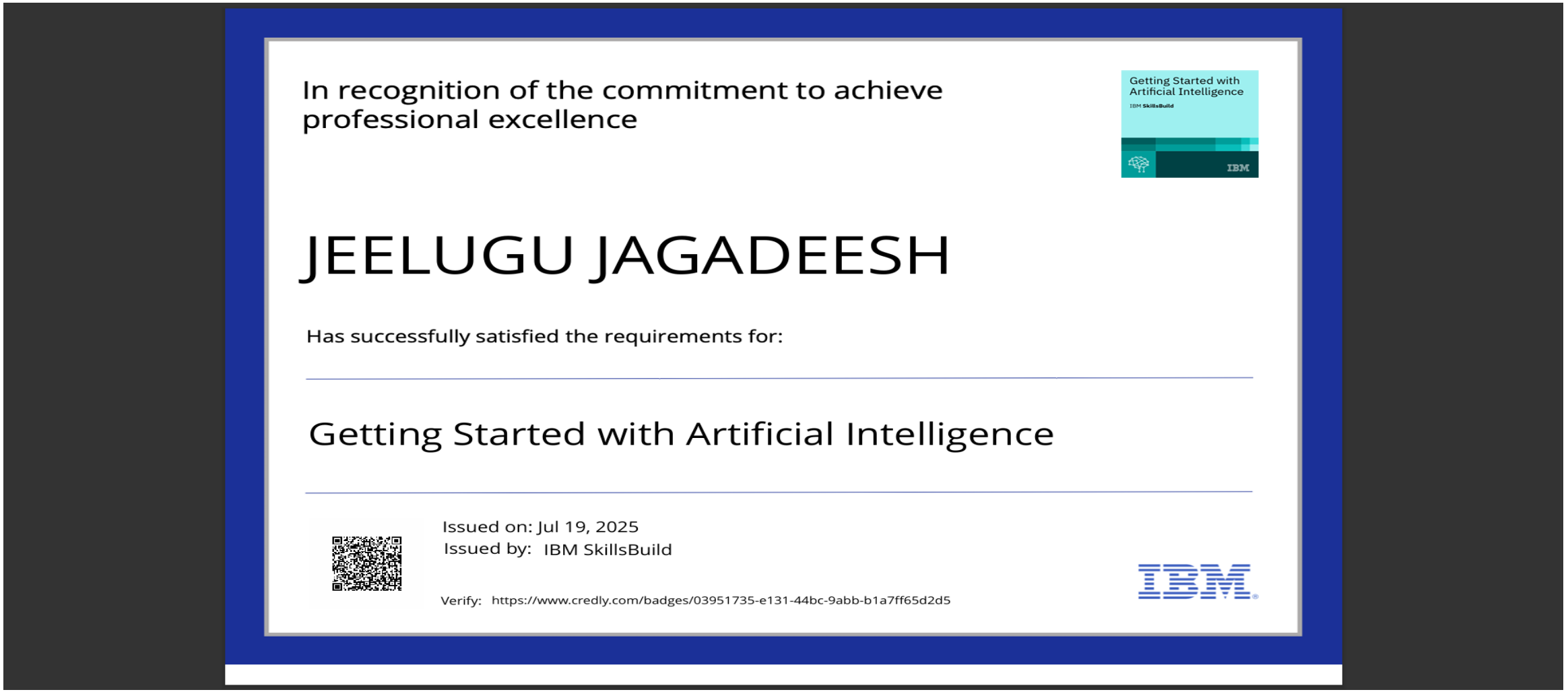
FUTURE SCOPE

- Integrate with academic databases like IEEE Xplore, Springer, and PubMed.
- Add PDF parsing and annotation capabilities.
- Voice interaction using IBM Watson Speech-to-Text.
- Enable offline knowledge storage (local knowledge base).
- Connect with LaTeX/BibTeX tools for paper drafting.

REFERENCES

- IBM Watsonx Documentation
- LangGraph and ReAct Architecture Papers
- Research articles on AI in Cancer Detection
- News sources: BBC, MIT, NYT, WSJ, NBC
- Tools: Google Search API, DuckDuckGo API, Wikipedia API

IBM CERTIFICATIONS



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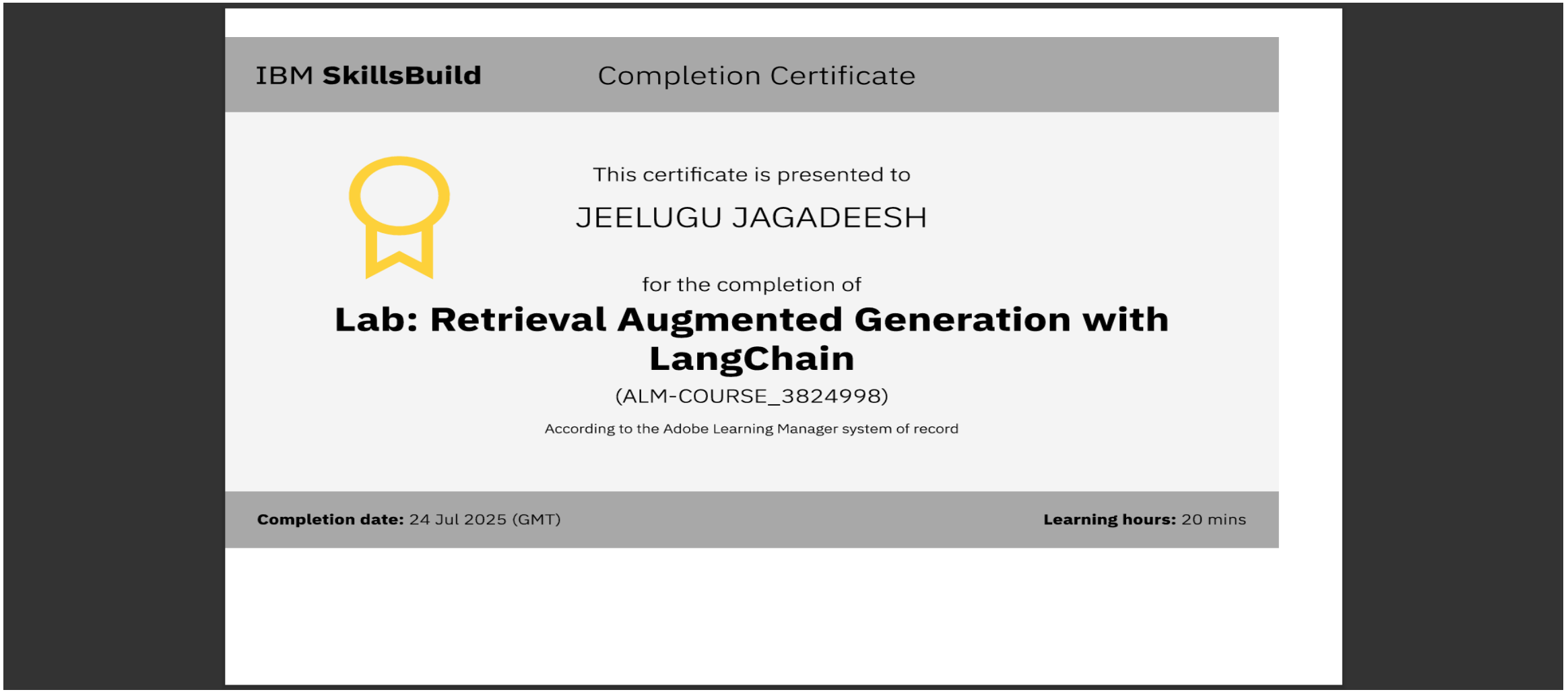

IBM **SkillsBuild** Completion Certificate

This certificate is presented to

JEELUGU JAGADEESH

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

THANK YOU

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