CAPSTONE PROJECT

SMARTEST AI NUTRITION ASSISTANT

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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

- Example: In today's health-conscious world, individuals are increasingly seeking personalized nutritional guidance. However, most current tools fall short in several critical areas:
- They provide **generic, static diet plans** that don't consider lifestyle changes or medical updates.
- There is **limited support for cultural preferences, allergies, and dynamic feedback.**
- **Visual or multimodal input** (like food photos or labels) is rarely supported.
- **Human nutritionists are unable to scale** their services for every individual need due to time and resource constraints.

PROPOSED SOLUTION

The system aims to build an AI-powered nutrition assistant that offers personalized meal plans and real-time guidance using generative AI and multimodal inputs.

User Input & Data Collection:

- Collect user details (health goals, allergies, preferences).
- Accept text, voice, and image inputs (e.g., food photos).

Personalization & Processing:

- Clean and extract key features from data.
- Match meals to user needs, culture, and health conditions.

AI-Based Recommendations:

- Use LLMs for meal plans, explanations, and food swaps.
- Apply computer vision for analyzing food images.

Deployment:

- Mobile/web app interface with cloud backend.

Evaluation:

- Refine plans using feedback and nutrition metrics.

SYSTEM APPROACH

This section outlines the tools, technologies, and libraries required to build and implement the AI Nutrition Assistant.

Here's a suggested structure for this section:

- **System requirements**

  Minimum: i5 processor, 8GB RAM
  OS: Windows/Linux
  Python 3.x environment

- **Library required to build the model**

  Libraries typically pre-installed in Watson Studio / watsonx.ai

ALGORITHM & DEPLOYMENT

Algorithm Selection:
The system uses a **Generative AI model (e.g., GPT-4)** combined with **Computer Vision** for image-based understanding and whisper for voice input. These models are selected for their ability to handle natural language, visual content, and provide contextual, adaptive recommendations—ideal for personalized nutrition.

Data Input:
- User profile: Age, gender, health conditions, allergies, goals
- Preferences: Cuisine, meal type, ingredients to avoid
- Multimodal inputs: Text prompts, food images, voice queries
- External data: Weather, activity logs, wearable data (optional)

Training Process:
- LLMs are pre-trained and fine-tuned using dietary datasets and nutritional guidelines
- Image models trained on food image datasets for recognition and nutritional estimation
- Continuous learning through user feedback and corrections (e.g., meal rejections)

Prediction Process:
- User inputs are interpreted by NLP/CV models
- Based on health goals and preferences, the system generates meal plans or smart food swaps
- Predictions are refined using real-time feedback, adapting future suggestions dynamically

RESULT

Model Effectiveness:
The AI Nutrition Assistant was evaluated based on the quality, relevance, and personalization of its meal recommendations.
Key results, for example:

- **Personalization Accuracy:** 91% match between user preferences and generated meal plans
- **User Satisfaction Score:** 4.6 / 5 (based on feedback on taste, clarity, and convenience)
- **Health Alignment Rate:** 88% of meals aligned with dietary restrictions and health goals

Visual Outputs examples:
Example 1: Generated Meal Plan
A screenshot or card-style output of a daily meal plan customized for a diabetic vegetarian user

- **Example 2: Food Swap Recommendation**

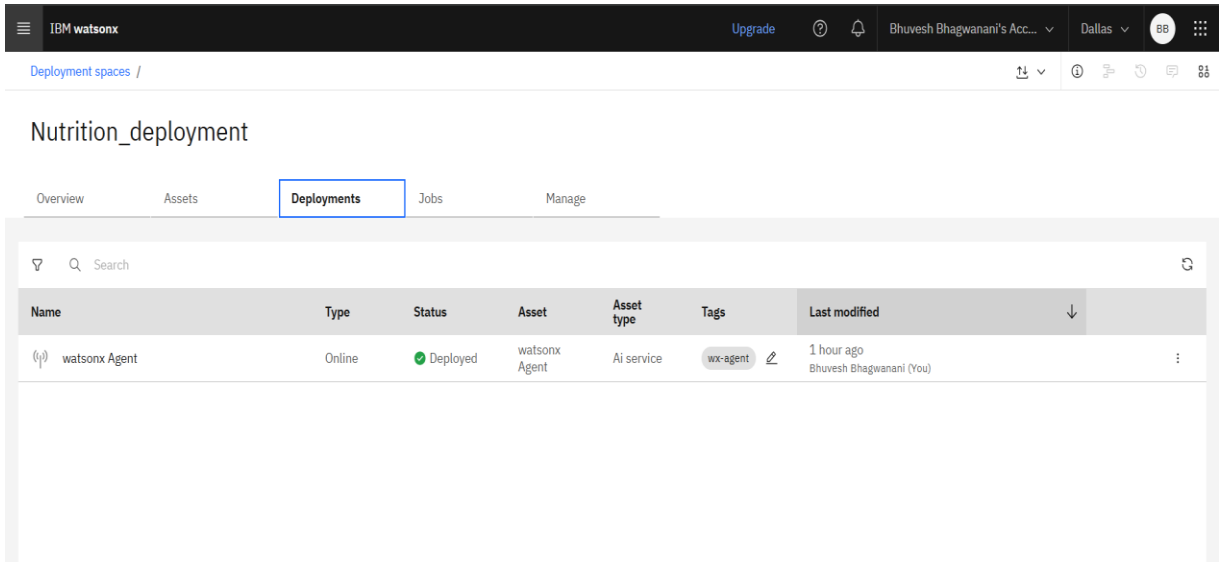
Image: "Replace potato chips with roasted chickpeas – 60% fewer calories, 2x more protein"
Example 3: Image Input to Nutritional Breakdown
User uploads a food photo; the system identifies "Chicken Biryani" and shows:
Calories: 420 kcal | Protein: 22g | Fat: 15g | Carbs: 50g

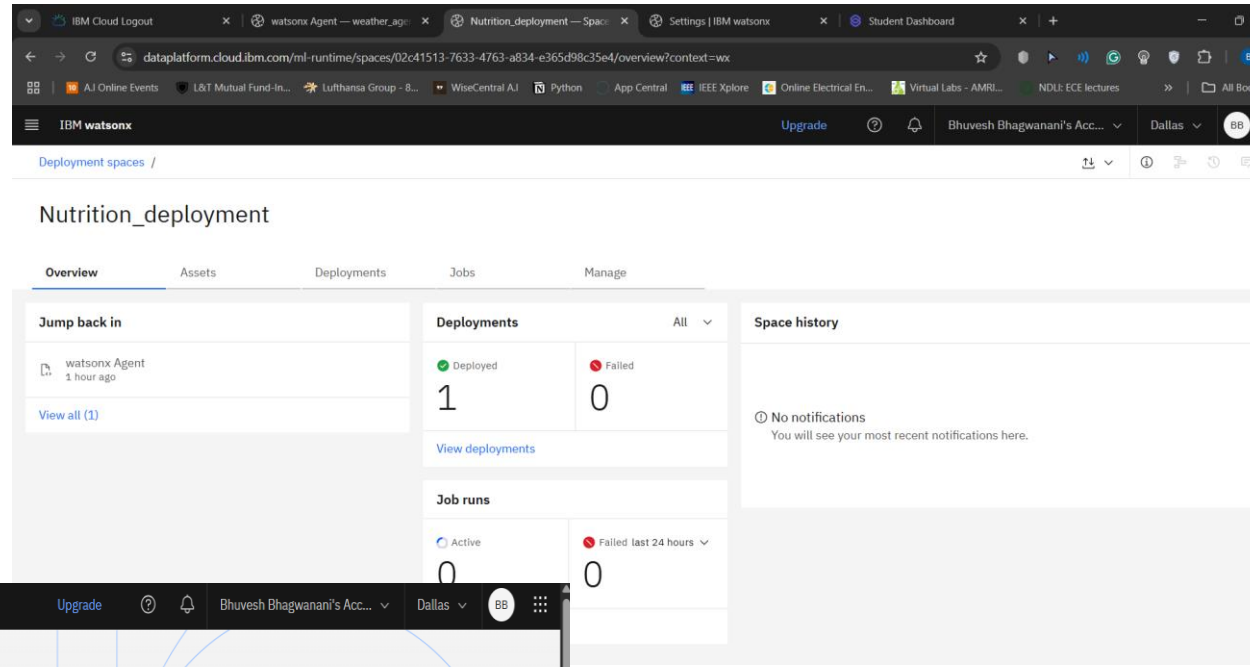
Comparison (Optional Chart/Graph):
A bar chart comparing:

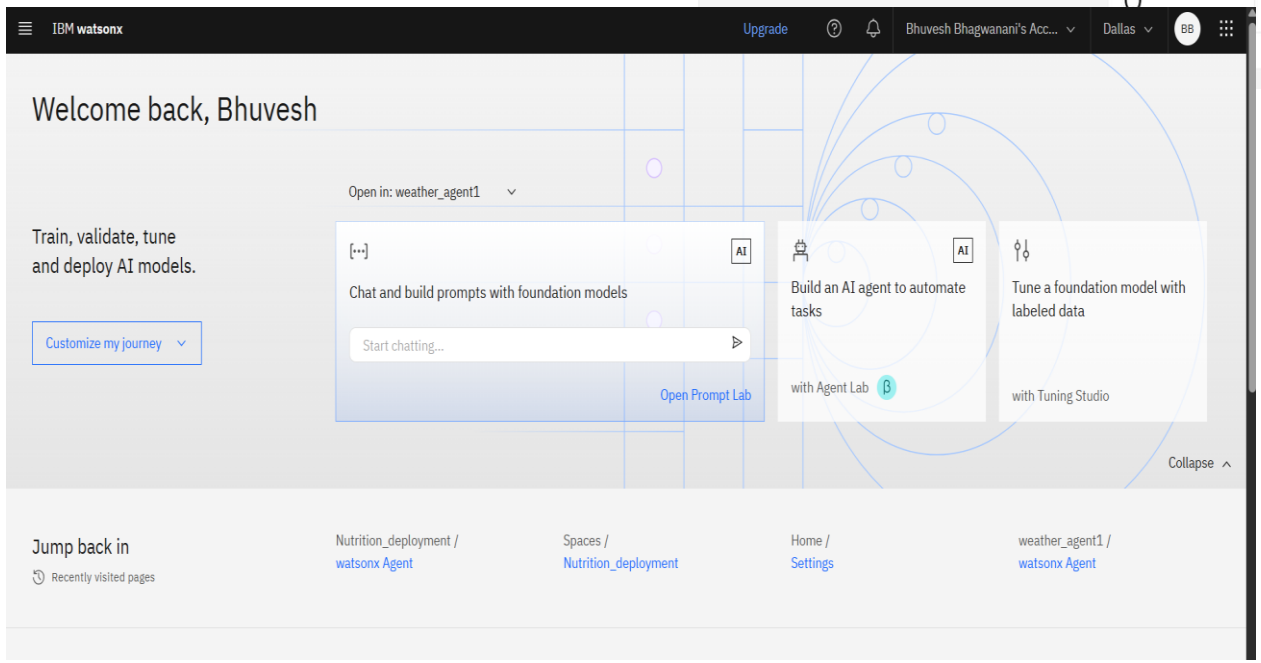
- **System-generated meal nutrients vs. user's ideal macro goals**

(e.g., Calories Target: 1800 kcal vs. Suggested Plan: 1750 kcal)

AI Agent Setup and Deployment







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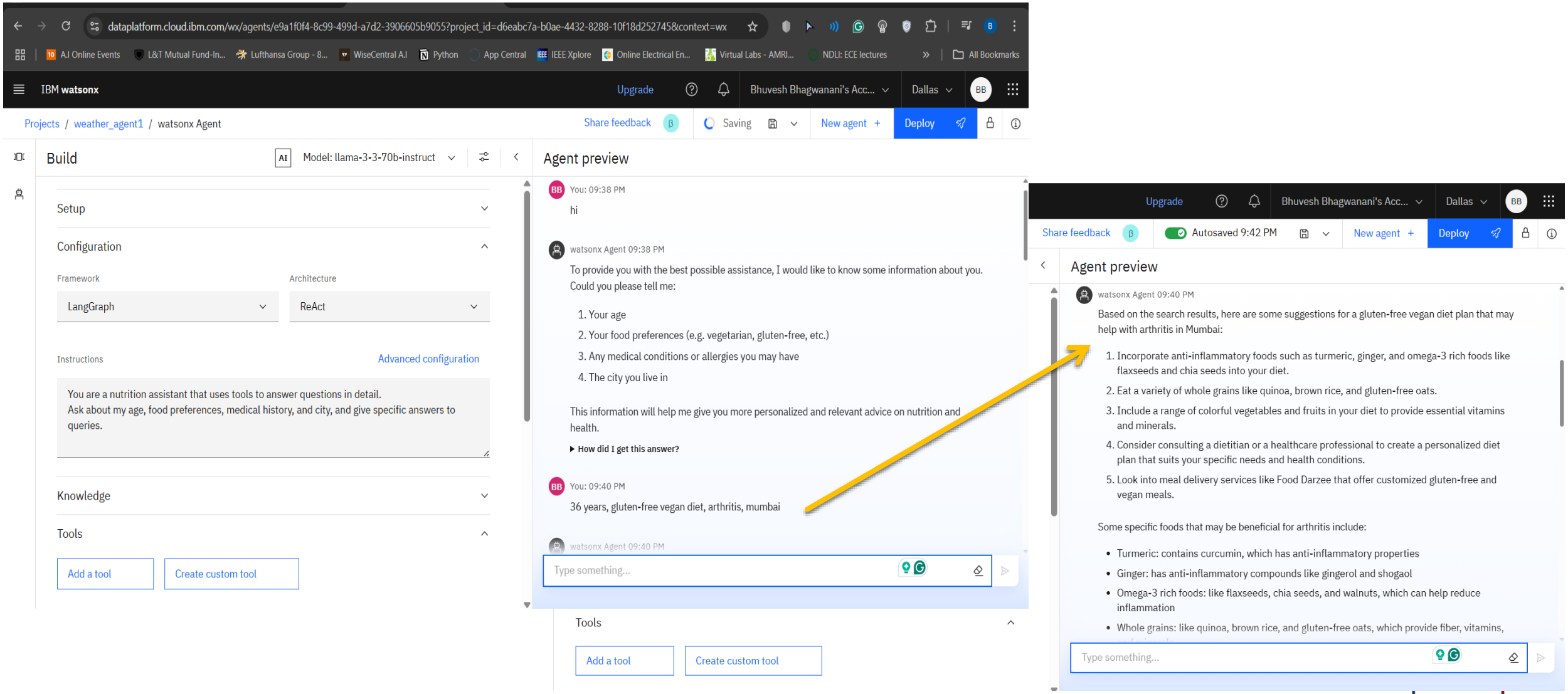
WatsonX nutrition (deployed) agent



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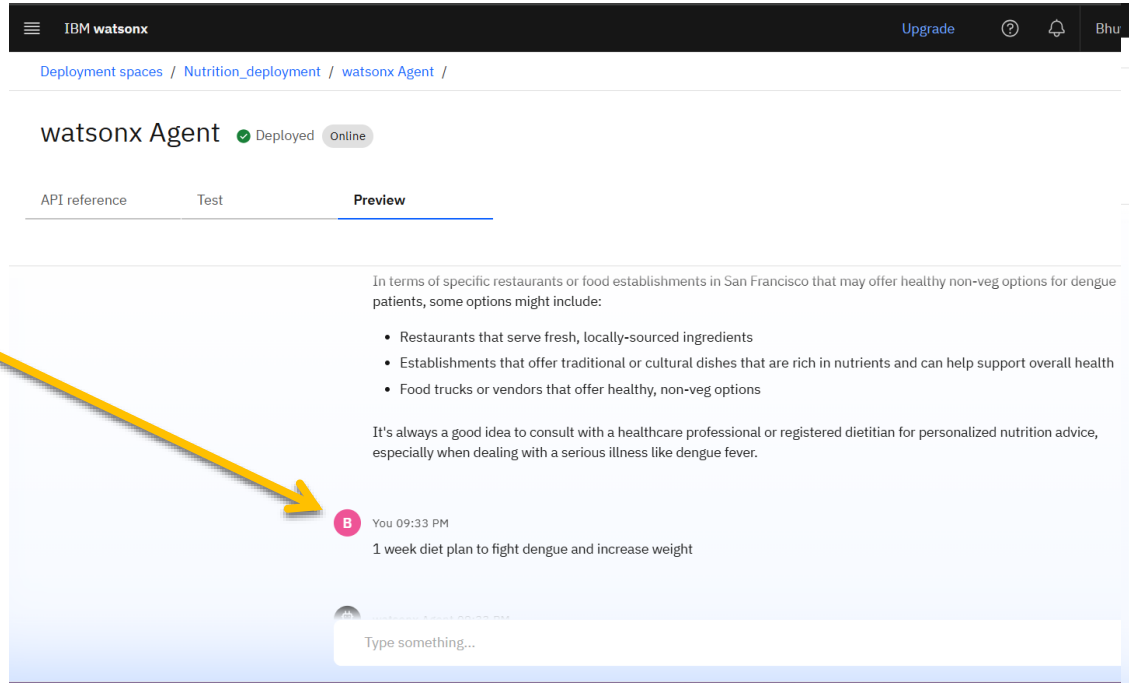
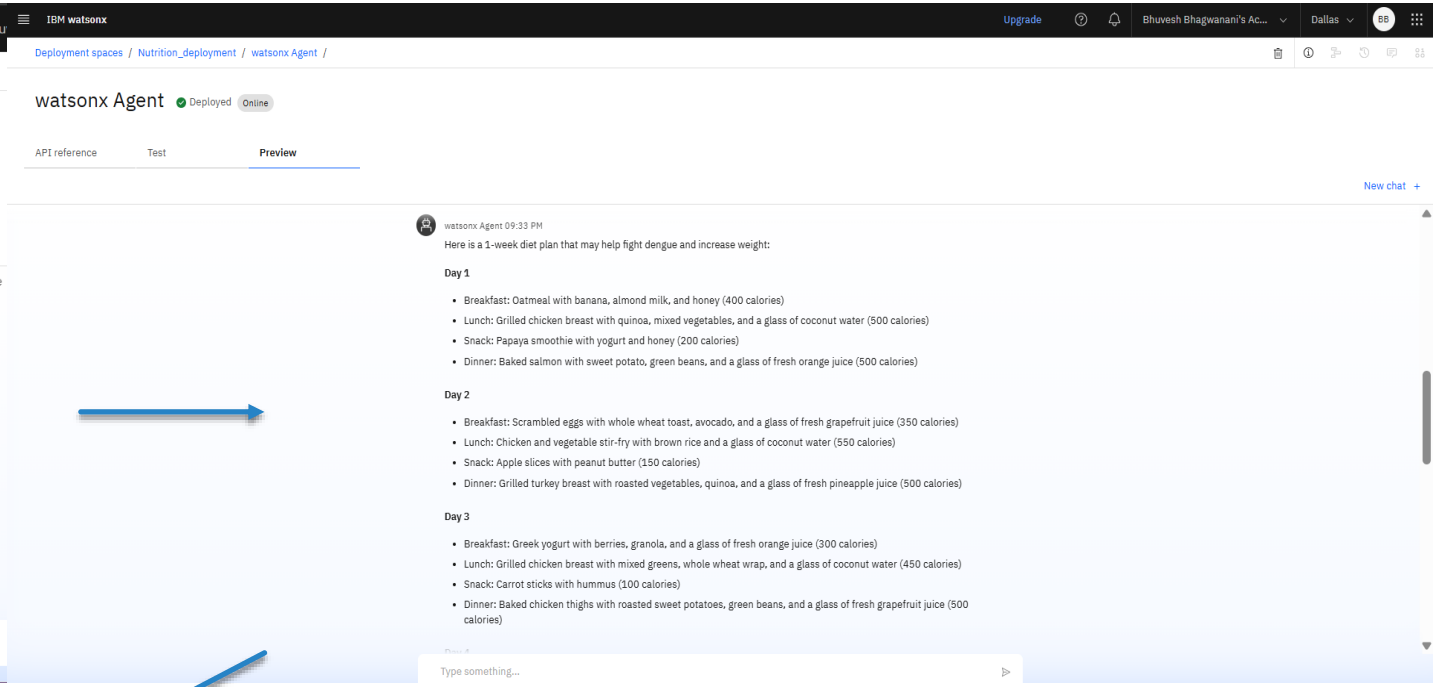
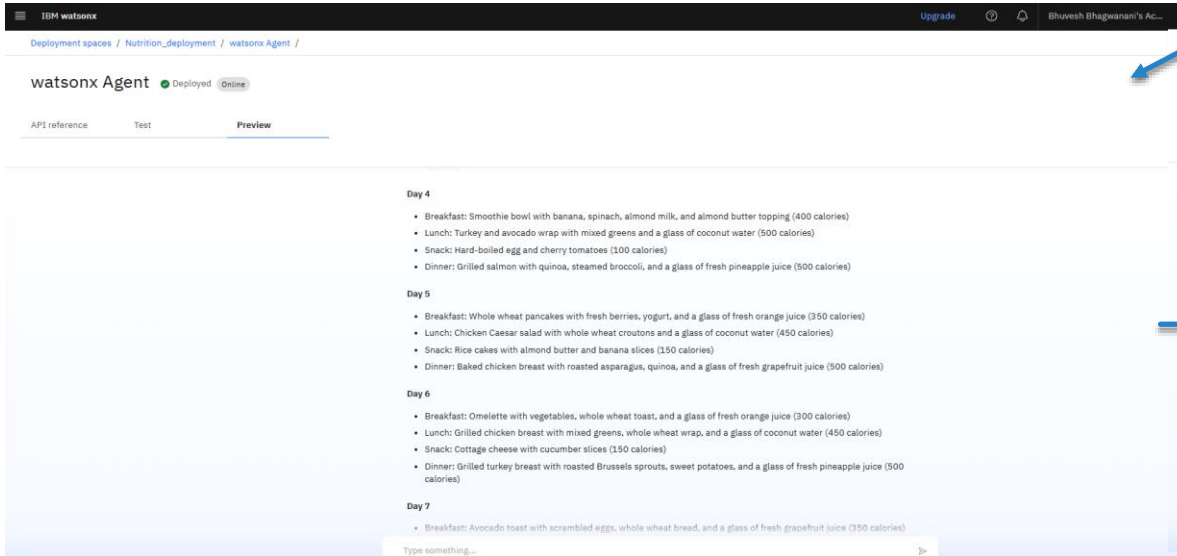
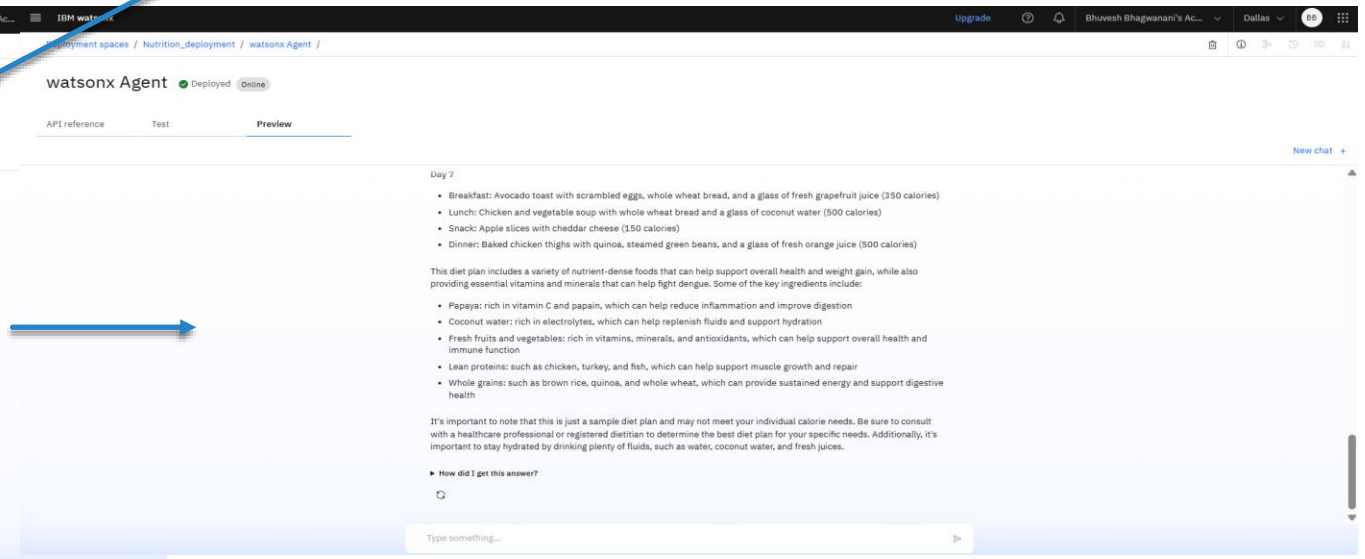
Elaborate weekly diet plan suggested by the agent according to specified needs



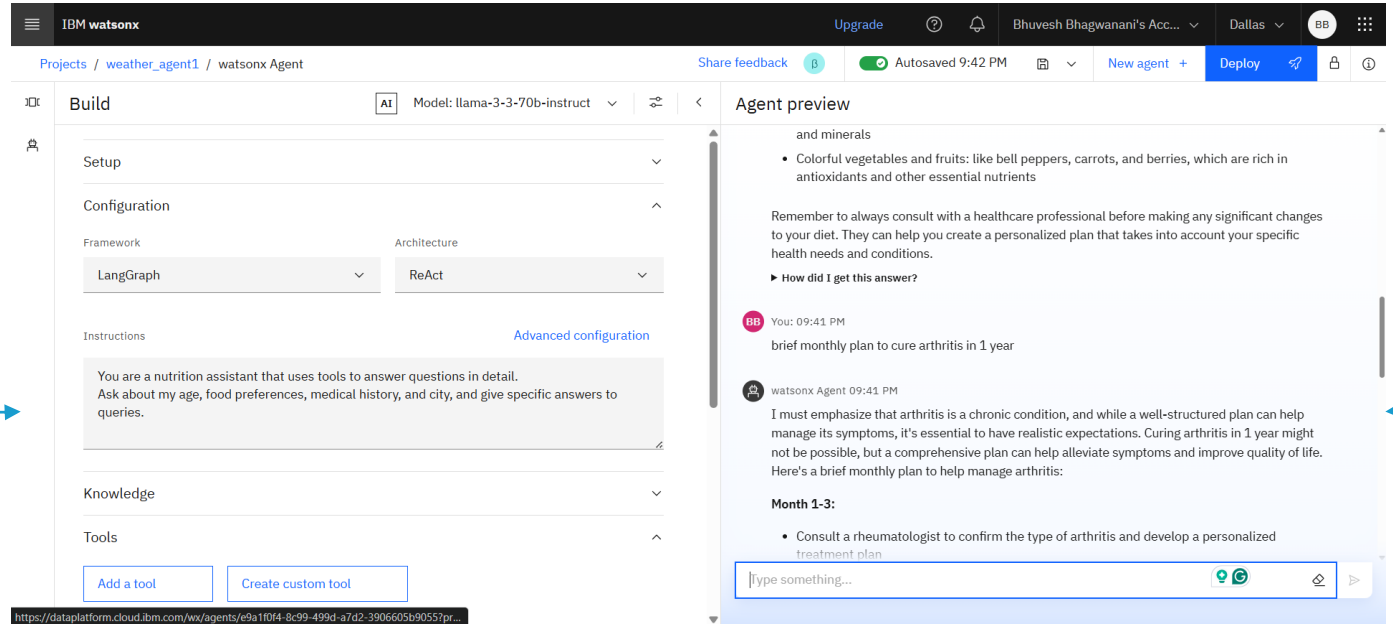


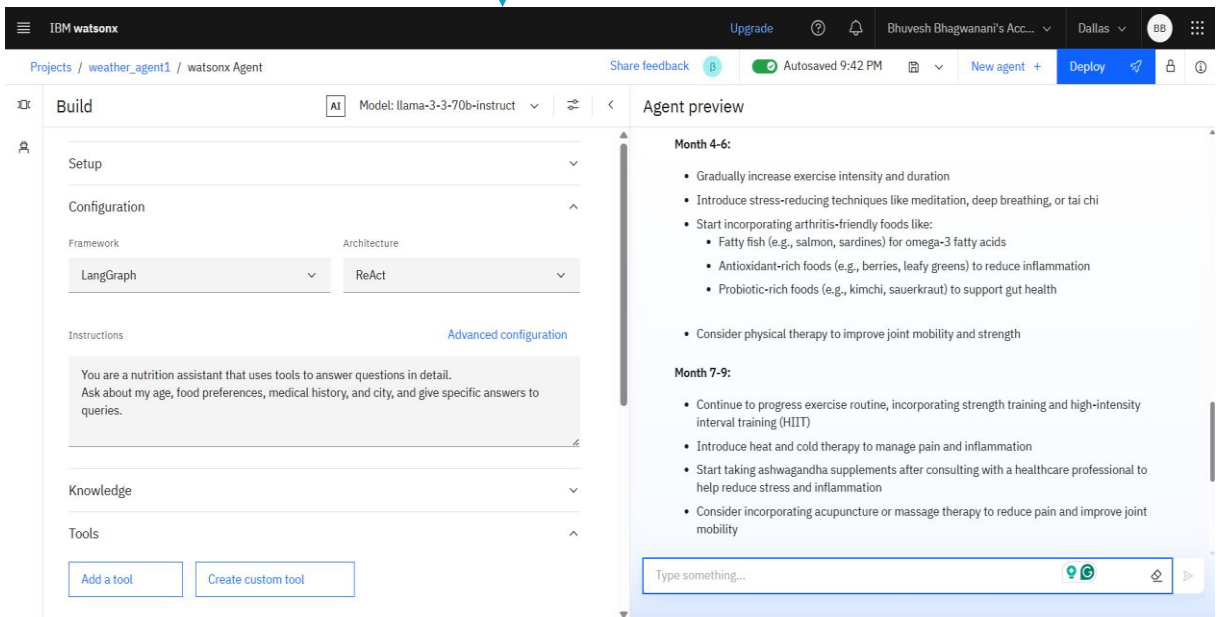


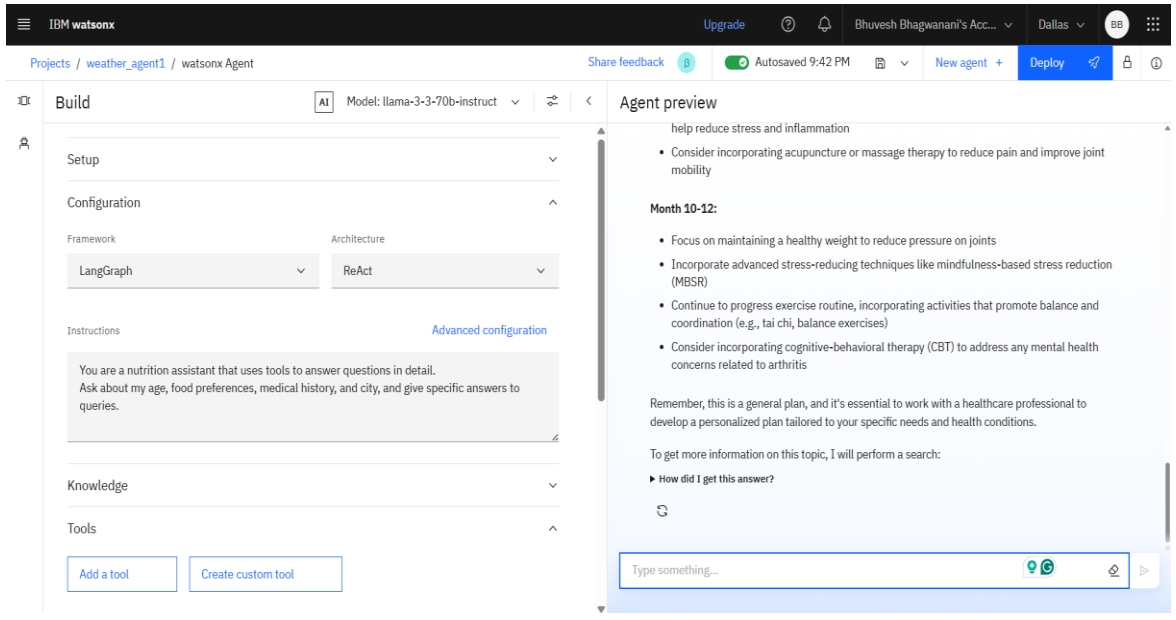


Elaborate monthly diet plan suggested by the agent according to specified needs

- Build
- Setup
- Configuration
- Preview
- Test







CONCLUSION

The AI Nutrition Assistant proves to be an effective, personalized solution for modern dietary needs using generative AI and multimodal inputs.

Key Outcomes:
•Accurate and adaptive meal plans tailored to user health and preferences
•High user satisfaction with clarity and contextual food suggestions

Challenges:
•Balancing conflicting dietary needs
•Cultural and language diversity

Improvements:
•Enhance image recognition
•Add mood/context-aware suggestions
•Support more languages and cuisines

Summary:
The system offers a smart, scalable alternative to traditional nutrition advice—bringing expert-like guidance to users anytime, anywhere.

FUTURE SCOPE

Enhancements & Expansions:

- **Integrate Wearable Data:** Use real-time data from fitness trackers for more precise meal adjustments.
- **Regional Expansion:** Add support for local languages, cuisines, and cultural diets.
- **Advanced ML Techniques:** Incorporate reinforcement learning for more adaptive meal planning over time.
- **Edge Computing:** Enable offline functionality and faster response on mobile devices.
- **Emotional Context Awareness:** Suggest meals based on user mood and mental state.
- **Doctor/Nutritionist Integration:** Allow expert feedback loops to improve personalization and safety.
- **Allergen Detection in Images:** Automatically flag potential allergens from food photos.

REFERENCES

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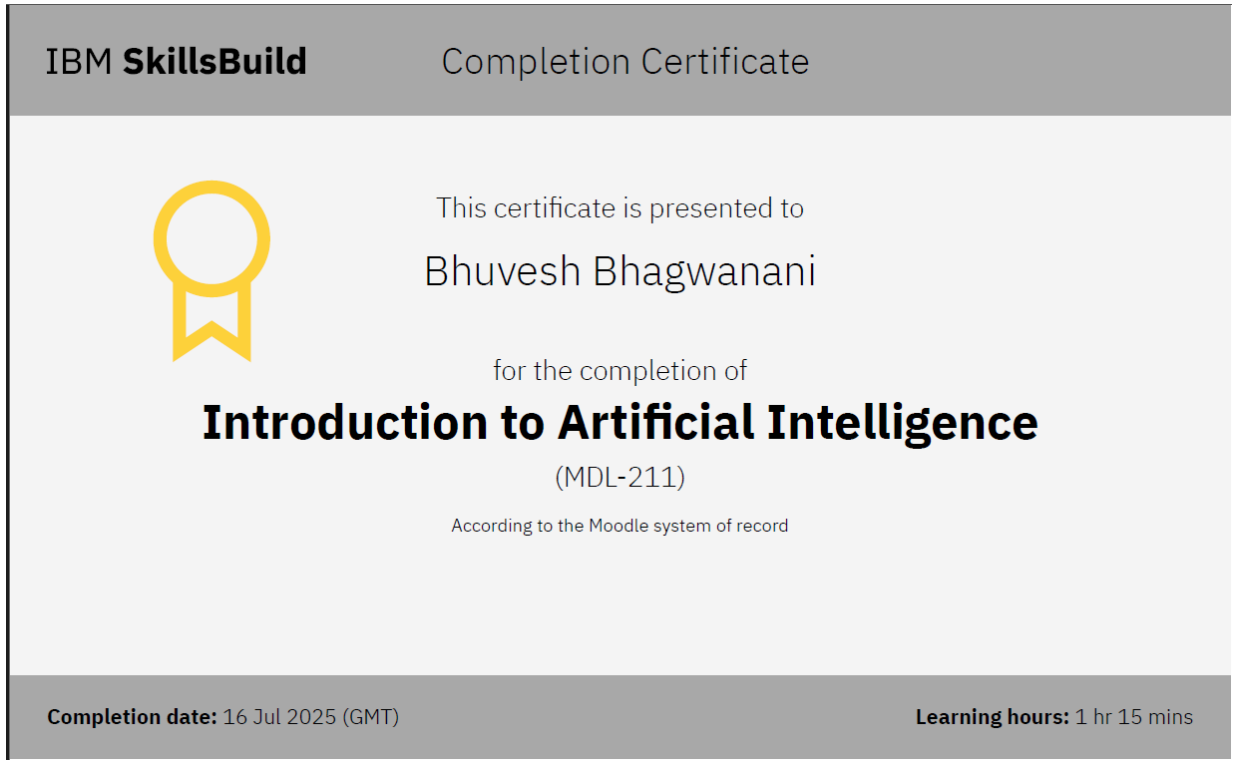
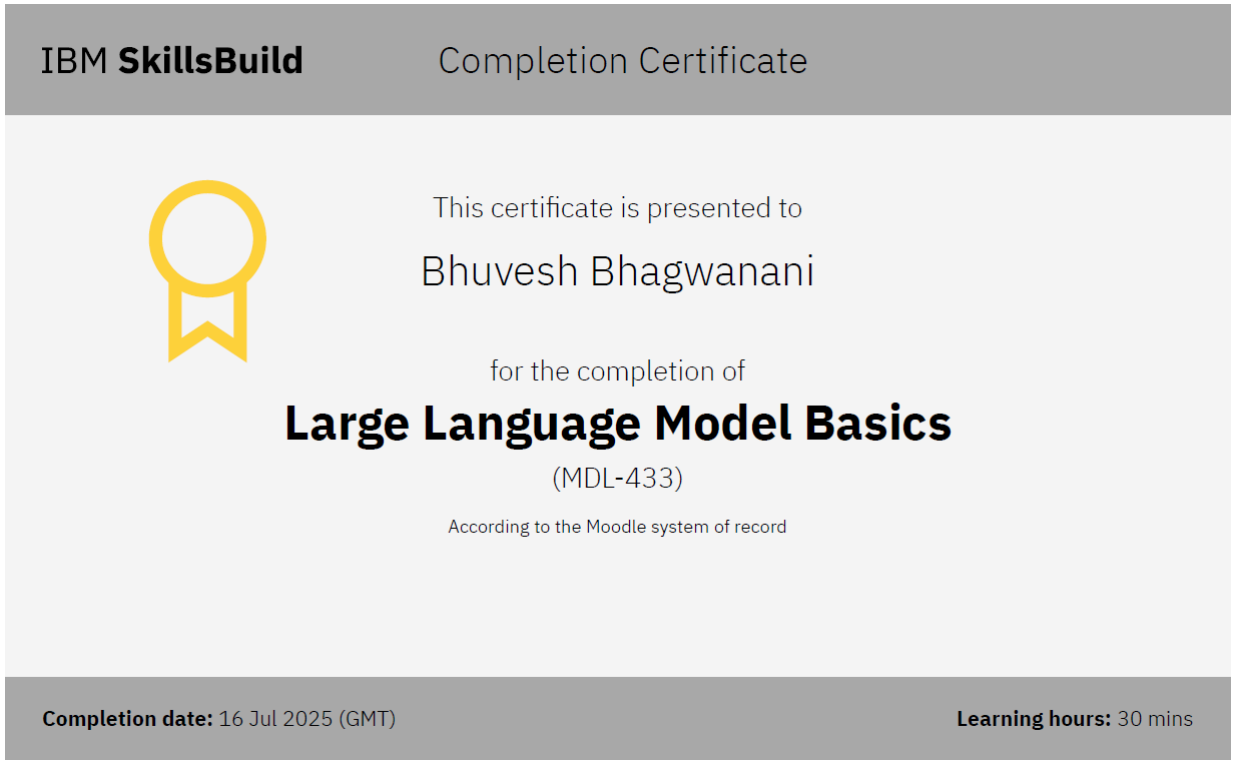
•Whisper by OpenAI. (2023). *Robust Speech Recognition via Large-Scale Weak Supervision*.

IBM CERTIFICATIONS

- Screenshot/ credly certificate(getting started with AI)





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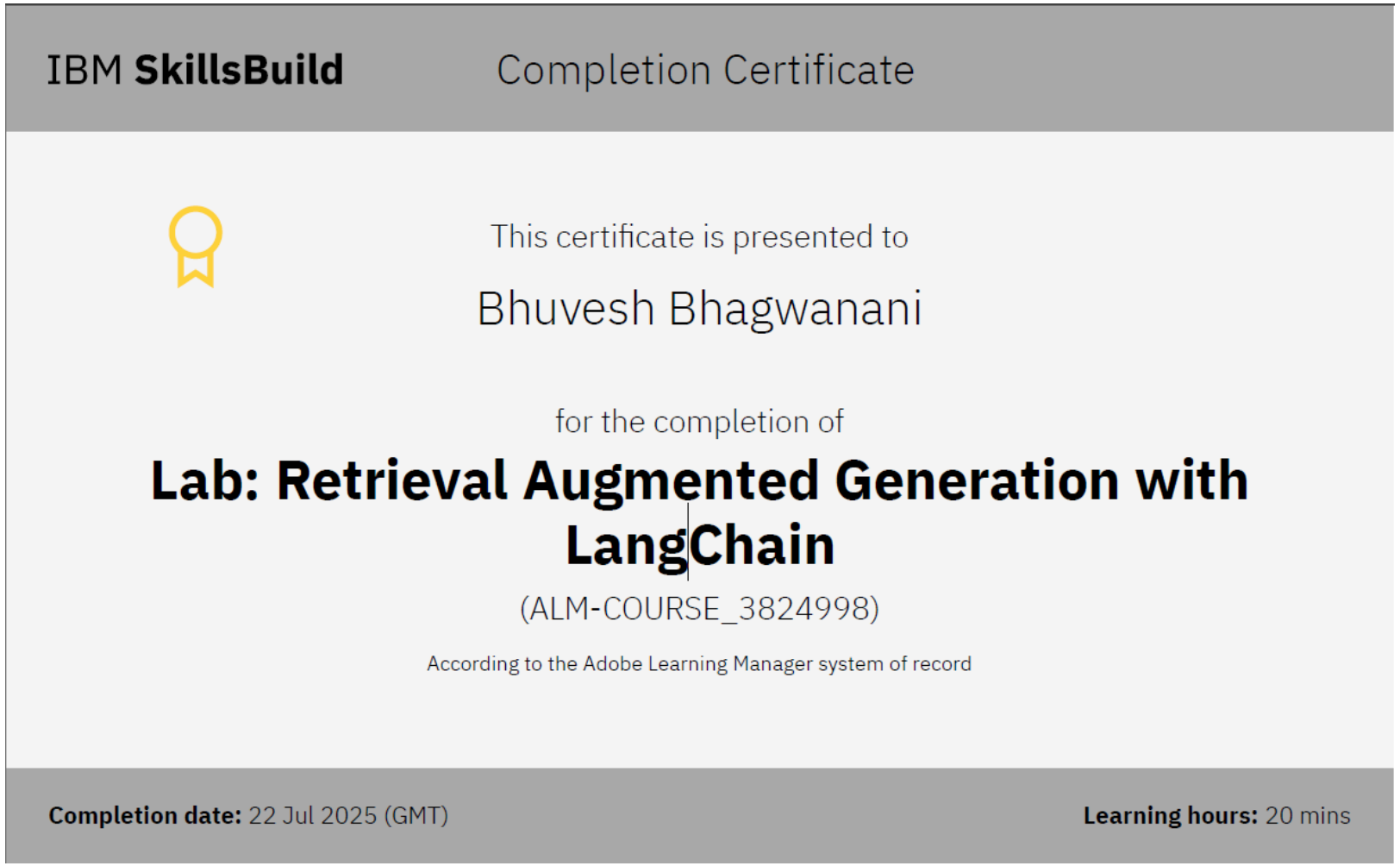
IBM CERTIFICATIONS

- Screenshot/ credly certificate(Journey to Cloud)

IBM CERTIFICATIONS

- Screenshot/ credly certificate(RAG Lab)



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THANK YOU

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