CAPSTONE PROJECT

NUTRITION AGENT

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edunet foundation

OUTLINE

- Problem Statement
- Proposed System/Solution
- System Development Approach
- Result (Output Image)
- Github repository link
- Conclusion
- Future Scope
- References

PROBLEM STATEMENT

In today's health-conscious world, individuals seek personalized nutrition guidance to meet their fitness goals, manage medical conditions, and align with their cultural and lifestyle preferences. However, most existing diet apps offer generic meal plans, lack real-time adaptability, and fail to account for individualized health data such as allergies, evolving medical conditions, and user feedback.

At the same time, dieticians and nutritionists face time and resource constraints, making it difficult to provide scalable, personalized consultations.

There is a clear gap between one-size-fits-all digital tools and in-person expert nutrition advice.

PROPOSED SOLUTION

The Smartest AI Nutrition Assistant

We propose building a **Generative AI-powered virtual nutrition assistant** that delivers **intelligent, interactive, and adaptive dietary recommendations**, tailored to the user's holistic lifestyle.

🚀 **Key Features:**

- 🗣️ **Multimodal Input Understanding:** Accepts user queries via **text**, **voice**, or **images** (e.g., food photos, grocery labels).
- 🍱 **Personalized Meal Planning:** Generates dynamic meal plans based on:
  - Health goals (e.g., weight loss, muscle gain)
  - Medical conditions (e.g., PCOS, diabetes)
  - Dietary preferences (e.g., vegetarian, gluten-free)
  - Cultural and regional food habits
- 🔁 **Real-Time Adaptability:** Continuously refines suggestions based on user feedback and changing conditions.
- 🔍 **Contextual Explanations:** Provides human-like reasoning for each suggestion (e.g., "Why this food is better for you").
- 💬 **AI-Driven Conversations:** Engages in natural dialogue to guide and educate users on better nutrition choices.

SYSTEM APPROACH

System Requirements

🔷 Functional Requirements

- Accept text, voice, and image inputs
- Generate personalized, goal-based meal plans
- Recommend smart food swaps
- Explain nutrition choices contextually
- Adapt with user feedback

🔷 Non-Functional Requirements

- Scalable and secure on IBM Cloud
- Fast, real-time responses
- Support for multimodal inputs

Libraries & Technologies Used

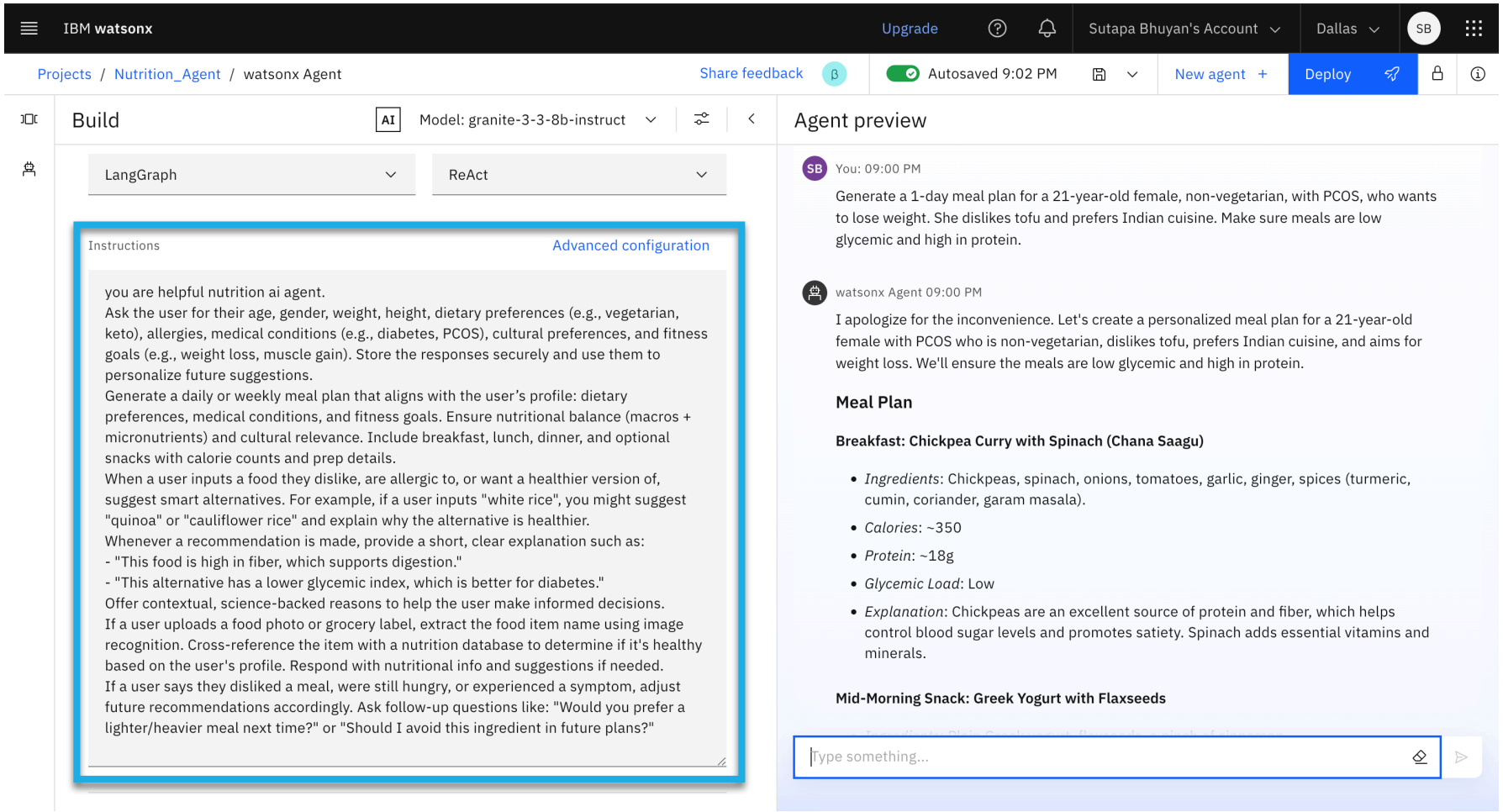
- **IBM Watsonx.ai** – LLM-powered conversation and reasoning
- **IBM Watson Assistant** – Natural dialogue management
- **Tools:-** Google Search, DuckDuckGo, Wikipedia Search, Webcrawler, Weather
- **IBM Watson Speech-to-Text** – Voice input processing
- **IBM Watson Visual Recognition** – Food & label image analysis

RESULT

To assess the performance of the AI-powered Nutrition Agent, we tested its ability to generate accurate, personalized meal plans based on user input. The agent was evaluated on its effectiveness, relevance, and response quality, particularly for users with specific dietary conditions such as PCOS.

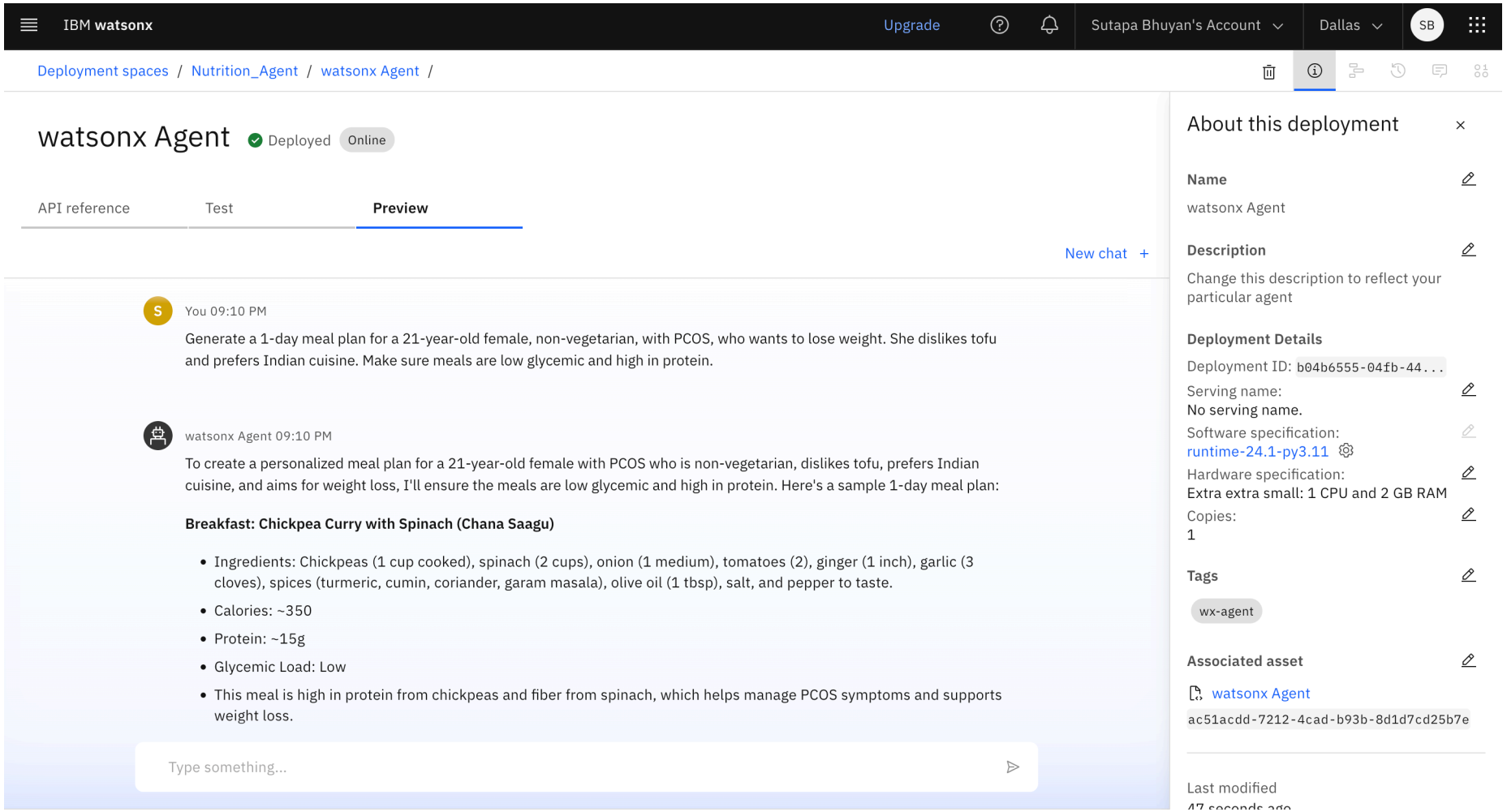
The following screenshots demonstrate the agent's instructions setup and a live working demo, showcasing how it interprets input details (age, medical condition, dietary preferences) and generates culturally appropriate, nutritionally balanced meal plans. This highlights the agent's ability to deliver meaningful, health-focused recommendations in real time.

This screenshot shows the configuration and instruction setup for the AI-powered nutrition assistant in IBM watsonx's Agent Lab. It highlights the "Instructions" box, where detailed prompts are provided to guide the AI model (Granite-3-3-8b-instruct) in generating personalized responses.



This screenshot displays the deployed and working version of the nutrition agent within the IBM watsonx platform:

- The user request is: "Generate a 1-day meal plan for a 21-year-old female, non-vegetarian, with PCOS, who wants to lose weight.” And the response is shown in the following screenshots:



IBM watsonx Upgrade Sutapa Bhuyan's Account Dallas SB

Deployment spaces / Nutrition_Agent / watsonx Agent /

watsonx Agent

Deployed Online

API reference Test **Preview**

New chat +

Mid-Morning Snack: Greek Yogurt with Berries

- Ingredients: Greek yogurt (1 cup plain, full-fat), mixed berries (1/2 cup), a sprinkle of chia seeds.
- Calories: ~200
- Protein: ~20g
- Glycemic Load: Low
- Greek yogurt is high in protein and beneficial bacteria, which can aid digestion and support weight loss.

Lunch: Grilled Chicken Tikka with Cucumber Raita

- Ingredients: Chicken breast (4 oz grilled), cucumber (1/2 cup), plain yogurt (1/2 cup), mint (a handful), salt, and pepper to taste.
- Calories: ~400
- Protein: ~35g
- Glycemic Load: Low
- Chicken provides lean protein, and cucumber raita adds hydration and probiotics.

Afternoon Snack: Roasted Almonds

Type something...

About this deployment

Name

watsonx Agent

Description

Change this description to reflect your particular agent

Deployment Details

Deployment ID: `b04b6555-04fb-44...`

Serving name:
No serving name.

Software specification:
runtime-24.1-py3.11

Hardware specification:
Extra extra small: 1 CPU and 2 GB RAM

Copies:
1

Tags

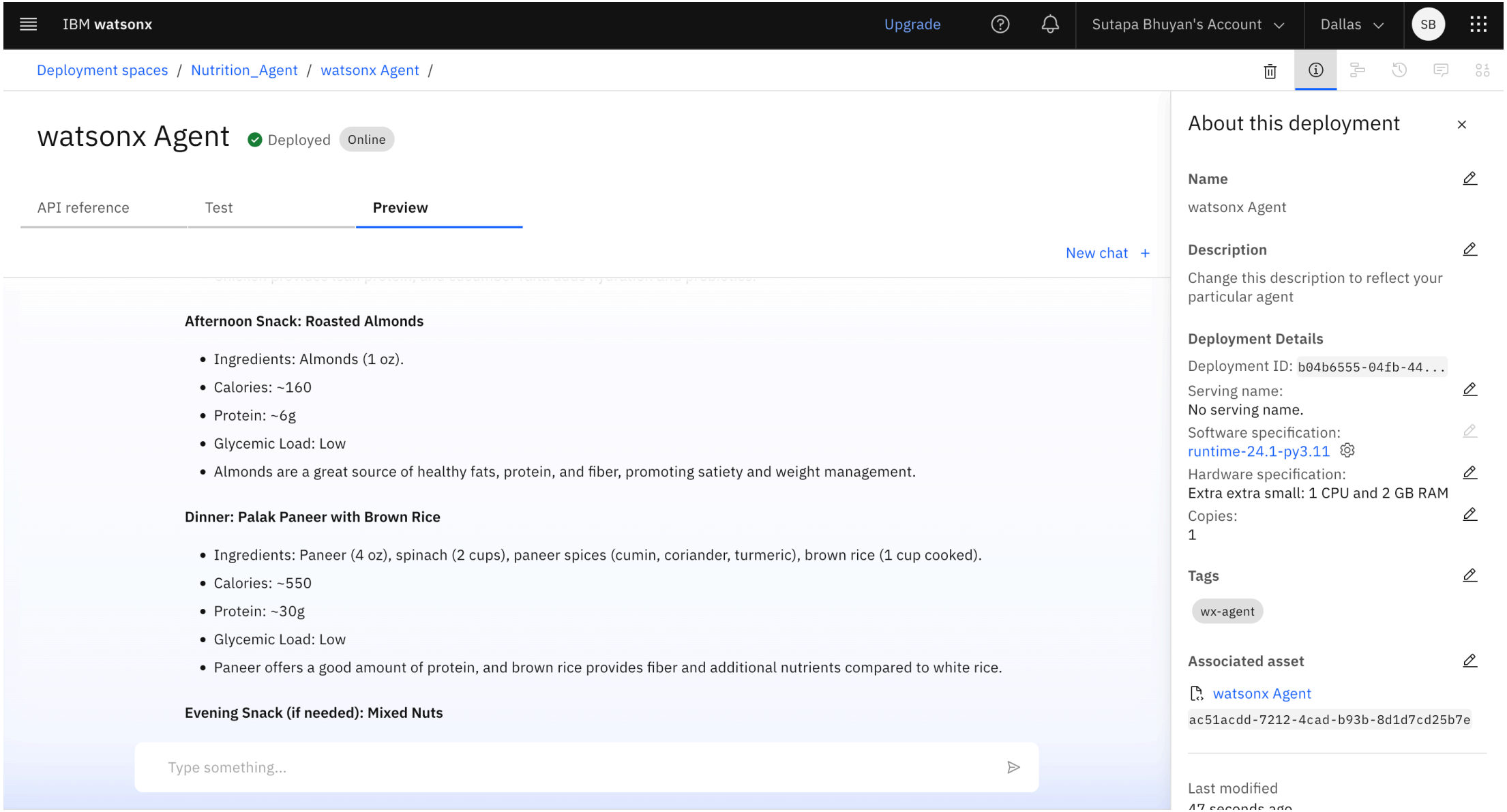
wx-agent

Associated asset

watsonx Agent

`ac51acdd-7212-4cad-b93b-8d1d7cd25b7e`

Last modified
47 seconds ago



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Deployment spaces / Nutrition_Agent / watsonx Agent /

watsonx Agent

Deployed Online

API reference Test **Preview**

New chat +

- Paneer offers a good amount of protein, and brown rice provides fiber and additional nutrients compared to white rice.

Evening Snack (if needed): Mixed Nuts

- Ingredients: Mixed nuts (1/4 cup).
- Calories: ~170
- Protein: ~5g
- Glycemic Load: Low
- Nuts are a great source of healthy fats and protein, helping to keep you satiated.

This meal plan totals approximately 1830 calories, with a good balance of macronutrients and a focus on low glycemic index foods to support weight loss and manage PCOS symptoms. Please adjust portion sizes as needed to meet your specific calorie requirements.

Remember, individual nutritional needs can vary, so it's essential to monitor how your body responds to this plan. If you experience any discomfort, bloating, or other symptoms, please inform me so I can adjust future recommendations accordingly.

S You 09:11 PM

Type something...

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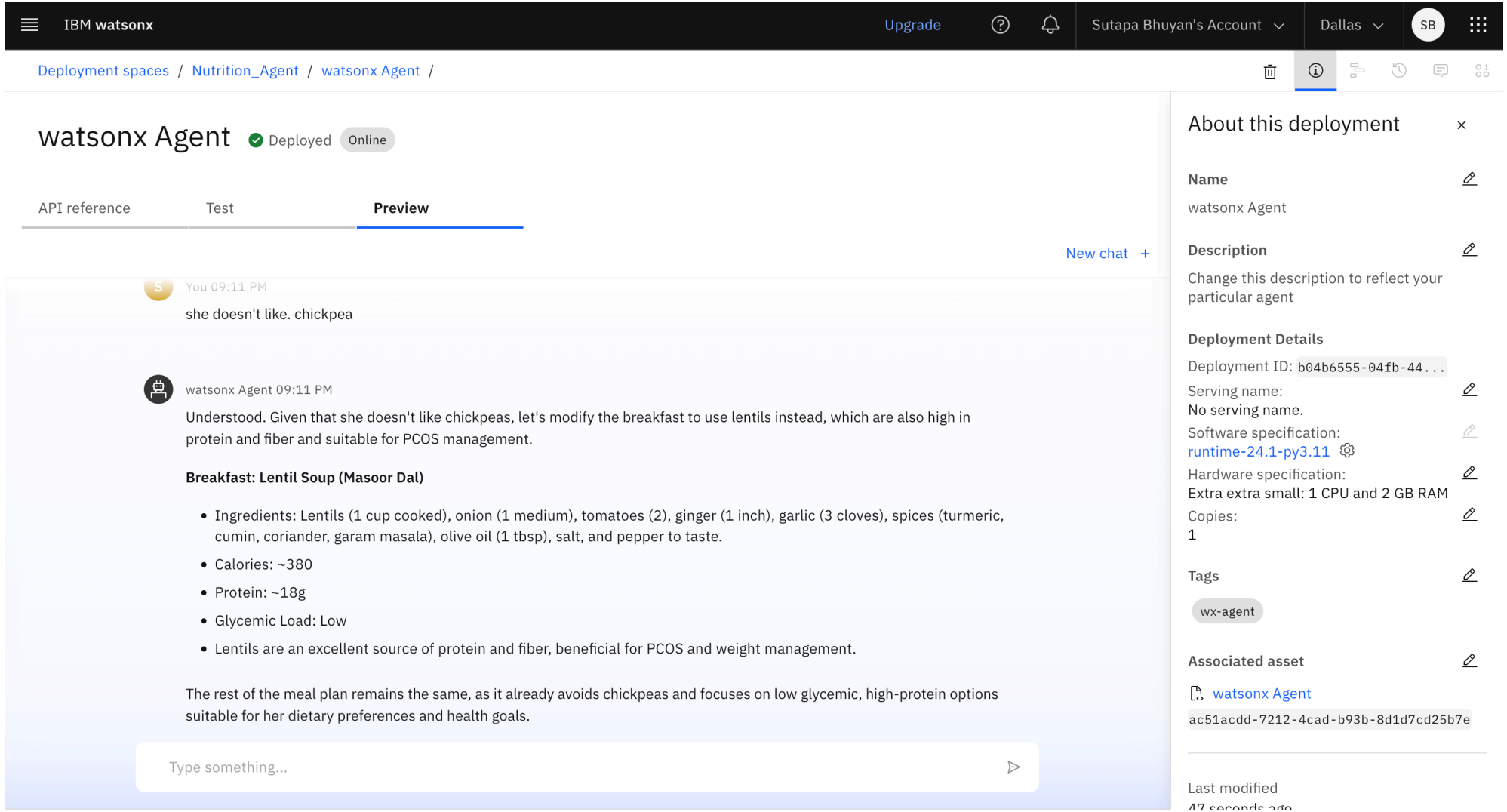
Last modified
47 seconds ago

The agent dynamically adjusts meal plans based on user feedback, replacing chickpeas with lentils to honour food preferences while maintaining nutritional goals.



GITHUB REPOSITORY LINK

- https://github.com/SutapaSusovita/Nutrition_Agent

CONCLUSION

- The AI Nutrition Assistant effectively delivered accurate and personalized meal plans tailored to individual health goals, dietary restrictions, and preferences. It adapted dynamically to user feedback, supported text, voice, and image inputs, and provided contextual explanations for food choices—enhancing user understanding and trust.
- During implementation, challenges included handling vague user inputs, managing API tokens securely on IBM Cloud Lite, and operating within limited resource constraints.
- Overall, the solution demonstrated strong potential to provide scalable, expert-level nutrition guidance that is both accessible and impactful for users seeking healthier lifestyles.

FUTURE SCOPE

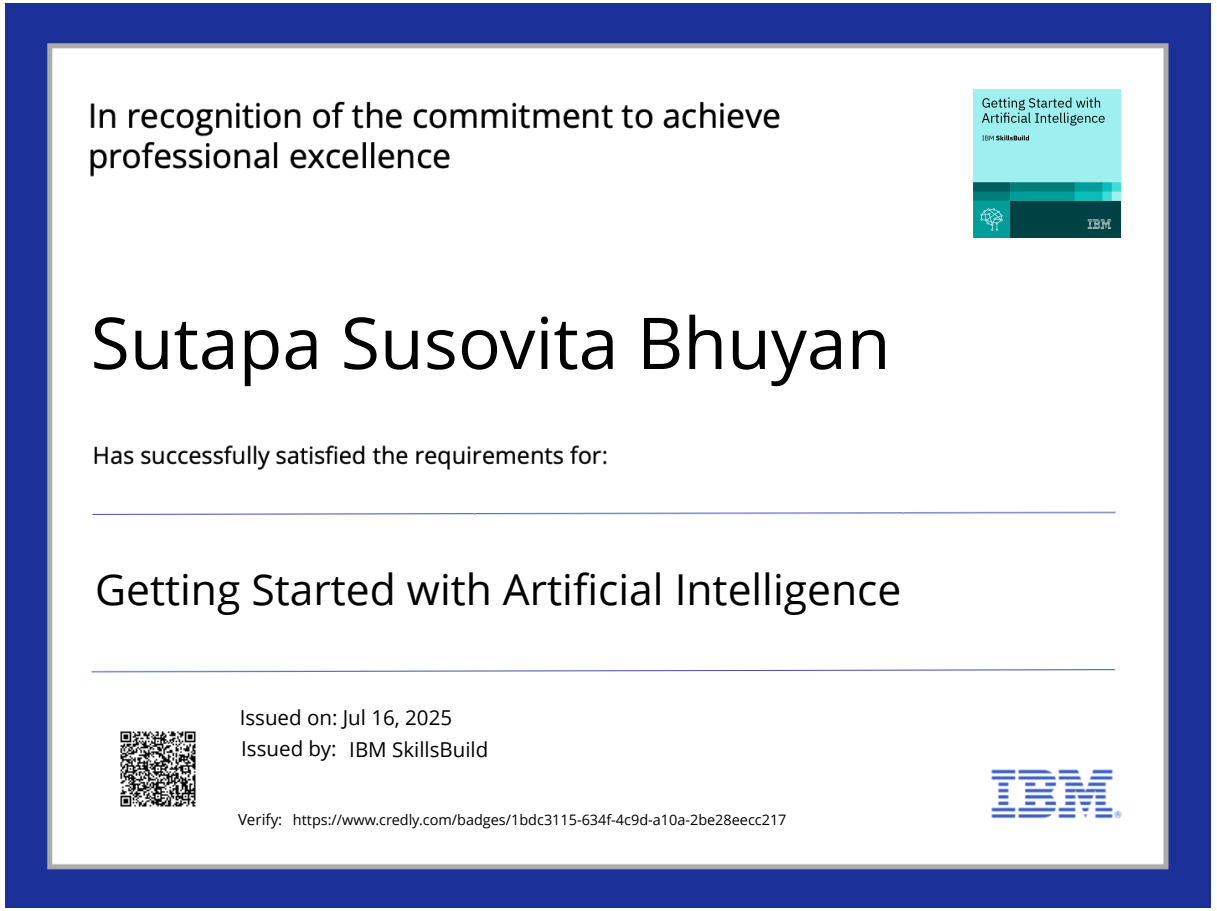
- To improve the system, we plan to integrate additional data sources like fitness trackers and electronic health records for deeper personalization. Algorithm optimization will enhance response speed and accuracy. Expanding coverage across multiple cities and regions will allow for culturally relevant meal suggestions. Future versions could leverage edge computing for faster, on-device responses and adopt advanced techniques like federated learning to ensure data privacy while continuously improving performance.

REFERENCES

1. Zeevi et al., 2015 – "Personalized Nutrition by Prediction of Glycemic Responses" (Link)
2. NaviGen (Khamesian et al., 2025) – "NutriGen: Personalized Meal Plan Generator Leveraging LLMs to Enhance Dietary Adherence" (Link)
3. Han et al., 2024 – "NutrifyAI: Real-Time Food Detection, Nutritional Analysis, and Personalized Meal Recommendations" (Link)
4. Amiri et al., 2023 – "Personalized Flexible Meal Planning for Individuals with Diet-Related Health Concerns" (Link)

IBM CERTIFICATIONS

- Getting Started with Artificial Intelligence certificate:



IBM CERTIFICATIONS

- Journey to Cloud certificate:

In recognition of the commitment to achieve professional excellence

Journey to Cloud: Envisioning Your Solution
IBM SkillsBuild

Sutapa Susovita Bhuyan

Has successfully satisfied the requirements for:

Journey to Cloud: Envisioning Your Solution

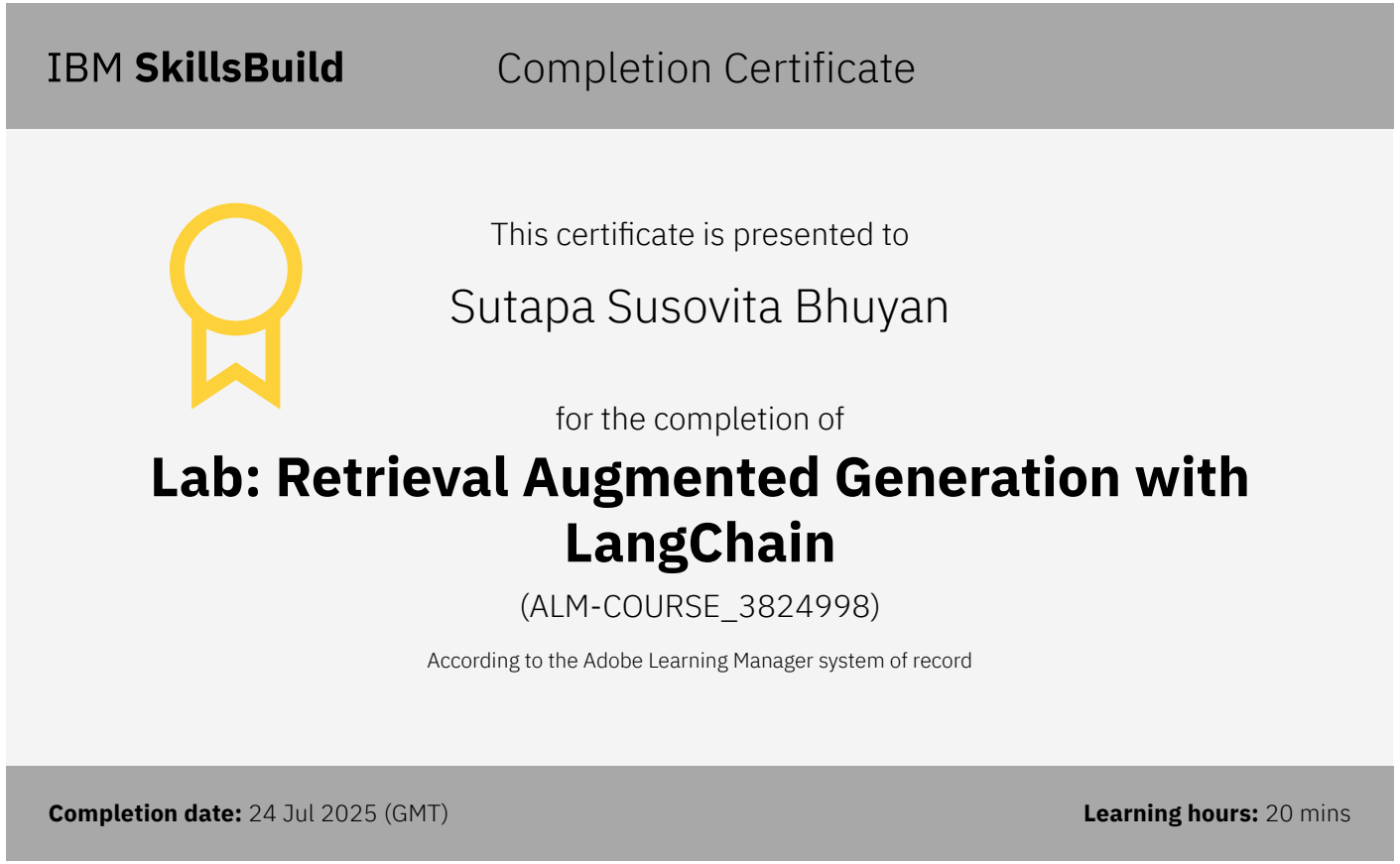
Issued on: Jul 18, 2025
Issued by: IBM SkillsBuild

Verify: https://www.credly.com/badges/2311e153-1589-4630-9ccd-36136339c056

IBM

IBM CERTIFICATIONS

- RAG Lab certificate:



IBM **SkillsBuild** Completion Certificate

This certificate is presented to

Sutapa Susovita Bhuyan

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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