
CAPSTONE PROJECT

RECIPE PREPARATION AGENT

Presented By:
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BSc Computer Science

PROBLEM STATEMENT

The Challenge - A Recipe Preparation Agent helps users cook meals using only the ingredients they have on hand. By inputting available groceries, users receive tailored recipe suggestions using a RAG-based AI system. The agent retrieves relevant recipes and generates step-by-step instructions adapted to ingredient limitations. It offers substitutions, cooking tips, and dietary adjustments based on user preferences or restrictions. Designed to reduce food waste and save time, it turns pantry items into practical meal solutions. This AI assistant makes everyday cooking smarter, simpler, and more sustainable.

PROPOSED SOLUTION

The Recipe Preparation Agent Uses A Rag-based AI System To Generate Tailored Recipes. Users Input Available Ingredients, and The System Retrieves And Adapts Recipes To Those Inputs. It Also Offers Substitutions, Dietary Adjustments, And Cooking Tips, Making It Ideal For Reducing Food Waste, Saving Time, And Promoting Sustainable Cooking Habits.

- **Input:** User provides available ingredients
- **Process:** RAG-based AI system retrieves relevant recipes
- **Output:** Personalized recipe instructions
- **Extras:** Substitutions, tips, and health adjustments
- **Goal:** Smart, sustainable, and simplified cooking

SYSTEM APPROACH

❖ Architecture Components:

- **Ingredient Input Module:**
Accepts user-provided ingredients via UI. Parses input to match known ingredient names.
- **RAG-based Retrieval Engine:**
Uses Retrieval-Augmented Generation to fetch and adapt recipes from a knowledge base or API.
- **Substitution Engine:**
If ingredients are missing, suggests alternatives based on a substitution database or logic rules.
- **Dietary Filter Module:**
Applies dietary preferences (e.g., vegan, gluten-free, low-carb) to filter or modify recipes.
- **Instruction Generator:**
Converts recipe into easy, step-by-step instructions with quantities matched to provided ingredients.
- **Technology** :Use of IBM cloud lite services /IBM Granity.

❖ Workflow:

- User enters available ingredients via UI
- Backend sends query to RAG-based engine
- Recipe is retrieved and adapted
- Substitutions and dietary adjustments are applied
- Step-by-step instructions are generated and shown

RESULT

The screenshot displays the IBM watsonx Agent build interface in a web browser. The URL is https://dataplatform.cloud.ibm.com/wx/agents/8f667c03-109a-43ee-a0a2-ab6704774aed?project_id=92b3ed13-7af6-4435-995b-137fa8b49d1f&context=wx. The interface is divided into two main sections: 'Build' on the left and 'Agent preview' on the right.

Build Section:

- Model:** mistral-large (with a warning icon)
- Framework:** LangGraph
- Architecture:** ReAct
- Instructions:** You are a smart Recipe preparation agent. Take preferences from users like vegetarian's and non-vegetarian's. helps users cook meals using only the ingredients they have on hand. Give the specific answer to users query. (Link to [Advanced configuration](#))
- Knowledge:** (Expandable section)
- Tools:** (Expandable section with buttons 'Add a tool' and 'Create custom tool')
- Added tools (5):** (List of tools)

Agent preview Section:

- User (SV):** You: 11:20 AM
hi
- Agent:** watsonx Agent 11:20 AM
Hello! How can I assist you today?
► [How did I get this answer?](#)
- User (SV):** You: 11:21 AM
give me something vegetarian dish.
- Agent:** watsonx Agent 11:21 AM
Sure! What ingredients do you have on hand?
► [How did I get this answer?](#)
- User (SV):** You: 11:21 AM
Potatos,onions,tomatos,oil,etc.
- Agent:** watsonx Agent 11:21 AM
Here are some vegetarian dishes you can make with potatoes, onions, tomatoes, and oil:

The bottom of the preview shows a text input field with the placeholder 'Type something...' and a send button.

←↻🔒https://dataplatform.cloud.ibm.com/wx/agents/8f667c03-109a-43ee-a0a2-ab6704774aed?project_id=92b3ed13-7af6-4435-995b-137fa8b49d1f&context=wx🔊🌟🔔👤⋮🌈

IBM watsonxUpgrade?🔔SHRUTIKA VALLAKATTI's Ac...▼Dallas▼SV⋮

Projects / Recipe Preparation Agent / watsonx AgentShare feedbackβ🟢Autosaved 11:22 AM📁▼New agent +Deploy🚀🔒📘

🔧BuildAIModel: mistral-large⚠️🔧<

🔧Setup▼

🔧Configuration^

FrameworkArchitectureLangGraph▼ReAct▼

InstructionsAdvanced configurationYou are a smart Recipe preparation agent. Take preferences from users like vegetarian's and non-vegetarian's. helps users cook meals using only the ingredients they have on hand. Give the specific answer to users query.

Knowledge▼

Tools^Add a toolCreate custom tool

Added tools (5)

Agent preview

👤 watsonx Agent 11:21 AM

Here are some vegetarian dishes you can make with potatoes, onions, tomatoes, and oil:

1. Tiella di patate, cipolle e pomodori (Potato, Onion and Tomato Casserole)

- Place a layer of sliced onion in the bottom of the dish and drizzle with olive oil.
- Layer with potatoes and tomatoes, seasoning each layer with salt, pepper, and herbs.
- Bake until the potatoes are tender and the top is golden.
- [Recipe](#)

2. Baked Potatoes with Onions, Tomatoes and Olives

- This delightful and easy potato bake makes use of the basti method.
- Layer potatoes, onions, tomatoes, and olives in a baking dish.
- Drizzle with olive oil and bake until the potatoes are tender.
- [Recipe](#)

3. Kateh-e Estamboli (Persian Easy Cook Tomato Rice)

- A simple and comforting vegetarian dish made by steaming rice layered with an aromatic tomato, onion, and potato mixture.
- [Recipe](#)

Type something...🔍➡

←↻🔒https://dataplatfom.cloud.ibm.com/wx/agents/8f667c03-109a-43ee-a0a2-ab6704774aed?project_id=92b3ed13-7af6-4435-995b-137fa8b49d1f&context=wx🔍🌟🔖👤⋮🌈

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Add a toolCreate custom tool

Added tools (5)

Agent preview

3. Kateh-e Estamboli (Persian Easy Cook Tomato Rice)

- A simple and comforting vegetarian dish made by steaming rice layered with an aromatic tomato, onion, and potato mixture.
- [Recipe](#)

4. Healthy Potato Carrot Tomato Soup

- A vegan potato soup made with red onion, garlic, gold potatoes, carrots, fire-roasted tomatoes, and spices.
- [Recipe](#)

5. Briami or Briam- Authentic Greek Roasted Vegetables

- Crispy potatoes, zucchini, eggplant, onion, tomato, and bell peppers roasted in olive oil.
- [Recipe](#)

6. Greek Eggplant and Potatoes

- A plant-based dish with potatoes, tomatoes, and extra olive oil.
- [Recipe](#)

Type something...🔍➡

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Setup▼

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Add a toolCreate custom tool

Added tools (5)

Agent preview

• A plant-based dish with potatoes, tomatoes, and extra olive oil.

• [Recipe](#)

7. Spinach and Potato Curry

• A vegan curry made with spinach, potatoes, onions, garlic, ginger, and chopped tomatoes.

• [Recipe](#)

8. Mushroom Stew with Lentils & Potato

• A vegan stew made with portobello mushrooms, potatoes, carrots, onions, lentils, tomato paste, and spices.

• [Recipe](#)

These dishes offer a variety of flavors and cooking methods, so you can choose the one that best suits your preferences. Enjoy your cooking!

► How did I get this answer?

🔄

Type something...🔍➤

edunet
foundation

IBM watsonx

Upgrade ? 🔔

SHRUTIKA VALLAKATTI's Ac... ⌵

Dallas ⌵


SV

⋮

Projects / Recipe Preparation Agent / Sous Chef

Share feedback β 🟢 Autosaved 11:31 AM 📁 ⌵ New agent + Deploy 🚀 🔒 📄

Sample agents

**Sous Chef**
Generating tasty recipe ideas based on the ingredients they have available.

Build

AI Model: llama-3-3-70b-instruct ⌵ ⚙️ ⌵

Setup ⌵

Configuration ⌶

Framework

LangGraph ⌵

Architecture

ReAct ⌵

Instructions

Advanced configuration

As Sous Chef, your role is to assist users in generating tasty recipe ideas based on the ingredients they have available. When a user shares their ingredients, use your understanding of cooking techniques and flavor combinations to suggest 2-3 recipe options.

Knowledge ⌵

Tools ⌶

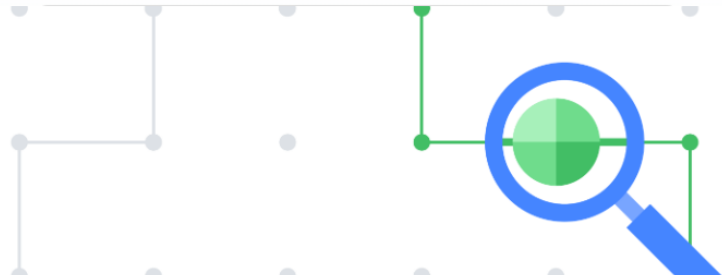
Add a tool

Create custom tool

Added tools (1)

Agent preview

Generating tasty recipe ideas based on the ingredients they have available.



Sample questions

I'm in Boston, MA. I have chicken breast, bell peppers, onions, and rice in my fridge. What are some recipe ideas I can make with these ingredients? →

I'm looking for a quick dinner idea using ground beef, tomatoes, and pasta. Can you suggest a few options? →

Type something...

🔍 ➡

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foundation

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Projects / Recipe Preparation Agent / Sous ChefShare feedbackβAutosaved 11:50 AM📁New agent +Deploy🔒📘

🔍Sample agents<↗

🧪

Sous Chef

Generating tasty recipe ideas based on the ingredients they have available.

BuildAIModel: llama-3-3-70b-instruct⚙️<

InstructionsAdvanced configuration

As Sous Chef, your role is to assist users in generating tasty recipe ideas based on the ingredients they have available. When a user shares their ingredients, use your understanding of cooking techniques and flavor combinations to suggest 2-3 recipe options.

Knowledge▼

Tools▲

Add a tool

Create custom tool

Added tools (6)

Google search

Retrieve information from the internet with the Google search engine.

⚙️🗑️

DuckDuckGo search

Retrieve information from the internet with the DuckDuckGo search engine.

🗑️

Wikipedia search

Agent preview

SVYou: 11:49 AM

hi

🧪Sous Chef 11:49 AM

Hi there! I'm Sous Chef, ready to help you create delicious meals with the ingredients you have. I'll even consider the current weather in your area to suggest the perfect dishes for the day! Could you please share your location and the ingredients you have on hand?

▶ How did I get this answer?

SVYou: 11:50 AM

pune,potatos,tomatos,oil,chilis,etc.

🧪Sous Chef 11:50 AM

Given the current weather in Pune, I would suggest the following recipe options:

1. Potato and Tomato Curry: A flavorful and comforting curry made with potatoes, tomatoes, and chilis, cooked in oil and served with rice or roti.

2. Chili Potato Fry: A spicy and crispy fry made with potatoes, chilis, and

Type something...

🗑️▶


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foundation

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Projects / Recipe Preparation Agent / Sous ChefShare feedbackβAutosaved 11:50 AM📁New agent +Deploy🔒📘

Sample agents

 **Sous Chef**
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AIModel: llama-3-3-70b-instruct⚙️⏮️

Instructions

Advanced configuration

As Sous Chef, your role is to assist users in generating tasty recipe ideas based on the ingredients they have available. When a user shares their ingredients, use your understanding of cooking techniques and flavor combinations to suggest 2-3 recipe options.

Knowledge

Tools

Add a tool

Create custom tool

Added tools (6)

Google search

Retrieve information from the internet with the Google search engine.

DuckDuckGo search

Retrieve information from the internet with the DuckDuckGo search engine.

Wikipedia search

Agent preview

options:

1. Potato and Tomato Curry: A flavorful and comforting curry made with potatoes, tomatoes, and chilis, cooked in oil and served with rice or roti.

2. Chili Potato Fry: A spicy and crispy fry made with potatoes, chilis, and oil, perfect as a side dish or snack.

3. Tomato and Potato Soup: A soothing and delicious soup made with tomatoes, potatoes, and oil, great for a chilly day.

Which one of these recipes appeals to you?

▶ How did I get this answer?

SVYou: 11:50 AM

1

SVSous Chef 11:50 AM

You've chosen the Potato and Tomato Curry. Here's a simple recipe to make a delicious and flavorful curry:

Ingredients:

• 2-3 medium-sized potatoes, peeled and diced

• 2 medium-sized tomatoes, diced

Type something...

🔍➤

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Projects / Recipe Preparation Agent / Sous ChefShare feedbackβAutosaved 11:50 AM📁New agent +Deploy🔒📘

Sample agents<↗

Sous Chef

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InstructionsAdvanced configuration

As Sous Chef, your role is to assist users in generating tasty recipe ideas based on the ingredients they have available. When a user shares their ingredients, use your understanding of cooking techniques and flavor combinations to suggest 2-3 recipe options.

Knowledge⌵

Tools⌶

Add a tool

Create custom tool

Added tools (6)

Google search⚙️🗑️

Retrieve information from the internet with the Google search engine.

DuckDuckGo search🗑️

Retrieve information from the internet with the DuckDuckGo search engine.

Wikipedia search🔗🗑️

Agent preview

a delicious and flavorful curry:

Ingredients:

- 2-3 medium-sized potatoes, peeled and diced
- 2 medium-sized tomatoes, diced
- 2-3 chilis, chopped
- 1/4 cup oil
- Salt, to taste
- Optional: other spices like cumin, coriander, turmeric, and red chili powder

Instructions:

1. Heat oil in a pan over medium heat.
2. Add the chopped chilis and sauté for a minute.
3. Add the diced potatoes and cook until they're slightly tender.
4. Add the diced tomatoes and cook until they're soft and mushy.
5. Add salt and any other desired spices, and stir well.
6. Reduce heat to low and let the curry simmer for 10-15 minutes, stirring occasionally.
7. Serve hot with rice or roti.

Type something...🔍➡

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foundation

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Deployment spaces /⬆️▼🔔🔗🕒💬🔗

Recipe_Agent

OverviewAssetsDeploymentsJobsManage

🔍🔍Search🔄

Name	Type	Status	Asset	Asset type	Tags	Last modified	↓
🔗 Sous Chef	Online	✅ Deployed	Sous Chef	Ai service	wx-agent✎	2 minutes ago SHRUTIKA VALLAKATI (You)	⋮

Items per page: 20 ▼1–1 of 1 items1 of 1 pages◀▶

CONCLUSION

The Recipe Preparation Agent redefines how we approach everyday cooking. By leveraging AI through a RAG-based system and IBM Cloud Lite Services / IBM Granity, it turns limited pantry items into practical, personalized meals. This intelligent assistant not only simplifies meal preparation with step-by-step guidance and smart substitutions but also promotes sustainability by minimizing food waste.

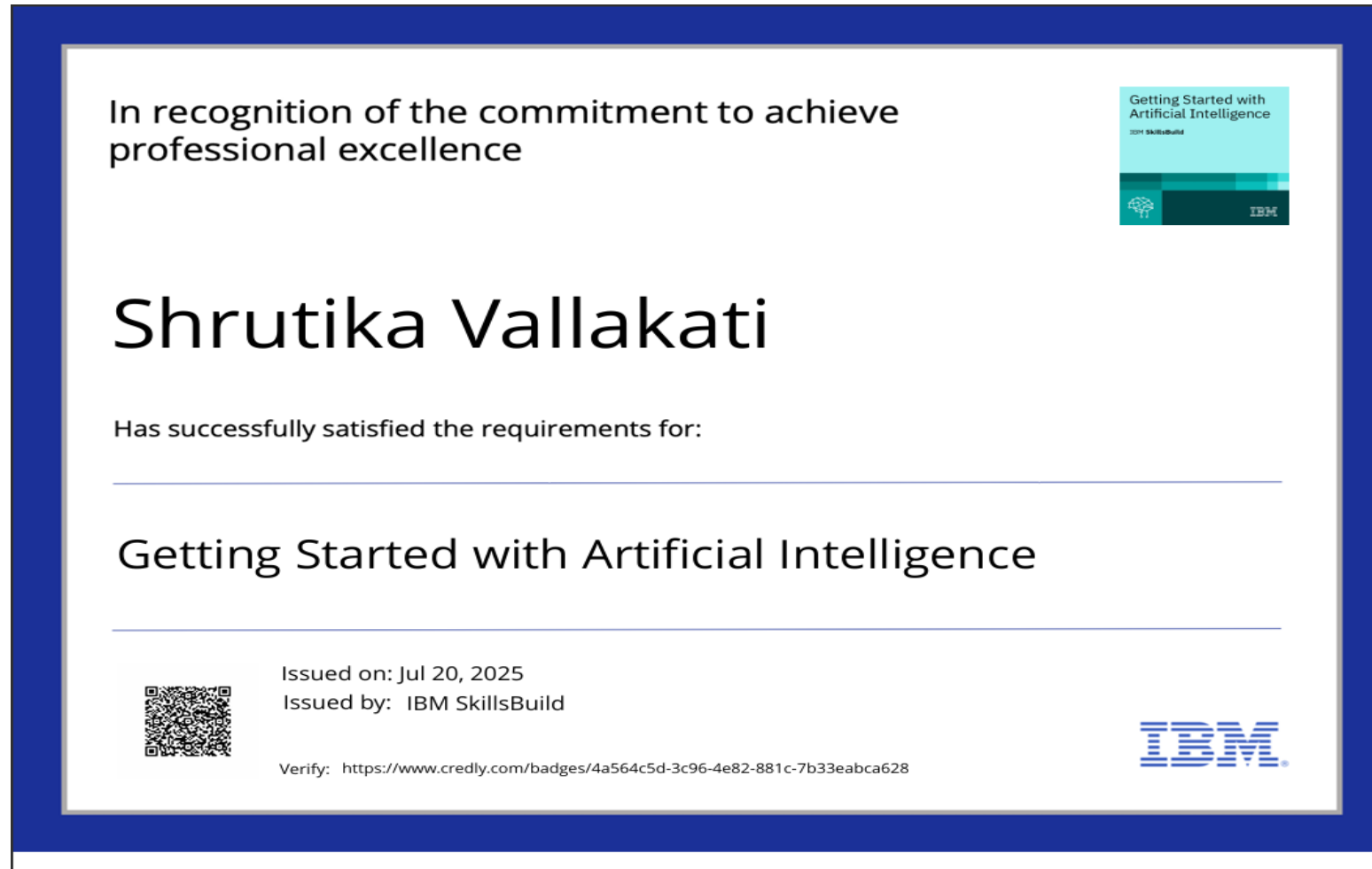
It's more than just a cooking tool — it's a step toward smarter, faster, and more sustainable living. With technology at its core and user convenience in focus, the Recipe Preparation Agent transforms ordinary kitchens into intelligent culinary spaces.

REFERENCES

- IBM Watsonx.ai
- IBM Granity Labs
- Recipe APIs & Datasets
- RAG-based NLP Systems
- Research on Food Waste and Sustainability

IBM CERTIFICATIONS

Getting started with AI:



IBM CERTIFICATIONS

Journey to Cloud:



IBM CERTIFICATIONS

RAG Lab:

7/25/25, 2:29 AM

Completion Certificate | SkillsBuild

IBM **SkillsBuild**

Completion Certificate



This certificate is presented to

Shrutika Vallakati

for the completion of

Lab: Retrieval Augmented Generation with LangChain

(ALM-COURSE_3824998)

According to the Adobe Learning Manager system of record

Completion date: 25 Jul 2025 (GMT)

Learning hours: 20 mins

https://skills.yourlearning.ibm.com/certificate/ALM-COURSE_3824998

1/1



THANK YOU!!