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# **CAPSTONE PROJECT**

## **RECIPE PREPARATION AGENT**

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**Department : Information Science and Engineering**

# OUTLINE

- Problem Statement
- Technology used
- Wow factor
- End users
- Result
- Conclusion
- Future scope
- IBM Certifications
- Git-hub Link

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# PROBLEM STATEMENT

Home cooks often face the challenge of deciding what to prepare using the limited ingredients they have available. Searching for suitable recipes online can be time-consuming and often fails to account for missing ingredients, dietary restrictions, or personal preferences. This leads to food waste, inefficiencies in meal planning, and added stress during cooking.

## **Proposed Solution:**

A Recipe Preparation Agent that leverages Retrieval-Augmented Generation (RAG) and AI to suggest customized recipes based on the ingredients users have on hand. The agent retrieves relevant recipes, adapts them to ingredient limitations, and provides step-by-step instructions. It also suggests ingredient substitutions, cooking tips, and dietary modifications to accommodate preferences or restrictions—making everyday cooking smarter, simpler, and more sustainable.

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# TECHNOLOGY USED

- IBM cloud lite services
- Natural Language Processing (NLP)
- Retrieval Augmented Generation (RAG)
- IBM Granite model

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# IBM CLOUD SERVICES USED

- IBM Cloud Watsonx AI Studio
- IBM Cloud Watsonx AI runtime
- IBM Cloud Agent Lab
- IBM Granite foundation model

# WOW FACTORS

This agent will help reduce food waste, save time, and make everyday cooking more efficient by turning available pantry items into practical meal solutions. It supports smarter meal planning, adapts to ingredient limitations, and enhances the home cooking experience.

## Unique features:

- Tailored recipe suggestions based on available groceries
- Step-by-step cooking instructions adapted to current ingredients
- Ingredient substitution recommendations
- Cooking tips for better results with limited ingredients
- Dietary adjustments based on user preferences or restrictions
- Retrieval-Augmented Generation (RAG)-based system for accurate and relevant recipe retrieval

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# END USERS

- Home Cooks
- Busy Professionals
- Students
- Families
- People with Dietary Restrictions
- Environmentally Conscious Consumers
- Beginner Cooks

# RESULTS: SETTING UP

IBM watsonx

Upgrade ⓘ 🔔 Khushi S Kittur's Account ▾ Frankfurt ▾ KS

Projects / Recipe-Preparation-Agent / Recipe Preparation Agent

Share feedback ⓘ Autosave on 📄 ▾ New agent + Deploy 🚀 🔒 ⓘ

Build

AI Model: granite-3-3-8b-instruct ▾ ⚙️ <

Setup ▾

Configuration ▴

Framework Architecture

LangGraph ▾ ReAct ▾

Instructions [Advanced configuration](#)

You are a helpful AI assistant that uses tools and a retrieval-augmented generation (RAG) system to assist users in preparing meals using only the ingredients they have. You provide practical, clear, and adaptive recipe guidance.

🔥 Greeting Behavior ✎

Knowledge ▾

Tools ▴

Add a tool Create custom tool

Added tools (2)

Google search ⚙️ 🗑️

Retrieve information from the internet with the Google search engine.

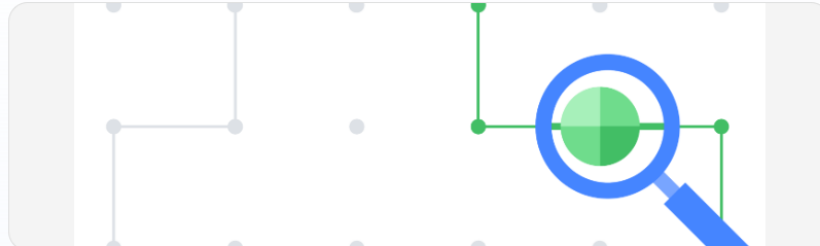
DuckDuckGo search 🗑️

Agent preview

👤 Recipe Preparation Agent 01:22 PM

Welcome to Recipe Preparation Agent

Turn your ingredients to get easy recipes, tips, and smart cooking ideas in seconds.



Sample questions

I have tomatoes, onions, rice, and some spices. Can you help me make something vegetarian and Indian? →

Can you suggest a vegetarian dinner with what I have? →

Type something... 🔍 ➤



# RESULTS:

## Suggest recipes based on input ingredients

### Agent preview



You: 12:51 PM

I have tomatoes, onions, rice, and some spices. Can you help me make something vegetarian and Indian?



Recipe Preparation Agent 12:51 PM

Based on your ingredients and preference, here are 5 dishes you could make:

1. **Tomato Rice:** A simple yet flavorful South Indian dish made with tomatoes and rice.
2. **Chickpea Curry:** A protein-rich dish that uses chickpeas, tomatoes, and spices.
3. **Vegetable Pilaf:** A fragrant rice dish with vegetables and spices.
4. **Paneer Jalfrezi:** A vegetarian dish with paneer (Indian cottage cheese) in a thick gravy made with onions, bell peppers, tomatoes, and spices.
5. **Tomato Onion Chutney Rice:** A tangy one-pot meal with rice, tomatoes, and onions.

Please select the recipe you'd like to prepare.

► **How did I get this answer?**

Type something...




# RESULTS:

Gives simple recipe based on user choice

## Agent preview

**KS** You: 12:52 PM

Tomato Rice

 Recipe Preparation Agent 12:52 PM

Great choice! Here's a simple recipe for Tomato Rice:

### Ingredients:

- 1 cup rice
- 2 medium tomatoes
- 1 medium onion
- 2 green chilies (adjust according to your spice preference)
- 2 teaspoons oil or ghee
- Salt to taste
- Spices: 1 teaspoon turmeric powder, 1 teaspoon red chili powder, 1 teaspoon garam masala

## Agent preview

### Instructions:

1. Wash the rice and soak it for 15 minutes. Then, cook the rice with double the water than usual. Keep it aside.
2. Finely chop the tomatoes, onion, and green chilies.
3. Heat oil or ghee in a pan. Add the chopped green chilies, followed by the onions. Sauté until the onions turn golden brown.
4. Add the chopped tomatoes to the pan. Cook until the tomatoes are soft and mushy.
5. Now, add the turmeric, red chili powder, and garam masala to the pan. Stir well and cook for another minute.
6. Drain the cooked rice and add it to the pan. Mix everything well so that the rice is well coated with the spices and tomato mixture.
7. Season with salt according to your taste. Give it a good mix and let it cook for another 2-3 minutes.
8. Your Tomato Rice is ready to be served hot with raita or your choice of Indian pickle.

### Optional Tips:

- For a richer flavor, you can add a pinch of asafoetida (hing) when sautéing the onions.
- If you have fresh coriander leaves, garnish your Tomato Rice with them for an extra burst of flavor.

Enjoy your meal! If you have any leftovers, they can be used to make a rice flour-based dosa or uttapam the next day.

► How did I get this answer?



|Type something...



# RESULTS:

## Suggest ingredient substitution

### Agent preview



You: 12:59 PM

Can you suggest substitutions for green chilies



Recipe Preparation Agent 12:59 PM

Absolutely! If you don't have green chilies, here are a few substitutions you can use:

1. **Red Chili Powder:** Increase the quantity of red chili powder to compensate for the heat that green chilies would provide. Start by adding a bit more, then adjust to taste.
2. **Red Bell Pepper:** This will add a mild flavor and a vibrant color to your dish. You might need to add a pinch of chili flakes for some heat if desired.
3. **Serano or Jalapeno Peppers:** These can be finely chopped to replace green chilies. Remember to remove the seeds for less heat.
4. **Sriracha or Hot Sauce:** A few drops can add a spicy kick to your dish. Use this sparingly as it's quite potent.
5. **Chili Garlic Sauce:** Similar to hot sauce, but with a bit more garlic flavor. Again, use it sparingly.

Remember, the heat level can vary greatly depending on the substitute you choose, so adjust according to your preference.

► How did I get this answer?



Type something...



# RESULTS: TOOLS USED (ALSO USED VECTOR INDEX)

The screenshot displays the IBM watsonx interface for building and previewing an AI agent. The top navigation bar includes the IBM watsonx logo, an 'Upgrade' button, a help icon, a notification bell, and user account information (Khushi S Kittur's Account, Frankfurt, KS).

The main interface is divided into two primary sections: 'Build' and 'Agent preview'.

**Build Section:**

- Prompt:** A text input field for defining the agent's prompt.
- Knowledge:** A section for managing the agent's knowledge base. It includes a 'Vector index' with a dropdown menu currently showing 'recipes'. A 'Clear chat' link is also present.
- Tools:** A section for adding and managing tools. It contains two buttons: 'Add a tool' and 'Create custom tool'.
- Added tools (3):** A list of tools currently added to the agent:
  - Google search:** Retrieve information from the internet with the Google search engine.
  - DuckDuckGo search:** Retrieve information from the internet with the DuckDuckGo search engine.
  - Document search - recipes:** Search documents with vector indexes.

**Agent preview Section:**

This section shows a simulated chat interaction with the agent:

- User:** You: 01:30 PM. Can you give the first recipe from the document.
- Recipe Preparation Agent:** 01:30 PM. Here's the first recipe from the document:
  - Chicken Curry**
  - Ingredients:**
    - 500g chicken
    - 1 tsp mustard seeds
    - Curry leaves
    - 1 tbsp ginger-garlic paste
  - Instructions:**
    1. Marinate chicken with yogurt, ginger-garlic paste, chili powder, and salt for 4 hours.
    2. Grill or pan-fry chicken until cooked.
    3. In another pan, melt butter. Sauté onion puree until golden.
    4. Add tomato puree, cook until oil separates.
    5. Add garam masala, salt, kasuri methi.
    6. Add grilled chicken. Simmer for 10 minutes.
    7. Add cream, stir gently. Cook for 2-3 minutes.
    8. Serve hot with naan or jeera rice.

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

# RESULTS

## Deployed AI Agent

IBM watsonx

Upgrade ? 🔔 Khushi S Kittur's Account Frankfurt KS


Deployment spaces / Recipe-Preparation-Agent-Space / Recipe Preparation Agent /

### Recipe Preparation Agent

🟢 Deployed Online


API reference Test **Preview**

New chat +

 Recipe Preparation Agent 01:13 PM

**Welcome to Recipe Preparation Agent**

Turn your ingredients to get easy recipes, tips, and smart cooking ideas in seconds.



**Quick start samples**

I have tomatoes, onions, rice, and some spices. Can you help me make something vegetarian and Indian? →

Can you suggest a vegetarian dinner with what I have? →

Type something... ➤


# RESULTS

[Deployment spaces](#) / [Recipe-Preparation-Agent-Space](#) / [Recipe Preparation Agent](#) /


## Recipe Preparation Agent

DeployedOnline

[API reference](#)[Test](#)[Preview](#)

 You 01:09 PM

I only have pasta, cheese, and a few herbs. I'm in the mood for something Italian but don't have any sauce. What can I cook?


 Recipe Preparation Agent 01:09 PM

Based on the ingredients you have - pasta, cheese, and herbs - and your preference for Italian cuisine, here are 5 simple dishes you could make:

- Cheesy Herb Pasta:** Boil the pasta until al dente. In the same pot, add a bit of olive oil, garlic, and your herbs for flavor. Toss the cooked pasta in this mixture, then add grated cheese and stir until the cheese melts.
- Pasta with Fresh Herbs and Cheese:** Cook the pasta as per instructions. In a pan, sauté some garlic in olive oil, add your herbs, then toss the cooked pasta in this mixture. Top with grated cheese.
- Simple Garlic Herb Pasta:** Boil pasta until al dente. In another pan, heat some olive oil, add minced garlic and your herbs. Toss the cooked pasta in this garlic-herb mixture, then sprinkle cheese on top.
- Pasta Primavera:** If you have any vegetables, you can quickly sauté them in olive oil with garlic and herbs. Toss this with your cooked pasta and top with cheese.
- Cheese Stuffed Pasta:** You can even make a simple version of stuffed pasta. Mix grated cheese with your herbs, stuff this mixture into the pasta shells, and bake until the cheese melts.

Please select the recipe you'd like to prepare.

[► How did I get this answer?](#)



# RESULTS

[Deployment spaces](#) / [Recipe-Preparation-Agent-Space](#) / [Recipe Preparation Agent](#) /

## Recipe Preparation Agent ✓ Deployed Online

[API reference](#)

[Test](#)

[Preview](#)



You 01:11 PM

Cheese Stuffed Pasta



Recipe Preparation Agent 01:11 PM

Great choice! Here's a simple step-by-step guide to make Cheese Stuffed Pasta with your available ingredients:

### Ingredients:

- Pasta (any type you have)
- Cheese (grated)
- Herbs (any fresh herbs you have, like basil, parsley, or oregano)
- Olive oil
- Salt and pepper to taste

### Instructions:

1. **Prepare the Pasta Shells:** Cook the pasta shells in salted boiling water until they are al dente (firm to the bite). Once done, drain and set aside.
2. **Make the Cheese Filling:** In a bowl, mix the grated cheese with your fresh herbs, a drizzle of olive oil, salt, and pepper. The

Type something...





# RESULTS

[Deployment spaces](#) / [Recipe-Preparation-Agent-Space](#) / [Recipe Preparation Agent](#) /

## Recipe Preparation Agent

✔ Deployed

Online

API reference

Test

Preview

**Instructions:**

- Prepare the Pasta Shells:** Cook the pasta shells in salted boiling water until they are al dente (firm to the bite). Once done, drain and set aside.
- Make the Cheese Filling:** In a bowl, mix the grated cheese with your fresh herbs, a drizzle of olive oil, salt, and pepper. The amount of each will depend on how much pasta you're making, but start with a small handful of cheese and adjust to taste.
- Stuff the Shells:** Allow the pasta shells to cool slightly so you don't burn your fingers. Scoop some of the cheese mixture into each shell and gently press them closed.
- Bake the Stuffed Shells:** Preheat your oven to 375°F (190°C). Place the stuffed pasta shells in a baking dish, drizzle a bit more olive oil on top, and sprinkle additional cheese. Bake for about 20 minutes, or until the cheese is bubbly and golden.
- Serve:** Let it cool for a minute or two, then serve. You can add a bit more fresh herbs or cheese on top if you like.

**Optional Tips:**

- If you want a crunch, you can sprinkle breadcrumbs mixed with a bit of cheese on top before baking for added texture.
- For extra flavor, you could sauté minced garlic in olive oil and mix it into the cheese filling.

Enjoy your meal! If you have any leftovers, they can be stored in the fridge and reheated for a quick meal later.

Type something...

➤



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# CONCLUSION

- The agent can generate personalized recipes, suggest ingredient substitutions, and provide step-by-step cooking instructions based on available groceries.
- It saves time by automating meal planning and reduces food waste through smart ingredient usage.
- Recipe Preparation Agents enhance efficiency, sustainability, and creativity in everyday home cooking.

# FUTURE SCOPE

- Multilingual Recipe Support
- Voice-Activated Cooking Assistant
- Real-Time Ingredient Recognition via Image Input
- Integration with Smart Kitchen Devices
- Meal Planning and Grocery List Generation
- Nutritional Analysis and Health Tracking
- Personalized Recipe Recommendations Based on User History

# IBM CERTIFICATIONS

## Getting Started with Artificial Intelligence



# IBM CERTIFICATIONS

## Journey to Cloud

In recognition of the commitment to achieve  
professional excellence



Khushi S Kittur

Has successfully satisfied the requirements for:

Journey to Cloud: Envisioning Your Solution



Issued on: Jul 20, 2025  
Issued by: IBM SkillsBuild

Verify: <https://www.credly.com/badges/9be94a14-7626-487f-922e-ed57e8150cb2>



# IBM CERTIFICATIONS

## Lab: Retrieval Augmented Generation with LangChain

IBM **SkillsBuild**

Completion Certificate



This certificate is presented to

Khushi S Kittur

for the completion of

**Lab: Retrieval Augmented Generation with  
LangChain**

(ALM-COURSE\_3824998)

According to the Adobe Learning Manager system of record

**Completion date:** 18 Jul 2025 (GMT)

**Learning hours:** 20 mins

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## GITHUB LINK

[Khush435/IBM-Cloud-Recipe-Preparation-agent](https://github.com/Khush435/IBM-Cloud-Recipe-Preparation-agent)

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**THANK YOU**