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# SMART KITCHEN COMPANION: AI RECIPE GENERATOR & MEAL PLANNER

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3. Department-CSE

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## OUTLINE

- **Problem Statement**
- **Proposed System/Solution**
- **System Development Approach** (Technology Used)
- **Algorithm & Deployment**
- **Result (Output Image)**
- **Conclusion**
- **Future Scope**
- **References**

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# PROBLEM STATEMENT

- Current meal planning and cooking are often limited by the ingredients on hand, leading to food waste, inconvenience, or poor dietary choices.
- There is no intelligent solution to suggest recipes, substitutions, or dietary adaptations based on available kitchen items and restrictions (allergies, preferences) in real time.

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# PROPOSED SOLUTION

- The system addresses the challenge of suggesting smart, personalized recipes based on available ingredients, while considering dietary restrictions and minimizing food waste. It combines language models with real-time knowledge retrieval.
- Ingredient Collection:
  - Users input ingredients via text (future: voice/image).
  - Optional filters: diet type, allergies, cooking time.
- Input Preprocessing:
  - Clean and map ingredients to standard formats.
  - Recognize ingredient categories (e.g., leafy greens).
- Recipe Generation:
  - Suggests step-by-step instructions and smart substitutions.
- Deployment:
  - Built using IBM watsonx Agent Lab and deployed as a REST API.
  - Usable via chatbot, web, or smart device interfaces.
- Evaluation:
  - Based on user satisfaction, clarity, and ingredient match.
  - Improved with continuous feedback.
- Result:
  - Smarter meal planning
  - Reduced waste
  - Cooking made easier and more inclusive

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# SYSTEM APPROACH

- System Requirements:
  - IBM Cloud Lite account
  - watsonx.ai and Agent Lab
  - Cloud Object Storage
- Technologies:
  - LangGraph
  - IBM Foundation Models (Mistral)
  - REST API
- Methodology:
  - Low-code agent via GUI
  - Web/Knowledge tools
  - Deployable as reusable AI service

# ALGORITHM & DEPLOYMENT

- Data Input:  
The agent takes input in various forms:
  - A list of available ingredients (entered as free text)
  - Optional dietary constraints (e.g., vegan, gluten-free, nut allergy)
  - Cooking preferences (e.g., quick recipes, no oven, Indian cuisine)
- Future expansion may include:
  - Images of ingredients (via computer vision)
  - Voice input (for hands-free kitchen use)
- Training Process:
  - No fine-tuning or supervised training is required as the agent uses pre-trained foundation models.
  - The system is enhanced with a curated set of retrieval tools: web search, Wikipedia, and internal recipe datasets.
  - Tools are connected via IBM watsonx Agent Lab using the LangGraph framework with the ReAct agent strategy.
- Prediction Process:
  - When the user provides ingredients and constraints, the agent first performs knowledge retrieval using built-in tools.
  - The retrieved results are passed to the LLM, which generates a personalized, step-by-step recipe.
  - The agent also suggests smart substitutions (e.g., “Out of eggs? Try using yogurt or banana.”) and highlights allergy considerations.
  - The model generates natural language output suitable for display in web/mobile apps.
- Deployment:
  - The system is deployed using the “Deploy as AI service” option in IBM watsonx Agent Lab.
  - A REST API is automatically generated, enabling integration with other applications (e.g., mobile app, smart fridge UI).
  - The deployment is scalable and can handle multiple concurrent users with low latency.

# RESULT

IBM watsonx

Upgrade

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Dallas

55

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

Recipe Agent

Deployed Online

API reference

Test

Preview

New chat +

You 10:51 PM

explain the recipe of butter paneer in detail

Recipe Agent 10:51 PM

Here are some detailed recipes for Butter Paneer:

1. Paneer Butter Masala Recipe - Swasthi's Recipes

Description: Paneer Butter Masala, also known as butter paneer, is a rich & creamy curry made with paneer, spices, onions, tomatoes, cashews, and butter.

URL: [Swasthi's Recipes](#)

2. The Best Butter Paneer Recipe (Restaurant Flavor!)

Description: This easy 30-minute Butter Paneer recipe is one of my half-Indian family's most cherished dishes. Rich, creamy, and totally rivals an Indian restaurant.

URL: [Foodies](#)

3. Paneer Butter Masala (Paneer Makhani) - Cook With Manali

Description: Creamy Restaurant style Paneer Butter Masala is easy to make at home. This creamy curry is made with onion, tomatoes, cashews, and spices.

URL: [Cook With Manali](#)

4. Butter Paneer Recipe

you something...

About this deployment

Name

Recipe Agent

Description

Change this description to reflect your particular agent

Deployment Details

Deployment ID: 9b2d8521-761e-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

kw-agent

Associated asset

Recipe Agent

8721b8768-3197-4819-b41d-31a20ab58186

Last modified

2 minutes ago

Created on

Aug 3, 2025

edunet  
foundation

# Recipe Agent Deployed Online

API reference   Test   Preview

## Endpoints for inferencing

Private endpoint

- https://us-south.nl.cloud.ibm.com/v1/v4/deployments/9b2d0521-761e-4456-8441-c31440ef697a/ai\_service?version=2021-05-01
- https://us-south.nl.cloud.ibm.com/v1/v4/deployments/9b2d0521-761e-4456-8441-c31440ef697a/ai\_service\_stream?version=2021-05-01

Public endpoint

- https://us-south.nl.cloud.ibm.com/v1/v4/deployments/9b2d0521-761e-4456-8441-c31440ef697a/ai\_service?version=2021-05-01
- https://us-south.nl.cloud.ibm.com/v1/v4/deployments/9b2d0521-761e-4456-8441-c31440ef697a/ai\_service\_stream?version=2021-05-01

Learn more about the 2021-05-01 version query parameter.

## Code snippets

cURL   Java   JavaScript   Python   Scala

```
# NOTE: you must set $API_KEY below using information retrieved from your IBM Cloud account (https://dataplatform.cloud.ibm.com/docs/content/wsj/analyze-data/nl-authentication.html?context=wx)
export API_KEY=<your API key>

export IAM_TOKEN=$(curl --insecure -X POST --location "https://iam.cloud.ibm.com/identity/token" \
--header "Content-Type: application/x-www-form-urlencoded" \
--header "Accept: application/json" \
--data-urlencode "grant_type=urn:ibm:params:oauth:grant-type:apikey" \
--data-urlencode "apikey=$API_KEY" | jq -r '.access_token')

# TODO: manually define and pass values to be scored below

curl --location 'https://us-south.nl.cloud.ibm.com/v1/v4/deployments/9b2d0521-761e-4456-8441-c31440ef697a/ai_service_stream?version=2021-05-01' \
--header "Content-Type: application/json" \
--header "Accept: application/json" \
```

## About this deployment

Name

Recipe Agent

Description

Change this description to reflect your particular agent

Deployment Details

Deployment ID: 9b2d0521-761e-44...

Serving name:

No serving name.

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runtime-24.1-py3.11

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Extra extra smali: 1 CPU and 2 GB RAM

Copies:

1

Tags

xxx-agent

Associated asset

Recipe Agent

871b8750-3197-4819-bd1d-21a26ab59136

Last modified  
1 minute ago  
  
Created on  
Aug 3, 2025



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Deployment spaces /

Recipe-Agent-Space

Overview





Assets

Deployments

Jobs

Manage

🔍 Search

Name	Type	Status	Asset	Asset type	Tags	Last modified
 Recipe Agent	Online	 Deployed	Recipe Agent	AI service	 	53 seconds ago Shruti Sharma (You)

Items per page: 20 ▾

1-1 of 1 items

1 of 1 pages

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Share feedback

Autosaved 10:47 PM

New agent +

Deploy

Build

Model: mistral-large

Setup

Configuration

Framework

LangGraph

Architecture

ReAct

Instructions

Advanced configuration

You are a helpful AI chef. Given a list of ingredients, suggest recipes, substitutions, and cooking tips. Adapt recipes for allergies/dietary needs.

Knowledge

Tools

Add a tool

Create custom tool

Added tools (3)

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

Retrieve information from Wikipedia articles.

Agent preview

You: 10:46 PM

give me recipee for chilli paneer

Recipe Agent 10:46 PM

Here are some recipes for Chilli Paneer:

1. Chilli Paneer Recipe (Dry & Gravy) - Swasthi's Recipes

Description: Chilli Paneer is an Indo-Chinese appetizer where crisp batter fried paneer is tossed in slightly sweet, spicy, hot and tangy chilli sauce.

URL: [Swasthi's Recipes](#)

2. Chilli Paneer - Cook With Manali

Description: Sauce: 2 tablespoons soy sauce 30 ml, I used 1 tablespoon regular soy sauce and 1 tablespoon dark soy sauce, 1 tablespoon rice vinegar 15 ml, 3...

URL: [Cook With Manali](#)

3. Chilli Paneer - Street Style - My Food Story

Description: Sauce Mixture: 1 table spoon Soy Sauce, 2 teaspoons Red Chilli Sauce, 1 tablespoon Ketchup, 3/4 teaspoon Kashmiri Chilli Powder, or paprika, 9s...

URL: [My Food Story](#)

4. Street Style Chilli Paneer - The Whisk Addict - Easy Recipes With A ...

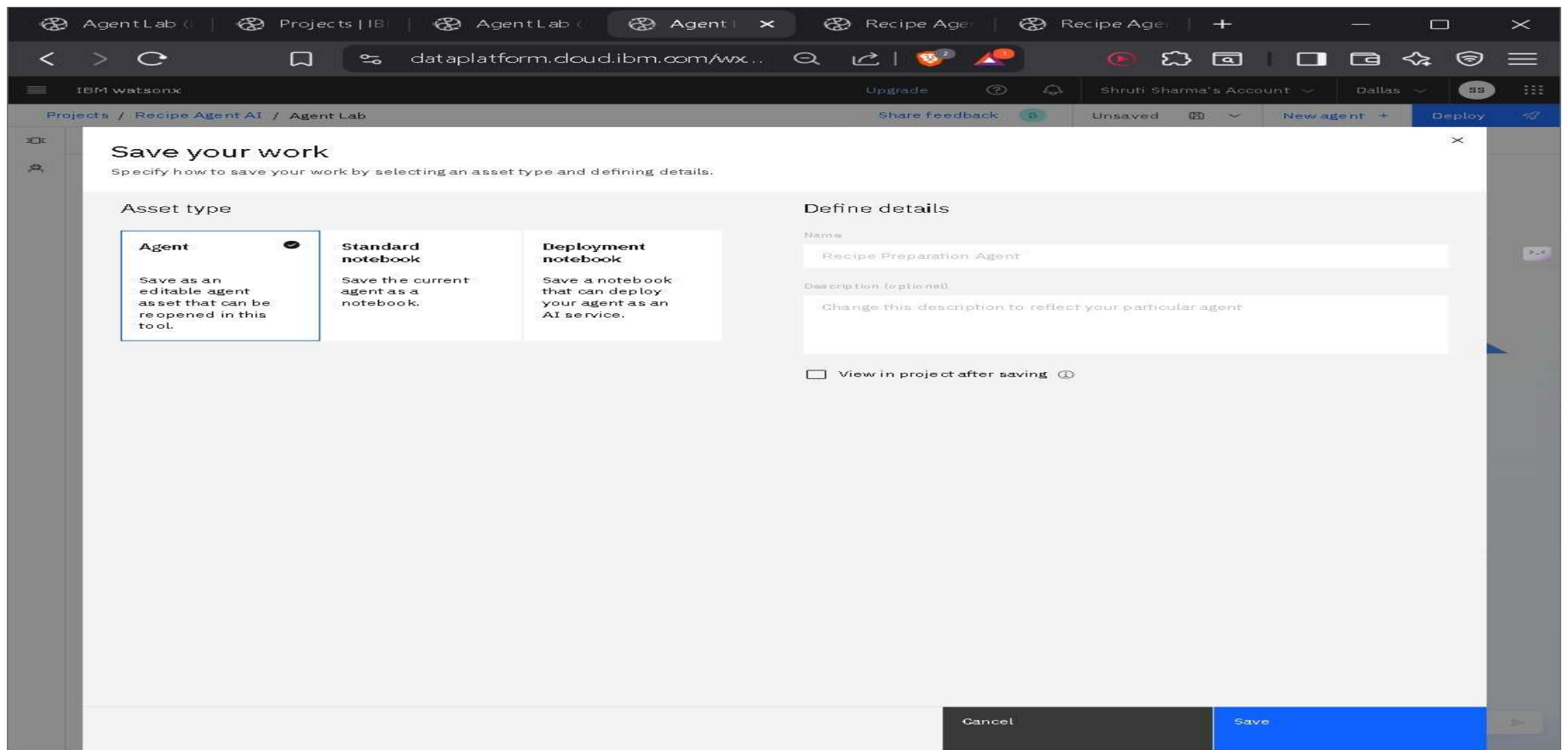
Description: Chilli Paneer Dry is an Indo-Chinese appetizer which is popularly enjoyed in India. This recipe is spicy, tangy, and sweet with crispy bite-sized paneer,...

URL: [The Whisk Addict](#)

5. Chilli Paneer - The Chutney Life

Description: Chilli Paneer: Soak the red chilis and make the red chili paste first. Do All the Chopping. Cut the

edunet  
foundation



Agent Lab (beta) — Docs | IBM watsoRecipe Agent — Recipe Agent AIBM watsonxSettings | IBM watsonx

dataplatform.cloud.ibm.com/ww/agents/f74c2d25-7f72-4ac4-bdba-c25bdfdd0ade?project\_id=ee3d00b5-eed2-4...

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Model: mistral-large

Agent preview

Setup

Configuration

Frontend: LangGraphArchitecture: ReAct

Instructions

You are a helpful AI chef. Given a list of ingredients, suggest recipes, substitutions, and cooking tips. Adapt recipes for allergies/dietary needs.

Knowledge

Tools

Add a toolCreate custom tool

Added tools (0)

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

Retrieve information from Wikipedia articles.

6. Jeong Kwan's No Recipe Noodles — SOOK

Description: Jeong Kwan's No Recipe Noodles • 1 cup plain flour • ¼ cup buckwheat • 1/2 tsp Perilla oil • 1/2 tsp Grapeseed oil • ¼...

URL: [Jeong Kwan's No Recipe Noodles](#)

6. Homemade Pasta • Recipes by Love and Lemons

Description: This 4-ingredient homemade pasta recipe is easy to make, and it yields chewy, delicious noodles every time.

URL: [Homemade Pasta](#)

7. Garlic Noodles Recipe | The Kitchen

Description: These easy garlic noodles get maximum umami flavor from garlic, oyster sauce, fish sauce, and soy sauce.

URL: [Garlic Noodles Recipe](#)

8. Lo Mein Noodles with Chinese Sausage and Gai Lan - Yay! For Food

Description: Lo Mein vs. Chow Mein • What is Chinese sausage (aka lap cheong)? • What's Gai Lan? • How about the sauce? • How do you make this lo mein noodle recipe?

URL: [Lo Mein Noodles with Chinese Sausage and Gai Lan](#)

9. Buttered Noodles Recipes (Quick and Easy) | The Kitchen

Description: Ingredients • 2 quarts water • 2 tablespoons kosher salt • 6 ounces dried egg noodles (2 to 4 cups, depending on width) • 2 tablespoons unsalted butter • 1/...

URL: [Buttered Noodles Recipes](#)

10. 10 Minute Gochujang Noodles • Carole Food

Description: These creamy gochujang noodles are the perfect thing to make when you haven't got a huge amount of time (they're ready in 10 minutes!). This recipe is very...

URL: [10 Minute Gochujang Noodles](#)

Enjoy your cooking! If you need more details on any of these recipes, feel free to ask.

► How did I get this answer?

Type something...

Deployment has started

Your AI service deployment has started.

View status

Timestamp: 9:15:03 PM



AgentLab (beta) | Projects | IBM watsonx | AgentLab (beta) | New project | IBM watsonx | Cloud Object Storage

dataplatform.cloud.ibm.com/da...

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Services catalog /

Cloud Object Storage

Author: IBM | Date of last update: Apr 15, 2025 | Docs | API Docs

Create | About

Pricing plan

Displayed prices do not include tax. Monthly prices shown are for country or region: United States

Plan	Features	Pricing
One-Rate	One-Rate Plan is a Pay-as-You-Go option with a single, flat monthly rate (\$/GB) that includes storage, API operations, retrieval, and outbound bandwidth—making it ideal for high-activity workloads with frequent access and data transfer, such as analytics, media, and web apps. The plan includes built-in allowances that scale with stored capacity and offers automatic volume discounts as usage grows.	
Lite (deprecated)	Lite plan instance is free to use for Storage capacity up to 25 GB per month. Lite plan instance is used for trial, and can be easily upgraded to Standard plan for unlimited scalability and full functionality.  None  Lite plan services are deleted after 30 days of inactivity.	Free
Standard	Standard Plan is a flexible Pay-as-You-Go option with no minimum fee—ideal for workloads with large storage needs but low or infrequent access and outbound traffic. It includes a Free Tier with 5GB of Smart Tier storage for 12 months. Charges are based on actual usage, with separate billing for storage, outbound bandwidth, API operations, and data retrieval. Multiple storage classes help you optimize costs based on how often data is accessed. Free Tier allowance: Storage up to 5GB/month Up to 2000 Class A requests/month Up to 20,000 Class B requests/month Up to 10GB/month of data retrieval Up to 5GB/month of egress Applies to aggregate total across all smart tier buckets in your account.	

Configure your resource

Summary

Cloud Object Storage  
Region: Global  
Plan: Lite (deprecated)  
Service name: Cloud Object Storage-bk  
Resource group: Default

Create  
View terms  
Cancel

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# CONCLUSION

- The Recipe Preparation Agent is a practical AI assistant for cooking.

- Adapts to kitchen constraints

- Reduces food waste

- Promotes healthy eating

- Scalable & easily integratable via IBM Cloud

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# FUTURE SCOPE

- Smarter Data
  - Integrate nutritional info, grocery APIs, and user preferences.
  - Support regional and seasonal recipes.
- Algorithm Improvements
  - Use advanced ML (e.g., reinforcement learning) for personalized suggestions.
  - Learn from user feedback and history.
- Scalable Reach
  - Expand to support multiple cuisines, languages, and cities.
  - Adapt recipes to local ingredients and culture.
- Emerging Tech
  - Add voice and image input for hands-free, visual cooking.
  - Enable offline use via edge computing.
- Seamless Integration
  - Auto-generate shopping lists.
  - Recommend recipes using soon-to-expire items.



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# REFERENCES

- IBM watsonx.ai documentation
- IBM Cloud Lite Services
- IBM SkillsBuild project.

## IBM CERTIFICATIONS

In recognition of the commitment to achieve  
professional excellence



# Shruti Sharma

Has successfully satisfied the requirements for:

## Getting Started with Artificial Intelligence



Issued on: Jul 16, 2025  
Issued by: IBM SkillsBuild

Verify: <https://www.credly.com/badges/b89fd248-9d1e-4a78-a35a-368ac06b691f>



## IBM CERTIFICATIONS

In recognition of the commitment to achieve  
professional excellence



# Shruti Sharma

Has successfully satisfied the requirements for:

## Journey to Cloud: Envisioning Your Solution



Issued on: Jul 21, 2025  
Issued by: IBM SkillsBuild

Verify: <https://www.credly.com/badges/cbc59619-3d91-4a87-accb-b51c1821215c>



# IBM CERTIFICATIONS

7/28/25, 12:39 AM

Completion Certificate | SkillsBuild

IBM **SkillsBuild**

Completion Certificate



This certificate is presented to

**Shruti Sharma**

for the completion of

**Lab: Retrieval Augmented Generation with  
LangChain**

(ALM-COURSE\_3824998)

According to the Adobe Learning Manager system of record

**Completion date:** 27 Jul 2025 (GMT)

**Learning hours:** 20 mins

[https://skills.yourlearning.ibm.com/certificate/ALM-COURSE\\_3824998](https://skills.yourlearning.ibm.com/certificate/ALM-COURSE_3824998)

1/1

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**THANK YOU**