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# RECIPE PREPARATION AGENT: AI SOUS CHEF FOR SMART COOKING

**Presented By:**

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2. College Name-Graphic Era Deemed to be university
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.

# 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

Deployment spaces /

## Recipe-Agent-Space1

Overview Assets **Deployments** Jobs Manage

Search

Name	Type	Status	Asset	Asset type	Tags	Last modified
 Recipe Agent	Online	 Deployed	Recipe Agent	AI service	 	41 seconds ago Anirudh Panwar (You)

Items per page: 20 1 of 1 items 1 of 1 pages

Meet - sokidbe-qzs

Agent Lab (beta) — Docs | IBM watson

Recipe Agent — Recipe Agent

FPS N/A N/A | GPU 0% 53°C 210 MHz 0.543 V 16 W 405 MHz | CPU 11% LAMP N/A N/A

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dataplatfom.cloud.ibm.com/ml-runtime/deployments/83979c5a-503e-4b59-a5b7-4f837aec7073?space\_id=14f...

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IBM watsonx

Upgrade ⓘ 🔔

Anirudh Panwar's Account ▾ Dallas ▾ AP

Deployment spaces / Recipe Agent Space1 / Recipe Agent /

Recipe Agent

Deployed Online

API reference

Test

Preview

Endpoints for inferencing ⓘ

Private endpoint

https://us-south.ml.cloud.ibm.com/v1/v4/deployments/83979c5a-503e-4b59-a5b7-4f837aec7073/ai\_service?version=2021-05-01

https://us-south.ml.cloud.ibm.com/v1/v4/deployments/83979c5a-503e-4b59-a5b7-4f837aec7073/ai\_service\_stream?version=2021-05-01

Public endpoint

https://us-south.ml.cloud.ibm.com/v1/v4/deployments/83979c5a-503e-4b59-a5b7-4f837aec7073/ai\_service?version=2021-05-01

https://us-south.ml.cloud.ibm.com/v1/v4/deployments/83979c5a-503e-4b59-a5b7-4f837aec7073/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://dataplatfom.cloud.ibm.com/docs/content/wsj/analyze-data/ml-authentication.html#secret-key)

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.ml.cloud.ibm.com/v1/v4/deployments/83979c5a-503e-4b59-a5b7-4f837aec7073/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: 83979c5a-503e-4b...

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

no-agent

Associated asset

Recipe Agent

5496a1f1-6279-4679-a915-bdcbaa1c7ae

Last modified

1 minute ago

Created on

Aug 3, 2025

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foundation



Meet – soxidsb-qz

Agent Lab (beta) — Docs | IBM watso

Recipe Agent — Recipe-Agent

FPS N/A N/A

GPU 18% 53°C 577 MHz 0.543 V 17 W 810 MHz

CPU 25%

LAT N/A N/A

dataplatform.cloud.ibm.com/ml-runtime/deployments/83979c5a-503e-4b59-a5b7-4f837aec7073/chat?space\_id...

Upgrade

Antiruh Panwar's Account

Dallas

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Deployment spaces / Recipe-Agent-Space1 / Recipe Agent

Recipe Agent Deployed Online

API reference

Test

Preview

You 10:25 PM

Can u help me with recipe

Recipe Agent 10:25 PM

Of course! What ingredients do you have on hand?

You 10:25 PM

help me with butter chicken

Recipe Agent 10:25 PM

Here are some butter chicken recipes I found:

1. [Butter Chicken Recipe \(Ghoshen Makhani\) - Swasthi's Recipes](#)

- Description: Butter Chicken is a classic Indian dish made with marinated & grilled chicken (Tandoori chicken), simmered in a creamy tomato gravy/curry.

2. [Butter Chicken - RecipeTin Eats](#)

- Description: The secret to the tender, flavour infused chicken is a spice infused yogurt marinade made with fresh ginger, garlic, lemon juice and spices.

3. [The Best Butter Chicken Recipe \(Murgh Makhani\) | Little Spice Jar](#)

Type something...

About this deployment

Name

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Change this description to reflect your particular agent

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runtime-24.1-py3.11

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Extra extra small: 1 CPU and 2 GB RAM

Copies:

1

Tags

xx-agent

Associated asset

Recipe Agent

5496a1f1-5277-4579-a915-1dcbaafccae

Last modified

1 minute ago

Created on

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Recipe-Agent-Pr
Recipe-Agent-Pr

dataplatform

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Upgrade
AP

Projects / Recipe-Agent-Project
Launch IDE

Associate service

Author: IBM • Date of last update: May 7, 2025 • Docs

Create
About

Select a region

Select a region
Dallas

Pricing plan

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

Plan	Features	Pricing
Lite	1 authorized user 10 capacity units hours monthly limit Environment = # of capacity units required per hour • 1 vCPU + 4 GB RAM = 0.5 • 2 vCPU + 8 GB RAM = 1 • 4 vCPU + 16 GB RAM = 2 • Decision Optimization + Watson NLP = Environment + 5 • Synthetic Data Generator, 2 vCPU + 8 GB RAM = 2 (requires watsonx.ai Runtime)	Free

The Lite plan

Summary

watsonx.ai Studio

Region: Dallas  
Plan: Lite  
Service name: watsonx.ai Studio-od  
Resource group: Default

Create
View terms
Cancel

Agent Lab (beta) — Docs
New project | IBM watsonx
Cloud Object Storage

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)	<p>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.</p> <p>None</p> <p>Lite plan services are deleted after 30 days of inactivity.</p>	Free
Standard	<p>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.</p> <p>Free Tier allowance:</p> <ul style="list-style-type: none"> <li>Storage up to 5GB/month</li> <li>Up to 2000 Class A requests/month</li> <li>Up to 20,000 Class B requests/month</li> <li>Up to 10GB/month of data retrieval</li> <li>Up to 5GB/month of egress</li> </ul> <p>Applies to aggregate total across all smart tier buckets</p>	

### Summary

**Cloud Object Storage**

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

Create
View terms
Cancel

Agent Lab

Agent

IBM watsonx

Recipe-Age

Recipe-Age

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Projects / Recipe-Agent-Project / Agent Lab

Build

AI

Model: mistral-large

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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

Retrieves information from the internet with the Google search engine.

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🗑️

DuckDuckGo search

Retrieves information from the internet with the DuckDuckGo search engine.

🗑️

Wikipedia search

Retrieves information from Wikipedia articles.

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🗑️

Agent preview

AP You: 02:38 PM

What can I make for dinner with pasta, chicken and eggs?

watsonxAgent: 02:38 PM

Here are some recipes you can make with pasta, chicken, and eggs:

1. Creamy Chicken Carbonara

Description: Creamy chicken carbonara is inspired by a classic Italian pasta dish made with bacon, whisked egg, and hard cheese.

URL: [Creamy Chicken Carbonara Recipe](#)

2. Chicken Penne Carbonara

Description: The sauce base for carbonara is two ingredients: eggs and grated parmesan cheese. When whisked together and tossed with HOT pasta, the eggs cook and create a creamy sauce.

URL: [Chicken Penne Carbonara](#)

3. Chicken and Egg Noodles

Description: This Italian-spiced chicken and egg noodles recipe is an easy weeknight winner. It uses up fresh summer produce and comes together in a snap.

URL: [Chicken and Egg Noodles](#)

4. Chicken Carbonara (Easy Pasta Recipe)

Description: Cook pasta per package directions, aiming for al dente. In a large bowl, whisk together egg yolks, cream, parmesan cheese, lemon zest, oregano, salt, and pepper.

URL: [Chicken Carbonara Recipe](#)

5. Easy One Pot Chicken and Noodles

Description: It has tender chicken and buttery egg noodles all smothered in a creamy sauce. Chicken & Poultry Mains One Pot Meals Pasta Quick & Easy Recipes

Type something...

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foundation



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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



# Anirudh Panwar

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/8c573abd-9a4b-4c7b-8cfc-438d09a847fb>



## IBM CERTIFICATIONS

In recognition of the commitment to achieve  
professional excellence



# Anirudh Panwar

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/2c4844e6-b2e1-490f-8939-fda2a20feecb>



## IBM CERTIFICATIONS

IBM **SkillsBuild**

Completion Certificate



This certificate is presented to

Anirudh Panwar

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

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**THANK YOU**