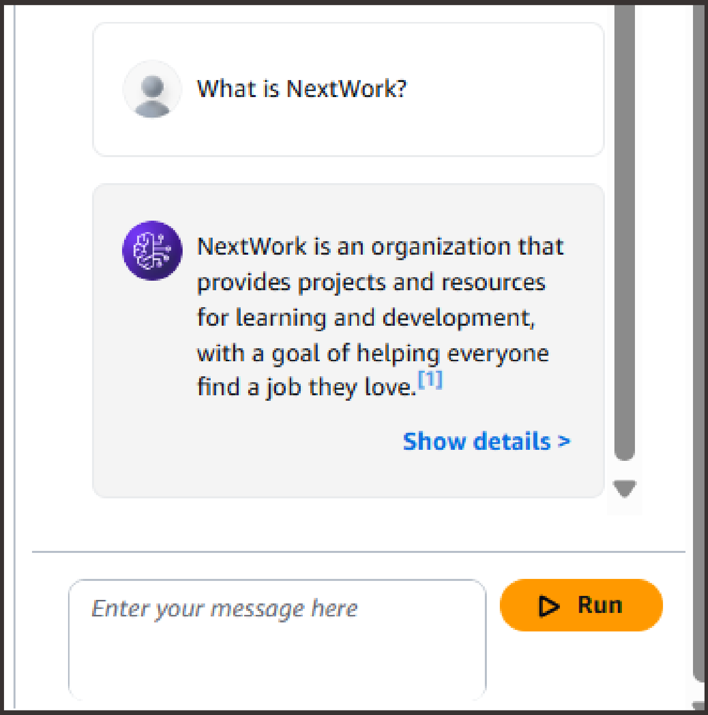
nextwork.org

Set Up a RAG Chatbot in Bedrock

DI Dineshraj Dhanapathy


What is NextWork?

NextWork is an organization that provides projects and resources for learning and development, with a goal of helping everyone find a job they love.[1]

Introducing Today's Project!

RAG (Retrieval Augmented Generation) is a method that combines retrieved data with AI to produce informed answers. In this project, I will demonstrate RAG by merging live search results with AI output.

Tools and concepts

Services I used were Amazon Bedrock, S3, and OpenSearch Serverless. Key concepts I learnt include chunking, embeddings, vector stores, and the importance of syncing data for effective AI-powered

Project reflection

This project took me approximately 2 hours. The most challenging part was setting up the Knowledge Base and troubleshooting model responses. It was most rewarding to see the chatbot provide accurate, real-time answers.

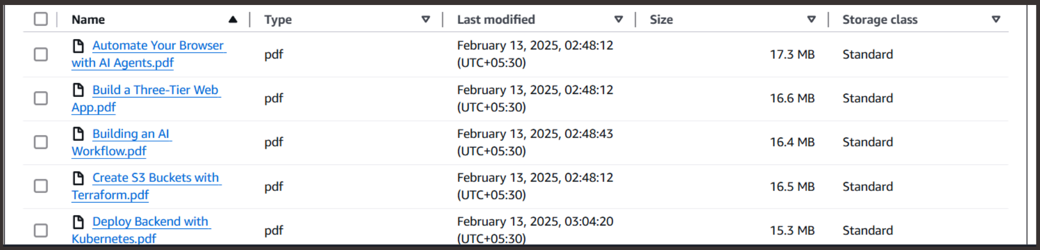
I did this project today to deepen my understanding of AI models and enhance my skills in integrating knowledge bases. The project met my goals by successfully building a functional, responsive AI chatbot.

Understanding Amazon Bedrock

Amazon Bedrock is a managed service offering scalable foundation models and tools to build generative AI applications. I'm using Bedrock in this project to integrate and deploy AI-powered solutions.

My Knowledge Base is connected to S3 because S3 is a secure, scalable, and durable storage solution that hosts our data and enables efficient retrieval and processing for AI models for fast access.

In an S3 bucket, I uploaded documents including FAQs, manuals, and guides for our chatbot's Knowledge Base. My S3 bucket is in the same region as my KB because I'm using Ohio East 2 for low latency



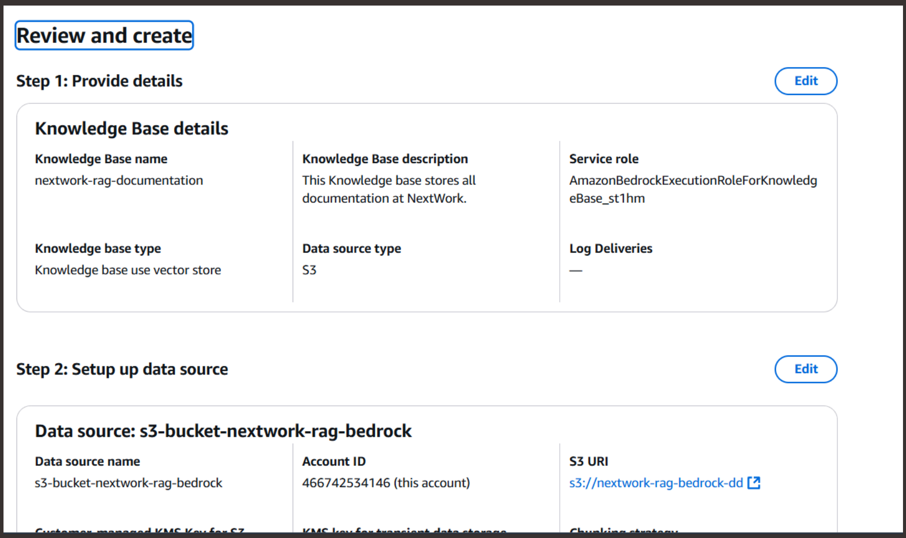
Name	Type	Last modified	Size	Storage class
Automate Your Browser with AI Agents.pdf	pdf	February 13, 2025, 02:48:12 (UTC+05:30)	17.3 MB	Standard
Build a Three-Tier Web App.pdf	pdf	February 13, 2025, 02:48:12 (UTC+05:30)	16.6 MB	Standard
Building an AI Workflow.pdf	pdf	February 13, 2025, 02:48:43 (UTC+05:30)	16.4 MB	Standard
Create S3 Buckets with Terraform.pdf	pdf	February 13, 2025, 02:48:12 (UTC+05:30)	16.5 MB	Standard
Deploy Backend with Kubernetes.pdf	pdf	February 13, 2025, 03:04:20 (UTC+05:30)	15.3 MB	Standard

My Knowledge Base Setup

My Knowledge Base uses a vector store, which means it efficiently stores and retrieves embeddings for fast AI responses. When I query my Knowledge Base, OpenSearch will quickly find relevant document chunks

Embeddings are numerical representations of text that help AI understand context and meaning. The embedding model I'm using is Titan Text Embeddings v2 because it provides accurate, efficient semantic search.

Chunking is the process of breaking large text into smaller parts for efficient AI processing. In my Knowledge Base, chunks are set to 300 tokens, ensuring the chatbot retrieves precise and relevant info.



Review and create

Step 1: Provide details

Knowledge Base details

Knowledge Base name	**Knowledge Base description**	**Service role**
nextwork-rag-documentation	This Knowledge base stores all documentation at NextWork.	AmazonBedrockExecutionRoleForKnowledgeBase_st1hm
Knowledge base type	**Data source type**	**Log Deliveries**
Knowledge base use vector store	S3	—

Step 2: Setup up data source

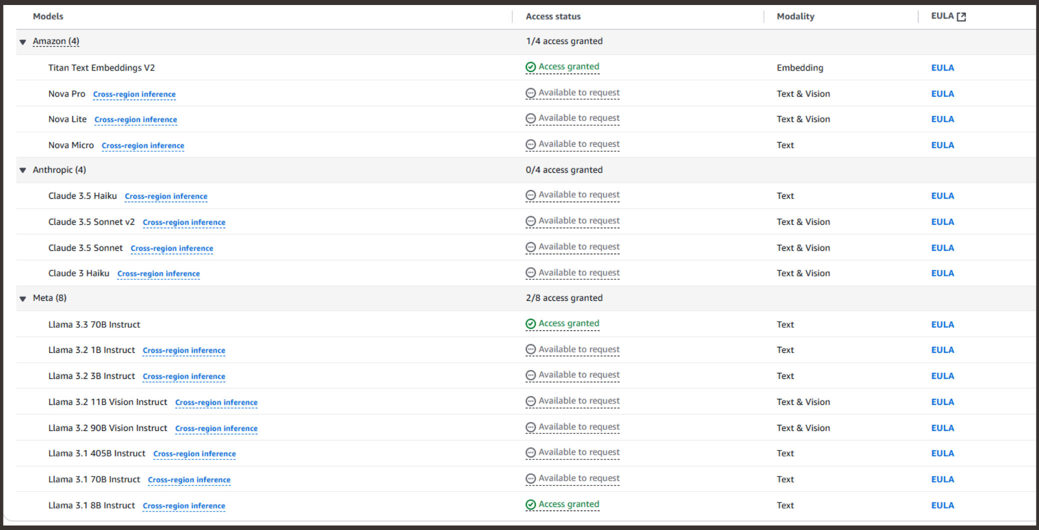
Data source: s3-bucket-nextwork-rag-bedrock

Data source name	**Account ID**	**S3 URI**
s3-bucket-nextwork-rag-bedrock	466742534146 (this account)	s3://nextwork-rag-bedrock-dd

AI Models

AI models are important for my chatbot because they generate intelligent, context-aware responses. Without AI models, my chatbot would only retrieve static text without understanding user intent.

To get access to AI models in Bedrock, I had to request model access in the AWS console. AWS needs explicit access because it ensures compliance, security, and proper usage of foundation models.

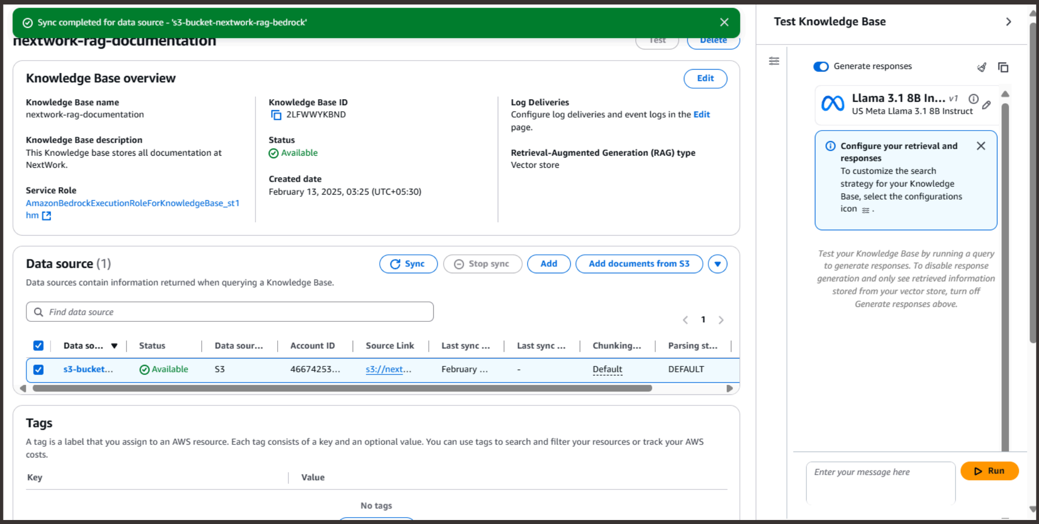


Models	Access status	Modality	EULA
▼ Amazon (4)	1/4 access granted		
Titan Text Embeddings V2	✓ Access granted	Embedding	EULA
Nova Pro Cross-region inference	Available to request	Text & Vision	EULA
Nova Lite Cross-region inference	Available to request	Text & Vision	EULA
Nova Micro Cross-region inference	Available to request	Text	EULA
▼ Anthropic (4)	0/4 access granted		
Claude 3.5 Haiku Cross-region inference	Available to request	Text	EULA
Claude 3.5 Sonnet v2 Cross-region inference	Available to request	Text & Vision	EULA
Claude 3.5 Sonnet Cross-region inference	Available to request	Text & Vision	EULA
Claude 3 Haiku Cross-region inference	Available to request	Text & Vision	EULA
▼ Meta (8)	2/8 access granted		
Llama 3.3 70B Instruct	✓ Access granted	Text	EULA
Llama 3.2 1B Instruct Cross-region inference	Available to request	Text	EULA
Llama 3.2 3B Instruct Cross-region inference	Available to request	Text	EULA
Llama 3.2 11B Vision Instruct Cross-region inference	Available to request	Text & Vision	EULA
Llama 3.2 90B Vision Instruct Cross-region inference	Available to request	Text & Vision	EULA
Llama 3.1 405B Instruct Cross-region inference	Available to request	Text	EULA
Llama 3.1 70B Instruct Cross-region inference	Available to request	Text	EULA
Llama 3.1 8B Instruct Cross-region inference	✓ Access granted	Text	EULA

Syncing the Knowledge Base

Even though I already connected my S3 bucket when creating the Knowledge Base, I still need to sync because it ensures the latest data is indexed, updated, and ready for accurate retrieval by the AI.

The sync process involves three steps: Ingesting, where Bedrock retrieves data from S3; Processing, where it chunks and embeds the data; and Storing, where Bedrock stores the processed data in OpenSearch Serverless.



Sync completed for data source - 's3-bucket-nextwork-rag-bedrock'

nextwork-rag-documentation

Knowledge Base overview

Knowledge Base name
nextwork-rag-documentation

Knowledge Base description
This Knowledge base stores all documentation at NextWork.

Service Role
AmazonBedrockExecutionRoleForKnowledgeBase_st1hm

Knowledge Base ID
2LFWWYKBND

Status
Available

Created date
February 13, 2025, 03:25 (UTC+05:30)

Log Deliveries
Configure log deliveries and event logs in the Edit page.

Retrieval-Augmented Generation (RAG) type
Vector store

Data source (1)

Data sources contain information returned when querying a Knowledge Base.

Data so...	Status	Data sour...	Account ID	Source Link	Last sync ...	Last sync ...	Chunking...	Parsing st...
s3-bucket...	Available	S3	46674253...	s3://next...	February ...	-	Default	DEFAULT

Tags

A tag is a label that you assign to an AWS resource. Each tag consists of a key and an optional value. You can use tags to search and filter your resources or track your AWS costs.

Key	Value

No tags

Test Knowledge Base

Generate responses

Llama 3.1 8B In... v1
US Meta Llama 3.1 8B Instruct

Configure your retrieval and responses
To customize the search strategy for your Knowledge Base, select the configurations icon.

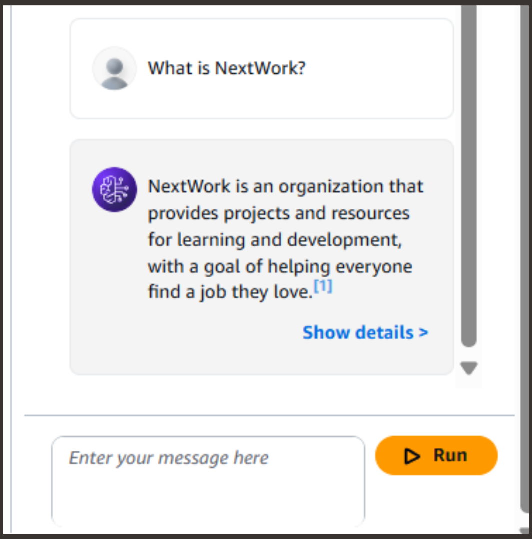
Test your Knowledge Base by running a query to generate responses. To disable response generation and only see retrieved information stored from your vector store, turn off Generate responses above.

Testing My Chatbot

I initially tried to test my chatbot using Llama 3.1 8B as the AI model, but it lacked the depth needed for complex queries. I had to switch to Llama 3.3 70B because it provides more accurate, nuanced responses.

When I asked about topics unrelated to my data, my chatbot struggled to provide relevant answers. This proves that the chatbot relies on the knowledge base, and without related data, its accuracy drops.

You can also turn off the Generate Responses setting to prevent the AI from automatically generating answers. This allows you to manually adjust or review the responses before they are delivered, giving more control over the interaction.



What is NextWork?

NextWork is an organization that provides projects and resources for learning and development, with a goal of helping everyone find a job they love.[1]