Building Agentic RAG Systems

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Outline

Vanilla RAG vs Agentic RAG

Vanilla RAG

Agent Components

Agentic RAG

Agent Ecosystem

LLM + Function Calling

Agent Frameworks

Observability

Generative Feedback Loops

Weaviate Agents

GFL Applications

Vanilla RAG vs Agentic RAG

Vanilla RAG

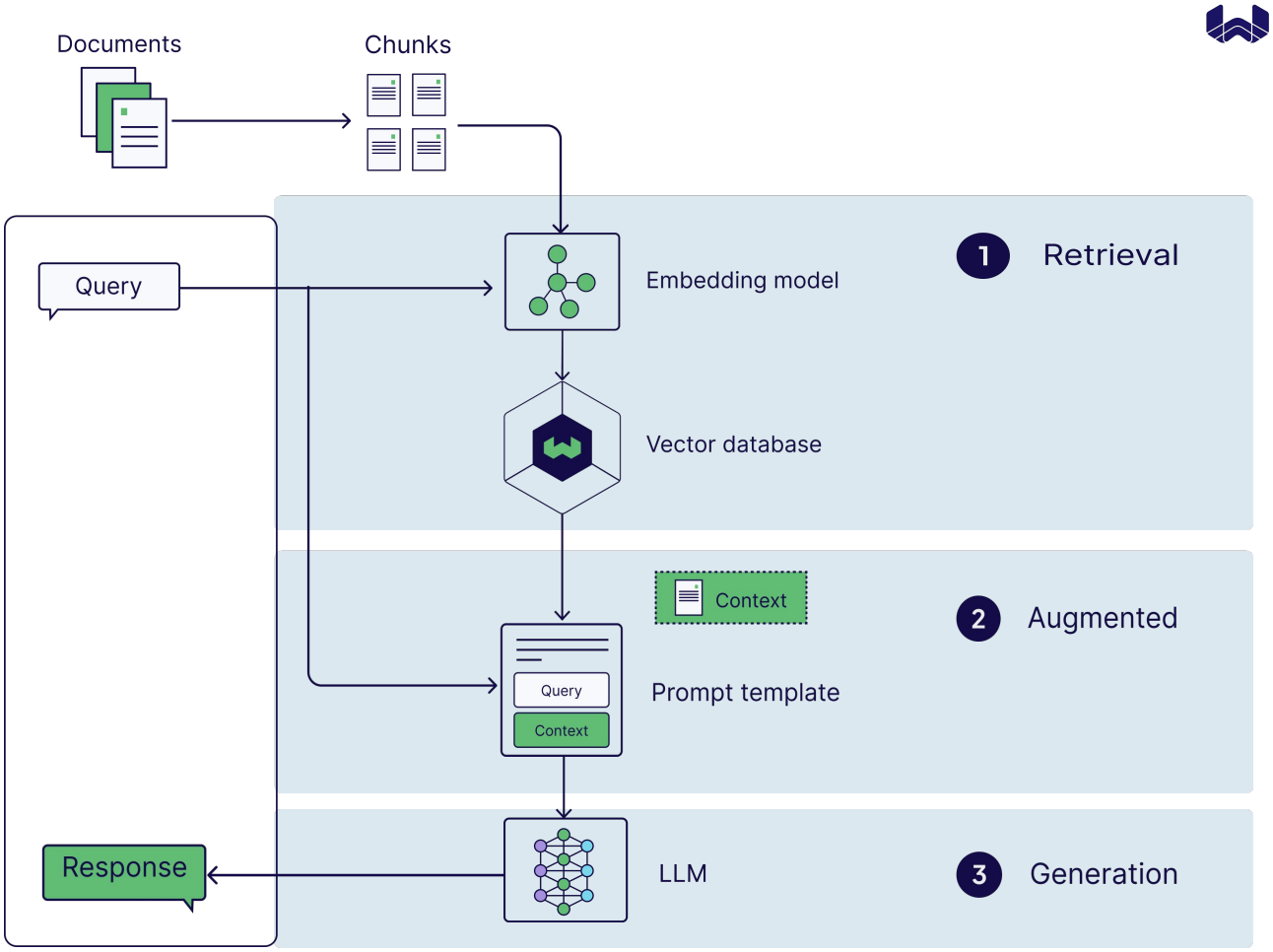
Agent Components

Agentic RAG

RAG Workflow

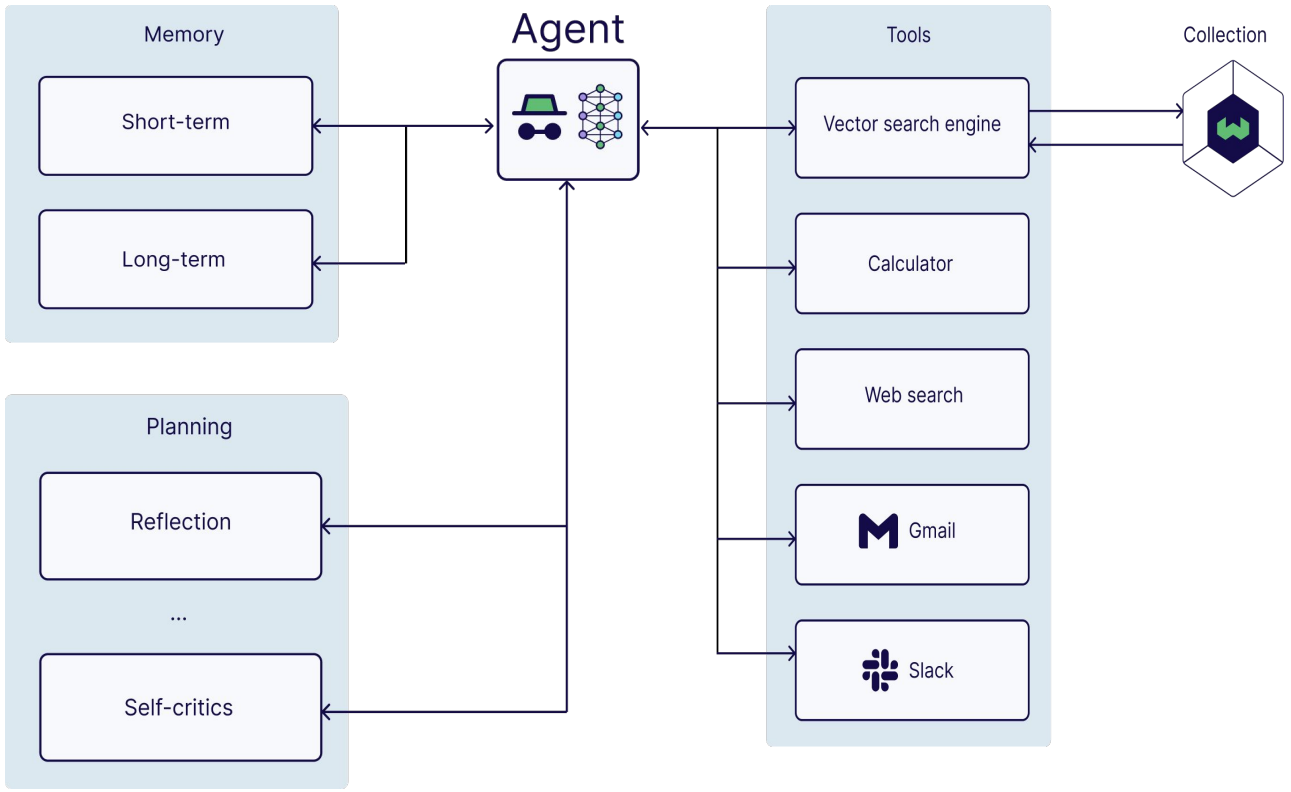
Vanilla RAG

1. Retrieve
2. Augment
3. Generate



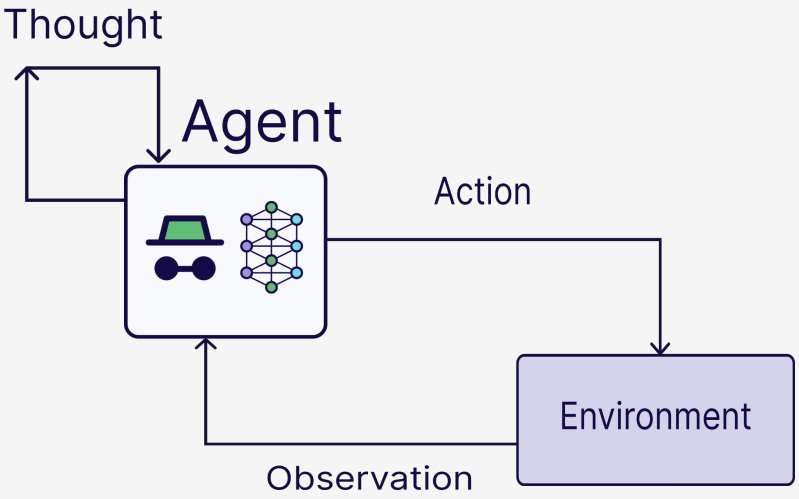
Agent Components

1. Language Model
2. Memory (short and long term)
3. Planning (CoT, ReAct, etc.)
4. Tools



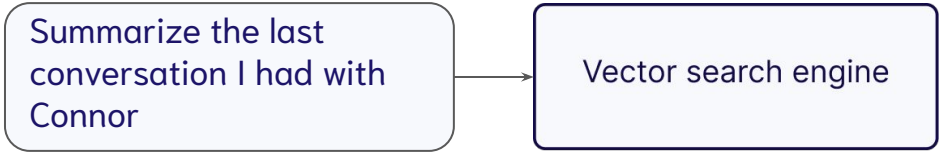
Agentic RAG with ReAct

1. Thought: Reason about the action to take based on the user query and past observations
2. Action: Decide an action and execute the tool (database queries)
3. Observation: Observe the feedback from the action
4. Loop until the agent responds to the user



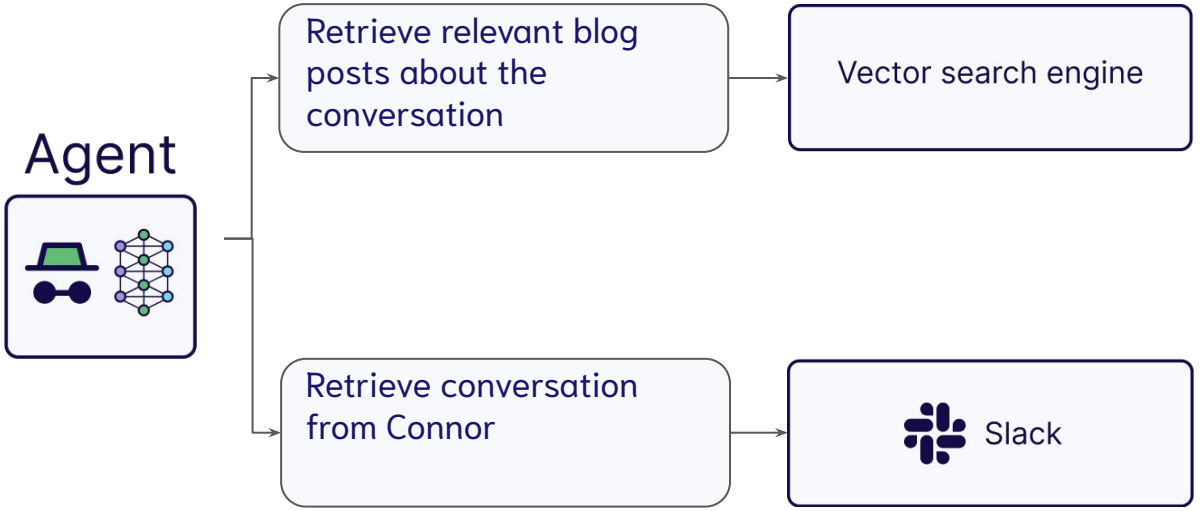
Query Example where Vanilla RAG Fails

“Summarize the last conversation I had with Connor”



Query Example where Agentic RAG Succeeds

"Summarize the last conversation I had with Connor"



Benefits

1. Format the search query from the prompt
2. Call tools in parallel
3. Navigate your database
4. Iteratively search

Limitations

1. Latency
2. Inference Cost

Vanilla RAG vs Agentic RAG

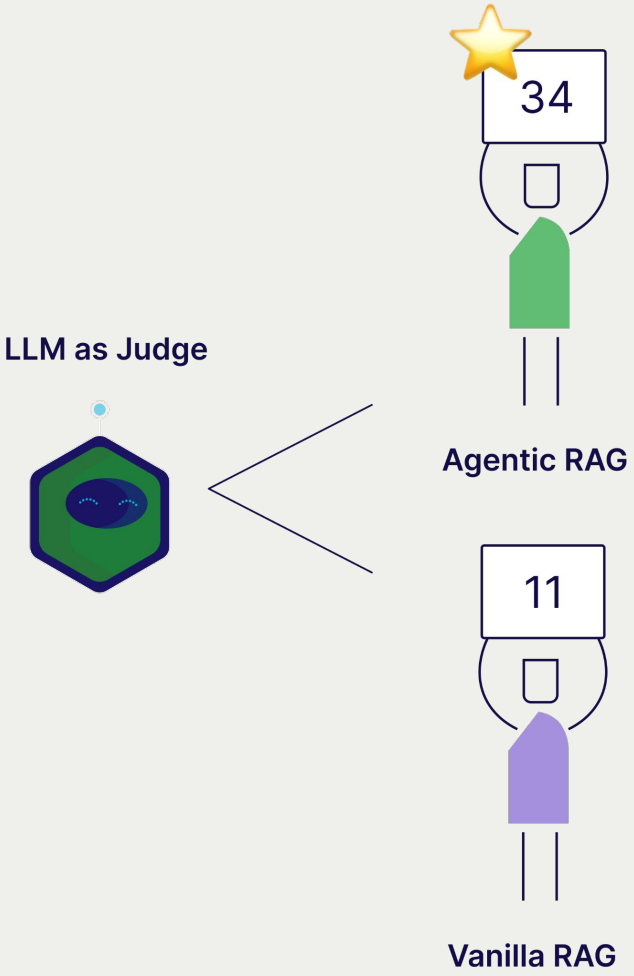
45 Weaviate FAQs

What is the role of the Binary Independence Model in the BM25 algorithm used by Weaviate's hybrid search?

Why might vector libraries not be suitable for applications that require real-time updates and scalable semantic search?

What guide does the document recommend for learning about LangChain projects?

...



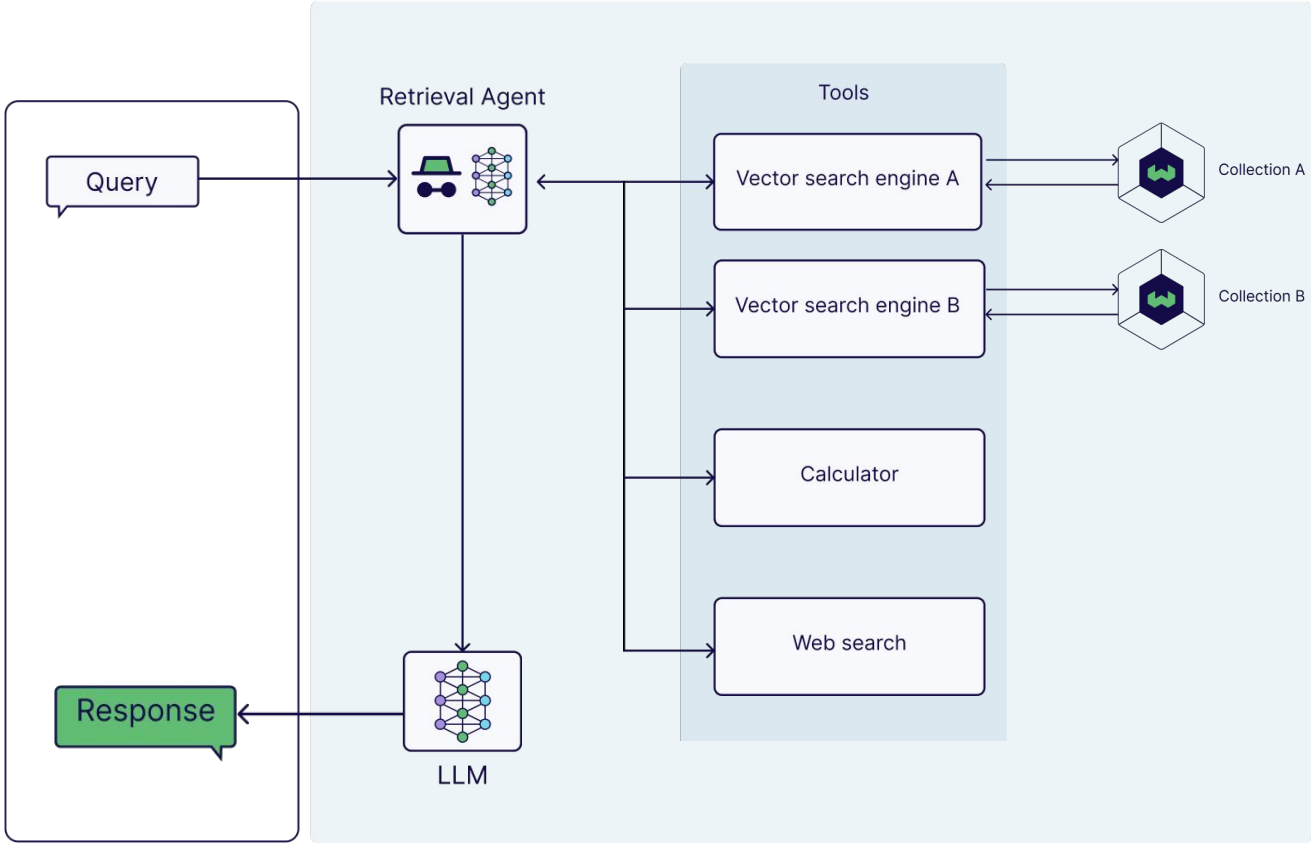
Source: https://github.com/weaviate/recipes/blob/main/integrations/llm-frameworks/agentic-rag-benchmark/vanilla-rag-vs-agentic-rag.ipynb

Exploring Multi-Agent Systems

- Roles and Routing
- Sharing and Isolating Tool Use

RAG Workflow

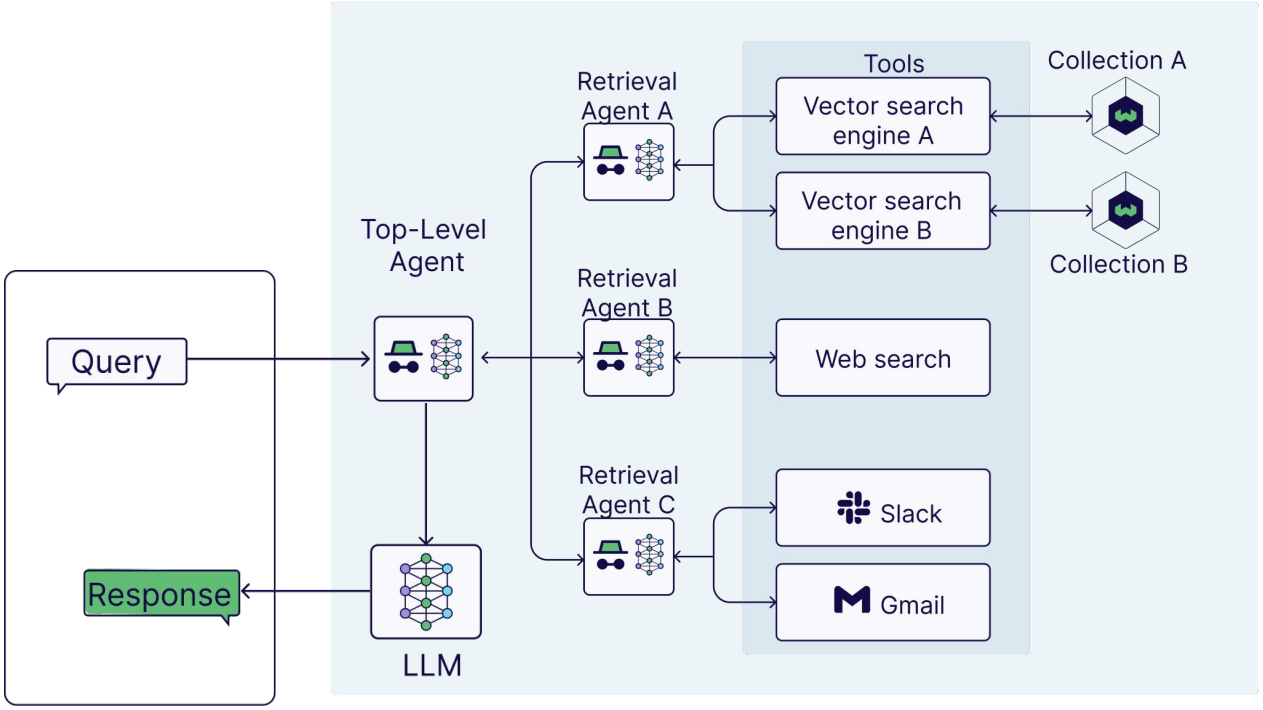
1. Retrieval agent that accesses external tools
2. Language model (summarize, etc.)



RAG Workflow

Multi-Agent Retrieval

1. Top-level agent
2. Call the required tool
3. Top-level agent sends the outputs to the other language model



Agent Ecosystem

LLM + Function Calling

Agent Frameworks

Observability

Gemini + Function Calling


```
calculator = genai.protos.Tool(
    function_declarations=[
      genai.protos.FunctionDeclaration(
        name='multiply',
        description="Returns the product of two numbers.",
        parameters=genai.protos.Schema(
            type=genai.protos.Type.OBJECT,
            properties={
                'a':genai.protos.Schema(type=genai.protos.Type.NUMBER),
                'b':genai.protos.Schema(type=genai.protos.Type.NUMBER)
            },
            required=['a','b']
        )
      )
    ])
```

Agent Frameworks

- Variety of tools and reasoning loops

- Supports ReAct agents and Avatar optimization

Letta

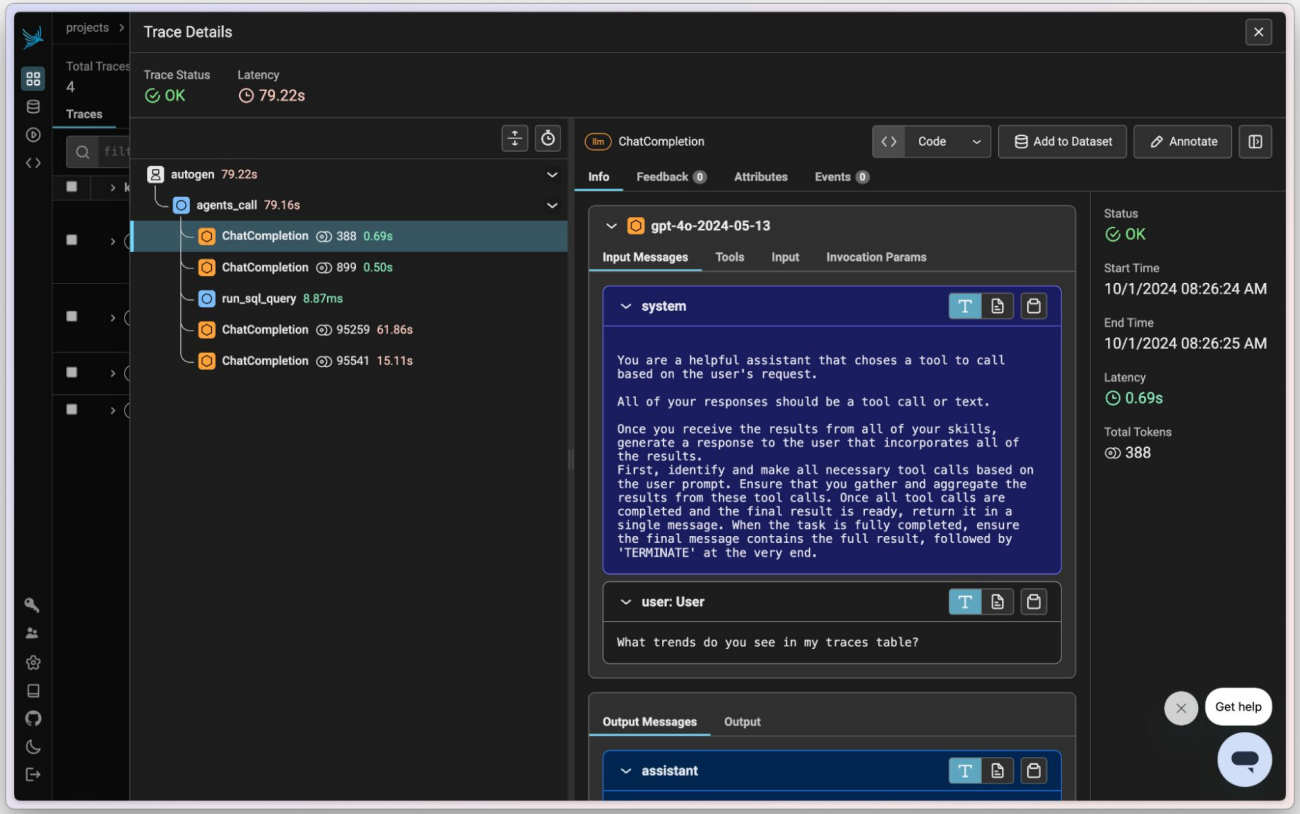
- Framework for updating agent memory

- LCEL and LangGraph frameworks

crewai

- Multi-agent orchestration

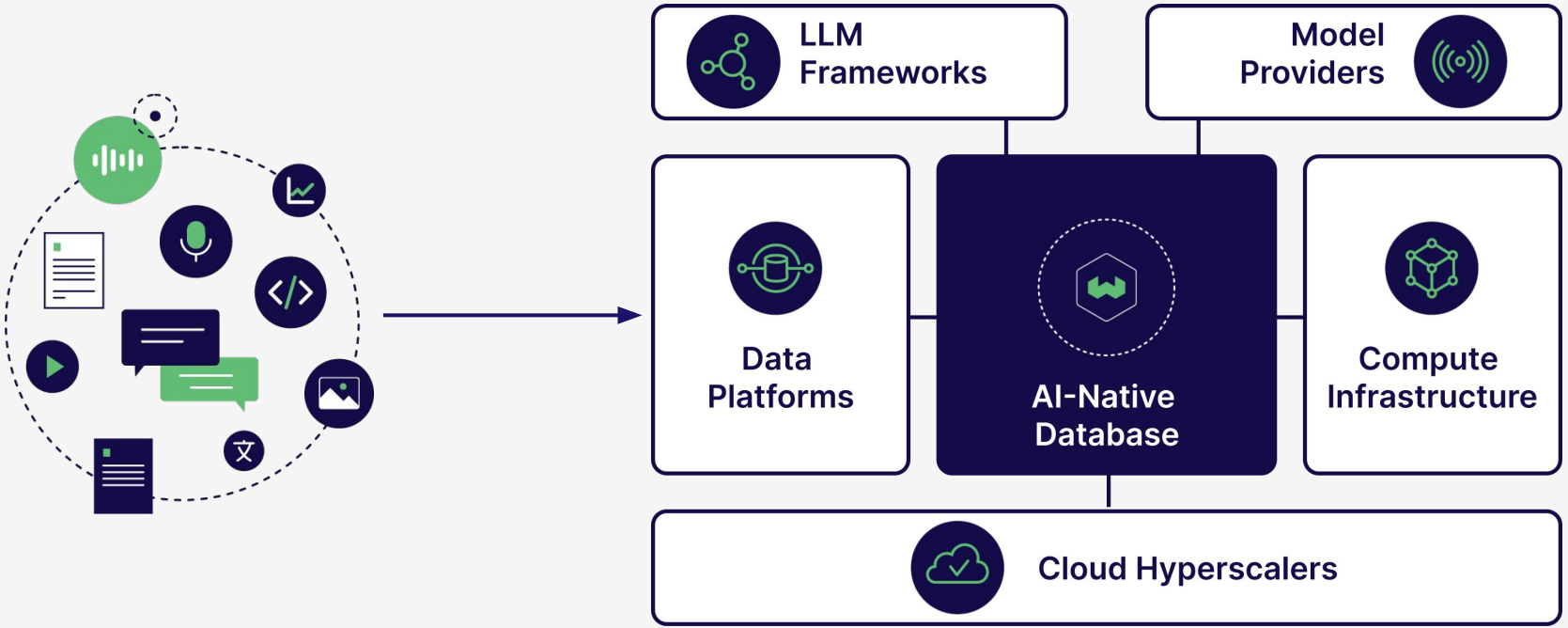
Observability



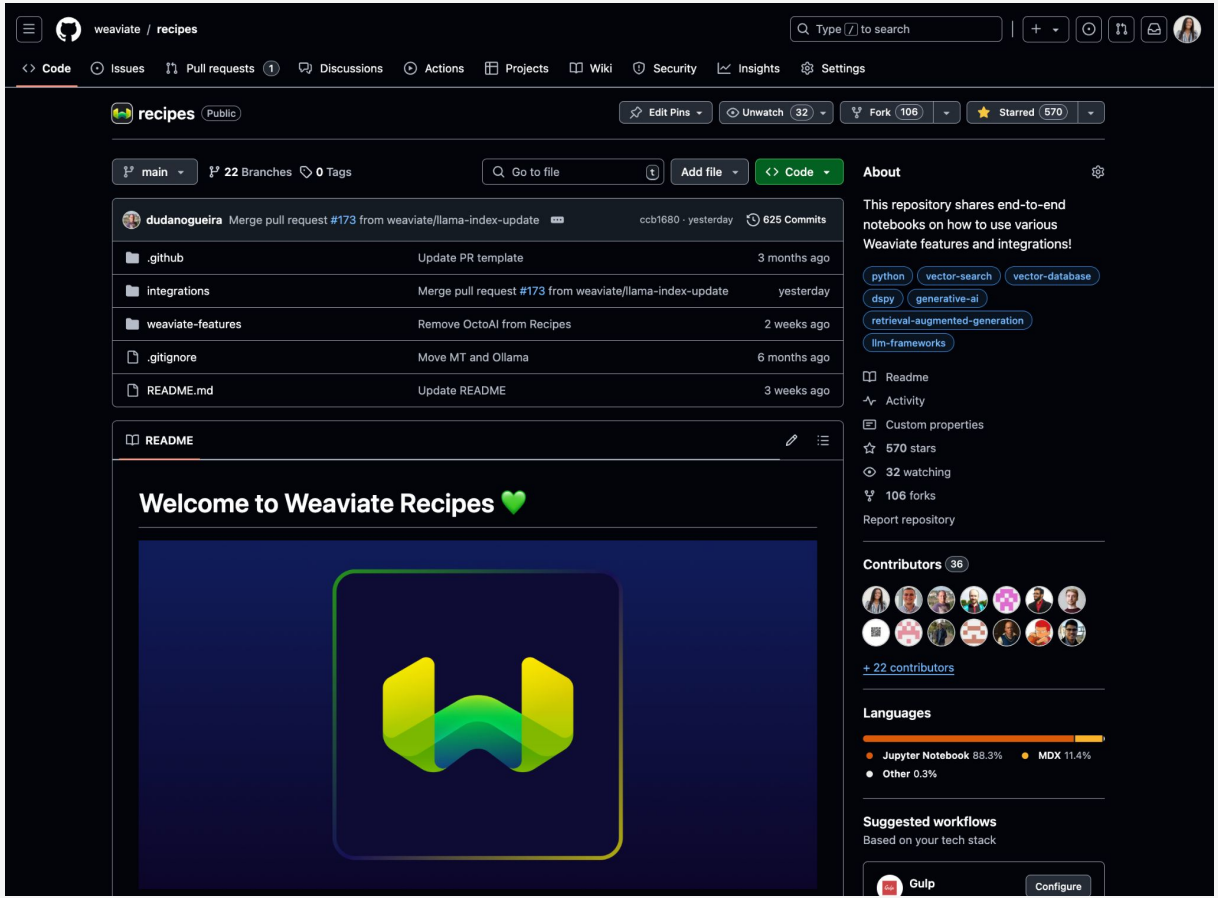
Source:https://arize.com/blog/what-is-autogen/

Source: https://www.letta.com/blog/ai-agents-stack

A new AI-native stack is emerging



Weaviate Recipes



Generative Feedback Loops

GFL API

GFL Applications

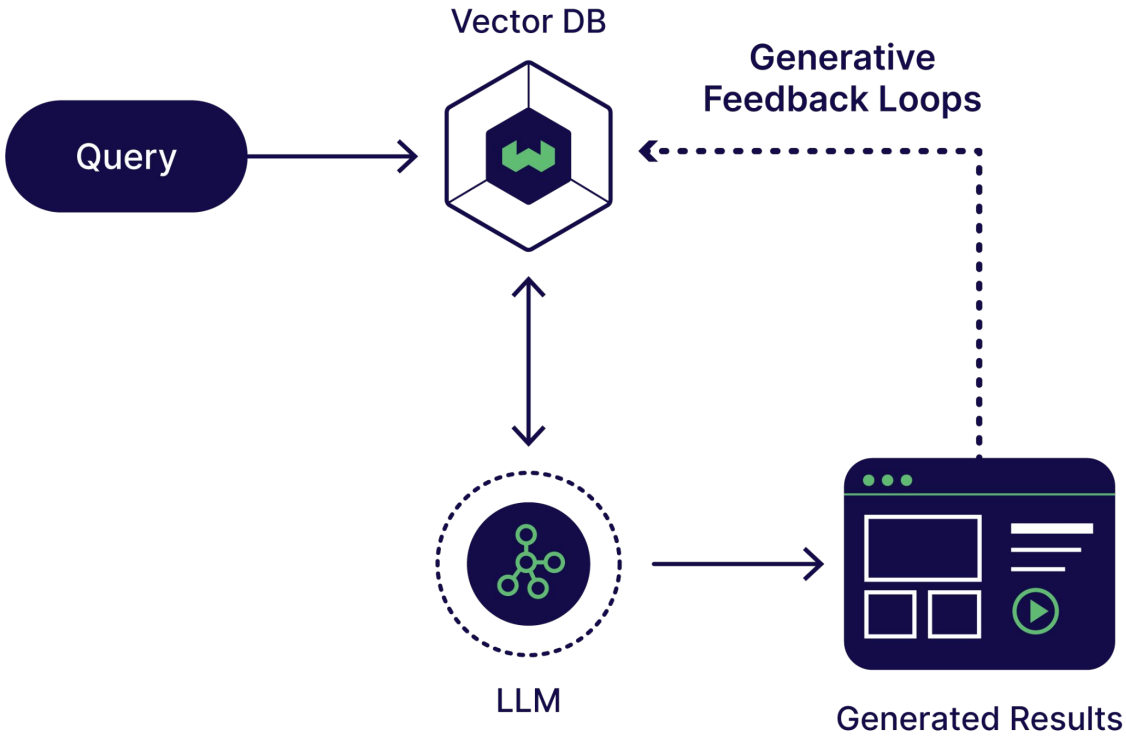
Weaviate

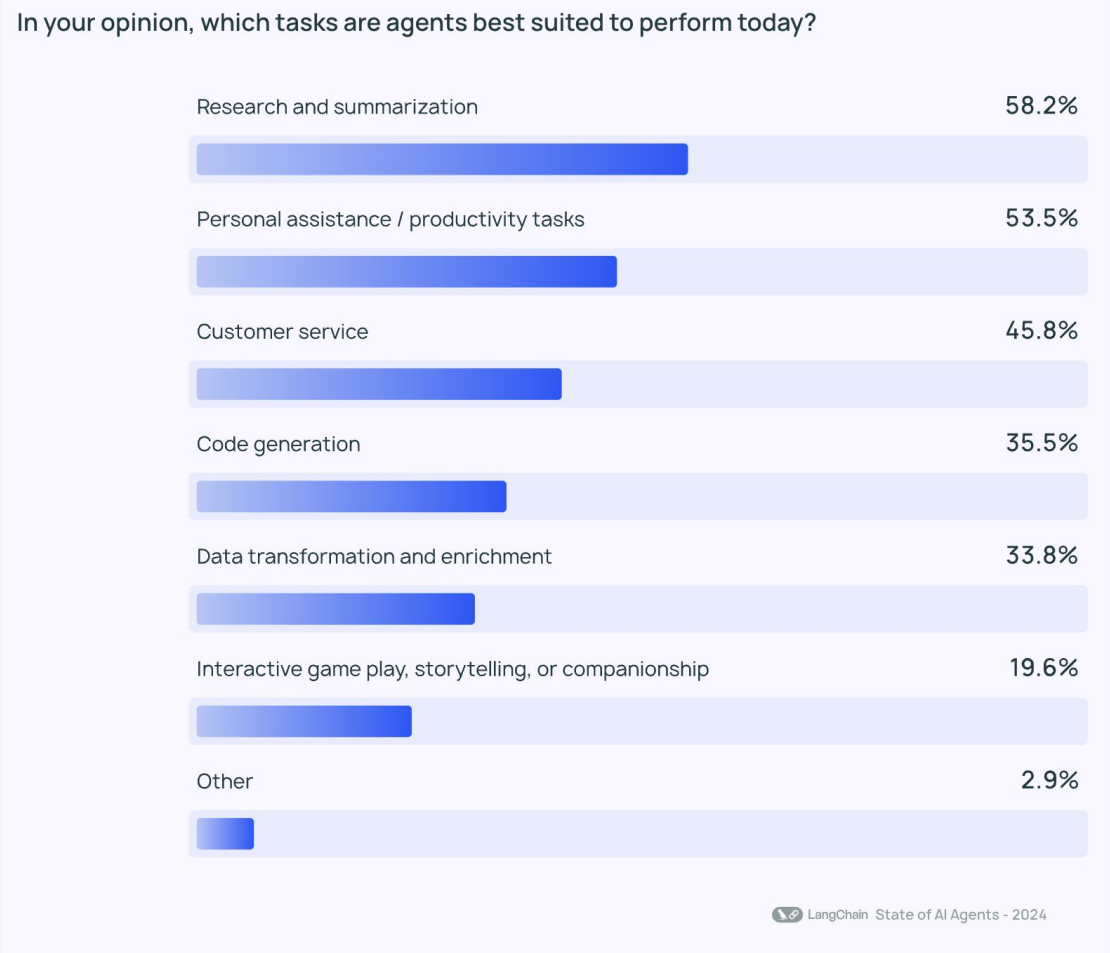
Generative Feedback Loops

```
instruction = """
Create an overview of the content. The overview should capture the
core topics and the main points of the post but does not need to
include all the details.
"""
overview_gfl = blogs.gfl.create(
    property_name="overview",
    data_type=wvcc.DataType.TEXT,
    view_properties=["content"],
    instruction=instruction,
)
```

GFL Applications

- Data cleaning
- Chunking text documents
- Generate synthetic data





Source: https://www.langchain.com/stateofaiagents

Summary

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Agent Components

Agentic RAG

Agent Ecosystem

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Agent Frameworks

Observability

Generative Feedback Loops

Weaviate Agents

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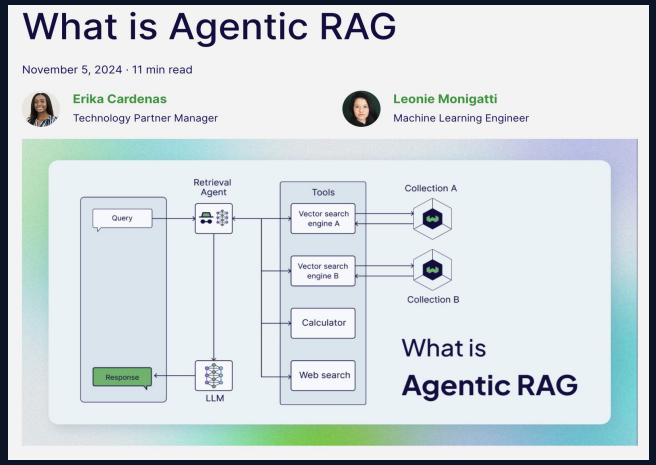
Resources


What is Agentic RAG
November 5, 2024 · 11 min read
Erika Cardenas
Technology Partner Manager
Leonie Monigatti
Machine Learning Engineer
Retrieval Agent
Tools
Collection A
Collection B
Query
Vector search engine A
Vector search engine B
Calculator
Web search
Response
LLM
What is
Agentic RAG


Agentic RAG
Erika Cardenas
Weaviate
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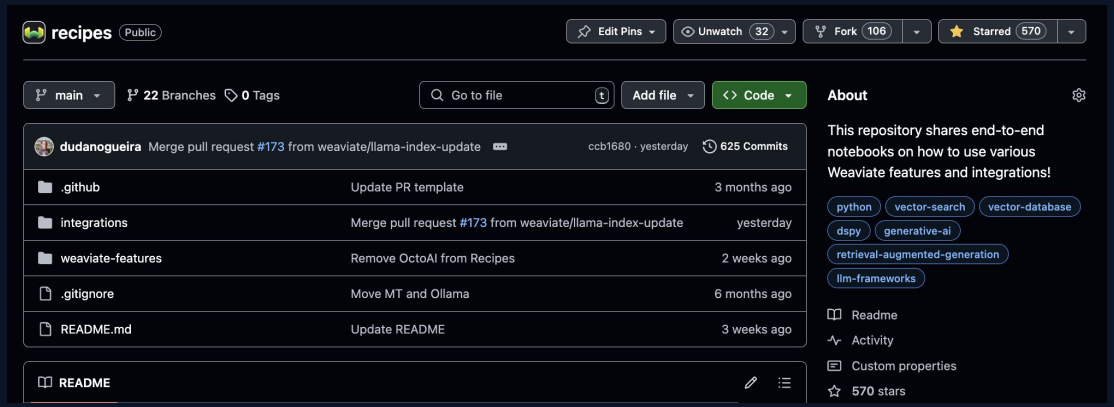
recipes
Public
Edit Pins
Unwatch 32
Fork 106
Starred 570
main
22 Branches
0 Tags
Go to file
Add file
Code
About
dudanogueira Merge pull request #173 from weaviate/llama-index-update
ccb1680 · yesterday
625 Commits
.github
Update PR template
3 months ago
integrations
Merge pull request #173 from weaviate/llama-index-update
yesterday
weaviate-features
Remove OctoAI from Recipes
2 weeks ago
.gitignore
Move MT and Ollama
6 months ago
README.md
Update README
3 weeks ago
README
This repository shares end-to-end notebooks on how to use various Weaviate features and integrations!
python
vector-search
vector-database
dspy
generative-ai
retrieval-augmented-generation
llm-frameworks
Readme
Activity
Custom properties
570 stars

Thank you!

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 weaviate/weaviate-recipes

 ecardenas300

 /ecardenas300/