The Oracle AI Microservices Sandbox for RAG Rapid Prototyping

Corrado De Bari, Mark Nelson, John Lathouwers

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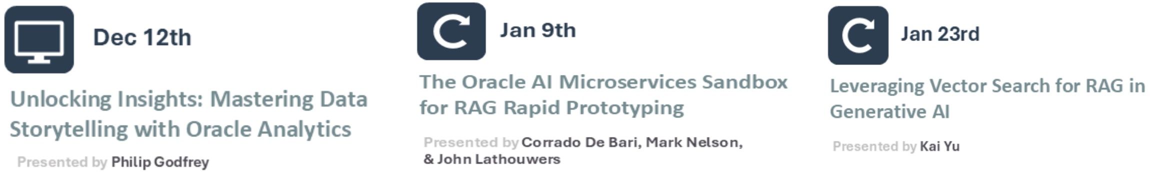

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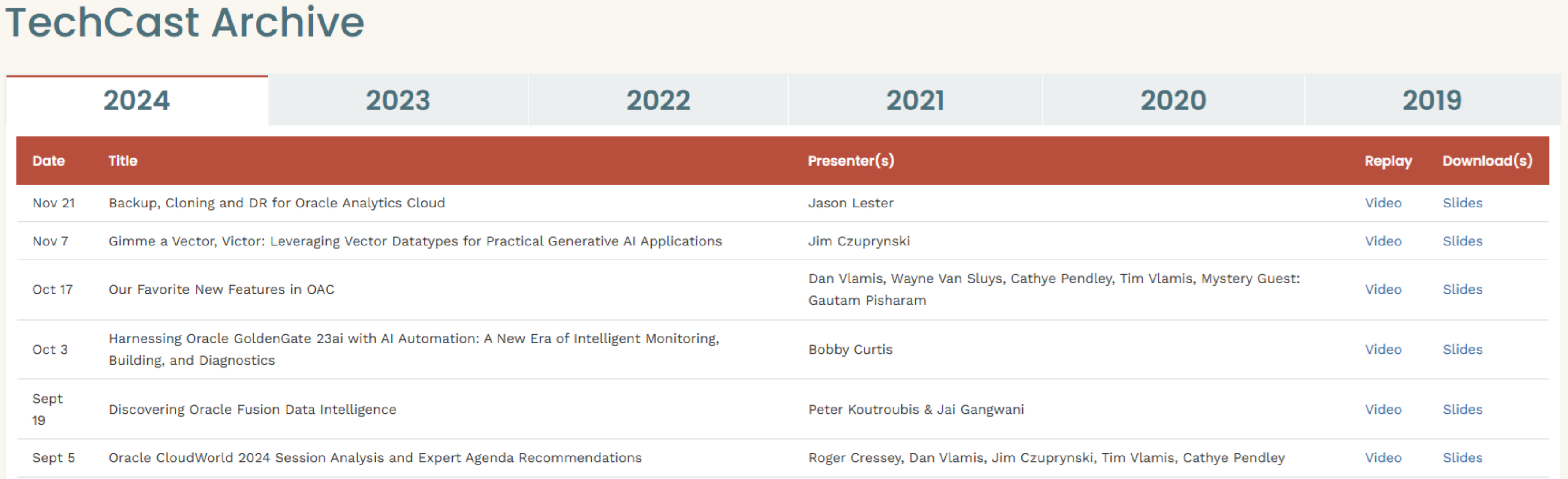
Leveraging Vector Search for RAG in Generative AI

Presented by **Kai Yu**



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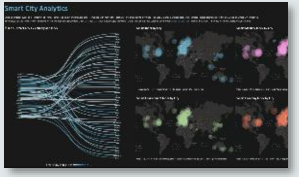

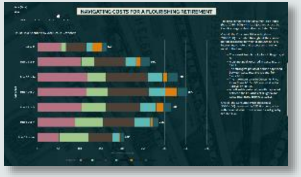

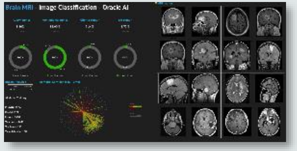

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Analytics and Data Summit 2025

*Registration is now **open**!*

April 8-10, 2025
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The Oracle AI Microservices Sandbox for RAG Rapid Prototyping

Mark Nelson, John Lathouwers, Corrado De Bari

Developer Evangelists
Oracle

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Everybody is building chatbots
But what defines enterprise quality?

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The fallacy of the “quick” chatbot

Many articles present a simple chatbot that can be created very quickly but these are not production-ready – why not?

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What are some common challenges?

- Choosing the right model
- Context window size
- The quality of the corpus – structure, content, formatting, size, presence of distractors
- The preciseness or ambiguousness of the question
- The quality of the prompt
- Domain-specific specialized language not seen in model pre-training
- Dealing with information after the model pre-training was completed

There are some aspects of working with LLMs that are extremely expensive (in terms of time and/or money)

- Testing/evaluating model performance with human feedback or human-created datasets
- Fine tuning models
- Creating embeddings for large corpora

LLMs tend to "make up" answers if they don't know the answer – formally called "hallucination"

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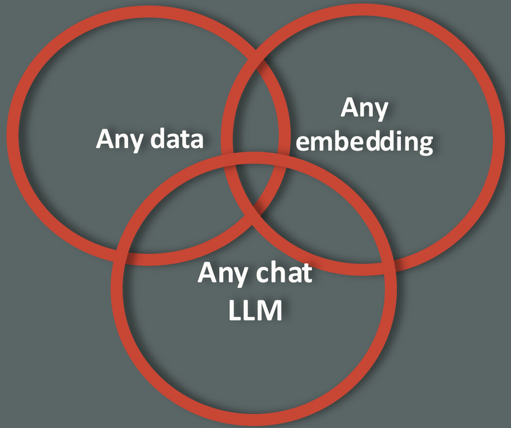
AI Microservices Sandbox

A Zero-Code platform to build, test & deploy a RAG Chatbot with:



The most important success factor in developing a real chatbot is ***experimentation*** and ***iteration.***

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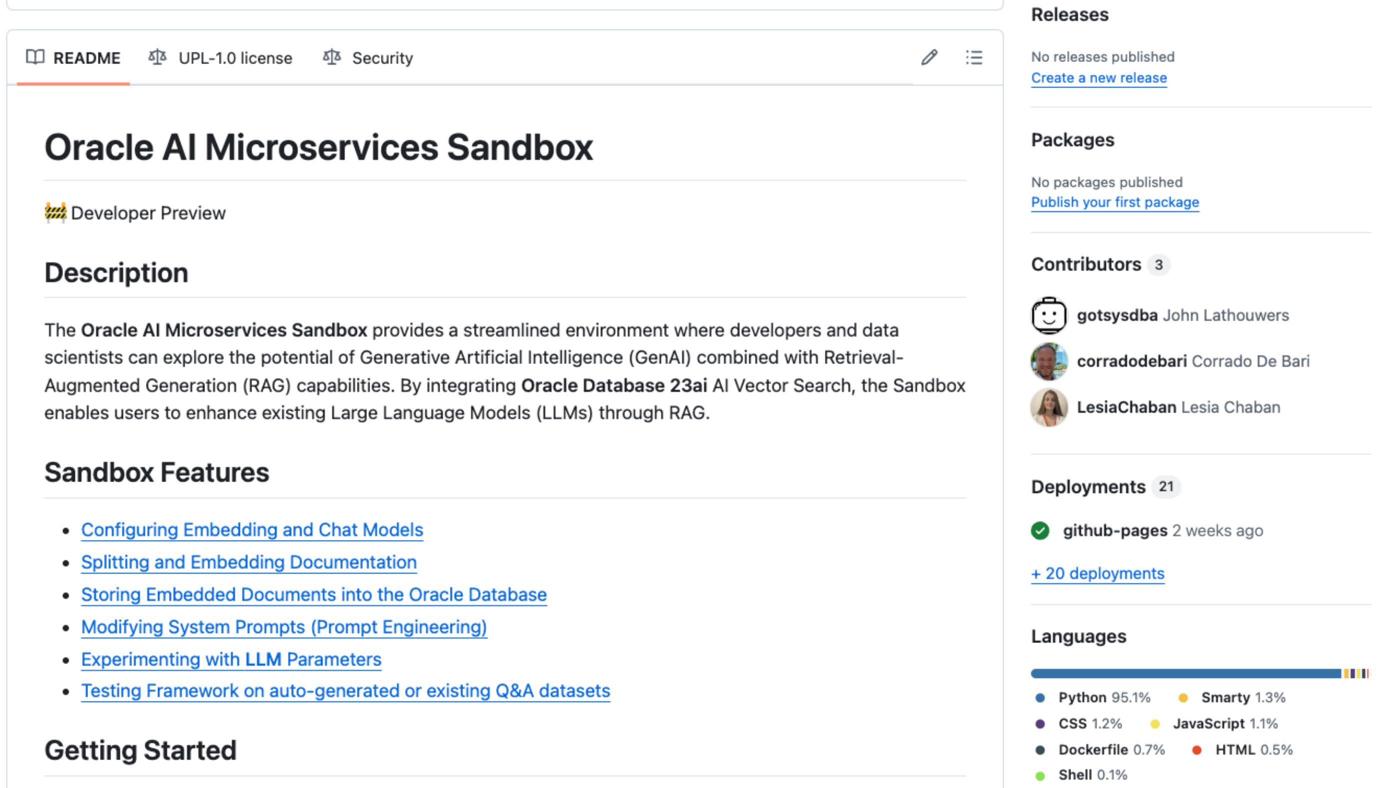
Oracle AI Microservices Sandbox



Oracle AI Microservices Sandbox

🚧 Developer Preview

Description

The **Oracle AI Microservices Sandbox** provides a streamlined environment where developers and data scientists can explore the potential of Generative Artificial Intelligence (GenAI) combined with Retrieval-Augmented Generation (RAG) capabilities. By integrating **Oracle Database 23ai** AI Vector Search, the Sandbox enables users to enhance existing Large Language Models (LLMs) through RAG.

Sandbox Features

- Configuring Embedding and Chat Models
- Splitting and Embedding Documentation
- Storing Embedded Documents into the Oracle Database
- Modifying System Prompts (Prompt Engineering)
- Experimenting with LLM Parameters
- Testing Framework on auto-generated or existing Q&A datasets

Getting Started

Releases

No releases published
Create a new release

Packages

No packages published
Publish your first package

Contributors 3

gotsysdba John Lathouwers
corradodebari Corrado De Bari
LesiaChaban Lesia Chaban

Deployments 21

✓ **github-pages** 2 weeks ago

+ 20 deployments

Languages

● **Python** 95.1%
● **Smarty** 1.3%
● **CSS** 1.2%
● **JavaScript** 1.1%
● **Dockerfile** 0.7%
● **HTML** 0.5%
● **Shell** 0.1%

Open Source Project
in
Developer Preview

https://github.com/oracle-samples/oaim-sandbox

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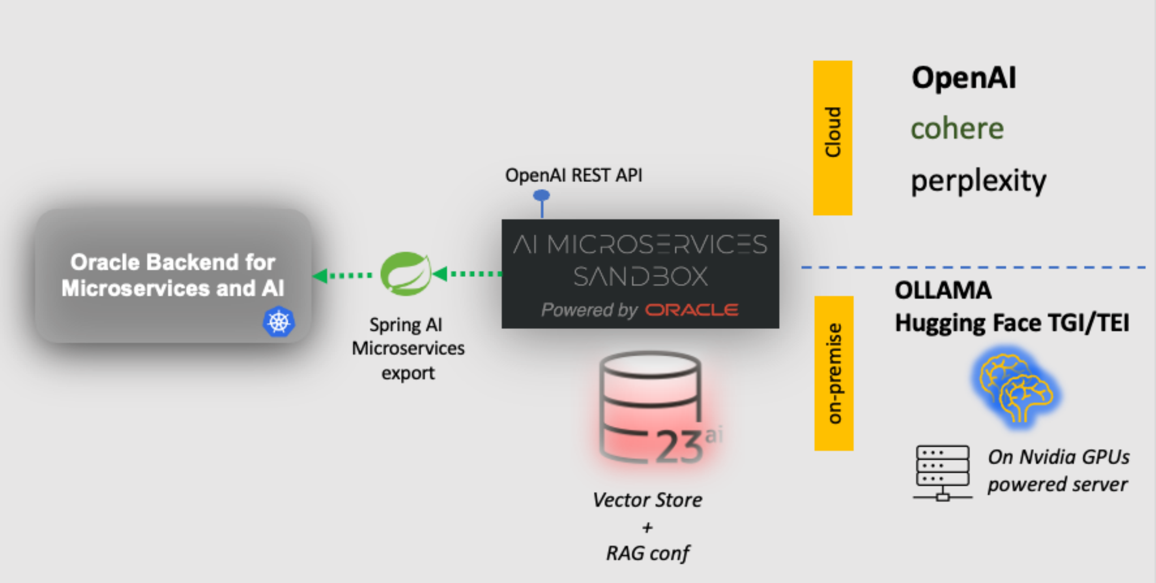
Building a RAG+ Chatbot

- **Playground env for RAG agent configuration: 0-Code approach**
- **Any LLM model (embeddings/chat):**
  - **PRIVATE**: On-premises with OLLAMA, HF TEI, HF TGI
  - **PUBLIC**: service providers like Cohere, OpenAI, Perplexity
- **Vector Store ingestion for DB23ai**:
  - Split & Model configuration
  - Documents: HTML, Txt, Pdf docs
  - From: local/OCI Object Storage/Web URL
- **Prompt configuration**
- **Test framework**:
  - Auto Generation for massive tests
  - Self Evalution
- **REST API Server** (OpenAI API compatible)
- **Export as SpringAI Microservice**



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The Oracle DB 23ai as knowledge base:

NEW vector indexes provide 100x faster and highly accurate similarity searches

private models

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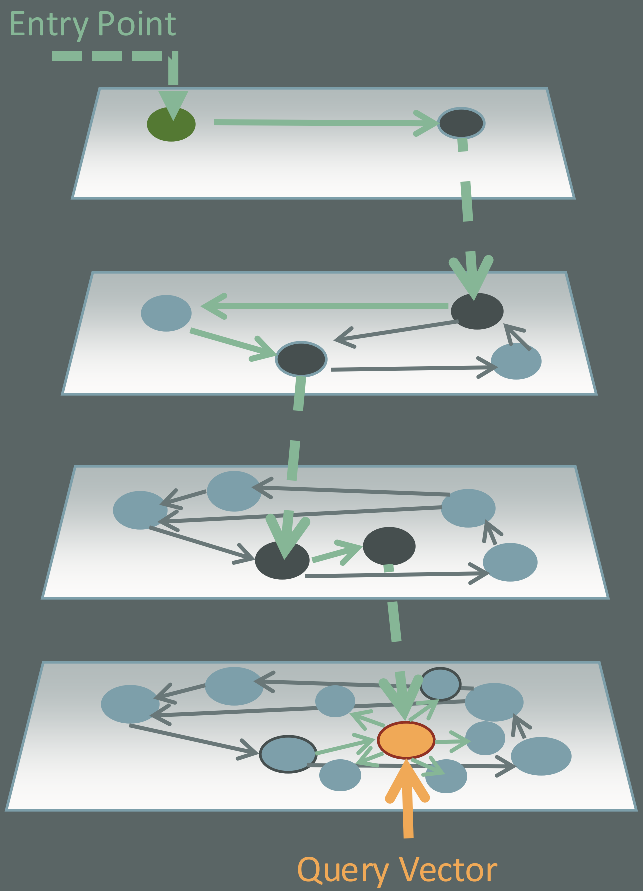
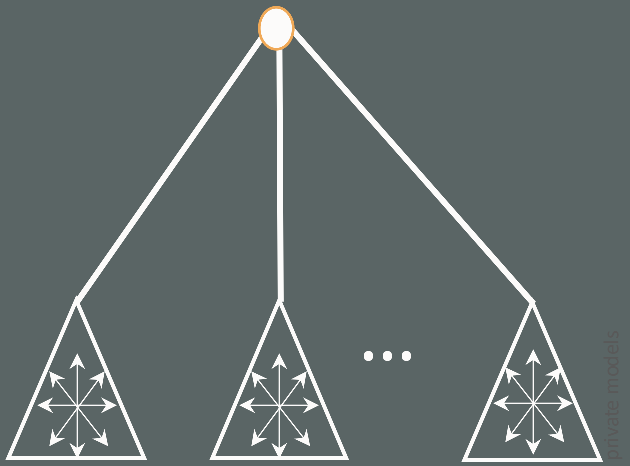
Oracle database accelerates AI vector search using sophisticated vector indexes



Graph Vector Index (e.g., **HNSW** Index)



Partition Vector Index (e.g., **IVF_FLAT** index)

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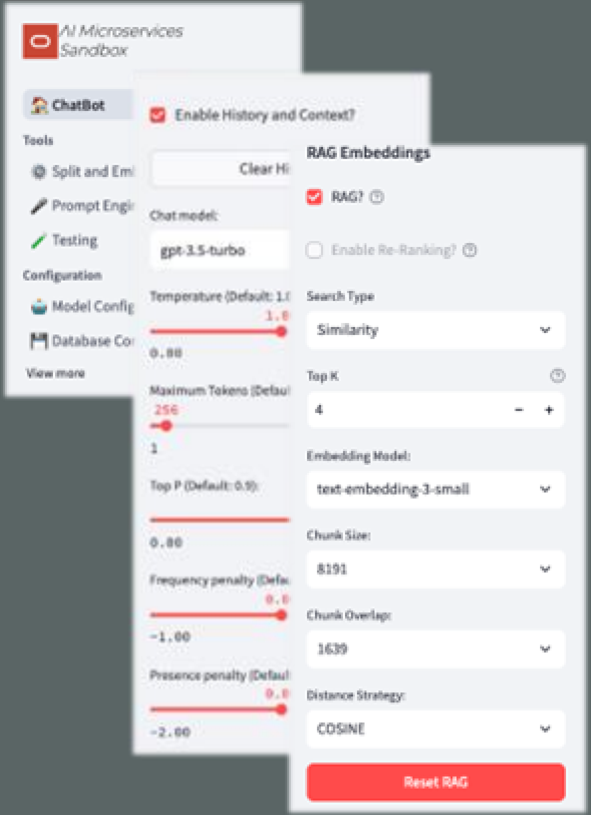
Experiment a Chatbot Application (in Sandbox)



☑ Enable History and Context?

Chat model: gpt-3.5-turbo

Temperature (Default: 1.0): 1.0

Maximum Tokens (Defau: 256

Top P (Default: 0.9):

Frequency penalty (Defa: 0.0

Presence penalty (Defaul: 0.0

☑ RAG?

☐ Enable Re-Ranking?

Search Type: Similarity

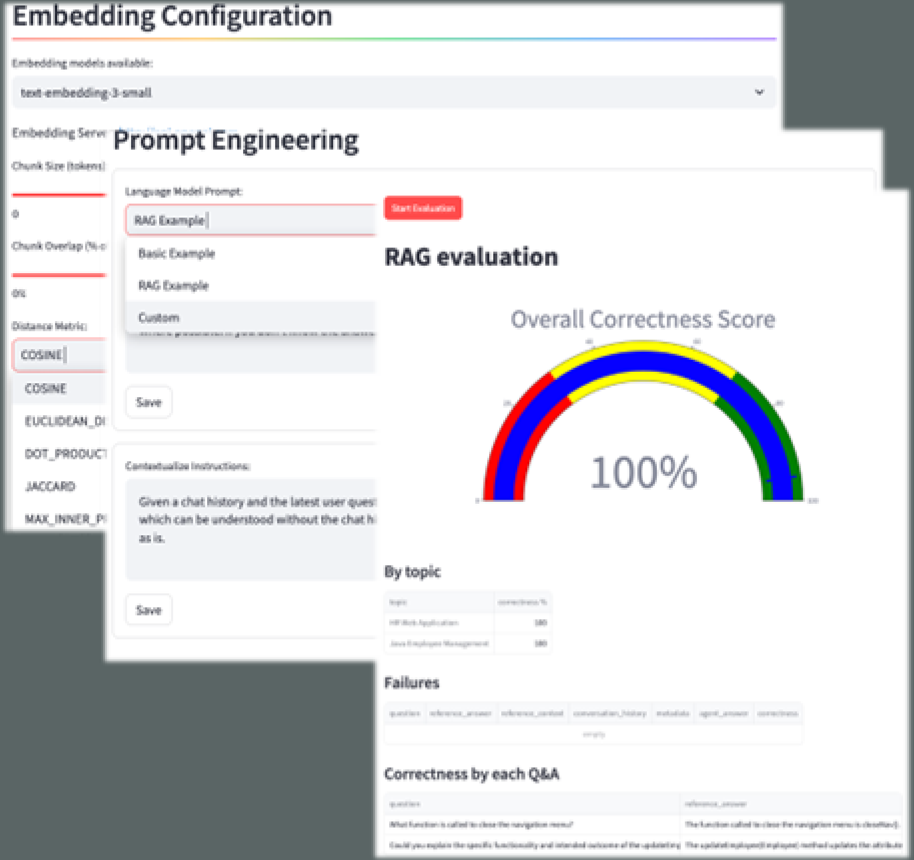
Top K: 4

Embedding Model: text-embedding-3-small

Chunk Size: 8191

Chunk Overlap: 1639

Distance Strategy: COSINE



Embedding models available: text-embedding-3-small

Distance Metric: COSINE

Language Model Prompt: RAG Example

Contextualize Instructions:

Given a chat history and the latest user ques which can be understood without the chat h as is.

By topic

topic	correctness %
HR Web Application	100
Java Employee Management	100

Failures

question	reference_answer	reference_context	conversation_history	metadata	agent_answer	correctness
empty						

Correctness by each Q&A

question	reference_answer
What function is called to close the navigation menu?	The function called to close the navigation menu is closeNav().

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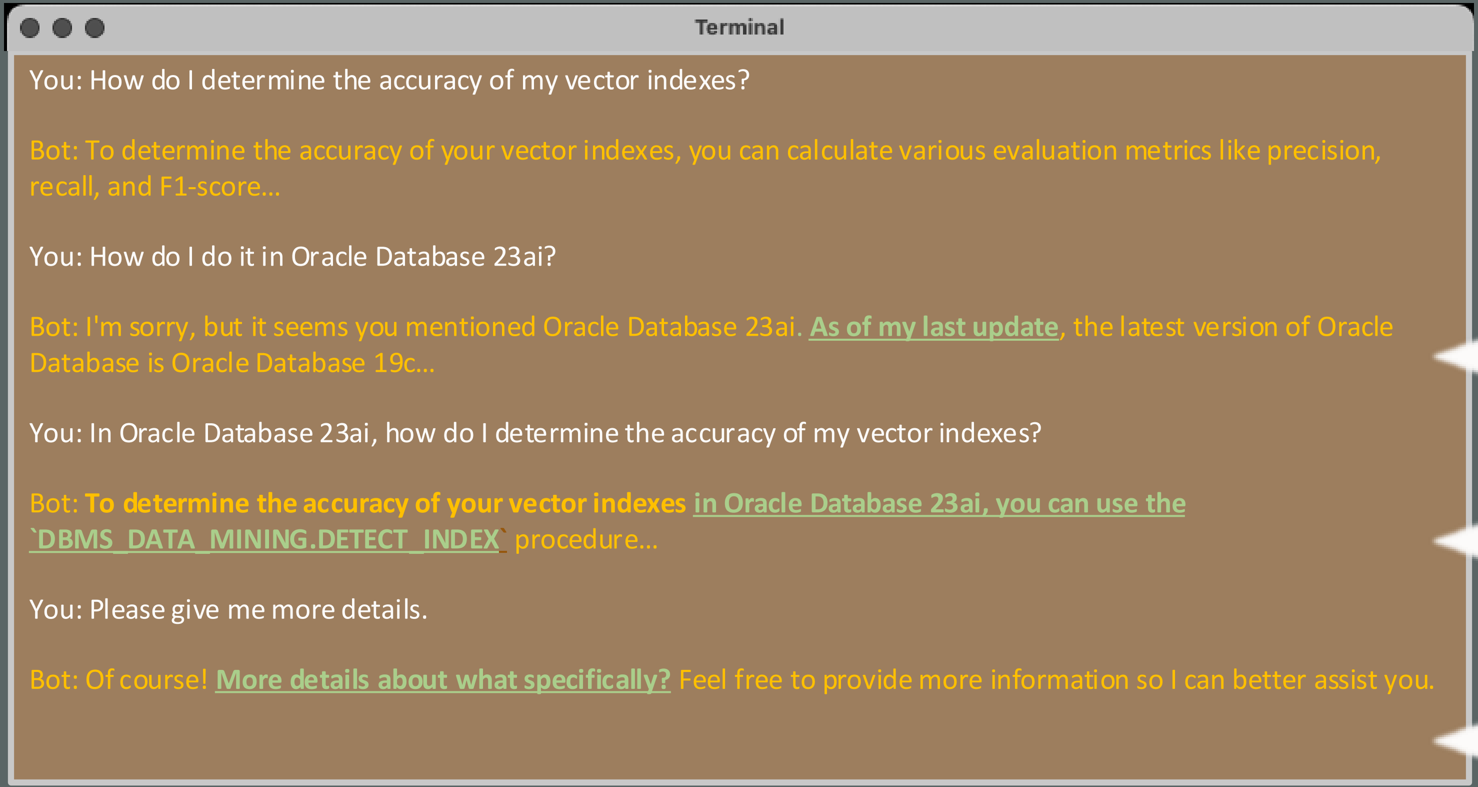
An Example of improving a Chatbot application (Before)



```
You: How do I determine the accuracy of my vector indexes?

Bot: To determine the accuracy of your vector indexes, you can calculate various evaluation metrics like precision,
recall, and F1-score...

You: How do I do it in Oracle Database 23ai?

Bot: I'm sorry, but it seems you mentioned Oracle Database 23ai. As of my last update, the latest version of Oracle
Database is Oracle Database 19c...

You: In Oracle Database 23ai, how do I determine the accuracy of my vector indexes?

Bot: To determine the accuracy of your vector indexes in Oracle Database 23ai, you can use the
`DBMS_DATA_MINING.DETECT_INDEX` procedure...

You: Please give me more details.

Bot: Of course! More details about what specifically? Feel free to provide more information so I can better assist you.
```

Knowledge Cutoff

Hallucinations

No Memory

gpt-3.5-turbo

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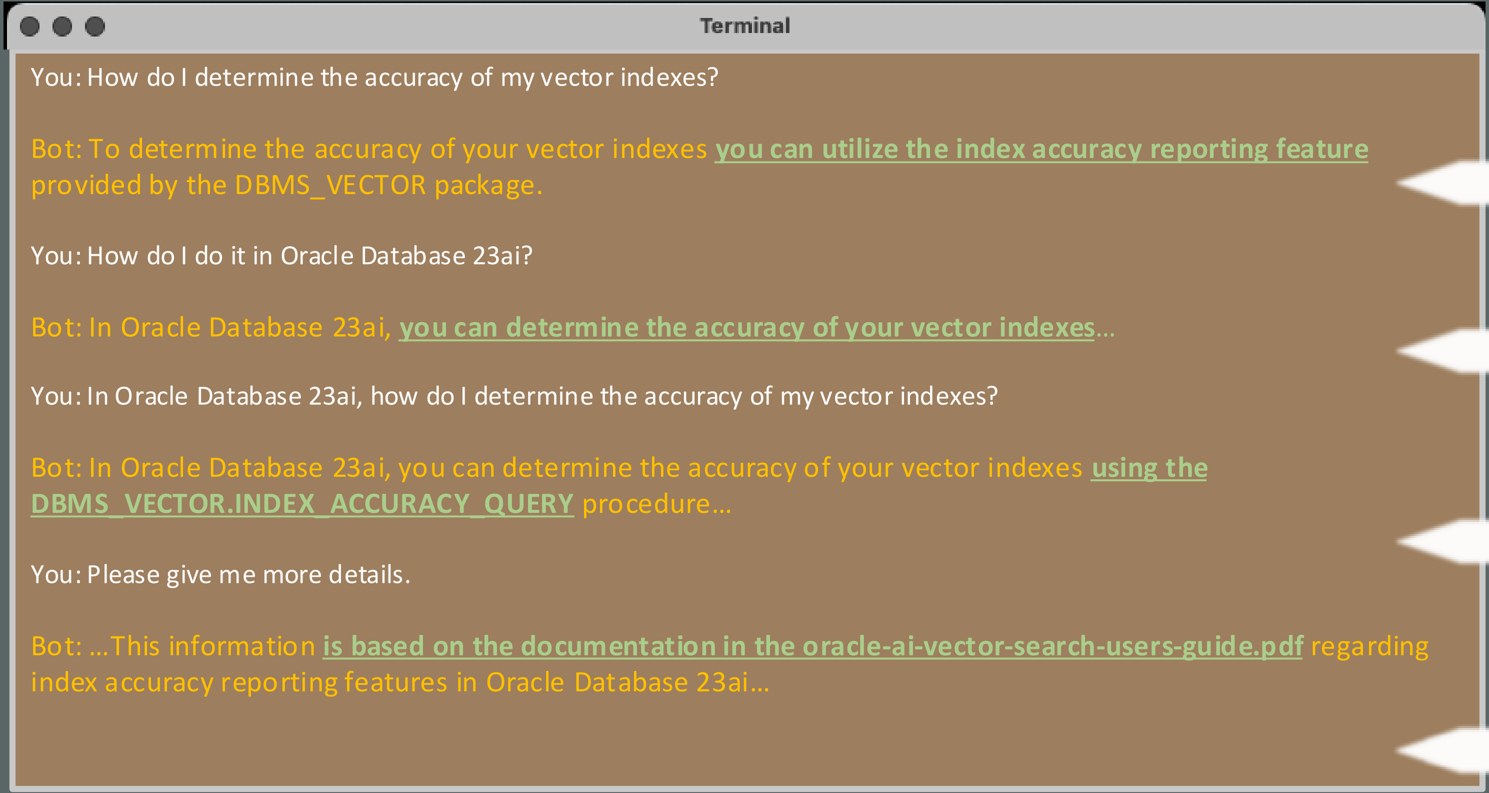
Experiment a Chatbot Application (in Sandbox)



```
You: How do I determine the accuracy of my vector indexes?

Bot: To determine the accuracy of your vector indexes you can utilize the index accuracy reporting feature
provided by the DBMS_VECTOR package.

You: How do I do it in Oracle Database 23ai?

Bot: In Oracle Database 23ai, you can determine the accuracy of your vector indexes…

You: In Oracle Database 23ai, how do I determine the accuracy of my vector indexes?

Bot: In Oracle Database 23ai, you can determine the accuracy of your vector indexes using the
DBMS_VECTOR.INDEX_ACCURACY_QUERY procedure…

You: Please give me more details.

Bot: …This information is based on the documentation in the oracle-ai-vector-search-users-guide.pdf regarding
index accuracy reporting features in Oracle Database 23ai…
```

Live Knowledge

Memory/Context

Grounded Response

RAG Attribution

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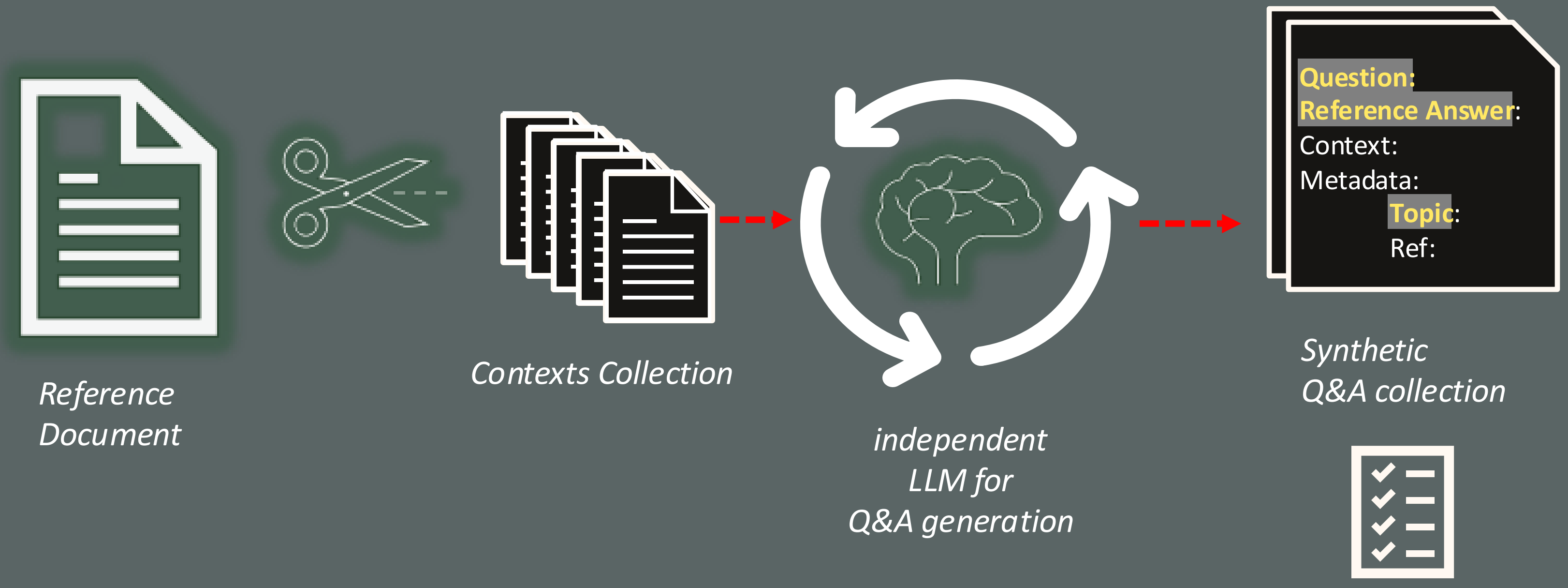
RAG+ Testset Generation & Evaluation

Generation



Reference Document

Contexts Collection

independent LLM for Q&A generation

Question:
Reference Answer:
Context:
Metadata:
Topic:
Ref:

Synthetic Q&A collection

List of topics

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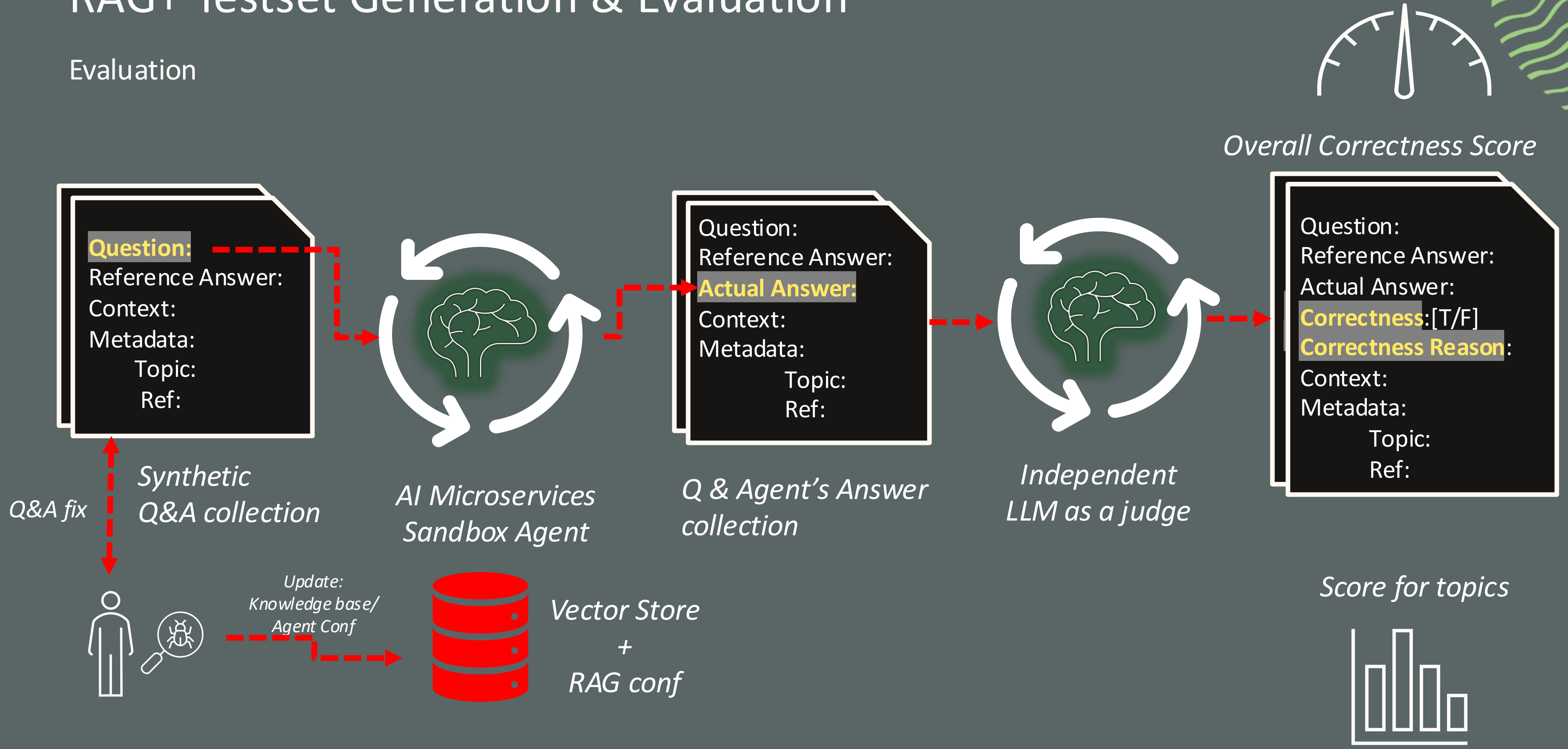
RAG+ Testset Generation & Evaluation

Evaluation



Question:
Reference Answer:
Context:
Metadata:
Topic:
Ref:

Synthetic Q&A collection

Q&A fix

AI Microservices Sandbox Agent

Question:
Reference Answer:
Actual Answer:
Context:
Metadata:
Topic:
Ref:

Q & Agent's Answer collection

Independent LLM as a judge

Overall Correctness Score

Question:
Reference Answer:
Actual Answer:
Correctness:[T/F]
Correctness Reason:
Context:
Metadata:
Topic:
Ref:

Update: Knowledge base/ Agent Conf

Vector Store + RAG conf

Score for topics

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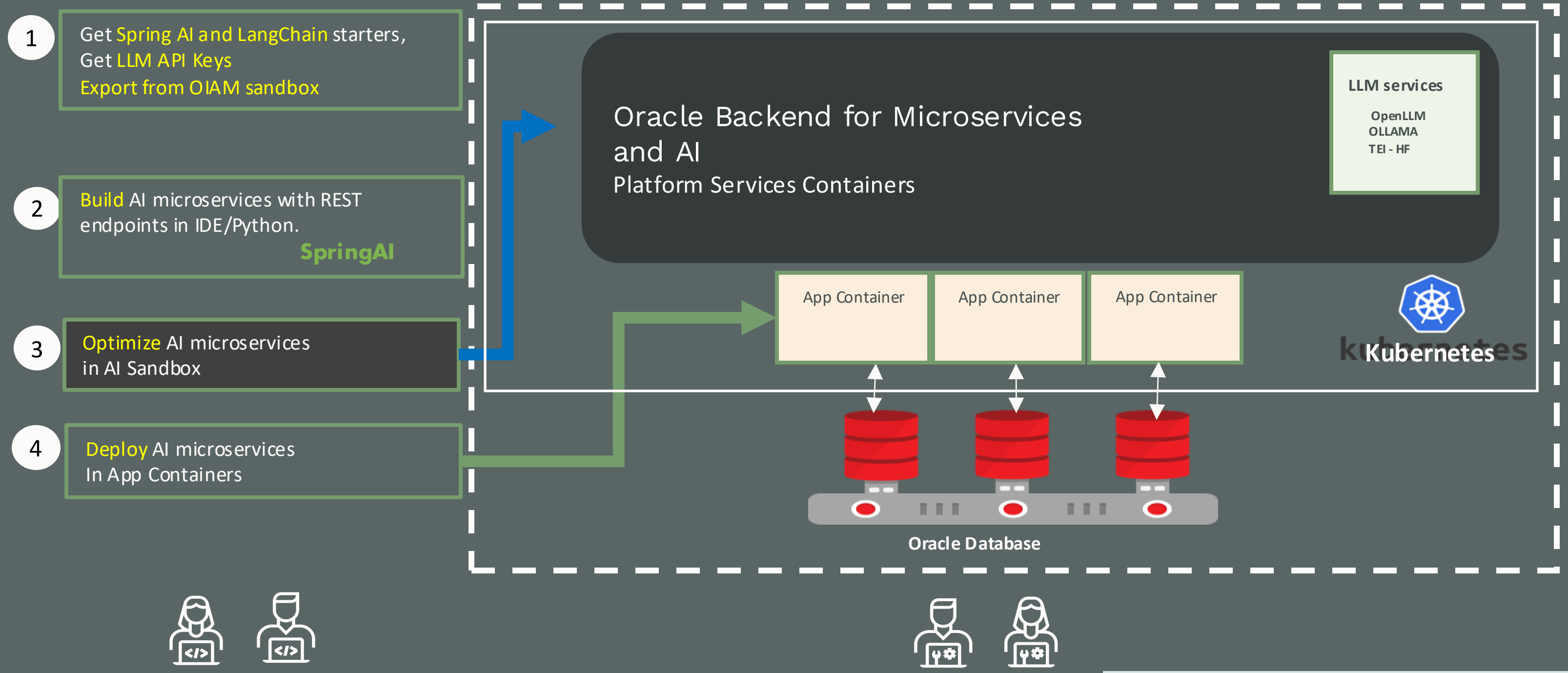
Oracle Backend for Microservices and AI v1.3

Working with AI in Microservices – Get Starters, Build, Optimize, & Deploy



1. Get Spring AI and LangChain starters,
Get LLM API Keys
Export from OIAM sandbox

2. Build AI microservices with REST endpoints in IDE/Python.
SpringAI

3. Optimize AI microservices
in AI Sandbox

4. Deploy AI microservices
In App Containers

AI Developers

DevOps

Available **free: on-premise, OCI and Azure.**

support through an Oracle DBMS contract

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Summary

- Rag platform for GenAI Chatbot building
- Zero-code
- Base on Oracle DB 23ai high scalable Vectorstore
- Any LLM for Embeddings & Chat
- Well suitable for Private and/or On-premises deployement
- Free and Open Source

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It’s now time for Q&A

Got any questions?

Thank you!

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OAC SEPTEMBER NEW FEATURES VIDEOS BY ORACLE: https://bit.ly/OACSept24Features

OAC NEW FEATURES DOCUMENTATION BY ORACLE:
https://docs.oracle.com/en/cloud/paas/analytics-cloud/acswn/index.html#GUID-CFF90F44-BCEB-49EE-B40B-8D040F02D476

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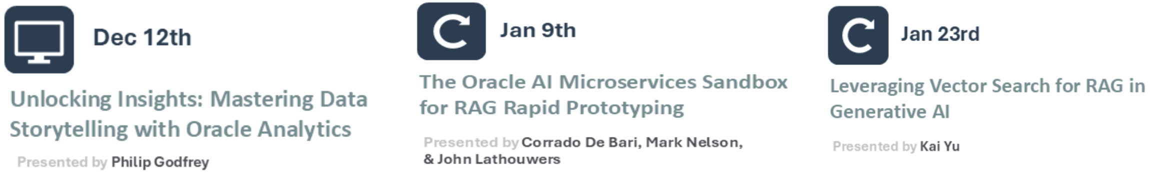

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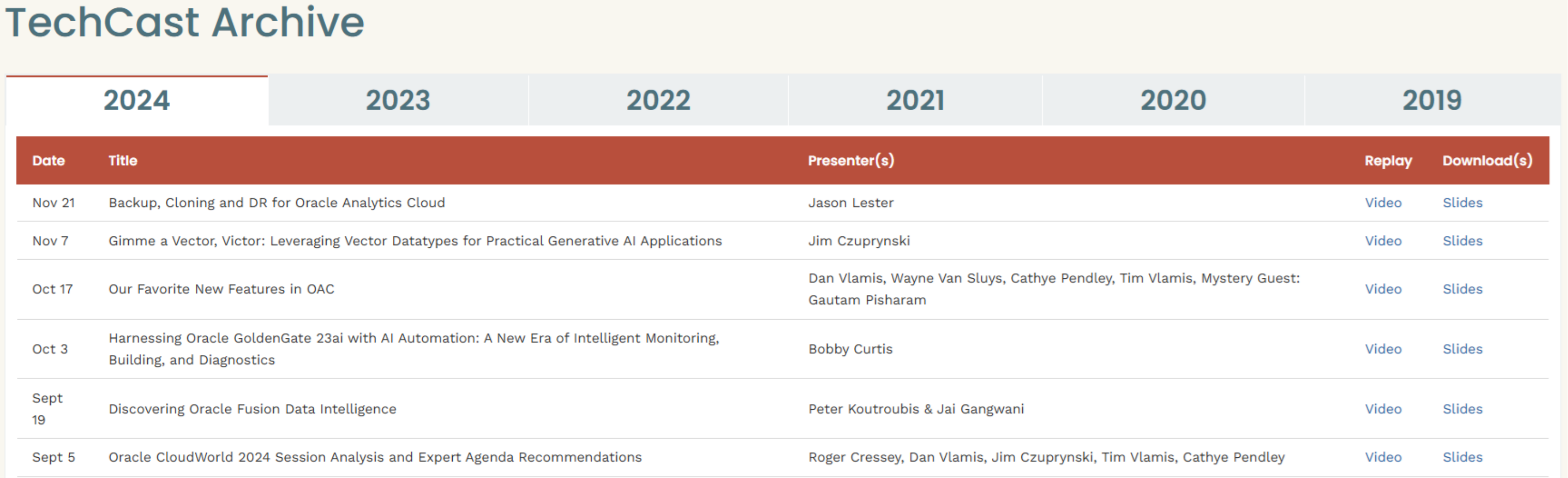

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