Architecture Diagrams

Exploring Real-Time Streaming for Retrieval Augmented Generation in GenerativeAI

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This architecture demonstrates the integration of streaming data services on AWS with Retrieval Augmented Generation(RAG) in Generative AI applications.

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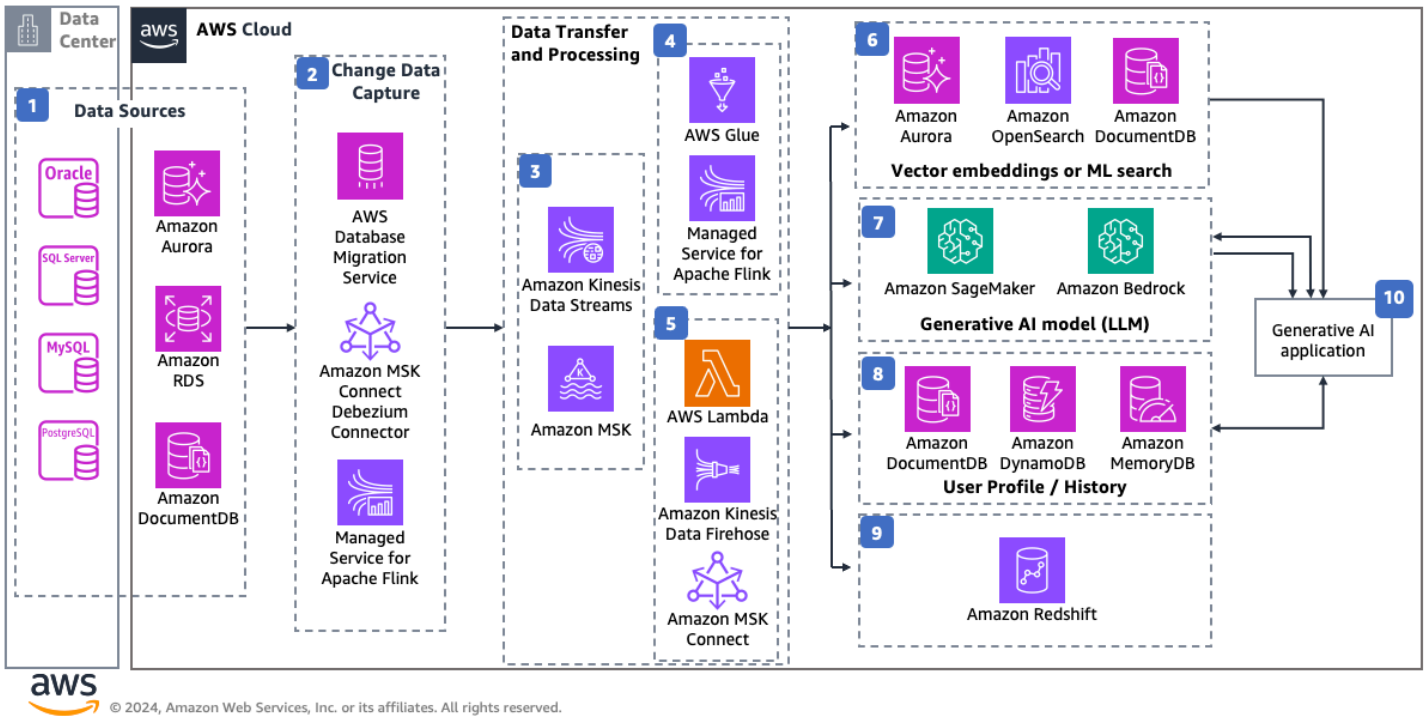

1. Data sources for change data capture(CDC) includes on-premise or AWS databases such as Oracle, SQL Server, MySQL, PostgreSQL, **Amazon Aurora** , and **Amazon RDS**, all funneling data into your Retrieval Augmented Generation(RAG) model.
2. **AWS Database Migration Service** and **Amazon MSK Connect with Debezium connector** help with one-time data migration of databases and continuous data replication. **AWS Database Migration Service** and **Amazon MSK Connect with Debezium connector** captures and stream changes from source databases and applies them in same order they are captured to the target.

3. Utilizing **AWS Database Migration Service** and **Amazon MSK Connect with Debezium connector** enables the streaming of data to **Amazon Kinesis Data Streams** or **Amazon Managed Streaming for Apache Kafka (Amazon MSK)** , facilitating the collection and processing of large streams.
4. By utilizing **AWS Glue** Spark Streaming and **Amazon Managed Service for Apache Flink** , you can construct specialized data processing pipelines to cater to your data consumption requirements.
5. **AWS Lambda** , **Amazon Kinesis Data Firehose** and **Amazon MSK Connect** , which serve as data sink services, enable the direct transfer of source data into destinations like **Data Lake** , **Amazon Redshift**, among others.
6. Leveraging **Amazon Aurora PostgreSQL with pgvector**, **Amazon Opensearch** and **Amazon DocumentDB** allows the generation of vector embeddings for streamlined data retrieval , vector representation management, scalability, and real-time inference capabilities.
7. **Amazon SageMaker** and **Amazon Bedrock** offers the means to discover pertinent information within a corpus, conduct similarity search on vectorized domain specific datasets, and use this data as input for generation models.
8. To preserve user profiles and conversation history, **Amazon DocumentDB**, **Amazon DynamoDB** and **Amazon MemoryDB** provide suitable options.
9. Leverage **Amazon Redshift** service to ensure data persistence, thereby augmenting the data inputs for the Generative AI RAG model.

10For details on the workings of RAG applications, refer to Retrieval-Augmented Generation(RAG)

Further reading

For additional information, refer to

- AWS Architecture Icons
- AWS Architecture Center
- AWS Well-Architected

Contributors

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