

**John Mousa**  
Sr. Solutions Architect  
Amazon Web Services



**Build an end to end data strategy for  
analytics and generative AI**



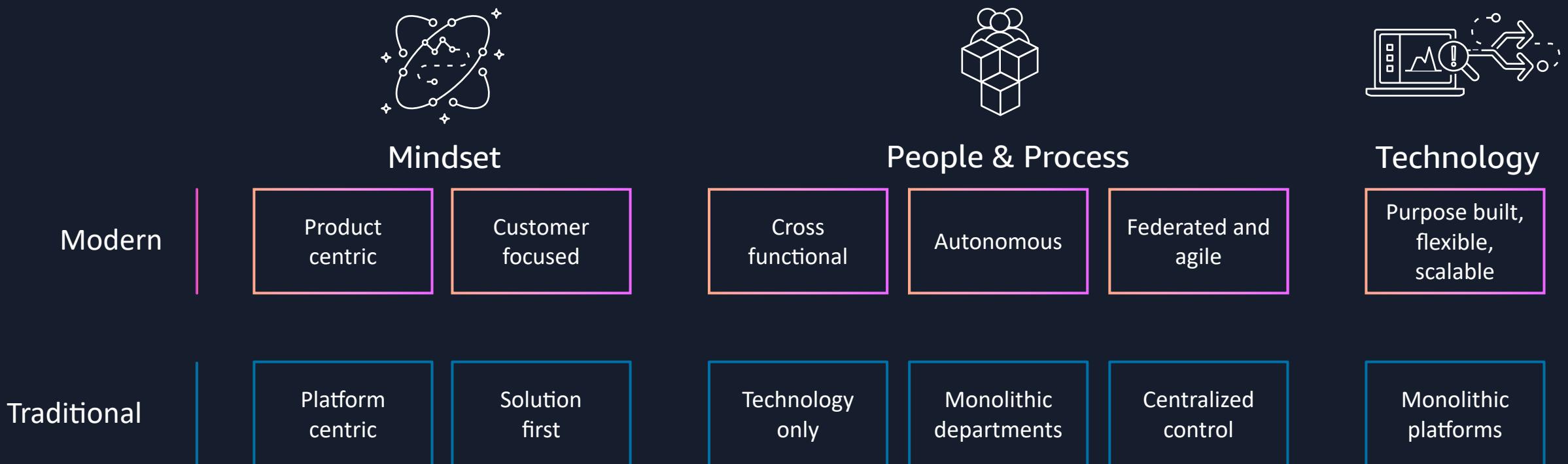


# Build an end to end data strategy for analytics and generative AI

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# Driving Value Creation Requires a Modern Data Strategy

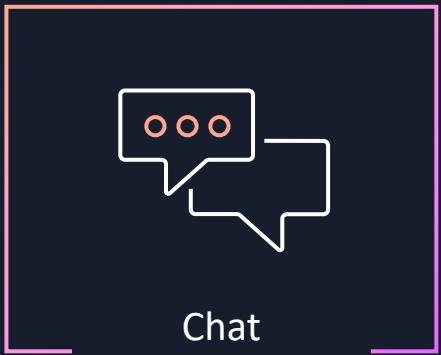


# Mindset



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# Predominant Categories of use cases



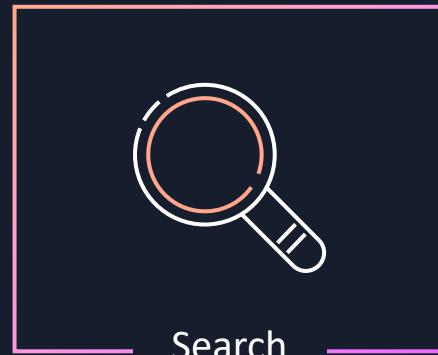
Chat  
Virtual assistant



Productivity  
Text generation



Summarization  
Text extraction



Search



Code  
generation

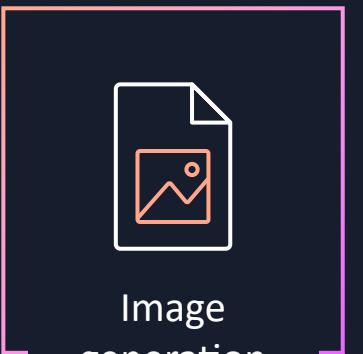


Image  
generation  
Object Creation

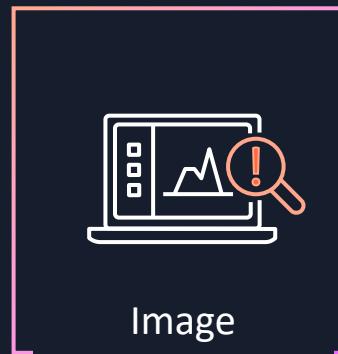
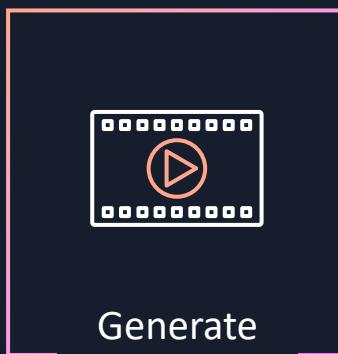


Image  
classification



Create  
music



Generate  
videos

# Technology

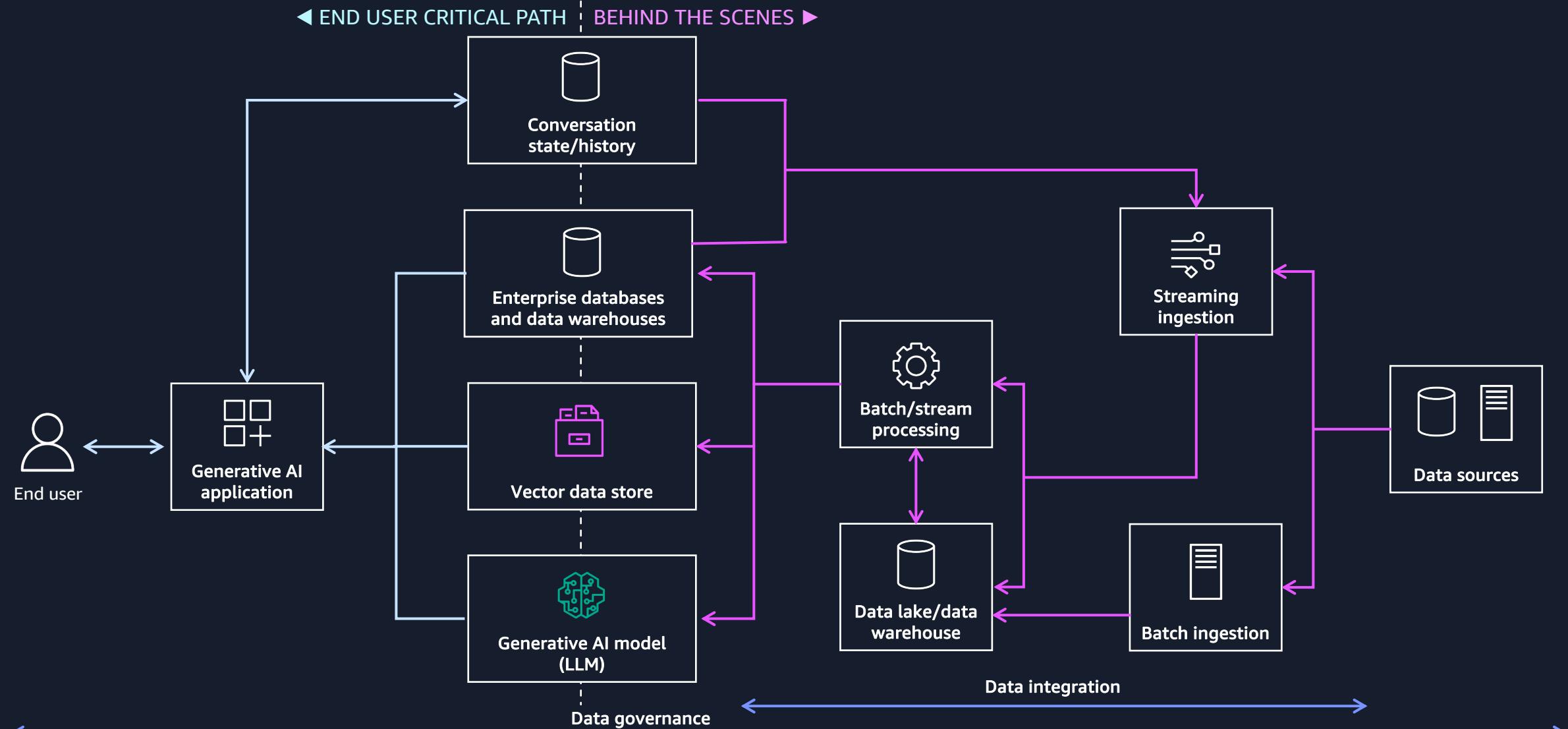


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# One size does not fit all



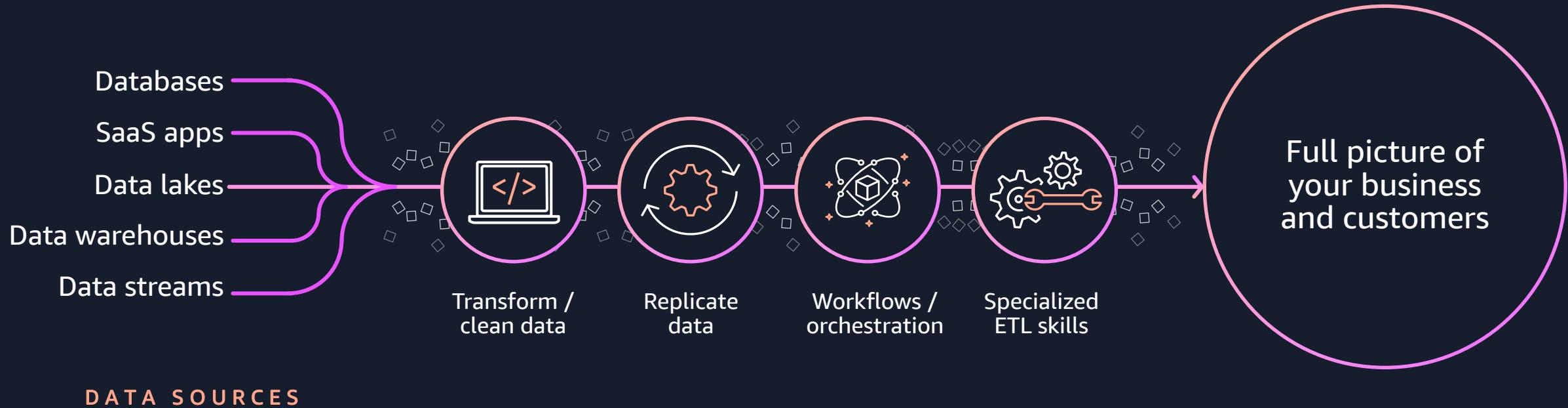
# Architecture for generative AI use case



# Data sources and data integration



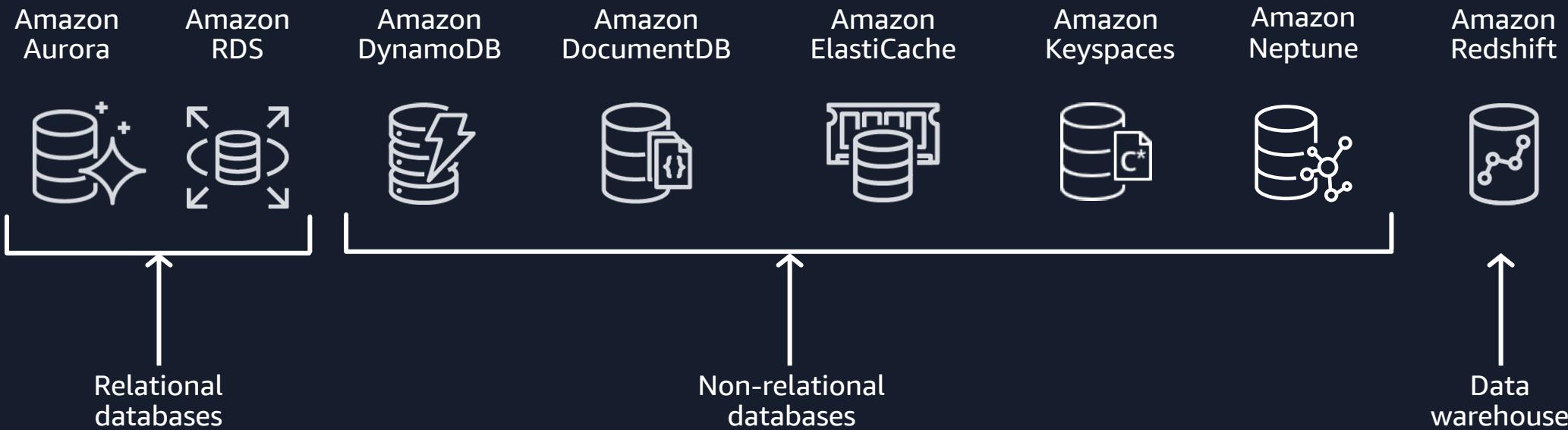
# Data integration gives you a full picture





Enterprise databases  
and data warehouses

# Purpose-built databases and data warehouse



# Amazon Aurora

COMMERCIAL-GRADE CLOUD  
NATIVE DATABASE DELIVERED  
AS A MANAGED SERVICE



Drop-in compatibility with MySQL and PostgreSQL



Simplicity and cost-effectiveness of open-source databases



Throughput and availability of commercial databases



Simple pay-as-you-go pricing



Batch/stream  
processing



Batch  
ingestion



Streaming  
ingestion

Amazon Managed Streaming for  
Apache Kafka (Amazon MSK)



Amazon Managed Service  
for Apache Flink

# Streaming and batch ingestion and processing

Amazon Kinesis  
Data Streams



Amazon EMR



# AWS Glue

SIMPLE, SCALABLE, AND  
SERVERLESS  
DATA INTEGRATION



Integrate data faster



Automate at scale



No servers to manage



Built on Spark, Python, and Ray

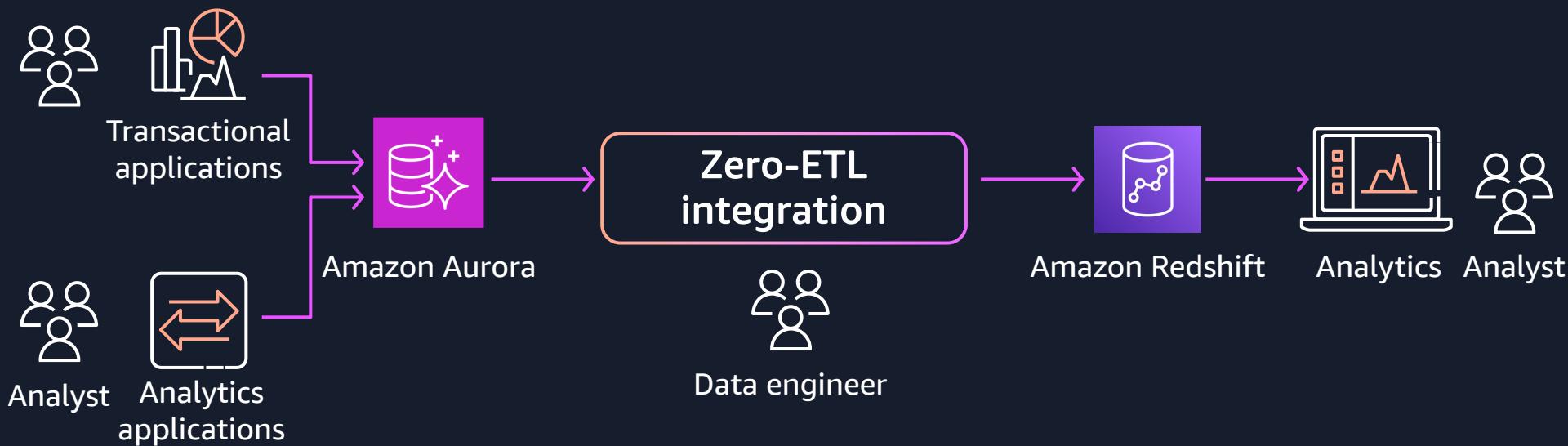
INVESTING IN A  
**ZeroETL**  
FUTURE

# Amazon Aurora

COMMERCIAL-GRADE CLOUD NATIVE DATABASE DELIVERED AS A MANAGED SERVICE

Recent launch

**Amazon Aurora MySQL zero-ETL integration with Amazon Redshift enables near real-time analytics on petabyte scale transactional data**

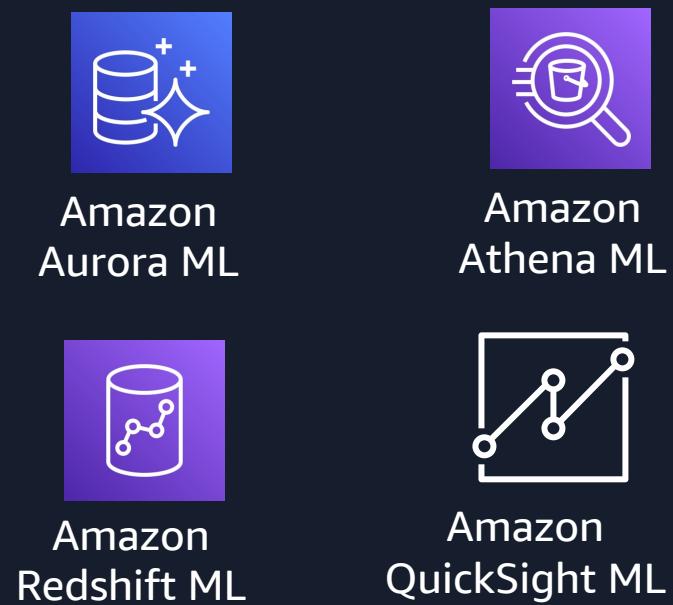


# Investing in a zero-ETL future by

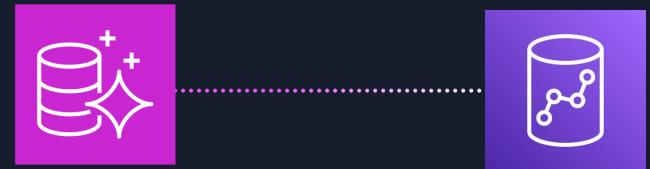
Accessing data in place via  
federated queries



Moving analytics and ML  
closer to the data



Building point-to-point  
integrations



# Generative AI to improve productivity



# Amazon Q, a generative AI-powered assistant from AWS

AMAZON Q DEVELOPER



AMAZON Q BUSINESS

Developers

IT professionals

Personas

Employees

Business analysts

In-built privacy and security

Benefits

Customizable to your business

# AWS Glue

SIMPLE, SCALABLE, AND SERVERLESS DATA INTEGRATION

Recent launch

**ETL AI coding assistant in AWS Glue Notebooks, powered by Amazon CodeWhisperer. Empowers everyone to build DI pipelines using natural language**

```
# Write Spark DataFrame into Redshift
def write_spark_df_to_redshift(spark_df, redshift_table_name, redshift_conn):
    spark_df.write.format("jdbc").options(
        url=redshift_conn.url,
        driver=redshift_conn.driver,
        dbtable=redshift_table_name,
        user=redshift_conn.user,
        password=redshift_conn.password
    ).mode("append").save()
```

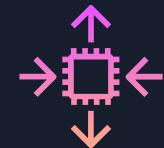


# Amazon Redshift

THE BEST PRICE-PERFORMANCE  
FOR CLOUD DATA  
WAREHOUSING



Analyze all your data



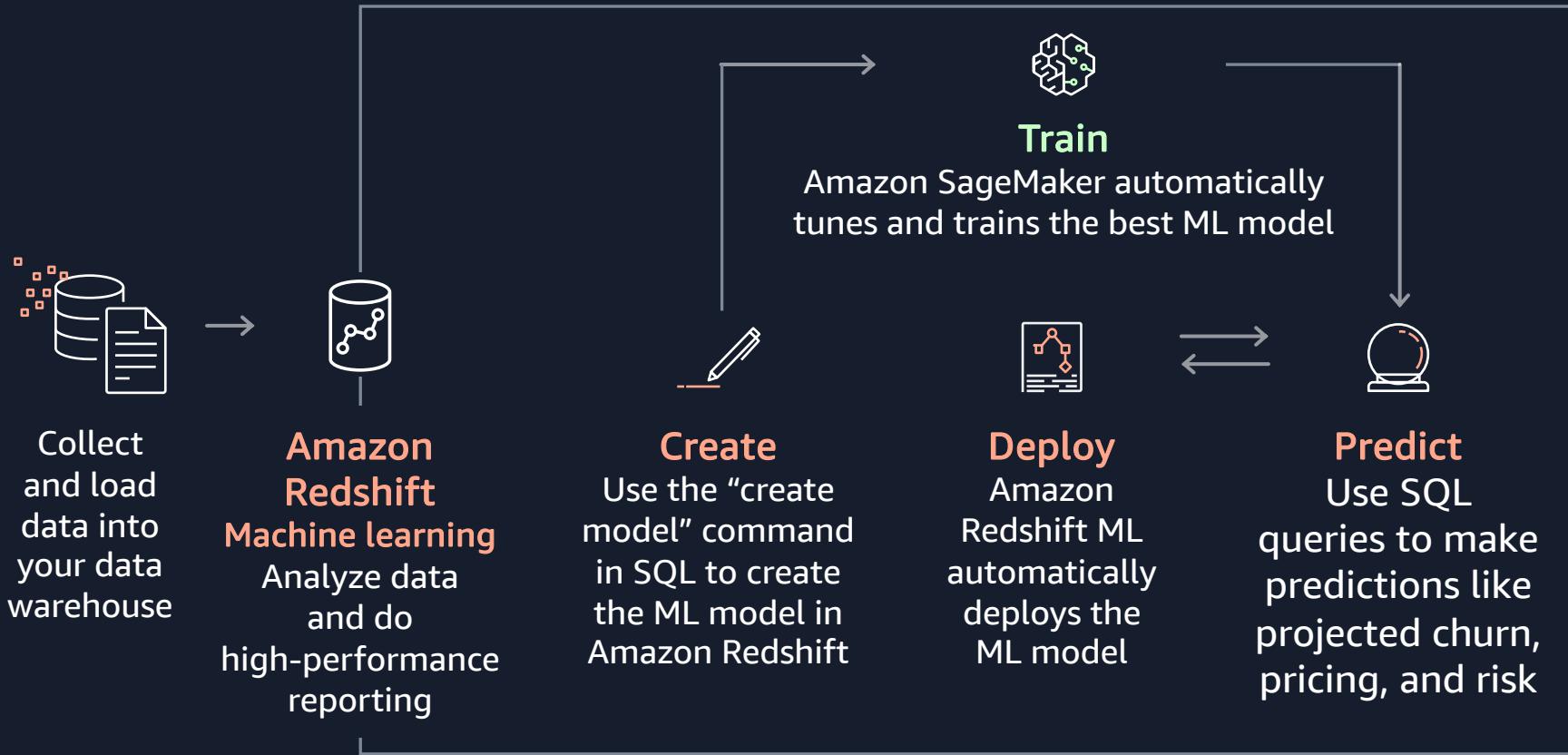
Easy, secure, and reliable



Price-performance at any scale

# Amazon Redshift ML

EASILY CREATE AND TRAIN ML MODELS USING SQL QUERIES WITH AMAZON SAGEMAKER



Train and create ML models using SQL

Automatic pre-processing, creation, training, deployment, and inferencing of models

SageMaker models for in-database or remote inference

Amazon Forecast integration for forecasting on timeseries data

80 billion+

predictions per week in the warehouse

**Jobcase**

**MagellanRx MANAGEMENT<sup>SM</sup>**



# Announcing Redshift ML support for bring-your-own LLMs

SQL-POWERED LLM INFERENCES

PREVIEW

```
1 CREATE MODEL my_llm_model
2 FUNCTION my_llm_model(super)
3 RETURNS super
4 SAGEMAKER '<endpoint_name>'
5 IAM_ROLE default/'<iam_role>';
```

- Bring the power of large language models to your data on Amazon Redshift
- Create and make inferences on LLM models using SQL
- Utilize SageMaker JumpStart large language models for remote inference



# Amazon Redshift Query Editor V2

FREE WEB-BASED TOOL FOR DATA EXPLORATION AND ANALYSIS USING SQL

The screenshot shows the Amazon Redshift Query Editor V2 interface. On the left, there's a sidebar with 'Database' (Create, Load data), 'Queries' (Serverless: testorol, redshift-cluster-1, redshift-cluster-2, tpcds), 'Notebooks' (Preview), 'Charts', and 'History'. The main area has tabs for 'Category analysis\*' (selected), 'Run' (Run, Explain, Isolated session), 'tpcds', and 'sample\_data\_dev'. A query editor window displays a complex SQL SELECT statement for TPC-DS query76.tpl. Below it, a 'Result 1 (100)' section shows a pie chart titled 'Channel Breakdown' with various categories and their percentages. The chart configuration panel on the right lists 'Type: Pie', 'Values: sales\_cnt', and 'Labels: Choose data...'. At the bottom, there are links for 'Feedback', 'Language selection', 'Privacy', 'Terms', and 'Cookie preferences'.

Browser, create schema & tables, load data, write SQL queries & stored procedures, visualize query results with charts, and track query changes

**NEW!** Improved collaboration with Notebooks to author, organize, and annotate queries

**NEW!** Single sign-on with IDP, query scheduling, schema-inference while loading data from Amazon S3, query history



# What is generative SQL

IMPROVES PRODUCTIVITY BY ALLOWING CUSTOMERS TO WRITE QUERIES IN NATURAL LANGUAGE

The screenshot shows a Jupyter Notebook environment with several tabs at the top: Demo-notebook, Untitled 4, load-data-customers-081b, Untitled 2, CREATE TABLE TESTER, Untitled 5, and demo space\*. Below the tabs, there are buttons for Run all, Add, and Generative SQL Preview.

The main area displays a table of customer data:

□	Aidan	Stephenson
□	Jad	Barry
□	Nevada	Ross
□	Blair	Boyle
□	Jael	Herring

Below the table, a query is written in the code cell:

```
1 SELECT u.username, SUM(s.pricepaid) AS total_revenue
2 FROM tickit.sales s JOIN tickit.listing l ON s.listid = l.listid JOIN tickit.users u ON l.sellerid = u.userid
3 GROUP BY u.username
4 ORDER BY total_revenue DESC
5 LIMIT 10;
```

The result of the query is shown in the Result 1 (9) table:

	username	total_revenue
□	DZI71YHJ	32399
□	ELU81XAA	31365
□	VDY84LTI	28495
□	ZZG76KSU	27653
□	IVU53MTM	27159

To the right of the notebook interface, a sidebar titled "Generative SQL Preview" provides information about the tool:

- Hello!
- I am Generative SQL, your coding companion that generates SQL statements.
- Ask me questions about your data and I will suggest SQL queries as best I can.
- I don't always get it right, so verify my suggestions before using them in any environment or workload.
- To learn more about me, see the Documentation.

Below the sidebar, there are two example questions:

- "Find total number of tickets sold on December 25th, 2022."
- "Find names of top three venues that sold the most tickets."

A callout box at the bottom right of the sidebar says: "Find the top five users from Seattle who bought the most number of tickets in 2022".



Personalized!



Conversational!



Accurate!



Secured!

# What does personalized SQL recommendations mean?

Count the number of schools  
in Alameda County that  
have less than 100 test takers



## Natural output

```
SELECT COUNT(*)  
FROM schools  
WHERE district = 'Alameda'  
AND num_test_takers < 100
```

## Generative SQL recommendation

```
SELECT COUNT(*)  
FROM schools a  
JOIN satscores ss  
ON s.CDSCode=ss.cds  
WHERE s.County = 'Alameda'  
AND ss.NumTstTakr < 100
```

Personalized to your database, tables, and schema

# What does personalized SQL recommendations mean?

List the product descriptions  
of the transactions in gas  
stations in the Czech Republic



## Natural output

```
SELECT DISTINCT T3.Description  
FROM transactions_1k AS T1  
INNER JOIN gasstations AS T2  
ON T1.GasStationID = T2.GasStationID  
INNER JOIN products AS T3  
ON T1.ProductID = T3.ProductID  
WHERE T2.Country = 'Czech Republic';
```

## Generative SQL recommendation

```
SELECT DISTINCT T3.Description  
FROM transactions_1k AS T1  
INNER JOIN gasstations AS T2  
ON T1.GasStationID = T2.GasStationID  
INNER JOIN products AS T3  
ON T1.ProductID = T3.ProductID  
WHERE T2.Country = 'CZE';
```

Personalized to your data

# What does personalized SQL recommendations mean?

Of all the contestants who got voted, what is the contestant number and name of the contestant who got least votes?



## Natural output

```
SELECT contestant_number, contestant_name  
FROM contestants inner join votes on  
contestants.contestant_number =  
votes.contestant_number  
GROUP BY contestant_number, contestant_name  
ORDER BY count(*) asc  
LIMIT 1;
```

OperationalError ambiguous column name: contestant\_number

## Generative SQL recommendation

```
SELECT c.contestant_number, c.contestant_name  
FROM contestants c inner join votes v on  
c.contestant_number = v.contestant_number  
GROUP BY c.contestant_number,  
c.contestant_name  
ORDER BY count(*) asc  
LIMIT 1;
```

Personalized to your data warehouse—Amazon Redshift!

# Amazon QuickSight

CLOUD-NATIVE BI  
SOLUTION FOR  
ILLUMINATING  
ORGANIZATIONAL INSIGHTS



Auto-scaling and serverless



Internal and/or external users



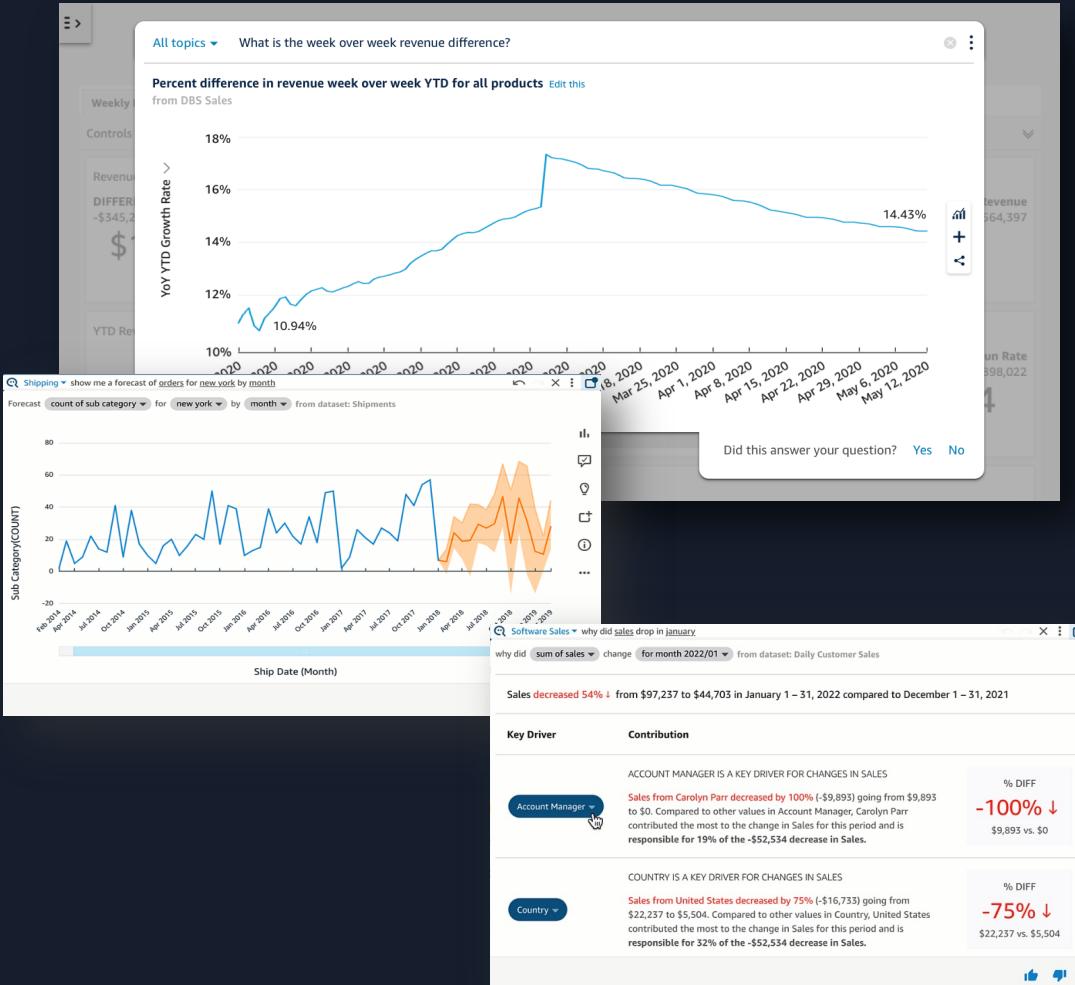
Deeply integrated with AWS services



Augmented insights on-demand

# Foster a data-driven culture with QuickSight Q

SELF-SERVICE INSIGHTS FOR ANYONE USING ML-POWERED NLQ



## Ask questions in natural language

- ML-models interpret user question and intent to generate visualization
- AI-enhanced automated data preparation accelerates time-to-value

## Forecast NEW

- See what's likely to happen
- See future trajectories for up to 3 measures simultaneously

## Ask 'Why?' NEW

- Identify key drivers to changes in the data with contribution analysis
- Quantify contribution by each driver



# AI-powered dashboard authoring experience

A NEW DASHBOARD BUILDING EXPERIENCE POWERED BY GENERATIVE BI

## Build visuals

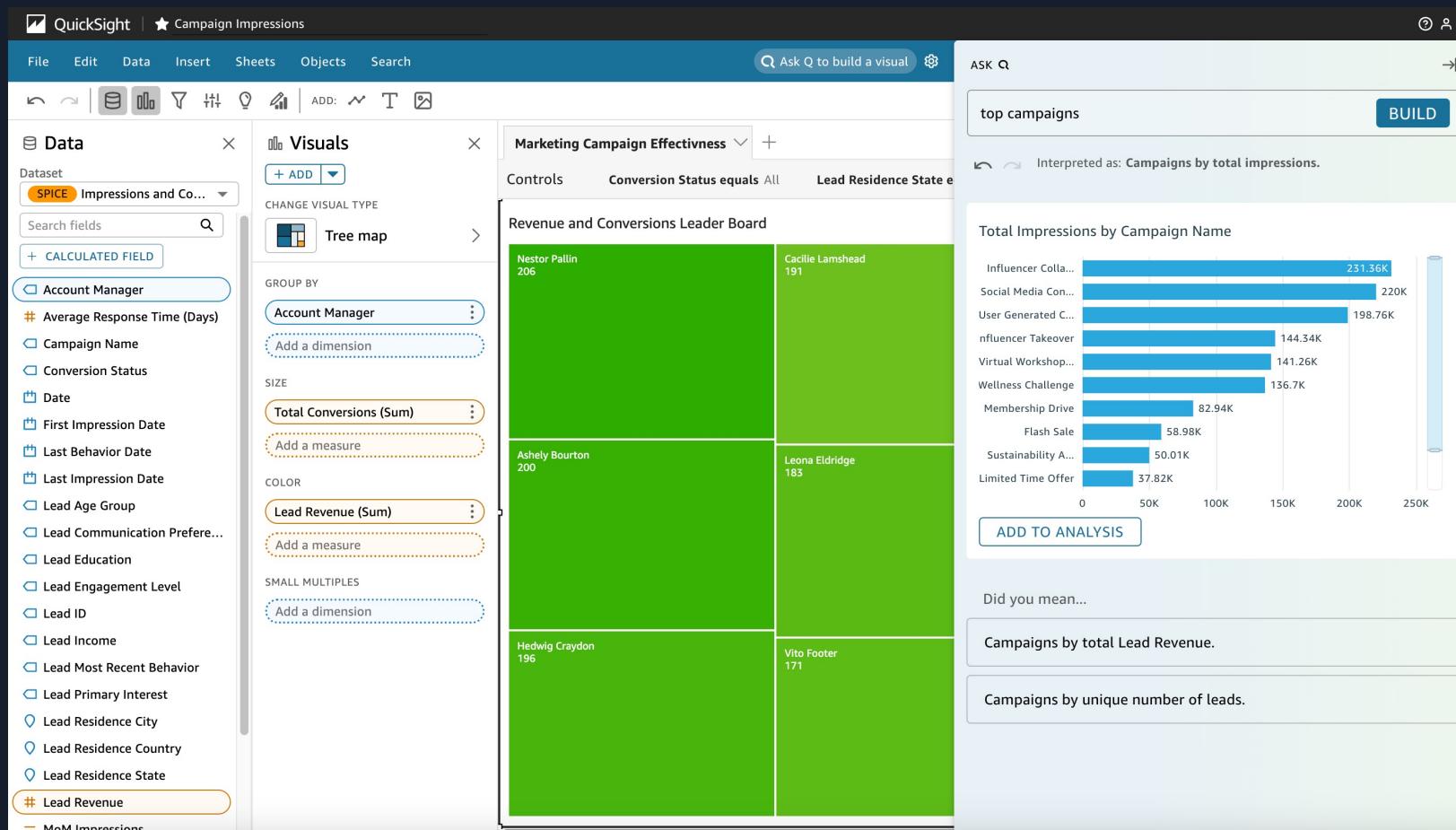
Use natural language to quickly build visuals for dashboards and reports

## Build calculations

Easily create calculations using natural language without looking up or learning specific syntax

## Refine visuals

Quickly update visuals by describing desired formats using natural language



# AI answers to questions of data on demand

DEEP INSIGHTS AT YOUR FINGERTIPS

## Executive summaries of dashboards

Instant summaries of key dashboard insights in natural language explaining top movers, outliers, and more

## Easy powerful Q&A for non-experts

Suggested questions and What's in my data show what can be asked

Multi-visual answers with narrative insight summaries explain answer context

Vague question support and Did-you mean alternatives enable iterative fact finding

The screenshot displays a data dashboard interface with several key components:

- Top Bar:** Includes "ASK Q | ? &" and "CREATE STORY".
- Left Sidebar:** Shows a "Sheet 1" card with a brief description: "The sheet displays sales, orders, and license data across products, time periods, and other dimensions through various visualizations." Below it are two bullet points:
  - Total sales decreased 25.66% from November to December 2022, from \$3,659.03 to \$2,791.39.
  - ContactMatcher had the most licenses at 1,842, while Alchemy had the least at 68.
- Central Dashboard Area:**
  - Executive summary:** A scatter plot titled "Number of Order ID by City" showing data for the United States, with a specific callout for San Francisco.
  - Marketing Effectiveness:** A line chart titled "Leona Eldridge conversions by month" showing conversion rates over time, with an AI-generated narrative explaining the trend.
  - Conversion Rate:** A bar chart titled "Conversion Rate Account Manager Leona Eldridge 0.2" showing conversion rates by source.
  - Account Managers:** A table titled "Account Managers" showing total impressions and conversions for different sources and account managers.
- Bottom Navigation:** Includes "SHARE", "FEEDBACK", and "ASK".



# AI-assisted storytelling

## IMPACTFUL DATA STORYTELLING TO DRIVE ACTIONS

### Interpret data for others

Help others derive meaning from data and reach conclusions to drive decisions

### Generate stories using AI

Generate cohesive, powerful, and insightful narratives by analyzing data with only a few words

### Create refined content

Control AI verbosity, customize narrative text, and apply stunning visual themes to bring content to life

### Governed and always up to date

Quickly and easily share and update data any time

A Data-Driven Journey: Optimizing Marketing Performance Through Insights

Prepared by [Name]

### Introduction

As we examine how to maximize success across our marketing efforts, we will analyze campaign results over time to understand what strategies have been most effective. By identifying the top campaigns, our goal is to optimize processes and targeting approaches to continue improving our overall performance.

### Revenue and Conversions Leader Board

Rank	Name	Revenue	Conversions
1	Nestor Pallin	206	183
2	Leona Eldridge	183	156
3	Tasha Doug...	156	152
4	Karol Brown...	152	139
5	Celka Dui...	139	139

Build a story about marketing campaign performance over time. Describe top campaigns and account managers. How can we improve overall campaign success?

Revenue and Co... × Revenue by State ×  
Impressions and... × Conversions per ... ×

+ ADD VISUALS ⓘ

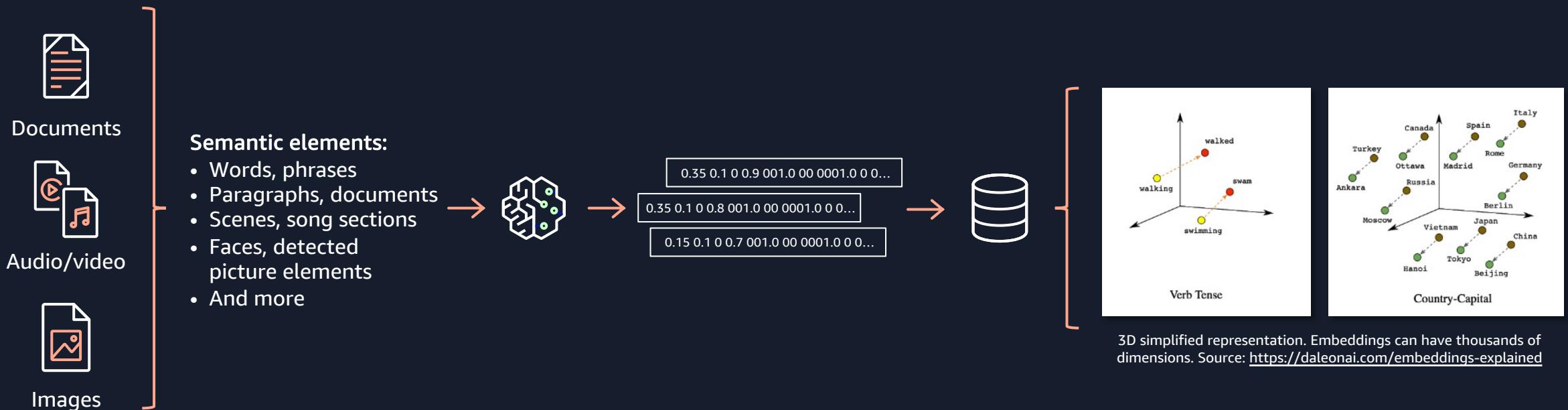
BUILD



# Vector data stores



# What are vector embeddings?



**Embeddings:** When vector elements are semantic, used in generative AI



# Amazon OpenSearch Service

REAL-TIME SEARCH,  
MONITORING, AND ANALYSIS  
OF OPERATIONAL DATA



**Managed:** Increase operational excellence and use a popular open source solution



**Secure:** Audit and secure your data with a data center and network architecture and built-in certifications



**Observability:** Systematically detect potential threats and react to a system's state through an open source solution for machine learning, alerting, and visualization



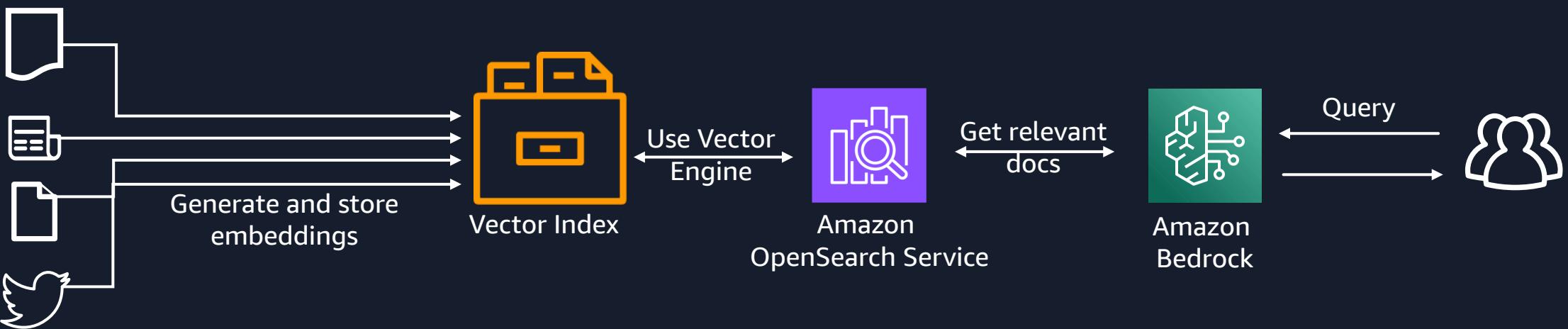
**Cost conscious:** Optimize time and resources for strategic work

# Amazon OpenSearch Service

REAL-TIME SEARCH, MONITORING, AND ANALYSIS OF OPERATIONAL DATA

Recent launch

**Vector Engine for Amazon OpenSearch Service**  
**Serverless: Simple, scalable, high-performance**  
**vector storage and search capability without**  
**having to manage infrastructure with**



# Amazon Bedrock

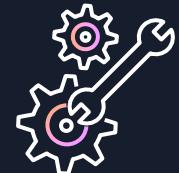
THE EASIEST WAY TO BUILD AND SCALE  
GENERATIVE AI APPLICATIONS WITH  
FOUNDATION MODELS



Accelerate development of generative AI applications using FMs through an API, without managing infrastructure



Choose FMs from Amazon, AI21 Labs, Anthropic, Cohere, Meta, and Stability AI to find the right FM for your use case



Privately customize FMs using your organization's data

# Amazon Bedrock

Choice of foundation models

**AI21labs**

**ANTHROPIC**

**co:here**

**Meta AI**

**stability.ai**

**amazon**

## JURASSIC-2

Multilingual LLMs for text generation in Spanish, French, German, Portuguese, Italian, and Dutch

## CLAUDE 3

LLM for conversations, question answering, and workflow automation based on research into training honest and responsible AI systems

## COMMAND

Text generation model for business applications like summarization, copywriting, dialog, extraction, and question answering

## LLAMA 3

Pre-trained and fine-tuned LLMs for natural language tasks like question answering and reading comprehension

## SDXL 1.0

Generation of unique, realistic, high-quality images, art, logos, and designs

## AMAZON TITAN

Text summarization, generation, classification, open-ended Q&A, information extraction, embeddings and search



# Vector databases for Amazon Bedrock



Vector engine for  
Amazon OpenSearch  
Serverless



Redis Enterprise  
Cloud



Pinecone

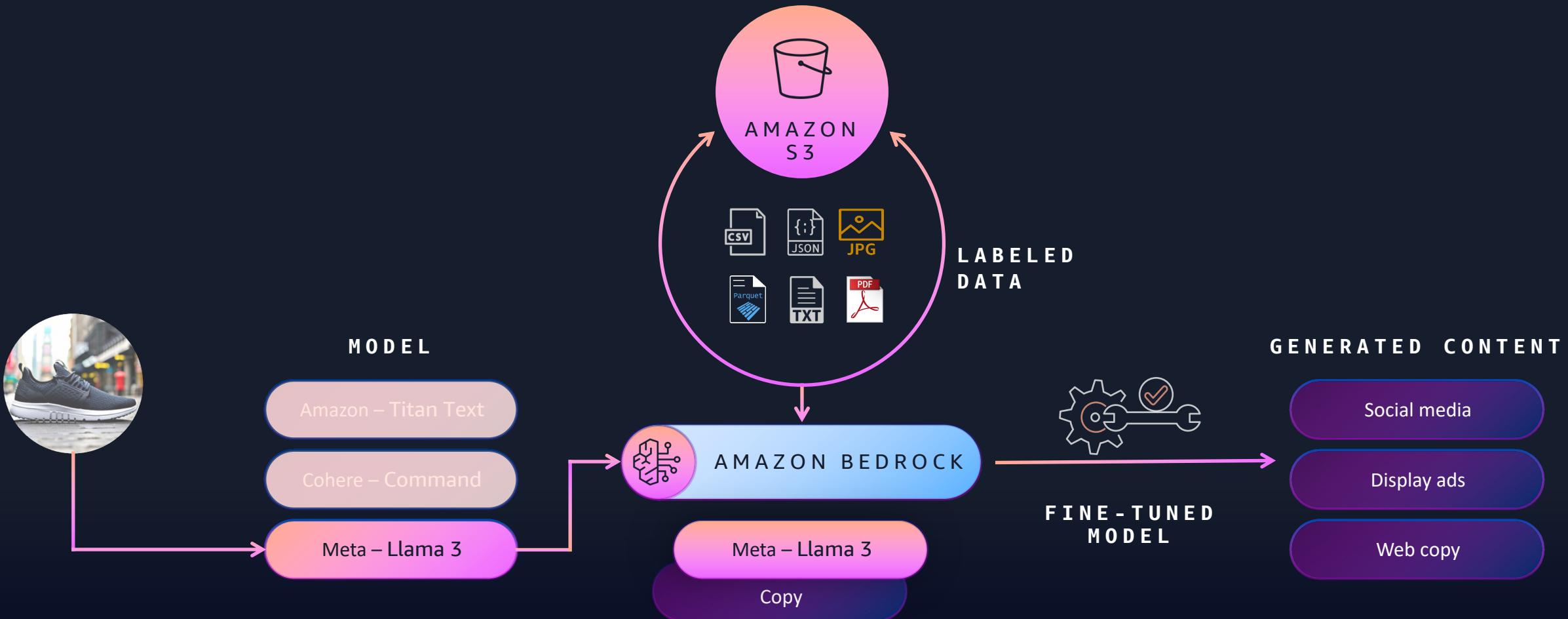


Amazon  
Aurora



MongoDB

# Fine-tuning your FMs



# Governance



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# Governance on AWS

CONTROL WHERE YOUR DATA SITS, WHO HAS ACCESS TO IT, AND WHAT CAN BE DONE WITH IT

◀ END USER CRITICAL PATH



AWS Identity and Access Management (IAM)



Amazon Cognito

BEHIND THE SCENES ▶



AWS Glue

Enable data quality, data cataloging, and metadata



AWS Lake Formation

Enable centralized permissions and fine-grained access controls



ML governance with Amazon SageMaker

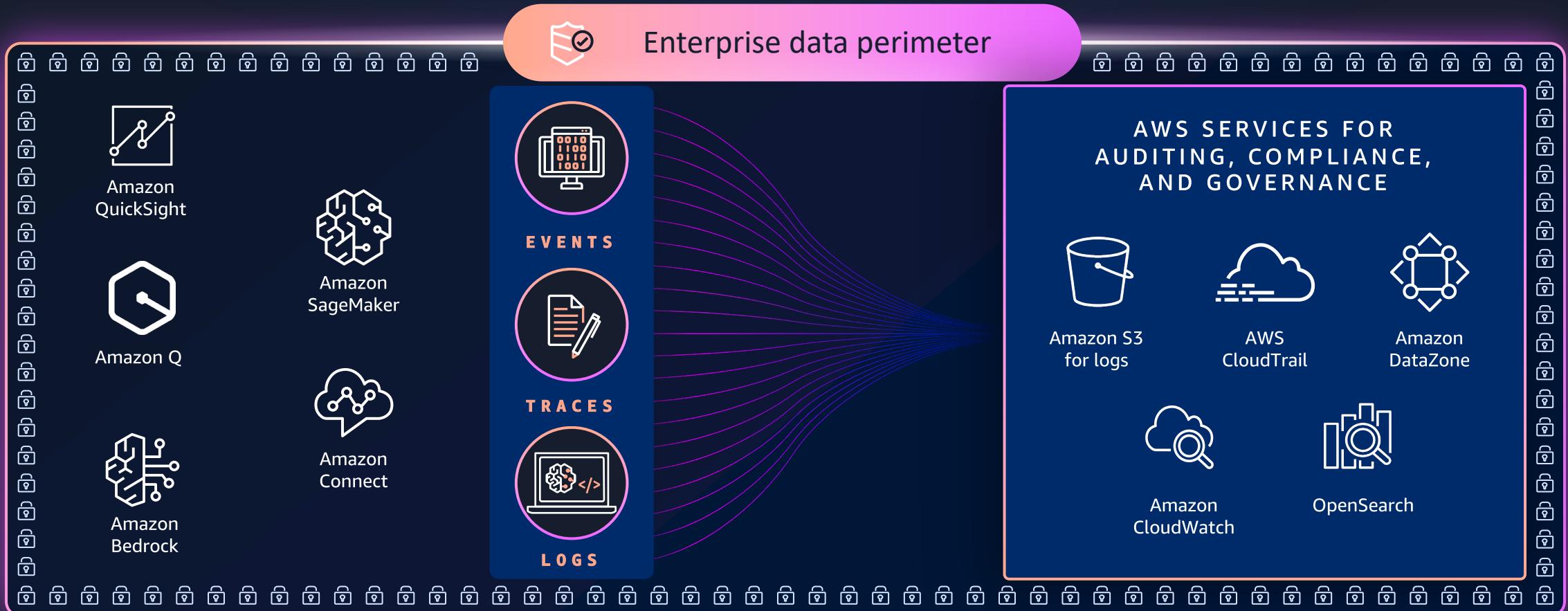
Get end-to-end visibility into ML models



Amazon DataZone

Catalog, discover, share, and govern data across the organization

# Data explainability



# Wrapping up



# AWS is an excellent place to build a data strategy to fuel your generative AI applications



## Comprehensive

Comprehensive set of services for storing and querying structured, unstructured, and vector data



## Integrated

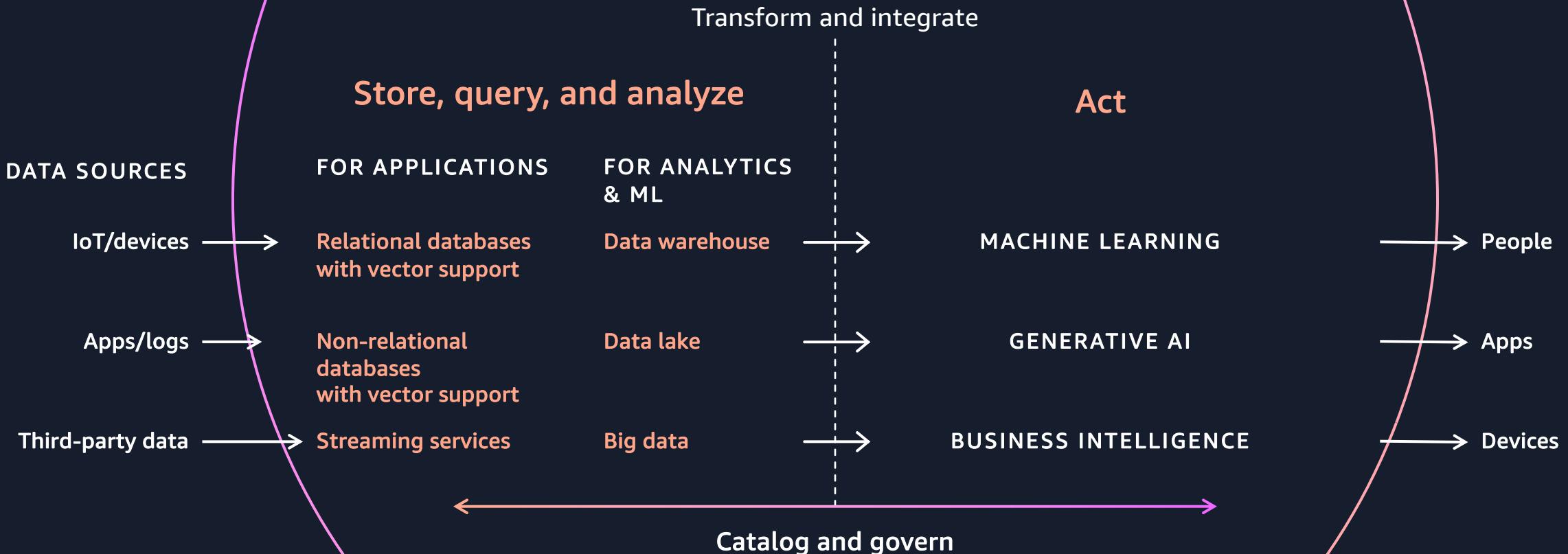
Choices for integrating data including zero ETL so you can easily connect to all your data



## Governed

End-to-end data governance capabilities, responsible AI, and regulating user interactions with LLMs

# A comprehensive set of services for your data foundation



# We are here to help

Need peer-level executive guidance?

## AWS Data Strategy

- Mental models and strategies based on the firsthand experience of former CXOs
- Get a peer-level sounding board and sparring partner

Inspire and accelerate your data transformation

Want to build a data vision and strategy?

## AWS Data-Driven Everything

- Create an organizational vision for innovation with data to drive business outcomes
- Define the first pilot, learn, and build

Jump-start the data flywheel

Want to modernize your data foundation?

## AWS re:Imagine Data

- Define the migration and modernization strategy for a future data foundation
- Lower cost, increase capacity, and unlock business access

Migrate and modernize data

AWS Generative AI Innovation Center



# Thank you!

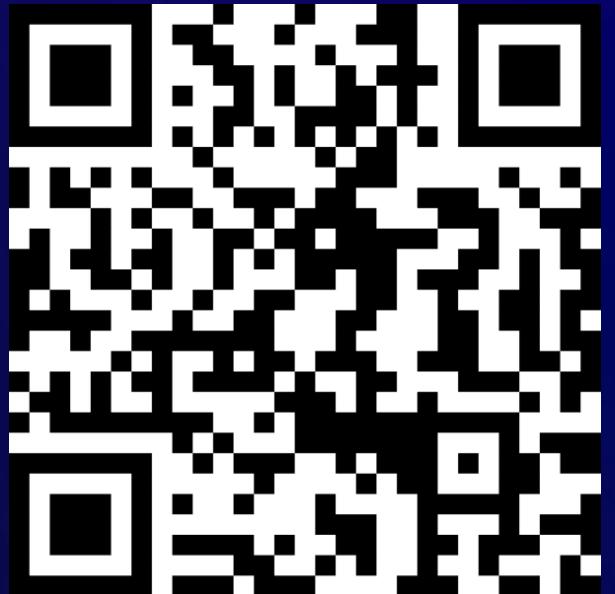
John Mousa

 in/JohnMousa

jmousa@amazon.de



Please complete the session  
survey



<https://pulse.aws/survey/2B0FPZIG>



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**BIG  
DATA  
DAYS  
2024**

# Thank You



<https://pulse.aws/survey/2B0FPZIG>



**ENTERPRISE  
BIG DATA  
FRAMEWORK®**

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🌐 <https://www.bigdataframework.org/>