Safe harbor statement

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ORACLE

AI For Data Made Simple

With Oracle Database 23ai, Oracle AI Services and Oracle Cloud Infrastructure

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Bruno Reis da Silva

ORACLE

- Brazilian based in Sweden.

- Love cultures, languages and traveling - 30 countries visited and counting.

- Master's in Software Engineering - Blekinge Institute of Technology in Sweden

- Master's in Data Science - Luleå University of Technology in Sweden

- 13+ years of experience as Oracle Database Administrator, Technical Architect, Solutions Architect, Lead Database Administrator, and Presales at companies such as IBM and Playtech.
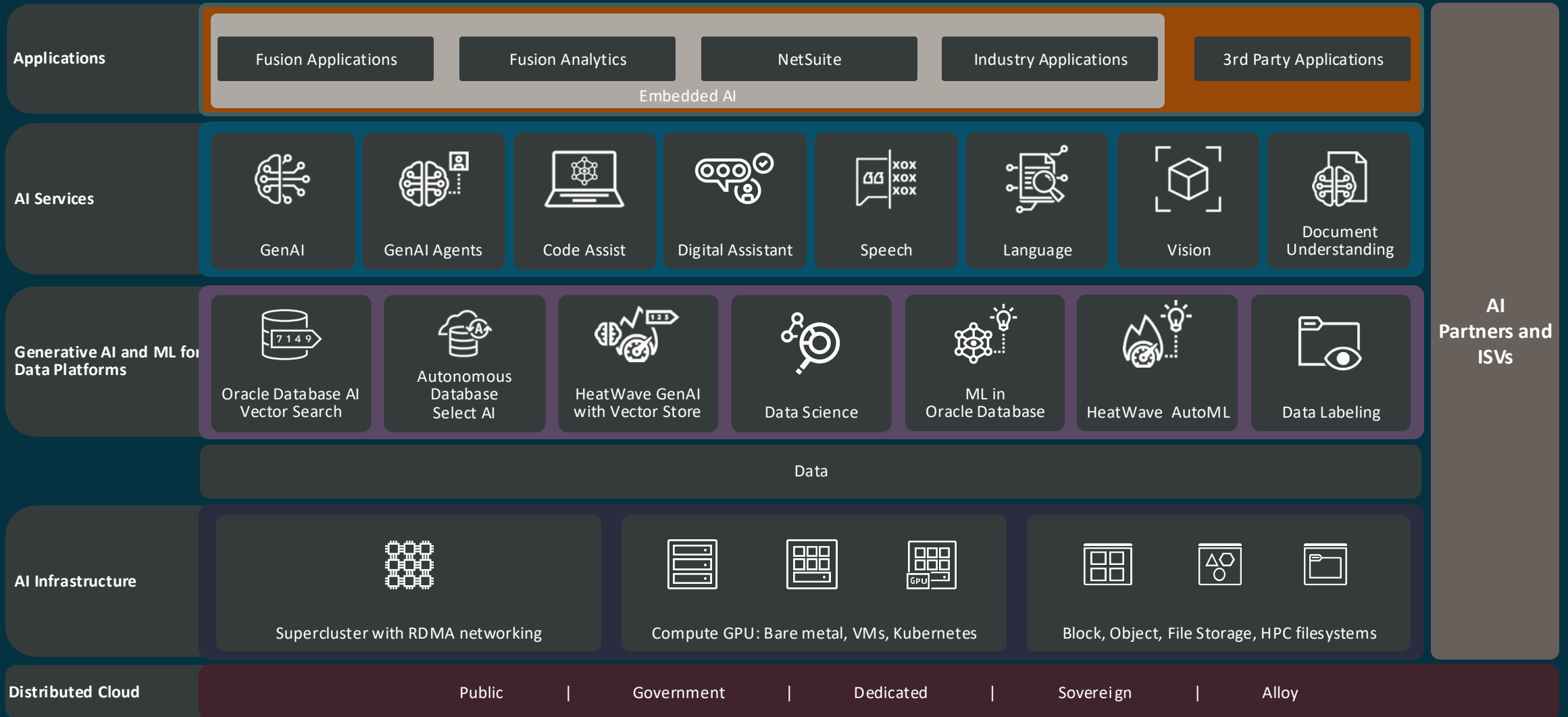
- Technology Software Account Engineer at Oracle.

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A modern data platform is key to achieving the full potential of AI

The Oracle AI stack

Applications	Fusion Applications	Fusion Analytics	NetSuite	Industry Applications	3rd Party Applications		
	Embedded AI						

AI Services	GenAI	GenAI Agents	Code Assist	Digital Assistant	Speech	Language	Vision	Document Understanding

Generative AI and ML for Data Platforms	Oracle Database AI Vector Search	Autonomous Database Select AI	HeatWave GenAI with Vector Store	Data Science	ML in Oracle Database	HeatWave AutoML	Data Labeling
	Data						

AI Infrastructure	Supercluster with RDMA networking	Compute GPU: Bare metal, VMs, Kubernetes	Block, Object, File Storage, HPC filesystems

Distributed Cloud	Public | Government | Dedicated | Sovereign | Alloy

AI Partners and ISVs

Oracle Database 23ai –Next Long-term Support Release

Available Now on Oracle Cloud and Oracle DB Free

Over 50 SQL simplifications

Data Use Case Domains

Real-time SQL Plan Management

Lock-Free Reservations

ORACLE Database 23ai

Read-Only Per-PDB Standby

Property Graphs

Microservice Support

JSON / Relational Duality

AI Vector Search

True Cache

SQL Firewall

Priority Transactions

Rolling Patching

JavaScript Stored Procedures

Developer Role

Lock-Free long-running transactions

Globally Distributed Database

How we deliver the Vision

Complete and Simple Platform for All Data Management Needs

Converged Database

Complete: all modern data types, workloads, and development styles

Simple: Add a SQL Statement, not a database to support any need of modern applications

Running on
Autonomous Database

Powerful: All the benefits of converged database running on Exadata
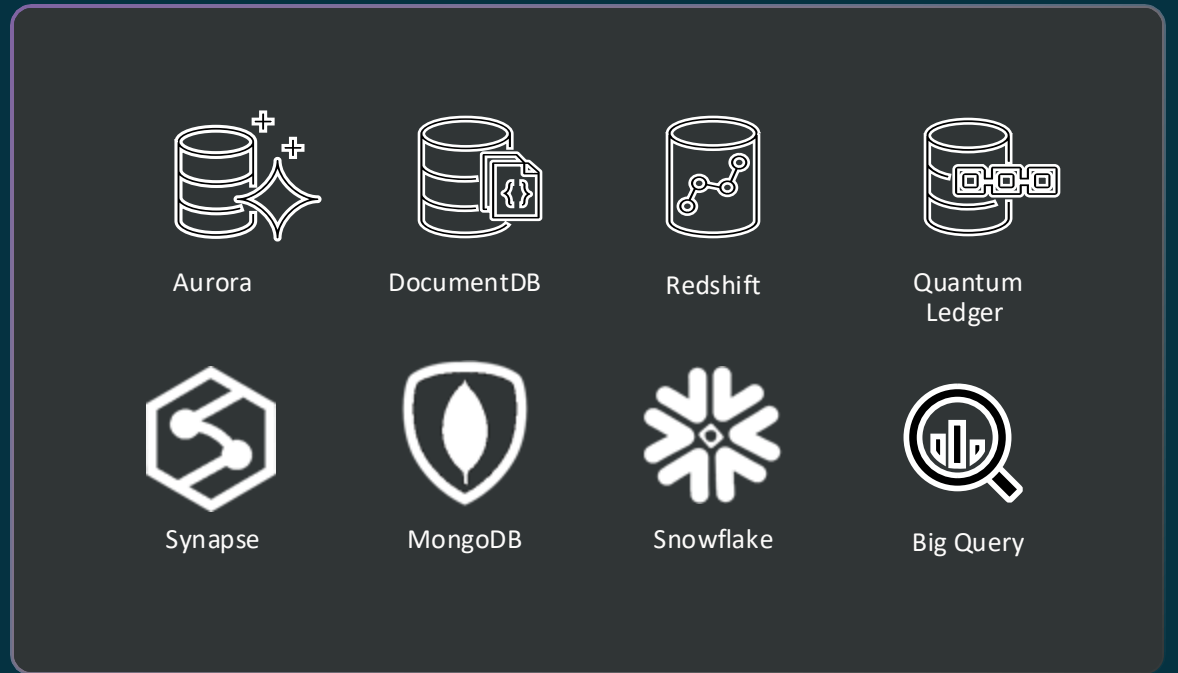
Simple: Fully-managed cloud service

Comparing Database Strategies

Run converged, open, SQL Database

Instead of single-use proprietary databases

Aurora   DocumentDB   Redshift   Quantum Ledger

Synapse   MongoDB   Snowflake   Big Query
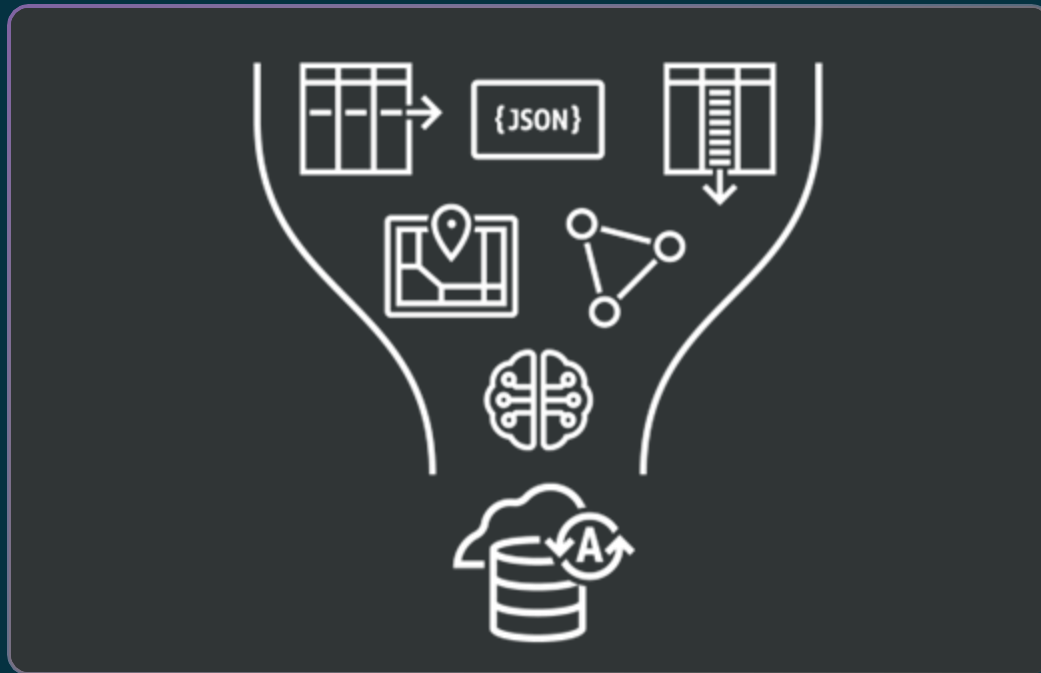
Developers and IT focus on Innovation

Developers and IT focus on Integration

Oracle's Goal– Make AI for Data ultra simple for

All Personas

Dev   DBA   Analyst   User

Data Engineers   Data Scientists

All Apps

All Workloads

3 AI for Data initiatives

Algorithmic AI

AI Vector Search

Augmented Generative AI (LLMs)

[1,4,8]
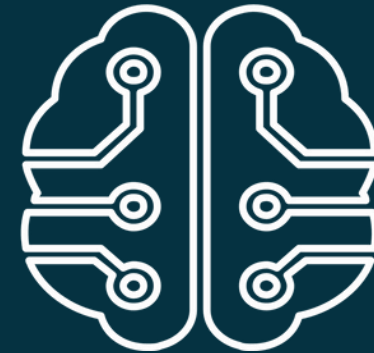
Algorithmic AI

Algorithmic AI uses non-neural net Machine Learning (ML)
We are making Algorithmic AI simple enough to use for all apps

Algorithmic AI has many use-cases

PRODUCT RECOMMENDATIONS

PERSONALIZED MARKETING

CUSTOMER CHURN PREDICTION

PROCESS AUTOMATION

FRAUD DETECTION

TALENT DEVELOPMENT

In-database algorithmic AI enables secure data-driven predictions

Use declarative SQL or leverage R and Python integration to run AI algorithms directly on business data

Running AI algorithms inside the database

- Is faster and safer than sending data to external AI algorithms

Over 30 in-database parallel and scalable AI algorithms

Continuously Enhanced for over 20 years

Classification

Decision Tree Explicit Semantic
Analysis Logistic Regression
(GLM)
Naïve Bayes Neural Network
Random Forest Support Vector
Machine (SVM) XGBoost

Clustering

Hierarchical K-Means
Hierarchical O-Cluster
Expectation Maximization

Row Importance

CUR Decomposition

Ranking

XGBoost

Regression

Generalized Linear Model (GLM)
Neural Network Support Vector
Machine (SVM)
Stepwise Linear regression
XGBoost

Feature Extraction

Principal Comp Analysis (PCA)
Non-negative
 Matrix Factorization
Singular Value Decomposition (SVD)
Explicit Semantic Analysis (ESA)

Attribute Importance

Minimum Description Length
Random Forest
Unsupervised Pairwise
KL Divergence CUR decomposition for
row & AI

Time Series

Exponential Smoothing Multiple
Time Series (23ai) *Includes
popular models e.g. Holt-Winters
with trends, seasonality, irregular
time series*

Anomaly Detection

One-Class SVM MSET-SPRT
Expectation Maximization (23c)

Association Rules

A priori

Survival Analysis

XGBoost

Easily build and deploy Machine Learning models using standard SQL

For example, you can build an AI model to predict customer behavior with 9 lines of code

```
DECLARE
    v_setlst DBMS_DATA_MINING.SETTING_LIST;
BEGIN
    v_setlst('ALGO_NAME')  :=  'ALGO_SUPPORT_VECTOR_MACHINES';
    V_setlst('PREP_AUTO')                   :=                   'ON';
    DBMS_DATA_MINING.CREATE_MODEL2(
            MODEL_NAME            ⟹ 'FIND_AT_RISK',
            MINING_FUNCTION       ⟹  'CLASSIFICATION',
            DATA_QUERY            ⟹  'SELECT * FROM customers',
            SET_LIST              ⟹   v_setlst,
            CASE_ID_COLUMN_NAME => 'CUST_ID',

            TARGET_COLUMN_NAME => 'Renewed_Membership');
    END;
```

Apply the Machine Learning model in real-time to predict customer behavior

With 2 lines of SQL

```sql
SELECT prediction_probability(FIND_AT_RISK, 'Yes'
  USING 3500 as bank_funds, 30 as age, 2 as num_previous_rentals, cust_id=5555);
```

3 AI for Data initiatives

Algorithmic AI

AI Vector Search

Augmented Generative AI (LLMs)

AI Vector Search

Breakthrough technology that enables searching for documents, images, patterns, and data that have similar content

Similarity Search

Oracle Database 23ai introduces a new data type called Vectors

50   21   16   42   33

Vectors represent the content (semantics) inside images, documents, data, etc.

Vector

33
42
16
21
50

A vector is a sequence of numbers, called dimensions, used to capture the important "features" of the data

For example, the features of a house image could be:

Vector

Features

House

33

Type of roof

42

Decorations

16

Number of Stories

21

Building Materials
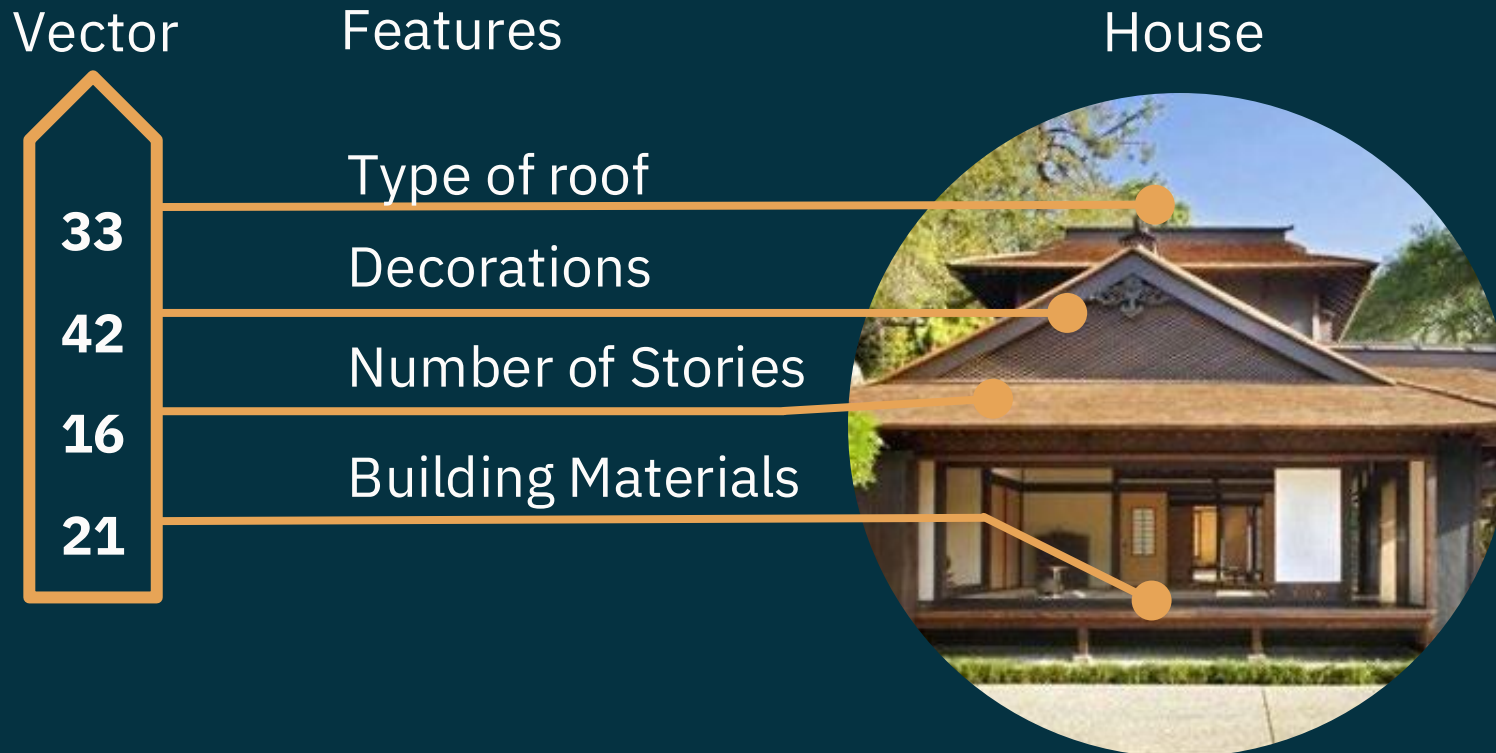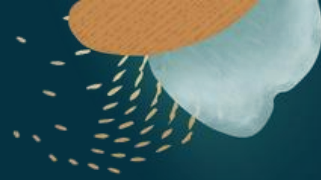
Each dimension (number), represents a feature of the house

Note: Features are often chosen by ML algorithms and are not as simple as shown here

House vectors when collapsed into 2 dimensions instead of hundreds could look like this
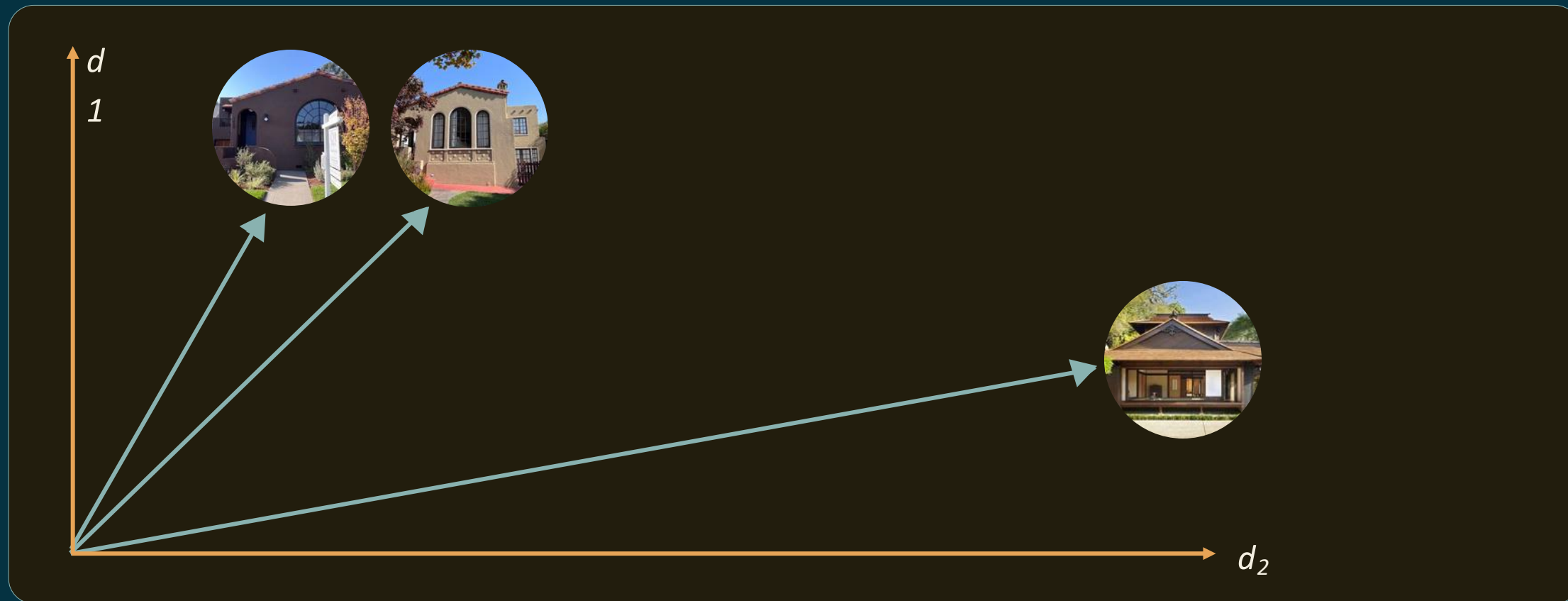
The distance between the vectors is proportional to their semantic similarity

Similar

Not as Similar

d_1

d_2
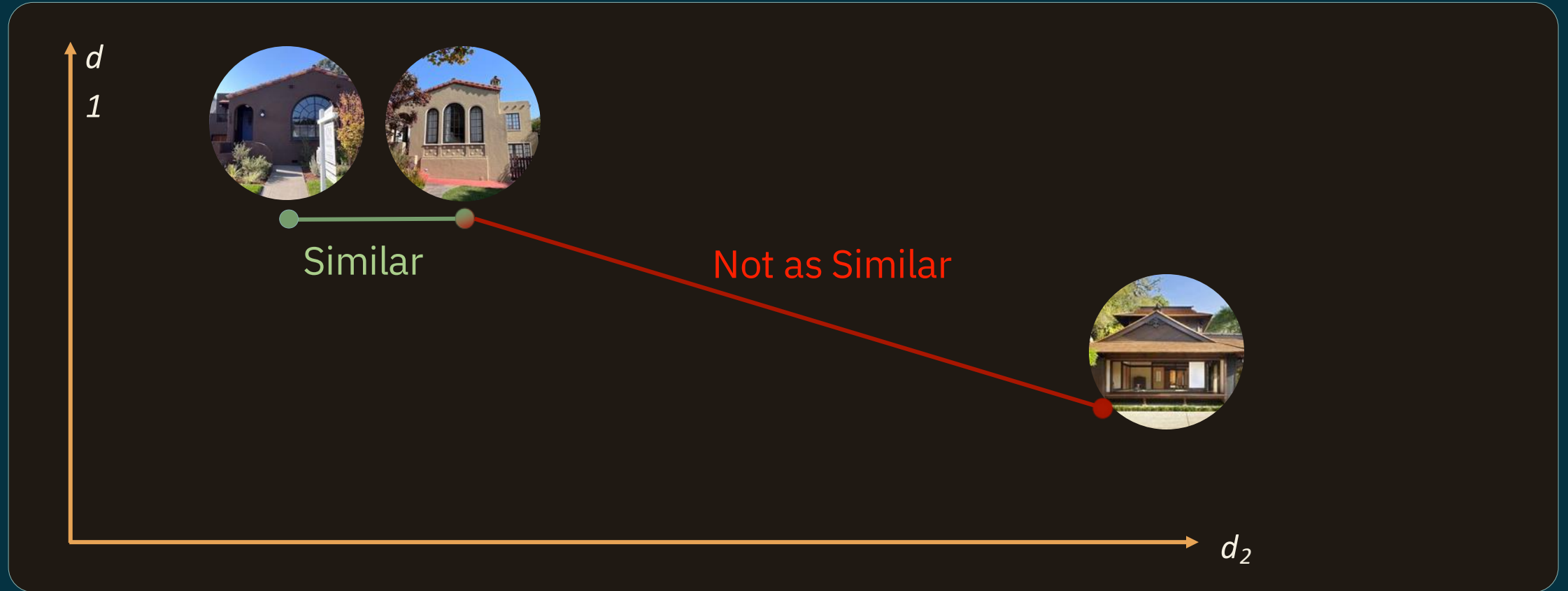
Oracle Database 23ai can store vectors using a new vector data type


```sql
CREATE TABLE house_for_sale(house_id number,
                            price   number,
                            city    varchar2(400),
                            house_photo  blob,
                            for_sale_house_vector vector
                            );
```
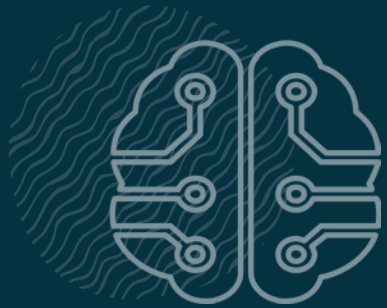
You can now find data that is semantically similar to an input

Find the top 10 houses that are similar to this picture


```
SELECT …
FROM    house_for_sale
ORDER BY vector_distance(for_sale_house_vector, :input_vector)
FETCH FIRST 10 ROWS ONLY;
```
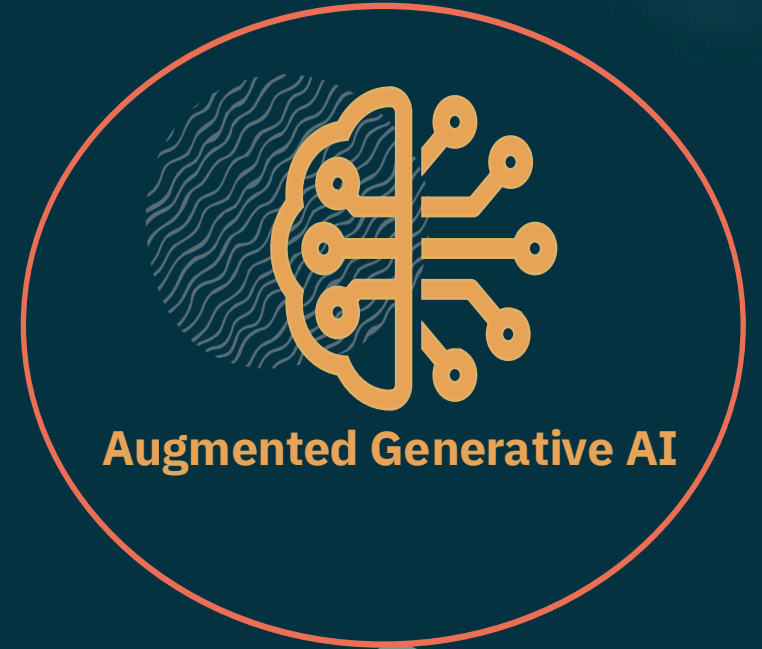
3 AI for Data initiatives

Algorithmic AI

AI Vector Search

[1,4,8]

Augmented Generative AI

Adding semantic search to relational search is great, but we can do even better by adding Generative AI (LLMs)
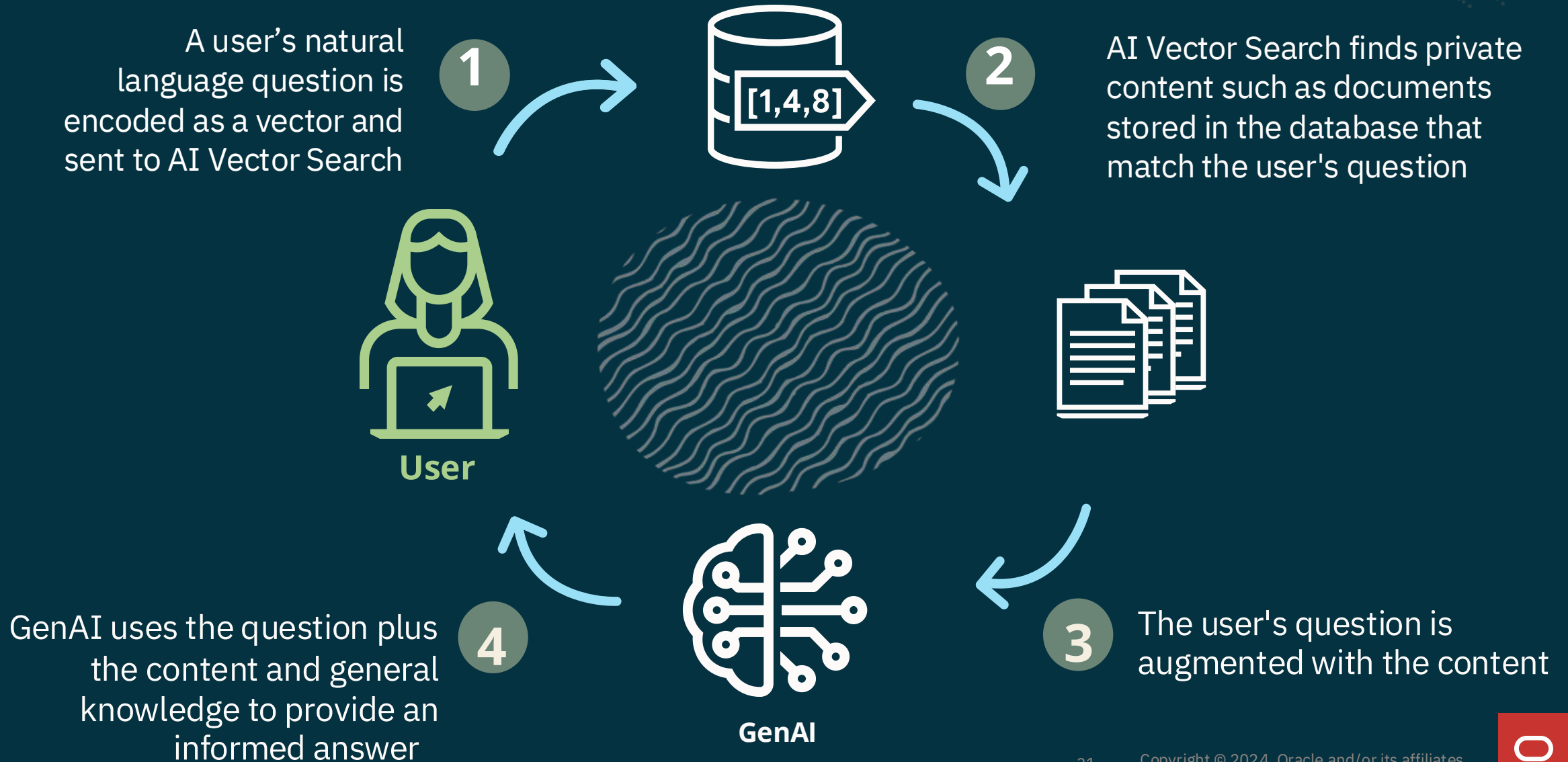
Oracle AI Vector Search improves Generative AI by augmenting prompts with private database content

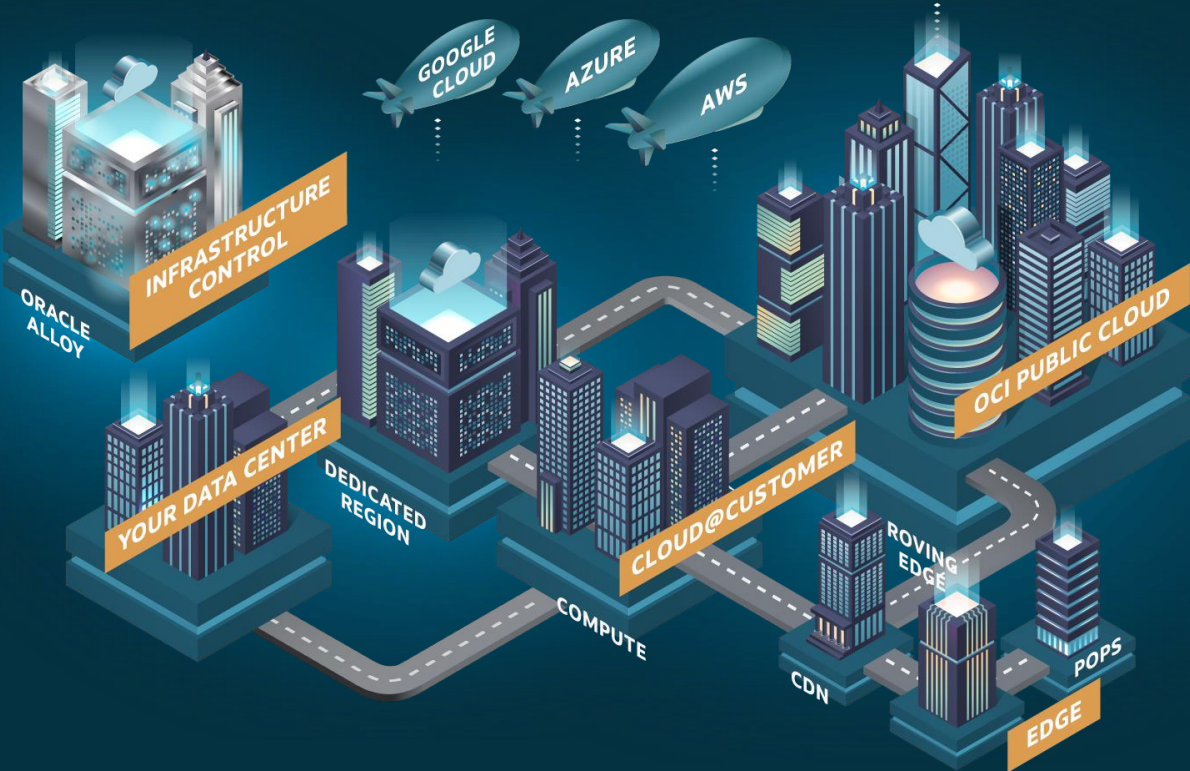This helps produce better and more accurate answers to user questions

Called: **Retrieval Augmented Generation (RAG**)

[1,4,8]

Retrieval Augmented Generation works like this

1 A user's natural language question is encoded as a vector and sent to AI Vector Search

[1,4,8]

2 AI Vector Search finds private content such as documents stored in the database that match the user's question

User

GenAI

4 GenAI uses the question plus the content and general knowledge to provide an informed answer

3 The user's question is augmented with the content

The *new* distributed cloud

Multicloud

We work with other providers:

Oracle Database@Azure

Interconnect for Azure

Oracle Database@Google Cloud

Interconnect for Google Cloud

Oracle Database@AWS

HeatWave on AWS

Public cloud

49 global locations:

Commercial

US Gov, UK Gov, AUS Gov

EU Sovereign Cloud

Cloud@Customer

We bring cloud services to you:

Oracle Exadata Cloud@Customer

Oracle Compute Cloud@Customer

Roving Edge Infrastructure

Dedicated cloud
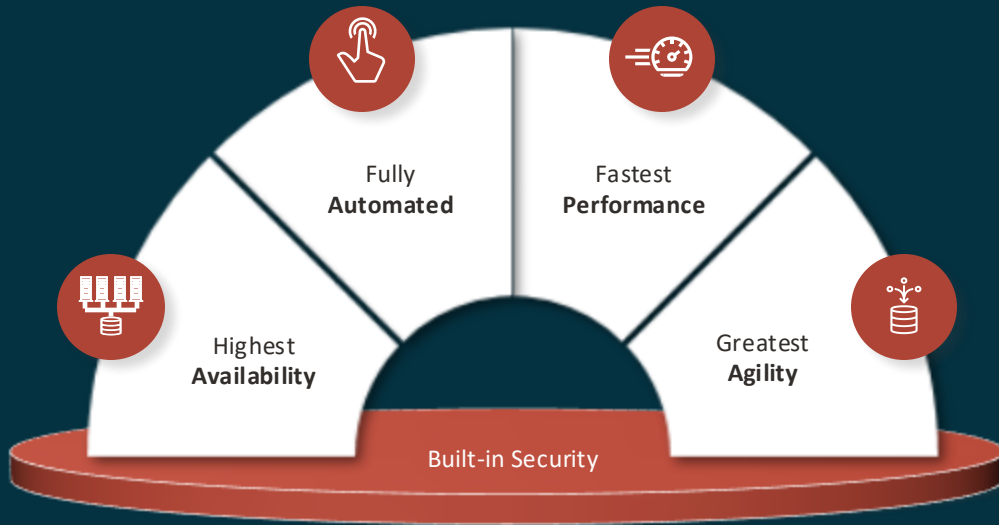
All 150+ OCI in customer data centers:services
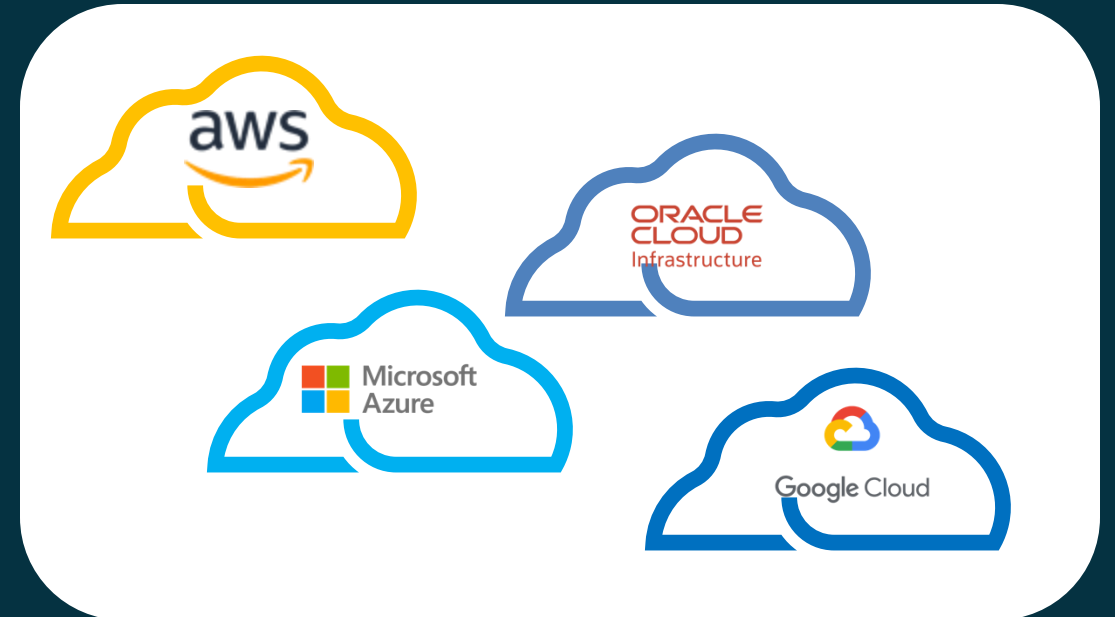
OCI Dedicated Region

Oracle Alloy

U.S. National Security Regions

OCI Isolated Regions

ORACLE
Distributed
Cloud

You trust Oracle Database

Oracle Database

Fully **Automated**

Fastest **Performance**

Highest **Availability**

Greatest **Agility**

Built-in Security

aws

ORACLE CLOUD Infrastructure

Microsoft Azure

Google Cloud

And you want choice of running your workloads in any cloud

Zoom AI Companion revolutionizes the way organizations work

- Video conferencing leader scaled to millions of users while improving performance and saving on infrastructure costs

- Sought generative AI capabilities on OCI AI infrastructure

- **9 hours** • **Millions** • **> 7 PB**

  - Time taken to onboard new customers on OCI
  - Number of concurrent live streams every day, with OCI
  - Volume of video and audio transferred per day
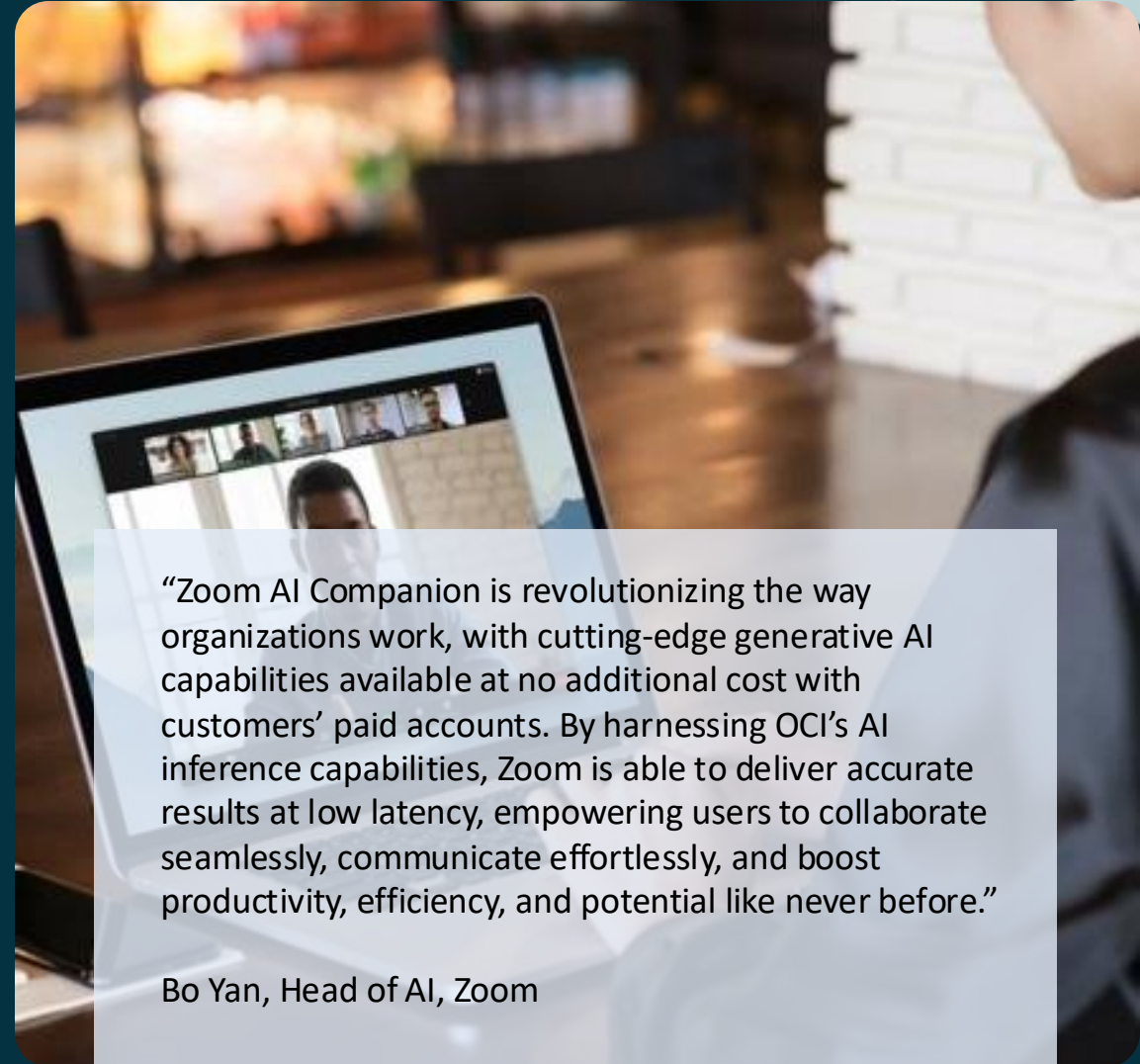
"Zoom AI Companion is revolutionizing the way organizations work, with cutting-edge generative AI capabilities available at no additional cost with customers' paid accounts. By harnessing OCI's AI inference capabilities, Zoom is able to deliver accurate results at low latency, empowering users to collaborate seamlessly, communicate effortlessly, and boost productivity, efficiency, and potential like never before."

Bo Yan, Head of AI, Zoom

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LiveLabs

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