ORACLE

Modern Data Platform and Generative AI

Oracle Cloud Infrastructure – The next frontier of enterprise innovation

Safe Harbor Statement

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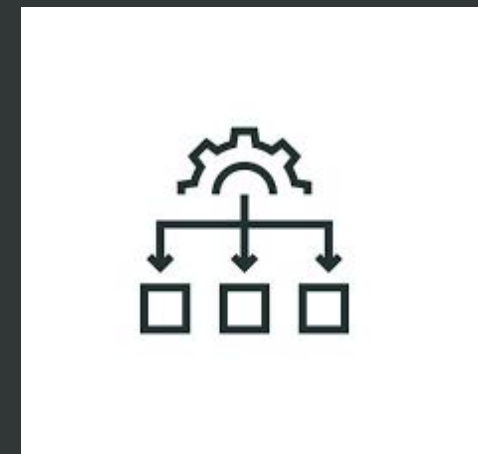
Agenda

- Oracle Cloud Infrastructure
- Oracle Modern Data Platform
- AI for Enterprise

Key Challenges for Data and AI Leaders
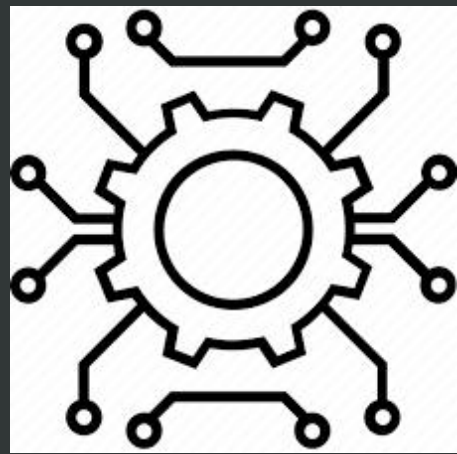
Strategic & Technology

- Lack of data-driven innovation
- Reduced D&A agility
- Proliferation of stealth D&A
- Multiple points of failure

Organizational

- Loss of influence for D&A team
- Incorrect use of data for decision making
- Non-data-driven approaches to decision making

People

- Employee burnout
- Dependency on dashboard and data silos
- Difficulty sourcing talent for multiple technologies

Financial

- Misallocation of resources
- Higher TCO for D&A projects
- Underused Investments

AI for Enterprises

Generative AI at Enterprise Requires

High quality, clean and well understood Data with known data lineage to base training upon ,while minimize job **failures** due to Infra.

Governance processes will need to be extended to address potential ethical concerns related to the content generated by AI, including bias mitigation and content quality review.

Collaboration between Data Scientists, Business Domain experts, Developers, and Architects.

Generative AI requires a **cultural change and new roles within the organizatio**n (ethics, biases, etc.) with support to users who will interact with generative AI outputs.

Training large generative AI models is very **computationally intensive** (GPUs) and thus rather expensive.

Are you ready to accepts a **results accuracy max up to ~80%?** What does it really mean for your Business? **Predictable Price Performance**

PROCESS

PEOPLE

TECHNOLOGY

AI innovation at Oracle

Address enterprise generative AI requirements

Embed generative AI across every layer of the tech stack

Prioritize data management, security and governance

AI across the Oracle Cloud ecosystem

Applications

| Fusion Applications | NetSuite | Fusion Analytics | Industry Applications | 3rd Party Applications |

AI Services

| OCI Generative AI | OCI Generative AI Agents | Digital Assistant | Speech | Language | Vision | Document Understanding |

ML for data platforms

| OCI Data Science | AI Vector Search in Oracle Database | MySQL HeatWave Vector Store | OCI Data Labeling |

Modern Data Platform

| No Code Data Integration | Real Time Streaming Analytics | Data Lake | Data Warehouses | Data Catalog | Self Service Augmented Analytics | No Code App Builder |

AI infrastructure

| Compute bare metal instances and VMs | OCI Supercluster with RDMA networking | Block, object, and file storage; HPC filesystems |

Oracle AI Partners

OCI Generative AI

Now Available: OCI Generative AI Service

High quality pre-built models

We are offering high quality models from Meta and Cohere to meet your business needs with minimal effort

Customize models to meet your needs

Fine tune models with your own data and focus on your most important tasks

Fully hosted inside OCI

All processing and data storage happens inside OCI, no cross-region or cross-cloud communication

Private and secure

Customer-provided training and inference data is secure and cannot be seen by other customers. Oracle does not send customer data to Cohere or Meta.

New models included in the GA release
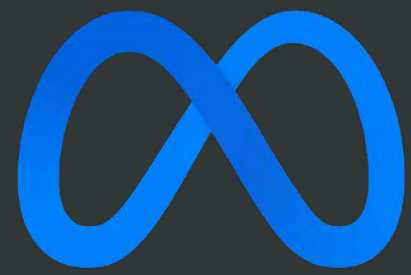
Llama-2 70B

The Llama-2 70B parameters text generation model developed by Meta that is the leading open source LLM. Free for research and commercial use.

cohere

Command

Command is Cohere's highly performant generation model. In two sizes: 6B (Medium) and 52B parameters (XL). Using the Command XL model provides better accuracy while Command M has lower latency and cost.

Summarize

The Summarize model provides high-quality summaries that accurately capture the most important information from your documents.

Embed

The English and multi-lingual Embedding model (V3) that converts text to vector embeddings. A 'light' version of the model exists that is smaller and faster but is slightly less performant (English only).

OCI Gen AI: New Features

New Models

- Meta Llama 2 models
- Cohere Multilingual and English Embed V3

Flexible fine tuning

- Fine-tuning of both Cohere Command 52/6B models
- Vanilla and T-few fine-tuning options along with fine-tuning parameters configuration
- Stacked fine-tuned model serving

Improved cluster UX

- Multi-endpoint support in hosting clusters
- Scaling your clusters by adding/removing units to handle more model requests
- Endpoint Analytics (tokens processed in/out, number of calls, etc.)

GenAI Ops

- Content moderation controls
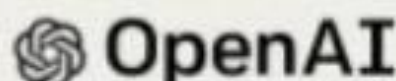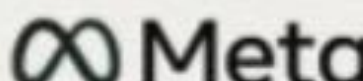- Endpoint model swap with zero-down time.
- Endpoints deactivation/activation
- LangChain Integration

A leader and differentiated relative to the competition

	cohere	**OpenAI**		**ANTHROP\C**		**Google**		**Meta**	
	Command	GPT-3.5	GPT-4	Claude Instant	Claude 2	Gemini Pro	Gemini Ultra	Llama 2 13B	Llama 2 70B
Customer Focus	Enterprise-focused	←		Consumer and enterprise			→	Research and enterprise	
Accuracy	Accurate MMLU 69.2% → 79% (Q1 projected)	Accurate MMLU 70.0%	**Leading** MMLU 86.4%	Accurate MMLU 73.4%[1]	Accurate MMLU 78.5%[1]	Accurate MMLU 71.8%	**Leading** MMLU 83.7%	Specialized MMLU 54.8%	Accurate MMLU 68.9%
TCO	**Leading TCO** (Bedrock prov. TCO[2]: $1.93 / 1M tokens)	Competitive TCO	Cost Prohibitive	Competitive TCO 1.3x Command[2]	Cost Prohibitive 5.7x Command[2]	Competitive TCO	Cost Prohibitive	Competitive TCO 1.8x Command[2]	Not benchmarked
Deployment	**Any cloud or private environment with enterprise support**	Limited cloud availability (Azure only) No private options		Limited cloud availability (AWS, Google) No private options		Limited cloud availability (Google only) No private options		Any cloud or private environment w/o enterprise support	
Retrieval-Augmented Generation (RAG)[3]	**Complete solution** (generative, embeddings, rerank, connectors) Avg Lost-in-the-Middle score Command: 78%	Partial solution (no rerank) Avg Lost-in-the-Middle score GPT-3.5: 67%		Incomplete solution (generative model only)		Partial solution (no rerank, no connectors)		Incomplete solution (generative model only) Avg Lost-in-the-Middle score Llama 2 70B: 72%	
Fine-tuning & Support	Fine-tunable Vendor Support **Cohere engineers**	Fine-tunable Vendor Support OpenAI engineers ($2-3m)	Roadmap	Roadmap Vendor Support Not available		Fine-tunable Vendor Support Not available		Fine-tunable Vendor Support Not available	

Retrieval Augmented Generation for OCI Generative AI Agents

Introducing: OCI Generative AI Agents
RAG Agent, the first in a series of Gen AI Agents

Featuring retrieval-augmented generation

OCI GenAI RAG Agent connected to
Vision Corp's knowledge bases

Analyst asks a natural language question

GenAI RAG Agent responds in humanlike manner
and provides links to relevant source documents

Analyst asks a follow up question

GenAI RAG Agent uses chat history and further
information retrieval to respond

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NEW
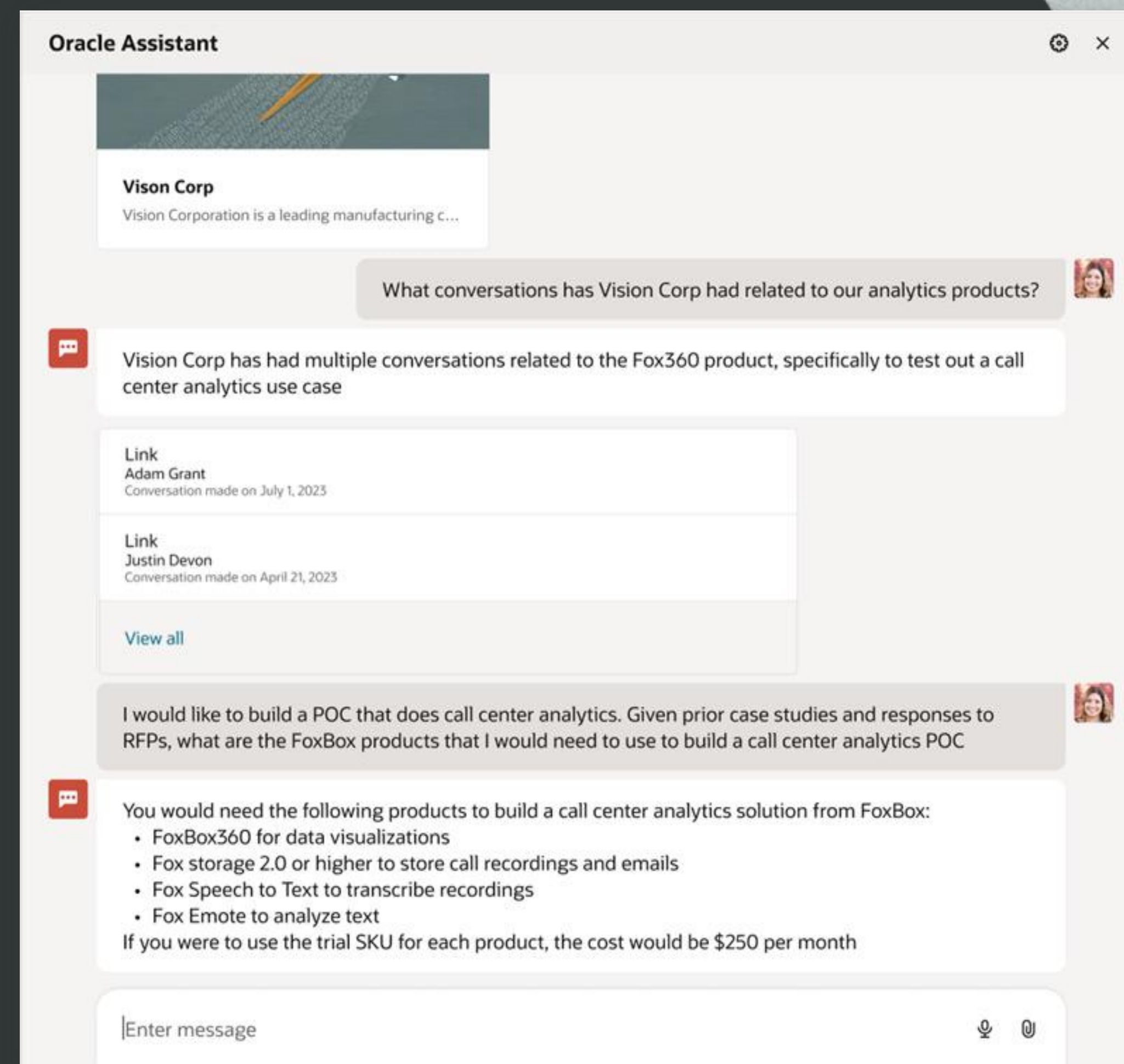
Core capabilities of OCI Generative AI Agents
RAG Agent

Agents act on knowledge bases such as search indexes, for example:
- call transcripts
- internal knowledge sources
- other large corpuses of enterprise proprietary data

Beta:
OCI OpenSearch

Coming Soon:
Oracle Database 23c AI Vector Search
MySQL HeatWave Vector Store

AI Quick Actions for OCI Data Science

OCI Data Science

Open and extensible

Use your favorite open-source tools and framework

Use your AI anywhere using ONNX

Accelerated Data Science SDK available as an open-source library
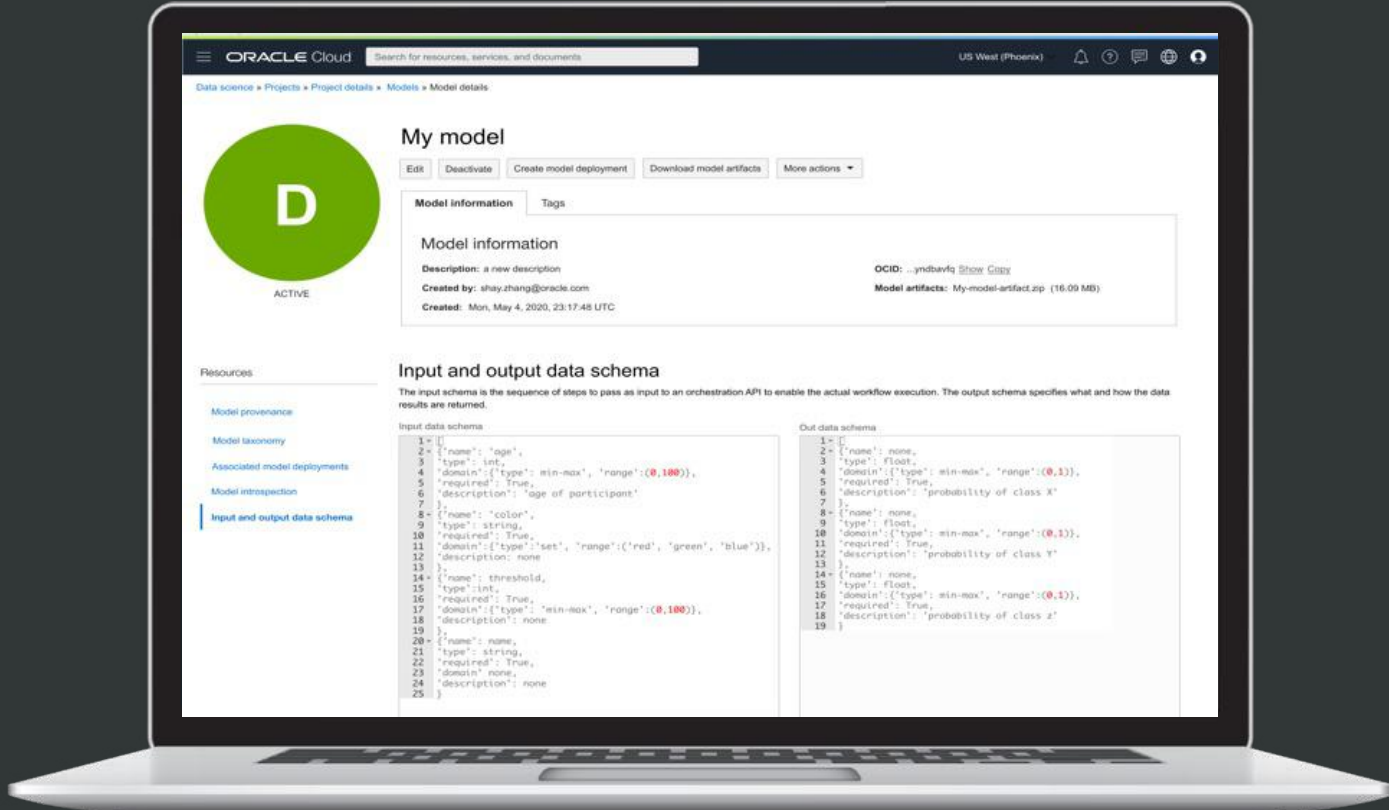
Oracle Cloud Infrastructure Data Science

Develop & Experiment

Notebook Sessions	Local and OCI Code Editors

Manage, Share, & Reproduce

Model Catalog	Feature Store*	Conda Environments

POWERED BY ANACONDA

Operationalize with MLOps

Jobs	Pipelines	Model Deployments	Model Monitoring*
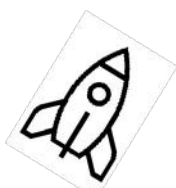
Integrate

ML Applications*

Data Management
Database – Data Lake – Access – Integration – Preparation

Infrastructure
CPU – GPU – Storage – Network

*Coming soon

Announcing: AI Quick Actions for OCI Data Science
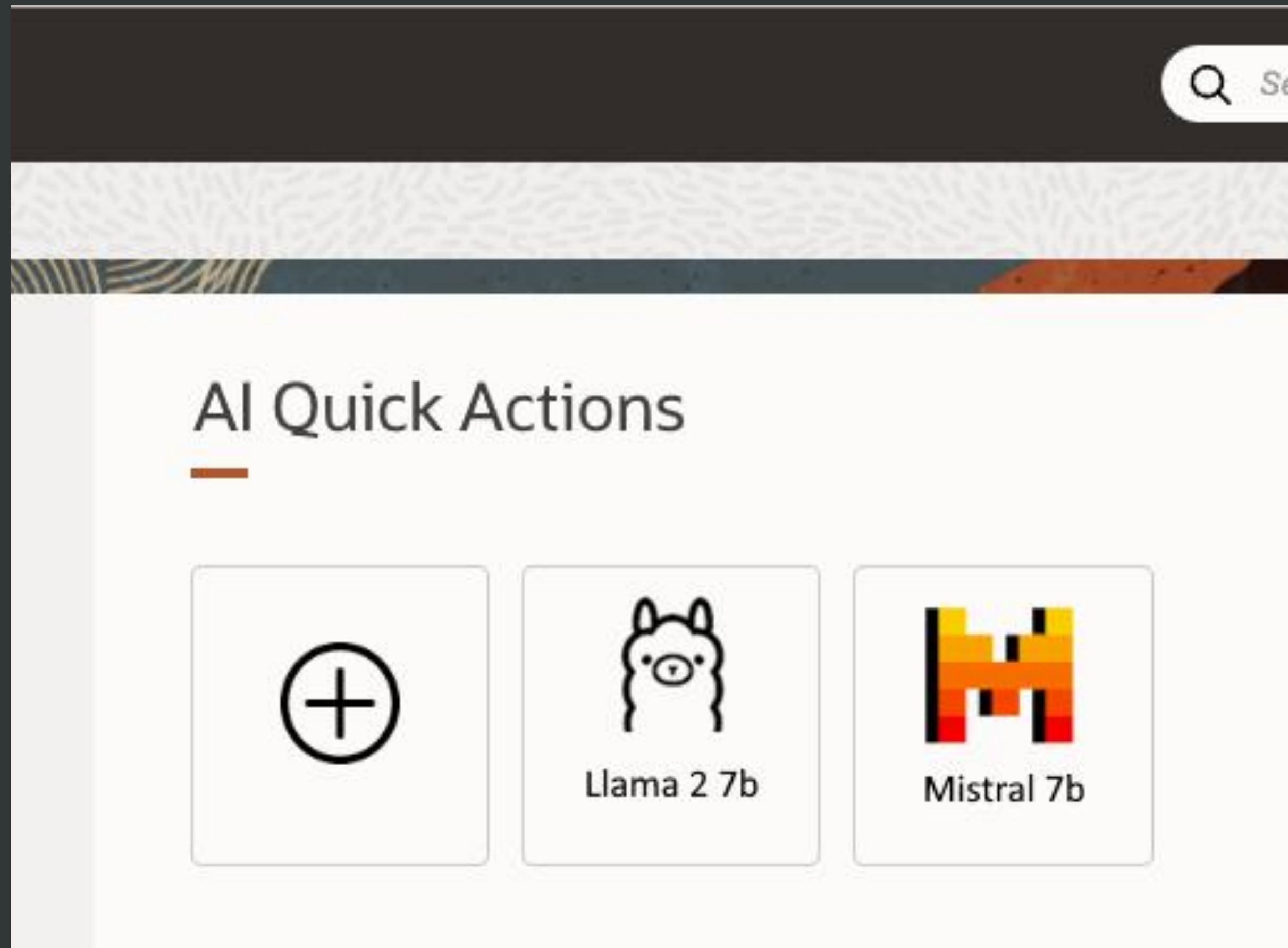
A collection of use cases that can be invoked in a click of a button, all in a user interface inside the Data Science notebook experience.

Get no-code access to LLMs such as Llama2 and Mistral 7B through seamless integration with Data Science notebooks.

Quick actions:
- Deploy
- Fine tune
- Integrate
- Scale

Deploy and Fine Tune

Deployment

- Provides support for model deployment beyond what is available in OCI Gen AI Service with finer grained controls for those who need it
- Support for Text Generation Inference (Hugging Face), vLLM (UC Berkeley) and Nvidia Triton serving with public examples for:
  - Llama2 7b and 13b using A10s
  - Llama2 70b using A100 and A10s via GPTQ Quantization
  - Mistral 7b
  - Jina Embedding Model using A100

Fine Tuning

- Distributed Training with PyTorch, Hugging Face Accelerate and DeepSpeed for Fine-tuning of LLM
- Mount for Object Storage and File System as a Service – enables effortless checkpointing and storage of fine-tuned weights
- Service-provided Condas, eliminates the requirement for custom docker environments

Oracle AI Services

AI Services
Benefits

AI for everyone

- An AI starting point, even without data science experience
- State-of-the-art LLMs from Meta and Cohere for generative AI use cases

Prebuilt for enterprise requirements
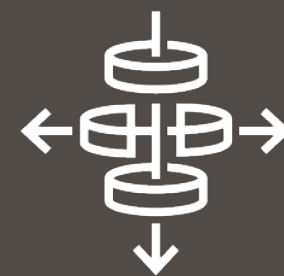
- Prebuilt models trained on industry-derived data
- Optimized for use cases across finance, manufacturing, and more
- Built-in insight highways into your SaaS applications with Oracle NetSuite, Fusion, and custom apps

Customizable for your needs

- Tailor your AI models without data science experience
- Save costs by training AI models already on OCI
- Fine tune generative AI models for specialized use cases

Best-in class support

- White glove treatment
- Data scientists on staff, dedicated to ensuring your organization's success
- Pricing to support AI experimentation

OCI Digital Assistant

Intelligent self service chatbot providing chat, text message, and voice interfaces

Improve self-service experiences with chatbots, voice interfaces, intuitive search

Reach new audiences by creating new application interfaces and dashboards

Create more intelligent customer experiences with added personalization, prediction, analytics, and more

Oracle Digital Assistant
Help on digital assistant learning

Greetings, I am Artie. I am a digital assistant here to help you.

You can always call up my help system by simply asking for help at any time.

Please ask me your most pressing questions on digital assistants.

Type a message
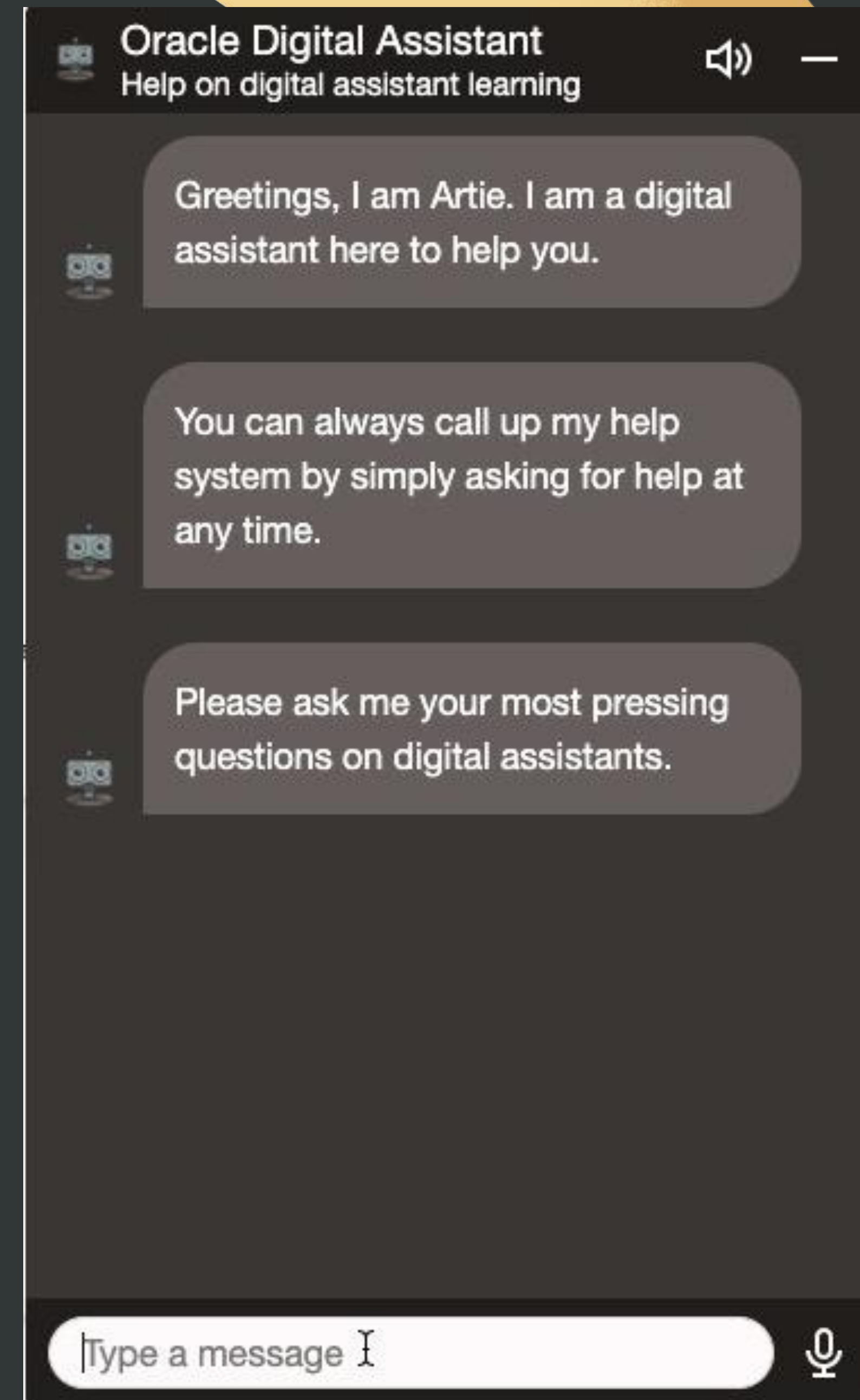
OCI Language

Text AI to classify sentiment and extract important entities

Analyze text at scale

Translate to/from 20+ languages to easily reach new audiences and consumers

Improve user experience by understanding sentiment from text

Recognize sensitive information to protect privacy and ensure compliance
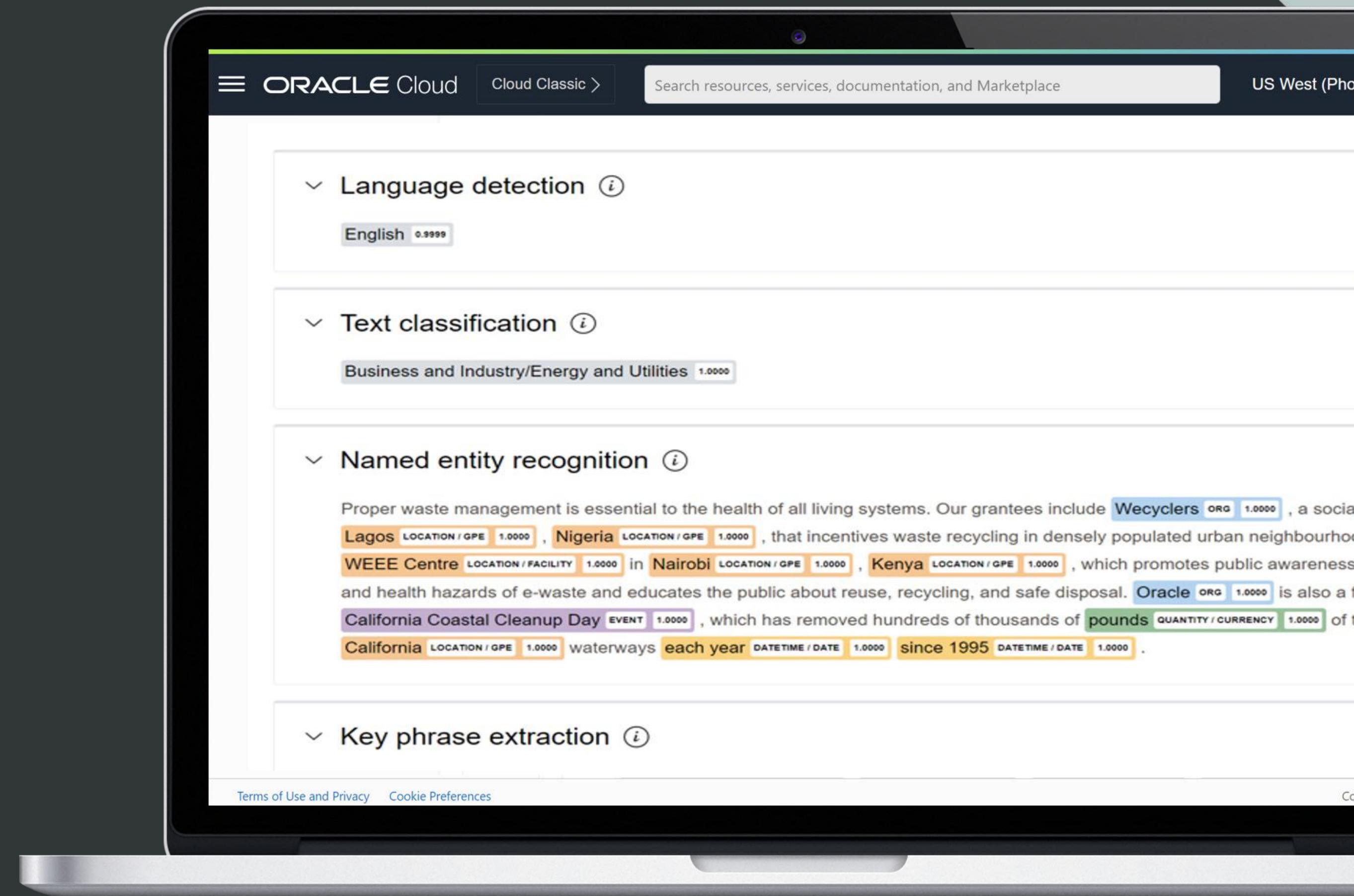
OCI Speech

Transcribe spoken audio with multilanguage support

Create searchable, indexed data by transcribing audio files

Filter profanities and leverage confidence scores

Combine with Language or other AI services to analyze sentiment, translate to other languages, and extract key information

Input Audio Signal

OCI Speech

Output Text

TEXT TRANSCRIPT
"Good afternoon, everyone, and welcome to Oracle's fourth-quarter and fiscal-year 2021 earnings conference call. A copy of..."
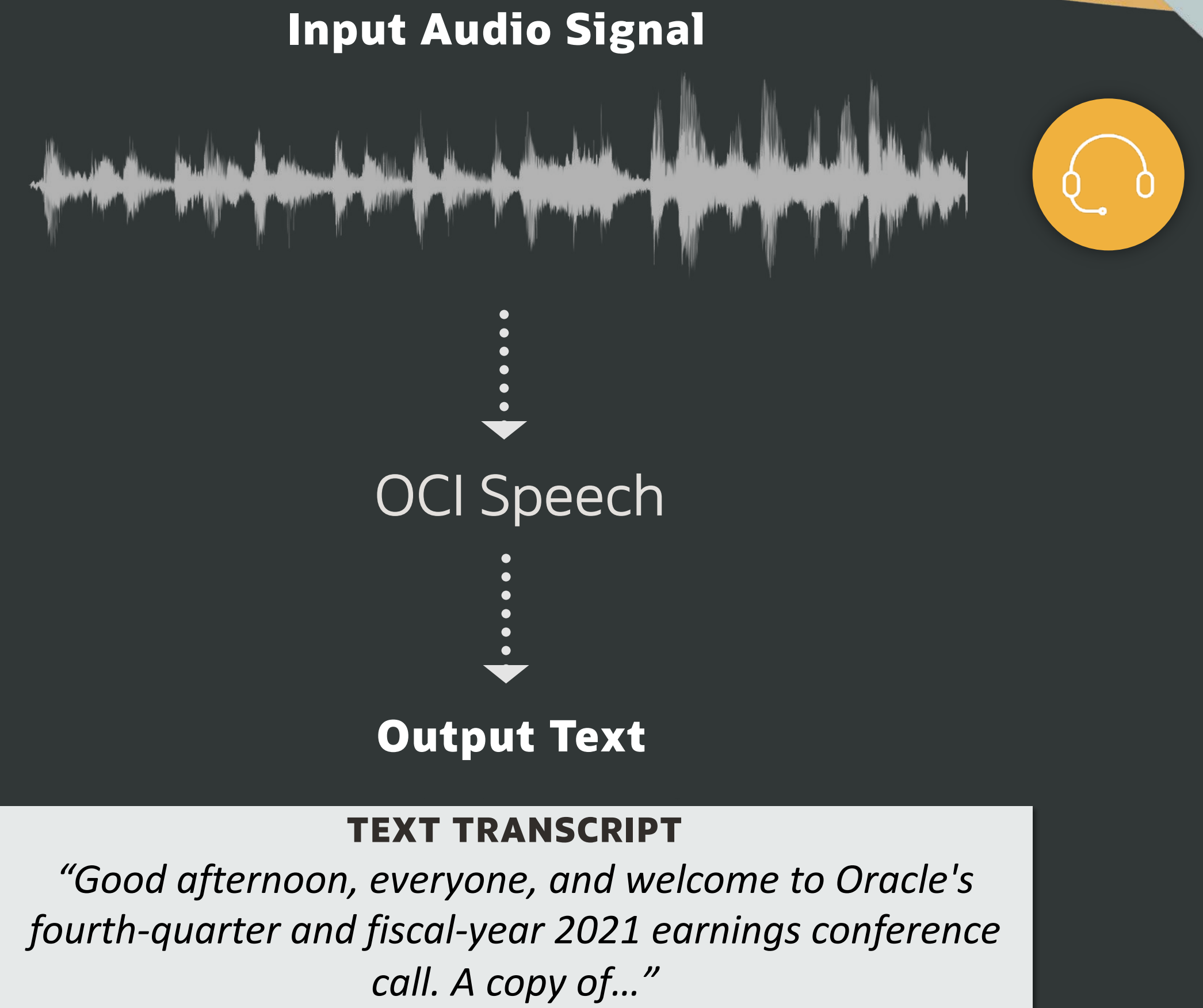
OCI Vision

Understand images and detect objects

Automate workflows and actions based on image analysis

Gain insights from visual data by automatically extracting text and objects

Enrich image-based files with metadata, including objects and colors for better indexing and retrieval in a digital asset management system
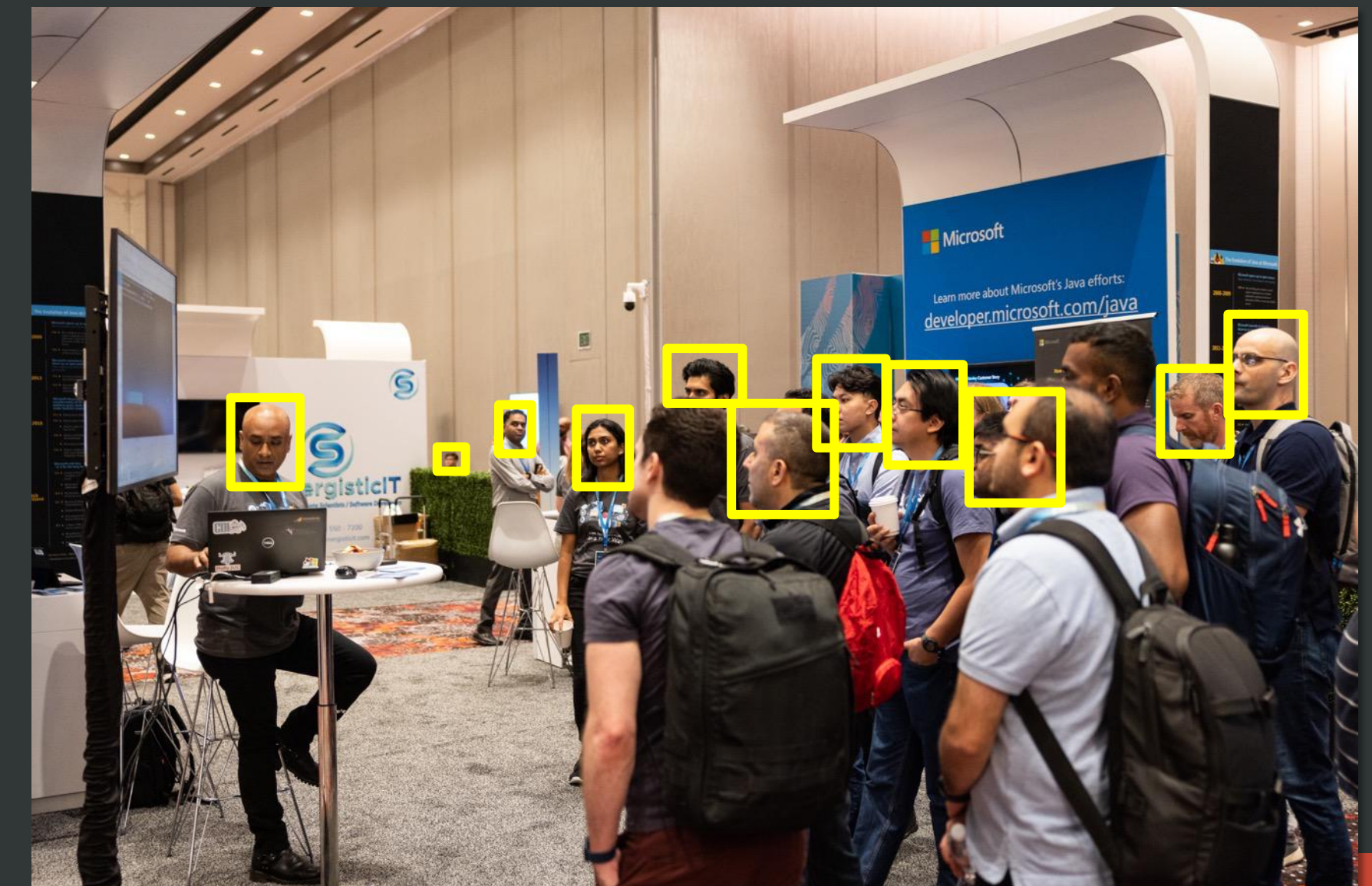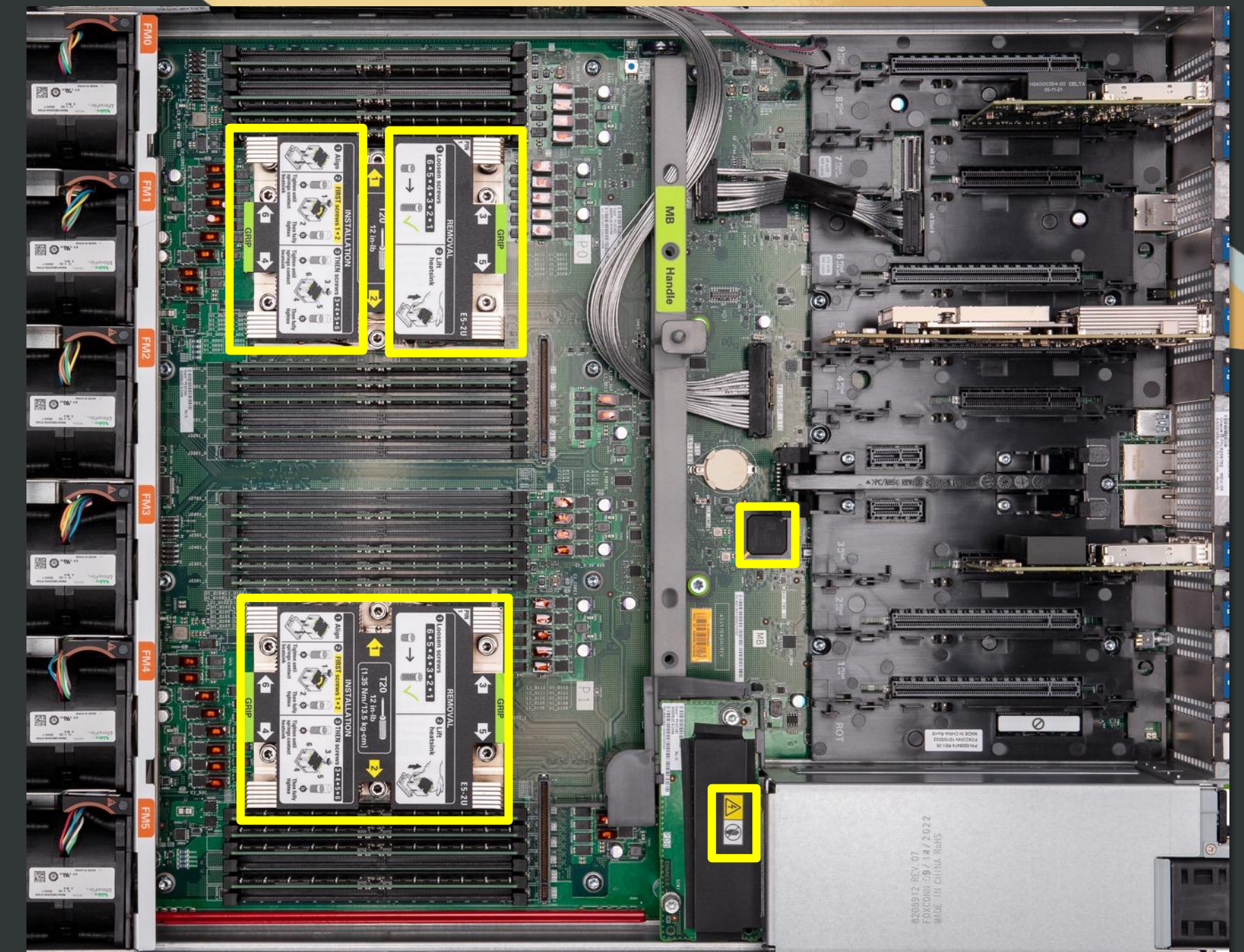
OCI Document Understanding

Recognize and extract text, tables, and key data

Extract text from scanned documents, mobile uploads, PDFs, and more

Preserve table formats and key value relationships recognized in documents

Easily automate tedious business processes based on data output in JSON format

Pretrained using enterprise focused data, providing accurate results for enterprise focused use cases

Streamlining the enterprise AI experience

OCI Generative AI coming in Fusion Applications 24A

Fusion Cloud HCM
- Candidate Experience Summary
- Compensation: Rewards and Recognition
- Survey Questions
- Goal Creation
- Performance Feedback & Development Tips
- Performance Review Summary
- About Me for Connections
- Job Category Landing Pages
- Job Match Explanations
- Feedback Assistance
- Career Summaries for Oracle Grow
- Creating SMART Team Goals

Fusion Cloud CX
- Generate a Knowledge Article from a Source Doc
- Generate a Knowledge Article from an SR
- Assisted Content Creation for Interviews
- Chat Agent Assistance
- Chat Summarization
- Issue/SR Summarization
- SLO and Campaign Text Generation

Fusion Cloud SCM
- Generate Item Descriptions and Attributes
- Sourcing; New Supplier Recommendations for Negotiation Invitation

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OCI - Modern Data Platform

Enterprises Transitioning to Democratize Data Across Many Stakeholders

Customer Personas

Visualization	Data Architect	Notebook	ELTL Tools	Low Code AppBuilder
BUSINESS USER	ARCHITECTURE	DATA SCIENTIST	DATA ENGINEERING	DATA PRODUCT
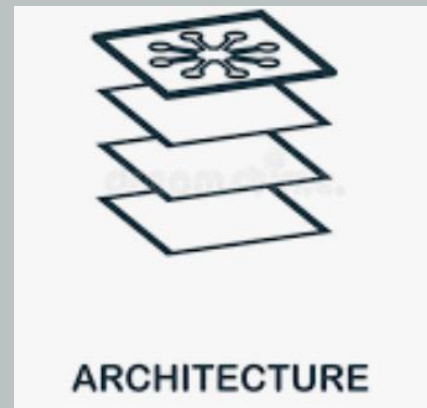
- Cloud helps brings silos of data together
- Make compliance and compartmentalization of data easy for various personas
- Democratize access to data securely using tools like Slack, Teams etc…

Generative AI - Needs a Modern Data Platform

Gen-AI and Data Platform fuels Growth. Data must be centralized, governed, processed and managed at scale.

Data sources

- Oracle SaaS / GBU Apps
- EBS / PSFT/ JDE on OCI
- 3RD Party
- Unstructured
- OLTP Database

Data curation & management

- Data Products
- Data Services
- Warehouses
- Data Catalog
- Object Storage
- Data Lake

Insights & generation

- Analytics
- DS & ML
- AI Services
- cohere / Llama 2 / Bring your own LLM — Gen AI Service

Interaction & value

- API
- ORACLE Digital Assistant
- Oracle APEX
- Oracle SaaS

Oracle Modern Data Platform

Oracle Packaged Applications
- ERP / CRM
- Any Applications
- IoT
- Social Media
- Digital Assets
- Big Data Lakes / Hadoop

Oracle Business Applications
- ERP — Enterprise Resource Planning
- SCM — Supply Chain Management
- IA — Industry Applications
- HCM — Human Capital Management
- ISV — Packaged Applications
- ACX — Advertising & Customer Experience

Applications Development
- DevOps services
- Containers and Kubernetes services
- API management services
- Low-code APEX

Data Movement and Integration
- OCI Integration services
- Real Time Stream Analytics
- ORACLE | GoldenGate
- Informatica
- kafka

Actionable Insights

Data Products

Data Processing and Storage
- Transaction Processing
- Data Lake
- Data Warehousing
- Data Flow
- Big Data Services
- Data Catalog

Governance, Security and Performance for your data

- AI-infused BI
- Real-Time Analytics — ORACLE Analytics Cloud
- ML training on latest data
- Machine Learning & Generative AI

ORACLE CLOUD

Public | Multi | Hybrid | Dedicated

OCI Modern Data Platform

Data Sources and discovery

- Oracle Fusion Modules
- SaaS apps - ADP, SFDC, WD, and many others
- On-premises Application
- Third Party Applications
- Unstructured Data
- Any Other Database

Data Integration

Data Flow (Spark)

Data Integration (Spark)

Golden Gate (Realtime)

Streaming Service (Near-Realtime)

Oracle Integration Cloud (App Connector)

Oracle Data Integrator (ETL Tool)

Data Store

Data Safe

Autonomous Data Warehouse or ExaCS

Data Flow

Big Data Service

Data Catalog

Object Storage

Raw Layer   Enriched Layer   Archive Layer

Analytics

Oracle Analytics Cloud

Data Science

AI and Gen-AI Services

Machine Learning

Measure, Act

- Enterprise reporting
- Transaction Investigation
- Fraud tracking
- Dashboards and reports
- Machine learning models
- Web-baseed apps
- Other consumers

| Low and Predictable Cost Granular control to match workload needs | Support Architecture Pattern (Data Fabric, Data Mesh, Lakehouse) | Comprehensive Data Protection Security assessment, sensitive data masking | Modern Bigdata platform Along with Serverless Spark data integration | Analytics, AI / Data Science Services with prebuilt machine learning models |

Data Integration comprehensive portfolio

Oracle offers multiple ways to load your data

App Integration	→ OCI Integration Cloud
Batch	→ OCI Data Integration
Real time	→ OCI GoldenGate
Spark	→ OCI Data Flow
Kafka	→ OCI Streaming

Data Store and Processing
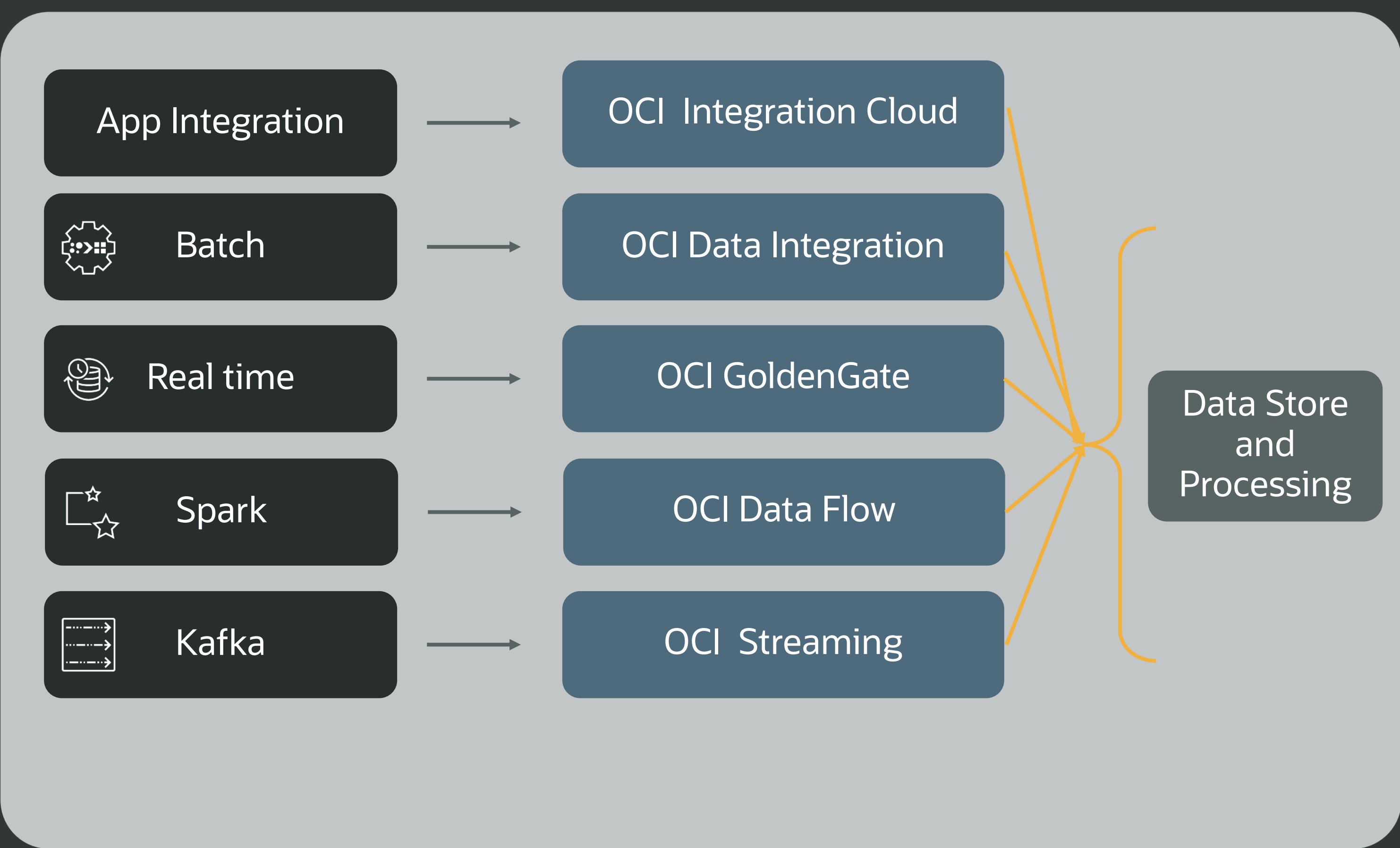
OCI Integration Cloud
Apps and API integration

OCI Data Integration
Batch data integration

OCI GoldenGate
Real-time data integration and streaming

OCI Data Flow
Managed Apache Spark service

OCI Streaming
Apache Kafka-compatible event streaming Service

Oracle Modern Data Platform
We meet you where you are!

OCI Data Flow with Apache Spark
Fully managed Apache Spark service for large datasets

Big Data with Apache Hadoop
Oracle Distribution Including Apache Hadoop, Apache Ambari, Apache HBase, Apache Hive, Apache Spark, more

Data Catalog
Metadata management to help discover data and support data governance on OCI

performance

NEW
Cache with Redis

Transaction processing

Data Warehousing

NEW
Database with PostgreSQL

Data Flow With Spark

Big Data with Hadoop

NEW
Data Lake

OpenSearch

Data Catalog

security & governance
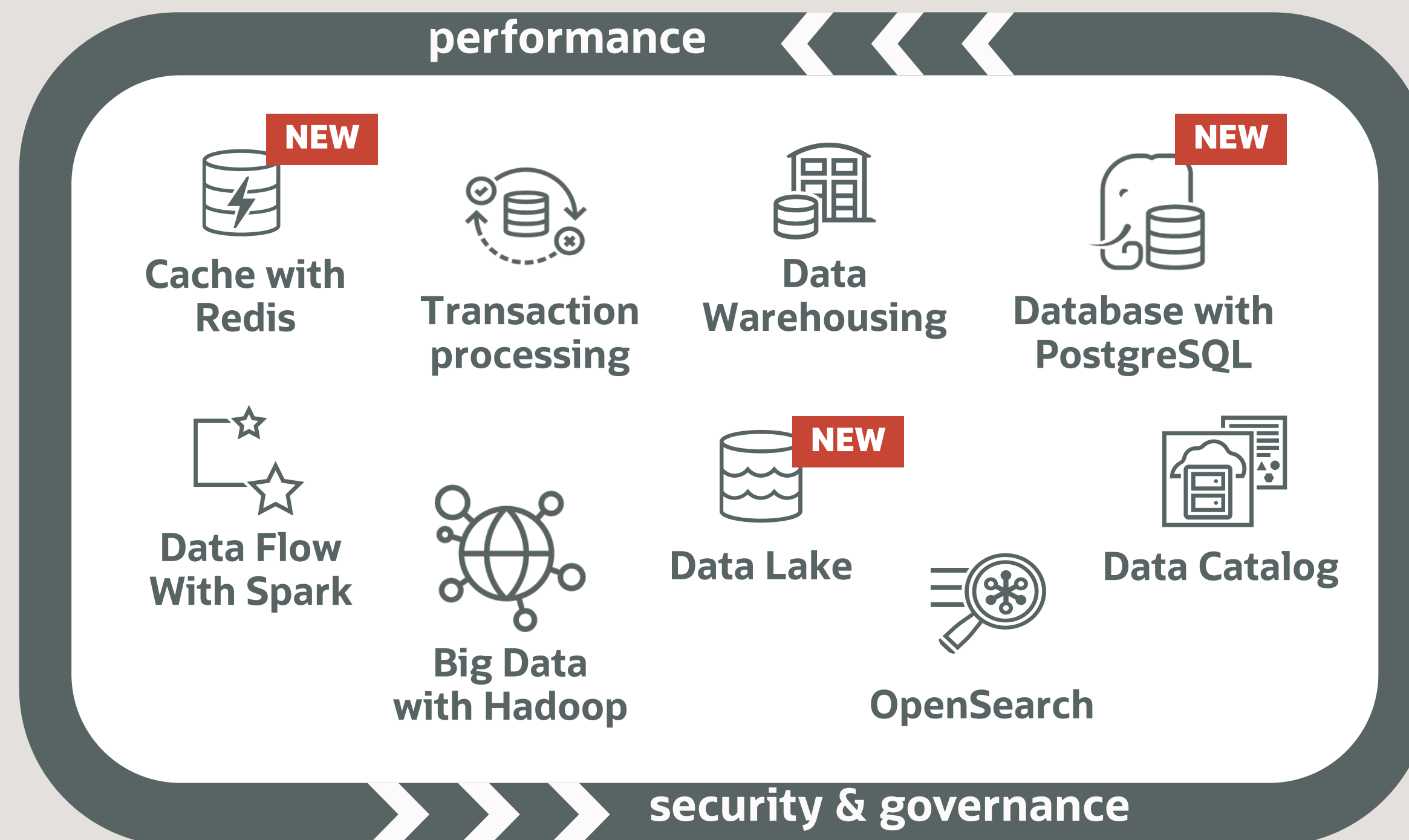
OpenSearch
Fully managed open source search service for you application search and log analysis

Redis
Managed in-memory caching solution to improve your application performance and customer experience

PostgreSQL
Managed PostgreSQL database with optimized performance, dynamically scale storage

Informatica **Enterprise Data Governance**
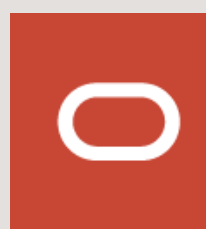
OCI Big Data Service and OCI Data Flow managed open-source services on shared storage and catalog

Big Data Service on Oracle Hadoop

Oracle Hadoop w/Ambari			
Hue		Oozie	
Hive	Tez	Spark	Pig
YARN		Zookeeper	
HDFS		Flink	
Kafka		Presto/Trino	

Ranger Authorization, Navigator Audit

Data Flow

Serverless Apache Spark

Interactive Spark SQL

Unlimited scale

Extreme performance

Shared data, catalog, governance

Unified Catalog, Governance, Security

Oracle Data Lake (Object Store)

OCI Infrastructure
CPU | GPU | Storage | Network

Data Flow simplifies the Spark ecosystem

Fully managed Apache Spark ETL, SQL and Streaming

Data Engineering Jobs	Interactive Spark SQL	Spark Streaming
Serverless Spark for Big Data and ML at any scale with no administration.	Petabyte-scale data discovery, preparation and interactive query on OCI Object Storage from BI tools using ODBC or JDBC.	Serverless Spark Streaming with deep OCI integration.
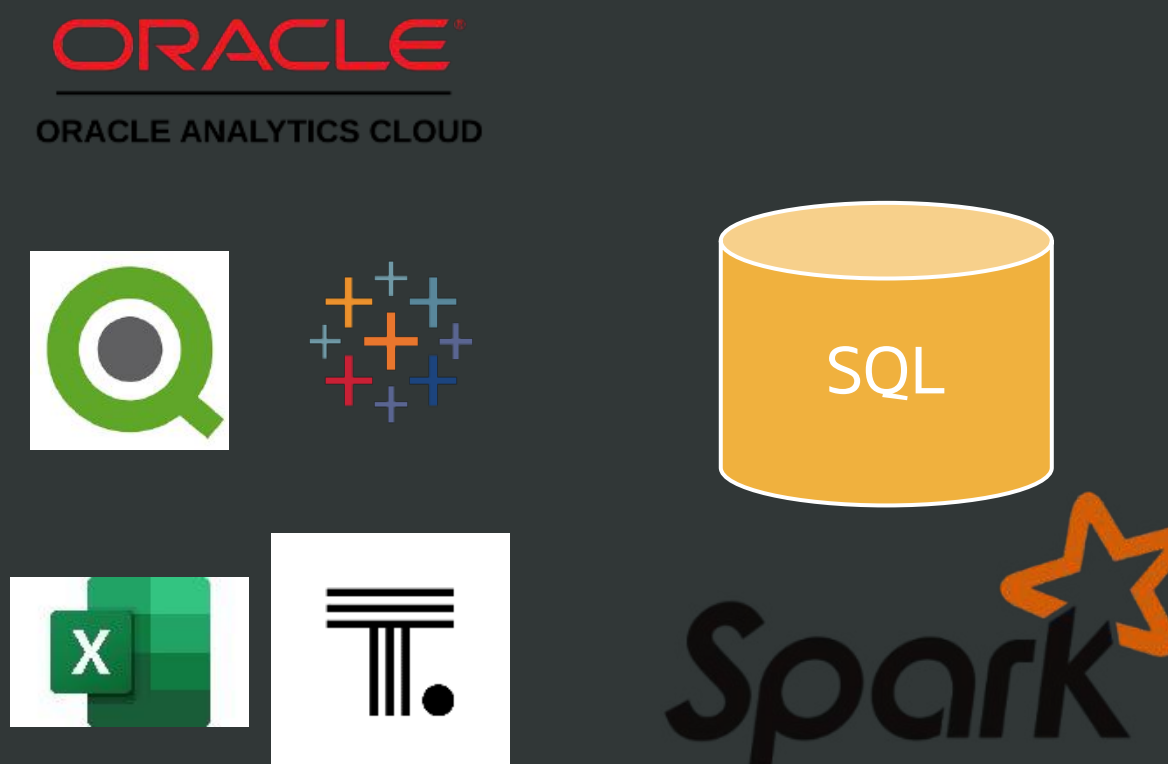
Data Engineering with Data Flow

Spark on Demand
Ephemeral Spark jobs on demand in about a minute.

Simple Operations
Built-in monitoring, alerting and diagnostic UIs.

Enterprise Security
RBAC and Impersonation for fine-grained data security.

Lowest Cost
No charge for the service, only pay for IaaS while it runs.
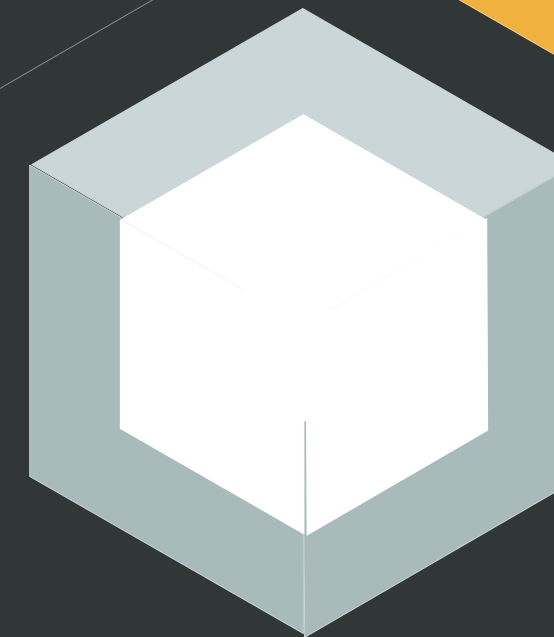
Interactive SQL with Data Flow SQL Endpoint

Fully-Managed Apache SparkSQL
Deploy SparkSQL endpoints in minutes with nothing to maintain

Discover your Data Lake
Query structured and unstructured data in object storage with SQL

Fast and Scalable
Fast in-memory performance
Scale to thousands of cores

Curate, Share and Secure
Publish data to Oracle Catalog

Integrated
Query with Oracle Analytics Cloud
or bring your favorite BI Tool

Data Flow Spark SQL endpoints can be connected over JDBC/ ODBC for ad-hoc queries and analytics at petabyte scale

Raw Data

Prepare
Discover Data

Data Engineers

Model
Prepare and Model Datasets

Data Scientists

Analyze
Summarize and Curate for Analysts

Business Analysts

Data Stewards

Secure Access to Data
Standardize Taxonomies

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ORACLE ANALYTICS CLOUD

Insights

OCI Object Storage

Oracle Data Catalog
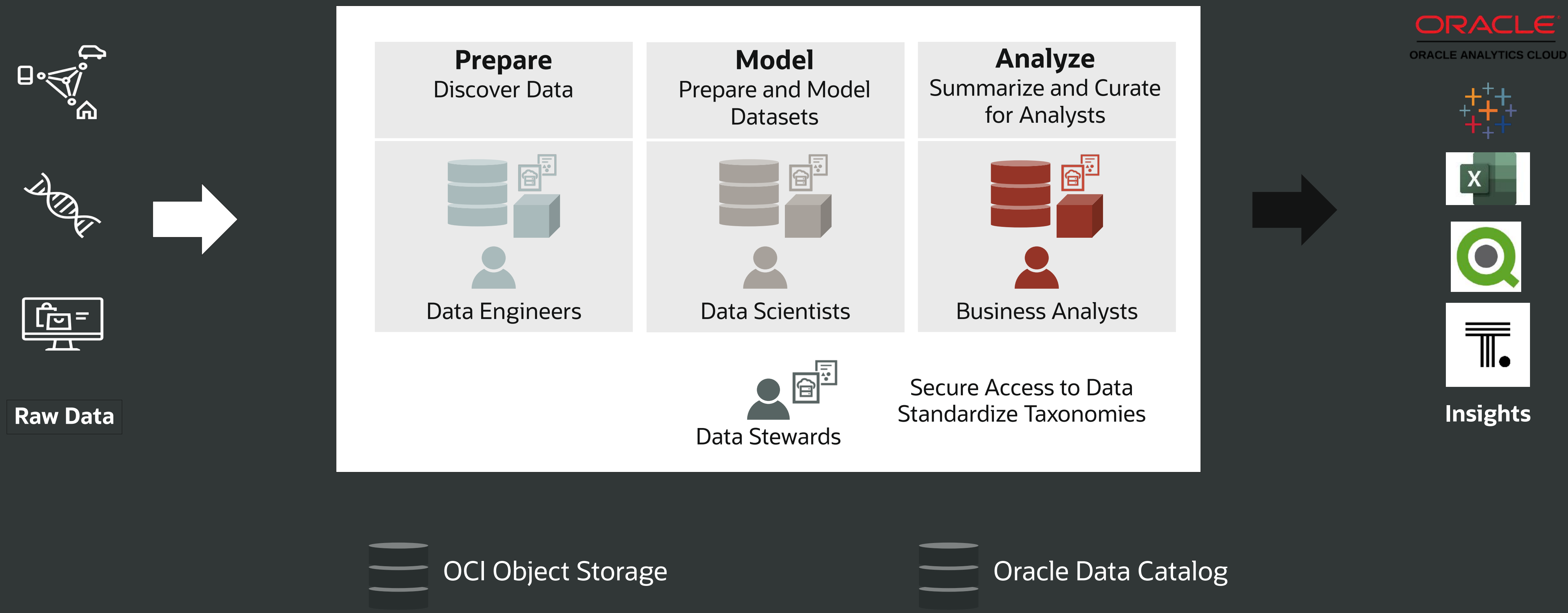
Data Flow now pre-includes Delta Lake libraries with Spark

OCI Streaming

Autonomous Data Warehouse

Object Storage

DELTA LAKE

OCI Data Flow

OCI Streaming

Autonomous Data Warehouse

Object Storage

DELTA LAKE

ACID Transactions
Protect your data with serializability, the strongest level of isolation

Scalable Metadata
Handle petabyte-scale tables with billions of partitions and files with ease

Time Travel
Access/revert to earlier versions of data for audits, rollbacks, or reproduce

Unified Batch/Streaming
Exactly once semantics ingestion to backfill to interactive queries

Schema Evolution / Enforcement
Prevent bad data from causing data corruption

Audit History
Delta Lake log all change details providing a fill audit trail

DML Operations
SQL, Scala/Java and Python APIs to merge, update and delete datasets

Introducing OCI Cache with Redis

OCI Cache with Redis is a fully managed distributed caching service that uses open-source **Redis 7.0.5.**

The service automates the complex and routine tasks associated with deploying and managing a distributed environment so you can focus on building great applications.

We offer easy cluster creation, automated HA, patching, security updates, and resizing.

                                    [Date]
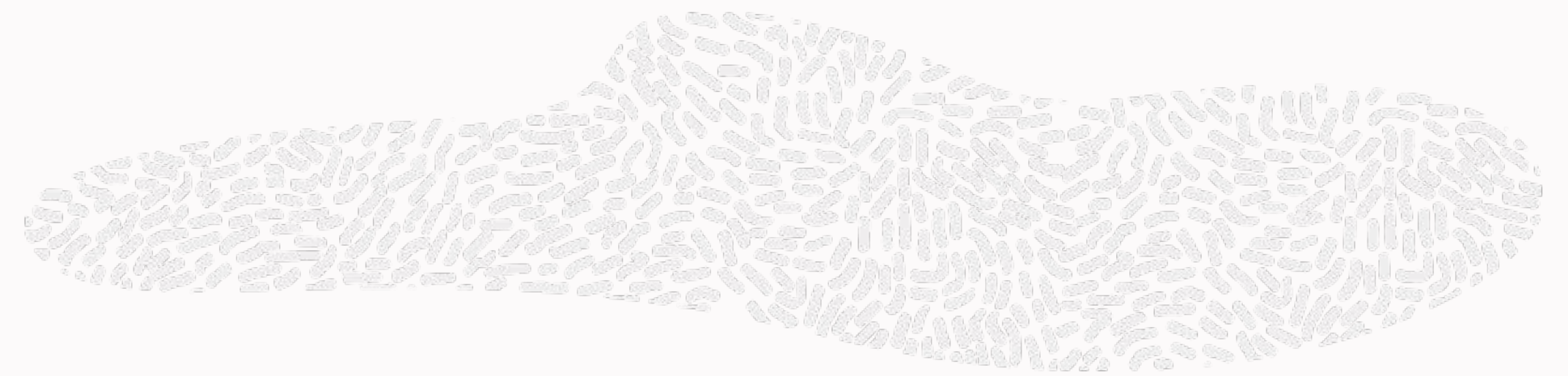
Key features
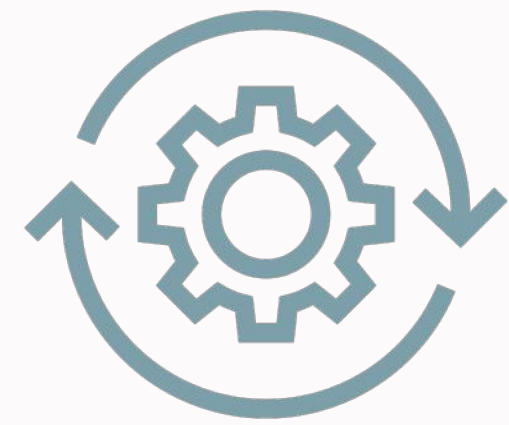
Fully Managed

- Automated cluster creation
- OS-level patching
- Monitoring
- Failover
- SLA 99.95%

Unparalleled Simplicity

- Specify the amount of memory and number of nodes and we take care of everything else
- Choose exact amount of memory for your workload. No need to overprovision

Scalable

- Scale your cache on the fly with no downtime
- Scale from 2GB up to 500GB per node and 5 nodes per cluster to meet your caching needs

Powerful Insights

- Out of box metrics to monitor cluster health and performance
- Access CPU and Memory utilization
- See transmitted and received network bytes

Automated HA

- Deploy 2 or more nodes and OCI automatically spreads them across multiple Availability or Fault Domains

[Date]

OCI Database with PostgreSQL
A fully managed service

Users	Application	Back end

Users

User

API service

End users initiate requests for data through the application interface.

Application

Container

Virtual machine

Application

The application processes incoming requests and facilitates the flow of data between users and the back end.

Back end

OCI Database with PostgreSQL

Ideal for

OLTP Spatial OLAP Vector

1 **Fully managed**: Spend less time managing PostgreSQL and infrastructure and more time developing and running modern applications.

2 **Instantaneous failover:** Get the best availability because we've designed Database Optimized Storage architecture with near instant failover capability fully decoupled from compute.

3 **Fully compatible with PostgreSQL:** We are 100% compatible with PostgreSQL open source code so you can migrate and use the service right away.

OCI Database with PostgreSQL
A fully managed service

60%
Less costly than Amazon Aurora with PostgreSQL[1]

3X
Faster than a self-managed cluster[2]

99.99%
Availability SLA

Complete and Simple Platform for All Data Management Needs

Choose your Oracle journey

performance

Autonomous Transaction Processing

Autonomous Data Warehouse

Autonomous JSON Database

{JSON}

MySQL HeatWave

Open Source Databases and Big Data

Data Lake

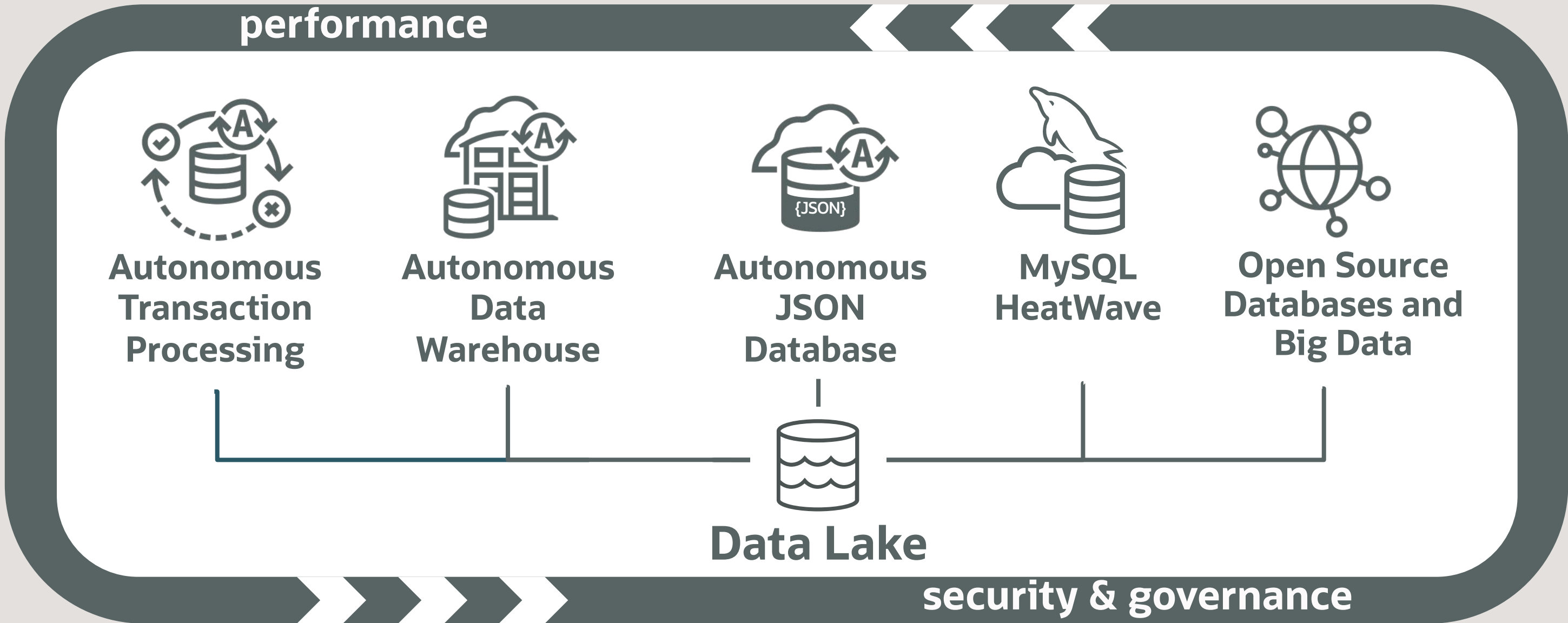**security & governance**

Autonomous Transaction Processing
Pre-configured for row format, indexes, and data caching to accelerate transaction processing and mixed workloads

Autonomous Data Warehouse
Pre-configured for columnar format, partitioning, and large joins to accelerate analytics and data warehouse

Autonomous JSON
Transactions and analytics on JSON data, and includes MongoDB compatible API
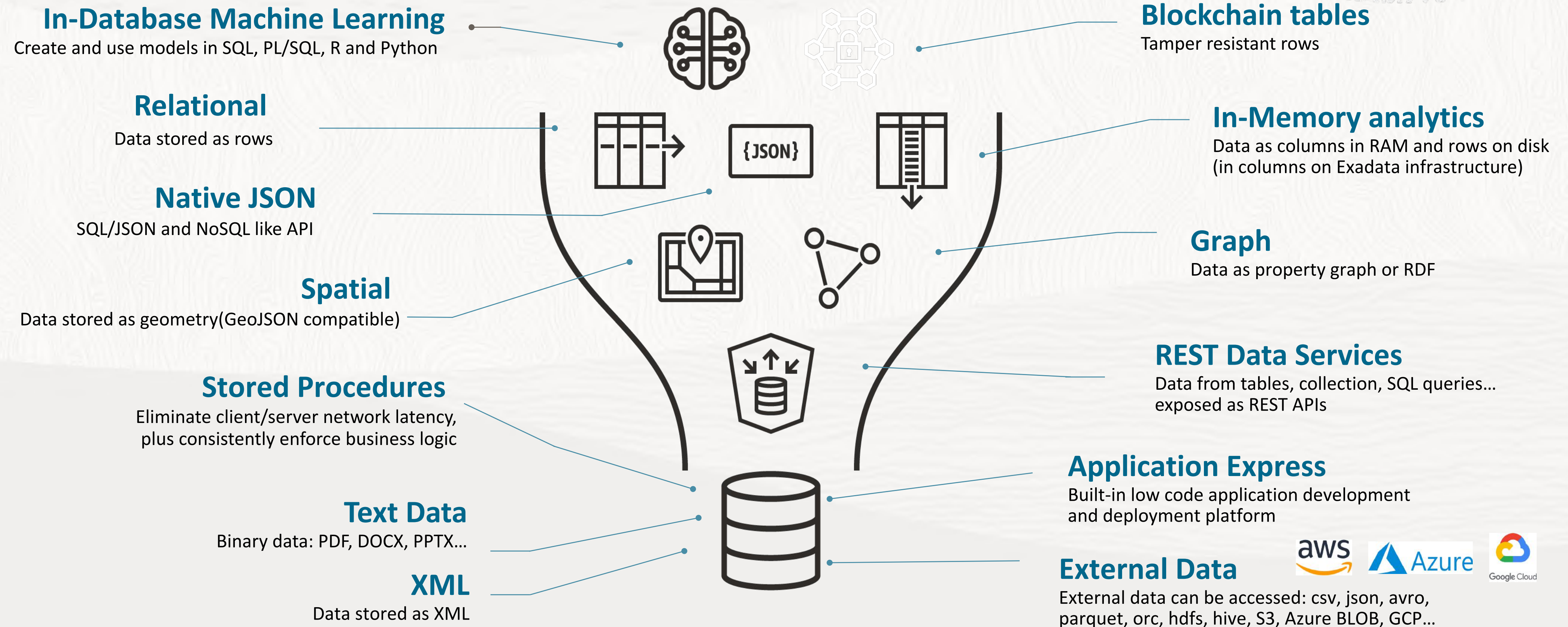
MySQL HeatWave
One MySQL cloud database service for transactions, real-time analytics across data warehouses and data lakes, and machine learning (ML)—without ETL

Open Source Databases and Big Data
A portfolio of managed open source databases and big data services

Autonomous Database Powered by Oracle Converged Database Engine

Runs on Exadata: Move Compute to the Data; Dramatically Simplifies Application Development

In-Database Machine Learning
Create and use models in SQL, PL/SQL, R and Python

Relational
Data stored as rows

Native JSON
SQL/JSON and NoSQL like API

Spatial
Data stored as geometry(GeoJSON compatible)

Stored Procedures
Eliminate client/server network latency,
plus consistently enforce business logic

Text Data
Binary data: PDF, DOCX, PPTX...

XML
Data stored as XML

Blockchain tables
Tamper resistant rows

In-Memory analytics
Data as columns in RAM and rows on disk
(in columns on Exadata infrastructure)

Graph
Data as property graph or RDF

REST Data Services
Data from tables, collection, SQL queries...
exposed as REST APIs

Application Express
Built-in low code application development
and deployment platform

External Data
External data can be accessed: csv, json, avro,
parquet, orc, hdfs, hive, S3, Azure BLOB, GCP...

{JSON}

Multi-model & Multi-workload

Oracle Database 23c – The next Long Term Support Release

New In 23c
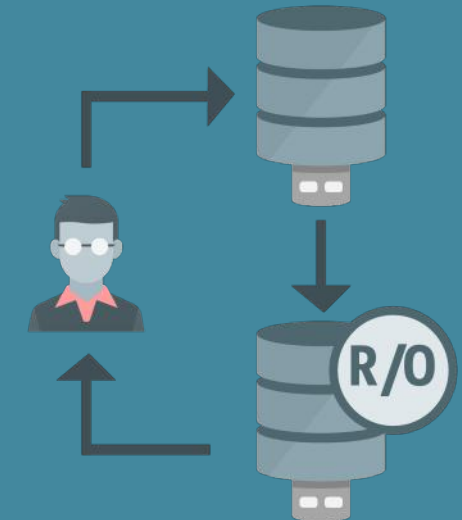
SQL Domains

Schema Privileges

Real-time SQL Plan Management

JSON Schema
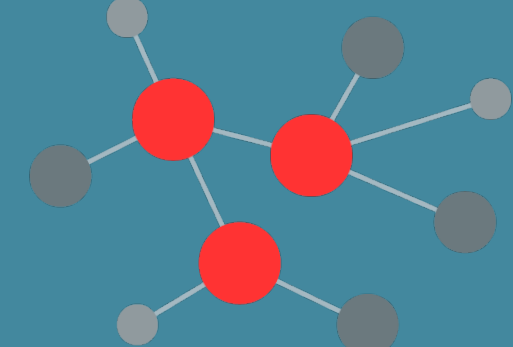
Oracle Database
23c
App Simple

Read-Only Per-PDB Standby
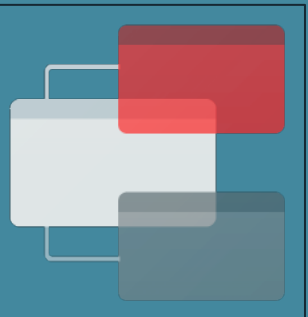
Operational Property Graphs
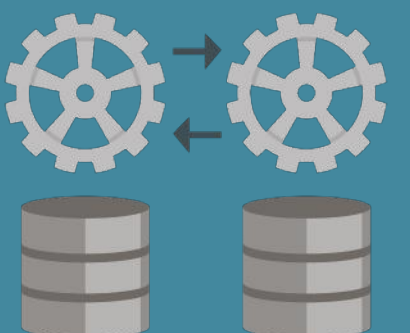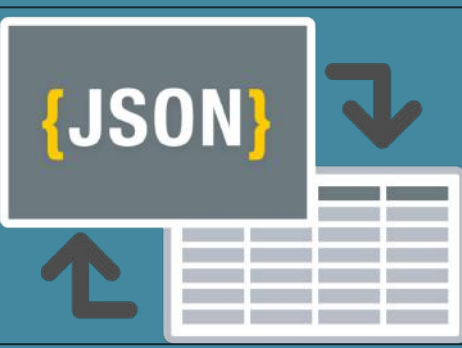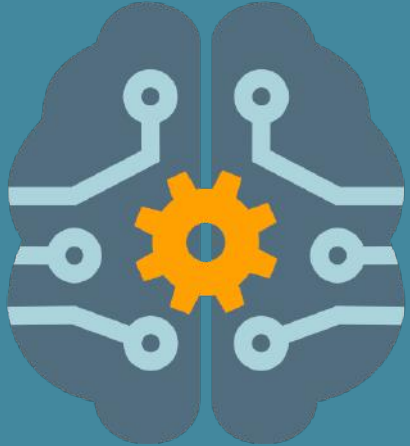
Microservice Support
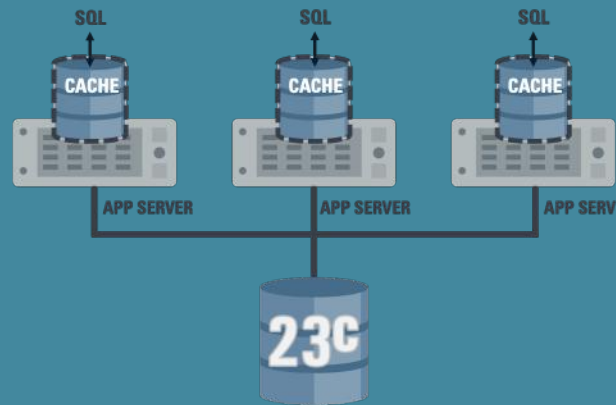
JSON Relational Duality

AI Vector Search
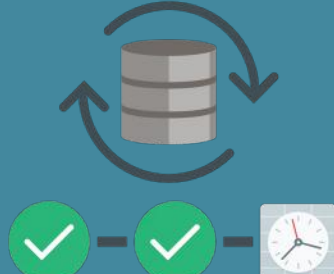
True Cache

SQL Firewall

Priority Transactions

Rolling Patching

JS Stored Procedures

Developer Role

Shrink Tablespace

Boolean Datatype

Globally Distributed Database

MySQL HeatWave

Transactions, real-time analytics across data warehouses and data lakes, and machine learning in one cloud database service
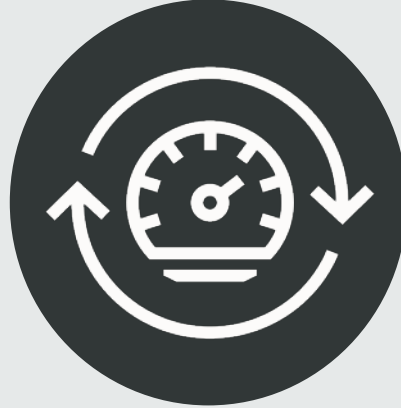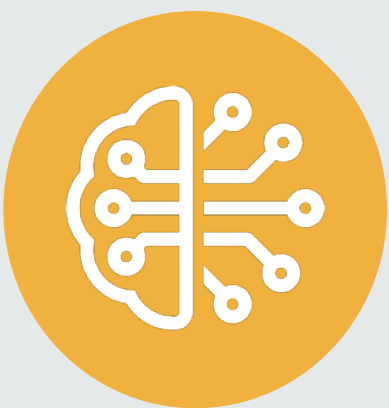
Social, eCommerce, gaming, healthcare, fintech, IoT apps. Analytics and ML tools.

ORACLE Analytics Cloud   Apache Zeppelin   jupyter

↓ Queries   ↑ Results

MySQL HeatWave

OLTP   Analytics   Vector Store   Generative AI   In-Database ML   Autopilot

Object Store

CSV   **Parquet**

AVRO   **Database exports**
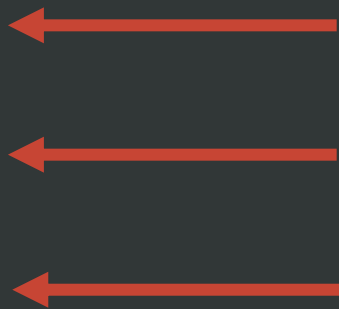
For both MySQL and non-MySQL workloads

Data remains in object store, processing is done in HeatWave

Oracle Analytics

Converged analytics platform for all personas, workloads and data

Data Engineers

Business Analysts

Business Users

Citizen Data Scientists

Governed Analytics		LOB/Self-Service Analytics		Augmented Analytics	
Dashboards	Distributed Pixel-Perfect Reports	Data Visualization	Self-Service Data Preparation	Voice & Chatbot	Natural Language
Semantic Models	Query Federation	Storytelling	Direct Connectivity	Data Profiling & Enrichment	Gen AI
Briefing Books	Data Export	Collaboration	Mobile	Automated Insights	Machine Learning

Open Connectivity
Oracle Cloud | Third Party Cloud | On-Premises

Click here or drag data to add a filter

Search

- OECO FLOOD HISTORY v2
  - A ID
  - # Row Count
  - A Flood Type
  - A Geo Type
  - A IPAC
  - A Geo Code
  - A Geo Name
  - A Parent Geo Code
  - A Country
  - A Period
  - ⏱ Year
  - A Flood Recover
  - # Pop. Exp %
  - # Total Population
  - # Pop. Exposed
  - # Built Area Exp %
  - # Total Built Area
  - # Built Area Exposed
  - # Crop Land Exp %
  - # Land Exp %
  - # Total Land Surface
  - # Land Exposed
  - # Gdp Per Capita
  - # Gdp Exposed
- My Calculations
- ◇ Value Labels

Population Exp % by Flood Type

Netherlands: Coastal 51.25, River 15.67
China: Coastal 3.26, River 17.85
Japan: Coastal 2.68, River 8.08
United States: Coastal 0.15, River 5.57

Flood Type ■ Coastal ■ River
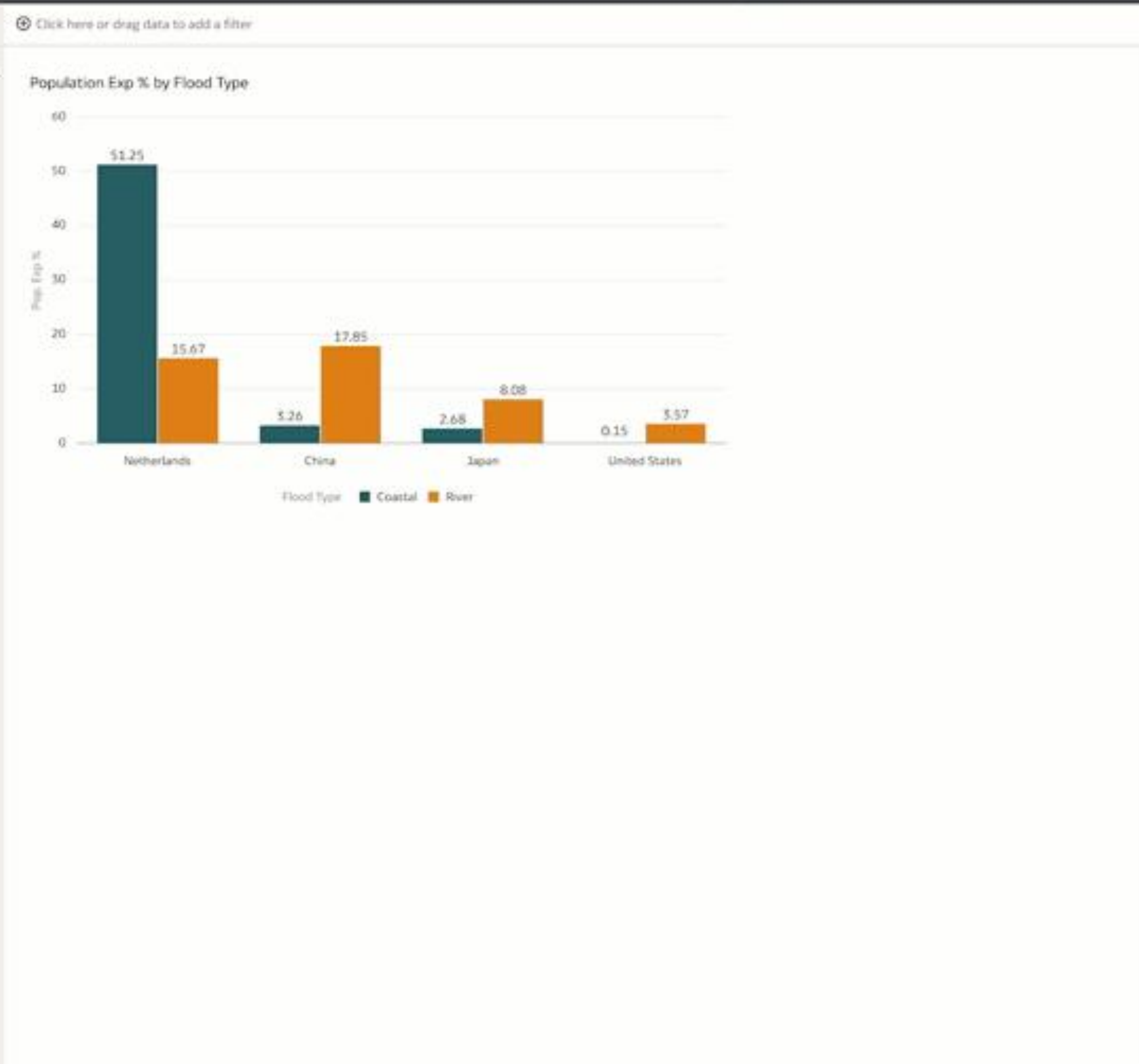
Insights | Chat

Other countries with significant flood prevention projects include the **United Kingdom, Germany, France, and Australia.** The projects typically involve a combination of structural measures, such as levees and dams, and non-structural measures, such as flood forecasting and warning system.

What is the population impact of flooding in these countries?

Among the 4 countries with the biggest flood prevention projects, The Netherlands has the biggest population exposure with 67% affected by flooding. 51% is due to Coastal flooding while 16% is due to River flooding. China has the next highest population exposure with 21% affected by flooding. 3% is due to Coastal flooding and 18% is due to River flooding.

Netherlands 66.92, China 21.31, Japan 10.76, United States 5.71

Add Flood Type

China, Japan, and the United States has a higher population exposure % from River flooding. The Netherlands has a higher population exposure % from Coastal flooding, which is primarily due to over 50% of the land being exposed to Coastal flooding.

Netherlands: 51.25, 15.67
China: 3.26, 17.85
Japan: 2.68, 8.08
United States: 0.15, 5.57

Flood Type ■ Coastal ■ River

Change Chart Type | Add field | Replace field | Remove field | Filter

Create a calculation for GDP Exp %

Canvas

Low-code Application development with APEX

ā'pĕks
(#orclapex)

World's most popular enterprise low-code platform

Build scalable and secure apps 20X faster, with 100X less code

Delivers the most productive way to develop and deploy mobile, web, and desktop apps everywhere – cloud and on-premises

19M+ apps created

2M+ live APEX apps

3K+ APEX apps created daily

700K+ APEX developers

75% of Fortune 500 use Oracle APEX

ORACLE

Oracle Cloud Infrastructure

Generation 2 – Internet of Cloud

Deploy in commercial, government, or sovereign regions

Legend:
- 🟥 38 Commercial
- ⬜ 5 Commercial, planned
- 🟦 8 Government
- 🟨 2 Sovereign
- 🟧 12 Oracle Interconnect for Azure
- 🔗 1 Oracle Database@Azure
- 🔗 9 Oracle Database@Azure, planned
- DR 15 Disaster Recovery within border
- DR 8 Disaster Recovery in other commercial regions

Canada
Toronto
Montreal

United States
Ashburn
Chicago
Phoenix
San Jose

US Government
US Gov East (FedRAMP)
US Gov West (FedRAMP)
US DoD East (IL-5)
US DoD North (IL-5)
US DoD West (IL-5)
US National security regions

Mexico
Querétaro
Monterrey

Colombia
Bogotá

Chile
Santiago
Valparaíso

Brazil
São Paulo
Vinhedo

UK
London
Newport

UK Government
UK Gov South
UK Gov West

Switzerland
Zurich

EU
Amsterdam
Frankfurt
Madrid
Marseille
Milan
Paris
Stockholm

EU Sovereign
Frankfurt
Madrid

Serbia
Jovanovac

Israel
Jerusalem
(+1 planned)

Kenya

Saudi Arabia
Jeddah
(+2 planned)

South Africa
Johannesburg

United Arab Emirates
Dubai
Abu Dhabi

India
Mumbai
Hyderabad

Singapore
Singapore
(+1 planned)

Japan
Tokyo
Osaka

South Korea
Seoul
Chuncheon

Australia
Sydney
Melbourne

Australia Government
Australia Gov

100% renewable energy by 2025

OCI's unique architecture
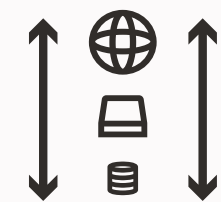
Flex infrastructure
Precise resource fit

Off-box virtualization
Isolation for security, performance, and economics.

Nonblocking networks

L2 network virtualization
Network optimized for performance and service reliability
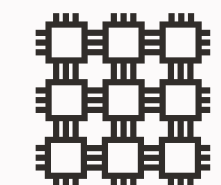
RDMA cluster networking

Powers New *and* Existing Workloads
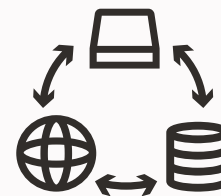
Traditional apps
Performance, elastic benefits without re-architecture, modernize incrementally

HPC / Machine Learning
Scale up to 20,000 CPUs or or 512 GPUs in a cluster

Compute-intensive apps
Bare metal instances for CPU and GPUs

Network-intensive apps
No network contention, lowest cost outbound in the market

Critical databases
Native database clustering, scale up to PBs and thousands of cores

Flexible sizing vs savings plans
We're (still) noticeably cheaper
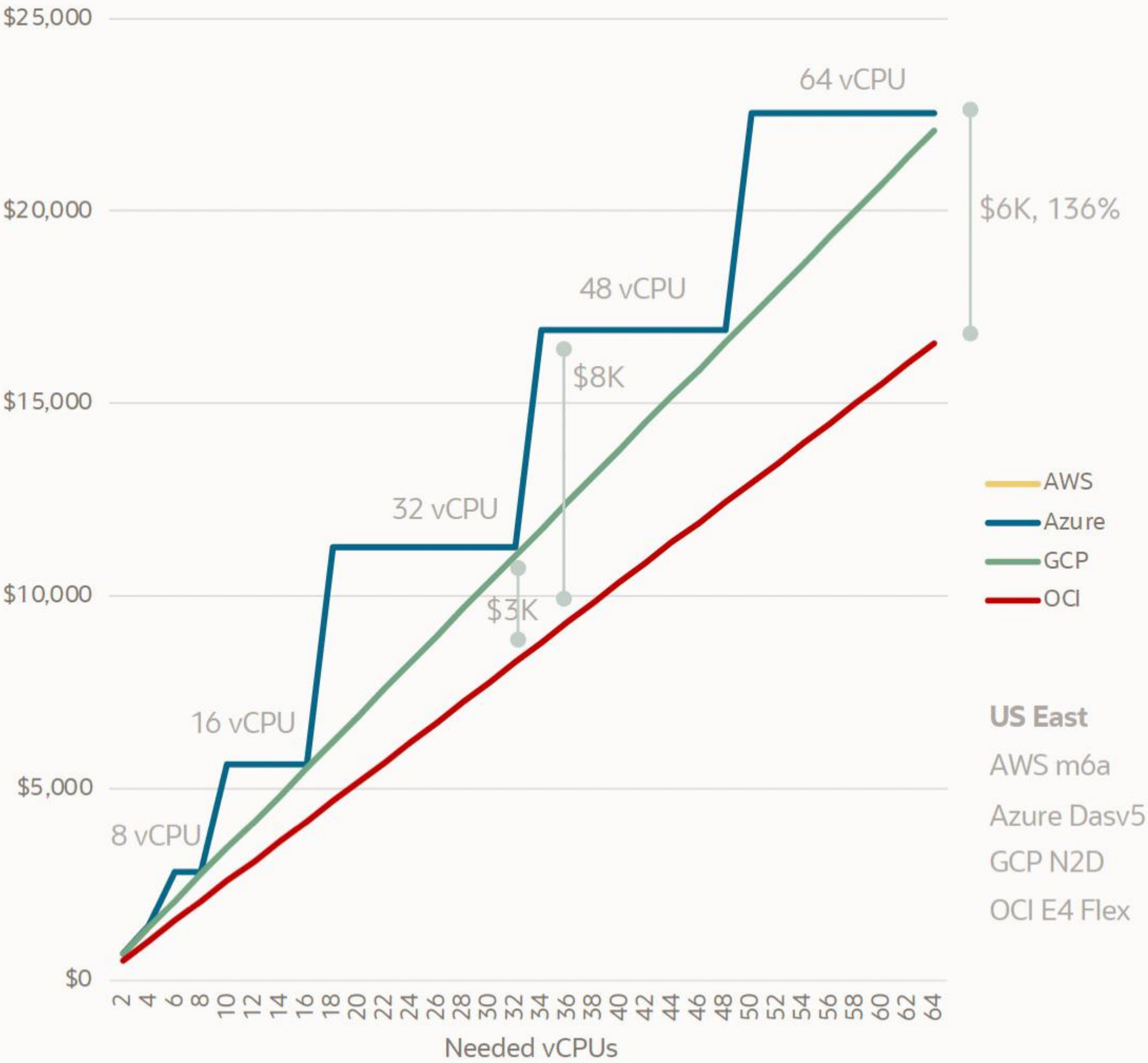
OCI and Google Cloud offer flexible CPU virtual machines

AWS and Azure offer fixed sizes, forcing you to "upsize" even if you just need "a little bit more"

Needed vCPUs	OCI		AWS		Azure	Google Cloud
2	2	(1 OCPU)	2	.large	2	2
4	4	(2 OCPU)	4	.xlarge	4	4
6	6	(3 OCPU)	8	.2xlarge	8	6
8	8	(4 OCPU)	8	.2xlarge	8	8
10	10	(5 OCPU)	16	.4xlarge	16	10
12	12	(6 OCPU)	16	.4xlarge	16	12
14	14	(7 OCPU)	16	.4xlarge	16	14
16	16	(8 OCPU)	16	.4xlarge	16	16
18	18	(9 OCPU)	32	.8xlarge	32	18
20	20	(10 OCPU)	32	.8xlarge	32	20
22	22	(11 OCPU)	32	.8xlarge	32	22
24	24	(12 OCPU)	32	.8xlarge	32	24
26	26	(13 OCPU)	32	.8xlarge	32	26
28	28	(14 OCPU)	32	.8xlarge	32	28
30	30	(15 OCPU)	32	.8xlarge	32	30
32	32	(16 OCPU)	32	.8xlarge	32	32

Annual cost of a virtual machine
(95% usage over all 12 months)

Legend: AWS, Azure, GCP, OCI

US East
AWS m6a
Azure Dasv5
GCP N2D
OCI E4 Flex

Savings plans are used when cheaper than on-demand pricing.
AWS and Azure lines overlap (with only Azure showing).

Better Cloud Economics

- Private network connectivity that costs **74% less**
- **More than 3X** better price-performance for compute
- **Up to 44% less** expensive infrastructure with local solid-state disks, twice the RAM, RDMA networking, and a performance SLA
- **20X the input/output** operations per second for less than half the cost

		ORACLE	aws	Azure	Google Cloud
COMPUTE	**Virtual Machine** [1] (AMD, 4 vCPU, 16 GB RAM Monthly)	$54	+ 132%	+ 132%	+ 83%
	Dense IO Virtual Machine Instances ($/OCPU/Hour)	$0.1275	+ 22%	+ 35%	+ 3% [2]
	Bare Metal Standard ($/OCPU/Hour)	$0.0638	+ 50%	N/A [3]	N/A [4]
	Kubernetes Cluster (100 vCPU, 750 GB RAM, Monthly)	$2,373	+ 101%	+ 80%	+ 45%
STORAGE	**Block Storage** [5] (400 GB, 20K IOPS, Monthly)	$17	69X	25X	69X
	Object Storage [6] (1 TB, standard access, Monthly)	$26	- 6%	- 29%	- 22%
NETWORK	**Internet Data Egress** (50 TB, Monthly)	$340	12X	9X	12X
	VPN (10 site to site VPN with 24 hrs connection)	Always Free	Paid	Paid	Paid
	Network Load Balancer	Always Free	Paid	Paid	Paid
	NAT Gateway	Always Free	Paid	Paid	Paid
DATABASE	**Private Line Network** (1 Gbps, 100 TB Data, Monthly)	$155	14X	18X	13X
SECURITY	**MySQL Database** (16 vCPU, 64 GB RAM, 500 GB, Monthly)	$345	+ 206%	+ 98%	+ 159%
MONITORING	**Vulnerability & Threat Scanning**	Always Free	Paid	Paid	Paid
	Log Storage	Free 10 GB	Paid	Paid	Paid
	CloudWatch – Detailed and custom Metrics	Free 500Mn Datapoints	Paid	Paid	Paid

Growth Tax Contributors
~ **25%**
=> Impact grows with Scale

Gen1 Legacy Tax
~**15%**
Always free services on OCI

[1] Leveraging OCI flexible shape (AMD processors for all cloud vendors)
[2] No local storage is included. This will be an additional cost
[3] Microsoft does not publicly disclose its bare metal pricing
[4] Google does not publicly disclose its bare metal pricing
[5] AWS EBS io2, Azure LRS P30, GCP Persistent Disk
[6] AWS S3 Intelligent Tiering, Azure Block Blob, Hot (LRS), GCP Cloud Storage, Standard. Read and write requests are additional costs (not included here)

Ref: https://www.oracle.com/cloud/economics/

Cluster networking

- Workload parallelization for AI training and Cloud Native Application to reduces time and cost for each run and performance
- Achieved with RDMA, using decades of prior experience in Oracle Database
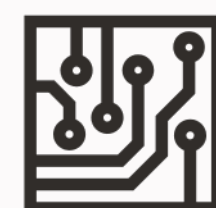- Purpose-built, dedicated network based on RoCE v2

Future

- Qualifying next generation Ethernet and Infiniband technologies
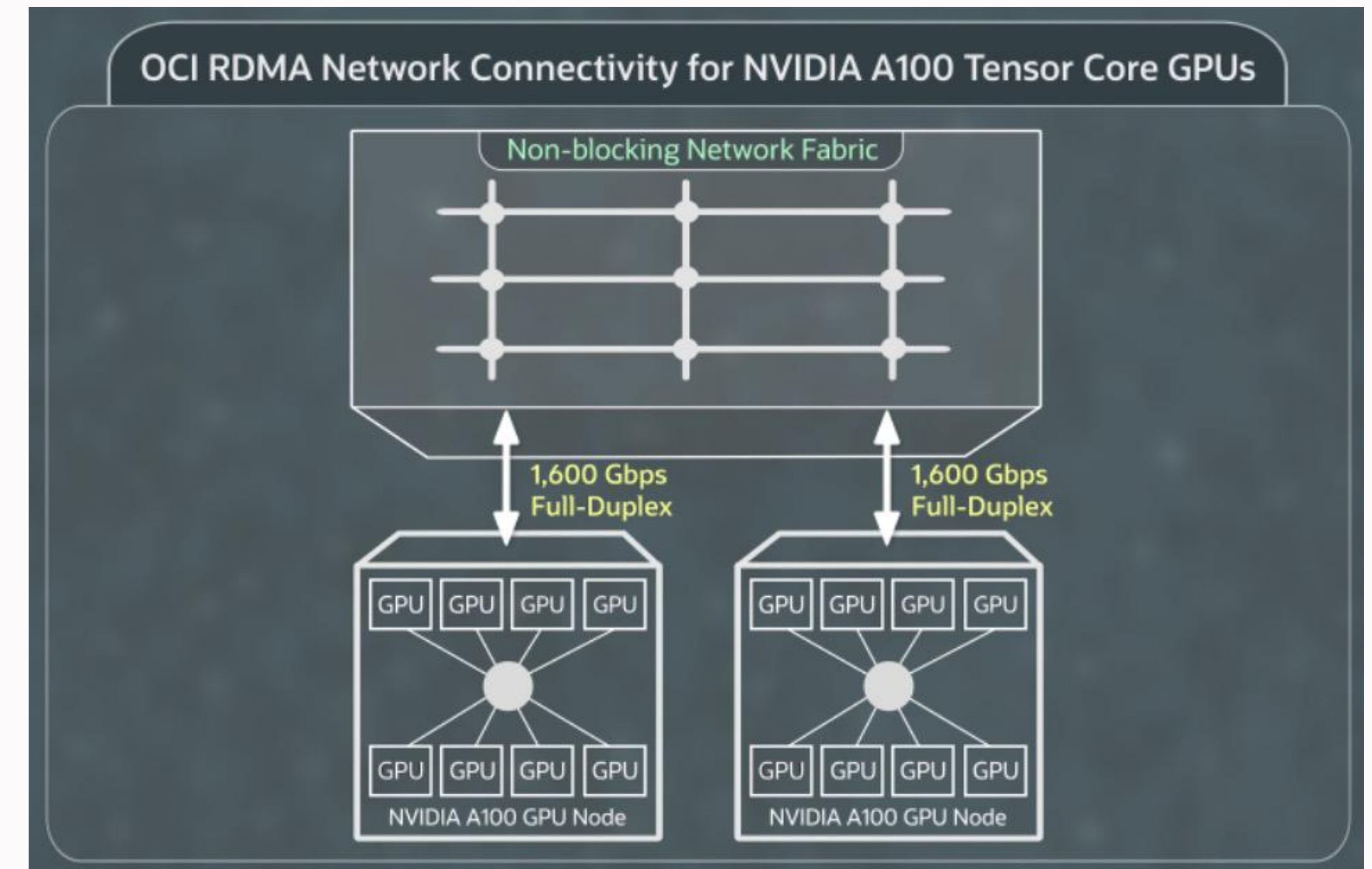
OCI Supercluster enables AI training at massive scale
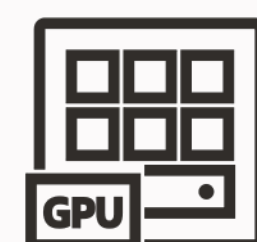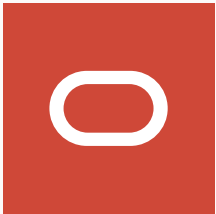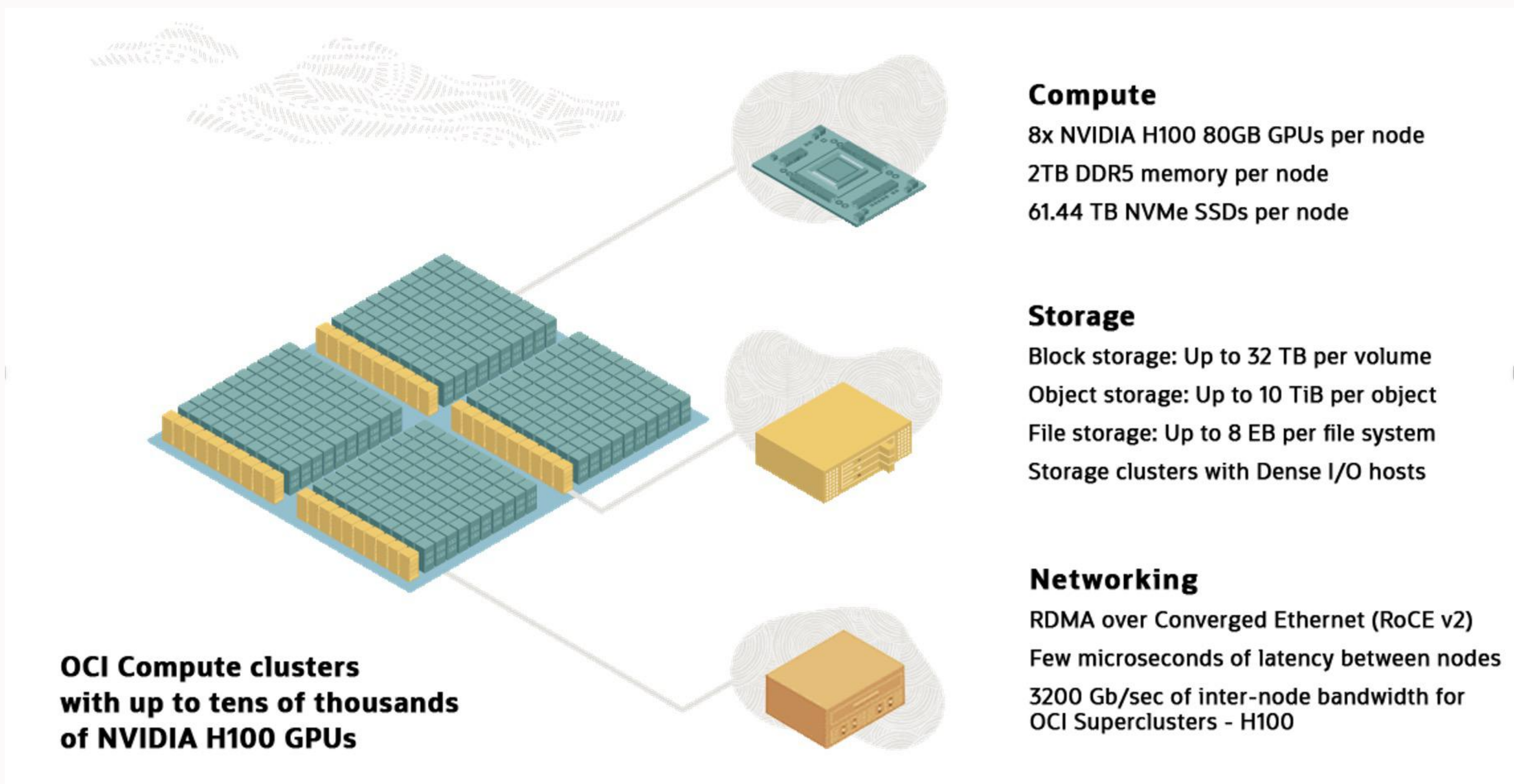
Native support for bare metal instances

NVIDIA A100 and H100 GPUs

Scalability to tens of thousands of GPUs

Local NVMe Storage

OCI Compute clusters with up to tens of thousands of NVIDIA H100 GPUs

Compute
8x NVIDIA H100 80GB GPUs per node
2TB DDR5 memory per node
61.44 TB NVMe SSDs per node

Storage
Block storage: Up to 32 TB per volume
Object storage: Up to 10 TiB per object
File storage: Up to 8 EB per file system
Storage clusters with Dense I/O hosts

Networking
RDMA over Converged Ethernet (RoCE v2)
Few microseconds of latency between nodes
3200 Gb/sec of inter-node bandwidth for OCI Superclusters - H100

OCI AI Infrastructure (GPU)

H100-80
8 GPU, 640GB GPU Memory

OCI
- ✓ 112 Cores
- ✓ 2048 GB Memory
- ✓ 3200 Gbps Networking
- ✓ 61.4 TB Local NVMe
- ✓ $80/node

AZURE
- 👎 96 Cores
- 👎 1900 GB Memory
- 👎 3200 Gbps Networking
- 👎 1 TB Local Storage
- $/node

AWS
- 96 Cores
- 2048 GB Memory
- ✓ 3200 Gbps Networking
- 30.7 TB Local Storage
- 👎 $98.3/node

GCP
- 👎 ? Cores
- 2048 GB Memory
- ? Gbps Networking
- ? TB Local NVMe
- ?/node

A100-80
8 GPU, 640GB GPU Memory

OCI
- ✓ 128 Cores
- ✓ 2048 GB Memory
- ✓ 1600 Gbps Networking
- ✓ 27.2 TB Local NVMe
- ✓ $32/node

AZURE
- 96 Cores (96 VCPU)
- 1900 GB Memory
- ✓ 1600 Gbps Networking
- 6.4 TB Local SSD
- $37.2/node

AWS
- 👎 48 Cores (96 VCPU)
- 👎 1152 GB Memory
- 400 Gbps Networking
- 8 TB Local NVMe
- 👎 $41.0/node

GCP
- 👎 48 Cores (96 VCPU)
- 1360 GB Memory
- 👎 100-200 Gbps Networking
- 👎 3 TB Local Storage
- $40.6/node

A100-40
8 GPU, 320GB GPU Memory

OCI
- 64 Cores
- 2048 GB Memory
- ✓ 1600 Gbps Networking
- ✓ 27.2 TB Local NVMe
- ✓ $24.4/node

AZURE
- ✓ 96 Cores (96 VCPU)
- 900 GB Memory
- ✓ 1600 Gbps Networking
- 6.4 TB Local SSD
- $27.2/node

AWS
- 👎 48 Cores (96 VCPU)
- 1152 GB Memory
- 400 Gbps Networking
- 8 TB Local NVMe
- 👎 $32.8/node

GCP
- 👎 48 Cores (96 VCPU)
- 👎 680 GB Memory
- 👎 100-200 Gbps Networking
- 👎 0
- $29.4/node

A10-24
4 GPU, 96GB GPU Memory

OCI
- 64 Cores
- 1024 GB Memory
- ✓ n/a
- ✓ 7.68 TB Local NVMe
- ✓ $8/node

AZURE
- 72 Cores (72 VCPU)
- 880 GB Memory
- n/a
- 👎 1.4 TB Local SSD
- 👎 $13/node

AWS
- 👎 48 Cores (96 VCPU)
- 👎 384 GB Memory
- n/a
- 3.8 TB Local NVMe
- $8.2/node

GCP
- 👎 Not Available

✓ best configuration   👎 worst configuration   Details please refer to excel file

Best-of-breed processors for training and inference

NVIDIA

OCI Compute

NVIDIA Grace Hopper/Blackwell

Bare metal

NVIDIA H200, B200

Bare metal

VMs for A100, H100, L40S

AMD

OCI Compute

AMD MI300X

Bare metal

AMPERE

OCI Compute

Ampere A2

Flexible VMs

Lowest Data Egress Charges by an Order of Magnitude

Outbound Traffic

|	First GB	1GB	1TB	10TB	100TB	150TB
Amazon Web Services*	Free – up to **1GB**		-	0.085	0.070	0.050
Google Cloud			0.11	0.08	-	-
IBM Cloud	Free – up to **10TB**, <u>select</u> regions			0.083	-	-
Microsoft Azure*	Free – up to **5TB**, any region			0.083	-	0.05
Oracle Cloud	**Free – up to 10TB, any region**			**0.0085**	-	-

* Only free for Tier-1 customers leaving Cloud

Uniquely, Oracle <u>doesn't</u> charge for data transfer between availability domains in the same region

Recent notable Oracle Cloud Infrastructure customer wins

Ridesharing platform
modernization

AI training
platform

ERP modernization
180TB SAP deployment

Data center exit
VMware

Microsoft Bing
Conversational Search
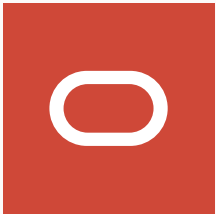
Forward-looking statements

This presentation is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions. The development, release, timing, and pricing of any features or functionality described for Oracle's products may change and remains at the sole discretion of Oracle Corporation.

Statements in this presentation relating to Oracle's future plans, expectations, beliefs, intentions, and prospects are "forward-looking statements" and are subject to material risks and uncertainties. A detailed discussion of these factors and other risks that affect our business is contained in Oracle's Securities and Exchange Commission (SEC) filings, including our most recent reports on Form 10-K and Form 10-Q under the heading "Risk Factors." These filings are available on the SEC's website or on Oracle's website at http://www.oracle.com/investor. All information in this presentation is current as of January 2024 and Oracle undertakes no duty to update any statement in light of new information or future events.

Thank you