State of the Dolphin

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May 1, 2024

Safe harbor statement

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Agenda

Data Platform Complexity

Technology Update

- Generative AI and Vector Store

- MySQL HeatWave

- Server Improvements

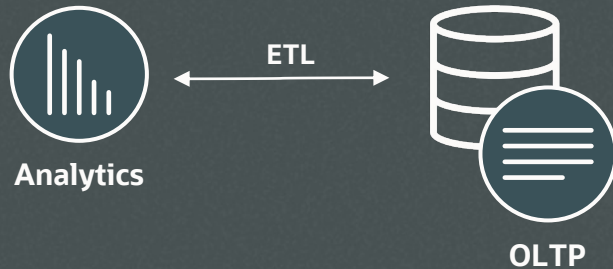- Accelerated Development

- Observability & Management

Data Platform Complexity
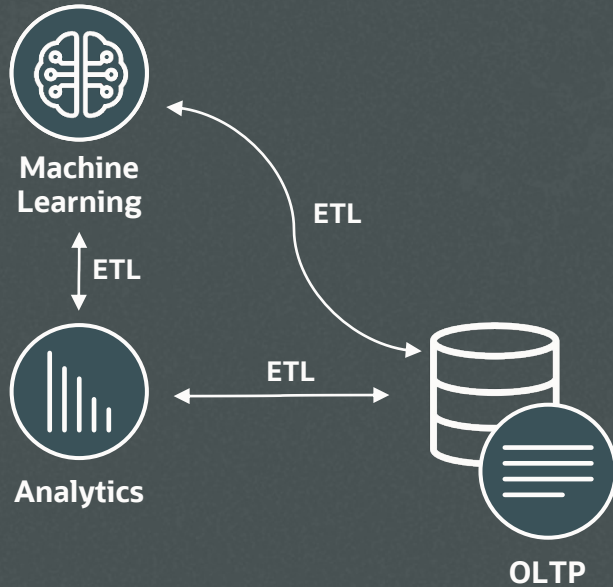
- **You start** with an OLTP database application

OLTP

Data Platform Complexity

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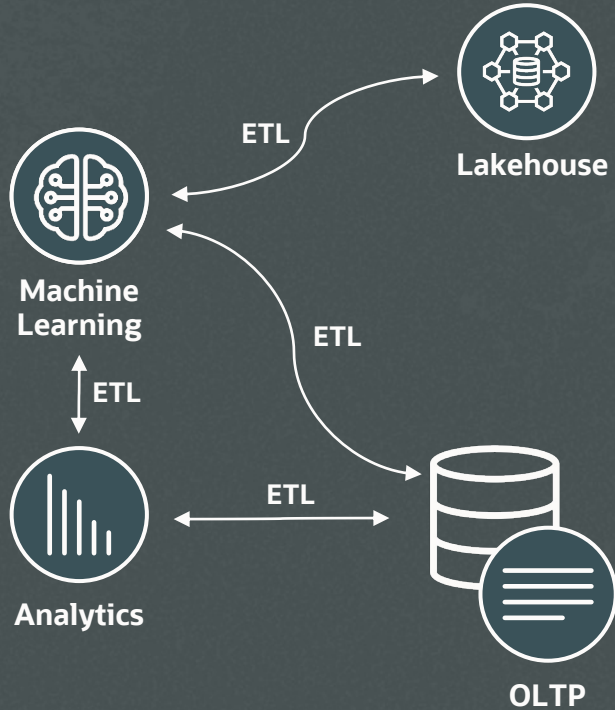
- **Analytics** will give LOB managers valuable insights

Analytics

ETL

OLTP

Data Platform Complexity

Machine Learning

ETL

ETL

Analytics

ETL

OLTP

- **You start** with an OLTP database application

- **Analytics** will give LOB managers valuable insights

- **Machine learning** predictions will improve the customer experience

Data Platform Complexity

ETL
Lakehouse
ETL
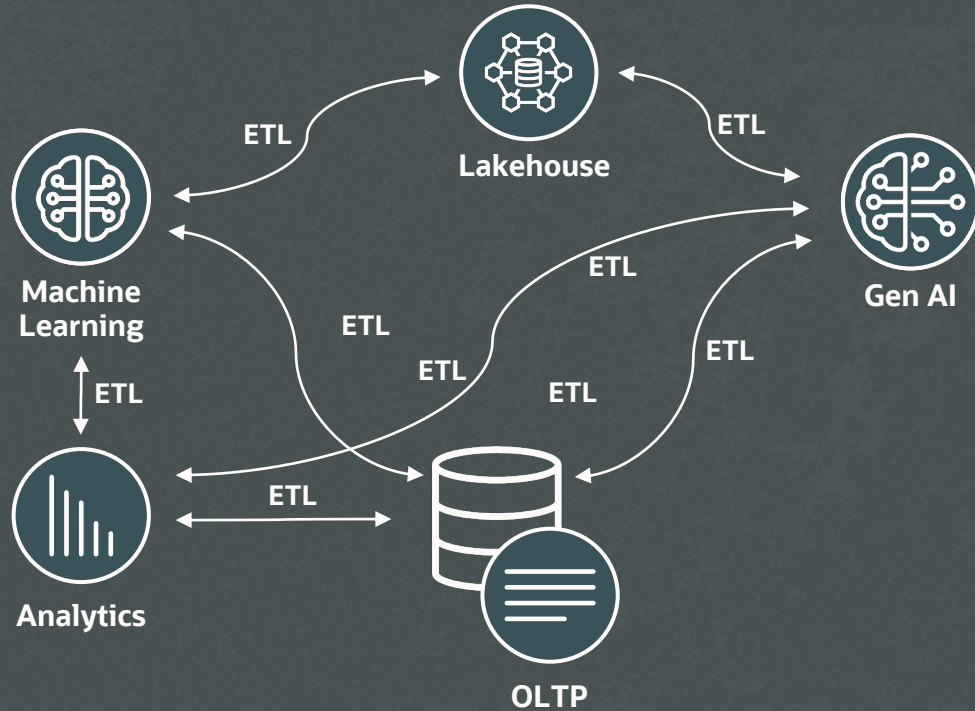Machine Learning
ETL
ETL
Analytics
OLTP

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- **Lakehouse** will deliver insights into structured and semi-structured data
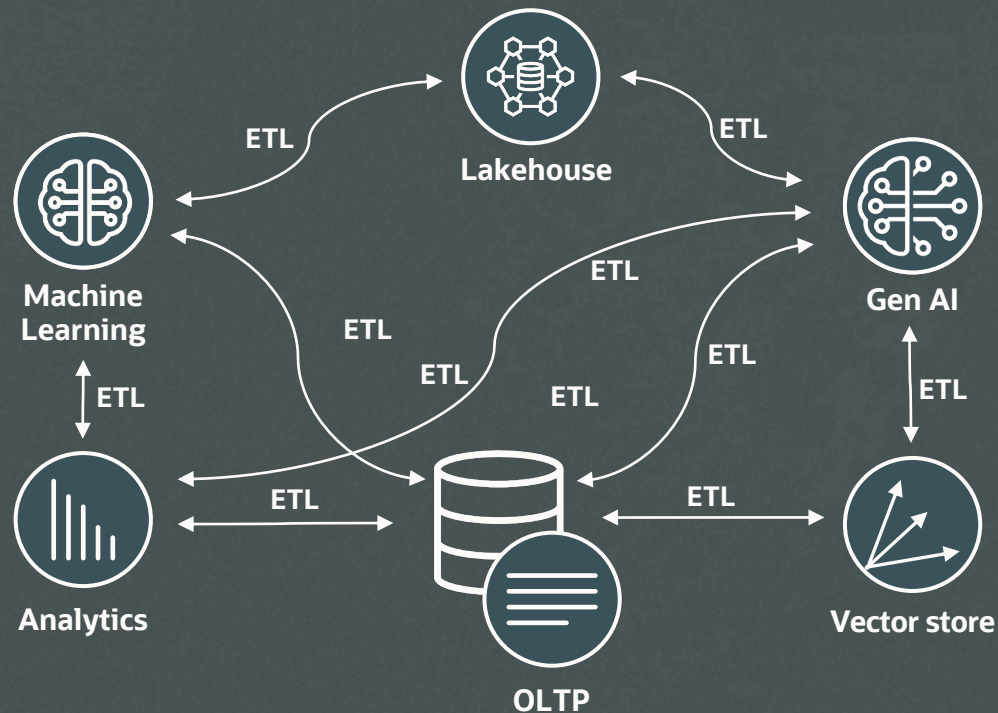
Data Platform Complexity

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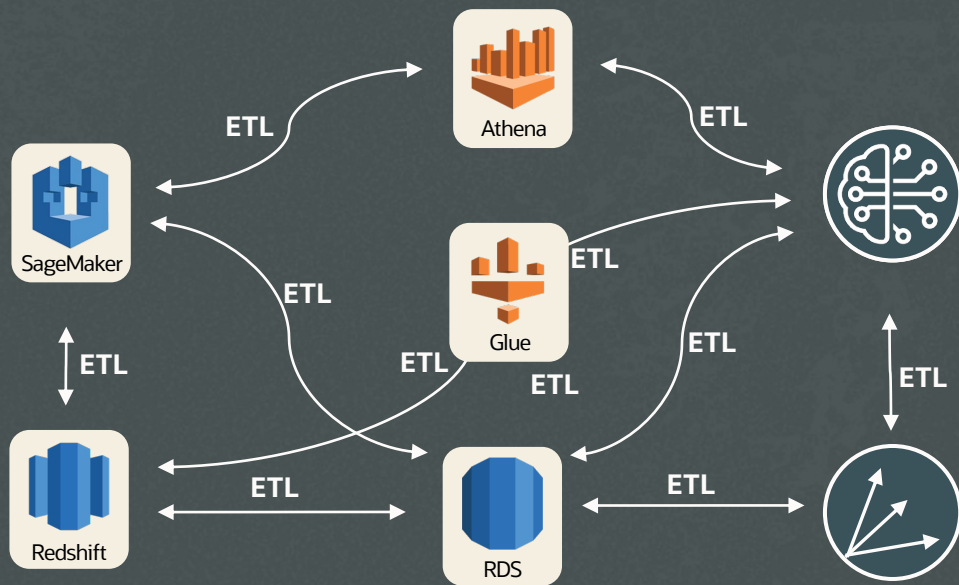
Data Platform Complexity

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- **Generative AI** will give results in natural language

- **Vector store** provides context to LLM for more relevant results

Data Platform Complexity at AWS

5 Separate Cloud Services

- Complex ETL processes
- Stale and obsolete data
- Difficult to maintain
- Security exposure
- Requires specialized skills

Data Platform Complexity at Oracle (OCI)

MySQL HeatWave

- ✓ **Gen AI**
- ✓ **Vector store**
- ✓ **Lakehouse**
- ✓ **OLAP**
- ✓ **OLTP**

One Database Cloud Service

- Democratizes OLAP, ML, AI
- No complex ETL
- Real-time data
- Secure
- Easy to manage

MySQL HeatWave

ONE DATABASE FOR OLTP, OLAP, LAKEHOUSE AND ML

Social, eCommerce, gaming, healthcare, fintech apps. Analytics and ML tools

ORACLE Analytics Cloud

Apache Zeppelin

jupyter

Queries

Results

MySQL HeatWave

Real-time analytics, machine learning, lakehouse, and OLTP in one cloud database service

OLTP

Analytics

AutoML

Autopilot

Lakehouse

Technology Update

Generative AI in HeatWave Enables New Use Cases

Retrieval Augmented Generation (RAG)
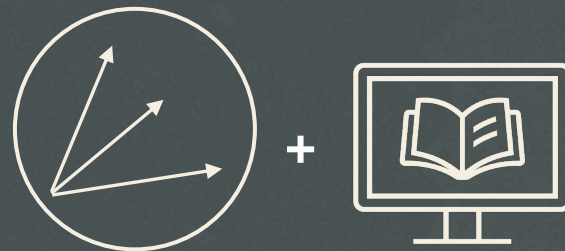
- Generate insights from enterprise documents

- Generate blogs from pdf instruction manuals

- Summarize logs

Content generation & summarization

- Search on public and private enterprise data

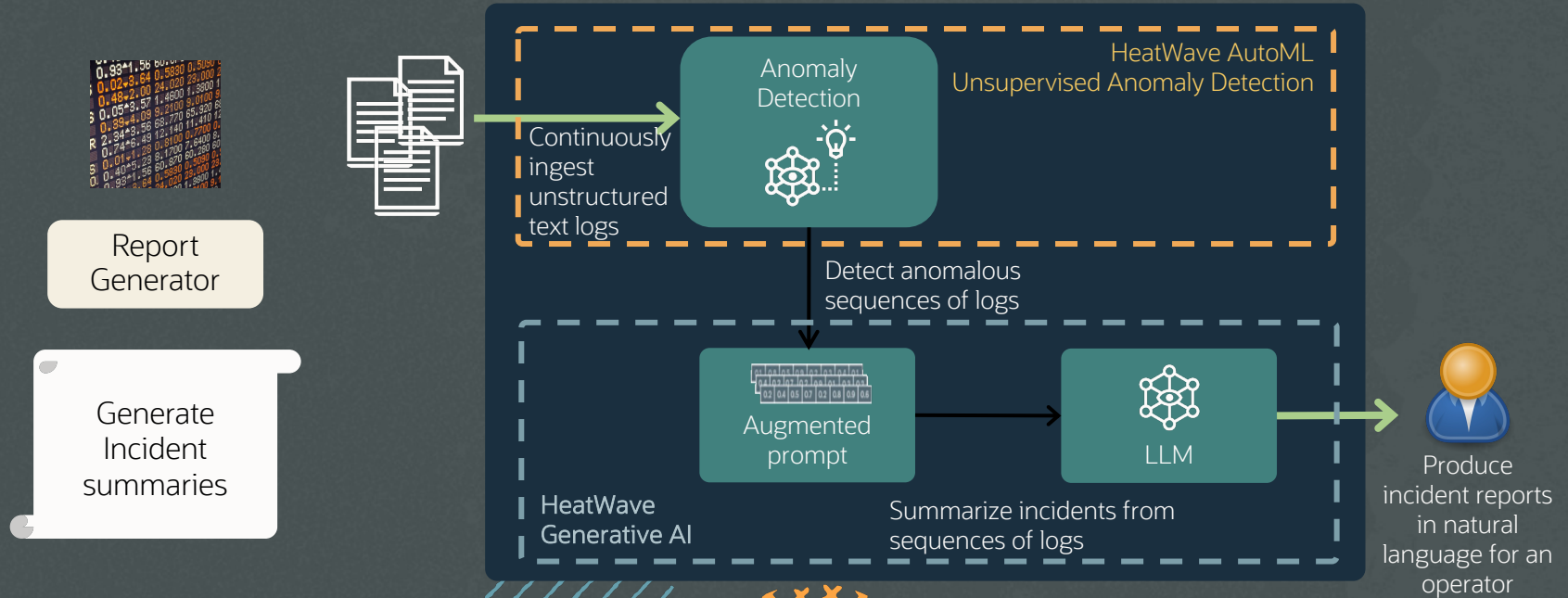- Search on unstructured data in vector store

Natural language interaction

- Natural language interaction with unstructured data

- Content retrieval and response in natural language

Usecase 1: Summarization

CONTENT GENERATION/SUMMARY

Report Generation: HW AutoML + Summarization of anomalous logs

HeatWave AutoML
Unsupervised Anomaly Detection

Anomaly Detection

Continuously ingest unstructured text logs

Report Generator

Generate Incident summaries

Detect anomalous sequences of logs

Augmented prompt

LLM

HeatWave Generative AI

Summarize incidents from sequences of logs

Produce incident reports in natural language for an operator

Usecase 1: Summarization

SYNERGY BETWEEN AUTOML AND GENERATIVE AI

Report Generation: Summarization of anomalous logs

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Ask the question ('What is the main problem in the following collection of logs. Provide a two-sentence summary.')

"The main problem in this collection of logs is that the memory usage of a particular process (with ID 8145) is consistently exceeding the defined memory threshold. This issue is repeatedly highlighted in the logs, and SIGTERM signals are sent to the main thread to terminate the process when it exceeds the memory threshold. Would you like me to help you with anything else regarding this collection of logs?"

HeatWave Offers Choice for Running LLMs
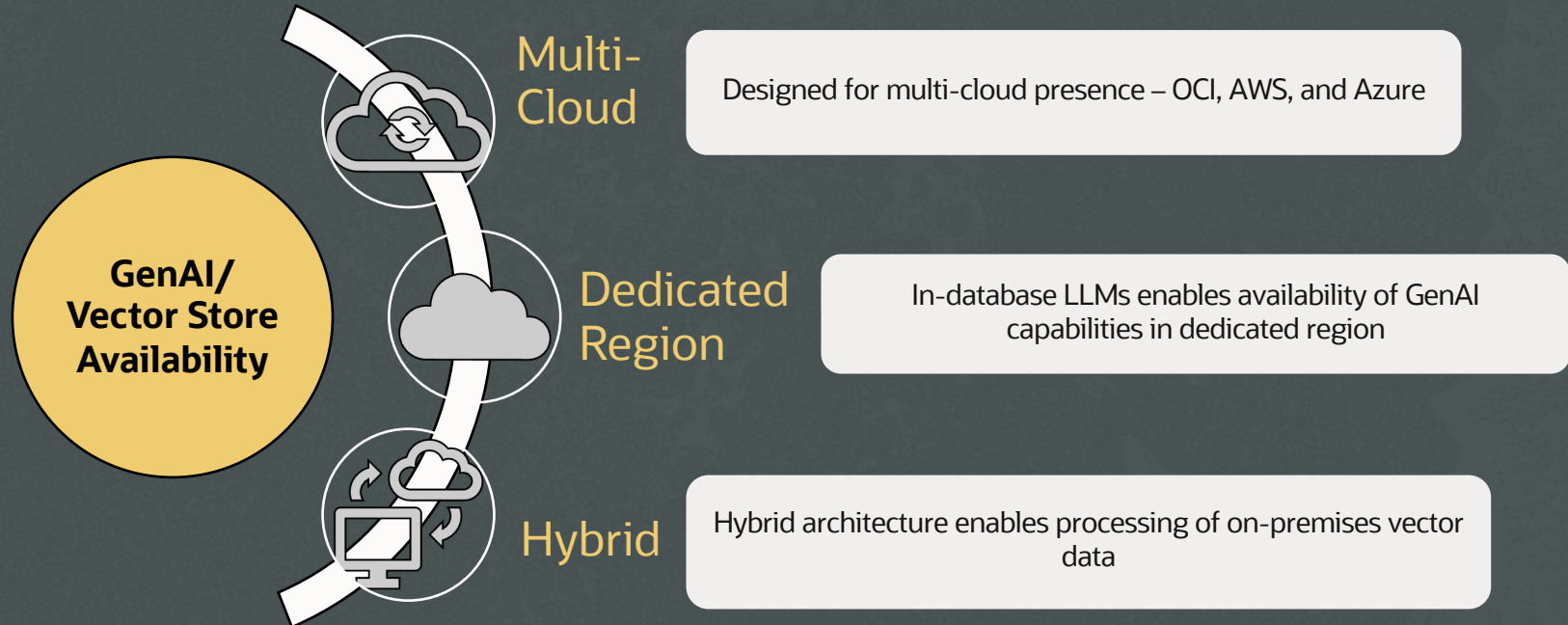
In-HeatWave LLMs

– Native execution within the HeatWave database

– Run smaller LLMs like Llama2-7B and Mistral-7B

– Secure, lower cost, guaranteed availability

OCI Generative AI service LLMs

– Support larger models like Cohere-command and Llama2-70B and run on GPUs

– Higher quality, better performance

Available in All Regions

VECTOR STORE AND ABILITY TO RUN LLMS INSIDE HEATWAVE PROVIDES FLEXIBILITY OF DEPLOYMENT

GenAI/ Vector Store Availability

Multi-Cloud

Designed for multi-cloud presence – OCI, AWS, and Azure

Dedicated Region

In-database LLMs enables availability of GenAI capabilities in dedicated region

Hybrid

Hybrid architecture enables processing of on-premises vector data

Vector Data Type Support

Standard SQL interface to create tables with vector columns

Vector data storage
- HeatWave: In-memory columnar format
- InnoDB: BLOB

```
mysql> CREATE TABLE wikipedia (

        id INT,

        title VARCHAR(1024)

        page_data TEXT

        page_list TEXT,

        page_url TEXT,

        page_embedding VECTOR(1024)
ENGINE_ATTRIBUTE='{"model":"cohere"}')

        ENGINE=lakehouse, SECONDARY_ENGINE=rapid;
```

Example distance functions
- L1/MANHATAN
- L2/EUCLIDIAN
- L1^2/MANHATAN_SQUARED
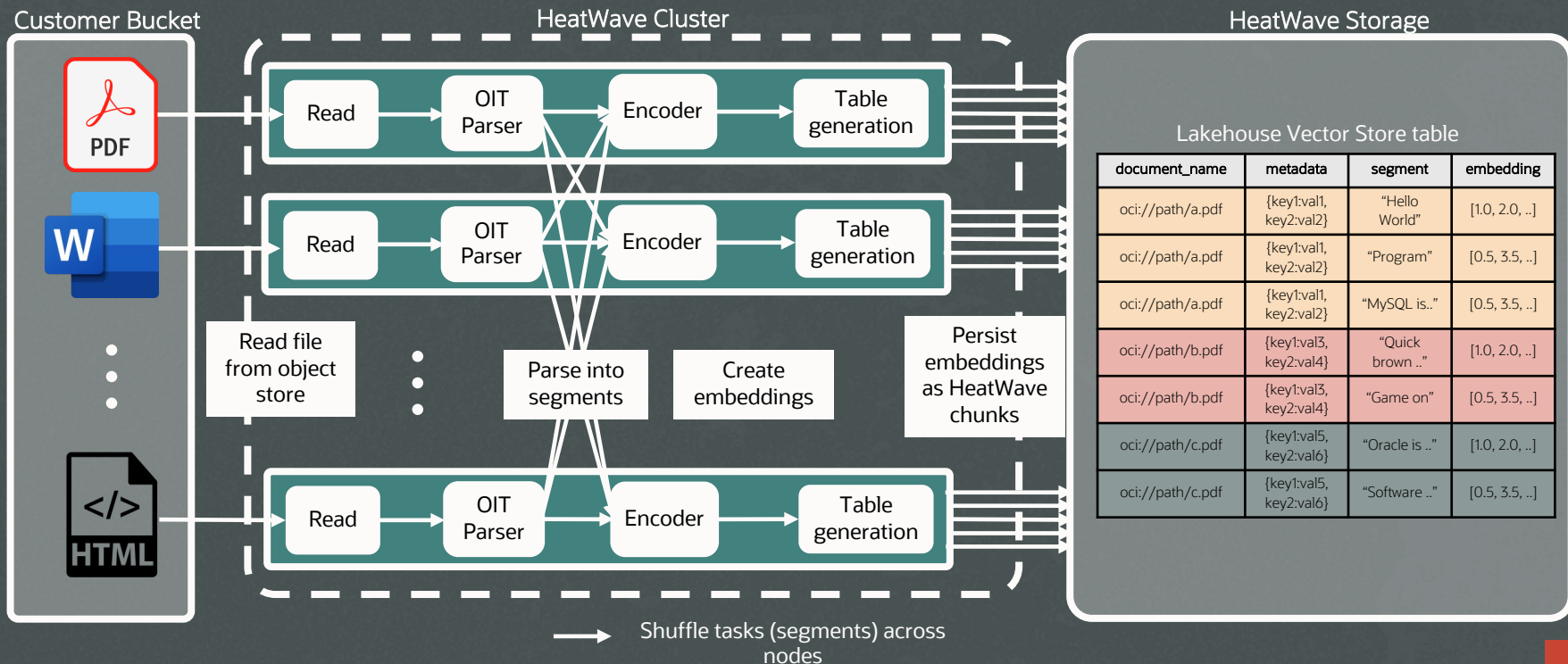- L2^2/EUCLIDIAN_SQUARED
- COSINE
- DOT
- HAMMING

All phases of Creating a Vector Store Done Inside HeatWave

Document Discovery → Parsing → Embedding Generation → Inserting into Vector Store
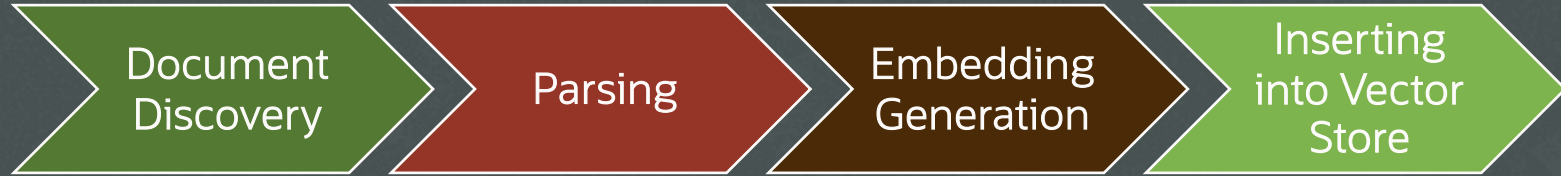
Vector Store Creation with HeatWave is Parallelized

BUILT IN EMBEDDING GENERATION DONE ACROSS NODES

Customer Bucket

HeatWave Cluster

HeatWave Storage

PDF

Read → OIT Parser → Encoder → Table generation

W

Read → OIT Parser → Encoder → Table generation

Read file from object store

Parse into segments

Create embeddings

Persist embeddings as HeatWave chunks

HTML

Read → OIT Parser → Encoder → Table generation

Lakehouse Vector Store table

document_name	metadata	segment	embedding
oci://path/a.pdf	{key1:val1, key2:val2}	"Hello World"	[1.0, 2.0, ..]
oci://path/a.pdf	{key1:val1, key2:val2}	"Program"	[0.5, 3.5, ..]
oci://path/a.pdf	{key1:val1, key2:val2}	"MySQL is.."	[0.5, 3.5, ..]
oci://path/b.pdf	{key1:val3, key2:val4}	"Quick brown .."	[1.0, 2.0, ..]
oci://path/b.pdf	{key1:val3, key2:val4}	"Game on"	[0.5, 3.5, ..]
oci://path/c.pdf	{key1:val5, key2:val6}	"Oracle is .."	[1.0, 2.0, ..]
oci://path/c.pdf	{key1:val5, key2:val6}	"Software .."	[0.5, 3.5, ..]

→ Shuffle tasks (segments) across nodes

DEMO: Gen AI

Sandeep Agrawal

MySQL HeatWave

OLTP with MySQL HeatWave

High Availability

Made up of three MySQL instances: a primary instance and two secondary instances

Provisioned across different availability or fault domains

The primary instance functions as a read/write endpoint

Automatic or Manual Promotion of a Secondary Instance

Automatic connection failover with zero data loss

Scalability

Read replicas for read-intensive workloads

Add and remove Read Replicas for horizontal read elasticity

Supports up to 18 read replicas

Built-in Load Balancer for the read-only endpoint

5-Tuple Hash Load Balancing Policy

Enhanced bulk ingest for faster imports from object store

Data protection and durability

Automatic backups
- Retention period between 1 and 35 days

Manual backups
- Retention for up to 365 days

Operator backup
- Created by CloudOps to assist in investigating potential issues

Point-In-Time Recovery
- RPO of approximately five minutes for an active database system
- RPO of 24 hours with daily backup

Reliability

Automated upgrades and patching
- No need to schedule patches, track patch contents or request one-off patches

Always up-to-date security fixes
- Frequent patches to meet compliance requirements

Full-stack patching
- Includes database and all cloud infrastructure

OLTP with MySQL HeatWave

SINGLE CLICK HIGH AVAILABILITY

- SLA 99.99%
- Automatic failover
- Zero data loss during failure event
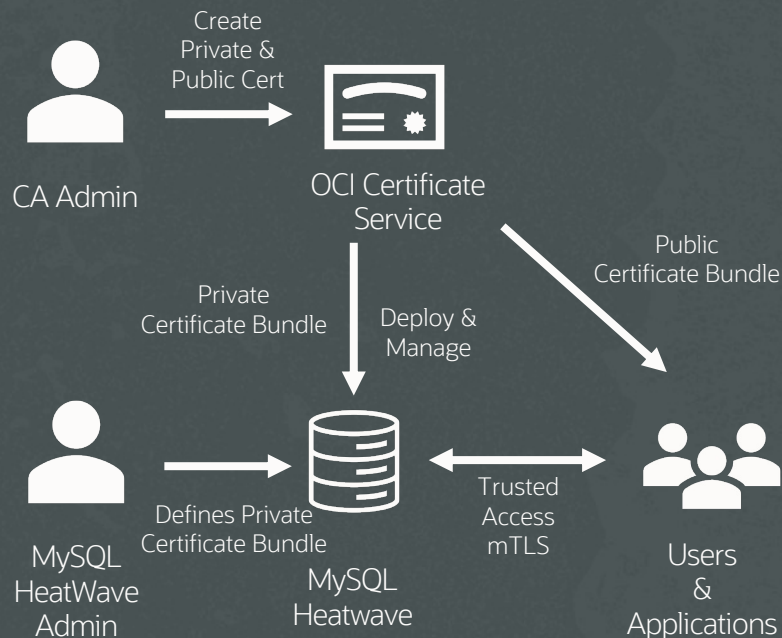- Disaster recovery with cross-region backups
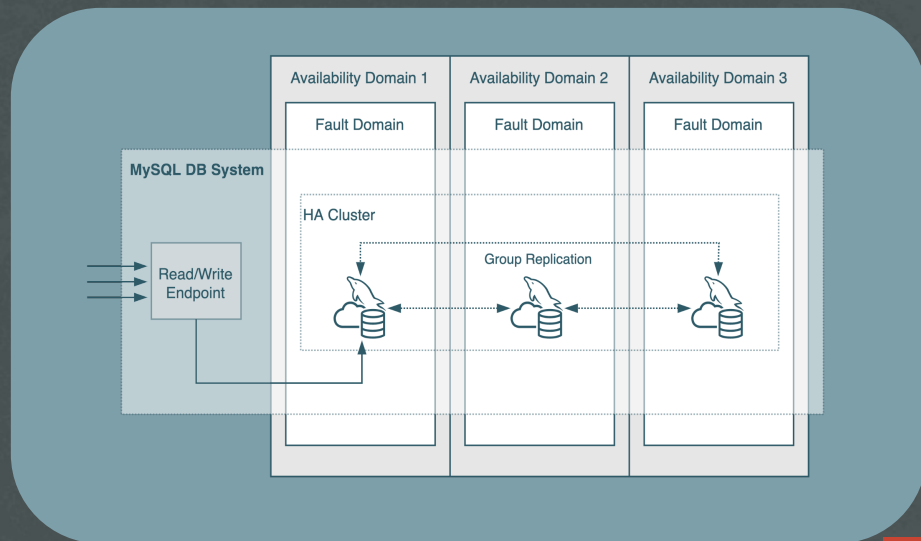
OLTP with MySQL HeatWave

BRING YOUR OWN CERTIFICATE (BYOC)

MySQL HeatWave enables users to point to the OCI Certificate Services so users can create, provision, manage, deploy, and automatically rotate PKI certs.

OCI Certificates Service

- Generates and stores private keys in a **FIPS Level 3 HSM**
- Removes the error prone, manual process of purchasing, uploading, and renewing certs
- Provides a Private Certificate Authority option for customers managing their own certificate chains
- Provides automatic cert deployment and renewal

CA Admin → Create Private & Public Cert → OCI Certificate Service

OCI Certificate Service → Public Certificate Bundle → Users & Applications

OCI Certificate Service → Private Certificate Bundle / Deploy & Manage → MySQL Heatwave

MySQL HeatWave Admin → Defines Private Certificate Bundle → MySQL Heatwave

MySQL Heatwave ↔ Trusted Access mTLS ↔ Users & Applications
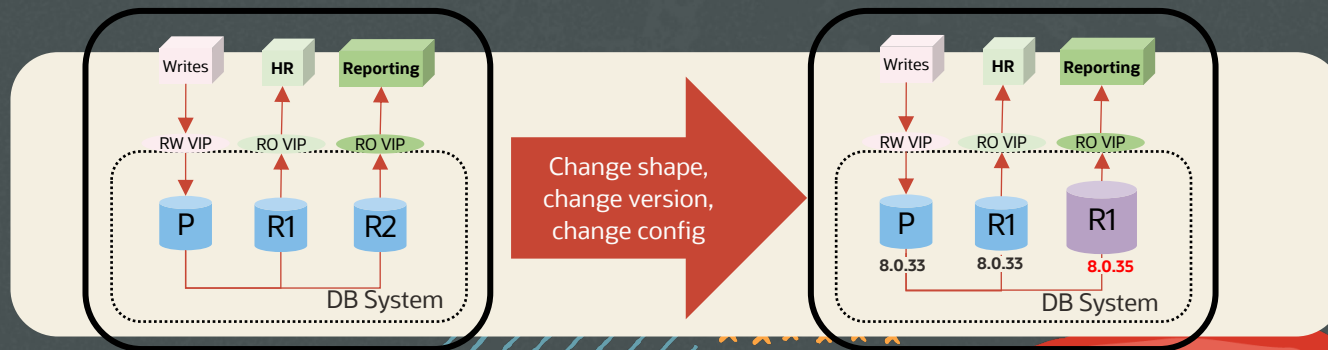
OLTP with MySQL HeatWave

HA IMPROVEMENTS

- Improvements in downtime:

  Planned Upgrade: **~60s → ~15s**

  Planned Switchover: **~60s → ~7s**

- Automatically replace uncoverable instances

- Online changes to shape and configuration of a HA cluster
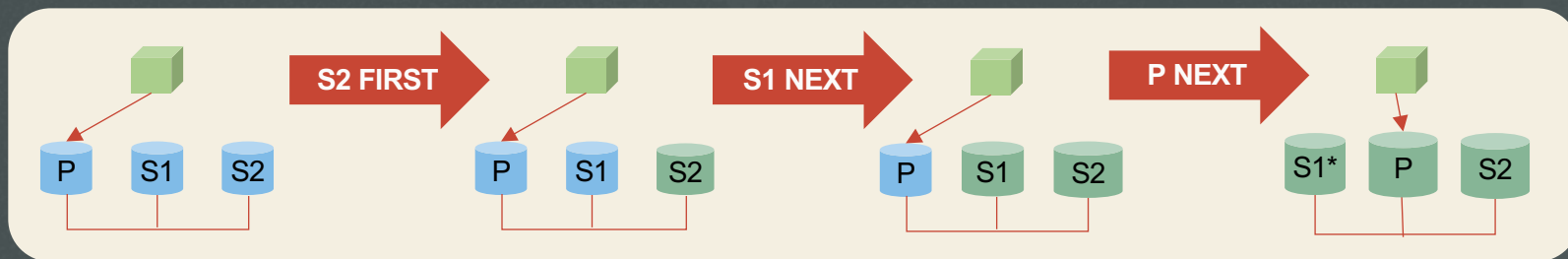
OLTP with MySQL HeatWave

READ REPLICA ENHANCEMENTS

Description	Summary
Change Shape	Customer can specify the shape for a specific read replica and can make it handle a specific read traffic profile that is more demanding resource-wise.
Change Configuration	Customer can specify the configuration for a specific read replica and can adjust it to handle a specific read traffic profile.
Change Version	Customer can specify the version for a specific read replica and try out new features with minimal disruption. Or they may want to pin a given replica to a specific version.

OLTP with MySQL HeatWave

PITR IMPROVEMENTS

1 **5x faster, smaller vulnerability window**

Binlog Size (GB)	Earlier	Now
4	52 sec	36 sec
16	10 min, 2 sec	2 min, 42 sec
44	15 min, 10 sec	2 min, 59 sec

2 **Multi-Threaded PITR: 2x better performance**

VM	Applying 500GB binlog	
	Earlier	Now
4 core VM	22 hours	10 hours
8 core VM	14 hours	7 hours

3 **Improved disable PITR performance**

- 34min to 3min
- Does not block other DB System operations

OLTP with MySQL HeatWave

MYSQL AUTOPILOT INDEXING (LA)

Recommends secondary indexes for OLTP workloads
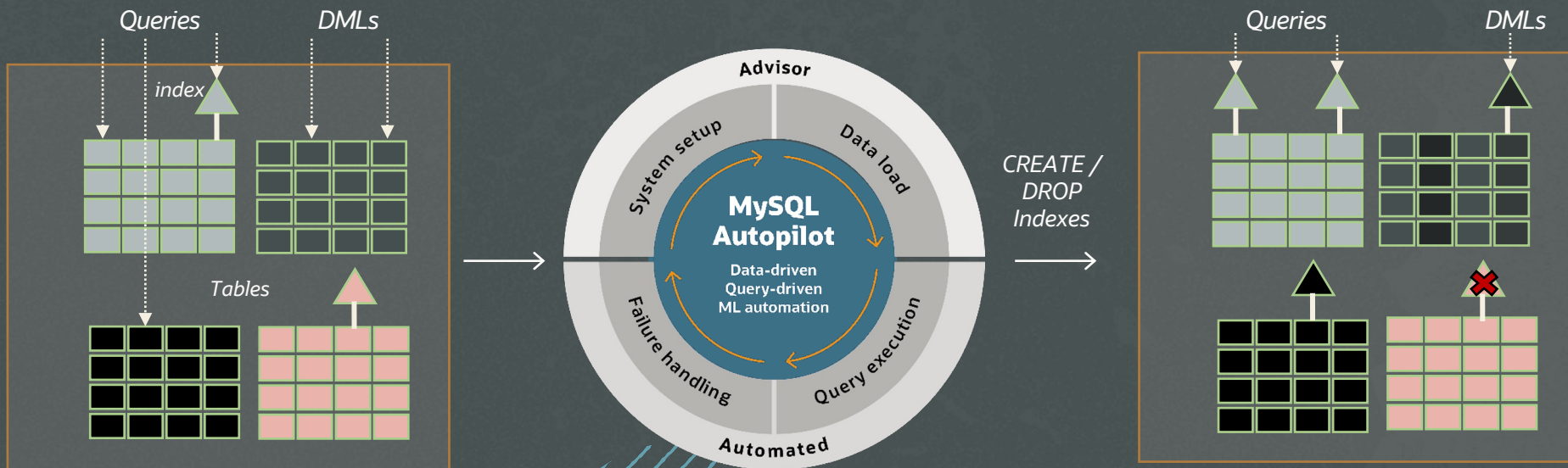
New Operators Support in HeatWave

FACILITATES MIGRATION OF MORE WORKLOADS

Operator	Snowflake	Redshift	BigQuery	Databricks	PostgreSQL	MySQL HeatWave
CUBE	✔	✔	X	✔	✔	✔
HLL_COUNT	✔	✔	✔	✔	✔	✔
Grouping Sets	✔	✔	X	✔	✔	✔
Qualify	✔	✔	✔	✔	X	✔
Table Sample	✔	X	✔	✔	✔	✔

Best Performance in Industry even with Concurrency

TPC-DS* 100TB

Legend: ■ HeatWave ■ Snowflake ■ Redshift ■ BigQuery ■ Databricks

Price-perf ($) (y-axis, 0 to 8)

1 Client:
- HeatWave: 1x
- Snowflake: 3.3x
- Redshift: 2.1x
- BigQuery: 4.2x
- Databricks: 6.8x

2 Clients:
- HeatWave: 1x
- Snowflake: 3.4x
- Redshift: 1.8x
- BigQuery: 4.1x
- Databricks: 6.8x

4 Clients:
- HeatWave: 1x
- Snowflake: 2.9x
- Redshift: 1.6x
- BigQuery: 3.5x
- Databricks: 5.3x

8 Clients:
- HeatWave: 1x
- Snowflake: 5x
- Redshift: 2x
- BigQuery: 3.4x
- Databricks: 5.4x

*Benchmark queries are derived from the TPC-DS benchmarks, but results are not comparable to published TPC-DS benchmark results since these do not comply with the TPC-DS specifications.

Best Load Performance in the Industry

TPC-DS* 100TB

Load Time

Load time (hours)

- HeatWave: 1.21
- Snowflake: 3.3
- Redshift: 7.74
- Big Query: 3.63
- Databricks: 7.46

Adaptive Query Execution

- Dynamically adjusts data structures and system resources during query execution

- Independently optimizes query execution for each node based on actual data distribution at run time

Workload	Data size	Improvement in first run
TPCDS	2TB	21%
TPCDS	16TB	25%
TPCDS	100TB	10%

Operator

Adjust Plan

Stats Collection

Part

Operator

Adjust Plan

Stats Collection

Part

MySQL Autopilot
Data-driven Query-driven ML self-actuation

Advisor
System setup
Data load
Failure Handling
Query execution
Automated
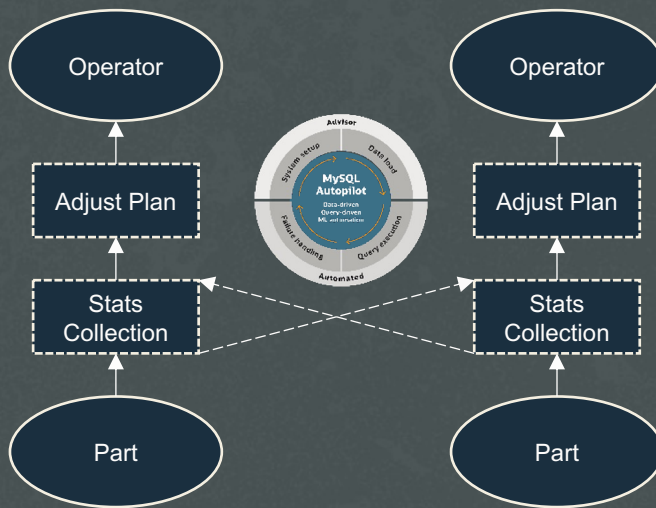
Improves ad-hoc query performance and skew handling

Auto Load and Unload

- Automatically loads tables or columns into HeatWave to optimize performance of user workload

- Automatically unloads tables less frequently used than other tables to optimize performance without increasing cost

MySQL Database   HeatWave cluster

LOAD

Workloads →
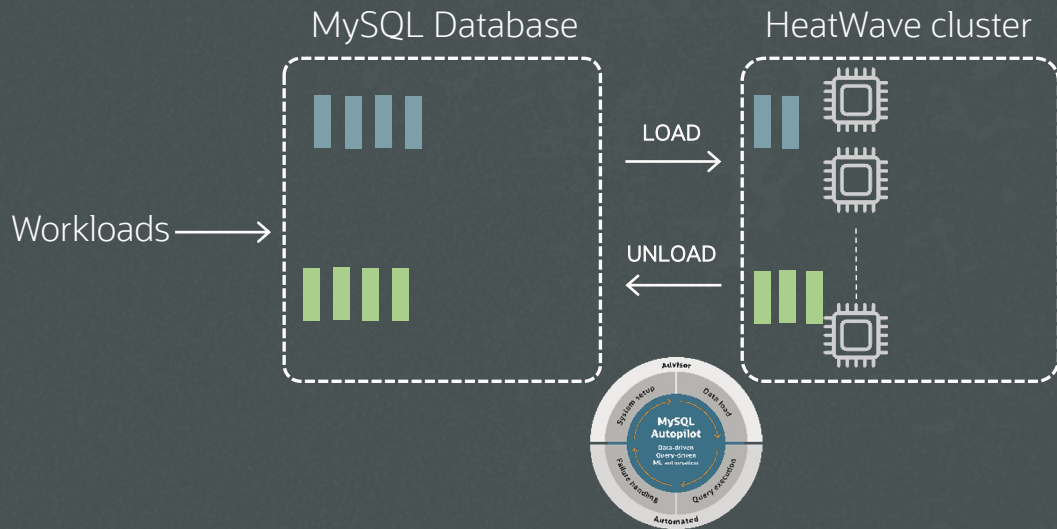
UNLOAD

Frees developers from manually loading/unloading tables

Adaptive Compression: Reduces Cost and Improves Load Performance
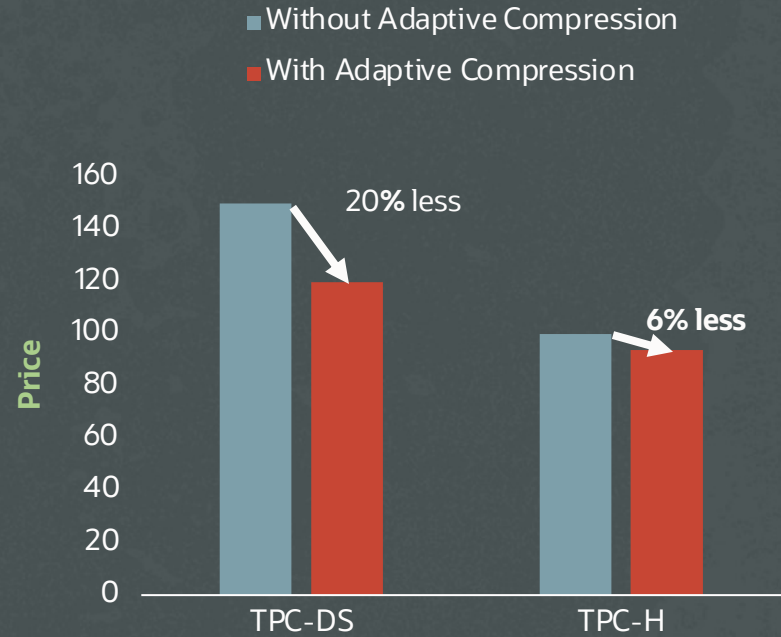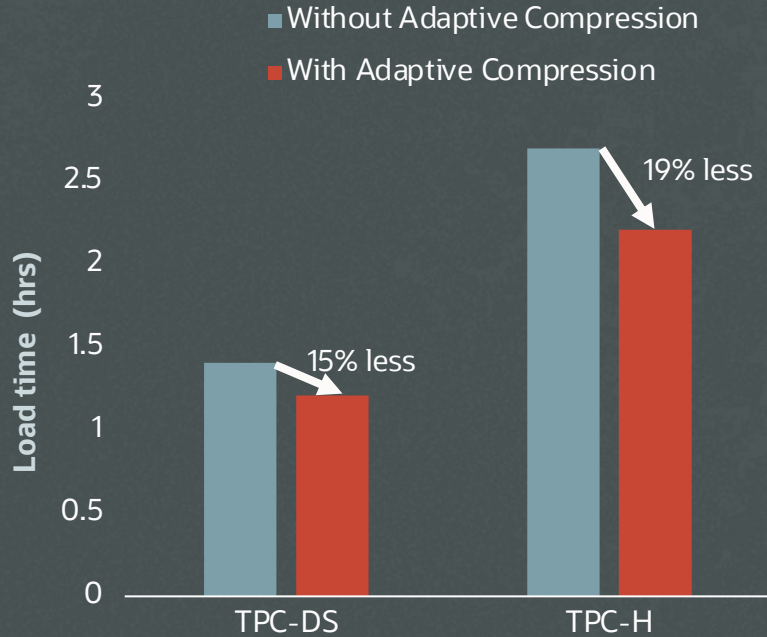
HeatWave Lakehouse Extends Support to Semi-Structured Data

- JSON data in CSV, Parquet, and Avro file formats can be processed by HeatWave

- Support extended to newline-delimited JSON files

- Ease of parsing and streaming has made it the most popular JSON format

- NDJSON data ingestion and processing scales similarly to structured file formats
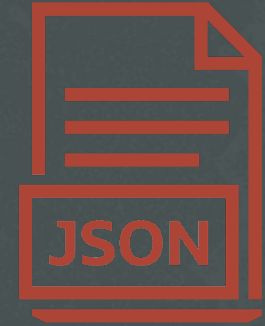
Example NDJSON file

```
...
{ "name": "Jane", "academics": { "undergraduate": "MIT", "graduate": "UT Austin" }, "age": 24 }
{ "name": "Jill", "academics": { "undergraduate": "Madison", "graduate": "Stanford" }, "age": 27 }
...
```

In-DB Machine Learning

- Automated training, prediction, and explanation

- No need to ETL data to a separate ML solution

- Easy for data & business analyst

- Support for What-if scenarios

- All processing inside DB

- No additional cost

- 25x faster than Redshift

Anomaly detection

Detect anomalous credit card spend

Classification

Identify game hacker

Time-series forecasting

Predict Advt spend ROI

Identify similar users

Loan default prediction

Demand forecasting

Recommend movies

Predict flight delay

Rainfall prediction

Recommender System

Regression

MySQL HeatWave Auto ML

Object Store

CSV   Parquet

AVRO   Database exports

Machine Learning Use Cases

Digital Marketing

Cost per acquisition

Targeted campaigns

Customer classification

E-Commerce

Videos for users

Lottery suggestions

Product upsell

Education

Predict student success

Monitor student behavior

HIPPA Compliance

Services

Erroneous ledge entries

Predict future losses

Predict price elasticity

FinTech

Loan default prediction

Identify loan extensions

Loan approval

Gaming

Player churn detection

Adjust game difficulty

Identify game hackers

Internet Of Things

Airport ticketing

Rainwater level

Air pollution

Manufacturing

Reduce warranty claims

Defective part identification

Detect anomalies in supplies

Data Drift Monitoring

Input data **DRIFTED**

Predictions **DRIFTED**
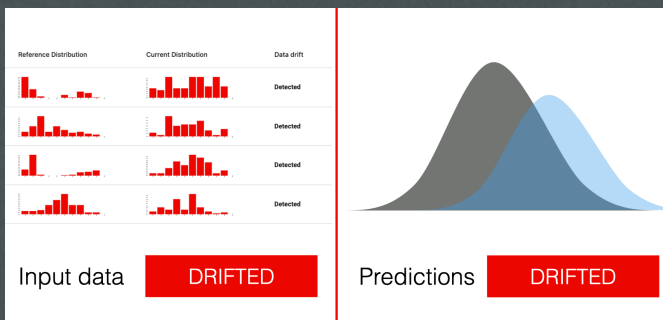
- Train a data drift detector based on Autoencoder (AE)
- Use the detector to monitor data drift in production
- The detector:
  - computes a *reconstruction* **error** for new incoming samples
  - updates the *cumulative drift metric*
- If the metric exceeds a threshold, automatically recommends that the model should be retrained

```
MySQL> CALL sys.ML_TRAIN('mlcorpus_v5.`diamonds_train`', 'price', JSON_OBJECT('task','regression'), @model);

MySQL> CALL sys.ML_MODEL_LOAD(@model, NULL);

MySQL> CALL sys.ML_PREDICT_TABLE('mlcorpus_v5.`diamonds_test`', @model, 'mlcorpus_v5.`diamonds_predictions_experiment_results`',
JSON_OBJECT('additional_details', TRUE));

MySQL> SELECT ml_results FROM diamonds_predictions_experiment_results WHERE json_extract(ml_results, '$.drift.metric') > 0.5 LIMIT 10;
+-----------------------------------------------------------------------------------------------------------------+
| ml_results                                                                                                      |
+-----------------------------------------------------------------------------------------------------------------+
| {"predictions": {"price": 4769.22265625}, "drift": {"metric": 0.69, "attribution_percent": {"cut": 100.0, "carat": 0.0, "clarity":
0.0}}}    |
| {"predictions": {"price": 2610.075439453125}, "drift": {"metric": 0.57, "attribution_percent": {"color": 91.25, "cut": 8.75, "carat":
0.0}}}    |
| {"predictions": {"price": 2725.368896484375}, "drift": {"metric": 0.54, "attribution_percent": {"cut": 100.0, "carat": 0.0, "clarity":
0.0}}}    |
| {"predictions": {"price": 7102.55224609375}, "drift": {"metric": 2.49, "attribution_percent": {"z": 64.53, "y": 16.86, "x": 11.58}}}
      |
| {"predictions": {"price": 3622.7236328125}, "drift": {"metric": 0.55, "attribution_percent": {"color": 81.2, "cut": 18.8, "carat":
0.0}}}    |
| {"predictions": {"price": 3879.93701171875}, "drift": {"metric": 2.24, "attribution_percent": {"z": 70.23, "y": 15.57, "x": 9.89}}}
      |
| {"predictions": {"price": 566.2338256835938}, "drift": {"metric": 0.67, "attribution_percent": {"color": 96.65, "cut": 3.35, "carat":
0.0}}}    |
| {"predictions": {"price": 2495.825439453125}, "drift": {"metric": 0.64, "attribution_percent": {"cut": 100.0, "carat": 0.0, "clarity":
0.0}}}    |
| {"predictions": {"price": 421.9180603027344}, "drift": {"metric": 0.58, "attribution_percent": {"color": 100.0, "carat": 0.0,
"clarity": 0.0}}} |
| {"predictions": {"price": 325.4655456542969}, "drift": {"metric": 0.53, "attribution_percent": {"color": 100.0, "carat": 0.0,
"clarity": 0.0}}} |
+-----------------------------------------------------------------------------------------------------------------+
```

Anomaly Detection for MySQL Logs

NOW TRAINED FOR MYSQL LOGS

- Heatwave processes and generalizes incoming machine logs, then builds a tailored anomaly detection model

- This model helps in identifying anomalies in logs, enabling effective preventative maintenance and root cause analysis
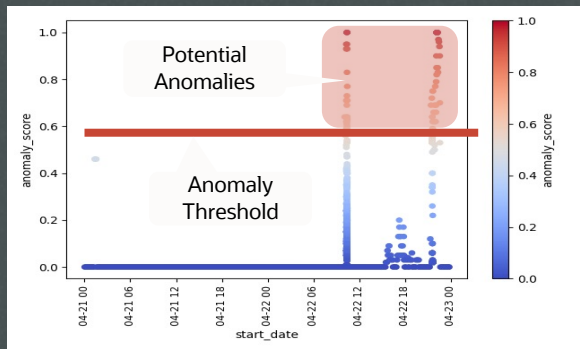
- [2024-03-05 13:28:59 - 2024-03-05 13:29:20] Group replication-related failure
  [GCS] Failure reading from fd=<:NUM:> <:*:> from <:IP:>:<:NUM:>

- [2024-03-05 13:29:25 - 2024-03-05 13:29:27]
  'This server is not able to reach a majority of members in the group. This server will now block all updates. The server will remain blocked until contact with the majority is restored. It is possible to use group replication force members to force a new group membership.'

- [2024-03-05 13:40:59 - 2024-03-05 13:41:21]
  Potential connection leak in group replication
  [GCS] Old incarnation found while trying to add node

- [2024-03-05 17:26:31]
  Database was not shutdown normally! Starting crash recovery. Starting to parse redo log at lsn = <:NUM:>

Server Improvements

Announcing: MySQL 8.4 LTS

MySQL Long-Term Support (LTS) Releases

- Stable: bugfix & security patches only
- Backwards compatibility
- Every 2 years
- Support lifecycle: 5y premier + 3y extended

MySQL Innovation Releases

- Leading-edge innovations
- Easy migration between LTS & Innovation
- Every quarter
- Support lifecycle: short term

MySQL 8.4 LTS

- Released: April 2024
- Supported until: April 2032 (8 years from GA)

JavaScript Stored Programs

```
CREATE FUNCTION construct_url (path VARCHAR(50),
search VARCHAR(20)) RETURNS VARCHAR(100)
LANGUAGE JAVASCRIPT AS $$
  let url = `${path}${search &&
    !search.startsWith('?') ? '?' : ''}${search ?? ''}`;
  return encodeURI(url);
$$
```

```
SELECT construct_url('/page', 'query=шел  лы');
/page?query=%D1%88%D0%B5%D0%BB%D0%BB%D1%8B
```

```
CREATE PROCEDURE update_item_urls(OUT url_count INT)
LANGUAGE JAVASCRIPT AS $$
  let result = mysql.getSession().runSql(
    `UPDATE my_table
     SET url = construct_url(path, CONCAT('item=',product))
     WHERE product IS NOT NULL`
  );
  url_count = result.getAffectedItemsCount();
$$
```
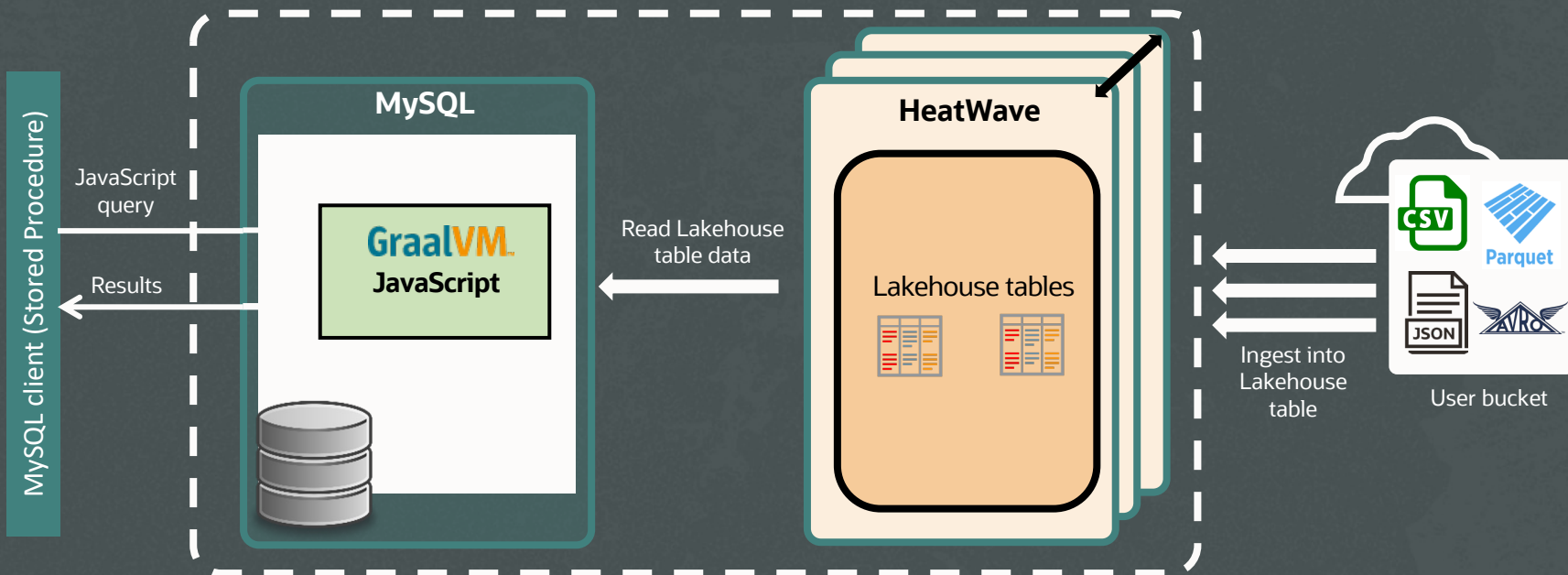
- Seamless MySQL ↔ JavaScript type conversion for input / output arguments

- First-class objects

- Can be used anywhere a SQL stored function can be used – e.g. SELECT, WHERE, ORDER BY

- Support for DML, DDL, Views

- Existing XDevAPI used to execute SQL inside JavaScript

GA for MySQL HeatWave

Currently in Beta for on-premises MySQL EE

Run JavaScript on files in Lakehouse

MySQL client (Stored Procedure)

JavaScript query

Results

MySQL

GraalVM
JavaScript

Read Lakehouse table data

HeatWave

Lakehouse tables

Ingest into Lakehouse table

User bucket

Performance Improvements: Thread Pool

HIGHLY SCALABLE THREAD-HANDLING MODEL

Sysbench OLTP Read/Write, "pareto" access pattern, 100GB data size

MySQL Enterprise Edition
with Thread Pool

MySQL Community Server
without Thread Pool
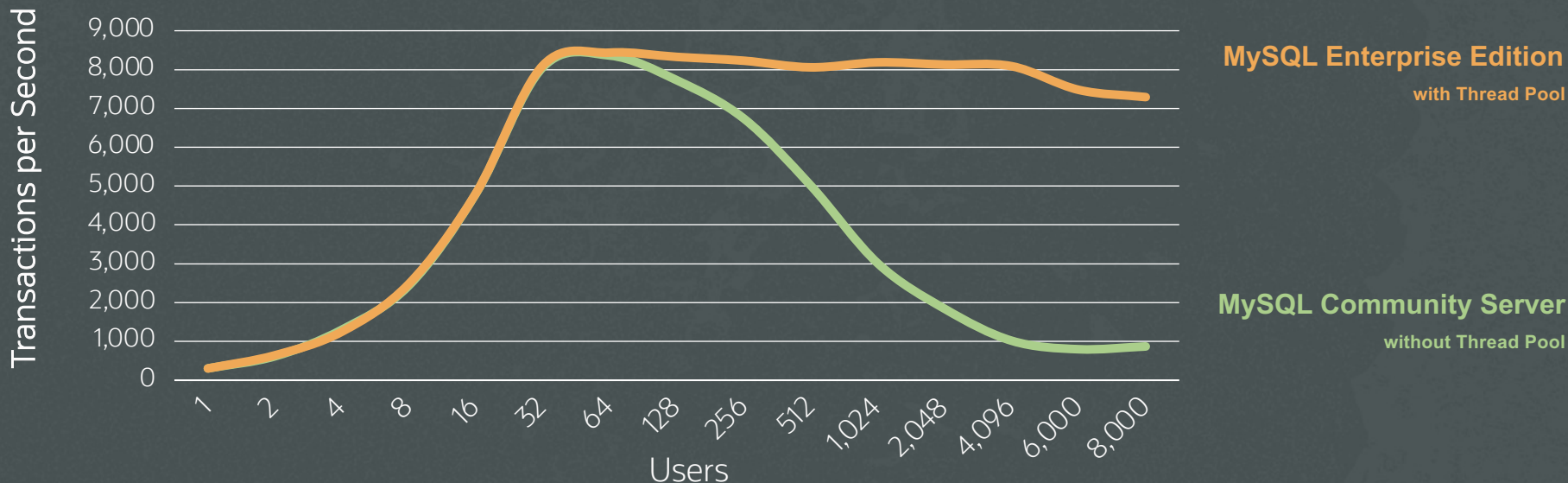
9x Better Scalablity: Sysbench OLTP Read/Write

Accelerated Development

MySQL for Developers License

FREE DOWNLOAD OF MYSQL ENTERPRISE EDITION FROM OTN

Full access to MySQL Enterprise Edition

- Enterprise Server

- Backup

- Router

- Shell

- Connectors

- JavaScript

Learn, Develop, Prototype

MySQL Enterprise Masking	MySQL Enterprise TDE	MySQL Enterprise Authentication	MySQL Enterprise Encryption
De-identify, Anonymize Sensitive Data	AES 256 encryption, Key Management	External Authentication Modules	Public/Private Key Cryptography, Asymmetric Encryption
MySQL Enterprise Firewall	MySQL Enterprise Audit	MySQL Enterprise Thread Pool	MySQL Enterprise Backup
Block SQL Injection Attacks, Intrusion Detection	User Activity Auditing, Regulatory Compliance	Performance & Scalability for enterprise workloads	Secure Backups, AES 256 encryption

Download Now
https://www.oracle.com/mysql/technologies/mysql-enterprise-edition-downloads.html

MySQL Shell for VS Code

Database Notebook Interface

• Write, Execute, Edit

MySQL Shell GUI Console

• Full Power of MySQL Shell

Full MySQL HeatWave Integration

• Manage MySQL HeatWave Instances

MySQL Operator for Kubernetes

Automated deployment & management

- Server
- Router
- HA/DR

Self-healing

Backup & Restore

Scaleup/Scaledown

Rolling upgrades

Configuration Management

Database Cloning

Private container registries

CNCF cert-manager support

MySQL Enterprise Edition

REST Service

FAST, SECURE HTTPS ACCESS FOR YOUR MYSQL DATA

RESTful Web Services

- Auto REST for tables, views and procedures

- {JSON} responses

- Paged results

- Developer support (GUI, CLI, API)

MySQL Shell for VS Code

- GUI frontend for MRS management

- RESTful Web Service creation

- Interactive documentation

- CLI & scripting support

Built in User Management

- Support for popular OAuth2 services

- Use Role, Group & Hierarchy Management

- User management GUI

- CLI & scripting support
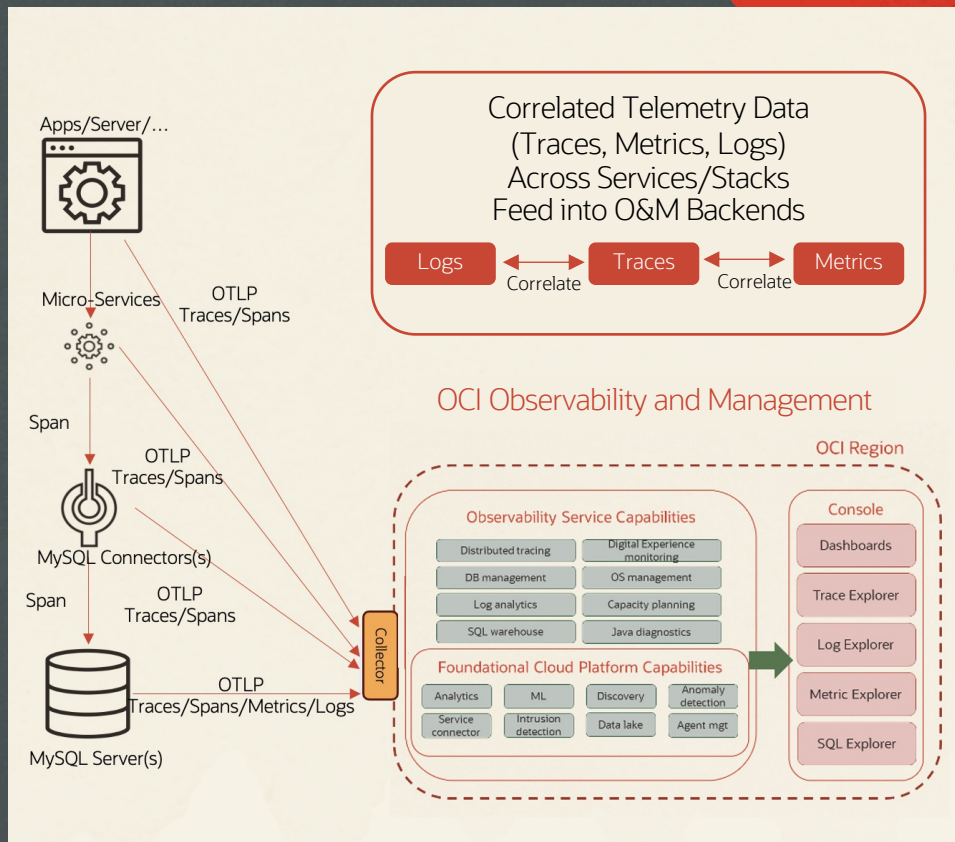
Observability & Management

OpenTelemetry Support

OpenTelemetry (Otel)

- Open standard for telemetry data
  - Cloud Native Compute Foundation (CNCF) project
  - OCI is CNCF Platinum member
- Provides technology to collect and export telemetry
  - APIs, libraries, agents, and instrumentation

MySQL integration

- Includes Otel libraries to emit Traces, Metrics, Logs
- Traces include Spans (unit of work context)
- Metrics – choose from 400+ metrics (meters and gauges)
- Logs - in progress for 9.0

Cloud Service for Managing MySQL

MONITORING & DIAGNOSTICS*

Unified fleet monitoring and management for on-prem and cloud databases

- Monitor heterogeneous fleet (MySQL, Oracle)
- Detailed availability, performance, and configuration metrics for DevOps

Easy load and performance analysis

- Quickly identify expensive queries
- Visualize query activity for fast troubleshooting

PREDICTIVE INSIGHTS**

Smart capacity planning

- Forecast demand for changing workloads
- Machine learning seasonality models
- Automatic prediction of near-term issues

SQL insights

- ML driven performance diagnostic insights based on curated SQL data
- Insights provided at SQL, database, and fleet levels
- Interactive dashboards to visualize, verify, and investigate problems

* In GA for MySQL HW; ETA for on-premises: July 2024

** Expected availability: July 2024
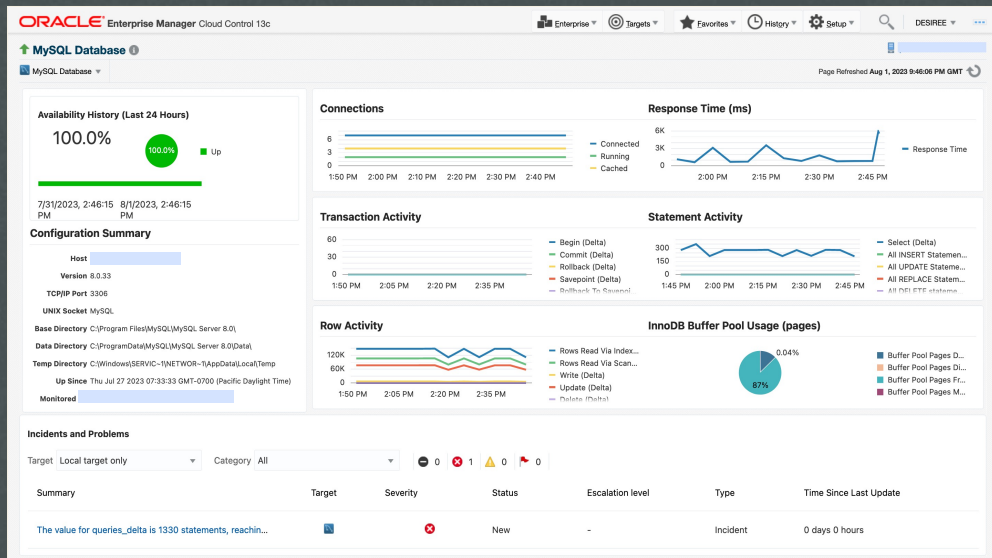
Enterprise Manager for MySQL

MONITORING, DIAGNOSTICS AND COMPLIANCE

Monitoring

- Status and performance monitoring

- Query Analyzer to identify slow queries

- Corrective Actions to automate alert resolution

- Metric Extensions for custom metrics

- Incident management with event compression

- Notifications: Email, SNMP traps, Webhooks, Slack

- Integrations: ServiceNow, MS SCOM, PagerDuty, Jira

Compliance

- Compliance Standards to evaluate against MySQL configuration and security best practices

- Compliance Dashboard to monitor compliance scores and violations across MySQL fleet

Innovative Organizations Run Their Business on MySQL

Social	E-Commerce	SaaS	Finance	Manufacturing
facebook	Booking.com	APPDYNAMICS part of Cisco	Bank of America	TESLA
twitter	NETFLIX	GitHub	J.P.Morgan	VW
LinkedIn	UBER	HubSpot	citi	TOYOTA
WeChat	airbnb	zendesk	Fidelity INVESTMENTS	CAT
Pinterest	淘宝网 Taobao.com	intuit mint	VISA	
	阿里巴巴 Alibaba.com	New Relic	CA	

Thank you