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## About me




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Certified Professional  
MySQL 5.7 Database–  
Administrator



ITALIAN ORACLE USER GROUP

Deep dive into HeatWave

22.05.2025

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## Who we are



### The Company

- > Founded in 2010
- > More than 100 employees
- > Specialized in the Middleware Infrastructure
  - > The invisible part of IT
- > Customers in Switzerland and all over Europe



### Our Offer

- > Consulting
- > Service Level Agreements (SLA)
- > Trainings
- > License Management



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## Agenda



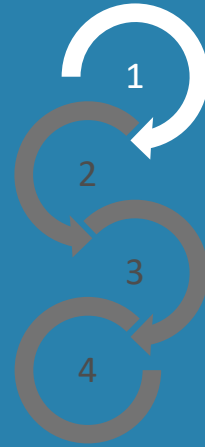
- 1.HeatWave Overview
- 2.HeatWave Setup
- 3.HeatWave Features
- 4.Conclusion

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## HeatWave Overview

- > Why HeatWave?
- > What is HeatWave?
- > Architecture

Deep dive into HeatWave



22.05.2025

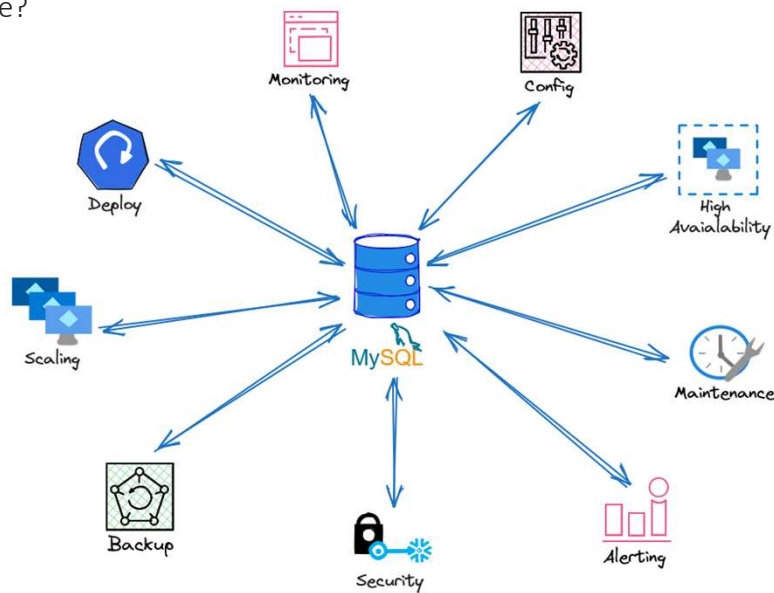
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## HeatWave Overview

### Why HeatWave?

### Challenge #1



Deep dive into HeatWave

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## HeatWave Overview

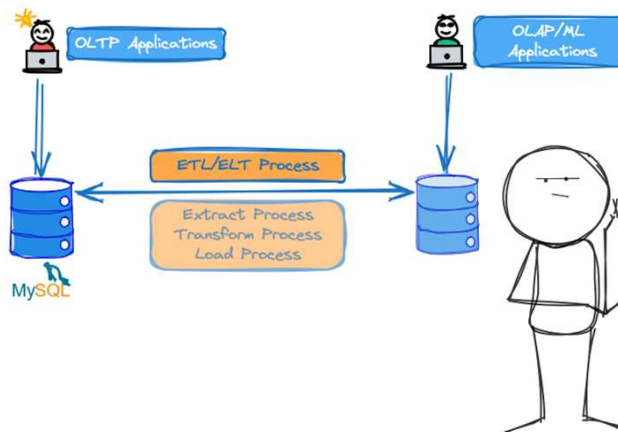
### Why HeatWave?



### Challenge #2

```
mysql> SELECT passenger_id
FROM passenger
WHERE passportno=<pass_n>;

mysql> SELECT airport_id, name
FROM airport_geo
WHERE country=<country>
AND city=<city>
ORDER BY name;
```



```
mysql> SELECT airlinename,
SUM (sold_seat)/SUM(capacity)
'Load Factor'
FROM (SELECT flight_id,
COUNT(*) sold_seat FROM
booking
GROUP BY flight_id) seat_sold
JOIN flights
USING (flight_id)
JOIN airplane
USING (airplane_id)
JOIN airline
ON
airline.airline_id=flight.airl
ine_id
GROUP BY airlinename
ORDER BY airlinename;
```

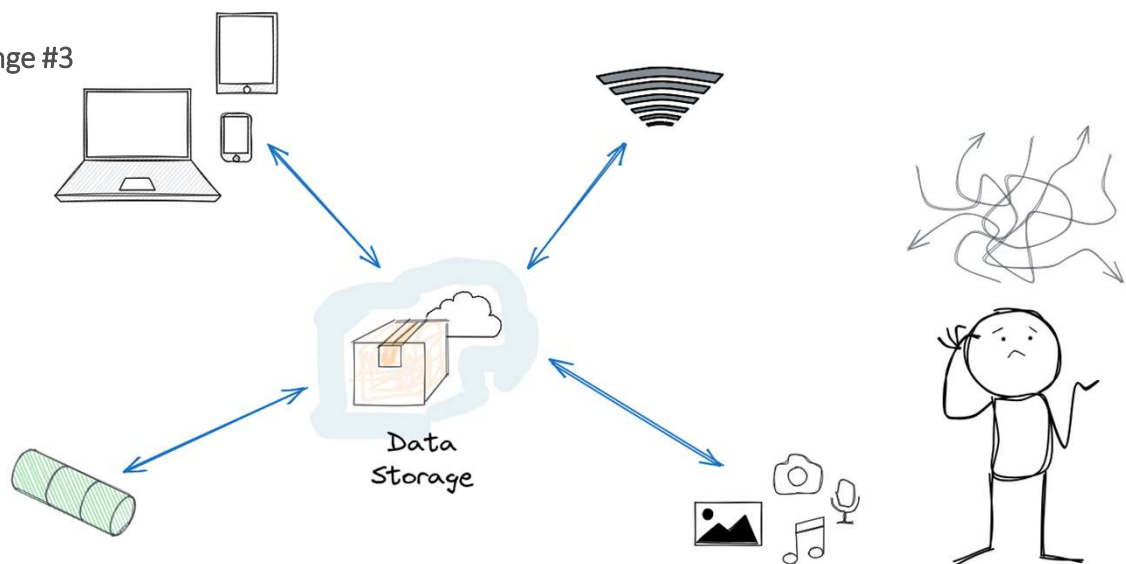
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## HeatWave Overview

### Why HeatWave?



### Challenge #3




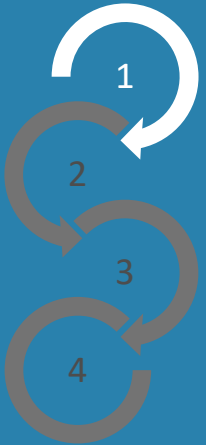
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## HeatWave Overview

- > Why HeatWave?
- > What is HeatWave?
- > Architecture

Deep dive into HeatWave






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## HeatWave Overview

### What is HeatWave?



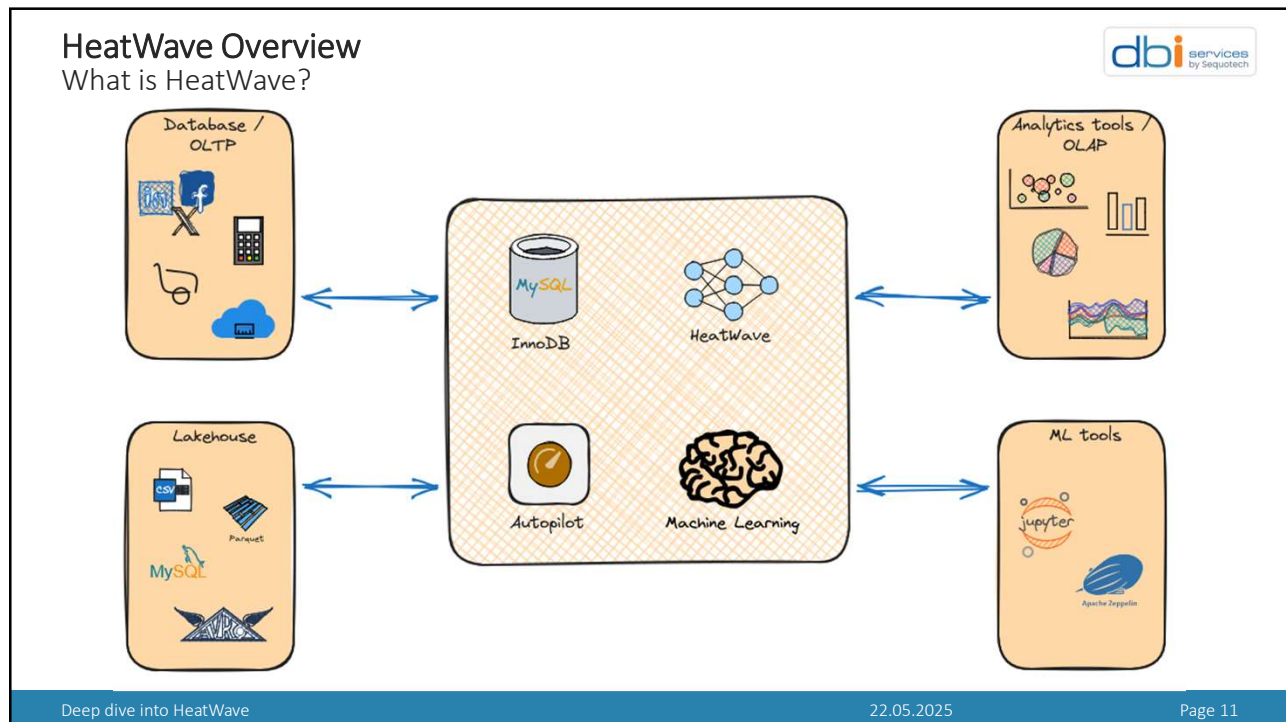
### HeatWave is...

- > A fully managed MySQL Database Service (MDS)
  - > Integrated plugin HeatWave
  - > High-speed query performance
  - > On Oracle Cloud Infrastructure (OCI), Amazon Web Services (AWS) and Microsoft Azure
  - > Oracle Premier Support for MySQL
- > A Cloud database service that combines different workloads
  - > Transactions (OLTP)
  - > Analytics (OLAP)
  - > Machine Learning service (ML)
  - > Lakehouse
  - > GenAI



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## HeatWave Overview

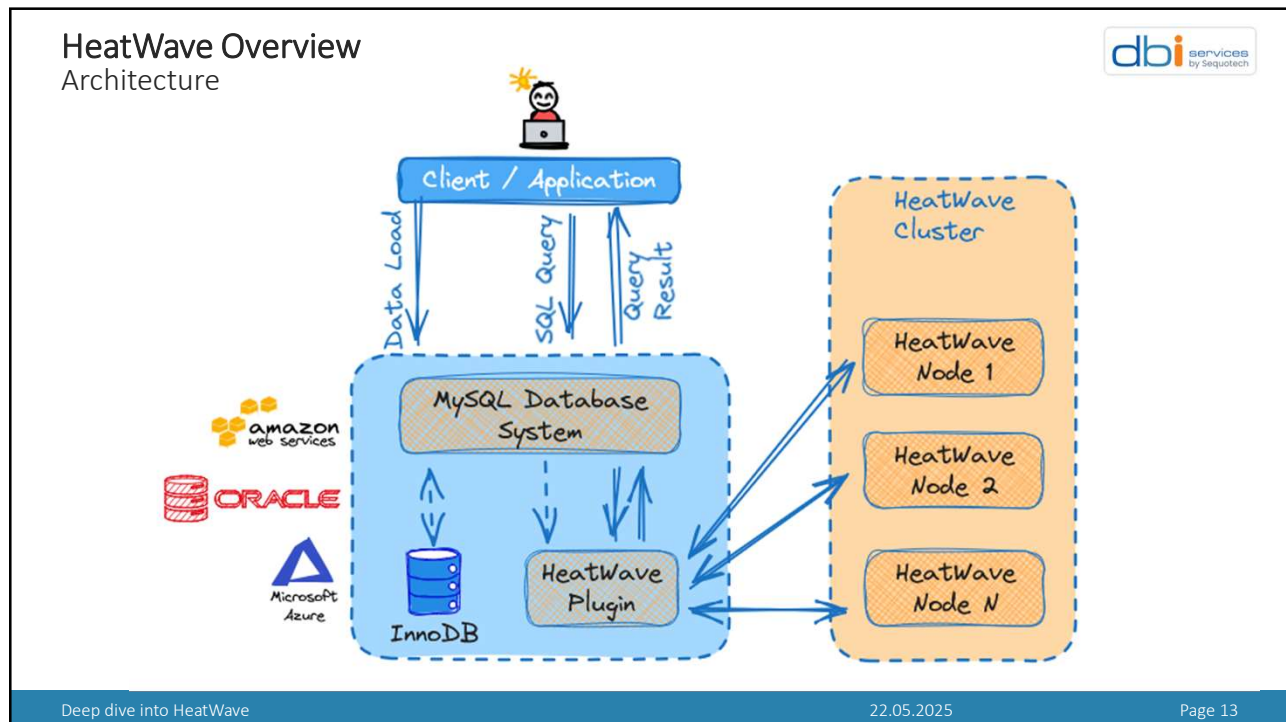
- > Why HeatWave?
- > What is HeatWave?
- > Architecture

The diagram on the right shows a four-step process flow, numbered 1 through 4, arranged in a vertical sequence with curved arrows indicating the flow from one step to the next. Step 1 is highlighted with a white arrow, while steps 2, 3, and 4 are shown with grey arrows.

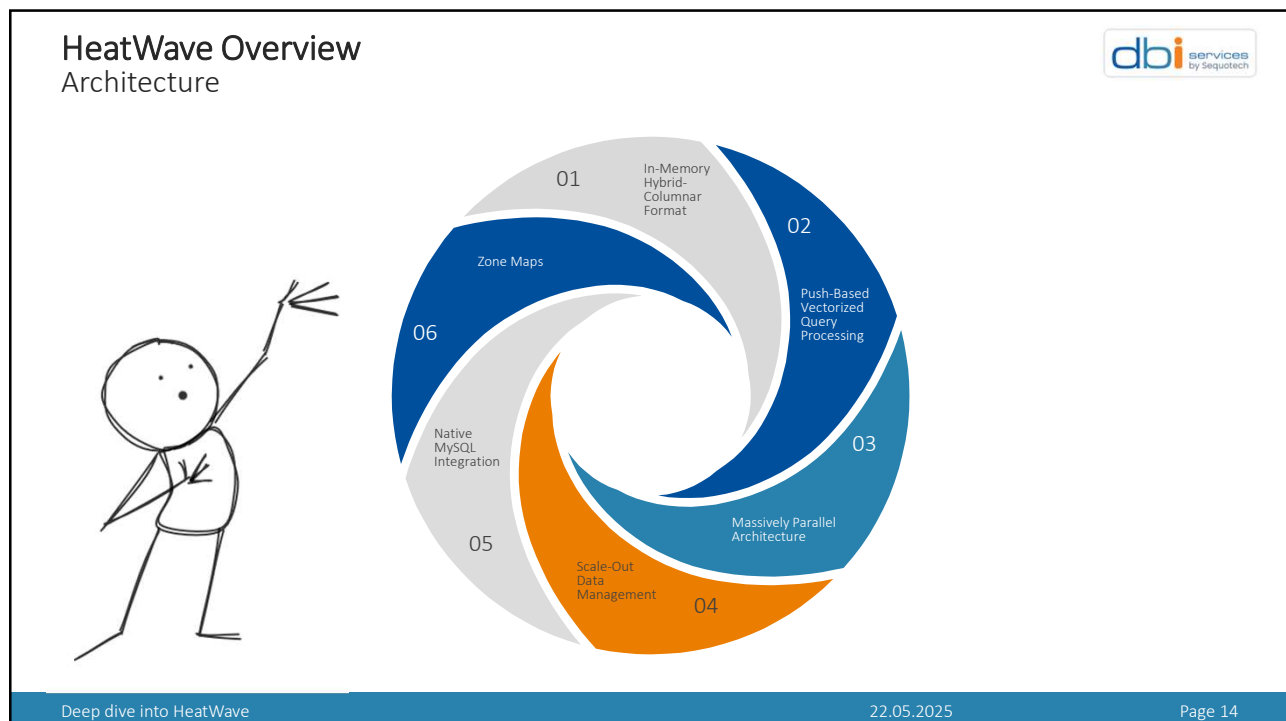
dbi services by Sequoia

Deep dive into HeatWave 22.05.2025 Page 12

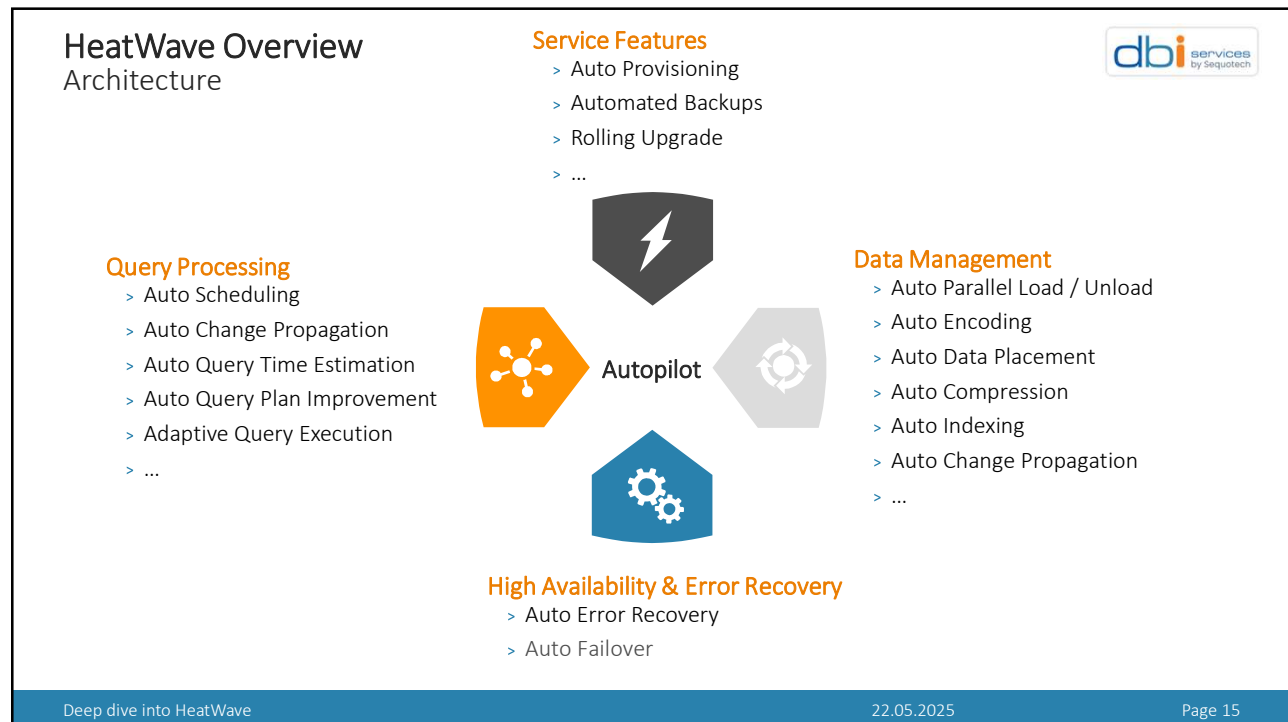
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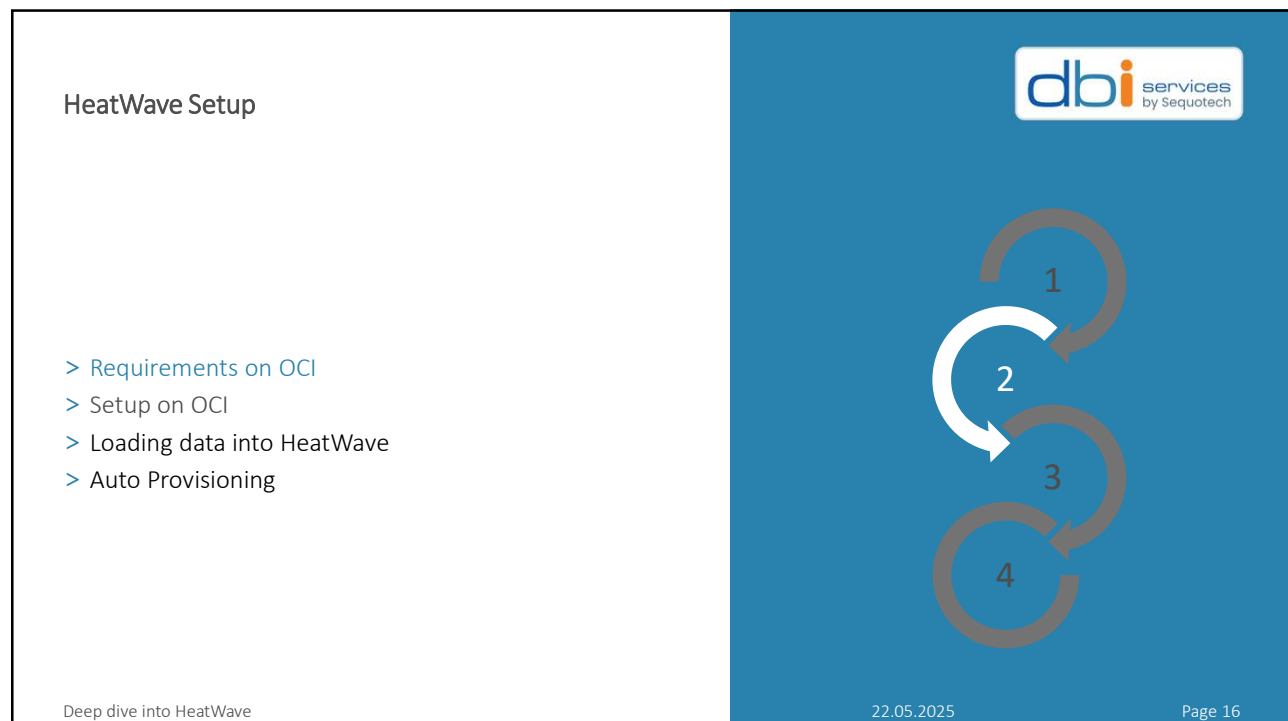
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## HeatWave Setup

### Requirements on OCI



#### OCI environment

- > OCI Tenancy
- > Compartment
- > Virtual Cloud Network (VCN)
- > Compute Instance
- > Security policies

#### Databases

- > InnoDB engine
- > Primary keys
- > Identify all queries (tables) for HeatWave processing
- > MySQL version support
- > MySQL Shell

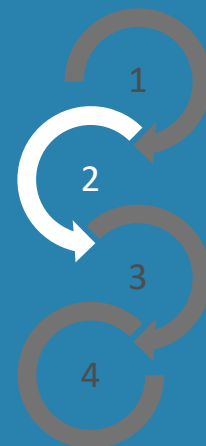


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## HeatWave Setup



- > Requirements on OCI
- > [Setup on OCI](#)
- > Loading data into HeatWave
- > Auto Provisioning



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HeatWave Setup  
Setup on OCI

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Cloud

Search resources, services, documentation, and Marketplace

heatwave

Home

Compute

Storage

Networking

Oracle Database

Database

Search results for "heatwave"

Overview

HeatWave MySQL

DB Systems

HeatWave MySQL

Backups

HeatWave MySQL

Channels

HeatWave MySQL

Configurations

HeatWave MySQL

Administration

HeatWave MySQL on AWS

Deep dive into HeatWave

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HeatWave Setup  
Setup on OCI

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Create DB system

Actions

Search

<input type="checkbox"/>	Name	DB system state	Crash recovery	Delete protected	High availability	HeatWave cluster	Created
No items found.							

0 selected

Showing 0 items < 1 of 1 >

Create DB system

Production

Sets up a high availability DB system with recommended defaults for a production environment.

Development or testing

Sets up a standalone DB system with recommended defaults for a development or testing environment.

Always Free

Sets up an Always Free standalone DB system with recommended defaults. Shape, storage, and HeatWave cluster nodes are restricted.

Provide DB system information

Create in compartment

ELU

dbi3oracle (root)/dbi-services/dbasandou/ELU

Name

myHeatWave

The user-friendly name for the DB system. It does not have to be unique.

Description Optional

User-provided data about the DB system.

Deep dive into HeatWave

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HeatWave Setup  
Setup on OCI

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Create administrator credentials

Username ⓘ  
admin

Password  
••••••••

Confirm password  
••••••••

Standalone  
Single-instance DB system ✓

High availability  
DB system with 3 database instances that provides automatic failover and zero data loss in the event of a failure

Configure networking Collapse

The VCN and subnet where the DB system endpoint will be attached. The DB system endpoint uses a private IP address and is not directly accessible from the internet. [How do I connect to a DB system?](#) If you do not have a VCN, [create a VCN](#).

Virtual cloud network in **ELU** [\(Change compartment\)](#)

VCN: myHeatWave

Subnet in **ELU** [\(Change compartment\)](#)

private subnet-VCN-myHeatWave (Regional)

Deep dive into HeatWave 22.05.2025 Page 21

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HeatWave Setup  
Setup on OCI

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Configure hardware Collapse

☒ Enable HeatWave cluster  
HeatWave cluster is a serverless query accelerator and a fully automated in-database machine learning engine. It is suitable for transactional, analytic and machine learning workloads across data stored in database, data warehouses and data lakes.

Select a shape

A shape determines the amount of CPU, memory and other resources allocated to a database instance of a DB system. The performance of a DB system depends on the shape you select. A shape has associated configurations, which you can select in the Configuration tab under Show advanced options.

Shape: MySQL 2 [Change shape](#)

ECPU count: 2

Memory size: 16 GB

Max network bandwidth: 1 Gbps

HeatWave cluster configuration

Shape: HeatWave 32GB [Configure HeatWave cluster](#)

Memory: 32 GB

Nodes: 1

HeatWave Lakehouse: Enabled

Storage size

Initial data storage size (GB) ⓘ

1024

Must be an integer between 50 and 131,072.

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## HeatWave Setup

Cloud Search resources, services, documentation, and Marketplace Switzerland North (Zurich)

HeatWave MySQL > DB systems > DB system details

### myHeatWave

DBS CREATING

Edit Performance Hub Start Stop More actions

DB system information Connections Tags

#### General information

OCID: ...hgmyin4q [Show](#) [Copy](#)

Description: -

Compartment: db|oracle (root)/db|services/db|sandbox/ELU

Created: Tue, May 6, 2025, 13:20:49 UTC

Last updated: Tue, May 6, 2025, 13:20:50 UTC

#### DB system configuration

Shape: MySQL 2

ECPU Count: 2

Memory: 16 GB

Automatic storage expansion: Disabled

Storage size: 1 TB

Database version: 8.4.5 - LTS

Configuration: [MySQL 2 Standalone](#)

Crash recovery: Enabled

#### Backup plan

#### Management

Database mode: Read/write

Access mode: All users

#### Associated services

Database Management: Disabled

Ops Insights: Disabled

#### High availability

High availability: Disabled

#### HeatWave cluster

HeatWave cluster: [Details](#)

State: ● Creating

HeatWave Lakehouse: Enabled

#### Deletion plan

Deletion plan: [Details](#)

Deep dive into HeatWave 22.05.2025 Page 23

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## HeatWave Setup

### Setup on OCI

dbi services by SequeTech

Resources

#### Work requests

A [work request](#) is an activity log that tracks each step in an asynchronous operation. Use work requests to monitor the progress of long-running operations.

Operation	Status	Progress	% Complete	Accepted	Started	Finished
<a href="#">ADD_HEATWAVE_CLUSTER</a>	In progress	<div style="width: 30%;"></div>	30	Mon, Mar 18, 2024, 10:08:59 UTC	Mon, Mar 18, 2024, 10:09:13 UTC	-
<a href="#">CREATE_DBSYSTEM</a>	In progress	<div style="width: 24%;"></div>	24	Mon, Mar 18, 2024, 10:08:58 UTC	Mon, Mar 18, 2024, 10:09:15 UTC	-

Showing 2 items < 1 of 1 >

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HeatWave Setup  
Setup on OCI

dbi services  
by Sequoia

HeatWave MySQL > DB systems > DB system details

DBS

ACTIVE

myHeatWave

Edit Performance Hub Start Stop More actions

DB system information

Connections Tags

General information

OCID: ...hgxmyn4jq Show Copy

Description: Edit

Compartment: dbiOracle (root)/dbi-services/dbisandbox/ELU

Created: Tue, May 6, 2025, 13:20:49 UTC

Last updated: Tue, May 6, 2025, 13:42:44 UTC

DB system configuration

Shape: MySQL 2 Edit

ECPU Count: 2

Memory: 16 GB

Automatic storage expansion: Disabled Edit

Storage size: 1 TB  Edit

Database version: 8.4.5 - LTS Edit

Configuration: MySQL 2 Standalone Edit

Crash recovery: Enabled Edit

Backup plan

Management

Database mode: Read/write

Access mode: All users  Edit

Associated services

Database Management: Disabled Enable

Ops Insights: Disabled Enable

High availability

High availability: Disabled Enable

HeatWave cluster

HeatWave cluster: Details Edit

State: Active

HeatWave Lakehouse: Enabled Disable

Deletion plan

Deletion plan: Details Edit

Deep dive into HeatWave

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HeatWave Setup  
Setup on OCI

dbi services  
by Sequoia

HeatWave MySQL > DB systems > DB system details

DBS

ACTIVE

myHeatWave

Edit Performance Hub Start Stop More actions

DB system information

Connections Tags

Networking

Virtual cloud network: myHeatWave

Subnet: private subnet-myHeatWave

Subnet type: Regional

Security certificate

Security certificate: Service defined Edit

Primary endpoint

Connect to the DB system using a MySQL client/connector via the endpoint below. How do I connect?

Private IP address: 10.0.1.190 Copy

Internal FQDN: HW-myHeatWave... Show Copy Edit

Database port: 3306

Database X protocol port: 33060

Read endpoint

Read endpoint: Disabled

Deep dive into HeatWave

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## HeatWave Setup Setup on OCI

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Cloud

Search resources, services, documentation, and Marketplace

Switzerland North (Zurich)

HeatWave MySQL > DB systems > DB system details

### myHeatWave

DB system information

Networks

Virtual cloud network: [myHeatWave](#)

Subnet: [private-subnet-myHeatWave](#)

Subnet type: Regional

Security certificate

Security certificate: Service defined [Edit](#)

Primary endpoint

Connect to the DB system using a MySQL client/connector via the endpoint below. [How do I connect?](#)

Private IP address: 10.0.1.190 [Copy](#)

Internal FQDN: HW-myHeatWave... [Show](#) [Copy](#) [Edit](#)

Database port: 3306

Database X protocol port: 33060

Read endpoint

Actions

Network: Ephemeral

Cloud Shell

```
elisa_usai@cloudshell:oci (eu-zurich-1) $ mysqlsh -uadmin -h10.0.1.190 -p
Please provide the password for "admin@10.0.1.190": *****
Save password for "admin@10.0.1.190"? [Y/n] [Y] (default No): Yes
MySQL Shell 9.2.0-commercial

Copyright (c) 2016, 2025, Oracle and/or its affiliates.
Oracle is a registered trademark of Oracle Corporation and/or its affiliates.
Other names may be trademarks of their respective owners.

Type 'help' or '?' for help; 'quit' to exit.
Creating a session to "admin@10.0.1.190"
Establishing connection... Press ^C to stop.
Your MySQL connection id is 96
Server version: 8.4.3-Cloud MySQL Enterprise - Cloud
No default schema selected; type use schema to set one.
WARNING: Permissions were for the file "/home/elisa_usai/.mysqlsh/mysqlsh.log" are too open. Permissions have been adjusted for user only access.
mysqlsh 10.0.1.190:33060 ssl JS >
```

Deep dive into HeatWave

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## HeatWave Setup

dbi services by Sequoia

- > Requirements on OCI
- > Setup on OCI
- > Loading data into HeatWave
- > Auto Provisioning

Deep dive into HeatWave

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## HeatWave Setup

### Loading data into HeatWave



Check the "airportdb" schema

```
MySQL 10.0.1.190:33060+ ssl JS > \sql
Switching to SQL mode... Commands end with ;
Fetching global names for auto-completion... Press ^C to stop.
MySQL 10.0.1.85:33060+ ssl SQL > show schemas;
+-----+
| Database |
+-----+
| airportdb |
| information_schema |
| mysql |
| mysql_audit |
| performance_schema |
| sys |
+-----+
```

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## HeatWave Setup

### Loading data into HeatWave



Check the "airportdb" tables

```
MySQL 10.0.1.190:3306 ssl SQL > SELECT table_name, table_rows
-> FROM INFORMATION_SCHEMA.TABLES
-> WHERE TABLE_SCHEMA = 'airportdb';
+-----+-----+
| TABLE_NAME | TABLE_ROWS |
+-----+-----+
| airline | 113 |
| airplane | 5583 |
| airplane_type | 310 |
| airport | 9684 |
| airport_geo | 10035 |
| airport_reachable | 0 |
| booking | 54173287 |
| employee | 1000 |
| flight | 461286 |
| flight_log | 0 |
| flightschedule | 9633 |
| passenger | 36247 |
| passengerdetails | 36071 |
| weatherdata | 4590083 |
+-----+-----+
```

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## HeatWave Setup

### Loading data into HeatWave



Load the data to the MySQL HeatWave cluster

```
MySQL 10.0.1.190:3306 ssl SQL > CALL sys.heatwave_load(JSON_ARRAY('airportdb'), NULL);
```

```
...
+-----+
| CAPACITY ESTIMATION |
+-----+
| Default encoding for string columns: VARLEN (unless specified in the schema) |
| Estimating memory footprint for 1 schema(s) |
| |
| SCHEMA          TOTAL      ESTIMATED      ESTIMATED      TOTAL      DICTIONARY      VARLEN      ESTIMATED |
| NAME            OFFLOADABLE HEATWAVE NODE  MYSQL NODE     STRING      ENCODED      ENCODED      LOAD |
| -----            TABLES      FOOTPRINT      FOOTPRINT      COLUMNS    COLUMNS    COLUMNS    TIME |
| `airportdb`          14          1.66 GiB      7.44 MiB      36          0          36          2.67 min |
| |
| Sufficient MySQL host memory available to load all tables. |
| Sufficient HeatWave cluster memory available to load all tables. |
| |
+-----+
...

```

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## HeatWave Setup

### Loading data into HeatWave



```
...
+-----+
| TABLE LOAD |
+-----+
| TABLE (14 of 14): `airportdb`.`weatherdata` |
| Commands executed successfully: 3 of 3 |
| Warnings encountered: 0 |
| Table load succeeded! |
| Total columns loaded: 9 |
| Table loaded using 4 thread(s) |
| Elapsed time: 12.05 s |
| |
+-----+
...
+-----+
| LOAD SUMMARY |
+-----+
| SCHEMA          TABLES      TABLES      COLUMNS      LOAD |
| NAME            LOADED        FAILED        LOADED        DURATION |
| -----            -----            -----            ----- |
| `airportdb`          14              0            105          2.26 min |
| |
+-----+

```

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## HeatWave Setup

### Loading data into HeatWave



Check if all tables are loaded

```
MySQL 10.0.1.190:3306 ssl SQL > USE performance_schema;

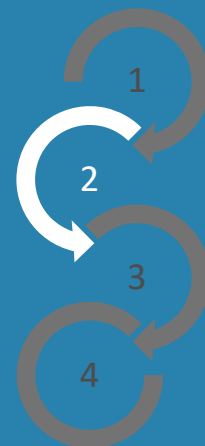
MySQL 10.0.1.190:3306 ssl performance_schema SQL > SELECT NAME, LOAD_STATUS
-> FROM rpd_tables, rpd_table_id
-> WHERE rpd_tables.ID = rpd_table_id.ID;
```

NAME	LOAD_STATUS
airportdb.flight_log	AVAIL_RPDGSTABSTATE
airportdb.airplane	AVAIL_RPDGSTABSTATE
airportdb.airport_reachable	AVAIL_RPDGSTABSTATE
airportdb.weatherdata	AVAIL_RPDGSTABSTATE
airportdb.passengerdetails	AVAIL_RPDGSTABSTATE
airportdb.airport_geo	AVAIL_RPDGSTABSTATE
airportdb.booking	AVAIL_RPDGSTABSTATE
airportdb.airplane_type	AVAIL_RPDGSTABSTATE
airportdb.employee	AVAIL_RPDGSTABSTATE
airportdb.flightschedule	AVAIL_RPDGSTABSTATE
airportdb.airline	AVAIL_RPDGSTABSTATE
airportdb.airport	AVAIL_RPDGSTABSTATE
airportdb.passenger	AVAIL_RPDGSTABSTATE
airportdb.flight	AVAIL_RPDGSTABSTATE

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## HeatWave Setup

- > Requirements on OCI
- > Setup on OCI
- > Loading data into HeatWave
- > Auto Provisioning



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## HeatWave Setup Auto Provisioning

dbi services by Sequoia

HeatWave MySQL • DB systems • DB system details

### myHeatWave

DBS ACTIVE

Edit Performance Hub Start Stop **More actions**

**DB system information**

General information

OCID: ...hgmyin4q [Show](#) [Copy](#)

Description: [Edit](#)

Compartment: db3oracle (root)/dbi-services/

Created: Tue, May 6, 2025, 13:20:49 UTC

Last updated: Tue, May 6, 2025, 13:42:44 UTC

**DB system configuration**

Shape: MySQL2 [Edit](#)

ECPU Count: 2 [Edit](#)

Memory: 16 GB [Edit](#)

Automatic storage expansion: Disabled [Edit](#)

Restart

Restore to a new DB system

Edit backup plan

Create manual backup

Enable Database Management

Enable high availability

Disable crash recovery

**Edit HeatWave cluster**

Create channel

Update storage size

Update hostname

Administrator password

**Management**

Database mode: Read/write [Edit](#)

Access mode: All users [Edit](#)

**Associated services**

Database Management: Disabled [Enable](#)

Ops Insights: Disabled [Enable](#)

**High availability**

High availability: Disabled [Enable](#)

**HeatWave cluster**

Deep dive into HeatWave

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## HeatWave Setup Auto Provisioning

dbi services by Sequoia

### Configure HeatWave cluster

Select a shape

You must reload your data after changing the shape.

Shape: HeatWave 32GB [Change shape](#)

CPU core count: 1

Memory size: 32 GB

Max network bandwidth: 1 Gbps

Nodes

1

Specify a number between 1 and 15. The HeatWave cluster remains available to process queries and keeps loaded tables in memory during resize.

Memory: 32 GB

**Estimate node**

This operation can take several minutes to complete.

### Estimate node

Estimate number of required nodes by selecting the schemas or tables you want to analyze with HeatWave cluster. This operation takes few minutes to complete. [?](#)

**Generate estimate**

Loading...

No schema information available.


Deep dive into HeatWave

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## HeatWave Setup



### Auto Provisioning

#### Estimate node

Estimate number of required nodes by selecting the schemas or tables you want to analyze with HeatWave cluster. This operation takes few minutes to complete. ⓘ

[Regenerate estimate](#)

Last estimate was generated on Wed, May 7, 2025, 12:33:03 UTC.

<input checked="" type="checkbox"/> Name	Memory estimate	Information
<input checked="" type="checkbox"/> airportdb	1.55 GB	Number of tables: 14

Total memory selected: 1.55 GB

HeatWave 32GB

Summary

HeatWave 32GB

CPU core count: 1

Memory size: 32 GB

Max network bandwidth: 1 Gbps

Nodes: 1 ⓘ

Total memory required: 1.55 GB

Total memory: 32 GB

On completion  
All currently loaded tables remain loaded during and after the edit operation. The following command is only necessary when loading additional tables or schemas. ⓘ


[Show load command](#)

Apply estimated nodes
Cancel

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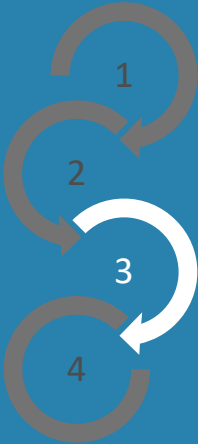
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## HeatWave Features



- > Queries Acceleration
- > Lakehouse
- > AutoML
- > GenAI

Deep dive into HeatWave



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## HeatWave Features

### Queries Acceleration



#### Query 1

> Without MySQL HeatWave engine

```
MySQL 10.0.1.190:3306 ssl airportdb SQL > SET SESSION use_secondary_engine=OFF;

MySQL 10.0.1.190:3306 ssl airportdb SQL > explain SELECT count(flight_id)
      -> FROM booking
      -> WHERE price > 300\G

***** 1. row *****
      id: 1
    select_type: SIMPLE
          table: booking
    partitions: NULL
          type: ALL
possible_keys: NULL
          key: NULL
      key_len: NULL
         ref: NULL
        rows: 50208088
   filtered: 33.33
      Extra: Using where
```

## HeatWave Features

### Queries Acceleration



#### Query 1

> Without MySQL HeatWave engine

```
MySQL 10.0.1.190:3306 ssl airportdb SQL > SET SESSION use_secondary_engine=OFF;

MySQL 10.0.1.190:3306 ssl airportdb SQL > SELECT format(count(flight_id),0) as "Nb of rows"
      -> FROM booking
      -> WHERE price > 300;

+-----+
| Nb of rows |
+-----+
| 21,823,795 |
+-----+
1 row in set (7.7609 sec)
```

## HeatWave Features

### Queries Acceleration



#### Query 1

> With MySQL HeatWave engine

```
MySQL 10.0.1.190:3306 ssl airportdb SQL > SET SESSION use_secondary_engine=ON;

MySQL 10.0.1.190:3306 ssl airportdb SQL > explain SELECT count(flight_id)
      -> FROM booking
      -> WHERE price > 300\G

***** 1. row *****
      id: 1
    select_type: NONE
      table: NULL
    partitions: NULL
        type: NULL
possible_keys: NULL
          key: NULL
      key_len: NULL
         ref: NULL
        rows: NULL
    filtered: NULL
    Extra: Using secondary engine RAPID. Use EXPLAIN FORMAT=TREE to show the plan.
```

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## HeatWave Features

### Queries Acceleration



#### Query 1

> With MySQL HeatWave engine

```
MySQL 10.0.1.190:3306 ssl airportdb SQL > SET SESSION use_secondary_engine=ON;

MySQL 10.0.1.190:3306 ssl airportdb SQL > explain SELECT count(flight_id)
      -> FROM booking
      -> WHERE price > 300\G

+-----+
| Nb of rows |
+-----+
| 21,823,795 |
+-----+
1 row in set (0.2236 sec)
```

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## HeatWave Features

### Queries Acceleration



#### Query 2

> Without MySQL HeatWave engine

```
MySQL 10.0.1.190:3306 ssl airportdb SQL > SET SESSION use_secondary_engine=OFF;

MySQL 10.0.1.190:3306 ssl airportdb SQL > SELECT booking.price, count(*)
      -> FROM booking
      -> WHERE booking.price > 500
      -> GROUP BY booking.price
      -> ORDER BY booking.price
      -> LIMIT 5;

+-----+-----+
| price | count(*) |
+-----+-----+
| 500.01 |      860 |
| 500.02 |     1207 |
| 500.03 |     1135 |
| 500.04 |     1010 |
| 500.05 |     1016 |
+-----+-----+
5 rows in set (7.1733 sec)
```

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## HeatWave Features

### Queries Acceleration



#### Query 2

> With MySQL HeatWave engine

```
MySQL 10.0.1.190:3306 ssl airportdb SQL > SET SESSION use_secondary_engine=ON;

MySQL 10.0.1.190:3306 ssl airportdb SQL > SELECT booking.price, count(*)
      -> FROM booking
      -> WHERE booking.price > 500
      -> GROUP BY booking.price
      -> ORDER BY booking.price
      -> LIMIT 5;

+-----+-----+
| price | count(*) |
+-----+-----+
| 500.01 |      860 |
| 500.02 |     1207 |
| 500.03 |     1135 |
| 500.04 |     1010 |
| 500.05 |     1016 |
+-----+-----+
5 rows in set (0.1594 sec)
```

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## HeatWave Features

### Queries Acceleration



#### Query 3

> Without MySQL HeatWave engine

```
MySQL 10.0.1.190:3306 ssl airportdb SQL > SET SESSION use_secondary_engine=OFF;

MySQL 10.0.1.190:3306 ssl airportdb SQL > SELECT
airline.airlinename,AVG(datediff(departure,birthdate)/365.25) as avg_age, count(*) as nb_people
-> FROM booking, flight, airline, passengerdetails
-> WHERE booking.flight_id=flight.flight_id
-> AND airline.airline_id=flight.airline_id
-> AND booking.passenger_id=passengerdetails.passenger_id
-> AND country IN ("SWITZERLAND", "FRANCE", "ITALY")
-> GROUP BY airline.airlinename ORDER BY airline.airlinename,
-> avg_age LIMIT 5;

+-----+-----+-----+
| airlinename | avg_age | nb_people |
+-----+-----+-----+
| Afghanistan Airlines | 45.92612137 | 20570 |
| Albania Airlines | 46.02485633 | 21804 |
| American Samoa Airli | 46.10098466 | 15249 |
| Angola Airlines | 45.97214161 | 18539 |
| Argentina Airlines | 46.03115082 | 21298 |
+-----+-----+-----+
5 rows in set (10.9100 sec)
```

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## HeatWave Features

### Queries Acceleration



#### Query 3

> With MySQL HeatWave engine

```
MySQL 10.0.1.190:3306 ssl airportdb SQL > SET SESSION use_secondary_engine=ON;

MySQL 10.0.1.190:3306 ssl airportdb SQL > SELECT
airline.airlinename,AVG(datediff(departure,birthdate)/365.25) as avg_age, count(*) as nb_people
-> FROM booking, flight, airline, passengerdetails
-> WHERE booking.flight_id=flight.flight_id
-> AND airline.airline_id=flight.airline_id
-> AND booking.passenger_id=passengerdetails.passenger_id
-> AND country IN ("SWITZERLAND", "FRANCE", "ITALY")
-> GROUP BY airline.airlinename ORDER BY airline.airlinename,
-> avg_age LIMIT 5;

+-----+-----+-----+
| airlinename | avg_age | nb_people |
+-----+-----+-----+
| Afghanistan Airlines | 45.92607116 | 20570 |
| Albania Airlines | 46.02480595 | 21804 |
| American Samoa Airli | 46.10093492 | 15249 |
| Angola Airlines | 45.97209191 | 18539 |
| Argentina Airlines | 46.03110048 | 21298 |
+-----+-----+-----+
5 rows in set (0.8871 sec)
```

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## HeatWave Features

### Queries Acceleration



#### Query 4

> Without MySQL HeatWave engine

```
MySQL 10.0.1.190:3306 ssl airportdb SQL > SET SESSION use_secondary_engine=OFF;

MySQL 10.0.1.190:3306 ssl airportdb SQL > SELECT airline.airlinename,
-> SUM(booking.price) as price_tickets,
-> count(*) as nb_tickets FROM booking, flight, airline,
-> airport_geo
-> WHERE booking.flight_id=flight.flight_id AND
-> airline.airline_id=flight.airline_id AND
-> flight.from=airport_geo.airport_id AND
-> airport_geo.country = "UNITED STATES"
-> GROUP BY airline.airlinename
-> ORDER BY nb_tickets desc, airline.airlinename LIMIT 5;
```

airlinename	price_tickets	nb_tickets
Falkland Is Airlines	54329614.83	216237
Micronesia Airlines	53875825.72	214275
Brazil Airlines	50039222.97	199451
Cyprus Airlines	47466718.63	189493
Yugoslavia Airlines	46905122.48	186865

5 rows in set (31.0606 sec)

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## HeatWave Features

### Queries Acceleration



#### Query 4

> With MySQL HeatWave engine

```
MySQL 10.0.1.190:3306 ssl airportdb SQL > SET SESSION use_secondary_engine=ON;

MySQL 10.0.1.190:3306 ssl airportdb SQL > SELECT airline.airlinename,
-> SUM(booking.price) as price_tickets,
-> count(*) as nb_tickets FROM booking, flight, airline,
-> airport_geo
-> WHERE booking.flight_id=flight.flight_id AND
-> airline.airline_id=flight.airline_id AND
-> flight.from=airport_geo.airport_id AND
-> airport_geo.country = "UNITED STATES"
-> GROUP BY airline.airlinename
-> ORDER BY nb_tickets desc, airline.airlinename LIMIT 5;
```

airlinename	price_tickets	nb_tickets
Falkland Is Airlines	54329614.83	216237
Micronesia Airlines	53875825.72	214275
Brazil Airlines	50039222.97	199451
Cyprus Airlines	47466718.63	189493
Yugoslavia Airlines	46905122.48	186865

5 rows in set (2.8184 sec)

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## HeatWave Features

### Queries Acceleration



#### Query 5

> Without MySQL HeatWave engine

```
MySQL 10.0.1.190:3306 ssl airportdb SQL > SET SESSION use_secondary_engine=OFF;

MySQL 10.0.1.190:3306 ssl airportdb SQL > SELECT firstname, lastname,
-> COUNT(booking.passenger_id) AS count_bookings
-> FROM passenger, booking
-> WHERE booking.passenger_id = passenger.passenger_id
-> AND passenger.lastname = 'Aldrin'
-> OR (passenger.firstname = 'Neil'
-> AND passenger.lastname = 'Armstrong')
-> AND booking.price > 400.00
-> GROUP BY firstname , lastname;

+-----+-----+-----+
| firstname | lastname | count_bookings |
+-----+-----+-----+
| Neil      | Armstrong | 10955025      |
| Buzz      | Aldrin    | 1404          |
+-----+-----+-----+
2 rows in set (28.5958 sec)
```

## HeatWave Features

### Queries Acceleration



#### Query 5

> With MySQL HeatWave engine

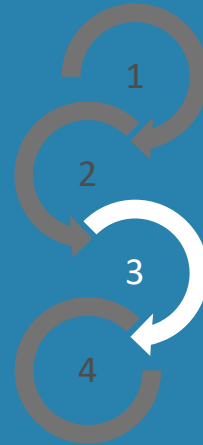
```
MySQL 10.0.1.190:3306 ssl airportdb SQL > SET SESSION use_secondary_engine=ON;

MySQL 10.0.1.190:3306 ssl airportdb SQL > SELECT firstname, lastname,
-> COUNT(booking.passenger_id) AS count_bookings
-> FROM passenger, booking
-> WHERE booking.passenger_id = passenger.passenger_id
-> AND passenger.lastname = 'Aldrin'
-> OR (passenger.firstname = 'Neil'
-> AND passenger.lastname = 'Armstrong')
-> AND booking.price > 400.00
-> GROUP BY firstname , lastname;

+-----+-----+-----+
| firstname | lastname | count_bookings |
+-----+-----+-----+
| Buzz      | Aldrin    | 1404          |
| Neil      | Armstrong | 10955025      |
+-----+-----+-----+
2 rows in set (15.8976 sec)
```

## HeatWave Features

- > Query Acceleration
- > Lakehouse
- > AutoML
- > GenAI



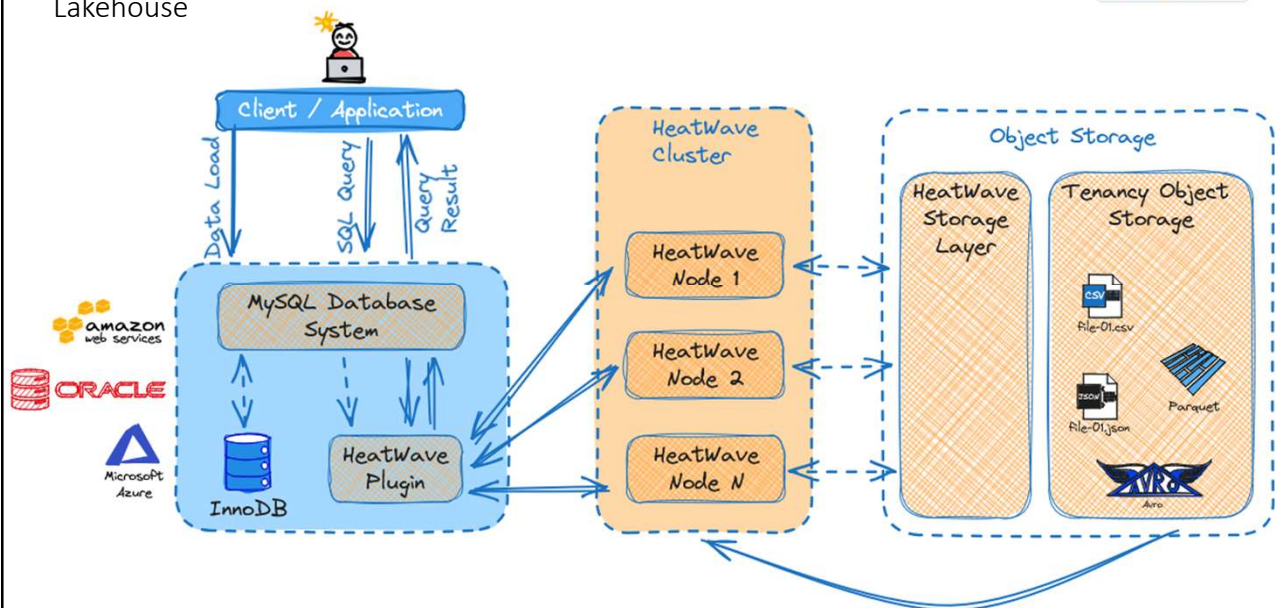
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## HeatWave Features Lakehouse




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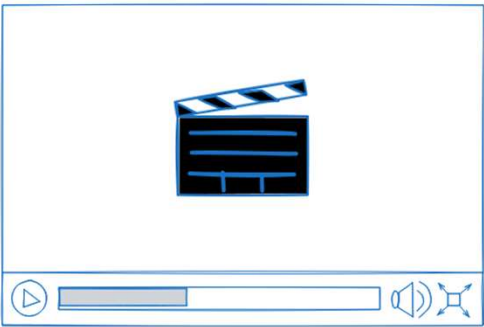

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## HeatWave Features Lakehouse



Demo Time



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cloud.oracle.com/mysq/aa/db-systems/region=eu-zurich-1&cloudshell=true&dbstate=minimized

Cloud

Search resources, services, documentation, and Marketplace

Switzerland North (Zurich)

### HeatWave MySQL

DB systems in ELU compartment

Create DB system Actions

Name	DB system state	Crash recovery	Delete protected	High availability	HeatWave cluster	Created
myHeatWave	Active	Enabled	Disabled	Disabled	Active	Tue, May 6, 2025, 13:20:49 UTC

0 selected

Showing 1 item < 1 of 1 >

Additional services

Activity

Alarms

Announcements

Service limits

List scope

Compartment

ELU

Filters

State

Any state

HeatWave cluster

All

Restore

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Why don't I see Redwood? | Redwood preview

13:15 10.05.2025

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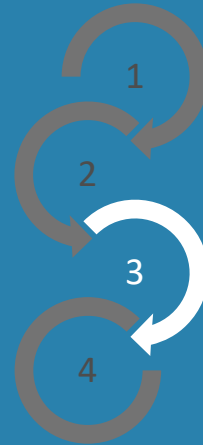
22.05.2025

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## HeatWave Features

- > Query Acceleration
- > Lakehouse
- > AutoML
- > GenAI



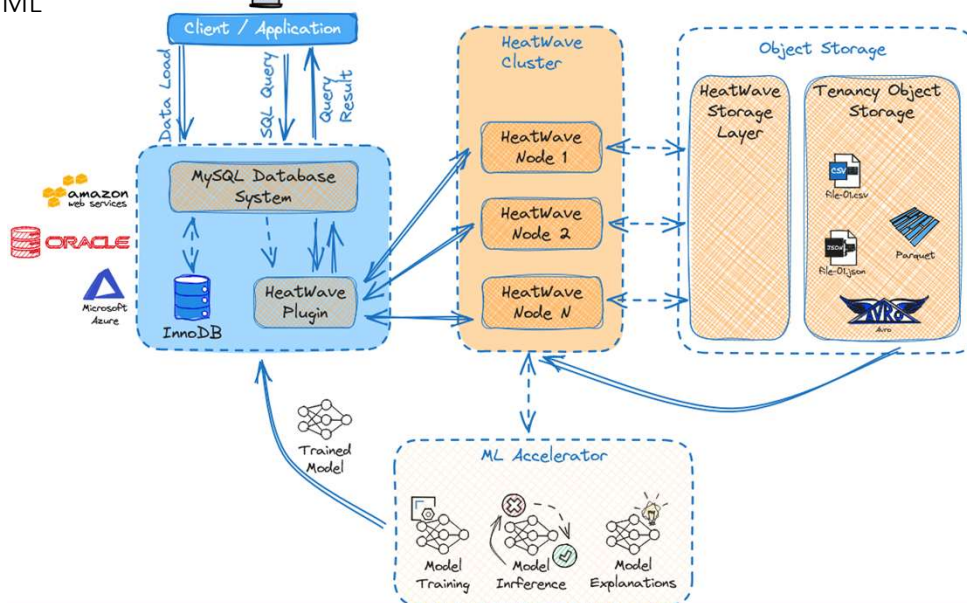
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## HeatWave Features AutoML



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## HeatWave Features

- > Query Acceleration
- > Lakehouse
- > AutoML
- > GenAI

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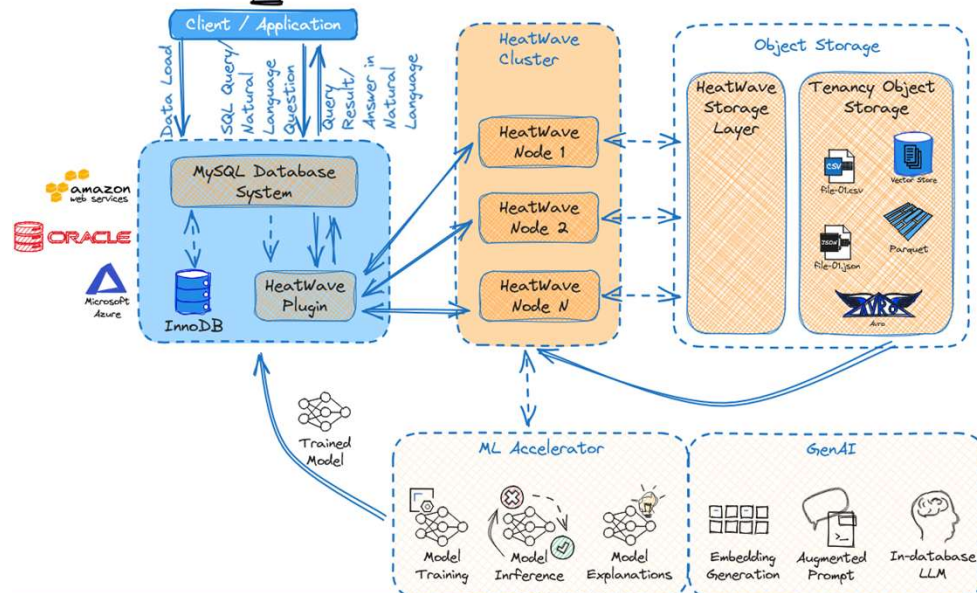
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## HeatWave Features

### GenAI



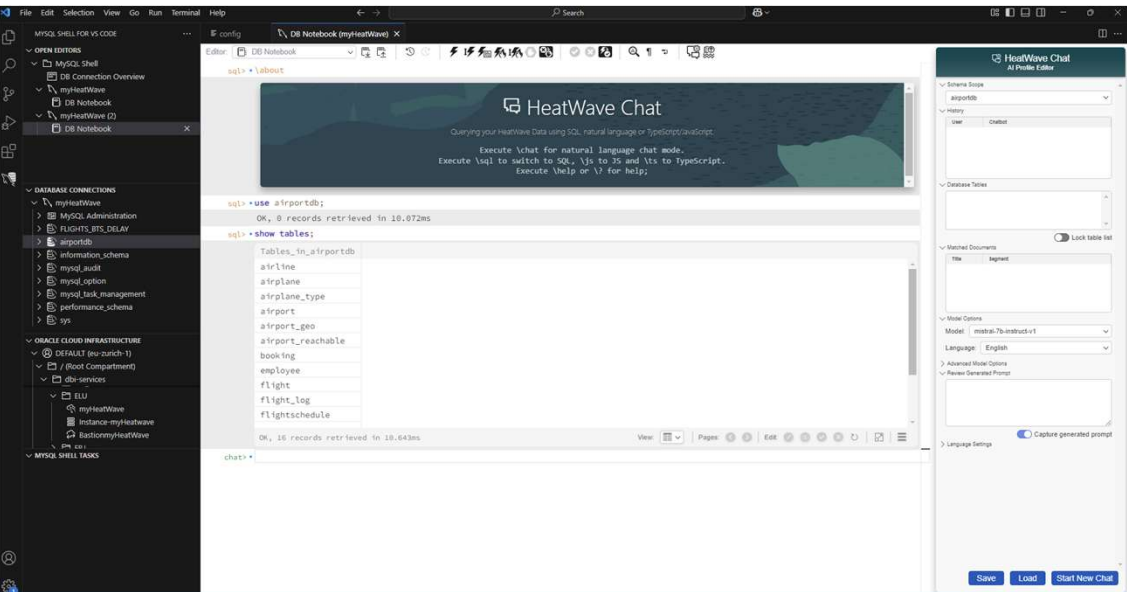
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## HeatWave Features GenAI



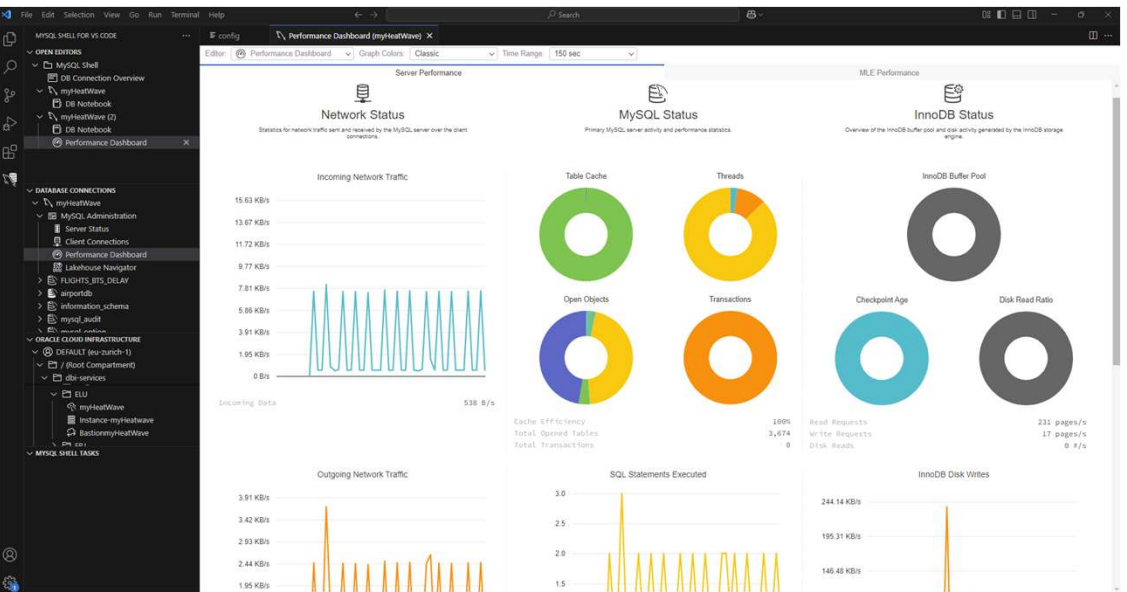
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## HeatWave Features GenAI



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## HeatWave Features GenAI

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## Conclusion

- > HeatWave: Advantages vs Drawbacks
- > Goal of this presentation

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## Conclusion



### HeatWave: Advantages vs Drawbacks







-  Single database for mixed workloads.
-  Real-time analytics.
-  High-performance analytical query processing.


-  Pricing can be a concern if not configured properly.
-  Not available as a standalone or on-premise offering (only available on some Clouds).

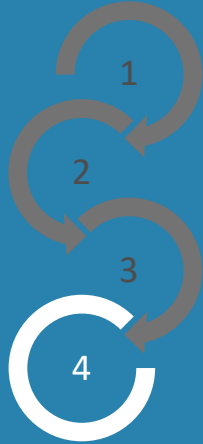
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## Conclusion

- > HeatWave: Advantages vs Drawbacks
- > Goal of this presentation







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## Conclusion

Goal of this presentation



### Do you remember our challenges?

1. Too much time on manual management tasks
2. Need to use separate systems for transactions, analytics and ML
3. How to store significant growth of data stored outside databases

### Could we solve them using HeatWave?



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## Any questions?



Please do ask!



We would love to boost  
your IT-Infrastructure  
How about you?

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