

ORACLE

Oracle Database In-Memory

AskTOM Office Hours – Advanced Features LiveLab – July 12, 2023

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LiveLabs – Database In-Memory Advanced Features

Oracle LiveLabs - <https://developer.oracle.com/livelabs>

The screenshot shows the Oracle LiveLabs website. At the top is a dark navigation bar with the LiveLabs logo, a search bar labeled "Search Workshops and Sprints...", and links for "Event Code" and "Sign". Below the navigation bar is a "Welcome to LiveLabs" section with a sub-header "Experience Oracle's best technology, live!". To the right of this is a dark banner for "Introducing LiveLabs Sprints" with the text "Now you can find answers to your technical questions. Blazingly fast!" and a "Try LiveLabs Sprints" button. Below the welcome section is a row of five icons representing different roles: Developer, DBA, Data Scientist, DevOps, and Low Code Developer. Further down is a "Featured Workshops" section with a "View All Workshops" link. This section displays four workshop cards, each with a title, description, duration, and view count.

Workshop Title	Duration	Views
Load and update Moviestream data in Oracle ADW using Data Tools	1 hr	3065 Views
DB Security Basics	5 hrs	21409 Views
Simplify Microservices with Converged Oracle Database	1 hr, 15 mins	33405 Views
Integrate, Analyze and Act on All data using Autonomous Database (Epic)	4 hrs	7139 Views

Oracle LiveLabs - <https://developer.oracle.com/livelabs>

The screenshot shows the Oracle LiveLabs website interface. At the top, there's a navigation bar with the 'LiveLabs' logo, a search bar containing 'in-memory', and links for 'Event Code' and 'Sign In'. Below the search bar, a dropdown menu displays search results for 'in-memory':

- Boost Analytics Performance with Oracle Database **In-Memory** (ID:566)
- Boost Analytics Performance with Oracle Database **In-Memory** (ID:3433)
- Database **In-Memory** Advanced Features (ID:3710)

A red circle highlights the search results dropdown. Below the search bar, a banner reads 'Oracle LiveLabs gives you access to Oracle's tools and technologies to run a wide variety of labs and workshops.' followed by 'Experience Oracle's best technology, live!'. To the right of the banner is a 'Blazingly fast!' section with a 'Try LiveLabs Sprints' button and an image of race cars.

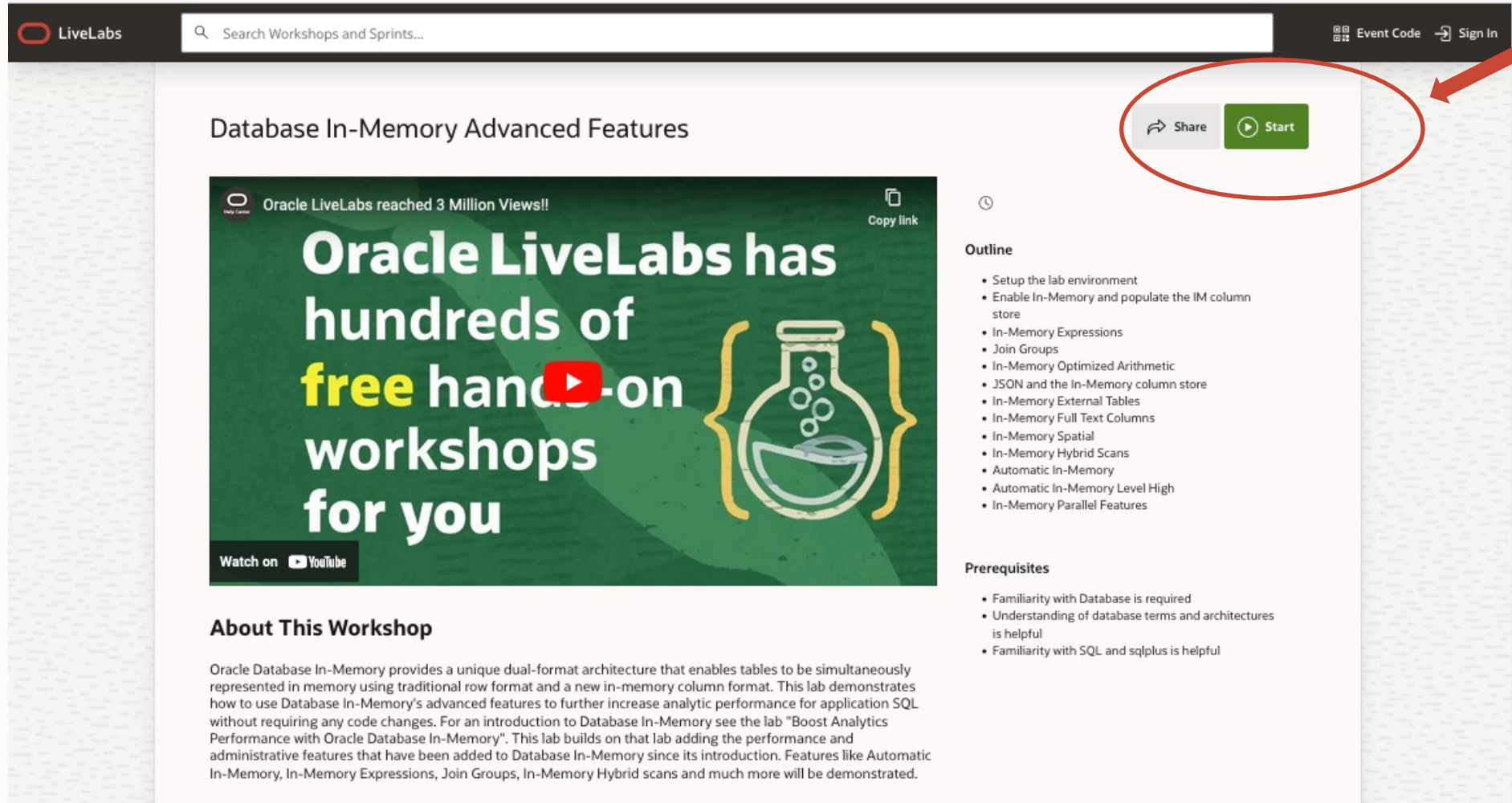
Below the banner, there's a row of icons representing different roles: Developer, DBA, Data Scientist, DevOps, and Low Code Developer.

The 'Featured Workshops' section is below, with a 'View All Workshops' link. It contains four workshop cards:

- DBA Essentials Workshops Series for Oracle Database 21c**: Check out the DBA Essentials workshops for Oracle Database 21c and learn the fundamentals of Oracle (...). Duration: 30 mins. Views: 737.
- Oracle Database 19c New Features**: Explore the latest features in Database 19c. Duration: 3 hrs. Views: 9007.
- DB Security Advanced**: Use database security products and options to achieve the Maximum Security Architecture. Duration: 7 hrs. Views: 14183.
- Use OCI Object Storage to Store Files in Oracle APEX Applications**: Author: Adrian Png, Senior Cloud Solutions Architect, Insum Solutions. Explore how to implement an (...). Duration: 1 hr, 30 mins. Views: 1482.



Database In-Memory Advanced Features LiveLabs page



LiveLabs

Search Workshops and Sprints...

Event Code Sign In

Database In-Memory Advanced Features

Oracle LiveLabs reached 3 Million Views!!

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About This Workshop

Oracle Database In-Memory provides a unique dual-format architecture that enables tables to be simultaneously represented in memory using traditional row format and a new in-memory column format. This lab demonstrates how to use Database In-Memory's advanced features to further increase analytic performance for application SQL without requiring any code changes. For an introduction to Database In-Memory see the lab "Boost Analytics Performance with Oracle Database In-Memory". This lab builds on that lab adding the performance and administrative features that have been added to Database In-Memory since its introduction. Features like Automatic In-Memory, In-Memory Expressions, Join Groups, In-Memory Hybrid scans and much more will be demonstrated.


Outline


- Setup the lab environment
- Enable In-Memory and populate the IM column store
- In-Memory Expressions
- Join Groups
- In-Memory Optimized Arithmetic
- JSON and the In-Memory column store
- In-Memory External Tables
- In-Memory Full Text Columns
- In-Memory Spatial
- In-Memory Hybrid Scans
- Automatic In-Memory
- Automatic In-Memory Level High
- In-Memory Parallel Features


Prerequisites

- Familiarity with Database is required
- Understanding of database terms and architectures is helpful
- Familiarity with SQL and sqlplus is helpful

LiveLabs Sandbox

 LiveLabs

 Event Code

 Sign In

Database In-Memory Advanced Features

 Share

 Start

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Outline

- Setup the lab environment
- Enable In-Memory Advanced Features
- In-Memory Expressions
- Join Groups
- In-Memory Optimization
- JSON and the In-Memory Column Store
- In-Memory External Tables
- In-Memory Full Text Search
- In-Memory Spatial
- In-Memory Hybrid Scans
- Automatic In-Memory
- Automatic In-Memory Level High
- In-Memory Parallel Features

Prerequisites

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The **Run on Your Tenancy** button provides step-by-step instructions so you can run this workshop on your personal tenancy!

Run on Your Tenancy

The **Run on LiveLabs** button will dynamically create resources in an Oracle-owned tenancy for you to use for free!

[Oracle account help](#) | [Oracle account signup](#)

Run on LiveLabs Sandbox



Sandbox Reservation

LiveLabs

Search Workshops and Sprints...

Database In-Memory Advanced Features

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Reserve Workshop

Attendee Email Address

andy.rivenes@oracle.com

Attendee Timezone

PST (-07:00)

Required

* Start Workshop Now?

☐

Public SSH key required to set up this workshop

ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQDCXM8KvWKI7z0xVISqVpPsVWQ

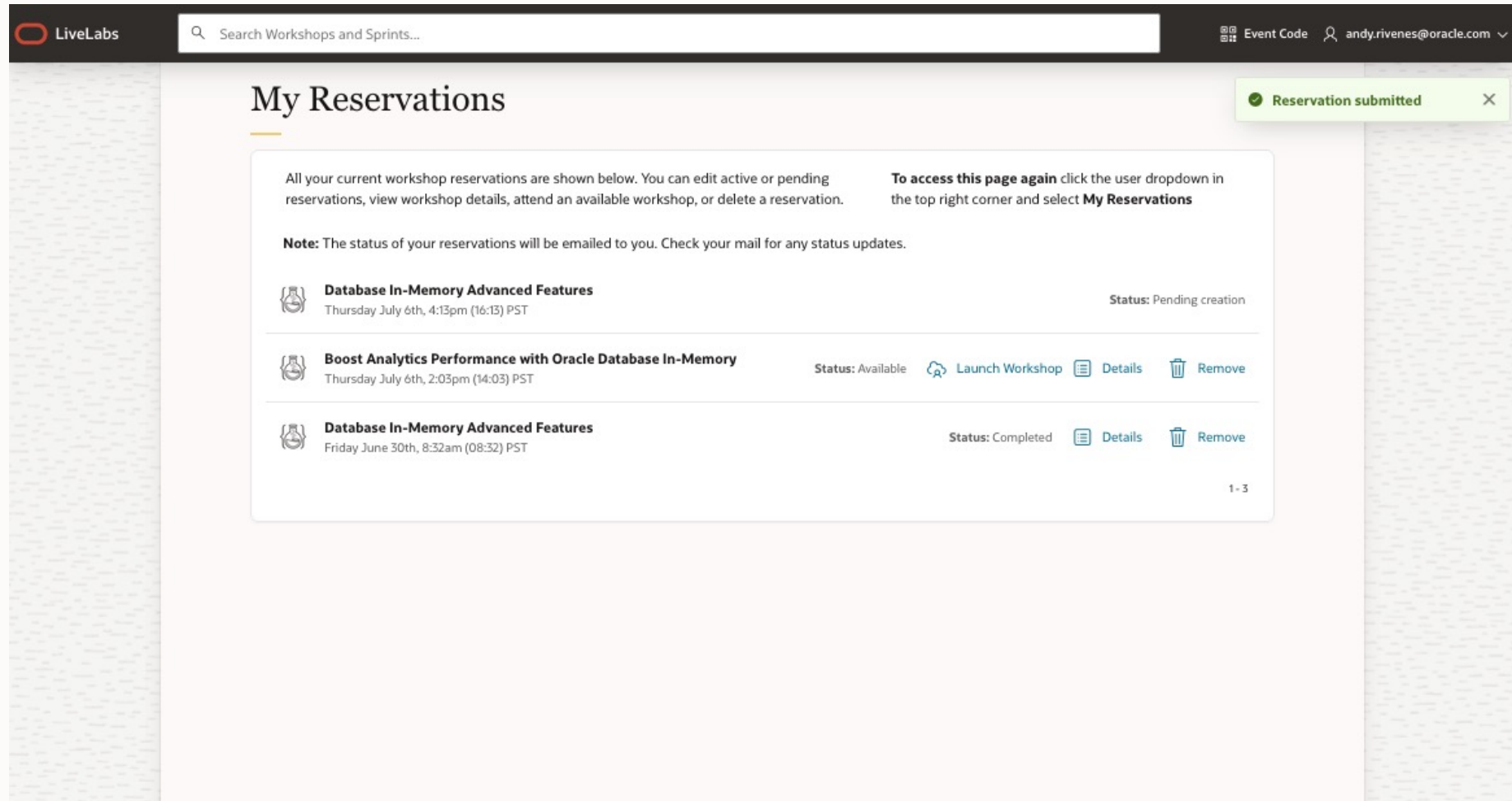
Required

☒ I consent to receive emails from LiveLabs for my reservation and I agree that I will not upload sensitive personal or company information to Oracle Cloud Infrastructure




Submit Reservation



Reservations – It takes a few minutes to create your environment

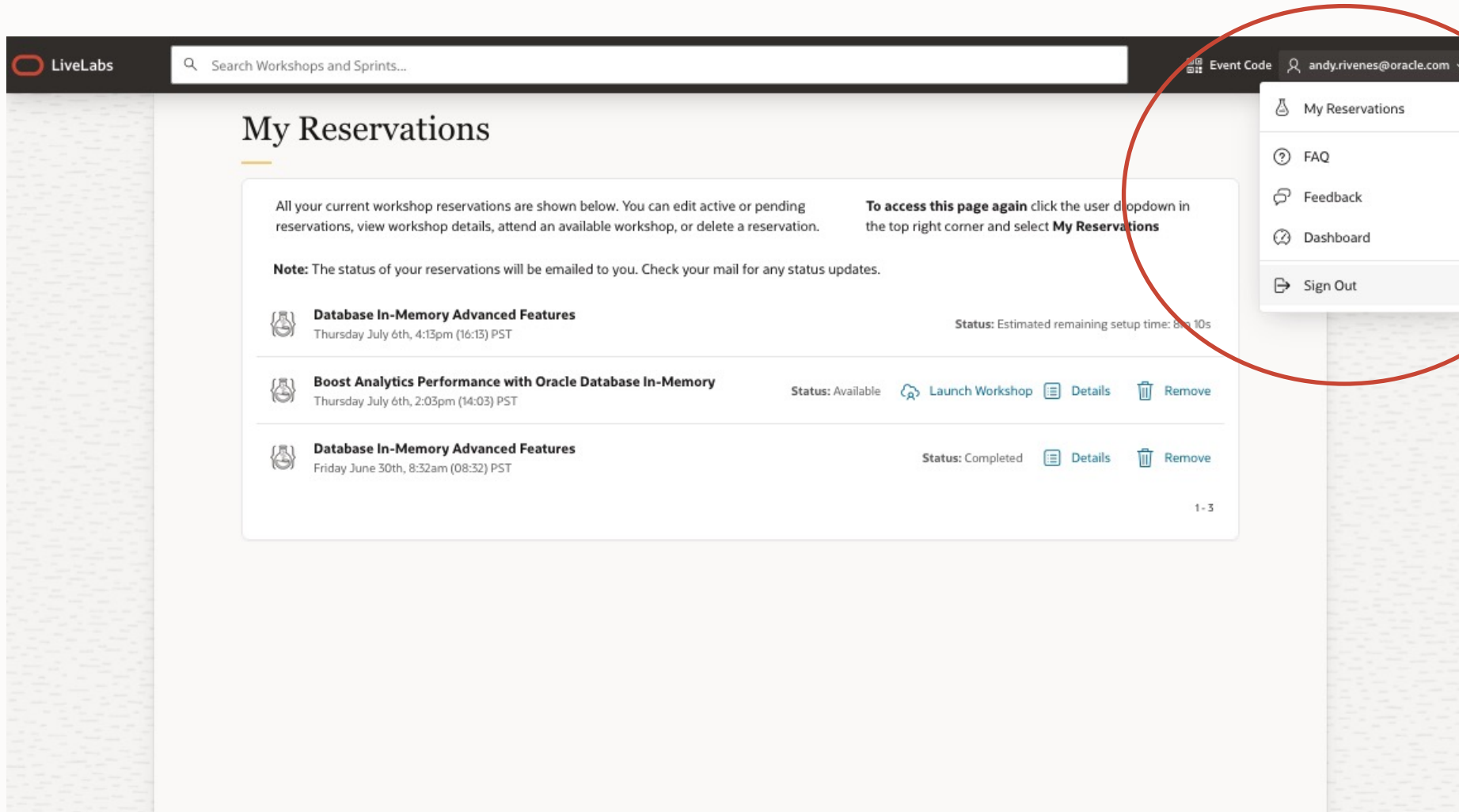


The screenshot shows the 'My Reservations' page in the LiveLabs interface. At the top, there's a dark header with the LiveLabs logo, a search bar, and user information. A green notification banner at the top right says 'Reservation submitted'. The main content area has a heading 'My Reservations' and a paragraph explaining that current workshop reservations are shown below, with options to edit, view details, attend, or delete. A note states that reservation status updates will be emailed. Below this is a table of reservations:

Reservation Details	Status	Actions
 Database In-Memory Advanced Features Thursday July 6th, 4:13pm (16:13) PST	Status: Pending creation	
 Boost Analytics Performance with Oracle Database In-Memory Thursday July 6th, 2:03pm (14:03) PST	Status: Available	Launch Workshop Details Remove
 Database In-Memory Advanced Features Friday June 30th, 8:32am (08:32) PST	Status: Completed	Details Remove

1 - 3

Reservations – To check the status go to the My Reservations page






LiveLabs Search Workshops and Sprints... Event Code andy.rivenes@oracle.com

My Reservations

All your current workshop reservations are shown below. You can edit active or pending reservations, view workshop details, attend an available workshop, or delete a reservation.

Note: The status of your reservations will be emailed to you. Check your mail for any status updates.

To access this page again click the user dropdown in the top right corner and select **My Reservations**

 Database In-Memory Advanced Features Thursday July 6th, 4:13pm (16:13) PST	Status: Estimated remaining setup time: 8m 10s
 Boost Analytics Performance with Oracle Database In-Memory Thursday July 6th, 2:03pm (14:03) PST	Status: Available Launch Workshop Details Remove
 Database In-Memory Advanced Features Friday June 30th, 8:32am (08:32) PST	Status: Completed Details Remove

1 - 3

Workshop is ready – click on Launch Workshop

LiveLabs

Search Workshops and Sprints...












Event Code andy.rivenes@oracle.com

My Reservations

All your current workshop reservations are shown below. You can edit active or pending reservations, view workshop details, attend an available workshop, or delete a reservation.

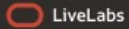
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1 - 3

Lab Landing Page

 LiveLabs

Search Workshops and Sprints...

Event Code andy.rivenes@oracle.com

[View Login Info](#)

Time Remaining: 7h 47m 50s

Learn How Database In-Memory Enables Real-Time Analytics > Introduction

Introduction

About this workshop

Overview

Learn More

Acknowledgements

+ Lab 1: Environment Setup

+ Lab 2: Initialize Environment

+ Lab 3: Set up the In-Memory Column Store

+ Lab 4: In-Memory Expressions

+ Lab 5: Joins Groups

+ Lab 6: In-Memory Optimized Arithmetic

+ Lab 7: JSON and the In-Memory column store

+ Lab 8: In-Memory External Tables

+ Lab 9: In-Memory Full Text Columns

+ Lab 10: In-Memory Spatial

+ Lab 11: In-Memory Hybrid Scans

+ Lab 12: Automatic Data Optimization

Introduction

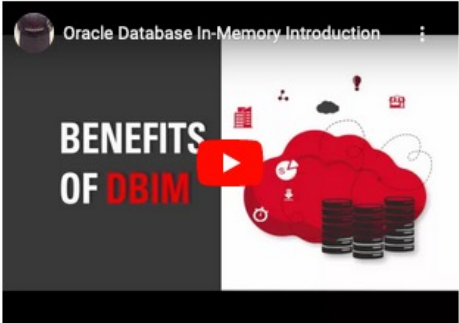
About this workshop

Database In-Memory features a highly optimized In-Memory Column Store (IM column store) maintained alongside the existing row formatted buffer cache as depicted below. The primary purpose of the IM column store is to accelerate column-oriented data accesses made by analytics operations.

It is similar in spirit to having a conventional index (for analytics) on every column in a table. However, it is much more lightweight than a conventional index, requiring no logging, or any writes to the database. Just as the performance benefit to an application from conventional indexes depends on the amount of time the application spends accessing data in the tables that are indexed, the benefit from the IM column store also depends on the amount of time the application spends on data access for analytic operations.

Estimated Workshop Time: 90 minutes

Watch the video below for an overview of Oracle In-Memory.



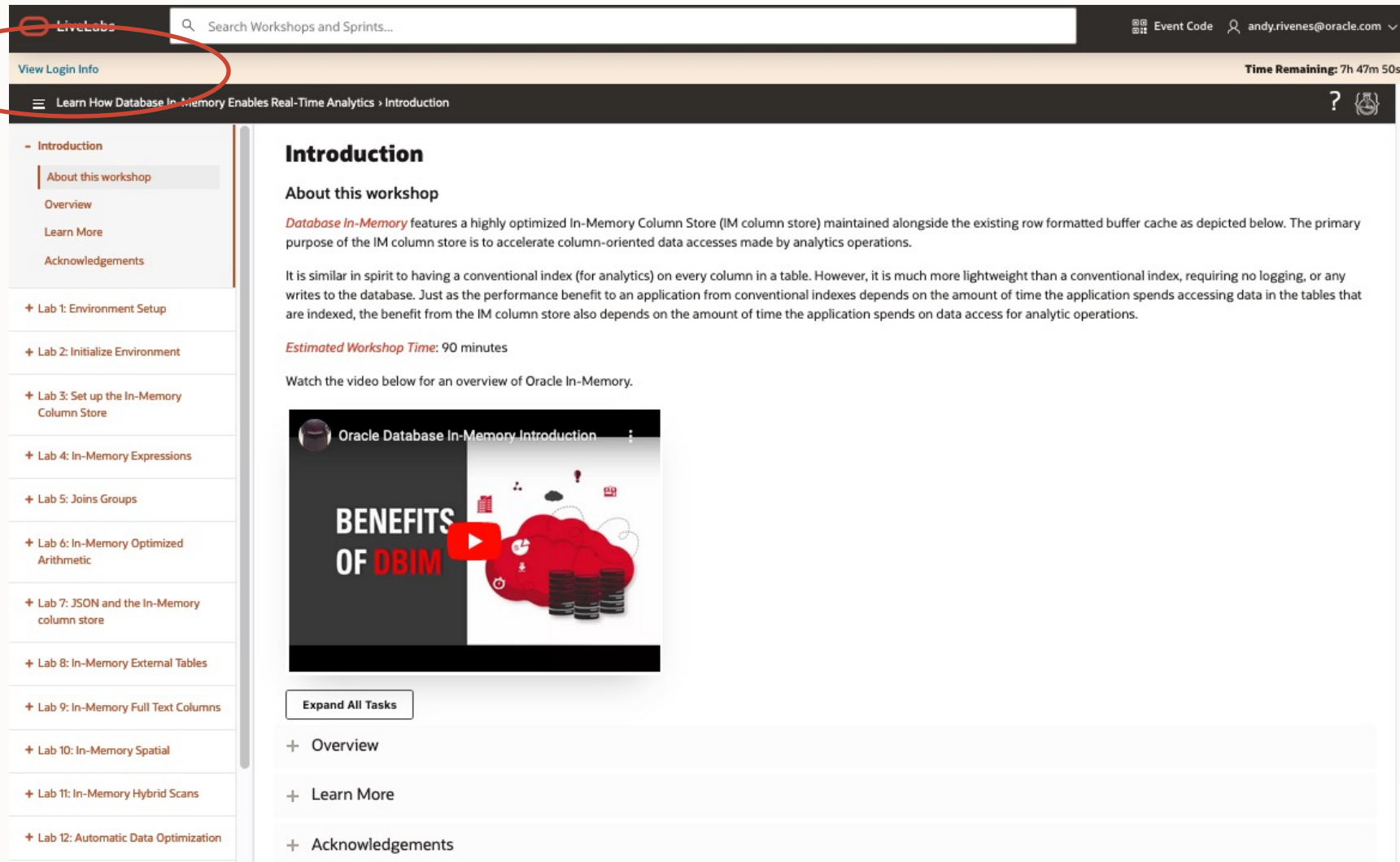
Expand All Tasks

+ Overview

+ Learn More

+ Acknowledgements

Lab Landing Page – Click “View Login Info”



LiveLabs Search Workshops and Sprints... Event Code andy.rivenes@oracle.com Time Remaining: 7h 47m 50s

[View Login Info](#)

Learn How Database In-Memory Enables Real-Time Analytics > Introduction

- Introduction
 - About this workshop
 - Overview
 - Learn More
 - Acknowledgements
- Lab 1: Environment Setup
- Lab 2: Initialize Environment
- Lab 3: Set up the In-Memory Column Store
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Estimated Workshop Time: 90 minutes

Watch the video below for an overview of Oracle In-Memory.

Oracle Database In-Memory Introduction

BENEFITS OF DBIM

Expand All Tasks

- Overview
- Learn More
- Acknowledgements

Launch the Workshop Environment

LiveLabs

Search Workshops and Sprints...

View Login Info

Learn How Database In-Memory Enables Real-Time Analytics > Introduction

Introduction

About this workshop

Overview

Learn More

Acknowledgements

+ Lab 1: Environment Setup

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Watch the video below for an overview of Oracle In-Memory.

Oracle Database In-Memory Introduction

BENEFITS OF DBIM

Expand All Tasks

+ Overview

+ Learn More

+ Acknowledgements

Reservation Information

Remote Desktop URL

`http://129.80.63.115:6080/vnc.html?password=ZNFL9H1XLS&resize=scale&quality=9&autoconnect=true`

Compartment

LL54517-COMPARTMENT

Compartment OCID

ocid1.compartment.oc1..aaaaaaa6vnturydkosliji5oeheybvc7xg46aldztsr74a5xmvrxlwabhqz

Instances Provisioned

LL54517-INSTANCE-DBHOL: 129.80.63.115

Launch Remote Desktop

Copy Compartment OCID



In-Memory Advanced Features LiveLabs environment

The screenshot displays the Oracle LiveLabs environment. On the left, a web browser window titled "Learn How Database In-Memory Enables Real-Time Analytics | Introduction" shows the "Introduction" page of a workshop. The page includes a sidebar with a list of tasks: "Introduction", "About this workshop", "Overview", "Learn More", "Acknowledgements", "Get Started", "Lab 1: Initialize Environment", "Lab 2: Setting up the In-Memory Column Store", "Lab 3: In-Memory Expressions", "Lab 4: Joins Groups", "Lab 5: In-Memory Optimized Arithmetic", "Lab 6: JSON and the In-Memory column store", "Lab 7: In-Memory External Tables", "Lab 8: In-Memory Full Text Columns", "Lab 9: In-Memory Spatial", and "Lab 10: In-Memory Hybrid". The main content area is titled "Introduction" and "About this workshop". It describes the "Database in-Memory" feature as a highly optimized In-Memory Column Store (IM column store) maintained alongside the existing row formatted buffer cache. It states that the primary purpose of the IM column store is to accelerate column-oriented data accesses made by analytics operations. It also mentions that it is similar in spirit to having a conventional index (for analytics) on every column in a table, but is much more lightweight, requiring no logging, or any writes to the database. Just as the performance benefit to an application from conventional indexes depends on the amount of time the application spends accessing data in the tables that are indexed, the benefit from the IM column store also depends on the amount of time the application spends on data access for analytic operations. An "Estimated Workshop Time: 90 minutes" is provided, along with a video thumbnail titled "Oracle Databases... BENEFIT OF IN-MEMORY" and a button to "Expand All Tasks". Below the video, there are links for "Overview", "Learn More", and "Acknowledgements".

On the right, a terminal window titled "Terminal" shows the "OracleLiveLabs" logo and a list of environment variables:

```
=====
ENV VARIABLES
=====
PRIVATE IP      = 10.0.0.175
PUBLIC IP       = 129.80.63.115
HOSTNAME        = dbhol.livelabs.oraclevcn.com
=====
Database ENV is not set

Run this to reload/setup the Database ENV: source /usr/local/bin/.set-env-db.sh
=====

[oracle@dbhol:~]$
```

The Oracle logo and "Linux" text are visible in the bottom right corner of the terminal window.

Get Started with the Lab

Learn How Database In-Memory Enables Real-Time Analytics | Lab 1: Initialize Environment

Learn How Database In-Memory Enables Real-Time Analytics > Initialize Environment

Introduction

Task 1: Validate That Required Processes are Up and Running.

Task 2: Initialize Database for In-Memory Use Cases

Task 3: Enable In-Memory

Appendix 1: Managing Startup Services

Acknowledgements

Lab 2: Setting up the In-Memory Column Store

Lab 3: In-Memory Expressions

Lab 4: Joins Groups

Lab 5: In-Memory Optimized Arithmetic

Lab 6: JSON and the In-Memory column store

Lab 7: In-Memory External Tables

Objectives

- Initialize the workshop environment.

Prerequisites

This lab assumes you have:

- A Free Tier, Paid or LiveLabs Oracle Cloud account
- You have completed:
 - Lab: Prepare Setup (*Free-tier* and *Paid Tenants* only)
 - Lab: Environment Setup

NOTE: When doing Copy/Paste using the convenient **Copy** function used throughout the guide, you must hit the **ENTER** key after pasting. Otherwise the last line will remain in the buffer until you hit **ENTER**!

Expand All Tasks

Task 1: Validate That Required Processes are Up and Running.

Task 2: Initialize Database for In-Memory Use Cases

Task 3: Enable In-Memory

Appendix 1: Managing Startup Services

Acknowledgements

Terminal

```
=====
                                Oracle LiveLabs
=====

ENV VARIABLES
-----
PRIVATE_IP    = 10.0.0.175
PUBLIC_IP     = 129.80.63.115
HOSTNAME       = dbhol.livelabs.oraclevcn.com
-----

Database ENV is not set

Run this to reload/setup the Database ENV: source /usr/local/bin/.set-env-db.sh
-----

[oracle@dbhol:~]$
```

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Linux



Lab Agenda

- Introduction
- Get Started
- Lab 1: Initialize Environment
- Lab 2: Setting up the In-Memory Column Store
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- Lab 9: In-Memory Spatial
- Lab 10: In-Memory Hybrid Scans
- Lab 11: Automatic Data Optimization
- Lab 12: Automatic In-Memory
- Lab 13: Automatic In-Memory Level High
- Lab 14: In-Memory Parallel Features

Running the Lab

- Be sure to follow the directions in Lab 1 and Lab 2 to setup the environment correctly
- The LINEORDER table is partitioned on year
- The new labs use the same environment as the Boost Analytics lab
- The new labs, starting with Lab 3 can be run in any order

Additional Information

- The lab is meant to be run in SQL*Plus
- There are multiple directories, one for each lab
- You can run the scripts or copy and paste the SQL from the Lab guide (Hint: run the scripts)
- Each script creates a new session which resets the session stats, where used, to allow you to see only what happened during the SQL statement being observed

Where Can You Get More Information?

<https://blogs.oracle.com/in-memory/dbim-resources>

