**Part 1. Amazon Aurora MySQL Database Service for OLTP**

The purpose of deploying our MySQL database on Amazon Aurora MySQL is to work with our database in an environment that is secure, highly available, operationally excellent, durable, resilient, and can connect to many other useful cloud services. It is made to optimize transactional workloads. The schema is normalized to 3NF for transactional workloads.

In the context of a larger data system, it would be used by apps for real-time reads and writes. For the purposes of this project it fits into the cloud architecture.

**Create Identity and Access Management (IAM) Project Group and Add Project Users**

Set up IAM group: Ecommerce-Project-Team

Add Users, gabe-tharp and marcos-fernandez, with PowerUserAccess IAM policy

Add User, owen-randolph, with AdministratorAccess IAM policy

**1. Create Aurora MySQL environment, starting with the cluster**

-Engine option: Aurora (MySQL Compatible)

Aurora MySQL provides high availability, fault tolerance, and MySQL compatibility, which makes it ideal for a production-level analytics project.

Credentials managed in AWS Secrets Manager

Aurora Standard cluster storage configuration

Instance engine: db.t3.medium (cost effective for this project), from Burstable classes

-Create Virtual Private Cloud (VPC) – VPC defines the network environment for the database cluster. It creates the foundation for a secure environment.

-Create a new subnet group for the database to live in inside the VPC. Two subnets in different availability zones (AZ) are selected for high availability.

-Allow public access for the database. This assigns a public IP address to the cluster, which will allow us to connect MySQL Workbench locally to Aurora MySQL.

-Create new security group. Security groups manage IP access at the instance level.

\* We will not create an Aurora replica due to scope and cost of this project. Multi-AZ deployment creates an Aurora replica for fast failover and high availability.

\* We will not create an RDS proxy for the scope of this project. This service allows applications to pool and share connections. This would be a great option to improve scalability.

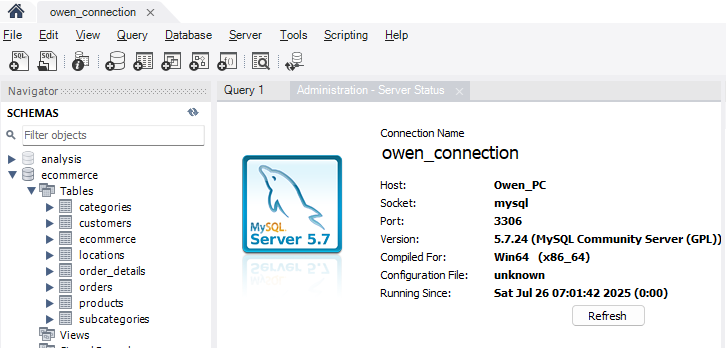
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* A writer instance is created as a transactional database feature to add data to our database.

2. Deploy MySQL database on Aurora MySQL

Open MySQL Workbench, connection to local MySQL instance , port 3306



Export data using the ecommerce schema to Self-contained file

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**Prepare Aurora connection**

Whitelist IP in VPC security group, use port 3306 for MySQL Workbench

Add inbound rules

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Create a new connection in MySQL Workbench to connect to Amazon Aurora cluster

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Import .sql Export file

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Double Check that the schema worked by entering a query in MySQL Workbench. What’s happening here is that the query is being done on the Aurora instance, not the local instance. This is actually data coming from Aurora now:

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**Create S3 Bucket for data pipeline from Aurora to Quicksight**

Bucket Name: ecommerce-aurora-export

Uncheck “Block Public Access” to allow Quicksight access

Create an IAM and attach to read from the bucket

Role name: AuroraS3IntegrationRole

Add permission: AmazonS3ReadOnlyAccess

**S3 Data Lake**

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**Amazon Quicksight**

Upload data from S3 data lake files as a json manifest files for each of the tables which Quicksight requires as data ingestion format:

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Add the csv files from the S3 buckets to the Quicksight builder and create joins to create star schema for OLAP

\* For a production-ready workflow we could add AWS Glue for automated ETL. For this project we will include that due to cost and scope

**Quicksight Star Schema Database model**

The star schema will make this database more efficient for OLAP querying. A table with the joins can be found in the appendix. The Quicksight GUI allows the user to configure the joins manually, rather than using SQL.

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** QuickSight stores datasets in a compressed, columnar format (SPICE).**

** This reduces storage size drastically compared to raw CSV text files.**

**We started with a 2,253 KB csv file and after normalizing into seven tables, and compressing into SPICE data format, it’s 150.6 KB.**

Save & Publish

**Create new Analysis**

**Build Dashboard**

Amazon Quicksight is functionally like Microsoft Power BI and Tableau platforms. It has a simple drag and drop interface with a variety of visualization options.

**References:**

[Amazon Aurora MySQL reference - Amazon Aurora](https://docs.aws.amazon.com/AmazonRDS/latest/AuroraUserGuide/AuroraMySQL.Reference.html)

[Connect to your Amazon Aurora MySQL DB cluster | AWS re:Post](https://repost.aws/articles/ARmIOpARjHTyKW0_dc8b3RVQ/connect-to-your-amazon-aurora-mysql-db-cluster)

[Introduction to AWS Simple Storage Service (AWS S3) - GeeksforGeeks](https://www.geeksforgeeks.org/devops/introduction-to-aws-simple-storage-service-aws-s3/)

[Overview of Performance Insights on Amazon RDS - Amazon Relational Database Service](https://docs.aws.amazon.com/AmazonRDS/latest/UserGuide/USER_PerfInsights.Overview.html)

**Appendix:**

Star Schema Model:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Fact Table | Dimension Table | Join Key (Fact Table) | Join Key (Dimension Table) | Join Type |
| order\_details | orders | Order\_ID | Order\_ID | INNER JOIN |
| order\_details | products | Product\_ID | Product\_ID | INNER JOIN |
| orders | customers | Customer\_ID | Customer\_ID | INNER JOIN |
| products | subcategories | Subcategory\_ID | Subcategory\_ID | LEFT JOIN |
| subcategories | categories | Category\_ID | Category\_ID | LEFT JOIN |