Workload Improvement for Product Deliveries
AWS Retail Case Study

Executive Summary

The main objective of **QualityPost** is to track the delivery of your packages through a web application connected to a database, offering a solution for tracking customers' shipments with logistics.

On the other hand, they have QPflex that allows you to generate tickets for local deliveries, as well another of its integrated businesses within the AWS Cloud is FESA which contains an e-commerce application that sells pharmaceutical online products for its customers.

Due to the problems presented by the lack of robust mechanisms for scaling and high availability in its web application, it was decided to manage the information contained in a database cluster with Amazon RDS, separating the infrastructure through two nodes, one for reading and the other for writing, as well as the updating of the corresponding endpoints within the web application, with which the workloads generated by the application towards the database will be managed in a better way, all this using the best AWS Practices.

The Challenge

It was necessary to create a highly available, robust, and secure solution that could handle any type of event. The critical solutions needed in the new architecture were:

- High availability of the services provided by the database that helps to always have the information available.

- Maintain a high availability and autoscaling environment for the tracking application.

Why AWS

AWS is a cloud platform that has all the necessary services to create a robust, highly available, scalable, and secure infrastructure for cloud solutions.

About Costumer

QualityPost is a specialized messaging and shipping company committed to build innovative solutions according to client's needs. Their human culture has allowed them to be one of the best places to work.

"Resilient Infrastructure"

- Change from Aurora Serverless to an Amazon Aurora DB cluster to update the system to the most recent version allowing more efficient transactions to the end customer increasing computing and storage capacity.

- Server Workloads for the tracking app in different availability zones to provide HA.

- Bastion Host to provide a single-entry point for management & troubleshooting.

The Solution

3 Layer Security Architecture

The First layer hosts the Database workloads in its private subnet.

The Second layer hosts de Application Workloads also in their private subnet. Only the Application Workloads can access the Database layer through their security groups.

The Third layer is for public access, hosts the Web Application Firewall, and only accesses the application layer through its security group. A Bastion Host is in place to provide access to QualityPost IT Staff.

Database

The homogeneous data migration service was implemented to achieve a transparent transition between the source database, which is in Aurora MySQL serverless, and the destination database, which will be generated on an Amazon Aurora DB cluster with MySQL database engine.

In this case, the schema structure, data types, source code, and target code of the databases may be quite similar, but a proper schema and code transformation is still required before the migration begins. That makes seamless migrations a two-step process:

- First, use the **AWS Schema Conversion Tool** to convert the source schema and code to match the target database.

- Second, the **AWS Database Migration Service** migrates data from the source to destination databases.
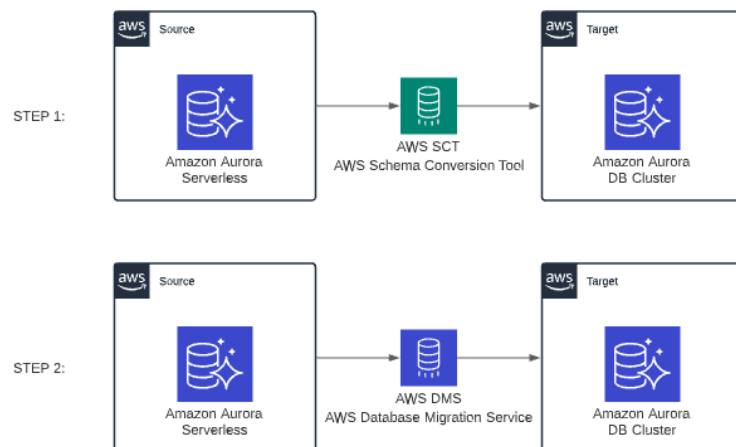
Note: The AWS Database Migration Service will automatically do all the conversions of the required data types during the migration. AWS Data Migration Services (DMS) included with all the features needed to achieve the above.

Aurora DB Cluster Features

- Amazon Aurora in a 2-node cluster (Master & Read Replica) to provide for high availability and failover

- High Performance

- Automated Autoscaling

- Best Security Practices

AWS Backups for Workload Protection

- Central Backup Console

- Backup Compliance Improvement

Application
Workload Phoenix initially was set up on a single EC2 which could cause availability issues in case of a disaster or corruption, it had no backup policy defined.

It was decided that workload **Phoenix** be improved with a highly available configuration, so it was set up over two availability zones to reduce downtime in case of an issue with an availability zone.

A daily backup policy was set up to protect it from accidental deletion or rollbacks in case of a bad installation from a hotfix, service pack, etc.

Seamless access from On-Premises to Cloud Infrastructure
The customer needed access to cloud resources from its On-Premises infrastructure, so a Site-to-site VPN was set up.

Bastion Host
Their support personnel needed to perform troubleshooting & maintenance, so a bastion host was set up to allow only a single machine to touch cloud infrastructure externally.

Results and Benefits

Database
The DB was improved by transitioning it to a Highly available configuration with a two-node cluster setup (Writer and Reader nodes), each in an availability zone that provided failover capabilities in case of a disaster. If needed, the customer can easily roll the database up and down from smaller to larger instance types as needs change. Also, it automatically grows storage as needed.

Application
The application's workload Phoenix was improved with high availability over two zones in the same region.

A web application firewall was also set up to help protect web applications or APIs against common web exploits and bots that may affect availability, compromise security, or consume excessive resources. QualityPost's WAF implementation gives them control over how traffic reaches their applications by enabling them to create security rules that control bot traffic and block common attack patterns.

Automated Backups
Daily backups were configured on workloads to be protected in case of accidental deletion, corruption, or damage and to do rollbacks.

Quality Post Solution Diagram

Next Steps

- The RDS database has been changed from an Aurora Serverless to an Aurora Cluster, and updated the endpoints in the web application to their respective node within the DB cluster.

- AWS offers the possibility of conducting this migration without affecting the company's operation following the pattern of reference architectures, standards, and implementation conventions following AWS best practices.

- Reduce their on-premises footprint over time.

- Remove dependencies from old physical hardware.

Superior Performance

This infrastructure provides a fast, resilient, and high availability environment for the application.

LOW TCO

Save money by replacing physical hardware with expensive license fees, with AWS you only pay for what you use.

Fully Managed

With fully managed resource provisioning, maintenance, and backup, deployments are more efficient.

About IO Connect Services

IO Connect Services is a nearshore Cloud Solutions Consultancy specializing in Digital Transformation, Migration and Modernization, Cloud-Native Development, DevOps, and Security. Our headquarters are located in the NYC metropolitan area, and we also have offices in Guadalajara, Mexico, and Madrid, Spain. We provide services in North America, LATAM, and Europe.