Database Migration from On-Premise to Google Cloud SQL

Project Overview

This project focused on migrating an existing MySQL database from an on-premise virtual machine to Google Cloud SQL using Google Cloud Database Migration Service (DMS). The goal was to enable secure, continuous data synchronization while maintaining minimal downtime.

Contributions

- Set up the MySQL database on the virtual machine.
- Configured and ran the Database Migration Service (DMS).
- Verified data migration and live synchronization.
- Automated the migration process using cron jobs.
- Configured the Cloud SQL instance on GCP and worked on VPC peering for secure connection.
- Assisted in migration testing and troubleshooting.
- Configured the Migration Connection Profile for the source VM and created the Migration Job for seamless integration between source and destination.
- Created dummy data, verified migration on the destination VM, and resolved firewall/network settings issues.

Technology Used

- Google Cloud SQL – Managed MySQL database service
- Google Cloud Database Migration Service (DMS)
- MySQL v8.0.41 on Virtual Machine
- VPC Peering for secure connectivity
- Google Cloud Console for monitoring and job setup

Features Implemented

- Continuous Data Sync using CDC (Change Data Capture)
- Secure VPC Peering between source and GCP
- Automated Data Dump and Migration Job
- Minimal Downtime Transition
- Live Data Monitoring and Validation

Project Architecture

- Source: On-premise VM running MySQL 8.0.41
- Target: Google Cloud SQL (MySQL)
- Connection: Remote-access user + VPC Peering
- Migration Tool: Google Cloud DMS (CDC enabled)

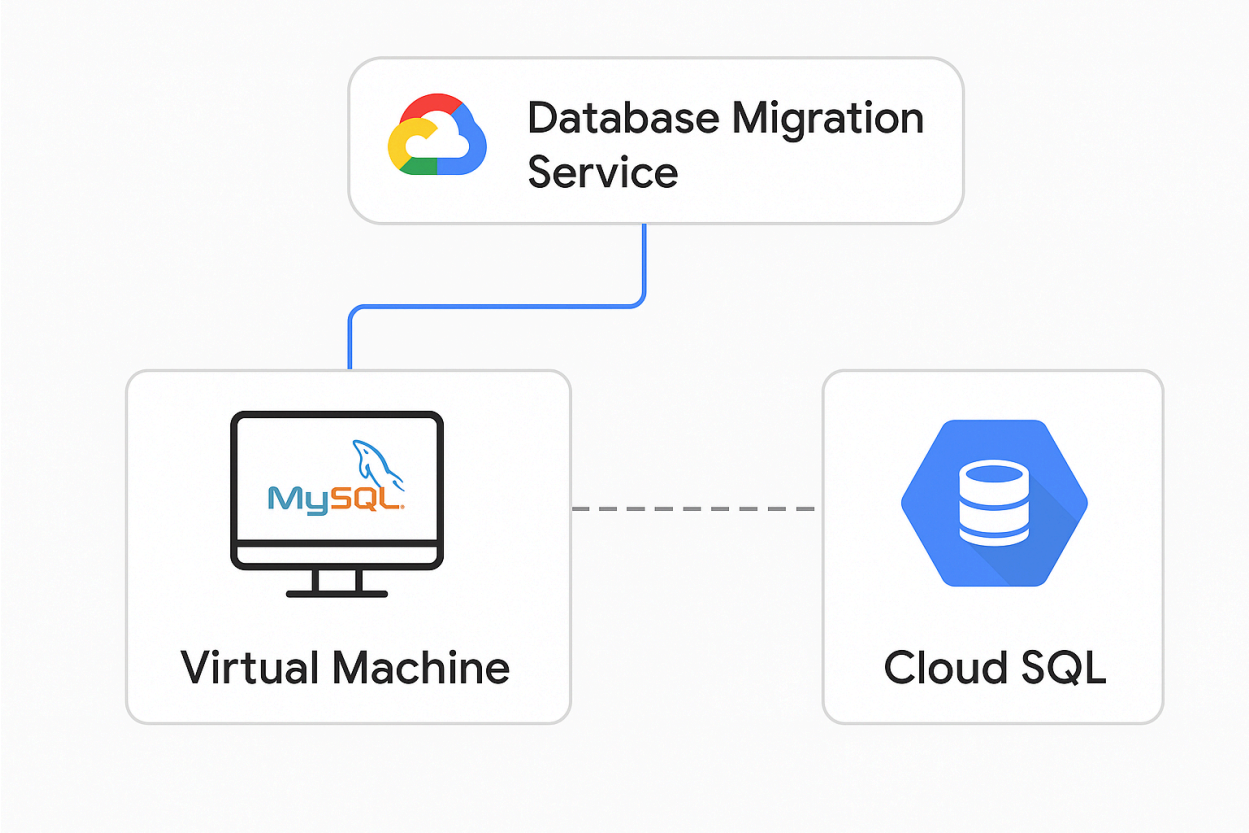

Fig 1: Architecture Diagram: On-Premise MySQL to Cloud SQL using Google Cloud DMS

Challenges

- Network/firewall restrictions for external MySQL access
- Schema mismatches between source and destination
- Occasional connection timeout during sync job
- Ensuring continuous sync without losing transactions

Solutions and Fixes

- Opened required firewall ports and tested access using MySQL clients
- Validated and aligned schemas manually before starting migration
- Used VPC peering for more stable connectivity
- Verified each phase (dump + CDC) via GCP Console and manual inserts

Final Outcome

- Successfully migrated the MySQL database to Google Cloud SQL
- Achieved live synchronization with zero data loss
- Verified real-time updates reflecting in Cloud SQL
- Reduced administrative overhead with cloud-native database

Future Improvements

- Integrate automated post-migration data validation and alerts
- Expand project to support multiple schema migrations
- Use BigQuery for analytics post-migration
- Automate rollback/recovery plans in case of sync failure

Conclusion

This project demonstrated how cloud-native tools like Google Cloud DMS and Cloud SQL simplify complex data migrations. It ensures performance, scalability, and secure continuous data flow, making it suitable for both dev and production environments.

Screen Layouts

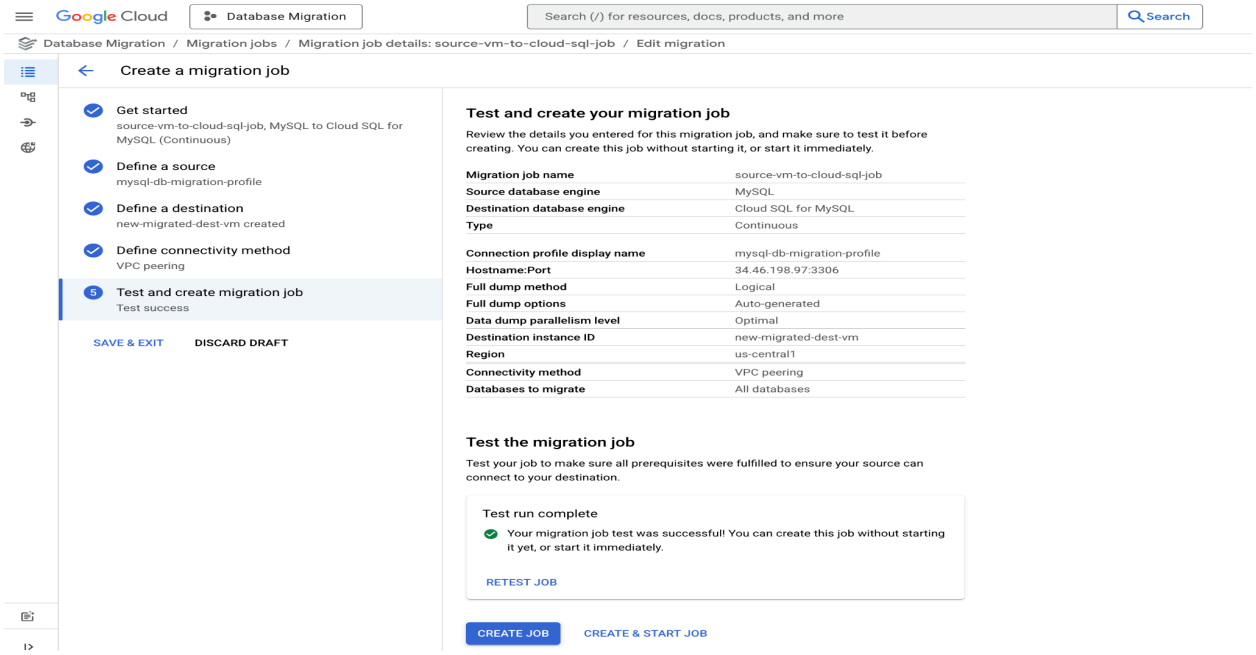

Fig 2 : Database Migration Job

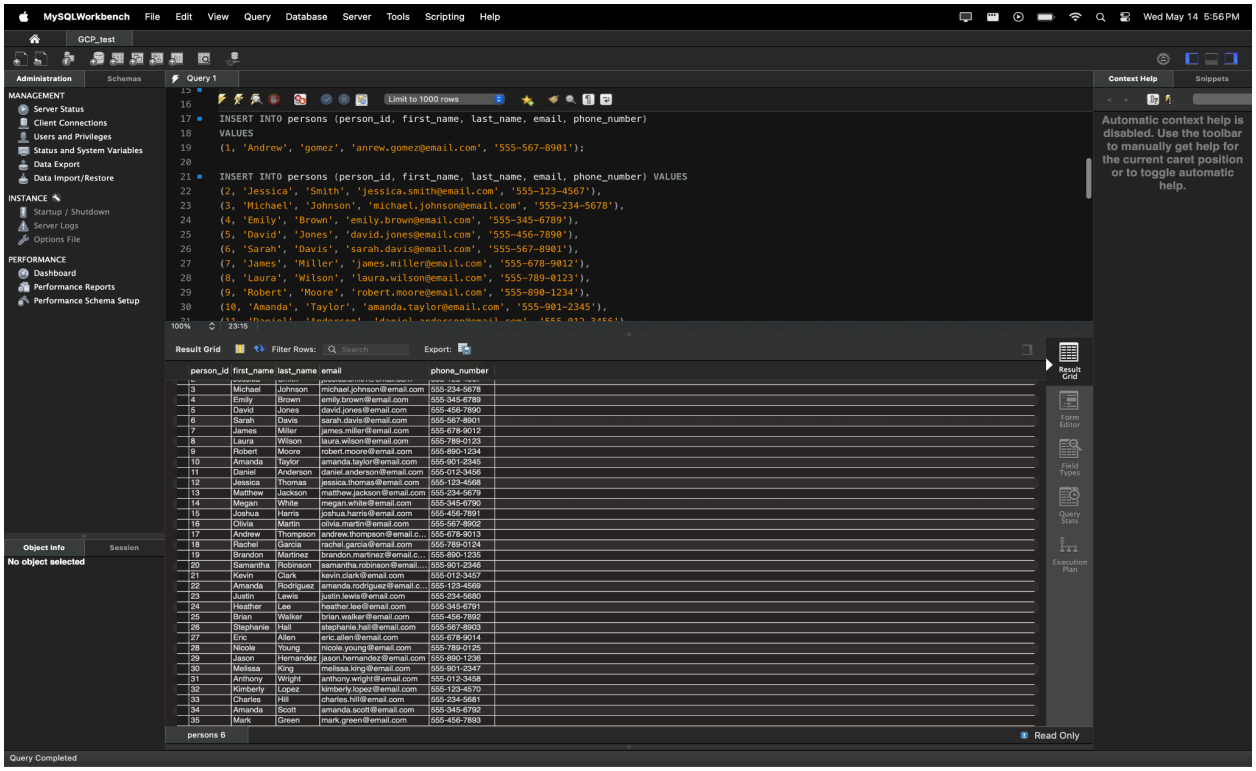

Fig 3: Data created in Source VM

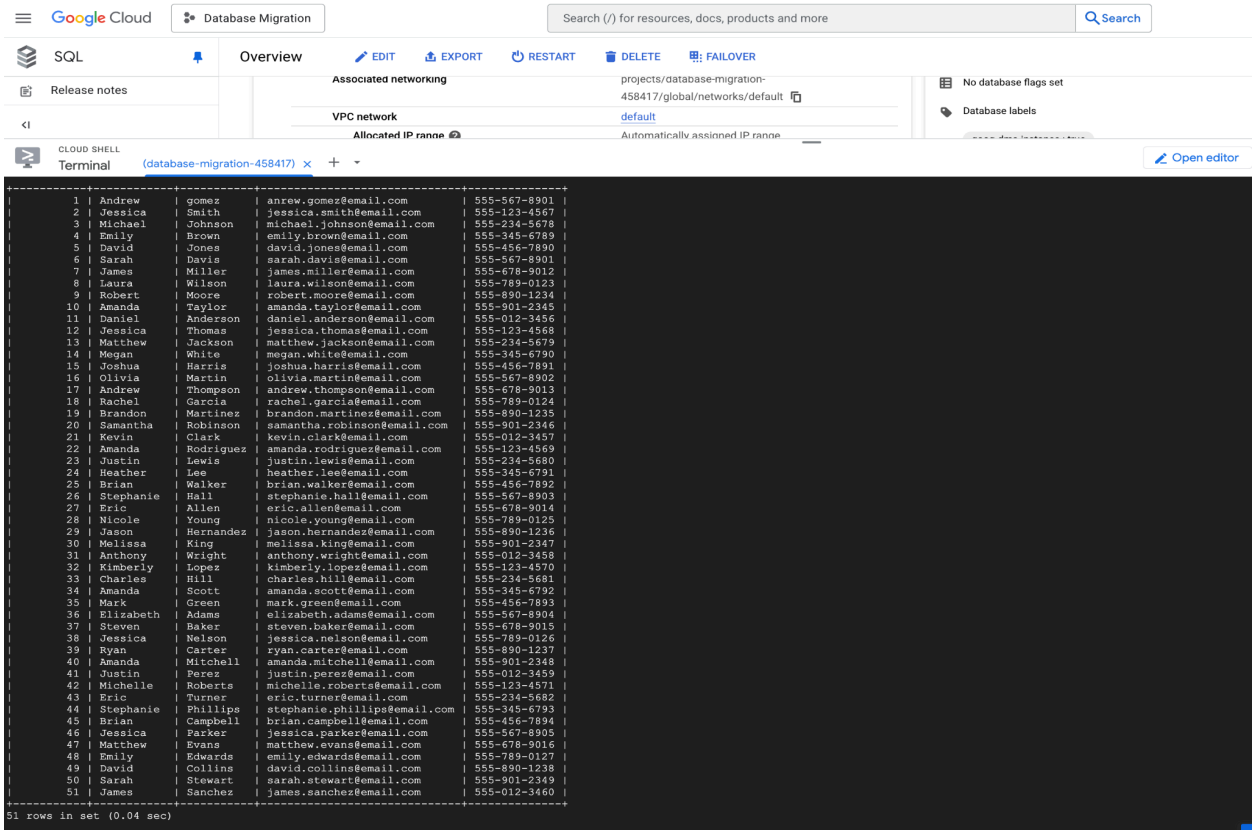

Fig 4 : Data migrated to Destination VM in real time