Private AWS RDS PostgreSQL to GCP Cloud SQL Migration

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Executive Summary

This case study presents a private PostgreSQL migration pattern from AWS RDS to Google Cloud SQL. The design avoids public database exposure by using hybrid networking, HA VPN, BGP routing, Private Services Access, and Google Cloud Database Migration Service concepts.

Primary services	AWS RDS PostgreSQL, GCP Cloud SQL, HA VPN, BGP, DMS
Security objective	Keep database traffic private and avoid public internet exposure
Migration mode	Logical replication / CDC-ready migration planning

Architecture

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AWS RDS -> AWS VPC -> Virtual Private Gateway -> IPsec HA VPN with BGP -> GCP VPC -> Private Services Access -> Cloud SQL. Database Migration Service coordinates replication.
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Implementation Steps

- Prepare AWS RDS PostgreSQL for logical replication with required parameter settings.
- Create secure hybrid connectivity between AWS and GCP using HA VPN and BGP.
- Configure GCP VPC routes and Private Services Access for Cloud SQL private connectivity.
- Create migration user permissions and validate database connectivity from the migration service.
- Run migration validation, monitor replication lag, and plan final cutover.

Validation

- Confirm VPN tunnel status, route advertisement, and private IP reachability.
- Validate PostgreSQL replication settings and migration user permissions.
- Check source/target schema consistency, row counts, and application connection tests.

Risks and Controls

- Route overlap can block private connectivity; mitigate with clear CIDR planning.
- Insufficient replication parameters can stop CDC; mitigate with pre-migration database checks.
- Cutover timing can affect users; mitigate with a maintenance window and rollback plan.

Interview Talking Points

- Why private migration architecture is preferred for sensitive workloads.
- How BGP route exchange supports hybrid cloud connectivity.
- What to validate before database cutover.