Relational Databases
For Transactional Usecases

Cloud SQL

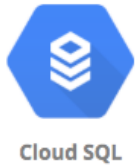
In28 Minutes

- **Fully Managed Relational Database** service
  - Configure your needs and do NOT worry about managing the database
  - Supports MySQL, PostgreSQL, and SQL Server
  - Regional Service providing High Availability (99.95%)
  - Use SSDs or HDDs (For best performance: use SSDs)
  - Upto 416 GB of RAM and 30 TB of data storage
- **Use Cloud SQL for simple relational use cases**:
  - To migrate local MySQL, PostgreSQL, and SQL Server databases
  - To reduce your maintenance cost for a simple relational database
  - (REMEMBER) Use Cloud Spanner(Expensive $$$$) instead of Cloud SQL if:
    - You have huge volumes of relational data (TBs) OR
    - You need infinite scaling for a growing application (to TBs) OR
    - You need a Global (distributed across multiple regions) Database OR
    - You need higher availability (99.999%)

Cloud SQL - Features

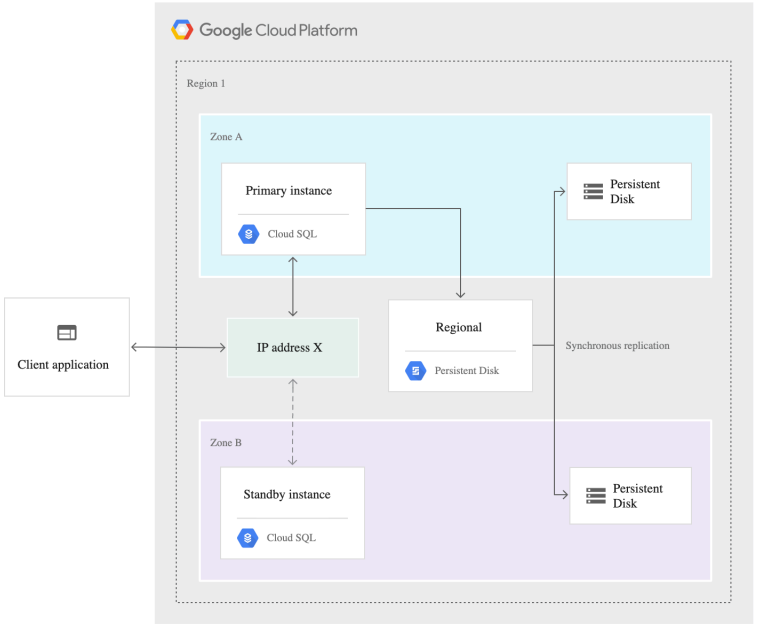
In28 Minutes

- **Important Cloud SQL Features:**
  - Automatic encryption (tables/backups), maintenance and updates
  - High availability and failover:
    - Create a Standby with automatic failover
    - Pre requisites: Automated backups and Binary logging
  - Read replicas for read workloads:
    - Options: Cross-zone, Cross-region and External (NON Cloud SQL DB)
    - Pre requisites: Automated backups and Binary logging
  - Automatic storage increase without downtime (for newer versions)
  - Point-in-time recovery: Enable binary logging
  - Backups (Automated and on-demand backups)
  - Supports migration from other sources
    - Use Database Migration Service (DMS)
  - You can export data from UI (console) or gcloud with formats:
    - SQL (Recommended if you import data into other databases) and CSV



Cloud SQL - High Availability

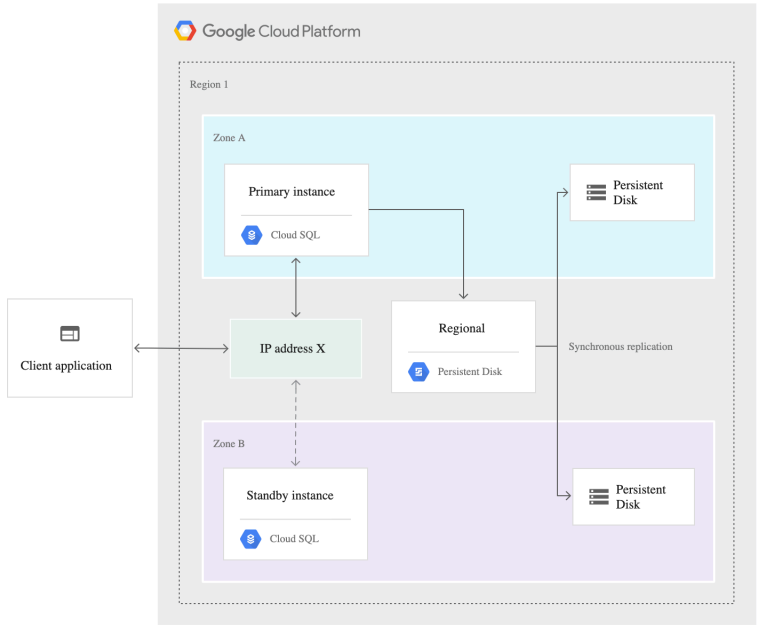
- Create a High Availability (HA) Configuration
  - Choose **Primary and Secondary** zones within a region
  - You will have two instances : **Primary** and **Secondary** instances
- Changes from primary are replicated **synchronously** to secondary
- In case of **Zonal** failure, automatic failover to secondary instance:
  - If **Primary zone** becomes available, failover does not revert automatically
- (Remember) **High Availability** setup CANNOT be used as a **Read Replica**



source:cloud.google.com

Understanding Cloud SQL Best Practices

- Use **Cloud SQL Proxy:**
  - Securely connect to Cloud SQL from your apps (GAE, Cloud Functions, Cloud Run, GKE etc)
- Understand **Scalability**
  - Enable **HA configuration** for high availability
    - Primary instance and a standby instance created in the same Region (Remember - Regional)
  - Read replicas help you **offload read workloads** (reporting, analytics etc)
    - (Remember) Read replicas do NOT increase availability
  - Prefer **Number of small Cloud SQL instances** to having one large instance
    - Cloud SQL cannot scale horizontally for writes



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Understanding Cloud SQL Best Practices - 2

In28 Minutes

- Understand **Backup and Export** options:
  - Backups are lightweight and provide point in time recovery
    - BUT Backups are deleted when an instance is deleted
    - AND you can't back up a single database or table
  - Exports take longer but they provide you with more flexibility
    - You can export a single database or table
    - (Remember) Exporting large databases can impact the performance of a Cloud SQL database
      - Use **serverless export** (flag - offload) to reduce impact
        - Cloud SQL creates a separate, temporary instance to offload the export operation
    - Import/Export in multiple small batches instead of large batches

Cloud Spanner

- **Fully managed, mission critical, relational(SQL), globally distributed database** with VERY high availability (99.999%)
  - Strong transactional consistency at **global scale**
  - **Scales to PBs of data** with automatic sharding
- Cloud Spanner **scales horizontally for reads and writes**
  - Configure no of nodes
  - (REMEMBER) In comparison, Cloud SQL provides read replicas:
    - BUT you cannot horizontally scale write operations with Cloud SQL!
- Regional and Multi-Regional configurations
- **Expensive** (compared to Cloud SQL): Pay for nodes & storage
- **Data Export**: Use Cloud Console to export data
  - Other option is to use Data flow to automate export
  - No gcloud export option

Cloud Spanner