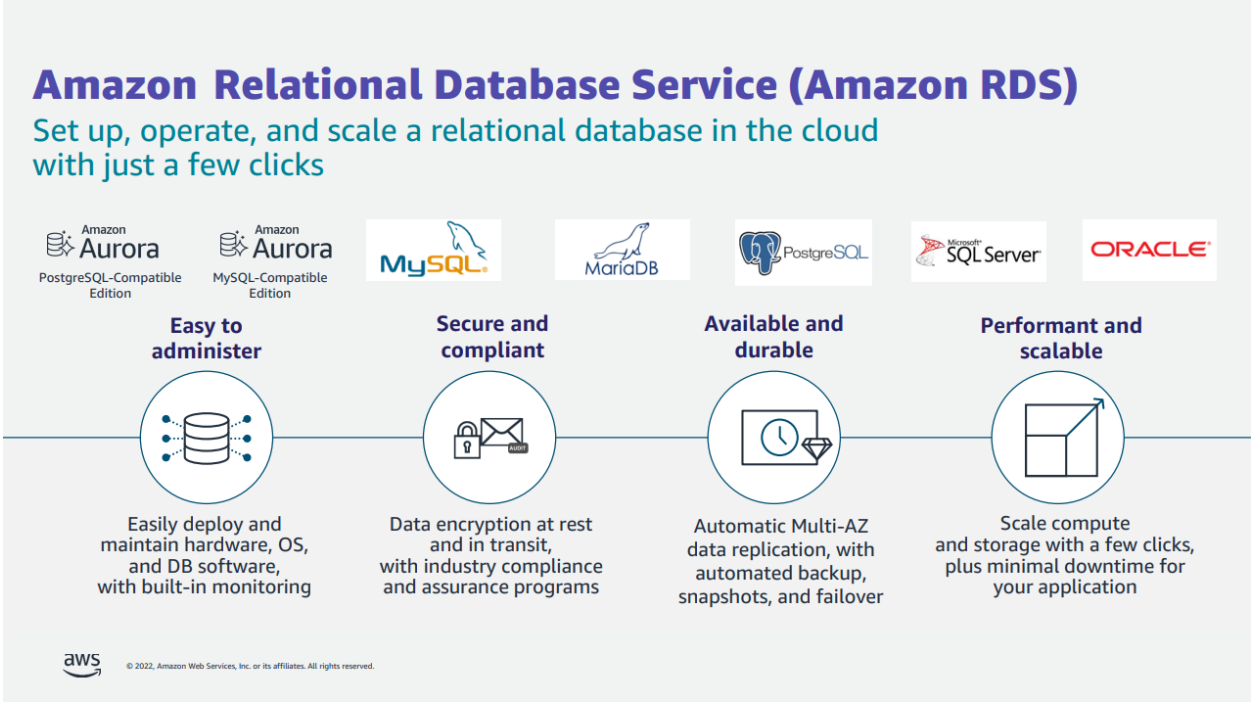
DATABASES
IN
AWS

Relation Database Service (RDS)

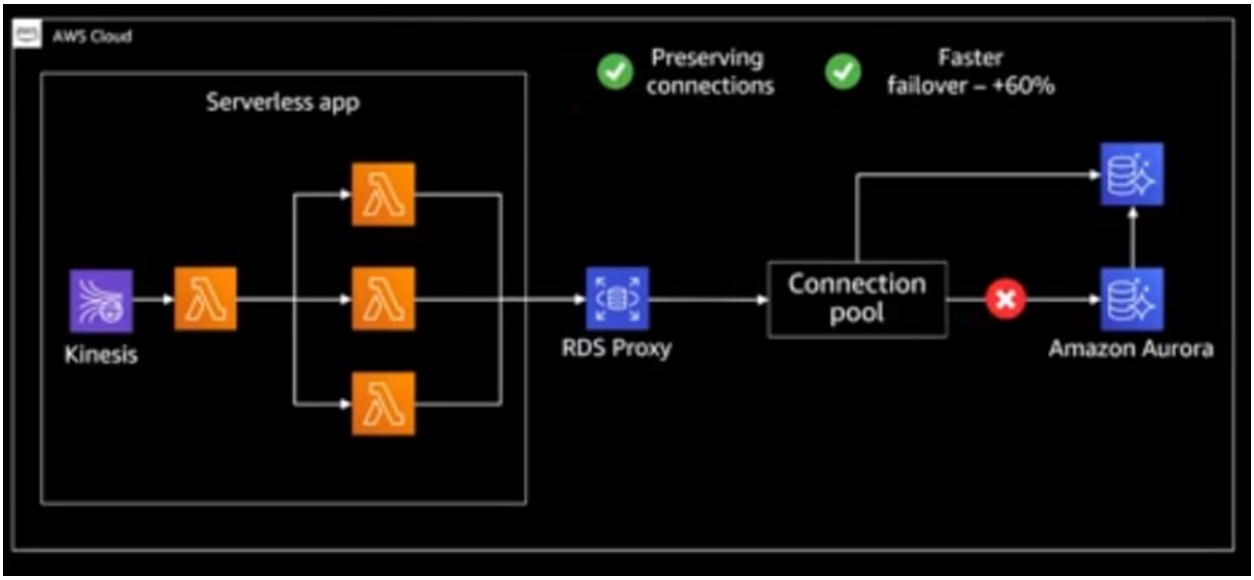
Amazon Relational Database Service (RDS) is a **managed SQL database service** provided by Amazon Web Services (AWS). Amazon RDS supports an array of database engines to store and organize data. It also helps in relational database management tasks like data migration, backup, recovery and patching.



Amazon RDS facilitates the deployment and maintenance of relational databases in the cloud. Cloud administrators use Amazon RDS to set up, operate, manage, and scale relational instances of cloud databases. Amazon **RDS itself is not a database; It is a service used to manage relational databases.**

RDS Proxy

AWS RDS Proxy is a fully managed, highly available database proxy service offered by Amazon Web Services. It acts as an intermediary between your application and your Amazon RDS database instances, enhancing performance, scalability, and security.



It also helps when timeout errors because too many customers.

Used to pool database connections together. Helps when too many connections error.

RDS Proxy vs Read Replica actually tbh.

Aurora

Aurora is an Amazon Managed MySQL and PostgreSQL-compatible relational database service. Aurora automatically handles database tasks such as scaling, patching, and backups, allowing you to focus on building applications rather than managing databases.

With features like Aurora Global Database for cross-region replication and Multi-AZ deployments for high availability, Aurora can efficiently power modern, scalable applications. However, the privilege of having Amazon manage your servers for you does come at an extra cost, thereby making the service more expensive sometimes, especially in comparision to RDS.

Database Cloning

Quick tip:

Using database cloning is a powerful strategy for creating staging databases on-demand in a streamlined and efficient manner.

Cloning allows you to replicate an existing database quickly and efficiently without the overhead of traditional backup and restore processes. This approach is particularly beneficial for development and testing environments where having a replica of the production database in a consistent state is crucial.

DynamoDB and DynamoDB Streams

Amazon DynamoDB is a fully managed NoSQL database service that provides fast and predictable performance with seamless scalability. It handles large amounts of data with high availability, making it ideal for applications requiring consistent, low-latency data access.

DynamoDB Streams is a feature that captures data modification events in DynamoDB tables. It enables real-time processing and replication of changes, allowing applications to react promptly to database updates, facilitating use cases like real-time analytics and cross-region replication.

Note: DynamoDB Streams must be enabled manually.

OLTP and OLAP

OLTP involves managing and processing high volumes of transactional data in real-time. It is optimized for rapid and efficient querying and updating of individual data records. OLTP databases are typically used for day-to-day transactional operations such as order processing, financial transactions, and customer relationship management (CRM). AWS services that support OLTP include:

- **Amazon RDS (Relational Database Service)**: Provides managed database services for relational databases like MySQL, PostgreSQL, Oracle, and SQL Server, optimized for OLTP workloads.
- **Amazon DynamoDB**: A fully managed NoSQL database service that provides fast and predictable performance with seamless scalability. It is ideal for applications requiring low-latency data access and high throughput, such as gaming and mobile apps.

OLAP, on the other hand, focuses on processing large volumes of data for complex analytical queries. It supports aggregations, calculations, and data mining to derive insights and make informed business decisions. OLAP databases are designed for data warehousing, business intelligence (BI), and reporting applications. AWS services that support OLAP include:

- **Amazon Redshift**: A fully managed data warehouse service that allows you to run complex queries across petabytes of structured data. It is optimized for online analytic processing (OLAP) and supports integration with BI tools for data visualization and analysis.

IAM DB Authentication

Quick Tip:

If you wish to allow authentication of EC2 instances connecting to your RDS Database, it is necessary to enable IAM DB authentication

Disaster Recovery

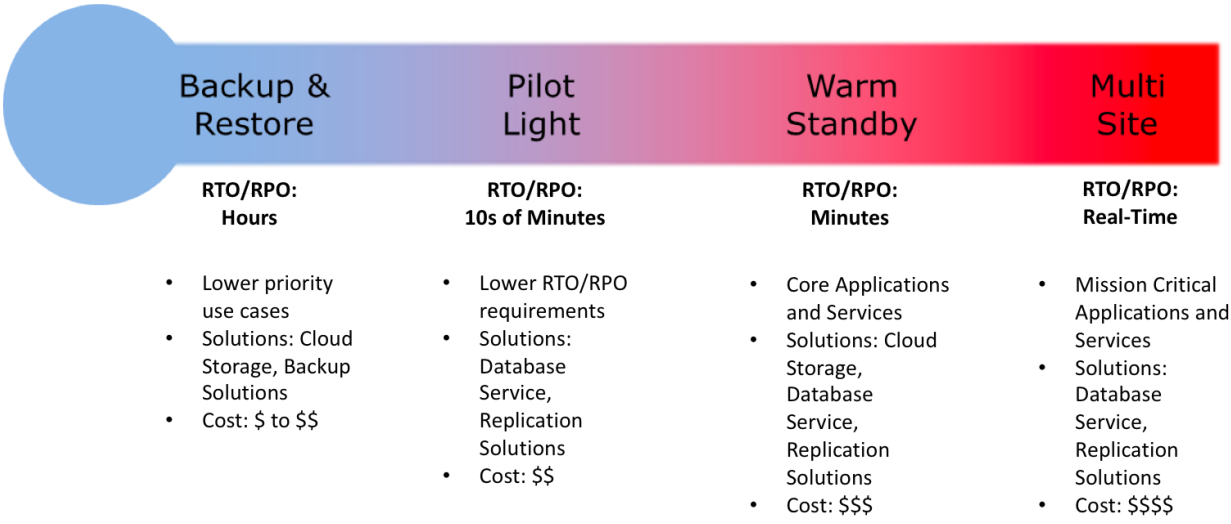
Disaster recovery is measured using Recovery Point Objective (RPO) and Recovery Time Objective (RTO).

Warm Standby for example, is a form of disaster recovery with Moderate RPO and Low RTO.

In this method, the full system architecture is up and running, but at a minimum size.

However it is running using ASG and upon disaster, it can scale to production load.

Consult the diagram below for a brief overview of all the disaster recovery methods:



When Primary Database fails CName changes

Quick Tip:

In RDS (Relational Database Service), when the primary database fails in a Multi-AZ environment, the Canonical Name (CNAME) is automatically changed.

This CNAME update redirects database requests to the standby instance, ensuring seamless failover and minimal downtime for applications. This mechanism helps maintain high availability and resilience for your database services.