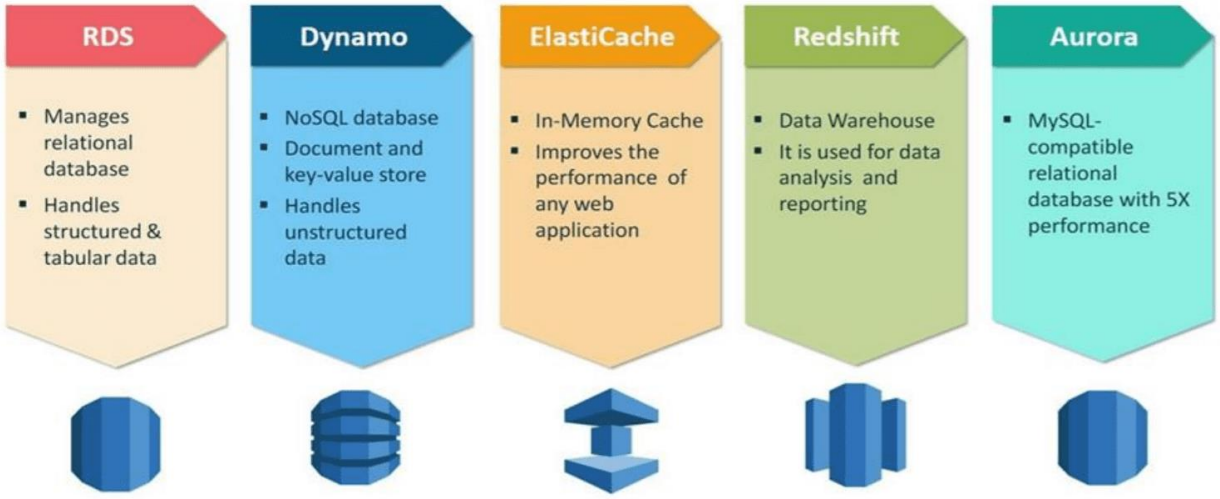
AWS Database Services – Amazon RDS, Aurora, DynamoDB, ElastiCache

AWS Database Services are Amazon's fully managed and scalable database solution for your applications. Amazon provides a wide range of database options such as Amazon RDS, Aurora, DynamoDB, ElasticCache, and Redshift.

What is AWS Database Services

AWS offers a wide range of database options that you can choose for your applications. AWS database services mainly fall into two categories: **Relational** and **non-relational.**

- **Amazon RDS –** Aurora, Oracle, PostgreSQL, MySQL, MariaDB, SQL Server
- **DynamoDB**
- **ElasticCache** – Memcached, Redis
- **Redshift**



Amazon Relational Database Service (Amazon RDS)

Relational databases store data in a table form with rows and columns and use SQL query language to query the data. In these databases, columns represent attributes and rows represent records. Each field in the table represents a data value.

Amazon Relational Database Service (Amazon RDS) makes it easy to spin up a database in the AWS cloud in just a few minutes. Amazon RDS is the most commonly used and a managed database service that automates all the time-consuming administration tasks such as provisioning, setup, patching, and backups.

Amazon RDS provides six different relational database options:

- Amazon Aurora
- Oracle Database
- PostgreSQL
- MySQL
- MariaDB

- Microsoft SQL Server

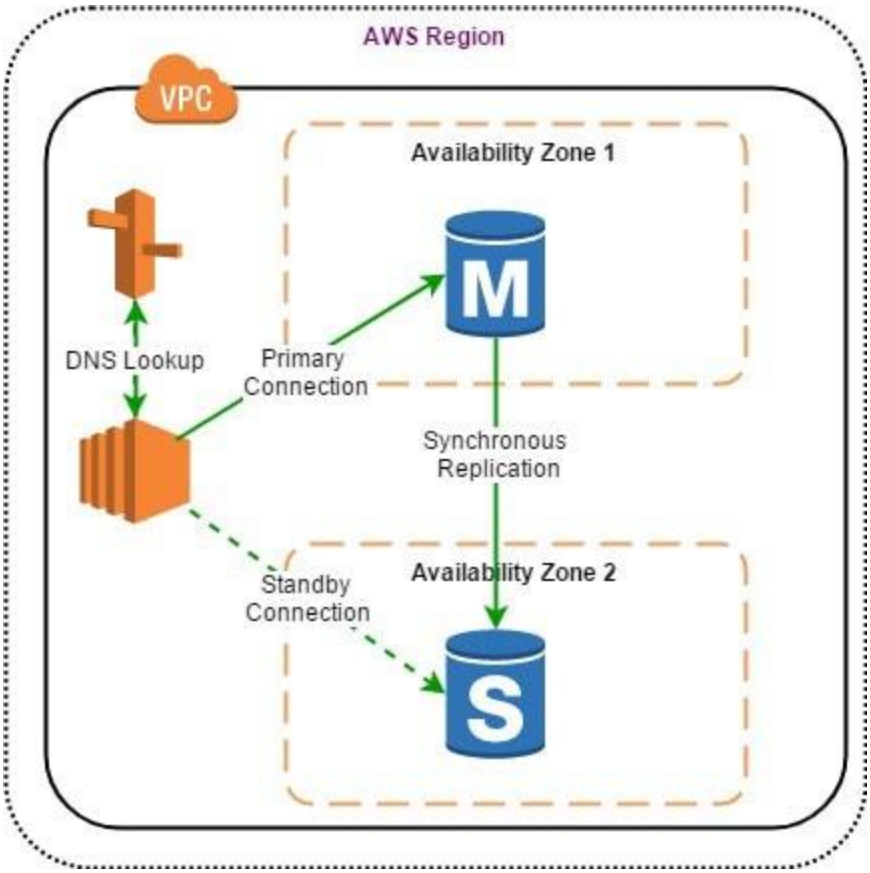
Amazon RDS Use Cases

- Web and mobile applications
- E-Commerce applications
- Mobile and online games

Amazon RDS has two main features:

1. Multi-AZ Deployments

Amazon RDS Multi-Az deployments provide high availability and failover support. Amazon RDS allows you to have multiple copies of your database in multiple availability zones. Amazon RDS creates a synchronous standby replica of your DB instance in another Availability Zone and automatically switches or failover to a standby replica in another Availability Zone in case of a planned or unplanned outage if you have enabled Multi-AZ.

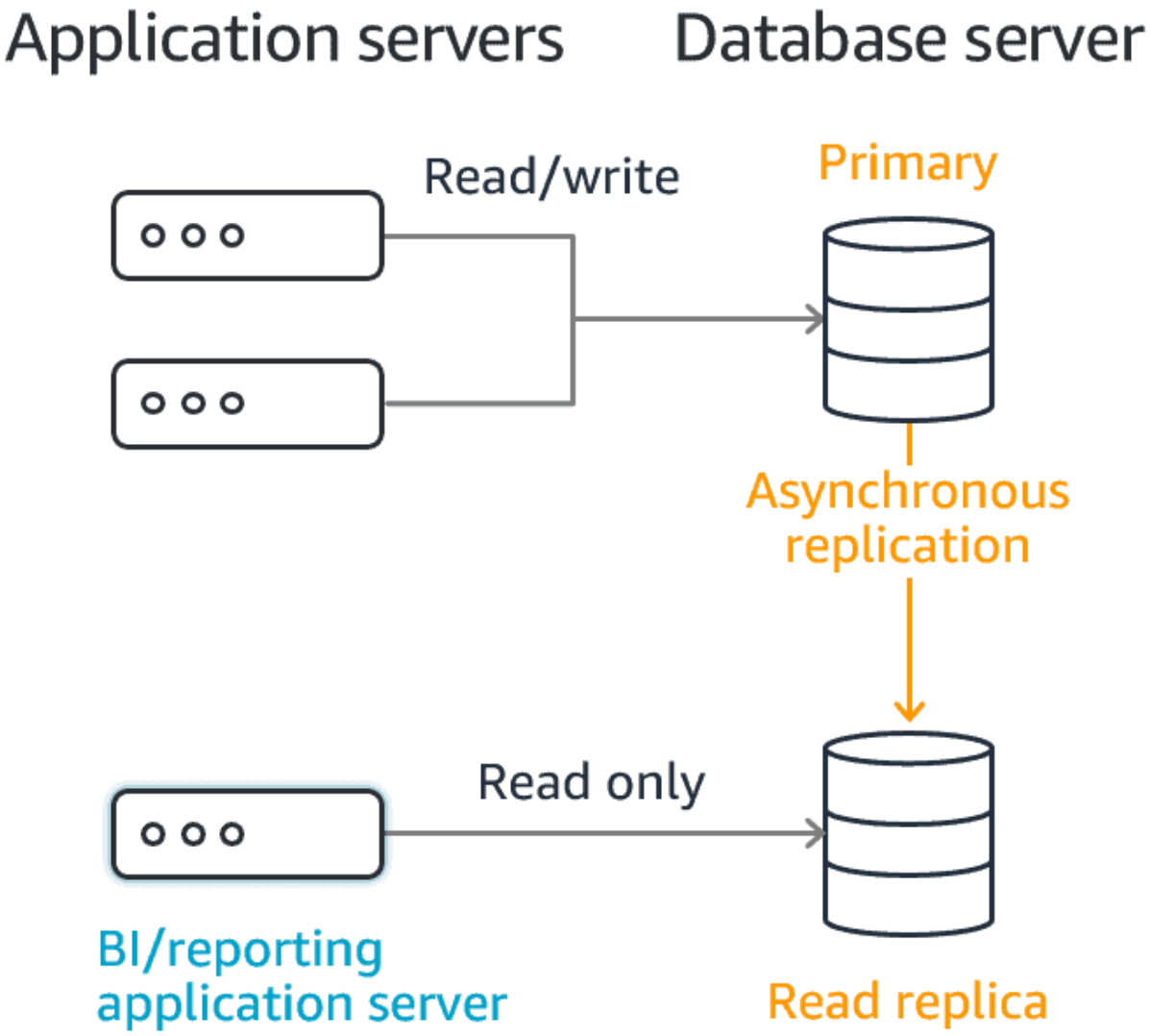


Multi-AZ is available for the following databases:

- SQL Server
- Oracle
- MySQL Server
- Postgre SQL
- MariaDB

2. Read Replicas

AWS RDS Read replicas provides the benefit that allows you to have a read-only copy of your database in the same or a different region thereby reducing latency. Whenever there is a change to the source database instance, the updates are asynchronously copied to the read replica. Read replicas are primarily used for read-heavy database workloads.



Read Replicas are available for the following databases:

- MySQL Server
- PostgreSQL
- MariaDB
- Oracle
- Aurora

Amazon DynamoDB

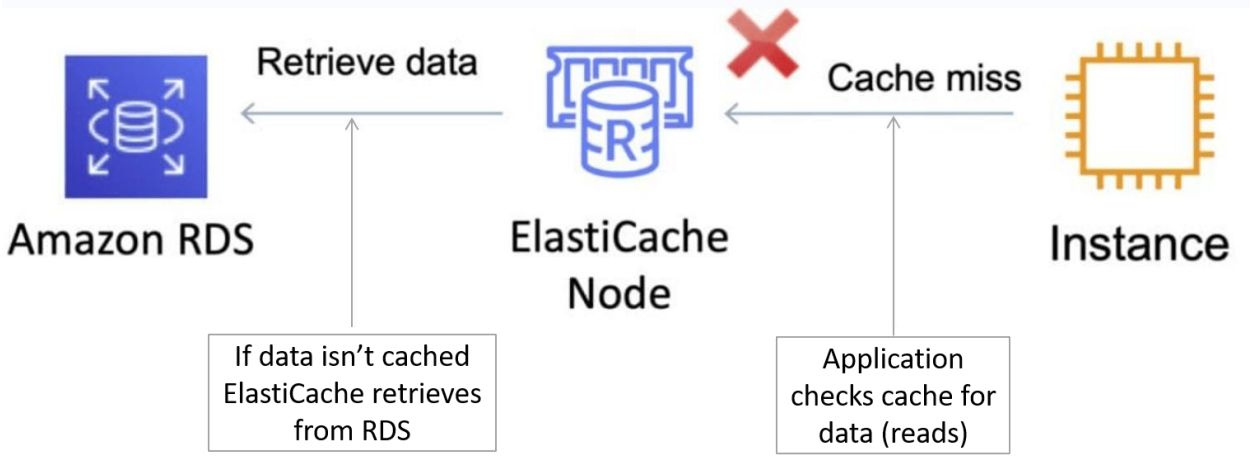
DynamoDB is Amazon's long-running **NoSQL database** solution since 2012. NoSQL databases originally refer to as **"non-SQL"** or **"not only SQL"** or **"non-relational"** databases. NoSQL is commonly used to handle big data – large volumes of unstructured or semi-structured data. Amazon DynamoDB is a fast, fully managed NoSQL database service that supports flexible data models such as both document and key-value data models. It is used for all applications that need consistent, single-digit millisecond performance latency at any scale.

Amazon DynamoDB Use Cases

- Ad tech
- Gaming
- Retail
- Banking and finance
- Media and entertainment
- Software as a service (SaaS)

Amazon ElastiCache

ElastiCache is AWS **in-memory database** solution that makes it easy to deploy, operate, and scale an in-memory cache in the cloud. It provides faster retrieval of information from fast, managed, in-memory caches instead of relying entirely on slower disk-based databases, thereby improving the performance of web applications.



Amazon ElastiCache offers two open-source in-memory cache database engines:

1. **Memcached:** Simple and easy solution to start with, ideal for small and static data.
2. **Redis:** It provides support for Multi-AZ, backup & restores, and persistence. It is ideal for more dense and complex data.

Let's take a look at some basic differences between Memcached and Redis.

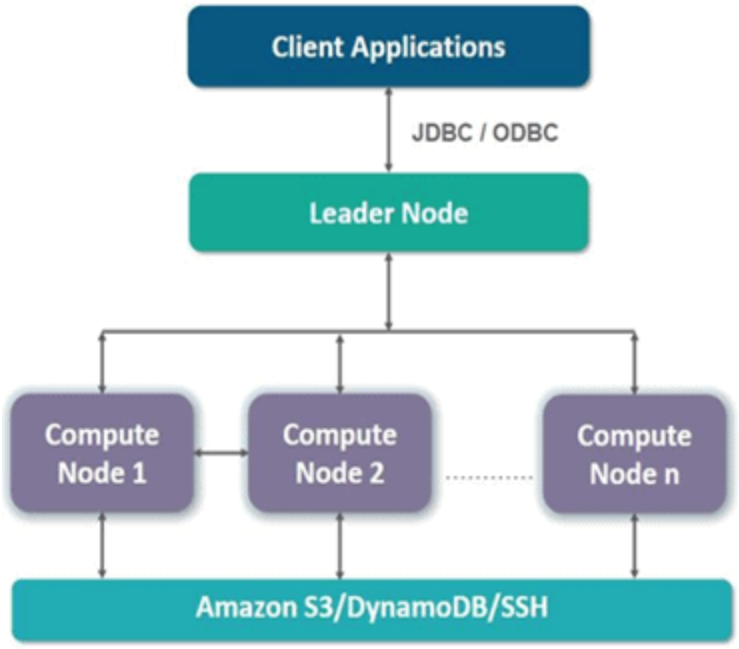
Characteristics	Memcached	Redis
Description	In-memory key-value store, originally intended for caching	In-memory data structure store, used as database, cache and message broker
Replication	Does not support replication	Supports master-slave replication
Storage type	Stores variables in memory & retrieves information directly from server instead of DB	Redis is like a database that resides in memory
Read/Write Speed	Good to handle high traffic websites	Neither can handle high traffic on read nor heavy writes
Key-Length	Memcached's key length has a maximum of 250 bytes	Redis has a maximum of 2GB
Ideal for	Caching relatively small and static data, such as HTML code fragments	Session Cache, Full Page Cache (FPC), Queues, Leaderboards /Counting and more

Amazon ElastiCache Use Cases

- Session stores
- Gaming
- Geospatial services
- Real-time analytics

Amazon Redshift

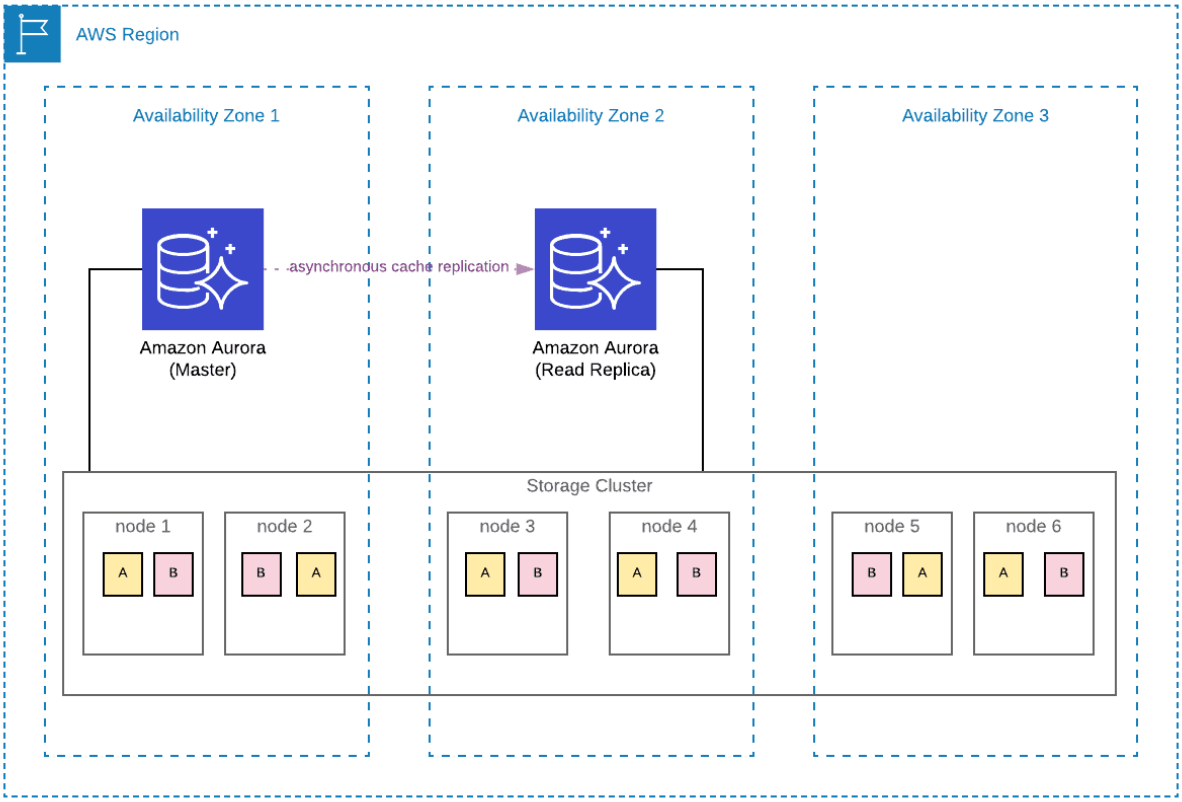
Amazon Redshift is a **data warehousing solution** used for business intelligence applications. It is a fast and powerful, fully managed, petabyte-scale data warehouse service in the cloud. This service manages all the work of setting up, operating, and scaling a data warehouse. It also manages all administrative tasks including provisioning capacity, monitoring and backing up the cluster, and applying patches and upgrades to the Amazon Redshift engine.



Amazon Aurora

Amazon Aurora is the managed relational database solution of AWS. It is a MySQL and PostgreSQL-compatible relational database engine that improves the speed and high-availability of databases. Recently, AWS also launched the serverless and multi-master versions of Aurora, and any of these features can alone be the reason to choose it.

Amazon Aurora delivers up to five times the performance of MySQL and three times the performance of PostgreSQL databases at a much lower price. It also supports cross-region read replicas.



Aurora provides more reliability in terms of storage. Its database storage is separate from the instances. Aurora allows your data to be replicated in 6 storage nodes, each of 10GB chunks, distributed in 3 Availability Zones. For each Aurora database instance, you will have 6 copies of your data, two in each Availability Zone.

Amazon Aurora Use Cases

- Enterprise applications
- Software as a Service (SaaS) offerings
- Web and mobile gaming applications