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SESSION-7:
RELATIONAL DATABASE SERVICE (RDS)

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AWS database services

Amazon Relational Database Service (Amazon RDS)

Amazon Aurora

Amazon Redshift

Amazon DocumentDB (with MongoDB compatibility)

Amazon DynamoDB

Amazon ElastiCache

Amazon MemoryDB for Redis

Amazon Keyspaces (for Apache Cassandra)

Amazon Timestream

Amazon Neptune

Amazon Quantum Ledger Database (Amazon QLDB)

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Relational and nonrelational databases

	Relational (SQL) databases	Nonrelational (NoSQL) databases
Data storage	Tables with rows and columns	Key-value, wide-column, graph, document, or other models
Schemas	Fixed	Dynamic
Example database services	 Amazon RDS  Aurora	 DynamoDB  ElastiCache

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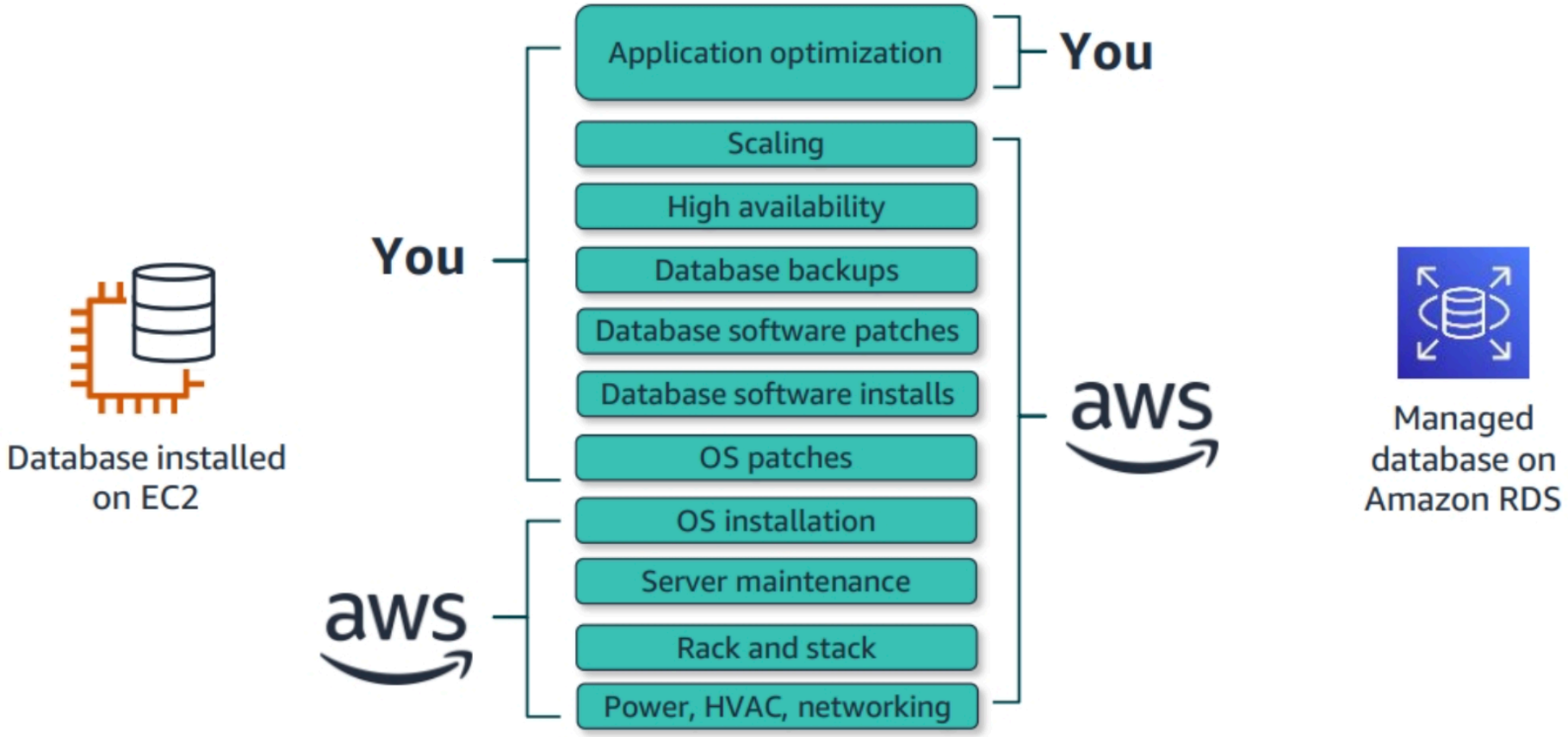
Choosing the right database

Relational database	Nonrelational (NoSQL) database
You require strict schema rules and data quality enforcement.	You need your database to scale horizontally.
Your database doesn't need extreme read/write capacity.	Your data does not lend itself well to traditional schemas.
If you have a relational dataset that does not require extreme performance, a relational database management system can be the best, lowest effort solution.	Your read/write rates exceed the rates that can be economically supported through a traditional structured query language (SQL) database.

Managed and unmanaged services



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Why do we need RDS?

Routine Database Operations

High Availability and Fault Tolerance

Scalability

Backup and Restore

Monitoring and Performance

Security

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RDS and Its Benefits – Overview

- High agility and adaptability
- Lower risk of hardware failures and downtime
- Easier managing disaster recovery capabilities
- Easier maintaining security and compliance standards
- Reduced dependency on internal IT resources for database management and support

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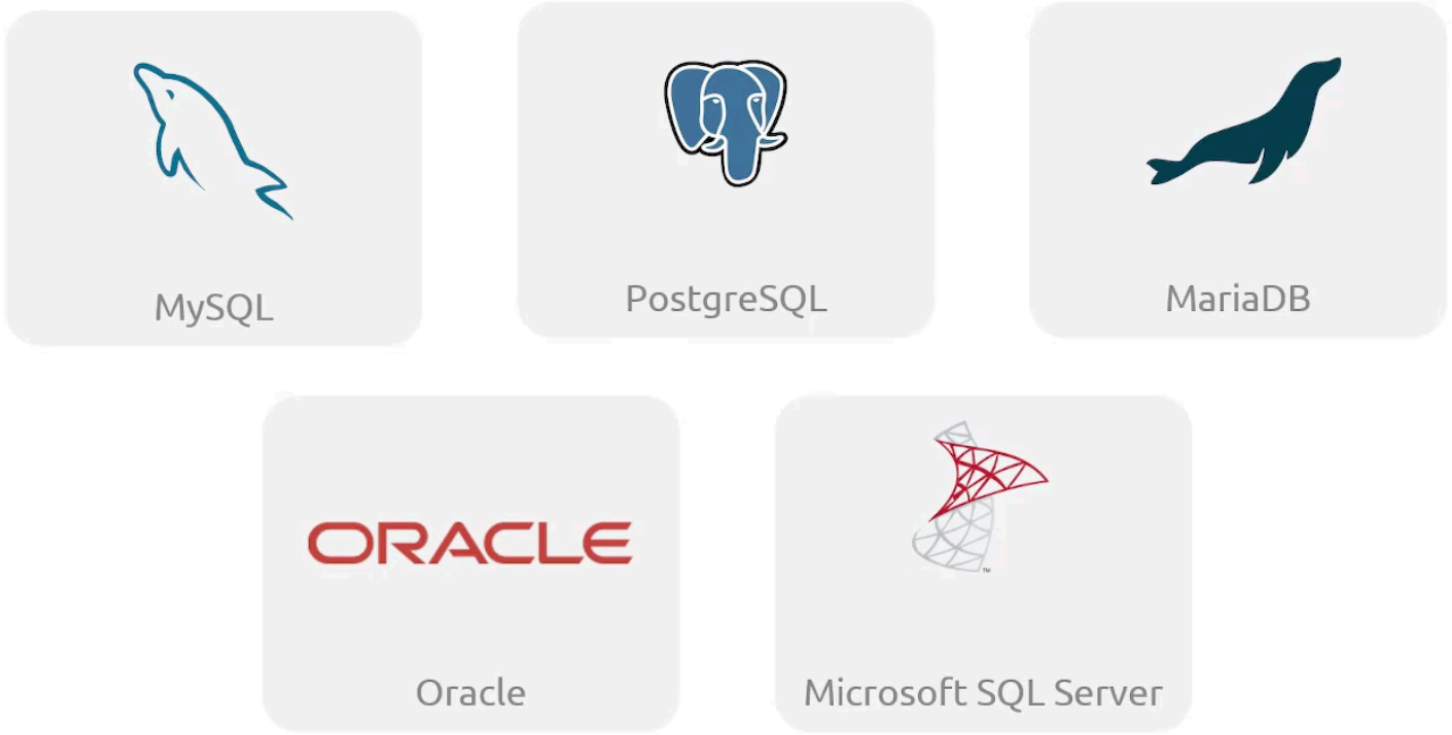
RDS Components



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RDS Instance Types

General Purpose

Memory Optimized

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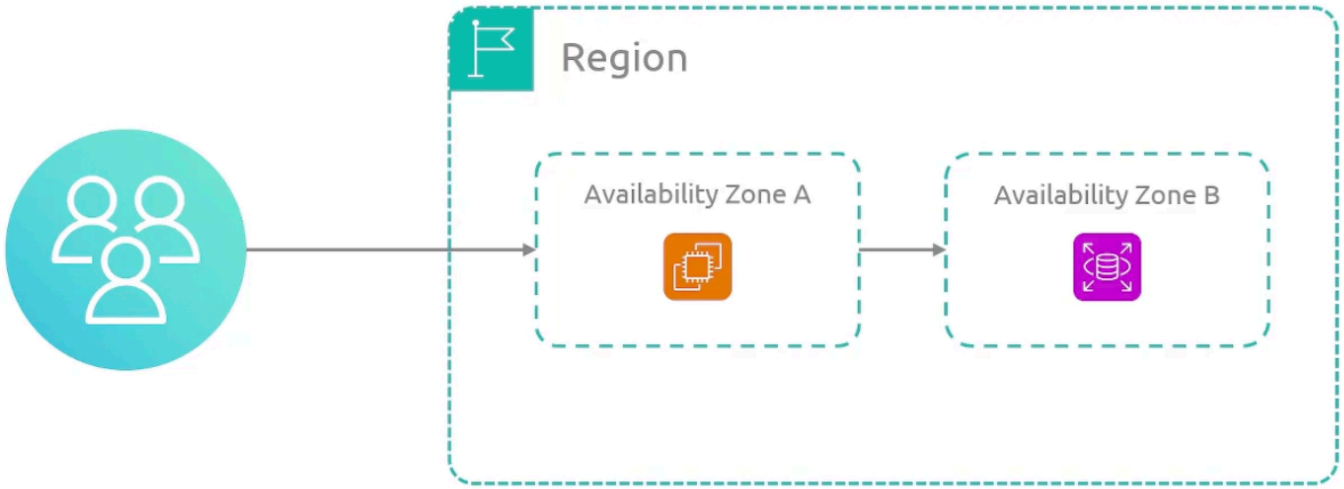
Single RDS Database Setup

- Best suited for **Staging/ Development** environment and running POC projects
- Offers low setup cost
- Doesn't offer high availability
- Offers higher latency for read/write operations



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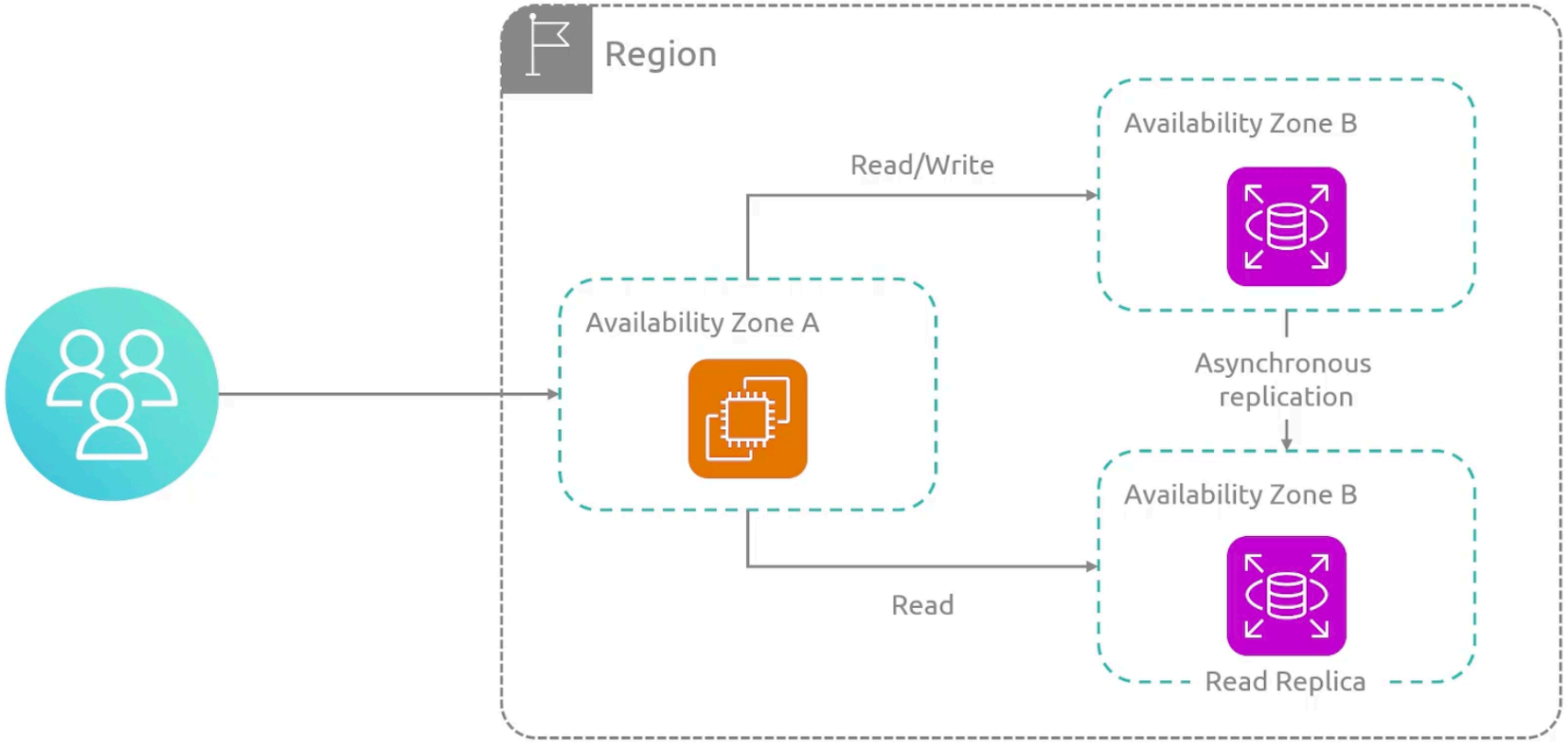
RDS Read Replicas



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RDS Read Replicas

A read replica is a read-only copy of a DB instance

Reduce the load on your primary DB instance by routing queries from your applications to the read replica

Elastically scale out beyond the capacity constraints of a single DB instance for read-heavy database workloads

Promote a read replica to a standalone instance as a disaster recovery solution if the primary DB instance fails

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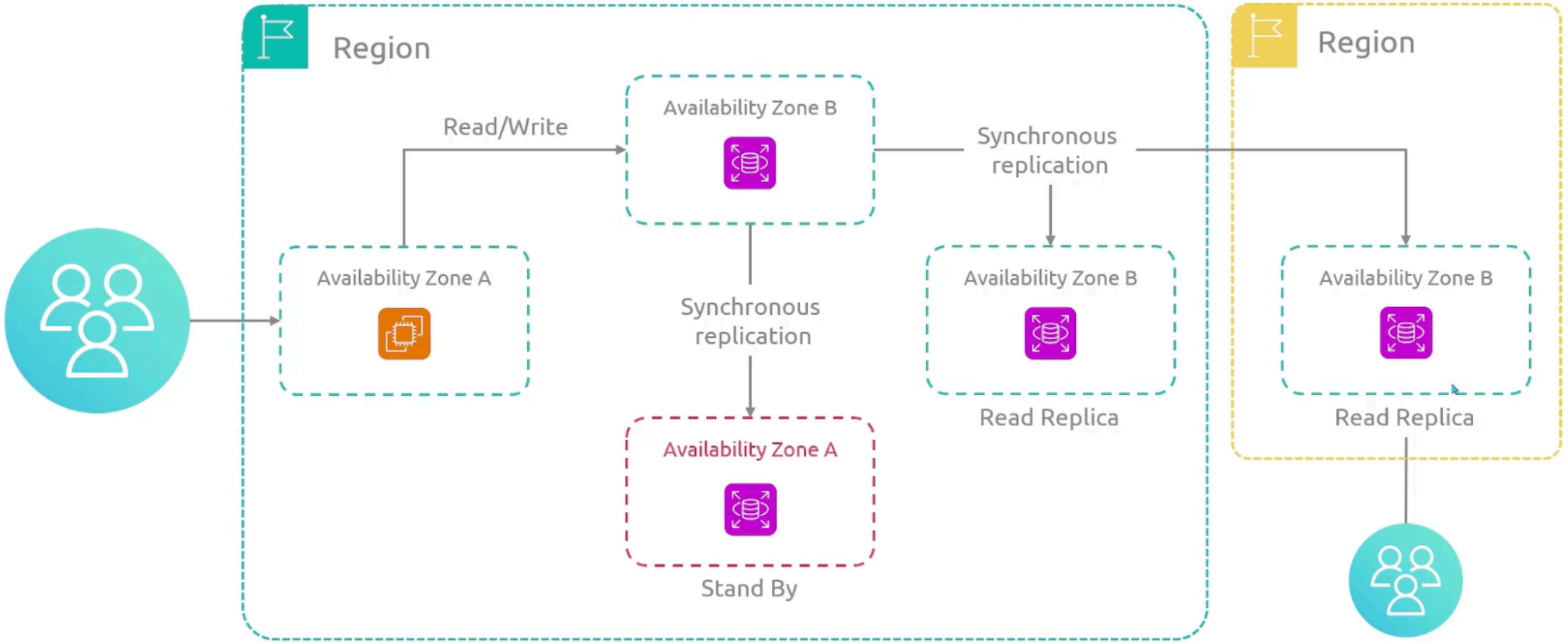
Multi-AZ Cluster



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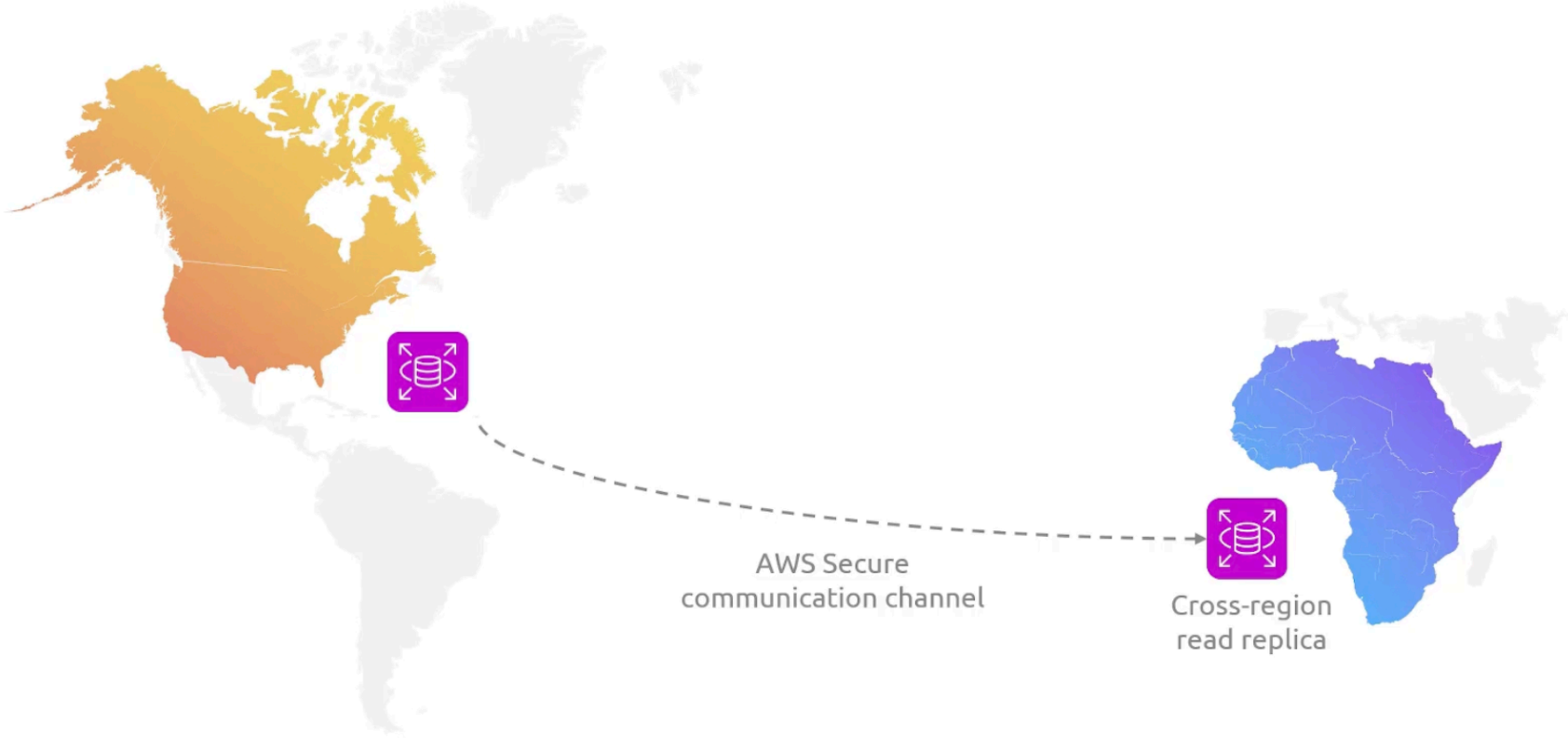
RDS Cross-Region Read Replicas



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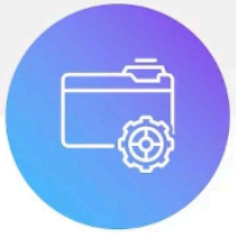
RDS Storage Types

General Purpose SSD

Provisioned IOPS SSD



Magnetic

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General Purpose SSD

General Purpose SSD volumes offer cost-effective storage

Ideal for a broad range of workloads running on medium-sized DB instances

General Purpose storage is best suited for development and testing environments

Baseline of **3 IOPS/GB** and ability to burst up to **3,000** IOPS

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Provisioned IOPS SSD

Provisioned IOPS storage is designed to meet the needs of I/O-intensive workloads and backed with SSD-backed storage

Particularly suited for database workloads that require low I/O latency and consistent I/O throughput

Provisioned IOPS storage is best suited for production environments

Minimum storage size is 100GB and maximum is 16TB

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Magnetic Storage

One of the initial storage types available when RDS was first launched but has been largely replaced by more modern and performant storage options

Magnetic Storage relies on traditional Hard Disk Drives (HDDs) for data storage. HDDs offer slower performance compared to newer storage technologies like Solid State Drives (SSDs)

Amazon RDS Magnetic Storage was being phased out and was no longer available for some newer database engine versions and instance types

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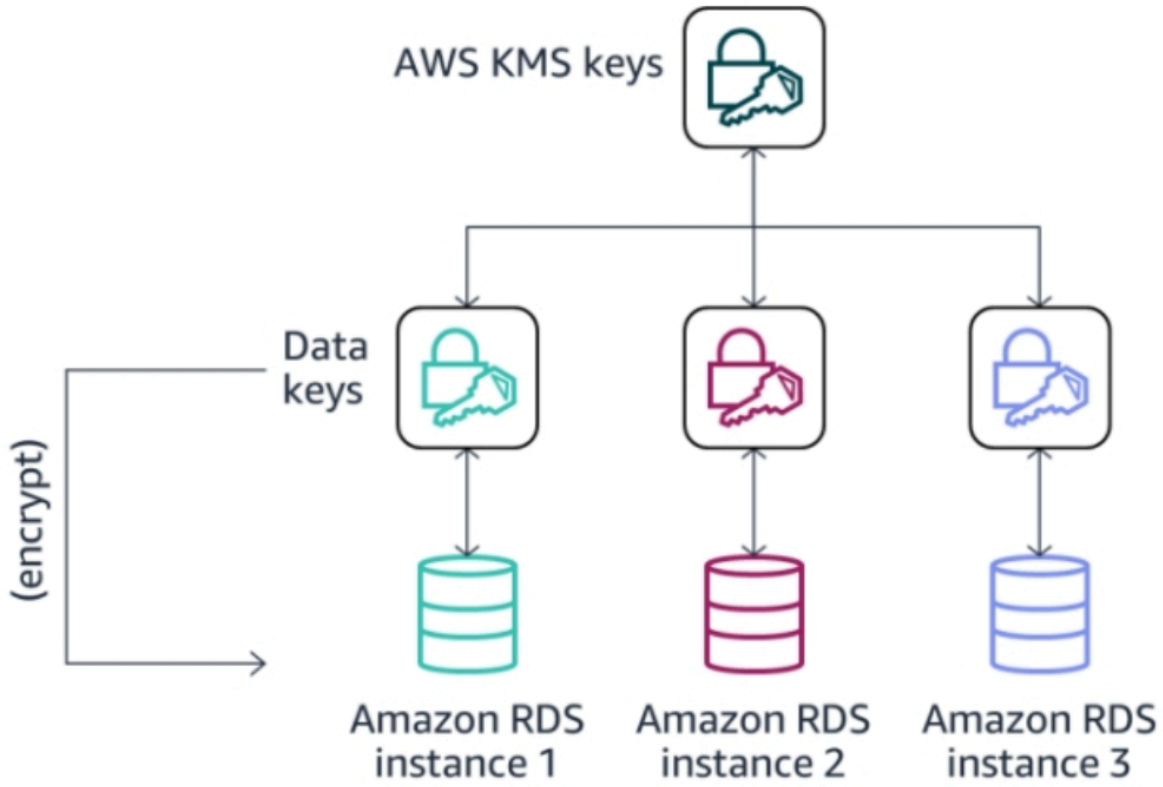
RDS Configurations

- DB Parameter Groups
- DB Option Groups
- DB Subnet Groups
- DB Security Groups
- DB Snapshots
- Parameter Store
- Performance Insights
- Enhanced Monitoring
- Audit and Log Data
- SSL and Encryption

Data encryption at rest

- Managed by AWS KMS
- Unique data key encrypts your data
- AWS KMS key encrypts data keys
- Available for all RDS engines



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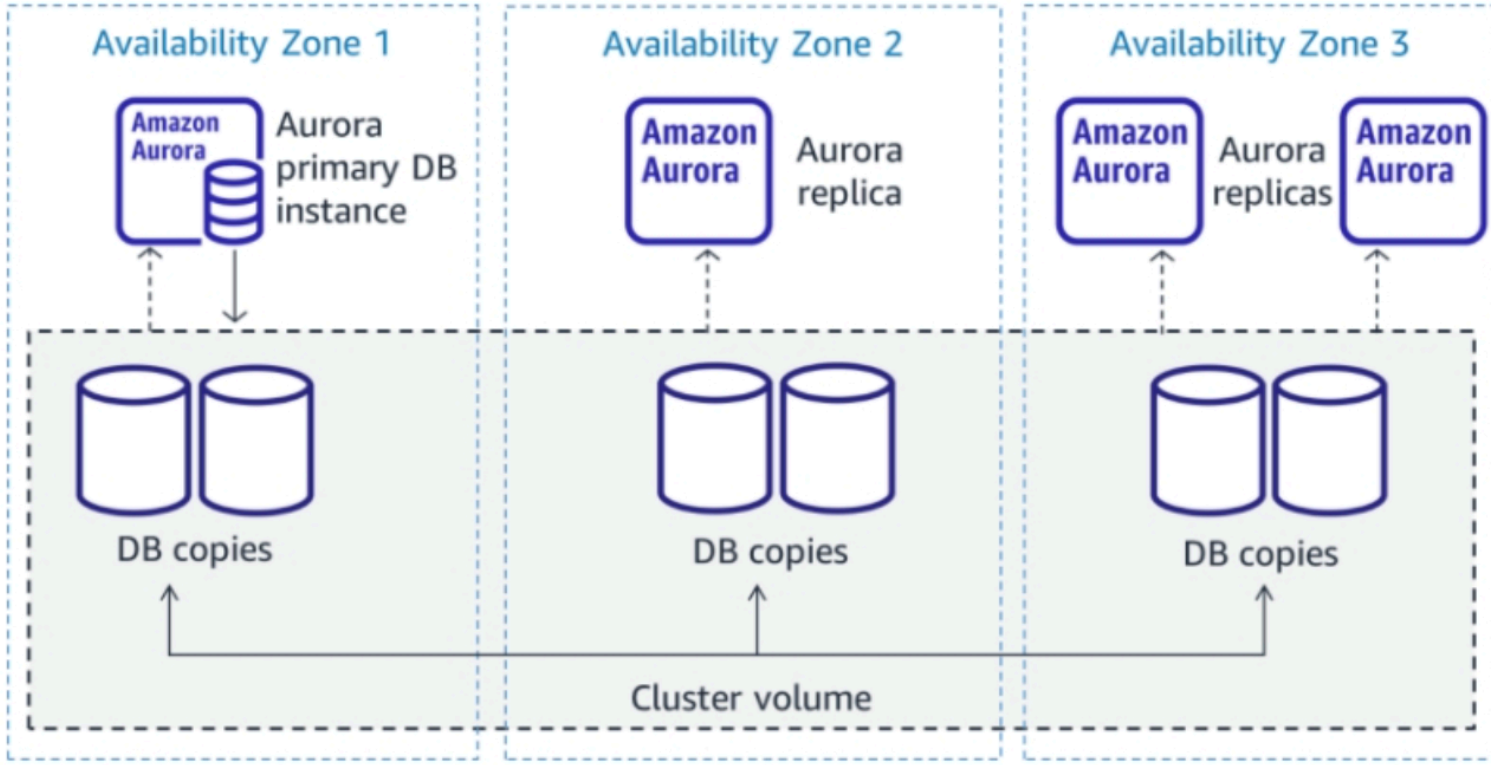
Amazon Aurora

A MySQL and PostgreSQL compatible relational database built for the cloud

Aurora DB clusters

- A DB cluster consists of one or more DB instances and a cluster volume.
- Primary instances perform read/write operations.
- Aurora replicas are read-only.
- A cluster volume is a virtual database storage volume that spans multiple Availability Zones.



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Aurora Serverless v2 for PostgreSQL and MySQL

Scaling configuration for Aurora that automatically scales capacity up or down based on your application's needs

Starts up on demand

Only pay for what you use

No application impact when scaling

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THANKS FOR LISTENING