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aws SUMMIT



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D A T 2 0 1

What's new with Amazon RDS

Bill Jacobi

(he/him)

Principal Solutions Architect

AWS

Alex Zarenin

(he/him)

Principal Solutions Architect

AWS



Audience poll



Agenda

Amazon RDS overview

Performance monitoring and tuning

Amazon RDS high availability

Amazon RDS read scaling and cloning


AI/ML enhancements

Amazon RDS overview




Amazon RDS

MANAGED RELATIONAL DATABASE SERVICE WITH A CHOICE OF POPULAR DATABASE ENGINES




Amazon Aurora
MySQL-Compatible
Edition




Amazon Aurora
PostgreSQL-Compatible
Edition


Amazon
Aurora



Amazon RDS for
MySQL



Amazon RDS for
MariaDB



Amazon RDS for
PostgreSQL

Amazon RDS
open source



Amazon RDS for Db2



Amazon RDS for
Oracle



Amazon RDS for
Microsoft SQL Server

Amazon RDS
commercial

RDS Custom Microsoft SQL Server and Oracle

BRING YOUR OWN LICENSE AND MEDIA



Customer media and license

- Download binary

NEW!
Includes
Developer Edition
(Microsoft SQL Server)

Amazon Machine Image (AMI)

- Create new Amazon EC2 instance
- Copy binary to instance
- Install binary
- Verify engine version
- Apply relevant cumulative updates (CU)

Custom Engine Version (CEV)

- Register engine and OS version metadata with Amazon RDS

Amazon RDS Custom

- Provision RDS Custom database instances
- Maintain preferred engine and OS baseline configuration
- Configurations persist through instance scaling, database failover, host replacements...

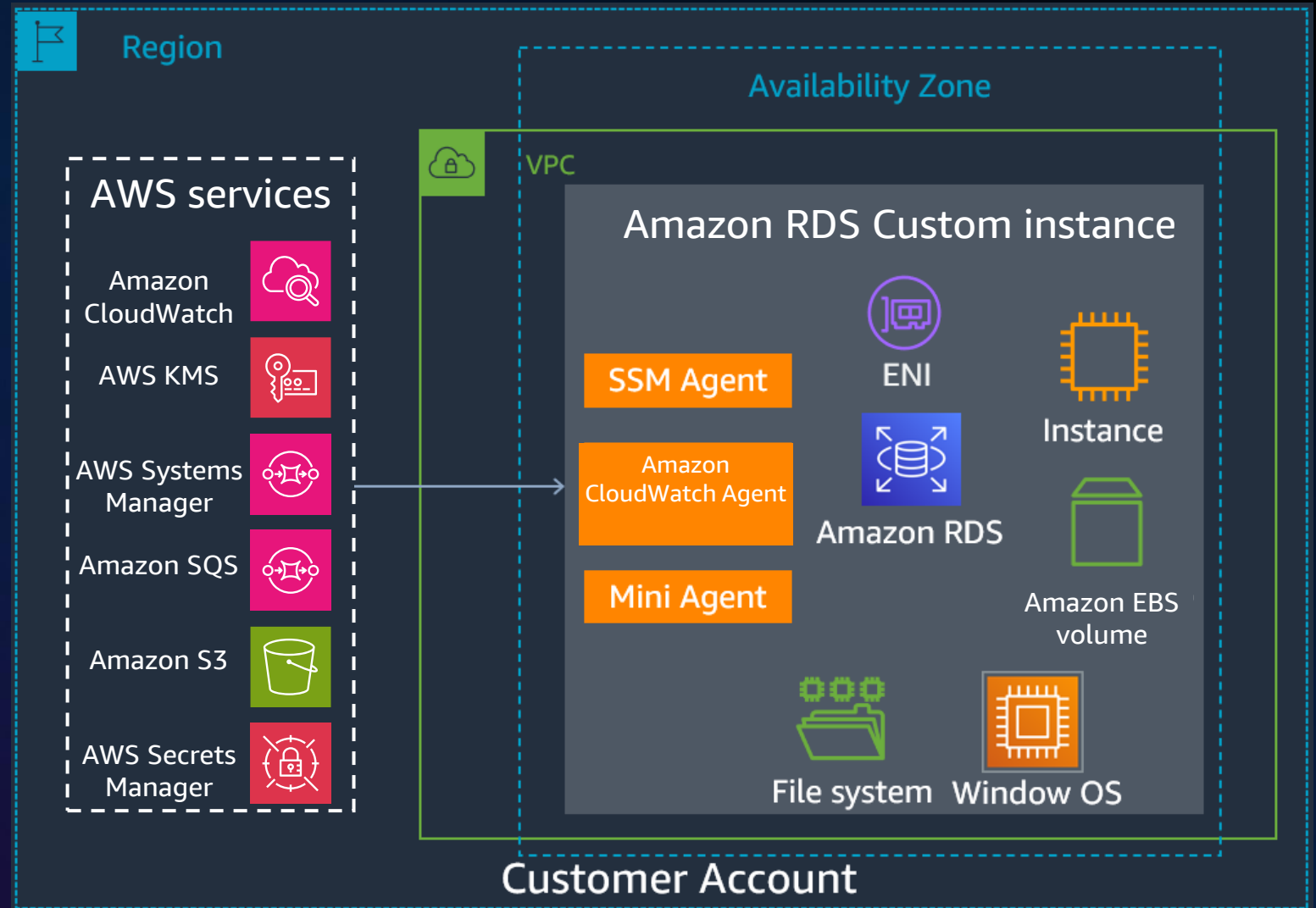
One-time setup

Provision any number of times



Amazon RDS Custom Service Integration

- DB instance deployed to customer VPC
- Local admin access to OS and file system
- Full Oracle or Microsoft SQL Server access with system admin privileges
- Instance console access through RDP, SSH, or AWS Systems Manager



Amazon RDS notable features

➤ Blue/Green deployments

(MariaDB, MySQL, PostgreSQL, Aurora MySQL-Compatible, Aurora PostgreSQL-Compatible)

➤ RDS proxy

(MariaDB, MySQL, PostgreSQL, Microsoft SQL Server, Aurora MySQL-Compatible, Aurora PostgreSQL-Compatible)

➤ Kerberos authentication

(MySQL, PostgreSQL, DB2, Oracle, Microsoft SQL Server, Aurora MySQL-Compatible, Aurora PostgreSQL-Compatible)

➤ Exporting snapshots to Amazon S3

(MariaDB, MySQL, PostgreSQL, Aurora MySQL-Compatible, Aurora PostgreSQL-Compatible)

<https://docs.aws.amazon.com/AmazonRDS/latest/UserGuide/Concepts.RDSFeaturesRegionsDBEngines.grid.html>

<https://docs.aws.amazon.com/AmazonRDS/latest/AuroraUserGuide/Concepts.AuroraFeaturesRegionsDBEngines.grid.html>

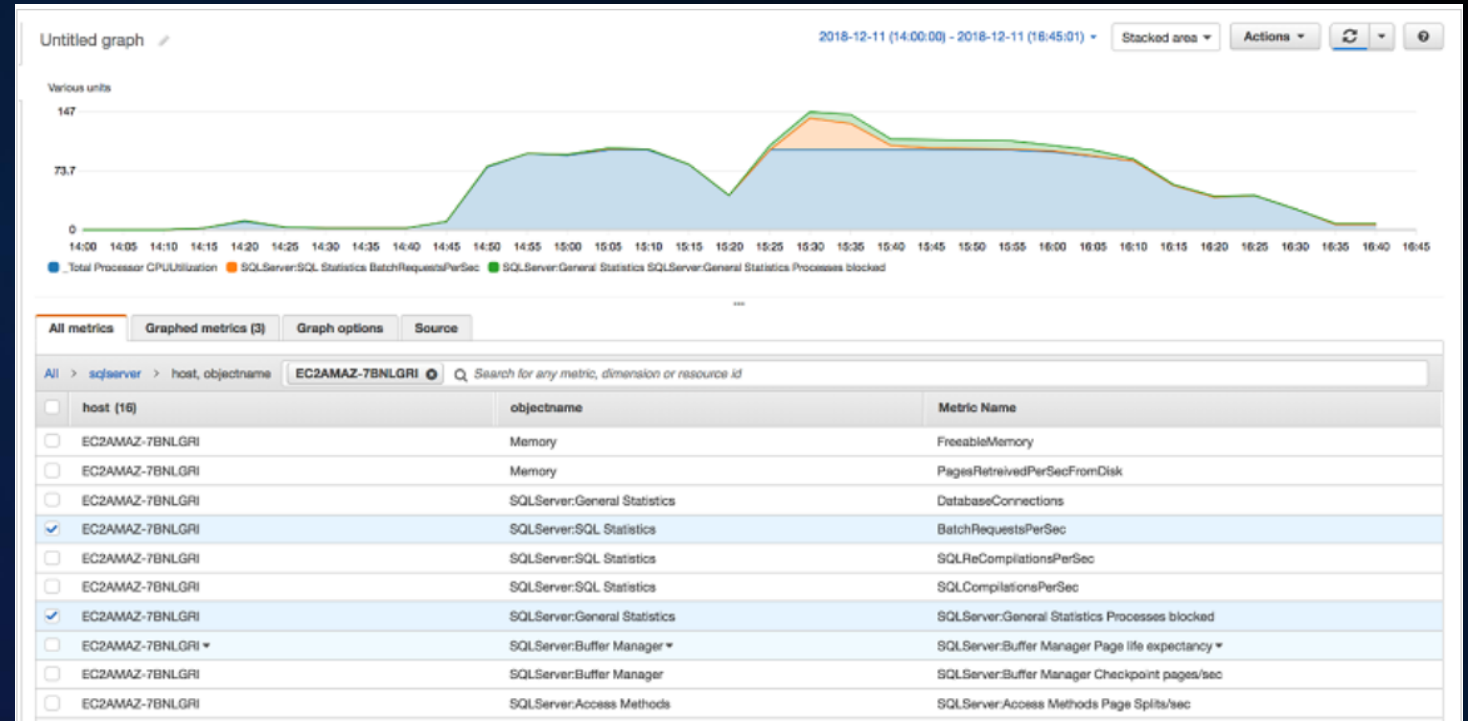


Amazon RDS: Performance monitoring and tuning

Amazon CloudWatch metrics for Amazon RDS

CLOUDWATCH METRICS INSIGHTS

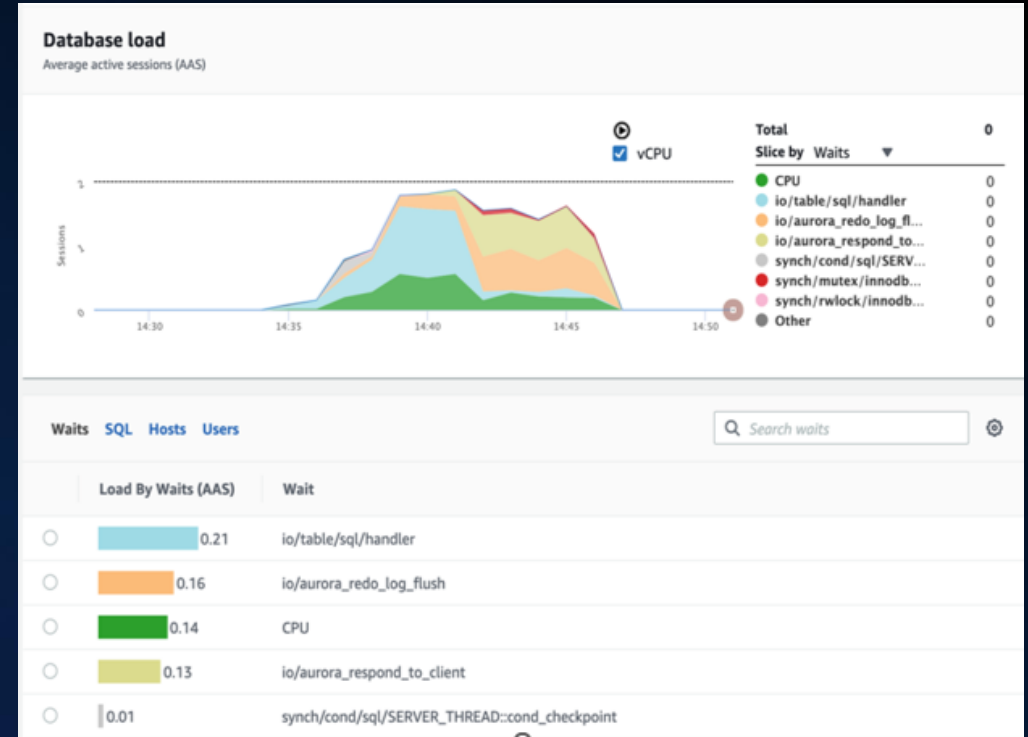
- CPU utilization
- DB connections
- Free storage space
- Freeable memory
- Write/read IOPS
- Queue depth
- Write/read throughput
- Swap usage
- Write/read latency
- Network receive throughput
- Network transmit throughput



https://docs.aws.amazon.com/AmazonCloudWatch/latest/monitoring/query_with_cloudwatch-metrics-insights.html

Amazon RDS Performance Insights

- Based upon CloudWatch native and enhanced metrics
- Simple and powerful dashboard showing load on your database
- Helps you identify source of bottlenecks: top SQL queries, wait statistics, DB engine counters
- Adjustable time frame (hour, day week, month)
- Custom time window option
- 7 days of performance data history with free tier (perfect for developers) and up to 2 years retention for production use cases with paid tier



Supported database engines

MariaDB, MySQL, PostgreSQL, Microsoft SQL Server, Oracle, Amazon Aurora

<https://aws.amazon.com/rds/performance-insights/>

Amazon DevOps Guru for RDS

AI/ML TOOL FOR DATABASE MANAGEMENT

➤ Fast diagnostics

DevOps Guru for RDS uses **statistical** and **machine learning** techniques to mine Performance Insights, **Enhanced Monitoring**, and **Amazon CloudWatch telemetry** data and detect anomalies

➤ Fast resolution

Each anomaly identifies the performance issue and suggests avenues of investigation or corrective actions; based on these recommendations, you can resolve performance issues more quickly than by troubleshooting manually

➤ Proactive insights

DevOps Guru for RDS uses metrics from your resources to detect potentially problematic behavior before it becomes a bigger problem



Supported database engines

- ✓ Amazon Aurora
- ✓ Amazon RDS for PostgreSQL

<https://docs.aws.amazon.com/devops-guru/latest/userguide/working-with-rds.overview.how-it-works.html>

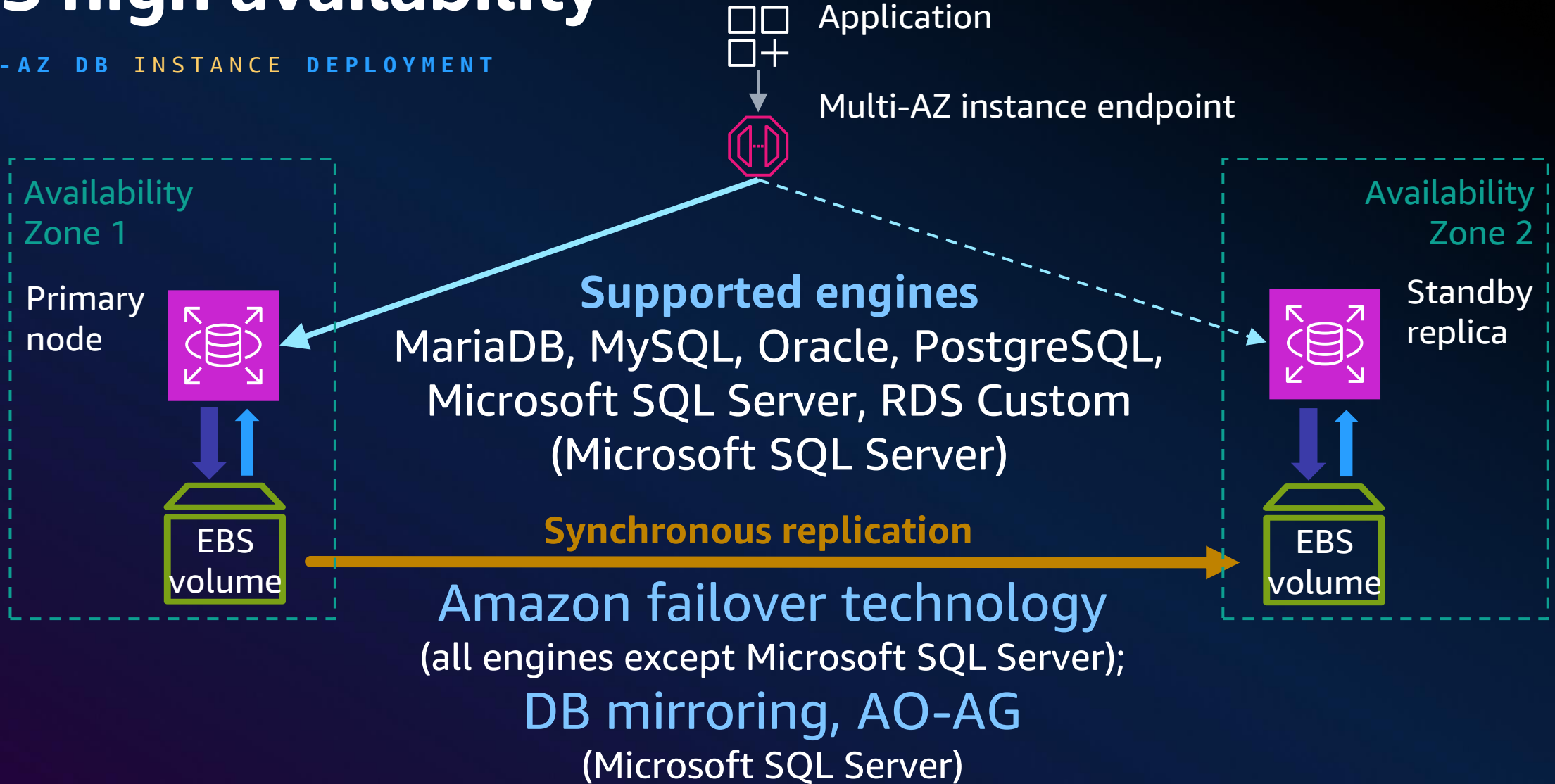


Amazon RDS high availability



RDS high availability

MULTI-AZ DB INSTANCE DEPLOYMENT

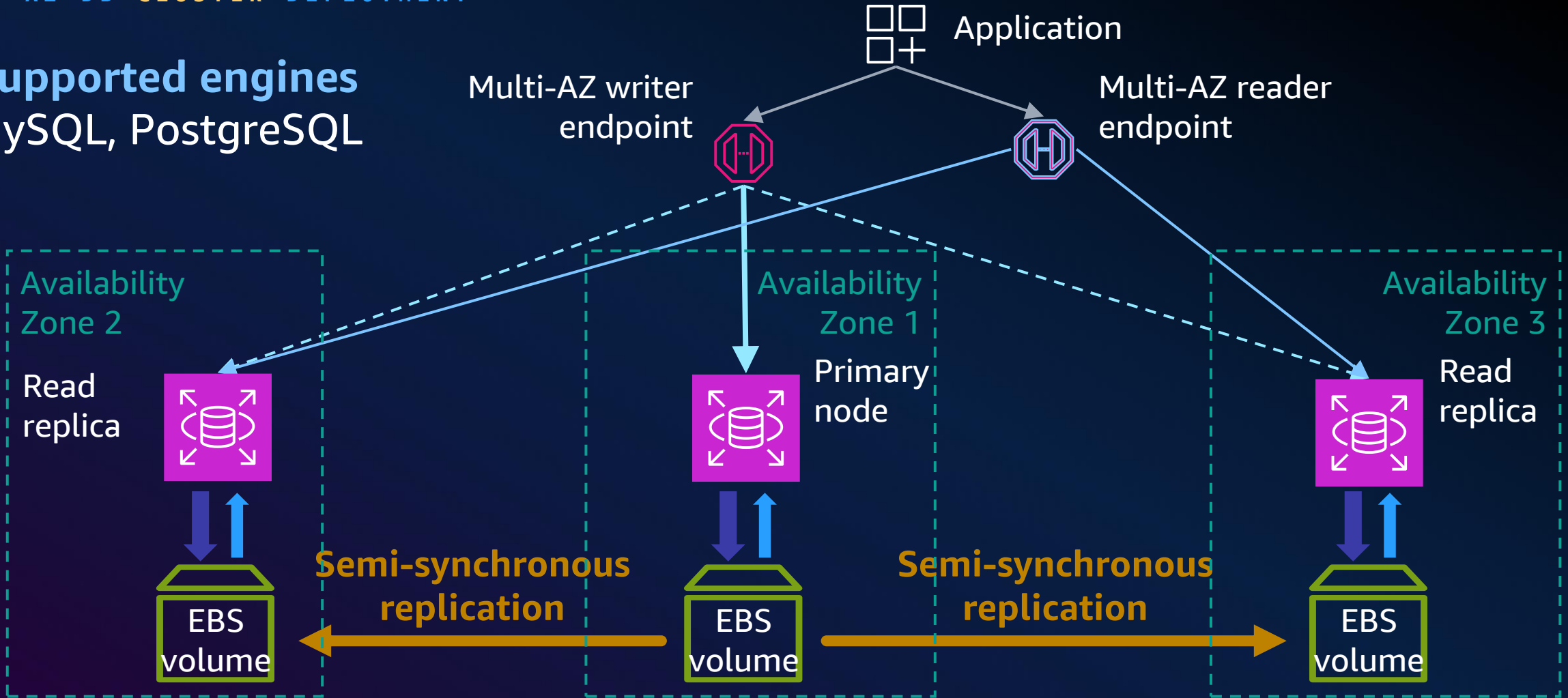


<https://docs.aws.amazon.com/AmazonRDS/latest/UserGuide/Concepts.MultiAZSingleStandby.html>

RDS high availability

MULTI-AZ DB CLUSTER DEPLOYMENT

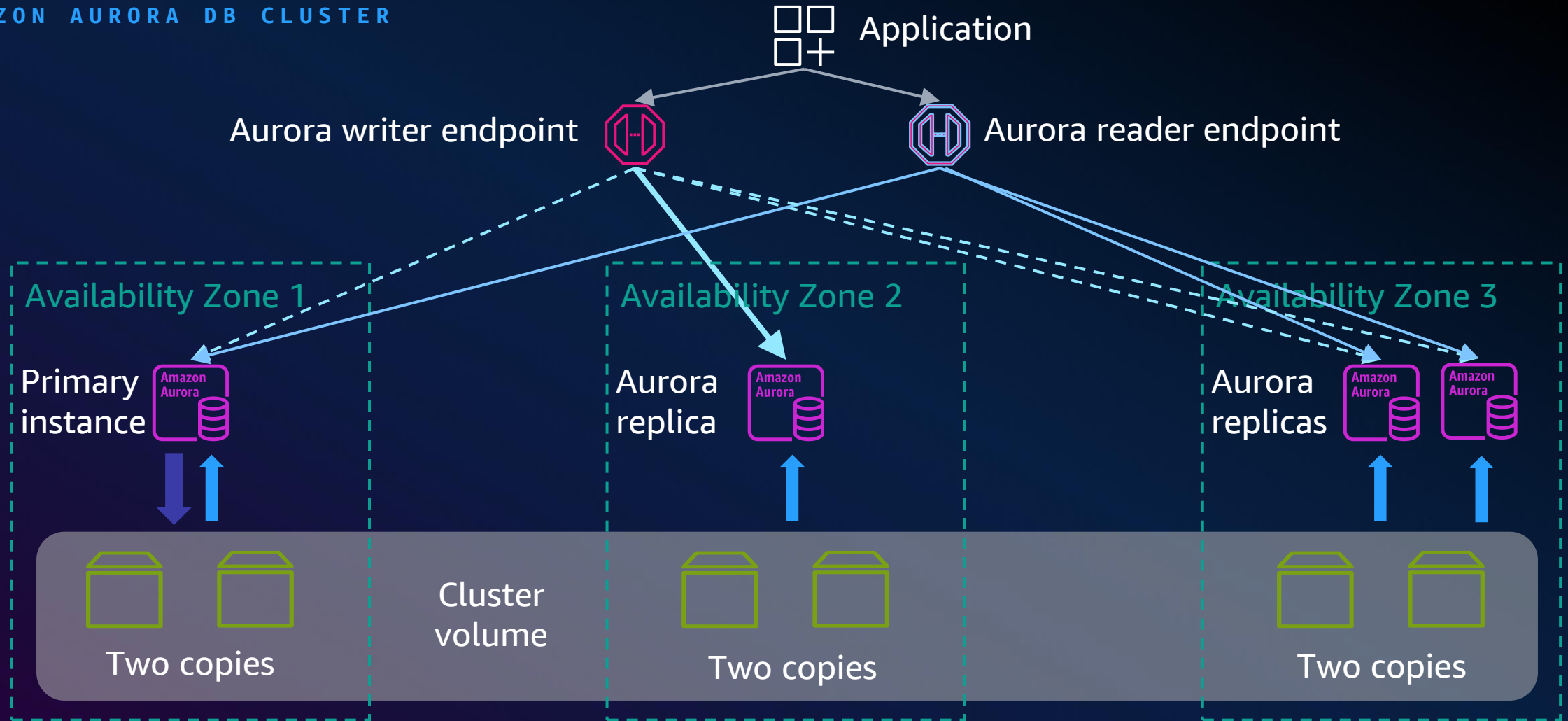
Supported engines
MySQL, PostgreSQL



<https://docs.aws.amazon.com/AmazonRDS/latest/UserGuide/create-multi-az-db-cluster.html>

Aurora high availability

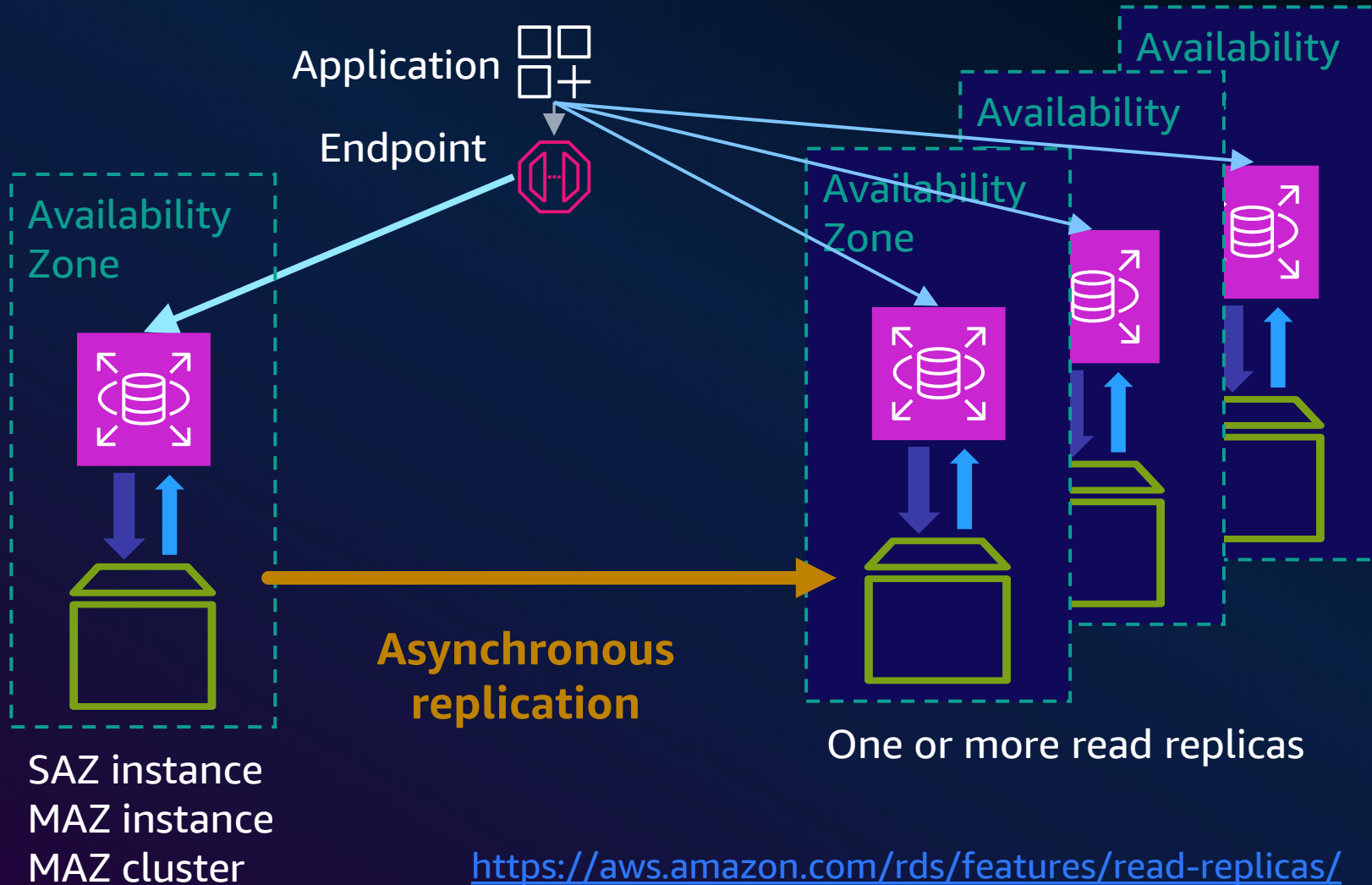
AMAZON AURORA DB CLUSTER



<https://docs.aws.amazon.com/AmazonRDS/latest/AuroraUserGuide/Aurora.Overview.StorageReliability.html>

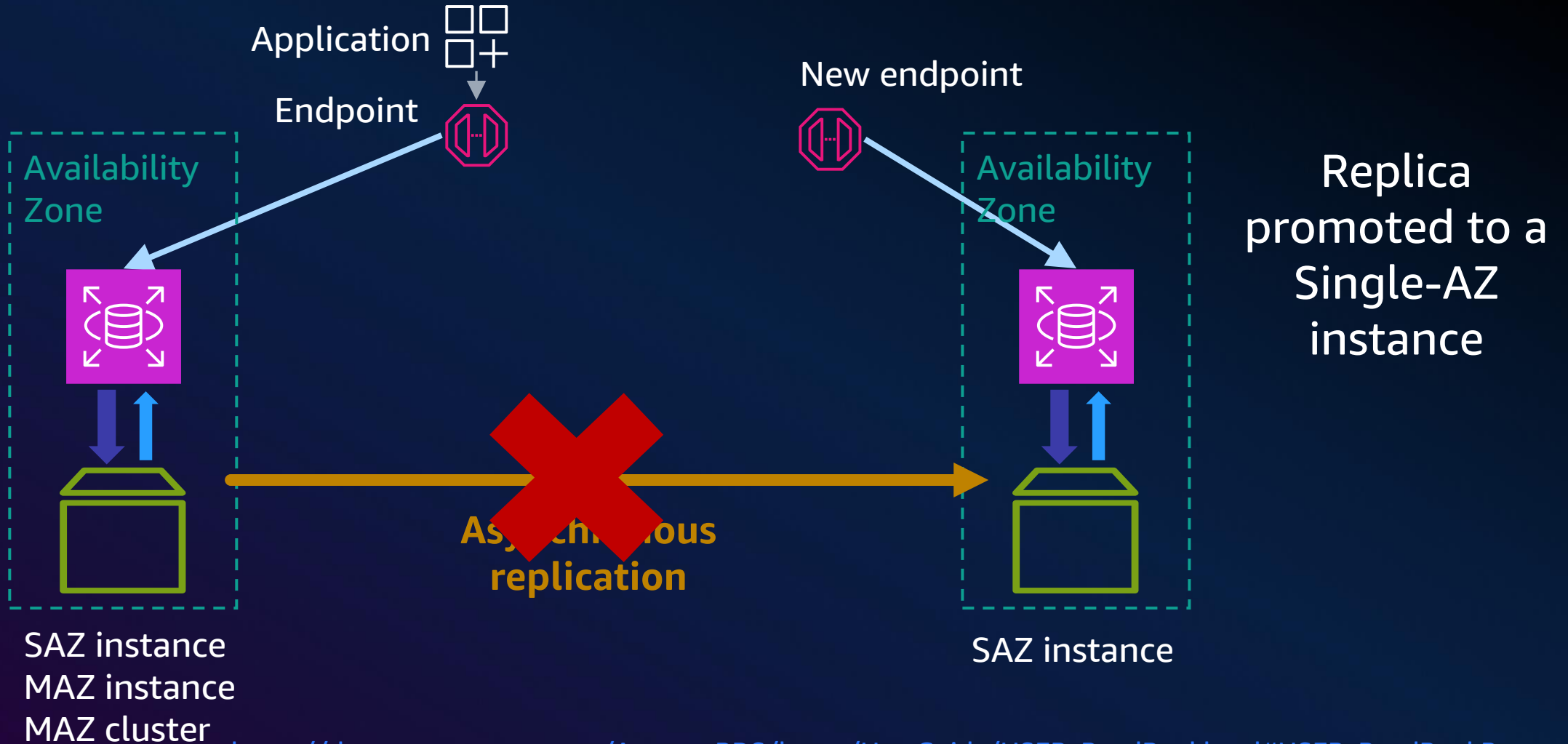
Amazon RDS read scaling and cloning

RDS read scaling



RDS cloning

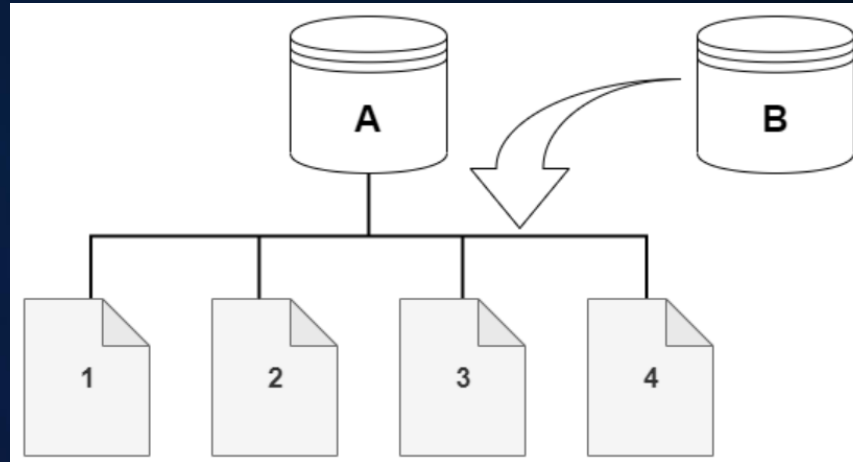
PROMOTION TO SINGLE-AZ INSTANCE



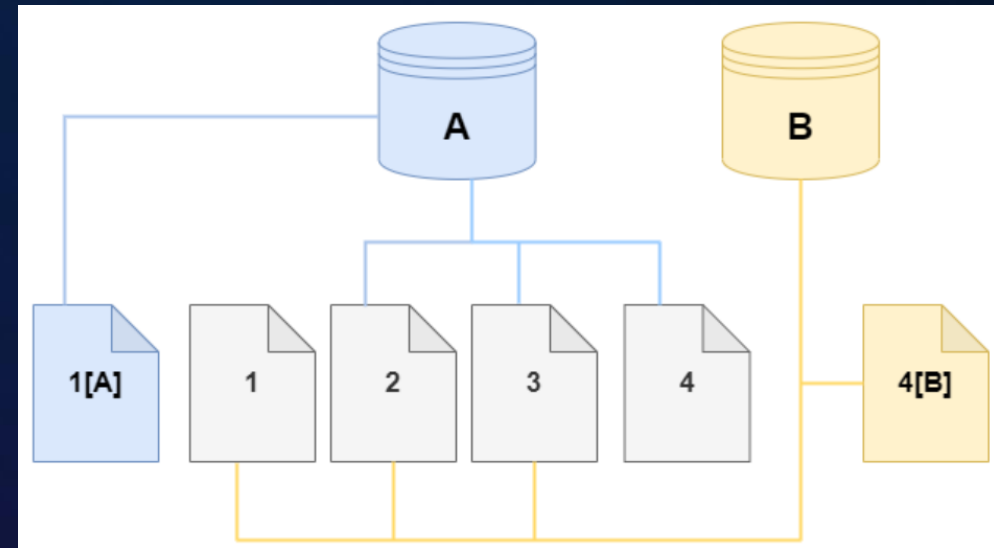
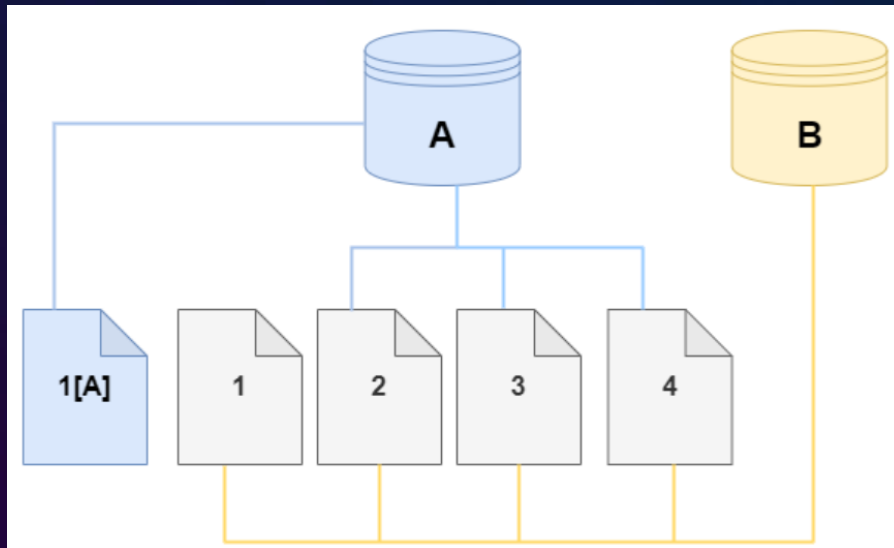
https://docs.aws.amazon.com/AmazonRDS/latest/UserGuide/USER_ReadRepl.html#USER_ReadRepl.Promote

Aurora cloning

COPY-ON-WRITE PROTOCOL



A new cluster is attached to **existing** cluster volume – this operation is practically **instantaneous** and uses **minimal** additional **space**



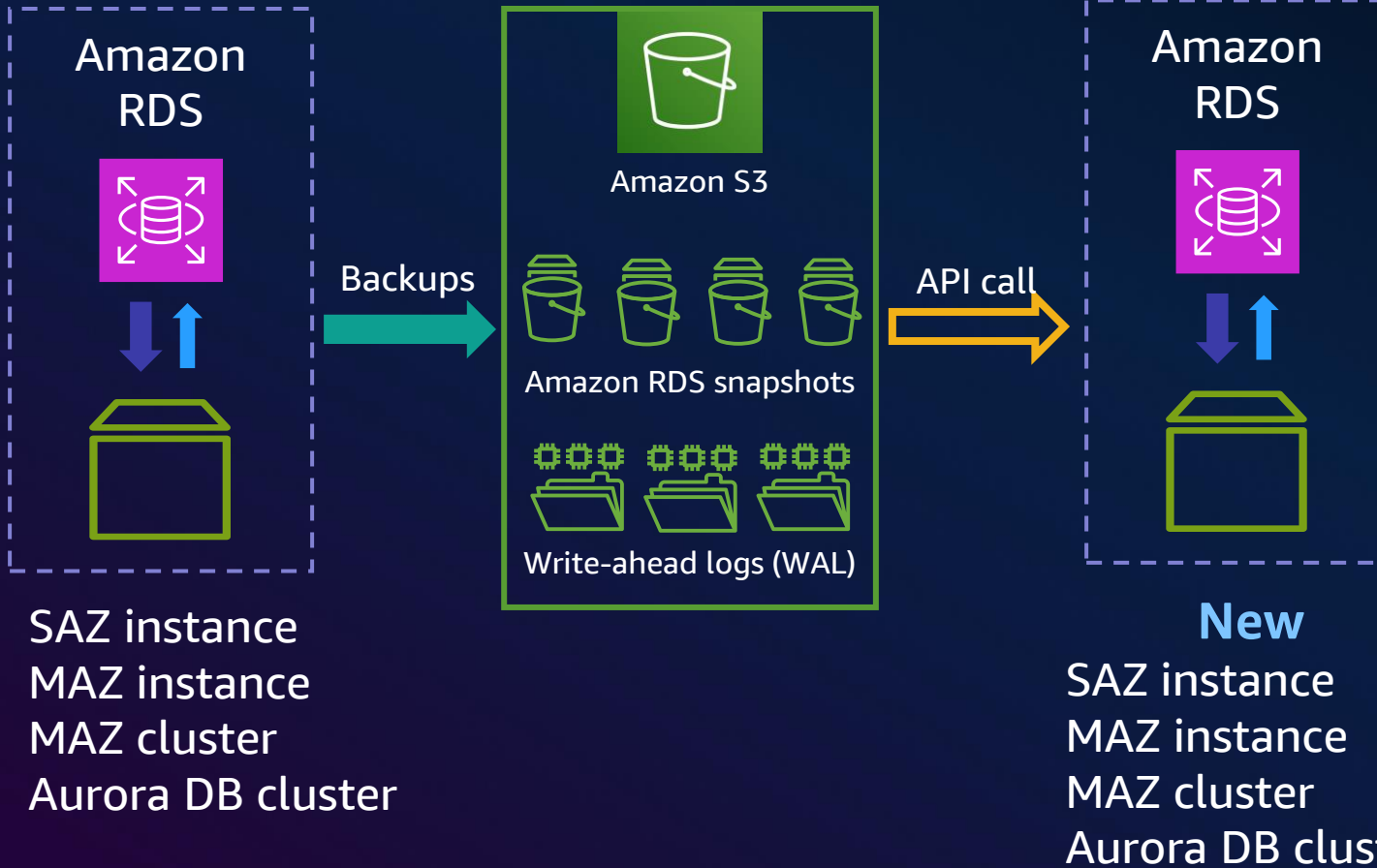
<https://docs.aws.amazon.com/AmazonRDS/latest/AuroraUserGuide/Aurora.Managing.Clone.html>

Amazon RDS disaster recovery



Disaster recovery

DATA CORRUPTION



Backup features:

- Automatic backup retention up to **35 days**
- Manual backup – **unlimited** retention
- Point-in-time recovery (**PITR**)
- **Cross-Region** backup replication
- Centralized solution using **AWS Backup**

https://docs.aws.amazon.com/AmazonRDS/latest/UserGuide/CHAP_CommonTasks.BackupRestore.html
<https://docs.aws.amazon.com/AmazonRDS/latest/AuroraUserGuide/BackupRestoreAurora.html>

Disaster recovery

HARDWARE FAILURE

Instance failure

- ✓ Restore backup
- ✓ MAZ Instance
- ✓ MAZ Cluster
- ✓ Aurora Cluster

Availability Zone failure

- ✓ Restore backup
- ✓ MAZ instance
- ✓ MAZ cluster
- ✓ Aurora cluster

Region failure

- ✓ Restore cross-Region backup replica (DB2, MariaDB, MySQL, Oracle, PostgreSQL, Microsoft SQL Server, Aurora)
- ✓ Promote cross-Region RDS replica (MariaDB, MySQL, Oracle, PostgreSQL, Microsoft SQL Server)
- ✓ Promote Aurora global database replica (MySQL, PostgreSQL)

https://docs.aws.amazon.com/AmazonRDS/latest/UserGuide/Concepts.RDS_Fea_Regions_DB-eng.Feature.CrossRegionAutomatedBackups.html

https://docs.aws.amazon.com/AmazonRDS/latest/UserGuide/Concepts.RDS_Fea_Regions_DB-eng.Feature.CrossRegionReadReplicas.html

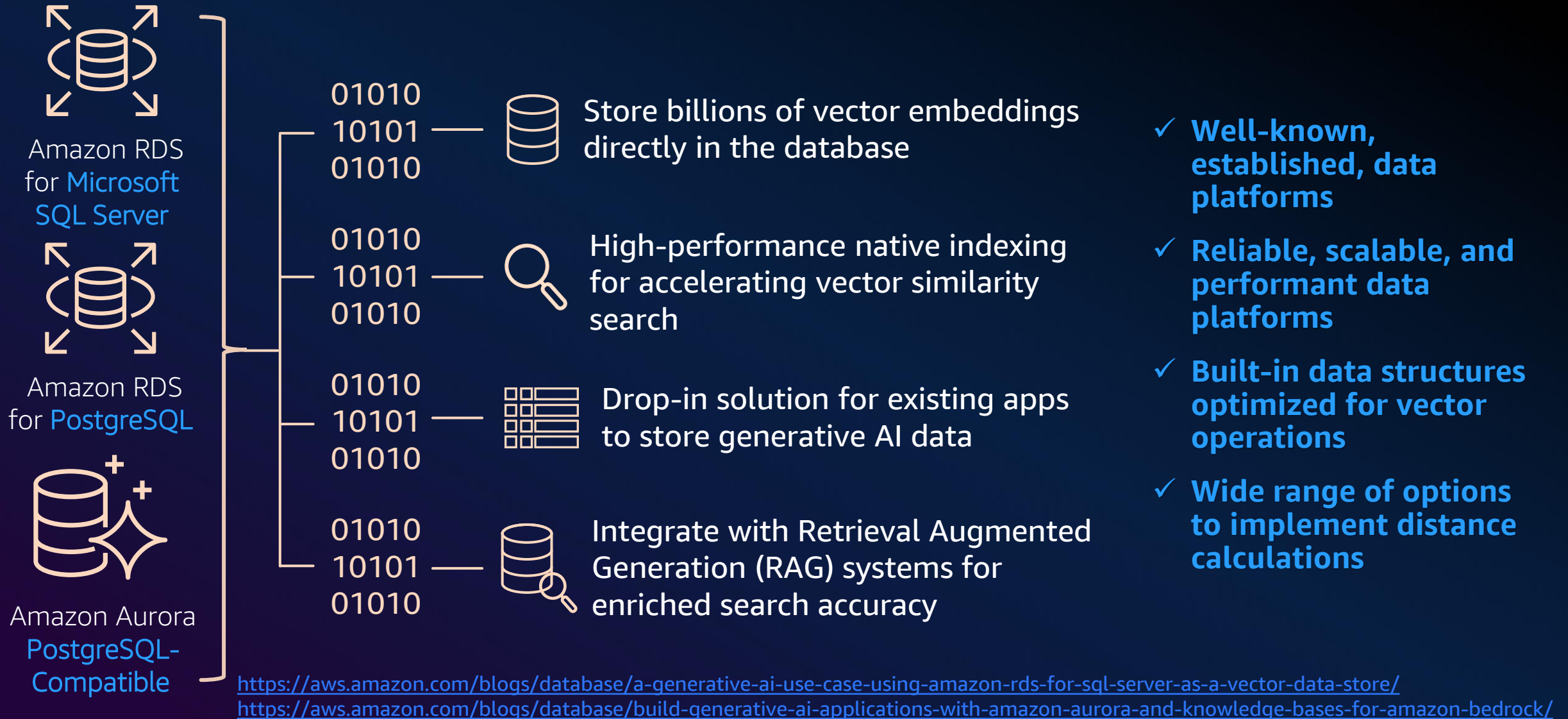
<https://docs.aws.amazon.com/AmazonRDS/latest/AuroraUserGuide/aurora-global-database.html>



Amazon RDS and AI/ML



Amazon RDS – Modern RAG platform for LLMs



Amazon Q Developer

```
-- Create Student table with StudentID as guid with default value as newid() with first-name,  
-- last-name, email, and phone as required fields  
CREATE TABLE Student (  
    StudentID uniqueidentifier DEFAULT NEWID() PRIMARY KEY,  
    FirstName varchar(50) NOT NULL,  
    LastName varchar(50) NOT NULL,  
    Email varchar(100) NOT NULL,  
    Phone varchar(20) NOT NULL  
);
```

Amazon Q Developer

```
-- Create Student table with StudentID as guid with default value as newid() with first-name,  
-- last-name, email, and phone as required fields  
CREATE TABLE Student (  
    StudentID uniqueidentifier DEFAULT newid() PRIMARY KEY,  
    FirstName varchar(50) NOT NULL,  
    LastName varchar(50) NOT NULL,  
    Email varchar(100) NOT NULL,  
    Phone varchar(20) NOT NULL  
);  
  
-- Create Course table with CourseID as guid with default value as newid() with name,  
-- description, and credits as required fields  
CREATE TABLE Course (  
    CourseID uniqueidentifier DEFAULT newid() PRIMARY KEY,  
    Name varchar(100) NOT NULL,  
    Description varchar(500) NOT NULL,  
    Credits int NOT NULL  
);  
  
-- Create StudentCourse table with StudentID and CourseID as foreign keys  
CREATE TABLE StudentCourse (  
    StudentID uniqueidentifier,  
    CourseID uniqueidentifier,  
    FOREIGN KEY (StudentID) REFERENCES Student(StudentID),  
    FOREIGN KEY (CourseID) REFERENCES Course(CourseID)  
);
```

Migration options



Migrating databases to Amazon RDS and RDS Custom

1

AWS Database Migration Service

Migrate on-premises databases with full load and CDC replication; Combine with AWS Snowball appliance to ship large databases

2

Built-in backup and restore

Create a full backup of your database, upload the database backup to Amazon S3, and restore the database to Amazon RDS

3

Built-in tools

Use tools such as Oracle GoldenGate, Oracle Data Pump, SQL Server replication, Distributed Availability Group (RDS Custom only)

Homogeneous database migration options



AWS DMS homogeneous migrations with built-in tooling

new!

- Customer workflow – serverless, same steps to connect source to target
- Under the hood – transparent, built-in tools for homogeneous migrations
- Benefits – comprehensive functionality, improved performance



RDS for Oracle: Recovery Manager (RMAN) Transportable Tablespaces

new!

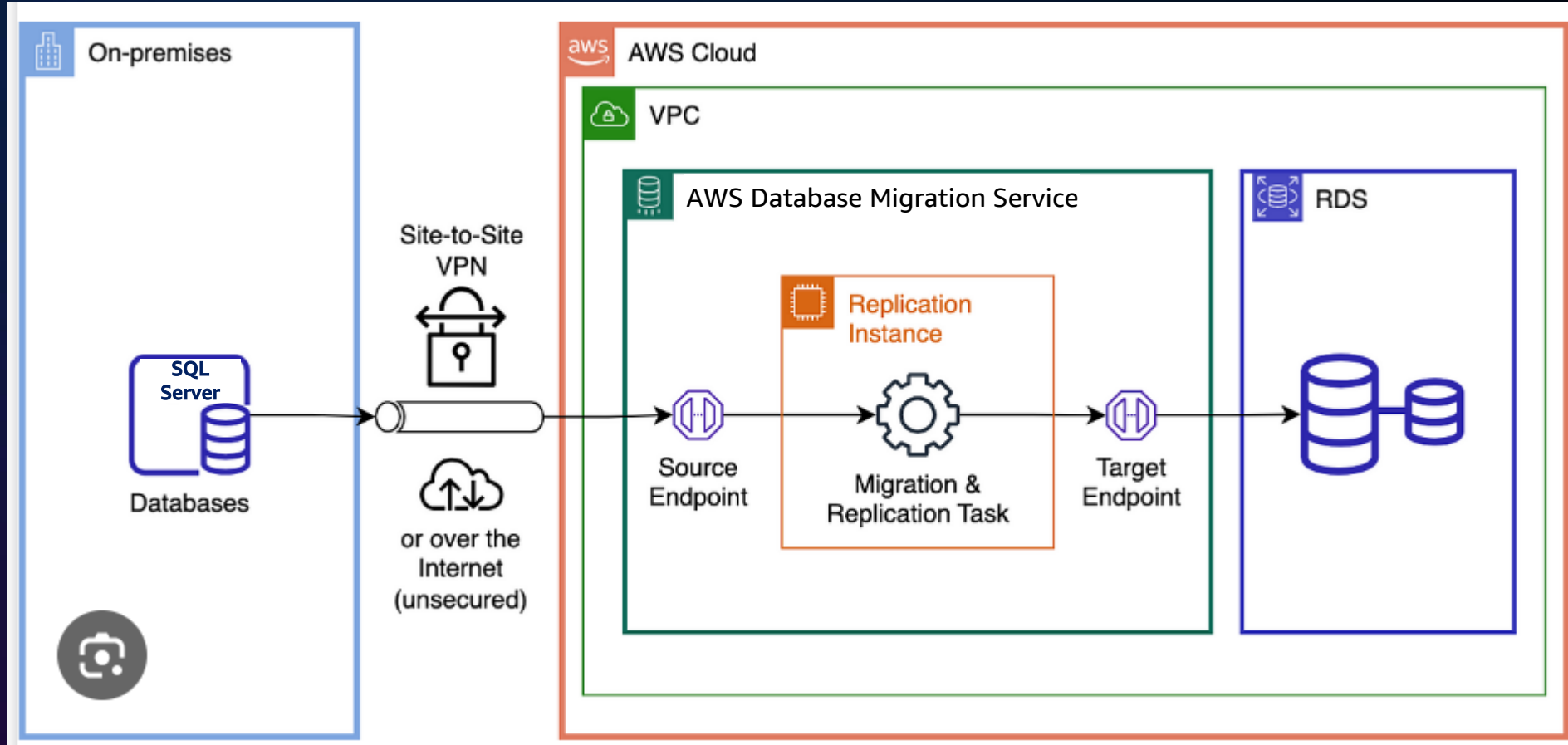
- Incremental backup and restore
- Flexibility to migrate across platforms and endianness types (e.g., Solaris to Linux)
- Available for Oracle Enterprise Edition



RDS for Microsoft SQL Server

- Built-in backup/restore
- AWS Migration Hub Orchestrator
 - Scripted backup/restore/monitoring

AWS Database Migration Service



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