Overview of Amazon RDS Open Source Relational Databases Services and Key Features

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Agenda

- What is Amazon RDS?
- Highly scalable and performant
- Available and durable
- Easy to administer
- Secure and compliant
- On-premises deployments
- Migration options

Amazon Relational Database Service (Amazon RDS)

Set up, operate, and scale a relational database in the cloud with just a few clicks

Amazon Aurora PostgreSQL-Compatible Edition

Amazon Aurora MySQL-Compatible Edition

MySQL

MariaDB

PostgreSQL

Microsoft SQL Server

ORACLE

Easy to administer

Easily deploy and maintain hardware, OS, and DB software, with built-in monitoring

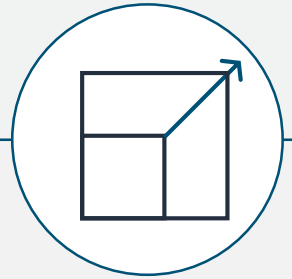
Secure and compliant

Data encryption at rest and in transit, with industry compliance and assurance programs

Available and durable

Automatic Multi-AZ data replication, with automated backup, snapshots, and failover

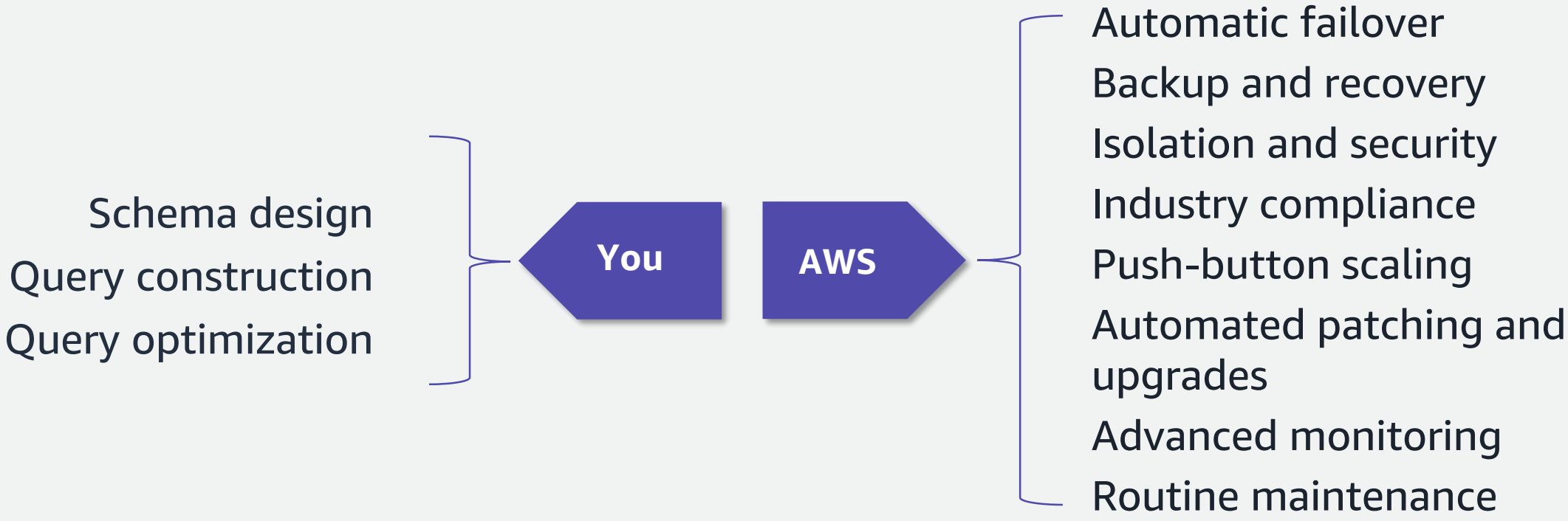
Performant and scalable



Scale compute and storage with a few clicks, plus minimal downtime for your application

Amazon RDS – fully managed

Spend time innovating and building new apps, not managing infrastructure



Amazon RDS Open Source Database Engines

- Amazon RDS supports MySQL 8.0, and 5.7 engine versions
- Support for MySQL storage engines, password validation plugin, binary log, and GTID-based replication

- Amazon RDS supports MariaDB versions 10.6, 10.5, 10.4, 10.3, 10.2
- SQL and JSON functions, optimizer trace feature, and InnoDB enhancements

- Amazon RDS supports PostgreSQL 13, 12, 11, 10, 9.6 engine versions
- Key features like PostGIS, Hstore, JSON data types, pg_stat_statements extension and others

What's new with Amazon RDS Open Source Engines

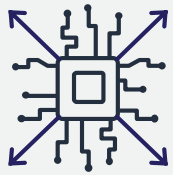
- Windows Functions, CTE, Atomic DDL, Roles, Replication filtering, audit plugin for RDS for MySQL 8.0, and new minor versions (5.7.36 and 8.0.27)

- MariaDB 10.6: MyRocks Storage engine, IAM integration, performance, replication filtering, Oracle PL/SQL compatibility, Atomic DDL and new minor versions (10.5.13, 10.4.22, 10.3.32, 10.2.41)

- PostgreSQL 13: performance and security improvements, new extensions: pg_bigm, automatic partition management with pg_partman, pg_cron, aws_lambda, PostGIS 3.1, and cross-region automated backups

Highly Scalable And Performant

Scale compute and storage with ease



Scale compute to handle increased load

- Up to 96 vCPU and 768 GiB of RAM per instance
- Scale out with read replicas

Scale storage for larger datasets

- Quickly scale EBS storage up to 64 TiB
- No downtime for storage scaling
- Storage Autoscaling

Scale down to control costs

- As little as 1 vCPU/ 1 GiB of RAM

Database server instance types

Burstable Instances T family

- Moderate networking performance
- Good for smaller or variable workloads
- 1 vCPU/1 GB RAM > 8 vCPU 32 GB RAM
- T2.micro is eligible for the AWS Free Tier
- T3 will enable unlimited mode—can burst above baseline for extra charge

General Purpose M family

- High-performance networking
- Good for running CPU-intensive workloads
- 2 vCPU/8 GiB RAM > 96 vCPU 384 GiB RAM

Memory Optimized R family

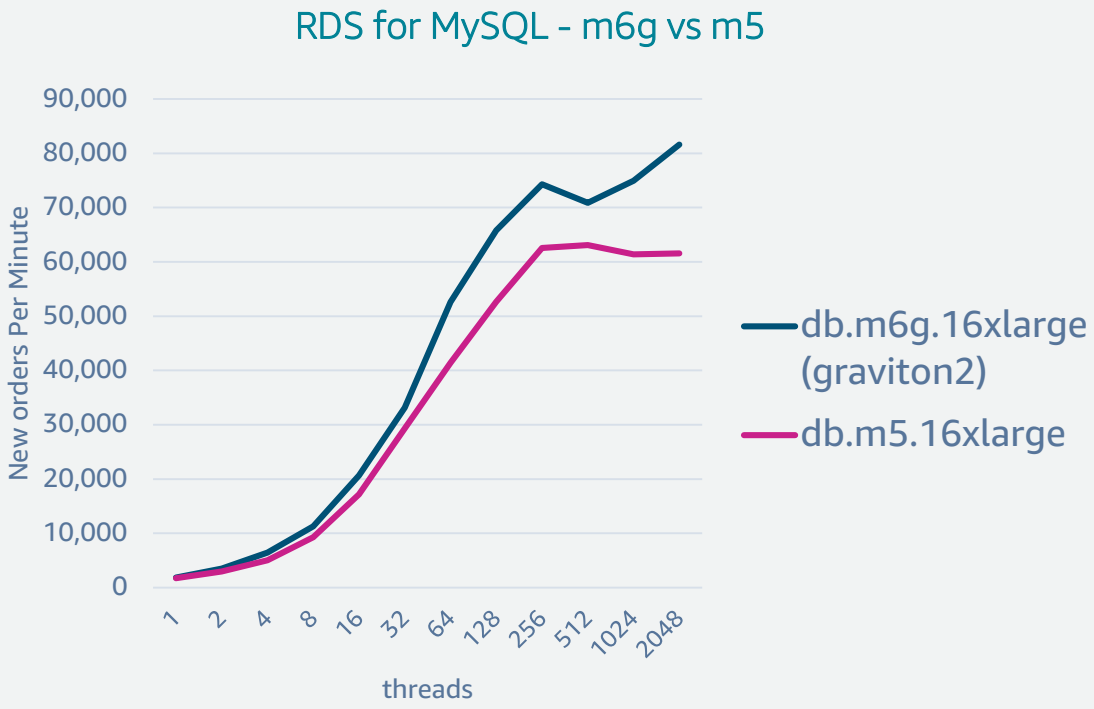
- High-performance networking
- Good for query-intensive workloads or high connection counts
- 2 vCPU/16 GiB RAM > 96 vCPU 768 GiB RAM

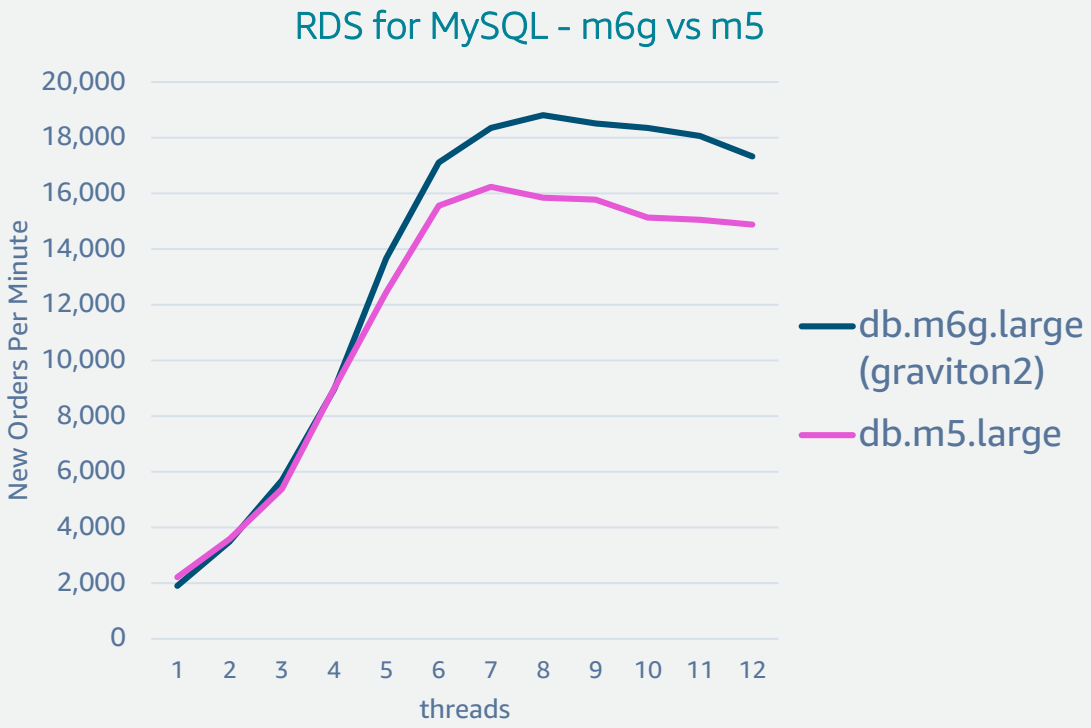
NEW

Graviton2 Instances (t4g, m6g, r6g, x2g)

- Supported with RDS for MySQL, PostgreSQL, and MariaDB
- Fully compatible with all existing Amazon RDS features
- Good for running CPU-intensive workloads
- Deliver better price, high performance networking
- No porting or code changes required when migrating to Graviton2 instances on Amazon RDS

Amazon RDS on Graviton2 processors





Graviton2 instances and write-intensive workloads in RDS for MySQL

High-performance database storage

General purpose (GP2)

- SSD storage
- Auto scale up to 64 TiB
- Latency in milliseconds
- IOPS determined by volume size
- Minimum of 100 IOPS (below 33.33 GiB)
- Bursts to 3,000 IOPS (applicable below 1.3 TiB)
- Baseline of 16,000 IOPS per volume (at 5.34 TiB and above)
- Affordable performance

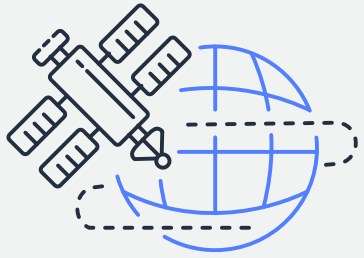
Provisioned IOPS (IO1)

- SSD storage
- Auto scale up to 64 TiB
- Single digit millisecond latencies
- Allocate the desired IOPS to volume
- Maximum of 80 K IOPS
- Delivers within 10% of the IOPS performance, 99.9% of the time
- High performance and consistency

Amazon RDS proxy

RDS for MySQL and RDS for PostgreSQL

- Fully managed, highly available database proxy feature for Amazon RDS
- Pools and shares DB connections to make applications more scalable, more resilient to database failures, and more secure



Pool and share DB connections for improved app scaling

Increase app availability and reduce DB failover times

Manage app data security with DB access controls

Fully managed DB proxy, compatible with your database

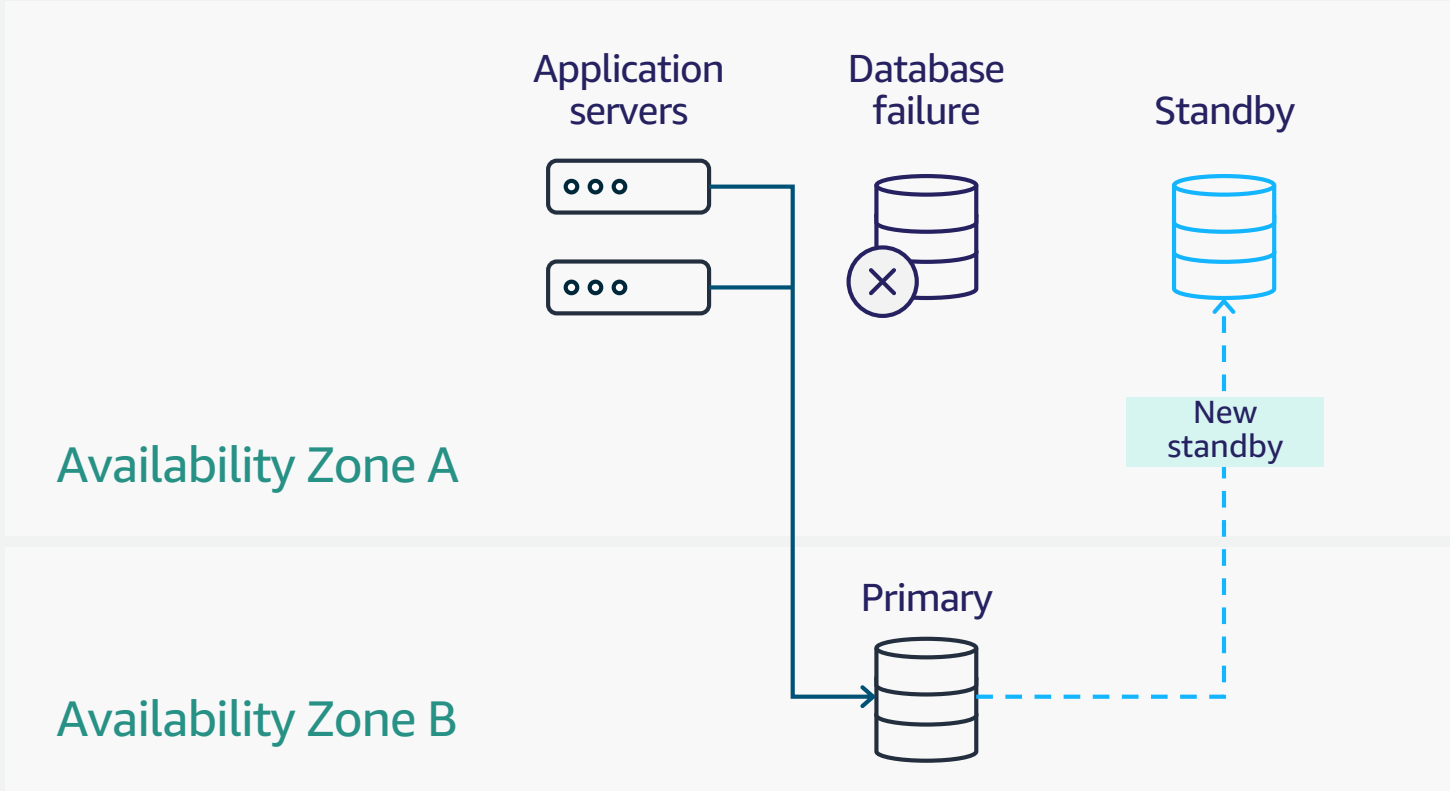
Available And Durable

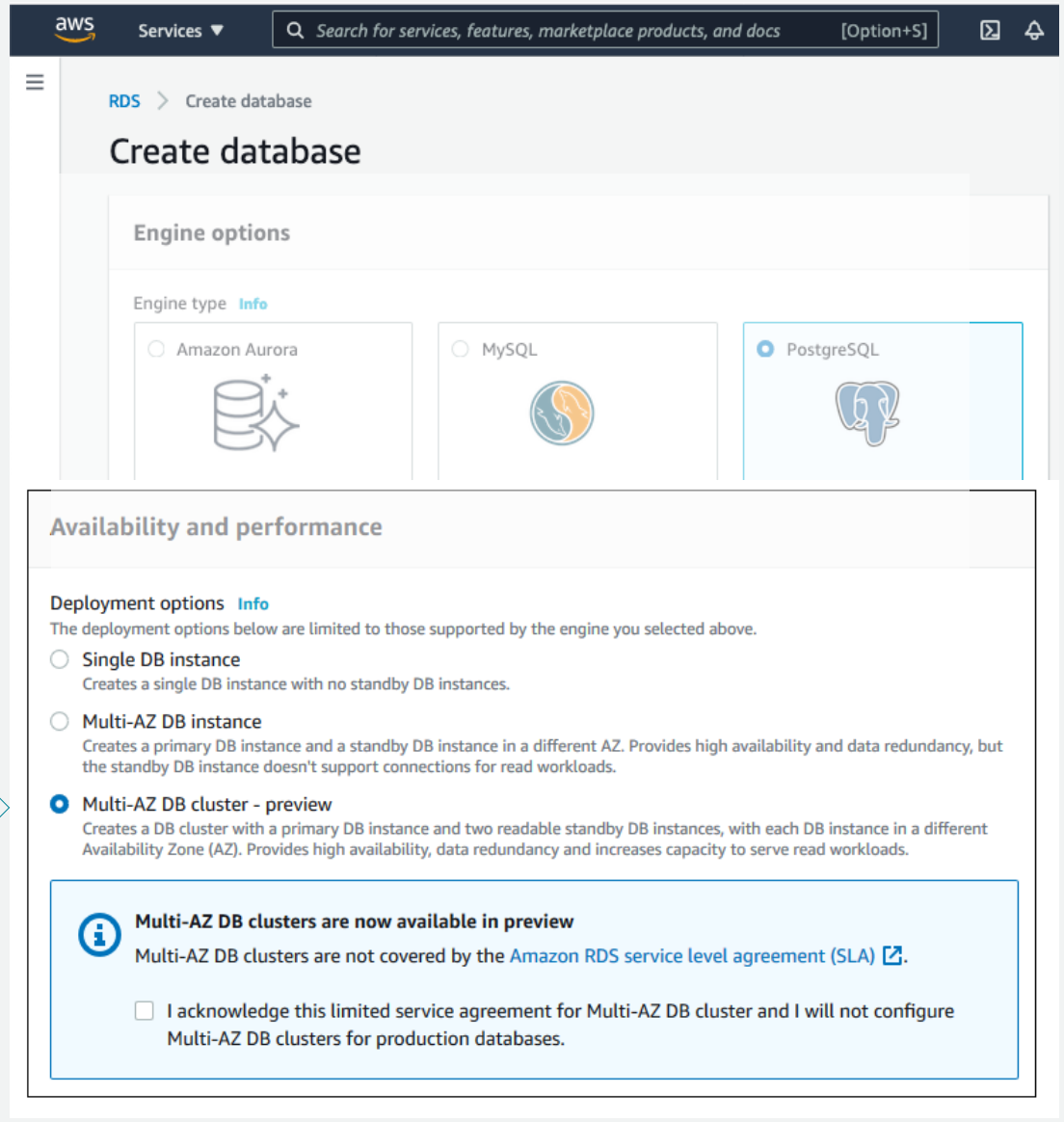
Amazon RDS Multi-AZ deployments

Enterprise-grade high availability

Fault tolerance across multiple data centers

- Automatic failover
- Synchronous replication
- Enabled with one click
- Failover in 1-2 minutes
- 99.95% monthly uptime SLA
- Amazon RDS for MySQL, MariaDB, and PostgreSQL





New deployment option for Amazon RDS Multi-AZ (Preview)

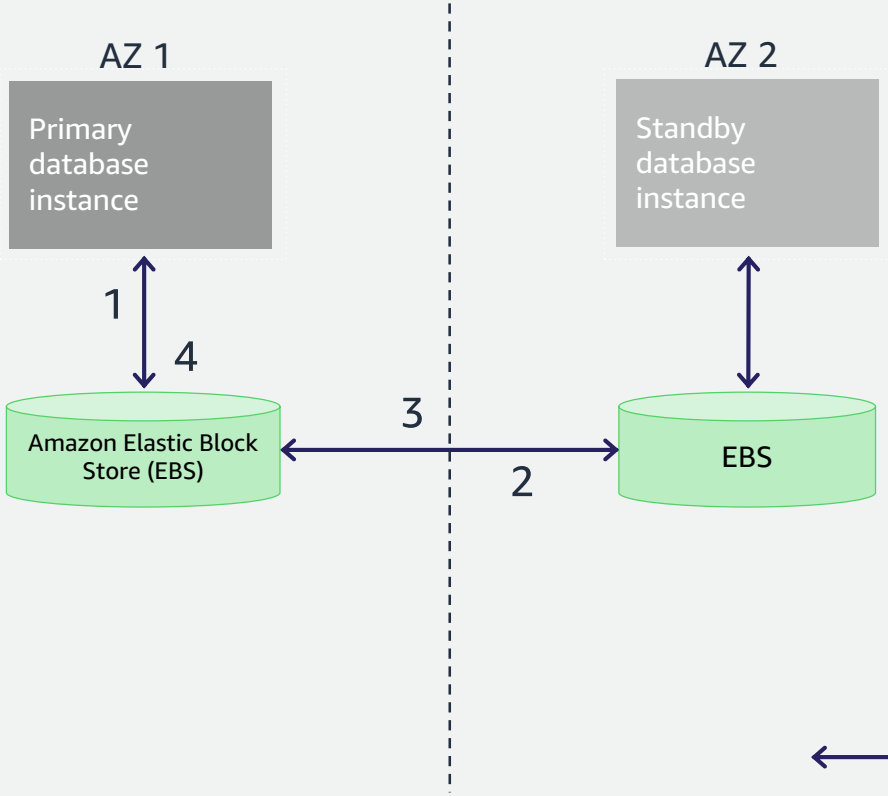
New Multi-AZ deployment option for one primary and two readable standby instances across three AZs

- Additional read capacity
- Automatically configures data replication
- Lower, more consistent latency for write transaction commits
- Shorter failover durations
- Available for Amazon RDS for MySQL and RDS for PostgreSQL

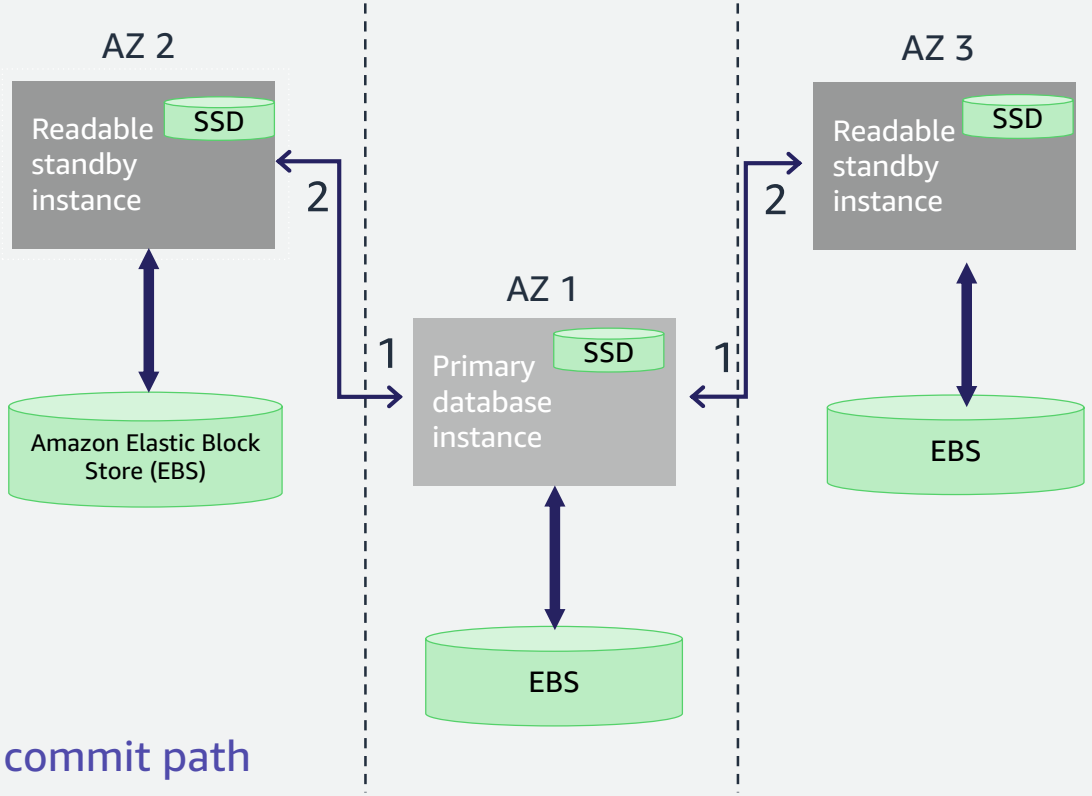
Comparison of Multi-AZ options

NEW

ONE STANDBY



TWO READABLE STANDBYS (preview)



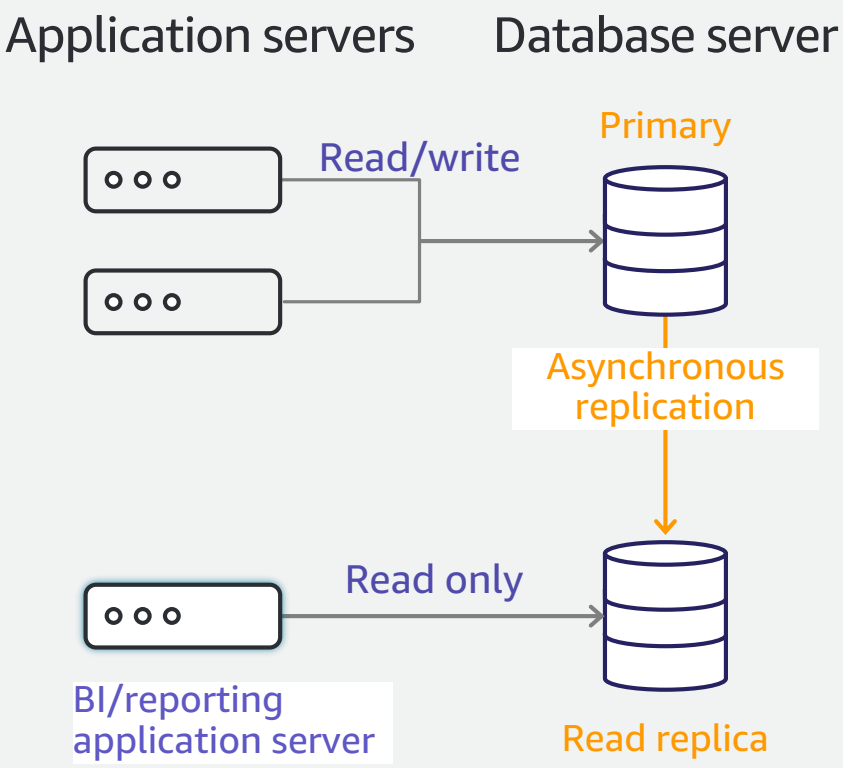
Write commit path

Demo

Amazon RDS Read Replicas

Read scaling and disaster recovery

- Relieve pressure on your primary node with additional read capacity
- Bring data close to your applications in different regions
- Promote a read replica to a primary for faster recovery in the event of disaster
- Create up to five replicas per source database
- Can create replication chains for more replicas



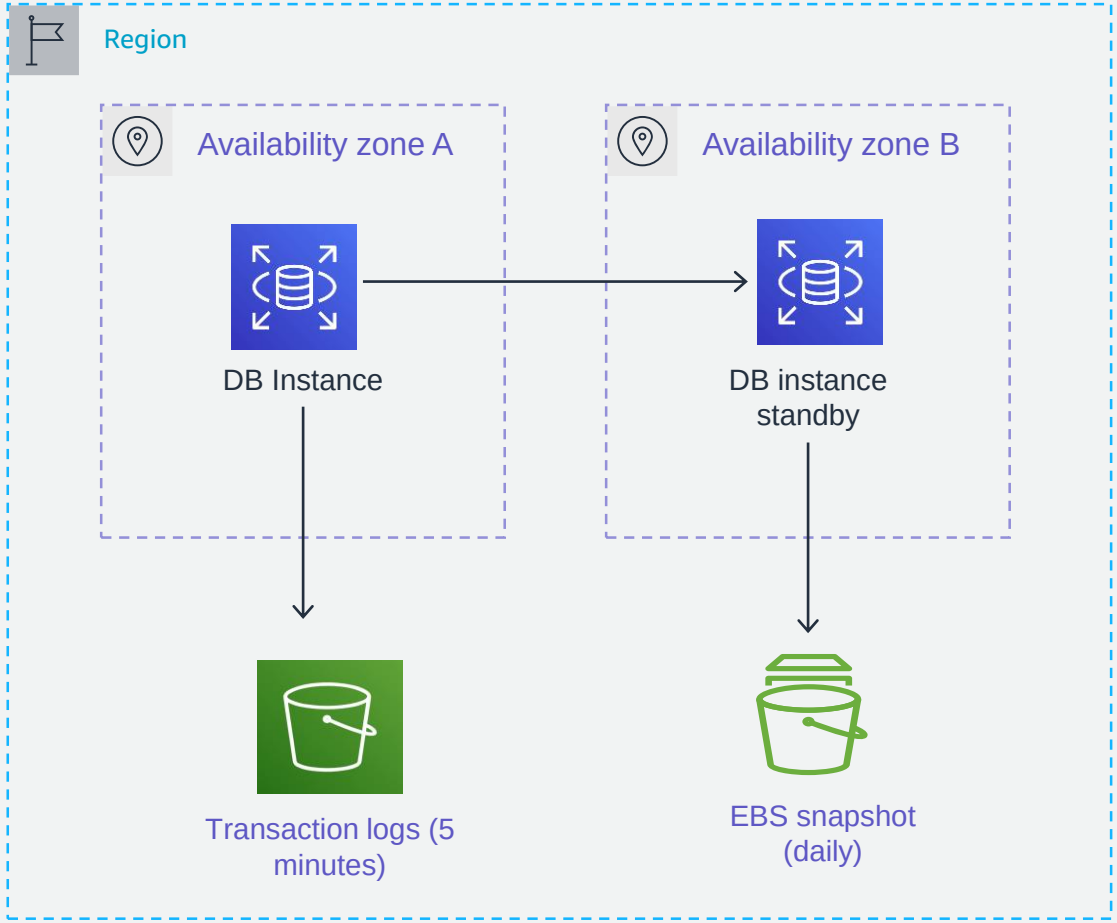
Amazon RDS backups

Automated backups

- Daily snapshot during backup window
- Transaction logs to S3 every 5 minutes
- Retained 1-35 days

Manual backups

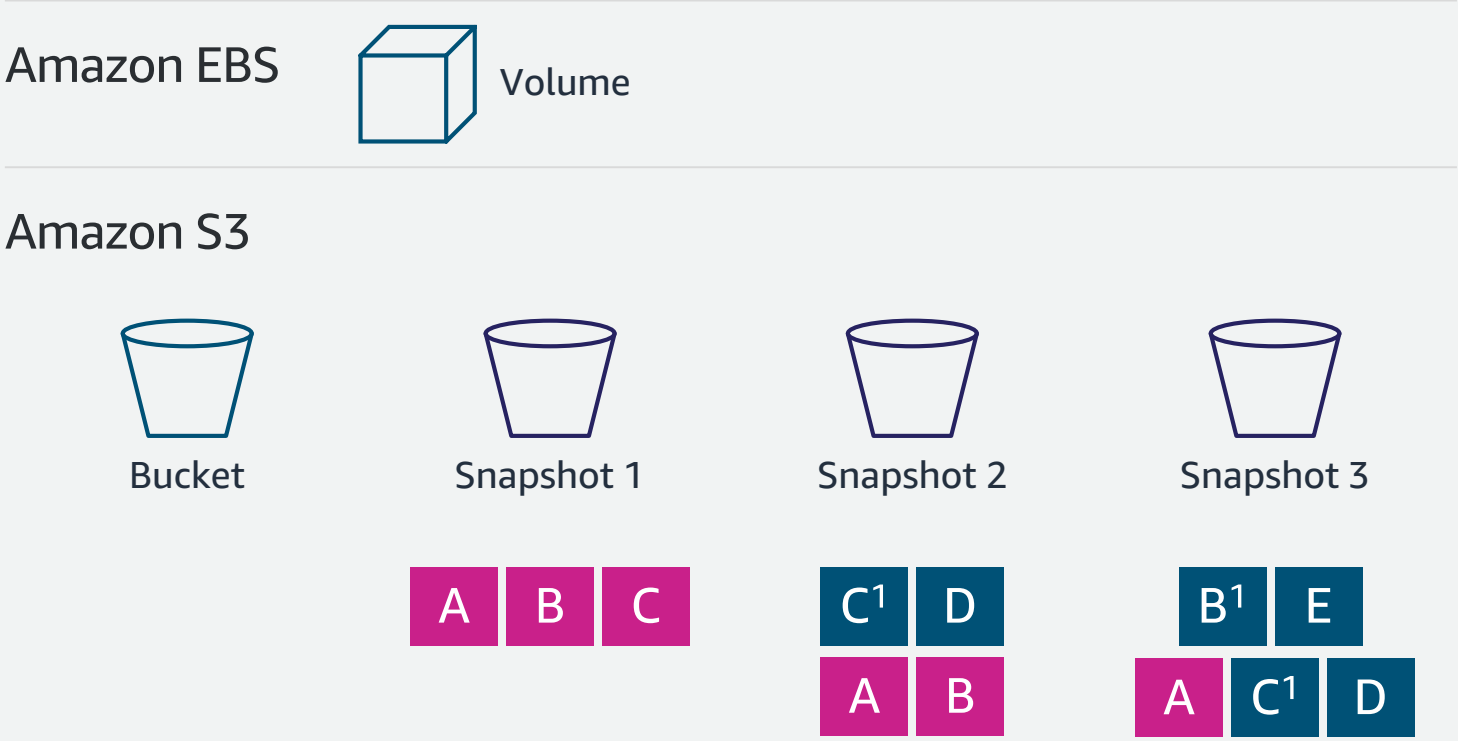
- Take a snapshot any time
- Kept until you delete



Database snapshots

Backups of your entire DB instance on Amazon Simple Storage Service (Amazon S3)

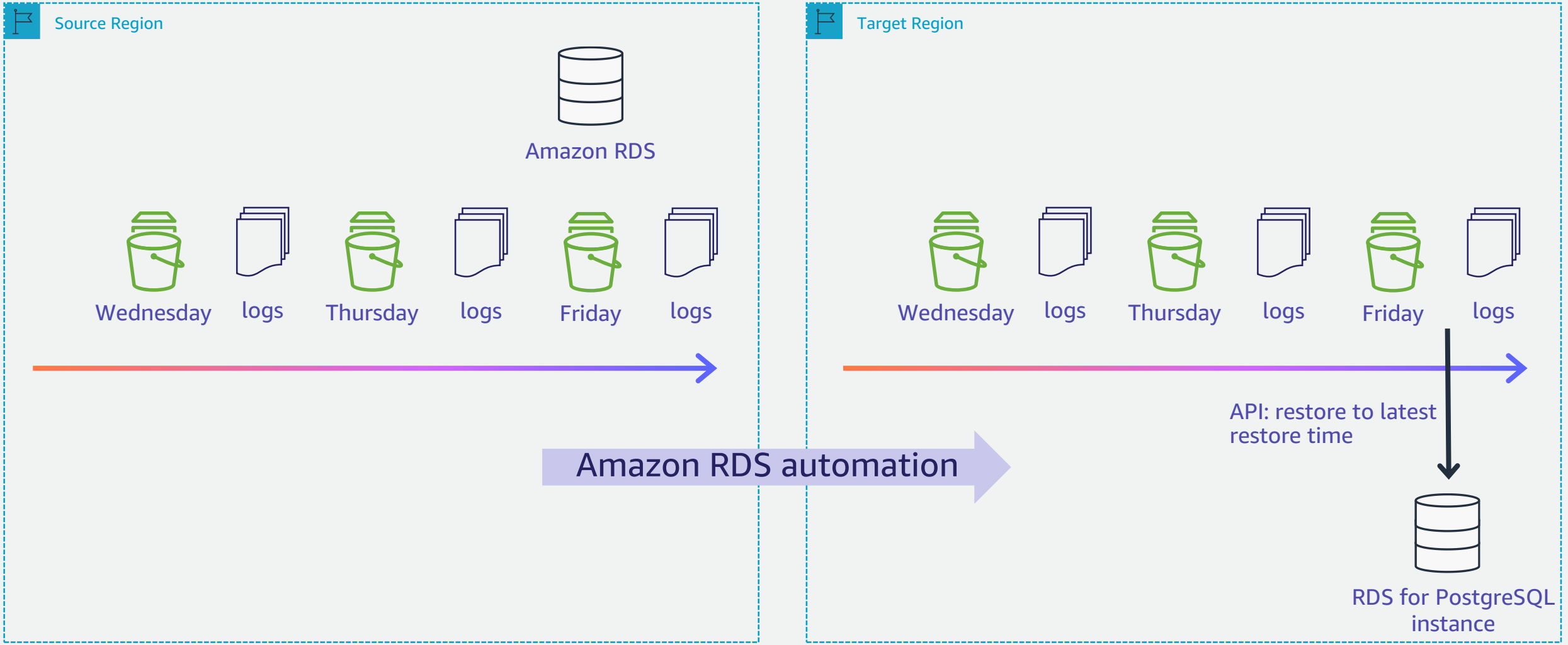
- Always incremental
- Amazon S3 → 99.999999999% durability
- Supports encryption
- Copy across accounts and Regions
- Export snapshot in Apache Parquet format



Amazon RDS cross-Region automated backups

for RDS for PostgreSQL

NEW



A review of HA / DR options on Amazon RDS

Feature	RPO (approximate)	RTO (approximate)
Multi-AZ for high availability	0	1-2 minutes
Multi-AZ DB cluster with readable standbys	0*	Typically 25-75 seconds
Automated snapshot restore	Hours	<1 hour
Manual snapshot restore	Depends on the time of snapshot	<1 hour
Point-in-time restore	5 Minutes	<1 to several hours
RDS read replica promotion (in-region)	Depends on the replication lag	<5 minutes
RDS read replica promotion (cross-region)	Depends on the replication lag	<5 minutes
Other replica promotion	Minutes to hours	Minutes to hours

Easy To Administer

Easy administration

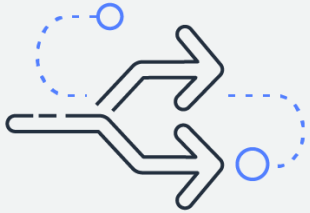
- Single console and API for managing all your relational databases
- Hardware provisioning, patching, backup/restore, scaling, and high availability with a few clicks
- Security and monitoring is built in

Monitoring Amazon RDS databases

Instance

Amazon CloudWatch

- CPU/Memory/IOPS/ Network
- Per-minute metric storage on CloudWatch



Operating system

Amazon RDS Enhanced Monitoring

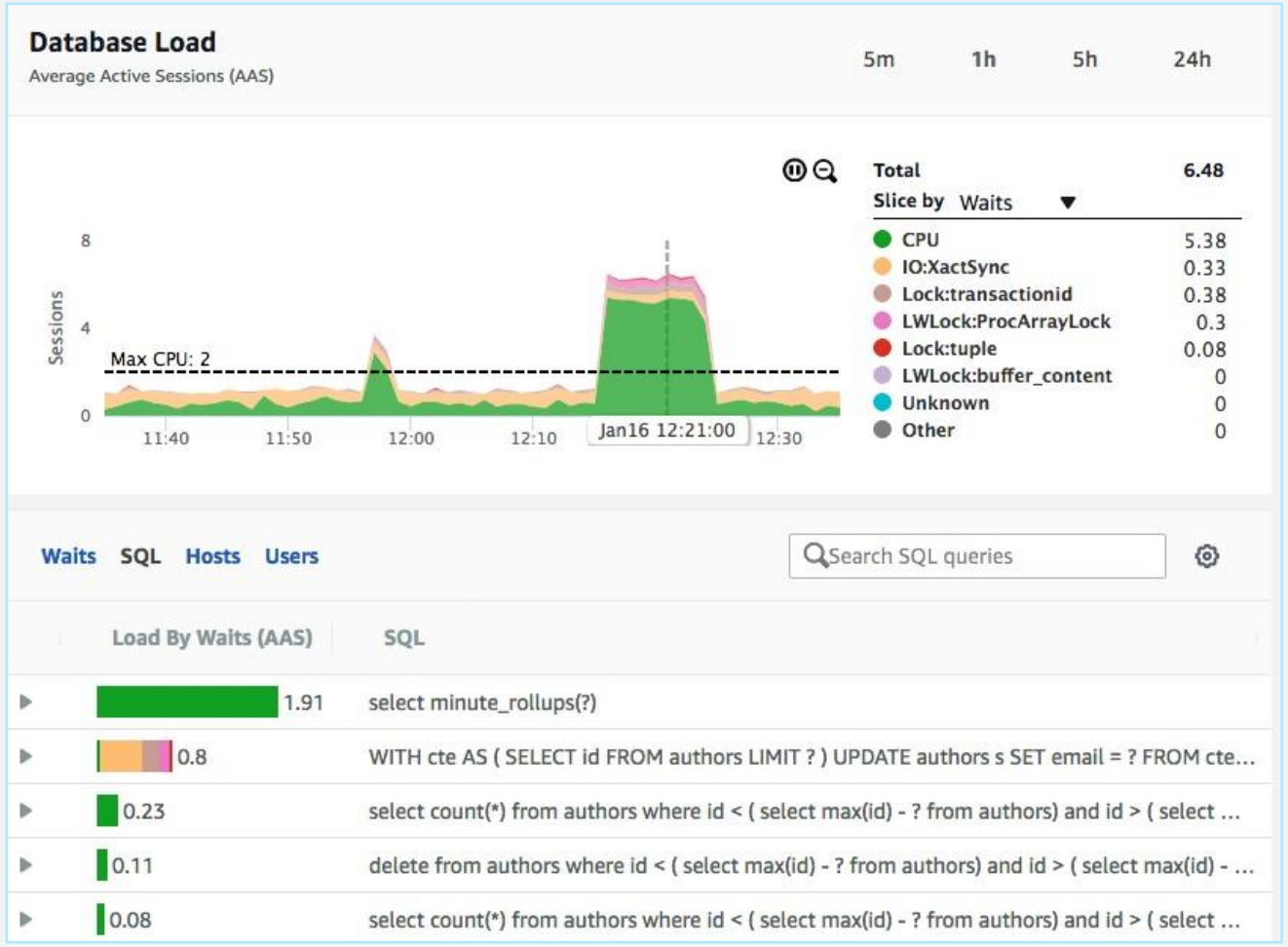
- Process/thread list
- Per-second metric storage on CloudWatch Logs

Database engine

Amazon RDS Performance Insights

- SQL/state/user/host (database load)
- Per-second metric storage on Amazon RDS

Performance Insights increases productivity



Measures database load over time

Easy to identify database bottlenecks

- Top SQL/most-intensive queries

Helps with problem discovery

Adjustable timeframe

- Hour, day, week, and longer

Available for all Amazon RDS database engines

Now supports new API endpoints

- GetResourceMetadata, ListAvailableResourceDimensions, and ListAvailableResourceMetrics

Secure And Compliant

Security and compliance

Network security

- Amazon VPC security groups act as a virtual firewall to control inbound and outbound traffic

Resource access permissions

- AWS Identity and Access Management (IAM) provides resource-level role permission controls

Data encryption

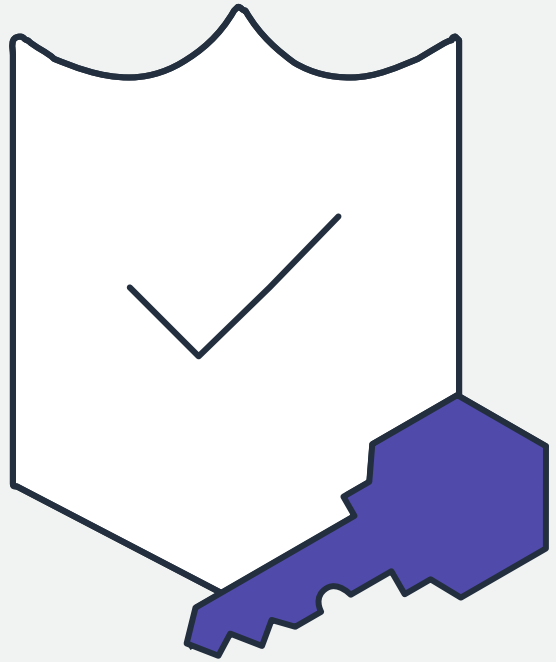
- Encryption at rest using AWS KMS
- SSL protection for data in transit

Compliance and assurance programs for finance, healthcare, government, and more

- HIPAA eligibility under a Business Associate Agreement (BAA) with AWS

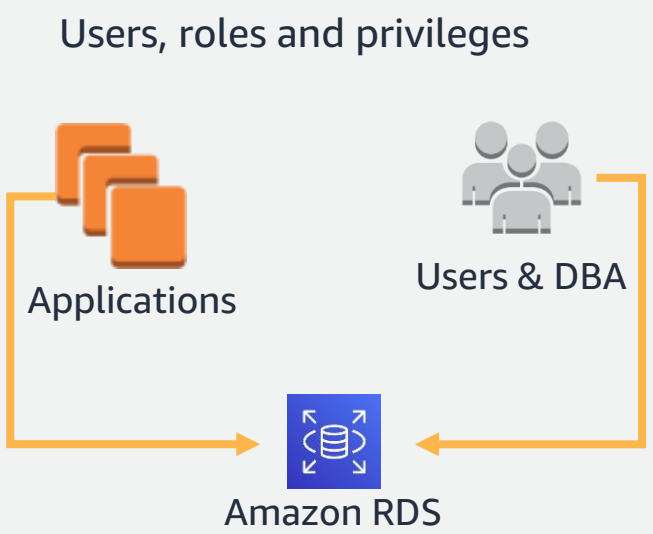
Active Directory/Kerberos integration

- Amazon RDS for PostgreSQL



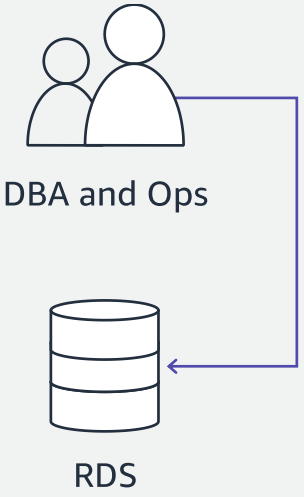
Amazon RDS Access Control at a Glance

Access control at DB level



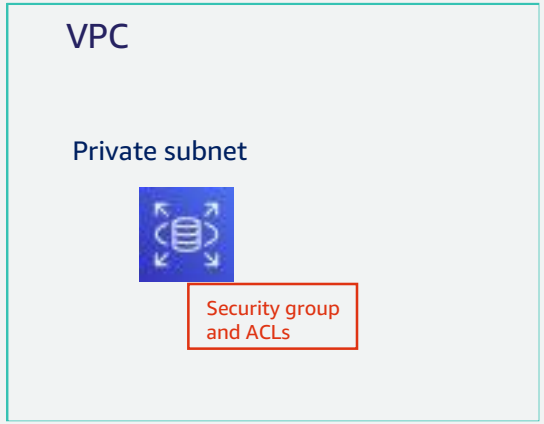
Schema/object level privileges
Enforces password policies

Controlled with IAM



Governed access: use IAM to control who can perform actions with Amazon RDS

Network Security



Secure network access controlled through Amazon VPC security groups

Database access auditing

Audit logging for an RDS for PostgreSQL DB instance

- Provides auditing based on several database parameters
- The pgaudit extension provides detailed session and object audit logging for RDS for PostgreSQL.

Audit logging for an RDS for MySQL and RDS for MariaDB instance

- Capture events, such as connections, disconnections, queries, or tabled queries
- Enable and configure the MariaDB Audit Plugin and push logs to CloudWatch

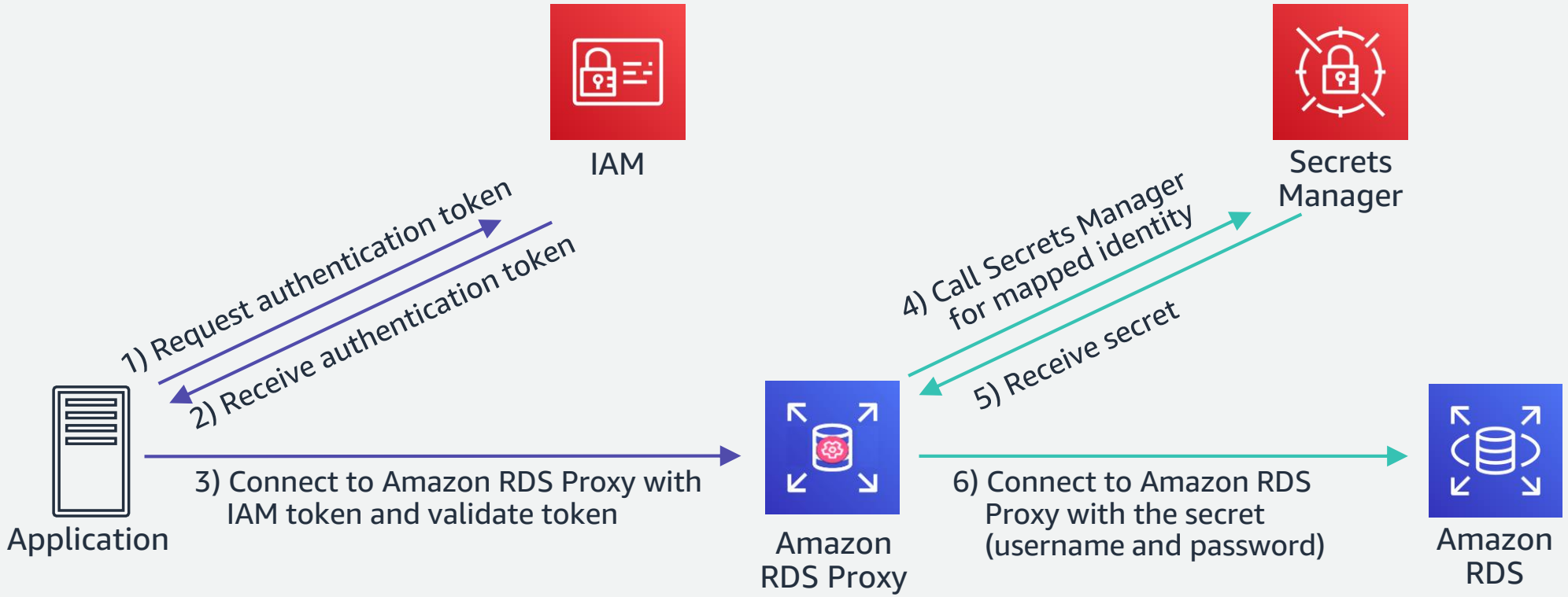
RDS for MySQL 8.0 supports MariaDB Audit Plugin

NEW

- Provides event logging for database activity to help customers with compliance and audit requirements and troubleshoot application issues

Improved application security

Centrally manage database credentials using AWS Secrets Manager



On-premises Deployments

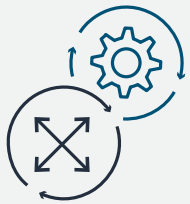
New Amazon RDS on AWS Outposts

Deploy managed databases in on-premises Outposts environments

MySQL® PostgreSQL

Easy to administer

Easily provision and operate on-premises DBs, plus automated patching and upgrades, and built-in monitoring



Performant and scalable

Scale compute and storage with a few clicks, plus near real-time data access for latency-sensitive applications

Available and durable

Health monitoring detects and recovers unhealthy instances, plus automated backup, snapshots, and restore

Unified interface

Use the same familiar AWS Management Console, CLI, and APIs to manage databases on premises and in the cloud

Migration Options

MySQL migration options at a glance

1

Physical Restore from Backups

Physical migration
+ logical replication
Tools: Percona XtraBackup (MySQL only)

2

Logical Export and Import

Using native or ecosystem tools
+ logical replication
Tools: mysqldump, mydumper/myloader

Homogenous Only

3

AWS Database Migration Service

Using AWS DMS and SCT for conversion and data migration

Heterogeneous Homogenous

PostgreSQL migration options at a glance

1

Logical Dump

pg_dump/pg_restore

2

Logical Replication

Native logical replication/pglogical

Homogenous Only

3

AWS Database Migration Service

Using AWS DMS and SCT for conversion and data migration

Heterogeneous Homogenous

Thank you!