ADB206

# What's new in Amazon RDS

Kevin Jernigan
Principal Product Manager, RDS and Aurora
Amazon Web Services

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# Agenda

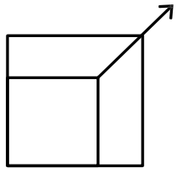
- Configuring your database instance in Amazon Relational Database Service (Amazon RDS)
- Managing high availability, read replicas, and backups in Amazon RDS
- Monitoring and troubleshooting your Amazon RDS database
- Optimizing costs in Amazon RDS
- Spotlighting new features NEW!

# Amazon RDS: Managed relational database service with a choice of popular database engines

Amazon Aurora · MySQL · PostgreSQL · MariaDB · Microsoft SQL Server · ORACLE

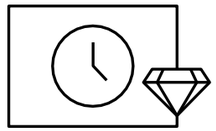
## Easy to administer

Easy deployment and maintenance of hardware, the OS, and DB software; built-in monitoring



## Performant & scalable

Scalable compute and storage with a few clicks; minimal downtime for your application



## Available & durable

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


## Secure & compliant

Data encryption at rest and in transit; industry compliance and assurance programs

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# Configuring your database instance in Amazon RDS

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# Amazon RDS database engines

| Commercial | Open source | Cloud native |
| --- | --- | --- |
| ORACLE<br>Microsoft SQL Server | MariaDB<br>PostgreSQL<br>MySQL | Amazon Aurora<br>MySQL-compatible<br>PostgreSQL-compatible |
| Storage based on Amazon Elastic Block Store (Amazon EBS) | | Aurora storage system |

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# Which database engine version should you use?

MySQL: ~~5.5~~, 5.6, 5.7, 8.0

- **MySQL 8.0:** Windows functions, common table expressions, JSON functions, spatial support, improved performance, crash-safe DDL operations, security roles, TLS 1.2

MariaDB: 10.0, 10.1, 10.2, 10.3

- **MariaDB 10.3:** Oracle compatibility (PL/SQL parser), sequences, INTERSECT and EXCEPT, new ROW type and TYPE OF stored functions, invisible columns, temporal versioned tables, user-defined aggregates, instant ADD COLUMN operations

PostgreSQL: ~~9.3~~, 9.4, 9.5, 9.6, 10, 11 NEW!

- **PostgreSQL 10:** Native table partitioning, improved parallelism in query execution, ICU collation support, column group statistics, enhanced FDW and PLV8 extensions, huge pages enabled by default
- **PostgreSQL 11:** Embedded transactions within a stored procedure, improvements to partitioning, improvements to parallelism, faster addition of columns with a non-null column default

Oracle: 11.2, 12.1, 12.2

- **Oracle 12.2:** New engine versioning scheme—release update (.ru) and release update revision (.rur)

SQL Server: ~~2008 R2~~, 2012, 2014, 2016, 2017

# Which instance type should you choose?

## T family

- Burstable instances
- 1 vCPU, 1 GiB RAM - 8 vCPUs, 32 GiB RAM
- Moderate networking performance

- Is good for small or variable workloads
- You can monitor CPU credit metrics in Amazon CloudWatch
- T2.micro is eligible for the AWS Free Tier
- T3 enables unlimited mode—can burst above baseline for an extra charge NEW!

## M family

- General purpose instances
- 2 vCPUs, 8 GiB RAM - 64 vCPUs, 256 GiB RAM
- High-performance networking

- Is good for running CPU-intensive workloads (such as WordPress)
- M5 offers up to 96 vCPUs NEW!

## R family

- Memory-optimized instances
- 2 vCPUs, 16 GiB RAM - 96 vCPUs, 768 GiB RAM
- High-performance networking

- Is good for query-intensive workloads or high connection counts
- R5 offers up to vCPU, 768 GiB RAM NEW!
- Oracle support is available for X1 and X1e instances and for CPU license optimization

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# Which storage type should you choose?

## General purpose (gp2)

- SSD storage
- Maximum of 64 TiB for Oracle NEW!
- Maximum of 32 TiB for PostgreSQL, MySQL, and MariaDB
- Maximum of 16 TiB for SQL Server
- Leveraging of Amazon EBS elastic volumes
- IOPS that is determined by volume size
- Minimum of 100 IOPS (below 33.33 GiB)
- Bursts of up to 3,000 IOPS (applicable below 1.3 TiB)
- Baseline of 16,000 IOPS per volume (at 5.3 TiB and above)
- Affordable performance

## Provisioned IOPS (io1)

- SSD storage
- Maximum of 64 TiB for Oracle NEW!
- Maximum of 32 TiB for PostgreSQL, MySQL, and MariaDB
- Leveraging of Amazon EBS elastic volumes
- Maximum of 80,000 IOPS (64,000 on SQL Server) NEW!
- Delivery within 10 percent of the IOPS performance 99.9 percent of the time
- High performance and consistency

## Magnetic

- Magnetic storage
- Maximum of 1 TB
- Support for legacy databases

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# Can you run Amazon RDS in your data center?NEW!

- Amazon RDS instances running in vSphere clusters (in preview)
- Use cases
  - Automated management of on-premises databases
  - Hybrid cloud backups and scaling
  - Migration of databases to AWS
- Features
  - Automated management, including provisioning and patching
  - Unified management console
  - Storage and compute scaling
  - Read replicas on premises or in AWS
  - Performance monitoring with vSphere and CloudWatch
  - Simple backup and restore on premises or in AWS
- Supported engines: MySQL, MariaDB, PostgreSQL, SQL Server, Oracle

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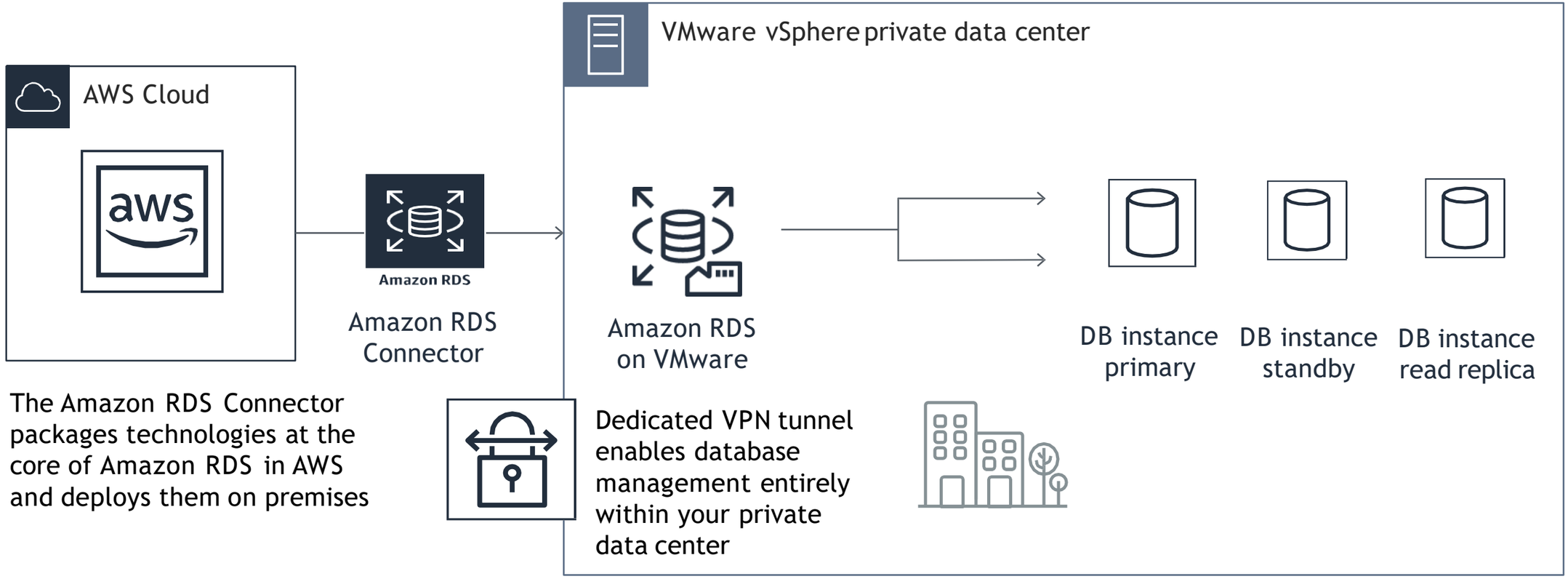
# Amazon RDS on VMware NEW!



# Managing high availability, read replicas, and backups in Amazon RDS

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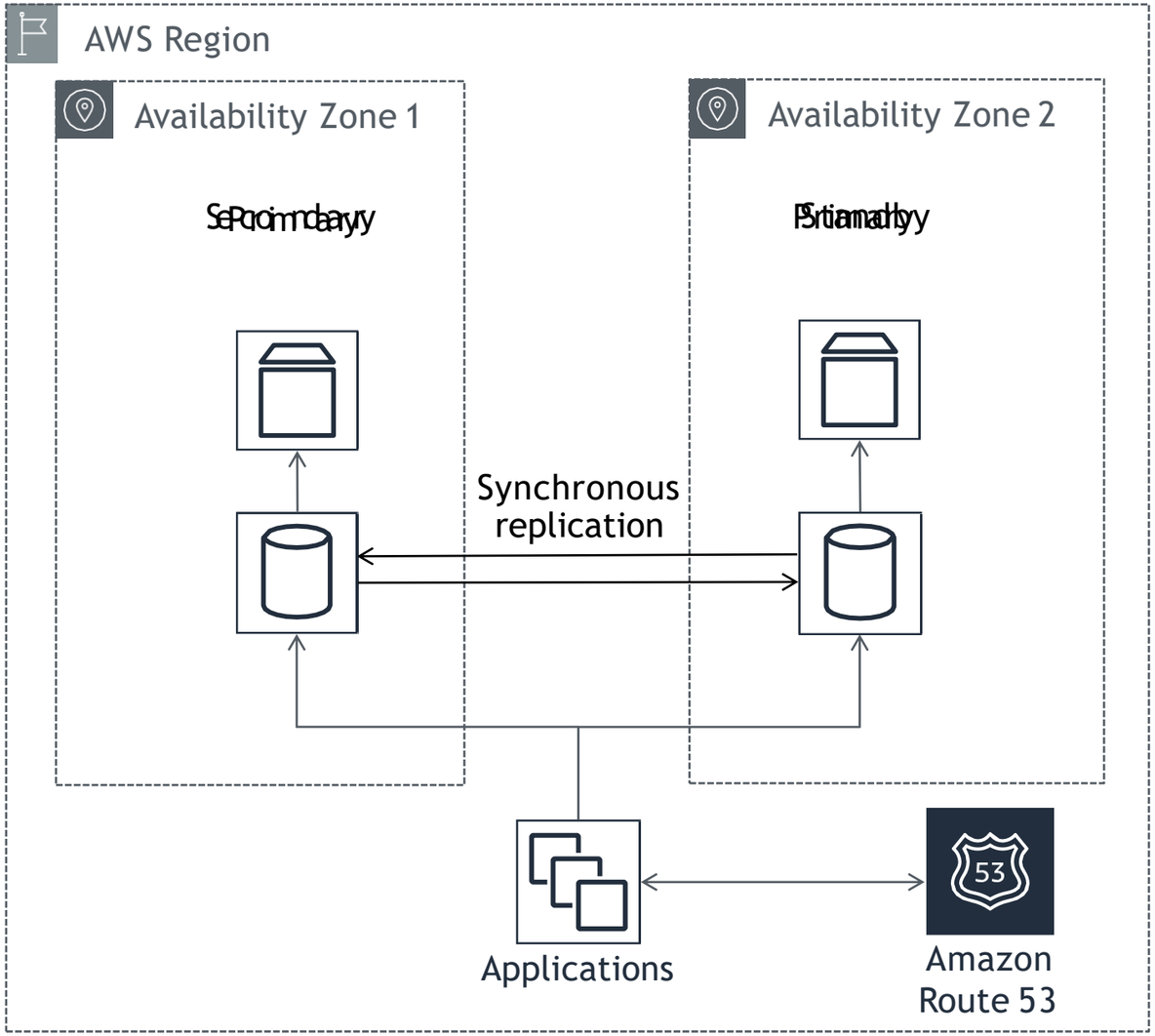
# How do you ensure high availability for your database?

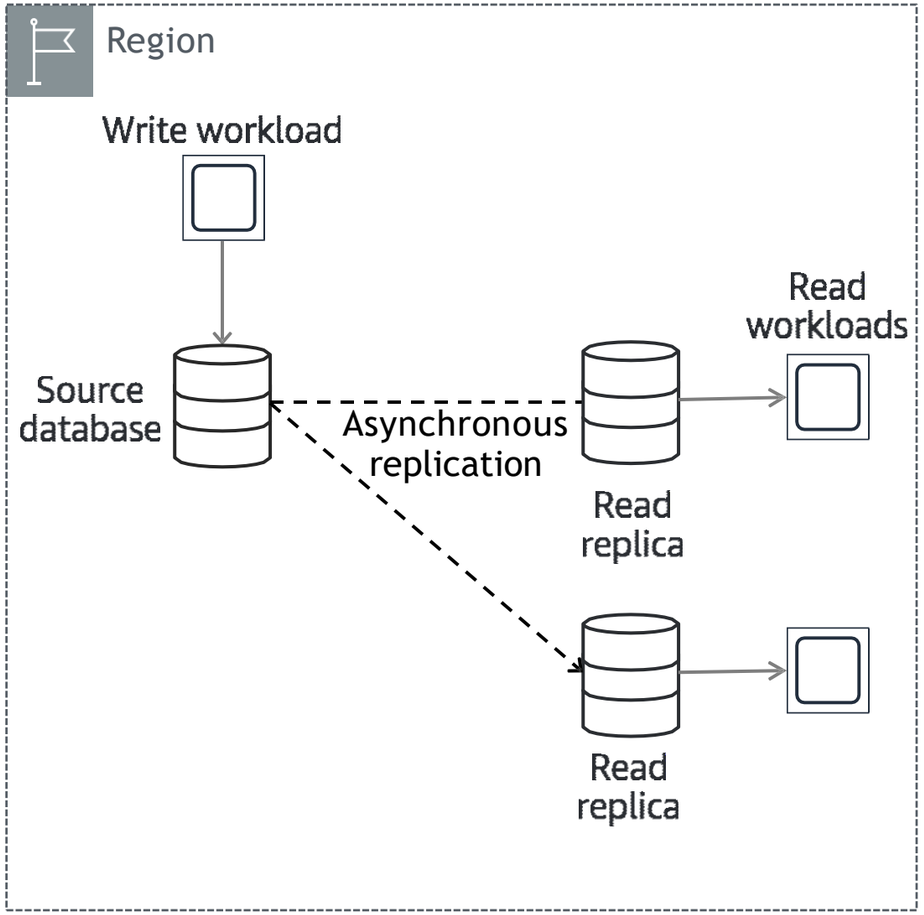
- Multi-AZ configurations provide enterprise-grade fault tolerance solution for production databases
- Each database host manages a set of Amazon EBS volumes with a full copy of the data
- Instances are monitored by an external observer to maintain consensus over quorum
- Failover is initiated by automation or through the Amazon RDS API
- Redirection to the new primary instance is provided through DNS
- This detects infrastructure issues, not database engine problems



# How can you gain read scalability?

- Use Amazon RDS read replicas to relieve pressure on your source database with additional read capacity
- Create up to five replicas per source database
- Monitor replication lag in CloudWatch or Amazon RDS console

- Read replicas are supported for MySQL, MariaDB, and PostgreSQL
- Single-region read replicas for Oracle Enterprise Edition (EE) are available in preview NEW!
- This is coming soon for SQL Server NEW!

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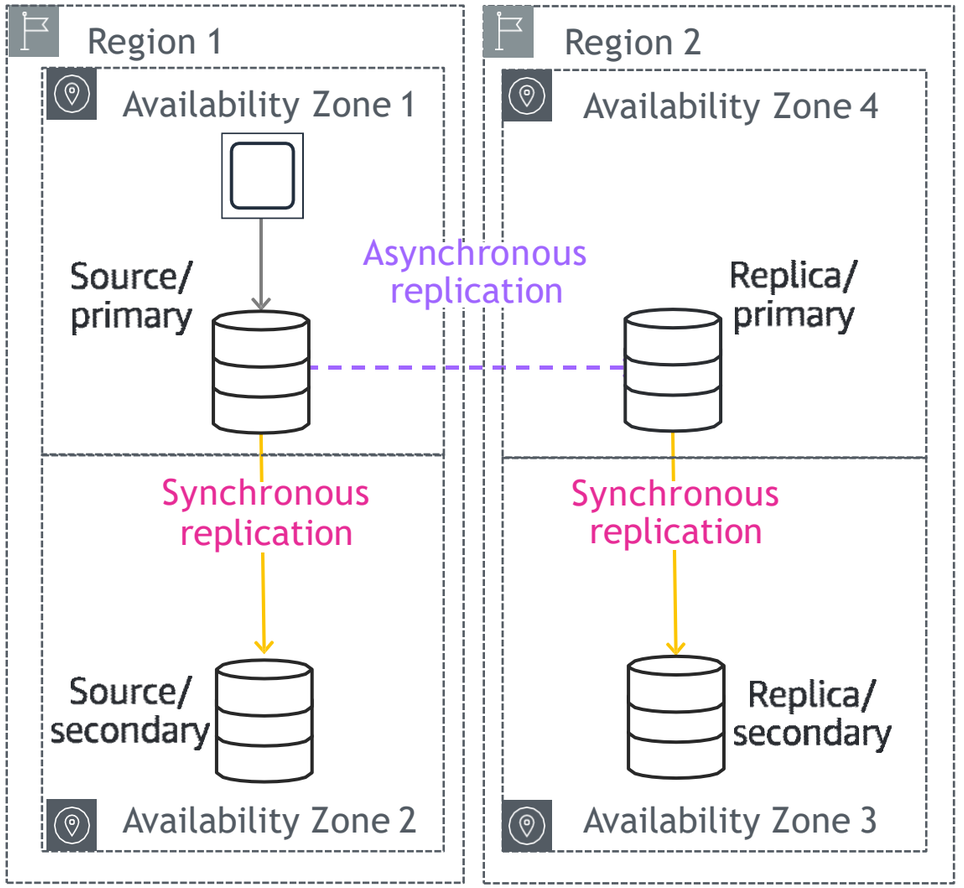
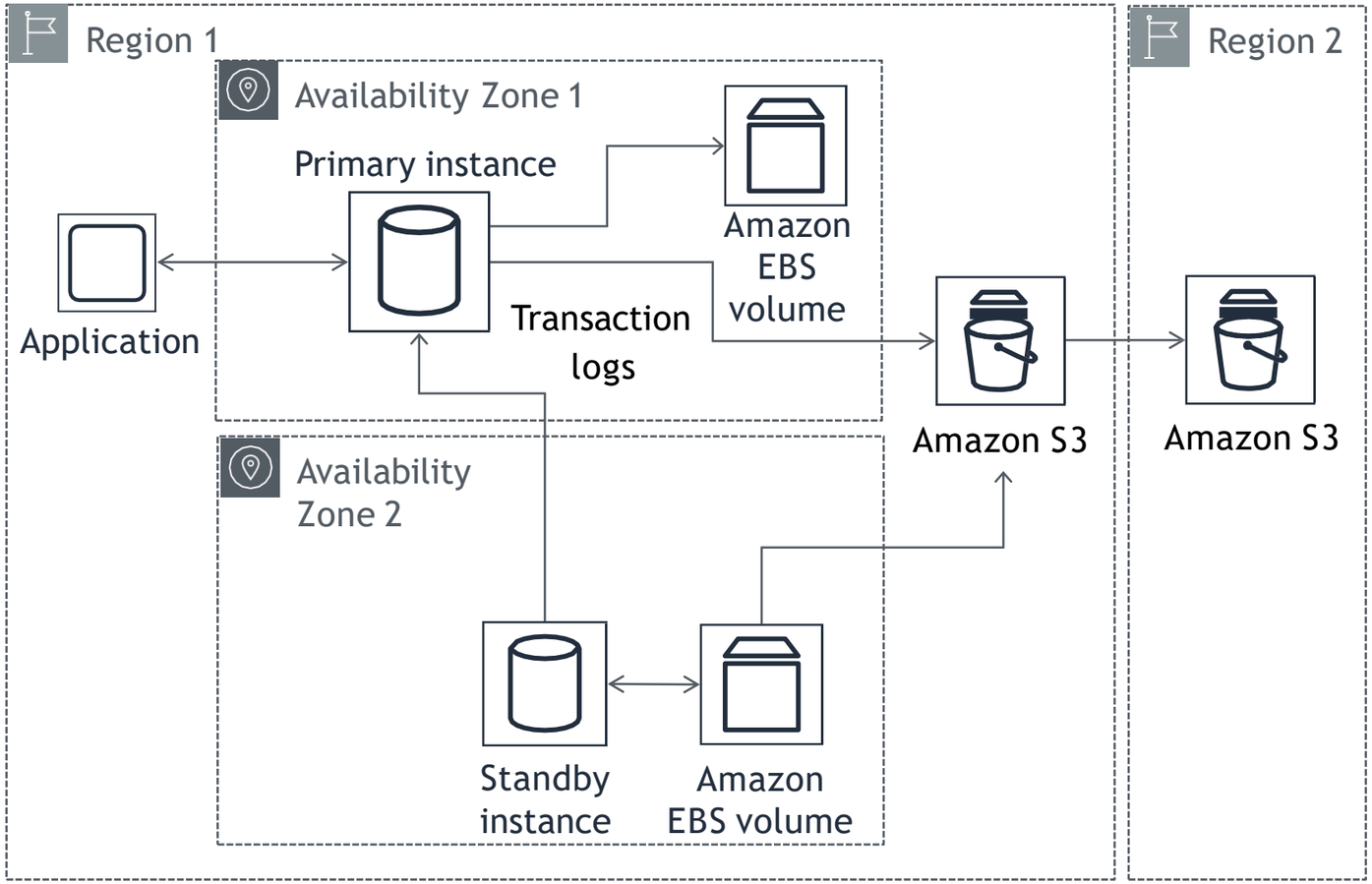
# How can you plan for disaster recovery?

- Use a cross-region read replica as a standby database for recovery in the event of a disaster
- Configure read replicas for Multi-AZ to reduce recovery time **NEW!**
- Use delayed replication for MySQL to protect from self-inflicted disasters **NEW!**
- Feature is supported for MySQL, MariaDB, and PostgreSQL
- For Oracle and SQL Server, use cross-region backup copies



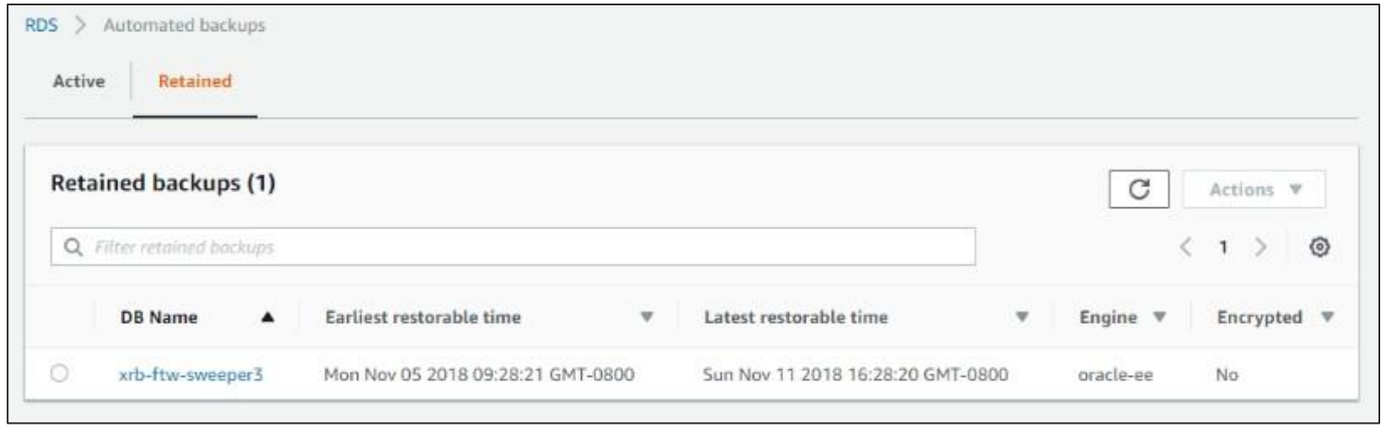
# How does Amazon RDS manage backups?

- There are two options—automated backups and manual snapshots
- Amazon RDS leverages Amazon EBS snapshots stored in Amazon Simple Storage Service (Amazon S3)
- For automated backups, transaction logs are stored every five minutes in Amazon S3 to support point-in-time recovery
- There is no performance penalty for backups, and there is a brief pause for Single-AZ configurations
- Snapshots can be copied across regions or shared with other accounts



# New Amazon RDS backup features

- Retain automated backups NEW!
  - You can optionally keep automated backups and transaction logs upon instance deletion
  - You can perform a point-in-time restore to any point during the retained period
  - Automated backups are retained for the original retention period for the instance




- Specify parameter group value on restore NEW!
- Copy incremental encrypted snapshots NEW!

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# Monitoring and troubleshooting your Amazon RDS database

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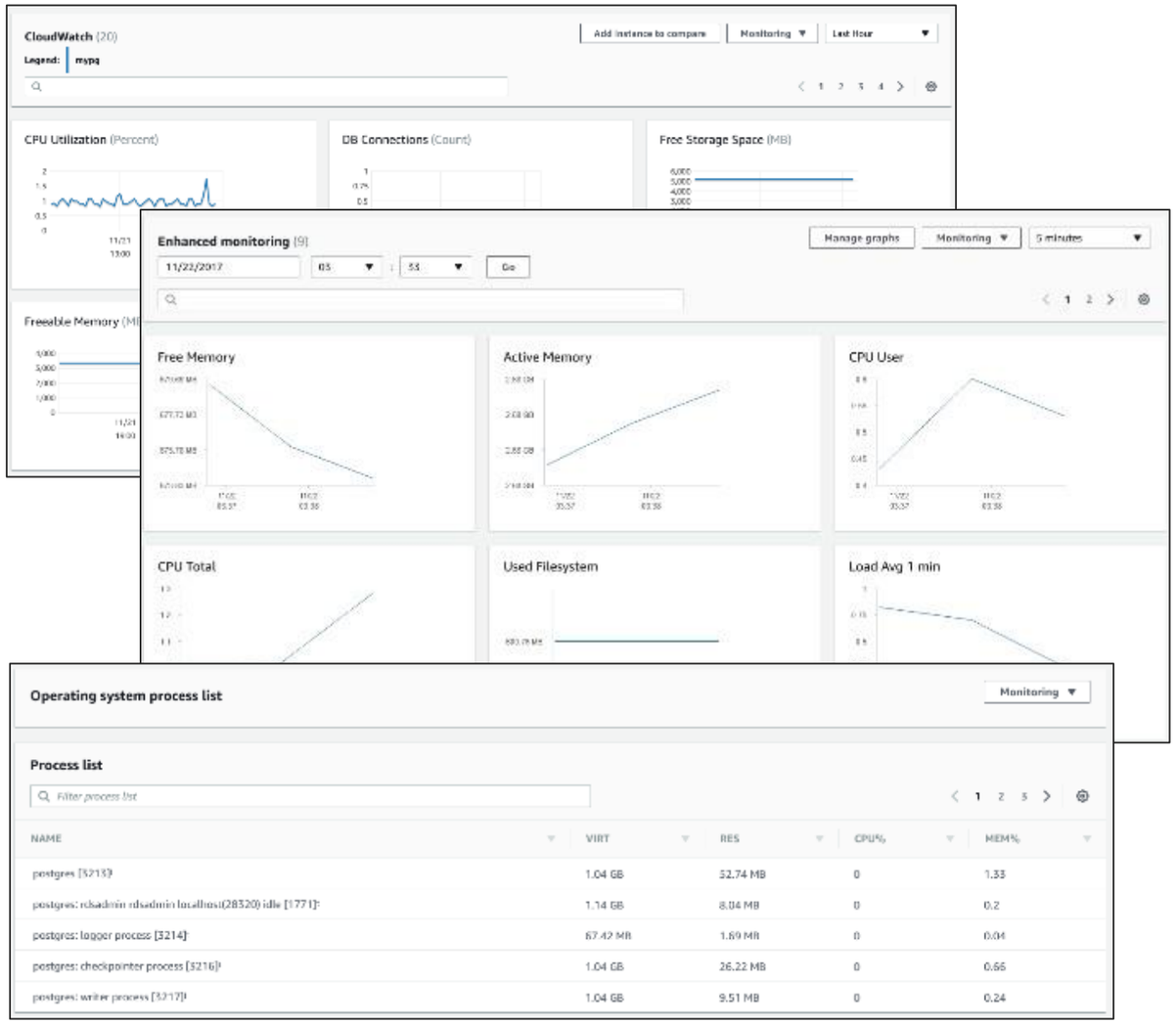
# How can you monitor your Amazon RDS database?




- CloudWatch metrics
  - CPU, storage, memory
  - Swap usage
  - I/O (read and write)
  - Latency (read and write)
  - Throughput (read and write)
  - Replica lag
- CloudWatch alarms—similar to on-premises monitoring tools
- Enhanced monitoring
  - Access to additional CPU, memory, file system, and disk I/O metrics
  - As low as one-second intervals
- Integration with third-party monitoring tools

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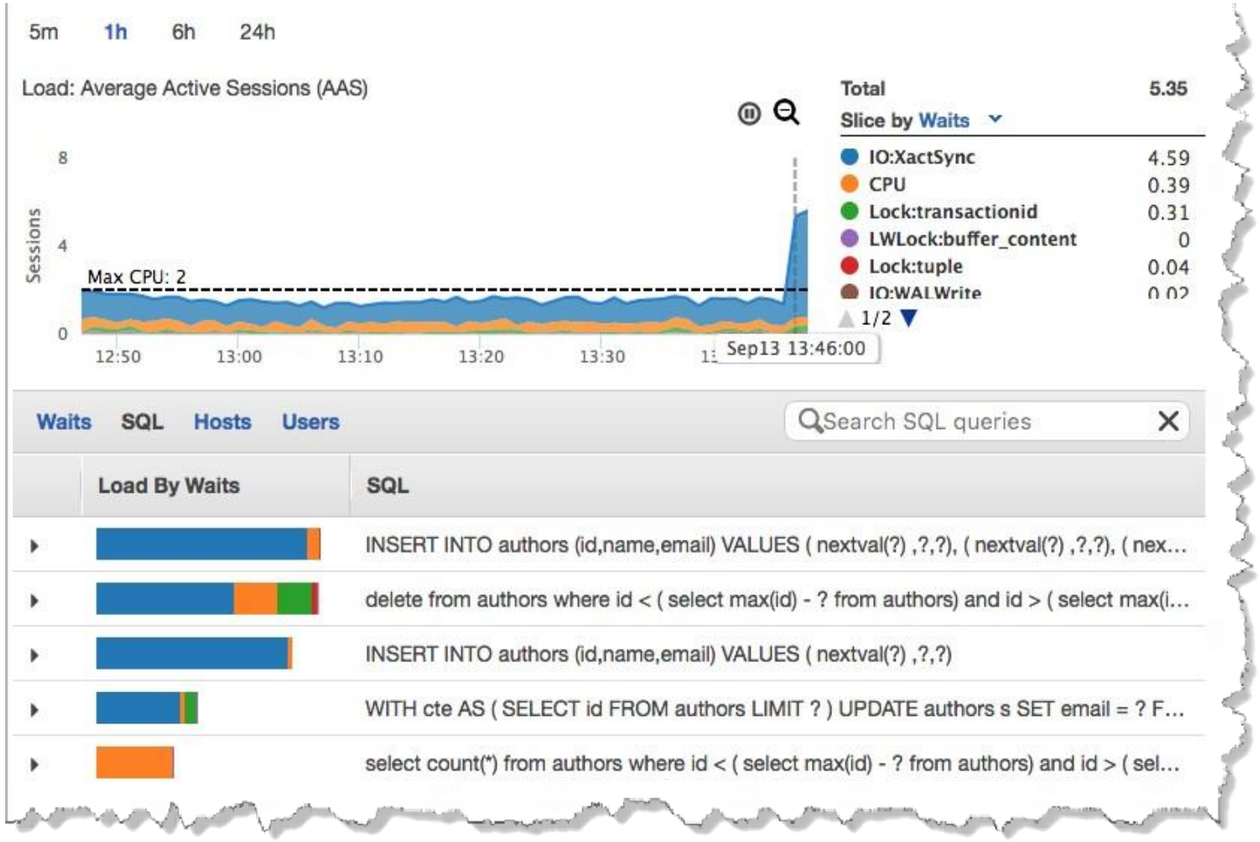
# How do you troubleshoot performance problems?




- Identify database bottlenecks with Amazon RDS Performance Insights
- Measure database load—average active sessions measured through lightweight sampling
- View load by database wait states (CPU, I/O, locks)
- Slice database load by top SQL statements
- Use adjustable time frame—hour, day, week, and longer

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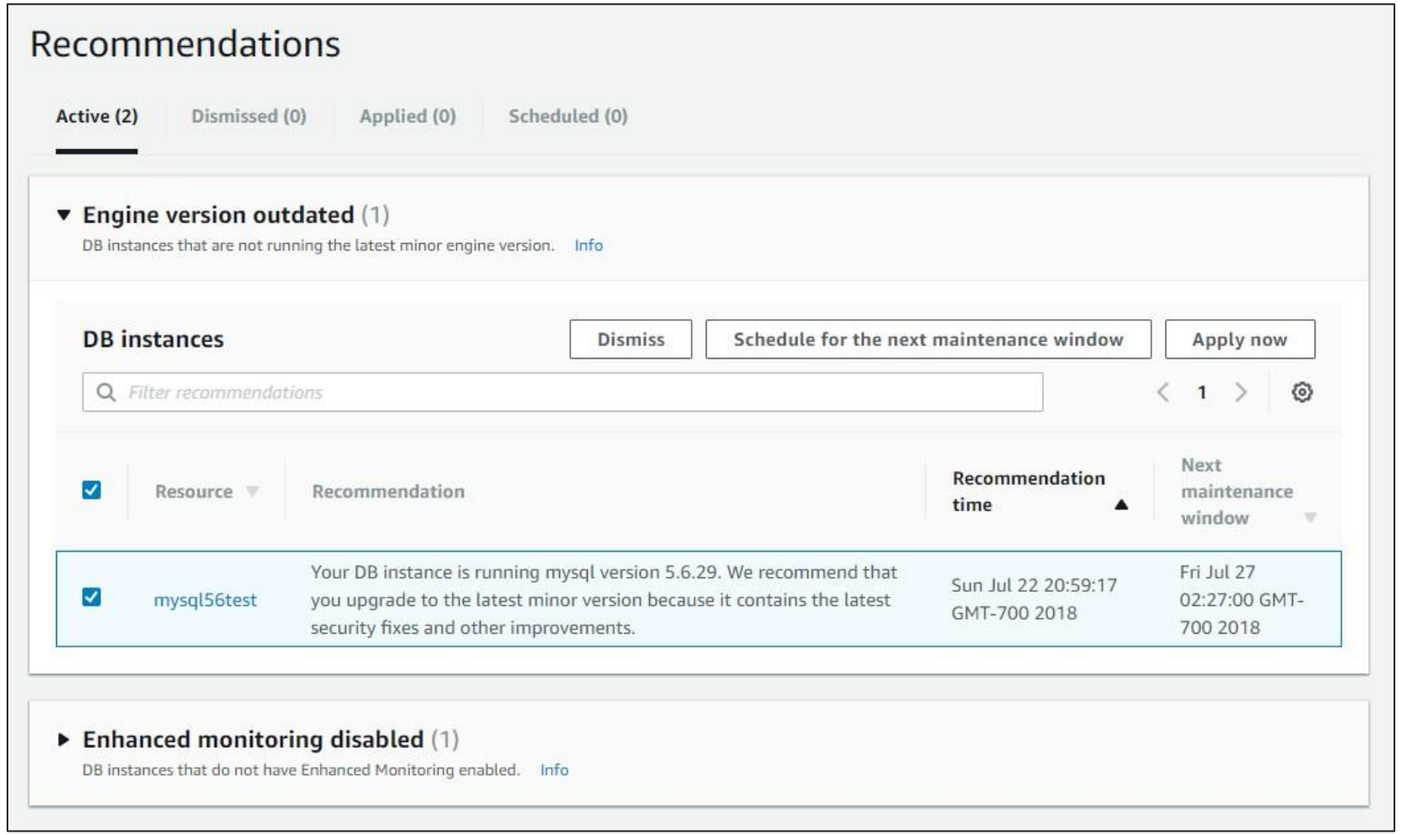
# New features in Performance Insights NEW!

- Engine support—all engines
- Extended data retention NEW!
  - Retain up to two years of performance data
  - Trend performance over time, analyze month-over-month activity, and compare end-of-quarter or end-of-year performance with earlier performance
- Load metrics in CloudWatch NEW!
  - DBLoad
  - DBLoadCPU
  - DBLoadNonCPU
- AWS CloudFormation support

# How do you adhere to best practices? NEW!

- Amazon RDS recommendations provide individualized best practice guidance by analyzing your resources
- It offers an initial setof configuration-based recommendations
- Future launches will include usage, parameters, and performance recommendations
- Results are presented in theAWS Management Console to apply immediately or schedule for the next maintenance window

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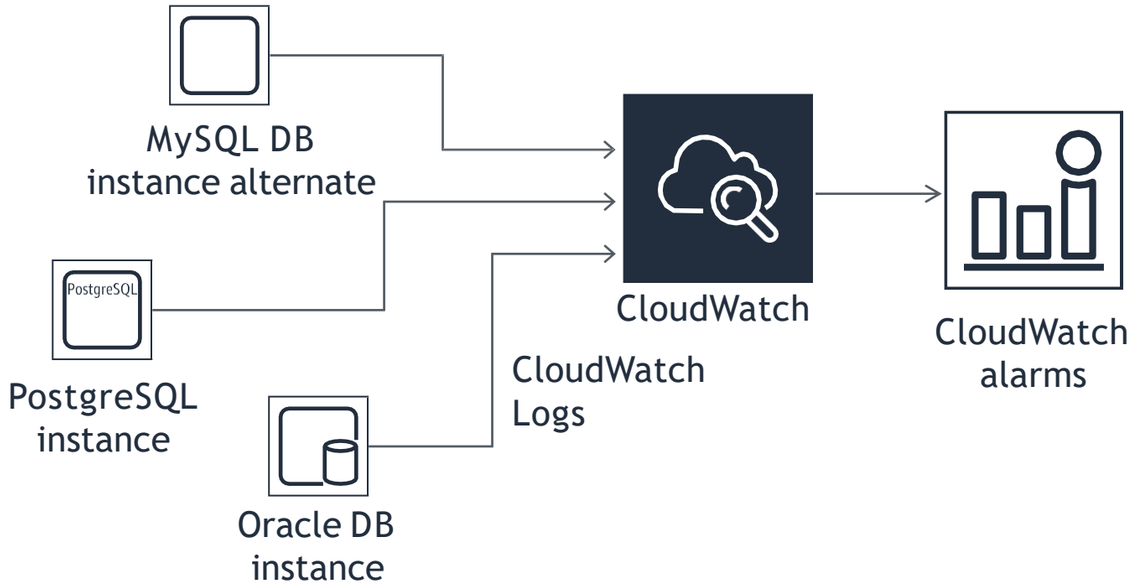
# How do you manage database log files?

- You can view database engine logs in the Amazon RDS console or download them via the Amazon RDS API
- You can now publish logs in real time to Amazon CloudWatch Logs NEW!
  - You can set CloudWatch alarms based on text search patterns
  - Supported engines are Aurora MySQL, Amazon RDS MySQL, MariaDB, Oracle, and Amazon RDS PostgreSQL
  - This feature is coming soon for Aurora PostgreSQL



# How can you track events with Amazon RDS resources?

- Amazon RDS event notifications let you know when important things happen
- There are built-in notifications for Amazon Simple Notification Service (Amazon SNS)
- RDS now publishes events to Amazon CloudWatch Events NEW!
  - Lets you create rules to respond to changes in resources
  - Supports cross-account event delivery
- Amazon RDS includes 6 source types (DB instance, DB parameter group, DB security group, DB snapshot, DB cluster, DB cluster snapshot)
- Amazon RDS includes 17 event categories (availability, backup, deletion, configuration change, and more)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# Optimizing costs in Amazon RDS

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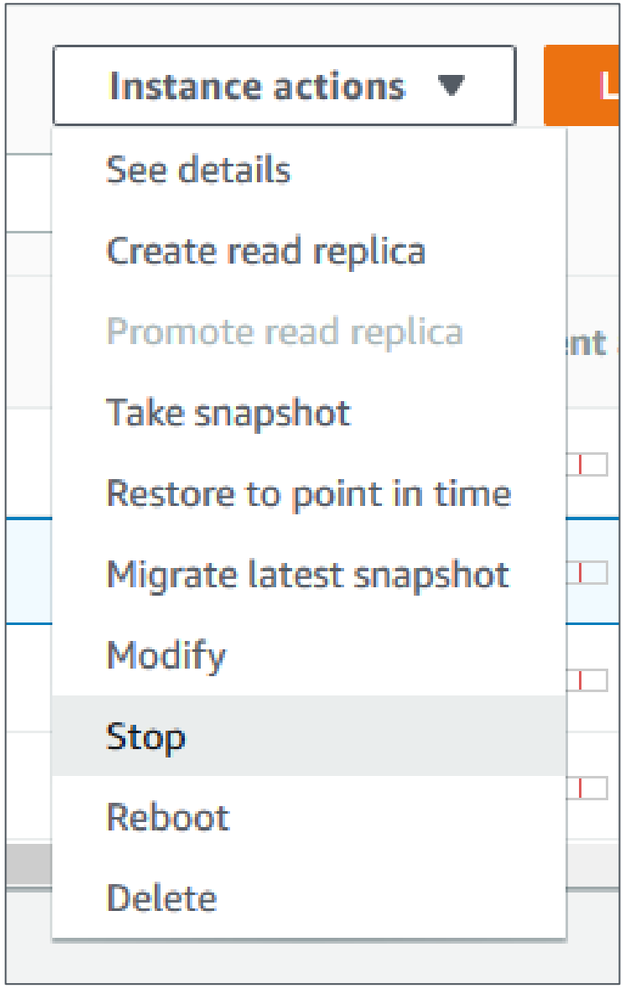
# Can you stop and start your databases?

- This solution is for development and test environments
- You can stop and start a running DB instance from the console or AWS Command Line Interface (AWS CLI)
- It is now available for both Single-AZ and Multi-AZ DB instances and Aurora DB clusters
- While an instance is stopped, you only pay for storage
- Backup retention window is maintained while an instance is stopped
- Instances are restarted after seven days
  - Pending maintenance operations are applied
  - Instances can be stopped again, if needed

NEW!

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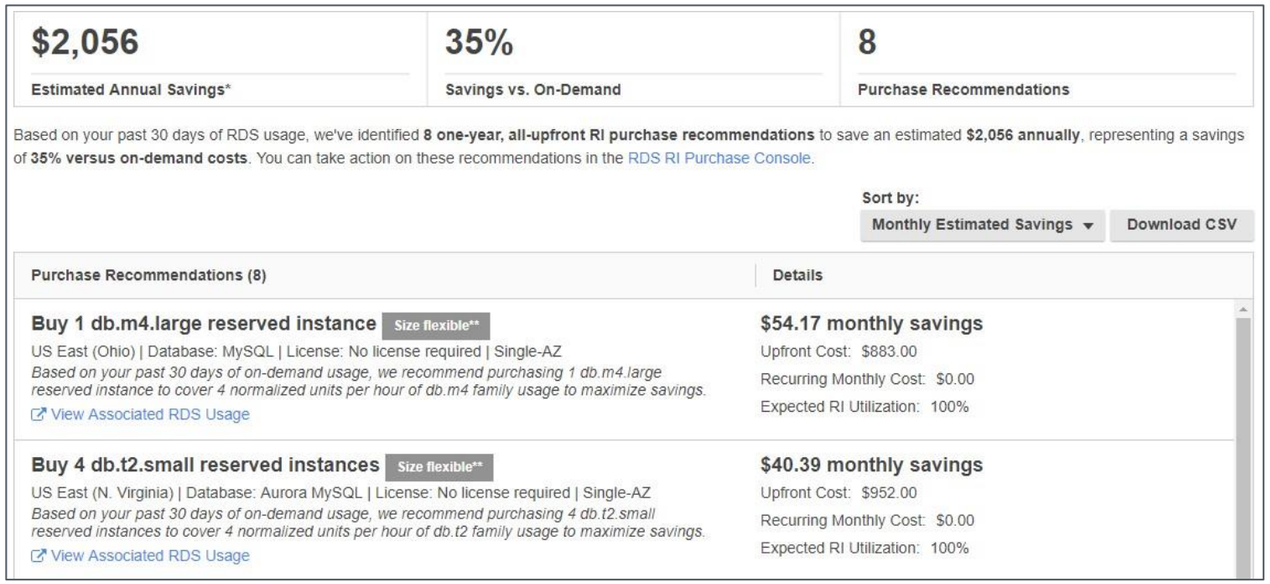
# Can you save money with Reserved Instances (RIs)?

- Amazon RDS RIs provide a discount compared to on-demand prices
- You can match region, instance family, and engine of on-demand usage to apply benefit
- Amazon RDS RIs offer size flexibility for open-source and Oracle BYOL engines
- By default, RIs are shared among all accounts in consolidated billing
- RI utilization and coverage reports help you determine how your RIs are being used
- Amazon RDS RI recommendations report uses historical data to recommend which RIs to buy

NEW!

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# Thank you!

Kevin Jernigan
kmj@amazon.com

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