



Amazon Relational Database Service (RDS)

Managed database service

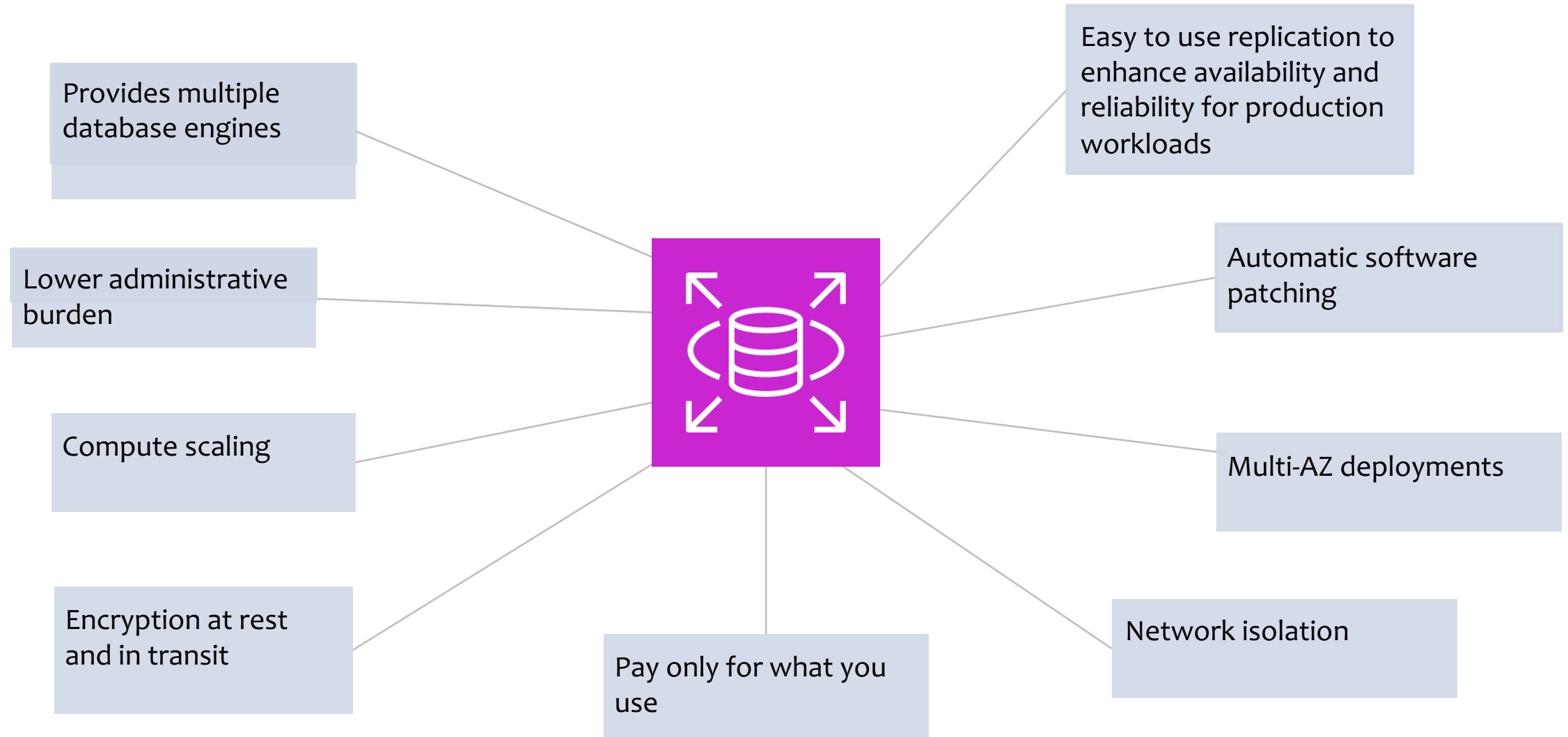
Cloud providers are offering managed database services mainly because these services present a comprehensive solution to the many challenges presented by data management. Organizations are dealing with increasingly large volumes of data, and managing this data in-house can be difficult, time-consuming, and expensive. Managed database services have the potential to overcome these challenges by offering scalable, flexible, and highly efficient solutions.



Managed database service

- The primary reason for the shift towards outsourcing database management to cloud providers is the significant cost savings it can provide. Managed database services allow organizations to eliminate the need for investing heavily in on-premises hardware, software, and human resources related to database management. Instead, organizations can use a pay-as-you-go service, which provides great savings and allows for budget flexibility.
- Besides cost-efficiency, the ability to work with up-to-date technology is a massive advantage offered by cloud-based managed database services. Legacy database systems can quickly become outdated, and upgrading them requires further investment. Managed database services provide access to state-of-the-art technology which simplifies data management and ensures organizational databases are always up-to-date.
- Scalability is another significant advantage of cloud-based managed database services. As organizations generate more data, the need for storage grows. Managed database services can be scaled up or down depending on the needs of the organization.
- Moreover, managed database services contribute to improving the organization's security. Cloud providers are equipped with sophisticated security tools and follow stringent security protocols to protect sensitive data. Besides, they also ensure compliance with data protection regulations.
- The use of managed database services also means faster and efficient database performance. The speed and performance of accessing and retrieving data from a managed database are enhanced with the use of modern technologies, which significantly improves business operations.
- By leveraging managed database services, organizations are set free from handling routine database management tasks and can instead focus on their core operational areas. Therefore, cloud providers are providing managed database services to meet the evolving needs of organizations and help them maximize their efficiency and productivity.

RDS Core features



RDS supported database engines

A *DB engine* is the specific relational database software that runs on your DB instance. Amazon RDS supports the following engines:

Oracle

MySQL

PostgreSQL

MariaDB

Microsoft SQL

IBM Db2

RDS terminologies

1. DB Instance - It is an isolated database environment running in the cloud. It is the basic building block of Amazon RDS. A DB instance can contain multiple user-created databases, and can be accessed using the same client tools and applications you might use to access a standalone database instance.
2. DB Instance class - It determines the computation and memory capacity of an Amazon RDS DB instance. The DB instance class that you need depends on your processing power and memory requirements.
3. Instance storage - It uses Amazon Elastic Block Store volumes for database and log storage. Depending on the amount of storage requested, Amazon RDS automatically stripes across multiple Amazon EBS volumes to enhance performance.

RDS storage types

General Purpose SSD

volumes offer cost-effective storage that is ideal for a broad range of workloads running on medium-sized DB instances.

Provisioned IOPS SSD

Provisioned IOPS storage is designed to meet the needs of I/O-intensive workloads, particularly database workloads, that require low I/O latency and consistent I/O throughput.

Magnetic

Amazon RDS also supports magnetic storage for backward compatibility.

Monitoring and maintenance

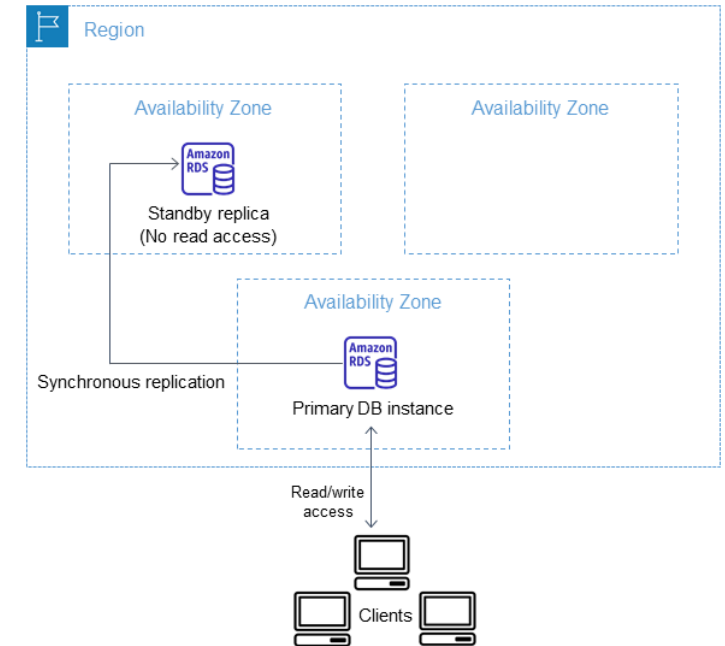
- There are several ways that you can track the performance and health of a DB instance. You can use the Amazon CloudWatch service to monitor the performance and health of a DB instance. CloudWatch performance charts are shown in the Amazon RDS console. You can also subscribe to Amazon RDS events to be notified about changes to a DB instance.
- A security group controls the access to a DB instance. It does so by allowing access to IP address ranges or Amazon EC2 instances that you specify.
- Every DB instance has a weekly maintenance window during which any system changes are applied. Think of the maintenance window as an opportunity to control when modifications and software patching occur.
- If a maintenance event is scheduled for a given week, it's initiated during the 30-minute maintenance window you identify. Most maintenance events also complete during the 30-minute maintenance window, although larger maintenance events may take more than 30 minutes to complete.
- The 30-minute maintenance window is selected at random from an 8-hour block of time per region. If you don't specify a maintenance window when you create the DB instance, RDS assigns a 30-minute maintenance window on a randomly selected day of the week.

Monitoring and maintenance

- Maintenance most often involves updates to the following resources in your DB instance:
 - Underlying hardware
 - Underlying operating system (OS)
 - Database engine version
- Updates to the operating system most often occur for security issues. You should do them as soon as possible.
- Some maintenance items require that Amazon RDS take your DB instance offline for a short time. Maintenance items that require a resource to be offline include required operating system or database patching.
- Required patching is automatically scheduled only for patches that are related to security and instance reliability. Such patching occurs infrequently, typically once every few months. It seldom requires more than a fraction of your maintenance window.
- Deferred DB instance modifications that you have chosen not to apply immediately are also applied during the maintenance window.
- In general, a major engine version upgrade can introduce changes that are not compatible with existing applications. In contrast, a minor version upgrade includes only changes that are backward-compatible with existing applications.

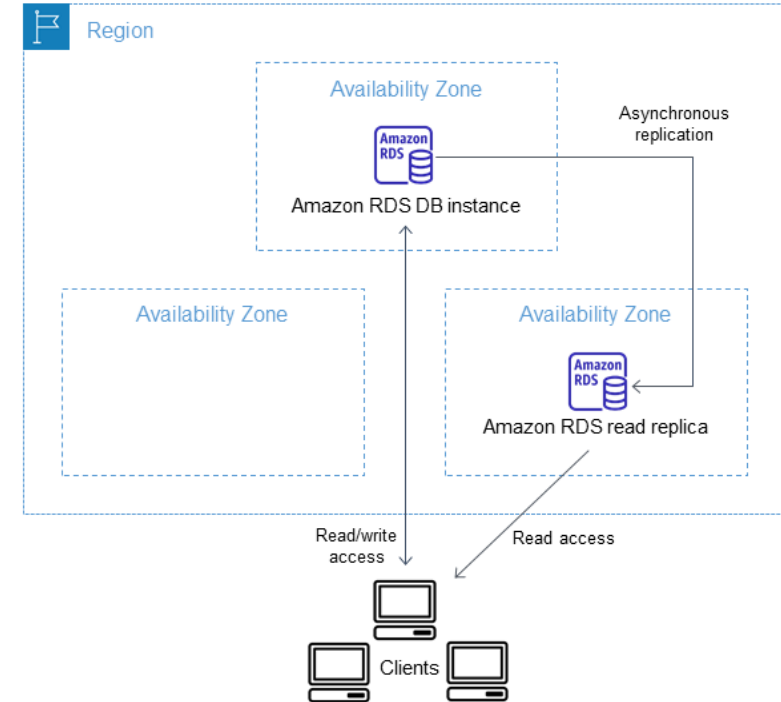
Multi AZ Deployment

- Amazon RDS provides high availability and failover support for DB instances using Multi-AZ deployments with a single standby DB instance. This type of deployment is called a Multi-AZ DB instance deployment.
- In a Multi-AZ DB instance deployment, Amazon RDS automatically provisions and maintains a synchronous standby replica in a different Availability Zone. The primary DB instance is synchronously replicated across Availability Zones to a standby replica to provide data redundancy and minimize latency spikes during system backups.
- Running a DB instance with high availability can enhance availability during planned system maintenance. It can also help protect your databases against DB instance failure and Availability Zone disruption.



Read replicas

- A read replica is a read-only copy of a DB instance. You can reduce the load on your primary DB instance by routing queries from your applications to the read replica.
- In this way, you can elastically scale out beyond the capacity constraints of a single DB instance for read-heavy database workloads.
- After you create a read replica from a source DB instance, the source becomes the primary DB instance.
- When you make updates to the primary DB instance, Amazon RDS copies them asynchronously to the read replica.



Multi AZ Cluster

- A Multi-AZ DB cluster deployment is a semisynchronous, high availability deployment mode of Amazon RDS with two readable standby DB instances.
- A Multi-AZ DB cluster has a writer DB instance and two reader DB instances in three separate Availability Zones in the same AWS Region.
- With a Multi-AZ DB cluster, Amazon RDS replicates data from the writer DB instance to both of the reader DB instances using the DB engine's native replication capabilities. When a change is made on the writer DB instance, it's sent to each reader DB instance.
- Multi-AZ DB cluster deployments use semisynchronous replication, which requires acknowledgment from at least one reader DB instance in order for a change to be committed. It doesn't require acknowledgment that events have been fully executed and committed on all replicas.
- Reader DB instances act as automatic failover targets and also serve read traffic to increase application read throughput. If an outage occurs on your writer DB instance, RDS manages failover to one of the reader DB instances. RDS does this based on which reader DB instance has the most recent change record.

