Amazon Relational Database Service

Week 6.5

What you will Learn

- Give an overview of Amazon RDS
- Describe some of the options that Amazon RDS offers
- Explore Amazon RDS backup options
- Explain the six database types on Amazon RDS
- Establish high availability, which Amazon RDS offers
- Examine a few uses cases for Amazon RDS

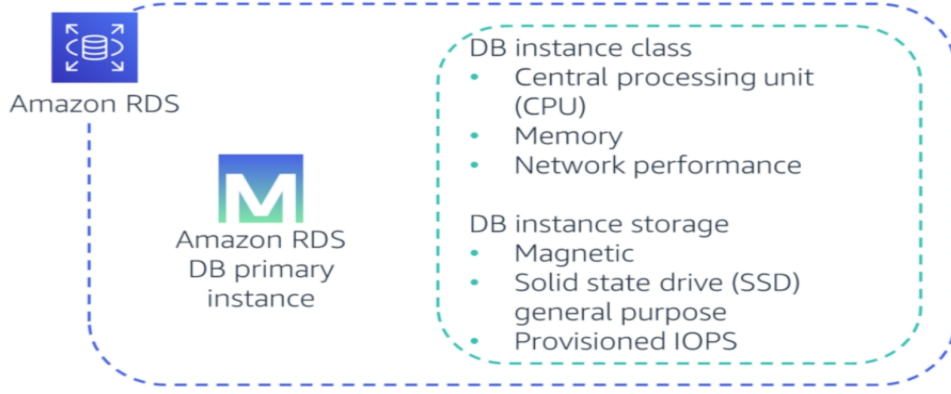
Introduction to Amazon RDS

- Amazon Relational Database Service (Amazon RDS) is a collection of managed services that makes it simple to set up, operate, and scale databases in the cloud.
- Running an unmanaged, standalone relational database can be time-consuming and have limited scope.
- To address these challenges, AWS provides a service that sets up, operates, and scales the relational database without any ongoing administration.
- Amazon RDS provides cost-efficient and resizable capacity while automating time-consuming administrative tasks.
- Amazon RDS frees you to focus on your application so you can give the applications the performance, high availability, security, and compatibility that they need.
- With Amazon RDS, your primary focus is your data and optimizing your application.

Introduction to Amazon RDS

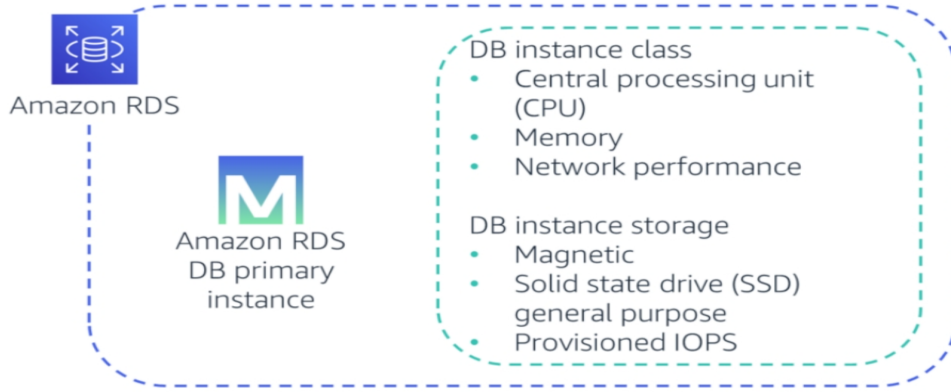
- It supports seven popular engines - Amazon Aurora with MySQL compatibility, Amazon Aurora with PostgreSQL compatibility, MySQL, MariaDB, PostgreSQL, Oracle, and SQL Server — and deploy on-premises with Amazon RDS on AWS Outposts.

Amazon RDS DB Instances



- The basic building block of Amazon RDS is the DB instance.
- A DB instance is an isolated database environment.
- It can contain multiple user-created databases and can be accessed by using the same tools and applications that you use with a standalone database instance.

Amazon RDS DB Instances

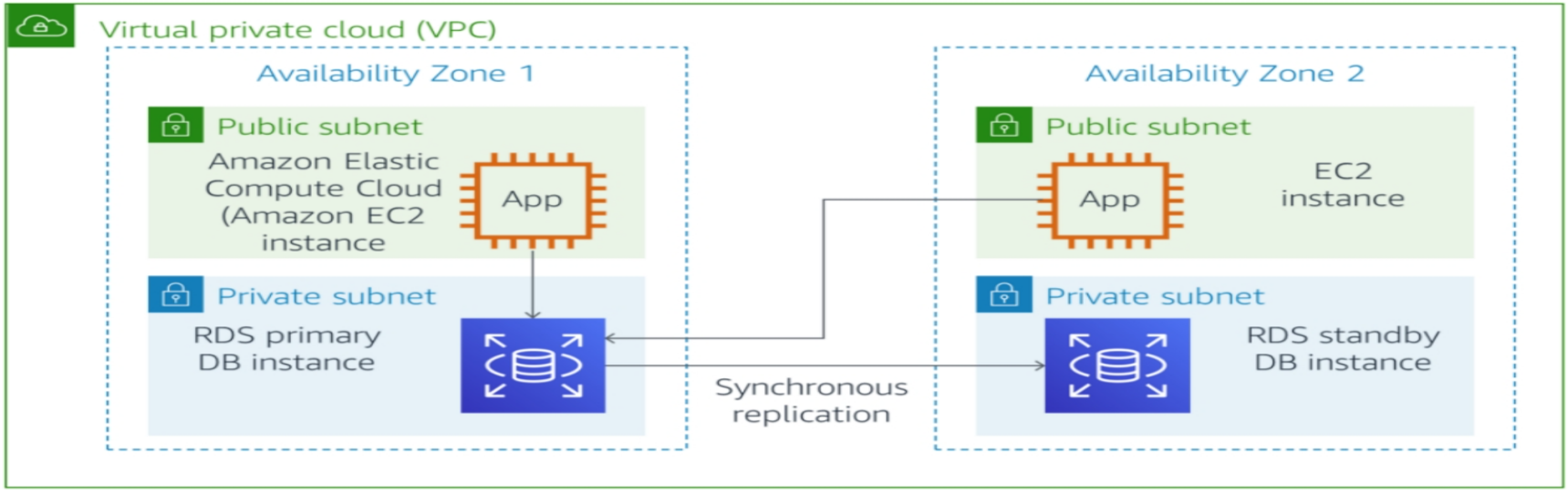


- The resources in a database instance are determined from its database instance class, and the type of storage is determined by the type of disks.
- Database instances and storage differ in performance characteristics and price, which enable you to customize your performance and cost to the needs of your database.
- When you choose to create a DB instance, you must first specify which database engine to run.

Amazon RDS Backup

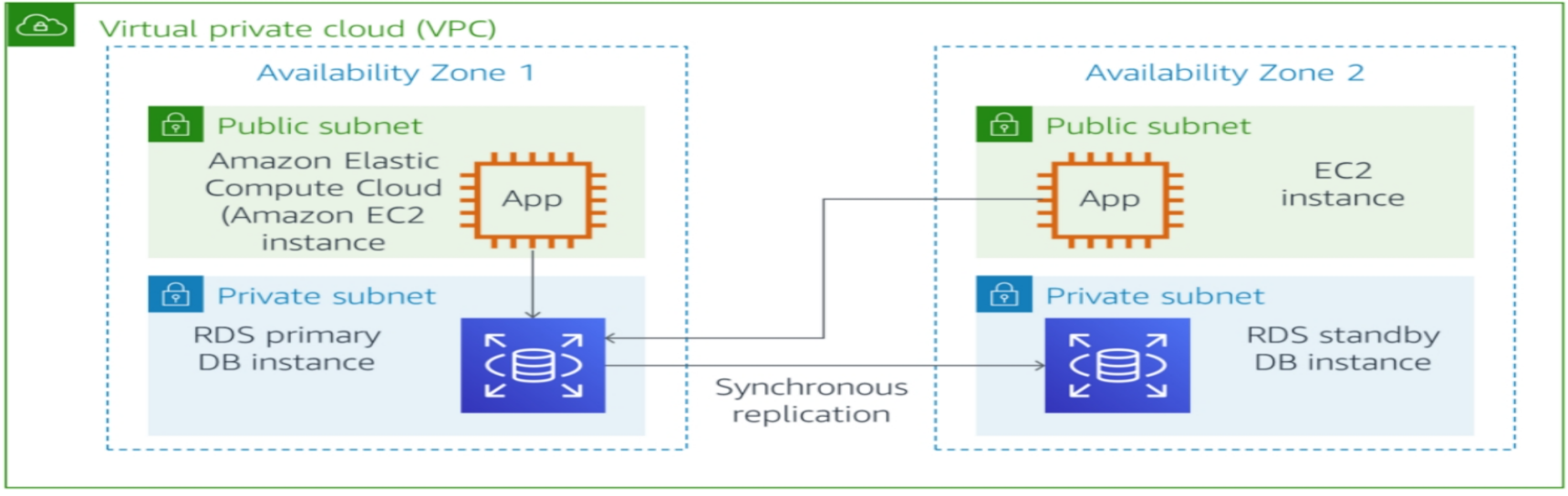
- Because Amazon RDS is a fully managed service, one task that it automatically performs is the periodic backup of a DB instance.
- The entire instance is backed up to a storage volume snapshot during a specified backup window.
- It is retained according to a specified backup retention period.
- The first snapshot of a DB instance contains the full data.
- Subsequent snapshots are incremental and contain only the data that changed since the most recent snapshot.
- Optionally, you can back up a database instance manually by creating a snapshot.
- For more information about working with backups, see Backing up and restoring an Amazon RDS DB instance.

High Availability with Amazon RDS



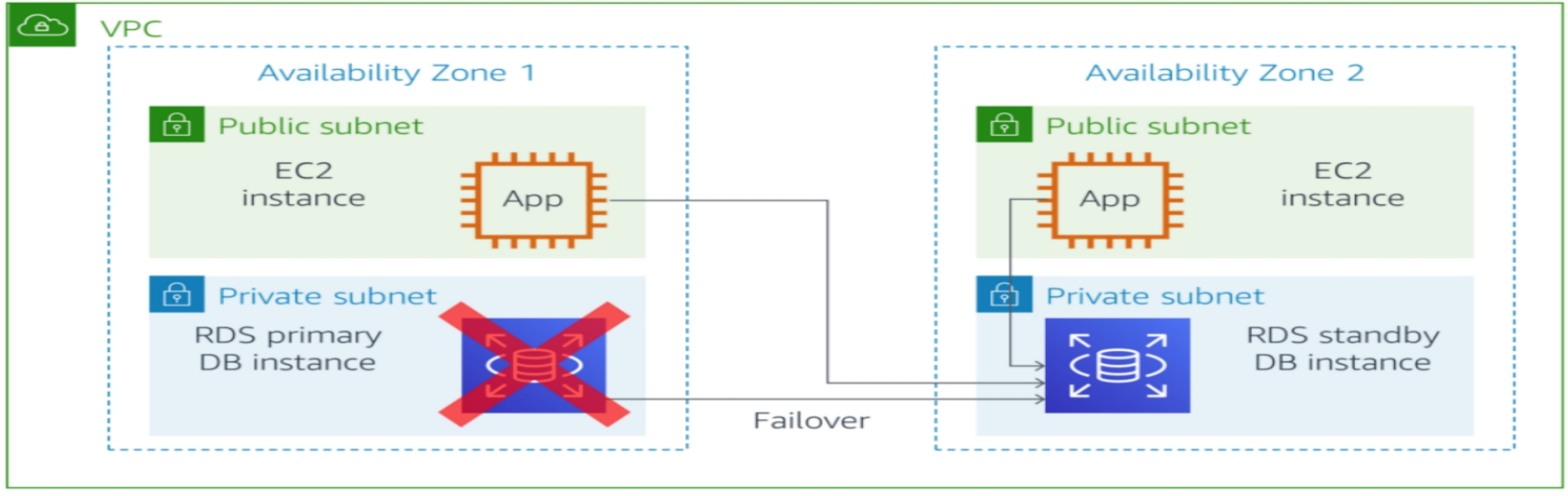
- You can configure a database instance with high availability by using a Multi-AZ deployment.
- This configuration automatically generates a standby copy of the database instance in another Availability Zone in the same virtual private cloud (VPC).

High Availability with Amazon RDS



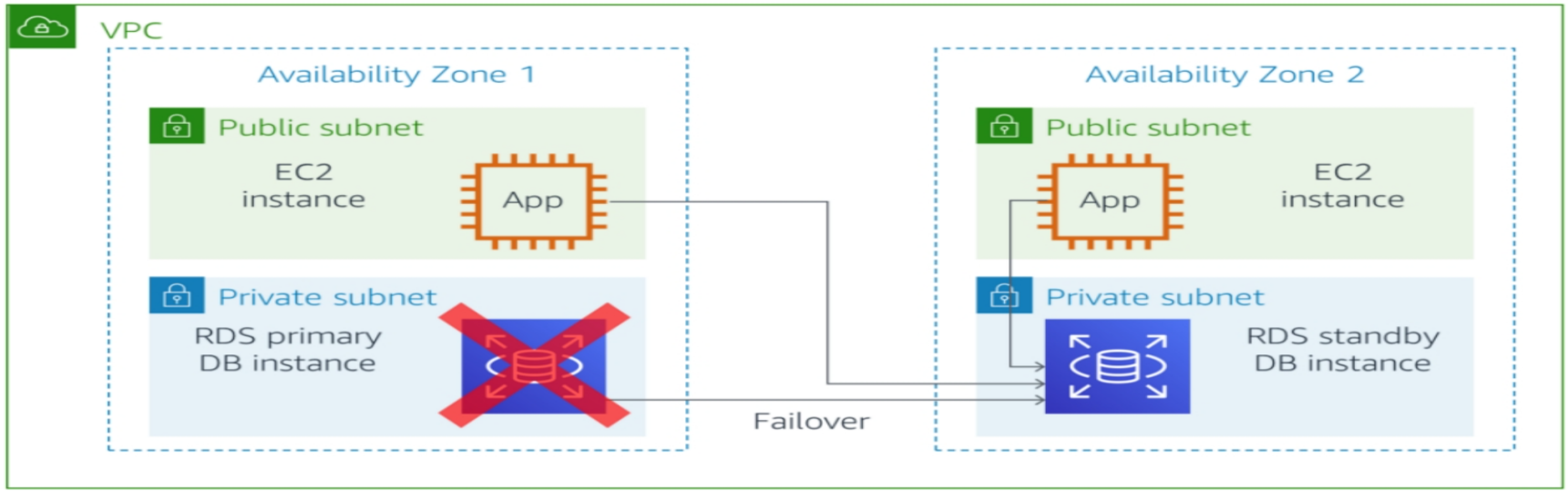
- After you make the initial full copy, transactions are synchronously replicated to the standby copy.
- Running a database in multiple Availability Zones can enhance availability during planned system maintenance.

High Availability with Amazon RDS: Failover



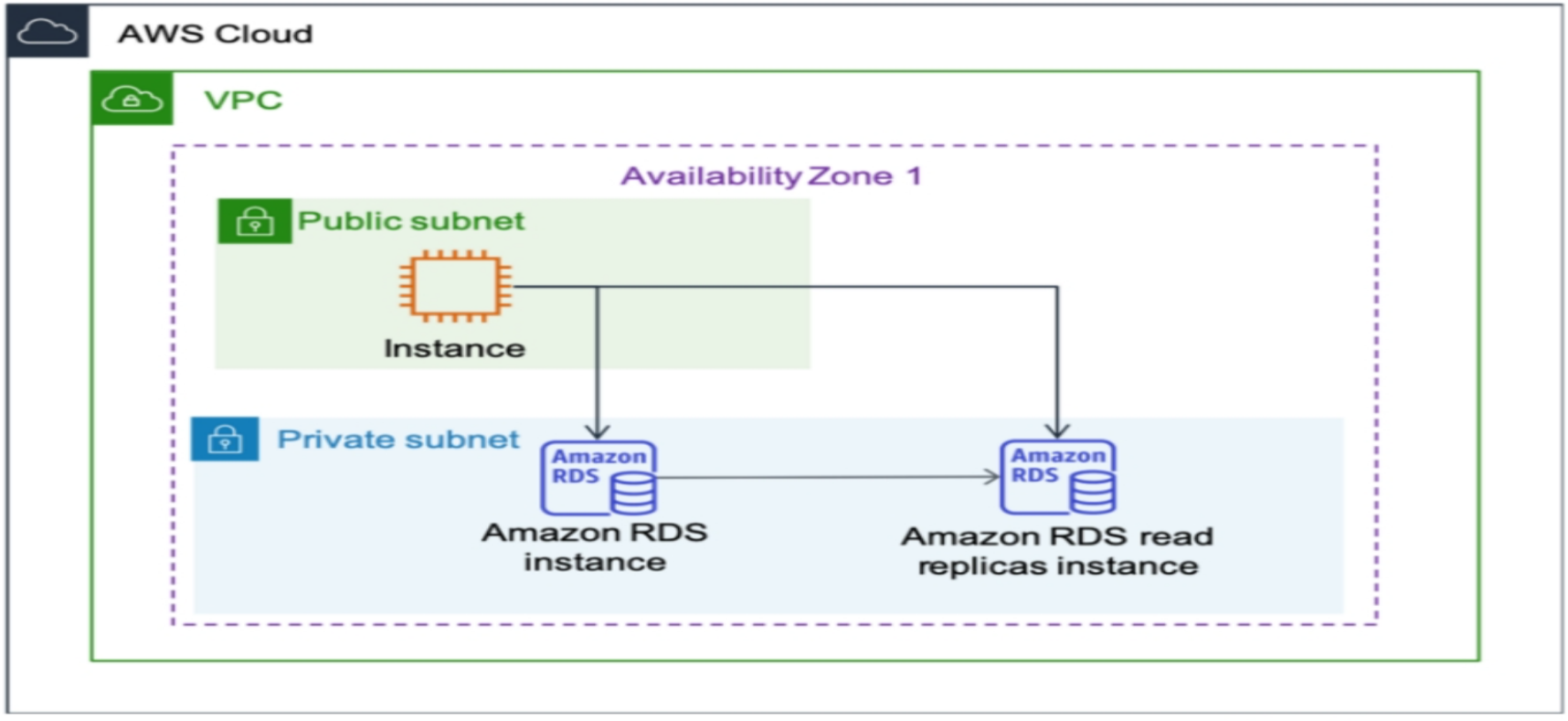
- If the primary database instance fails, Amazon RDS automatically brings the standby database instance online as the new primary instance.
- Requests from both applications are then directed to the new primary instance.

High Availability with Amazon RDS: Failover



- The requesting applications use the Amazon RDS Domain Name System (DNS) endpoint to reference the database by name.
- As a result, the failover happens without needing to change the application code.
- No data loss occurs because of the synchronous replication.

Amazon RDS Read Replicas and Scaling



Amazon RDS Read Replicas and Scaling

- Amazon RDS read replicas provide enhanced performance and durability for RDS DB instances.
- They make it easy to elastically scale out beyond the capacity constraints of a single DB instance for read-heavy database workloads.
- Updates to the source DB instance are asynchronously copied to the read replica instance.
- You can reduce the load on your source DB instance by routing read queries from your applications to the read replica.
- Read replicas can be promoted to become the primary DB instance.
- However, because it uses asynchronous replication, this option requires manual action.

Amazon RDS Read Replicas and Scaling

- Read replicas can be created in a different Region from the primary DB instance.
- This feature can help satisfy disaster recovery (DR) requirements or reduce latency by directing reads to a read replica in a geographic area that is closer to the user.
- For more information see Amazon RDS Read Replicas

Scaling your Amazon RDS Instance

- As discussed earlier, Amazon RDS takes care of scaling your relational database so your database can keep up with the increasing demands of your applications.
- You can scale your RDS instance **vertically** by adding more capacity to the storage and computing of your current RDS instance.
- Or scale **horizontally** by adding additional RDS instances for reads and writes.

Vertical Scaling

- Vertical scaling is the most straightforward approach to adding more capacity to your database.
- Vertical scaling is suitable if you can’t change your application and database connectivity configuration.
- You can vertically scale up your RDS instance with a click of a button.
- Several instance sizes are available, from general-purpose to CPU and memory-optimized.
- Instance types have combinations of CPU, memory, storage, and networking capacity, and give you the flexibility to choose the appropriate mix of resources for your database.
- In addition, each instance type includes several instance sizes, which allows you to scale your database to the requirements of your target workload.
- For more information about DB instance classes, see DB instance classes.

Horizontal Scaling

- Horizontal scaling increases performance by extending the database operations to additional nodes.
- You can choose this option if you need to scale beyond the capacity of a single DB instance.
- An advantage of horizontally scaling in Amazon RDS is that AWS handles the infrastructure management, provisioning, and configuration of additional nodes.
- You can easily create additional nodes from the Amazon RDS console or API.

When to use Amazon RDS

When to use Amazon RDS	When NOT to use Amazon RDS
Your aplication requires complex transactions or complex queries	Simple GET or PUT requests and queries that a NoSQL database can handle
Build highly durable database solutions	Relational database management system (RDBMS) customization

- For circumstances where you should not use Amazon RDS, you can use a NoSQL database solution, such as DynamoDB.
- Another alternative to Amazon RDS is to run your relational database engine on Amazon EC2 instances, which will provide more options for customizing your database.

Amazon RDS Best Practices

- Some recommended practices for RDS include:
- Enable automatic backups, and set the backup window to occur during a time when you have minimal write operations to the database.
- If you use a Multi-AZ deployment, test the failover for your DB instance to understand how long it takes to complete the switch-over.
- Verify that your application can successfully access the new primary DB instance.
- For more information about best practices for Amazon RDS, see Best practices for Amazon RDS.

Amazon RDS Use Cases

- Amazon RDS works well for web and mobile applications that need a database with high throughput, extensive storage scalability, and high availability.
- Because Amazon RDS does not have any licensing constraints, it fits the variable usage pattern of these applications.
- For small and large e-commerce businesses, Amazon RDS provides a flexible, secured, and low-cost database solution for online sales and retailing.
- Amazon RDS manages the database infrastructure, so developers do not need to worry about provisioning, scaling, or monitoring database servers.

Key Takeaways

- Amazon RDS is a database service that makes it easy to set up, operate, and scale a relational database in the cloud.
- As a managed service, Amazon RDS is accessible by using the console, the AWS CLI, or application programming interface (API) calls.
- Amazon RDS offers features for automated redundancy and backups.
- Amazon RDS supports an array of database engines, which includes Amazon Aurora, PostgreSQL, MySQL, MariaDB, Oracle Database, and Microsoft SQL Server.