AWS Certified Solutions Architect: Associate - 7.0 Databases and AWS

filename: amazon-acsaa-7-1-amazon_rds
Title: Amazon Relational Database Service
Subtitle: AWS Certified Solutions Architect: Associate

7.1 Amazon Relational Database Service

- Relational Databases
  - Most common type of DB in use today
  - Use the *Structured Query Language* (SQL)
  - (Example Diagram)
  - Primary Key
    - Allows a record (row) in one table to be *related* to rows in another table
  - OLTP vs OLAP
  - AWS supports 6 different RDB engines
  - Unsupported DB engines can be run within an EC2 instance
  - (Diagram about responsibilities)
- Data Warehouses
  - Primarily OLAP
  - Batch write operations performed infrequently
  - RDS can perform both OLAP and OLTP roles
    - However, usually OLTP
    - Redshift provides high-performance DW for OLAP
  - RDS and Redshift can be combined for ultimate effect
- NoSQL Databases
  - Overcomes limitations of RDS especially when it comes to scaling
    - RDS have issues with write access
    - Typically one master and one or more slaves
    - Slaves are read-only
    - (Diagram)
- Amazon RDS
  - Database Instances
    - Allows for quick, managed, DB deployment
    - Replication is easy to configure
    - Does not provide shell access
    - Supports standard tools for the chosen engine
    - Can be created/maintained via the API
    - Instance Class
      - Similar to an EC2 instance class
      - Determines the CPU/RAM of the server
  - Database Engines
    - MySQL
    - Oracle
    - PostgreSQL
    - Microsoft SQL Server
    - MariaDB
    - Amazon Aurora
  - Licensing
    - License Included model
    - Bring Your Own License (BYOL)
  - Storage Options
    - Magnetic
    - General Purpose SSD
    - Provisioned IOPS SSD
  - Backup and Recovery
    - Recovery Time Objective (RTO)
      - Typically hours or days
    - Recovery Point Objective (RPO)
      - Typically minutes
    - Two systems
      - Automated backups
        - Performed daily during a backup window
        - One day retained by default
        - Can be increased to 35 days maximum
        - Storage volume snapshot
      - Manual Snapshots
        - Performed as needed

        - Retained until you delete them
- Multi-AZ Deployments
    - (Diagram)
    - Designed for disaster recovery, not performance
        - Redshift or read-replicas should be used for performance
    - RDS configures and maintains the cluster
    - Complexity is reduced significantly
    - DB is assigned a DNS endpoint that can be flipped from primary to slave
    - Auto-failover situations
        - Failed AZ
        - Compute unit failure on the primary database
        - Storage failure on the primary database
- Scaling Up and Out
    - Scaling up is supported for all engines
    - Scaling out (horizontally) is only supported for some engines
    - Partitioning or sharding
        - Amazon implements this in DynamoDB and Cassandra
    - Read Replicas
        - Another method of scaling out
        - Improves OLAP, but not OLTP
        - Supported DB engines
            - MySQL
            - PostgreSQL
            - MariaDB
            - Amazon Aurora
- Security
    - Identity and Access Management (IAM)
    - Virtual Private Cloud (VPC)
    - Security Groups / Network ACLs
    - SSL / TLS / VPN
    - Database encryption