DATABASE

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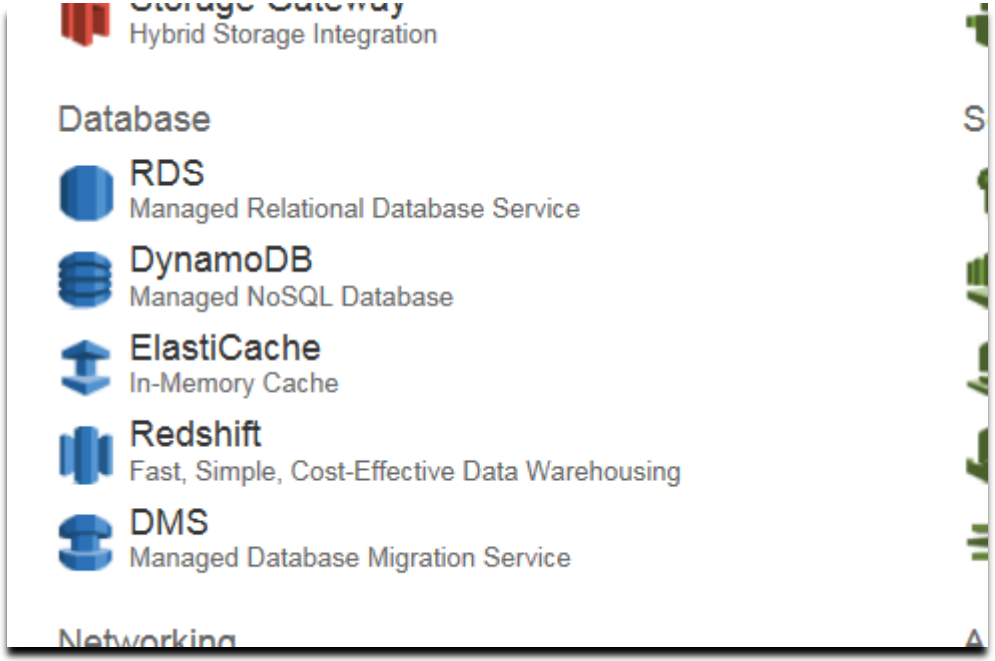
Services in Database



Database Basics

Course	
CID	**Course**
1	Networking
2	AWS
3	Big-Data
4	Advance Big-Data

Course Registration	
CID	**Student**
1	Ram
1	Muhammad
3	Jesus
4	Nanak
5	Fahad

1. **RDS "Relational Database Service" is a web service that makes it easy to setup, operate, or scale a relational databases on AWS cloud. RDS is On demand service meaning you'll be billed based on the capacity you've used.**
2. **Relational Database – RDS**
   - Mainly used for online transaction processing (OLTP)
   - Stores items across a set of related tables.
   - Contains Database, Tables with rows and Columns.
   - Data is saved in the form of tables and fetched in rows using SQL.
   - Uses SQL to fetch/insert data.
   - Supported RDS DB's are: Oracle, SQL Server, MYSQL, AuroraDB, Maria DB, PostgreSQL.

Database Basics

Quiz Score		
Student ID	**Quiz**	**Score**
8173233871	1	90%
8173233871	2	88%
9728812345	1	65%
5871233456	1	75%
5871233456	2	71%

2. **NoSQL Database – Dynamo DB**
   - Dynamo DB (AWS Managed Service), Mongo DB.
   - NoSQL databases typically store each item as a single document for high scalability.
   - Data is fetched using JSON (Java Script Object Notation format)

Database Basics

3. **Warehousing Database - RedShift**
   - Helps to generate analytical reports from huge data.
   - Many Warehousing databases store data in the form of cube. But redshift stores columnar data.

Relational Database

- **Database Installed in EC2**
  - Supports any database that can be installed on server.
  - It does not support Amazon's Aurora DB, It is only available on RDS.
  - Minimum limitations Click here to see limitations
  - Maximum responsibility (System administration, security, antivirus, backup, replication etc.)
- **RDS**
  - Oracle, SQLServer, MySQL, Aurora, MariaDB, PostgreSQL.
  - Many limitations (Many features of the database are disabled)
  - Managed Service / Minimum Responsibility (AWS take care of Operating System, Anti-virus and Mirroring etc.)

RDS License Model

1. License Included with the instance.
2. Bring your own license (BYOL).

Maximum instances in RDS

- Default limit is **40** (including sum of Amazon Aurora, MySQL, MariaDB, Oracle, SQL Server, or PostgreSQL)
- Limit of instances with BYOL is **10** (for SQL Server or Oracle)
- More instances can be created by requesting AWS

RDS – Automated Backups and Snapshots

- **Automated Backup**
  - Keeps backup up to 35 days
  - First backup is free
  - Takes full backup everyday and then takes transactional backup
  - Supports point in time recovery
  - When you delete RDS instance, automated backup is also deleted
- **Snapshot**
  - Taken manually
  - IT does not take transaction log backup, so it does not support point in time recovery

AWS also supports backup and restore of RDS Database manually from S3 bucket.

RDS – Multi-AZ and Read-Replica

- **Multi-AZ**
  - Passive copy of database in another availability zone for disaster recovery.
  - RDS also uses Multi-AZ to take backup and to keep the database available during backup.
  - In case of disaster, Multi-AZ database becomes active without any downtime.
  - Multi-AZ is not used to improve performance.
- **Read-Replica**
  - Read-only copy of database in another AZ to distribute read load.
  - Any write operation on read-replica will break its replication.
  - Amazon Aurora DB in RDS support Cross-Region replication as well.
  - Automatic backup should be turned on for read-replica.
  - You can have up to 5 read-replica of a database.
  - You can create read-replica of read-replica database but it will cause latency.
  - You cannot create read-replica of Multi-AZ (passive) database.

Dynamo DB

- Fully Managed and fast NoSQL Database service.
- It can be scaled-up easily without any downtime.
- Stores data in SSD
- Instance is deployed on 3 geographically distinct data centers.

Dynamo DB – Read consistency

- **Eventual Consistent Read (Default)**
  - Any update in data is replicated to its copies within a second.
  - Reading data right after modifying can give wrong response.
  - Much cheaper than strongly consistent read option.
- **Strongly Consistent Read**
  - Costs much more than eventual consistent read.
  - Fetching data right after updating will always give correct response.

Elasticache

- Amazon ElastiCache is a web service that makes it easy to deploy, operate, and scale an in-memory data store or cache in the cloud.
- Helps to improve performance by keeping frequently accessed and rarely modified data in fast memory instead of slower disk.
- **Memcached**
  - Widely used.
  - Does not support Multi-AZ
- **Redis**
  - Open-source, key-value store
  - Supports master-slave replication and Multi-AZ

Redshift

- Fully managed **Data-Warehousing service**
- Supports data up to petabyte
- 10 times cheaper than other data warehousing solutions
- 10 times faster
- Stores columnar data (data is kept separate for each column in sequence)
- Columnar data supports additional compression.
- Massively Parallel Processing (Distributes load in different nodes).

Redshift Nodes

- **Single Node**
  - Runs on single node if the size of data is not greater than 160GB.
- **Multiple Node**
  - Data and Load is distributed in nodes if data is more than 160GB
  - Leader Node:
    - Acts as a leader of compute nodes
    - Manages client connections and forwards requests to compute nodes.
    - AWS does not charge for leader node.
  - Compute Node:
    - Performs computations on the data
    - An instance can have up to 128 compute nodes

Database Migration Service (DMS)

- AWS Database Migration Service helps you migrate databases to AWS easily and securely. The source database remains fully operational during the migration, minimizing downtime to applications that rely on the database.
- The service supports homogenous migrations such as Oracle to Oracle, as well as heterogeneous migrations between different database platforms, such as Oracle to Amazon Aurora or Microsoft SQL Server to MySQL.
- Supports migrating real-time databases.
- Charges minimal amount for migration.
- Schema is migrated through AWS Schema Migration Tool, Data is migrated through DMS.

Question..

- You are hosting a MySQL database on the root volume of an EC2 instance. The database is using a large amount of IOPs and you need to increase the IOPs available to it. What should you do?

A. Migrate the database to an S3 bucket.

B. Migrate the database to Glacier.

C. Add 4 additional EBS SSD volumes and create a RAID 10 using these volumes.

D. Use Cloud Front to cache the database.

Question..

- Under the shared responsibility model for DynamoDB which of the following is NOT a responsibility of Amazons.

A. Patching the Xen Hypervisor.

B. Destruction of magnetic storage media on decommissioning of disks.

C. Patching the underlying DynamoDB operating system.

D. Restricting access of DynamoDB so that only the customers web application in EC2 can write data to it.

Question..

- What AWS DB platform is most suitable for OLTP?

A. Elasticache
B. RDS
C. RedShift
D. DynamoDB

Questions?