RDS(Relational Database Service):

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It is an web service that makes it easy to setup and maintain databases in aws cloud.

It provides cost-efficient, resizable capacity for databases.

The main advantage of rds is it can be resized.

You can resize cpu, memory, storage whenever you want.

You can use regular databases in RDS like mysql, mariaDB, postgre SQL, Microsoft SQL, oracle and Amazon aurora DB.

You can setup your databases in different AZ. It will replicate the entire DB.

In case, if your db in an AZ is failed.

Managed Database instance for one or more databases.

After creating an RDS DB, it gives an endpoint. With this endpoint you can connect to your DB from EC2 instance.

Types of databases:

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Relational and Non-Relational database

Relational database stored information in tables.

Often, these tables have shared information between them, causing a relationship to form between tables.

This is where a relational database gets its name from.

Example: MySql, Oracle, MariaDB, Postgres and MS-SQL

Non-Relational Database,sometimes called NoSQL (Not Only SQL), is any kind of database that doesn’t use the

tables, fields, and columns structured data concept from relational databases.

Example: MongoDB, BigTable, Redis, RavenDb, Cassandra, and CouchDb.

Database on ec2:

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We can configure our database on ec2.

Webserver

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Application

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Database

If you want to host a application then we need webserver and database also to store data.

The above example is called as 3tier architecture.

We need to run all the 3 components.

We can install all the 3 components in the same machine but still it is not recomended.

Why should you run db on EC2?

Access to the DB instance OS

Vendor Demands

DB or DB version that aws doesn’tprovide.

Why shouldn't you run DB on EC2?

Admin overhead

Backup and DR (Disaster Recovery)

Ec2 is running in single AZ

Will miss out features from aws DB products.

Performance will be slower than aws options.

Install Db on ec2 steps:

Begin Configuration :

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sudo su -

yum -y install mariadb-server wget

systemctl enable mariadb

systemctl start mariadb

yum -y update

Set Environmental Variables

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DBName=ec2db

DBPassword=admin123456

DBRootPassword=admin123456

DBUser=ec2dbuser

Database Setup on EC2 Instance:

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echo "CREATE DATABASE ${DBName};" >> /tmp/db.setup

echo "CREATE USER '${DBUser}' IDENTIFIED BY '${DBPassword}';" >> /tmp/db.setup

echo "GRANT ALL PRIVILEGES ON \*.\* TO '${DBUser}'@'%';" >> /tmp/db.setup

echo "FLUSH PRIVILEGES;" >> /tmp/db.setup

mysqladmin -u root password "${DBRootPassword}"

mysql -u root --password="${DBRootPassword}" < /tmp/db.setup

rm /tmp/db.setup

Adding some dummy data to the Database inside EC2 Instance:

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mysql -u root --password="${DBRootPassword}"

USE ec2db;

CREATE TABLE table1 (id INT, name VARCHAR(45));

INSERT INTO table1 VALUES(1, 'Virat'), (2, 'Sachin'), (3, 'Dhoni'), (4, 'ABD');

SELECT \* FROM table1;

RDS Database Instance:

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Database connects with a CNAME.RDS uses standard database engines.

DB can be optimized with db.m5 general,db.r5 memory,db.t3 burst.

when we provision an instance,we also provision one ebs storage that

is dedicated to instance.

Ebs storage will also be in the same AZ.

If ebs storage fails for some reason then RDS will also fail to operate.

Migrating DB from EC2 to RDS:

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1) Get the dump of your existing DB on EC2

mysqldump -u root -p database\_name > file\_name.sql

2) Migrate the DB dump that you have taken in step 1 to RDS

mysql -h <replace-rds-end-point-here> -P 3306 -u <user\_name> -p database\_name < ec2db.sql

3) Connect to your RDS DB instance

mysql -h <replace-rds-end-point-here> -P 3306 -u rdsuser -p

4) Switch to the database and verify the details.

USE rdsdb

SELECT \* FROM table1;

RDS Multi Az (High-Availability):

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Multi Az option can be enabled on rds instance and it will create a replica/standby db of original db

in anaother availability zone.

The ebs volume attached for standby db will be in the created in the same region.

RDS access only via database CNAME. so we cannot access standy db for any reason via RDS.

Standby replica cannot be used as extra capacity.

synchronus replication means if some is written in the db then the same will be replciated in standby db.

This is helpful if for some reasons primary is not working as expected then aws will detect

and it will take 1-2 mins to create a new instance.(Fail Over)

Fail over means it will have some downtime.

Fault tolerance means there will be no downtime.

Points to remember:

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1) Multi AZ feature is not free and we need to pay twice the price.

2) Standy replcia cannot be accessed directly unless a failure occurs.

3) Failover is highly available, not fault tolerant.

4) Backups taken from standby (Removes performance impacts)

5) Multi AZ will be created in same region.

RDS Backup and Restores:

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Key Terminologies in Backup and Restores.

1) RPO

2) RTO

RPO - Recovery Point Objective

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1) Time between the last backup and whenver the failure occured.

Ex: We have taken backup at 6 a.m and failure happened at 7 a.m

then RPO is for 1 hour and we will loose 1 hr of data.

2) Amaount of maximum data loss.

3) Business provides an RPO value.

4) influence technical solution and case.

RTO- Recovery Time Objective

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1) Time between the DR event and full recovery.

Ex: Disaster happened at 6 a.m and you took 30 mins to restore back the DB.

Then 30 mins we can say as RTO.

2) Influenced by process,staff,tech and documentation.

Backups:

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1) First snap is full size of consumed data.

After first snapshot it will only capture the latest data written to db.

2) Manual snapshots will remain in your aws account even after the life

of snapshot,these needs to be deleted manually.

3) Automatic Snapshots.

4)Automatic cleanups can be anywhere from 0 to 35 days.

5) When you delete the db,they can be retained but they will

expire based on thier retention period.

Points to Remember:

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1) When performing a restore,RDs creates new endpoint address.

2) Restores aren't fast, think about RTO.

RDS Read-Replicas:

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Read Replcias is a copy of the primary instance.

Use case: Let’s assume we have a primary RDS instance that serves both read and write traffic.

Due to the size of the instance and the amount of read-intensive traffic being directed to the

database for queries. the performance of the instance is taking a hit.

To help resolve this, you can create a read replica. A snapshot will be taken of your database,

and if you are using Multi-AZ, then this snapshot will be taken of your secondary database instance

to ensure that there are no performance impacts during the process. Once the snapshot is completed,

a read replica instance is created from this data.

1) Asynchronous replication.

2) It is written fully to the primary instance.

once its stored-on disk,it is then push to the replcia db.

This means there could be small log.

3) These can be created in the same region or different region,it is a cross region replication.

why we need Read Replicas:

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1) We can create 5 read-repicas per DB instance.

2) Each of these provides an additional instance of Read performance.

3) This allows you to scale out read operations for an instance.

4) Can provide global performance improvments.