



# DAY - 11

## AWS RDS

# AWS Architecture and Design

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1. Day 1 Overview of Cloud Computing
2. Day 2 Overview of AWS
3. Day 3 Amazon EC2\*
4. Day 4 Amazon EBS \*
5. Day 5 Amazon CloudWatch \*
6. Day 6 Amazon S3\*
7. Day 7 Amazon Elastic Load Balancer \*
8. Day 8 Amazon Auto Scaling \*
9. Day 9 Amazon VPC \*
10. Day 10 Amazon IAM \*
11. **Day 11 Amazon RDS**
12. Day 12 Amazon Route 53 \*
13. Day 13 Amazon DynamoDB\* & Glacier
14. Day 14 Amazon Cloudfront\* & Import Export & Amazon SES \*
15. Day 15 Amazon ElasticBeanStalk & Amazon Cloudformation & Amazon OpsWorks
16. Day 16 AWS Economics & AWS Account Overview \*
17. Day 17 AWS Architecture
18. Day 18 AWS Certification Preparation

[With Hands on Demo]

# AWS Relational Database Service

# AWS RDS

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What is RDS?

- RDS Offerings
  - Multi AZ
  - Read Replica
  - Instance Types
- Demo

# The Data is Going to Cloud

## On-Premise



- ☐ Managed by Organization
- ☐ On-Premise or third party hosted
- ☐ Scale upto limit
- ☐ Under Utilized
- ☐ CAPEX
- ☐ Manage DR, backup, HA, Security, Patch on your own

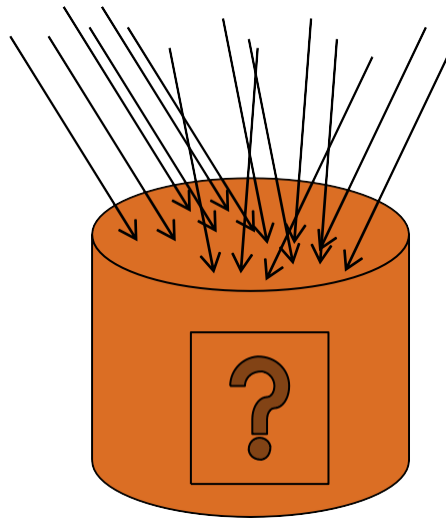
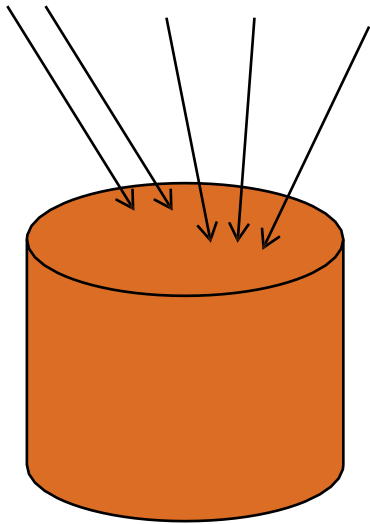
## DBAAS



- ☐ Deployed in Cloud
- ☐ Scalable
- ☐ Resource pooling with optimal resource usage
- ☐ OPEX
- ☐ Easy to manage or managed by Cloud provider

# Can You Scale Your DB?

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# Database Systems Offered by AWS



EC2

Host your own  
DB in IaaS

Manage on  
your own but  
get advantage  
of IaaS

RDS

Host your own  
DB in AWS  
managed DB

Managed by  
AWS

DynamoDB

No SQL  
Offering

Fully Managed  
by AWS

# Amazon RDS

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Amazon Relational Database Service (Amazon RDS) is a web service that makes it easy to set up, operate, and scale a relational database in the cloud.

AWS managed service can be accessed using popular tools.





# Why RDS

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AWS  
managed DB

Automated  
Patches,  
Backup

Scaling

HA & DR

The most  
popular DBs  
of the world

High IOs

High IOs

Snapshot

Security

Reliability

AWS Aurora

Agile and  
works with  
popular tools

# RDS Features



Managed DB

Select your own size

Automated Backups

Snapshot for manual backups

Scale with minimal efforts

Automated Patching

# RDS Features



Event Management

Pre configured Parameters

Optional Groups for Add on features

Works with VPC for security

Cloudwatch for monitoring

High IOPS

# RDS Features



Read Replica

Multi AZ

Resilient to failures

Automated Maintenance

DNS for easy access

Supports Logs & Performance Tuning

# RDS – Components

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## RDS Instance

- An isolated DB environment running in the Cloud. It will have multiple user created DataBases. Each DB instance runs a DB engine based on different type of database.

## Instance Class

- Like EC2, it offers various sized of the DB based on CPU and memory (Micro, Large, 4xLarge etc.)

## Regions & Zones

- Hosted in HA AWS regions & Zones. Does support Multi-AZ for HA.

## VPC

- Host in private VPC and securely access DB only from public VPC.

# RDS – Components

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## Automated Backups

- A unique feature to recover data upto last few minutes

## Parameter Group

- Manage configuration of DB engine

## Options Group

- Tools to simplify DB access or use add on tools. Available for Oracle, MySQL, MS SQL

## Security Group

- Control access to DB

## Instance Maintenance

- A time where DB will undergo maintenance. It may/may not have downtime based on changes. (Scaling, Patching)

# RDS – Multi AZ

Amazon RDS provides high availability and failover support for DB instances using Multi-AZ deployments. Multi-AZ deployments for Oracle, PostgreSQL, MySQL, and MariaDB DB instances use Amazon technology, while SQL Server DB instances use SQL Server Mirroring.

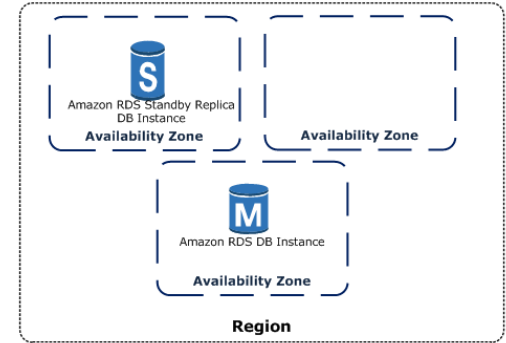
Synchronous physical replication, keeping data on the standby up-to-date with the primary

Automatic provision. Maintains a synchronous replica in other AZ

Data Redundancy, eliminates I/O Freezes & minimum latency during system backup or maintenance

HA & protection against DB instance failure

<http://docs.aws.amazon.com/AmazonRDS/latest/UserGuide/Concepts.MultiAZ.html>



# RDS – Multi AZ

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Multi-AZ deployments for the MySQL, Oracle, and PostgreSQL engines utilize synchronous physical replication to keep data on the standby up-to-date with the primary. Multi-AZ deployments for the SQL Server engine use synchronous logical replication to achieve the same result, employing SQL Server-native Mirroring technology. Both approaches safeguard your data in the event of a DB Instance failure or loss of an Availability Zone

Amazon Aurora employs a highly durable, SSD-backed virtualized storage layer purpose-built for database workloads. Amazon Aurora automatically replicates your volume six ways, across three Availability Zones. Amazon Aurora storage is fault-tolerant, transparently handling the loss of up to two copies of data without affecting database write availability and up to three copies without affecting read availability.

High availability does not mean that Amazon keeps, for example, two databases running in parallel; it is the data on disk that is replicated. If the primary DB instance becomes unavailable, a failover begins and the database software is started on the standby replica. The time it takes for the failover to complete depends on the database activity and other conditions at the time the primary DB instance became unavailable. When the failover is complete, it can take additional time for the RDS console UI to reflect the new Availability Zone.

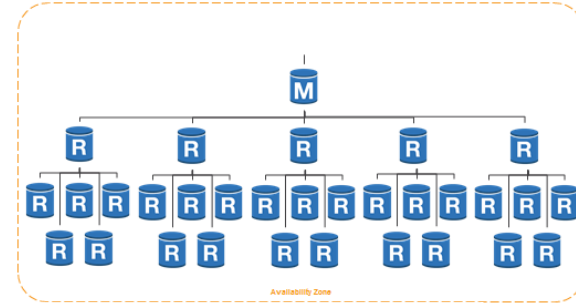
RDS handles failovers automatically so you can resume database operations as quickly as possible without administrative intervention. The primary DB instance switches over automatically to the standby replica. The automatic failover mechanism simply changes the canonical name record (CNAME) of the main DB instance to point to the standby DB instance.



# RDS – Read Replicas

Amazon RDS Read Replicas provide enhanced performance and durability for Database (DB) Instances. This replication feature makes it easy to elastically scale out beyond the capacity constraints of a single DB Instance for read-heavy database workloads.

Asynchronous copy of RDS Database



MySQL & PostgreSQL's native replication to propagate changes made to a source DB Instance to any associated Read Replicas. Data may lag due to asynchronos.

create one or more replicas of a given source DB Instance and serve high-volume application read traffic from multiple copies of your data to increase aggregate read throughput

Amazon Aurora employs an SSD-backed virtualized storage layer purpose-built for database workloads. Amazon Aurora Replicas and share the same underlying storage as the source instance, lowering costs and avoiding the need to copy data to the replica nodes

# Amazon RDS Engine Features

## Oracle

Oracle VM with hard partitioning

SSL / Oracle Native Network Encryption

BYOL & License Included

Oracle Golden Gate Support

6TB storage and 30,000 IOPS

## MySQL

Supports Multi AZ & Read Replica

Encrypt data with AWS Key Management Service

Encrypt data with AWS Key Management Service

Migrate to Aurora

6TB storage and 30,000 IOPS

## Aurora

MySQL Compliant

five times better performance than MySQL

Encryption at Rest

replicating 6 copies of data across 3 Availability Zones

Automatic DB growth in 10 GB size upto 64 TB

## SQL Server

2014 Express, Web, & Standard also Enterprise

BYOL & License Included

Only Multi AZ

Can not increase IOPS & storage of existing DB

4TB storage and 20,000 IOPS

<http://aws.amazon.com/rds/pricing/>

# RDS – Volumes & IOPS



- Does support General purpose, PIOPS & magnetic volume types.
- Provisioned IOPS provides dedicated number of IO requests that the system is capable of processing concurrently.
  - » Increased concurrency allows for decreased latency since IO requests spend less time in a queue.
  - » Decreased latency allows for faster database commits, which improves response time and allows for higher database throughput
- You can provision a PostgreSQL, MySQL or Oracle DB instance with up to 30,000 IOPS and 6 TB of allocated storage.
  - » You can provision a SQL Server DB instance with up to 20,000 IOPS and 4 TB of allocated storage.

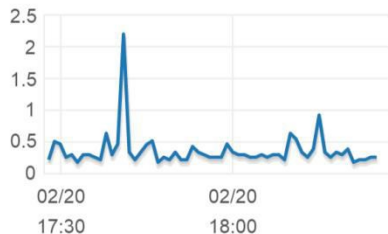
	Range of Provisioned IOPS	Range of Storage	Range of IOPS to Storage (GB) Ratio
MySQL	1000 - 30,000 IOPS	100 GB - 6 TB	3:1 - 10:1
MariaDB	1000 - 30,000 IOPS	100 GB - 6 TB	3:1 - 10:1
PostgreSQL	1000 - 30,000 IOPS	100 GB - 6 TB	3:1 - 10:1
Oracle	1000 - 30,000 IOPS	100 GB - 6 TB	3:1 - 10:1
SQL Server Express and Web	1000 - 20,000 IOPS	100 GB - 4 TB	3:1 - 10:1
SQL Server Standard and Enterprise	1000 - 20,000 IOPS	200 GB - 4 TB	3:1 - 10:1

[http://docs.aws.amazon.com/AmazonRDS/latest/UserGuide/CHAP\\_Storage.html](http://docs.aws.amazon.com/AmazonRDS/latest/UserGuide/CHAP_Storage.html)

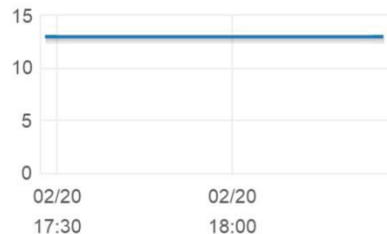
# How do I Monitor My Database?



**CPU Utilization (Percent)**



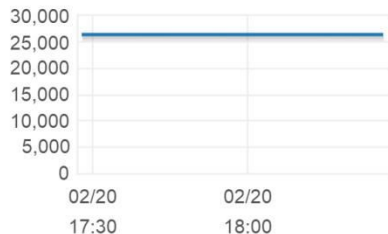
**DB Connections (Count)**



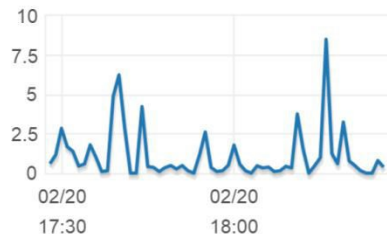
**Free Storage Space (MB)**



**Freeable Memory (MB)**



**Write Operations (Count/Second)**



**Read Operations (Count/Second)**



In the next video we will do hands on with AWS RDS

# Thank You

Email us – [support@intellipaat.com](mailto:support@intellipaat.com)

Visit us - <https://intellipaat.com>