Introduction

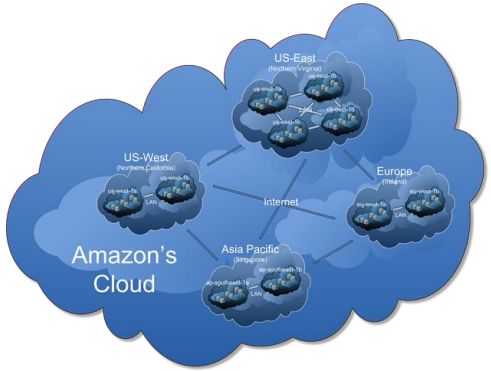
- Amazon Relational Database Service (Amazon RDS) is a web service that makes it easier to set up, operate, and scale a relational database in the cloud. It provides cost-efficient, resizable capacity for an industry-standard relational database and manages common database administration tasks.
- Amazon RDS provides you six familiar database engines to choose from, including Amazon Aurora, PostgreSQL, MySQL, MariaDB, Oracle, and Microsoft SQL Server.

History

- Amazon Relational Database Service (or Amazon RDS) is a distributed relational database service by Amazon Web Services (AWS).
- Amazon RDS was first released on 22 October 2009, supporting MySQL databases.
- This was followed by support for Oracle Database in June 2011, Microsoft SQL Server in May 2012, PostgreSQL in November 2013, and MariaDB (a fork of MySQL) in October 2015.
  In November 2014 AWS announced Amazon Aurora, a MySQL-compatible database offering enhanced high availability and performance.

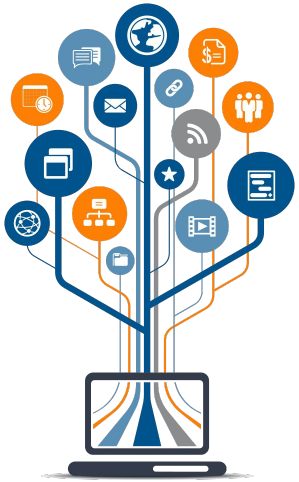
Motivation for RDS

- Amazon Relational Database Service (Amazon RDS) is a web service that makes it easier to set up, operate, and scale a relational database in the cloud
- It provides cost-efficient, resizable capacity for an industry-standard relational database and manages common database administration tasks.
- No need to handle the administrative tasks associated with running a relation database
  - Configuration
  - Back-up
  - Monitoring



Features

1. Amazon RDS has variety of qualities that are right for every customer.
2. Easy to Administer
    - Monitoring / Automatic Software Patching
- Highly Scalable
- Available and Durable
    - Multi-AZ Deployment / Backup
- Fast
- Secure
    - Network Isolation (VPC) / Encryption
- Inexpensive



Features

Easy to Use
Amazon RDS makes it easy to go from project conception to deployment, you can use simple API calls to access the capabilities of a production-ready relational database in minutes, also in minutes you can launch a database instance and connect your application.

Highly Scalable
You can scale your database's compute and storage resources with only a few mouse clicks or an API call, and you have easy storage. Come up with read replicas on the same region or different region to leverage high connection volumes.

Available and Durable
Amazon RDS runs on the same highly reliable infrastructure used by other Amazon Web Service, automated backup feature of Amazon RDS enables point-in-time recovery for your database instance.

Features

Fast

Amazon RDS Provisioned IOPS Storage is an SSD-backed storage option designed to deliver fast, predictable, and consistent I/O performance.Amazon RDS supports the most demanding database applications.

Secure

Amazon RDS allows you to encrypt your databases using keys you manage through AWS Key Management Service (KMS). On a database instance running with Amazon RDS encryption, data stored at rest in the underlying storage is encrypted, as are its automated backups, read replicas, and snapshots

Inexpensive

There is no up-front commitment with Amazon RDS; you simply pay a monthly charge for each database instance that you launch and you pay very low rates and only for the resources you actually consume.

Example Use Cases

1. I’m a developer or small startup building a new application.
2. No resources for a DBA
3. My database size changes dramatically.

Airbnb

We chose Amazon RDS because it simplifies much of the time-consuming administrative tasks typically associated with databases. We use Multi-Availability Zone (Multi-AZ) deployment to further automate our database replication and augment data durability. We were able to complete our entire database migration to Amazon RDS with only 15 minutes of downtime.

Bandai

Bandai Namco Studios uses Amazon RDS to provide better performance, lower costs, better security, and greater availability for their arcade, social and mobile games. Bandai Namco saw the benefit in terms of reductions in overhead, especially when it came to adding, modifying, and removing server resources.

Technology Advantages

Availability – AWS RDS is a highly available relational database that offers a feature called Multi-AZ, which provides a SLA up-time of 99.95%.

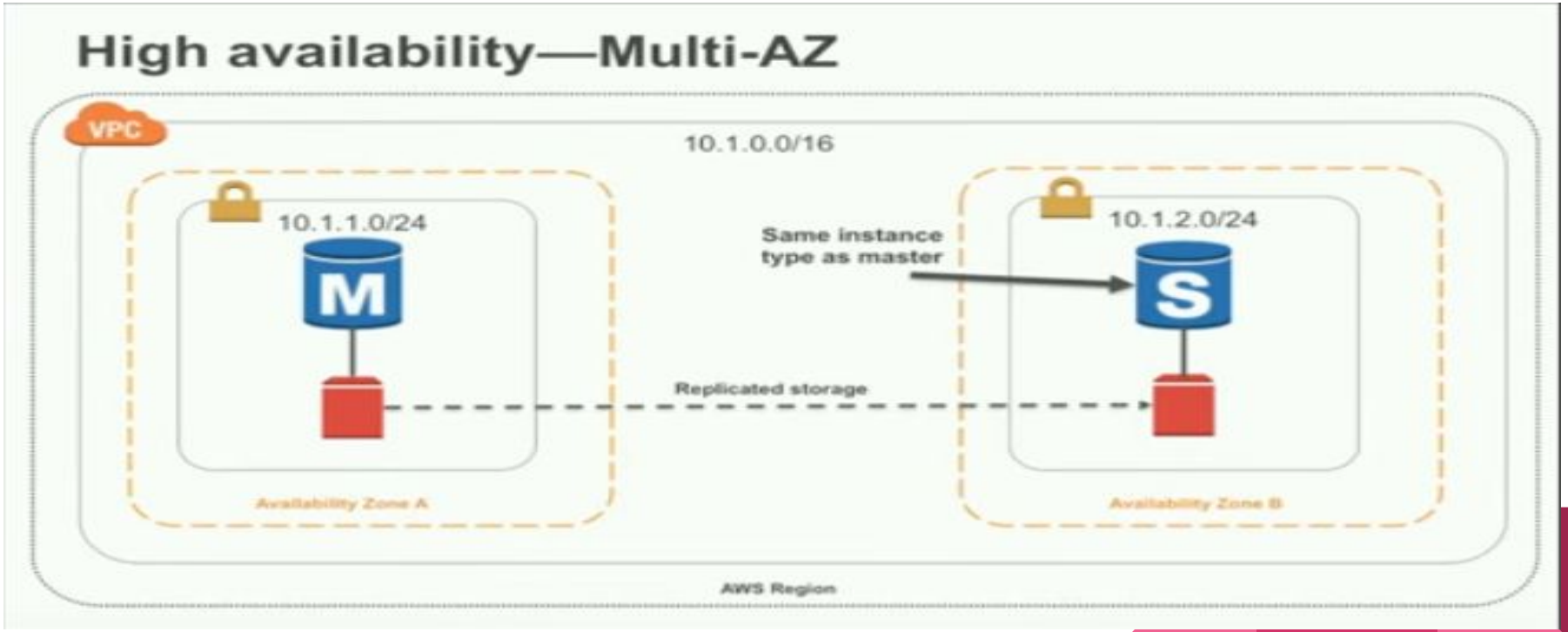
Vertical Scalability /Scaling Up – With RDS, Amazon enables push-button vertical scaling. This means that you can scale the size of an RDS instance [memory, CPU, PIOPS etc] or disk, either up or down, with the click of a button

Horizontal Scalability /Scaling Out – Horizontal scalability is an approach that distributes the total database across many RDS instances that will work together.

Backup – AWS RDS provides two types of backup mechanisms which are both very easy to setup:

- **Automated backup –** This functionality automatically performs a full daily snapshot of a database's data . It also captures your transaction logs as well as any updates to your RDS database.
- **Point-in-Time snapshots –** RDS database snapshots are user initiated. Unlike automated backup, which is performed once a day, point-in-time snapshots can be performed as many times as desired..

Key Feature of Multi-AZ, Failover and Backups



Technology Disadvantages

System Data – On Amazon RDS it's not possible to access and modify your system data. Eg, it is impossible to change the system timezone, you are forced to use UTC time zone, or it is impossible to make custom installations, as master-slave support.

Logs – Amazon RDS doesn't provide a full set of logs which sometimes are vital for debugging.

Sysadmin – There is no sysadmin access allowed to an RDS server, and some of the other elevated privileges also can’t be granted to a login (such as securityadmin, diskadmin, bulkadmin, dbcreator and diskadmin).

Usability

- Web UI
- Amazon CLI

```
aws rds modify-db-instance --db-instance-identifier sg-cli-test --db-instance-class
db.m4.large --apply-immediately
```

- AWS Lambda

```
import boto3

client=boto3.client('rds')

def lambda_handler(event, context):
    response=client.modify_db_instance(DBInstanceIdentifier='sg-cli-test',
                                       DBInstanceClass='db.m4.xlarge',
                                       ApplyImmediately=True)

    print response
```

Cost Discussion

EC2 instance vs AWS RDS instance

Single-AZ VS Multi-AZ Deployment

Other Cost

- Backup Storage
- Data Transfer

Cost EC2 VS RDS

	vCPU	Memory(GiB)	EC2 price per Hour	RDS price per Hour
t2 .micro	1	1	$0.012	$0.018
t2.small	1	2	$0.023	$0.036
t2.medium	2	4	$0.047	$0.073
t2.large	2	8	$0.094	$0.145
m4.large	2	8	$0.1	$0.182
m4.xlarge	4	16	$0.2	$0.365
m4.2xlarge	8	32	$0.4	$0.730
m4.4xlarge	16	64	$0.8	$1.461
m4.10xlarge	40	160	$2	$3.654

RDS Single AZ vs Multi AZ

	vCPU	Memory(GiB)	Single AZ	Multi AZ
t2 .micro	1	1	$0.018	$0.036
t2.small	1	2	$0.036	$0.072
t2.medium	2	4	$0.073	$0.146
t2.large	2	8	$0.145	$0.290
m4.large	2	8	$0.182	$0.364
m4.xlarge	4	16	$0.365	$0.730
m4.2xlarge	8	32	$0.730	$1.460
m4.4xlarge	16	64	$1.461	$2.922
m4.10xlarge	40	160	$3.654	$7.308

Other Costs for RDS

Database Storage

General Purpose SSD Storage 5GB to 6GB $0.115 / GB-month

Provisioned IOPS SSD Storage $0.125 / GB-month + $0.10 / IOPS-Month

With Provisioned storage, backup up to the total storage is free
Otherwise $0.095 / GB-month

Possible alternatives-Google Cloud Platform

Google Cloud Platform is a cloud computing service released on October 6, 2011 by Google that offers hosting on the same supporting infrastructure that Google uses internally for end-user products like Google Search and YouTube.

Google Cloud Platform Features:

Future-Proof Infrastructure – Secure, high-performance, global, cost-effective and constantly improving.

Powerful Data & Analytics – Build better products and fuel amazing applications.

Serverless, Fully Managed Computing – Grow from prototype to production to planet-scale, without having to think about capacity, reliability or performance.

Customer-Friendly Pricing – Google pricing innovations like per-minute billing and sustained use discounts save you money.

Data Center Innovation – Google's backbone network has thousands of miles of fiber optic cable, uses advanced software-defined networking and has edge caching services to deliver fast, consistent and scalable performance.

Security at Scale – Deploy on an infrastructure protected by more than 700 top experts in information, application, and network security.

Conclusions

- Amazon RDS provides high quality PaaS service and easy to use cloud service platforms while providing customers with reasonable cost.

- With Amazon RDS there is no up-front investment and customers can easily switch between any storage size.

Demo

Questions