Databases Services

Amazon Web Services

AWS Database Services

- Amazon Relational Database Service (RDS)
- Amazon Aurora
- Amazon DynamoDB
- Amazon Redshift
- Amazon ElastiCache
- Additional Database Services

Amazon Relational Database Service (RDS)

Amazon Web Services

What is a Database?

A database (DB), is an organized collection of data. With a database, you can easily store, access, query and analyze data. A Database Management System (DBMS) is a tool that enables users to interact with the database.

Primary Key

CustomerID	First Name	Last Name	Flat/House	Street	Town
Iaascust001	John	Major	24	Shelley Way	Wimbledon
Iaascust002	Edward	Smith	18	Brixham Road	Edgbaston
Iaascust003	Marcus	Manor	33	Delta Drive	Alberney
Iaascust004	Julia	Brown	34	Cavendish Ave	Harrow

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What is a Relational Database?

A relational database is a set of formally described tables from which data can be accessed or reassembled in many different ways without having to reorganize the database tables.

Primary Key

CustomerID	First Name	Last Name	Flat/House	Street	Town
Iaascust001	John	Major	24	Shelley Way	Wimbledon
Iaascust002	Edward	Smith	18	Brixham Road	Edgbaston
Iaascust003	Marcus	Manor	33	Delta Drive	Alberney
Iaascust004	Julia	Brown	34	Cavendish Ave	Harrow

Foreign Key

Primary Key

CustomerID	OrderID	Order Date	Order Amount
Iaascust002	Omega001	12 April 2019	$200.75
Iaascust002	Omega002	15 June 2019	$250.99
Iaascust002	Omega003	17 August 2019	$330.99

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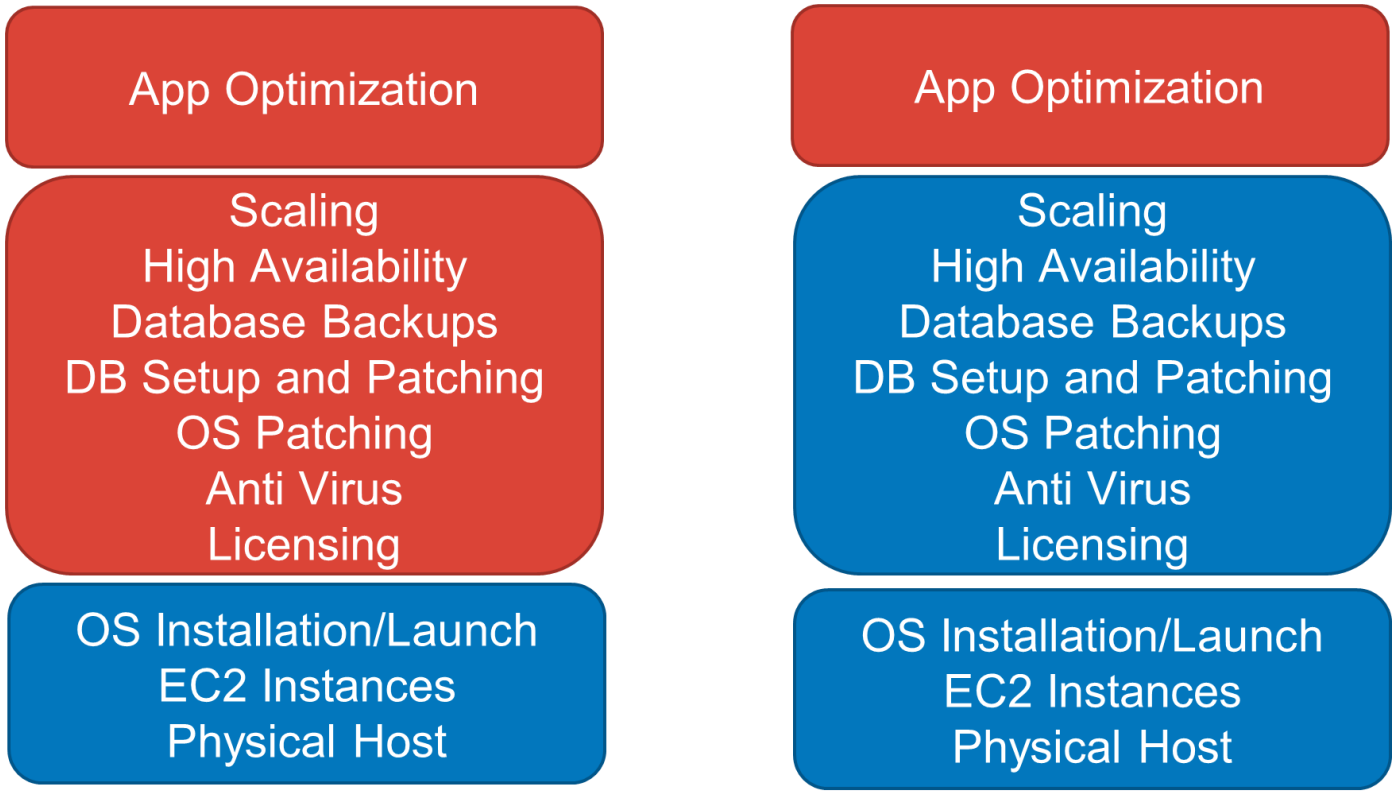
Relational Databases on AWS

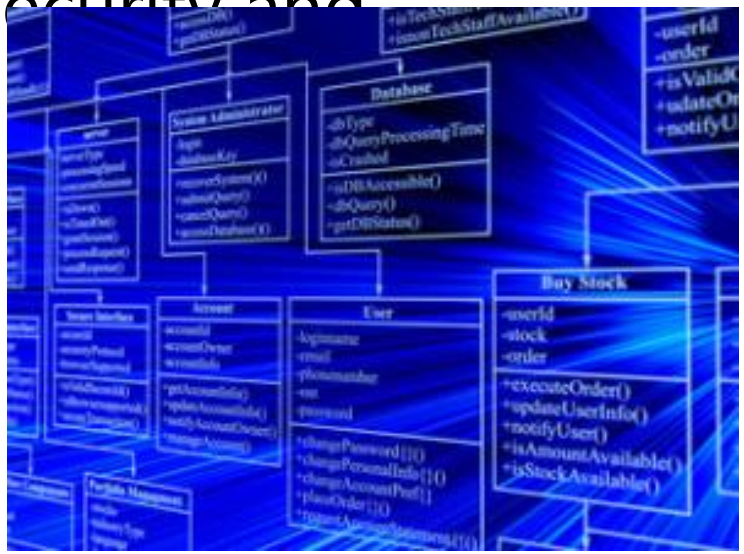
Two options available to host DBMS on Amazon Web Services

EC2 Instances vs. Amazon RDS



Amazon RDS

Amazon Relational Database Service (Amazon RDS) makes it easy to set up, operate, and scale a relational database in the cloud. It provides cost-efficient and resizable capacity while automating time-consuming administration tasks such as hardware provisioning, database setup, patching and backups. It frees you to focus on your applications so you can give them the fast performance, high availability, security and compatibility they need.



Amazon RDS – Decoupled Architecture

With Amazon RDS, instance types, storage, and IOPS are decoupled and can be scaled independently of each other, giving you flexibility of your database deployments.

Availability Zone A

Database Instance Class
- CPU
- Memory
- Performance

Database Instance Storage
- Magnetic
- General Purpose SSD
- Provisioned IOPS

Amazon RDS – 6 Engines

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Amazon RDS – Design for Security

Amazon CloudWatch

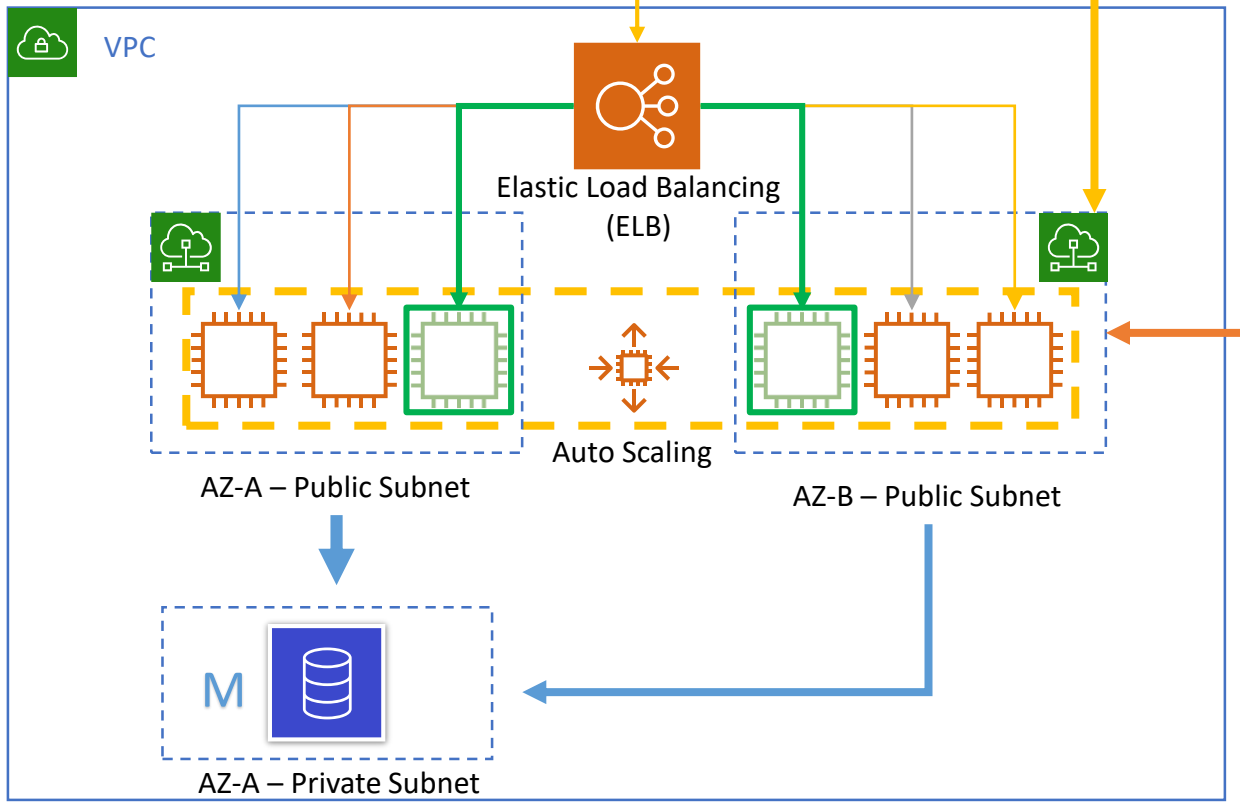
CPU Utilization > 80%
Launch Additional EC2 Instances

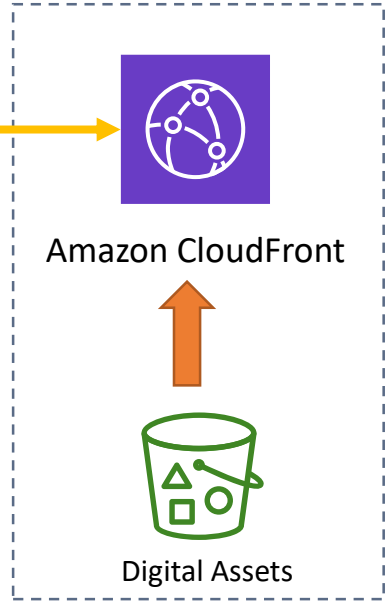
Alarm

AMI

Userdata (Scripts)

Configuration Options for EC2





IAM Roles

Configuration Files (HTML documents etc.)

Amazon RDS – Multi-AZ

When you setup RDS for Multi-AZ, it automatically creates a primary DB Instance and synchronously replicates the data to a standby instance in a different Availability Zone (AZ). During a failover process, Amazon RDS performs an automatic failover to the **standby** and you can quickly resume database operations as soon as the failover is complete. Since the endpoint for your DB Instance remains the same after a failover, your application can resume database operation without the need for manual administrative intervention.

Amazon RDS – Design for Security

Amazon CloudWatch

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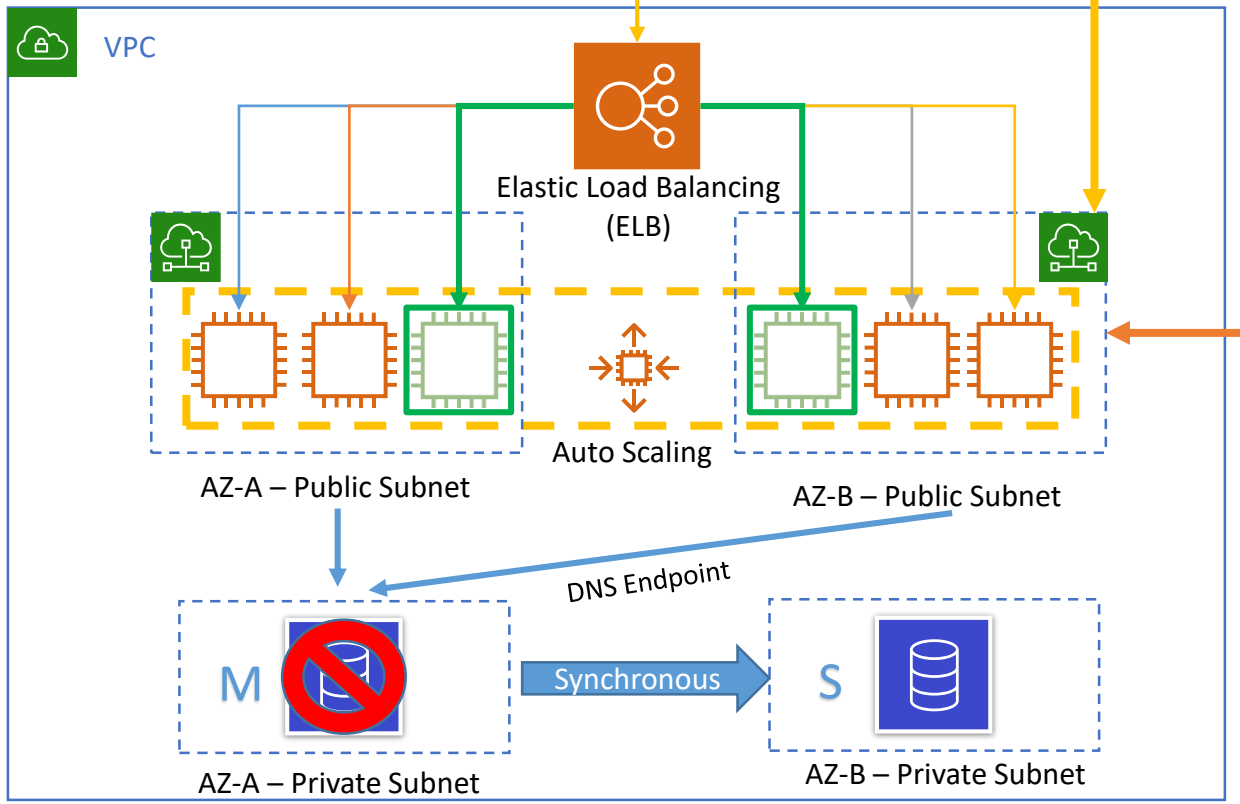

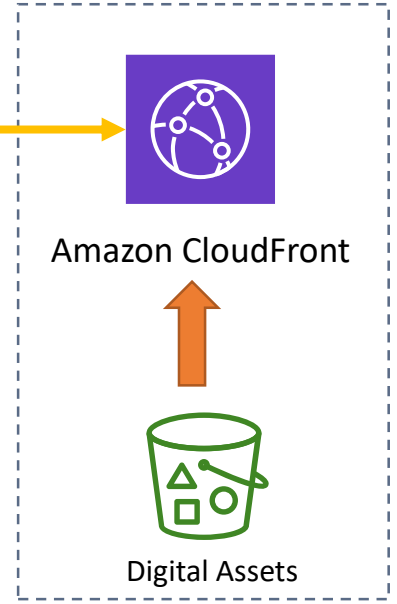

IAM Roles

Configuration Files (HTML documents etc.)

Amazon RDS – Design for Security

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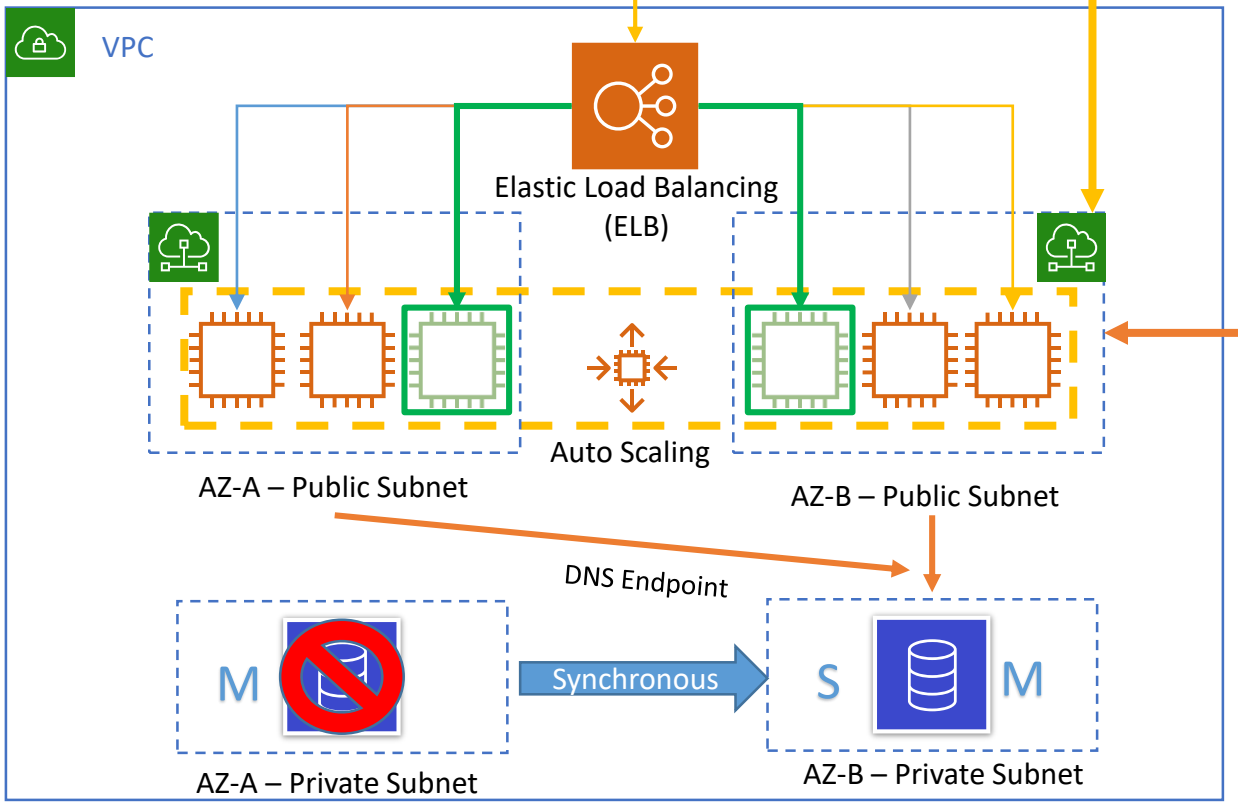
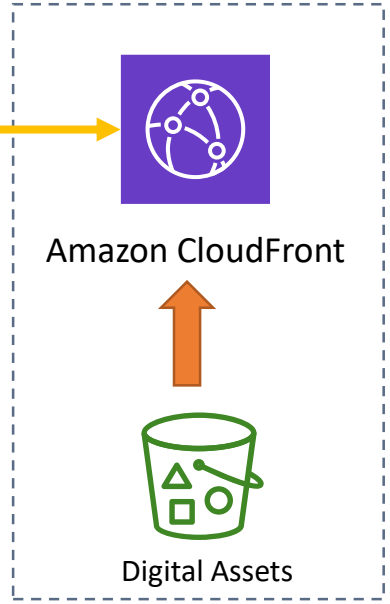




IAM Roles

Configuration Files (HTML documents etc.)

Amazon RDS – Backups

RTO & RPO

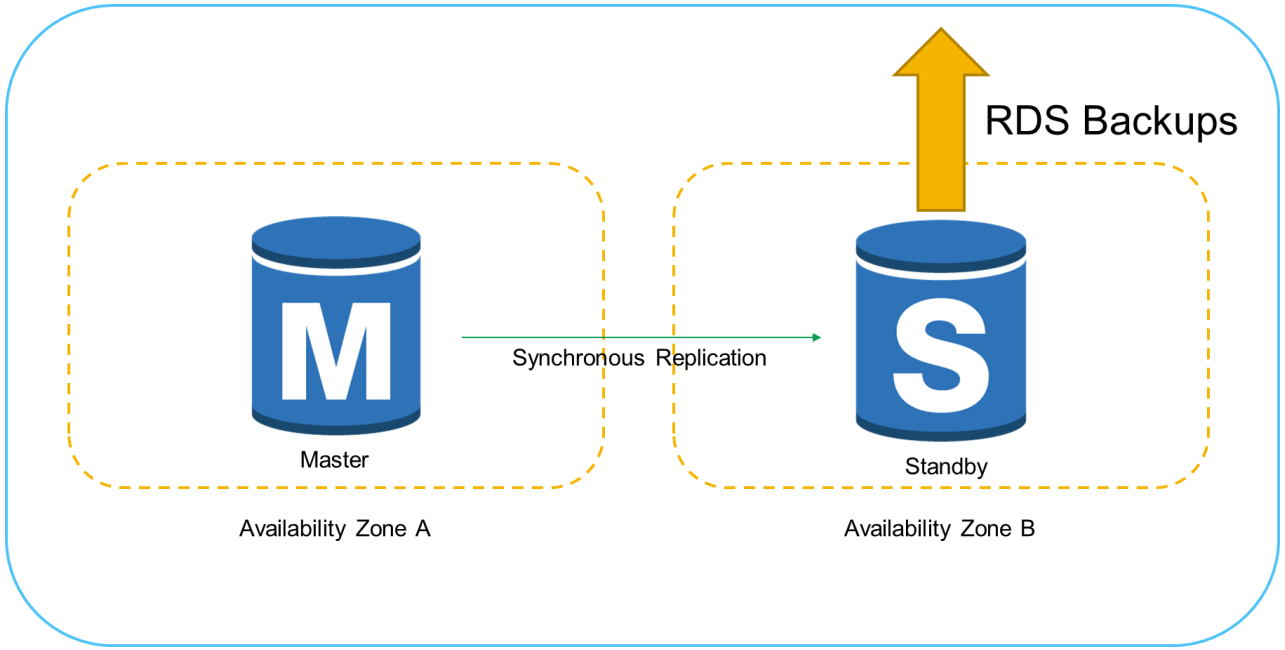
- Recovery Time Objective (RTO) - This the amount of time the business can be without the service, without incurring significant risks or significant losses.
- Recovery Point Objective (RPO) - This measures the maximum time period in which recent data might have been permanently lost in the event of a major incident.

I/O suspension issue

- When you create a snapshot of a Single-AZ DB instance, you will experience brief I/O suspension that can last from a few seconds to a few minutes, depending on the size and class of your DB instance

Amazon RDS – Backups

Multi-AZ DB instances are not affected by this I/O suspension since the backup is taken on the standby.



Amazon RDS – Scalability

Amazon RDS manages scalability to cope with demand. Two scalability options offered are

- Vertical Scalability – Scaling up involves the addition of additional resources on existing resources to improve performance
- Horizontal Scalability – Scaling out involves the additional of identical resources in a fleet to cope with demand and workload

Amazon RDS – Read Replicas

Amazon RDS offers read replicas for certain database engines such as MySQL, MariaDB, PostgreSQL and Amazon Aurora. Read Replicas are read only copies of a database instance and offers the ability to scale out beyond the limitations of a single DB instance for read heavy database workloads.

You can redirect all read only traffic to read replicas of your database and this in turn can help you maintain your primary database performance levels.

Amazon RDS – Design for Security

Amazon CloudWatch

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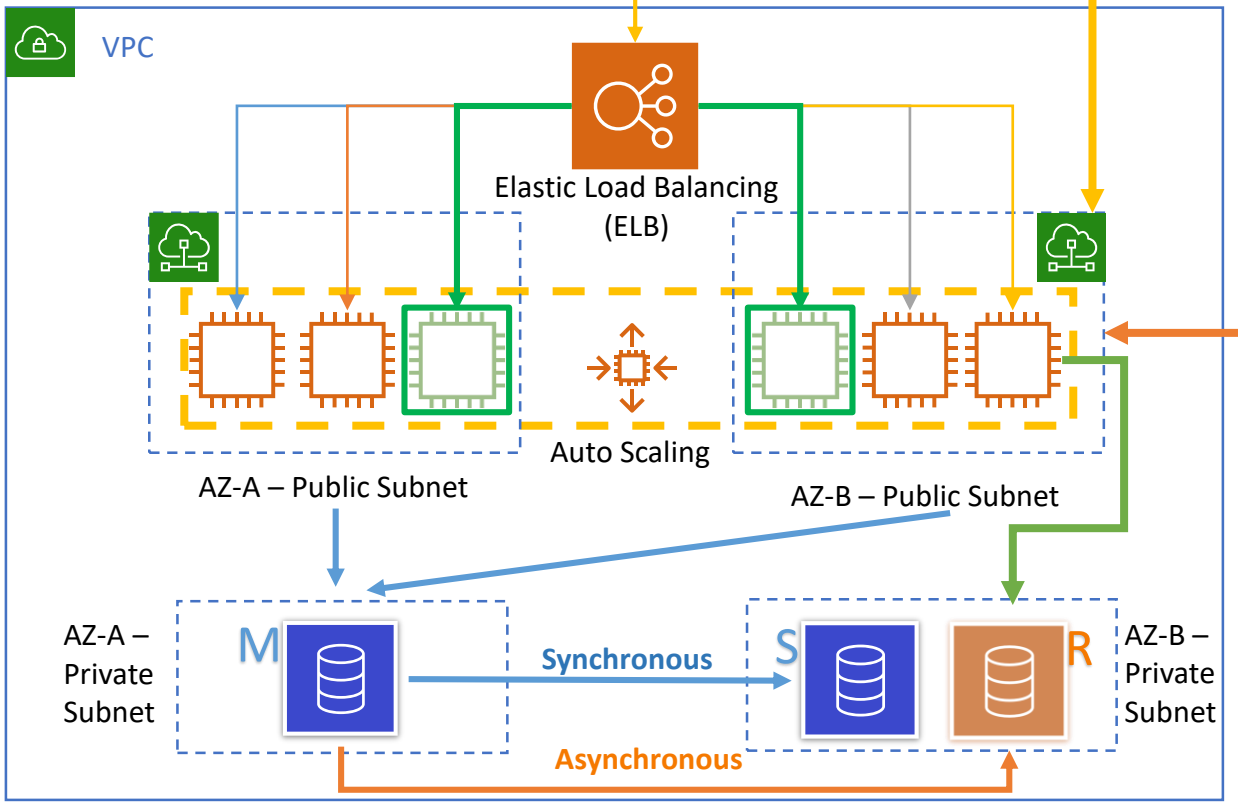
Configuration Options for EC2



Amazon CloudFront

Digital Assets

IAM Roles

Configuration Files (HTML documents etc.)

Amazon RDS

Multi-AZ Deployments	Read Replicas
Synchronous replication – highly durable	Asynchronous replication – highly scalable
Only database engine on primary instance is active	All read replicas are accessible and can be used for read scaling
Automated backups are taken from standby	No backups configured by default
Always span two Availability Zones within a single Region	Can be within an Availability Zone, Cross-AZ, or Cross-Region
Database engine version upgrades happen on primary	Database engine version upgrade is independent from source instance
Automatic failover to standby when a problem is detected	Can be manually promoted to a standalone database instance

Next Video

Create an RDS Database - Lab