Solution Training for Partners: Technical Foundations

An Introduction to the Principles of AWS Solution Architecture

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Course Content

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- What is AWS?
- What is an AWS Solutions Architect?
- “You know more than you realize.”
- What do customers want to know about AWS?
- Principles of AWS solution design: The Well-Architected Framework
- Designing a solution: A customer case study
- Common solution patterns
- Takeaways and next steps

Learning Objectives

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In this course, you will learn:

- Design a basic solution using AWS services
- Select the right AWS services for a customer's use case
- Anticipate and address customer concerns about digital transformation
- The foundational principles of the AWS Well-Architected Framework
- Some best-practices, architecture patterns for some typical AWS solutions

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Customers Are Moving to AWS

Why Customers are moving to AWS

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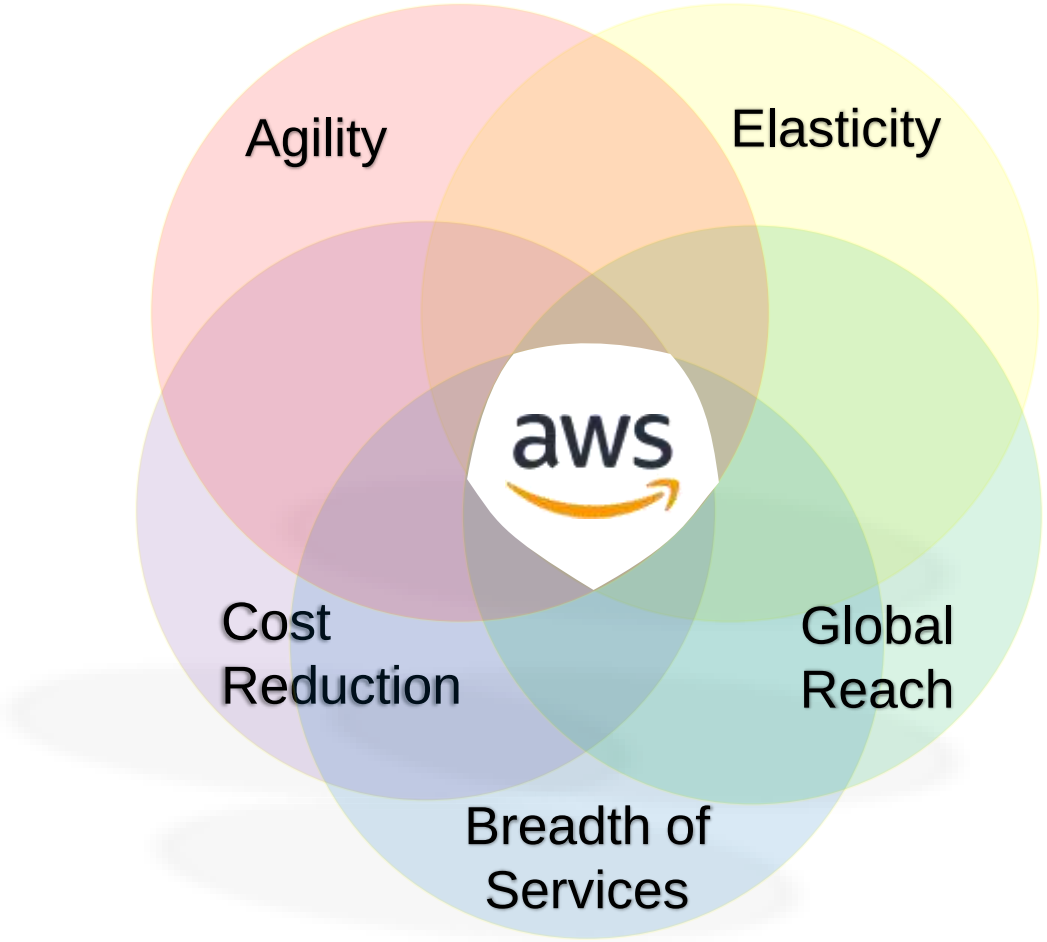

Why Customers are Moving to AWS

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- Trade Capital Expense for Variable Expense
- Increase Speed & Agility
- Streamline & Enhance Infrastructure Decisions
- Reduce Expenses

- Scale Globally
- Increase Innovation
- Accelerate Time to Business Value

What Sets AWS Apart?

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Enterprise Leadership

Building and managing the cloud since 2006

Service Breadth and Depth

Over 125 services

Pace of Innovation

1,430 Features in 2017

Global Presence

55 Availability Zones in 18 geographic regions around the world

Amazon Culture

67 proactive price reductions

Security

#1 Priority

Largest Partner Ecosystem

AWS Marketplace and APN

Hybrid Cloud

Broadest set of hybrid capabilities of any cloud provider

Why AWS?

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- Large and rapidly growing business
- Millions of active customers every month
- Reduced prices 65 times since 2006
- Expanding services
- Launched 1,017 new features and services in 2016
- Launched 1,430 new features and services in 2017
- Amazon S3 holds trillions of objects and peaks at millions of requests per second
- Amazon Aurora is the fastest growing service in AWS history

Why AWS?

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- More than 60,000 databases migrated using AWS Database Migration Service.
- More than 100,000 AWS customers use Amazon DynamoDB. Well over one trillion requests per day.
- Since October 2015, AWS Snowball has moved more than 5 billion objects into Amazon S3
- AWS Snowball appliances have traveled a distance equal to circling the world more than 100 times.

AWS Positioned as a Leader in the Gartner Magic Quadrant for Cloud Infrastructure as a Service, Worldwide*

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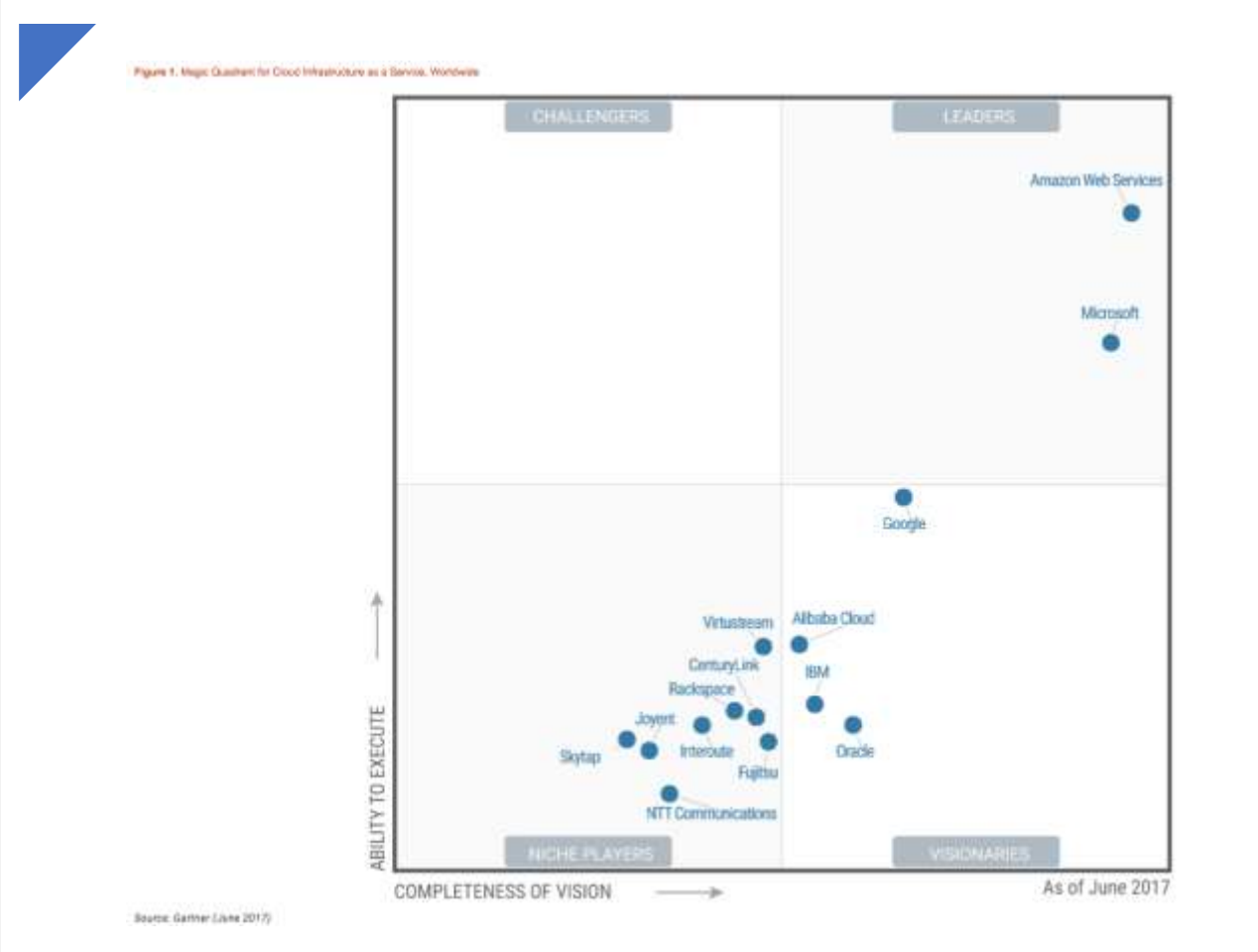
AWS is positioned highest in execution and furthest in vision within the Leaders Quadrant



*Gartner, Magic Quadrant for Cloud Infrastructure as a Service, Worldwide, Leong, Lydia, Petri, Gregor, Gill, Bob, Dorosh, Mike, August 32016
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AWS Marketplace Overview

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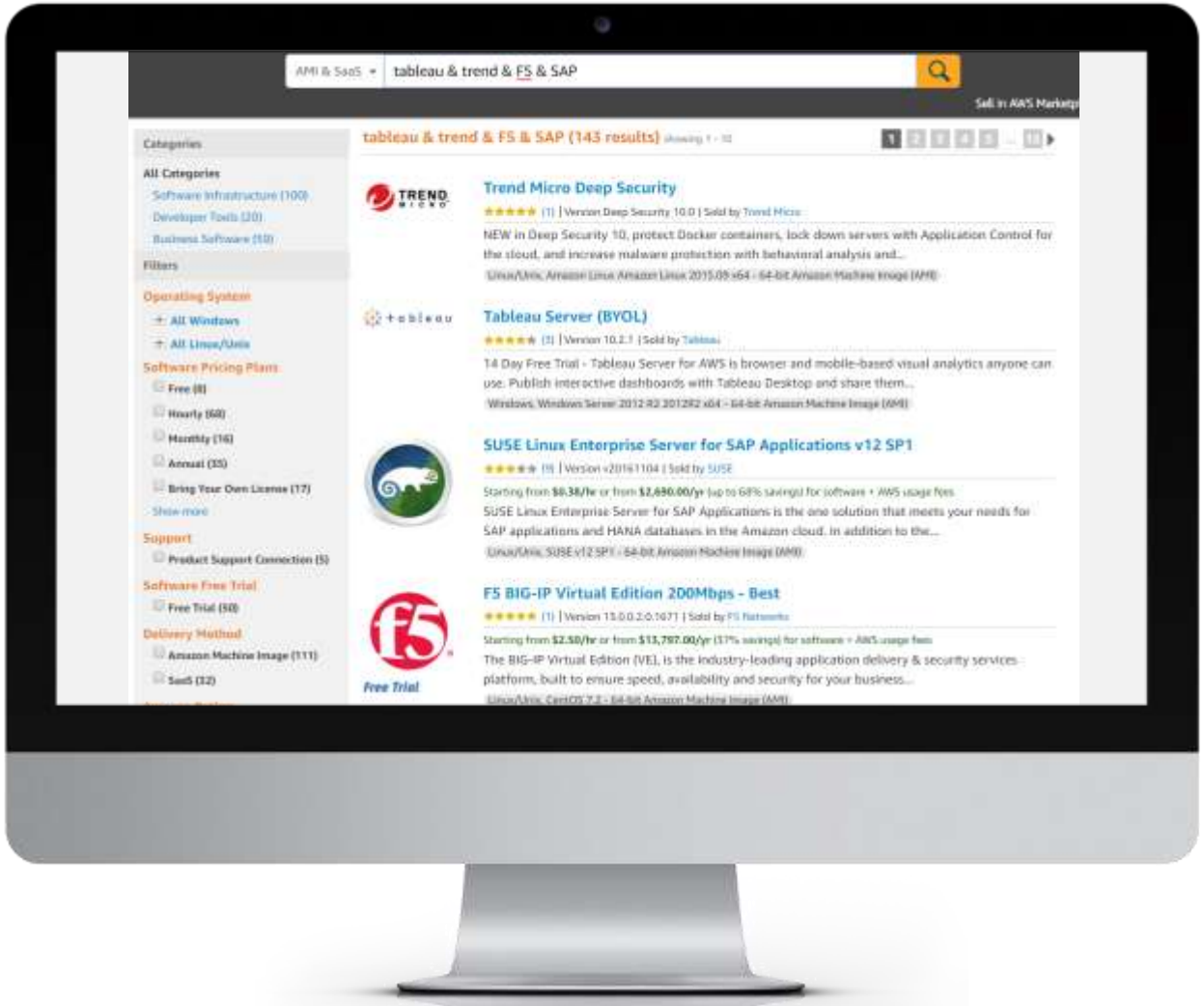

AWS Marketplace is an online store that supports:

01	Over **1,400** participating ISVs
02	**170,000+** active customers
03	**4,200+** software listings
04	Over **481M** hours of software per month

AWS Marketplace Vendors

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Operating Systems	Security	Storage	Networking	Database	Media	DevOps	BI
CentOS	SOPHOS	NetApp	cisco	TERADATA	Adobe	Hewlett Packard Enterprise	tableau
ubuntu	paloalto NETWORKS	N2W software	f5	SAP	aspera	CHEF	splunk>
debian	FORTINET	Barracuda	CITRIX	MAPR	SIGNIANT	zend	MATILLION
SUSE	Check Point SOFTWARE TECHNOLOGIES LTD.	SoftNAS	BROCADE	DATAGUISE	bitfusion.io	GitLab	MicroStrategy
ORACLE LINUX	TREND MICRO	COMMVAULT	riverbed	AEROSPIKE	WOWZA Streaming Engine	Parse Server	TIBCO
Windows	IMPERVA	ATTUNITY		Couchbase			informatica

awsmarketplace

Who is using AWS?

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AWS Solution Architecture

What services does AWS offer?

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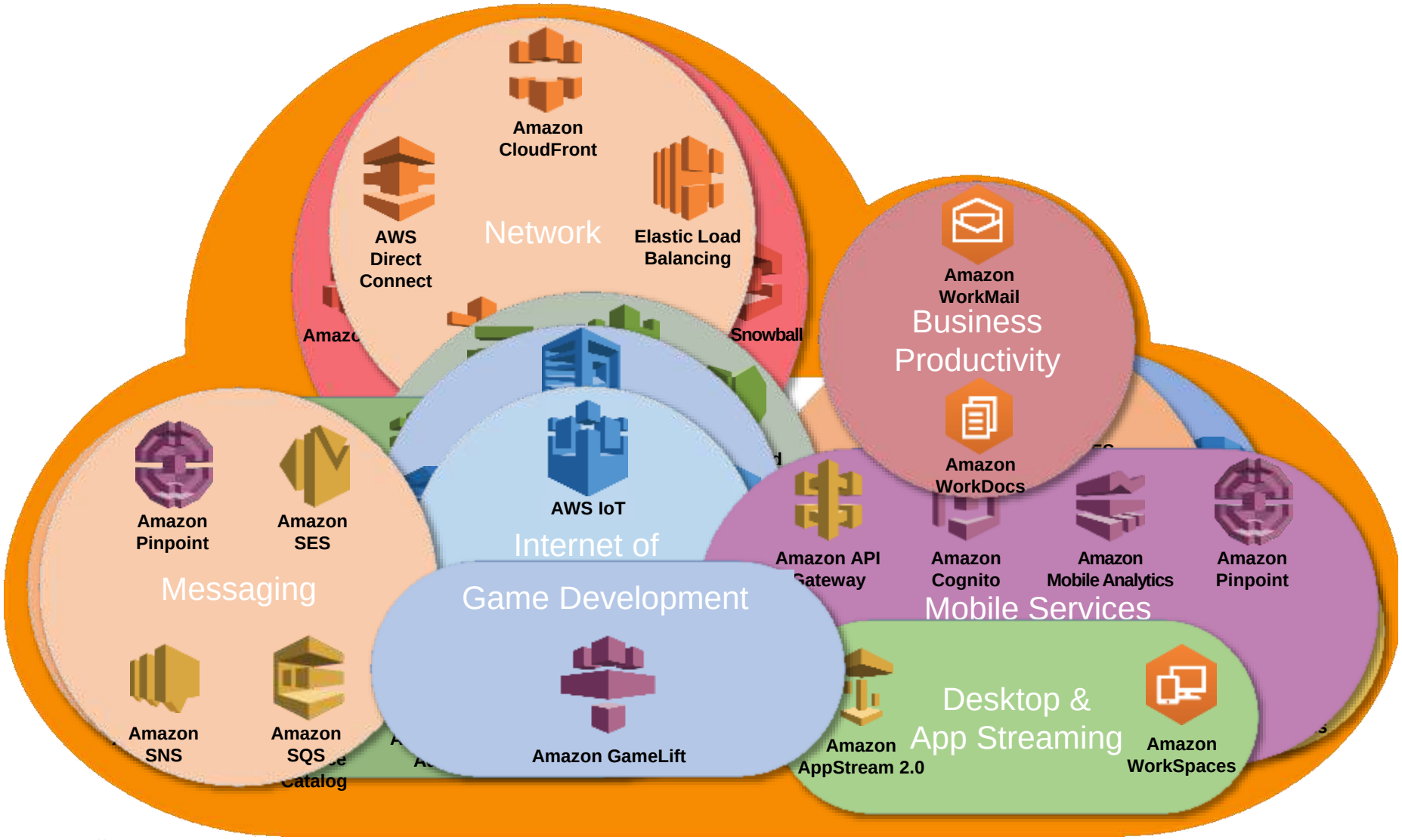

Customers Build Amazing Things

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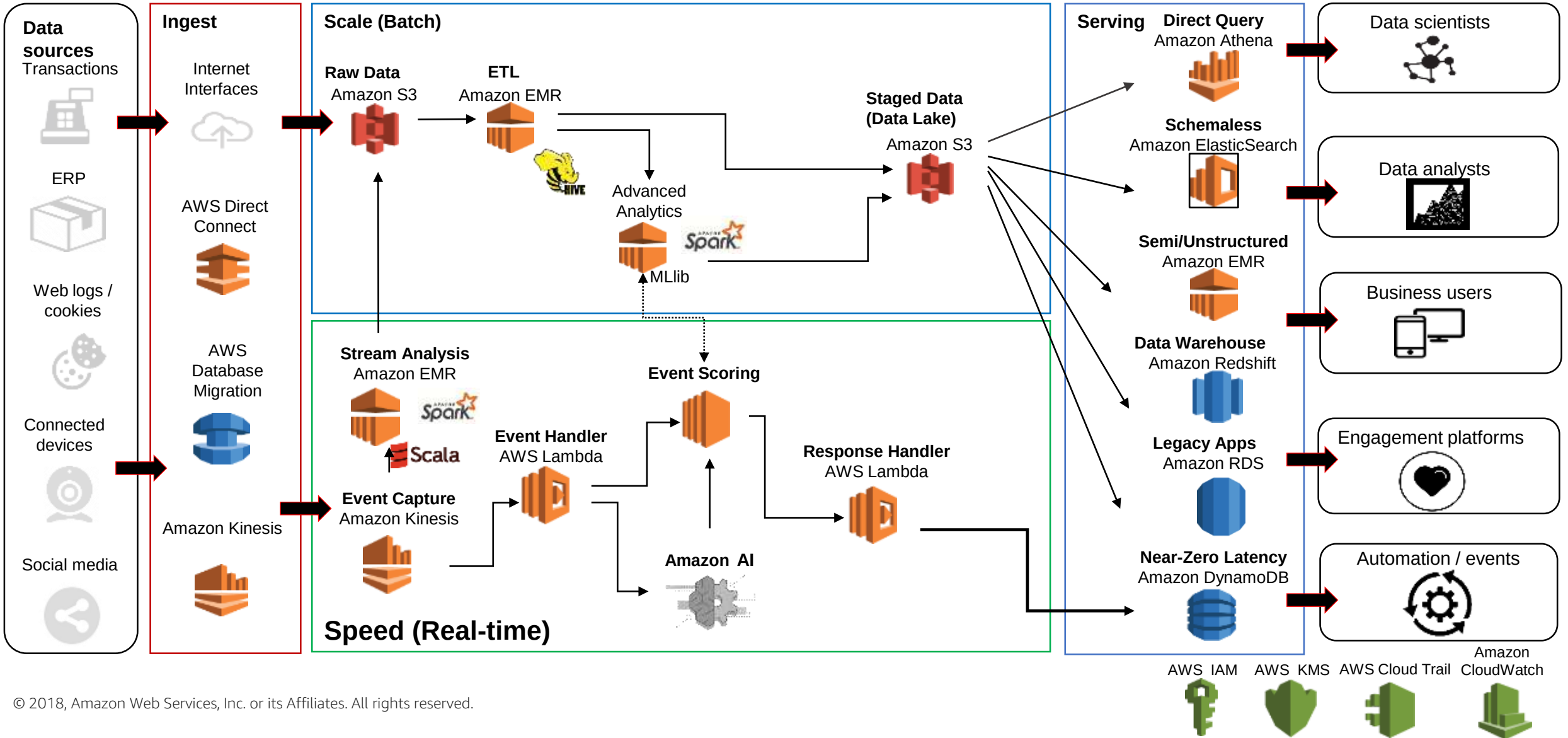
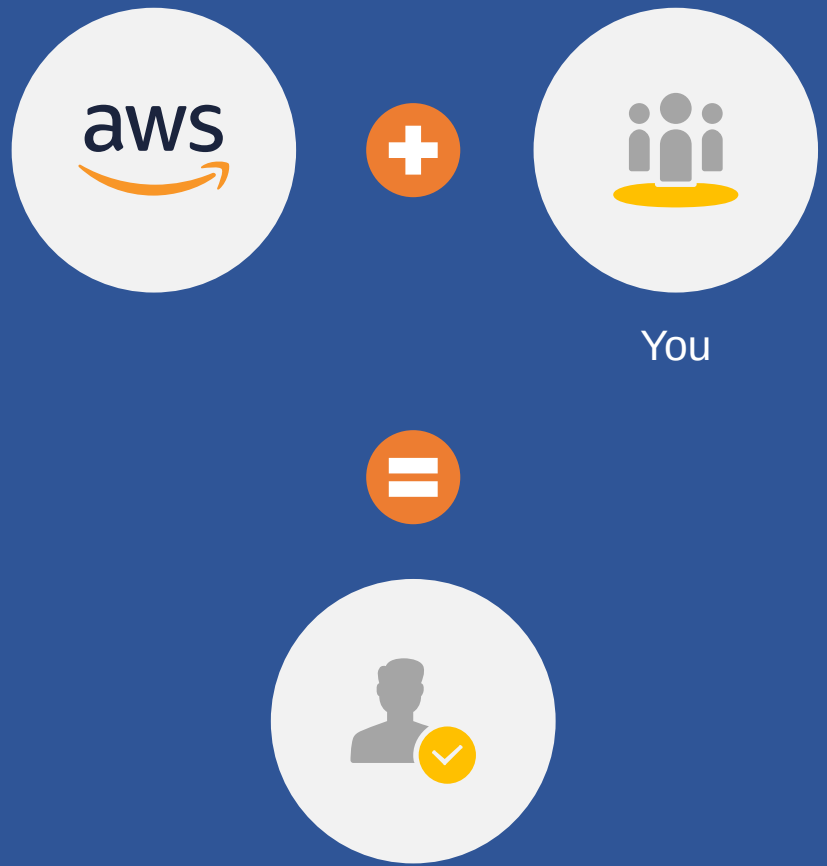


Customer Obsession



AWS Leadership Principles

- Customer Obsession
- Learn and Be Curious
- Earn Trust
- Dive Deep
- Invent and Simplify
- Think Big
- Bias For Action
- Drive Results

We Do Things in Peculiar Ways

The Solution Architect is Key!

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1. Define your scope.
2. Dive deep.
3. Design “Well-Architected” solutions.
4. Earn trust.
5. Educate.
6. Iterate. Invent and Simplify. Innovate.

A Few Guiding Principles for AWS SAs

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1. Cloud migration is a process.
2. Customers need your expertise and help.
3. Know your customer.
4. Know the AWS platform and services.
5. Act in the customer's long-term, best interest.

Long-term, professional services revenue = Success.
We play the long game.

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Module 2 – AWS Services

Mapping On-premises Services to AWS

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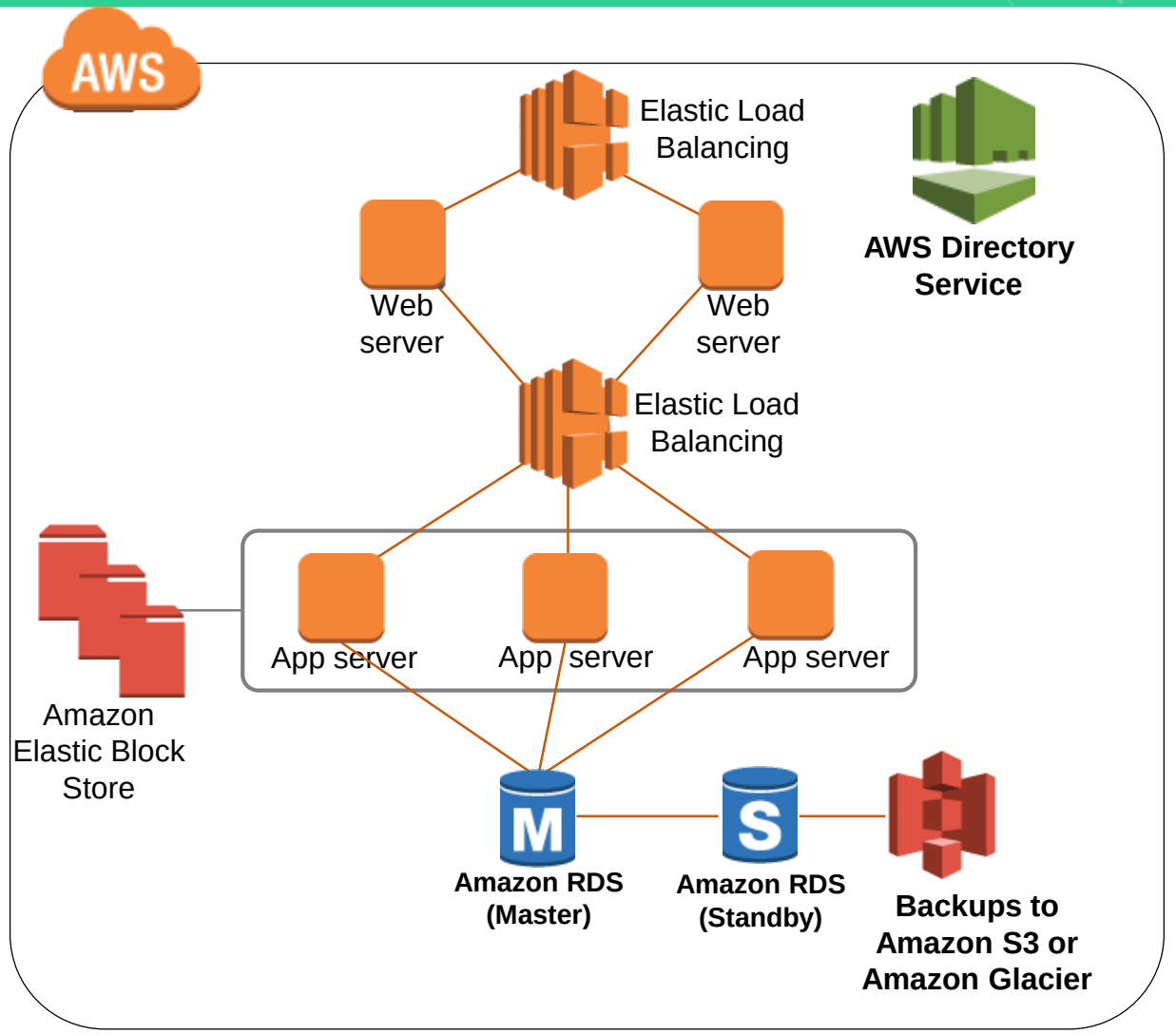

AWS Advanced Services

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AWS Lambda

- A stateless compute service
- Runs code in response to an event
- Triggers in milliseconds
- Low-cost. Billed in 100ms increments.
- Focus on the application. Not the infrastructure.

Lambda

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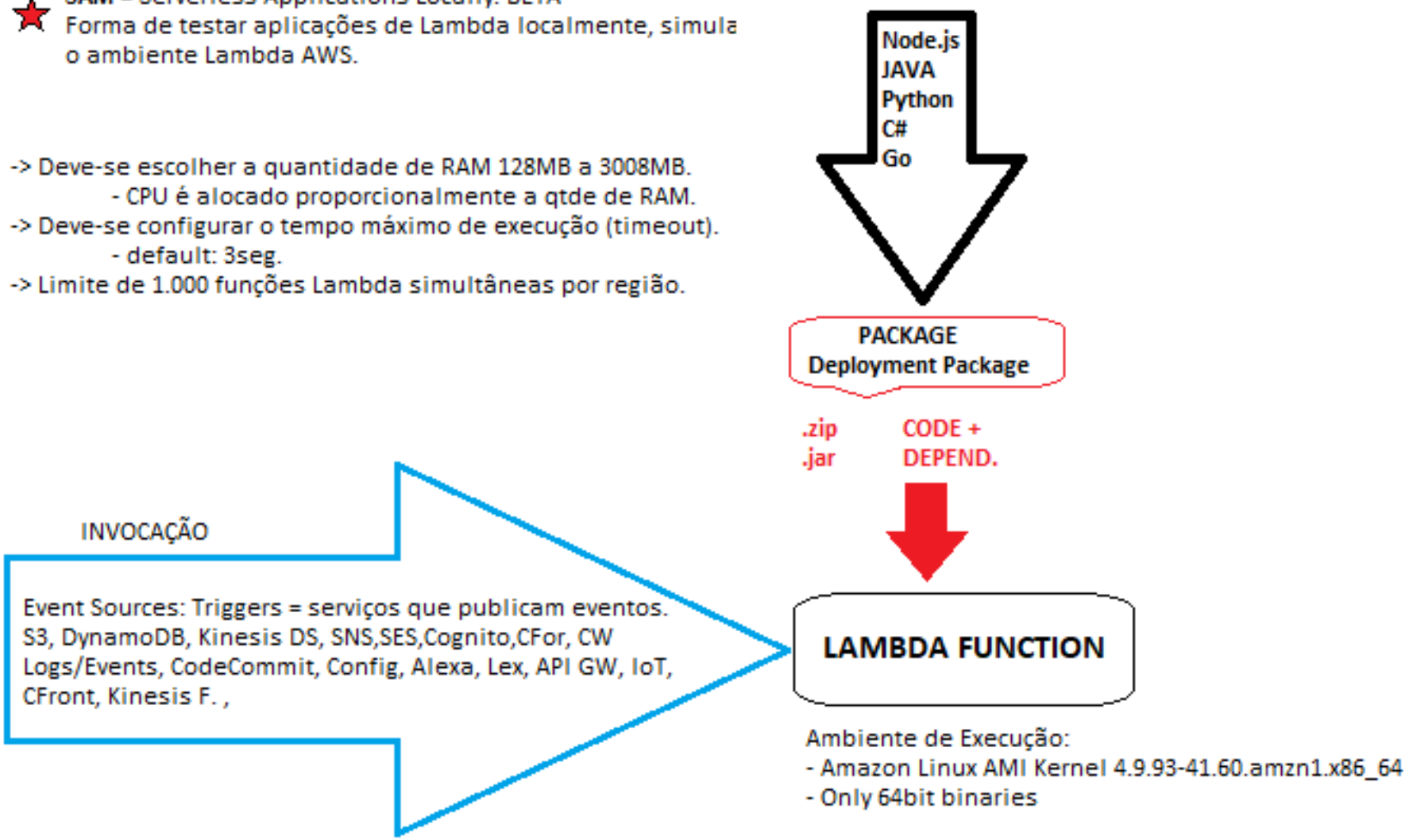
SAM = Serverless Applications Locally. BETA
Forma de testar aplicações de Lambda localmente, simula o ambiente Lambda AWS.

-> Deve-se escolher a quantidade de RAM 128MB a 3008MB.
- CPU é alocado proporcionalmente a qtde de RAM.

-> Deve-se configurar o tempo máximo de execução (timeout).
- default: 3seg.

-> Limite de 1.000 funções Lambda simultâneas por região.



The Sum is Greater Than Its Parts

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External Services

Content Delivery Network

Amazon CloudFront

DNS

Amazon Route 53

Third Party Tools

Monitoring

Logging

Amazon CloudWatch

AWS CloudTrail

Load Balancing

Elastic Load Balancing*

External services and third-party too are native and integrated.

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AWS Architectural Concepts

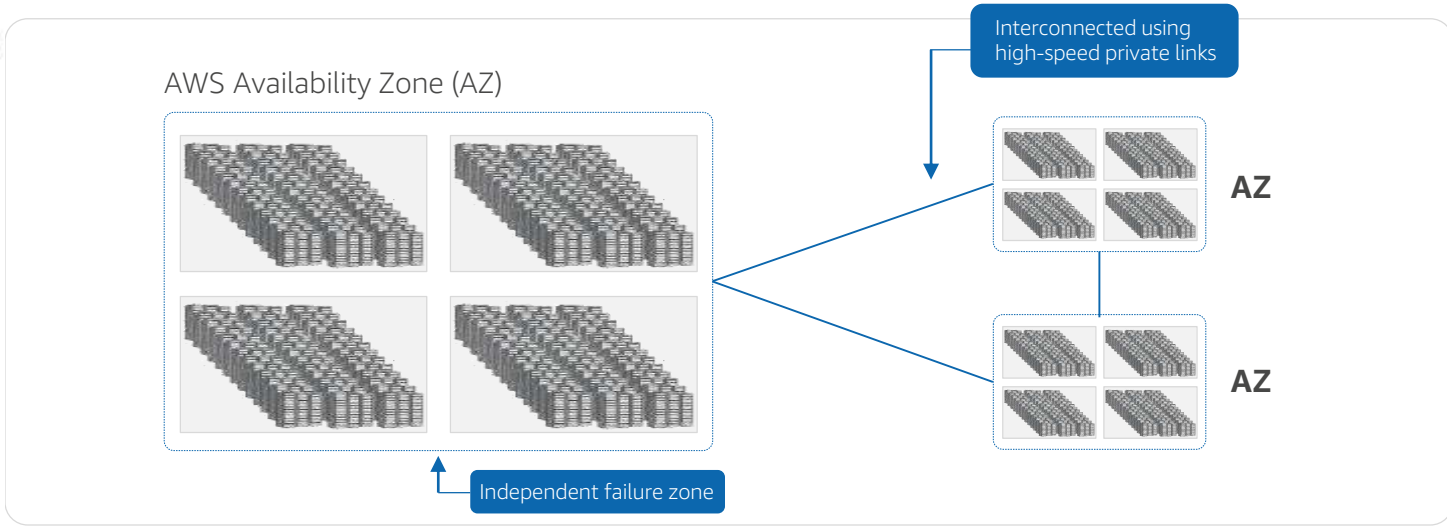
AWS Highly Available Global Infrastructure

18 Geographic Regions

55 Availability Zones

132 Edge Locations

Region



AWS Regions and Availability Zones

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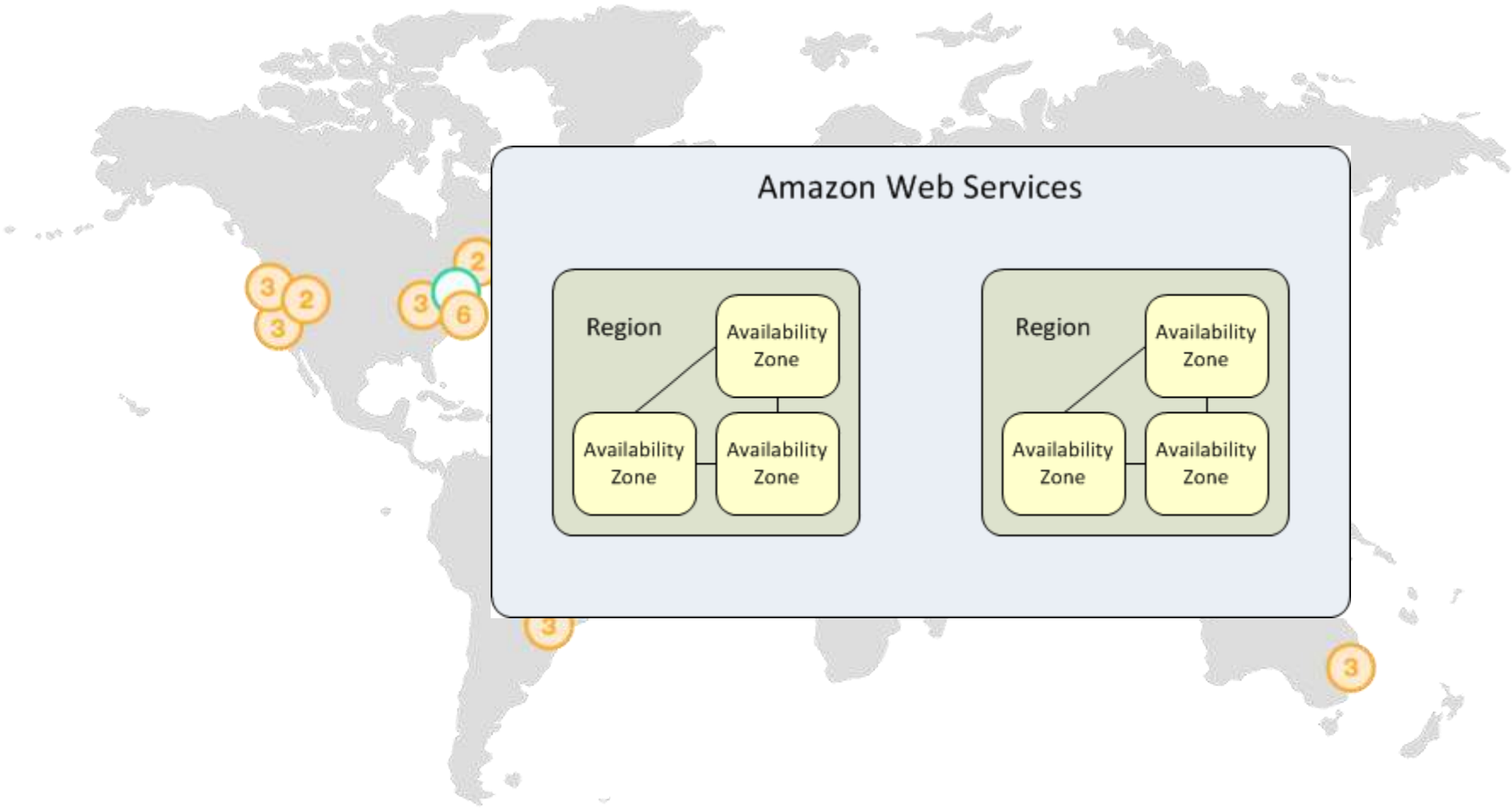

Where are AWS Regions?

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Managed Services

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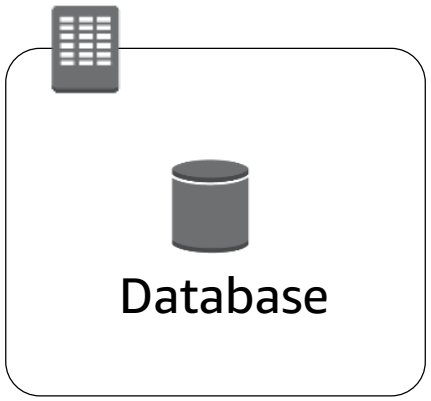
Self-Managed

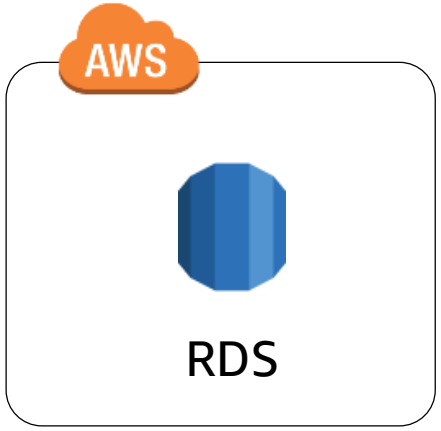


Corporate data center

Amazon EC2 Service

AWS Data Center(s)

Fully Managed Service



AWS Data Center(s)

Security: The Shared Responsibility Model

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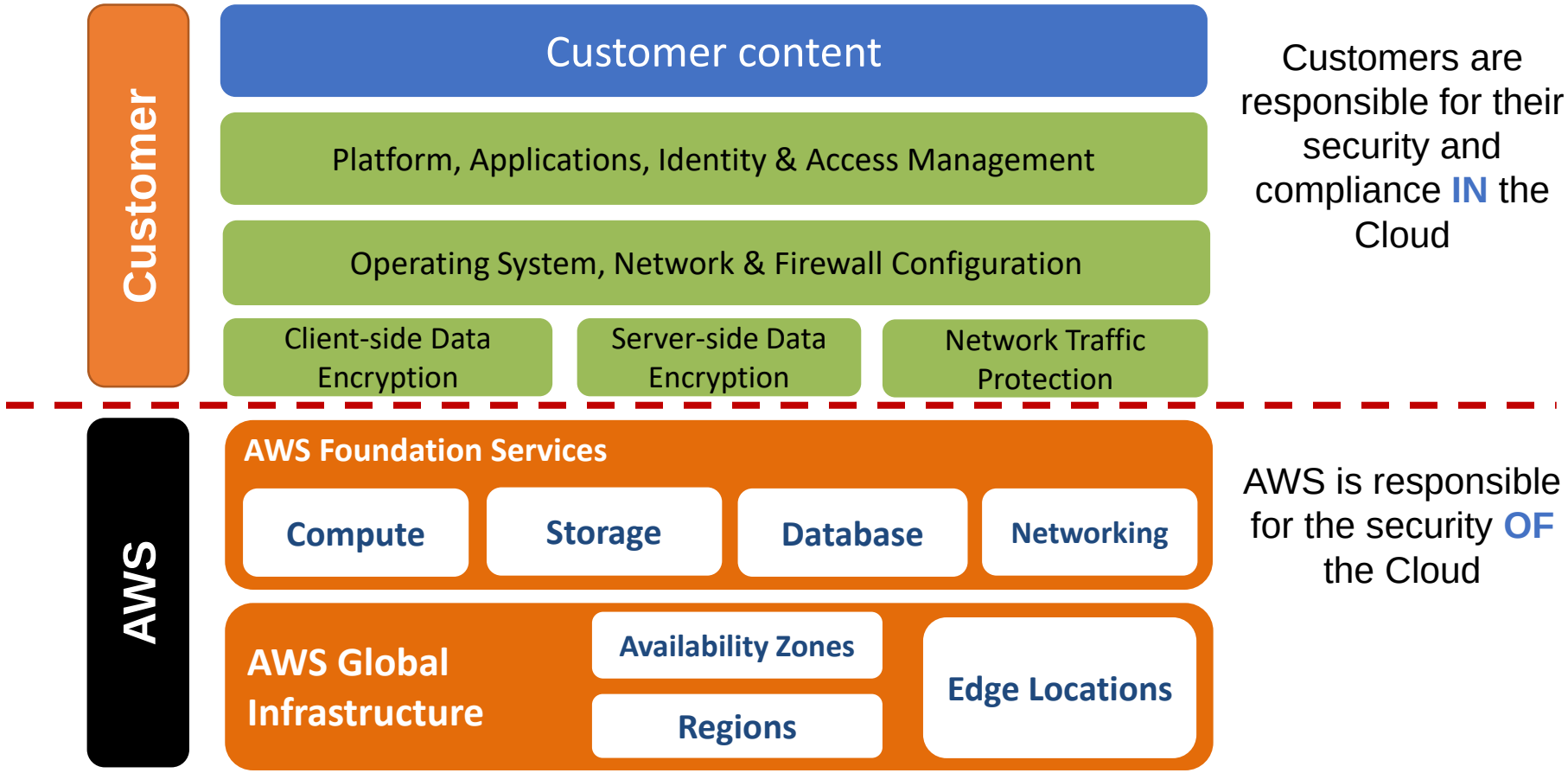

Customers are responsible for their security and compliance **IN** the Cloud

AWS is responsible for the security **OF** the Cloud

Infrastructure as a Code

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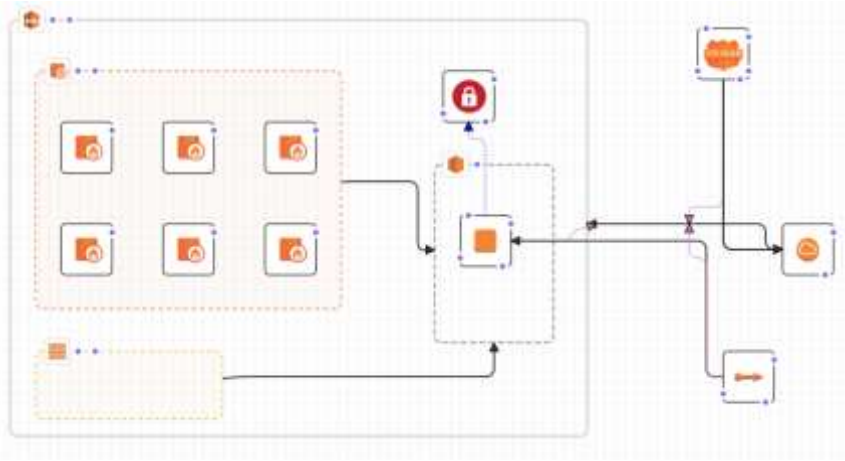
Managing applications and infrastructure using code-based tools and software development techniques.

1. Build an AWS solution.
2. Create templates of your solution stacks.
3. Use templates to replicate stack deployments consistently, at scale.
4. Update templates as you update the solution design.
5. Manage templates like code.



AWS CloudFormation Designer

AWS is API-driven.

Use the SDKs to build and operate.

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AWS Services

AWS Services

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Compute


Amazon EC2


Amazon ECS


Auto Scaling


AWS Lambda

Storage


Amazon Glacier


Amazon EBS


Amazon S3

Networking


Elastic Load Balancing*


Amazon Route 53


Application Load Balancer


Amazon VPC*


AWS Direct Connect


VPN connection

Databases


Amazon RDS


Amazon Aurora


Amazon DynamoDB


Amazon ElastiCache

Security


IAM


AWS WAF


AWS KMS


AWS Shield

Management


Amazon CloudWatch


AWS CloudTrail


AWS CloudFormation


AWS Config


Amazon EC2 Systems Manager

Amazon Elastic Compute Cloud (Amazon EC2)

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- Virtual machine instance running on an AWS hypervisor
- Support numerous distributions of Linux or Microsoft Windows
- Complete control of your host operating system with root and administrator accounts
- Responsible for all installed applications

https://aws.amazon.com/ec2/

Broad Set of Compute Instance Types

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General purpose

M5d

M5

M4

t3

t2

Burst CPU

Compute optimized

C5d

C5

C4

Storage and I/O optimized

H1

I3

D2

GPU enabled

P3

P2

G2

F1

Memory optimized

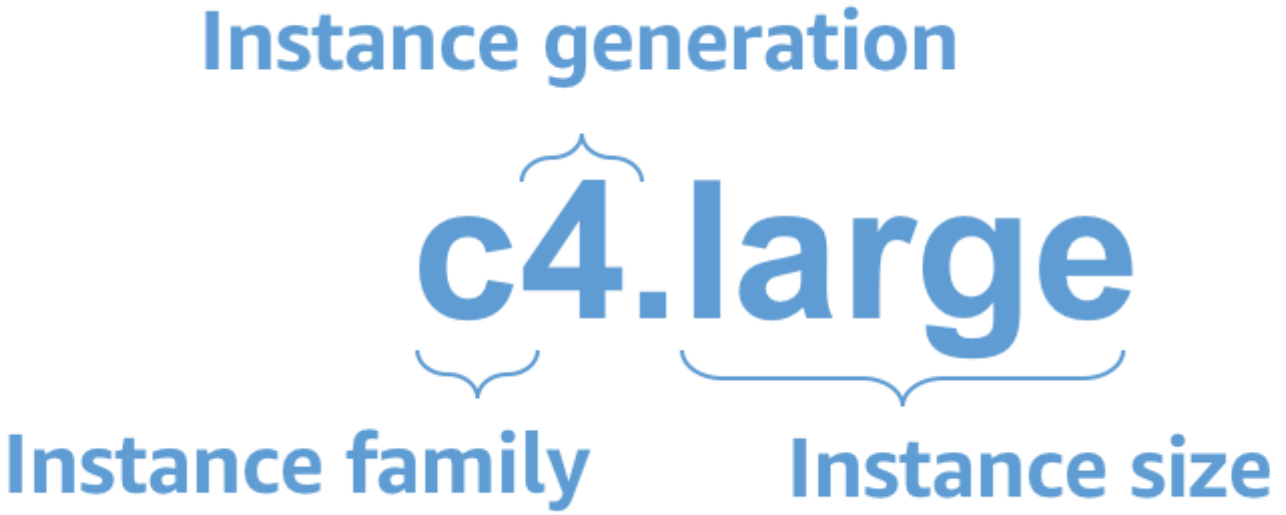
X1 & X1e

R5 & R5d

z1d

R4

EC2 instances: Types and Sizes



https://aws.amazon.com/ec2/instance-types/

Amazon EC2 – CPU credits t2,t3 family

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- A CPU Credit provides the performance of a full CPU core for one minute.
  - + CPU credits [idle state] <+ rate depends on instance size>
  - - CPU credits [active state]

AWS Instance Launch

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You can launch an AWS Instance using:

- Amazon EC2 console
- AWS CLI
- AWS CloudFormation

```
$ aws ec2 run-instances --image-id ami-1a2b3c4d --count 1
--instance-type c3.large --key-name MyKeyPair --security-
groups MySecurityGroup
```

Amazon EC2 Image

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An AMI includes the following:

- A template for the root volume for the instance (such as an operating system, an application server, and applications).
- Launch permissions that control which AWS accounts can use the AMI to launch instances.
- A block device mapping that specifies the volumes to attach to the instance when it's launched.


```
aws ec2 create-image --instance-id i-1234567890abcdef0 --name
“ECD_AMI" --description “SAP ECD AMI"
```

Creating a Custom AMI

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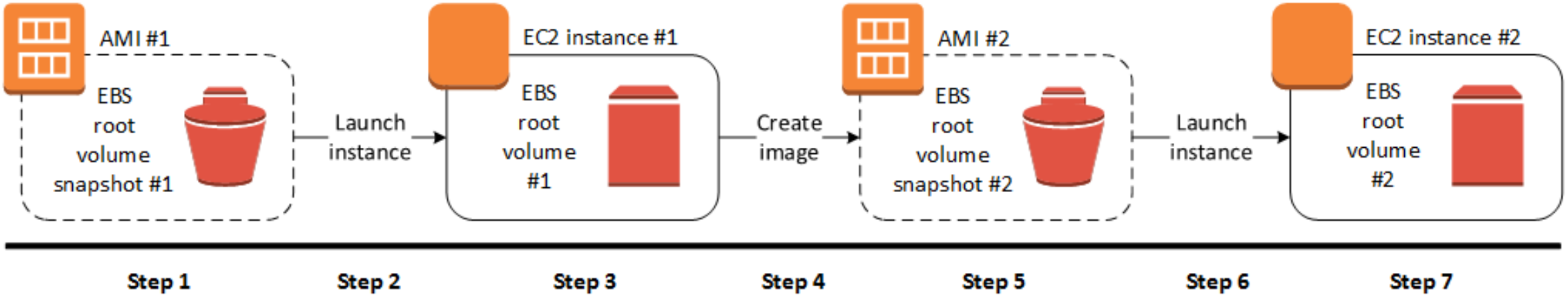
- Using the Management Console:



Customizations...

Launch from new AMI...

- Using the CLI:

```
aws ec2 create-image --instance-id i-1026251cc00125c52 --name
"Our_Base_Image-2017-05-06"
```

EC2 Purchasing Options

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On-Demand

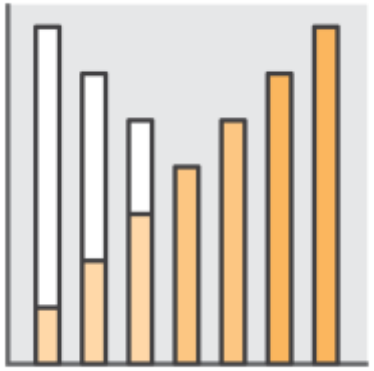
Pay for compute capacity **by the second** with no long-term commitments

Spiky workloads, to define needs

Reserved

Make a 1 or 3 Year commitment and receive a **significant discount** off On-Demand prices

Committed, steady-state usage



Spot

Spare EC2 capacity at **savings of up to 90%** off On-Demand prices

Fault-tolerant, dev/test, time-flexible, stateless workloads

https://aws.amazon.com/ec2/pricing/

Scaling on Demand

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- **Buying hardware to meet demand creates waste.**
  - Hardware is idle during off-peak periods and constrained during peak periods.
- **Scale on demand**
  - Scale out during spikes.
    - Anticipated: Holiday rush, tax deadlines, scheduled batch jobs.
    - Unanticipated: Web site goes viral on social media.
  - Scale in during off-peak.
  - Replace unhealthy instances.
  - Pay only for what you use.

Auto Scaling

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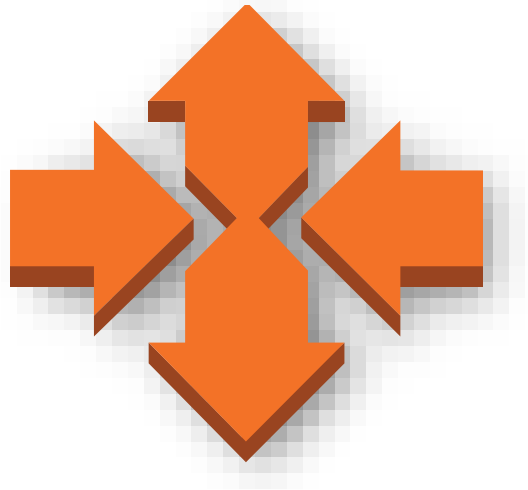
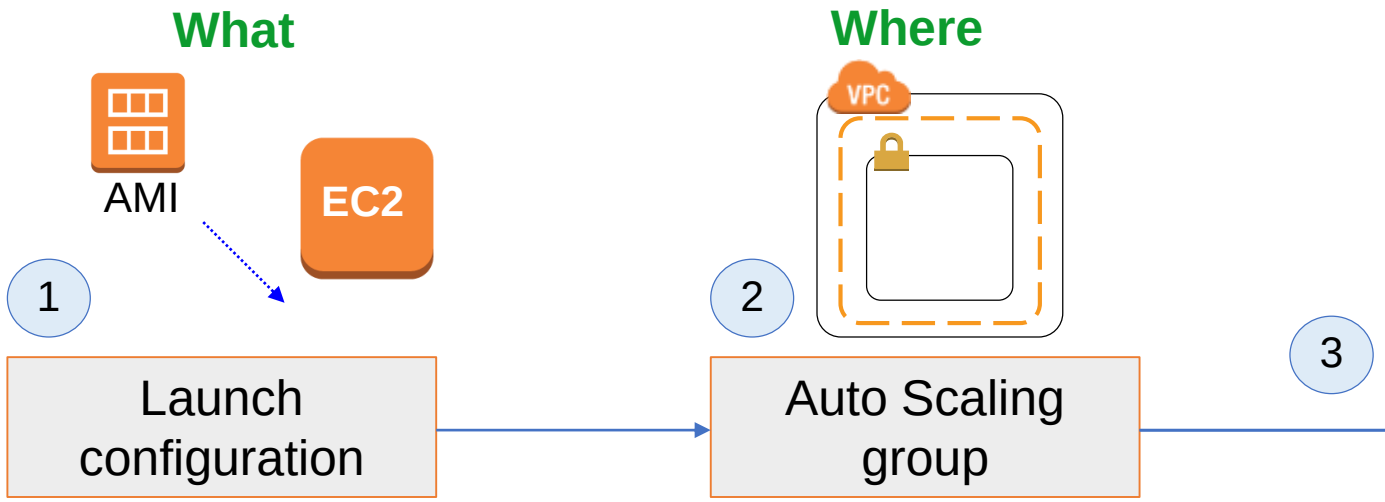
- Automatically launch or terminate Amazon EC2 instances based on:
  - User-defined policies driven by CloudWatch
  - Health status checks
  - Schedules
  - Other criteria (i.e., programmatically)
  - Manually using set-desired-capacity in the CLI
- Scale out to meet demand, scale in to reduce costs.



How Does Auto Scaling Work?



Auto Scaling group defines:

- Name
- Launch configuration name
- Min and Max
- AZ or subnet
- Load balancer
- Desired capacity
- Etc.

Specifies when to increase or decrease Amazon EC2 instances based on CloudWatch alarms.

Tells Auto Scaling to perform a scaling action **at a certain time** in the future (minimum, maximum, and desired size for the ASG).

Auto Scaling: Minimum Capacity Size

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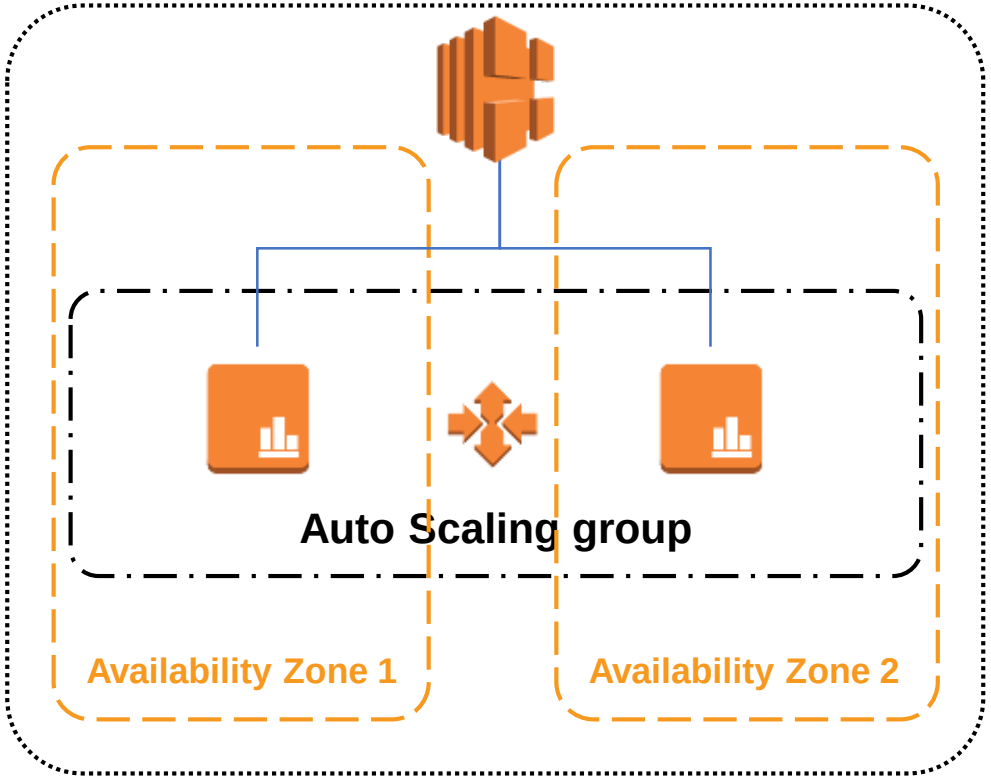
What about high availability?



Minimum = two instances (# of AZs)

Desired capacity = two instances (Min.)

Auto Scaling: Maximum Capacity Size

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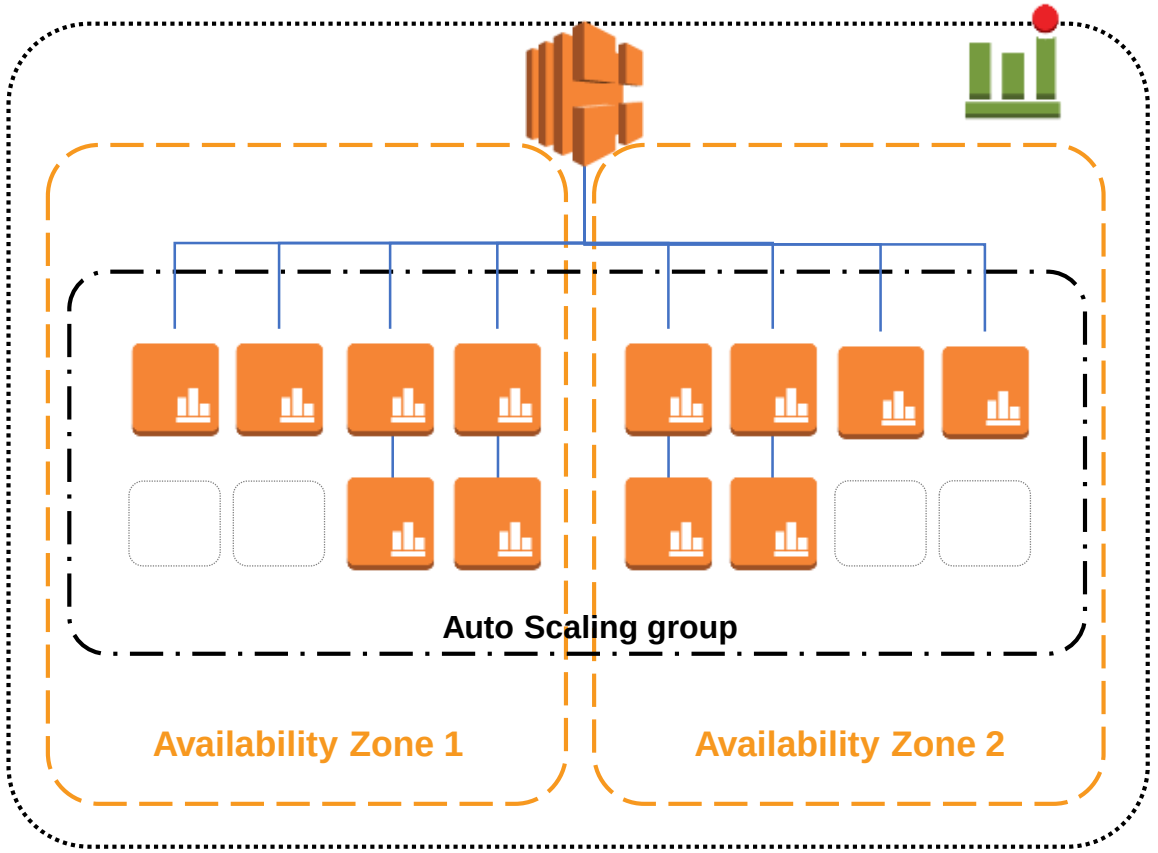
Auto Scaling group:

- Minimum = 2
- Maximum = 12

Auto Scaling policy:

- When CPU utilization is greater than 60%
- Add 100% of group = **double the capacity**

CPU utilization triggers the alarm: capacity is doubled until CPU utilization drops below 60% or max capacity is reached.



Amazon Container Services (ECS/EKS)

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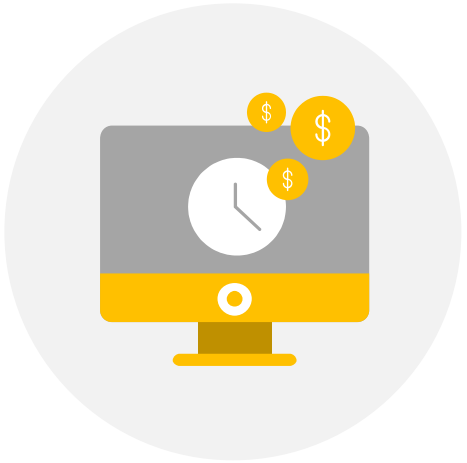
- Elastic Container Service and Elastic Container Service for Kubernetes
- AWS runs the EC2 cluster management for you
- Eliminates the complexity of operating container infrastructure
- Use Cases
  - Deploy microservices to speed innovation
  - Batch processing
  - Migrate legacy applications without requiring code changes
  - Accelerate machine learning

https://aws.amazon.com/ecs/

AWS Lambda: Serverless Compute

No servers to manage

Pay only for compute time used



Pay only for compute time used

AWS Lambda Video https://www.youtube.com/watch?v=eOBq__h4OJ4 **(3:01)**

AWS Foundational Services

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Compute


Amazon EC2


Amazon ECS


Amazon Glacier


Amazon EBS


Auto Scaling


AWS Lambda


Amazon S3

Networking


Elastic Load Balancing*


Amazon Route 53


Application Load Balancer


Amazon VPC*


AWS Direct Connect


VPN connection

Databases


Amazon RDS


Amazon Aurora


Amazon DynamoDB


Amazon ElastiCache

Security


IAM


AWS WAF


AWS KMS


AWS Shield

Management


Amazon CloudWatch


AWS CloudTrail


AWS CloudFormation


AWS Config


Amazon EC2 Systems Manager

Amazon Elastic Block Storage (EBS)

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- Block storage volumes for use with Amazon EC2 instances
- Persistent storage attached to EC2 instances as native disk
- Formatted using a standard OS file system (e.g. ext4 or NTFS)
- Scalable, high-performance storage for applications
- Use Cases
  - Boot/root volumes for EC2 instances
  - Data volumes for enterprise applications such as SAP, Microsoft Exchange and Microsoft SharePoint.
  - Relational or NoSQL databases supporting millions of users.

https://aws.amazon.com/ebs/

EBS Volume Types

https://docs.aws.amazon.com/pt_br/AWSEC2/latest/UserGuide/EBSVolumeTypes.html

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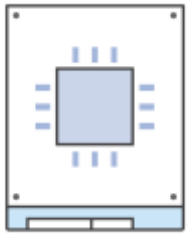
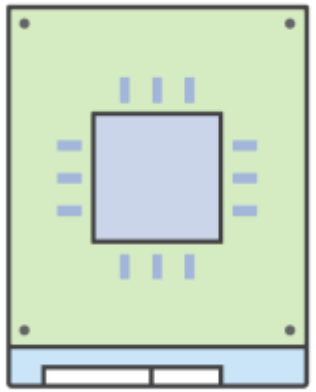


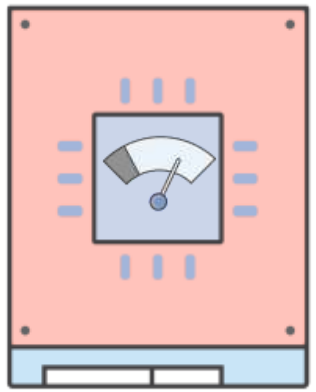
SSD

HDD



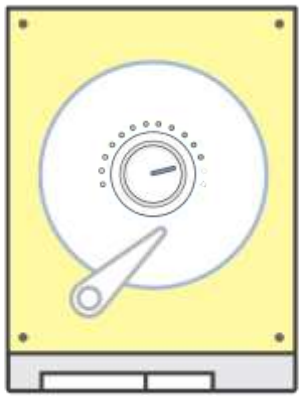
gp2

General Purpose SSD



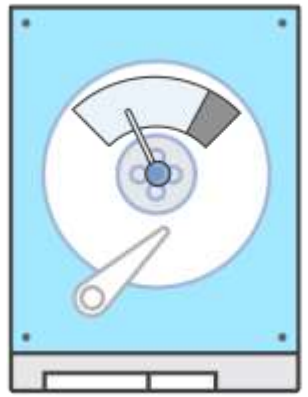
io1

Provisioned IOPS SSD



st1

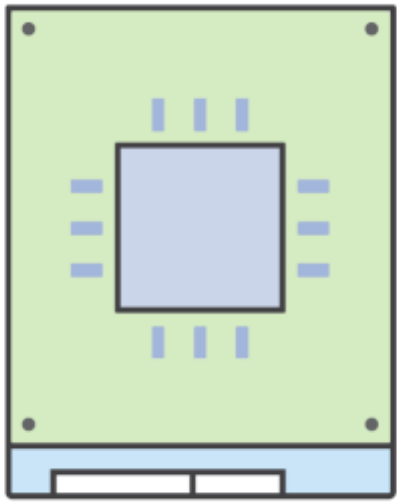
Throughput Optimized HDD



sc1

Cold HDD

EBS Volume Types: General Purpose



gp2

General Purpose SSD

Baseline: 3 IOPS per GB up to 10,000

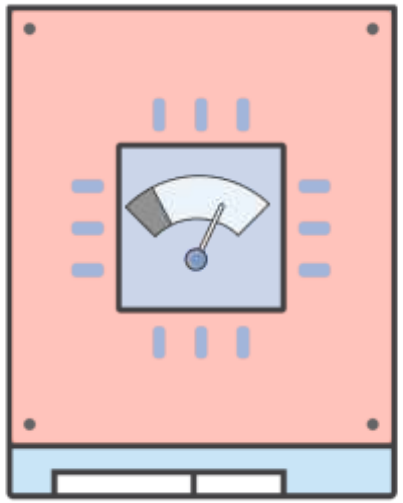
Burst: 3,000 IOPS (for volumes up to 1 TB)

Throughput: 160 MiB/s

Latency: Single-digit ms

Capacity: 1 GiB to 16 TiB

EBS Volume Types: I/O Provisioned



`io1`

Provisioned IOPS SSD

Baseline: 100 to 20,000 IOPS

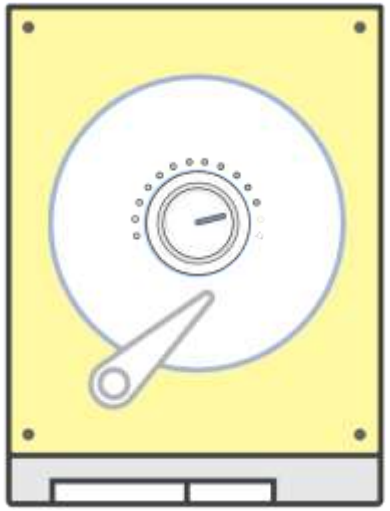
Throughput: 500 MiB/s

Latency: Single-digit ms

Capacity: 4 GiB to 16 TiB

Ideal for critical applications and databases with sustained IOPS

Amazon EBS Volume Types: Throughput Optimized



st1

Throughput Optimized HDD

Baseline: 40 MiB/s per TB up to 500 MiB/s

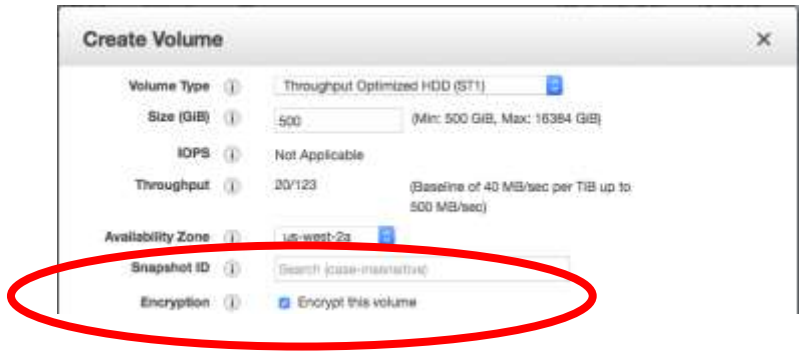
Burst: 250 MiB/s per TB up to 500 MiB/s

Capacity: 500 GiB to 16 TiB

Ideal for large block, high throughput sequential workloads

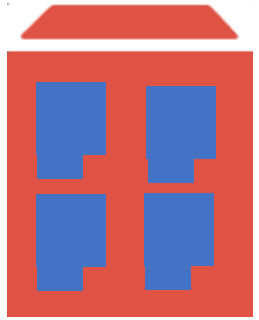
What is Amazon EBS Encryption?

Encryption



- Boot and data volumes can be encrypted
- Attach both encrypted and unencrypted
- No volume performance impact
- Supported by all Amazon EBS volume types
- Snapshots also encrypted
- No extra cost

How does an Amazon EBS Snapshot Work?



Amazon EBS volume

Amazon EBS snapshot

- Point-in-time backup of modified volume blocks
- Stored in Amazon S3, accessed via Amazon EBS APIs
- Subsequent snapshots are incremental
- Deleting snapshot will only remove data exclusive to that snapshot
- Snapshots can be used to create new volumes
- Snapshots of encrypted volumes are also encrypted

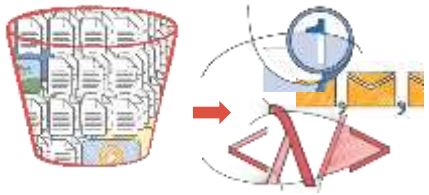
Amazon EBS Architectures

aws training and certification

- Select the appropriate EC2 < > EBS design.
- Select the appropriate EBS volumes.
- Don’t forget to take snapshots.

Key Amazon S3 Features

aws training and certification

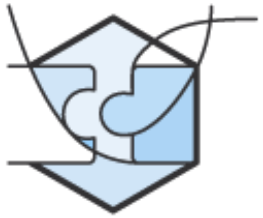


Event notifications

Cross-region replication

VPC endpoint for Amazon S3

- Amazon CloudWatch metrics for Amazon S3
- AWS CloudTrail support



Lifecycle policy

Expired object delete marker

Incomplete multipart upload expiration

Storage Tiered to Your Requirements

aws training and certification

S3

"Hot" Data
Active and/or
Temporary Data

$0.023/GB per month | **> 0K** | **≥ 0 Days**

S3-IA

"Warm" Data
Infrequently
Accessed Data

$0.0125/GB per month | **≥ 128K** | **≥ 30 Days**

$0.01/GB retrieval

Glacier

"Cold" Data
Archive and
Compliance Data

$0.004/GB per month | **> 0K** | **≥ 90 Days**

$0.01/GB retrieval > 5% | **3 – 5 Hrs**

Lifecycle

Durable
99.999999999%

Available
S3: 99.99%
S3-IA: 99.9%

Performant
Low Latency
High Throughput

Scalable
Elastic capacity
No preset limits

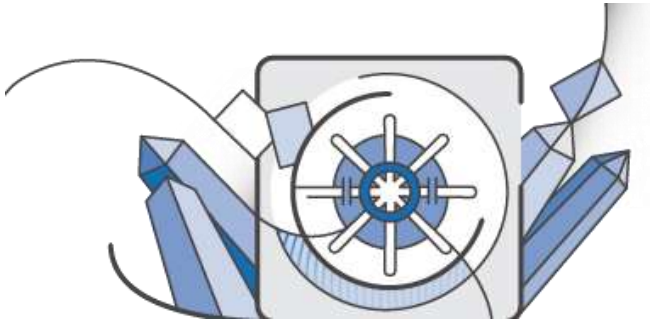
Choice of storage classes on Amazon S3

aws training and certification

Standard

Standard – Infrequent Access

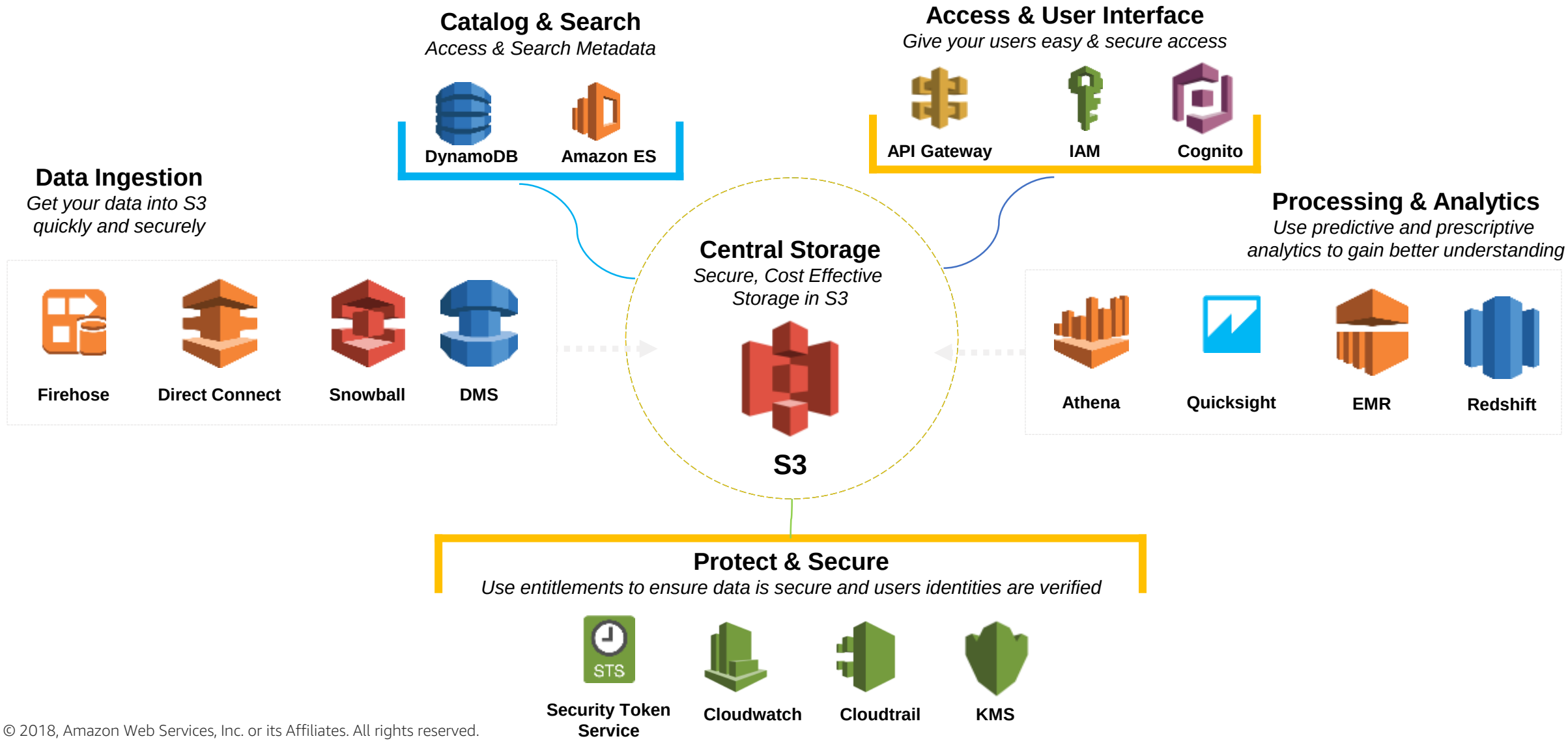
One Zone – Infrequent Access



Amazon Glacier

Active data — Infrequently accessed data — Archive data

Data Lakes



Amazon Glacier

aws training and certification

- Long term storage solution
- Optimized for data that is infrequently accessed
- Takes hours to begin accessing stored data
- Extremely low cost
- Use Cases:
  - Long-term storage
  - Data archiving
  - Data lifecycle automation

https://aws.amazon.com/glacier/

AWS Foundational Services

aws training and certification

Compute


Amazon EC2


Amazon ECS


Amazon Glacier


Amazon EBS


Auto Scaling


AWS Lambda


Amazon S3

Networking


Elastic Load Balancing*


Amazon Route 53


Application Load Balancer


Amazon VPC*


AWS Direct Connect


VPN connection

Databases


Amazon RDS


Amazon Aurora


Amazon DynamoDB


Amazon ElastiCache

Security


IAM


AWS WAF


AWS KMS


AWS Shield

Management


Amazon CloudWatch


AWS CloudTrail


AWS CloudFormation


AWS Config


Amazon EC2 Systems Manager

Amazon VPC

aws training and certification


Amazon VPC


Router


Internet gateway


Customer gateway


Virtual private gateway


VPN connection


VPC peering

- Provision a logically isolated section of the AWS cloud
- Control your virtual networking environment
  - Subnets
  - Route tables
  - Security groups
  - Network ACLs
- Connect to your on-premises network via VPN or Direct Connect
- Control if and how your instances access the Internet

Amazon Virtual Private Cloud
Amazon VPC

aws training and certification

- Isolated virtual subnets in the AWS Cloud
- Secure, performant, highly-configurable
- Support rich security
- Use Cases:
  - Host both public and private resources
  - Organize/isolate applications components
  - Isolate resources by logical entity, group, sensitivity, or function
  - Extend on-prem networks into the cloud

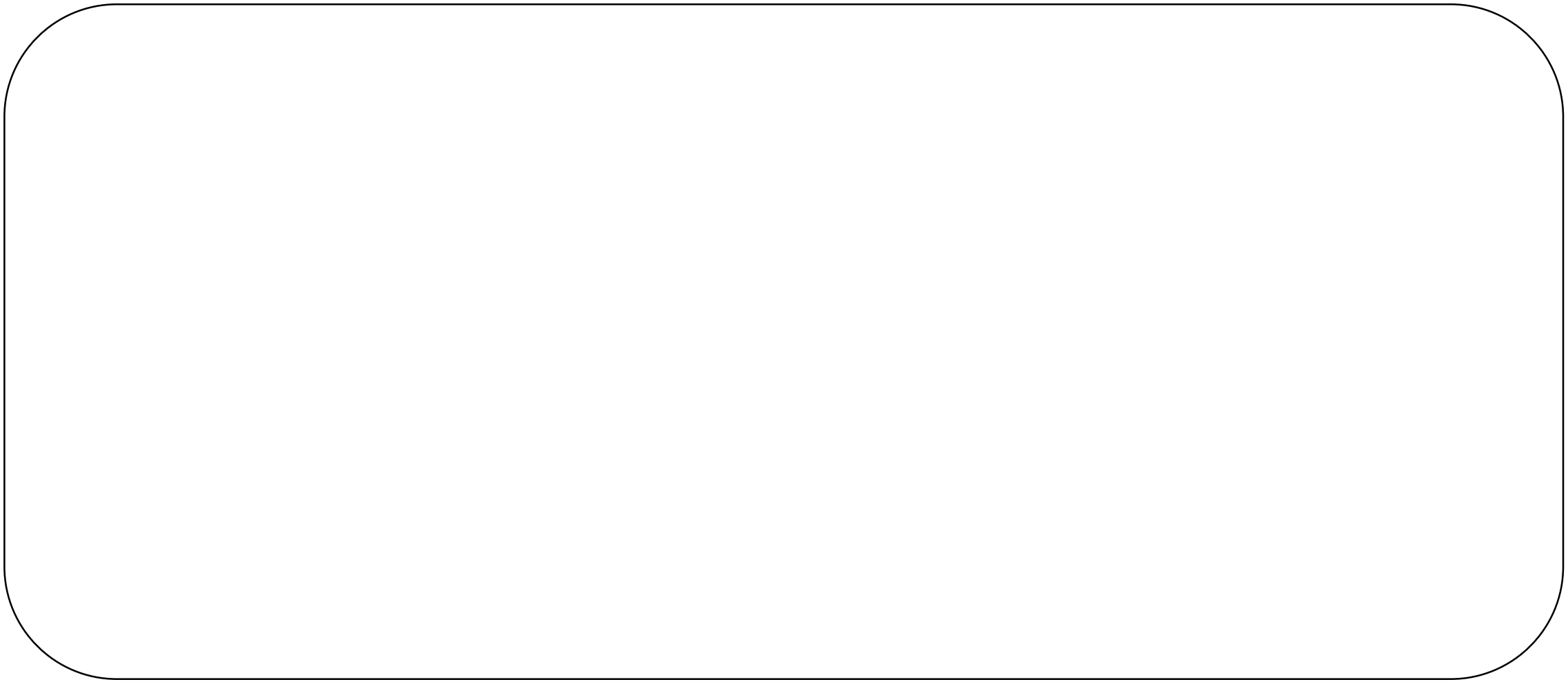
https://aws.amazon.com/vpc/

What is Amazon VPC?

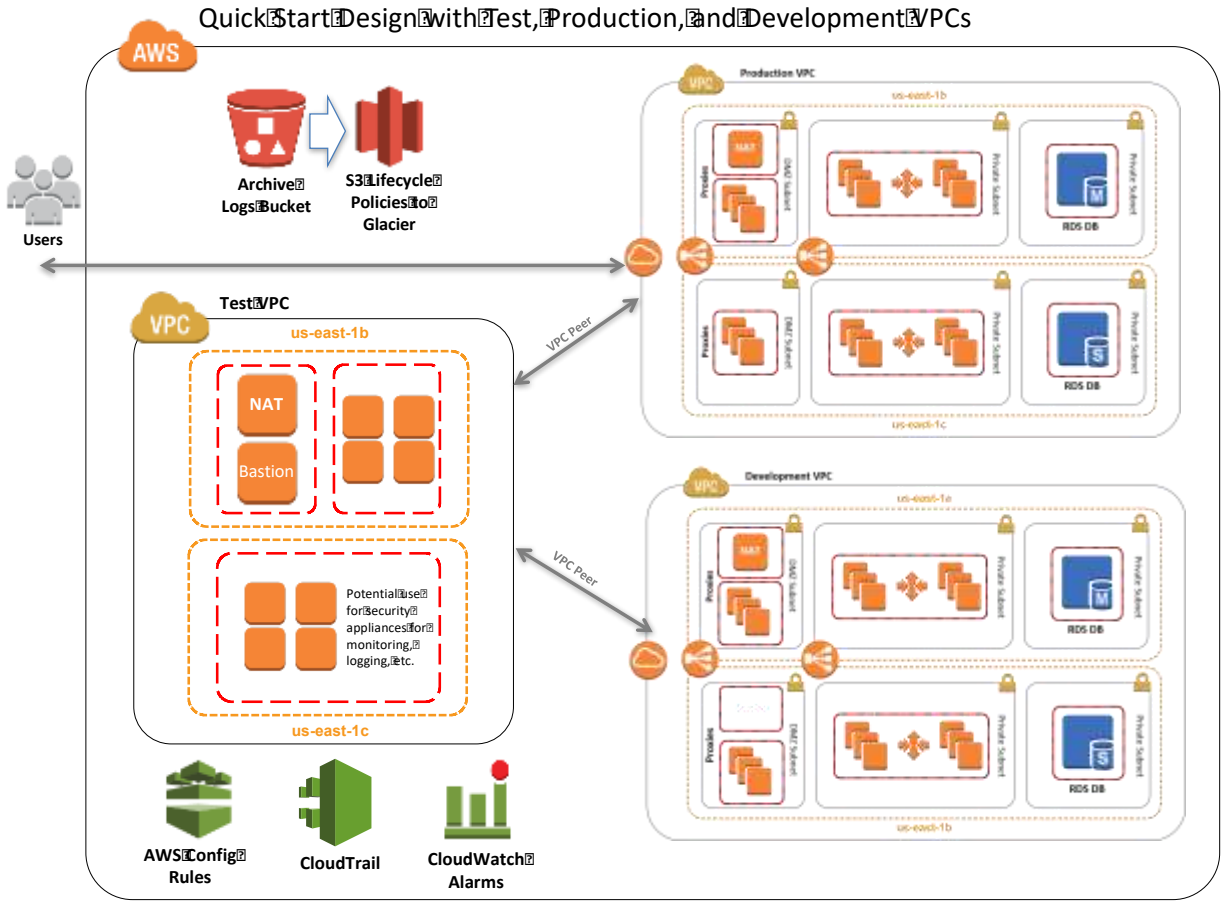
aws training and certification

- Your own logically isolated section of the Amazon Web Services (AWS) cloud
- By default, your VPC has no access to the internet, nor are instances addressable from the internet
- You have complete control over your virtual networking environment
- Proven and well-understood networking concepts:
  - User defined IP address range
  - Subnets
  - Route tables
  - Access control lists
  - Network gateways
- A way to gain *agility* as well as additional security

VPC



VPCs as Strategy

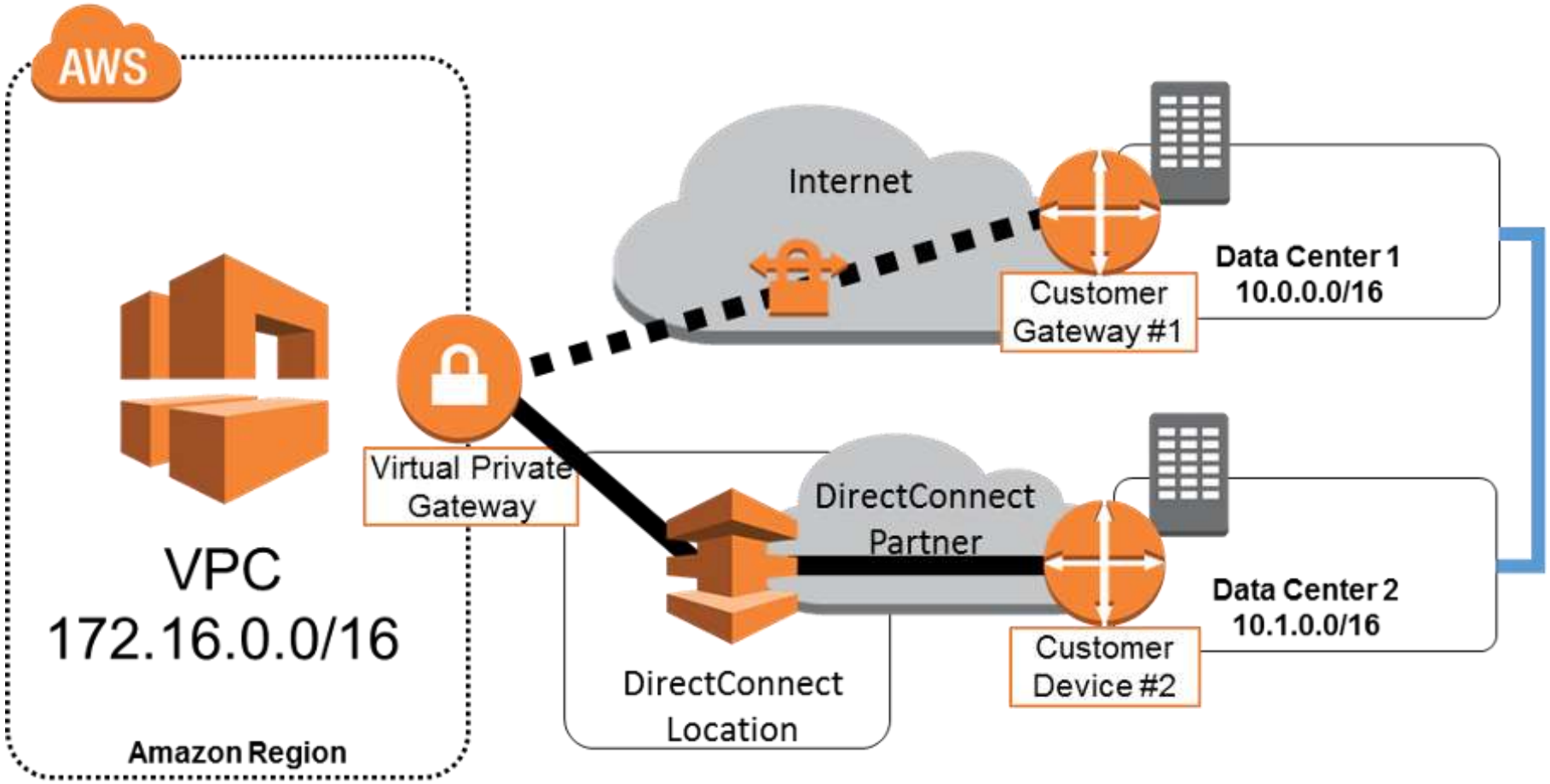


Like any production application, AWS solutions should be deployed in a landscape of multiple environments

- Each environment should be in its own Amazon VPC
- At a minimum, consider production and development VPC environments
- Can make sense to add environments for test, future development ("dev+1"), staging, and other purposes
- Remember, AWS environments with intermittent use (such as test) can be stopped when not in use, helping to limit costs

Amazon Virtual Private Cloud
Corporate Datacenter Connectivity

aws training and certification



Amazon Elastic Load Balancing (ELB)

aws training and certification

- Automatically distributes incoming application traffic
- Incorporates new resources as applications scale, automatically
- Detects and accommodates application faults
- Pool AWS cloud and on-premises resources seamlessly
- Integrates with other AWS services
  - Route 53
  - Internet Gateway
  - Identity and Access Management

https://aws.amazon.com/elasticloadbalancing/

Application Load Balancer

aws training and certification

- Part of Elastic Load Balancing (ELB)
- Balances load at the application layer (Layer 7)
- Supports HTTPS termination and offload
- Improves application security
- Routes requests based upon the content requested (URL).
- Use case:
  - HTTP and HTTPS traffic
  - Advanced request routing
  - Microservices and container-based applications.

https://aws.amazon.com/about-aws/whats-new/2016/08/announcing-application-load-balancer-for-elastic-load-balancing/

Network Load Balancer (NLB)

aws training and certification

- Ultra-low latency handles tens of millions of requests per second
- "IP-per-AZ" feature improves performance, and fault-tolerance
- Preserves the source IP address and ports for incoming connections
- Connections can be open for months or years
- Supports failover between IP addresses within and across regions
- Use Case:
  - Hard-coded IP address
  - Microservices

https://aws.amazon.com/elasticloadbalancing/details/#compare

Amazon CloudFront

aws training and certification

- Content delivery network (CDN) with optimization
- Distribute content to end users with low latency and high data transfer rates
- Broad, geographic presence beyond AWS Regions
- Accelerate data uploaded from end users
- Use cases:
  - Accelerating web application performance
  - Caching static web content and frequent database query results
  - Offloading TLS termination

https://aws.amazon.com/cloudfront/

Amazon Route 53

aws training and certification

- Global Domain Name System (DNS) service
- Highly available and scalable – 100% availability SLA
- Critical tool integrated with many AWS services
- Use Cases:
  - Optimized Routing
  - Failover
  - Geolocation Compliance
  - Integrated with other AWS services
    - Micro-segmentation

https://aws.amazon.com/route53/

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aws training and certification

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AWS WAF


AWS KMS


AWS Shield

Management


Amazon CloudWatch


AWS CloudTrail


AWS CloudFormation


AWS Config


Amazon EC2 Systems Manager

Amazon RDS

Amazon RDS

- Relational databases
- Fully managed and secure
- Fast, predictable performance
- Simple and fast to scale
- Low cost, pay for what you use

Amazon Aurora

Data Migration

aws training and certification

- Process of moving existing data to a new cloud storage location. There are two ways of migrating data:
  - A single “lift-and-shift” move
  - A hybrid model weighted toward the cloud

AWS Database Migration Services

aws training and certification

AWS
Database Migration
Service

PostgreSQL ORACLE Amazon Aurora

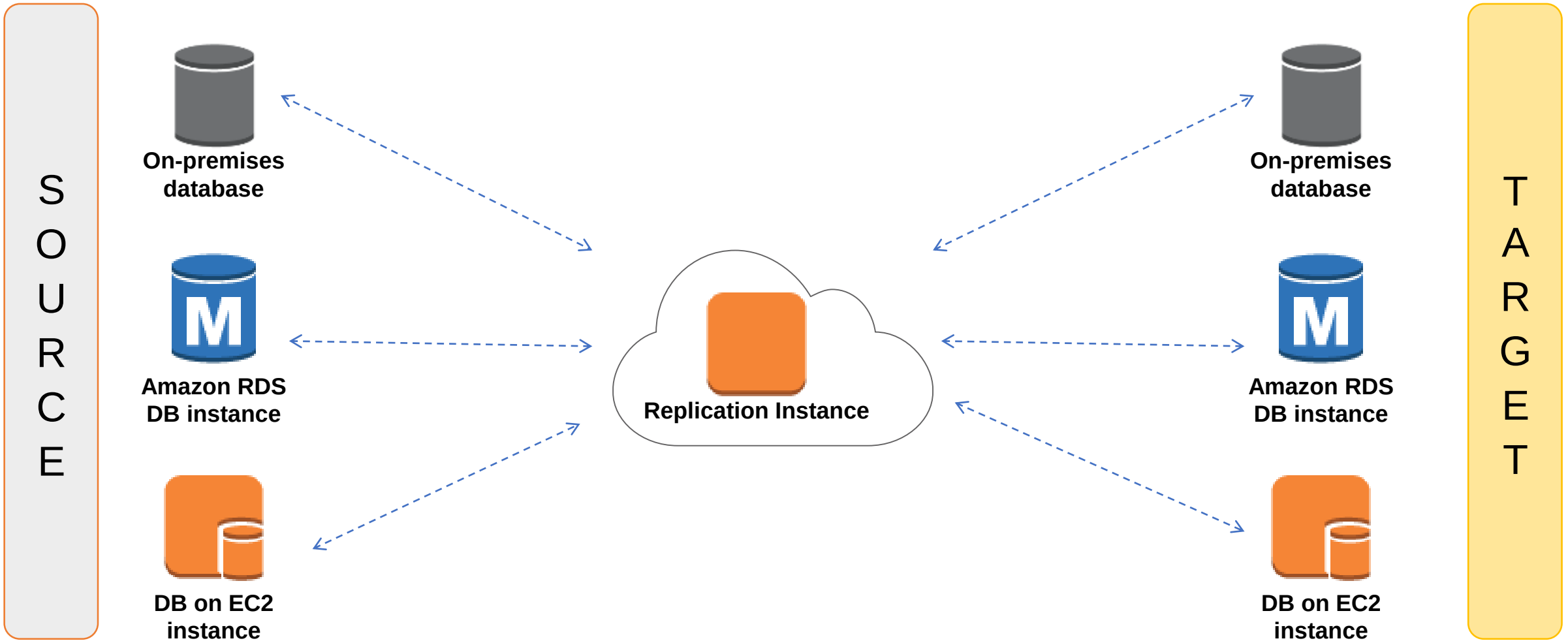
AMAZON REDSHIFT MySQL MariaDB Microsoft SQL Server

- Start your first migration in 10 minutes or less
- Keep your apps running during the migration
- Replicate within, to, or from Amazon EC2 or RDS
- Move data to the same or different database engine

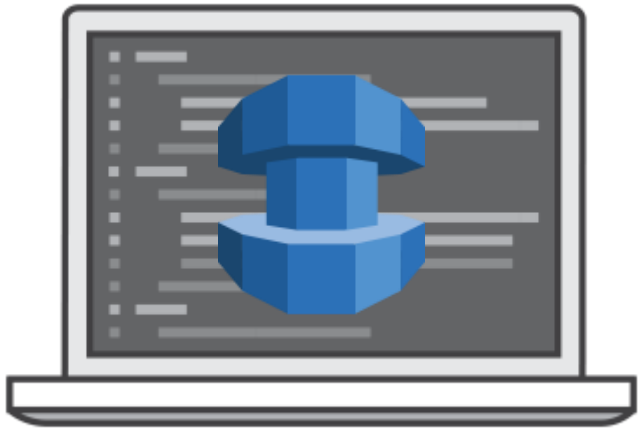
AWS Database Migration Service (DMS)

https://docs.aws.amazon.com/dms/latest/userguide/CHAP_ReplicationInstance.html

aws training and certification



AWS Schema Conversion



AWS
Schema Conversion
Tool

Migrate from Oracle and SQL Server

Move your tables, views, stored procedures, and data manipulation language (DML) to MySQL, MariaDB, and Amazon Aurora

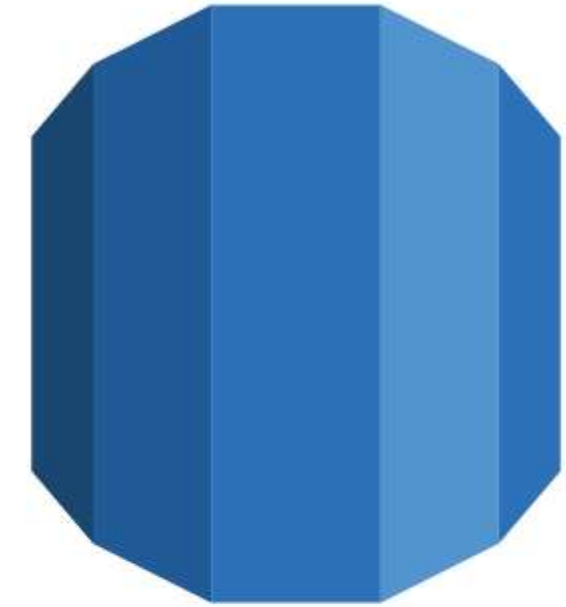
Know exactly where manual edits are needed

Download at aws.amazon.com/dms

Amazon Aurora

aws training and certification

- Runs on top of RDS
- MySQL and PostgreSQL compatible
- Up to 64TiB of auto-scaling SSD storage
- Automatic data backup (1*-35 days)
- Up to 15 Read Replicas with sub-10ms replica lag
- Automatic monitoring and failover in less than 30 seconds.



Amazon Aurora

Why AWS built Amazon Aurora

- ☑ **Speed** and **availability** of high-end commercial databases
- ☑ **Simplicity** and **cost-effectiveness** of open source databases
- ☑ Drop-in **compatibility** with MySQL
- ☑ Simple **pay as you go** pricing

- ¾ of top 100 AWS customers runs Amazon Aurora.

Amazon Aurora Architecture

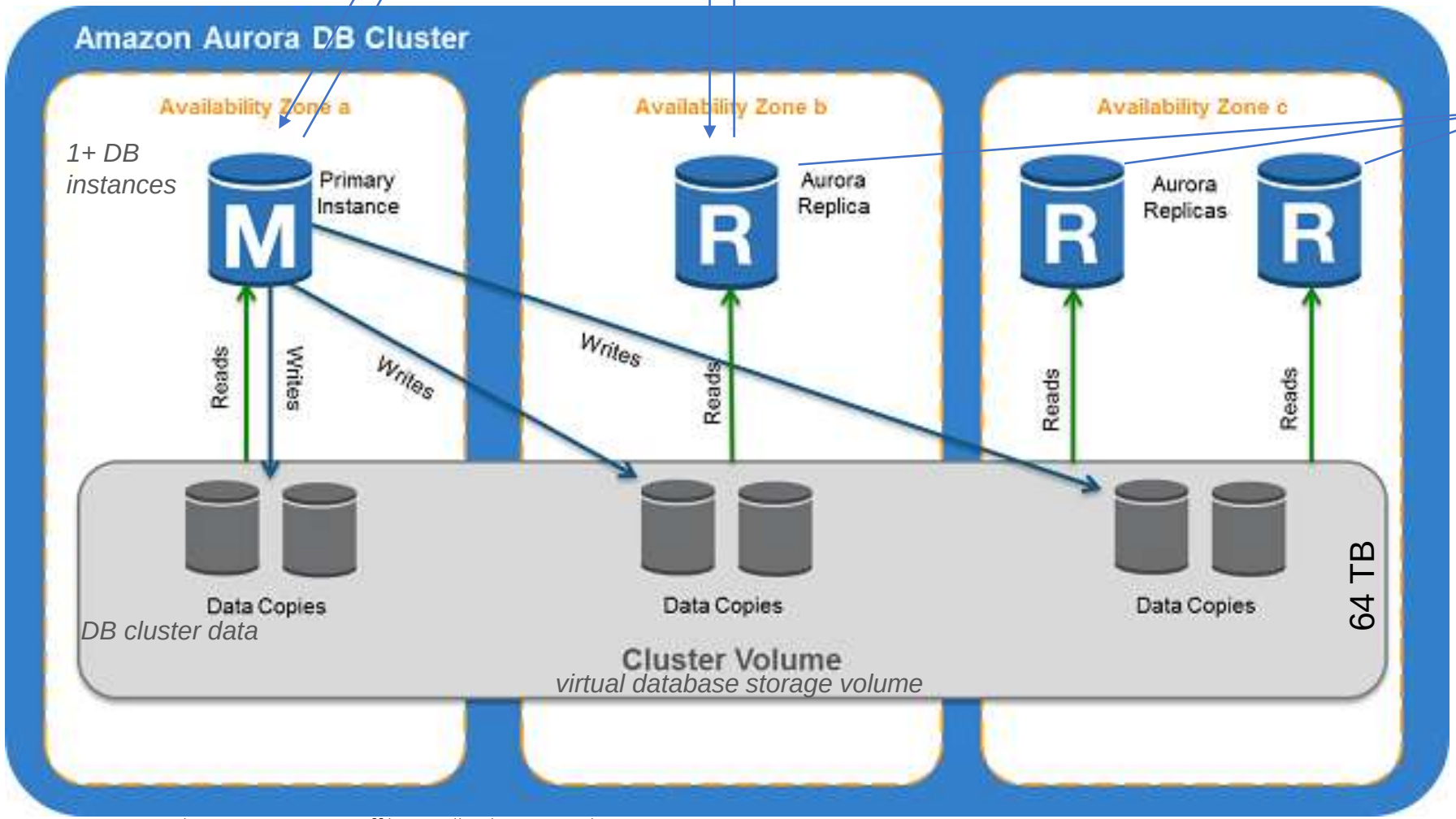
aws training and certification

Host URL:port

mydbcluster.cluster-123456789012.us-east-1.rds.amazonaws.com:3306
mydbcluster.cluster-ro-123456789012.us-east-1.rds.amazonaws.com:3306
mydbinstance.123456789012.us-east-1.rds.amazonaws.com:3306

Cluster endpoint | Reader endpoint | Instance endpoint

Query L.B.

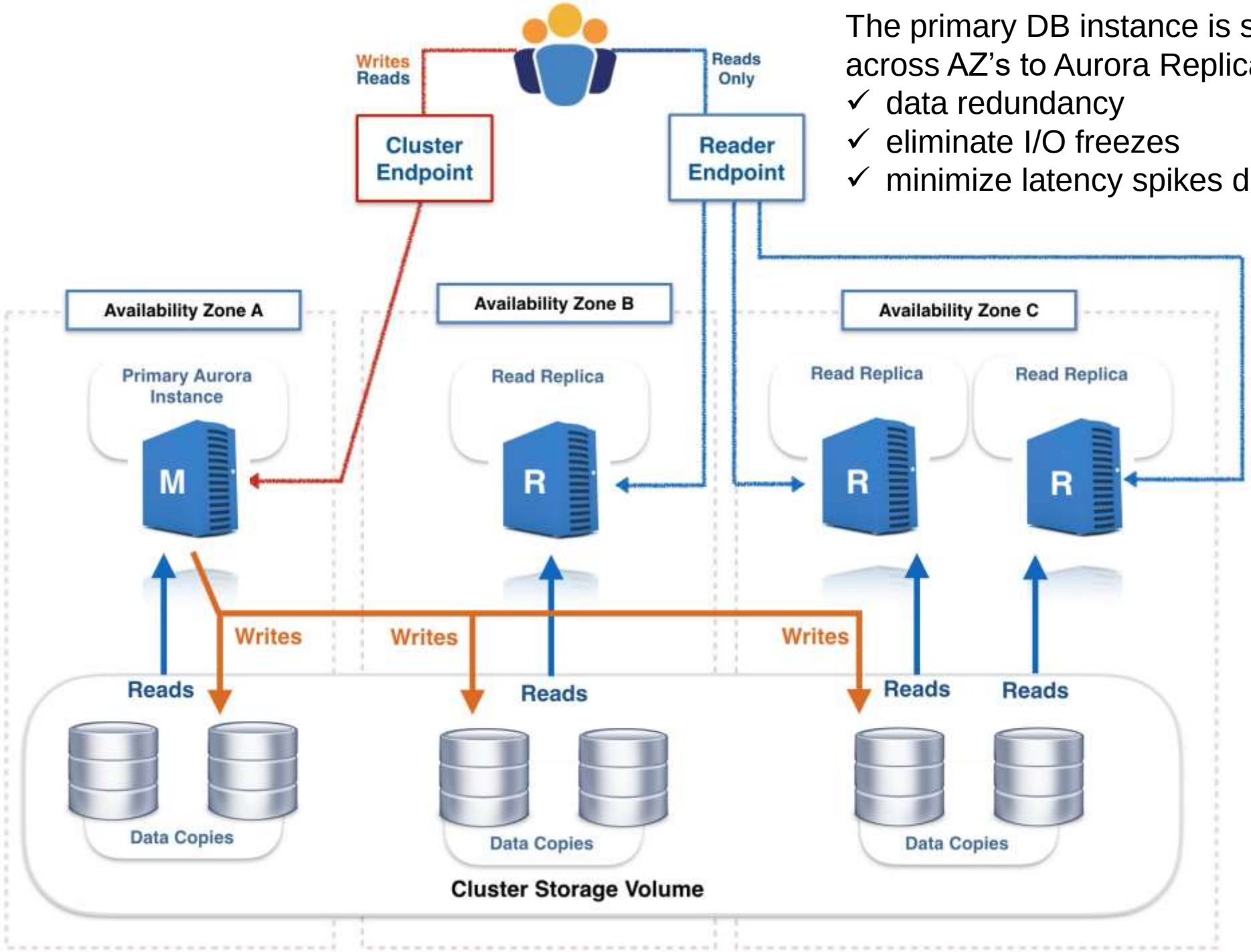


(SQL,Transaction,Caching) Layer

Transparent data layer. (Logging + Storage Layer)

The primary DB instance is synchronously replicated across AZ's to Aurora Replicas.

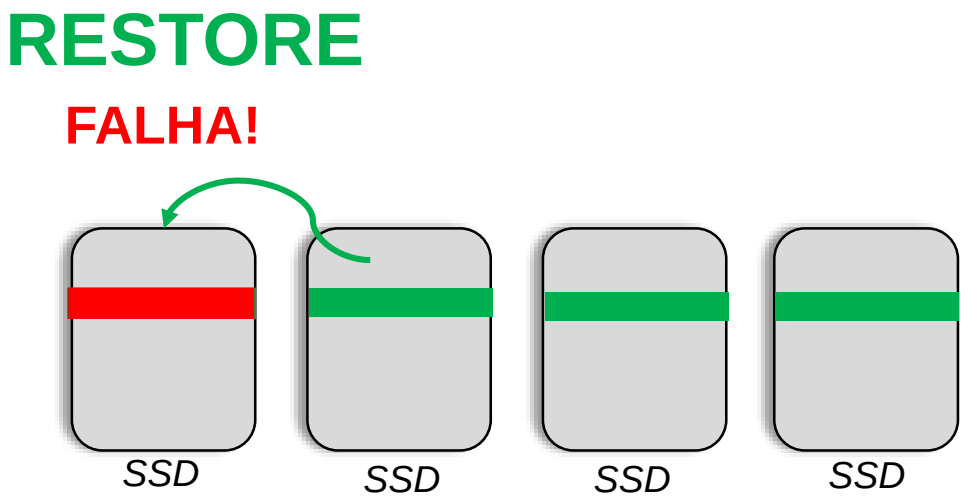
- ✓ data redundancy
- ✓ eliminate I/O freezes
- ✓ minimize latency spikes during system backups.



Amazon Aurora - Main Features

aws training and certification

- **Cluster Volume**
  - Virtual volume using SSD drives.
  - Copies of data across multiple AZ's.
- **Storage Auto-Repair**
  - Automatic failure detection & repair.
  - Avoid data loss and point-in-time restores.

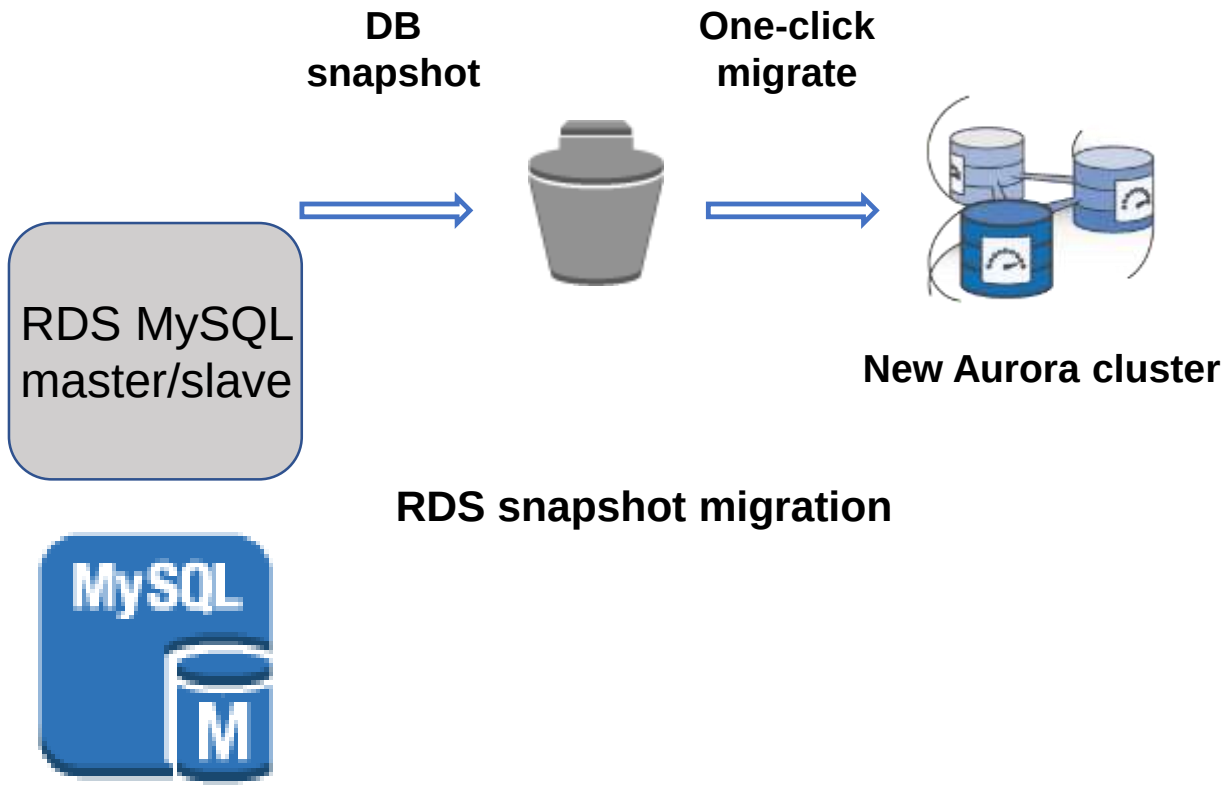


- **Survivable Cache Warming**
  - Pre-loads buffer pool with common queries.
  - Page-cache survives independently.
- **Crash Recovery**
  - Designed to recover from DB crashes almost instantaneously.

Migration from Amazon RDS MySQL/PostgreSQL to Aurora

aws training and certification

- **Source database on RDS**
  - Snapshot migration: One-click migration from RDS MySQL 5.6 to Aurora
- **Source database external or on EC2**
  - Use native MySQL migration tools
  - Back up to S3 using Persona XtraBackup, restore from S3

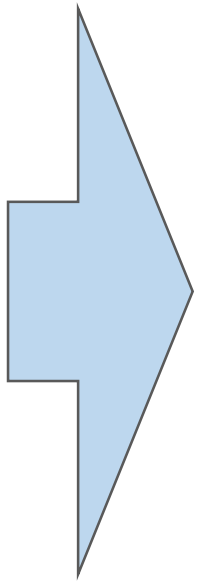


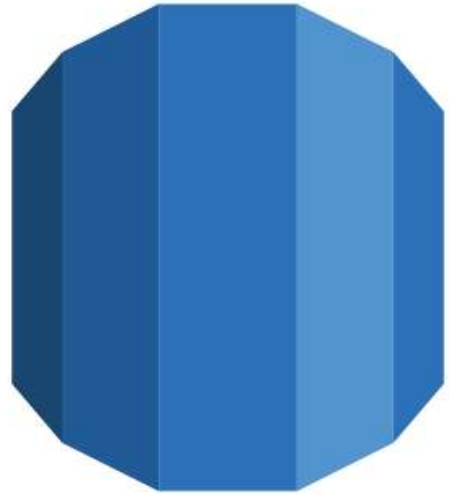
Amazon Aurora - Migrations Options

aws training and certification

You have several options for migrating data from your existing database to an Amazon Aurora MySQL/PostgreSQL DB cluster.

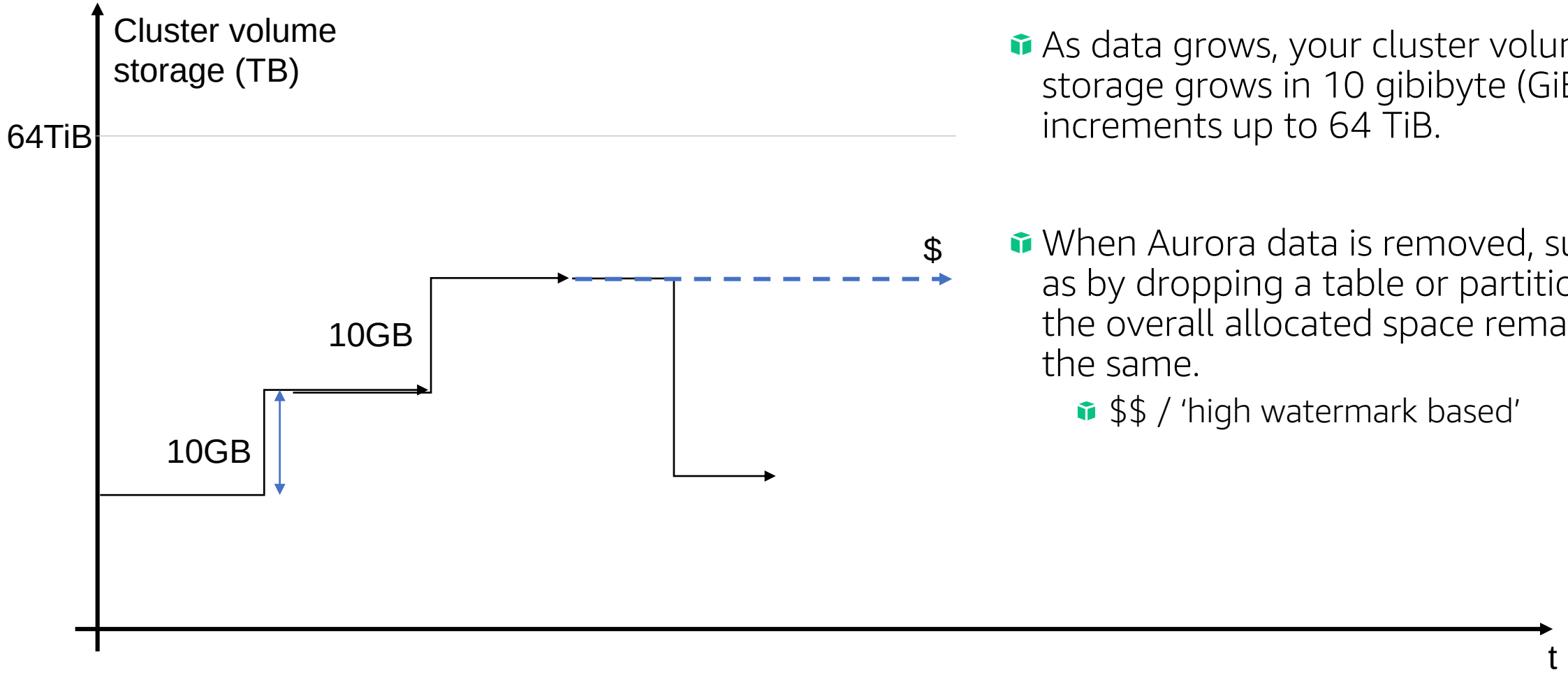
1. RDS MySQL / PostgreSQL instance
2. RDS MySQL / PostgreSQL DB snapshot
3. MySQL database external (dump)
4. MySQL database external (backup files w/ S3)
5. MySQL database external (text files w/ S3)
6. A database that is not MySQL-compatible (DMS) / PostgreSQL





Amazon Aurora

Amazon Aurora - usage



- As data grows, your cluster volume storage grows in 10 gibibyte (GiB) increments up to 64 TiB.
- When Aurora data is removed, such as by dropping a table or partition, the overall allocated space remains the same.
  - $$ / 'high watermark based'

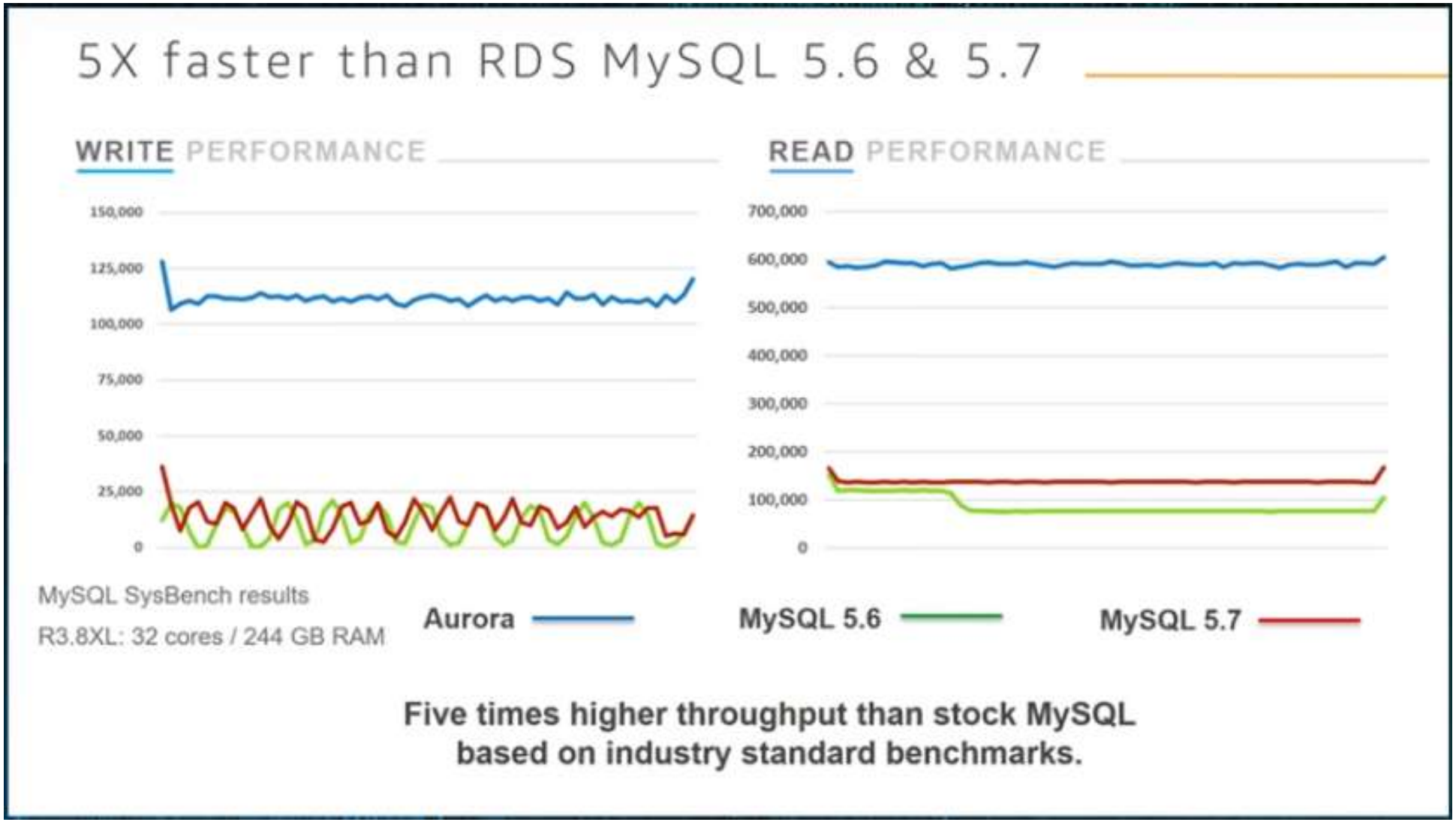
Cross-Region Read Replicas

aws training and certification

Choose cross-region read replicas for faster disaster recovery and enhanced data locality

- Promote a read replica to a master for faster recovery in the event of disaster
- Bring data close to your customer's applications in different regions

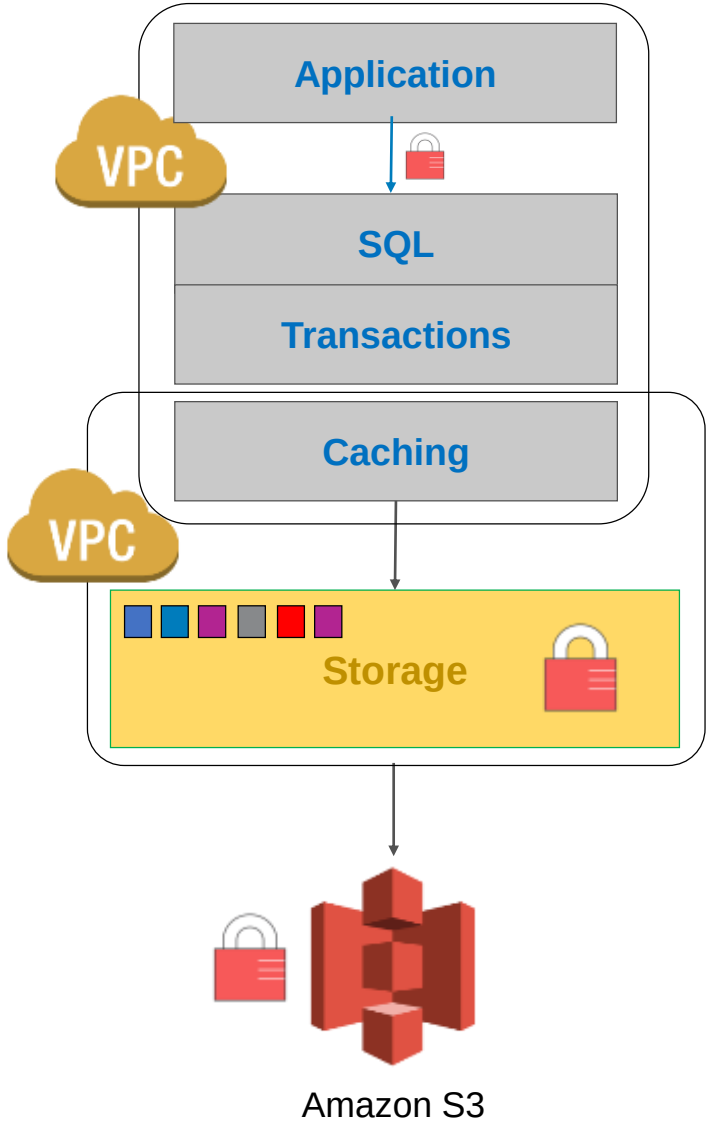
Amazon Aurora - Performance



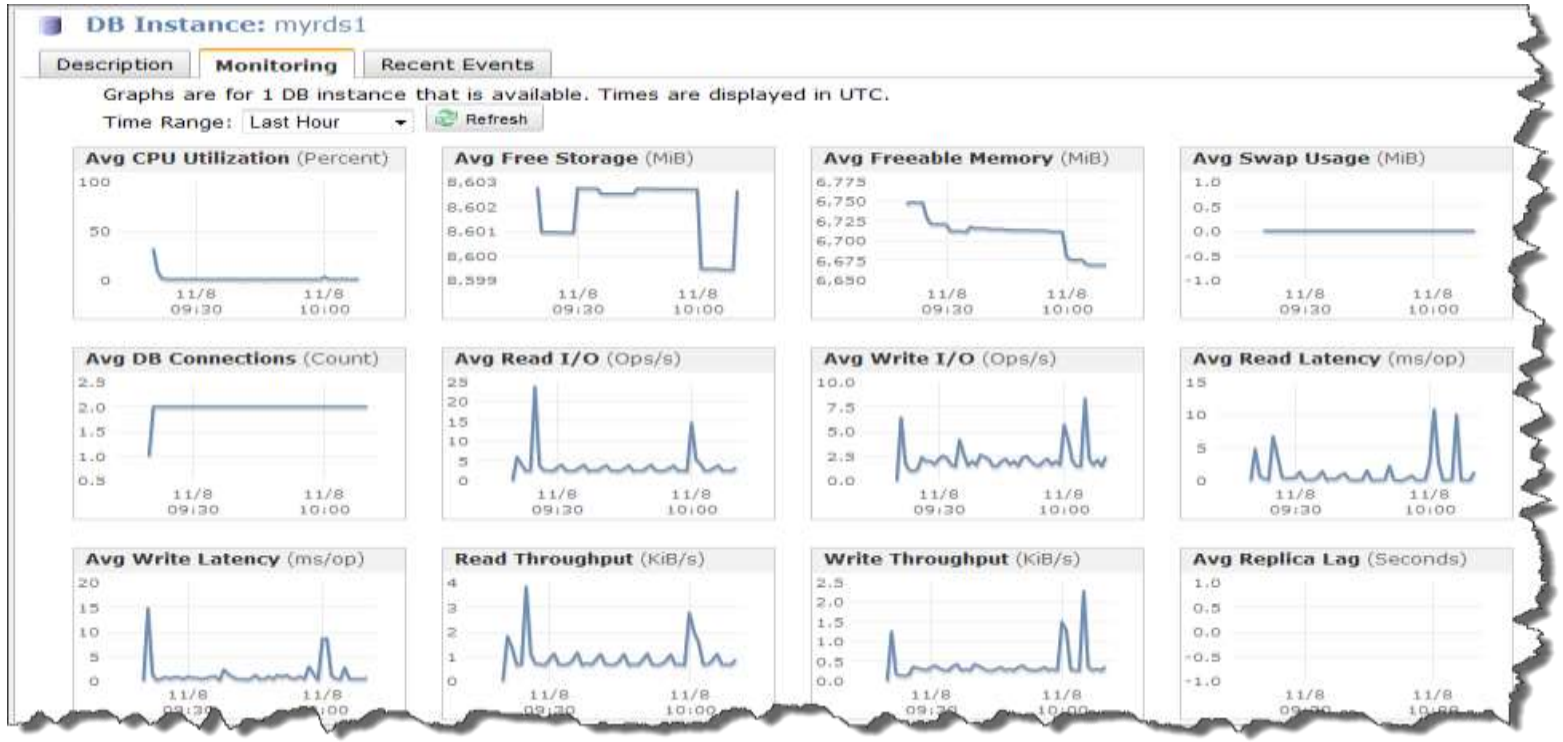
Amazon Aurora - data security

aws training and certification

- ☑ Encryption to secure data at rest
  - AES-256; hardware accelerated
  - All blocks on disk and in Amazon S3 are encrypted
  - Key management by using AWS KMS
- ☑ SSL to secure data in transit
- ☑ Network isolation by using Amazon VPC by default
- ☑ No direct access to nodes
- ☑ Supports industry standard security and data protection certifications



Simplify monitoring with AWS Management Console



Amazon CloudWatch metrics for RDS

- CPU utilization
- Storage
- Memory
- 50+ system/OS metrics
- 1–60 second granularity
- DB connections
- Selects per second
- Latency (read and write)
- Cache hit ratio
- Replica lag

CloudWatch alarms

- Similar to on-premises custom monitoring tools

Amazon DynamoDB

aws training and certification

- Fast, flexible, fully-managed, NoSQL database service
- Single-digit millisecond latency at any scale
- Highly available, replicated across multiple availability zones and between regions
- +100.000 AWS customers
- Use Cases:
  - High-performance database applications
  - Ad Tech
  - Big Data
  - Gaming
  - Mobile/IoT

https://aws.amazon.com/dynamodb/

SQL ou NoSQL?

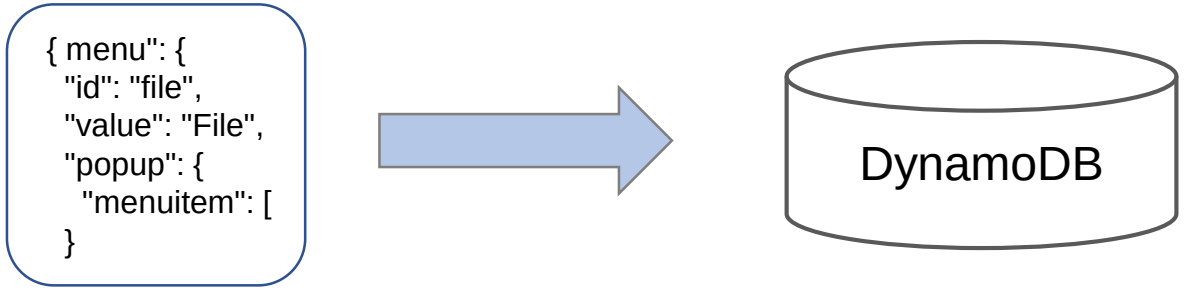
aws training and certification

Características	Relational Database Management System (RDBMS)	Amazon DynamoDB
Cargas de trabalho	Queries Ad-hoc; data-warehousing; OLAP	Web-scaling app's, social networks, gaming, media sharing, IoT.
Modelo de Dados	**Relacional**. Schema bem definido, dados normalizados em tabelas, colunas/linhas.	Schemaless.Primary key to table relation. Dados estruturados e semi-estruturados, incluíndo JSON.
Acesso a Dados	**SQL**, padrão para armazenar e recuperar dados.	AWS Console, AWS CLI, AWS SDK.
Performance	DB relacionais são otimizadas para storage. Os desenvolvedores devem otimizar queries, indexes, estruturas de tabelas.	Otimizado para computação intensiva, depende basicamente do servidor e latência de rede.
Escalabilidade	Facil escalabilidade via scale-up. Sistemas distribuídos são complexos e caros.	Arquitetados para ser distribuído em cluster. Não há limite no nº de itens por tabela nem do seu tamanho.

Amazon DynamoDB Core-Components

aws training and certification

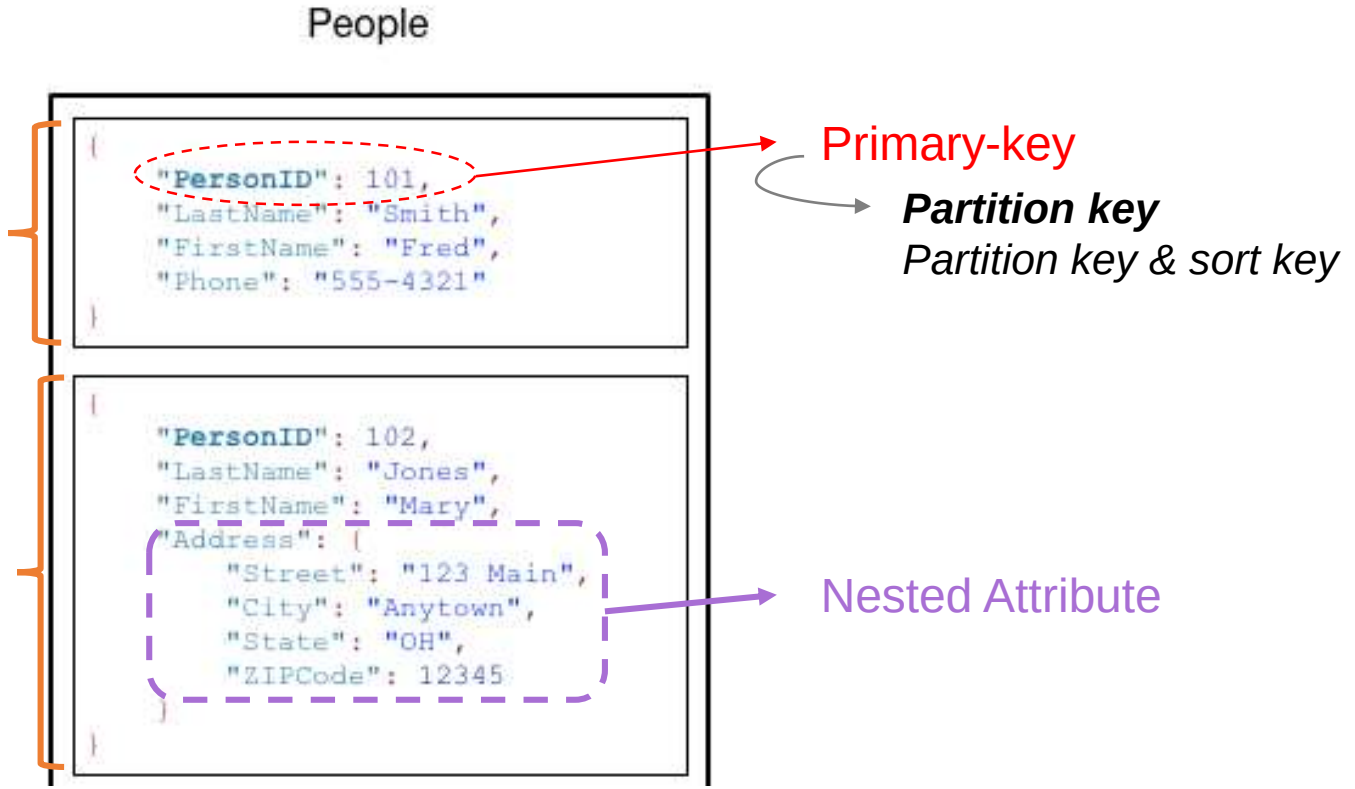
- **Key-value** & Document (JSON,XML)



- ✓ Tables
- ✓ Items : group of attributes
- ✓ Attributes : data element characteristics

>CreateTable

- TableName
- KeySchema
- AttributeDefinitions
- ProvisionedThroughput



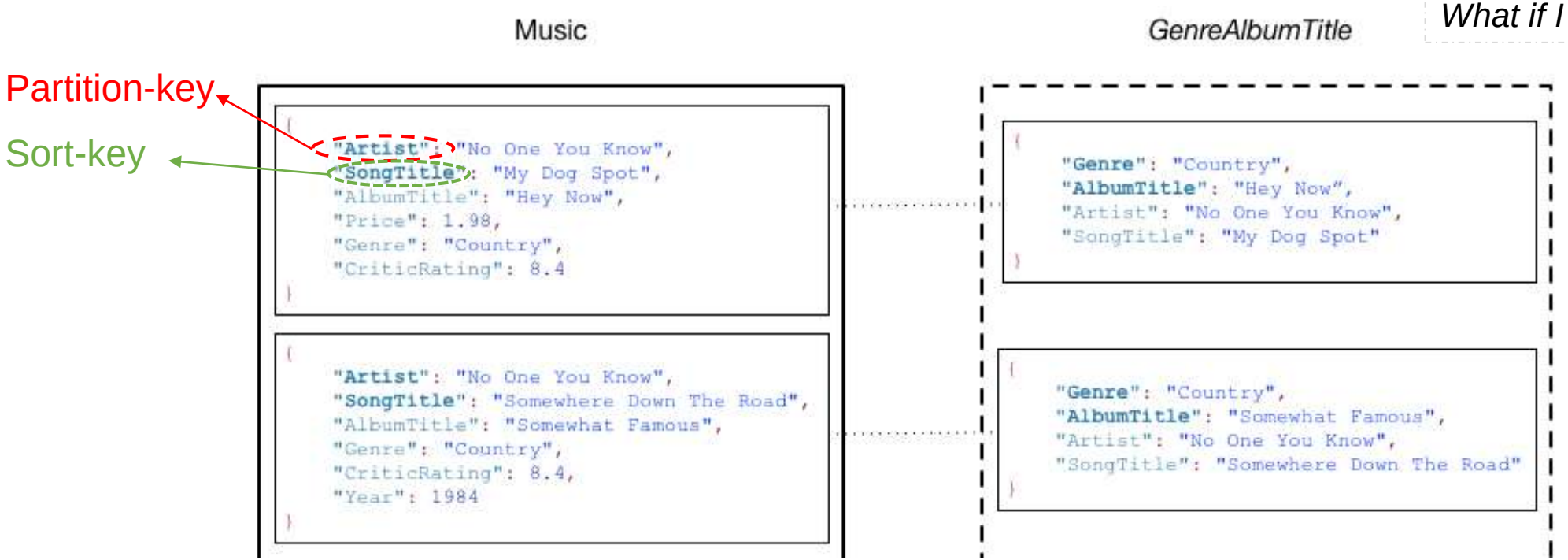
Amazon DynamoDB Core-Components

aws training and certification

Secondary Indexes: **query the data in the table using an alternate key.**

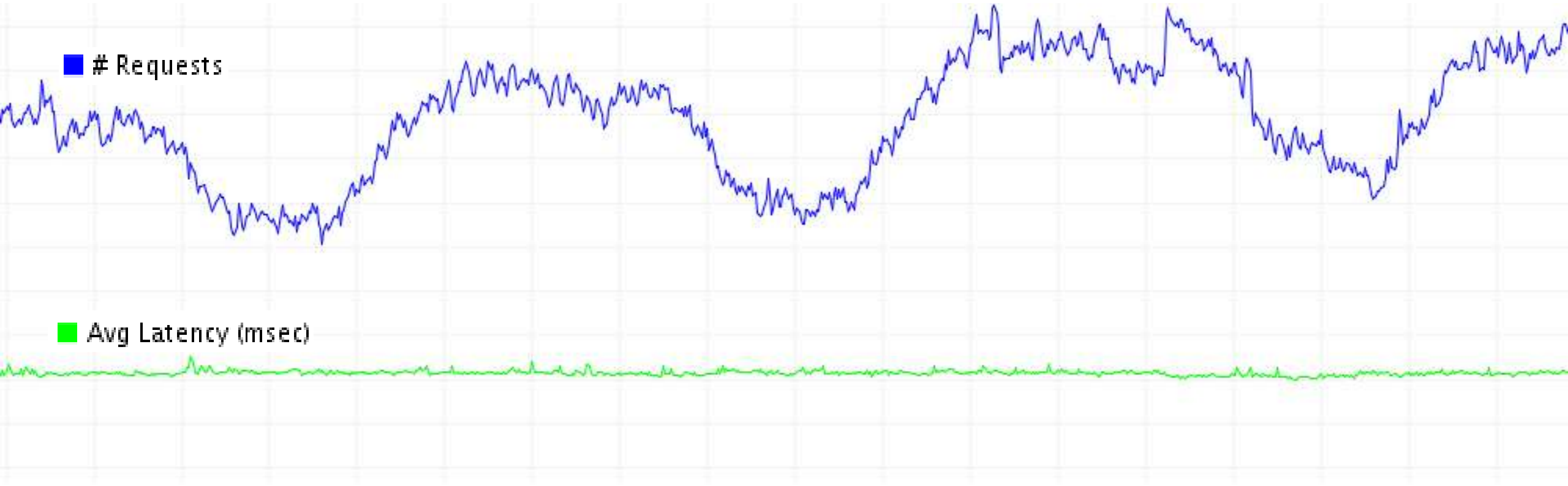
- ✓ **Global Secondary Indexes :** partition key and sort key that can be different from those on the table.
- ✓ **Local Secondary Indexes :** same partition key as the table, but a different sort key.

What if I want to query by Genre?



Consistently: low latency at scale

aws training and certification



PREDICTABLE PERFORMANCE!

Amazon ElastiCache

aws training and certification

- A fully-managed open-source-compatible, Redis and Memcached service.
- Improves performance by retrieving data from high-throughput and low-latency, in-memory data stores.
- Use Cases:
  - Gaming
  - Ad-Tech
  - Financial Services
  - Healthcare
  - IoT

https://aws.amazon.com/elasticache/

AWS Foundational Services

aws training and certification

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Amazon S3

Storage

Networking


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IAM


AWS WAF


AWS KMS


AWS Shield

Management


Amazon CloudWatch


AWS CloudTrail


AWS CloudFormation


AWS Config


Amazon EC2 Systems Manager

AWS Identity & Access Management

aws training and certification

- A core AWS security service
- Create and manage AWS users, roles and groups
- Manage fine-grained access control to AWS resources
  - Control what operations a user or service can perform
- Integrates with Microsoft Active Directory using SAML identity federation and AWS Directory Service (AD Connector)
- Allows scalable, consistent security and auditability
- Multi-factor authentication for highly privileged users

https://aws.amazon.com/iam/

AWS Principals

aws training and certification

Account Owner ID (Root Account)

- Access to all subscribed services.
- Access to billing.
- Access to console and APIs.
- Access to Customer Support.

IAM Users, Groups and Roles

- Access to specific services.
- Access to console and/or APIs.
- Access to Customer Support (Business and Enterprise).

Temporary Security Credentials

- Access to specific services.
- Access to console and/or APIs.

AWS Key Management Service (AWS KMS)

aws training and certification

- Managed service that simplifies management and use of encryption keys
- Integrated with many AWS services
- Integrated with AWS CloudTrail to provide auditable logs of key usage for regulatory and compliance activities

https://aws.amazon.com/kms/

AWS Web Application Firewall (AWS WAF)

aws training and certification

- Protects web applications
- Filter traffic based on custom rules
- Easy to deploy as part of Amazon CloudFront or ELB
- Provides real-time metrics and detailed request data
- Configure manually or via an AWS API
- Integrate third-party. workload-optimized, AWS WAF configuration rules
- AWS Firewall Manager synchronizes AWF WAF rules across multiple-accounts

https://aws.amazon.com/waf/

AWS Shield (Standard or Advanced)

aws training and certification

- Guards against distributed denial of service (DDoS) attacks
- AWS Shield Standard
  - Addresses common layer 3-4 DDoS incidents
  - Monitors network flows for quick attack detection
  - Mitigates service impacts automatically
- AWS Shield Advanced
  - Enhanced DDoS detection and response
  - Supports customized rules against sophisticated attacks
  - Includes AWS DDoS Response Team 24x7
  - Covers cost of increased resource utilization due to attack

https://aws.amazon.com/shield/

AWS Foundational Services

aws training and certification

Compute


Amazon EC2


Amazon ECS


Amazon Glacier


Amazon EBS


Auto Scaling


AWS Lambda


Amazon S3

Storage

Networking


Elastic Load Balancing*


Amazon Route 53


Application Load Balancer


Amazon VPC*


AWS Direct Connect


VPN connection

Databases


Amazon RDS


Amazon Aurora


Amazon DynamoDB


Amazon ElastiCache

Security


IAM


AWS WAF


AWS KMS


AWS Shield

Management


Amazon CloudWatch


AWS CloudTrail


AWS CloudFormation


AWS Config


Amazon EC2 Systems Manager

AWS CloudWatch

aws training and certification

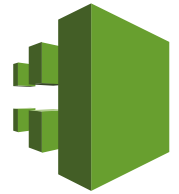
- Monitoring service for AWS cloud resources and applications
- Collect and track metrics, monitor log files, and set alarms
- Gain visibility into resource utilization, application performance, and operational health
- Set alarms to send notifications or take other automated actions
- Supports custom dashboards
- Use cases:
  - Cost management; billing alerts

https://aws.amazon.com/cloudwatch/

AWS CloudTrail

aws training and certification

- Managed service that records all AWS API calls for your account
- Records information about API calls to AWS service
- Delivers results in log files for automatic response
- Use cases:
  - Security, alerting
  - Compliance
  - Troubleshooting
  - Remediation



https://aws.amazon.com/cloudtrail/

CloudFormation: Infrastructure as Code

aws training and certification

AWS CloudFormation allows you to launch, configure, and connect AWS resources with JSON or YAML templates.

Template

- JSON/YAML-formatted file describing the resources to be created
- Treat it as source code: put it in your repository

AWS CloudFormation Engine

- AWS service component
- Interprets AWS CloudFormation template into stacks of AWS resources

Stack

- A collection of resources created by AWS CloudFormation
- Tracked and reviewable in the AWS Management Console

Benefits of AWS CloudFormation

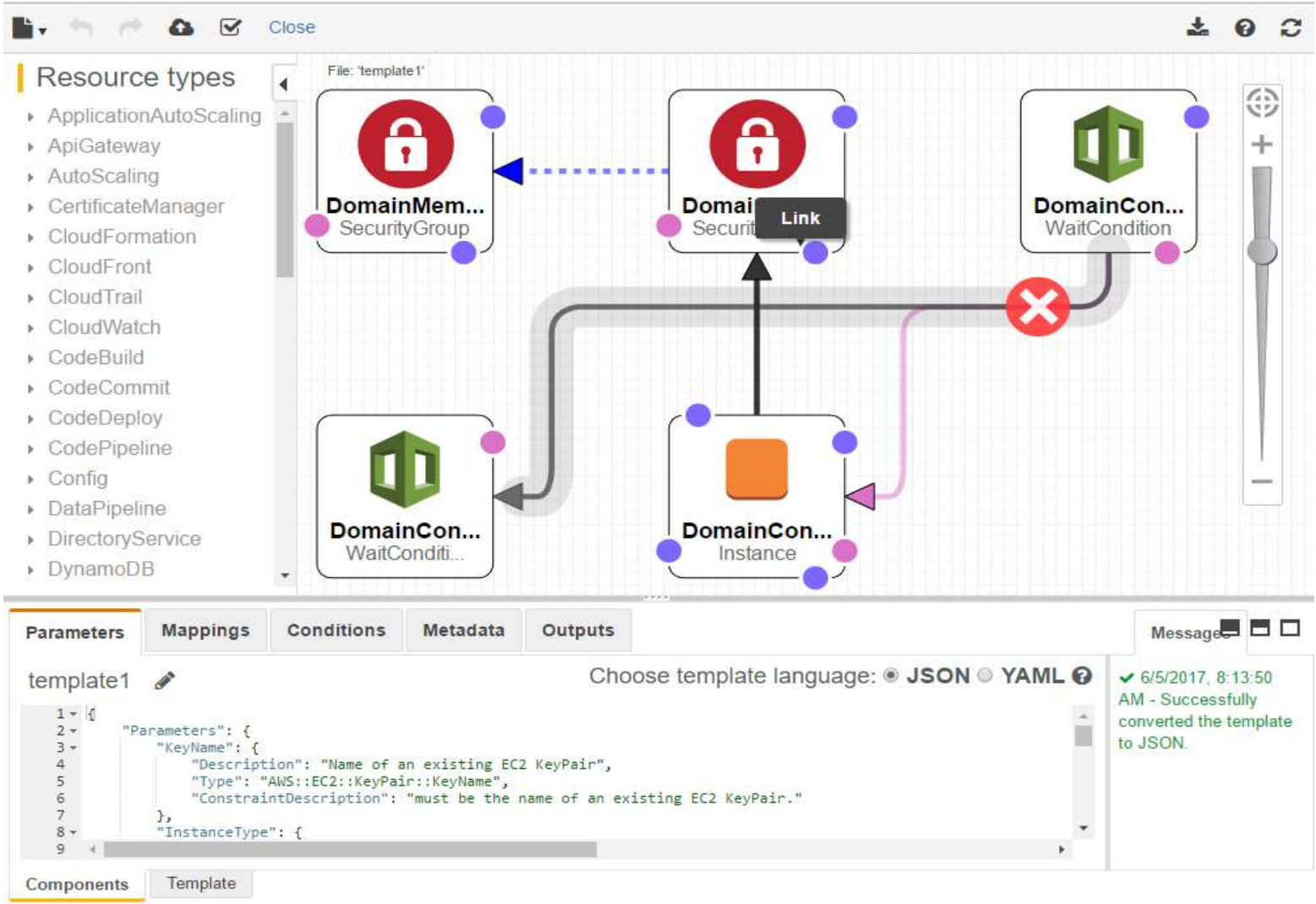
aws training and certification

- Create stacks in multiple regions from the same template.
- Update and delete stacks easily.
- Document your infrastructure.
- Maintain your infrastructure as a code artifact
  - Use a code repository such as AWS CodeCommit or GitHub
- Sample templates available for multiple workloads.

AWS CloudFormation Designer

aws training and certification

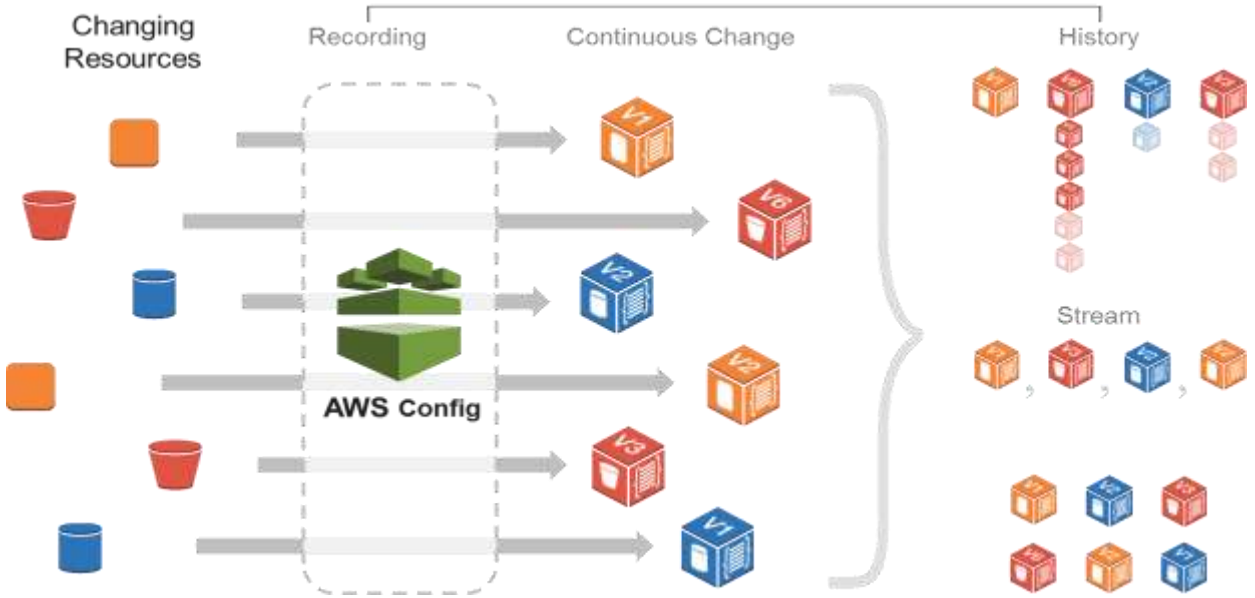
- Visualize template resources
- Modify template with drag-and-drop gestures
- Customize sample templates

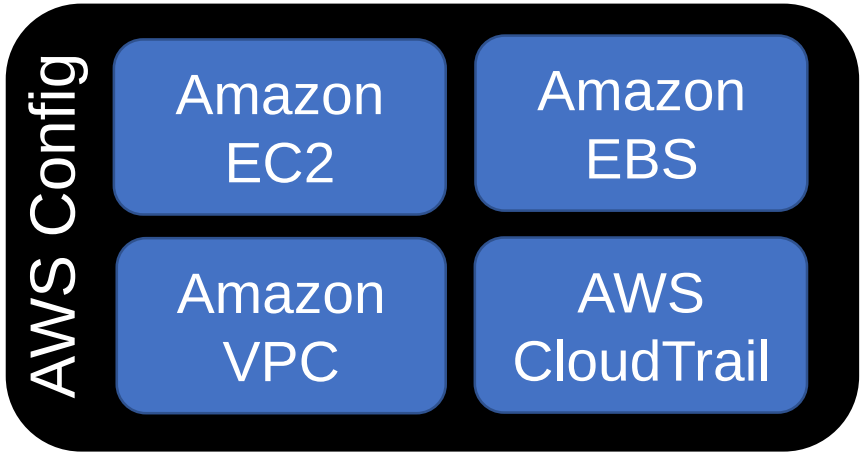


AWS Config

aws training and certification

Managed service for tracking AWS inventory and configuration, and configuration change notification.





Security analysis

Audit compliance

Change management

Troubleshooting

Discovery

aws training and certification

The AWS Well-Architected Framework

The AWS Well-Architected Framework

aws training and certification

- Increase awareness of architectural best practices
- Addresses **foundational areas** that are often neglected
- Consistent approach to **evaluating** architectures

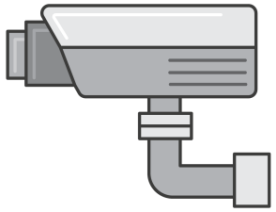
- Composed of:
  - Pillars
  - Design principles
  - Questions

Pillars of AWS Well-Architected

aws training and certification

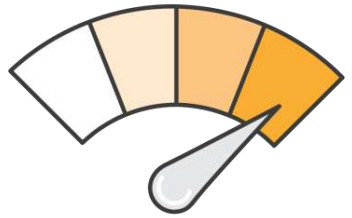
Operational Excellence

Security



Reliability

Performance Efficiency



Cost Optimization

Operational Excellence

aws training and certification

- Principles
  - 1. Perform operations with code
  - 2. Align operations processes to business objectives
  - 3. Make regular, small, incremental changes
  - 4. Test for responses to unexpected events
  - 5. Learn from operational events and failures
  - 6. Keep operations procedures current
- Coverage Area
  - Preparation
  - Operation
  - Response

Operational Excellence: Best Practices

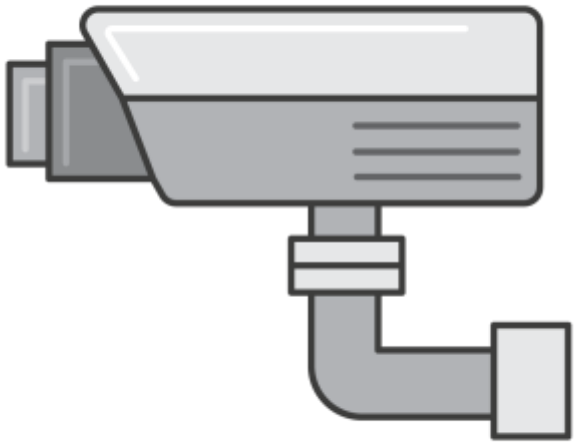
aws training and certification

- Prepare
  - AWS Config rules
- Operate
  - Amazon CloudWatch
- Evolve
  - Amazon ElastiSearch Services (Amazon ES)

Security

aws training and certification

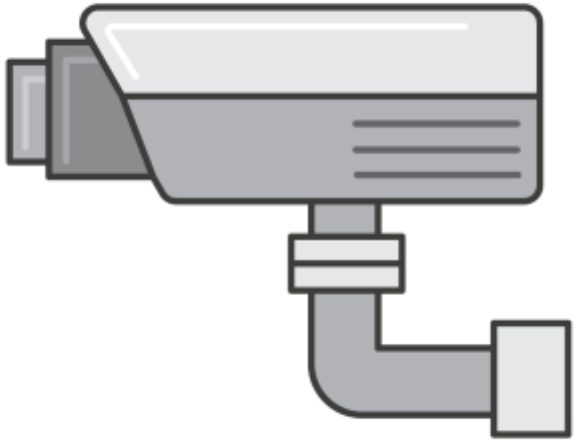
- The ability to protect information, systems, and assets while delivering business value through risk assessments and mitigation strategies.
  - Identity and access management
  - Detective controls
  - Infrastructure protection
  - Data protection
  - Incident response



Security

aws training and certification

- Principles
  - 1. Apply security at all layers
  - 2. Enable traceability
  - 3. Implement a principle of least privilege
  - 4. Focus on securing your system
  - 5. Automate security best practices
- Coverage Areas
  - Identity and access management
  - Detective controls
  - Infrastructure protection
  - Data protection
  - Incident response



Security: AWS Services

aws training and certification

- Identity and Access Management
  - IAM, MFA
- Detective Controls
  - Cloud Trail, AWS Config, CloudWatch
- Infrastructure Protection
  - Amazon VPC
- Data Protection
  - ELB, Amazon EBS, Amazon S3, Amazon RDS, Amazon Macie, AWS KMS,
- Incident Response
  - AWS CloudFormation

Reliability

aws training and certification

- The ability of a system to recover from infrastructure or service failures, dynamically acquire computing resources to meet demand, and mitigate disruptions such as misconfigurations or transient network issues.
  - Foundations
  - Change management
  - Failure management

Reliability

aws training and certification

- Principles
  - 1. Test recovery procedures
  - 2. Automatically recover from failure
  - 3. Scale horizontally to increase aggregate system availability
  - 4. Stop guessing capacity
  - 5. Manage change in automation
- Coverage Areas
  - Foundations
  - Change Management
  - Failure Management

Reliability: AWS Services

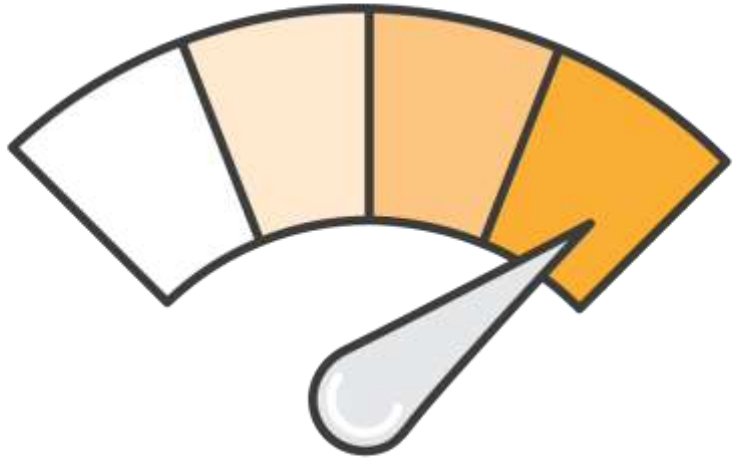
aws training and certification

- **Foundations**
  - IAM, Amazon VPC, Aws Trusted Advisor, Aws Shield
- **Change Management**
  - AWS CloudTrail, AWS Config, Auto Scaling, CloudWatch
- **Failure Management**
  - AWS CloudFormation, Amazon S3, Amazon Glacier, AWS KMS

Performance Efficiency (PE)

aws training and certification

- The ability to use computing resources efficiently to meet system requirements, and to maintain that efficiency as demand changes and technologies evolve.
  - Selection
  - Review
  - Monitoring
  - Tradeoffs



Performance – Sample Question

aws training and certification

- **Selection**
  - How do you select the best performing architecture?
  - How do you select your compute solution?
  - How do you select your storage solution?
  - How do you select your database solution?
  - How do you select your network solution?
- **Review**
  - How do you ensure that you continue to have the most appropriate resource type as new resource types and features are introduced?
- **Monitoring**
  - How do you monitor your resources post-launch to ensure they are performing as expected?
- **Tradeoffs**
  - How do you use tradeoffs to improve performance?

Performance Efficiency: AWS Services

aws training and certification

- Selection
  - **Compute**: Auto Scaling
  - **Storage:** Amazon EBS, Amazon S3
  - **Database:** Amazon RDS, Amazon DynamoDB
  - **Network:** Amazon Route 53, Amazon VPC, AWS Direct Connect
- Review
  - AWS Blog
- Monitoring
  - Amazon CloudWatch, AWS Lambda
- Tradeoffs
  - Amazon ElastiCache, Amazon CloudFront, AWS Snowball, Read replicas for RDS

Cost Optimization (CO)

aws training and certification

- The ability to avoid or eliminate unneeded cost or suboptimal resources
  - Cost-effective resources
  - Matched supply and demand
  - Expenditure awareness
  - Optimizing over time

Cost Optimization

aws training and certification

- Principles
  - 1. Adopt a consumption model
  - 2. Benefit from economies of scale
  - 3. Stop spending money on data center operations
  - 4. Analyze and attribute expenditure
  - 5. Use managed services to reduce cost of ownership
- Coverage Areas
  - Cost-Effective Resources
  - Matching Supply and Demand
  - Expenditure Awareness
  - Optimizing Over Time

Performance Efficiency: AWS Services

aws training and certification

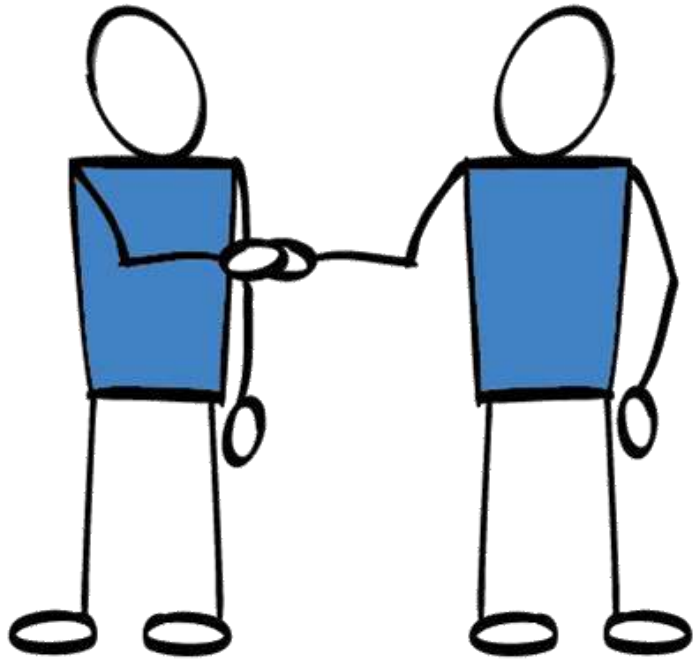
- Cost-Effective Resources
  - AWS Well-Architected Framework
- Matching Supply and Demand
  - Auto Scaling
- Expenditure Awareness
  - Amazon CloudWatch, Amazon Simple Notification Services (SNS)
- Optimizing Over Time
  - AWS Blogs, AWS Trusted Advisor, AWS Cost Explorer

Value Proposition

aws training and certification

Help Customers:

- Consistent approach to reviewing architectures
- Understand and reduce risk in your architecture
- Learn best practices
- Influence future architectures
- Generate additional opportunities



Available Resources

aws training and certification

- AWS Well-Architected Framework whitepaper
- Pillar-specific whitepapers
- Prescriptive high-level implementation guidance
- Lens whitepapers
- Free online training

AWS Well-Architected

Useful Well-Architected Links

aws training and certification

- General Information:

  https://aws.amazon.com/well-architected

- Well-Architected Whitepaper:

  http://d0.awsstatic.com/whitepapers/architecture/AWS_Well-Architected_Framework.pdf

- Link to the digital, Well-Architected course:

  https://www.aws.training/learningobject/curriculum?id=12049

aws training and certification

Case Study Detailed Debrief

The Six R's of Application Migration

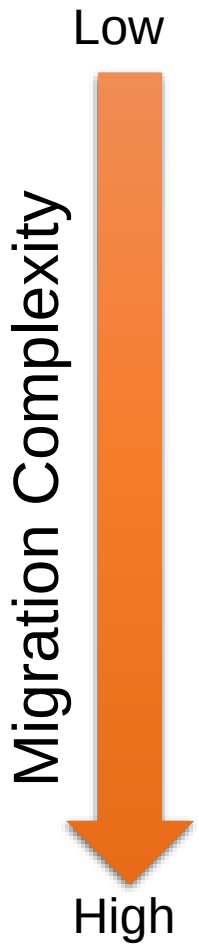
aws training and certification

Pattern Label	Pattern Name	Pattern Percentage
	**Retain**	10%
	**Retire** (Decommission)	5%
	**Re-Host** (Lift and Shift)	40%
	**Re-Platform** (Lift and Replace)	30%
	**Re-Factor** (Rewriting and Decoupling Applications)	10%
	**Re-Purchase** (Replace/Drop and Shop)	5%

70%

Comparing Cloud Migration Strategies

aws training and certification



	Time	Cost	Agility
Retain	+	+	N/A
Retire	+	+	N/A
Re-host	++	++	++
Re-purchase	+++	++++	+++
Re-platform	+++	+++	+++
Refactor	++++	++++	++++

Case Study: Data Services

aws training and certification

- Data elements are simple
  - Username, password, some additional information
  - 1KB or less per registered user
- Total scale is difficult to predict, but could be large
  - Want to support 100m users; that could increase
  - Need fast performance, but not sub-millisecond
- Want to scale up and down to meet changing needs
- Current staff has strong relational database skills

Discussion Points

This is a transactional problem, not analytics, so we will not use Amazon EMR, Amazon Redshift, or Amazon Athena. This is not a graph problem, so we will not use Amazon Neptune.

We don't need ElastiCache for extremely low latency. Needs for scale and consistent fast performance can be best met with Amazon Aurora or Amazon DynamoDB.

DynamoDB does this very well; Aurora can also meet the requirement.

DynamoDB is nonrelational. Aurora is the best choice.

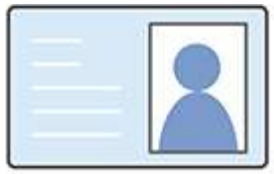
AWS releases new services frequently, so check for new approaches and services to use. Your design assumptions may change.

Case Study: Compute and Storage

aws training and certification

- Current staff has strong Java skills
  - Preference to keep applications in Java
- Total scale is difficult to predict, but could be large
- Want ability to scale up and scale down to meet changing needs
- Serverless could work
  - Want to minimize change from legacy registration system
- Only storage needs are for the database
  - Will need local storage for application servers
  - Will need backups

Discussion Points



Can manage Java using open source Apache Tomcat.

Amazon EC2 can automatically scale. Containers (Amazon ECS, Amazon EKS) can automatically scale even better, but may add too much complexity.

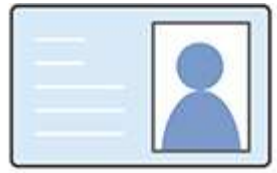
AWS Fargate and AWS Lambda could work well, but moving to serverless is a big change. Amazon EC2 with auto scaling groups is the best choice.

Use Amazon EBS for local storage and Amazon S3 for backups.

Case Study: Network and Security

aws training and certification

- Need load balancing among web servers, application servers, and data servers
- Only the web servers should be accessible from the internet
- All data should be encrypted, in motion and at rest
- Must be able to pass corporate security audit



Discussion Points

Provided by ELB for web and application servers. Amazon Aurora provides a single endpoint with automated balancing.

Need to set security groups and IAM permissions correctly. Are there private and public subnets?

Using Amazon VPCs will ensure that all data in motion is encrypted. You must choose to enable encryption for database and Amazon S3.

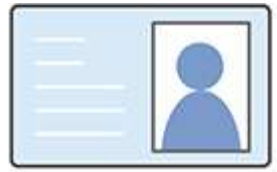
Consider using Amazon Inspector, Amazon GuardDuty, and AWS Shield.

Case Study: Monitoring and Management

aws training and certification

- Must be able to alert and mitigate when the application fails
  - Technical failure: When a service doesn't operate or reaches a limit
    (for example, a server running out of storage space)
  - Business failure: When user action causes a failure
    (for example, not using a valid email address in the email field)
- Must be able to monitor activity
  - Dashboard to show current activity
  - Method to understand errors and find root causes

Discussion Points



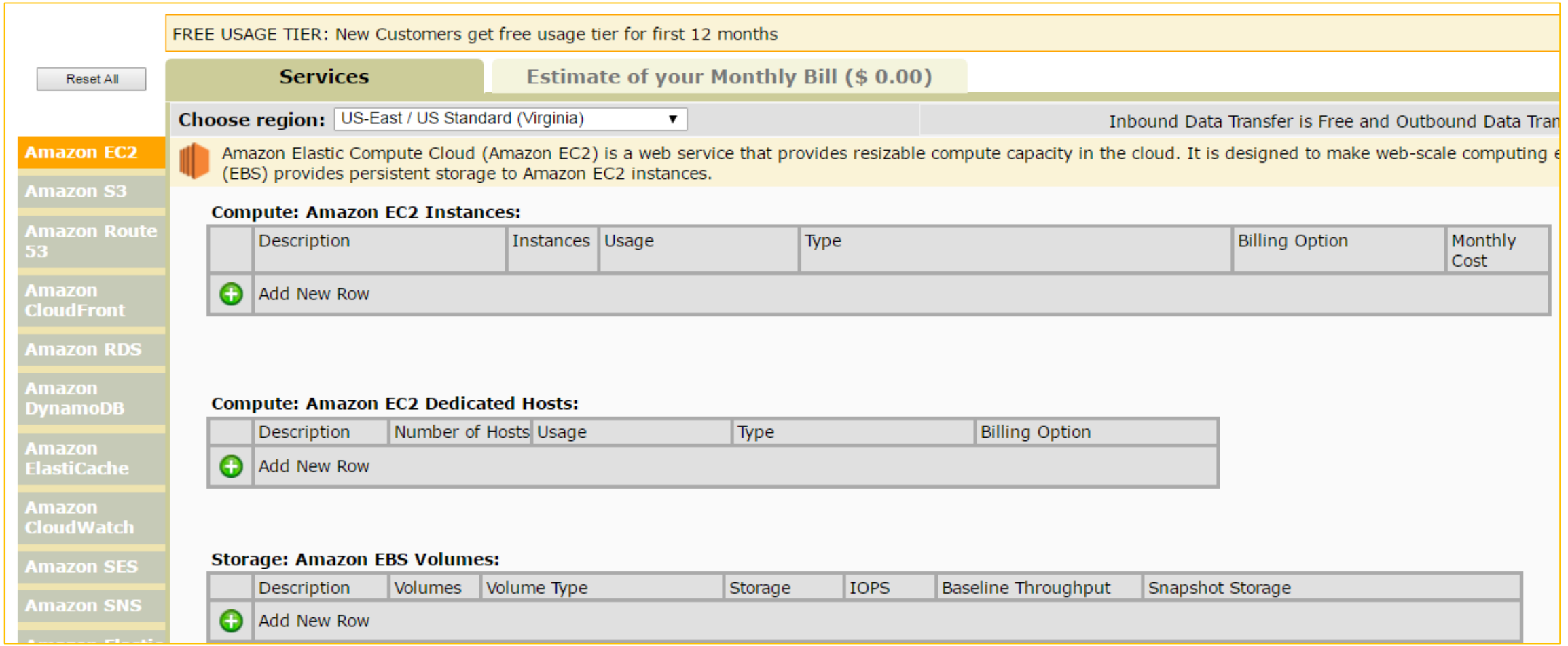
Technical failures will cause events in CloudWatch, which can lead to notifications and a response using AWS Lambda.

Mitigating business failures requires validation check function in the application code.

The application should emit logs to an S3 bucket. These logs combine with CloudWatch and CloudTrail data in Amazon ES to create dashboards and searchable forensics.

Estimate Cost Savings: Simple Monthly Calculator

aws training and certification



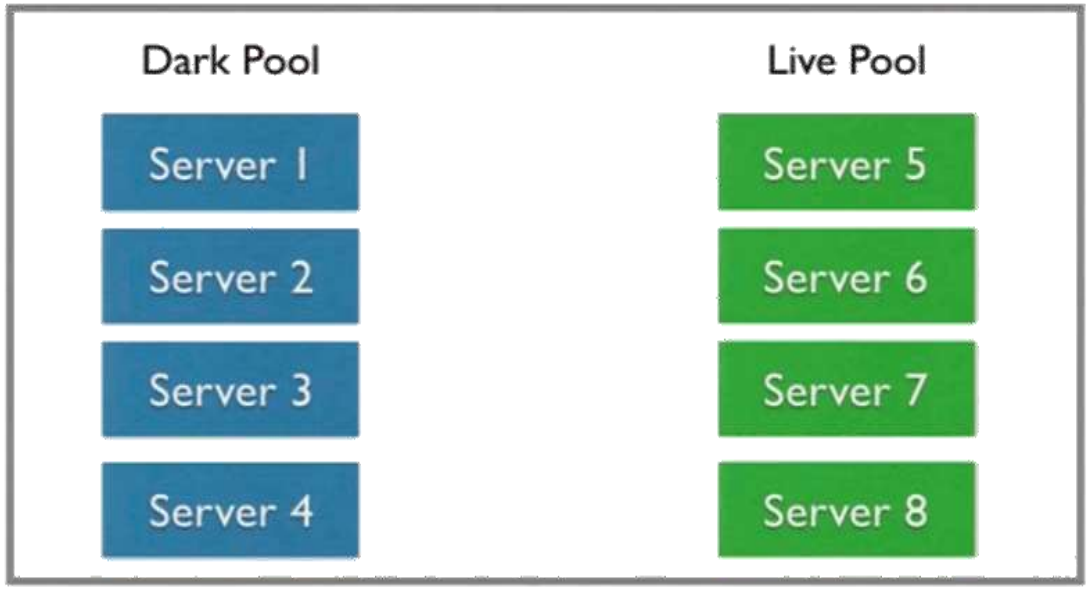
http://calculator.s3.amazonaws.com/index.html

From Concept to Production

aws training and certification

- Implementing a pilot
  - The cloud makes it easy to do experiments. Whenever possible, build the solution, test it, then deploy to a subset of the user community.
- Cutover strategies: “Canary” vs. “Blue-Green”

Vs.



Case Study: Migration and Cutover

aws training and certification

- Legacy data must be moved from Oracle to Aurora
  - Need near-zero downtime for migration
- Need to cutover from legacy web and application servers to new systems
  - Again, need near-zero downtime
  - Must have ability to fail back, if problems in new system appear

Discussion Points

AWS DMS makes the data migration easy. It is non-disruptive, so no downtime will be needed.

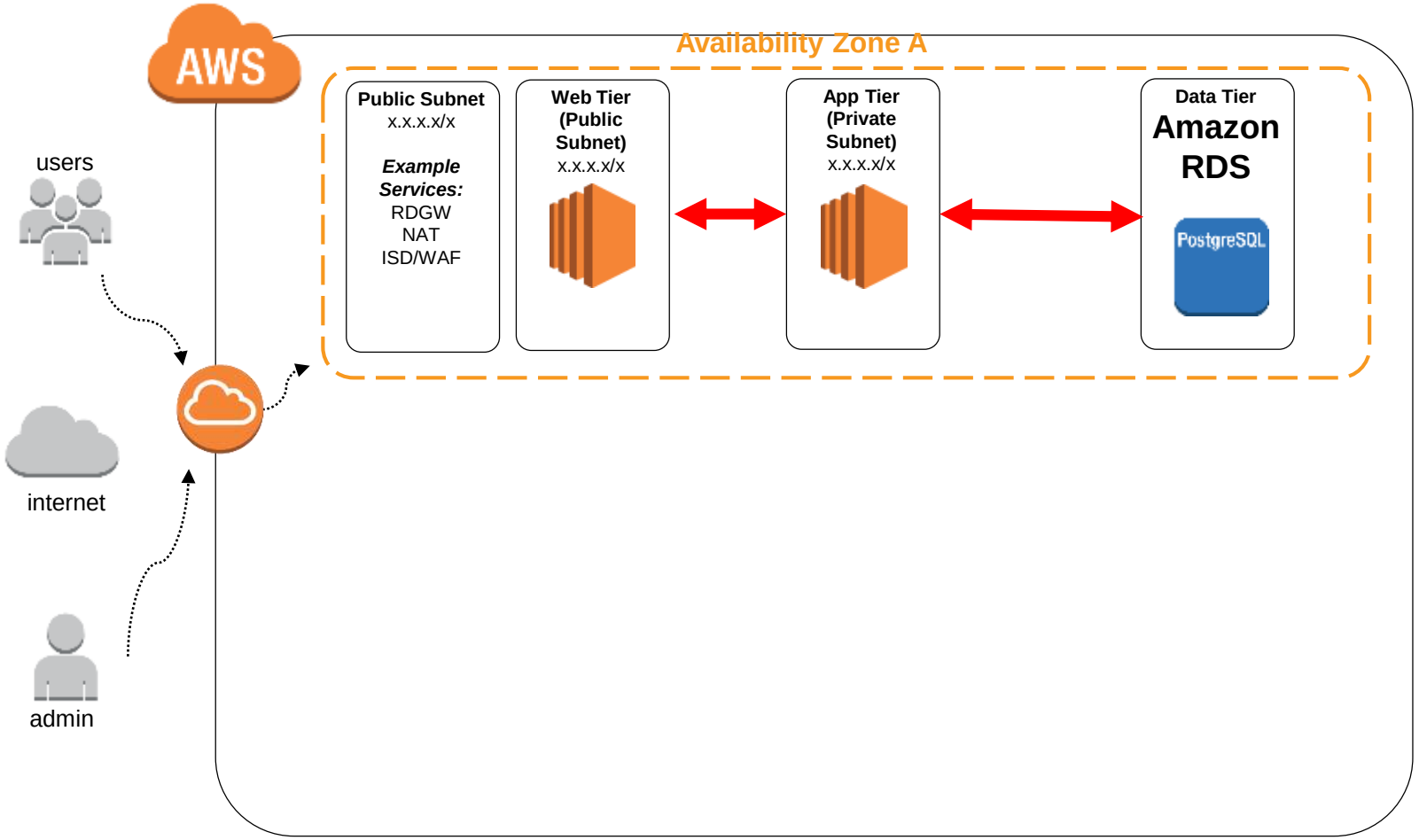
Using a canary deployment will create major difficulties in data consistency, so a blue-green deployment is best. After setting up and testing the new (“green”) solution and migrating data, use DNS to switch the website resolution from the old (“blue”) systems to the green services.

If failback is needed, switch back from green -> blue and use DMS to replicate data back to the blue Oracle server.

Proposed CSI Solution Architecture

Cloud Migrated

aws training and certification



1. Three-tier web-app using EC2 and Aurora
2. Single VPC
3. Single region
4. Single AZ

Services:
ELB
Guard Duty
Shield Advanced
WAF

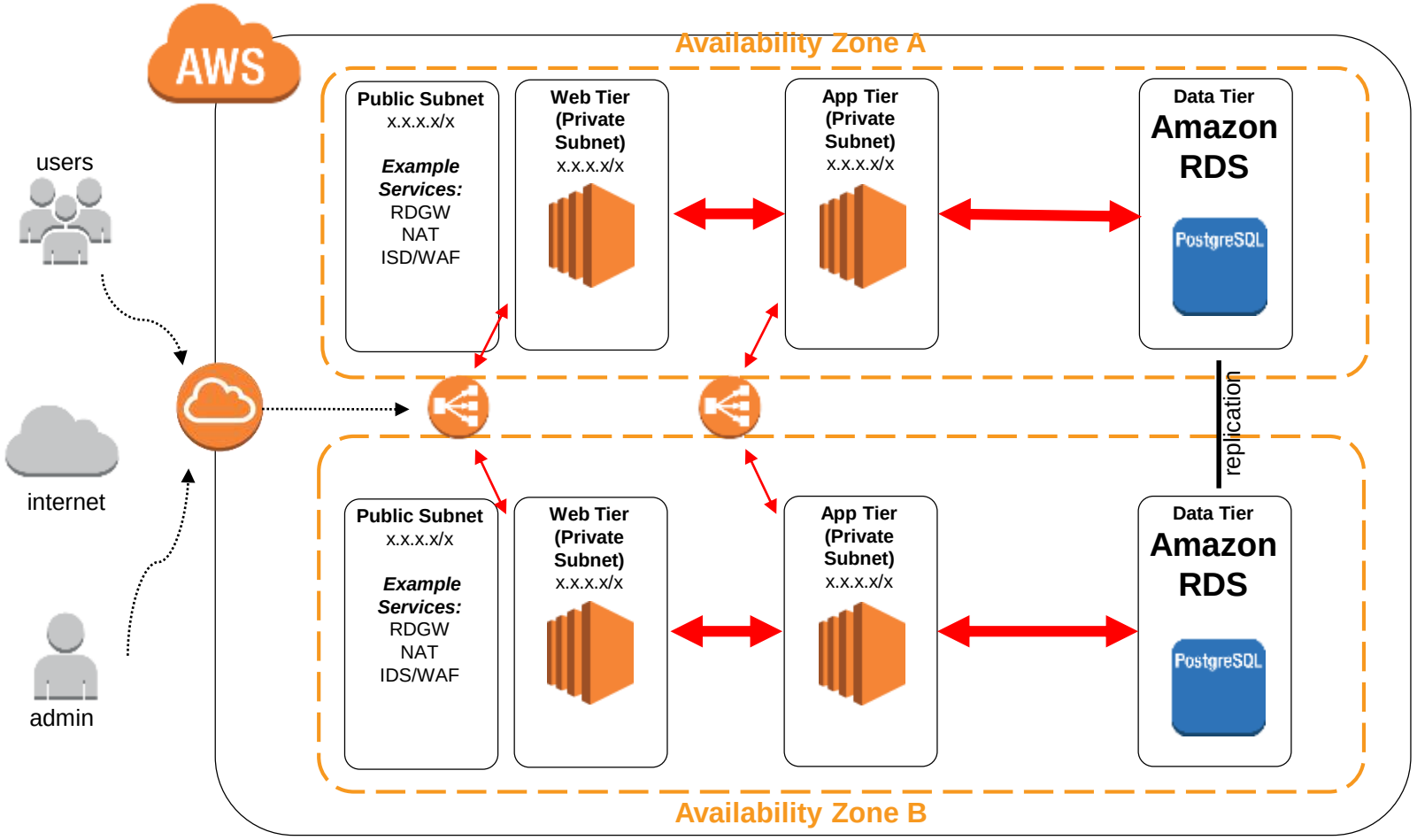
Services:
EC2
ECS/EKS
Fargate
Lambda
EBS
S3

Services:
EC2
ECS/EKS
Fargate
Lambda
EBS
S3

Proposed CSI Solution Architecture

Reliability

1. Multi-AZ



3 - Database replication between the two AZs

Services:
ELB
Guard Duty
Shield Advanced
WAF

Services:
EC2
ECS/EKS
Fargate
Lambda
EBS
S3

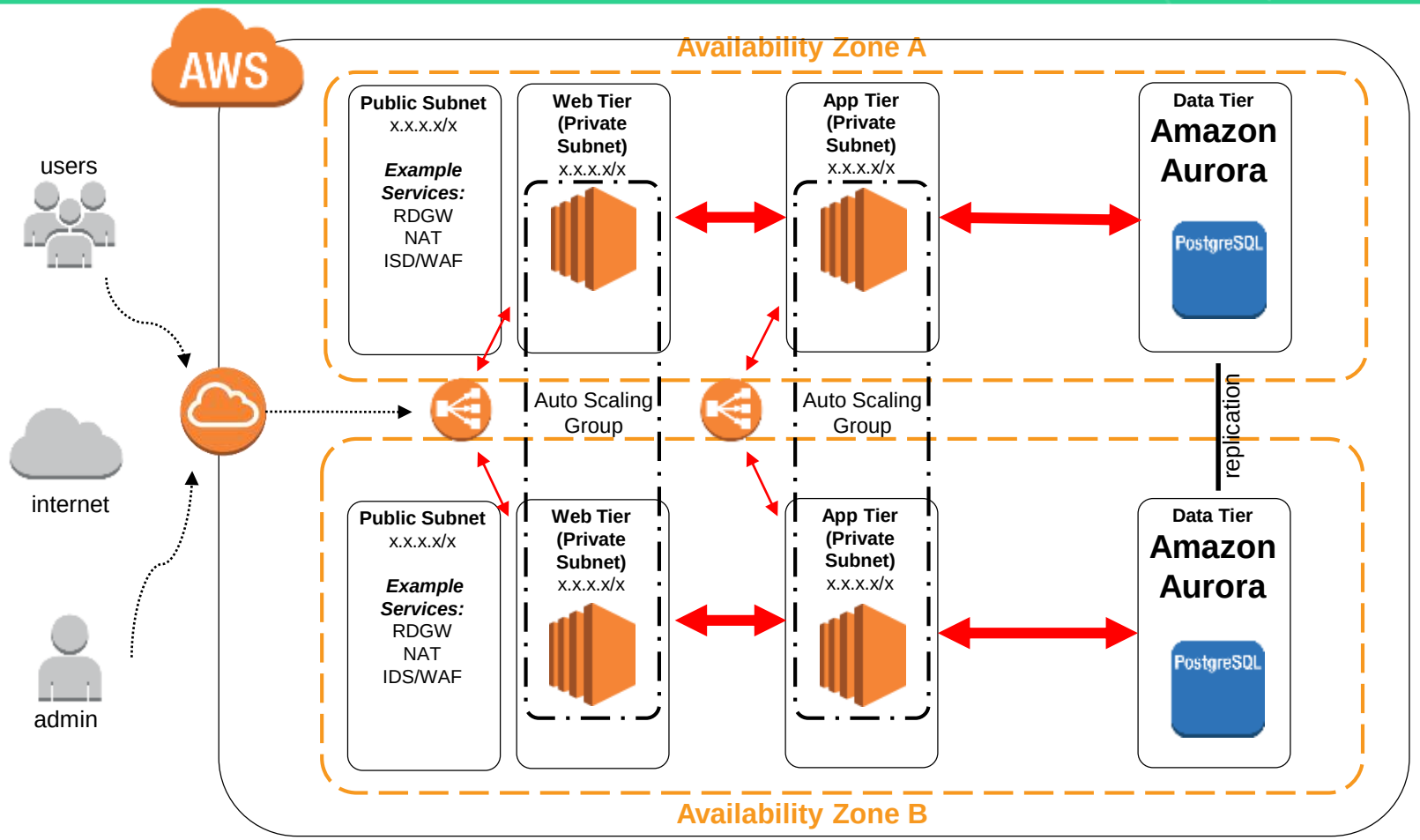
Services:
EC2
ECS/EKS
Fargate
Lambda
EBS
S3

3. Scalable ELB instances
- Independent resource scalability.
- Independent service recovery – when used with auto-scaling
- This will be relevant when we talk about "Performance Efficiency" as well.

Proposed CSI Solution Architecture

Performance Efficiency

1. Auto Scaling groups



Services:
ELB
Guard Duty
Shield Advanced
WAF

Services:
EC2
ECS/EKS
Fargate
Lambda
EBS
S3

Services:
EC2
ECS/EKS
Fargate
Lambda
EBS
S3

2. CloudFormation as a tool to facilitate repeatability and global deployment

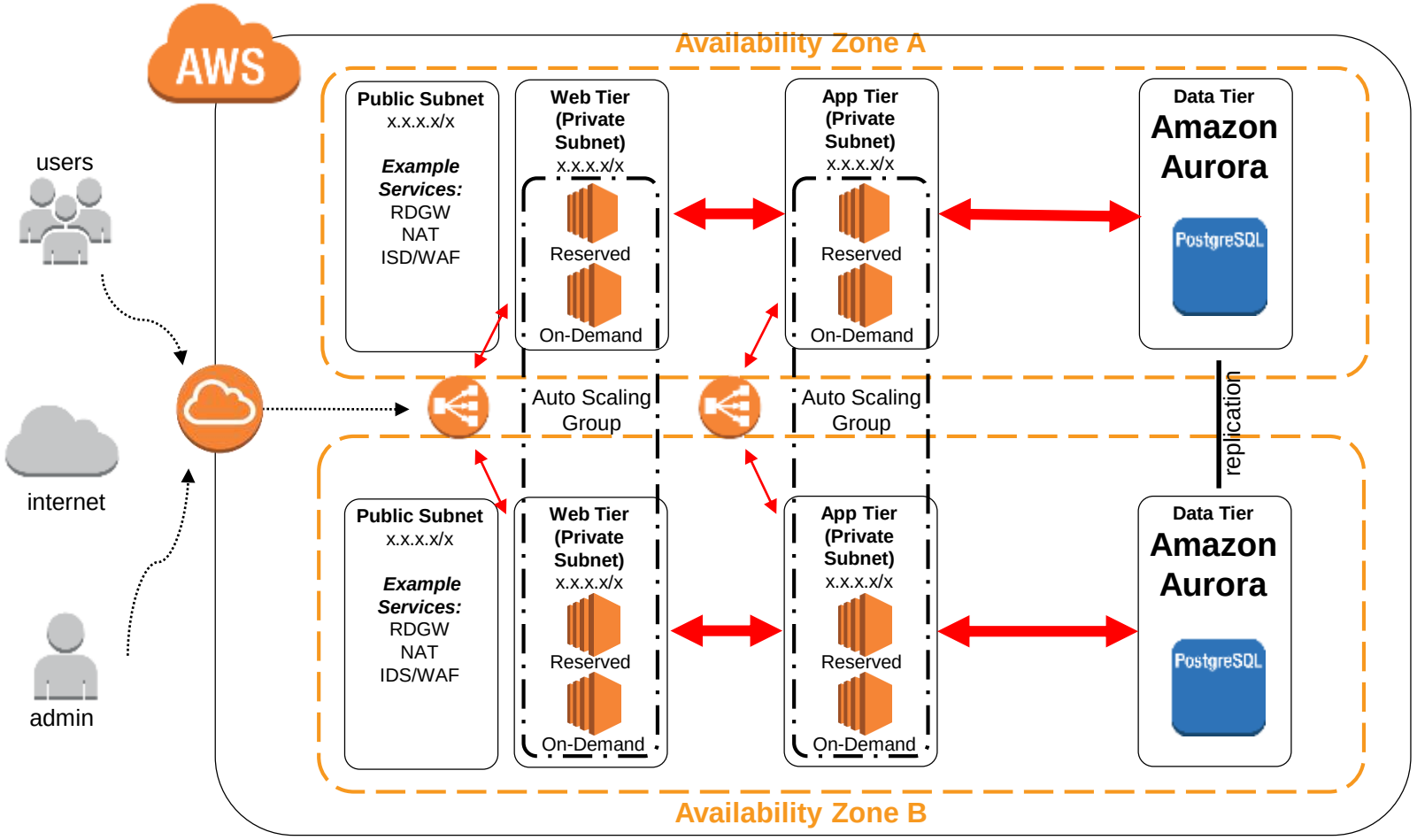
AWS CloudFormation

Proposed CSI Solution Architecture

Cost Optimization

aws training and certification

1. combination of reserved and on-demand instances



2. The use of Aurora as the relational database layer

3. The use of Apache Tomcat as a replacement for WebSphere

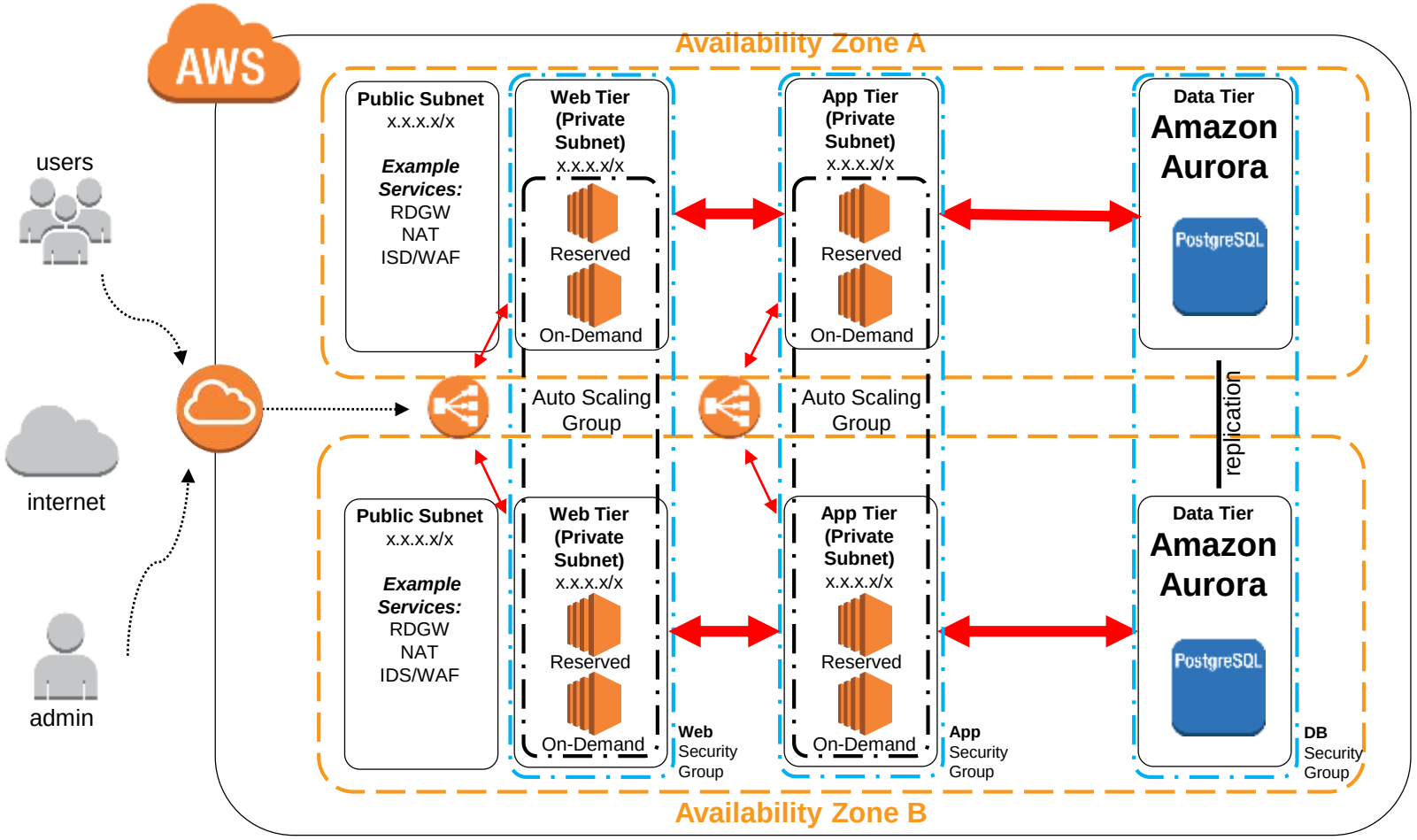
AWS CloudFormation

Proposed CSI Solution Architecture

Security

aws training and certification

1. Public and private subnets
   - ELB and other edge devices are the only things the public can reach
   - The application of WAF, and Shield at the edge to control traffic



2. The use of IAM (Dive deep – Understand the roles and users.)

3. The use of CloudTrail and Config to maintain a known infrastructure state

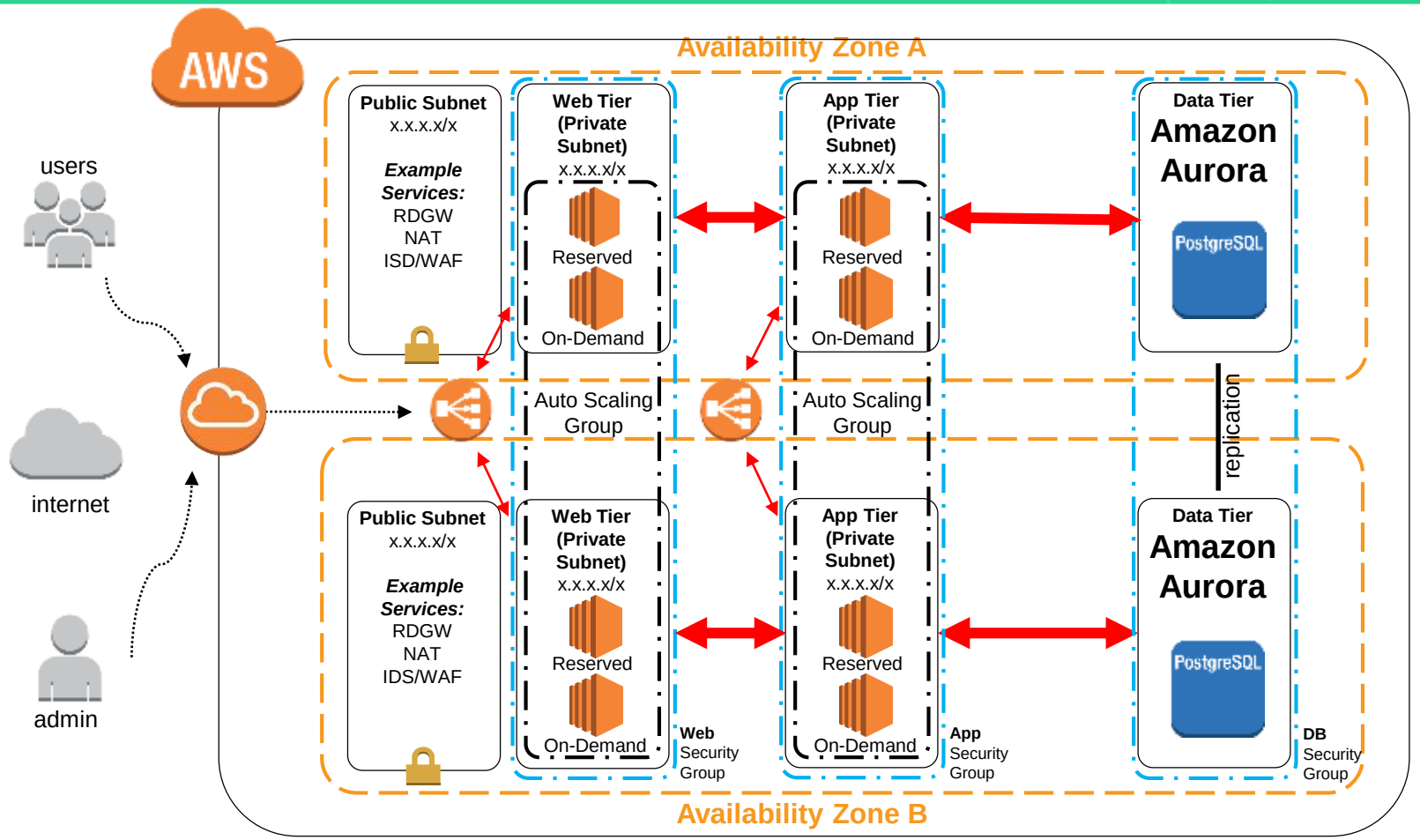
4. Using IAM to create roles that ensure that only the App tier can talk to the database

Proposed CSI Solution Architecture

Operational Excellence

aws training and certification

1. Use of CloudWatch to achieve visibility in the cloud



2. Use of CodeStar to deploy Infrastructure as Code

IAM

AWS WAF

AWS Shield

AWS CodeStar

Amazon CloudWatch

AWS CloudFormation

AWS CloudTrail

AWS Config

Proposed CSI Solution Architecture

Considerations

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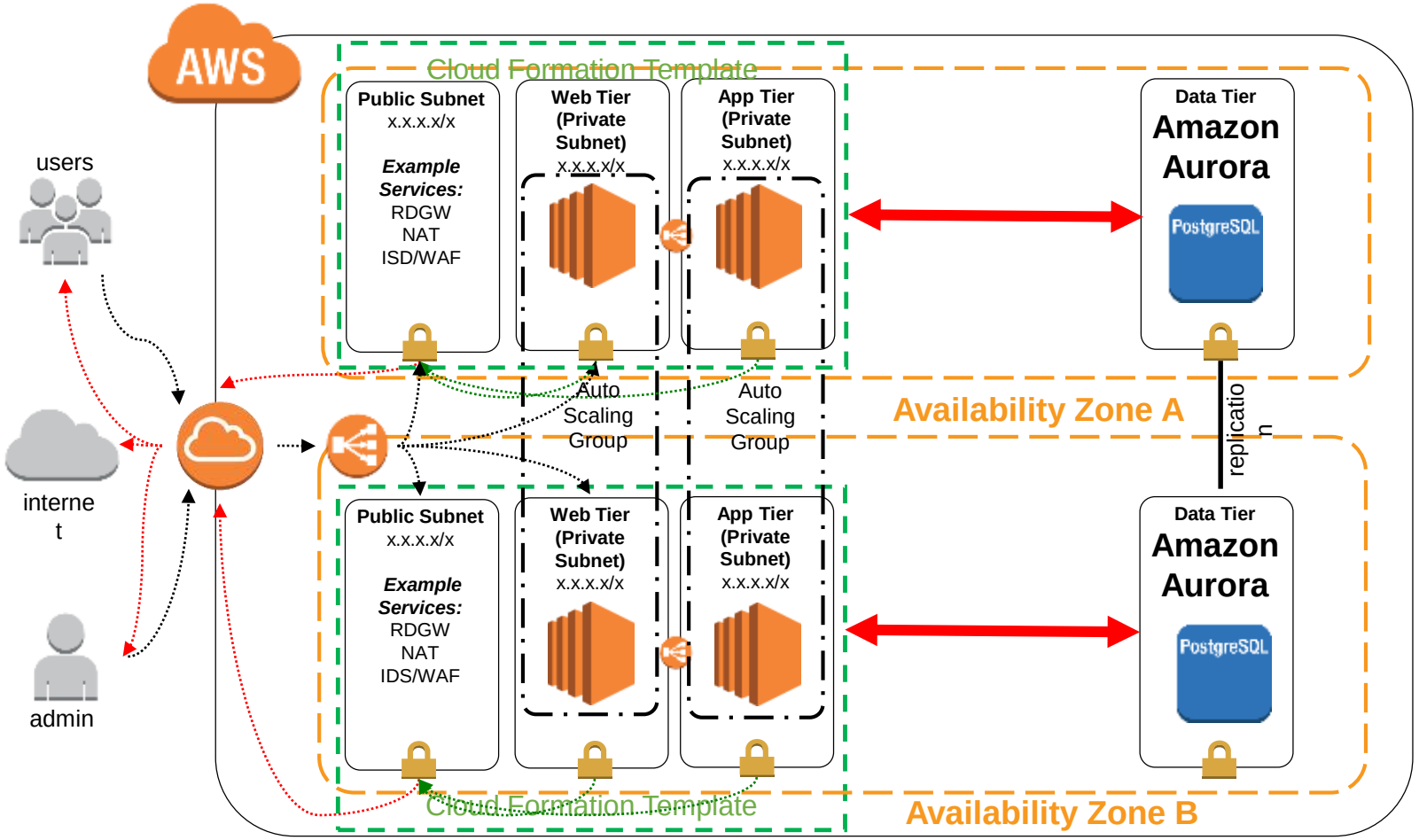
- Limit Risk
  - Lift & Shift
  - VMs
  - Relational Database
- Global Rollout
- High Availability
  - Multi-AZ
- Performance
  - Load Balanced
  - Auto Scale Grouping
- Relational Database



- Open source
  - No licenses
- Management/ Monitoring
- Dev Tools/Lifecycle
- Data Migration

IAM

AWS WAF

AWS Shield

Services:
ELB
Guard Duty
Shield Advanced
WAF

Services:
EC2
ECS/EKS
Fargate
Lambda
EBS
S3

Services:
EC2
ECS/EKS
Fargate
Lambda
EBS
S3

AWS CodeStar

Amazon CloudWatch

AWS CloudFormation

AWS CloudTrail

AWS Config

Iterate. Invent and Simplify. Innovate.

aws training and certification

- **Microservices** – Containers, AWS Lambda
- **Big Data** – Amazon S3, Amazon EMR, Amazon ML
- **DevOps & CI/CD** - Amazon CodeStar
- **Database** – Amazon DynamoDB, Amazon ElastiCache
- **Manageability and Scale** - AWS CloudFormation
- **Security** – Amazon Guard Duty, Amazon WAF, Micro-segmentation,…
- **Performance and Global Reach** - Amazon CloudFront, TLS offload, Localization…
- **Amazon EC2 Pricing** – Reserve Instances, Spot, On-Demand

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Next Steps

Next Step: Advance Your Technical Skills

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Intermediate

Architecting on AWS

Instructor-led | Live or Virtual Class | 3 Days

Learn cloud best practices, architecture patterns, case studies, and other practical ways of thinking about how to architect infrastructure on AWS.

https://www.aws.training/training/schedule?courseId=10002

Advanced

Advanced Architecting on AWS

Instructor-led | Live or Virtual Class | 3 Days

Learn how to build complex AWS solutions incorporating data services, governance, and security.

Gain best practices for building scalable, elastic, secure, and highly available applications.

https://www.aws.training/training/schedule?courseId=10000

https://aws.amazon.com/training/course-descriptions/architect/

AWS Well-Architected

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- AWS Well-Architected Framework Whitepaper
- Pillar Specific Whitepapers
  - Prescriptive high-level implementation guidance
- Lens Whitepapers
- Free Online Training

- https://aws.amazon.com/well-architected

AWS Well-Architected

Available Security Trainings

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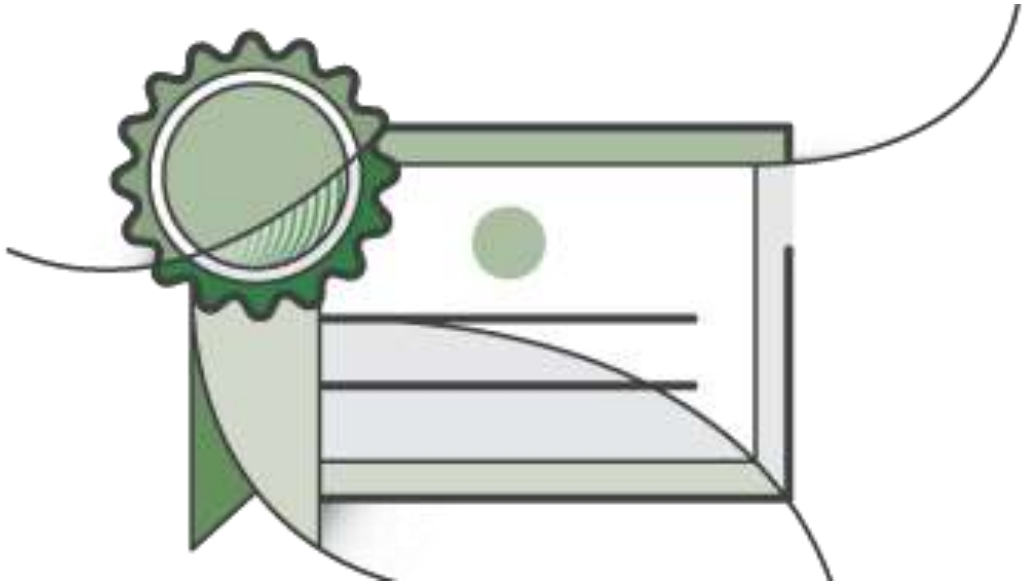

Security Fundamentals on AWS
(Free online course)

Security Operations on AWS
(3-day class)

Details at aws.amazon.com/training

AWS Security Center

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Comprehensive security portal to provide a variety of security notifications, information and documentation.

Security Whitepapers

- Overview of Security Process
- AWS Risk and Compliance
- AWS Security Best Practices

Security Bulletin

Security Resources

Vulnerability Reporting

Penetration Testing

Requests

Report Suspicious Emails

http://aws.amazon.com/security

Keeping Up
AWS Announcements and Updates

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- AWS blog - https://aws.amazon.com/blogs/aws/
- AWS podcast - https://aws.amazon.com/podcasts/aws-podcast/
- APN blog - https://aws.amazon.com/blogs/apn/
- This is MY Architecture YouTube channel - https://aws.amazon.com/this-is-my-architecture/
- AWS loft schedule - https://aws.amazon.com/start-ups/loft/
- @awscloud twitter - https://twitter.com/awscloud

AWS APN Competency Program

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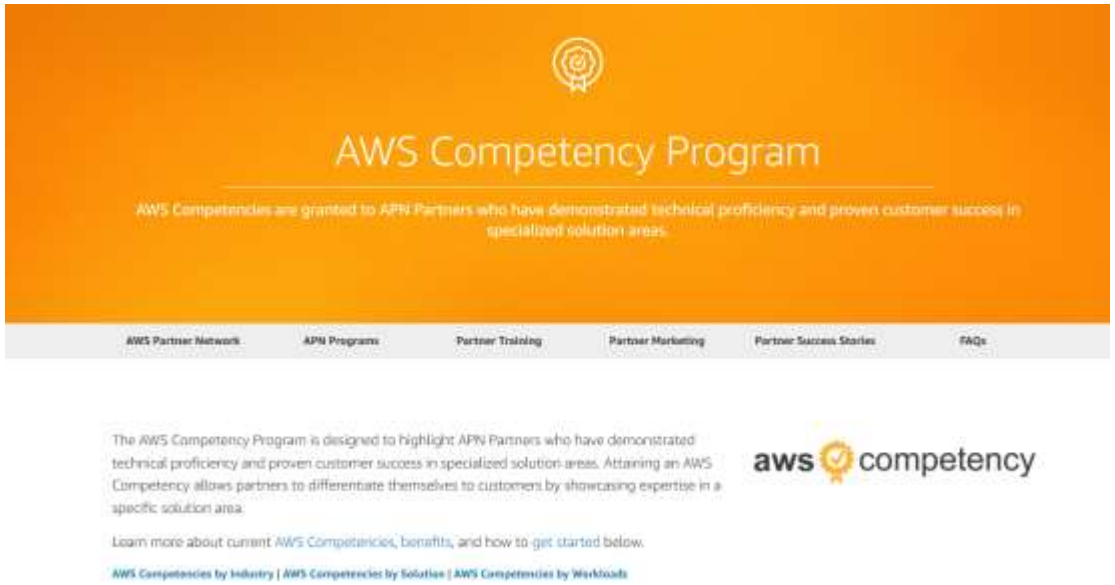
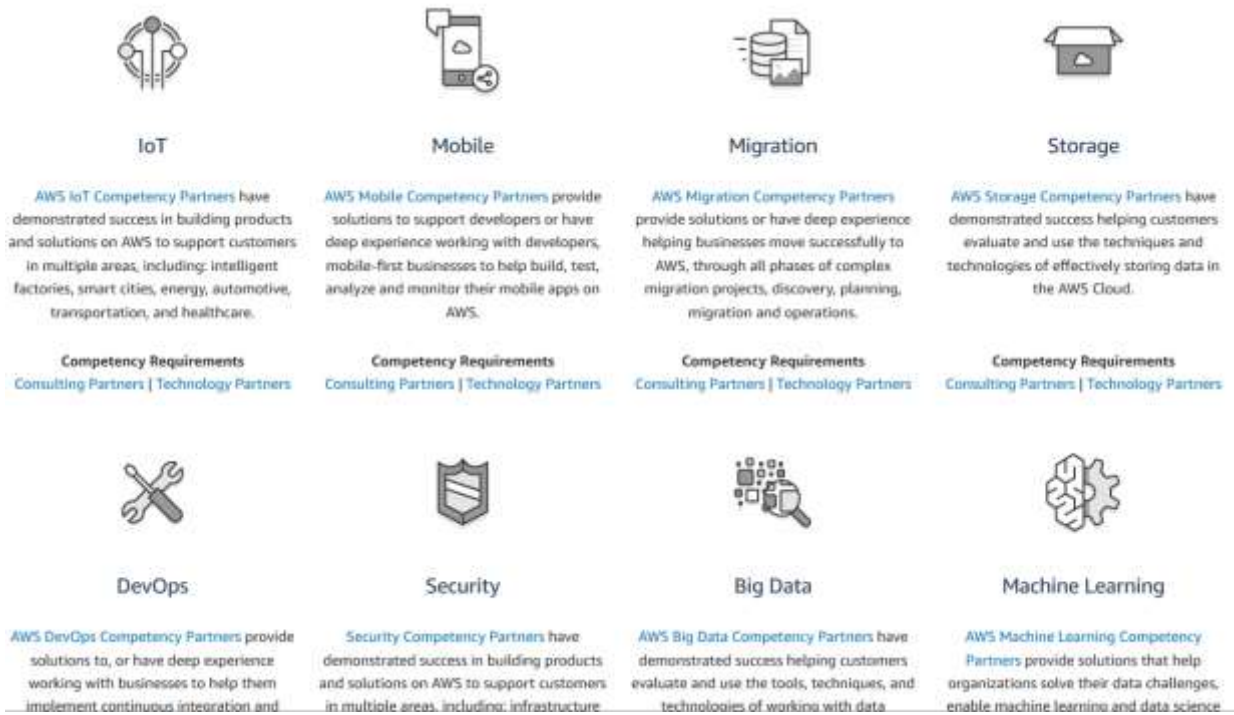
- Cloud is solutions focused.
- Consider APN Competencies





https://aws.amazon.com/partners/competencies/

Thank You!

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