

| AWS Fundamentals Basecamp

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Agenda

8:30am – 9:00am: Check-in

9:00am – 12:05pm: AWS Basecamp

- Basecamp Introduction

- Introduction to Cloud Computing

- AWS Services and Regions Overview

- AWS Networking

 - VPC - Route 53

- AWS Security Overview

- AWS Compute

 - EC2 – ELB - ASG - Directory Services

- AWS Storage

 - EBS - S3 - Glacier

- AWS Databases

 - RDS – DynamoDB - Redshift

12:05pm – 1:00pm: Break & Lunch

1:00pm – 3:00pm: Hands-On Lab - Building AWS Infrastructure

Basecamp Introductions

Name:

Company:

Title/Work Area:

What was the 1st computer you used?

| Introduction to Cloud Computing

New IT Business Model

Cloud Computing
is *first and foremost* a
Business Model


Business Reasons for Adopting Cloud Computing

Not Good




Good

\$ Move from capital expense to variable expense

 Increased agility

\$ Lower variable expense than they could achieve on their own

? Stop guessing capacity

 Remove undifferentiated heavy lifting

 Go global in minutes

Defining Cloud Computing



NIST defined a well accepted, industry standard definition of Cloud Computing

url: <http://nvlpubs.nist.gov/nistpubs/Legacy/SP/nistspecialpublication800-145.pdf>

Covers:

- ❖ 5 Key Characteristics of Cloud Computing
- ❖ 3 Service Model
- ❖ 4 Deployment Models
- plus
- ❖ 5 Cloud Actors
- ❖ A Cloud Reference Architecture
- ❖ Shared Security model

What is Cloud Computing?

NIST 5 Key Characteristics

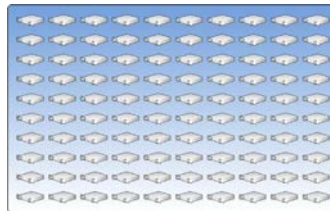


#1 On-demand self service
“as easy as buying candy from a vending machine”

#2 Broad network access
“access it anytime from anywhere”



#3 Resource pooling
“you’re not the only user”



#5 Measured service
“pay only for what you consume”

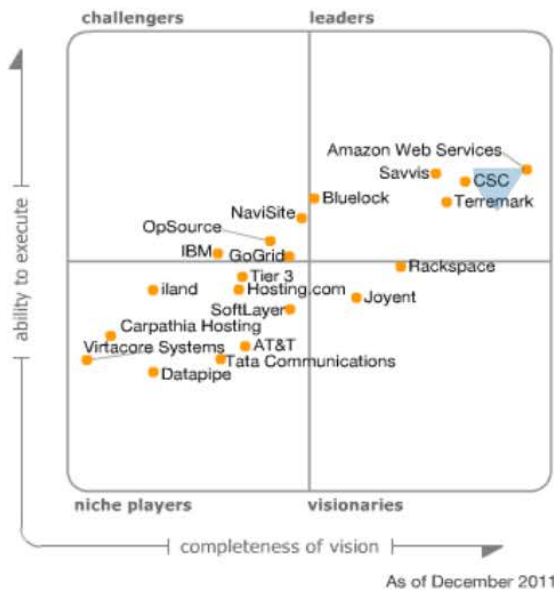


#4 Rapid elasticity
“scale up and scale down in real-time”



Why Amazon Web Services?

2011



2012



2013



In 2013, IT research firm Gartner had to rescale its famed infrastructure-as-a-service “Magic Quadrant” to accommodate Amazon Web Services’ enormous competitive lead.

“It is the overwhelming market share leader, with over *10 times more* cloud IaaS compute capacity in use *than the aggregate total of the other 14 providers* in this Magic Quadrant” Gartner Report May, 2015.

AWS Today - 2017

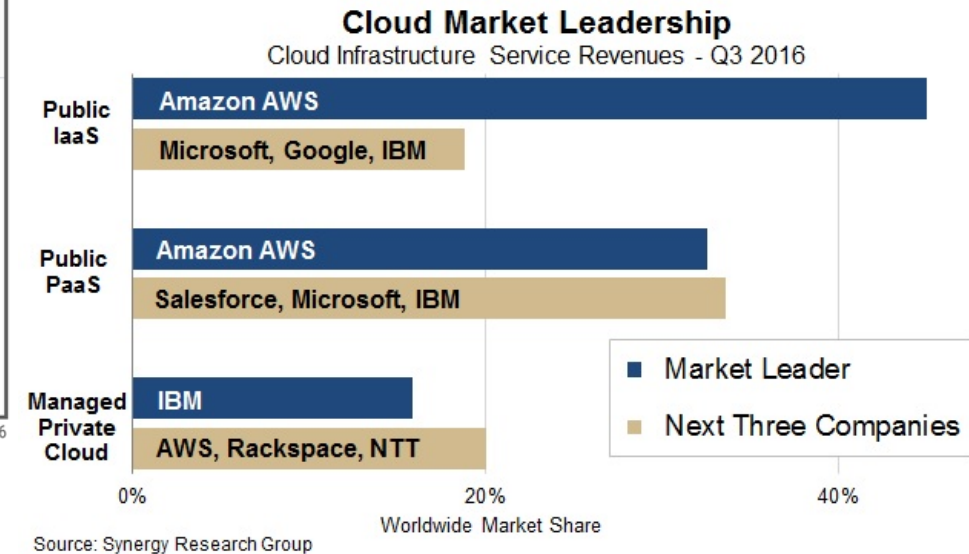
Figure 1. Magic Quadrant for Cloud Infrastructure as a Service, Worldwide



Public cloud market share

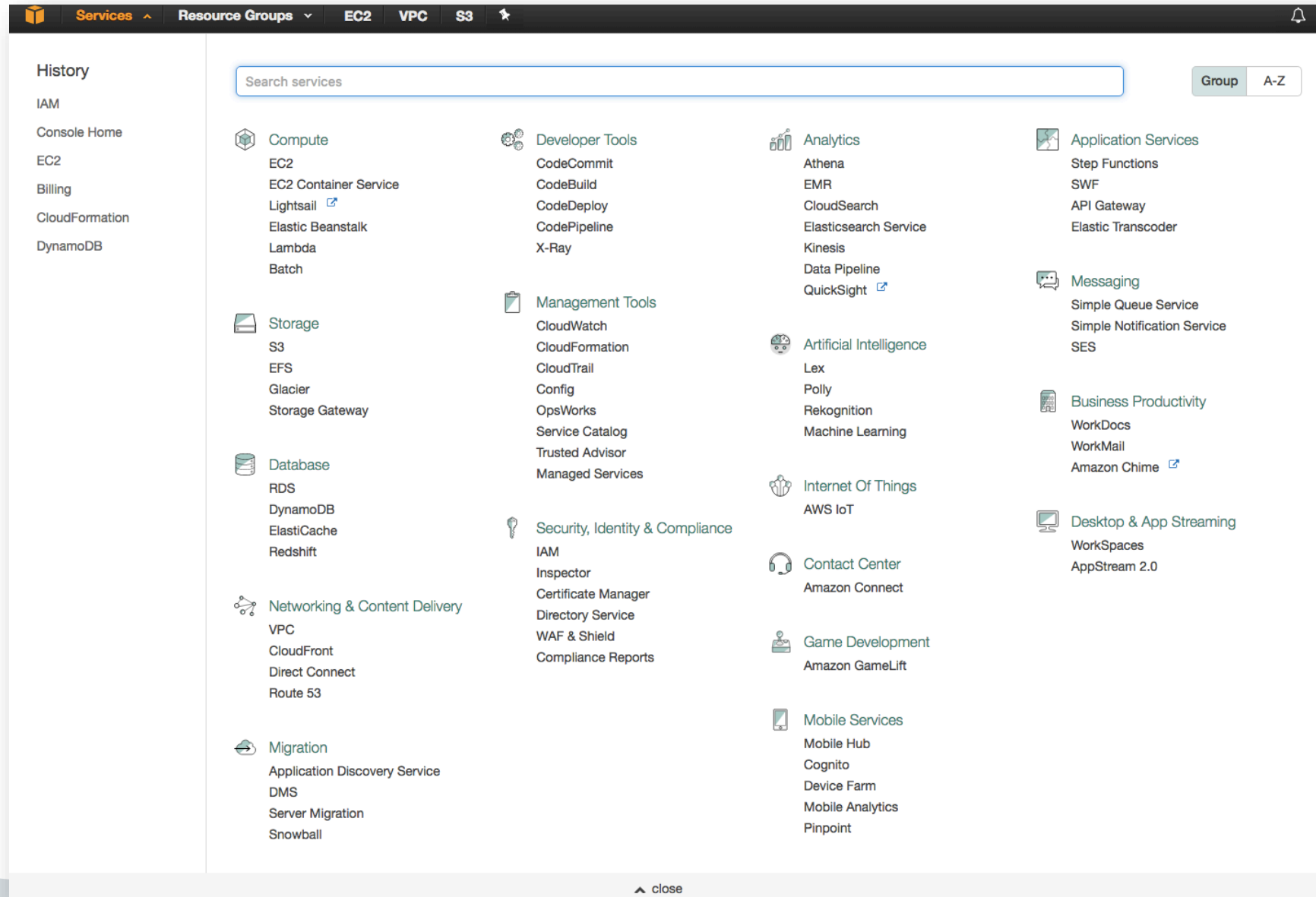
Amazon Web Services: 45%
per Synergy Research Group

AWS generating > \$12 billion a year.



| AWS Services and Regions Overview

AWS Services



The screenshot displays the AWS Management Console's 'Services' page. The top navigation bar includes the AWS logo, 'Services' (with a dropdown arrow), 'Resource Groups' (with a dropdown arrow), and filters for 'EC2', 'VPC', and 'S3'. A search bar is located at the top right of the main content area, with a 'Group' button and an 'A-Z' sort option. The left sidebar shows a 'History' section with links to IAM, Console Home, EC2, Billing, CloudFormation, and DynamoDB. The main content area is organized into a grid of service categories, each with an icon and a list of services. The categories and their respective services are: Compute (EC2, EC2 Container Service, Lightsail, Elastic Beanstalk, Lambda, Batch), Storage (S3, EFS, Glacier, Storage Gateway), Database (RDS, DynamoDB, ElastiCache, Redshift), Networking & Content Delivery (VPC, CloudFront, Direct Connect, Route 53), Migration (Application Discovery Service, DMS, Server Migration, Snowball), Developer Tools (CodeCommit, CodeBuild, CodeDeploy, CodePipeline, X-Ray), Management Tools (CloudWatch, CloudFormation, CloudTrail, Config, OpsWorks, Service Catalog, Trusted Advisor, Managed Services), Security, Identity & Compliance (IAM, Inspector, Certificate Manager, Directory Service, WAF & Shield, Compliance Reports), Analytics (Athena, EMR, CloudSearch, Elasticsearch Service, Kinesis, Data Pipeline, QuickSight), Artificial Intelligence (Lex, Polly, Rekognition, Machine Learning), Internet Of Things (AWS IoT), Contact Center (Amazon Connect), Game Development (Amazon GameLift), Mobile Services (Mobile Hub, Cognito, Device Farm, Mobile Analytics, Pinpoint), Application Services (Step Functions, SWF, API Gateway, Elastic Transcoder), Messaging (Simple Queue Service, Simple Notification Service, SES), Business Productivity (WorkDocs, WorkMail, Amazon Chime), and Desktop & App Streaming (WorkSpaces, AppStream 2.0). A 'close' button is located at the bottom center of the console window.

Services

Resource Groups

EC2 VPC S3

Search services

Group A-Z

History

- IAM
- Console Home
- EC2
- Billing
- CloudFormation
- DynamoDB

Compute

- EC2
- EC2 Container Service
- Lightsail
- Elastic Beanstalk
- Lambda
- Batch

Storage

- S3
- EFS
- Glacier
- Storage Gateway

Database

- RDS
- DynamoDB
- ElastiCache
- Redshift

Networking & Content Delivery

- VPC
- CloudFront
- Direct Connect
- Route 53

Migration

- Application Discovery Service
- DMS
- Server Migration
- Snowball

Developer Tools

- CodeCommit
- CodeBuild
- CodeDeploy
- CodePipeline
- X-Ray

Management Tools

- CloudWatch
- CloudFormation
- CloudTrail
- Config
- OpsWorks
- Service Catalog
- Trusted Advisor
- Managed Services

Security, Identity & Compliance

- IAM
- Inspector
- Certificate Manager
- Directory Service
- WAF & Shield
- Compliance Reports

Analytics

- Athena
- EMR
- CloudSearch
- Elasticsearch Service
- Kinesis
- Data Pipeline
- QuickSight

Artificial Intelligence

- Lex
- Polly
- Rekognition
- Machine Learning

Internet Of Things

- AWS IoT

Contact Center

- Amazon Connect

Game Development

- Amazon GameLift

Mobile Services

- Mobile Hub
- Cognito
- Device Farm
- Mobile Analytics
- Pinpoint

Application Services

- Step Functions
- SWF
- API Gateway
- Elastic Transcoder

Messaging

- Simple Queue Service
- Simple Notification Service
- SES

Business Productivity

- WorkDocs
- WorkMail
- Amazon Chime

Desktop & App Streaming

- WorkSpaces
- AppStream 2.0

close

Core Services

Compute

 **EC2**
Virtual Servers in the Cloud

Storage & Content Delivery

 **S3**
Scalable Storage in the Cloud

Management Tools

 **CloudWatch**
Monitor Resources and Applications

 **CloudFormation**
Create and Manage Resources with Templates

Networking

 **VPC**
Isolated Cloud Resources

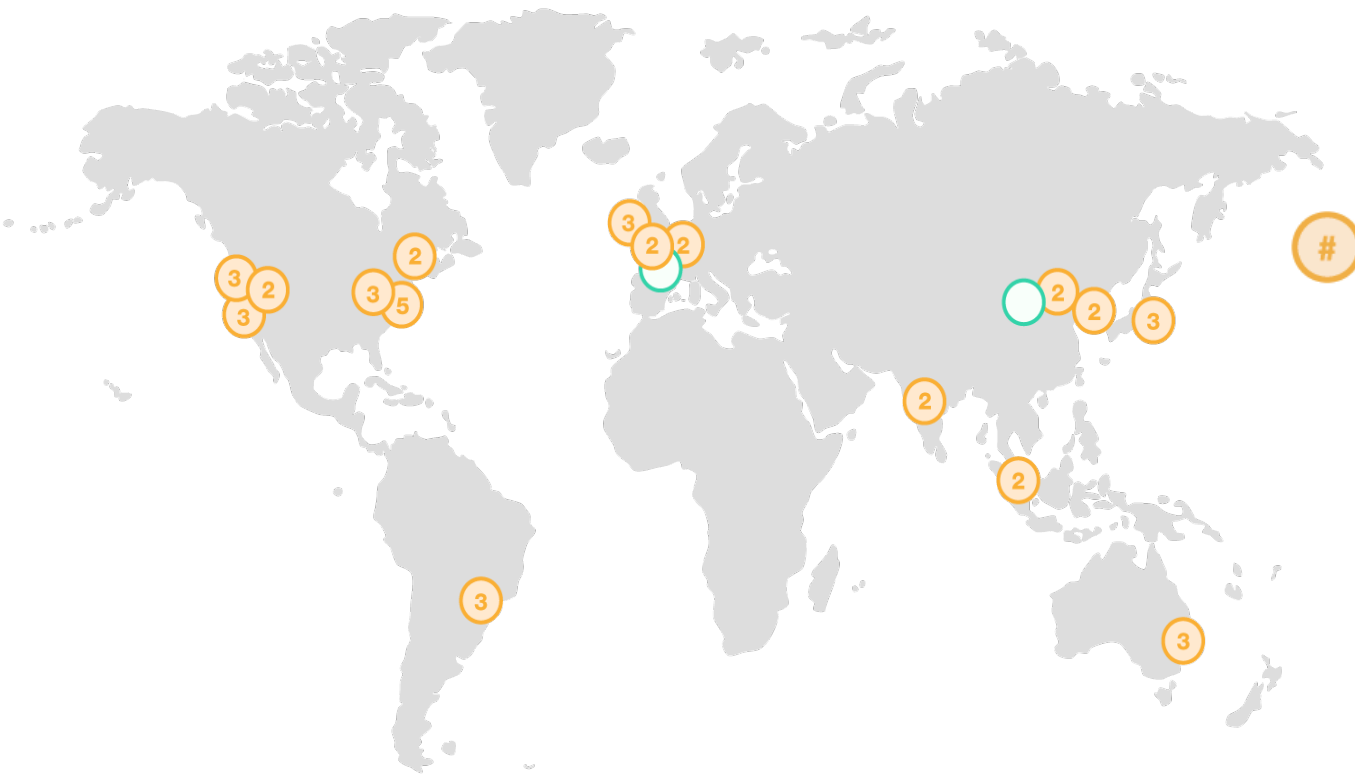
Database

 **RDS**
Managed Relational Database Service

Security & Identity

 **Identity & Access Management**
Manage User Access and Encryption Keys

AWS Regions – Global Infrastructure



Region & Number of Availability Zones

AWS GovCloud (2)

US West

Oregon (3), Northern California (3)

US East

Northern Virginia (5), Ohio (3)

Canada

Central (2)

South America

São Paulo (3)

Europe

Ireland (3), Frankfurt (2), London (2)

Asia Pacific

Singapore (2), Sydney (3), Tokyo (3), Seoul (2), Mumbai (2)

China

Beijing (2)



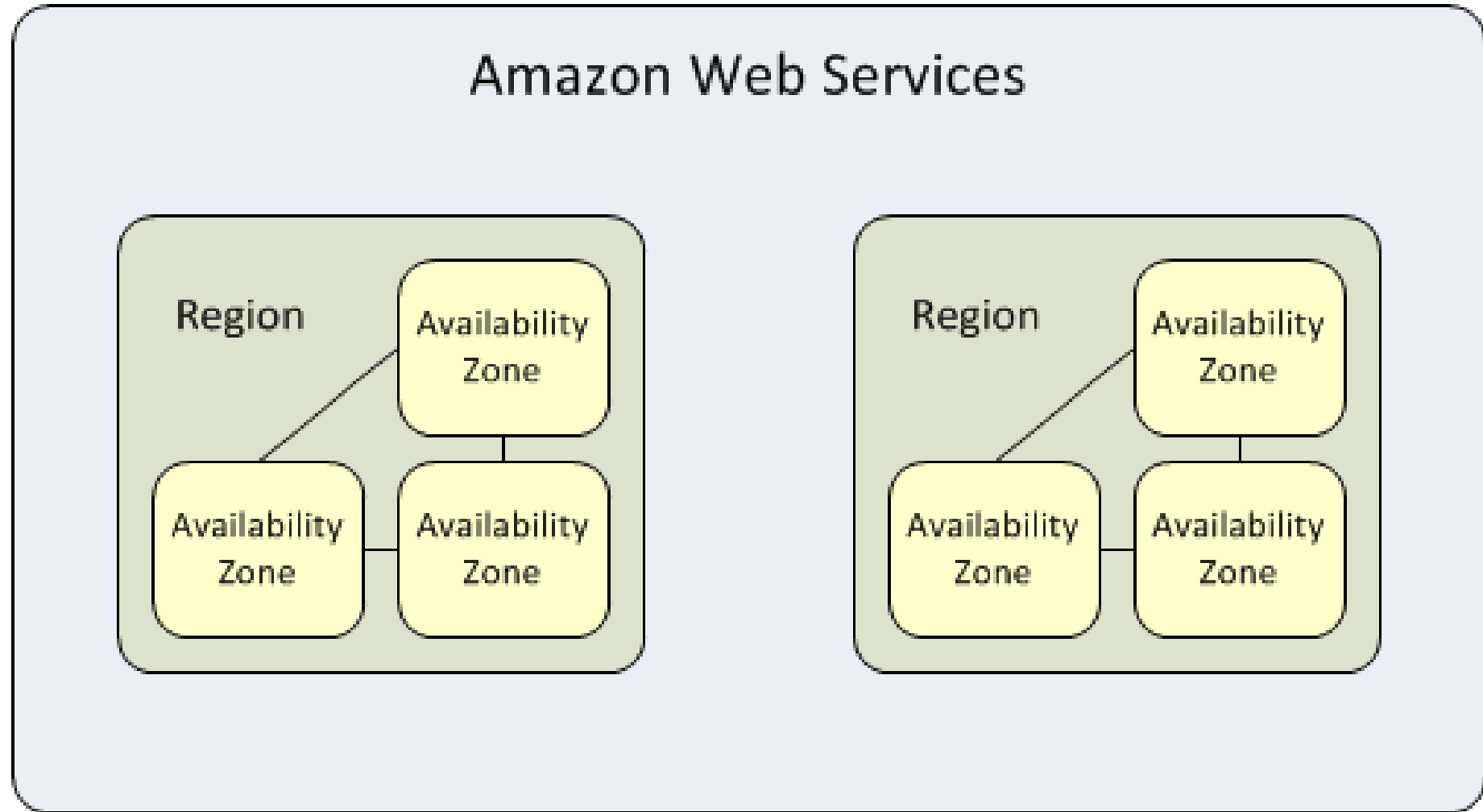
New Region (coming soon)

Paris

Ningxia

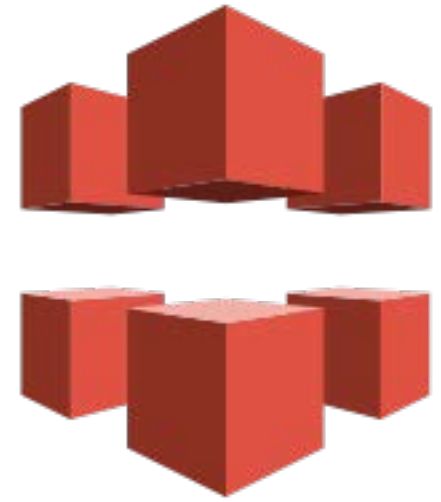
Regions and Availability Zones

- **Global Resources**
 - » IAM Users
 - » Route 53 Records
- **Regional Resources**
 - » S3 Buckets
 - » VPCs
 - » ELB
 - » EIPs
- **AZ Resources**
 - » EBS Volumes
 - » EC2 Instances
 - » RDS Instances
 - » Subnets
 - » ENIs



Edge Locations

- CDN Endpoints for CloudFront (PoPs)
- Edge Locations != Regions
- More Edge Locations than Regions
- ~70 Edge locations and growing



| AWS Networking Overview

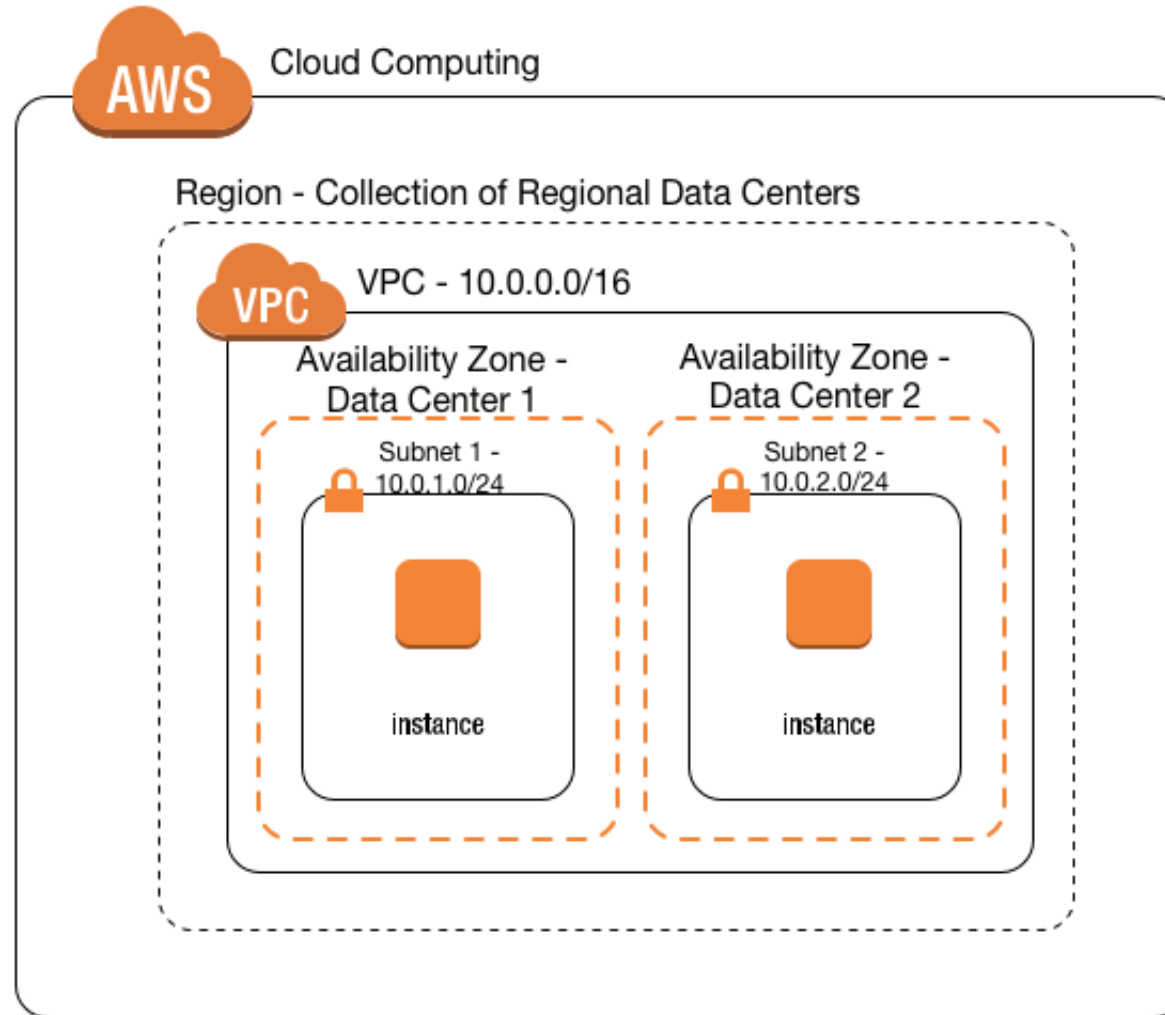
VPC - Virtual Private Cloud Overview



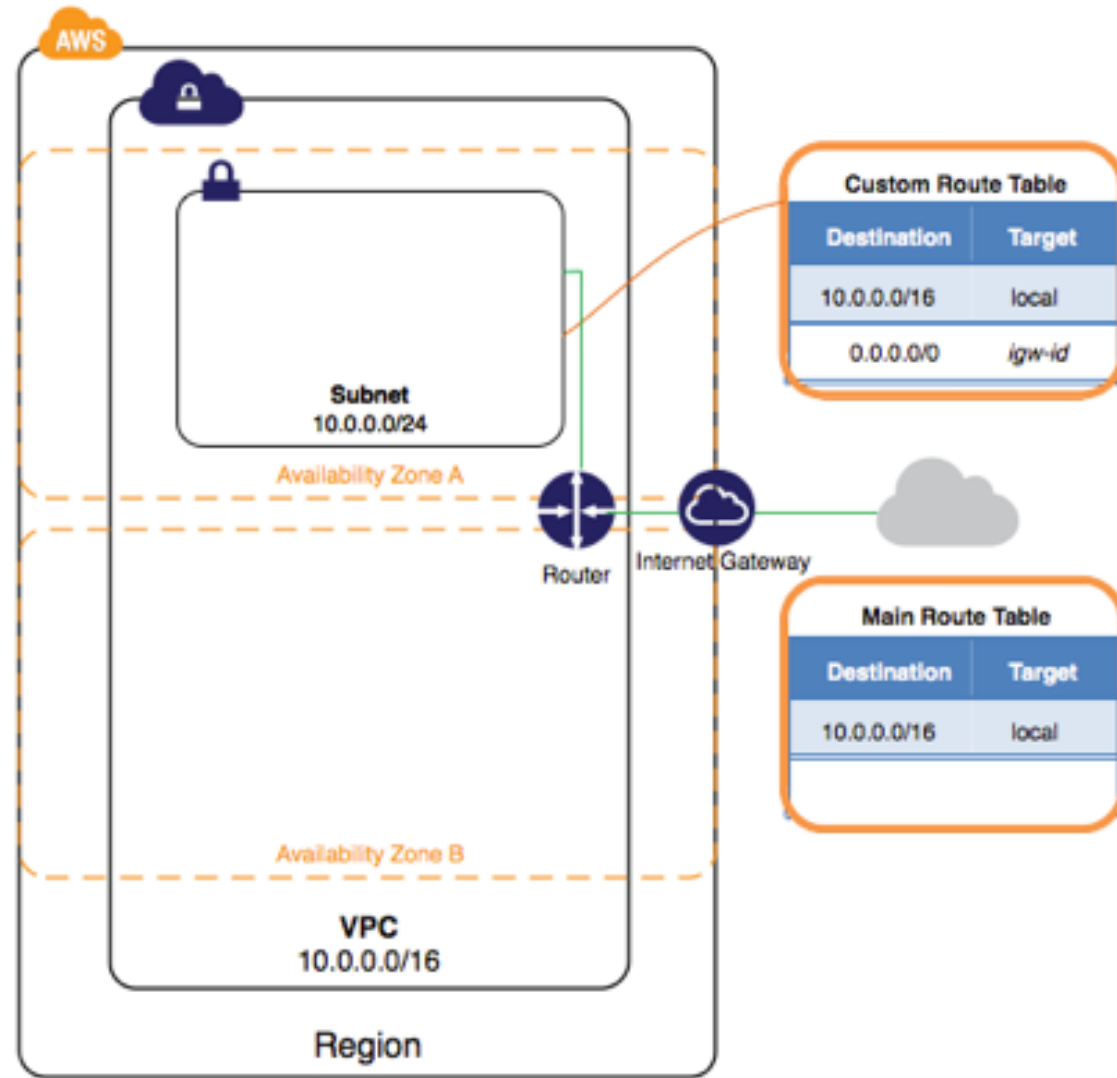
“Your Virtual Datacenter in the Cloud”

Essential Components:

- Subnets
- Route Tables
- Network ACLs
- Security Groups
- Internet Gateways
- NAT Gateways
- Virtual Private Gateways



VPC - Subnets



VPC – Network and Subnets



- **Network Topology**

- Private address space
 - Any range is valid, but we suggest a non-routable CIDR
 - Public CIDR ranges are only reachable via a Virtual Private Gateway
 - CIDR ranges can be as large as a /16 to as small as a /28

- **Subnets**

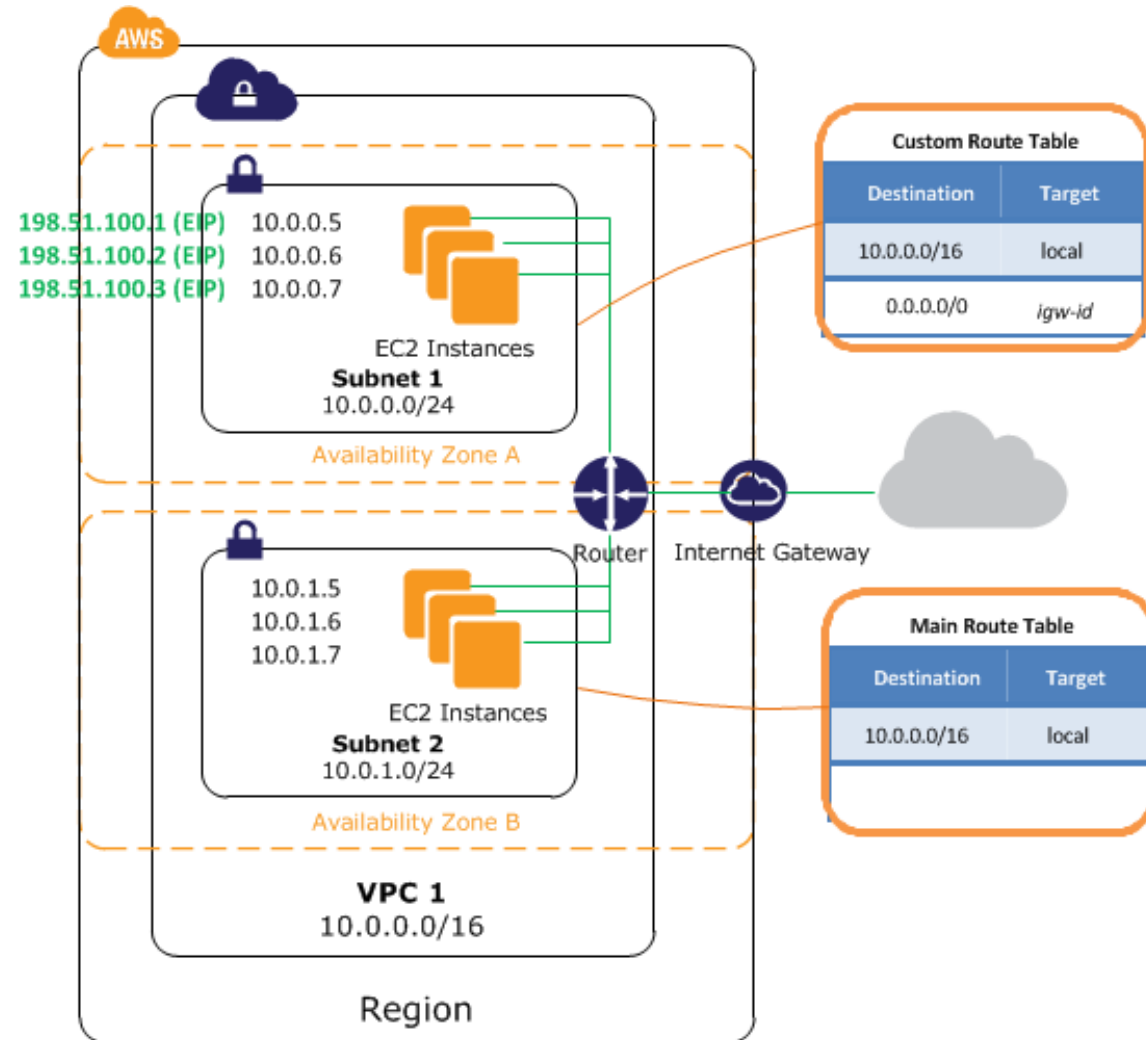
- Public subnets have a 0.0.0.0/0 route to the Internet Gateway (IGW)
 - Instances that require a public IP need to reside in a public subnet
- Private subnets do not have an outbound route through the IGW
 - NAT instances are commonly used as an outbound gateway for private instances
- Subnets cannot span AZ's, but can share routing tables, which provides similar functionality.

VPC – Route Tables



- **Route Tables**

- Can be applied to multiple subnets
- Typical routing entries
 - 10.0.0.0/16 = Local
 - 0.0.0.0/0 = Internet Gateway (Public Subnet)
 - -or-
 - 0.0.0.0/0 = eni-12345678 (Private Subnet)



VPC – Network ACLs

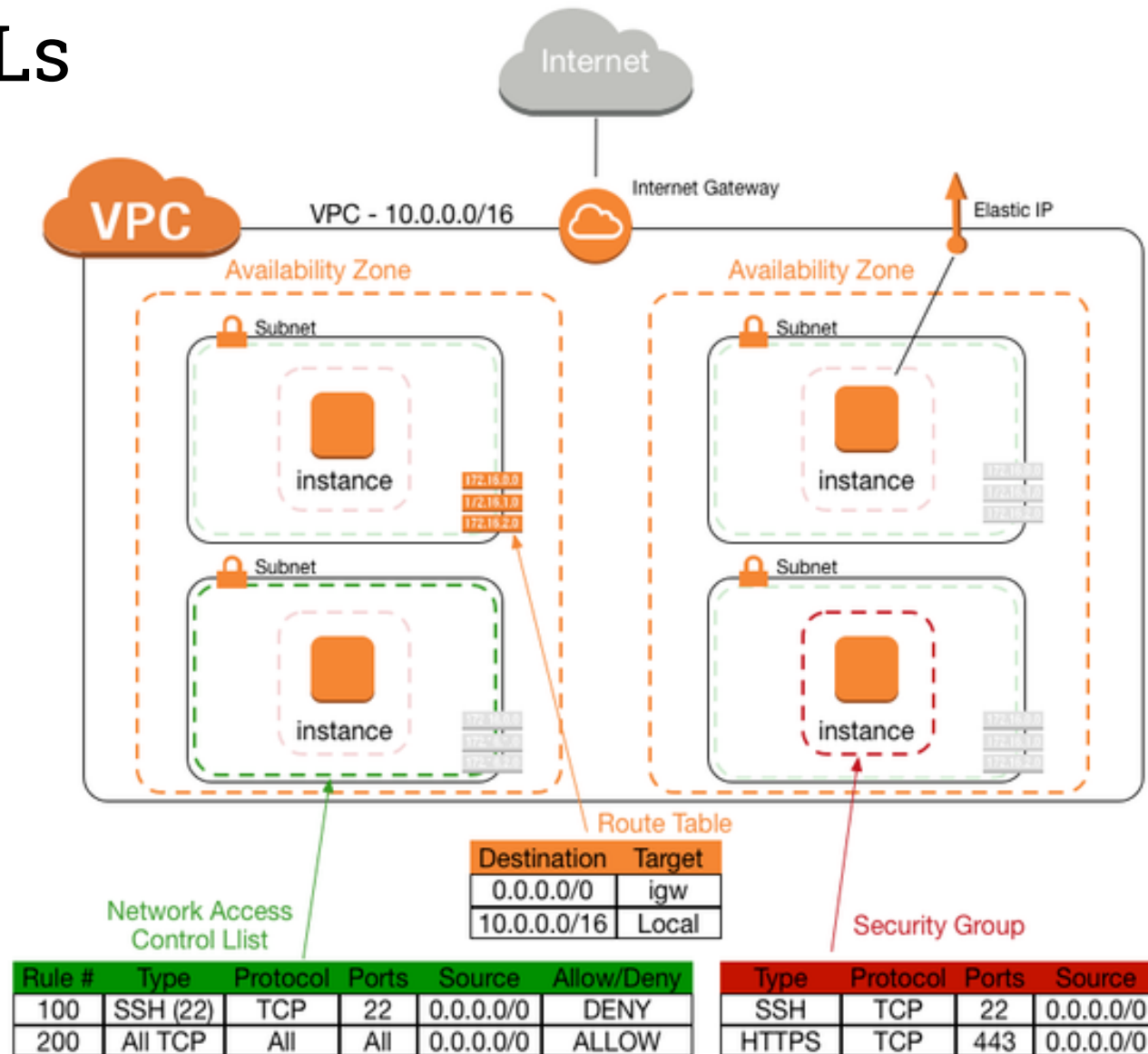


Behavior:

- Allow/Deny traffic at the subnet level
- Stateless
- Default is Allow All

Pro – further defines permissible traffic

Con – adds complexity and can complicate troubleshooting



VPC - Security Groups



- Security Groups are similar to firewall rules
- Can be associated to resources independent of a subnet or CIDR range
- Security Groups are limited only to the VPC in which you create them

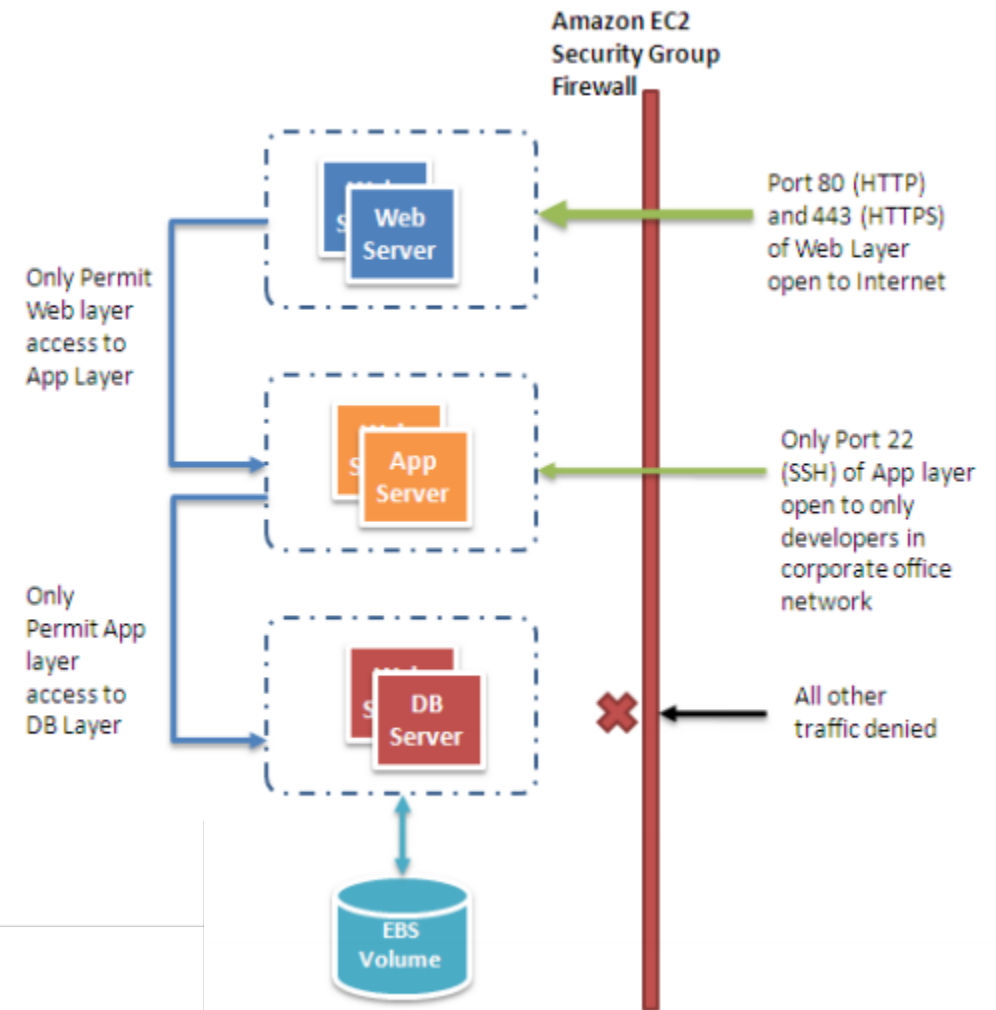
Example of Security Group configuration

Security Group: sg-78992901

Description Inbound Outbound Tags

Edit

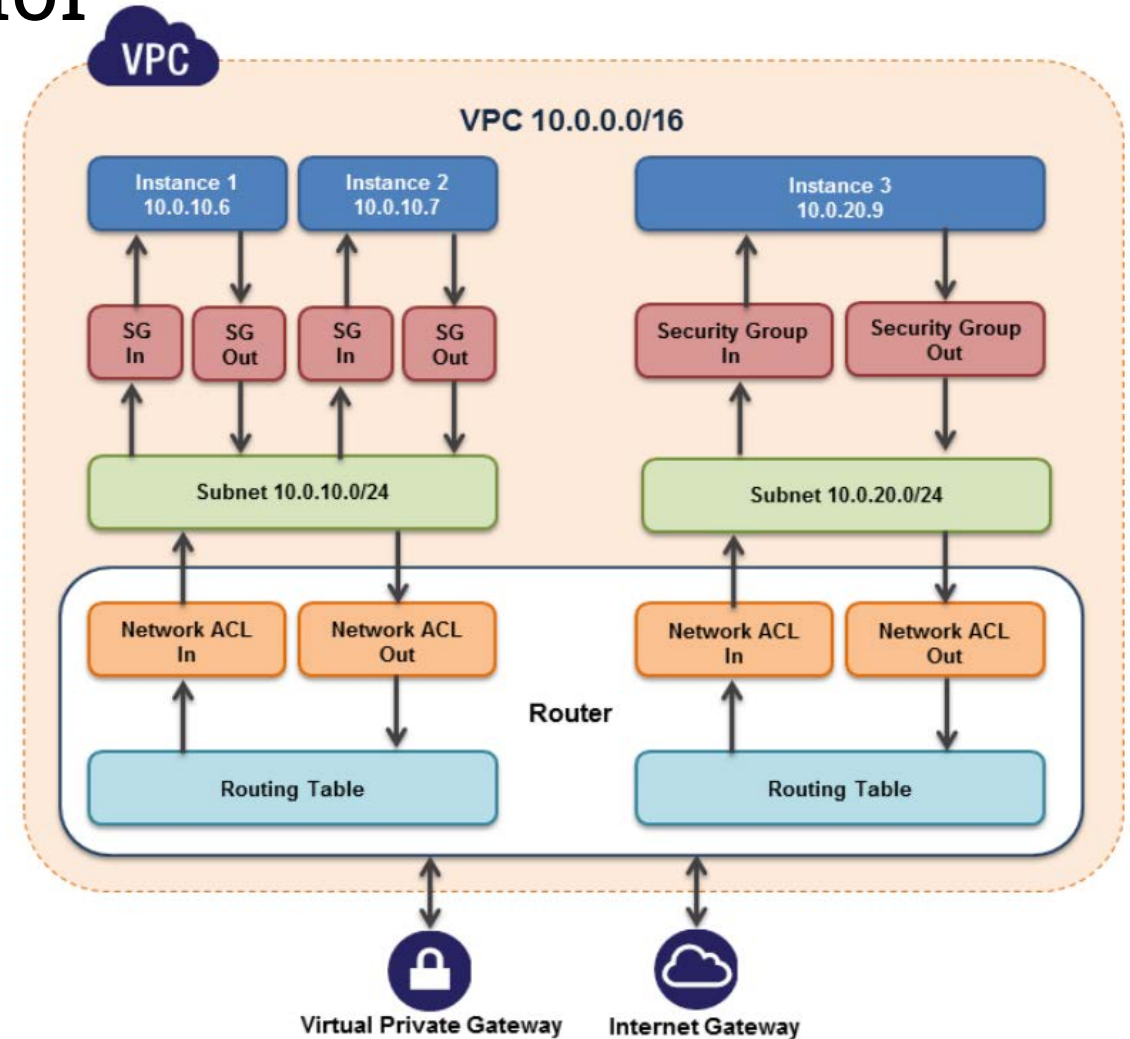
Type ⓘ	Protocol ⓘ	Port Range ⓘ	Source ⓘ
HTTP	TCP	80	0.0.0.0/0
HTTPS	TCP	443	0.0.0.0/0



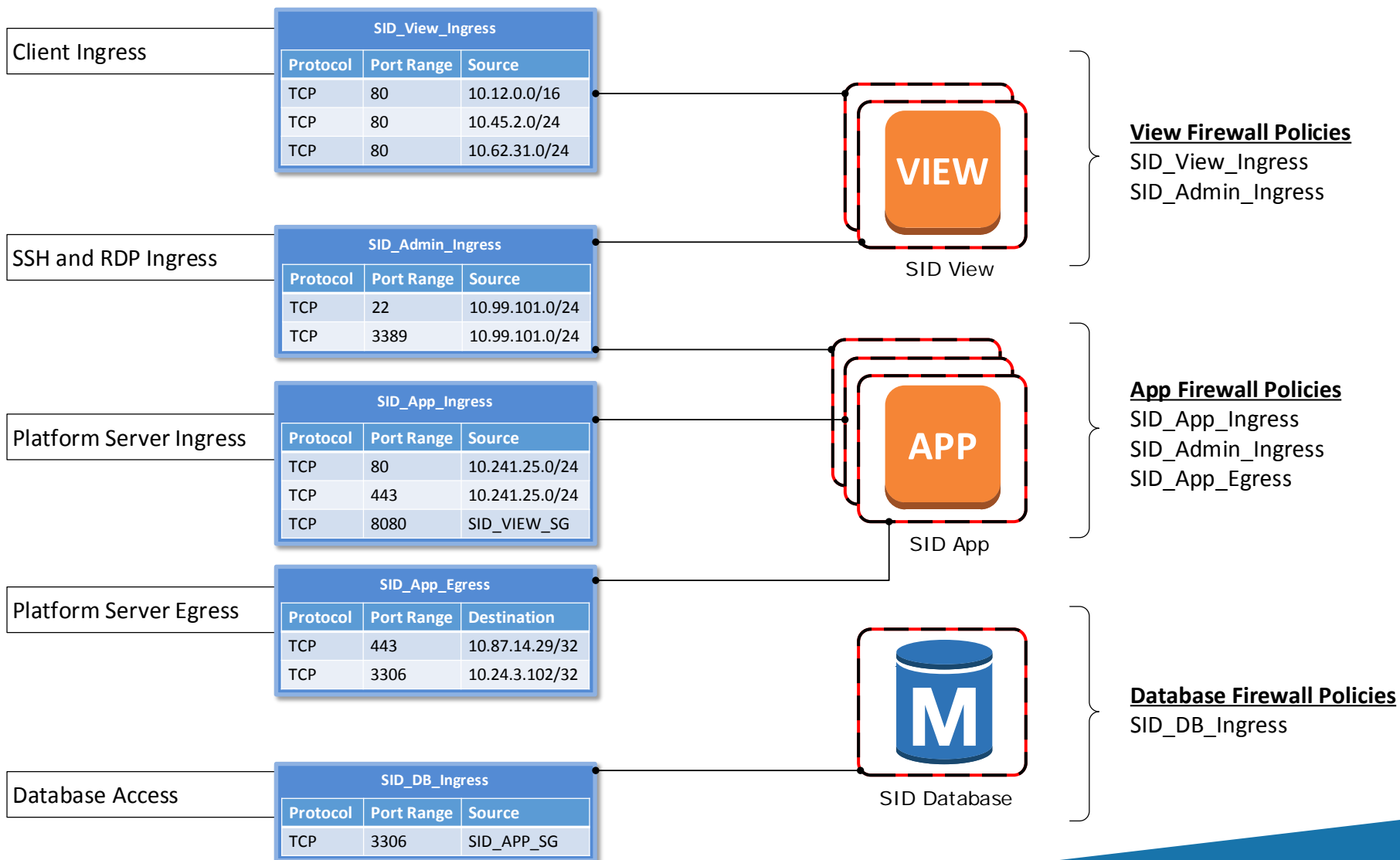
VPC - Security Group Behavior



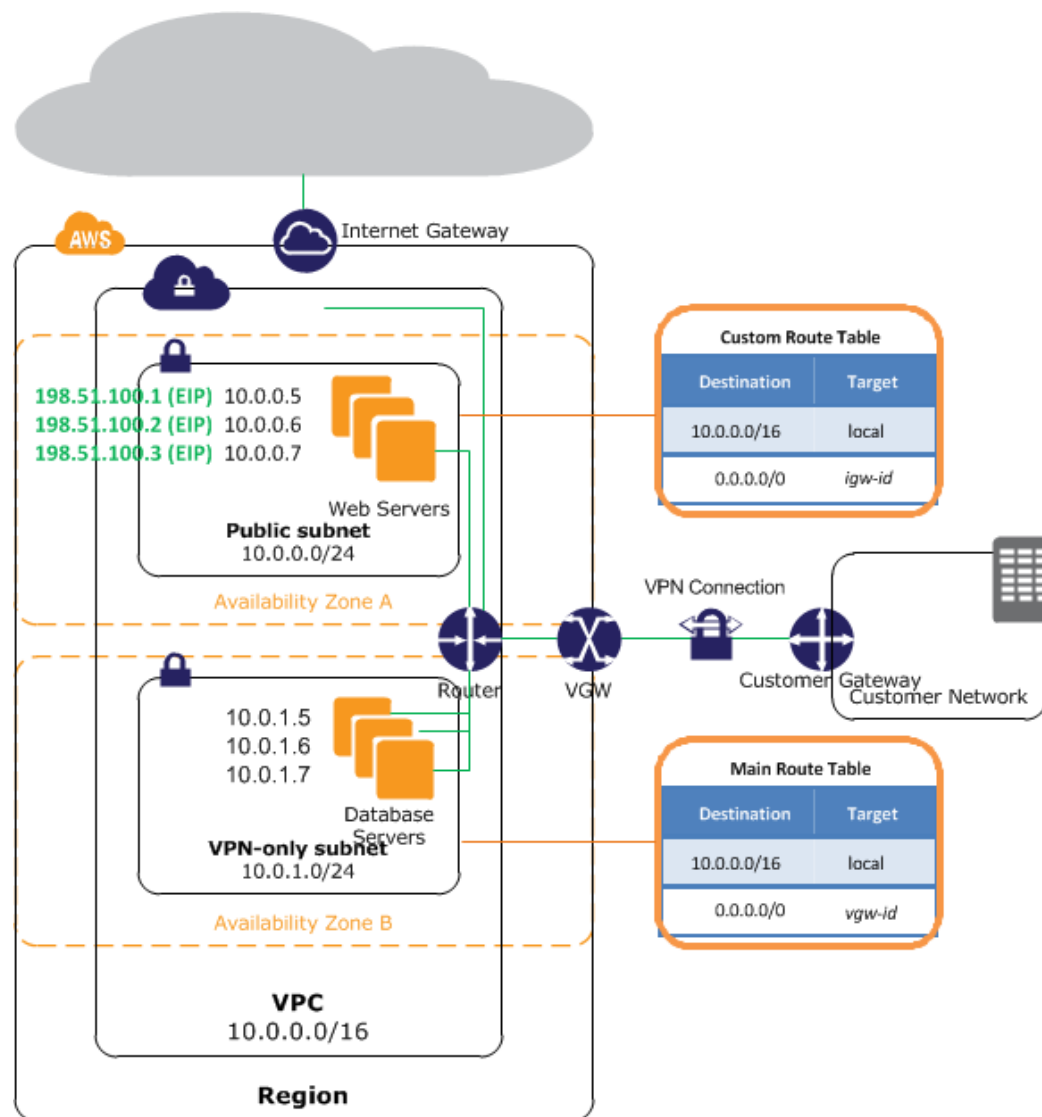
- Work at instance level
- Stateful
- Deny by default
- IP Whitelisting (CIDR)
- Allow port and protocol
 - Can allow TCP, UDP, ICMP or a combination of all three
- SG Trust Relationships
 - Scoped to the VPC



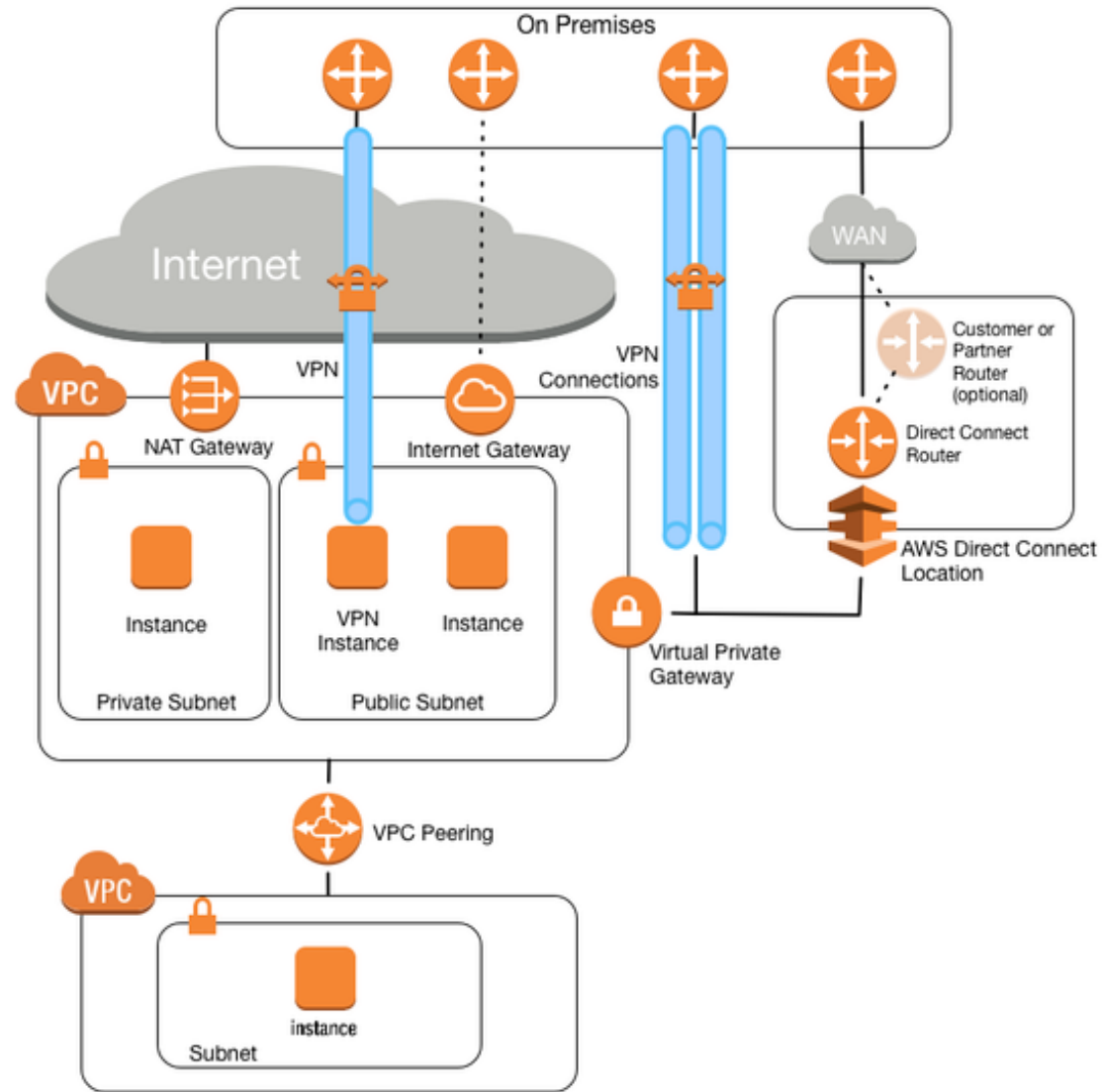
VPC - Security Group/Firewall Rules



VPC – Bringing it Together



VPC – On-Premises Connection

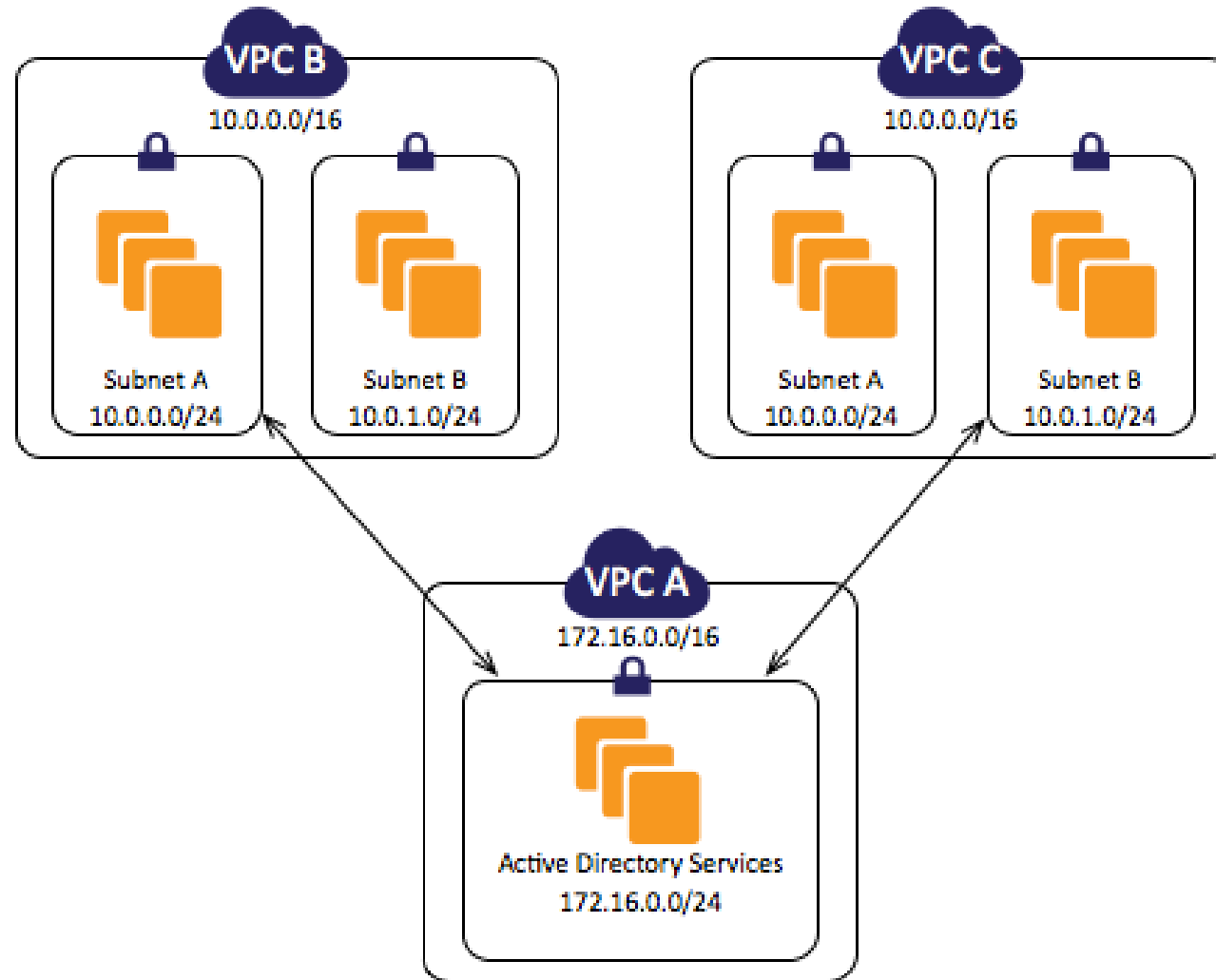


VPC– Peering



- **Peering**

- Not Transitive
- VPC -> VPC peering
- Unique CIDR
- VPN solutions
 - OpenVPN
 - OpenSwan



Route53 - Basic Feature Set



- Zone Creation
- Zone Import
 - Import your zone file from a previous provider
 - Delegate this zone to the AWS name servers
- Record Types
 - A
 - CNAME
 - TXT, MX, DKIM
 - Alias
 - S3 buckets and ELBs can be an alias target, allows zone apex magic

Route53 - Advanced Feature Set

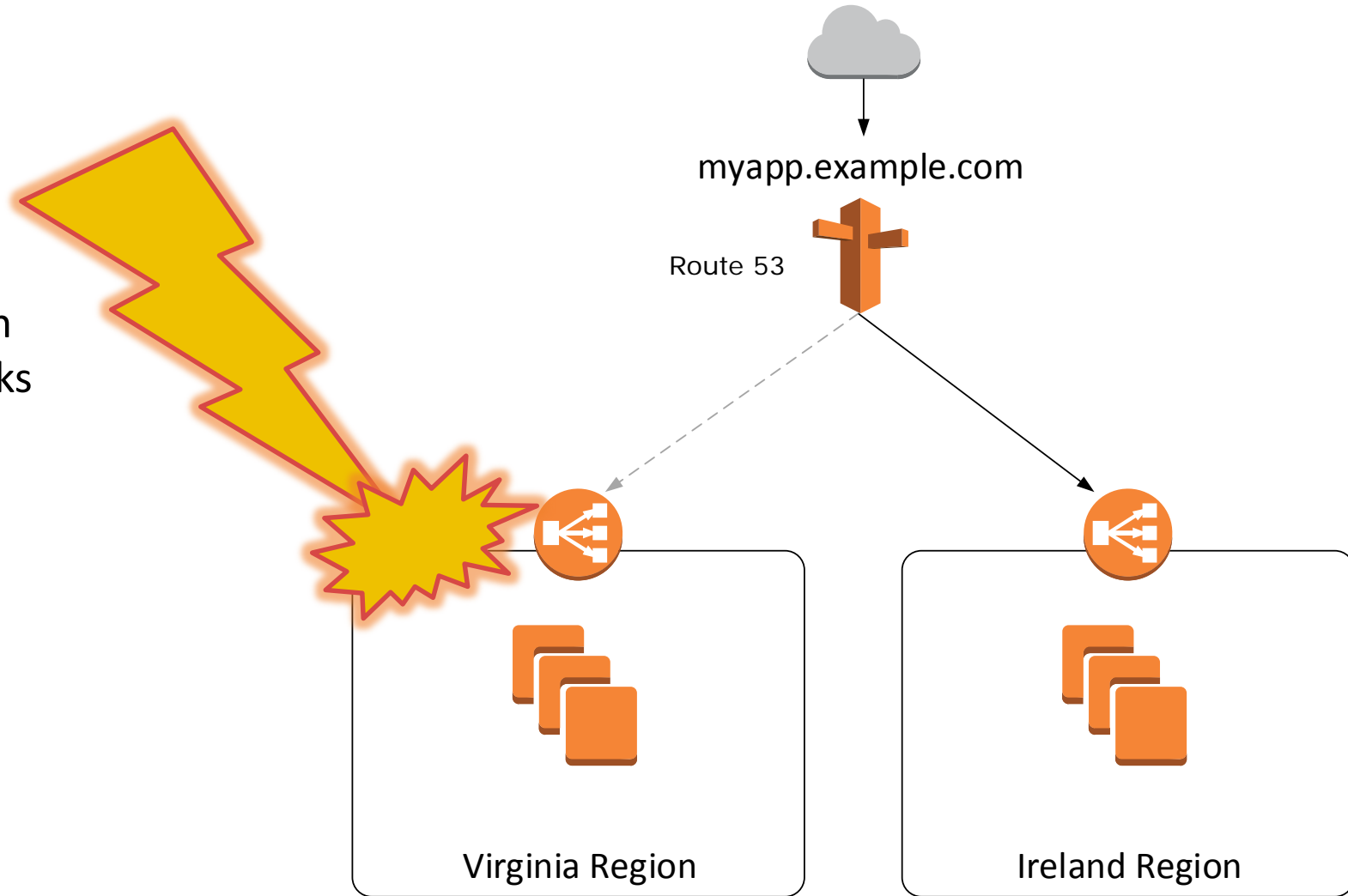


- Weighted Resource Record Sets
- Health Checks
- Global Load Balancer
 - Using weighted record sets, you can create a pool of endpoints from which to balance traffic
 - Enabling a health-check on this pool allows for a DNS based load balancer which can be applied to any resource (AWS or non-AWS)
- Latency Resource Record Sets
- Geolocation Resource Record Sets

Route53 – Global Failover

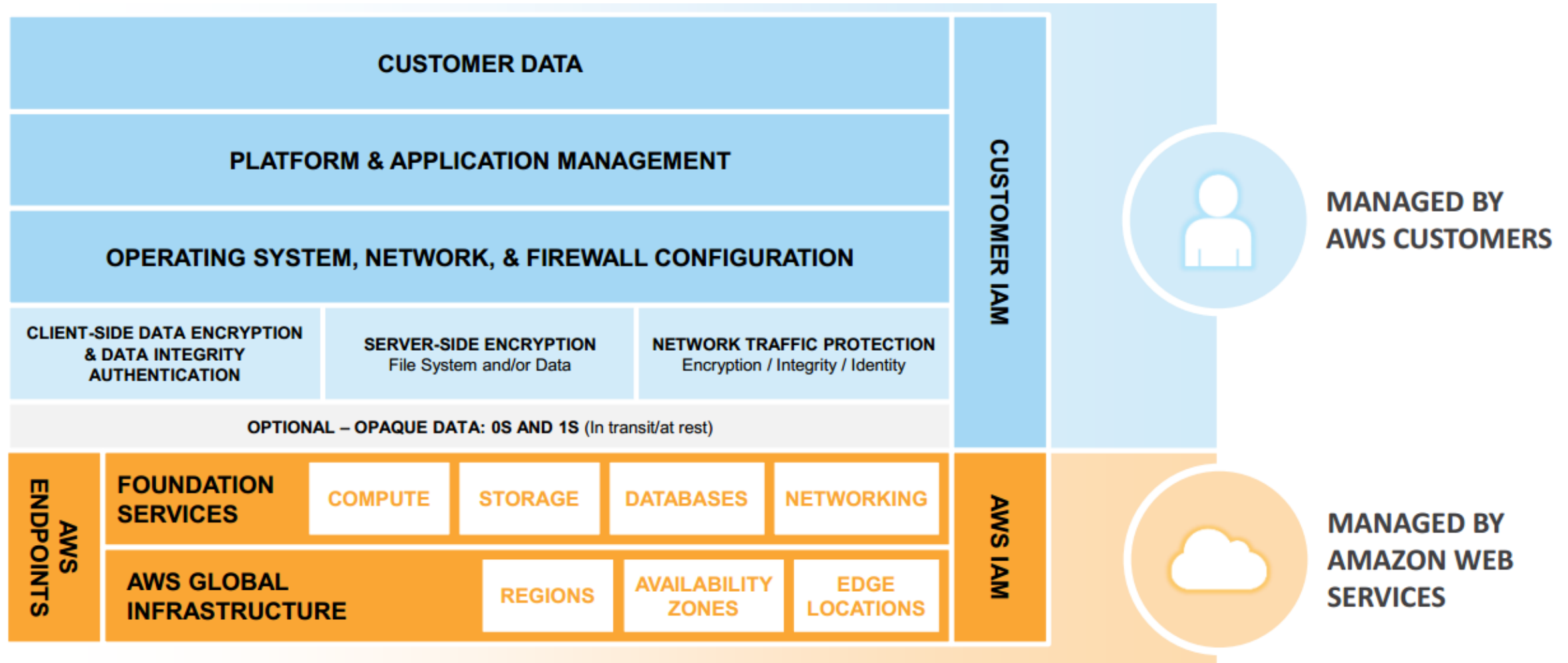


- Global Failover Pattern
- Uses R53 Health Checks

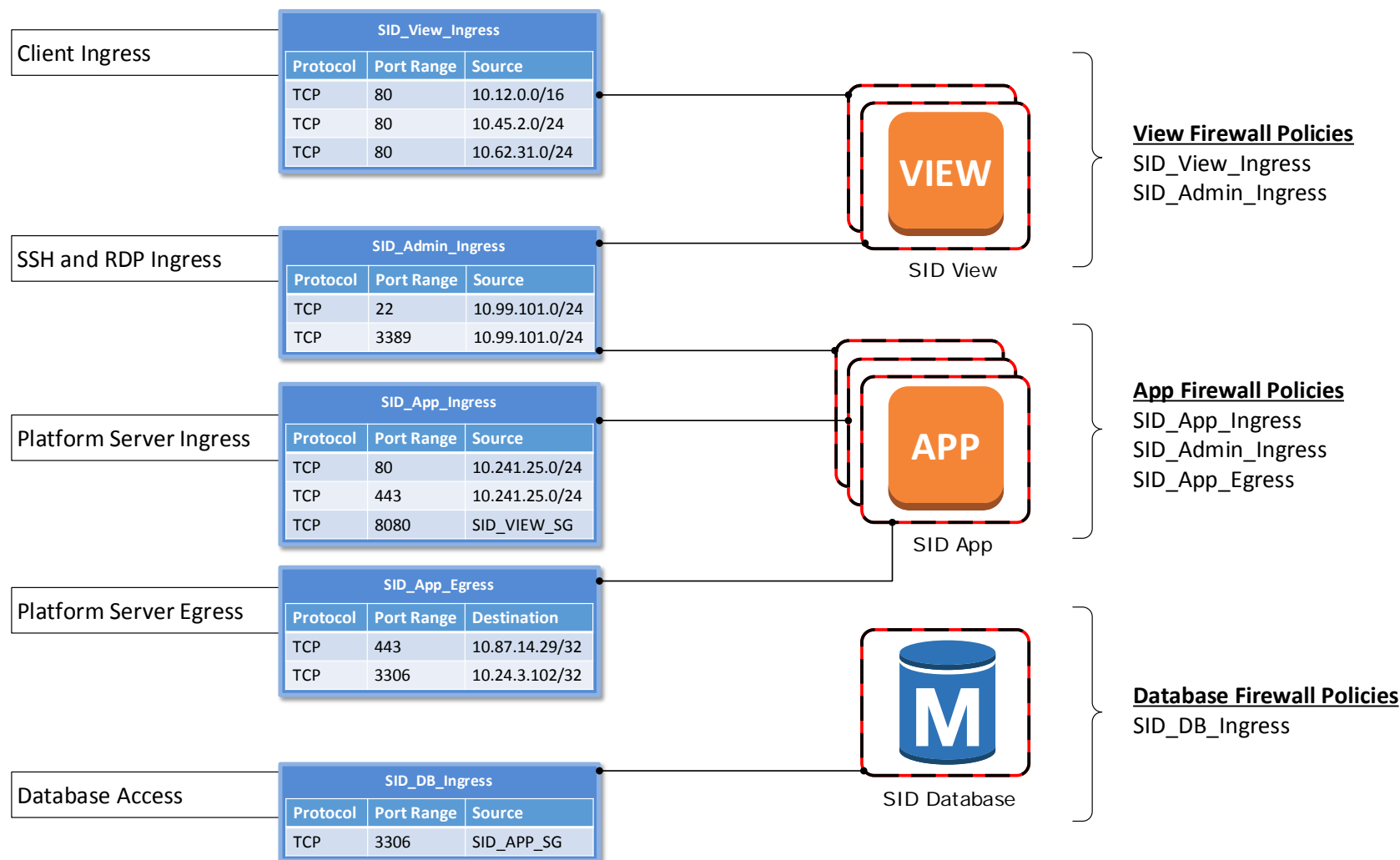


| AWS Security Overview

Security and Compliance – Shared Security Model



Security - Security Group/Firewall Rules



AWS Certifications

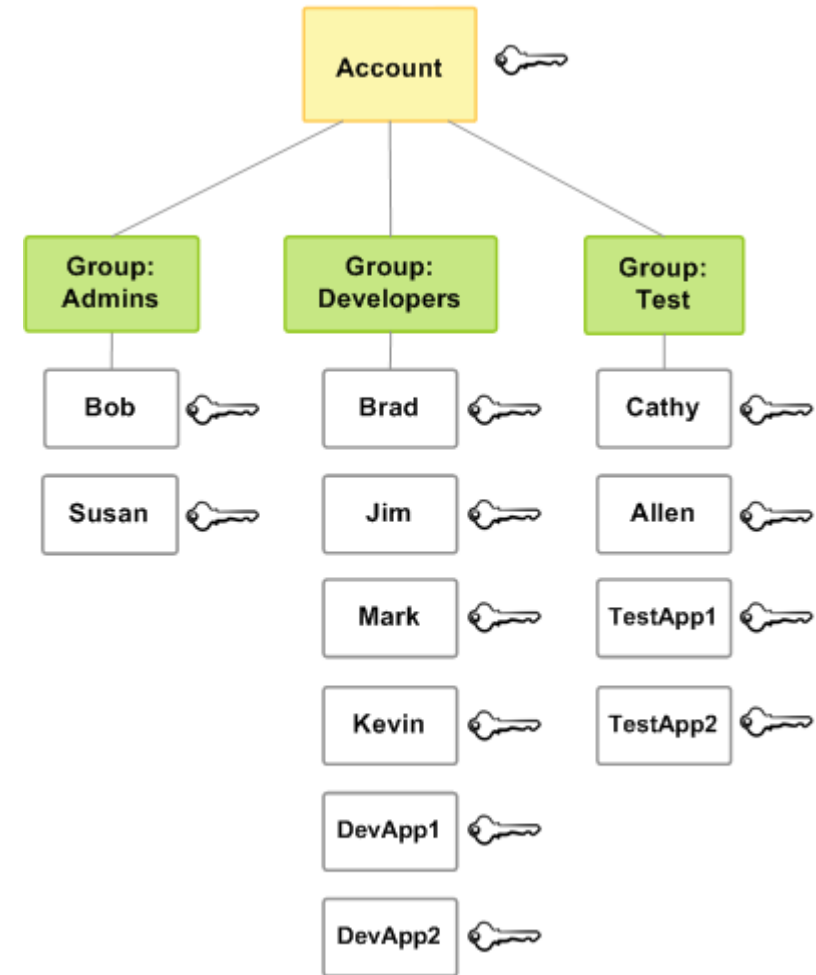


| Identity & Access Management

IAM Users



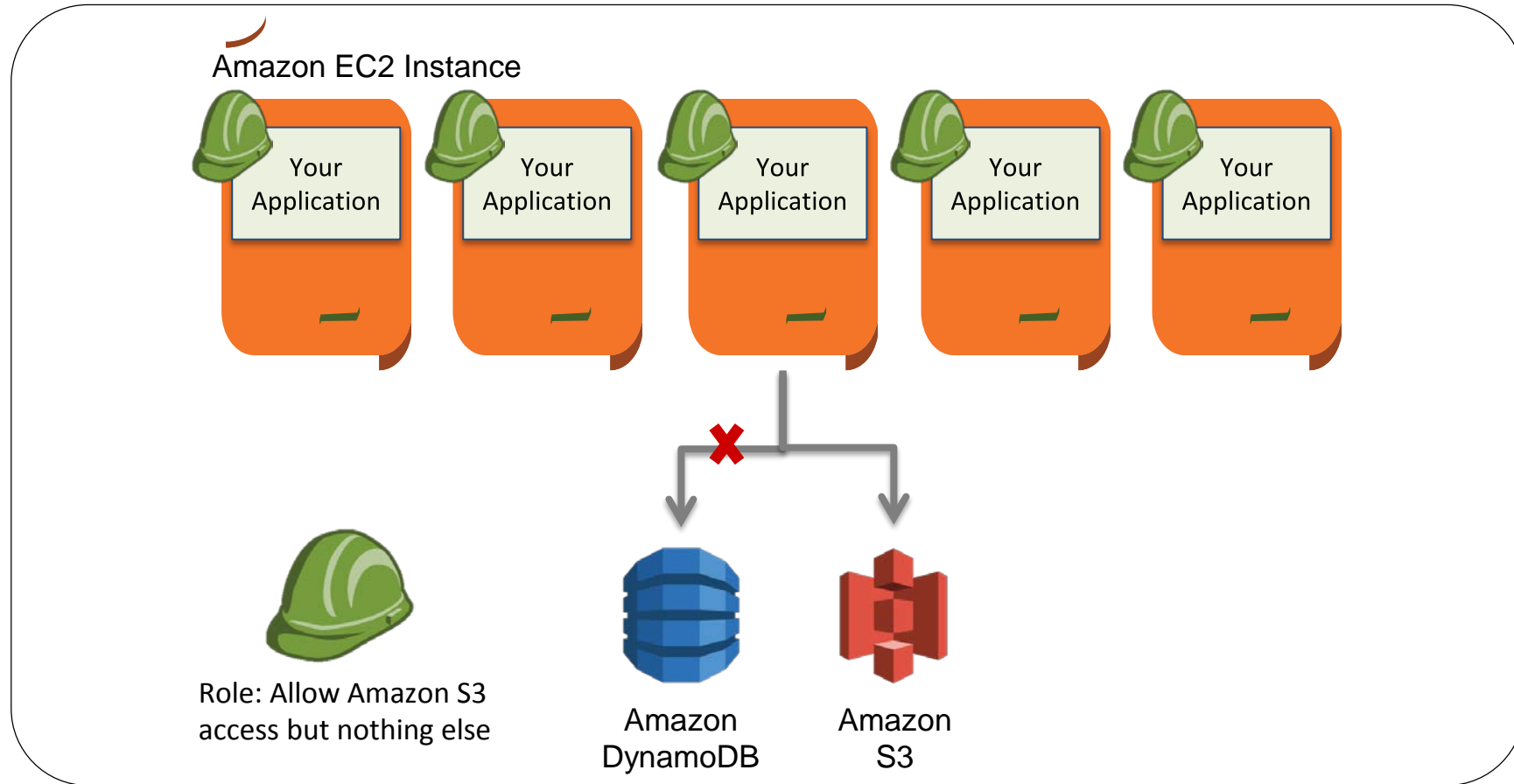
- Identity and Access Management
- Create Users and Groups
- Establish Trust Relationships
- Govern Access via Policy Documents



IAM - Groups, Roles & Instance Profiles

- Deny by default
 - Explicit allow required to grant access
 - Explicit deny always trumps an explicit allow
- Users/Groups
 - Policies can be applied at the group or user level
- Roles
 - Policies can be applied to roles
- Instance Profile
 - An instance profile is a container for an IAM role that you can use to pass role information to an EC2 instance when the instance starts
 - Assumes role
 - Credentials are stored in instance metadata
 - Only Access Key ID and Temporary Token

IAM - Instance Profiles

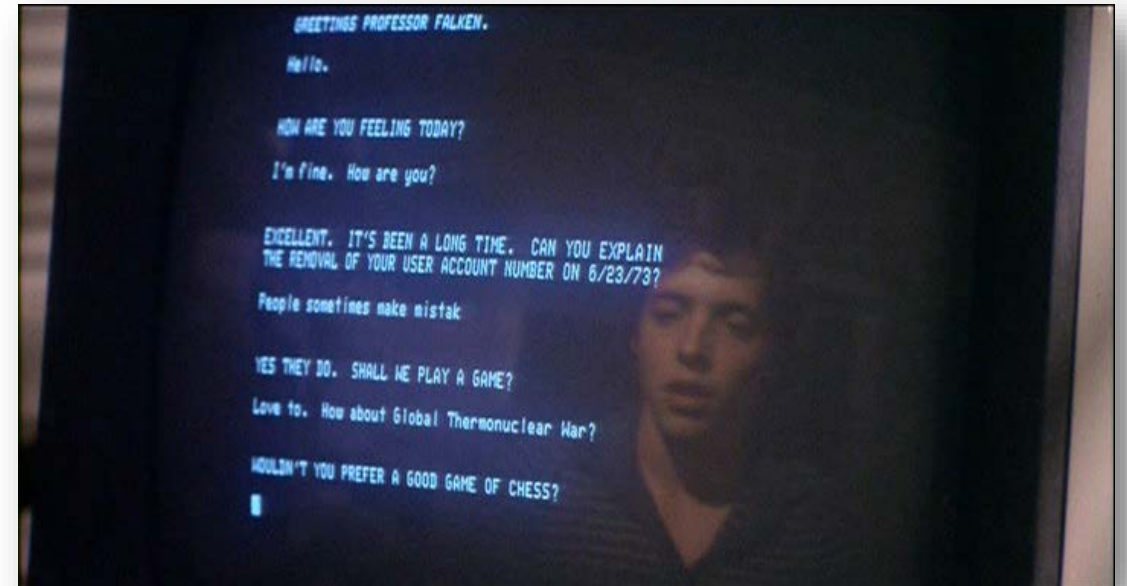


Overview of AWS IAM
Identity & Access Management

IAM – AWS Master Account

AWS Account

- Master/Root Account Permissions
- Allow by default
- MFA



Always treat the master account credentials as if they could launch an ICBM!

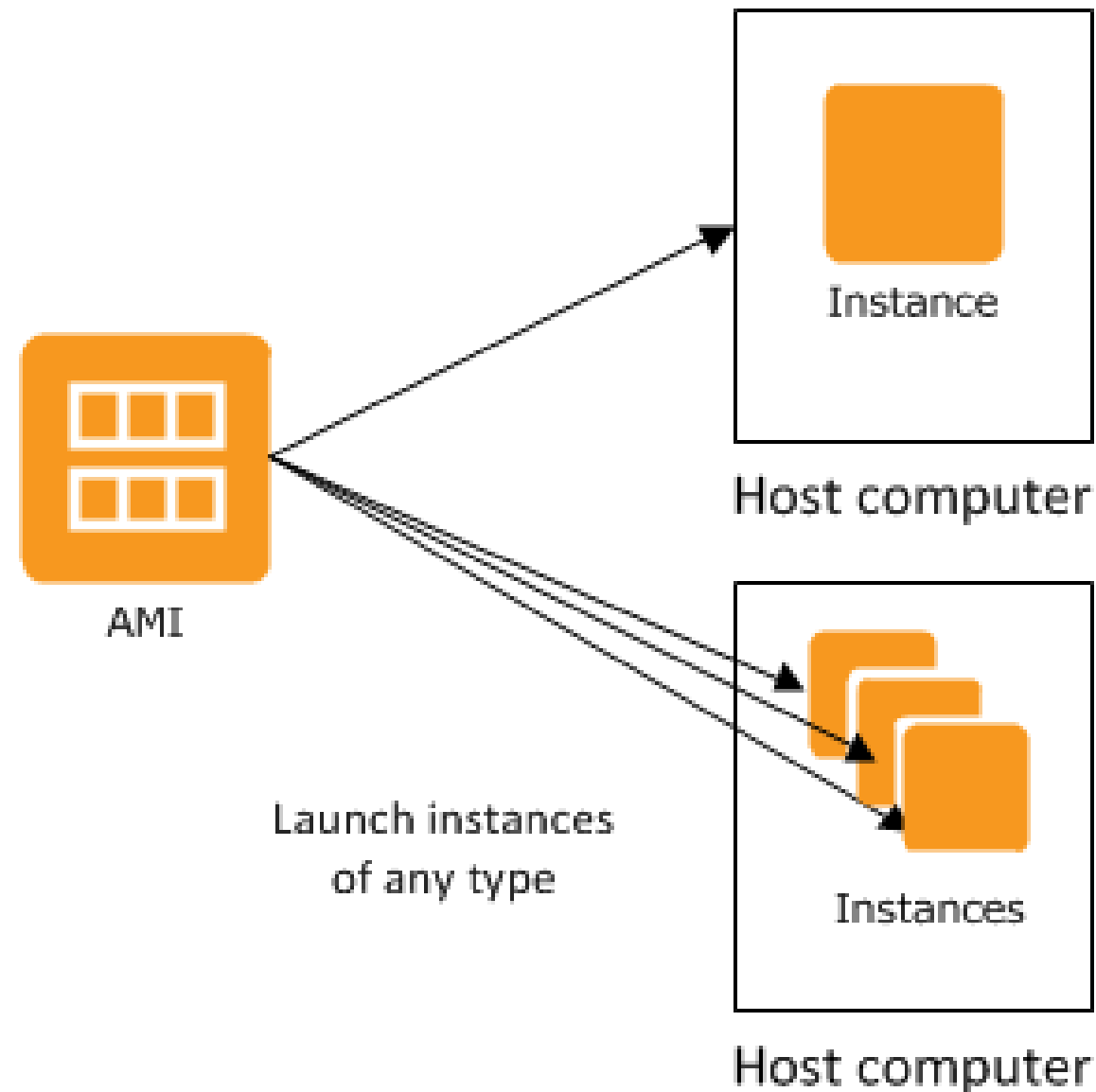
| AWS Compute Overview

EC2 – Elastic Cloud Compute



■ AMI

- Instances are based on an Amazon Machine Image
- You can create new AMIs from a running instance
- AMIs are stored in S3 for 11 9's of durability
- AMIs are unique to each region



EC2 - Instance Types

Choosing the correct instance type for the required workload

- T2 for light weight general purpose – but with burstable performance
- M4 for general purpose
- R3, X1 for memory and database heavy applications
- C3, C4 for compute heavy applications
- G2, P2 for GPU intensive applications
- I2, D2 for storage heavy applications (random)
- HS1 for storage heavy applications (sequential)

Model	vCPU	Mem (GiB)	SSD Storage (GB)
m3.medium	1	3.75	1 x 4
m3.large	2	7.5	1 x 32
m3.xlarge	4	15	2 x 40
m3.2xlarge	8	30	2 x 80

Example of M3 family of instance type

EC2 - Running Instances

Running instances

- Instances are launched into an existing VPC subnet
- CloudWatch monitoring is enabled by default
 - CPU Utilization, Network I/O are the primary data points of interest
 - Memory and Disk require an additional script that will post a to a custom CloudWatch metric
- Status checks
 - OS check
 - Network reachability check

EC2 – Instance Recovery

- CloudWatch monitors instance
- Automatically recovers if it becomes impaired
 - underlying hardware failure
 - problem that requires AWS involvement to repair
- During instance recovery, the instance is migrated during an instance reboot, and any data that is in-memory is lost

EC2 - Monitoring

Description

Status Checks

Monitoring

Tags

▼ CloudWatch alarms:  No alarms configured

Create

No alarms created. You can create an alarm using the Create Alarm button above.

CloudWatch metrics: Basic monitoring. [Enable Detailed Monitoring](#)

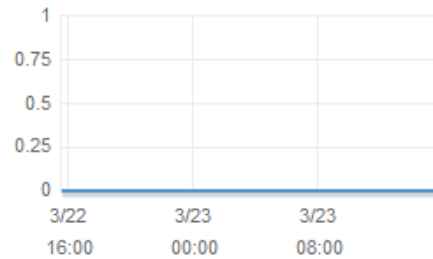
Showing data for: Last 24 Hour

Below are your CloudWatch metrics for the selected resources (a maximum of 10). Click on a graph to see an expanded view. All times shown are in UTC. [View all CloudWatch metrics](#)

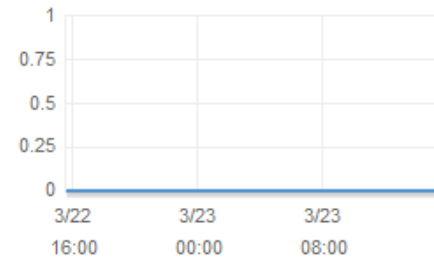
CPU Utilization (Percent)



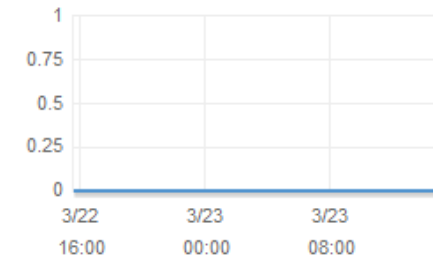
Disk Reads (Bytes)



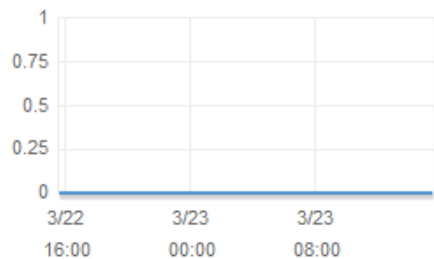
Disk Read Operations (Operations)



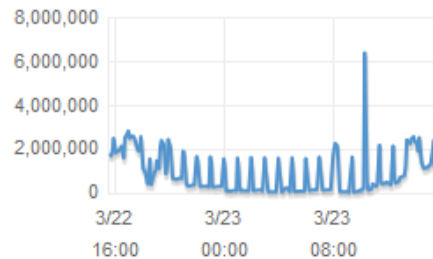
Disk Writes (Bytes)



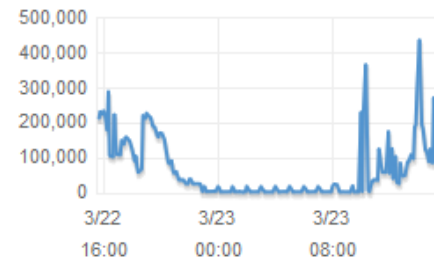
Disk Write Operations (Operations)



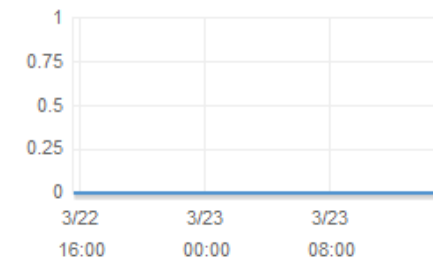
Network In (Bytes)



Network Out (Bytes)



Status Check Failed (Any) (Count)



EC2 - Bootstrapping

■ User Data

- Provides a hook to inject scripting into any standard instance you decide to launch
 - These include the Amazon Linux, Windows and Ubuntu AMIs
 - User Data can only be modified while the instance is stopped
- Suggested patterns
 - Install security updates
 - `yum update -y`
 - Install middleware
 - `yum install -y httpd`
 - `chkconfig httpd on`
 - Download and execute a remote script
 - Assign an IAM Profile to the EC2 instance
 - `Aws s3 cp s3://mybucket/myscript.sh /tmp/myscript.sh`
 - `./tmp/myscript.sh`

EC2 - Pricing

1 > On Demand Instance

- This is the most common and flexible pricing option
- Pay only for what you use
- Stopped instances will not accrue hourly compute costs
- Pay by the instance hour

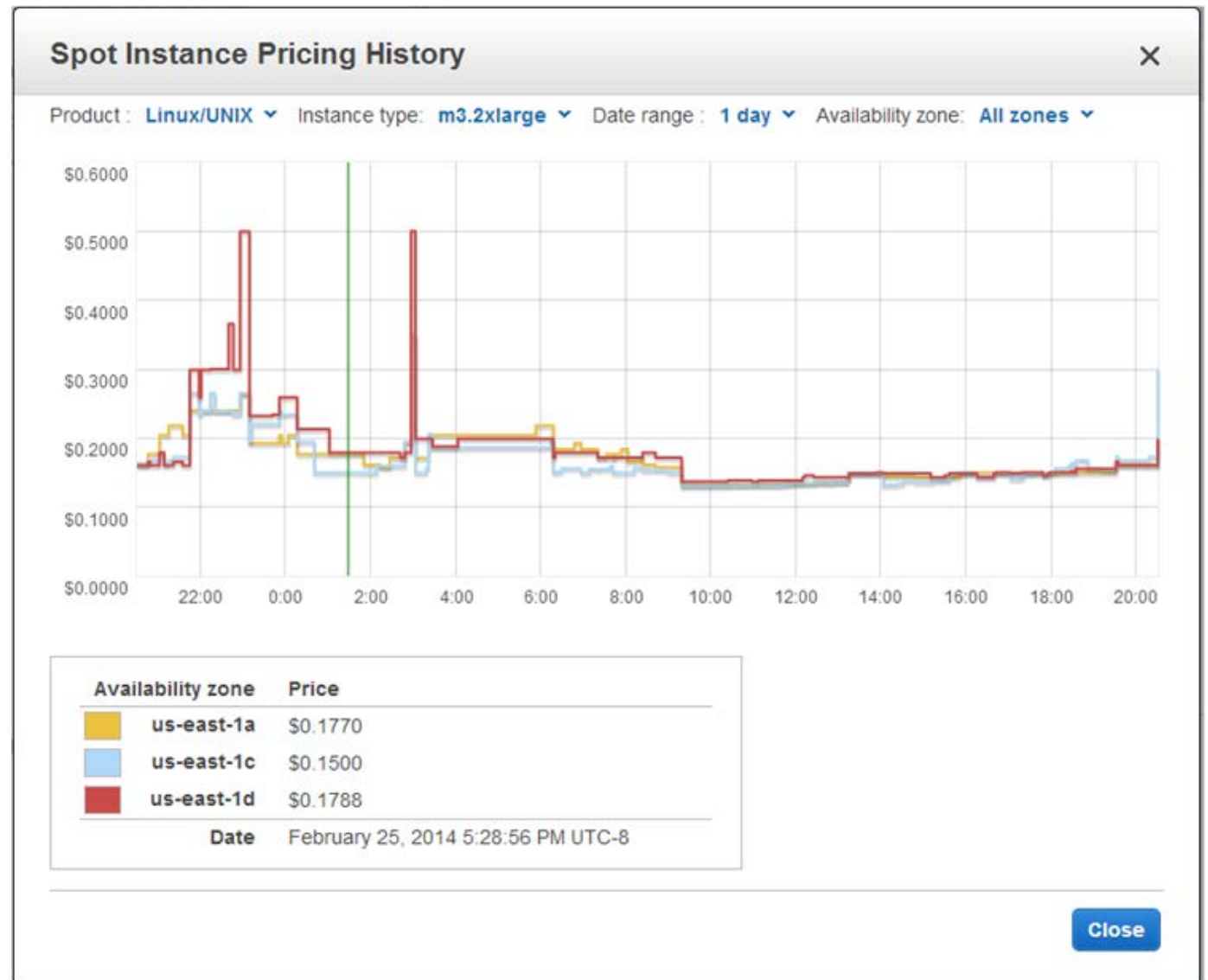
2 > Reserved Instance (RI)

- 1 or 3 year commitment
 - Pay for EC2 hourly at reduced rates (from On Demand rates)
- Payment Options
 - No Upfront payment: no CapEx, lower hourly rate than On Demand
 - Partial Upfront payment: some CapEx, lower hourly rate than No Upfront
 - All Upfront payment: larger Capex, lowest hourly rate possible

EC2 - Pricing

3 > Spot

- Useful for “worker pool” scenarios
 - Transcode, map reduce task nodes
- Can be lost as soon as someone is willing to pay more for that instance



| AWS Elastic Load Balancing

ELB - Elastic Load Balancer



Elastic Pool of Virtual Load Balancers

■ Public Side

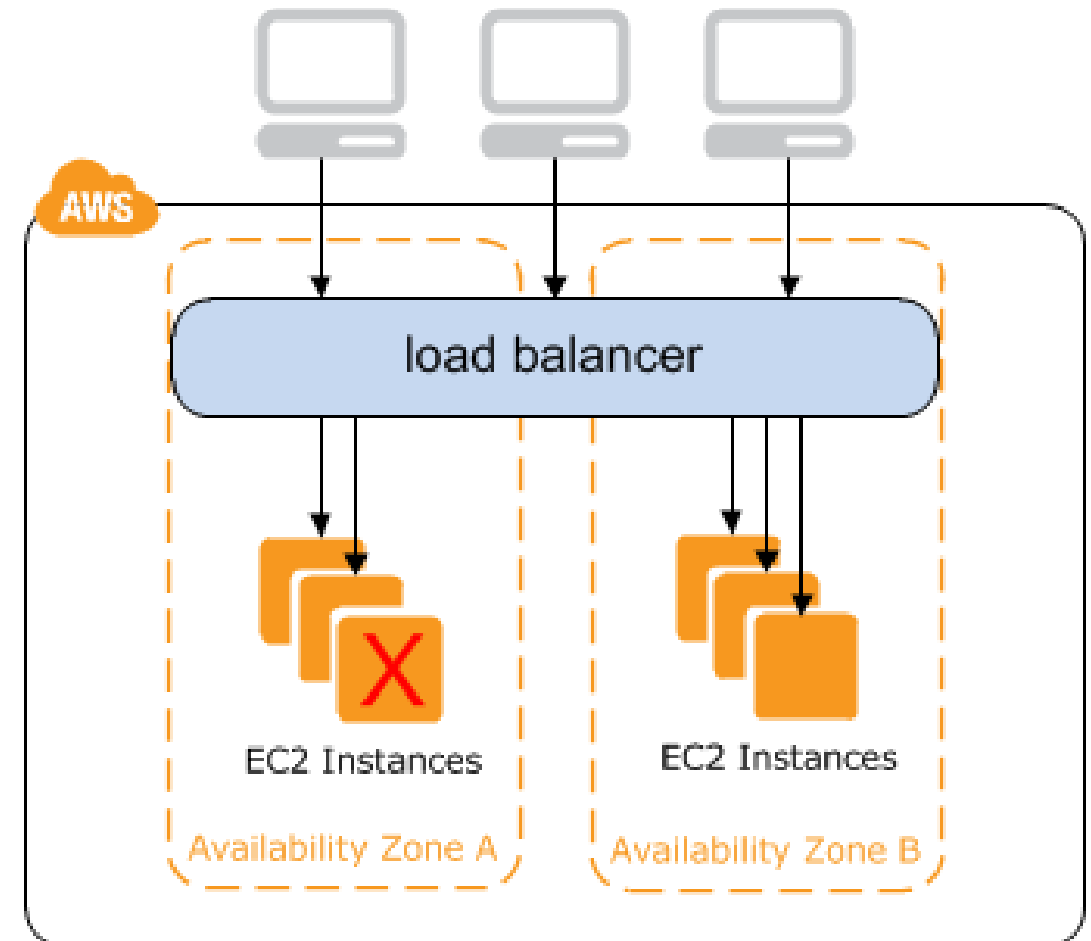
- Consists of an endpoint which is the equivalent to a traditional VIP
- Does not use a static IPv4, but rather an Alias/CNAME
- The endpoint will not always resolve to the same IP

■ Private Side

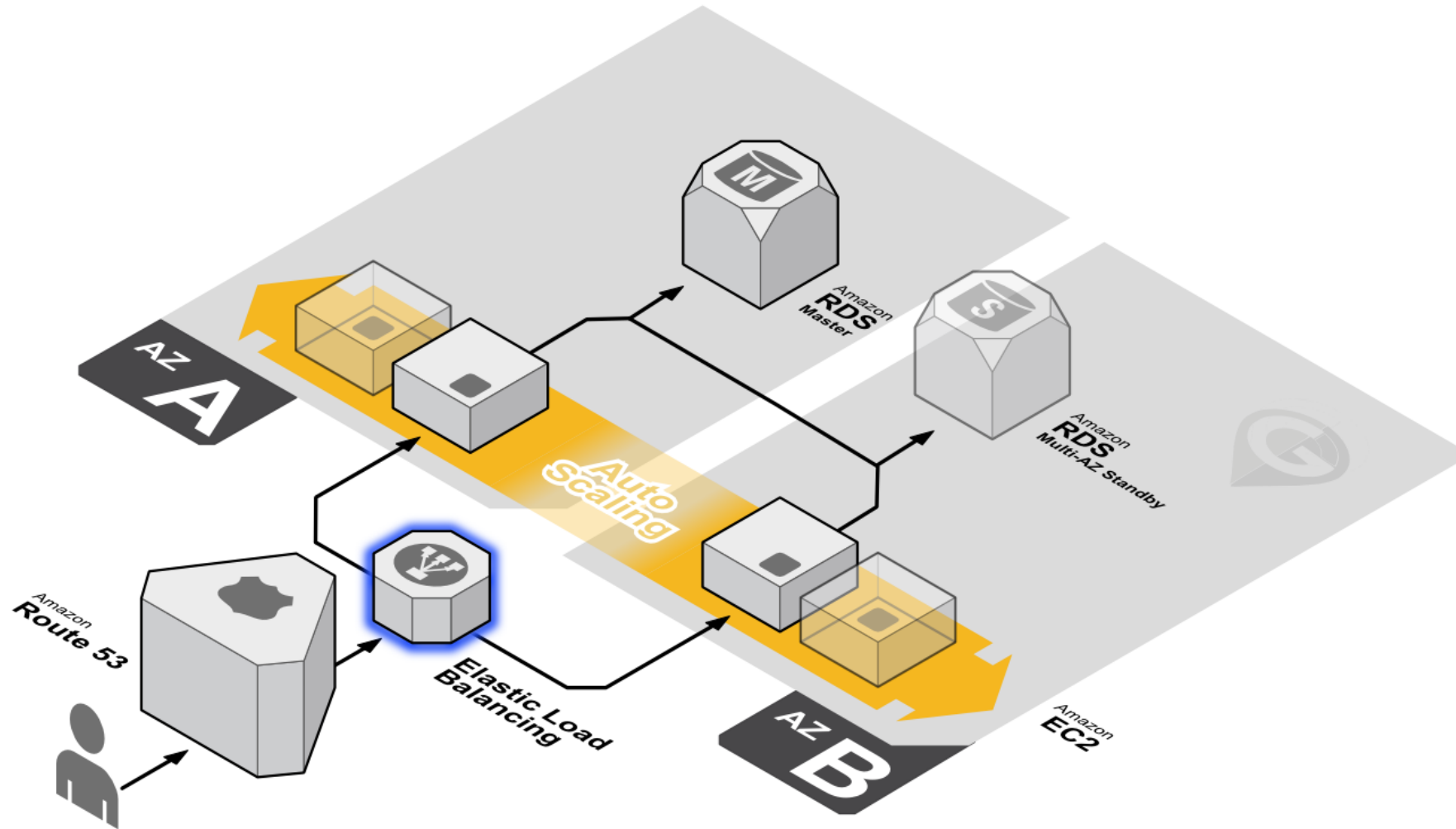
- Minimum of one virtual ELB node per AZ

■ Certificate Termination

- Only one SSL certificate per ELB
- Multi-Domain certificates are valid



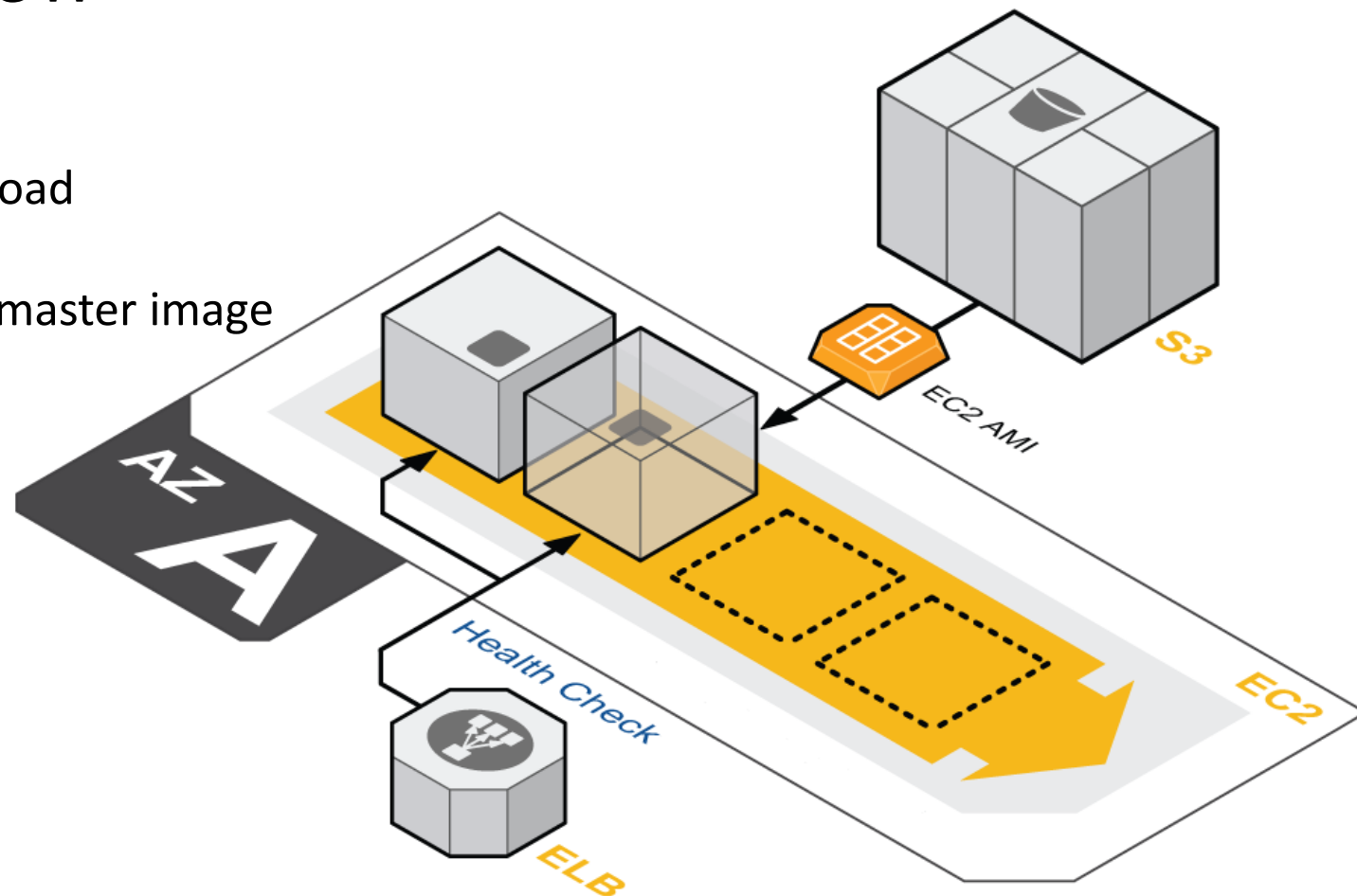
ELB – Spans Multiple Availability Zones



Auto Scaling - Overview

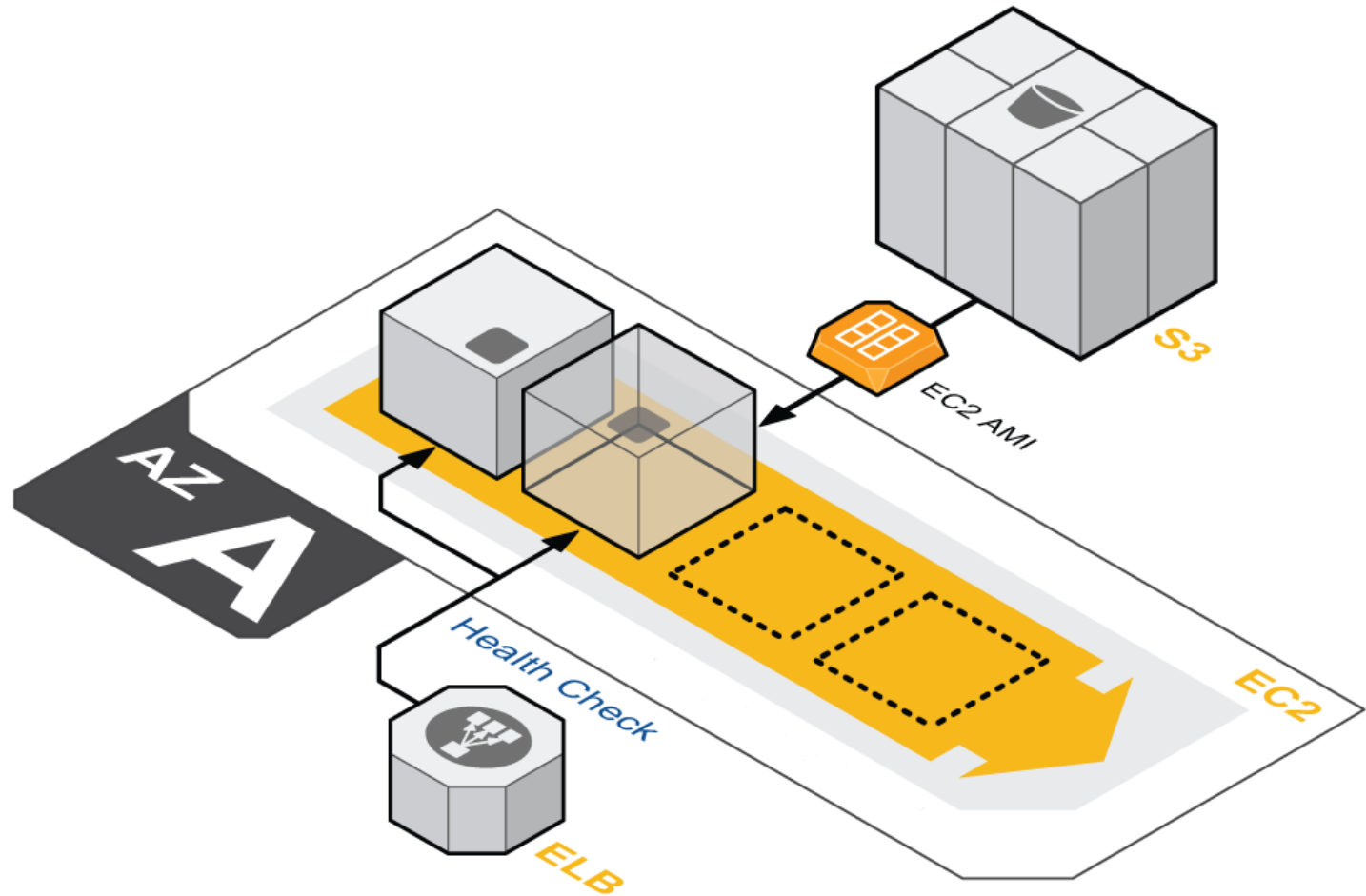
■ Auto Scaling Key Features

- Adds or removes servers based on load
- Self-healing pool of resources
- Every instance is based on a “gold” master image



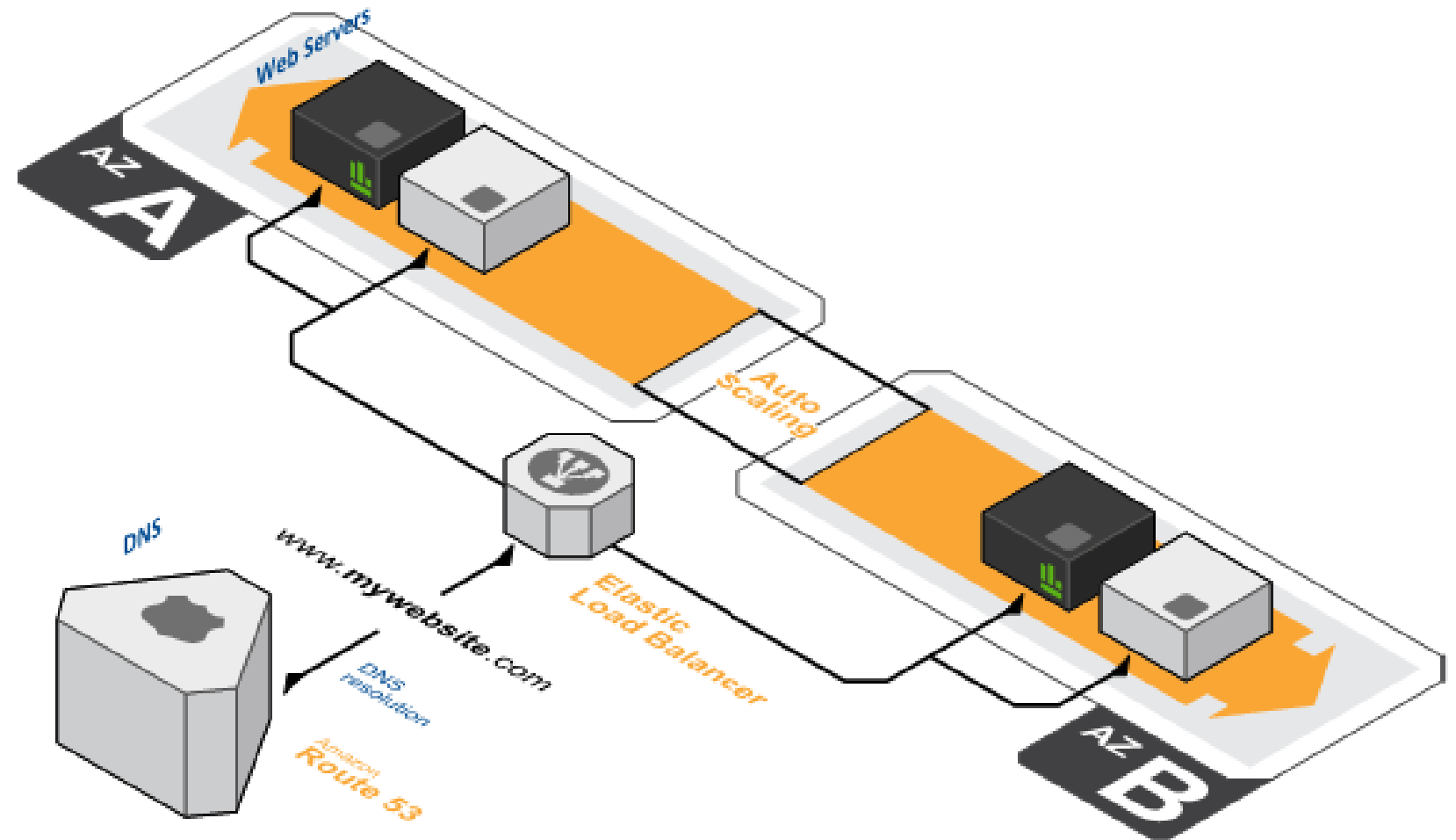
Auto Scaling - Components

- **Auto scaling group**
 - Instance location
 - Subnet
 - Load Balancer
 - Number of instances
 - Min
 - Max
 - Desired
- **Launch config**
 - Instance details
 - Size
 - PEM key
 - IAM Profile
 - Security Group(s)
 - User data



Auto Scaling - Multi-AZ

- **Multi-AZ Auto Scaling**
 - Highly Available
 - Production Standard
 - Spans Datacenters



Auto Scaling - CloudWatch

CloudWatch is the final piece of the auto scaling puzzle. You can create alarms based on instance metrics which trigger auto scaling actions.

Scaling policies

Scale up alarm

- Execute policy when: CPU is greater than 60%
- Take the action: Add 2 instances
- And then wait: 10 minutes

Scale down alarm

- Execute policy when: CPU is less than 20%
- Take the action: Remove 2 instances
- And then wait: 10 minutes

| AWS Directory Service

Directory Service - Overview

Three types of directory services:

- Microsoft AD

- A managed Microsoft Active Directory service running on Windows Server 2012 R12
- Highly availability (multi-AZ), patched, and monitored
- Can support up to 50,000 users
- Fully functional MS AD

- Simple AD

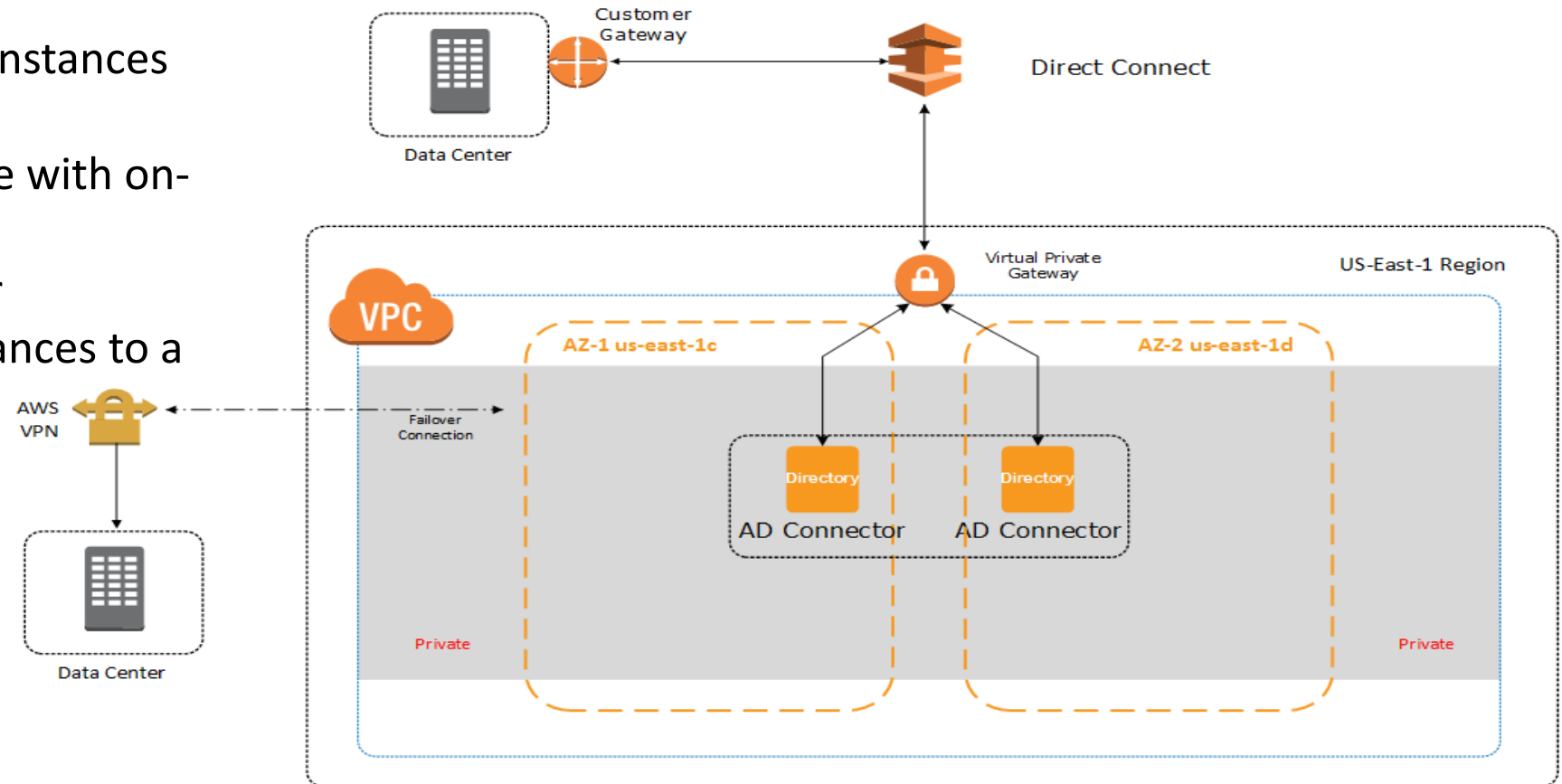
- Powered by Samba 4 Active Directory
- Users and Groups can be created directly in the AWS console
- Windows servers can auto-join this domain as they would in an AD environment
- Can support 500 users

- AD Connector

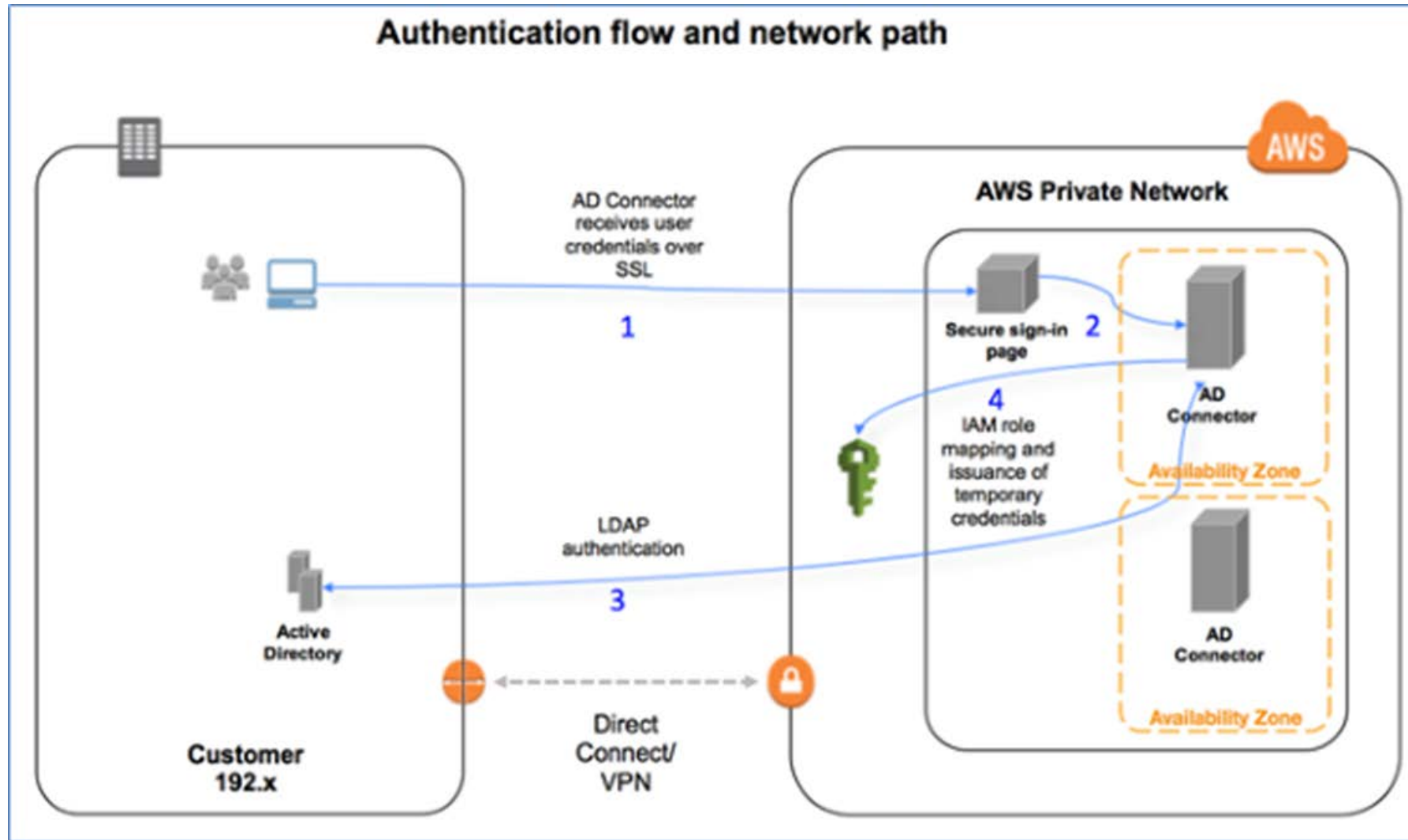
- Connect your on-prem AD to your AWS account
- Associate AD users/groups with IAM users/groups
- Windows servers can auto-join this domain as they would in an AD environment
- Manage the AWS console using your AD credentials

Directory Service – AD Connector

- Active Directory Connector instances are launched into your VPC
- AD Connectors communicate with on-prem AD servers
- AD credentials are no longer necessary when joining instances to a domain (Auto-Join)



AD Connector - Single Sign On Flow



| AWS Storage Overview

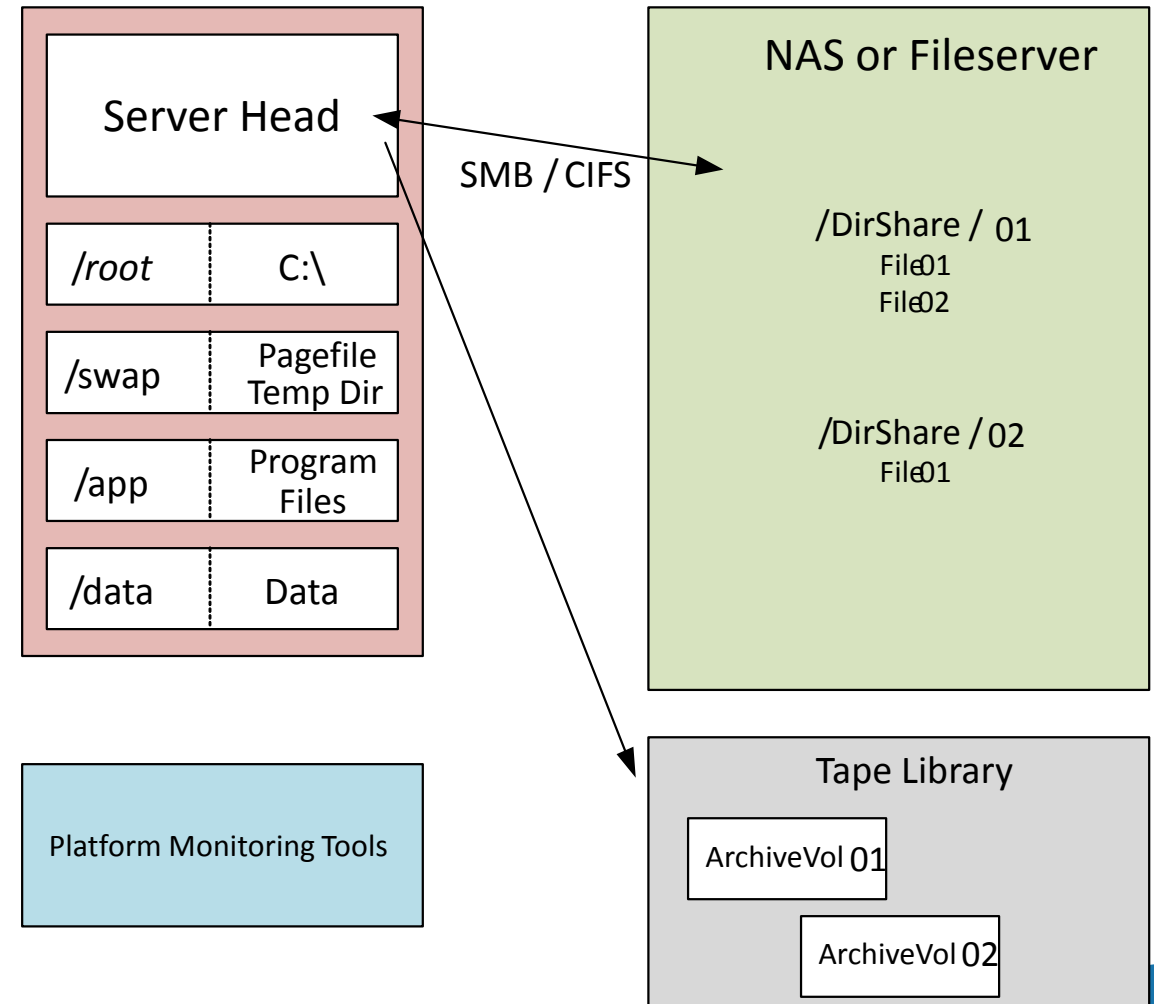
Storage Services

- **EBS** — Elastic Block Store - (not actually a "service")
- **S3** — Simple Storage Service - (object storage)
 - **Standard**
 - **Standard I/A** — Infrequent Access
 - **Reduced Redundancy Storage (RRS)** — 4 9's of durability (1 facility)
 - **Glacier** — Archival/Long-term
 - **Expedited** — 1-5 minutes
 - **Standard** — 3-5 hours
 - **Bulk** — 5-12 hours
- **AWS Storage Gateway**
 - **Gateway-cached volumes** — store primary data in AWS and cache most recently used data locally
 - **Gateway-stored volumes** — store entire dataset onsite and asynchronously replicate data back to S3
 - **Gateway-virtual tape library** — store your virtual tapes in either S3 or Glacier
- **EFS** — Elastic File System

Traditional Platform - Storage Architecture

In the old days...

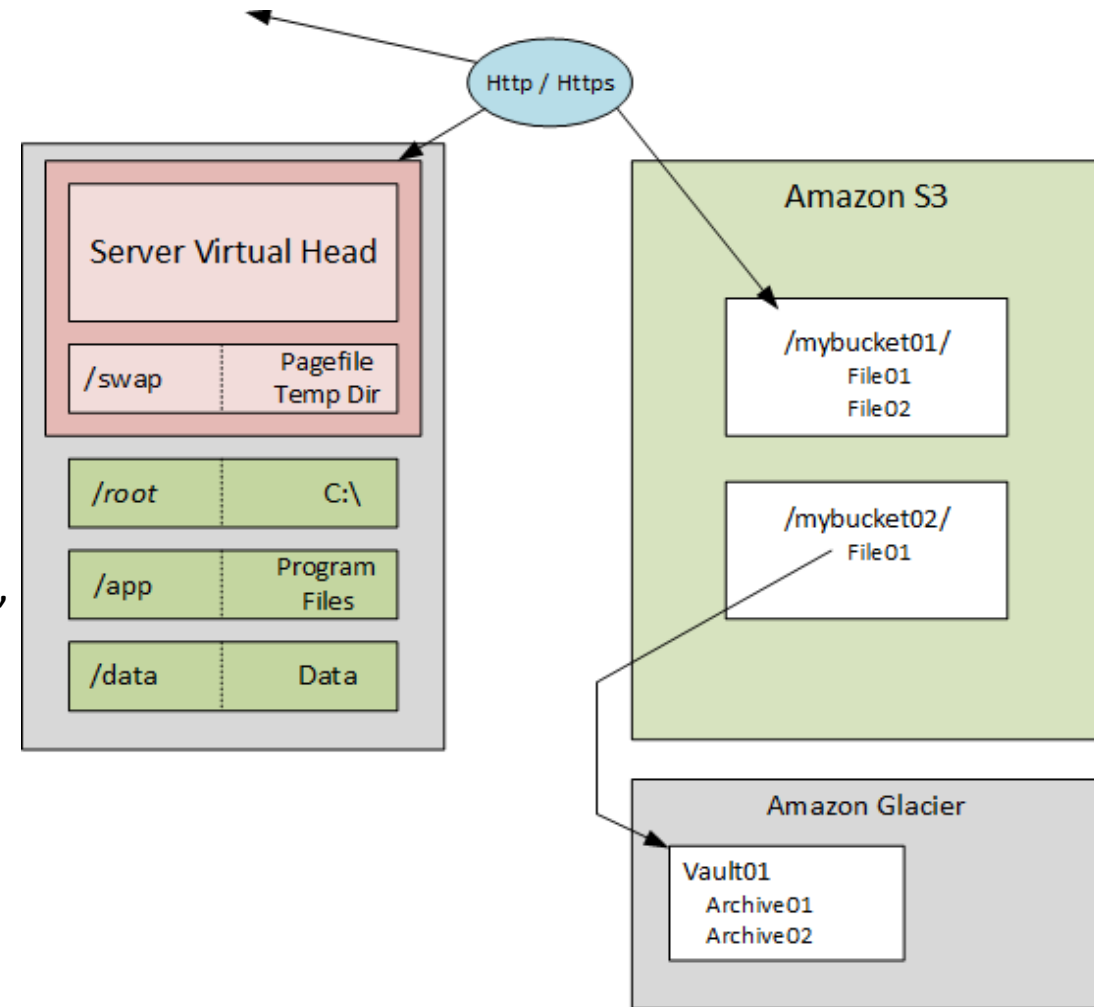
- Hardware acquisition and datacenter space required advanced planning
- Disk space and I/O allocation juggling for the entire application lifecycle
- Volume and file redundancy not built-in
- Capital commitment and refresh budget considerations



AWS Instance Volumes and Data Storage

The new [improved] way of doing things...

- Elastic pay-as-you-go model
- Redundancy and snapshot utilities built-in
- New APIs and tools simplify application development, administration and data lifecycle management



EBS - Elastic Block Store

Block storage ideal for creating versatile OS volumes

- Define type, size and optionally I/O capacities [within service limits]
- Magnetic, SSD and Provisioned IOPS
- Mount to a single instance, similar to local drive
- Simplified Encryption options

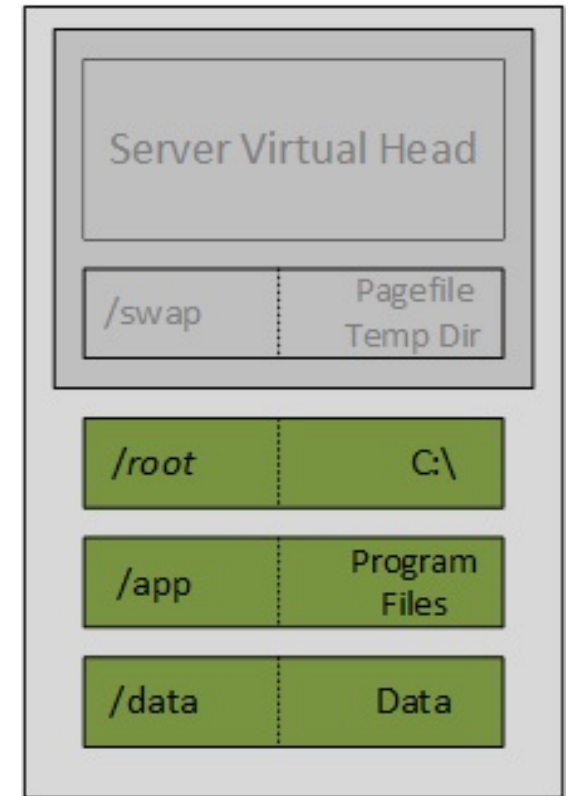
Persistent and durable

- Redundant copies stored in single AZ
- Not permanently bound to a server instance and will survive server crash or shutdown

Snapshot capabilities for point-in-time backups

- Resizing and duplicating volumes
- Moving across AZs; Exporting across Regions

Performance metrics available through CloudWatch



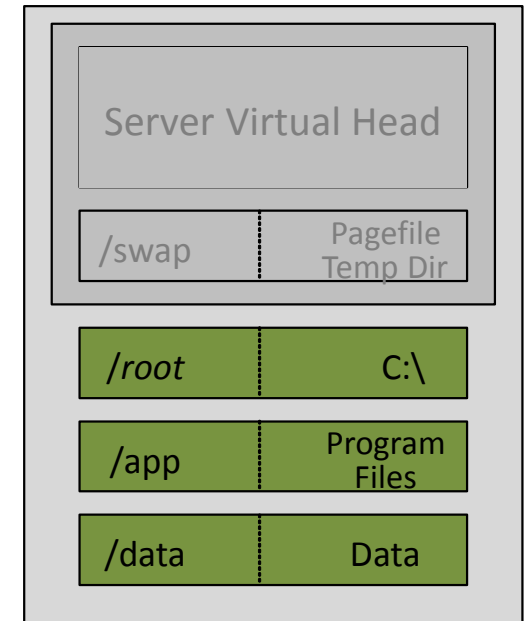
Elastic Block Store (EBS) – Best Practices

Recommended for applications

- Making frequent data changes
- Requiring consistent I/O performance
- Needing to persist data beyond server instance stop/start cycles
- Requiring fine-grain control of raw, unformatted data blocks

Define appropriate configuration options

- EBS Optimized instances can handle higher I/O bandwidth
- Underlying technology (Magnetic, General Purpose (SSD), Provisioned IOPS (SSD))



Ephemeral Drives (EC2 Instance Store) Overview

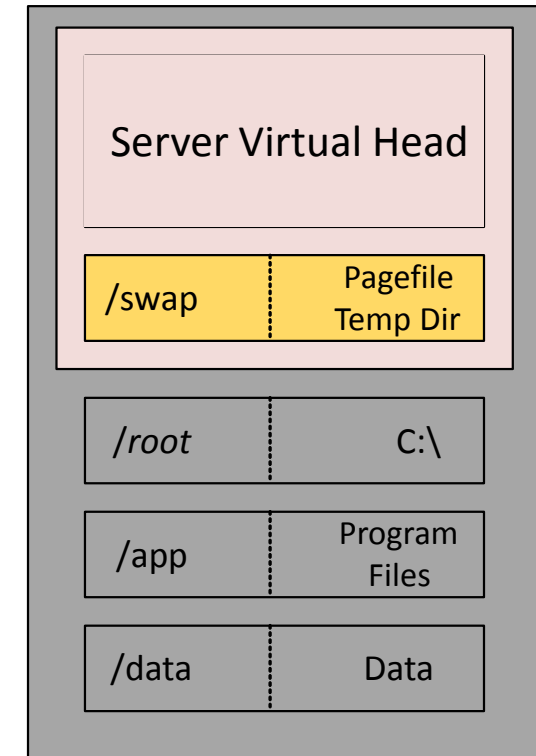
Block device attached to the host machine

- Available to server instance
- May be mounted and used for temporary storage
- No additional usage charges for disk space or I/O

Not redundant: no built-in RAID or snapshot function

Data loss will result if any of the following occur:

- Host server or instance crash
- Instance termination
- Disk failure

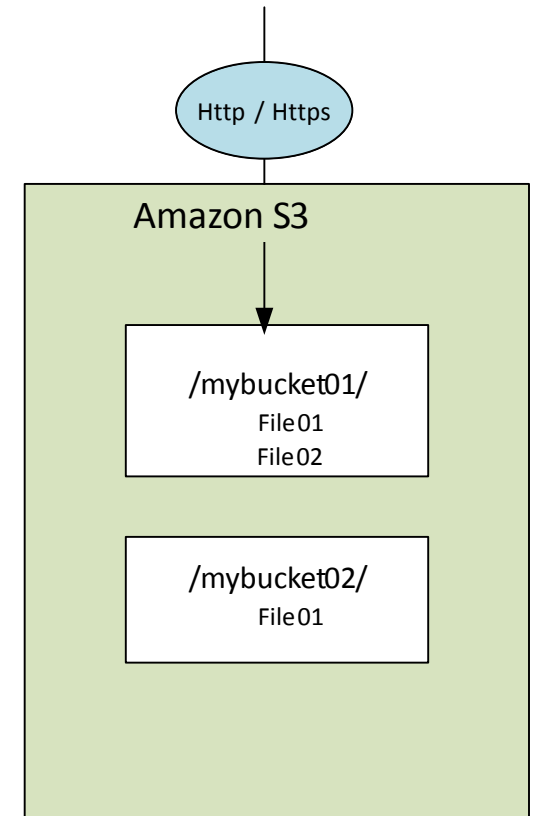


S3 - Simple Storage Service



Object storage container with virtually unlimited capacity

- Store files (objects) in containers (buckets)
- Redundant copies for high durability and reliability
- Available on the internet via REST requests directly or through SDK
- Multiple strategies to secure contents
 - Set permissions, access policies and optionally require MFA
 - Encryption: Server (simplified) or Client-side
 - Audit logging (optional) will record all access requests via APIs
- Built-in tools for managing versioning, object lifecycle and creating static websites
- Provides 99.999999999% durability (11 '9s')
- Provides 99.99% availability



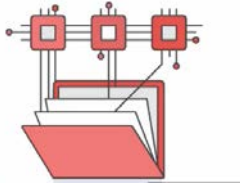
Amazon Glacier - Overview



Storage service optimized for reliable and low cost storage of archive data

- Data objects are securely archived, however not immediately accessible
- Create vaults (containers) to hold archives (any file based object)
- Upload archives programmatically
- Submit requests to retrieve archives. Available in about 4 hours
- Cost is approximately \$.01/GB/Month plus modest API and retrieval charges [if applicable]

EFS – Elastic File System



Fully managed file server storage

- Uses NFS (v4.1) protocol
- Linux server only, Windows support planned for future release
- Can be mounted by 1,000s of EC2s
- Can be accessed from on-prem Data Center if using Direct Connect
- Highly available, redundant across multiple AZs

EFS – Comparing EFS and EBS

		Amazon EFS	Amazon EBS PIOPS
Performance	Per-operation latency	Low, consistent	Lowest, consistent
	Throughput scale	Multiple GBs per second	Single GB per second
Characteristics	Data Availability/Durability	Stored redundantly across multiple AZs	Stored redundantly in a single AZ
	Access	1 to 1000s of EC2 instances, from multiple AZs, concurrently	Single EC2 instance in a single AZ
	Use Cases	Big Data and analytics, media processing workflows, content management, web serving, home directories	Boot volumes, transactional and NoSQL databases, data warehousing & ETL

| AWS Database Overview

AWS Structured Data Services

Deploying structured data systems (for example SQL, NoSQL and Data Warehouse applications) in a traditional environment may be complex, costly, and time consuming.

Amazon provides a set of structured data services with the following advantages:

- Simple to deploy, operate and scale
- Many common administrative and operational tasks are automated
- Pay-as-you-go pricing
- Support for a wide variety of standard and emerging application models

RDS - Relational Database Service



Fully managed relational database service offering popular platforms with the following key advantages:

- Amazon manages resource redundancy, software patching, backups, failure detection and recovery
- Ability to configure specific resources to cost-effectively scale your application
- Pay-as-you-go model offering included license or license portability [see fine print to ensure license compliance]
- Streamlined management options to easily configure highly available topologies, create database snapshots and deploy test instances

RDS - Relational Database Service

Key Concepts

- ❖ Database Instance
- ❖ Database Storage
- ❖ DB Instance Class

- ❖ 6 Platforms

1. Oracle
2. MS SQL
3. MySQL
4. PostgreSQL
5. MariaDB
6. Amazon Aurora

ORACLE®

Microsoft®
SQL Server®

MySQL

PostgreSQL

MariaDB

Amazon
Aurora

AWS Aurora

Fully managed relational database engine that combines the speed and availability of high-end commercial databases with the simplicity and cost effectiveness of open source databases.

Key features:

- Architected for 99.99% availability
- Automatic failover < 30s (Possible Oracle RAC solution)
- Enterprise performance (5x) at 1/10 the cost
- Compatible with MySQL and PostgreSQL
- Automatically grows storage as needed, up to 64 TB
- Easy migration from MySQL
- Up to 15 Aurora Replicas in a region
- Cross-region replication
- Encryption in-transit and at rest
- Continuous backup to S3 (11 9's data durability)
- Fully managed



DynamoDB



Fully managed NoSQL database service offering the following key advantages:

- Seamless and virtually unlimited scalability conveniently managed automatically by Amazon
- Ability to define specific resource allocation limits to ensure predictable performance while containing costs
- Easy administration and well-supported development model
- Integration with other core Amazon data services (for example Redshift and EMR)

Redshift



Fully managed Enterprise-class data warehouse service offering the following advantages:

- High performance, massively parallel columnar storage architecture providing streamlined scalability
- Mainstream SQL query syntax allowing for rapid platform adoption
- Flexible node type and RI options allowing for workload alignment and cost efficiency

Database Migration Service (DMS)



- AWS Database Migration Service helps you migrate databases to AWS easily and securely.
- The source database remains fully operational during the migration, minimizing downtime to applications that rely on the database.
- Homogenous (Oracle to Oracle) & heterogeneous migrations (ie Oracle to Aurora, or Microsoft SQL Server to MySQL) using Schema Conversion Tool
- Can also be used for continuous data replication with high-availability

AWS Schema Conversion Tool



Source Database	Target Database on Amazon RDS
Oracle	Amazon Aurora, MySQL, PostgreSQL, MariaDB
Oracle Data Warehouse	Amazon Redshift
Microsoft SQL Server	Amazon Aurora, MySQL, PostgreSQL, MariaDB
Teradata	Amazon Redshift
Netezza	Amazon Redshift
Greenplum	Amazon Redshift
MySQL and MariaDB	PostgreSQL
PostgreSQL	Amazon Aurora, MySQL, MariaDB
Amazon Aurora	PostgreSQL

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Thank You | Questions?