AWS TRAINING SERVICES

PART 4

EC2

Elastic Compute Cloud

PhD.Vurğun Hacıyev

AWS Certifications

aws certified
Updated May 2019

Professional

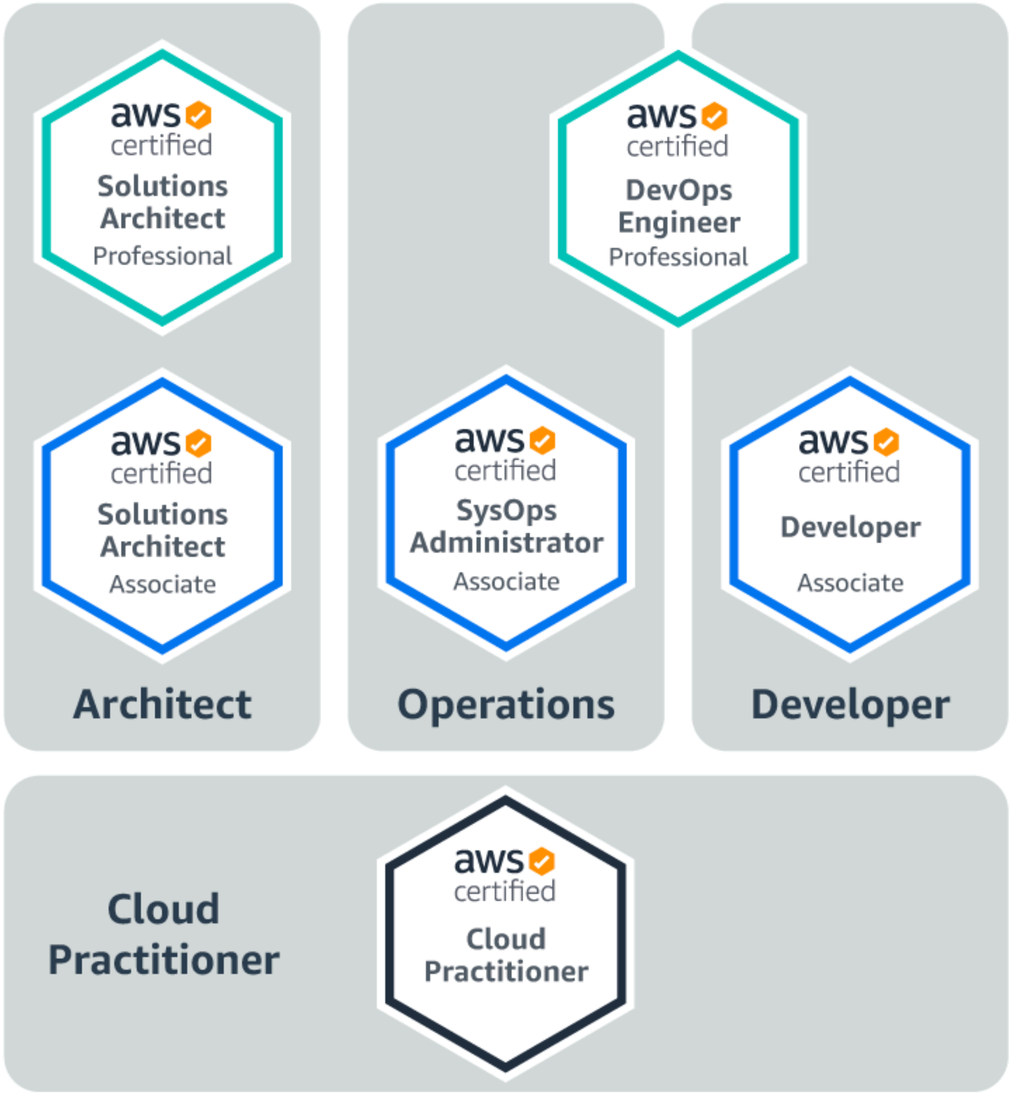
Two years of comprehensive experience designing, operating, and troubleshooting solutions using the AWS Cloud

Associate

One year of experience solving problems and implementing solutions using the AWS Cloud

Foundational

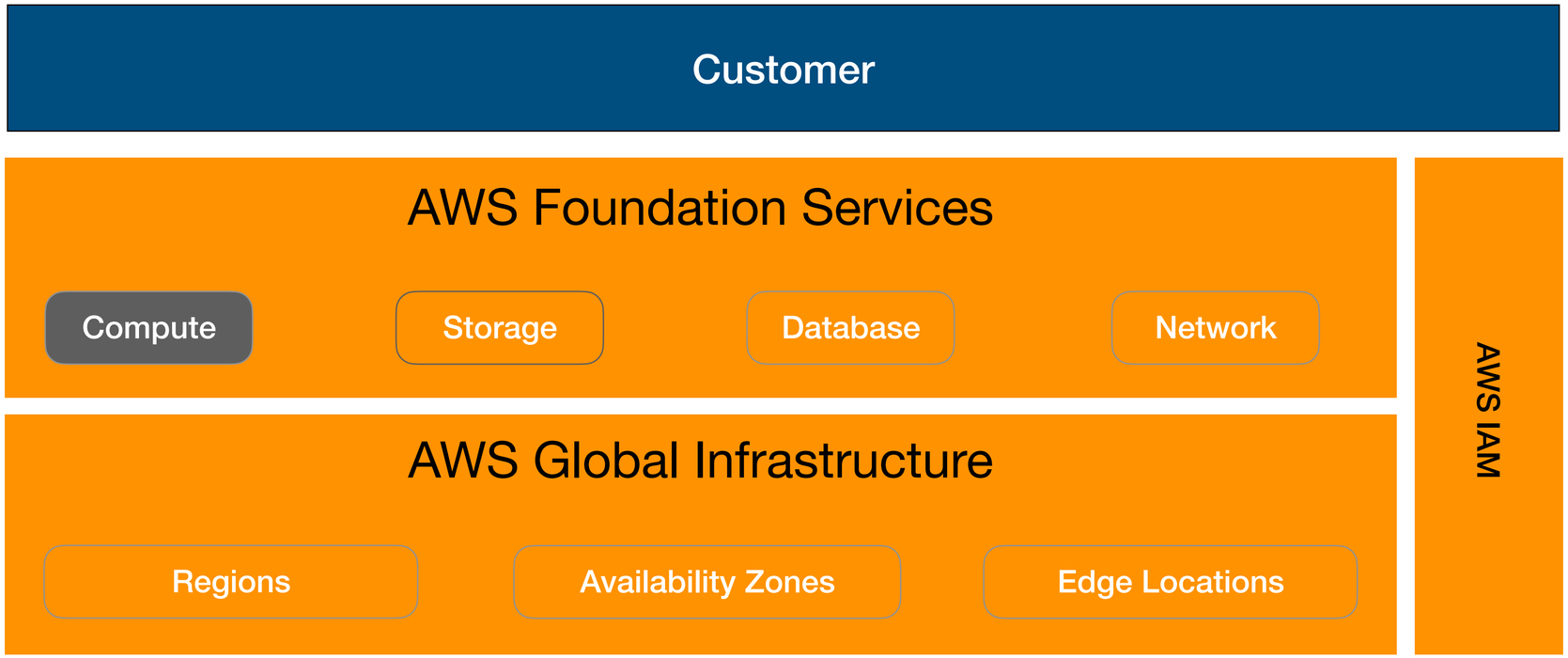
Six months of fundamental AWS Cloud and industry knowledge



Specialty

Technical AWS Cloud experience in the Specialty domain as specified in the **exam guide**

AWS (Amazon Web Services)



AWS Content

- EC2
- Let's Get Our Hands Dirty With EC2
- Security Groups Basics
- EBS
- Volumes & Snapshots Lab
- AMI Types (EBS vs Instance Store)
- Encrypted Root Device Volumes & Snapshots Lab
- CloudWatch
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- Using IAM Roles With EC2 Lab
- Using Boot Strap Scripts
- EC2 Instance Meta Data
- Elastic File System
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- EC2 Summary

What is EC2?

Amazon Elastic Compute Cloud (Amazon EC2) is a web service that provides secure, resizable compute capacity in the cloud. It is designed to make web-scale computing easier for developers.

The Amazon EC2 simple web service interface allows you to obtain and configure capacity with minimal friction. It provides you with complete control of your computing resources and lets you run on Amazon's proven computing environment. Amazon EC2 reduces the time required to obtain and boot new server instances (called Amazon EC2 instances) to minutes, allowing you to quickly scale capacity, both up and down, as your computing requirements change. Amazon EC2 changes the economics of computing by allowing you to pay only for capacity that you actually use. Amazon EC2 provides developers and system administrators the tools to build failure resilient applications and isolate themselves from common failure scenarios.

Amazon EC2

EC2 pricing Models

1 On Demand

- With On-Demand instances, you pay for compute capacity by the hour with no long-term commitments.

2 Reserverd

- Provide you with a significant discount (up to 75%) compared to On-Demand instance pricing. You have the flexibility to change families, operating system types, and tenancies while benefitting from Reserved Instance pricing when you use Convertible Reserved Instances.

3 Spot

- Available at up to a 90% discount compared to On-Demand prices and let you take advantage of unused EC2 capacity in the AWS Cloud. You can significantly reduce the cost of running your applications, grow your application’s compute capacity and throughput for the same budget, and enable new types of cloud computing applications.

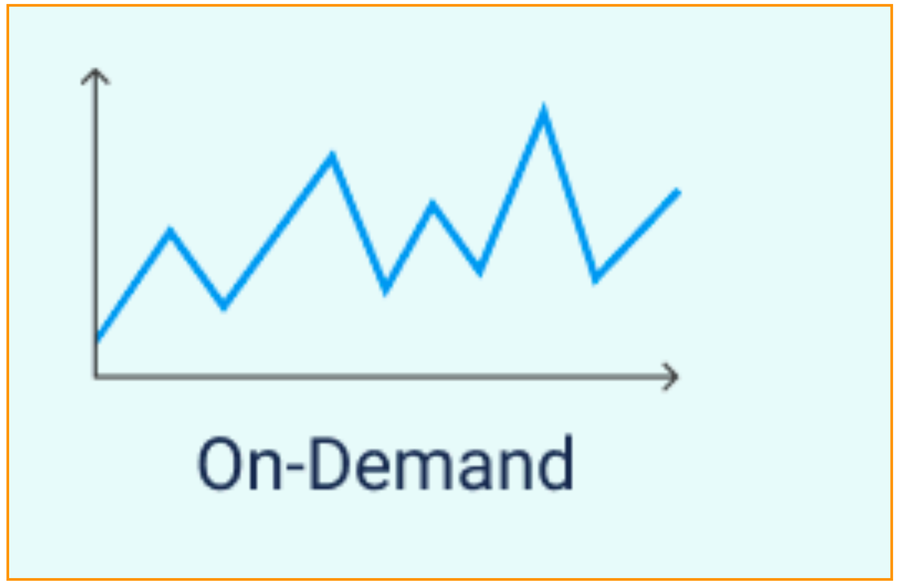
4 Dedicate Hosts

- Physical EC2 server dedicated for you use. Dedicates Hosts can help you reduce costs by allowing you to use your existing server-bound software licenses.

On Demand Pricing

On Demand pricing is useful for;

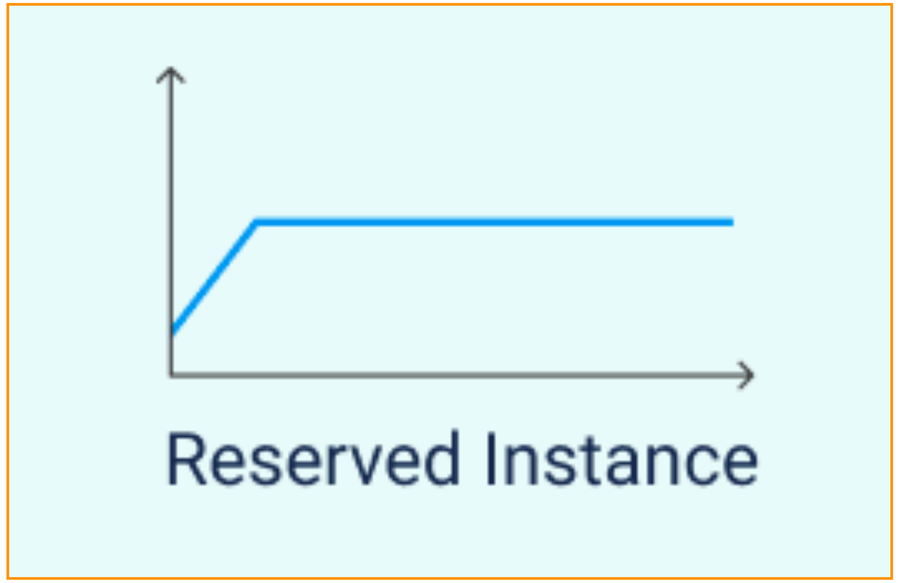
- USers that want the low cost and flexibility of Amazon EC2 without any up-front payments of long-term commitment
- Applications with short term, spiky, or unpredictable workloads the cannot be interrupted
- Applications being developed or tested on Amazon EC2 for the first time



Reserved Pricing

Reserved pricing is useful for;

- Applications with steady state or predictable usage
- Applications that require reserved capacity
- Users able to make upfront payments to reduce their total computing costs even further



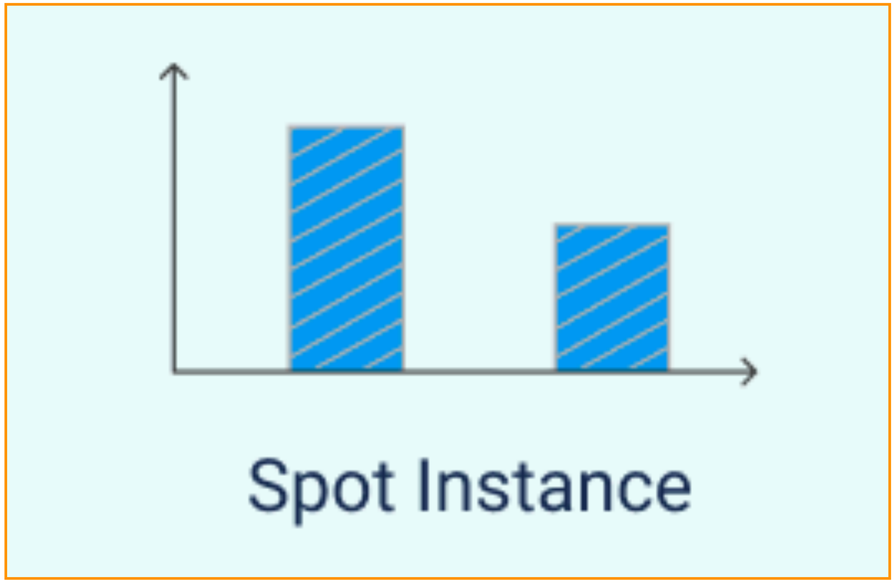
Reserved pricing Type

- Standart Reserved Instances
- Convertible Reserved Instances
- Scheduled Reserved Instances

Spot Pricing

Spot pricing is useful for;

- Applications that have flexible start and end times
- Applications that are only feasible at very low compute prices
- Users with urgent computing needs for large amounts of additional capacity



Dedicated Host Pricing

Dedicated Hosts pricing is useful for;

- Useful for regulatory requirements that may not support multi -tenant virtualization
- Great for licensing which does not support multi- tenancy or cloud deployments.
- Can be purchased On -Demand (hourly)
- Can be purchased as a Reservation for up to 70% off the On-Demand price

EC2 Instance Type

Family	Speciality	Use case
F1	Field Programmable Gate Array	Genomics research, financial analytics, real-time video processing, big data etc
I3	High Speed Storage	NoSQL DBs, Data Warehousing etc
G3	Graphics Intensive	Video Encoding/ 3D Application Streaming
H1	High Disk Throughput	MapReduce-based workloads, distributed file systems such as HDFS and MapR-FS
T3	Lowest Cost, General Purpose	Web Servers/Small DBs
D2	Dense Storage	Fileservers/Data Warehousing/Hadoop
R5	Memory Optimized	Memory Intensive Apps/DBs
M5	General Purpose	Application Servers
C5	Compute Optimized	CPU Intensive Apps/DBs
P3	Graphics/General Purpose GPU	Machine Learning, Bit Coin Mining etc
X1	Memory Optimized	SAP HANA/Apache Spark etc
Z1D	High compute capacity and a high memory footprint.	Ideal for electronic design automation (EDA) and certain relational database workloads with high per-core licensing costs.
A1	Arm-based workloads	Scale-out workloads such as web servers
U-6tb1	Bare Metal	Bare metal capabilities that eliminate virtualization overhead

EC2 Instance Types - Mnemonic

- **F** - For FPGA
- **I** - For IOPS
- **G** - Graphics
- **H** - High Disk Throughput
- **T** - Cheap general purpose (think T2 Micro)
- **D** - For Density
- **R** - For RAM
- **M** - Main choice for general purpose apps
- **C** - For Compute
- **P** - Graphics (think Pics)
- **X** - Extreme Memory
- **Z** - Extreme Memory AND CPU
- **A** - Arm-based workloads
- **U** - Bare Metal

EC2 Instance Lab

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Security Groups Basics Lab

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Lab

- All inbound traffic is blocked by default.
- All Outbound traffic is allowed.
- Change to Security Groups take effect immediately.
- You can have any number od EC2 instance within a security group.
- You can have multiple security groups attached to EC2 instance.

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EBS
(Elastic Block Store)

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What is EBS?

Amazon Elastic Block Store (EBS) provide persistent block storage volumes for use with Amazon EC2 instance in the AWS Cloud. Each Amazon EBS volume is automatically replicated within is Availability Zone to protect your from component failure, offering high availability and durability.

Amazon EBS

EBS Volumes

- 5 Different Types of EBS Storage
  - General Purpose (SSD)
  - Provisioned IOPS (SSD)
  - Throughput Optimised Hard Disk Drive
  - Cold Hard Disk Drive
  - Magnetic

Compare EBS Type

	Solid-State Drives (SSD)		Hard disk Drives (HDD)		
Volume Type	**General Purpose SSD**	**Provisioned IOPS SSD**	**Throughput Optimized HDD**	**Cold HDD**	**EBS Magnetic**
Description	General purpose SSD volume that balances price and performance for a wide variety of transactional workloads	Highest-performance SSD volume designed for mission-critical applications	Low cost HDD volume designed for frequently accessed, throughput-intensive workloads	Lowest cost HDD volume designed for less frequently accessed workloads	Previous generation HDD
Use Cases	**Most Work Loads**	**Databases**	**Big Data & Data Warehouses**	**File Servers**	**Workloads where data is infrequently accessed**
API Name	gp2	io1	st1	sc1	Standard
Volume Size	1 GiB - 16 TiB	4 GiB - 16 TiB	500 GiB - 16 TiB	500 GiB - 16 TiB	1 GiB-1 TiB
Max. IOPS**/ Volume	16,000	64,000	500	250	40-200

Volumes & Snapshots Lab

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AMI Types
(EBS vs Instance Store)

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AMI’s

You can selected based on:

- Region (see Regions and Availability Zones)
- Operating system
- Architecture (32-bit or 64 bit)
- Launch Permissions
- Storage for the Root Device (Root Device Volume)
  - Instance Store (EPHEMERAL STORAGE)
  - EBS Backed Volumes

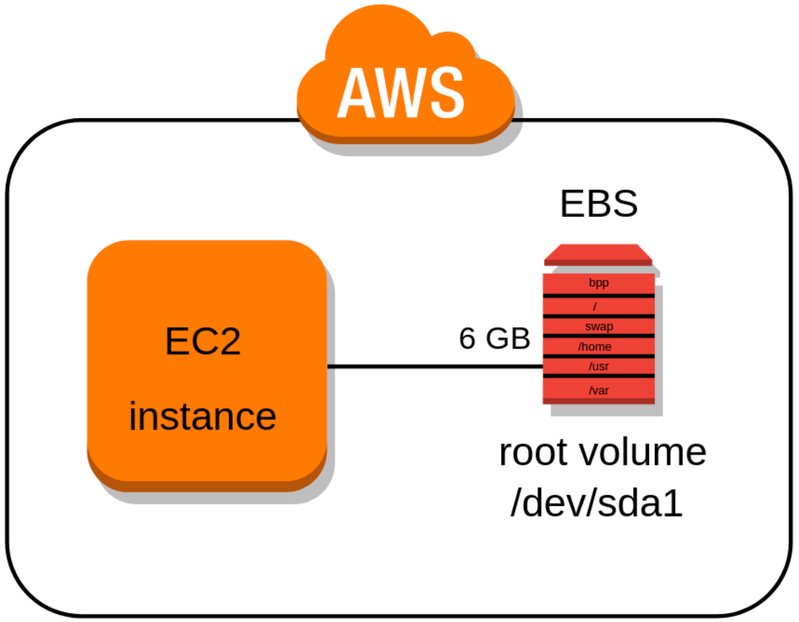
AMI

EBS vs Instance Store Volumes

All AMIs are categorized as either backed by Amazon EBS or backed by instance store

For EBS Volumes: The root devices for an instance launched from an Amazon EBS snapshot.

For Instance Store Volumes: The root devices for an instance launched from AMI is an instance store volume created from a template stored in Amazon S3



EBS vs Instance Store Volumes

Instance Store Volumes are sometimes called Ephemeral Storage

Instance store volumes cannot be stopped. If the underlying host fails, you will lose your data

EBS backed instance can be stopped. You will not lose the data on this instance if it is stopped.

You can reboot both, you will not lose your data.

By default, both ROOT volumes will be deleted on termination. However, with EBS volumes, you can tell AWS to keep the root device volume.

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Encrypted Root Device Volumes & Snapshots LAB

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EBS vs Instance Store Volumes

Create a Snapshot of the unencrypted root device volume

Create a copy of Snapshot and select the encrypt option

Create an AMI from the encrypted Snapshot

Use that AMI to lunch new encrypted instances

CloudWatch

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What is AWS CloudWatch?

Amazon CloudWatch is a monitoring service to monitor your AWS resources, as well as the applications that you run on AWS

Cloud Watch

What can AWS CloudWatch monitor?

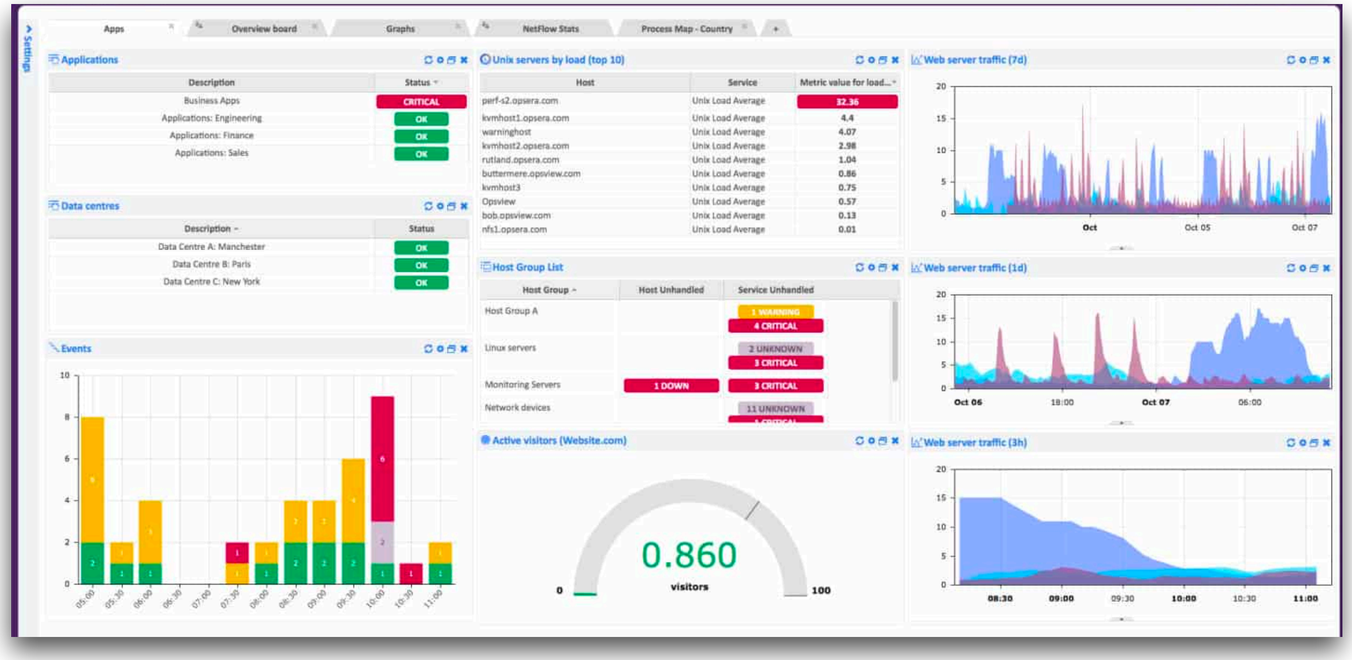
CloudWatch can monitor things like

- **Compute**
  - EC2 Instance
  - Autoscaling Groups
  - Elastic Load Balances
  - Route53 Health Checks
- **Storage & Content Delivery**
  - EBS Volumes
  - Storage Gateways
  - Cloud Front

CloudWatch & EC2

Host Level Metrics Consist of:

- **CPU**
- **Network**
- **Disk**
- **Status Check**

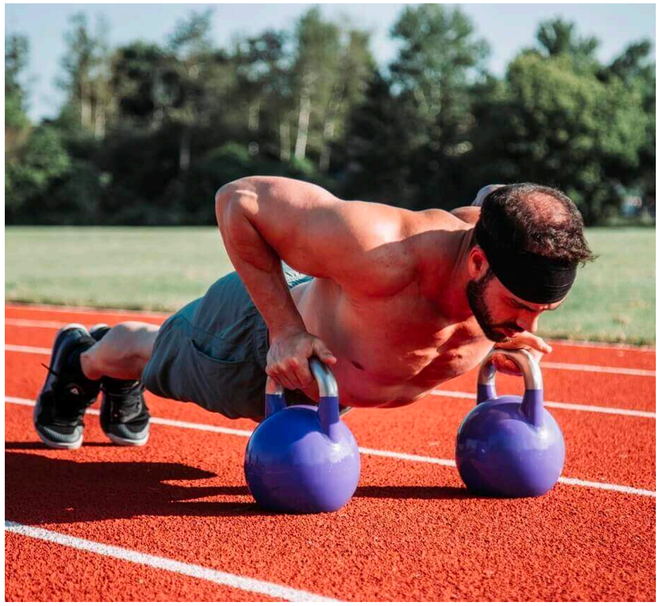


What is AWS CloudTrail?

AWS CloudTrail increases visibility into your user and resource activity by recording AWS Management Console actions and API calls. You can identify which users and accounts called AWS, the source IP address from which the calls were made, and when the calls occurred

AWS CloudTrail and CloudWatch

CloudWatch monitors performance



CloudTrial monitors API calls in the AWS platform.

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CloudWatch
Lab

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The AWS Command Line Lab

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Using IAM Roles With EC2 Lab

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Using IAM Roles With EC2 Lab

- Roles are more secure than storing your access key and secret access key on individual EC2 instance.
- Roles are easier to manage
- Roles can be assignees to an EC2 instance after it is created using both the console & command line.
- Roles are universal - you can use them in any region.

Using Boot Strap Scripts Lab

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EC2 Instance Meta Data Lab

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Elastic File System
Lab

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EC2 Placement Groups

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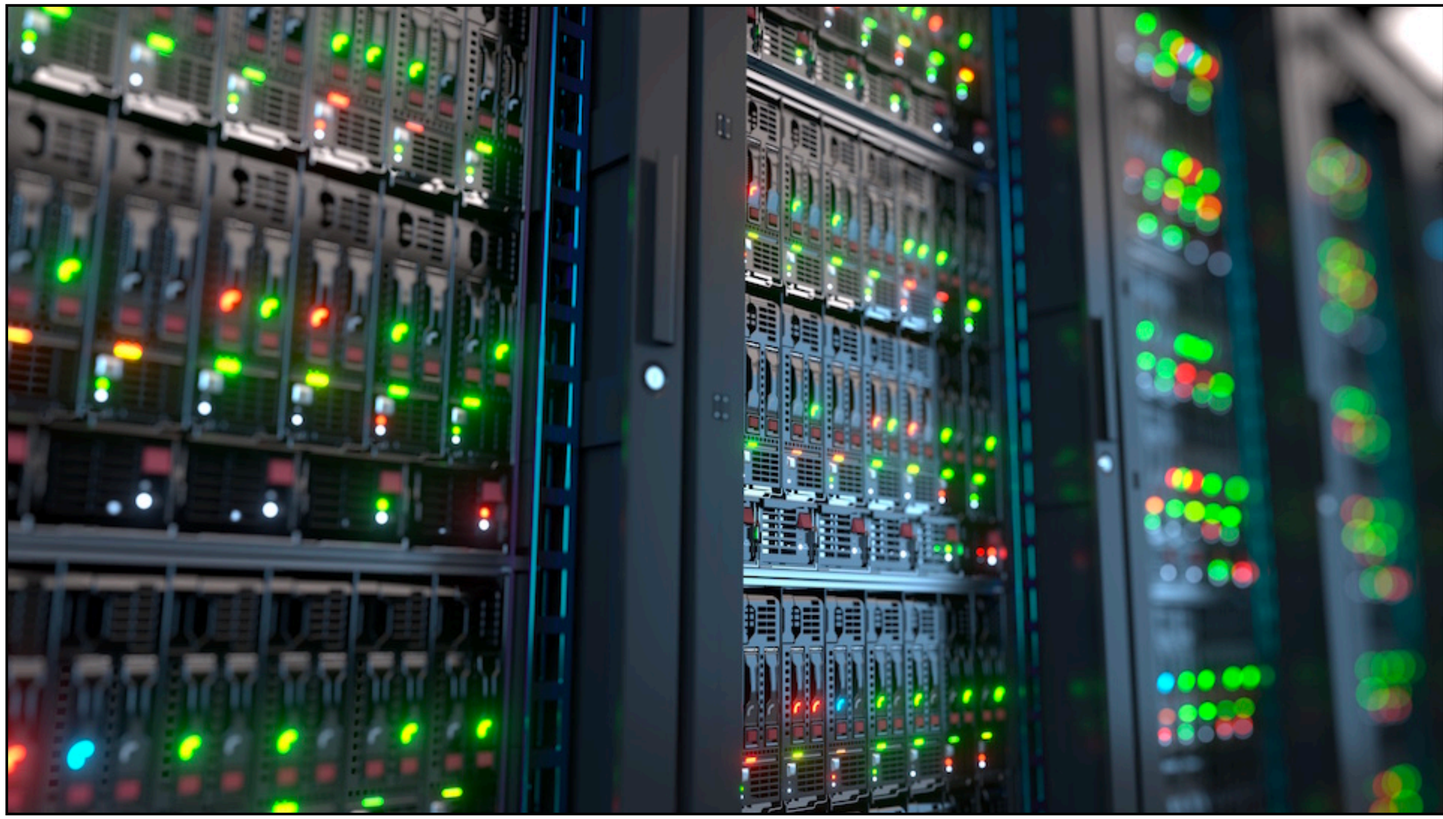
EC2 Placement Groups

Three Types of Placement Groups;

- **Clustered Placement GroupSpread Placement Group**
- **Partitioned**



Cluster Placement Groups

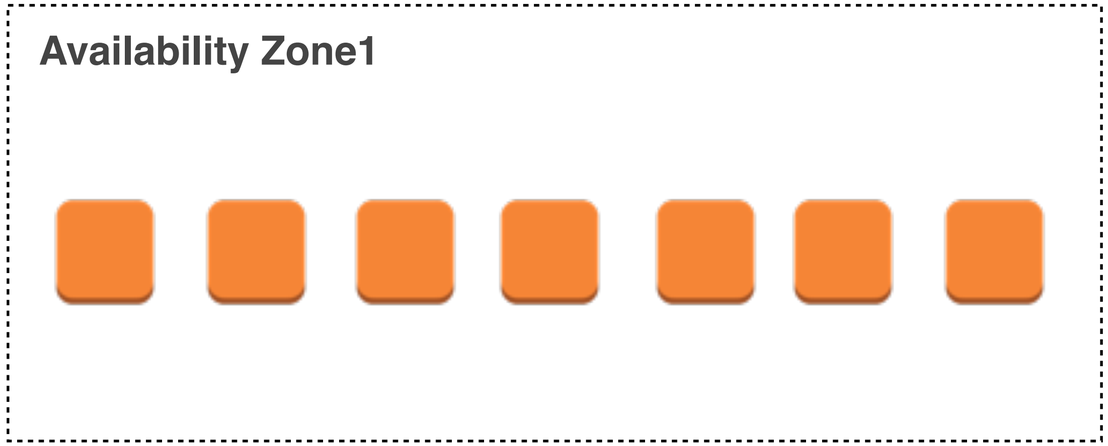
A Cluster placement group is a grouping of instance within a single Availability Zone. Placement groups are recommended for applications that need network latency, high network throughput or both.

Only creating instance can be lunched in to Clustered Placement Group.

Spread Placement Groups

A spread placement group is a group instance that are each placed on distinct underlying hardware.

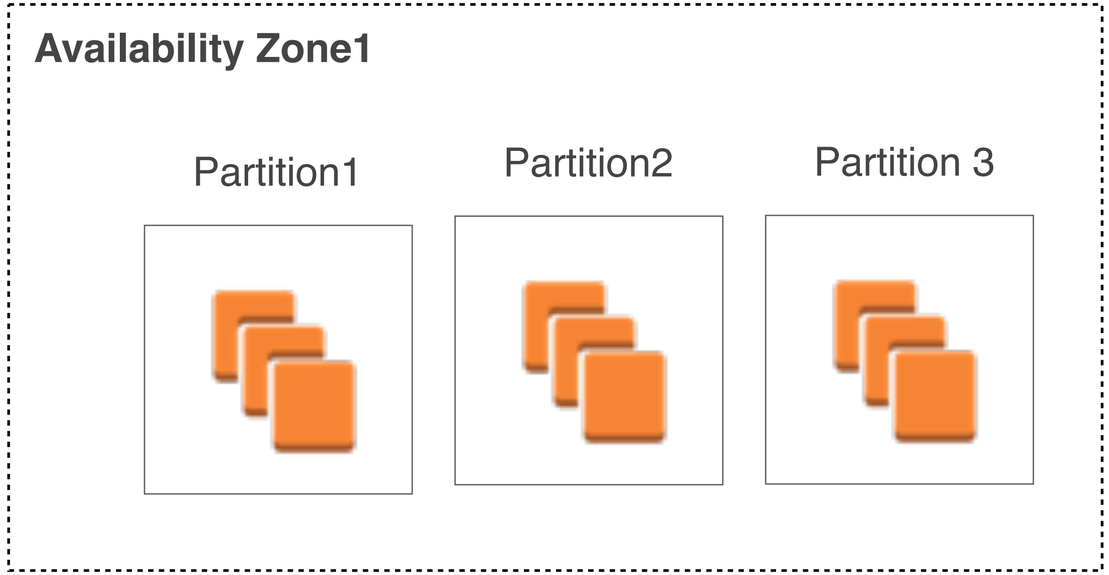
Spread placement groups are recommended for applications that have a small number of critical instance that should be kept separate from each other.



Think individual instances

Spread Placement Groups

When using partition placement groups, Amazon EC2 divides each group into logical segments called partition.A mazon EC2 ensures that each partition within a placement group has its own set of racks.No two partitions within a placement group share the same racks, allowing you to isolate the impact of hardware failure within your application.

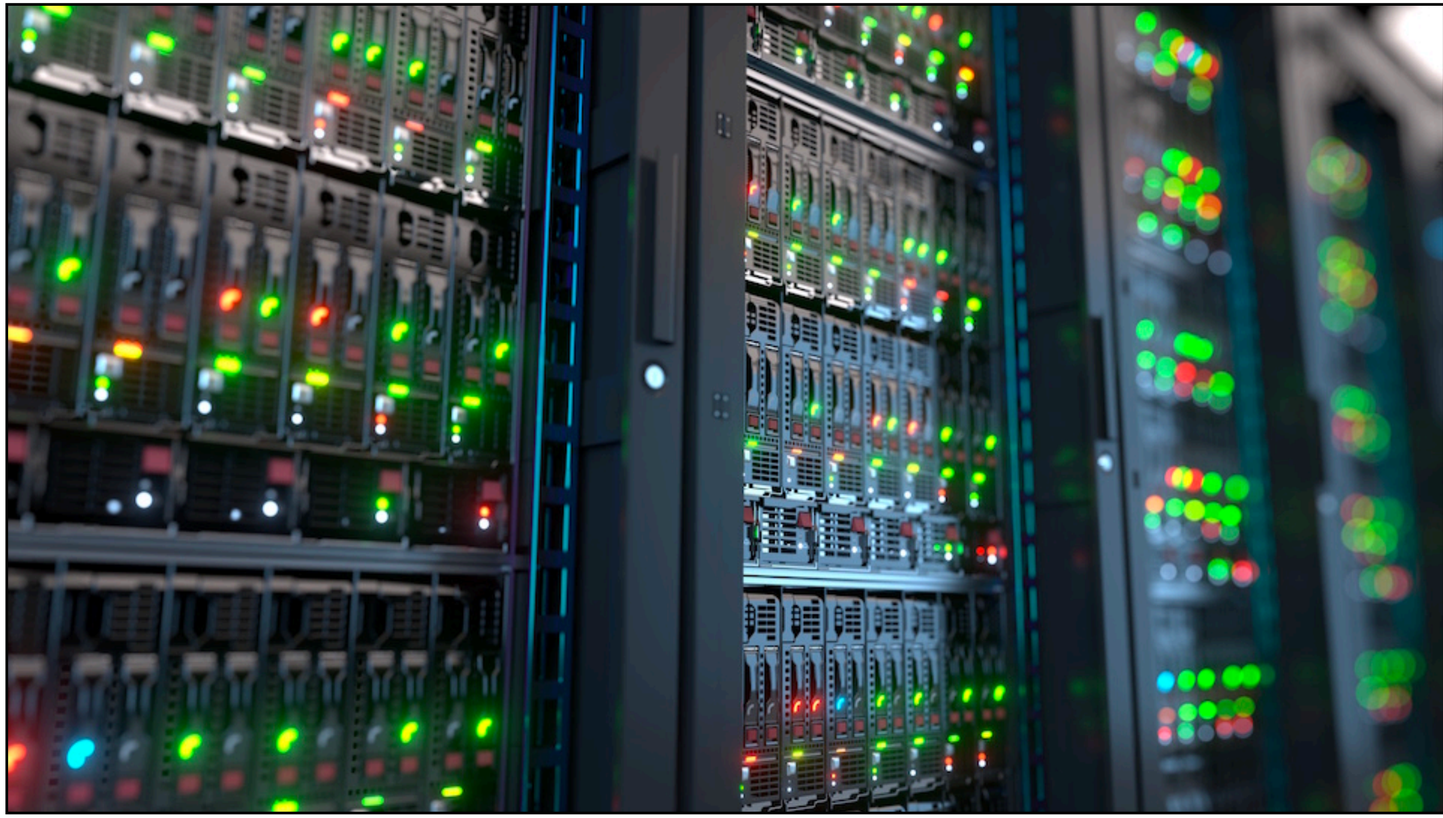


Think Multiple instances

EC2 Placement Groups

Three Types of Placement Groups;

- **Clustered Placement GroupSpread**
  - Low Network Latency / High Network Throughput
- **Placement Group**
  - Individual Critical EC2 Instance
- **Partitinoed**
  - Multiple EC2 instances HDFS, HBase and Cassandra



Thank you