



IAM Associate

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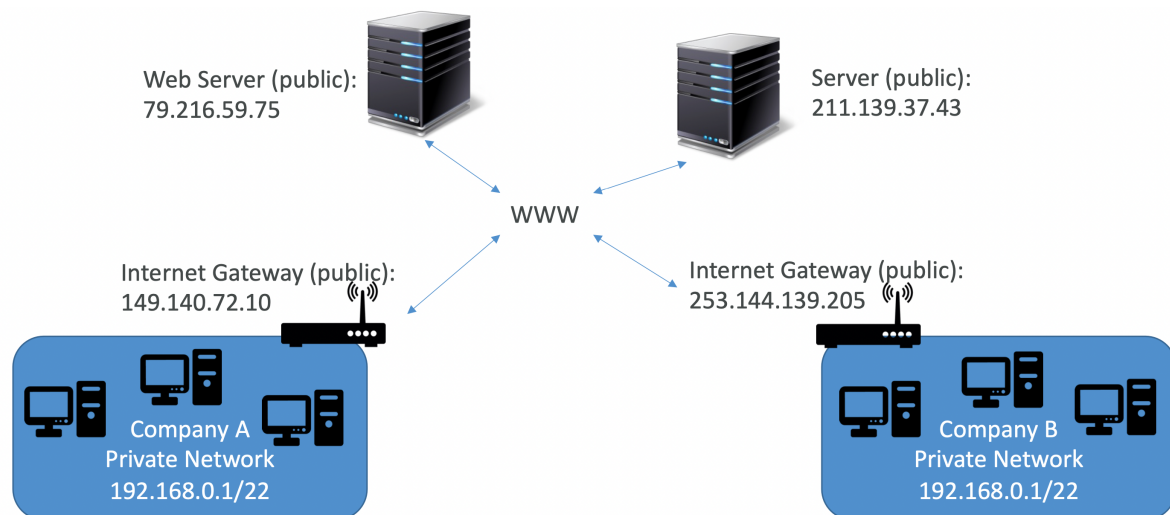
TOPIC

AWS - EC2 Associate (PPT - p. 77 ~ p.90)

1. Private vs Public IP

- Networking has two sorts of IPs. IPv4 and IPv6
 - IPv4 : **1.160.10.240**
 - IPv6 : **3ffe:1900:4545:3:200:f8ff:fe21:67cf**
- In this course, we will only be using IPv4.
- IPv4 is still the most common format used online.
- IPv6 is newer and solves problems for the Internet of Things (IoT).
- IPv4 allows for 3.7 billion different addresses in the public space
- IPv4: [0-255].[0-255].[0-255].[0-255].

1) Example



2) Fundamental Differences

- Public IP
 - Public IP means the machine can be identified on the internet (WWW)
 - Must be unique across the whole web (not two machines can have the same public IP).
 - Can be geo-located easily
- Private IP
 - Private IP means the machine can only be identified on a private network only
 - The IP must be unique across the private network
 - BUT two different private networks (two companies) can have the same IPs.
 - Machines connect to WWW using a NAT + internet gateway (a proxy)
 - Only a specified range of IPs can be used as private IP

3) Private vs Public IP in AWS EC2 - Hands on

- By default, your EC2 machine comes with:
 - A private IP for the internal AWS Network
 - A public IP, for the WWW.
- When we are doing SSH into our EC2 machines:
 - We can't use a private IP, because we are not in the same network

- We can only use the public IP.
- If your machine is stopped and then started, the public IP can change

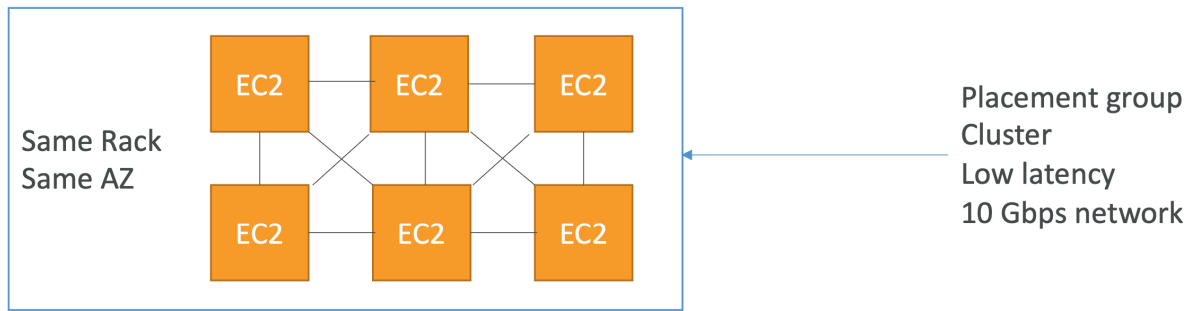
2. Elastic IPs

- When you stop and then start an EC2 instance, it can change its public IP.
- If you need to have a fixed public IP for your instance, you need an Elastic IP
- An Elastic IP is a public IPv4 IP you own as long as you don't delete it
- You can attach it to one instance at a time
- With an Elastic IP address, you can mask the failure of an instance or software by rapidly remapping the address to another instance in your account.
- You can only have 5 Elastic IP in your account (you can ask AWS to increase that).
- Overall, try to avoid using Elastic IP
 - They often reflect poor architectural decisions
 - Instead, use a random public IP and register a DNS name to it
 - Or, as we'll see later, use a Load Balancer and don't use a public IP

3. Placement Groups

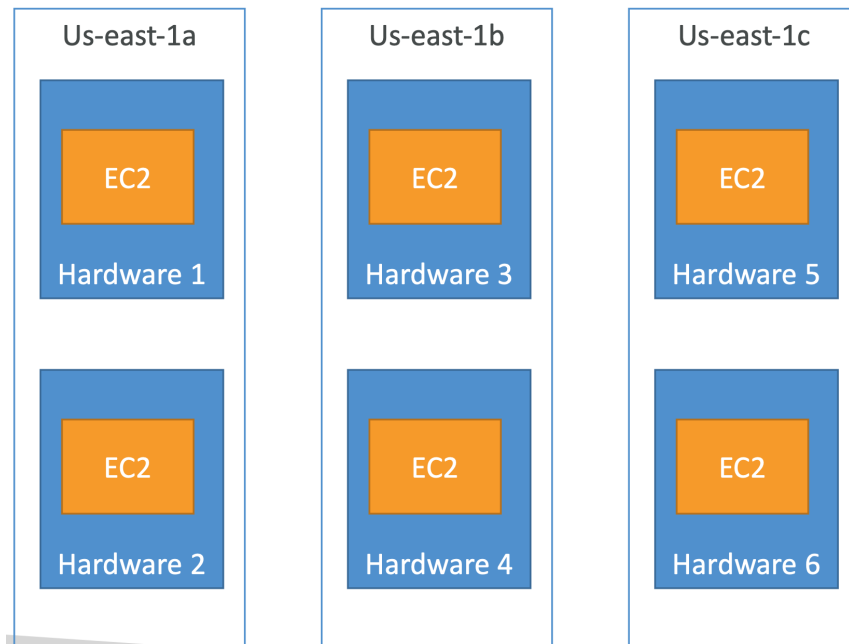
- Sometimes you want control over the EC2 Instance placement strategy
- That strategy can be defined using placement groups
- When you create a placement group, you specify one of the following strategies for the group:
 - *Cluster*—clusters instances into a low-latency group in a single Availability Zone
 - *Spread*—spreads instances across underlying hardware (max 7 instances per group per AZ)
 - *Partition*—spreads instances across many different partitions (which rely on different sets of racks) within an AZ. Scales to 100s of EC2 instances per group (Hadoop, Cassandra, Kafka)

1) Cluster



- Pros: Great network (10 Gbps bandwidth between instances with Enhanced Networking enabled - recommended)
- Cons: If the rack fails, all instances fails at the same time
- Use case:
 - Big Data job that needs to complete fast
 - Application that needs extremely low latency and high network throughput

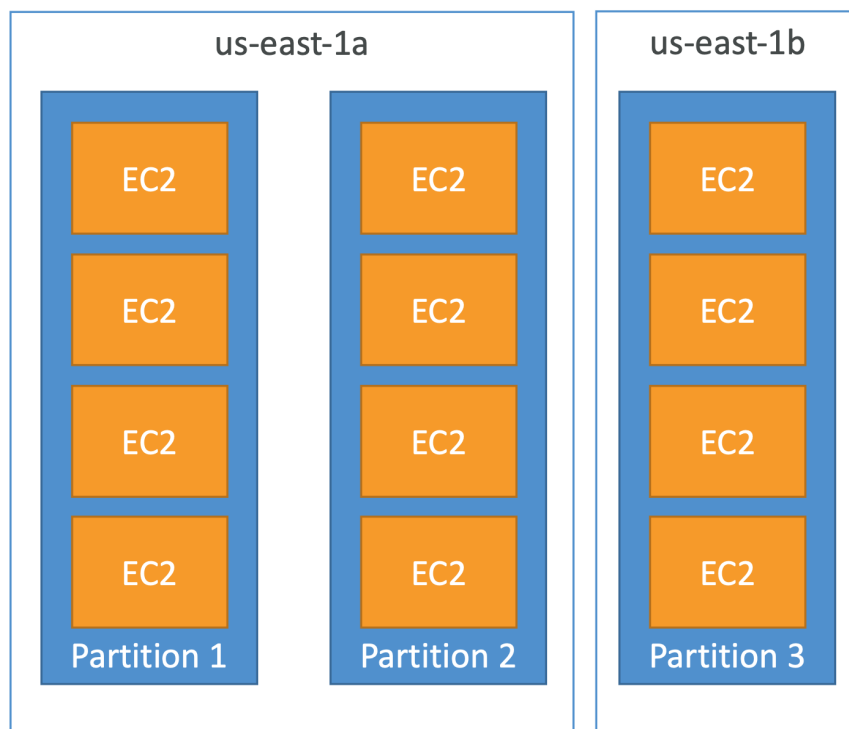
2) Spread



- Pros:
 - Can span across Availability Zones (AZ)
 - Reduced risk is simultaneous failure

- EC2 Instances are on different physical hardware
- Cons:
 - Limited to 7 instances per AZ per placement group
- Use case:
 - Application that needs to maximize high availability
 - Critical Applications where each instance must be isolated from failure from each other

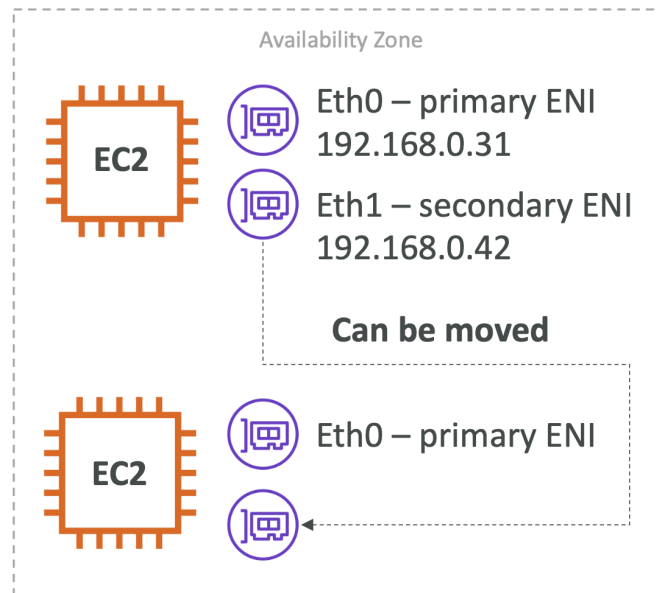
3) Partition



- Up to 7 partitions per AZ
- Can span across multiple AZs in the same region
- Up to 100s of EC2 instances
- The instances in a partition do not share racks with the instances in the other partitions
- A partition failure can affect many EC2 but won't affect other partitions
- EC2 instances get access to the partition information as metadata

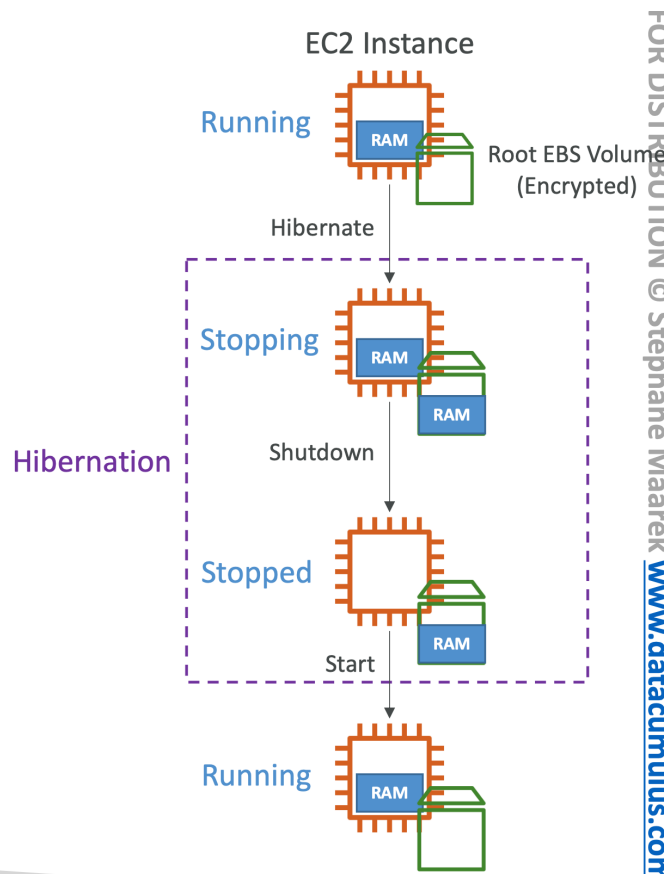
- Use cases: HDFS, HBase, Cassandra, Kafka

4. Elastic network Interfaces(ENI)



- Logical component in a VPC that represents a virtual network card
- The ENI can have the following attributes:
 - Primary private IPv4, one or more secondary IPv4
 - One Elastic IP (IPv4) per private IPv4
 - One Public IPv4
 - One or more security groups
 - A MAC address
- You can create ENI independently and attach them on the fly (move them) on EC2 instances for failover
- Bound to a specific availability zone (AZ)

EC2 Hibernate



- We know we can stop, terminate instances
 - Stop – the data on disk (EBS) is kept intact in the next start
 - Terminate – any EBS volumes (root) also set-up to be destroyed is lost
- On start, the following happens:
 - First start: the OS boots & the EC2 User Data script is run
 - Following starts: the OS boots up
 - Then your application starts, caches get warmed up, and that can take time!
- Introducing EC2 Hibernate:
 - The in-memory (RAM) state is preserved
 - The instance boot is much faster! (the OS is not stopped / restarted)
 - Under the hood: the RAM state is written to a file in the root EBS volume
 - The root EBS volume must be encrypted
- Use Case:
 - Long-running processing

- Saving the RAM state
- Services that take time to initialize

1) Good to know

- Supported Instance Families – C3, C4, C5, I3, M3, M4, R3, R4, T2, T3, ...
- Instance RAM Size – must be less than 150 GB.
- Instance Size – not supported for bare metal instances.
- AMI – Amazon Linux 2, Linux AMI, Ubuntu, RHEL, CentOS & Windows...
- Root Volume – must be EBS, encrypted, not instance store, and large
- Available for On-Demand, Reserved and Spot Instances
- An instance can NOT be hibernated more than 60 days