Elastic Compute Cloud (EC2)

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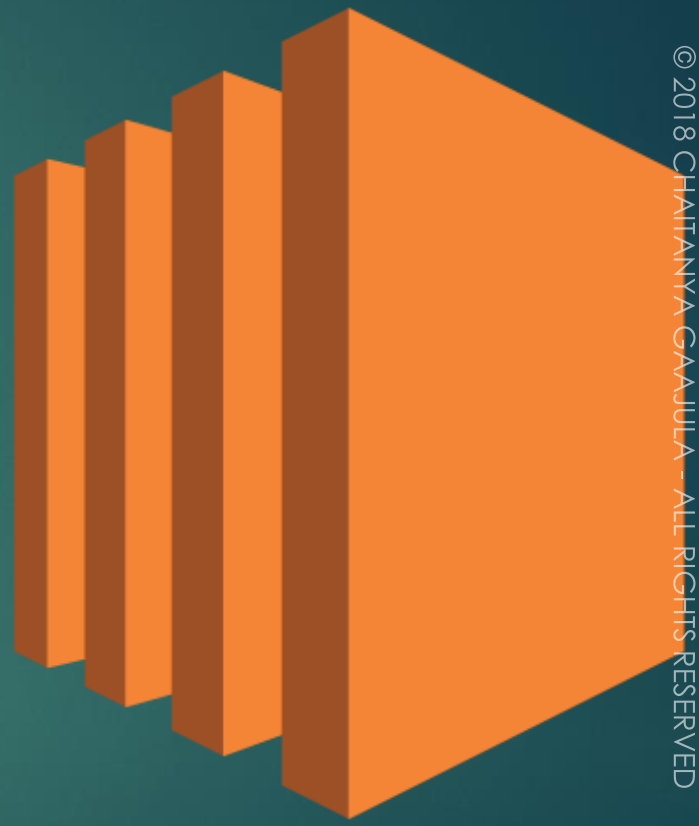


What is EC2 (Elastic Cloud Compute)

- Amazon Elastic Compute Cloud (Amazon EC2) provides scalable computing capacity in the Amazon Web Services (AWS) cloud.
- 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 (EC2 instances) to minutes.
- Amazon EC2 changes the economics of computing by allowing you to pay only for capacity that you actually use

AWS EC2: Benefits

- Elastic Web-Scale Computing
- Completely Controlled
- Flexible Cloud Hosting Services
- Integrated
- Reliable
- Secure
- Inexpensive

AWS EC2: Features

- Instances
- AMI
- Instance Types
- Key Pair
- Instance Store
- EBS Volumes
- VPC
- Security Group
- EIP
- Tags
- Regions & AZs

AWS EC2: How to access EC2

Web-based User Interface

Command Line Interface (CLI)

Windows PowerShell

AWS EC2: Purchasing Options

On-Demand Instances

Pay by the hour

Reserved Instances

Purchase at significant discount (up to 75%).

Instances are always available

1-year to 3 year terms

Spot Instances

Highest bidder uses instance at a significant discount (up to 90%)

Spot blocks supported

Dedicated Instance

Pay, by the hour, for instances that run on single tenant hardware

Dedicated Hosts

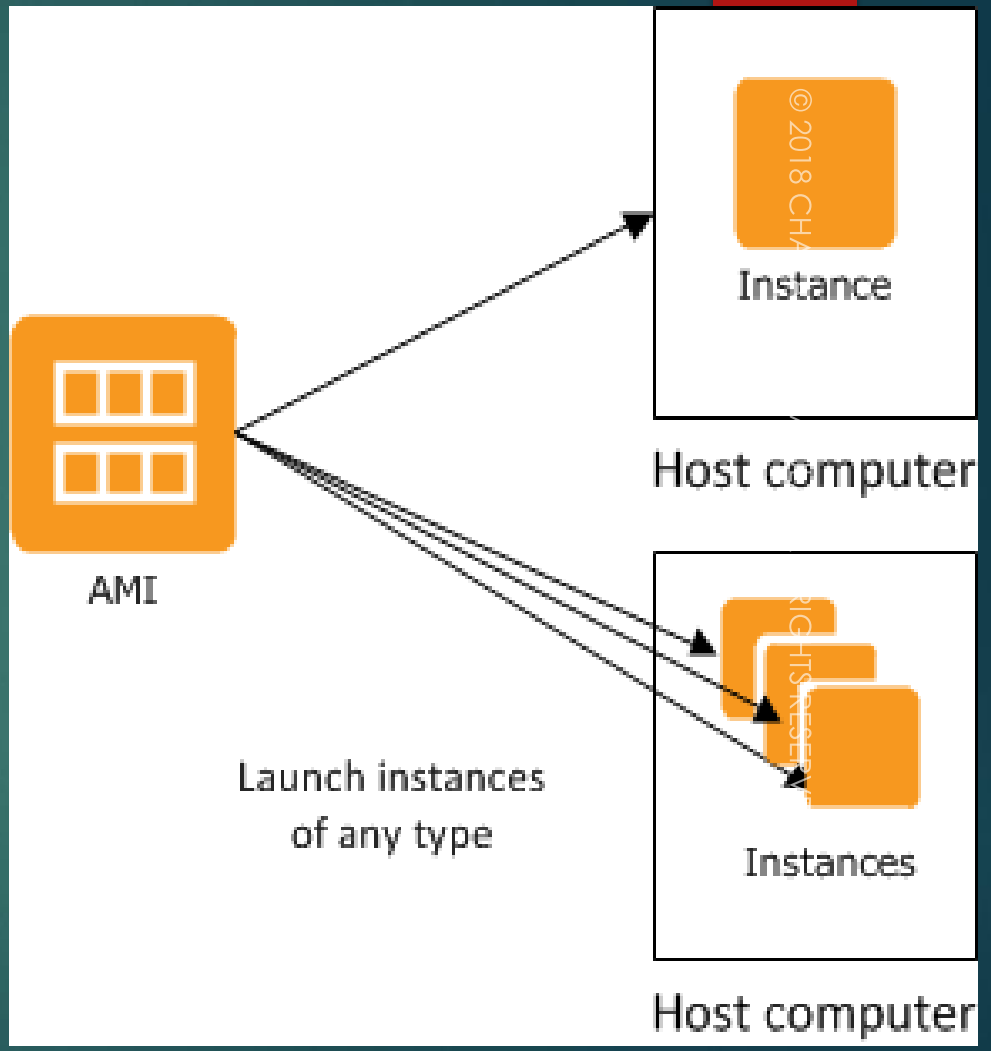
Physical host is fully dedicated to run your instances.

Bring your per-socket, per-core, or per-VM software licenses to reduce cost.

AWS EC2: Amazon Machine Images

- An Amazon Machine Image (AMI) provides the information required to launch an instance.

- An AMI includes the following:
  - A template for the root volume for the instance (for example, 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.

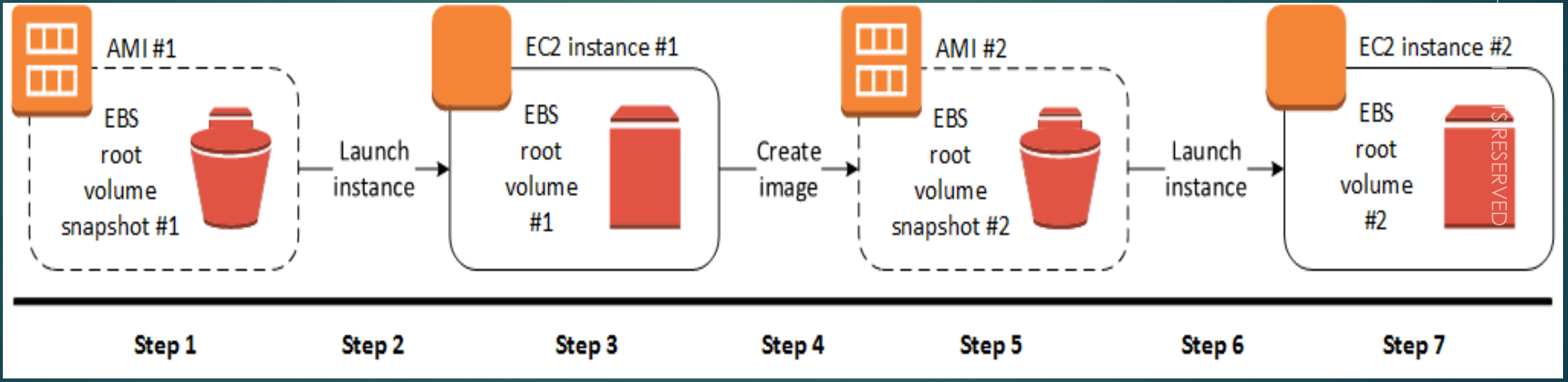


AWS EC2: Storage for the Root Device

Characteristic	EBS Backed	Instance-Store Backed
Boot Time	✓ Usually < 1 minute	✓ Usually < 5 minutes
Size Limit	✓ 16 TiB	✓ 10 GiB
Data Persistence	✓ The root volume is deleted when the instance terminates or EBS volumes persists after instance termination	✓ Data on any instance store volumes persists only during the life of the instance
Charges	✓ Instance usage ✓ EBS volume usage ✓ Storing your AMI as an EBS snapshot	✓ Instance usage ✓ Storing AMI in S3
Stopped State	✓ Can be stopped	✓ Cannot be stopped

AWS EC2: Creating AMI

- Select an appropriate EBS-backed AMI
- Launch an instance
- Update an instance
- Create image
- Launch an instance from your new AMI



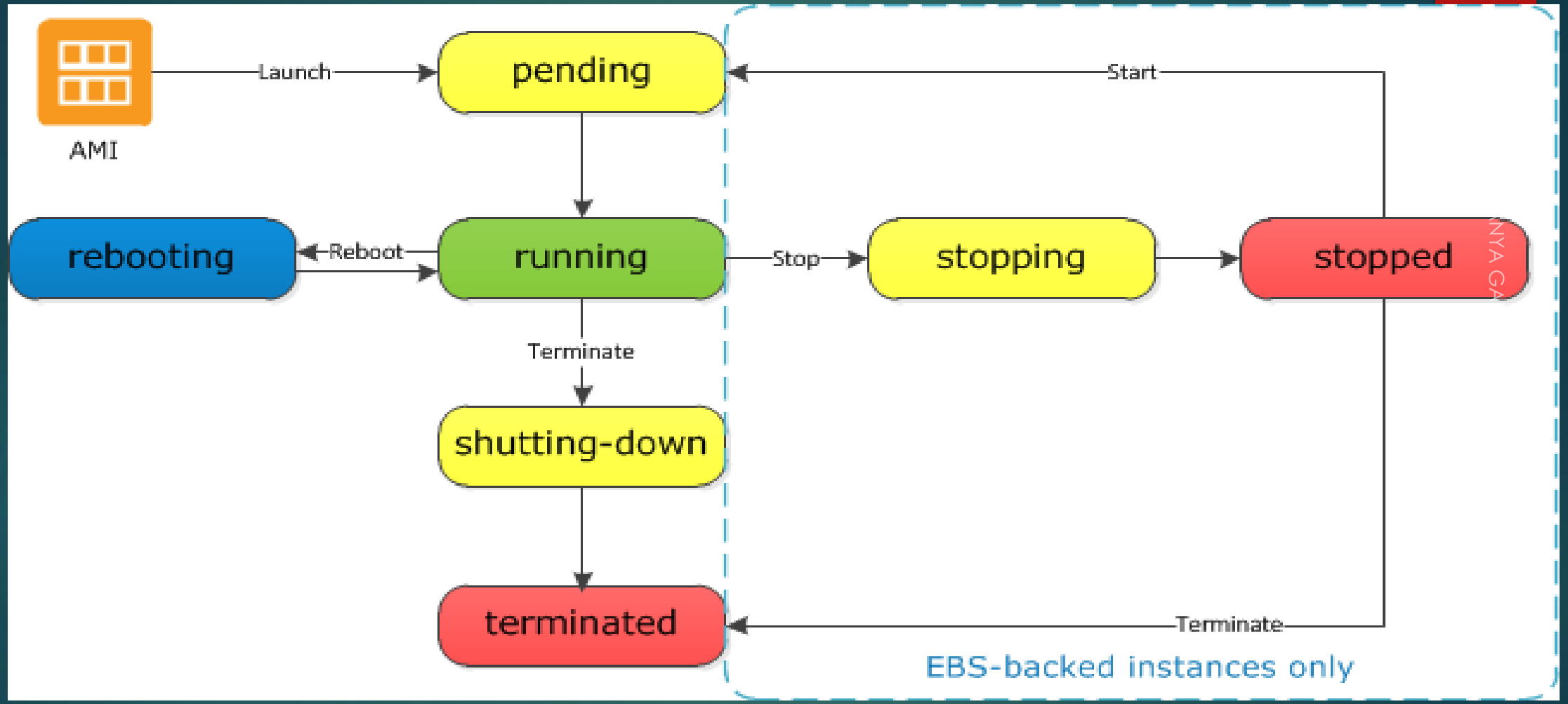
AWS EC2: Instance Types

- The instance type specify the hardware of the host computer used for your instance.
- Each instance type offers different compute, memory, and storage capabilities.
- Amazon EC2 dedicates some resources of the host computer, such as CPU, memory, and instance storage, to a particular instance.
- Amazon EC2 shares other resources of the host computer, such as the network and the disk subsystem, among instances.
- If each instance on a host computer tries to use as much of one of these shared resources as possible, each receives an equal share of that resource.
- However, when a resource is under-utilized, an instance can consume a higher share of that resource while it's available.

AWS EC2: Resizing

- If the root device for your instance is an EBS volume, you can change the size of the instance simply by changing its instance type, which is known as resizing.
- You must stop your Amazon EBS–backed instance before you can change its instance type.
- After resizing, the instance ID does not change.
- If instance has a public IPv4 address, AWS release the address and give it a new public IPv4 address.
- The instance retains its private IPv4 addresses, any Elastic IP addresses.

AWS EC2: Instance Lifecycle



AWS EC2: Reboot, Stop, and Terminate

Characteristic	Reboot	Stop/start (EBS- backed instances only)	Terminate
Host computer	✓The instance stays on the same host computer	✓The instance runs on a new host computer	✓None
Private and public IPv4 addresses	✓These addresses stay the same	✓The instance keeps its private IPv4 address. ✓The instance gets a new public IPv4 address	✓None
Elastic IP addresses (IPv4)	✓The Elastic IP remains associated with the instance	✓The Elastic IP remains associated with the instance	✓The Elastic IP is disassociated from the instance
Instance store Volumes	✓The data is preserved	✓The data is erased	✓The data is erased
Root device volume	✓The volume is preserved	✓The volume is preserved	✓The volume is deleted by default
Billing	✓The instance billing hour doesn't change.	✓You stop incurring charges for an instance as soon as its state changes to stopping. ✓Each time an instance transitions	✓You stop incurring charges for an instance as soon as its state

AWS EC2: Instance Termination

- After you terminate an instance, it remains visible in the console for a short while, and then the entry is automatically deleted.
- By default, Amazon EBS root device volumes are automatically deleted when the instance terminates.
- By default, any additional EBS volumes that you attach at launch, or any EBS volumes that you attach to an existing instance persist even after the instance terminates.
- If you want to prevent your instance from being accidentally terminated using Amazon EC2, you can enable termination protection for the instance

AWS EC2: Elastic IP

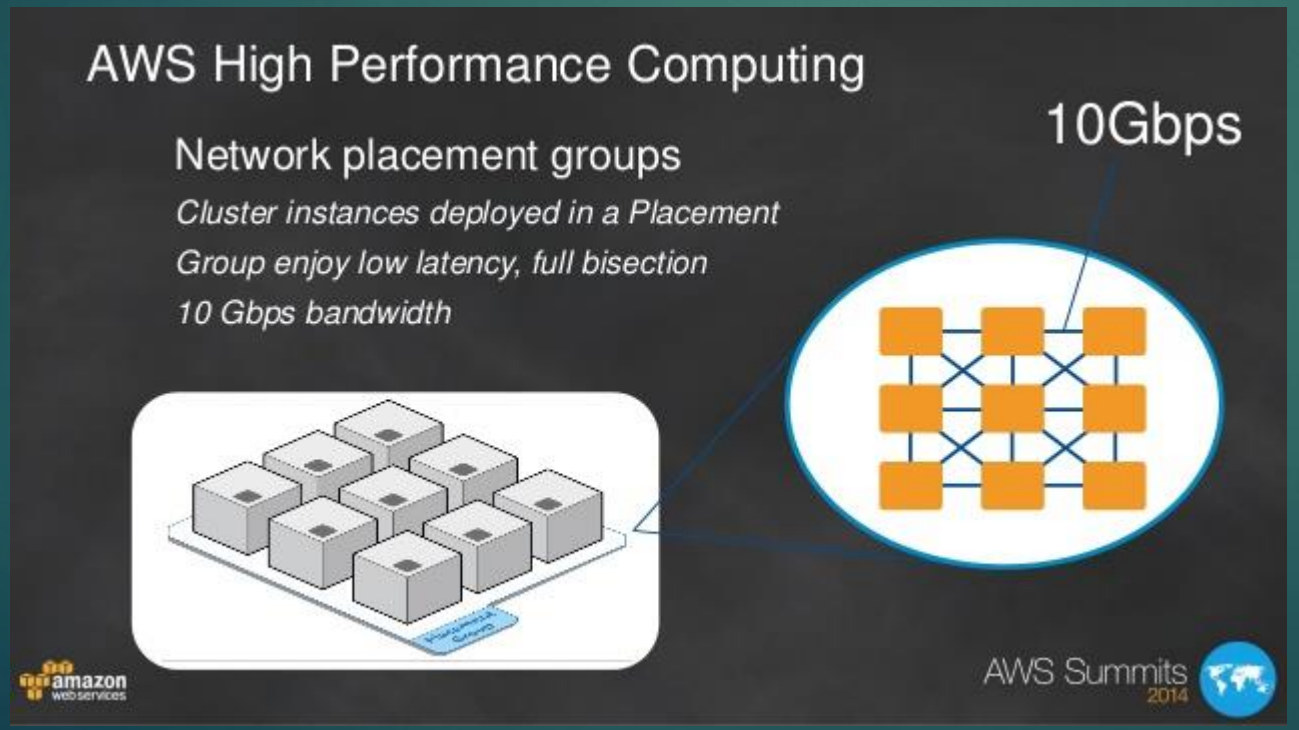
- An Elastic IP address is a public IP address (static) that you can allocate to instance.
- You can disassociate an Elastic IP address from a resource, and re-associate it with a different resource.
- A disassociated Elastic IP address remains allocated to your account until you explicitly release it.
- To ensure efficient use of Elastic IP addresses, a hourly charge is associated if an Elastic IP address is not associated with a running instance, or if it is associated with a stopped instance or an unattached network interface.
- You are not charged for one Elastic IP address associated with the running instance, but you are charged for any additional Elastic IP addresses associated with the instance.
- By default, all AWS accounts are limited to 5 Elastic IP addresses per region.

AWS EC2: Elastic Network Interfaces

- An elastic network interface is a virtual network interface that you can attach to an instance in a VPC.
- You can create a network interface, attach it to an instance, detach it from an instance, and attach it to another instance.
- Every instance has a default network interface, called the primary network interface (eth0). You cannot detach a primary network interface from an instance.
- You can create and attach additional network interfaces. The maximum number of network interfaces that you can use varies by instance type.
- A network interface can include the following attributes:
  - A primary private IP address & one or more secondary private IP addresses
  - One Elastic IP address per private IP address
  - One public IP address
  - One or more security groups
  - A MAC address

Placement Groups

- Logical grouping of instances within a single Availability Zone and are recommended for applications that benefits from low network latency, high network throughput, or both.
- Cluster Placement group is a logical grouping of instances in a single Availability Zone
- Spread Placement group is a group of instances that are each placed on distinct underlying hardware
- Using placement groups enables applications to participate in a low-latency, 10 Gbps network.



AWS EC2: Understanding EC2 Billing

- If instance is billed by the hour, you are billed for a minimum of one hour each time a new instance is started—when it enters the running state.
- If your instance is billed by the second, you are billed for a minimum of 60 seconds each time a new instance is started—when it enters the running state.
- Instances that are in any other state—such as stopped, pending, etc.—are not billed.

AWS EC2: Pricing

Resource	OS	Region	Pricing	Remarks
t2.micro	Linux	USE (N. Virginia)	$0.0116/ Hr.	On-Demand
t2.micro	Windows	USE (N. Virginia)	$0.0162/ Hr.	On-Demand
t2.micro	Linux	AP (Mumbai)	$0.0144./ Hr.	On-Demand
t2.micro	Windows	AP (Mumbai)	$0.019/ Hr.	On-Demand
t2.micro	Linux	USE (N. Virginia)	$0.007/ Hr.	- Reserved (1 Year, Upfront) - 42% Saving, On-Demand)
t2.micro	Windows	USE (N. Virginia)	$0.011/ Hr.	- Reserved (1 Year, Upfront) - 30% Saving, On-Demand

*Pricing as on 1st November 2017

AWS EC2: Limitation

Resource	Default Limit
EIP per region	5
Running On-Demand t2.micro instances	20
Reserved Instances	20

AWS CLI

- AWS CLI is an open source tool built that provides commands for interacting with AWS services. With minimal configuration, you can start using all of the functionality provided by the AWS Management Console from your favorite terminal program.

- Linux shells – Use common shell programs such as Bash, Zsh, and tsch to run commands in Linux, macOS, or Unix.

- Windows command line – On Microsoft Windows, run commands in either PowerShell or the Windows Command Processor.

- Remotely – Run commands on Amazon EC2 instances through a remote terminal such as PuTTY or SSH, or with Amazon EC2 systems manager

Hands-On Lab

AWS AMI: Demonstration

- Custom AMI
  - Creating Custom AMI
  - Registering & Deregistering AMI
  - Making an AMI Public
  - Launch AMI from other account
- Marketplace
  - http://aws.amazon.com/marketplace
  - Type of AMIs
  - Software & Hardware Cost
- Instance
  - Launch an Instance
  - Configure Web Server
  - Connect an Instance
  - Configure Static IP Address

Thank You