TRAINING CONTENT

Cloud Computing

YOUR NEXT DESTINATION

OF SOFTWARE OUTSOURCING

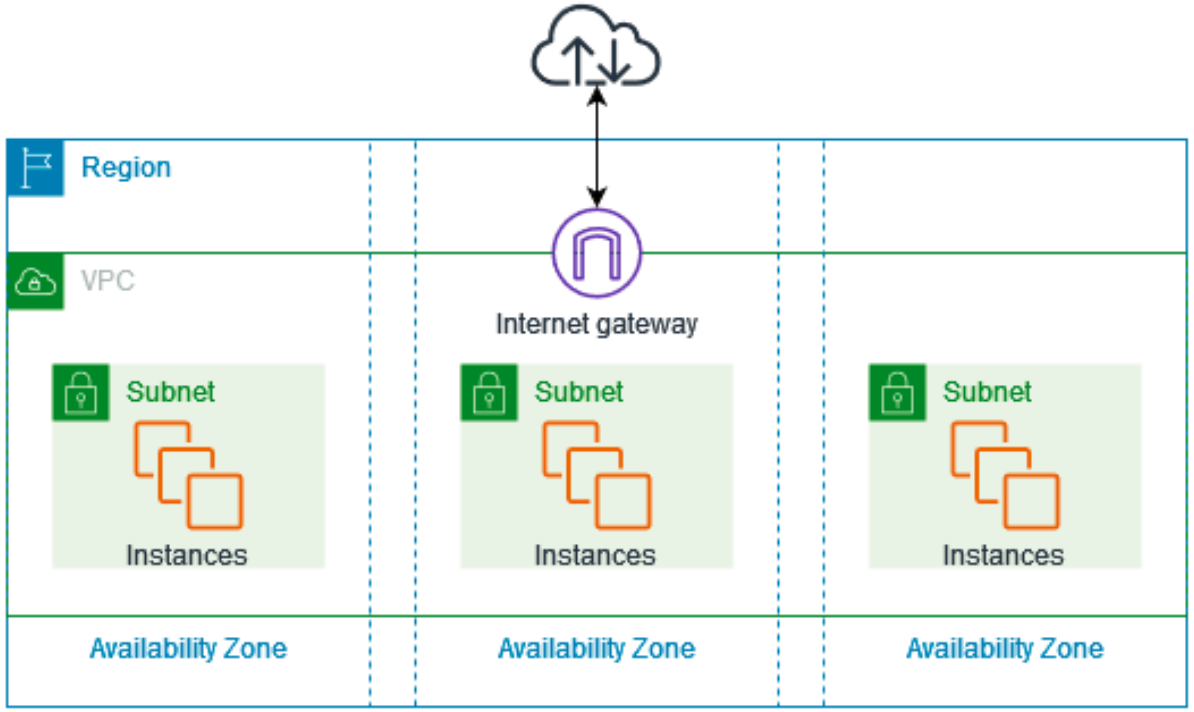
VPC –Virtual Private cloud

- Amazon Virtual Private Cloud (Amazon VPC) provides a logically isolated area of the AWS cloud where you can launch AWS resources in a virtual network that you define.
- You have complete control over your virtual networking environment, including a selection of your IP address range, the creation of subnets, and configuration of route tables and network gateways.
- You can easily customize the network configuration for your Amazon Virtual Private Cloud.
- You can provide multiple layers of security, including security groups and network access control lists, to help control access to Amazon EC2 instances in each subnet.
- Please Study more from AWS VPC official website:

https://docs.aws.amazon.com/vpc/index.html

VPC - Architecture

VPC simple architechture



VPC –Virtual Private cloud

- **Private IP Range:**

Class A: 10.0.0.0/8 IP address: 10.0.0.0 to 10.255.255.255

Class B: 172.16.0.0/12 IP address: 172.16.0.0 to 172.31.255.255

Class C: 192.168. 0.0/16 IP address: 192.168.0.0 to 192.168.255.255

- **IPv4 address size – 32 bit**

192	168	1	20	/24
11111111	11111111	11111111	00000000	
Network part			Host part	

128	64	32	16	8	4	2	1
0	0	0	0	0	0	0	0

VPC –Virtual Private cloud

128	64	32	16	8	4	2	1
0	0	0	0	0	0	0	0
$2^0 = 1$	$2^1=2$	$2^2=4$	$2^3=8$	$2^4=16$	$2^5=32$	$2^6=64$	$2^7=128$

2^8-2 =256-2=254

- **First IP – 192.168.0.0 – Network address**
- **Last IP – 192.168.0.255 – Broadcast**
- **Amazon reserves First 4 IPs and last 1 IP address for every subnet for IP networking.**

No. of Taken Bits	1	2	3	4	5	6
Mask Value	128	192	224	240	248	252
Subnets	2	4	8	16	32	64
Valid Hosts Per Subnet	126	62	30	14	6	2
CIDR	/25	/26	/27	/28	/29	/30
Block Size	128	64	32	16	8	4

Hands on - VPC

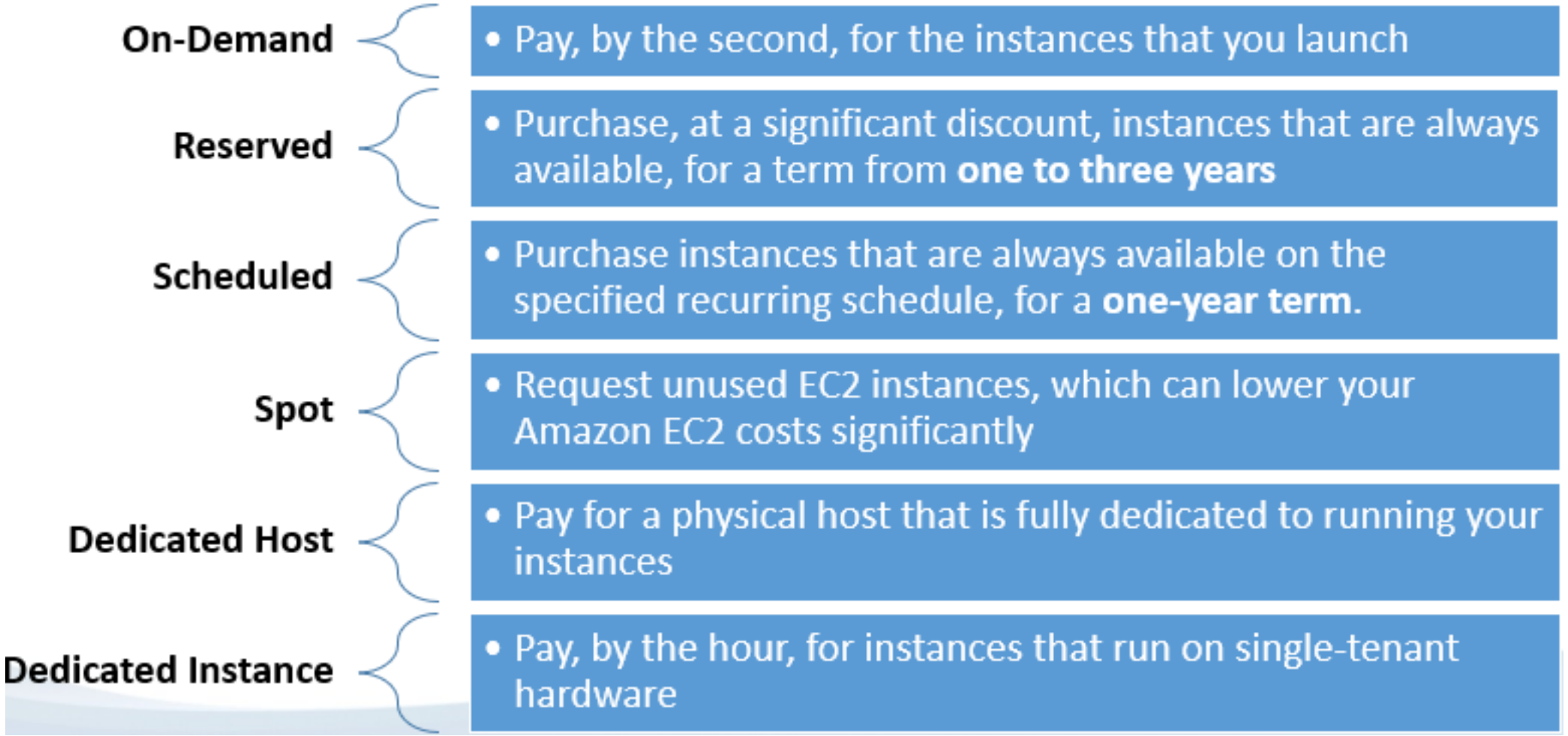
Main Components:

- **VPC**
- **Subnet**
- **Internet Gateway (IGW)**
- **Nat Gateway (Network Access Translation)**
- **Route Tables**
- **Security Group**
- **Network ACLS (Access Control List)**
- **Elastic IPs -**

Elastic Compute Cloud (EC2)

- Amazon Elastic Compute Cloud (Amazon EC2) provides scalable computing capacity in the Amazon Web Services (AWS) cloud.
- Amazon EC2 eliminates your need to invest in hardware up front, so you can develop and deploy applications faster.
- You can use Amazon EC2 to launch as many or as few virtual servers as you need, configure security and networking, and manage storage.
- Amazon EC2 enables you to scale up or down to handle changes in requirements or spikes in popularity, reducing your need to forecast traffic.

EC2 Instance Types



EC2 Instance Family

	Type	Description	Mnemonic
General Purpose	a1	Good for scale-out workloads, supported by Arm	**a** is for Arm processor – or as light as **A1** steak sauce
	t-family: t3, t3a, t2	Burstable, good for changing workloads	**t** is for **tiny** or **turbo**
	m-family: m6g, m5, m5a, m5n, m4	Balanced, good for consistent workloads	**m** is for **main** or happy **medium**
Compute Optimized	c-family: c5, c5n, c4	High ratio of compute to memory	**c** is for **compute**
Memory Optimized	r-family: r5, r5a, r5n, r4	Good for in-memory databases	**r** is for **RAM**
	x1-family: x1e, x1	Good for full in-memory applications	**x** is for **xtreme**
	High memory	Good for large in-memory databases	High memory is for… high memory.
	z1d	Both high compute and high memory	**z** is for **zippy**
Accelerated Computing	p-family: p3, p2	Good for graphics processing and other GPU uses	**p** is for **pictures**
	Inf1	Support machine learning inference applications	**Inf** is for **inference**
	g-family: g4, g3	Accelerate machine learning inference and graphics-intensive workloads	**g** is for **graphics**
	f1	Customizable hardware acceleration with field programmable gate arrays (FPGAs)	**f** is for **FPGA** or **feel** as in hardware
Storage Optimized	i-family: i3, i3en	SDD-backed, balance of compute and memory	**i** is for **IOPS**
	d2	Highest disk ratio	**d** is for **dense**
	h1	HDD-backed, balance of compute and memory	**H** is for **HDD**

EC2 - Hands-0n

- Launch an EC2 instance (Windows/Linux Platform)

Amazon Machine Image

- An Amazon Machine Image (AMI) provides the information required to launch an instance. You must specify an AMI when you launch an instance.
- You can launch multiple instances from a single AMI when you need multiple instances with the same configuration.
- You can use different AMIs to launch instances when you need instances with different configurations.

Security Groups

- A security group acts as a virtual firewall that controls the traffic for one or more instances. When you launch an instance, you can specify one or more security groups; otherwise, default security group is used.
- The rules of a security group control the inbound traffic that's allowed to reach the instances that are associated with the security group and the outbound traffic that's allowed to leave them.
- By default, security groups allow all outbound traffic.
- Security group rules are always permissive; you can't create rules that deny access.

Launch Templates

- A launch template specifies instance configuration information. Included are the ID of the Amazon Machine Image (AMI), the instance type, a key pair, security groups, and the other parameters that you use to launch EC2 instances.
- Defining a launch template instead of a launch configuration allows you to have multiple versions of a template.

Elastic Block Storage

Amazon Elastic Block Store (Amazon EBS) provides block level storage volumes for use with EC2 instances. EBS volumes are highly available and reliable storage volumes that can be attached to any running instance that is in the same Availability Zone. EBS volumes that are attached to an EC2 instance are exposed as storage volumes that persist independently from the life of the instance.

Scaling Types

Horizontal scaling means that you scale by adding more ec2 machines into your pool of resources whereas **Vertical** scaling means that you scale by adding more power (CPU, RAM) to an existing ec2 machine.

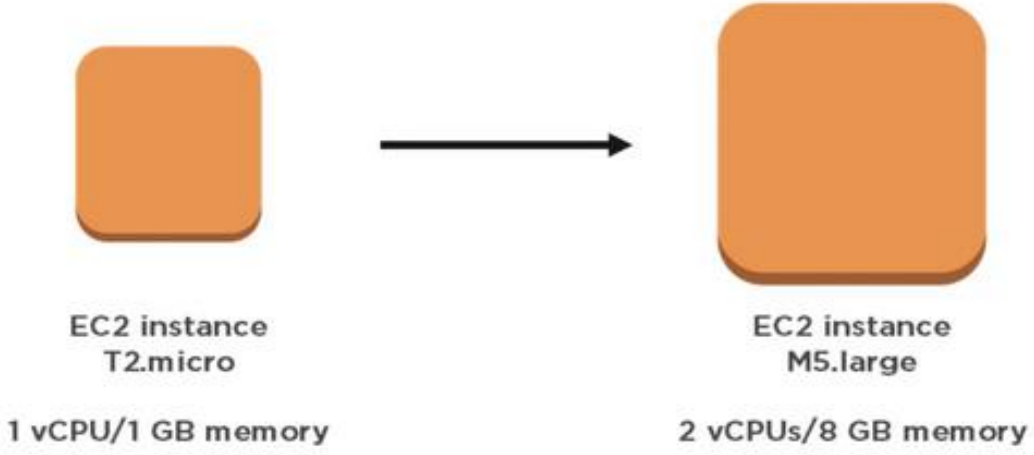


Fig-1: Vertical Scaling

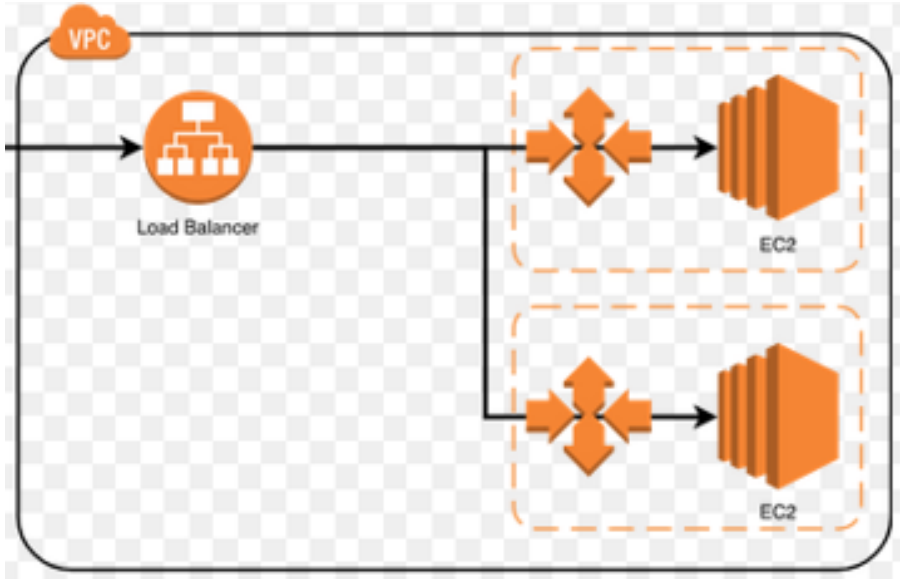


Fig-2: Horizontal Scaling

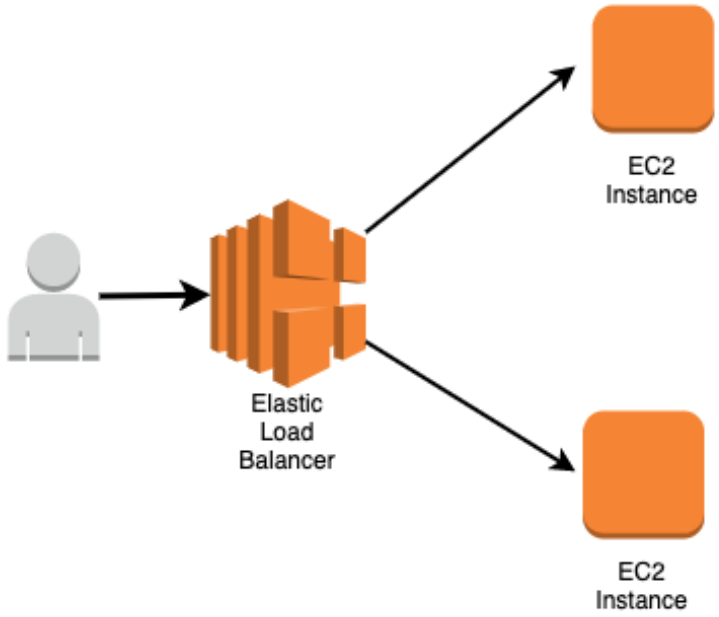
Elastic Block Storage

Amazon EBS provides the following volume types:

- General Purpose SSD (gp2)
- Provisioned IOPS SSD (io1)
- Throughput Optimized HDD (st1)
- Cold HDD (sc1)
- Magnetic (standard, a previous-generation type)

Elastic Load Balancer

- Elastic Load Balancing distributes incoming application or network traffic across multiple targets, such as Amazon EC2 instances, containers, and IP addresses, in multiple Availability Zones.
- Benefits:
  - It increases the availability and fault tolerance of the applications.
  - You can add and remove compute resources from your load balancer as your needs change, without disrupting the overall flow of requests to your applications.
  - You can configure health checks, which are used to monitor the health of the compute resources so that the load balancer can send requests only to the healthy ones.



Type of Load Balancers

Application Load Balancer (ALB)

- Distributes incoming application traffic across multiple targets, such as EC2 instances, in multiple Availability Zones.
- You add one or more listeners to your load balancer.
- Functions at the seventh layer of the Open Systems Interconnection (OSI) model.

Network Load Balancer (NLB)

- A Network Load Balancer functions at the fourth layer of the Open Systems Interconnection (OSI) model.
- With Network Load Balancers, cross-zone load balancing is disabled by default.
- Listeners supports – TCP, HTTP/HTTPS

Classic Load Balancer (CLB)

- Previous generation load balancer
- Listeners supports – TCP