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EC2
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=> EC2 means Elastic Compute Cloud

=> It is used to create virtual machines in aws cloud.

=> EC2 is a paid service in aws cloud.

=> EC2 works based on 'Pay as you go' model.

=> Ec2 VMs bill will be generated on hourly basis.

=> Ec2 VM minimum billing period is 1 hour.

9:00 AM --- 9:15 AM ==> 1 hr

9:30 AM -- 9:45 AM ==> 1 hr

Note: For practice purpose AWS provided "t2.micro/t3.micro" instances 1 year free of cost (monthly 750 hours we can use).

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EC2 Usecases :
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1) To deploy dynamic web apps

2) To setup sonarqube server

3) To setup docker server

4) to setup Kubernetes cluster

5) To setup Jenkins server

6) To setup Nexus/Jfrog server

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How to setup EC2 vm
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=> To setup EC2 instance we will use below options in AWS

1) AMI

2) Instance Type

3) Keypair (public key & Private key)

4) Network (VPC)

5) Security Group (inbound & outbound)

6) Storage (EBS)

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What is AMI
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=> AMI stands for Amazon machine image.

=> An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance.

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EC2 Instance Types
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=> Amazon EC2 (Elastic Compute Cloud) offers a variety of instance types to suit different use cases.

1) General Purpose

- T series : t2, t3, t4...

2) Compute Optimzed (High-performance processors)

- C series: c7gm c6i, c6g, c5, c5a

3) Memory Optimized (High memory capacity)

- R series : r6g, r5, r5a, r5n

4) Storage Optimized (High-performance local storage using NVMe, SSDs or HDDs)

- I series : i4i, i3, i3en

5) Accelrated Computing (Powerful GPU and FPGA accelerators)

- G series : g5, g4ad, g4dn

6) High Performance Computing (HPC) (massive computational power & latest-generation processors)

- H series

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Key Pair
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=> In AWS, a Key Pair is a set of security credentials used to securely connect to EC2 instances.

=> It consists of two parts:

1) public key : Stored in AWS and attached to the EC2 instance.

2) private key : Kept by the user and used to connect to the instance.

Note-1: When we are connecting with EC2 instance, private key and public key handshake will happen. If handshake is successfull then only we can connect with that EC2 machine.

Note-2: One key pair we can use to launch multiple EC2 instances.

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What is VPC in EC2
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=> VPC stands for Virtual Private Cloud.

=> VPC provides network required to launch our ec2 instance.

Note: To encourage beginners, AWS provided Default VPC to launch EC2 instances.

Note: Based on requirement, we can create custom VPC and we can use custom vpc to launch Ec2 instances.

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Security Groups
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=> A Security Group (SG) in AWS acts as a virtual firewall that controls inbound and outbound traffic for EC2 instances.

=> In Security Group we can define 2 types of rules

1) inbound rule : Control Traffic comming into the instance

2) outbound rule : Control traffic going out from instance.

=> Below PORTs we are going to enable in Security Group based on requirement

SSH :: 22

RDP :: 3389

HTTP :: 80

MySQL :: 3306

Custom TCP :: 8080 or 9090 or 9091

Note: One Security Group we can use to launch multiple EC2 instances.

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What is EBS
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=> EBS stands for Elastic Block Store

=> It is block level storage device (Hard Disc / SSD)

=> For EC2 instances storage will be provided by EBS.

Note: EBS volume can have upto 16 TB (16000 GB)

=> For Linux VM, we will get 8 GB as default volume size.

=> For windows VM, we will get 30 GB as default volume size.

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What is Load Balancer
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=> When we run our application in single server then we have to face below challenges

1) One server should handle all reqs

2) Burden will increase on server

3) Response will be delayed for clients

4) Server can crash

5) Single Point Of Failure

6) Business Loss

=> To avoid above problems, we will run our application using "Load Balancer".

=> Load Balancer is used to distribute load to multiple servers in round robbin fashion.

=> We have below advantages with Load Balancer

1) App will run in multiple severs

2) Load will be distributed

3) Burden will be reduces on servers

4) Fast Performance

5) High Availability

=> We have 4 types of load balancers in aws

1) Application Load balancer (ALB)

2) Network Load balancer (NLB)

3) Gateway load balancer (GLB)

4) Classes load balancer (previous generation)

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Load Balancer Lab Task
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#### Step-1 :: Create EC2 Linux VM-1 with below user data

#! /bin/bash
sudo su
yum install httpd -y
cd /var/www/html
echo "<html><h1>Life Insurance Server - 1</h1></html>" > index.html
service httpd start

#### Step-2 ::  Create EC2 Linux VM-2 with below user data

#! /bin/bash
sudo su
yum install httpd -y
cd /var/www/html
echo "<html><h1>Life Insurance Server - 2</h1></html>" > index.html
service httpd start


### Step-3 :: Add these 2 instances to one "Target Group"

### Step-4 :: Create Load Balancer with Target Group (ALB)

### Step-5 :: Access our aplication using LBR DNS URL
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Auto Scaling
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=> It is used to adjust the capacity required to handle the load of our application.

=> If requests are increasing then servers should be increased and if requests are decreasing then servers should be reduced.

=> If we use Auto scaling then it will increase or decrease the no.of servers based on incoming traffic.

=> We have below advantages with Auto Scaling

1) Better Cost Management

2) Fault Tolerance

3) High Availability

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Types of IP's in AWS Cloud
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=> We have 3 types of IP's in AWS cloud

1) private ip

2) public ip

3) elastic ip

=> Private IP is a fixed IP in AWS. It is used for internal communication (With in VPC).
=> Even if we restart the EC2 instance, private IP will not change.

=> public ip is a dynamic IP in aws. It is used to connect with EC2 VM from outside.
=> When we restart our EC2 instance then public ip gets changed.

=> If we want fixed public ip then we need to use Elastic IP.
=> Elastic IPs are commercial (bill will be generated).