**Elastic Load Balancer**

- ELB is a region specific service .
- Types :  Application Load Balancer , Network Load Balancer , Classic Load Balancer .

- Application Load Balancer works on 7th layer of OSI models which is 7th layer . It supports Http(s) protocols .
- Network Load Balancer works on 4th layer which Transport layer .  As it supports TCP , UDP and TLS protocols .
- Classic load balancer supports Http(s) , Tcp , Ssl etc . It is Previous generation load balancer .

- Why does AWS reserves 5 IP address :::
- 10.0.0.0/16 is VPC . In one account by default 5 VPCs can be created , Hence 10.0.0.0/16 , 10.1.0.0/16 etc. In One VPC 10.1.0.0/16 we can create max 200 subnets by default like 10.1.0.0/24 to  10.1.199.0 .
- One subnet can be created like 10.1.0.0/24 and 10.1.0.0/28 . It means in first one there can be 255 Ips under 10.1.0.0 to 10.1.0.255 and in former subnet there can be 32 IP addresses from 10.1.0.0 to 10.1.0.31 .
- AWS reserve 5 IP addresses of a subnet as follow 1st IP: Network Address ,  Last IP: Broadcast Address ,  2nd IP: VPC Router , 3rd IP: DNS Server , 4th IP: Future use.

- A subnet must have less than or equal to /27 CIDR . If 28 is taken then only 4 bits will be available . Now max iPs can be created is 16 . 16 - 5 (Reserved always) - 8 (Reserved for ELB nodes) = 3 . Now you can create only 3 EC2s in a subnet . Which is a very small network . Hence CIDR most be created with <= 27 .
- For Fault Tolerance and HA you must connect 2 availability zones .

- ELB Health Check Mechanism :::
- First Ping is sent to an EC2 . Default request timeout is 5 seconds . Can be tuned from 2 to 60 seconds.
- Now suppose first was failed by default it will ping again after 30 seconds . Can be tuned from 5 to 300 seconds . If set to 5 seconds then you can detect the failure very fastly but it can increase CU . But if set 300 then it will take max time more than 5 minutes to check the failure .
- Unhealthy threshold is by default 2 means 2 consecutive failures will treat the instance as unhealthy .Can be tuned between 2 to 10 .
- If threshold is set to 10 and all things by default then 5 seconds + 30*10 + 5*10 = 355 seconds to declare an instance unhealthy . It is very high time . Hence default is good.
- Healthy threshold is 10 by default . Means 10 times success must come . Can be tuned between 2 to 10 .10 is a good number as it will make ELB sure that instance is healthy .

- Cross Zone Load Distribution :::
- By Default ELB distributes load between AZs not looking at how much instances each zone have . For taking this into consideration you need to switch on Cross zone load distributon .
- You need to register one subnet from each AZ with the ELB.
- ELB will not send traffic to a registered EC2 if the subnet of that EC2 is not registered with it .

- ELB is accessed by DNS only not by IP .
- You can associate a ASG with a target group .

- Public facing ELB will have a DNS like name.1234567890(Random number).region.elb.amazonaws.com
- Internal will have DNS like internal.name.123456789(Random number).region.elb.amazonaws.com

- Steps for Console :::
- Create 2 EC2 instances in two availability zones in a single VPC. For Example in North Virginia region while creating EC2 instance 1 choose default VPC and 1a availability zone . Second time choose AZ as 1b .
- Then create a load balancer by clicking Create Load Balancer and choose Application LB showing Http(s). Choose internet facing and IPV4 . Choose Http port 80 . Select AZs in which EC2 instance has been created .Choose any security group or create new 1 .

- Create a target group while creating ELB only and register both EC2s in this target Group. Choose VMs that you need to register with ELB .
- Now you will be able to see that TG in Target Group option .
- Now in ELB description use DNS of ELB on browser .
- Same can be used with Network Load Balancer as well . You can choose Ip instead of instances . Here choose TCP port 80.

- To add new EC2 in different AZ :::
- Go to ELB's Edit AZ option and add new AZ.
- In Targets Edit Target and choose new instance and click register .
- On deletion of ELB instances will not be deleted and TG will also not be deleted and have to deleted manually .

- ELB with two VPCs :::
- Create A VPC named VPC1 10.0.0.0/16
- Create Internet  Gateway and attach it to VPC1
- Create Two Subnets 10.0.1.0/24 and 10.0.2.0/24 respectively in two different AZs
- Add 0.0.0.0/0 in default routing table .
- Attach both subnets 10.0.1.0/24 and 10.0.2.0/24 to this routing table .
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- Create a VPC name VPC2 192.168.0.0/16
- Create a subnet in any AZs with Subnet 192.168.1./24
- Create IG and attach it to VPC2

- Add 0.0.0.0/0 in default routing table .
- Associate subnet with this routing table .

- Create Peering connection choose VPC1 and requester and VPC2 as acceptor .
- Choose to accept the request of peering connection
- In both routing tables add peering connection entry . In 192.168.0.0/16 add 10.0.0.0/16 with perking connection entry and vice versa.
- Launch instances In all three subnets
- Add Http(s) and RDS , ICMP anywhere as a security group .

- Create an ELB and add two subnets in VPC1 but you will not get VPC2 here .
- Create a SG for IG and choose ICMP and http .
- Choose a target group and choose IP.
- Choose to add two IPs of VPC1 and for adding IP of second VPC add other IP address , All AZs add IP of second VPC2
- Test