Module 4: ELB AND ROUTE 53

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Course Offered: Advanced Cloud Computing And Devops
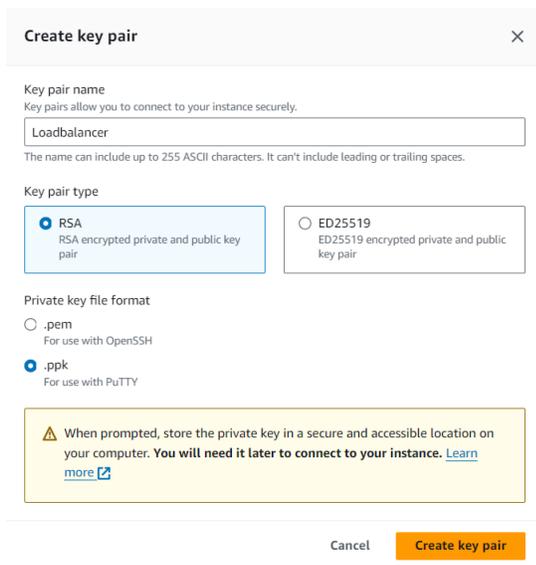
Problem Statement:

You work for XYZ Corporation which uses on-premise solutions and a limited number of systems. With the increase in requests in their application, the load also increases. So, to handle the load the corporation must buy more systems almost on a regular basis. Realizing the need to cut down the expenses on systems, they decided to move their infrastructure to AWS.

Tasks To Be Performed:

1. Manage the scaling requirements of the company by:

a. Deploying multiple compute resources on the cloud as soon as the load increases and the CPU utilization exceeds 80%

b. Removing the resources when the CPU utilization goes under 60%

2. Create a load balancer to distribute the load between compute resources.

3. Route the traffic to the company's domain

Answer

Login to AWS Console and go to the EC2 dashboard.

Create a Key Pair for accessing the EC2 instances.

Create Security Groups

Go to the Security Groups ❼ Create Security Group (cloudwatch agent) and allow port 80 and 22.

Compare security group rules Info

Amazon EC2 evaluates all the rules of the selected security groups to control inbound and outbound traffic. You can select more security groups to view their inbound rules to help you to decide how to secure your instance from incoming traffic.

Common security groups

Select security groups   ▼

default sg-0087d67d5ce0fb457 ✕
VPC: vpc-0ca4bd13727b758cb

Security groups that you add or remove here will be added to or removed from all your network interfaces.

Inbound rules (2)

🔍   ‹ 1 › ⚙

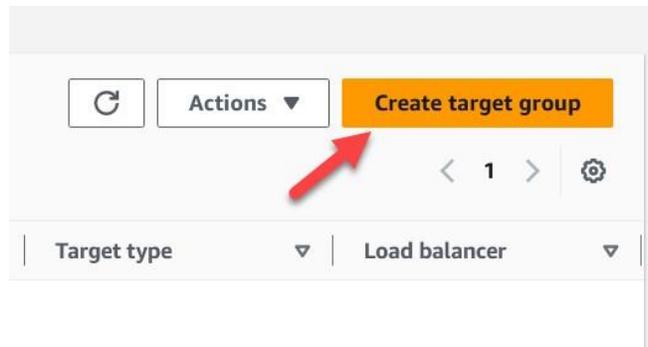| Security group name ▲	Security group ID ▽	Type ▽	Protocol ▽	Port range ▽	Source ▽	Description ▽
default	sg-0087d67d5ce0fb457	HTTP	tcp	80	0.0.0.0/0	-
default	sg-0087d67d5ce0fb457	ssh	tcp	22	0.0.0.0/0	-

Now Security Group is created successfully.

EC2 > Instances > Launch an instance

⊘ **Success**
Successfully initiated launch of instances (i-0cb9644581f5ad938, i-0e429874168d1ac12)

EC2 Dashboard ❼ Load Balancing ❼ Target Groups ❼ Create Target Group

C   Actions ▼   **Create target group**
                              ‹ 1 › ⚙

Target type ▽	Load balancer ▽

Choose target Type

Basic configuration

Settings in this section can't be changed after the target group is created.

Choose a target type

○ **Instances**
- Supports load balancing to instances within a specific VPC.
- Facilitates the use of Amazon EC2 Auto Scaling [↗] to manage and scale your EC2 capacity.

○ **IP addresses**
- Supports load balancing to VPC and on-premises resources.
- Facilitates routing to multiple IP addresses and network interfaces on the same instance.
- Offers flexibility with microservice based architectures, simplifying inter-application communication.
- Supports IPv6 targets, enabling end-to-end IPv6 communication, and IPv4-to-IPv6 NAT.

○ **Lambda function**
- Facilitates routing to a single Lambda function.
- Accessible to Application Load Balancers only.

○ **Application Load Balancer**
- Offers the flexibility for a Network Load Balancer to accept and route TCP requests within a specific VPC.
- Facilitates using static IP addresses and PrivateLink with an Application Load Balancer.

Target group name

```
newloadbalancer
```

A maximum of 32 alphanumeric characters including hyphens are allowed, but the name must not begin or end with a hyphen.

Protocol : Port

Choose a protocol for your target group that corresponds to the Load Balancer type that will route traffic to it. Some protocols now include anomaly detection for the targets and you can set mitigation options once your target group is created. This choice cannot be changed after creation

```
HTTP                        ▼        80
```
1-65535

IP address type

Only targets with the indicated IP address type can be registered to this target group.

● **IPv4**
Each instance has a default network interface (eth0) that is assigned the primary private IPv4 address. The instance's primary private IPv4 address is the one that will be applied to the target.

○ **IPv6**
Each instance you register must have an assigned primary IPv6 address. This is configured on the instance's default network interface (eth0). Learn more [↗]

VPC

Select the VPC with the instances that you want to include in the target group. Only VPCs that support the IP address type selected above are available in this list.

```
-
vpc-0ca4bd13727b758cb                    ▼
IPv4 VPC CIDR: 172.31.0.0/16
```

Protocol version

● **HTTP1**
Send requests to targets using HTTP/1.1. Supported when the request protocol is HTTP/1.1 or HTTP/2.

○ **HTTP2**
Send requests to targets using HTTP/2. Supported when the request protocol is HTTP/2 or gRPC, but gRPC-specific features are not available.

○ **gRPC**
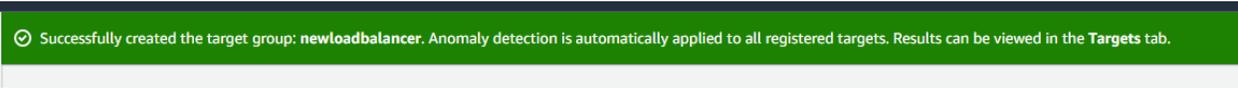Send requests to targets using gRPC. Supported when the request protocol is gRPC.

Click Next

Register targets

This is an optional step to create a target group. However, to ensure that your load balancer routes traffic to this target group you must register your targets.

Available instances (2/2)

	Instance ID	Name	State	Security groups	Zone	Private IPv4 address
☑	i-0e429874168d1ac12	my loadbalancer	⊘ Running	cloudwatch agent	us-east-1a	172.31.82.143
☑	i-0cb9644581f5ad938	my loadbalancer	⊘ Running	cloudwatch agent	us-east-1a	172.31.89.127

Click Create Target Group

⊘ Successfully created the target group: **newloadbalancer**. Anomaly detection is automatically applied to all registered targets. Results can be viewed in the **Targets** tab.
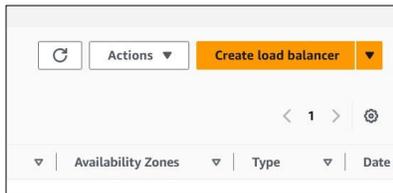
Now Target group has been created successfully

Load Balancer

EC2 Dashboard ❼ Load Balancing ❼ Load Balancer ❼ Create Load Balancer

Basic configuration

Load balancer name

Name must be unique within your AWS account and can't be changed after the load balancer is created.

myalb

A maximum of 32 alphanumeric characters including hyphens are allowed, but the name must not begin or end with a hyphen.

Scheme | Info

Scheme can't be changed after the load balancer is created.

○ **Internet-facing**

An internet-facing load balancer routes requests from clients over the internet to targets. Requires a public subnet. Learn more ⧉

○ Internal

An internal load balancer routes requests from clients to targets using private IP addresses.

IP address type | Info

Select the type of IP addresses that your subnets use.

○ IPv4

Recommended for internal load balancers.

○ Dualstack

Includes IPv4 and IPv6 addresses.

Network mapping Info

The load balancer routes traffic to targets in the selected subnets, and in accordance with your IP address settings.

VPC | Info

The load balancer will exist and scale within the selected VPC. The selected VPC is also where the load balancer targets must be hosted unless routing to Lambda or on-premis using VPC peering. To confirm the VPC for your targets, view target groups ☑. For a new VPC, create a VPC ☑.

```
-
vpc-0ca4bd13727b758cb
IPv4 VPC CIDR: 172.31.0.0/16                                                    ▼
```

Mappings | Info

Select at least two Availability Zones and one subnet per zone. The load balancer routes traffic to targets in these Availability Zones only. Availability Zones that are not suppo balancer or the VPC are not available for selection.

Availability Zones

☐ us-east-1a (use1-az2)

☐ us-east-1b (use1-az4)

☐ us-east-1c (use1-az6)

☐ us-east-1d (use1-az1)

☐ us-east-1e (use1-az3)

☐ us-east-1f (use1-az5)

Security groups Info

A security group is a set of firewall rules that control the traffic to your load balancer. Select an existing security group, or you can create a new security group ☑.

Security groups

```
Select up to 5 security groups                                                  ▼
```

```
cloudwatch agent                                          ✕
sg-0513f7b0108994883    VPC: vpc-0ca4bd13727b758cb
```

Listeners and routing Info

A listener is a process that checks for connection requests using the port and protocol you configure. The rules that you define for a listener determine how the load balancer routes requests to its registered targets.

▼ Listener **HTTP:80**   [Remove]

Protocol	Port	Default action	Info

```
Protocol              Port
HTTP        ▼    :    80            Forward to    newloadbalancer                    HTTP ▼    ⟳
                      1-65535                     Target type: Instance, IPv4
```

Create target group ☑

Listener tags - optional

Consider adding tags to your listener. Tags enable you to categorize your AWS resources so you can more easily manage them.

[Add listener tag]

You can add up to 50 more tags.

[Add listener]

Select the Target group which we have created

Create Load Balancer

Summary
Review and confirm your configurations. Estimate cost ⬈

Basic configuration Edit
myalb
- Internet-facing
- IPv4

Security groups Edit
- cloudwatch agent
  sg-0513f7b0108994883 ⬈

Network mapping Edit
VPC vpc-0ca4bd13727b758cb ⬈
- us-east-1a
  subnet-0da62f71a2c23d8a8 ⬈
- us-east-1b
  subnet-07500936c65530e04 ⬈
- us-east-1c
  subnet-09c8bc6fedafb2bce ⬈
- us-east-1d
  subnet-0d828a638aec31575 ⬈
- us-east-1e
  subnet-084eae892db4de22c ⬈
- us-east-1f
  subnet-0c3a227a6d896e22e ⬈

Listeners and routing Edit
- HTTP:80 defaults to
  newloadbalancer ⬈

Service integrations Edit
AWS WAF: None
AWS Global Accelerator: None

Tags Edit
None

Creation workflow and status

▶ **Server-side tasks and status**
After completing and submitting the above steps, all server-side tasks and their statuses become available for monitoring.

Cancel   **Create load balancer**

ALB creation will take a few minutes

Create Launch Template

EC2 Dashboard ❼ Instances ❼ Launch Templates

- Select OS as Amazon Linux
- Instance Type is t2.micro (Free Tier Eligible)
- Select the Key Pair
- Select the Security Group as WEBSG

In Advanced options provide the user data script to make your website ready

⊘ **Success**
   Successfully created mylaunchtemplate1(lt-069c6cb563ce83e2d).

Create Auto Scaling Groups

EC2 Dashboard ❼ Auto Scaling ❼ Create Auto Scaling Groups

Create Auto Scaling group

Get started with EC2 Auto Scaling by creating an Auto Scaling group.

Create Auto Scaling group

Provide the Auto Scaling Group name

Choose launch template Info
Specify a launch template that contains settings common to all EC2 instances that are launched by this Auto

Name

Auto Scaling group name
Enter a name to identify the group.

    asg1

Must be unique to this account in the current Region and no more than 255 characters.

Launch template Info

> (i) For accounts created after May 31, 2023, the EC2 console only supports creating Auto Scaling groups with launch templates. Creating Auto Scaling groups with launch configurations is not recommended but still available via the CLI and API until December 31, 2023.

Launch template
Choose a launch template that contains the instance-level settings, such as the Amazon Machine Image (AMI), instance type, key pair, and security groups.

```
mylaunchtemplate1                                        ▼
```
[Refresh]

Create a launch template ↗

Version

```
Default (1)            ▼
```
[Refresh]

Create a launch template version ↗

Description	Launch template	Instance type
v1	mylaunchtemplate1 ↗ lt-069c6cb563ce83e2d	t2.micro
AMI ID ami-0ebfd941bbafe70c6	**Security groups** -	**Request Spot Instances** No
Key pair name Loadbalancer	**Security group IDs** sg-0513f7b0108994883 ↗	

Additional details

Storage (volumes)	Date created	
-	Sun Sep 29 2024 13:13:21 GMT+0530 (India Standard Time)	

Click Next.

Instance type requirements Info

Override launch template

You can keep the same instance attributes or instance type from your launch template, or you can choose to override the launch template by specifying different instance attributes or manually adding instance types.

Launch template	Version	Description
mylaunchtemplate1 ↗	Default	v1
lt-069c6cb563ce83e2d		

Instance type
t2.micro

Network Info

For most applications, you can use multiple Availability Zones and let EC2 Auto Scaling balance your instances across the zones. The default VPC and default subnets are suitable for getting started quickly.

VPC
Choose the VPC that defines the virtual network for your Auto Scaling group.

vpc-0ca4bd13727b758cb
172.31.0.0/16   Default

Create a VPC ↗

Availability Zones and subnets
Define which Availability Zones and subnets your Auto Scaling group can use in the chosen VPC.

Select Availability Zones and subnets

Create a subnet ↗

Cancel   Skip to review   Previous   Next

Select the VPC Settings and Subnets

Network Info

For most applications, you can use multiple Availability Zones and let EC2 Auto Scaling balance your instances across the zones. The default VPC and default subnets are suitable for getting started quickly.

VPC
Choose the VPC that defines the virtual network for your Auto Scaling group.

vpc-0ca4bd13727b758cb
172.31.0.0/16   Default

Create a VPC

Availability Zones and subnets
Define which Availability Zones and subnets your Auto Scaling group can use in the chosen VPC.

Select Availability Zones and subnets

us-east-1a | subnet-0da62f71a2c23d8a8 ✕
172.31.80.0/20   Default

us-east-1b | subnet-07500936c65530e04 ✕
172.31.16.0/20   Default

us-east-1c | subnet-09c8bc6fedafb2bce ✕
172.31.32.0/20   Default

us-east-1d | subnet-0d828a638aec31575 ✕
172.31.0.0/20   Default

us-east-1e | subnet-084eae892db4de22c ✕
172.31.48.0/20   Default

us-east-1f | subnet-0c3a227a6d896e22e ✕
172.31.64.0/20   Default

Create a subnet

Click NEXT

Configure advanced options – *optional* Info

Integrate your Auto Scaling group with other services to distribute network traffic across multiple servers using a load balancer or to establish service-to-service communications using VPC Lattice. You can also set options that give you more control over health check replacements and monitoring.

Load balancing Info

Use the options below to attach your Auto Scaling group to an existing load balancer, or to a new load balancer that you define.

○ No load balancer
Traffic to your Auto Scaling group will not be fronted by a load balancer.

● Attach to an existing load balancer
Choose from your existing load balancers.

○ Attach to a new load balancer
Quickly create a basic load balancer to attach to your Auto Scaling group.

Attach to an existing load balancer
Select the load balancers that you want to attach to your Auto Scaling group.

● Choose from your load balancer target groups
This option allows you to attach Application, Network, or Gateway Load Balancers.

○ Choose from Classic Load Balancers

Existing load balancer target groups
Only instance target groups that belong to the same VPC as your Auto Scaling group are available for selection.

Select target groups

newloadbalancer | HTTP   ✕
Application Load Balancer: myalb

Load Balancing options Attach to an existing load balancer.

Choose from your load balancer target groups (Since we already created one)

Health checks

Health checks increase availability by replacing unhealthy instances. When you use multiple health checks, all are evaluated, and if at least one fails, instance replacement occurs.

EC2 health checks

ⓘ Always enabled

Additional health check types - *optional*   Info

☑ Turn on Elastic Load Balancing health checks   Recommended
   Elastic Load Balancing monitors whether instances are available to handle requests. When it reports an unhealthy instance, EC2 Auto Scaling can replace it on its next periodic check.

┌───┐
│ ⓘ EC2 Auto Scaling will start to detect and act on health checks performed by Elastic Load Balancing. To   ✕ │
│   avoid unexpected terminations, first verify the settings of these health checks in the Load Balancer │
│   console ↗ │
└───┘

Health check grace period   Info
This time period delays the first health check until your instances finish initializing. It doesn't prevent an instance from terminating when placed into a non-running state.

┌──────┐
│ 10   ⌄│ seconds
└──────┘

Additional settings

Monitoring   Info
☐ Enable group metrics collection within CloudWatch

Default instance warmup   Info
The amount of time that CloudWatch metrics for new instances do not contribute to the group's aggregated instance metrics, as their usage data is not reliable yet.
☐ Enable default instance warmup

Cancel   Skip to review   Previous   **Next**

Click **Next**

Group size - *optional* Info

Specify the size of the Auto Scaling group by changing the desired capacity. You can also specify minimum and maximum capacity limits. Your desired capacity must be within the limit range.

Desired capacity
┌──────┐
│ 1   ⌄│
└──────┘

Minimum capacity
┌──────┐
│ 1   ⌄│
└──────┘

Maximum capacity
┌──────┐
│ 2   ⌄│
└──────┘

Configure Scaling Policies as described in questions, when CPU 80% utilized it should create another EC2 instance

Click **Next**

Click **Next**

Create ASG

Access the Website using ALB URL.

The ASG is working fine as expected

Map the Company Domain

Go to Route 53

Create a hosted zone ex: (hiteshchauhan.xyz)

Create hosted zone Info

Hosted zone configuration
A hosted zone is a container that holds information about how you want to route traffic for a domain, such as example.com, and its subdomains.

Domain name | Info
This is the name of the domain that you want to route traffic for.

hiteshchauhan.xyz

Valid characters: a-z, 0-9, ! " # $ % & ' ( ) * + , - / : ; < = > ? @ [\ ] ^ _ ` { | } . ~

Description - *optional* | Info
This value lets you distinguish hosted zones that have the same name.

The hosted zone is used for...

The description can have up to 256 characters. 0/256

Type | Info
The type indicates whether you want to route traffic on the internet or in an Amazon VPC.

- ● **Public hosted zone**
  A public hosted zone determines how traffic is routed on the internet.

- ○ **Private hosted zone**
  A private hosted zone determines how traffic is routed within an Amazon VPC.

Public hiteshchauhan.xyz Info

[Delete zone] [Test record] [Configure query logging]

▶ Hosted zone details   [Edit hosted zone]

| Records (2) | DNSSEC signing | Hosted zone tags (0) |

Records (2) Info
Automatic mode is the current search behavior optimized for best filter results. To change modes go to settings.

[⟳] [Delete record] [Import zone file] [Create record]

| Q Filter records by property or value | | Type ▼ | Routing pol... ▼ | Alias ▼ | ‹ 1 › ⚙ |

☐	Record name ▽	Type ▽	Routin... ▽	Differ... ▽	Alias ▽	Value/Route traffic to ▽	TTL (s... ▽	Health ... ▽	Evalua... ▽	R.. ▽
☐	hiteshchauhan.xyz	NS	Simple	-	No	ns-435.awsdns-54.com. ns-1013.awsdns-62.net. ns-1086.awsdns-07.org. ns-1981.awsdns-55.co.uk.	172800	-	-	-
☐	hiteshchauhan.xyz	SOA	Simple	-	No	ns-435.awsdns-54.com. awsd...	900	-	-	-

Create record Info

Quick create record

▼ **Record 1**

Delete

Record name Info

myweb .hiteshchauhan.xyz

Keep blank to create a record for the root domain.

Record type Info

CNAME – Routes traffic to another domain name and to some AWS reso... ▼

◯ Alias

Value Info

www.example.com

Enter multiple values on separate lines.

TTL (seconds) Info

300 | 1m | 1h | 1d

Recommended values: 60 to 172800 (two days)

Routing policy Info

Simple routing ▼

Add another record

Cancel **Create records**

Quick create record

▼ **Record 1**

Delete

Record name Info

myweb .hiteshchauhan.xyz

Keep blank to create a record for the root domain.

Record type Info

CNAME – Routes traffic to another domain name and to some AWS reso... ▼

◯ Alias

Value Info

myalb-1562156745.us-east-1.elb.amazonaws.com

Enter multiple values on separate lines.

TTL (seconds) Info

300 | 1m | 1h | 1d

Recommended values: 60 to 172800 (two days)

Routing policy Info

Simple routing ▼

Add another record

Cancel **Create records**

Public **hiteshchauhan.xyz** Info

Delete zone   Test record   Configure query logging

▶ Hosted zone details   Edit hosted zone

Records (3)   DNSSEC signing   Hosted zone tags (0)

Records (3) Info

Automatic mode is the current search behavior optimized for best filter results. To change modes go to settings.

🔁   Delete record   Import zone file   Create record

🔍 Filter records by property or value   Type ▼ Routing pol... ▼ Alias ▼   ‹ 1 › ⚙

☐	Record name ▽	Type ▽	Routin... ▽	Differ... ▽	Alias ▽	Value/Route traffic to ▽	TTL (s... ▽	Health ... ▽	Evalua... ▽	R.. ▽
☐	hiteshchauhan.xyz	NS	Simple	-	No	ns-435.awsdns-54.com. ns-1013.awsdns-62.net. ns-1086.awsdns-07.org. ns-1981.awsdns-55.co.uk.	172800	-	-	-
☐	hiteshchauhan.xyz	SOA	Simple	-	No	ns-435.awsdns-54.com. awsd...	900	-	-	-
☐	myweb.hiteshchauhan.xyz	CNAME	Simple	-	No	myalb-1562156745.us-east-...	300	-	-	-