Ismail Basheer

2348521

Load Balancing and its Significance in Cloud Environment

Load balancing is the process of distributing incoming network traffic across multiple servers to ensure no single server bears too much load. This technique helps to optimize resource use, maximize throughput, minimize response time, and avoid overload on any single resource. In a cloud environment, load balancing is crucial for maintaining high availability and reliability of applications.

Significance in Cloud Environment:

- **High Availability:** Load balancers ensure that applications remain available even when individual servers or components fail by rerouting traffic to healthy servers.
- **Scalability:** By distributing traffic among multiple servers, load balancers allow applications to scale out seamlessly as demand increases. - **Performance**: Load balancers help optimize application performance by balancing the load evenly and reducing the risk of performance bottlenecks.
- **Flexibility**: Cloud load balancers can dynamically adjust to traffic patterns and scale resources up or down based on demand.
- **Maintenance**: Load balancing allows for maintenance and updates without downtime by diverting traffic from servers being updated to those that are operational.

Load Balancing Services Available in AWS, Azure, and GCP

AWS:

- Elastic Load Balancing (ELB): This service offers three types of load balancers:
- Application Load Balancer (ALB): Designed for HTTP and HTTPS traffic, ideal for microservices and container-based applications.
- Network Load Balancer (NLB): Handles TCP traffic and is optimized for performance, ideal for high-throughput workloads.
- Classic Load Balancer: Legacy option that supports HTTP, HTTPS, and TCP, suitable for applications built within the EC2-Classic network.

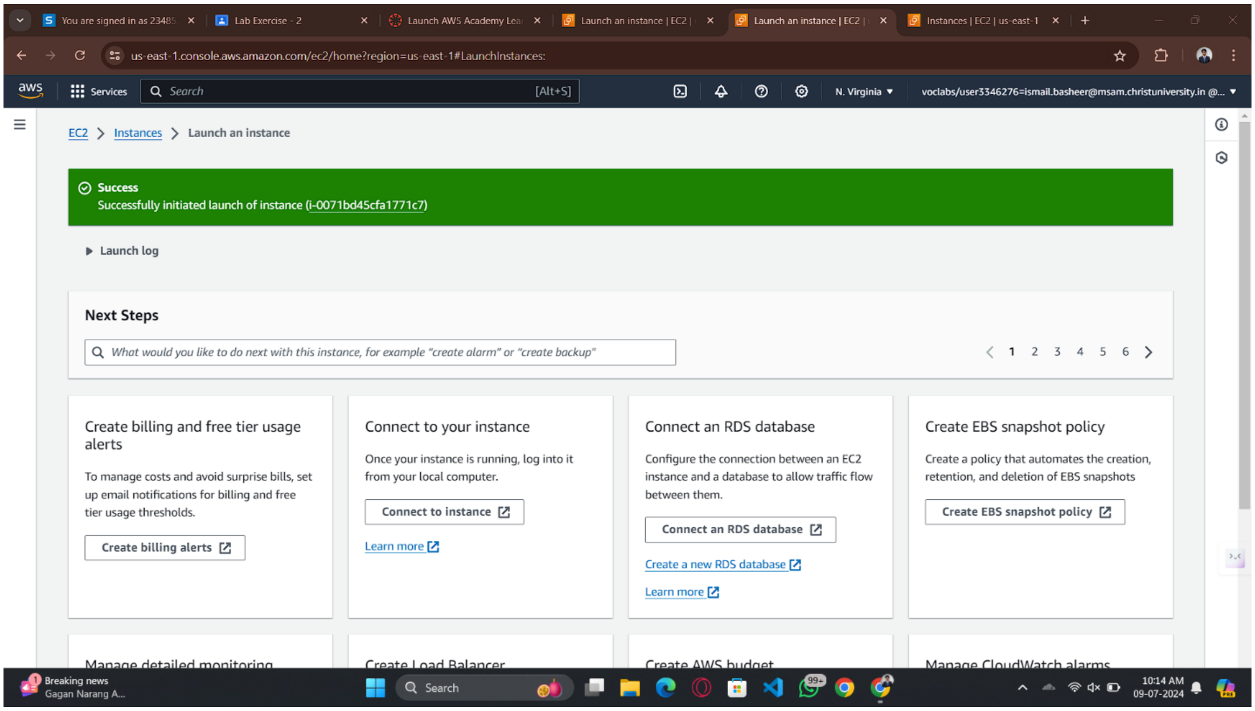
Azure:

- Azure Load Balancer: Provides high availability and network performance to applications. It offers two types:
- Public Load Balancer: Distributes incoming internet traffic to virtual machines.
- Internal Load Balancer: Distributes traffic among virtual machines within a virtual network.
- Azure Application Gateway: A layer 7 load balancer that includes SSL termination, URL-based routing, and web application firewall.
- Azure Traffic Manager: A DNS-based traffic load balancer that distributes traffic across Azure regions, improving performance and availability.

GCP (Google Cloud Platform):

- Google Cloud Load Balancing: Provides global load balancing services:
- HTTP(S) Load Balancing: A global load balancer that distributes traffic among multiple instances, supports advanced traffic management features.
- SSL Proxy Load Balancing: Terminates SSL connections and forwards traffic to instances.
- TCP Proxy Load Balancing: Optimized for non-SSL TCP traffic.
- Network Load Balancing: Distributes TCP/UDP traffic among instances within a region.

CREATED TWO INSTANCES 2348521_EC2_VM1 AND 2348521_EC2_VM2



us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#LaunchInstances:

N. Virginia ▾ voclabs/user3346276=ismail.basheer@msam.christuniversity.in @...

EC2 > Instances > Launch instance

Success
Successfully initiated launch of instance (i-0071bd45cfa1771c7)

▸ Launch log

Next Steps

What would you like to do next with this instance, for example "create alarm" or "create backup"

Create billing and free tier usage alerts

To manage costs and avoid surprise bills, set up email notifications for billing and free tier usage thresholds.

Create billing alerts

Connect to your instance

Once your instance is running, log into it from your local computer.

Connect to instance

Learn more

Connect an RDS database

Configure the connection between an EC2 instance and a database to allow traffic flow between them.

Connect an RDS database

Create a new RDS database

Learn more

Create EBS snapshot policy

Create a policy that automates the creation, retention, and deletion of EBS snapshots

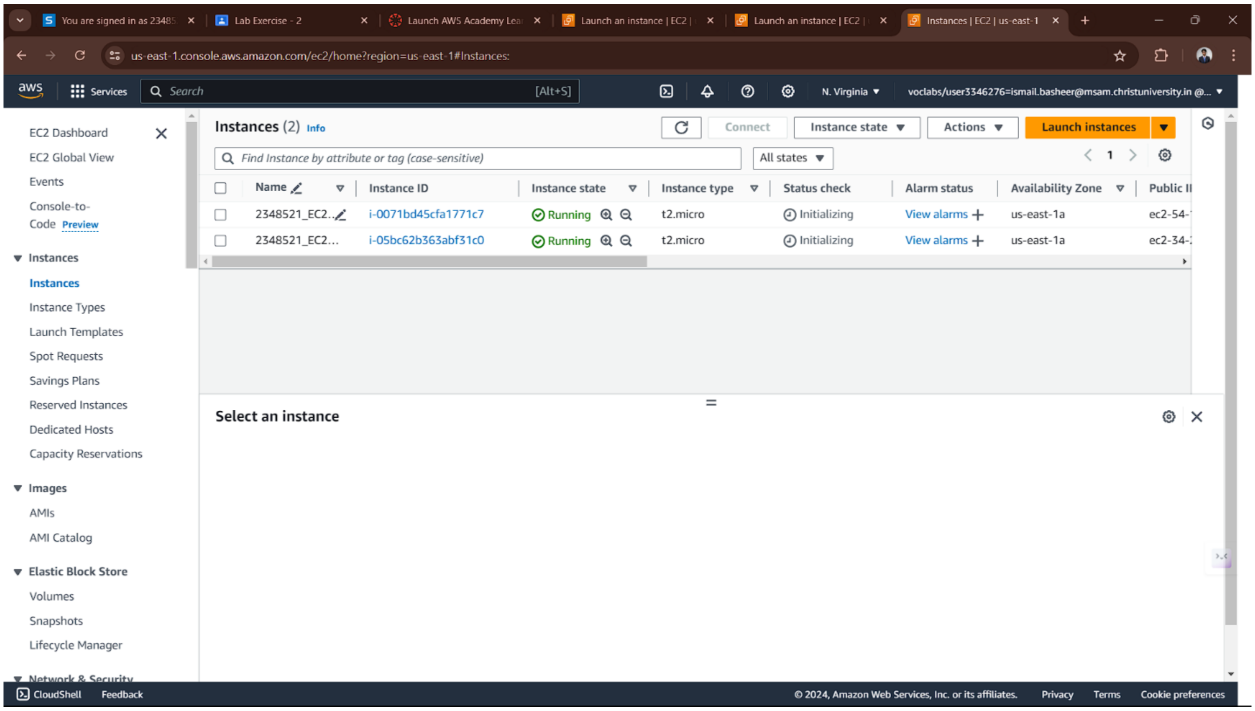
Create EBS snapshot policy

Manage detailed monitoring

Create Load Balancer

Create AWS budget

Manage CloudWatch alarms



us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#Instances:

N. Virginia ▾ voclabs/user3346276=ismail.basheer@msam.christuniversity.in @...

Instances (2) Info

Find Instance by attribute or tag (case-sensitive)

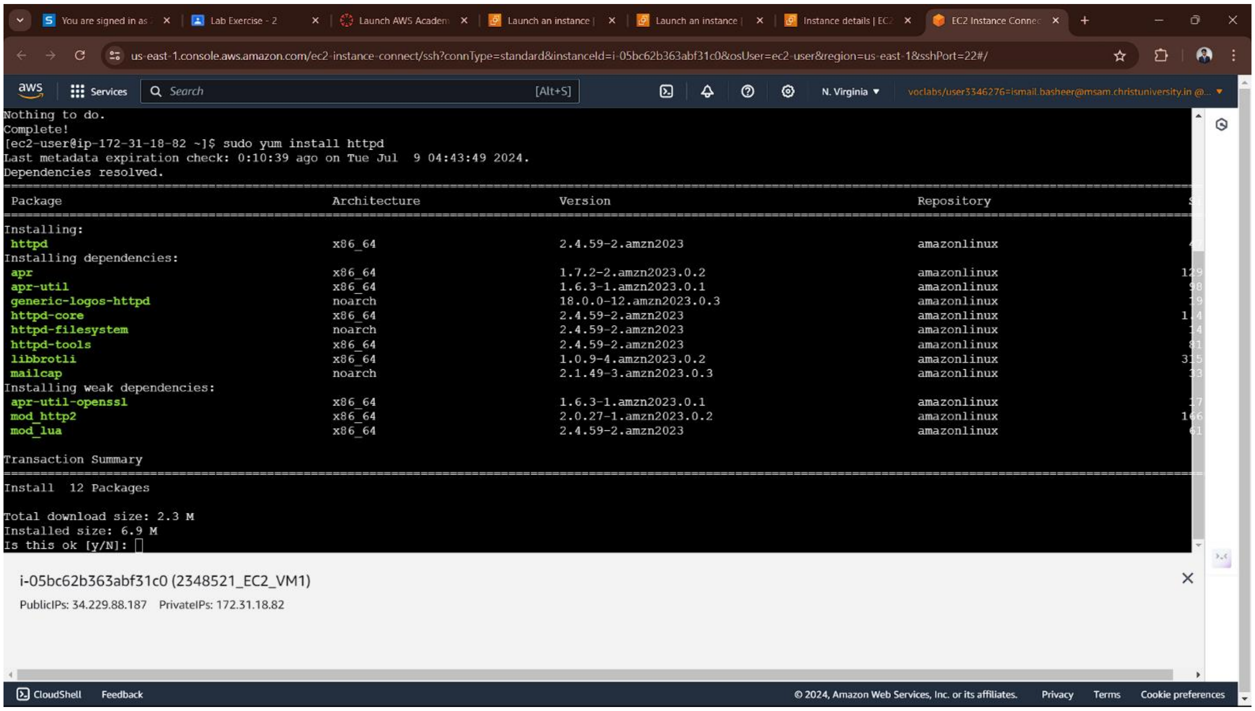
All states

□	Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public II
□	2348521_EC2...	i-0071bd45cfa1771c7	Running	t2.micro	Initializing	View alarms +	us-east-1a	ec2-54-
□	2348521_EC2...	i-05bc62b363abf31c0	Running	t2.micro	Initializing	View alarms +	us-east-1a	ec2-34-

Select an instance

CREATING HTML FILES IN BOTH THE INSTANCES SEPARATELY

VM1:



You are signed in as
Lab Exercise - 2
Launch AWS Academ
Launch an instance |
Launch an instance |
Instance details | EC2
EC2 Instance Connec
us-east-1.console.aws.amazon.com/ec2-instance-connect/ssh?connType=standard&instanceId=i-05bc62b363abf31c0&osUser=ec2-user&region=us-east-1&sshPort=22#/
aws
Services
Search
[Alt+S]
N. Virginia
voclabs/user3346276=ismail.basheer@msam.christuniversity.in @...

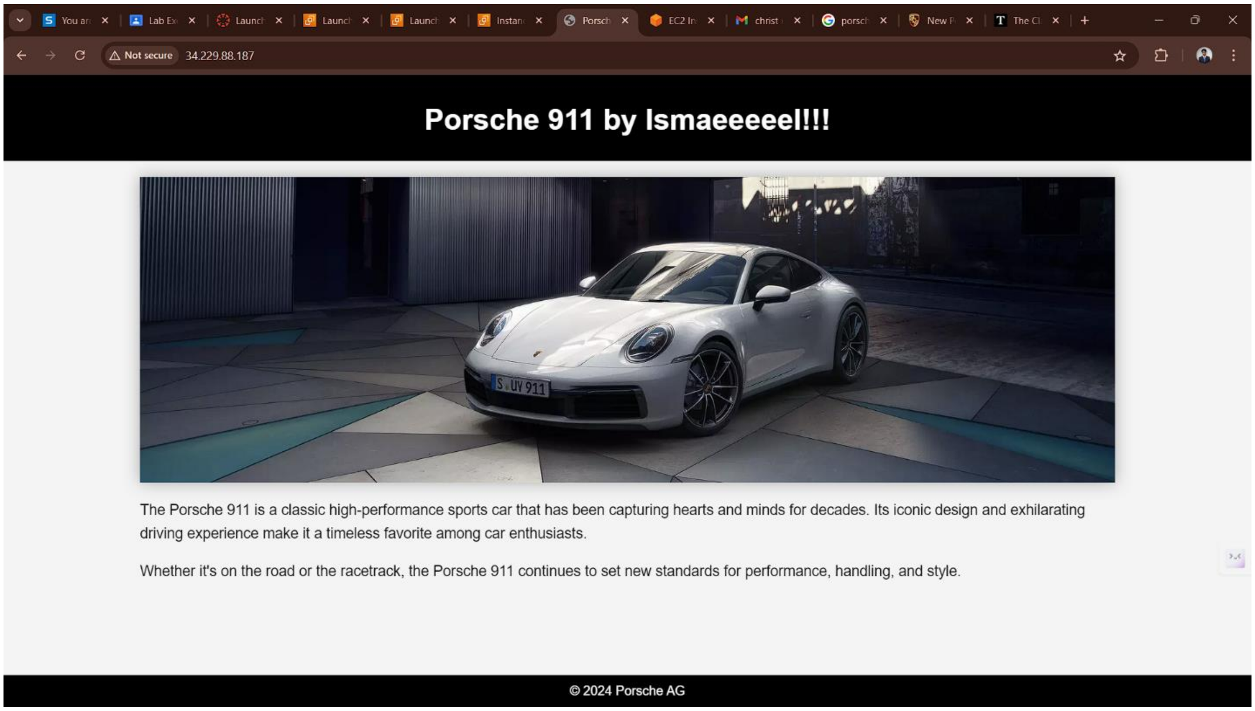
```
Nothing to do.
Complete!
[ec2-user@ip-172-31-18-82 ~]$ sudo yum install httpd
Last metadata expiration check: 0:10:39 ago on Tue Jul  9 04:43:49 2024.
Dependencies resolved.
================================================================================================================================
 Package                      Architecture          Version                             Repository
================================================================================================================================
Installing:
 httpd                        x86_64                2.4.59-2.amzn2023                   amazonlinux
Installing dependencies:
 apr                          x86_64                1.7.2-2.amzn2023.0.2                amazonlinux
 apr-util                     x86_64                1.6.3-1.amzn2023.0.1                amazonlinux
 generic-logos-httpd          noarch                18.0.0-12.amzn2023.0.3              amazonlinux
 httpd-core                   x86_64                2.4.59-2.amzn2023                   amazonlinux
 httpd-filesystem             noarch                2.4.59-2.amzn2023                   amazonlinux
 httpd-tools                  x86_64                2.4.59-2.amzn2023                   amazonlinux
 libbrotli                    x86_64                1.0.9-4.amzn2023.0.2                amazonlinux
 mailcap                      noarch                2.1.49-3.amzn2023.0.3               amazonlinux
Installing weak dependencies:
 apr-util-openssl             x86_64                1.6.3-1.amzn2023.0.1                amazonlinux
 mod_http2                    x86_64                2.0.27-1.amzn2023.0.2               amazonlinux
 mod_lua                      x86_64                2.4.59-2.amzn2023                   amazonlinux

Transaction Summary
================================================================================================================================
Install  12 Packages

Total download size: 2.3 M
Installed size: 6.9 M
Is this ok [y/N]:
```

i-05bc62b363abf31c0 (2348521_EC2_VM1)

PublicIPs: 34.229.88.187   PrivateIPs: 172.31.18.82



Porsche 911 by Ismaeeeeel!!!

The Porsche 911 is a classic high-performance sports car that has been capturing hearts and minds for decades. Its iconic design and exhilarating driving experience make it a timeless favorite among car enthusiasts.

Whether it's on the road or the racetrack, the Porsche 911 continues to set new standards for performance, handling, and style.

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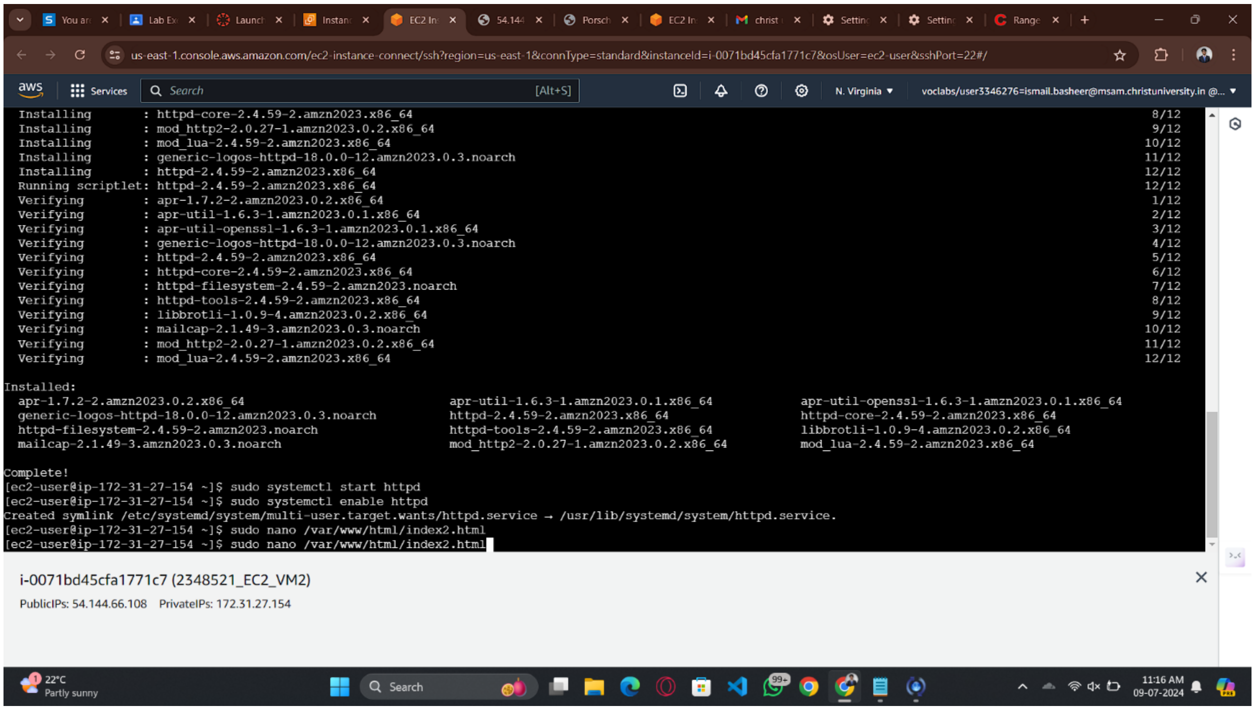
VM2:



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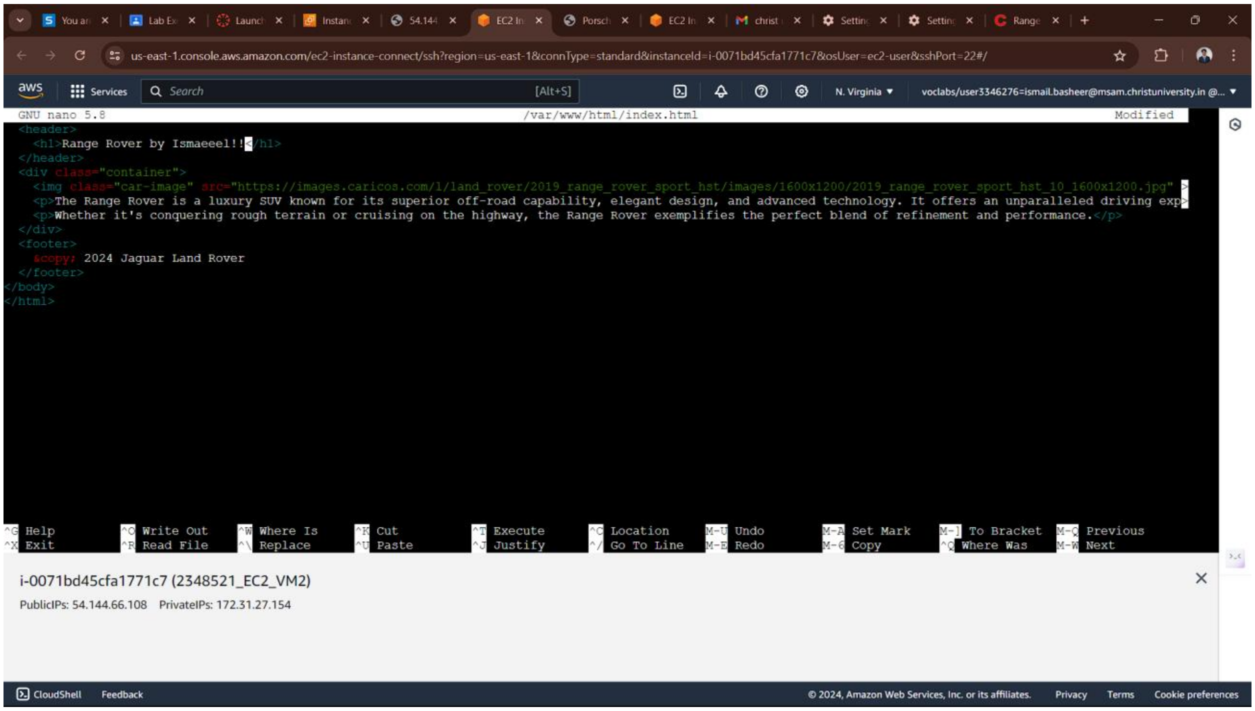
aws
Services
Search
[Alt+S]
N. Virginia
voclabs/user3346276=ismail.basheer@msam.christuniversity.in @...

```
  Installing       : httpd-core-2.4.59-2.amzn2023.x86_64                                                                  8/12
  Installing       : mod_http2-2.0.27-1.amzn2023.0.2.x86_64                                                               9/12
  Installing       : mod_lua-2.4.59-2.amzn2023.x86_64                                                                    10/12
  Installing       : generic-logos-httpd-18.0.0-12.amzn2023.0.3.noarch                                                   11/12
  Installing       : httpd-2.4.59-2.amzn2023.x86_64                                                                      12/12
  Running scriptlet: httpd-2.4.59-2.amzn2023.x86_64                                                                      12/12
  Verifying        : apr-1.7.2-2.amzn2023.0.2.x86_64                                                                      1/12
  Verifying        : apr-util-1.6.3-1.amzn2023.0.1.x86_64                                                                 2/12
  Verifying        : apr-util-openssl-1.6.3-1.amzn2023.0.1.x86_64                                                         3/12
  Verifying        : generic-logos-httpd-18.0.0-12.amzn2023.0.3.noarch                                                    4/12
  Verifying        : httpd-2.4.59-2.amzn2023.x86_64                                                                       5/12
  Verifying        : httpd-core-2.4.59-2.amzn2023.x86_64                                                                  6/12
  Verifying        : httpd-filesystem-2.4.59-2.amzn2023.noarch                                                            7/12
  Verifying        : httpd-tools-2.4.59-2.amzn2023.x86_64                                                                 8/12
  Verifying        : libbrotli-1.0.9-4.amzn2023.0.2.x86_64                                                                9/12
  Verifying        : mailcap-2.1.49-3.amzn2023.0.3.noarch                                                                10/12
  Verifying        : mod_http2-2.0.27-1.amzn2023.0.2.x86_64                                                              11/12
  Verifying        : mod_lua-2.4.59-2.amzn2023.x86_64                                                                    12/12

Installed:
  apr-1.7.2-2.amzn2023.0.2.x86_64                       apr-util-1.6.3-1.amzn2023.0.1.x86_64          apr-util-openssl-1.6.3-1.amzn2023.0.1.x86_64
  generic-logos-httpd-18.0.0-12.amzn2023.0.3.noarch     httpd-2.4.59-2.amzn2023.x86_64                httpd-core-2.4.59-2.amzn2023.x86_64
  httpd-filesystem-2.4.59-2.amzn2023.noarch             httpd-tools-2.4.59-2.amzn2023.x86_64          libbrotli-1.0.9-4.amzn2023.0.2.x86_64
  mailcap-2.1.49-3.amzn2023.0.3.noarch                  mod_http2-2.0.27-1.amzn2023.0.2.x86_64        mod_lua-2.4.59-2.amzn2023.x86_64

Complete!
[ec2-user@ip-172-31-27-154 ~]$ sudo systemctl start httpd
[ec2-user@ip-172-31-27-154 ~]$ sudo systemctl enable httpd
Created symlink /etc/systemd/system/multi-user.target.wants/httpd.service → /usr/lib/systemd/system/httpd.service.
[ec2-user@ip-172-31-27-154 ~]$ sudo nano /var/www/html/index2.html
[ec2-user@ip-172-31-27-154 ~]$ sudo nano /var/www/html/index2.html
```

i-0071bd45cfa1771c7 (2348521_EC2_VM2)

PublicIPs: 54.144.66.108   PrivateIPs: 172.31.27.154

22°C
Partly sunny
Search
11:16 AM
09-07-2024



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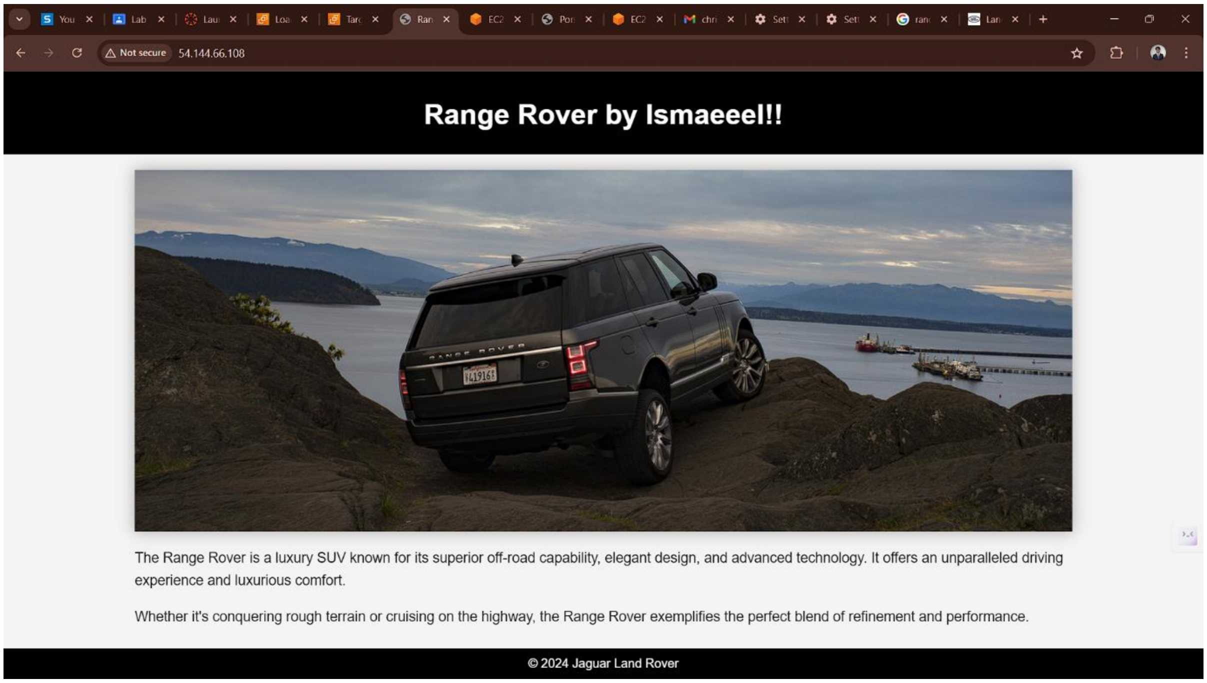
us-east-1.console.aws.amazon.com/ec2-instance-connect/ssh?region=us-east-1&connType=standard&instanceId=i-0071bd45cfa1771c7&osUser=ec2-user&sshPort=22#/
aws
Services
Search
[Alt+S]
N. Virginia
voclabs/user3346276=ismail.basheer@msam.christuniversity.in @...

```
  GNU nano 5.8                                  /var/www/html/index.html                                          Modified
  <header>
    <h1>Range Rover by Ismaeeel!!</h1>
  </header>
  <div class="container">
    <img class="car-image" src="https://images.caricos.com/l/land_rover/2019_range_rover_sport_hst/images/1600x1200/2019_range_rover_sport_hst_10_1600x1200.jpg" >
    <p>The Range Rover is a luxury SUV known for its superior off-road capability, elegant design, and advanced technology. It offers an unparalleled driving exp>
    <p>Whether it's conquering rough terrain or cruising on the highway, the Range Rover exemplifies the perfect blend of refinement and performance.</p>
  </div>
  <footer>
    &copy; 2024 Jaguar Land Rover
  </footer>
</body>
</html>

^G Help        ^O Write Out   ^W Where Is    ^K Cut         ^T Execute     ^C Location    M-U Undo       M-A Set Mark   M-] To Bracket M-Q Previous
^X Exit        ^R Read File   ^\ Replace     ^U Paste       ^J Justify     ^/ Go To Line  M-E Redo       M-6 Copy       ^Q Where Was   M-W Next
```

i-0071bd45cfa1771c7 (2348521_EC2_VM2)

PublicIPs: 54.144.66.108   PrivateIPs: 172.31.27.154



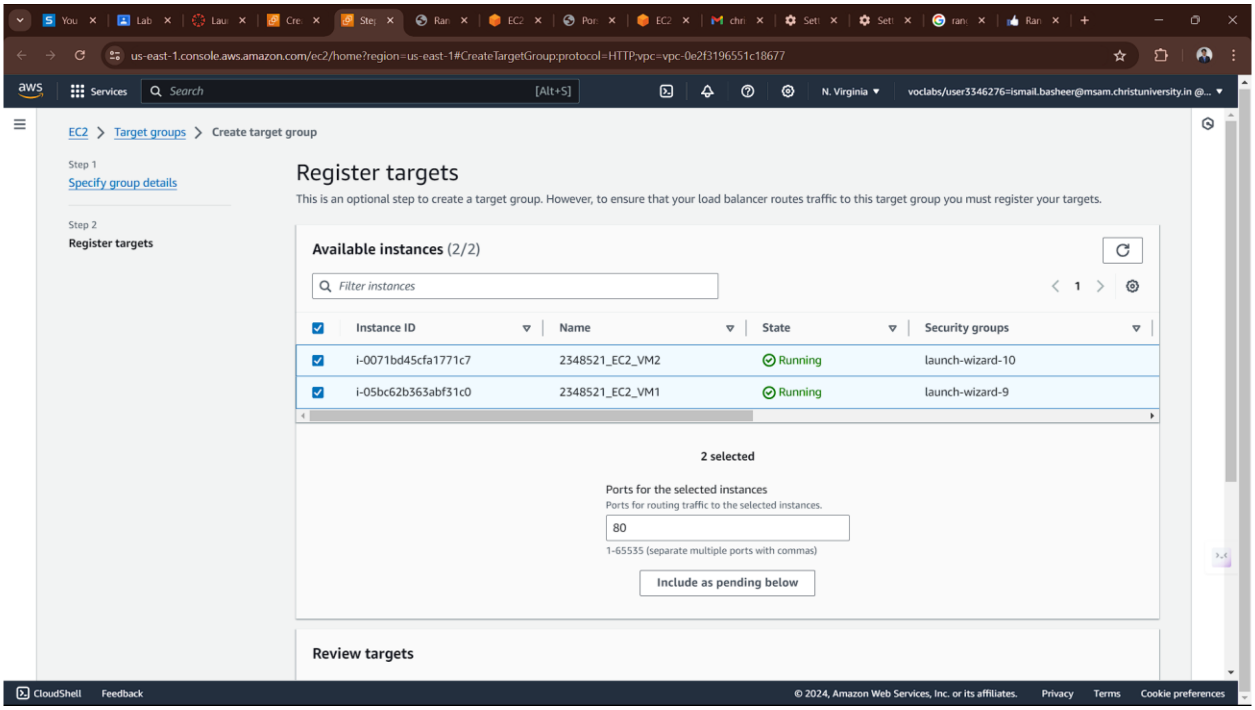
Range Rover by Ismaeeel!!

The Range Rover is a luxury SUV known for its superior off-road capability, elegant design, and advanced technology. It offers an unparalleled driving experience and luxurious comfort.

Whether it's conquering rough terrain or cruising on the highway, the Range Rover exemplifies the perfect blend of refinement and performance.

© 2024 Jaguar Land Rover

CREATING A LOAD BALANCER with name (christ2348521)



us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#CreateTargetGroup:protocol=HTTP;vpc=vpc-0e2f3196551c18677
aws
Services
Search
[Alt+S]
N. Virginia ▾
voclabs/user3346276=ismail.basheer@msam.christuniversity.in @... ▾
EC2 > Target groups > Create target group
Step 1
Specify group details
Step 2
Register targets

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.

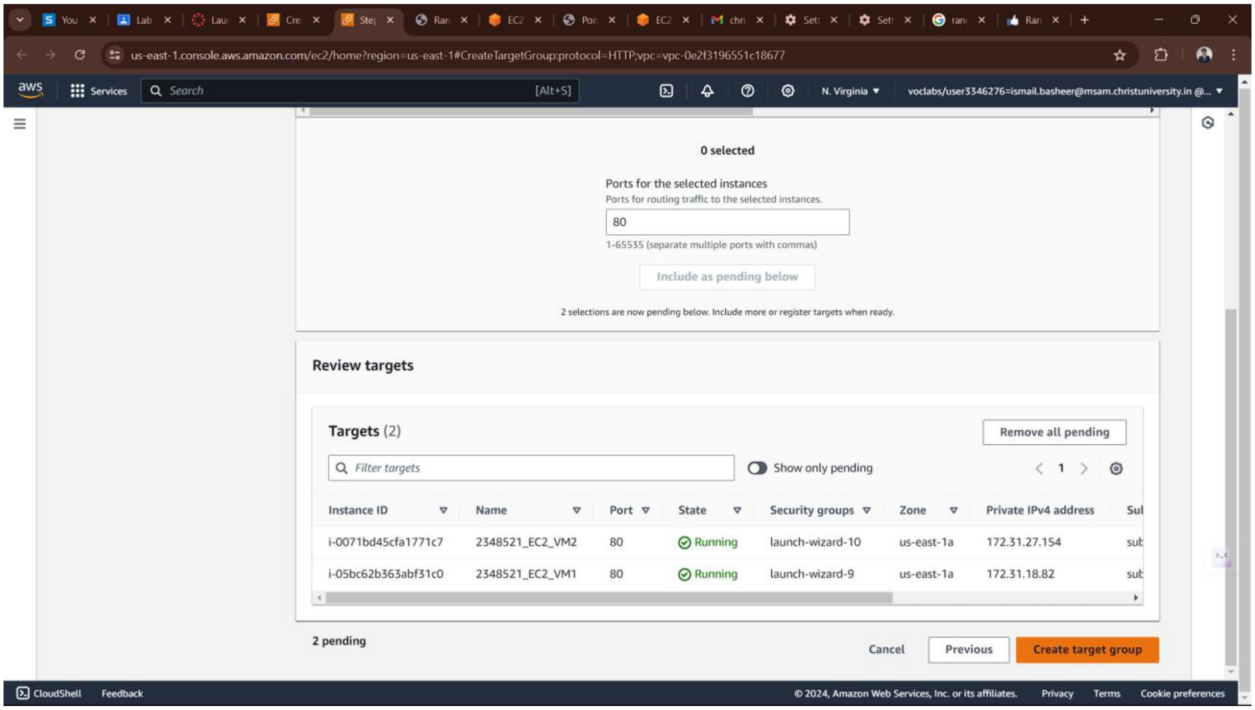
Available instances (2/2)

☑	Instance ID	Name	State	Security groups
☑	i-0071bd45cfa1771c7	2348521_EC2_VM2	Running	launch-wizard-10
☑	i-05bc62b363abf31c0	2348521_EC2_VM1	Running	launch-wizard-9

2 selected

Ports for the selected instances
Ports for routing traffic to the selected instances.
80
1-65535 (separate multiple ports with commas)

Review targets



us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#CreateTargetGroup:protocol=HTTP;vpc=vpc-0e2f3196551c18677
Services
Search
[Alt+S]
N. Virginia
voclabs/user3346276=ismail.basheer@msam.christuniversity.in @...

0 selected

Ports for the selected instances
Ports for routing traffic to the selected instances.

80

1-65535 (separate multiple ports with commas)

2 selections are now pending below. Include more or register targets when ready.

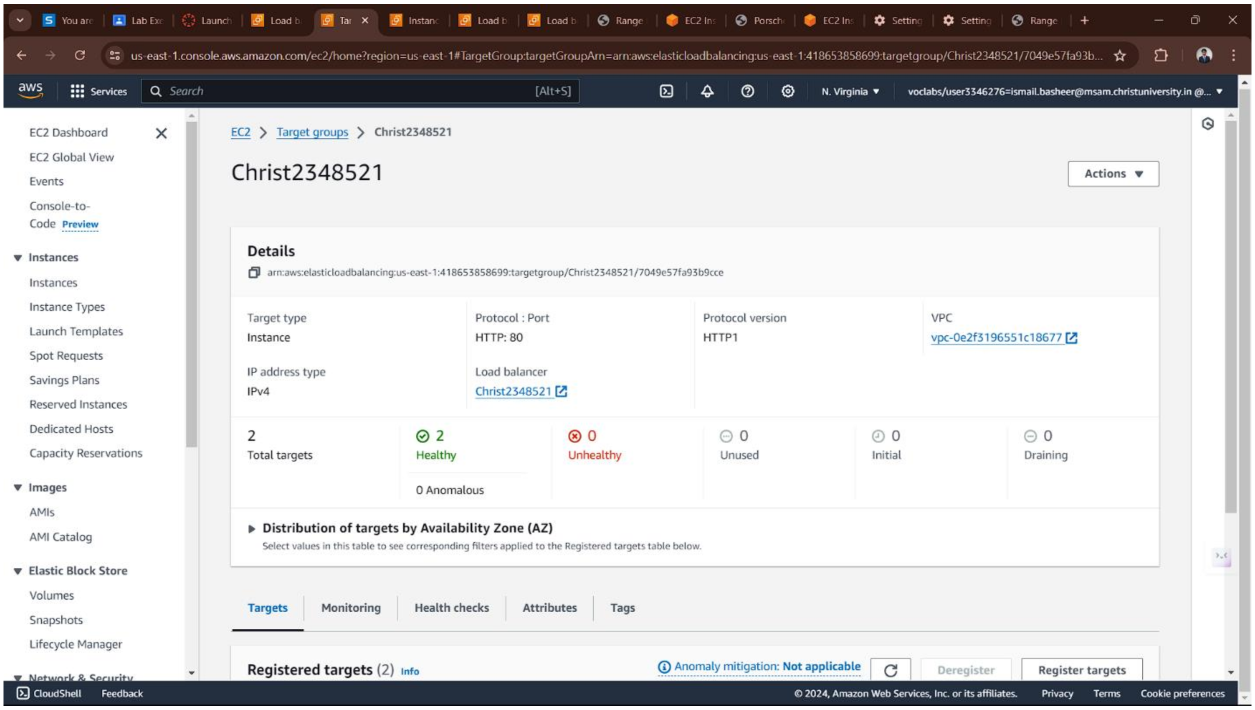
Review targets

Targets (2)

Remove all pending
Filter targets
Show only pending

Instance ID	Name	Port	State	Security groups	Zone	Private IPv4 address	Sul
i-0071bd45cfa1771c7	2348521_EC2_VM2	80	✓ Running	launch-wizard-10	us-east-1a	172.31.27.154	sub
i-05bc62b363abf31c0	2348521_EC2_VM1	80	✓ Running	launch-wizard-9	us-east-1a	172.31.18.82	sub

2 pending



Christ2348521

Details

arn:aws:elasticloadbalancing:us-east-1:418653858699:targetgroup/Christ2348521/7049e57fa93b9cce

Target type: Instance

Protocol : Port: HTTP: 80

Protocol version: HTTP1

VPC: vpc-0e2f3196551c18677

IP address type: IPv4

Load balancer: Christ2348521

2 Total targets

✓ 2 Healthy

0 Anomalous

⊗ 0 Unhealthy

0 Unused

0 Initial

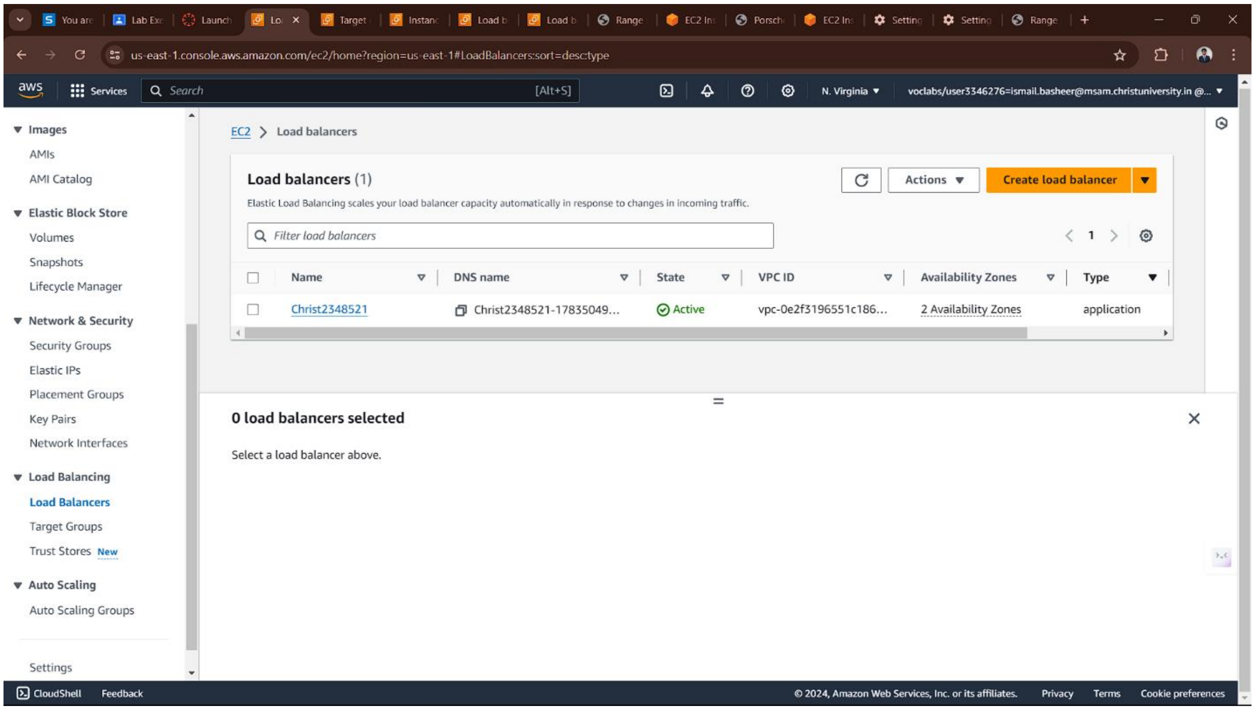
0 Draining

Distribution of targets by Availability Zone (AZ)

Select values in this table to see corresponding filters applied to the Registered targets table below.

Registered targets (2)

Info
Anomaly mitigation: Not applicable
Deregister
Register targets
CloudShell
Feedback
© 2024, Amazon Web Services, Inc. or its affiliates.
Privacy
Terms
Cookie preferences



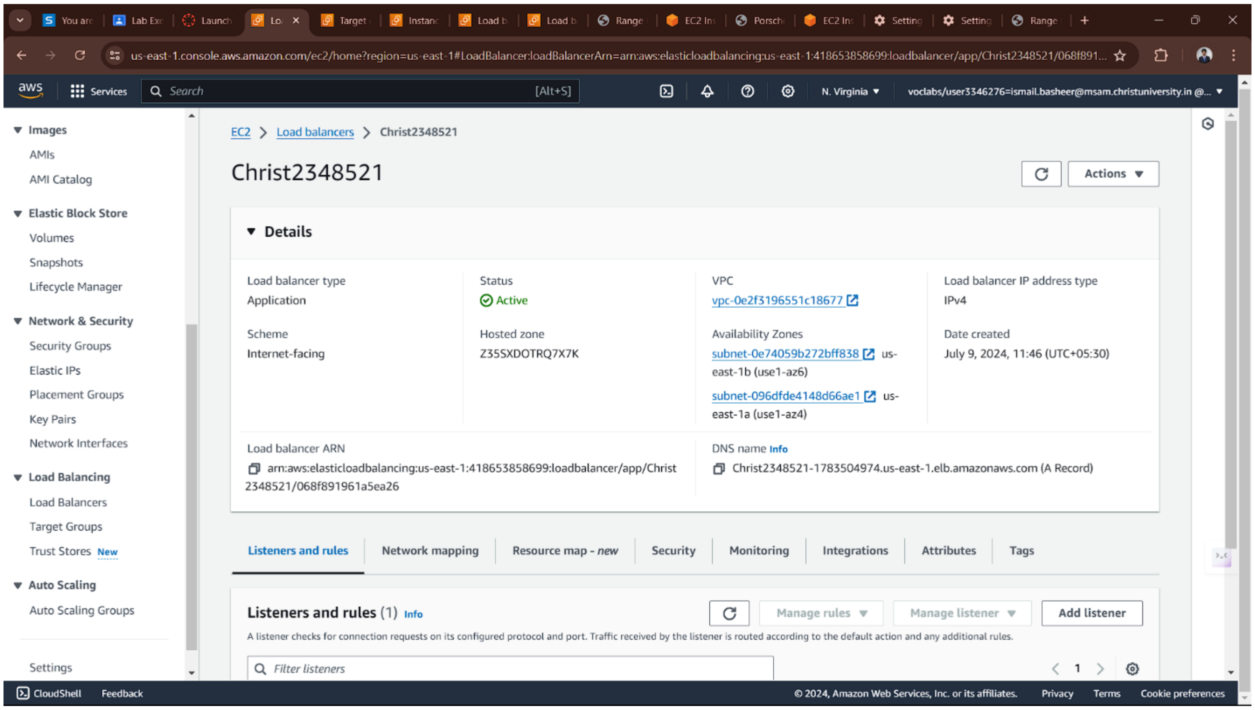
Load balancers (1)

Elastic Load Balancing scales your load balancer capacity automatically in response to changes in incoming traffic.

Name	DNS name	State	VPC ID	Availability Zones	Type
Christ2348521	Christ2348521-17835049...	Active	vpc-0e2f3196551c186...	2 Availability Zones	application

0 load balancers selected

Select a load balancer above.



us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#LoadBalancer:loadBalancerArn=arn:aws:elasticloadbalancing:us-east-1:418653858699:loadbalancer/app/Christ2348521/068f891...
Services
Search
N. Virginia
voclabs/user3346276=ismail.basheer@msam.christuniversity.in @...
EC2 > Load balancers > Christ2348521
Actions
Listeners and rules
Network mapping
Resource map - new
Security
Monitoring
Integrations
Attributes
Tags
Manage rules
Manage listener
Add listener
Filter listeners
CloudShell
Feedback
© 2024, Amazon Web Services, Inc. or its affiliates.
Privacy
Terms
Cookie preferences

Christ2348521

Details

Load balancer type: Application

Status: Active

VPC: vpc-0e2f3196551c18677

Load balancer IP address type: IPv4

Scheme: Internet-facing

Hosted zone: Z35SXDOTRQ7X7K

Availability Zones: subnet-0e74059b272bff838 us-east-1b (use1-az6); subnet-096dfde4148d66ae1 us-east-1a (use1-az4)

Date created: July 9, 2024, 11:46 (UTC+05:30)

Load balancer ARN: arn:aws:elasticloadbalancing:us-east-1:418653858699:loadbalancer/app/Christ2348521/068f891961a5ea26

DNS name Info: Christ2348521-1783504974.us-east-1.elb.amazonaws.com (A Record)

Listeners and rules (1) Info

A listener checks for connection requests on its configured protocol and port. Traffic received by the listener is routed according to the default action and any additional rules.

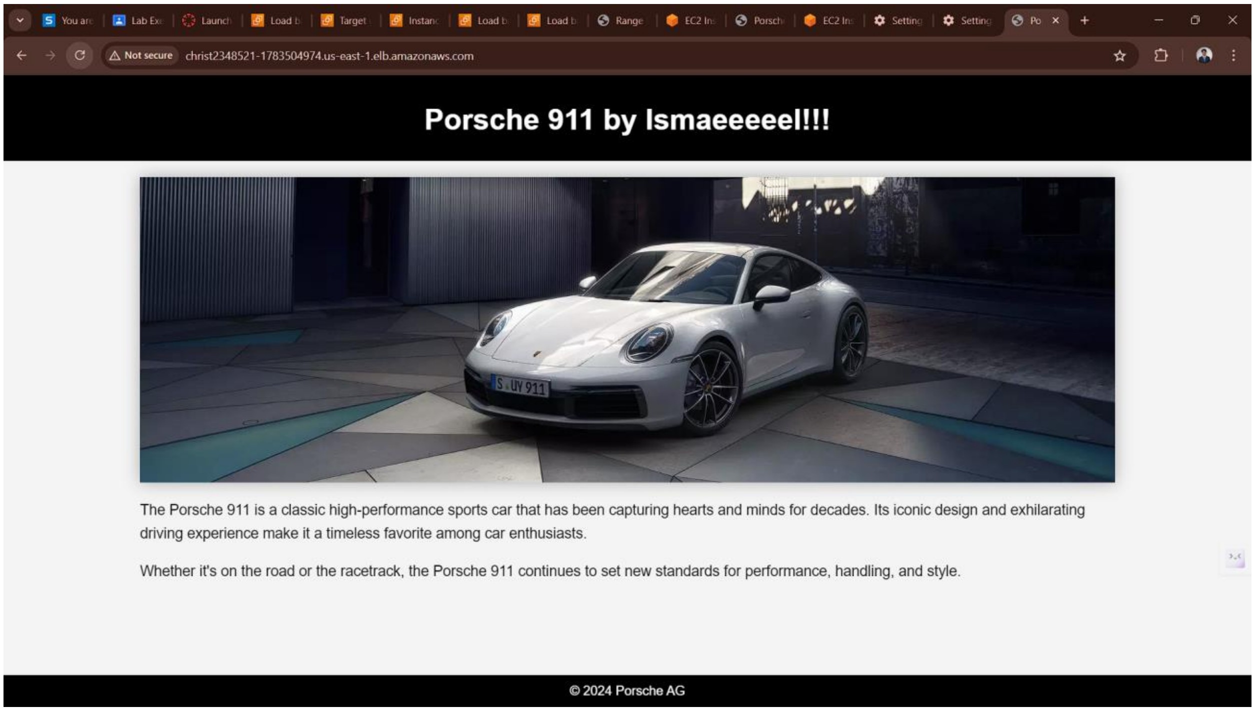
During the creation of the load balancer we have to ensure that the security groups of our instances are properly mentioned.

Also the availability zones should be the same as the instance's zone,here I used (us-east-1b and us-east-1a). The protocol is HTTP-80.

During target group creation both the instances should be included in the same target group, with ipv4 and HTTP 80 port.

NOW ACCESSING THE 2 INSTANCES USING THE DNS NAME OF THE LOAD BALANCER

ACCESSING VM1 WEBPAGE



christ2348521-1783504974.us-east-1.elb.amazonaws.com

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Whether it's on the road or the racetrack, the Porsche 911 continues to set new standards for performance, handling, and style.

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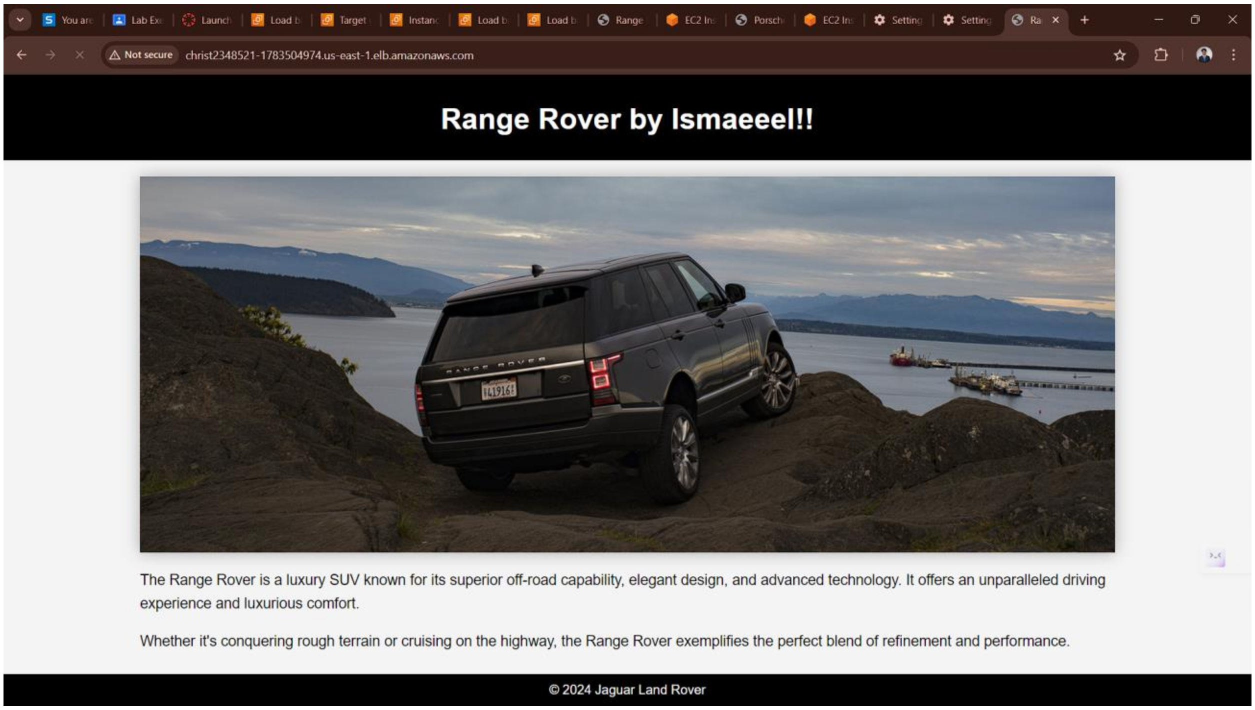
AFTER REFRESHING WE GET VM2 WEBPAGE



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Whether it's conquering rough terrain or cruising on the highway, the Range Rover exemplifies the perfect blend of refinement and performance.

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If you look carefully by checking the URL we can see the load balancer is switching from 2348521_EC2_VM1 to 2348521_EC2_VM2.

SUMMARY:

On accessing the load balancer we get the webpage on vm1, but on refreshing the webpage we get the webpage on vm2. This indicates that our load balancer is working properly as it is switching from instance vm1 to vm2 and vice versa to balance the load efficiently.