Project: Scalable WordPress Deployment on AWS

Group 8

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Course Code: INFO2350

Instructor: Amarpreet Sigh

Due Date: 30th March 2025

Contents

Project Overview:

This project uses CloudFormation templates to establish a scalable and highly available WordPress service on AWS. Several AWS services will be used in the completely automated deployment to guarantee security, scalability, and performance. CloudFormation templates will be used exclusively for deployment; no manual user interface modifications will be made.

The WordPress website will be housed on several EC2 instances with an Application Load Balancer (ALB) to disperse traffic effectively. An Auto Scaling Group (ASG) will guarantee automatic scaling in response to demand. For increased dependability and data consistency, Amazon RDS (MySQL) will be used to administer the WordPress database. CloudWatch will also be utilized to log activities and track infrastructure performance.

Objectives:

- Use AWS CloudFormation to automate the deployment of WordPress.
- Set up a scalable and safe AWS architecture.
- Make sure WordPress has fault tolerance and high availability.
- Use Amazon RDS as the database for the backend.
- AWS CloudWatch is used to maintain and monitor the infrastructure.
- Reduce the amount of work required by applying the infrastructure-as-code concept.

Architecture Components:

Networking:

- **Amazon VPC & Subnets:** This customized Virtual Private Cloud (VPC) has both public and private subnets to improve security and scalability.
- **Internet Gateways and Route Tables:** Route tables and an internet gateway provide external connectivity for the visible parts to the public.
- **Network ACLs and Security Groups:** Prevent unwanted access while permitting necessary services.

Compute & Load Balancing:

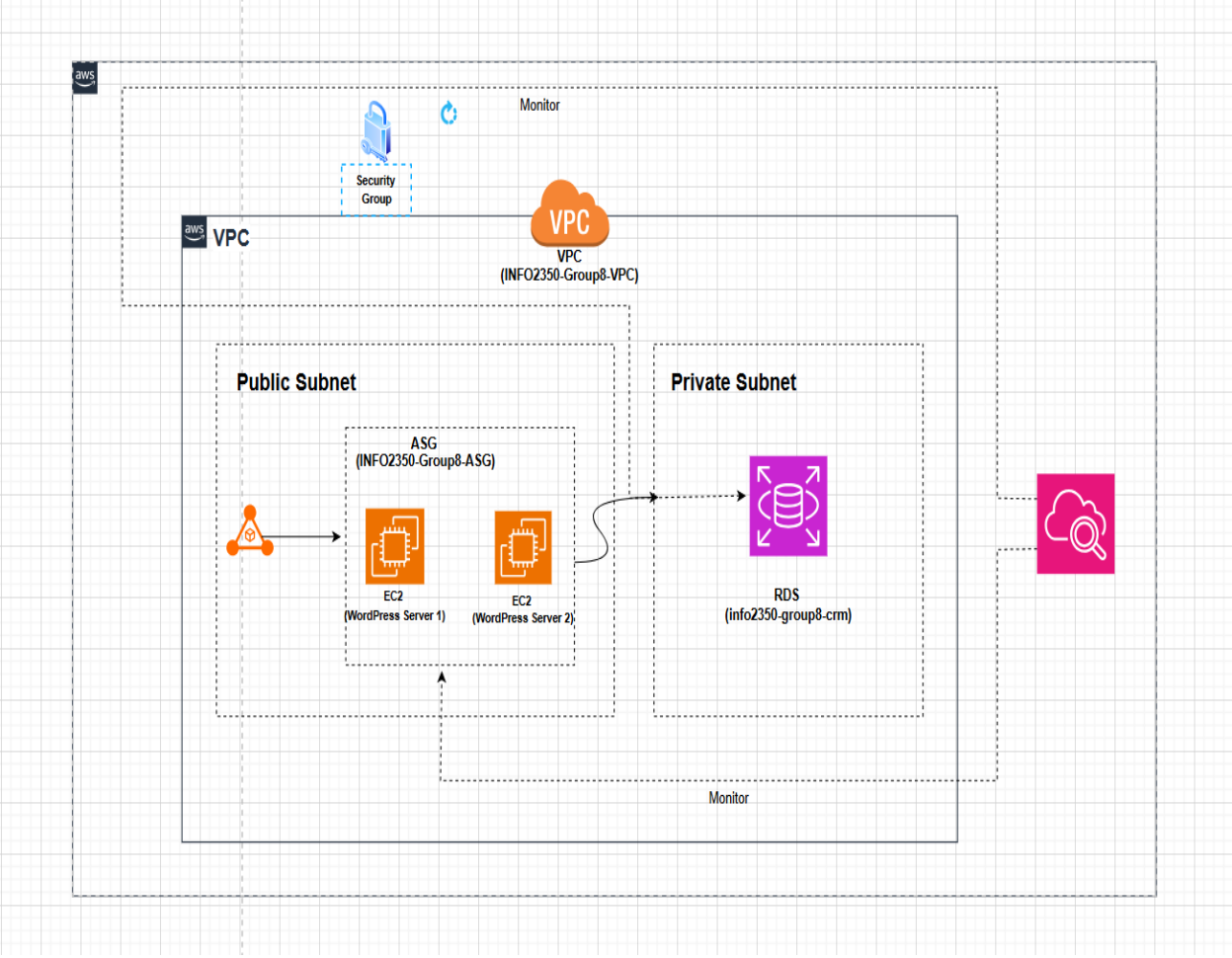
- **2 x EC2 Instances (WordPress Servers):** Two WordPress servers, or EC2 instances, host the WordPress program with Apache, PHP, and other required settings.
- **Application Load Balancer (ALB):** By distributing incoming traffic evenly among EC2 instances, the Application Load Balancer (ALB) improves dependability and performance.
- **Auto Scaling Group (ASG):** The Auto Scaling Group (ASG) automatically adds or removes EC2 instances in response to demand, ensuring dynamic scalability.

Database:

- **Amazon RDS:** A managed relational database service with improved availability and automated backups is offered by Amazon RDS (MySQL).
- **Private Subnet Placement**: Private subnet placement ensures security by blocking the database from being accessed from the public internet.

Monitoring & Logging:

- **Amazon CloudWatch:** This makes it possible to log and monitor EC2 instances, ALB, RDS, and system performance in real time.
- **AWS CloudTrail:** Monitors API requests for security research and auditing.



Deployment Instructions

1. Prepare AWS Environment:

- Make sure you have an administratively authorized AWS account.
- Set up CloudFormation execution by configuring IAM roles and permissions.
- Check that the AWS CLI is configured for automation.

2. Deploy Network Infrastructure:

- Make a VPC with the proper public and private subnets.
- Establish security groups, internet gateways, and route tables.
- Use the network.yaml CloudFormation template to deploy network components.

3. Deploy Application Layer:

- In the ASG, start EC2 instances.
- Set up the installation scripts for WordPress, PHP, and Apache.
- ALB ought to be set up for traffic distribution.
- Use the WordPress.yaml CloudFormation template for deployment.

4. Deploy Database Layer:

- Provide a private subnet for Amazon RDS (MySQL).
- Set up security settings and parameter groups.
- Connect the RDS instance to EC2 instances.

5. Configure Monitoring & Security:

- Turn on CloudWatch alerts and logging.
- Set up least-privilege access for IAM roles.
- Verify security group rules to make sure necessary services are permitted.

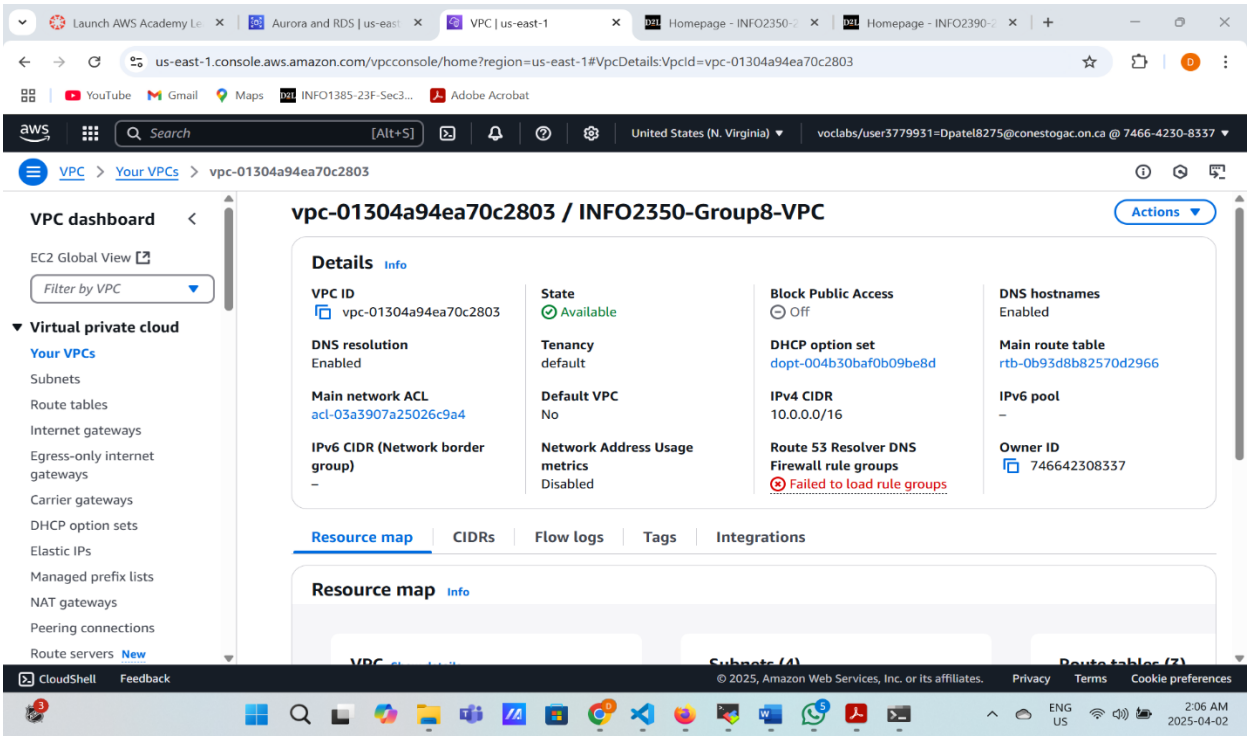
6. Testing & Validation:

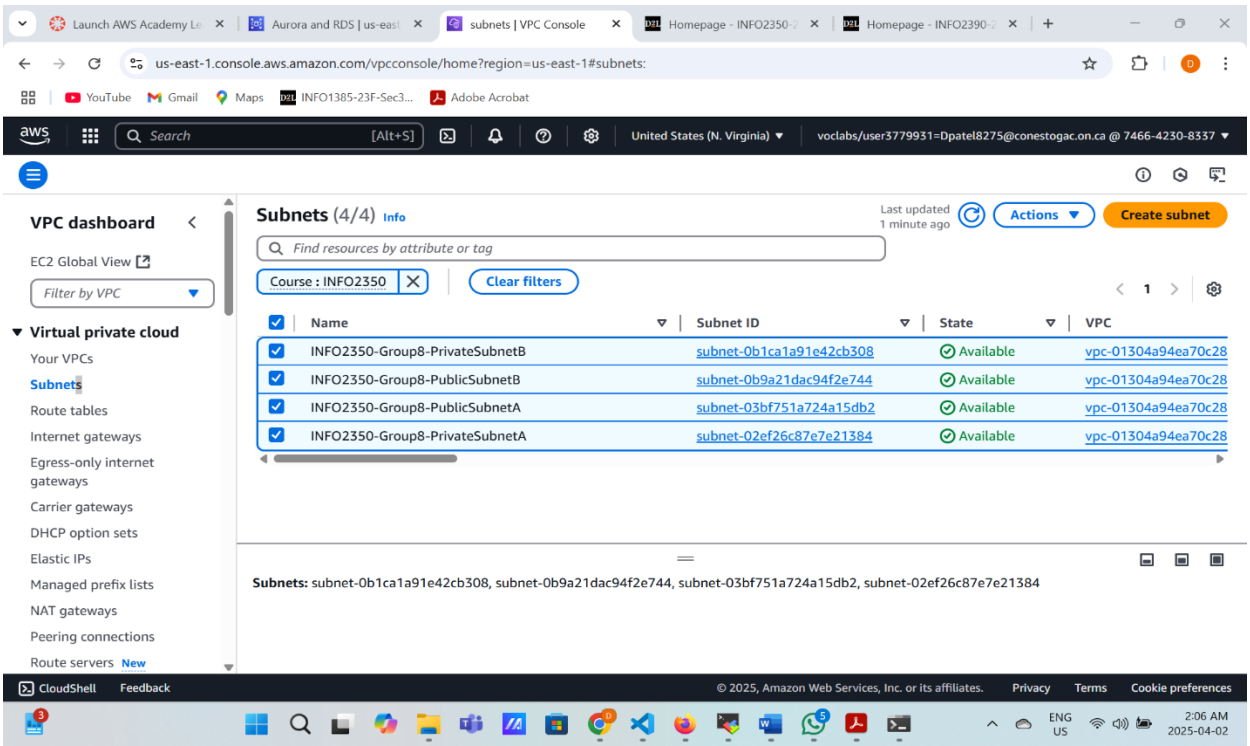
- Use the ALB URL to confirm if the website is available.
  - **http://info2350-group8-alb-1010922734.us-east-1.elb.amazonaws.com/wp-admin/edit.php**
  - **Username – admin**
  - **Password - MySecurePassword123**
- Check the WordPress instances' database connectivity.
- Simulate load circumstances to keep an eye on ASG behaviour.
- Record activities and performance metrics.

Project

Screenshots:

→ Amazon VPC & Subnets





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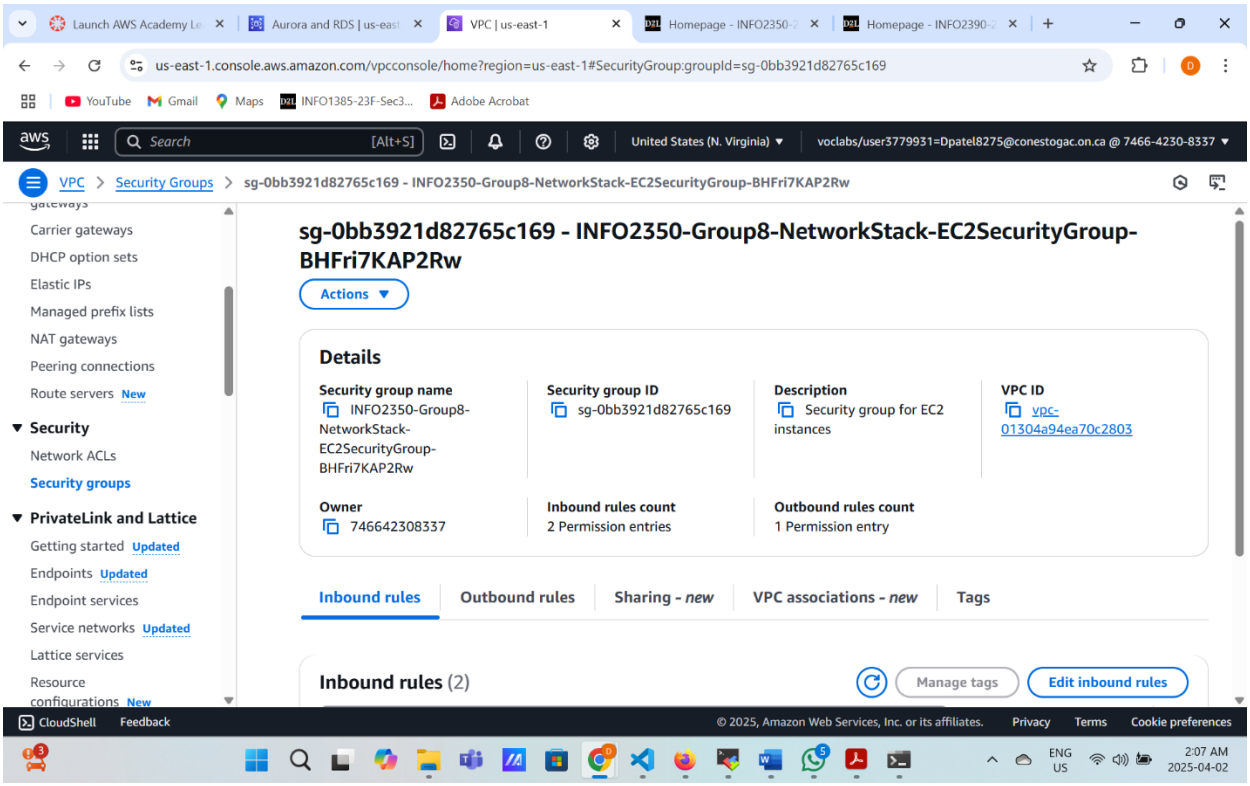
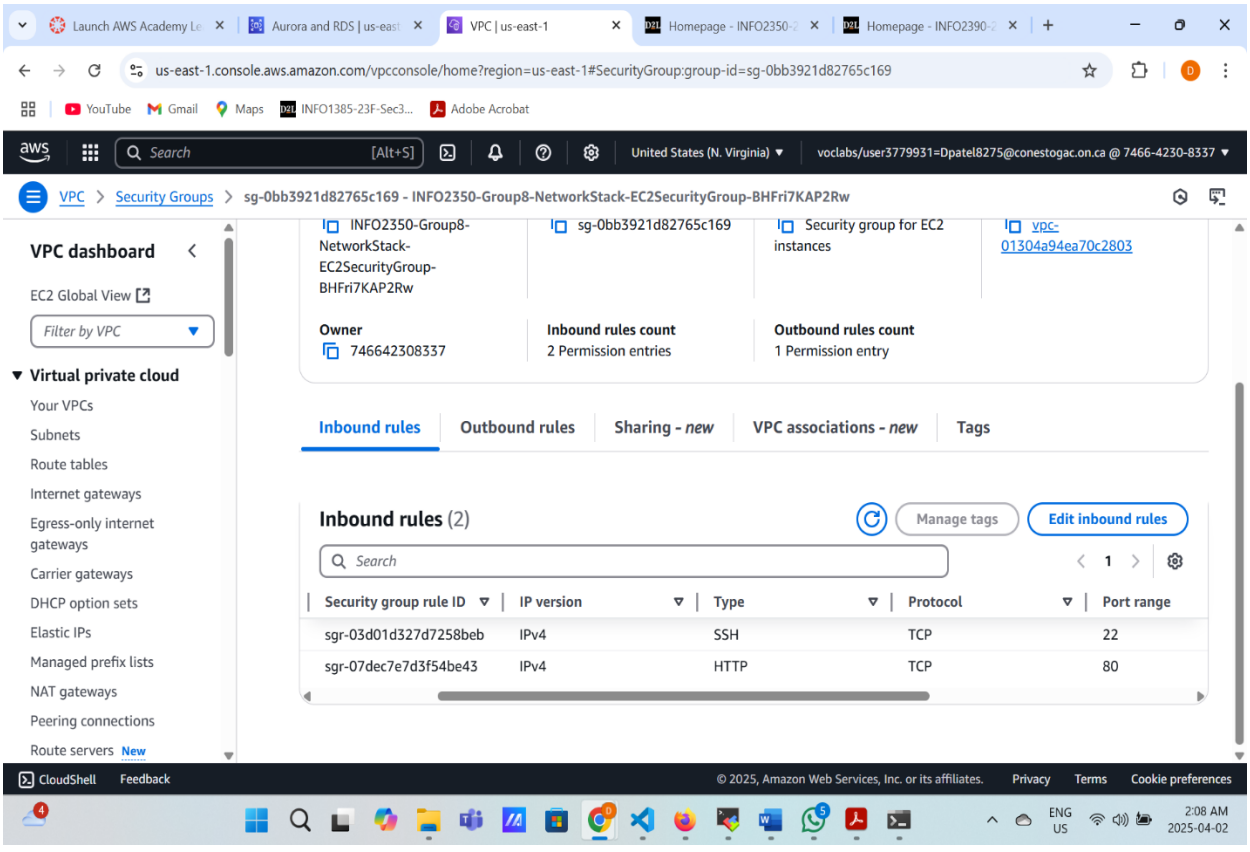
→ Security Group





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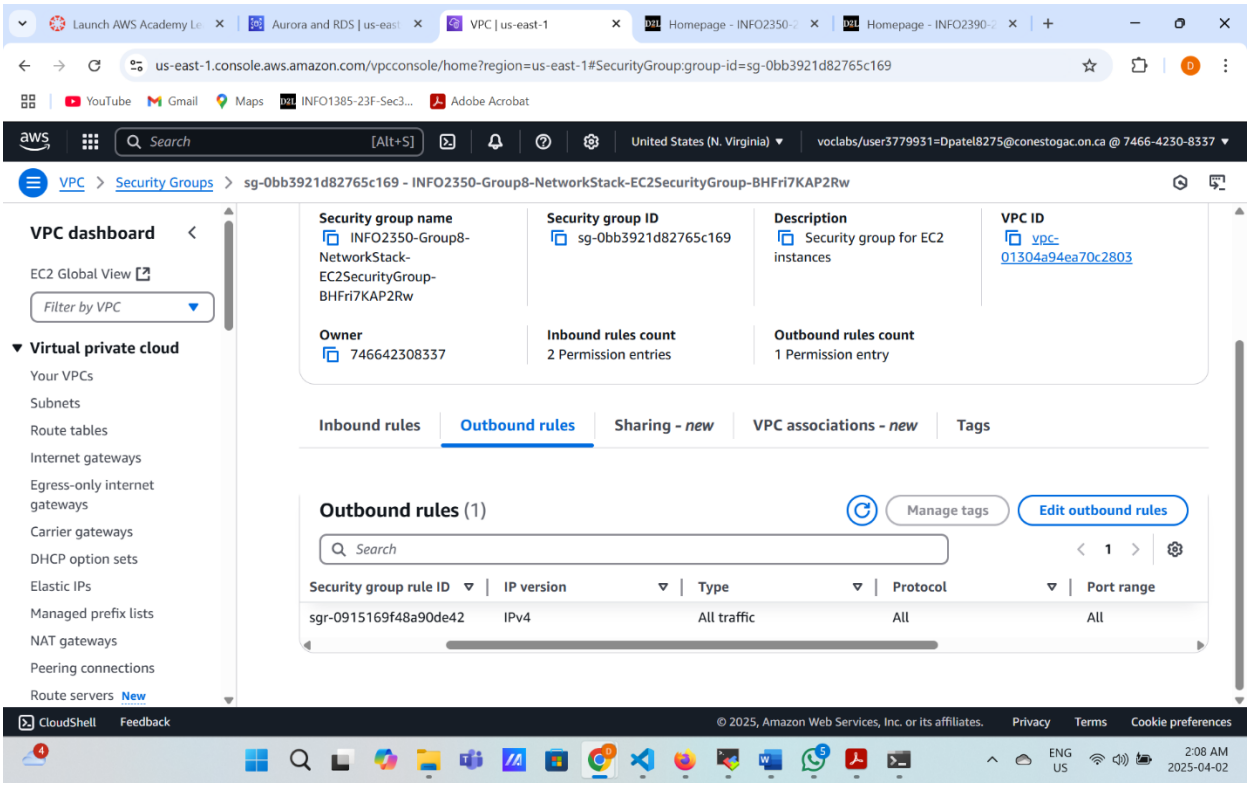
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VPC dashboard
Security group name
INFO2350-Group8-NetworkStack-EC2SecurityGroup-BHFri7KAP2Rw
Security group ID
sg-0bb3921d82765c169
Description
Security group for EC2 instances
VPC ID
vpc-01304a94ea70c2803
Owner
746642308337
Inbound rules count
2 Permission entries
Outbound rules count
1 Permission entry
Inbound rules
Outbound rules
Sharing - new
VPC associations - new
Tags
Outbound rules (1)
Manage tags
Edit outbound rules
Search
Security group rule ID
IP version
Type
Protocol
Port range
sgr-0915169f48a90de42
IPv4
All traffic
All
All
CloudShell
Feedback
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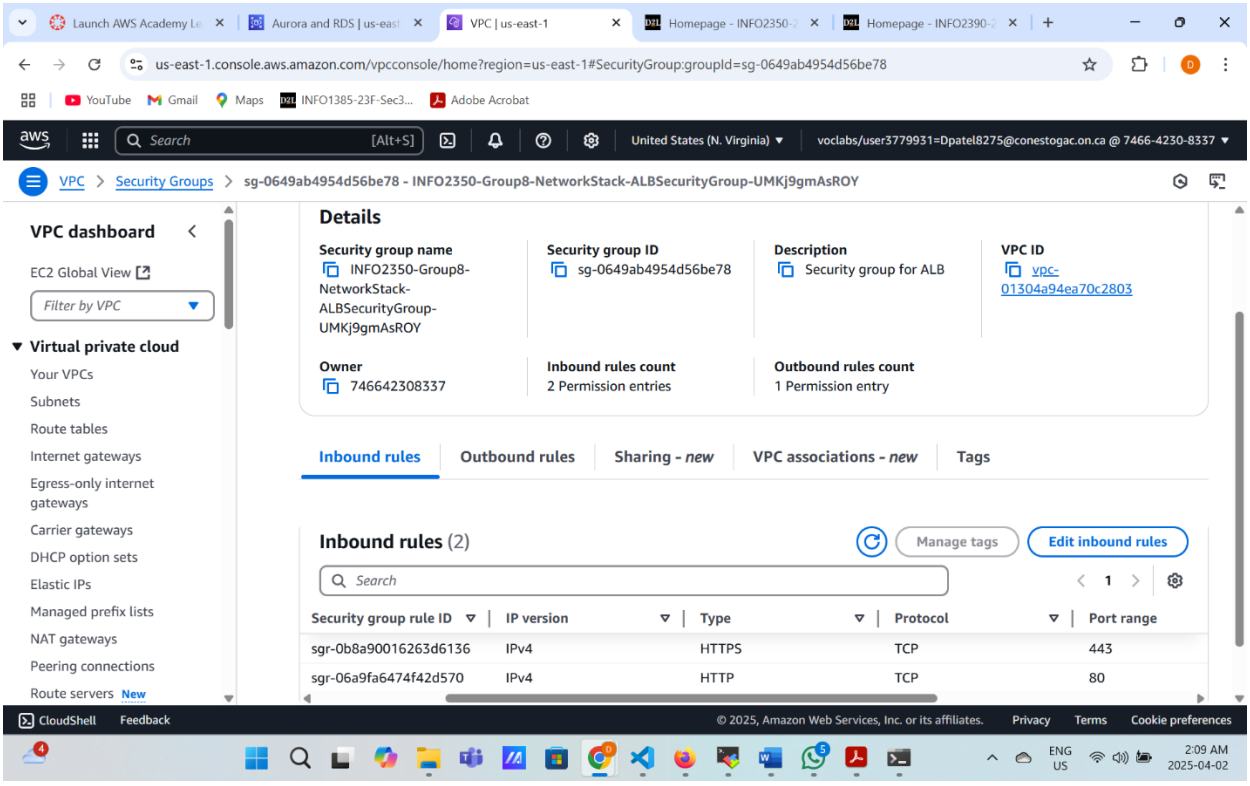
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VPC > Security Groups > sg-0649ab4954d56be78 - INFO2350-Group8-NetworkStack-ALBSecurityGroup-UMKj9gmAsROY
Details
VPC dashboard
Security group name
INFO2350-Group8-NetworkStack-ALBSecurityGroup-UMKj9gmAsROY
Security group ID
sg-0649ab4954d56be78
Description
Security group for ALB
VPC ID
vpc-01304a94ea70c2803
Owner
746642308337
Inbound rules count
2 Permission entries
Outbound rules count
1 Permission entry
Inbound rules
Outbound rules
Sharing - new
VPC associations - new
Tags
Inbound rules (2)
Manage tags
Edit inbound rules
Search
Security group rule ID
IP version
Type
Protocol
Port range
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IPv4
HTTPS
TCP
443
sgr-06a9fa6474f42d570
IPv4
HTTP
TCP
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CloudShell
Feedback
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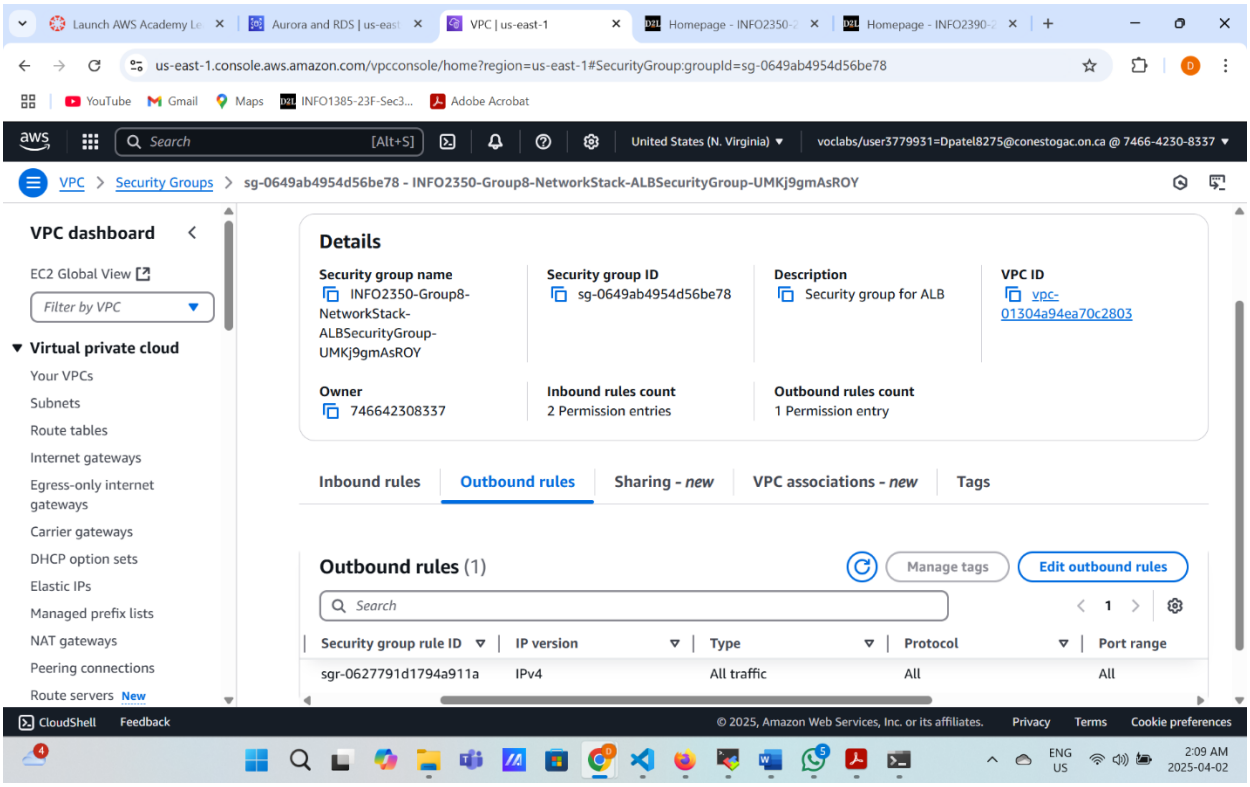
us-east-1.console.aws.amazon.com/vpcconsole/home?region=us-east-1#SecurityGroup:groupId=sg-0649ab4954d56be78
VPC > Security Groups > sg-0649ab4954d56be78 - INFO2350-Group8-NetworkStack-ALBSecurityGroup-UMKj9gmAsROY
VPC dashboard
EC2 Global View
Filter by VPC
Virtual private cloud
Your VPCs
Subnets
Route tables
Internet gateways
Egress-only internet gateways
Carrier gateways
DHCP option sets
Elastic IPs
Managed prefix lists
NAT gateways
Peering connections
Route servers New
Details
Security group name
INFO2350-Group8-NetworkStack-ALBSecurityGroup-UMKj9gmAsROY
Security group ID
sg-0649ab4954d56be78
Description
Security group for ALB
VPC ID
vpc-01304a94ea70c2803
Owner
746642308337
Inbound rules count
2 Permission entries
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1 Permission entry
Inbound rules
Outbound rules
Sharing - new
VPC associations - new
Tags
Outbound rules (1)
Manage tags
Edit outbound rules
Search
Security group rule ID
IP version
Type
Protocol
Port range
sgr-0627791d1794a911a
IPv4
All traffic
All
All
CloudShell
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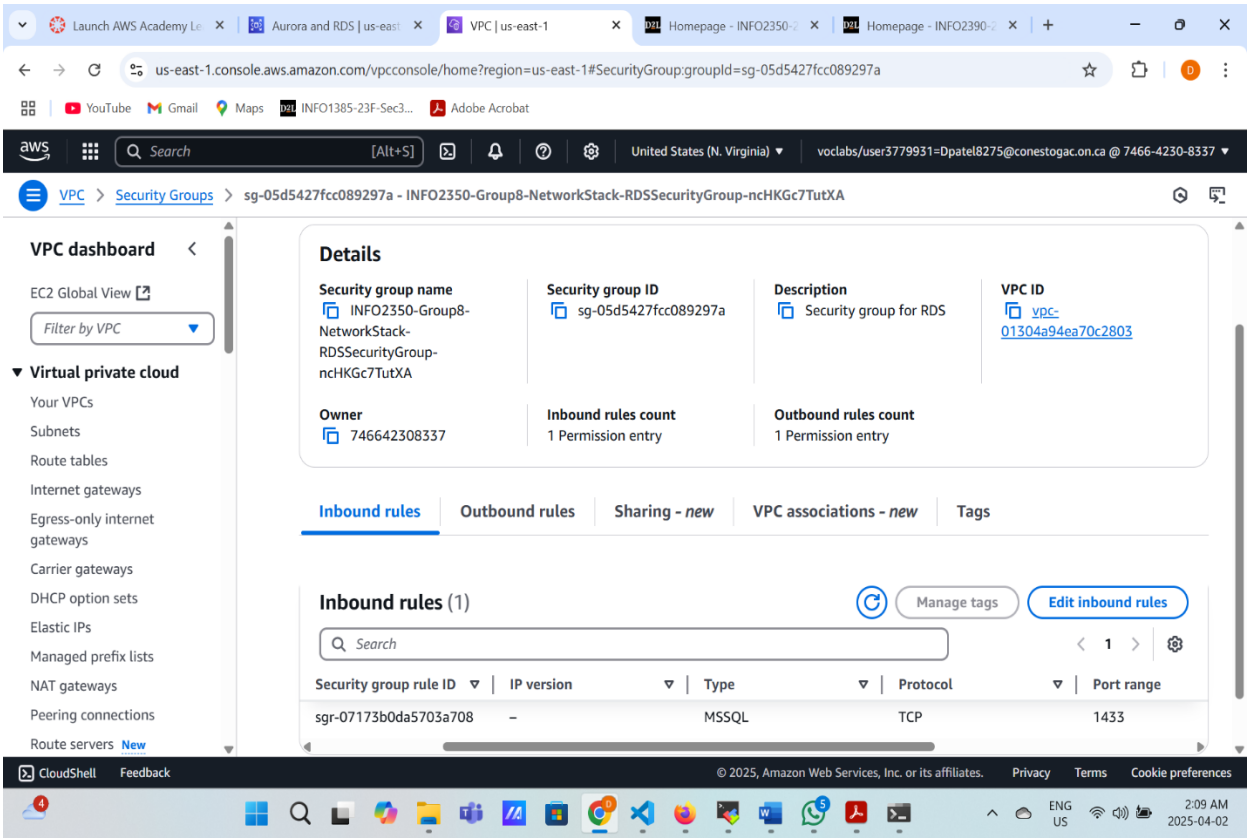
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VPC dashboard
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Security group name
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Security group ID
sg-05d5427fcc089297a
Description
Security group for RDS
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Owner
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Inbound rules count
1 Permission entry
Outbound rules count
1 Permission entry
Inbound rules
Outbound rules
Sharing - new
VPC associations - new
Tags
Inbound rules (1)
Manage tags
Edit inbound rules
Search
Security group rule ID
IP version
Type
Protocol
Port range
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–
MSSQL
TCP
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CloudShell
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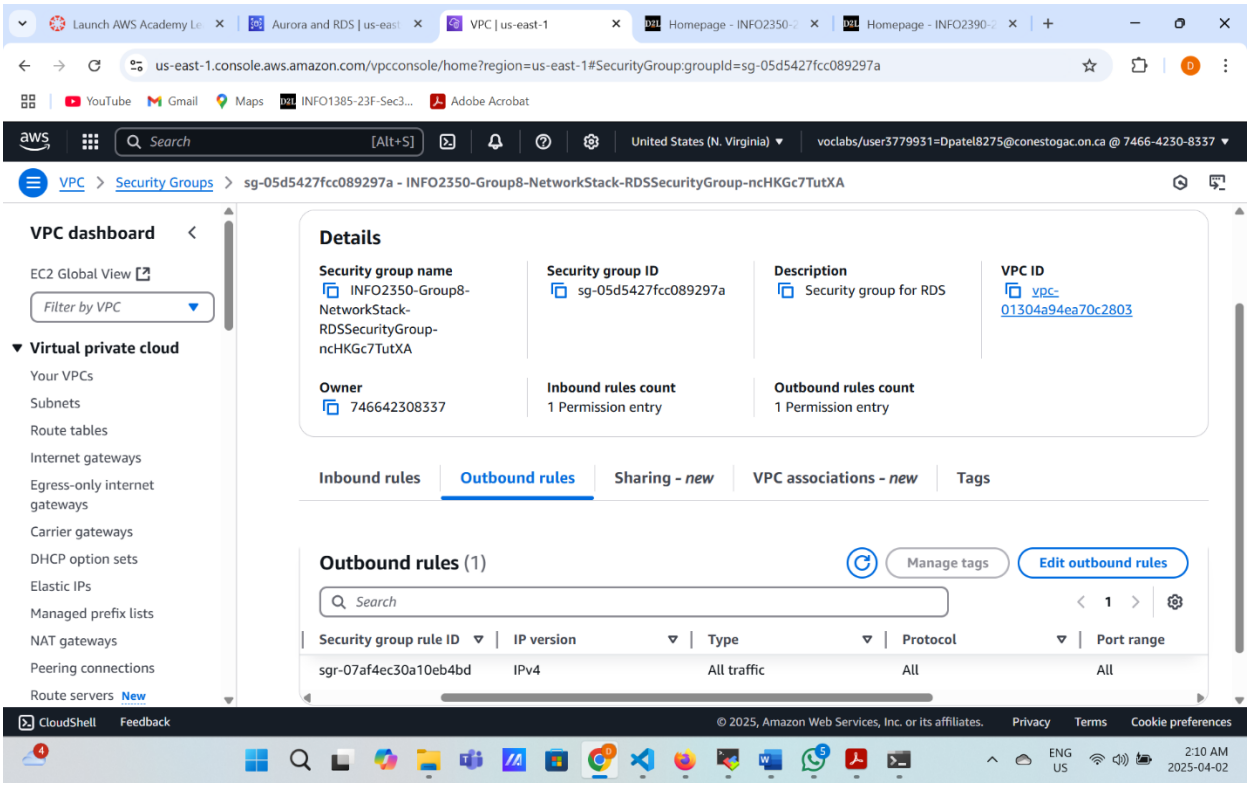
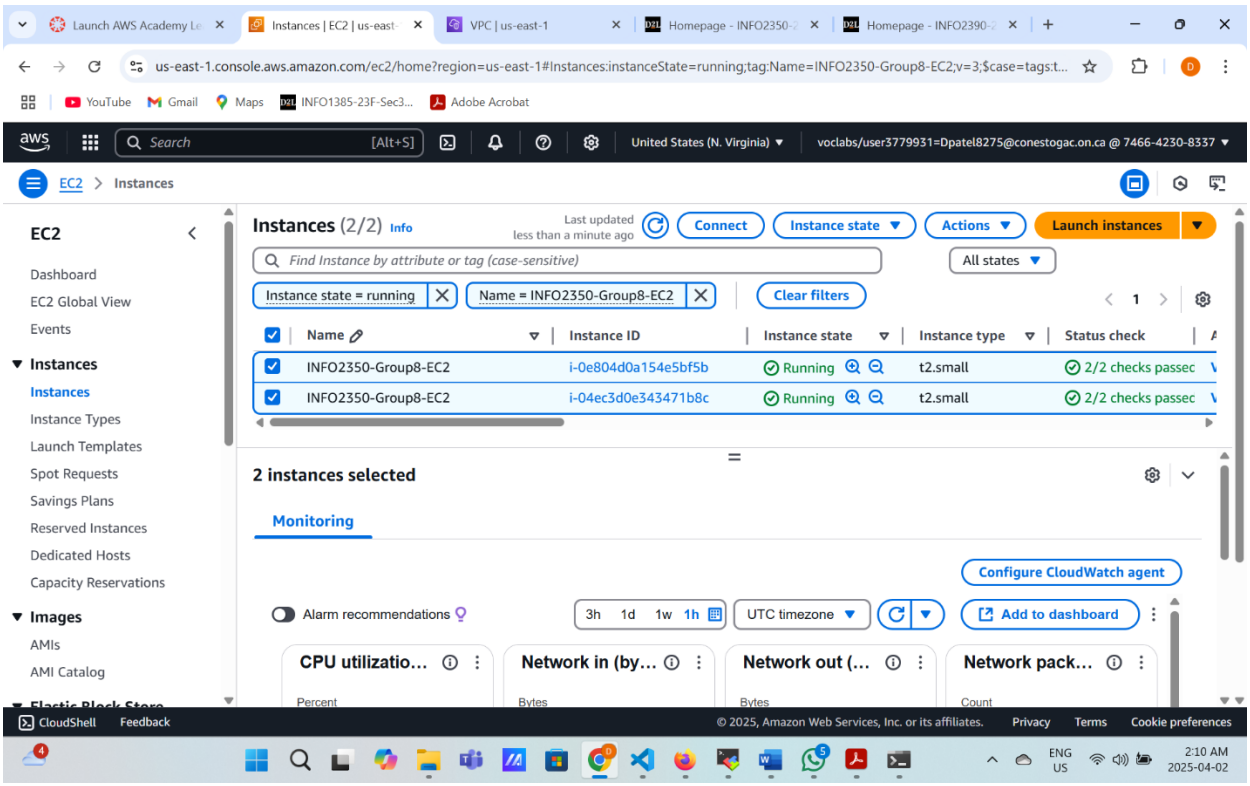


→ **2 x EC2 Instances (WordPress Server)**



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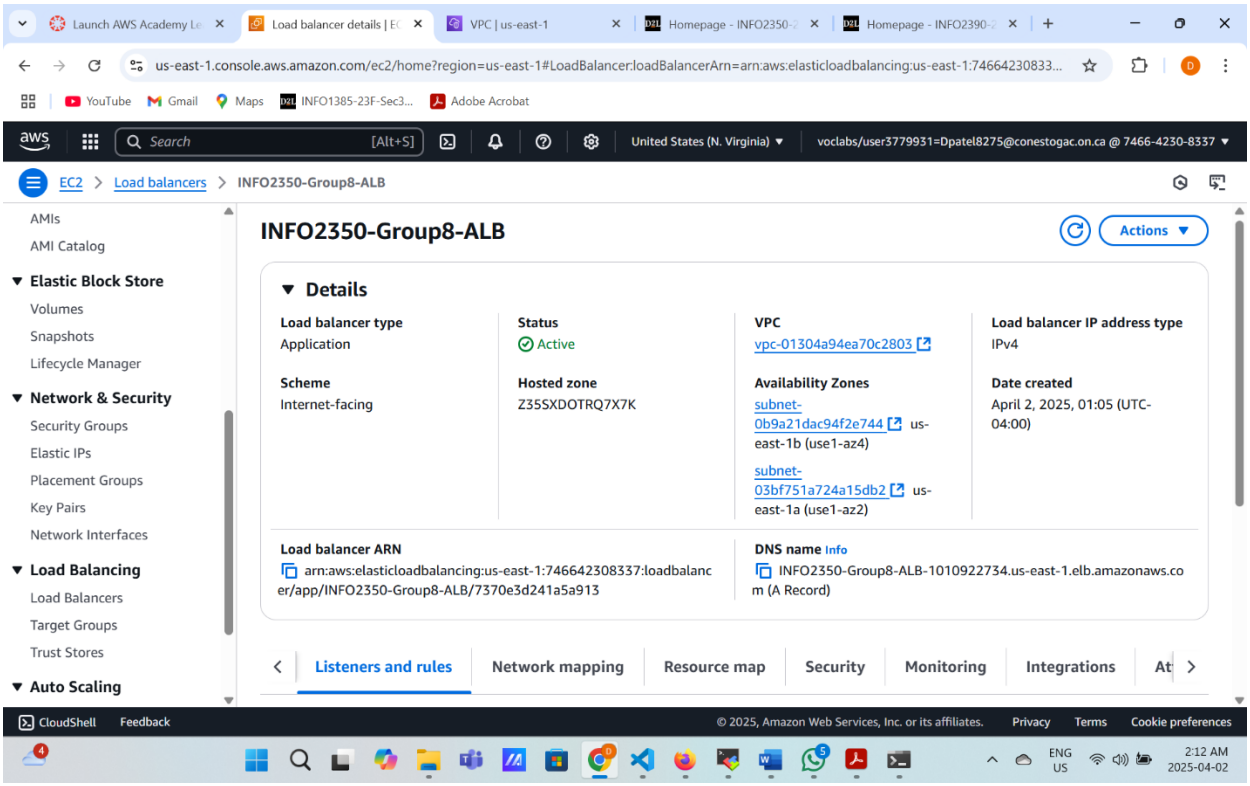
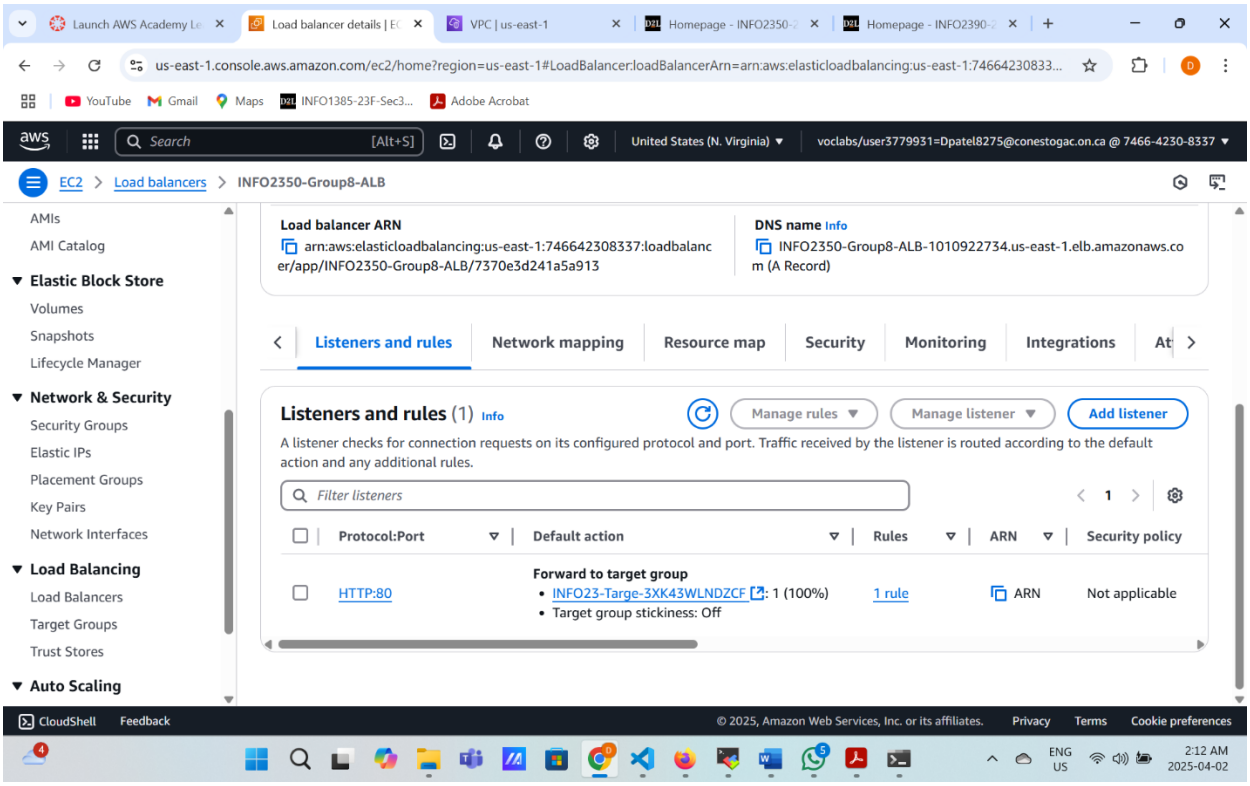
→ Application Load Balancer (ALB)





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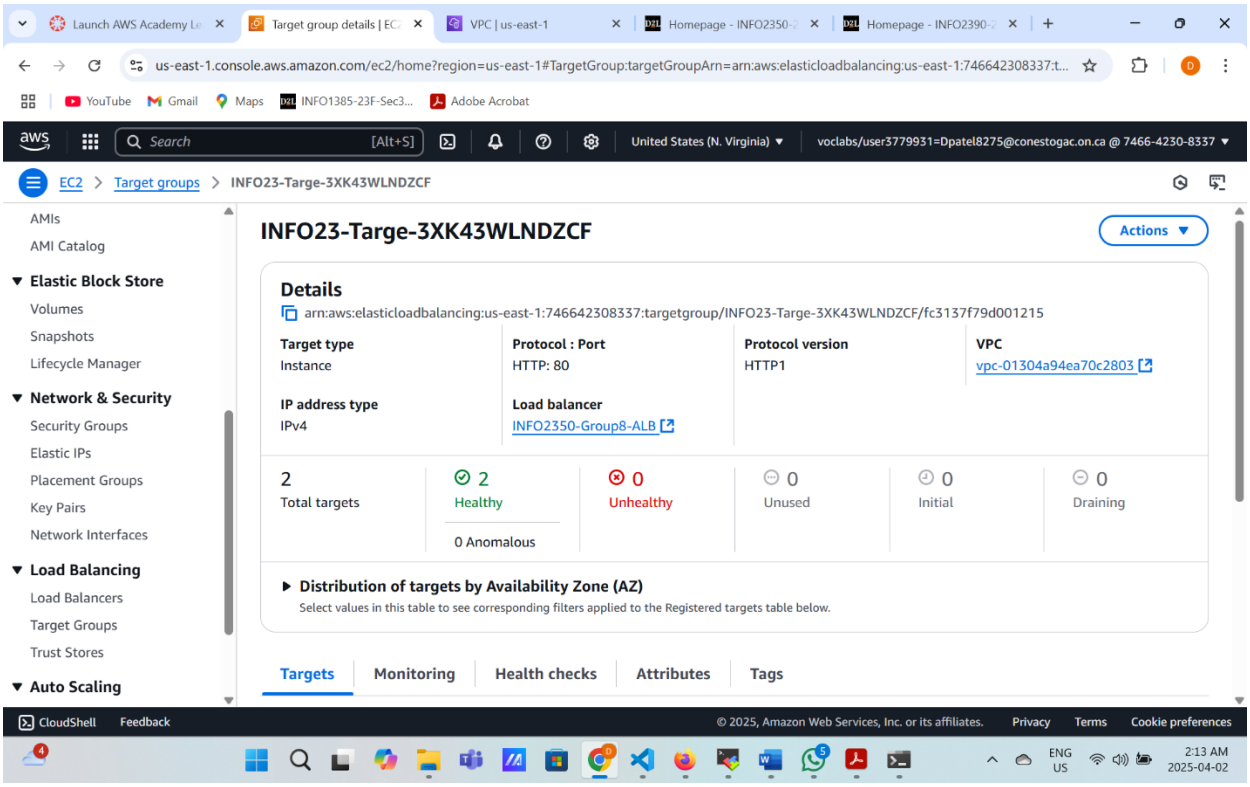
Launch AWS Academy Le
Target group details | EC
VPC | us-east-1
Homepage - INFO2350
Homepage - INFO2390
us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#TargetGroup:targetGroupArn=arn:aws:elasticloadbalancing:us-east-1:746642308337:t...
YouTube
Gmail
Maps
INFO1385-23F-Sec3...
Adobe Acrobat
Search
[Alt+S]
United States (N. Virginia)
voclabs/user3779931=Dpatel8275@conestogac.on.ca @ 7466-4230-8337
EC2
Target groups
INFO23-Targe-3XK43WLNDZCF
AMIs
AMI Catalog
Elastic Block Store
Volumes
Snapshots
Lifecycle Manager
Network & Security
Security Groups
Elastic IPs
Placement Groups
Key Pairs
Network Interfaces
Load Balancing
Load Balancers
Target Groups
Trust Stores
Auto Scaling
INFO23-Targe-3XK43WLNDZCF
Actions
Details
arn:aws:elasticloadbalancing:us-east-1:746642308337:targetgroup/INFO23-Targe-3XK43WLNDZCF/fc3137f79d001215
Target type
Instance
Protocol : Port
HTTP: 80
Protocol version
HTTP1
VPC
vpc-01304a94ea70c2803
IP address type
IPv4
Load balancer
INFO2350-Group8-ALB
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.
Targets
Monitoring
Health checks
Attributes
Tags
CloudShell
Feedback
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Terms
Cookie preferences
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US
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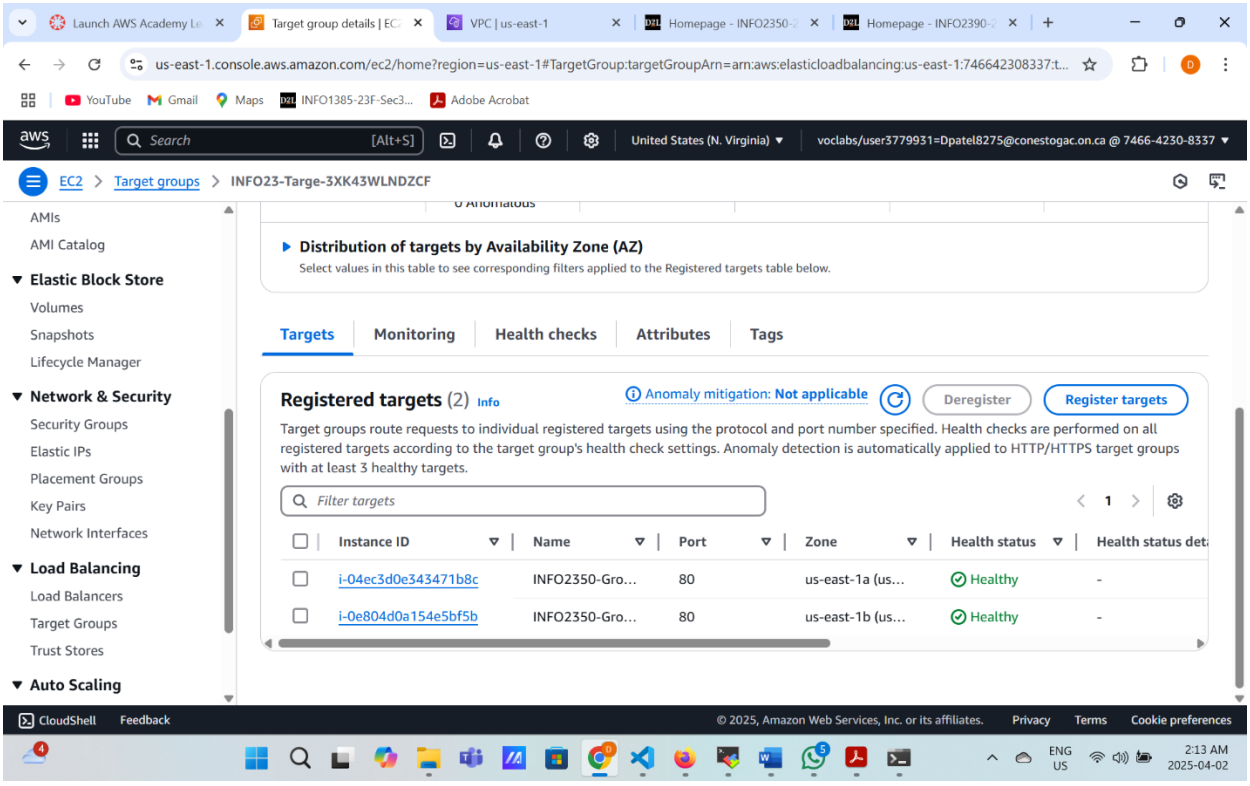
Launch AWS Academy Le
Target group details | EC
VPC | us-east-1
Homepage - INFO2350
Homepage - INFO2390
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YouTube
Gmail
Maps
INFO1385-23F-Sec3...
Adobe Acrobat
Search
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United States (N. Virginia)
voclabs/user3779931=Dpatel8275@conestogac.on.ca @ 7466-4230-8337
EC2
Target groups
INFO23-Targe-3XK43WLNDZCF
AMIs
AMI Catalog
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Volumes
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Network & Security
Security Groups
Elastic IPs
Placement Groups
Key Pairs
Network Interfaces
Load Balancing
Load Balancers
Target Groups
Trust Stores
Auto Scaling
Distribution of targets by Availability Zone (AZ)
Select values in this table to see corresponding filters applied to the Registered targets table below.
Targets
Monitoring
Health checks
Attributes
Tags
Registered targets (2) Info
Anomaly mitigation: Not applicable
Deregister
Register targets
Target groups route requests to individual registered targets using the protocol and port number specified. Health checks are performed on all registered targets according to the target group's health check settings. Anomaly detection is automatically applied to HTTP/HTTPS target groups with at least 3 healthy targets.
Filter targets
Instance ID
Name
Port
Zone
Health status
Health status det
i-04ec3d0e343471b8c
INFO2350-Gro...
80
us-east-1a (us...
Healthy
i-0e804d0a154e5bf5b
INFO2350-Gro...
80
us-east-1b (us...
Healthy
CloudShell
Feedback
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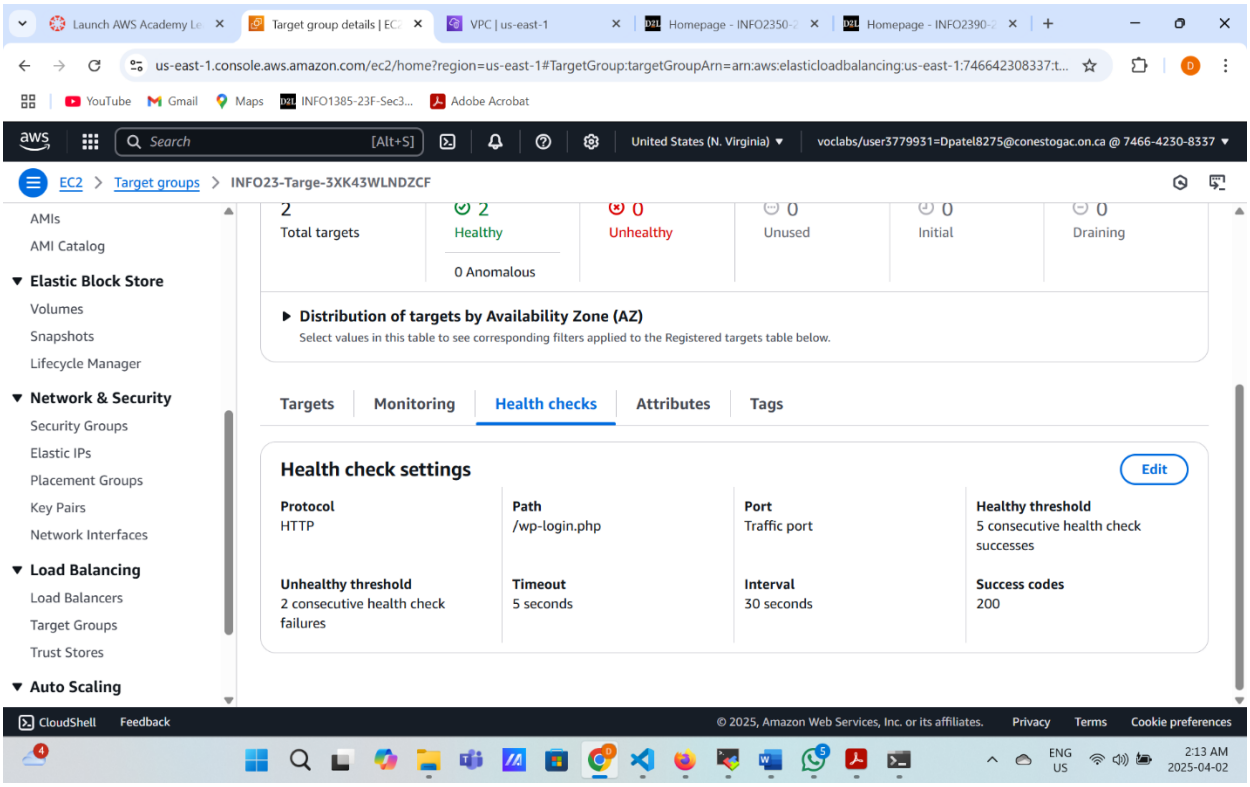
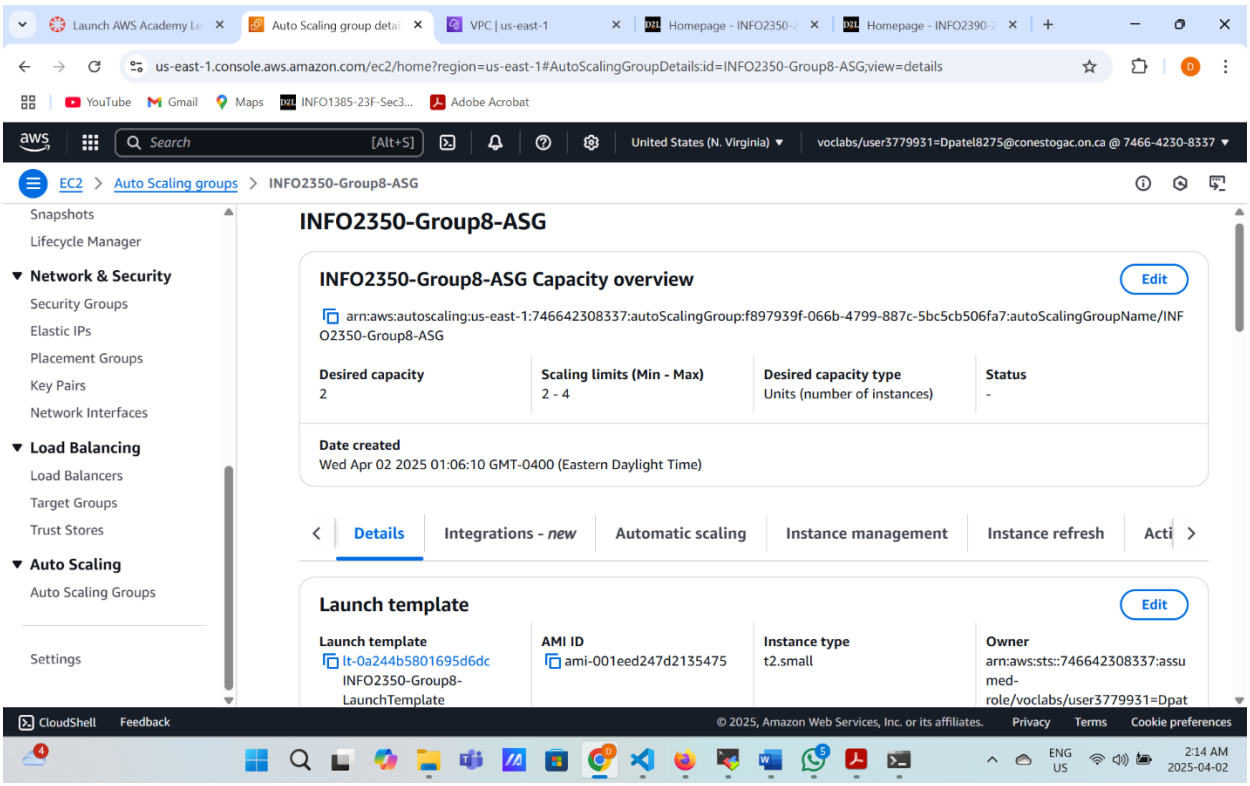


→ Auto Scaling Group (ASG)



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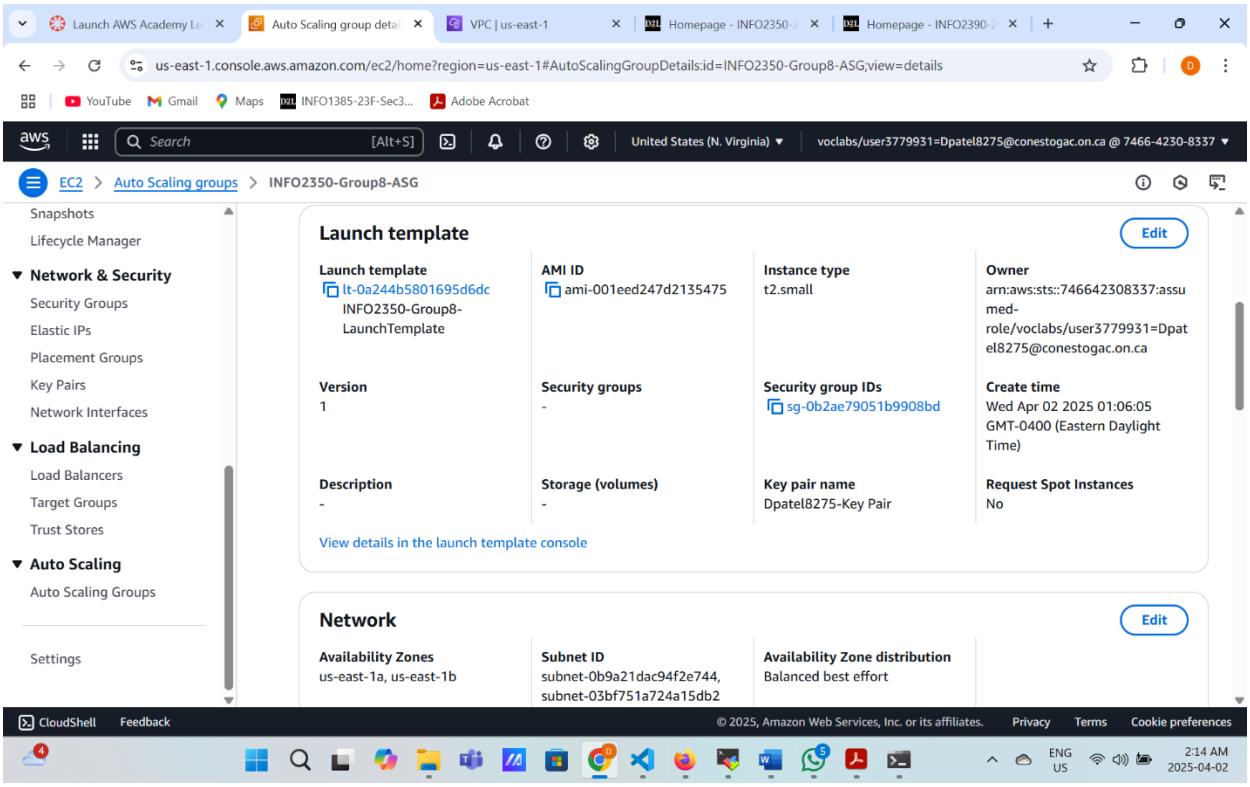
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EC2 > Auto Scaling groups > INFO2350-Group8-ASG
Launch template
Edit
Launch template
lt-0a244b5801695d6dc
INFO2350-Group8-LaunchTemplate
AMI ID
ami-001eed247d2135475
Instance type
t2.small
Owner
arn:aws:sts::746642308337:assumed-role/voclabs/user3779931=Dpatel8275@conestogac.on.ca
Version
1
Security groups
-
Security group IDs
sg-0b2ae79051b9908bd
Create time
Wed Apr 02 2025 01:06:05 GMT-0400 (Eastern Daylight Time)
Description
-
Storage (volumes)
-
Key pair name
Dpatel8275-Key Pair
Request Spot Instances
No
View details in the launch template console
Network
Edit
Availability Zones
us-east-1a, us-east-1b
Subnet ID
subnet-0b9a21dac94f2e744, subnet-03bf751a724a15db2
Availability Zone distribution
Balanced best effort
Network & Security
Security Groups
Elastic IPs
Placement Groups
Key Pairs
Network Interfaces
Load Balancing
Load Balancers
Target Groups
Trust Stores
Auto Scaling
Auto Scaling Groups
Settings
CloudShell
Feedback
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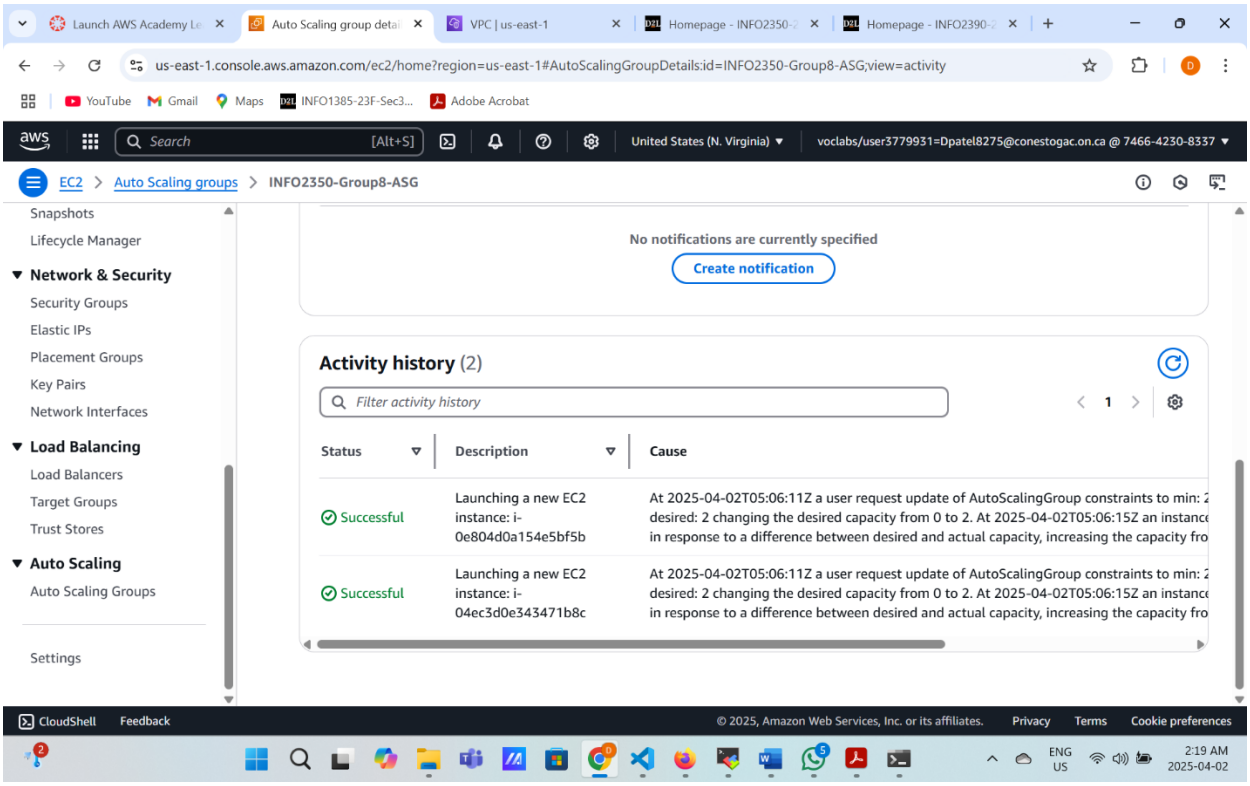
us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#AutoScalingGroupDetails:id=INFO2350-Group8-ASG;view=activity
EC2 > Auto Scaling groups > INFO2350-Group8-ASG
No notifications are currently specified
Create notification
Activity history (2)
Filter activity history
Status
Description
Cause
Successful
Launching a new EC2 instance: i-0e804d0a154e5bf5b
At 2025-04-02T05:06:11Z a user request update of AutoScalingGroup constraints to min: 2 desired: 2 changing the desired capacity from 0 to 2. At 2025-04-02T05:06:15Z an instance in response to a difference between desired and actual capacity, increasing the capacity fro
Successful
Launching a new EC2 instance: i-04ec3d0e343471b8c
At 2025-04-02T05:06:11Z a user request update of AutoScalingGroup constraints to min: 2 desired: 2 changing the desired capacity from 0 to 2. At 2025-04-02T05:06:15Z an instance in response to a difference between desired and actual capacity, increasing the capacity fro
Network & Security
Security Groups
Elastic IPs
Placement Groups
Key Pairs
Network Interfaces
Load Balancing
Load Balancers
Target Groups
Trust Stores
Auto Scaling
Auto Scaling Groups
Settings
CloudShell
Feedback
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2025-04-02

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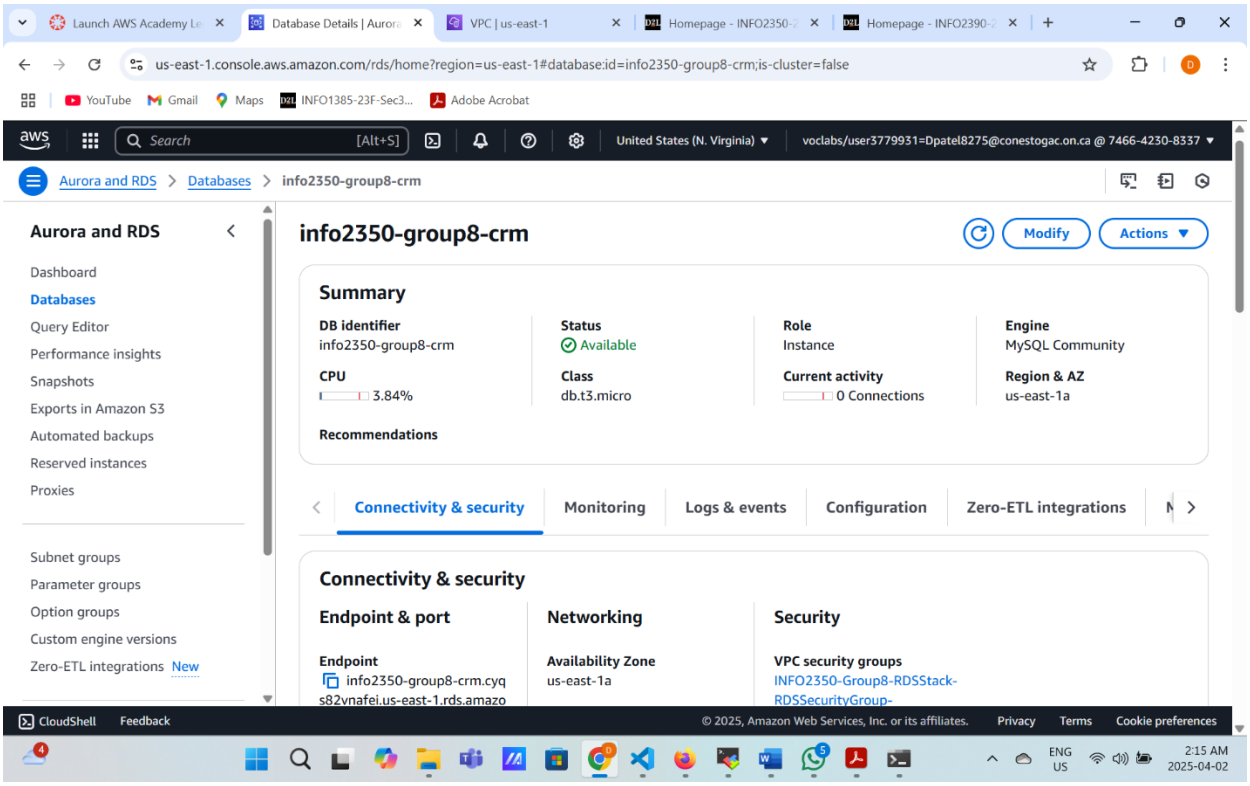
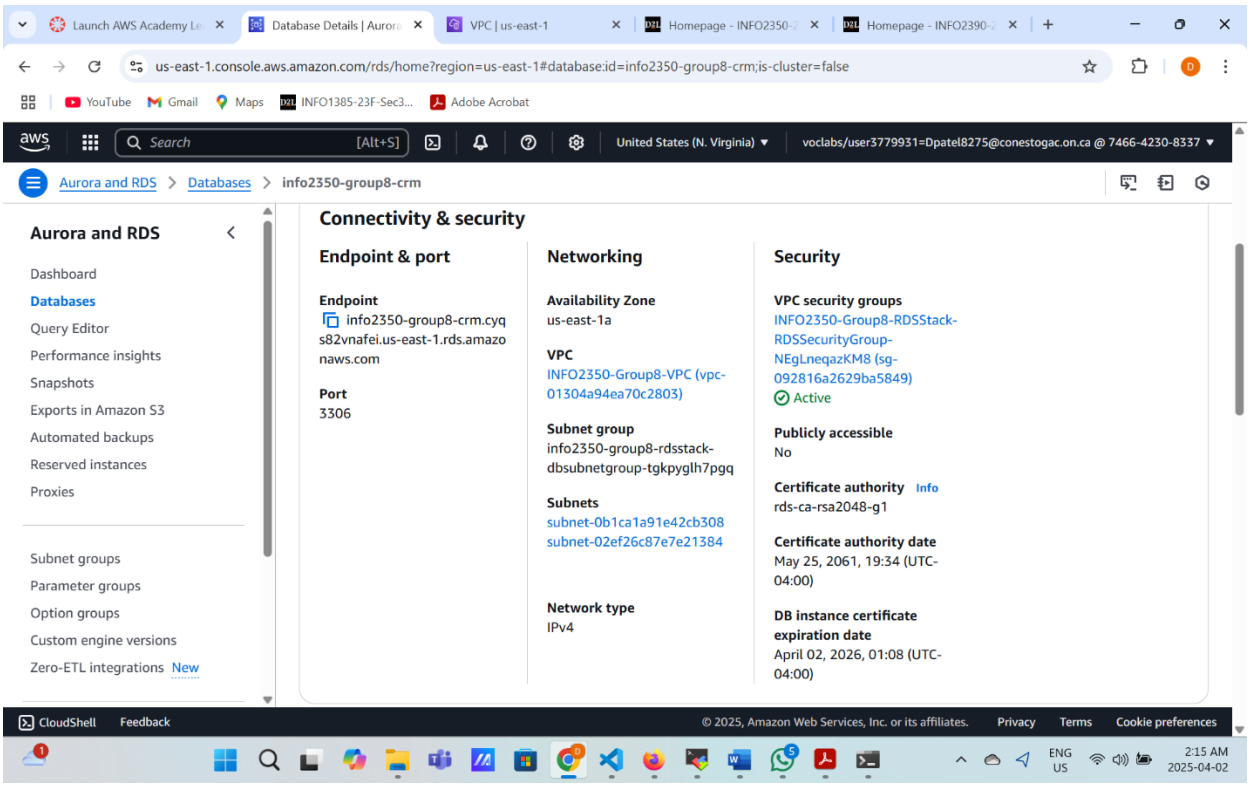
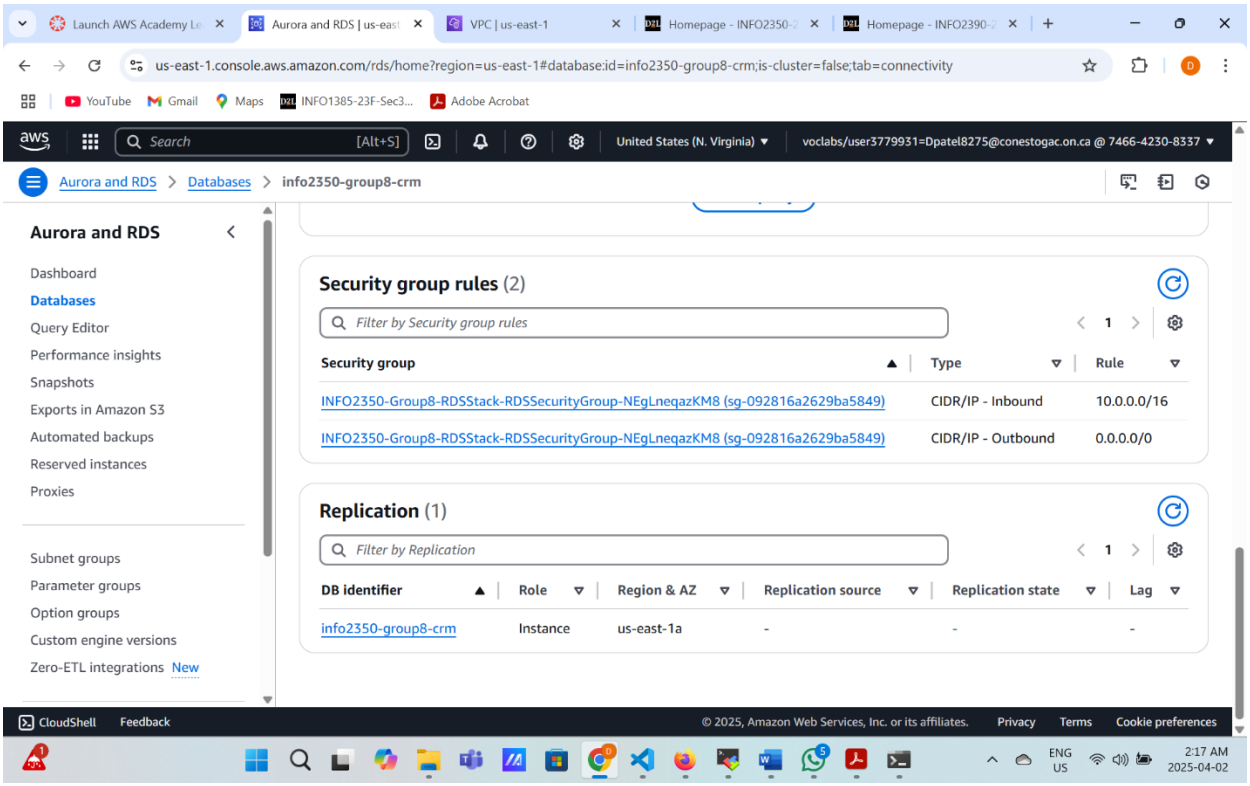
→ Amazon RDS (MySQL)

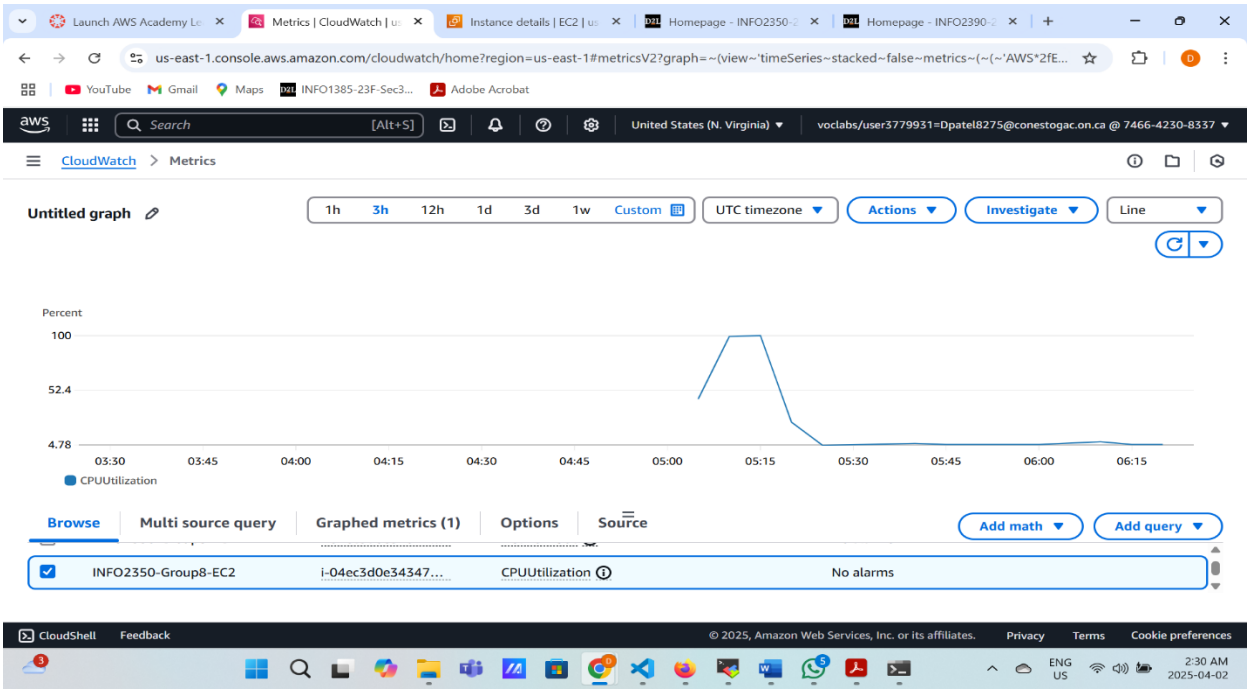




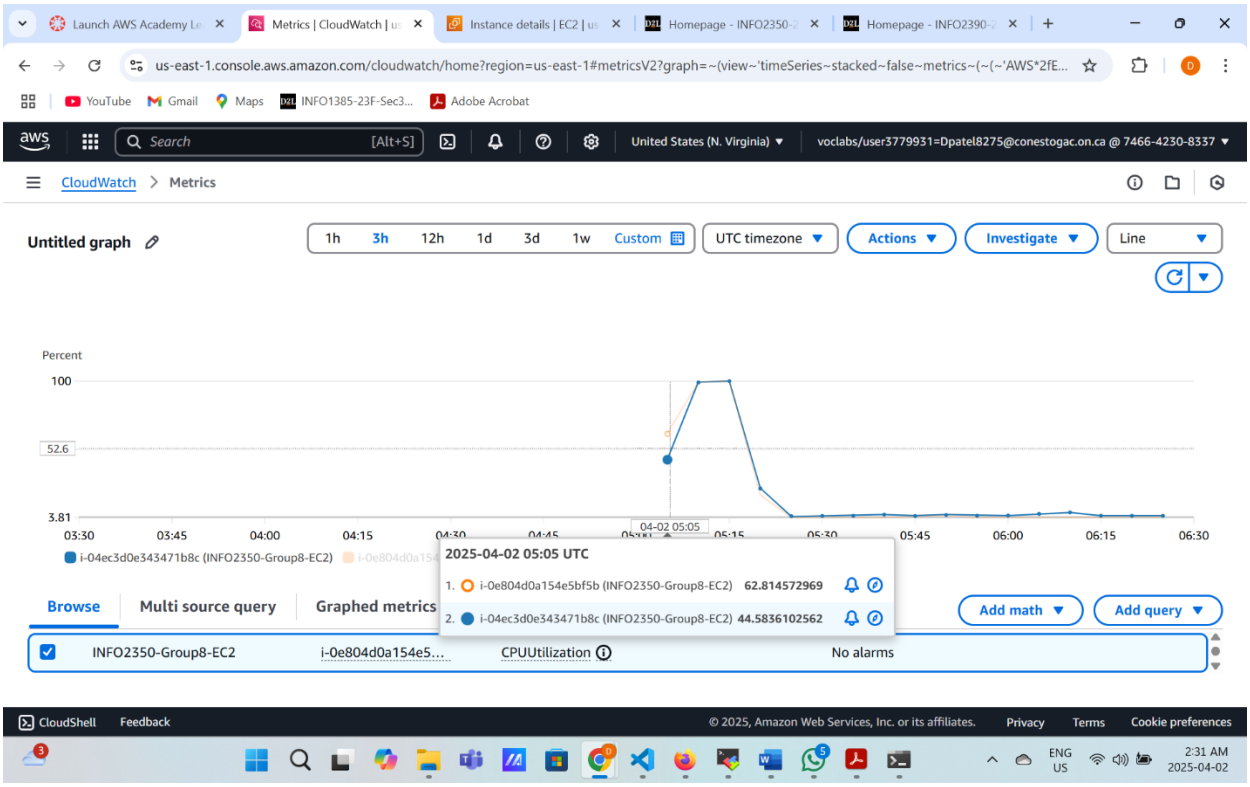
Project



→ **CloudWatch Monitoring**



Project


Launch AWS Academy Le
Metrics | CloudWatch | us
Instance details | EC2 | us
Homepage - INFO2350-2
Homepage - INFO2390-2
us-east-1.console.aws.amazon.com/cloudwatch/home?region=us-east-1#metricsV2?graph=~(view~'timeSeries~stacked~false~metrics~(~(~'AWS*2fE...
YouTube
Gmail
Maps
INFO1385-23F-Sec3...
Adobe Acrobat
Search
[Alt+S]
United States (N. Virginia)
voclabs/user3779931=Dpatel8275@conestogac.on.ca @ 7466-4230-8337
CloudWatch
Metrics
Untitled graph
1h
3h
12h
1d
3d
1w
Custom
UTC timezone
Actions
Investigate
Line
Percent
100
52.6
3.81
03:30
03:45
04:00
04:15
04:30
04:45
05:00
05:15
05:30
05:45
06:00
06:15
06:30
04-02 05:05
i-04ec3d0e343471b8c (INFO2350-Group8-EC2)
2025-04-02 05:05 UTC
1. i-0e804d0a154e5bf5b (INFO2350-Group8-EC2) 62.814572969
2. i-04ec3d0e343471b8c (INFO2350-Group8-EC2) 44.5836102562
Browse
Multi source query
Graphed metrics
Add math
Add query
INFO2350-Group8-EC2
i-0e804d0a154e5...
CPUUtilization
No alarms
CloudShell
Feedback
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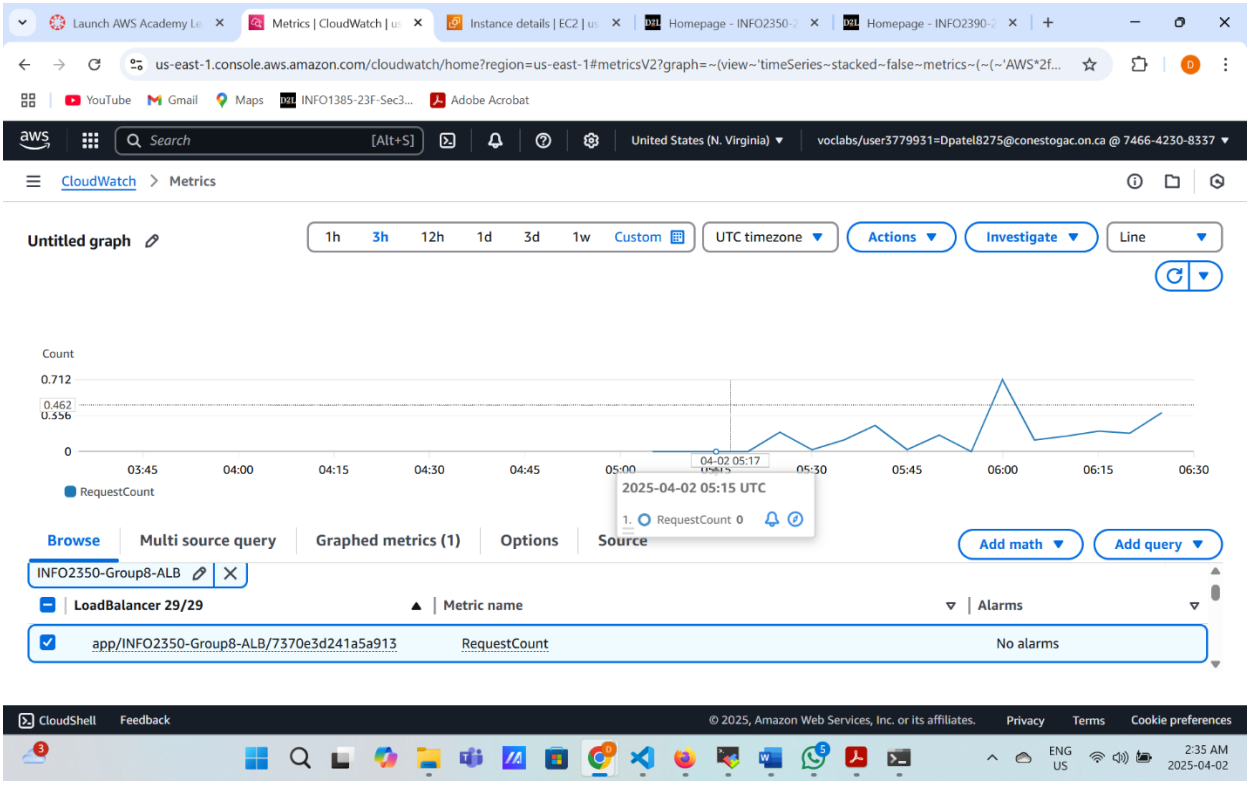
ENG
US
2:31 AM
2025-04-02


Launch AWS Academy Le
Metrics | CloudWatch | us
Instance details | EC2 | us
Homepage - INFO2350-2
Homepage - INFO2390-2
us-east-1.console.aws.amazon.com/cloudwatch/home?region=us-east-1#metricsV2?graph=~(view~'timeSeries~stacked~false~metrics~(~(~'AWS*2f...
YouTube
Gmail
Maps
INFO1385-23F-Sec3...
Adobe Acrobat
Search
[Alt+S]
United States (N. Virginia)
voclabs/user3779931=Dpatel8275@conestogac.on.ca @ 7466-4230-8337
CloudWatch
Metrics
Untitled graph
1h
3h
12h
1d
3d
1w
Custom
UTC timezone
Actions
Investigate
Line
Count
0.712
0.462
0.356
0
03:45
04:00
04:15
04:30
04:45
05:00
05:30
05:45
06:00
06:15
06:30
04-02 05:17
RequestCount
2025-04-02 05:15 UTC
1. RequestCount 0
Browse
Multi source query
Graphed metrics (1)
Options
Source
Add math
Add query
INFO2350-Group8-ALB
LoadBalancer 29/29
Metric name
Alarms
app/INFO2350-Group8-ALB/7370e3d241a5a913
RequestCount
No alarms
CloudShell
Feedback
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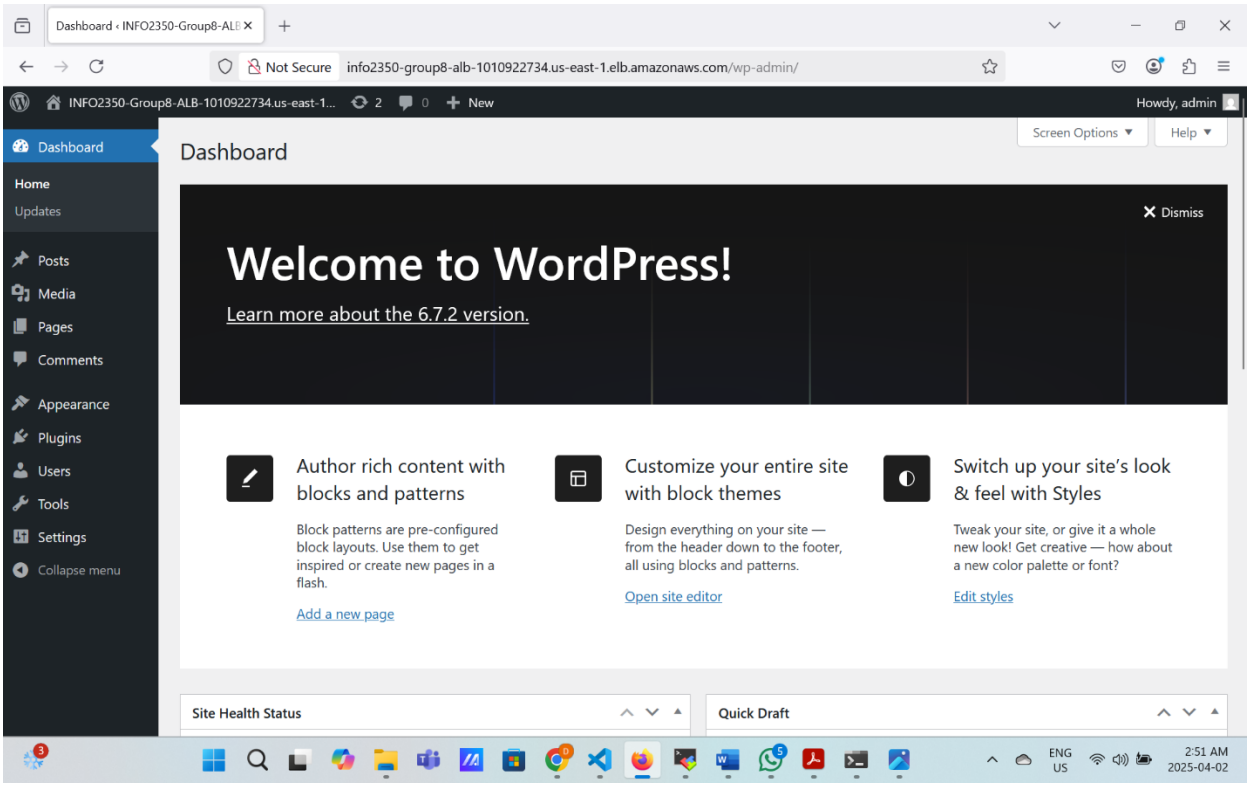
2025-04-02

Project


Dashboard ‹ INFO2350-Group8-ALB
Not Secure
info2350-group8-alb-1010922734.us-east-1.elb.amazonaws.com/wp-admin/
INFO2350-Group8-ALB-1010922734.us-east-1...
New
Howdy, admin
Dashboard
Home
Updates
Posts
Media
Pages
Comments
Appearance
Plugins
Users
Tools
Settings
Collapse menu
Screen Options
Help
Dismiss
Welcome to WordPress!
Learn more about the 6.7.2 version.
Author rich content with blocks and patterns
Block patterns are pre-configured block layouts. Use them to get inspired or create new pages in a flash.
Add a new page
Customize your entire site with block themes
Design everything on your site — from the header down to the footer, all using blocks and patterns.
Open site editor
Switch up your site's look & feel with Styles
Tweak your site, or give it a whole new look! Get creative — how about a new color palette or font?
Edit styles
Site Health Status
Quick Draft
ENG
US
2:51 AM
2025-04-02