Department of Computer Engineering

Academic Term: JAN-MAY 2022

Class: ***BE COMPUTERS***

Subject Name: ***CLOUD COMPUTING LABORATORY***

Subject Code: CSL803

Practical No:	**08**
Title:	**AWS Autoscaling**
Date of Performance:	**28/01/2022**
Date of Submission:	**09/02/2022**
Roll No:	**8626**
Name of the Student:	**Divita Phadakale**

Evaluation:

Sr. No	Rubric	Grade
1	**On time submission(2)**	
2	**Preparedness(2)**	
3	**Output(2)**	
4	**Post Lab Questions (4)**	
	TOTAL	

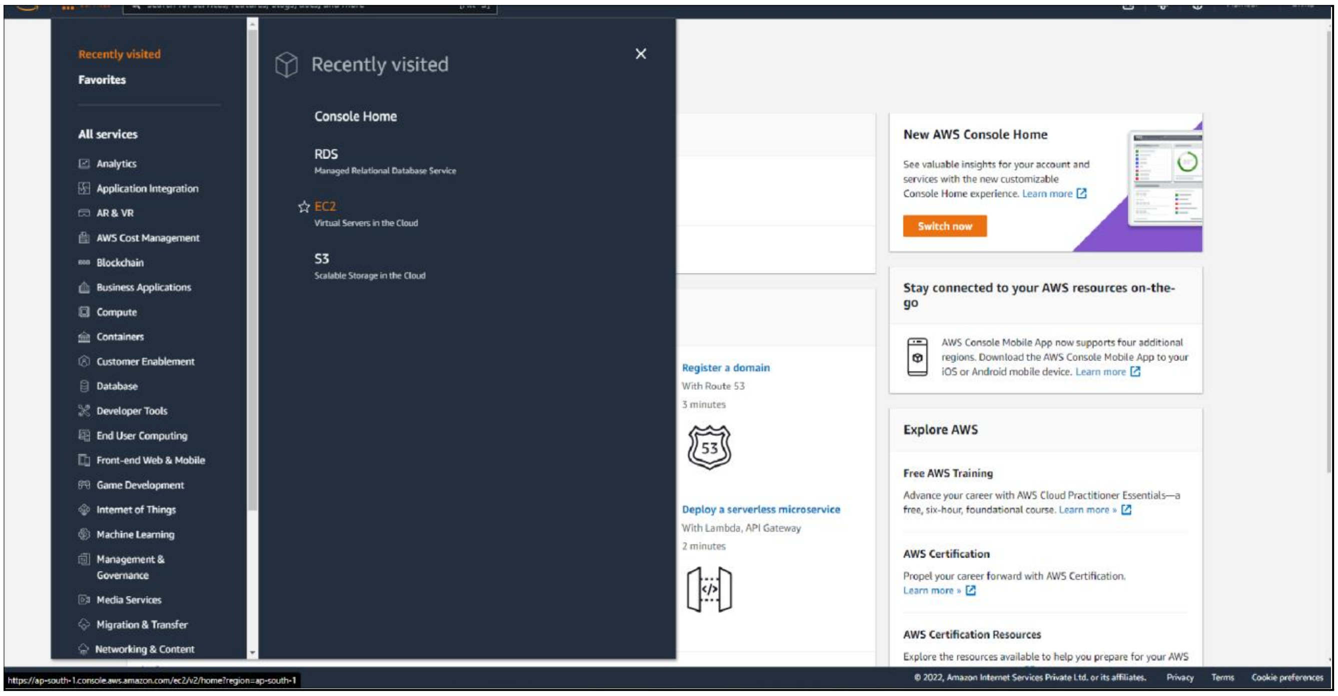
Signature of the Teacher:

Aim: To demonstrate auto- scaling on AWS

- Step 1 :Create EC2 instance on AWS.

Create AWS account with proper credentials

Go to the Services section in the left corner and select EC2



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3 minutes

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With Lambda, API Gateway
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https://ap-south-1.console.aws.amazon.com/ec2/v2/home?region=ap-south-1

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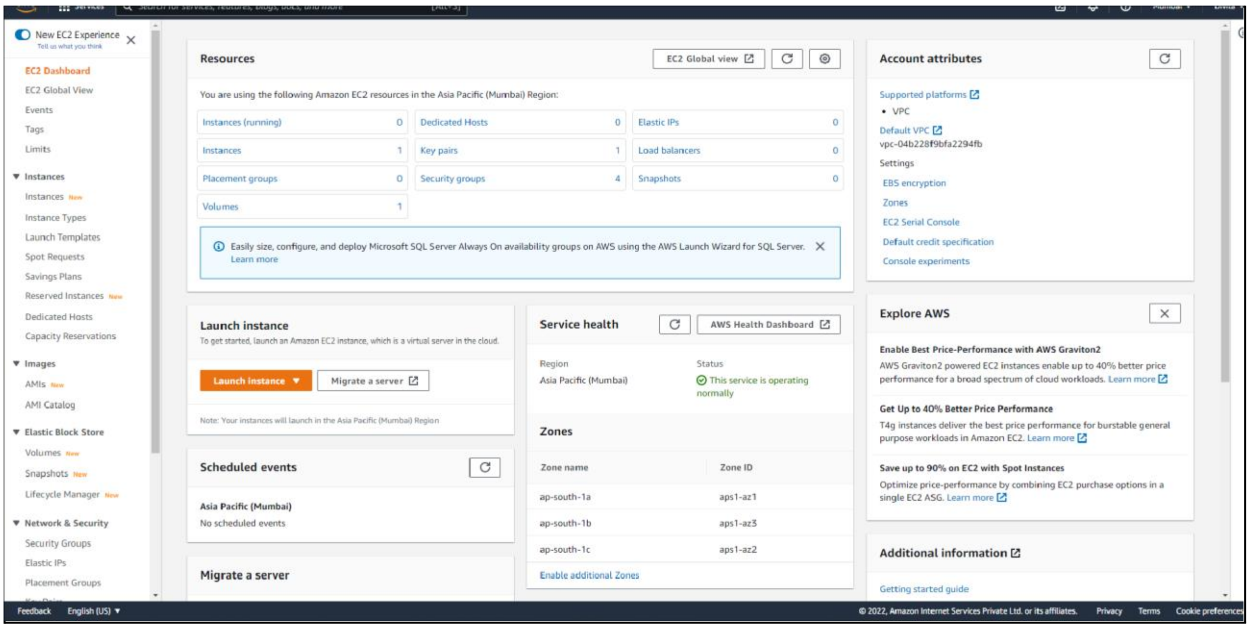
The below page would appear which is called as the EC2 Dashboard

We must click on "Launch Instance" to create the instance

But before that lets create security groups for our instance



Resources

You are using the following Amazon EC2 resources in the Asia Pacific (Mumbai) Region:

Instances (running)	0	Dedicated Hosts	0	Elastic IPs	0
Instances	1	Key pairs	1	Load balancers	0
Placement groups	0	Security groups	4	Snapshots	0
Volumes	1				

Easily size, configure, and deploy Microsoft SQL Server Always On availability groups on AWS using the AWS Launch Wizard for SQL Server. Learn more

Launch instance

To get started, launch an Amazon EC2 instance, which is a virtual server in the cloud.

Note: Your instances will launch in the Asia Pacific (Mumbai) Region

Service health

Region: Asia Pacific (Mumbai)

Status: This service is operating normally

Zones

Zone name	Zone ID
ap-south-1a	aps1-az1
ap-south-1b	aps1-az3
ap-south-1c	aps1-az2

Enable additional Zones

Scheduled events

Asia Pacific (Mumbai)
No scheduled events

Migrate a server

Account attributes

Supported platforms
- VPC

Default VPC
vpc-04b228f9bfa2294fb

Settings
EBS encryption
Zones
EC2 Serial Console
Default credit specification
Console experiments

Explore AWS

Enable Best Price-Performance with AWS Graviton2

AWS Graviton2 powered EC2 instances enable up to 40% better price performance for a broad spectrum of cloud workloads. Learn more

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Additional information

Getting started guide

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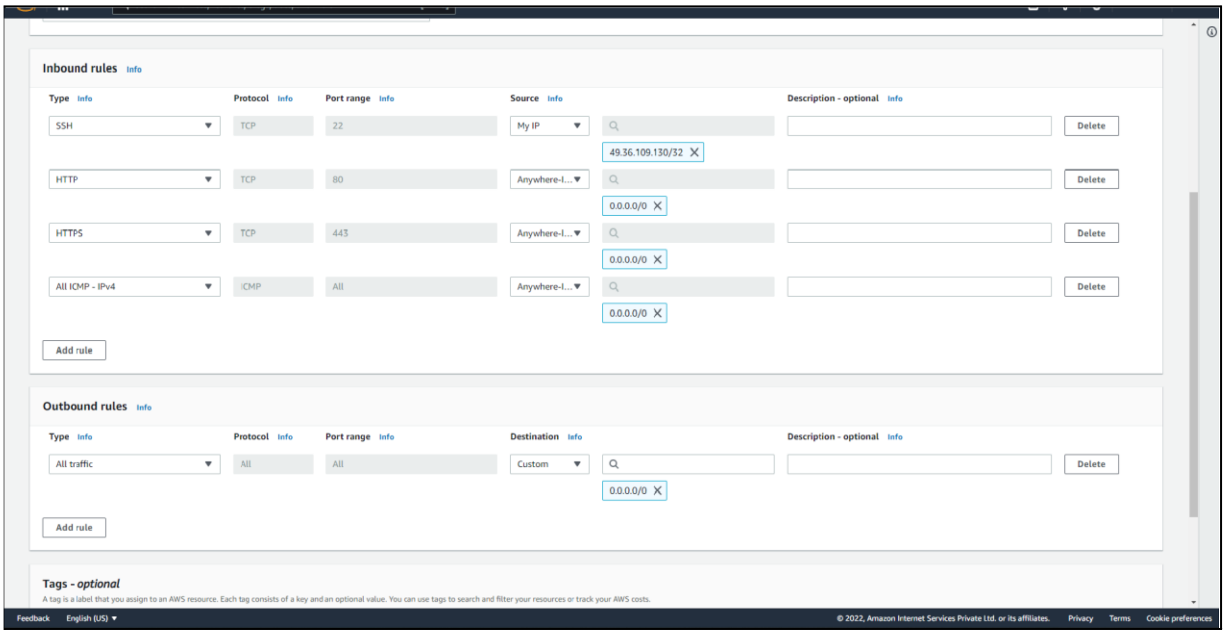
Click on “Security Groups” in Network & Security and click on CREATE SECURITY GROUP in the right corner

Give name and description(optional) to the security group and enter the following inbound and outbound rules

Click on create



Inbound rules

Type	Protocol	Port range	Source		Description - optional
SSH	TCP	22	My IP	49.36.109.130/32	
HTTP	TCP	80	Anywhere-I...	0.0.0.0/0	
HTTPS	TCP	443	Anywhere-I...	0.0.0.0/0	
All ICMP - IPv4	ICMP	All	Anywhere-I...	0.0.0.0/0	

Outbound rules

Type	Protocol	Port range	Destination		Description - optional
All traffic	All	All	Custom	0.0.0.0/0	

Tags - *optional*

A tag is a label that you assign to an AWS resource. Each tag consists of a key and an optional value. You can use tags to search and filter your resources or track your AWS costs.

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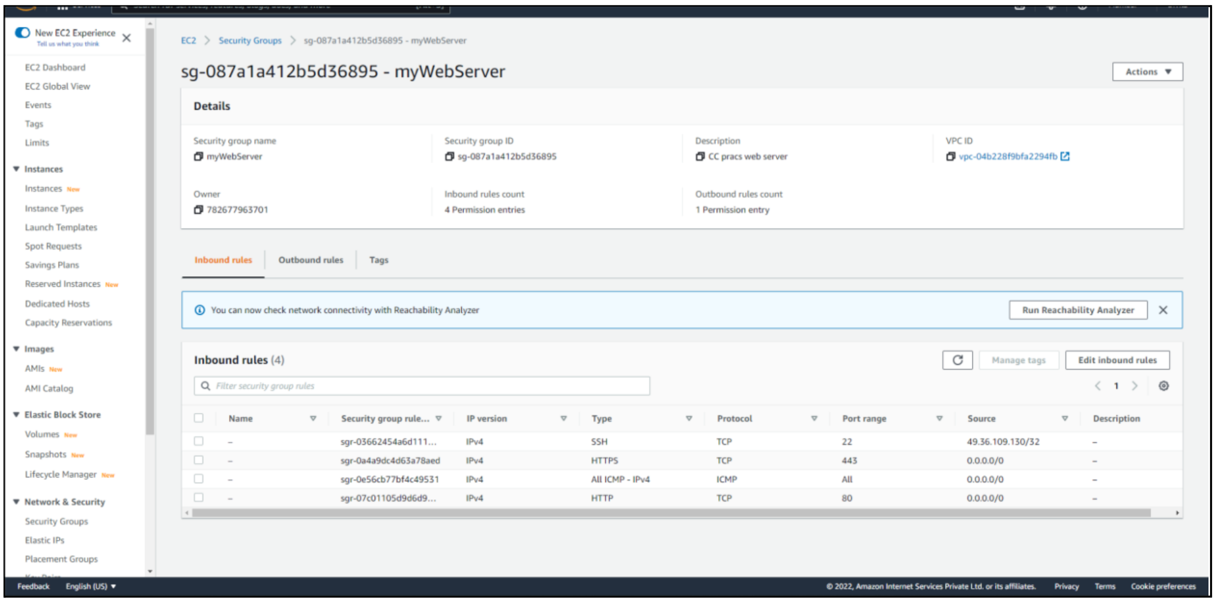
Once you click on the security group you created you will see all the rules that you added as shown in figure below



EC2 > Security Groups > sg-087a1a412b5d36895 - myWebServer

sg-087a1a412b5d36895 - myWebServer

Details

Security group name: myWebServer	Security group ID: sg-087a1a412b5d36895	Description: CC pracs web server	VPC ID: vpc-04b228f9bfa2294fb
Owner: 782677963701	Inbound rules count: 4 Permission entries	Outbound rules count: 1 Permission entry	

You can now check network connectivity with Reachability Analyzer

Inbound rules (4)

Name	Security group rule...	IP version	Type	Protocol	Port range	Source	Description
–	sgr-03662454a6d111...	IPv4	SSH	TCP	22	49.36.109.130/32	–
–	sgr-0a4a9dc4d63a78aed	IPv4	HTTPS	TCP	443	0.0.0.0/0	–
–	sgr-0e56cb77bf4c49531	IPv4	All ICMP - IPv4	ICMP	All	0.0.0.0/0	–
–	sgr-07c01105d9d6d9...	IPv4	HTTP	TCP	80	0.0.0.0/0	–

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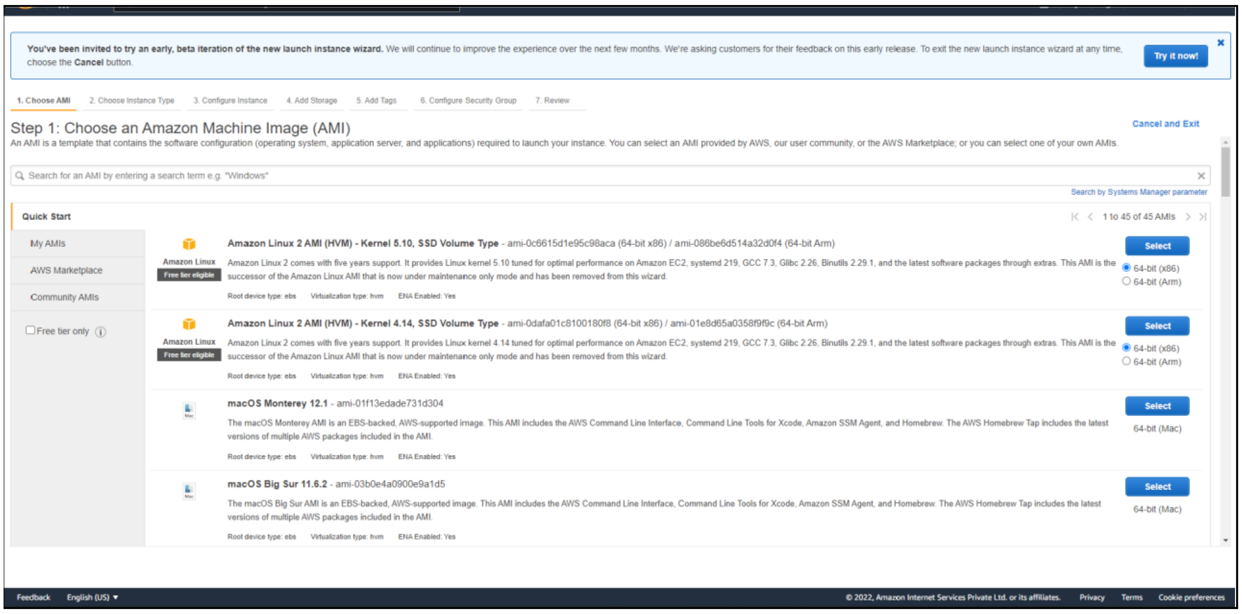
Now coming back to creating the instance, once you clicked on Launch Instance you have to undergo 7 steps as shown here

Step 1: Choose AMI


You've been invited to try an early, beta iteration of the new launch instance wizard. We will continue to improve the experience over the next few months. We're asking customers for their feedback on this early release. To exit the new launch instance wizard at any time, choose the **Cancel** button.

1. Choose AMI | 2. Choose Instance Type | 3. Configure Instance | 4. Add Storage | 5. Add Tags | 6. Configure Security Group | 7. Review

Step 1: Choose an Amazon Machine Image (AMI)

An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. You can select an AMI provided by AWS, our user community, or the AWS Marketplace; or you can select one of your own AMIs.

Search for an AMI by entering a search term e.g. "Windows"

Quick Start — 1 to 45 of 45 AMIs

Amazon Linux 2 AMI (HVM) - Kernel 5.10, SSD Volume Type - ami-0c6615d1e95c98aca (64-bit x86) / ami-086be6d514a32d0f4 (64-bit Arm)
Amazon Linux 2 comes with five years support. It provides Linux kernel 5.10 tuned for optimal performance on Amazon EC2, systemd 219, GCC 7.3, Glibc 2.26, Binutils 2.29.1, and the latest software packages through extras. This AMI is the successor of the Amazon Linux AMI that is now under maintenance only mode and has been removed from this wizard.
Root device type: ebs Virtualization type: hvm ENA Enabled: Yes
[✓ 64-bit (x86)] 64-bit (Arm)

Amazon Linux 2 AMI (HVM) - Kernel 4.14, SSD Volume Type - ami-0dafa01c8100180f8 (64-bit x86) / ami-01e8d65a0358f9f9c (64-bit Arm)
Amazon Linux 2 comes with five years support. It provides Linux kernel 4.14 tuned for optimal performance on Amazon EC2, systemd 219, GCC 7.3, Glibc 2.26, Binutils 2.29.1, and the latest software packages through extras. This AMI is the successor of the Amazon Linux AMI that is now under maintenance only mode and has been removed from this wizard.
Root device type: ebs Virtualization type: hvm ENA Enabled: Yes
[✓ 64-bit (x86)] 64-bit (Arm)

macOS Monterey 12.1 - ami-01f13edade731d304
The macOS Monterey AMI is an EBS-backed, AWS-supported image. This AMI includes the AWS Command Line Interface, Command Line Tools for Xcode, Amazon SSM Agent, and Homebrew. The AWS Homebrew Tap includes the latest versions of multiple AWS packages included in the AMI.
Root device type: ebs Virtualization type: hvm ENA Enabled: Yes
64-bit (Mac)

macOS Big Sur 11.6.2 - ami-03b0e4a0900e9a1d5
The macOS Big Sur AMI is an EBS-backed, AWS-supported image. This AMI includes the AWS Command Line Interface, Command Line Tools for Xcode, Amazon SSM Agent, and Homebrew. The AWS Homebrew Tap includes the latest versions of multiple AWS packages included in the AMI.
Root device type: ebs Virtualization type: hvm ENA Enabled: Yes
64-bit (Mac)

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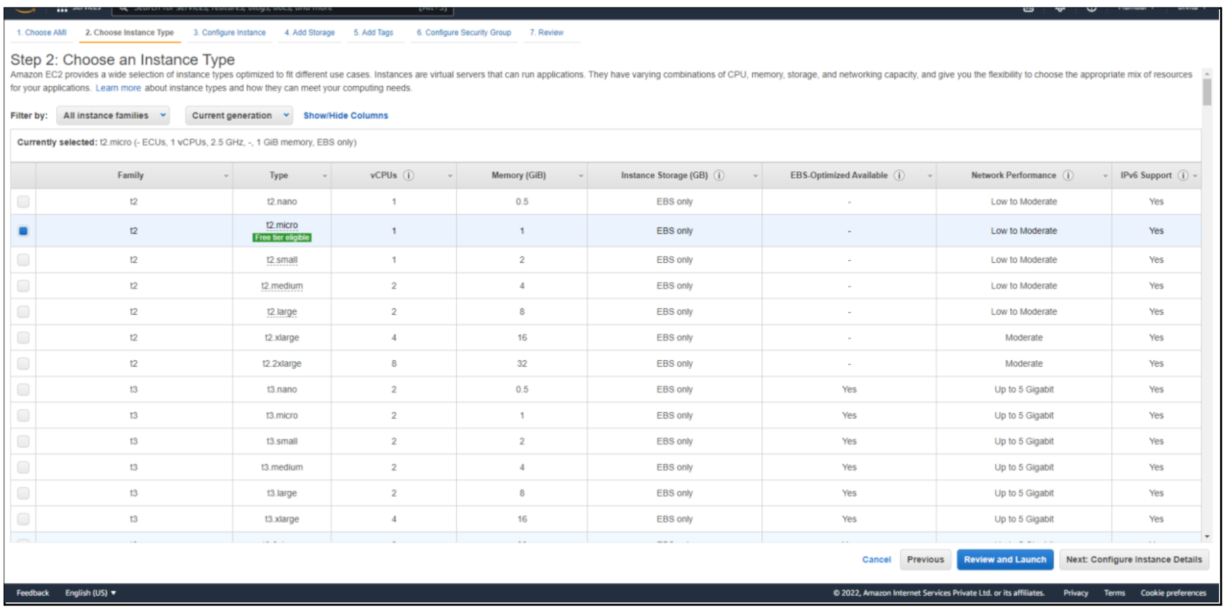
Step 2: Instance Type -> Free Tier -> Next Configure Instance Details


1. Choose AMI | 2. Choose Instance Type | 3. Configure Instance | 4. Add Storage | 5. Add Tags | 6. Configure Security Group | 7. Review

Step 2: Choose an Instance Type

Amazon EC2 provides a wide selection of instance types optimized to fit different use cases. Instances are virtual servers that can run applications. They have varying combinations of CPU, memory, storage, and networking capacity, and give you the flexibility to choose the appropriate mix of resources for your applications. Learn more about instance types and how they can meet your computing needs.

Filter by: All instance families | Current generation | Show/Hide Columns

Currently selected: t2.micro (- ECUs, 1 vCPUs, 2.5 GHz, -, 1 GiB memory, EBS only)

	Family	Type	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance	IPv6 Support
☐	t2	t2.nano	1	0.5	EBS only	-	Low to Moderate	Yes
■	t2	t2.micro Free tier eligible	1	1	EBS only	-	Low to Moderate	Yes
☐	t2	t2.small	1	2	EBS only	-	Low to Moderate	Yes
☐	t2	t2.medium	2	4	EBS only	-	Low to Moderate	Yes
☐	t2	t2.large	2	8	EBS only	-	Low to Moderate	Yes
☐	t2	t2.xlarge	4	16	EBS only	-	Moderate	Yes
☐	t2	t2.2xlarge	8	32	EBS only	-	Moderate	Yes
☐	t3	t3.nano	2	0.5	EBS only	Yes	Up to 5 Gigabit	Yes
☐	t3	t3.micro	2	1	EBS only	Yes	Up to 5 Gigabit	Yes
☐	t3	t3.small	2	2	EBS only	Yes	Up to 5 Gigabit	Yes
☐	t3	t3.medium	2	4	EBS only	Yes	Up to 5 Gigabit	Yes
☐	t3	t3.large	2	8	EBS only	Yes	Up to 5 Gigabit	Yes
☐	t3	t3.xlarge	4	16	EBS only	Yes	Up to 5 Gigabit	Yes

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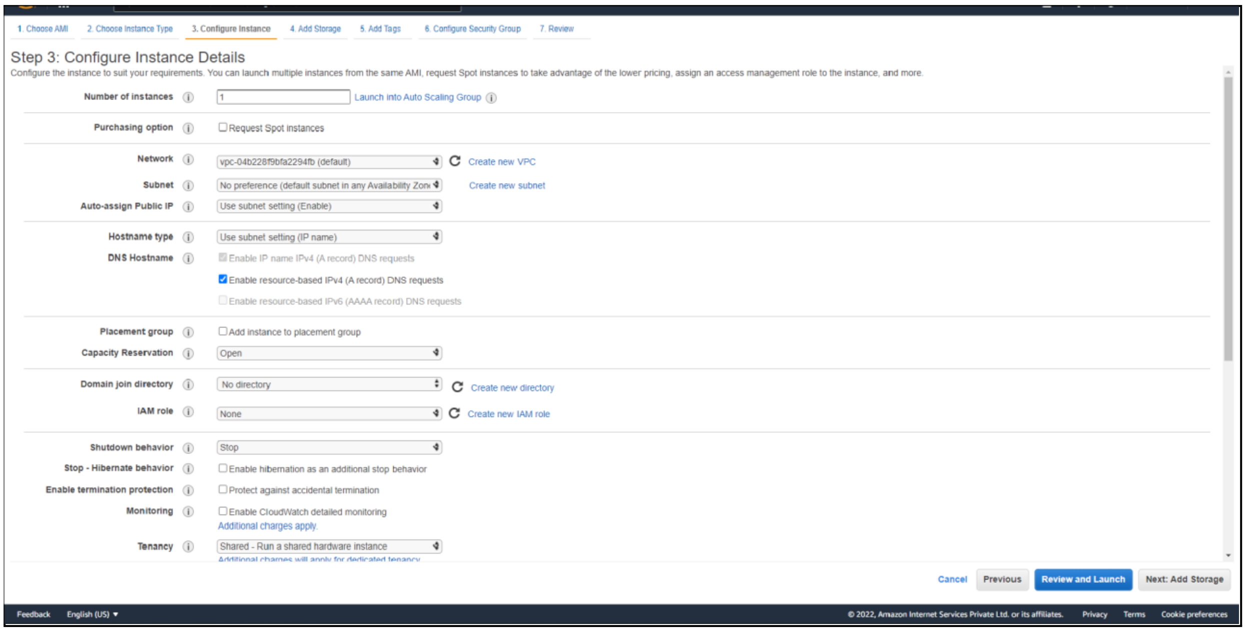
Step 3: Instance Details, choose according to your requirements and then Next


1. Choose AMI | 2. Choose Instance Type | 3. Configure Instance | 4. Add Storage | 5. Add Tags | 6. Configure Security Group | 7. Review

Step 3: Configure Instance Details

Configure the instance to suit your requirements. You can launch multiple instances from the same AMI, request Spot instances to take advantage of the lower pricing, assign an access management role to the instance, and more.

Number of instances	1 — Launch into Auto Scaling Group
Purchasing option	☐ Request Spot instances
Network	vpc-04b228f9bfa2294fb (default) — Create new VPC
Subnet	No preference (default subnet in any Availability Zon — Create new subnet
Auto-assign Public IP	Use subnet setting (Enable)
Hostname type	Use subnet setting (IP name)
DNS Hostname	☑ Enable IP name IPv4 (A record) DNS requests ☑ Enable resource-based IPv4 (A record) DNS requests ☐ Enable resource-based IPv6 (AAAA record) DNS requests
Placement group	☐ Add instance to placement group
Capacity Reservation	Open
Domain join directory	No directory — Create new directory
IAM role	None — Create new IAM role
Shutdown behavior	Stop
Stop - Hibernate behavior	☐ Enable hibernation as an additional stop behavior
Enable termination protection	☐ Protect against accidental termination
Monitoring	☐ Enable CloudWatch detailed monitoring Additional charges apply.
Tenancy	Shared - Run a shared hardware instance Additional charges will apply for dedicated tenancy

Cancel | Previous | Review and Launch | Next: Add Storage

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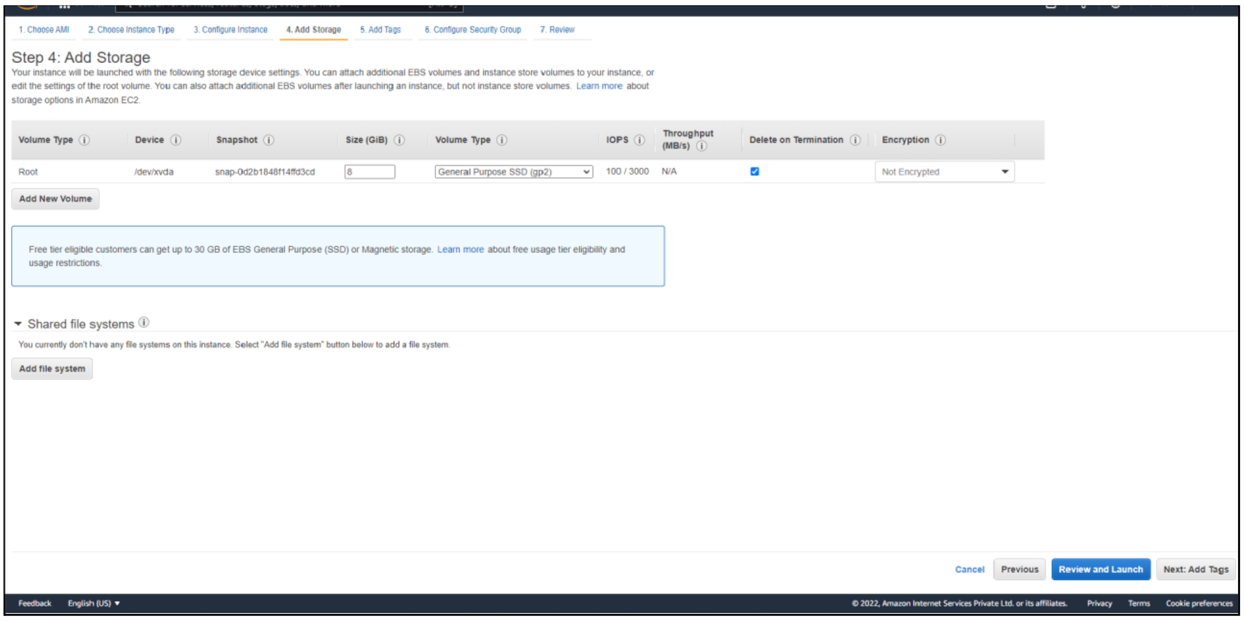
Step 4: Add Storage -> according to requirements -> next


1. Choose AMI | 2. Choose Instance Type | 3. Configure Instance | 4. Add Storage | 5. Add Tags | 6. Configure Security Group | 7. Review

Step 4: Add Storage

Your instance will be launched with the following storage device settings. You can attach additional EBS volumes and instance store volumes to your instance, or edit the settings of the root volume. You can also attach additional EBS volumes after launching an instance, but not instance store volumes. Learn more about storage options in Amazon EC2.

Volume Type	Device	Snapshot	Size (GiB)	Volume Type	IOPS	Throughput (MB/s)	Delete on Termination	Encryption
Root	/dev/xvda	snap-0d2b1848f14ffd3cd	8	General Purpose SSD (gp2)	100 / 3000	N/A	☑	Not Encrypted

Add New Volume

Free tier eligible customers can get up to 30 GB of EBS General Purpose (SSD) or Magnetic storage. Learn more about free usage tier eligibility and usage restrictions.

▾ Shared file systems

You currently don't have any file systems on this instance. Select "Add file system" button below to add a file system.

Add file system

Cancel | Previous | Review and Launch | Next: Add Tags

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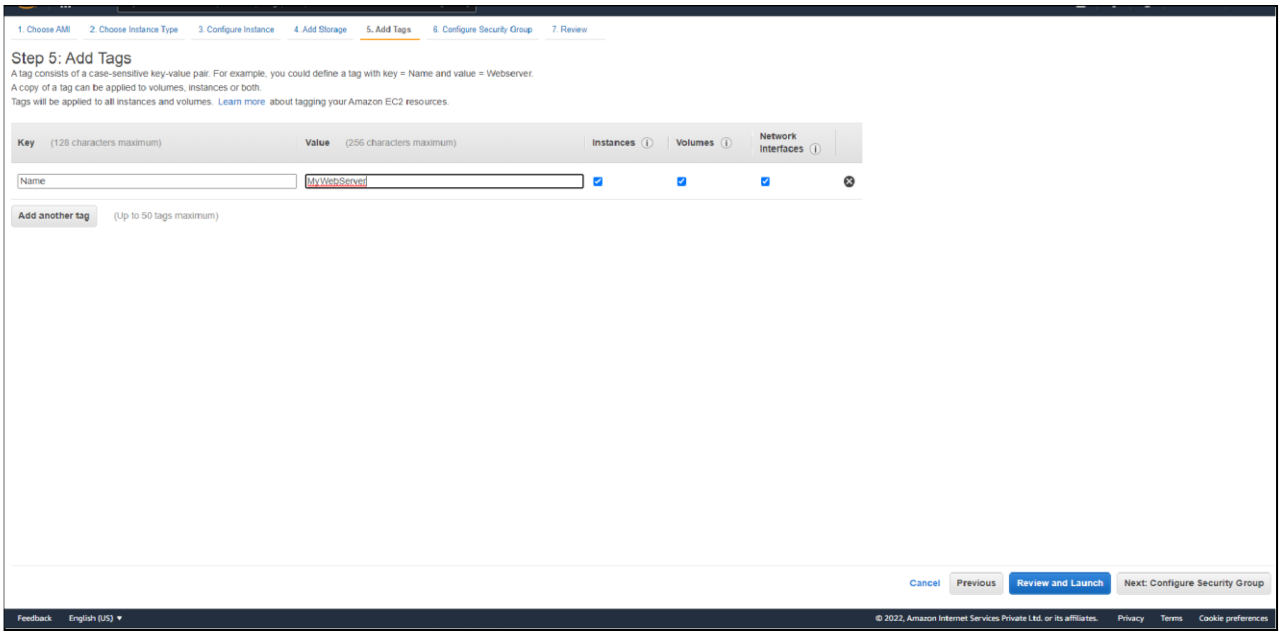
Step 5: Add tags -> Enter Key-value pair as Name and xyz -> Next



Step 5: Add Tags

A tag consists of a case-sensitive key-value pair. For example, you could define a tag with key = Name and value = Webserver.
A copy of a tag can be applied to volumes, instances or both.
Tags will be applied to all instances and volumes. Learn more about tagging your Amazon EC2 resources.

Key (128 characters maximum)	Value (256 characters maximum)	Instances	Volumes	Network Interfaces
Name	MyWebServer	✓	✓	✓

Add another tag (Up to 50 tags maximum)

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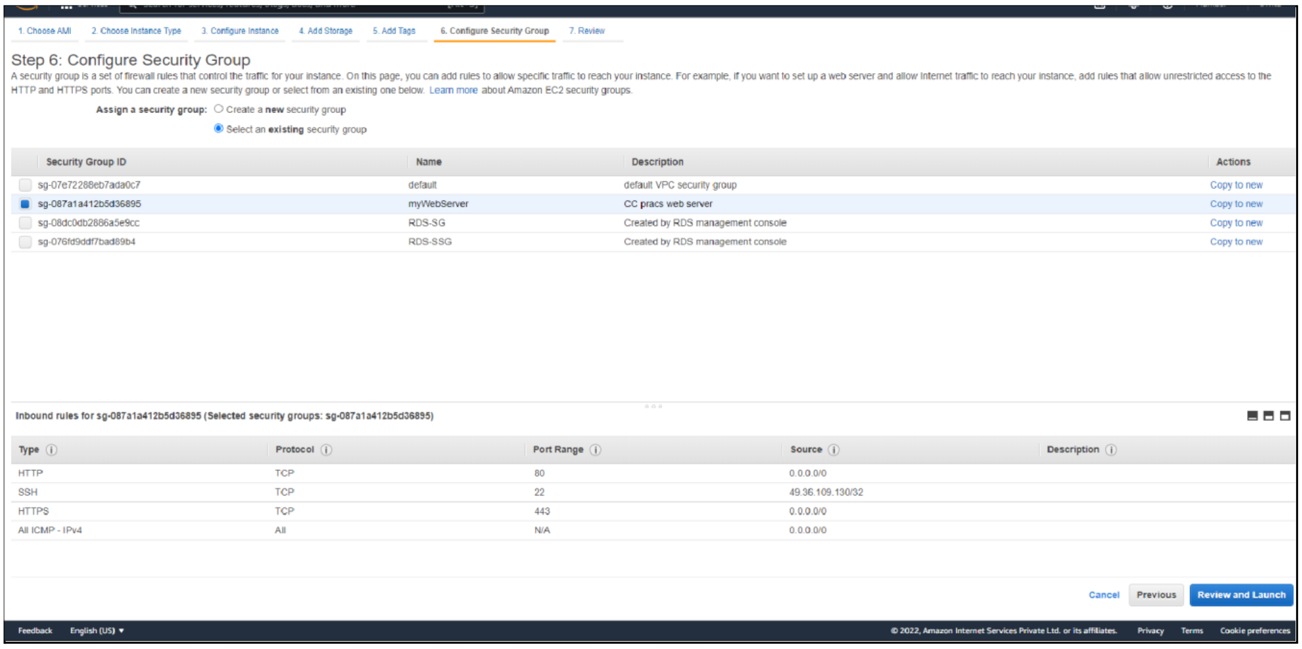
Step 6: Configure Security Group (this is where we'll select the security group that was created previously)

Tick the Select an existing security group

Select the desired security group

You can see the rules below



Step 6: Configure Security Group

A security group is a set of firewall rules that control the traffic for your instance. On this page, you can add rules to allow specific traffic to reach your instance. For example, if you want to set up a web server and allow Internet traffic to reach your instance, add rules that allow unrestricted access to the HTTP and HTTPS ports. You can create a new security group or select from an existing one below. Learn more about Amazon EC2 security groups.

Assign a security group: Create a **new** security group [✓ Select an **existing** security group]

	Security Group ID	Name	Description	Actions
	sg-07e72288eb7ada0c7	default	default VPC security group	Copy to new
✓	sg-087a1a412b5d36895	myWebServer	CC pracs web server	Copy to new
	sg-08dc0db2886a5e9cc	RDS-SG	Created by RDS management console	Copy to new
	sg-076fd9ddf7bad89b4	RDS-SSG	Created by RDS management console	Copy to new

Inbound rules for sg-087a1a412b5d36895 (Selected security groups: sg-087a1a412b5d36895)

Type	Protocol	Port Range	Source	Description
HTTP	TCP	80	0.0.0.0/0	
SSH	TCP	22	49.36.109.130/32	
HTTPS	TCP	443	0.0.0.0/0	
All ICMP - IPv4	All	N/A	0.0.0.0/0	

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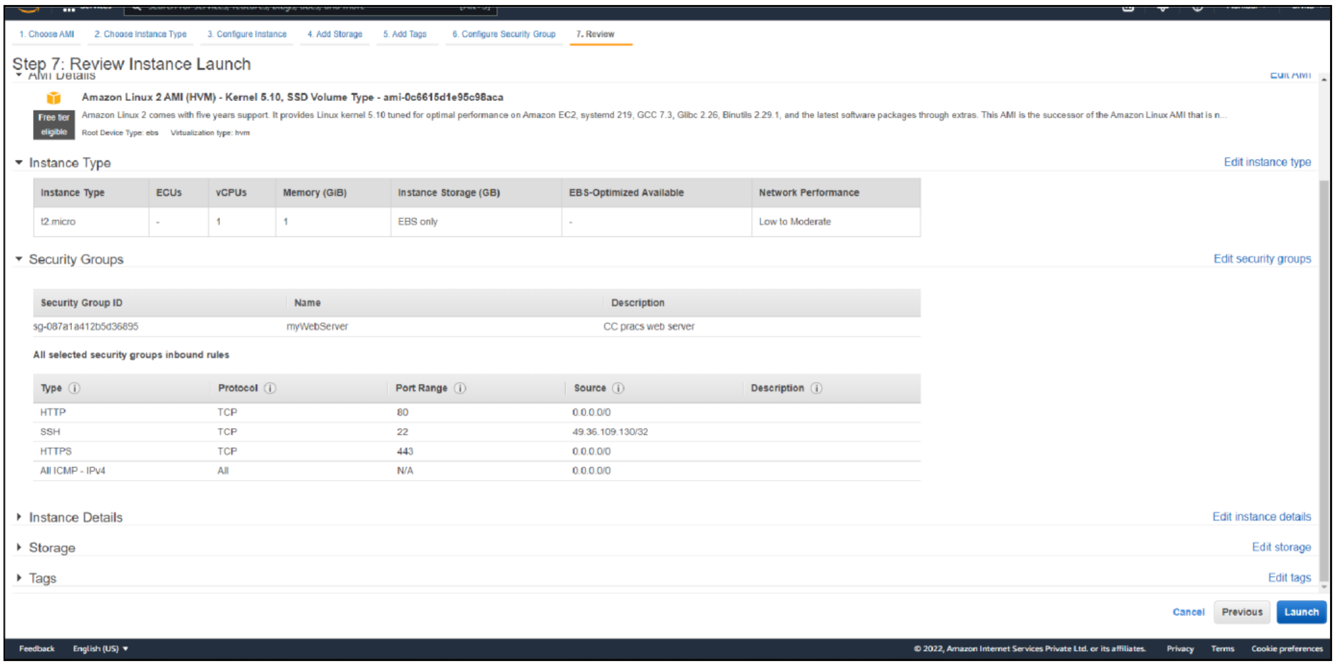
Step 7: Review and LAUNCH



Step 7: Review Instance Launch

AMI Details

Amazon Linux 2 AMI (HVM) - Kernel 5.10, SSD Volume Type - ami-0c6615d1e95c98aca

Free tier eligible

Amazon Linux 2 comes with five years support. It provides Linux kernel 5.10 tuned for optimal performance on Amazon EC2, systemd 219, GCC 7.3, Glibc 2.26, Binutils 2.29.1, and the latest software packages through extras. This AMI is the successor of the Amazon Linux AMI that is n...

Root Device Type: ebs   Virtualization type: hvm

Instance Type

Instance Type	ECUs	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance
t2.micro	-	1	1	EBS only	-	Low to Moderate

Security Groups

Security Group ID	Name	Description
sg-087a1a412b5d36895	myWebServer	CC pracs web server

All selected security groups inbound rules

Type	Protocol	Port Range	Source	Description
HTTP	TCP	80	0.0.0.0/0	
SSH	TCP	22	49.36.109.130/32	
HTTPS	TCP	443	0.0.0.0/0	
All ICMP - IPv4	All	N/A	0.0.0.0/0	

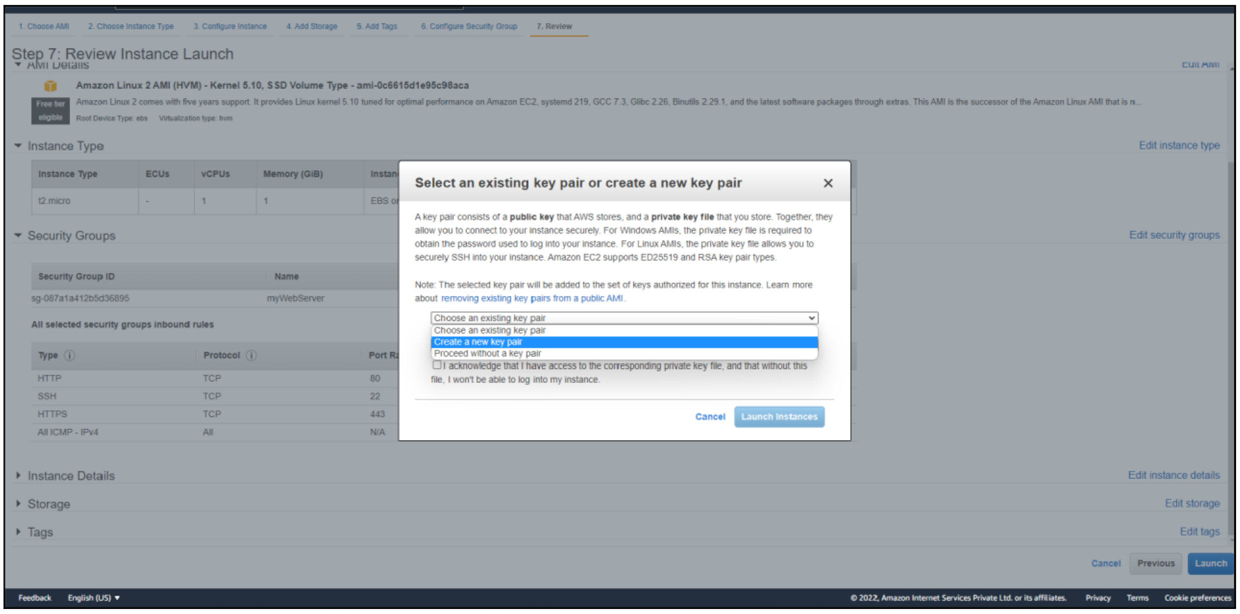
Instance Details

Storage

Tags

After you launch, you will see a pop-up like this

We have to select a key value pair or create a new one if its not existing



Select an existing key pair or create a new key pair

A key pair consists of a **public key** that AWS stores, and a **private key file** that you store. Together, they allow you to connect to your instance securely. For Windows AMIs, the private key file is required to obtain the password used to log into your instance. For Linux AMIs, the private key file allows you to securely SSH into your instance. Amazon EC2 supports ED25519 and RSA key pair types.

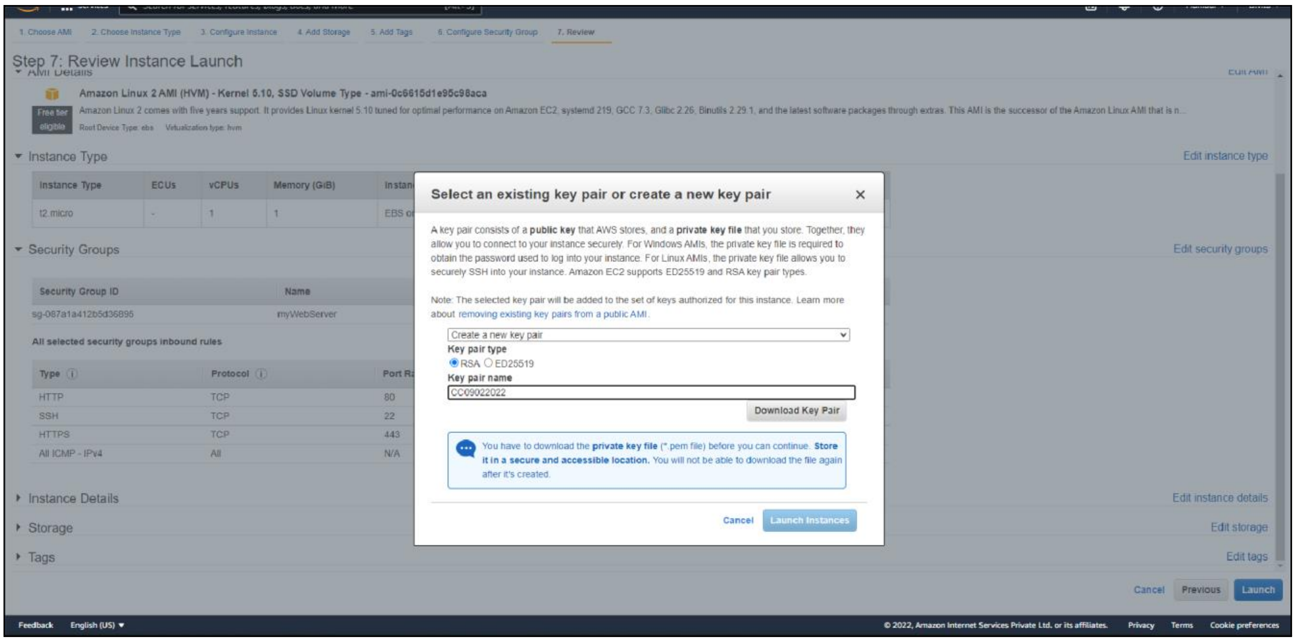
Note: The selected key pair will be added to the set of keys authorized for this instance. Learn more about removing existing key pairs from a public AMI.

Choose an existing key pair
Choose an existing key pair
Create a new key pair
Proceed without a key pair

☐ I acknowledge that I have access to the corresponding private key file, and that without this file, I won't be able to log into my instance.

Select RSA -> give name to the key pair and download it

The downloaded file will be in .pem format


Step 7: Review Instance Launch

Amazon Linux 2 AMI (HVM) - Kernel 5.10, SSD Volume Type - ami-0c6615d1e95c98aca

Amazon Linux 2 comes with five years support. It provides Linux kernel 5.10 tuned for optimal performance on Amazon EC2, systemd 219, GCC 7.3, Glibc 2.26, Binutils 2.29.1, and the latest software packages through extras. This AMI is the successor of the Amazon Linux AMI that is n...

Root Device Type: ebs Virtualization type: hvm

Instance Type

Instance Type	ECUs	vCPUs	Memory (GiB)
t2.micro	-	1	1

Security Groups

Security Group ID	Name
sg-087a1a412b5d36895	myWebServer

All selected security groups inbound rules

Type	Protocol	Port Range
HTTP	TCP	80
SSH	TCP	22
HTTPS	TCP	443
All ICMP - IPv4	All	N/A

Select an existing key pair or create a new key pair

A key pair consists of a **public key** that AWS stores, and a **private key file** that you store. Together, they allow you to connect to your instance securely. For Windows AMIs, the private key file is required to obtain the password used to log into your instance. For Linux AMIs, the private key file allows you to securely SSH into your instance. Amazon EC2 supports ED25519 and RSA key pair types.

Note: The selected key pair will be added to the set of keys authorized for this instance. Learn more about removing existing key pairs from a public AMI.

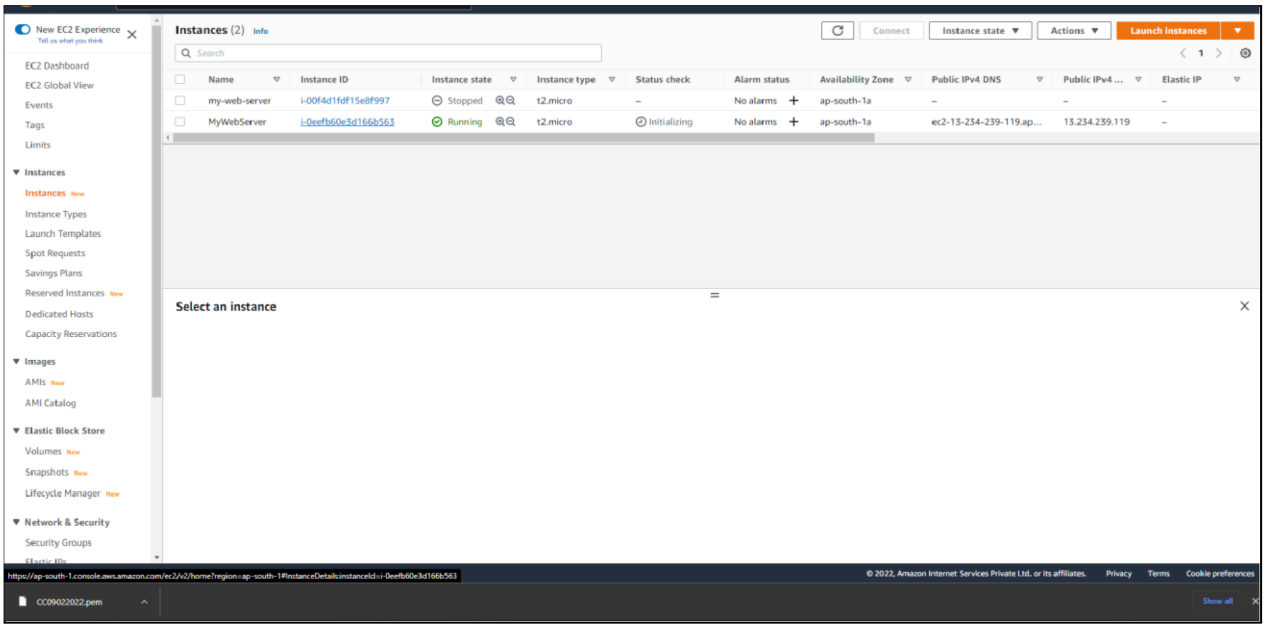
Create a new key pair

Key pair type: [✓ RSA] ED25519

Key pair name: CC09022022

You have to download the **private key file** (*.pem file) before you can continue. **Store it in a secure and accessible location.** You will not be able to download the file again after it's created.

You can view your instance in the "Instances" and check the status


Instances (2)

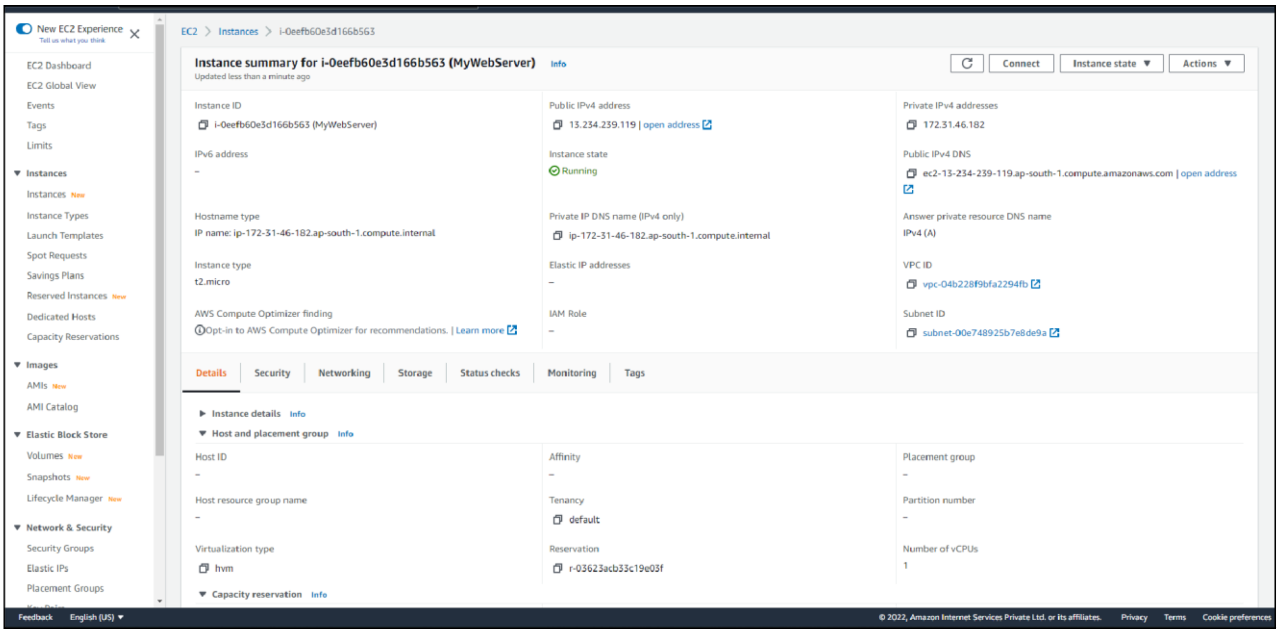
Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS	Public IPv4 ...	Elastic IP
my-web-server	i-00f4d1fdf15e8f997	Stopped	t2.micro	–	No alarms	ap-south-1a	–	–	–
MyWebServer	i-0eefb60e3d166b563	Running	t2.micro	Initializing	No alarms	ap-south-1a	ec2-13-234-239-119.ap...	13.234.239.119	–

Select an instance

https://ap-south-1.console.aws.amazon.com/ec2/v2/home?region=ap-south-1#InstanceDetails:instanceId=i-0eefb60e3d166b563

You can see this after the instance is launched successfully

This consists of Public and Private IP addresses along with their DNS address



Instance summary for i-0eefb60e3d166b563 (MyWebServer) Info
Updated less than a minute ago

Instance ID i-0eefb60e3d166b563 (MyWebServer)	Public IPv4 address 13.234.239.119 | open address	Private IPv4 addresses 172.31.46.182
IPv6 address –	Instance state Running	Public IPv4 DNS ec2-13-234-239-119.ap-south-1.compute.amazonaws.com | open address
Hostname type IP name: ip-172-31-46-182.ap-south-1.compute.internal	Private IP DNS name (IPv4 only) ip-172-31-46-182.ap-south-1.compute.internal	Answer private resource DNS name IPv4 (A)
Instance type t2.micro	Elastic IP addresses –	VPC ID vpc-04b228f9bfa2294fb
AWS Compute Optimizer finding Opt-in to AWS Compute Optimizer for recommendations. | Learn more	IAM Role –	Subnet ID subnet-00e748925b7e8de9a

Instance details Info
Host and placement group Info

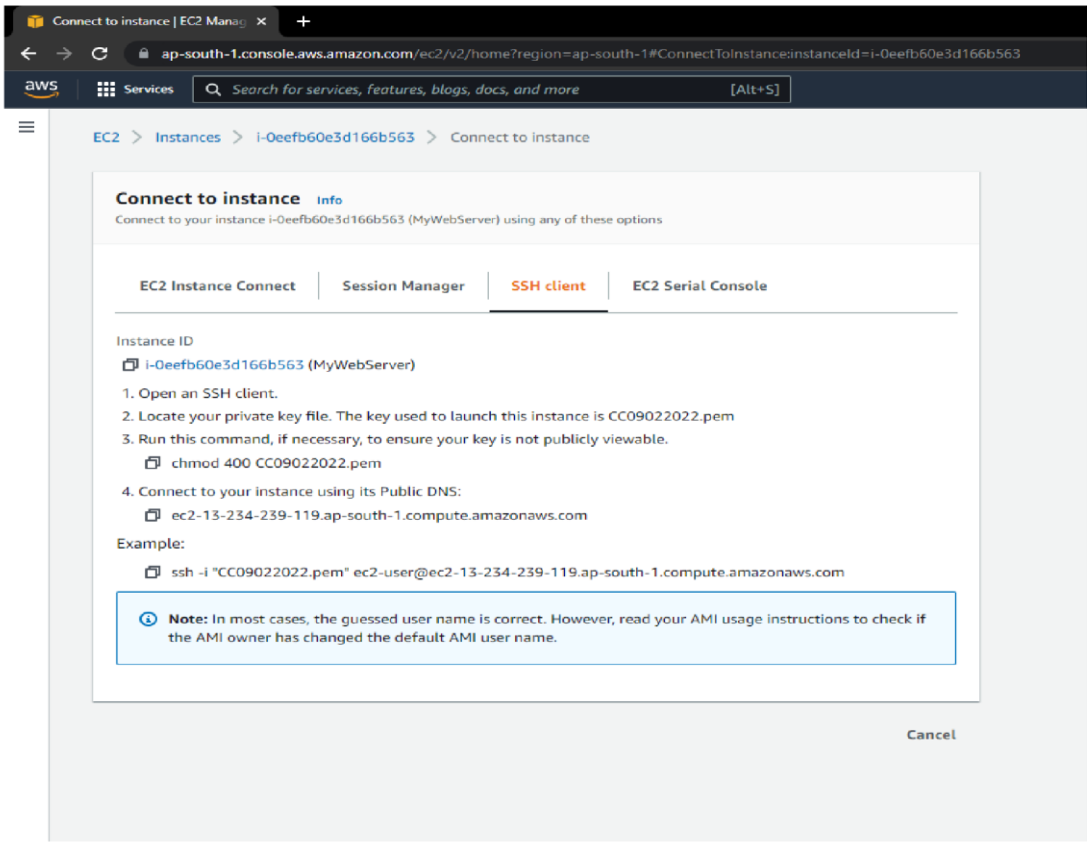
Host ID –	Affinity –	Placement group –
Host resource group name –	Tenancy default	Partition number –
Virtualization type hvm	Reservation r-03623acb33c19e03f	Number of vCPUs 1

Capacity reservation Info

Connecting instance:

Click on "CONNECT" present on the right side

Go to the SSH Client tab and copy the line after Example


Connect to instance | EC2 Manag
ap-south-1.console.aws.amazon.com/ec2/v2/home?region=ap-south-1#ConnectToInstance:instanceId=i-0eefb60e3d166b563
aws
Services
Search for services, features, blogs, docs, and more
[Alt+S]
EC2 > Instances > i-0eefb60e3d166b563 > Connect to instance
EC2 Instance Connect
Session Manager
SSH client
EC2 Serial Console
Cancel

Connect to instance Info
Connect to your instance i-0eefb60e3d166b563 (MyWebServer) using any of these options

Instance ID
i-0eefb60e3d166b563 (MyWebServer)

1. Open an SSH client.
2. Locate your private key file. The key used to launch this instance is CC09022022.pem
3. Run this command, if necessary, to ensure your key is not publicly viewable.
```
chmod 400 CC09022022.pem
```
4. Connect to your instance using its Public DNS:
```
ec2-13-234-239-119.ap-south-1.compute.amazonaws.com
```

Example:
```
ssh -i "CC09022022.pem" ec2-user@ec2-13-234-239-119.ap-south-1.compute.amazonaws.com
```

Note: In most cases, the guessed user name is correct. However, read your AMI usage instructions to check if the AMI owner has changed the default AMI user name.

Open command prompt on your desktop and paste the command copied there
It will ask for confirmation to which say yes
Now you are ready to run commands on your EC2 instance.

- Step 2 : Log in to the created AWS instance using a SSH client.
- Step 3 : Install NodeJS on the server.
- Step 4 : Creating a simple WebAPI application.

For the Web API creation, Hapi can be used.

1) Create a new NodeJS application.

2) Go inside the project folder.

3) Install Hapi

4) Create an index.js file.

1) *npm init*

2) cd api

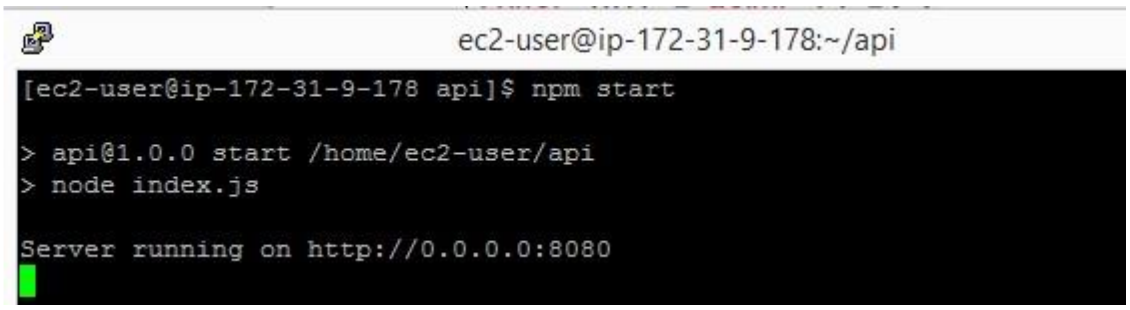
3) *npm install @hapi/hapi*

4) *nano index.js*

5) Update the index.js using the below code snippet.index.js

6) Update the package.json as below.package.json

7) Run the project using — 'npm start'



```
[ec2-user@ip-172-31-9-178 api]$ npm start

> api@1.0.0 start /home/ec2-user/api
> node index.js

Server running on http://0.0.0.0:8080
```

Running the API

8) Try to hit the instance's IPV4 public IP from outside. (IP + :8080) It will show themessage "API is running!" in the browser.

What if you try to restart the server and hit the API from outside. It will timeout your request since the API is not running anymore. In order to fix this problem, PM2 can be used. PM2 will allow to run the API in the background.

9) Install PM2 globally.

10) Start the API using PM2.

11) If you want to auto start the WebAPI once the server is restarted, PM2 startupcommand can be used. Once you run the startup command, It will print a code in the console. Copy the startup code, paste it in the console window and hit enter.

12) Save the PM2 script.

9) npm install pm2@latest -g

10) pm2 start index.js

11) pm2 startup

11.1) sudo env PATH=$PATH:/home/ec2-user/.nvm/versions/node/v13.10.1/bin /home/ec2-user/.nvm/versions/node/v13.10.1/lib/node_modules/pm2/bin/pm2 startup systemd -u ec2-user --hp /home/ec2-user

12)pm2 save

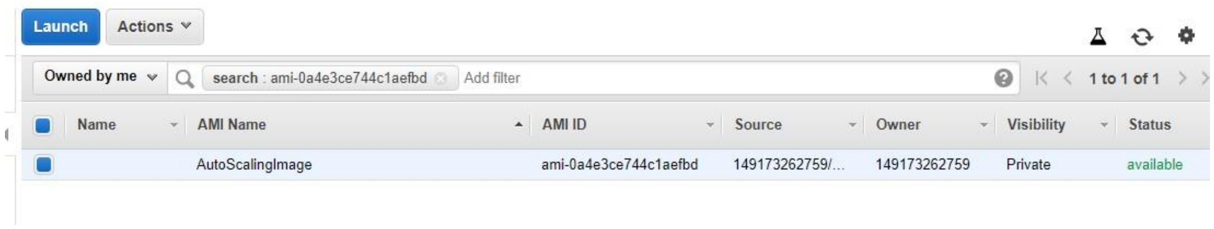
Now restart the server. Copy the newly assigned IP, append the port number and call it using a browser. You can see the API is running.

As the next step, it is required to have a clone of the created server in order to create the Auto Scaling API.

- Step 5 : Creating an Image (AMI).

Right click on the AWS instance -> Image -> Create Image.

Add a name and leave others as default.



Name	AMI Name	AMI ID	Source	Owner	Visibility	Status
	AutoScalingImage	ami-0a4e3ce744c1aefbd	149173262759/...	149173262759	Private	available

Image of the instance

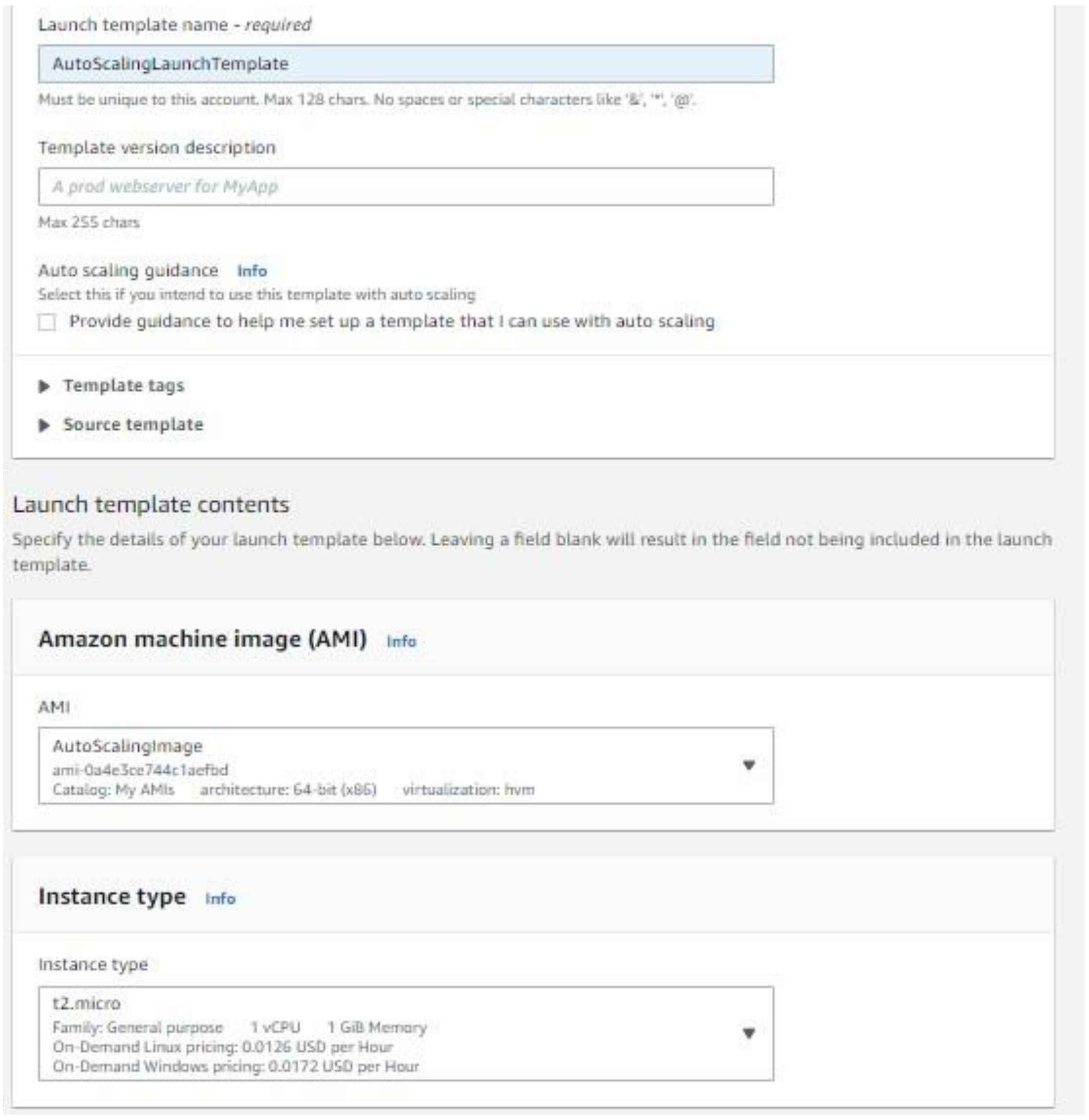
- Step 6 : Creating a Launch Template.

Go to Instances -> Launch Templates -> Create a new Launch Template

Add a name

In Amazon machine image (AMI), select the image created above. Select instance type as t2.micro.

Make sure to select the Network Settings -> Security Groups -> Select the Security group which belongs to your main instance.



Launch template name - *required*

AutoScalingLaunchTemplate

Must be unique to this account. Max 128 chars. No spaces or special characters like '&', '*', '@'.

Template version description

A prod webserver for MyApp

Max 255 chars

Auto scaling guidance Info

Select this if you intend to use this template with auto scaling

☐ Provide guidance to help me set up a template that I can use with auto scaling

▶ Template tags

▶ Source template

Launch template contents

Specify the details of your launch template below. Leaving a field blank will result in the field not being included in the launch template.

Amazon machine image (AMI) Info

AMI

AutoScalingImage
ami-0a4e3ce744c1aefbd
Catalog: My AMIs architecture: 64-bit (x86) virtualization: hvm

Instance type Info

Instance type

t2.micro
Family: General purpose 1 vCPU 1 GiB Memory
On-Demand Linux pricing: 0.0126 USD per Hour
On-Demand Windows pricing: 0.0172 USD per Hour

Creation of the Launch Template

Leave others as default and create the Launch Template.

Stop 7 : Setting up an Auto Scaling Group.

Go to Instances -> Auto Scaling -> Auto Scaling Groups

Press “Create Auto Scaling Group”

Select “Launch Template” & select the created Launch Template

Press Next, type the group name

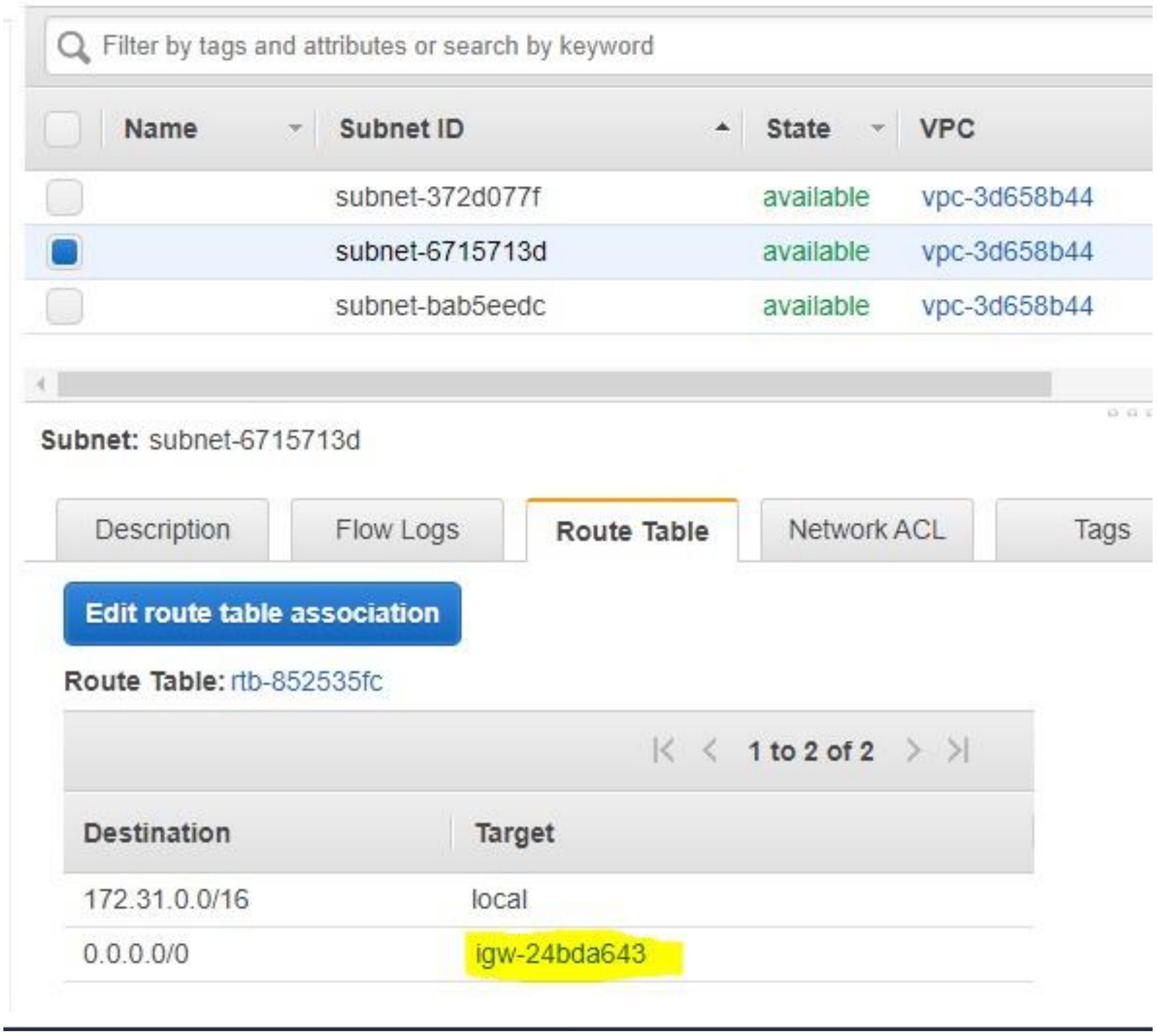
Select the subnets from the list, In this case, you should select a public subnet.

How to check whether the subnet is public or not?

Search for VPC, in the find services text box. Click on Subnets.

From the opened subnet list, click on one of the subnets.

Scroll down, there is tab called “Route Table”.



Filter by tags and attributes or search by keyword

	Name	Subnet ID	State	VPC
		subnet-372d077f	available	vpc-3d658b44
✓		subnet-6715713d	available	vpc-3d658b44
		subnet-bab5eedc	available	vpc-3d658b44

Subnet: subnet-6715713d

Description
Flow Logs
Route Table
Network ACL
Tags
Edit route table association

Route Table: rtb-852535fc

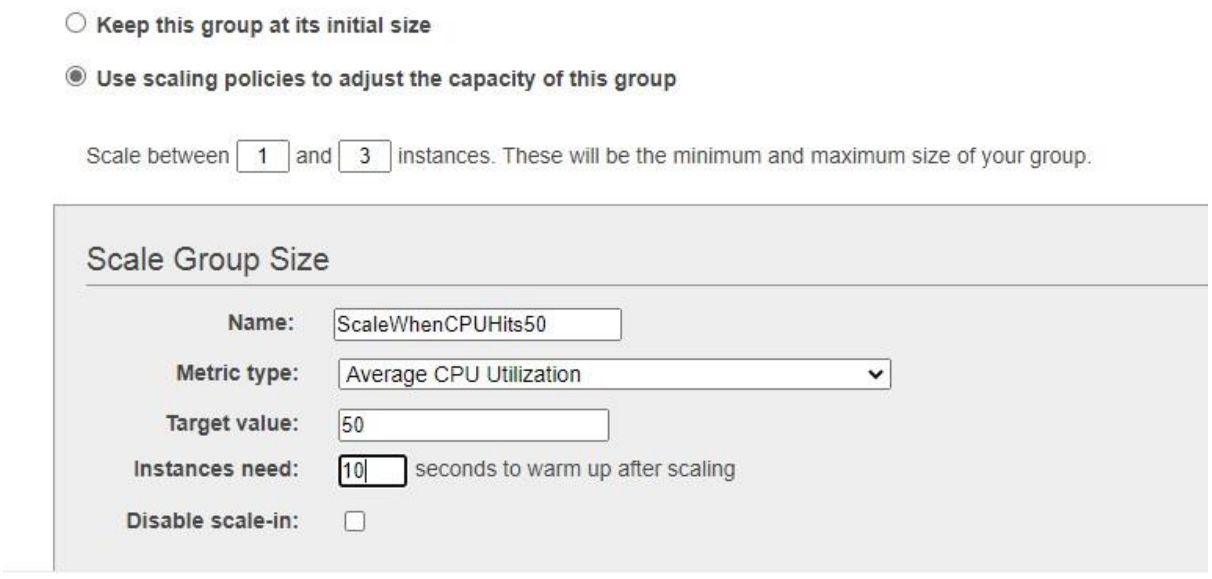
Destination	Target
172.31.0.0/16	local
0.0.0.0/0	igw-24bda643

IGW denotes a public subnet.

Back to Auto Scaling Group Configuration.

Press “Next: Configure Scaling Policies”.

Select “Use scaling policies to adjust the capacity of this group”.


( ) Keep this group at its initial size
(●) Use scaling policies to adjust the capacity of this group

Scale between 1 and 3 instances. These will be the minimum and maximum size of your group.

Scale Group Size

Name:	ScaleWhenCPUHits50
Metric type:	Average CPU Utilization
Target value:	50
Instances need:	10 seconds to warm up after scaling
Disable scale-in:	☐

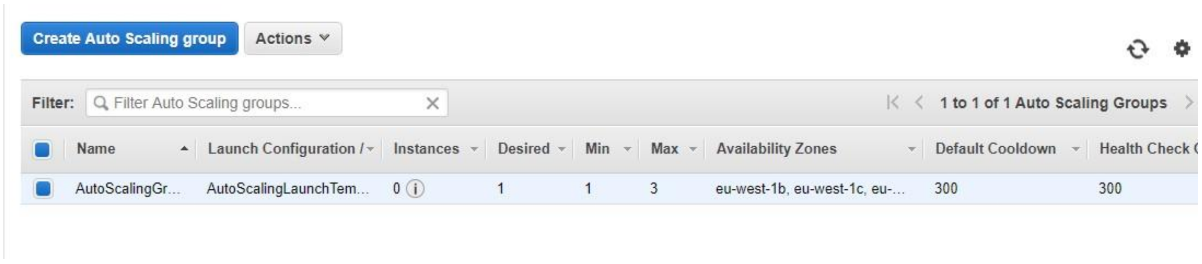
Configuring the Auto Scaling Group

Metric type can be selected based on the application’s nature. In this scenario, the scale group size should be increased by creating instances one by one if the Average CPU Utilisation is more that 50% and the API needs 10 seconds to come to the functioning stage. The maximum number of instances can be created is 3.

Important: Please note that, if the “Disable scale-in” is checked, it wont terminate the servers even after the scaling is no longer required.

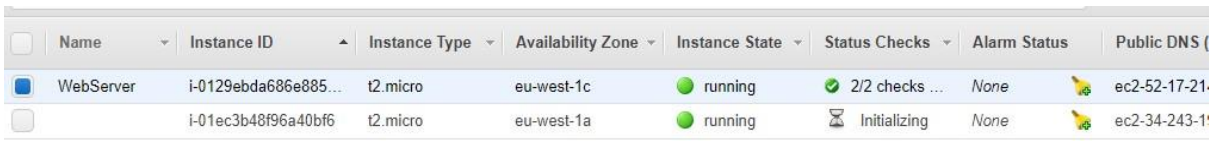
Leave the other steps as default and Create the Auto Scaling Group.

Check the status of the created Auto Scaling Group.


Create Auto Scaling group
Actions
Filter: Filter Auto Scaling groups...
1 to 1 of 1 Auto Scaling Groups

Name	Launch Configuration /	Instances	Desired	Min	Max	Availability Zones	Default Cooldown	Health Check
AutoScalingGr...	AutoScalingLaunchTem...	0	1	1	3	eu-west-1b, eu-west-1c, eu-...	300	300

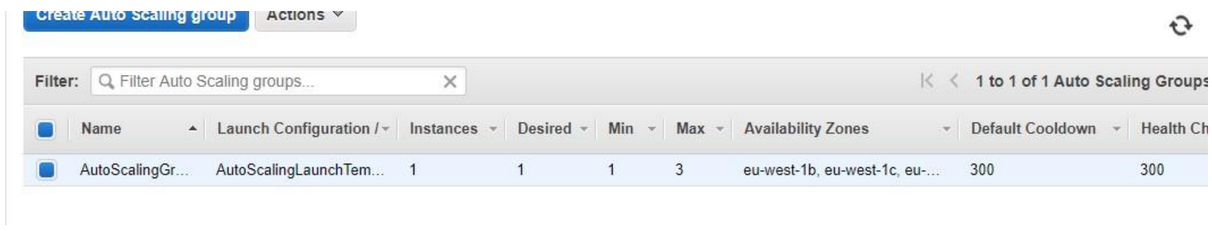
It will show the number of instances as 0, and desired as 1. This is because the scaling group is about to create an instance since the min instance count is 1. Go to the instances window.



	Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status		Public DNS (
☑	WebServer	i-0129ebda686e885...	t2.micro	eu-west-1c	● running	✓ 2/2 checks ...	None		ec2-52-17-21
☐		i-01ec3b48f96a40bf6	t2.micro	eu-west-1a	● running	⌛ Initializing	None		ec2-34-243-1

It is about to spawn another instance and its in the initialisation stage. This is the instance that is created by auto scaling groups.

Go to the Auto Scaling Groups.


Create Auto Scaling group
Actions
Filter:
Filter Auto Scaling groups...
1 to 1 of 1 Auto Scaling Groups

	Name	Launch Configuration /	Instances	Desired	Min	Max	Availability Zones	Default Cooldown	Health Ch
☑	AutoScalingGr...	AutoScalingLaunchTem...	1	1	1	3	eu-west-1b, eu-west-1c, eu-...	300	300

Auto Scaling Groups

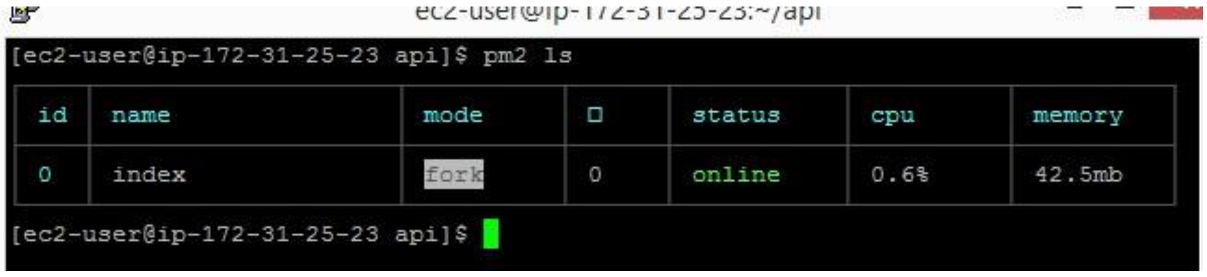
Is it showing that the Instance count is now 1 since one instance is automatically created based on the added policies.

Lets try to overload the CPU. The scaling group will create another instance when the CPU load > 50%. For this, lets alter the NodeJS API that is already in the instance that automatically created through the scaling groups.

Login to the new server which created automatically.

Fire *“pm2 ls”*

This will show the pm2 processors running and the server can be seen as running which we configured to run in startup.



```
[ec2-user@ip-172-31-25-23 api]$ pm2 ls
┌────┬───────────────────┬──────────┬──────┬──────────┬──────────┬──────────┐
│ id │ name              │ mode     │ ↺    │ status   │ cpu      │ memory   │
├────┼───────────────────┼──────────┼──────┼──────────┼──────────┼──────────┤
│ 0  │ index             │ fork     │ 0    │ online   │ 0.6%     │ 42.5mb   │
└────┴───────────────────┴──────────┴──────┴──────────┴──────────┴──────────┘
[ec2-user@ip-172-31-25-23 api]$
```

The CPU Utilization can be seen. In this scenario its 0.6%. Lets increase it up to 50% in order to check the auto creation of instances.

Install the infinite-loop npm package.

```
npm install infinite-loop
```

Stop running the API on PM2 using the below command.

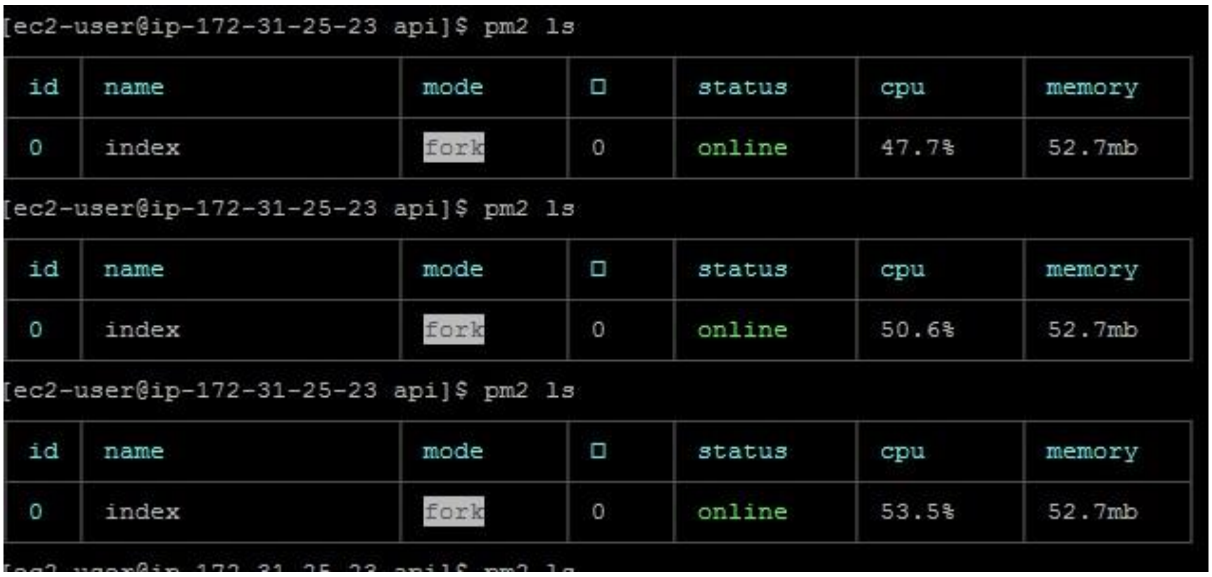
```
pm2 stop 0
```

Modify the index.js using the below code.

Run “pm2 start 0”.

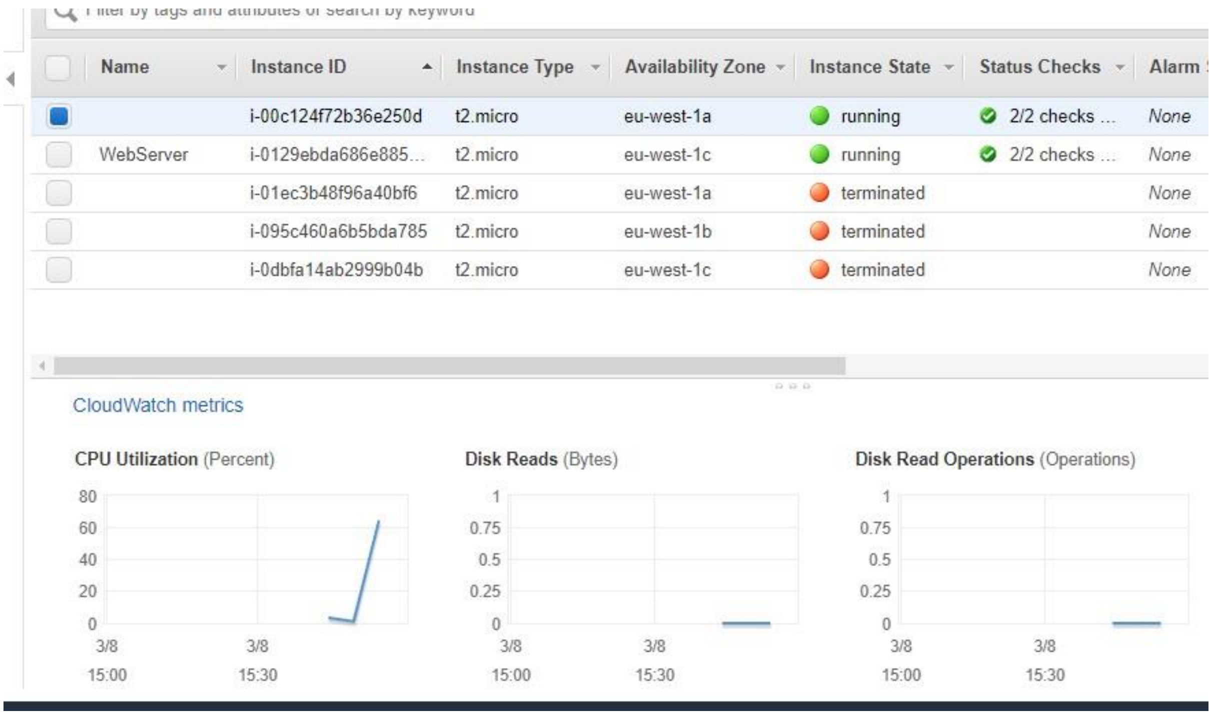
Run “pm2 ls”

It will show CPU process is increasing as below.



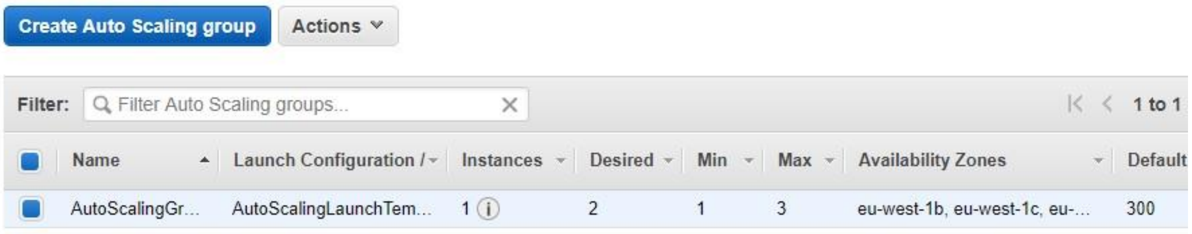
```
[ec2-user@ip-172-31-25-23 api]$ pm2 ls
│ id │ name  │ mode │ ◻ │ status │ cpu   │ memory │
│ 0  │ index │ fork │ 0 │ online │ 47.7% │ 52.7mb │
[ec2-user@ip-172-31-25-23 api]$ pm2 ls
│ id │ name  │ mode │ ◻ │ status │ cpu   │ memory │
│ 0  │ index │ fork │ 0 │ online │ 50.6% │ 52.7mb │
[ec2-user@ip-172-31-25-23 api]$ pm2 ls
│ id │ name  │ mode │ ◻ │ status │ cpu   │ memory │
│ 0  │ index │ fork │ 0 │ online │ 53.5% │ 52.7mb │
```

Go to the instance and check the CPU Utilization in CloudWatch metrics as below. It will show a graphical view how the CPU load increases.



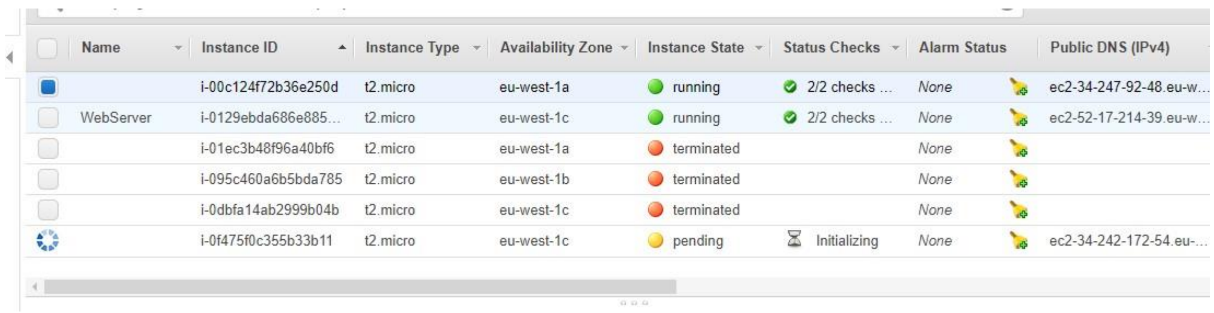
Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm
	i-00c124f72b36e250d	t2.micro	eu-west-1a	running	2/2 checks ...	None
WebServer	i-0129ebda686e885...	t2.micro	eu-west-1c	running	2/2 checks ...	None
	i-01ec3b48f96a40bf6	t2.micro	eu-west-1a	terminated		None
	i-095c460a6b5bda785	t2.micro	eu-west-1b	terminated		None
	i-0dbfa14ab2999b04b	t2.micro	eu-west-1c	terminated		None

From this point onward, the Auto Scaling Group starts deciding to spawn up an another instance as below. Desired count starts to increase.



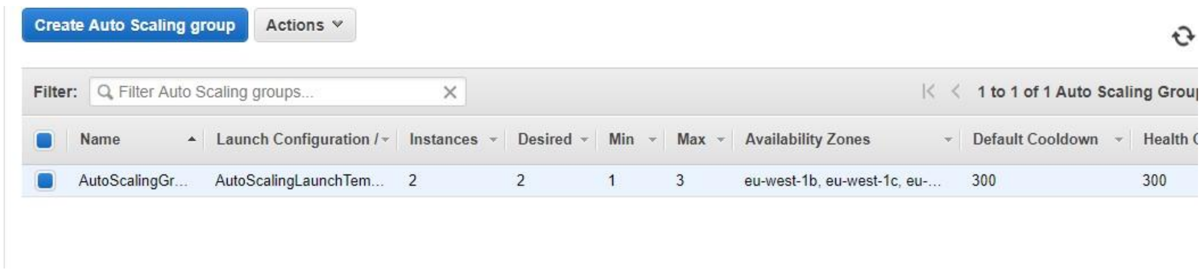
Name	Launch Configuration /	Instances	Desired	Min	Max	Availability Zones	Default
AutoScalingGr...	AutoScalingLaunchTem...	1	2	1	3	eu-west-1b, eu-west-1c, eu-...	300

EC2 starts to spawn an instance as below.



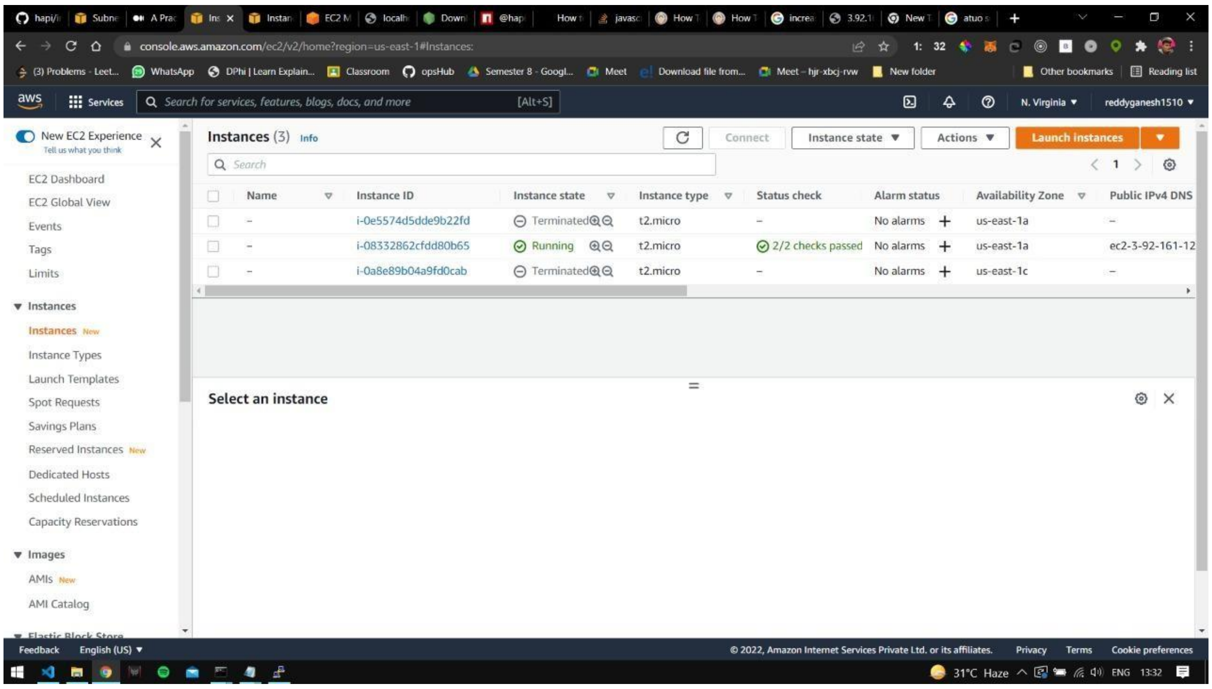
Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status	Public DNS (IPv4)
	i-00c124f72b36e250d	t2.micro	eu-west-1a	● running	✓ 2/2 checks ...	None	ec2-34-247-92-48.eu-w...
WebServer	i-0129ebda686e885...	t2.micro	eu-west-1c	● running	✓ 2/2 checks ...	None	ec2-52-17-214-39.eu-w...
	i-01ec3b48f96a40bf6	t2.micro	eu-west-1a	● terminated		None	
	i-095c460a6b5bda785	t2.micro	eu-west-1b	● terminated		None	
	i-0dbfa14ab2999b04b	t2.micro	eu-west-1c	● terminated		None	
	i-0f475f0c355b33b11	t2.micro	eu-west-1c	● pending	⌛ Initializing	None	ec2-34-242-172-54.eu-...

Finally Auto Scaling Groups setting the instance count as 2.


Create Auto Scaling group
Actions
Filter:
Filter Auto Scaling groups...
1 to 1 of 1 Auto Scaling Grou

Name	Launch Configuration /	Instances	Desired	Min	Max	Availability Zones	Default Cooldown	Health C
AutoScalingGr...	AutoScalingLaunchTem...	2	2	1	3	eu-west-1b, eu-west-1c, eu-...	300	300

Once the load is restored to normal i.e. by switching the ec2 instance which has infinite loop then the required ec2 instance which was deployed gets terminated as follows.



console.aws.amazon.com/ec2/v2/home?region=us-east-1#Instances:

Instances (3) Info

	Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS
	–	i-0e5574d5dde9b22fd	Terminated	t2.micro	–	No alarms	us-east-1a	–
	–	i-08332862cfdd80b65	Running	t2.micro	2/2 checks passed	No alarms	us-east-1a	ec2-3-92-161-12
	–	i-0a8e89b04a9fd0cab	Terminated	t2.micro	–	No alarms	us-east-1c	–

Select an instance

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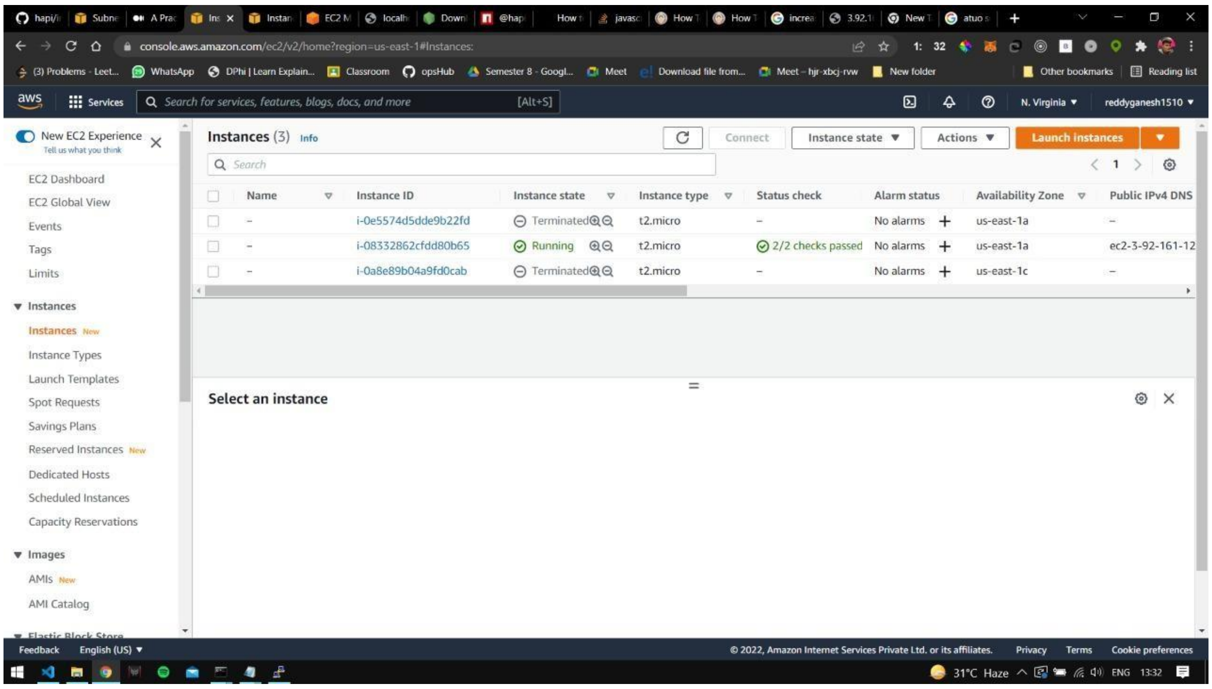

console.aws.amazon.com/ec2/v2/home?region=us-east-1#Instances:

Instances (3) Info

	Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS
	–	i-0e5574d5dde9b22fd	Terminated	t2.micro	–	No alarms	us-east-1a	–
	–	i-08332862cfdd80b65	Running	t2.micro	2/2 checks passed	No alarms	us-east-1a	ec2-3-92-161-12
	–	i-0a8e89b04a9fd0cab	Terminated	t2.micro	–	No alarms	us-east-1c	–

Select an instance

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Postlab Questions:

1. Explain advantages of opting for Auto Scaling

When we use Amazon EC2 Auto Scaling, your applications gain the following benefits:

- Better fault tolerance- Amazon EC2 Auto Scaling can detect when an instance is unhealthy, terminate it, and launch an instance to replace it. You can also configure Amazon EC2 Auto Scaling to use multiple Availability Zones. If one Availability Zone becomes unavailable, Amazon EC2 Auto Scaling can launch instances in another one to compensate.
- Better availability- Amazon EC2 Auto Scaling helps ensure that your application always has the right amount of capacity to handle the current traffic demand.
- Better cost management- Amazon EC2 Auto Scaling can dynamically increase and decrease capacity as needed. We save money by launching instances when they are needed and terminating them when they aren't.

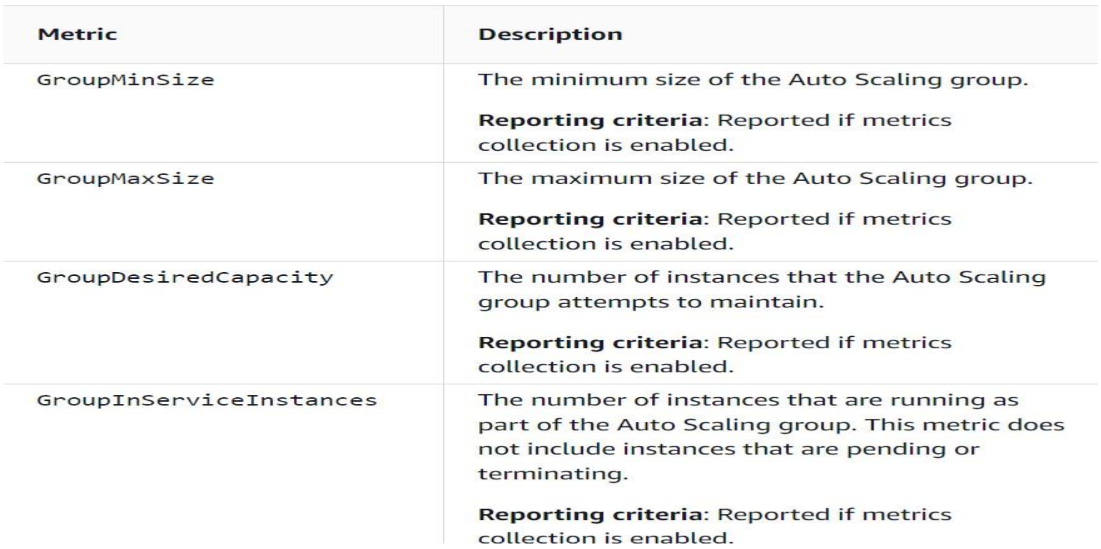
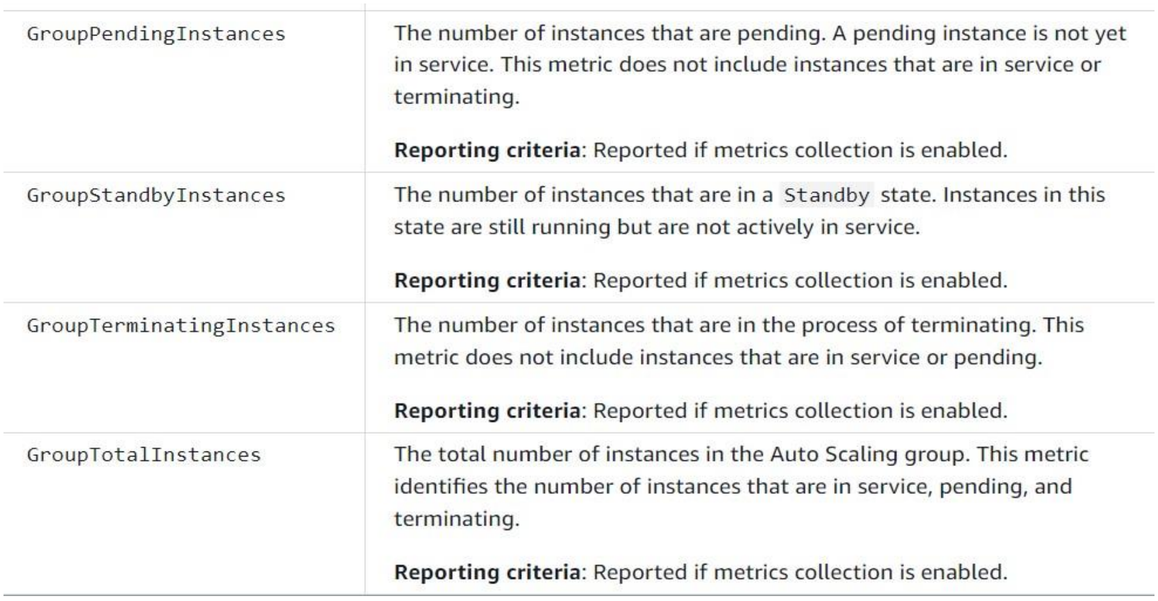
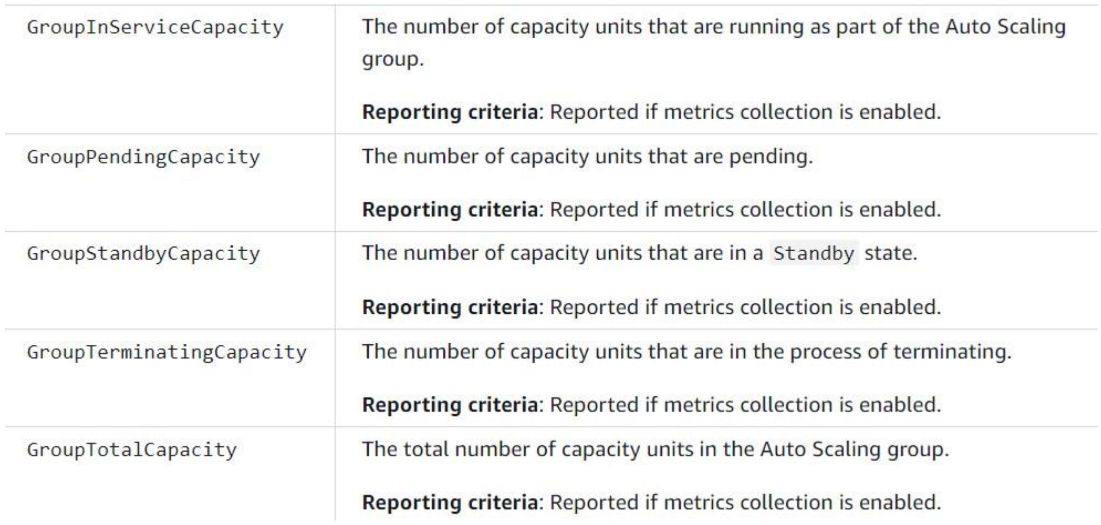
2. What is an Auto Scaling group?

An Auto Scaling group contains a collection of Amazon EC2 instances that are treated as a logical grouping for the purposes of automatic scaling and management. An Auto Scaling group also enables you to use Amazon EC2 Auto Scaling features such as health check replacements and scaling policies.

3. On which Metrics does AWS provide Auto Scaling ?

A metric represents a time-ordered set of data points. Amazon EC2 Auto Scaling publishes data points to CloudWatch about your Auto Scaling groups. The metrics are available at one-minute granularity at no additional charge, but you must enable them

Auto scaling metrics are -

Metric	Description
`GroupMinSize`	The minimum size of the Auto Scaling group. **Reporting criteria**: Reported if metrics collection is enabled.
`GroupMaxSize`	The maximum size of the Auto Scaling group. **Reporting criteria**: Reported if metrics collection is enabled.
`GroupDesiredCapacity`	The number of instances that the Auto Scaling group attempts to maintain. **Reporting criteria**: Reported if metrics collection is enabled.
`GroupInServiceInstances`	The number of instances that are running as part of the Auto Scaling group. This metric does not include instances that are pending or terminating. **Reporting criteria**: Reported if metrics collection is enabled.
`GroupPendingInstances`	The number of instances that are pending. A pending instance is not yet in service. This metric does not include instances that are in service or terminating. **Reporting criteria**: Reported if metrics collection is enabled.
`GroupStandbyInstances`	The number of instances that are in a `Standby` state. Instances in this state are still running but are not actively in service. **Reporting criteria**: Reported if metrics collection is enabled.
`GroupTerminatingInstances`	The number of instances that are in the process of terminating. This metric does not include instances that are in service or pending. **Reporting criteria**: Reported if metrics collection is enabled.
`GroupTotalInstances`	The total number of instances in the Auto Scaling group. This metric identifies the number of instances that are in service, pending, and terminating. **Reporting criteria**: Reported if metrics collection is enabled.
`GroupInServiceCapacity`	The number of capacity units that are running as part of the Auto Scaling group. **Reporting criteria**: Reported if metrics collection is enabled.
`GroupPendingCapacity`	The number of capacity units that are pending. **Reporting criteria**: Reported if metrics collection is enabled.
`GroupStandbyCapacity`	The number of capacity units that are in a `Standby` state. **Reporting criteria**: Reported if metrics collection is enabled.
`GroupTerminatingCapacity`	The number of capacity units that are in the process of terminating. **Reporting criteria**: Reported if metrics collection is enabled.
`GroupTotalCapacity`	The total number of capacity units in the Auto Scaling group. **Reporting criteria**: Reported if metrics collection is enabled.

4. **You have a content management system running on an Amazon EC2 instance that is approaching 100% CPU utilization. Which option will reduce load on the Amazon EC2 instance? (Explain your Choice)**

   a. **Create a load balancer, and register the Amazon EC2 instance with it**
   b. **Create a CloudFront distribution, and configure the Amazon EC2instance as the origin**
   c. **Create an Auto Scaling group from the instance using the CreateAutoScalingGroup action**
   d. **Create a launch configuration from the instance using theCreateLaunchConfigurationAction**

   Ans - Option B

Option A – Create ELB and register the instance, but only one instance still the same load

Option B – Cloudfront will have multiple endpoints and cache the files, relieving the load

Option C – autoscaling without ELB don’t reduce the load

Option D – lauch configuration is just a configuraiton setting for autoscaling