

IT4090 – Cloud Computing

Assignment 3 – Report

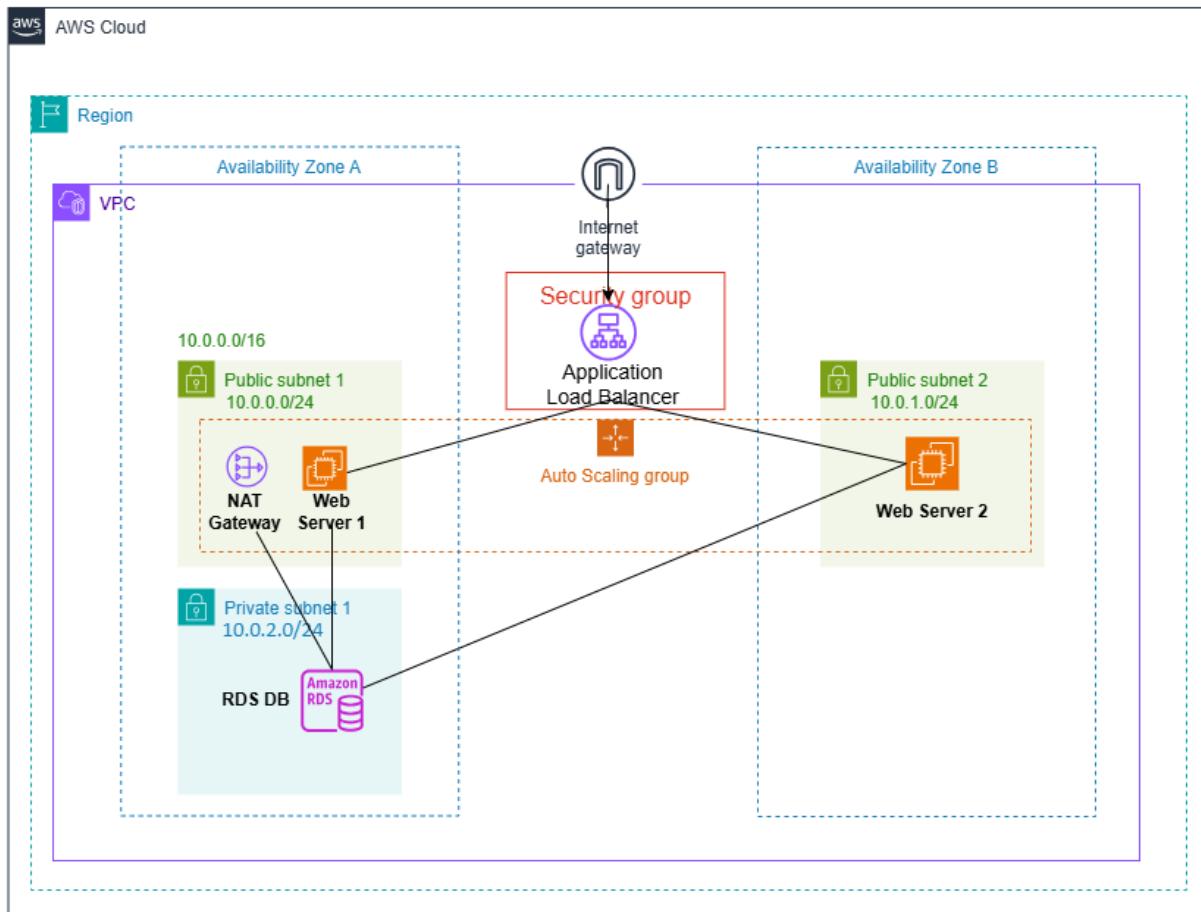
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Submission Date – 10/7/2024

Task 1: Creating an architectural diagram

Architectural Diagram and Plan



This architecture uses a VPC with public and private subnets. Web servers are hosted in public subnets behind an Application Load Balancer for traffic distribution, while databases are securely hosted in private subnets. An Internet Gateway provides public access to the web servers, and a NAT Gateway allows private instances to access the Internet. Security groups control traffic, and auto-scaling ensures the application handles varying loads.

Task 2: Implementation using any Cloud Service Provider

Step 1: Set Up a VPC (Virtual Private Cloud)

1. Log in to the AWS Management Console.
2. Navigate to VPC:

Go to the VPC Dashboard and click on Create VPC.

Create a VPC with an appropriate IPv4 CIDR block (e.g. 10.0.0.0/16).

3. Create Subnets:

Create two public subnets in different Availability Zones (for high availability).

Create a private subnet for the database (PostgreSQL/MySQL).

Example:

Public Subnet 1 (AZ1): 10.0.0.0/24

Public Subnet 2 (AZ2): 10.0.1.0/24

Private Subnet (Database): 10.0.2.0/24

The screenshot shows the AWS VPC Dashboard. On the left, there's a navigation sidebar with links like EC2 Global View, Virtual private cloud (with Your VPCs selected), Security, DNS firewall, and Network Firewall. The main content area has a header 'Your VPCs (1) Info' with a search bar. Below it is a table with one row of data:

Name	VPC ID	State	IPv4 CIDR	IPv6 CIDR	DHCP option set	Main route table	Main network ACL
yoc-07e8e04abbea80e71	Available	172.31.0.0/16	-	-	dopt-0cf9635f8e854003	rtb-07ed4269ec2ede6c5	acl-082244110272b453

At the bottom of the dashboard, there are links for CloudShell, Feedback, and a footer with copyright information: © 2024, Amazon Web Services, Inc. or its affiliates. Privacy Terms Cookie preferences.

Create VPC Info

A VPC is an isolated portion of the AWS Cloud populated by AWS objects, such as Amazon EC2 instances. Mouse over a resource to highlight the related resources.

VPC settings

Resources to create Info
Create only the VPC resource or the VPC and other networking resources.

VPC only VPC and more

Name tag auto-generation Info
Enter a value for the Name tag. This value will be used to auto-generate Name tags for all resources in the VPC.

Auto-generate
IT21510380

IPv4 CIDR block Info
Determine the starting IP and the size of your VPC using CIDR notation.
10.0.0.0/16 65,536 IPs
CIDR block size must be between /16 and /28.

IPv6 CIDR block Info
 No IPv6 CIDR block Amazon-provided IPv6 CIDR block

Tenancy Info
Default

Number of Availability Zones (AZs) Info
Choose the number of AZs in which to provision subnets. We recommend at least two AZs for high availability.
1 2 3

Preview

VPC Show details
Your AWS virtual network
IT21510380-vpc

Subnets (4)
Subnets within this VPC

us-east-1a
IT21510380-subnet-public1-us-east-1a
IT21510380-subnet-private1-us-east-1a

us-east-1b
IT21510380-subnet-public2-us-east-1b
IT21510380-subnet-private2-us-east-1b

Route tables (3)
Route network traffic to resources

IT21510380-rtb-public
IT21510380-rtb-private1-us-east-1a
IT21510380-rtb-private2-us-east-1b

Network connections (2)
Connections to other networks

IT21510380-igw
IT21510380-nat-public1-us-east-1a

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Create VPC Info

Number of public subnets Info
The number of public subnets to add to your VPC. Use public subnets for web applications that need to be publicly accessible over the Internet.
0 1 2

Number of private subnets Info
The number of private subnets to add to your VPC. Use private subnets to secure backend resources that don't need public access.
0 2 4

NAT gateways (1) Info
Choose the number of Availability Zones (AZs) in which to create NAT gateways. Note that there is a charge for each NAT gateway.
None In 1 AZ 1 per AZ

VPC endpoints Info
Endpoints can help reduce NAT gateway charges and improve security by accessing S3 directly from the VPC. By default, full access policy is used. You can customize this policy at any time.
None S3 Gateway

DNS options Info
 Enable DNS hostnames
 Enable DNS resolution

Additional tags

Create VPC

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The screenshot shows the 'Create VPC workflow' page in the AWS VPC console. The status is 'Success' with 21 steps completed. The steps include creating the VPC, enabling DNS, verifying creation, creating subnets, creating an internet gateway, and attaching route tables. A large orange 'View VPC' button is at the bottom.

The screenshot shows the 'VPC dashboard' for the VPC 'vpc-039018eb35a57cf16 / IT21510380-vpc'. The 'Details' tab is selected, showing information like VPC ID, State (Available), and Subnets (4). The 'Resource map' tab shows a diagram of the network structure with subnets, route tables, and network connections.

Amazon VPC allows AWS resources to be launched into a controlled virtual network. This network functions similarly to a traditional network in a data center but with the scalability of AWS. A VPC can span multiple Availability Zones.

After completing this step, the following areas will be achieved:

Create a VPC.

Create subnets.

Set up a security group.

Launch an EC2 instance into the VPC.

Step 2: Launch EC2 Instances for Web Servers

1. Go to EC2 Dashboard:

Launch two EC2 instances running Ubuntu for your web application in each of the public subnets.

2. Choose an Instance type:

In the Instance type panel, select the default t2.micro.

3. Create the key pair to associate with the instance:

From the Key pair name give the IT number

4. Configure the Network settings:

Next to Network settings, choose Edit, then configure:

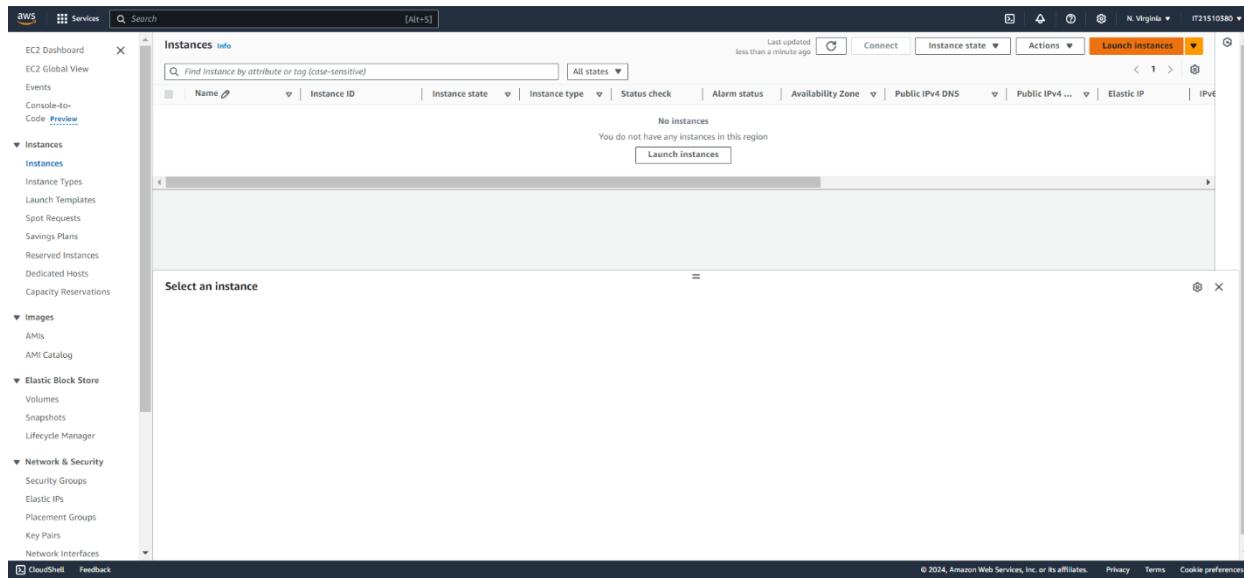
Network: IT21510380-vpc

Subnet: IT21510380-subnet-public1 (not Private!)

Auto-assign public IP: Enable

5. Security Groups:

Create a Security Group that allows HTTP (port 80) and SSH (port 22) access from the internet for your web servers.



Launch an instance

Amazon EC2 allows you to create virtual machines, or instances, that run on the AWS Cloud. Quickly get started by following the simple steps below.

Name and tags

Name: IT21510380-WebServer

Application and OS Images (Amazon Machine Image)

An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. Search or Browse for AMIs if you don't see what you are looking for below.

Search our full catalog including 1000s of application and OS images

Quick Start

Amazon Linux, macOS, Ubuntu, Windows, Red Hat, SUSE, Browse more AMIs

Amazon Machine Image (AMI)

Ubuntu Server 24.04 LTS (HVM), SSD Volume Type

Free tier eligible

Summary

Number of instances: 1

Software Image (AMI): Canonical, Ubuntu, 24.04, amd64..read more ami-0866a3c5b686eae0ba

Virtual server type (instance type): t2.micro

Firewall (security group): New security group

Storage (volumes): 1 volume(s) - 8 GiB

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 750 hours of public IPv4 address usage per month, 30 GiB of EBS storage, 2 million I/Os, 1 GB of snapshots, and 100 GiB of bandwidth to the internet.

Cancel Launch instance Review commands

Amazon Machine Image (AMI)

Ubuntu Server 24.04 LTS (HVM), SSD Volume Type

Free tier eligible

Description

Ubuntu Server 24.04 LTS (HVM),EBS General Purpose (SSD) Volume Type. Support available from Canonical (<http://www.ubuntu.com/cloud/services>).

Architecture: 64-bit (x86)

AMI ID: ami-0866a3c5b686eae0ba

Username: ubuntu

Verified provider

Instance type

t2.micro

All generations Compare instance types

Key pair (login)

You can use a key pair to securely connect to your instance. Ensure that you have access to the selected key pair before you launch the instance.

Key pair name - required

Key-IT21510380

Create new key pair

Summary

Number of instances: 1

Software Image (AMI): Canonical, Ubuntu, 24.04, amd64..read more ami-0866a3c5b686eae0ba

Virtual server type (instance type): t2.micro

Firewall (security group): New security group

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Cancel Launch instance Review commands

* Instance type: t2.micro

Instance type: t2.micro

t2.micro

t2.micro - 1 vCPU, 1 GiB Memory, Current generation: true

On-Demand Windows base pricing: 0.0162 USD per Hour

On-Demand SUSE base pricing: 0.0116 USD per Hour

On-Demand RHEL base pricing: 0.0236 USD per Hour

On-Demand Linux base pricing: 0.0116 USD per Hour

Additional costs apply for AMIs with pre-installed software

Create key pair

Key pair name: Key-IT21510380

Key pairs allow you to connect to your instance securely.

Key pair type: RSA

RSA RSA encrypted private and public key pair

ED25519 ED25519 encrypted private and public key pair

Private key file format: pem

For use with OpenSSH

apk For use with PuTTY

When prompted, store the private key in a secure and accessible location on your computer. You will need it later to connect to your instance. Learn more

Create key pair

Summary

Number of instances: 1

Cancel Create instance Review commands

Key pair (login) [Info](#)

You can use a key pair to securely connect to your instance. Ensure that you have access to the selected key pair before you launch the instance.

Key pair name - required

Key-IT21510380 [Create new key pair](#)

Network settings [Info](#)

VPC - required [Info](#)

vpc-039018eb35a57cf16 (IT21510380-vpc) [Create new subnet](#)

Subnet [Info](#)

subnet-08a08e0cc03296e6 IT21510380-subnet-public1-us-east-1a [Create new subnet](#)

Auto-assign public IP [Info](#)

Enable [Additional charges apply when outside of free tier allowance](#)

Firewall (security groups) [Info](#)

A security group is a set of firewall rules that control the traffic for your instance. Add rules to allow specific traffic to reach your instance.

[Create security group](#) [Select existing security group](#)

Security group name - required

IT21510380-SecurityGroup

This security group will be added to all network interfaces. The name can't be edited after the security group is created. Max length is 255 characters. Valid characters: a-z, A-Z, 0-9, spaces, and _/-[!@#\\$%^&_]/

Description - required [Info](#)

CloudShell [Feedback](#)

Summary

Number of instances [Info](#)
1

Software Image (AMI)
Canonical, Ubuntu, 24.04, amd64 [read more](#)
ami-0866a3c9868caedba

Virtual server type (instance type)
t2.micro

Firewall (security group)
New security group

Storage (volumes)
1 volume(s) - 8 GiB

Free tier: In your first year includes

750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 750 hours of public IPv4 address usage per month, 30 GiB of EBS storage, 2 million I/Os, 1 GB of snapshots, and 100 GB of bandwidth to the internet.

Launch instance [Review commands](#)

Description - required [Info](#)

This security group for cloud computing assignment

Inbound Security Group Rules

Security group rule 1 (TCP, 22, 0.0.0.0/0)

Type Info	Protocol Info	Port range Info
ssh	TCP	22

Source type [Info](#)

Anywhere [Add CIDR, prefix list or security group](#)

Description - optional [Info](#)

e.g. SSH for admin desktop

[0.0.0.0/0](#) [X](#)

[Add security group rule](#)

[Advanced network configuration](#)

Configure storage [Info](#)

Advanced

1x 8 GB gp3 [Root volume \(Not encrypted\)](#)

Free tier eligible customers can get up to 30 GB of EBS General Purpose (SSD) or Magnetic storage

[Add new volume](#)

The selected AMI contains more instance store volumes than the instance allows. Only the first 0 instance store volumes from the AMI will be accessible from the instance

[Click refresh to view backup information](#)

The tags that you assign determine whether the instance will be backed up by any

CloudShell [Feedback](#)

Summary

Number of instances [Info](#)
1

Software Image (AMI)
Canonical, Ubuntu, 24.04, amd64 [read more](#)
ami-0866a3c9868caedba

Virtual server type (instance type)
t2.micro

Firewall (security group)
New security group

Storage (volumes)
1 volume(s) - 8 GiB

Free tier: In your first year includes

750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 750 hours of public IPv4 address usage per month, 30 GiB of EBS storage, 2 million I/Os, 1 GB of snapshots, and 100 GB of bandwidth to the internet.

Launch instance [Review commands](#)

EC2 > ... > Launch an instance

Success
Successfully initiated launch of instance i-06b36e5b1264baf81

[Launch log](#)

Next Steps

Q. 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 Enable or disable detailed monitoring for the instance. If you enable detailed monitoring, the Amazon EC2 console displays monitoring graphs with a 1-minute period. Manage detailed monitoring	Create Load Balancer Create a application, network gateway or classic Elastic Load Balancer. Create Load Balancer
Create AWS budget AWS Budgets allows you to create budgets, forecast spend, and take action on your costs and usage from a single location. Create AWS budget	Manage CloudWatch alarms Create or update Amazon CloudWatch alarms for the instance. Manage CloudWatch alarms	Disaster recovery for your instances Recover the instances you just launched into a different Availability Zone or a different Region using AWS Elastic Disaster Recovery (EDR). Monitor for suspicious runtime activities	Monitor for suspicious runtime activities Amazon GuardDuty enables you to continuously monitor for malicious runtime activity and unauthorized behavior, with near-real-time visibility into on-host activities occurring across	Get instance screenshot Capture a screenshot from the instance and view it as an image. This is useful for troubleshooting an unreachable instance. Get instance screenshot	Get system log View the instance's system log to troubleshoot issues. Get system log

CloudShell [Feedback](#)

The screenshot shows the AWS EC2 Instances page. On the left, there's a navigation sidebar with links like EC2 Dashboard, EC2 Global View, Events, Console-to-Code Preview, Instances, Instance Types, Launch Templates, Spot Requests, Savings Plans, Reserved Instances, Dedicated Hosts, Capacity Reservations, Images, AMIs, AMI Catalog, Elastic Block Store, Volumes, Snapshots, Lifecycle Manager, Network & Security, Security Groups, Elastic IPs, Placement Groups, Key Pairs, and Network Interfaces. The main content area displays a table of instances. One instance is selected: 'i-06b36e5b1264baf1 (IT21510380-WebServer)'. The instance details show it's a t2.micro type, running, with a Public IPv4 address of 34.207.177.30 and a Private IPv4 address of 10.0.8.165. It's associated with a VPC ID (vpc-039018eb35a57cf16), a subnet ID (subnet-08a08e01cc03296eb), and an instance ARN (arn:aws:ec2:us-east-1:503561420987:instance/i-06b36e5b1264baf1). The status bar at the bottom indicates the instance was last updated 4 minutes ago.

Amazon Elastic Compute Cloud (Amazon EC2) is a cloud service that offers flexible computing capacity. It allows quick setup of servers and makes it easy to scale up or down based on demand. EC2 charges only for the capacity used and helps build applications that are resilient to failures.

After completing these steps, the following will be done:

Launch a web server with termination protection.

Monitor the EC2 instance.

Modify the security group to allow HTTP access.

Resize the instance and enable stop protection, Test and stop the instance.

Step 3: Connect to the Ubuntu EC2 Instance

1. Access via SSH:

After launching the instance, go to EC2 Dashboard → Instances.

Select the instance and click Connect.

2. Switch to root user (optional, but it keeps you from having to use sudo with each command):

sudo -i

3. Update the package list: **apt update**

4. Install Apache: **apt install apache2**

5. Check the status of Apache to ensure it's running: **systemctl status apache2**

6. Navigate to the web root directory where Apache serves files from: **cd /var/www/html**

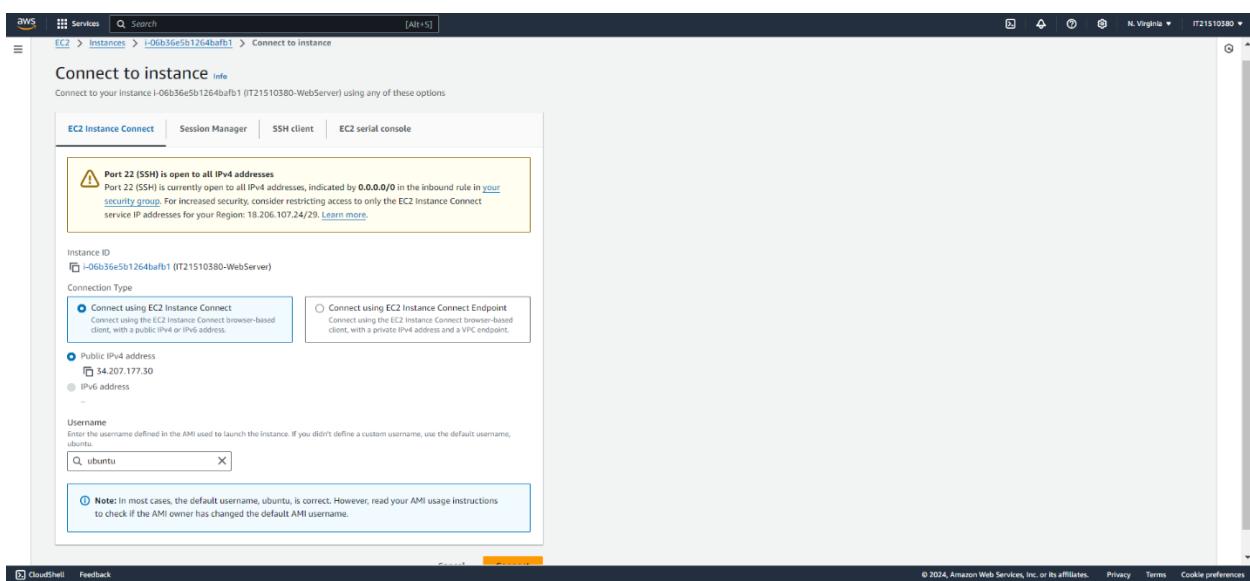
7. Create an index.html file for your static website: **nano index.html**

8. Static website that uses HTML with JavaScript

9. Save and exit the file (Ctrl + X, then Y to confirm, and Enter)

10. Verify the website is working: Open a web browser and visit your EC2 instance's public IP address:

<http://<your-ec2-public-ip>> = <https://34.207.177.30/>



```
AWS Services Search [Alt+S] N. Virginia IT21510380 ▾
welcome to Ubuntu 24.04.1 LTS (GNU/Linux 6.8.0-1016-aws x86_64)

* Documentation: https://help.ubuntu.com
* Management: https://landscape.canonical.com
* Support: https://ubuntu.com/pro

System information as of Sun Oct 6 14:20:17 UTC 2024

System load: 0.08 Processes: 105
Usage of /: 22.9% of 6.71GB Users logged in: 0
Memory usage: 20% IPv4 address for enX0: 10.0.8.165
Swap usage: 0%

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

The list of available updates is more than a week old.
To check for new updates run: sudo apt update

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

ubuntu@ip-10-0-8-165:~$
```

i-06b36e5b1264bafbf1 (IT21510380-WebServer)
PublicIPs: 34.207.177.30 PrivateIPs: 10.0.8.165

```
AWS Services Search [Alt+S] N. Virginia IT21510380 ▾
welcome to Ubuntu 24.04.1 LTS (GNU/Linux 6.8.0-1016-aws x86_64)

* Documentation: https://help.ubuntu.com
* Management: https://landscape.canonical.com
* Support: https://ubuntu.com/pro

System information as of Sun Oct 6 14:20:17 UTC 2024

System load: 0.08 Processes: 105
Usage of /: 22.9% of 6.71GB Users logged in: 0
Memory usage: 20% IPv4 address for enX0: 10.0.8.165
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Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

The list of available updates is more than a week old.
To check for new updates run: sudo apt update

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

ubuntu@ip-10-0-8-165:~$ sudo -i
root@ip-10-0-8-165:~# apt install apache2
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:

i-06b36e5b1264bafbf1 (IT21510380-WebServer)  
PublicIPs: 34.207.177.30 PrivateIPs: 10.0.8.165
```

```
AWS Services Search [Alt+S] N. Virginia IT21510380 ▾
Enabling module authz_host.
Enabling module authz_core.
Enabling module authn_file.
Enabling module authn_socache.
Enabling module authn_user.
Enabling module authz_user.
Enabling module alias.
Enabling module dir.
Enabling module autoindex.
Enabling module env.
Enabling module mime.
Enabling module negotiation.
Enabling module setenvif.
Enabling module limit.
Enabling module deflate.
Enabling module status.
Enabling module reqtimeout.
Enabling conf charset.
Enabling conf env.
Enabling conf log-level.
Enabling conf other-headers-access-log.
Enabling conf security.
Enabling conf session-blob.
Enabling conf site-default.
Created symlink /etc/systemd/system/multi-user.target.wants/apache2.service → /usr/lib/systemd/system/apache2.service.
Created symlink /etc/systemd/system/multi-user.target.wants/apache-htcacheclean.service → /usr/lib/systemd/system/apache-htcacheclean.service.
Processing triggers for ureadahead (0.100.0-195ubuntu1) ...
Processing triggers for liblc-bin (2.39-0ubuntu8.3) ...
Scanning processes...
Scanning linux images...
Running kernel seems to be up-to-date.
No services need to be restarted.
No containers need to be restarted.
No user sessions are running outdated binaries.
No VM guests are running outdated hypervisor (qemu) binaries on this host.
root@ip-10-0-8-165:~$
```

i-06b36e5b1264bafbf1 (IT21510380-WebServer)
PublicIPs: 34.207.177.30 PrivateIPs: 10.0.8.165

```

AWS Services Q Search [Alt+S]
Enabling conf other-hosts-access-log.
Enabling conf security.
Enabling conf security-bin.
Enabling site 000-default.
Created symlink /etc/systemd/system/multi-user.target.wants/apache2.service → /usr/lib/systemd/system/apache2.service.
Created symlink /etc/systemd/system/multi-user.target.wants/apache-htcacheclean.service → /usr/lib/systemd/system/apache-htcacheclean.service.
Processing triggers for libc-bin (0.12.1.0-4ubuntu12.3) ...
Processing triggers for libgcc1 (2.39-0ubuntu8.3) ...
Scanning processes...
Scanning linux images...
Running kernel seems to be up-to-date.
No services need to be restarted.
No containers need to be restarted.
No user sessions are running outdated binaries.
No VM guests are running outdated hypervisor (qemu) binaries on this host.
root@i-06b36e5b1264bafbf1:~# systemctl status apache2
● apache2.service - The Apache HTTP Server
   Loaded: loaded (/usr/lib/systemd/system/apache2.service; enabled; preset: enabled)
   Active: active (running) since Sun 2024-10-06 14:22:48 UTC; 35ms ago
     Docs: http://httpd.apache.org/docs/2.4/
Main PID: 2120 (apache2)
    Tasks: 55 (limit: 1130)
      Memory: 3.4M (peak: 5.6M)
        CPU: 0ms
       CGroup: /system.slice/apache2.service
           └─2120 /usr/sbin/apache2 -k start
              ├─2123 /usr/sbin/apache2 -k start
              ├─2124 /usr/sbin/apache2 -k start
              └─2125 /usr/sbin/apache2 -k start

Oct 06 14:22:48 ip-10-0-8-165 systemd[1]: Starting apache2.service - The Apache HTTP Server...
Oct 06 14:22:48 ip-10-0-8-165 systemd[1]: Started apache2.service - The Apache HTTP Server.
root@i-06b36e5b1264bafbf1:~# sync
root@i-06b36e5b1264bafbf1:~# systemctl enable apache2
root@i-06b36e5b1264bafbf1:~# 

i-06b36e5b1264bafbf1 (IT21510380-WebServer)
PublicIP: 34.207.177.30 PrivateIP: 10.0.8.165

```

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Step 4: Edit Inbound Rules for an EC2 Instance:

1. Open EC2 Dashboard in the AWS Management Console.
2. Select the Instance from the Instances section.
3. In the Description tab, click the Security Group ID linked to your instance.
4. Go to the Inbound Rules tab and click Edit Inbound Rules.
5. Add or Modify Rules:

For SSH (port 22), select SSH and set Source to Custom or 0.0.0.0/0.

For HTTP (port 80), select HTTP and set Source to Anywhere Ipv4 0.0.0.0/0.

6. Click Save Rules to apply changes.

Name	Security group rule ID	Port range	Protocol	Source	Security groups	Description
sgr-0e50ff2d15fb1f1684	22	TCP	0.0.0.0/0	IIT21510380-SecurityGroup	-	

Name	Security group rule ID	Port range	Protocol	Destination	Security groups	Description
sgr-00de44f719e9e754e	All	All	0.0.0.0/0	IIT21510380-SecurityGroup	-	

<https://us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#SecurityGroup:securityGroupId=sgr-06ec29a23257093e2>

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Screenshot of the AWS EC2 Security Groups page showing the details of the security group sg-06ec29a23257093e2 - IT21510380-SecurityGroup.

Details

Security group name	sg-06ec29a23257093e2	Security group ID	sg-06ec29a23257093e2	Description	This security group for cloud computing assignment
Owner	503561420987	Inbound rules count	1 Permission entry	VPC ID	vpc-039018eb35a57cf16
Outbound rules count 1 Permission entry					

Inbound rules | **Outbound rules** | **Tags**

Inbound rules (1)

Name	Security group rule...	IP version	Type	Protocol	Port range	Source	Description
-	sgr-0e50ff2d15fbf1684	IPv4	SSH	TCP	22	0.0.0.0/0	-

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Screenshot of the AWS EC2 Edit inbound rules page for the security group sg-06ec29a23257093e2 - IT21510380-SecurityGroup.

Edit inbound rules info

Inbound rules control the incoming traffic that's allowed to reach the instance.

Inbound rules Info

Security group rule ID	Type	Protocol	Port range	Source	Description - optional
sgr-0e50ff2d15fbf1684	SSH	TCP	22	Custom <input type="text" value="0.0.0.0/0"/> <input type="button" value="Delete"/>	
-	HTTP	TCP	80	Anywhere-IPv4 <input type="text" value="0.0.0.0/0"/> <input type="button" value="Delete"/>	

Add rule Cancel Preview changes Save rules

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Screenshot of the AWS EC2 Security Groups page showing the details of the security group sg-06ec29a23257093e2 - IT21510380-SecurityGroup after modifications.

Details

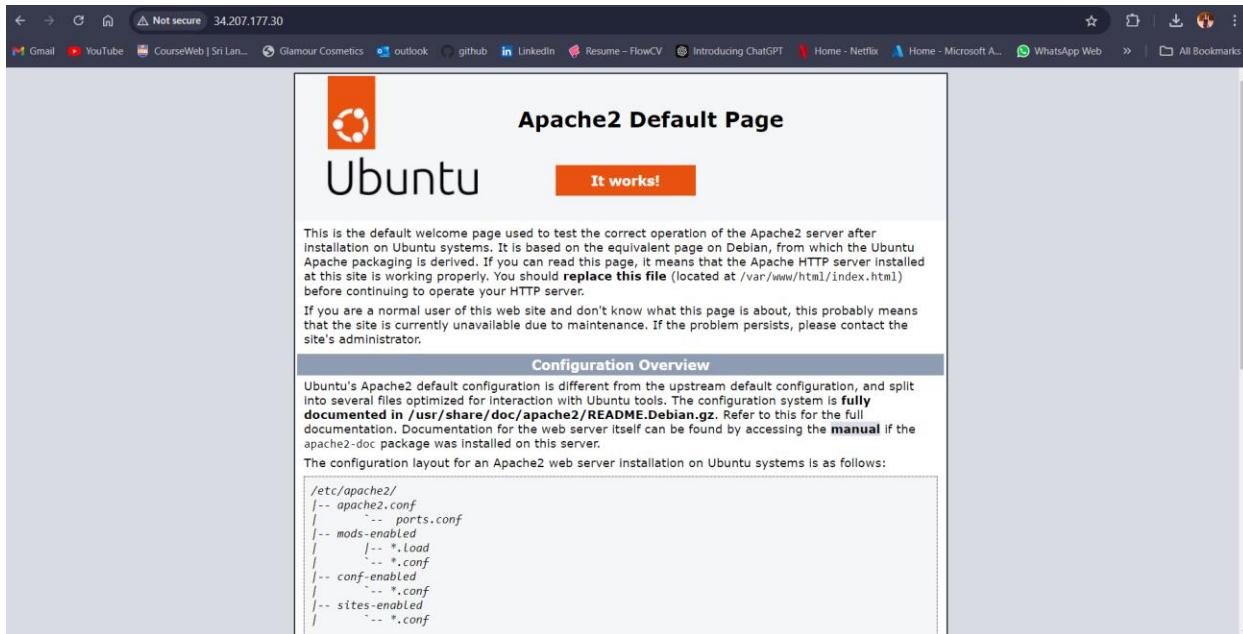
Security group name	sg-06ec29a23257093e2	Security group ID	sg-06ec29a23257093e2	Description	This security group for cloud computing assignment
Owner	503561420987	Inbound rules count	2 Permission entries	VPC ID	vpc-039018eb35a57cf16
Outbound rules count 1 Permission entry					

Inbound rules | **Outbound rules** | **Tags**

Inbound rules (2)

Name	Security group rule...	IP version	Type	Protocol	Port range	Source	Description
-	sgr-017c27182bd8ce6e6	IPv4	HTTP	TCP	80	0.0.0.0/0	-
-	sgr-0e50ff2d15fbf1684	IPv4	SSH	TCP	22	0.0.0.0/0	-

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```
aws Services Search [Alt+S]
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
root@ip-10-0-8-165:~# systemctl status apache2
● apache2.service - The Apache HTTP Server
   Loaded: loaded (/usr/lib/systemd/system/apache2.service; enabled; preset: enabled)
     Active: active (running) since Sun 2024-10-06 14:22:48 UTC; 17min ago
       Docs: https://httpd.apache.org/docs/2.4/
      Main PID: 2120 (apache2)
        Tasks: 55 (limit: 1130)
       Memory: 5.6M (peak: 5.8M)
          CPU: 85ms
         CGroup: /system.slice/apache2.service
             ├─2120 /usr/sbin/apache2 -k start
             ├─2123 /usr/sbin/apache2 -k start
             └─2124 /usr/sbin/apache2 -k start

Oct 06 14:22:48 ip-10-0-8-165 systemd[1]: Starting apache2.service - The Apache HTTP Server...
Oct 06 14:22:48 ip-10-0-8-165 systemd[1]: Started apache2.service - The Apache HTTP Server.
root@ip-10-0-8-165:~# systemctl enable apache2
Synchronizing state of apache2.service with sysV service script with /usr/lib/systemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable apache2
root@ip-10-0-8-165:~# cd /var/www/html
root@ip-10-0-8-165:/var/www/html# sudo nano /var/www/html/index.html
root@ip-10-0-8-165:/var/www/html# cd /var/www/html
root@ip-10-0-8-165:/var/www/html# nano index.html
root@ip-10-0-8-165:/var/www/html# sudo nano /var/www/html/index.html
root@ip-10-0-8-165:/var/www/html# [REDACTED]
```

i-06b36e5b1264bafbf1 (IT21510380-WebServer)

Public IPs: 34.207.177.30 Private IPs: 10.0.8.165

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```
curl sans 7.2
curl https://www.w3.org/1999/xhtml/*
<!--
Modified from the Debian original for Ubuntu
Last updated: 2023-03-02
See: https://Launchpad.net/bugs/1966004
-->
<head>
<meta http-equiv="Content-Type" content="text/html; charset=UTF-8" />
<title>Apache2 Default Page: It works!</title>
<style type="text/css" media="screen">
<(
margin: 0px 0px 0px;
padding: 0px 0px 0px;
)
body, html {
padding: 3px 3px 3px;
background-color: #008B8B;
font-family: Ubuntu, Verdana, sans-serif;
font-size: 11pt;
text-align: center;
}
div.main_page {
position: relative;
display: table;
width: 800px;
margin-bottom: 3px;
margin-left: auto;
margin-right: auto;
padding: 0px 0px 0px;
border-width: 2px;
}
</style>
</head>
<body>
<div>
<h1>Apache2 Default Page: It works!</h1>
<p>This is the default welcome page used to test the correct operation of the Apache2 server after installation on Ubuntu systems. It is based on the equivalent page on Debian, from which the Ubuntu Apache packaging is derived. If you can read this page, it means that the Apache HTTP server installed at this site is working properly. You should <a href="/var/www/html/index.html">replace this file</a> (located at /var/www/html/index.html) before continuing to operate your HTTP server.
If you are a normal user of this web site and don't know what this page is about, this probably means that the site is currently unavailable due to maintenance. If the problem persists, please contact the site's administrator.
</p>
<h2>Configuration Overview</h2>
<pre>/etc/apache2/
|-- apache2.conf
|--- ports.conf
|-- mods-enabled
|--- *.load
|--- *.conf
|-- conf-enabled
|--- *.conf
|-- sites-enabled
|--- *.conf
</pre>
<p>Ubuntu's Apache2 default configuration is different from the upstream default configuration, and split into several files optimized for interaction with Ubuntu tools. The configuration system is fully documented in /usr/share/doc/apache2/README.Debian.gz. Refer to this for the full documentation. Documentation for the web server itself can be found by accessing the manual if the apache2-doc package was installed on this server.
The configuration layout for an Apache2 web server installation on Ubuntu systems is as follows:</p>
<pre>/etc/apache2/
|-- apache2.conf
|--- ports.conf
|-- mods-enabled
|--- *.load
|--- *.conf
|-- conf-enabled
|--- *.conf
|-- sites-enabled
|--- *.conf
</pre>
</div>
</body>
</html>
```

Help Write Out Where Is Cut Execute Location Cancelled Undo Set Mark To Bracket Previous Back Prev Word Home

```

<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Student Records</title>
    <style>
        body {
            font-family: Arial, sans-serif;
            background-color: #f4f4f4;
            text-align: center;
            padding: 50px;
        }
        #studentTable {
            margin: 0 auto;
            width: 50%;
            border-collapse: collapse;
        }
        #studentTable th, #studentTable td {
            border: 1px solid #ddd;
            padding: 8px;
        }
        .Help { }
        .Write Out { }
        .Where Is { }
        .Cut { }
        .Execute { }
        .Location { }
        .Undo { }
        .Redo { }
        .Copy { }
        .Paste { }
        .Justify { }
        .Go To Line { }
        .Set Mark { }
        .To Bracket { }
        .Prev { }
        .Next { }
        .Forward { color: white; }
    </style>
<body>
    <table border="1">
        <thead>
            <tr>
                <th>Age</th>>D</th>
        </thead>
        <tbody>
        </tbody>
    </table>
</body>

```

i-06b36e5b1264bafbf1 (IT21510380-WebServer)
Public IPs: 34.207.177.30 Private IPs: 10.0.8.165

```

<tr>
</thead>
<tbody id="studentBody">
    <!-- Content will be loaded by JavaScript -->
</tbody>
</table>

<script>
    // Simple JavaScript to load static student records
    const students = [
        { id: 1, name: "John Doe", age: 20 },
        { id: 2, name: "Jane Smith", age: 21 },
        { id: 3, name: "Mary Johnson", age: 22 }
    ];

    // Function to dynamically add student data to the table
    function loadStudents() {
        const studentBody = document.getElementById("studentBody");
        students.forEach(student => {
            const row = document.createElement("tr");

            const cellId = document.createElement("td");
            cellId.textContent = student.id;

```

i-06b36e5b1264bafbf1 (IT21510380-WebServer)
Public IPs: 34.207.177.30 Private IPs: 10.0.8.165

Welcome to the Student Records System

This is my database server and my IT number is IT21510380.

Student Records

Student ID	Name	Age
1	John Doe	20
2	Jane Smith	21
3	Mary Johnson	22

Step 5: Create an AMI from an EC2 Instance:

1. Open EC2 Dashboard:

Go to the AWS Management Console and select EC2.

2. Select the Instance:

In the Instances section, locate and select the EC2 instance for which the AMI will be created.

3. Create Image:

With the instance selected, click on the Actions dropdown menu. Navigate to Image and Templates, then select Create Image.

4. Configure Image Settings:

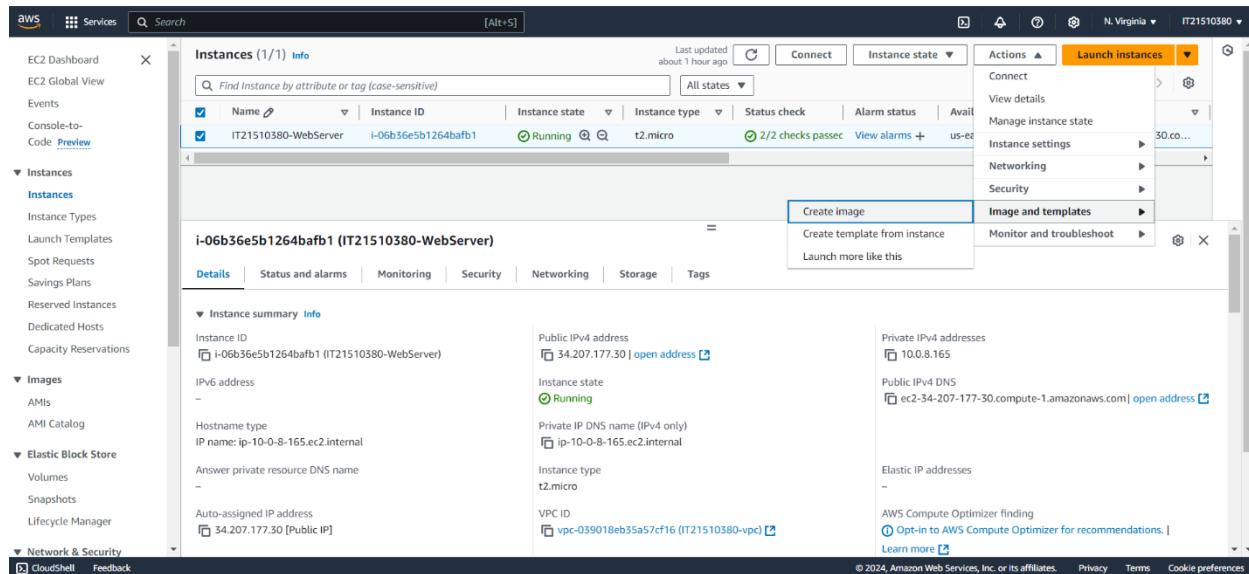
In the Create Image dialog box, provide a name with an IT number and an optional description for the AMI.

5. Create Image:

Click the Create Image button. The AMI creation process will begin, which may take a few minutes.

6. View Created AMI:

To view the newly created AMI, navigate to the AMIs section under the Images menu in the EC2 dashboard.



Create image Info

An image (also referred to as an AMI) defines the programs and settings that are applied when you launch an EC2 instance. You can create an image from the configuration of an existing instance.

Instance ID	i-06b36e5b1264bafb1 (IT21510380-WebServer)						
Image name	AMI-IT21510380						
Image description - optional	AMI for cloud computing assignment						
<input checked="" type="checkbox"/> Reboot instance	When selected, Amazon EC2 reboots the instance so that data is at rest when snapshots of the attached volumes are taken. This ensures data consistency.						
Instance volumes							
Storage type	Device	Snapshot	Size	Volume type	IOPS	Throughput	Delete on termination
EBS	/dev/sda1	Create new snapshot	8 GiB	EBS General Purpose (SSD)	3000	Enable	Enable

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Reboot instance

When selected, Amazon EC2 reboots the instance so that data is at rest when snapshots of the attached volumes are taken. This ensures data consistency.

Instance volumes

Storage type	Device	Snapshot	Size	Volume type	IOPS	Throughput	Delete on termination	Encrypted
EBS	/dev/sda1	Create new snapshot	8 GiB	EBS General Purpose (SSD)	3000	Enable	Enable	<input checked="" type="checkbox"/>

[Add volume](#)

During the image creation process, Amazon EC2 creates a snapshot of each of the above volumes.

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.

<input checked="" type="radio"/> Tag image and snapshots together	Tag the image and the snapshots with the same tag.
<input type="radio"/> Tag image and snapshots separately	Tag the image and the snapshots with different tags.

No tags associated with the resource.

[Add new tag](#)

You can add up to 50 more tags.

[Cancel](#) [Create image](#)

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Currently creating AMI ami-047886677f6ff252b from instance i-06b36e5b1264bafb1. Check that the AMI status is 'Available' before deleting the instance or carrying out other actions related to this AMI.

Instances (1/1) Info

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS
IT21510380-WebServer	i-06b36e5b1264bafb1	Running	t2.micro	2/2 checks passed	View alarms +	us-east-1a	ec2-34-207-177-30.compute-1.amazonaws.com

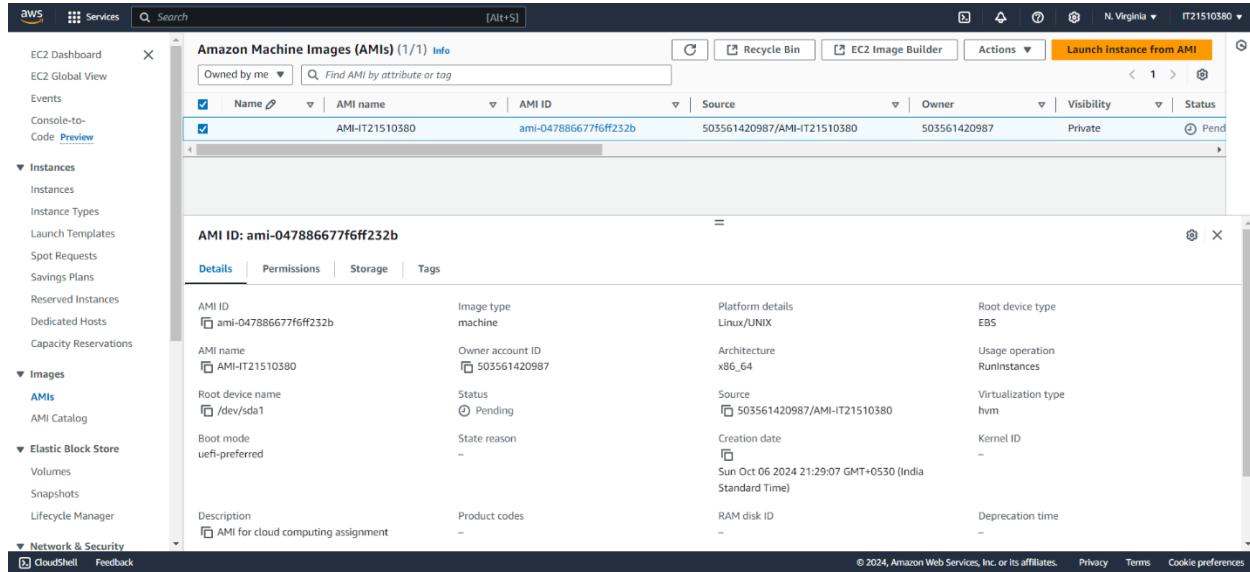
i-06b36e5b1264bafb1 (IT21510380-WebServer)

- [Details](#) [Status and alarms](#) [Monitoring](#) [Security](#) [Networking](#) [Storage](#) [Tags](#)
- [Instance summary](#) Info

Instance ID	i-06b36e5b1264bafb1 (IT21510380-WebServer)	Public IPv4 address	54.207.177.30 open address
IPv6 address	-	Instance state	Running
Hostname type	IP name: ip-10-0-8-165.ec2.internal	Private IP DNS name (IPv4 only)	ip-10-0-8-165.ec2.internal
Answer private resource DNS name	-	Instance type	t2.micro
Auto-assigned IP address	34.207.177.30 [Public IP]	VPC ID	vpc-039018eb35a57cf16 (IT21510380-vpc)
Elastic IP addresses	-	AWS Compute Optimizer finding	Opt-in to AWS Compute Optimizer for recommendations

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Step 6: Set Up RDS (Relational Database Service)

A. Create a Subnet Group

1. Open the RDS Dashboard:

Go to the AWS Management Console and select RDS.

2. Create Subnet Group:

In the RDS dashboard, click on Subnet Groups in the left-hand menu.

Click the Create DB Subnet Group button.

3. Configure Subnet Group Settings:

Name: Enter a name for the subnet group.

Description: Add a description for your subnet group (optional).

VPC: Choose the VPC where your RDS instance will reside.

4. Select Subnets:

Choose at least two subnets in different Availability Zones to ensure high availability.

Click on the Add button for each subnet to include it in the group.

5. Create Subnet Group:

Click the Create button to finalize the creation of the subnet group.

Amazon RDS

Resources

You are using the following Amazon RDS resources in the US East (N. Virginia) region (used/quota)

Category	Count	Description
DB Instances (0/40)	0	Allocated storage (0 TB/100 TB)
Instances and storage include Neptune and DocumentDB.	0	Increase DB Instances limit
DB Clusters (0/40)	0	Default (0)
Reserved instances (0/40)	0	Custom (0/100)
Snapshots (0)	0	Option groups (0)
Manual	0	Custom (0/20)
DB Cluster (0/100)	0	Subnet groups (0/50)
DB Instance (0/100)	0	Supported platforms VPC
Automated	0	Default network vpc-07e8e04abbea80e71
DB Cluster (0)	0	
DB Instance (0)	0	
Recent events (0)	0	
Event subscriptions (0/20)	0	

Create database

<https://us-east-1.console.aws.amazon.com/rds/home?region=us-east-1#db-subnet-groups-l...>

Amazon RDS

Subnet groups

Subnet groups (0)

Create DB subnet group

No db subnet groups
You don't have any db subnet groups.
Create DB subnet group

RDS > Subnet groups > Create DB subnet group

Create DB subnet group

To create a new subnet group, give it a name and a description, and choose an existing VPC. You will then be able to add subnets related to that VPC.

Subnet group details

Name
You won't be able to modify the name after your subnet group has been created.

Must contain from 1 to 255 characters. Alphanumeric characters, spaces, hyphens, underscores, and periods are allowed.

Description

VPC
Choose a VPC identifier that corresponds to the subnets you want to use for your DB subnet group. You won't be able to choose a different VPC identifier after your subnet group has been created.

Add subnets

Availability Zones
Choose the Availability Zones that include the subnets you want to add.

Add subnets

Availability Zones
Choose the Availability Zones that include the subnets you want to add.

Select subnets

subnet-08b8e9ffde52137c9 (10.0.144.0/20)
subnet-0eb89b8dde9578e99 (10.0.128.0/20)

For Multi-AZ DB clusters, you must select 3 subnets in 3 different Availability Zones.

Subnets selected (2)

Availability zone	Subnet ID	CIDR block
us-east-1b	subnet-08b8e9ffde52137c9	10.0.144.0/20
us-east-1a	subnet-0eb89b8dde9578e99	10.0.128.0/20

Create

Successfully created SubnetGroup-IT21510380. View subnet group

RDS > Subnet groups

Subnet groups (1)

Name	Description	Status	VPC
subnetgroup-IT21510380	DB Subnet Groups for cloud computing assingment	Complete	vpc-039018eb35a57cf16

Successfully created SubnetGroup-IT21510380. View subnet group

RDS > Databases

Introducing Aurora I/O-Optimized
Aurora's I/O-Optimized is a new cluster storage configuration that offers predictable pricing for all applications and improved price-performance, with up to 40% costs savings for I/O-intensive applications.

Databases (0)

DB identifier	Status	Role	Engine	Region ...	Size	Recommendations	CPU
No instances found							

B. Create the Database

1. Open the RDS Dashboard:

In the RDS dashboard, click on Databases in the left-hand menu.

2. Create Database:

Click on the Create Database button.

3. Choose a Database Creation Method:

Select either Standard Create or Easy Create. For more configuration options, choose Standard Create.

4. Select Database Engine:

Choose the database engine you wish to use (e.g., MySQL, PostgreSQL).

5. Specify DB Details:

DB Instance Class: Select the instance type (e.g., db.t2.micro).

DB Instance Identifier: Enter a unique name for your database instance.

Master Username: Set the master username for database access.

Master Password: Create a password for the master user.

6. Connectivity:

VPC: Choose the VPC that contains your subnet group.

Subnet Group: Select the subnet group you created earlier.

Public Access: Choose whether to make the database publicly accessible.

VPC Security Group: Select an existing security group or create a new one to control access to the database.

7. Additional Configuration (Optional):

Set backup retention, monitoring, maintenance settings, and more as needed.

8. Create Database:

Review your settings, and click the Create database button. The database instance will be created, which may take a few minutes.

9. View Database Instance:

Successfully created SubnetGroup-IT21510380. [View subnet group](#)

RDS > Create database

Create database Info

Choose a database creation method

Standard create
You set all of the configuration options, including ones for availability, security, backups, and maintenance.

Easy create
Use recommended best-practice configurations. Some configuration options can be changed after the database is created.

Engine options

Engine type Info

Aurora (MySQL Compatible) 

Aurora (PostgreSQL Compatible) 

MySQL 

MariaDB 

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Edition

MySQL Community

Engine version Info
View the engine versions that support the following database features.

▼ Hide filters

Show only versions that support the Multi-AZ DB cluster Info
Create a Multi-AZ DB cluster with one primary DB instance and two readable standby DB instances. Multi-AZ DB clusters provide up to 2x faster transaction commit latency and automatic failover in typically under 35 seconds.

Show only versions that support the Amazon RDS Optimized Writes Info
Amazon RDS Optimized Writes improves write throughput by up to 2x at no additional cost.

Engine version

MySQL 8.0.35

Enable RDS Extended Support Info
Amazon RDS Extended Support is a paid offering. By selecting this option, you consent to being charged for this offering if you are running your database major version past the RDS end of standard support date for that version. Check the end of standard support date for your major version in the [RDS for MySQL documentation](#).

Templates

Choose a sample template to meet your use case.

Production
Use defaults for high availability and fast, consistent performance.

Dev/Test
This instance is intended for development use outside of a production environment.

Free tier
Use RDS Free Tier to develop new applications, test existing applications, or gain hands-on experience with Amazon RDS.

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Availability and durability

Deployment options Info
The deployment options below are limited to those supported by the engine you selected above.

Multi-AZ DB Cluster
Creates a DB cluster with a primary DB instance and two readable standby DB instances, with each DB instance in a different Availability Zone (AZ). Provides high availability, data redundancy and increases capacity to serve read workloads.

Multi-AZ DB instance (not supported for Multi-AZ DB cluster snapshot)
Creates a primary DB instance and a standby DB instance in a different AZ. Provides high availability and data redundancy, but the standby DB instance doesn't support connections for read workloads.

Single DB instance (not supported for Multi-AZ DB cluster snapshot)
Creates a single DB instance with no standby DB instances.

Settings

DB instance identifier Info
Type a name for your DB instance. The name must be unique across all DB instances owned by your AWS account in the current AWS Region.

The DB instance identifier is case-insensitive, but is stored as all lowercase (as in "mydbinstance"). Constraints: 1 to 60 alphanumeric characters or hyphens. First character must be a letter. Can't contain two consecutive hyphens. Can't end with a hyphen.

▼ Credentials Settings

Master username Info
Type a login ID for the master user of your DB instance.

1 to 16 alphanumeric characters. The first character must be a letter.

Credentials management

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Credentials management

You can use AWS Secrets Manager or manage your master user credentials.

- Managed in AWS Secrets Manager - **most secure**
RDS generates a password for you and manages it throughout its lifecycle using AWS Secrets Manager.
- Self managed
Create your own password or have RDS create a password that you manage.
- Auto generate password
Amazon RDS can generate a password for you, or you can specify your own password.

Master password [Info](#)

Password strength **Very strong**
Minimum constraints: At least 8 printable ASCII characters. Can't contain any of the following symbols: / \ * @

Confirm master password [Info](#)

Instance configuration

The DB instance configuration options below are limited to those supported by the engine that you selected above.

DB instance class [Info](#)

- Hide filters
- Show instance classes that support Amazon RDS Optimized Writes [Info](#)
Amazon RDS Optimized Writes improves write throughput by up to 2x at no additional cost.
- Include previous generation classes
- Standard classes (includes m classes)

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Storage

Storage type [Info](#)
Provisioned IOPS SSD (io2) storage volumes are now available.

General Purpose SSD (gp3)
Performance scales independently from storage

Allocated storage [Info](#)
20 GiB

Minimum: 20 GiB. Maximum: 6,144 GiB

**After you modify the storage for a DB instance, the status of the DB instance will be in storage-optimization.
Your instance will remain available as the storage-optimization operation completes.** [Learn more](#)

Advanced settings
Baseline IOPS of 3,000 IOPS and storage throughput of 125 MiBps are included for allocated storage less than 400 GiB.

Storage autoscaling

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Connectivity [Info](#)

Compute resource
Choose whether to set up a connection to a compute resource for this database. Setting up a connection will automatically change connectivity settings so that the compute resource can connect to this database.

- Don't connect to an EC2 compute resource
Don't set up a connection to a compute resource for this database. You can manually set up a connection to a compute resource later.
- Connect to an EC2 compute resource
Set up a connection to an EC2 compute resource for this database.

Virtual private cloud (VPC) [Info](#)
Choose the VPC. The VPC defines the virtual networking environment for this DB instance.

IT21510380-vpc (vpc-039018eb35a57cf16)
4 Subnets, 2 Availability Zones

Only VPCs with a corresponding DB subnet group are listed.

After a database is created, you can't change its VPC.

DB subnet group [Info](#)
Choose the DB subnet group. The DB subnet group defines which subnets and IP ranges the DB instance can use in the VPC that you selected.

subnetgroup-it21510380
2 Subnets, 2 Availability Zones

Public access [Info](#)

- Yes
RDS assigns a public IP address to the database. Amazon EC2 instances and other resources outside of the VPC can connect to your database. Resources inside the VPC can also connect to the database. Choose one or more VPC security groups that specify which resources can connect to the database.
- No
RDS doesn't assign a public IP address to the database. Only Amazon EC2 instances and other resources inside the VPC can connect to your database. Choose one or more VPC security groups that specify which resources can connect to the database.

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VPC security group (firewall) [Info](#)
Choose one or more VPC security groups to allow access to your database. Make sure that the security group rules allow the appropriate incoming traffic.

Choose existing
Choose existing VPC security groups

Create new
Create new VPC security group

Existing VPC security groups
▼
IT21510380-SecurityGroup [X](#)

Availability Zone [Info](#)
▼

RDS Proxy
RDS Proxy is a fully managed, highly available database proxy that improves application scalability, resiliency, and security.

Create an RDS Proxy [Info](#)
RDS automatically creates an IAM role and a Secrets Manager secret for the proxy. RDS Proxy has additional costs. For more information, see [Amazon RDS Pricing](#).

Certificate authority - optional [Info](#)
Using a server certificate provides an extra layer of security by validating that the connection is being made to an Amazon database. It does so by checking the server certificate that is automatically installed on all databases that you provision.

rds-ca-rsa2048-91 (default)
Expiry: May 26, 2061
▼

► Additional configuration

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Tags - optional
A tag consists of a case-sensitive key-value pair.

No tags associated with the resource.

[Add new tag](#)
You can add up to 50 more tags.

Database authentication

Database authentication options [Info](#)

Password authentication
Authenticates using database passwords.

Password and IAM database authentication
Authenticates using the database password and user credentials through AWS IAM users and roles.

Password and Kerberos authentication
Choose a directory in which you want to allow authorized users to authenticate with this DB instance using Kerberos Authentication.

Monitoring

Enable Enhanced Monitoring
Enabling Enhanced Monitoring metrics are useful when you want to see how different processes or threads use the CPU.

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Enable Enhanced Monitoring
Enabling Enhanced Monitoring metrics are useful when you want to see how different processes or threads use the CPU.

► Additional configuration
Database options, encryption turned on, backup turned on, backtrack turned off, maintenance, CloudWatch Logs, delete protection turned off.

Estimated monthly costs

The Amazon RDS Free Tier is available to you for 12 months. Each calendar month, the free tier will allow you to use the Amazon RDS resources listed below for free:

- 750 hrs of Amazon RDS in a Single-AZ db.t2.micro, db.t3.micro or db.t4g.micro instance.
- 20 GB of General Purpose Storage (SSD).
- 20 GB for automated backup storage and any user-initiated DB Snapshots.

[Learn more about AWS Free Tier](#)

When your free usage expires or if your application use exceeds the free usage tiers, you simply pay standard, pay-as-you-go service rates as described in the [Amazon RDS Pricing page](#).

ⓘ You are responsible for ensuring that you have all of the necessary rights for any third-party products or services that you use with AWS services.

[Cancel](#) [Create database](#)

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Screenshot of the AWS RDS console showing the creation of a database named "database-it21510380".

The top banner displays a message: "Creating database database-it21510380. Your database might take a few minutes to launch. You can use settings from database-it21510380 to simplify configuration of suggested database add-ons while we finish creating your DB for you." A "View credential details" button is also present.

A green notification bar at the top states: "Successfully created SubnetGroup-IT21510380. View subnet group".

A blue banner at the top right introduces "Introducing Aurora I/O-Optimized".

The main content area shows the "Databases (1)" section with a table:

DB identifier	Status	Role	Engine	Region ...	Size	Recommendations	CPU
database-it21510380	Creating	Instance	MySQL Co...	us-east-1a	db.t3.micro	-	-

Below the table, there is a note about "Consider creating a Blue/Green Deployment to minimize downtime during upgrades".

At the bottom right of the page, there are links for "CloudShell" and "Feedback".

Screenshot of the AWS RDS console showing the creation of a database named "database-it21510380".

The top banner displays a message: "Successfully created database database-it21510380. You can use settings from database-it21510380 to simplify configuration of suggested database add-ons while we finish creating your DB for you." A "View connection details" button is also present.

A green notification bar at the top states: "Successfully created SubnetGroup-IT21510380. View subnet group".

A blue banner at the top right introduces "Introducing Aurora I/O-Optimized".

The main content area shows the "Databases (1)" section with a table:

DB identifier	Status	Role	Engine	Region ...	Size	Recommendations	CPU
database-it21510380	Backing-up	Instance	MySQL Co...	us-east-1a	db.t3.micro	-	-

Below the table, there is a note about "Consider creating a Blue/Green Deployment to minimize downtime during upgrades".

At the bottom right of the page, there are links for "CloudShell" and "Feedback".

Screenshot of the AWS RDS console showing the creation of a database named "database-it21510380".

The top banner displays a message: "Creating database database-it21510380. Your database might take a few minutes to launch. You can use settings from database-it21510380 to simplify configuration of suggested database add-ons while we finish creating your DB for you." A "View credential details" button is also present.

A green notification bar at the top states: "Successfully created SubnetGroup-IT21510380. View subnet group".

A blue banner at the top right introduces "Introducing Aurora I/O-Optimized".

The main content area shows the "Databases (1)" section with a table:

DB identifier	Status	Role	Engine	Region ...	Size	Recommendations	CPU
database-it21510380	Available	Instance	MySQL Co...	us-east-1a	db.t3.micro	-	5.00%

Below the table, there is a note about "Consider creating a Blue/Green Deployment to minimize downtime during upgrades".

At the bottom right of the page, there are links for "CloudShell" and "Feedback".

Step 7: Set Up the EC2 Launch Template

1. *Open the EC2 Dashboard:*

Go to the AWS Management Console and select EC2.

2. *Navigate to Launch Templates:*

In the left-hand menu, click on Launch Templates under the Instances section.

3. *Create Launch Template:*

Click on the Create launch template button.

4. *Configure Launch Template Settings:*

Launch template name: Enter a name for your IT number launch template.

Version description (optional): Add a description for the version of the launch template.

5. *Choose an AMI:*

6. *Instance Type:*

Choose the instance type (e.g., t2.micro) based on your requirements.

7. *Key Pair:*

Select an existing key pair.

8. *Network Settings:*

VPC: Choose the VPC where your instances will be launched.

Subnet: Select the subnet for your instances.

Auto-assign Public IP: Choose whether to assign a public IP address to your instances.

9. *Security Groups:*

Choose an existing security group or create a new one to control access to your instances.

10. *Create Launch Template:*

After reviewing your settings, click the Create Launch template button to save it.

11. *View Launch Template:*

The new launch template will appear in the Launch Templates section, and you can create instances from it whenever needed.

EC2 launch templates

Streamline, simplify and standardize instance launches

Use launch templates to automate instance launches, simplify permission policies, and enforce best practices across your organization. Save launch parameters in a template that can be used for on-demand launches and with managed services, including EC2 Auto Scaling and EC2 Fleet. Easily update your launch parameters by creating a new launch template version.

Benefits and features

Streamline provisioning	Simplify permissions
Minimize steps to provision instances. With EC2 Auto Scaling, updates to a launch template can be automatically applied.	Create shorter, easier to manage IAM policies. Learn more

New launch template

[Create launch template](#)

Documentation

[Documentation](#) [API reference](#)

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Create launch template

Creating a launch template allows you to create a saved instance configuration that can be reused, shared and launched at a later time. Templates can have multiple versions.

Launch template name and description

Launch template name - required
Template-IT21510380
Must be unique to this account. Max 128 chars. No spaces or special characters like '&', '<', '@'.

Template version description
A prod webserver for cloud computing assignment
Max 255 chars

Auto Scaling guidance: [Info](#)
Select this if you intend to use this template with EC2 Auto Scaling
 Provide guidance to help me set up a template that I can use with EC2 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.

Summary

Software Image (AMI)
AMI for cloud computing assign...[read more](#)
ami-047886677f6ff232b

Virtual server type (instance type)
t2.micro

Firewall (security group)
IT21510380-SecurityGroup

Storage (volumes)
1 volume(s) - 8 GiB

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 750 hours of public IPv4 address usage per month, 30 GiB of EBS storage, 2 million I/Os, 1 GB of snapshots, and 100 GiB of bandwidth to the internet.

[Cancel](#) [Create launch template](#)

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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.

Application and OS Images (Amazon Machine Image) [Info](#)

An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. Search or Browse for AMIs if you don't see what you are looking for below

Search our full catalog including 1000s of application and OS images

Recent | My AMIs | Quick Start

Don't include in launch template Owned by me Shared with me

Browse more AMIs
Including AMIs from AWS, Marketplace and the Community

Amazon Machine Image (AMI)

AMI-IT21510380
ami-047886677f6ff232b
2024-10-06T15:59:07.000Z Virtualization: hvm ENA enabled: true Root device type: ebs

Description
AMI for cloud computing assignment

Architecture AMI ID

[CloudShell](#) [Feedback](#)

Summary

Software Image (AMI)
AMI for cloud computing assign...[read more](#)
ami-047886677f6ff232b

Virtual server type (instance type)
t2.micro

Firewall (security group)
IT21510380-SecurityGroup

Storage (volumes)
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Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 750 hours of public IPv4 address usage per month, 30 GiB of EBS storage, 2 million I/Os, 1 GB of snapshots, and 100 GiB of bandwidth to the internet.

[Cancel](#) [Create launch template](#)

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Instance type

t2.micro Family: t2 1 vCPU 1 GiB Memory Current generation: true Free tier eligible

On-Demand Windows base pricing: 0.0162 USD per Hour
On-Demand SUSE base pricing: 0.0116 USD per Hour
On-Demand RHEL base pricing: 0.026 USD per Hour
On-Demand Linux base pricing: 0.0116 USD per Hour

All generations Compare instance types

Additional costs apply for AMIs with pre-installed software

Key pair (login)

You can use a key pair to securely connect to your instance. Ensure that you have access to the selected key pair before you launch the instance.

Key pair name: Key-IT21510380 Create new key pair

Network settings

Subnet: IT21510380-subnet-public1-us-east-1a

subnet-08a08e01cc03296eb VPC: vpc-039018eb35a57cf16 Owner: 503561420987 Availability Zone: us-east-1a Zone type: Availability Zone IP addresses available: 4089 CIDR: 10.0.0.0/20

Create new subnet

When you specify a subnet, a network interface is automatically added to your template.

Summary

Software Image (AMI) AMI for cloud computing assign...read more ami-047886677f6ff232b

Virtual server type (instance type) t2.micro

Firewall (security group) IT21510380-SecurityGroup

Storage (volumes) 1 volume(s) - 8 GiB

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 750 hours of public IPv4 address usage per month, 30 GiB of EBS storage, 2 million I/Os, 1 GB of snapshots, and 100 GiB of bandwidth to the internet.

Create launch template

Network settings

Subnet: IT21510380-subnet-public1-us-east-1a

subnet-08a08e01cc03296eb VPC: vpc-039018eb35a57cf16 Owner: 503561420987 Availability Zone: us-east-1a Zone type: Availability Zone IP addresses available: 4089 CIDR: 10.0.0.0/20

Create new subnet

When you specify a subnet, a network interface is automatically added to your template.

Firewall (security groups)

A security group is a set of firewall rules that control the traffic for your instance. Add rules to allow specific traffic to reach your instance.

Select existing security group: IT21510380-SecurityGroup Create security group

Common security groups

Select security groups: IT21510380-SecurityGroup sg-06ec29a23257093e2

Compare security group rules

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

Advanced network configuration

Storage (volumes)

EBS Volumes Hide details

Volume 1 (AMI Root) (8 GiB, EBS, General purpose SSD (gp3))

Summary

Software Image (AMI) AMI for cloud computing assign...read more ami-047886677f6ff232b

Virtual server type (instance type) t2.micro

Firewall (security group) IT21510380-SecurityGroup

Storage (volumes) 1 volume(s) - 8 GiB

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 750 hours of public IPv4 address usage per month, 30 GiB of EBS storage, 2 million I/Os, 1 GB of snapshots, and 100 GiB of bandwidth to the internet.

Create launch template

Storage (volumes)

EBS Volumes Hide details

Volume 1 (AMI Root) (8 GiB, EBS, General purpose SSD (gp3))
AMI Volumes are not included in the template unless modified

Free tier eligible customers can get up to 30 GiB of EBS General Purpose (SSD) or Magnetic storage

Add new volume

The selected AMI contains more instance store volumes than the instance allows. Only the first 0 instance store volumes from the AMI will be accessible from the instance

Resource tags

No resource tags are currently included in this template. Add a resource tag to include it in the launch template.

Add new tag

You can add up to 50 more tags.

Advanced details

Summary

Software Image (AMI) AMI for cloud computing assign...read more ami-047886677f6ff232b

Virtual server type (instance type) t2.micro

Firewall (security group) IT21510380-SecurityGroup

Storage (volumes) 1 volume(s) - 8 GiB

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 750 hours of public IPv4 address usage per month, 30 GiB of EBS storage, 2 million I/Os, 1 GB of snapshots, and 100 GiB of bandwidth to the internet.

Create launch template

Screenshot of the AWS EC2 'Create launch template' success page.

Success
Successfully created Template-IT21510380(lt-0ef1f81535f3f3869).

Actions log

Next Steps

- Launch an instance**
With On-Demand Instances, you pay for compute capacity by the second (for Linux, with a minimum of 60 seconds) or by the hour (for all other operating systems) with no long-term commitments or upfront payments. Launch an On-Demand Instance from your launch template.
- Launch instance from this template**
- Create an Auto Scaling group from your template**
Amazon EC2 Auto Scaling helps you maintain application availability and allows you to scale your Amazon EC2 capacity up or down automatically according to conditions you define. You can use Auto Scaling to help ensure that you are running your desired number of Amazon EC2 instances during demand spikes to maintain performance and decrease capacity during lulls to reduce costs.
- Create Auto Scaling group**
- Create Spot Fleet**
A Spot Instance is an unused EC2 instance that is available for less than the On-Demand price. Because Spot Instances enable you to request unused EC2 instances at steep discounts, you can lower your Amazon EC2 costs significantly. The hourly price for a Spot Instance (of each instance type in each Availability Zone) is set by Amazon EC2, and adjusted gradually based on the long-term supply of and demand for Spot Instances. Spot instances are well-suited for data-analysis, batch jobs, background processing, and optional tasks.
- Create Spot Fleet**

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Screenshot of the AWS EC2 'Launch Templates' page.

Launch Templates (1/1)

Launch Template ID	Launch Template Name	Default Version	Latest Version	Create Time	Created By
lt-0ef1f81535f3f3869	Template-IT21510380	1	1	2024-10-06T16:49:05.000Z	arn:aws:iam::503561420987:root

Template-IT21510380 (lt-0ef1f81535f3f3869)

Launch template details

Launch template ID lt-0ef1f81535f3f3869	Launch template name Template-IT21510380	Default version 1	Owner arn:aws:iam::503561420987:root
--	---	----------------------	---

Details **Versions** **Template tags**

Launch template version details

Version 1 (Default)	Description A prod webserver for cloud computing assignment	Date created 2024-10-06T16:49:05.000Z	Created by arn:aws:iam::503561420987:root
------------------------	--	--	--

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Step 8: Configure Application Load Balancer

1. Open the EC2 Dashboard:

Go to the AWS Management Console and select EC2.

2. Navigate to Load Balancers:

In the left-hand menu, scroll down and click on Load Balancers under the Load Balancing section.

3. Create Load Balancer:

Click on the Create Load Balancer button.

4. Choose Load Balancer Type:

Select Application Load Balancer and click Create.

5. Configure Load Balancer Settings:

Name: Enter a name for the load balancer.

Scheme: Choose whether to make it Internet-facing (accessible from the Internet) or Internal (accessible only within your VPC).

IP address type: Choose either IPv4 or Dualstack (for both IPv4 and IPv6).

6. Configure Security Groups:

Select an existing security group.

7. Configure Target Groups:

Click on Create a new target group

Target group name: Enter a name for the target group with IT number.

Protocol: Choose the protocol for communication with targets (HTTP or HTTPS).

8. Review and Create:

Review all the configurations. If everything looks good, click the Create button to create the Application Load Balancer.

9. View Load Balancer:

Once created, the new Application Load Balancer will appear in the Load Balancers section. You can monitor its health and performance from there.

EC2 > Load balancers

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

Actions **Create load balancer**

No load balancers
You don't have any load balancers in us-east-1

Create load balancer

0 load balancers selected

Select a load balancer above.

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EC2 > Load balancers > Compare and select load balancer type

A complete feature-by-feature comparison along with detailed highlights is also available. Learn more

Load balancer types

Application Load Balancer	Network Load Balancer	Gateway Load Balancer
Choose an Application Load Balancer when you need a flexible feature set for your applications, without the need for TLS offloading at the application layer. Operating at the application level, Application Load Balancers provide advanced routing and visibility features targeted at application architectures, including microservices and containers.	Choose a Network Load Balancer when you need ultra-high performance, TLS offloading at scale, comprehensive traffic management, support for UDP, and static IP addresses for your applications. Operating at the connection level, Network Load Balancers are capable of handling millions of requests per second securely while maintaining ultra-low latency.	Choose a Gateway Load Balancer when you need to deploy and manage a fleet of third-party virtual appliances that support SSL/TLS termination. Features enable you to improve security, compliance, and policy controls.
Create	Create	Create

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EC2 > Target groups > Create target group

Step 1 Specify group details
Your load balancer routes requests to the targets in a target group and performs health checks on the targets.

Step 2 Register targets

Specify group details

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

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aws Services Search [Alt+S]

Target group name
TargetGroup-IT21510380

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.

IT21510380-vpc vpc-039018b635a57cf16 IPv4 VPC CIDR: 10.0.0.0/16

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.

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

Health checks
The associated load balancer periodically sends requests, per the settings below, to the registered targets to test their status.

Health check protocol
HTTP

Health check path
Use the default path of "/" to perform health checks on the root, or specify a custom path if preferred.
/

Advanced health check settings

Attributes
Certain default attributes will be applied to your target group. You can view and edit them after creating the target group.

Tags - optional
Consider adding tags to your target group. Tags enable you to categorize your AWS resources so you can more easily manage them.

Cancel Next © 2024, Amazon Web Services, Inc. or its affiliates. Privacy Terms Cookie preferences

aws Services Search [Alt+S]

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 (1/1)

Instance ID	Name	State	Security groups	Zone	Private IPv4 address
i-06b36e5b1264bafb1	IT21510380-WebServer	Running	IT21510380-SecurityGroup	us-east-1a	10.0.8.165

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

Include as pending below

Review targets
Targets (0)
Remove all pending

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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 (1)

Instance ID	Name	State	Security groups	Zone	Private IPv4 address	Subnet ID	Launch time
i-06b36e5b1264bafb1	IT21510380-WebServer	Running	IT21510380-SecurityGroup	us-east-1a	10.0.8.165	subnet-08a08e01c03296eb	October 6, 2024, 19:40 (UTC+05:30)

Ports for the selected instances
Ports for routing traffic to the selected instances.
80
1-45535 (specify multiple ports with commas)
Include as pending below

1 selection is now pending below. Include more or register targets when ready.

Review targets

Targets (1)

Instance ID	Name	Port	State	Security groups	Zone	Private IPv4 address	Subnet ID	Launch time
i-06b36e5b1264bafb1	IT21510380-WebServer	80	Running	IT21510380-SecurityGroup	us-east-1a	10.0.8.165	subnet-08a08e01c03296eb	October 6, 2024, 19:40 (UTC+05:30)

1 pending

Cancel Previous Create target group

TargetGroup-IT21510380

Details

arn:aws:elasticloadbalancing:us-east-1:503561420987:targetgroup/TargetGroup-IT21510380/a7532bf5339e10

Target type	Protocol : Port	Protocol version	VPC
Instance	HTTP: 80	HTTP1	vpc-039018eb35a57cf16
IP address type	Load balancer		
IPv4	None associated		

1 Total targets 0 Healthy 0 Unhealthy 1 Unused 0 Initial 0 Draining

Distribution of targets by Availability Zone (A2)

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

Targets **Monitoring** **Health checks** **Attributes** **Tags**

Registered targets (1) info

Target group 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.

Instance ID	Name	Port	Zone	Health status	Health status details	Launch time	Anomaly detection result
i-06b36e5b1264bafb1	IT21510380-W...	80	us-east-1a	<input checked="" type="radio"/> Unused	Target group is not co...	October 6, 2024, 19:40 (UTC+05:30)	Normal

Actions

Create Application Load Balancer

The Application Load Balancer distributes incoming HTTP and HTTPS traffic across multiple targets such as Amazon EC2 instances, microservices, and containers, based on request attributes. When the load balancer receives a connection request, it evaluates the listener rules in priority order to determine which rule to apply, and if applicable, it selects a target from the target group for the rule action.

How Application Load Balancers work

Basic configuration

Load balancer name
Name must be unique within your AWS account and can't be changed after the load balancer is created.
LoadBalancer-IT21510380
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. Compatible with the IPv4 and Dualstack IP address types.

Load balancer IP address type [Info](#)
Select the front-end IP address type to assign to the load balancer. The VPC and subnets mapped to this load balancer must include the selected IP address types. Public IPv4 addresses have an additional cost.

IPv4
Includes only IPv4 addresses.

Dualstack
Includes IPv4 and IPv6 addresses.

Dualstack without public IPv4

CloudShell Feedback

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 selected VPC 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-premises targets, or if using VPC peering. To confirm the VPC for your targets, view [target groups](#). For a new VPC, create a VPC.

IT21510380-vpc
VPC ID: vpc-039018eb35a57cf16
IPv4 VPC CIDR: 10.0.0.0/16

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 supported by the load balancer or the VPC are not available for selection.

Availability Zones

us-east-1a (use1-az6)

Subnet: subnet-08a08e01cc03296eb (IPv4 subnet CIDR: 10.0.0.0/20)

IP4 address Assigned by AWS

us-east-1b (use1-az1)

Subnet: subnet-0111f2e59231947c1 (IPv4 subnet CIDR: 10.0.16.0/20)

IP4 address Assigned by AWS

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.

IT21510380-SecurityGroup
sg-06ec29a23257093e2 VPC: vpc-039018eb35a57cf16

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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.

Select up to 5 security groups

IT21510380-SecurityGroup
sg-06ec29a23257093e2 VPC: vpc-039018eb35a57cf16

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

Protocol	Port	Default action	Info
HTTP	: 80	Forward to TargetGroup-IT21510380	HTTP
1-465535			
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](#)

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Load balancer tags - optional

Consider adding tags to your load balancer. Tags enable you to categorize your AWS resources so you can more easily manage them. The 'Key' is required, but 'Value' is optional. For example, you can have Key = production-websvc1; or Key = websvc1; and Value = production.

Optimize with service integrations - optional

Optimize your load balancing architecture by integrating AWS services with this load balancer at launch. You can also add these and other services after your load balancer is created by reviewing the load balancer's "Integrations" tab.

AWS Web Application Firewall (WAF) [Info](#) [Additional charges apply](#)

Optimizes: Security

Include WAF security protections behind the load balancer

Associates a pre-defined web ACL that includes the AWS-recommended security protections. Alternatively, you can associate any of your existing WAF web ACLs for custom protections.

AWS Global Accelerator [Info](#) [Additional charges apply](#)

Optimizes: Performance, Availability, Security

Create an accelerator

An accelerator will be created in your account. The accelerator provides 2 global static IPs that act as a fixed entry point to your load balancer.

Review

Review the load balancer configurations and make changes if needed. After you finish reviewing the configurations, choose [Create load balancer](#).

Summary

Review and confirm your configurations. [Estimate cost](#)

Basic configuration Edit LoadBalancer-IT21510380	Security groups Edit IT21510380-SecurityGroup	Network mapping Edit VPC: vpc-039018eb35a57cf16	Listeners and routing Edit HTTP:80 (defaults to)
---	--	--	---

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Summary

Review and confirm your configurations. [Estimate cost](#)

Basic configuration Edit	Security groups Edit	Network mapping Edit	Listeners and routing Edit
LoadBalancer-IT21510380 <ul style="list-style-type: none"> Internet-facing IPv4 	IT21510380-SecurityGroup sg-06ec29a23257093e2 Edit	VPC vpc-039018eb35a57cf16 Edit IT21510380-vpc <ul style="list-style-type: none"> us-east-1a subnet-08a060e1cc03296eb Edit IT21510380-subnet-public1-us-east-1a us-east-1b subnet-0111f2e59231947c1 Edit IT21510380-subnet-public2-us-east-1b 	HTTP:80 defaults to TargetGroup-IT21510380 Edit
Service integrations Edit		Tags Edit	
AWS WAF: None AWS Global Accelerator: None		None	
Attributes			
<p>i Certain default attributes will be applied to your load balancer. You can view and edit them after creating the load balancer.</p>			
Creation workflow and status <p>▶ Server-side tasks and status After completing and submitting the above steps, all server-side tasks and their statuses become available for monitoring.</p>			
Cancel Create load balancer			

[CloudShell](#) [Feedback](#)

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Successfully created load balancer: LoadBalancer-IT21510380

It might take a few minutes for your load balancer to fully set up and route traffic. Targets will also take a few minutes to complete the registration process and pass initial health checks.

[EC2](#) > [Load balances](#) > LoadBalancer-IT21510380

LoadBalancer-IT21510380

i **Details**

Load balancer type Application	Status Provisioning	VPC vpc-039018eb35a57cf16 Edit	Load balancer IP address type IPv4
Scheme Internet-facing	Hosted zone Z35SX0DTRQ7X7K	Availability Zones subnet-08a060e1cc03296eb Edit us-east-1a (use1-az6) subnet-0111f2e59231947c1 Edit us-east-1b (use1-az1)	Date created October 6, 2024, 22:38 (UTC+05:30)
Load balancer ARN arn:aws:elasticloadbalancing:us-east-1:503561420987:loadbalancer/app/LoadBalancer-IT21510380/8Bf67d6ab9de993	DNS name info LoadBalancer-IT21510380-1308893141.us-east-1.elb.amazonaws.com (A Record)		

[Listeners and rules](#) [Network mapping](#) [Resource map - new](#) [Security](#) [Monitoring](#) [Integrations](#) [Attributes](#) [Tags](#)

Listeners and rules (1) i

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.

Protocol/Port	Default action	Rules	ARN	Security policy	Default SSL/TLS certificate	mTLS	Trust store
HTTP:80	<ul style="list-style-type: none"> Forward to target group <ul style="list-style-type: none"> TargetGroup-IT21510380-1 (100%) Target group stickiness: Off 	1 rule	ARN	Not applicable	Not applicable	Not applicable	Not applicable

[Filter listeners](#)

[CloudShell](#) [Feedback](#)

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Step 9: Set Up AWS Auto Scaling.

1. Navigate to the EC2 Dashboard:

In the AWS Management Console, search for and select EC2 from the services menu.

2. Access Auto Scaling Groups:

In the left navigation pane, scroll down to the Auto Scaling section and click on Auto Scaling Groups.

3. Create an Auto Scaling Group:

Click on Create Auto Scaling group.

4. Configure Auto Scaling Group Details:

Auto Scaling group name: Enter a name for your Auto Scaling group.

Launch template: Choose an existing launch template.

VPC and subnets: Select the VPC and subnets where the Auto Scaling group will be deployed.

5. Set Group Size:

Desired capacity: Enter the number of instances you want to maintain.

Minimum capacity: Specify the minimum number of instances.

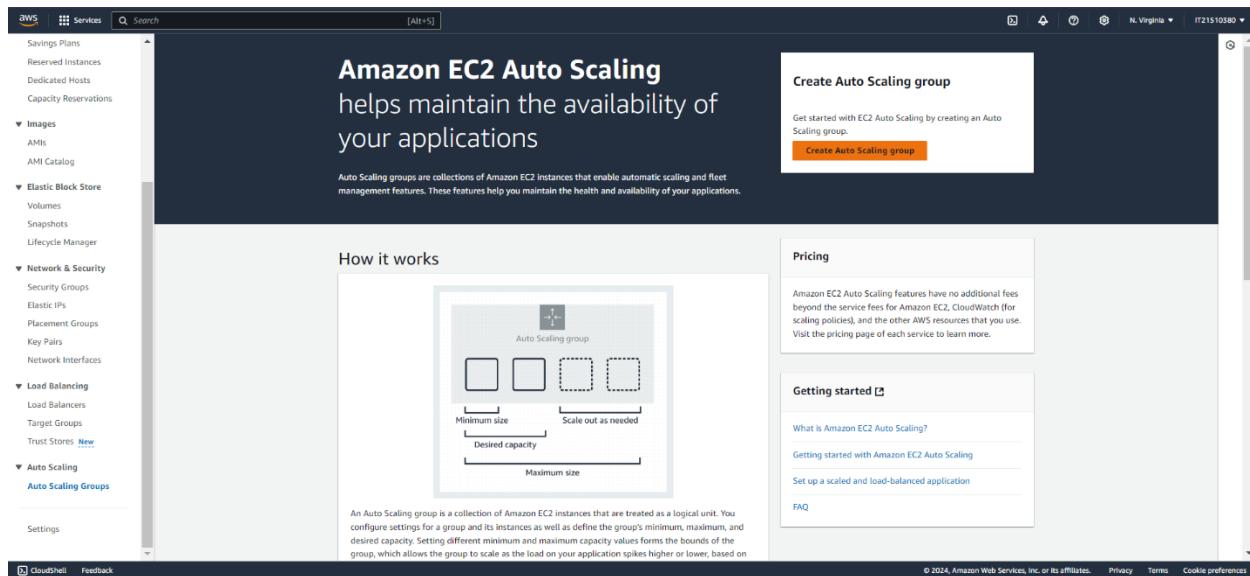
Maximum capacity: Specify the maximum number of instances.

6. Configure Scaling Policies:

Add scaling policies: No policy.

7. Review and Create:

Review all the settings you've configured. If everything looks good, click the Create Auto Scaling group button.



Choose launch template

Specify a launch template that contains settings common to all EC2 instances that are launched by this Auto Scaling group.

Name

Auto Scaling group name
Enter a name to identify the group.
AutoScalingGroup-IT21510380
Must be unique to this account in the current Region and no more than 255 characters.

Launch template

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.
Template-IT21510380

Create a launch template version
Version
Default (1)

Description
A prod webserver for cloud computing assignment

Launch template
Template-IT21510380
lt-0ef1f81555f3f5869

Instance type
t2.micro

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Launch template

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.
Template-IT21510380

Create a launch template version
Version
Default (1)

Description
A prod webserver for cloud computing assignment

Launch template
Template-IT21510380
lt-0ef1f81555f3f5869

Instance type
t2.micro

AMI ID
ami-04788677f6f232b

Security groups
-

Request Spot Instances
No

Key pair name
Key-IT21510380

Security group IDs
sg-06ec29a23257093e2

Additional details

Storage (volumes)
-

Date created
Sun Oct 28 2024 22:19:05
GMT+05:30 (India Standard Time)

Cancel **Next**

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Choose instance launch options

Choose the VPC network environment that your instances are launched into, and customize the instance types and purchase options.

Instance type requirements

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
Template-IT21510380	Default	A prod webserver for cloud computing assignment

Instance type
t2.micro

Network

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-039018eb53a57cf16 (IT21510380-vpc)
id:0.0.8716

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-08a080e01c03296eb [IT21510380-us-east-1a-us-east-1a]

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Choose instance launch options

Choose the VPC network environment that your instances are launched into, and customize the instance types and purchase options.

Instance type requirements

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
Template-IT21510380	Default	A prod webserver for cloud computing assignment

Network

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.

Availability Zones and subnets

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

Create a VPC

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Configure advanced options - optional

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

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 handled 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

VPC Lattice integration options

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VPC Lattice integration options

To improve networking capabilities and scalability, integrate your Auto Scaling group with VPC Lattice. VPC Lattice facilitates communications between AWS services and helps you connect and manage your applications across compute services in AWS.

Select VPC Lattice service to attach

No VPC Lattice service
VPC Lattice will not manage your Auto Scaling group's network access and connectivity with other services.

Attach to VPC Lattice service
Incoming requests associated with specified VPC Lattice target groups will be routed to your Auto Scaling group.

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

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.

Turn on VPC Lattice health checks
VPC Lattice monitors whether instances are available to handle requests. If it considers a target as failed a health check, EC2 Auto Scaling replaces it on its next periodic check.

Turn on Amazon EBS health checks
EBS monitors whether an instance's root volume or attached volume stalls. When it reports an unhealthy volume, EC2 Auto Scaling can replace the instance on its next periodic health check.

Health check grace period

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.

300 seconds

Additional settings

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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

- Turn on Elastic Load Balancing health checks Recommended
- Turn on VPC Lattice health checks
- Turn on Amazon EBS health checks

Health check grace period

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.

300 seconds

Additional settings

Monitoring

- Enable group metrics collection within CloudWatch

Default instance warmup

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**

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Step 1 Choose launch template

Step 2 Choose instance launch options

Step 3 - optional Configure advanced options

Step 4 - optional Configure group size and scaling

Step 5 - optional Add notifications

Step 6 - optional Add tags

Step 7 Review

Configure group size and scaling - optional

Define your group's desired capacity and scaling limits. You can optionally add automatic scaling to adjust the size of your group.

Group size

Set the initial size of the Auto Scaling group. After creating the group, you can change its size to meet demand, either manually or by using automatic scaling.

Desired capacity type

Choose the unit of measurement for the desired capacity value. vCPUs and Memory(GiB) are only supported for mixed instances groups configured with a set of instance attributes.

Units (number of instances)

Desired capacity

Specify your group size.

1

Scaling

You can resize your Auto Scaling group manually or automatically to meet changes in demand.

Scaling limits

Set limits on how much your desired capacity can be increased or decreased.

Min desired capacity	Max desired capacity
1	1

Equal or less than desired capacity Equal or greater than desired capacity

Automatic scaling - optional

Choose whether to use a target tracking policy

You can set up other metric-based scaling policies and scheduled scaling after creating your Auto Scaling group.

No scaling policies Target tracking scaling policy

Cancel **Skip to review** **Previous** **Next**

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Automatic scaling - optional

Choose whether to use a target tracking policy

You can set up other metric-based scaling policies and scheduled scaling after creating your Auto Scaling group.

No scaling policies

Your Auto Scaling group will remain at its initial size and will not dynamically resize to meet demand.

Target tracking scaling policy

Choose a CloudWatch metric and target value and let the scaling policy adjust the desired capacity in proportion to the metric's value.

Instance maintenance policy

Control your Auto Scaling group's availability during instance replacement events. This includes health checks, instance refreshes, maximum instance lifetime features and events that happen automatically to keep your group balanced, called rebalancing events.

Choose a replacement behavior depending on your availability requirements

Mixed behavior

No policy

For rebalancing events, new instances will be created before terminating others. For all other events, instances terminate at the same time.

Promote availability

Launch before terminating

Launch new instances and wait for them to become healthy before terminating others. This allows you to go below your desired capacity by a certain percentage and may temporarily reduce availability.

Control costs

Terminate and launch

Terminate and launch instances at the same time. This allows you to go below your desired capacity by a certain percentage and may temporarily reduce availability.

Flexible

Custom behavior

Set custom values for the minimum and maximum levels of available capacity. This gives you greater flexibility in setting targets for your group over your desired capacity. EC2 Auto Scaling goes when reducing instances.

Instance scale-in protection

Scale-in protection prevents newly launched instances from being terminated by scaling activities. Make sure to remove scale-in protection for the group or individual instances when instances are ready to be terminated.

Enable instance scale-in protection

Cancel **Skip to review** **Previous** **Next**

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Add notifications - optional Info

Send notifications to SNS topics whenever Amazon EC2 Auto Scaling launches or terminates the EC2 instances in your Auto Scaling group.

Add notification

Cancel **Skip to review** **Previous** **Next**

Step 1 Choose launch template

Step 2 Choose instance launch options

Step 3 - optional Configure advanced options

Step 4 - optional Configure group size and scaling

Step 5 - optional Add notifications

Step 6 - optional Add tags

Step 7 Review

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Add tags - optional Info

Add tags to help you search, filter, and track your Auto Scaling group across AWS. You can also choose to automatically add these tags to instances when they are launched.

Tags (0)

Add tag

50 remaining

Cancel **Previous** **Next**

Step 1 Choose launch template

Step 2 Choose instance launch options

Step 3 - optional Configure advanced options

Step 4 - optional Configure group size and scaling

Step 5 - optional Add notifications

Step 6 - optional Add tags

Step 7 Review

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Review Info

Step 1: Choose launch template

Group details

Auto Scaling group name: AutoScalingGroup-IT21510380

Launch template

Launch template	Version	Description
Template-IT21510380	Default	A prod webserver for cloud computing assignment

Step 2: Choose instance launch options

Network

Network: vpc-059018eb35a572f16

Availability Zone	Subnet	
us-east-1a	subnet-08a08e01cc03296eb	10.0.0.0/20
us-east-1b	subnet-0111f2e59231947c1	10.0.16.0/20

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aws Services Search [Alt+S] N. Virginia IT21510380

Instance type requirements
This Auto Scaling group will adhere to the launch template.

Step 3: Configure advanced options Edit

Load balancing

Load balancer 1

Name: LoadBalancer-IT21510380	Type: Application/HTTP	Target group: TargetGroup-IT21510380
-------------------------------	------------------------	--------------------------------------

VPC Lattice integration options

VPC Lattice target groups

Health checks

Health check type: EC2	Health check grace period: 300 seconds
------------------------	--

Additional settings

Monitoring: Disabled	Default instance warmup: Disabled
----------------------	-----------------------------------

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

Gmail YouTube CourseWeb | Sri Lan... Glamour Cosmetics outlook github LinkedIn Resume - FlowCV Introducing ChatGPT Home - Netflix Home - Microsoft A... WhatsApp Web All Bookmarks N. Virginia IT21510380

Step 4: Configure group size and scaling policies Edit

Group size

Desired capacity: 1	Desired capacity type: Units (number of instances)
---------------------	--

Scaling

Minimum desired capacity: 1	Maximum desired capacity: 1
-----------------------------	-----------------------------

Target tracking policy

Instance maintenance policy

Replacement behavior: No policy	Min healthy percentage: -	Max healthy percentage: -
---------------------------------	---------------------------	---------------------------

Instance scale-in protection

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aws Services Search [Alt+S] N. Virginia IT21510380

Instance maintenance policy

Replacement behavior: No policy	Min healthy percentage: -	Max healthy percentage: -
---------------------------------	---------------------------	---------------------------

Instance scale-in protection

Instance scale-in protection
Enable instance protection from scale in

Step 5: Add notifications Edit

Notifications

No notifications

Step 6: Add tags Edit

Tags (0)

Key	Value	Tag new instances
No tags		

Cancel Previous Create Auto Scaling group © 2024, Amazon Web Services, Inc. or its affiliates. Privacy Terms Cookie preferences

The screenshot shows the AWS CloudShell interface with the URL [https://cloudshell.aws.compute�aws.com](#). The main content area displays the AWS Auto Scaling groups page, which lists one group named "AutoScalingGroup-IT21510380". The table includes columns for Name, Launch template/configuration, Instances, Status, Desired capacity, Min, Max, and Availability Zones. The instance count is currently 1, desired capacity is 1, and it spans across us-east-1a and us-east-1b availability zones.

Note on CRUD Operations

I just tried to implement CRUD functionalities for personal learning, so this was that.

The screenshot shows the AWS CloudShell interface with the URL [https://cloudshell.aws.compute�aws.com](#). The terminal window displays the process of installing Apache and MySQL on an Ubuntu 8.4 server. It shows commands like "apt install apache2" and "apt install mysql-server", along with the resulting log output. The output includes details about package dependencies, file installations, and service starts for both Apache and MySQL.

```
aws Services Search [Alt+5] N. Virginia IT21510380

mysql-common mysql-server 8.0 mysql-server-core 8.0
0 upgraded, 0 newly installed, 0 to remove and 6 not upgraded.
Need to get 29.6 MB of archives.
After this operation, 242 MB of additional disk space will be used.
Do you want to continue? [Y/n]: y
Get: 1 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 mysql-common all 5.9+1.0.1build1 [6796 B]
Get: 2 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 mysql-client-core-8.0 amd64 8.0.39-0ubuntu0.24.04.2 [2794 kB]
Get: 3 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 mysql-client-8.0 amd64 8.0.39-0ubuntu0.24.04.2 [22.5 kB]
Get: 4 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 libevent-phrased-2.1-764 amd64 2.1.12-stable-0ubuntu2 [7982 B]
Get: 5 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 libibutil-perl amd64 1.21.12-2.2build1 [238 kB]
Get: 6 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 mysql-server-core-8.0 amd64 8.0.39-0ubuntu0.24.04.2 [17.5 MB]
Get: 7 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 mysql-server-8.0 amd64 8.0.39-0ubuntu0.24.04.2 [1428 kB]
Get: 8 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 libibutil-tap-amd64 amd64 1.20.0-0ubuntu1.3 [3 kB]
Get: 10 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 liblhttp-perl all 5.27.1 [88.8 kB]
Get: 11 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 liblhttp-parser-perl all 3.01.1build3 [85.8 kB]
Get: 12 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 liblhttp-ps-perl all 4.63-1 [18.8 kB]
Get: 14 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 liblhttp-template-perl amd64 0.82+dfsg-2ubuntu12 [26.8 kB]
Get: 15 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 liblhttp-faster-perl all 1.2.17-1 [10.3 kB]
Get: 16 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 liblclone-perl amd64 0.46-1build3 [10.7 kB]
Get: 17 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 liblhttp-xml-perl amd64 0.1.1-1 [10 kB]
Get: 19 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 liblhttp-template-perl all 2.4.2-2.1build1 [11.2 kB]
Get: 20 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 libtime-mEDIATE-perl all 2.3300-2 [34.0 kB]
Get: 22 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 liblhttp-xml-perl all 0.6.0-1 [6.0 kB]
Get: 23 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 liblhttp-wmediates-perl all 6.04-2 [20.1 kB]
Get: 24 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 liblhttp-message-perl all 6.45-1ubuntu1 [78.8 kB]
Get: 25 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 libmemcached-perl all 1.0.18-1 [10.8 kB]
Get: 26 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 libmecab-ipadic-all a 2.7.0-20070801-2main-3 [6718 kB]
Get: 27 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 mecab-ipadic-utf8 all 2.7.0-20070801-2main-3 [4384 B]
Get: 28 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 mysql-server all 8.0.39-0ubuntu0.24.04.2 [9520 B]
Fetched 29.5 MB in 0s (71.5 MB/s)
Preselecting previously unselected packages: mysql-common.
(Reading database ... 68559 files and directories currently installed.)
Preparing to unpack .../mysql-client-core-8.0_8.0.39-0ubuntu0.24.04.2_amd64.deb ...
Selecting previously unselected package mysql-client-core-8.0.
Preparing to unpack .../mysql-client-core-8.0_8.0.39-0ubuntu0.24.04.2_amd64.deb ...

i-06b365b1264babf1 [IT21510380-WebServer]
Duration: 74.307 137.20. Preinstall: 10.8 155
```

i-06b36e5b1264bafb1 (IT21510380-WebServer)

PublicIPs: 34.207.177.30 PrivateIPs: 10.0.8.165

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```
aws Services Search [Alt+S] N. Virginia IT21510580
emitting double-array: 100% #########################################################################
reading /usr/share/mecab/dic/padic/matrix.def ... 1316x1316
emitting matrix : 100% #########################################################################
done!
update-alternatives: using /usr/lib/mecab/dic/padic-utf8 to provide /var/lib/mecab/dic/debian (mecab-dictionary) in auto mode
Setting up libmecab-dev (0.9.39-0ubuntu0.24.04.2) ...
Setting up libmecab-common (0.9.39-0ubuntu0.24.04.2) ...
Setting up libmecab0 (0.9.39-0ubuntu0.24.04.2) ...
Setting up libmysqlclient20 (8.0.39-0ubuntu0.24.04.2) ...
Setting up libncurses5 (6.5-1ubuntu1) ...
Setting up libncursesw5 (6.5-1ubuntu1) ...
Setting up libpcre3 (8.45-1ubuntu1) ...
Setting up libpcrecpp0 (8.45-1ubuntu1) ...
Setting up libstdc++6 (9.5.0-1ubuntu1) ...
Setting up libzmq5 (5.1.1-1ubuntu1) ...
Processing triggers for man-db (2.12.0-4ubuntu2) ...
Processing triggers for libc-bin (2.39-0ubuntu8.3) ...
scanning processes...
scanning linux images...

Running kernel seems to be up-to-date.

No services need to be restarted.

No containers need to be restarted.

No user sessions are running outdated binaries.

No VM guests are running outdated hypervisor (qemu) binaries on this host.

root@ip-10-0-8-165:~# tail -f /var/log/mysql/error.log | tail -n 1
mysqld: [Note] mysqld (mysqld 8.0.39-0ubuntu0.24.04.2) starting as process 1 ...
Building dependency tree... Done
Reading state information... Done
Reading configuration file for mysql (the latest version (8.0.39-0ubuntu0.24.04.2).
0 upgraded, 0 newly installed, 0 to remove and 6 not upgraded.
root@ip-10-0-8-165:~# mysql -u root -p
Enter password:
* * * * * MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 8
Server version: 8.0.39-0ubuntu0.24.04.2 (Ubuntu)

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Oracle is a registered trademark of Oracle Corporation and/or its
```

i-06b36e5b1264bafb1 (IT21510380-WebServer)

PublicIPs: 34.207.177.30 PrivateIPs: 10.0.8.165

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```
aws Services | Q Search [Alt+S] N. Virginia IT21510380
mysql-server is already the newest version (8.0.39-Ubuntu0.24.04.2).
0 upgraded, 0 newly installed, 0 to remove and 6 not upgraded.
root@ip-10-0-8-165:~# mysql -u root -p
Enter password:
Last command completed successfully.

Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 8
Server version 8.0.39-Ubuntu0.24.04.2 (Ubuntu)

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owners.

Type 'help;' or '\h' for help. Type 'c' to clear the current input statement.

mysql> CREATE DATABASE student_records;
Query OK, 1 row affected (0.01 sec)

mysql> CREATE USER 'username'@'localhost' IDENTIFIED BY 'password';
Query OK, 0 rows affected (0.03 sec)

mysql> GRANT ALL PRIVILEGES ON student_records.* TO 'username'@'localhost';
Query OK, 0 rows affected (0.02 sec)

mysql> FLUSH PRIVILEGES;
Query OK, 0 rows affected (0.00 sec)

mysql> USE student_records;
Database changed
mysql> CREATE TABLE students (
    ->     id INT AUTO_INCREMENT PRIMARY KEY,
    ->     name VARCHAR(100),
    ->     age INT,
    ->     major VARCHAR(100)
    -> );
Query OK, 0 rows affected (0.04 sec)

mysql> exit
Bye
root@ip-10-0-8-165:~|
```

i-06b36e5b1264bafb1 (IT21510380-WebServer)

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```
aws Services Search [Alt+S] N. Virginia IT21510380
Setting up node-find-cache-dir (3.3.2+3.2.1-1) ...
Setting up node-istanbul (0.4.5+repack10+cm98.25.59-2) ...
Setting up node-tape (5.0.0+cm100.1.1-1) ...
Setting up node-wait-stream (7.20.15ds1+cm121.269.168-0build1) ...
update-alternatives: using /usr/bin/babeljs* to provide /usr/bin/babeljs (babeljs) in auto mode
update-alternatives: using /usr/bin/babeljs*-7-external-helpers to provide /usr/bin/babeljs-external-helpers (babeljs-external-helpers) in auto mode
update-alternatives: using /usr/bin/babeljs*-node to provide /usr/bin/babeljs-node (babeljs-node) in auto mode
update-alternatives: using /usr/bin/babeljs*-parser to provide /usr/bin/babeljs-parser (babeljs-parser) in auto mode
Setting up node-deep-equal (2.2.3+cm43.15.94-1) ...
Setting up libjs-util (0.12.5+1.0.10-1) ...
Setting up node-deep-equal (2.3.4+cm43.15.94-1) ...
Setting up node-jest-debundl (29.6.2-dal+cm33.45.28-5) ...
Setting up node-tap (16.3.7+ds1+cm50.9.19-4) ...
Setting up node-util (0.12.5+1.0.10-1) ...
Setting up libxml2:amd64 (5.1.10+cm100.1.1-1) ...
Setting up node-assert (2.0.0+cm33.9.8-2) ...
Setting up node-css-loader (6.8.1+cm14.0.17-1) ...
Setting up node-parse-json (5.2.0+cm51.7-1) ...
Setting up libxml2:amd64 (5.1.10+cm100.1.1-1) ...
Processing triggers for liblc-bin (2.39-Ubuntu#8.3) ...
Processing triggers for man-db (2.12.0-0build2) ...
Processing triggers for libxml2 (2.9.9+cm100.1.1-1) ...
Setting up libxml2:amd64 (2.15.0-1.1ubuntu2) ...
Setting up libxslt2:amd64 (2.3.6-1build1) ...
Setting up libgd3:amd64 (2.3.3-3-Ubuntu#5) ...
Setting up libxml2-devtools (2.39-Ubuntu#8.3) ...
Processing triggers for liblc-bin (2.39-Ubuntu#8.3) ...
Scanning processes...
Scanning linux images...
Running kernel seems to be up-to-date.
No services need to be restarted.
No containers need to be restarted.
No user sessions are running outdated binaries.
No VM guests are running outdated hypervisor (qemu) binaries on this host.
root@ip-10-0-165-:~/it21510380app#
```

i-06b36e5b1264bafbf1 (IT21510380-WebServer)
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```
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Setting up node-alternatives: using /usr/bin/babeljs* to provide /usr/bin/babeljs (babeljs) in auto mode
update-alternatives: using /usr/bin/babeljs*-7-external-helpers to provide /usr/bin/babeljs-external-helpers (babeljs-external-helpers) in auto mode
update-alternatives: using /usr/bin/babeljs*-node to provide /usr/bin/babeljs-node (babeljs-node) in auto mode
update-alternatives: using /usr/bin/babeljs*-parser to provide /usr/bin/babeljs-parser (babeljs-parser) in auto mode
Setting up node-deep-equal (2.2.3+cm43.15.94-1) ...
Setting up libjs-util (0.12.5+1.0.10-1) ...
Setting up node-deep-equal (2.3.4+cm43.15.94-1) ...
Setting up node-jest-debundl (29.6.2-dal+cm33.45.28-5) ...
Setting up node-tap (16.3.7+ds1+cm50.9.19-4) ...
Setting up node-util (0.12.5+1.0.10-1) ...
Setting up libxml2:amd64 (5.1.10+cm100.1.1-1) ...
Setting up node-assert (2.0.0+cm33.9.8-2) ...
Setting up node-css-loader (6.8.1+cm14.0.17-1) ...
Setting up node-parse-json (5.2.0+cm51.7-1) ...
Setting up libxml2:amd64 (5.1.10+cm100.1.1-1) ...
Processing triggers for liblc-bin (2.39-Ubuntu#8.3) ...
Processing triggers for man-db (2.12.0-0build2) ...
Processing triggers for libxml2 (2.9.9+cm100.1.1-1) ...
Setting up libxml2:amd64 (2.15.0-1.1ubuntu2) ...
Setting up libgd3:amd64 (2.3.3-3-Ubuntu#5) ...
Setting up libxml2-devtools (2.39-Ubuntu#8.3) ...
Processing triggers for liblc-bin (2.39-Ubuntu#8.3) ...
Scanning processes...
Scanning linux images...
Running kernel seems to be up-to-date.
No services need to be restarted.
No containers need to be restarted.
No user sessions are running outdated binaries.
No VM guests are running outdated hypervisor (qemu) binaries on this host.
root@ip-10-0-165-:~/it21510380app# node -v
v18.19.1
root@ip-10-0-165-:~/it21510380app# npm -v
9.2.0
root@ip-10-0-165-:~/it21510380app# npm init -y
wrote to /root/.npm/_cacache/package.json:
```

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```
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aws Services Search [Alt+S] N. Virginia IT21510380
Processing triggers for sgml-base (1.31) ...
Setting up libfontconfig:amd64 (2.15.0-1.1ubuntu2) ...
Setting up libxft2:amd64 (2.3.6-1build1) ...
Setting up libxkbcommon:amd64 (0.7.0-1.1ubuntu2) ...
Setting up xlst-utils (7.7+0build1) ...
Setting up liblc-devtools (2.39-Ubuntu#8.3) ...
Processing triggers for liblc-bin (2.39-Ubuntu#8.3) ...
Scanning processes...
Scanning linux images...
Running kernel seems to be up-to-date.
No services need to be restarted.
No containers need to be restarted.
No user sessions are running outdated binaries.
No VM guests are running outdated hypervisor (qemu) binaries on this host.
root@ip-10-0-165-:~/it21510380app# node -v
v18.19.1
root@ip-10-0-165-:~/it21510380app# npm -v
9.2.0
root@ip-10-0-165-:~/it21510380app# npm init -y
wrote to /root/.npm/_cacache/package.json:
```

```
{
  "name": "it21510380app",
  "version": "1.0.0",
  "description": "",
  "main": "index.js",
  "scripts": {
    "test": "echo \\\"Error: no test specified\\\" && exit 1"
  },
  "keywords": [],
  "author": "",
  "license": "ISC"
}

root@ip-10-0-165-:~/it21510380app#
```

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AWS Services Search [Alt+S] N. Virginia IT21510380

EC2 > Security Groups > sg-06ec29a23257093e2 - IT21510380-SecurityGroup > Edit inbound rules

Edit inbound rules [Info](#)

Inbound rules control the incoming traffic that's allowed to reach the instance.

Security group rule ID	Type Info	Protocol Info	Port range Info	Source Info	Description - optional Info
sgr-017c27182bd8ce6e6	HTTP	TCP	80	Custom	<input type="text"/> 0.0.0.0/0 X
sgr-0e50ff2d15f8f1684	SSH	TCP	22	Custom	<input type="text"/> 0.0.0.0/0 X
-	Custom TCP	TCP	3000	Anywhere-IPv4	<input type="text"/> 0.0.0.0/0 X

[Add rule](#)

Cancel [Preview changes](#) [Save rules](#)

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```
root@ip-10-0-9-165:~/IT21510380# mysql -u root -p
password: Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 13
Server version: 8.0.39-0ubuntu0.24.04.2 (Ubuntu)

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owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> USE student_records;
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
mysql> SELECT * FROM students;
Empty set (0.00 sec)

mysql> INSERT INTO students (name, age, major) VALUES ('John Doe', 20, 'Computer Science');
Query OK, 1 row affected (0.01 sec)

mysql> INSERT INTO students (name, age, major) VALUES ('Jane Smith', 21, 'Information Technology');
Query OK, 1 row affected (0.01 sec)

mysql> INSERT INTO students (name, age, major) VALUES ('Mary Johnson', 22, 'Software Engineering');
Query OK, 1 row affected (0.00 sec)

mysql> SELECT * FROM students;
+----+-----+-----+
| id | name | age | major |
+----+-----+-----+
| 1  | John Doe | 20 | Computer Science |
| 2  | Jane Smith | 21 | Information Technology |
| 3  | Mary Johnson | 22 | Software Engineering |
+----+-----+-----+
3 rows in set (0.00 sec)
```

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AWS Services Search [Alt+S] N. Virginia IT21510380

```
GNU nano 7.2 app.js +
const express = require('express');
const mysql = require('mysql');
const app = express();

const db = mysql.createConnection({
  host: 'localhost',
  user: 'root',
  password: 'password',
  database: 'student_records'
});

db.connect((err) => {
  if (err) throw err;
  console.log('Connected to MySQL');
});

app.get('/', (req, res) => {
  db.query('SELECT * FROM students', (err, results) => {
    if (err) throw err;

    // Generate HTML response
    let html =
      `
        
          Student Records
        
        

|                      | Name             | Age             | Major             |
|----------------------|------------------|-----------------|-------------------|
| <a href="#">Edit</a> | \${student.name} | \${student.age} | \${student.major} |


      `;
    res.send(html);
  });
});

app.listen(3000, () => {
  console.log('App listening on port 3000!');
});
```

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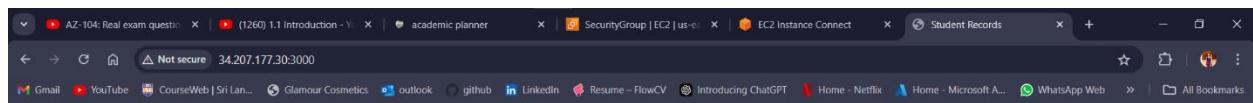
```

AWS Services Search [Alt+S] N. Virginia IT21510380
GNU nano 7.2 app.js +
}
</style>
</head>
<body>
<h1>Student Records</h1>
<table>
<tr>
<th>ID</th>
<th>Name</th>
<th>Age</th>
<th>Major</th>
</tr>>?
results.forEach(student => {
  html += `
    <tr>
      <td>${student.id}</td>
      <td>${student.name}</td>
      <td>${student.age}</td>
      <td>${student.major}</td>
    </tr>`;
});
html += `</table>`;
</body>
</html>;
res.send(html); // Send HTML response
);
);

app.listen(3000, () => {
  console.log('Server running on port 3000');
});

Help Exit Write Out Where Is Replace Cut Paste Execute Justify Location Undo Set Mark To Bracket Previous Back Next Forward Prev Word
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```



Student Records

ID	Name	Age	Major
1	John Doe	20	Computer Science
2	Jane Smith	21	Information Technology
3	Mary Johnson	22	Software Engineering

```

AWS Services Search [Alt+S] N. Virginia IT21510380
GNU nano 7.2
    </table>
    </body>
</html>;
    res.send(html); // Send HTML response
});

// 2. CREATE (Add a new student)
app.post('/create', (req, res) => {
    const { name, age, major } = req.body;
    const query = `INSERT INTO students (name, age, major) VALUES (?, ?, ?)`;
    db.query(query, [name, age, major], (err) => {
        if (err) throw err;
        res.send('New student record added!');
    });
});

// 3. UPDATE (Edit a student record by ID)
app.put('/students/:id', (req, res) => {
    const { id } = req.params;
    const { name, age, major } = req.body;
    const query = `UPDATE students SET name = ?, age = ?, major = ? WHERE id = ?`;
    db.query(query, [name, age, major, id], (err) => {
        if (err) throw err;
        res.send(`Student record with ID ${id} updated!`);
    });
});

// 4. DELETE (Delete a student record by ID)
app.delete('/students/:id', (req, res) => {
    const { id } = req.params;
    const query = `DELETE FROM students WHERE id = ?`;
    db.query(query, [id], (err) => {
        if (err) throw err;
        res.send(`Student record with ID ${id} deleted!`);
    });
});

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```

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ID	Name	Age	Major
1	John Doe	20	Computer Science
2	Jane Smith	21	Information Technology
3	Mary Johnson	22	Software Engineering

```

AWS Services Search [Alt+S] N. Virginia IT21510380
GNU nano 7.2
        <td>${student.age}</td>
        <td>${student.major}</td>
        <td>
            <a href="/edit/${student.id}">Edit</a> |
            <a href="/delete/${student.id}">Delete</a>
        </td>
    </tr>
});
}

html += `
</table>
<form action="/create" method="POST">
    <h3>Add New Student</h3>
    Name: <input type="text" name="name"><br>
    Age: <input type="text" name="age"><br>
    Major: <input type="text" name="major"><br>
    <button type="submit">Add Student</button>
</form>`;
    res.send(html); // Send HTML response
});

// 2. CREATE (Add a new student)
app.post('/create', (req, res) => {
    const { name, age, major } = req.body;
    const query = `INSERT INTO students (name, age, major) VALUES (?, ?, ?)`;
    db.query(query, [name, age, major], (err) => {
        if (err) throw err;
        res.redirect('/');
    });
});

// 3. UPDATE Student
app.put('/update/:id', (req, res) => {
    const { id } = req.params;
    const { name, age, major } = req.body;
    const query = `UPDATE students SET name = ?, age = ?, major = ? WHERE id = ?`;
    db.query(query, [name, age, major, id], (err) => {
        if (err) throw err;
        res.send(`Student record with ID ${id} updated!`);
    });
});

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```

i-06b36e5b1264bafbf1 (IT21510380-WebServer)
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```
aws Services Search [Alt+S] spp.js * N. Virginia IT21510380
GNU nano 7.2
const { name, age, major } = req.body;
const sql = `INSERT INTO students (name, age, major) VALUES (?, ?, ?)`;
db.query(sql, [name, age, major], (err) => {
  if (err) throw err;
  res.redirect('/');
});

// 3. UPDATE Student
app.post('/update/:id', (req, res) => {
  const { id } = req.params;
  const { name, age, major } = req.body;
  db.query(`UPDATE students SET name = ?, age = ?, major = ? WHERE id = ?`, [name, age, major, id], (err) => {
    if (err) throw err;
    res.redirect('/');
  });
});

// Edit Student Form
app.get('/edit/:id', (req, res) => {
  const { id } = req.params;
  const sql = `SELECT * FROM students WHERE id = ?`;
  db.query(sql, [id], (err, result) => {
    if (err) throw err;
    const student = result[0];
    const html = `
      <h1>Edit Student</h1>
      <form action="/update/${id}" method="POST">
        Name: <input type="text" name="name" value="${student.name}"><br>
        Age: <input type="number" name="age" value="${student.age}"><br>
        Major: <input type="text" name="major" value="${student.major}"><br>
        <button type="submit">Update</button>
      </form>`;
    res.send(html);
  });
});

// Delete Student
app.get('/delete/:id', (req, res) => {
  const { id } = req.params;
  const sql = `DELETE FROM students WHERE id = ?`;
  db.query(sql, [id], (err) => {
    if (err) throw err;
    res.redirect('/');
  });
});

app.listen(3000, () => {
  console.log('Server running on port 3000');
});

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X
```



```
aws Services Search [Alt+S] spp.js * N. Virginia IT21510380
GNU nano 7.2
);
};

// Edit Student Form
app.get('/edit/:id', (req, res) => {
  const { id } = req.params;
  const sql = `SELECT * FROM students WHERE id = ?`;
  db.query(sql, [id], (err, result) => {
    if (err) throw err;
    const student = result[0];
    const html = `
      <h1>Edit Student</h1>
      <form action="/update/${id}" method="POST">
        Name: <input type="text" name="name" value="${student.name}"><br>
        Age: <input type="number" name="age" value="${student.age}"><br>
        Major: <input type="text" name="major" value="${student.major}"><br>
        <button type="submit">Update</button>
      </form>`;
    res.send(html);
  });
});

// Delete Student
app.get('/delete/:id', (req, res) => {
  const { id } = req.params;
  const sql = `DELETE FROM students WHERE id = ?`;
  db.query(sql, [id], (err) => {
    if (err) throw err;
    res.redirect('/');
  });
});

app.listen(3000, () => {
  console.log('Server running on port 3000');
});
}

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X
```