

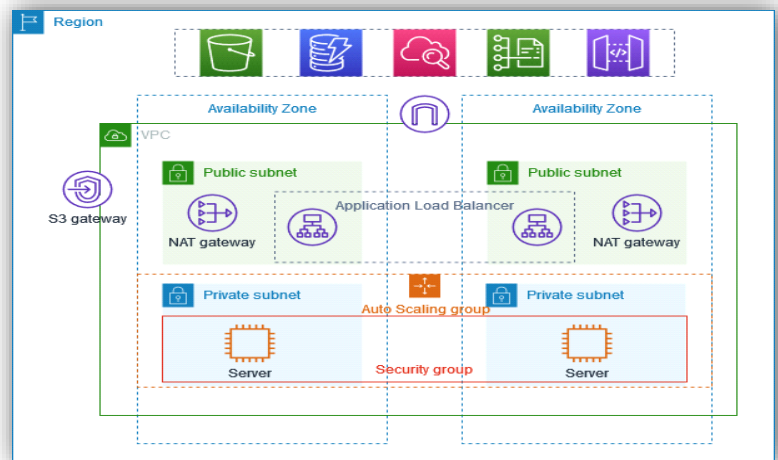
# AWS Project: A Secure, Scalable, and Highly Available Production VPC Infrastructure.

## Summary

In this project, I demonstrate setting up a secure multi-AZ VPC infrastructure with highly-available, auto-scaling Linux servers in private subnets. This involves creating a multi-AZ VPC with public and private subnets, configuring an auto-scaling group with a minimum of two EC2 instances for high availability in private subnets. Access to private subnets is restricted to the public subnets' security group. A bastion host enables secure connections to EC2 instances. An application load balancer evenly distributes traffic to web servers across multiple availability zones. The load balancer, situated in public subnets, securely routes internet traffic to the appropriate web server. Successful access to online resumes hosted on web servers confirms the load balancer's effectiveness in directing traffic to designated EC2 instances across availability zones.

## Project Steps:

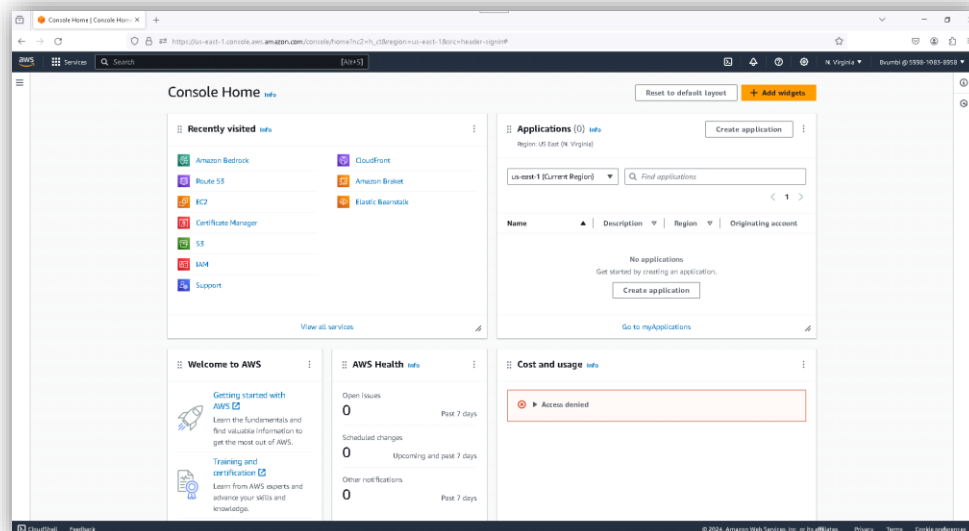
1. Create VPC
2. Create EC2 Instances
3. Create an Auto Scaling Group for the EC2 instances
4. Create Bastion Host
5. Connect Bastion Host to EC2 instances
6. Create Application Load Balancer
7. Start Web Server on EC2 instances
8. Connect to Web Server on EC2 instances



Topology of the Distributed System Architecture.

## Step by Step implementation:

1.



AWS Main Console.

2.

**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  
aws-prod-example

**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.

**Preview**

**VPC** [Show details](#)  
Your AWS virtual network

aws-prod-example-vpc

## Creating Virtual Private Cloud (VPC).

3.

**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  
Customize AZs

**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 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  
Customize subnets CIDR blocks

**NAT gateways (\$)** [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

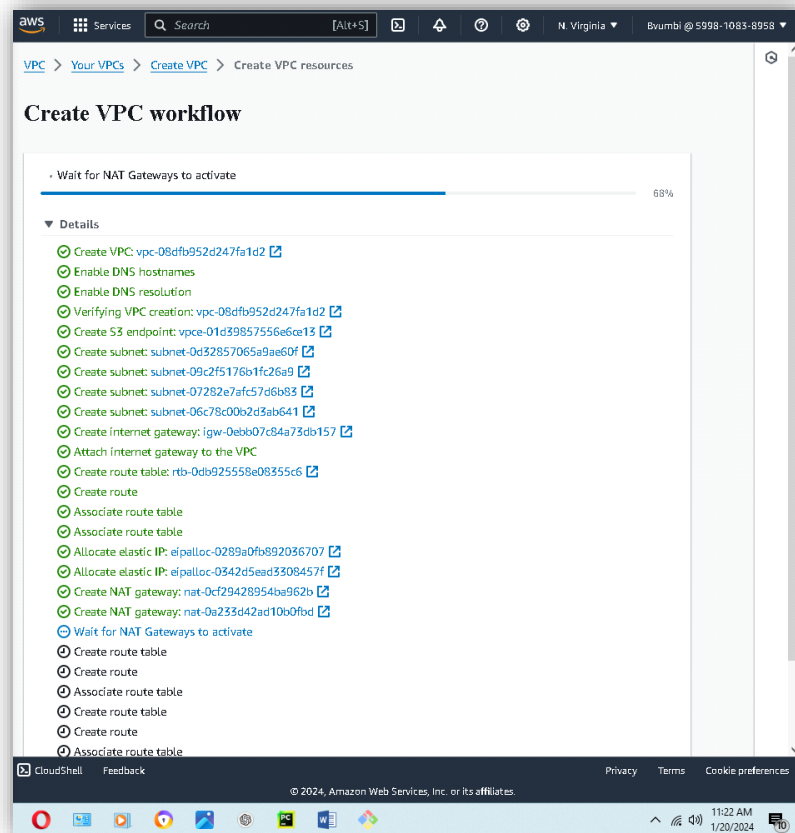
**Preview**

**VPC** [Show details](#)  
Your AWS virtual network

aws-prod-example-vpc

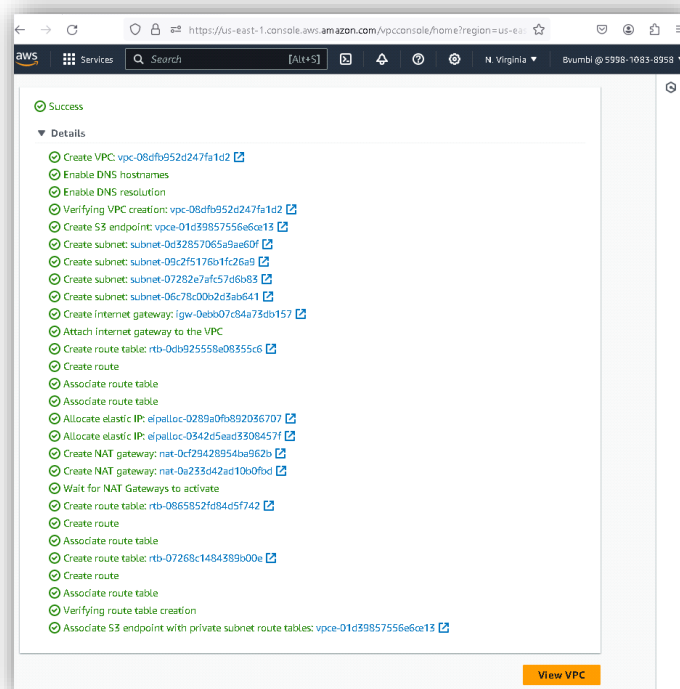
## Multi-AZ Settings.

4.



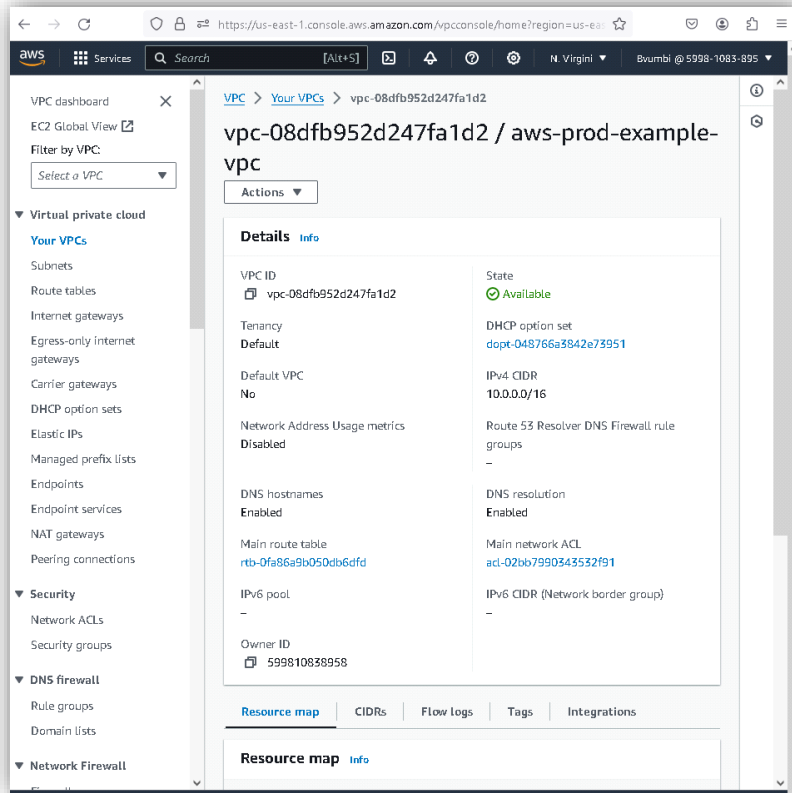
VPC Creating.

5.



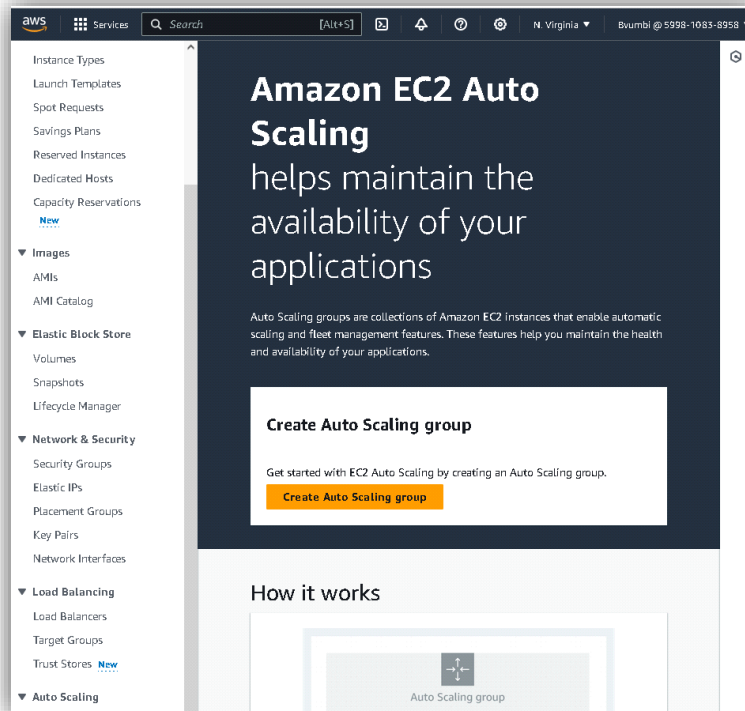
VPC Creation Success.

6.



VPC View.

7.



EC2 Auto Scaling Group Creation.

8.

**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*

aws-prod-example

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

Template version description

demonstration of application deployment in a private subnet

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.

▼ **Application and OS Images (Amazon Machine Image) - required** [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

## ASG Launch Template.

9

▼ **Application and OS Images (Amazon Machine Image) - required** [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

Recents Quick Start

macOS Ubuntu Windows Red Hat SUSE Linux

Mac ubuntu Microsoft Red Hat SUSE

Browse more AMIs

Including AMIs from AWS, Marketplace and the Community

**Amazon Machine Image (AMI)**

Ubuntu Server 22.04 LTS (HVM), SSD Volume Type Free tier eligible

ami-0c7217cdde317cfec (64-bit (x86)) / ami-05d47d29a4c2d19e1 (64-bit (ARM))

Virtualization: hvm ENA enabled: true Root device type: ebs

**Description**

Canonical, Ubuntu, 22.04 LTS, amd64 jammy image build on 2023-12-07

**Architecture** **AMI ID**

64-bit (x86) ami-0c7217cdde317cfec [Verified provider](#)

▼ **Instance type** [Info](#) | [Get advice](#) [Advanced](#)

**Instance type**

t2.micro Free tier eligible

## EC2 Instance Creation.

10.

**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  
aws-prod-example [Create new key pair](#)

**Network settings** Info

Subnet Info  
Don't include in launch template [Create new subnet](#)

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

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.

☐ Select existing security group ☒ Create security group

Security group name - required  
MyWebServerGroup

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  
Allows SSH access to developers

VPC Info  
vpc-0d371e0f87905e931 (default) [Create new VPC](#)

Inbound Security Group Rules  
No security group rules are currently included in this template. Add a new rule to include it in the launch template.

### Key Pair Creation.

11.

**Network settings** Info

Subnet Info  
Don't include in launch template [Create new subnet](#)

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

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.

☐ Select existing security group ☒ Create security group

Security group name - required  
aws-prod-example

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  
allow ssh access

VPC Info  
vpc-08dfb952d247fa1d2 (aws-prod-example-vpc) [Create new VPC](#)

Inbound Security Group Rules  
No security group rules are currently included in this template. Add a new rule to include it in the launch template.

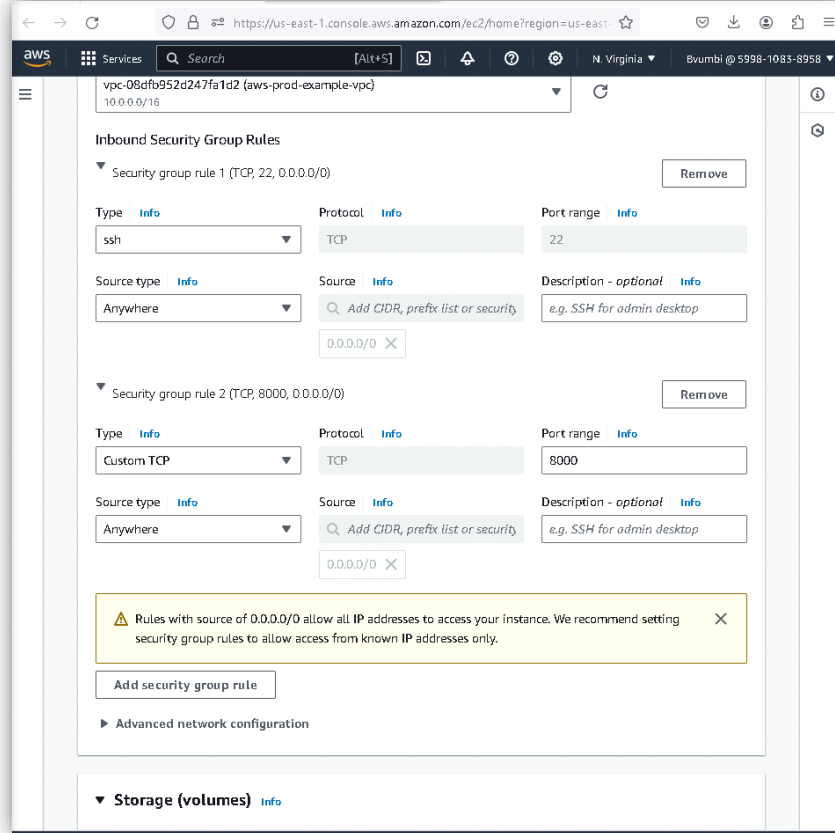
[Add security group rule](#)

► Advanced network configuration

**Storage (volumes)** Info

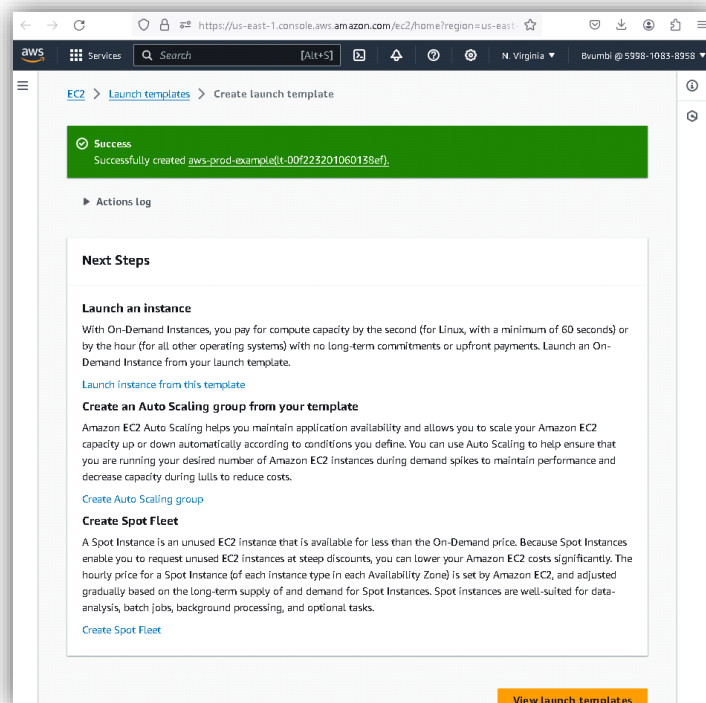
### ASG Security Group Setup.

12.



## Configuring Security Group Inbound Rules (Firewall).

13.



## EC2 Launch Template Creation Success.

14.

The screenshot displays the AWS Management Console interface for the 'aws-prod-example' Launch Template. The left sidebar shows the navigation menu with categories like EC2 Dashboard, Instances, Images, Elastic Block Store, and Network & Security. The main content area is titled 'aws-prod-example (lt-00f223201060138ef)' and includes a 'Delete template' button. Below this, the 'Launch template details' section shows the template ID, name, default version (1), and owner. The 'Launch template version details' section shows the version (1), description, date created, and creator. The 'Instance details' section shows the AMI ID, instance type, availability zone, and key pair name.

Launch template details			
Launch template ID	Launch template name	Default version	Owner
lt-00f223201060138ef	aws-prod-example	1	arn:aws:iam::599810838958:user/Bvumbi

Launch template version details			
Version	Description	Date created	Created by
1 (Default)	demonstration of application deployment in a private subnet	2024-01-20T11:02:58.000Z	arn:aws:iam::599810838958:user/Bvumbi

Instance details			
AMI ID	Instance type	Availability Zone	Key pair name
ami-0c7217cdd317cfec	t2.micro	-	aws-prod-example

### Launch Template Details.

15.

The screenshot displays the 'Create Auto Scaling group' wizard in the AWS Management Console, specifically the 'Choose launch template' step. The left sidebar shows the progress of the wizard with steps 1 through 7. The main content area is titled 'Choose launch template' and includes a description: 'Specify a launch template that contains settings common to all EC2 instances that are launched by this Auto Scaling group.' Below this, the 'Name' section has a text input for the 'Auto Scaling group name' with a note that it must be unique and no more than 255 characters. The 'Launch template' section has a dropdown menu to 'Select a launch template' and a 'Create a launch template' link. A blue information box states: '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.' At the bottom, there are 'Cancel' and 'Next' buttons.

### ASG Setup.



16.

The screenshot shows the 'Create Auto Scaling group' wizard in the AWS Management Console, specifically Step 1: Choose launch template. The left sidebar lists steps from Step 1 to Step 7. The main content area is titled 'Choose launch template' and includes a sub-header '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.  
aws-prod-example  
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.  
aws-prod-example  
Create a launch template

Version  
Default (1)  
Create a launch template version

Description  
demonstration of application deployment in a private subnet

Launch template  
aws-prod-example  
lt-00f223201060138ef

Instance type  
t2.micro

AMI ID  
Security groups  
Request Spot Instances

## ASG Launch.

17.

The screenshot shows the 'Create Auto Scaling group' wizard in the AWS Management Console, specifically Step 2: Choose instance launch options. The left sidebar lists steps from Step 1 to Step 7. The main content area is titled 'Choose instance launch options' and includes a sub-header '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  
aws-prod-example  
lt-00f223201060138ef

Version  
Default

Description  
demonstration of application deployment in a private subnet

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-08d9f952d247fa1d2 (aws-prod-example-vpc)  
10.0.0.0/16  
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-07262e7afc57d6b983 (aws-prod-example-subnet-private1-us-east-1a)  
10.0.128.0/20

us-east-1b | subnet-06c78c00b2d3ab641 (aws-prod-example-subnet-private2-us-east-1b)  
10.0.144.0/20

## ASG Assigned to Private Subnets.

18.

**Configure group size and scaling - optional** [Info](#)

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

**Group size** [Info](#)  
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.

2 ▾

**Scaling** [Info](#)  
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** ▾ 1 ▾  
Equal or less than desired capacity

**Max desired capacity** ▾ 4 ▾  
Equal or greater than desired capacity

**Automatic scaling - optional**  
Choose whether to use a target tracking policy [Info](#).  
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

☐ **Target tracking scaling policy**  
Choose a CloudWatch metric and target value

### ASG Maximum and Minimum Limit Settings.

19.

**Add notifications** [Info](#)

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

**Notification 1** [Remove](#)

Send a notification to

With these recipients

**Event types**  
Notify subscribers whenever instances

- ☒ Launch
- ☒ Terminate
- ☒ Fail to launch
- ☒ Fail to terminate

**Add notifications** [Info](#)

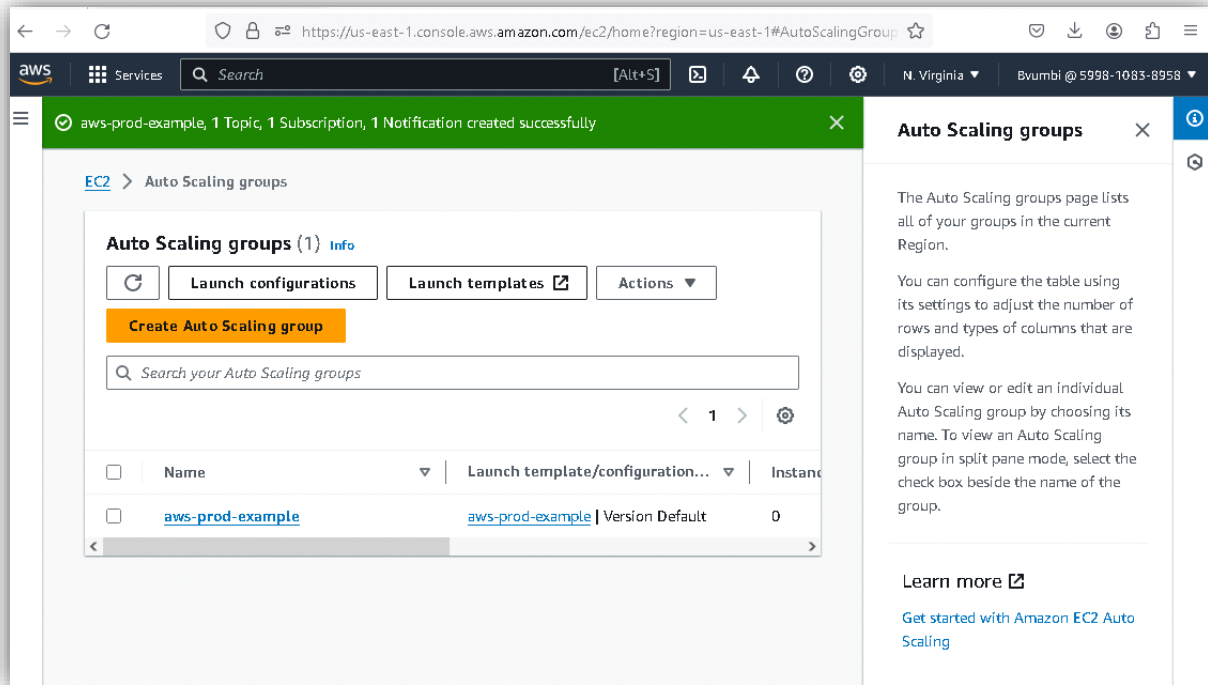
When you configure notifications, they help keep your users informed of changes by publishing to an Amazon SNS topic when selected events occur. For example, you can configure notifications when an instance launches or terminates. Notifications require an Amazon SNS topic and user subscriptions.

Each time that you create a new topic, check your email for a confirmation message, and click the link in the email to confirm your subscription. Notifications can only be sent to confirmed addresses.

**Learn more** [Get Amazon SNS notifications when your Auto Scaling group scales](#)

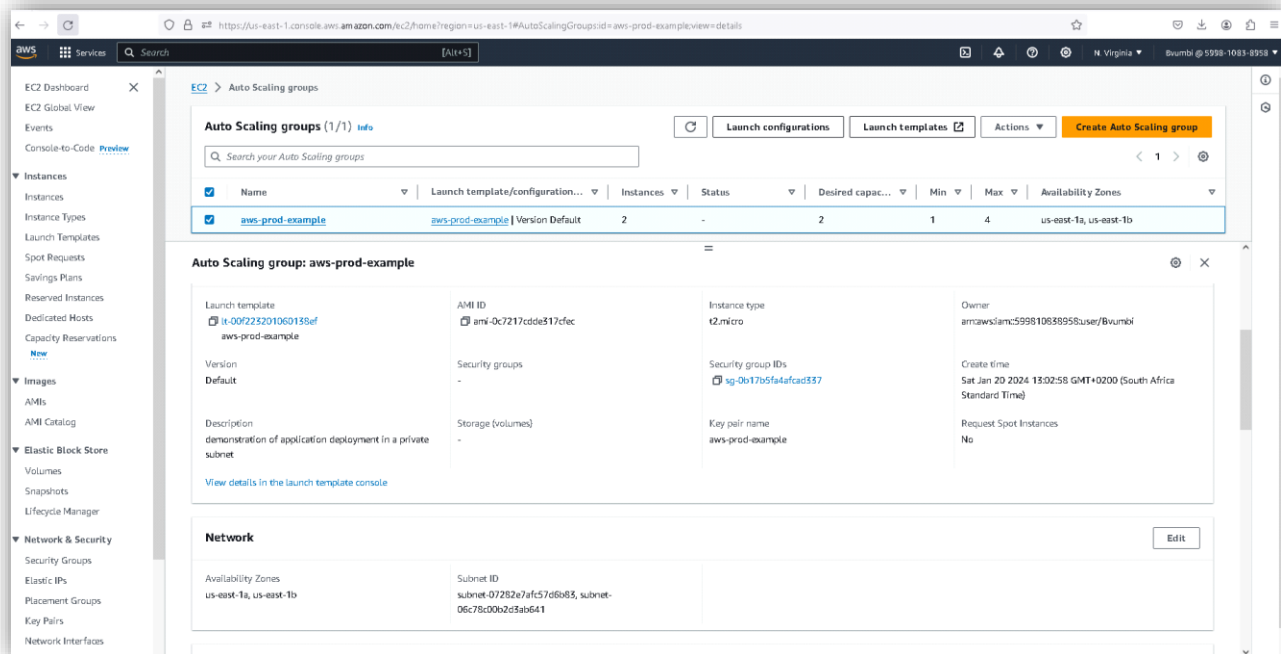
### SNS Setup for EC2 Instances.

20.



ASG Creation Success.

21.



ASG EC2 Instances Running.

22.

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 [Info](#)

Name  
bastion-host [Add additional tags](#)

### 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.

Recents **Quick Start**

Amazon Linux

macOS

Ubuntu

Windows

Red Hat

SUSE Linux

Browse more AMIs

Including AMIs from AWS, Marketplace and the Community

Amazon Machine Image (AMI)

Ubuntu Server 22.04 LTS (HVM), SSD Volume Type Free tier eligible

ami-0c7217cdd6317cfc / ami-05d47d29a4c2d19e1 (64-bit (Arm))  
Virtualization: hvm ENA enabled: true Root device type: ebs

Description  
Canonical, Ubuntu, 22.04 LTS, amd64 jammy image build on 2023-12-07

Architecture AMI ID

### Summary

Number of instances [Info](#)  
1

Software Image (AMI)  
Canonical, Ubuntu, 22.04 LTS, ...[read more](#)  
ami-0c7217cdd6317cfc

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

Cancel **Launch instance** [Review commands](#)

## Bastion Host Creation.

23.

### 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*  
aws-prod-example [Create new key pair](#)

### Network settings [Info](#)

VPC - *required* [Info](#)  
vpc-08dfb952d247fa1d2 (aws-prod-example-vpc) [10.0.0.0/16](#)

Subnet [Info](#)  
subnet-09c2f5176b1fc26a9 aws-prod-example-subnet-public-c2-us-east-1b  
VPC: vpc-08dfb952d247fa1d2 Owner: 599810838958 Availability Zone: us-east-1b  
IP addresses available: 4090 CIDR: 10.0.16.0/20 [Create new subnet](#)

Auto-assign public IP [Info](#)  
Enable

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

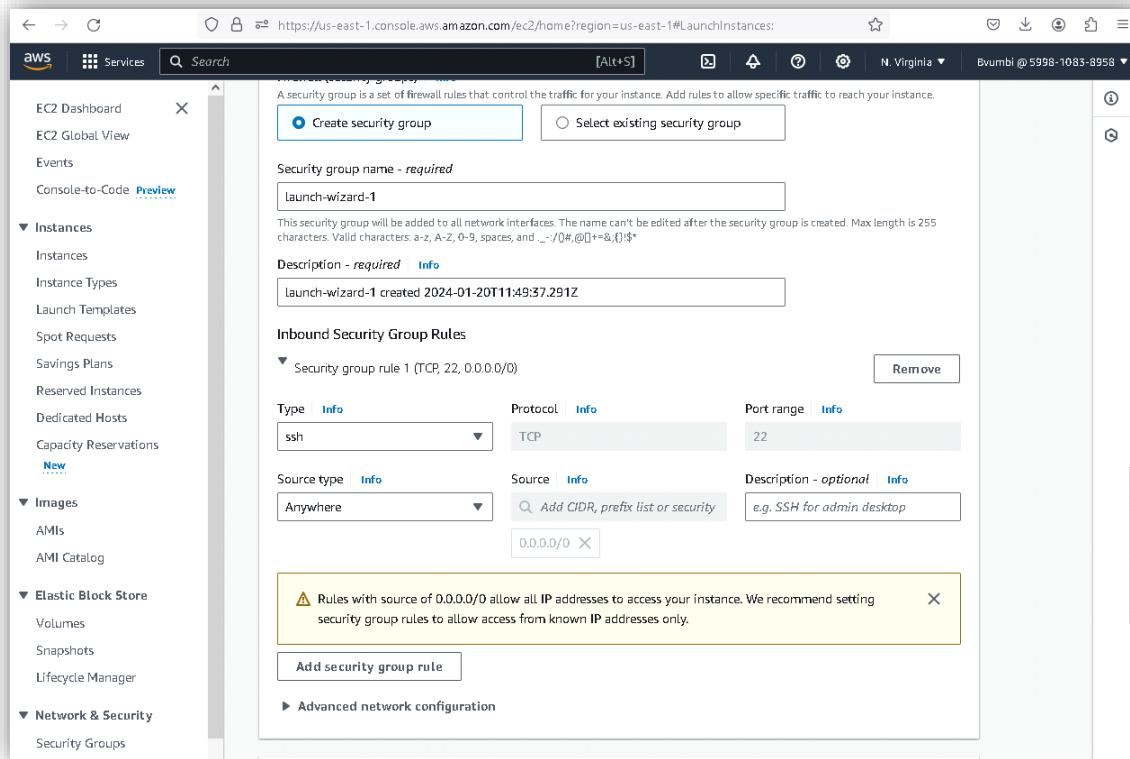
Security group name - *required*  
launch-wizard-1

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](#)  
launch-wizard-1 created 2024-01-20T11:49:37.291Z

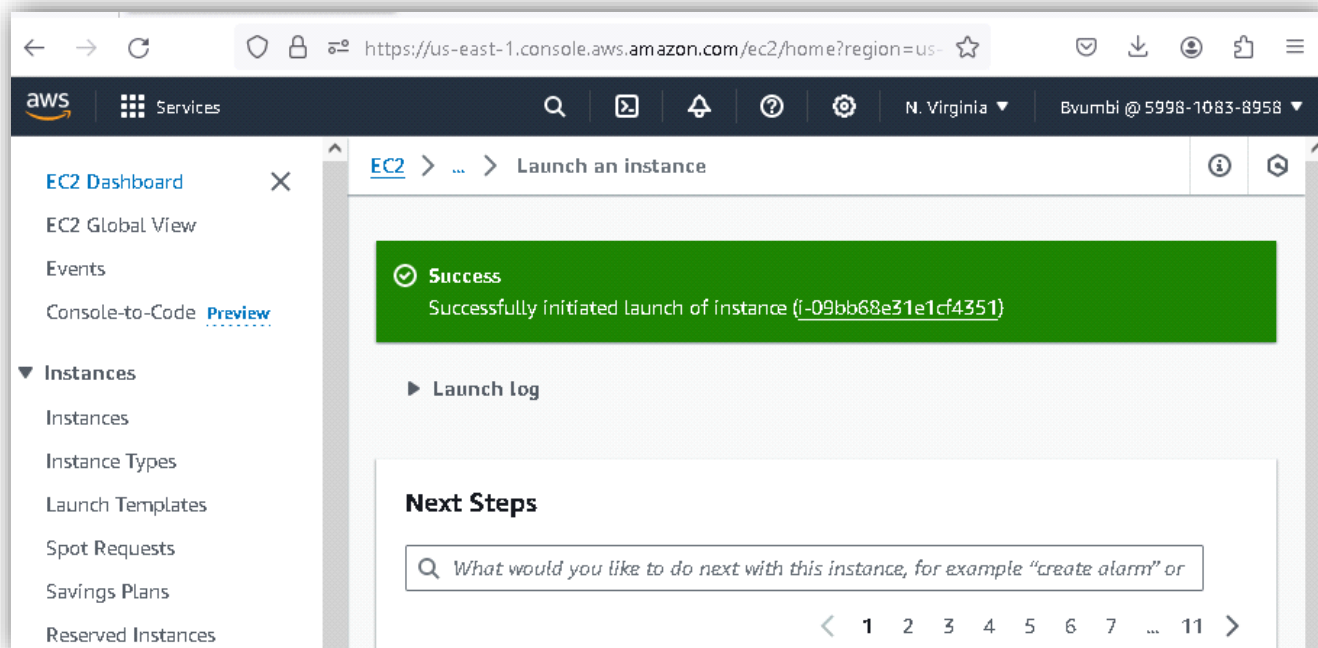
## Bastion Host Public IP and Subnet Assigning.

24.



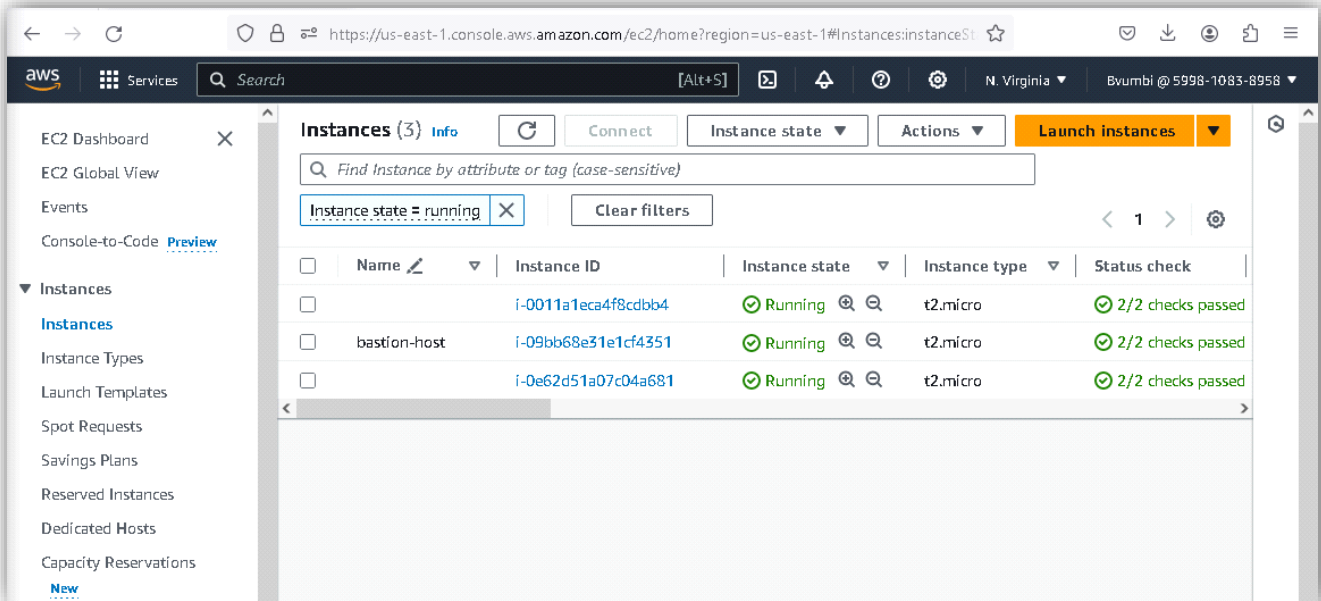
### Bastion Host Firewall Setting.

25.



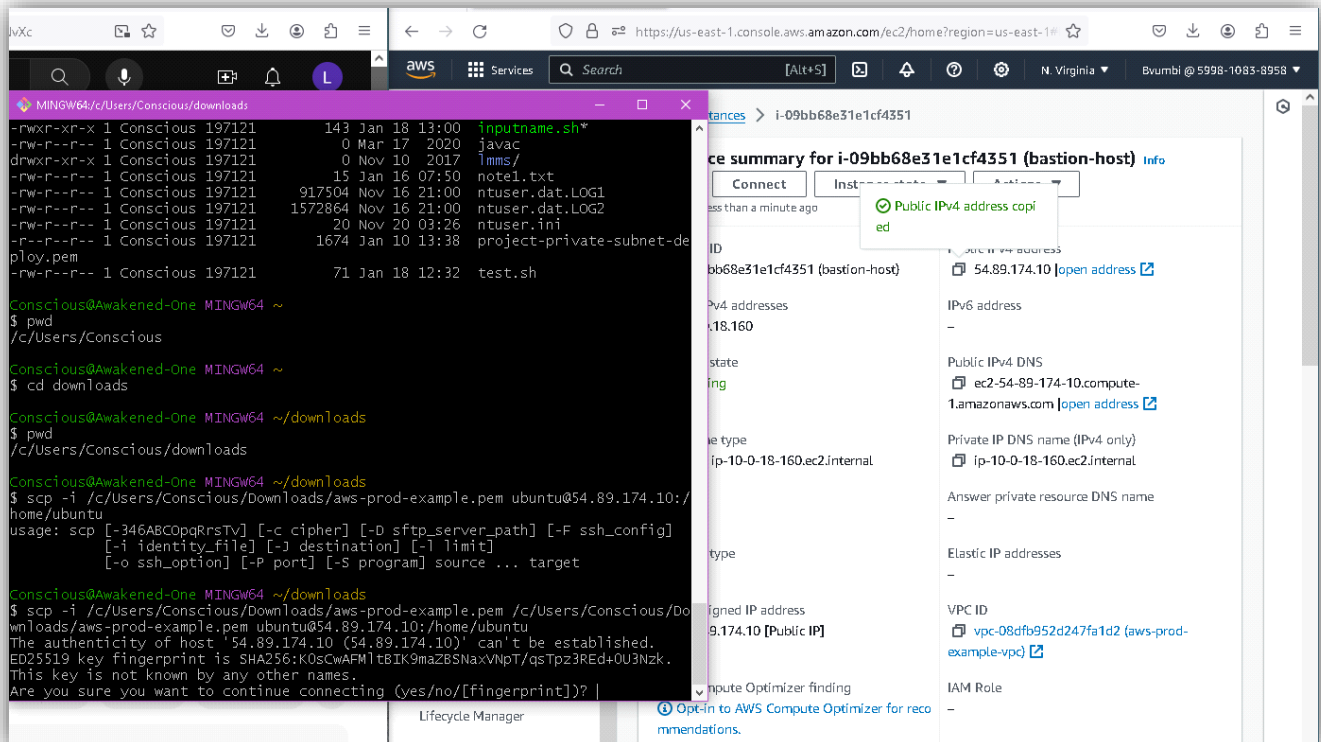
### Bastion Host Creation Success.

26.



Bastion Host and Two EC2 Instances Running.

27.



Copying Key Pair from Laptop to Bastion Host.

28.

The screenshot shows a laptop screen with two main windows. On the left is a terminal window titled 'ubuntu@ip-10-0-18-160: ~'. It displays the Ubuntu 22.04.3 LTS login banner and system information, including system load, processes, memory usage, and network details. On the right is the AWS Management Console, specifically the 'Instances' page for the us-east-1 region. It shows the instance summary for 'i-09bb68e31e1cf4351 (bastion-host)'. The instance is in a 'Running' state with a public IP address of 54.89.174.10. The console also shows details like the instance type (t2.micro), VPC ID, and IAM Role.

**Logged In to Bastion Host from Laptop.**

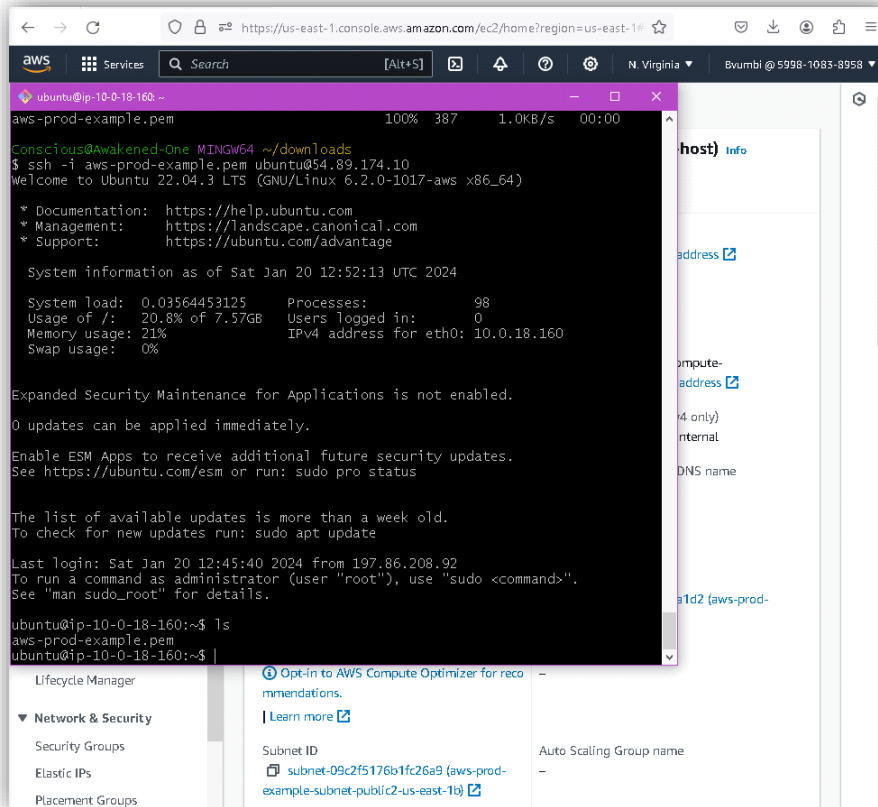
29.

The screenshot shows a laptop screen with two main windows. On the left is a terminal window titled 'MINGW64 /c/Users/Conscious/downloads'. It displays the command to copy a key pair to the bastion host: 'scp -i /c/Users/Conscious/Downloads/aws-prod-example.pem /c/Users/Conscious/Downloads/aws-prod-example.pem ubuntu@54.89.174.10: /home/ubuntu'. The command is successful, and the key pair is copied. On the right is the AWS Management Console, specifically the 'Network & Security' section. It shows the 'Subnet ID' field, which is set to 'subnet-09c2f5176b1fc26a9 (aws-prod-example-subnet-public2-us-east-1b)'. The console also shows details like the VPC ID and the IAM Role.

**Key Pair Copying to Bastion Host Success.**

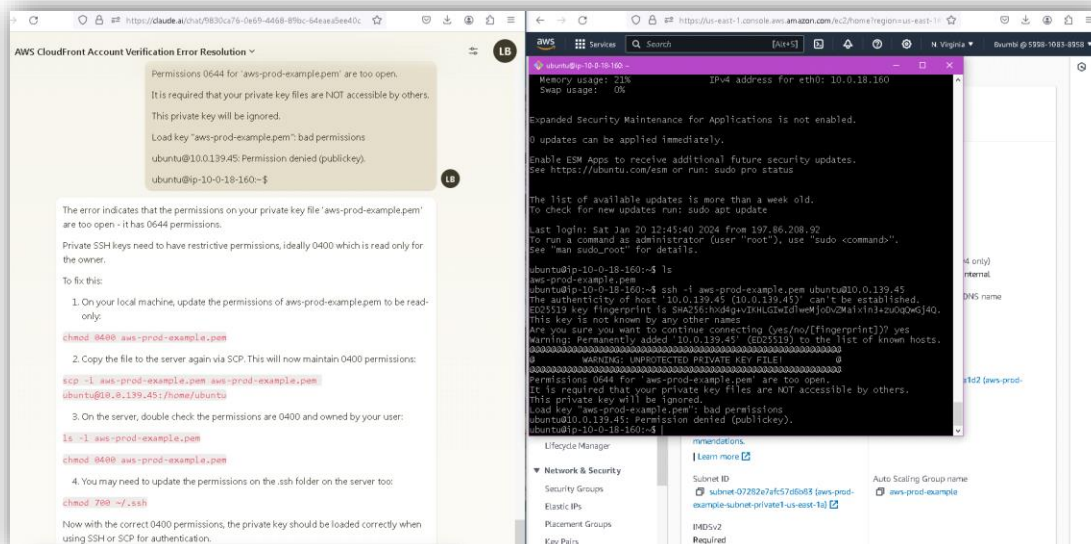


30.



**Confirmed Key Pair on Bastion Host.**

31.



**Public Key Permission Denied Error to Private EC2 server.**



33.

```

aws
Services Search [Alt+S] N. Virginia Bvumbi @ 5998-1083-8958

MINGW64:/c/Users/Conscious/downloads
ED25519 key fingerprint is SHA256:hx4d4g+vIKHLGIwIdlweMjoDvZMaixn3+zuOqQwGj4Q.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '10.0.139.45' (ED25519) to the list of known hosts.
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
@                WARNING: UNPROTECTED PRIVATE KEY FILE!                @
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
Permissions 0644 for 'aws-prod-example.pem' are too open.
It is required that your private key files are NOT accessible by others.
This private key will be ignored.
Load key 'aws-prod-example.pem': bad permissions
ubuntu@10.0.139.45: Permission denied (publickey).
ubuntu@ip-10-0-18-160:~$ exit
logout
Connection to 54.89.174.10 closed.

Conscious@Awakened-One MINGW64 ~/downloads
$ chmod 0400 aws-prod-example.pem

Conscious@Awakened-One MINGW64 ~/downloads
$ scp -i /c/Users/Conscious/Downloads/aws-prod-example.pem /c/Users/Conscious/Do
wnloads/aws-prod-example.pem ubuntu@54.89.174.10:/home/ubuntu
aws-prod-example.pem                                100% 387    1.2KB/s   00:00

Conscious@Awakened-One MINGW64 ~/downloads
$ ssh -i aws-prod-example.pem ubuntu@54.89.174.10
Welcome to ubuntu 22.04.3 LTS (GNU/Linux 6.2.0-1017-aws x86_64)

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

System information as of Sat Jan 20 13:08:23 UTC 2024

System load:  0.0          Processes:    98
Usage of /:   20.8% of 7.57GB Users logged in:  0

Lifecycle Manager

```

Changed Permissions of Key Pair to Read Only on Laptop.

34.

```

https://us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#
aws
Services Search [Alt+S] N. Virginia Bvumbi @ 5998-1083-8958

MINGW64:/c/Users/Conscious/downloads
The list of available updates is more than a week old.
To check for new updates run: sudo apt update

Last login: Sat Jan 20 12:52:14 2024 from 197.86.208.92
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

ubuntu@ip-10-0-18-160:~$ ls -l aws-prod-example.pem
-rw-r--r-- 1 ubuntu ubuntu 387 Jan 20 13:05 aws-prod-example.pem
ubuntu@ip-10-0-18-160:~$ chmod 0400 aws-prod-example.pem
ubuntu@ip-10-0-18-160:~$ ls -l aws-prod-example.pem
-r----- 1 ubuntu ubuntu 387 Jan 20 13:05 aws-prod-example.pem
ubuntu@ip-10-0-18-160:~$ chmod 700 ~/.ssh
ubuntu@ip-10-0-18-160:~$ exit
logout
Connection to 54.89.174.10 closed.

Conscious@Awakened-One MINGW64 ~/downloads
$ |

Capacity Reservations
New

Images
Instance type
Answer private resource DNS name
-
Elastic IP addresses

```

Changed Permissions of Key Pair to Read Only on Bastion Host.

35.

```

ubuntu@ip-10-0-154-79:~$
<p>Jan 2015 - Dec 2020</p>
<h2>Education</h2>
<p>Houston Community College...</p>
<h2>References</h2>
<p>Tawanda Gatsi...</p>
<p>Terence Furusa...</p>
</div>
<script>
// JS for responsive behavior
// Responsive navigation toggle
const navToggle = document.querySelector('.nav-toggle');
const navLinks = document.querySelectorAll('.nav-link');
navToggle.addEventListener('click', () => {
  document.body.classList.toggle('nav-open');
});
navLinks.forEach(link => {
  link.addEventListener('click', () => {
    document.body.classList.remove('nav-open');
  })
});
// Smooth scrolling
const scroll = new SmoothScroll('a[href*="#"]', {
  speed: 1000
});
</script>
</body>
</html>
ubuntu@ip-10-0-154-79:~$ python3 -m http.server 8000
Serving HTTP on 0.0.0.0 port 8000 (http://0.0.0.0:8000/) ...

```

Security Groups

Elastic IPs

subnet-06c78c00b2d3ab641 (aws-prod-example-subnet-private2-us-east-1b)

aws-prod-example

### Starting Web Server on Private EC2 instance.

36.

EC2 > Load balancers > Create Application Load Balancer

## Create Application Load Balancer Info

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

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

☒ Internet-facing  
An Internet-facing load balancer routes requests from clients over the Internet to targets. Requires a public subnet. [Learn more](#)

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

**IP address type** Info  
Select the type of IP addresses that your subnets use.

☒ IPv4  
Recommended for internal load balancers.

☐ Dualstack  
Includes IPv4 and IPv6 addresses.

### Creating Application Load Balancer (ALB).

37.

Recommended for internal load balancers.

☐ Dualstack  
Includes IPv4 and IPv6 addresses.

### Network mapping [Info](#)

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

**VPC** [Info](#)  
Select the virtual private cloud (VPC) for your targets or you can [create a new VPC](#). Only VPCs with an internet gateway are enabled for selection. The selected VPC can't be changed after the load balancer is created. To confirm the VPC for your targets, view your [target groups](#).

aws-prod-example-vpc  
vpc-08dfb952d247fa1d2  
IPv4: 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.

☒ us-east-1a (use1-az2)  
Subnet  
subnet-0d32857065a9ae60f    aws-prod-example-subnet-public1-us-east-1a  
IPv4 address  
Assigned by AWS

☒ us-east-1b (use1-az4)  
Subnet  
subnet-09c2f5176b1fc26a9    aws-prod-example-subnet-public2-us-east-1b  
IPv4 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](#)

### ALB VPC and Public Subnet Settings.

38.

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

**Security groups**  
Select up to 5 security groups

aws-prod-example  
sg-0b17b5fa4afcad337    VPC: vpc-08dfb952d247fa1d2

### Listeners and routing [Info](#)

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

▼ Listener HTTP:80 [Remove](#)

Protocol: HTTP : Port: 80  
1-65535

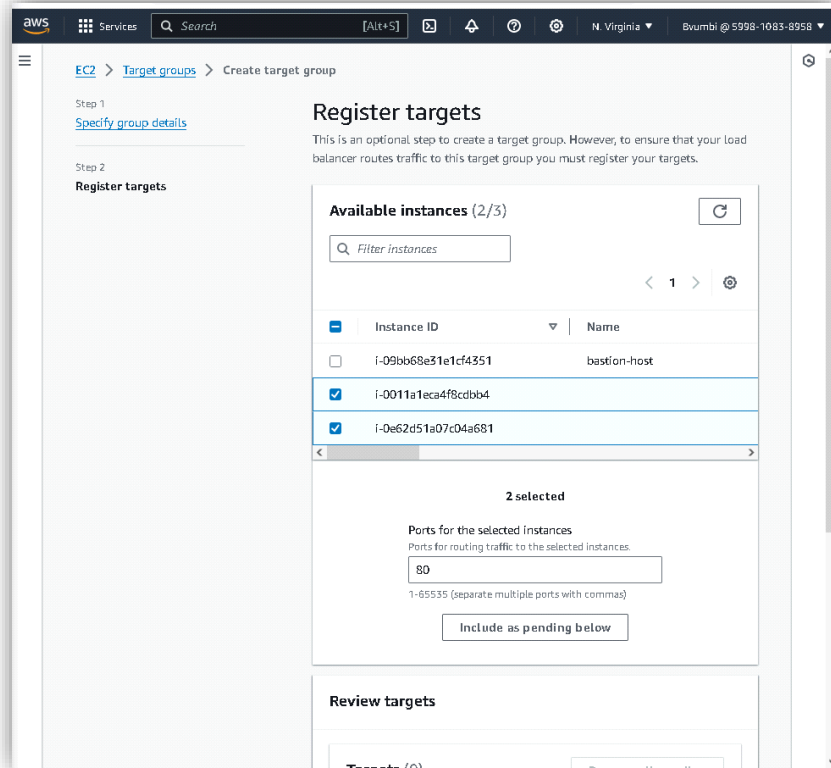
Default action: [Info](#)  
Forward to: Select a target group  
[Create target group](#)

**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.

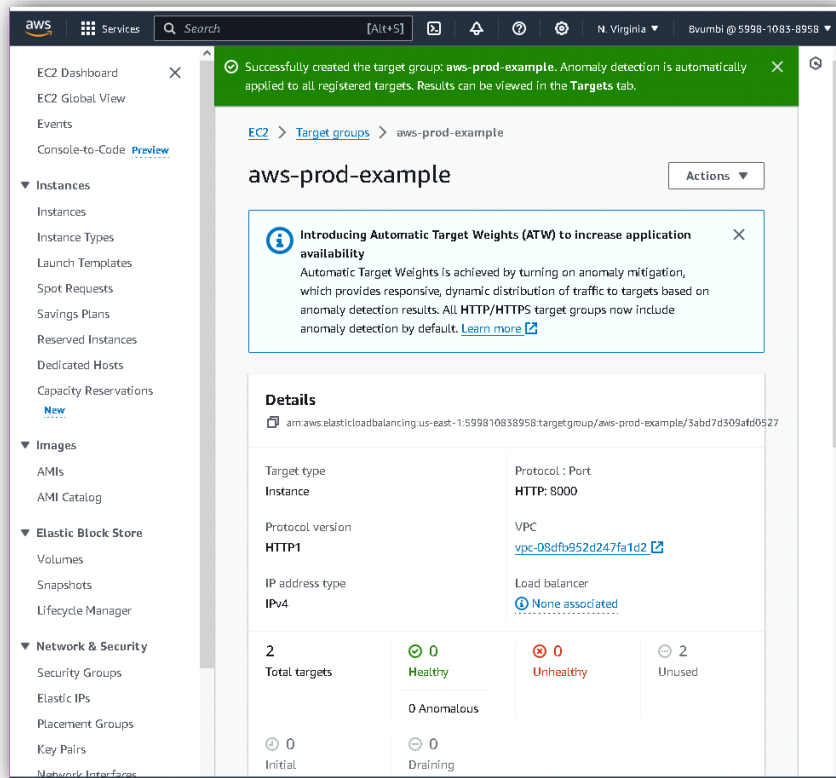
### Adding Security Group to ALB.

39.



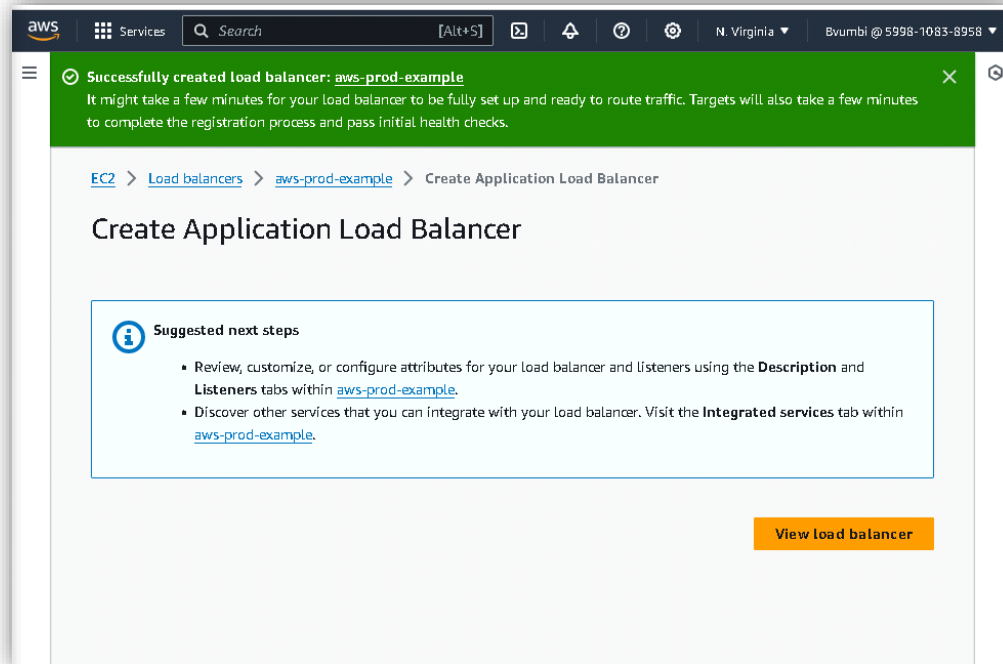
### Adding EC2 instances to Target Group for Load Balancer.

40.



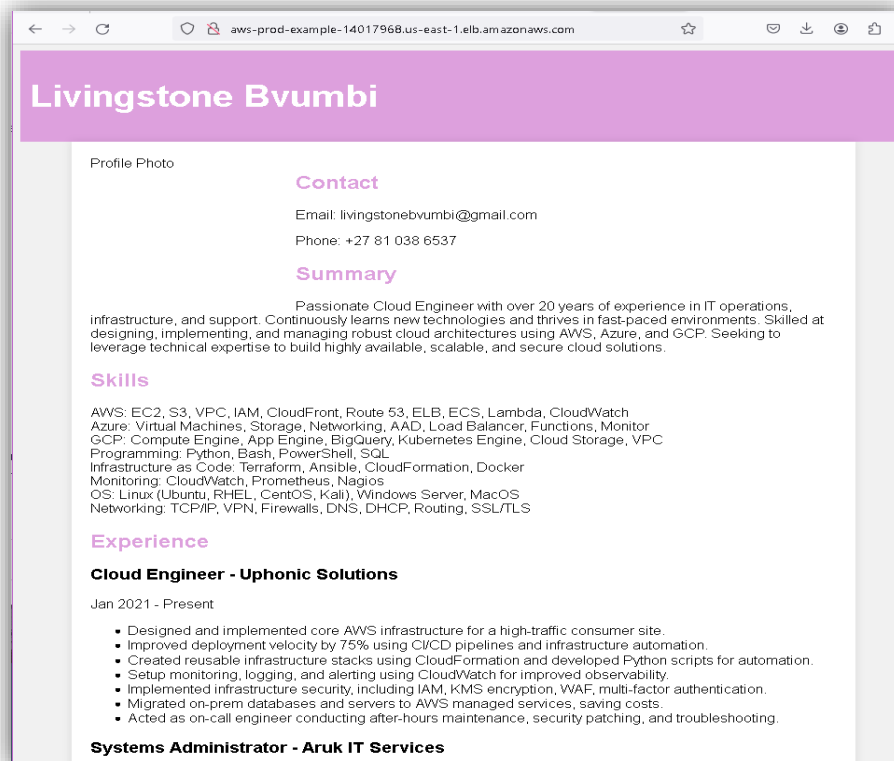
### Target Group Setup Success.

41.



**ALB Setup Success.**

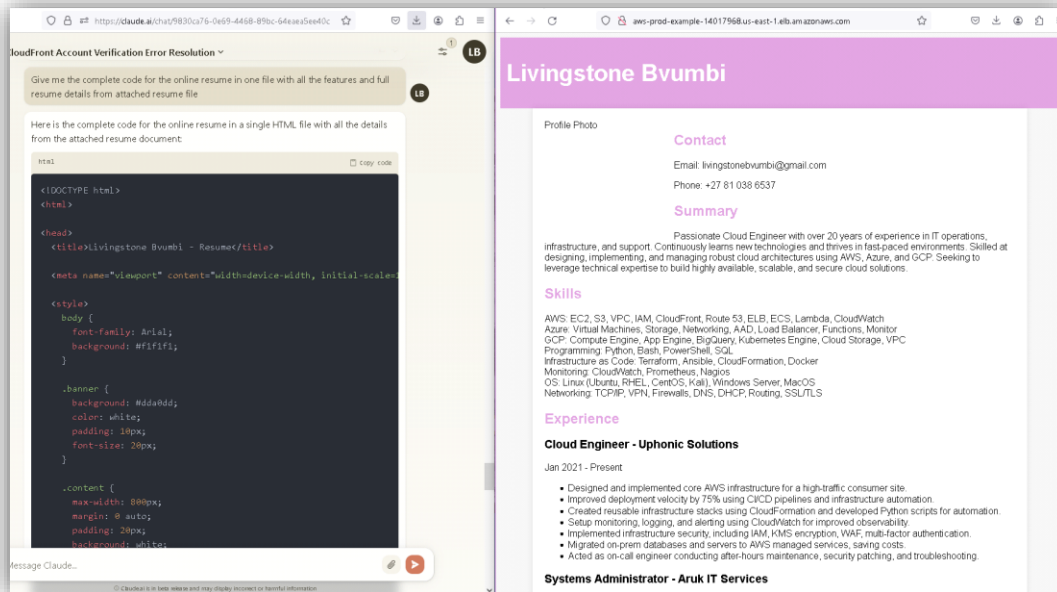
42.



**Online Resume hosted on Private Web Server Displaying in Web Browser Proving Successful Setup of Infrastructure.**

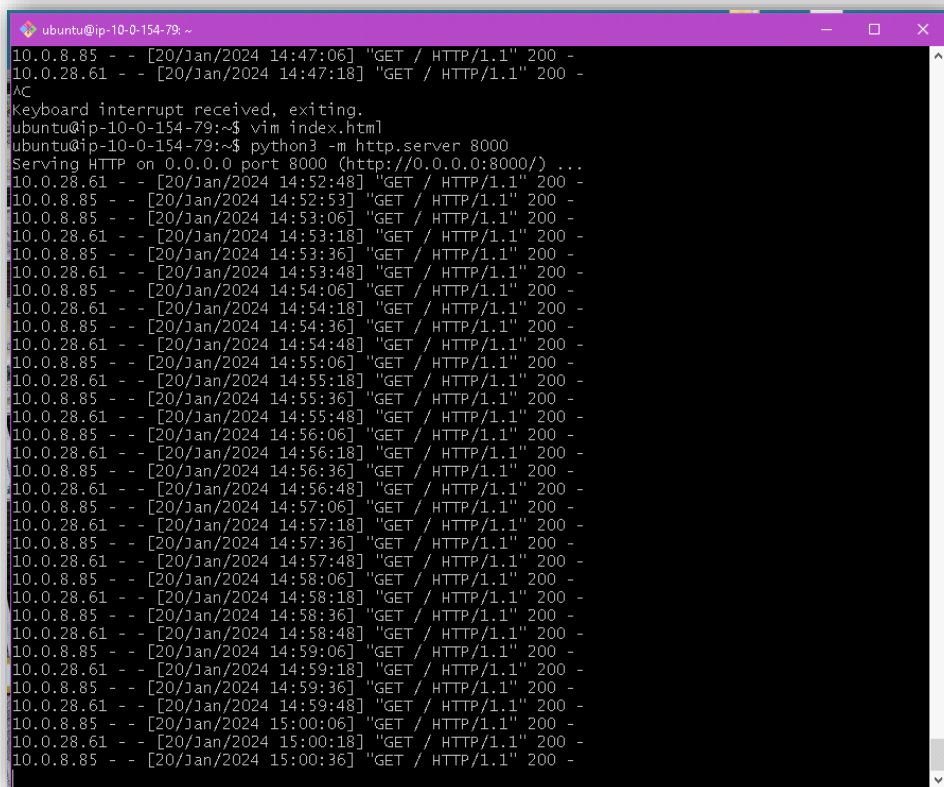
## How website files were created and uploaded to the web servers:

43.



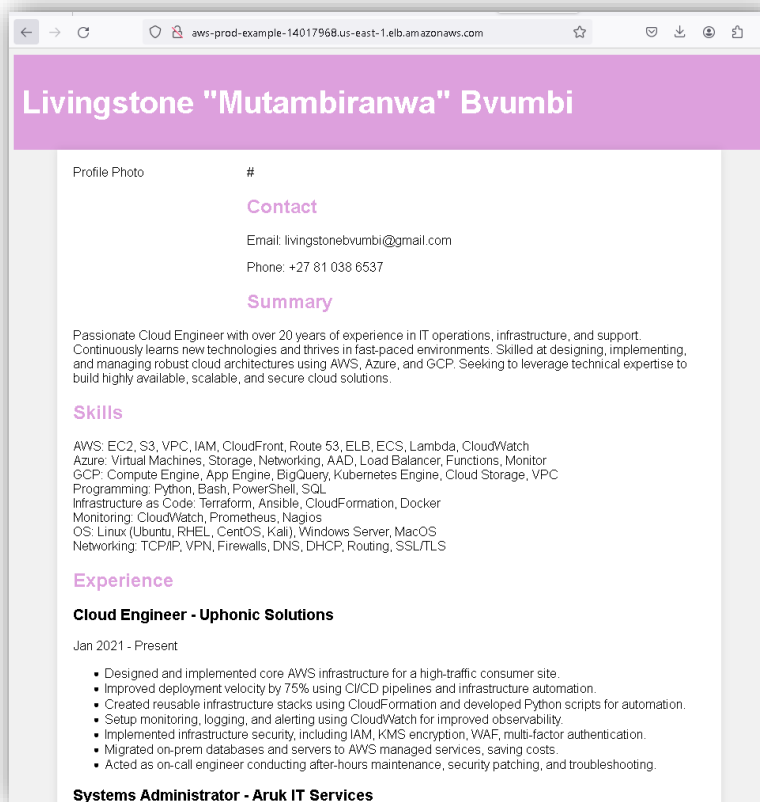
AI Prompts used to generate web files, index.html.

44.



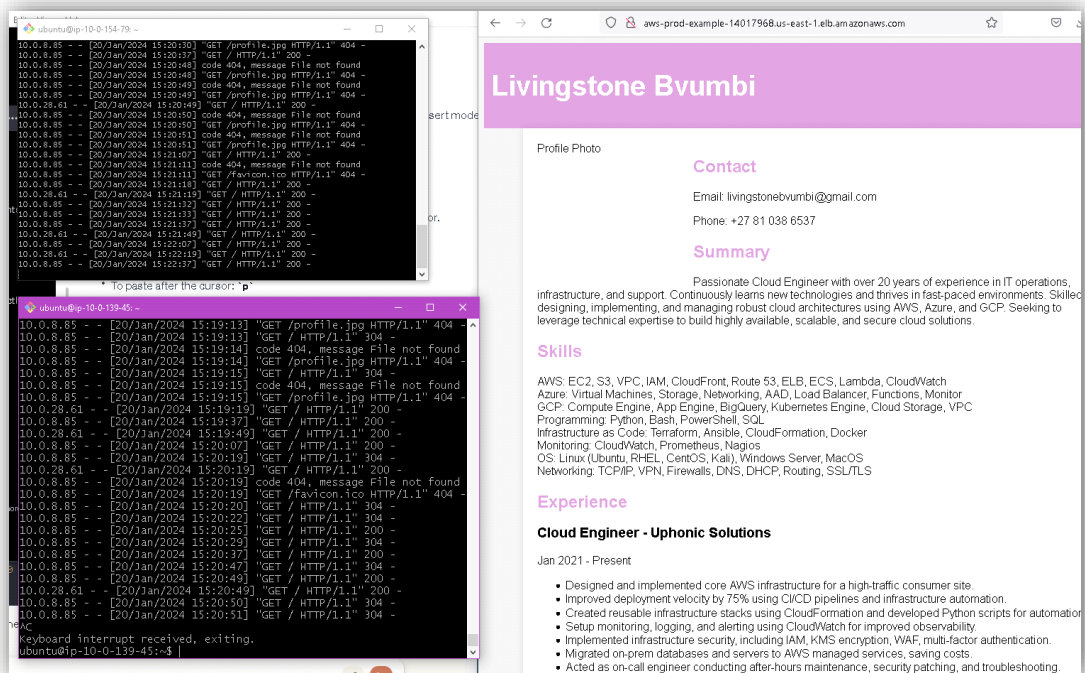
Creating and editing html file on Ubuntu virtual machine using vim editor and starting web server.

45.



Online Resume displaying on web server running on second private EC2 to demonstrate load-balancing, and multi-AZ feature of the distributed system architecture.

46.



ssh connections to two private EC2 web servers.