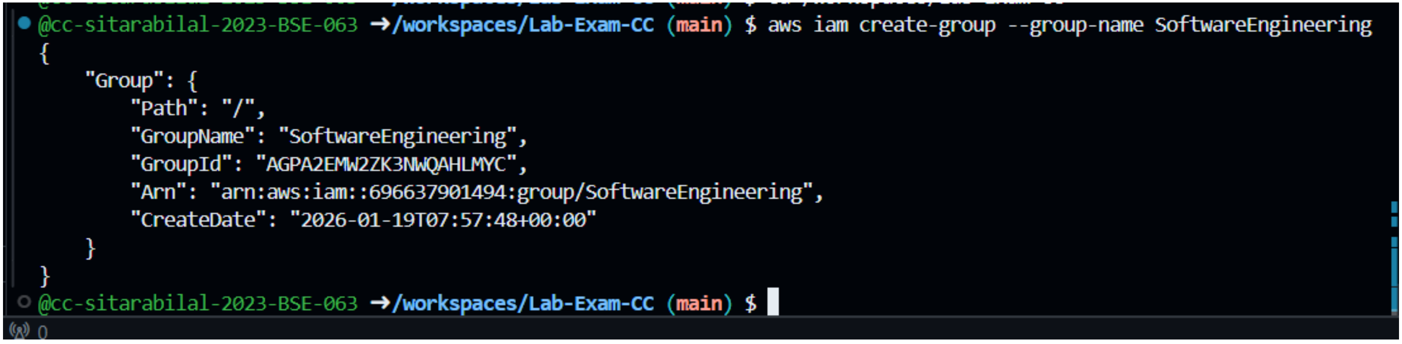
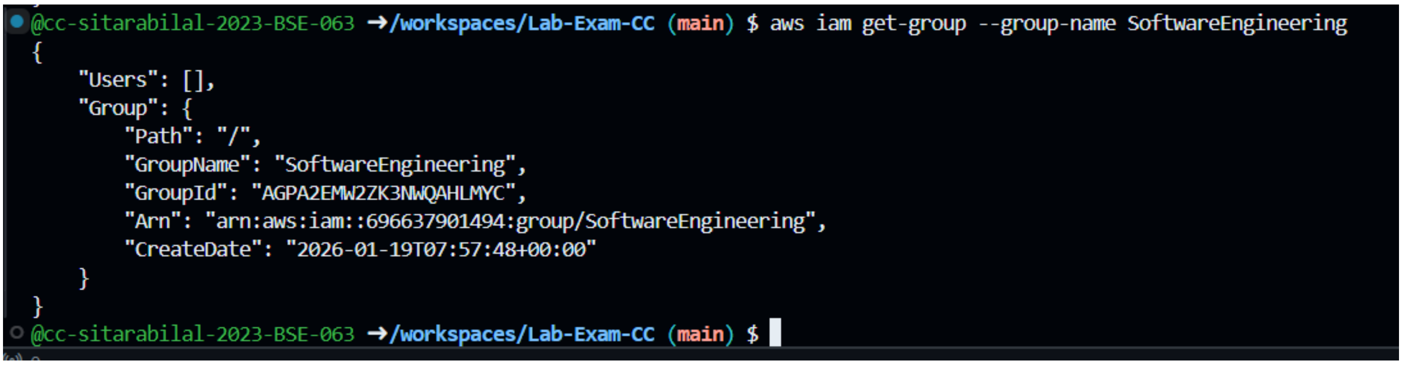
Sitara Bilal
2023-BSE-063
V-B

Lab Exam

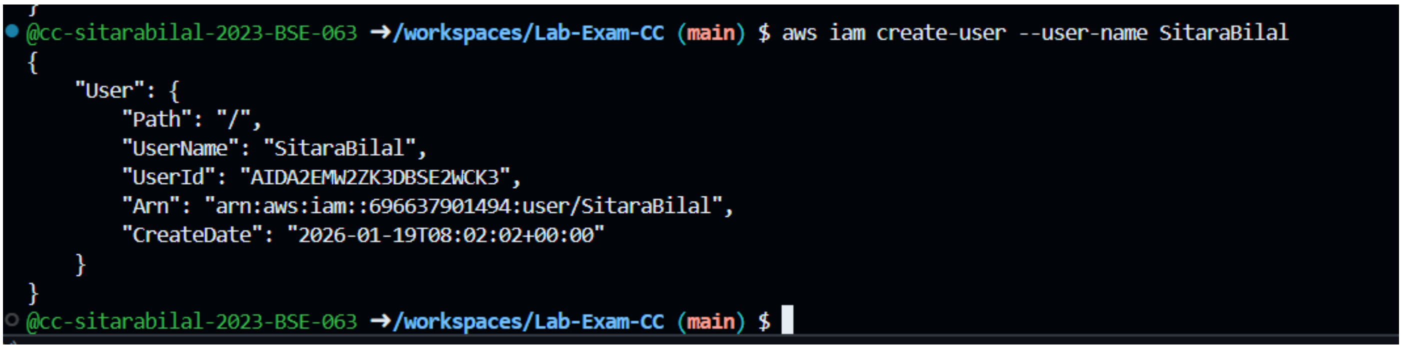
Q1 – AWS IAM Setup Using AWS CLI and Console Verification (10 marks)



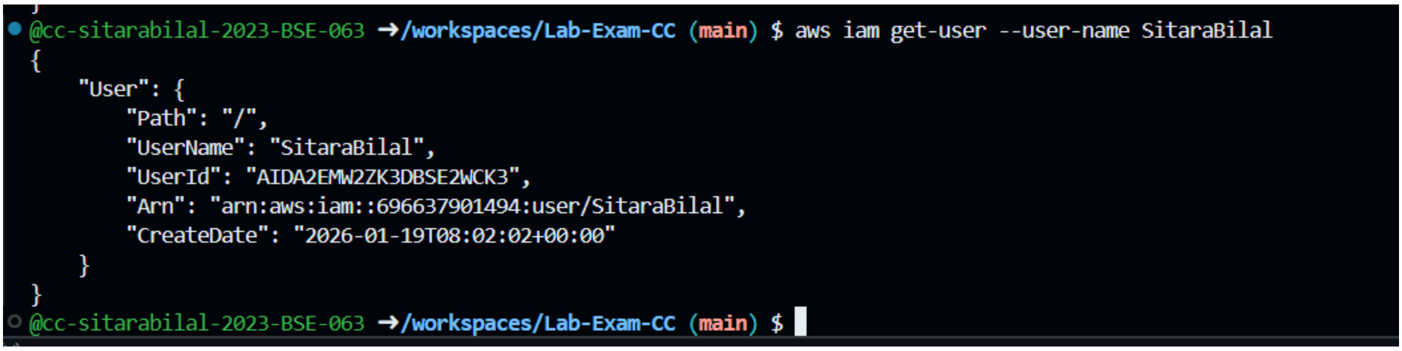
```
@cc-sitarabilal-2023-BSE-063 →/workspaces/Lab-Exam-CC (main) $ aws iam create-group --group-name SoftwareEngineering
{
    "Group": {
        "Path": "/",
        "GroupName": "SoftwareEngineering",
        "GroupId": "AGPA2EMW2ZK3NWQAHLMYC",
        "Arn": "arn:aws:iam::696637901494:group/SoftwareEngineering",
        "CreateDate": "2026-01-19T07:57:48+00:00"
    }
}
@cc-sitarabilal-2023-BSE-063 →/workspaces/Lab-Exam-CC (main) $
```



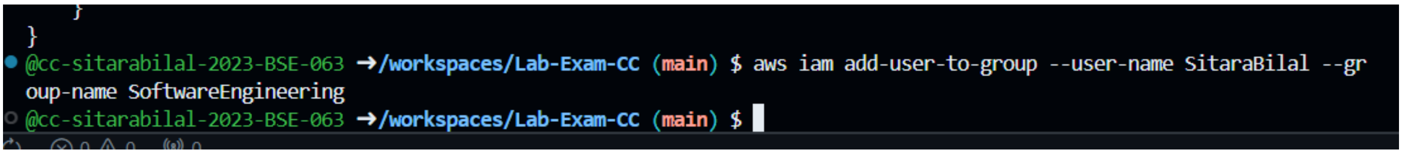
```
@cc-sitarabilal-2023-BSE-063 →/workspaces/Lab-Exam-CC (main) $ aws iam get-group --group-name SoftwareEngineering
{
    "Users": [],
    "Group": {
        "Path": "/",
        "GroupName": "SoftwareEngineering",
        "GroupId": "AGPA2EMW2ZK3NWQAHLMYC",
        "Arn": "arn:aws:iam::696637901494:group/SoftwareEngineering",
        "CreateDate": "2026-01-19T07:57:48+00:00"
    }
}
@cc-sitarabilal-2023-BSE-063 →/workspaces/Lab-Exam-CC (main) $
```



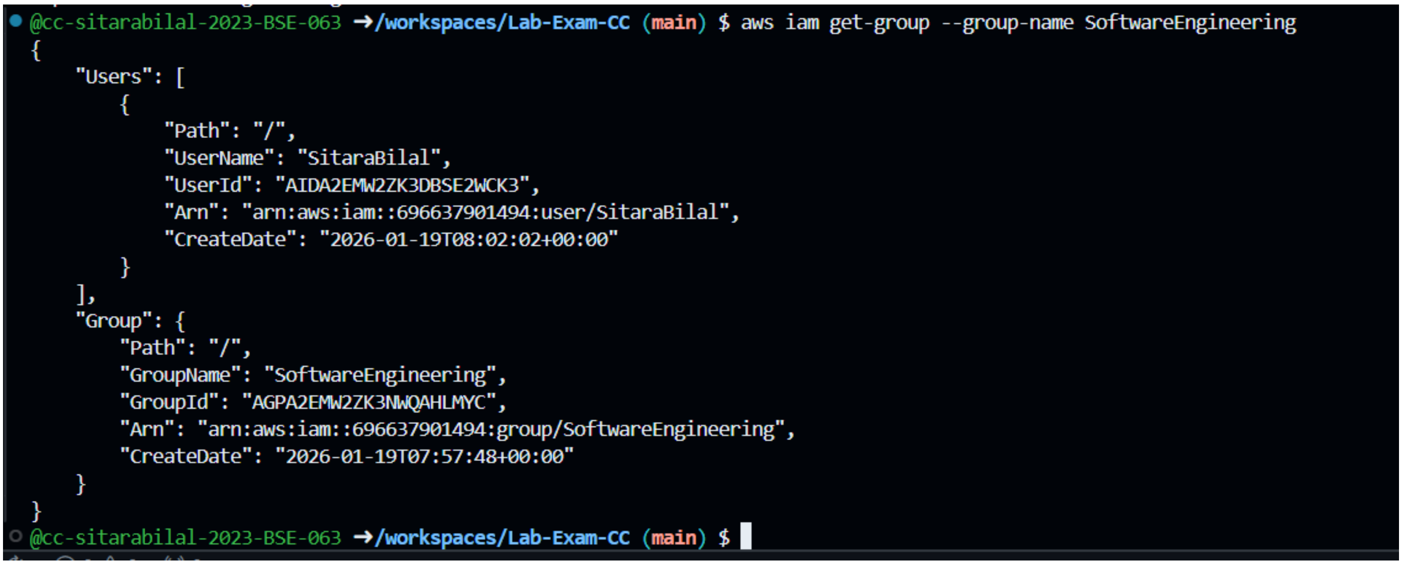
```
@cc-sitarabilal-2023-BSE-063 →/workspaces/Lab-Exam-CC (main) $ aws iam create-user --user-name SitaraBilal
{
    "User": {
        "Path": "/",
        "UserName": "SitaraBilal",
        "UserId": "AIDA2EMW2ZK3DBSE2WCK3",
        "Arn": "arn:aws:iam::696637901494:user/SitaraBilal",
        "CreateDate": "2026-01-19T08:02:02+00:00"
    }
}
@cc-sitarabilal-2023-BSE-063 →/workspaces/Lab-Exam-CC (main) $
```



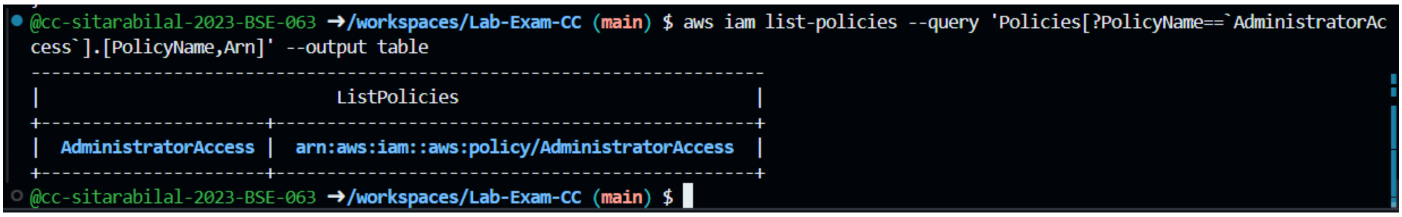
```
@cc-sitarabilal-2023-BSE-063 →/workspaces/Lab-Exam-CC (main) $ aws iam get-user --user-name SitaraBilal
{
    "User": {
        "Path": "/",
        "UserName": "SitaraBilal",
        "UserId": "AIDA2EMW2ZK3DBSE2WCK3",
        "Arn": "arn:aws:iam::696637901494:user/SitaraBilal",
        "CreateDate": "2026-01-19T08:02:02+00:00"
    }
}
@cc-sitarabilal-2023-BSE-063 →/workspaces/Lab-Exam-CC (main) $
```



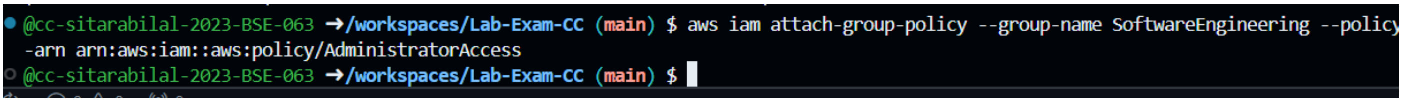
```
}
@cc-sitarabilal-2023-BSE-063 →/workspaces/Lab-Exam-CC (main) $ aws iam add-user-to-group --user-name SitaraBilal --gr
oup-name SoftwareEngineering
@cc-sitarabilal-2023-BSE-063 →/workspaces/Lab-Exam-CC (main) $
```



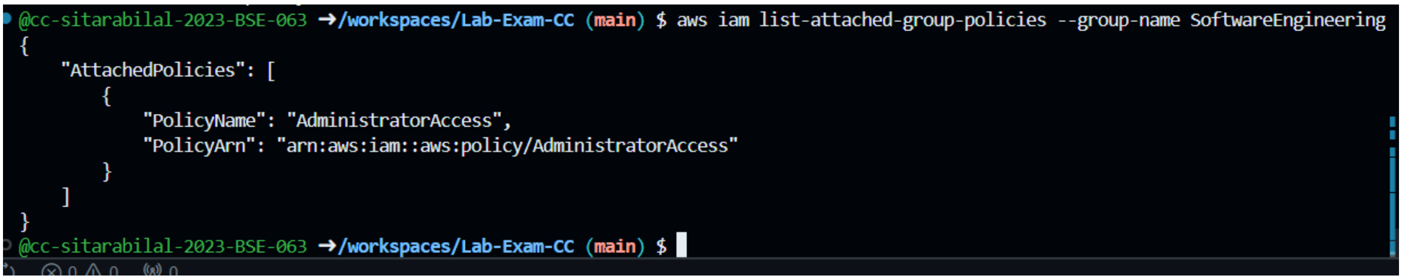
```
@cc-sitarabilal-2023-BSE-063 →/workspaces/Lab-Exam-CC (main) $ aws iam get-group --group-name SoftwareEngineering
{
    "Users": [
        {
            "Path": "/",
            "UserName": "SitaraBilal",
            "UserId": "AIDA2EMW2ZK3DBSE2WCK3",
            "Arn": "arn:aws:iam::696637901494:user/SitaraBilal",
            "CreateDate": "2026-01-19T08:02:02+00:00"
        }
    ],
    "Group": {
        "Path": "/",
        "GroupName": "SoftwareEngineering",
        "GroupId": "AGPA2EMW2ZK3NWQAHLMYC",
        "Arn": "arn:aws:iam::696637901494:group/SoftwareEngineering",
        "CreateDate": "2026-01-19T07:57:48+00:00"
    }
}
@cc-sitarabilal-2023-BSE-063 →/workspaces/Lab-Exam-CC (main) $
```



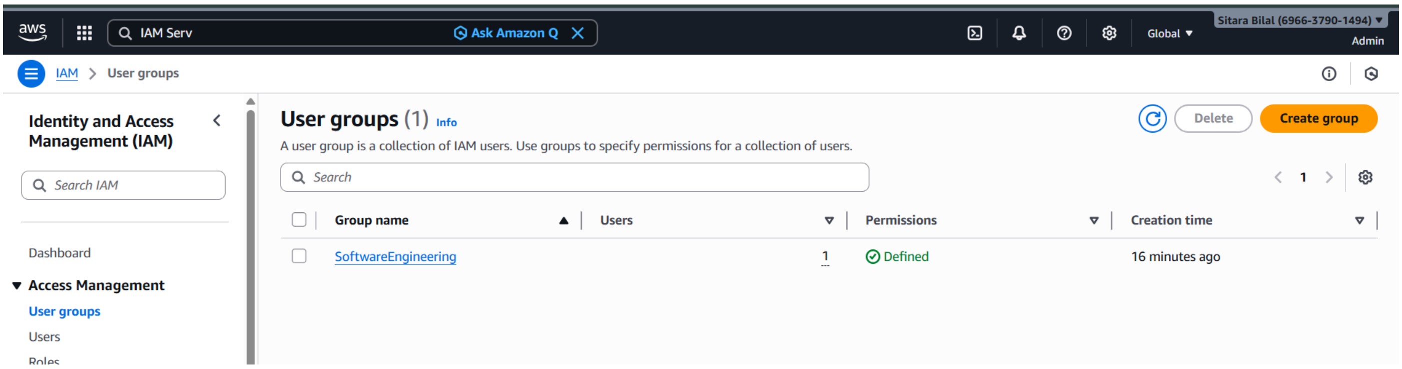
```
@cc-sitarabilal-2023-BSE-063 →/workspaces/Lab-Exam-CC (main) $ aws iam list-policies --query 'Policies[?PolicyName==`AdministratorAc
cess`].[PolicyName,Arn]' --output table
---------------------------------------------------------------------------
|                              ListPolicies                               |
+----------------------+--------------------------------------------------+
|  AdministratorAccess |  arn:aws:iam::aws:policy/AdministratorAccess     |
+----------------------+--------------------------------------------------+
@cc-sitarabilal-2023-BSE-063 →/workspaces/Lab-Exam-CC (main) $
```



```
@cc-sitarabilal-2023-BSE-063 →/workspaces/Lab-Exam-CC (main) $ aws iam attach-group-policy --group-name SoftwareEngineering --policy
-arn arn:aws:iam::aws:policy/AdministratorAccess
@cc-sitarabilal-2023-BSE-063 →/workspaces/Lab-Exam-CC (main) $
```



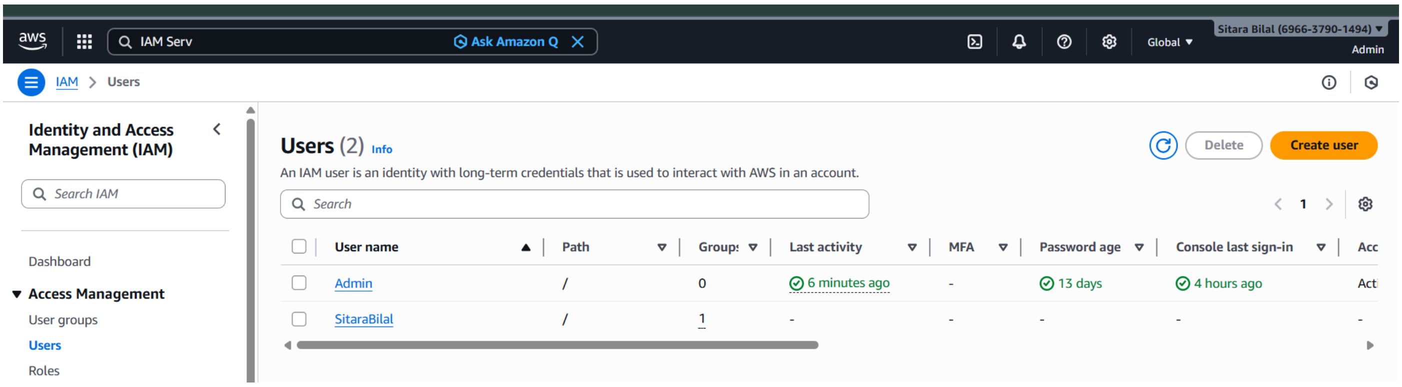
```
@cc-sitarabilal-2023-BSE-063 →/workspaces/Lab-Exam-CC (main) $ aws iam list-attached-group-policies --group-name SoftwareEngineering
{
    "AttachedPolicies": [
        {
            "PolicyName": "AdministratorAccess",
            "PolicyArn": "arn:aws:iam::aws:policy/AdministratorAccess"
        }
    ]
}
@cc-sitarabilal-2023-BSE-063 →/workspaces/Lab-Exam-CC (main) $
```



User groups (1) Info

A user group is a collection of IAM users. Use groups to specify permissions for a collection of users.

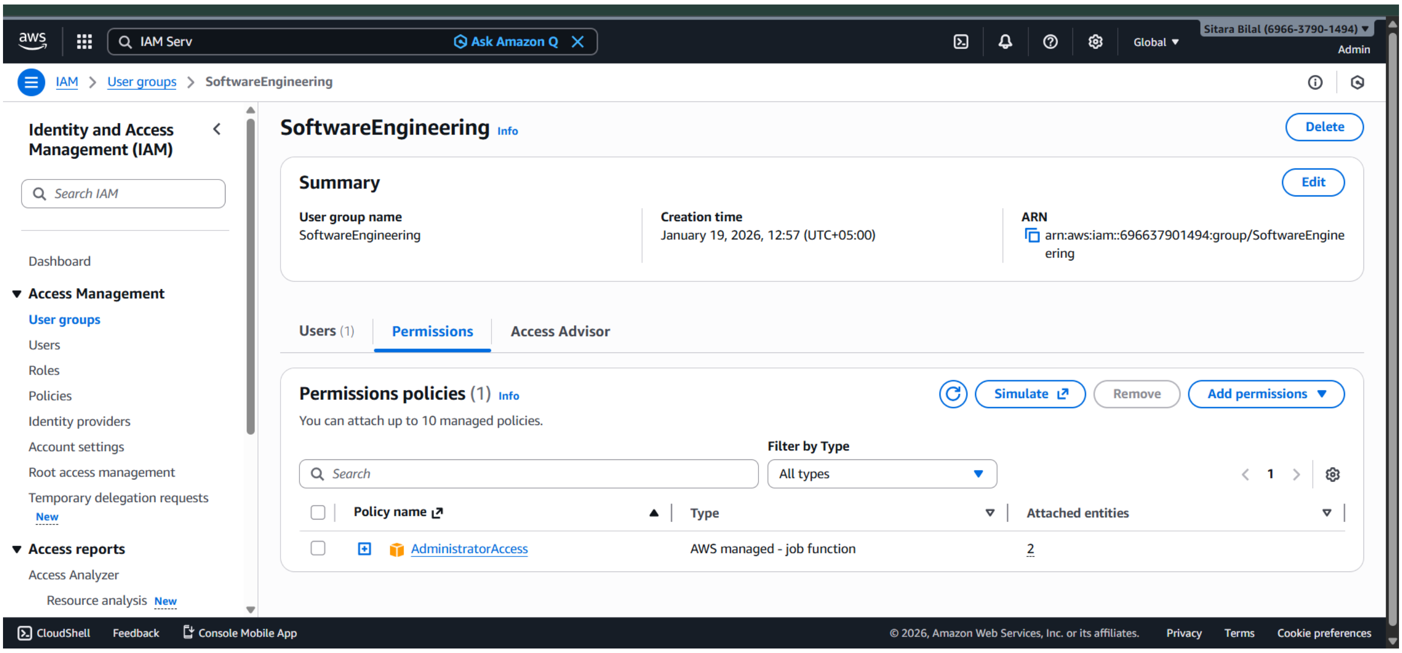
□	Group name	Users	Permissions	Creation time
□	SoftwareEngineering	1	✓ Defined	16 minutes ago



Users (2) Info

An IAM user is an identity with long-term credentials that is used to interact with AWS in an account.

□	User name	Path	Group:	Last activity	MFA	Password age	Console last sign-in	Acc
□	Admin	/	0	✓ 6 minutes ago	-	✓ 13 days	✓ 4 hours ago	Act
□	SitaraBilal	/	1	-	-	-	-	-



SoftwareEngineering Info

Summary

User group name: SoftwareEngineering

Creation time: January 19, 2026, 12:57 (UTC+05:00)

ARN: arn:aws:iam::696637901494:group/SoftwareEngineering

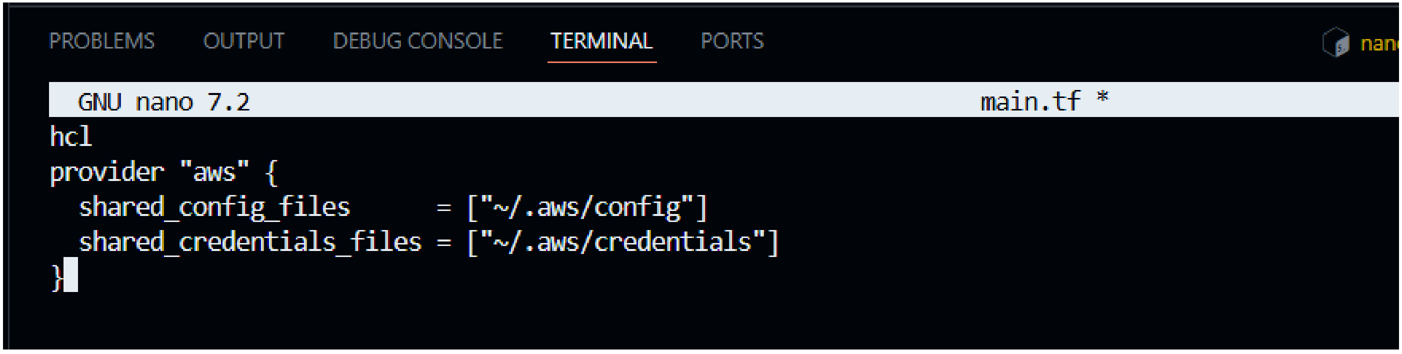
Permissions policies (1) Info

You can attach up to 10 managed policies.

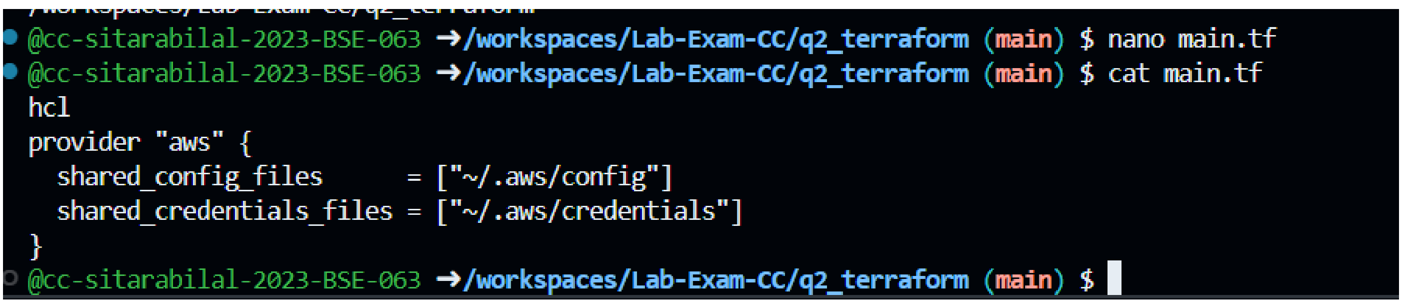
Filter by Type: All types

Policy name	Type	Attached entities
AdministratorAccess	AWS managed - job function	2

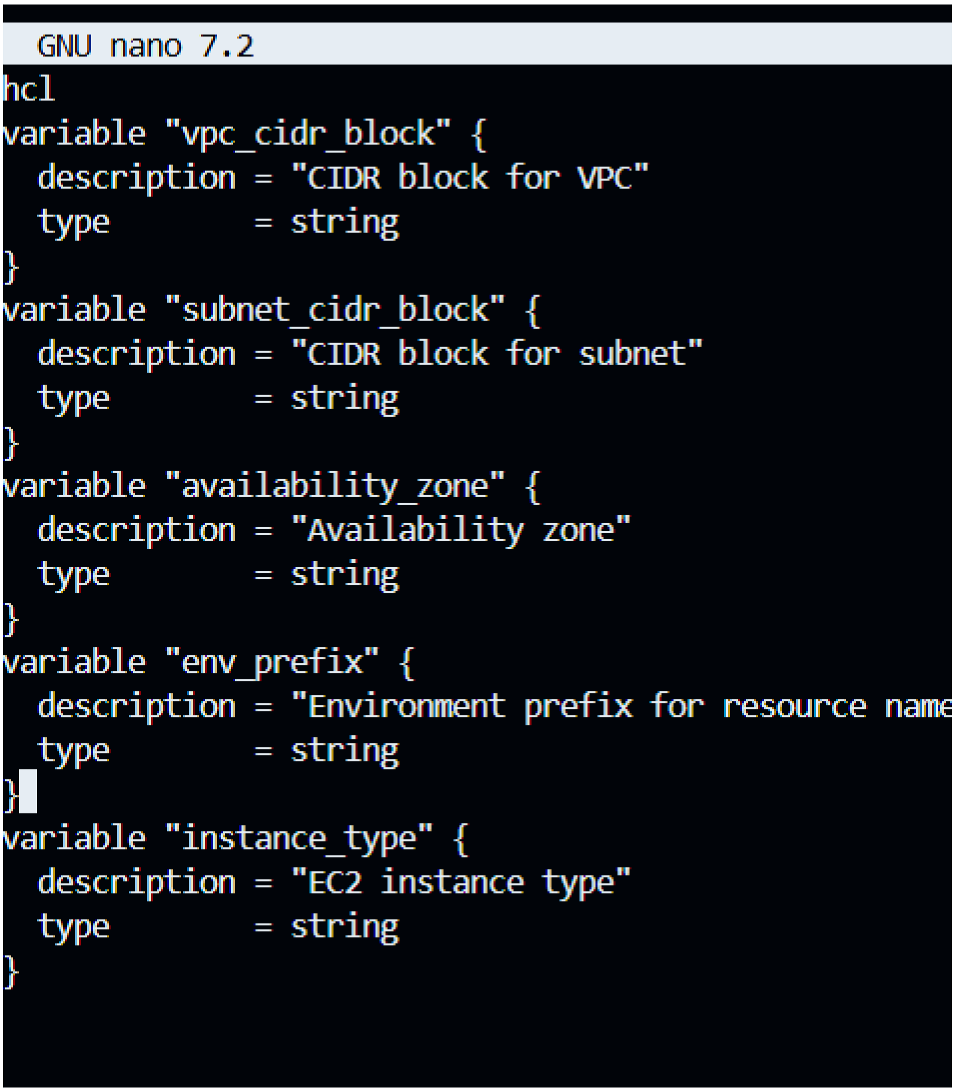
Q2 – Terraform Lab: Simple AWS Environment with Nginx over HTTPS (30 marks)



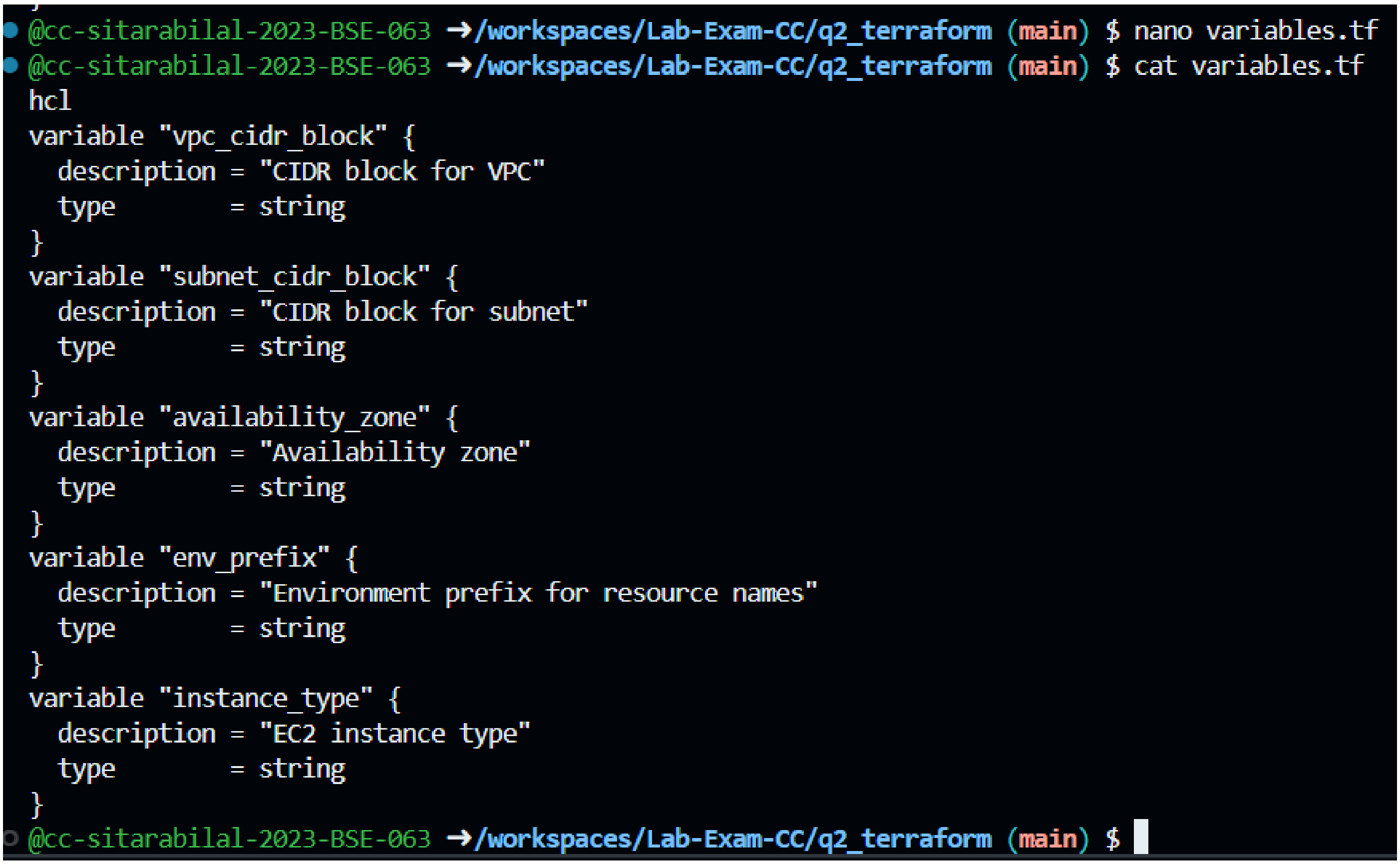
```
 GNU nano 7.2                                      main.tf *
hcl
provider "aws" {
  shared_config_files      = ["~/.aws/config"]
  shared_credentials_files = ["~/.aws/credentials"]
}
```



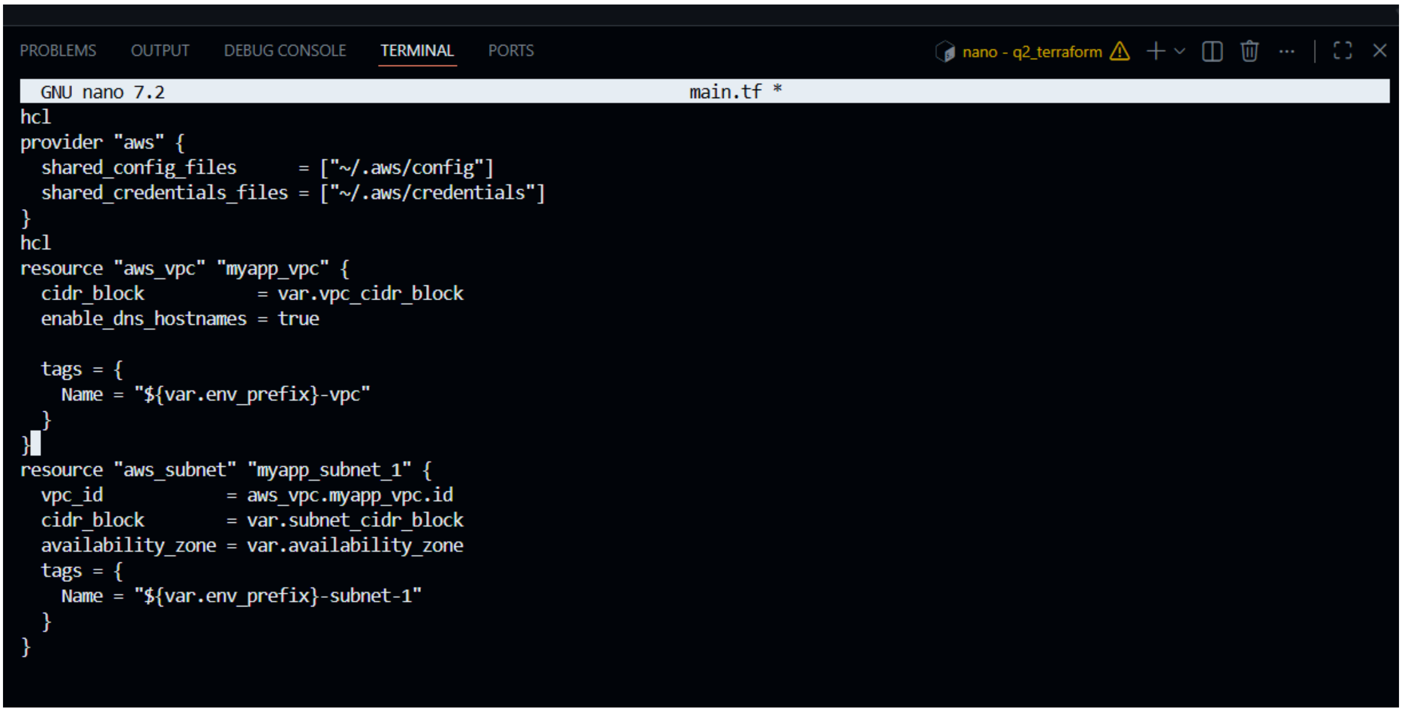
```
/workspaces/Lab-Exam-CC/q2_terraform
@cc-sitarabilal-2023-BSE-063 ➜/workspaces/Lab-Exam-CC/q2_terraform (main) $ nano main.tf
@cc-sitarabilal-2023-BSE-063 ➜/workspaces/Lab-Exam-CC/q2_terraform (main) $ cat main.tf
hcl
provider "aws" {
  shared_config_files      = ["~/.aws/config"]
  shared_credentials_files = ["~/.aws/credentials"]
}
@cc-sitarabilal-2023-BSE-063 ➜/workspaces/Lab-Exam-CC/q2_terraform (main) $ 
```



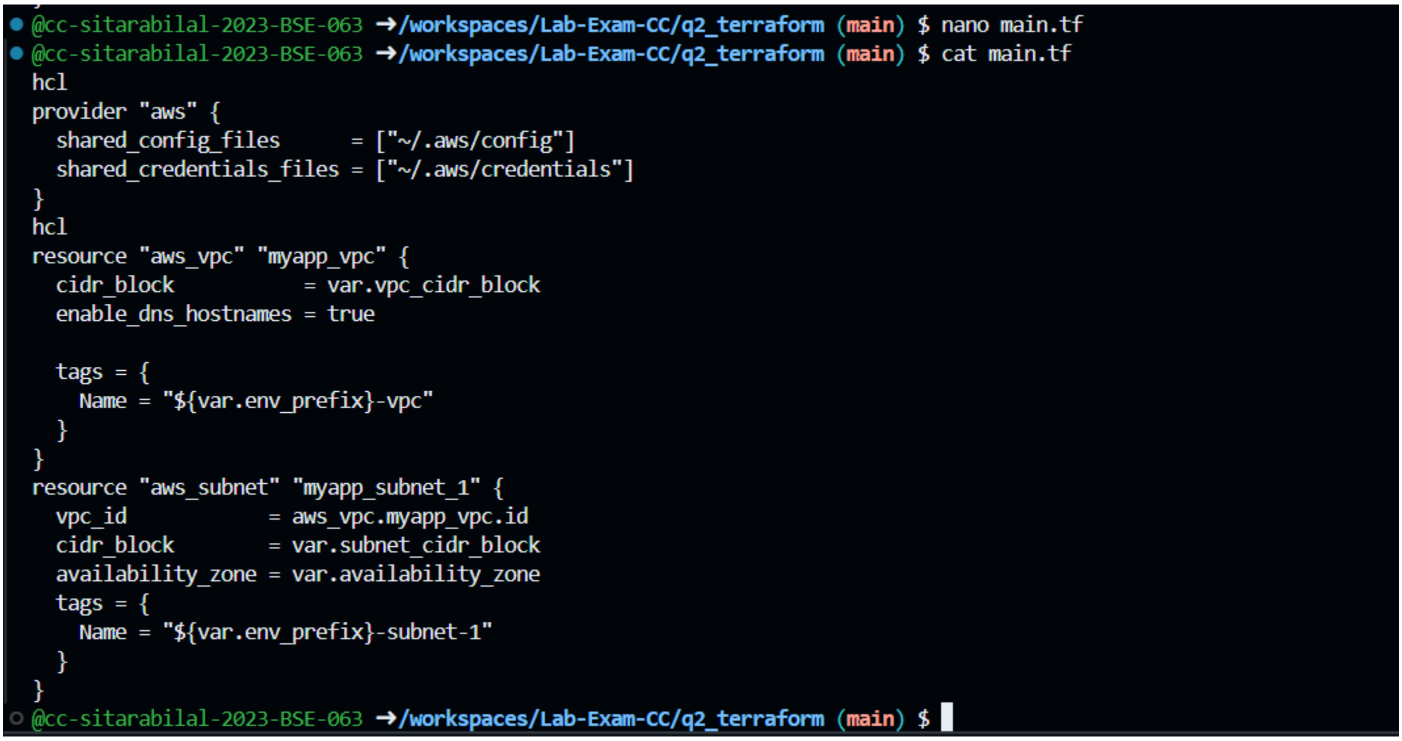
```
  GNU nano 7.2
hcl
variable "vpc_cidr_block" {
  description = "CIDR block for VPC"
  type        = string
}
variable "subnet_cidr_block" {
  description = "CIDR block for subnet"
  type        = string
}
variable "availability_zone" {
  description = "Availability zone"
  type        = string
}
variable "env_prefix" {
  description = "Environment prefix for resource name
  type        = string
}
variable "instance_type" {
  description = "EC2 instance type"
  type        = string
}
```



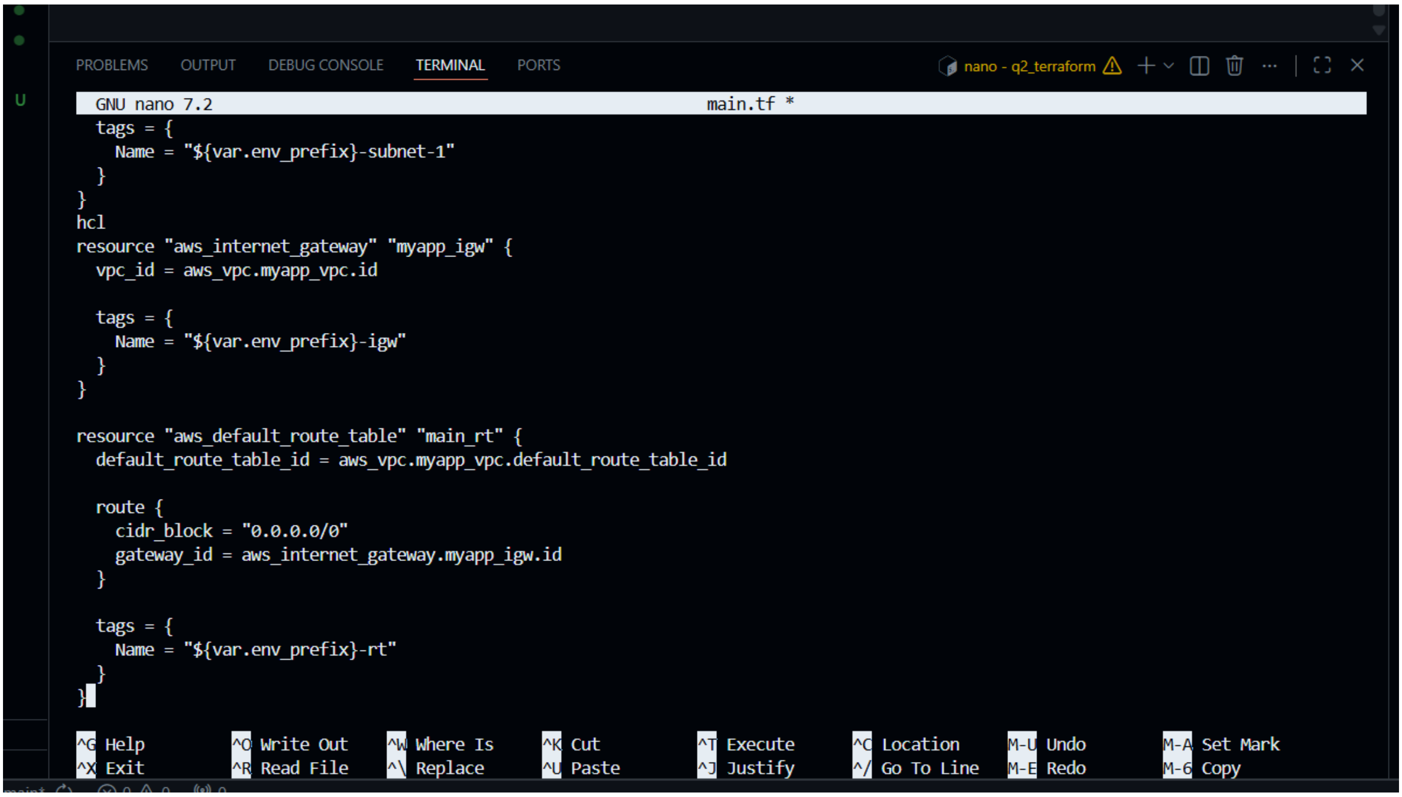
```
@cc-sitarabilal-2023-BSE-063 ➜ /workspaces/Lab-Exam-CC/q2_terraform (main) $ nano variables.tf
@cc-sitarabilal-2023-BSE-063 ➜ /workspaces/Lab-Exam-CC/q2_terraform (main) $ cat variables.tf
hcl
variable "vpc_cidr_block" {
  description = "CIDR block for VPC"
  type        = string
}
variable "subnet_cidr_block" {
  description = "CIDR block for subnet"
  type        = string
}
variable "availability_zone" {
  description = "Availability zone"
  type        = string
}
variable "env_prefix" {
  description = "Environment prefix for resource names"
  type        = string
}
variable "instance_type" {
  description = "EC2 instance type"
  type        = string
}
@cc-sitarabilal-2023-BSE-063 ➜ /workspaces/Lab-Exam-CC/q2_terraform (main) $
```



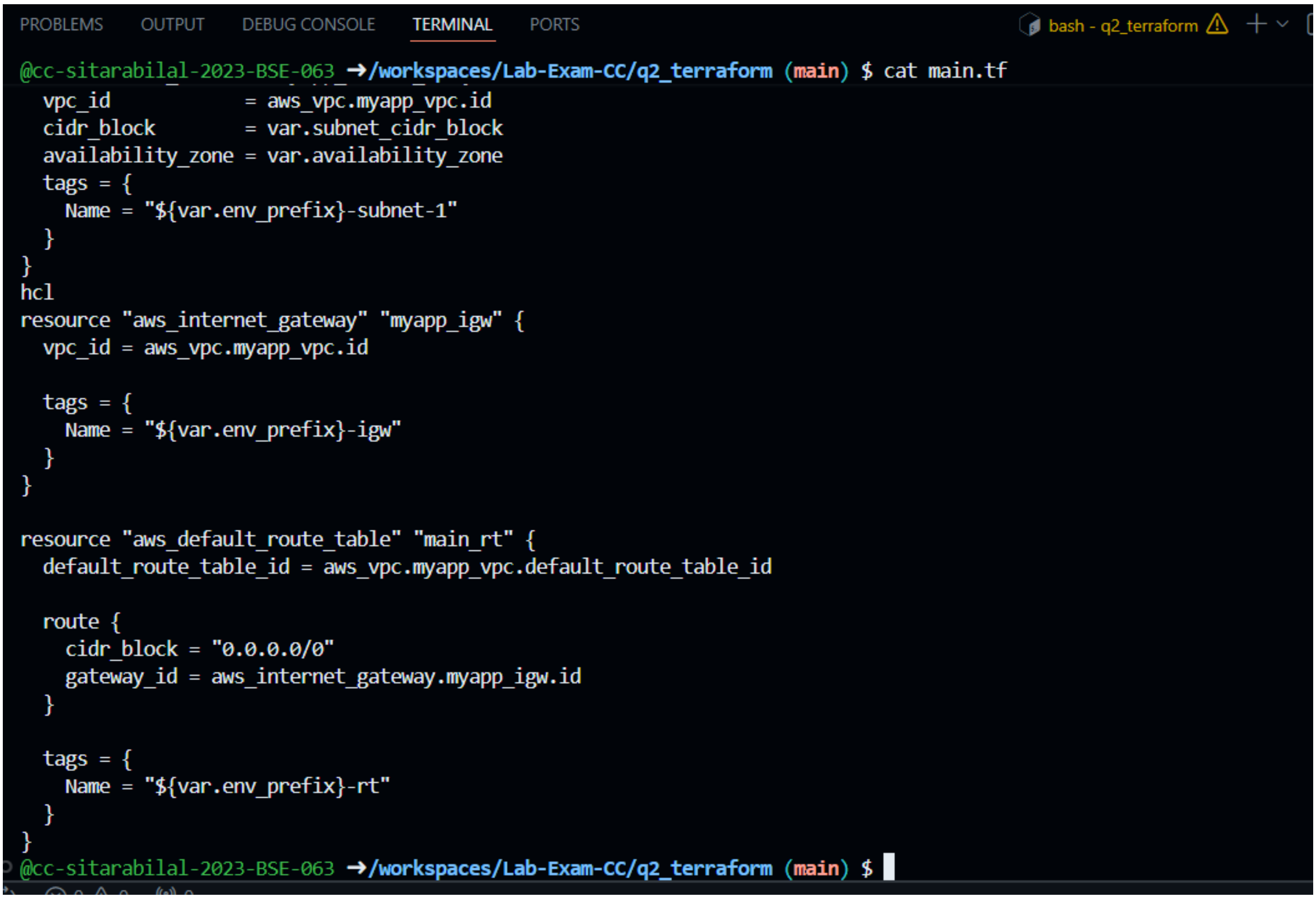
```
  GNU nano 7.2                                          main.tf *
hcl
provider "aws" {
  shared_config_files      = ["~/.aws/config"]
  shared_credentials_files = ["~/.aws/credentials"]
}
hcl
resource "aws_vpc" "myapp_vpc" {
  cidr_block           = var.vpc_cidr_block
  enable_dns_hostnames = true

  tags = {
    Name = "${var.env_prefix}-vpc"
  }
}
resource "aws_subnet" "myapp_subnet_1" {
  vpc_id            = aws_vpc.myapp_vpc.id
  cidr_block        = var.subnet_cidr_block
  availability_zone = var.availability_zone
  tags = {
    Name = "${var.env_prefix}-subnet-1"
  }
}
```



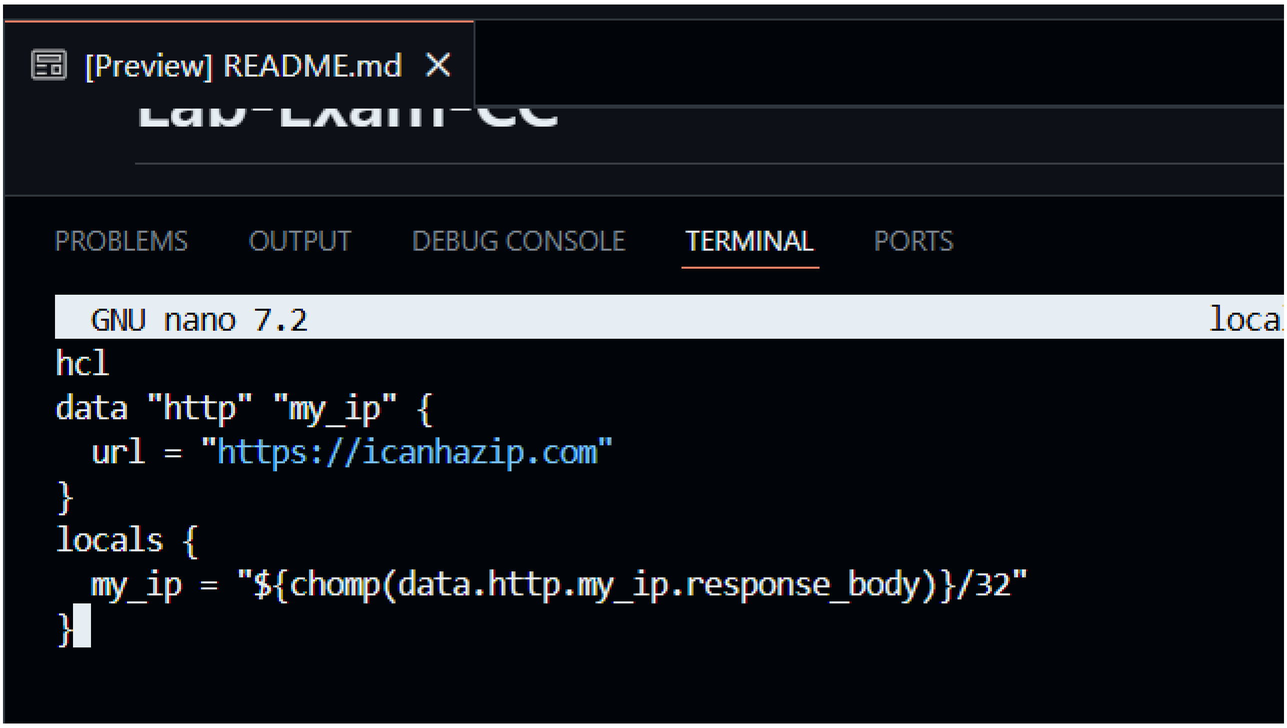
```
@cc-sitarabilal-2023-BSE-063 ➜/workspaces/Lab-Exam-CC/q2_terraform (main) $ nano main.tf
@cc-sitarabilal-2023-BSE-063 ➜/workspaces/Lab-Exam-CC/q2_terraform (main) $ cat main.tf
hcl
provider "aws" {
  shared_config_files      = ["~/.aws/config"]
  shared_credentials_files = ["~/.aws/credentials"]
}
hcl
resource "aws_vpc" "myapp_vpc" {
  cidr_block           = var.vpc_cidr_block
  enable_dns_hostnames = true

  tags = {
    Name = "${var.env_prefix}-vpc"
  }
}
resource "aws_subnet" "myapp_subnet_1" {
  vpc_id            = aws_vpc.myapp_vpc.id
  cidr_block        = var.subnet_cidr_block
  availability_zone = var.availability_zone
  tags = {
    Name = "${var.env_prefix}-subnet-1"
  }
}
@cc-sitarabilal-2023-BSE-063 ➜/workspaces/Lab-Exam-CC/q2_terraform (main) $
```



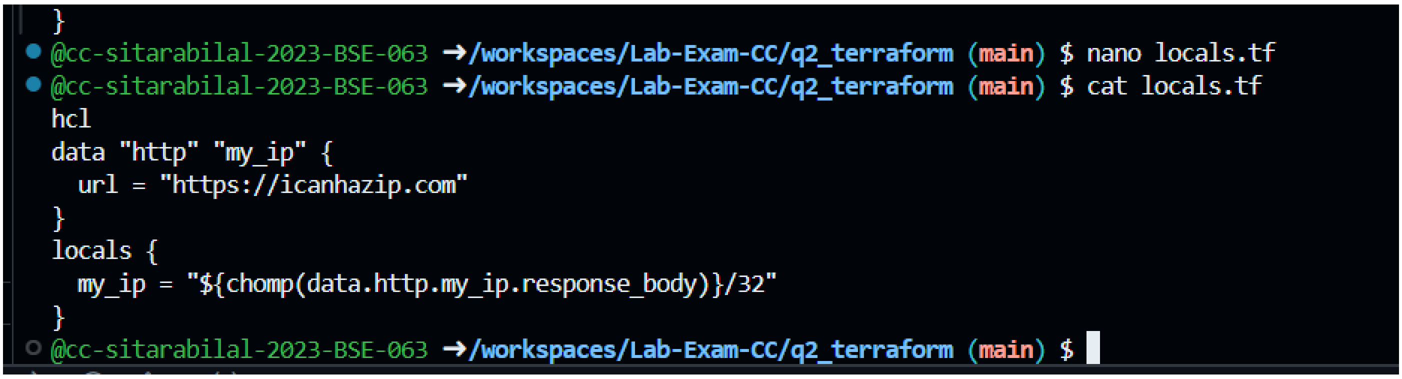
```
  GNU nano 7.2                                         main.tf *
  tags = {
    Name = "${var.env_prefix}-subnet-1"
  }
}
hcl
resource "aws_internet_gateway" "myapp_igw" {
  vpc_id = aws_vpc.myapp_vpc.id

  tags = {
    Name = "${var.env_prefix}-igw"
  }
}

resource "aws_default_route_table" "main_rt" {
  default_route_table_id = aws_vpc.myapp_vpc.default_route_table_id

  route {
    cidr_block = "0.0.0.0/0"
    gateway_id = aws_internet_gateway.myapp_igw.id
  }

  tags = {
    Name = "${var.env_prefix}-rt"
  }
}

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



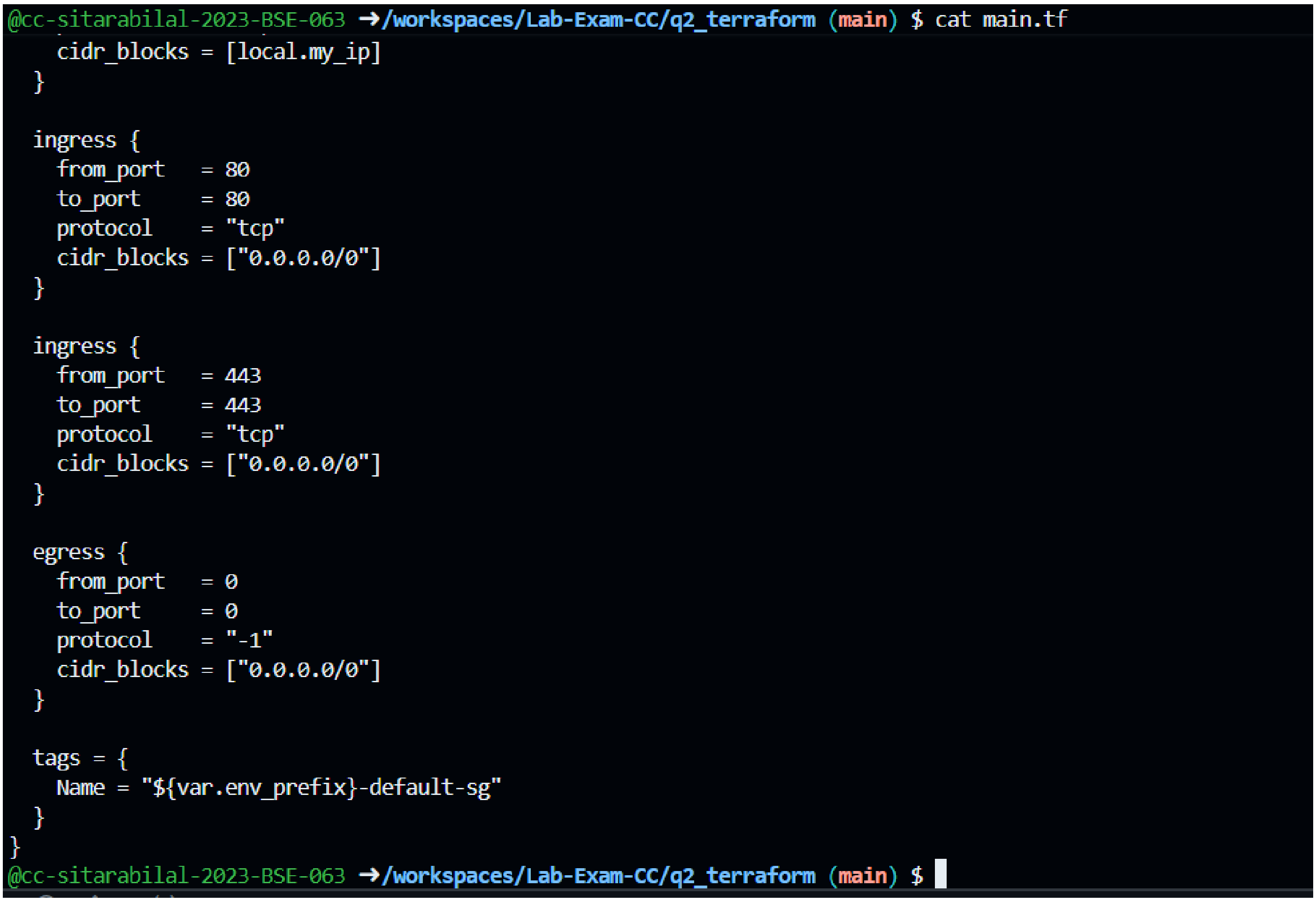
```
@cc-sitarabilal-2023-BSE-063 ➜/workspaces/Lab-Exam-CC/q2_terraform (main) $ cat main.tf
  vpc_id            = aws_vpc.myapp_vpc.id
  cidr_block        = var.subnet_cidr_block
  availability_zone = var.availability_zone
  tags = {
    Name = "${var.env_prefix}-subnet-1"
  }
}
hcl
resource "aws_internet_gateway" "myapp_igw" {
  vpc_id = aws_vpc.myapp_vpc.id

  tags = {
    Name = "${var.env_prefix}-igw"
  }
}

resource "aws_default_route_table" "main_rt" {
  default_route_table_id = aws_vpc.myapp_vpc.default_route_table_id

  route {
    cidr_block = "0.0.0.0/0"
    gateway_id = aws_internet_gateway.myapp_igw.id
  }

  tags = {
    Name = "${var.env_prefix}-rt"
  }
}
@cc-sitarabilal-2023-BSE-063 ➜/workspaces/Lab-Exam-CC/q2_terraform (main) $
```



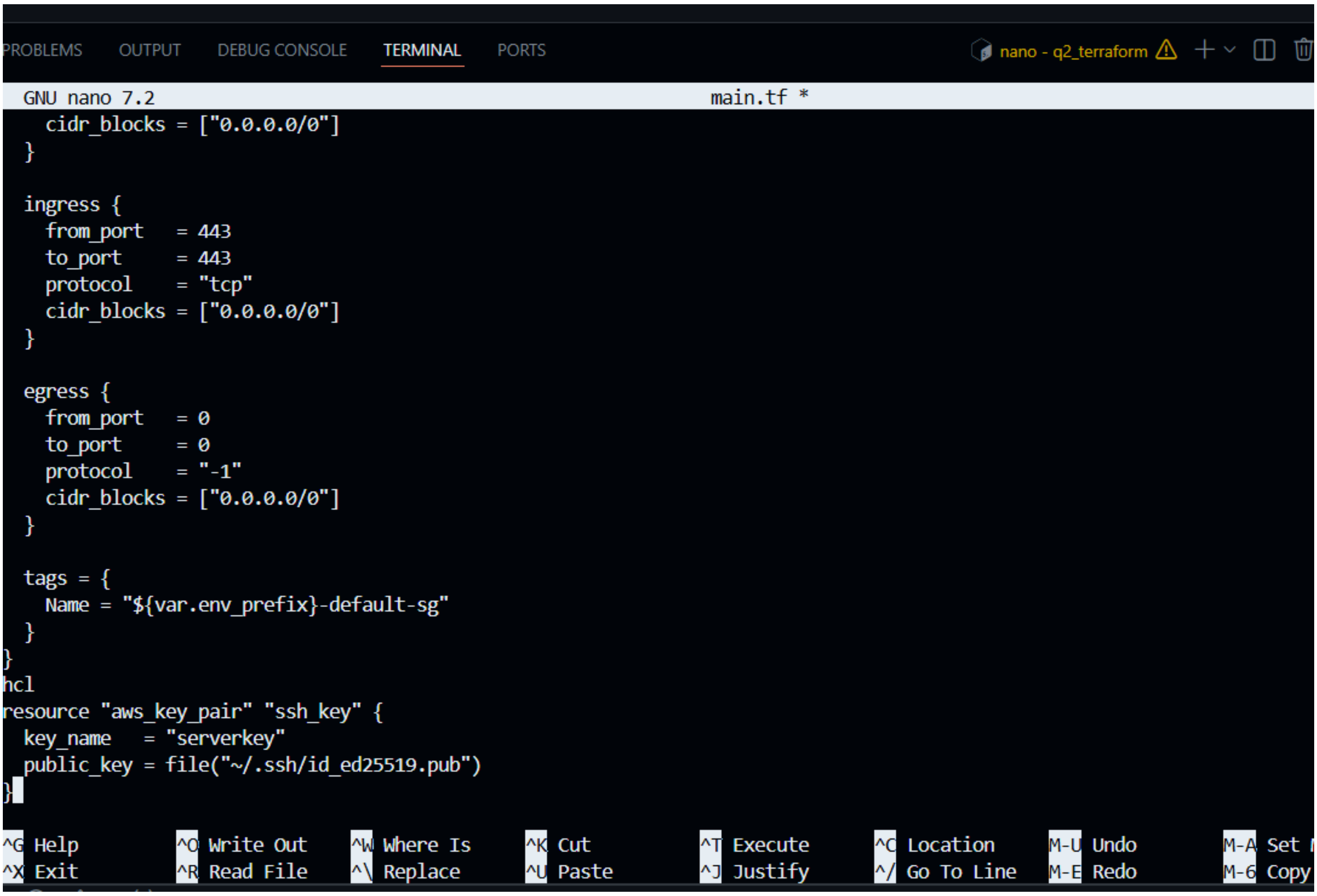
```
  GNU nano 7.2                                                        loca
hcl
data "http" "my_ip" {
  url = "https://icanhazip.com"
}
locals {
  my_ip = "${chomp(data.http.my_ip.response_body)}/32"
}
```



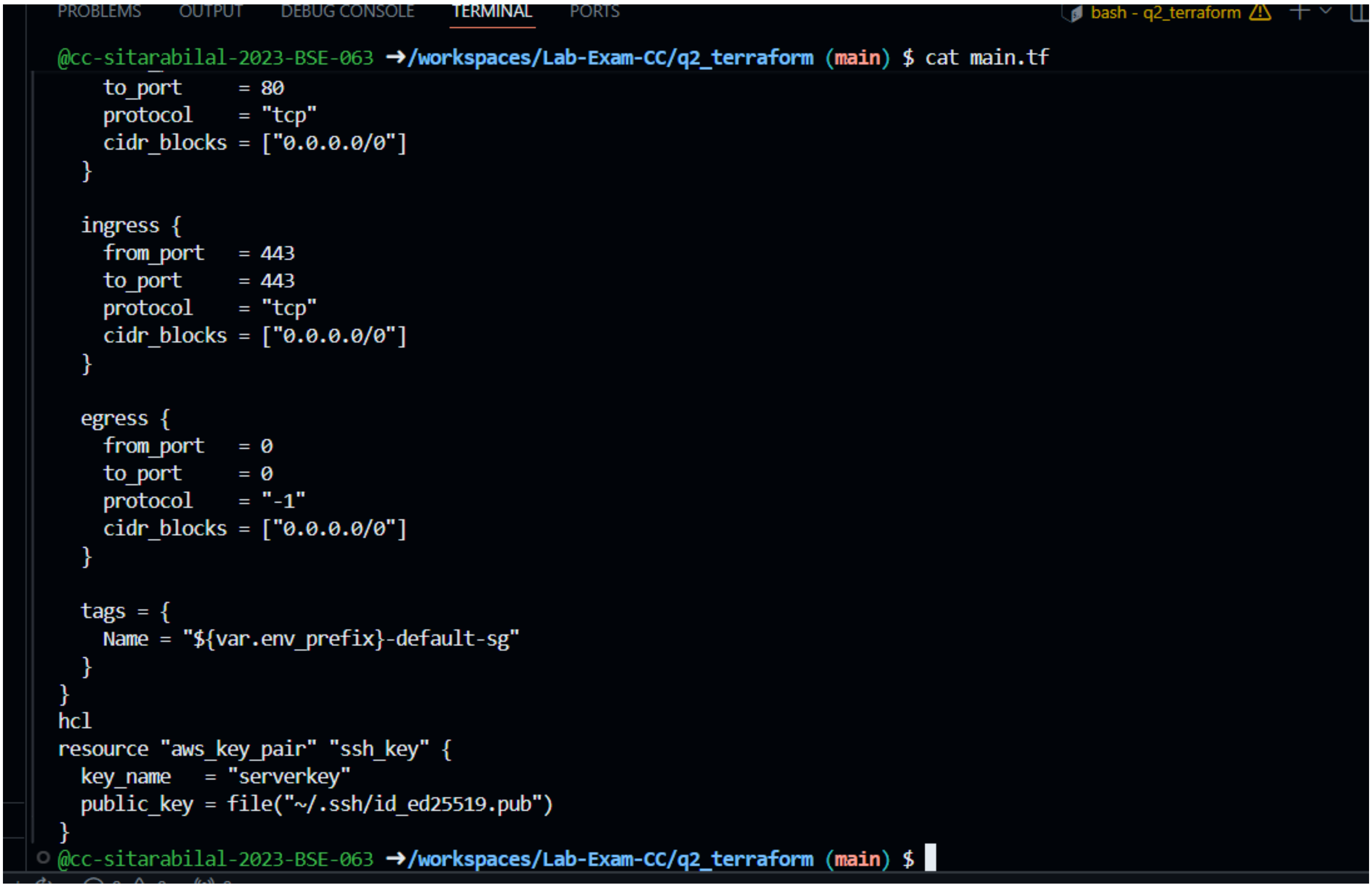
```
}
● @cc-sitarabilal-2023-BSE-063 ➜ /workspaces/Lab-Exam-CC/q2_terraform (main) $ nano locals.tf
● @cc-sitarabilal-2023-BSE-063 ➜ /workspaces/Lab-Exam-CC/q2_terraform (main) $ cat locals.tf
hcl
data "http" "my_ip" {
  url = "https://icanhazip.com"
}
locals {
  my_ip = "${chomp(data.http.my_ip.response_body)}/32"
}
○ @cc-sitarabilal-2023-BSE-063 ➜ /workspaces/Lab-Exam-CC/q2_terraform (main) $
```



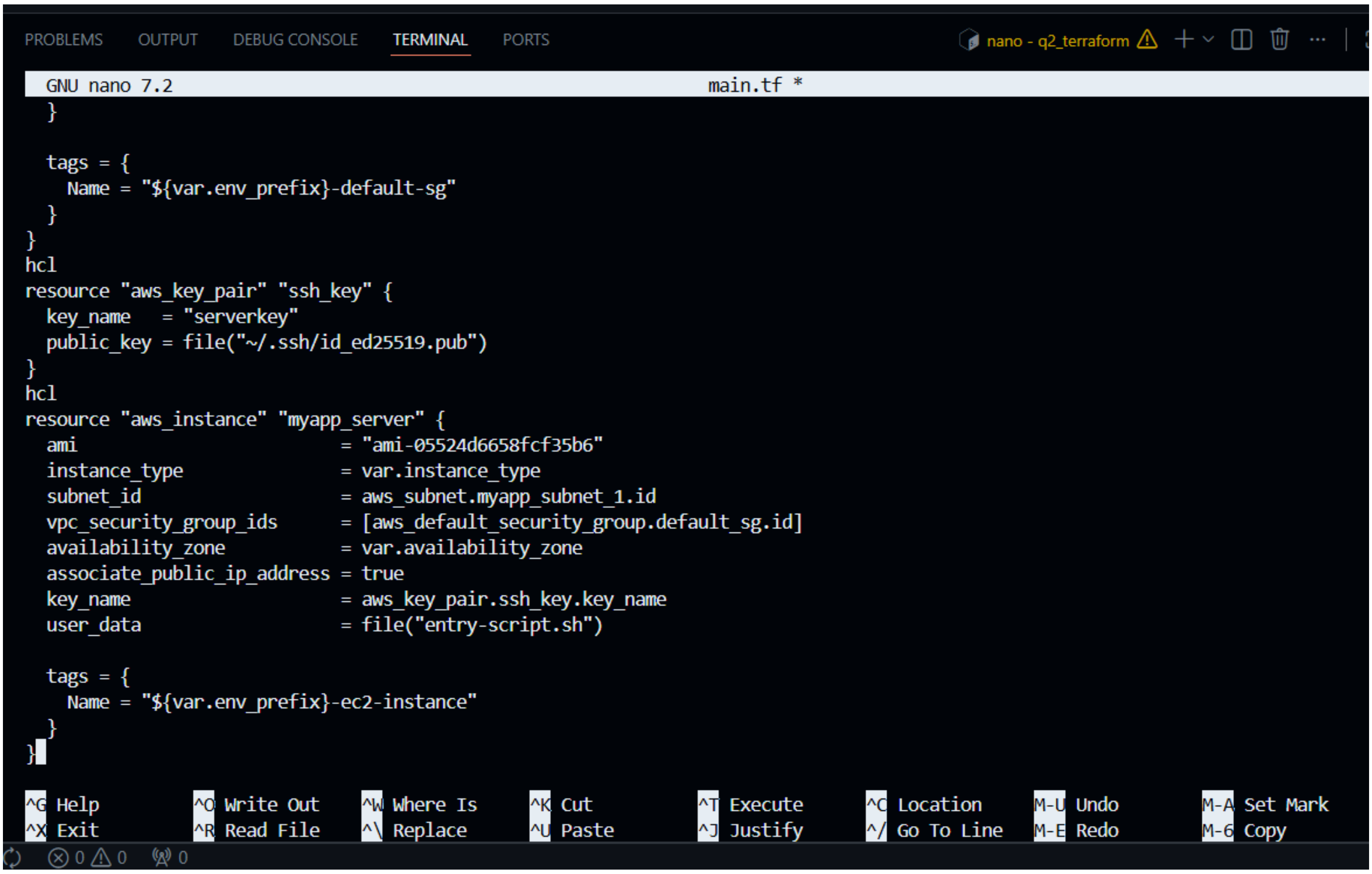
```
@cc-sitarabilal-2023-BSE-063 →/workspaces/Lab-Exam-CC/q2_terraform (main) $ cat main.tf
    cidr_blocks = [local.my_ip]
  }

  ingress {
    from_port   = 80
    to_port     = 80
    protocol    = "tcp"
    cidr_blocks = ["0.0.0.0/0"]
  }

  ingress {
    from_port   = 443
    to_port     = 443
    protocol    = "tcp"
    cidr_blocks = ["0.0.0.0/0"]
  }

  egress {
    from_port   = 0
    to_port     = 0
    protocol    = "-1"
    cidr_blocks = ["0.0.0.0/0"]
  }

  tags = {
    Name = "${var.env_prefix}-default-sg"
  }
}
@cc-sitarabilal-2023-BSE-063 →/workspaces/Lab-Exam-CC/q2_terraform (main) $
```



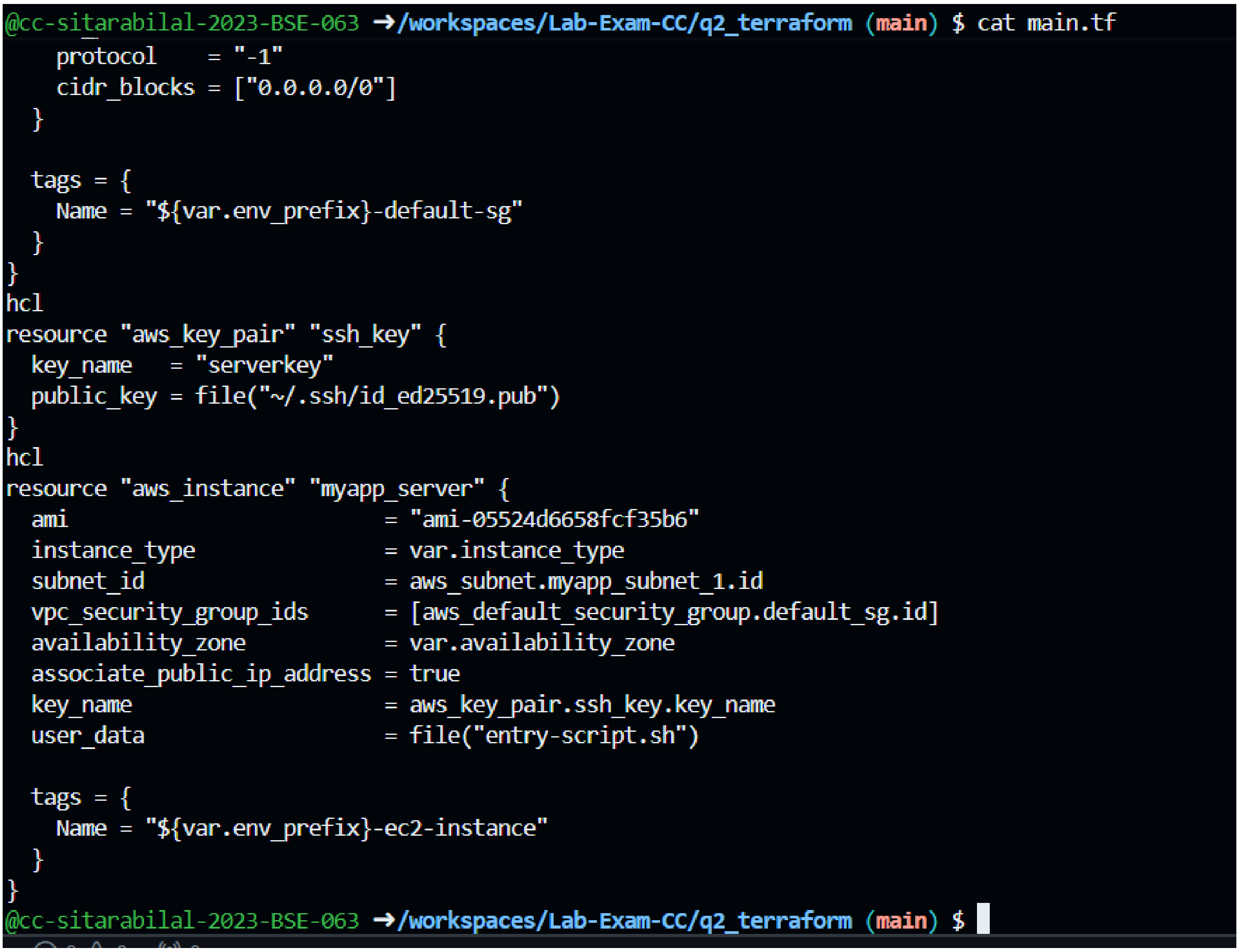
```
  GNU nano 7.2                              main.tf *
    cidr_blocks = ["0.0.0.0/0"]
  }

  ingress {
    from_port   = 443
    to_port     = 443
    protocol    = "tcp"
    cidr_blocks = ["0.0.0.0/0"]
  }

  egress {
    from_port   = 0
    to_port     = 0
    protocol    = "-1"
    cidr_blocks = ["0.0.0.0/0"]
  }

  tags = {
    Name = "${var.env_prefix}-default-sg"
  }
}
hcl
resource "aws_key_pair" "ssh_key" {
  key_name   = "serverkey"
  public_key = file("~/.ssh/id_ed25519.pub")
}

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



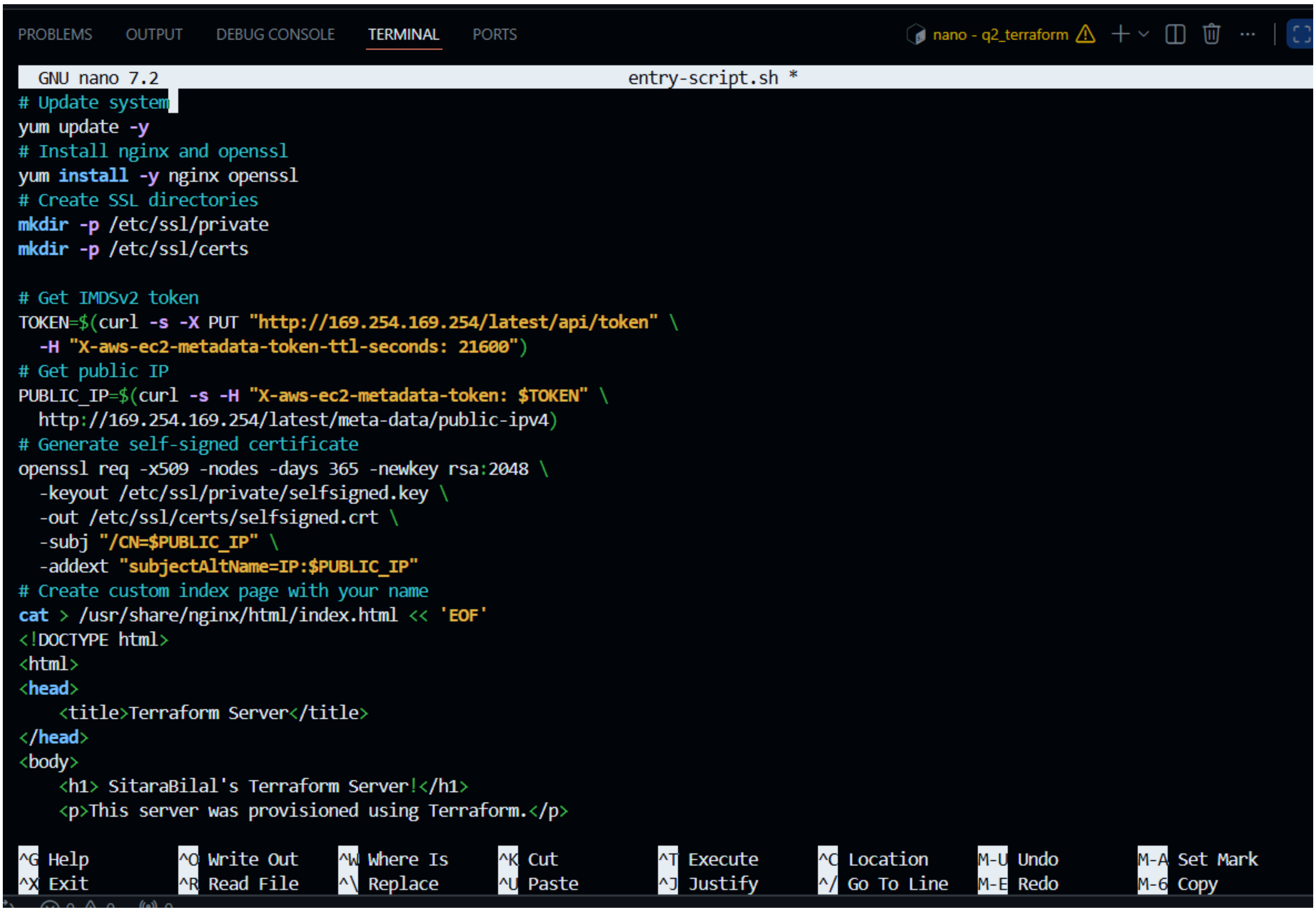
```
@cc-sitarabilal-2023-BSE-063 ➜ /workspaces/Lab-Exam-CC/q2_terraform (main) $ cat main.tf
    to_port     = 80
    protocol    = "tcp"
    cidr_blocks = ["0.0.0.0/0"]
  }

  ingress {
    from_port   = 443
    to_port     = 443
    protocol    = "tcp"
    cidr_blocks = ["0.0.0.0/0"]
  }

  egress {
    from_port   = 0
    to_port     = 0
    protocol    = "-1"
    cidr_blocks = ["0.0.0.0/0"]
  }

  tags = {
    Name = "${var.env_prefix}-default-sg"
  }
}
hcl
resource "aws_key_pair" "ssh_key" {
  key_name   = "serverkey"
  public_key = file("~/.ssh/id_ed25519.pub")
}
@cc-sitarabilal-2023-BSE-063 ➜ /workspaces/Lab-Exam-CC/q2_terraform (main) $ 
```



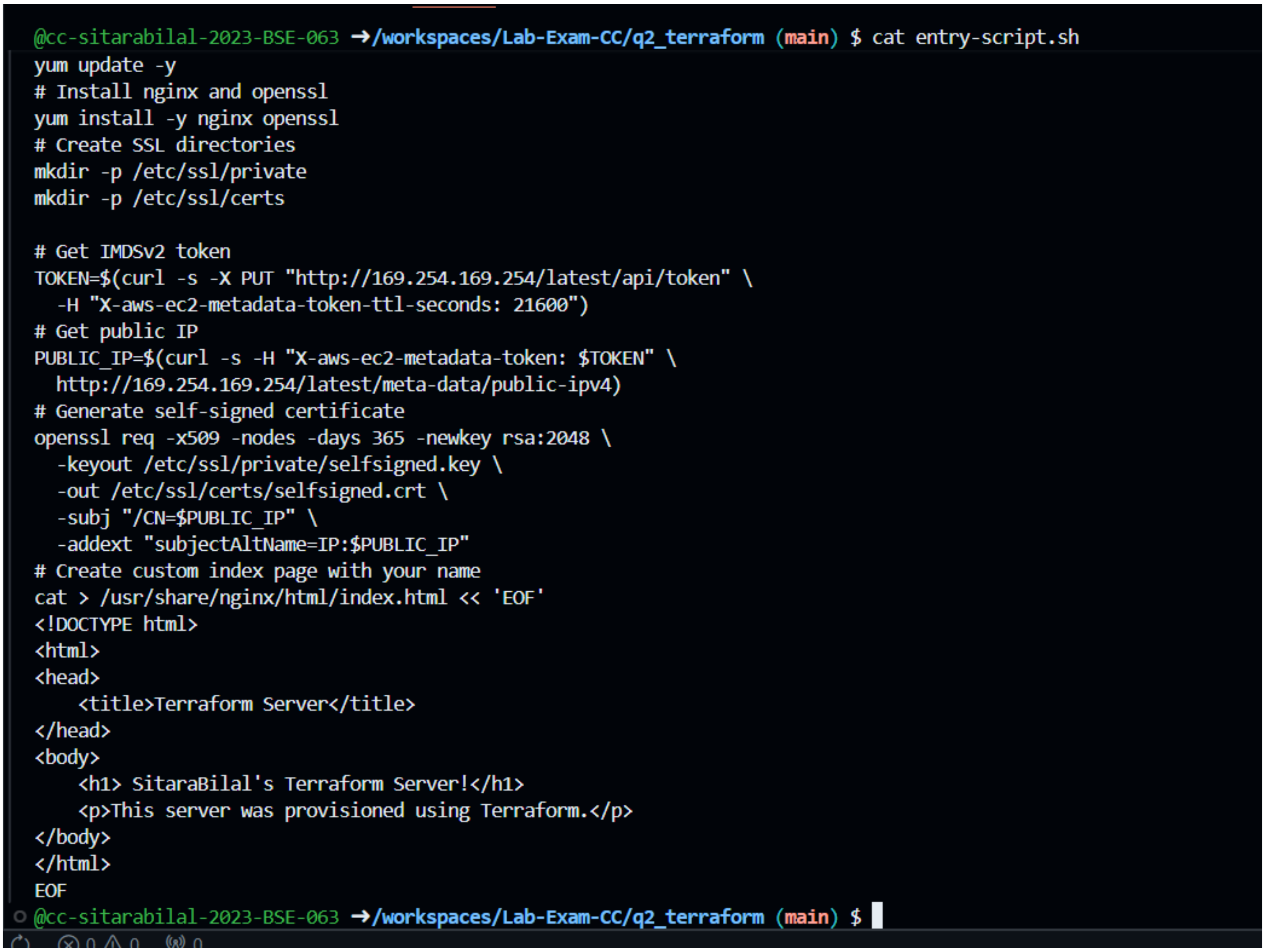
```
  GNU nano 7.2                                  main.tf *
  }

  tags = {
    Name = "${var.env_prefix}-default-sg"
  }
}
hcl
resource "aws_key_pair" "ssh_key" {
  key_name   = "serverkey"
  public_key = file("~/.ssh/id_ed25519.pub")
}
hcl
resource "aws_instance" "myapp_server" {
  ami                         = "ami-05524d6658fcf35b6"
  instance_type               = var.instance_type
  subnet_id                   = aws_subnet.myapp_subnet_1.id
  vpc_security_group_ids      = [aws_default_security_group.default_sg.id]
  availability_zone           = var.availability_zone
  associate_public_ip_address = true
  key_name                    = aws_key_pair.ssh_key.key_name
  user_data                   = file("entry-script.sh")

  tags = {
    Name = "${var.env_prefix}-ec2-instance"
  }
}

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



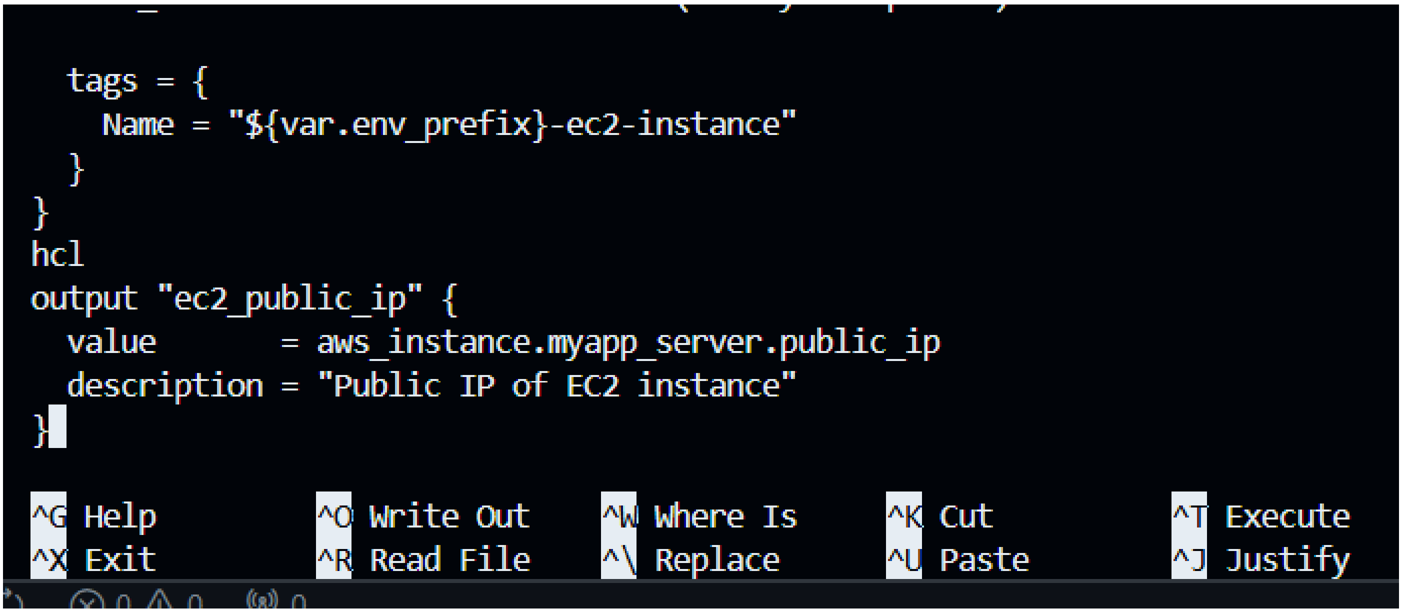
```
@cc-sitarabilal-2023-BSE-063 ➜/workspaces/Lab-Exam-CC/q2_terraform (main) $ cat main.tf
    protocol    = "-1"
    cidr_blocks = ["0.0.0.0/0"]
  }

  tags = {
    Name = "${var.env_prefix}-default-sg"
  }
}
hcl
resource "aws_key_pair" "ssh_key" {
  key_name   = "serverkey"
  public_key = file("~/.ssh/id_ed25519.pub")
}
hcl
resource "aws_instance" "myapp_server" {
  ami                         = "ami-05524d6658fcf35b6"
  instance_type               = var.instance_type
  subnet_id                   = aws_subnet.myapp_subnet_1.id
  vpc_security_group_ids      = [aws_default_security_group.default_sg.id]
  availability_zone           = var.availability_zone
  associate_public_ip_address = true
  key_name                    = aws_key_pair.ssh_key.key_name
  user_data                   = file("entry-script.sh")

  tags = {
    Name = "${var.env_prefix}-ec2-instance"
  }
}
@cc-sitarabilal-2023-BSE-063 ➜/workspaces/Lab-Exam-CC/q2_terraform (main) $
```



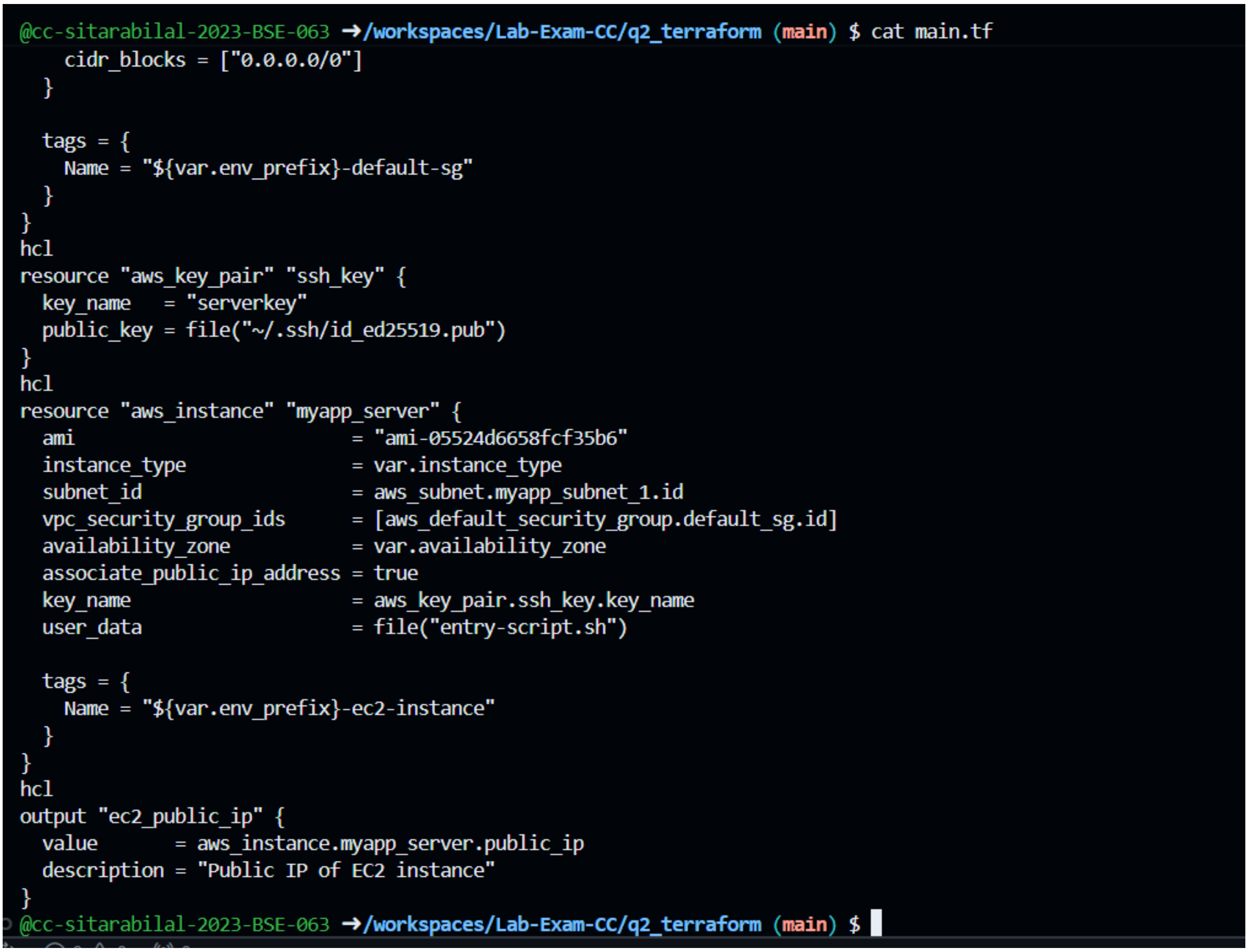
```
  GNU nano 7.2                            entry-script.sh *
# Update system
yum update -y
# Install nginx and openssl
yum install -y nginx openssl
# Create SSL directories
mkdir -p /etc/ssl/private
mkdir -p /etc/ssl/certs

# Get IMDSv2 token
TOKEN=$(curl -s -X PUT "http://169.254.169.254/latest/api/token" \
  -H "X-aws-ec2-metadata-token-ttl-seconds: 21600")
# Get public IP
PUBLIC_IP=$(curl -s -H "X-aws-ec2-metadata-token: $TOKEN" \
  http://169.254.169.254/latest/meta-data/public-ipv4)
# Generate self-signed certificate
openssl req -x509 -nodes -days 365 -newkey rsa:2048 \
  -keyout /etc/ssl/private/selfsigned.key \
  -out /etc/ssl/certs/selfsigned.crt \
  -subj "/CN=$PUBLIC_IP" \
  -addext "subjectAltName=IP:$PUBLIC_IP"
# Create custom index page with your name
cat > /usr/share/nginx/html/index.html << 'EOF'
<!DOCTYPE html>
<html>
<head>
    <title>Terraform Server</title>
</head>
<body>
    <h1> SitaraBilal's Terraform Server!</h1>
    <p>This server was provisioned using Terraform.</p>

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



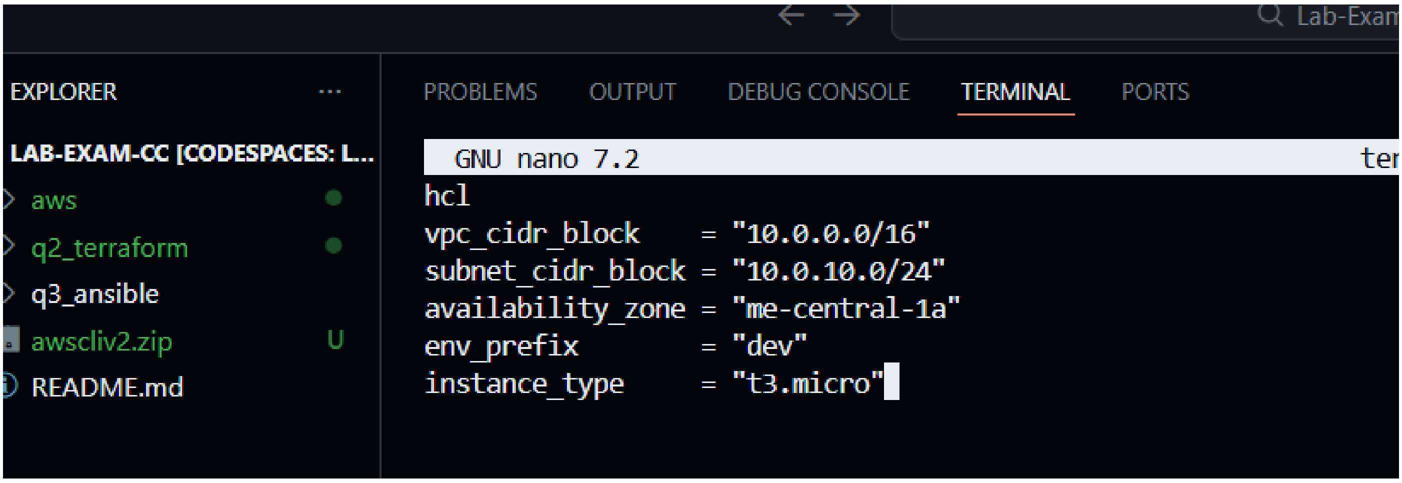
```
@cc-sitarabilal-2023-BSE-063 ➜ /workspaces/Lab-Exam-CC/q2_terraform (main) $ cat entry-script.sh
yum update -y
# Install nginx and openssl
yum install -y nginx openssl
# Create SSL directories
mkdir -p /etc/ssl/private
mkdir -p /etc/ssl/certs

# Get IMDSv2 token
TOKEN=$(curl -s -X PUT "http://169.254.169.254/latest/api/token" \
  -H "X-aws-ec2-metadata-token-ttl-seconds: 21600")
# Get public IP
PUBLIC_IP=$(curl -s -H "X-aws-ec2-metadata-token: $TOKEN" \
  http://169.254.169.254/latest/meta-data/public-ipv4)
# Generate self-signed certificate
openssl req -x509 -nodes -days 365 -newkey rsa:2048 \
  -keyout /etc/ssl/private/selfsigned.key \
  -out /etc/ssl/certs/selfsigned.crt \
  -subj "/CN=$PUBLIC_IP" \
  -addext "subjectAltName=IP:$PUBLIC_IP"
# Create custom index page with your name
cat > /usr/share/nginx/html/index.html << 'EOF'
<!DOCTYPE html>
<html>
<head>
    <title>Terraform Server</title>
</head>
<body>
    <h1> SitaraBilal's Terraform Server!</h1>
    <p>This server was provisioned using Terraform.</p>
</body>
</html>
EOF
@cc-sitarabilal-2023-BSE-063 ➜ /workspaces/Lab-Exam-CC/q2_terraform (main) $
```



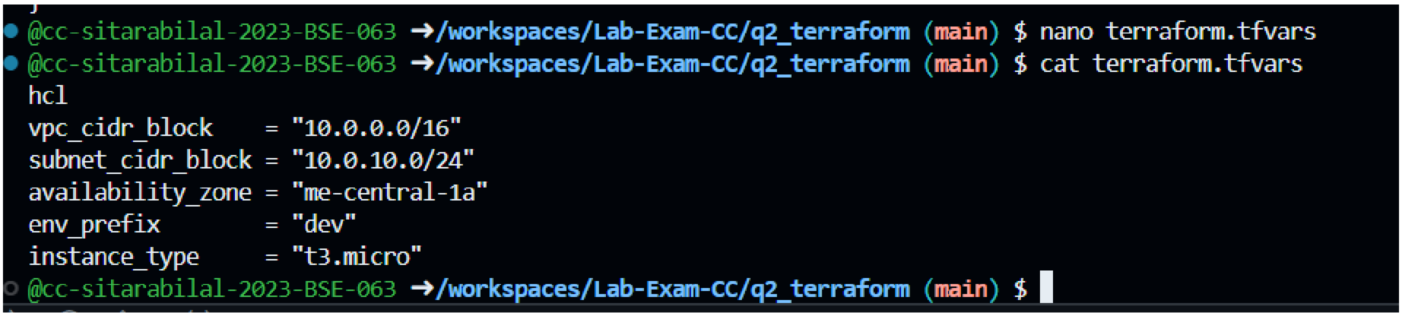
```
  tags = {
    Name = "${var.env_prefix}-ec2-instance"
  }
}
hcl
output "ec2_public_ip" {
  value       = aws_instance.myapp_server.public_ip
  description = "Public IP of EC2 instance"
}

^G Help         ^O Write Out    ^W Where Is     ^K Cut          ^T Execute
^X Exit         ^R Read File    ^\ Replace      ^U Paste        ^J Justify
```



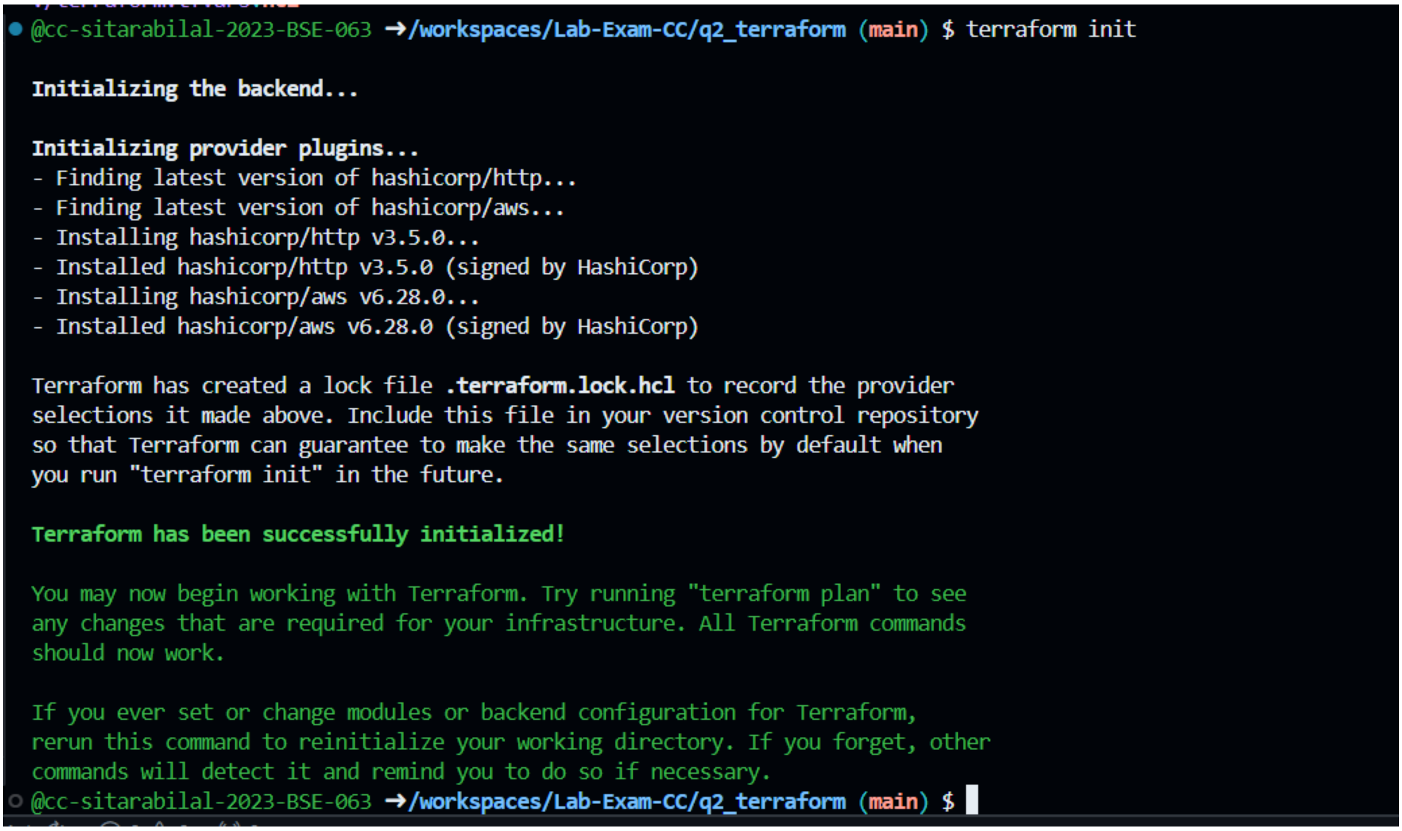
```
@cc-sitarabilal-2023-BSE-063 ➜ /workspaces/Lab-Exam-CC/q2_terraform (main) $ cat main.tf
    cidr_blocks = ["0.0.0.0/0"]
  }

  tags = {
    Name = "${var.env_prefix}-default-sg"
  }
}
hcl
resource "aws_key_pair" "ssh_key" {
  key_name   = "serverkey"
  public_key = file("~/.ssh/id_ed25519.pub")
}
hcl
resource "aws_instance" "myapp_server" {
  ami                         = "ami-05524d6658fcf35b6"
  instance_type               = var.instance_type
  subnet_id                   = aws_subnet.myapp_subnet_1.id
  vpc_security_group_ids      = [aws_default_security_group.default_sg.id]
  availability_zone           = var.availability_zone
  associate_public_ip_address = true
  key_name                    = aws_key_pair.ssh_key.key_name
  user_data                   = file("entry-script.sh")

  tags = {
    Name = "${var.env_prefix}-ec2-instance"
  }
}
hcl
output "ec2_public_ip" {
  value       = aws_instance.myapp_server.public_ip
  description = "Public IP of EC2 instance"
}
@cc-sitarabilal-2023-BSE-063 ➜ /workspaces/Lab-Exam-CC/q2_terraform (main) $
```



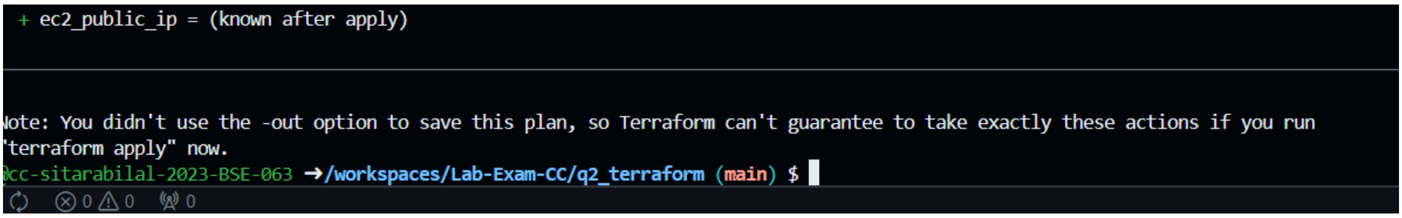
```
hcl
vpc_cidr_block     = "10.0.0.0/16"
subnet_cidr_block = "10.0.10.0/24"
availability_zone = "me-central-1a"
env_prefix         = "dev"
instance_type      = "t3.micro"
```



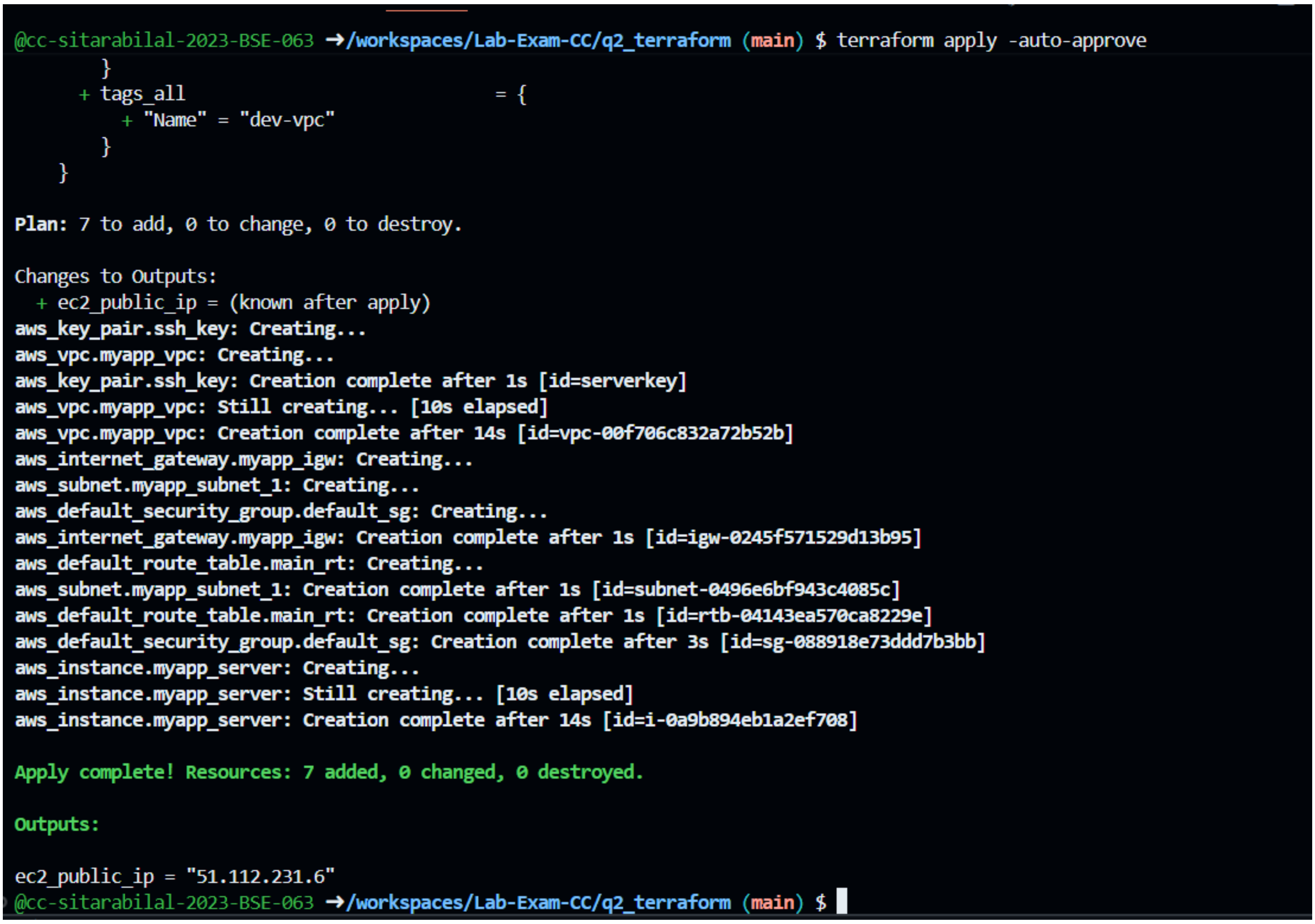
```
@cc-sitarabilal-2023-BSE-063 ➜/workspaces/Lab-Exam-CC/q2_terraform (main) $ nano terraform.tfvars
@cc-sitarabilal-2023-BSE-063 ➜/workspaces/Lab-Exam-CC/q2_terraform (main) $ cat terraform.tfvars
hcl
vpc_cidr_block     = "10.0.0.0/16"
subnet_cidr_block = "10.0.10.0/24"
availability_zone = "me-central-1a"
env_prefix         = "dev"
instance_type      = "t3.micro"
@cc-sitarabilal-2023-BSE-063 ➜/workspaces/Lab-Exam-CC/q2_terraform (main) $
```



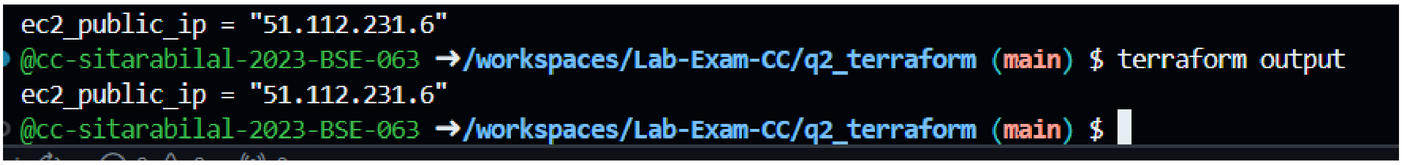
```
@cc-sitarabilal-2023-BSE-063 ➜/workspaces/Lab-Exam-CC/q2_terraform (main) $ terraform init

Initializing the backend...

Initializing provider plugins...
- Finding latest version of hashicorp/http...
- Finding latest version of hashicorp/aws...
- Installing hashicorp/http v3.5.0...
- Installed hashicorp/http v3.5.0 (signed by HashiCorp)
- Installing hashicorp/aws v6.28.0...
- Installed hashicorp/aws v6.28.0 (signed by HashiCorp)

Terraform has created a lock file .terraform.lock.hcl to record the provider
selections it made above. Include this file in your version control repository
so that Terraform can guarantee to make the same selections by default when
you run "terraform init" in the future.

Terraform has been successfully initialized!

You may now begin working with Terraform. Try running "terraform plan" to see
any changes that are required for your infrastructure. All Terraform commands
should now work.

If you ever set or change modules or backend configuration for Terraform,
rerun this command to reinitialize your working directory. If you forget, other
commands will detect it and remind you to do so if necessary.
@cc-sitarabilal-2023-BSE-063 ➜/workspaces/Lab-Exam-CC/q2_terraform (main) $
```



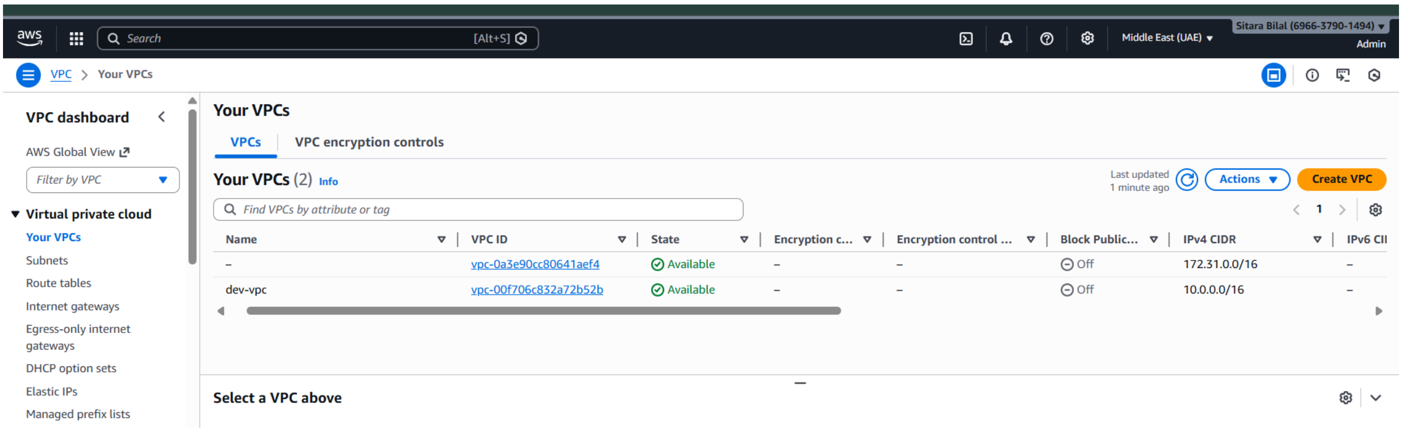
```
 + ec2_public_ip = (known after apply)


ote: You didn't use the -out option to save this plan, so Terraform can't guarantee to take exactly these actions if you run
'terraform apply" now.
cc-sitarabilal-2023-BSE-063 ➜/workspaces/Lab-Exam-CC/q2_terraform (main) $
```



```
@cc-sitarabilal-2023-BSE-063 →/workspaces/Lab-Exam-CC/q2_terraform (main) $ terraform apply -auto-approve
        }
      + tags_all                             = {
          + "Name" = "dev-vpc"
        }
    }

Plan: 7 to add, 0 to change, 0 to destroy.

Changes to Outputs:
  + ec2_public_ip = (known after apply)
aws_key_pair.ssh_key: Creating...
aws_vpc.myapp_vpc: Creating...
aws_key_pair.ssh_key: Creation complete after 1s [id=serverkey]
aws_vpc.myapp_vpc: Still creating... [10s elapsed]
aws_vpc.myapp_vpc: Creation complete after 14s [id=vpc-00f706c832a72b52b]
aws_internet_gateway.myapp_igw: Creating...
aws_subnet.myapp_subnet_1: Creating...
aws_default_security_group.default_sg: Creating...
aws_internet_gateway.myapp_igw: Creation complete after 1s [id=igw-0245f571529d13b95]
aws_default_route_table.main_rt: Creating...
aws_subnet.myapp_subnet_1: Creation complete after 1s [id=subnet-0496e6bf943c4085c]
aws_default_route_table.main_rt: Creation complete after 1s [id=rtb-04143ea570ca8229e]
aws_default_security_group.default_sg: Creation complete after 3s [id=sg-088918e73ddd7b3bb]
aws_instance.myapp_server: Creating...
aws_instance.myapp_server: Still creating... [10s elapsed]
aws_instance.myapp_server: Creation complete after 14s [id=i-0a9b894eb1a2ef708]

Apply complete! Resources: 7 added, 0 changed, 0 destroyed.

Outputs:

ec2_public_ip = "51.112.231.6"
@cc-sitarabilal-2023-BSE-063 →/workspaces/Lab-Exam-CC/q2_terraform (main) $ 
```



```
ec2_public_ip = "51.112.231.6"
@cc-sitarabilal-2023-BSE-063 →/workspaces/Lab-Exam-CC/q2_terraform (main) $ terraform output
ec2_public_ip = "51.112.231.6"
@cc-sitarabilal-2023-BSE-063 →/workspaces/Lab-Exam-CC/q2_terraform (main) $ 
```



Your VPCs

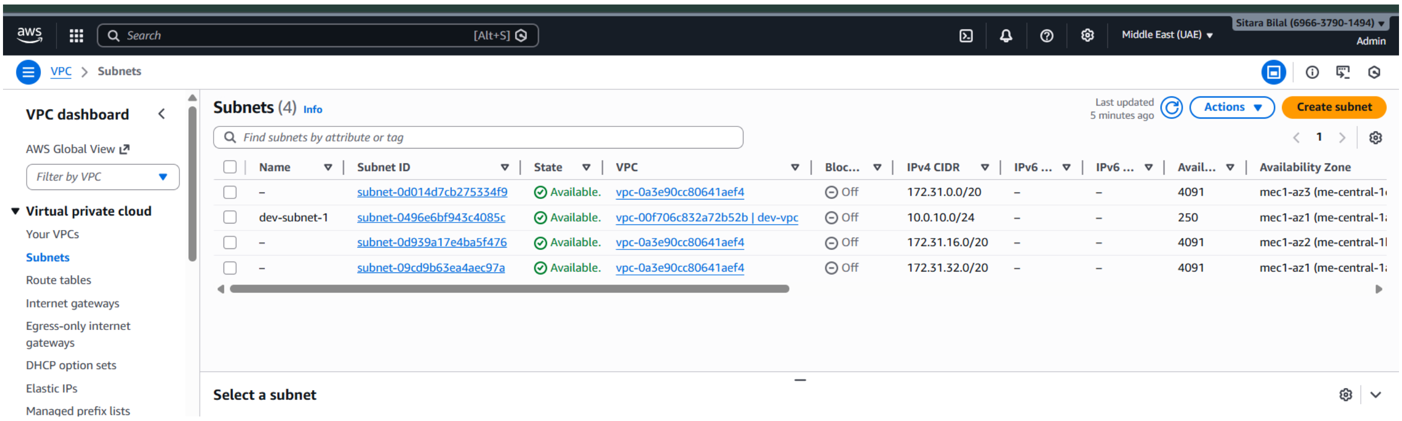
VPCs | VPC encryption controls

Your VPCs (2) Info

Last updated 1 minute ago

Name	VPC ID	State	Encryption c...	Encryption control ...	Block Public...	IPv4 CIDR	IPv6 CII
–	vpc-0a3e90cc80641aef4	✓ Available	–	–	⊖ Off	172.31.0.0/16	–
dev-vpc	vpc-00f706c832a72b52b	✓ Available	–	–	⊖ Off	10.0.0.0/16	–

Select a VPC above

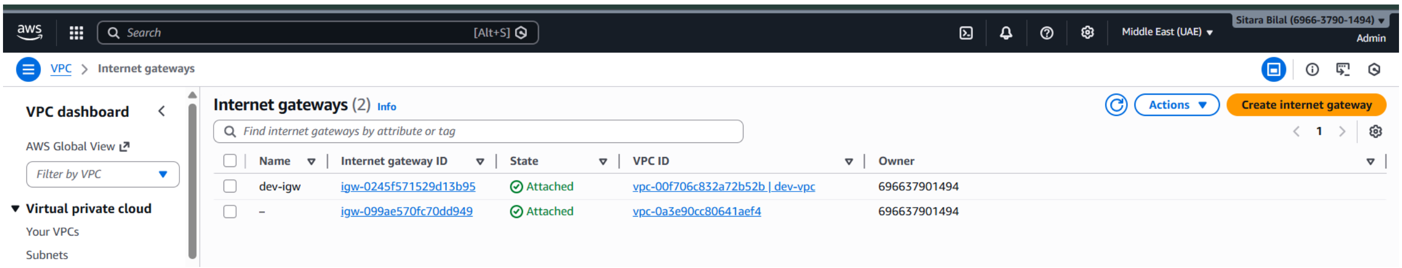


Subnets (4) Info

Last updated 5 minutes ago

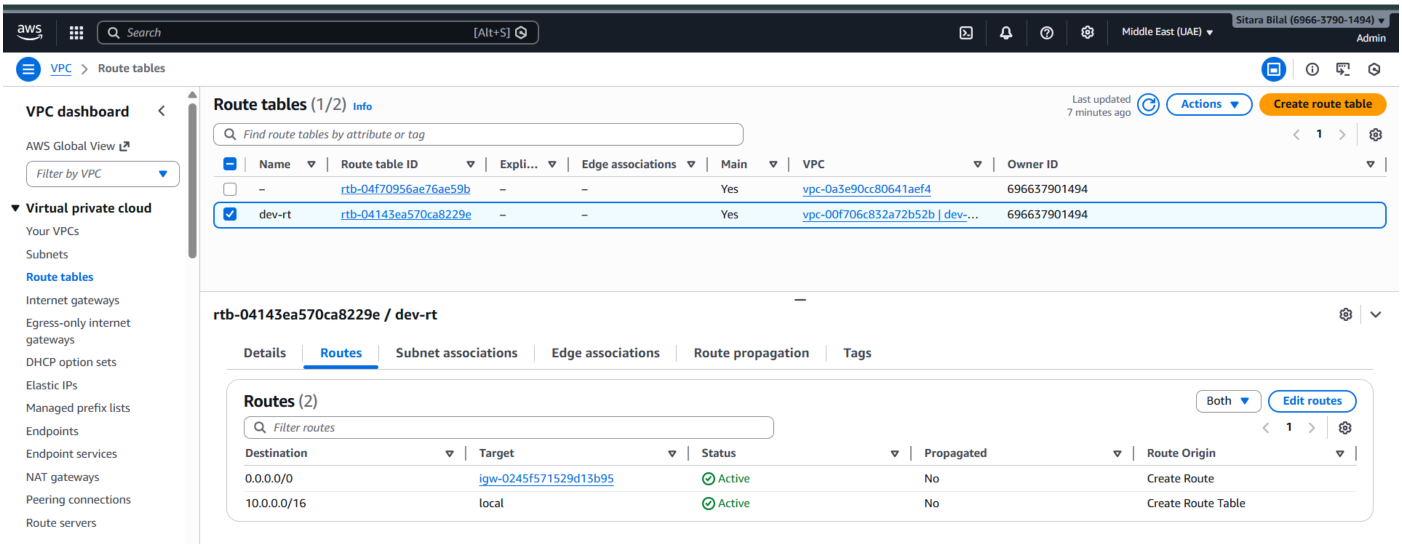
Name	Subnet ID	State	VPC	Bloc...	IPv4 CIDR	IPv6 ...	IPv6 ...	Avail...	Availability Zone
–	subnet-0d014d7cb275334f9	Available.	vpc-0a3e90cc80641aef4	Off	172.31.0.0/20	–	–	4091	mec1-az3 (me-central-1
dev-subnet-1	subnet-0496e6bf943c4085c	Available.	vpc-00f706c832a72b52b | dev-vpc	Off	10.0.10.0/24	–	–	250	mec1-az1 (me-central-1
–	subnet-0d939a17e4ba5f476	Available.	vpc-0a3e90cc80641aef4	Off	172.31.16.0/20	–	–	4091	mec1-az2 (me-central-1
–	subnet-09cd9b63ea4aec97a	Available.	vpc-0a3e90cc80641aef4	Off	172.31.32.0/20	–	–	4091	mec1-az1 (me-central-1

Select a subnet



Internet gateways (2) Info

Name	Internet gateway ID	State	VPC ID	Owner
dev-igw	igw-0245f571529d13b95	Attached	vpc-00f706c832a72b52b | dev-vpc	696637901494
–	igw-099ae570fc70dd949	Attached	vpc-0a3e90cc80641aef4	696637901494



Route tables (1/2) Info

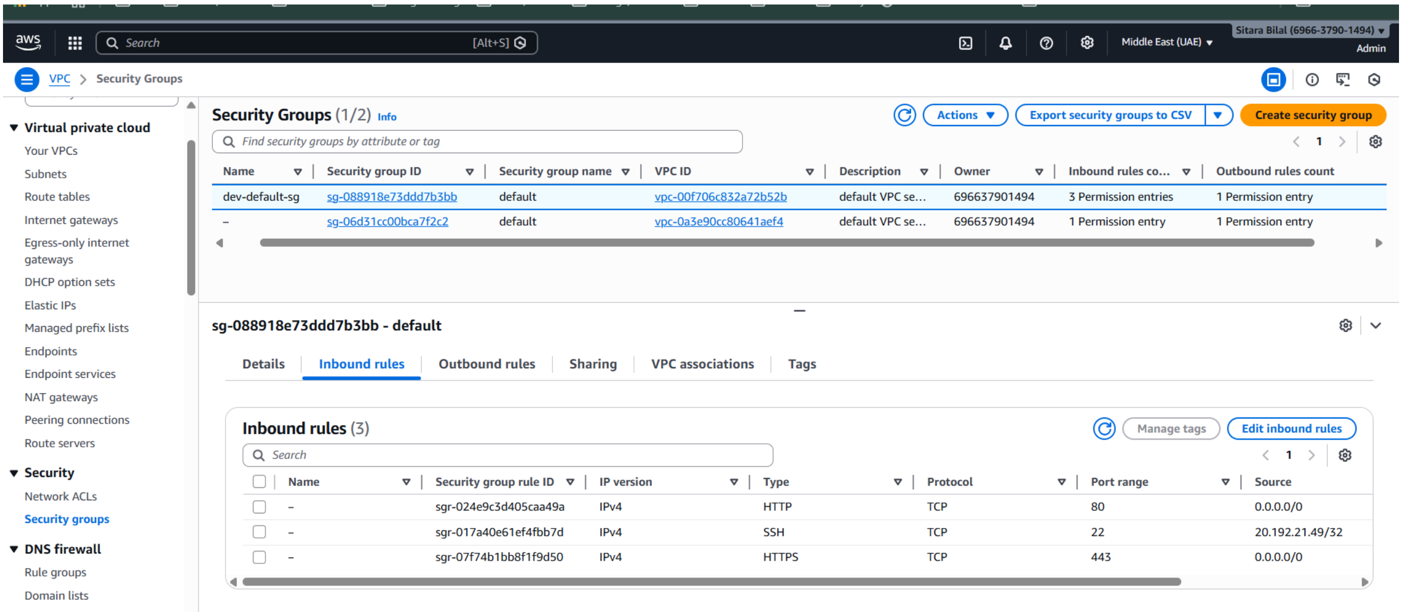
Last updated 7 minutes ago

	Name	Route table ID	Expli...	Edge associations	Main	VPC	Owner ID
□	–	rtb-04f70956ae76ae59b	–	–	Yes	vpc-0a3e90cc80641aef4	696637901494
☑	dev-rt	rtb-04143ea570ca8229e	–	–	Yes	vpc-00f706c832a72b52b | dev-...	696637901494

rtb-04143ea570ca8229e / dev-rt

Routes (2)

Destination	Target	Status	Propagated	Route Origin
0.0.0.0/0	igw-0245f571529d13b95	Active	No	Create Route
10.0.0.0/16	local	Active	No	Create Route Table



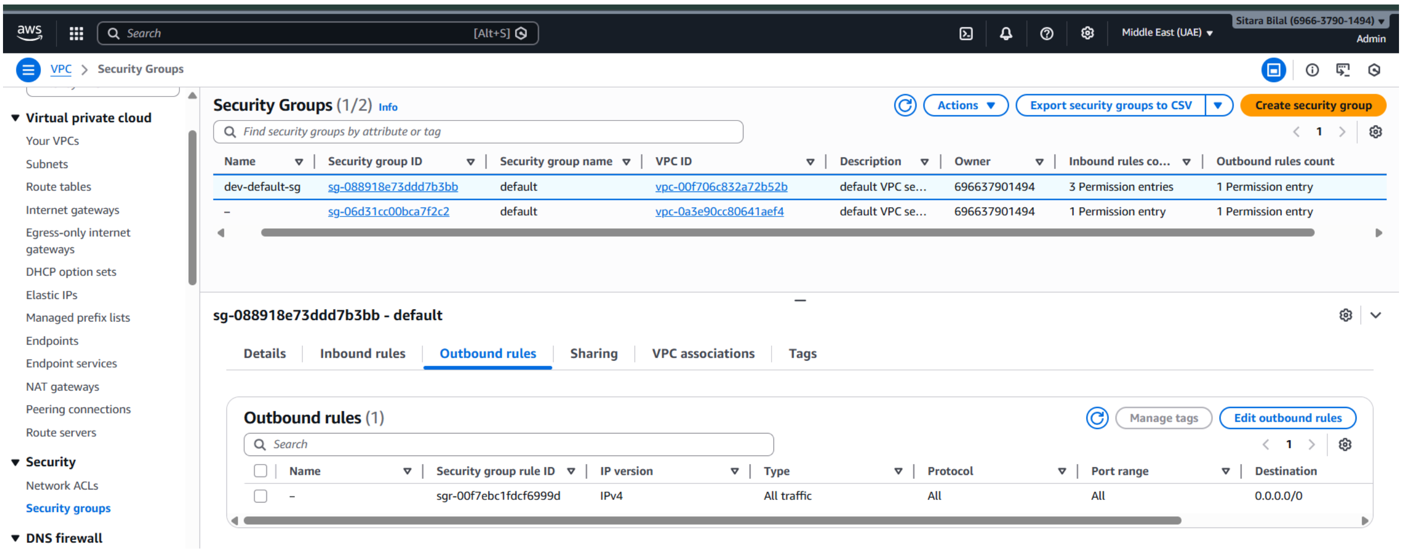
Security Groups (1/2) Info

Name	Security group ID	Security group name	VPC ID	Description	Owner	Inbound rules co...	Outbound rules count
dev-default-sg	sg-088918e73ddd7b3bb	default	vpc-00f706c832a72b52b	default VPC se...	696637901494	3 Permission entries	1 Permission entry
–	sg-06d31cc00bca7f2c2	default	vpc-0a3e90cc80641aef4	default VPC se...	696637901494	1 Permission entry	1 Permission entry

sg-088918e73ddd7b3bb - default

Inbound rules (3)

Name	Security group rule ID	IP version	Type	Protocol	Port range	Source
–	sgr-024e9c3d405caa49a	IPv4	HTTP	TCP	80	0.0.0.0/0
–	sgr-017a40e61ef4fbb7d	IPv4	SSH	TCP	22	20.192.21.49/32
–	sgr-07f74b1bb8f1f9d50	IPv4	HTTPS	TCP	443	0.0.0.0/0



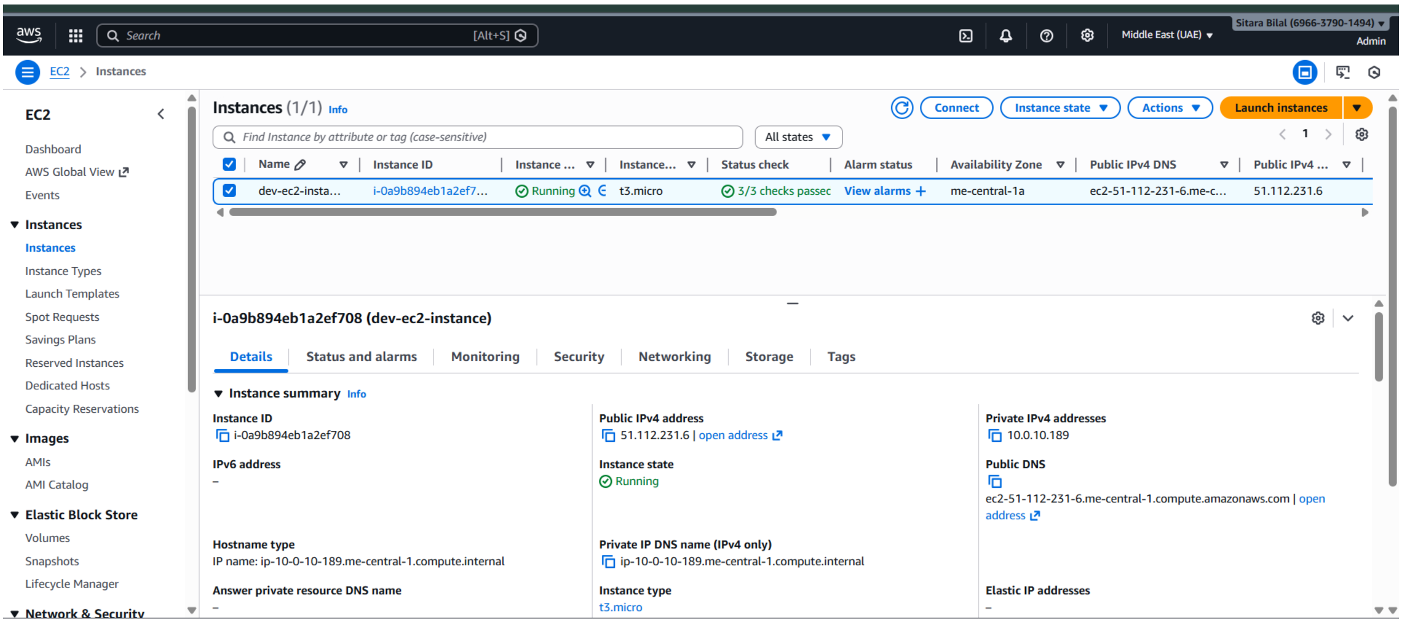
Security Groups (1/2) Info

Name	Security group ID	Security group name	VPC ID	Description	Owner	Inbound rules co...	Outbound rules count
dev-default-sg	sg-088918e73ddd7b3bb	default	vpc-00f706c832a72b52b	default VPC se...	696637901494	3 Permission entries	1 Permission entry
–	sg-06d31cc00bca7f2c2	default	vpc-0a3e90cc80641aef4	default VPC se...	696637901494	1 Permission entry	1 Permission entry

sg-088918e73ddd7b3bb - default

Outbound rules (1)

☐	Name	Security group rule ID	IP version	Type	Protocol	Port range	Destination
☐	–	sgr-00f7ebc1fdcf6999d	IPv4	All traffic	All	All	0.0.0.0/0



Instances (1/1) Info

☑	Name	Instance ID	Instance ...	Instance...	Status check	Alarm status	Availability Zone	Public IPv4 DNS	Public IPv4 ...
☑	dev-ec2-insta...	i-0a9b894eb1a2ef7...	Running	t3.micro	3/3 checks passec	View alarms +	me-central-1a	ec2-51-112-231-6.me-c...	51.112.231.6

i-0a9b894eb1a2ef708 (dev-ec2-instance)

Instance summary Info

Instance ID
i-0a9b894eb1a2ef708

Public IPv4 address
51.112.231.6 | open address

Private IPv4 addresses
10.0.10.189

IPv6 address
–

Instance state
Running

Public DNS
ec2-51-112-231-6.me-central-1.compute.amazonaws.com | open address

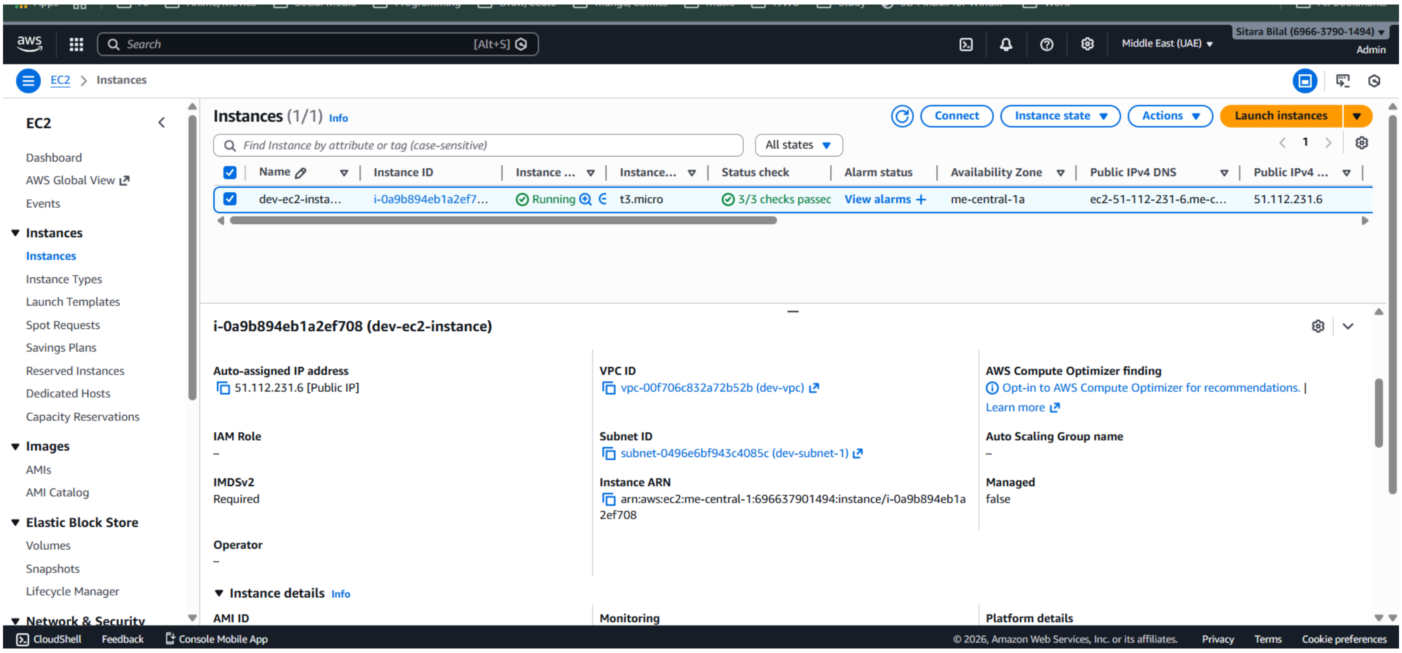
Hostname type
IP name: ip-10-0-10-189.me-central-1.compute.internal

Private IP DNS name (IPv4 only)
ip-10-0-10-189.me-central-1.compute.internal

Answer private resource DNS name
–

Instance type
t3.micro

Elastic IP addresses
–



Instances (1/1) Info

☑	Name	Instance ID	Instance ...	Instance...	Status check	Alarm status	Availability Zone	Public IPv4 DNS	Public IPv4 ...
☑	dev-ec2-insta...	i-0a9b894eb1a2ef7...	Running	t3.micro	3/3 checks passec	View alarms +	me-central-1a	ec2-51-112-231-6.me-c...	51.112.231.6

i-0a9b894eb1a2ef708 (dev-ec2-instance)

Auto-assigned IP address
51.112.231.6 [Public IP]

VPC ID
vpc-00f706c832a72b52b (dev-vpc)

AWS Compute Optimizer finding
Opt-in to AWS Compute Optimizer for recommendations. | Learn more

IAM Role
–

Subnet ID
subnet-0496e6bf943c4085c (dev-subnet-1)

Auto Scaling Group name
–

IMDSv2
Required

Instance ARN
arn:aws:ec2:me-central-1:696637901494:instance/i-0a9b894eb1a2ef708

Managed
false

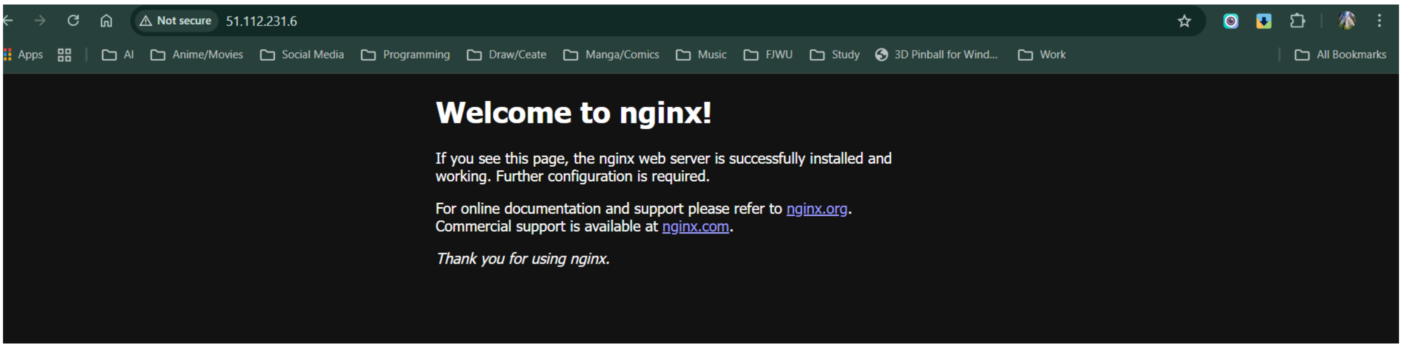
Operator
–

Instance details Info

AMI ID

Monitoring

Platform details

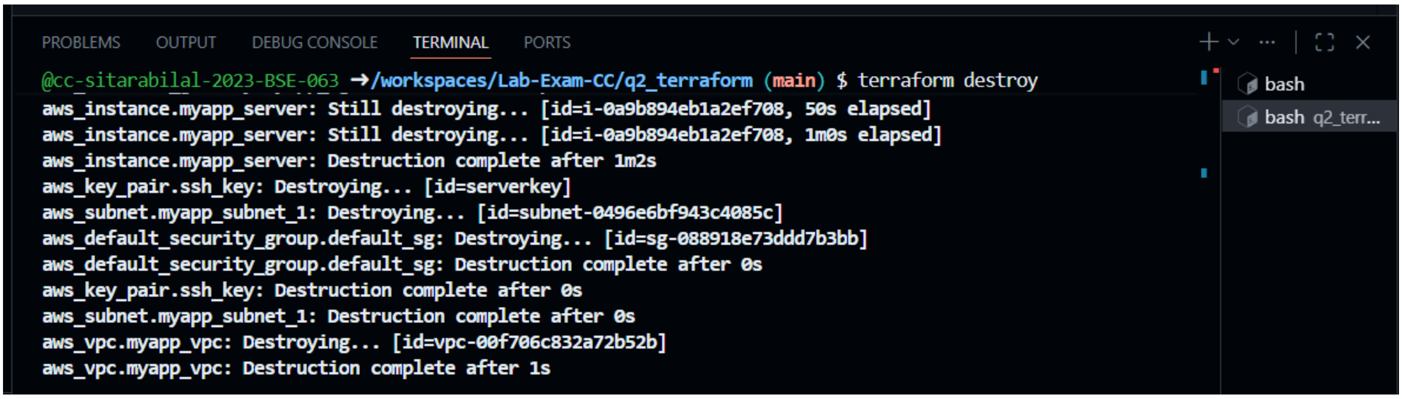


Welcome to nginx!

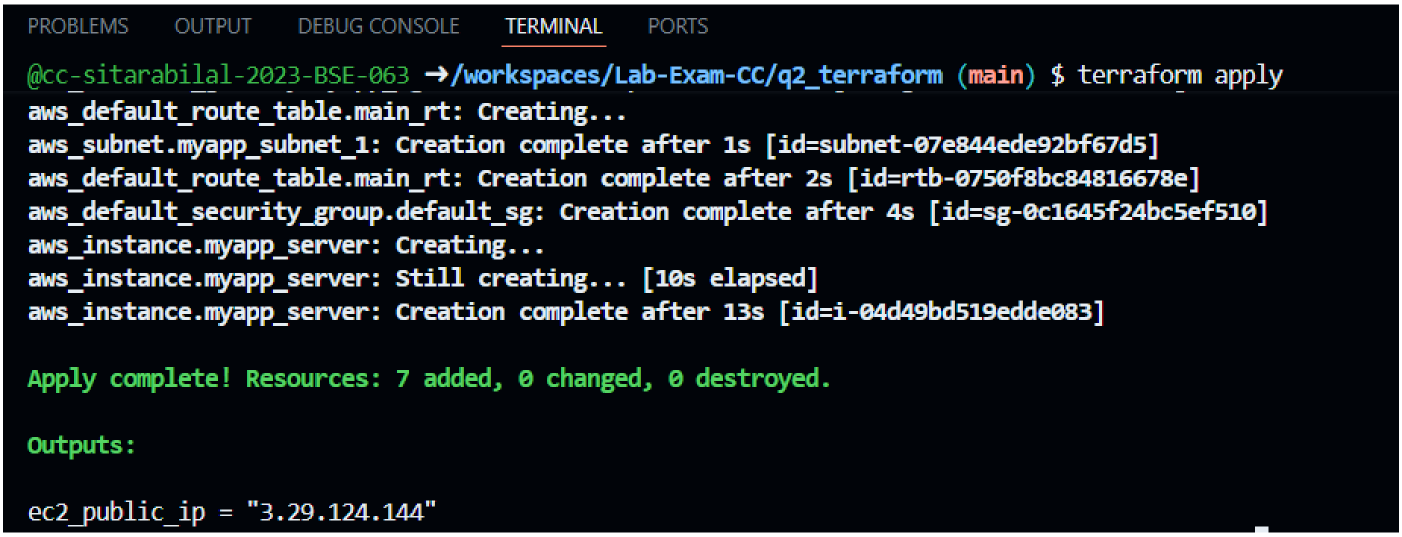
If you see this page, the nginx web server is successfully installed and working. Further configuration is required.

For online documentation and support please refer to nginx.org.
Commercial support is available at nginx.com.

Thank you for using nginx.

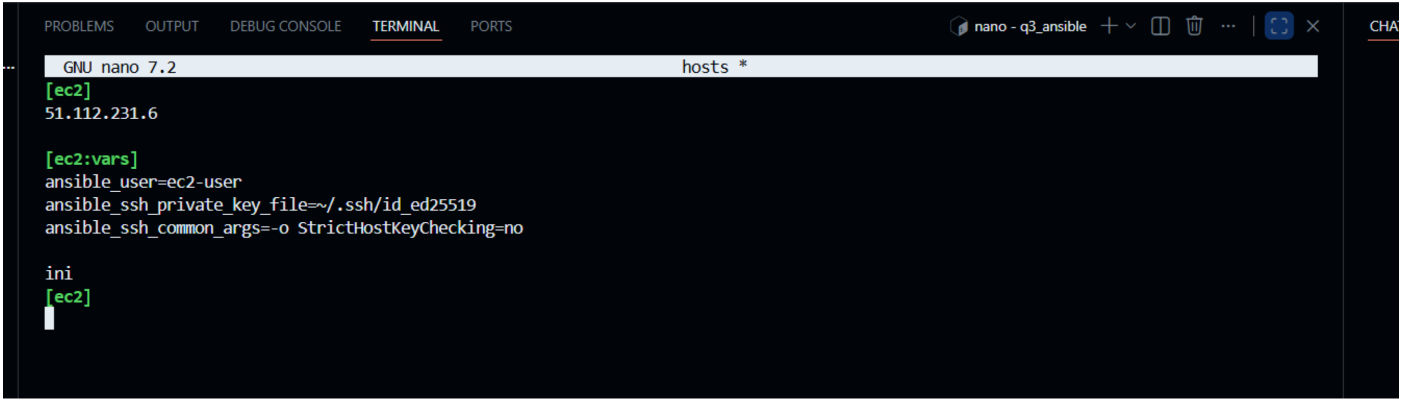


```
@cc-sitarabilal-2023-BSE-063 →/workspaces/Lab-Exam-CC/q2_terraform (main) $ terraform destroy
aws_instance.myapp_server: Still destroying... [id=i-0a9b894eb1a2ef708, 50s elapsed]
aws_instance.myapp_server: Still destroying... [id=i-0a9b894eb1a2ef708, 1m0s elapsed]
aws_instance.myapp_server: Destruction complete after 1m2s
aws_key_pair.ssh_key: Destroying... [id=serverkey]
aws_subnet.myapp_subnet_1: Destroying... [id=subnet-0496e6bf943c4085c]
aws_default_security_group.default_sg: Destroying... [id=sg-088918e73ddd7b3bb]
aws_default_security_group.default_sg: Destruction complete after 0s
aws_key_pair.ssh_key: Destruction complete after 0s
aws_subnet.myapp_subnet_1: Destruction complete after 0s
aws_vpc.myapp_vpc: Destroying... [id=vpc-00f706c832a72b52b]
aws_vpc.myapp_vpc: Destruction complete after 1s
```

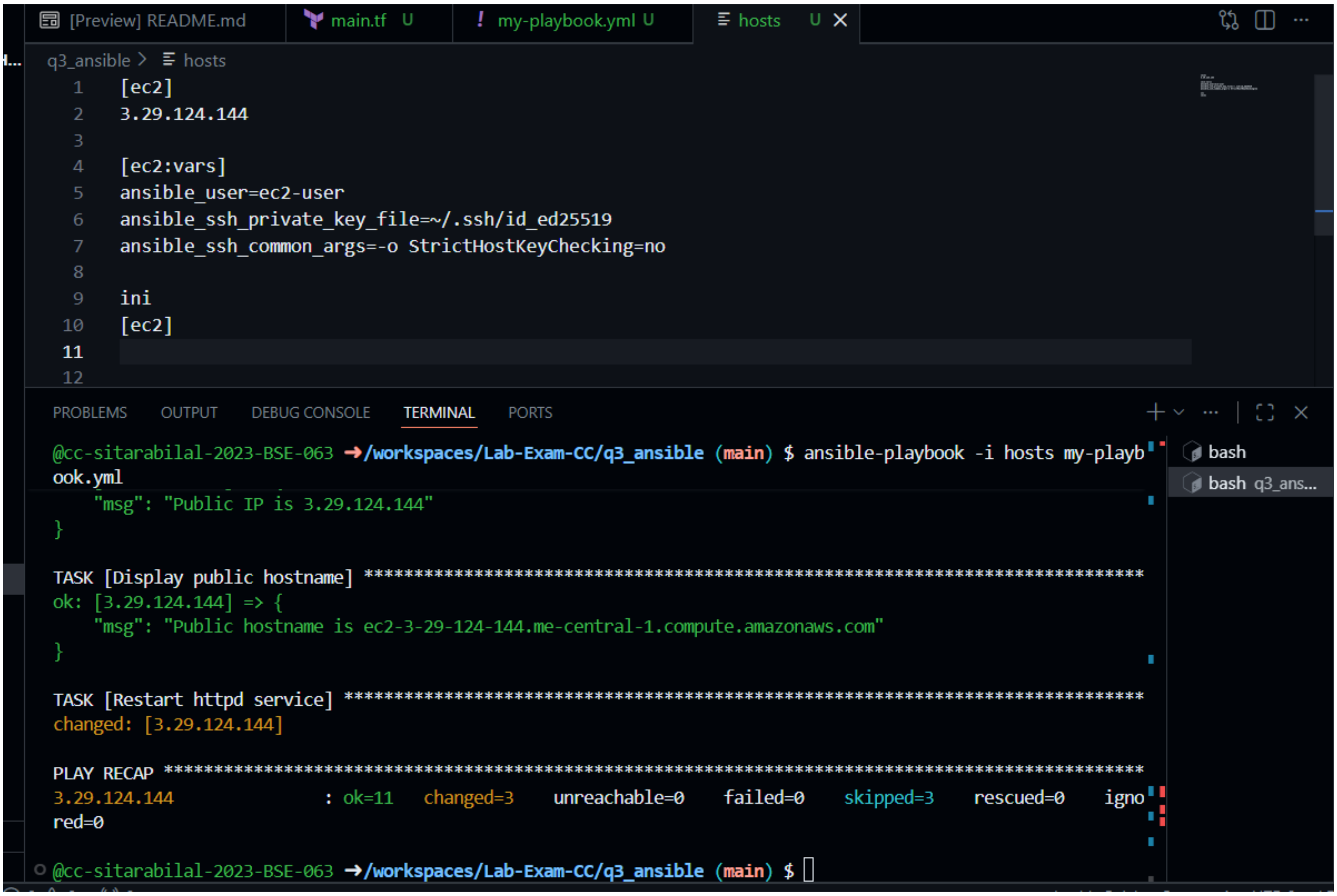


```
@cc-sitarabilal-2023-BSE-063 →/workspaces/Lab-Exam-CC/q2_terraform (main) $ terraform apply
aws_default_route_table.main_rt: Creating...
aws_subnet.myapp_subnet_1: Creation complete after 1s [id=subnet-07e844ede92bf67d5]
aws_default_route_table.main_rt: Creation complete after 2s [id=rtb-0750f8bc84816678e]
aws_default_security_group.default_sg: Creation complete after 4s [id=sg-0c1645f24bc5ef510]
aws_instance.myapp_server: Creating...
aws_instance.myapp_server: Still creating... [10s elapsed]
aws_instance.myapp_server: Creation complete after 13s [id=i-04d49bd519edde083]

Apply complete! Resources: 7 added, 0 changed, 0 destroyed.

Outputs:

ec2_public_ip = "3.29.124.144"
```

Q3 – Ansible Playbook for EC2 Web Server Using Q2 Instance (10 marks)

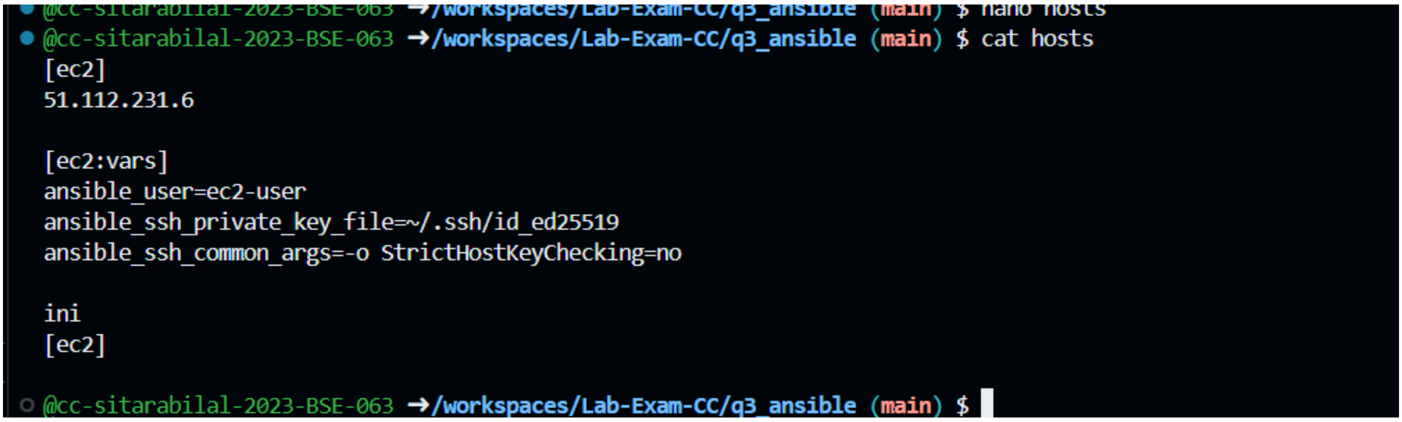


```
 GNU nano 7.2                                    hosts *
[ec2]
51.112.231.6

[ec2:vars]
ansible_user=ec2-user
ansible_ssh_private_key_file=~/.ssh/id_ed25519
ansible_ssh_common_args=-o StrictHostKeyChecking=no

ini
[ec2]
```

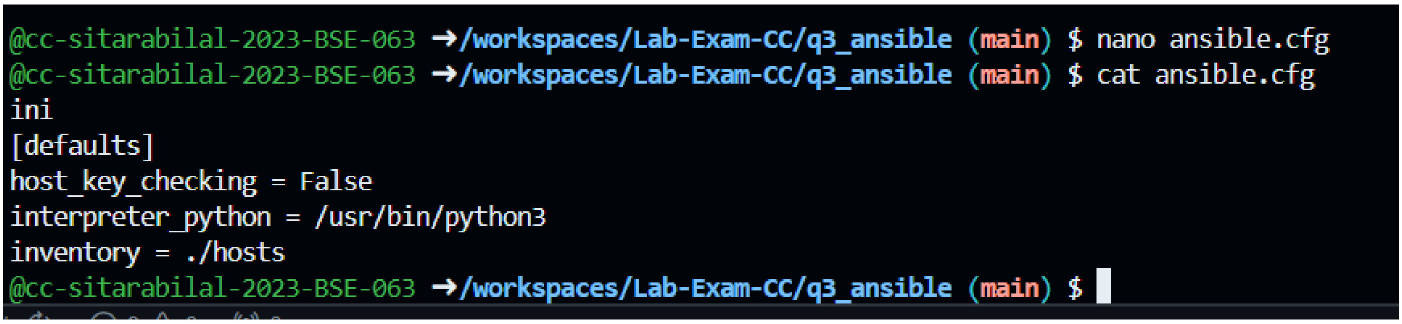


```
[ec2]
3.29.124.144

[ec2:vars]
ansible_user=ec2-user
ansible_ssh_private_key_file=~/.ssh/id_ed25519
ansible_ssh_common_args=-o StrictHostKeyChecking=no

ini
[ec2]

```

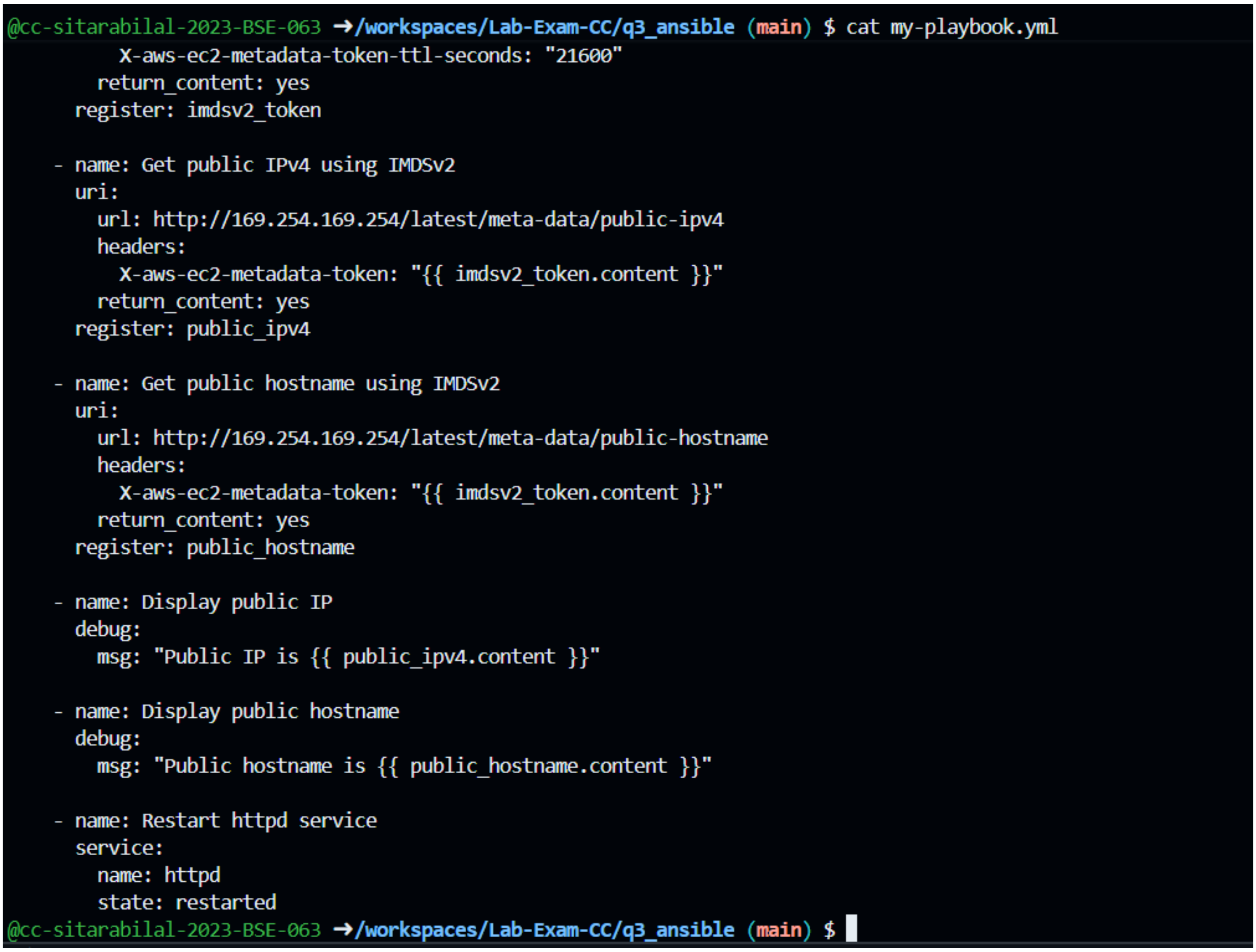
```
@cc-sitarabilal-2023-BSE-063 ➜/workspaces/Lab-Exam-CC/q3_ansible (main) $ ansible-playbook -i hosts my-playb
ook.yml
    "msg": "Public IP is 3.29.124.144"
}

TASK [Display public hostname] ***********************************************************************
ok: [3.29.124.144] => {
    "msg": "Public hostname is ec2-3-29-124-144.me-central-1.compute.amazonaws.com"
}

TASK [Restart httpd service] *************************************************************************
changed: [3.29.124.144]

PLAY RECAP *******************************************************************************************
3.29.124.144               : ok=11   changed=3    unreachable=0    failed=0    skipped=3    rescued=0    igno
red=0

@cc-sitarabilal-2023-BSE-063 ➜/workspaces/Lab-Exam-CC/q3_ansible (main) $ 
```



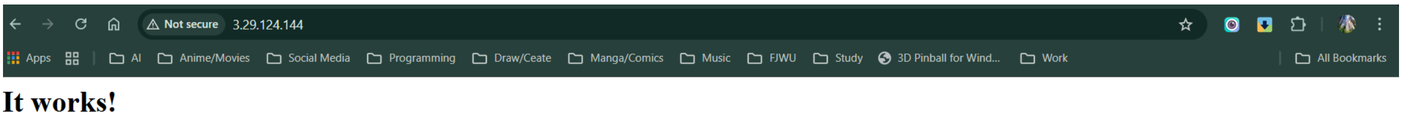
```
@cc-sitarabilal-2023-BSE-063 ➜/workspaces/Lab-Exam-CC/q3_ansible (main) $ nano hosts
@cc-sitarabilal-2023-BSE-063 ➜/workspaces/Lab-Exam-CC/q3_ansible (main) $ cat hosts
[ec2]
51.112.231.6

[ec2:vars]
ansible_user=ec2-user
ansible_ssh_private_key_file=~/.ssh/id_ed25519
ansible_ssh_common_args=-o StrictHostKeyChecking=no

ini
[ec2]

@cc-sitarabilal-2023-BSE-063 ➜/workspaces/Lab-Exam-CC/q3_ansible (main) $ 
```



```
@cc-sitarabilal-2023-BSE-063 ➜/workspaces/Lab-Exam-CC/q3_ansible (main) $ nano ansible.cfg
@cc-sitarabilal-2023-BSE-063 ➜/workspaces/Lab-Exam-CC/q3_ansible (main) $ cat ansible.cfg
ini
[defaults]
host_key_checking = False
interpreter_python = /usr/bin/python3
inventory = ./hosts
@cc-sitarabilal-2023-BSE-063 ➜/workspaces/Lab-Exam-CC/q3_ansible (main) $ 
```



```
@cc-sitarabilal-2023-BSE-063 ➜/workspaces/Lab-Exam-CC/q3_ansible (main) $ cat my-playbook.yml
          X-aws-ec2-metadata-token-ttl-seconds: "21600"
        return_content: yes
      register: imdsv2_token

    - name: Get public IPv4 using IMDSv2
      uri:
        url: http://169.254.169.254/latest/meta-data/public-ipv4
        headers:
          X-aws-ec2-metadata-token: "{{ imdsv2_token.content }}"
        return_content: yes
      register: public_ipv4

    - name: Get public hostname using IMDSv2
      uri:
        url: http://169.254.169.254/latest/meta-data/public-hostname
        headers:
          X-aws-ec2-metadata-token: "{{ imdsv2_token.content }}"
        return_content: yes
      register: public_hostname

    - name: Display public IP
      debug:
        msg: "Public IP is {{ public_ipv4.content }}"

    - name: Display public hostname
      debug:
        msg: "Public hostname is {{ public_hostname.content }}"

    - name: Restart httpd service
      service:
        name: httpd
        state: restarted
@cc-sitarabilal-2023-BSE-063 ➜/workspaces/Lab-Exam-CC/q3_ansible (main) $
```



It works!

THE END

Github Repo Link

https://github.com/cc-sitarabilal-2023-BSE-063/Lab-Exam-CC