

Public EC2 with Apache and Internet Gateway

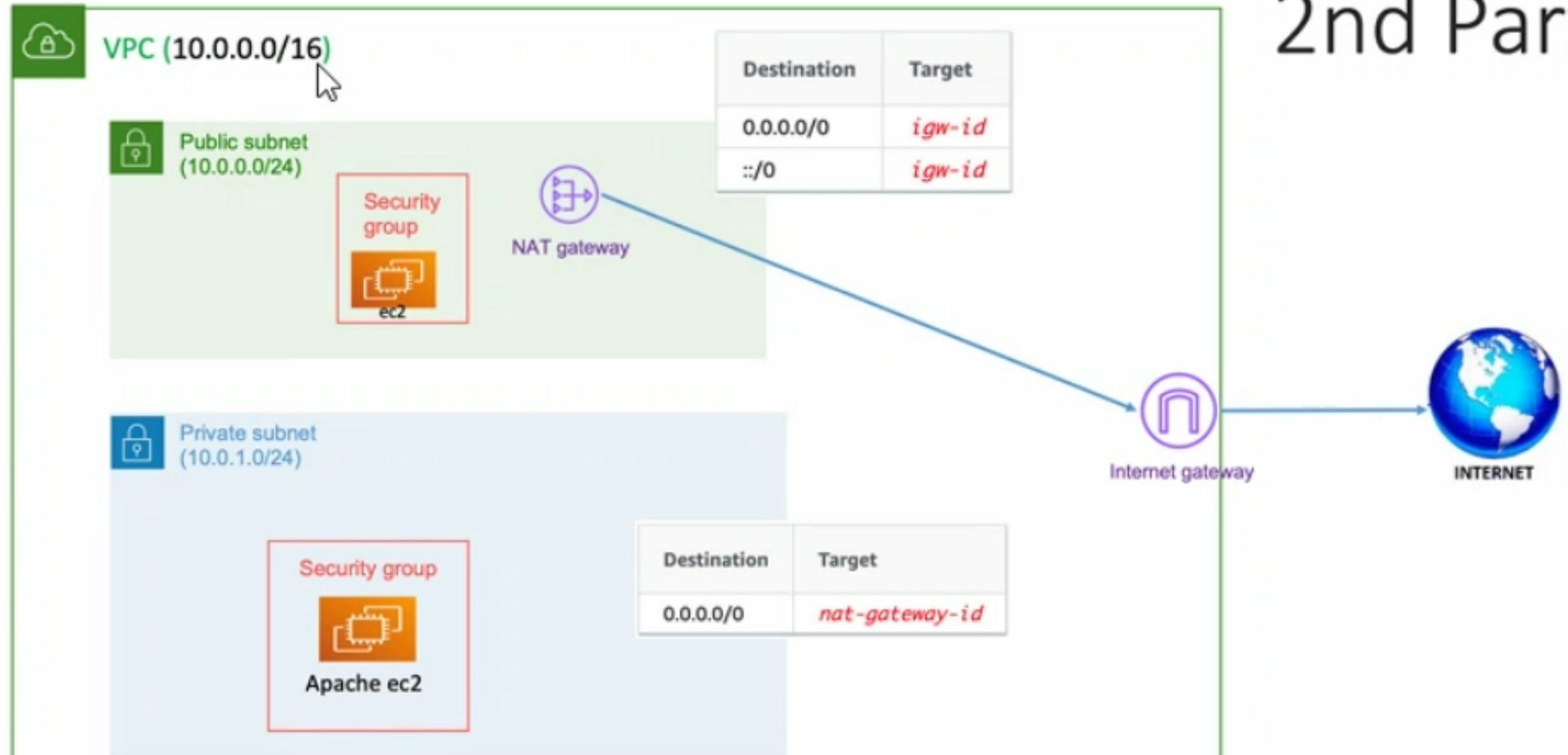
Name: Mohamed Mostafa Mostafa Esmael

Track: System Administration

Branch: Aswan

Lab2:

Use variables for all arguments, output `public_ip` , `private_ip` , screenshot of the public ip from the browser, private ip logs also use count for creating subnets.



Welcome to Esmael's Public instance - IP: 10.0.1.100





```
ubuntu@ip-10-0-1-100:~$ curl 10.0.1.100:80
```

```
Welcome to Esmael's Public instance - IP: 10.0.1.100
```

```
ubuntu@ip-10-0-1-100:~$
```

```
ubuntu@ip-10-0-2-46: ~
ubuntu@ip-10-0-1-100: ~$ curl 10.0.1.100:80
Welcome to Esmael's Public instance - IP: 10.0.1.100
ubuntu@ip-10-0-1-100: ~$ ssh -i "~/terraform.pem" ubuntu@10.0.2.46
The authenticity of host '10.0.2.46 (10.0.2.46)' can't be established.
ED25519 key fingerprint is SHA256:FwH5knPhZkkYauDXaAHD35x037qkQlwcC4QPjKrTz3Q.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '10.0.2.46' (ED25519) to the list of known hosts.
Welcome to Ubuntu 24.04.1 LTS (GNU/Linux 6.8.0-1021-aws x86_64)

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

System information as of Mon Mar 24 13:52:04 UTC 2025

System load: 0.0          Processes:              107
Usage of /:  28.5% of 6.71GB Users logged in:        0
Memory usage: 22%         IPv4 address for enX0: 10.0.2.46
Swap usage:  0%

Expanded Security Maintenance for Applications is not enabled.

150 updates can be applied immediately
```



ubuntu@ip-10-0-2-46: ~



ubuntu@ip-10-0-2-46: ~



serverb@192:~



```
ubuntu@ip-10-0-2-46:~$ curl 10.0.2.46:80
Welcome to Esmael's Private instance - IP: 10.0.2.46
ubuntu@ip-10-0-2-46:~$
```

```
aws_nat_gateway.nat: Creation complete after 1m39s [id=nat-0f144026c96e38ef5]
aws_route_table.private_rt: Creating...
aws_route_table.private_rt: Creation complete after 3s [id=rtb-0d3ce4bf8d82bbe93]
aws_route_table_association.private_assoc: Creating...
aws_route_table_association.private_assoc: Creation complete after 2s [id=rtbassoc-0df194b5c01d183db]
```

Apply complete! Resources: 16 added, 0 changed, 0 destroyed.

Outputs:

```
elastic_ip = "35.168.141.18"
private_apache_private_ip = "10.0.2.46"
public_apache_private_ip = "10.0.1.100"
public_apache_public_ip = "34.204.95.82"
[serverb@192 task2]$
```


VPC dashboard <

EC2 Global View

Filter by VPC

Virtual private cloud

Your VPCs

Subnets

Route tables

Internet gateways

Egress-only internet gateways

Carrier gateways

DHCP option sets

Elastic IPs

Managed prefix lists

NAT gateways

Peering connections

Security

Network ACLs

Security groups

| | | | |
|--|--|--|---------------------------------|
| Main network ACL acl-0ff53837f6ca8b34f | Default VPC No | IPv4 CIDR 10.0.0.0/16 | IPv6 pool - |
| IPv6 CIDR (Network border group) - | Network Address Usage metrics Disabled | Route 53 Resolver DNS Firewall rule groups - | Owner ID 025066251600 |

Resource map

CIDRs

Flow logs

Tags

Integrations

Resource map

VPC

Show details

Your AWS virtual network

Esmael_VPC

Subnets (2)

Subnets within this VPC

us-east-1e

E

Esmael_public-subnet

E

Esmael_private-subnet

Route tables (3)

Route network traffic to resources

Esmael_public_route_table

Esmael_private_route_table

rtb-0548ff539f172572a

VPC dashboard <

EC2 Global View

Filter by VPC ▼

- ▼ Virtual private cloud
- Your VPCs
- Subnets
- Route tables
- Internet gateways
- Egress-only internet gateways
- Carrier gateways
- DHCP option sets
- Elastic IPs
- Managed prefix lists
- NAT gateways
- Peering connections
- ▼ Security
- Network ACLs
- Security groups

nat-0f144026c96e38ef5 / Esmael_nat_gateway

Actions ▼

Details

| | | | |
|---|--|--|--|
| NAT gateway ID nat-0f144026c96e38ef5 | Connectivity type Public | State Available | State message Info – |
| NAT gateway ARN arn:aws:ec2:us-east-1:025066251600:natgateway/nat-0f144026c96e38ef5 | Primary public IPv4 address 35.168.141.18 | Primary private IPv4 address 10.0.1.171 | Primary network interface ID eni-05715fde1a6a4a92e |
| VPC vpc-0ab1f8305092c70a0 / Esmael_VPC | Subnet subnet-01a96da5c8acf8741 / Esmael_public-subnet | Created Monday, March 24, 2025 at 15:42:13 GMT+2 | Deleted – |

Secondary IPv4 addresses | Monitoring | Tags

Tags

Manage tags

Search tags

< 1 >

| Key | Value |
|------|--------------------|
| Name | Esmael_nat_gateway |



aws

Search

[Alt+S]

United States (N. Virginia)

Mohamed_Esmael

S3

IAM

VPC

EC2

VPC dashboard

<

EC2 Global View

Filter by VPC

Virtual private cloud

Your VPCs

Subnets

Route tables

Internet gateways

Egress-only internet gateways

Carrier gateways

DHCP option sets

Elastic IPs

Managed prefix lists

NAT gateways

Peering connections

Security

Network ACLs

Security groups

Subnets (10)

Info

Last updated less than a minute ago

Actions

Create subnet

Find resources by attribute or tag

Name

Subnet ID

State

VPC

Blo

-

subnet-0bb5c7f151c754447

Available

vpc-010a1bb0e81ab03be

public3

subnet-010a3468d0fbd8db1

Available

vpc-095bd4fe70782dc80 | my-vpc

Esmael_private-subnet

subnet-0de485d47ad14dff4

Available

vpc-0ab1f8305092c70a0 | Esmael_VPC

public4

subnet-0234d4731d9ac82d1

Available

vpc-095bd4fe70782dc80 | my-vpc

-

subnet-0cf99d384933db8f5

Available

vpc-010a1bb0e81ab03be

Esmael_public-subnet

subnet-01a96da5c8acf8741

Available

vpc-0ab1f8305092c70a0 | Esmael_VPC

-

subnet-0d793c4d8d04f9d90

Available

vnc-010a1bb0e81ab03be

Select a subnet

Home

serverb_GUI

ActivitiesVisual Studio Code

Mar 24 16:01

FileEditSelectionViewGoRunTerminalHelp

Untitled (Workspace)

EXPLORER

UNTIT...

aws

terraform

.terraform

task2

.terraform

.terraform.lock.hcl

keypairs.tf

main.tf

outputs.tf

provider.tf

terraform.tfstate

terraform.tfstate....

terraform.tfvars

variables.tf

.terraform.lock.hcl

main.tf

provider.tf

terraform.tfstate

terraform.tfstate.b...

terraform > task2 > keypairs.tf

1 resource "tls_private_key" "esmael_key" {

2 algorithm = "RSA"

3 rsa_bits = 4096

4 }

5

6 resource "aws_key_pair" "esmael_keypair" {

7 key_name = "esmael_key"

8 public_key = tls_private_key.esmael_key.public_key_openssh

9 }

10

11 resource "null_resource" "generate_key_file" {

12 provisioner "local-exec" {

13 command = "echo '\${tls_private_key.esmael_key.private_key_pem}' > ~/.ssh/terraform.pem"

14 }

15

16 depends_on = [aws_key_pair.esmael_keypair]

17 }

18

PROBLEMS

OUTPUT

DEBUG CONSOLE

TERMINAL

PORTS

bash - task2

aws_nat_gateway.nat: Creation complete after 1m39s [id=nat-0f144026c96e38ef5]

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aws_route_table.private_rt: Creation complete after 3s [id=rtb-0d3ce4bf8d82bbe93]

aws_route_table_association.private_assoc: Creating...

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

public_apache_public_ip = "34.204.95.82"


```
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aws_route_table.private_rt: Creating...
aws_route_table.private_rt: Creation complete after 3s [id=rtb-0d3ce4bf8d82bbe93]
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public_apache_public_ip = "34.204.95.82"
```



 > OUTLINE

Home

serverb_GUI

ActivitiesVisual Studio Code

Mar 24 16:02

Activities

Visual Studio Code

FileEditSelectionViewGoRunTerminalHelp

Untitled (Workspace)

EXPLORER

UNTITLED...

- aws
- terraform
 - .terraform
 - task2
 - .terraform
 - .terraform.lock.hcl
 - keypairs.tf
 - main.tf
 - outputs.tf
 - provider.tf
 - terraform.tfstate
 - terraform.tfstate....
 - terraform.tfvars
 - variables.tf

terraform > task2 > provider.tf

```
1 provider "aws" {
2     region = var.region
3 }
4
```

PROBLEMSOUTPUTDEBUG CONSOLETERMINALPORTS

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Home

serverb_GUI

ActivitiesVisual Studio Code

Mar 24 16:02

Activities

FileEditSelectionViewGoRunTerminalHelp

Untitled (Workspace)

8

08[][]-[]x

EXPLORER

UNTIT...

aws

terraform

.terraform

task2

.terraform

.terraform.lock.hclkeypairs.tfmain.tfoutputs.tfterraform.tfterraform.tfstate...terraform.tfvarsvariables.tf.terraform.lock.hclmain.tfterraform.tfterraform.tfstate...terraform.tfstate.b...

terraform > task2 > terraform.tfvars

1 region = "us-east-1"

2 vpc_cidr = "10.0.0.0/16"

3 public_subnet_cidrs = ["10.0.1.0/24"]

4 private_subnet_cidrs = ["10.0.2.0/24"]

5 subnet_name = ["Esmael_public-subnet", "Esmael_public-subnet2", "Esmael_private-subnet", "Esmael_private-subnet2"]

6 aws_ami = "ami-04b4f1a9cf54c11d0"

7 instance_type = "t2.micro"

8

PROBLEMS

OUTPUT

DEBUG CONSOLE

TERMINAL

PORTS

bash - task2

aws_nat_gateway.nat: Creation complete after 1m39s [id=nat-0f144026c96e38ef5]

aws_route_table.private_rt: Creating...

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aws_route_table_association.private_assoc: Creation complete after 2s [id=rtbassoc-0df194b5c01d183db]

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Outputs:

elastic_ip = "35.168.141.18"

private_apache_private_ip = "10.0.2.46"

public_apache_private_ip = "10.0.1.100"

public_apache_public_ip = "34.204.95.82"

 Welcome
  provider.tf
  variables.tf
 

```
terraform > task2 >  variables.tf
```

```
1 variable "region" {
2   type           = string
3   default        = "us-east-1"
4 }
```

```
6 variable "vpc_cidr" {
7   type      = string
8   default   = "10.0.0.0/16"
9 }
```

```
11 variable "public_subnet_cidrs" {
12   type      = list(string)
13   default   = ["10.0.1.0/24"]
14 }
```

```
16 variable "private_subnet_cidrs" {
17   type      = list(string)
18   default   = ["10.0.2.0/24"]
19 }
```

```
21 variable "instance_type" {
22     type      = string
23     default   = "t2.micro"
24 }
```

```
26 variable "aws ami" {
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

```
aws_nat_gateway.nat: Creation complete after 1m39s [id=nat-0f144026c96e38ef5]
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elastic_ip = "35.168.141.18"
private_apache_private_ip = "10.0.2.46"
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public_apache_public_ip = "34.204.95.82"
```

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serverb_GUI

Activities Visual Studio Code

Mar 24 16:02

File Edit Selection View Go Run Terminal Help

Untitled (Workspace)

EXPLORER

UNTIT...
aws
terraform
 .terraform
 task2
 .terraform
 .terraform.lock.hcl
 keypairs.tf
 main.tf
 outputs.tf
 provider.tf
 terraform.tfstate
 terraform.tfstate....
 terraform.tfvars
 variables.tf
 .terraform.lock.hcl
 main.tf
 provider.tf
 terraform.tfstate
 terraform.tfstate.b...

terraform > task2 > variables.tf

19 }
20
21 variable "instance_type" {
22 type = string
23 default = "t2.micro"
24 }
25
26 variable "aws_ami" {
27 type = string
28 default = "ami-04b4f1a9cf54c11d0"
29 }
30
31 variable "subnet_name" {
32 type = list(string)
33 default = ["Esmael_public-subnet", "Esmael_public-subnet2", "Esmael_private-subnet", "Esmael_private-subnet2"]
34 }
35

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

bash - task2

aws_nat_gateway.nat: Creation complete after 1m39s [id=nat-0f144026c96e38ef5]
aws_route_table.private_rt: Creating...
aws_route_table.private_rt: Creation complete after 3s [id=rtb-0d3ce4bf8d82bbe93]
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Home

serverb_GUI

ActivitiesVisual Studio CodeMar 24 16:02

FileEditSelectionViewGoRunTerminalHelp

Untitled (Workspace)

EXPLORER

UNTIT...

aws

terraform

.terraform

task2

.terraform

.terraform.lock.hcl

keypairs.tf

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provider.tf

terraform.tfstate

terraform.tfstate....

terraform.tfvars

variables.tf

.terraform.lock.hcl

main.tf

provider.tf

terraform.tfstate

terraform.tfstate.b...

terraform > task2 > main.tf

1 resource "aws_vpc" "main" {
2 cidr_block = var.vpc_cidr
3 tags = {
4 Name = "Esmael_VPC"
5 }
6 }
7
8 resource "aws_subnet" "public_subnet" {
9 vpc_id = aws_vpc.main.id
10 cidr_block = var.public_subnet_cidrs[0]
11 map_public_ip_on_launch = true
12 tags = {
13 Name = var.subnet_name[0]
14 }
15 }
16
17 resource "aws_subnet" "private_subnet" {
18 vpc_id = aws_vpc.main.id
19 cidr_block = var.private_subnet_cidrs[0]
20 tags = {
21 Name = var.subnet_name[2]
22 }
23 }
24
25 resource "aws_internet_gateway" "igw" {
26 vpc_id = aws_vpc.main.id

PROBLEMS

OUTPUT

DEBUG CONSOLE

TERMINAL

PORTS

bash - task2

aws_nat_gateway.nat: Creation complete after 1m39s [id=nat-0f144026c96e38ef5]
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Outputs:

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Home

serverb_GUI

ActivitiesVisual Studio Code

Mar 24 16:03

FileEditSelectionViewGoRunTerminalHelp

Untitled (Workspace)

EXPLORER

UNTIT...

> aws

> terraform

> .terraform

> task2

> .terraform

.terraform.lock.hcl

keypairs.tf

main.tf

outputs.tf

provider.tf

terraform.tfstate

terraform.tfstate....

terraform.tfvars

variables.tf

.terraform.lock.hcl

main.tf

provider.tf

terraform.tfstate

terraform.tfstate.b...

terraform > task2 > main.tf

25 resource "aws_internet_gateway" "igw" {

26 vpc_id = aws_vpc.main.id

27 tags = {

28 Name = "main_igw"

29 }

30 }

31

32 resource "aws_eip" "nat_eip" {

33 domain = "vpc"

34 }

35

36 resource "aws_nat_gateway" "nat" {

37 allocation_id = aws_eip.nat_eip.id

38 subnet_id = aws_subnet.public_subnet.id

39 tags = {

40 Name = "Esmael_nat_gateway"

41 }

42 }

43

44 resource "aws_route_table" "public_rt" {

45 vpc_id = aws_vpc.main.id

46 route {

47 cidr_block = "0.0.0.0/0"

48 gateway_id = aws_internet_gateway.igw.id

49 }

50 tags = {

PROBLEMS

OUTPUT

DEBUG CONSOLE

TERMINAL

PORTS

bash - task2

aws_nat_gateway.nat: Creation complete after 1m39s [id=nat-0f144026c96e38ef5]

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private_apache_private_ip = "10.0.2.46"

public_apache_private_ip = "10.0.1.100"

public_apache_public_ip = "34.204.95.82"

```
terraform > task2 >  main.tf
```

```

54
55 resource "aws_route_table_association" "public_assoc" {
56     subnet_id      = aws_subnet.public_subnet.id
57     route_table_id = aws_route_table.public_rt.id
58 }
59
60 resource "aws_route_table" "private_rt" {
61     vpc_id = aws_vpc.main.id
62     route {
63         cidr_block      = "0.0.0.0/0"
64         nat_gateway_id = aws_nat_gateway.nat.id
65     }
66     tags = {
67         Name = "Esmael_private_route_table"
68     }
69 }
70
71 resource "aws_route_table_association" "private_assoc" {
72     subnet_id      = aws_subnet.private_subnet.id
73     route_table_id = aws_route_table.private_rt.id
74 }
75
76 resource "aws_security_group" "apache_sg" {
77     name          = "Esmael_apache_sg"
78     description   = "Allow inbound HTTP and SSH"
79     vpc_id        = aws_vpc.main.id

```

[illegible]

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

```
aws_nat_gateway.nat: Creation complete after 1m39s [id=nat-0f144026c96e38ef5]
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public_apache_public_ip = "34.204.95.82"
```


main.tf terraform

11 ...

```
123 sudo systemctl start apache2
```

PORTS

bash - task2 + ▾ □ ☒ ... ^ ×

```
aws_nat_gateway.nat: Creation complete after 1m39s [id=nat-0f144026c96e38ef5]
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[➤ OUTLINE](#)

5. $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

Home

serverb_GUI

ActivitiesVisual Studio Code

Mar 24 16:04

FileEditSelectionViewGoRunTerminalHelp

Untitled (Workspace)

EXPLORER

UNTITLED (WORKSPACE)

aws

terraform

.terraform

task2

.terraform.terraform.lock.hclkeypairs.tfmain.tfoutputs.tfprovider.tfterraform.tfstate...terraform.tfvarsvariables.tfterraform.lock.hclmain.tfprovider.tfterraform.tfstate...terraform.tfstate.b...

terraform > task2 > main.tf112 resource "aws_instance" "Esmael_apache_ec2_public" {118 user_data = <<-EOF119 #!/bin/bash120 sudo apt update -y121 sudo apt install -y apache2122 echo "Welcome to Esmael's Public instance - IP: \$(hostname -I)" > /var/www/html/index.html123 sudo systemctl start apache2124 sudo systemctl enable apache2125 sudo systemctl restart apache2126 EOF127 key_name = aws_key_pair.esmael_keypair.key_name128 tags = {129 Name = "Esmael_apache_ec2_public"130 }131 }132133 resource "aws_instance" "Esmael_apache_ec2_private" {134 ami = var.aws_ami135 instance_type = var.instance_type136 subnet_id = aws_subnet.private_subnet.id137 vpc_security_group_ids = [aws_security_group.apache_sg.id]138 associate_public_ip_address = false139 user_data = <<-EOF140 #!/bin/bash141 sudo apt update -y142 sudo apt install -y apache2

PROBLEMSOUTPUTDEBUG CONSOLETERMINALPORTS

bash - task2

aws_nat_gateway.nat: Creation complete after 1m39s [id=nat-0f144026c96e38ef5]
aws_route_table.private_rt: Creating...
aws_route_table.private_rt: Creation complete after 3s [id=rtb-0d3ce4bf8d82bbe93]
aws_route_table_association.private_assoc: Creating...
aws_route_table_association.private_assoc: Creation complete after 2s [id=rtbassoc-0df194b5c01d183db]

Apply complete! Resources: 16 added, 0 changed, 0 destroyed.

Outputs:

elastic_ip = "35.168.141.18"
private_apache_private_ip = "10.0.2.46"
public_apache_private_ip = "10.0.1.100"
public_apache_public_ip = "34.204.95.82"

Home

serverb_GUI

ActivitiesVisual Studio Code

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Untitled (Workspace)

EXPLORER

UNTITLED (WORKSPACE)

aws

terraform

.terraform

task2

.terraform

.terraform.lock.hcl

keypairs.tf

main.tf

outputs.tf

provider.tf

terraform.tfstate

terraform.tfstate....

terraform.tfvars

variables.tf

.terraform.lock.hcl

main.tf

provider.tf

terraform.tfstate

terraform.tfstate.b...

main.tf

112 resource "aws_instance" "Esmael_apache_ec2_public" {

131 }

132

133 resource "aws_instance" "Esmael_apache_ec2_private" {

134 ami = var.aws_ami

135 instance_type = var.instance_type

136 subnet_id = aws_subnet.private_subnet.id

137 vpc_security_group_ids = [aws_security_group.apache_sg.id]

138 associate_public_ip_address = false

139 user_data = <<-EOF

140 #!/bin/bash

141 sudo apt update -y

142 sudo apt install -y apache2

143 echo "Welcome to Esmael's Private instance - IP: \$(hostname -I)" > /var/www/html/index.html

144 sudo systemctl start apache2

145 sudo systemctl enable apache2

146 sudo systemctl restart apache2

147 EOF

148 key_name = aws_key_pair.esmael_keypair.key_name

149 tags = {

150 Name = "Esmael_apache_ec2_private"

151 }

152 }

153

154

PROBLEMS

OUTPUT

DEBUG CONSOLE

TERMINAL

PORTS

bash - task2

aws_nat_gateway.nat: Creation complete after 1m39s [id=nat-0f144026c96e38ef5]

aws_route_table.private_rt: Creating...

aws_route_table.private_rt: Creation complete after 3s [id=rtb-0d3ce4bf8d82bbe93]

aws_route_table_association.private_assoc: Creating...

aws_route_table_association.private_assoc: Creation complete after 2s [id=rtbassoc-0df194b5c01d183db]

Apply complete! Resources: 16 added, 0 changed, 0 destroyed.

Outputs:

elastic_ip = "35.168.141.18"

private_apache_private_ip = "10.0.2.46"

public_apache_private_ip = "10.0.1.100"

public_apache_public_ip = "34.204.95.82"