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TASK: Deployment of a WordPress website in EC2 instance using terraform.

Step1: Configure AWS CLI using your credentials.

```
PS C:\Users\Saurabh Pundir\Desktop\aws_terraform\terraform_wordpress> aws configure
AWS Access Key ID [*****MT2A]:
AWS Secret Access Key [*****bAoa]:
Default region name [us-east-1]:
Default output format [None]:
PS C:\Users\Saurabh Pundir\Desktop\aws_terraform\terraform_wordpress>
```

Step2: **AWS Provider**

The Amazon Web Services (AWS) provider is used to interact with the many resources supported by AWS. The provider needs to be configured with the proper credentials before it can be used.

```
providers.tf
1  provider "aws" {
2      region = var.aws_reg
3      # version = "2.12.0"
4      profile = "default"
5
6  }
```

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Step3: Create a Terraform code for instance launching

```
ec2-database.tf
2 | #create a private key
3 | resource "tls_private_key" "mykey" {
4 |   algorithm = "RSA"
5 | }
6 |
7 | #make private key your keypair
8 | resource "aws_key_pair" "keypair1" {
9 |   key_name   = "mykey"
10 |  public_key = "${tls_private_key.mykey.public_key_openssh}"
11 |
12 |  depends_on = [
13 |    tls_private_key.mykey
14 |  ]
15 | }
16 |
17 |
18 | #to fetch the secret file
19 | resource "local_file" "key-file" {
20 |   content = "${tls_private_key.mykey.private_key_pem}"
21 |   filename = "mykey.pem"
22 |
23 |   depends_on = [
24 |     tls_private_key.mykey
25 |   ]
26 | }
27 |
28 |
29 |
30 |
31 | data "template_file" "phpconfig" {
32 |   template = file("files/conf.wp-config.php")
33 |
34 |   vars = {
35 |     db_port = aws_db_instance.mysql.port
36 |     db_host = aws_db_instance.mysql.address
37 |     db_user = var.username
38 |     db_pass = var.password
39 |   }
40 | }
41 |
42 |
43 | #create MySQL DB
44 | resource "aws_db_instance" "mysql" {
45 |   allocated_storage = 20
46 |   storage_type      = "gp2"
47 |   engine            = "mysql"
48 |   engine_version    = "5.7"
49 |   instance_class    = "db.t2.micro"
50 |   name              = var.dbname
51 |   username          = var.username
52 |   password          = var.password
53 |   parameter_group_name = "default.mysql5.7"
54 |   vpc_security_group_ids = [aws_security_group.mysql.id]
55 |   db_subnet_group_name = aws_db_subnet_group.mysql.name
56 |   skip_final_snapshot = true
57 | }
58 |
59 | #create ec2 Instance
60 | resource "aws_instance" "ec2" {
61 |   ami           = data.aws_ami.ubuntu.id
62 |   instance_type = "t2.micro"
63 |
64 |   depends_on = [
65 |     aws_db_instance.mysql,
66 |   ]
67 |
68 |   key_name          = aws_key_pair.keypair1.key_name
69 |   vpc_security_group_ids = [aws_security_group.web.id]
70 |   subnet_id        = aws_subnet.public1.id
71 |   associate_public_ip_address = true
72 |
73 |   #create a user data file
74 |   user_data = file("files/userdata.sh")
75 | }
76 |
77 | tags = {
78 |   Name = "EC2 Instance"
79 | }
80 |
81 | provisioner "file" {
82 |   source      = "files/userdata.sh"
83 |   destination = "/var/tmp/userdata.sh"
84 |
85 |   connection {
86 |     type      = "ssh"
87 |     user      = "ubuntu"
88 |     host      = self.public_ip
89 |     private_key = file("mykey.pem")
90 |   }
91 | }
92 |
93 | #to run userdata
94 | provisioner "remote-exec" {
95 |   inline = [
96 |     "chmod +x /var/tmp/userdata.sh",
97 |     "sh /var/tmp/userdata.sh",
98 |   ]
99 |
100 |   connection {
101 |     type      = "ssh"
102 |     user      = "ubuntu"
103 |     host      = self.public_ip
104 |     private_key = file("mykey.pem")
105 |   }
106 | }
107 |
108 | provisioner "file" {
109 |   content      = data.template_file.phpconfig.rendered
110 |   destination = "/var/tmp/wp-config.php"
111 |
112 |   connection {
113 |     type      = "ssh"
114 |     user      = "ubuntu"
115 |     host      = self.public_ip
116 |     private_key = file("mykey.pem")
117 |   }
118 | }
119 |
120 | provisioner "remote-exec" {
121 |   inline = [
122 |     "sudo cp /var/tmp/wp-config.php /var/www/html/wp-config.php",
123 |   ]
124 |
125 |   connection {
126 |     type      = "ssh"
127 |     user      = "ubuntu"
128 |     host      = self.public_ip
129 |     private_key = file("mykey.pem")
130 |   }
131 | }
132 |
133 | timeouts {
134 |   create = "20m"
135 | }
136 |
137 | data "aws_ami" "ubuntu" {
138 |   most_recent = true
139 |
140 |   filter {
141 |     name   = "name"
142 |     values = ["ubuntu/images/hvm-ssd/ubuntu-trusty-14.04-amd64-server"]
143 |   }
144 |
145 |   filter {
146 |     name   = "virtualization-type"
147 |     values = ["hvm"]
148 |   }
149 | }
```

Step3: Create a User Data shell script file.

```
files > userdata.sh
1  #!/bin/bash
2  sudo -- sh -c 'echo "127.0.0.1 `hostname`" >> /etc/hosts'
3  sudo apt-get update
4  sudo apt-get install mysql-client -y
5  sudo apt-get install apache2 apache2-utils -y
6  sudo apt-get install php5 -y
7  sudo apt-get install php5 libapache2-mod-php5 php5-mcrypt php5-curl php5-gd php5-xmlrpc -y
8  sudo apt-get install php5-mysqldb -y
9  sudo service apache2 restart
10 sudo wget -c http://wordpress.org/wordpress-5.1.1.tar.gz
11 sudo tar -xvzf wordpress-5.1.1.tar.gz
12 sleep 20
13 sudo mkdir -p /var/www/html/
14 sudo rsync -av wordpress/* /var/www/html/
15 sudo chown -R www-data:www-data /var/www/html/
16 sudo chmod -R 755 /var/www/html/
17 sudo cp /var/www/html/wp-config-sample.php /var/www/html/wp-config.php
18 sudo service apache2 restart
19 sleep 20
20
```

Step4: Create WordPress Config file

```
files > conf-wp-config.php
1  <?php
2  /**
3   * The base configuration for WordPress
4   *
5   * The wp-config.php creation script uses this file during the
6   * installation. You don't have to use the web site, you can
7   * copy this file to "wp-config.php" and fill in the values.
8   *
9   * This file contains the following configurations:
10  *
11  * * MySQL settings
12  * * Secret keys
13  * * Database table prefix
14  * * ABSPATH
15  *
16  * @link https://codex.wordpress.org/Editing_wp-config.php
17  *
18  * @package WordPress
19  */
20
21 // ** MySQL settings - You can get this info from your web host ** //
22 /** The name of the database for WordPress */
23 define( 'DB_NAME', 'wp_name' );
24
25 /** MySQL database username */
26 define( 'DB_USER', 'wp_user' );
27
28 /** MySQL database password */
29 define( 'DB_PASSWORD', 'wp_pass' );
30
31 /** MySQL hostname */
32 define( 'DB_HOST', 'localhost' );
33
34 /** Database charset to use in creating database tables. */
35 define( 'DB_CHARSET', 'utf8' );
36
37 /** The database collate type. Don't change this if in doubt. */
38 define( 'DB_COLLATE', '' );
39
40 /**#@+
41  * Authentication Unique Keys and Salts.
42  *
43  * Change these to different unique phrases!
44  * You can generate these using the {@link https://api.wordpress.org/secret-key/1.1/salt/ WordPress.org secret-key service}
45  * You can change these at any point in time to invalidate all existing cookies. This will force all users to have to log in again.
46  *
47  * @since 2.6.0
48  */
49 define( 'AUTH_KEY', 'put your unique phrase here' );
50 define( 'SECURE_AUTH_KEY', 'put your unique phrase here' );
51 define( 'LOGGED_IN_KEY', 'put your unique phrase here' );
52 define( 'NONCE_KEY', 'put your unique phrase here' );
53 define( 'AUTH_SALT', 'put your unique phrase here' );
54 define( 'SECURE_AUTH_SALT', 'put your unique phrase here' );
55 define( 'LOGGED_IN_SALT', 'put your unique phrase here' );
56 define( 'NONCE_SALT', 'put your unique phrase here' );
57
58 /**#@-*/
59
60 /**
61  * WordPress Database Table prefix.
62  *
63  * You can have multiple installations in one database if you give each
64  * a unique prefix. Only numbers, letters, and underscores please!
65  */
66 $table_prefix = 'wp_';
67
68 /**
69  * For developers: WordPress debugging mode.
70  *
71  * Change this to true to enable the display of notices during development.
72  * It is strongly recommended that plugin and theme developers use WP_DEBUG
73  * in their development environments.
74  */
75
76 /**
77  * For information on other constants that can be used for debugging,
78  * visit the Codex.
79  *
80  * @link https://codex.wordpress.org/Debugging_in_WordPress
81  */
82 define( 'WP_DEBUG', false );
83
84 /** That's all, stop editing! Happy publishing. */
85
86 /** Absolute path to the WordPress directory. */
87 if ( ! defined( 'ABSPATH' ) ) {
88     define( 'ABSPATH', dirname( __FILE__ ) . '/' );
89 }
90
91 /** Sets up WordPress vars and included files. */
92 require_once( ABSPATH . 'wp-settings.php' );
```

Step4: Create a Secure environment using VPC

```
security.tf
1 resource aws_security_group "mysql" {
2   name = "${var.stack}-DBSG"
3   description = "managed by terraform for db servers"
4   vpc_id = aws_vpc.vpc.id
5
6   tags = {
7     Name = "${var.stack}-DBSG"
8   }
9
10  ingress {
11    protocol = "tcp"
12    from_port = 3306
13    to_port = 3306
14    security_groups = ["${aws_security_group.web.id}"]
15  }
16
17  egress {
18    protocol = "-1"
19    from_port = 0
20    to_port = 0
21    cidr_blocks = ["0.0.0.0/0"]
22  }
23 }
24
25 resource aws_security_group "web" {
26   name = "${var.stack}-websg"
27   description = "This is for ${var.stack}'s web servers security group"
28   vpc_id = "${aws_vpc.vpc.id}"
29
30   tags = {
31     Name = "${var.stack}-websg"
32   }
33
34  ingress {
35    protocol = "tcp"
36    from_port = 22
37    to_port = 22
38    cidr_blocks = ["0.0.0.0/0"]
39  }
40
41  ingress {
42    protocol = "icmp"
43    from_port = -1
44    to_port = -1
45    cidr_blocks = [aws_vpc.vpc.cidr_block]
46  }
47
48  ingress {
49    protocol = "tcp"
50    from_port = 80
51    to_port = 80
52    cidr_blocks = ["0.0.0.0/0"]
53  }
54
55  egress {
56    protocol = "-1"
57    from_port = 0
58    to_port = 0
59    cidr_blocks = ["0.0.0.0/0"]
60  }
61 }
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```

Step5: Create an **OUTPUT** file

```
output.tf
1  output "ami_id" {
2    | value = data.aws_ami.ubuntu.id
3  }
4
5  output "Login" {
6    | value = "ssh -i ${aws_key_pair.keypair1.key_name} ubuntu@${aws_instance.ec2.public_ip}"
7  }
8
9  output "azs" {
10   | value = data.aws_availability_zones.azs.*.names
11 }
12
13 output "db_access_from_ec2" {
14   | value = "mysql -h ${aws_db_instance.mysql.address} -P ${aws_db_instance.mysql.port} -u ${var.username} -p${var.password}"
15 }
16
17 output "access" {
18   | value = "http://${aws_instance.ec2.public_ip}/index.php"
19 }
20
```

As we are done with creating **INFRASTRUCTURE CODE** now we have to implement It by running the following command in the working directory.

Step6: Run the following command

1. Terraform init

The `terraform init` command is used to initialize a working directory containing Terraform configuration files. This is the first command that should be run after writing a new Terraform configuration or cloning an existing one from version control. It is safe to run this command multiple times.

```
PS C:\Users\Saurabh Pundir\Desktop\aws_terraform\terraform_wordpress> terraform init
Initializing the backend...

Initializing provider plugins...

The following providers do not have any version constraints in configuration,
so the latest version was installed.

To prevent automatic upgrades to new major versions that may contain breaking
changes, it is recommended to add version = "..." constraints to the
corresponding provider blocks in configuration, with the constraint strings
suggested below.

* provider.aws: version = "~> 2.70"
* provider.local: version = "~> 1.4"
* provider.tls: version = "~> 2.2"

Warning: Interpolation-only expressions are deprecated

on ec2-database.tf line 8, in resource "aws_key_pair" "keypair1":
8:   public_key = "${tls_private_key.mykey.public_key_openssh}"

Terraform 0.11 and earlier required all non-constant expressions to be
provided via interpolation syntax, but this pattern is now deprecated. To
silence this warning, remove the "${" sequence from the start and the ")"
sequence from the end of this expression, leaving just the inner expression.

Template interpolation syntax is still used to construct strings from
expressions when the template includes multiple interpolation sequences or a
mixture of literal strings and interpolations. This deprecation applies only
to templates that consist entirely of a single interpolation sequence.

(and 2 more similar warnings elsewhere)

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.
PS C:\Users\Saurabh Pundir\Desktop\aws_terraform\terraform_wordpress>
```

<https://www.linkedin.com/in/saurabhpundir00/>

2. Terraform plan

The `terraform plan` command is used to create an execution plan. Terraform performs a refresh, unless explicitly disabled, and then determines what actions are necessary to achieve the desired state specified in the configuration files.

```
PS C:\Users\Saurabh Pundir\Desktop\aws_terraform\terraform_wordpress> terraform plan
Refreshing Terraform state in-memory prior to plan...
The refreshed state will be used to calculate this plan, but will not be
persisted to local or remote state storage.

data.aws_availability_zones.azs: Refreshing state...
data.aws_ami.ubuntu: Refreshing state...

-----
```

3. Terraform apply –auto-approve

The `terraform apply` command is used to apply the changes required to reach the desired state of the configuration, or the pre-determined set of actions generated by a `terraform plan` execution plan.

```
PS C:\Users\Saurabh Pundir\Desktop\aws_terraform\terraform_wordpress> terraform apply --auto-approve
data.aws_availability_zones.azs: Refreshing state...
data.aws_ami.ubuntu: Refreshing state...
tls_private_key.mykey: Creating...
tls_private_key.mykey: Creation complete after 1s [id=abbebee6ccab7f7246a5fb3e9ba4f637f08523b3]
local_file.key-file: Creating...
local_file.key-file: Creation complete after 0s [id=12ee5f5b5d38cf5e22e65c7665de34888ed99121]
aws_key_pair.keypair1: Creating...
aws_eip.eip: Creating...
aws_vpc.vpc: Creating...
aws_key_pair.keypair1: Creation complete after 5s [id=mykey]
```

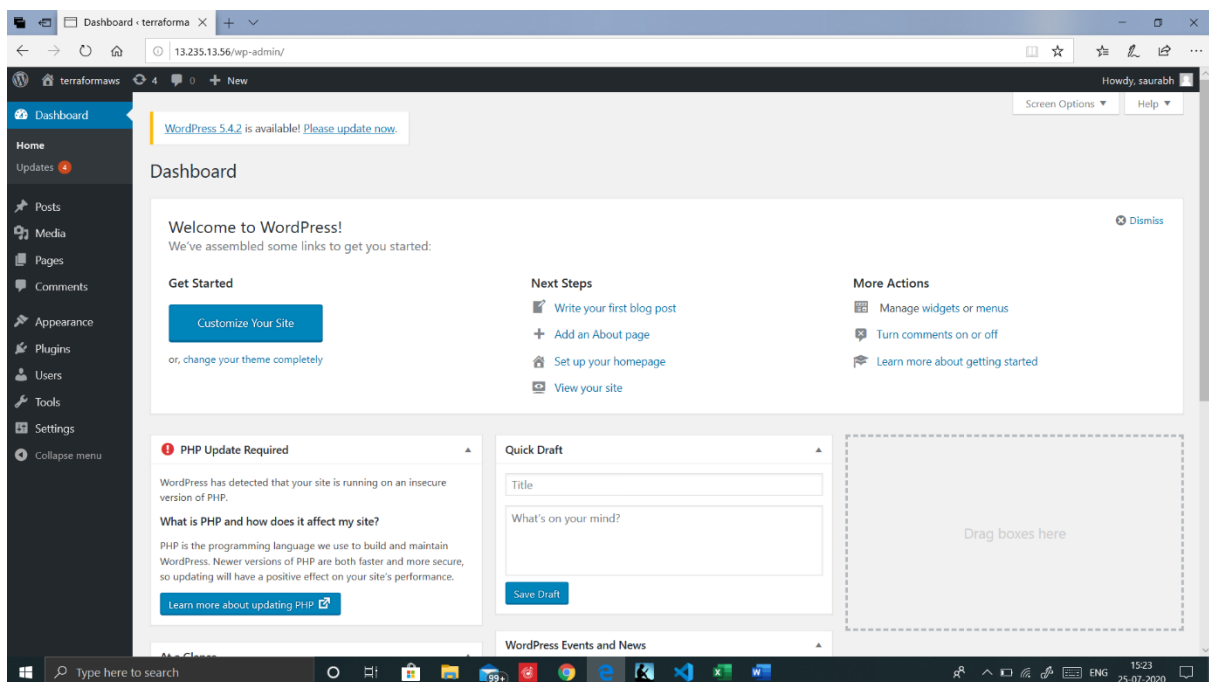
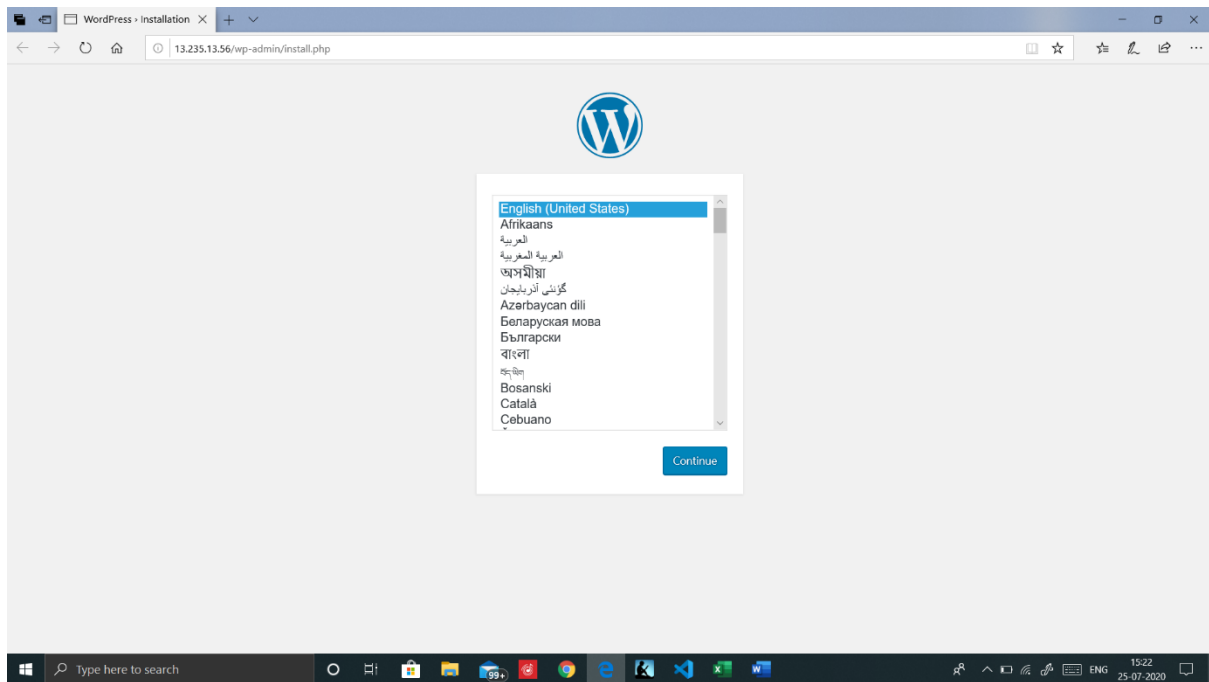
```
Apply complete! Resources: 1 added, 1 changed, 1 destroyed.

Outputs:
Login = ssh -i mykey ubuntu@13.235.13.56
access = http://13.235.13.56/index.php
ami_id = ami-0460ce78b2cf43489
azs = [
  "ap-south-1a",
  "ap-south-1b",
  "ap-south-1c",
]
db_access_from_ec2 = mysql -h terraform-20200725091643788500000001.c20eywgr4fzg.ap-south-1.rds.amazonaws.com -P 3306 -u saurabh -pmypass123
```

Our **Infrastructure** has been created and you can check that all the **AWS resources** have been automatically deployed

Now, click on the **access link** and you'll be directed to the **WordPress website**.

<https://www.linkedin.com/in/saurabhpundir00/>



Your **INFRASTRUCTURE** is deployed and running on **AWS**

<https://www.linkedin.com/in/saurabhpundir00/>

aws Services Resource Groups

New EC2 Experience

EC2 Dashboard

Launch Instance

Filter by tags and attributes or search by keyword

Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status	Public DNS (IPv4)	IPv4 Public IP	IPv6
EC2 Instance	i-00aa1580ae17cac06	t2.micro	ap-south-1a	terminated	None				
EC2 Instance	i-038bfa707fe5be3d	t2.micro	ap-south-1a	terminated	None				
EC2 Instance	i-05b8ae5515b0ae49	t2.micro	ap-south-1a	running	2/2 checks	None	13.235.13.56		

Instance: i-05b8ae5515b0ae49 (EC2 Instance) Public IP: 13.235.13.56

Description Status Checks Monitoring Tags

Instance ID: i-05b8ae5515b0ae49
Instance state: running
Instance type: t2.micro
Finding: Opt-in to AWS Compute Optimizer for recommendations.
Private DNS: ip-10-0-1-27.ap-south-1.compute.internal
Private IPs: 10.0.1.27
Secondary private IPs: VPC ID: vpc-0ff2bb6439257c04a (terraform-vpc)
Subnet ID: subnet-0659198f5abb1c86 (terraform-public-1)
Network interfaces: eth0
IAM role: -

Public DNS (IPv4): -
IPv4 Public IP: 13.235.13.56
IPv6 IPs: -
Elastic IPs: -
Availability zone: ap-south-1a
Security groups: terraform-webSG, view inbound rules, view outbound rules
Scheduled events: No scheduled events
AMI ID: ubuntu/images/hvm-ssd/ubuntu-trusty-14.04-amd64-server-20191107 (ami-0460ca78b2c43489)
Platform details: Linux/UNIX
Usage operation: RunInstances
Source/dest. check: True

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aws Services Resource Groups

New VPC Experience

VPC Dashboard

Create VPC

Filter by VPC: Select a VPC

VIRTUAL PRIVATE CLOUD

Your VPCs

Subnets

Route Tables

Internet Gateways

Egress Only Internet Gateways

DHCP Options Sets

Elastic IPs

Managed Prefix Lists

search: vpc-0ff2bb6439257c04a Add filter

Name	VPC ID	State	IPv4 CIDR	IPv6 CIDR	DHCP options set	Main Route table	Main Network ACL
terraform-vpc	vpc-0ff2bb6439257c04a	available	10.0.0.0/16	-	dopt-65bca10d	rtb-0b2240a207fa73bad	acl-0defd52d744c1

VPC: vpc-0ff2bb6439257c04a

Description CIDR Blocks Flow Logs Tags

VPC ID: vpc-0ff2bb6439257c04a
State: available
IPv4 CIDR: 10.0.0.0/16
IPv6 Pool: -
Network ACL: acl-0defd52d744c1333b8
DHCP options set: dopt-65bca10d
Owner: 706035267738

Tenancy: default
Default VPC: No
IPv6 CIDR: -
DNS resolution: Enabled
DNS hostnames: Disabled
Route table: rtb-0b2240a207fa73bad

aws Services Resource Groups

New VPC Experience

VPC Dashboard

Filter by VPC: Select a VPC

VIRTUAL PRIVATE CLOUD

Your VPCs

Subnets

Route Tables

Internet Gateways

Egress Only Internet Gateways

DHCP Options Sets

Elastic IPs

Managed Prefix Lists

Endpoints

Endpoint Services

NAT Gateways

Peering Connections

SECURITY

Network ACLs

search: subnet-0659198f5abb1c86 Add filter

Name	Subnet ID	State	VPC	IPv4 CIDR	Available IPv4	IPv6 CIDR	Availability Zone	Available
terraform-p...	subnet-0659198f5abb1c86	available	vpc-0ff2bb6439257c04a ...	10.0.1.0/24	249	-	ap-south-1a	aps1-1z
terraform-pr...	subnet-069af258f36d0310b	available	vpc-0ff2bb6439257c04a ...	10.0.3.0/24	251	-	ap-south-1a	aps1-1z
terraform-pr...	subnet-0ab88d8fe8780f11a	available	vpc-0ff2bb6439257c04a ...	10.0.5.0/24	251	-	ap-south-1c	aps1-1z
terraform-p...	subnet-0cd7a36b6e3770889	available	vpc-0ff2bb6439257c04a ...	10.0.2.0/24	251	-	ap-south-1b	aps1-1z
terraform-pr...	subnet-0ff79b96a0badb5f8	available	vpc-0ff2bb6439257c04a ...	10.0.4.0/24	250	-	ap-south-1b	aps1-1z

Subnet: subnet-0659198f5abb1c86

Description Flow Logs Route Table Network ACL Tags Sharing

Edit route table association

Route Table: rtb-09896616fb94e212 | terraform-public

Destination	Target
10.0.0.0/16	local
0.0.0.0/0	lgw-0ec80d87a5d7f127d

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Internet gateways (1/2)

Name	Internet gateway ID	State	VPC ID	Owner
igw-0e9a5966	igw-0e9a5966	Attached	vpc-decdffb6	706035267738
terraform-igw	igw-0ec80d87a5d7f127d	Attached	vpc-0ff2bb6439257c04a terraform-vpc	706035267738

Details

Internet gateway ID	igw-0ec80d87a5d7f127d	State	Attached	VPC ID	vpc-0ff2bb6439257c04a terraform-vpc	Owner	706035267738
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Elastic IP addresses (1/1)

Name	Public IPv4 address	Allocation ID	Associated instance ID	Private IP address
terraform-nat-ip	52.66.123.127	eipalloc-06ecd046510910152	-	10.0.1.121

Summary

Public IPv4 address	52.66.123.127	Allocation ID	eipalloc-06ecd046510910152	Association ID	eipassoc-03ca7d11165cdf48b	Scope	VPC
Associated instance ID	-	Private IP address	10.0.1.121	Network interface ID	eni-047e84962df900ff8	Network interface owner account ID	706035267738
Public DNS	-	NAT Gateway ID	nat-0c734bf2a2072dee7 (terraform-nat)	Address pool	Amazon	Customer owned IP address	-
Customer owned IP address pool	-						

Route Tables

Name	Route Table ID	Explicit subnet associator	Edge associations	Main	VPC ID	Owner
terraform-pr...	rtb-0414500ac3a3d5842	3 subnets	-	No	vpc-0ff2bb6439257c04a ...	706035267738
terraform-p...	rtb-098896616fb94e212	2 subnets	-	No	vpc-0ff2bb6439257c04a ...	706035267738
rtb-0b2240a207fa73bad	-	-	-	Yes	vpc-0ff2bb6439257c04a ...	706035267738
rtb-0cb34467	-	-	-	Yes	vpc-decdffb6	706035267738

Route Table: rtb-0414500ac3a3d5842

Routes

Destination	Target	Status	Propagated
10.0.0.0/16	local	active	No
0.0.0.0/0	nat-0c734bf2a2072dee7	active	No

4. Terraform destroy –auto-update

The `terraform destroy` command is used to destroy the Terraform-managed infrastructure.

<https://www.linkedin.com/in/saurabhpundir00/>

```
Terraform 0.11 and earlier required all non-constant expressions to be
provided via interpolation syntax, but this pattern is now deprecated. To
silence this warning, remove the "${" sequence from the start and the "}"
sequence from the end of this expression, leaving just the inner expression.
```

```
Template interpolation syntax is still used to construct strings from
expressions when the template includes multiple interpolation sequences or a
mixture of literal strings and interpolations. This deprecation applies only
to templates that consist entirely of a single interpolation sequence.
```

```
(and 2 more similar warnings elsewhere)
```

```
Destroy complete! Resources: 24 destroyed.
```

```
PS C:\Users\Saurabh Pundir\Documents> terraform destroy
```

Github LINK: https://github.com/saurabhpundir2000/aws_terraform