

Configuration Manual

MSc Research Project
Cloud Computing

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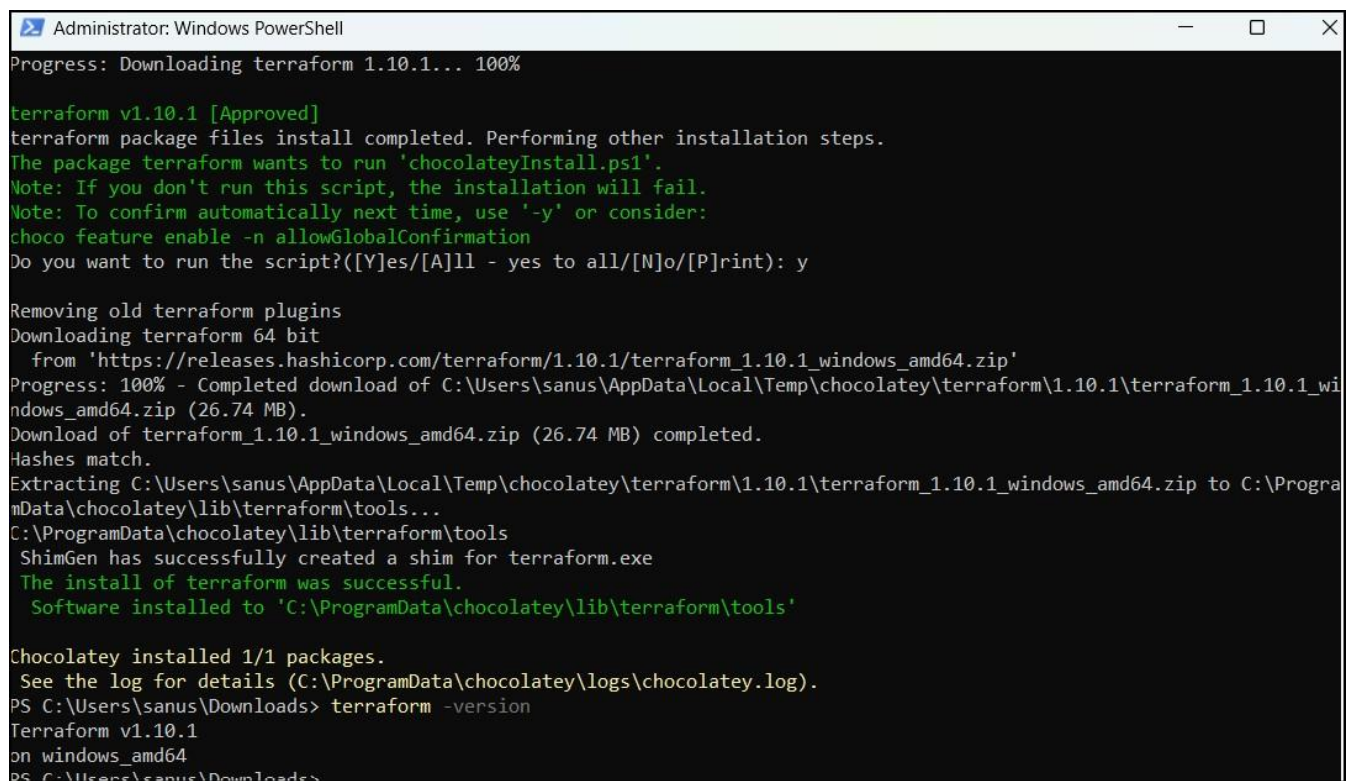
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Configuration Manual

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1 How to Install Terraform?

- Go the Terraform Downloads Page and download the Windows (64-bit) .zip file.
- Extract the downloaded .zip to a directory like C:\Users\sanus\Downloads\Terraform.
- Setting Open Environment Variables by using the Start Menu.
- However, when using command prompts and calling functions, you need to modify the Path under System Variables by adding the folder containing the extracted Terraform.
- To check the installation of Terraform launch the Command Prompt or PowerShell type terraform -version.
- Chocolatey is one of the best package managers for windows download it and then use choco install terraform to install Terraform. Check on the terminal using terraform version.



```
Administrator: Windows PowerShell
Progress: Downloading terraform 1.10.1... 100%

terraform v1.10.1 [Approved]
terraform package files install completed. Performing other installation steps.
The package terraform wants to run 'chocolateyInstall.ps1'.
Note: If you don't run this script, the installation will fail.
Note: To confirm automatically next time, use '-y' or consider:
choco feature enable -n allowGlobalConfirmation
Do you want to run the script?([Y]es/[A]ll - yes to all/[N]o/[P]rint): y

Removing old terraform plugins
Downloading terraform 64 bit
  from 'https://releases.hashicorp.com/terraform/1.10.1/terraform_1.10.1_windows_amd64.zip'
Progress: 100% - Completed download of C:\Users\sanus\AppData\Local\Temp\chocolatey\terraform\1.10.1\terraform_1.10.1_wi
ndows_amd64.zip (26.74 MB).
Download of terraform_1.10.1_windows_amd64.zip (26.74 MB) completed.
Hashes match.
Extracting C:\Users\sanus\AppData\Local\Temp\chocolatey\terraform\1.10.1\terraform_1.10.1_windows_amd64.zip to C:\Progra
mData\chocolatey\lib\terraform\tools...
C:\ProgramData\chocolatey\lib\terraform\tools
ShimGen has successfully created a shim for terraform.exe
The install of terraform was successful.
  Software installed to 'C:\ProgramData\chocolatey\lib\terraform\tools'

Chocolatey installed 1/1 packages.
See the log for details (C:\ProgramData\chocolatey\logs\chocolatey.log).
PS C:\Users\sanus\Downloads> terraform -version
Terraform v1.10.1
on windows_amd64
PS C:\Users\sanus\Downloads>
```

Figure 1: Terraform Installation

2 How to create IAM role with login credentials in AWS?

The access to the IAM services requires having an active AWS cloud account to complete below steps. It is better to take a different AWS IAM role which will be used for performing further interactions with the services.

Create a New IAM Role

- Access the AWS Management Console
- Search for **IAM** in the search bar and navigate to the IAM service.
- Create a New IAM Role
- Select Trusted Entity
- Attach Policies

Eg:

JSON

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": "s3:*",
      "Resource": "*"
    }
  ]
}
```

- Set Role Name
- Create Role

Generate Login Credentials for an IAM User

- Create an IAM User
- Attach the Role or Policies
- Generate Access Keys

Terraform Workflow for IAM Role and User

- Write Terraform Config (main.tf)
- terraform init
- terraform apply
- AWS Resources Created (IAM Role, Policies, User, Credentials) • Retrieve & Use Credentials

```

IAMGroups.tf X
Secure-Terraform-Infrastructure > IAMGroups.tf
1 # Existing Groups and Policies
2 resource "aws_iam_group" "admins" {
3   name = "AdminGroup"
4 }
5
6 resource "aws_iam_group_policy_attachment" "admins_policy_attach" {
7   group      = aws_iam_group.admins.name
8   policy_arn = "arn:aws:iam::aws:policy/AdministratorAccess"
9 }
10
11 resource "aws_iam_group" "devops" {
12   name = "DevOpsGroup"
13 }
14
15 resource "aws_iam_policy" "devops_policy" {
16   name          = "DevOpsPolicy"
17   description   = "Policy for DevOps team to manage infrastructure"
18   policy        = data.aws_iam_policy_document.devops_policy.json
19 }
20
21 data "aws_iam_policy_document" "devops_policy" {
22   statement [

```

Figure 2: IAM Groups in Terraform

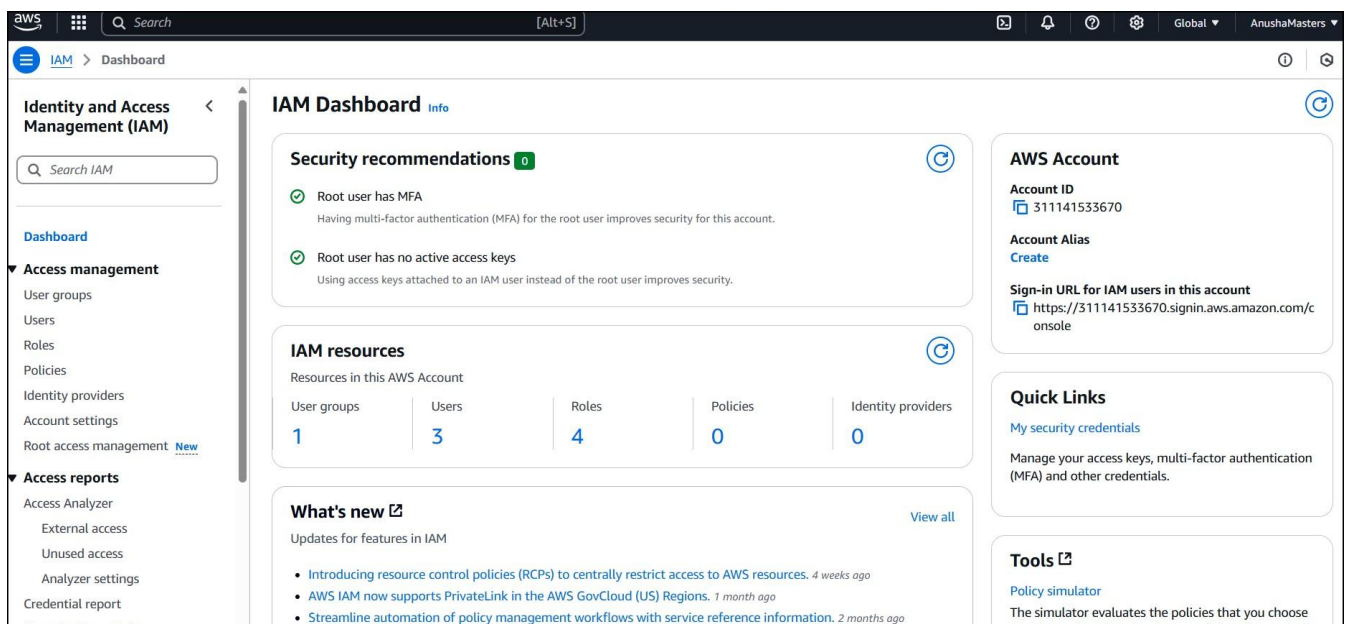
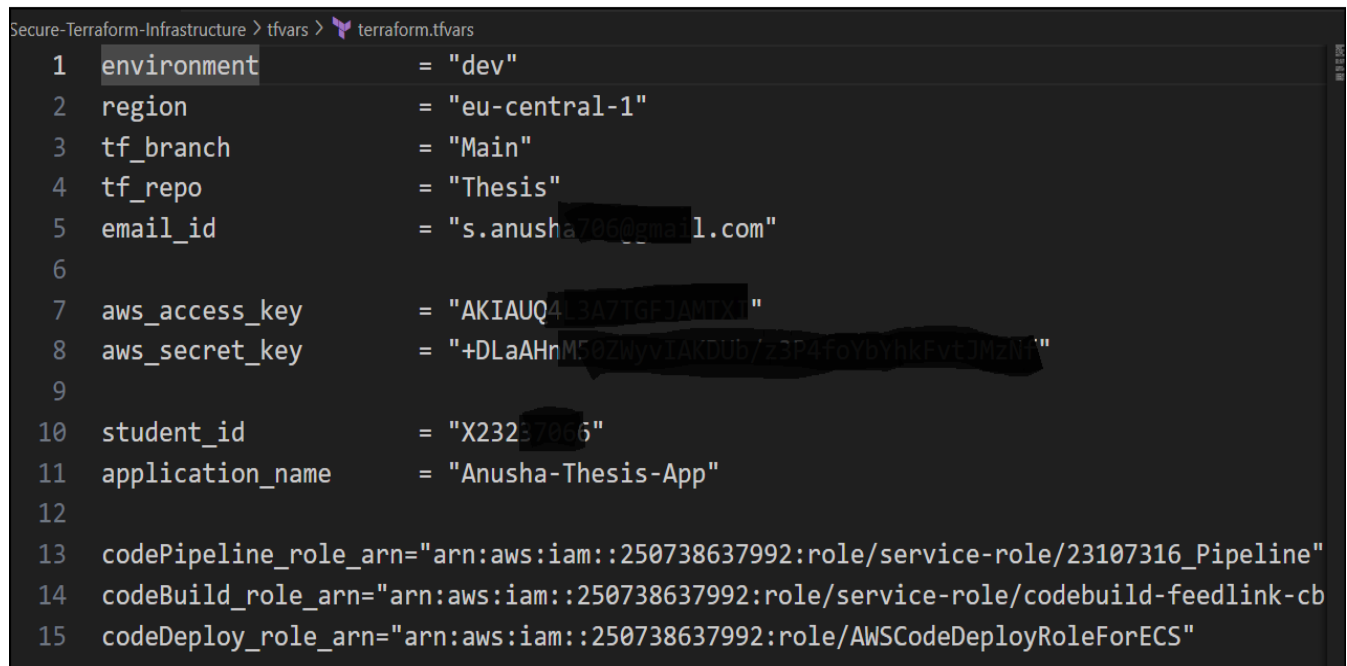


Figure 3: IAM Dashboard in AWS

3 How to set generated credentials in variable file. (tfvars>terraform.tfvars)?

Facing sensitive credentials including API keys, database passwords, cloud provider access keys, etc. it is vital to adhere to secure, automated and consistent approach to work. This guide builds on the different areas of how to create, set up and protect credential in Terraform Projects.

- Define credentials in variables as variables in the variables.tf file.
- Create/get your credential and store them in terraform.tfvars in a safe manner.
- Reading these variables in the Terraform configuration.



```
Secure-Terraform-Infrastructure > tfvars > terraform.tfvars
1 environment = "dev"
2 region      = "eu-central-1"
3 tf_branch   = "Main"
4 tf_repo     = "Thesis"
5 email_id    = "s.anusha706@gmail.com"
6
7 aws_access_key = "AKIAUQ413A7TGFJANTX1"
8 aws_secret_key = "+DLAhnM50ZWYvIAKDUB/z3P4foYbYhkFvt0JMzN1"
9
10 student_id    = "X23237066"
11 application_name = "Anusha-Thesis-App"
12
13 codePipeline_role_arn="arn:aws:iam::250738637992:role/service-role/23107316_Pipeline"
14 codeBuild_role_arn="arn:aws:iam::250738637992:role/service-role/codebuild-feedlink-cb"
15 codeDeploy_role_arn="arn:aws:iam::250738637992:role/AWSCodeDeployRoleForECS"
```

Figure 4: Terraform Variables

4 How to Run?

- **Install Prerequisites** ○ Terraform: Available for download on Terraform's official website: Install on your computer.
 - AWS CLI: It is installed and set up using Command Line Interface abbreviated as CLI by using the aws configure.
- **Configure Project** ○ Also, make sure any files as the awsKey.pem file is appropriately stored in the correct format and from the wrong hands. Update permissions for private keys: `chmod 400 awsKey.pem`
- **Initialize Terraform**
 - Set up the environment and download necessary plugins: `terraform init`
- **Validate and Preview Changes** ○ Validate the configuration syntax `terraform validate`
 - Preview changes Terraform will make `terraform plan`

- **Deploy Infrastructure** ○ Apply the configuration to deploy resources terraform apply -var-file=tfvars/terraform.tfvars
- **Review Outputs**
 - Display important outputs defined in outputs.tf: terraform output
- **Clean Up Resources** ○ If you need to tear down the infrastructure: terraform destroy -var-file=tfvars/terraform.tfvars

```
Secure-Terraform-Infrastructure > outputs.tf
1  output "vpc_id" {
2    value = aws_vpc.main.id
3  }
4
5  output "public_subnets" {
6    value = aws_subnet.public[*].id
7  }
8
9  output "private_subnets" {
10   value = aws_subnet.private[*].id
11 }
12
13 output "nat_instance_id" {
14   value = aws_instance.nat.id
15 }
16
17 output "bastion_host_id" {
18   value = aws_instance.bastion.id
19 }
20
```

Figure 5: Terraform Output

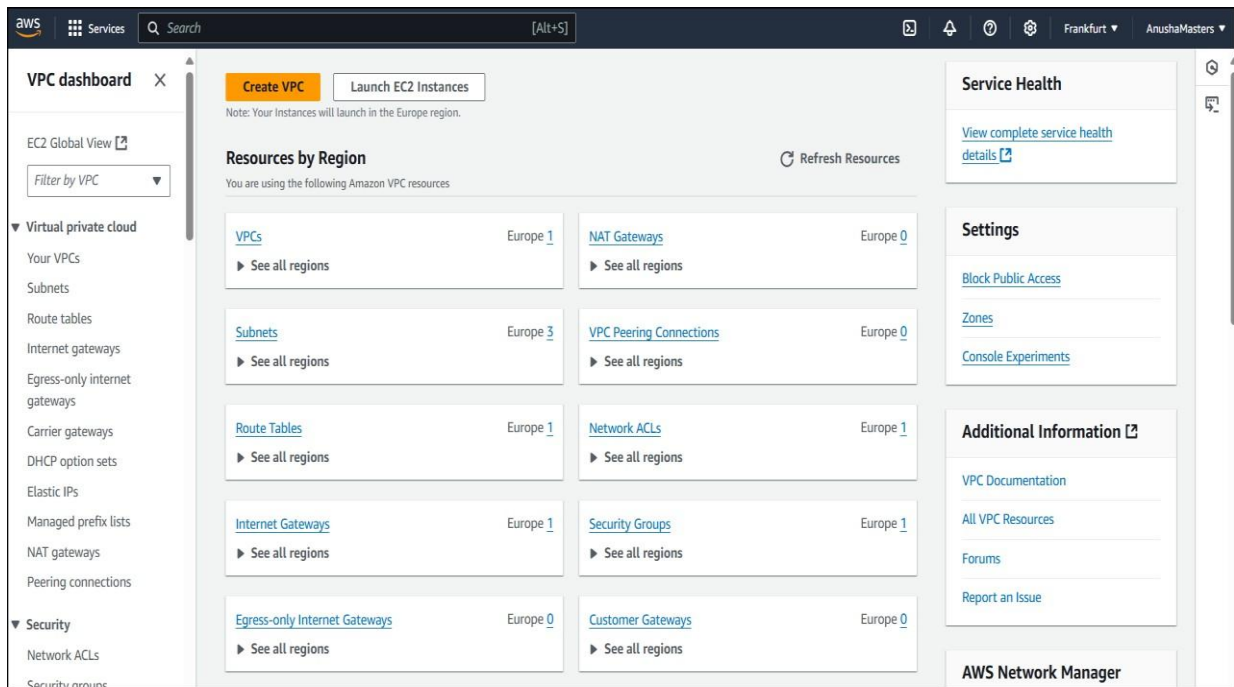


Figure 6: AWS Resources

References

1. Terraform official documentation for installation:

<https://www.terraform.io/downloads.html>

2. Chocolatey Terraform installation guide:

<https://community.chocolatey.org/packages/terraform>

3. AWS official documentation for creating IAM

roles: https://docs.aws.amazon.com/IAM/latest/UserGuide/id_roles.html

4. AWS JSON policy syntax guide:

https://docs.aws.amazon.com/IAM/latest/UserGuide/reference_policies.html

5. Terraform variable configuration guide:

<https://developer.hashicorp.com/terraform/language/values/variables>

6. Terraform best practices for sensitive variables:

<https://developer.hashicorp.com/terraform/language/values/variables#sensitive-values>

7. AWS CLI installation guide:

<https://docs.aws.amazon.com/cli/latest/userguide/installcliv2.html>

8. Terraform CLI commands and initialization steps:

<https://developer.hashicorp.com/terraform/cli/commands>