LAB ASSIGNMENTS 1: Terraform

What is Iac?

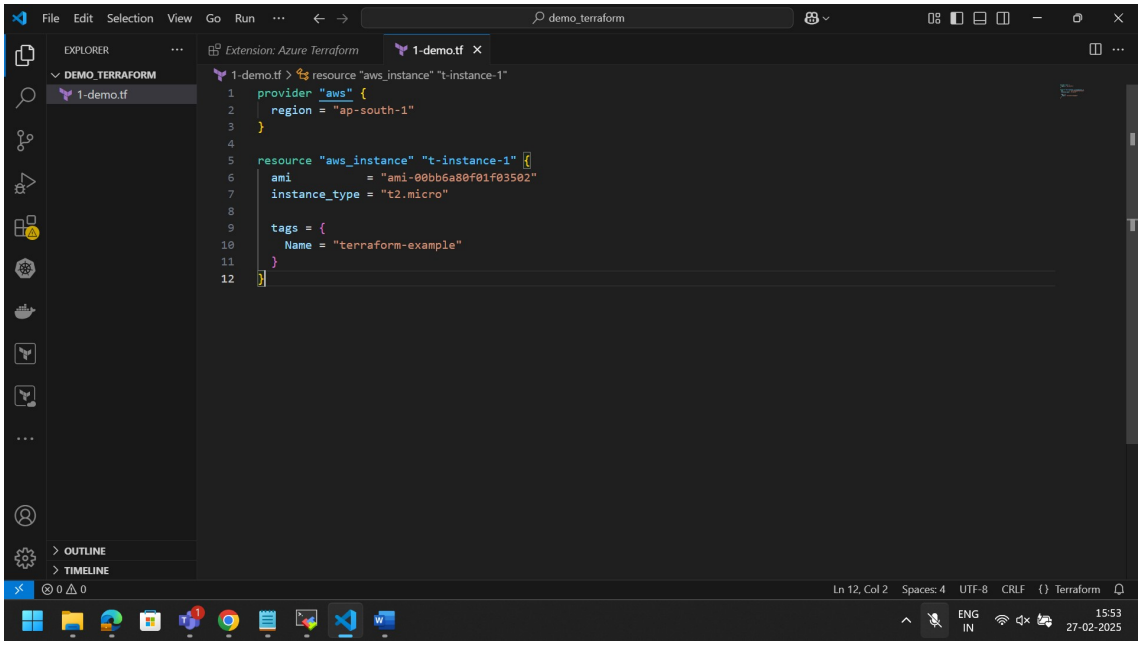
As Code (IaC) is a practice where infrastructure is managed and provisioned using code rather than manual processes.
Similar to application code, the infrastructure code is stored in a version control systems (VCS), that ensure infrastructure changes are trackable and scalable.
By defining infrastructure in descriptive, machine-readable files,IaC enables automation, consistency, and repeatability while reducing human error.

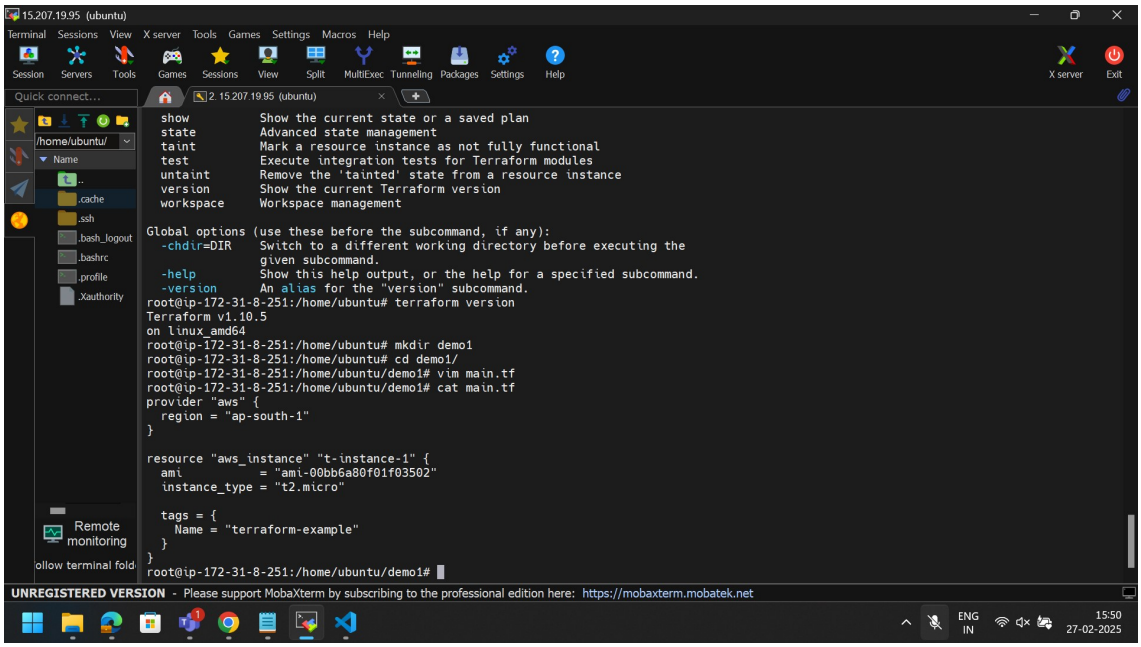
Why use Terraform?

Declarative approach allows users to define the desired state of their infrastructure, which Terraform then enforces. This capability extends across various cloud providers and on-premises environments, offering flexibility and reducing the complexity of managing multi-cloud or hybrid environments.

Lab assignment

1: creating an ec2 instance of aws




15.207.19.95 (ubuntu)
Terminal Sessions View X server Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
X server Exit
Quick connect...
2. 15.207.19.95 (ubuntu)
/home/ubuntu/
Name
.cache
.ssh
.bash_logout
.bashrc
.profile
.Xauthority
Remote monitoring
ollow terminal fold
show Show the current state or a saved plan
state Advanced state management
taint Mark a resource instance as not fully functional
test Execute integration tests for Terraform modules
untaint Remove the 'tainted' state from a resource instance
version Show the current Terraform version
workspace Workspace management
Global options (use these before the subcommand, if any):
-chdir=DIR Switch to a different working directory before executing the given subcommand.
-help Show this help output, or the help for a specified subcommand.
-version An alias for the "version" subcommand.
root@ip-172-31-8-251:/home/ubuntu# terraform version
Terraform v1.10.5
on linux_amd64
root@ip-172-31-8-251:/home/ubuntu# mkdir demo1
root@ip-172-31-8-251:/home/ubuntu# cd demo1/
root@ip-172-31-8-251:/home/ubuntu/demo1# vim main.tf
root@ip-172-31-8-251:/home/ubuntu/demo1# cat main.tf
provider "aws" {
region = "ap-south-1"
}
resource "aws_instance" "t-instance-1" {
ami = "ami-00bb6a80f01f03502"
instance_type = "t2.micro"
tags = {
Name = "terraform-example"
}
}
root@ip-172-31-8-251:/home/ubuntu/demo1#
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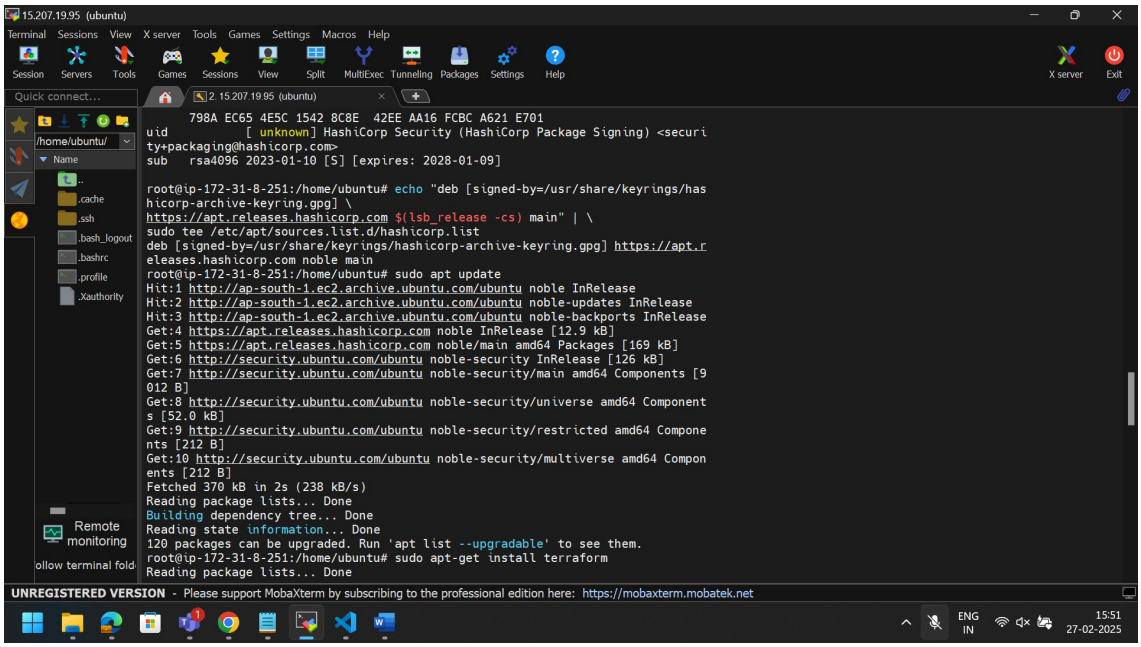
ENG IN
15:50
27-02-2025


15.207.19.95 (ubuntu)
Terminal Sessions View X server Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
X server Exit
Quick connect...
2. 15.207.19.95 (ubuntu)
/home/ubuntu/
Name
.cache
.ssh
.bash_logout
.bashrc
.profile
.Xauthority
Remote monitoring
ollow terminal fold
798A EC65 4E5C 1542 8C8E 42EE AA16 FCBC A621 E701
uid [unknown] HashiCorp Security (HashiCorp Package Signing) <security+packaging@hashicorp.com>
sub rsa4096 2023-01-10 [S] [expires: 2028-01-09]
root@ip-172-31-8-251:/home/ubuntu# echo "deb [signed-by=/usr/share/keyrings/hashicorp-archive-keyring.gpg] \
https://apt.releases.hashicorp.com $(lsb_release -cs) main" | \
sudo tee /etc/apt/sources.list.d/hashicorp.list
deb [signed-by=/usr/share/keyrings/hashicorp-archive-keyring.gpg] https://apt.releases.hashicorp.com noble main
root@ip-172-31-8-251:/home/ubuntu# sudo apt update
Hit:1 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu noble InRelease
Hit:2 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:3 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu noble-backports InRelease
Get:4 https://apt.releases.hashicorp.com noble InRelease [12.9 kB]
Get:5 https://apt.releases.hashicorp.com noble/main amd64 Packages [169 kB]
Get:6 http://security.ubuntu.com/ubuntu noble-security InRelease [126 kB]
Get:7 http://security.ubuntu.com/ubuntu noble-security/main amd64 Components [9012 B]
Get:8 http://security.ubuntu.com/ubuntu noble-security/universe amd64 Components [52.0 kB]
Get:9 http://security.ubuntu.com/ubuntu noble-security/restricted amd64 Components [212 B]
Get:10 http://security.ubuntu.com/ubuntu noble-security/multiverse amd64 Components [212 B]
Fetched 370 kB in 2s (238 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
120 packages can be upgraded. Run 'apt list --upgradable' to see them.
root@ip-172-31-8-251:/home/ubuntu# sudo apt-get install terraform
Reading package lists... Done
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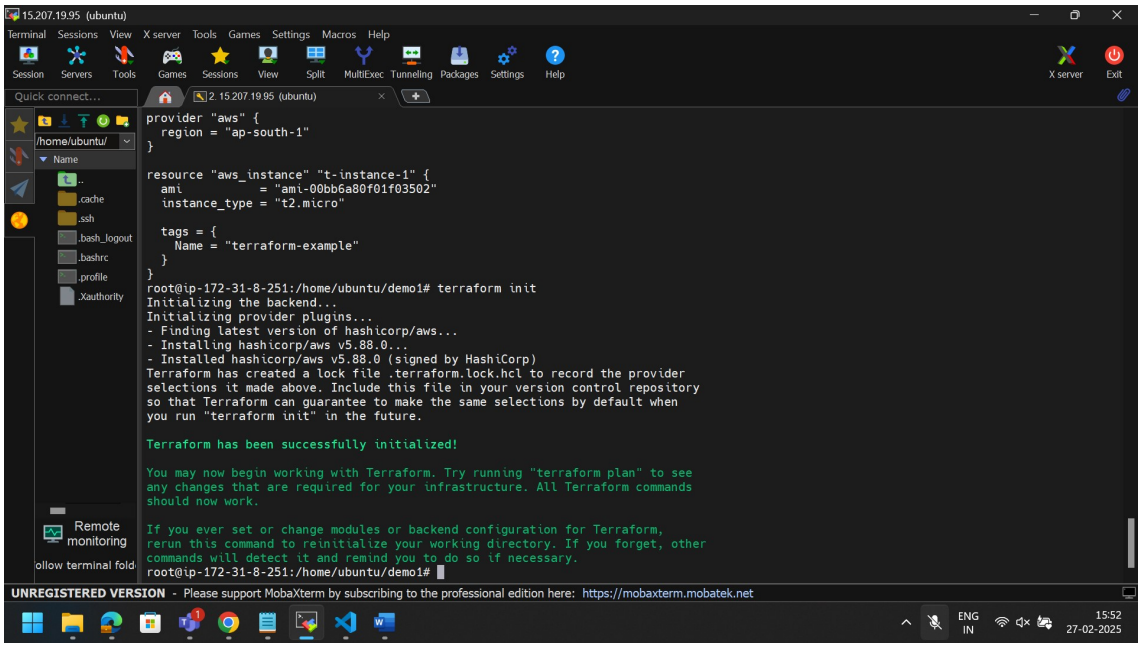
15.207.19.95 (ubuntu)
Terminal Sessions View X server Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help X server Exit
Quick connect...
2. 15.207.19.95 (ubuntu)
/home/ubuntu/
Name
.cache
.ssh
.bash_logout
.bashrc
.profile
.Xauthority
Remote monitoring
ollow terminal fold
provider "aws" {
region = "ap-south-1"
}
resource "aws_instance" "t-instance-1" {
ami = "ami-00bb6a80f01f03502"
instance_type = "t2.micro"
tags = {
Name = "terraform-example"
}
}
root@ip-172-31-8-251:/home/ubuntu/demo1# terraform init
Initializing the backend...
Initializing provider plugins...
- Finding latest version of hashicorp/aws...
- Installing hashicorp/aws v5.88.0...
- Installed hashicorp/aws v5.88.0 (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.
root@ip-172-31-8-251:/home/ubuntu/demo1#
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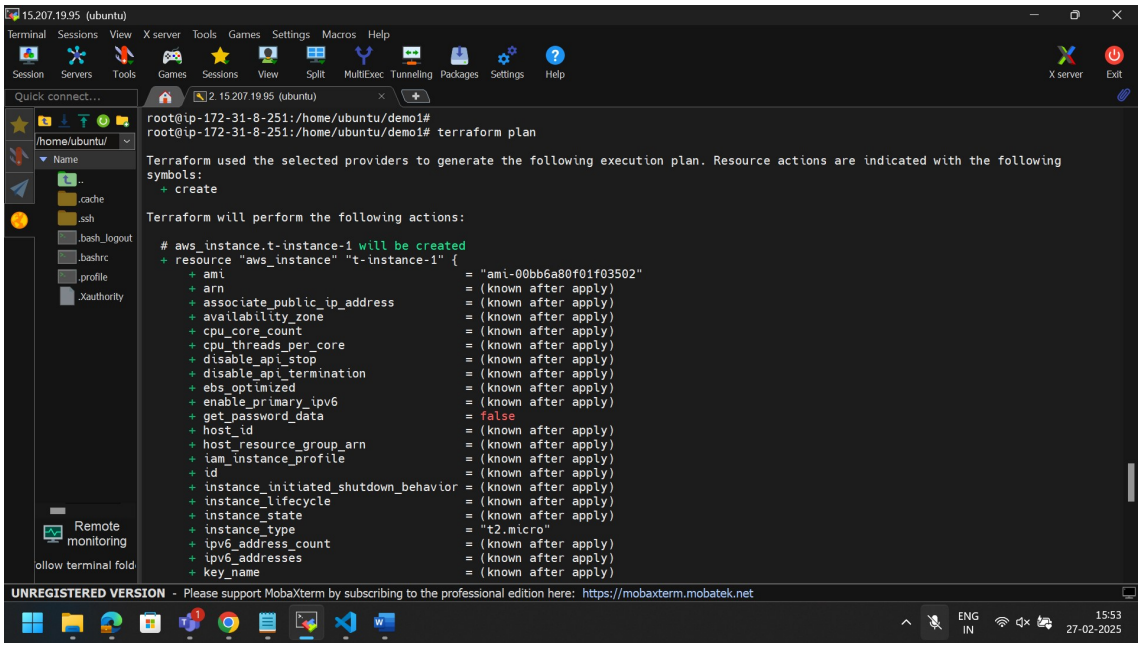
15.207.19.95 (ubuntu)
Terminal Sessions View X server Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help X server Exit
Quick connect...
2. 15.207.19.95 (ubuntu)
/home/ubuntu/
Name
.cache
.ssh
.bash_logout
.bashrc
.profile
.Xauthority
Remote monitoring
ollow terminal fold
root@ip-172-31-8-251:/home/ubuntu/demo1#
root@ip-172-31-8-251:/home/ubuntu/demo1# terraform plan
Terraform used the selected providers to generate the following execution plan. Resource actions are indicated with the following
symbols:
+ create
Terraform will perform the following actions:
# aws_instance.t-instance-1 will be created
+ resource "aws_instance" "t-instance-1" {
+ ami = "ami-00bb6a80f01f03502"
+ arn = (known after apply)
+ associate_public_ip_address = (known after apply)
+ availability_zone = (known after apply)
+ cpu_core_count = (known after apply)
+ cpu_threads_per_core = (known after apply)
+ disable_api_stop = (known after apply)
+ disable_api_termination = (known after apply)
+ ebs_optimized = (known after apply)
+ enable_primary_ipv6 = (known after apply)
+ get_password_data = false
+ host_id = (known after apply)
+ host_resource_group_arn = (known after apply)
+ iam_instance_profile = (known after apply)
+ id = (known after apply)
+ instance_initiated_shutdown_behavior = (known after apply)
+ instance_lifecycle = (known after apply)
+ instance_state = (known after apply)
+ instance_type = "t2.micro"
+ ipv6_address_count = (known after apply)
+ ipv6_addresses = (known after apply)
+ key_name = (known after apply)
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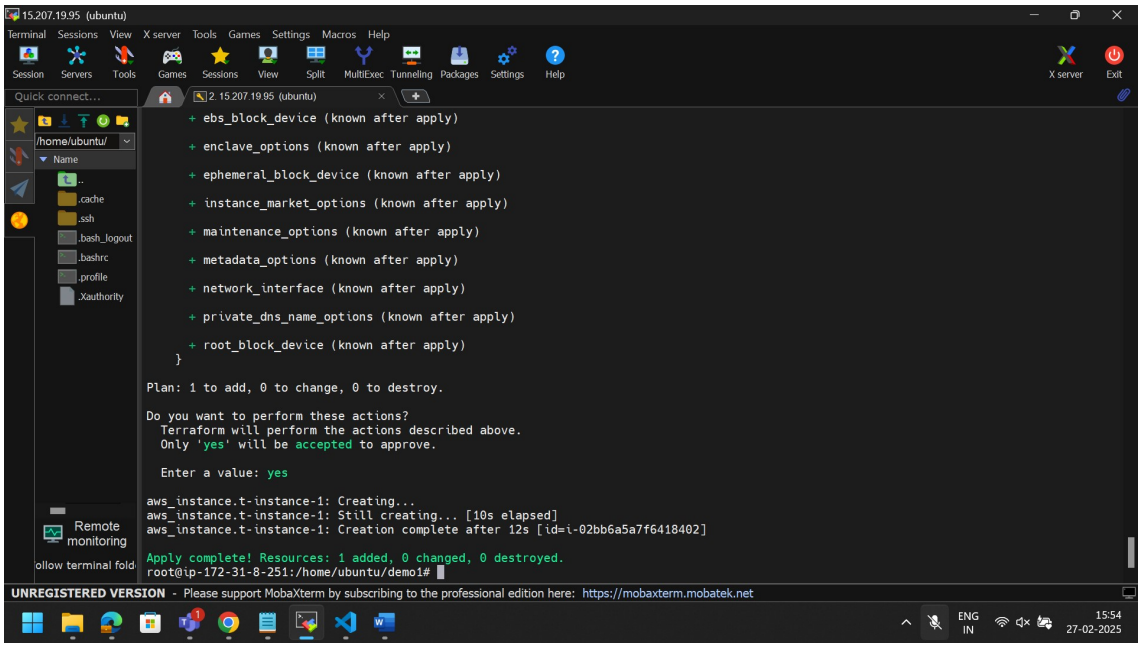
15.207.19.95 (ubuntu)
+ ebs_block_device (known after apply)
+ enclave_options (known after apply)
+ ephemeral_block_device (known after apply)
+ instance_market_options (known after apply)
+ maintenance_options (known after apply)
+ metadata_options (known after apply)
+ network_interface (known after apply)
+ private_dns_name_options (known after apply)
+ root_block_device (known after apply)
}
Plan: 1 to add, 0 to change, 0 to destroy.
Do you want to perform these actions?
Terraform will perform the actions described above.
Only 'yes' will be accepted to approve.
Enter a value: yes
aws_instance.t-instance-1: Creating...
aws_instance.t-instance-1: Still creating... [10s elapsed]
aws_instance.t-instance-1: Creation complete after 12s [id=i-02bb6a5a7f6418402]
Apply complete! Resources: 1 added, 0 changed, 0 destroyed.
root@ip-172-31-8-251:/home/ubuntu/demo1#
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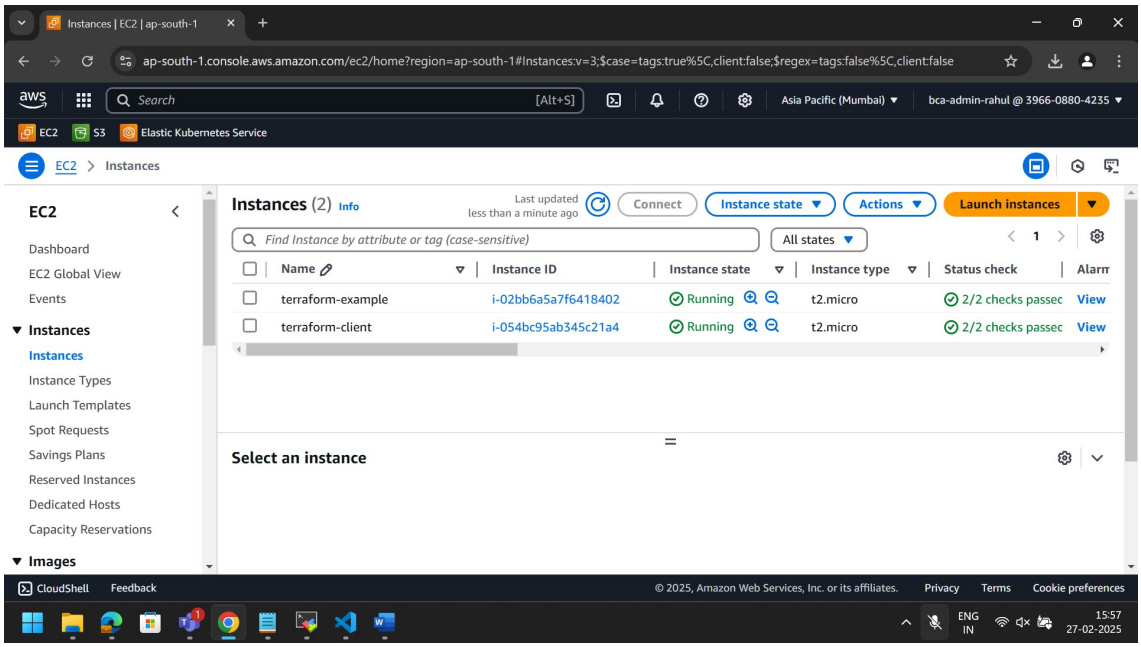
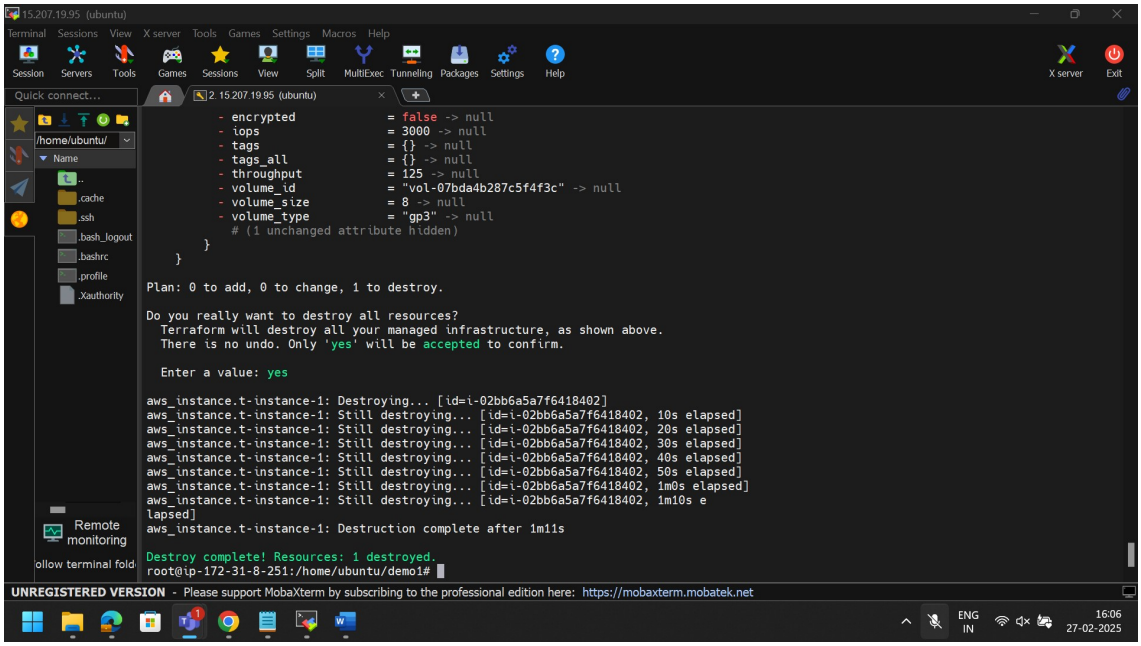

Instances | EC2 | ap-south-1
ap-south-1.console.aws.amazon.com/ec2/home?region=ap-south-1#Instances:v=3;$case=tags:true%5C,client:false;$regex=tags:false%5C,client:false
Search [Alt+S]
Asia Pacific (Mumbai)
bca-admin-rahul @ 3966-0880-4235
EC2 > Instances
EC2
Dashboard
EC2 Global View
Events
Instances
Instances
Instance Types
Launch Templates
Spot Requests
Savings Plans
Reserved Instances
Dedicated Hosts
Capacity Reservations
Images
Instances (2) Info
Last updated less than a minute ago
Connect
Instance state
Actions
Launch instances
Find Instance by attribute or tag (case-sensitive)
All states
Name
Instance ID
Instance state
Instance type
Status check
terraform-example i-02bb6a5a7f6418402 Running t2.micro 2/2 checks passec View
terraform-client i-054bc95ab345c21a4 Running t2.micro 2/2 checks passec View
Select an instance
CloudShell
Feedback
© 2025, Amazon Web Services, Inc. or its affiliates.
Privacy
Terms
Cookie preferences


15.207.19.95 (ubuntu)
Terminal Sessions View X server Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
X server Exit
Quick connect...
2. 15.207.19.95 (ubuntu)
/home/ubuntu/
Name
.cache
.ssh
.bash_logout
.bashrc
.profile
.Xauthority
Remote monitoring
ollow terminal fold
- encrypted = false -> null
- iops = 3000 -> null
- tags = {} -> null
- tags_all = {} -> null
- throughput = 125 -> null
- volume_id = "vol-07bda4b287c5f4f3c" -> null
- volume_size = 8 -> null
- volume_type = "gp3" -> null
# (1 unchanged attribute hidden)
}
}
Plan: 0 to add, 0 to change, 1 to destroy.
Do you really want to destroy all resources?
Terraform will destroy all your managed infrastructure, as shown above.
There is no undo. Only 'yes' will be accepted to confirm.
Enter a value: yes
aws_instance.t-instance-1: Destroying... [id=i-02bb6a5a7f6418402]
aws_instance.t-instance-1: Still destroying... [id=i-02bb6a5a7f6418402, 10s elapsed]
aws_instance.t-instance-1: Still destroying... [id=i-02bb6a5a7f6418402, 20s elapsed]
aws_instance.t-instance-1: Still destroying... [id=i-02bb6a5a7f6418402, 30s elapsed]
aws_instance.t-instance-1: Still destroying... [id=i-02bb6a5a7f6418402, 40s elapsed]
aws_instance.t-instance-1: Still destroying... [id=i-02bb6a5a7f6418402, 50s elapsed]
aws_instance.t-instance-1: Still destroying... [id=i-02bb6a5a7f6418402, 1m0s elapsed]
aws_instance.t-instance-1: Still destroying... [id=i-02bb6a5a7f6418402, 1m10s e
lapsed]
aws_instance.t-instance-1: Destruction complete after 1m11s
Destroy complete! Resources: 1 destroyed.
root@ip-172-31-8-251:/home/ubuntu/demo1#
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ENG
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16:06
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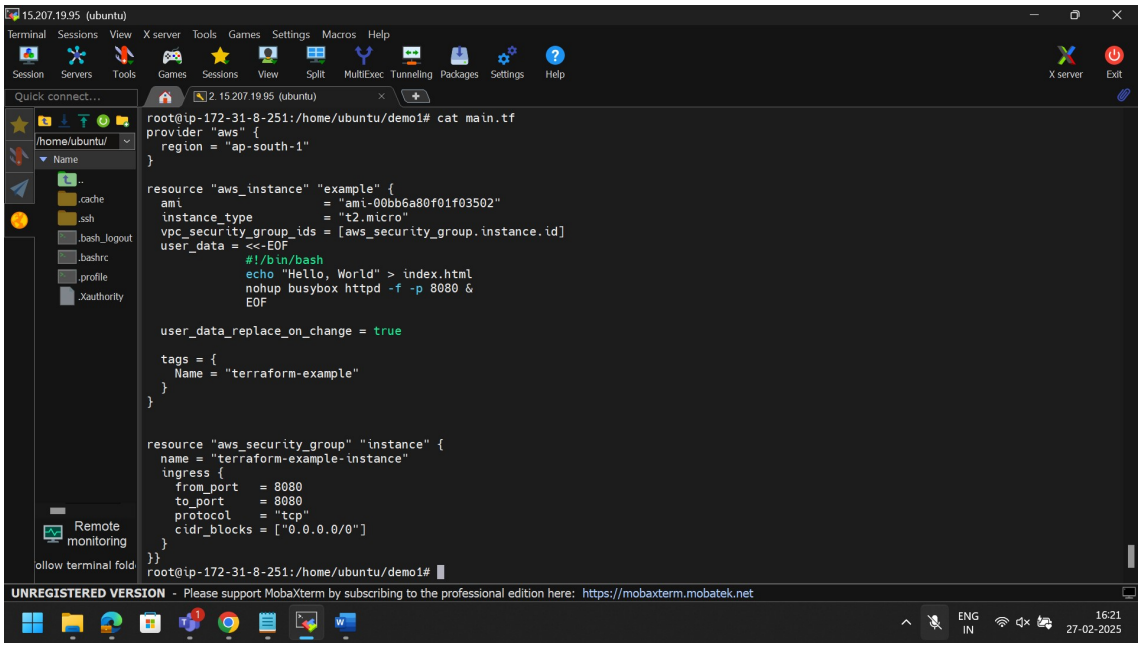
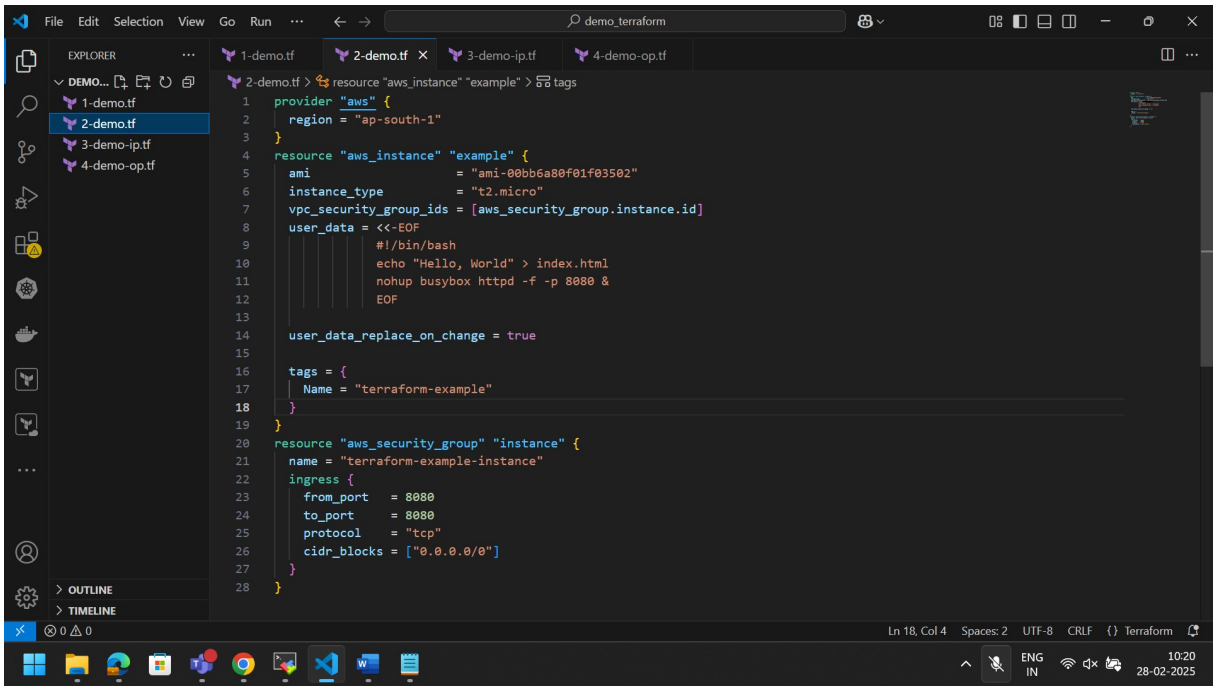
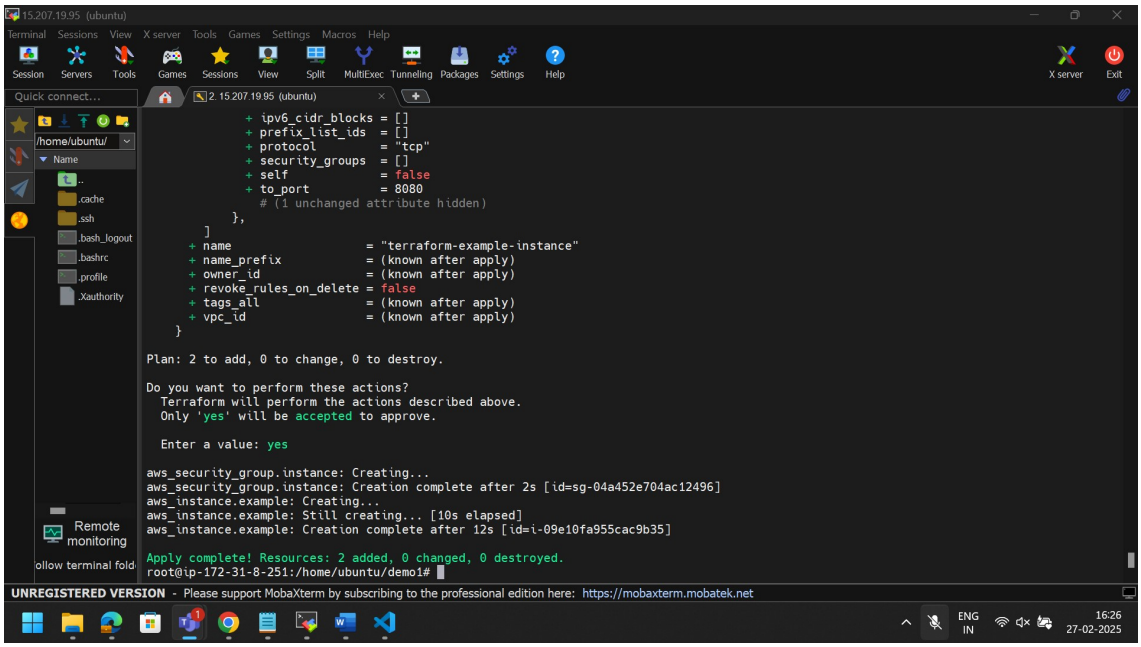
2. creating an web server using terraform






15.207.19.95 (ubuntu)
Terminal Sessions View X server Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
X server Exit
Quick connect...
2. 15.207.19.95 (ubuntu)
/home/ubuntu/
Name
.cache
.ssh
.bash_logout
.bashrc
.profile
.Xauthority
Remote monitoring
ollow terminal fold
+ ipv6_cidr_blocks = []
+ prefix_list_ids = []
+ protocol = "tcp"
+ security_groups = []
+ self = false
+ to_port = 8080
# (1 unchanged attribute hidden)
},
]
+ name = "terraform-example-instance"
+ name_prefix = (known after apply)
+ owner_id = (known after apply)
+ revoke_rules_on_delete = false
+ tags_all = (known after apply)
+ vpc_id = (known after apply)
}
Plan: 2 to add, 0 to change, 0 to destroy.
Do you want to perform these actions?
Terraform will perform the actions described above.
Only 'yes' will be accepted to approve.
Enter a value: yes
aws_security_group.instance: Creating...
aws_security_group.instance: Creation complete after 2s [id=sg-04a452e704ac12496]
aws_instance.example: Creating...
aws_instance.example: Still creating... [10s elapsed]
aws_instance.example: Creation complete after 12s [id=i-09e10fa955cac9b35]
Apply complete! Resources: 2 added, 0 changed, 0 destroyed.
root@ip-172-31-8-251:/home/ubuntu/demo1#
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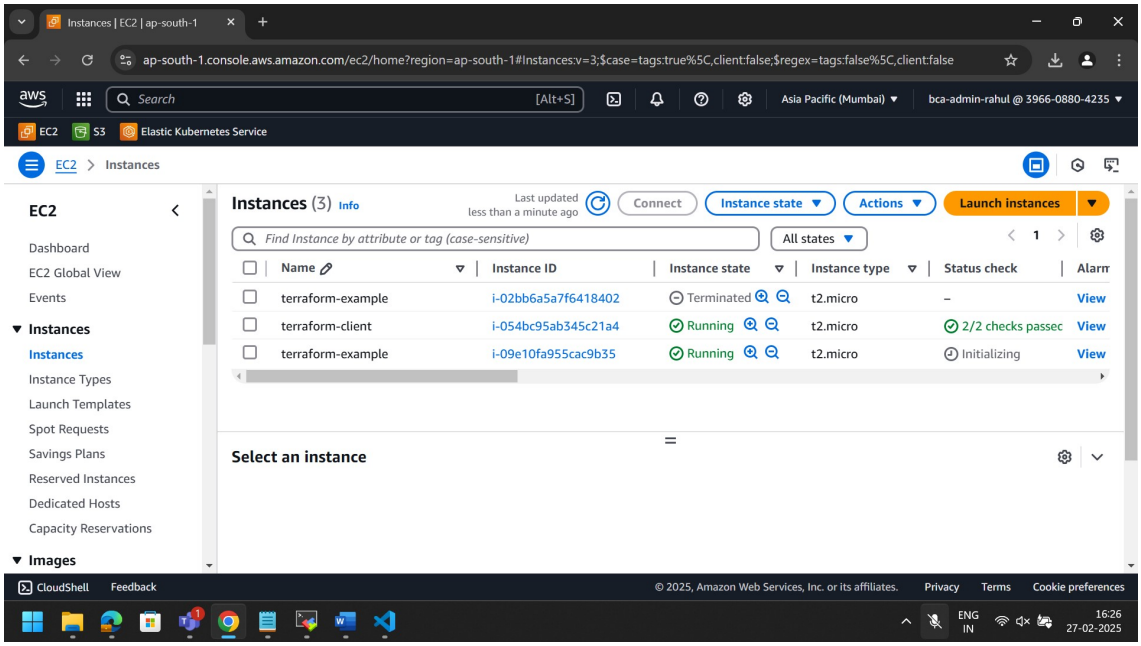
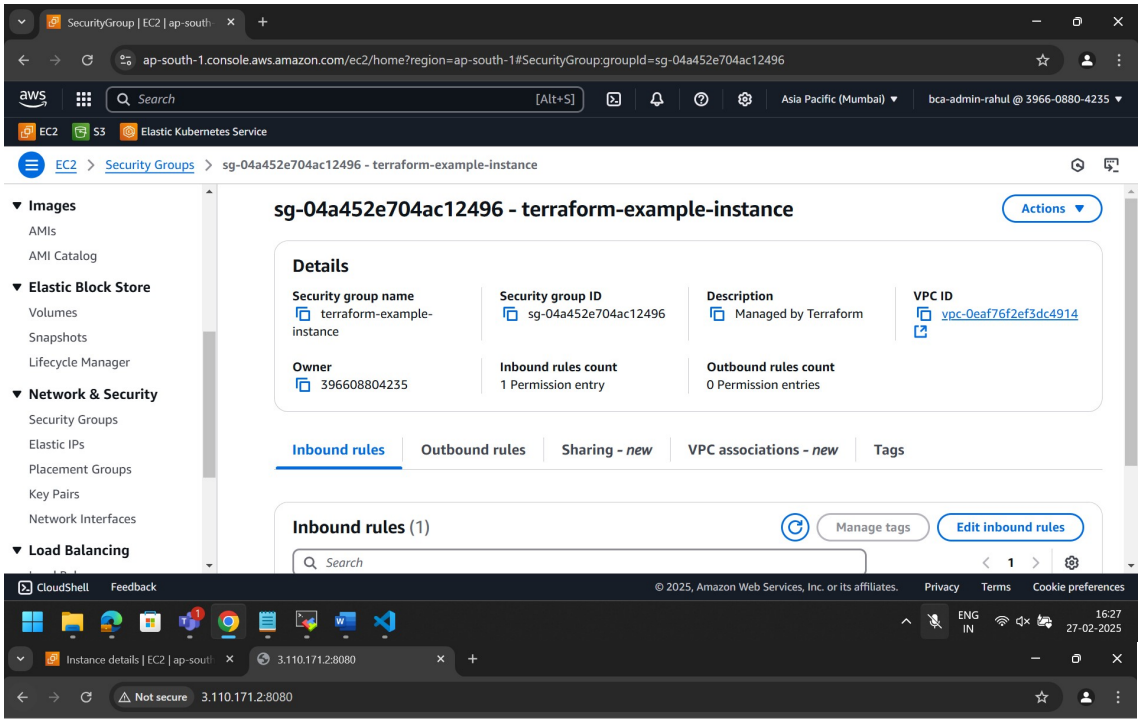

Instances | EC2 | ap-south-1
ap-south-1.console.aws.amazon.com/ec2/home?region=ap-south-1#Instances:v=3;$case=tags:true%5C,client:false;$regex=tags:false%5C,client:false
aws
Search [Alt+S]
Asia Pacific (Mumbai)
bca-admin-rahul @ 3966-0880-4235
EC2 S3 Elastic Kubernetes Service
EC2 > Instances
EC2
Dashboard
EC2 Global View
Events
Instances
Instances
Instance Types
Launch Templates
Spot Requests
Savings Plans
Reserved Instances
Dedicated Hosts
Capacity Reservations
Images
Instances (3) Info
Last updated less than a minute ago
Connect
Instance state
Actions
Launch instances
Find Instance by attribute or tag (case-sensitive)
All states
Name
Instance ID
Instance state
Instance type
Status check
Alarm
terraform-example i-02bb6a5a7f6418402 Terminated t2.micro – View
terraform-client i-054bc95ab345c21a4 Running t2.micro 2/2 checks passec View
terraform-example i-09e10fa955cac9b35 Running t2.micro Initializing View
Select an instance
CloudShell
Feedback
© 2025, Amazon Web Services, Inc. or its affiliates.
Privacy
Terms
Cookie preferences
ENG IN
16:26
27-02-2025

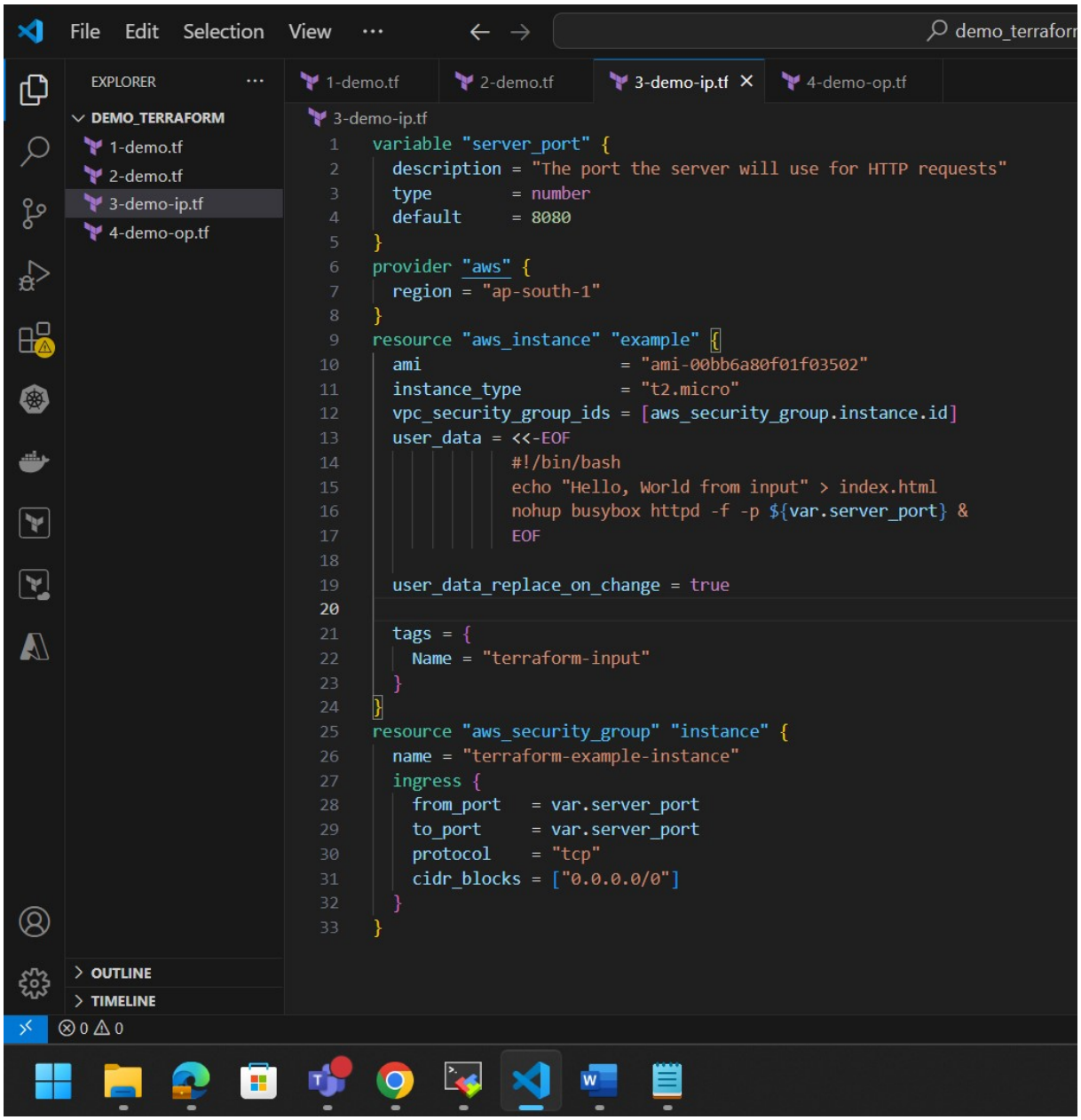

SecurityGroup | EC2 | ap-south
ap-south-1.console.aws.amazon.com/ec2/home?region=ap-south-1#SecurityGroup:groupId=sg-04a452e704ac12496
Search
[Alt+S]
Asia Pacific (Mumbai)
bca-admin-rahul @ 3966-0880-4235
EC2
S3
Elastic Kubernetes Service
EC2 > Security Groups > sg-04a452e704ac12496 - terraform-example-instance
Images
AMIs
AMI Catalog
Elastic Block Store
Volumes
Snapshots
Lifecycle Manager
Network & Security
Security Groups
Elastic IPs
Placement Groups
Key Pairs
Network Interfaces
Load Balancing
sg-04a452e704ac12496 - terraform-example-instance
Actions
Details
Security group name
terraform-example-instance
Security group ID
sg-04a452e704ac12496
Description
Managed by Terraform
VPC ID
vpc-0eaf76f2ef3dc4914
Owner
396608804235
Inbound rules count
1 Permission entry
Outbound rules count
0 Permission entries
Inbound rules
Outbound rules
Sharing - new
VPC associations - new
Tags
Inbound rules (1)
Manage tags
Edit inbound rules
Search
1
CloudShell
Feedback
© 2025, Amazon Web Services, Inc. or its affiliates.
Privacy
Terms
Cookie preferences
ENG
IN
16:27
27-02-2025
Instance details | EC2 | ap-south
3.110.171.2:8080
Not secure
3.110.171.2:8080

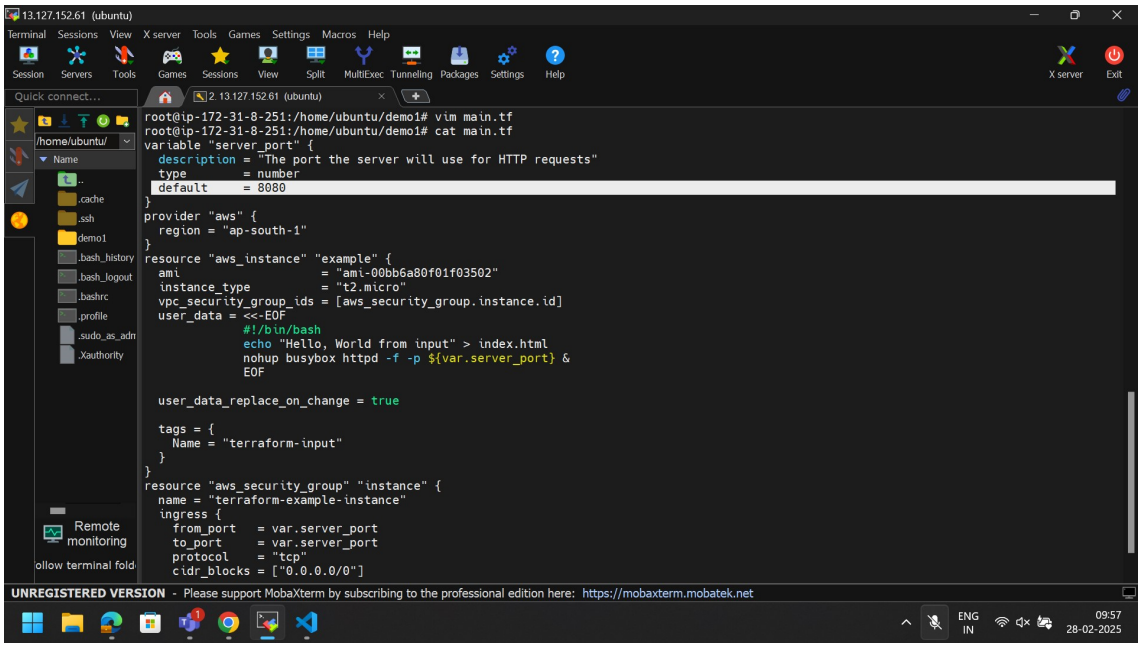
Hello, World


ENG
IN
16:29
27-02-2025

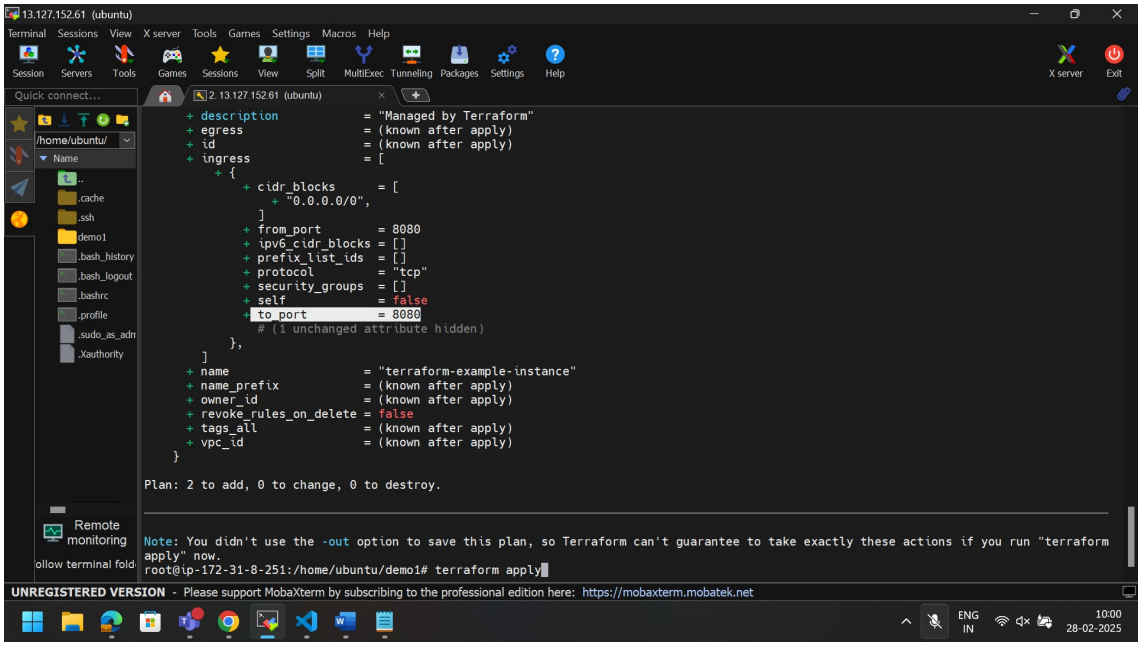
3. Apply terraform input/output variables to assignment 2 so that we dont have hard coding of port numbers

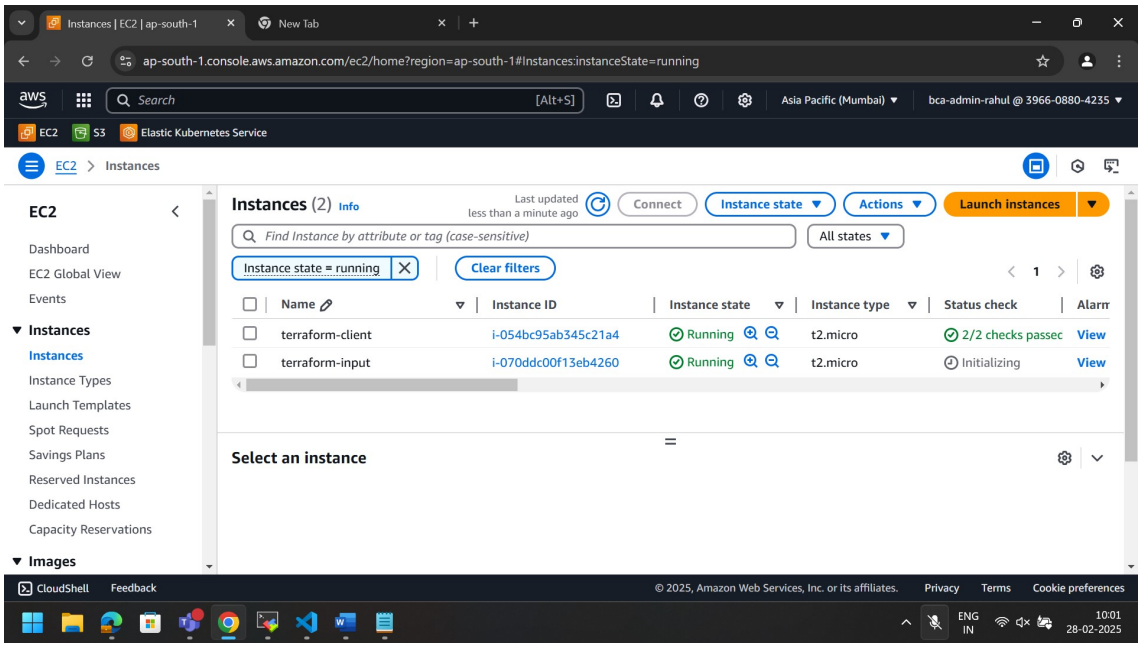
Input





Terraform plan command gives 8080



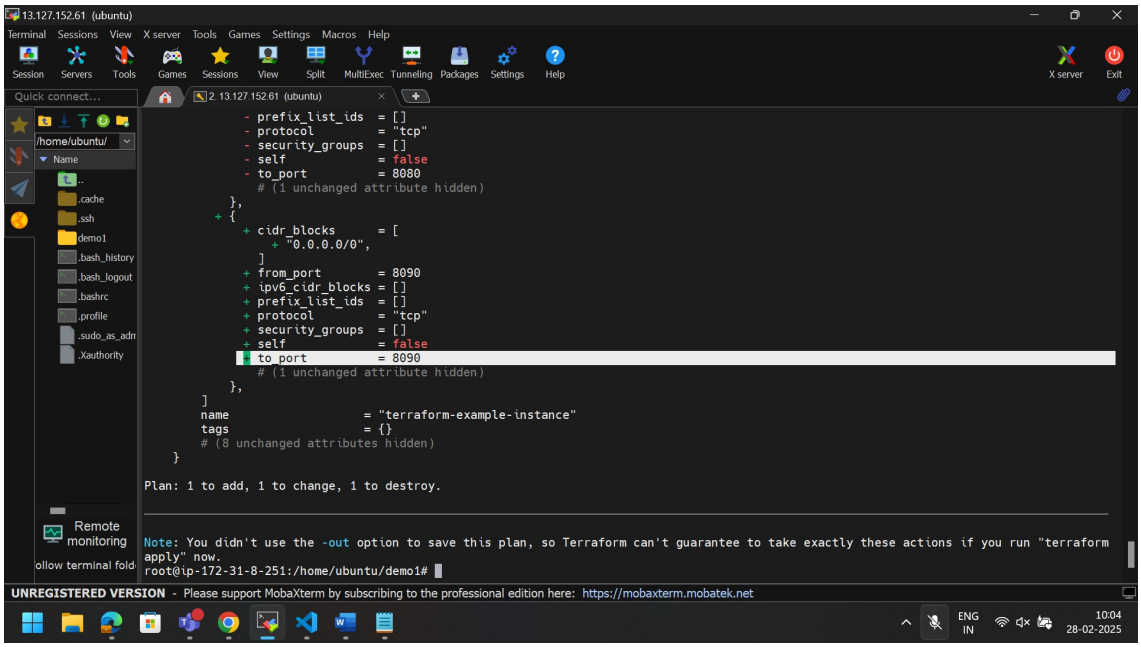


Running on port 8080

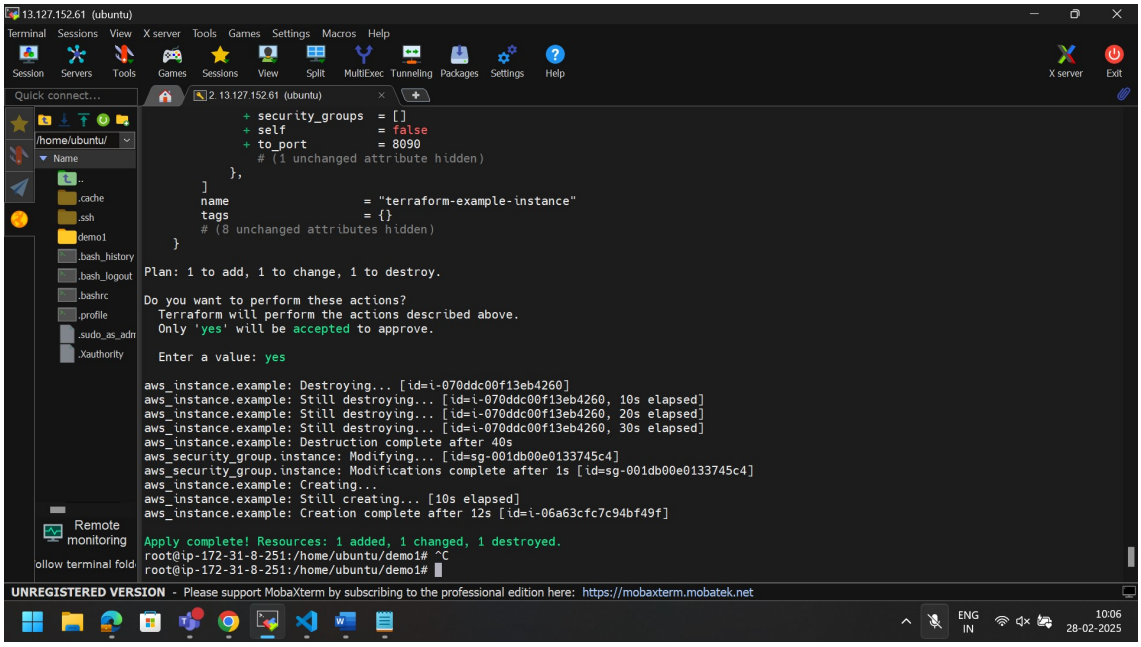
Hello, World from input

Ran terraform plan -var="server_port=8090"

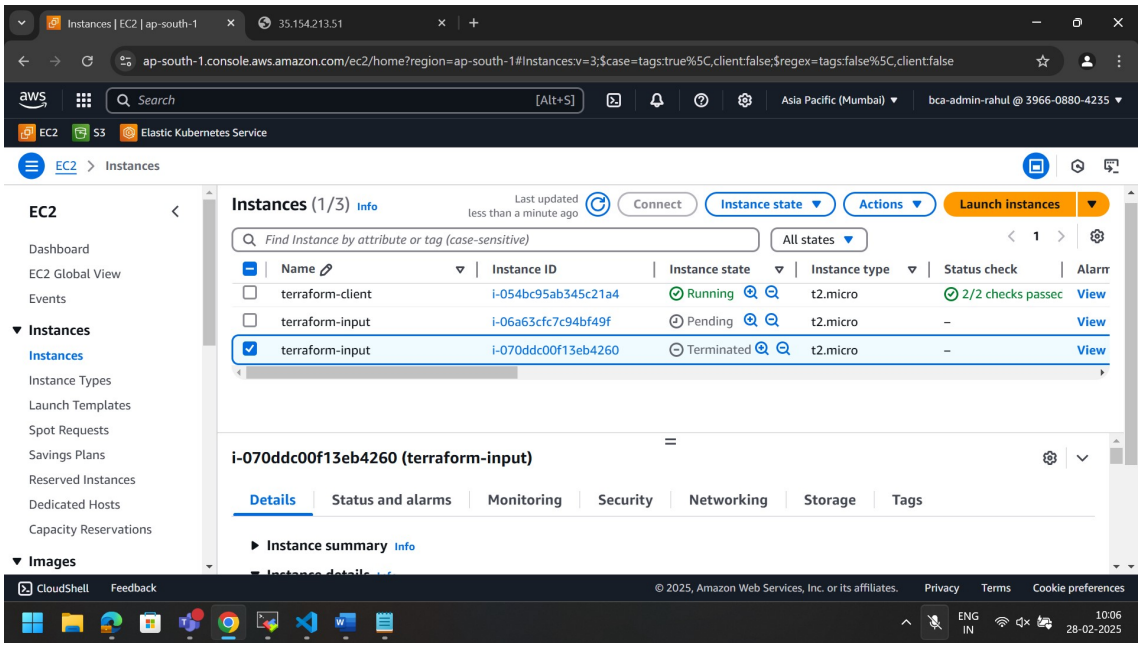
So port changed to 8090

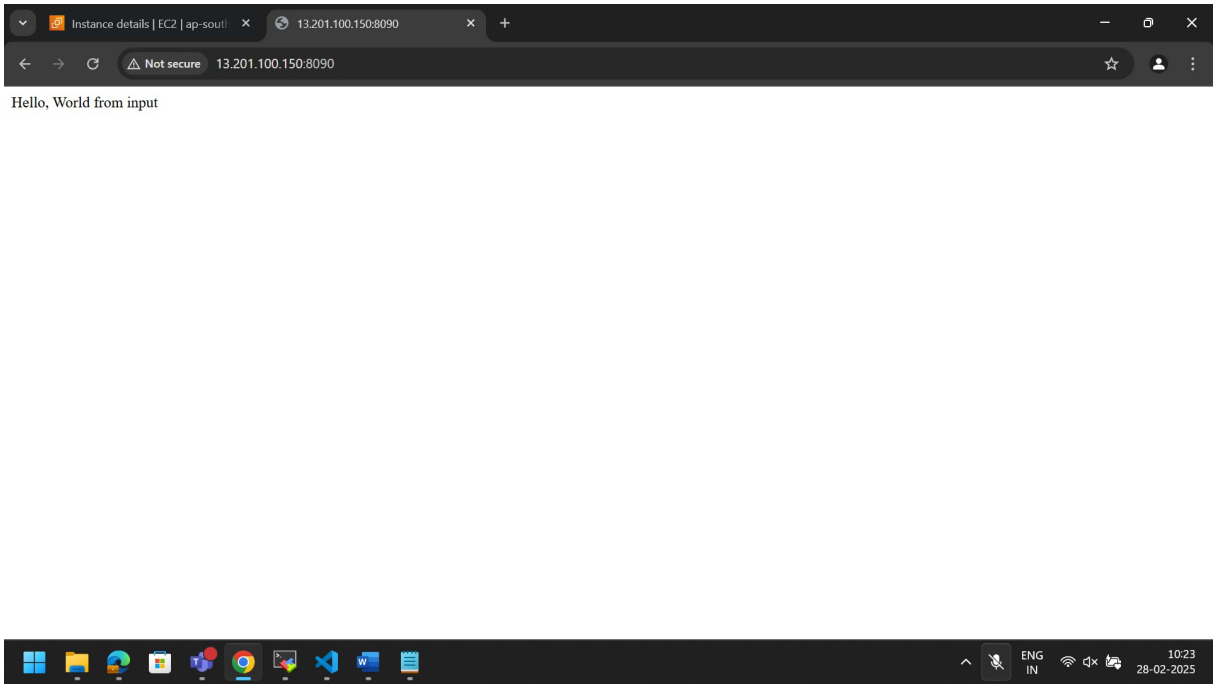


Then terraform apply -var="server_port=8090"



Added: new instance
Changes: port number variable
Destroyed: new instance



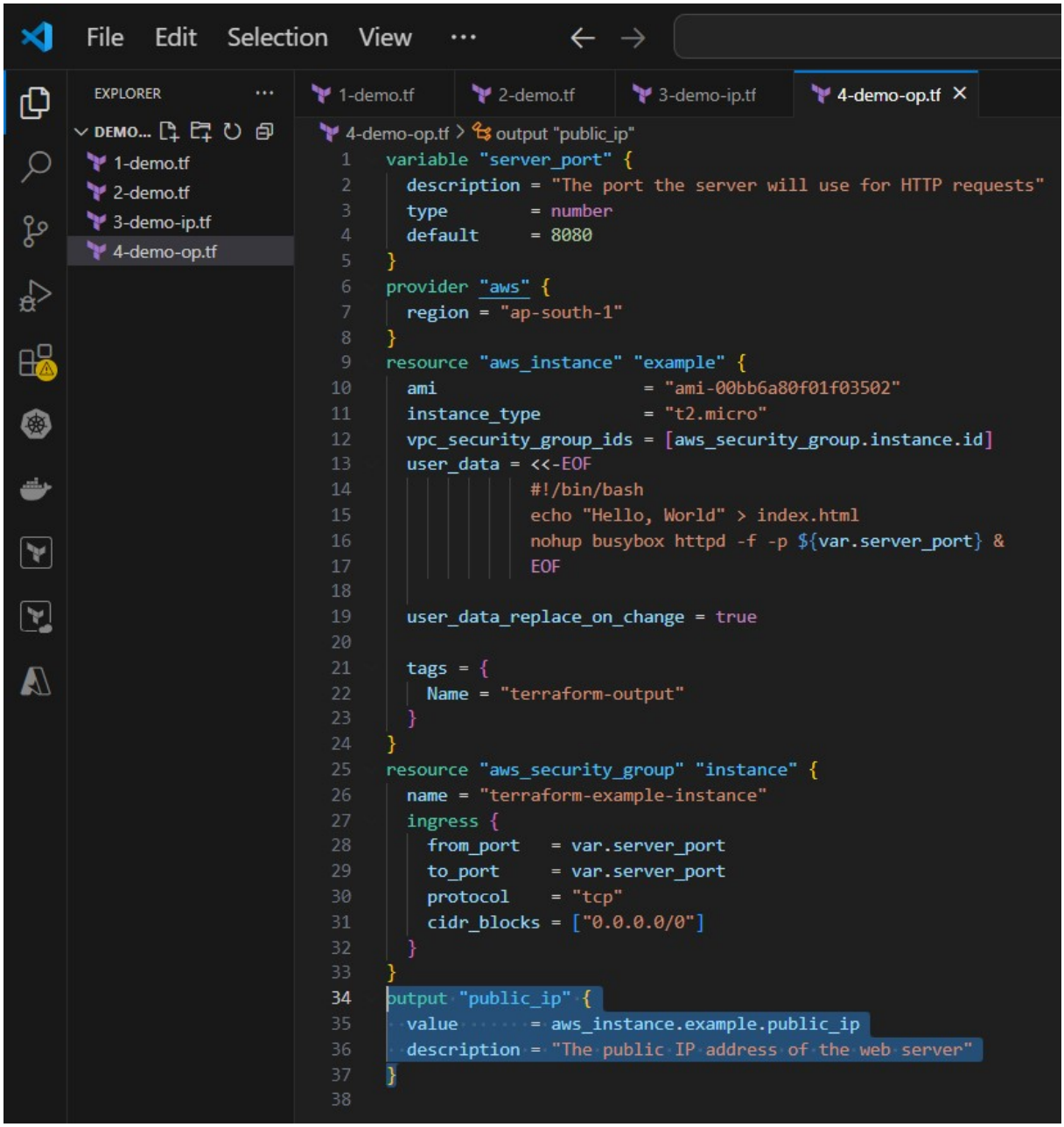


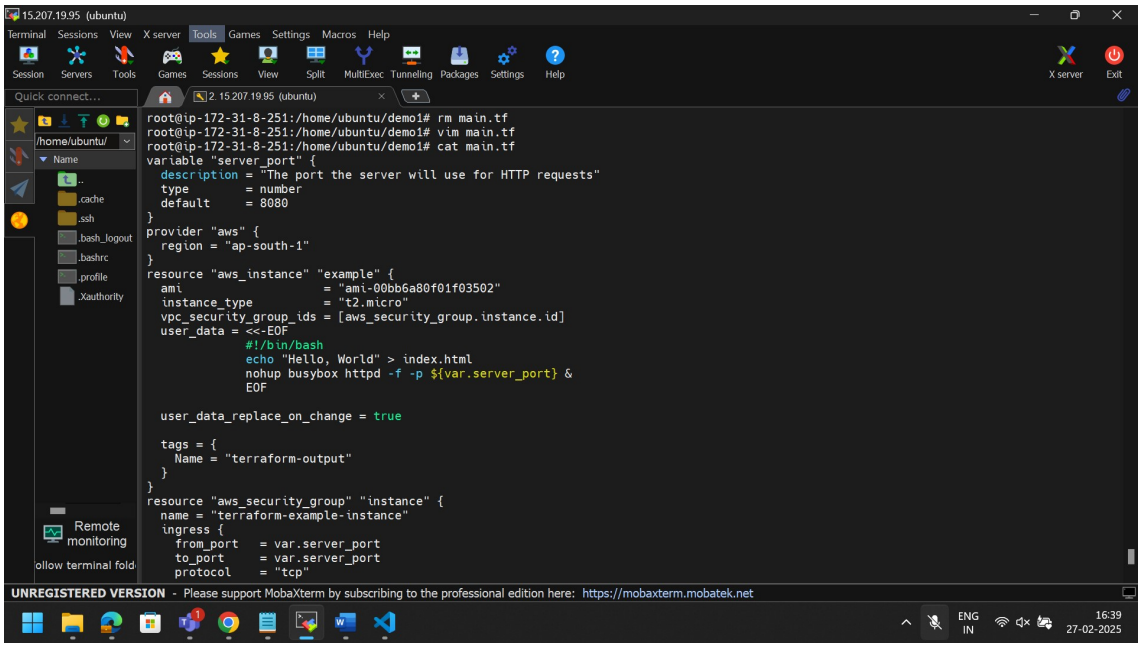
So now it runs on port 8090

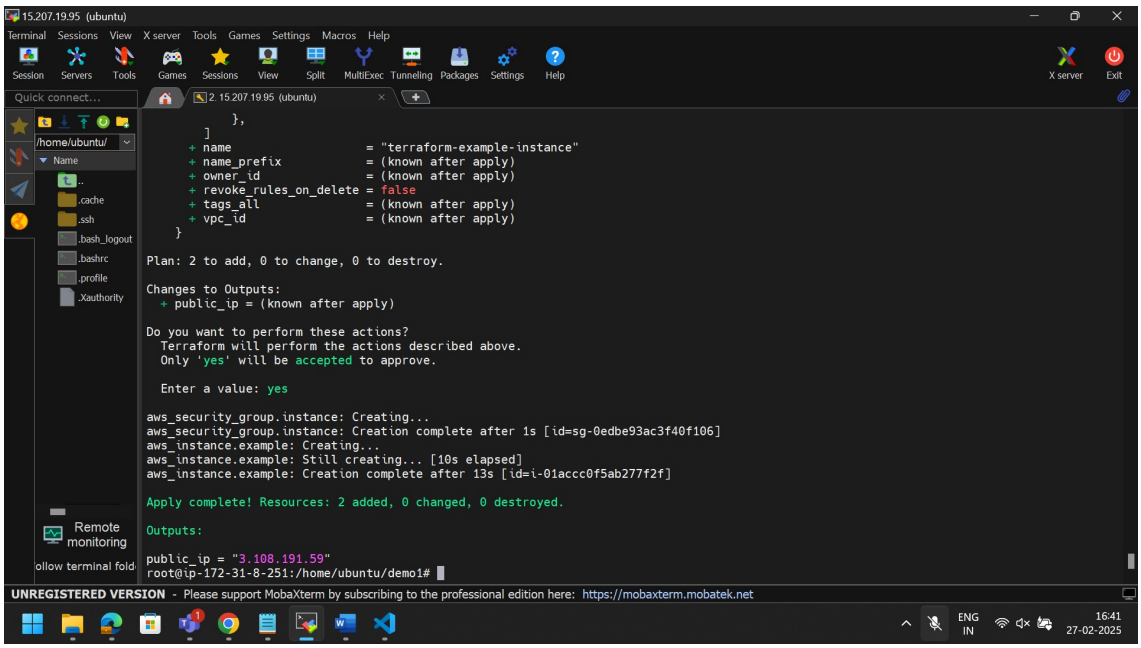
We can also create a separate variables.tf file for variable “server_port”
vim variables.tf
---
variable "server_port" {
  description = "The port the server will use for HTTP requests"
  type   = number
  default   = 8080
}

terraform apply -var-file

Output variables



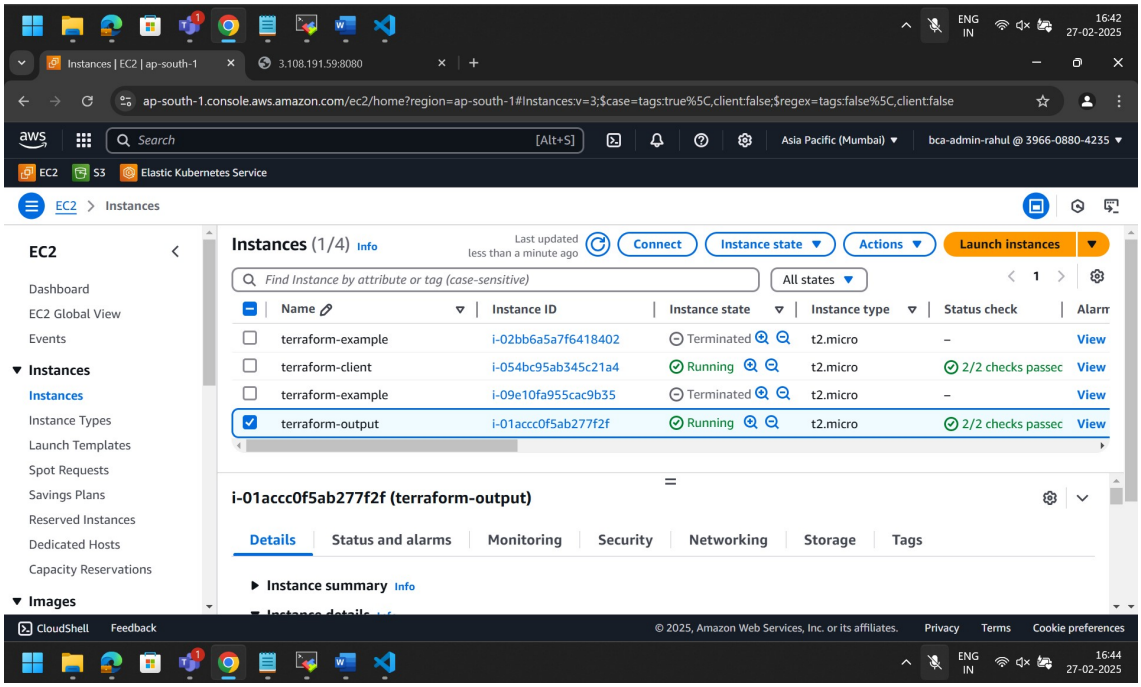




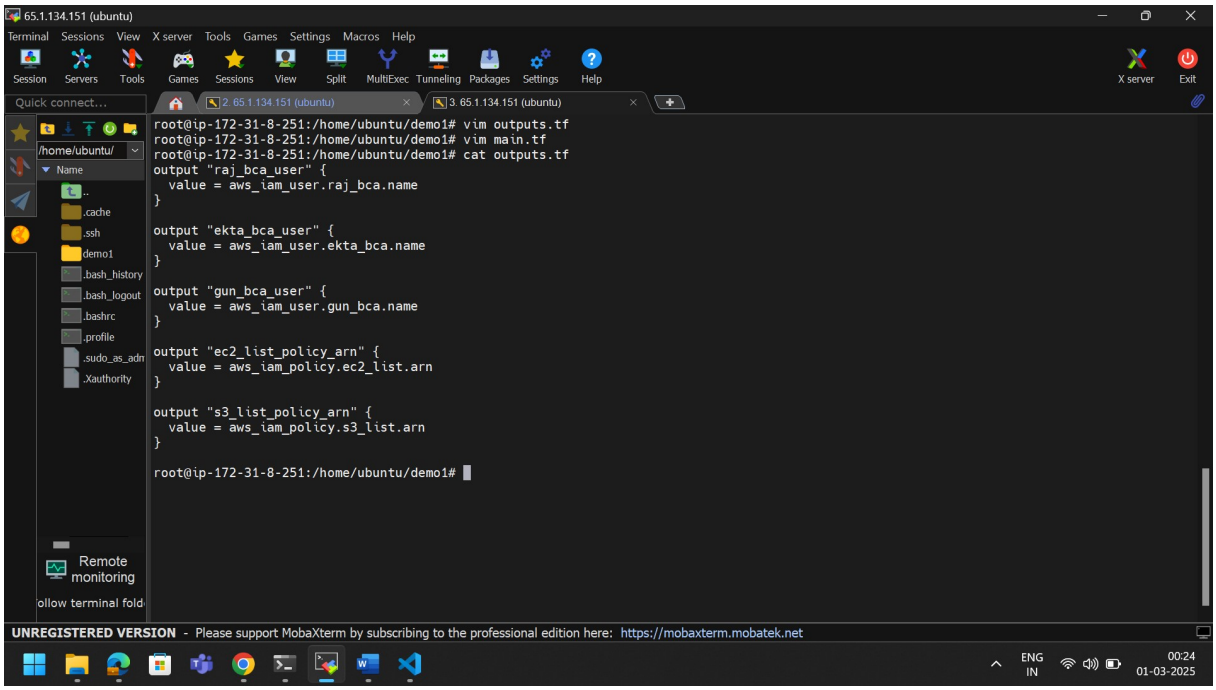
We can see the public_ip on the output in the shell.

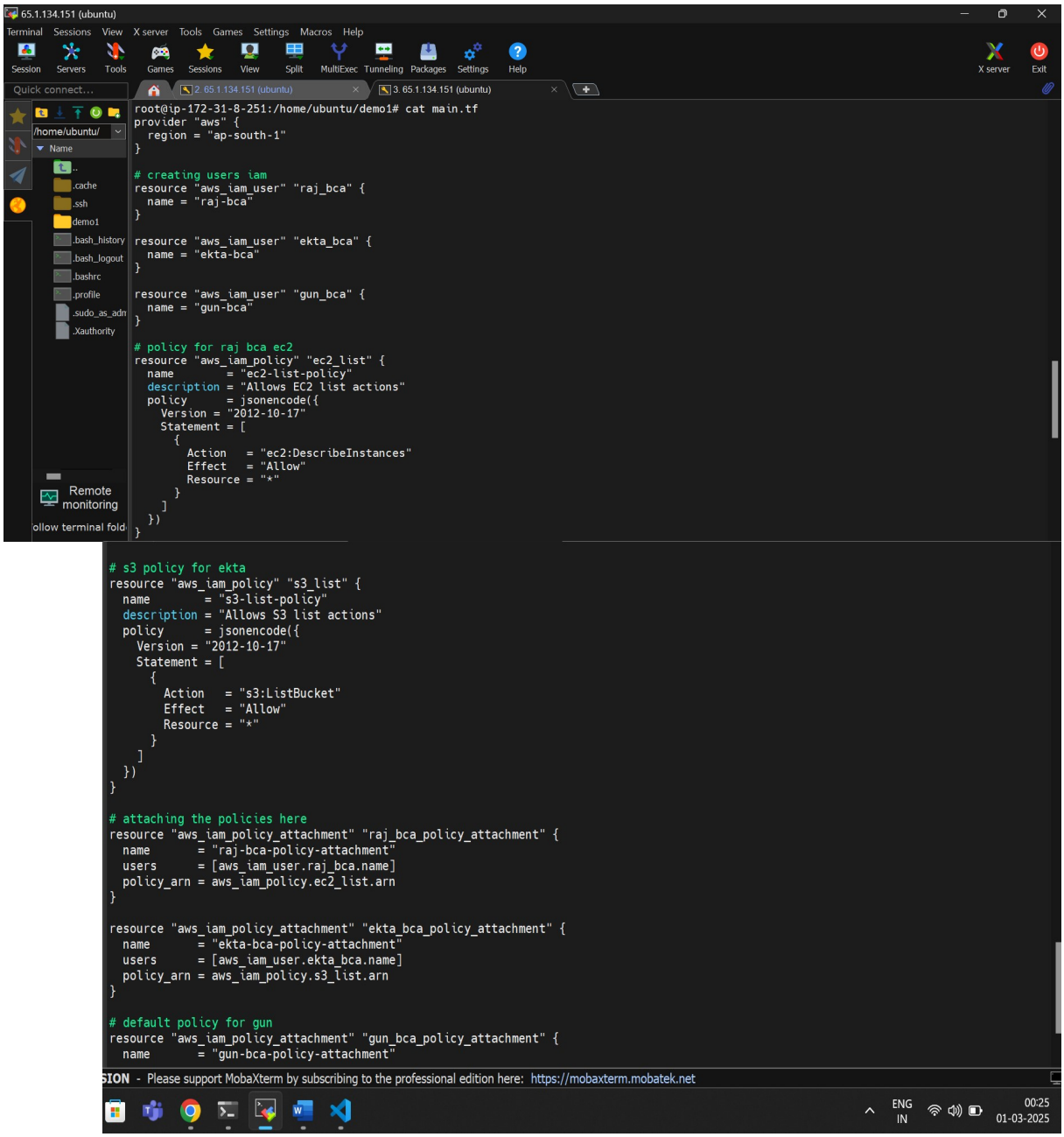

Instance details | EC2 | ap-south
3.108.191.59:8080
Not secure
3.108.191.59:8080

Hello, World


Instances | EC2 | ap-south-1
3.108.191.59:8080
ap-south-1.console.aws.amazon.com/ec2/home?region=ap-south-1#Instances:v=3;$case=tags:true%5C,client:false;$regex=tags:false%5C,client:false
Search
[Alt+S]
Asia Pacific (Mumbai)
bca-admin-rahul @ 3966-0880-4235
EC2
S3
Elastic Kubernetes Service
EC2 > Instances
EC2
Dashboard
EC2 Global View
Events
Instances
Instances
Instance Types
Launch Templates
Spot Requests
Savings Plans
Reserved Instances
Dedicated Hosts
Capacity Reservations
Images
Instances (1/4) Info
Last updated less than a minute ago
Connect
Instance state
Actions
Launch instances
Find Instance by attribute or tag (case-sensitive)
All states
Name
Instance ID
Instance state
Instance type
Status check
terraform-example i-02bb6a5a7f6418402 Terminated t2.micro – View
terraform-client i-054bc95ab345c21a4 Running t2.micro 2/2 checks passec View
terraform-example i-09e10fa955cac9b35 Terminated t2.micro – View
terraform-output i-01accc0f5ab277f2f Running t2.micro 2/2 checks passec View
i-01accc0f5ab277f2f (terraform-output)
Details
Status and alarms
Monitoring
Security
Networking
Storage
Tags
Instance summary Info
CloudShell
Feedback
© 2025, Amazon Web Services, Inc. or its affiliates.
Privacy
Terms
Cookie preferences
ENG IN
16:42 27-02-2025
16:44 27-02-2025

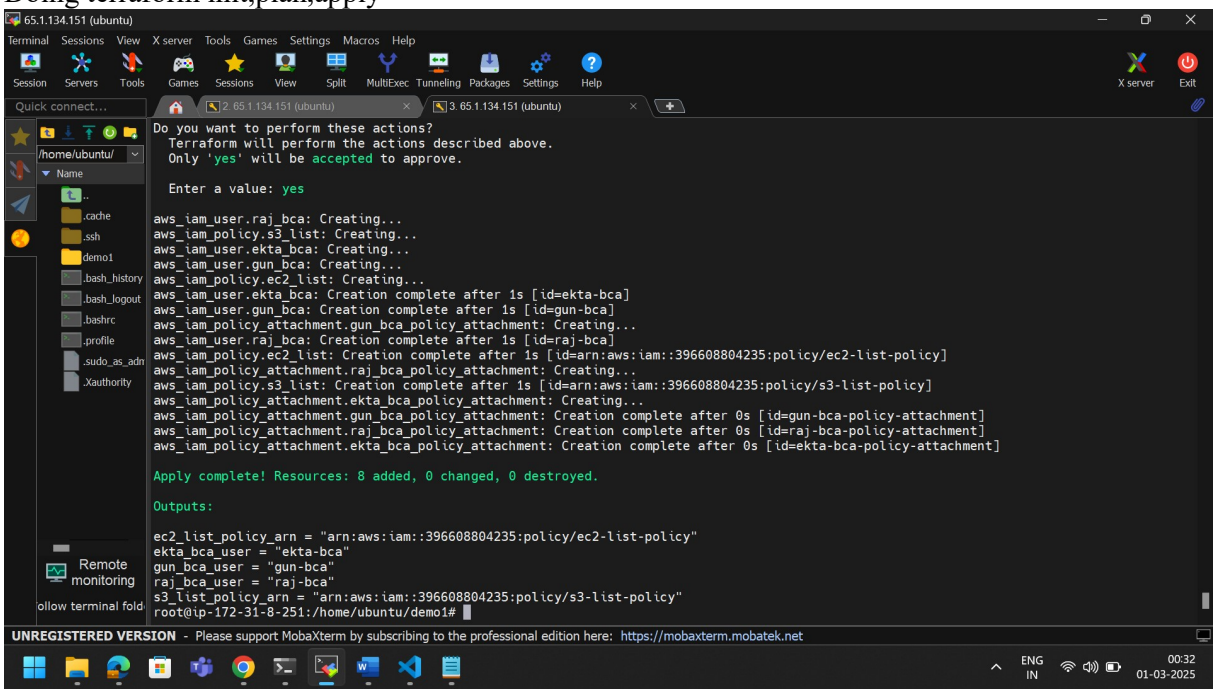
4. Create AWS IAM User and Policy using terraform as discussed in the session



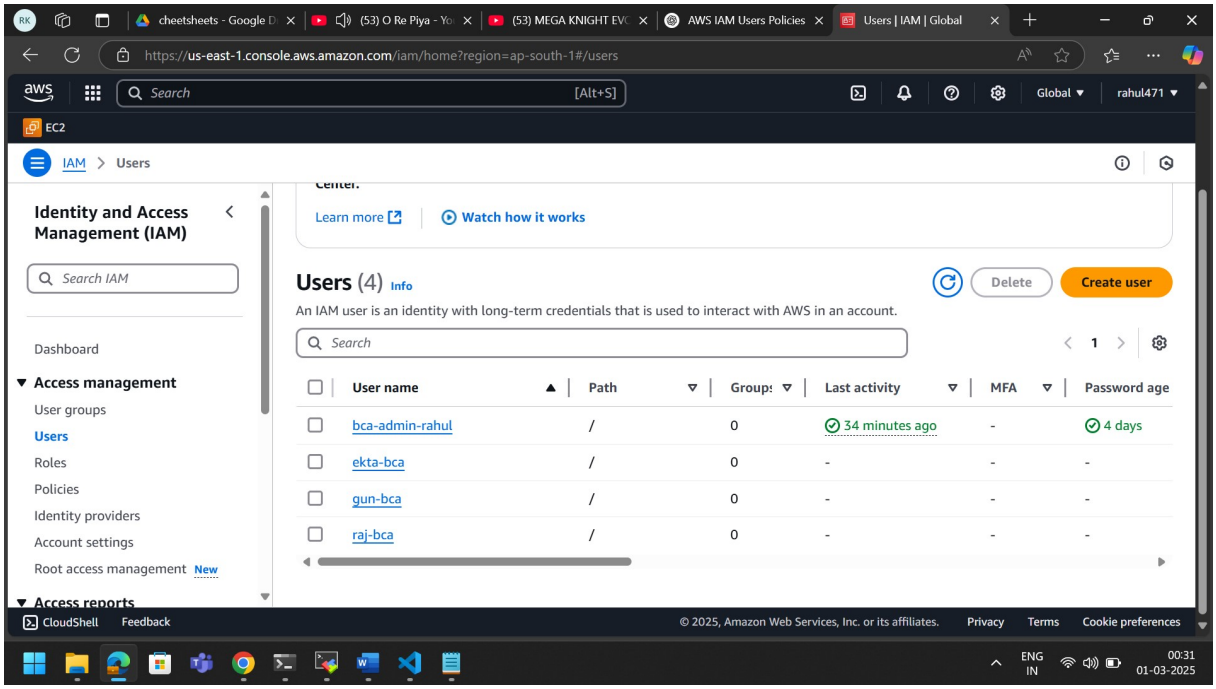


The terraform files are above

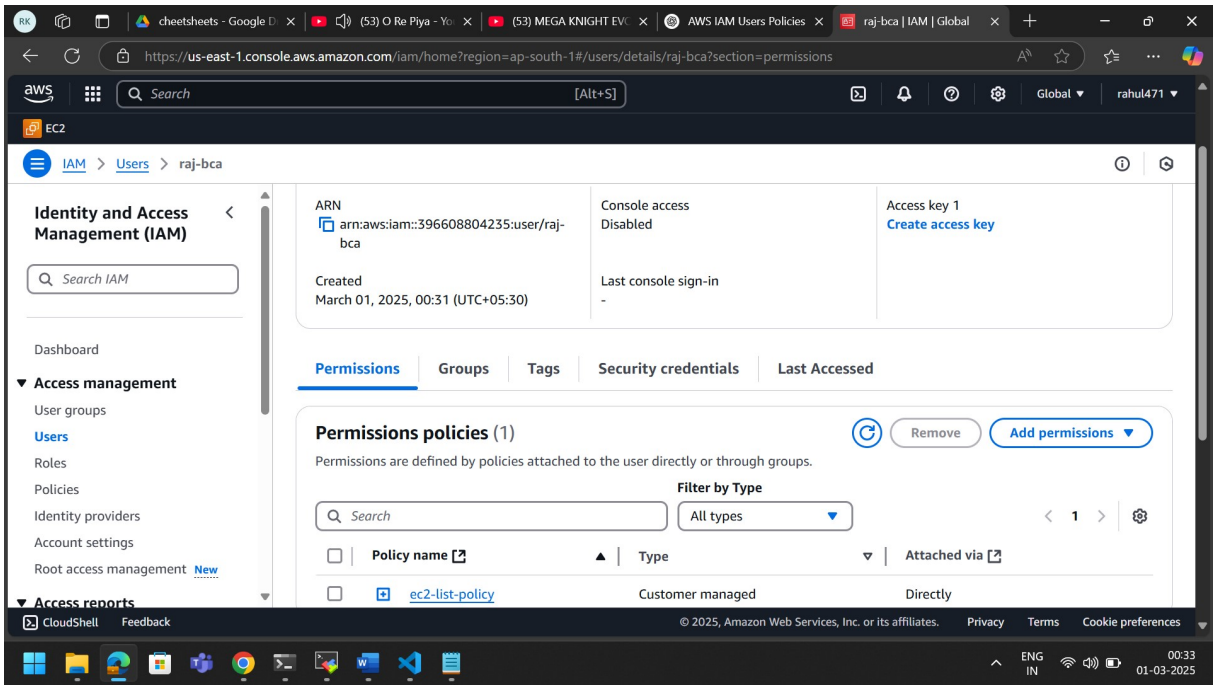
Doing terraform init,plan,apply



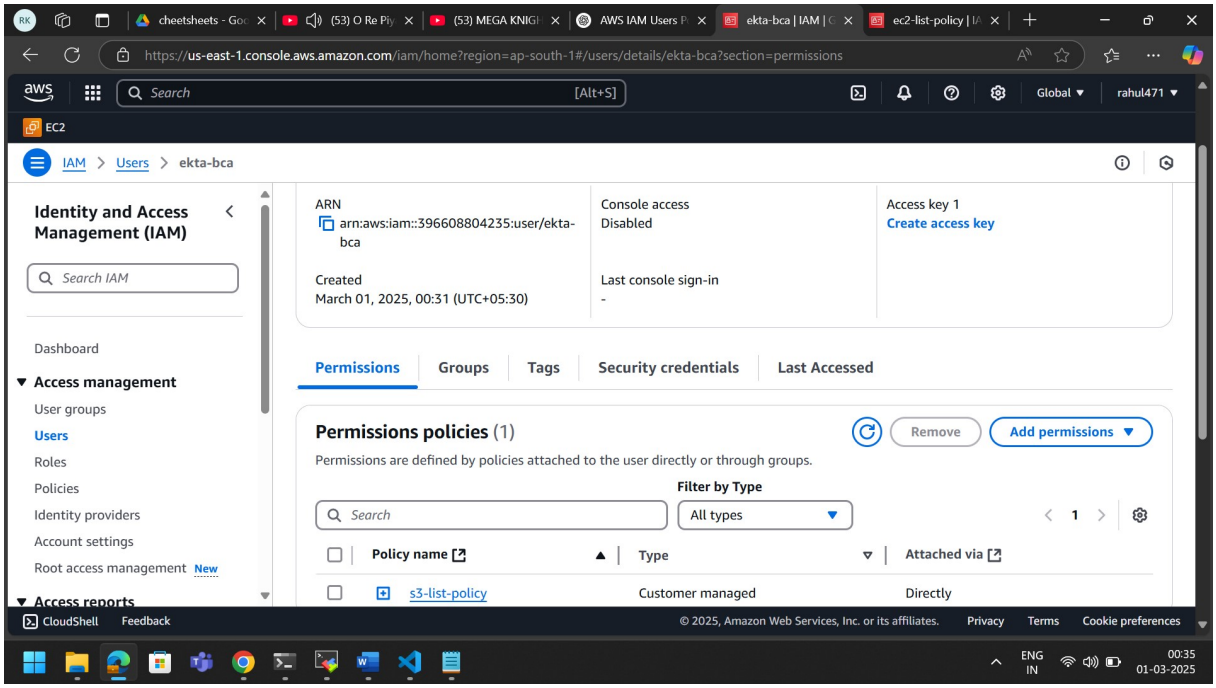
IAM users created in AWS



Policy applied to raj-bca : ec2-list-policy



S3 for ekta-bca



Read only for gun-bca