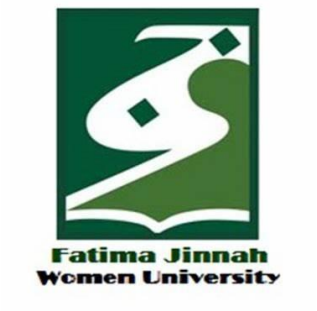
CLOUD COMPUTING



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BSE V-A

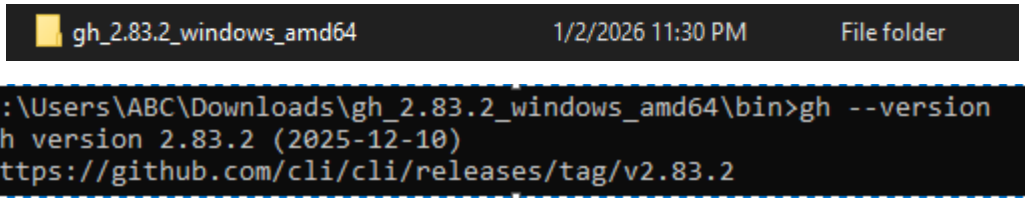
LAB 09

Codespaces + AWS: GH CLI (Codespaces), AWS CLI, EC2, IAM, Security Groups, Filters & Queries

Task 1 — GitHub CLI, Codespace setup and authentication

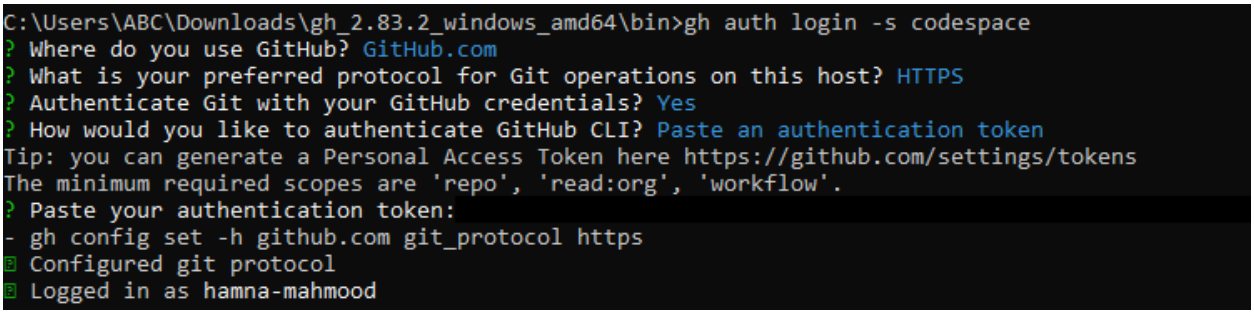
- (Local desktop) Install GitHub CLI:

task1_gh_install.png

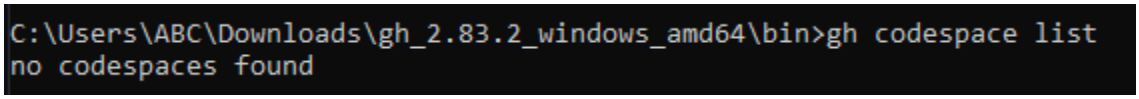


task1_gh_auth_login.png

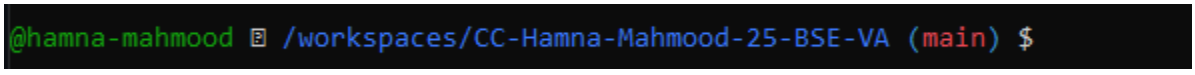
- (Local) Authenticate GH CLI for Codespaces:
  task1_gh_auth_login.png



- (Local) List available Codespaces (optional verification):
  task1_codespace_list.png



- (Local) Create or connect to a Codespace.
  task1_codespace_ssh_connected.png



Task 2 — Install AWS CLI inside the Codespace and configure it

- Download and install AWS CLI:

task2_aws_install_and_version.png

```
@hamna-mahmood ➜ /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ curl "https://awscli.amazonaws.com/awscli-exe-linux-x86
_64.zip" -o "awscliv2.zip"
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100 60.2M  100 60.2M    0     0   170M      0 --:--:-- --:--:-- --:--:--  170M
@hamna-mahmood ➜ /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ unzip awscliv2.zip
Archive:  awscliv2.zip
   creating: aws/
   creating: aws/dist/
@hamna-mahmood ➜ /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ sudo ./aws/install
You can now run: /usr/local/bin/aws --version
@hamna-mahmood ➜ /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ aws --version
aws-cli/2.32.26 Python/3.13.11 Linux/6.8.0-1030-azure exe/x86_64.ubuntu.24
```

- Verify installation:

task2_aws_install_and_version.png


```
@hamna-mahmood ➜ /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ curl "https://awscli.amazonaws.com/awscli-exe-linux-x86
_64.zip" -o "awscliv2.zip"
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100 60.2M  100 60.2M    0     0   170M      0 --:--:-- --:--:-- --:--:--  170M
@hamna-mahmood ➜ /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ unzip awscliv2.zip
Archive:  awscliv2.zip
   creating: aws/
   creating: aws/dist/
@hamna-mahmood ➜ /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ sudo ./aws/install
You can now run: /usr/local/bin/aws --version
@hamna-mahmood ➜ /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ aws --version
aws-cli/2.32.26 Python/3.13.11 Linux/6.8.0-1030-azure exe/x86_64.ubuntu.24
```


- Configure the AWS CLI (you will provide Access Key ID and Secret Access Key for a user with permissions, or use root/IAM user you prepared for the lab):

task2_aws_configure_and_files.png

```
@hamna-mahmood ➜ /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ aws configure
AWS Access Key ID [None]:
AWS Secret Access Key [None]
Default region name [None]: me-central-1
Default output format [None]: json
@hamna-mahmood ➜ /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $
```

- Verify credentials/config files:

task2_aws_configure_and_files.png

```
@hamna-mahmood ➜ /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ cat ~/.aws/credentials
[default]
aws_access_key_id =
aws_secret_access_key
@hamna-mahmood ➜ /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ cat ~/.aws/config
[default]
region = me-central-1
output = json
@hamna-mahmood ➜ /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $
```

- Verify connectivity (you should see a JSON result showing your caller identity):

task2_aws_get_caller_identity.png

```
@hamna-mahmood ➜ /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ aws sts get-caller-identity
{
    "UserId": "AIDAX4VWZI3PVPPIQABGB",
    "Account": "542622959327",
    "Arn": "arn:aws:iam::542622959327:user/Hamna_Assignment"
}
@hamna-mahmood ➜ /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $
```

Task 3 — Create security group and add ingress rules using Codespace IP

- Create a security group (substitute your VPC id):
  task3_create_security_group_output.png

```
@hamna-mahmood /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ aws ec2 create-security-group --group-name 'MySecurityGroup' \
>   --description 'My Security Group' \
>   --vpc-id 'vpc-09822723aed1d2815'
{
    "GroupId": "sg-0e075b42f5a5ce11e",
    "SecurityGroupArn": "arn:aws:ec2:me-central-1:542622959327:security-group/sg-0e075b42f5a5ce11e"
}
@hamna-mahmood /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $
```

- Inspect the security group (initially ingress will be empty or default):
  task3_describe_sg_before_ingress.png

```
@hamna-mahmood /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ aws ec2 describe-security-groups --group-ids sg-0e075b42f5a5ce11e
{
    "SecurityGroups": [
        {
            "GroupId": "sg-0e075b42f5a5ce11e",
            "IpPermissionsEgress": [
                {
                    "IpProtocol": "-1",
                    "UserIdGroupPairs": [],
                    "IpRanges": [
                        {
                            "CidrIp": "0.0.0.0/0"
                        }
                    ],
                    "Ipv6Ranges": [],
                    "PrefixListIds": []
                }
            ],
            "VpcId": "vpc-09822723aed1d2815",
            "SecurityGroupArn": "arn:aws:ec2:me-central-1:542622959327:security-group/sg-0e075b42f5a5ce11e",
            "OwnerId": "542622959327",
            "GroupName": "MySecurityGroup",
            "Description": "My Security Group",
            "IpPermissions": []
```

- Get your Codespace public IP (from inside the Codespace):
  task3_codespace_public_ip.png

```
@hamna-mahmood /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ curl icanhazip.com
4.240.18.225
```

- Authorize SSH inbound on port 22 from your Codespace IP:
  task3_authorize_ssh_and_describe.png

```
@hamna-mahmood /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ aws ec2 authorize-security-group-ingress   --group-id sg-0e075b42f5a5ce
  --protocol tcp   --port 22   --cidr 4.240.18.225/32
{
    "Return": true,
    "SecurityGroupRules": [
        {
            "SecurityGroupRuleId": "sgr-05a7872b75e3625f6",
            "GroupId": "sg-0e075b42f5a5ce11e",
            "GroupOwnerId": "542622959327",
            "IsEgress": false,
            "IpProtocol": "tcp",
            "FromPort": 22,
            "ToPort": 22,
            "CidrIpv4": "4.240.18.225/32",
            "SecurityGroupRuleArn": "arn:aws:ec2:me-central-1:542622959327:security-group-rule/sgr-05a7872b75e3625f6"
:
```

- Verify ingress rule appears:
  task3_authorize_ssh_and_describe.png

```
@hamna-mahmood /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ aws ec2 describe-security-groups --group-ids sg-0e075b42f5a5ce11e
{
    "SecurityGroups": [
        {
            "GroupId": "sg-0e075b42f5a5ce11e",
            "IpPermissionsEgress": [
                {
```

- Add an HTTP rule (port 80) using ip-permissions JSON:
  task3_authorize_http_and_describe.png

```
@hamna-mahmood /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ aws ec2 authorize-security-group-ingress   --group-id 'sg-0e075b42f5a5ce11e'   --ip-permissions '{"From
Port":80,"ToPort":80,"IpProtocol":"tcp","IpRanges":[{"CidrIp":"2.240.18.225/32"}]}'
{
    "Return": true,
    "SecurityGroupRules": [
        {
            "SecurityGroupRuleId": "sgr-0149b08e7377ef879",
            "GroupId": "sg-0e075b42f5a5ce11e",
            "GroupOwnerId": "542622959327",
            "IsEgress": false,
            "IpProtocol": "tcp",
            "FromPort": 80,
            "ToPort": 80,
            "CidrIpv4": "2.240.18.225/32",
            "SecurityGroupRuleArn": "arn:aws:ec2:me-central-1:542622959327:security-group-rule/sgr-0149b08e7377ef879"
        }
    ]
}
@hamna-mahmood /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $
```

- Verify both ingress rules are present:

  task3_describe_sg_final.png

```
@hamna-mahmood /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ aws ec2 describe-security-groups --group-ids sg-0e075b42f5a5ce11e
{
    "SecurityGroups": [
        {
            "GroupId": "sg-0e075b42f5a5ce11e",
            "IpPermissionsEgress": [
                {
                    "IpProtocol": "-1",
                    "UserIdGroupPairs": [],
                    "IpRanges": [
                        {
                            "CidrIp": "0.0.0.0/0"
                        }
                    ],
                    "Ipv6Ranges": [],
                    "PrefixListIds": []
                }
            ],
"VpcId": "vpc-09822723aed1d2815",
"SecurityGroupArn": "arn:aws:ec2:me-central-1:542622959327:security-group/sg-0e075b42f5a5ce11e",
"OwnerId": "542622959327",
"GroupName": "MySecurityGroup",
"Description": "My Security Group",
"IpPermissions": [
    {
        "IpProtocol": "tcp",
        "FromPort": 80,
        "ToPort": 80,
        "UserIdGroupPairs": [],
        "IpRanges": [
            {
                "CidrIp": "2.240.18.225/32"
            }
        ]
                                                    "Ipv6Ranges": [],
                                                    "PrefixListIds": []
                                                },
                                                {
                                                    "IpProtocol": "tcp",
                                                    "FromPort": 22,
                                                    "ToPort": 22,
                                                    "UserIdGroupPairs": [],
                                                    "IpRanges": [
                                                        {
```

Task 4 — Create a key pair, describe key pairs, and launch EC2 instance

- Create the key pair and save the PEM file into the Codespace workspace:
  task4_create_keypair_output.png

```
@hamna-mahmood /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ aws ec2 create-key-pair \
>   --key-name MyED25519Key \
>   --key-type ed25519 \
>   --key-format pem \
>   --query 'KeyMaterial' \
>   --output text > MyED25519Key.pem
@hamna-mahmood /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ ls -l MyED25519Key.pem
-rw-rw-rw- 1 codespace codespace 388 Jan  2 20:48 MyED25519Key.pem
@hamna-mahmood /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $
```

- View created key pairs:

task4_describe_keypairs.png

```
@hamna-mahmood 🖹 /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ aws ec2 describe-key-pairs
{
    "KeyPairs": [
        {
            "KeyPairId": "key-082c144ac8c3d074c",
            "KeyType": "ed25519",
            "Tags": [],
            "CreateTime": "2025-12-30T17:09:02.769000+00:00",
            "KeyName": "web-3-3-key",
            "KeyFingerprint": "VmsrVcKxmSslZ73bwBnB4jhI8xLHGDyO44VZQaL7gt4="
        },
        {
            "KeyPairId": "key-01a87edae3f0198fe",
```

- Launch an EC2 instance (example values — replace IDs with ones from your account/region):

task4_run_instances_output.png

```
@hamna-mahmood 🖹 /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ aws ec2 run-instances   --image-id ami-05e66df2bafcb7dea   --count 1   --i
nstance-type t3.micro   --key-name MyED25519Key   --security-group-ids sg-0e075b42f5a5ce11e   --subnet-id subnet-0a2cee75f0ad691a6   --tag-
specifications "ResourceType=instance,Tags=[{Key=Name,Value=MyServer}]"
{
    "ReservationId": "r-0d538521c04eb99a4",
    "OwnerId": "542622959327",
    "Groups": [],
    "Instances": [
        {
            "Architecture": "x86_64",
            "BlockDeviceMappings": [],
            "ClientToken": "4bfd16d6-8cb3-4459-ab69-c671c1f5c60e",
            "EbsOptimized": false,
            "EnaSupport": true,
```

```
@hamna-mahmood 🖹 /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ aws ec2 run-instances   --image-id ami-05e66df2bafcb7dea   --count 1   --i
nstance-type t3.micro   --key-name MyED25519Key   --security-group-ids sg-0e075b42f5a5ce11e   --subnet-id subnet-0a2cee75f0ad691a6   --tag-
specifications "ResourceType=instance,Tags=[{Key=Name,Value=MyServer}]"   --query "Instances[0].InstanceId"   --output text
i-00a608cde40fd0cf1
```

- Get the public IP address of your instance:

task4_describe_instances_public_ip.png

```
@hamna-mahmood 🖹 /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ aws ec2 describe-instances \
>   --query "Reservations[*].Instances[*].[InstanceId,PublicIpAddress]" \
>   --output table

-----------------------------------------
|           DescribeInstances           |
+----------------------+----------------+
|  i-0fa9d64afed5822d6 |  3.28.133.115  |
|  i-01b0026b0394a0b56 |  3.29.33.6     |
|  i-09dc2f89d7b6a07a5 |  158.252.33.74 |
|  i-06a6d1c601e3e9e60 |  3.29.125.165  |
|  i-01d026d26fc0ea152 |  3.28.135.154  |
|  i-00a608cde40fd0cf1 |  3.28.207.172  |
+----------------------+----------------+
@hamna-mahmood 🖹 /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $
```

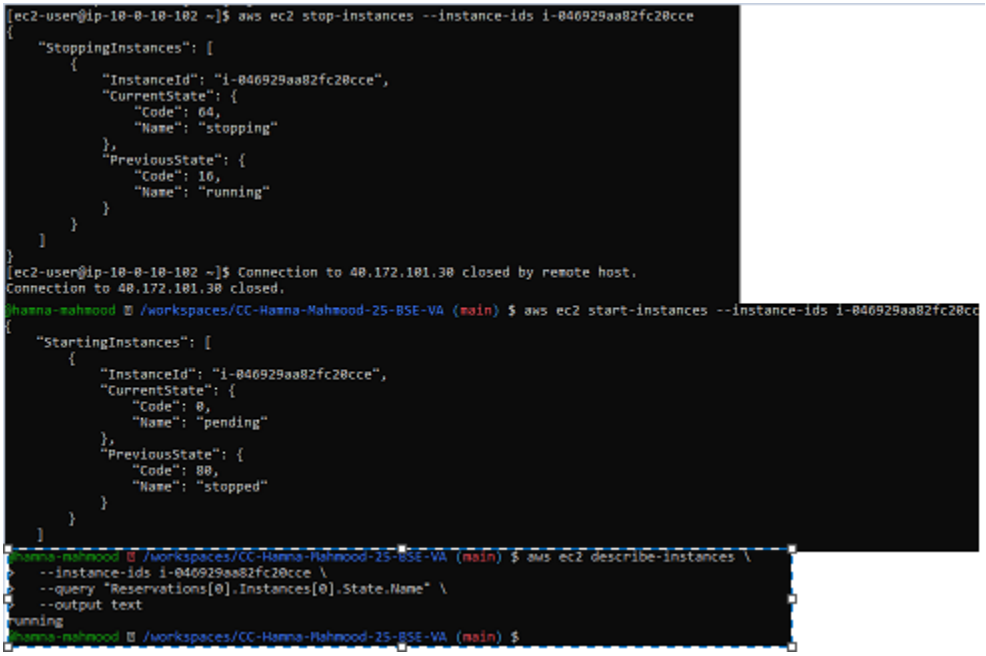
- Attempt SSH into the instance from the Codespace or from a machine whose IP is allowed in the security group:

task4_ssh_permission_error_and_fix.png

```
@hamna-mahmood ➜ /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ ssh -i MyED25519Key.pem ec2-user@40.172.101.30
The authenticity of host '40.172.101.30 (40.172.101.30)' can't be established.
ED25519 key fingerprint is SHA256:CHKy9kfrR2EbUU3kemPfrDTgXe+BKfLVCOeNHgMadbs.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '40.172.101.30' (ED25519) to the list of known hosts.
   ,     #_
   ~\_  ####_        Amazon Linux 2023
  ~~  \_#####\
  ~~     \###|
  ~~       \#/ ___   https://aws.amazon.com/linux/amazon-linux-2023
   ~~       V~' '->
    ~~~         /
      ~~._.   _/
         _/ _/
       _/m/'
[ec2-user@ip-10-0-10-102 ~]$
```

- Stop, start and (optionally) terminate the instance:

task4_stop_start_terminate_commands.png



Task 5 — Understand AWS describe-* commands

Run and understand these commands (run each, then capture screenshot immediately after):
task5_describe_security_groups.png

```
[ec2-user@ip-10-0-10-102 ~]$ aws ec2 describe-security-groups
{
    "SecurityGroups": [
        {
            "GroupId": "sg-06d1566c80bccf8ad",
            "IpPermissionsEgress": [
                {
                    "IpProtocol": "tcp",
                    "FromPort": 80,
                    "ToPort": 80,
                    "UserIdGroupPairs": [],
                    "IpRanges": [
                        {
                            "CidrIp": "0.0.0.0/0"
                        }
                    ],
                    "Ipv6Ranges": [],
                    "PrefixListIds": []
                }
            ],
            "Tags": [
                {
                    "Key": "Name",
                    "Value": "prod-backend-sg"
                }
            ],
            "VpcId": "vpc-09822723aed1d2815",
:...skipping...
```

task5_describe_vpcs.png

```
[ec2-user@ip-10-0-10-102 ~]$ aws ec2 describe-vpcs
{
"Vpcs": [
    {
        "OwnerId": "542622959327",
        "InstanceTenancy": "default",
        "CidrBlockAssociationSet": [
            {
                "AssociationId": "vpc-cidr-assoc-05694f8e33f894621",
                "CidrBlock": "10.0.0.0/16",
                "CidrBlockState": {
                    "State": "associated"
                }
            }
        ],
        "IsDefault": false,
        "Tags": [
            {
                "Key": "Name",
                "Value": "prod-vpc"
            }
        ],
        "BlockPublicAccessStates": {
            "InternetGatewayBlockMode": "off"
        },
        "VpcId": "vpc-09822723aed1d2815",
        "State": "available",
        "CidrBlock": "10.0.0.0/16",
        "DhcpOptionsId": "dopt-073b0c55c0a106d5a"
    },
    {
        "OwnerId": "542622959327",
        "InstanceTenancy": "default",
```

task5_describe_subnets.png

```
[ec2-user@ip-10-0-10-102 ~]$ aws ec2 describe-subnets
{
    "Subnets": [
        {
            "AvailabilityZoneId": "mec1-az2",
            "MapCustomerOwnedIpOnLaunch": false,
            "OwnerId": "542622959327",
            "AssignIpv6AddressOnCreation": false,
            "Ipv6CidrBlockAssociationSet": [],
            "SubnetArn": "arn:aws:ec2:me-central-1:542622959327:subnet/subnet-078f1b79825a5fee0",
            "EnableDns64": false,
            "Ipv6Native": false,
            "PrivateDnsNameOptionsOnLaunch": {
                "HostnameType": "ip-name",
                "EnableResourceNameDnsARecord": false,
                "EnableResourceNameDnsAAAARecord": false
            },
            "BlockPublicAccessStates": {
                "InternetGatewayBlockMode": "off"
            },
            "SubnetId": "subnet-078f1b79825a5fee0",
            "State": "available",
            "VpcId": "vpc-0b412746b28b797e7",
            "CidrBlock": "172.31.16.0/20",
            "AvailableIpAddressCount": 4091,
            "AvailabilityZone": "me-central-1b",
            "DefaultForAz": true,
            "MapPublicIpOnLaunch": true
        },
        {
            "AvailabilityZoneId": "mec1-az1",
            "MapCustomerOwnedIpOnLaunch": false,
            "OwnerId": "542622959327",
```

task5_describe_instances.png

```
[ec2-user@ip-10-0-10-102 ~]$ aws ec2 describe-instances
{
    "Reservations": [
        {
            "ReservationId": "r-070230ab471c7c75d",
            "OwnerId": "542622959327",
            "Groups": [],
            "Instances": [
                {
                    "Architecture": "x86_64",
                    "BlockDeviceMappings": [
                        {
                            "DeviceName": "/dev/xvda",
                            "Ebs": {
                                "AttachTime": "2025-12-30T17:18:51+00:00",
                                "DeleteOnTermination": true,
                                "Status": "attached",
                                "VolumeId": "vol-085ca9941c4724e91"
                            }
                        }
                    ],
                    "ClientToken": "terraform-20251230171846486800000002",
                    "EbsOptimized": false,
                    "EnaSupport": true,
                    "Hypervisor": "xen",
                    "NetworkInterfaces": [
                        {
                            "Association": {
                                "IpOwnerId": "amazon",
                                "PublicDnsName": "",
                                "PublicIp": "3.28.133.115"
                            },
                            "Attachment": {
                                "AttachTime": "2025-12-30T17:18:50+00:00",
```

task5_describe_regions.png

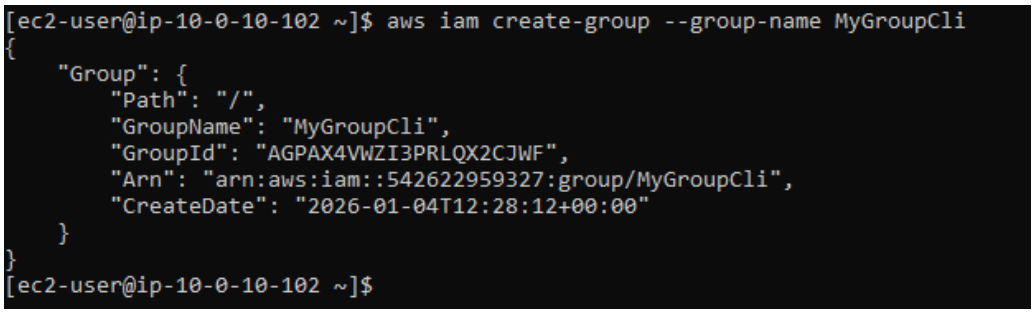
```
[ec2-user@ip-10-0-10-102 ~]$ aws ec2 describe-regions
{
    "Regions": [
        {
            "OptInStatus": "opt-in-not-required",
            "RegionName": "ap-south-1",
            "Endpoint": "ec2.ap-south-1.amazonaws.com"
        },
        {
            "OptInStatus": "opt-in-not-required",
            "RegionName": "eu-north-1",
            "Endpoint": "ec2.eu-north-1.amazonaws.com"
        },
        {
            "OptInStatus": "opt-in-not-required",
            "RegionName": "eu-west-3",
            "Endpoint": "ec2.eu-west-3.amazonaws.com"
        },
        {
            "OptInStatus": "opt-in-not-required",
            "RegionName": "eu-west-2",
            "Endpoint": "ec2.eu-west-2.amazonaws.com"
        },
        {
            "OptInStatus": "opt-in-not-required",
            "RegionName": "eu-west-1",
            "Endpoint": "ec2.eu-west-1.amazonaws.com"
        },
        {
            "OptInStatus": "opt-in-not-required",
            "RegionName": "ap-northeast-3",
            "Endpoint": "ec2.ap-northeast-3.amazonaws.com"
        },
```

task5_describe_availability_zones.png

Task 6 — IAM: create group, user, attach policies, create console login & keys

Create group:

task6_create_group_and_user.png



Get group details:

task6_create_group_and_user.png

```
[ec2-user@ip-10-0-10-102 ~]$ aws iam get-group --group-name MyGroupCli
{
    "Users": [],
    "Group": {
        "Path": "/",
        "GroupName": "MyGroupCli",
        "GroupId": "AGPAX4VWZI3PRLQX2CJWF",
        "Arn": "arn:aws:iam::542622959327:group/MyGroupCli",
        "CreateDate": "2026-01-04T12:28:12+00:00"
    }
}
[ec2-user@ip-10-0-10-102 ~]$
```

Create user:

task6_create_group_and_user.png

```
[ec2-user@ip-10-0-10-102 ~]$ aws iam create-user --user-name MyUserCli
{
    "User": {
        "Path": "/",
        "UserName": "MyUserCli",
        "UserId": "AIDAX4VWZI3PYBIHCD3HA",
        "Arn": "arn:aws:iam::542622959327:user/MyUserCli",
        "CreateDate": "2026-01-04T12:30:34+00:00"
    }
}
[ec2-user@ip-10-0-10-102 ~]$
```

Get user details:

task6_create_group_and_user.png

```
[ec2-user@ip-10-0-10-102 ~]$ aws iam add-user-to-group --user-name MyUserCli --group-name MyGroupCli
[ec2-user@ip-10-0-10-102 ~]$
```

Add user to group:

task6_add_user_to_group_and_verify.png

```
[ec2-user@ip-10-0-10-102 ~]$ aws iam add-user-to-group --user-name MyUserCli --group-name MyGroupCli
[ec2-user@ip-10-0-10-102 ~]$
```

See group again:

task6_add_user_to_group_and_verify.png

```
[ec2-user@ip-10-0-10-102 ~]$ aws iam get-group --group-name MyGroupCli
{
    "Users": [
        {
            "Path": "/",
            "UserName": "MyUserCli",
            "UserId": "AIDAX4VWZI3PYBIHCD3HA",
            "Arn": "arn:aws:iam::542622959327:user/MyUserCli",
            "CreateDate": "2026-01-04T12:30:34+00:00"
        }
    ],
    "Group": {
        "Path": "/",
        "GroupName": "MyGroupCli",
        "GroupId": "AGPAX4VWZI3PRLQX2CJWF",
        "Arn": "arn:aws:iam::542622959327:group/MyGroupCli",
        "CreateDate": "2026-01-04T12:28:12+00:00"
    }
}
[ec2-user@ip-10-0-10-102 ~]$
```

List policies that mention EC2:

task6_policy_list_and_attach.png

```
[ec2-user@ip-10-0-10-102 ~]$ aws iam list-policies \
>   --query "Policies[?contains(PolicyName, 'EC2')].{Name:PolicyName}" \
>   --output text
AmazonEC2FullAccess
AmazonEC2ReadOnlyAccess
AmazonElasticMapReduceforEC2Role
AmazonEC2RoleforDataPipelineRole
AmazonEC2ContainerServiceforEC2Role
AmazonEC2ContainerServiceRole
AmazonEC2RoleforAWSCodeDeploy
AmazonEC2RoleforSSM
CloudWatchActionsEC2Access
AmazonEC2ContainerRegistryReadOnly
AmazonEC2ContainerRegistryPowerUser
AmazonEC2ContainerRegistryFullAccess
AmazonEC2ContainerServiceAutoscaleRole
AmazonEC2SpotFleetAutoscaleRole
AWSElasticBeanstalkCustomPlatformforEC2Role
AmazonEC2ContainerServiceEventsRole
AmazonEC2SpotFleetTaggingRole
AWSEC2SpotServiceRolePolicy
AWSServiceRoleForEC2ScheduledInstances
:...skipping...
AmazonEC2FullAccess
AmazonEC2ReadOnlyAccess
AmazonElasticMapReduceforEC2Role
AmazonEC2RoleforDataPipelineRole
AmazonEC2ContainerServiceforEC2Role
AmazonEC2ContainerServiceRole
AmazonEC2RoleforAWSCodeDeploy
AmazonEC2RoleforSSM
CloudWatchActionsEC2Access
AmazonEC2ContainerRegistryReadOnly
AmazonEC2ContainerRegistryPowerUser
AmazonEC2ContainerRegistryFullAccess
AmazonEC2ContainerServiceAutoscaleRole
AmazonEC2SpotFleetAutoscaleRole
AWSElasticBeanstalkCustomPlatformforEC2Role
AmazonEC2ContainerServiceEventsRole
AmazonEC2SpotFleetTaggingRole
AWSEC2SpotServiceRolePolicy
AWSServiceRoleForEC2ScheduledInstances
AWSEC2SpotFleetServiceRolePolicy
```

Get ARN for AmazonEC2FullAccess (example query):

task6_policy_list_and_attach.png

```
[ec2-user@ip-10-0-10-102 ~]$ aws iam list-policies --query 'Policies[?PolicyName==`AmazonEC2FullAccess`].{Name:PolicyName, ARN:Arn}' --
output table
-------------------------------------------------------------------------
|                           ListPolicies                                |
+-----------------------------------------------+-----------------------+
|                      ARN                      |         Name          |
+-----------------------------------------------+-----------------------+
|  arn:aws:iam::aws:policy/AmazonEC2FullAccess  |  AmazonEC2FullAccess  |
+-----------------------------------------------+-----------------------+
[ec2-user@ip-10-0-10-102 ~]$
```

Attach policy to group (use the ARN you retrieved):

task6_policy_list_and_attach.png

```
[ec2-user@ip-10-0-10-102 ~]$ aws iam attach-group-policy   --group-name MyGroupCli   --policy-arn  arn:aws:iam::aws:policy/AmazonEC2Ful
lAccess
[ec2-user@ip-10-0-10-102 ~]$
```

List attached policies for the group:

task6_policy_list_and_attach.png

```
[ec2-user@ip-10-0-10-102 ~]$ aws iam list-attached-group-policies --group-name MyGroupCli
{
    "AttachedPolicies": [
        {
            "PolicyName": "AmazonEC2FullAccess",
            "PolicyArn": "arn:aws:iam::aws:policy/AmazonEC2FullAccess"
        }
    ]
}
[ec2-user@ip-10-0-10-102 ~]$
```

Create a console login profile for the user:

task6_create_login_profile_and_signin.png

```
[ec2-user@ip-10-0-10-102 ~]$ aws iam create-login-profile   --user-name MyUserCLI   --password [redacted] --password-reset-required
{
    "LoginProfile": {
        "UserName": "MyUserCli",
        "CreateDate": "2026-01-04T12:57:04+00:00",
        "PasswordResetRequired": true
    }
}
[ec2-user@ip-10-0-10-102 ~]$
```

Create access keys for the user (save AccessKeyId and SecretAccessKey securely):

task6_create_access_key_output.png

```
[ec2-user@ip-10-0-10-102 ~]$ aws iam create-access-key --user-name MyUserCli
{
    "AccessKey": {
        "UserName": "MyUserCli",
        "AccessKeyId": [redacted]
        "Status": "Active",
        "SecretAccessKey": [redacted]
        "CreateDate": "2026-01-04T12:59:34+00:00"
    }
}
[ec2-user@ip-10-0-10-102 ~]$
```

List access keys:

task6_create_access_key_output.png

```
[ec2-user@ip-10-0-10-102 ~]$ aws iam list-access-keys --user-name MyUserCli
{
    "AccessKeyMetadata": [
        {
            "UserName": "MyUserCli",
            "AccessKeyId": [redacted]
            "Status": "Active",
            "CreateDate": "2026-01-04T12:59:34+00:00"
        }
    ]
}
[ec2-user@ip-10-0-10-102 ~]$
```

Use environment variables to authenticate as that user in the Codespace:

task6_env_exports_and_get_user_error.png

```
[ec2-user@ip-10-0-10-102 ~]$ export AWS_ACCESS_KEY_ID=
[ec2-user@ip-10-0-10-102 ~]$ export AWS_SECRET_ACCESS_KEY=
[ec2-user@ip-10-0-10-102 ~]$ printenv | grep AWS_
AWS_SECRET_ACCESS_KEY=
AWS_ACCESS_KEY_ID=
[ec2-user@ip-10-0-10-102 ~]$ aws iam get-user --user-name MyUserCli

An error occurred (AccessDenied) when calling the GetUser operation: User: arn:aws:iam::542622959327:user/MyUserCli is not authorized to perform: iam
:GetUser on resource: user MyUserCli because no identity-based policy allows the iam:GetUser action
[ec2-user@ip-10-0-10-102 ~]$ exit
logout
Connection to 3.29.21.250 closed.
@hamna-mahmood /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $
```

After clearing or switching credentials, repeat get-user and save:

task6_after_logout_get_user_success.png

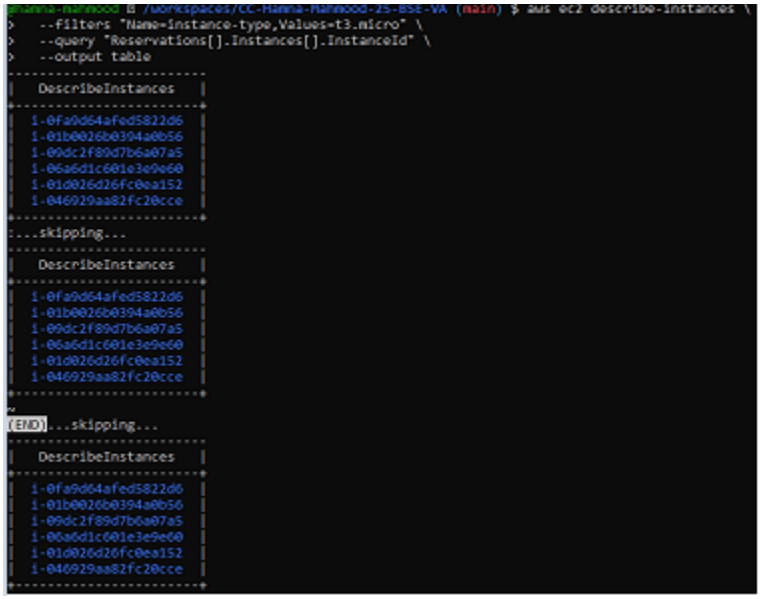
```
@hamna-mahmood /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ unset AWS_ACCESS_KEY_ID
@hamna-mahmood /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ unset AWS_SECRET_ACCESS_KEY
@hamna-mahmood /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ printenv | grep AWS_
@hamna-mahmood /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ aws iam get-user --user-name MyUserCli
{
    "User": {
        "Path": "/",
        "UserName": "MyUserCli",
        "UserId": "AIDAX4VWZI3PYBIHCD3HA",
        "Arn": "arn:aws:iam::542622959327:user/MyUserCli",
        "CreateDate": "2026-01-04T12:30:34+00:00"
    }
}
```

Task 7 — Filters: query with filters to find instances and their attributes

task7_filter_by_tag_public_ip.png

```
@hamna-mahmood 🖹 /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ aws ec2 describe-instances \
>   --filters "Name=tag:Name,Values=MyServer" \
>   --query "Reservations[*].Instances[*].PublicIpAddress" \
>   --output text
3.28.135.154
3.29.21.250
@hamna-mahmood 🖹 /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $
```

task7_filter_by_instance_type.png



task7_filter_by_subnet.png

```
@hamna-mahmood 🖹 /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ aws ec2 describe-instances   --filters "Name=subnet
-id,Values=subnet-0a2cee75f0ad691a6"   --query "Reservations[*].Instances[*].InstanceId"   --output table
------------------------
|   DescribeInstances   |
+-----------------------+
|  i-0fa9d64afed5822d6  |
|  i-01b0026b0394a0b56  |
|  i-09dc2f89d7b6a07a5  |
|  i-06a6d1c601e3e9e60  |
|  i-01d026d26fc0ea152  |
|  i-046929aa82fc20cce  |
+-----------------------+
```

task7_filter_by_vpc.png

```
@hamna-mahmood 🖹 /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ aws ec2 describe-instances   --filters "Name=vpc-id
,Values=vpc-09822723aed1d2815"   --query "Reservations[*].Instances[*].InstanceId"   --output table
------------------------
|   DescribeInstances   |
+-----------------------+
|  i-0fa9d64afed5822d6  |
|  i-01b0026b0394a0b56  |
|  i-09dc2f89d7b6a07a5  |
|  i-06a6d1c601e3e9e60  |
|  i-01d026d26fc0ea152  |
|  i-046929aa82fc20cce  |
+-----------------------+
@hamna-mahmood 🖹 /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $
```

Task 8 — Use --query to format outputs for reporting

task8_query_table_instances_name_ip.png

```
@hamna-mahmood ➜ /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ aws ec2 describe-instances \
>   --filters "Name=tag:Name,Values=MyServer" \
>   --query "Reservations[*].Instances[*].[InstanceId,PublicIpAddress,Tags[?Key=='Name'].Value|[0]]" \
>   --output table
-----------------------------------------------------
|                DescribeInstances                  |
+----------------------+----------------+-----------+
|  i-01d026d26fc0ea152 |  3.28.135.154  |  MyServer |
|  i-046929aa82fc20cce |  3.29.21.250   |  MyServer |
+----------------------+----------------+-----------+
```

task8_query_table_instance_state.png

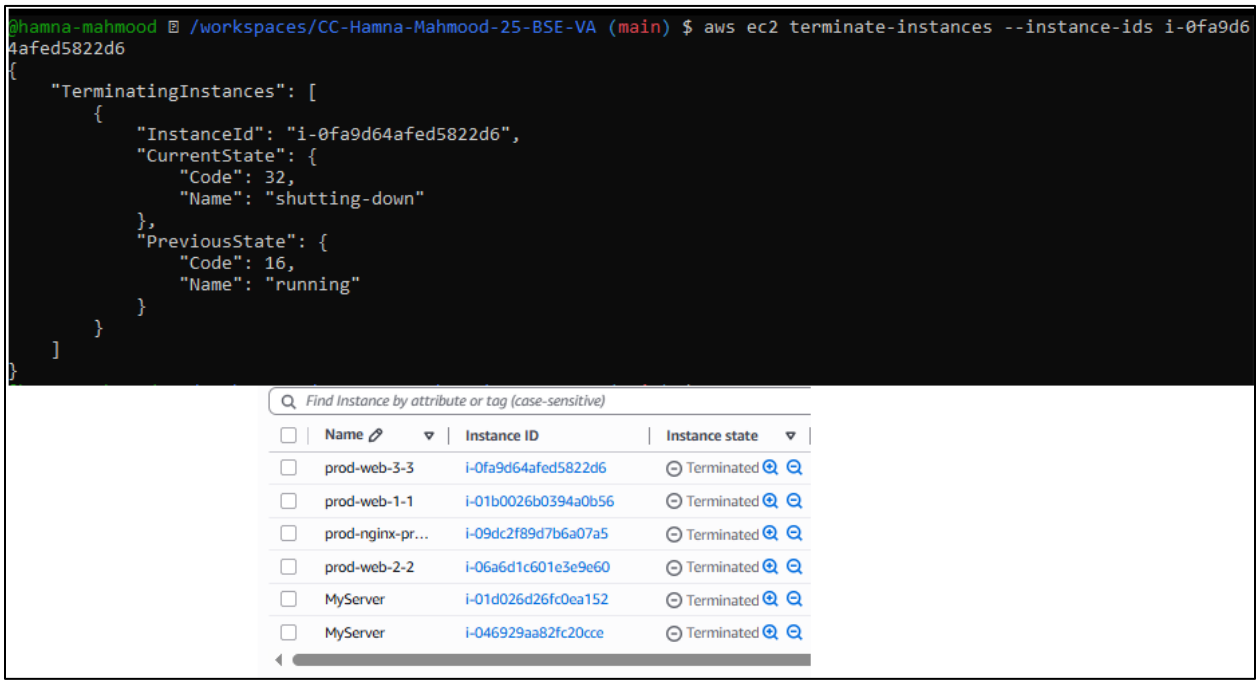
```
@hamna-mahmood ➜ /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ aws ec2 describe-instances \
>   --query "Reservations[*].Instances[*].[InstanceId,State.Name]" \
>   --output table
-----------------------------------
|         DescribeInstances       |
+----------------------+----------+
|  i-0fa9d64afed5822d6 |  running |
|  i-01b0026b0394a0b56 |  running |
|  i-09dc2f89d7b6a07a5 |  running |
|  i-06a6d1c601e3e9e60 |  running |
|  i-01d026d26fc0ea152 |  running |
|  i-046929aa82fc20cce |  running |
+----------------------+----------+
```

task8_query_table_instance_type_az.png

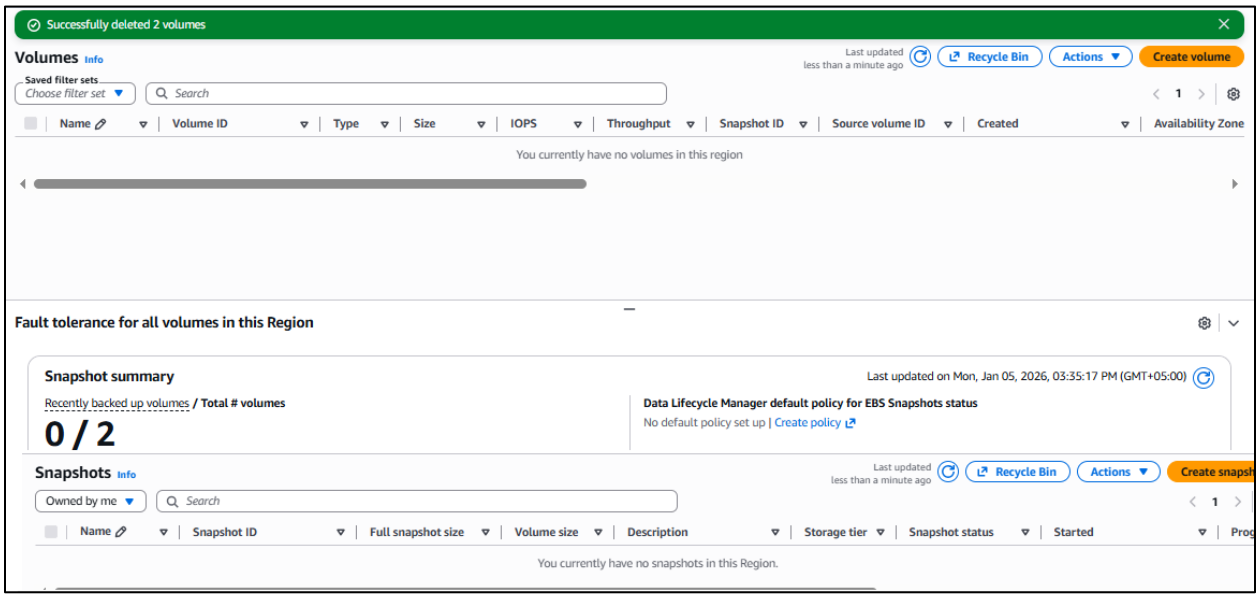
```
@hamna-mahmood ➜ /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ aws ec2 describe-instances \
>   --query "Reservations[*].Instances[*].[InstanceId,InstanceType,Placement.AvailabilityZone]" \
>   --output table
-------------------------------------------------------
|                  DescribeInstances                  |
+----------------------+-----------+-----------------+
|  i-0fa9d64afed5822d6 |  t3.micro |  me-central-1a  |
|  i-01b0026b0394a0b56 |  t3.micro |  me-central-1a  |
|  i-09dc2f89d7b6a07a5 |  t3.micro |  me-central-1a  |
|  i-06a6d1c601e3e9e60 |  t3.micro |  me-central-1a  |
|  i-01d026d26fc0ea152 |  t3.micro |  me-central-1a  |
|  i-046929aa82fc20cce |  t3.micro |  me-central-1a  |
+----------------------+-----------+-----------------+
```

Cleanup — Remove resources to avoid charges

cleanup_terminate_instance.png

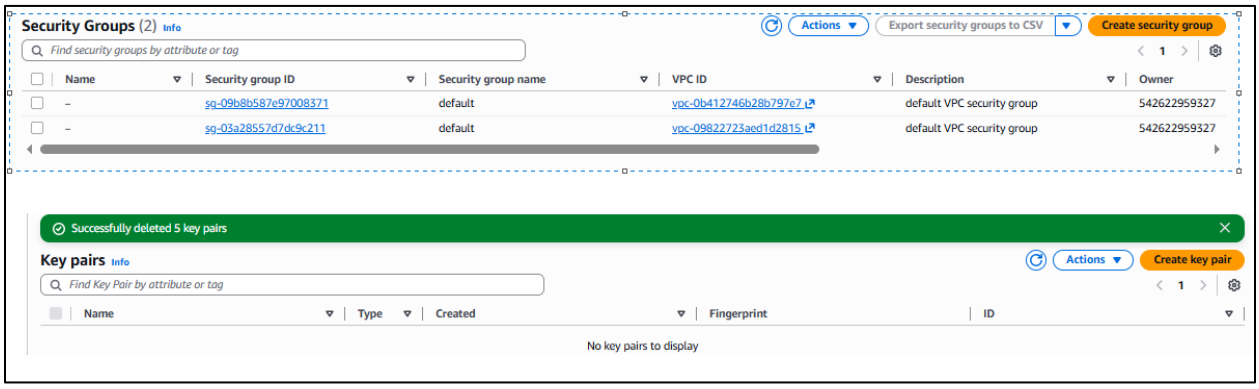


cleanup_delete_volumes_snapshots.png

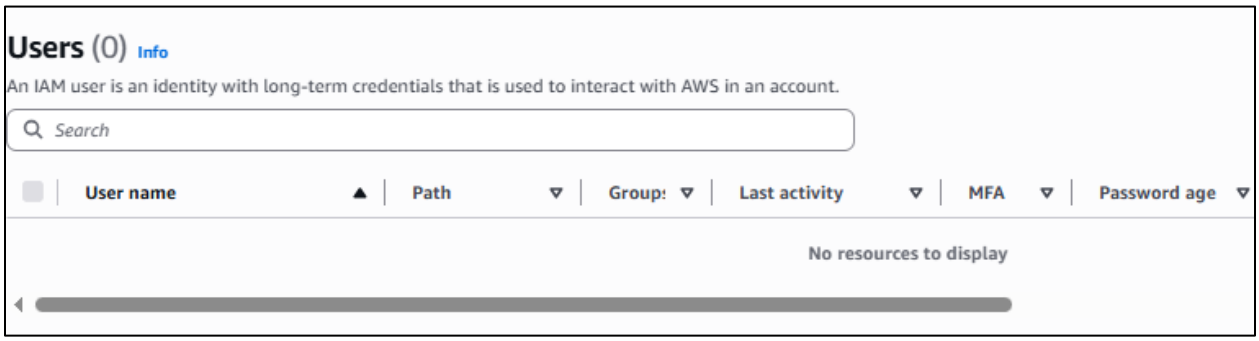


cleanup_delete_security_group_and_keypair.png

These groups cannot be deleted as they are default.

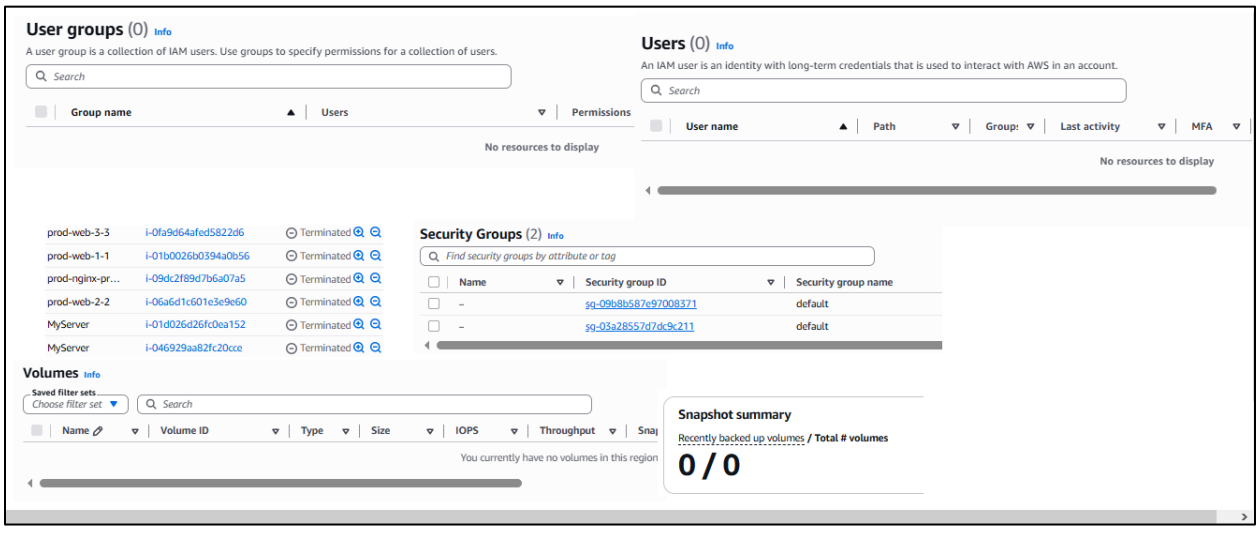


cleanup_iam_users_deleted.png



cleanup_summary.png

Only default security groups remain.




Key pairs Info
Find Key Pair by attribute or tag
Name
Type
Created
Fingerprint
No key pairs to display