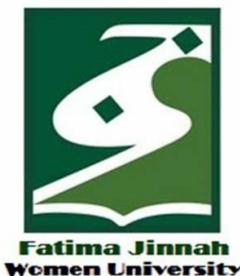


## **CLOUD COMPUTING LAB**



**SUBMITTED TO**  
ENGR. SHOAIB & SIR WAQAS

**SUBMITTED BY**  
HAMNA MAHMOOD  
2023-BSE-025  
BSE V-A

# Lab 13

## Terraform IAM Management with AWS

### Task 0 Lab Setup (Codespace & GH CLI)

- task0\_codespace\_create\_and\_list.png

```
@HamnaMahmood20 →/workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ gh codespace list
NAME          DISPLAY NAME   REPOSITORY      BRANCH STATE    CREATED AT
refactored-acorn-... refactored acorn HamnaMahmood20/... main Available about 1 minute ago
```

- task0\_codespace\_ssh\_connected.png

```
@HamnaMahmood20 →/workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ gh codespace ssh -c refactored-acorn-x5gwq9w4qvr6c9p6j
Welcome to Ubuntu 24.04.3 LTS (GNU/Linux 6.8.0-1030-azure x86_64)

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

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

@HamnaMahmood20 →/workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $
```

### Task 1 Create IAM Group and Output Details

- task1\_project\_directory.png

```
@HamnaMahmood20 →/workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ mkdir -p ~/Lab13
@HamnaMahmood20 →~ $ cd ~/Lab13
@HamnaMahmood20 →~/Lab13 $
```

- task1\_file\_created.png

```
@HamnaMahmood20 →~/Lab13 $ touch main.tf
@HamnaMahmood20 →~/Lab13 $ ls
main.tf
```

- task1\_main\_tf.png

```
@HamnaMahmood20 →/workspaces/CC-Hamna-Mahmood-25-BSE-VA/lab_13/Task (main) $ touch main.tf
@HamnaMahmood20 →/workspaces/CC-Hamna-Mahmood-25-BSE-VA/lab_13/Task (main) $ ls
main.tf
```

```

lab_13 > Task > main.tf > output "group_details"
  1 provider "aws" {
  2   shared_config_files      = ["~/.aws/config"]
  3   shared_credentials_files = ["~/.aws/credentials"]
  4 }
  5
  6 resource "aws_iam_group" "developers" {

```

- task1\_terraform\_init.png

```

@HannaMahmood20 → /workspaces/CC-Hanna-Mahmood-25-BSE-VA/lab_13/Task (main) $ terraform init
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.

```

- task1\_terraform\_apply.png

```

@HannaMahmood20 → /workspaces/CC-Hanna-Mahmood-25-BSE-VA/lab_13/Task (main) $ terraform apply auto-
approve
Apply complete! Resources: 1 added, 0 changed, 0 destroyed.

Outputs:

group_details = {
  "group_arn" = "arn:aws:iam::941618064465:group/groups/developers"
  "group_name" = "developers"
  "unique_id" = "AGPA5WPGPNRWQVQPNE5"
}
commands will detect it and remind you to do so if necessary.

```

- task1\_terraform\_output.png

```

● @HannaMahmood20 → /workspaces/CC-Hanna-Mahmood-25-BSE-VA/lab_13/Task (main) $ terraform output
group_details = {
  "group_arn" = "arn:aws:iam::941618064465:group/groups/developers"
  "group_name" = "developers"
  "unique_id" = "AGPA5WPGPNRWQVQPNE5"

```

- task1\_aws\_console\_group.png

User groups (1) <a href="#">Info</a>				
A user group is a collection of IAM users. Use groups to specify permissions for a collection of users.				
<input type="text"/> Search <span style="float: right;">Delete</span> <span style="float: right;">Create group</span>				
Group name	Users	Permissions	Creation time	
<a href="#">developers</a>	0	Not defined	5 minutes ago	

## Task 2 – Create IAM User with Group Membership

- task2\_main\_tf\_user.png

```
> Task > main.tf > output "user_details"
  output "group_details" {
    }

  resource "aws_iam_user" "lb" {
    name = "loadbalancer"
    path = "/users/"
    force_destroy = true
    tags = {
      DisplayName = "Load Balancer"
    }
  }
```

- task2\_terraform\_apply.png

```
@HamnaMahmood20 ➔ /workspaces/CC-Hamna-Mahmood-25-BSE-VA/lab_13/Task (main) $ terraform apply auto-approve
  "group_arn" = "arn:aws:iam::941618064465:group/groups/developers"
  "group_name" = "developers"
  "unique_id" = "AGPA5WPGPNRIWSOVQPNE5"
}
user_details = {
  "unique_id" = "AIDA5WPGPNRI5E5P3HF3E"
  "user_arn" = "arn:aws:iam::941618064465:user/users/loadbalancer"
  "user_name" = "loadbalancer"
```

- task2\_terraform\_output.png

```
@HamnaMahmood20 ➔ /workspaces/CC-Hamna-Mahmood-25-BSE-VA/lab_13/Task (main) $ terraform output
group_details = {
  "group_arn" = "arn:aws:iam::941618064465:group/groups/developers"
  "group_name" = "developers"
  "unique_id" = "AGPA5WPGPNRIWSOVQPNE5"
}
user_details = {
  "unique_id" = "AIDA5WPGPNRI5E5P3HF3E"
  "user_arn" = "arn:aws:iam::941618064465:user/users/loadbalancer"
  "user_name" = "loadbalancer"
```

- task2\_aws\_console\_user.png

Users (2) <small>Info</small>						
An IAM user is an identity with long-term credentials that is used to interact with AWS in an account.						
	User name	Path	Group:	Last activity	MFA	Password age
<input type="checkbox"/>	<a href="#">Admin</a>	/	0	⌚ 13 minutes ago	-	⌚ 9 days
<input type="checkbox"/>	<a href="#">loadbalancer</a>	/users/	1	-	-	-

- task2\_aws\_console\_user\_groups.png

The screenshot shows the 'User groups membership' section of the AWS IAM console. It displays a table with one row for the 'developers' group. The table has columns for 'Group name' and 'Attached policies'. A 'Remove' button is at the top right, and an 'Add user to groups' button is also present.

Group name	Attached policies
<a href="#">developers</a>	-

### Task 3 – Attach Policies to IAM Group

- task3\_main\_tf\_policies.png

```
resource "aws_iam_group_policy_attachment" "developer_ec2_fullaccess" {
  group = aws_iam_group.developers.name
  policy_arn = "arn:aws:iam::aws:policy/AmazonEC2FullAccess"
```

- task3\_terraform\_apply.png

```
@HamnaMahmood20 → /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ terraform apply -auto-approve
Apply complete! Resources: 2 added, 0 changed, 0 destroyed.

Outputs:

group_details = {
  "group_arn" = "arn:aws:iam::941618064465:group/groups/developers"
  "group_name" = "developers"
  "unique_id" = "AGPA5WPGPNRTWSOQPNES"
```

- task3\_aws\_console\_policies.png

The screenshot shows the 'Policies' section of the AWS IAM console. It lists two policies: 'AmazonEC2FullAccess' and 'IAMUserChangePassword'. Both are AWS managed policies and are attached to 1 entity each.

Policy name	Type	Attached entities
<a href="#">AmazonEC2FullAccess</a>	AWS managed	1
<a href="#">IAMUserChangePassword</a>	AWS managed	2

### Task 4 – Create Login Profile for IAM User

- task4\_variables\_tf.png

```
Task > 🐾 variables.tf > 📄 variable "iam_password"
variable "iam_password" {
  description = "Temporary password for the IAM user"
  type        = string
  sensitive   = true
  default     = "IdontKnow"
```

- task4\_create\_login\_script.png

```

① README.md U   🐫 main.tf U   🐫 variables.tf U   $ create-login-profile.sh U X
lab_13 > Task > $ create-login-profile.sh
1  #!/usr/bin/env bash
2  set -euo pipefail
3
4  USERNAME="$1"
5  PASSWORD="$2"

```

- task4\_chmod\_script.png

```
● @HamnaMahmood20 →/workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ chmod +x create-login-profile.sh
```

- task4\_terraform\_apply.png

```
@HamnaMahmood20 →/workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ terraform apply -auto-approve -var="iam_password=MySecurePass123!"
Apply complete! Resources: 1 added, 0 changed, 0 destroyed.
```

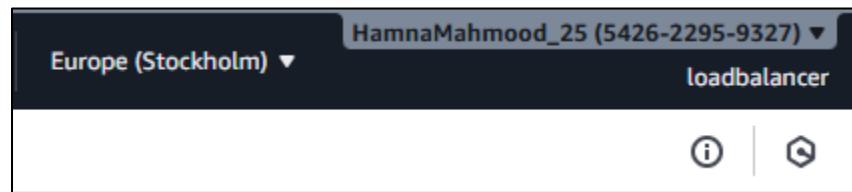
#### Outputs:

```
group_details = {
  "group_arn" = "arn:aws:iam::941618064465:group/groups/developers"
  "group_name" = "developers"
```

- task4\_aws\_cli\_verify.png

```
● @HamnaMahmood20 →/workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ aws iam get-login-profile --user-name loadbalancer
{
  "LoginProfile": {
    "UserName": "loadbalancer",
    "CreateDate": "2026-01-28T08:31:30+00:00",
    "PasswordResetRequired": true
  }
}
```

- task4\_aws\_console\_login.png



- task4\_aws\_console\_password\_reset.png

The form contains the following fields:

- Old Password: A password field with masked input.
- Show Password: A checkbox next to the Old Password field.
- New Password: A password field with masked input.
- Confirm New Password: A password field with masked input.
- Show Password: A checkbox next to the New Password field.
- Matches: A label indicating the two password fields must match.
- Confirm Password Change: A large orange button.
- Sign in to a different account: A link at the bottom left.

#### Task 5- Generate Access Keys for IAM Users

- task5\_main\_tf\_access\_keys.png

```
lab_13 > Task > main.tf > ...
66  # Access key for IAM user
67  resource "aws_iam_access_key" "lb_access_key" {
68    user = aws_iam_user.lb.name
```

- task5\_terraform\_apply.png

```
@HamnaMahmood20 →/workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ terraform apply -auto-approve -var="iam_password=MySecurePass123!"
Apply complete! Resources: 1 added, 0 changed, 0 destroyed.
```

- task5\_tfstate\_secret.Png

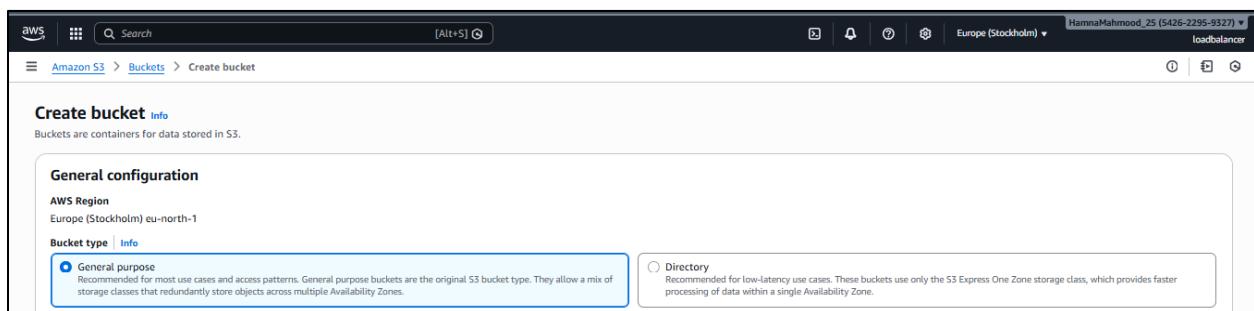
```
@HamnaMahmood20 →/workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ cat terraform.tfstate
| grep -A 10 "access_key_secret"
"access_key_secret": {
  "value": "O9BbFIWKW7J5vRngwSzuIVZTiMkUXFtCMoBc9122",
  "type": "string",
  "sensitive": true
},
"group_details": {
  "value": {
    "group_arn": "arn:aws:iam::941618064465:group/groups/developers",
    "group_name": "developers",
    "unique_id": "AGPA5WPGPNRISOVQPNE5"
```

- task5\_aws\_console\_access\_keys.Png

<b>AKIA5WPGPNRIYT2DNYFM</b>	
<b>Description</b>	<b>Status</b>
-	 Active
<b>Last used</b>	<b>Created</b>
None	6 minutes ago
<b>Last used region</b>	<b>Last used service</b>
N/A	N/A

### Task 6 – Implement Terraform State with S3

- task6\_s3\_bucket\_create.png



- task6\_s3\_bucket\_versioning.png

### Bucket Versioning

Versioning is a means of keeping multiple variants of an object in the same bucket. You can use versioning to both unintended user actions and application failures. [Learn more](#)

#### Bucket Versioning

Disable  
 Enable

- task6\_terraform\_init\_migrate.png

```
@HamnaMahmood20 → /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ terraform init migrate-state
Terraform has been successfully initialized!

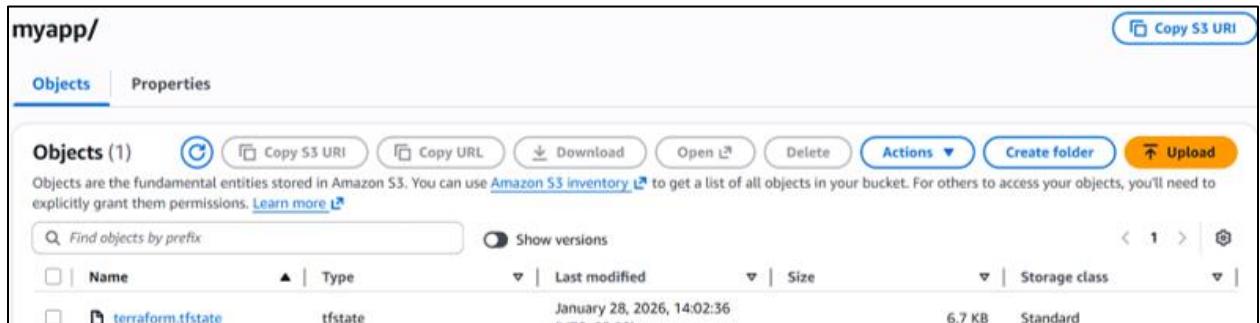
You may now begin working with Terraform. Try running "terraform plan" to see
any changes that are required for your infrastructure. All Terraform commands
should now work.

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.
```

- task6\_terraform\_apply.png

```
@HamnaMahmood20 ➔ /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ terraform apply -auto-approve -var="iam_password=MySecurePass123!"  
Apply complete! Resources: 0 added, 0 changed, 0 destroyed.
```

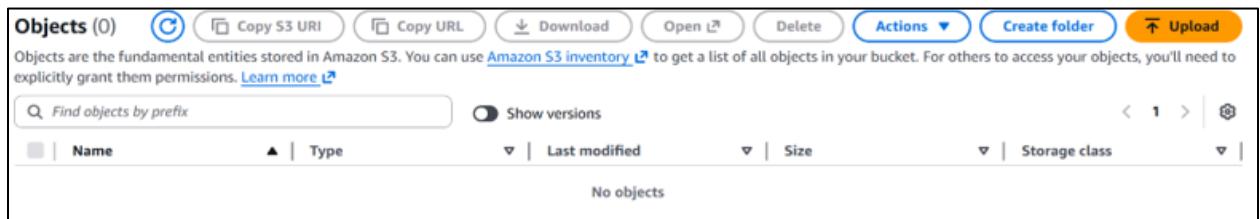
- task6\_s3\_tfstate\_file.png



- task6\_terraform\_destroy.png

```
@HamnaMahmood20 ➔ /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ terraform destroy -auto-approve  
aws_iam_group_policy_attachment.developer_ec2_fullaccess: Destruction complete after 1s  
aws_iam_user_group_membership.lb_membership: Destruction complete after 1s  
aws_iam_group.developers: Destroying... [id=developers]  
aws_iam_access_key.lb_access_key: Destruction complete after 1s  
aws_iam_user.lb: Destroying... [id=loadbalancer]  
aws_iam_group.developers: Destruction complete after 1s  
aws_iam_user.lb: Destruction complete after 3s  
  
Destroy complete! Resources: 7 destroyed.
```

- task6\_s3\_tfstate\_destroyed.png



## Task 7 – Create Multiple Users From CSV File

- task7\_locals\_tf.png

```
locals {  
    users = csvdecode(file("users.csv"))
```

- task7\_users\_csv.png

```

1   user_name
2   Michael
3   Dwight
4   Jim
5   Pam
6   Ryan

```

- task7\_main\_tf\_multiple\_users.png

```

# Create multiple IAM users from CSV
resource "aws_iam_user" "users" {
    for_each = { for user in local.users : user.user_name => user }

    name      = each.value.user_name
    path      = "/users/"
}

```

- task7\_terraform\_apply.png

```

@HamnaMahmood20 ➔ /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ terraform apply -auto-approve
-var="iam_password=MySecurePass123!"
Apply complete! Resources: 107 added, 0 changed, 0 destroyed.

```

- task7\_terraform\_output.png

```

@HamnaMahmood20 ➔ /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ terraform output
"Robert" = {
    "access_key_id" = "AKIA5WPGPNR17QXWFB0"
    "user_arn" = "arn:aws:iam::941618864465:user/users/Robert"
    "user_unique_id" = "AIDAS5WPGPNR16MD7NID48T"
}
"Ryan" = {
    "access_key_id" = "AKIA5WPGPNRIVRS4IRU7"
    "user_arn" = "arn:aws:iam::941618864465:user/users/Ryan"
    "user_unique_id" = "AIDAS5WPGPNRIZC7VAJ3CC"
}
"Stanley" = {
    "access_key_id" = "AKIA5WPGPNR1YCY2XGYHQ"
    "user_arn" = "arn:aws:iam::941618864465:user/users/Stanley"
    "user_unique_id" = "AIDAS5WPGPNR16PAUCS4SU"
}
"Toby" = {
    "access_key_id" = "AKIA5WPGPNR1AV6ZFA72"
    "user_arn" = "arn:aws:iam::941618864465:user/users/Toby"
    "user_unique_id" = "AIDAS5WPGPNR1QZSFJFVTT"
}
group_details = {
    "group_arn" = "arn:aws:iam::941618864465:group/groups/developers"
    "group_name" = "developers"
    "unique_id" = "AGPAS5WPGPNR12DIGHVZKS"
}

```

- task7\_tfstate\_secrets. Png

```

@HamnaMahmood20 ➔ /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $ cat terraform.tfstate
| grep -A 5 "all_access_key_secrets"
@HamnaMahmood20 ➔ /workspaces/CC-Hamna-Mahmood-25-BSE-VA (main) $

```

- task7\_aws\_console\_all\_users.png

Users (27) <a href="#">Info</a>						
	User name	Path	Group	Last activity	MFA	Password age
<input type="checkbox"/>	<a href="#">Admin</a>	/	0	25 minutes ago	-	9 days
<input type="checkbox"/>	<a href="#">Andy</a>	/users/	1	-	-	26 minutes
<input type="checkbox"/>	<a href="#">Angela</a>	/users/	1	-	-	26 minutes
<input type="checkbox"/>	<a href="#">Charles</a>	/users/	1	-	-	26 minutes

- task7\_aws\_console\_group\_members.png

Users in this group (26)			
	User name	Groups	Last activity
<input type="checkbox"/>	<a href="#">Andy</a>	-	None
<input type="checkbox"/>	<a href="#">Angela</a>	-	28 minutes ago
<input type="checkbox"/>	<a href="#">Charles</a>	-	28 minutes ago
<input type="checkbox"/>	<a href="#">Clark</a>	-	28 minutes ago

- task7\_aws\_console\_user\_access\_key.png

AKIA5WPGPNRI65FILOUR		Actions
Description	-	Status
Last used	None	Created
Last used region	N/A	Last used service

- task7\_s3\_tfstate\_multiple\_users.png

terraform.tfstate <a href="#">Info</a>		<a href="#">Copy S3 URI</a>	<a href="#">Download</a>	<a href="#">Open</a>	<a href="#">Object actions</a>
		<a href="#">Properties</a>	<a href="#">Permissions</a>	<a href="#">Versions</a>	
<strong>Object overview</strong>					
Owner	98399dcf824dcc012e5979aed346b3c6482a423cf1bd9234c2d7702f86559af9	S3 URI	<a href="#">s3://myapp-s3-bucket-laab13/myapp/terraform.tfstate</a>		
AWS Region	Middle East (UAE) me-central-1	Amazon Resource Name (ARN)	<a href="#">arn:aws:s3:::myapp-s3-bucket-laab13/myapp/terraform.tfstate</a>		
Last modified	January 28, 2026, 14:18:37 (UTC+05:00)	Entity tag (Etag)	<a href="#">40ce8e94e29c3d15782a285fb6f91ef8</a>		
Size	95.0 KB	Object URL	<a href="#">https://myapp-s3-bucket-laab13.s3.me-central-1.amazonaws.com/myapp/terraform.tfstate</a>		

## Cleanup

- cleanup\_destroy\_complete.png
  - aws\_iam\_user.users["Peter"] : Destruction complete after 3s
  - aws\_iam\_user.users["Michael"] : Destruction complete after 3s
  - aws\_iam\_user.users["Meredith"] : Destruction complete after 5s
  - aws\_iam\_user.users["Kevin"] : Destruction complete after 8s
- cleanup\_aws\_console\_users\_deleted.png

The screenshot shows the AWS IAM Users console. At the top, there is a header with the title "Users (1)" and a "Delete" button. Below the header, a search bar and a pagination indicator (< 1 >) are visible. The main table has columns: "User name", "Path", "Group:", "Last activity", "MFA", and "Password age". There is one row for the user "Admin", which is highlighted in blue. The "Last activity" column shows "36 minutes ago", and the "Password age" column shows "9 days".

- cleanup\_aws\_console\_group\_deleted.png

The screenshot shows the AWS IAM User groups console. At the top, there is a header with the title "User groups (0)" and a "Create group" button. Below the header, a search bar and a pagination indicator (< 1 >) are visible. The main table has columns: "Group name", "Users", "Permissions", and "Creation time". A message "No resources to display" is centered below the table.

- cleanup\_s3\_empty\_state.png

The screenshot shows the AWS S3 "myapp/" bucket. At the top, there is a "Copy S3 URI" button. Below it, there are tabs for "Objects" and "Properties", with "Objects" being selected. The main area shows a table with a single row for "Objects (0)". The table has columns: "Name", "Type", "Last modified", "Size", and "Storage class". A message "No objects" is centered below the table.

- cleanup\_final\_files.png

```
@HamnaMahmood20 → /workspaces/CC-Hamna-Mahmood-25-BSE-VA/lab_13/Task (main) $ ls -la
total 44
drwxrwxrwx+ 3 vscode vscode 4096 Jan 28 09:12 .
drwxrwxrwx+ 3 vscode vscode 4096 Jan 28 07:46 ..
-rwxrwxrwx 1 vscode vscode 422 Jan 28 08:26 create-login-profile.sh
-rw-rw-rw- 1 vscode vscode 49 Jan 28 09:11 locals.tf
-rw-rw-rw- 1 vscode vscode 2535 Jan 28 09:16 main.tf
-rw-rw-rw- 1 vscode vscode 0 Jan 28 07:46 README.md
drwxr-xr-x+ 3 vscode vscode 4096 Jan 28 09:02 .terraform
-rw-r--r-- 1 vscode vscode 2422 Jan 28 08:31 .terraform.lock.hcl
```