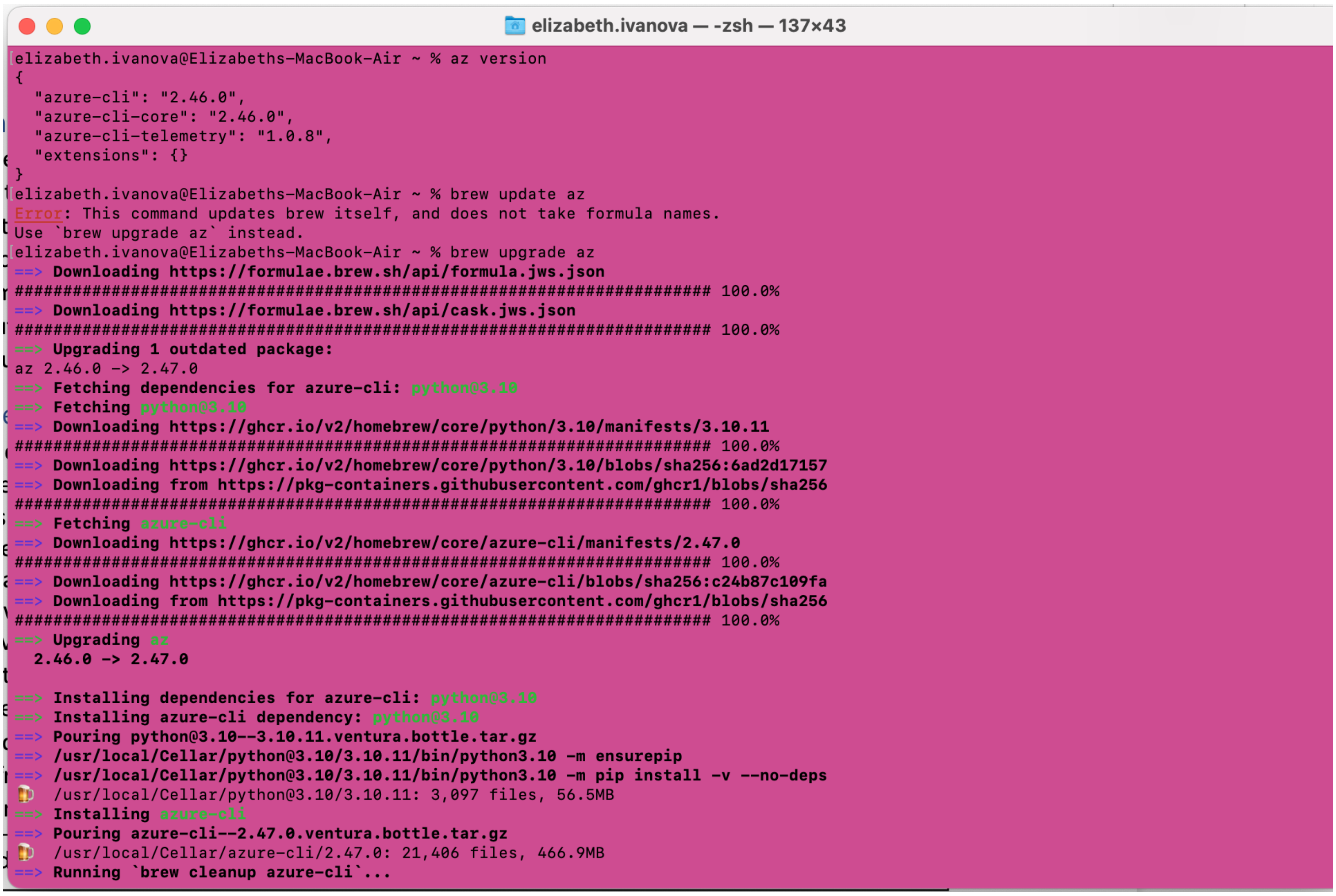
SFA Homework #18
Elizabet Ivanova

Terraform Basic Exercises

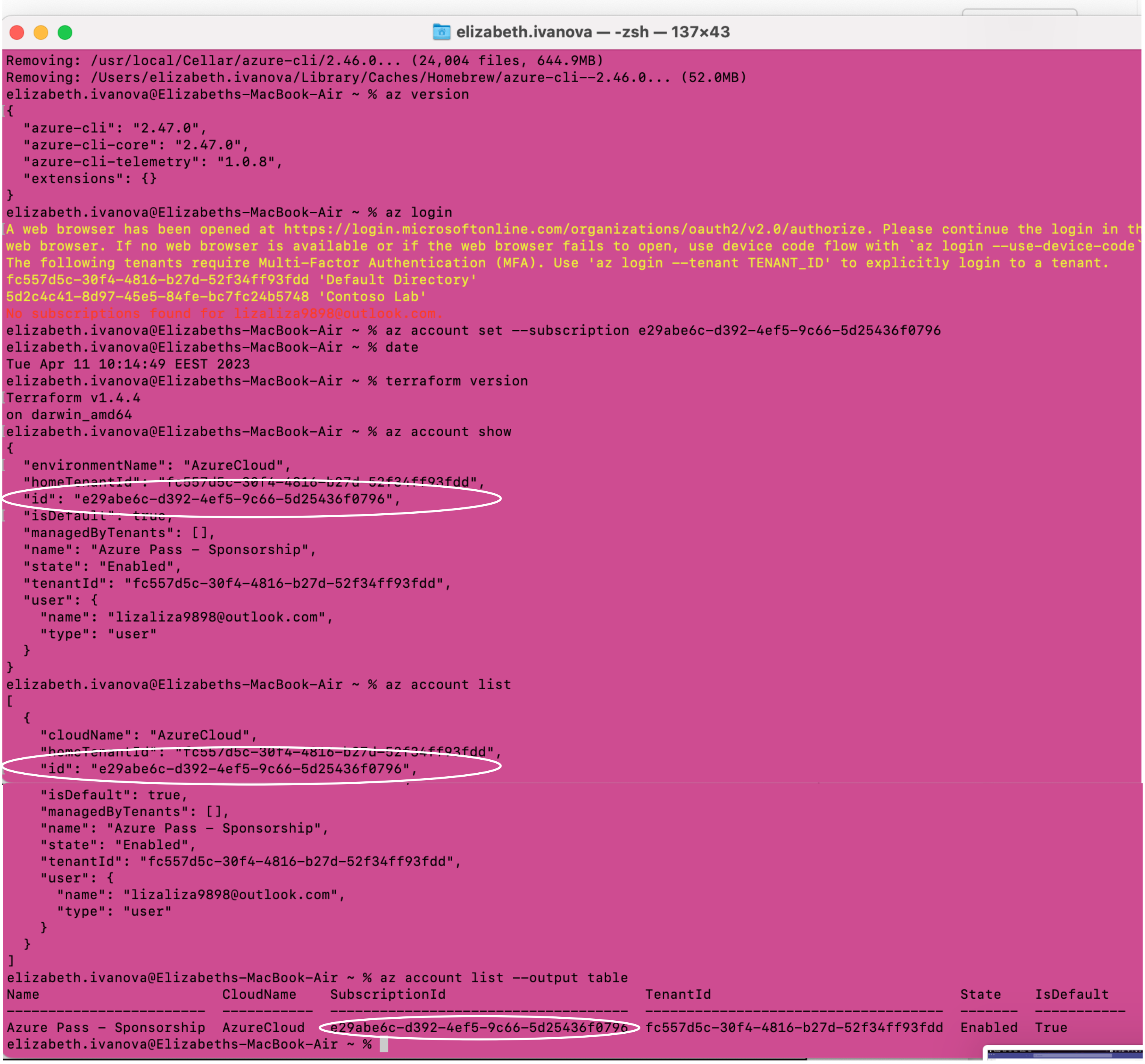
Task 1: Install terraform and Azure CLI

1. Using the brew package manager, I updated Azure CLI (I had it installed previously) and as for Terraform, it was installed yesterday.



```
elizabeth.ivanova@Elizabeths-MacBook-Air ~ % az version
{
  "azure-cli": "2.46.0",
  "azure-cli-core": "2.46.0",
  "azure-cli-telemetry": "1.0.8",
  "extensions": {}
}
elizabeth.ivanova@Elizabeths-MacBook-Air ~ % brew update az
Error: This command updates brew itself, and does not take formula names.
Use `brew upgrade az` instead.
elizabeth.ivanova@Elizabeths-MacBook-Air ~ % brew upgrade az
==> Downloading https://formulae.brew.sh/api/formula.jws.json
######################################################################## 100.0%
==> Downloading https://formulae.brew.sh/api/cask.jws.json
######################################################################## 100.0%
==> Upgrading 1 outdated package:
az 2.46.0 -> 2.47.0
==> Fetching dependencies for azure-cli: python@3.10
==> Fetching python@3.10
==> Downloading https://ghcr.io/v2/homebrew/core/python/3.10/manifests/3.10.11
######################################################################## 100.0%
==> Downloading https://ghcr.io/v2/homebrew/core/python/3.10/blobs/sha256:6ad2d17157
==> Downloading from https://pkg-containers.githubusercontent.com/ghcr1/blobs/sha256
######################################################################## 100.0%
==> Fetching azure-cli
==> Downloading https://ghcr.io/v2/homebrew/core/azure-cli/manifests/2.47.0
######################################################################## 100.0%
==> Downloading https://ghcr.io/v2/homebrew/core/azure-cli/blobs/sha256:c24b87c109fa
==> Downloading from https://pkg-containers.githubusercontent.com/ghcr1/blobs/sha256
######################################################################## 100.0%
==> Upgrading az
  2.46.0 -> 2.47.0

==> Installing dependencies for azure-cli: python@3.10
==> Installing azure-cli dependency: python@3.10
==> Pouring python@3.10--3.10.11.ventura.bottle.tar.gz
==> /usr/local/Cellar/python@3.10/3.10.11/bin/python3.10 -m ensurepip
==> /usr/local/Cellar/python@3.10/3.10.11/bin/python3.10 -m pip install -v --no-deps
🍺  /usr/local/Cellar/python@3.10/3.10.11: 3,097 files, 56.5MB
==> Installing azure-cli
==> Pouring azure-cli--2.47.0.ventura.bottle.tar.gz
🍺  /usr/local/Cellar/azure-cli/2.47.0: 21,406 files, 466.9MB
==> Running `brew cleanup azure-cli`...
```

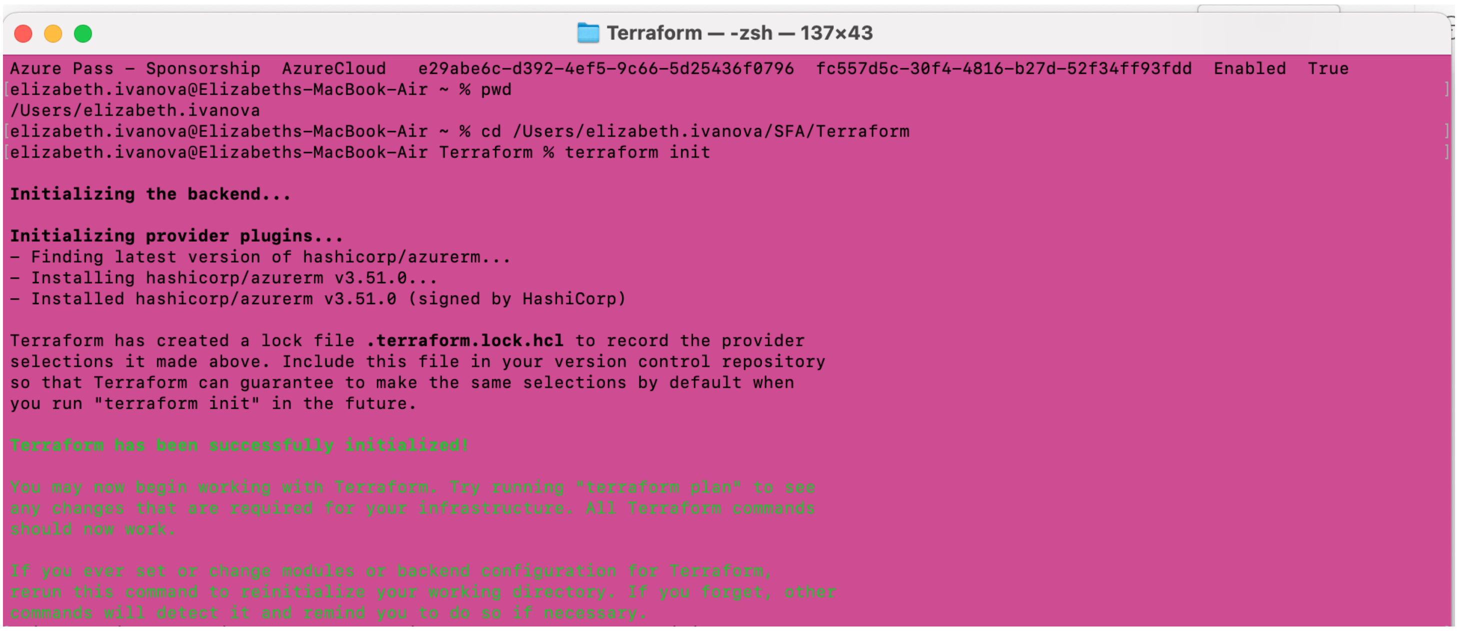
2. Then, I checked the version to verify it was upgraded, I logged into my account through the browser, set my azure pass subscription as default, checked the date, the terraform version, and displayed the current subscription using three different commands:



```
Removing: /usr/local/Cellar/azure-cli/2.46.0... (24,004 files, 644.9MB)
Removing: /Users/elizabeth.ivanova/Library/Caches/Homebrew/azure-cli--2.46.0... (52.0MB)
elizabeth.ivanova@Elizabeths-MacBook-Air ~ % az version
{
  "azure-cli": "2.47.0",
  "azure-cli-core": "2.47.0",
  "azure-cli-telemetry": "1.0.8",
  "extensions": {}
}
elizabeth.ivanova@Elizabeths-MacBook-Air ~ % az login
A web browser has been opened at https://login.microsoftonline.com/organizations/oauth2/v2.0/authorize. Please continue the login in th
web browser. If no web browser is available or if the web browser fails to open, use device code flow with `az login --use-device-code`
The following tenants require Multi-Factor Authentication (MFA). Use 'az login --tenant TENANT_ID' to explicitly login to a tenant.
fc557d5c-30f4-4816-b27d-52f34ff93fdd 'Default Directory'
5d2c4c41-8d97-45e5-84fe-bc7fc24b5748 'Contoso Lab'
No subscriptions found for lizaliza9898@outlook.com.
elizabeth.ivanova@Elizabeths-MacBook-Air ~ % az account set --subscription e29abe6c-d392-4ef5-9c66-5d25436f0796
elizabeth.ivanova@Elizabeths-MacBook-Air ~ % date
Tue Apr 11 10:14:49 EEST 2023
elizabeth.ivanova@Elizabeths-MacBook-Air ~ % terraform version
Terraform v1.4.4
on darwin_amd64
elizabeth.ivanova@Elizabeths-MacBook-Air ~ % az account show
{
  "environmentName": "AzureCloud",
  "homeTenantId": "fc557d5c-30f4-4816-b27d-52f34ff93fdd",
  "id": "e29abe6c-d392-4ef5-9c66-5d25436f0796",
  "isDefault": true,
  "managedByTenants": [],
  "name": "Azure Pass - Sponsorship",
  "state": "Enabled",
  "tenantId": "fc557d5c-30f4-4816-b27d-52f34ff93fdd",
  "user": {
    "name": "lizaliza9898@outlook.com",
    "type": "user"
  }
}
elizabeth.ivanova@Elizabeths-MacBook-Air ~ % az account list
[
  {
    "cloudName": "AzureCloud",
    "homeTenantId": "fc557d5c-30f4-4816-b27d-52f34ff93fdd",
    "id": "e29abe6c-d392-4ef5-9c66-5d25436f0796",
    "isDefault": true,
    "managedByTenants": [],
    "name": "Azure Pass - Sponsorship",
    "state": "Enabled",
    "tenantId": "fc557d5c-30f4-4816-b27d-52f34ff93fdd",
    "user": {
      "name": "lizaliza9898@outlook.com",
      "type": "user"
    }
  }
]
elizabeth.ivanova@Elizabeths-MacBook-Air ~ % az account list --output table
Name                      CloudName    SubscriptionId                        TenantId                              State    IsDefault
------------------------  -----------  ------------------------------------  ------------------------------------  -------  -----------
Azure Pass - Sponsorship  AzureCloud   e29abe6c-d392-4ef5-9c66-5d25436f0796  fc557d5c-30f4-4816-b27d-52f34ff93fdd  Enabled  True
elizabeth.ivanova@Elizabeths-MacBook-Air ~ %
```

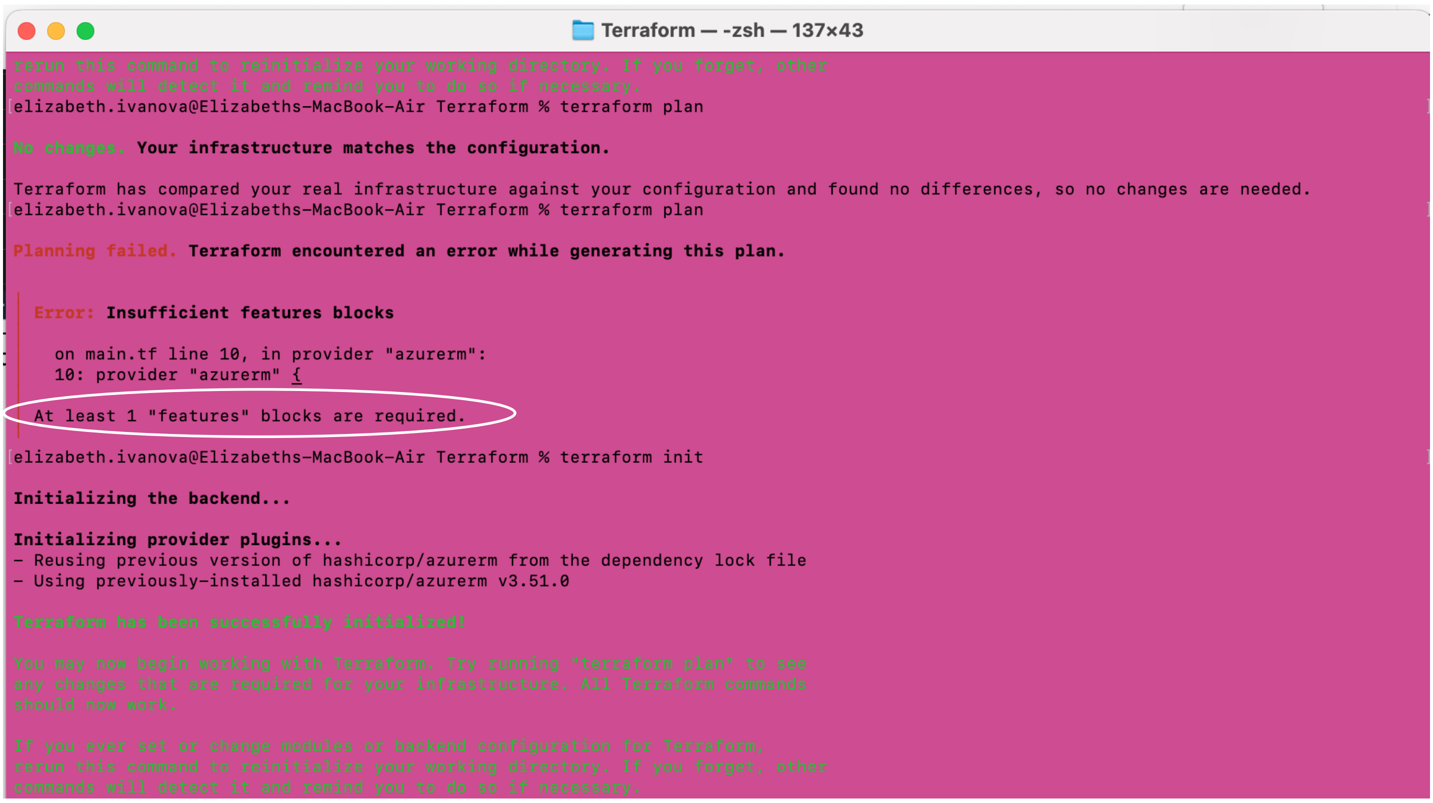
Task 2: Define your first terraform infrastructure code

1. Initializing the minimal configuration main.tf file,



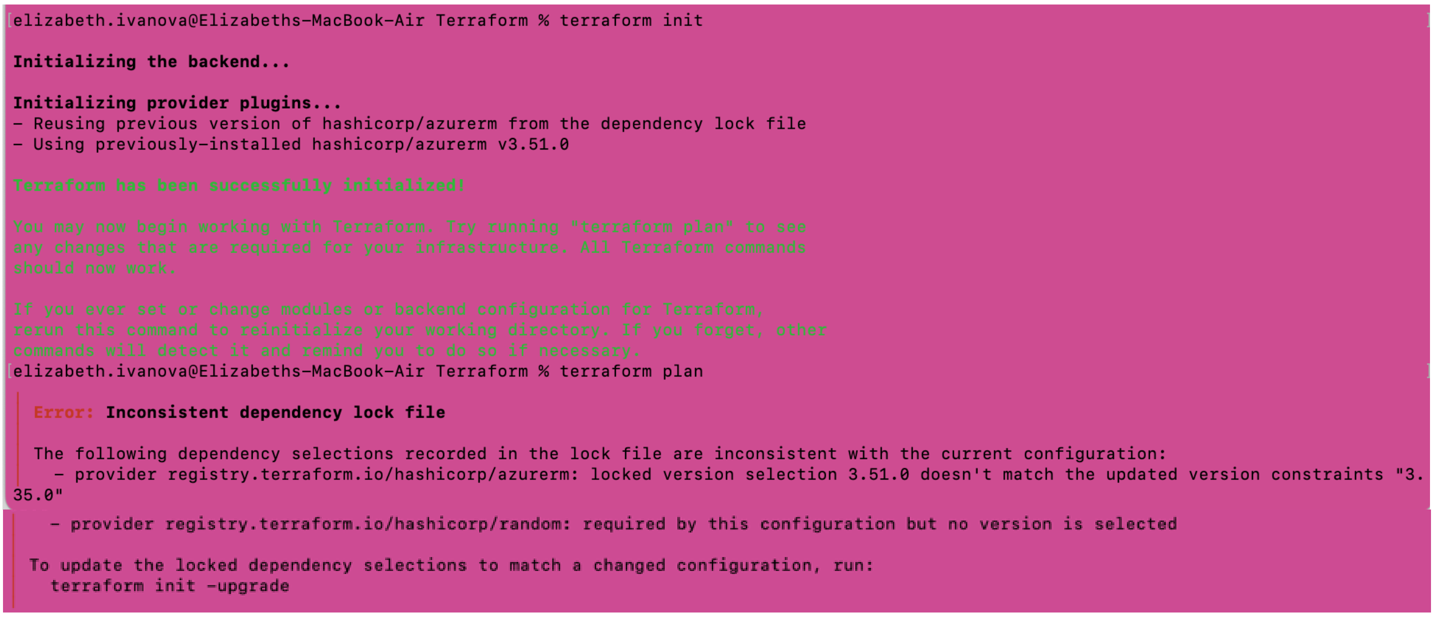
```
Azure Pass - Sponsorship  AzureCloud   e29abe6c-d392-4ef5-9c66-5d25436f0796  fc557d5c-30f4-4816-b27d-52f34ff93fdd  Enabled  True
elizabeth.ivanova@Elizabeths-MacBook-Air ~ % pwd
/Users/elizabeth.ivanova
elizabeth.ivanova@Elizabeths-MacBook-Air ~ % cd /Users/elizabeth.ivanova/SFA/Terraform
elizabeth.ivanova@Elizabeths-MacBook-Air Terraform % terraform init

Initializing the backend...

Initializing provider plugins...
- Finding latest version of hashicorp/azurerm...
- Installing hashicorp/azurerm v3.51.0...
- Installed hashicorp/azurerm v3.51.0 (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.
```

2. After checking the registry, we can see that, indeed, the “features” block is a required block which is why the error occurs.



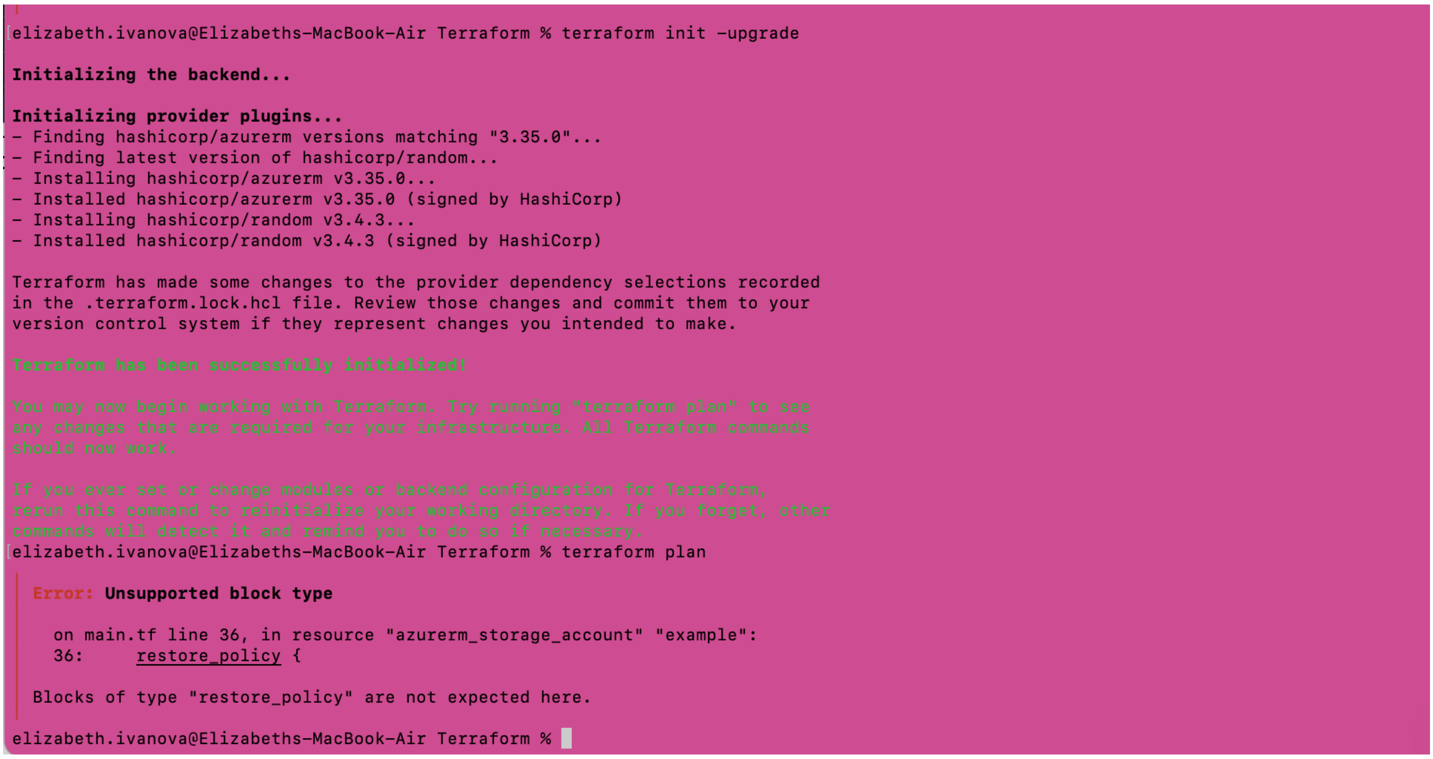
```
rerun this command to reinitialize your working directory. If you forget, other
commands will detect it and remind you to do so if necessary.
elizabeth.ivanova@Elizabeths-MacBook-Air Terraform % terraform plan

No changes. Your infrastructure matches the configuration.

Terraform has compared your real infrastructure against your configuration and found no differences, so no changes are needed.
elizabeth.ivanova@Elizabeths-MacBook-Air Terraform % terraform plan

Planning failed. Terraform encountered an error while generating this plan.

│
│ Error: Insufficient features blocks
│
│   on main.tf line 10, in provider "azurerm":
│   10: provider "azurerm" {
│
│ At least 1 "features" blocks are required.

elizabeth.ivanova@Elizabeths-MacBook-Air Terraform % terraform init

Initializing the backend...

Initializing provider plugins...
- Reusing previous version of hashicorp/azurerm from the dependency lock file
- Using previously-installed hashicorp/azurerm v3.51.0

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.
```

3. After switching to an older version, we get an inconsistency error:



```
elizabeth.ivanova@Elizabeths-MacBook-Air Terraform % terraform init

Initializing the backend...

Initializing provider plugins...
- Reusing previous version of hashicorp/azurerm from the dependency lock file
- Using previously-installed hashicorp/azurerm v3.51.0

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.
elizabeth.ivanova@Elizabeths-MacBook-Air Terraform % terraform plan
│
│ Error: Inconsistent dependency lock file
│
│ The following dependency selections recorded in the lock file are inconsistent with the current configuration:
│   - provider registry.terraform.io/hashicorp/azurerm: locked version selection 3.51.0 doesn't match the updated version constraints "3.
35.0"
│   - provider registry.terraform.io/hashicorp/random: required by this configuration but no version is selected
│
│ To update the locked dependency selections to match a changed configuration, run:
│   terraform init -upgrade
```

4. To fix that, we need to run an upgrade command but end up with another error because the older version does not support the restore_policy block type:

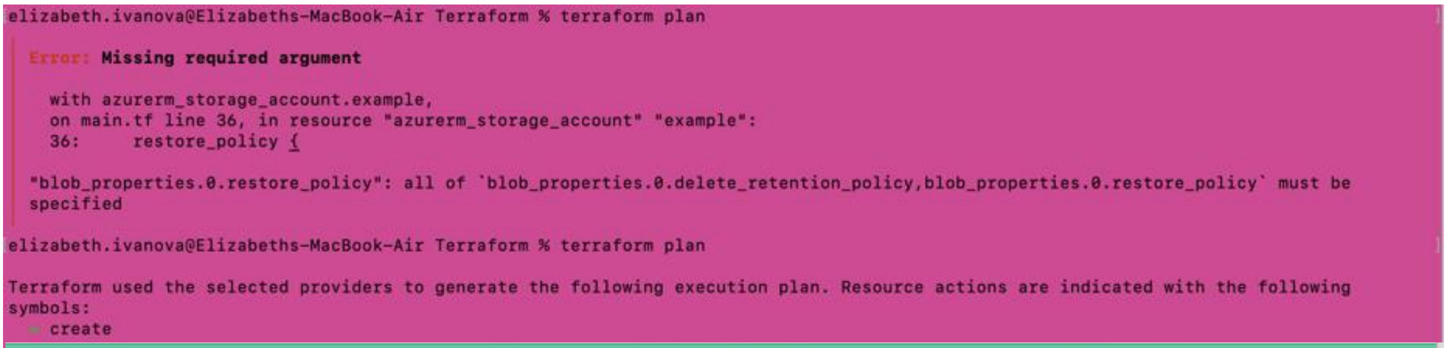


```
elizabeth.ivanova@Elizabeths-MacBook-Air Terraform % terraform init -upgrade

Initializing the backend...

Initializing provider plugins...
- Finding hashicorp/azurerm versions matching "3.35.0"...
- Finding latest version of hashicorp/random...
- Installing hashicorp/azurerm v3.35.0...
- Installed hashicorp/azurerm v3.35.0 (signed by HashiCorp)
- Installing hashicorp/random v3.4.3...
- Installed hashicorp/random v3.4.3 (signed by HashiCorp)

Terraform has made some changes to the provider dependency selections recorded
in the .terraform.lock.hcl file. Review those changes and commit them to your
version control system if they represent changes you intended to make.

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.
elizabeth.ivanova@Elizabeths-MacBook-Air Terraform % terraform plan
│
│ Error: Unsupported block type
│
│   on main.tf line 36, in resource "azurerm_storage_account" "example":
│   36:     restore_policy {
│
│ Blocks of type "restore_policy" are not expected here.
│
elizabeth.ivanova@Elizabeths-MacBook-Air Terraform %
```

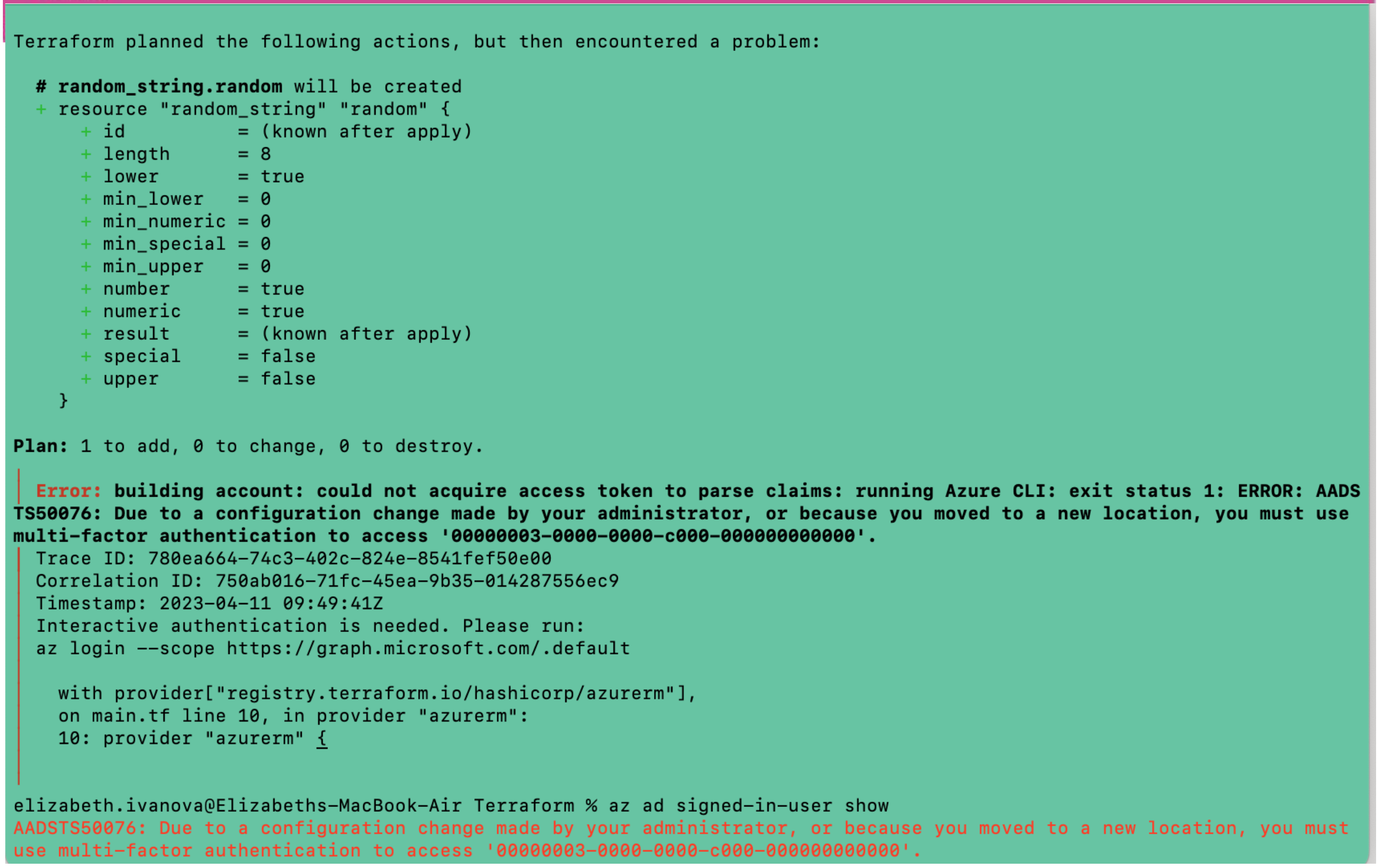
5. In order to make this work using the minimum version supporting the restore_policy block, we modify the version in the tf file with ">=3.36.0" and but we will know that it will not work once again if we have taken a careful look at what the blob_properties supports in the latest version:

`restore_policy` - (Optional) A `restore_policy` block as defined below. This must be used together with `delete_retention_policy` set, `versioning_enabled` and `change_feed_enabled` set to `true`.

6. After adding these required statements, we can now plan terraform again – and here I got an error that I was not sure how to resolve but I managed (using stack overflow, of course).

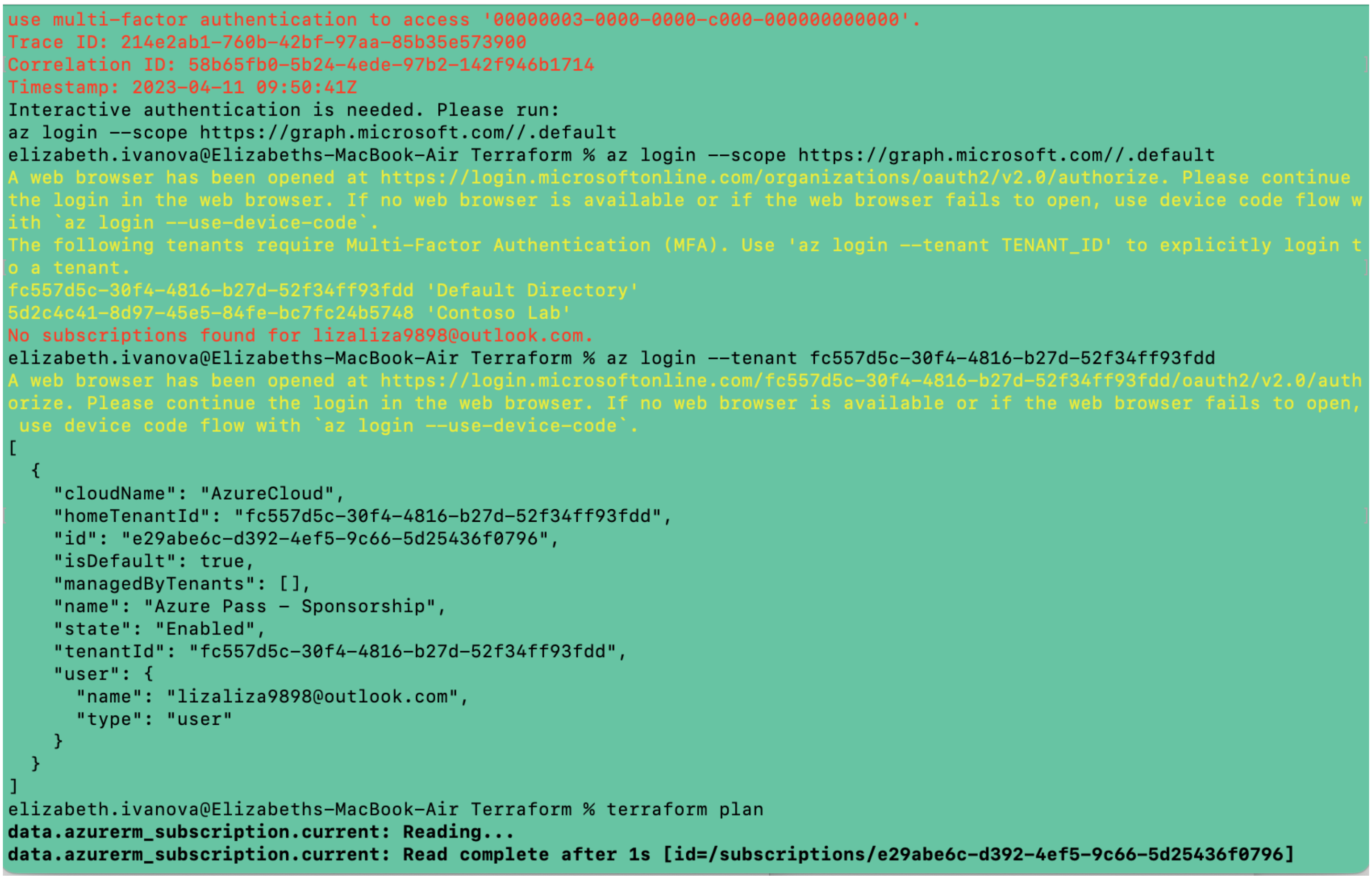


```
elizabeth.ivanova@Elizabeths-MacBook-Air Terraform % terraform plan

  Error: Missing required argument

    with azurerm_storage_account.example,
    on main.tf line 36, in resource "azurerm_storage_account" "example":
    36:     restore_policy {

  "blob_properties.0.restore_policy": all of `blob_properties.0.delete_retention_policy,blob_properties.0.restore_policy` must be
  specified

elizabeth.ivanova@Elizabeths-MacBook-Air Terraform % terraform plan

Terraform used the selected providers to generate the following execution plan. Resource actions are indicated with the following
symbols:
  + create
```

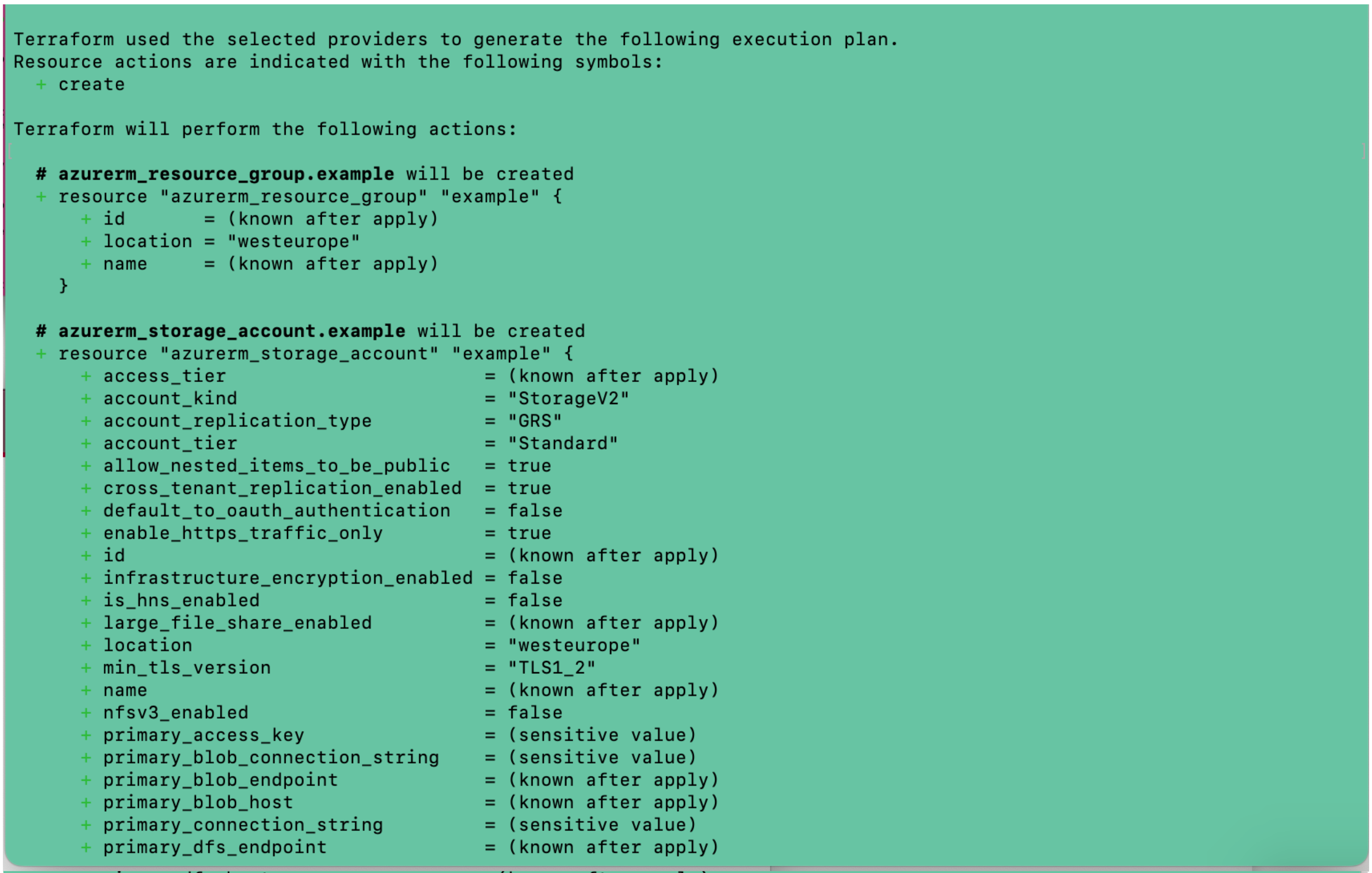


```
Terraform planned the following actions, but then encountered a problem:

  # random_string.random will be created
  + resource "random_string" "random" {
      + id          = (known after apply)
      + length      = 8
      + lower       = true
      + min_lower   = 0
      + min_numeric = 0
      + min_special = 0
      + min_upper   = 0
      + number      = true
      + numeric     = true
      + result      = (known after apply)
      + special     = false
      + upper       = false
    }

Plan: 1 to add, 0 to change, 0 to destroy.

  Error: building account: could not acquire access token to parse claims: running Azure CLI: exit status 1: ERROR: AADS
TS50076: Due to a configuration change made by your administrator, or because you moved to a new location, you must use
multi-factor authentication to access '00000003-0000-0000-c000-000000000000'.
  Trace ID: 780ea664-74c3-402c-824e-8541fef50e00
  Correlation ID: 750ab016-71fc-45ea-9b35-014287556ec9
  Timestamp: 2023-04-11 09:49:41Z
  Interactive authentication is needed. Please run:
  az login --scope https://graph.microsoft.com/.default

    with provider["registry.terraform.io/hashicorp/azurerm"],
    on main.tf line 10, in provider "azurerm":
    10: provider "azurerm" {


elizabeth.ivanova@Elizabeths-MacBook-Air Terraform % az ad signed-in-user show
AADSTS50076: Due to a configuration change made by your administrator, or because you moved to a new location, you must
use multi-factor authentication to access '00000003-0000-0000-c000-000000000000'.
```

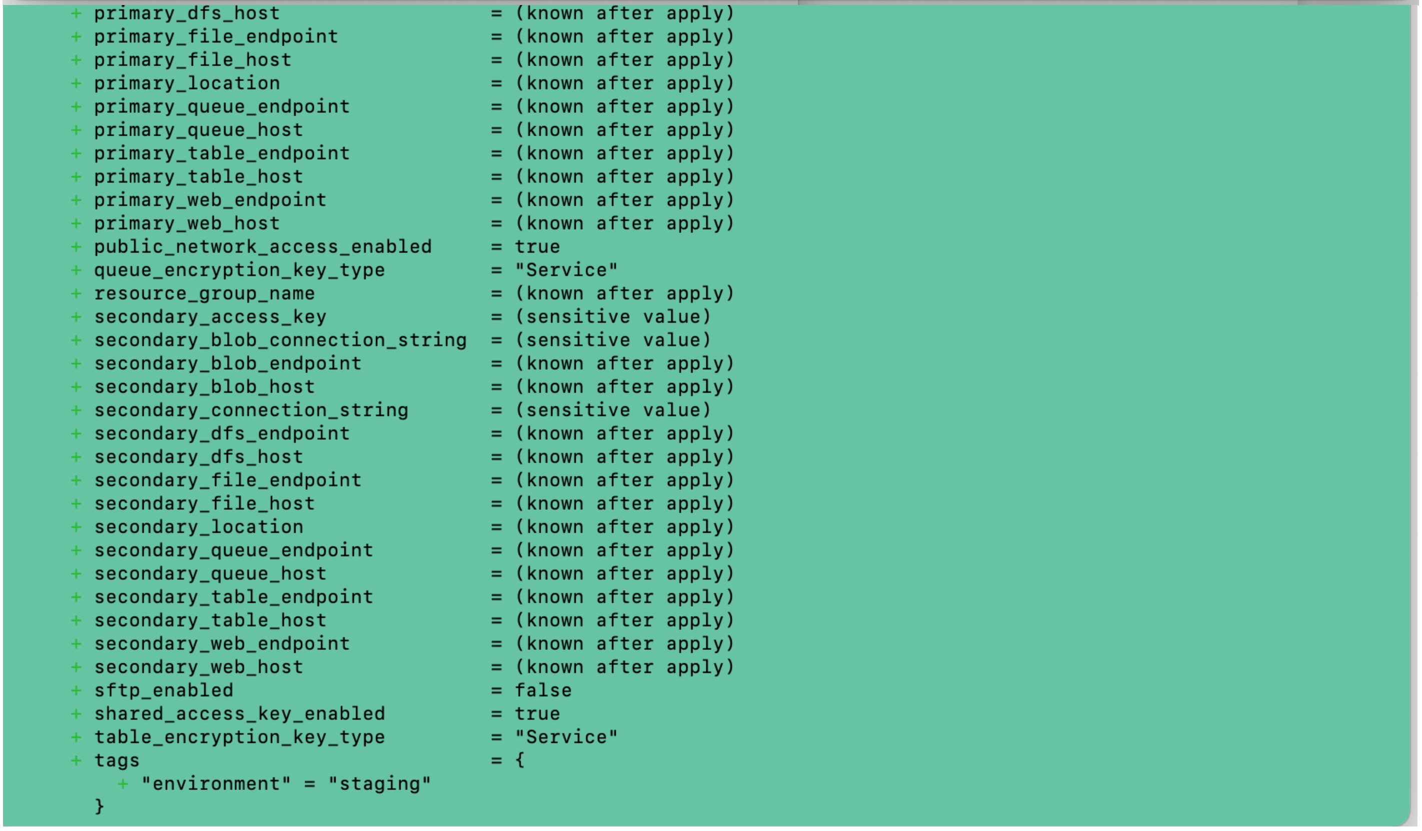
7. And after this multi-factor authentication issue, I managed to run terraform plan:



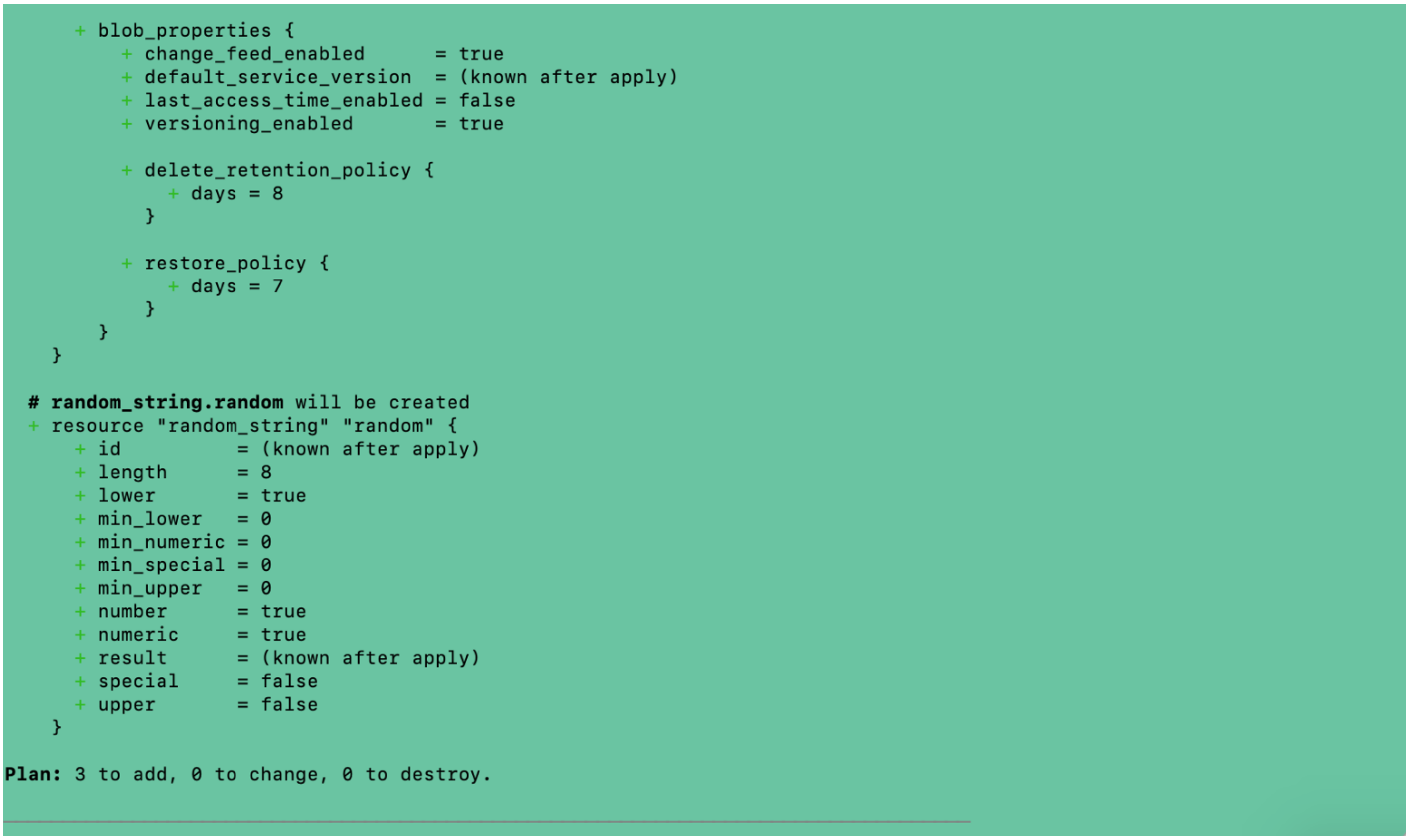
```
use multi-factor authentication to access '00000003-0000-0000-c000-000000000000'.
Trace ID: 214e2ab1-760b-42bf-97aa-85b35e573900
Correlation ID: 58b65fb0-5b24-4ede-97b2-142f946b1714
Timestamp: 2023-04-11 09:50:41Z
Interactive authentication is needed. Please run:
az login --scope https://graph.microsoft.com//.default
elizabeth.ivanova@Elizabeths-MacBook-Air Terraform % az login --scope https://graph.microsoft.com//.default
A web browser has been opened at https://login.microsoftonline.com/organizations/oauth2/v2.0/authorize. Please continue
the login in the web browser. If no web browser is available or if the web browser fails to open, use device code flow w
ith `az login --use-device-code`.
The following tenants require Multi-Factor Authentication (MFA). Use 'az login --tenant TENANT_ID' to explicitly login t
o a tenant.
fc557d5c-30f4-4816-b27d-52f34ff93fdd 'Default Directory'
5d2c4c41-8d97-45e5-84fe-bc7fc24b5748 'Contoso Lab'
No subscriptions found for lizaliza9898@outlook.com.
elizabeth.ivanova@Elizabeths-MacBook-Air Terraform % az login --tenant fc557d5c-30f4-4816-b27d-52f34ff93fdd
A web browser has been opened at https://login.microsoftonline.com/fc557d5c-30f4-4816-b27d-52f34ff93fdd/oauth2/v2.0/auth
orize. Please continue the login in the web browser. If no web browser is available or if the web browser fails to open,
 use device code flow with `az login --use-device-code`.
[
  {
    "cloudName": "AzureCloud",
    "homeTenantId": "fc557d5c-30f4-4816-b27d-52f34ff93fdd",
    "id": "e29abe6c-d392-4ef5-9c66-5d25436f0796",
    "isDefault": true,
    "managedByTenants": [],
    "name": "Azure Pass - Sponsorship",
    "state": "Enabled",
    "tenantId": "fc557d5c-30f4-4816-b27d-52f34ff93fdd",
    "user": {
      "name": "lizaliza9898@outlook.com",
      "type": "user"
    }
  }
]
elizabeth.ivanova@Elizabeths-MacBook-Air Terraform % terraform plan
data.azurerm_subscription.current: Reading...
data.azurerm_subscription.current: Read complete after 1s [id=/subscriptions/e29abe6c-d392-4ef5-9c66-5d25436f0796]
```



```
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:

  # azurerm_resource_group.example will be created
  + resource "azurerm_resource_group" "example" {
      + id       = (known after apply)
      + location = "westeurope"
      + name     = (known after apply)
    }

  # azurerm_storage_account.example will be created
  + resource "azurerm_storage_account" "example" {
      + access_tier                       = (known after apply)
      + account_kind                      = "StorageV2"
      + account_replication_type          = "GRS"
      + account_tier                      = "Standard"
      + allow_nested_items_to_be_public   = true
      + cross_tenant_replication_enabled  = true
      + default_to_oauth_authentication   = false
      + enable_https_traffic_only         = true
      + id                                = (known after apply)
      + infrastructure_encryption_enabled = false
      + is_hns_enabled                    = false
      + large_file_share_enabled          = (known after apply)
      + location                          = "westeurope"
      + min_tls_version                   = "TLS1_2"
      + name                              = (known after apply)
      + nfsv3_enabled                     = false
      + primary_access_key                = (sensitive value)
      + primary_blob_connection_string    = (sensitive value)
      + primary_blob_endpoint             = (known after apply)
      + primary_blob_host                 = (known after apply)
      + primary_connection_string         = (sensitive value)
      + primary_dfs_endpoint              = (known after apply)
```



```
      + primary_dfs_host                  = (known after apply)
      + primary_file_endpoint             = (known after apply)
      + primary_file_host                 = (known after apply)
      + primary_location                  = (known after apply)
      + primary_queue_endpoint            = (known after apply)
      + primary_queue_host                = (known after apply)
      + primary_table_endpoint            = (known after apply)
      + primary_table_host                = (known after apply)
      + primary_web_endpoint              = (known after apply)
      + primary_web_host                  = (known after apply)
      + public_network_access_enabled     = true
      + queue_encryption_key_type         = "Service"
      + resource_group_name               = (known after apply)
      + secondary_access_key              = (sensitive value)
      + secondary_blob_connection_string  = (sensitive value)
      + secondary_blob_endpoint           = (known after apply)
      + secondary_blob_host               = (known after apply)
      + secondary_connection_string       = (sensitive value)
      + secondary_dfs_endpoint            = (known after apply)
      + secondary_dfs_host                = (known after apply)
      + secondary_file_endpoint           = (known after apply)
      + secondary_file_host               = (known after apply)
      + secondary_location                = (known after apply)
      + secondary_queue_endpoint          = (known after apply)
      + secondary_queue_host              = (known after apply)
      + secondary_table_endpoint          = (known after apply)
      + secondary_table_host              = (known after apply)
      + secondary_web_endpoint            = (known after apply)
      + secondary_web_host                = (known after apply)
      + sftp_enabled                      = false
      + shared_access_key_enabled         = true
      + table_encryption_key_type         = "Service"
      + tags                              = {
          + "environment" = "staging"
        }
```



```
      + blob_properties {
          + change_feed_enabled      = true
          + default_service_version  = (known after apply)
          + last_access_time_enabled = false
          + versioning_enabled       = true

          + delete_retention_policy {
              + days = 8
            }

          + restore_policy {
              + days = 7
            }
        }
    }

  # random_string.random will be created
  + resource "random_string" "random" {
      + id          = (known after apply)
      + length      = 8
      + lower       = true
      + min_lower   = 0
      + min_numeric = 0
      + min_special = 0
      + min_upper   = 0
      + number      = true
      + numeric     = true
      + result      = (known after apply)
      + special     = false
      + upper       = false
    }

Plan: 3 to add, 0 to change, 0 to destroy.
```

8. Based on this output, we can now answer the questions:

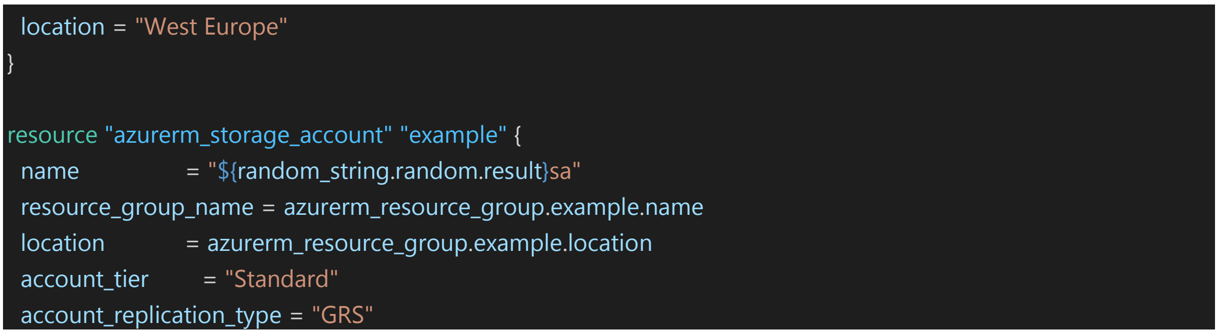
2.7.1 How many resources have you defined in your code and how many resources does the plan output show? Are they the same and why?

The output describes three resources that are to be created: a resource group, a storage account, and a random string generator. In the code, we have also defined the same resources that are now visible in the plan output. We are defining in the code whatever we are planning to create.

2.7.2 What is the location of your resource group and what is the location of the storage account?

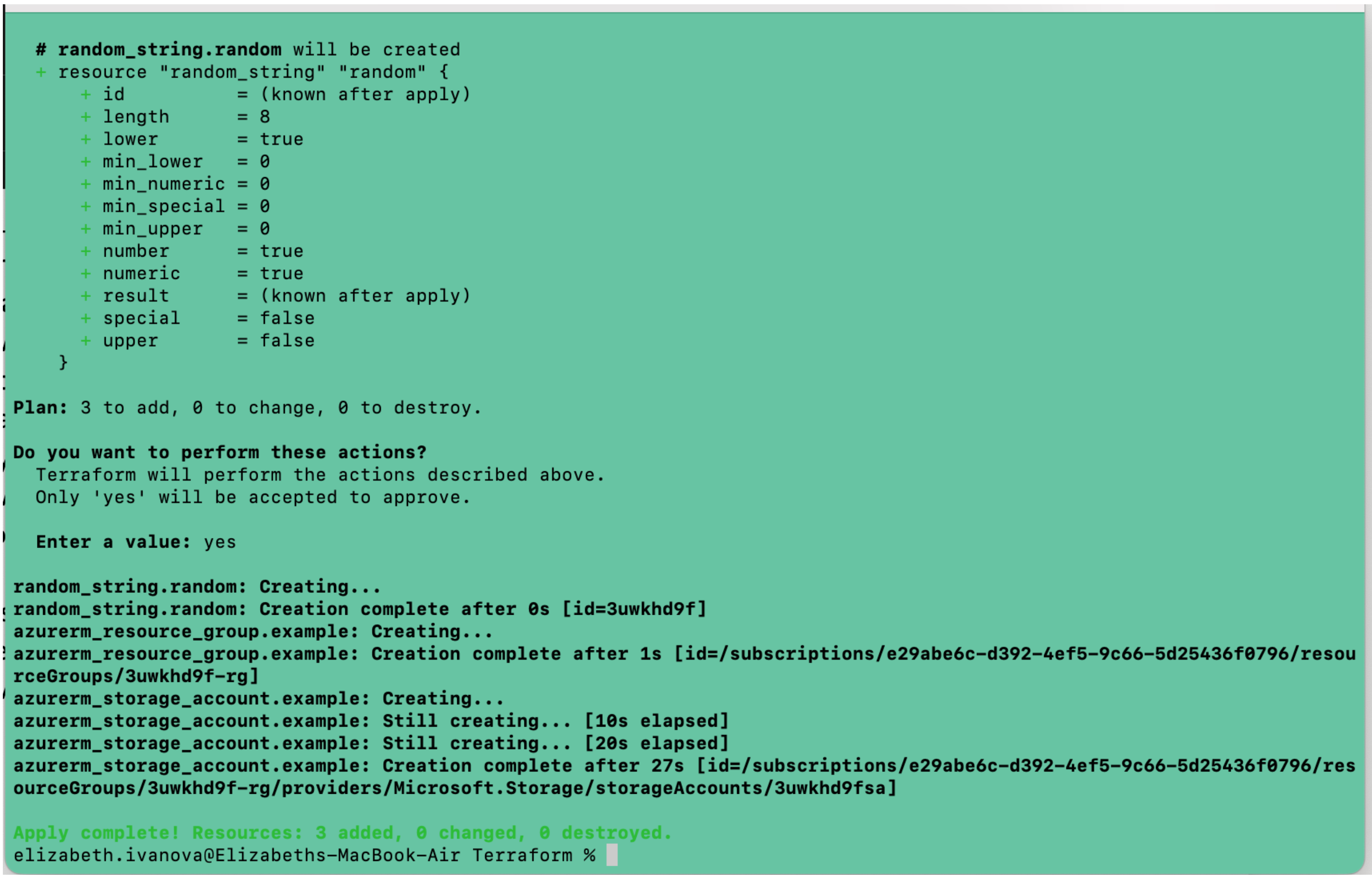
The location of the resource group and the storage account is in West Europe as visible in the location parameter, as we have defined in the code in an earlier task:

```
resource "azurerm_resource_group" "example" {
  name     = "${random_string.random.result}-rg"
```

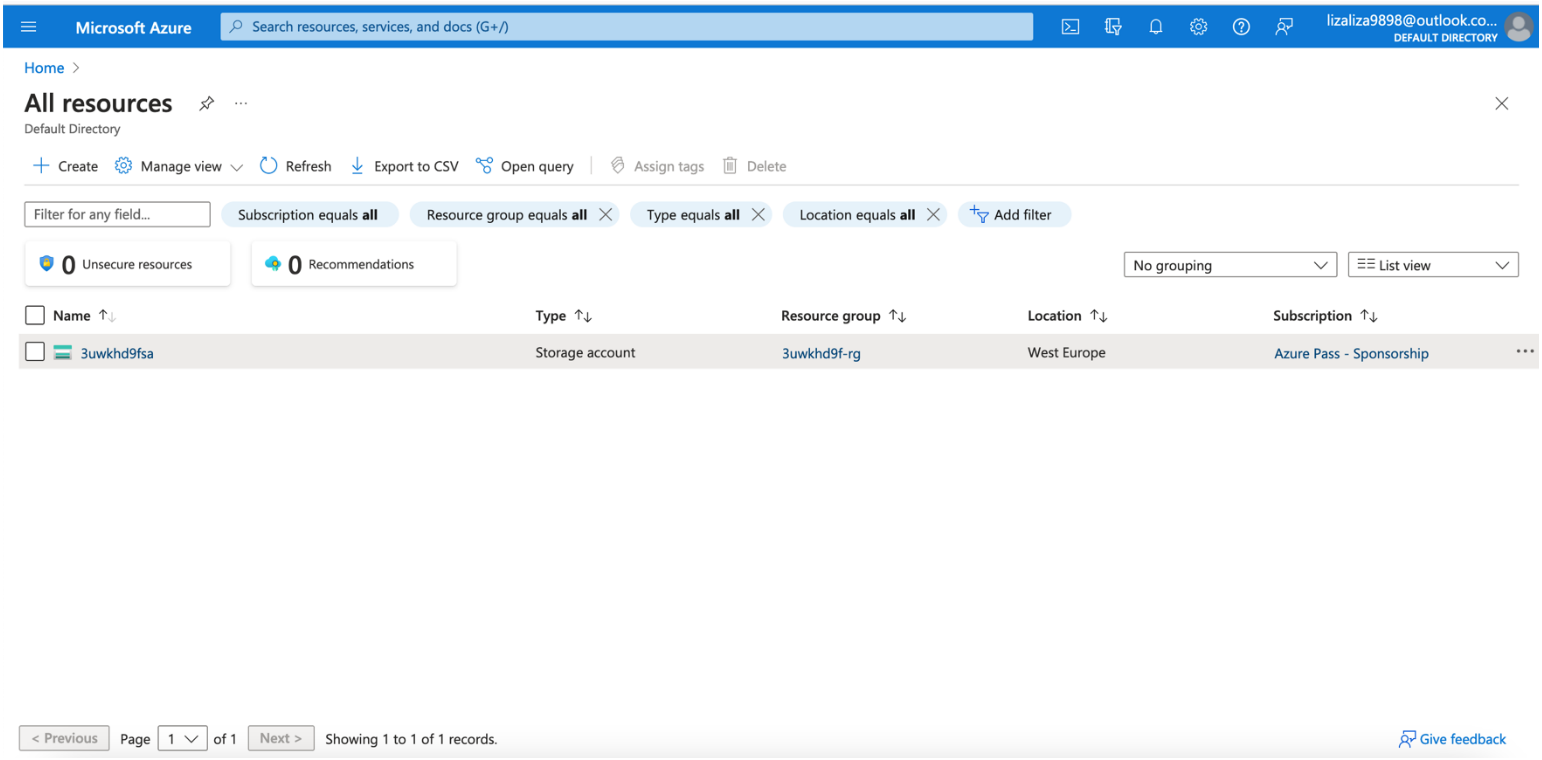


```
  location = "West Europe"
}

resource "azurerm_storage_account" "example" {
  name                = "${random_string.random.result}sa"
  resource_group_name = azurerm_resource_group.example.name
  location            = azurerm_resource_group.example.location
  account_tier        = "Standard"
  account_replication_type = "GRS"
```

9. After running terraform apply, confirming, and finalizing the deployment, we can answer the following questions:



```
  # random_string.random will be created
  + resource "random_string" "random" {
      + id          = (known after apply)
      + length      = 8
      + lower       = true
      + min_lower   = 0
      + min_numeric = 0
      + min_special = 0
      + min_upper   = 0
      + number      = true
      + numeric     = true
      + result      = (known after apply)
      + special     = false
      + upper       = false
    }

Plan: 3 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

random_string.random: Creating...
random_string.random: Creation complete after 0s [id=3uwkhd9f]
azurerm_resource_group.example: Creating...
azurerm_resource_group.example: Creation complete after 1s [id=/subscriptions/e29abe6c-d392-4ef5-9c66-5d25436f0796/resou
rceGroups/3uwkhd9f-rg]
azurerm_storage_account.example: Creating...
azurerm_storage_account.example: Still creating... [10s elapsed]
azurerm_storage_account.example: Still creating... [20s elapsed]
azurerm_storage_account.example: Creation complete after 27s [id=/subscriptions/e29abe6c-d392-4ef5-9c66-5d25436f0796/res
ourceGroups/3uwkhd9f-rg/providers/Microsoft.Storage/storageAccounts/3uwkhd9fsa]

Apply complete! Resources: 3 added, 0 changed, 0 destroyed.
elizabeth.ivanova@Elizabeths-MacBook-Air Terraform %
```

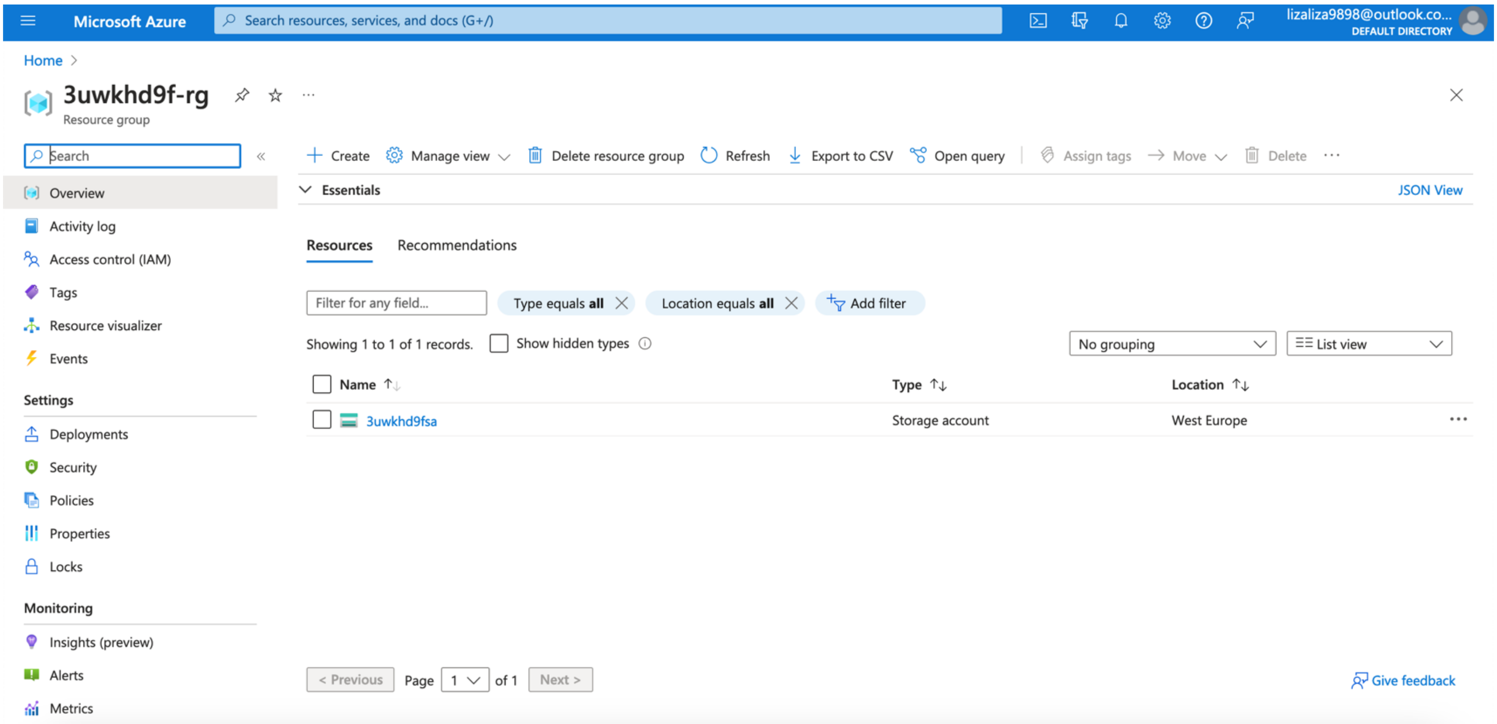


Name	Type	Resource group	Location	Subscription
3uwkhd9fsa	Storage account	3uwkhd9f-rg	West Europe	Azure Pass - Sponsorship

Showing 1 to 1 of 1 records.

2.8.1 How many resources do you have on your subscription?

In the “All resources” section, we can see only one resource – the storage account. The storage account is a part of the random string resource group which was also created.



Showing 1 to 1 of 1 records.

Name	Type	Location
3uwkhd9fsa	Storage account	West Europe

2.8.2 Are the number of resources shown in the All resources portal window the same with the ones from your plan?

Not quite.

2.8.3 Give short explanation about the resources that are not shown?

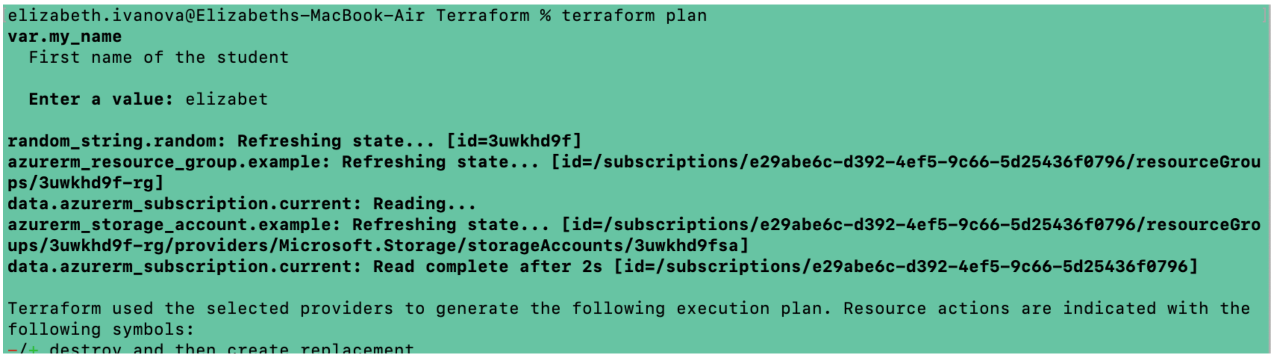
In the code, we defined a random string generator with the sole purpose of generating random names for the Azure resource group and storage account. The generator is only used within the Terraform configuration. The random string is not exposed in the Azure portal as a resource or parameter that can be viewed or managed, it is merely an easy way to come up with a name. The two resources that are actually visible in the portal are the storage account and resource group, both with randomized names.

Task 3: Using variables and outputs

1. Assuming that this is my variables.tf file:

```
variable "my_name" {
  type        = string
  description = "First name of the student"
}

variable "location" {
  type        = string
  default     = "West Europe"
  description = "The location where all resources will be placed"
}
```

2. We execute the terraform plan, and we get asked to input only one variable – my_name:



```
elizabeth.ivanova@Elizabeths-MacBook-Air Terraform % terraform plan
var.my_name
  First name of the student

  Enter a value: elizabet

random_string.random: Refreshing state... [id=3uwkhd9f]
azurerm_resource_group.example: Refreshing state... [id=/subscriptions/e29abe6c-d392-4ef5-9c66-5d25436f0796/resourceGrou
ps/3uwkhd9f-rg]
data.azurerm_subscription.current: Reading...
azurerm_storage_account.example: Refreshing state... [id=/subscriptions/e29abe6c-d392-4ef5-9c66-5d25436f0796/resourceGro
ups/3uwkhd9f-rg/providers/Microsoft.Storage/storageAccounts/3uwkhd9fsa]
data.azurerm_subscription.current: Read complete after 2s [id=/subscriptions/e29abe6c-d392-4ef5-9c66-5d25436f0796]

Terraform used the selected providers to generate the following execution plan. Resource actions are indicated with the
following symbols:
-/+ destroy and then create replacement
```

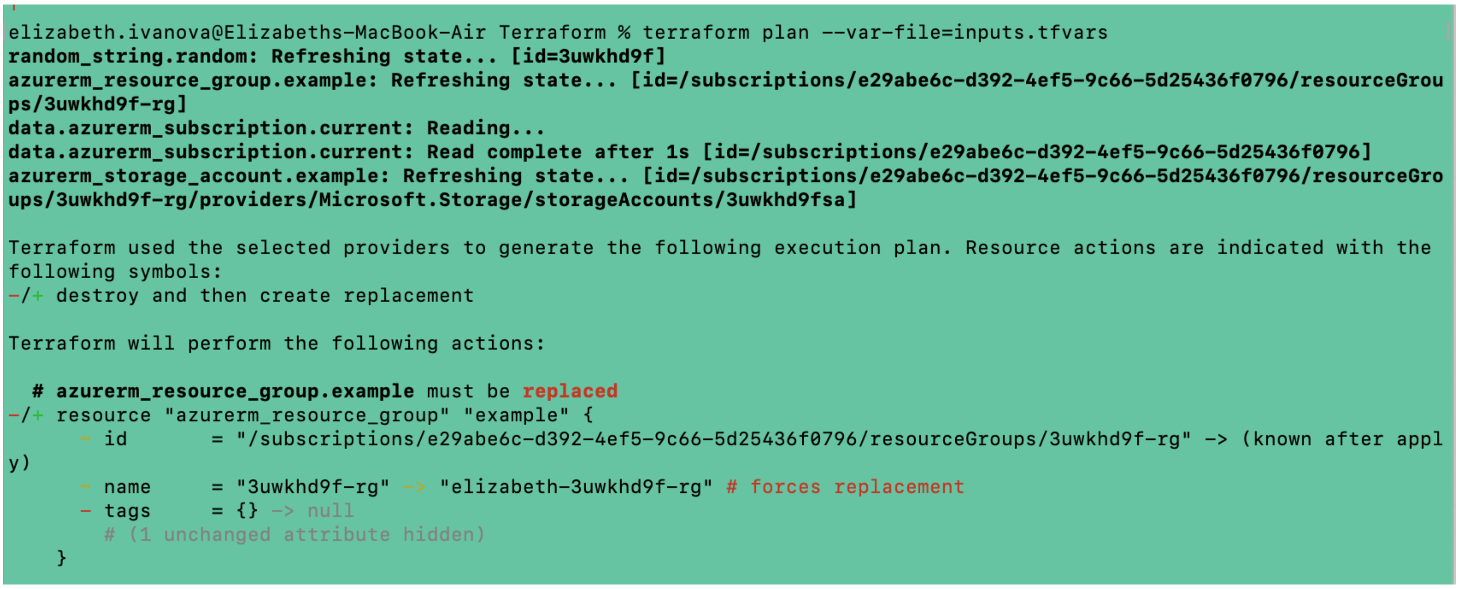
To answer the questions:

How many variables do we have defined, and which are they?

Why did terraform asked us to input a value only for the my_name variable?

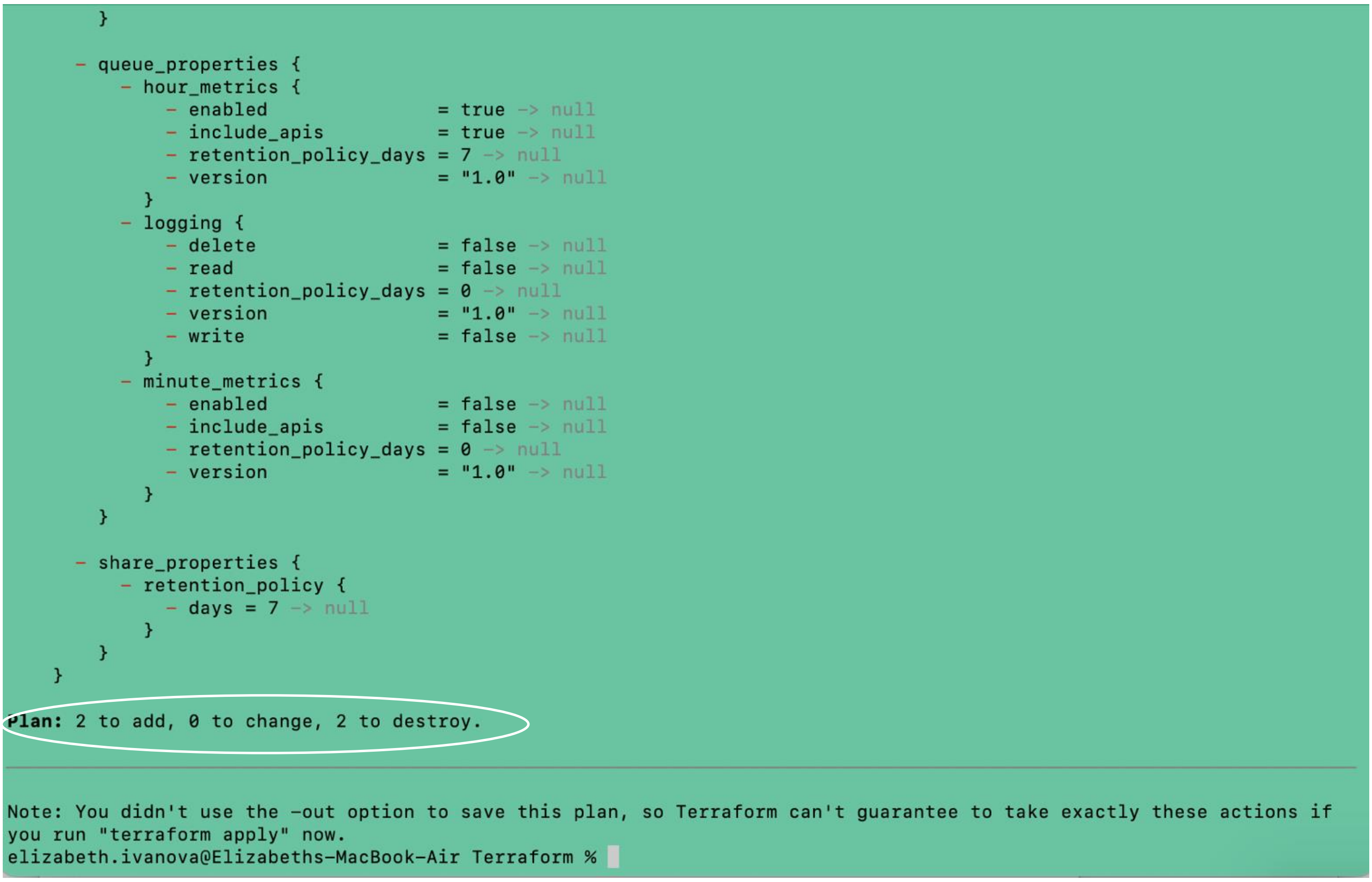
In the variables.tf file, we have defined two variables but the difference between them is that location has a default value, and my_name does not. Because of that, Terraform requires us to explicitly provide a value for it. Meanwhile, the location variable has a default value of “West Europe” assigned to it, which means that Terraform will use that value.

3. After creating the inputs.tfvars file, I ran the plan command with the appropriate option and I got the expected output:



```
elizabeth.ivanova@Elizabeths-MacBook-Air Terraform % terraform plan --var-file=inputs.tfvars
random_string.random: Refreshing state... [id=3uwkhd9f]
azurerm_resource_group.example: Refreshing state... [id=/subscriptions/e29abe6c-d392-4ef5-9c66-5d25436f0796/resourceGrou
ps/3uwkhd9f-rg]
data.azurerm_subscription.current: Reading...
data.azurerm_subscription.current: Read complete after 1s [id=/subscriptions/e29abe6c-d392-4ef5-9c66-5d25436f0796]
azurerm_storage_account.example: Refreshing state... [id=/subscriptions/e29abe6c-d392-4ef5-9c66-5d25436f0796/resourceGro
ups/3uwkhd9f-rg/providers/Microsoft.Storage/storageAccounts/3uwkhd9fsa]

Terraform used the selected providers to generate the following execution plan. Resource actions are indicated with the
following symbols:
-/+ destroy and then create replacement

Terraform will perform the following actions:

  # azurerm_resource_group.example must be replaced
-/+ resource "azurerm_resource_group" "example" {
      ~ id       = "/subscriptions/e29abe6c-d392-4ef5-9c66-5d25436f0796/resourceGroups/3uwkhd9f-rg" -> (known after appl
y)
      ~ name     = "3uwkhd9f-rg" -> "elizabeth-3uwkhd9f-rg" # forces replacement
      - tags     = {} -> null
        # (1 unchanged attribute hidden)
    }
```

• • •



```
        }

      - queue_properties {
          - hour_metrics {
              - enabled               = true -> null
              - include_apis          = true -> null
              - retention_policy_days = 7 -> null
              - version               = "1.0" -> null
            }
          - logging {
              - delete                = false -> null
              - read                  = false -> null
              - retention_policy_days = 0 -> null
              - version               = "1.0" -> null
              - write                 = false -> null
            }
          - minute_metrics {
              - enabled               = false -> null
              - include_apis          = false -> null
              - retention_policy_days = 0 -> null
              - version               = "1.0" -> null
            }
        }

      - share_properties {
          - retention_policy {
              - days = 7 -> null
            }
        }
    }

Plan: 2 to add, 0 to change, 2 to destroy.

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Note: You didn't use the -out option to save this plan, so Terraform can't guarantee to take exactly these actions if
you run "terraform apply" now.
elizabeth.ivanova@Elizabeths-MacBook-Air Terraform %
```
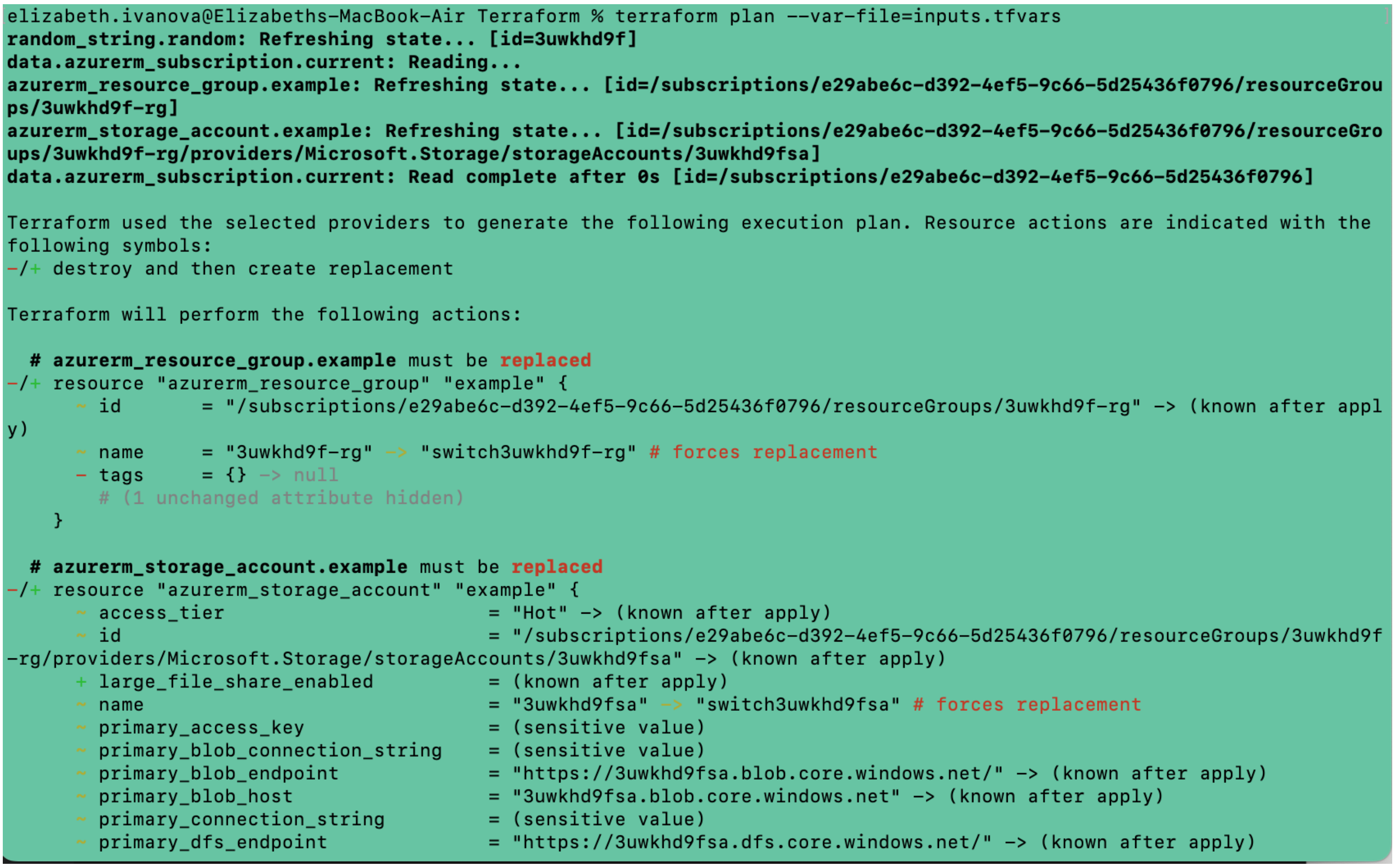
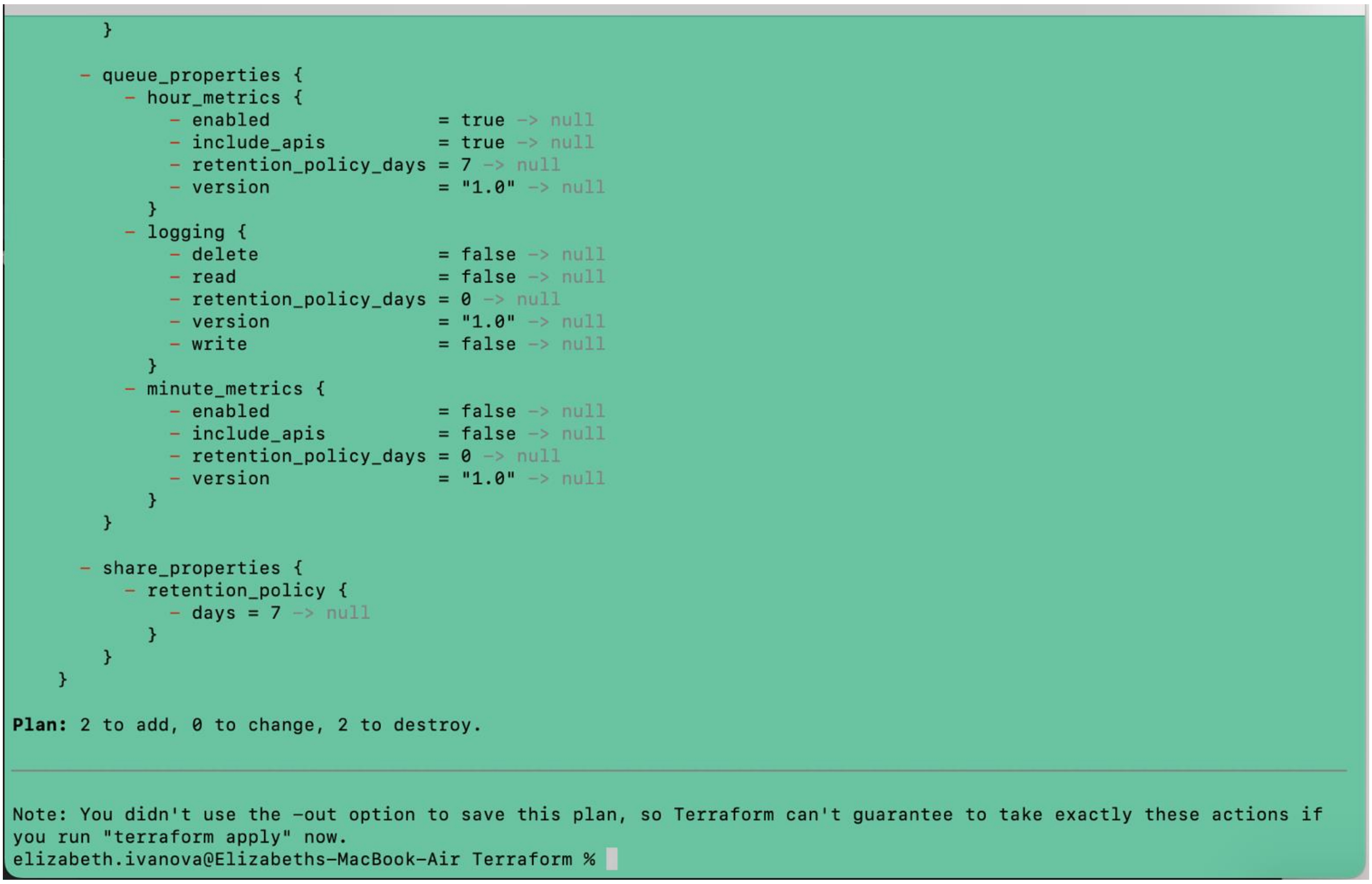

1. After adding the resource_prefix to the code and replacing my name with “switch” in the inputs.tfvars file, we execute terraform plan:



```
elizabeth.ivanova@Elizabeths-MacBook-Air Terraform % terraform plan --var-file=inputs.tfvars
random_string.random: Refreshing state... [id=3uwkhd9f]
data.azurerm_subscription.current: Reading...
azurerm_resource_group.example: Refreshing state... [id=/subscriptions/e29abe6c-d392-4ef5-9c66-5d25436f0796/resourceGrou
ps/3uwkhd9f-rg]
azurerm_storage_account.example: Refreshing state... [id=/subscriptions/e29abe6c-d392-4ef5-9c66-5d25436f0796/resourceGro
ups/3uwkhd9f-rg/providers/Microsoft.Storage/storageAccounts/3uwkhd9fsa]
data.azurerm_subscription.current: Read complete after 0s [id=/subscriptions/e29abe6c-d392-4ef5-9c66-5d25436f0796]

Terraform used the selected providers to generate the following execution plan. Resource actions are indicated with the
following symbols:
-/+ destroy and then create replacement

Terraform will perform the following actions:

  # azurerm_resource_group.example must be replaced
-/+ resource "azurerm_resource_group" "example" {
      ~ id       = "/subscriptions/e29abe6c-d392-4ef5-9c66-5d25436f0796/resourceGroups/3uwkhd9f-rg" -> (known after appl
y)
      ~ name     = "3uwkhd9f-rg" -> "switch3uwkhd9f-rg" # forces replacement
      - tags     = {} -> null
        # (1 unchanged attribute hidden)
    }

  # azurerm_storage_account.example must be replaced
-/+ resource "azurerm_storage_account" "example" {
      ~ access_tier                       = "Hot" -> (known after apply)
      ~ id                                = "/subscriptions/e29abe6c-d392-4ef5-9c66-5d25436f0796/resourceGroups/3uwkhd9f
-rg/providers/Microsoft.Storage/storageAccounts/3uwkhd9fsa" -> (known after apply)
      + large_file_share_enabled          = (known after apply)
      ~ name                              = "3uwkhd9fsa" -> "switch3uwkhd9fsa" # forces replacement
      ~ primary_access_key                = (sensitive value)
      ~ primary_blob_connection_string    = (sensitive value)
      ~ primary_blob_endpoint             = "https://3uwkhd9fsa.blob.core.windows.net/" -> (known after apply)
      ~ primary_blob_host                 = "3uwkhd9fsa.blob.core.windows.net" -> (known after apply)
      ~ primary_connection_string         = (sensitive value)
      ~ primary_dfs_endpoint              = "https://3uwkhd9fsa.dfs.core.windows.net/" -> (known after apply)
```

•••



```
        }

      - queue_properties {
          - hour_metrics {
              - enabled               = true -> null
              - include_apis          = true -> null
              - retention_policy_days = 7 -> null
              - version               = "1.0" -> null
            }
          - logging {
              - delete                = false -> null
              - read                  = false -> null
              - retention_policy_days = 0 -> null
              - version               = "1.0" -> null
              - write                 = false -> null
            }
          - minute_metrics {
              - enabled               = false -> null
              - include_apis          = false -> null
              - retention_policy_days = 0 -> null
              - version               = "1.0" -> null
            }
        }

      - share_properties {
          - retention_policy {
              - days = 7 -> null
            }
        }
    }

Plan: 2 to add, 0 to change, 2 to destroy.

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Note: You didn't use the -out option to save this plan, so Terraform can't guarantee to take exactly these actions if
you run "terraform apply" now.
elizabeth.ivanova@Elizabeths-MacBook-Air Terraform %
```
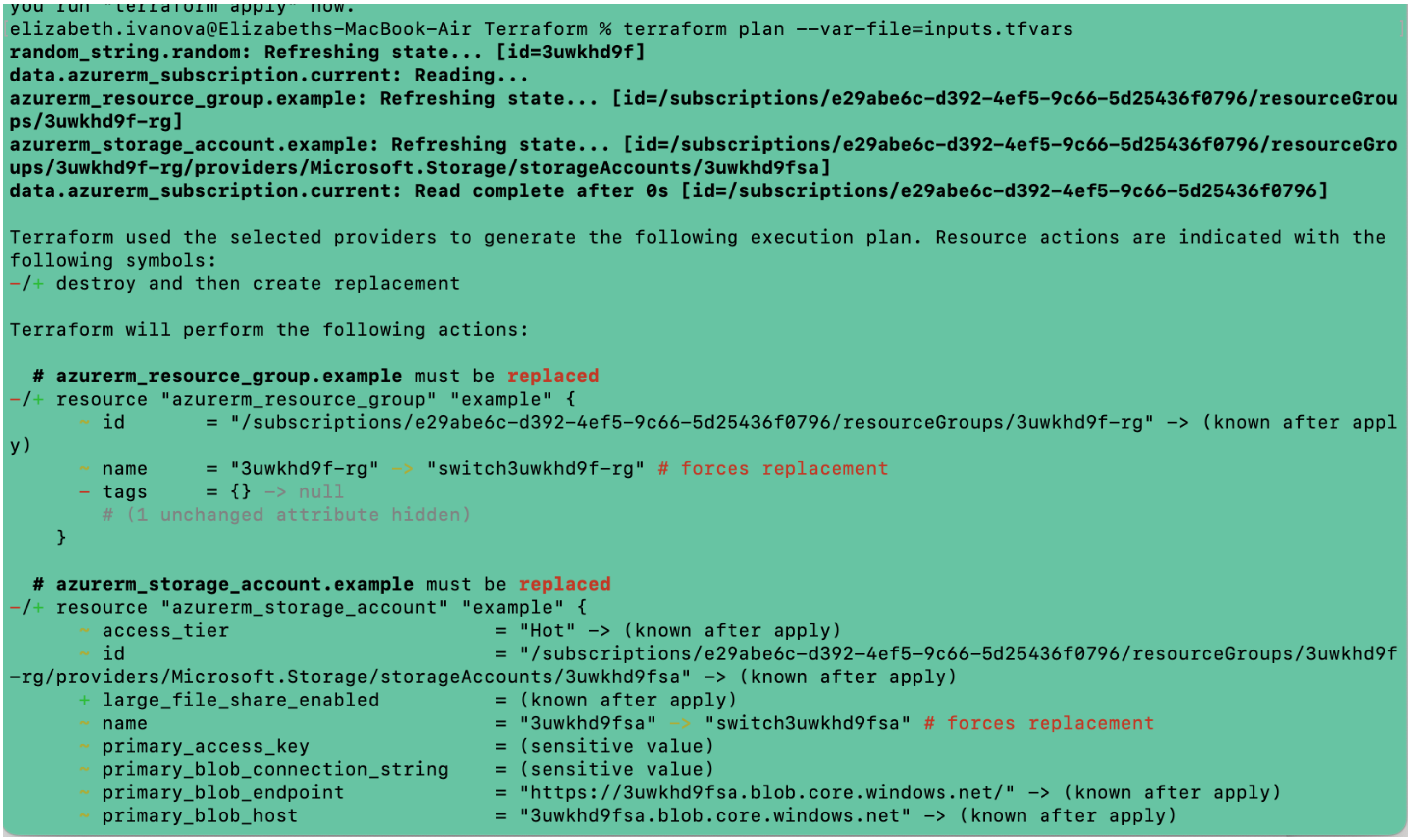
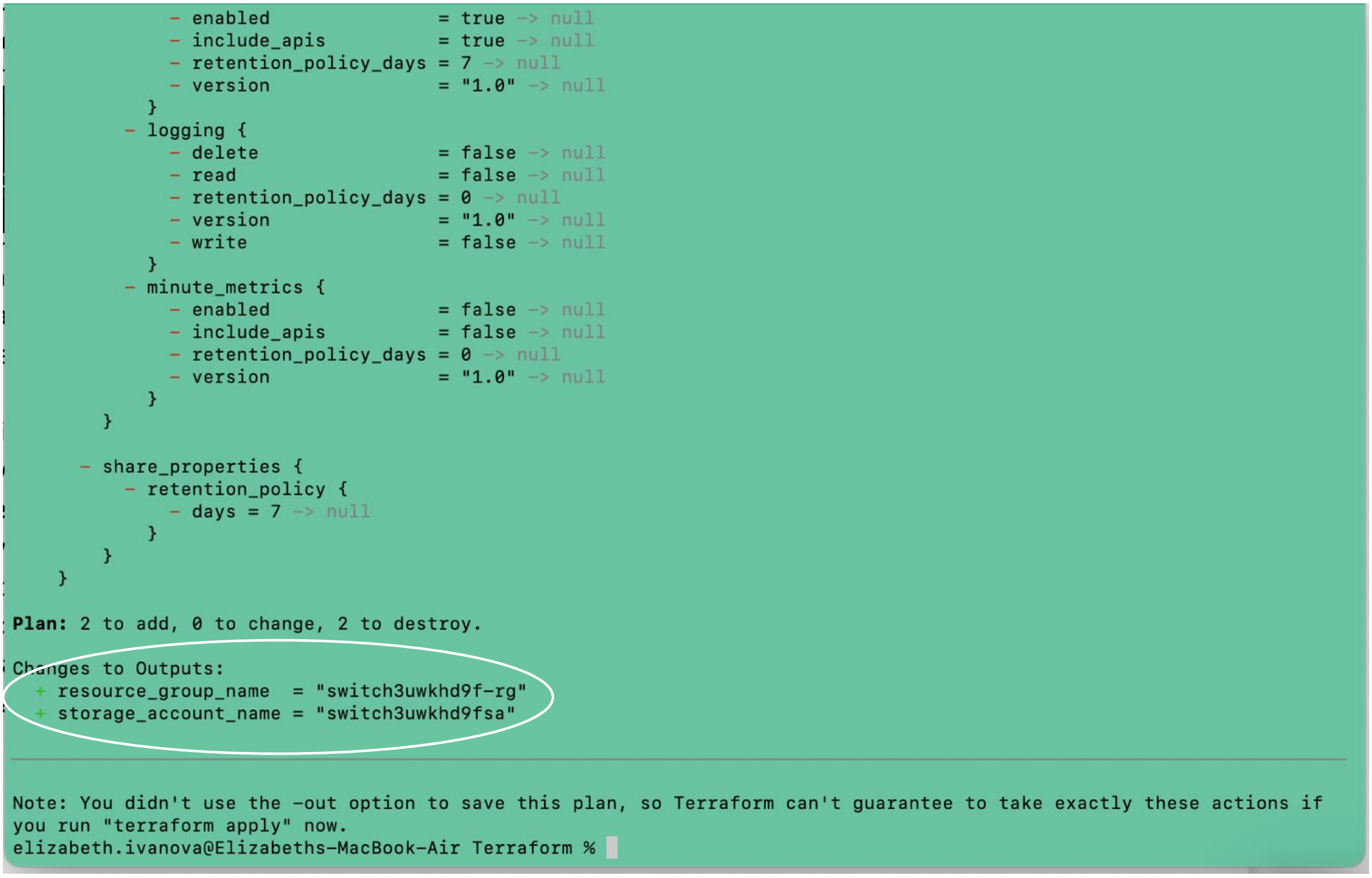

2. And now that we have added the output.tf file:

```
output "resource_group_name" {
  value = azurerm_resource_group.example.name
  description = "The name of the resource group we deployed"
}

output "storage_account_name" {
  value = azurerm_storage_account.example.name
  description = "The name of the storage account that was created"
}
```

We get the following:

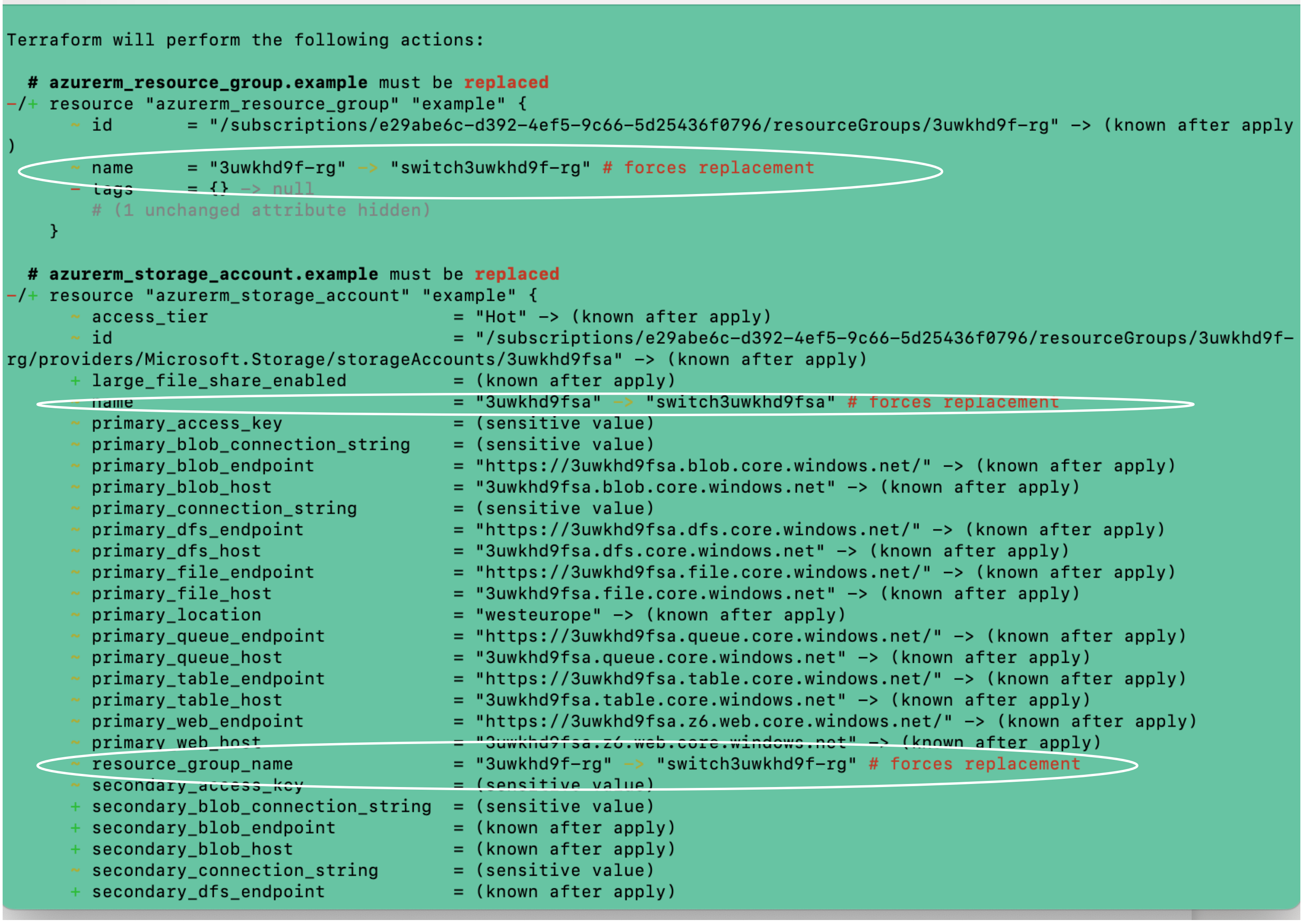


```
you run "terraform apply" now.
elizabeth.ivanova@Elizabeths-MacBook-Air Terraform % terraform plan --var-file=inputs.tfvars
random_string.random: Refreshing state... [id=3uwkhd9f]
data.azurerm_subscription.current: Reading...
azurerm_resource_group.example: Refreshing state... [id=/subscriptions/e29abe6c-d392-4ef5-9c66-5d25436f0796/resourceGrou
ps/3uwkhd9f-rg]
azurerm_storage_account.example: Refreshing state... [id=/subscriptions/e29abe6c-d392-4ef5-9c66-5d25436f0796/resourceGro
ups/3uwkhd9f-rg/providers/Microsoft.Storage/storageAccounts/3uwkhd9fsa]
data.azurerm_subscription.current: Read complete after 0s [id=/subscriptions/e29abe6c-d392-4ef5-9c66-5d25436f0796]

Terraform used the selected providers to generate the following execution plan. Resource actions are indicated with the
following symbols:
-/+ destroy and then create replacement

Terraform will perform the following actions:

  # azurerm_resource_group.example must be replaced
-/+ resource "azurerm_resource_group" "example" {
      ~ id       = "/subscriptions/e29abe6c-d392-4ef5-9c66-5d25436f0796/resourceGroups/3uwkhd9f-rg" -> (known after appl
y)
      ~ name     = "3uwkhd9f-rg" -> "switch3uwkhd9f-rg" # forces replacement
      - tags     = {} -> null
        # (1 unchanged attribute hidden)
    }

  # azurerm_storage_account.example must be replaced
-/+ resource "azurerm_storage_account" "example" {
      ~ access_tier                       = "Hot" -> (known after apply)
      ~ id                                = "/subscriptions/e29abe6c-d392-4ef5-9c66-5d25436f0796/resourceGroups/3uwkhd9f
-rg/providers/Microsoft.Storage/storageAccounts/3uwkhd9fsa" -> (known after apply)
      + large_file_share_enabled          = (known after apply)
      ~ name                              = "3uwkhd9fsa" -> "switch3uwkhd9fsa" # forces replacement
      ~ primary_access_key                = (sensitive value)
      ~ primary_blob_connection_string    = (sensitive value)
      ~ primary_blob_endpoint             = "https://3uwkhd9fsa.blob.core.windows.net/" -> (known after apply)
      ~ primary_blob_host                 = "3uwkhd9fsa.blob.core.windows.net" -> (known after apply)
```



```
              - enabled               = true -> null
              - include_apis          = true -> null
              - retention_policy_days = 7 -> null
              - version               = "1.0" -> null
            }
          - logging {
              - delete                = false -> null
              - read                  = false -> null
              - retention_policy_days = 0 -> null
              - version               = "1.0" -> null
              - write                 = false -> null
            }
          - minute_metrics {
              - enabled               = false -> null
              - include_apis          = false -> null
              - retention_policy_days = 0 -> null
              - version               = "1.0" -> null
            }
        }

      - share_properties {
          - retention_policy {
              - days = 7 -> null
            }
        }
    }

Plan: 2 to add, 0 to change, 2 to destroy.

Changes to Outputs:
  + resource_group_name  = "switch3uwkhd9f-rg"
  + storage_account_name = "switch3uwkhd9fsa"

Note: You didn't use the -out option to save this plan, so Terraform can't guarantee to take exactly these actions if
you run "terraform apply" now.
elizabeth.ivanova@Elizabeths-MacBook-Air Terraform %
```

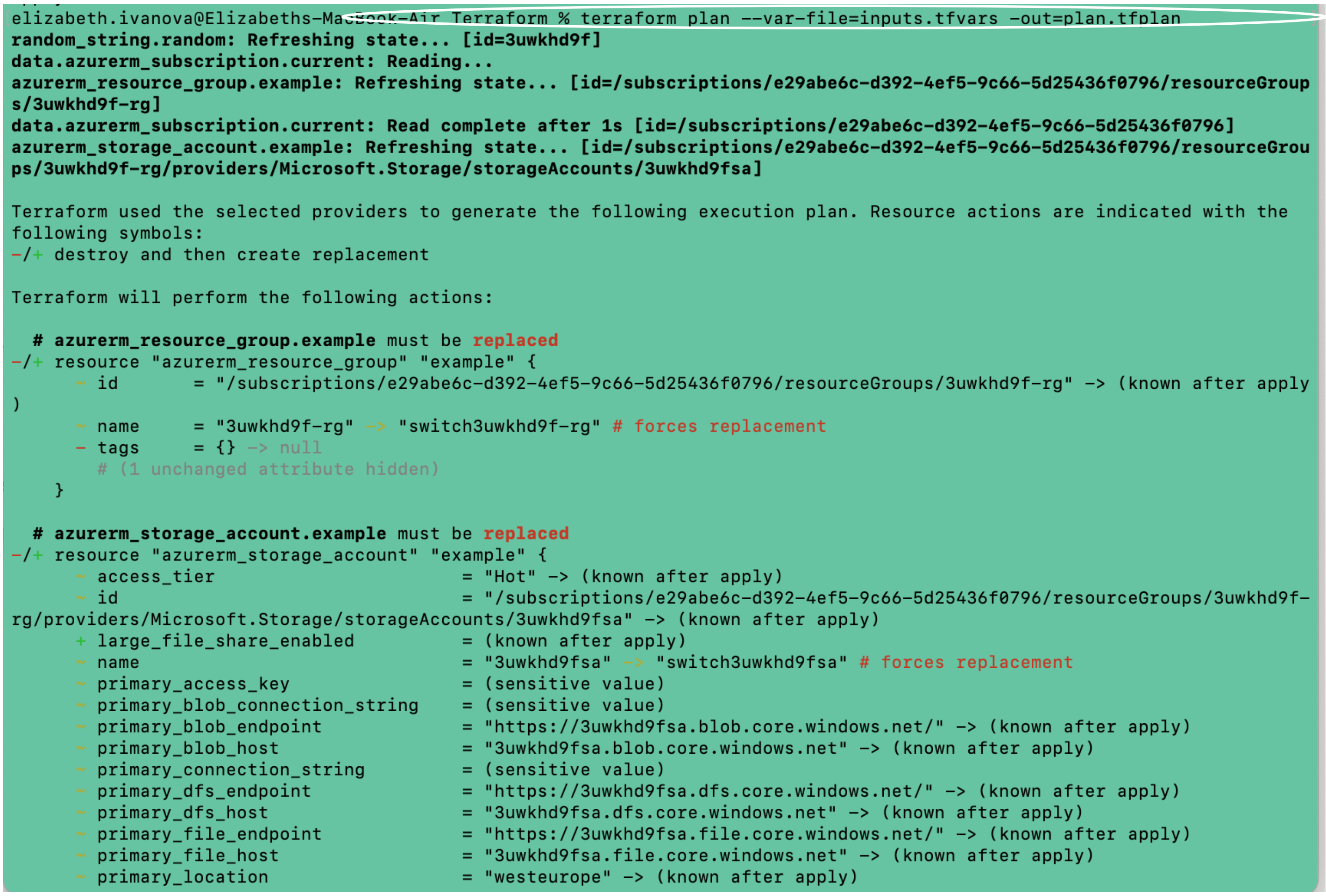
3. Going over the plan once again we find that:



```
Terraform will perform the following actions:

  # azurerm_resource_group.example must be replaced
-/+ resource "azurerm_resource_group" "example" {
      ~ id       = "/subscriptions/e29abe6c-d392-4ef5-9c66-5d25436f0796/resourceGroups/3uwkhd9f-rg" -> (known after apply
)
      ~ name     = "3uwkhd9f-rg" -> "switch3uwkhd9f-rg" # forces replacement
      - tags     = {} -> null
        # (1 unchanged attribute hidden)
    }

  # azurerm_storage_account.example must be replaced
-/+ resource "azurerm_storage_account" "example" {
      ~ access_tier                      = "Hot" -> (known after apply)
      ~ id                               = "/subscriptions/e29abe6c-d392-4ef5-9c66-5d25436f0796/resourceGroups/3uwkhd9f-
rg/providers/Microsoft.Storage/storageAccounts/3uwkhd9fsa" -> (known after apply)
      + large_file_share_enabled         = (known after apply)
      ~ name                             = "3uwkhd9fsa" -> "switch3uwkhd9fsa" # forces replacement
      ~ primary_access_key               = (sensitive value)
      ~ primary_blob_connection_string   = (sensitive value)
      ~ primary_blob_endpoint            = "https://3uwkhd9fsa.blob.core.windows.net/" -> (known after apply)
      ~ primary_blob_host                = "3uwkhd9fsa.blob.core.windows.net" -> (known after apply)
      ~ primary_connection_string        = (sensitive value)
      ~ primary_dfs_endpoint             = "https://3uwkhd9fsa.dfs.core.windows.net/" -> (known after apply)
      ~ primary_dfs_host                 = "3uwkhd9fsa.dfs.core.windows.net" -> (known after apply)
      ~ primary_file_endpoint            = "https://3uwkhd9fsa.file.core.windows.net/" -> (known after apply)
      ~ primary_file_host                = "3uwkhd9fsa.file.core.windows.net" -> (known after apply)
      ~ primary_location                 = "westeurope" -> (known after apply)
      ~ primary_queue_endpoint           = "https://3uwkhd9fsa.queue.core.windows.net/" -> (known after apply)
      ~ primary_queue_host               = "3uwkhd9fsa.queue.core.windows.net" -> (known after apply)
      ~ primary_table_endpoint           = "https://3uwkhd9fsa.table.core.windows.net/" -> (known after apply)
      ~ primary_table_host               = "3uwkhd9fsa.table.core.windows.net" -> (known after apply)
      ~ primary_web_endpoint             = "https://3uwkhd9fsa.z6.web.core.windows.net/" -> (known after apply)
      ~ primary_web_host                 = "3uwkhd9fsa.z6.web.core.windows.net" -> (known after apply)
      ~ resource_group_name              = "3uwkhd9f-rg" -> "switch3uwkhd9f-rg" # forces replacement
      ~ secondary_access_key             = (sensitive value)
      + secondary_blob_connection_string = (sensitive value)
      + secondary_blob_endpoint          = (known after apply)
      + secondary_blob_host              = (known after apply)
      ~ secondary_connection_string      = (sensitive value)
      + secondary_dfs_endpoint           = (known after apply)
```

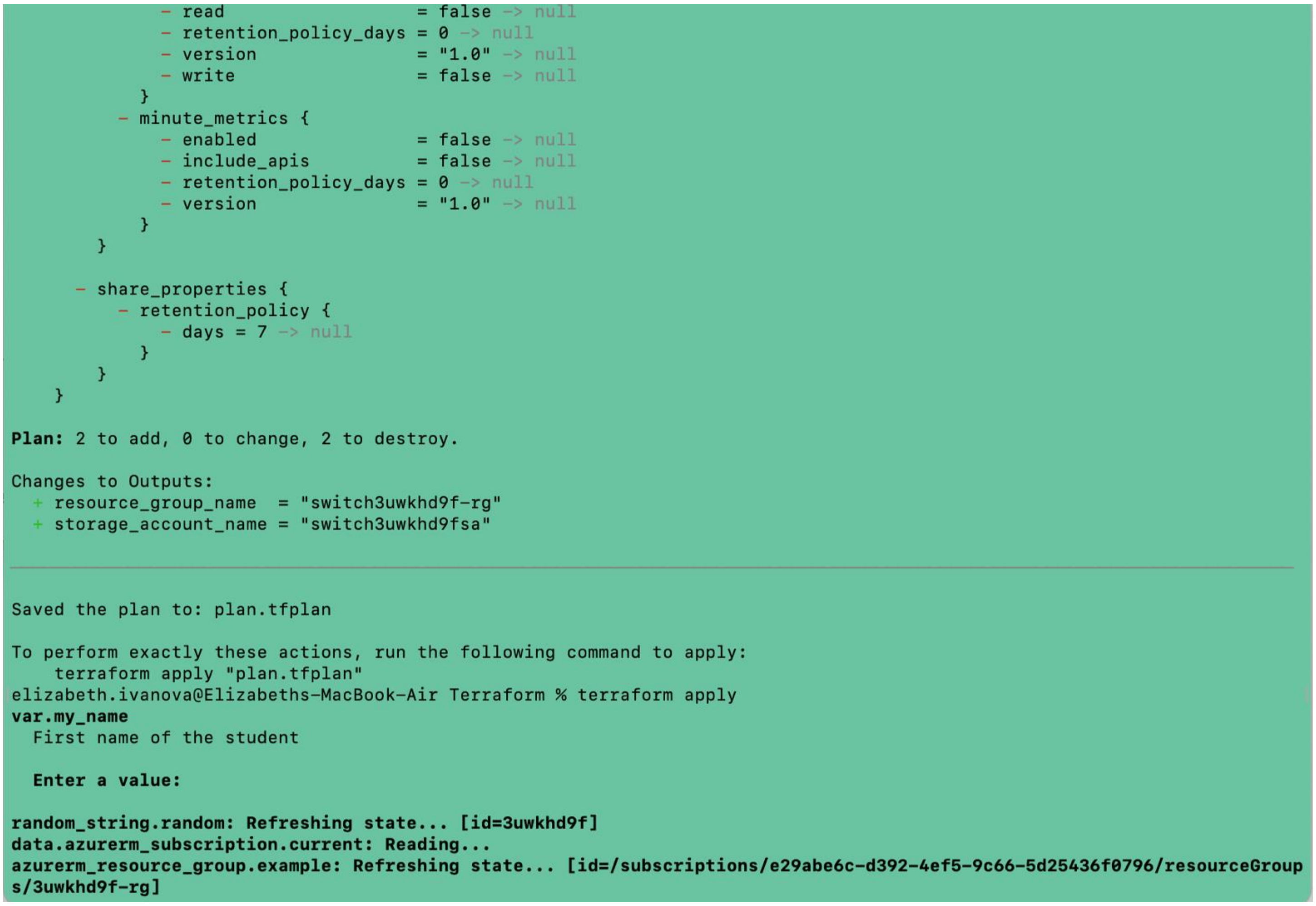
Three “# forces replacement” statements but they are basically only two – the resource group name and the storage account name. They need to be replaced because we have defined “switch” as the value of the variable my_name. And in the code, this variable is concatenated with the randomly generated string in the local variable resource_prefix. And resource_prefix itself we set to be the name of both the storage account (plus “sa” at the end) and the resource group (plus “-rg” ar the end).

4. Lastly, before we can apply any plan, we need to save it because terraform cannot guarantee that the same exact plan will be deployed. So we do the following:
   - First, run the -out command:



```
elizabeth.ivanova@Elizabeths-MacBook-Air Terraform % terraform plan --var-file=inputs.tfvars -out=plan.tfplan
random_string.random: Refreshing state... [id=3uwkhd9f]
data.azurerm_subscription.current: Reading...
azurerm_resource_group.example: Refreshing state... [id=/subscriptions/e29abe6c-d392-4ef5-9c66-5d25436f0796/resourceGroup
s/3uwkhd9f-rg]
data.azurerm_subscription.current: Read complete after 1s [id=/subscriptions/e29abe6c-d392-4ef5-9c66-5d25436f0796]
azurerm_storage_account.example: Refreshing state... [id=/subscriptions/e29abe6c-d392-4ef5-9c66-5d25436f0796/resourceGrou
ps/3uwkhd9f-rg/providers/Microsoft.Storage/storageAccounts/3uwkhd9fsa]

Terraform used the selected providers to generate the following execution plan. Resource actions are indicated with the
following symbols:
-/+ destroy and then create replacement

Terraform will perform the following actions:

  # azurerm_resource_group.example must be replaced
-/+ resource "azurerm_resource_group" "example" {
      ~ id       = "/subscriptions/e29abe6c-d392-4ef5-9c66-5d25436f0796/resourceGroups/3uwkhd9f-rg" -> (known after apply
)
      ~ name     = "3uwkhd9f-rg" -> "switch3uwkhd9f-rg" # forces replacement
      - tags     = {} -> null
        # (1 unchanged attribute hidden)
    }

  # azurerm_storage_account.example must be replaced
-/+ resource "azurerm_storage_account" "example" {
      ~ access_tier                      = "Hot" -> (known after apply)
      ~ id                               = "/subscriptions/e29abe6c-d392-4ef5-9c66-5d25436f0796/resourceGroups/3uwkhd9f-
rg/providers/Microsoft.Storage/storageAccounts/3uwkhd9fsa" -> (known after apply)
      + large_file_share_enabled         = (known after apply)
      ~ name                             = "3uwkhd9fsa" -> "switch3uwkhd9fsa" # forces replacement
      ~ primary_access_key               = (sensitive value)
      ~ primary_blob_connection_string   = (sensitive value)
      ~ primary_blob_endpoint            = "https://3uwkhd9fsa.blob.core.windows.net/" -> (known after apply)
      ~ primary_blob_host                = "3uwkhd9fsa.blob.core.windows.net" -> (known after apply)
      ~ primary_connection_string        = (sensitive value)
      ~ primary_dfs_endpoint             = "https://3uwkhd9fsa.dfs.core.windows.net/" -> (known after apply)
      ~ primary_dfs_host                 = "3uwkhd9fsa.dfs.core.windows.net" -> (known after apply)
      ~ primary_file_endpoint            = "https://3uwkhd9fsa.file.core.windows.net/" -> (known after apply)
      ~ primary_file_host                = "3uwkhd9fsa.file.core.windows.net" -> (known after apply)
      ~ primary_location                 = "westeurope" -> (known after apply)
```

5. And now, if we don’t use the saved plan and just run apply, we get back to the providing an input value instead of using the one we created in inputs.tfvars:



```
            - read                  = false -> null
            - retention_policy_days = 0 -> null
            - version               = "1.0" -> null
            - write                 = false -> null
          }
        - minute_metrics {
            - enabled               = false -> null
            - include_apis          = false -> null
            - retention_policy_days = 0 -> null
            - version               = "1.0" -> null
          }
      }

    - share_properties {
        - retention_policy {
            - days = 7 -> null
          }
      }
  }

Plan: 2 to add, 0 to change, 2 to destroy.

Changes to Outputs:
  + resource_group_name  = "switch3uwkhd9f-rg"
  + storage_account_name = "switch3uwkhd9fsa"

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Saved the plan to: plan.tfplan

To perform exactly these actions, run the following command to apply:
    terraform apply "plan.tfplan"
elizabeth.ivanova@Elizabeths-MacBook-Air Terraform % terraform apply
var.my_name
  First name of the student

  Enter a value:

random_string.random: Refreshing state... [id=3uwkhd9f]
data.azurerm_subscription.current: Reading...
azurerm_resource_group.example: Refreshing state... [id=/subscriptions/e29abe6c-d392-4ef5-9c66-5d25436f0796/resourceGroup
s/3uwkhd9f-rg]
```
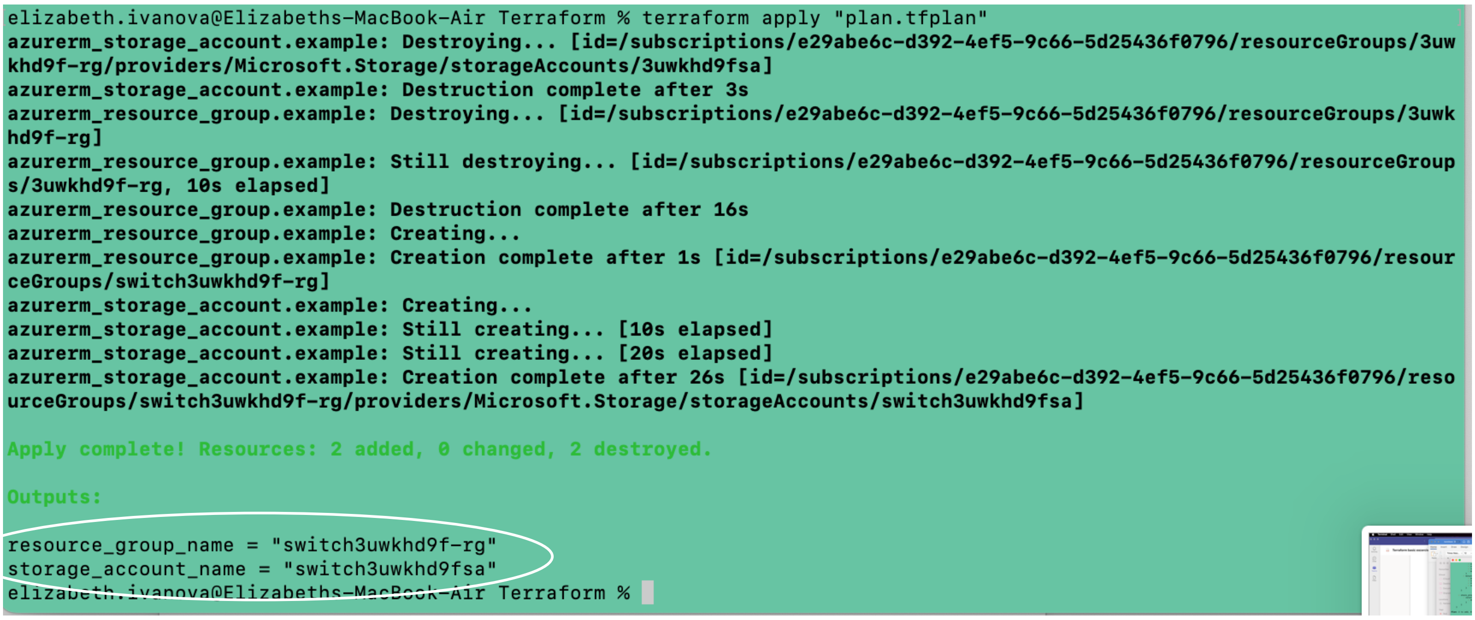

6. To use the saved plan, we just run the following, as terraform instructs:



```
elizabeth.ivanova@Elizabeths-MacBook-Air Terraform % terraform apply "plan.tfplan"
azurerm_storage_account.example: Destroying... [id=/subscriptions/e29abe6c-d392-4ef5-9c66-5d25436f0796/resourceGroups/3uw
khd9f-rg/providers/Microsoft.Storage/storageAccounts/3uwkhd9fsa]
azurerm_storage_account.example: Destruction complete after 3s
azurerm_resource_group.example: Destroying... [id=/subscriptions/e29abe6c-d392-4ef5-9c66-5d25436f0796/resourceGroups/3uwk
hd9f-rg]
azurerm_resource_group.example: Still destroying... [id=/subscriptions/e29abe6c-d392-4ef5-9c66-5d25436f0796/resourceGroup
s/3uwkhd9f-rg, 10s elapsed]
azurerm_resource_group.example: Destruction complete after 16s
azurerm_resource_group.example: Creating...
azurerm_resource_group.example: Creation complete after 1s [id=/subscriptions/e29abe6c-d392-4ef5-9c66-5d25436f0796/resour
ceGroups/switch3uwkhd9f-rg]
azurerm_storage_account.example: Creating...
azurerm_storage_account.example: Still creating... [10s elapsed]
azurerm_storage_account.example: Still creating... [20s elapsed]
azurerm_storage_account.example: Creation complete after 26s [id=/subscriptions/e29abe6c-d392-4ef5-9c66-5d25436f0796/reso
urceGroups/switch3uwkhd9f-rg/providers/Microsoft.Storage/storageAccounts/switch3uwkhd9fsa]

Apply complete! Resources: 2 added, 0 changed, 2 destroyed.

Outputs:

resource_group_name = "switch3uwkhd9f-rg"
storage_account_name = "switch3uwkhd9fsa"
elizabeth.ivanova@Elizabeths-MacBook-Air Terraform %
```

Without asking for input and getting all the outputs.