МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
НАЦІОНАЛЬНИЙ АЕРОКОСМІЧНИЙ УНІВЕРСИТЕТ ім. М. Є. Жуковського «Харківський авіаційний інститут»

Факультет радіоелектроніки, комп'ютерних систем та інфокумунікацій

Кафедра комп'ютерних систем, мереж і кібербезпеки

Лабораторна робота №6

З дициплiни: «Теорія та технології розроблення безпечних розподільних систем»

Виконав:

студент 5 курсу групи №555 ім

Напряму підготовки

125 Кібербезпека та захист інформації

ст. Орлов Станіслав Валерійович

Прийняв:

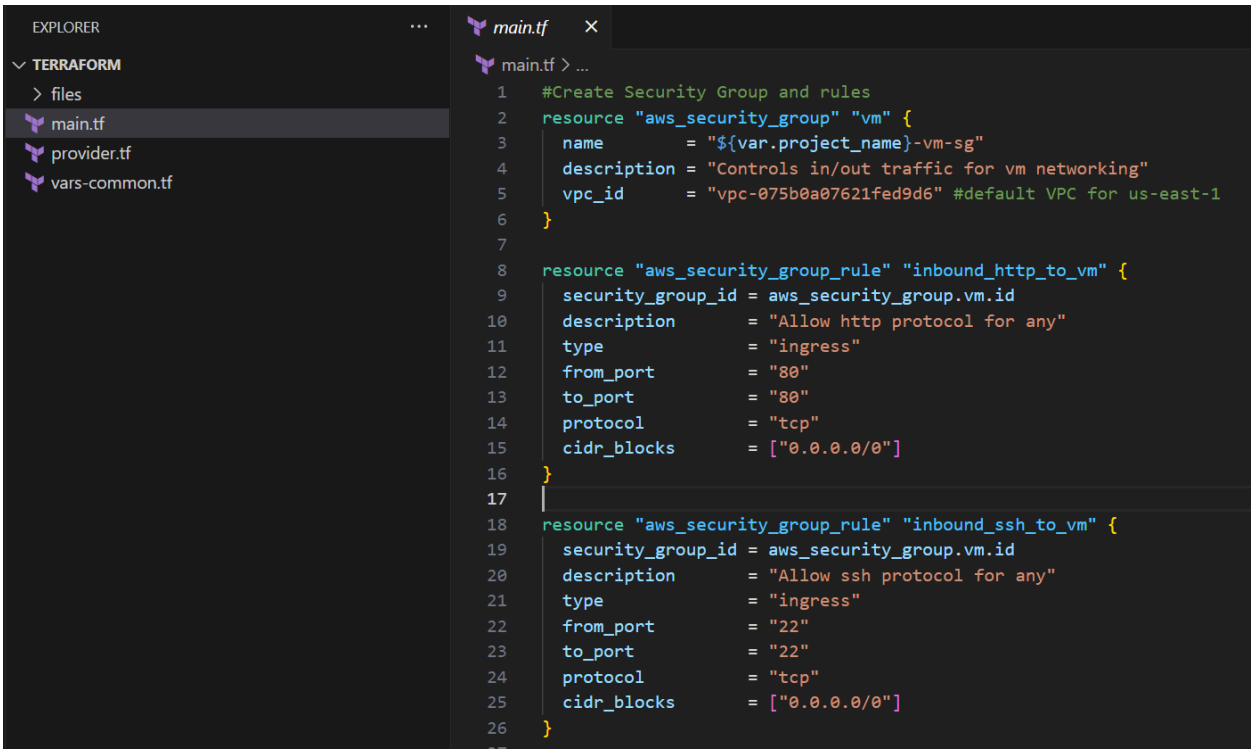
аспірант

Карпенко Андрій Сергійович

Харків, 2023

Step 1 Opening simple terraform project:

1. Download and unzip sample project.

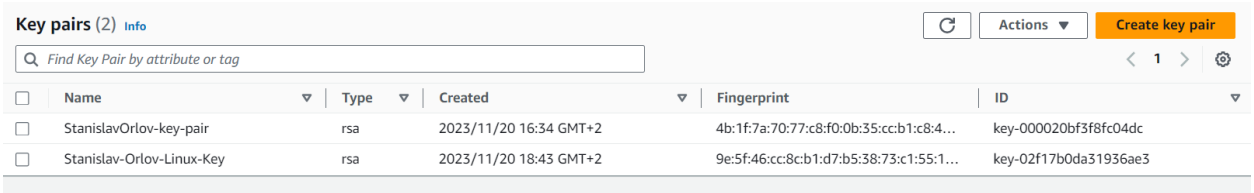


Step 2 Understanding Terraform Code

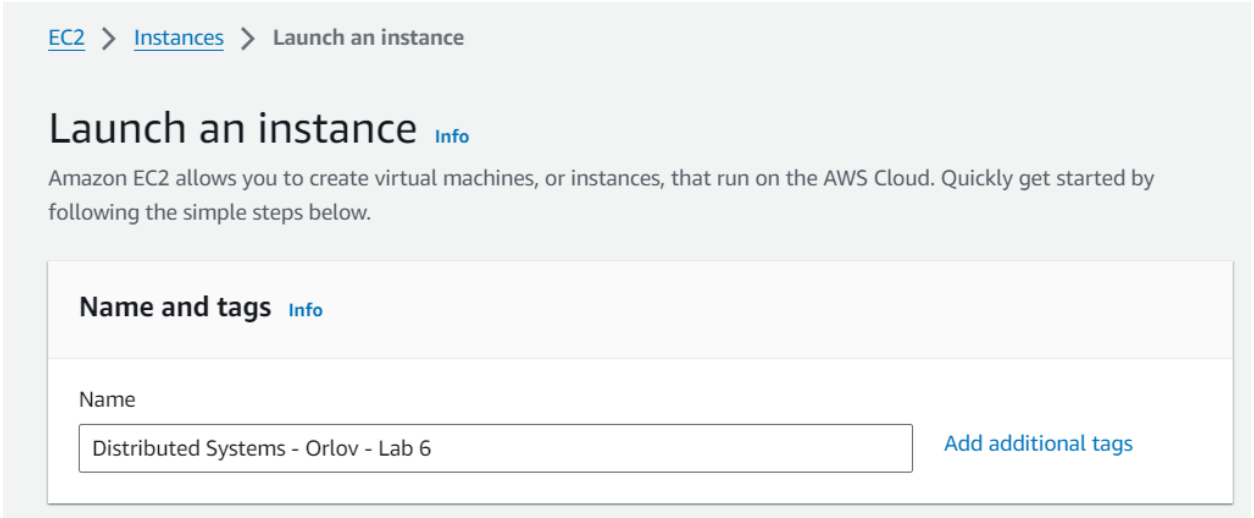
2. Replace student id:

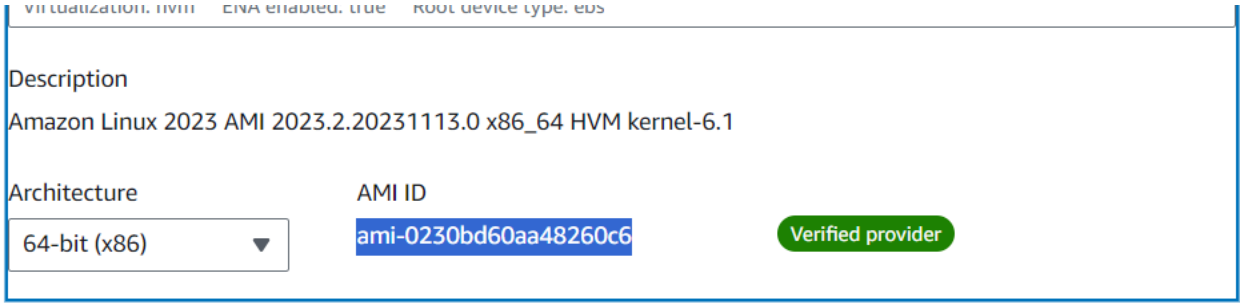
Step 3 Update key VM Settings

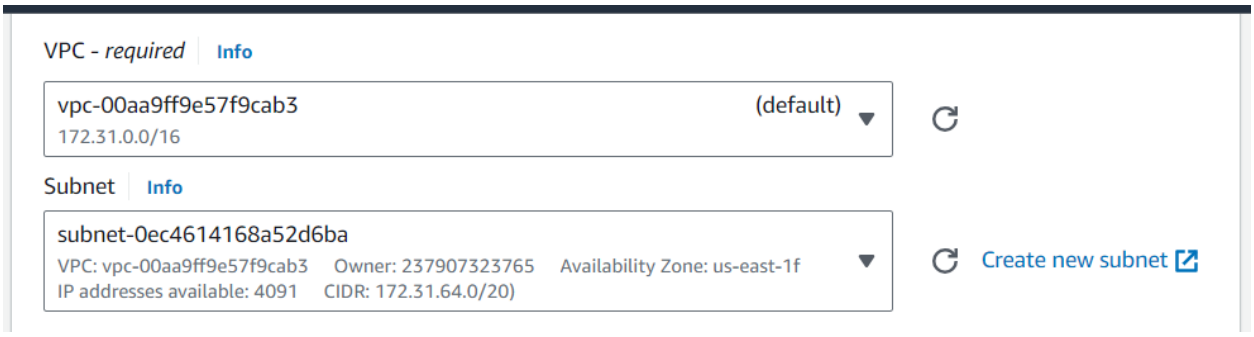
3. Update key VM settings with created key-pair name



4. Launching a new EC2 instance







Step 4 Configure AWS Credentials for AWS CLI

```
Windows PowerShell
PS C:\Projects\XAI_навчання\Git\SecureDistibutedSystems\Lab6\Terraform(Lab-10)\Terraform> aws configure
AWS Access Key ID [****************UFXG]: [redacted]
AWS Secret Access Key [****************AvJb]: [redacted]
Default region name [us-east-1]: us-east-1
Default output format [None]: None
PS C:\Projects\XAI_навчання\Git\SecureDistibutedSystems\Lab6\Terraform(Lab-10)\Terraform>
```

Step 5 Deploying AWS Virtual Infrastructure

terraform init

```
PS C:\Projects\XAI_навчання\Git\SecureDistibutedSystems\Lab6\Terraform(Lab-10)\Terraform> terraform init

Initializing the backend...

Initializing provider plugins...
- Finding latest version of hashicorp/aws...
- Installing hashicorp/aws v5.30.0...
- Installed hashicorp/aws v5.30.0 (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.
```

terraform validate

```
PS C:\Projects\XAI_навчання\Git\SecureDistibutedSystems\Lab6\Terraform(Lab-10)\Terraform> terraform validate
Success! The configuration is valid.

PS C:\Projects\XAI_навчання\Git\SecureDistibutedSystems\Lab6\Terraform(Lab-10)\Terraform>
```

terraform plan

```
PS C:\Projects\ХАІ_навчання\Git\SecureDistibutedSystems\Lab6\Terraform(Lab-10)\Terraform> terraform plan

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

Terraform will perform the following actions:

  # aws_instance.CCD_demo will be created
  + resource "aws_instance" "CCD_demo" {
      + ami                                  = "ami-0b0dcb5067f052a63"
      + arn                                  = (known after apply)
      + associate_public_ip_address          = (known after apply)
      + availability_zone                    = (known after apply)
      + cpu_core_count                       = (known after apply)
      + cpu_threads_per_core                 = (known after apply)
      + disable_api_stop                     = (known after apply)
      + disable_api_termination              = (known after apply)
      + ebs_optimized                        = (known after apply)
      + get_password_data                    = false
      + host_id                              = (known after apply)
      + host_resource_group_arn              = (known after apply)
      + iam_instance_profile                 = (known after apply)
      + id                                   = (known after apply)
      + instance_initiated_shutdown_behavior = (known after apply)
      + instance_lifecycle                   = (known after apply)
      + instance_state                       = (known after apply)
      + instance_type                        = "t2.micro"
      + ipv6_address_count                   = (known after apply)
      + ipv6_addresses                       = (known after apply)
      + key_name                             = "CCD2022"
      + monitoring                           = (known after apply)
      + outpost_arn                          = (known after apply)
      + password_data                        = (known after apply)
      + placement_group                      = (known after apply)
      + placement_partition_number           = (known after apply)
      + primary_network_interface_id         = (known after apply)
      + private_dns                          = (known after apply)
      + private_ip                           = (known after apply)
```

List of planned of actions to be performed

```
  + resource "aws_security_group_rule" "inbound_ssh_to_vm" {
      + cidr_blocks              = [
          + "0.0.0.0/0",
        ]
      + description              = "Allow ssh protocol for any"
      + from_port                = 22
      + id                       = (known after apply)
      + protocol                 = "tcp"
      + security_group_id        = (known after apply)
      + security_group_rule_id   = (known after apply)
      + self                     = false
      + source_security_group_id = (known after apply)
      + to_port                  = 22
      + type                     = "ingress"
    }

  # aws_security_group_rule.vm_outbound_any will be created
  + resource "aws_security_group_rule" "vm_outbound_any" {
      + cidr_blocks              = [
          + "0.0.0.0/0",
        ]
      + from_port                = 0
      + id                       = (known after apply)
      + protocol                 = "-1"
      + security_group_id        = (known after apply)
      + security_group_rule_id   = (known after apply)
      + self                     = false
      + source_security_group_id = (known after apply)
      + to_port                  = 0
      + type                     = "egress"
    }

Plan: 6 to add, 0 to change, 0 to destroy.
```

Applying infrastructure changes

```
PS C:\Projects\XAI_навчання\Git\SecureDistibutedSystems\Lab6\Terraform(Lab-10)\Terraform> terraform apply

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:
```

Getting and error about invalid key pair

```
Error: creating EC2 Instance: InvalidKeyPair.NotFound: The key pair 'CCD2022' does not exist
       status code: 400, request id: ebc4526c-3145-4cd0-9a64-d034065139a4
```

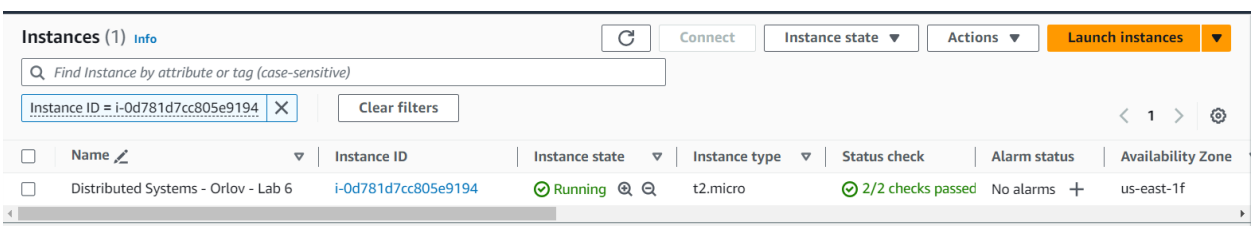
Updating with personal Key Pair information

```
instance_type        = "t2.micro"
user_data            = file("./files/template.tpl") #U
key_name             = "StanislavOrlov-key-pair"
```

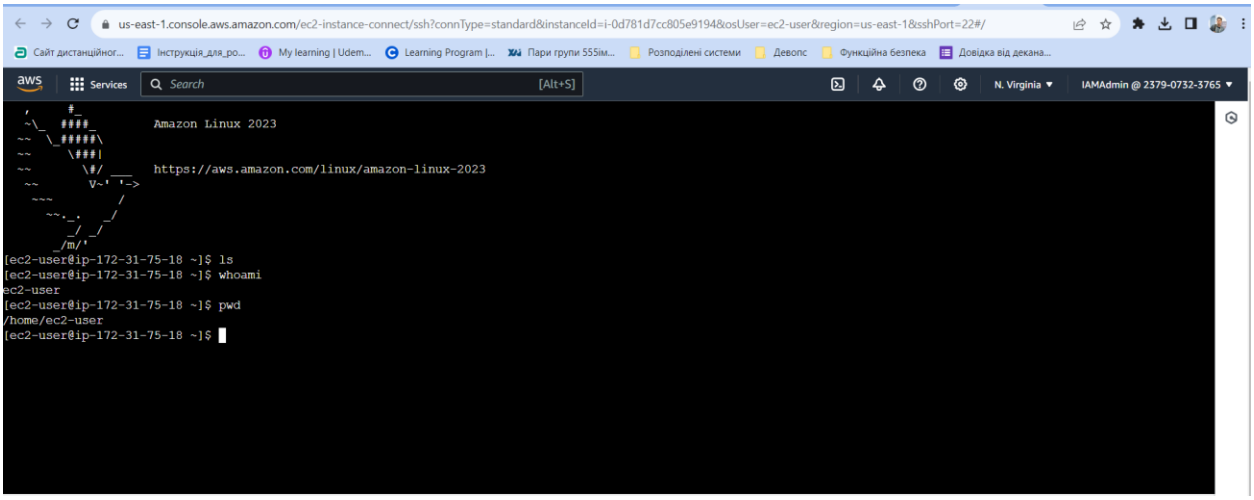
Message regarding successful instance creation

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

Do you want to perform these actions?
  Terraform will perform the actions described above.
  Only 'yes' will be accepted to approve.

  Enter a value: yes

aws_instance.CCD_demo: Creating...
aws_instance.CCD_demo: Still creating... [10s elapsed]
aws_instance.CCD_demo: Still creating... [20s elapsed]
aws_instance.CCD_demo: Still creating... [30s elapsed]
aws_instance.CCD_demo: Creation complete after 35s [id=i-0f2dacca6987937e0]

Apply complete! Resources: 1 added, 0 changed, 0 destroyed.
PS C:\Projects\XAI_навчання\Git\SecureDistibutedSystems\Lab6\Terraform(Lab-10)\Terraform>
```

Step 6 Checking Deployed Resources



Connecting to deployed EC2 instance



Step 7 Destroying AWS EC2 Resources

```
PS C:\Projects\XAI_навчання\Git\SecureDistibutedSystems\Lab6\Terraform(Lab-10)\Terraform> terraform destroy
aws_security_group.vm: Refreshing state... [id=sg-087c5031dc37d09d3]
aws_security_group_rule.vm_outbound_any: Refreshing state... [id=sgrule-1960886935]
aws_security_group_rule.inbound_http_to_vm: Refreshing state... [id=sgrule-916124940]
aws_security_group_rule.inbound_ssh_to_vm: Refreshing state... [id=sgrule-2146391873]
aws_network_interface.main: Refreshing state... [id=eni-09f0c7b41d75b1473]
aws_instance.CCD_demo: Refreshing state... [id=i-0f2dacca6987937e0]

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

```
Plan: 0 to add, 0 to change, 6 to destroy.

Do you really want to destroy all resources?
  Terraform will destroy all your managed infrastructure, as shown above.
  There is no undo. Only 'yes' will be accepted to confirm.

  Enter a value: yes

aws_security_group_rule.vm_outbound_any: Destroying... [id=sgrule-1960886935]
aws_security_group_rule.inbound_http_to_vm: Destroying... [id=sgrule-916124940]
aws_security_group_rule.inbound_ssh_to_vm: Destroying... [id=sgrule-2146391873]
aws_instance.CCD_demo: Destroying... [id=i-0f2dacca6987937e0]
aws_security_group_rule.vm_outbound_any: Destruction complete after 1s
aws_security_group_rule.inbound_ssh_to_vm: Destruction complete after 1s
aws_security_group_rule.inbound_http_to_vm: Destruction complete after 2s
aws_instance.CCD_demo: Still destroying... [id=i-0f2dacca6987937e0, 10s elapsed]
aws_instance.CCD_demo: Still destroying... [id=i-0f2dacca6987937e0, 20s elapsed]
aws_instance.CCD_demo: Still destroying... [id=i-0f2dacca6987937e0, 30s elapsed]
aws_instance.CCD_demo: Destruction complete after 31s
aws_network_interface.main: Destroying... [id=eni-09f0c7b41d75b1473]
aws_network_interface.main: Destruction complete after 0s
aws_security_group.vm: Destroying... [id=sg-087c5031dc37d09d3]
aws_security_group.vm: Destruction complete after 1s

Destroy complete! Resources: 6 destroyed.
PS C:\Projects\XAI_навчання\Git\SecureDistibutedSystems\Lab6\Terraform(Lab-10)\Terraform>
```

Висновки:

У ході виконання лабораторної роботи ознайомився та отримав практичні навички з Infrastructure-as-Code створивши хмарну інфрастуктуру AWS використовуючи фреймворк Terraform.