Lab 03

Instructions:

1. Paste all screenshots (highlighted in red) in a single Word document in the correct order
2. Name the document as **YourName-lab03**
3. Submit the document as an attachment in Bb under Labs
4. Use a WSL terminal for all activities

Lab submissions must be made by the due date (as indicated on the Critical Path). Each day thereafter will incur a **10%** deduction from the earned marks, up to a maximum of **3 days**. Submissions beyond this deadline will receive a grade of **Zero**.

Lab Objectives:

There are 3 sections in this lab. Each section has a different set of objectives. The sections are described below:

Section 1: Expand lab02s3 and define and consume local values (lab03s1)
Section 2: Expand lab03s1 and define output blocks (lab03s2)
Section 3: Expand lab03s2 and add explicit lifecycle rules and dependencies (lab03s3)

WARNING

Code generated by ChatGPT or a similar generative AI tool, and copied and pasted without making the **right** modifications will result in a **ZERO** for that **entire section**.

Section 1

Objectives:

- Use configuration from lab02s3
- Define a locals block to assign tags to resources
- Validate, deploy, expand, analyze, and destroy infrastructure

Part 1: Prepare for the lab:

1. Create a folder called **lab03s1** under **automation/terraform**

2. Copy **network-main.tf**, **network-vars.tf**, **vmlinux-main.tf**, **vmlinux-vars.tf**, and **providers.tf** files from **lab02s3** to **lab03s1** directory
3. Change into **lab03s1**

Part 2: Update vmlinux-vars.tf file:

4. Define a locals block with the following values at the beginning of the file. Make sure to enclose values within double quotation marks.
    a. Name: **Terraform-Class**
    b. Project: **Learning**
    c. ContactEmail: **yourHumberemail**
    d. Environment: **Lab**

SCREENSHOT of vmlinux-vars.tf

Part 3: Update vmlinux-main.tf file:

5. Add tags to network interface, public IP, and virtual machine resource blocks.

SCREENSHOT of vmlinux-main.tf

Part 4: Initialize Terraform:

6. Initialize Terraform to download plug-ins as required (**terraform init**)

Part 5: Validate configuration:

7. Validate the configuration to ensure there are no errors or typos in the file (**terraform validate**)
8. Fix any issues in the Terraform files if reported
9. Re-run the validation until no errors are reported (**terraform validate**)

Part 6: Run simulation:

10. Perform a dry run (**terraform plan**)
11. Review output and ensure all configuration is as per requirements. Observe the resources with +, -, or -/+ signs.
12. Fix any issues in the Terraform files if reported
13. Redo the dry run until no errors are reported (**terraform plan**)

Part 7: Deploy infrastructure:

14. Deploy the infrastructure and monitor progress (**terraform apply**)
15. View Terraform log file and review details

Part 8: Get information from Terraform state:

16. View and analyze state information (**terraform state list | nl**) **SCREENSHOT**

Part 9: Confirm resource creation in Azure:

17. Log in to the Azure Portal. Navigate to the resource group and click on the virtual machine resource to confirm tags applied as per the specifications.

SCREENSHOT of VM Overview

Part 10: Destroy all resources and verify:

18. Destroy all the resources (**terraform destroy**)
19. Verify deletion (**terraform state list | nl**)

========================== End of Section 1 ==================================

Section 2

Objectives:

- Use configuration from lab03s1
- Define output blocks to display values
- Validate, deploy, expand, analyze, and destroy infrastructure

Part 1: Prepare for the lab:

1. Copy the directory **lab03s1** as **lab03s2**
2. Change into **lab03s2**
3. Create an empty file called **outputs.tf**

Part 2: Update outputs.tf file:

4. Define output blocks in the outputs.tf file to display the following values:
   a. VM hostname (1 block)
   b. VM FQDN (1 block)
   c. Private IP address (1 block) and Public IP address (1 block)
   d. Virtual network name (1 block) and address space (1 block)
   e. Subnet names (2 blocks) and address spaces (2 blocks)

SCREENSHOT of outputs.tf

Part 3: Validate configuration:

5. Validate the configuration to ensure there are no errors or typos in the file (**terraform validate**)
6. Fix any issues in the Terraform files if reported
7. Re-run the validation until no errors are reported (**terraform validate**)

Part 4: Run simulation:

8. Perform a dry run (**terraform plan**)
9. Review output and ensure all configuration is as per requirements. Observe the resources with +, -, or -/+ signs.

10. Fix any issues in the Terraform files if reported
11. Redo the dry run until no errors are reported (**terraform plan**)

Part 5: Deploy infrastructure:

12. Deploy the infrastructure and monitor progress (**terraform apply**)
13. Confirm output values displayed on the screen at the end of infrastructure deployment

Part 6: Get information from Terraform state:

14. View and analyze state information (**terraform state list | nl**) **SCREENSHOT**

Part 7: Display output information:

15. Display output information (**terraform output**) **SCREENSHOT**

Part 8: Destroy all resources and verify:

16. Destroy all the resources (**terraform destroy**)
17. Verify deletion (**terraform state list | nl**)

========================== End of Section 2 =================================

Section 3

Objectives:

- Use configuration from lab03s2
- Define lifecycle rules to prevent updates and resource deletions
- Define explicit dependency
- Validate, deploy, expand, analyze, and destroy infrastructure

Part 1: Prepare for the lab:

1. Copy the folder **lab03s2** as **lab03s3**
2. Change into **lab03s3**

Part 2: Update network-main.tf file:

3. Define an explicit dependency rule for the resource group to wait for the creation of virtual machine

SCREENSHOT of network-main.tf

Part 3: Validate configuration:

4. Validate the configuration to ensure there are no errors or typos in the file (**terraform validate**)

The validation will fail with an error. **SCREENSHOT**

5. Remove the dependency for the resource group to wait for the creation of virtual machine
6. Re-run the validation until no errors are reported (**terraform validate**)

The validation should be successful this time.

Part 4: Run simulation:

7. Perform a dry run (**terraform plan**)
8. Review output and ensure all configuration is as per requirements. Observe the resources with +, -, or -/+ signs.
9. Fix any issues in the Terraform files if reported
10. Redo the dry run until no errors are reported (**terraform plan**)

Part 5: Deploy infrastructure:

11. Deploy the infrastructure and monitor progress (**terraform apply**)
12. Confirm output values displayed on the screen at the end of infrastructure deployment

Part 6: Add and test a lifecycle deletion rule:

13. Edit **vmlinux-main.tf** file and add a rule to prevent virtual machine, public IP, and network interface resources from removal
14. Run **terraform destroy** and observe the error message generated **SCREENSHOT**
15. Edit **vmlinux-main.tf** file again and remove the deletion rules

Do not destroy the infrastructure yet.

Part 7: Add and test a lifecycle update rule:

16. Go to the Azure Portal and change some of the tag values for the virtual machine
17. Edit **vmlinux-main.tf** file and add a rule to prevent tag updates to the virtual machine
18. Run **terraform plan** and observe the dry run output **SCREENSHOT**
19. Edit **vmlinux-main.tf** file again and remove the update rule

Part 8: Destroy all resources and verify:

20. Destroy all the resources (**terraform destroy**)
21. Verify deletion (**terraform state list | nl**)

========================== End of Section 3 ==================================