

Asignatura	Datos del alumno	Fecha
Devops & Cloud	Apellidos: Lorenzo Villoria	24/07/2023
	Nombre: Miguel Angel	

Informe Caso Práctico 2:

Automatización de despliegues en entornos Cloud

Repositorio: https://github.com/WillyVilloria/Practica_2.git

version 0.0.3

Objetivos de la actividad

Objetivo de el caso practico 2:

- Crear infraestructura de forma automatizada en un proveedor de Cloud pública.
- Utilizar herramientas de gestión de la configuración para automatizar la instalación y configuración de servicios.
- Desplegar mediante un enfoque totalmente automatizado aplicaciones en forma de contenedor sobre el sistema operativo.
- Desplegar mediante un enfoque totalmente automatizado aplicaciones que hagan uso de almacenamiento persistente sobre una plataforma de orquestación de contenedores.

Terraform

Creo infraestructura con terraform de forma automatizada en azure.

- **archivo terra.sh** --> archivo bash con los comandos terraform para poder ser utilizados por el archivo deploy.sh de ansible
- **archivo acs.tf** -- >
 - genera el grupo de recursos (rg).
 - genera el container registry (acr).
- **archivo aks.tf** --> genera el cluster de kubernetes (aks) de azure.
- **archivo vm.tf** --> genera los siguientes elementos de azure

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- virtual network.
- subnet.
- network interface.
- public ip.
- virtual machine (vm).
- admin de ssh.
- plan.
- source image reference.
- grupo de network security (ngs1).
 - Permito rango de puertos http 8080-8090 para poder tener más de un puerto de acceso.
- azurerm_subnet_network_security_group_association (ngs-link)

Los detalles del Sistema operativo y demás servicios están en el apartado de “infraestructura generada con terraform”.

- **archivo input-vars.tf** --> archivo de variables con los nombres y datos necesarios para crear los recursos nombrados en los archivos anteriores.
- **archivo outputs.tf** --> archivo con las variables de salida.

Ansible

Despliegue con ansible de aplicaciones:

- **Archivo deploy.sh** --> archivo con comando de consola que realiza las siguientes funciones:
 - llamada al archivo terra.sh para ejecutar los comandos de terraform y realizar el despliegue de la infraestructura comentada anteriormente

Una vez terminado el despliegue se realiza la llamada de los playbooks de ansible:

- **playbook obtenerlogs.yaml** --> ejecuta un comando shell que obtiene las variables de salida definidas en el despliegue de terraform con el archivo outputs.tf, guarda la información en un registro y después lo vuelco a dos archivos diferentes llamados outputs pero uno con formato json y el otro yaml (sólo voy a utilizar uno de ellos, en este caso utilizaré el archivo .json).

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- **Utilizo el archivo dep vars.sh**, básicamente leo las variables del archivo vars.sjon y utilizo la ip para guardarla en los archivos hosts e inventory y así poder automatizar el despliegue con ansible.
- **playbook instalarpodman.yaml** --> instala la aplicación podman. Utilizaré los archivos de variables vars.yaml y el de outputs.json con los datos obtenidos del despliegue de terraform.
- **playbook instalar.yaml** --> instala las aplicaciones y módulos necesarios para realizar la práctica. Destaco la instalación del módulo passlib de python ya que tenía un error en el despliegue en el que se me comunicaba que era imposible exportar este módulo desde el plano de control. Variables vars.yaml y el de outputs.json
- **playbook copiar.yaml** -->
 - crea el directorio webserver que es donde se copiarán los archivos necesarios para el despliegue de la aplicación web requerida en la práctica.
 - copio archivo principal de la web -> index.html.
 - copio archivo .htacces de configuración de la autenticación.
 - copio archivo httpd.conf con la configuración de un servidor apache2
 - copio archivo Containerfile con la configuración los chivos que se deben volcar en los direcotrios de apache2.
- **playbook certificados.yaml** --> se generan los certificados de seguridad OppenSSL
- **playbook podmanlogin.yaml** --> se logea podman con el acr de azure con los datos guardados en el archivo outputs.json.
- **playbook images.yaml** -->
 - genero imagen
 - tagueo la imagen con el nombre de la actividad: casopractico2
 - subo la imagen al acr de azure
 - creo el contenedor para un servidor web
 - inicio el servicio.
- **playbook imagefor k8s.yaml** -->
 - Genero un directoriopara albergar los archivos (appi)
 - Copio el archivo Containerfile al directorio generado previamente (appi)

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- obtengo una imagen de nginx desde dockers
- tagueo la imagen con el nombre de la actividad: casopractico2
- subo la imagen al acr de azure
- genero el servicio de la aplicación
- **playbook autenticacion k8s.yaml** -->
 - Instalo con pip kubernetes, ya que he tenido varios errores debido a que no se encontraban en el plano de control algún archivo relacionado con este módulo, he tenido que desinstalar todos los programas relacionados con kubernetes e instalarlo desde ansible y han remitido los errores.
 - a través del shell obtengo las credenciales del kluster de aks
 - creo un namespace
 - **archivo de variables vars_k8s.yaml** → apunta hacia el archivo de configuración del servicio que se encuentra en el directorio k8sfiles.
 - **archivo k8s_persistent_storage.yaml** → define la configuración del servicio
 - creo un servicio con persistencia que consiste:
 - archivo
 - un deployment
 - un persistent volume pv
 - un persistent volume claim
 - un pod asociado al pv

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Infraestructura generada con terraform:

```
miguel@willy:~/Documentos/Proyectos/Practica_2/ansible$ chmod +x deploy.sh
```

```
miguel@willy:~/Documentos/Proyectos/Practica_2/ansible$ . deploy.sh
```

Archivos despliegue de ansible

Archivo creación recursos terraform

Initializing the backend...

Initializing provider plugins...

- Reusing previous version of hashicorp/azurerm from the dependency lock file
- Using previously-installed hashicorp/azurerm v3.37.0

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.

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_container_registry.acr will be created

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```

+ resource "azurerm_container_registry" "acr" {
  + admin_enabled          = true
  + admin_password         = (sensitive value)
  + admin_username        = (known after apply)
  + encryption            = (known after apply)
  + export_policy_enabled  = true
  + id                    = (known after apply)
  + location               = "uksouth"
  + login_server           = (known after apply)
  + name                   = "practica2acr"
  + network_rule_bypass_option = "AzureServices"
  + network_rule_set       = (known after apply)
  + public_network_access_enabled = true
  + resource_group_name    = "practica2rg"
  + retention_policy       = (known after apply)
  + sku                    = "Basic"
  + trust_policy           = (known after apply)
  + zone_redundancy_enabled = false
}

# azurerm_kubernetes_cluster.aks will be created
+ resource "azurerm_kubernetes_cluster" "aks" {
  + dns_prefix          = "aks01"
  + fqdn                = (known after apply)
  + http_application_routing_zone_name = (known after apply)
  + id                  = (known after apply)
  + image_cleaner_enabled = false
  + image_cleaner_interval_hours = 48
  + kube_admin_config    = (sensitive value)
  + kube_admin_config_raw = (sensitive value)

```

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```

+ kube_config          = (sensitive value)
+ kube_config_raw      = (sensitive value)
+ kubernetes_version   = (known after apply)
+ location             = "uksouth"
+ name                 = "aks01"
+ node_resource_group  = (known after apply)
+ oidc_issuer_url      = (known after apply)
+ portal_fqdn          = (known after apply)
+ private_cluster_enabled = false
+ private_cluster_public_fqdn_enabled = false
+ private_dns_zone_id  = (known after apply)
+ private_fqdn         = (known after apply)
+ public_network_access_enabled = true
+ resource_group_name  = "practica2rg"
+ role_based_access_control_enabled = true
+ run_command_enabled  = true
+ sku_tier             = "Free"
+ tags                 = {
  + "Environment" = "Production"
}
+ workload_identity_enabled = false

+ default_node_pool {
  + kubelet_disk_type = (known after apply)
  + max_pods          = (known after apply)
  + name              = "default"
  + node_count        = 2
  + node_labels       = (known after apply)
  + orchestrator_version = (known after apply)
  + os_disk_size_gb   = (known after apply)

```

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```

+ os_disk_type      = "Managed"
+ os_sku            = (known after apply)
+ scale_down_mode   = "Delete"
+ type              = "VirtualMachineScaleSets"
+ ultra_ssd_enabled = false
+ vm_size           = "Standard_D2_v2"
+ workload_runtime  = (known after apply)
}

+ identity {
  + principal_id = (known after apply)
  + tenant_id    = (known after apply)
  + type         = "SystemAssigned"
}
}

# azurerm_linux_virtual_machine.vm will be created
+ resource "azurerm_linux_virtual_machine" "vm" {
  + admin_username      = "casopractico2"
  + allow_extension_operations = true
  + computer_name       = (known after apply)
  + custom_data          = (sensitive value)
  + disable_password_authentication = true
  + extensions_time_budget = "PT1H30M"
  + id                  = (known after apply)
  + location             = "uksouth"
  + max_bid_price        = -1
  + name                 = "vm"
  + network_interface_ids = (known after apply)
  + patch_assessment_mode = "ImageDefault"

```


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```

+ patch_mode          = "ImageDefault"
+ platform_fault_domain = -1
+ priority             = "Regular"
+ private_ip_address   = (known after apply)
+ private_ip_addresses = (known after apply)
+ provision_vm_agent    = true
+ public_ip_address     = (known after apply)
+ public_ip_addresses   = (known after apply)
+ resource_group_name   = "practica2rg"
+ size                 = "Standard_DS1_v2"
+ virtual_machine_id     = (known after apply)

```

```

+ admin_ssh_key {

```

```

    + public_key = <<-EOT

```

ssh-rsa

```

AAAAB3NzaC1yc2EAAAADAQABAAQGBgQDRWmwncgWDtwSn1wGM/4sxRWkJ8cw1xxf2INnt3ysMh
yW+8l9MyxN7m24M4cN6cv3ldO3kT/RXCLYWLdldWz+dfF+Y4Mo8oYvB0ZI793zACD34zvJ6eKZV8Kjl
VJjmt9j5s2NEY1KVYE6Wsh+FbuV/wKew1N2enHmJG1bklWwXwdAOiJNaztpN3Sf2YWT03QqfEyMC
avKmpSttwMrcPj4ZWozG9zndv7SJSEs5vBSshLeFMNQWIIAFJXEX6tL/ELvDzlcCam/+1JzGcpxGzVY
KeBJouXcNC1SqfUHbKPWi5Dqam6GYph8vgIR/RF+950YEBXjH+IHtsD1COwmO0ZdHO0lcvDXRZ2uU
w17E/SofQhEzER6HBdMyCDqRfYmkdrLjVWxVO7/dmrCA04pEfBMElocw2pl/jfMJNf9yn1jYAB7uJHn
SLj9WgaNvb+685kP3r765lZk1TBbjXf/w3trMbneeYofqVIA9OkndOwhAC0sIdqSvNf3xsS/vSoVOc=
miguel@willy

```

```

    EOT

```

```

    + username = "casopractico2"

```

```

  }

```

```

+ os_disk {

```

```

    + caching = "ReadWrite"

```

```

    + disk_size_gb = (known after apply)

```

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```

+ name          = (known after apply)
+ storage_account_type = "Standard_LRS"
+ write_accelerator_enabled = false
}

+ plan {
  + name     = "centos-8-stream-free"
  + product  = "centos-8-stream-free"
  + publisher = "cognosys"
}

+ source_image_reference {
  + offer     = "centos-8-stream-free"
  + publisher = "cognosys"
  + sku       = "centos-8-stream-free"
  + version   = "22.03.28"
}
}

# azurerm_network_interface.nic_vm will be created
+ resource "azurerm_network_interface" "nic_vm" {
  + applied_dns_servers      = (known after apply)
  + dns_servers              = (known after apply)
  + enable_accelerated_networking = false
  + enable_ip_forwarding     = false
  + id                       = (known after apply)
  + internal_dns_name_label   = (known after apply)
  + internal_domain_name_suffix = (known after apply)
  + location                  = "uksouth"
  + mac_address               = (known after apply)

```

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```

+ name = "vnic-vm"
+ private_ip_address = (known after apply)
+ private_ip_addresses = (known after apply)
+ resource_group_name = "practica2rg"
+ virtual_machine_id = (known after apply)

+ ip_configuration {
  + gateway_load_balancer_frontend_ip_configuration_id = (known after apply)
  + name = "internal"
  + primary = (known after apply)
  + private_ip_address = (known after apply)
  + private_ip_address_allocation = "Dynamic"
  + private_ip_address_version = "IPv4"
  + public_ip_address_id = (known after apply)
  + subnet_id = (known after apply)
}
}

```

azurerm_network_security_group.nsg1 will be created

```

+ resource "azurerm_network_security_group" "nsg1" {
  + id = (known after apply)
  + location = "uksouth"
  + name = "securitygroup"
  + resource_group_name = "practica2rg"
  + security_rule = [
    + {
      + access = "Allow"
      + description = ""
      + destination_address_prefix = "*"
      + destination_address_prefixes = []
    }
  ]
}

```

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```

+ destination_application_security_group_ids = []
+ destination_port_range                    = "22"
+ destination_port_ranges                  = []
+ direction                               = "Inbound"
+ name                                     = "sshrule"
+ priority                                = 101
+ protocol                                 = "Tcp"
+ source_address_prefix                    = "*"
+ source_address_prefixes                  = []
+ source_application_security_group_ids    = []
+ source_port_range                        = "*"
+ source_port_ranges                       = []
},
+ {
+   + access                               = "Allow"
+   + description                           = ""
+   + destination_address_prefix            = "*"
+   + destination_address_prefixes          = []
+   + destination_application_security_group_ids = []
+   + destination_port_range                = "8080-8090"
+   + destination_port_ranges                = []
+   + direction                             = "Inbound"
+   + name                                   = "httprule"
+   + priority                              = 102
+   + protocol                              = "Tcp"
+   + source_address_prefix                  = "*"
+   + source_address_prefixes                = []
+   + source_application_security_group_ids  = []
+   + source_port_range                      = "*"
+   + source_port_ranges                     = []

```

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```

    },
  ]
}

# azure_rm_public_ip.pip_vm will be created
+ resource "azure_rm_public_ip" "pip_vm" {
  + allocation_method    = "Dynamic"
  + ddos_protection_mode = "VirtualNetworkInherited"
  + fqdn                 = (known after apply)
  + id                   = (known after apply)
  + idle_timeout_in_minutes = 4
  + ip_address           = (known after apply)
  + ip_version           = "IPv4"
  + location             = "uksouth"
  + name                 = "public-ip-vm"
  + resource_group_name  = "practica2rg"
  + sku                  = "Basic"
  + sku_tier             = "Regional"
}

# azure_rm_resource_group.rg will be created
+ resource "azure_rm_resource_group" "rg" {
  + id      = (known after apply)
  + location = "uksouth"
  + name    = "practica2rg"
}

# azure_rm_role_assignment.aksrole will be created
+ resource "azure_rm_role_assignment" "aksrole" {
  + id      = (known after apply)

```

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```

+ name = (known after apply)
+ principal_id = (known after apply)
+ principal_type = (known after apply)
+ role_definition_id = (known after apply)
+ role_definition_name = "AcrPull"
+ scope = (known after apply)
+ skip_service_principal_aad_check = true
}

# azurerm_subnet.subnet will be created
+ resource "azurerm_subnet" "subnet" {
  + address_prefixes = [
    + "10.0.2.0/24",
  ]
  + enforce_private_link_endpoint_network_policies = (known after apply)
  + enforce_private_link_service_network_policies = (known after apply)
  + id = (known after apply)
  + name = "subnet1"
  + private_endpoint_network_policies_enabled = (known after apply)
  + private_link_service_network_policies_enabled = (known after apply)
  + resource_group_name = "practica2rg"
  + virtual_network_name = "vnet1"
}

```

```

# azurerm_subnet_network_security_group_association.nsg-link will be created
+ resource "azurerm_subnet_network_security_group_association" "nsg-link" {
  + id = (known after apply)
  + network_security_group_id = (known after apply)
  + subnet_id = (known after apply)
}

```

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```
# azurerm_virtual_network.vnet will be created
+ resource "azurerm_virtual_network" "vnet" {
  + address_space    = [
    + "10.0.0.0/16",
  ]
  + dns_servers      = (known after apply)
  + guid             = (known after apply)
  + id               = (known after apply)
  + location         = "uksouth"
  + name             = "vnet1"
  + resource_group_name = "practica2rg"
  + subnet           = (known after apply)
}
```

Plan: 11 to add, 0 to change, 0 to destroy.

Changes to Outputs:

```
+ acr_admin_pass    = (sensitive value)
+ acr_admin_user    = (sensitive value)
+ acr_login_server  = (known after apply)
+ client_certificate = (sensitive value)
+ kube_config       = (sensitive value)
+ ssh_user          = "casopractico2"
+ vm_public_ip      = (known after apply)
```

azurerm_resource_group.rg: Creating...

azurerm_resource_group.rg: Creation complete after 1s [id=/subscriptions/4cec99f2-dcb1-40e5-b292-66072a2186b8/resourceGroups/practica2rg]

azurerm_virtual_network.vnet: Creating...

azurerm_public_ip.pip_vm: Creating...

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```

azurerm_network_security_group.nsg1: Creating...
azurerm_container_registry.acr: Creating...
azurerm_kubernetes_cluster.aks: Creating...
azurerm_public_ip.pip_vm: Creation complete after 3s [id=/subscriptions/4cec99f2-dcb1-40e5-b292-66072a2186b8/resourceGroups/practica2rg/providers/Microsoft.Network/publicIPAddresses/public-ip-vm]
azurerm_network_security_group.nsg1: Creation complete after 3s [id=/subscriptions/4cec99f2-dcb1-40e5-b292-66072a2186b8/resourceGroups/practica2rg/providers/Microsoft.Network/networkSecurityGroups/securitygroup]
azurerm_virtual_network.vnet: Creation complete after 6s [id=/subscriptions/4cec99f2-dcb1-40e5-b292-66072a2186b8/resourceGroups/practica2rg/providers/Microsoft.Network/virtualNetworks/vnet1]
azurerm_subnet.subnet: Creating...
azurerm_container_registry.acr: Still creating... [10s elapsed]
azurerm_kubernetes_cluster.aks: Still creating... [10s elapsed]
azurerm_subnet.subnet: Creation complete after 5s [id=/subscriptions/4cec99f2-dcb1-40e5-b292-66072a2186b8/resourceGroups/practica2rg/providers/Microsoft.Network/virtualNetworks/vnet1/subnets/subnet1]
azurerm_subnet_network_security_group_association.nsg-link: Creating...
azurerm_network_interface.nic_vm: Creating...
azurerm_subnet_network_security_group_association.nsg-link: Creation complete after 4s [id=/subscriptions/4cec99f2-dcb1-40e5-b292-66072a2186b8/resourceGroups/practica2rg/providers/Microsoft.Network/virtualNetworks/vnet1/subnets/subnet1]
azurerm_network_interface.nic_vm: Creation complete after 5s [id=/subscriptions/4cec99f2-dcb1-40e5-b292-66072a2186b8/resourceGroups/practica2rg/providers/Microsoft.Network/networkInterfaces/vnic

```


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```
-vm]
azurerm_linux_virtual_machine.vm: Creating...
azurerm_container_registry.acr: Still creating... [20s elapsed]
azurerm_kubernetes_cluster.aks: Still creating... [20s elapsed]
azurerm_container_registry.acr: Creation complete after 23s [id=/subscriptions/4cec99f2-dcb1-40e5-b292-66072a2186b8/resourceGroups/practica2rg/providers/Microsoft.ContainerRegistry/registries/practica2acr]
azurerm_linux_virtual_machine.vm: Still creating... [10s elapsed]
azurerm_kubernetes_cluster.aks: Still creating... [30s elapsed]
azurerm_linux_virtual_machine.vm: Still creating... [20s elapsed]
azurerm_kubernetes_cluster.aks: Still creating... [40s elapsed]
azurerm_linux_virtual_machine.vm: Creation complete after 27s [id=/subscriptions/4cec99f2-dcb1-40e5-b292-66072a2186b8/resourceGroups/practica2rg/providers/Microsoft.Compute/virtualMachines/vm]
azurerm_kubernetes_cluster.aks: Still creating... [50s elapsed]
azurerm_kubernetes_cluster.aks: Still creating... [1m0s elapsed]
azurerm_kubernetes_cluster.aks: Still creating... [1m10s elapsed]
azurerm_kubernetes_cluster.aks: Still creating... [1m20s elapsed]
azurerm_kubernetes_cluster.aks: Still creating... [1m30s elapsed]
azurerm_kubernetes_cluster.aks: Still creating... [1m40s elapsed]
azurerm_kubernetes_cluster.aks: Still creating... [1m50s elapsed]
azurerm_kubernetes_cluster.aks: Still creating... [2m0s elapsed]
azurerm_kubernetes_cluster.aks: Still creating... [2m10s elapsed]
azurerm_kubernetes_cluster.aks: Still creating... [2m20s elapsed]
azurerm_kubernetes_cluster.aks: Still creating... [2m30s elapsed]
azurerm_kubernetes_cluster.aks: Still creating... [2m40s elapsed]
azurerm_kubernetes_cluster.aks: Still creating... [2m50s elapsed]
azurerm_kubernetes_cluster.aks: Still creating... [3m0s elapsed]
azurerm_kubernetes_cluster.aks: Still creating... [3m10s elapsed]
```

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```

azurerm_kubernetes_cluster.aks: Still creating... [3m20s elapsed]
azurerm_kubernetes_cluster.aks: Still creating... [3m30s elapsed]
azurerm_kubernetes_cluster.aks: Creation complete after 3m39s [id=/subscriptions/4cec99f2-dcb1-40e5-b292-66072a2186b8/resourceGroups/practica2rg/providers/Microsoft.ContainerService/managedClusters/aks01]
azurerm_role_assignment.aksrole: Creating...
azurerm_role_assignment.aksrole: Still creating... [10s elapsed]
azurerm_role_assignment.aksrole: Still creating... [20s elapsed]
azurerm_role_assignment.aksrole: Creation complete after 26s [id=/subscriptions/4cec99f2-dcb1-40e5-b292-66072a2186b8/resourceGroups/practica2rg/providers/Microsoft.ContainerRegistry/registries/practica2acr/providers/Microsoft.Authorization/roleAssignments/f8f79836-64f0-782b-a8e0-d9c838d8ab70]

Apply complete! Resources: 11 added, 0 changed, 0 destroyed.

Outputs:

acr_admin_pass = <sensitive>
acr_admin_user = <sensitive>
acr_login_server = "practica2acr.azurecr.io"
client_certificate = <sensitive>
kube_config = <sensitive>
ssh_user = "casopractico2"
vm_public_ip = ""
azurerm_resource_group.rg: Refreshing state... [id=/subscriptions/4cec99f2-dcb1-40e5-b292-66072a2186b8/resourceGroups/practica2rg]
azurerm_virtual_network.vnet: Refreshing state... [id=/subscriptions/4cec99f2-dcb1-40e5-b292-66072a2186b8/resourceGroups/practica2rg/providers/Microsoft.Network/virtualNetworks/vnet1

```

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```

]
azurerm_public_ip.pip_vm: Refreshing state... [id=/subscriptions/4cec99f2-dcb1-40e5-b292-66072a2186b8/resourceGroups/practica2rg/providers/Microsoft.Network/publicIPAddresses/public-ip-vm]
azurerm_container_registry.acr: Refreshing state... [id=/subscriptions/4cec99f2-dcb1-40e5-b292-66072a2186b8/resourceGroups/practica2rg/providers/Microsoft.ContainerRegistry/registries/practica2acr]
azurerm_network_security_group.nsg1: Refreshing state... [id=/subscriptions/4cec99f2-dcb1-40e5-b292-66072a2186b8/resourceGroups/practica2rg/providers/Microsoft.Network/networkSecurityGroups/securitygroup]
azurerm_kubernetes_cluster.aks: Refreshing state... [id=/subscriptions/4cec99f2-dcb1-40e5-b292-66072a2186b8/resourceGroups/practica2rg/providers/Microsoft.ContainerService/managedClusters/aks01]
azurerm_subnet.subnet: Refreshing state... [id=/subscriptions/4cec99f2-dcb1-40e5-b292-66072a2186b8/resourceGroups/practica2rg/providers/Microsoft.Network/virtualNetworks/vnet1/subnets/subnet1]
azurerm_subnet_network_security_group_association.nsg-link: Refreshing state... [id=/subscriptions/4cec99f2-dcb1-40e5-b292-66072a2186b8/resourceGroups/practica2rg/providers/Microsoft.Network/virtualNetworks/vnet1/subnets/subnet1]
azurerm_network_interface.nic_vm: Refreshing state... [id=/subscriptions/4cec99f2-dcb1-40e5-b292-66072a2186b8/resourceGroups/practica2rg/providers/Microsoft.Network/networkInterfaces/vnic-vm]
azurerm_role_assignment.aksrole: Refreshing state... [id=/subscriptions/4cec99f2-dcb1-40e5-b292-66072a2186b8/resourceGroups/practica2rg/providers/Microsoft.ContainerRegistry/registries/practica2acr/providers/Microsoft.Authorization/roleAssignments/f8f79836-64f0-782b-a8e0-d9c838d8ab70]

```

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azurerm_linux_virtual_machine.vm: Refreshing state... [id=/subscriptions/4cec99f2-dcb1-40e5-b292-

66072a2186b8/resourceGroups/practica2rg/providers/Microsoft.Compute/virtualMachines/vm]

Outputs:

acr_admin_pass = <sensitive>

acr_admin_user = <sensitive>

acr_login_server = "practica2acr.azurecr.io"

client_certificate = <sensitive>

kube_config = <sensitive>

ssh_user = "casopractico2"

vm_public_ip = "20.90.107.110"

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Despliegue de playbooks de ansible:

```
PLAY [inicio]
*****

TASK [Ejecutar Terraform]
*****

changed: [localhost]

TASK [Crear archivo de outputs json]
*****

changed: [localhost]

TASK [Crear archivo de outputs yaml]
*****

changed: [localhost]

TASK [leer una variable de output]
*****

changed: [localhost]

PLAY RECAP
*****

localhost      : ok=4  changed=4  unreachable=0  failed=0  skipped=0  rescued=0
ignored=0

20.90.107.110

PLAY [playbook instala podman en vm]
*****
```

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TASK [Gathering Facts]

The authenticity of host '20.90.107.110 (20.90.107.110)' can't be established.

ECDSA key fingerprint is SHA256:oEfRFVXdlaAENmaEUsdXiR6tGoBkwRcL3l1+wrqvGpw.

Are you sure you want to continue connecting (yes/no/[fingerprint])? yes

ok: [20.90.107.110]

TASK [instalo podman]

changed: [20.90.107.110]

PLAY RECAP

20.90.107.110 : ok=2 changed=1 unreachable=0 failed=0 skipped=0 rescued=0
ignored=0

PLAY [playbook instala aplicaciones en vm]

TASK [Gathering Facts]

ok: [20.90.107.110]

TASK [cambio zonahoraria]

changed: [20.90.107.110]

TASK [instalo httpd]

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```

*****
changed: [20.90.107.110]

TASK [instalo openssl]
*****

ok: [20.90.107.110]

TASK [Instalar passlib en el host remoto]
*****

changed: [20.90.107.110]

PLAY RECAP
*****

20.90.107.110      : ok=5  changed=3  unreachable=0  failed=0  skipped=0  rescued=0
ignored=0

PLAY [playbook copia los archivos del directorio /file]
*****

TASK [Gathering Facts]
*****

ok: [20.90.107.110]

TASK [Create a directory if it does not exist]
*****

changed: [20.90.107.110]

TASK [Copy file index.html]
*****

```

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changed: [20.90.107.110]

TASK [Copy file ansible/files/.htaccess]

changed: [20.90.107.110]

TASK [Copy file ansible/files/httpd.conf]

changed: [20.90.107.110]

TASK [Copy file ansible/files/Containerfile]

changed: [20.90.107.110]

PLAY RECAP

20.90.107.110 : ok=6 changed=5 unreachable=0 failed=0 skipped=0 rescued=0
ignored=0

PLAY [Generar certificados]

TASK [Gathering Facts]

ok: [20.90.107.110]

TASK [Generate file htpasswd]

changed: [20.90.107.110]

TASK [Generate an OpenSSL private key with a different size (2048 bits)]

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```

*****
changed: [20.90.107.110]

TASK [Generate an OpenSSL Certificate Signing Request]
*****
changed: [20.90.107.110]

TASK [Generate a Self Signed OpenSSL certificate]
*****
changed: [20.90.107.110]

PLAY RECAP
*****
20.90.107.110      : ok=5  changed=4  unreachable=0  failed=0  skipped=0  rescued=0
ignored=0

PLAY [playbook login podman with acr]
*****

TASK [Gathering Facts]
*****
ok: [20.90.107.110]

TASK [Login to default registry with outputs.json]
*****
changed: [20.90.107.110]

PLAY RECAP
*****

```

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```

*****

20.90.107.110      : ok=2  changed=1  unreachable=0  failed=0  skipped=0  rescued=0
ignored=0

PLAY [playbook despliegue']

*****

TASK [Gathering Facts]

*****

ok: [20.90.107.110]

TASK [Build a basic image]

*****

changed: [20.90.107.110]

TASK [containers.podman.podman_tag]

*****

changed: [20.90.107.110]

TASK [Build and push an image using existing credentials]

*****

changed: [20.90.107.110]

TASK [Create a webserver container]

*****

changed: [20.90.107.110]

TASK [Iniciar servicio de web]

*****

```

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changed: [20.90.107.110]

PLAY RECAP

20.90.107.110 : ok=6 changed=5 unreachable=0 failed=0 skipped=0 rescued=0
ignored=0

PLAY [playbook despliegue para k8s]

TASK [Gathering Facts]

ok: [20.90.107.110]

TASK [Create a directory if it does not exist]

changed: [20.90.107.110]

TASK [Copy file ansible/files_k8s/Containerfile]

changed: [20.90.107.110]

TASK [Pull an image]

changed: [20.90.107.110]

TASK [containers.podman.podman_tag]

changed: [20.90.107.110]

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TASK [Build and push an image using existing credentials]

changed: [20.90.107.110]

TASK [Run container]

changed: [20.90.107.110]

PLAY RECAP

20.90.107.110 : ok=7 changed=6 unreachable=0 failed=0 skipped=0 rescued=0
ignored=0

PLAY [Autenticacion kubernetes]

TASK [Gathering Facts]

ok: [localhost]

TASK [Instalar kubernetes]

ok: [localhost]

TASK [credenciales aks]

changed: [localhost]

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TASK [Create a k8s namespace]

changed: [localhost]

TASK [Create a persistant service from a local file]

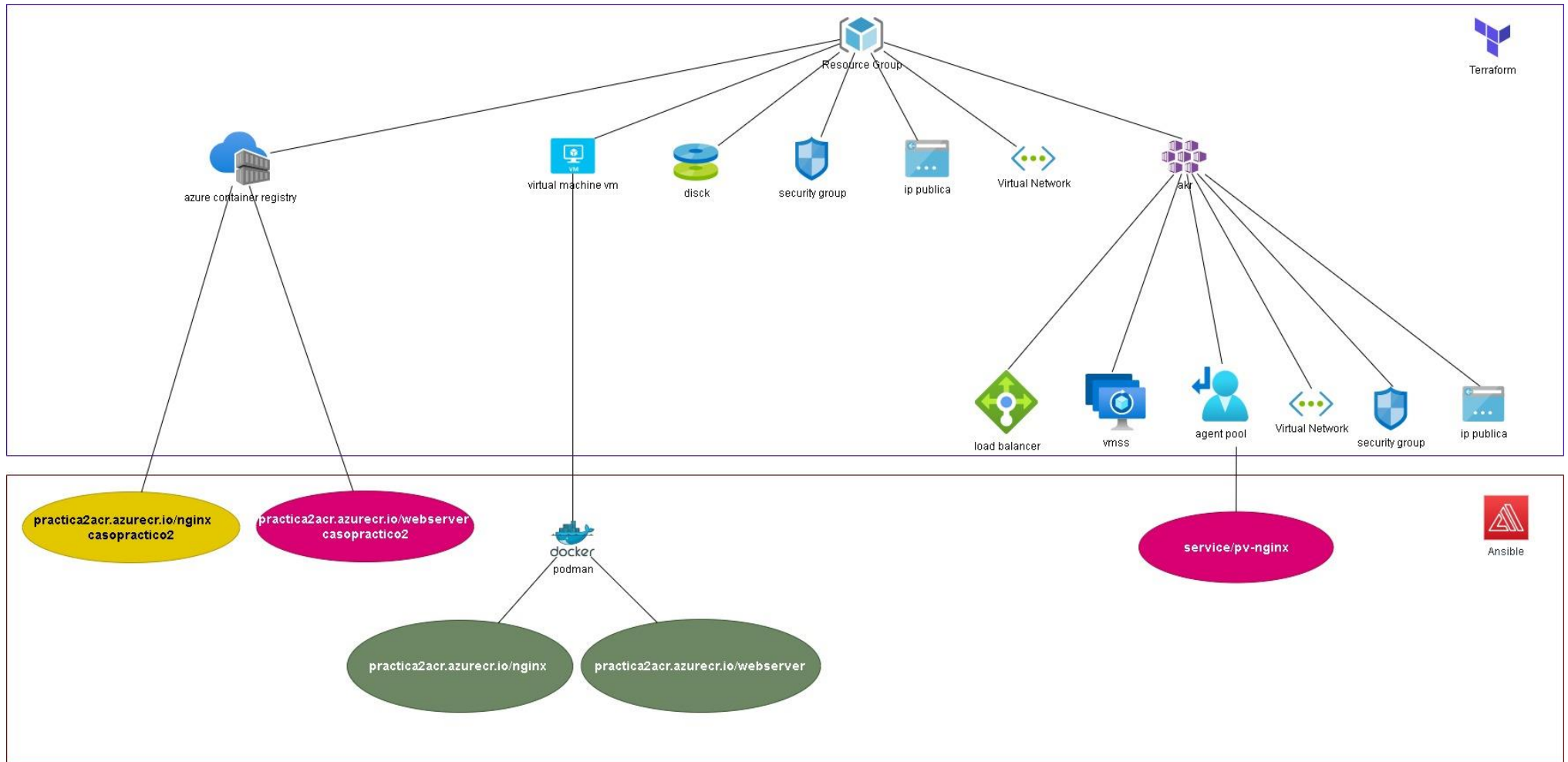
changed: [localhost]

PLAY RECAP

localhost : ok=5 changed=3 unreachable=0 failed=0 skipped=0 rescued=0
ignored=0

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Diagrama



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Pantallas

```

File Edit Shell Extensions View Window Settings Help
miguel@willy: ~
miguel@willy:~$ ssh casopractico2@20.90.107.110
Activate the web console with: systemctl enable --now cockpit.socket

Last login: Sat Jul 22 18:48:19 2023 from 83.53.24.126
[casopractico2@vm ~]$ sudo podman images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
localhost/webserver latest             24568b2b8675       3 minutes ago      173 MB
practica2acr.azurecr.io/webserver casopractico2     24568b2b8675       3 minutes ago      173 MB
docker.io/library/nginx latest             021283c8eb95       2 weeks ago        191 MB
practica2acr.azurecr.io/nginx casopractico2     021283c8eb95       2 weeks ago        191 MB
docker.io/library/httpd latest             d140b777a247       2 weeks ago        173 MB
[casopractico2@vm ~]$ sudo podman ps
CONTAINER ID   IMAGE                                     COMMAND              CREATED             STATUS              PORTS              NAMES
a243d67aea5d   practica2acr.azurecr.io/webserver:casopractico2 httpd -foreground    3 minutes ago       Up 3 minutes ago   0.0.0.0:8090->443/tcp web
d9b58b70c09f   practica2acr.azurecr.io/nginx:casopractico2   nginx -g daemon o... 2 minutes ago       Up 2 minutes ago   web
[casopractico2@vm ~]$ exit
logout
Connection to 20.90.107.110 closed.
miguel@willy:~$ kubectl get nodes,deployment,pods,services,pv,pvc -n practica-k8s
NAME                                     STATUS    ROLES    AGE   VERSION
node/aks-default-61792623-vmss000000   Ready    agent    9m38s v1.25.6
node/aks-default-61792623-vmss000001   Ready    agent    9m36s v1.25.6

NAME                READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/mypod 1/1       1             1           3m25s

NAME                READY   STATUS    RESTARTS   AGE
pod/mypod-5854ddd96c-4r9mx 1/1       Running    0           3m25s

NAME                TYPE          CLUSTER-IP   EXTERNAL-IP   PORT(S)          AGE
service/pv-nginx    LoadBalancer 10.0.194.92   20.108.110.179 80:31660/TCP     3m25s

NAME                                     CAPACITY   ACCESS MODES   RECLAIM POLICY   STATUS   CLAIM                STORAGECLASS   REASON   AGE
persistentvolume/pvc-5ec31a9e-a60c-4a7f-91f9-a4b73cd45c85 1Gi         RWO            Delete           Bound   practica-k8s/pvc-nginx managed-csi    3m20s

NAME                                     STATUS   VOLUME                                     CAPACITY   ACCESS MODES   STORAGECLASS   AGE
persistentvolumeclaim/pvc-nginx          Bound   pvc-5ec31a9e-a60c-4a7f-91f9-a4b73cd45c85 1Gi         RWO            managed-csi    3m25s
miguel@willy:~$ _

```

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