



CONSULTING | SAP BUSINESS SOLUTIONS | DATA ANALYTICS | TECHNOLOGY PLATFORMS

## Dossier Project

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Azure



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GORANI Driton  
ECOLE CLOUD BY SIMPLON – PARCOURS  
ADMINISTRATEUR CLOUD  
Année : 2022/2023

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AZ104

AZ900

## Remerciements

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Merci à Mme Stéphanie Oltra et Julien Morreti qui m'ont permis d'intégrer cette formation tout en m'acceptant dans l'entreprise.

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Et un remerciement général à l'ensemble des collaborateurs. Tous furent d'excellents collègues et ont grandement facilité mon intégration au sein de Teamwork en m'offrant un accueil de qualité et un cadre de travail très agréable.

Un grand merci aussi à toute l'équipe pédagogique de SIMPLON, pour leur accompagnement avant et pendant l'alternance, ainsi qu'aux différents formateurs et intervenants pour leur professionnalisme et la qualité des cours dispensés.

Cette période au sein de Teamwork a été très enrichissantes et formatrices et m'a permis d'accroître mes compétences. Tout ceci aurait été impossible sans la confiance de toutes ces personnes.

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## Introduction

Je suis ravi de présenter devant vous mon projet qui finalise ma formation d'Administrateur Cloud DEV OPS, une discipline qui incarne la convergence de plusieurs discipline (Développement et Opérationnel).

Mon parcours dans le monde professionnel m'a conduit à explorer de nombreux domaines, de géomètre à logisticien, et à acquérir une variété de compétences. Pourtant, au fond de moi, une passion a toujours brûlé : celle de l'informatique. C'était un rêve que je n'ai jamais cessé d'aspirer à réaliser.

C'est ainsi qu'après un parcours riche et varié, j'ai décidé de me lancer dans l'univers de l'informatique. J'ai saisi l'opportunité exceptionnelle d'être accepté en alternance chez TeamWork, une entreprise qui valorise l'apprentissage continu et la collaboration.

Au cours de cette formation, j'ai exploré les principes fondamentaux de DevOps, les outils essentiels, et j'ai compris comment cela peut améliorer notre approche dans le domaine de l'informatique moderne.

## Présentation de l'entreprise

TeamWork est un groupe international indépendant, fondé en 1999 à Genève par son PDG actuel, M. Philippe Rey-Gorrez. Véritable partenaire de la transformation numérique des entreprises, TeamWork intervient sur quatre grands métiers : Management Consulting, SAP Business Solutions, Data Analytics et Technology Platforms. TeamWork est reconnu par ses clients pour accroître leur performance opérationnelle, les accompagner dans leur transformation et générer de nouveaux leviers de croissance et de compétitivité.

En 2021, Teamwork compte 20 implantations à travers le monde avec plus de 900 collaborateurs, et son chiffre d'affaires s'élève à 120 millions d'euros. Sa présence sur plusieurs continents lui permet d'adopter la stratégie dite "Follow the sun", qui consiste à couvrir la totalité des fuseaux horaires afin de fournir un service continu 24 heures sur 24, 7 jours sur 7.



Créé en 1999



900 Collaborateurs



130 M CHF / 120 M €

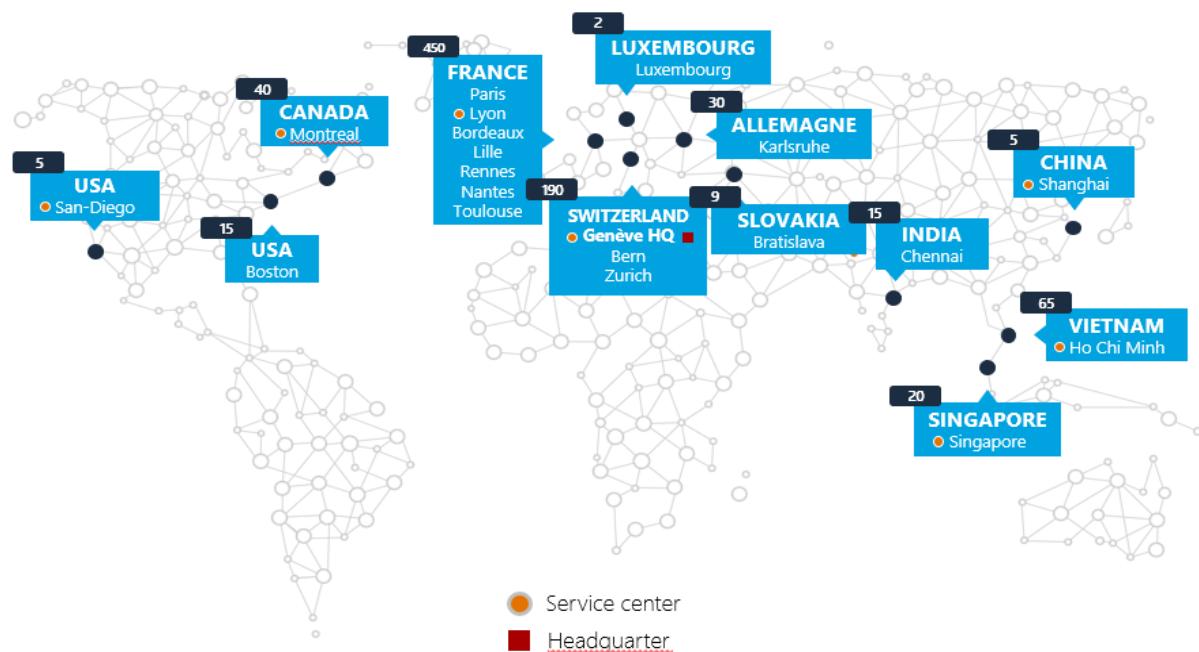


20 Bureaux



Service continu

Les différentes implantations lui permettent également d'avoir une proximité avec ses clients dans leur propre implémentation à l'internationale, mais aussi de s'ouvrir sur les marchés locaux afin de développer l'activité dans des endroits stratégiques de la planète.



## Contexte

J'ai réalisé un projet personnel dans le cadre de mon alternance.

Mon objectif est de déployer une infrastructure solide, sécurisé et évolutive et d'en automatiser les processus.

Le but de cette infrastructure est de déployer une application conteneurisée de manière sécurisée.

Afin d'optimisé et de surveiller le cycle de vie applicatif je mets en place des outils de supervision basé sur la collecte de logs.

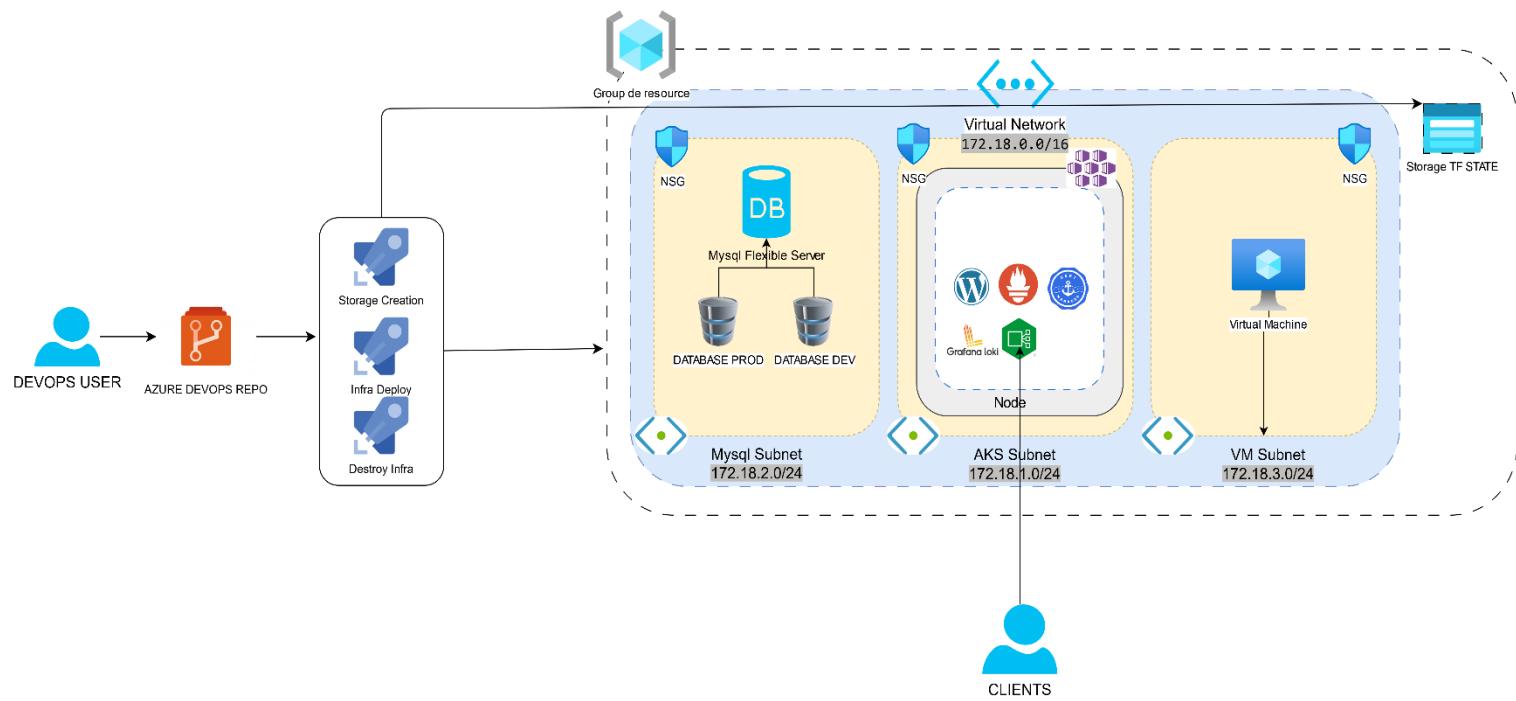
Mon choix s'est orienté vers l'orchestrateur de conteneur Kubernetes via Azure Kubernetes Service (AKS), le Kubernetes managé par Azure : car avec les fonctionnalités avancées qu'il offre il est devenu le standard de l'orchestration de conteneur d'application modernes.

Une fois le service AKS déployé, une phase d'intégration applicative d'un site WordPress sera effectué.

Typologie :

- Réseau virtuel
- Trois sous-réseaux
- Serveur MySQL flexible
- Trois groupes de sécurité réseau (NSG pour Network Security Group)
- Machine virtuelle
- AKS (Kubernetes)

## 1.1 Schéma

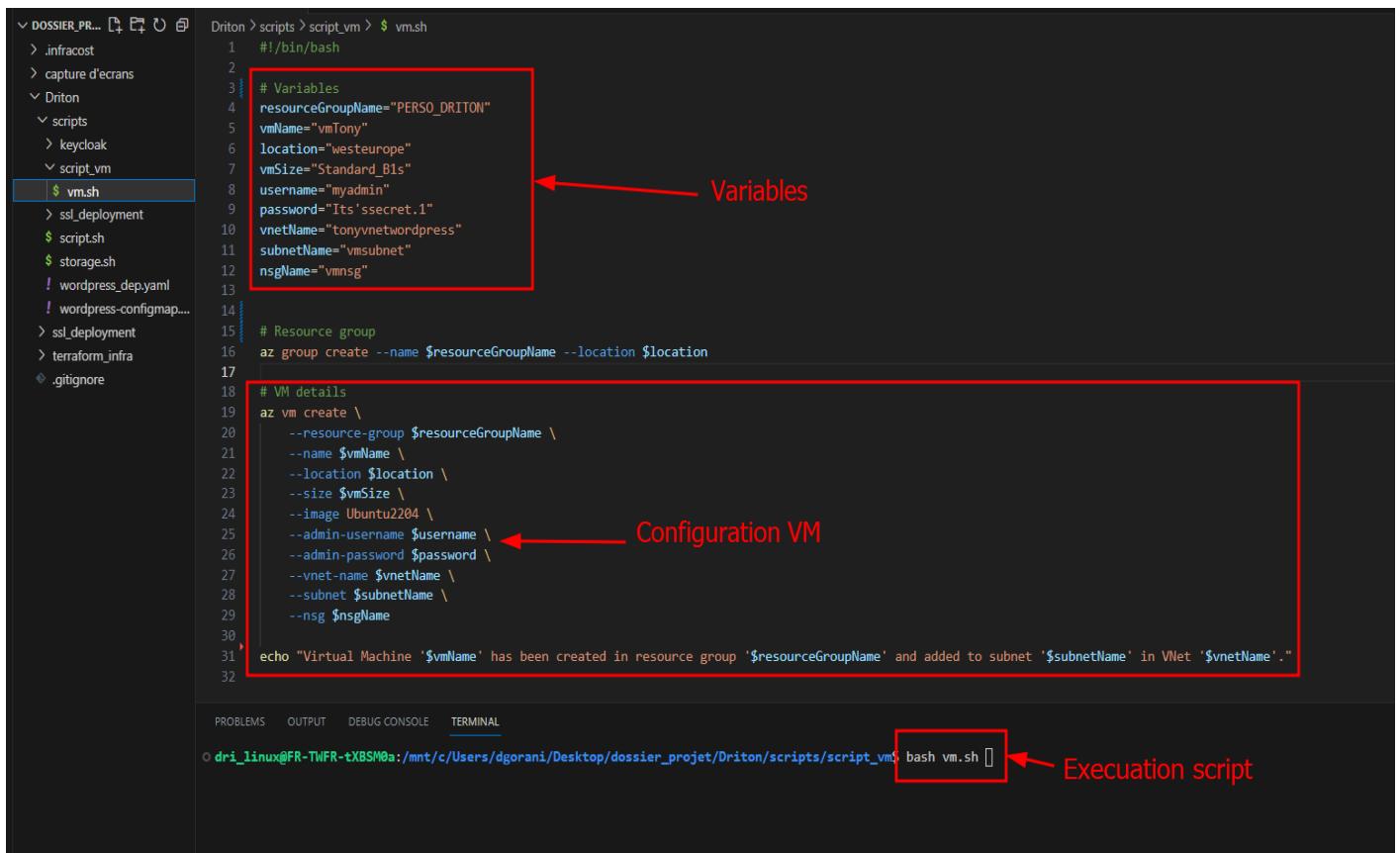


## 1. Automatiser le déploiement d'une infrastructure dans le cloud

### 1. Automatiser la création de serveurs à l'aide de scripts

- Pour automatiser la création de serveurs en utilisant un script, je vais rédiger un script Bash contenant des commandes Azure CLI. Au fur et à mesure, j'envisage d'intégrer des variables pour simplifier les modifications futures. Cela rendra le script plus flexible et adaptable en cas de changements de configuration ou de besoins.
- **L'objectif** est de créer un outil automatisé qui facilite la création de serveurs tout en restant facile à personnaliser au fil du temps.

#### Captures d'écrans :



```

DOSSIER_PR... D+ 🗑️ U 🗃
> .infracost
> capture d'écrans
└── Driton
    ├── scripts
    ├── keycloak
    └── script_vm
        └── $ vm.sh
            > ssl_deployment
            $ script.sh
            $ storage.sh
            ! wordpress_dep.yaml
            ! wordpress-configmap...
            > ssl_deployment
            > terraform_infra
            └── .gitignore

Driton > scripts > script_vm > $ vm.sh
1  #!/bin/bash
2
3  # Variables
4  resourceGroupName="PERSO_DRITON"
5  vmName="vmTony"
6  location="westeurope"
7  vmSize="Standard_B1s"
8  username="myadmin"
9  password="Its'ssecret.1"
10 vnetName="tonyvnetworkpress"
11 subnetName="vmsubnet"
12 nsgName="vmsng"
13
14
15 # Resource group
16 az group create --name $resourceGroupName --location $location
17
18 # VM details
19 az vm create \
20   --resource-group $resourceGroupName \
21   --name $vmName \
22   --location $location \
23   --size $vmSize \
24   --image Ubuntu2204 \
25   --admin-username $username \
26   --admin-password $password \
27   --vnet-name $vnetName \
28   --subnet $subnetName \
29   --nsg $nsgName
30
31 echo "Virtual Machine '$vmName' has been created in resource group '$resourceGroupName' and added to subnet '$subnetName' in VNet '$vnetName'."
32

```

Variables

Configuration VM

Execution script

```

16 az group create --name $resourceGroupName --location $location
17
18 # VM details
19 az vm create \
20   --resource-group $resourceGroupName \
21   --name $vmName \
22   --location $location \
23   --size $vmSize \
24   --image Ubuntu2204 \
25   --admin-username $username \
26   --admin-password $password \
27   --vnet-name $vnetName \
28   --subnet $subnetName \

```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL

```

dri_linux@FR-TWFR-tXBSM0:~/mnt/c/Users/dgorani/Desktop/dossier_projet/Driton/scripts/script_vm$ bash vm.sh
{
  "id": "/subscriptions/682603a3-d9f3-417f-98e8-a7b2398bc448/resourceGroups/PERSO_DRITON",
  "location": "westeurope",
  "managedBy": null,
  "name": "PERSO_DRITON",
  "properties": {
    "provisioningState": "Succeeded"
  },
  "tags": null,
  "type": "Microsoft.Resources/resourceGroups"
}
Selecting "uksouth" may reduce your costs. The region you've selected may cost more for the same services. You can disable this message in the future with the command "az config set core.denyIdentifiedEndpoints=false". Learn more at https://go.microsoft.com/fwlink/?linkid=222571
Ignite (November) 2023 onwards "az vm/vmss create" command will deploy Gen2-Trusted Launch VM by default. To know more about the default change and Trusted Launch, please visit https://aka.ms/ignitevm. It is recommended to use parameter "--public-ip-sku Standard" to create new VM with Standard public IP. Please note that the default public IP used for VM creation will be changed from Basic in the future.
{
  "fqdns": "",
  "id": "/subscriptions/682603a3-d9f3-417f-98e8-a7b2398bc448/resourceGroups/PERSO_DRITON/providers/Microsoft.Compute/virtualMachines/vmTony",
  "location": "westeurope",
  "macAddress": "00-0D-3A-21-DE-11",
  "powerState": "VM running",
  "privateIpAddress": "10.0.0.4",
  "publicIpAddress": "13.94.173.151",
  "resourceGroup": "PERSO_DRITON",
  "zones": ""
}
Virtual Machine 'vmTony' has been created in resource group 'PERSO_DRITON' and added to subnet 'vmsubnet' in VNet 'tonyvnetwork'.
dri_linux@FR-TWFR-tXBSM0:~/mnt/c/Users/dgorani/Desktop/dossier_projet/Driton/scripts/script_vm>

```

← after deployment

	Name	Type	Location	Actions
	tonyvnetwork	Virtual network	West Europe	...
	vmnsg	Network security group	West Europe	...
	vmTony	Virtual machine	West Europe	...
	vmTony\_OsDisk\_1\_25585300b6314a289e6a9a5ce2392fb6	Disk	West Europe	...
	vmTonyPublicIP	Public IP address	West Europe	...
	vmTonyVMNic	Network Interface	West Europe	...

**vmTony** Virtual machine

Search Connect Start Restart Stop Capture Delete Refresh Open in mobile Feedback CLI / PS

Overview Activity log Access control (IAM) Tags Diagnose and solve problems

**Essentials**

Resource group (move) : PERSO\_DRITON Status : Running ← **Vm on running state**  
Location : West Europe

Subscription (move) : Simplon ARA - LYON P#20 Admin Cloud Subscription ID : 682603a3-d9f3-417f-98e8-a7b2398bc448

Operating system : Linux (ubuntu 22.04)  
Size : Standard B1s (1 vcpu, 1 GiB memory)  
Public IP address : 13.94.173.151  
Virtual network/subnet : tonyvnetworkpress/vmsubnet  
DNS name : Not configured  
Health state : -

Tags (edit) : Add tags

Properties Monitoring Capabilities (7) Recommendations Tutorials

Virtual machine		Networking	
Computer name	vmTony	Public IP address	13.94.173.151 ( Network interface vmTonyVMNic )
Operating system	Linux (ubuntu 22.04)	Public IP address (IPv6)	-
Image publisher	Canonical	Private IP address	10.0.0.4
Image offer	0001-com-ubuntu-server-jammy	Private IP address (IPv6)	-
Image plan	22_04-lts-gen2	Virtual network/subnet	tonyvnetworkpress/vmsubnet
VM generation	V2	DNS name	Configure

```
dri_linux@FR-TWFR-tXB5M0a:~$ ssh myadmin@13.94.173.151
The authenticity of host '13.94.173.151 (13.94.173.151)' can't be established.
ECDSA key fingerprint is SHA256:LGcigAioFCUnnNPxA5RCgz0BqBJYg6b03YDhaet2Zww.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '13.94.173.151' (ECDSA) to the list of known hosts.
myadmin@13.94.173.151's password:
Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 6.2.0-1014-azure x86_64)

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

 System information as of Sat Oct  7 21:29:01 UTC 2023
 Logging details

 System load: 0.0          Processes:           100
 Usage of /:   5.1% of 28.89GB  Users logged in:      0
 Memory usage: 30%          IPv4 address for eth0: 10.0.0.4
 Swap usage:  0%

```

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.  
See <https://ubuntu.com/esm> or run: sudo pro status

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

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

To run a command as administrator (user "root"), use "sudo <command>".  
See "man sudo\_root" for details.

myadmin@vmTony:~\$ sudo apt update ← **Entry confirmation**

## 2. Automatiser le déploiement d'une infrastructure

Pour automatiser le déploiement d'une infrastructure, j'utiliserai Terraform, un outil de gestion d'infrastructure en tant que code IaC. Les ressources que je prévois de créer incluent :

- Un réseau virtuel (VNet)
- Trois sous-réseaux
- Une base de données MySQL flexible server
- Un cluster Azure Kubernetes Service (AKS)
- Des groupes de sécurité réseau (NSG)

En utilisant Terraform, je vais décrire l'ensemble de cette infrastructure dans des fichiers de configurations, ce qui me permettra de la créer de manière reproductible et de la gérer facilement au fil du temps.

### Captures d'écrans

```
DOSSIER_PROJET [WSL: UBUNTU...]
  > .infracost
  > capture d'écrans
  < Driton
    > scripts
    > ssl_deployment
  < terraform_infra
    > .terraform
    & .terraform.lock.hcl
    & aks.tf
    & backend.tf
    & data.tf
    & mysql_server.tf
    & nsg.tf
    & provider.tf
    README.md
    & sshkey.tf
    & variables.tf
    & vnet.tf
    .gitignore
    ~$ssier_project_teamwork...
    dossier_project_teamwork...
```

```
1  terraform {
2    required_version = ">=1.0"
3
4    required_providers {
5      azapi = {
6        source  = "azure/azapi"
7        version = "~>1.5"
8      }
9      azurerm = {
10        source  = "hashicorp/azurerm"
11        version = "~>3.0"
12      }
13    }
14  }
15
16  provider "azurerm" {
17    # Configuration options
18    features {
19    }
20  }
21
22
23
24
25
26
27
28
```

Declaring provider AZURERM

EXPLORER    ...    aks.tf    backend.tf X

Driton > terraform\_infra > backend.tf > terraform

```
1 terraform {  
2   backend "azurerm" {  
3     resource_group_name  = "PERSO_DRITON"  
4     storage_account_name = "tonystostocreate"  
5     container_name       = "mytfstatecontainer"  
6     key                  = "terraform.tfstate"  
7   }  
8 }
```

**backend for tfstate.**  
Storage must be created first before using cmd terraform init.  
I'm using Azurerm backend and not local one.

DOSSIER\_PROJET [WSL: UBUNTU]    Driton > terraform\_infra > data.tf > data "azurerm\_resource\_group" "RSG"

```
1 ##### Data #####  
2 data "azurerm_resource_group" "RSG" {  
3   name = "PERSO_DRITON"  
4 }
```

I'm using the "data" block to query existing resources in my cloud provider.  
Ressource already exist

Driton > terraform\_infra > vnet.tf > resource "azurerm\_virtual\_network" "wpvnet" > tags

```

1 ##### Vnet Azure #####
2
3 resource "azurerm_virtual_network" "wpvnet" {
4   name          = "tonyvnetworkpress"
5   location      = data.azure_rm_resource_group.RSG.location
6   resource_group_name = data.azure_rm_resource_group.RSG.name
7   address_space  = ["172.18.0.0/16"]
8   tags          = "Production" ← Env: Prod
9 }
10
11 # Subnet for AKS
12 resource "azurerm_subnet" "aks_subnet" {
13   name          = "aks-subnet"
14   resource_group_name = data.azure_rm_resource_group.RSG.name
15   virtual_network_name = azurerm_virtual_network.wpvnet.name
16   address_prefixes = ["172.18.1.0/24"]
17 }
18
19
20 ###Subnet for MySQL server
21 resource "azurerm_subnet" "mysql_subnet" {
22   name          = "mysql-subnet"
23   resource_group_name = data.azure_rm_resource_group.RSG.name
24   virtual_network_name = azurerm_virtual_network.wpvnet.name
25   address_prefixes = ["172.18.2.0/24"]
26   service_endpoints = ["Microsoft.Storage"]
27   delegation {
28     name = "fs"
29     service_delegation {
30       name = "Microsoft.DBforMySQL/flexibleServers"
31       actions = [
32         "Microsoft.Network/virtualNetworks/subnets/join/action",
33       ]
34     }
35   }
36 }
37
38 ##### Subnet for VM #####

```

Vnet  
Parameters

Subnet  
Parameters

on > terraform\_infra > vnet.tf > resource "azurerm\_subnet" "aks\_subnet"

```
##### Vnet Azure #####

```

```

resource "azurerm_virtual_network" "wpvnet" {
  name          = "tonyvnetworkpress"
  location      = data.azure_rm_resource_group.RSG.location
  resource_group_name = data.azure_rm_resource_group.RSG.name
  address_space  = ["172.18.0.0/16"]
  tags          = "Development" ← Env: Dev
}
# Subnet for AKS
resource "azurerm_subnet" "aks_subnet" {
  name          = "aks-subnet"
  resource_group_name = data.azure_rm_resource_group.RSG.name
  virtual_network_name = azurerm_virtual_network.wpvnet.name
  address_prefixes = ["172.18.1.0/24"]
}

```

```

###Subnet for MySQL server
resource "azurerm_subnet" "mysql_subnet" {
  name          = "mysql-subnet"
  resource_group_name = data.azure_rm_resource_group.RSG.name
  virtual_network_name = azurerm_virtual_network.wpvnet.name
  address_prefixes = ["172.18.2.0/24"]
  service_endpoints = ["Microsoft.Storage"]
  delegation {
    name = "fs"
    service_delegation {
      name = "Microsoft.DBforMySQL/flexibleServers"
      actions = [
        "Microsoft.Network/virtualNetworks/subnets/join/action",
      ]
    }
  }
}

```

```

2 ##### Azurerm kubernetes cluster #####
3
4 Total monthly cost: $126.29
5 resource "azurerm_kubernetes_cluster" "k8s" {
6   location      = data.azurerm_resource_group.RSG.location
7   name          = var.cluster_name
8   resource_group_name = data.azurerm_resource_group.RSG.name
9   dns_prefix    = var.dns_prefix
10  tags = {
11    Environment = "Production"
12  }
13  identity {
14    type = "SystemAssigned"
15  }
16  # Default node pool configuration.
17  default_node_pool [
18    name        = "defalut" # Typo? Should it be "default"?
19    node_count  = 1
20    vm_size     = "Standard_DS2_v2"
21    vnet_subnet_id = azurerm_subnet.aks_subnet.id # Associating AKS with a subnet.
22    enable_auto_scaling = true
23    max_count   = 3
24    min_count   = 1
25  ]
26
27  # Linux profile configuration for nodes.
28  linux_profile {
29    admin_username = "ubuntu"
30
31    # SSH key data for authentication.
32    ssh_key {
33      key_data = jsondecode(azapi_resource_action.ssh_public_key_gen.output).publicKey
34    }
35
36  # Network profile configuration.
37  network_profile {
38    network_plugin  = "kubenet"
39    load_balancer_sku = "standard"
40  }
41}

```

Env: Production

Kubernetes Configuration using terraform

> .infracost  
 > capture d'écrans  
 > Driton  
 > scripts  
 > ssl\_deployment  
 > terraform\_infra  
 > .terraform  
 E .terraform.lock.hcl  
 T aks.tf  
 T backend.tf  
 T data.tf  
 T mysql\_server.tf  
 T nsg.tf  
 T provider.tf  
 ⓘ README.md  
 T sshkey.tf  
 T variables.tf  
 T vnet.tf  
 .gitignore  
 ~\$sier\_project\_teamwork...  
 dossier\_project\_teamwork...

```

> .infracost
> capture d'écrans
> Driton
> scripts
> ssl_deployment
> terraform_infra
> .terraform
E .terraform.lock.hcl
T aks.tf
T backend.tf
T data.tf
T mysql_server.tf
T nsg.tf
T provider.tf
ⓘ README.md
T sshkey.tf
T variables.tf
T vnet.tf
.gitignore
~$sier_project_teamwork...
dossier_project_teamwork...

4 Total monthly cost: $2.30
5 resource "azurerm_mysql_flexible_server" "wpserver" [
6   name          = "tonywpserver"
7   resource_group_name = data.azurerm_resource_group.RSG.name
8   location      = data.azurerm_resource_group.RSG.location
9   administrator_login  = var.databaseuseradmin
10  administrator_password = var.databasepass
11  backup_retention_days = 7
12  delegated_subnet_id   = azurerm_subnet.mysql_subnet.id
13  private_dns_zone_id  = azurerm_private_dns_zone.privatedns.id
14  sku_name            = "P_General_Purpose"
15  geo_redundant_backup_enabled optional, bool
16  geo_redundant_backup_enabled = true
17  depends_on = [azurerm_private_dns_zone_virtual_network_link.tonywp]
18  tags = "Production"
19
20  ##### Database #####
21  resource "azurerm_mysql_flexible_database" "wpdatabase" {
22    name          = var.wordpressdb
23    resource_group_name = data.azurerm_resource_group.RSG.name
24    server_name   = azurerm_mysql_flexible_server.wpserver.name
25    charset       = "utf8"
26    collation     = "utf8_unicode_ci"
27
28  Total monthly cost: $0.50
29  resource "azurerm_private_dns_zone" "privatedns" {
30    name          = "tony.mysql.database.azure.com"
31    resource_group_name = data.azurerm_resource_group.RSG.name
32
33  resource "azurerm_private_dns_zone_virtual_network_link" "tonywp" {
34    name          = "tonywpVnetZone.com"
35    private_dns_zone_name = azurerm_private_dns_zone.privatedns.name
36    virtual_network_id   = azurerm_virtual_network.wpnets.id
37    resource_group_name  = data.azurerm_resource_group.RSG.name
38  }
39

```

```
> .infracost
> capture d'écrans
✓ Triton
> scripts
> ssl_deployment
✗ terraform_infra
|> .terraform
✗ .terraform.lock.hcl
⚡ aks.tf
⚡ backend.tf
⚡ data.tf
⚡ mysql_server.tf
⚡ nsg.tf
⚡ provider.tf
① README.md
⚡ sshkey.tf
⚡ variables.tf
⚡ vnet.tf
◆ .gitignore
$ ~$sier_project_teamwork...
$ dossier_project_teamwork...
```

1 ##### MySQL NSG #####
2
3 # Create a Network Security Group (NSG) for MySQL resources
4 resource "azurerm\_network\_security\_group" "mysqlnsg" {
5 name = var.mysqlnsg
6 location = data.azurerm\_resource\_group.RSG.location
7 resource\_group\_name = data.azurerm\_resource\_group.RSG.name
8
9
10 # Define a deny-all rule at the lowest priority
11 security\_rule {
12 name = "deny"
13 priority = 130
14 direction = "Inbound"
15 access = "Deny"
16 protocol = "\*"
17 source\_port\_range = "\*"
18 destination\_port\_range = "\*"
19 source\_address\_prefix = "\*"
20 destination\_address\_prefix = "\*"
21 }
22
23 tags = {
24 environment = "Dev"
25 }
26
27 }
28
29 # Associate the MySQL NSG with a subnet
30 resource "azurerm\_subnet\_network\_security\_group\_association" "mysqlsubnetasso" {
31 subnet\_id = azurerm\_subnet.mysql\_subnet.id
32 network\_security\_group\_id = azurerm\_network\_security\_group.mysqlnsg.id
33 }
34

NSG  
Network Security  
Group

Env: Dev

iton > terraform.infra > ⚡ sshkey.tf > ⚡ resource "azapi\_resource" "ssh\_public\_key"

```
1 ##### SSH Key Generator #####
2
3 # Generate a random SSH key name using the "random_pet" resource.
4 resource "random_pet" "ssh_key_name" {
5   prefix      = "ssh"      #
6   separator   = ""
7 }
8
9 # Define an Azure API resource action to generate SSH key pairs.
10 resource "azapi_resource_action" "ssh_public_key" {
11   type        = "Microsoft.Compute/sshPublicKeys@2022-11-01"
12   resource_id = azapi_resource.ssh_public_key.id
13   action      = "generateKeyPair"
14   method      = "POST"
15
16 # Export response values from the SSH key generation action.
17 response_export_values = ["publicKey", "privateKey"]
18 }
19
20 # Define an Azure API resource to represent SSH public keys.
21 resource "azapi_resource" "ssh_public_key" {
22   type        = "Microsoft.Compute/sshPublicKeys@2022-11-01"
23   name        = random_pet.ssh_key_name.id
24   location    = data.azurerm_resource_group.RSG.location
25   parent_id   = data.azurerm_resource_group.RSG.id
26 }
```

SSH key generator  
for secure access to AKS  
Kubernetes.

DOSSIER\_PROJET [WSL: UBUNTU...]

```

1 # Variables
2
3 # Cluster Name variable - Specifies the name of your Kubernetes cluster.
4 variable "cluster_name" {
5   default = "dritonclustertest4"
6 }
7
8 # DNS Prefix variable - Specifies the DNS prefix for your cluster's URL.
9 variable "dns_prefix" {
10  default = "k8stest"
11 }
12
13 # Database User Admin variable - (You may want to provide a description)
14 variable "databaseuseradmin" {
15 }
16
17 # Database Password variable - (You may want to provide a description)
18 variable "databasepass" {
19 }
20
21
22 # WordPress Database Name variable - Specifies the name of the WordPress database.
23 variable "wordpressdb" {
24   default = "wpdatabase"
25 }
26
27
28 # NSG (Network Security Group) variables - These variables specify the names of NSGs.
29
30 # Azure Kubernetes Service NSG (AKS NSG) variable - Specifies the name of the NSG for AKS.
31 variable "aksnsg" {
32   default = "aksnsg"
33 }
34
35 # MySQL NSG (Network Security Group) variable - Specifies the name of the NSG for MySQL resources.
36 variable "mysqlnsg" {
37   default = "mysqlnsg"
38 }
39
40 # Virtual Machine NSG variable - Specifies the name of the NSG for virtual machines.
41 variable "vmnsg" {

```

Sensible info tfstate

Sensible info tfstate

PROBLEMS    OUTPUT    DEBUG CONSOLE    TERMINAL

Variables for my infra.

ck.hcl

```

8 administrator_login      = var.databaseuseradmin
9 administrator_password    = var.databasepass
10 backup_retention_days   = 7
11 delegated_subnet_id     = azurerm_subnet.mysql_subnet.id
12 private_dns_zone_id     = azurerm_private_dns_zone.privatedns.id
13 sku_name                 = "B_Standard_B1s"

```

PROBLEMS    OUTPUT    DEBUG CONSOLE    TERMINAL

● dri\_linux@FR-TWFR-tXBSM0a:/mnt/c/Users/dgorani/Desktop/dossier\_projet/Driton/terraform\_infra\$ terraform init

Initializing the backend...

Successfully configured the backend "azurerm"! Terraform will automatically use this backend unless the backend configuration changes.

Initializing provider plugins...

- Reusing previous version of azure/azapi from the dependency lock file
- Reusing previous version of hashicorp/azurerm from the dependency lock file
- Reusing previous version of hashicorp/random from the dependency lock file
- Installing azure/azapi v1.9.0...
- Installed azure/azapi v1.9.0 (signed by a HashiCorp partner, key ID 6F0B91BDE98478CF)
- Installing hashicorp/azurerm v3.75.0...
- Installed hashicorp/azurerm v3.75.0 (signed by HashiCorp)
- Installing hashicorp/random v3.5.1...
- Installed hashicorp/random v3.5.1 (signed by HashiCorp)

Partner and community providers are signed by their developers.  
If you'd like to know more about provider signing, you can read about it here:  
<https://www.terraform.io/docs/cli/plugins/signing.html>

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.

dri\_linux@FR-TWFR-tXBSM0a:/mnt/c/Users/dgorani/Desktop/dossier\_projet/Driton/terraform\_infra\$

```
"primaryLocation": "westeurope",
dri_linux@FR-TWFR-tXBSM0a:/mnt/c/Users/dgorani/Desktop/dossier_projet/Driton/terraform_infra$ terraform plan
data.azurerm_resource_group.RSG: Reading...
data.azurerm_resource_group.RSG: Read complete after 1s [id=/subscriptions/682603a3-d9f3-417f-98e8-a7b2398bc448/resourceGroups/PERSO_DRITON]
```

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:

```
# azapi_resource.ssh_public_key will be created
+ resource "azapi_resource" "ssh_public_key" {
  + body = jsonencode({})
  + id   = (known after apply)
  + ignore_casing = false
  + ignore_missing_property = true
  + location = "westeurope"
  + name   = (known after apply)
  + output  = (known after apply)
  + parent_id = "/subscriptions/682603a3-d9f3-417f-98e8-a7b2398bc448/resourceGroups/PERSO_DRITON"
  + removing_special_chars = false
  + schema_validation_enabled = true
  + tags    = (known after apply)
  + type    = "Microsoft.Compute/sshPublicKeys@2022-11-01"

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

# azapi_resource_action.ssh_public_key_gen will be created
+ resource "azapi_resource_action" "ssh_public_key_gen" {
  + action = "generateKeyPair"
  + id     = (known after apply)
  + method = "POST"
  + output  = (known after apply)
  + resource_id = (known after apply)
  + response_export_values = [
    + "publicKey",
    + "privateKey",
  ]
  + type   = "Microsoft.Compute/sshPublicKeys@2022-11-01"
}
```

```
# azurerm_mysql_flexible_server.wpserver will be created
+ resource "azurerm_mysql_flexible_server" "wpserver" {
  + administrator_login = "tonyadmin"
  + administrator_password = (sensitive value)
  + backup_retention_days = 7
  + delegated_subnet_id = (known after apply)
  + fqdn   = (known after apply)
  + geo_redundant_backup_enabled = true
  + id     = (known after apply)
  + location = "westeurope"
  + name   = "tonywpserver"
  + private_dns_zone_id = (known after apply)
  + public_network_access_enabled = (known after apply)
  + replica_capacity = (known after apply)
  + replication_role = (known after apply)
  + resource_group_name = "PERSO_DRITON"
  + sku_name   = "B_Standard_B1s"
  + version   = (known after apply)

  + storage {
    + auto_grow_enabled = (known after apply)
    + io_scaling_enabled = (known after apply)
    + iops      = (known after apply)
    + size_gb   = (known after apply)
  }
}
```

```
# azurerm_network_security_group.aksnsg will be created
+ resource "azurerm_network_security_group" "aksnsg" {
  + id     = (known after apply)
  + location = "westeurope"
  + name   = "aksnsg"
  + resource_group_name = "PERSO_DRITON"
  + security_rule = [
    + {
      + access          = "Allow"
      + description     = ...
      + destination_address_prefix = "*"
      + destination_address_prefixes = []
      + destination_application_security_group_ids = []
      + destination_port_range = "*"
      + destination_port_ranges = []
      + direction       = "Inbound"
      + name            = "testforall"
      + priority        = 110
      + protocol        = "*"
    }
  ]
}
```

```

azurerm_mysql_flexible_server.wpserver: Still creating... [1m0s elapsed]
azurerm_kubernetes_cluster.k8s: Still creating... [2m0s elapsed]
azurerm_mysql_flexible_server.wpserver: Still creating... [1m10s elapsed]
azurerm_kubernetes_cluster.k8s: Still creating... [2m10s elapsed]
azurerm_mysql_flexible_server.wpserver: Still creating... [1m20s elapsed]
azurerm_kubernetes_cluster.k8s: Still creating... [2m20s elapsed]
azurerm_mysql_flexible_server.wpserver: Still creating... [1m30s elapsed]
azurerm_kubernetes_cluster.k8s: Still creating... [2m30s elapsed]
azurerm_mysql_flexible_server.wpserver: Still creating... [1m40s elapsed]
azurerm_kubernetes_cluster.k8s: Still creating... [2m40s elapsed]
azurerm_mysql_flexible_server.wpserver: Still creating... [1m50s elapsed]
azurerm_kubernetes_cluster.k8s: Still creating... [2m50s elapsed]
azurerm_mysql_flexible_server.wpserver: Still creating... [2m0s elapsed]
azurerm_kubernetes_cluster.k8s: Still creating... [3m0s elapsed]
azurerm_mysql_flexible_server.wpserver: Still creating... [2m10s elapsed]
azurerm_kubernetes_cluster.k8s: Still creating... [3m10s elapsed]
azurerm_mysql_flexible_server.wpserver: Still creating... [2m20s elapsed]
azurerm_kubernetes_cluster.k8s: Still creating... [3m20s elapsed]
azurerm_mysql_flexible_server.wpserver: Still creating... [2m30s elapsed]
azurerm_kubernetes_cluster.k8s: Still creating... [3m30s elapsed]
azurerm_mysql_flexible_server.wpserver: Still creating... [2m40s elapsed]
azurerm_kubernetes_cluster.k8s: Still creating... [3m40s elapsed]
azurerm_kubernetes_cluster.k8s: Creation complete after 3m40s [id=/subscriptions/682603a3-d9f3-417f-98e8-a7b2398bc448/resourceGroups/PERSO_DRITON/providers/Microsoft.ContainerService/managedClusters/dritonclustertest4]
azurerm_mysql_flexible_server.wpserver: Still creating... [2m50s elapsed]
azurerm_mysql_flexible_server.wpserver: Still creating... [3m0s elapsed]
azurerm_mysql_flexible_server.wpserver: Still creating... [3m10s elapsed]
azurerm_mysql_flexible_server.wpserver: Still creating... [3m20s elapsed]
azurerm_mysql_flexible_server.wpserver: Still creating... [3m30s elapsed]
azurerm_mysql_flexible_server.wpserver: Still creating... [3m40s elapsed]
azurerm_mysql_flexible_server.wpserver: Still creating... [3m50s elapsed]
azurerm_mysql_flexible_server.wpserver: Still creating... [4m0s elapsed]
azurerm_mysql_flexible_server.wpserver: Still creating... [4m10s elapsed]
azurerm_mysql_flexible_server.wpserver: Still creating... [4m20s elapsed]
azurerm_mysql_flexible_server.wpserver: Still creating... [4m30s elapsed]
azurerm_mysql_flexible_server.wpserver: Still creating... [4m40s elapsed]
azurerm_mysql_flexible_server.wpserver: Still creating... [4m50s elapsed]
azurerm_mysql_flexible_server.wpserver: Still creating... [5m0s elapsed]
azurerm_mysql_flexible_server.wpserver: Creation complete after 5m8s [id=/subscriptions/682603a3-d9f3-417f-98e8-a7b2398bc448/resourceGroups/PERSO_DRITON/providers/Microsoft.DBforMySQL/serverGroups/wpserver]
azurerm_mysql_flexible_database.wpdatabase: Creating...
azurerm_mysql_flexible_database.wpdatabase: Still creating... [10s elapsed]
azurerm_mysql_flexible_database.wpdatabase: Creation complete after 20s [id=/subscriptions/682603a3-d9f3-417f-98e8-a7b2398bc448/resourceGroups/PERSO_DRITON/providers/Microsoft.DBforMySQL/serverGroups/wpdatabase]

Apply complete! Resources: 18 added, 0 changed, 0 destroyed.
dri_linux@FR-TWFR-tXBMSM0a:/mnt/c/Users/dgorani/Desktop/dossier_projet/Driton/terraform_infra$ 

```

terraform apply successfully deployed

## All resources | Simplified view

Refresh Feedback | Assign tags

Filter by name...

Showing 10 results.

All my resources have been deployed from terraform.

Name	Type	Location	Resource Group
aksnsg	Network security group	West Europe	PERSO_DRITON
dritonclustertest4	Kubernetes service	West Europe	PERSO_DRITON
mysqlnsg	Network security group	West Europe	PERSO_DRITON
sshflyingbuffalo	SSH key	West Europe	PERSO_DRITON
tony.mysql.database.azure.com	Private DNS zone	Global	PERSO_DRITON
tony.mysql.database.azure.com/tonywpVnetZone.com	Microsoft.Network/privateDnsZones...	Global	PERSO_DRITON
tonystocreate	Storage account	West Europe	PERSO_DRITON
tonynetworkpress	Virtual network	West Europe	PERSO_DRITON
tonywpserver	Azure Database for MySQL flexible s...	West Europe	PERSO_DRITON
vmnsg	Network security group	West Europe	PERSO_DRITON

### 3. Sécuriser l'infrastructure

---

Pour renforcer la sécurité de mon infrastructure, je vais mettre en place plusieurs mesures de sécurité essentielles. Tout d'abord, je vais déployer des Groupes de Sécurité Réseau (NSG) pour chaque sous-réseau de mon réseau virtuel. Ces NSG permettront de définir des règles de sécurité spécifiques pour contrôler le trafic entrant et sortant, garantissant ainsi une segmentation appropriée et une protection contre les menaces potentielles.

De plus, je vais configurer des règles restrictives pour limiter l'accès à la base de données MySQL. Cela signifie que seule la machine virtuelle (VM) située à l'intérieur d'un sous-réseau spécifique aura l'autorisation d'accéder à la base de données. Cette restriction renforce considérablement la sécurité des données stockées dans la base de données.

Pour sécuriser également mon site WordPress, je vais mettre en place un certificat SSL en utilisant Let's Encrypt. Ce certificat SSL assurera une communication sécurisée entre les utilisateurs et le site Web, en chiffrant les données en transit. Cela garantira la confidentialité et l'intégrité des informations échangées, renforçant ainsi la sécurité de mon site WordPress.

### Captures d'écrans

---

```

> scripts
> ssl_deployment
terraform_infra
> .terraform
  .terraform.lock.hcl
  aks.tf
  backend.tf
  data.tf
  mysql_server.tf
  nsg.tf
  provider.tf
  README.md
  secret.auto.tfvars
  sshkey.tf
  variables.tf
  vnet.tf
  .gitignore
  README.md

1 resource "azurerm_network_security_group" "mysqlnsg" {
2   name                = var.mysqlnsg
3   location             = data.azurerm_resource_group.RSG.location
4   resource_group_name = data.azurerm_resource_group.RSG.name
5
6   security_rule {
7     name        = "allowaksaccessaks"
8     priority    = 110
9     direction   = "Inbound"
10    access      = "Allow"
11    protocol    = "*"
12    source_port_range = "*"
13    destination_port_range = "*"
14    source_address_prefix = "172.18.1.0/24"
15    destination_address_prefix = "*"
16  }
17
18  security_rule {
19    name        = "allowaksaccesssvm"
20    priority    = 120
21    direction   = "Inbound"
22    access      = "Allow"
23    protocol    = "*"
24    source_port_range = "*"
25    destination_port_range = "*"
26    source_address_prefix = "172.18.3.0/24"
27    destination_address_prefix = "*"
28  }
29
30  security_rule {
31    name        = "deny"
32    priority    = 130
33    direction   = "Inbound"
34    access      = "Deny"
35    protocol    = "*"
36    source_port_range = "*"
37    destination_port_range = "*"
38    source_address_prefix = "*"
39    destination_address_prefix = "*"
40  }
41
42}

```

This my NSG Mysql

In this rule I allow only my subnet of aks to have acces on MYSQL

In this rule I allow only my subnet VM to have acces on MYSQL Server

In this rule I deny everything except two mentioned rules above.

Priority ↑	Name ↑	Port ↑	Protocol ↑	Source ↑	Destination ↑	Action ↑↓
110	AllowAnySSHInbound	2230	TCP	Any	Any	<span style="color: green;">Allow</span>
120	⚠️ denyall	Any	Any	Any	Any	<span style="color: red;">Deny</span>
65000	AllowVnetInBound	Any	Any	VirtualNetwork	VirtualNetwork	<span style="color: green;">Allow</span>
65001	AllowAzureLoadBalancer...	Any	Any	AzureLoadBalancer	Any	<span style="color: green;">Allow</span>
65500	DenyAllInBound	Any	Any	Any	Any	<span style="color: red;">Deny</span>

I did a redirection of Port, i'm not using port 22, instead I'm using port 2230 and SSH key generator.

I deny all others ports, and sources to my VM from outside of my VNET

**Inbound Security Rules**

Priority	Name	Port	Protocol	Source	Destination	Action
110	accessaks	Any	Any	Any	Any	Allow
120	allowmysqlaccess	Any	Any	172.18.2.0/24	Any	Allow
130	deny	Any	Any	Any	Any	Deny
65000	AllowVnetInBound	Any	Any	VirtualNetwork	VirtualNetwork	Allow
65001	AllowAzureLoadBalancerI...	Any	Any	AzureLoadBalancer	Any	Allow
65500	DenyAllInBound	Any	Any	Any	Any	Deny

**Outbound Security Rules**

Priority	Name	Port	Protocol	Source	Destination	Action
65000	AllowNetOutBound	Any	Any	VirtualNetwork	VirtualNetwork	Allow
65001	AllowInternetOutBound	Any	Any	Any	Internet	Allow
65500	DenyAllOutBound	Any	Any	Any	Any	Deny

The screenshot shows a Firefox browser window displaying the security details of a website. The address bar shows the URL: <https://wordpresstony.sandbox.aws.teamwork.net/wp-admin/install.php?step=1>. The browser interface includes a 'Page Info' tab and various status icons.

**Website Identity:**

- Website: wordpresstony.sandbox.aws.teamwork.net (highlighted with a red box)
- Owner: This website does not supply ownership information.
- Verified by: Let's Encrypt (highlighted with a red box)

**Privacy & History:**

- Have I visited this website prior to today? Yes, 18 times
- Is this website storing information on my computer? Yes, cookies and 229 KB of site data
- Have I saved any passwords for this website? No

**Technical Details:**

- Connection Encrypted (TLS\_AES\_256\_GCM\_SHA384, 256 bit keys, TLS 1.3)
- The page you are viewing was encrypted before being transmitted over the Internet.
- Encryption makes it difficult for unauthorized people to view information traveling between computers. It is therefore unlikely that anyone read this page as it traveled across the network.

## 4. Mettre l'infrastructure en production dans le cloud

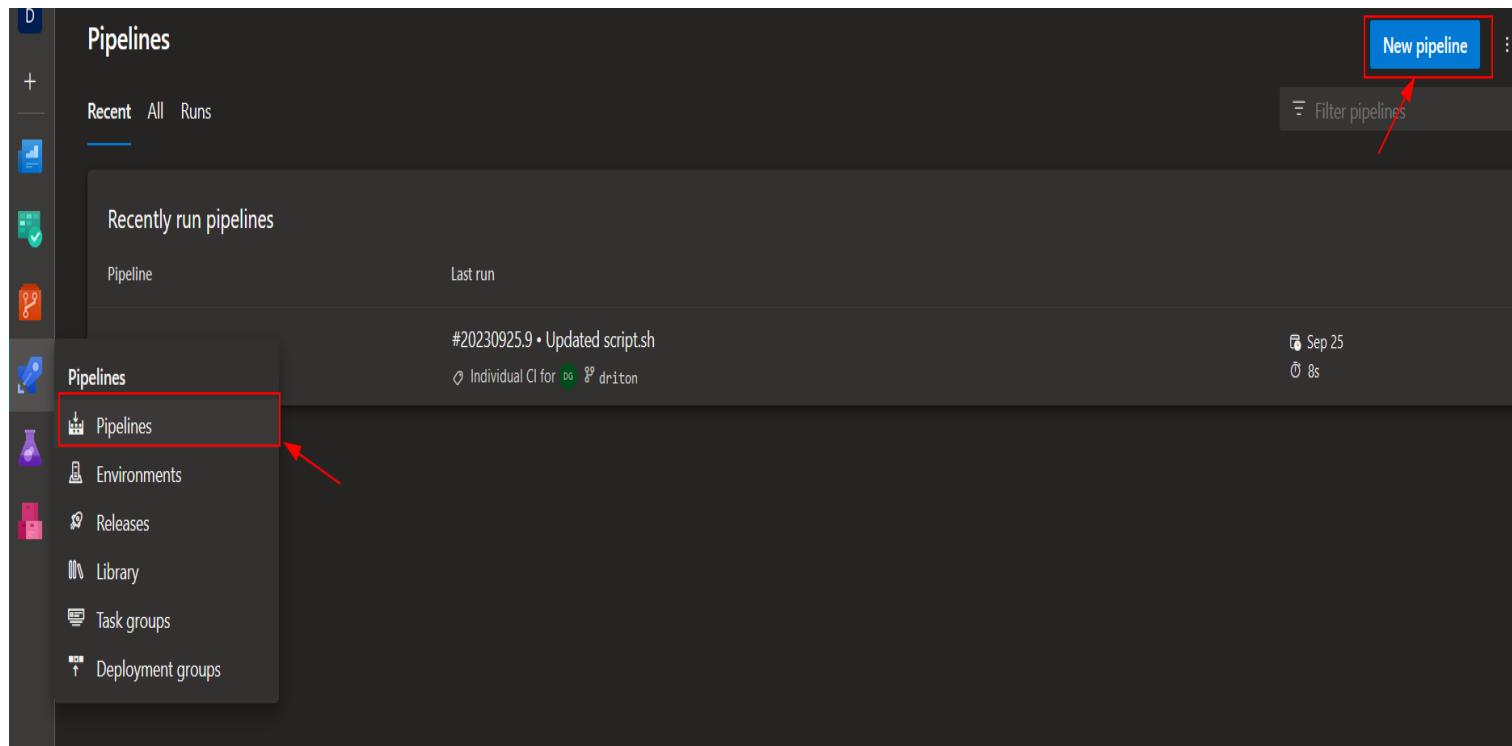
Pour déployer mon infrastructure dans le cloud et automatiser le processus, j'ai opté pour l'utilisation d'Azure DevOps afin de créer des pipelines. Cette approche me permet de simplifier et d'optimiser le processus de déploiement.

Je vais mettre en place une infrastructure identique à celle décrite dans la documentation, en particulier en suivant les indications de la page 11 comme référence. Je vais utiliser la branche PROD pour le déploiement de mon infrastructure, tout en créant un artefact spécifique dédié à la branche PROD.

### Captures d'écrans

The screenshot shows a dark-themed interface for managing a GitHub repository named 'Driton'. A red box highlights the dropdown menu where 'prod' is selected, with a red arrow pointing to it labeled 'My branch Prod'. Another red box highlights the list of files in the 'prod' branch, with a red arrow pointing to it labeled 'My Repo'. The visible files are:

Name	Last change	Commits
scripts	Friday	a8f63dc9 update Driton
ssl_deployment	Sep 26	1210ade4 m Driton
terraform_infra	Just now	8230b8a4 production Driton
.gitignore	Sep 22	3322501b Added 7 files to / Driton Gorani
README.md	Sep 22	3322501b Added 7 files to / Driton Gorani



Pipelines

Recent All Runs

Recently run pipelines

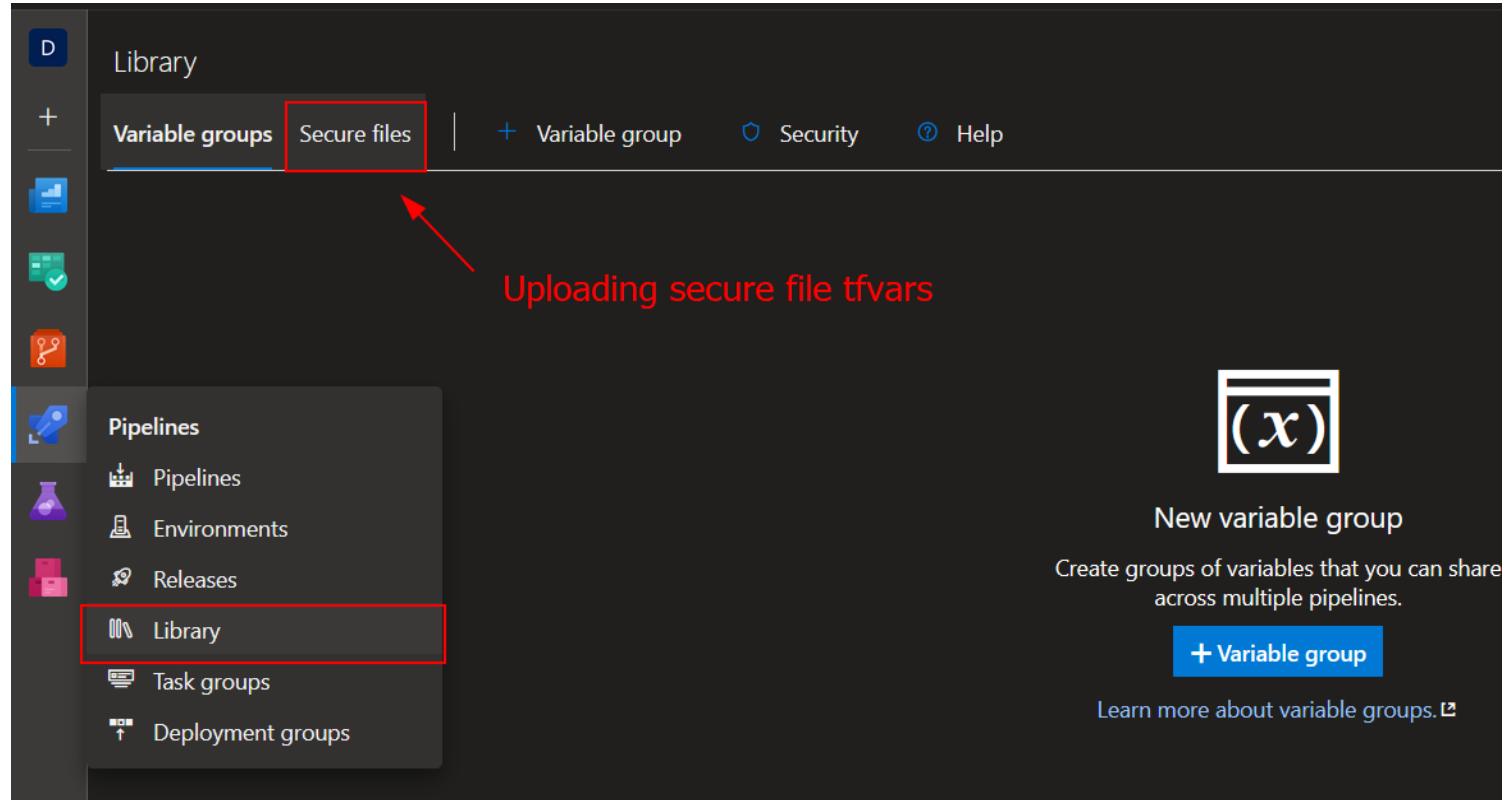
Pipeline	Last run	
#20230925.9 • Updated script.sh	⌚ Sep 25 🕒 8s	🔗 Individual CI for  driton

New pipeline

Filter pipelines

Pipelines

- Pipelines
- Environments
- Releases
- Library
- Task groups
- Deployment groups



Library

Variable groups Secure files + Variable group Security Help

Pipelines

Environments

Releases

Library

Task groups

Deployment groups

Uploading secure file tfvars

(x)

New variable group

Create groups of variables that you can share across multiple pipelines.

+ Variable group

Learn more about variable groups.

**New release pipeline (1)**

**Releases** Deployments Analytics

① Pending approval on PROD stage.

Releases	Created	Stages
Release-52	10/8/2023, 1:21:33 PM	<span style="background-color: pink;">✖ Create St...</span> <span style="background-color: green;">✓ DEV</span> <span style="background-color: blue;">🕒 PROD</span> <span style="background-color: lightgray;">● Terraform...</span>
Release-51	10/8/2023, 1:18:11 PM	<span style="background-color: green;">✓ Create St...</span> <span style="background-color: red;">✖ DEV</span> <span style="background-color: lightgray;">● PROD</span> <span style="background-color: lightgray;">● Terraform...</span>
Release-50	10/8/2023, 1:15:00 PM	<span style="background-color: green;">✓ Create St...</span> <span style="background-color: red;">✖ DEV</span> <span style="background-color: lightgray;">● PROD</span> <span style="background-color: lightgray;">● Terraform...</span>
Release-49	10/8/2023, 12:58:52 PM	<span style="background-color: green;">✓ Create St...</span> <span style="background-color: green;">✓ DEV</span> <span style="background-color: red;">✖ PROD</span> <span style="background-color: lightgray;">● Terraform...</span>
Release-48	10/8/2023, 12:50:34 PM	<span style="background-color: green;">✓ Create St...</span> <span style="background-color: lightgray;">● DEV</span> <span style="background-color: lightgray;">● PROD</span> <span style="background-color: lightgray;">● Terraform...</span>
Release-47	10/8/2023, 12:49:13 PM	<span style="background-color: pink;">✖ Create St...</span> <span style="background-color: lightgray;">● DEV</span> <span style="background-color: lightgray;">● PROD</span> <span style="background-color: lightgray;">● Terraform...</span>

**I'm going to edit this release**

All pipelines > General\_deployment > General\_deployment

**Pipeline** Tasks Variables Retention Options History

**Artifacts** | + Add

- \_DritonDEV
- \_DritonPROD
- Schedule not set

**Stages** | + Add

- Create Storage (1 job, 1 task)
- DEV (1 job, 8 tasks)
  - Terraform destroy (1 job, 3 tasks)
- PROD (1 job, 8 tasks)

This release should be applied manually to create azure storage.

This is my DEV release and its connected directly with branch DEV using artifact.

This is my PROD release, connected with artifact PROD.

All pipelines > General\_depl... > General\_deployment

Pipeline Tasks Variables Retention Options History

**Artifacts** | + Add    **Stages** | + Add

The PROD stage is highlighted with a red box. A callout points to the artifact configuration with the text: "It comes from the same repository." Another callout points to the 'Default branch' dropdown with the text: "This the branch PROD that i'm choosing for this Artifact."

**Artifact**  
Git - \_DritonPROD

Project \* Driton

Source (repository) \* Driton

Default branch \* prod

Default version \* Latest from the default branch

Checkout submodules

Checkout files from LFS

Shallow fetch depth

The PROD stage is highlighted with a red box. A callout points to the artifact filter configuration with the text: "This is Artifact filter, I'm including only PROD".

**Artifact filters** + Add

Type Branch

Include prod

+ Add

After release After stage Manual only

Schedule Disabled

Pull request deployment Disabled

**Pre-deployment approvals** Enabled

Select the users who can approve or reject deployments to this stage

I have applied a Pre deployment approval, to deploy something on this stage, i should approve it or reject it.

All pipelines > General\_depl... > **General\_deployment**

Pipeline Tasks Variables Retention Options History

**PROD**  
Deployment process

**Agent job** Run on agent

+ **Use Terraform latest** Terraform Installer

+ **terraform init** Terraform CLI

+ **terraform plan** Terraform CLI

+ **terraform apply** Terraform CLI

**Install Helm 2.14.1** Helm tool installer

**Install Kubectl latest** Disabled: Kubectl tool installer

**Azure CLI** Disabled: Azure CLI

**VM-deploy** Disabled: Azure CLI

Stage name: PROD

I'm going to use four of them in order to deploy my infra to PROD.

Pipeline Tasks Variables Retention Options History

**Create Storage** Deployment process

**Agent job** Run on agent

+ **Azure CLI creating storage** Azure CLI

Azure CLI runner (task) allowing me to connect to azure using SPN, and executing Azure CLI script.

Task version: 2.\*

Display name: Azure CLI creating storage

Azure Resource Manager connection: driton\_spn | Manage

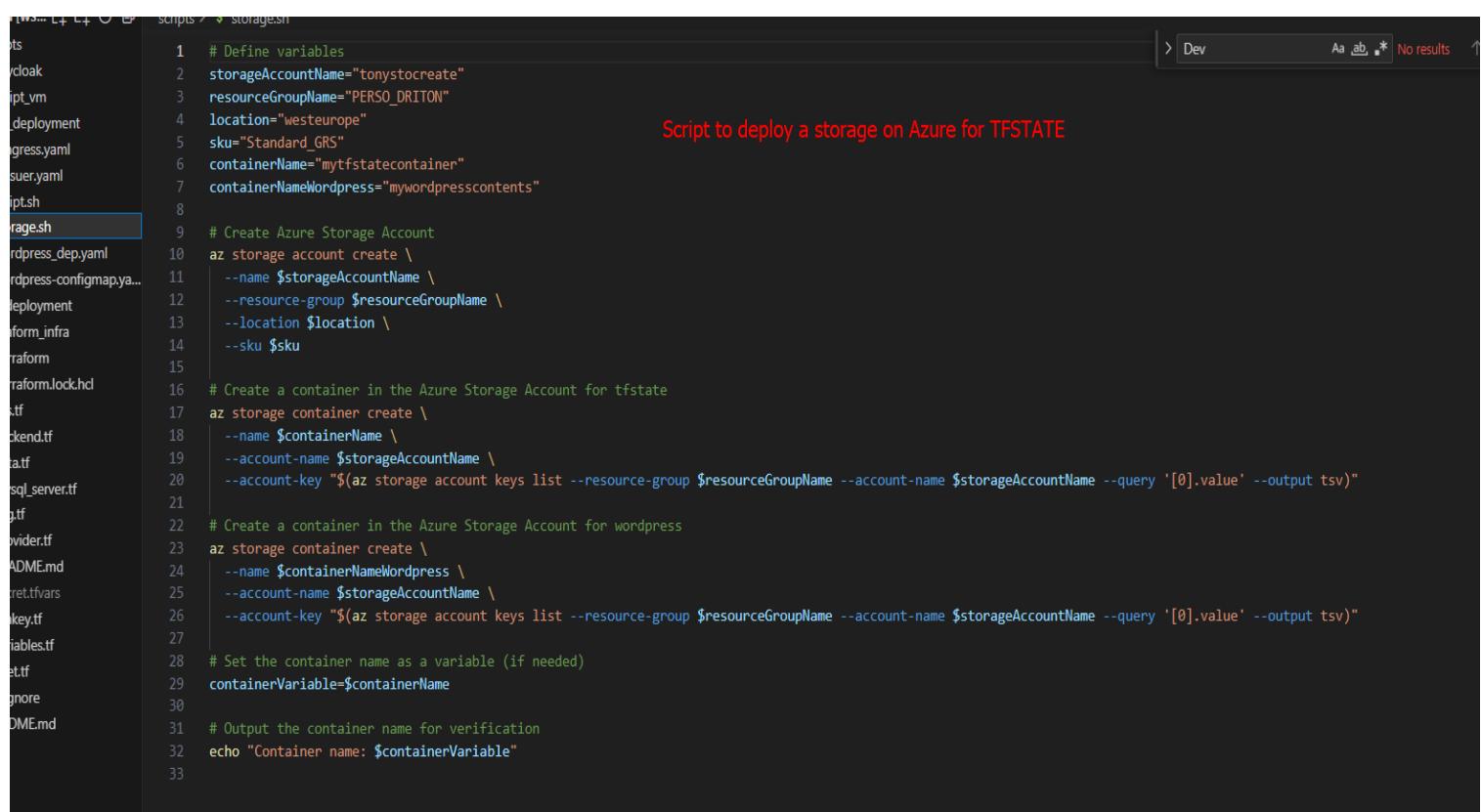
driton\_spn  
Scoped to resource group 'PERSO\_DRITON'

Script Type: Shell

Script Location: Script path

Script Path: \$(System.DefaultWorkingDirectory)/\_DritonInfra/scripts/storage.sh

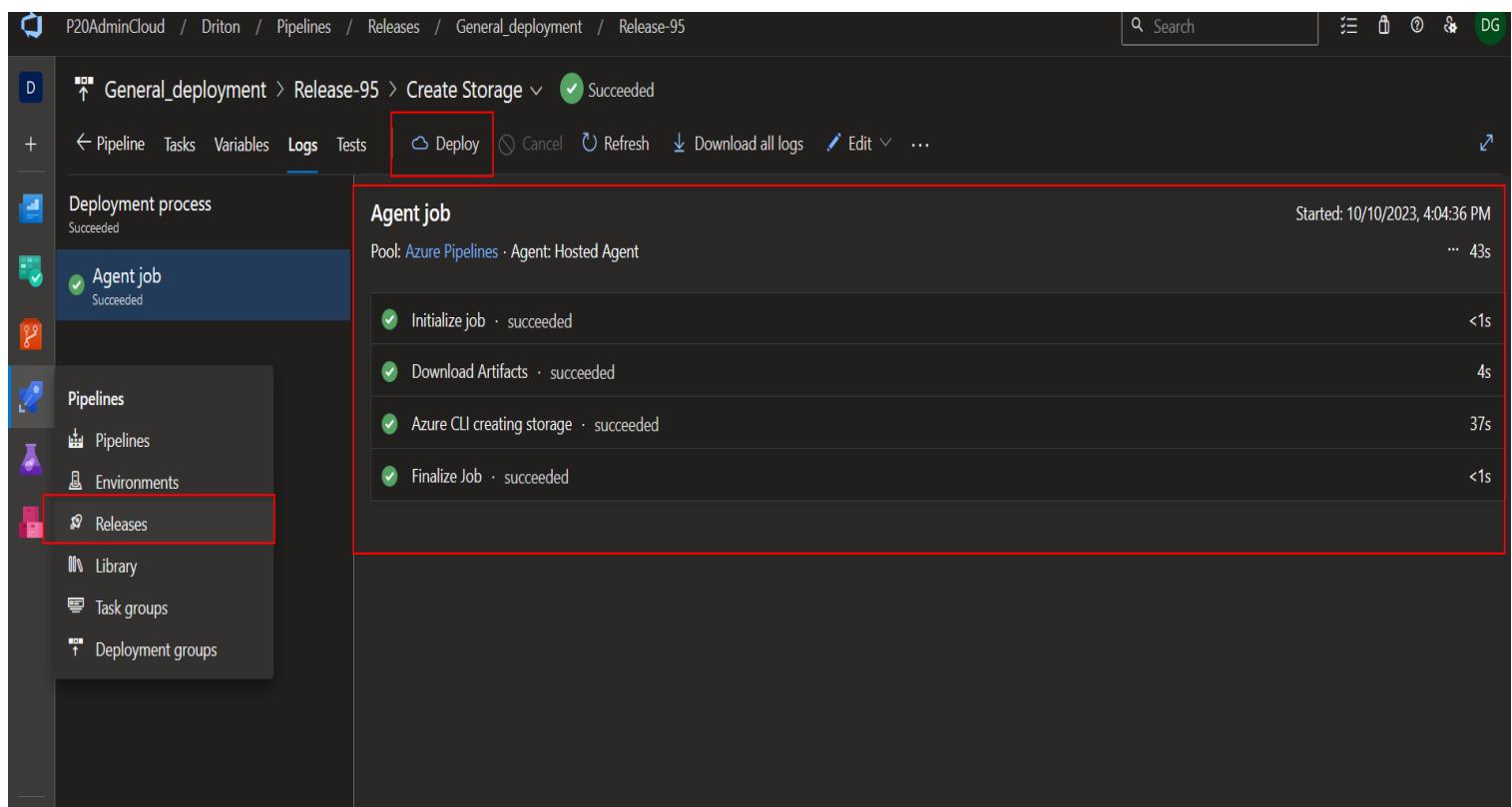
Script Arguments:



```

scripts > storage.sh
1 # Define variables
2 storageAccountName="tonystocreate"
3 resourceGroupName="PERSO_DRITON"
4 location="westeurope"
5 sku="Standard_GRS"
6 containerName="mytfstatecontainer"
7 containerNameWordpress="mywordpresscontents"
8
9 # Create Azure Storage Account
10 az storage account create \
11   --name $storageAccountName \
12   --resource-group $resourceGroupName \
13   --location $location \
14   --sku $sku
15
16 # Create a container in the Azure Storage Account for tfstate
17 az storage container create \
18   --name $containerName \
19   --account-name $storageAccountName \
20   --account-key "$(az storage account keys list --resource-group $resourceGroupName --account-name $storageAccountName --query '[0].value' --output tsv)"
21
22 # Create a container in the Azure Storage Account for wordpress
23 az storage container create \
24   --name $containerNameWordpress \
25   --account-name $storageAccountName \
26   --account-key "$(az storage account keys list --resource-group $resourceGroupName --account-name $storageAccountName --query '[0].value' --output tsv)"
27
28 # Set the container name as a variable (if needed)
29 containerVariable=$containerName
30
31 # Output the container name for verification
32 echo "Container name: $containerVariable"
33

```



P20AdminCloud / Dralon / Pipelines / Releases / General\_deployment / Release-95

General\_deployment > Release-95 > Create Storage ✓ Succeeded

Logs Deploy Cancel Refresh Download all logs Edit ...

**Deployment process** Succeeded

**Agent job** Succeeded

Pool: Azure Pipelines · Agent: Hosted Agent

Started: 10/10/2023, 4:04:36 PM    43s

Task	Status	Duration
Initialize job	succeeded	<1s
Download Artifacts	succeeded	4s
Azure CLI creating storage	succeeded	37s
Finalize Job	succeeded	<1s

**Releases**

Pipelines

Environments

Library

Task groups

Deployment groups

Pipeline Variables History | + Deploy Cancel Refresh Edit ...

**Release**

Continuous deployment for Driton Gorani 10/10/2023, 2:42 PM

Artifacts

- \_DritonDEV dc62ba99
- prod
- DritonPROD

**Stages**

Create Storage Succeeded on 10/10/2023, 4:05 PM

DEV Not deployed

Terraform destroy Not deployed

Release has been deployed.

Home > **PERSO\_DRITON** Resource group

My resources group

Search Create Manage view Delete resource group Refresh Export to CSV Open query Assign tags Move Delete Export template ...

Overview

Activity log Access control (IAM) Tags Resource visualizer Events

Settings

Deployments Security Deployment stacks Policies Properties Locks

Monitoring Insights (preview) Alerts

Resources Recommendations

Filter for any field... Type equals all Location equals all Add filter

Showing 1 to 1 of 1 records. Show hidden types

No grouping List view

Name	Type	Location
tonystocreate	Storage account	West Europe

Result of my release, storage has been created.

DRITON [WSL: UBUNTU-20.04]

```

  terraform_infra > aks.tf > resource "azurerm_kubernetes_cluster" "k8s" > default_node_pool > enable_auto_scaling
    scripts
    > script_vm
    > ssl_deployment
    $ script.sh
    $ storage.sh
    ! wordpress_dep.yaml
    ! wordpress-configmap.yaml
    > ssl_deployment
    ! ingress.yaml
    ! issuer.yaml
    > .terraform
    > .terraform.lock.hcl
    aks.tf
      backend.tf
      data.tf
      mysql_server.tf
      nsg.tf
      provider.tf
      README.md
      secret.auto.tfvars
      sshkey.tf
      variables.tf
      vnet.tf
      .gitignore
      README.md
    PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
    > OUTLINE > TIMELINE
  WSL-Ubuntu-20.04 dev 0.0.0 * In 21 Col 31 Spaces:2 UTE-8 LF { T

```

1 ##### Azurerm kubernetes cluster #####  
2  
3 Total monthly cost: \$126.29  
4 resource "azurerm\_kubernetes\_cluster" "k8s" {  
5 location = data.azurerm\_resource\_group.RSG.location  
6 name = var.cluster\_name  
7 resource\_group\_name = data.azurerm\_resource\_group.RSG.name  
8 dns\_prefix = var.dns\_prefix  
9 tags = {  
10 Environment = "Production" ← Environment: Production  
11 }  
12  
13 identity {  
14 type = "SystemAssigned"  
15 }  
16  
17 default\_node\_pool {  
18 name = "defalut"  
19 node\_count = 1  
20 vm\_size = "Standard\_DS2\_v2"  
21 vnet\_subnet\_id = azurerm\_subnet.aks\_subnet.id ← This is my default node pool that will be deployed with the infrastructure.  
22 enable\_auto\_scaling = true  
23 max\_count = 3  
24 min\_count = 1  
25 }  
26  
27 linux\_profile {  
28 admin\_username = "ubuntu"  
29 ssh\_key {  
30 key\_data = jsondecode(asapi\_resource\_action.ssh\_public\_key\_gen.output).publicKey  
31 }  
32 }  
33 network\_profile {  
34 network\_plugin = "kubenet"  
35 load\_balancer\_sku = "standard"  
36 }  
--  
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
 • dri\_linux@FR-TWFR-tXB5M0a:/mnt/c/Users/dgorani/Desktop/dossier\_projet/Driton\$ git checkout prod ← I try to change my branch  
 Already on 'prod'  
 I'm already on PROD  
 Your branch is up to date with 'origin/prod'.  
 • dri\_linux@FR-TWFR-tXB5M0a:/mnt/c/Users/dgorani/Desktop/dossier\_projet/Driton\$ git branch  
 dev  
 \* prod ← I'm going to push, and a release will be triggered on DEVOPS  
 dri\_linux@FR-TWFR-tXB5M0a:/mnt/c/Users/dgorani/Desktop/dossier\_projet/Driton\$

DRITON [WSL: UBUNTU-20.04]

```

  scripts
  > ssl_deployment
  terraform_infra
    > .terraform
    aks.tf
      backend.tf
      data.tf
      mysql_server.tf
      nsg.tf
      provider.tf
      README.md
      secret.auto.tfvars
      sshkey.tf
      variables.tf
      vnet.tf
      .gitignore
      README.md
    PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
    > OUTLINE > TIMELINE
  WSL-Ubuntu-20.04 dev 0.0.0 * In 21 Col 31 Spaces:2 UTE-8 LF { T

```

1 ##### Azurerm kubernetes cluster #####  
2  
3 Total monthly cost: \$126.29  
4 resource "azurerm\_kubernetes\_cluster" "k8s" {  
5 location = data.azurerm\_resource\_group.RSG.location  
6 name = var.cluster\_name  
7 resource\_group\_name = data.azurerm\_resource\_group.RSG.name  
8 dns\_prefix = var.dns\_prefix  
9 tags = {  
10 Environment = "Production"  
11 }  
12  
13 identity {  
14 type = "SystemAssigned"  
15 }  
16  
17 default\_node\_pool {  
18 name = "defalut"  
19 node\_count = 1  
20 vm\_size = "Standard\_DS2\_v2"  
21 vnet\_subnet\_id = azurerm\_subnet.aks\_subnet.id ← This is my default node pool that will be deployed with the infrastructure.  
22 enable\_auto\_scaling = true  
23 max\_count = 3  
24 min\_count = 1  
25 }  
26  
27 linux\_profile {  
28 admin\_username = "ubuntu"  
29 ssh\_key {  
30 key\_data = jsondecode(asapi\_resource\_action.ssh\_public\_key\_gen.output).publicKey  
31 }  
32 }  
33 network\_profile {  
34 network\_plugin = "kubenet"  
35 load\_balancer\_sku = "standard"  
36 }  
--  
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
 1 file changed, 1 insertion(+), 1 deletion(-)  
 • dri\_linux@FR-TWFR-tXB5M0a:/mnt/c/Users/dgorani/Desktop/dossier\_projet/Driton\$ git push  
 Warning: the RSA host key for 'ssh.dev.azure.com' differs from the key for the IP address '51.104.26.13'  
 Offending key for IP in /home/dri\_linux/.ssh/known\_hosts:2  
 Matching host key in /home/dri\_linux/.ssh/known\_hosts:18  
 Are you sure you want to continue connecting (yes/no)? yes  
 Enumerating objects: 7, done.  
 Counting objects: 100% (7/7), done.  
 Delta compression using up to 8 threads  
 Compressing objects: 100% (4/4), done.  
 Writing objects: 100% (4/4), 342 bytes | 24.00 KiB/s, done.  
 Total 4 (delta 3), reused 0 (delta 0)  
 remote: Analyzing objects... (4/4) (264 ms)  
 remote: Validating commits... (1/1) done (0 ms)  
 remote: Storing packfile... done (62 ms)  
 remote: Storing index... done (64 ms)  
 To ssh.dev.azure.com:v3/P2PAdminCloud/Driton/Driton  
 dc62ba9...9e0d63f prod -> prod  
 ✓ dri\_linux@FR-TWFR-tXB5M0a:/mnt/c/Users/dgorani/Desktop/dossier\_projet/Driton\$

**General\_deployment**

**Releases** Deployments Analytics

① Pending approval on PROD stage.

Releases	Created	Stage
Release-96 9e0d63f9 prod	10/10/2023, 4:37:27 PM	● Pending
Release-95 dc62ba... prod	10/10/2023, 2:42:37 PM	● Pending
Release-90 eed6fdc2 dev	10/10/2023, 12:13:12 PM	● Pending
Release-89 e7c28a97 dev	10/10/2023, 12:03:40 PM	● Pending

**Release-96 > Pending approval on PROD stage.**

Pre-deployment approval pending

View logs

Approval pending for 4 minutes  
Waiting for all approvers to approve in sequence.

Diton Gorani Pending for 4 minutes

Timeout in 30d

User who should approve it.

Comment

Defer deployment for later

Approve Reject

I need to approve it in order to trigger the release

General\_deployment > Release-96

Pipeline Variables History + Deploy Cancel Refresh Edit ...

Continuous deployment for Diton Gorani 10/10/2023, 4:37 PM

Artifacts

- DitonDEV 9e0d63f9 prod
- DitonPROD 9e0d63f9 prod

Create Storage ● Not deployed

DEV ● Not deployed △ Artifact conditions not met

Terraform destroy ● Not deployed

PROD ● Succeeded on 10/10/2023, 4:51 PM

My passed successfully

PERSO\_DRITON Resource group

Search Create Manage view Delete resource group Refresh Export to CSV Open query Assign tags Move Delete Export template ... JSON View

Overview Essentials

Activity log Access control (IAM) Tags Resource visualizer Events

Deployments Security Deployment stacks Policies Properties Locks

Monitoring Insights (preview)

Resources Recommendations

Filter for any field... Type equals all X Location equals all X Add filter

Showing 1 to 9 of 9 records. Show hidden types No grouping List view

Name	Type	Location
aksnsg	Network security group	West Europe
dritonclusterprod	Kubernetes service	West Europe
mysqlnsg	Network security group	West Europe
sshopefulpipefish	SSH key	West Europe
tony.mysql.database.azure.com	Private DNS zone	Global
tonystocreate	Storage account	West Europe
tonywordpress	Virtual network	West Europe

< Previous Page 1 of 1 Next >

Give feedback

My resources are deployed on Azure

Name	Type	Location
aksnsg	Network security group	West Europe
dritonclusterprod	Kubernetes service	West Europe
mysqlnsg	Network security group	West Europe
sshopefulpipefish	SSH key	West Europe
tony.mysql.database.azure.com	Private DNS zone	Global
tonystocreate	Storage account	West Europe
tonywordpress	Virtual network	West Europe

## 2.Déployer en continu une application

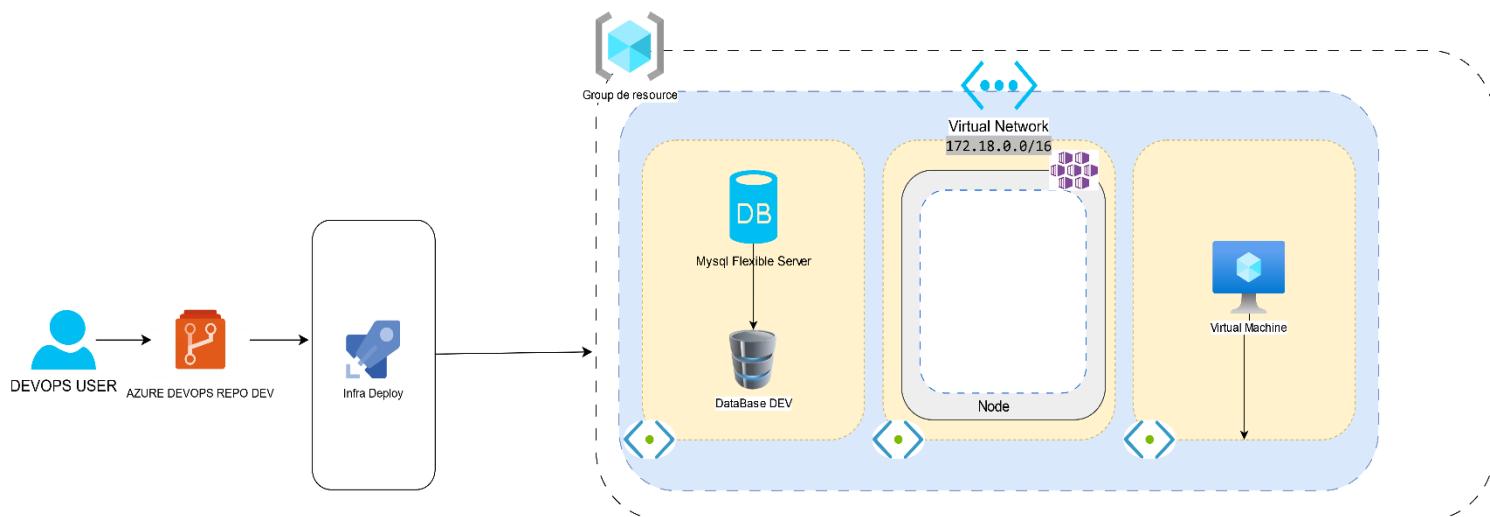
### 5. Préparer un environnement de test

Pour préparer un environnement de test, j'ai organisé mon projet dans DevOps en créant deux branches distinctes : "dev" pour le développement et "prod" pour la production. J'ai également ajouté des étiquettes (tags) à chaque ressource pour les identifier comme faisant partie de l'environnement de test. Enfin, j'ai mis en place deux Artifacts, l'un pour le développement et l'autre pour la production.

Ces étapes assurent une gestion claire de l'environnement de test, en séparant les différentes étapes de développement et en permettant de repérer facilement les ressources liées à cet environnement. Les pipelines dédiés simplifient le déploiement et les tests dans chaque phase, ce qui contribue à un développement structuré et sécurisé.

### Captures d'écrans

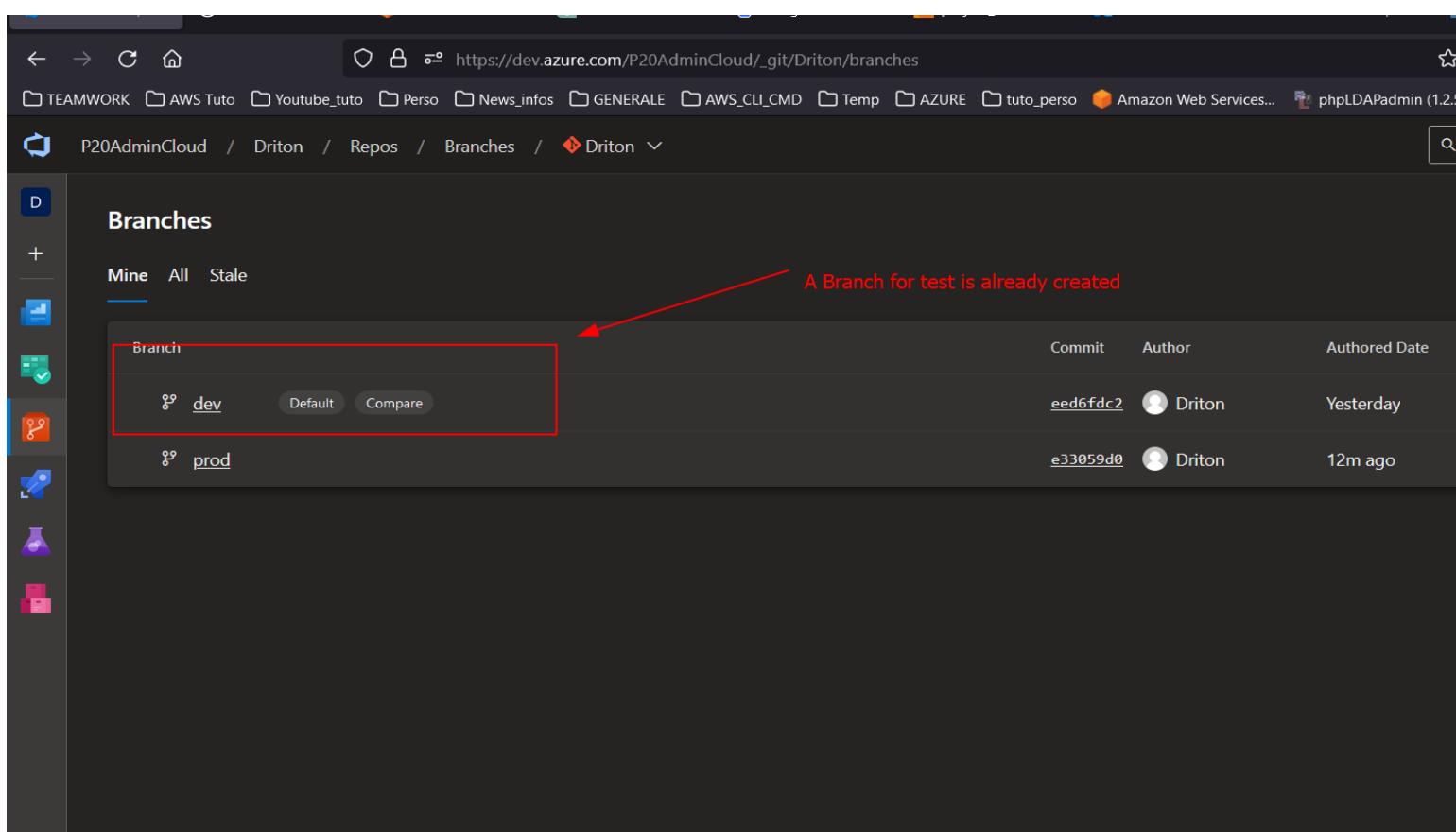
Schéma :



```
User: clusterUser_PERSO_DRITON_dritonclusterpr <e> Edit
K9s Rev: v0.27.2 ✅ v0.27.4 <?> Help
K8s Rev: v1.26.6 <u> Use
CPU: 8% <y> YAML
MEM: 30%
```

NAME↑	STATUS	AGE
all(*)	Active	
default	Active	4h26m
dev-env	Active	69s
kube-node-lease	Active	4h26m
kube-public	Active	4h26m
kube-system	Active	4h26m

A namespace for testing issues is created on AKS to deploy the test code.

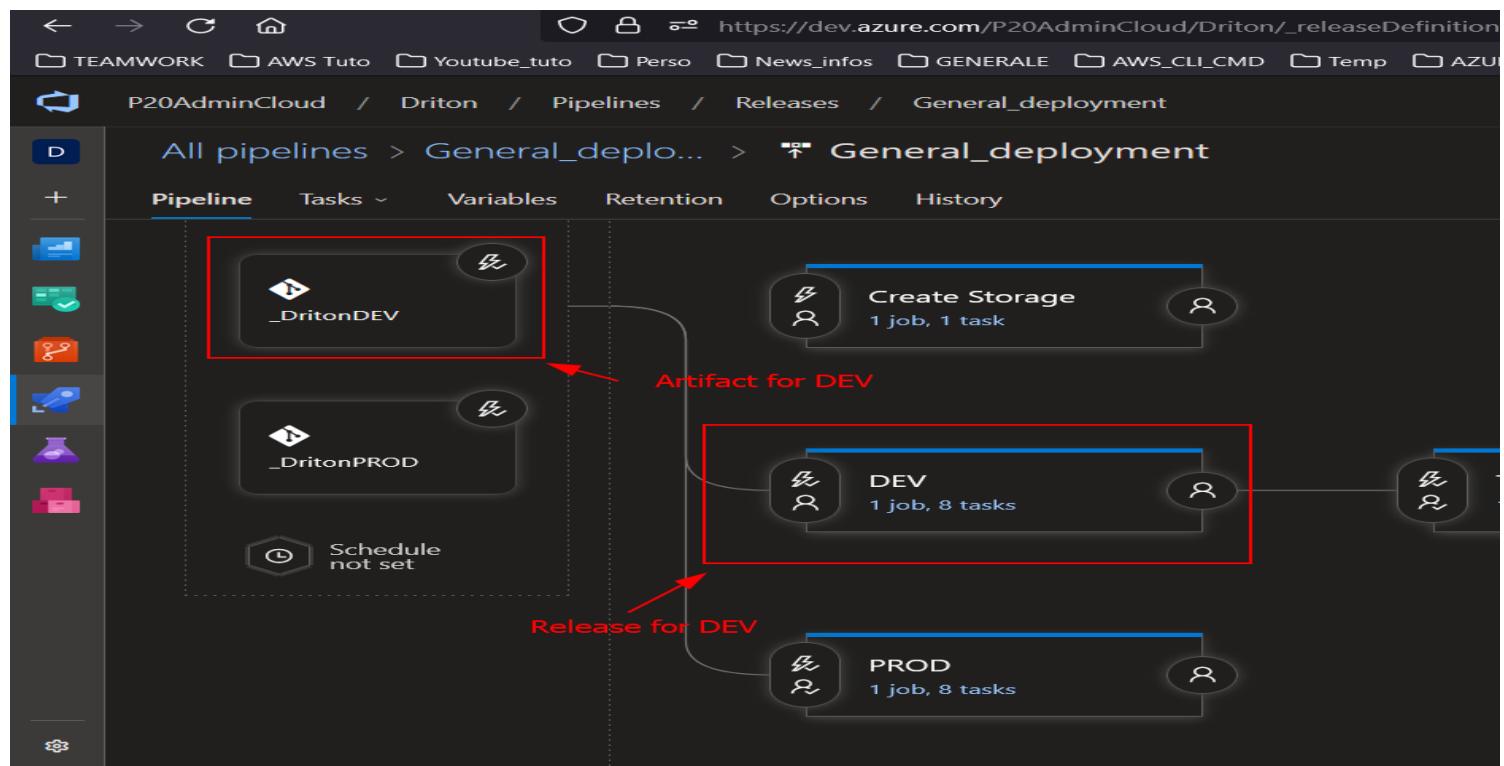


The screenshot shows the Azure DevOps interface for managing branches. The URL is https://dev.azure.com/P20AdminCloud/\_git/Driton/branches. The navigation bar includes TEAMWORK, AWS Tuto, Youtube\_tuto, Perso, News\_infos, GENERALE, AWS\_CLI\_CMD, Temp, AZURE, tuto\_perso, Amazon Web Services..., and phpLDAPadmin (1.2.5). The current repository is P20AdminCloud / Driton / Repos / Branches / Driton.

The main area displays the 'Branches' section with three branches listed:

Branch	Commit	Author	Authored Date
dev	eed6fdc2	Driton	Yesterday
prod	e33059d0	Driton	12m ago

A red box highlights the 'dev' branch, and a red arrow points from it to the text 'A Branch for test is already created'.



```

1  apiVersion: v1
2  kind: Service
3  metadata:
4    name: wordpress
5    namespace: dev-env
6    labels:
7      app: wordpress
8  spec:
9    ports:
10      - port: 80
11    selector:
12      app: wordpress
13      tier: frontend
14
15  ---
16  apiVersion: v1
17  kind: PersistentVolumeClaim
18  metadata:
19    namespace: dev-env
20    name: wp-pv-claim
21    labels:
22      app: wordpress
23  spec:
24    accessModes:
25      - ReadWriteOnce
26    resources:
27      requests:
28        storage: 20Gi
29
30  ---
31  apiVersion: apps/v1
32  kind: Deployment
33  metadata:
34    name: wordpress
35    namespace: dev-env
36    labels:
37      app: wordpress
38  spec:
39    selector:
40      matchLabels:
41        app: wordpress
42        tier: frontend
43    strategy:
44      type: Recreate
45    template:
46      metadata:

```

Code that has been tested on dev-env, YAML file for wordpress configuration

## 6. Gérer le stockage des données

Pour la gestion de la base de données, je vais déployer un serveur MySQL flexible. J'utilisera les options "backup enable" et "retention days" pour automatiser la création de sauvegardes quotidiennes et conserver ces sauvegardes pendant une période de 7 jours. En parallèle, je vais me connecter à ma base de données pour afficher les tables.

```
> scripts
> ssl_deployment
✓ terraform_infra
  > .terraform
  ⚡ .terraform.lock.hcl
  🐾 aks.tf
  🐾 backend.tf
  🐾 data.tf
  🐾 mysql_server.tf
  🐾 nsq.tf
  🐾 provider.tf
  ⓘ README.md
  🐾 secret.auto.tfvars
  🐾 sshkey.tf
  🐾 variables.tf
  🐾 vnet.tf
  ⚡ .gitignore
  ⓘ README.md

1  ##### Mysql flexible server #####
2
3
4 resource "azurerm_mysql_flexible_server" "wpserver" {
5   name          = var.mysqlservername
6   resource_group_name = data.azurerm_resource_group.RSG.name
7   location      = data.azurerm_resource_group.RSG.location
8   administrator_login = var.databaseuseradmin
9   administrator_password = var.databasepass
10  backup_retention_days = 7
11  delegated_subnet_id = azurerm_subnet.mysql_subnet.id
12  private_dns_zone_id = azurerm_private_dns_zone.privatedns.id
13  sku_name       = "B_Standard_B1s"
14
15  geo_redundant_backup_enabled = true
16  depends_on = [azurerm_private_dns_zone_virtual_network_link.tonywp]
17 }
18 #### Database ####
19 resource "azurerm_mysql_flexible_database" "wpdatabaseprod" {
20   name          = var.wordpressdbprod
21   resource_group_name = data.azurerm_resource_group.RSG.name
22   server_name    = azurerm_mysql_flexible_server.wpserver.name
23   charset        = "utf8"
24   collation      = "utf8_unicode_ci"
25 }
26
27 resource "azurerm_mysql_flexible_database" "wpdatabasedev" [
28   name          = var.wordpressdbdev
29   resource_group_name = data.azurerm_resource_group.RSG.name
30   server_name    = azurerm_mysql_flexible_server.wpserver.name
31   charset        = "utf8"
32   collation      = "utf8_unicode_ci"
33 ]
34
35
36 #####
37
38
```

Home > tonywpserver

## tonywpserver | Backup and restore ⚡ ⋮

Azure Database for MySQL flexible server

Search

Backup now Refresh Feedback FAQs

Azure Database for MySQL flexible servers are backed up automatically. Available full backups for restores are listed below. [Learn more](#)

Earliest restore point ① 2023-10-11 09:08:05.440 UTC

Completion timestamp range	Backup types				
Last 24 hour(s)	All				
wordpressbackup	Completed	2023-10-11 13:46:03.901	2023-10-18 13:46:03.901	On-Demand backup	Fast restore
ondemandbackup-10112023-1	Completed	2023-10-11 13:44:20.123	2023-10-18 13:44:20.123	On-Demand backup	Fast restore

Backup is already completed for wordpress.

Settings

- Compute + storage
- Networking
- Databases
- Connect
- Server parameters
- Replication
- Maintenance
- High availability
- Backup and restore

```
dri_linux@FR-TWFR-tXBSM0a:/mnt/c/Users/dgorani/Desktop/dossier_projet/Driton$ ssh -i ~/.ssh/mysshkey myadmin@20.71.144.145 -p 2230
```

SSH key

Public IP of VM

Redirected Port instead: 22

```
dri_linux@FR-TWFR-tXBSM0a:/mnt/c/Users/dgorani/Desktop/dossier_projet/Driton$ ssh -i ~/.ssh/mysshkey myadmin@20.71.144.145 -p 2230
Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 6.2.0-1014-azure x86_64)
```

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

System information as of Wed Oct 11 14:13:07 UTC 2023

```
System load: 0.0          Processes:      103
Usage of /: 5.4% of 28.89GB  Users logged in:    0
Memory usage: 33%          IPv4 address for eth0: 172.18.3.4
Swap usage: 0%
```

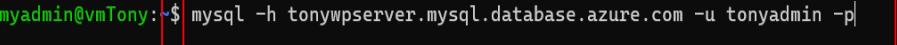
Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.  
See <https://ubuntu.com/esm> or run: sudo pro status

Last login: Wed Oct 11 10:22:35 2023 from 90.85.242.157

myadmin@vmTony:~\$ mysql -h tonywpserver.mysql.database.azure.com -u tonyadmin -p|

 Successfully connected to VM

 I'm going to connect on my Mysql Server using mysql-client

```
myadmin@vmTony:~$ mysql -h tonywpserver.mysql.database.azure.com -u tonyadmin -p
Enter password:
```

Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 10
Server version: 5.7.43-log MySQL Community Server (GPL)

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affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

```
mysql> show databases;
+--------------------+
| Database           |
+--------------------+
| information_schema |
| mysql               |
| performance_schema |
| sys                |
| wpdatabasedev     |
| wpdatabaseprod    |
+--------------------+
6 rows in set (0.14 sec)
```

 My databases that already
exist on my server

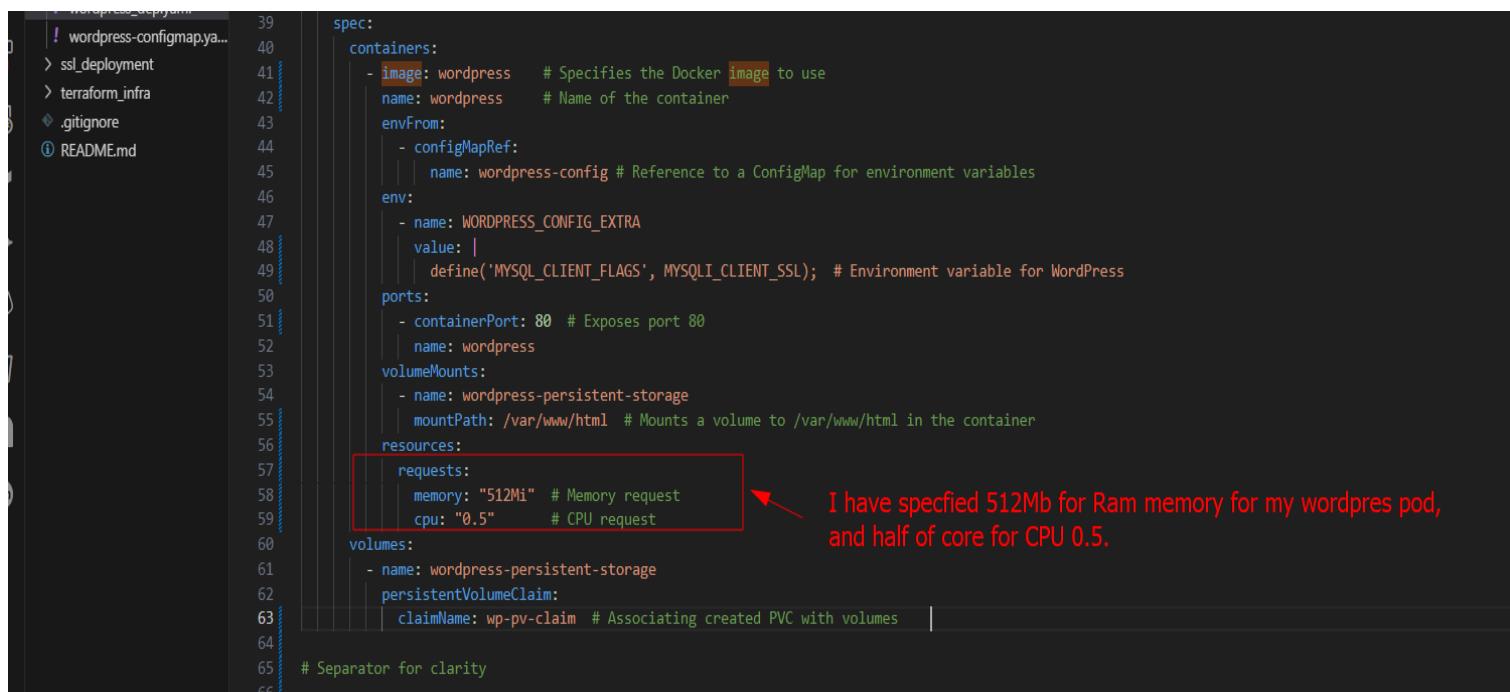
 Successfully accesed to mysql server
from my VM.

## 7. Gérer des containers

Pour la gestion des conteneurs, j'ai choisi d'utiliser Kubernetes, une plateforme de gestion d'orchestration de conteneurs très puissante. Dans Kubernetes, je vais créer et gérer des "pods", qui sont les plus petites unités de déploiement. Pour assurer un fonctionnement optimal, je vais définir différents paramètres pour ces pods, notamment la quantité de CPU allouée, la mémoire disponible et l'espace disque nécessaire.

En ajustant ces paramètres en fonction des besoins spécifiques de mes applications, je vais garantir une utilisation efficace des ressources tout en assurant des performances optimales. Cela me permettra de maintenir un équilibre entre la capacité de traitement, la disponibilité de la mémoire et le stockage requis pour chaque conteneur, assurant ainsi une expérience fiable pour les utilisateurs finaux. En somme, Kubernetes me permettra de gérer de manière précise et évolutive l'orchestration de mes conteneurs.

### Captures d'écrans



```
! wordpress-deployment
39 spec:
40   containers:
41     - image: wordpress    # Specifies the Docker image to use
42       name: wordpress      # Name of the container
43       envFrom:
44         - configMapRef:
45           name: wordpress-config # Reference to a ConfigMap for environment variables
46       env:
47         - name: WORDPRESS_CONFIG_EXTRA
48           value: |
49             define('MYSQL_CLIENT_FLAGS', MYSQLI_CLIENT_SSL); # Environment variable for WordPress
50       ports:
51         - containerPort: 80    # Exposes port 80
52           name: wordpress
53       volumeMounts:
54         - name: wordpress-persistent-storage
55           mountPath: /var/www/html # Mounts a volume to /var/www/html in the container
56       resources:
57         requests:
58           memory: "512Mi" # Memory request
59           cpu: "0.5"        # CPU request
60       volumes:
61         - name: wordpress-persistent-storage
62           persistentVolumeClaim:
63             claimName: wp-pv-claim # Associating created PVC with volumes
64
65   # Separator for clarity
66
```

I have specified 512Mb for Ram memory for my wordpres pod, and half of core for CPU 0.5.

```
# Separator for clarity
---

# Define a PersistentVolumeClaim (PVC) to request persistent storage.
apiVersion: v1
kind: PersistentVolumeClaim
metadata:
  namespace: prod-env
  name: wp-pv-claim          # Name of the PVC
  labels:
    app: wordpress
spec:
  accessModes:
    - ReadWriteOnce      # Defines access mode
  resources:
    requests:
      storage: 20Gi       # Requests 20 gigabytes of storage
```

I have created a Volume for my pod

20gb of storage for my pod

```
dri_linux@FR-TWFR-tXBSM0a:~$ kubectl get pods -n prod-env
NAME           READY   STATUS    RESTARTS   AGE
cm-acme-http-solver-k5cbg   1/1     Running   0          9m19s
wordpress-69884b5d9f-hq9vh  1/1     Running   0          9m11s
dri_linux@FR-TWFR-tXBSM0a:~$ kubectl exec -it wordpress-69884b5d9f-hq9vh /bin/sh -n prod-env
kubectl exec [POD] [COMMAND] is DEPRECATED and will be removed in a future version. Use kubectl exec [POD] -- [COMMAND] instead.
# bash
root@wordpress-69884b5d9f-hq9vh:/var/www/html#
root@wordpress-69884b5d9f-hq9vh:/var/www/html#
root@wordpress-69884b5d9f-hq9vh:/var/www/html#
root@wordpress-69884b5d9f-hq9vh:/var/www/html# ping google.com
PING google.com (142.250.179.174) 56(84) bytes of data.
```

This command shows me all the containers (pods) in namespace PROD-ENV

This command allows me to enter to a container

I have successfully entered to my container.

I can ping google, so my container is connected to network.

```
User: clusterUser_PERSO_DRITON_dritonclusterpr <2> monitoring      <d>   Describe  <shift-f> Port-Forward
K9s Rev: v0.27.2 ✅ v0.27.4          <3> prod-env    <s>   Shell
K8s Rev: v1.26.6           <4> default     <n>   Show Node
CPU: 9%                   <?> Help        <f>   Show PortForward
MEM: 56%                  <ctrl-k> Kill      <f>   Show PortForward
```

[ ] <\--- /---/ | \ / \---\ /---\ V /---//---\ V

Pods(prod-env)[2]													
NAME↑	PF	READY	RESTARTS	STATUS	CPU	MEM	%CPU/R	%CPU/L	%MEM/R	%MEM/L	IP	NODE	AGE
cm-acme-httpsolver-k5cbg	●	1/1	0	Running	1	6	10	1	10	10	10.244.0.24	aks-defalut-89297279-vmss000000	14m
wordpress-69884b5d9f-hq9vh	●	1/1	0	Running	1	47	0	n/a	9	n/a	10.244.0.26	aks-defalut-89297279-vmss000000	14m

My container is on running state.

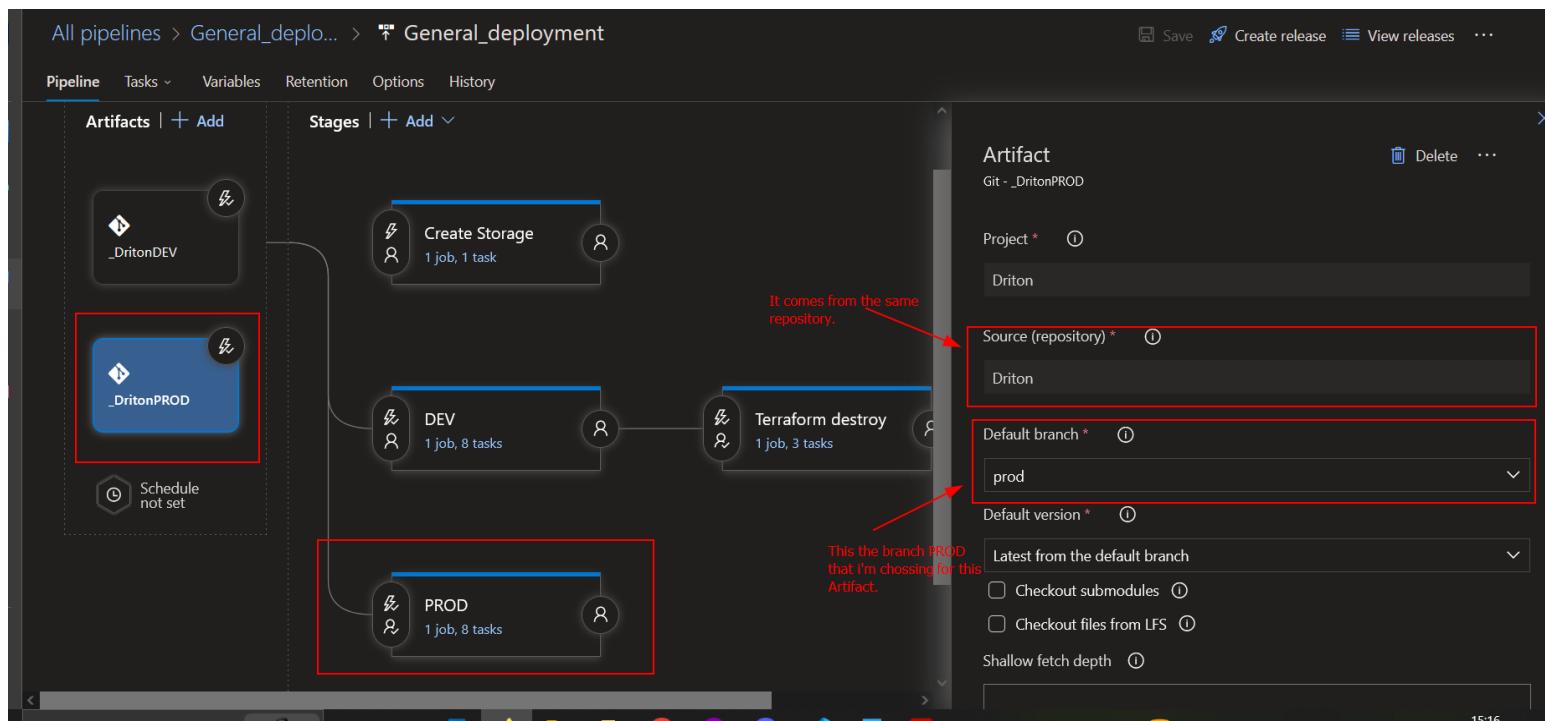
## 8. Automatiser la mise en production d'une application avec une plateforme

Pour orchestrer et gérer mes conteneurs, j'ai opté pour Kubernetes, un outil d'une puissance inestimable. Dans le cadre de Kubernetes, j'utilise des "pods" pour déployer mes applications, en prenant soin de paramétriser des éléments cruciaux tels que les allocations de CPU, de mémoire, et d'espace disque nécessaires.

En adaptant ces paramètres en fonction des besoins spécifiques de mes applications, je m'assure que mes conteneurs utilisent de manière efficiente les ressources disponibles, tout en garantissant des performances optimales.

Pour automatiser le déploiement en production, j'utilise une pipeline sur Azure DEVOPS, comme évoquée précédemment dans la compétence numéro 4, en spécifiant la branche PROD.

### Captures d'écrans



All pipelines > New release pipeline (1)

Pipeline Tasks Variables Retention Options History

**PROD**  
Deployment process

Agent job Run on agent

- Use Terraform latest Terraform Installer
- terraform init Terraform CLI
- terraform plan Terraform CLI
- terraform apply Terraform CLI
- Install Helm 2.14.1 Helm tool installer
- Install Kubectl latest Kubectl tool installer
- Azure CLI Azure CLI

Stage name PROD

Runners for PROD

```

scripts
> keycloak
> script_vm
ssl_deployment
! ingress.yaml
! issuer.yaml
$ script.sh
$ storage.sh
! wordpress_dep.yaml
! wordpress-configmap.yaml
> ssl_deployment
> terraform_infra
> .terraform
! .terraform.lock.hcl
! aks.tf
! backend.tf
! data.tf
! mysql_server.tf
! nsg.tf
! provider.tf
! README.md
! secret.tvars
! sshkey.tf
! variables.tf
! vnet.tf
.gitignore
! README.md

3 ## Ssl cert-manager, nginx controller, wordpress issuer, ingress installation ##
4
5 # Get AKS cluster credentials
6 az aks get-credentials --resource-group PERSO_DRITON --name dritonclustertest4
7
8 # Create a new Kubernetes namespace called 'dev-env'
9 kubectl create ns dev-env
10 # Install cert-manager
11 kubectl apply -f https://github.com/cert-manager/cert-manager/releases/download/v1.12.4/cert-manager.yaml
12 # Sleep for 20 seconds (allow time for cert-manager to be ready)
13 sleep 20
14 # Install NGINX Ingress Controller
15 kubectl apply -f https://raw.githubusercontent.com/kubernetes/ingress-nginx/controller-v1.8.2/deploy/static/provider/cloud/deploy.yaml
16 # Sleep for 30 seconds (allow time for the NGINX Ingress Controller to be ready)
17 sleep 30
18 # Apply issuer.yaml for SSL certificates
19 kubectl apply -f ./ssl_deployment/issuer.yaml
20 # Sleep for 10 seconds (allow time for issuer to be created)
21 sleep 10
22 # Apply ingress.yaml for SSL certificates
23 kubectl apply -f ./ssl_deployment/ingress.yaml
24 # Sleep for 5 seconds
25 sleep 5
26 # Print a message indicating successful installation
27 echo "Cert-manager, NGINX Ingress Controller, WordPress issuer, and ingress have been installed"
28 sleep 5
29
30 # Wordpress Deployment
31 # Apply WordPress configuration
32 kubectl apply -f ./wordpress-configmap.yaml
33 # Apply WordPress deployment
34 kubectl apply -f ./wordpress_dep.yaml
35 # Sleep for 5 seconds
36 sleep 5
37 # Print a message indicating successful WordPress deployment
38 echo "WordPress has been deployed"
39
40 # Helm, Grafana, Prometheus, Loki Installation

```

```

# Helm, Grafana, Prometheus, Loki Installation
# Add Grafana Helm repository
helm repo add grafana https://grafana.github.io/helm-charts
# Update Helm repositories
helm repo update
# Install Loki with Grafana enabled
helm upgrade --install loki grafana/loki-stack --namespace monitoring --set grafana.enabled=true --create-namespace
# Add Prometheus Helm repository
helm repo add prometheus-community https://prometheus-community.github.io/helm-charts --namespace monitoring
# Update Helm repositories
helm repo update
# Install Prometheus
helm install my-prometheus --namespace monitoring prometheus-community/prometheus --version 24.4.0
# Sleep for 10 seconds
sleep 10
# Print the admin password for Grafana
echo "Secret connect key for GRAFANA: $(kubectl get secret --namespace monitoring loki-grafana -o jsonpath=".data.admin-password" | base64 --decode ; echo)"
# Print the external IP address of the NGINX Ingress Controller
echo "External IP Address of Ingress NGINX Controller: $(kubectl get svc -n ingress-nginx ingress-nginx-controller -o jsonpath='{.status.loadBalancer.ingress[0].ip}')"
# Print a message indicating successful installation of Helm, Grafana, Prometheus, and Loki
echo "Helm, Grafana, Prometheus, and Loki have been installed"

### Dashboard ID's for Grafana.

# node exporter: 1860
# Istio prometheuse: 7645
# Loki dash: 13639

```

The screenshot shows a deployment management interface. On the left, under 'General\_deployment' and 'Releases', there is a list of releases: Release-96, Release-95, Release-90, and Release-89. Release-96 is highlighted and has a pending approval status. On the right, a modal window titled 'Release-96 > Pending approval on PROD stage.' displays the 'Pre-deployment approval pending' status. It shows a user named 'Driton Gorani' is pending approval for 4 minutes. A red box highlights this information, with an annotation pointing to it: 'User who should approve it.' Below the user info is a 'Comment' input field and a checkbox for 'Defer deployment for later'. At the bottom are 'Approve' and 'Reject' buttons, with a red arrow pointing to the 'Approve' button and the annotation 'I need to approve it in order to trigger the release'.

[https://dev.azure.com/P20AdminCloud/Driton/\\_releaseProgress?releaseId=127&a=release-environment-logs&environmentId=1](https://dev.azure.com/P20AdminCloud/Driton/_releaseProgress?releaseId=127&a=release-environment-logs&environmentId=1)

General\_deployment > Release-102 > PROD ✓ Succeeded

← Pipeline Tasks Variables Logs Tests | Deploy Cancel Refresh Download all logs Edit ...

Deployment attempt #2 Succeeded

Pre-deployment approvals Approved

Agent job Succeeded

Agent job Pool: Azure Pipelines · Agent: Hosted Agent

Started: 10/12/2023, 10:37:12 AM ... 11m 21s

Task	Duration
Initialize job · succeeded	2s
Download Artifacts · succeeded	6s
Use Terraform latest · succeeded	1s
terraform init · succeeded	8s
terraform plan · succeeded	6s
terraform apply · succeeded	8m 23s
Install Helm 2.14.1 · succeeded	3s
Install Kubectl latest · succeeded	<1s
Azure CLI · succeeded	1m 43s
VM deploy · succeeded	46s
Finalize Job · succeeded	<1s

Runners have deployed successfully the scripts and my infra

PERSO\_DRITON Resource group

Search Create Manage view Delete resource group Refresh Export to CSV Open query Assign tags Move Delete Export template ... JSON View

Overview Activity log Access control (IAM) Tags Resource visualizer Events

Settings Deployments Security Deployment stacks Policies Properties Locks Monitoring Insights (preview)

Essentials

Resources Recommendations

Filter for any field... Type equals all Location equals all Add filter

Showing 1 to 9 of 9 records. Show hidden types

Name	Type	Location
aksnsg	Network security group	West Europe
dritonclusterprod	Kubernetes service	West Europe
mysqlnsg	Network security group	West Europe
sshopefulpipefish	SSH key	West Europe
tony.mysql.database.azure.com	Private DNS zone	Global
tonystocreate	Storage account	West Europe
tonynetworkpress	Virtual network	West Europe

No grouping List view

< Previous Page 1 of 1 Next >

Give feedback

My resources are deployed on Azure

```

Context: dritonclusterprod          <ctrl-d> Delete
Cluster: dritonclusterprod        <d> Describe
User:   clusterUser_PERSO_DRITON_dritonclusterpr <e> Edit
K9s Rev: v0.27.2 → v0.27.4       <?> Help
K8s Rev: v1.26.6                 <u> Use
CPU:    10%↑                      <y> YAML
MEM:   63%↑
  
```



## Namespaces(all)[9] -

NAME↑	STATUS	AGE
all-(*)	Active	
cert-manager	Active	4h24m
default	Active	4h30m
ingress-nginx	Active	4h24m
kube-node-lease	Active	4h30m
kube-public	Active	4h30m
kube-system	Active	4h30m
monitoring	Active	4h23m
prod-env	Active	4h24m

Prod env namespace for wordpress

Sample Page – TonyWordpress X +

https://wordpresstony.sandbox.aws.teamwork.net/sample-page/

Go back one page (Alt+Left Arrow)  
Right-click or pull down to show history

be\_tuto Perso News\_infos GENERALE AWS\_CLI\_CMD Temp AZURE tuto\_perso Amazon Web Services... phpLDAPAdmin (1.2.5)... Service | Kubernetes Install Grafana Loki wi...

TONYWORDPRESS

Search

Sample Page

TonyWordpress > Sample Page

This is an example page. It's different from a blog post because it will stay in one place and will show up in your site navigation (in most themes). Most people start with an About page that introduces them to potential site visitors. It might say something like this:

Hi there! I'm a bike messenger by day, aspiring actor by night, and this is my website. I live in Los Angeles, have a great dog named Jack, and I like piña coladas. (And gettin' caught in the rain.)

...or something like this:

The XYZ Doohickey Company was founded in 1971, and has been providing quality doohickeys to the public ever since. Located in Gotham City, XYZ employs over 2,000 people and does all kinds of awesome things for the Gotham community.

Search

Recent Posts

- Hello world!
- Odit in pariatur cupiditate suscipit voluptatem soluta
- Ut dolorem ea dolorem
- Laboriosam fuga unde occaecati aliquid fugiat
- Placeat odio sit dolor dolor qui

Recent Comments

### 3. Superviser les services déployés

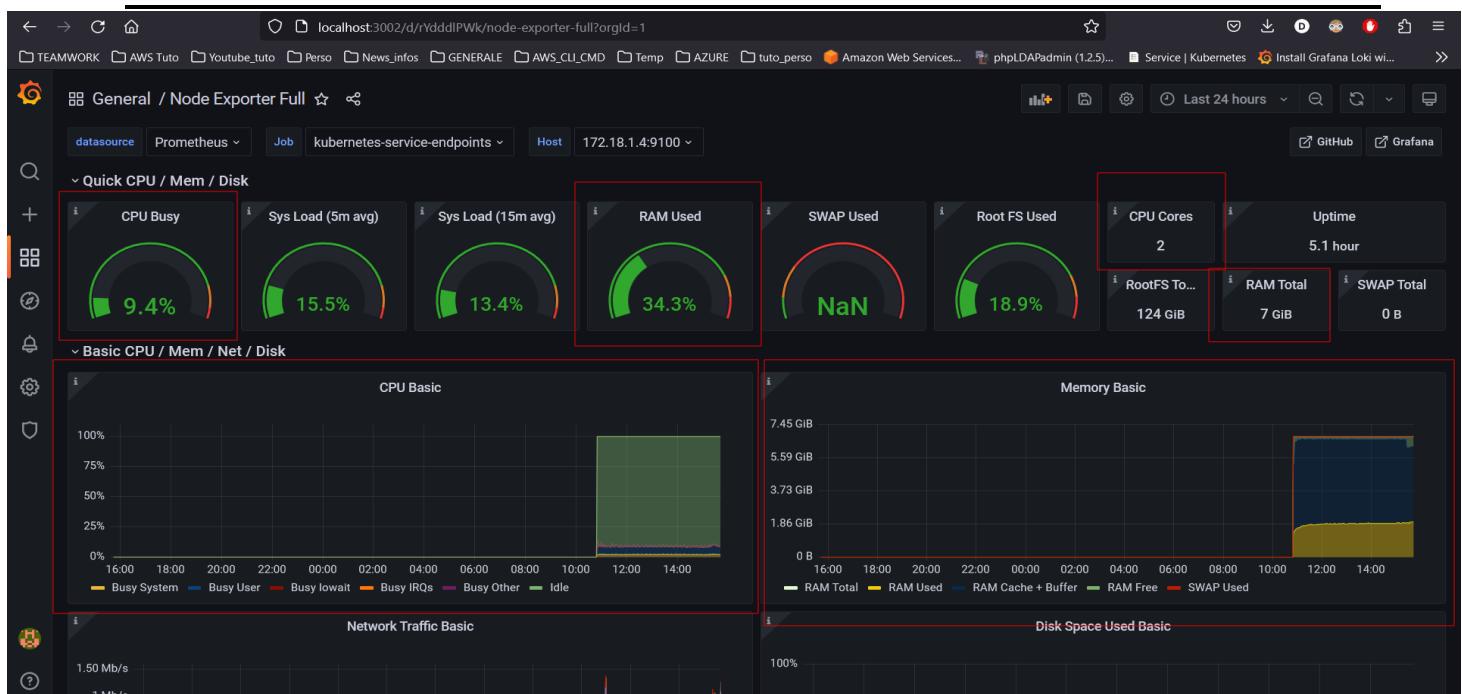
#### 9. Définir et mettre en place des statistiques de services

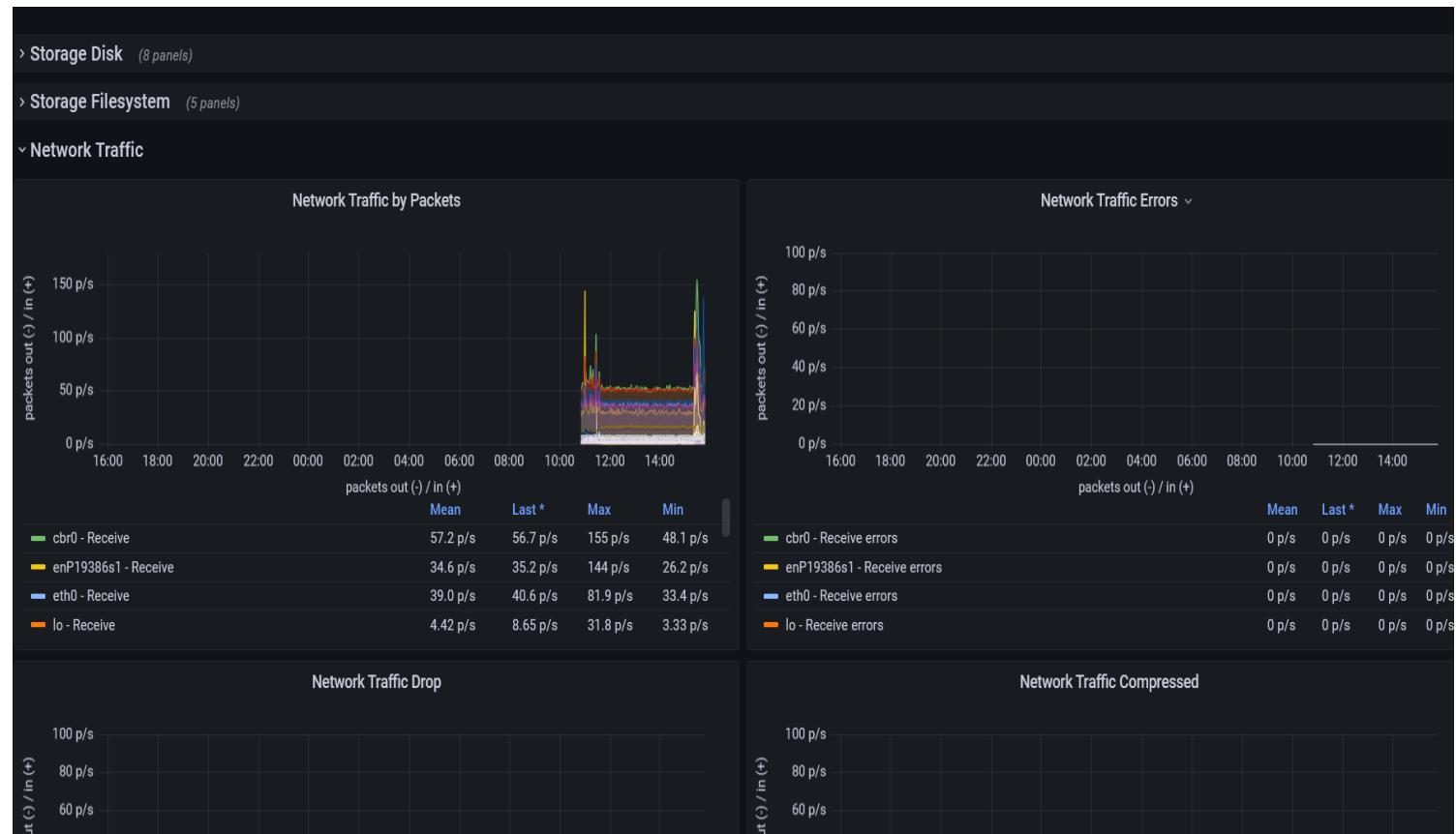
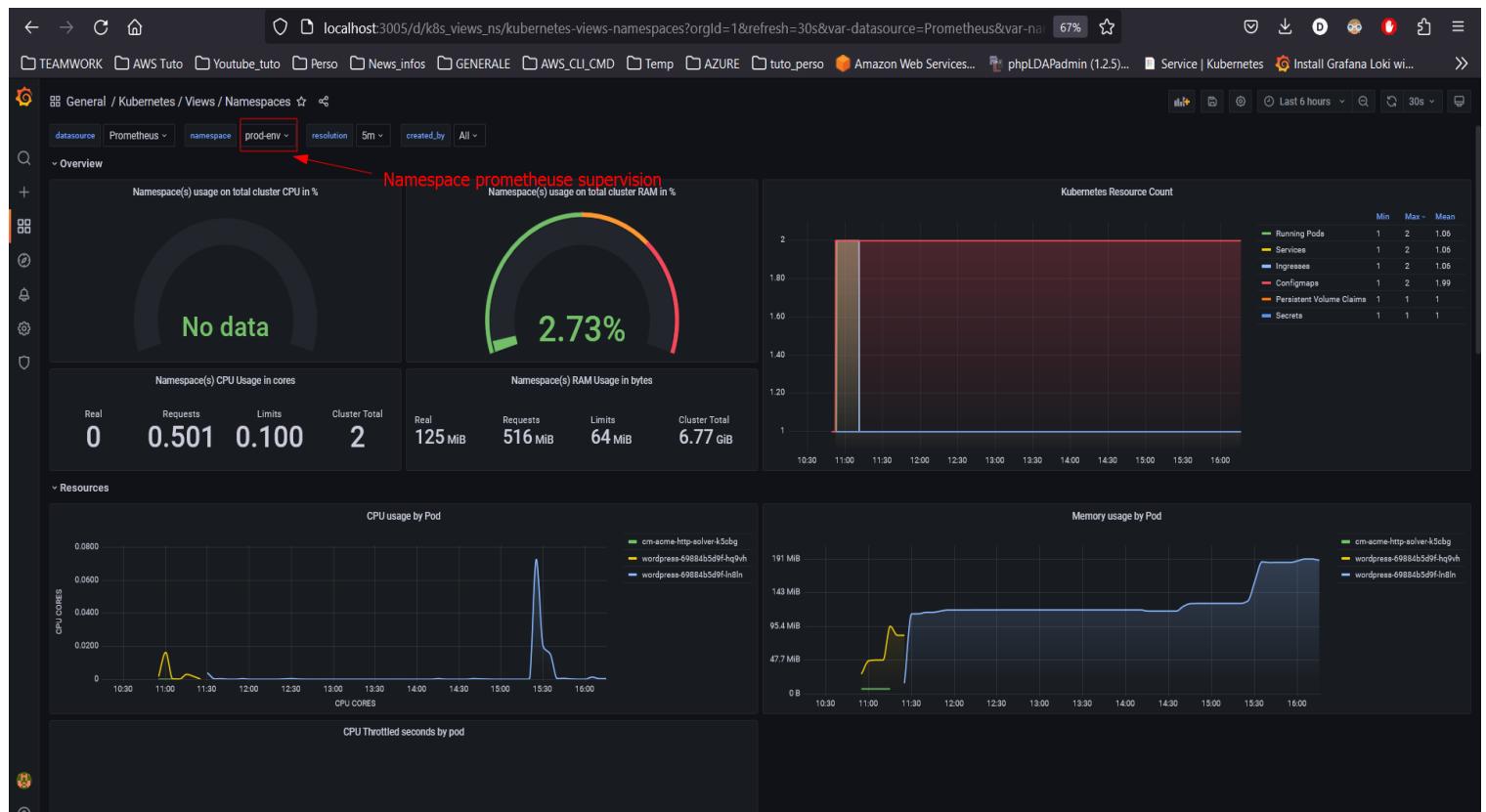
Pour suivre et analyser les statistiques de manière approfondie, j'ai choisi d'intégrer Grafana et Prometheus à mon infrastructure. Ces outils de surveillance puissants me permettent de collecter et de visualiser des données cruciales, telles que le pourcentage d'utilisation du CPU, l'espace disque disponible, l'utilisation de la mémoire, et bien plus encore. En utilisant Grafana, je peux créer des tableaux de bord personnalisés pour afficher ces statistiques de manière claire et intuitive.

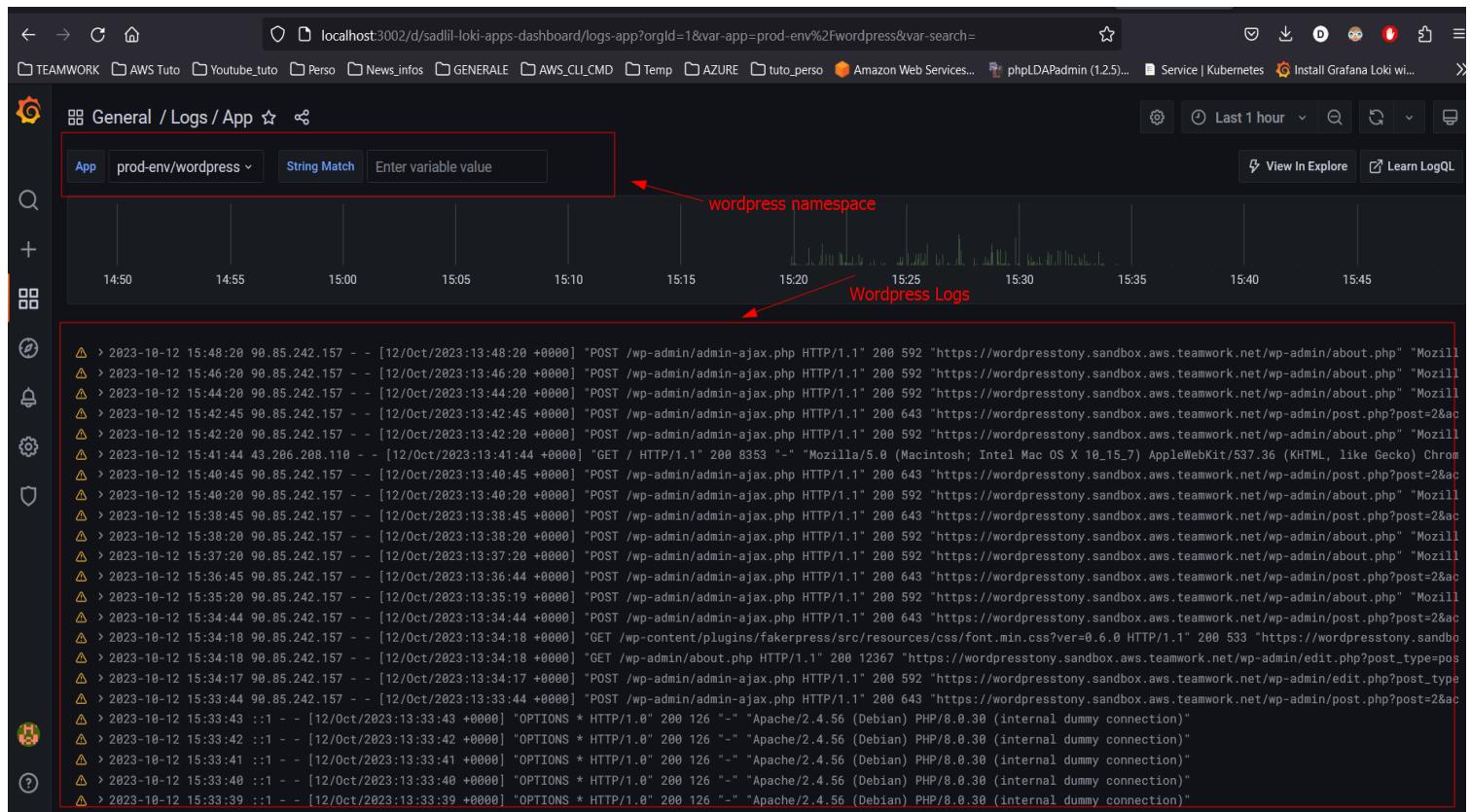
L'avantage de cette approche est la capacité à avoir une vue en temps réel de la santé de mon système. Je peux définir des alertes personnalisées pour être informé immédiatement en cas de problème ou de dépassement de seuils critiques. En outre, je peux examiner les tendances à long terme grâce à l'historique des données collectées, ce qui m'aide à prendre des décisions éclairées pour l'optimisation des performances et la gestion des ressources.

Grafana et Prometheus offrent une combinaison puissante pour surveiller et analyser les statistiques de mon infrastructure, assurant ainsi un fonctionnement fluide et efficient de mes systèmes.

#### Captures d'écrans







## 10. Exploiter une solution de supervision

Pour une supervision complète de mon infrastructure, j'ai choisi d'intégrer Grafana, Prometheus et Loki. Ces outils combinés me permettent d'obtenir une vue d'ensemble détaillée de mon environnement, en collectant, visualisant et stockant des données essentielles pour la surveillance.

Prometheus est l'outil central de collecte de données, il récupère des informations sur les performances du système, notamment le CPU, la mémoire, l'utilisation du réseau et bien d'autres. Grafana vient compléter l'ensemble en créant des tableaux de bord interactifs, où je peux afficher en temps réel ces données sous forme de graphiques, de jauge et de tableaux, ce qui facilite la détection précoce des problèmes et l'analyse des tendances sur le long terme.

De plus, Loki est utilisé pour la journalisation et la gestion des journaux de façon efficace. Cela me permet de rechercher et d'analyser les journaux en cas d'incidents ou de comportements inattendus, ce qui facilite le dépannage.

L'ensemble de ces outils forme une solution de surveillance puissante qui me permet de maintenir un niveau de performance élevé et de réagir rapidement en cas de problèmes, contribuant ainsi à la fiabilité et à la stabilité de mon infrastructure.

### Captures d'écrans

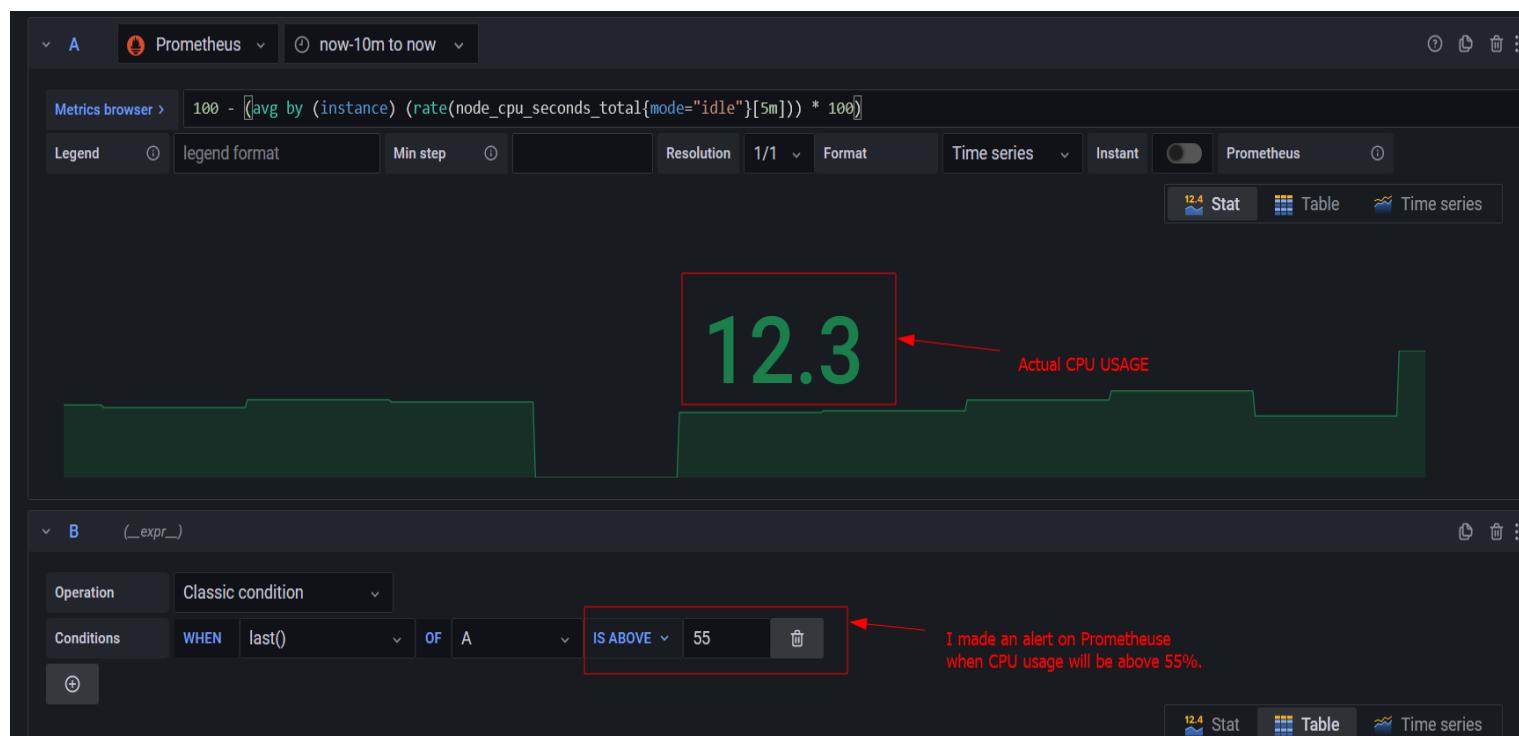
A screenshot of a terminal window on a Linux system. The user is running a wrk load test with 10 threads and 100 connections against a WordPress site hosted on AWS Teamwork. The test duration is 120 seconds. The results show an average latency of 30.12ms, a standard deviation of 29.82ms, and a maximum latency of 592.67ms. The test completed 455198 requests in 2.00m, reading 159.75MB. A red box highlights the command and the initial results table. Another red box highlights the conclusion message at the bottom right. A red arrow points from the conclusion message to a explanatory text on the right side of the terminal window.

```
dri_linux@FR-TWFR-tXB5M0a:~/desktop/wrk$ wrk -t10 -c100 -d120s http://wordpresstonysite.sandbox.aws.teamwork.net/
Running 2m test @ http://wordpresstonysite.sandbox.aws.teamwork.net/
  10 threads and 100 connections
  Thread Stats      Avg      Stdev     Max   +/- Stdev
    Latency    30.12ms  29.82ms  592.67ms  96.13%
    Req/Sec   383.92    75.76   500.00   87.74%
  455198 requests in 2.00m, 159.75MB read

Requests/sec:  3790.06
Transfer/sec:   1.33MB
dri_linux@FR-TWFR-tXB5M0a:~/desktop/wrk$
```

I'm using wrk to make a test load of my server: 10 threads and 100 connections during 120s.

My latency resultat:  
AVG:30.12  
Standard: 29.82ms  
Max 592.67  
Conclusion  
My server is able to handle correctly the charge.



Create alert rule

Cancel Save Save and e

1 Rule type

Rule name **RAM Usage** RAM USAGE ALERT

Rule type **Grafana managed alert**

Folder **Monitoring**

2 Create a query to be alerted on

A Prometheus now-5m to now

Metrics browser >  $100 - ((\text{node\_memory\_MemAvailable\_bytes}\{\text{node}=\text{"aks-defalut-11720612-vmss000000"}\} * 100) / \text{node\_memory\_MemTotal\_bytes}\{\text{node}=\text{"aks-defalut-11720612-vmss000000"}\})$

B (`_expr_`) WHEN MY RAM PASS 75% OF USAGE I WILL GET AN ALERT

Operation **Classic condition**

Conditions **WHEN max() OF A IS ABOVE 75**

## **11. Echanger sur des réseaux professionnels éventuellement en anglais**

Pour échanger et interagir sur des réseaux professionnels, notamment en anglais, j'ai l'habitude d'utiliser des plateformes telles que Stack Overflow, ainsi que d'autres sites internet similaires. Que ce soit pour résoudre un problème technique complexe, comprendre le dysfonctionnement d'une application, ou même apprendre comment installer de nouveaux logiciels, je privilégie toujours la recherche en anglais.

Cette préférence s'explique par le fait qu'Internet est une ressource mondiale, et l'anglais est largement considéré comme la langue officielle de la technologie et de la programmation. En effectuant des recherches en anglais, je peux accéder à une plus grande quantité de ressources, de tutoriels, de réponses à des questions et de discussions de la part de la communauté mondiale. Cela me permet de bénéficier de l'expertise et de l'expérience d'une audience internationale, ce qui est extrêmement précieux pour résoudre des problèmes techniques et rester à jour dans un environnement technologique en constante évolution.

J'ai répondu à quelques questions sur Stack Overflow en anglais, puis j'ai créé un blog pour expliquer l'installation d'outils de supervision tels que Grafana, Prometheus et Loki sur AKS.

Voici le lien : <https://dgoranidevops.wordpress.com/>

Captures d'écrans

 Products  31 2 

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## How to Install Docker on Mac Version 10.13? [closed]

Asked 1 year, 1 month ago Modified 29 days ago Viewed 3k times

 0 

**Closed.** This question is [not about programming or software development](#). It is not currently accepting answers.

 This question does not appear to be about [a specific programming problem, a software algorithm, or software tools primarily used by programmers](#). If you believe the question would be on-topic on [another Stack Exchange site](#), you can leave a comment to explain where the question may be able to be answered.

Closed last year.

[Improve this question](#)

I know macs need version 10.15 or above to install Docker. But I want to install docker on my 10.13 mac, can you give me any advice?

(Docker officially requires at least version 10.15 or above, but my Mac can't be upgraded.)

[docker](#) [macos](#) [installation](#) [version](#)

Share Edit Follow Flag edited Sep 13, 2022 at 8:21 asked Sep 13, 2022 at 8:14  **Jack Cheng** 11 1 2

**The Overflow Blog**

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-  Update on Collectives and Di
-  OverflowAI Search is now available testing (September 13,

**Related**

## 2 Answers

Sorted by: Highest score (default)

Maybe it can be useful for you this site, try this method who knows. Better lose than never try. You have all instructions in link below

<https://www.aeoluswing.xyz/docker-for-mac/install/>

Share Edit Delete Flag edited Sep 13, 2022 at 8:41 answered Sep 13, 2022 at 8:40

My answear

Thanks for your advice. I have tried the method you mentioned, but it seems to go back to the process of downloading dmg, which has been tested and is not feasible. – Jack Cheng Sep 13, 2022 at 9:24

Add a comment

His response

The easiest way is to install [Docker Desktop for MacOS](#). If you need Docker-Compose too, you can run `brew install docker-compose` if [Brew](#) isn't installed

1 And if that doesn't work you can maybe virtualize an Debian based Linux...

Share Edit Follow Flag

edited Sep 14 at 8:03

answered Sep 13, 2022 at 8:45

OverIOAI Search is now available for alpha testing (September 13, 2023)

## Related

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3226 From inside of a Docker container, how do I connect to the localhost of the machine?

1672 How do I install pip on macOS or OS X?

2220 How to copy Docker images from one host to another without using a repository

## Hot Network Questions

Is there precedent in official material for small creatures to mount bipedal creatures 2 sizes larger than them?

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Through various editions of D&D, why would you

← → ⌂ ⌂ https://stackoverflow.com/questions/29308219/azure-vm-strange-fail/73700794#73700794

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## Azure VM - strange fail

Asked 8 years, 6 months ago Modified 1 year ago Viewed 61 times Part of Microsoft Azure Collective

0 I was using my Azure VM and when installing SQL Express the RDP session stopped. Can't reconnect RDP, but asks for password and if wrong denies access. Also tried to reboot and shutdown from Azure Web Panel and Azure PowerShell with no success. What can I do more?

Thanks,  
Paulo

Share Edit Follow Flag

Question

edited Mar 28, 2015 at 1:07 asked Mar 27, 2015 at 18:56

David Makogon 69.5k 21 142 190 Paulo P 1 1

MWORK AWS Tuto Youtube\_tuto Perso News\_infos GENERALE AWS\_CLI\_CMD Temp AZURE tuto\_perso Amazon Web Services... phpLDAPAdmin 1.2.5... Service | Kubernetes Install Gra

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1 Answer Sorted by: Highest score (default) Related

You can try to change password for your RDP in order to reconnect, try this maybe it will work.

**Reset by using the Azure portal**

First, sign in to the Azure portal and then select Virtual machines on the left menu. Reset the local administrator account password

1.Select your Windows VM and then select Reset password under Help. The Reset password window is displayed.

2.Select Reset password, enter a username and a password, and then select Update.

3.Try connecting to your VM again.

Reset the Remote Desktop Services configuration

This process will enable Remote Desktop service in the VM, and create a firewall rule for the default RDP port 3389.

1.Select your Windows VM and then select Reset password under Help. The Reset password window is displayed.

2.Select Reset configuration only and then select Update.

3.Try connecting to your VM again.

Share Edit Delete Flag My answear answered Sep 13, 2022 at 9:43 driton 31 2 Add a comment

1 cannot access windows azure virtual machine

2 Azure VM - the operation cannot be performed because the virtual machine is faulted

1 AZURE VM refuses to start "Starting (Could not start)"

0 Azure VM faulted error

1 Failed to start virtual machine - Azure Portal Error

0 Azure: Provisioning of virtual machine fails.

1 Corrupted Azure Virtual Machine

1 Can't start an Azure virtual machine which is in Available status

0 Azure can not access VM

0 Azure VM gets Provisioning failed issue

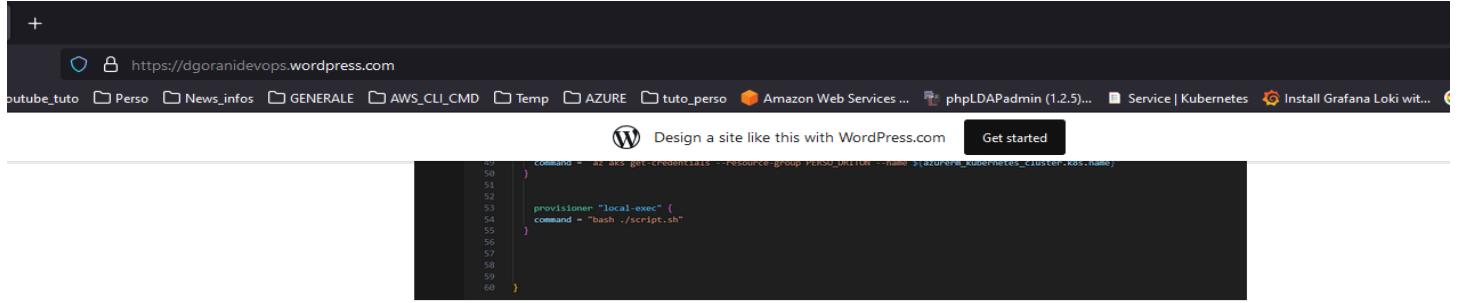
Hot Network Questions

Why isn't there a letter for /b/ sound in Greek alphabet while they have the sound?

Why does burnt milk on bottom of pan have cork-like pattern?

Why is Reuben spelled with an "eu"?

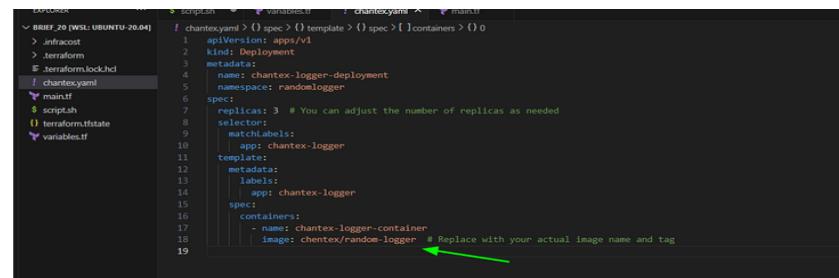
"Real-life" examples of limits of functions at finite



```

92     command = "az aks get-credentials --resource-group PERSO_MILLION --name azurerem_kubernetes_cluster.k8s.fqdn
93   }
94 
95   provisioner "local-exec" {
96     command = "bash ./script.sh"
97   }
98 }
99
100 }
```

Here is the Terraform script to deploy to a cluster on AKS (Azure Kubernetes Service). My goal is to use Helm to install Grafana and Loki to monitor and continuously collect logs from an application that generates logs. But here is only the main page that I've published in order to create an AKS as IaaS using terraform. If you aren't able to use terraform and code your infrastructure you can use also Azure Portal in order to create it manually.



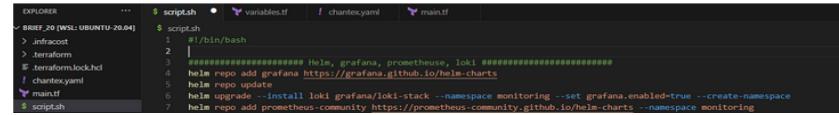
```

EXPLORER      $ script.sh  •  variables.tf  / chantex.yaml  ✘ main.tf
✓ BRIDGE_20 [WSL:UBUNTU-20.04]
> infacost
> terraform
> terraform.lock.hcl
! chantex.yaml
└ main.tf
  $ script.sh
  ! terraform.tfstate
  ! variables.tf
```

```

1  apiVersion: apps/v1
2  kind: Deployment
3  metadata:
4    name: chantex-logger-deployment
5    namespace: randomlogger
6  spec:
7    replicas: 3 # You can adjust the number of replicas as needed
8    selector:
9      matchLabels:
10        app: chantex-logger
11    template:
12      metadata:
13        labels:
14          app: chantex-logger
15      spec:
16        containers:
17          - name: chantex-logger-container
18            image: chantex/random-logger # Replace with your actual image name and tag
19
```

Script to deploy an image generating logs, named 'chantex random logger'.



```

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```

$ script.sh
#!/bin/bash
#
# Helm repo add grafana https://grafana.github.io/helm-charts
# Helm repo update
# helm upgrade --install loki grafana/loki-stack --namespace monitoring --set grafana.enabled=true --create-namespace
# helm repo add grafana https://grafana.github.io/helm-charts --namespace monitoring
# helm repo add prometheus-community https://prometheus-community.github.io/helm-charts --namespace monitoring
```