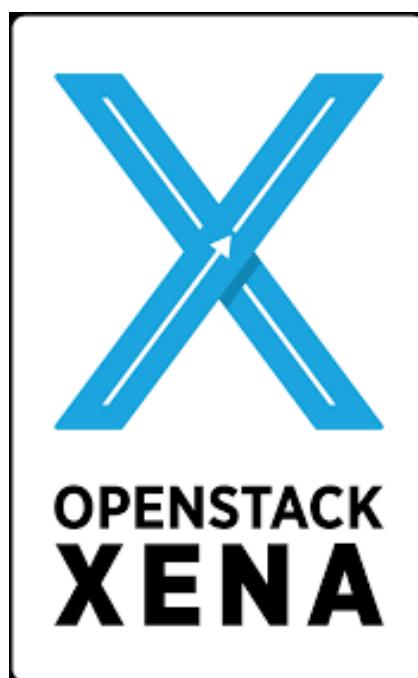


Rapport du Projet Cloud Computing

Création d'un réseau privée openstack



ASEDS 2021/2022

Qu'est ce que le cloud computing:

Le cloud computing est un modèle de calcul qui consiste à fournir des services cloud « à la demande » en tant qu'infrastructure et ressources informatiques, ce modèle de calcul est associé à deux modes de paiement soit par abonnement ou par utilisation . En ce qui concerne le contexte d'émergence du cloud computing est que les grandes entreprises ont un excès en matière des ressources informatiques alors que les petites et moyennes n'ont pas la puissance financière nécessaire pour instaurer et maintenir une infrastructure informatique. Donc les grandes interfaces telles que Amazon et Microsoft louent ses services et sa puissance de calcul a ces petites et moyennes entreprises.



Parmi les avantages du cloud computing, on cite:

- La puissance de calcul offerte par le cloud computing est assez avantageuse puisque l'utilisation de serveurs virtuels démultiplie la puissance des processeurs alloués au traitement des opérations complexes ce qui permet de réduire considérablement le délai d'exécution.
- Abstraction de la complexité du matériel puisqu'en utilisant le paradigme du cloud computing, on n'a qu'à préciser ce qu'on veut en termes de ressources, et tout est géré automatiquement.
- Meilleure disponibilité : Les fournisseurs de cloud computing proposent des niveaux de disponibilité élevés, pouvant aller jusqu'à 99,9%. Grâce au système de haute disponibilité et de reprise d'activité, un serveur de secours prend immédiatement le relais en cas de défaillance.
- L'élasticité garantie grâce au redimensionnement automatique et la prédition des besoins aux ressources supplémentaires
- La réduction des coûts car au lieu d'instaurer toute une infrastructure informatique ce qui coûte énormément, on a qu'à profiter des ressources allouées et payer que ce qu'on a utilisé.

Parmi les limites du cloud computing, on cite:

- La latence réseau
- La nécessité de la connectivité
- Le manque des normes et des standards dans ce domaine
- Confidentialité de données

Les types du cloud computing:

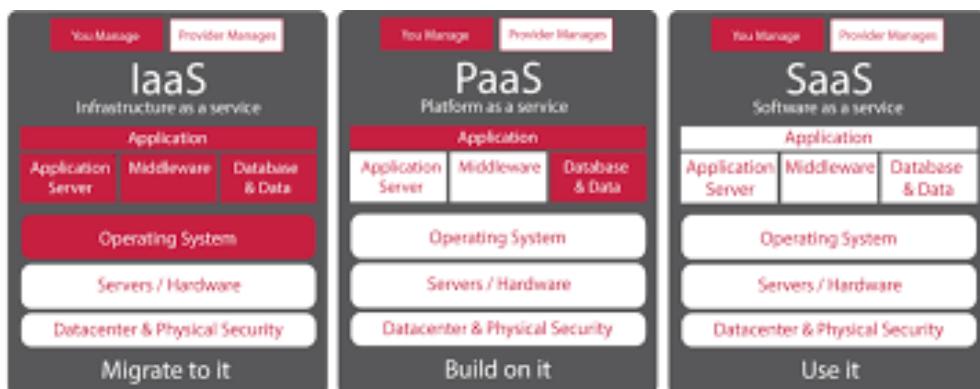
On peut catégoriser le cloud computing selon le paradigme de déploiement utilisé ou en fonction des services offerts.

Concernant les types de déploiement au niveau du cloud computing, on a :

- **Cloud public** : Dans ce type de cloud, les fournisseurs mettent à disposition leurs ressources au public via internet, et la gestion des data-center est déléguée aux fournisseurs.
- **Cloud privé**: Le cloud privé est un modèle informatique qui offre un environnement propriétaire dédié à une seule entité commerciale. Comme les autres types d'environnements de cloud computing, le cloud privé fournit des ressources informatiques étendues et virtualisées via des composants physiques stockés sur place ou dans le centre de données d'un fournisseur.
- **Cloud hybride**: ce type de cloud mélange deux types d'environnements publics et privés. Ainsi, pour qu'un cloud soit réellement hybride, ces différents environnements doivent être étroitement interconnectés entre eux, fonctionnant essentiellement comme une infrastructure combinée. Presque tous les cloud hybrides comprennent au moins un cloud public.

En ce qui concerne les services, on a :

- **Infrastructure as service** : Les fournisseurs pour ce type de services offrent au client une infrastructure externe. Ils prennent en charge l'installation des serveurs de fichiers, les réseaux et le stockage des données. Mais , c'est au client de gérer ses applications, ses données et son système d'exploitation.
- **Platform as service**: Pour ce type de service , le fournisseur héberge le matériel et les logiciels sur sa propre infrastructure et fournit cette plate-forme à l'utilisateur en tant que solution intégrée, pile de solutions ou service via une connexion Internet ou une API publique.
- **Software as service**: Pour ce type de service cloud, le fournisseur offre une application complète aux utilisateurs pour l'utiliser et toute la gestion est hébergée aux fournisseurs.



Qu'est ce que OpenStack:

OpenStack est un ensemble de logiciels open source permettant de déployer des infrastructures de cloud computing privés ou publics en se basant sur un pool des ressources virtuelles.

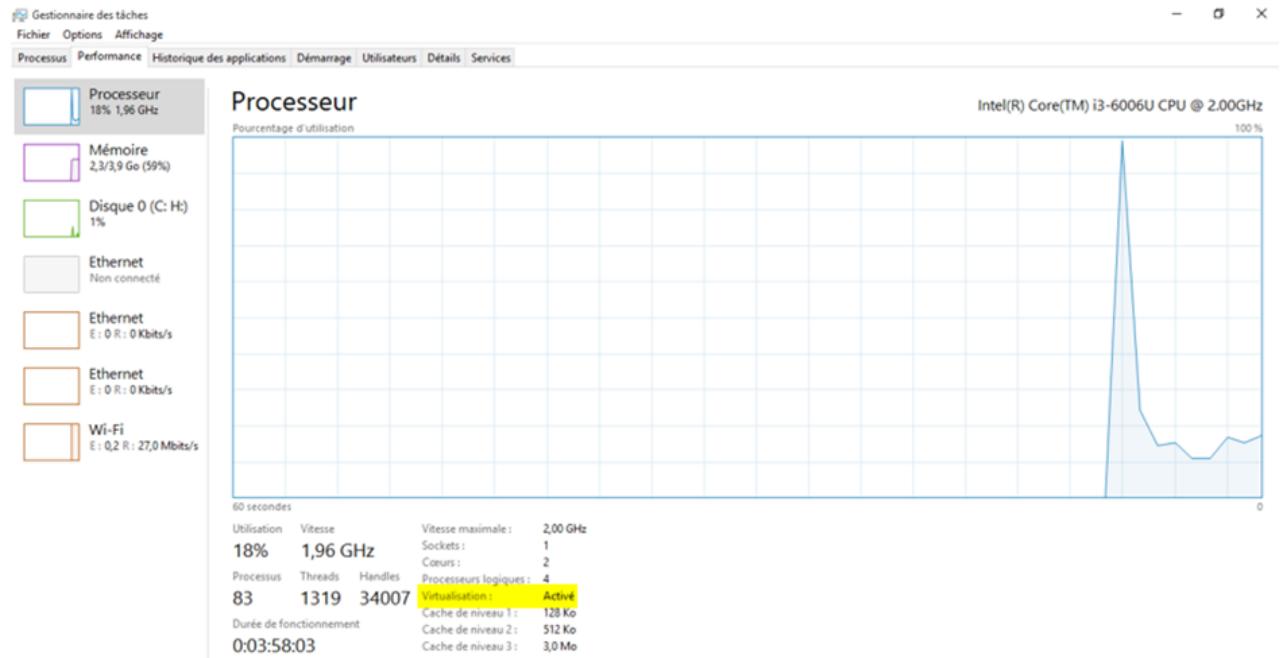


Le cloud Openstack est composé de plusieurs éléments :

- Nova (Compute Service)
- Keystone (Identity Service)
- Glance (Image Service)
- Neutron (Networking)
- Cinder (Block Storage)
- Swift (Object Storage)
- Horizon (Dashboard)

Création de la machine virtuelle CentOS Stream 8 et la configuration requise

- Puisque Openstack ne fonctionne que sous un système d'exploitation linux, on a besoin de créer une machine virtuelle linux. Pour ce faire, on commence par vérifier que la virtualisation est activée au niveau de BIOS à partir de gestionnaire de tâches. On trouve que c'est bien le cas, sinon il fallait l'activer au niveau du Bios:



- On crée ensuite un sous réseau de type Host-only dont la plage des adresses IP allant de 10.0.0.30 à 10.0.0.254:

Virtual Network Editor

Name	Type	External Connection	Host Connection	DHCP	Subnet Address
VMnet0	Custom	-	-	-	192.168.145.0
VMnet1	NAT	NAT	Connected	Enabled	192.168.236.0
VMnet2	Host-only	-	Connected	Enabled	10.0.0.0

Add Network... Remove Network... Rename Network...

VMnet Information

Bridged (connect VMs directly to the external network)
Bridged to:

NAT (shared host's IP address with VMs)

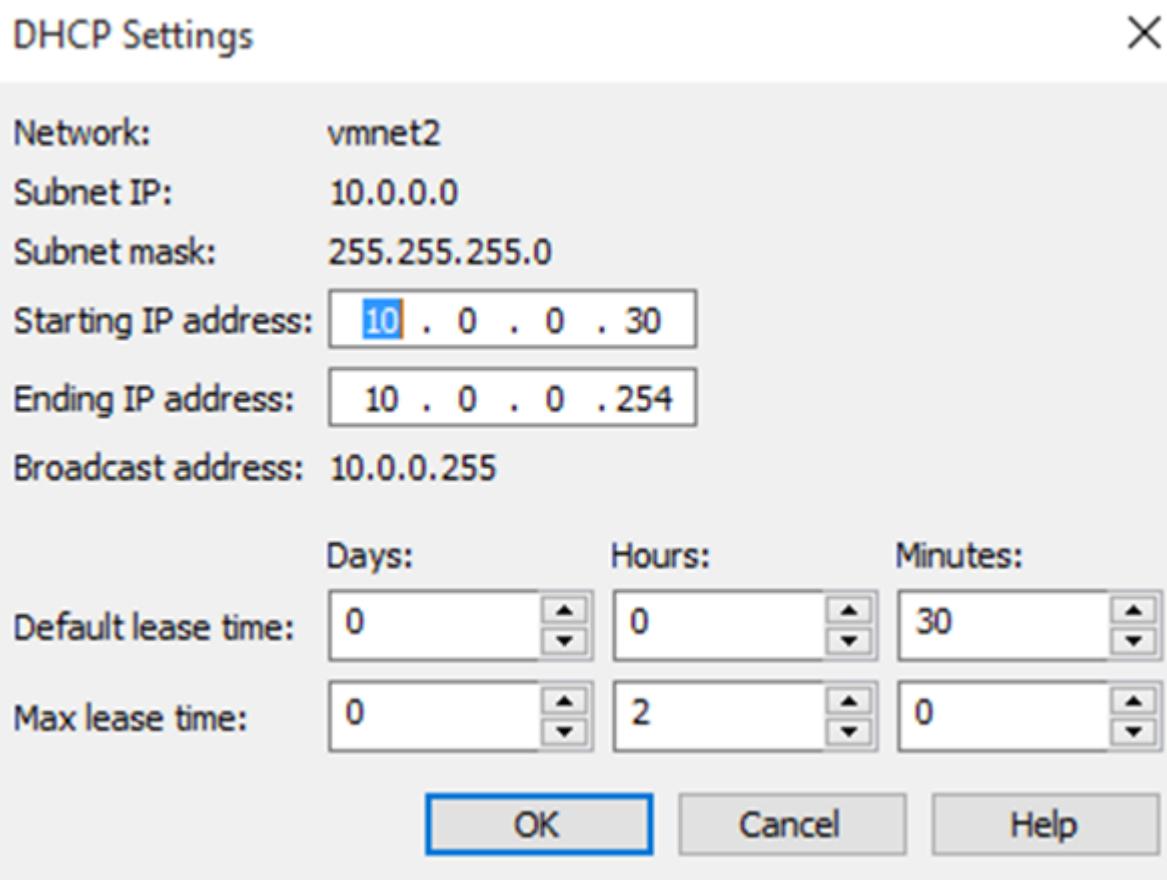
Host-only (connect VMs internally in a private network)

Connect a host virtual adapter to this network
Host virtual adapter name: VMware Network Adapter VMnet2

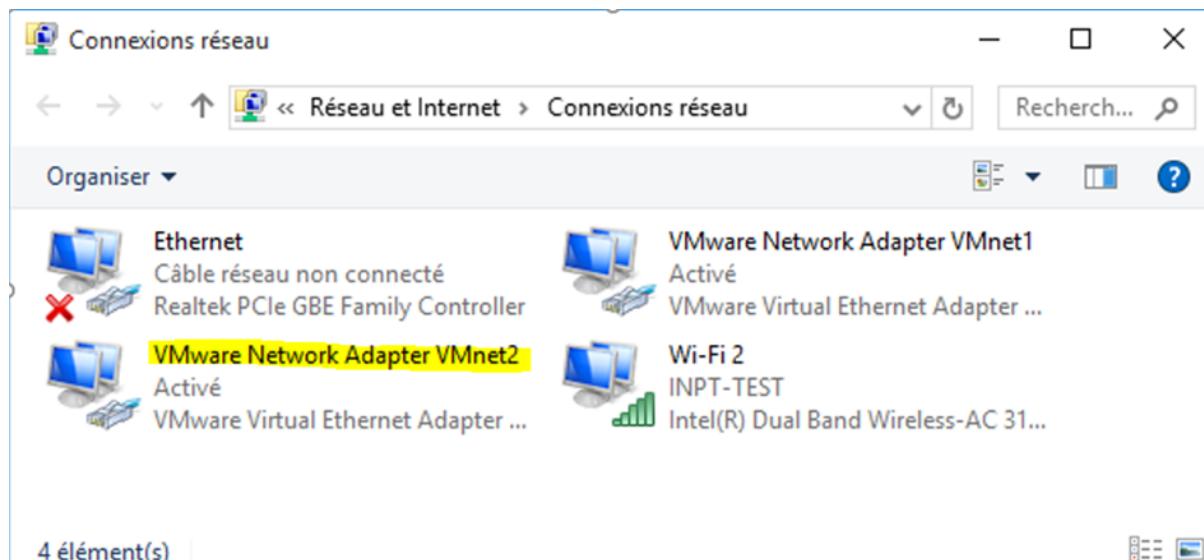
Use local DHCP service to distribute IP address to VMs

Subnet IP: Subnet mask:

Restore Defaults Import... Export... OK Cancel Apply Help



- On trouve que le sous réseau a été bien ajouté au niveau des connexions réseau de Windows:



- Après on Crée la machine virtuelle CentOS Stream 8 au niveau de VMware en choisissant une configuration personnalisée de la machine :



VMWARE
WORKSTATION
PRO™
16

Welcome to the New Virtual Machine Wizard

What type of configuration do you want?

Typical (recommended)

Create a Workstation 16.2.x virtual machine in a few easy steps.

Custom (advanced)

Create a virtual machine with advanced options, such as a SCSI controller type, virtual disk type and compatibility with older VMware products.

Help

< Back

Next >

Cancel

New Virtual Machine Wizard



Choose the Virtual Machine Hardware Compatibility

Which hardware features are needed for this virtual machine?

Virtual machine hardware compatibility

Hardware compatibility: Workstation 16.2.x ▼

Compatible with: ESX Server

Compatible products:

Fusion 12.2.x
Workstation 16.2.x

Limitations:

128 GB memory
32 processors
10 network adapters
8 TB disk size
8 GB shared graphics memory

Help

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Next >

Cancel

New Virtual Machine Wizard



Select a Guest Operating System

Which operating system will be installed on this virtual machine?

Guest operating system

- Microsoft Windows
- Linux
- VMware ESX
- Other

Version

CentOS 8 64-bit



Help

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Next >

Cancel

New Virtual Machine Wizard



Name the Virtual Machine

What name would you like to use for this virtual machine?

Virtual machine name:

Location:

The default location can be changed at [Edit > Preferences](#).

- On choisit d'affecter à notre VM 2 processeurs avec 2 cœurs pour atteindre les performances souhaitées:

New Virtual Machine Wizard

X

Processor Configuration

Specify the number of processors for this virtual machine.

Processors

Number of processors:

2

Number of cores per processor:

2

Total processor cores:

4

Help

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Cancel

- On choisit d'attribuer à notre VM 3GO de RAM:

New Virtual Machine Wizard



Memory for the Virtual Machine

How much memory would you like to use for this virtual machine?

Specify the amount of memory allocated to this virtual machine. The memory size must be a multiple of 4 MB.

128 GB

64 GB

32 GB

16 GB

8 GB

4 GB

2 GB

1 GB

512 MB

256 MB

128 MB

64 MB

32 MB

16 MB

8 MB

4 MB

Memory for this virtual machine:

3000 MB

Maximum recommended memory:

2.9 GB

Recommended memory:

1 GB

Guest OS recommended minimum:

512 MB

[Help](#)

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Next >

Cancel

New Virtual Machine Wizard



Select I/O Controller Types

Which SCSI controller type would you like to use for SCSI virtual disks?

I/O controller types

SCSI Controller:

- BusLogic (Not available for 64-bit guests)
- LSI Logic (Recommended)
- LSI Logic SAS
- Paravirtualized SCSI

Help< BackNext >Cancel

New Virtual Machine Wizard

X

Select a Disk Type

What kind of disk do you want to create?

Virtual disk type

- IDE
- SCSI
- SATA
- NVMe (Recommended)

Help

< Back

Next >

Cancel

- On détermine par la suite 60GO comme taille du disque dur, et on choisit de sauvegarder le disque virtuel comme un seul fichier afin d'augmenter les performances :

New Virtual Machine Wizard



Specify Disk Capacity

How large do you want this disk to be?

Maximum disk size (GB):

Recommended size for CentOS 8 64-bit: 20 GB

Allocate all disk space now.

Allocating the full capacity can enhance performance but requires all of the physical disk space to be available right now. If you do not allocate all the space now, the virtual disk starts small and grows as you add data to it.

Store virtual disk as a single file

Split virtual disk into multiple files

Splitting the disk makes it easier to move the virtual machine to another computer but may reduce performance with very large disks.

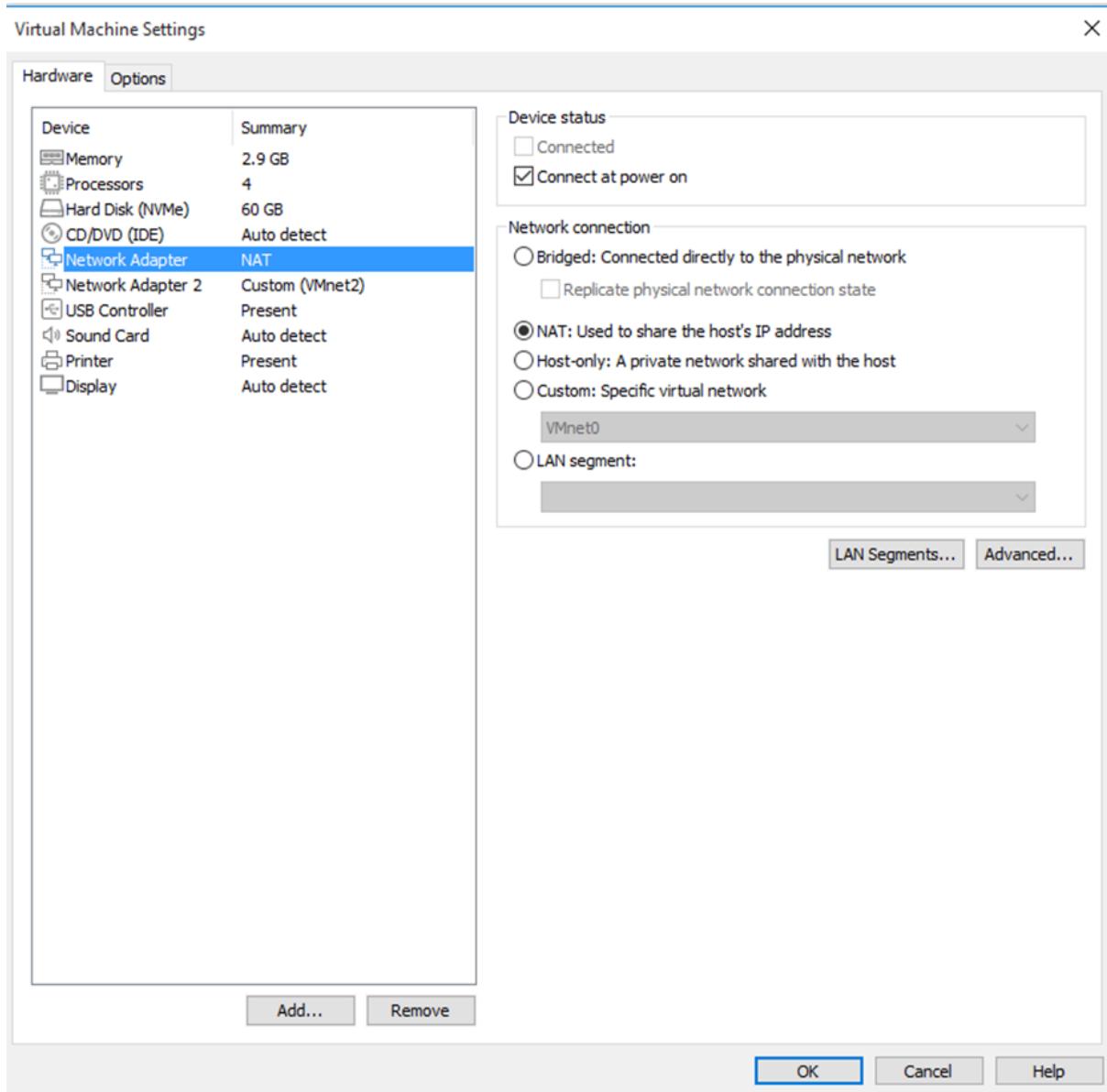
[Help](#)

[<< Back](#)

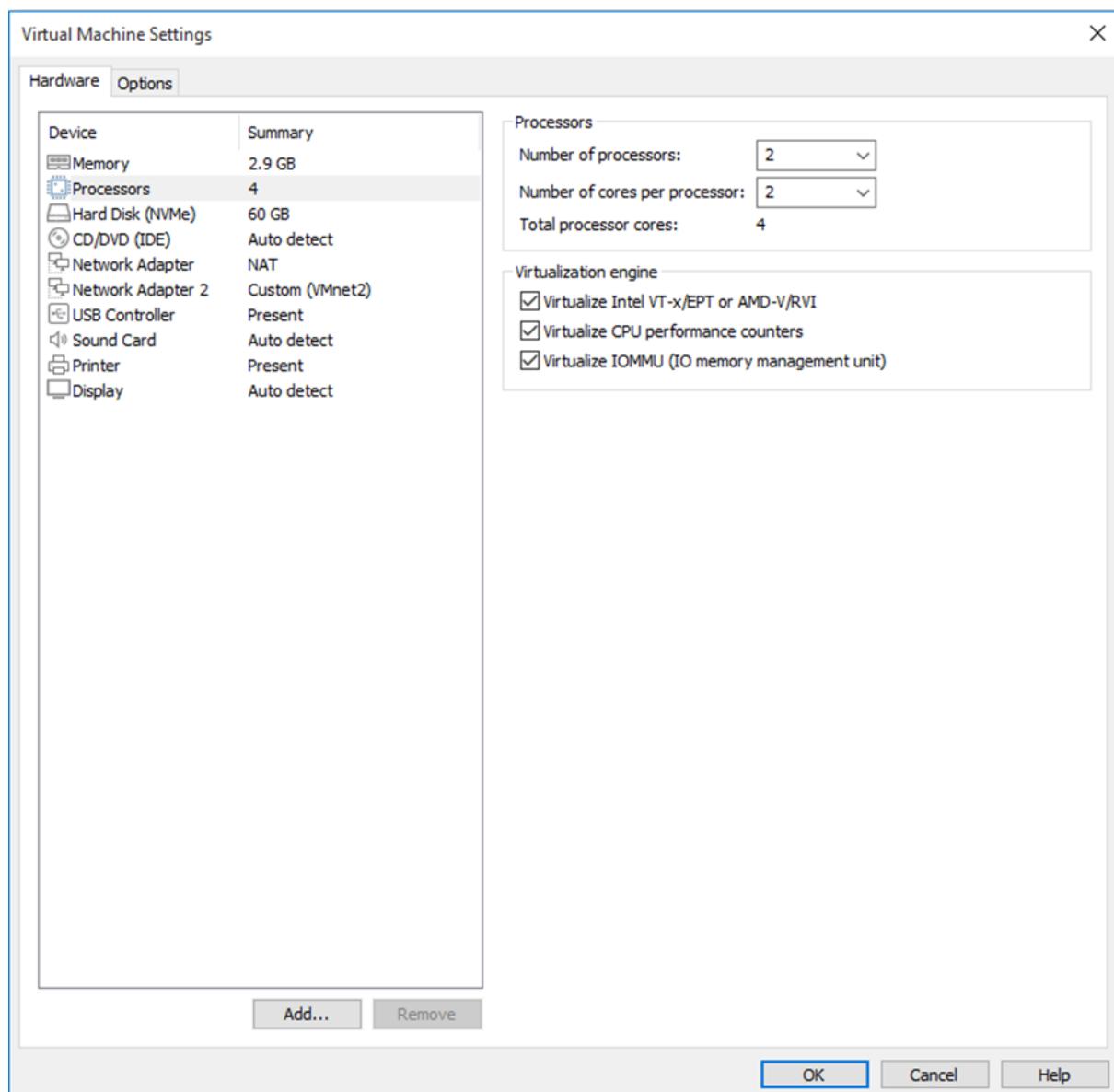
[Next >](#)

[Cancel](#)

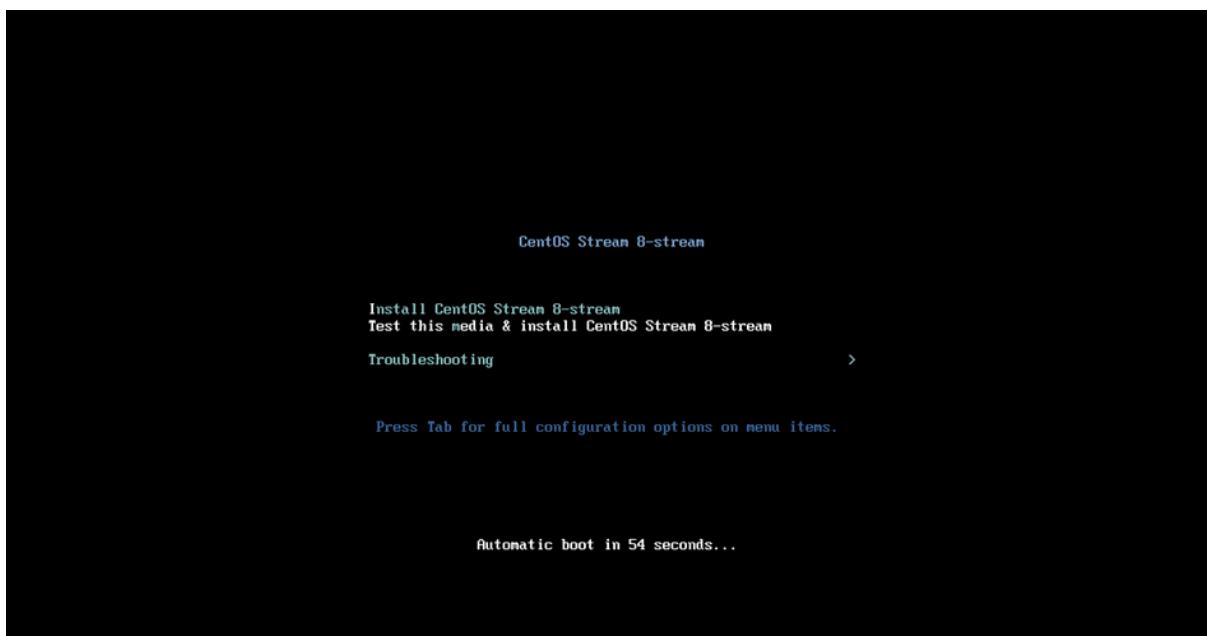
- On Configure le réseau de la machine virtuelle en créant deux interfaces réseau :
 - **Une interface NAT:** pour qu'on puisse télécharger les packages de Internet ;
 - **Une interface Host ONLY :** associée au sous réseau qu'on a créé, cette interface va permettre une communication entre les machines virtuelles et leurs hôtes en interdisant la communication des VMS entre elles.



- Puisqu'on va gérer une infrastructure cloud en utilisant open stack, on doit activer la virtualisation engine au niveau de BIOS de la machine virtuelle pour qu'on puisse créer des machines virtuelles au sein de notre machine:



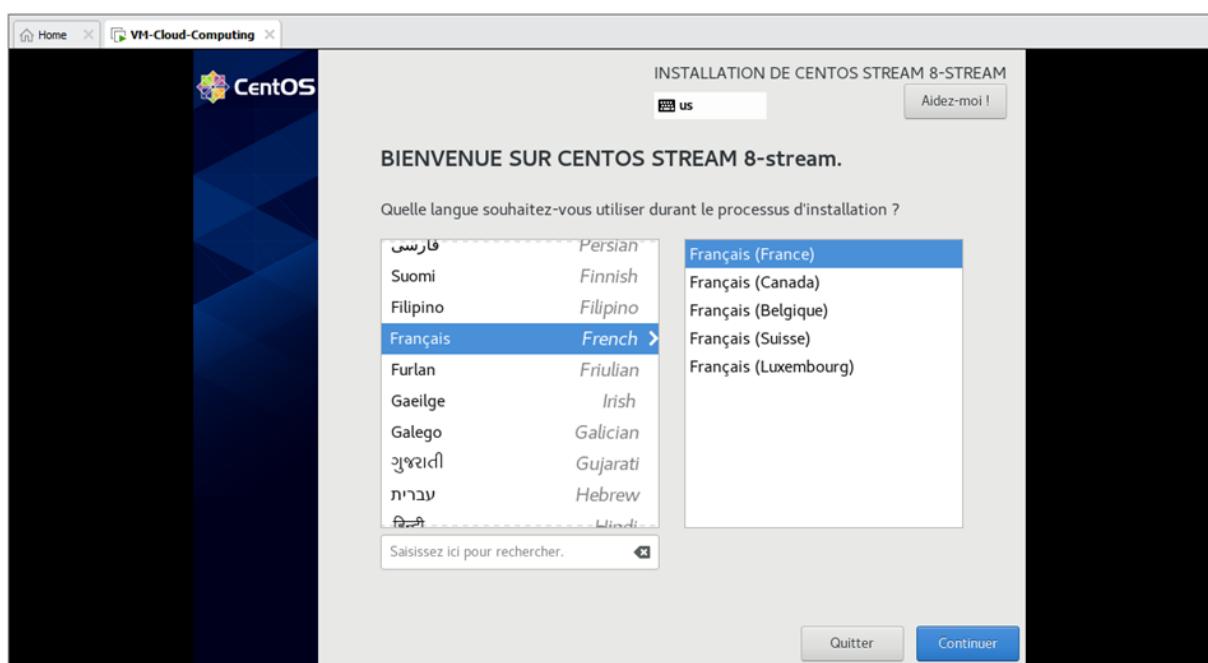
- On installe par la suite CentOS Stream 8 :

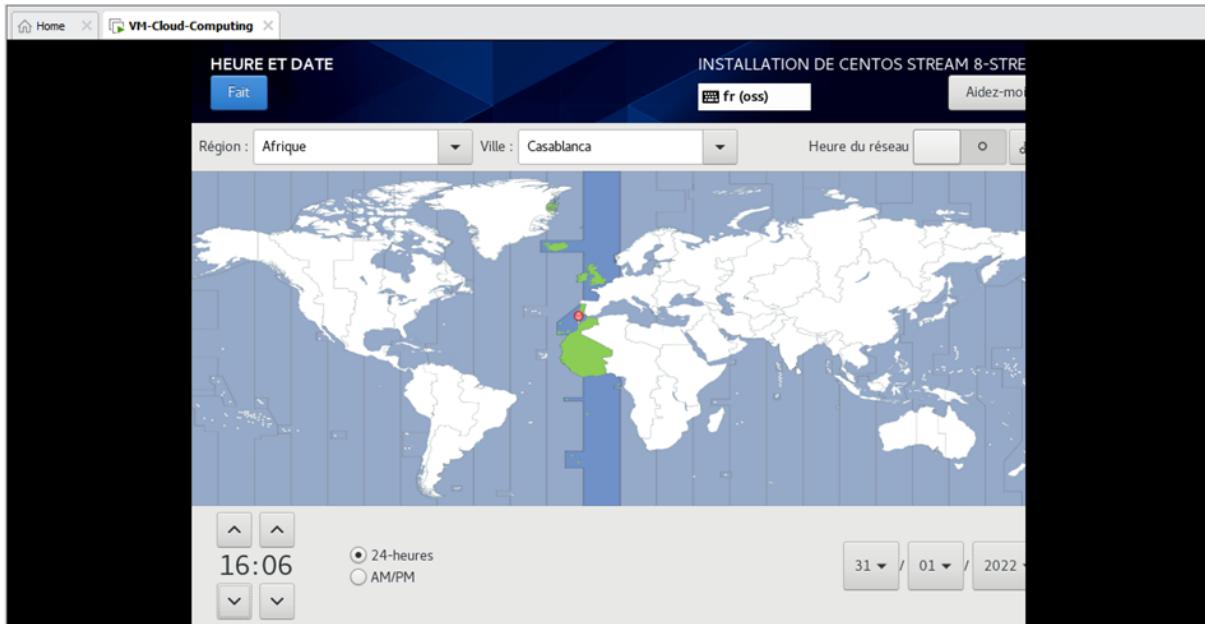


Pourquoi choisir CentOS 8 Stream ?

Puisque l'openstack ne fonctionne que sous linux, on a besoin de choisir une distribution linux. L'une des distributions les plus robustes, fiables et sécurisées est CentOS qui est dérivée de la distribution payante **REDHAT**. Et la dernière version stable de cette distribution est CentOS 8. Contrairement aux autres distributions, avait une seule édition de son système d'exploitation, CentOS 8 a non seulement l'édition stable Classique mais il existe également la version "Stream". CentOS 8 Stream est une édition développeur avec un modèle de mise à jour à diffusion continue car les packages sont mis à jour dès qu'ils sont disponibles dans les référentiels. Ce qui justifie le choix de cette de **CentOS 8 Stream**.

- On passe maintenant à la configuration de la langue et du fuseau horaire :





- Puis on indique le disque virtuel qu'on souhaite déterminer comme cible de l'installation :

CIBLE DE L'INSTALLATION

INSTALLATION DE CENTOS STREAM 8-STRE

fr (oss)

Sélection des périphériques

Selectionnez le périphérique sur lequel vous souhaitez faire l'installation. Il restera intact jusqu'à ce que vous cliquez sur le bouton « Commencer l'installation » du menu principal.

Disques locaux standards

60 Gio	
VMware Virtual NVMe Disk i.5493941413109169000c296e3c5ae559	
nvme0n1	/ 60 Gio d'espace libre

Les disques décochés ne seront pas modifiés

Disques spéciaux et réseau

Ajouter un disque...

Les disques décochés ne seront pas modifiés

Configuration du stockage

Automatique Personnalisé

Je voudrais libérer plus d'espace.

[Résumé complet du disque et chargeur de démarrage...](#)

1 disque sélectionné ; 60 Gio de capacité ; 60 Gio d'espace libre [Rafraîchir](#)

- On indique par la suite le mot de passe du super utilisateur :

MOT DE PASSE ADMINISTRATEUR

Fait

INSTALLATION DE CENTOS STREAM 8-STF

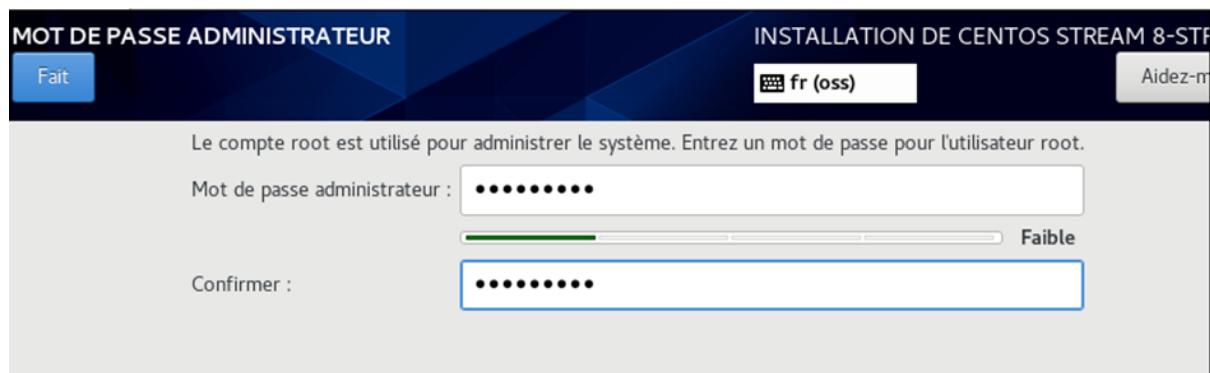
fr (oss)

Aidez-m

Le compte root est utilisé pour administrer le système. Entrez un mot de passe pour l'utilisateur root.

Mot de passe administrateur : ⚡ fr (oss) Faible

Confirmer :



- On ajoute un nouvel utilisateur :

CRÉER UN UTILISATEUR

Fait

INSTALLATION DE CENTOS STREAM 8-STF

fr (oss)

Aidez-m

Nom et prénom

Nom d'utilisateur

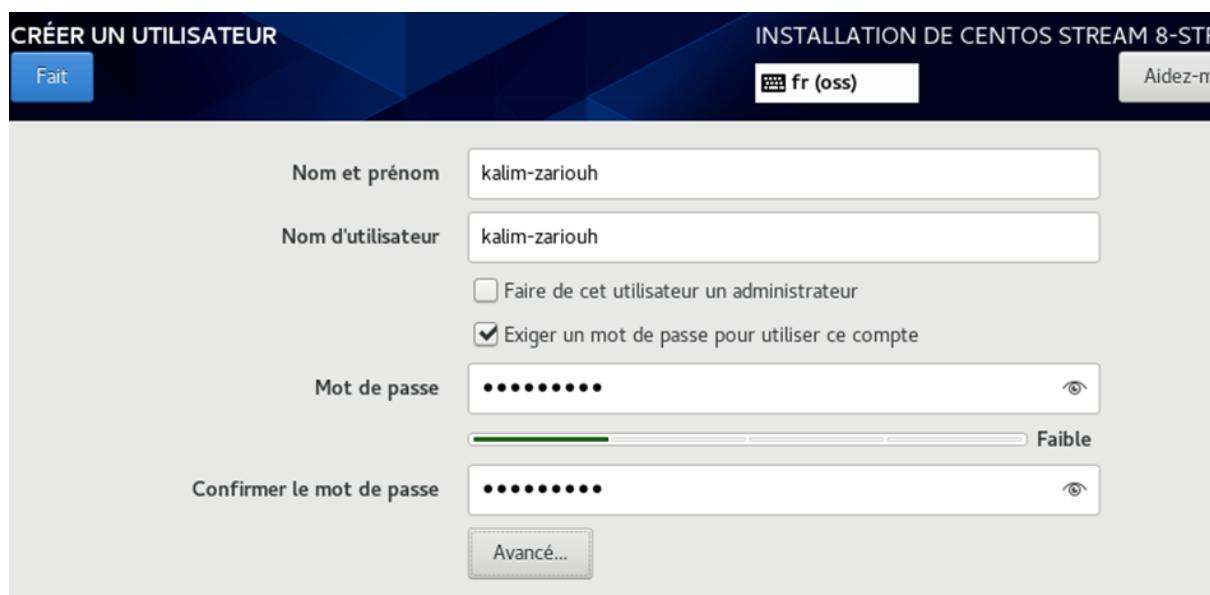
Faire de cet utilisateur un administrateur

Exiger un mot de passe pour utiliser ce compte

Mot de passe ⚡ fr (oss) Faible

Confirmer le mot de passe ⚡

Avancé...



- Puis on accepte la licence :

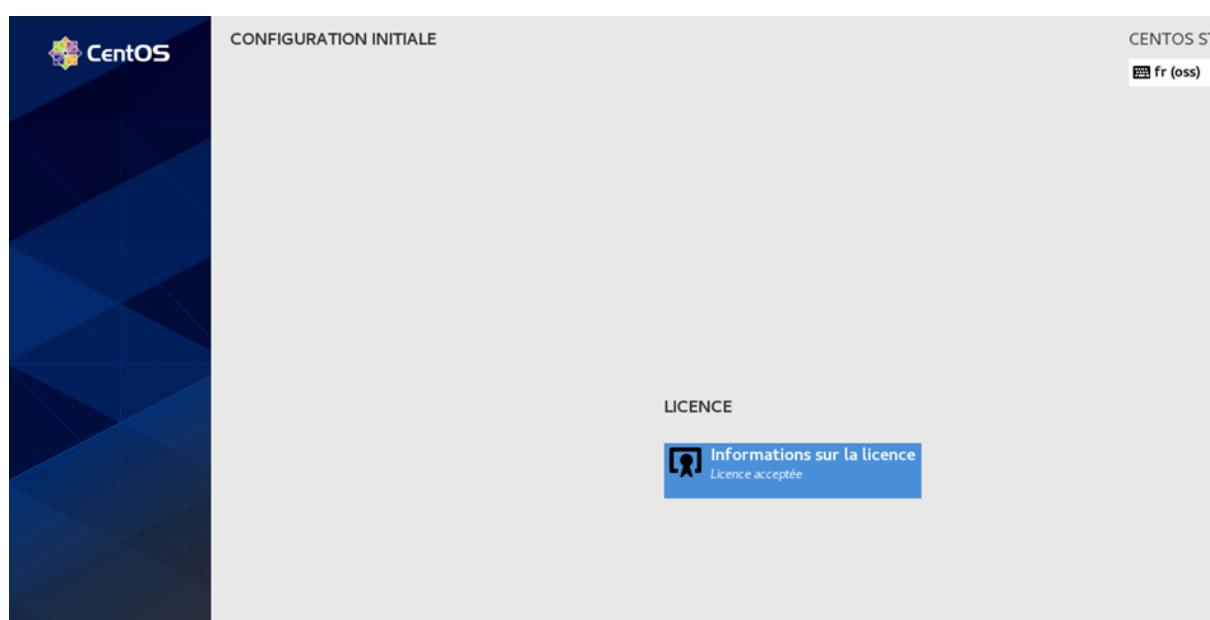
CentOS

CONFIGURATION INITIALE

CENTOS ST
fr (oss)

LICENCE

 Informations sur la licence
Licence acceptée



- On modifie le `hostName` à ‘`controller`’ en éditant le fichier `/etc/hostname` :

```
kalim-zariouh@localhost:/home/kalim-zariouh
Fichier Édition Affichage Rechercher Terminal Aide
[root@localhost kalim-zariouh]# vi /etc/hostname
[root@localhost kalim-zariouh]# cat /etc/hostname
controller
[root@localhost kalim-zariouh]#
```

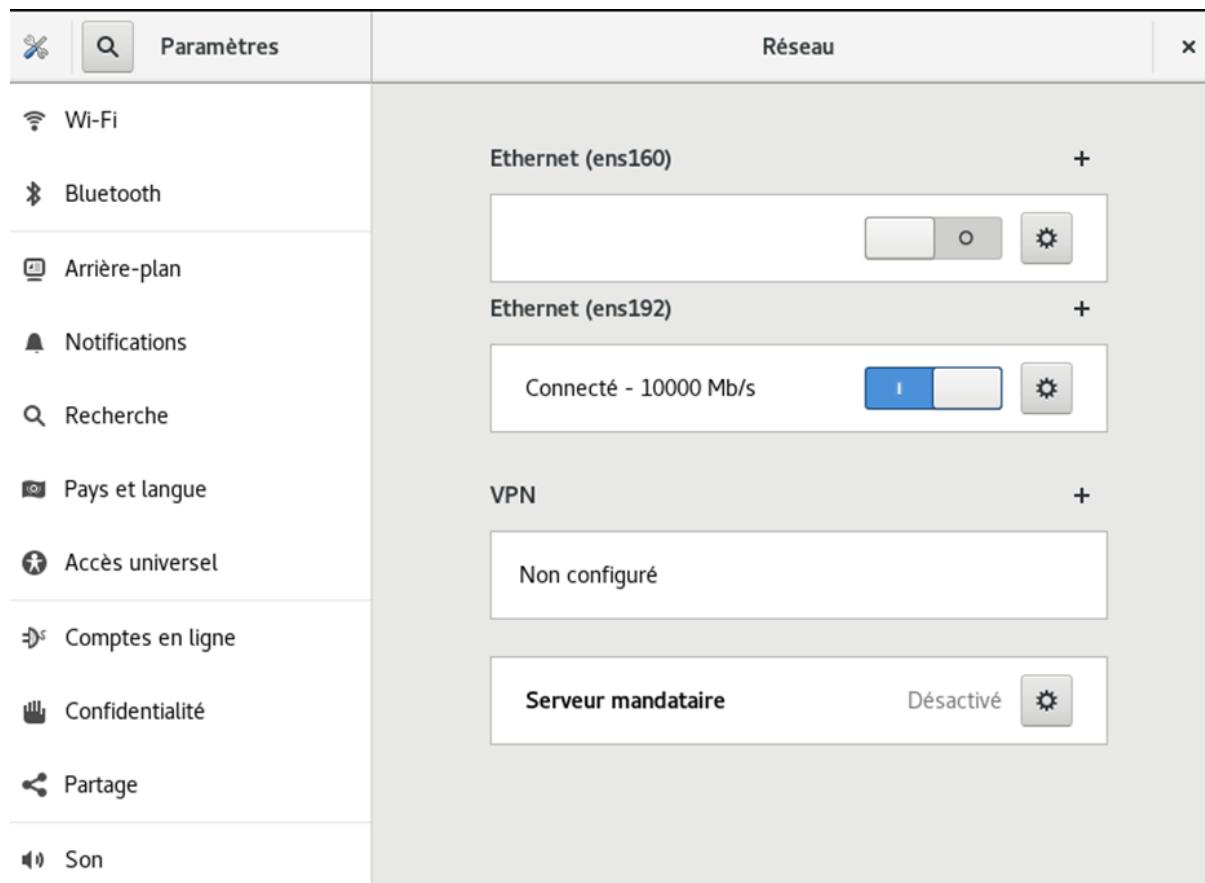
- Au niveau du fichier /etc/hosts, on ajoute l'adresse IP de l'hôte en indiquant l'host name:

```
kalim-zariouh@localhost:/home/kalim-zariouh
Fichier Édition Affichage Rechercher Terminal Aide
127.0.0.1 localhost localhost.localdomain localhost4 localhost4.localdomain4
::1 localhost localhost.localdomain localhost6 localhost6.localdomain6
10.0.0.30 controller
~
```

- On teste la connectivité à controller via la commande ping, et on trouve que cette connexion se passe bien ce qui signifie que la configuration est bien faite:

```
[root@localhost kalim-zariouh]# ping controller
PING controller (10.0.0.30) 56(84) bytes of data.
64 bytes from controller (10.0.0.30): icmp_seq=1 ttl=64 time=0.090 ms
64 bytes from controller (10.0.0.30): icmp_seq=2 ttl=64 time=0.148 ms
64 bytes from controller (10.0.0.30): icmp_seq=3 ttl=64 time=0.138 ms
64 bytes from controller (10.0.0.30): icmp_seq=4 ttl=64 time=0.113 ms
64 bytes from controller (10.0.0.30): icmp_seq=5 ttl=64 time=0.100 ms
64 bytes from controller (10.0.0.30): icmp_seq=6 ttl=64 time=0.185 ms
64 bytes from controller (10.0.0.30): icmp_seq=7 ttl=64 time=0.176 ms
64 bytes from controller (10.0.0.30): icmp_seq=8 ttl=64 time=0.053 ms
64 bytes from controller (10.0.0.30): icmp_seq=9 ttl=64 time=0.145 ms
64 bytes from controller (10.0.0.30): icmp_seq=10 ttl=64 time=0.111 ms
64 bytes from controller (10.0.0.30): icmp_seq=11 ttl=64 time=0.225 ms
64 bytes from controller (10.0.0.30): icmp_seq=12 ttl=64 time=0.056 ms
64 bytes from controller (10.0.0.30): icmp_seq=13 ttl=64 time=0.071 ms
64 bytes from controller (10.0.0.30): icmp_seq=14 ttl=64 time=0.062 ms
64 bytes from controller (10.0.0.30): icmp_seq=15 ttl=64 time=0.158 ms
```

- On choisit l'interface réseau avec l'interface graphique :



- On désactive le firewalld et on s'assure que c'est bien le cas :

Pourquoi désactiver le firewalld :

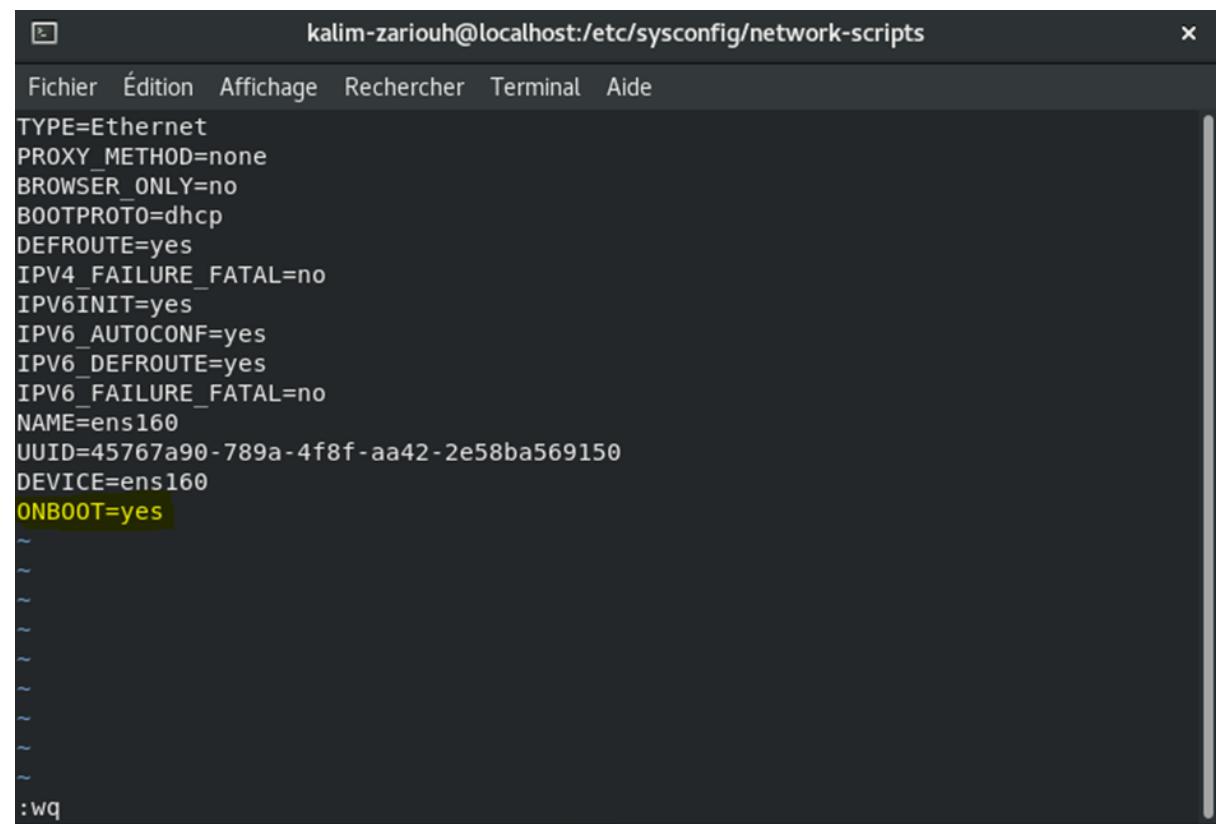
Le firewall limite ou interdit l'accès à certains services, ainsi il peut bloquer la communication entre les VMS et la machine hôte d'où la nécessité de le désactiver, sinon il faut effectuer des configurations supplémentaires.

```
[root@localhost kalim-zariouh]# systemctl stop firewalld
[root@localhost kalim-zariouh]# systemctl disable firewalld
Removed /etc/systemd/system/multi-user.target.wants/firewalld.service.
Removed /etc/systemd/system/dbus-org.fedoraproject.FirewallD1.service.
[root@localhost kalim-zariouh]# systemctl status firewalld
● firewalld.service - firewalld - dynamic firewall daemon
  Loaded: loaded (/usr/lib/systemd/system/firewalld.service; disabled; vendor >
  Active: inactive (dead) since Mon 2022-01-31 16:56:47 +01; 34s ago
    Docs: man:firewalld(1)
   Main PID: 1086 (code=exited, status=0/SUCCESS)

janv. 31 16:36:53 localhost.localdomain systemd[1]: Starting firewalld - dynami>
janv. 31 16:36:55 localhost.localdomain systemd[1]: Started firewalld - dynamic>
janv. 31 16:36:55 localhost.localdomain firewalld[1086]: WARNING: AllowZoneDrif>
janv. 31 16:56:46 localhost.localdomain systemd[1]: Stopping firewalld - dynami>
janv. 31 16:56:47 localhost.localdomain systemd[1]: firewalld.service: Succeede>
janv. 31 16:56:47 localhost.localdomain systemd[1]: Stopped firewalld - dynamic>
[root@localhost kalim-zariouh]#
```

Modification les fichiers du dossier /etc/sysconfig/network-scripts :

On active l'interface réseau **NAT** en changeant la valeur attribuée à **ONBOOT** à **yes**



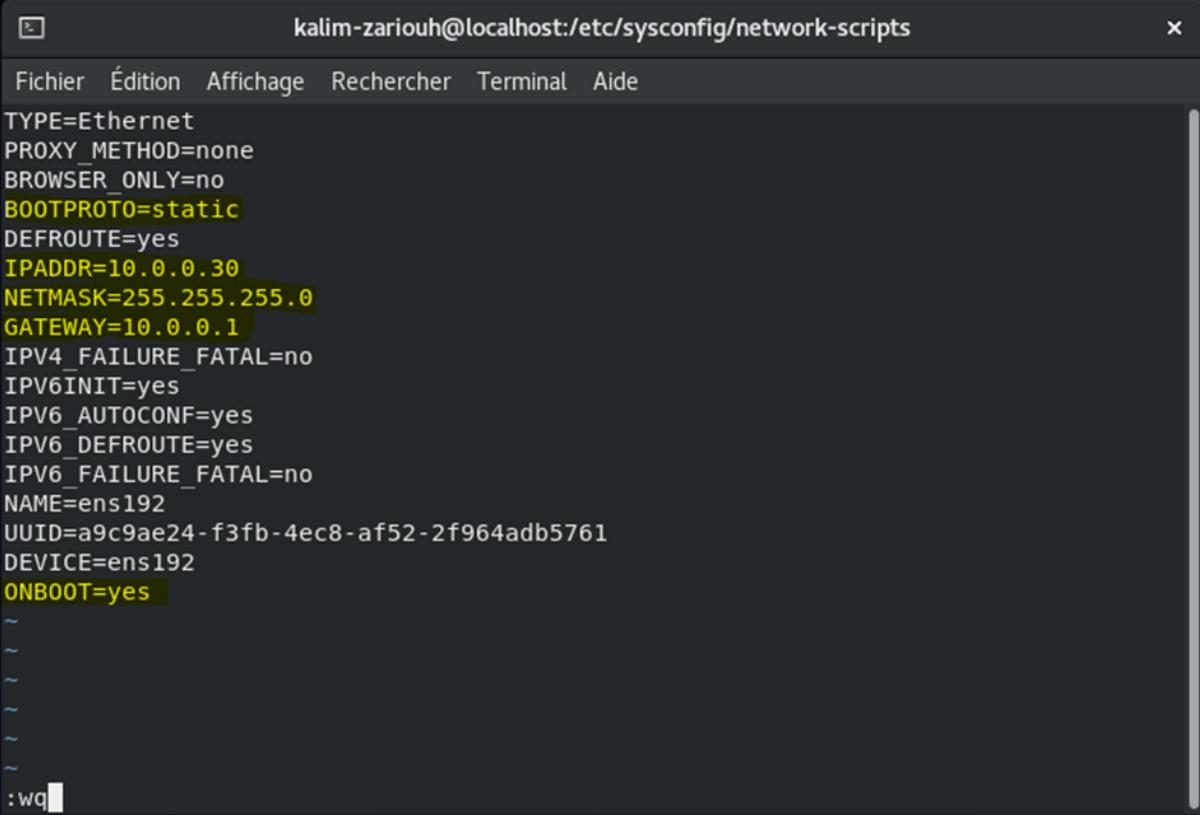
```
kalim-zariouh@localhost:/etc/sysconfig/network-scripts
```

```
Fichier Édition Affichage Rechercher Terminal Aide
```

```
TYPE=Ethernet
PROXY_METHOD=none
BROWSER_ONLY=no
BOOTPROTO=dhcp
DEFROUTE=yes
IPV4_FAILURE_FATAL=no
IPV6INIT=yes
IPV6_AUTOCONF=yes
IPV6_DEFROUTE=yes
IPV6_FAILURE_FATAL=no
NAME=ens160
UUID=45767a90-789a-4f8f-aa42-2e58ba569150
DEVICE=ens160
ONBOOT=yes
```

```
:wq
```

Rendre l'adressage IP statique au lieu de celui géré automatiquement par DHCP est indispensable pour éviter les problèmes causés par le changement de l'adresse IP et le besoin de changer à chaque fois l'adresse IP au niveau de fichier **/etc/hosts** avec la nécessité de saisir l'adresse IP, le masque et le Gateway fixés :



The screenshot shows a terminal window titled "kalim-zariouh@localhost:/etc/sysconfig/network-scripts". The window contains the following configuration file content:

```
TYPE=Ethernet
PROXY_METHOD=none
BROWSER_ONLY=no
BOOTPROTO=static
DEFROUTE=yes
IPADDR=10.0.0.30
NETMASK=255.255.255.0
GATEWAY=10.0.0.1
IPV4_FAILURE_FATAL=no
IPV6INIT=yes
IPV6_AUTOCONF=yes
IPV6_DEFROUTE=yes
IPV6_FAILURE_FATAL=no
NAME=ens192
UUID=a9c9ae24-f3fb-4ec8-af52-2f964adb5761
DEVICE=ens192
ONBOOT=yes
~
~
~
~
~
~
: wq
```

Le SELinux est bien activé, donc on doit le désactiver en éditant le fichier /etc/selinux

SELinux est une extension du kernel qui permet de surveiller des processus en cours d'exécution, elle permet de sécuriser les accès aux services de la machine d'où la nécessité de la désactiver pour faciliter l'accès aux ressources de la machine hôte sinon comme le cas de firewalld, on aura besoin de faire des configurations supplémentaires :

```
[root@localhost selinux]# sestatus
SELinux status:                 enabled
SELinuxfs mount:                /sys/fs/selinux
SELinux root directory:         /etc/selinux
Loaded policy name:              targeted
Current mode:                   enforcing
Mode from config file:          disabled
Policy MLS status:              enabled
Policy deny_unknown status:     allowed
Memory protection checking:     actual (secure)
Max kernel policy version:      33
[root@localhost selinux]#
```

- On redémarre la machine pour que les modifications seront prises en compte, et on trouve que c'est bien le cas :

```
kalim-zariouh@controller:/home/kalim-zariouh
Fichier Édition Affichage Rechercher Terminal Aide
[root@controller kalim-zariouh]# sestatus
SELinux status: disabled
[root@controller kalim-zariouh]#
```

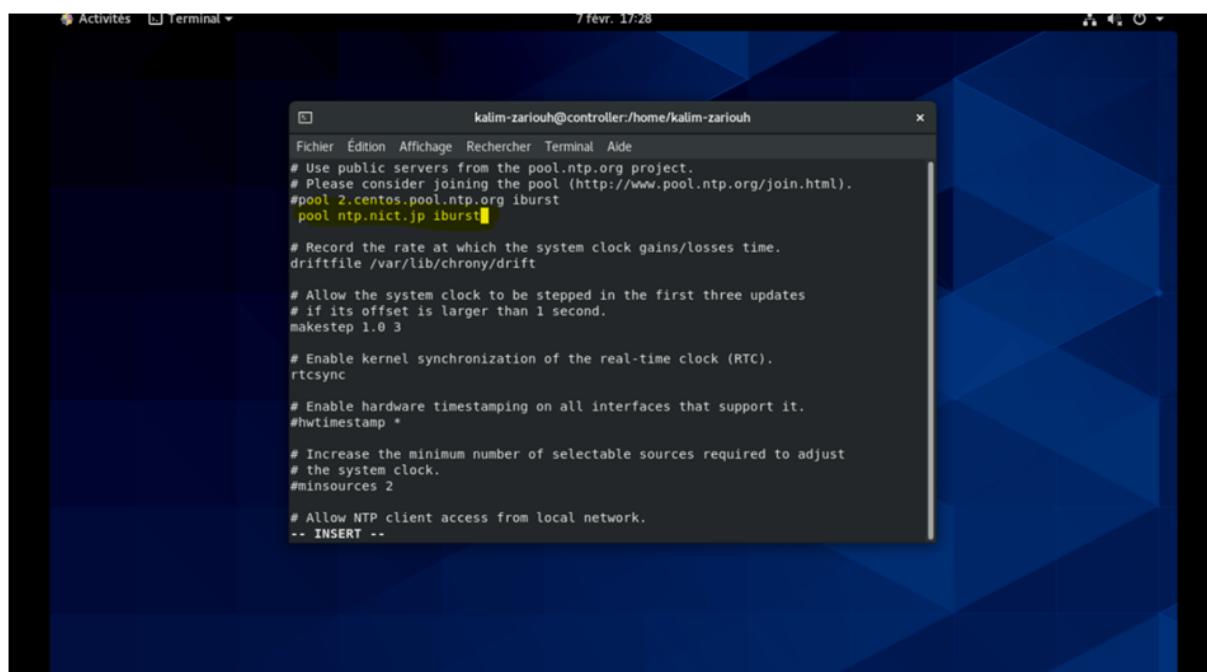
Partie Pré-requis:

Installation de NTP Server :

La précision de l'heure est critique dès lors que plusieurs machines travaillent ensemble, car elles utilisent souvent l'heure pour synchroniser leurs actions. On utilise le protocole NTP, pour Network Time Protocol, pour synchroniser en continu l'heure de tous les ordinateurs de votre réseau avec des horloges de référence en ligne ou avec l'utilisation d'un serveur NTP.

On utilise le logiciel Chrony comme serveur NTP :

```
[root@controller kalim-zariouh]# dnf -y install chrony
CentOS Linux 8 - AppStream                               1.2 MB/s | 8.4 MB   00:07
CentOS Linux 8 - BaseOS                                1.2 MB/s | 4.6 MB   00:03
CentOS Linux 8 - Extras                               5.9 kB/s | 10 kB   00:01
Le paquet chrony-4.1-1.el8.x86_64 est déjà installé.
Dépendances résolues.
Rien à faire.
Terminé !
[root@controller kalim-zariouh]#
```



```
# Use public servers from the pool.ntp.org project.
# Please consider joining the pool (http://www.pool.ntp.org/join.html).
#pool 2.centos.pool.ntp.org iburst
#pool ntp.nict.jp iburst

# Record the rate at which the system clock gains/losses time.
driftfile /var/lib/chrony/drift

# Allow the system clock to be stepped in the first three updates
# if its offset is larger than 1 second.
makestep 1.0 3

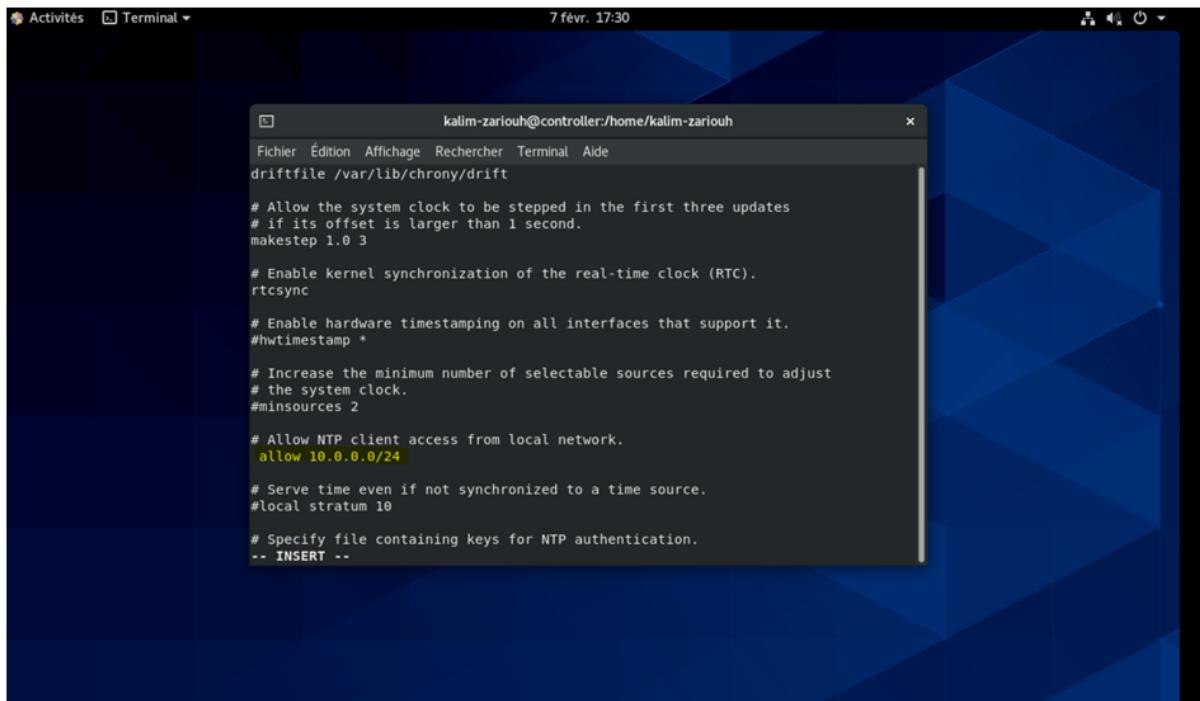
# Enable kernel synchronization of the real-time clock (RTC).
rtcsync

# Enable hardware timestamping on all interfaces that support it.
#hwclock -w

# Increase the minimum number of selectable sources required to adjust
# the system clock.
#minsources 2

# Allow NTP client access from local network.
-- INSERT --
```

Par défaut, Chrony ne permet pas à des clients de se synchroniser avec ce service de temps. On autorise explicitement le réseau de nos clients par la directive `allow` .



```
# Allow the system clock to be stepped in the first three updates
# if its offset is larger than 1 second.
makestep 1.0 3

# Enable kernel synchronization of the real-time clock (RTC).
rtcsync

# Enable hardware timestamping on all interfaces that support it.
#hwtimestamp *

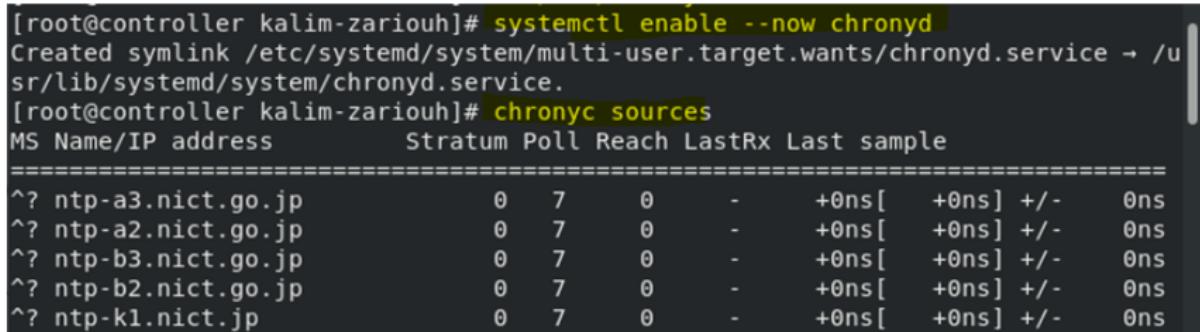
# Increase the minimum number of selectable sources required to adjust
# the system clock.
#minsources 2

# Allow NTP client access from local network.
allow 10.0.0.0/24

# Serve time even if not synchronized to a time source.
#local stratum 10

# Specify file containing keys for NTP authentication.
-- INSERT --
```

On affiche les serveurs avec lesquels nous sommes synchronisé par la commande :
chronyc sources



MS Name/IP address	Stratum	Poll	Reach	LastRx	Last sample
^? ntp-a3.nict.go.jp	0	7	0	-	+0ns[+0ns] +/- 0ns
^? ntp-a2.nict.go.jp	0	7	0	-	+0ns[+0ns] +/- 0ns
^? ntp-b3.nict.go.jp	0	7	0	-	+0ns[+0ns] +/- 0ns
^? ntp-b2.nict.go.jp	0	7	0	-	+0ns[+0ns] +/- 0ns
^? ntp-k1.nict.jp	0	7	0	-	+0ns[+0ns] +/- 0ns

Installation de MariaDB Server :

MariaDB est un système de gestion de base de données édité sous licence GPL, on l'installe pour qu'on puisse gérer nos bases de données en cloud :



```
kalim-zariouh@controller:/home/kalim-zariouh
Fichier Édition Affichage Rechercher Terminal Aide
Vérification de : mariadb-connector-c-3.1.11-2.el8_3.x86_64      4/11
Vérification de : mariadb-connector-c-config-3.1.11-2.el8_3.noa   5/11
Vérification de : mariadberrmsg-3:10.5.9-1.module_el8.4.0+801+    6/11
Vérification de : mariadb-gssapi-server-3:10.5.9-1.module_el8.4     7/11
Vérification de : mariadb-server-3:10.5.9-1.module_el8.4.0+801+    8/11
Vérification de : mariadb-server-utils-3:10.5.9-1.module_el8.4.     9/11
Vérification de : mysql-selinux-1.0.2-4.el8.noarch                10/11
Vérification de : perl-DBD-MySQL-4.046-3.module_el8.3.0+419+c2d   11/11

Installé:
mariadb-3:10.5.9-1.module_el8.4.0+801+647c4915.x86_64
mariadb-backup-3:10.5.9-1.module_el8.4.0+801+647c4915.x86_64
mariadb-common-3:10.5.9-1.module_el8.4.0+801+647c4915.x86_64
mariadb-connector-c-3.1.11-2.el8_3.x86_64
mariadb-connector-c-config-3.1.11-2.el8_3.noarch
mariadberrmsg-3:10.5.9-1.module_el8.4.0+801+647c4915.x86_64
mariadb-gssapi-server-3:10.5.9-1.module_el8.4.0+801+647c4915.x86_64
mariadb-server-3:10.5.9-1.module_el8.4.0+801+647c4915.x86_64
mariadb-server-utils-3:10.5.9-1.module_el8.4.0+801+647c4915.x86_64
mysql-selinux-1.0.2-4.el8.noarch
perl-DBD-MySQL-4.046-3.module_el8.3.0+419+c2dec72b.x86_64

Terminé !
[root@controller kalim-zariouh]#
```

Indiquer l'encodage qu'on va utiliser est **UTF8mb4**:

```
kalim-zariouh@controller:/home/kalim-zariouh
Fichier Édition Affichage Rechercher Terminal Aide
# create new

# set default charset

# if not set, default is [latin1]

# for the case of 4 bytes UTF-8, specify [utf8mb4]

[mysqld]
character-set-server = utf8mb4

[client]
default-character-set = utf8mb4
```

Activer le service de MariaDB:

```
[root@controller kalim-zariouh]# systemctl enable --now mariadb
Created symlink /etc/systemd/system/mysql.service → /usr/lib/systemd/system/mariadb.service.
Created symlink /etc/systemd/system/mysqld.service → /usr/lib/systemd/system/mariadb.service.
Created symlink /etc/systemd/system/multi-user.target.wants/mariadb.service → /usr/lib/systemd/system/mariadb.service.
[root@controller kalim-zariouh]#
```

Configurer initiale de MariaDB:

```
kalim-zariouh@controller:/home/kalim-zariouh
Fichier Édition Affichage Rechercher Terminal Aide
sr/lib/systemd/system/mariadb.service.
[root@controller kalim-zariouh]# mysql_secure_installation

NOTE: RUNNING ALL PARTS OF THIS SCRIPT IS RECOMMENDED FOR ALL MariaDB
      SERVERS IN PRODUCTION USE! PLEASE READ EACH STEP CAREFULLY!

In order to log into MariaDB to secure it, we'll need the current
password for the root user. If you've just installed MariaDB, and
haven't set the root password yet, you should just press enter here.

Enter current password for root (enter for none):
OK, successfully used password, moving on...

Setting the root password or using the unix_socket ensures that nobody
can log into the MariaDB root user without the proper authorisation.

You already have your root account protected, so you can safely answer 'n'.

Switch to unix_socket authentication [Y/n] n
... skipping.

You already have your root account protected, so you can safely answer 'n'.

Change the root password? [Y/n] n
```

On peut remarquer que l'authentification est activé par défaut:

```
kalim-zariouh@controller:/home/kalim-zariouh
Fichier Édition Affichage Rechercher Terminal Aide
MariaDB [(none)]> show grants for root@localhost;
+-----+
| Grants for root@localhost
+-----+
| GRANT ALL PRIVILEGES ON *.* TO `root`@`localhost` IDENTIFIED VIA mysql_native_
password USING 'invalid' OR unix_socket WITH GRANT OPTION |
| GRANT PROXY ON ''@''% TO 'root'@'localhost' WITH GRANT OPTION
+-----+
2 rows in set (0.000 sec)
```

Afficher les informations des utilisateurs existants:

```
MariaDB [(none)]> select user,host,password from mysql.user;
+-----+-----+-----+
| User      | Host     | Password |
+-----+-----+-----+
| mariadb.sys | localhost |          |
| root       | localhost | invalid   |
| mysql      | localhost | invalid   |
+-----+-----+-----+
3 rows in set (0.002 sec)
```

Afficher les bases de données existantes:

```
MariaDB [(none)]> show databases;
+-----+
| Database      |
+-----+
| information_schema |
| mysql          |
| performance_schema |
+-----+
3 rows in set (0.001 sec)

MariaDB [(none)]>
```

Créer une base de données pour le test et tester l'insertion et la sélection:

```
MariaDB [(none)]> create database test_database;
Query OK, 1 row affected (0.001 sec)

MariaDB [(none)]> create table test_database.test_table (id int, name varchar(50),
address varchar(50), primary key (id));
Query OK, 0 rows affected (0.007 sec)

MariaDB [(none)]> insert into test_database.test_table(id, name, address) values
("001", "CentOS", "Hiroshima");
Query OK, 1 row affected (0.002 sec)

MariaDB [(none)]> select * from test_database.test_table;
+----+-----+-----+
| id | name   | address  |
+----+-----+-----+
| 1  | CentOS | Hiroshima |
+----+-----+-----+
1 row in set (0.001 sec)

MariaDB [(none)]>
```

Supprimer la database de test créée :

```
MariaDB [(none)]> drop database test_database;
Query OK, 1 row affected (0.007 sec)

MariaDB [(none)]> exit
Bye
[root@controller kalim-zariouh]#
```

Installation du dépôt d'Openstack Xena et mise à jour du système CentOS Stream:

Xena est la 24e itération du gestionnaire d'infrastructure cloud open source **OpenStack** lancé en 2011. Cette plateforme permet les entreprises de construire les fondations d'un système d'informations basé sur le cloud.



OPENSTACK XENA

```
[root@controller kalim-zariouh]# dnf -y install centos-release-openstack-xena
Dernière vérification de l'expiration des métadonnées effectuée il y a 0:23:53 le lun. 07 févr. 2022 18:23:22 +01.
Dépendances résolues.
=====
 Paquet          Architecture Version   Dépôt     Taille
=====
Installation:
centos-release-openstack-xena      noarch    1-1.el8   extras    10 k
Installation des dépendances:
centos-release-advanced-virtualization  noarch    1.0-4.el8  extras    16 k
centos-release-ceph-pacific        noarch    1.0-2.el8  extras    8.9 k
centos-release-messaging          noarch    1-3.el8   extras    9.5 k
```

```
kalim-zariouh@controller:/home/kalim-zariouh

Fichier Édition Affichage Rechercher Terminal Aide
Vérification de : centos-release-advanced-virtualization-1.0-4.el8.noarch 1/9
Vérification de : centos-release-ceph-pacific-1.0-2.el8.noarch 2/9
Vérification de : centos-release-messaging-1-3.el8.noarch 3/9
Vérification de : centos-release-nfv-common-1-3.el8.noarch 4/9
Vérification de : centos-release-nfv-openvswitch-1-3.el8.noarch 5/9
Vérification de : centos-release-openstack-xena-1-1.el8.noarch 6/9
Vérification de : centos-release-rabbitmq-38-1-3.el8.noarch 7/9
Vérification de : centos-release-storage-common-2-2.el8.noarch 8/9
Vérification de : centos-release-virt-common-1-2.el8.noarch 9/9

Installé:
centos-release-advanced-virtualization-1.0-4.el8.noarch
centos-release-ceph-pacific-1.0-2.el8.noarch
centos-release-messaging-1-3.el8.noarch
centos-release-nfv-common-1-3.el8.noarch
centos-release-nfv-openvswitch-1-3.el8.noarch
centos-release-openstack-xena-1-1.el8.noarch
centos-release-rabbitmq-38-1-3.el8.noarch
centos-release-storage-common-2-2.el8.noarch
centos-release-virt-common-1-2.el8.noarch

Terminé !
[root@controller kalim-zariouh]#
```

Installation de RabbitMq et Memcached:

RabbitMQ est un logiciel d'agent de messages open source qui implémente le protocole Advanced Message Queuing et des plugins Streaming Text Oriented Messaging Protocol et Message Queuing Telemetry Transport, on l'installe pour que les différentes instances logicielles peuvent échanger des messages :



Memcached est un système d'usage général servant à gérer la mémoire cache distribuée:



```
[root@controller kalim-zariouh]# dnf --enablerepo=powertools -y install rabbitmq-server memcached
CentOS Stream 8 - PowerTools                               863 kB/s | 4.0 MB   00:04
Dernière vérification de l'expiration des métadonnées effectuée il y a 0:00:06 le mer. 09 févr. 2022 18:13:19 +01.
Dépendances résolues.
=====
Paquet          Architecture      Version       Dépôt     Taille
=====
Installation:
memcached        x86_64    1.5.22-2.el8    appstream      162 k
rabbitmq-server  x86_64    3.8.3-1.el8    centos-rabbitmq-38  11 M
Installation des dépendances:
SDL2              x86_64    2.0.10-2.el8    powertools      465 k
erlang-asn1       x86_64    22.3.4.1-1.el8  centos-rabbitmq-38  773 k
erlang-common_test x86_64    22.3.4.1-1.el8  centos-rabbitmq-38  1.0 M
erlang-compiler   x86_64    22.3.4.1-1.el8  centos-rabbitmq-38  1.4 M
erlang-crypto     x86_64    22.3.4.1-1.el8  centos-rabbitmq-38  169 k
erlang-cuttlefish noarch    2.0.11-10.el8   centos-rabbitmq-38  154 k
```

Le nombre maximale des connexions au serveur de base de données MariaDB par défaut est 151, ce qui est insuffisant pour un environnement openStack alors on doit le changer à 500:

```
kalim-zariouh@controller:/home/kalim-zariouh
Fichier Édition Affichage Rechercher Terminal Aide
# this is read by the standalone daemon and embedded servers
[server]

# this is only for the mysqld standalone daemon
# Settings user and group are ignored when systemd is used.
# If you need to run mysqld under a different user or group,
# customize your systemd unit file for mysqld/mariadb according to the
# instructions in http://fedoraproject.org/wiki/Systemd
[mysqld]
datadir=/var/lib/mysql
socket=/var/lib/mysql/mysql.sock
log-error=/var/log/mariadb/mariadb.log
pid-file=/run/mariadb/mariadb.pid
max_connections=500

#
# * Galera-related settings
#
[galera]
# Mandatory settings
#wsrep_on=ON
#wsrep_provider=
#wsrep_cluster_address=
```

Pour permettre au MiddleWare RabbitMq de recevoir le messages de toutes les adresses, on modifie la valeur de '**OPTIONS**':

```
kalim-zariouh@controller:/home/kalim-zariouh
Fichier Édition Affichage Rechercher Terminal Aide
PORT="11211"
USER="memcached"
MAXCONN="1024"
CACHESIZE="64"
OPTIONS="-l 0.0.0.0,::"
~
```

Redémarrer et activer le service de mariadb:

```
[root@controller kalim-zariouh]# systemctl restart mariadb rabbitmq-server memcached
[root@controller kalim-zariouh]# systemctl enable mariadb rabbitmq-server memcached
Created symlink /etc/systemd/system/multi-user.target.wants/rabbitmq-server.service → /usr/lib/systemd/system/rabbitmq-server.service.
Created symlink /etc/systemd/system/multi-user.target.wants/memcached.service → /usr/lib/systemd/system/memcached.service.
[root@controller kalim-zariouh]#
```

Ajouter un utilisateur et lui attribuer toutes les permissions:

```
[root@controller kalim-zariouh]# rabbitmqctl add_user openstack password
Adding user "openstack" ...
[root@controller kalim-zariouh]# rabbitmqctl set_permissions openstack ".*" ".*"
Setting permissions for user "openstack" in vhost "/" ...
[root@controller kalim-zariouh]#
```

Modification du fichier rabbitmqctl.te

```

kalim-zariouh@controller:/home/kalim-zariouh
Fichier Édition Affichage Rechercher Terminal Aide
# create new
module rabbitmqctl 1.0;

require {
    type rabbitmq_t;
    type rabbitmq_var_log_t;
    type rabbitmq_var_lib_t;
    type etc_t;
    type init_t;
    class file write;
    class file getattr;
}

===== rabbitmq_t =====
allow rabbitmq_t etc_t:file write;

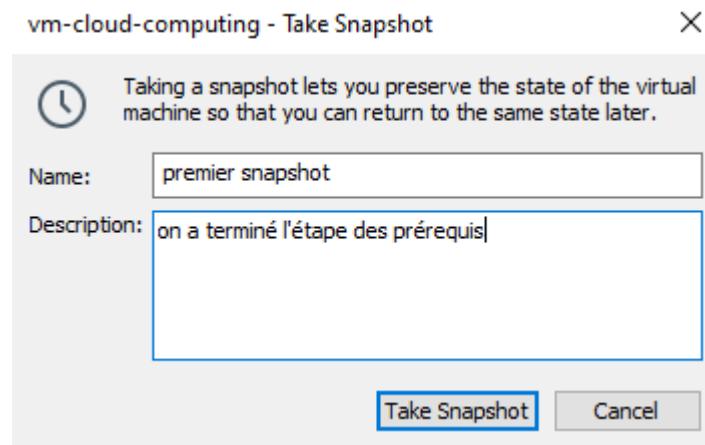
===== init_t =====
allow init_t rabbitmq_var_lib_t:file getattr;
allow init_t rabbitmq_var_log_t:file getattr;
~
~

[root@controller kalim-zariouh]# checkmodule -m -M -o rabbitmqctl.mod rabbitmqct
l.te
[root@controller kalim-zariouh]# semodule_package --outfile rabbitmqctl.pp --modu
le rabbitmqctl.mod
[root@controller kalim-zariouh]# semodule -i rabbitmqctl.pp
[root@controller kalim-zariouh]#

```

Prendre un snapshot à notre machine virtuelle:

pour conserver l'état de notre machine à cette étape afin de la récupérer au cas d'un problème, on a effectué un SnapShot:



Configurer KeyStone 1:

Le Cloud computing ne se contente pas de gérer des ordinateurs virtuels, il met en place des réseaux entiers. Dans ce contexte, l'identification des utilisateurs et la

compartimentation des activités sont indispensables et c'est **Keystone** qui est responsable de l'autorisation et de l'authentification des utilisateurs:

```
[root@controller kalim-zariouh]# mysql
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 3
Server version: 10.5.9-MariaDB MariaDB Server

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

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

MariaDB [(none)]>
```

Ajouter au niveau de MariaDB une base de données et un utilisateur pour keyStone en attribuant à cet utilisateur toutes les priviléges de gestion de la base de données keystone:

```
MariaDB [(none)]> create database keystone;
Query OK, 1 row affected (0.001 sec)

MariaDB [(none)]> grant all privileges on keystone.* to keystone@'localhost' identified by 'password';
Query OK, 0 rows affected (0.004 sec)

MariaDB [(none)]> grant all privileges on keystone.* to keystone@'%' identified by 'password';
Query OK, 0 rows affected (0.001 sec)

MariaDB [(none)]> flush privileges;
Query OK, 0 rows affected (0.002 sec)

MariaDB [(none)]> exit
Bye
[root@controller kalim-zariouh]#
```

Installation de KeyStone:

```
[root@controller kalim-zariouh]# dnf --enablerepo=centos-openstack-xena,powertools -y install openstack-keystone python3-openstackclient httpd mod_ssl python3-mod_wsgi python3-oauth2client
CentOS-8 - Advanced Virtualization          4.0 kB/s | 3.0 kB    00:00
CentOS-8-stream - Ceph Pacific             11 kB/s | 3.0 kB    00:00
CentOS-8 - RabbitMQ 38                      7.7 kB/s | 3.0 kB    00:00
CentOS-8 - NFV OpenvSwitch                 9.7 kB/s | 3.0 kB    00:00
CentOS-8 - NFV OpenvSwitch                 99 kB/s | 107 kB   00:01
CentOS-8 - OpenStack xena                  2.3 kB/s | 3.0 kB    00:01
CentOS-8 - OpenStack xena                  508 kB/s | 2.1 MB   00:04
CentOS Stream 8 - AppStream                7.6 kB/s | 4.4 kB    00:00
CentOS Stream 8 - AppStream                557 kB/s | 20 MB    00:35
CentOS Stream 8 - BaseOS                  2.8 kB/s | 3.9 kB    00:01
CentOS Stream 8 - BaseOS                  524 kB/s | 19 MB    00:37
CentOS Stream 8 - Extras                  3.6 kB/s | 3.0 kB    00:00
CentOS Stream 8 - PowerTools              7.2 kB/s | 4.4 kB    00:00
CentOS Stream 8 - PowerTools              679 kB/s | 4.0 MB    00:06
Dépendances résolues.

=====
Paquet           Architecture      Version       Dépôt      Taille
=====
Installation:
  httpd          x86_64          2.4.37-43.module_el8.5.0+1022+b541f3b1
```

```
[root@controller kalim-zariouh]# dnf install epel-release
Dernière vérification de l'expiration des métadonnées effectuée il y a 16:06:47 le
dim. 13 févr. 2022 17:06:20 +01.
Dépendances résolues.

=====
Paquet           Architecture      Version       Dépôt      Taille
=====
Installation:
  epel-release    noarch          8-11.el8     extras      24 k
Installation des dépendances faibles:
  epel-next-release  noarch          8-11.el8     extras      11 k

Résumé de la transaction
=====
Installer 2 Paquets

Taille totale des téléchargements : 35 k
Taille des paquets installés : 38 k
Voulez-vous continuer ? [o/N] : o
Téléchargement des paquets :
(1/2): epel-next-release-8-11.el8.noarch.rpm      4.4 kB/s | 11 kB    00:02
(2/2): epel-release-8-11.el8.noarch.rpm            6.7 kB/s | 24 kB   00:03
```

```
[root@controller kalim-zariouh]# dnf --enablerepo=centos-openstack-xena,epel,power tools -y install openstack-keystone python3-openstackclient httpd mod_ssl python3-mod_wsgi python3-oauth2client
Dernière vérification de l'expiration des métadonnées effectuée il y a 0:01:00 le l un. 14 févr. 2022 09:16:11 +01.
Le paquet openstack-keystone-1:20.0.0-2.el8.noarch est déjà installé.
Le paquet python3-openstackclient-5.6.0-1.el8.noarch est déjà installé.
Le paquet httpd-2.4.37-43.module_el8.5.0+1022+b541f3b1.x86_64 est déjà installé.
Le paquet mod_ssl-1:2.4.37-43.module_el8.5.0+1022+b541f3b1.x86_64 est déjà installé .
Le paquet python3-mod_wsgi-4.6.4-4.el8.x86_64 est déjà installé.
Le paquet python3-oauth2client-4.1.3-9.el8.noarch est déjà installé.
Dépendances résolues.
Rien à faire.
Terminé !
[root@controller kalim-zariouh]#
```

Après l'installation de KeyStone, on configure ce dernier en saisissant au niveau du fichier de configuration l'adresse IP du serveur de mémoire de cache, les informations de connexion à la base de données keystone et en précisant Fernet comme fournisseur de token :

```
# Memcache servers in the format of "host:port". (dogpile.cache.memcached and
# oslo_cache.memcache_pool backends only). If a given host refer to an IPv6 or
# a given domain refer to IPv6 then you should prefix the given address with
# the address family (`inet6`) (e.g ``inet6[::1]:11211``,
# ``inet6:[fd12:3456:789a:1::1]:11211``,
# ``inet6:[controller-0.internalapi]:11211``). If the address family is not
# given then default address family used will be ``inet`` which correspond to
# IPv4 (list value)
memcache_servers = memcache_servers = 10.0.0.30:11211
#
# Number of seconds memcached server is considered dead before it is tried
# again. (dogpile.cache.memcache and oslo_cache.memcache_pool backends only).
# (integer value)
#memcache_dead_retry = 300

# Timeout in seconds for every call to a server. (dogpile.cache.memcache and
# oslo_cache.memcache_pool backends only). (floating point value)
#memcache_socket_timeout = 1.0
```

```
kalim-zariouh@controller:/home/kalim-zariouh
Fichier Édition Affichage Rechercher Terminal Aide

#
# From oslo.db
#
# If True, SQLite uses synchronous mode. (boolean value)
#sqlite_synchronous = true

# The back end to use for the database. (string value)
# Deprecated group/name - [DEFAULT]/db_backend
#backend = sqlalchemy

# The SQLAlchemy connection string to use to connect to the database. (string
# value)
# Deprecated group/name - [DEFAULT]/sql_connection
# Deprecated group/name - [DATABASE]/sql_connection
# Deprecated group/name - [sql]/connection
connection = mysql+pymysql://keystone:password@10.0.0.30/keystone

# The SQLAlchemy connection string to use to connect to the slave database.
# (string value)
#slave_connection = <None>

# The SQL mode to be used for MySQL sessions. This option, including the
```

```
kalim-zariouh@controller:/home/kalim-zariouh
Fichier Édition Affichage Rechercher Terminal Aide

# and revocation operations. Supported upstream providers are `fernet` and
# `jws`. Neither `fernet` or `jws` tokens require persistence and both require
# additional setup. If using `fernet`, you're required to run `keystone-manage
# fernet_setup`, which creates symmetric keys used to encrypt tokens. If using
# `jws`, you're required to generate an ECDSA keypair using a SHA-256 hash
# algorithm for signing and validating token, which can be done with `keystone-
# manage create_jws_keypair`. Note that `fernet` tokens are encrypted and `jws`
# tokens are only signed. Please be sure to consider this if your deployment
# has security requirements regarding payload contents used to generate token
# IDs. (string value)
provider = fernet

# Toggle for caching token creation and validation data. This has no effect
# unless global caching is enabled. (boolean value)
#caching = true

# The number of seconds to cache token creation and validation data. This has
# no effect unless both global and `[token] caching` are enabled. (integer
# value)
# Minimum value: 0
# Maximum value: 9223372036854775807
#cache_time = <None>

# This toggles support for revoking individual tokens by the token identifier
```

```
[root@controller kalim-zariouh]# su -s /bin/bash keystone -c "keystone-manage db_sync"
2022-02-13 16:59:30.899 10554 INFO migrate.versioning.api [-] 66 -> 67...
2022-02-13 16:59:31.369 10554 INFO migrate.versioning.api [-] done
2022-02-13 16:59:31.369 10554 INFO migrate.versioning.api [-] 67 -> 68...
2022-02-13 16:59:31.377 10554 INFO migrate.versioning.api [-] done
2022-02-13 16:59:31.377 10554 INFO migrate.versioning.api [-] 68 -> 69...
2022-02-13 16:59:31.391 10554 INFO migrate.versioning.api [-] done
2022-02-13 16:59:31.391 10554 INFO migrate.versioning.api [-] 69 -> 70...
2022-02-13 16:59:31.400 10554 INFO migrate.versioning.api [-] done
2022-02-13 16:59:31.401 10554 INFO migrate.versioning.api [-] 70 -> 71...
2022-02-13 16:59:31.414 10554 INFO migrate.versioning.api [-] done
```

```
[root@controller kalim-zariouh]# keystone-manage fernet_setup --keystone-user keystone --keystone-group keystone
2022-02-13 17:01:26.093 10707 INFO keystone.common.utils [-] /etc/keystone/fernet-keys/ does not appear to exist; attempting to create it
2022-02-13 17:01:26.530 10707 INFO keystone.common.fernet_utils [-] Created a new temporary key: /etc/keystone/fernet-keys/0.tmp
2022-02-13 17:01:26.532 10707 INFO keystone.common.fernet_utils [-] Become a valid new key: /etc/keystone/fernet-keys/0
2022-02-13 17:01:26.535 10707 INFO keystone.common.fernet_utils [-] Starting key rotation with 1 key files: ['/etc/keystone/fernet-keys/0']
2022-02-13 17:01:26.537 10707 INFO keystone.common.fernet_utils [-] Created a new temporary key: /etc/keystone/fernet-keys/0.tmp
2022-02-13 17:01:26.538 10707 INFO keystone.common.fernet_utils [-] Current primary key is: 0
2022-02-13 17:01:26.545 10707 INFO keystone.common.fernet_utils [-] Next primary key will be: 1
2022-02-13 17:01:26.546 10707 INFO keystone.common.fernet_utils [-] Promoted key 0 to be the primary: 1
2022-02-13 17:01:26.548 10707 INFO keystone.common.fernet_utils [-] Become a valid new key: /etc/keystone/fernet-keys/0
[root@controller kalim-zariouh]#
```

```
[root@controller kalim-zariouh]# keystone-manage credential_setup --keystone-user keystone --keystone-group keystone
2022-02-13 17:03:22.157 10847 INFO keystone.common.utils [-] /etc/keystone/credential-keys/ does not appear to exist; attempting to create it
2022-02-13 17:03:22.159 10847 INFO keystone.common.fernet_utils [-] Created a new temporary key: /etc/keystone/credential-keys/0.tmp
2022-02-13 17:03:22.160 10847 INFO keystone.common.fernet_utils [-] Become a valid new key: /etc/keystone/credential-keys/0
2022-02-13 17:03:22.160 10847 INFO keystone.common.fernet_utils [-] Starting key rotation with 1 key files: ['/etc/keystone/credential-keys/0']
2022-02-13 17:03:22.161 10847 INFO keystone.common.fernet_utils [-] Created a new temporary key: /etc/keystone/credential-keys/0.tmp
2022-02-13 17:03:22.161 10847 INFO keystone.common.fernet_utils [-] Current primary key is: 0
2022-02-13 17:03:22.162 10847 INFO keystone.common.fernet_utils [-] Next primary key will be: 1
2022-02-13 17:03:22.162 10847 INFO keystone.common.fernet_utils [-] Promoted key 0 to be the primary: 1
2022-02-13 17:03:22.163 10847 INFO keystone.common.fernet_utils [-] Become a valid new key: /etc/keystone/credential-keys/0
[root@controller kalim-zariouh]#
```

Démarrer keystone:

```
[root@controller kalim-zariouh]# export controller=10.0.0.30
[root@controller kalim-zariouh]# keystone-manage bootstrap --bootstrap-password adm
inpassword \
> --bootstrap-admin-url http://$controller:5000/v3/ \
> --bootstrap-internal-url http://$controller:5000/v3/ \
> --bootstrap-public-url http://$controller:5000/v3/ \
> --bootstrap-region-id RegionOne
2022-02-13 17:05:14.842 10948 INFO keystone.cmd.bootstrap [req-1644ee22-5759-4bbb-8
378-2f8a841bfdd7 - - - -] Created domain default
2022-02-13 17:05:14.981 10948 INFO keystone.cmd.bootstrap [req-1644ee22-5759-4bbb-8
378-2f8a841bfdd7 - - - -] Created project admin
2022-02-13 17:05:15.859 10948 INFO keystone.cmd.bootstrap [req-1644ee22-5759-4bbb-8
378-2f8a841bfdd7 - - - -] Created user admin
2022-02-13 17:05:15.939 10948 INFO keystone.cmd.bootstrap [req-1644ee22-5759-4bbb-8
378-2f8a841bfdd7 - - - -] Created role reader
2022-02-13 17:05:15.975 10948 INFO keystone.cmd.bootstrap [req-1644ee22-5759-4bbb-8
378-2f8a841bfdd7 - - - -] Created role member
2022-02-13 17:05:16.060 10948 INFO keystone.cmd.bootstrap [req-1644ee22-5759-4bbb-8
378-2f8a841bfdd7 - - - -] Created implied role where 017a7041c99a4c0b8238afba
cb3e implies 480712e8c9d94aa5bd8a73aa1e97dda5
2022-02-13 17:05:16.078 10948 INFO keystone.cmd.bootstrap [req-1644ee22-5759-4bbb-8
378-2f8a841bfdd7 - - - -] Created role admin
2022-02-13 17:05:16.110 10948 INFO keystone.cmd.bootstrap [req-1644ee22-5759-4bbb-8
378-2f8a841bfdd7 - - - -] Created implied role where 59aba8e667084242bfa
161b40dd600a9 implies 017a7041c99a4c0b8238afba
4bbcb3e
2022-02-13 17:05:16.158 10948 INFO keystone.cmd.bootstrap [req-1644ee22-5759-4bbb-8
378-2f8a841bfdd7 - - - -] Granted role admin on project admin to user admin.
2022-02-13 17:05:16.185 10948 INFO keystone.cmd.bootstrap [req-1644ee22-5759-4bbb-8
378-2f8a841bfdd7 - - - -] Granted role admin on the system to user admin.
2022-02-13 17:05:16.212 10948 WARNING py.warnings [req-1644ee22-5759-4bbb-8378-2f8a
841bfdd7 - - - -] /usr/lib/python3.6/site-packages/pycadf/identifier.py:72: UserW
arning: Invalid uuid: RegionOne. To ensure interoperability, identifiers should be
a valid uuid.
    'identifiers should be a valid uuid.' % (value))

2022-02-13 17:05:16.221 10948 INFO keystone.cmd.bootstrap [req-1644ee22-5759-4bbb-8
378-2f8a841bfdd7 - - - -] Created region RegionOne
2022-02-13 17:05:16.281 10948 INFO keystone.cmd.bootstrap [req-1644ee22-5759-4bbb-8
378-2f8a841bfdd7 - - - -] Created public endpoint http://10.0.0.30:5000/v3/
2022-02-13 17:05:16.335 10948 INFO keystone.cmd.bootstrap [req-1644ee22-5759-4bbb-8
378-2f8a841bfdd7 - - - -] Created internal endpoint http://10.0.0.30:5000/v3/
2022-02-13 17:05:16.378 10948 INFO keystone.cmd.bootstrap [req-1644ee22-5759-4bbb-8
378-2f8a841bfdd7 - - - -] Created admin endpoint http://10.0.0.30:5000/v3/
[root@controller kalim-zariouh]#
```

```
[root@controller kalim-zariouh]# setsebool -P httpd_use_openstack on
[root@controller kalim-zariouh]# etsebool -P httpd_can_network_connect on
bash: etsebool: commande inconnue...
[root@controller kalim-zariouh]# setsebool -P httpd_can_network_connect on
[root@controller kalim-zariouh]# setsebool -P httpd_can_network_connect_db on
[root@controller kalim-zariouh]#
```

```
kalim-zariouh@controller:/home/kalim-zariouh
Fichier Édition Affichage Rechercher Terminal Aide
module keystone-httpd 1.0;

require {
    type httpd_t;
    type keystone_var_lib_t;
    type keystone_log_t;
    class file { create getattr ioctl open read write };
    class dir { add_name create write };
}

===== httpd_t =====
allow httpd_t keystone_var_lib_t:dir { add_name create write };
allow httpd_t keystone_var_lib_t:file { create open write getattr ioctl open read };
allow httpd_t keystone_log_t:dir { add_name write };
allow httpd_t keystone_log_t:file create;
~
~
~
~
~
~
:wq

[root@controller kalim-zariouh]# checkmodule -m -M -o keystone-httpd.mod keystone-h
tpd.te
[root@controller kalim-zariouh]# semodule_package --outfile keystone-httpd.pp --mod
ule keystone-httpd.mod
[root@controller kalim-zariouh]# semodule -i keystone-httpd.pp
```

Activer keystone et le configurer pour qu'il démarre sur le serveur Apache httpd:

```

kalim-zariouh@controller:/home/kalim-zariouh
Fichier Édition Affichage Rechercher Terminal Aide
#
ServerAdmin root@localhost

#
# ServerName gives the name and port that the server uses to identify itself.
# This can often be determined automatically, but we recommend you specify
# it explicitly to prevent problems during startup.
#
# If your host doesn't have a registered DNS name, enter its IP address here.
#
ServerName dlp.srv.world:80

#
# Deny access to the entirety of your server's filesystem. You must
# explicitly permit access to web content directories in other
# <Directory> blocks below.
#
<Directory />
    AllowOverride none
    Require all denied
</Directory>

#
# Note that from this point forward you must specifically allow
:wq

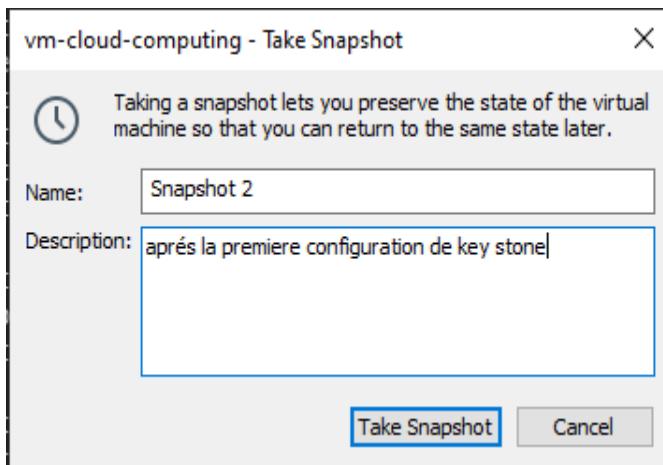
```

```

[root@controller kalim-zariouh]# vi /etc/httpd/conf/httpd.conf
[root@controller kalim-zariouh]# ln -s /usr/share/keystone/wsgi-keystone.conf /etc/
httpd/conf.d/
[root@controller kalim-zariouh]# systemctl enable --now httpd
Created symlink /etc/systemd/system/multi-user.target.wants/httpd.service → /usr/li
b/systemd/system/httpd.service.
[root@controller kalim-zariouh]#

```

Take snapshot:



Configurer KeyStone : 2ème étape

Création d'un fichier RC pour charger les valeurs d'environnement appropriés aux clients de ligne de commande afin d'interagir avec les services.

```
Fichier Édition Affichage Rechercher Terminal Aide
export OS_PROJECT_DOMAIN_NAME=default
export OS_USER_DOMAIN_NAME=default
export OS_PROJECT_NAME=admin
export OS_USERNAME=admin
export OS_PASSWORD=adminpassword
export OS_AUTH_URL=http://10.0.0.30:5000/v3
export OS_IDENTITY_API_VERSION=3
export OS_IMAGE_API_VERSION=2
export PS1='[\u@\h \W(keystone)]\$ '
```

Attribuer les droits 600 à l'environnement KeyStone pour qu'on puisse l'exécuter:

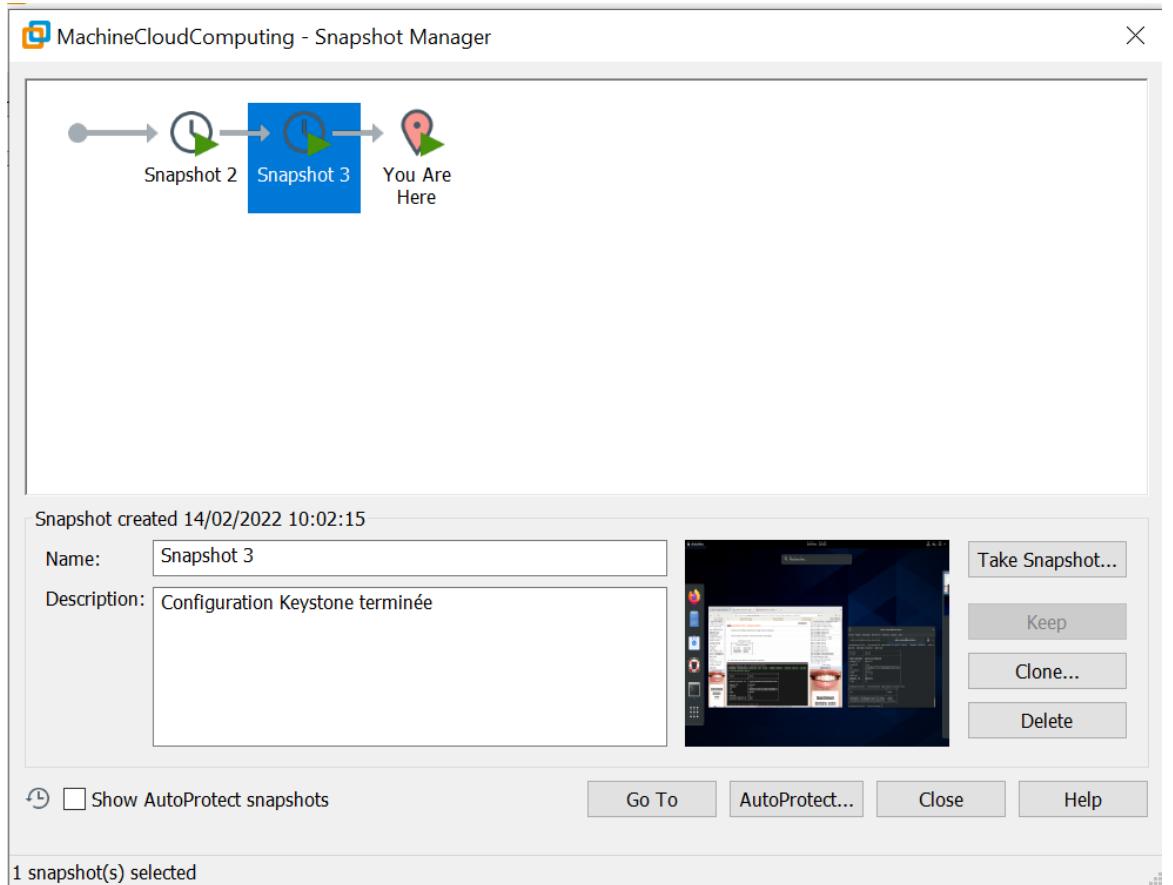
```
[root@controller ~]# chmod 600 ~/keystonerc
[root@controller ~]# source ~/keystonerc
[root@controller ~](keystone)]# echo "source ~/keystonerc" >> ~/.bash_profile
```

Au niveau de l'environnement keyStone, on crée un projet openStack:

```
[root@controller ~](keystone)]# openstack project create --domain default --description "Service Project" service
+-----+-----+
| Field      | Value
+-----+-----+
| description | Service Project
| domain_id   | default
| enabled     | True
| id          | 3bff2f81ef834adcac21cee82a872377
| is_domain   | False
| name        | service
| options     | {}
| parent_id   | default
| tags         | []
+-----+
[root@controller ~](keystone)]#
```

On remarque que le projet créé est bien ajouté au niveau des projets openstack:

```
[root@controller ~](keystone)]# openstack project list
+-----+-----+
| ID              | Name    |
+-----+-----+
| 3bff2f81ef834adcac21cee82a872377 | service |
| a820dc9b62b14754bbb504a96eef5c5f | admin   |
+-----+
[root@controller ~](keystone)]#
```



Configurer Glance :

Le service d'Image OpenStack (glance) permet aux utilisateurs de découvrir, enregistrer et récupérer les images de machines virtuelles. Il offre une API [REST](#) qui permet d'interroger les métadonnées des images de machine virtuelle et de récupérer une image.

Avant d'installer et configurer le service d'Image sur le nœud de contrôle, on crée une base de données, des credentials de service, et des endpoints API.

Au niveau du projet service créé dans l'environnement KeyStone, on ajoute un utilisateur Glance:

```
[root@controller ~]# openstack user create --domain default --project service --password servicepassword glance
+-----+-----+
| Field          | Value        |
+-----+-----+
| default_project_id | 3bff2f81ef834adcac21cee82a872377 |
| domain_id      | default      |
| enabled         | True         |
| id              | 2fb72812db654158a4dea74b0398d7c9 |
| name            | glance       |
| options          | {}           |
| password_expires_at | None         |
+-----+-----+
[root@controller ~]#
```

On attribue à cet utilisateur glance le rôle admin:

```
[root@controller ~]# openstack role add --project service --user glance admin
[root@controller ~]# openstack service create --name glance --description "OpenStack Image service" image
+-----+-----+
| Field | Value |
+-----+-----+
| description | OpenStack Image service |
| enabled | True |
| id | e27330933392419982e27d90ec495328 |
| name | glance |
| type | image |
+-----+
[root@controller ~]#
```

On crée trois points de terminaison pour Glance:

- Publique :Point de terminaison d'URL publique à utiliser pour la réponse des versions Glance.
- Interne:L'URL fournit l'emplacement où les données temporaires seront stockées.
- Admin:Cette option est utilisée par l'administrateur pour réinitialiser le statut de l'image de *pending_delete* à *actif* lorsque l'image est supprimée par erreur et que la fonction de *suppression en attente* est activée dans Glance.

```
[root@controller ~]# export controller=10.0.0.30
[root@controller ~]# openstack endpoint create --region RegionOne image public http://$controller:9292
+-----+-----+
| Field | Value |
+-----+-----+
| enabled | True |
| id | ea0f1409bbaf455398b14ae02eee4b0c |
| interface | public |
| region | RegionOne |
| region_id | RegionOne |
| service_id | e27330933392419982e27d90ec495328 |
| service_name | glance |
| service_type | image |
| url | http://10.0.0.30:9292 |
+-----+
[root@controller ~]#
```

```
[root@controller ~]# openstack endpoint create --region RegionOne image internal http://$controller:9292
+-----+-----+
| Field | Value |
+-----+-----+
| enabled | True |
| id | c31f16434de442a8b80e161868092a8e |
| interface | internal |
| region | RegionOne |
| region_id | RegionOne |
| service_id | e27330933392419982e27d90ec495328 |
| service_name | glance |
| service_type | image |
| url | http://10.0.0.30:9292 |
+-----+
```

```
[root@controller ~]# openstack endpoint create --region RegionOne image a
dmin http://$controller:9292
+-----+-----+
| Field | Value |
+-----+-----+
| enabled | True |
| id | 2bfef791993144e6a3ebc315fd1fe564 |
| interface | admin |
| region | RegionOne |
| region_id | RegionOne |
| service_id | e27330933392419982e27d90ec495328 |
| service_name | glance |
| service_type | image |
| url | http://10.0.0.30:9292 |
+-----+
[root@controller ~]#
```

Au niveau de serveur MariaDB, on ajoute une base de données glance, en attribuant toutes les priviléges de cette base de données à l'utilisateur glance:

```
Fichier Édition Affichage Rechercher Terminal Aide
Your MariaDB connection id is 11
Server version: 10.5.9-MariaDB MariaDB Server

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

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

MariaDB [(none)]> create database glance;
Query OK, 1 row affected (0.010 sec)

MariaDB [(none)]> grant all privileges on glance.* to glance@'localhost' identified b
y 'password';
Query OK, 0 rows affected (0.047 sec)

MariaDB [(none)]> grant all privileges on glance.* to glance@'%' identified by 'passw
ord';
Query OK, 0 rows affected (0.011 sec)

MariaDB [(none)]> flush privileges;
Query OK, 0 rows affected (0.028 sec)

MariaDB [(none)]> exit
Bye
[root@controller ~]#
```

Installation de Glance :

```
[root@controller ~]# dnf --enablerepo=centos-openstack-xena,powertools,epel -y install openstack-glance
Dernière vérification de l'expiration des métadonnées effectuée il y a 0:31:40 le lun
. 14 févr. 2022 09:16:11 +01.
Dépendances résolues.
=====
 Paquet          Architecture      Version       Dépôt        Taille
=====
Installation:
openstack-glance      noarch 1:23.0.0-1.el8    centos-openstack-xena 79 k
Installation des dépendances:
blosc           x86_64 1.20.1-1.el8    centos-openstack-xena 62 k
graphviz         x86_64 2.40.1-43.el8   appstream          1.7 M
hdf5            x86_64 1.10.5-5.el8    centos-openstack-xena 2.1 M
libXaw           x86_64 1.0.13-10.el8   appstream          194 k
libaec           x86_64 1.0.2-3.el8     powertools        39 k
libgfortran      x86_64 8.5.0-10.el8   baseos            643 k
libqhull          x86_64 1:7.2.1-2.el8   centos-openstack-xena 168 k
libquadmath       x86_64 8.5.0-10.el8   baseos            171 k
openblas          x86_64 0.3.15-3.el8   appstream         4.7 M
```

On configure les informations d'authentification au niveau de keyStone du service Glance, les informations de connexion à la base de données MariaDB et les configurations de stockage des images:

```
kalim-zariouh@controller:~ Fichier Édition Affichage Rechercher Terminal Aide
[glance_store]
stores = file,http
default_store = file
filesystem_store_datadir = /var/lib/glance/images/

[database]
# MariaDB connection info
connection = mysql+pymysql://glance:password@10.0.0.30/glance

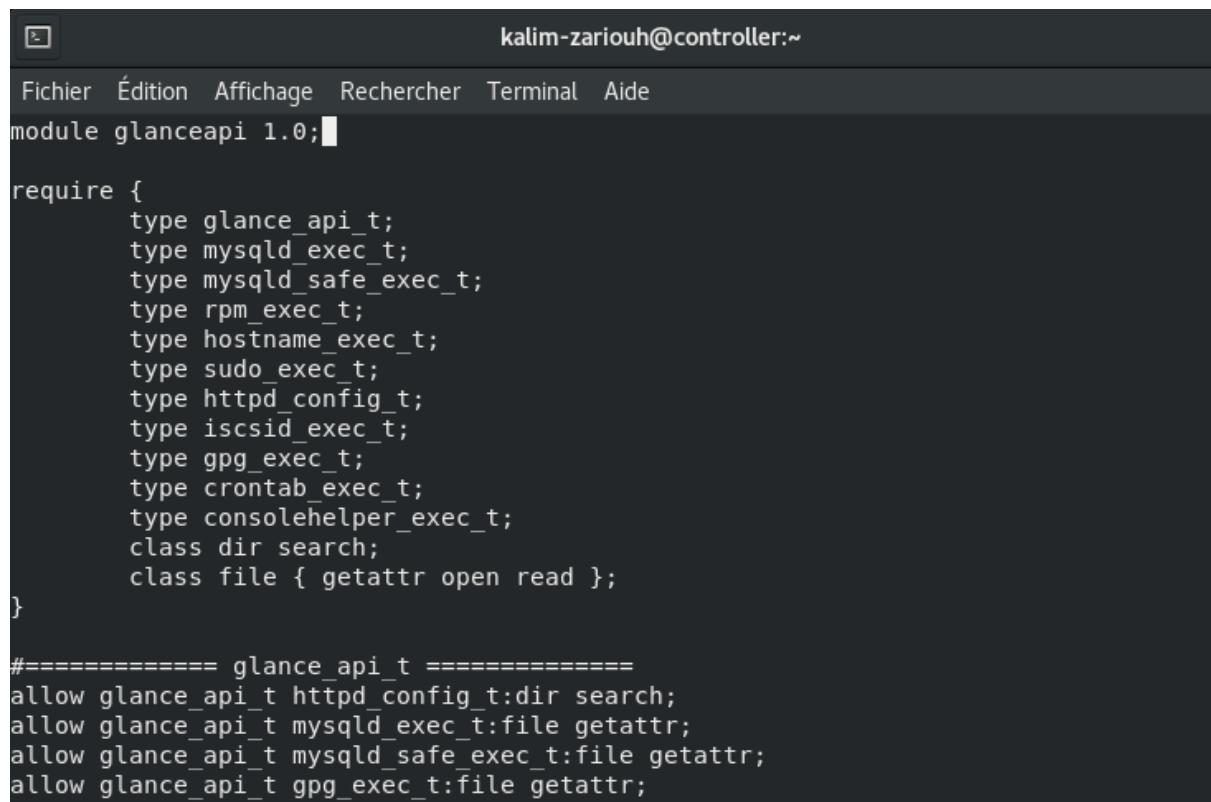
# keystone auth info
[keystone_auth]
www_authenticate_uri = http://10.0.0.30:5000
auth_url = http://10.0.0.30:5000
memcached_servers = 10.0.0.30:11211
auth_type = password
project_domain_name = default
user_domain_name = default
project_name = service
username = glance
password = servicepassword

[paste_deploy]
flavor = keystone
```

```
[root@controller ~]# chmod 640 /etc/glance/glance-api.conf
[root@controller ~]# chgrp glance /etc/glance/glance-api.conf
[root@controller ~]# su -s /bin/bash glance -c "glance-manage db_sync"
2022-02-14 09:52:55.518 17570 INFO alembic.runtime.migration [-] Context impl MySQLImpl.
2022-02-14 09:52:55.520 17570 INFO alembic.runtime.migration [-] Will assume non-transactional DDL.
2022-02-14 09:52:55.556 17570 INFO alembic.runtime.migration [-] Context impl MySQLImpl.
2022-02-14 09:52:55.556 17570 INFO alembic.runtime.migration [-] Will assume non-transactional DDL.
INFO [alembic.runtime.migration] Context impl MySQLImpl.
INFO [alembic.runtime.migration] Will assume non-transactional DDL.
INFO [alembic.runtime.migration] Running upgrade -> liberty, liberty initial
INFO [alembic.runtime.migration] Running upgrade liberty -> mitaka01, add index on created_at and updated_at columns of 'images' table
INFO [alembic.runtime.migration] Running upgrade mitaka01 -> mitaka02, update metadata for os_nova_server
```

Activer le service Glance:

```
[root@controller ~]# systemctl enable --now openstack-glance-api
Created symlink /etc/systemd/system/multi-user.target.wants/openstack-glance-api.service → /usr/lib/systemd/system/openstack-glance-api.service.
[root@controller ~]#
```



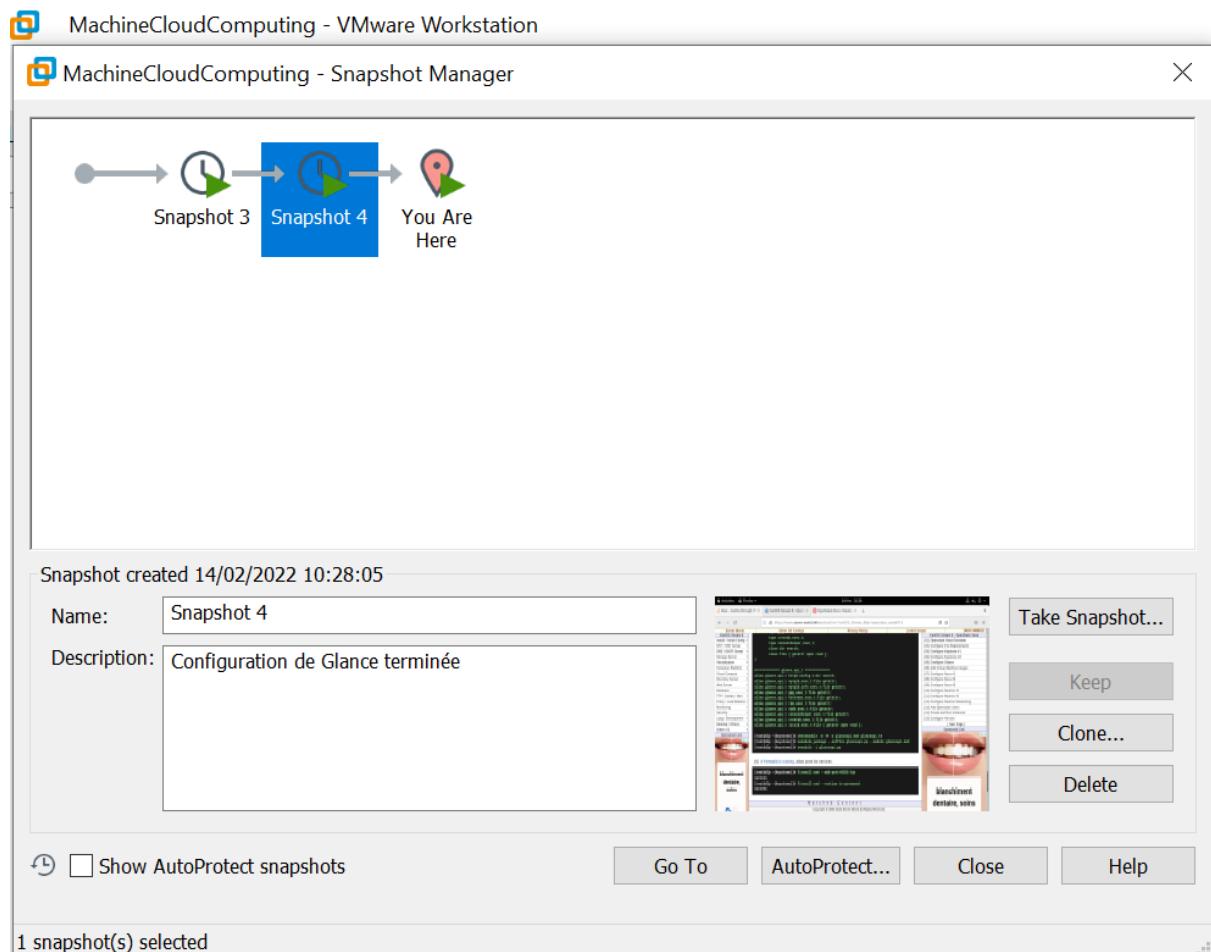
The screenshot shows a terminal window with a dark background and light-colored text. At the top, it says "kalim-zariouh@controller:~". Below that is a menu bar with "Fichier", "Édition", "Affichage", "Rechercher", "Terminal", and "Aide". The main area contains SELinux policy code for the "glanceapi" module. It defines types for various system components like MySQL and Apache, and then specifies permissions for the "glance_api_t" type. Specifically, it allows "glance_api_t" to search directories for "httpd_config_t", "mysqld_exec_t", and "mysqld_safe_exec_t", and to read files for "gpg_exec_t".

```
module glanceapi 1.0;

require {
    type glance_api_t;
    type mysqld_exec_t;
    type mysqld_safe_exec_t;
    type rpm_exec_t;
    type hostname_exec_t;
    type sudo_exec_t;
    type httpd_config_t;
    type iscsid_exec_t;
    type gpg_exec_t;
    type crontab_exec_t;
    type consolehelper_exec_t;
    class dir search;
    class file { getattr open read };
}

===== glance_api_t =====
allow glance_api_t httpd_config_t:dir search;
allow glance_api_t mysqld_exec_t:file getattr;
allow glance_api_t mysqld_safe_exec_t:file getattr;
allow glance_api_t gpg_exec_t:file getattr;
```

```
[root@controller ~]# checkmodule -m -M -o glanceapi.mod glanceapi.te
[root@controller ~]# semodule_package --outfile glanceapi.pp --module glanceapi.mod
[root@controller ~]# semodule -i glanceapi.pp
```



Ajouter des images de machines virtuelles sur Glance:

Afin de bootstrap les images qu'on va ajouter au niveau de Glance, on doit disposer d'un hyperviseur de type 1 d'où la nécessité d'installation de KVM:

```
[root@controller ~]# dnf -y install qemu-kvm libvirt virt-install
Dernière vérification de l'expiration des métadonnées effectuée il y a 0:49:53 le lun.
. 14 févr. 2022 09:16:11 +01.
Le paquet qemu-kvm-15:6.2.0-5.module_el8.6.0+1087+b42c8331.x86_64 est déjà installé.
Dépendances résolues.
=====
Paquet          Architecture      Version       Dépôt     Taille
=====
Installation:
libvirt          x86_64 8.0.0-2.module_el8.6.0+1087+b42c8331 appstream 62 k
virt-install      noarch 3.2.0-3.el8                      appstream 81 k
Installation des dépendances:
libvirt-client    x86_64 8.0.0-2.module_el8.6.0+1087+b42c8331 appstream 411 k
libvirt-daemon-config-nwfilter
python3-argcomplete   x86_64 8.0.0-2.module_el8.6.0+1087+b42c8331 appstream 70 k
python3-libvirt     noarch 1.9.3-6.el8                      appstream 60 k
virt-manager-common x86_64 8.0.0-1.module_el8.6.0+1087+b42c8331 appstream 332 k
                           noarch 3.2.0-3.el8                      appstream 1.0 M
Résumé de la transaction
=====
Installer 7 Paquets
```

On s'assure que les modules de KVM sont été bien téléchargées, et on active le service de libvirtd pour qu'on puisse exploiter la bibliothèque de gestion des machines virtuelles Libvirt::

```
[root@controller ~]# lsmod | grep kvm
kvm_intel           323584  0
kvm                 905216  1 kvm_intel
irqbypass          16384   1 kvm
[root@controller ~]# systemctl enable --now libvirtd
[root@controller ~]#
```

On installe par la suite des outils utiles pour la gestion des machines virtuelles:

```
[root@controller ~]# dnf -y install libguestfs-tools virt-top
Dernière vérification de l'expiration des métadonnées effectuée il y a 1:04:44 le lun
. 14 févr. 2022 09:16:11 +01.
Dépendances résolues.
=====
 Paquet           Architecture      Version       Dépôt     Taille
=====
Installation:
 libguestfs-tools    noarch 1:1.44.0-5.module_el8.6.0+1087+b42c8331 appstream 28 k
 virt-top            x86_64 1.0.8-32.el8                      appstream 729 k
Installation des dépendances:
 bind-export-libs    x86_64 32:9.11.36-2.el8                  baseos    1.1 M
 dhcp-client          x86_64 12:4.3.6-47.el8.0.1               baseos    318 k
 dhcp-common          noarch 12:4.3.6-47.el8.0.1               baseos    207 k
 dhcp-libs             x86_64 12:4.3.6-47.el8.0.1               baseos    148 k
 hexedit              x86_64 1.2.13-12.el8                  appstream 46 k
 hivex                x86_64 1.3.18-23.module_el8.6.0+983+a7505f3f appstream 113 k
 ipcalc               x86_64 0.2.4-4.el8                  baseos    38 k
 libguestfs            x86_64 1:1.44.0-5.module_el8.6.0+1087+b42c8331 appstream 769 k
 libguestfs-appliance x86_64 1:1.44.0-5.module_el8.6.0+1087+b42c8331 appstream 2.1 M
 libguestfs-tools-c    x86_64 1:1.44.0-5.module_el8.6.0+1087+b42c8331 appstream 5.6 M
 perl-Class-Inspector noarch 1.32-2.el8                  appstream 37 k
```

Création d'une machine virtuelle à partir de l'image centos 8.2 :

```
[root@controller ~]# virt-builder -l
opensuse-13.1           x86_64      openSUSE 13.1
opensuse-13.2           x86_64      openSUSE 13.2
opensuse-42.1           x86_64      openSUSE Leap 42.1
opensuse-tumbleweed     x86_64      openSUSE Tumbleweed
alma-8.5                x86_64      AlmaLinux 8.5
centos-6                x86_64      CentOS 6.6
centos-7.0              x86_64      CentOS 7.0
centos-7.1              x86_64      CentOS 7.1
centos-7.2              aarch64    CentOS 7.2 (aarch64)
centos-7.2              x86_64      CentOS 7.2
centos-7.3              x86_64      CentOS 7.3
centos-7.4              x86_64      CentOS 7.4
centos-7.5              x86_64      CentOS 7.5
centos-7.6              x86_64      CentOS 7.6
centos-7.7              x86_64      CentOS 7.7
centos-7.8              x86_64      CentOS 7.8
centos-8.0              x86_64      CentOS 8.0
centos-8.2             x86_64      CentOS 8.2
cirros-0.3.1            x86_64      CirrOS 0.3.1
cirros-0.3.5            x86_64      CirrOS 0.3.5
debian-6                x86_64      Debian 6 (Squeeze)
debian-7                sparc64    Debian 7 (Wheezy) (sparc64)
debian-7                x86_64      Debian 7 (wheezy)
debian-8                x86_64      Debian 8 (jessie)
debian-9                x86_64      Debian 9 (stretch)
```

```
[root@controller ~]# virt-builder centos-8.2 --format qcow2 --size 10G -o /var/kvm/images/centos-8.2.qcow2 --root-password password:myrootpassword
[ 1,9] Downloading: http://builder.libguestfs.org/centos-8.2.xz
#####
[1060,0] Planning how to build this image
[1060,0] Uncompressing
[1118,4] Resizing (using virt-resize) to expand the disk to 10,0G
[1283,8] Opening the new disk
[1295,6] Setting a random seed
[1295,7] Setting passwords
[1298,7] Finishing off
          Output file: /var/kvm/images/centos-8.2.qcow2
          Output size: 10,0G
          Output format: qcow2
          Total usable space: 9,3G
          Free space: 8,0G (85%)
[root@controller ~]#
```

```
[    0.000000] Linux version 4.18.0-193.6.3.el8_2.x86_64 (mockbuild@kbuilder.bsys.centos.org) (gcc version 8.3.1 20191121 (Red Hat 8.3.1-5) (GCC)) #1 SMP Wed Jun 10 11:09:32 UTC 2020
[    0.000000] Command line: BOOT_IMAGE=(hd0,gpt2)/vmlinuz-4.18.0-193.6.3.el8_2.x86_64 root=UUID=4fd120e4-1f6d-46b3-a404-5569ef6af1f9 ro console=tty0 rd_NO_PLYMOUTH crashkern el=auto resume=UUID=40f14688-2619-4046-a9eb-b7333fff1b84 console=ttyS0,115200
[    0.000000] x86/fpu: Supporting XSAVE feature 0x001: 'x87 floating point registers'
[    0.000000] x86/fpu: Supporting XSAVE feature 0x002: 'SSE registers'
[    0.000000] x86/fpu: Supporting XSAVE feature 0x004: 'AVX registers'
[    0.000000] x86/fpu: xstate_offset[2]: 576, xstate_sizes[2]: 256
[    0.000000] x86/fpu: Enabled xstate features 0x7, context size is 832 bytes, using 'compacted' format.
[    0.000000] BIOS-provided physical RAM map:
[    0.000000] BIOS-e820: [mem 0x0000000000000000-0x0000000000009fbff] usable
[    0.000000] BIOS-e820: [mem 0x0000000000009fc00-0x0000000000009ffff] reserved
[    0.000000] BIOS-e820: [mem 0x000000000000f0000-0x000000000000ffff] reserved
[    0.000000] BIOS-e820: [mem 0x000000000100000-0x000000000635dbfff] usable
[    0.000000] BIOS-e820: [mem 0x000000000635dc000-0x000000000635ffff] reserved
[    0.000000] BIOS-e820: [mem 0x00000000b000000-0x00000000bffffffff] reserved
[    0.000000] BIOS-e820: [mem 0x00000000fed1c000-0x00000000fed1ffff] reserved
[    0.000000] BIOS-e820: [mem 0x00000000feffc000-0x00000000feffff] reserved
[    0.000000] BIOS-e820: [mem 0x00000000fffc0000-0x00000000ffff] reserved
[    0.000000] NX (Execute Disable) protection: active
```

Ainsi on s'assure qu'on peut très bien démarrer des machines virtuelles:

```
Welcome to CentOS Linux 8 (Core) dracut-049-70.git20200228.el8 (Initramfs)!

[    6.146517] systemd[1]: Set hostname to <localhost.localdomain>.
[    6.315805] systemd[1]: Reached target Timers.
[ OK  ] Reached target Timers.
[    6.332622] systemd[1]: Listening on udev Kernel Socket.
[ OK  ] Listening on udev Kernel Socket.
[    6.347356] systemd[1]: Reached target Slices.
[ OK  ] Reached target Slices.
[    6.361174] systemd[1]: Listening on udev Control Socket.
[ OK  ] Listening on udev Control Socket.
[    6.377231] systemd[1]: Listening on Journal Socket.
[ OK  ] Listening on Journal Socket.
      Starting Setup Virtual Console...
[ OK  ] Listening on Journal Socket (/dev/log).
      Starting Journal Service...
      Starting Create list of required static nodes for the current kernel...
[ OK  ] Reached target Swap.
[ OK  ] Created slice system-systemd\x2dhibernate\x2dresume.slice.
      Starting Apply Kernel Variables...
[ OK  ] Started Hardware RNG Entropy Gatherer Daemon.
[ OK  ] Reached target Sockets.
[ OK  ] Started Create list of required static nodes for the current kernel.
[ OK  ] Started Apply Kernel Variables.
      Starting Create Static Device Nodes in /dev...
[ OK  ] Started Create Static Device Nodes in /dev.
[ OK  ] Started Setup Virtual Console.
```

On crée un dossier qui va contenir les images des machines virtuelles:

```
[root@controller ~](keystone)]# mkdir -p /var/kvm/images
[root@controller ~](keystone)]# qemu-img create -f qcow2 /var/kvm/images/centos-st8.img 10G
Formatting '/var/kvm/images/centos-st8.img', fmt=qcow2 cluster_size=65536 extended_l2=off compression_type=zlib size=10737418240 lazy_refcounts=off refcount_bits=16
[root@controller ~](keystone)]#
```

Créer une machine virtuelle centos stream 8:

```
[root@controller ~(keystone)]# virt-install \
> --name centos-st8 \
> --ram 1096 \
> --disk path=/var/kvm/images/centos-st8.img,format=qcow2 \
> --vcpus 2 \
> --os-variant centos-stream8 \
> --network network=default \
> --graphics none \
> --console pty,target_type=serial \
> --location /home/CentOS-Stream-8-x86_64-latest-dvd1.iso \
```

Au niveau de la machine créée, on ajoute un utilisateur nommé centos et qui à comme mot de passe centos:

```
[root@localhost ~]# useradd centos
[root@localhost ~]# passwd centos
Changing password for user centos.
New password:
BAD PASSWORD: The password is shorter than 8 characters
Retype new password:
passwd: all authentication tokens updated successfully.
[root@localhost ~]#
```

On désactive le UUID car on a déterminé auparavant qu'on va travailler avec: et on active le dhcp

```
# Generated by dracut initrd
NAME="enp1s0"
DEVICE="enp1s0"
ONBOOT="yes"
NETBOOT="yes"
#UUID="79a007f8-69f6-4baf-9f66-ed59be8a604f"
IPV6INIT="yes"
BOOTPROTO="dhcp"
TYPE="Ethernet"
PROXY_METHOD="none"
BROWSER_ONLY="no"
DEFROUTE="yes"
IPV4_FAILURE_FATAL="no"
IPV6_AUTOCONF="yes"
IPV6_DEFROUTE="yes"
IPV6_FAILURE_FATAL="no"
~
```

On installe le serveur SSH et on démarre ce service:

```
[kalim-zariouh@controller ~]$ dnf -y install cloud-init openssh-server
Erreur : Cette commande doit être exécutée avec les priviléges super-utilisateur
(sous l'utilisateur root sur la plupart des systèmes).
[kalim-zariouh@controller ~]$ su
Mot de passe :
[root@controller kalim-zariouh]# dnf -y install cloud-init openssh-server
Dernière vérification de l'expiration des métadonnées effectuée il y a 0:43:00 le
lun. 14 févr. 2022 11:40:45 +01.
Le paquet openssh-server-8.0pl1-12.el8.x86_64 est déjà installé.
Dépendances résolues.
=====
 Paquet           Architecture Version      Dépôt     Taille
=====
Installation:
 cloud-init        noarch      21.1-13.el8    appstream   1.1 M
Installation des dépendances:
 python3-pyserial  noarch      3.1.1-8.el8    appstream   169 k
Résumé de la transaction
=====
Installer 2 Paquets
```

```
users:
- default

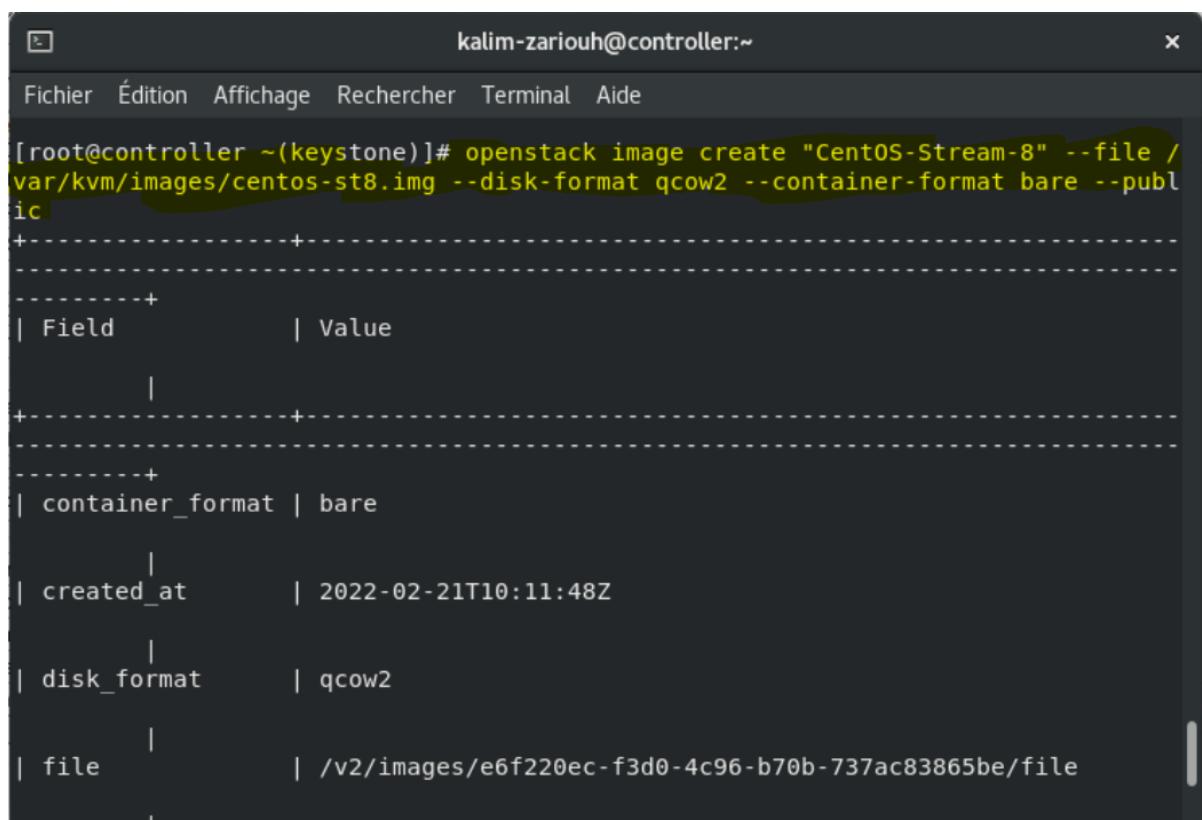
disable_root: 1
ssh_pwauth: 1

mount_default_fields: [~, ~, 'auto', 'defaults,nofail,x-systemd.requires=cloud-init.service', '0', '2']
resize_rootfs_tmp: /dev
ssh_deletekeys: 1
ssh_genkeytypes: ['rsa', 'ecdsa', 'ed25519']

system_info:
  default_user:
    name: centos
    lock_passwd: false
    gecos: Cloud User
    groups: [adm, systemd-journal]
    sudo: ["ALL=(ALL) NOPASSWD:ALL"]
    shell: /bin/bash
```

```
[root@controller ~]# systemctl status sshd
● sshd.service - OpenSSH server daemon
   Loaded: loaded (/usr/lib/systemd/system/sshd.service; enabled; vendor preset:>
   Active: active (running) since Mon 2022-02-21 09:23:40 +01; 2min 32s ago
     Docs: man:sshd(8)
           man:sshd_config(5)
   Main PID: 1936 (sshd)
      Tasks: 1 (limit: 17189)
     Memory: 2.3M
    CGroup: /system.slice/sshd.service
            └─1936 /usr/sbin/sshd -D -oCiphers=aes256-gcm@openssh.com,chacha20-p>

Feb 21 09:23:40 controller systemd[1]: Starting OpenSSH server daemon...
Feb 21 09:23:40 controller sshd[1936]: Server listening on 0.0.0.0 port 22.
Feb 21 09:23:40 controller sshd[1936]: Server listening on :: port 22.
Feb 21 09:23:40 controller systemd[1]: Started OpenSSH server daemon.
```



The screenshot shows a terminal window titled "kalim-zariouh@controller:~". The user is running the command `openstack image create "CentOS-Stream-8" --file /var/kvm/images/centos-st8.img --disk-format qcow2 --container-format bare --public`. The output shows the creation of a new image entry in the database:

Field	Value
container_format	bare
created_at	2022-02-21T10:11:48Z
disk_format	qcow2
file	/v2/images/e6f220ec-f3d0-4c96-b70b-737ac83865be/file

On remarque que après avoir quitté la machine créée que l'image a été bien ajouté aux images openstack:

```
[root@controller ~](keystone)]# openstack image list
+-----+-----+-----+
| ID          | Name        | Status |
+-----+-----+-----+
| e6f220ec-f3d0-4c96-b70b-737ac83865be | CentOS-Stream-8 | active |
+-----+-----+-----+
```

```
kalim-zariouh@controller:~  
Fichier Édition Affichage Rechercher Terminal Aide  
[root@controller ~]# wget http://cloud-images.ubuntu.com/releases/20.04/release/ubuntu-20.04-server-cloudimg-amd64.img -P /var/kvm/images  
--2022-02-21 11:15:23-- http://cloud-images.ubuntu.com/releases/20.04/release/ubuntu-20.04-server-cloudimg-amd64.img  
Résolution de cloud-images.ubuntu.com (cloud-images.ubuntu.com)... 91.189.88.248,  
91.189.88.247, 2001:67c:1360:8001::34, ...  
Connexion à cloud-images.ubuntu.com (cloud-images.ubuntu.com)|91.189.88.248|:80... connecté.  
requête HTTP transmise, en attente de la réponse... 302 Found  
Emplacement : http://cloud-images.ubuntu.com/releases/focal/release/ubuntu-20.04-server-cloudimg-amd64.img [suivant]  
--2022-02-21 11:15:27-- http://cloud-images.ubuntu.com/releases/focal/release/ubuntu-20.04-server-cloudimg-amd64.img  
Réutilisation de la connexion existante à cloud-images.ubuntu.com:80.  
requête HTTP transmise, en attente de la réponse... 200 OK  
Taille : 582483968 (556M) [application/octet-stream]  
Sauvegarde en : « /var/kvm/images/ubuntu-20.04-server-cloudimg-amd64.img »  
  
ubuntu-20.04-server 100%[=====] 555,50M 926KB/s ds 20m 0s S  
2022-02-21 11:35:27 (474 KB/s) - « /var/kvm/images/ubuntu-20.04-server-cloudimg-amd64.img » sauvé [582483968/582483968]  
[root@controller ~]# openstack image create "Ubuntu2004-Official" --fi
```

```
kalim-zariouh@controller:~  
Fichier Édition Affichage Rechercher Terminal Aide  
[root@controller ~]# openstack image create "Ubuntu2004-Official" --file /var/kvm/images/ubuntu-20.04-server-cloudimg-amd64.img --disk-format qcow2 --container-format bare --public  
+-----+-----+  
| Field | Value |  
+-----+-----+  
-----+-----+  
| container_format | bare |  
-----+-----+  
| created_at | 2022-02-21T10:37:11Z |  
-----+-----+  
| disk_format | qcow2 |  
-----+-----+  
| file | /v2/images/c5adb26e-4d63-4be3-9a11-fa905f96aa31/file |  
-----+-----+
```

configuration NOVA :

OpenStack Compute Service (Nova) est un contrôleur d'instance de cloud computing, qui est la partie principale d'un système IaaS. Nova est le projet OpenStack qui fournit un moyen de provisionner des instances de calcul (c'est-à-dire des serveurs virtuels), qui est utilisé pour héberger et gérer des systèmes de cloud computing. Nova permet la dimension dynamique des puissances de calcul aux instances des machines virtuelles et il offre également un control complet sur ces ressources:

On commence par créer un utilisateur nova en lui attribuant le rôle admin:

```
[root@controller ~]# openstack user create --domain default --project service --password servicepassword nova
+-----+-----+
| Field | Value |
+-----+-----+
| default_project_id | 3bff2f81ef834adcac21cee82a872377 |
| domain_id | default |
| enabled | True |
| id | 6465be72957b4048b6d6c7fce481265 |
| name | nova |
| options | {} |
| password_expires_at | None |
+-----+-----+
[root@controller ~]# openstack role add --project service --user nova admin
[root@controller ~]#
```

Au niveau de projet service déjà créé au niveau de l'environnement KeyStone, on crée un utilisateur placement en lui attribuant le rôle admin:

```
[root@controller ~]# openstack user create --domain default --project service --password servicepassword placement
+-----+-----+
| Field | Value |
+-----+-----+
| default_project_id | 3bff2f81ef834adcac21cee82a872377 |
| domain_id | default |
| enabled | True |
| id | 18adbabaf81341c28637433a2e9b0631 |
| name | placement |
| options | {} |
| password_expires_at | None |
+-----+-----+
[root@controller ~]#
```

Créer un service complet pour nova et un autre pour placement:

```
[root@controller ~]# openstack role add --project service --user placement admin
[root@controller ~]# openstack service create --name nova --description "OpenStack Compute service" compute
+-----+-----+
| Field | Value |
+-----+-----+
| description | OpenStack Compute service |
| enabled | True |
| id | 473b7df5ff404c5ba853ca5fe7637961 |
| name | nova |
| type | compute |
+-----+-----+
```

```
[root@controller ~ (keystone)]# openstack service create --name placement --description "OpenStack Compute Placement service" placement
+-----+-----+
| Field | Value |
+-----+-----+
| description | OpenStack Compute Placement service |
| enabled | True |
| id | c0886ac312ef4d30a9d69f81af7d6c76 |
| name | placement |
| type | placement |
+-----+-----+
[root@controller ~ (keystone)]#
```

On détermine l'host API pour le service Nova et on indique les points de terminaison:

```
[root@controller ~ (keystone)]# export controller=10.0.0.30
[root@controller ~ (keystone)]# openstack endpoint create --region RegionOne compute public http://$controller:8774/v2.1/%\{tenant_id\}s
+-----+-----+
| Field | Value |
+-----+-----+
| enabled | True |
| id | af6cc499347f41ffb1afec3d6c738237 |
| interface | public |
| region | RegionOne |
| region_id | RegionOne |
| service_id | 473b7df5ff404c5ba853ca5fe7637961 |
| service_name | nova |
| service_type | compute |
| url | http://10.0.0.30:8774/v2.1/%\{tenant_id\}s |
+-----+-----+
[root@controller ~ (keystone)]#
```

```
[root@controller ~ (keystone)]# openstack endpoint create --region RegionOne compute internal http://$controller:8774/v2.1/%\{tenant_id\}s
+-----+-----+
| Field | Value |
+-----+-----+
| enabled | True |
| id | e312001f4a1743fcbe721c62e31a76c |
| interface | internal |
| region | RegionOne |
| region_id | RegionOne |
| service_id | 473b7df5ff404c5ba853ca5fe7637961 |
| service_name | nova |
| service_type | compute |
| url | http://10.0.0.30:8774/v2.1/%\{tenant_id\}s |
+-----+-----+
[root@controller ~ (keystone)]#
```

```
[root@controller ~ (keystone)]# openstack endpoint create --region RegionOne compute admin http://$controller:8774/v2.1/%\{tenant_id\}s
+-----+-----+
| Field | Value |
+-----+-----+
| enabled | True |
| id | bc6ae73118b54bb0b8275fd1c307959a |
| interface | admin |
| region | RegionOne |
| region_id | RegionOne |
| service_id | 473b7df5ff404c5ba853ca5fe7637961 |
| service_name | nova |
| service_type | compute |
| url | http://10.0.0.30:8774/v2.1/%\{tenant_id\}s |
+-----+-----+
```

```
[root@controller ~ (keystone)]# openstack endpoint create --region RegionOne placement
public http://$controller:8778
+-----+-----+
| Field | Value |
+-----+-----+
| enabled | True |
| id | a7f3c2f29ad74d6394f970a0b7168be5 |
| interface | public |
| region | RegionOne |
| region_id | RegionOne |
| service_id | c0886ac312ef4d30a9d69f81af7d6c76 |
| service_name | placement |
| service_type | placement |
| url | http://10.0.0.30:8778 |
+-----+-----+
[root@controller ~ (keystone)]# openstack endpoint create --region RegionOne placement
internal http://$controller:8778
+-----+-----+
| Field | Value |
+-----+-----+
| enabled | True |
| id | 322e8c82564e4eb8b7924bbb608d3943 |
| interface | internal |
| region | RegionOne |
| region_id | RegionOne |
| service_id | c0886ac312ef4d30a9d69f81af7d6c76 |
| service_name | placement |
| service_type | placement |
| url | http://10.0.0.30:8778 |
+-----+-----+
[root@controller ~ (keystone)]# openstack endpoint create --region RegionOne placement
admin http://$controller:8778
+-----+-----+
| Field | Value |
+-----+-----+
| enabled | True |
| id | c23700e06ec34cee8e90d1c5359a5d16 |
| interface | admin |
| region | RegionOne |
| region_id | RegionOne |
| service_id | c0886ac312ef4d30a9d69f81af7d6c76 |
| service_name | placement |
| service_type | placement |
| url | http://10.0.0.30:8778 |
+-----+-----+
[root@controller ~ (keystone)]#
```

On crée une base de données Nova au niveau de serveur des bases de données MariaDB en attribuant à l'utilisateur nova les priviléges de gestion de cette base de données:

```
Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

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

MariaDB [(none)]> create database nova;
Query OK, 1 row affected (0.006 sec)

MariaDB [(none)]> grant all privileges on nova.* to nova@'localhost' identified by 'password';
Query OK, 0 rows affected (0.023 sec)

MariaDB [(none)]> grant all privileges on nova.* to nova@'%' identified by 'password'
;
Query OK, 0 rows affected (0.006 sec)

MariaDB [(none)]> create database nova_api;
Query OK, 1 row affected (0.000 sec)

MariaDB [(none)]> grant all privileges on nova_api.* to nova@'localhost' identified
by 'password';
Query OK, 0 rows affected (0.004 sec)

MariaDB [(none)]> 

MariaDB [(none)]> create database nova_cell0;
Query OK, 1 row affected (0.002 sec)

MariaDB [(none)]> grant all privileges on nova_cell0.* to nova@'localhost' identified
by 'password';
Query OK, 0 rows affected (0.006 sec)

MariaDB [(none)]> grant all privileges on nova_cell0.* to nova@'%' identified by 'pas
sword';
Query OK, 0 rows affected (0.002 sec)

MariaDB [(none)]> create database placement;
Query OK, 1 row affected (0.000 sec)

MariaDB [(none)]> grant all privileges on placement.* to placement@'localhost' identifi
ed by 'password';
Query OK, 0 rows affected (0.002 sec)

MariaDB [(none)]>
```

On crée également une base de données placement en attribuant à l'utilisateur placement toutes les privilèges de gestion de cette base de données:

```

MariaDB [(none)]> grant all privileges on nova_cell0.* to nova@'%' identified by 'pas
sword';
Query OK, 0 rows affected (0.002 sec)

MariaDB [(none)]> create database placement;
Query OK, 1 row affected (0.000 sec)

MariaDB [(none)]> grant all privileges on placement.* to placement@'localhost' identi
fied by 'password';
Query OK, 0 rows affected (0.002 sec)

MariaDB [(none)]> grant all privileges on placement.* to placement@'%' identified by
'password';
Query OK, 0 rows affected (0.001 sec)

MariaDB [(none)]> flush privileges;
Query OK, 0 rows affected (0.494 sec)

MariaDB [(none)]> exit
Bye
[root@controller ~]#

```

On installe par la suite les packages nécessaires pour démarrer le service Nova:

```

[root@controller ~]# dnf --enablerepo=centos-openstack-xena,powertools,epel -y install openstack-nova openstack-placement-api
CentOS-8 - OpenStack xena                               2.2 kB/s | 3.0 kB     00:01
CentOS-8 - OpenStack xena                           199 kB/s | 2.1 MB     00:11
CentOS Stream 8 - PowerTools                         6.9 kB/s | 4.4 kB     00:00
CentOS Stream 8 - PowerTools                        349 kB/s | 4.2 MB     00:12
Last metadata expiration check: 0:00:07 ago on Mon 21 Feb 2022 11:11:54 AM +01.
Dependencies resolved.
=====
 Package           Arch   Version        Repository      Size
 =====
 Installing:
 openstack-nova          noarch 1:24.0.0-1.el8 centos-openstack-xena 7.0 k
 openstack-placement-api noarch 6.0.0-1.el8    centos-openstack-xena 12 k
 Installing dependencies:
 ipmitool            x86_64 1.8.18-18.el8 appstream      395 k
 iptables-services    x86_64 1.8.4-22.el8   baseos         63 k
 network-scripts      x86_64 10.00.17-1.el8 baseos        197 k
 network-scripts-openvswitch2.15 x86_64 2.15.0-72.el8s centos-nfv-openvswitch 32 k
 novnc               noarch 1.3.0-3.el8    epel          584 k
 openstack-nova-api    noarch 1:24.0.0-1.el8 centos-openstack-xena 11 k
 openstack-nova-common noarch 1:24.0.0-1.el8 centos-openstack-xena 265 k
 openstack-nova-compute noarch 1:24.0.0-1.el8 centos-openstack-xena 9.7 k
 openstack-nova-conductor noarch 1:24.0.0-1.el8 centos-openstack-xena 8.6 k

```

On configure le service Nova en indiquant au niveau du fichier de configuration les informations de connexion au Middleware RabbitMq, au gestionnaire des images Glance, au gestionnaire des authentifications KeyStone et au serveur des bases de données MariaDB. Et en précisant également l'adresse IP:

```
kalim-zariouh@controller:~
```

```
File Edit View Search Terminal Help
```

```
[keystone_auth_token]
www_authenticate_uri = http://10.0.0.30:5000
auth_url = http://10.0.0.30:5000
memcached_servers = 10.0.0.30:11211
auth_type = password
project_domain_name = default
user_domain_name = default
project_name = service
username = nova
password = servicepassword

[placement]
auth_url = http://10.0.0.30:5000
os_region_name = RegionOne
auth_type = password
project_domain_name = default
user_domain_name = default
project_name = service
username = placement
password = servicepassword

[wsgi]
api_paste_config = /etc/nova/api-paste.ini
```

```
[root@controller ~]# mv /etc/nova/nova.conf /etc/nova/nova.conf.org
[root@controller ~]# vi /etc/nova/nova.conf
[root@controller ~]# chmod 640 /etc/nova/nova.conf
[root@controller ~]# chgrp nova /etc/nova/nova.conf
```

Au niveau du fichier de configuration de l'utilisateur placement, on détermine ses informations d'authentification et de la connexion à la base de données:

```
kalim-zariouh@controller:~
```

```
File Edit View Search Terminal Help
```

```
[DEFAULT]
debug = false

[api]
auth_strategy = keystone

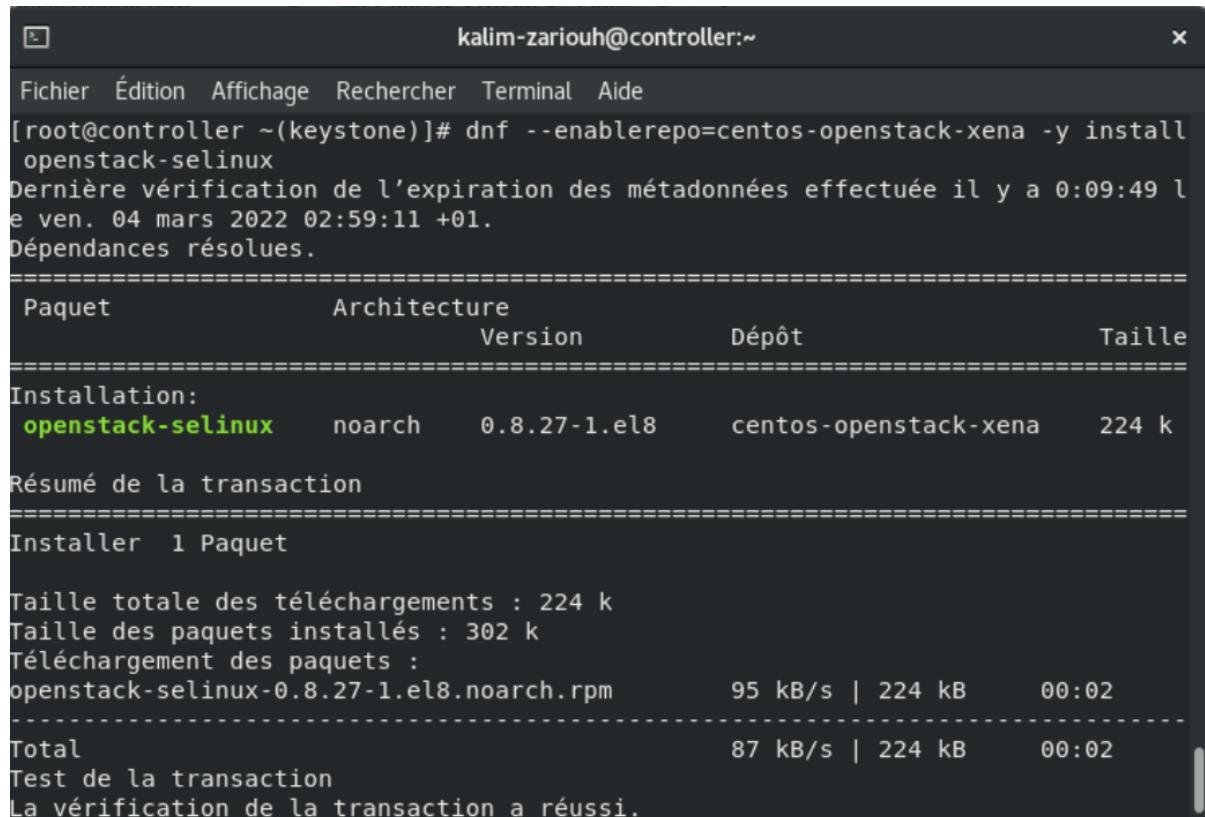
[keystone_auth_token]
www_authenticate_uri = http://10.0.0.30:5000
auth_url = http://10.0.0.30:5000
memcached_servers = 10.0.0.30:11211
auth_type = password
project_domain_name = default
user_domain_name = default
project_name = service
username = placement
password = servicepassword

[placement_database]
connection = mysql+pymysql://placement:password@10.0.0.30/placement
```

On attribue à l'utilisateur placement tout les priviléges:

```
<VirtualHost *:8778>
    WSGIProcessGroup placement-api
    WSGIApplicationGroup %{GLOBAL}
    WSGIPassAuthorization On
    WSGIDaemonProcess placement-api processes=3 threads=1 user=placement group=placement
    WSGIScriptAlias / /usr/bin/placement-api
    <IfVersion >= 2.4>
        ErrorLogFormat "%M"
    </IfVersion>
    ErrorLog /var/log/placement/placement-api.log
    #SSLEngine On
    #SSLCertificateFile ...
    #SSLCertificateKeyFile ...
    <Directory /usr/bin>
        Require all granted
    </Directory>
</VirtualHost>

Alias /placement-api /usr/bin/placement-api
<Location /placement-api>
    SetHandler wsgi-script
```



The screenshot shows a terminal window titled "kalim-zariouh@controller:~". The window contains the following command and its output:

```
[root@controller ~]# dnf --enablerepo=centos-openstack-xena -y install openstack-selinux
Dernière vérification de l'expiration des métadonnées effectuée il y a 0:09:49 le ven. 04 mars 2022 02:59:11 +01.
Dépendances résolues.
=====
 Paquet          Architecture      Version       Dépôt          Taille
=====
Installation:
 openstack-selinux      noarch     0.8.27-1.el8   centos-openstack-xena 224 k

Résumé de la transaction
=====
Installer 1 Paquet

Taille totale des téléchargements : 224 k
Taille des paquets installés : 302 k
Téléchargement des paquets :
openstack-selinux-0.8.27-1.el8.noarch.rpm      95 kB/s | 224 kB   00:02
-----
Total                                         87 kB/s | 224 kB   00:02

Test de la transaction
La vérification de la transaction a réussi.
```

At the bottom of the terminal window, there are three commands:

```
[root@controller ~]# semanage port -a -t http_port_t -p tcp 8778
[root@controller ~]# vi novaapi.te
[root@controller ~]#
```

```

kalim-zariouh@controller:~ Fichier Édition Affichage Rechercher Terminal Aide
# create new

module novaapi 1.0;

require {
    type rpm_exec_t;
    type hostname_exec_t;
    type nova_t;
    type mysqld_exec_t;
    type mysqld_safe_exec_t;
    type gpg_exec_t;
    type crontab_exec_t;
    type consolehelper_exec_t;
    class file getattr;
}

===== nova_t =====
allow nova_t mysqld_exec_t:file getattr;
allow nova_t mysqld_safe_exec_t:file getattr;
allow nova_t gpg_exec_t:file getattr;
allow nova_t hostname_exec_t:file getattr;
allow nova_t rpm_exec_t:file getattr;
allow nova_t consolehelper_exec_t:file getattr;

```

```

[root@controller ~]# semanage port -a -t http_port_t -p tcp 8778
[root@controller ~]# vi novaapi.te
[root@controller ~]# checkmodule -m -M -o novaapi.mod novaapi.te
[root@controller ~]# semodule_package --outfile novaapi.pp --module no
vaapi.mod
[root@controller ~]#

```

On importe les données à la base de données:

```

[root@controller ~]# su -s /bin/bash placement -c "placement-manage db sync"
[root@controller ~]# su -s /bin/bash nova -c "nova-manage cell_v2 create_ce
ll --name cell1"

[root@controller ~]# su -s /bin/bash placement -c "placement-manage db
sync"
[root@controller ~]# su -s /bin/bash nova -c "nova-manage api_db sync"
[root@controller ~]# su -s /bin/bash nova -c "nova-manage cell_v2 map_
cell0"
[root@controller ~]# su -s /bin/bash nova -c "nova-manage db sync"
[root@controller ~]# su -s /bin/bash nova -c "nova-manage cell_v2 crea
te_cell --name cell1"
--transport-url not provided in the command line, using the value [DEFAULT]/tran
sport_url from the configuration file
--database_connection not provided in the command line, using the value [databas
e]/connection from the configuration file
[root@controller ~]#

```

Redémarrer le service httpd et attribuer à l'utilisateur placement la propriété de son log :

```

[root@controller ~]# systemctl restart httpd
[root@controller ~]# chown placement. /var/log/placement/placement-api
.log
[root@controller ~]# for service in api conductor scheduler; do

```

Pour chaque service, on active le service Nova:

```

kalim-zariouh@controller:~ i.log
[root@controller ~]# for service in api conductor scheduler; do
> systemctl enable --now openstack-nova-$service
> done
Created symlink /etc/systemd/system/multi-user.target.wants/openstack-nova-api.service → /usr/lib/systemd/system/openstack-nova-api.service.
Created symlink /etc/systemd/system/multi-user.target.wants/openstack-nova-conductor.service → /usr/lib/systemd/system/openstack-nova-conductor.service.
Created symlink /etc/systemd/system/multi-user.target.wants/openstack-nova-scheduler.service → /usr/lib/systemd/system/openstack-nova-scheduler.service.
[root@controller ~]# openstack compute service list
+-----+-----+-----+-----+-----+
| ID | Binary | Host | Zone | Status | State | Updated At |
+-----+-----+-----+-----+-----+
| 4 | nova-conductor | controller | internal | enabled | up | 2022-03-04T02:50:07.000000 |
| 7 | nova-scheduler | controller | internal | enabled | up | 2022-03-04T02:50:04.000000 |
+-----+-----+-----+-----+-----+
[root@controller ~]# S

```

On installe le nova-compute:

```

[root@controller ~]# dnf --enablerepo=centos-openstack-xena,epel,powertools -y install openstack-nova-compute
Last metadata expiration check: 1:01:01 ago on Mon 21 Feb 2022 11:11:54 AM +01.
Package openstack-nova-compute-1:24.0.0-1.el8.noarch is already installed.
Dependencies resolved.
Nothing to do.
Complete!
[root@controller ~]#

```

Déterminer le driver de nova-compute est celui offert par la bibliothèque Libvirt:

```

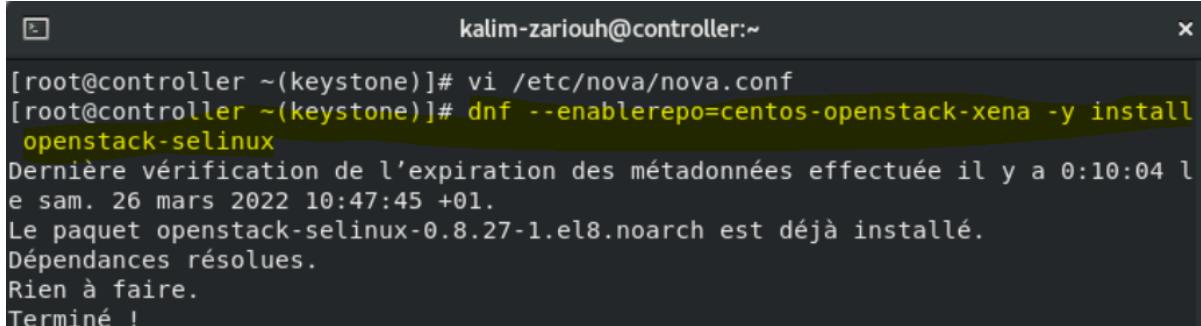
[DEFAULT]
# define own IP address
my_ip = 10.0.0.30
state_path = /var/lib/nova
enabled_apis = osapi_compute,metadata
log_dir = /var/log/nova
compute_driver = libvirt.LibvirtDriver

```

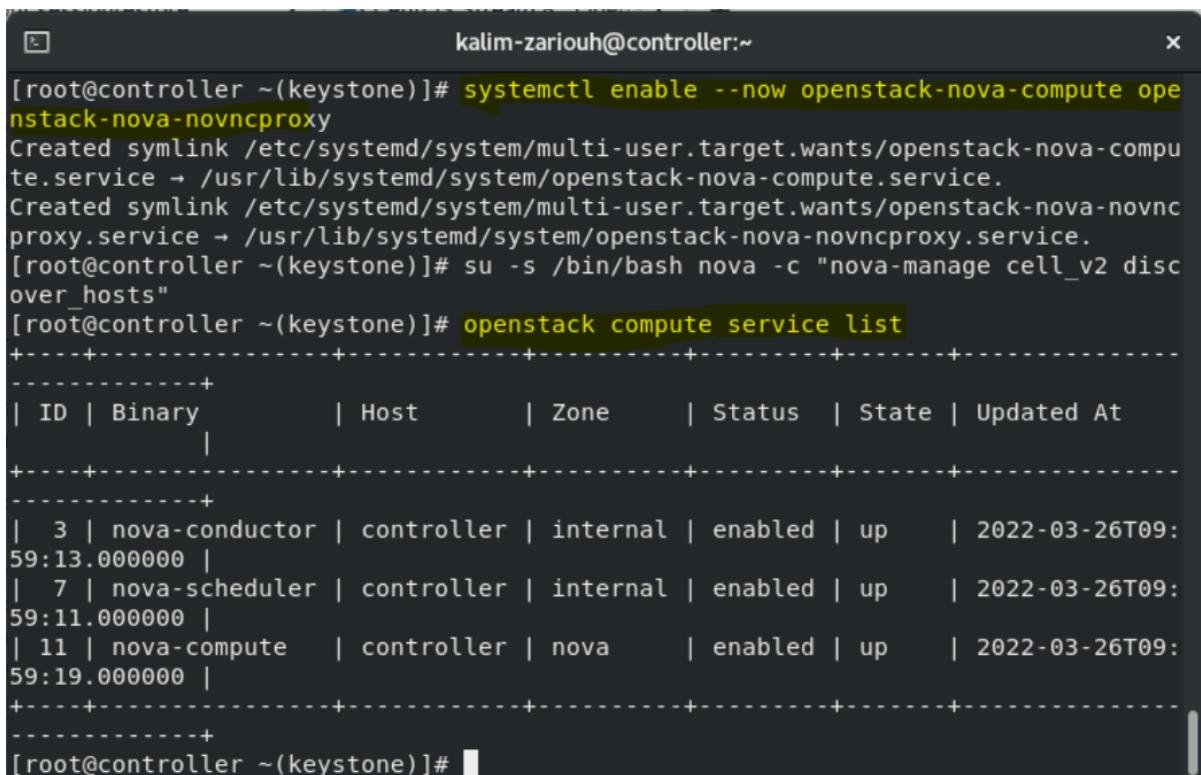
On active le VNC qui présente un système de visualisation et de contrôle de l'environnement de bureau d'un ordinateur distant en déterminant l'adresse du serveur proxy du client, et en autorisant l'écoute de serveur à toutes les requêtes:

```
[vnc]
enabled = True
server_listen = 0.0.0.0
server_proxyclient_address = 10.0.0.30
novncproxy_base_url = http://10.0.0.30:6080/vnc_auto.html
[wsgi]
api_paste_config = /etc/nova/api-paste.ini
```

Démarrer le service Nova-Compute:



```
kalim-zariouh@controller:~ [root@controller ~]# vi /etc/nova/nova.conf
[root@controller ~]# dnf --enablerepo=centos-openstack-xena -y install
openstack-selinux
Dernière vérification de l'expiration des métadonnées effectuée il y a 0:10:04 l
e sam. 26 mars 2022 10:47:45 +01.
Le paquet openstack-selinux-0.8.27-1.el8.noarch est déjà installé.
Dépendances résolues.
Rien à faire.
Terminé !
```



```
kalim-zariouh@controller:~ [root@controller ~]# systemctl enable --now openstack-nova-compute ope
nstack-nova-novncproxy
Created symlink /etc/systemd/system/multi-user.target.wants/openstack-nova-compu
te.service → /usr/lib/systemd/system/openstack-nova-compute.service.
Created symlink /etc/systemd/system/multi-user.target.wants/openstack-nova-novnc
proxy.service → /usr/lib/systemd/system/openstack-nova-novncproxy.service.
[root@controller ~]# su -s /bin/bash nova -c "nova-manage cell_v2 disc
over_hosts"
[root@controller ~]# openstack compute service list
+---+-----+-----+-----+-----+-----+
| ID | Binary          | Host      | Zone    | Status | State | Updated At
+---+-----+-----+-----+-----+-----+
| 3 | nova-conductor | controller | internal | enabled | up   | 2022-03-26T09:
59:13.000000 |
| 7 | nova-scheduler | controller | internal | enabled | up   | 2022-03-26T09:
59:11.000000 |
| 11 | nova-compute   | controller | nova     | enabled | up   | 2022-03-26T09:
59:19.000000 |
+---+-----+-----+-----+-----+-----+
[root@controller ~]#
```

Configure Neutron

Neutron constitue l'infrastructure réseau virtuelle d'OpenStack. Il est ainsi possible de répartir des sous-réseaux, de gérer les adresses IP et de générer des réseaux virtuels (VLAN), des VPN (Virtual Private Networking) par Neutron.

On commence par créer un utilisateur Neutron en lui attribuant le rôle Admin au niveau du projet service créé antérieurement::

```
[root@controller ~]# openstack user create --domain default --project service --password servicepassword neutron
+-----+-----+
| Field | Value |
+-----+-----+
| default_project_id | 3bff2f81ef834adcac21cee82a872377 |
| domain_id | default |
| enabled | True |
| id | 6130db994592424ca0774db981b5e457 |
| name | neutron |
| options | {} |
| password_expires_at | None |
+-----+-----+
[root@controller ~]#
```

On crée par la suite un service Neutron:

```
[root@controller ~]# openstack service create --name neutron --description "OpenStack Networking service" network
+-----+-----+
| Field | Value |
+-----+-----+
| description | OpenStack Networking service |
| enabled | True |
| id | e4d03690ca834958972081677a853926 |
| name | neutron |
| type | network |
+-----+-----+
[root@controller ~]#
```

On indique l'hôte de ce service en déterminant également les points de terminaison:

```
[root@controller ~]# export controller=10.0.0.30
[root@controller ~]# openstack endpoint create --region RegionOne network public http://$controller:9696
+-----+-----+
| Field | Value |
+-----+-----+
| enabled | True |
| id | 9dde684bce834170aa39d836af63171e |
| interface | public |
| region | RegionOne |
| region_id | RegionOne |
| service_id | e4d03690ca834958972081677a853926 |
| service_name | neutron |
| service_type | network |
| url | http://10.0.0.30:9696 |
+-----+-----+
```

```
[root@controller ~ (keystone)]# openstack endpoint create --region RegionOne network internal http://$controller:9696
+-----+-----+
| Field | Value |
+-----+-----+
| enabled | True |
| id | 189ef6e1a4f14e9da640927481c1f20b |
| interface | internal |
| region | RegionOne |
| region_id | RegionOne |
| service_id | e4d03690ca834958972081677a853926 |
| service_name | neutron |
| service_type | network |
| url | http://10.0.0.30:9696 |
+-----+
[root@controller ~ (keystone)]#
```

```
[root@controller ~ (keystone)]# openstack endpoint create --region RegionOne network admin http://$controller:9696
+-----+-----+
| Field | Value |
+-----+-----+
| enabled | True |
| id | c0ae196fdaee4dd0b36fe9d9d73c9f87 |
| interface | admin |
| region | RegionOne |
| region_id | RegionOne |
| service_id | e4d03690ca834958972081677a853926 |
| service_name | neutron |
| service_type | network |
| url | http://10.0.0.30:9696 |
+-----+
[root@controller ~ (keystone)]#
```

Au niveau du gestionnaire des bases de données MariaDB, on crée une base de données pour ce service en attribuant à l'utilisateur neutron toutes les priviléges de de gestion de cette base de données:

```
[root@controller ~ (keystone)]# mysql
Welcome to the MariaDB monitor. Commands end with ; or \g.
Your MariaDB connection id is 13
Server version: 10.5.9-MariaDB MariaDB Server

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

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

MariaDB [(none)]> create database neutron_ml2;
Query OK, 1 row affected (0.007 sec)

MariaDB [(none)]> grant all privileges on neutron_ml2.* to neutron@'localhost' identified by 'password';
Query OK, 0 rows affected (0.122 sec)

MariaDB [(none)]> grant all privileges on neutron_ml2.* to neutron@'%' identified by 'password';
Query OK, 0 rows affected (0.006 sec)

MariaDB [(none)]> flush privileges;
Query OK, 0 rows affected (0.029 sec)
```

On installe toutes les packages nécessaires pour démarrer le service Neutron:

```
[root@controller ~]# dnf --enablerepo=centos-openstack-xena,powertools,epel -y install openstack-neutron openstack-neutron-ml2 openstack-neutron-openvswitch
CentOS-8 - Advanced Virtualization           138 B/s | 3.0 kB     00:22
CentOS-8-stream - Ceph Pacific               80 B/s | 3.0 kB     00:38
CentOS-8 - RabbitMQ 38                      3.1 kB/s | 3.0 kB     00:00
CentOS-8 - NFV OpenvSwitch                  4.8 kB/s | 3.0 kB     00:00
CentOS-8 - NFV OpenvSwitch                  49 kB/s | 114 kB     00:02
CentOS-8 - OpenStack xena                   2.1 kB/s | 3.0 kB     00:01
CentOS-8 - OpenStack xena                   32 kB/s | 2.2 MB     01:09
CentOS Stream 8 - AppStream                 4.9 kB/s | 4.4 kB     00:00
CentOS Stream 8 - App  8% [=-                ] 43 kB/s | 1.7 MB    07:16 ETA
```

Au niveau du fichier de configuration de Neutron, on ajoute les informations de connexion à toutes les autres services:

The screenshot shows a terminal window with the following content:

```
kalim-zariouh@controller:~
```

File Edit View Search Terminal Help

```
[DEFAULT]
core_plugin = ml2
service_plugins = router
auth_strategy = keystone
state_path = /var/lib/neutron
dhcp_agent_notification = True
allow_overlapping_ips = True
notify_nova_on_port_status_changes = True
notify_nova_on_port_data_changes = True
# RabbitMQ connection info
transport_url = rabbit://openstack:password@10.0.0.30

# Keystone auth info
[keystone_authtoken]
www_authenticate_uri = http://10.0.0.30:5000
auth_url = http://10.0.0.30:5000
memcached_servers = 10.0.0.30:11211
auth_type = password
project_domain_name = default
user_domain_name = default
project_name = service
username = neutron
password = servicepassword
```

```
[root@controller ~]#
[root@controller ~]# mv /etc/neutron/neutron.conf /etc/neutron/neutron.conf.org
[root@controller ~]# vi /etc/neutron/neutron.conf
[root@controller ~]# chmod 640 /etc/neutron/neutron.conf
[root@controller ~]# chgrp neutron /etc/neutron/neutron.conf
[root@controller ~]# vi /etc/neutron/l3_agent.ini
[root@controller ~]#
```

```
[DEFAULT]
interface_driver = openvswitch
#
# From oslo.log
#
# If set to true, the logging level will be set to DEBUG instead of the default
# INFO level. (boolean value)
# Note: This option can be changed without restarting.
#debug = false

# The name of a logging configuration file. This file is appended to any
# log output from neutron. It must be a valid Python configuration file.
```

kalim-zariouh@controller:~

```
File Edit View Search Terminal Help
[DEFAULT]
interface_driver = openvswitch
dhcp_driver = neutron.agent.linux.dhcp.Dnsmasq
enable_isolated_metadata = true
#
# From oslo.log
#
# If set to true, the logging level will be set to DEBUG instead of the default
# INFO level. (boolean value)
# Note: This option can be changed without restarting.
#debug = false
```

kalim-zariouh@controller:~

```
File Edit View Search Terminal Help
[DEFAULT]
# specify Nova API server
nova_metadata_host = 10.0.0.30
# specify any secret key you like
metadata_proxy_shared_secret = metadata_secret
#
# From oslo.log
#
# If set to true, the logging level will be set to DEBUG instead of the default
# INFO level. (boolean value)
# Note: This option can be changed without restarting.
#debug = false
```

```
# Memcache servers in the format of "host:port". (dogpile.cache.memcached and  
# oslo_cache.memcache_pool backends only). If a given host refer to an IPv6 or  
# a given domain refer to IPv6 then you should prefix the given address with  
# the address family (`inet6`) (e.g ``inet6[::1]:11211``,  
# ``inet6:[fd12:3456:789a:1::1]:11211``,  
# ``inet6:[controller-0.internalapi]:11211``). If the address family is not  
# given then default address family used will be ``inet`` which correspond to  
# IPv4 (list value)  
memcache_servers = 10.0.0.30:11211  
  
# Number of seconds memcached server is considered dead before it is tried  
# again. (dogpile.cache.memcache and oslo_cache.memcache_pool backends only).  
# (integer value)  
#memcache_dead_retry = 300
```

```
# The format for an instance UUID that is passed with the log message. (string  
# value)  
#instance_uuid_format = "[instance: %(uuid)s] "  
  
# Interval, number of seconds, of log rate limiting. (integer value)  
#rate_limit_interval = 0  
  
# Maximum number of logged messages per rate_limit_interval. (integer value)  
#rate_limit_burst = 0  
  
# Log level name used by rate limiting: CRITICAL, ERROR, INFO, WARNING, DEBUG  
# or empty string. Logs with level greater or equal to rate_limit_except_level  
# are not filtered. An empty string means that all levels are filtered. (string  
# value)  
#rate_limit_except_level = CRITICAL  
  
# Enables or disables fatal status of deprecations. (boolean value)  
#fatal_deprecations = false  
[ml2]  
type_drivers = flat,vlan,gre,vxlan  
tenant_network_types =  
mechanism_drivers = openvswitch  
extension_drivers = port_security  
  
# value)  
#instance_uuid_format = "[instance: %(uuid)s] "  
  
# Interval, number of seconds, of log rate limiting. (integer value)  
#rate_limit_interval = 0  
  
# Maximum number of logged messages per rate_limit_interval. (integer value)  
#rate_limit_burst = 0  
  
# Log level name used by rate limiting: CRITICAL, ERROR, INFO, WARNING, DEBUG  
# or empty string. Logs with level greater or equal to rate_limit_except_level  
# are not filtered. An empty string means that all levels are filtered. (string  
# value)  
#rate_limit_except_level = CRITICAL  
  
# Enables or disables fatal status of deprecations. (boolean value)  
#fatal_deprecations = false  
[securitygroup]  
firewall_driver = openvswitch  
enable_security_group = true  
enable_ipset = true
```

```
[DEFAULT]
vif_plugging_is_fatal = True
vif_plugging_timeout = 300
# define own IP address
my_ip = 10.0.0.30
state_path = /var/lib/nova
enabled_apis = osapi_compute,metadata
log_dir = /var/log/nova
compute_driver = libvirt.LibvirtDriver

project_domain_name = default
user_domain_name = default
project_name = service
username = placement
password = servicepassword
[vnc]
enabled = True
server_listen = 0.0.0.0
server_proxyclient_address = 10.0.0.30
novncproxy_base_url = http://10.0.0.30:6080/vnc_auto.html
[wsgi]
api_paste_config = /etc/nova/api-paste.ini
[neutron]
auth_url = http://10.0.0.30:5000
auth_type = password
project_domain_name = default
user_domain_name = default
region_name = RegionOne
project_name = service
username = neutron
password = servicepassword
service_metadata_proxy = True
metadata_proxy_shared_secret = metadata_secret
```

On active par la suite le service Neutron :

```
kalim-zariouh@controller:~  
→ /usr/lib/systemd/system/openvswitch.service.  
[root@controller ~]# systemctl enable --now openvswitch  
[root@controller ~]# ovs-vsctl add-br br-int  
[root@controller ~]# ln -s /etc/neutron/plugins/ml2/ml2_conf.ini /etc/  
neutron/plugin.ini  
[root@controller ~]# su -s /bin/bash neutron -c "neutron-db-manage --c  
onfig-file /etc/neutron/neutron.conf --config-file /etc/neutron/plugin.ini upgra  
de head"  
INFO [alembic.runtime.migration] Context impl MySQLImpl.  
INFO [alembic.runtime.migration] Will assume non-transactional DDL.  
Exécution de upgrade pour neutron...  
INFO [alembic.runtime.migration] Context impl MySQLImpl.  
INFO [alembic.runtime.migration] Will assume non-transactional DDL.  
INFO [alembic.runtime.migration] Running upgrade -> kilo  
INFO [alembic.runtime.migration] Running upgrade kilo -> 354db87e3225  
INFO [alembic.runtime.migration] Running upgrade 354db87e3225 -> 599c6a226151  
INFO [alembic.runtime.migration] Running upgrade 599c6a226151 -> 52c5312f6baf  
INFO [alembic.runtime.migration] Running upgrade 52c5312f6baf -> 313373c0ffee  
INFO [alembic.runtime.migration] Running upgrade 313373c0ffee -> 8675309a5c4f  
INFO [alembic.runtime.migration] Running upgrade 8675309a5c4f -> 45f955889773  
INFO [alembic.runtime.migration] Running upgrade 45f955889773 -> 26c371498592  
INFO [alembic.runtime.migration] Running upgrade 26c371498592 -> 1c844d1677f7  
INFO [alembic.runtime.migration] Running upgrade 1c844d1677f7 -> 1b4c6e320f79  
INFO [alembic.runtime.migration] Running upgrade 1b4c6e320f79 -> 48153cb5f051  
INFO [alembic.runtime.migration] Running upgrade 48153cb5f051 -> 1b4c6e320f79  
[root@controller ~]# for service in server dhcp-agent l3-agent metadata  
a-agent openvswitch-agent; do  
> systemctl enable --now neutron-$service  
> done  
Created symlink /etc/systemd/system/multi-user.target.wants/neutron-server.servi  
ce → /usr/lib/systemd/system/neutron-server.service.  
Created symlink /etc/systemd/system/multi-user.target.wants/neutron-dhcp-agent.s  
ervice → /usr/lib/systemd/system/neutron-dhcp-agent.service.  
Created symlink /etc/systemd/system/multi-user.target.wants/neutron-l3-agent.ser  
vice → /usr/lib/systemd/system/neutron-l3-agent.service.  
Created symlink /etc/systemd/system/multi-user.target.wants/neutron-metadata-age  
nt.service → /usr/lib/systemd/system/neutron-metadata-agent.service.  
Created symlink /etc/systemd/system/multi-user.target.wants/neutron-openvswitch-  
agent.service → /usr/lib/systemd/system/neutron-openvswitch-agent.service.  
[root@controller ~]# systemctl restart openstack-nova-api openstack-no  
va-compute
```

On liste les agents du service Neutron:

```
[root@controller ~]# openstack network agent list
+-----+-----+-----+-----+
| ID           | Agent Type   | Host    | Avail |
| ability Zone | Alive | State | Binary      |
+-----+-----+-----+-----+
| cec6f1cc-3b47-493e-ac8f-ad3d8cf13294 | L3 agent     | controller | nova
| | :-- | UP | neutron-l3-agent |
| d2a779d9-b4e8-4953-b000-526b13b5531d | DHCP agent    | controller | nova
| | :-- | UP | neutron-dhcp-agent |
| e15a56f2-e08a-4488-ac79-72da77b088ce | Metadata agent | controller | None
| | :-- | UP | neutron-metadata-agent |
| fdc0e35f-d36f-4fa8-9793-c5fc32780521 | Open vSwitch agent | controller | None
| | :-- | UP | neutron-openvswitch-agent |
+-----+-----+-----+-----+
[root@controller ~]#
```

Configuration du réseau Neutron:

```
[root@controller ~]# ovs-vsctl add-port br-eth1 port0 -- set Interface
port0 type=internal
[root@controller ~]# vi /etc/neutron/plugins/ml2/ml2_conf.ini
[root@controller ~]#
```

```
kalim-zariouh@controller:~
```

Fichier Édition Affichage Rechercher Terminal Aide

```
#rate_limit_interval = 0

# Maximum number of logged messages per rate_limit_interval. (integer value)
#rate_limit_burst = 0

# Log level name used by rate limiting: CRITICAL, ERROR, INFO, WARNING, DEBUG
# or empty string. Logs with level greater or equal to rate_limit_except_level
# are not filtered. An empty string means that all levels are filtered. (string
# value)
#rate_limit_except_level = CRITICAL

# Enables or disables fatal status of deprecations. (boolean value)
#fatal_deprecations = false
# add to the end
# OK with no value for [tenant_network_types] now (set later if need)
[ml2]
type_drivers = flat,vlan,gre,vxlan
tenant_network_types =
mechanism_drivers = openvswitch
extension_drivers = port_security
[ml2_type_flat]
flat_networks = physnet1
-- INSERT --
```

```
kalim-zariouh@controller:~ Fichier Édition Affichage Rechercher Terminal Aide # Interval, number of seconds, of log rate limiting. (integer value) #rate_limit_interval = 0 # Maximum number of logged messages per rate_limit_interval. (integer value) #rate_limit_burst = 0 # Log level name used by rate limiting: CRITICAL, ERROR, INFO, WARNING, DEBUG # or empty string. Logs with level greater or equal to rate_limit_except_level # are not filtered. An empty string means that all levels are filtered. (string # value) #rate_limit_except_level = CRITICAL # Enables or disables fatal status of deprecations. (boolean value) #fatal_deprecations = false # add to the end [securitygroup] firewall_driver = openvswitch enable_security_group = true enable_ipset = true [ovs] bridge_mappings = physnet1:br-eth1 : [root@controller ~]# systemctl restart neutron-openvswitch-agent [root@controller ~]# systemctl status neutron-openvswitch-agent ● neutron-openvswitch-agent.service - OpenStack Neutron Open vSwitch Agent Loaded: loaded (/usr/lib/systemd/system/neutron-openvswitch-agent.service; e Active: active (running) since Mon 2022-03-14 11:29:49 +01; 36s ago Process: 117084 ExecStartPre=/usr/bin/neutron-enable-bridge-firewall.sh (code Main PID: 117089 (neutron-openvsw Tasks: 1 (limit: 17278) Memory: 125.9M CGroup: /system.slice/neutron-openvswitch-agent.service └─117089 neutron-openvswitch-agent (/usr/bin/python3 /usr/bin/neutro mars 14 11:29:49 controller systemd[1]: Starting OpenStack Neutron Open vSwitch> mars 14 11:29:49 controller systemd[1]: Started OpenStack Neutron Open vSwitch > lines 1-12/12 (END)
```

```
[root@controller ~]# openstack subnet create subnet1 --network sharednet1 \
> --project $projectID --subnet-range 10.0.0.0/24 \
> --allocation-pool start=10.0.0.200,end=10.0.0.254 \
> --gateway 10.0.0.1 --dns-nameserver 10.0.0.10
+-----+
| Field          | Value        |
+-----+
| allocation_pools | 10.0.0.200-10.0.0.254 |
| cidr           | 10.0.0.0/24      |
| created_at     | 2022-03-14T10:33:31Z |
| description     |                      |
| dns_nameservers | 10.0.0.10       |
| dns_publish_fixed_ip | None |
| enable_dhcp    | True          |
| gateway_ip     | 10.0.0.1       |
| host_routes    |                      |
| id              | df69c28c-5583-412a-9f55-b423352d2086 |
| ip_version      | 4             |
| ipv6_address_mode | None |
| ipv6_ra_mode    | None          |
| name            | subnet1        |
| network_id      | f20662f5-3cd3-4e8c-a634-5d0a33762077
```

```
[root@controller ~]# openstack network list
+-----+-----+
| ID          | Name      | Subnets |
+-----+-----+
| f20662f5-3cd3-4e8c-a634-5d0a33762077 | sharednet1 | df69c28c-5583-412a-9f55-b423352d2086 |
+-----+-----+
[root@controller ~]# openstack subnet list
+-----+-----+
| ID          | Subnet      | Name      | Network |
+-----+-----+
| df69c28c-5583-412a-9f55-b423352d2086 | 10.0.0.0/24 | subnet1 | f20662f5-3cd3-4e8c-a634-5d0a33762077 |
+-----+-----+
[root@controller ~]#
```

Ajouter les utilisateurs openstack:

On crée un nouveau projet sous le nom de Hiroshima:

```
[root@controller ~]# openstack project create --domain default --description "Hiroshima Project" hiroshima
+-----+-----+
| Field | Value |
+-----+-----+
| description | Hiroshima Project |
| domain_id | default |
| enabled | True |
| id | e76fcfc77a5843d486ab302269229734 |
| is_domain | False |
| name | hiroshima |
| options | {} |
| parent_id | default |
| tags | [] |
+-----+-----+
```

Au niveau de ce projet, on ajoute l'utilisateur serverworld:

```
[root@controller ~]# openstack user create --domain default --project hiroshima --password userpassword serverworld
+-----+-----+
| Field | Value |
+-----+-----+
| default_project_id | e76fcfc77a5843d486ab302269229734 |
| domain_id | default |
| enabled | True |
| id | 769de73248cc4f8c85dd90502f52e71d |
| name | serverworld |
| options | {} |
| password_expires_at | None |
+-----+-----+
[root@controller ~]#
```

On crée un rôle CloudUser et on attribue ce rôle à l'utilisateur déjà serverworld créé::

```
[root@controller ~]# openstack role create CloudUser
+-----+-----+
| Field | Value |
+-----+-----+
| description | None |
| domain_id | None |
| id | f19db8f38e8b43739d39c259e4b01691 |
| name | CloudUser |
| options | {} |
+-----+-----+
[root@controller ~]# openstack role add --project hiroshima --user serverworld CloudUser
```

```
[root@controller ~]# openstack flavor create --id 0 --vcpus 1 --ram 2048 --disk 10 m1.small
+-----+
| Field          | Value   |
+-----+
| OS-FLV-DISABLED:disabled | False    |
| OS-FLV-EXT-DATA:ephemeral | 0        |
| description      | None     |
| disk            | 10      |
| id              | 0        |
| name            | m1.small|
| os-flavor-access:is_public | True    |
| properties      |          |
| ram             | 2048    |
| rxtx_factor     | 1.0     |
| swap            |          |
| vcpus           | 1        |
+-----+
[root@controller ~]#
```

Créer et lancer les instances:

```
kalim-zariouh@controller:~
[root@controller ~]# openstack flavor list
+-----+-----+-----+-----+-----+-----+
| ID  | Name   | RAM | Disk | Ephemeral | VCPUs | Is Public |
+-----+-----+-----+-----+-----+-----+
| 0   | m1.small | 2048 | 10  | 0          | 1      | True       |
+-----+-----+-----+-----+-----+-----+
[root@controller ~]# openstack image list
+-----+-----+-----+
| ID          | Name          | Status |
+-----+-----+-----+
| e6f220ec-f3d0-4c96-b70b-737ac83865be | CentOS-Stream-8 | active |
| c5adb26e-4d63-4be3-9a11-fa905f96aa31 | Ubuntu2004-Official | active |
+-----+-----+-----+
[root@controller ~]# openstack network list
+-----+-----+-----+
| ID          | Name          | Subnets |
+-----+-----+-----+
| 5d4396ea-69c7-4c53-afb8-6ad2f27a09c2 | sharednet1 | db489163-b8a5-4273-85c6-4463f090d0ed |
+-----+-----+-----+
```

```
[root@controller ~]# openstack security group create secgroup01
+-----+
| Field      | Value
+-----+
| created_at | 2022-03-26T15:52:51Z
| description | secgroup01
| id          | 0cf4ee42-ab0d-4c8d-8d5e-6c035b1cb81f
|
```

```
[root@controller ~]# openstack security group list
+-----+-----+
| ID           | Name      | Description
| Project      | Tags      |
+-----+-----+
| 0cf4ee42-ab0d-4c8d-8d5e-6c035b1cb81f | secgroup01 | secgroup01
| 0942a895c71649ba8be7eadf75af0ee | []        |
| 28692a66-17e5-432e-8dbc-c71372454254 | default    | Groupe de sécurité par défaut
| 15c9abbc67154376bbc8e61135644cda | []        |
| 7c5cfa9c-608d-4ad4-a7e6-574c47766adc | default    | Groupe de sécurité par défaut
| 0942a895c71649ba8be7eadf75af0ee | []        |
+-----+-----+
[root@controller ~]#
```

```
[root@controller ~]# openstack keypair create --public-key ~/.ssh/id_rsa.pub mykey
+-----+
| Field      | Value
+-----+
| created_at | None
| fingerprint| d0:7d:58:6c:5f:06:3c:2a:bb:8e:92:13:84:f7:e9:76
| id          | mykey
| is_deleted  | None
| name        | mykey
| type        | ssh
| user_id     | a07b40216d9742dcae1c777ffa24a82a
+-----+
[root@controller ~]#
```

```
[root@controller ~]# openstack keypair list
+-----+-----+
| Name   | Fingerprint           | Type |
+-----+-----+
| mykey | d0:7d:58:6c:5f:06:3c:2a:bb:8e:92:13:84:f7:e9:76 | ssh  |
+-----+-----+
```

```
[root@controller ~ (keystone)]# netID=$(openstack network list | grep sharednet1 | awk '{ print $2 }')
[root@controller ~ (keystone)]# openstack server create --flavor m1.small --image CentOS-Stream-8 --security-group secgroup01 --nic net-id=$netID --key-name mykey CentOS-St-8
+-----+
| Field | Value |
+-----+
| OS-DCF:diskConfig | MANUAL
| OS-EXT-AZ:availability_zone |
| OS-EXT-SRV-ATTR:host | None
```

kalim-zariouh@controller:~

```
[root@controller ~ (keystone)]# openstack server list
+-----+-----+-----+-----+-----+
| ID | Flavor | Name | Status | Networks | Image |
+-----+-----+-----+-----+-----+
| 80d87f96-3ce0-4ef5-872e-9781776b169d | m1.small | CentOS-St-8 | BUILD | | CentOS-Stream-8 |
```

kalim-zariouh@controller:~

```
[root@controller ~ (keystone)]# openstack security group rule create --protocol icmp --ingress secgroup01
+-----+
| Field | Value |
+-----+
| created_at | 2022-03-26T17:09:59Z
| description | ingress
| direction | ingress
| ether_type | IPv4
| id | 93e0af6a-6a48-4cdb-beb2-fbf7fd64a62e
| name | None
| port_range_max | None
| port_range_min | None
| project_id | 0942a895c71649ba8be7eadf75afd0ee
| protocol | icmp
| remote_address_group_id | None
| remote_group_id | None
| remote_ip_prefix | 0.0.0.0/0
| revision_number | 0
| security_group_id | 0cf4ee42-ab0d-4c8d-8d5e-6c035b1cb81f
| tags | []
| updated_at | 2022-03-26T17:09:59Z
```

```

kalim-zariouh@controller:~ [root@controller ~]# openstack security group rule create --protocol t
cp --dst-port 22:22 secgroup01
+-----+-----+
| Field | Value |
+-----+-----+
| created_at | 2022-03-26T17:15:37Z |
| description | ingress |
| direction | IPv4 |
| ether_type | IPv4 |
| id | 9364406e-9814-4071-9f91-7fe929b5f406 |
| name | None |
| port_range_max | 22 |
| port_range_min | 22 |
| project_id | 0942a895c71649ba8be7eadf75af0ee |
| protocol | tcp |
| remote_address_group_id | None |
| remote_group_id | None |
| remote_ip_prefix | 0.0.0.0/0 |
| revision_number | 0 |
| security_group_id | 0cf4ee42-ab0d-4c8d-8d5e-6c035b1cb81f |
| tags | [] |
| updated_at | 2022-03-26T17:15:37Z |
+-----+-----+
[root@controller ~]# [root@controller ~]# openstack security group rule list secgroup01
+-----+-----+-----+-----+-----+-----+
| ID | IP Protocol | Ethertype | IP Range | Port Range | Direction | Remote Security Group | Remote Address Group |
+-----+-----+-----+-----+-----+-----+
| 21a0728f-22df-4ec2-9efb-654f5cdeaa0d | None | IPv6 | ::/0 | | egress | None | | |
| 9364406e-9814-4071-9f91-7fe929b5f406 | tcp | IPv4 | 0.0.0.0/0 | 22 | ingress | None | | |
| 93e0af6a-6a48-4cdb-beb2-fbf7fd64a62e | icmp | IPv4 | 0.0.0.0/0 | | ingress | None | | |
| e9454f02-c478-439c-ac98-c83d73749969 | None | IPv4 | 0.0.0.0/0 | | egress | None | | |
+-----+-----+-----+-----+-----+-----+
[root@controller ~]# [root@controller ~]# openstack server start CentOS-St-8
L'instance 80d87f96-3ce0-4ef5-872e-9781776b169d n'a pas pu être trouvée. (HTTP 404) (Request-ID: req-1f5a8808-a126-4694-b076-aa9a006b115a)

```

creation d'une autre instance

```
[root@controller ~]# openstack server create --flavor m2.small --image CentOS-Stream-8 --security-group secgroup01 --nic net-id=$netID --key-name mykey CentOS-St-8-second
+-----+
| Field | Value
+-----+
| OS-DCF:diskConfig | MANUAL
| OS-EXT-AZ:availability_zone |
| OS-EXT-SRV-ATTR:host | None
| OS-EXT-SRV-ATTR:hypervisor_hostname | None
| OS-EXT-SRV-ATTR:instance_name |
| OS-EXT-STS:power_state | NOSTATE
| OS-EXT-STS:task_state | scheduling
```

```
[root@controller ~]# openstack server start CentOS-St-8-second
L'instance feb1315b-0b08-414a-a994-43fbf137bed8 n'a pas pu être trouvée. (HTTP 404) (Request-ID: req-863ff0c5-9b3f-43b6-9734-d60335218f24)
[root@controller ~]#
```

```
[root@controller ~]# ping 10.0.0.219 -c3
PING 10.0.0.219 (10.0.0.219) 56(84) bytes of data.
From 10.0.0.30 icmp_seq=1 Destination Host Unreachable
From 10.0.0.30 icmp_seq=2 Destination Host Unreachable
From 10.0.0.30 icmp_seq=3 Destination Host Unreachable

--- 10.0.0.219 ping statistics ---
3 packets transmitted, 0 received, +3 errors, 100% packet loss, time 2084ms
pipe 3
[root@controller ~]#
```

```
[root@controller ~]# ssh centos@10.0.0.219
ssh: connect to host 10.0.0.219 port 22: No route to host
```

captures de salima

```
kalim-zariouh@controller:~ Fichier Édition Affichage Rechercher Terminal Onglets Aide nova@controller:~ x kalim-zariouh@controller:~ x +-----+  
export OS_PROJECT_DOMAIN_NAME=default  
export OS_USER_DOMAIN_NAME=default  
export OS_PROJECT_NAME=hiroshima  
export OS_USERNAME=serverworld  
export OS_PASSWORD=userpassword  
export OS_AUTH_URL=http://10.0.0.30:5000/v3  
export OS_IDENTITY_API_VERSION=3  
export OS_IMAGE_API_VERSION=2  
export PS1='[\u@\h \w(keystone)]\$ '  
~  
~  
~  
~  
~  
~  
~  
~  
~  
[root@controller ~]# dnf --enablerepo=centos-openstack-xena,powertools, epel -y install openstack-dashboard  
CentOS-8 - Advanced Virtualization 2.4 kB/s | 3.0 kB 00:01  
CentOS-8-stream - Ceph Pacific 19 kB/s | 3.0 kB 00:00  
CentOS-8 - RabbitMQ 38 7.9 kB/s | 3.0 kB 00:00  
CentOS-8 - NFV OpenvSwitch 25 kB/s | 3.0 kB 00:00  
CentOS-8 - NFV OpenvSwitch 361 kB/s | 123 kB 00:00  
CentOS-8 - OpenStack xena 8.6 kB/s | 3.0 kB 00:00  
CentOS-8 - OpenStack xena 729 kB/s | 2.2 MB 00:03  
CentOS Stream 8 - AppStream 13 kB/s | 4.4 kB 00:00  
CentOS Stream 8 - AppStream 2.9 MB/s | 20 MB 00:06  
CentOS Stream 8 - BaseOS 2.4 kB/s | 3.9 kB 00:01  
CentOS Stream 8 - BaseOS 2.8 MB/s | 19 MB 00:06  
CentOS Stream 8 - Extras 3.1 kB/s | 3.0 kB 00:00  
CentOS Stream 8 - Extras 20 kB/s | 18 kB 00:00  
CentOS Stream 8 - PowerTools 13 kB/s | 4.4 kB 00:00  
CentOS Stream 8 - PowerTools 1.1 MB/s | 4.2 MB 00:03  
Extra Packages for Enterprise Linux 8 - x86_64 44 kB/s | 44 kB 00:00  
Extra Packages for Enterprise Linux 8 - x86_64 1.4 MB/s | 11 MB 00:08  
Extra Packages for Enterprise Linux Modular 8 - 32 kB/s | 43 kB 00:01  
Extra Packages for Enterprise Linux Modular 8 - 555 kB/s | 1.0 MB 00:01  
Extra Packages for Enterprise Linux 8 - Next - 47 kB/s | 45 kB 00:00  
Extra Packages for Enterprise Linux 8 - Next - 106 kB/s | 205 kB 00:01  
Dependencies resolved.  
=====
```

```
[kalim-zariouh@controller ~ (keystone)]$ chmod 600 ~/keystonerc
[kalim-zariouh@controller ~ (keystone)]$ source ~/keystonerc
[kalim-zariouh@controller ~ (keystone)]$ echo "source ~/keystonerc " >> ~/.bash_profile

[kalim-zariouh@controller ~ (keystone)]$ openstack image list
+-----+-----+-----+
| ID          | Name        | Status |
+-----+-----+-----+
| e6f220ec-f3d0-4c96-b70b-737ac83865be | CentOS-Stream-8 | active |
| c5adb26e-4d63-4be3-9a11-fa905f96aa31 | Ubuntu2004-Official | active |
+-----+-----+-----+
[kalim-zariouh@controller ~ (keystone)]$ openstack network list
+-----+-----+
| ID          | Name        | Subnets
+-----+-----+
| f20662f5-3cd3-4e8c-a634-5d0a33762077 | sharednet1 | df69c28c-5583-412a-9f55-b423352d2086 |
+-----+-----+
[kalim-zariouh@controller ~ (keystone)]$ openstack security group create secgroup01
+-----+
| Field      | Value
+-----+
| created_at | 2022-03-14T11:18:25Z
| description | secgroup01
| id         | c16033a4-e1ac-4b62-b548-e798f5b2f0cb
| name       | secgroup01
| project_id | 4111b740ac614179941726a373659a5e
```

```
[kalim-zariouh@controller ~ (keystone)]$ openstack security group list
+-----+-----+
| ID | Project | Name | Description |
| Tags |          |       |           |
+-----+-----+
| 7980c7f2-50b7-4142-9f89-d0d5be913acb | default | Groupe de sécurité par défaut | []
| 4111b740ac614179941726a373659a5e |        | secgroup01 | secgroup01 |
| c16033a4-e1ac-4b62-b548-e798f5b2f0cb |        |        | []
| 4111b740ac614179941726a373659a5e |        |        | []
+-----+-----+
[kalim-zariouh@controller ~ (keystone)]$
```

Configurer Horizon

Horizon est l'implémentation canonique du tableau de bord d'openstack , qui fournit une interface utilisateur Web aux services OpenStack, notamment Nova, Swift, Keystone, etc.

On commence par installer Horizon:

```
[root@controller ~ (keystone)]# dnf --enablerepo=centos-openstack-xena,powertools, epel -y install openstack-dashboard
CentOS-8 - Advanced Virtualization           2.4 kB/s | 3.0 kB   00:01
CentOS-8-stream - Ceph Pacific               19 kB/s | 3.0 kB   00:00
CentOS-8 - RabbitMQ 38                      7.9 kB/s | 3.0 kB   00:00
CentOS-8 - NFV OpenvSwitch                  25 kB/s | 3.0 kB   00:00
CentOS-8 - NFV OpenvSwitch                  361 kB/s | 123 kB   00:00
CentOS-8 - OpenStack xena                   8.6 kB/s | 3.0 kB   00:00
CentOS-8 - OpenStack xena                   729 kB/s | 2.2 MB   00:03
CentOS Stream 8 - AppStream                 13 kB/s | 4.4 kB   00:00
CentOS Stream 8 - AppStream                 2.9 MB/s | 20 MB   00:06
CentOS Stream 8 - BaseOS                   2.4 kB/s | 3.9 kB   00:01
CentOS Stream 8 - BaseOS                   2.8 MB/s | 19 MB   00:06
CentOS Stream 8 - Extras                  3.1 kB/s | 3.0 kB   00:00
CentOS Stream 8 - Extras                  20 kB/s | 18 kB   00:00
CentOS Stream 8 - PowerTools              13 kB/s | 4.4 kB   00:00
CentOS Stream 8 - PowerTools              1.1 MB/s | 4.2 MB   00:03
Extra Packages for Enterprise Linux 8 - x86_64 44 kB/s | 44 kB   00:00
Extra Packages for Enterprise Linux 8 - x86_64 1.4 MB/s | 11 MB   00:08
Extra Packages for Enterprise Linux Modular 8 - 32 kB/s | 43 kB   00:01
Extra Packages for Enterprise Linux Modular 8 - 555 kB/s | 1.0 MB   00:01
Extra Packages for Enterprise Linux 8 - Next - 47 kB/s | 45 kB   00:00
Extra Packages for Enterprise Linux 8 - Next - 106 kB/s | 205 kB   00:01
Dependencies resolved.
```

On autorise tous les hôtes:

```

# for more information
#COMPRESS_OFFLINE = not DEBUG

# If horizon is running in production (DEBUG is False), set this
# with the list of host/domain names that the application can serve.
# For more information see:
# https://docs.djangoproject.com/en/dev/ref/settings/#allowed-hosts
ALLOWED_HOSTS = ['*', 'localhost']

# Set SSL proxy settings:
# Pass this header from the proxy after terminating the SSL,
# and don't forget to strip it from the client's request.
# For more information see:
# https://docs.djangoproject.com/en/dev/ref/settings/#secure-proxy-ssl-header
#SECURE_PROXY_SSL_HEADER = ('HTTP_X_FORWARDED_PROTO', 'https')

# If Horizon is being served through SSL, then uncomment the following two
# settings to better secure the cookies from security exploits
#CSRF_COOKIE_SECURE = True
#SESSION_COOKIE_SECURE = True

```

On indique le serveur hôte de la mémoire de cache:

```

# (usually behind a load-balancer). Either you have to make sure that a session
# gets all requests routed to the same dashboard instance or you set the same
# SECRET_KEY for all of them.
SECRET_KEY='b51ec673748356e678da'

# We recommend you use memcached for development; otherwise after every reload
# of the django development server, you will have to login again. To use
# memcached set CACHES to something like below.
# For more information, see
# https://docs.djangoproject.com/en/1.11/topics/http/sessions/.
CACHES = {

    'default': {
        'BACKEND': 'django.core.cache.backends.memcached.MemcachedCache',
        'LOCATION': '127.0.0.1:11211',
    },
}

# If you use ``tox -e runserver`` for developments, then configure
# SESSION_ENGINE to django.contrib.sessions.backends.signed_cookies
# as shown below:
#SESSION_ENGINE = 'django.contrib.sessions.backends.signed_cookies'

```

On indique l'adresse de session-engine:

```

# If you use ``tox -e runserver`` for developments, then configure
# SESSION_ENGINE to django.contrib.sessions.backends.signed_cookies
# as shown below
SESSION_ENGINE = "django.contrib.sessions.backends.cache"

# Send email to the console by default

```

On précise l'adresse URL de keystone:

```

OPENSTACK_HOST = "10.0.0.30"
#OPENSTACK_KEYSTONE_URL = "http://%s/identity/v3" % OPENSTACK_HOST
OPENSTACK_KEYSTONE_URL = "http://10.0.0.30:5000/v3"

```

On indique le time-zone:

```

# The timezone of the server. This should correspond with the timezone
# of your entire OpenStack installation, and hopefully be in UTC.
TIME_ZONE = "GMT"

```

On configure le dashboard d'openstack:

```

},
'mysql': {
    'name': 'MYSQL',
    'ip_protocol': 'tcp',
    'from_port': '3306',
    'to_port': '3306',
},
'rdp': {
    'name': 'RDP',
    'ip_protocol': 'tcp',
    'from_port': '3389',
    'to_port': '3389',
},
}

# Help URL can be made available for the client. To provide a help URL, edit the
# following attribute to the URL of your choice.
#HORIZON_CONFIG["help_url"] = "http://openstack.mycompany.org"
WEBROOT = '/dashboard'
LOGIN_URL = '/dashboard/auth/login/'
LOGOUT_URL = '/dashboard/auth/logout/'
LOGIN_REDIRECT_URL = '/dashboard/'
OPENSTACK_KEYSTONE_MULTIDOMAIN_SUPPORT = True
OPENSTACK_KEYSTONE_DEFAULT_DOMAIN = 'Default'

```

```

WSGIProcessGroup dashboard
WSGIApplicationGroup %{GLOBAL}

WSGIScriptAlias /dashboard /usr/share/openstack-dashboard/openstack_dashboard/wsgi
/django.wsgi
Alias /dashboard/static /usr/share/openstack-dashboard/static

```

```

WSGIScriptAlias /dashboard /usr/share/openstack-dashboard/openstack_dashboard/wsgi
.py
Alias /dashboard/static /usr/share/openstack-dashboard/static

```

```

<Directory /usr/share/openstack-dashboard/openstack_dashboard>
    Options All
    AllowOverride All
    Require all granted
</Directory>

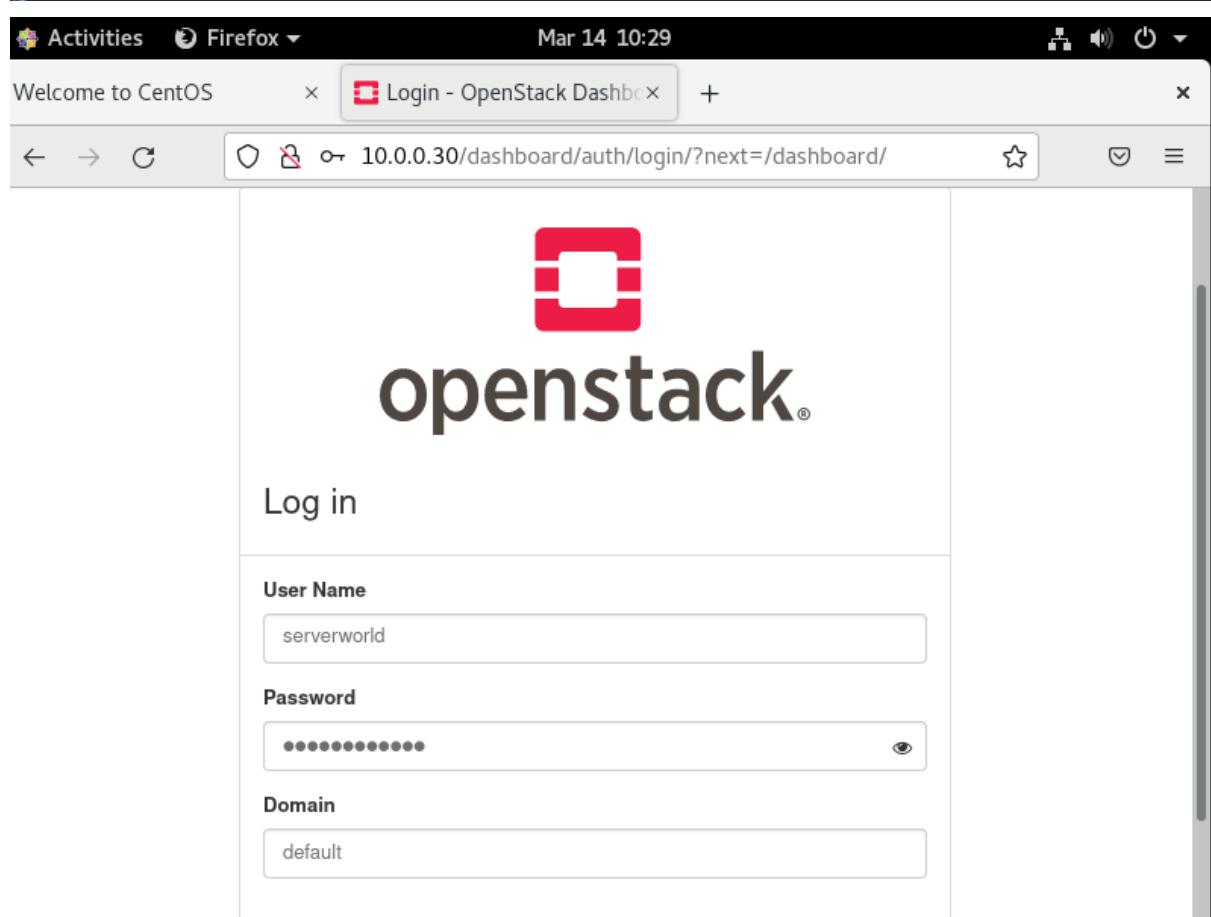
```

On redemarre le serveur HTTPD:

```
[root@controller ~]# systemctl restart httpd  
[root@controller ~]#
```

On autorise aux utilisateurs l'accès au dashboard:

```
{  
    "os_compute_api:os-extended-server-attributes": "rule:admin_or_owner",  
}
```



Welcome to CentOS × Instance Overview - Open × +

← → C 10.0.0.30/dashboard/project/ ☆ ☰ ≡

openstack. Default • hiroshima ▾ serverworld ▾

API Access

Compute ▾

Overview

Instances

Images

Key Pairs

Server Groups

Network

Admin

Identity

Overview

Limit Summary

Compute

Volume

Network

Usage Summary

Select a period of time to query its usage:
The date should be in YYYY-MM-DD format.

2022-03-13 to 2022-03-14

Submit

The screenshot shows the 'Instance Overview' page of the OpenStack dashboard. On the left, there's a sidebar with links for Compute, Network, Admin, and Identity. The main area has tabs for Overview, Limit Summary, and Usage Summary. The Usage Summary tab is active, displaying a form to select a time range for usage data. The date range is set from '2022-03-13' to '2022-03-14'. A 'Submit' button is at the bottom of the form.