

HƯỚNG DẪN CÀI ĐẶT CHI TIẾT

**Ghi chú:*

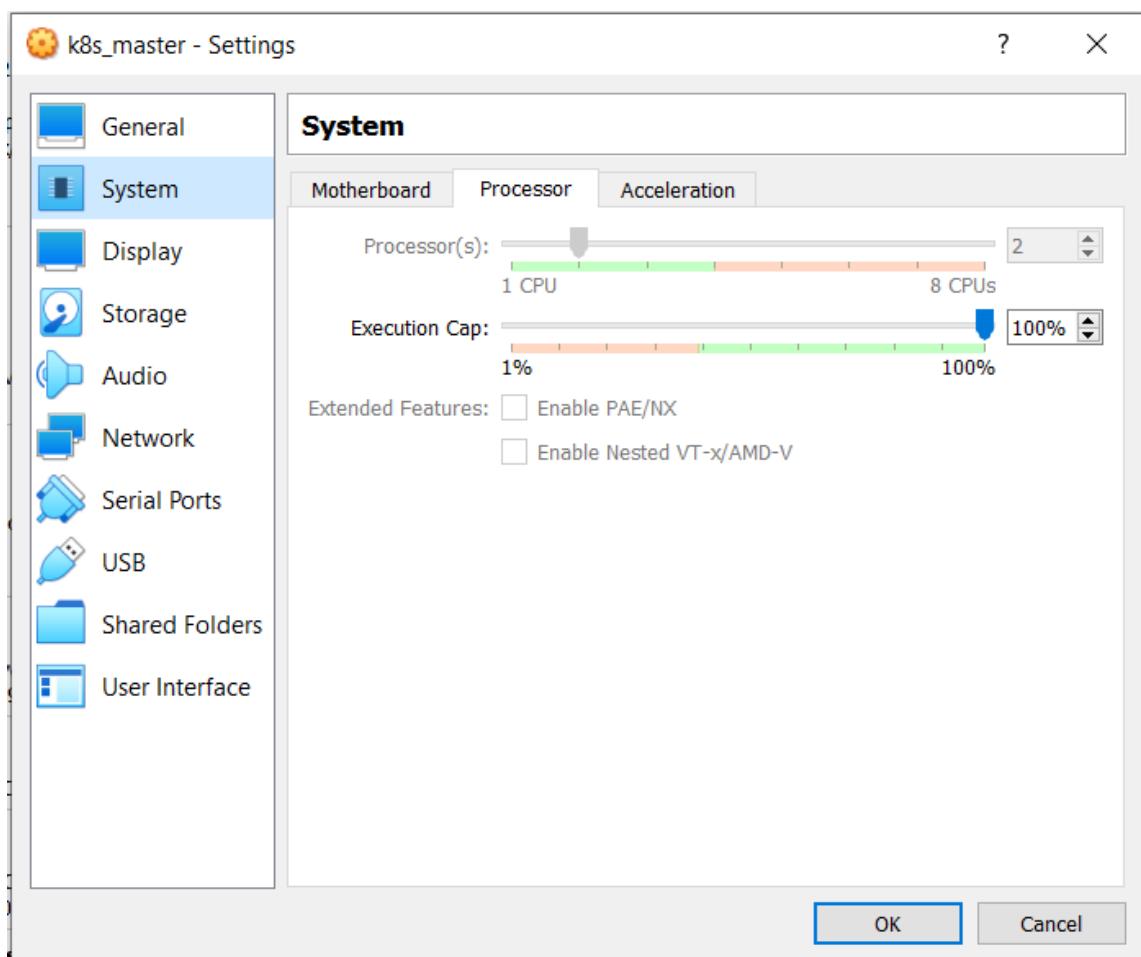
Tạo 3 máy ảo *Ubuntu 20.04: Cluster-0, Cluster-1, Cluster-2*

- **Cluster-0**: 192.168.1.100 (*master*)
- **Cluster-1**: 192.168.1.101 (*Worker 1*)
- **Cluster-2**: 192.168.1.102 (*Worker 2*)

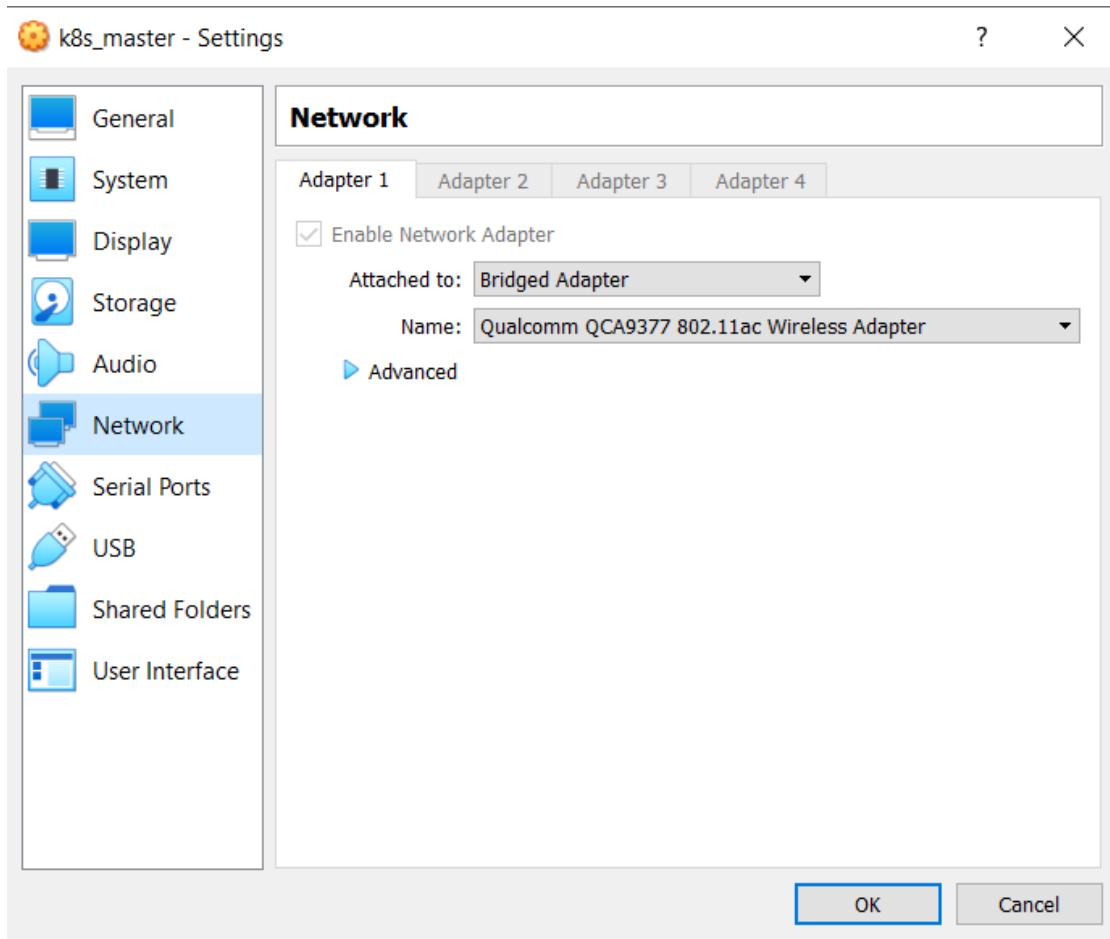
1. Cấu hình mạng.

Sau khi tạo 3 máy ảo Ubuntu 20.04 thì tiến hành cấu hình mạng và thiết lập một số thông số.

☞ **CPU** của máy “**Master Node**” phải ít nhất 2 để có thể cài đặt và sử dụng Kubernetes:



Trong phần “**network**”, chọn “**Bridged Adapter**”



Kiểm tra *ip*, *gateway*, *subnet mask* trên máy vật lý bằng cách nhấn “**Windows + R**”, nhập “**cmd**” rồi chạy lệnh “**ipconfig**”

```
Wireless LAN adapter Local Area Connection* 10:
  Media State . . . . . : Media disconnected
  Connection-specific DNS Suffix . :

Wireless LAN adapter Wi-Fi:
  Connection-specific DNS Suffix . :
  Link-local IPv6 Address . . . . . : fe80::318e:84f9:ce3d:20c6%11
  IPv4 Address. . . . . : 192.168.1.5
  Subnet Mask . . . . . : 255.255.255.0
  Default Gateway . . . . . : 192.168.1.1

C:\Users\Dell>
```

Cấu hình mạng máy *cluster-0*:

```
cluster-0@B1709267:~$ sudo nano /etc/netplan/01-network-manager-all.yaml
cluster-0@B1709267:~$ sudo netplan apply
GNU nano 4.8          /etc/netplan/01-network-manager-all.yaml
# Let NetworkManager manage all devices on this system
network:
  version: 2
  renderer: NetworkManager
  ethernets:
    enp0s3:
      dhcp4: no
      dhcp6: no
      addresses: [192.168.1.100/24]
      gateway4: 192.168.1.1
      nameservers:
        addresses: [123.26.26.26, 8.8.8.8, 8.8.4.4]
```

Cấu hình mạng máy *cluster-1*:

```
cluster-1@B1709267:~$ sudo nano /etc/netplan/01-network-manager-all.yaml
[sudo] password for cluster-1:
cluster-1@B1709267:~$ sudo netplan apply
GNU nano 4.8          /etc/netplan/01-network-manager-all.yaml
# Let NetworkManager manage all devices on this system
network:
  version: 2
  renderer: NetworkManager
  ethernets:
    enp0s3:
      dhcp4: no
      dhcp6: no
      addresses: [192.168.1.101/24]
      gateway4: 192.168.1.1
      nameservers:
        addresses: [123.26.26.26, 8.8.8.8, 8.8.4.4]
```

Cấu hình mạng máy *cluster-2*:

```
cluster-2@B1709267:~$ sudo nano /etc/netplan/01-network-manager-all.yaml
cluster-2@B1709267:~$ sudo netplan apply
```

```

GNU nano 4.8          /etc/netplan/01-network-manager-all.yaml      Modified
# Let NetworkManager manage all devices on this system
network:
  version: 2
  renderer: NetworkManager
  ethernets:
    enp0s3:
      dhcp4: no
      dhcp6: no
      addresses: [192.168.1.102/24]
      gateway4: 192.168.1.1
      nameservers:
        addresses: [123.26.26.26, 8.8.8.8, 8.8.4.4]

```

2. NFS Share

Trên máy *Master Node* cài đặt package “*nfs-kernel-server*”

```

cluster-0@B1709267:~$ sudo apt install nfs-kernel-server
[sudo] password for cluster-0:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  keyutils libnfsidmap2 libtirpc1 nfs-common rpcbind
Suggested packages:
  open-iscsi watchdog
The following NEW packages will be installed:
  keyutils libnfsidmap2 libtirpc1 nfs-common nfs-kernel-server rpcbind
0 upgraded, 6 newly installed, 0 to remove and 0 not upgraded.
Need to get 492 kB of archives.
After this operation, 1.708 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://vn.archive.ubuntu.com/ubuntu bionic/main amd64 keyutils amd64 1:5.9-9.2ubuntu2 [47,9 kB]
Get:2 http://vn.archive.ubuntu.com/ubuntu bionic/main amd64 libnfsidmap2 amd64 0.25-5.1 [27,2 kB]
Get:3 http://vn.archive.ubuntu.com/ubuntu bionic-updates/main amd64 libtirpc1 amd64 0.2.5-1.2ubuntu0.1 [75,7 kB]
Get:4 http://vn.archive.ubuntu.com/ubuntu bionic-updates/main amd64 rpcbind amd64 0.2.3-0.6ubuntu0.18.04.4 [42,1 kB]
Get:5 http://vn.archive.ubuntu.com/ubuntu bionic-updates/main amd64 nfs-common amd64 1:1.3.4-2.1ubuntu5.5 [206 kB]
Get:6 http://vn.archive.ubuntu.com/ubuntu bionic-updates/main amd64 nfs-kernel-server amd64 1:1.3.4-2.1ubuntu5.5 [93,8 kB]
Fetched 492 kB in 2 s (215 kB/s)
Selecting previously unselected package keyutils.
(Reading database ... 95%

```

Trên máy *Worker Node* cài đặt package “*nfs-common*”

☞ Máy Cluster-1:

```

cluster-1@B1709267:~$ sudo apt install nfs-common
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  keyutils libnfsidmap2 libtirpc1 rpcbind
Suggested packages:
  open-iscsi watchdog
The following NEW packages will be installed:
  keyutils libnfsidmap2 libtirpc1 nfs-common rpcbind
0 upgraded, 5 newly installed, 0 to remove and 78 not upgraded.
Need to get 399 kB of archives.
After this operation, 1.363 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://vn.archive.ubuntu.com/ubuntu bionic/main amd64 keyutils amd64 1:5.9-9.2ubuntu2 [47,9 kB]
Get:2 http://vn.archive.ubuntu.com/ubuntu bionic/main amd64 libnfsidmap2 amd64 0.25-5.1 [27,2 kB]
Get:3 http://vn.archive.ubuntu.com/ubuntu bionic-updates/main amd64 libtirpc1 amd64 0.2.5-1.2ubuntu0.1 [75,7 kB]
Get:4 http://vn.archive.ubuntu.com/ubuntu bionic-updates/main amd64 rpcbind amd64 0.2.3-0.6ubuntu0.18.04.4 [42,1 kB]
Get:5 http://vn.archive.ubuntu.com/ubuntu bionic-updates/main amd64 nfs-common amd64 1:1.3.4-2.1ubuntu5.5 [206 kB]
Fetched 399 kB in 2 s (209 kB/s)

```

☞ Máy Cluster-2:

```
cluster-2@B1709267:~$ sudo apt install nfs-common
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  keyutils libnfsidmap2 libtirpc1 rpcbind
Suggested packages:
  open-iscsi watchdog
The following NEW packages will be installed:
  keyutils libnfsidmap2 libtirpc1 nfs-common rpcbind
0 upgraded, 5 newly installed, 0 to remove and 0 not upgraded.
Need to get 399 kB of archives.
After this operation, 1.363 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://vn.archive.ubuntu.com/ubuntu bionic amd64 keyutils amd64 1.5.9-9.2ubuntu2 [47,9 kB]
Get:2 http://vn.archive.ubuntu.com/ubuntu bionic amd64 libnfsidmap2 amd64 0.25-5.1 [27,2 kB]
Get:3 http://vn.archive.ubuntu.com/ubuntu bionic-updates/main amd64 libtirpc1 amd64 0.2.5-1.2ubuntu0.1 [75,7 kB]
Get:4 http://vn.archive.ubuntu.com/ubuntu bionic-updates/main amd64 rpcbind amd64 0.2.3-0.6ubuntu0.18.04.4 [42,1 kB]
]
Get:5 http://vn.archive.ubuntu.com/ubuntu bionic-updates/main amd64 nfs-common amd64 1:1.3.4-2.1ubuntu5.5 [206 kB]
Fetched 399 kB in 2s (177 kB/s)
Selecting previously unselected package keyutils.
(Reading database ... 163840 files and directories currently installed.)
Preparing to unpack .../keyutils_1.5.9-9.2ubuntu2_amd64.deb ...
```

Tạo một thư mục chia sẻ **/var/couchnfs** trên máy **Master Node**

```
cluster-0@B1709267:~$ sudo mkdir /var/couchnfs
cluster-0@B1709267:~$ ls -l /var/
total 52
drwxr-xr-x  2 root root    4096 Thg 7 28 14:42 backups
drwxr-xr-x 16 root root    4096 Thg 7 28 14:47 cache
drwxr-xr-x  2 root root    4096 Thg 7 28 15:37 couchnfs
drwxrwsrwt  2 root whoopsie 4096 Thg 8  7  2020 crash
drwxr-xr-x 64 root root    4096 Thg 7 28 15:08 lib
drwxrwsr-x  2 root staff   4096 Thg 4 24  2018 local
lrwxrwxrwx  1 root root      9 Thg 7 28 14:11 lock -> /run/lock
drwxrwxr-x 11 root syslog   4096 Thg 7 28 14:58 log
drwxrwsr-x  2 root mail    4096 Thg 8  7  2020 mail
drwxrwsrwt  2 root whoopsie 4096 Thg 8  7  2020 metrics
drwxr-xr-x  2 root root    4096 Thg 8  7  2020 opt
lrwxrwxrwx  1 root root      4 Thg 7 28 14:11 run -> /run
drwxr-xr-x 10 root root   4096 Thg 7 28 14:28 snap
drwxr-xr-x  7 root root    4096 Thg 8  7  2020 spool
drwxrwsrwt  8 root root    4096 Thg 7 28 15:06 tmp
```

Vì tạo **/var/couchnfs** bằng **sudo** nên thư mục thuộc sở hữu của người dùng **root** trên **Master Node**

NFS sẽ chuyển bất kỳ hoạt động **root** nào trên máy **Client** sang nobody:nogroup như một biện pháp bảo mật. Do đó, chúng ta cần thay đổi quyền sở hữu thư mục để phù hợp với các thông tin đăng nhập đó.

```
cluster-0@B1709267:~$ sudo chown nobody:nogroup /var/couchnfs
cluster-0@B1709267:~$ ls -l /var/
total 52
drwxr-xr-x  2 root    root      4096 Thg 7 28 14:42 backups
drwxr-xr-x 16 root    root      4096 Thg 7 28 14:47 cache
drwxr-xr-x  2 nobody  nogroup   4096 Thg 7 28 15:37 couchnfs
drwxrwsrwt  2 root    whoopsie  4096 Thg 8  7  2020 crash
drwxr-xr-x 64 root    root      4096 Thg 7 28 15:08 lib
drwxrwsr-x  2 root    staff     4096 Thg 4 24 2018 local
lrwxrwxrwx  1 root    root      9 Thg 7 28 14:11 lock -> /run/lock
drwxrwxr-x 11 root   syslog    4096 Thg 7 28 14:58 log
drwxrwsr-x  2 root    mail     4096 Thg 8  7  2020 mail
drwxrwsrwt  2 root    whoopsie  4096 Thg 8  7  2020 metrics
drwxr-xr-x  2 root    root     4096 Thg 8  7  2020 opt
lrwxrwxrwx  1 root    root      4 Thg 7 28 14:11 run -> /run
drwxr-xr-x 10 root   root     4096 Thg 7 28 14:28 snap
drwxr-xr-x  7 root    root     4096 Thg 8  7  2020 spool
drwxrwsrwt  8 root    root     4096 Thg 7 28 15:06 tmp
cluster-0@B1709267:~$
```

Thiết lập việc chia sẻ các tài nguyên

```
cluster-0@B1709267:~$ sudo nano /etc/exports
[sudo] password for cluster-0:
GNU nano 2.9.3                               /etc/exports

# /etc/exports: the access control list for filesystems which may be exported
#               to NFS clients.  See exports(5).
#
# Example for NFSv2 and NFSv3:
# /srv/homes      hostname1(rw,sync,no_subtree_check) hostname2(ro,sync,no_subtree_check)
#
# Example for NFSv4:
# /srv/nfs4       gss/krb5i(rw,sync,fsid=0,crossmnt,no_subtree_check)
# /srv/nfs4/homes gss/krb5i(rw,sync,no_subtree_check)
#
/var/couchnfs 192.168.1.0/24(rw,sync,no_subtree_check)
```

Chú thích:

directory_to_share client(share_option1,...,share_optionN)

rw: Cho phép máy client quyền truy cập đọc và ghi vào ổ đĩa.

sync: Ghi các thay đổi vào đĩa trước khi trả lời.

no_subtree_check: Tùy chọn này ngăn chặn việc kiểm tra subtree, là quá trình mà Server phải kiểm tra xem file có thực sự vẫn có sẵn trong cây được xuất cho mọi yêu cầu hay không. Điều này có thể gây ra nhiều vấn đề khi một file được đổi tên trong khi client đã mở nó. Trong hầu hết mọi trường hợp, tốt hơn hết là nên tắt kiểm tra subtree.

no_root_squash: Theo mặc định, NFS dịch các request từ người dùng root của client thành người dùng không có đặc quyền trên Server. Đây được coi là tính năng bảo mật để ngăn tài khoản root trên máy client sử dụng hệ thống file của máy Server làm tài khoản root. **no_root_squash** vô hiệu hóa hành vi này đối với một số chia sẻ nhất định.

Khởi động lại máy chủ NFS bằng lệnh “**sudo systemctl restart nfs-kernel-server**”

```
cluster-0@B1709267:~$ sudo systemctl restart nfs-kernel-server
[sudo] password for cluster-0:
cluster-0@B1709267:~$
```

Để cung cấp các chia sẻ từ xa trên máy **Worker Node**, chúng ta cần gắn các thư mục trên **Master Node** mà chúng ta muốn chia sẻ vào các thư mục trống trên máy **Worker Node**.

Tạo thư mục “**couchnfs**” để gắn chia sẻ với thư mục trên **Master Node**

☞ **Máy Cluster-1:**

```
cluster-1@b1709267node1:~$ sudo mount 192.168.1.100:/var/couchnfs couchnfs
[sudo] password for cluster-1:
cluster-1@b1709267node1:~$ ls -l
total 44
drwxr-xr-x 11 nobody nogroup 4096 Thg 12 31 10:47 couchnfs
```

☞ **Máy Cluster-2:**

```
cluster-2@b1709267node2:~$ sudo mount 192.168.1.100:/var/couchnfs couchnfs
cluster-2@b1709267node2:~$ ls -l
total 44
drwxr-xr-x 11 nobody nogroup 4096 Thg 12 31 10:47 couchnfs
```

Lệnh trên sẽ gắn các chia sẻ từ máy **Master Node** vào máy **Worker Node**

Kiểm tra lại xem chúng đã kết thành công hay chưa bằng một số cách. Có thể kiểm tra điều này bằng một lệnh đơn giản “**mount**” hoặc “**findmnt**”, nhưng “**df -h**” cung cấp đầu ra dễ đọc hơn

```
cluster-1@B1709267:~/couchnfs$ df -h
Filesystem      Size  Used Avail Use% Mounted on
udev            970M    0  970M  0% /dev
tmpfs           199M   1,6M 198M  1% /run
/dev/sda1        9,8G  6,4G 3,0G  69% /
tmpfs           994M    0  994M  0% /dev/shm
tmpfs           5,0M  4,0K 5,0M  1% /run/lock
tmpfs           994M    0  994M  0% /sys/fs/cgroup
/dev/loop2        2,5M  2,5M    0 100% /snap/gnome-system-monitor/163
/dev/loop1        2,5M  2,5M    0 100% /snap/gnome-calculator/884
/dev/loop0        2,3M  2,3M    0 100% /snap/gnome-system-monitor/148
/dev/loop3        219M  219M    0 100% /snap/gnome-3-34-1804/72
/dev/loop6        384K  384K    0 100% /snap/gnome-characters/550
/dev/loop5         56M   56M    0 100% /snap/core18/1885
/dev/loop8         33M   33M    0 100% /snap/snapd/12704
/dev/loop7        256M  256M    0 100% /snap/gnome-3-34-1804/36
/dev/loop4         33M   33M    0 100% /snap/snapd/12398
/dev/loop10       768K  768K    0 100% /snap/gnome-characters/726
/dev/loop9        244M  244M    0 100% /snap/gnome-3-38-2004/39
/dev/loop12       1,0M  1,0M    0 100% /snap/gnome-logs/100
/dev/loop15       2,5M  2,5M    0 100% /snap/gnome-calculator/748
/dev/loop13         62M   62M    0 100% /snap/core20/1081
/dev/loop14         56M   56M    0 100% /snap/core18/2074
/dev/loop16         63M   63M    0 100% /snap/gtk-common-themes/1506
/dev/loop11         66M   66M    0 100% /snap/gtk-common-themes/1515
/dev/loop17       640K  640K    0 100% /snap/gnome-logs/106
tmpfs            199M  28K  199M  1% /run/user/121
tmpfs            199M  28K  199M  1% /run/user/1000
/dev/sr0          59M   59M    0 100% /media/cluster-1/VBox_GAs_6.1.22
192.168.1.101:/var/couchnfs  15G  6,9G  7,2G  49% /home/cluster-1/couchnfs
cluster-1@B1709267:~/couchnfs$
```

Sau khi *mount* NFS share trên máy **Worker Node** thì tạo 3 thư mục **couchdb-0**, **couchdb-1** và **couchdb-2**

```
cluster-1@B1709267:~/couchnfs$ sudo mkdir couchdb-0 couchdb-1 couchdb-2
cluster-1@B1709267:~/couchnfs$ ls -l
total 12
drwxr-xr-x 2 nobody nogroup 4096 Thg 8  7 16:59 couchdb-0
drwxr-xr-x 2 nobody nogroup 4096 Thg 8  7 16:59 couchdb-1
drwxr-xr-x 2 nobody nogroup 4096 Thg 8  7 16:59 couchdb-2
```

Kiểm tra lại thư mục “**couchnfs**” trên máy **Master Node**

```
cluster-0@B1709267:~$ ls -l /var/couchnfs/
total 12
drwxr-xr-x 2 nobody nogroup 4096 Thg 8 7 16:59 couchdb-0
drwxr-xr-x 2 nobody nogroup 4096 Thg 8 7 16:59 couchdb-1
drwxr-xr-x 2 nobody nogroup 4096 Thg 8 7 16:59 couchdb-2
```

Kiểm tra thư mục “*couchnfs*” trên máy *Cluster-2*

```
cluster-2@B1709267:~$ ls -l
total 48
drwxr-xr-x 2 cluster-2 cluster-2 4096 Thg 8 7 15:24 couchnfs
cluster-2@B1709267:~$ sudo mount 192.168.1.101:/var/couchnfs couchnfs
[sudo] password for cluster-2:
cluster-2@B1709267:~$ ls -l
total 48
drwxr-xr-x 5 nobody nogroup 4096 Thg 8 7 15:59 couchnfs
cluster-2@B1709267:~/couchnfs$ ls -l
total 45824
drwxr-xr-x 2 nobody nogroup 4096 Thg 8 7 16:59 couchdb-0
drwxr-xr-x 2 nobody nogroup 4096 Thg 8 7 16:59 couchdb-1
drwxr-xr-x 2 nobody nogroup 4096 Thg 8 7 16:59 couchdb-2
```

3. Install Docker

+ Tiến hành cài đặt Docker trên cả 3 máy

~\$: sudo apt update

```
cluster-0@b1709267master:~$ sudo apt update
[sudo] password for cluster-0:
Hit:1 http://vn.archive.ubuntu.com/ubuntu focal InRelease
Get:2 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]
Get:3 http://vn.archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]
Get:4 http://security.ubuntu.com/ubuntu focal-security/main amd64 DEP-11 Metadata [27,6 kB]
Get:5 http://vn.archive.ubuntu.com/ubuntu focal-backports InRelease [101 kB]
Get:6 http://security.ubuntu.com/ubuntu focal-security/universe amd64 DEP-11 Metadata [61,0 kB]
Get:7 http://security.ubuntu.com/ubuntu focal-security/multiverse amd64 DEP-11 Metadata [2.468 B]
Get:8 http://vn.archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [1.169 kB]
Get:9 http://vn.archive.ubuntu.com/ubuntu focal-updates/main i386 Packages [522 kB]
Get:10 http://vn.archive.ubuntu.com/ubuntu focal-updates/main amd64 DEP-11 Metadata [282 kB]
Get:11 http://vn.archive.ubuntu.com/ubuntu focal-updates/universe i386 Packages [629 kB]
Get:12 http://vn.archive.ubuntu.com/ubuntu focal-updates/universe amd64 Packages [848 kB]
Get:13 http://vn.archive.ubuntu.com/ubuntu focal-updates/universe amd64 DEP-11 Metadata [351 kB]
Get:14 http://vn.archive.ubuntu.com/ubuntu focal-updates/multiverse amd64 DEP-11 Metadata [940 B]
Get:15 http://vn.archive.ubuntu.com/ubuntu focal-backports/universe amd64 DEP-11 Metadata [10,3 kB]
Fetched 4.233 kB in 4 s (1.045 kB/s)
```

~\$: sudo apt install -y curl gnupg2 software-properties-common apt-transport-https ca-certificates

```
cluster-0@b1709267master:~$ sudo apt install -y curl gnupg2 software-properties-common apt-transport-https ca-certificates
Reading package lists... Done
Building dependency tree
Reading state information... Done
ca-certificates is already the newest version (20210119~20.04.1).
ca-certificates set to manually installed.
software-properties-common is already the newest version (0.98.9.5).
software-properties-common set to manually installed.
The following package was automatically installed and is no longer required:
  libllyvm11
Use 'sudo apt autoremove' to remove it.
The following NEW packages will be installed:
  apt-transport-https curl gnupg2
0 upgraded, 3 newly installed, 0 to remove and 0 not upgraded.
Need to get 171 kB of archives.
After this operation, 624 kB of additional disk space will be used.
Get:1 http://vn.archive.ubuntu.com/ubuntu focal-updates/universe amd64 apt-transport-https all 2.0.6 [4.680 B]
Get:2 http://vn.archive.ubuntu.com/ubuntu focal-updates/main amd64 curl amd64 7.68.0-1ubuntu2.6 [161 kB]
Get:3 http://vn.archive.ubuntu.com/ubuntu focal-updates/universe amd64 gnupg2 all 2.2.19-3ubuntu2.1 [4.584 B]
```

~\$: curl -fsSL

https://download.docker.com/linux/ubuntu/gpg | sudo
apt-key add -

```
cluster-0@b1709267master:~$ curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo apt-key add -  
OK
```

~\$: sudo add-apt-repository "deb [arch=amd64]

https://download.docker.com/linux/ubuntu

\$(lsb_release -cs) stable"

```
cluster-0@b1709267master:~$ sudo add-apt-repository "deb [arch=amd64] https://download.docker.com/linux/  
ubuntu $(lsb_release -cs) stable"  
Get:1 https://download.docker.com/linux/ubuntu focal InRelease [52,1 kB]  
Get:2 https://download.docker.com/linux/ubuntu focal/stable amd64 Packages [10,7 kB]  
  
Hit:3 http://vn.archive.ubuntu.com/ubuntu focal InRelease  
Hit:4 http://security.ubuntu.com/ubuntu focal-security InRelease  
Hit:5 http://vn.archive.ubuntu.com/ubuntu focal-updates InRelease  
Hit:6 http://vn.archive.ubuntu.com/ubuntu focal-backports InRelease  
Fetched 62,9 kB in 1s (64,4 kB/s)  
Reading package lists... Done
```

~\$: sudo apt update

```
cluster-0@b1709267master:~$ sudo apt update  
Hit:1 https://download.docker.com/linux/ubuntu focal InRelease  
Hit:2 http://vn.archive.ubuntu.com/ubuntu focal InRelease  
  
Hit:3 http://security.ubuntu.com/ubuntu focal-security InRelease  
Hit:4 http://vn.archive.ubuntu.com/ubuntu focal-updates InRelease  
Hit:5 http://vn.archive.ubuntu.com/ubuntu focal-backports InRelease  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
All packages are up to date.
```

~\$: sudo apt install -y containerd.io docker-ce docker-ce-
cli

```
cluster-0@b1709267master:~$ sudo apt install -y containerd.io docker-ce docker-ce-cli  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
The following package was automatically installed and is no longer required:  
 liblvm11  
Use 'sudo apt autoremove' to remove it.  
The following additional packages will be installed:  
 docker-ce-rootless-extras docker-scan-plugin git git-man liberror-perl pigz slirp4netns  
Suggested packages:  
 aufs-tools cgroupfs-mount | cgroup-lite git-daemon-run | git-daemon-sysvinit git-doc git-el git-email  
git-gui gitk gitweb  
 git-cvs git-mediawiki git-svn  
The following NEW packages will be installed:  
 containerd.io docker-ce docker-ce-cli docker-ce-rootless-extras docker-scan-plugin git git-man liberro  
r-perl pigz slirp4netns
```

~\$: sudo curl -L

"https://github.com/docker/compose/releases/download/1.23.2/docker-compose-\$(uname -s)-\$(uname -m)" -o
/usr/local/bin/docker-compose

```
cluster-0@b1709267master:~$ sudo curl -L "https://github.com/docker/compose/releases/download/1.23.2/docker-compose-$(uname -s)-$(uname -m)" -o /usr/local/bin/docker-compose
  % Total    % Received % Xferd  Average Speed   Time   Time     Current
                                         Dload  Upload Total Spent   Left  Speed
100    633  100    633     0      0  1187      0  --:--:--  --:--:--  1187
100  11.2M  100  11.2M     0      0  3555k      0  0:00:03  0:00:03  --:--:-- 4938k
```

~\$: sudo chmod +x /usr/local/bin/docker-compose

```
cluster-0@b1709267master:~$ sudo chmod +x /usr/local/bin/docker-compose
cluster-0@b1709267master:~$
```

⊕ Cấu hình Docker daemon

~\$: sudo tee /etc/docker/daemon.json <<EOF

```
{
  "exec-opts": ["native.cgroupdriver=systemd"],
  "log-driver": "json-file",
  "log-opt": {
    "max-size": "100m"
  },
  "storage-driver": "overlay2"
}
```

EOF

```
cluster-0@b1709267master:~$ sudo tee /etc/docker/daemon.json <<EOF
{
  "exec-opts": ["native.cgroupdriver=systemd"],
  "log-driver": "json-file",
  "log-opt": {
    "max-size": "100m"
  },
  "storage-driver": "overlay2"
}
EOF
[sudo] password for cluster-0:
[{"exec-opts": ["native.cgroupdriver=systemd"], "log-driver": "json-file", "log-opt": {"max-size": "100m"}, "storage-driver": "overlay2"}]
```

⊕ Khởi động và kích hoạt các dịch vụ Docker

~\$: sudo systemctl daemon-reload

~\$: sudo systemctl restart docker

~\$: sudo systemctl enable docker

```
cluster-0@b1709267master:~$ sudo systemctl daemon-reload
cluster-0@b1709267master:~$ sudo systemctl restart docker
cluster-0@b1709267master:~$ sudo systemctl enable docker
Synchronizing state of docker.service with SysV service script with /lib/systemd/systemd-sysv-install.
Executing: /lib/systemd/systemd-sysv-install enable docker
cluster-0@b1709267master:~$
```

Để chạy Docker không cần dùng sudo, thêm người dùng vào nhóm Docker

~\$: sudo usermod -aG docker \$USER

~\$: sudo reboot

```
cluster-0@b1709267master:~$ sudo usermod -aG docker $USER
cluster-0@b1709267master:~$ sudo reboot
```

4. Install Kubernetes

~\$: sudo apt update

```
cluster-0@b1709267master:~$ sudo apt update
[sudo] password for cluster-0:
Hit:1 https://download.docker.com/linux/ubuntu focal InRelease
Hit:2 http://vn.archive.ubuntu.com/ubuntu focal InRelease
Get:3 http://vn.archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]
Get:4 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]
Get:5 http://vn.archive.ubuntu.com/ubuntu focal-backports InRelease [101 kB]
Get:6 http://vn.archive.ubuntu.com/ubuntu focal-updates/main amd64 DEP-11 Metadata
[282 kB]
Get:7 http://security.ubuntu.com/ubuntu focal-security/main amd64 DEP-11 Metadata
[27,6 kB]
Get:8 http://vn.archive.ubuntu.com/ubuntu focal-updates/universe amd64 DEP-11 Meta
data [351 kB]
```

~\$: curl -s

```
https://packages.cloud.google.com/apt/doc/apt-key.gpg
| sudo apt-key add
```

```
cluster-0@b1709267master:~$ curl -s https://packages.cloud.google.com/apt/doc/apt-
key.gpg | sudo apt-key add
OK
```

~\$: sudo apt-add-repository "deb

```
http://apt.kubernetes.io/ kubernetes-xenial main"
```

```
cluster-0@b1709267master:~$ sudo apt-add-repository "deb http://apt.kubernetes.io/
kubernetes-xenial main"
Hit:1 https://download.docker.com/linux/ubuntu focal InRelease
Get:2 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]
Hit:4 http://vn.archive.ubuntu.com/ubuntu focal InRelease
Get:5 http://vn.archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]
Get:3 https://packages.cloud.google.com/apt kubernetes-xenial InRelease [9.383 B]
Get:6 https://packages.cloud.google.com/apt kubernetes-xenial/main amd64 Packages
[49,4 kB]
Get:7 http://vn.archive.ubuntu.com/ubuntu focal-backports InRelease [101 kB]
Get:8 http://vn.archive.ubuntu.com/ubuntu focal-updates/main i386 Packages [522 kB]
Get:9 http://vn.archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [1.169
kB]
```

~\$: sudo apt update

```
cluster-0@b1709267master:~$ sudo apt update
Hit:1 https://download.docker.com/linux/ubuntu focal InRelease
Hit:2 http://vn.archive.ubuntu.com/ubuntu focal InRelease
Hit:4 http://vn.archive.ubuntu.com/ubuntu focal-updates InRelease
Get:5 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]
Hit:3 https://packages.cloud.google.com/apt kubernetes-xenial InRelease
Get:6 http://vn.archive.ubuntu.com/ubuntu focal-backports InRelease [101 kB]
Fetched 214 kB in 2s (123 kB/s)
Reading package lists... Done
Building dependency tree
Reading state information... Done
All packages are up to date.
```

~\$: sudo apt install -y kubeadm kubelet kubectl

```
cluster-0@b1709267master:~$ sudo apt install -y kubeadm kubelet kubectl
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following package was automatically installed and is no longer required:
  liblvm11
Use 'sudo apt autoremove' to remove it.
The following additional packages will be installed:
  conntrack cri-tools ebttables kubernetes-cni socat
Suggested packages:
  nftables
The following NEW packages will be installed:
  conntrack cri-tools ebtables kubeadm kubectl kubelet kubernetes-cni socat
0 upgraded, 8 newly installed, 0 to remove and 0 not upgraded.
```

~\$: sudo apt-mark hold kubeadm kubelet kubectl

```
cluster-1@b1709267node1:~$ sudo apt-mark hold kubeadm kubelet
kubeadm set on hold.
kubelet set on hold.
kubectl set on hold.
```

~\$: kubeadm version

```
cluster-0@b1709267master:~$ kubeadm version
kubeadm version: &version.Info{Major:"1", Minor:"22", GitVersion:"v1.22.1", GitCommit:"632ed300f2c34f6d6d15ca4cef3d3c7073412212", GitTreeState:"clean", BuildDate:"2021-08-19T15:44:22Z", GoVersion:"go1.16.7", Compiler:"gc", Platform:"linux/amd64"}
```

~\$: sudo swapoff -a

```
cluster-0@b1709267master:~$ sudo swapoff -a
cluster-0@b1709267master:~$ sudo nano /etc/fstab
```

~\$: sudo nano /etc/fstab

```
GNU nano 4.8                               /etc/fstab
# /etc/fstab: static file system information.
#
# Use 'blkid' to print the universally unique identifier for a
# device; this may be used with UUID= as a more robust way to name devices
# that works even if disks are added and removed. See fstab(5).
#
# <file system> <mount point> <type> <options>      <dump>  <pass>
# / was on /dev/sda5 during installation
UUID=bb17a195-aac4-4c77-bd2f-dbb0317c4aa4 /          ext4    errors=remount-
# /boot/efi was on /dev/sda1 during installation
UUID=0679-A299  /boot/efi      vfat    umask=0077      0       1
#/swapfile
```

~\$: sudo sysctl net.bridge.bridge-nf-call-iptables=1

```
cluster-0@b1709267master:~$ sudo sysctl net.bridge.bridge-nf-call-iptables=1  
net.bridge.bridge-nf-call-iptables = 1
```

Trên máy cluster-0 chạy các lệnh sau:

```
~$: sudo kubeadm init --apiserver-advertise-  
address=192.168.1.100 --pod-network-  
cidr=10.244.0.0/16
```

```
[sudo] password for cluster-0:  
[init] Using Kubernetes version: v1.22.1  
[preflight] Running pre-flight checks  
  
Your Kubernetes control-plane has initialized successfully!  
  
To start using your cluster, you need to run the following as a regular user:  
  
mkdir -p $HOME/.kube  
sudo cp -i /etc/kubernetes/admin.conf $HOME/.kube/config  
sudo chown $(id -u):$(id -g) $HOME/.kube/config  
  
Alternatively, if you are the root user, you can run:  
  
export KUBECONFIG=/etc/kubernetes/admin.conf  
  
You should now deploy a pod network to the cluster.  
Run "kubectl apply -f [podnetwork].yaml" with one of the options listed at:  
https://kubernetes.io/docs/concepts/cluster-administration/addons/  
  
Then you can join any number of worker nodes by running the following on each as root:  
kubeadm join 192.168.1.100:6443 --token 90zwlbc2msmlo0xnmk0k98 \  
--discovery-token-ca-cert-hash sha256:02403c27238b06bfc3fbbbc4120a34ce9e7077a1d7477d3f878fe5097cb13b6b
```

```
~$: mkdir -p $HOME/.kube
```

```
~$: sudo cp -i /etc/kubernetes/admin.conf  
$HOME/.kube/config
```

```
~$: sudo chown $(id -u):$(id -g) $HOME/.kube/config
```

```
cluster-0@b1709267master:~$ mkdir -p $HOME/.kube  
cluster-0@b1709267master:~$ sudo cp -i /etc/kubernetes/admin.conf $HOME/.kube/config  
cluster-0@b1709267master:~$ sudo chown $(id -u):$(id -g) $HOME/.kube/config  
cluster-0@b1709267master:~$
```

Trên các máy cluster-1, cluster-2 chạy lệnh sau:

```
~$: kubeadm join 192.168.1.100:6443 --token  
90zwlbc2msmlo0xnmk0k98 \  
--discovery-token-ca-cert-hash  
sha256:02403c27238b06bfc3fbbbc4120a34ce9e7077a1  
d7477d3f878fe5097cb13b6b
```

```

cluster-1@b1709267node1:~$ sudo kubeadm join 192.168.1.100:6443 --token 90zwlb.c2msmlo0xnmk0k98 \
> --discovery-token-ca-cert-hash sha256:02403c27238b06bfc3fbbbc4120a34ce9e7077a1d7477d3f878fe5097cb13b6b
[sudo] password for cluster-1:
[preflight] Running pre-flight checks
[preflight] Reading configuration from the cluster...
[preflight] FYI: You can look at this config file with 'kubectl -n kube-system get cm kubeadm-config -o yaml'
[kubelet-start] Writing kubelet configuration to file "/var/lib/kubelet/config.yaml"
[kubelet-start] Writing kubelet environment file with flags to file "/var/lib/kubelet/kubeadm-flags.env"
[kubelet-start] Starting the kubelet
[kubelet-start] Waiting for the kubelet to perform the TLS Bootstrap...

This node has joined the cluster:
* Certificate signing request was sent to apiserver and a response was received.
* The Kubelet was informed of the new secure connection details.

Run 'kubectl get nodes' on the control-plane to see this node join the cluster.

cluster-2@b1709267node2:~$ sudo kubeadm join 192.168.1.100:6443 --token 90zwlb.c2msmlo0xnmk0k98 \
> --discovery-token-ca-cert-hash sha256:02403c27238b06bfc3fbbbc4120a34ce9e7077a1d7477d3f878fe5097cb13b6b
[preflight] Running pre-flight checks
[preflight] Reading configuration from the cluster...
[preflight] FYI: You can look at this config file with 'kubectl -n kube-system get cm kubeadm-config -o yaml'
[kubelet-start] Writing kubelet configuration to file "/var/lib/kubelet/config.yaml"
[kubelet-start] Writing kubelet environment file with flags to file "/var/lib/kubelet/kubeadm-flags.env"
[kubelet-start] Starting the kubelet
[kubelet-start] Waiting for the kubelet to perform the TLS Bootstrap...

This node has joined the cluster:
* Certificate signing request was sent to apiserver and a response was received.
* The Kubelet was informed of the new secure connection details.

Run 'kubectl get nodes' on the control-plane to see this node join the cluster.

```

Trên máy Cluster-0, kiểm tra lại các node
~\$: kubectl get nodes

```

cluster-0@b1709267master:~$ kubectl get nodes
NAME      STATUS   ROLES      AGE      VERSION
b1709267master  NotReady  control-plane,master  51m      v1.22.1
b1709267node1  NotReady  <none>     49m      v1.22.1
b1709267node2  NotReady  <none>     9s       v1.22.1
cluster-0@b1709267master:~$ 

```

Apply pod network flannel cho Cluster

```

cluster-0@b1709267master:~$ kubectl apply -f https://raw.githubusercontent.com/
coreos/flannel/master/Documentation/kube-flannel.yml
Warning: policy/v1beta1 PodSecurityPolicy is deprecated in v1.21+, unavailable
in v1.25+
podsecuritypolicy.policy/psp.flannel.unprivileged created
clusterrole.rbac.authorization.k8s.io/flannel created
clusterrolebinding.rbac.authorization.k8s.io/flannel created
serviceaccount/flannel created
configmap/kube-flannel-cfg created
daemonset.apps/kube-flannel-ds created

```

Trên máy Cluster-0, kiểm tra lại các node
~\$: kubectl get nodes

```

cluster-0@b1709267master:~$ kubectl get nodes
NAME      STATUS   ROLES      AGE      VERSION
b1709267master  Ready    control-plane,master  141m      v1.22.1
b1709267node1  Ready    <none>     132m      v1.22.1
b1709267node2  Ready    <none>     64m       v1.22.1
cluster-0@b1709267master:~$ 

```

5. Deploy CouchDB, cấu hình Cluster

Tạo thư mục **couchdb-0**, **couchdb-1**, **couchdb-2**, **couchdb-3**, **couchdb-4**, **couchdb-5**, **couchdb-6**, **couchdb-7**, **couchdb-8**

```
cluster-0@b1709267master:/var/couchnfs$ sudo mkdir couchdb-0 couchdb-1 couchdb-2 couchdb-3 couchdb-4 couchdb-5 couchdb-6 couchdb-7 couchdb-8  
[sudo] password for cluster-0:
```

Apply file “*pv.yaml*”, “*pv1.yaml*” để tạo **volume**

```
cluster-0@b1709267master:/var/couchnfs$ kubectl apply -f pv.yaml  
persistentvolume/couch-vol-0 created  
persistentvolume/couch-vol-1 created  
persistentvolume/couch-vol-2 created  
cluster-0@b1709267master:/var/couchnfs$ kubectl apply -f pv1.yaml  
persistentvolume/couch-vol-3 created  
persistentvolume/couch-vol-4 created  
persistentvolume/couch-vol-5 created  
persistentvolume/couch-vol-6 created  
persistentvolume/couch-vol-7 created  
persistentvolume/couch-vol-8 created
```

Apply file “*couchdb-statefulset.yaml*” để tạo **pod**

```
cluster-0@b1709267master:/var/couchnfs$ kubectl apply -f couchdb-statefulset.yaml  
Warning: spec.template.spec.containers[0].env[6].name: duplicate name "ERL_FLAGS"  
statefulset.apps/couchdb created
```

Kiểm tra **pod** đã hoạt động chưa

```
cluster-0@b1709267master:/var/couchnfs$ kubectl get pods  
NAME      READY   STATUS    RESTARTS   AGE  
couchdb-0  1/1     Running   0          23s  
couchdb-1  1/1     Running   0          15s  
couchdb-2  1/1     Running   0          8s
```

Apply file “*service.yaml*” để tạo **Service** cho **Statefulset couchdb**

```
cluster-0@b1709267master:/var/couchnfs$ kubectl apply -f service.yaml  
service/couch-service created  
service/couch-nodep-svc created
```

Kiểm tra *PV*

```
cluster-0@b1709267master:/var/couchnfs$ kubectl get pv
NAME      CAPACITY   ACCESS MODES  RECLAIM POLICY  STATUS    CLAIM          STORAGECLASS  REASON  AGE
couch-vol-0  10Gi      RWO         Retain        Bound     default/couch-pvc-couchdb-0
couch-vol-1  10Gi      RWO         Retain        Available
couch-vol-2  10Gi      RWO         Retain        Available
couch-vol-3  10Gi      RWO         Retain        Available
couch-vol-4  10Gi      RWO         Retain        Available
couch-vol-5  10Gi      RWO         Retain        Available
couch-vol-6  10Gi      RWO         Retain        Available
couch-vol-7  10Gi      RWO         Retain        Bound     default/couch-pvc-couchdb-1
couch-vol-8  10Gi      RWO         Retain        Available
                                                 AGE
                                                 24s
                                                 24s
                                                 24s
                                                 21s
                                                 21s
                                                 21s
                                                 21s
                                                 21s
                                                 21s
```

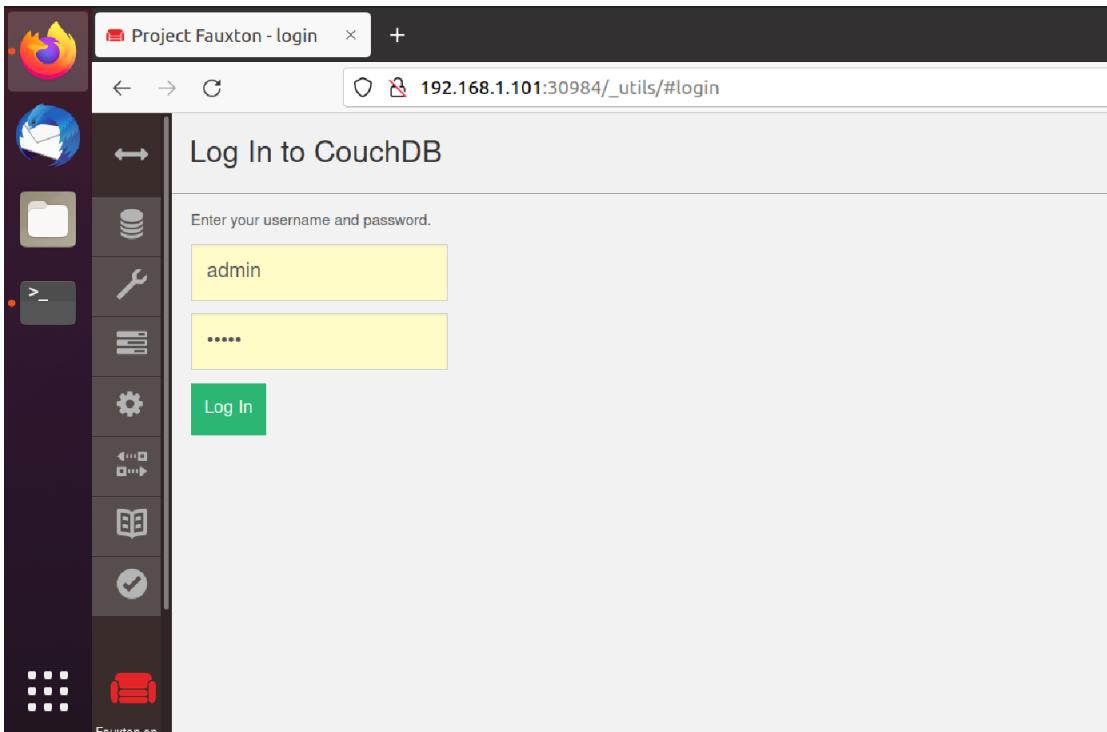
Kiểm tra *Service*

```
cluster-0@b1709267master:/var/couchnfs$ kubectl get svc
NAME        TYPE        CLUSTER-IP       EXTERNAL-IP      PORT(S)        AGE
couch-nodep-svc  NodePort    10.108.90.154 <none>        5984:30984/TCP  34s
couch-service   ClusterIP   None           <none>        5984/TCP      35s
kubernetes     ClusterIP   10.96.0.1      <none>        443/TCP       109d
```

SSH vào *couchdb-0* để cấu hình *Cluster*

```
cluster-0@b1709267master:/var/couchnfs$ kubectl exec couchdb-0 -i -t -- bash
root@couchdb-0:# curl http://admin:admin@127.0.0.1/_membership
curl: (7) Failed to connect to 127.0.0.1 port 80: Connection refused
root@couchdb-0:# curl http://admin:admin@127.0.0.1:5984/_membership
{"all_nodes": ["couchdb@couchdb-0.couch-service"], "cluster_nodes": ["couchdb@couchdb-0.couch-service"]}
root@couchdb-0:# curl -X POST -H "Content-Type: application/json" http://admin:admin@127.0.0.1:5984/_cluster_setup -d '{"action": "add_node", "host": "couchdb-1.couch-service", "port": 5984, "username": "admin", "password": "admin"}'
{"ok": true}
root@couchdb-0:# curl -X POST -H "Content-Type: application/json" http://admin:admin@127.0.0.1:5984/_cluster_setup -d '{"action": "add_node", "host": "couchdb-2.couch-service", "port": 5984, "username": "admin", "password": "admin"}'
{"ok": true}
root@couchdb-0:# curl http://admin:admin@127.0.0.1:5984/_membership
{"all_nodes": ["couchdb@couchdb-0.couch-service", "couchdb@couchdb-1.couch-service", "couchdb@couchdb-2.couch-service"], "cluster_nodes": ["couchdb@couchdb-0.couch-service", "couchdb@couchdb-1.couch-service", "couchdb@couchdb-2.couch-service"]}
root@couchdb-0:# exit
```

Kiểm tra *Database* trên trình duyệt



6. Deploy ứng dụng Web

Trước khi triển khai, kiểm tra **IP, Port, tên, mật khẩu** tài khoản đăng nhập CouchDB của **tất cả các file** trong thư mục **API**

AccountAPI.js - shop-on-offline - Visual Studio Code

```

File Edit Selection View Go Run Terminal Help
EXPLORER JS AccountAPI.js ...
src > API > JS AccountAPI.js > ...
1 import PouchDB from 'pouchdb'
2
3 //Khai báo cơ sở dữ liệu cục bộ
4 const accountDatabase = new PouchDB("account")
5 //Khai báo cơ sở dữ liệu từ xa
6 const remoteAccountDatabase = new PouchDB('http://admin:admin@192.168.1.100:30984/account')
7 //Đồng bộ hóa cơ sở dữ liệu cục bộ và từ xa
8 PouchDB.sync(accountDatabase, remoteAccountDatabase, {
9   live: true,
10   timeout: false, //Vô hiệu hóa thời gian chờ
11   retry: true, //Thứ đồng bộ lại nếu thất bại
12 })
13 //Nếu cơ sở dữ liệu bia chưa tồn tại => được tạo tự động khi một đối tượng được thêm mới
14 export const addData = data => accountDatabase.post(data)
15 //Cap nhât bia
16 export const editData = data => accountDatabase.put(data)
17 //Xoa bia
18 export const removeData = data => accountDatabase.get(data).then(doc => accountDatabase.remove(doc))
19 //Liệt kê tất cả
20 export const getData = () =>
21   accountDatabase
22     .allDocs({
23       include_docs: true,
24       descending: true
25     })
26
27 
```

Ln 1, Col 1 Spaces: 4 UTF-8 CRLF () JavaScript

Sửa "start": "react-scripts start" thành "start": "react-scripts --openssl-legacy-provider start" trong file **package.json**

```

{
  "name": "shop-on-offline",
  "version": "1.0.0",
  "private": true,
  "dependencies": {
    "react": "^17.0.2",
    "react-bootstrap": "^2.0.0-rc.0",
    "react-dom": "^17.0.2",
    "react-hook-form": "7.16.1",
    "react-icons": "4.3.1",
    "react-router-dom": "5.3.0",
    "react-scripts": "4.0.3",
    "react-select": "5.1.0",
    "react-toastify": "8.0.3",
    "web-vitals": "1.1.2"
  },
  "scripts": {
    "start": "react-scripts --openssl-legacy-provider start",
    "build": "react-scripts build",
    "test": "react-scripts test",
    "eject": "react-scripts eject"
  },
  "eslintConfig": {
    "extends": [
      "react-app",
      "react-app/jest"
    ]
  }
}
  
```

Cấp quyền thực thi cho **react-script** bằng lệnh:
~\$ sudo chmod +x node_modules/.bin/react-scripts

Tạo file “**Dockerfile**” trong thư mục dự án để mô tả công việc cần làm khi **build Image**

```

FROM node:17-alpine3.12
WORKDIR /app
COPY package.json .
RUN npm install
RUN npm install npm@8.3.0
RUN npm install -g add-cors-to-couchdb
COPY .
EXPOSE 3000
CMD [ "npm", "start" ]
  
```

Tạo file “**.dockerignore**” để bỏ qua thư mục **node_module** khi **build Image** vì đã copy file “**package.json**”

```

node_modules
.git
#Please check the shop-on-offline folder by command "ls -a", if there is a
# folder ".git", you must uncomment the line ".git" to ignore this folder when
# building Image
  
```

Tạo tài khoản **Docker Hub**, sau đó tạo **repo** mới và đăng nhập trên **Terminal**

```
cluster-0@b1709267master:~/couchnfs/shop-on-offline$ docker login
Login with your Docker ID to push and pull images from Docker Hub. If you don't have a Docker ID, head over to https://hub.docker.com to create one.
Username: b1709267
Password:
WARNING! Your password will be stored unencrypted in /home/cluster-0/.docker/config.json.
Configure a credential helper to remove this warning. See
https://docs.docker.com/engine/reference/commandline/login/#credentials-store
Login Succeeded
```

Tiến hành **build Image** và **push** lên **Docker Hub**

```
cluster-0@b1709267master:~/couchnfs/shop-on-offline$ docker build -t b1709267/shop-on-offline:13.2.1 .
Sending build context to Docker daemon 4.631MB
Step 1/9 : FROM node:17-alpine3.12
--> 9c73a3e8baaf
Step 2/9 : WORKDIR /app
--> Using cache
--> 9e28fb63ab5
Step 3/9 : COPY package.json .
--> Using cache
--> 19982d618e21
Step 4/9 : RUN npm install
--> Running in 44b97e7e25b9
```

Kiểm tra Image bằng lệnh “**docker images**”

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
b1709267/shop-on-offline	13.2.1	8c561245eb0a	14 seconds ago	633MB
node	17-alpine3.12	9c73a3e8baaf	9 days ago	170MB
k8s.gcr.io/kube-apiserver	v1.23.1	b6d7abedde39	2 weeks ago	135MB
k8s.gcr.io/kube-proxy	v1.23.1	b46c42588d51	2 weeks ago	112MB
k8s.gcr.io/kube-controller-manager	v1.23.1	f51846a4fd28	2 weeks ago	125MB
k8s.gcr.io/kube-scheduler	v1.23.1	71d575fe628	2 weeks ago	53.5MB
quay.io/coreos/flannel	v0.15.1	e6ea68648f0c	6 weeks ago	69.5MB
k8s.gcr.io/etcd	3.5.1-0	25f8c7f3da61	8 weeks ago	293MB
rancher/mirrored-flannel-cni-flannel-cni-plugin	v1.0.0	cd5235cd7dc2	2 months ago	9.03MB
k8s.gcr.io/coredns/coredns	v1.8.6	a4ca41631cc7	2 months ago	46.8MB
k8s.gcr.io/pause	3.6	6270bb605e12	4 months ago	683kB

Tiến hành **đẩy** lên Docker Hub

```
cluster-0@b1709267master:~/couchnfs/shop-on-offline$ docker push b1709267/shop-on-offline:13.2.1
The push refers to repository [docker.io/b1709267/shop-on-offline]
c26b59aeb157: Pushed
72eedad89e4fa: Pushed
2c706f10068f: Pushing [=====>] 15.44MB
59dffbd157b: Pushing [====>] 38.67MB/443.6MB
ccc5a75674ff: Pushed
6b3311ab7711: Pushed
ac21e925463c: Layer already exists
9b403f53f62d: Layer already exists
5924aa91f2bb: Layer already exists
eb4bde6b29a6: Waiting
```

The screenshot shows a Docker repository page for the repository b1709267/shop-on-offline. The page includes a list of tags (13.2.1, 11.2.4, 11.2.3, 11.2.2, 11.2.1), Docker commands (docker push b1709267/shop-on-offline:tagname), and automated build options.

Apply file “*shop-on-offline.yaml*” để tạo *pod*

```
cluster-0@b1709267master:/var/couchnfs$ kubectl apply -f shop-on-offline.yaml
deployment.apps/shop-on-offline created
service/shop-on-offline created
```

Kiểm tra *pod* đã hoạt động chưa

```
cluster-0@b1709267master:/var/couchnfs$ kubectl get pod -o wide
NAME                               READY   STATUS    RESTARTS   AGE
couchdb-0                           1/1     Running   0          3m8s
couchdb-1                           1/1     Running   0          3m
couchdb-2                           1/1     Running   0          2m53s
shop-on-offline-58b5f6f75c-926r2   1/1     Running   0          22s
```

The screenshot shows a web browser displaying the Shop On-Offline website at 192.168.1.102:30812. The website features a prominent red banner advertising a "SALE SỐC ĐÓN TUẦN MỚI" (New Week Special Sale) with prices from 12K. It also highlights "QUÀ TẶNG 100K" (100K gifts) and "VOUCHER 50K" (50K vouchers). The website has a blue header with navigation links like Trang chủ, Chăm sóc khách hàng, and Giỏ hàng.

* Lưu ý: Nếu bị lỗi khi lưu dữ liệu vào Database, hãy SSH vào pod shop-on-offline để addcors

```
cluster-0@b1709267master:/var/couchnfs$ kubectl exec shop-on-offline-58b5f6f75c-926r2 -i -t -- sh  
/app # add-cors-to-couchdb http://admin:admin@192.168.1.100:30984/  
success  
/app # exit
```

Nên addcors trước khi build Image, vì ứng dụng Web được triển khai với loại Deployment, và nó Stateless, addcors sẽ mất khi pod bị khởi động lại.

7. Scale

Download Metrics Server để theo dõi CPU và Memory

```
cluster-0@b1709267master:~$ wget https://github.com/kubernetes-sigs/metrics-server/releases/download/v0.5.2/components.yaml  
--2021-12-30 23:58:43-- https://github.com/kubernetes-sigs/metrics-server/releases/download/v0.5.2/components.yaml  
Resolving github.com (github.com)... 20.205.243.166  
Connecting to github.com (github.com)|20.205.243.166|:443... connected.  
HTTP request sent, awaiting response... 302 Found  
Location: https://objects.githubusercontent.com/github-production-release-asset-2e65be/92132038/c6b1b76f-b7c7-4cb1-87c2-9eab3f7bee  
f67X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIAIWNJYAX4CSVEHS3%2F20211230%2Fs-east-1%2F%32Faws4_request&X-Amz-Date=20  
211230T165843Z&X-Amz-Expires=3000X-Amz-Signature=75d3fbec519c648320897348e76f298bc33df8eca1d5f9dcba49139b1ae73de5&X-Amz-SignedHe  
aders=host&actor_id=0&key_id=0&repo_id=92132038&response-content-disposition=attachment%3B%20filename%3Dcomponents.yaml&response-con  
tent-type=application%2Foctet-stream [following]  
--2021-12-30 23:58:44-- https://objects.githubusercontent.com/github-production-release-asset-2e65be/92132038/c6b1b76f-b7c7-4cb1-  
87c2-9eab3f7bee%32Faws4_request&X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIAIWNJYAX4CSVEHS3%2F20211230%2Fs-east-1%2F%32Faws4_reques  
t&X-Amz-Date=20211230T165843Z&X-Amz-Expires=3000X-Amz-Signature=75d3fbec519c648320897348e76f298bc33df8eca1d5f9dcba49139b1ae73de5&X-Amz-SignedHe  
aders=host&actor_id=0&key_id=0&repo_id=92132038&response-content-disposition=attachment%3B%20filename%3Dcomponents.ya  
ml&response-content-type=application%2Foctet-stream  
Resolving objects.githubusercontent.com (objects.githubusercontent.com)... 185.199.109.133, 185.199.108.133, 185.199.110.133, ...  
Connecting to objects.githubusercontent.com (objects.githubusercontent.com)|185.199.109.133|:443... connected.  
HTTP request sent, awaiting response... 200 OK  
Length: 4117 (4,0K) [application/octet-stream]  
Saving to: 'components.yaml'  
  
components.yaml          100%[=====] 4,02K  --.-KB/s   in 0,004s  
2021-12-30 23:58:44 (936 KB/s) - 'components.yaml' saved [4117/4117]
```

Thêm nội dung sau vào file vừa tải về và apply file mô tả

command:

- /metrics-server
- --kubelet-insecure-tls
- --kubelet-preferred-address-types=InternalIP

```

127     labels:
128       k8s-app: metrics-server
129   spec:
130     containers:
131       - args:
132         - --cert-dir=/tmp
133         - --secure-port=4443
134         - --kubelet-preferred-address-types=InternalIP,ExternalIP,Hostname
135         - --kubelet-use-node-status-port
136         - --metric-resolution=15s
137       command:
138         - /metrics-server
139         - --kubelet-insecure-tls
140         - --kubelet-preferred-address-types=InternalIP
141       image: k8s.gcr.io/metrics-server/metrics-server:v0.5.2
142       imagePullPolicy: IfNotPresent
143       livenessProbe:
144         failureThreshold: 3
145         httpGet:
146           path: /livez
147           port: https
148           scheme: HTTPS
149           periodSeconds: 10
150         name: metrics-server
151       ports:
152         - containerPort: 4443
153           name: https
154           protocol: TCP

```

YAML ▾ Tab Width: 8 ▾ Ln 140, Col 9 ▾ INS

```

cluster-0@b1709267master:~$ kubectl apply -f components.yaml
serviceaccount/metrics-server created
clusterrole.rbac.authorization.k8s.io/system:aggregated-metrics-reader created
clusterrole.rbac.authorization.k8s.io/system:metrics-server created
rolebinding.rbac.authorization.k8s.io/metrics-server-auth-reader created
clusterrolebinding.rbac.authorization.k8s.io/metrics-server:system:auth-delegator created
clusterrolebinding.rbac.authorization.k8s.io/system:metrics-server created
service/metrics-server created
deployment.apps/metrics-server created
apiservice.apiregistration.k8s.io/v1beta1.metrics.k8s.io created

```

Kiểm tra xem Metrics Server đã hoạt động chưa

```

cluster-0@b1709267master:/var/couchnfs$ kubectl top node
NAME          CPU(cores)   CPU%    MEMORY(bytes)   MEMORY%
b1709267master  686m        34%    2363Mi        61%
b1709267node1   614m        30%    1611Mi        55%
b1709267node2   598m        29%    1860Mi        64%

```

Apply file “*hpa-couchdb.yaml*” và “*hpa-shop-on-offline.yaml*” để tạo **HPA**

```

cluster-0@b1709267master:/var/couchnfs$ kubectl apply -f hpa-couchdb.yaml
horizontalpodautoscaler.autoscaling/hpa-couchdb created
cluster-0@b1709267master:/var/couchnfs$ kubectl apply -f hpa-shop-on-offline.yaml
horizontalpodautoscaler.autoscaling/hpa-shop-on-offline created

```

Theo dõi Scale tự động

```
cluster-0@b1709267master:/var/couchnfs$ kubectl get hpa
NAME             REFERENCE          TARGETS      MINPODS   MAXPODS   REPLICAS
hpa-couchdb     StatefulSet/couchdb <unknown>/80%  4         9         0
hpa-shop-on-offline Deployment/shop-on-offline <unknown>/60%  3         20        0
```

```
cluster-0@b1709267master:/var/couchnfs$ kubectl get hpa
NAME             REFERENCE          TARGETS      MINPODS   MAXPODS   REPLICAS   AGE
hpa-couchdb     StatefulSet/couchdb 6%/80%     4         9         4         40s
hpa-shop-on-offline Deployment/shop-on-offline 0%/60%    3         20        3         35s
cluster-0@b1709267master:/var/couchnfs$ kubectl get pod
NAME           READY   STATUS    RESTARTS   AGE
couchdb-0      1/1     Running   0          10m
couchdb-1      1/1     Running   0          10m
couchdb-2      1/1     Running   0          10m
couchdb-3      1/1     Running   0          29s
shop-on-offline-58b5f6f75c-926r2 1/1     Running   0          8m
shop-on-offline-58b5f6f75c-cd4cb 1/1     Running   0          24s
shop-on-offline-58b5f6f75c-v6qks 1/1     Running   0          24s
```

```
cluster-0@b1709267master:/var/couchnfs$ kubectl get pod
NAME           READY   STATUS    RESTARTS   AGE
couchdb-0      1/1     Running   0          12m
couchdb-1      1/1     Running   0          12m
couchdb-2      1/1     Running   0          12m
couchdb-3      1/1     Running   0          2m13s
shop-on-offline-58b5f6f75c-926r2 1/1     Running   0          9m44s
shop-on-offline-58b5f6f75c-9vk2r 1/1     Running   0          8s
shop-on-offline-58b5f6f75c-cd4cb 1/1     Running   0          2m8s
shop-on-offline-58b5f6f75c-v6qks 1/1     Running   0          2m8s
shop-on-offline-58b5f6f75c-vs2lv 1/1     Running   0          53s
cluster-0@b1709267master:/var/couchnfs$ kubectl get hpa
NAME             REFERENCE          TARGETS      MINPODS   MAXPODS   REPLICAS   AGE
hpa-couchdb     StatefulSet/couchdb 6%/80%     4         9         4         2m36s
hpa-shop-on-offline Deployment/shop-on-offline 76%/60%   3         20        5         2m31s
```

PHỤ LỤC

1. Lưu ý không sử dụng **Image** có sẵn trong đê tài này để triển khai nếu không thỏa các điều kiện sau:

- **IP Database** phải là **192.168.1.100**
- **Port** phải là **30984**
- Tài khoản đăng nhập **CouchDB** với **Username: admin, Password: admin**

2. **Version** sử dụng trong đê tài này là:

- **Kubernetes v1.22.1**
- **Docker version 20.10.8, build 3967b7d**

3. Có thể cách triển khai và file mô tả sẽ không hoạt động ở những **Version** mới hơn.

4. Có thể sử dụng **Package Manager** của **Kubernetes** là **Helm** để triển khai **CouchDB**

Link tham khảo:

<https://artifacthub.io/packages/helm/couchdb/couchdb>

* **Lưu ý:** Code Clone về từ **Git Hub** muốn chạy được phải cài **NodeJS** và chạy lệnh “**npm install**” để cài các **package** cần thiết.

Link file mô tả: <https://github.com/b1709267/couchnfs>

Link shop-on-offline: <https://github.com/b1709267/shop-on-offline>