

BÀI THỰC HÀNH KHÔNG SỐ

Trong bài thực hành này em sử dụng hệ điều hành *Ubuntu 20.04*.

1. Cài đặt **Docker** bằng kho lưu trữ

- Thiết lập kho lưu trữ

Cập nhật các gói *apt* và cài đặt các gói cho phép *apt* sử dụng kho lưu trữ qua HTTPS:

```
sudo apt-get update
sudo apt-get install \
    apt-transport-https \
    ca-certificates \
    curl \
    gnupg \
    lsb-release
```

Thêm khóa GPG cho *Docker*:

```
curl -fsSL https://download.docker.com/linux/ubuntu/gpg |
sudo gpg --dearmor -o /usr/share/keyrings/docker-archive-
keyring.gpg
```

Thiết lập lưu trữ ổn định:

```
echo \
    "deb [arch=amd64 signed-by=/usr/share/keyrings/docker-
    archive-keyring.gpg] https://download.docker.com/linux/ubuntu \
    (lsb_release -cs) stable" |
sudo tee /etc/apt/sources.list.d/docker.list > /dev/null
```

```

→ ~ sudo apt-get update
[sudo] password for thuyyy:
Hit:1 https://brave-browser-apt-release.s3.brave.com stable InRelease
Hit:2 http://ppa.launchpad.net/katharainframework/kathara/ubuntu focal InRelease
Hit:3 https://download.docker.com/linux/ubuntu focal InRelease
Get:4 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]
Hit:5 http://vn.archive.ubuntu.com/ubuntu focal InRelease
Get:6 http://vn.archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]
Get:7 http://vn.archive.ubuntu.com/ubuntu focal-backports InRelease [101 kB]
Get:8 http://security.ubuntu.com/ubuntu focal-security/main amd64 DEP-11 Metadata [27,6 kB]
Get:9 http://vn.archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [1.174 kB]
Get:10 http://security.ubuntu.com/ubuntu focal-security/universe amd64 DEP-11 Metadata [61,0 kB]
Get:11 http://security.ubuntu.com/ubuntu focal-security/universe amd64 c-n-f Metadata [12,3 kB]
Get:12 http://security.ubuntu.com/ubuntu focal-security/multiverse amd64 DEP-11 Metadata [2.464 B]
Get:13 http://vn.archive.ubuntu.com/ubuntu focal-updates/main i386 Packages [526 kB]
Get:14 http://vn.archive.ubuntu.com/ubuntu focal-updates/main Translation-en [253 kB]
Get:15 http://vn.archive.ubuntu.com/ubuntu focal-updates/main amd64 DEP-11 Metadata [282 kB]
Get:16 http://vn.archive.ubuntu.com/ubuntu focal-updates/universe amd64 Packages [849 kB]
Get:17 http://vn.archive.ubuntu.com/ubuntu focal-updates/universe Translation-en [180 kB]
Get:18 http://vn.archive.ubuntu.com/ubuntu focal-updates/universe amd64 DEP-11 Metadata [351 kB]
Get:19 http://vn.archive.ubuntu.com/ubuntu focal-updates/multiverse amd64 DEP-11 Metadata [944 B]
Get:20 http://vn.archive.ubuntu.com/ubuntu focal-backports/universe amd64 DEP-11 Metadata [10,3 kB]
Fetched 4.059 kB in 3s (1.221 kB/s)
Reading package lists... Done
→ ~ sudo apt-get install \
    apt-transport-https \
    ca-certificates \
    curl \
    gnupg \
    lsb-release
Reading package lists... Done
Building dependency tree
Reading state information... Done
lsb-release is already the newest version (11.1.0ubuntu2).
ca-certificates is already the newest version (20210119-20.04.1).
curl is already the newest version (7.68.0-1ubuntu2.6).
gnupg is already the newest version (2.2.19-3ubuntu2.1).
apt-transport-https is already the newest version (2.0.6).
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
→ ~ curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo gpg --dearmor -o /usr/share/keyrings/docker-archive-keyring.gpg
File '/usr/share/keyrings/docker-archive-keyring.gpg' exists. Overwrite? (y/n) [1] + 3826 done
curl -fsSL https://download.docker.com/linux/ubuntu/gpg |
3827 suspended (tty input) sudo gpg --dearmor -o /usr/share/keyrings/docker-archive-keyring.gpg

```

- Cài đặt *Docker Engine* phiên bản mới nhất

`sudo apt-get update`

`sudo apt-get install docker-ce docker-ce-cli containerd.io`

```

→ ~ sudo apt-get install docker-ce docker-ce-cli containerd.io
[sudo] password for thuyyy:
Reading package lists... Done
Building dependency tree
Reading state information... Done
containerd.io is already the newest version (1.4.9-1).
The following additional packages will be installed:
  docker-ce-rootless-extras docker-scan-plugin pigz slurp4netns
Suggested packages:
  aufs-tools cgroupfs-mount lxc cgroup-lite

```

- Khởi động *Docker* bằng lệnh *service* và thêm người dùng vào nhóm có quyền thao tác trên *Docker*:

`service docker start`

`sudo usermod -aG docker ${USER}`

```

→ ~ service docker start
==== AUTHENTICATING FOR org.freedesktop.systemd1.manage-units ====
Authentication is required to start 'docker.service'.
Authenticating as: Thuyyy,,, (thuyyy)
Password:
==== AUTHENTICATION COMPLETE ====
→ ~ sudo usermod -aG docker ${USER}
[sudo] password for thuyyy:
→ ~

```

- Kiểm tra hoạt động của *Docker* bằng cách khởi động một Containerized Application từ ảnh *hello-world*

docker run hello-world

```
→ - docker run hello-world

Hello from Docker!
This message shows that your installation appears to be working correctly.

To generate this message, Docker took the following steps:
1. The Docker client contacted the Docker daemon.
2. The Docker daemon pulled the "hello-world" image from the Docker Hub.
   (amd64)
3. The Docker daemon created a new container from that image which runs the
   executable that produces the output you are currently reading.
4. The Docker daemon streamed that output to the Docker client, which sent it
   to your terminal.

To try something more ambitious, you can run an Ubuntu container with:
$ docker run -it ubuntu bash

Share images, automate workflows, and more with a free Docker ID:
https://hub.docker.com/

For more examples and ideas, visit:
https://docs.docker.com/get-started/
```

- Tìm kiếm phiên bản phù hợp của ứng dụng

docker search ubuntu

```
→ - docker search ubuntu

NAME                DESCRIPTION                STARS     OFFICIAL   AUTOMATED
ubuntu              Ubuntu is a Debian-based Linux operating sys... 12691     [OK]
dorowu/ubuntu-desktop-lxde-vnc Docker image to provide HTML5 VNC interface ... 561       [OK]
websphere-liberty   WebSphere Liberty multi-architecture images ... 280       [OK]
rastasheep/ubuntu-sshd Dockerized SSH service, built on top of offi... 255       [OK]
consol/ubuntu-xfce-vnc Ubuntu container with "headless" VNC sessio... 241       [OK]
ubuntu-upstart      DEPRECATED, as is Upstart (find other proces... 113       [OK]
ansible/ubuntu14.04-ansible Ubuntu 14.04 LTS with ansible 98          [OK]
landinternet/ubuntu-16-nginx-php-phpmyadmin-mysql-5 ubuntu-16-nginx-php-phpmyadmin-mysql-5 50          [OK]
ubuntu-debootstrap  DEPRECATED; use "ubuntu" instead 44
i386/ubuntu         Ubuntu is a Debian-based Linux operating sys... 25
solita/ubuntu-systemd Ubuntu + systemd 24          [OK]
fnnsc/ubuntu-python3 A slim Ubuntu-based Python3 image 24          [OK]
nuagebec/ubuntu     Simple always updated Ubuntu docker images w... 24          [OK]
landinternet/ubuntu-16-apache-php-5.6 ubuntu-16-apache-php-5.6 14          [OK]
landinternet/ubuntu-16-apache-php-7.0 ubuntu-16-apache-php-7.0 13          [OK]
eclipse/ubuntu_jdk8 Ubuntu, JDK8, Maven 3, git, curl, nmap, mc, ... 13          [OK]
landinternet/ubuntu-16-nginx-php-phpmyadmin-mariadb-10 ubuntu-16-nginx-php-phpmyadmin-mariadb-10 11          [OK]
landinternet/ubuntu-16-nginx-php-5.6-wordpress-4 ubuntu-16-nginx-php-5.6-wordpress-4 9          [OK]
landinternet/ubuntu-16-apache-php-7.1 ubuntu-16-apache-php-7.1 7          [OK]
landinternet/ubuntu-16-nginx-php-7.0 ubuntu-16-nginx-php-7.0 4          [OK]
landinternet/ubuntu-16-nginx ubuntu-16-nginx 3          [OK]
landinternet/ubuntu-16-sshd ubuntu-16-sshd 1          [OK]
landinternet/ubuntu-16-php-7.1 ubuntu-16-php-7.1 1          [OK]
```

2-6. Cài đặt python, ipaddress, Wrapper, Xterm terminal

sudo apt install python3 pip

pip install ipaddress

sudo apt install build-essential

sudo apt install xterm

```

→ ~ python3 --version
Python 3.8.10
→ ~ pip install ipaddress
Requirement already satisfied: ipaddress in ~/.local/lib/python3.8/site-packages (1.0.23)
→ ~ sudo apt install build-essential
Reading package lists... Done
Building dependency tree
Reading state information... Done
build-essential is already the newest version (12.8ubuntu1.1).
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
→ ~ sudo apt install xterm
Reading package lists... Done
Building dependency tree
Reading state information... Done
xterm is already the newest version (353-1ubuntu1.20.04.2).
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
→ ~

```

7. Giải nén file zip đã tải về

`cd Downloads`

`unzip Kathara-0.36.1.zip`

```

→ ~ cd Downloads
→ Downloads ls
Kathara-0.36.1.zip  TLHT_HuongdanMMT_2019.pdf
→ Downloads unzip Kathara-0.36.1.zip
Archive: Kathara-0.36.1.zip
1d7c16eee7bd222b97f51dbb5ee64c0c70ae286f
  creating: Kathara-0.36.1/
  extracting: Kathara-0.36.1/.gitattributes
  creating: Kathara-0.36.1/.github/
  creating: Kathara-0.36.1/.github/ISSUE_TEMPLATE/
  inflating: Kathara-0.36.1/.github/ISSUE_TEMPLATE/bug_report.md
  inflating: Kathara-0.36.1/.github/ISSUE_TEMPLATE/feature_request.md
  inflating: Kathara-0.36.1/.gitignore
  inflating: Kathara-0.36.1/.gitmodules

```

8. Sao chép thư mục vừa giải nén vào /home. Đặt lại tên cho thư mục vừa sao chép được là *KatharaMMT*.

`cd ~`

`cp -r ~/Downloads/Kathara-0.36.1 ~/`

`mv Kathara-0.36.1 KatharaMMT`

```
→ Downloads cd ~
→ ~ cp -r ~/Downloads/Kathara-0.36.1 .
→ ~ ls
BaiTapMMT Desktop Documents Downloads Kathara-0.36.1 Music Pictures Public snap Templates Videos
→ ~ mv Kathara-0.36.1 KatharaMMT
→ ~ ls
BaiTapMMT Desktop Documents Downloads KatharaMMT Music Pictures Public snap Templates Videos
→ ~
```

9. Đặt biến môi trường cho *Kathara*

Do em sử dụng *Z Shell* (ZSH) nên các lệnh đặt biến được thêm vào cuối file `.zshrc`:

`vi ~/.zshrc`

Di chuyển đến cuối file và thêm 3 lệnh vào để đặt biến môi trường:

`export NETKIT_HOME=~/.KatharaMMT/bin`

`export PATH=$PATH:$NETKIT_HOME`

`export MANPATH=:$NETKIT_HOME/man`

```
# this, if it's already enabled in /etc/bash.bashrc and /etc/profile
# sources /etc/bash.bashrc).
if ! shopt -oq posix; then
  if [ -f /usr/share/bash-completion/bash_completion ]; then
    . /usr/share/bash-completion/bash_completion
  elif [ -f /etc/bash_completion ]; then
    . /etc/bash_completion
  fi
fi

# environment variable for kathara
export NETKIT_HOME=~/.KatharaMMT/bin
export PATH=$PATH:$NETKIT_HOME
export MANPATH=:$NETKIT_HOME/man
```

10. Thực thi các lệnh đã đưa vào file `.zshrc` và cài đặt *Kathara* lên *Docker*

`source ~/.zshrc`

`$NETKIT_HOME/install`

```
→ ~ vi ~/.zshrc
→ ~ source ~/.zshrc
→ ~ echo $NETKIT_HOME
/home/thuyyy/KatharaMMT/bin
→ ~ $NETKIT_HOME/install
[sudo] password for thuyyy:
Setting permissions
chattr: No such file or directory while trying to stat /home/thuyyy/KatharaMMT/bin/wrapper/bin/netkit_dw
Compiling netkit_dw
Pulling images
Using default tag: latest
latest: Pulling from kathara/netkit_base
fa77aded9814: Pull complete
5d1ecba15986: Pull complete
```


11. Kiểm tra thông tin ảnh đang được quản lí bởi *Docker*

`docker` images

```
→ ~ docker images
REPOSITORY          TAG         IMAGE ID      CREATED       SIZE
alpine               latest      14119a10abf4  2 days ago   5.6MB
hello-world          latest      d1165f221234  5 months ago 13.3kB
kathara/netkit_base  latest      90f86699ac62  2 years ago  824MB
→ ~
```

12. Khởi động máy ảo để thử nghiệm việc cài đặt

`vstart` -eth 0:A pc1

Khi khởi động máy ảo, terminal báo lỗi không tìm thấy thư viện *ipaddress* (ImportError: No module named ipaddress) nên em sao chép thư viện *ipaddress.py* vào trong thư mục python của *Kathara* và khởi động lại máy ảo:

`sudo cp ~/.local/lib/python3.8/ipaddress.py`
`~/KatharaMMT/bin/python`

`vstart` -eth 0:A pc1

```
→ ~ sudo cp ~/.local/lib/python3.8/site-packages/ipaddress.py ~/KatharaMMT/bin/python
[sudo] password for thuyyy:
→ ~ vstart --eth 0:A pc1
===== Starting Lab =====
01baa492e45b289bde4204c3be0da0e1298ae8a696193c1766724386d353f92c
Applying brctl patch to link 01baa492e45b
4d87156879aa544ccf26c03ba40f6b6853a46059d687011a8bc0f26fc9a6cab5
net.ipv4.conf.all.rp_filter = 0
net.ipv4.conf.default.rp_filter = 0
net.ipv4.conf.eth0.rp_filter = 0
net.ipv4.conf.lo.rp_filter = 0
netkit_1000_pc1
[~]
→ ~ - Warning: Cannot convert string "-adobe-helvetica-bold-r-normal--*-*-*-*-*-*-*-*-*-*" to type FontStruct
[~]
```

```
root@pc1:/#
```

13. Tắt và xóa máy ảo bằng lệnh `vclean`

`vclean` pc1

```
→ ~ vclean --eth 0:A pc1
Any network still in use by another machine will not be deleted (and will raise an error instead)
Containers will be deleted
netkit_1000_pc1
Please you started the lab with external.conf file, need root permission to clean current lab.
Networks will be deleted
netkit_1000_A
→ ~
```