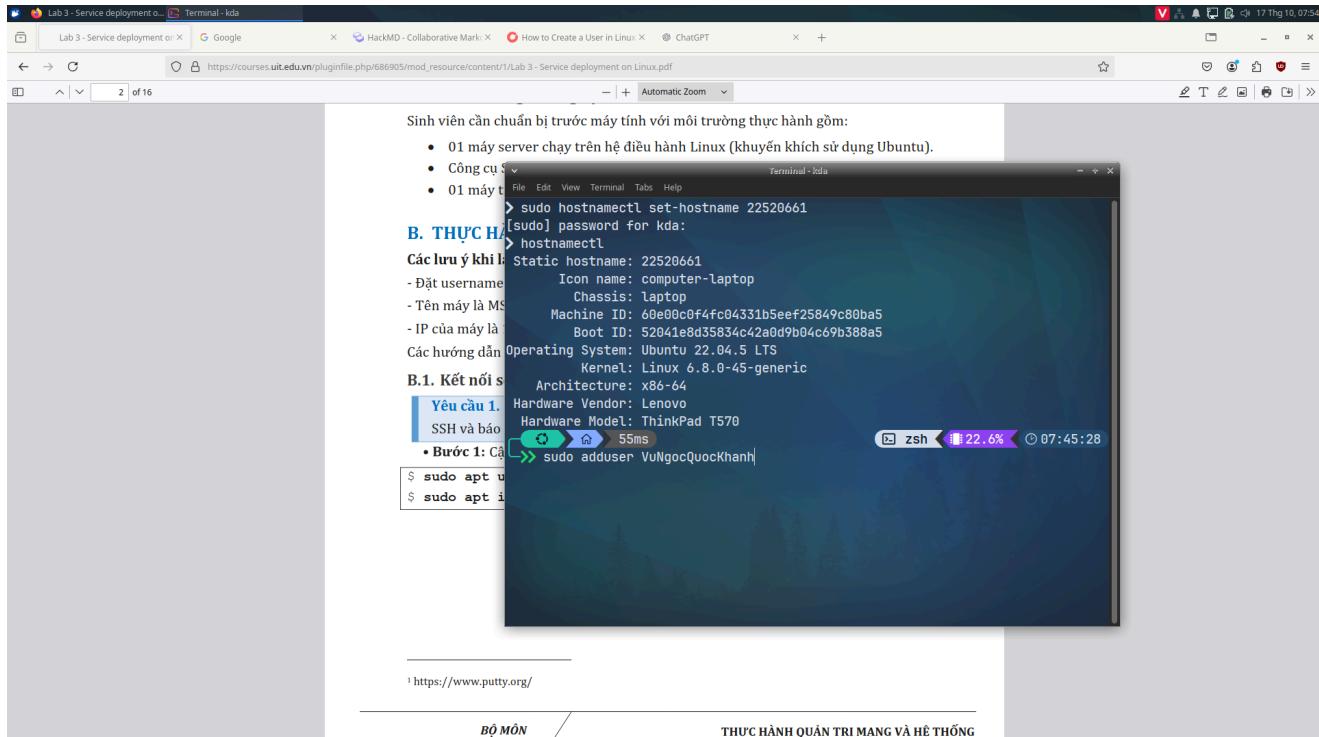
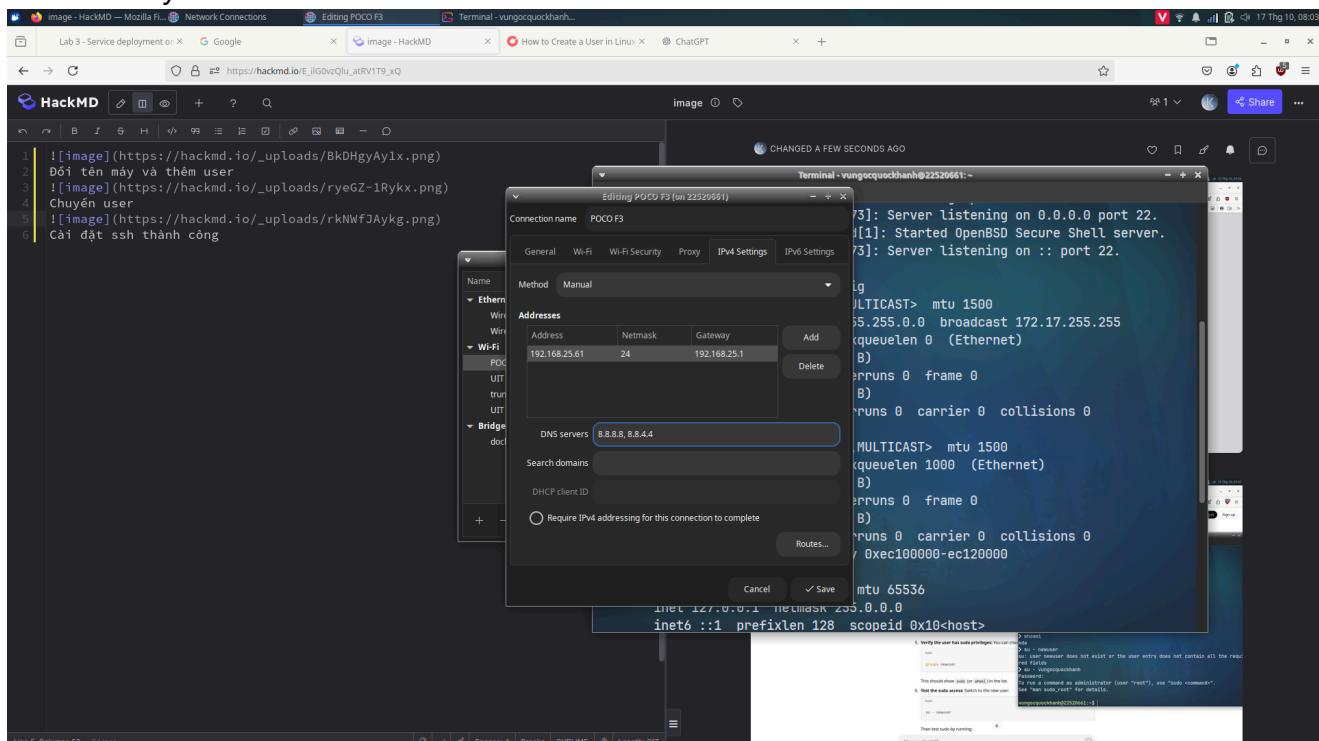


Lab 3 - Triển khai các dịch vụ trên Linux



Đổi tên máy và thêm user



Đổi ip

Chuyển user

```

1 
2 Đổi tên máy và thêm user
3 
Đổi ip
4 
Chuyển user
5 
Cài đặt ssh thành công
6 
Cài đặt apache2:
7 
Thiết lập tường lửa
8 
Kiểm tra dịch vụ apache2:
9 
Truy cập vào server:
10 
Sử dụng lệnh sudo mysql_secure_installation để cấu hình bảo mật:
11 
Thiết lập mật khẩu khi truy cập MySQL dưới quyền root
12 
Cài đặt các gói dịch vụ cần thiết với lệnh sudo apt install php
13 
Cấu hình cho Web server có thể upload file .PHP:
14 
Khởi động lại Apache để áp dụng các thay đổi bằng lệnh sudo systemctl restart apache2.service. Kiểm tra trạng thái hoạt động của Apache bằng lệnh sudo systemctl status apache2.service.
15 
Kiểm tra hoạt động của PHP trên server bằng cách tạo 1 file .php bất kỳ và truy cập:
16 
Truy cập vào server để kiểm tra file info.php:
17 
Cấu hình domain cho dịch vụ Web:
18 

```

Line 43, Columns 1 - 43 Lines

Cài đặt ssh thành công

```

1 
2 Đổi tên máy và thêm user
3 
Chuyển user
4 
vungocquochanh@22520661:~$ sudo systemctl status ssh
● ssh.service - OpenBSD Secure Shell server
  Loaded: loaded (/lib/systemd/system/ssh.service; enabled; vendor preset: enabled)
  Active: active (running) since Thu 2024-10-17 07:40:55 +07; 20min ago
    Docs: man:sshd(8)
          man:sshd_config(5)
  Process: 733 ExecStartPre=/usr/sbin/sshd -t (code=exited, status=0/SUCCESS)
 Main PID: 773 (sshd)
    Tasks: 1 (limit: 9095)
   Memory: 3.3M
      CPU: 41ms
     CGroup: /system.slice/ssh.service
             └─773 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"

Thg 10 17 07:40:55 thinkpad systemd[1]: Starting OpenBSD Secure Shell server...
Thg 10 17 07:40:55 thinkpad sshd[773]: Server listening on 0.0.0.0 port 22.
Thg 10 17 07:40:55 thinkpad systemd[1]: Started OpenBSD Secure Shell server.
Thg 10 17 07:40:55 thinkpad sshd[773]: Server listening on :: port 22.
lines 1-17/17 (END)

5 Verify the user has sudo privileges. You can do this by running:
6
7 1. Run 'sudo -l' to see what sudo entries exist for the user.
8 2. If no entries exist, run 'sudo visudo' and add an entry like:
9
10 #!/bin/sh
11
12 # User privilege requirements
13 %wheel        ALL=(ALL) ALL
14
15 # User privilege requirements
16 # User privilege requirements
17
18 This should allow sudo for wheel in the file.
19
20 3. Test the sudo access. Switch to the new user and run 'sudo whoami'.
21
22 vungocquochanh@22520661:~$
```

Line 4, Columns 12 -- 8 Lines

```
vungocquockhanh@22520661 ~ + - X
PS C:\Users\l1b1n> ssh vungocquockhanh@192.168.249.22 -p 22
The authenticity of host '192.168.249.22 (192.168.249.22)' can't be established.
ED25519 key fingerprint is SHA256:y9ypBhDTdF6nV7b7mJFzU/8vLM0VWIHKNtt+YlindrQ.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])?
PS C:\Users\l1b1n> ssh vungocquockhanh@192.168.25.61 -p 22
ssh: connect to host 192.168.25.61 port 22: Connection timed out
PS C:\Users\l1b1n> ssh vungocquockhanh@192.168.25.61 -p 22
ssh: connect to host 192.168.25.61 port 22: Connection timed out
PS C:\Users\l1b1n> ssh vungocquockhanh@192.168.249.22 -p 22
The authenticity of host '192.168.249.22 (192.168.249.22)' can't be established.
ED25519 key fingerprint is SHA256:y9ypBhDTdF6nV7b7mJFzU/8vLM0VWIHKNtt+YlindrQ.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '192.168.249.22' (ED25519) to the list of known hosts.
vungocquockhanh@192.168.249.22's password:
Welcome to Ubuntu 22.04.5 LTS (GNU/Linux 6.8.0-45-generic x86_64)

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

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

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

vungocquockhanh@22520661:~$ |
```

Cài đặt apache2:

```
vungocquockhanh@22520661 ~ + - X
com/ubuntu jammy-updates/caracal InRelease' doesn't support architecture 'i386'
vungocquockhanh@22520661:~$ sudo apt install apache2
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  libwpe-1.0-1 libwpebackend-fdo-1.0-1
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  apache2-bin apache2-data apache2-utils libapr1 libaprutil1 libaprutil1-dbd-sqlite3 libaprutil1-ldap liblua5.3-0
Suggested packages:
  apache2-doc apache2-suexec-pristine | apache2-suexec-custom
The following NEW packages will be installed:
  apache2 apache2-bin apache2-data apache2-utils libapr1 libaprutil1 libaprutil1-dbd-sqlite3 libaprutil1-ldap liblua5.3-0
0 upgraded, 9 newly installed, 0 to remove and 14 not upgraded.
Need to get 2.062 kB of archives.
After this operation, 8.234 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://vn.archive.ubuntu.com/ubuntu jammy-updates/main amd64 libapr1 amd64 1.7.0-8ubuntu0.22.04.2 [108 kB]
Get:2 http://vn.archive.ubuntu.com/ubuntu jammy-updates/main amd64 libaprutil1 amd64 1.6.1-5ubuntu4.22.04.2 [92,8 kB]
Get:3 http://vn.archive.ubuntu.com/ubuntu jammy-updates/main amd64 libaprutil1-dbd-sqlite3 amd64 1.6.1-5ubuntu4.22.04.2 [11,3 kB]
Get:4 http://vn.archive.ubuntu.com/ubuntu jammy-updates/main amd64 libaprutil1-ldap amd64 1.6.1-5ubuntu4.22.04.2 [9.170 kB]
Get:5 http://vn.archive.ubuntu.com/ubuntu jammy/main amd64 liblua5.3-0 amd64 5.3.6-1build1 [140 kB]
Get:6 http://vn.archive.ubuntu.com/ubuntu jammy-updates/main amd64 apache2-bin amd64 2.4.52-1ubuntu4.12 [1.348 kB]
Get:7 http://vn.archive.ubuntu.com/ubuntu jammy-updates/main amd64 apache2-data all 2.4.52-1ubuntu4.12 [165 kB]
Get:8 http://vn.archive.ubuntu.com/ubuntu jammy-updates/main amd64 apache2-utils amd64 2.4.52-1ubuntu4.12 [89,1 kB]
Get:9 http://vn.archive.ubuntu.com/ubuntu jammy-updates/main amd64 apache2 amd64 2.4.52-1ubuntu4.12 [97,9 kB]
```

Thiết lập tường lửa

```
vungocquockhanh@22520661:~$ sudo ufw enable
Command may disrupt existing ssh connections. Proceed with operation (y|n)? y
Firewall is active and enabled on system startup
vungocquockhanh@22520661:~$ sudo ufw allow ssh
Rule added
Rule added (v6)
vungocquockhanh@22520661:~$ sudo ufw allow http
Rule added
vungocquockhanh@22520661:~$ sudo ufw allow https
Rule added
Rule added (v6)
vungocquockhanh@22520661:~$ sudo ufw status
Status: active

To                         Action      From
--                         --          --
22/tcp                     ALLOW       Anywhere
80/tcp                     ALLOW       Anywhere
443                        ALLOW       Anywhere
22/tcp (v6)                ALLOW       Anywhere (v6)
80/tcp (v6)                ALLOW       Anywhere (v6)
443 (v6)                  ALLOW       Anywhere (v6)

vungocquockhanh@22520661:~$ |
```

LAMP/LEMP stack

LAMP/LEMP stack là nền tảng để hosting web gồm 4 lớp giải pháp hỗ trợ để phát triển web. Trong LAMP stack có:

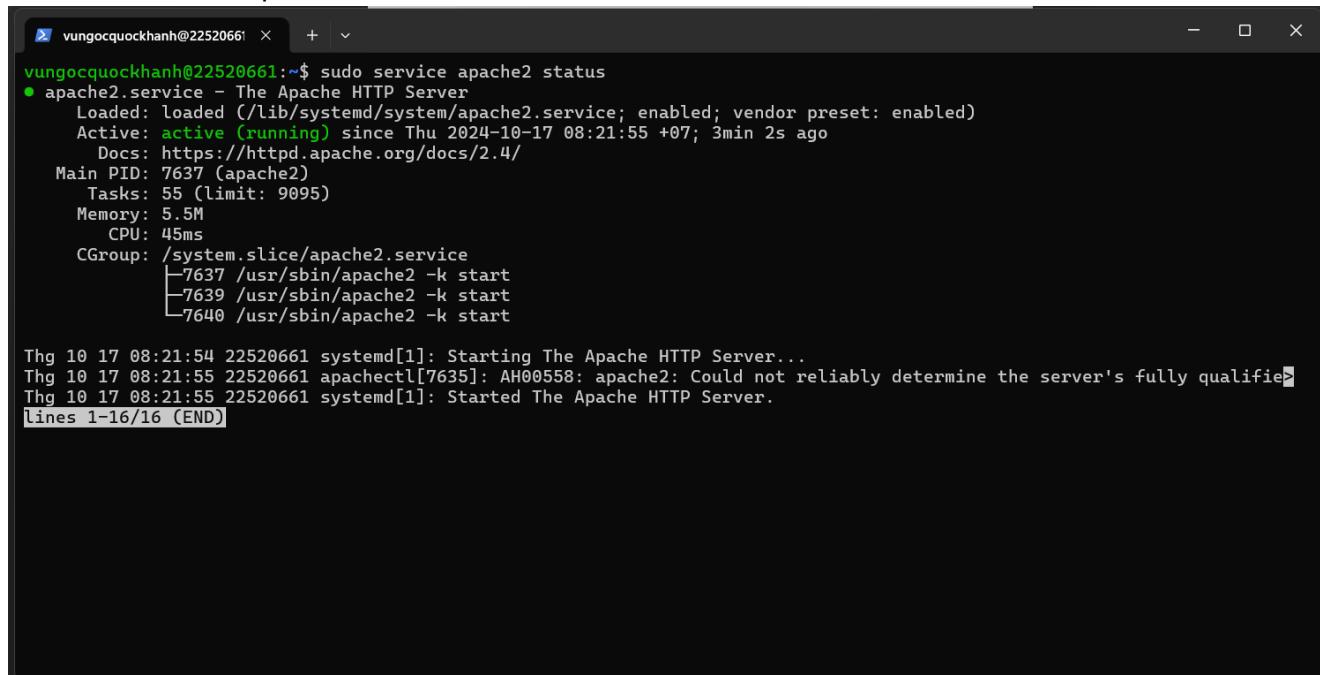
1. Linux: hệ điều hành để host web
2. Apache: Web server
3. MySQL: Hệ quản trị cơ sở dữ liệu
4. PHP: Ngôn ngữ để phát triển web.

LEMP stack tương tự như LAMP stack nhưng thay Apache thành Nginx (chữ A thành chữ E).

So sánh LAMP stack và LEMP stack

Sự khác nhau nằm ở web server được sử dụng là Apache hay Nginx. Nginx ra đời sau và giải quyết được các vấn đề của Apache, Nginx cũng nhanh hơn. Ngược lại Apache lại có các module để hỗ trợ phát triển web

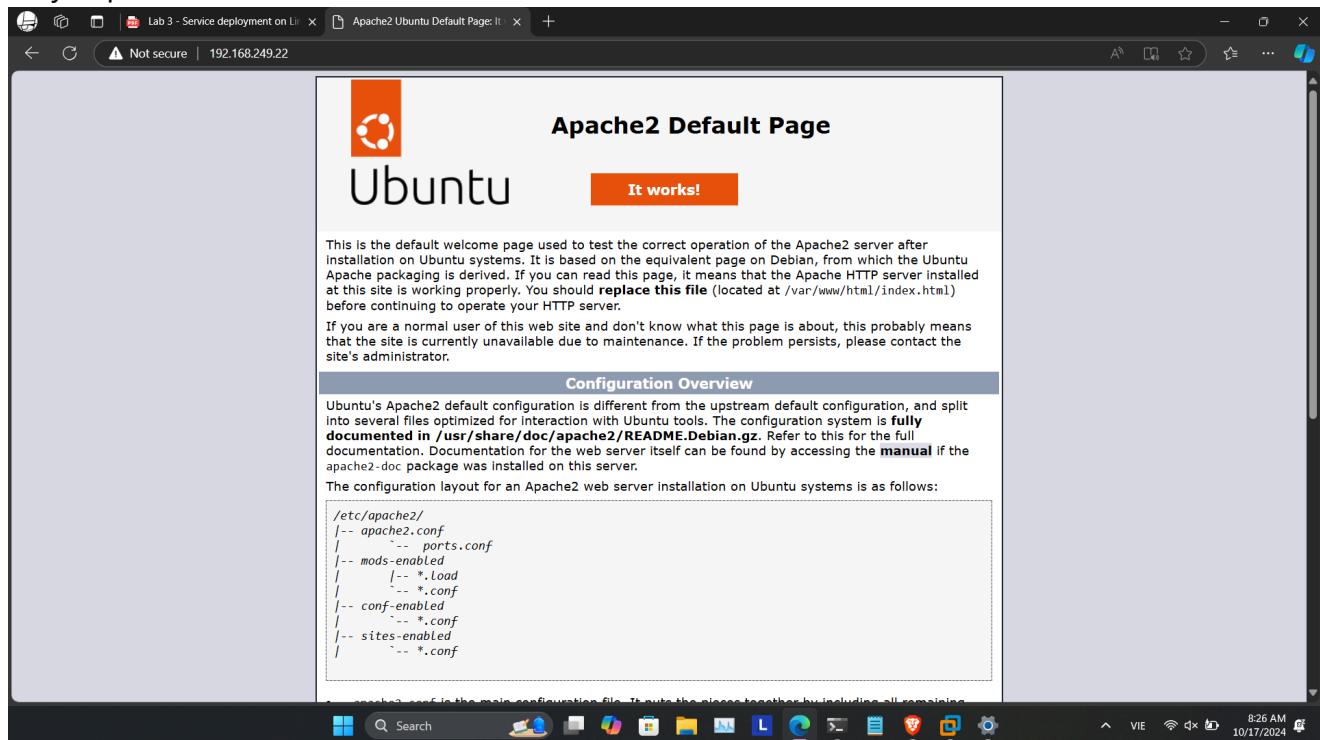
Kiểm tra dịch vụ apache2:



```
vungocquockhanh@22520661:~$ sudo service apache2 status
● apache2.service - The Apache HTTP Server
  Loaded: loaded (/lib/systemd/system/apache2.service; enabled; vendor preset: enabled)
  Active: active (running) since Thu 2024-10-17 08:21:55 +07; 3min 2s ago
    Docs: https://httpd.apache.org/docs/2.4/
   Main PID: 7637 (apache2)
      Tasks: 55 (limit: 9095)
     Memory: 5.5M
        CPU: 45ms
       CGroup: /system.slice/apache2.service
           └─7637 /usr/sbin/apache2 -k start
             ├─7639 /usr/sbin/apache2 -k start
             ├─7640 /usr/sbin/apache2 -k start
             └─7641 /usr/sbin/apache2 -k start

Thg 10 17 08:21:54 22520661 systemd[1]: Starting The Apache HTTP Server...
Thg 10 17 08:21:55 22520661 apachectl[7635]: AH00558: apache2: Could not reliably determine the server's fully qualified name, using 192.168.249.22 for Port 80
Thg 10 17 08:21:55 22520661 systemd[1]: Started The Apache HTTP Server.
lines 1-16/16 (END)
```

Truy cập vào server:



Sử dụng lệnh `sudo mysql_secure_installation` để cấu hình cho Mysql nhằm nâng cao tính bảo mật:

```
vungocquockhanh@22520661:~$ sudo mysql_secure_installation
Securing the MySQL server deployment.

Connecting to MySQL using a blank password.

VALIDATE PASSWORD COMPONENT can be used to test passwords
and improve security. It checks the strength of password
and allows the users to set only those passwords which are
secure enough. Would you like to setup VALIDATE PASSWORD component?

Press y|Y for Yes, any other key for No: Y

There are three levels of password validation policy:

LOW    Length >= 8
MEDIUM Length >= 8, numeric, mixed case, and special characters
STRONG Length >= 8, numeric, mixed case, special characters and dictionary      file

Please enter 0 = LOW, 1 = MEDIUM and 2 = STRONG: 0

Skipping password set for root as authentication with auth_socket is used by default.
If you would like to use password authentication instead, this can be done with the "ALTER_USER" command.
See https://dev.mysql.com/doc/refman/8.0/en/alter-user.html#alter-user-password-management for more information.

By default, a MySQL installation has an anonymous user,
allowing anyone to log into MySQL without having to have
a user account created for them. This is intended only for
testing, and to make the installation go a bit smoother.
You should remove them before moving into a production
environment.

Remove anonymous users? (Press y|Y for Yes, any other key for No) : No
... skipping.

Normally, root should only be allowed to connect from
'localhost'. This ensures that someone cannot guess at
the root password from the network.

8:29 AM 10/17/2024
```

Thiết lập mật khẩu khi truy cập MySQL dưới quyền root:

```
vungocquockhanh@22520661:~$ sudo mysql
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 10
Server version: 8.0.39-Ubuntu0.22.04.1 (Ubuntu)

Copyright (c) 2000, 2024, Oracle and/or its affiliates.

Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
owners.

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

mysql> ALTER USER root@localhost IDENTIFIED WITH mysql_native_password BY '123456';
ERROR 1819 (HY000): Your password does not satisfy the current policy requirements
mysql> ALTER USER root@localhost IDENTIFIED WITH mysql_native_password BY '12345678';
Query OK, 0 rows affected (0,01 sec)

mysql> FLUSH PRIVILEGES;
Query OK, 0 rows affected (0,01 sec)

mysql> exit;
Bye
vungocquockhanh@22520661:~$ |
```

Cài đặt các gói dịch vụ cần thiết với lệnh sudo apt install php libapache2-mod-php php-mysql.

```
vungocquockhanh@22520661:~$ sudo apt install php libapache2-mod-php php-mysql
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  libwpe-1.0-1 libwpebackend-fdo-1.0-1
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  libapache2-mod-php8.1 php-common php8.1 php8.1-cli php8.1-common php8.1-mysql php8.1-opcache php8.1-readline
Suggested packages:
  php-pear
The following NEW packages will be installed:
  libapache2-mod-php libapache2-mod-php8.1 php php-common php-mysql php8.1 php8.1-cli php8.1-common php8.1-mysql php8.1-opcache php8.1-readline
0 upgraded, 11 newly installed, 0 to remove and 14 not upgraded.
Need to get 5.264 kB of archives.
After this operation, 21,8 MB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://vn.archive.ubuntu.com/ubuntu jammy/main amd64 php-common all 2:92ubuntu1 [12,4 kB]
Get:2 http://vn.archive.ubuntu.com/ubuntu jammy-updates/main amd64 php8.1-common amd64 8.1.2-1ubuntu2.19 [1.127 kB]
Get:3 http://vn.archive.ubuntu.com/ubuntu jammy-updates/main amd64 php8.1-opcache amd64 8.1.2-1ubuntu2.19 [365 kB]
Get:4 http://vn.archive.ubuntu.com/ubuntu jammy-updates/main amd64 php8.1-readline amd64 8.1.2-1ubuntu2.19 [13,6 kB]
Get:5 http://vn.archive.ubuntu.com/ubuntu jammy-updates/main amd64 php8.1-cli amd64 8.1.2-1ubuntu2.19 [1.833 kB]
Get:6 http://vn.archive.ubuntu.com/ubuntu jammy-updates/main amd64 libapache2-mod-php8.1 amd64 8.1.2-1ubuntu2.19 [1.765 kB]
Get:7 http://vn.archive.ubuntu.com/ubuntu jammy/main amd64 libapache2-mod-php all 2:8.1+92ubuntu1 [2.898 B]
Get:8 http://vn.archive.ubuntu.com/ubuntu jammy-updates/main amd64 php8.1 all 8.1.2-1ubuntu2.19 [9.156 B]
Get:9 http://vn.archive.ubuntu.com/ubuntu jammy/main amd64 php all 2:8.1+92ubuntu1 [2.756 B]
Get:10 http://vn.archive.ubuntu.com/ubuntu jammy-updates/main amd64 php8.1-mysql amd64 8.1.2-1ubuntu2.19 [130 kB]
Get:11 http://vn.archive.ubuntu.com/ubuntu jammy/main amd64 php-mysql all 2:8.1+92ubuntu1 [1.834 B]
Fetched 5.264 kB in 25 (3.316 kB/s)
Selecting previously unselected package php-common.
(Reading database ... 220688 files and directories currently installed.)
Preparing to unpack .../00-php-common_2%a92ubuntu1_all.deb ...
Unpacking php-common (2:92ubuntu1) ...
Selecting previously unselected package php8.1-common.
Preparing to unpack .../01-php8.1-common_8.1.2-1ubuntu2.19_amd64.deb ...
Unpacking php8.1-common (8.1.2-1ubuntu2.19) ...
Selecting previously unselected package php8.1-opcache.
Preparing to unpack .../02-php8.1-opcache_8.1.2-1ubuntu2.19_amd64.deb ...
Unpacking php8.1-opcache (8.1.2-1ubuntu2.19) ...
Selecting previously unselected package php8.1-readline.
```

Cấu hình cho Web server có thể ưu tiên load file .PHP:

```
GNU nano 6.2                                     /etc/apache2/mods-enabled/dir.conf
<IfModule mod_dir.c>
  DirectoryIndex index.php index.html index.cgi index.pl index.php index.xhtml index.htm
</IfModule>

# vim: syntax=apache ts=4 sw=4 sts=4 sr noet
```

Khởi động lại Apache để áp dụng các thay đổi bằng lệnh sudo
 systemctl restart apache2.service. Kiểm tra trạng thái hoạt động của
 Apache bằng lệnh sudo systemctl status apache2.service.

```
vungocquockhanh@22520661:~$ sudo systemctl restart apache2.service
vungocquockhanh@22520661:~$ sudo systemctl status apache2.service
● apache2.service - The Apache HTTP Server
   Loaded: loaded (/lib/systemd/system/apache2.service; enabled; vendor preset: enabled)
   Active: active (running) since Thu 2024-10-17 08:38:34 +07; 11s ago
     Docs: https://httpd.apache.org/docs/2.4/
   Process: 16350 ExecStart=/usr/sbin/apachectl start (code=exited, status=0/SUCCESS)
 Main PID: 16356 (apache2)
    Tasks: 6 (limit: 9995)
   Memory: 10.5M
      CPU: 70ms
     CGroup: /system.slice/apache2.service
             ├─16356 /usr/sbin/apache2 -k start
             ├─16357 /usr/sbin/apache2 -k start
             ├─16358 /usr/sbin/apache2 -k start
             ├─16359 /usr/sbin/apache2 -k start
             ├─16360 /usr/sbin/apache2 -k start
             └─16361 /usr/sbin/apache2 -k start

Thg 10 17 08:38:34 22520661 systemd[1]: Starting The Apache HTTP Server...
Thg 10 17 08:38:34 22520661 apachectl[16355]: AH00558: apache2: Could not reliably determine the server's fully qualified domain name, using 1.87.163.85. S
Thg 10 17 08:38:34 22520661 systemd[1]: Started The Apache HTTP Server.
[lines 1-20/20 (END)]
```

Kiểm tra hoạt động của PHP trên server bằng cách tạo 1 file .php bất kỳ và kiểm tra truy cập:

```
GNU nano 6.2
/var/www/html/info.php
<?php
    phpinfo();
?>
```

Truy cập vào server để kiểm tra file info.php:

The screenshot shows a web browser window with the URL `192.168.249.22/info.php`. The page title is "PHP Version 8.1.2-1ubuntu2.19". The content is a table of PHP configuration settings. Key entries include:

System	Linux 22520681 6.8.0-45-generic #45~22.04.1-Ubuntu SMP PREEMPT_DYNAMIC Wed Sep 11 15:25:05 UTC 2024 x86_64
Build Date	Sep 30 2024 16:25:25
Build System	Linux
Server API	Apache 2.0 Handler
Virtual Directory Support	disabled
Configuration File (php.ini) Path	/etc/php/8.1/apache2
Loaded Configuration File	/etc/php/8.1/apache2/php.ini
Scan this dir for additional .ini files	/etc/php/8.1/apache2/conf.d
Additional .ini files parsed	/etc/php/8.1/apache2/conf.d/10_opencart.ini, /etc/php/8.1/apache2/conf.d/10_xdebug.ini, /etc/php/8.1/apache2/conf.d/20-calendario.ini, /etc/php/8.1/apache2/conf.d/20-pdo.ini, /etc/php/8.1/apache2/conf.d/20-type.ini, /etc/php/8.1/apache2/conf.d/20-ext.ini, /etc/php/8.1/apache2/conf.d/20-ftp.ini, /etc/php/8.1/apache2/conf.d/20-filinfo.ini, /etc/php/8.1/apache2/conf.d/20-iconv.ini, /etc/php/8.1/apache2/conf.d/20-gettext.ini, /etc/php/8.1/apache2/conf.d/20-conv.ini, /etc/php/8.1/apache2/conf.d/20-mysqli.ini, /etc/php/8.1/apache2/conf.d/20-pdo_mysql.ini, /etc/php/8.1/apache2/conf.d/20-pdo_dblib.ini, /etc/php/8.1/apache2/conf.d/20-pdo_odbc.ini, /etc/php/8.1/apache2/conf.d/20-pdo_pgsql.ini, /etc/php/8.1/apache2/conf.d/20-pdo_sqlite.ini, /etc/php/8.1/apache2/conf.d/20-shmop.ini, /etc/php/8.1/apache2/conf.d/20-sockets.ini, /etc/php/8.1/apache2/conf.d/20-sysvmsg.ini, /etc/php/8.1/apache2/conf.d/20-sysvsem.ini, /etc/php/8.1/apache2/conf.d/20-sysvshm.ini, /etc/php/8.1/apache2/conf.d/20-tokenizer.ini
PHP API	20210902
PHP Extension	20210902
Zend Extension	420210902
Zend Extension Build	API420210902,NTS
PHP Extension Build	API20210902,NTS
Debug Build	no
Thread Safety	disabled
Zend Signal Handling	enabled
Zend Memory Manager	enabled
Zend MultiByte Support	disabled
IPv6 Support	enabled
DTrace Support	available, disabled
Registered PHP Streams	https, ftps, compress.zlib, php, file, glob, data, http, ftp, phar

Cấu hình domain cho dịch vụ Web:

```
GNU nano 6.2
/etc/hosts
127.0.0.1 localhost
127.0.1.1 thinkpad
192.168.249.22 nhom13.local
# The following lines are desirable for IPv6 capable hosts
::1 ip6-localhost ip6-loopback
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters
```

Cấu hình HTTPS:

```
vungocquockhanh@22520661:~$ cat /etc/apache2/sites-enabled/000-default.conf
# <VirtualHost *:80>
#   # The ServerName directive sets the request scheme, hostname and port that
#   # the server uses to identify itself. This is used when creating
#   # redirection URLs. In the context of virtual hosts, the ServerName
#   # specifies what hostname must appear in the request's Host: header to
#   # match this virtual host. For the default virtual host (this file) this
#   # value is not decisive as it is used as a last resort host regardless.
#   # However, you must set it for any further virtual host explicitly.
#   #ServerName www.example.com

#   ServerAdmin webmaster@localhost
#   DocumentRoot /var/www/html

#   # Available loglevels: trace8, ..., trace1, debug, info, notice, warn,
#   # error, crit, alert, emerg.
#   # It is also possible to configure the loglevel for particular
#   # modules, e.g.
#   #LogLevel info ssl:warn

#   ErrorLog ${APACHE_LOG_DIR}/error.log
#   CustomLog ${APACHE_LOG_DIR}/access.log combined

#   # For most configuration files from conf-available/, which are
#   # enabled or disabled at a global level, it is possible to
#   # include a line for only one particular virtual host. For example the
#   # following line enables the CGI configuration for this host only
#   # after it has been globally disabled with "a2disconf".
#   #Include conf-available/serve-cgi-bin.conf
# </VirtualHost>

# # vim: syntax=apache ts=4 sw=4 sts=4 sr noet

<VirtualHost _default_:443>
    ServerAdmin webmaster@localhost
    DocumentRoot /var/www/html

    # Available loglevels: trace8, ..., trace1, debug, info, notice, warn,
    # error, crit, alert, emerg.
    # It is also possible to configure the loglevel for particular
```

```
DocumentRoot /var/www/html

# Available loglevels: trace8, ..., trace1, debug, info, notice, warn,
# error, crit, alert, emerg.
# It is also possible to configure the loglevel for particular
# modules, e.g.
#LogLevel info ssl:warn

ErrorLog ${APACHE_LOG_DIR}/error.log
CustomLog ${APACHE_LOG_DIR}/access.log combined

# For most configuration files from conf-available/, which are
# enabled or disabled at a global level, it is possible to
# include a line for only one particular virtual host. For example the
# following line enables the CGI configuration for this host only
# after it has been globally disabled with "a2disconf".
#Include conf-available/serve-cgi-bin.conf

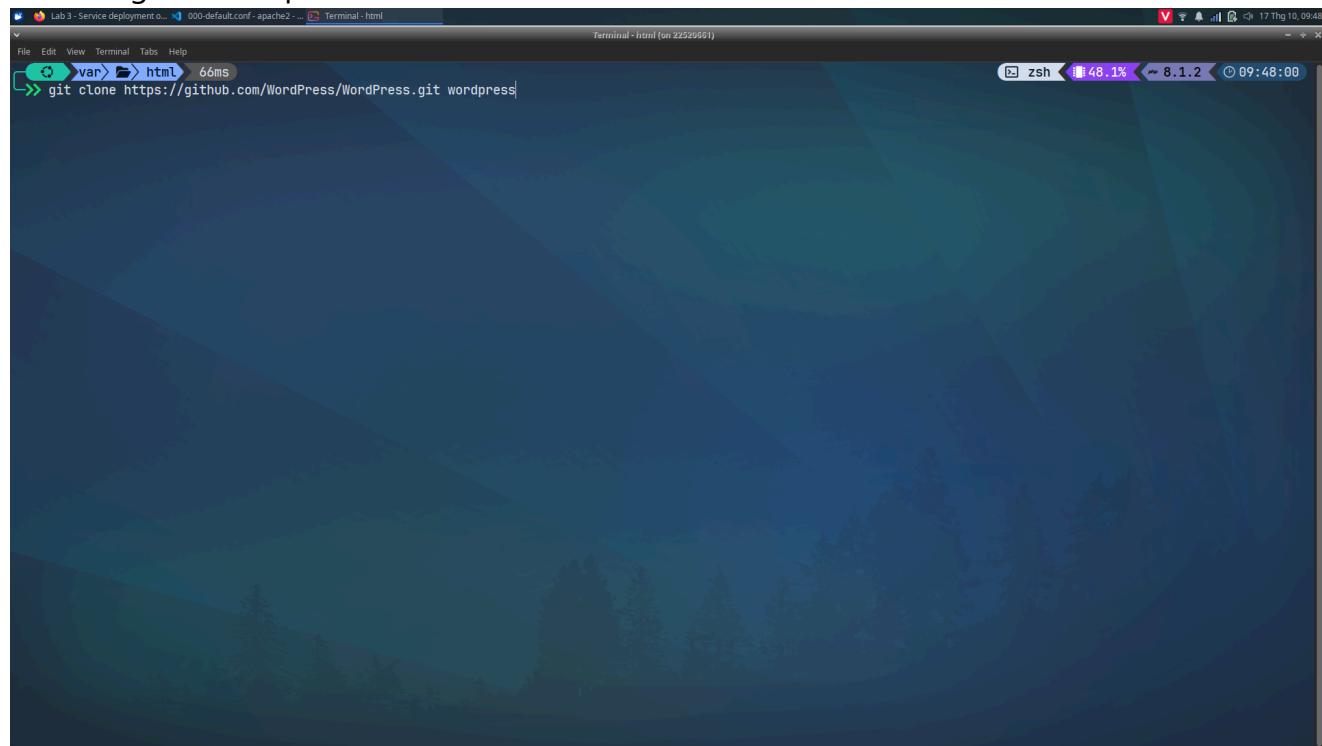
#   SSL Engine Switch:
#   # Enable/Disable SSL for this virtual host.
SSLEngine on

#   A self-signed (snakeoil) certificate can be created by installing
#   the ssl-cert package. See
#   /usr/share/doc/apache2/README.Debian.gz for more info.
#   If both key and certificate are stored in the same file, only the
#   SSLCertificateFile directive is needed.
SSLCertificateFile      /etc/ssl/certs/ssl-cert-snakeoil.pem
SSLCertificateKeyFile  /etc/ssl/private/ssl-cert-snakeoil.key

#   Server Certificate Chain:
#   Point SSLCertificateChainFile at a file containing the
#   concatenation of PEM encoded CA certificates which form the
#   certificate chain for the server certificate. Alternatively
#   the referenced file can be the same as SSLCertificateFile
#   when the CA certificates are directly appended to the server
#   certificate for convinience.
#SSLCertificateChainFile /etc/apache2/ssl.crt/server-ca.crt

#   Certificate Authority (CA):
```

Tải mã nguồn wordpress



The screenshot shows the Visual Studio Code interface with the Apache configuration file "000-default.conf" open in the editor. The code defines a virtual host for "nholm13.local" on port 443, serving files from "/var/www/html/wordpress". It includes SSL settings and log file configurations. The left sidebar shows the project structure under "APACHE2".

```
<VirtualHost *:443>
    ServerName nholm13.local
    #ServerAlias nholm13.local
    ServerAdmin webmaster@localhost

    DocumentRoot /var/www/html/wordpress

    # Available loglevels: trace0, ..., trace1, debug, info, notice, warn,
    # error, crit, alert, emerg.
    # It is also possible to configure the loglevel for particular
    # modules, e.g.
    #LogLevel info ssl:warn

    ErrorLog ${APACHE_LOG_DIR}/error.log
    CustomLog ${APACHE_LOG_DIR}/access.log combined

    # For most configuration files from conf-available/, which are
    # enabled or disabled at a global level, it is possible to
    # include a line for only one particular virtual host. For example the
    # following line enables the CGI configuration for this host only
    # after it has been globally disabled with "a2disconf".
    #Include conf-available/serve-cgi-bin.conf

    # SSL Engine Switch:
    #   Enable/Disable SSL for this virtual host.
    SSLEngine on

    # A self-signed (snakeoil) certificate can be created by installing
```

Welcome to WordPress. Before getting started, you will need to know the following items.

1. Database name
2. Database username
3. Database password
4. Database host
5. Table prefix (if you want to run more than one WordPress in a single database)

This information is being used to create a `wp-config.php` file. If for any reason this automatic file creation does not work, do not worry. All this does is fill in the database information to a configuration file. You may also simply open `wp-config-sample.php` in a text editor, fill in your information, and save it as `wp-config.php`. Need more help? [Read the support article on `wp-config.php`.](#)

In all likelihood, these items were supplied to you by your web host. If you do not have this information, then you will need to contact them before you can continue. If you are ready...

[Let's go!](#)

Welcome to WordPress!

Learn more about the 6.7 version.

Author rich content with blocks and patterns

Block patterns are pre-configured block layouts. Use them to get inspired or create new pages in a flash.

[Add a new page](#)

Customize your entire site with block themes

Design everything on your site — from the header down to the footer, all using blocks and patterns.

[Open site editor](#)

Switch up your site's look & feel with Styles

Tweak your site, or give it a whole new look! Get creative — how about a new color palette or font?

[Edit styles](#)

Site Health Status

No information yet...

Site health checks will automatically run periodically to gather information about your site. You can also [visit the Site Health screen](#) to gather information about your site now.

Quick Draft

Title

Content

Save Draft

Drag boxes here

Drag boxes here

At a Glance

1 Post 1 Page

1 Comment

WordPress 6.7-beta3-59244 running [Twenty Twenty-Five](#) theme.

Activity

Attend an upcoming event near you. [Select location](#)

Tạo user u1 và u2:

```
u1:x:1002:1002:,:/home/u1:/bin/bash
u2:x:1003:1003:,:/home/u2:/bin/bash
bind:x:124:136::/var/cache/bind:/usr/sbin/nologin
vunaoctauockhanh@22520661:~$ |
```

Tạo thư mục folder1, phân quyền đọc ghi cho u1, chặn mọi quyền của nhóm và user khác trên folder1. Sử dụng lệnh ls -l để kiểm tra:

Tạo thư mục folder2, phân quyền đọc ghi cho u2 và nhóm u2, chặn mọi quyền từ user khác trên folder2. Sử dụng lệnh ls -l để kiểm tra:

```
vungocquockhanh@22520661:/tmp$ ls -l
total 3676
-rw----- 1 kda  kda      0 Thg 10 17 07:41 config-err-pV9fg7
drwx----- 2 u1    u1      4096 Thg 10 17 10:19 folder1
drwxrwx--- 2 u2    u2      4096 Thg 10 17 10:20 folder2
```

Đăng nhập vào user u1 bằng lệnh su u1. Truy cập và tạo file trong folder1 và folder2 để xem kết quả:

```
u1@22520661:/tmp$ cd folder1
u1@22520661:/tmp/folder1$ ls -l
total 4
-rw-rw-r-- 1 u1 u1 6 Thg 10 22 12:15 test.txt
u1@22520661:/tmp/folder1$ cd ../folder2
u1@22520661:/tmp/folder2$ ls -l
total 4
-rw-rw-r-- 1 u1 u1 7 Thg 10 22 12:16 test.txt
u1@22520661:/tmp/folder2$ |
```

Netspeed

```
#!/bin/bash

# Kiểm tra xem người dùng đã cung cấp interface chưa
if [ -z "$1" ]; then
    echo "Vui lòng cung cấp tên interface. Ví dụ: ./net_speed.sh eth0"
    exit 1
fi

# Interface cần theo dõi
INTERFACE=$1

# Hàm lấy số byte gửi và nhận
get_bytes() {
    cat /sys/class/net/$INTERFACE/statistics/tx_bytes # Số byte gửi
    cat /sys/class/net/$INTERFACE/statistics/rx_bytes # Số byte nhận
}
while true; do
# Lấy số byte ban đầu
TX1=$(get_bytes | head -n 1)
RX1=$(get_bytes | tail -n 1)

# Thời gian chờ (2 giây)
sleep 2
```

```
# Lấy số byte sau khi đợi
TX2=$(get_bytes | head -n 1)
RX2=$(get_bytes | tail -n 1)

# Tính tốc độ (số byte đã chuyển trong 2 giây)
TX_RATE=$(expr $((TX2 - TX1)) / 2) # Tốc độ gửi (byte/giây)
RX_RATE=$(expr $((RX2 - RX1)) / 2) # Tốc độ nhận (byte/giây)

# Hiển thị kết quả
echo "Tốc độ gửi: $TX_RATE B/s"
echo "Tốc độ nhận: $RX_RATE B/s"
done
```

The screenshot shows a terminal window with a dark background and light-colored text. The title bar reads "vungocquockhanh@2252066: ~/Lab3\$". The command entered is ". ./net_speed.sh wlp4s0". The output of the script is displayed below:

```
Tốc độ gửi: 0 B/s
Tốc độ nhận: 0 B/s
Tốc độ gửi: 0 B/s
Tốc độ nhận: 0 B/s
Tốc độ gửi: 303 B/s
Tốc độ nhận: 85 B/s
Tốc độ gửi: 0 B/s
Tốc độ nhận: 0 B/s
Tốc độ gửi: 53 B/s
Tốc độ nhận: 43 B/s
Tốc độ gửi: 0 B/s
Tốc độ nhận: 0 B/s
Tốc độ gửi: 0 B/s
Tốc độ nhận: 0 B/s
Tốc độ gửi: 57 B/s
Tốc độ nhận: 39 B/s
Tốc độ gửi: 0 B/s
Tốc độ nhận: 0 B/s
Tốc độ gửi: 0 B/s
Tốc độ nhận: 0 B/s
Tốc độ gửi: 0 B/s
Tốc độ nhận: 0 B/s
```