Documentation

A Individual Component

1. Create a new Virtual machine for assignment

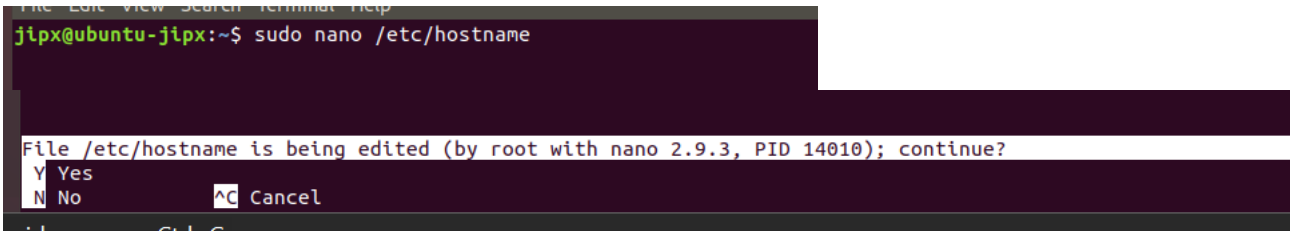
hostname: p*****

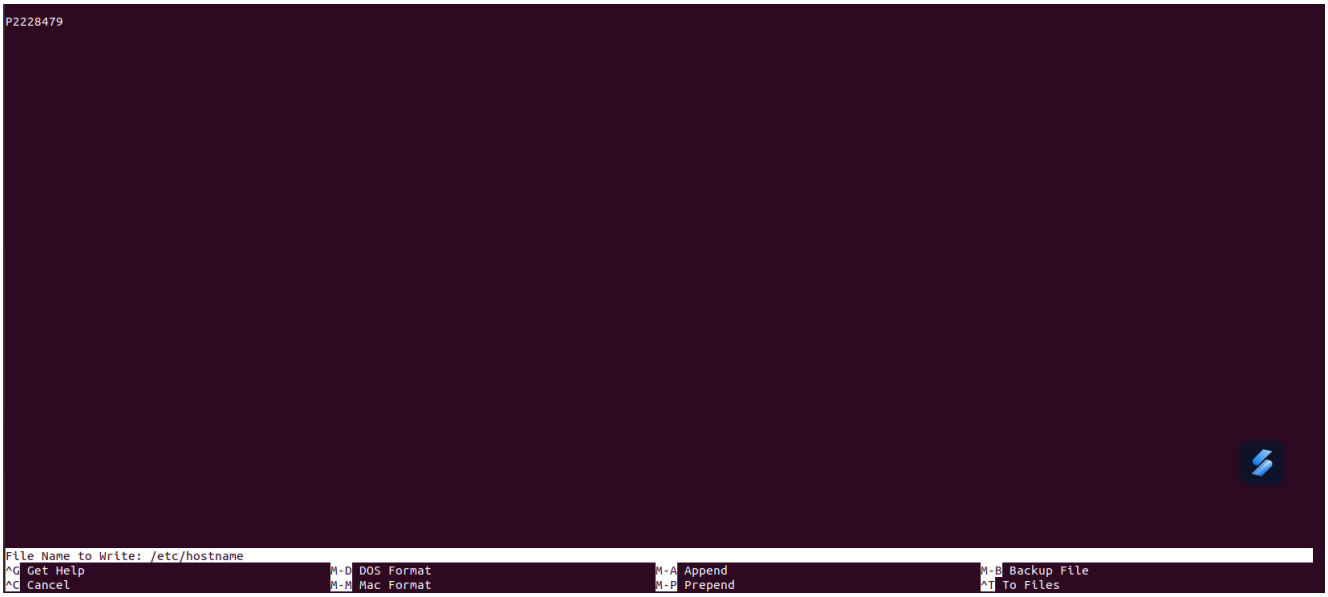
Where p***** is your student admission number**

Resource: *You can use the image provided in Practical 09 Linux Quick Tour (PoliteMall: Learning Resources -> Topic 6: Overview of the Linux Operating System -> Practical 09 Linux Quick Tour ->* ***ubuntu1.7z****)*

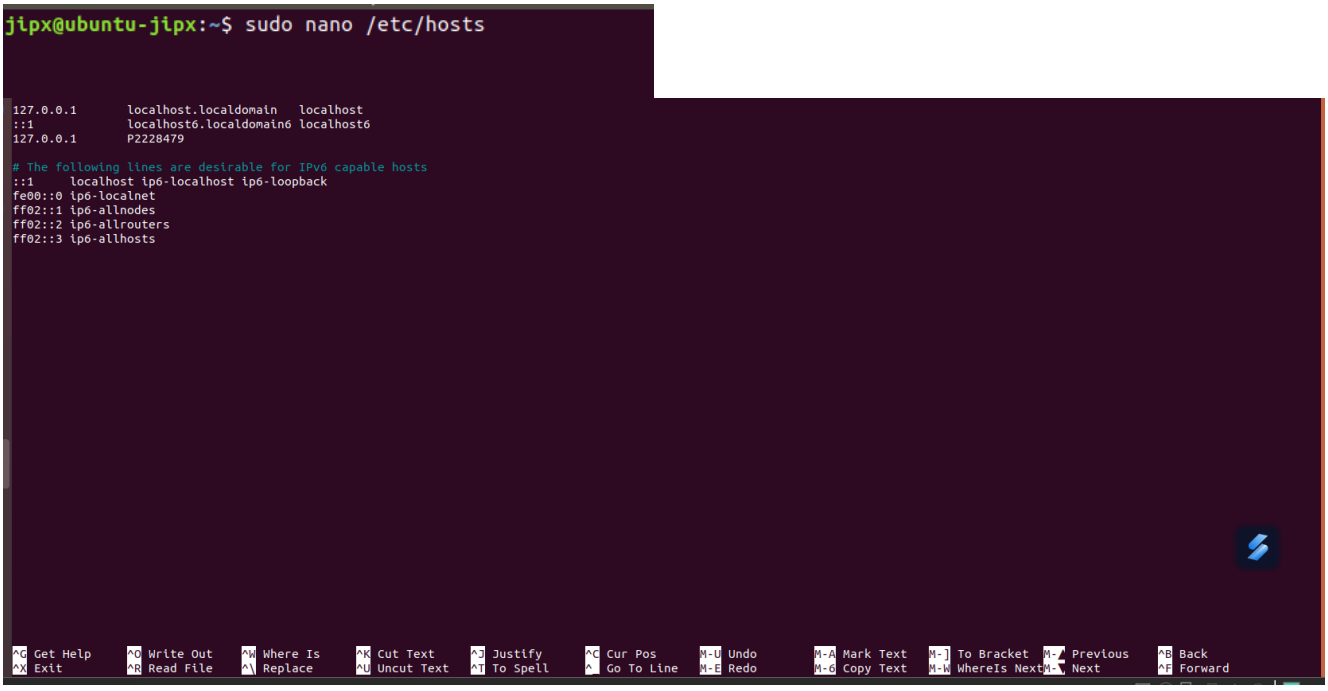
To change the name permanently, run command to edit the host files

1. *For Ubuntu server without a GUI, run sudo nano /etc/hostname*
2. CTRL 0 AND ENTER TO SAVE AND CTRLX EXIT





Run sudo nano /etc/hosts



2. Install Apache web server, PHP and Mysql server

- Apache service should be started automatically after system boot.
- Mysql service need to be manually started after system boot.

Install Apache web server

Run sudo apt-get update

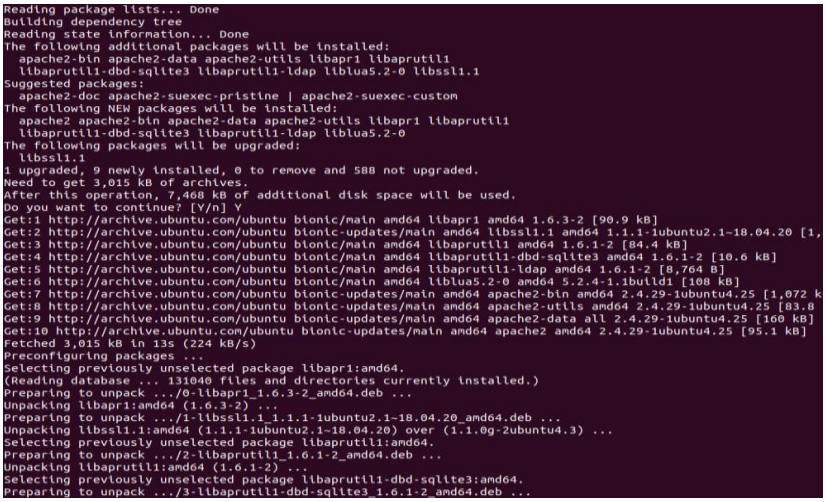
```
jipx@P2228479:~$  sudo apt-get update
[sudo] password for jipx:
Hit:1 http://archive.ubuntu.com/ubuntu bionic InRelease
Get:2 http://archive.ubuntu.com/ubuntu bionic-updates InRelease [88.7 kB]
Get:3 http://archive.ubuntu.com/ubuntu bionic-backports InRelease [74.6 kB]
Get:4 http://archive.ubuntu.com/ubuntu bionic-security InRelease [88.7 kB]
Get:5 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 Packages [2,706
 kB]
Get:6 http://archive.ubuntu.com/ubuntu bionic-updates/main Translation-en [500 k
B]
Get:7 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 DEP-11 Metadata
 [297 kB]
Get:8 http://archive.ubuntu.com/ubuntu bionic-updates/restricted amd64 Packages
[889 kB]
Get:9 http://archive.ubuntu.com/ubuntu bionic-updates/restricted Translation-en
[123 kB]
Get:10 http://archive.ubuntu.com/ubuntu bionic-updates/universe amd64 Packages [
1,836 kB]
Get:11 http://archive.ubuntu.com/ubuntu bionic-updates/universe Translation-en [
398 kB]
Get:12 http://archive.ubuntu.com/ubuntu bionic-updates/universe amd64 DEP-11 Met
adata [302 kB]
Get:13 http://archive.ubuntu.com/ubuntu bionic-updates/multiverse amd64 Packages
 [24.9 kB]
```

restart after this with sudo reboot

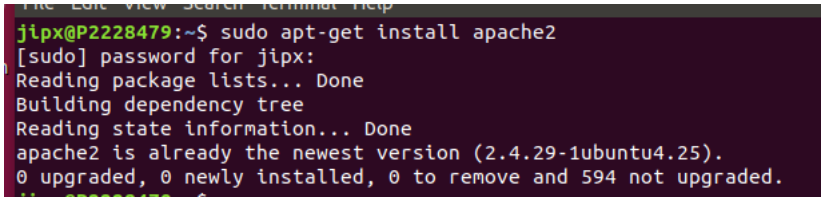
```
jipx@P2228479:~$ sudo reboot
```

Install apache2

sudo apt-get install apache2



To show command was run

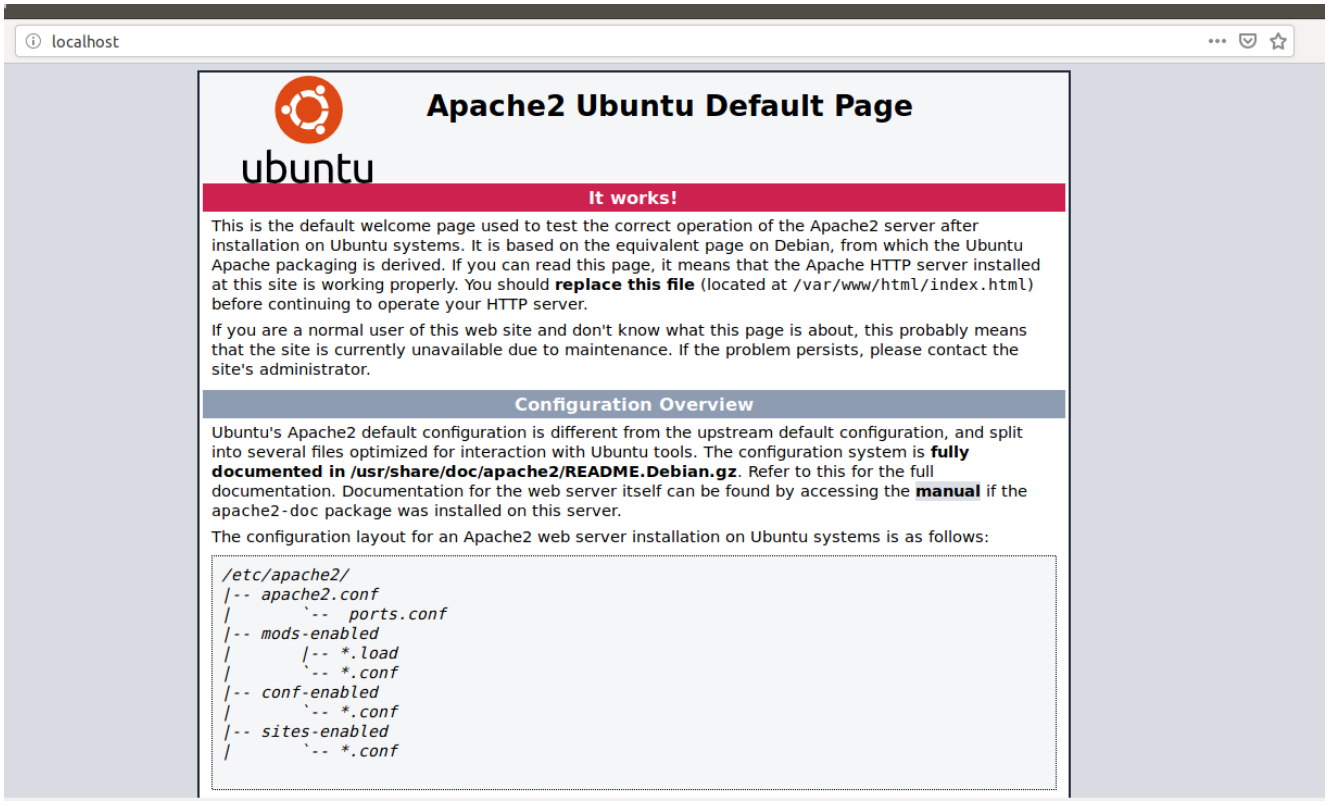


sudo systemctl status apache2 to see if apache 2 installed

```
jipx@P2228479:~$ sudo systemctl status apache2
[sudo] password for jipx:
● apache2.service - The Apache HTTP Server
   Loaded: loaded (/lib/systemd/system/apache2.service; enabled; vendor preset:
  Drop-In: /lib/systemd/system/apache2.service.d
           └─apache2-systemd.conf
   Active: active (running) since Thu 2022-07-28 16:29:00 UTC; 1min 36s ago
  Process: 1125 ExecStart=/usr/sbin/apachectl start (code=exited, status=0/SUCCE
 Main PID: 1197 (apache2)
    Tasks: 6 (limit: 2286)
   CGroup: /system.slice/apache2.service
           ├─1197 /usr/sbin/apache2 -k start
           ├─1201 /usr/sbin/apache2 -k start
           ├─1202 /usr/sbin/apache2 -k start
           ├─1203 /usr/sbin/apache2 -k start
           ├─1204 /usr/sbin/apache2 -k start
           └─1205 /usr/sbin/apache2 -k start

Jul 28 16:28:58 P2228479 systemd[1]: Starting The Apache HTTP Server...
Jul 28 16:29:00 P2228479 systemd[1]: Started The Apache HTTP Server.
lines 1-18/18 (END)
```

search http://localhost to check if apache2 is installed



- *To install PHP and all required PHP extensions, run the following command:*

sudo apt install php7.2 php7.2-cli php7.2-mysql php7.2-json php7.2-opcache php7.2-mbstring php7.2-xml php7.2-gd php7.2-curl

```
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  libapache2-mod-php7.2 php-common php7.2-common php7.2-readline
Suggested packages:
  php-pear
The following NEW packages will be installed:
  libapache2-mod-php7.2 php-common php7.2 php7.2-cli php7.2-common php7.2-curl php7.2-gd php7.2-json php7.2-mbstring php7.2-my
0 upgraded, 13 newly installed, 0 to remove and 588 not upgraded.
Need to get 4,633 kB of archives.
After this operation, 20.0 MB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://archive.ubuntu.com/ubuntu bionic/main amd64 php-common all 1:60ubuntu1 [12.1 kB]
Get:2 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 php7.2-common amd64 7.2.24-0ubuntu0.18.04.13 [890 kB]
Get:3 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 php7.2-json amd64 7.2.24-0ubuntu0.18.04.13 [18.9 kB]
Get:4 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 php7.2-opcache amd64 7.2.24-0ubuntu0.18.04.13 [165 kB]
Get:5 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 php7.2-readline amd64 7.2.24-0ubuntu0.18.04.13 [12.2 kB]
Get:6 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 php7.2-cli amd64 7.2.24-0ubuntu0.18.04.13 [1,409 kB]
Get:7 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 libapache2-mod-php7.2 amd64 7.2.24-0ubuntu0.18.04.13 [1,352 k
Get:8 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 php7.2 all 7.2.24-0ubuntu0.18.04.13 [9,244 B]
Get:9 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 php7.2-curl amd64 7.2.24-0ubuntu0.18.04.13 [28.8 kB]
Get:10 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 php7.2-gd amd64 7.2.24-0ubuntu0.18.04.13 [27.2 kB]
Get:11 http://archive.ubuntu.com/ubuntu bionic-updates/universe amd64 php7.2-mbstring amd64 7.2.24-0ubuntu0.18.04.13 [483 kB]
Get:12 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 php7.2-mysql amd64 7.2.24-0ubuntu0.18.04.13 [117 kB]
Get:13 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 php7.2-xml amd64 7.2.24-0ubuntu0.18.04.13 [107 kB]
Fetched 4,633 kB in 1s (304 kB/s)
Selecting previously unselected package php-common.
(Reading database ... 131747 files and directories currently installed.)
Preparing to unpack .../00-php-common_1%3a60ubuntu1_all.deb ...
Unpacking php-common (1:60ubuntu1) ...
Selecting previously unselected package php7.2-common.
Preparing to unpack .../01-php7.2-common_7.2.24-0ubuntu0.18.04.13_amd64.deb ...
Unpacking php7.2-common (7.2.24-0ubuntu0.18.04.13) ...
Selecting previously unselected package php7.2-json.
Preparing to unpack .../02-php7.2-json_7.2.24-0ubuntu0.18.04.13_amd64.deb ...
Unpacking php7.2-json (7.2.24-0ubuntu0.18.04.13) ...
Selecting previously unselected package php7.2-opcache.
Preparing to unpack .../03-php7.2-opcache_7.2.24-0ubuntu0.18.04.13_amd64.deb ...
Unpacking php7.2-opcache (7.2.24-0ubuntu0.18.04.13) ...
```

To show command was run

```
jipx@P2228479:~$ sudo apt install php7.2 php7.2-cli php7.2-mysql php7.2-json php
7.2-opcache php7.2-mbstring php7.2-xml php7.2-gd php7.2-curl
Reading package lists... Done
Building dependency tree
Reading state information... Done
php7.2 is already the newest version (7.2.24-0ubuntu0.18.04.13).
php7.2-cli is already the newest version (7.2.24-0ubuntu0.18.04.13).
php7.2-curl is already the newest version (7.2.24-0ubuntu0.18.04.13).
php7.2-gd is already the newest version (7.2.24-0ubuntu0.18.04.13).
php7.2-json is already the newest version (7.2.24-0ubuntu0.18.04.13).
php7.2-mysql is already the newest version (7.2.24-0ubuntu0.18.04.13).
php7.2-opcache is already the newest version (7.2.24-0ubuntu0.18.04.13).
php7.2-xml is already the newest version (7.2.24-0ubuntu0.18.04.13).
php7.2-mbstring is already the newest version (7.2.24-0ubuntu0.18.04.13).
```

To check if php installed run php -v

```
php-v: command not found
jipx@P2228479:~$ php -v
PHP 7.2.24-0ubuntu0.18.04.13 (cli) (built: Jul  6 2022 12:23:22) ( NTS )
Copyright (c) 1997-2018 The PHP Group
Zend Engine v3.2.0, Copyright (c) 1998-2018 Zend Technologies
    with Zend OPcache v7.2.24-0ubuntu0.18.04.13, Copyright (c) 1999-2018, by Zen
d Technologies
```

Install Mysql server

1. sudo apt install mysql-server

```
jipx@P2228479:~$ sudo apt install mysql-server
[sudo] password for jipx:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  libaio1 libevent-core-2.1-6 libhtml-template-perl mysql-client-5.7
  mysql-client-core-5.7 mysql-common mysql-server-5.7 mysql-server-core-5.7
Suggested packages:
  libipc-sharedcache-perl mailx tinyca
The following NEW packages will be installed:
  libaio1 libevent-core-2.1-6 libhtml-template-perl mysql-client-5.7
  mysql-client-core-5.7 mysql-common mysql-server mysql-server-5.7
  mysql-server-core-5.7
0 upgraded, 9 newly installed, 0 to remove and 588 not upgraded.
Need to get 19.1 MB of archives.
After this operation, 154 MB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://archive.ubuntu.com/ubuntu bionic/main amd64 mysql-common all 5.8+1.
0.4 [7,308 B]
Get:2 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 libaio1 amd64 0
.3.110-5ubuntu0.1 [6,476 B]
Get:3 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 mysql-client-co
re-5.7 amd64 5.7.38-0ubuntu0.18.04.1 [6,632 kB]
```

check status : sudo systemctl status mysql

- press q to exit, after this do sudo shutdown now

```
jipx@P2228479:~$ sudo systemctl status mysql
● mysql.service - MySQL Community Server
   Loaded: loaded (/lib/systemd/system/mysql.service; enabled; vendor preset: en
   Active: active (running) since Sun 2022-07-24 07:42:44 UTC; 1min 57s ago
 Main PID: 3011 (mysqld)
    Tasks: 27 (limit: 2286)
   CGroup: /system.slice/mysql.service
           └─3011 /usr/sbin/mysqld --daemonize --pid-file=/run/mysqld/mysqld.pid

Jul 24 07:42:44 P2228479 systemd[1]: Starting MySQL Community Server...
Jul 24 07:42:44 P2228479 systemd[1]: Started MySQL Community Server.
lines 1-10/10 (END)
```

3.Create users Groups and Permissions

Group: sysadmin (with 2 users) Manage Ubuntu server
webdev (with 2 users) Update contents for Wordpress Web site

After you have created the above groups, you need to set proper permissions for group members to access the resources, using the **LEAST Privilege**.

Sample for reference only:

Users	groups		Tasks to do
sysadminuser1	sysadmin	**sudo**	Manage Ubuntu server, for example, start/stop server, install/update/remove package
sysadminuser2	sysadmin	**sudo**	
webdevuser1	webdev		Update contents for Wordpress Web site in the web site root directory
webdevuser2	webdev		

Add users.
alternative : sudo adduser username

Done 4 times for all user (type all 4)

```
jipx@P2228479:~$ sudo adduser sysadminuser1
[sudo] password for jipx:
Adding user `sysadminuser1' ...
Adding new group `sysadminuser1' (1001) ...
Adding new user `sysadminuser1' (1001) with group `sysadminuser1' ...
Creating home directory `/home/sysadminuser1' ...
Copying files from `/etc/skel' ...
Enter new UNIX password:
Retype new UNIX password:
passwd: password updated successfully
Changing the user information for sysadminuser1
Enter the new value, or press ENTER for the default
        Full Name []:
        Room Number []:
        Work Phone []:
        Home Phone []:
        Other []:
Is the information correct? [Y/n] Y
jipx@P2228479:~$
```

Check if the accounts has been created: cat /etc/passwd

```
sysadminuser1:x:1001:1001:,,,:/home/sysadminuser1:/bin/bash
sysadminuser2:x:1002:1002:,,,:/home/sysadminuser2:/bin/bash
webdevuser1:x:1003:1003:,,,:/home/webdevuser1:/bin/bash
webdevuser2:x:1004:1004:,,,:/home/webdevuser2:/bin/bash
```

Add group
alternative :sudo addgroup groupname

sudo addgroup sysadmin / web dev

```
jipx@P2228479:~$ sudo addgroup sysadmin
Adding group `sysadmin' (GID 1005) ...
Done.
jipx@P2228479:~$ sudo addgroup webdev
Adding group `webdev' (GID 1006) ...
Done.
```

To check the created group use cat /ect/grou

```
sysadmin:x:1005:
webdev:x:1006:
```

To add a user to a group : sudo usermod -aG groupname username
sudo usermod -aG sysadmin sysadminuser1 (will show blank then user id username)

```
jipx@P2228479:~$
jipx@P2228479:~$ sudo usermod -aG sysadmin sysadminuser1
jipx@P2228479:~$ sudo usermod -aG sysadmin sysadminuser2
jipx@P2228479:~$ sudo usermod -aG webdev webdevuser1
jipx@P2228479:~$ sudo usermod -aG webdev webdevuser1
jipx@P2228479:~$ sudo usermod -aG webdev webdevuser2
jipx@P2228479:~$
```

Id sysaadmineuser1 (username) to check

```
jipx@P2228479:~$ id sysadminuser1
uid=1001(sysadminuser1) gid=1001(sysadminuser1) groups=1001(sysadminuser1),1005(
sysadmin)
jipx@P2228479:~$ id sysadminuser2
uid=1002(sysadminuser2) gid=1002(sysadminuser2) groups=1002(sysadminuser2),1005(
sysadmin)
jipx@P2228479:~$ id webdevuser1
uid=1003(webdevuser1) gid=1003(webdevuser1) groups=1003(webdevuser1),1006(webdev
)
jipx@P2228479:~$ id webdevuser2
uid=1004(webdevuser2) gid=1004(webdevuser2) groups=1004(webdevuser2),1006(webdev
)
jipx@P2228479:~$
```

4.Install, Configure and Monitor Wordpress Web site

- Your root document for Wordpress Web site: /var/www/html/p*******
- Configure Apache web server to set the document root to /var/www/html/p*******
- Set proper permission for **www-data** system user, as well as webdev
- Create a database user in mysql server for PHP application to access mysql server, and assign proper rightsUser name: **wordpress-user-p*******
  Mysql database name for Wordpress: wordpress-db-p*******

Download and unzip the WordPress installation package

Download the latest WordPress installation package with the **wget** command. The following command should always download the latest release.

```
$ wget https://wordpress.org/latest.tar.gz
```

```
jipx@P2228479:~$ wget https://wordpress.org/latest.tar.gz
--2022-07-31 08:00:54--  https://wordpress.org/latest.tar.gz
Resolving wordpress.org (wordpress.org)... 198.143.164.252
Connecting to wordpress.org (wordpress.org)|198.143.164.252|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 21171263 (20M) [application/octet-stream]
Saving to: 'latest.tar.gz'

latest.tar.gz       100%[===================>]  20.19M  5.68MB/s    in 3.6s

2022-07-31 08:00:59 (5.68 MB/s) - 'latest.tar.gz' saved [21171263/21171263]

jipx@P2228479:~$
```

Unzip and unarchive the installation package. The installation folder is unzipped to a folder called wordpress. Then use ls to list

```
$ tar -xzf latest.tar.gz
```

```
jipx@P2228479:~$ tar -xzf latest.tar.gz
jipx@P2228479:~$ ls
Desktop     Downloads      Music     Public          Templates  wordpress
Documents   latest.tar.gz  Pictures  resultSmtp.txt  Videos
jipx@P2228479:~$
```

To create and edit the wp-config.php file

.Copy the wp-config-sample.phpfile to a file called wp-config.php. This creates a new configuration file and keeps the original sample file intact as a backup.

```
cp wordpress/wp-config-sample.php wordpress/wp-config.php
```

```
jipx@P2228479:~$ cp wordpress/wp-config-sample.php wordpress/wp-config.php
jipx@P2228479:~$ ls
Desktop     Downloads      Music     Public          Templates  wordpress
Documents   latest.tar.gz  Pictures  resultSmtp.txt  Videos
jipx@P2228479:~$
```

Edit the wp-config.phpfile

```
nano wordpress/wp-config.php
```

```
* * Database settings
* * Secret keys
* * Database table prefix
* * ABSPATH
*
* @link https://wordpress.org/support/article/editing-wp-config-php/
*
* @package WordPress
*/

// ** Database settings - You can get this info from your web host ** //
/** The name of the database for WordPress */
define( 'DB_NAME', 'wordpress-db-p2228479' );

/** Database username */
define( 'DB_USER', 'wordpress-user-p2228479' );

/** Database password */
define( 'DB_PASSWORD', 'Ubuntu1@#' );

^G Get Help  ^O Write Out ^W Where Is  ^K Cut Text  ^J Justify   ^C Cur Pos
^X Exit      ^R Read File ^\ Replace   ^U Uncut Text^T To Spell  ^_ Go To Line
```

For WordPress to run in an alternative directory under the document root, first create that directory, and then copy the files to it . WordPress will run from the directory p2228479:

```
sudo mkdir /var/www/html/p2228479
sudo cp -r wordpress/* /var/www/html/p2228479/
```

```
mkdir: cannot create directory '/var/www/html/p2228479': File exists
jipx@P2228479:~$ sudo mkdir /var/www/html/p2228479
jipx@P2228479:~$ sudo cp -r wordpress/* /var/www/html/p2228479/
jipx@P2228479:~$
```

- Configure Apache web server to set the document root to /var/www/html/p*******

1. To change Apache's root directory and open the 000-default.conf file using the command:

sudo nano /etc/apache2/sites-available/000-default.conf

2. Edit the DocumentRoot option:

DocumentRoot /var/www/html/p2228479

```
<VirtualHost *:80>
        # The ServerName directive sets the request scheme, hostname and port t$
        # 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/p2228479

        # 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


^G Get Help  ^O Write Out ^W Where Is  ^K Cut Text  ^J Justify   ^C Cur Pos
^X Exit      ^R Read File ^\ Replace   ^U Uncut Text^T To Spell  ^_ Go To Line
```

Restart apache

```
jipx@P2228479:~$ sudo systemctl restart apache2
[sudo] password for jipx:
jipx@P2228479:~$
```

To fix file permissions for the Apache web server

Some of the available features in WordPress require write access to the Apache document root (such as uploading media though the Administration screens).

Grant file ownership of /var/wwwand its contents to the www-datauser.

```
sudo chown -R www-data /var/www
```

Grant group ownership of /var/wwwand its contents to the www-datagroup.

```
sudo chgrp -R www-data /var/www
```

Change the directory permissions of /var/wwwand its subdirectories to add group write permissions and to set the group ID on future subdirectories.

```
sudo chmod 2775 /var/www
sudo find /var/www -type d -exec sudo chmod 2775 {} \;
```

Recursively change the file permissions of /var/wwwand its subdirectories to add group write permissions.

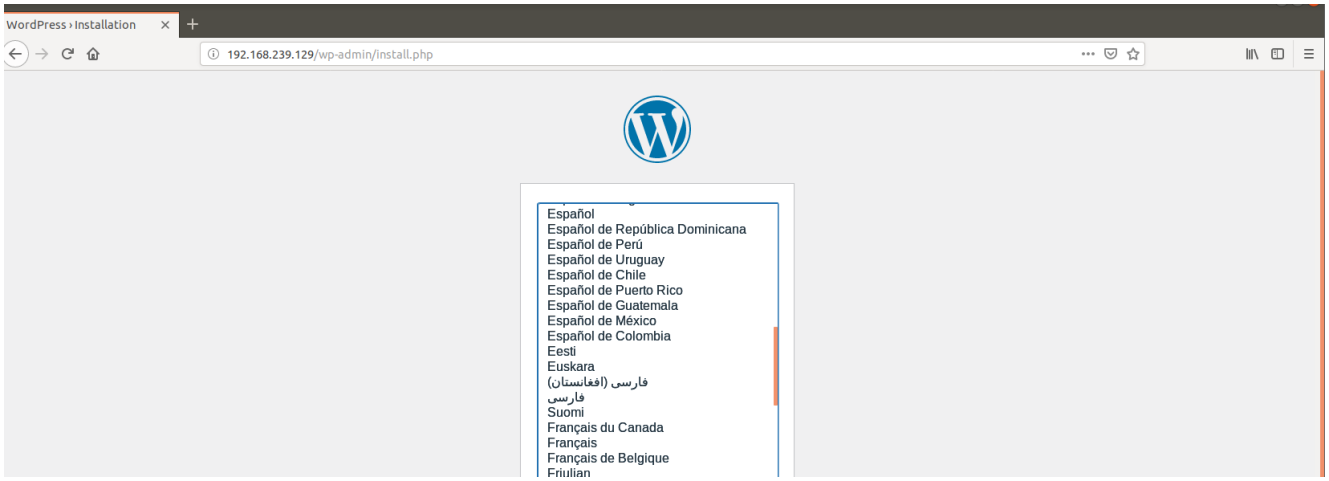
```
sudo find /var/www -type f -exec sudo chmod 0664
```

```
jipx@P2228479:~$ sudo chown -R www-data /var/www
[sudo] password for jipx:
jipx@P2228479:~$ sudo chgrp -R www-data /var/www
jipx@P2228479:~$ sudo chmod 2775 /var/www
jipx@P2228479:~$ sudo find /var/www -type d -exec sudo chmod 2775 {} \;
jipx@P2228479:~$ sudo find /var/www -type f -exec sudo chmod 0664 {} \;
```

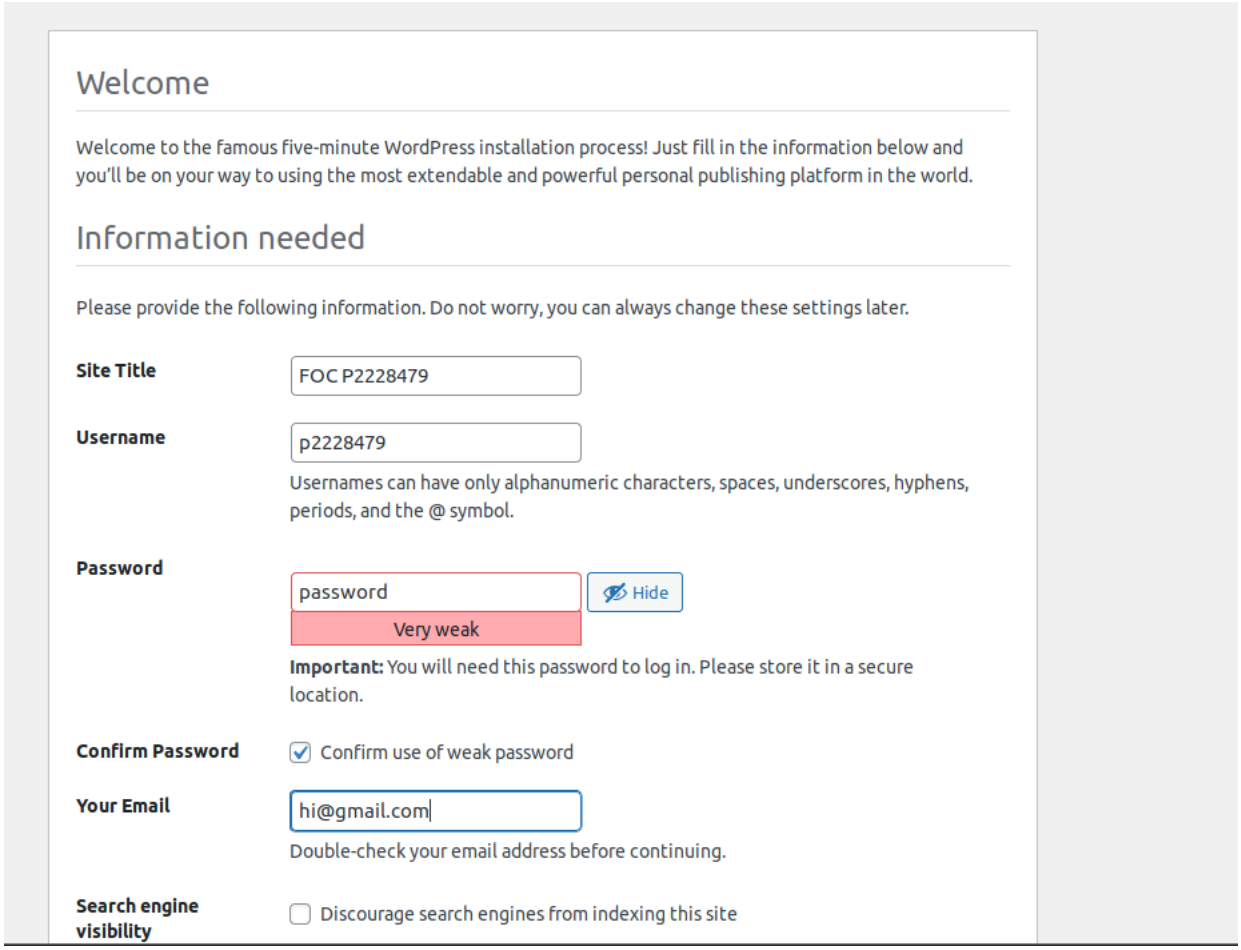
Ifconfig

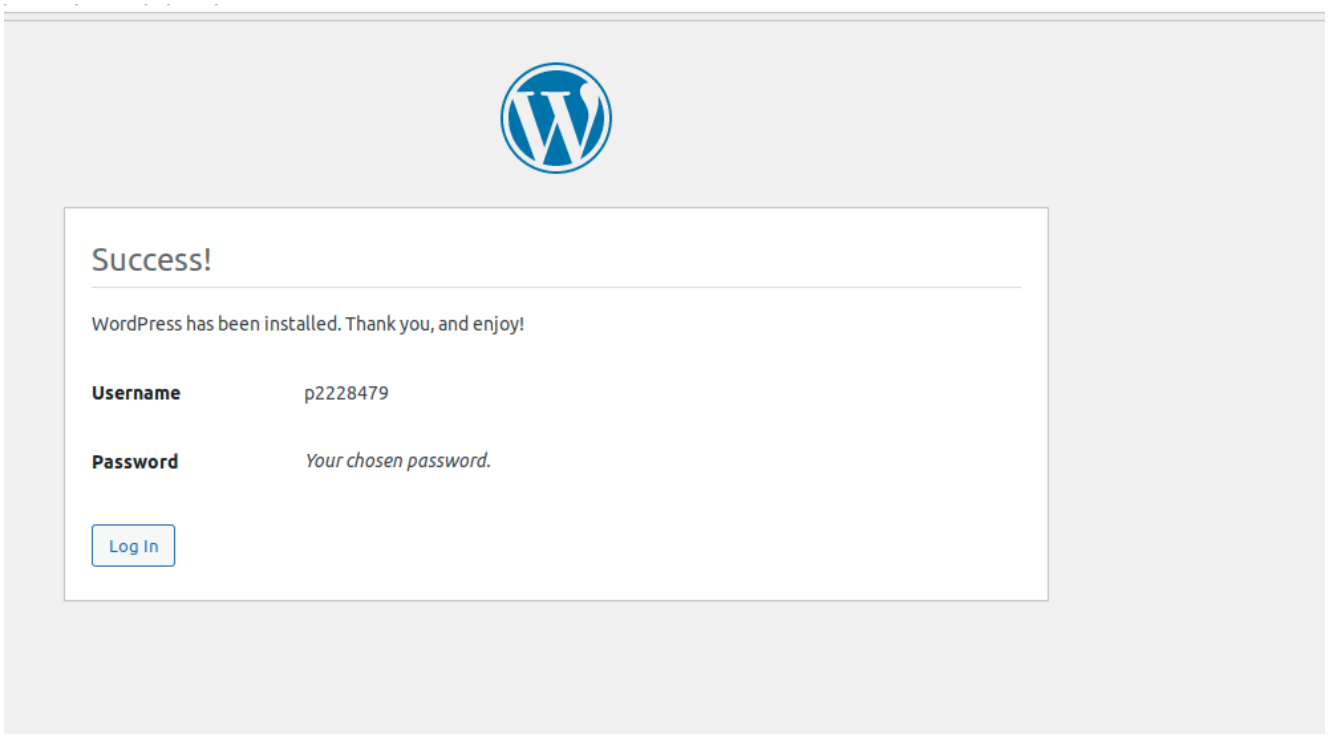
Start wordpress

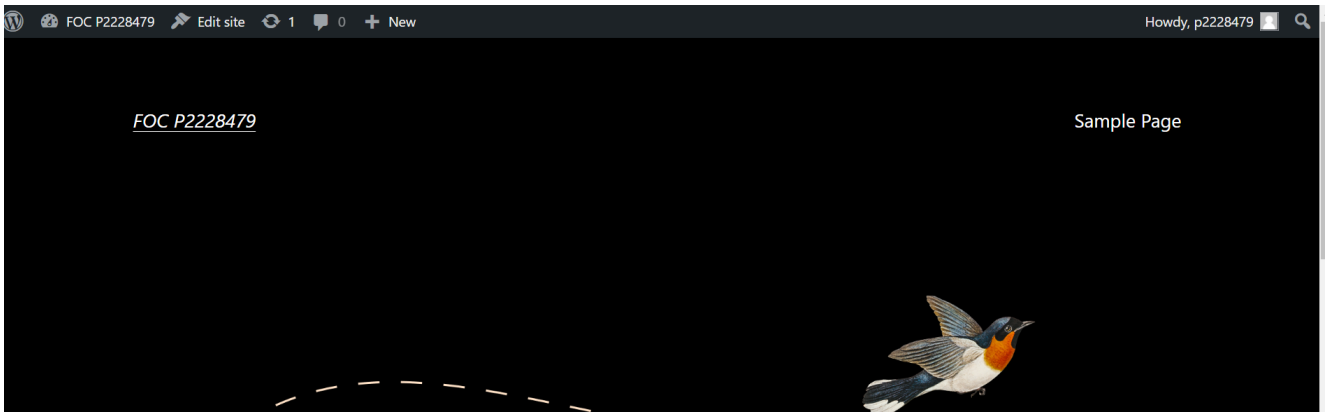
Check wordpress installation



Information details







- Create a database user in mysql server for PHP application to access mysql server, and assign proper rights

  User name: **wordpress-user-p*******

Mysql database name for Wordpress: wordpress-db-p*******

Run sudo mysql

This is the command I will use to create a database user in mysql server

```
jipx@P2228479:~$ sudo mysql
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 2
Server version: 5.7.38-0ubuntu0.18.04.1 (Ubuntu)

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

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

mysql>
```

Enter the following:

CREATE USER 'wordpress-user-p2228479'@'localhost' IDENTIFIED BY 'Ubuntu1@#';

CREATE DATABASE `wordpress-db-p2228479`;

GRANT ALL PRIVILEGES ON `wordpress-db-p2228479`.* TO "wordpress-user-p2228479"@"localhost";

FLUSH PRIVILEGES;

exit;

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

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

mysql> CREATE USER 'wordpress-user-p2228479'@'localhost' IDENTIFIED BY 'Ubuntu1@
#';
Query OK, 0 rows affected (0.00 sec)

mysql> CREATE DATABASE `wordpress-db-p2228479`;
Query OK, 1 row affected (0.00 sec)

mysql> GRANT ALL PRIVILEGES ON `wordpress-db-p2228479`.* TO "wordpress-user-p222
8479"@"localhost";
Query OK, 0 rows affected (0.00 sec)

mysql> FLUSH PRIVILEGES;
Query OK, 0 rows affected (0.00 sec)

mysql> exit;
Bye
```

Monitor log files generated by Ubuntu Server, Apache server, and Mysql server. Show the latest 20 log entries.

Log data is used by **sysadmin and webdev** team to better understand how the system is performing and to diagnose any issues that might arise. Log data can be produced by the ubuntu server, web server, mysql server and Wordpress web site itself, This might include anything from access logs produced by your web server to security audit logs produced by the operating system itself. Your team needs reliable and timely access to these logs at all times, regardless of whether the instance that originally produced the log is still in existence.

For this reason, it's important to move log data from the instance to a more durable storage platform as close to real time as possible.

Adapted from: https://d1.awsstatic.com/whitepapers/managing-your-aws-infrastructure-at-scale.pdf

2. Upload your **Practical Lab Documents (the practical documentation that you had done previously during the lab)** [practical lab document 1, 2, 3, 4, 5, 6] and design your web site to make it **easier** for users to use.

3. Backup your local Ubuntu server and Wordpress web site for recovery in case of failure.