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UNIVERSITY OF WOLVERHAMPTON

HERALD COLLEGE KATHMANDU

Distributed and Cloud System Programming (5CS022)

Workshop 9

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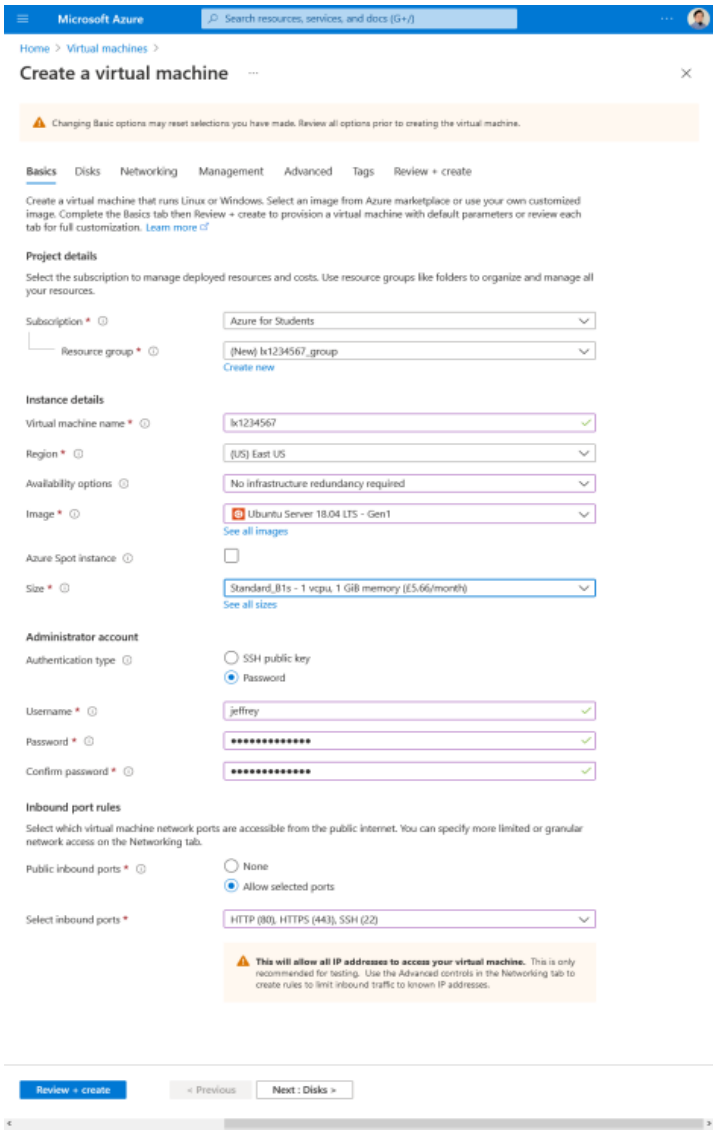
Linux server on Azure

Part 1 – Creating a Virtual Machine for Linux

● Log into Azure via https://azureforeducation.microsoft.com/ and go the main Azure portal. ● In the Virtual machines page, create a new virtual machine.

● At the next page fill in the fields similar to below:



● Make sure the Subscription is on "Azure for Students"

● Name the Virtual Machine name "lx"+ your student ID number, eg. "lx1234567"

● Make sure the Region is on (US) East US

● Set the Availability options to "No infrastructure redundancy required"

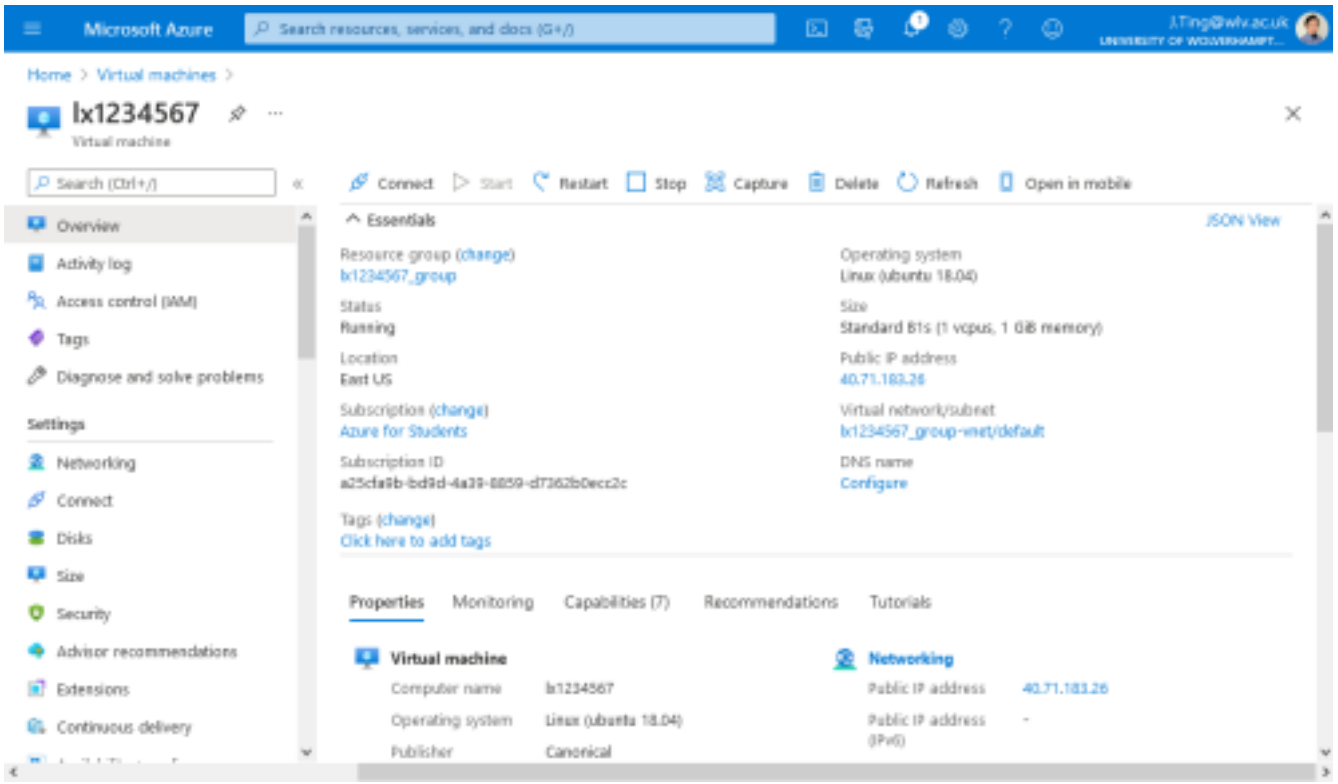
● Select the "Ubuntu Server 18.04 LTS – Gen 1" image

● Select the VM Size: "Standard_B1s – 1vcpu, 1GiB memory". This is an appropriate size and cost for the Linux Server as it does not require as much as Windows.

● Create your administrator user account and password. Please note this information down somewhere. If you forget, you will be locked out of your Virtual Machine and there will be nothing we can do. ● For the Inbound ports rules, select all available ones for now, and those are 80, 443,and 22.

Then click on "Review + create" to validate your Virtual Machine, and it should after a few moments say "Validation passed"

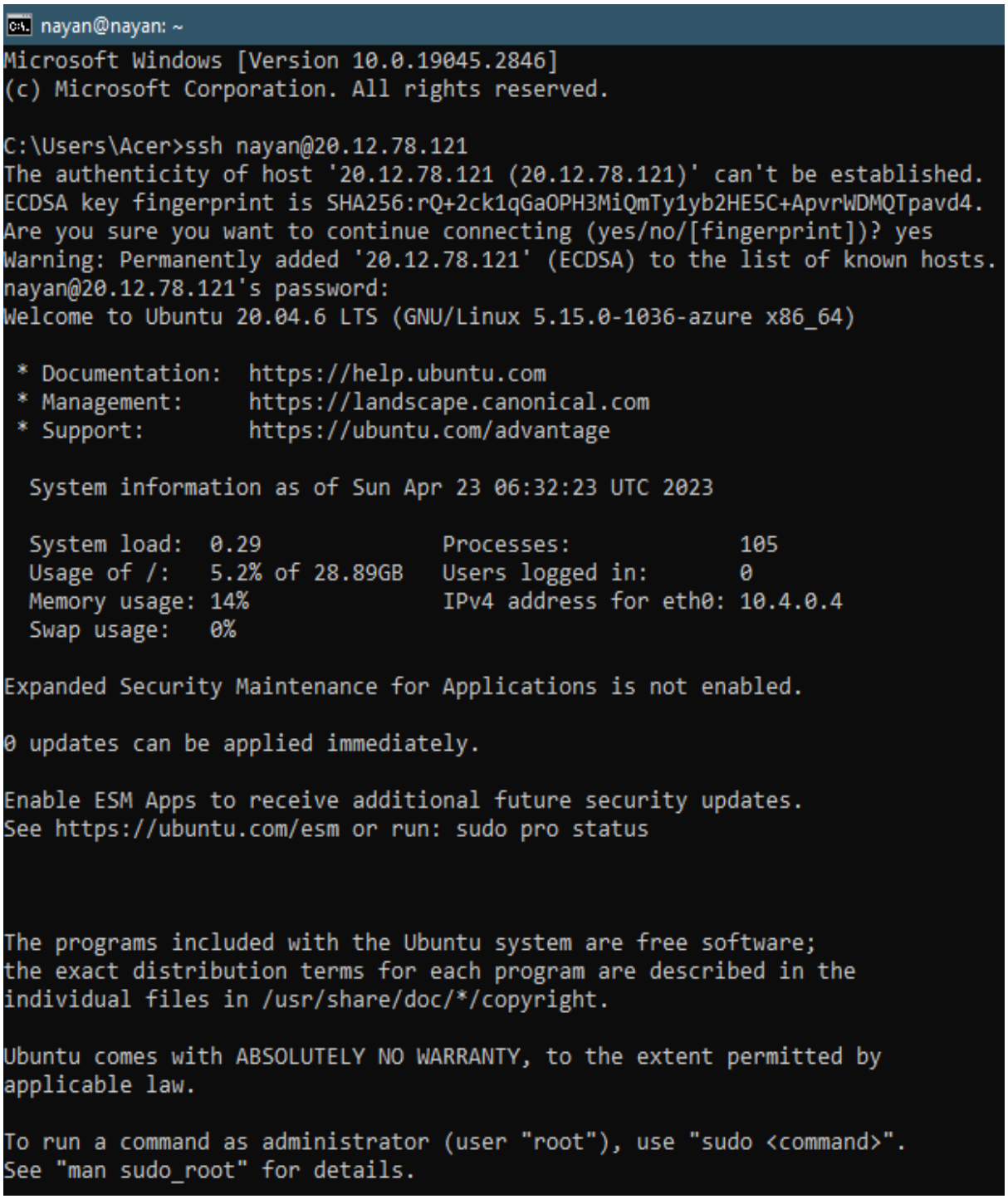
- Then click on "Create" to create the actual Virtual Machine.
- Go to your Virtual Machines to get to:



- Please make a note of your server's Public IP address.(eg. 40.71.183.26), as you will need this to connect to it.

Part 2 – Connect to virtual machine

- Start a command prompt on your Windows PC.
- Connect to your Ubuntu Linux server using SSH



Part 3 – Setting up Webmin on the Linux Server

● As the Linux server does not a graphical user interface, having a web-based control dashboard to help set up the services on the server make it much easier to manage. Start a command prompt on your Windows PC.

● We will install Webmin, a popular web-based control dashboard on this server.
● Issue the following command in terminal session to import the Webmin repository key:
wget http://www.webmin.com/jcameron-key.asc

```
nayan@nayan:~$ wget http://www.webmin.com/jcameron-key.asc
--2023-04-23 06:34:20--  http://www.webmin.com/jcameron-key.asc
Resolving www.webmin.com (www.webmin.com)... 216.105.38.11
Connecting to www.webmin.com (www.webmin.com)|216.105.38.11|:80... connected.
HTTP request sent, awaiting response... 301 Moved Permanently
Location: https://www.webmin.com/jcameron-key.asc [following]
--2023-04-23 06:34:21--  https://www.webmin.com/jcameron-key.asc
Connecting to www.webmin.com (www.webmin.com)|216.105.38.11|:443... connected.
HTTP request sent, awaiting response... 301 Moved Permanently
Location: https://webmin.com/jcameron-key.asc [following]
--2023-04-23 06:34:21--  https://webmin.com/jcameron-key.asc
Resolving webmin.com (webmin.com)... 216.105.38.11
Connecting to webmin.com (webmin.com)|216.105.38.11|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 1320 (1.3K) [text/plain]
Saving to: ‘jcameron-key.asc’

jcameron-key.asc             100%[=============================================>]   1.29K  --.-KB/s    in 0s

2023-04-23 06:34:21 (180 MB/s) - ‘jcameron-key.asc’ saved [1320/1320]
```

● Next, issue the following command in Terminal to install the key:

sudo apt-key add jcameron-key.asc

```
nayan@nayan:~$ sudo apt-key add jcameron-key.asc
OK
```

● You will also add the Webmin repository into the /etc/apt/sources.list file. In this way, you will be able to install Webmin.
● Issue the following 3 commands in Terminal to do this:

sudo bash
echo "deb http://download.webmin.com/download/repository sarge contrib" >> /etc/apt/sources.list
exit

```
nayan@nayan:~$ sudo bash
root@nayan:/home/nayan# echo "deb http://download.webmin.com/download/repository sarge contrib" >> /etc/apt/sources.listroot@nayan:/home/nayan# exit
exit
```

● Next, issue the following command in Terminal to update the repository index with that of the newly added Webmin repository:

sudo apt update

```
nayan@nayan:~$ sudo apt update
Hit:1 http://azure.archive.ubuntu.com/ubuntu focal InRelease
Get:2 http://azure.archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]
Get:3 http://azure.archive.ubuntu.com/ubuntu focal-backports InRelease [108 kB]
Get:4 http://azure.archive.ubuntu.com/ubuntu focal-security InRelease [114 kB]
Get:5 http://azure.archive.ubuntu.com/ubuntu focal/universe amd64 Packages [8628 kB]
Ign:6 http://download.webmin.com/download/repository sarge InRelease
Get:7 http://download.webmin.com/download/repository sarge Release [16.9 kB]
Get:8 http://azure.archive.ubuntu.com/ubuntu focal/universe Translation-en [5124 kB]
Get:9 http://download.webmin.com/download/repository sarge Release.gpg [173 B]
Get:10 http://azure.archive.ubuntu.com/ubuntu focal/universe amd64 c-n-f Metadata [265 kB]
Get:11 http://azure.archive.ubuntu.com/ubuntu focal/multiverse amd64 Packages [144 kB]
Get:12 http://azure.archive.ubuntu.com/ubuntu focal/multiverse Translation-en [104 kB]
Get:13 http://azure.archive.ubuntu.com/ubuntu focal/multiverse amd64 c-n-f Metadata [9136 B]
Get:14 http://azure.archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [2498 kB]
Get:15 http://azure.archive.ubuntu.com/ubuntu focal-updates/main amd64 c-n-f Metadata [16.4 kB]
Get:16 http://azure.archive.ubuntu.com/ubuntu focal-updates/restricted amd64 Packages [1775 kB]
Get:17 http://azure.archive.ubuntu.com/ubuntu focal-updates/universe amd64 Packages [1051 kB]
Get:18 http://azure.archive.ubuntu.com/ubuntu focal-updates/universe Translation-en [248 kB]
Get:19 http://azure.archive.ubuntu.com/ubuntu focal-updates/universe amd64 c-n-f Metadata [24.2 kB]
Get:20 http://azure.archive.ubuntu.com/ubuntu focal-updates/multiverse amd64 Packages [25.2 kB]
Get:21 http://azure.archive.ubuntu.com/ubuntu focal-updates/multiverse Translation-en [7408 B]
Get:22 http://azure.archive.ubuntu.com/ubuntu focal-updates/multiverse amd64 c-n-f Metadata [612 B]
Get:23 http://azure.archive.ubuntu.com/ubuntu focal-backports/main amd64 Packages [45.7 kB]
Get:24 http://azure.archive.ubuntu.com/ubuntu focal-backports/main Translation-en [16.3 kB]
Get:25 http://azure.archive.ubuntu.com/ubuntu focal-backports/main amd64 c-n-f Metadata [1420 B]
Get:26 http://azure.archive.ubuntu.com/ubuntu focal-backports/restricted amd64 c-n-f Metadata [116 B]
Get:27 http://azure.archive.ubuntu.com/ubuntu focal-backports/universe amd64 Packages [24.9 kB]
Get:28 http://azure.archive.ubuntu.com/ubuntu focal-backports/universe Translation-en [16.3 kB]
Get:29 http://azure.archive.ubuntu.com/ubuntu focal-backports/universe amd64 c-n-f Metadata [880 B]
Get:30 http://azure.archive.ubuntu.com/ubuntu focal-backports/multiverse amd64 c-n-f Metadata [116 B]
Get:31 http://azure.archive.ubuntu.com/ubuntu focal-security/main amd64 Packages [2114 kB]
Get:32 http://azure.archive.ubuntu.com/ubuntu focal-security/main Translation-en [341 kB]
Get:33 http://azure.archive.ubuntu.com/ubuntu focal-security/main amd64 c-n-f Metadata [12.5 kB]
Get:34 http://azure.archive.ubuntu.com/ubuntu focal-security/restricted amd64 Packages [1667 kB]
Get:35 http://azure.archive.ubuntu.com/ubuntu focal-security/restricted Translation-en [235 kB]
Get:36 http://azure.archive.ubuntu.com/ubuntu focal-security/restricted amd64 c-n-f Metadata [640 B]
Get:37 http://azure.archive.ubuntu.com/ubuntu focal-security/universe amd64 Packages [825 kB]
Get:38 http://azure.archive.ubuntu.com/ubuntu focal-security/universe Translation-en [166 kB]
Get:39 http://azure.archive.ubuntu.com/ubuntu focal-security/universe amd64 c-n-f Metadata [17.6 kB]
Get:40 http://azure.archive.ubuntu.com/ubuntu focal-security/multiverse amd64 Packages [22.9 kB]
Get:41 http://azure.archive.ubuntu.com/ubuntu focal-security/multiverse Translation-en [5488 B]
Get:42 http://azure.archive.ubuntu.com/ubuntu focal-security/multiverse amd64 c-n-f Metadata [540 B]
Get:43 http://download.webmin.com/download/repository sarge/contrib amd64 Packages [1432 B]
Fetched 25.8 MB in 5s (5549 kB/s)
Reading package lists... Done
Building dependency tree
Reading state information... Done
7 packages can be upgraded. Run 'apt list --upgradable' to see them.
```

- Install the Webmin package as sudo via the following command:

  sudo apt install webmin

```
nayan@nayan:~$ sudo apt install webmin
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  libalgorithm-c3-perl libauthen-pam-perl libb-hooks-endofscope-perl
  libclass-singleton-perl libclass-xsaccessor-perl libdata-optlist-p
  libdynaloader-functions-perl libeval-closure-perl libexception-cla
  libnamespace-clean-perl libnet-ssleay-perl libpackage-stash-perl
  libref-util-xs-perl librole-tiny-perl libspecio-perl libsub-export
  libxstring-perl perl-openssl-defaults unzip
Suggested packages:
  libscalar-number-perl libtest-fatal-perl zip
The following NEW packages will be installed:
  libalgorithm-c3-perl libauthen-pam-perl libb-hooks-endofscope-perl
  libclass-singleton-perl libclass-xsaccessor-perl libdata-optlist-p
  libdynaloader-functions-perl libeval-closure-perl libexception-cla
  libnamespace-clean-perl libnet-ssleay-perl libpackage-stash-perl
  libref-util-xs-perl librole-tiny-perl libspecio-perl libsub-export
  libxstring-perl perl-openssl-defaults unzip webmin
0 upgraded, 53 newly installed, 0 to remove and 7 not upgraded.
```

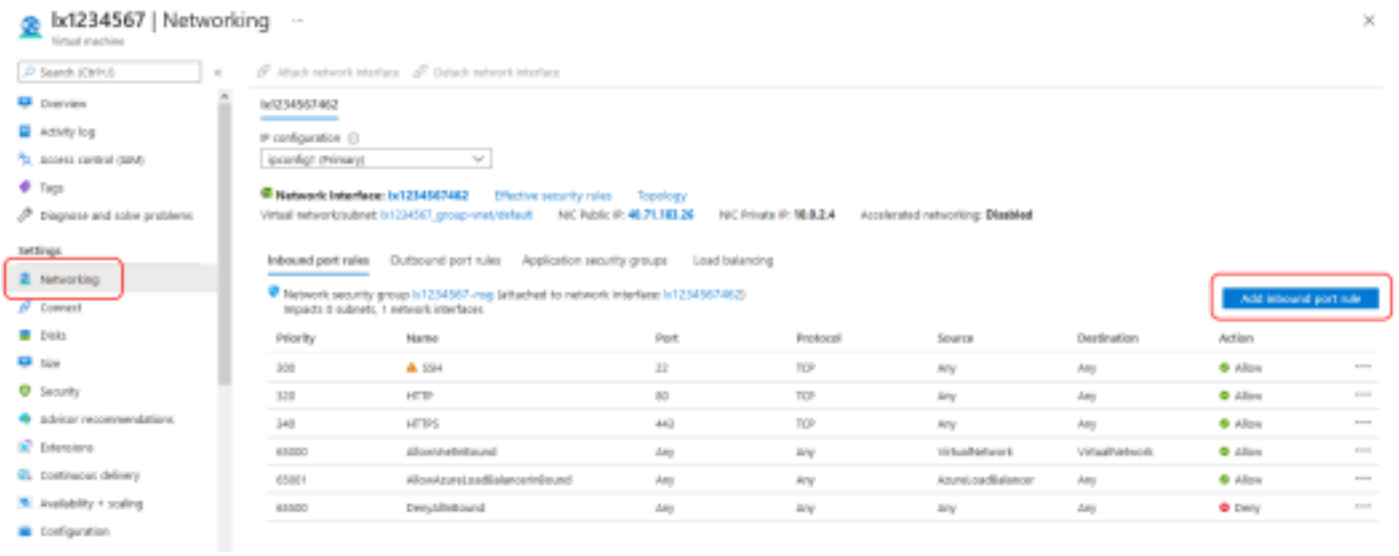
- The system might prompt you for confirmation by providing you with a y/n option. Hit y to continue the installation process. Once installation is complete, you will see a message explaining how to access Webmin.

```
Need to get 38.2 MB of archives.
After this operation, 223 MB of additional disk space will be used.
Do you want to continue? [Y/n] Y
```

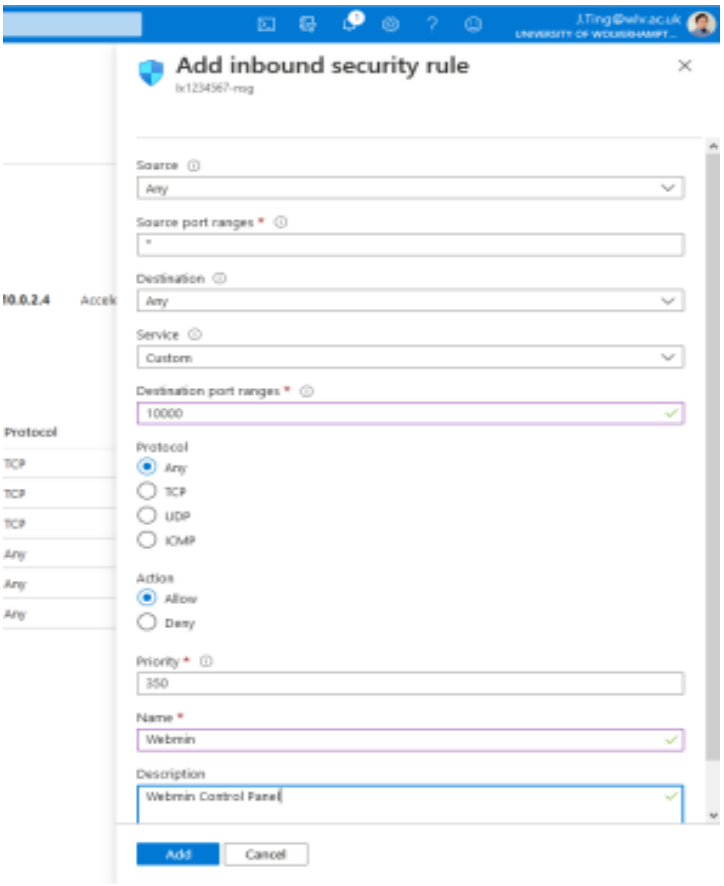
```
Setting up libnamespace-clean-perl (0.27-1) ...##################################################################################
Setting up libnamespace-autoclean-perl (0.29-1) ...##############################################################################
Setting up libdatetime-locale-perl (1:1.25-1) ...################################################################################
Setting up libdatetime-timezone-perl (1:2.38-1+2019c) ...########################################################################
Setting up libdatetime-perl:amd64 (2:1.51-1build1) ...###########################################################################
Processing triggers for man-db (2.9.1-1) ...#####################################################################################
Processing triggers for mime-support (3.64ubuntu1) ...
```

Part 4 – Configuring network firewall settings to allow access to the Webmin control panel

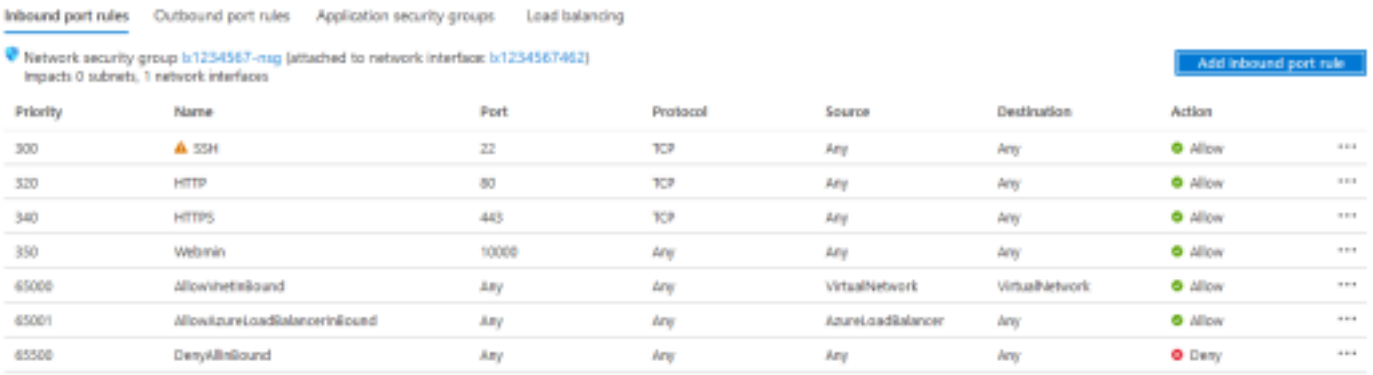
- In the web browser, switch back to the Overview panel for the virtual machine. You can find the VM under All Resources.
- In the Settings section, select the Networking item.
- You should see the NSG rules for the subnet in the top section and the NSG rules for the network interface in the bottom section of the same tab. In the bottom section, for the NSG rules for the network interface, select Add inbound port rule.



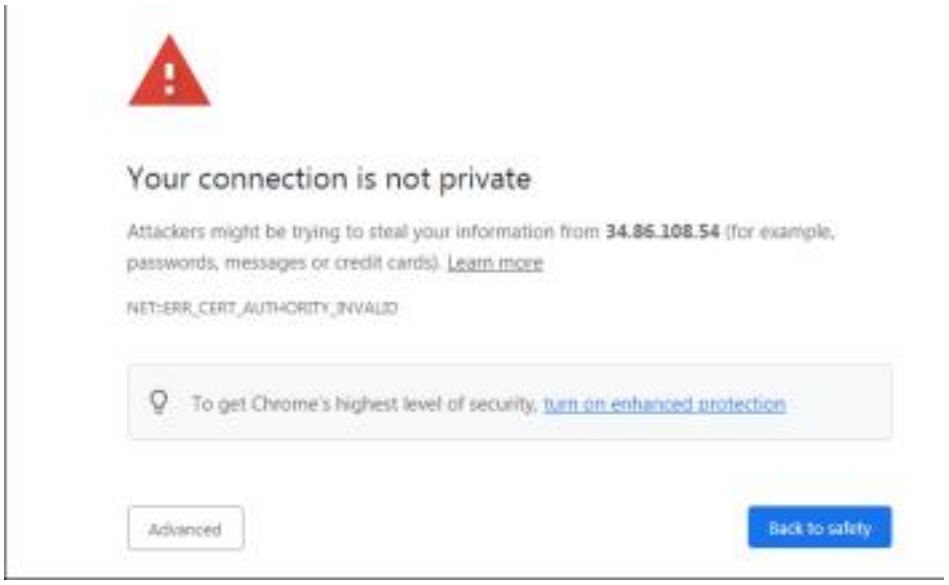
- Then add the following rule:



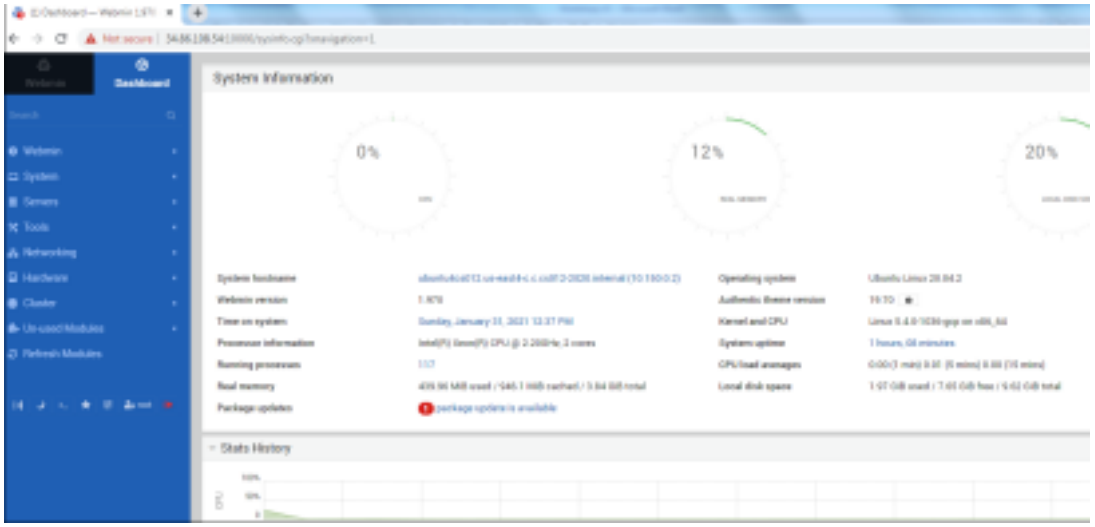
- You should then end up with these rules for your VM:



- Use your web browser and then go to the URL: **https:// 35.86.108.54:10000**
- The web browser may complain about the website's security certificate:



- Click on "Continue to this webpage (not recommended)."
- Login to Webmin with your Linux username and password.
- You should see a page similar to the following:



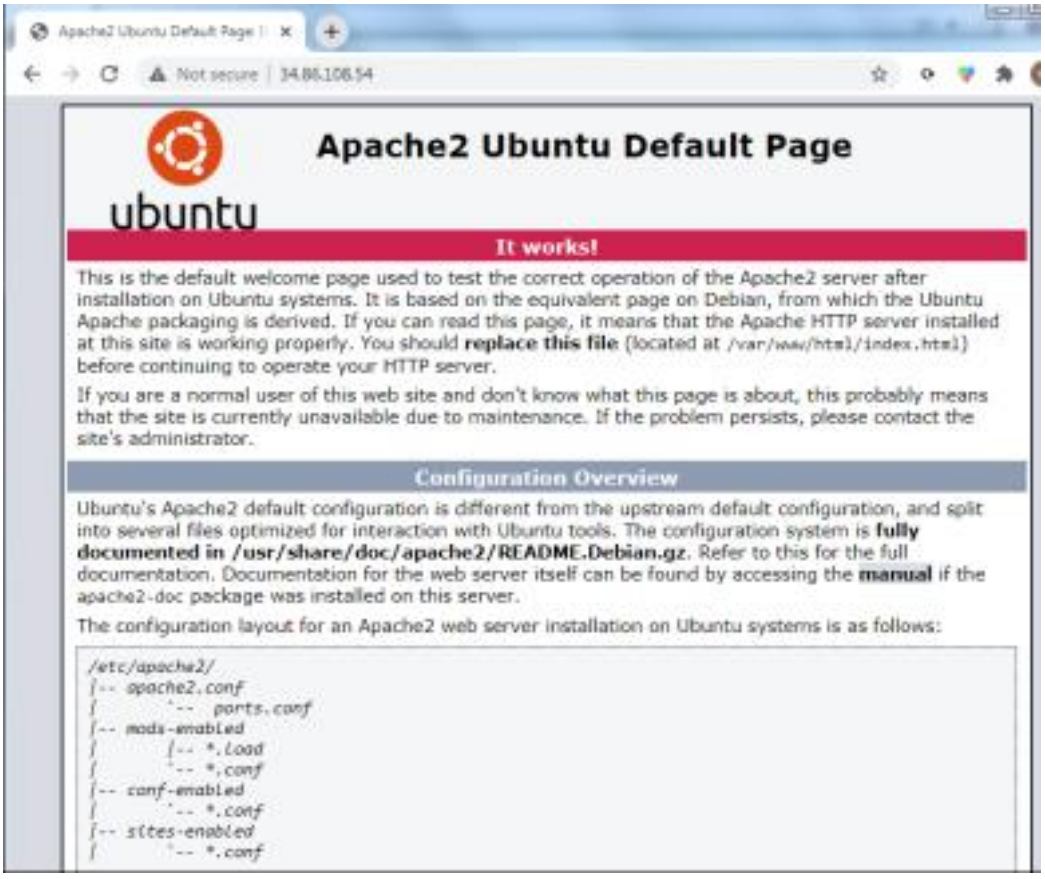
Part 5 – Installing Apache web server

- The Apache web server is currently the most popular web server in the world, which makes it a great default choice for hosting a website:

  sudo apt install apache2

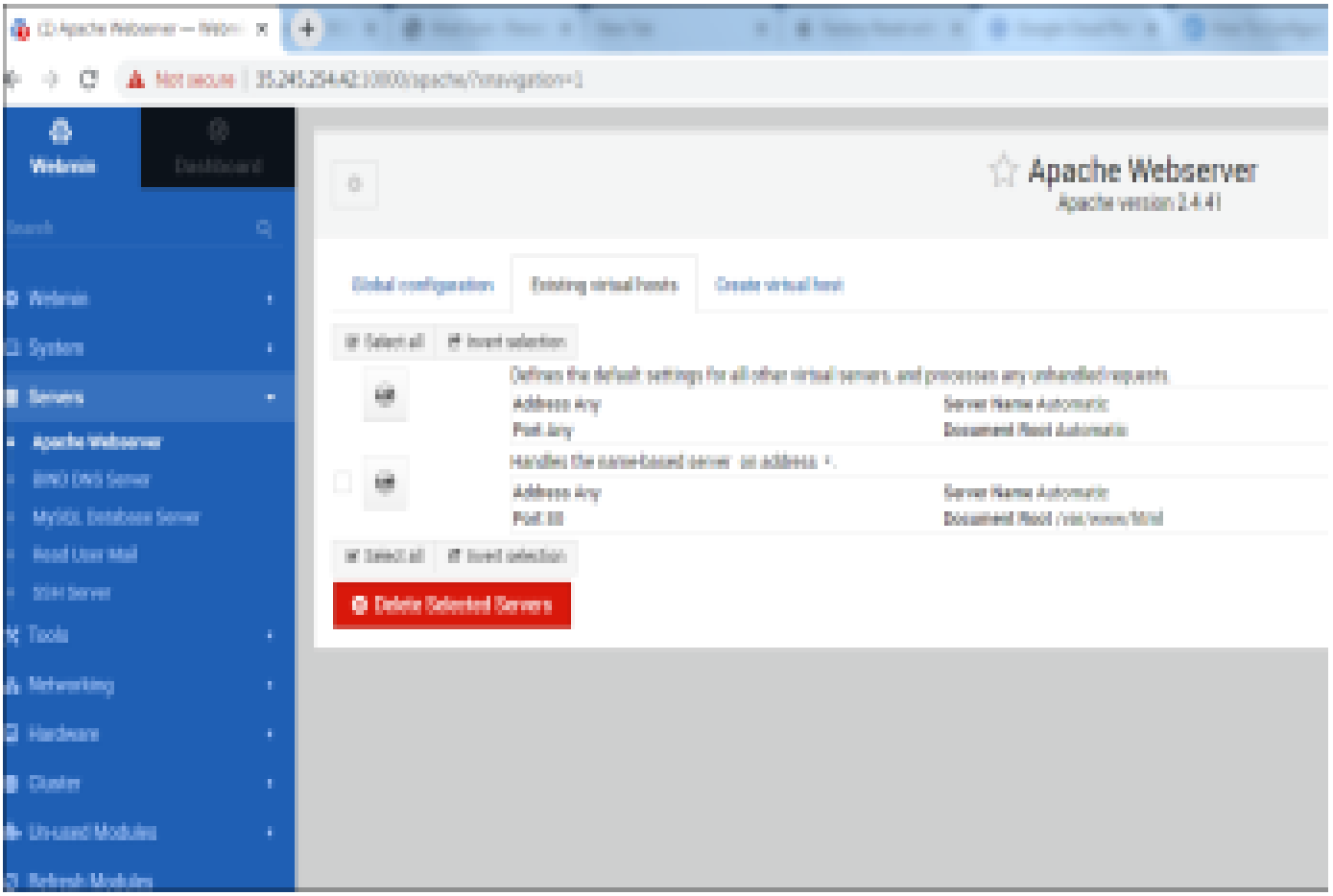
```
nayan@nayan:~$ sudo apt install apache2
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  apache2-bin apache2-data apache2-utils libapr1 libaprutil1 libaprutil1-dbd-sqlite3 libaprutil1-ldap libjansson4 liblua5.2-0 ssl-cert
Suggested packages:
  apache2-doc apache2-suexec-pristine | apache2-suexec-custom www-browser openssl-blacklist
The following NEW packages will be installed:
  apache2 apache2-bin apache2-data apache2-utils libapr1 libaprutil1 libaprutil1-dbd-sqlite3 libaprutil1-ldap libjansson4 liblua5.2-0 ssl-c
0 upgraded, 11 newly installed, 0 to remove and 7 not upgraded.
Need to get 1867 kB of archives.
After this operation, 8098 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://azure.archive.ubuntu.com/ubuntu focal/main amd64 libapr1 amd64 1.6.5-1ubuntu1 [91.4 kB]
Get:2 http://azure.archive.ubuntu.com/ubuntu focal-updates/main amd64 libaprutil1 amd64 1.6.1-4ubuntu2.1 [84.9 kB]
Get:3 http://azure.archive.ubuntu.com/ubuntu focal-updates/main amd64 libaprutil1-dbd-sqlite3 amd64 1.6.1-4ubuntu2.1 [10.6 kB]
Get:4 http://azure.archive.ubuntu.com/ubuntu focal-updates/main amd64 libaprutil1-ldap amd64 1.6.1-4ubuntu2.1 [8756 B]
Get:5 http://azure.archive.ubuntu.com/ubuntu focal/main amd64 libjansson4 amd64 2.12-1build1 [28.9 kB]
Get:6 http://azure.archive.ubuntu.com/ubuntu focal/main amd64 liblua5.2-0 amd64 5.2.4-1.1build3 [106 kB]
Get:7 http://azure.archive.ubuntu.com/ubuntu focal-updates/main amd64 apache2-bin amd64 2.4.41-4ubuntu3.14 [1182 kB]
Get:8 http://azure.archive.ubuntu.com/ubuntu focal-updates/main amd64 apache2-data all 2.4.41-4ubuntu3.14 [158 kB]
Get:9 http://azure.archive.ubuntu.com/ubuntu focal-updates/main amd64 apache2-utils amd64 2.4.41-4ubuntu3.14 [84.4 kB]
Get:10 http://azure.archive.ubuntu.com/ubuntu focal-updates/main amd64 apache2 amd64 2.4.41-4ubuntu3.14 [95.6 kB]
Get:11 http://azure.archive.ubuntu.com/ubuntu focal/main amd64 ssl-cert all 1.0.39 [17.0 kB]
Fetched 1867 kB in 0s (19.1 MB/s)
Preconfiguring packages ...
```

- Verify if apache was installed as planned by visiting your server's IP address in your web browser and http://your_server_IP_address/ example **http://35.204.55.123**
- You will see the default Apache web page, which is there for informational and testing purposes. It should look something like this:



- Go back to Webmin. On the left hand side of Webmin, click on Servers. Apache server should figure on the list. If not click on “Refresh Modules” at the bottom of the list to refresh these modules. Then reload webmin. Click on

Apache Webserver. You will see the following screen:



Part 6 – Installing MySQL Database Server

● Now that you have a web server up and running, you need to install the database system to be able to store and manage data for your site. MySQL is a popular database management system used within PHP environments. ● Again, use apt to acquire and install this software:

sudo apt install mysql-server

```
nayan@nayan:~$ sudo apt install mysql-server
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  libcgi-fast-perl libcgi-pm-perl libencode-locale-perl libevent-core-2.1-7 libevent-pthreads-2.1-7 libfcgi-perl libhtml-parser-perl libht
  liblwp-mediatypes-perl libmecab2 libtimedate-perl liburi-perl mecab-ipadic mecab-ipadic-utf8 mecab-utils mysql-client-8.0 mysql-client-c
Suggested packages:
  libdata-dump-perl libipc-sharedcache-perl libwww-perl mailx tinyca
The following NEW packages will be installed:
  libcgi-fast-perl libcgi-pm-perl libencode-locale-perl libevent-core-2.1-7 libevent-pthreads-2.1-7 libfcgi-perl libhtml-parser-perl libht
  liblwp-mediatypes-perl libmecab2 libtimedate-perl liburi-perl mecab-ipadic mecab-ipadic-utf8 mecab-utils mysql-client-8.0 mysql-client-c
0 upgraded, 25 newly installed, 0 to remove and 7 not upgraded.
```

● When prompted, confirm installation by typing Y, and then ENTER.

```
Need to get 36.7 MB of archives.
After this operation, 319 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://azure.archive.ubuntu.com/ubuntu focal/main amd64 mysql-common all 5.8+1.0.5ubuntu2 [7496 B]
Get:2 http://azure.archive.ubuntu.com/ubuntu focal-updates/main amd64 mysql-client-core-8.0 amd64 8.0.32-0ubuntu0.20.04.2 [5157 kB]
Get:3 http://azure.archive.ubuntu.com/ubuntu focal-updates/main amd64 mysql-client-8.0 amd64 8.0.32-0ubuntu0.20.04.2 [22.0 kB]
Get:4 http://azure.archive.ubuntu.com/ubuntu focal/main amd64 libevent-core-2.1-7 amd64 2.1.11-stable-1 [89.1 kB]
Get:5 http://azure.archive.ubuntu.com/ubuntu focal/main amd64 libevent-pthreads-2.1-7 amd64 2.1.11-stable-1 [7372 B]
Get:6 http://azure.archive.ubuntu.com/ubuntu focal/main amd64 libmecab2 amd64 0.996-10build1 [233 kB]
Get:7 http://azure.archive.ubuntu.com/ubuntu focal-updates/main amd64 mysql-server-core-8.0 amd64 8.0.32-0ubuntu0.20.04.2 [22.5 MB]
Get:8 http://azure.archive.ubuntu.com/ubuntu focal-updates/main amd64 mysql-server-8.0 amd64 8.0.32-0ubuntu0.20.04.2 [1317 kB]
Get:9 http://azure.archive.ubuntu.com/ubuntu focal/main amd64 libhtml-tagset-perl all 3.20-4 [12.5 kB]
Get:10 http://azure.archive.ubuntu.com/ubuntu focal/main amd64 liburi-perl all 1.76-2 [77.5 kB]
Get:11 http://azure.archive.ubuntu.com/ubuntu focal/main amd64 libhtml-parser-perl amd64 3.72-5 [86.3 kB]
Get:12 http://azure.archive.ubuntu.com/ubuntu focal/main amd64 libcgi-pm-perl all 4.46-1 [186 kB]
Get:13 http://azure.archive.ubuntu.com/ubuntu focal/main amd64 libfcgi-perl amd64 0.79-1 [33.1 kB]
Get:14 http://azure.archive.ubuntu.com/ubuntu focal/main amd64 libcgi-fast-perl all 1:2.15-1 [10.5 kB]
Get:15 http://azure.archive.ubuntu.com/ubuntu focal/main amd64 libencode-locale-perl all 1.05-1 [12.3 kB]
Get:16 http://azure.archive.ubuntu.com/ubuntu focal/main amd64 libhtml-template-perl all 2.97-1 [59.0 kB]
Get:17 http://azure.archive.ubuntu.com/ubuntu focal/main amd64 libtimedate-perl all 2.3200-1 [34.0 kB]
Get:18 http://azure.archive.ubuntu.com/ubuntu focal/main amd64 libhttp-date-perl all 6.05-1 [9920 B]
Get:19 http://azure.archive.ubuntu.com/ubuntu focal/main amd64 libio-html-perl all 1.001-1 [14.9 kB]
Get:20 http://azure.archive.ubuntu.com/ubuntu focal/main amd64 liblwp-mediatypes-perl all 6.04-1 [19.5 kB]
Get:21 http://azure.archive.ubuntu.com/ubuntu focal/main amd64 libhttp-message-perl all 6.22-1 [76.1 kB]
Get:22 http://azure.archive.ubuntu.com/ubuntu focal/main amd64 mecab-utils amd64 0.996-10build1 [4912 B]
Get:23 http://azure.archive.ubuntu.com/ubuntu focal/main amd64 mecab-ipadic all 2.7.0-20070801+main-2.1 [6714 kB]
Get:24 http://azure.archive.ubuntu.com/ubuntu focal/main amd64 mecab-ipadic-utf8 all 2.7.0-20070801+main-2.1 [4380 B]
Get:25 http://azure.archive.ubuntu.com/ubuntu focal-updates/main amd64 mysql-server all 8.0.32-0ubuntu0.20.04.2 [9472 B]
Fetched 36.7 MB in 4s (9438 kB/s)
Preconfiguring packages ...
Selecting previously unselected package mysql-common.
(Reading database ... 89600 files and directories currently installed.)
Preparing to unpack .../0-mysql-common_5.8+1.0.5ubuntu2_all.deb ...
Unpacking mysql-common (5.8+1.0.5ubuntu2) ...
Selecting previously unselected package mysql-client-core-8.0.
```

- Now that our MySQL database is running, we want to run a simple security script that will remove some dangerous defaults and lock down access to our database system a little bit. Start the interactive script by running:

  sudo mysql_secure_installation

- The prompt will ask you for your current root password. Since you just installed MySQL, you most likely won't have one, so leave it blank by pressing enter. Then the prompt will ask you if you want to set a root password. Go ahead and enter Y, and follow the instructions:

```
root@ubuntu4cs012:/home/cmbarushimana# 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:
```

  - Choose low as password policy and set password as '**password**'
  - For the rest of the questions, press yes. When you're finished, test if you're able to log in to the MySQL console by typing:

    sudo mysql

```
root@ubuntu4cs012:/home/cmbarushimana# mysql
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 10
Server version: 8.0.22-0ubuntu0.20.04.3 (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 **quit** to exit mysql

```
nayan@nayan:~$ sudo killall -9 mysql_secure_installation
mysql_secure_installation: no process found
nayan@nayan:~$ sudo mysql
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 10
Server version: 8.0.32-0ubuntu0.20.04.2 (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> ALTER USER 'root'@'localhost' IDENTIFIED WITH mysql_native_password BY 'SetRootPasswordHere';
Query OK, 0 rows affected (0.01 sec)

mysql> exit
Bye
nayan@nayan:~$ sudo mysql_secure_installation

Securing the MySQL server deployment.

Enter password for user root:
Error: Access denied for user 'root'@'localhost' (using password: YES)
nayan@nayan:~$ sudo mysql_secure_installation

Securing the MySQL server deployment.

Enter password for user root:

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
Using existing password for root.

Estimated strength of the password: 50
Change the password for root ? ((Press y|Y for Yes, any other key for No) : y

New password:

Re-enter new password:

Estimated strength of the password: 50
Do you wish to continue with the password provided?(Press y|Y for Yes, any other key for No) : y
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) : y
Success.


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

Disallow root login remotely? (Press y|Y for Yes, any other key for No) : y
Success.

By default, MySQL comes with a database named 'test' that
anyone can access. This is also intended only for testing,
and should be removed before moving into a production
environment.


Remove test database and access to it? (Press y|Y for Yes, any other key for No) : y
 - Dropping test database...
Success.

 - Removing privileges on test database...
Success.

Reloading the privilege tables will ensure that all changes
made so far will take effect immediately.

Reload privilege tables now? (Press y|Y for Yes, any other key for No) : y
Success.

All done!
```

Part 7 – Installing PHP

- PHP is the component of our setup that will process code to display dynamic content. It can run scripts, connect to our MySQL databases to get information, and hand the processed content over to our web server to display:

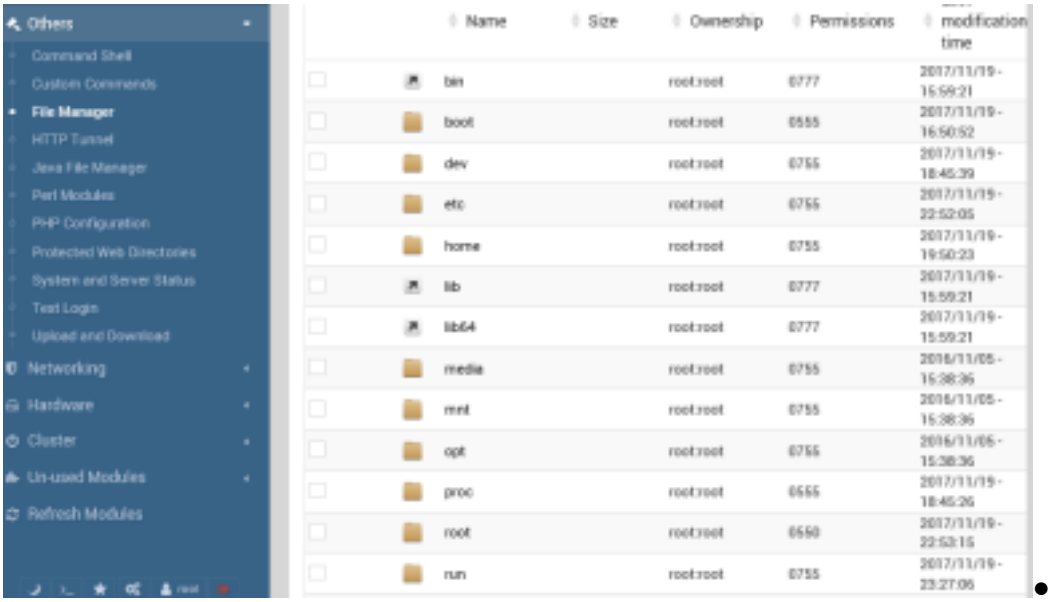
  sudo apt install php libapache2-mod-php php-mysql

```
root@ubuntu4cs012:/home/cmbarushimana# php -v
PHP 7.4.3 (cli) (built: Oct  6 2020 15:47:56) ( NTS )
Copyright (c) The PHP Group
Zend Engine v3.4.0, Copyright (c) Zend Technologies
    with Zend OPcache v7.4.3, Copyright (c), by Zend Technologies
root@ubuntu4cs012:/home/cmbarushimana#
```

```
nayan@nayan:~$ sudo apt install php libapache2-mod-php php-mysql
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  libapache2-mod-php7.4 php-common php7.4 php7.4-cli php7.4-common php7.4-json php7.4-mysql php7.4-opcache php7.4-readli
Suggested packages:
  php-pear
The following NEW packages will be installed:
  libapache2-mod-php libapache2-mod-php7.4 php php-common php-mysql php7.4 php7.4-cli php7.4-common php7.4-json php7.4-m
0 upgraded, 12 newly installed, 0 to remove and 7 not upgraded.
Need to get 4158 kB of archives.
After this operation, 18.5 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://azure.archive.ubuntu.com/ubuntu focal/main amd64 php-common all 2:75 [11.9 kB]
Get:2 http://azure.archive.ubuntu.com/ubuntu focal-updates/main amd64 php7.4-common amd64 7.4.3-4ubuntu2.18 [982 kB]
Get:3 http://azure.archive.ubuntu.com/ubuntu focal-updates/main amd64 php7.4-json amd64 7.4.3-4ubuntu2.18 [19.2 kB]
Get:4 http://azure.archive.ubuntu.com/ubuntu focal-updates/main amd64 php7.4-opcache amd64 7.4.3-4ubuntu2.18 [198 kB]
Get:5 http://azure.archive.ubuntu.com/ubuntu focal-updates/main amd64 php7.4-readline amd64 7.4.3-4ubuntu2.18 [12.6 kB]
Get:6 http://azure.archive.ubuntu.com/ubuntu focal-updates/main amd64 php7.4-cli amd64 7.4.3-4ubuntu2.18 [1427 kB]
Get:7 http://azure.archive.ubuntu.com/ubuntu focal-updates/main amd64 libapache2-mod-php7.4 amd64 7.4.3-4ubuntu2.18 [136
Get:8 http://azure.archive.ubuntu.com/ubuntu focal/main amd64 libapache2-mod-php all 2:7.4+75 [2836 B]
Get:9 http://azure.archive.ubuntu.com/ubuntu focal-updates/main amd64 php7.4 all 7.4.3-4ubuntu2.18 [9240 B]
Get:10 http://azure.archive.ubuntu.com/ubuntu focal/main amd64 php all 2:7.4+75 [2712 B]
Get:11 http://azure.archive.ubuntu.com/ubuntu focal-updates/main amd64 php7.4-mysql amd64 7.4.3-4ubuntu2.18 [121 kB]
Get:12 http://azure.archive.ubuntu.com/ubuntu focal/main amd64 php-mysql all 2:7.4+75 [2000 B]
```

Part 8 - Manipulating files on the Linux Server via Webmin

- In Webmin, and click Tools and then File Manager.

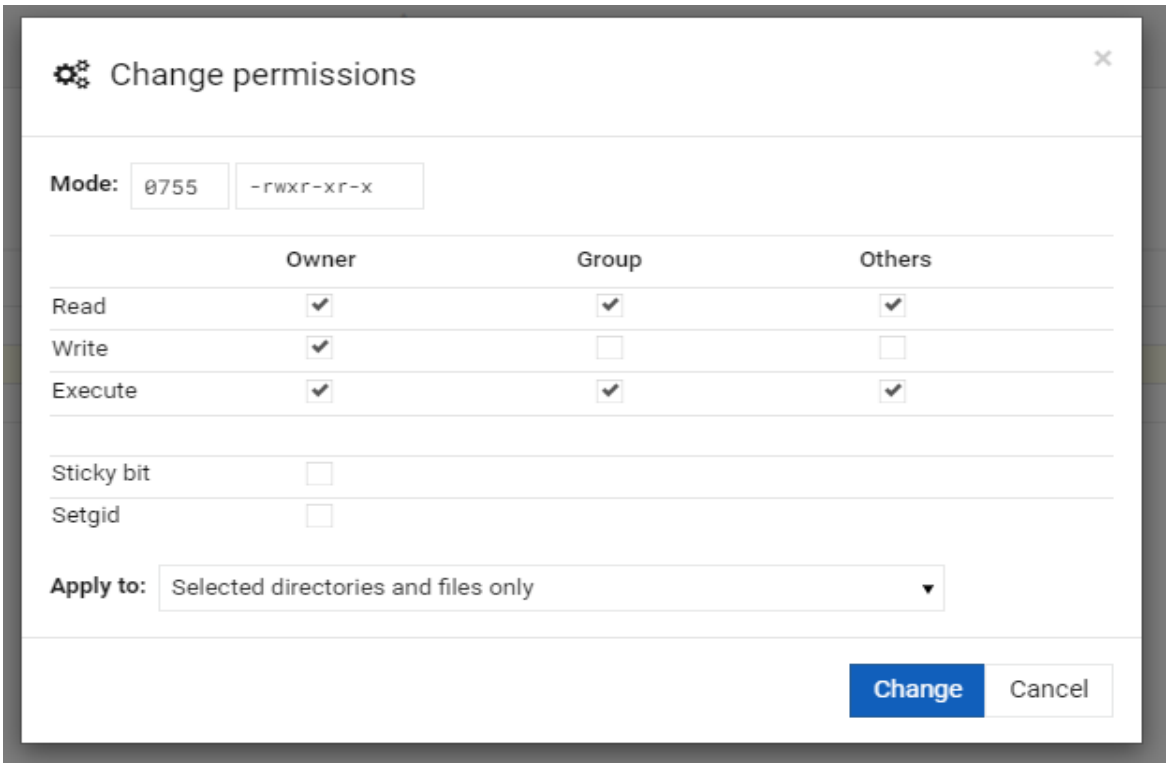


- Navigate the File Manager by double-clicking the folders, to the directory "/var/www/html".
- Click on the "File" and Create new file. Name the file testpage.html
- Right click the index.html file and select Edit
- "Hello yourstudentnumber" or similar text into the editor box
- Click "Save and Close".

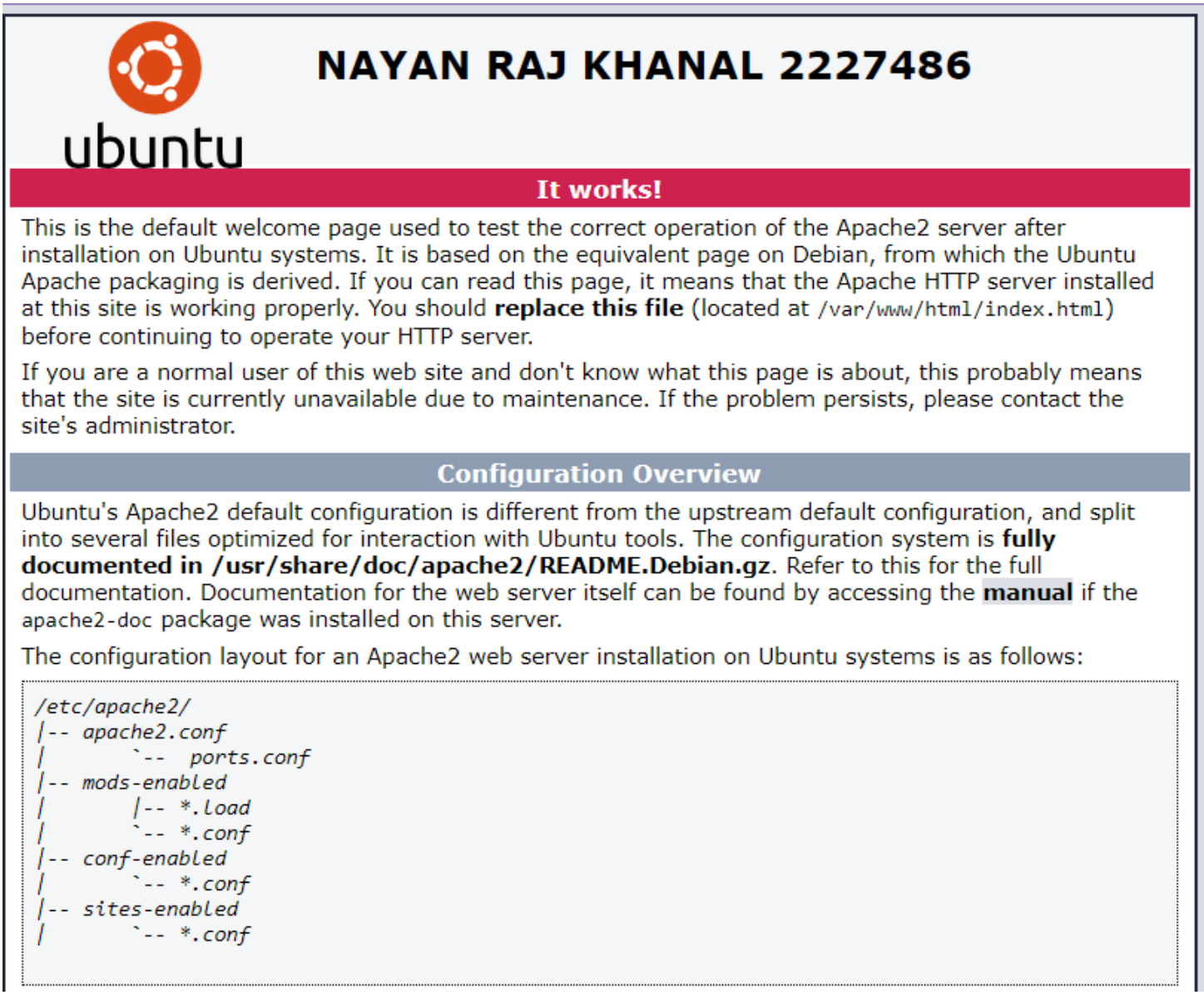
index.html (/var/www/html)

```
188   div.validator {
189   }
190     </style>
191   </head>
192   <body>
193     <div class="main_page">
194       <div class="page_header floating_element">
195         <img src="/icons/ubuntu-logo.png" alt="Ubuntu Logo" class="floating_element"/>
196         <span class="floating_element">
197           NAYAN RAJ KHANAL 2227486
198         </span>
199       </div>
```

- Select the testpage.html file that you have just created and change the permissions to 0755.



●Now verify that your new website is working.



Part 9 - Setting up a PHP info page

1) PHP is one of the most common web application programming languages in use today. We are now going to create a PHP web page.

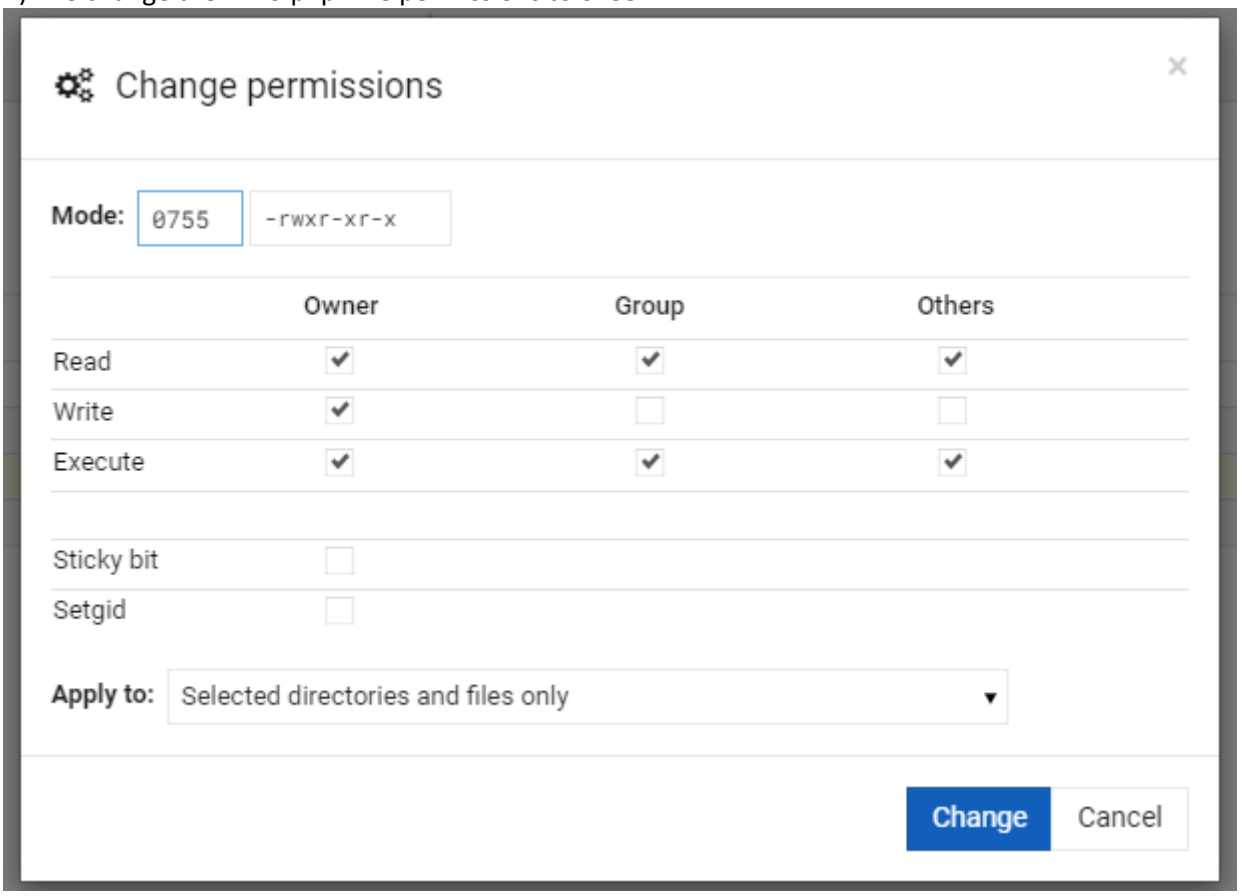
2) Using Webmin's File Manager, create a file in the "/var/www/html" directory, called "info.php".

3) Insert the following code into the "info.php" file:

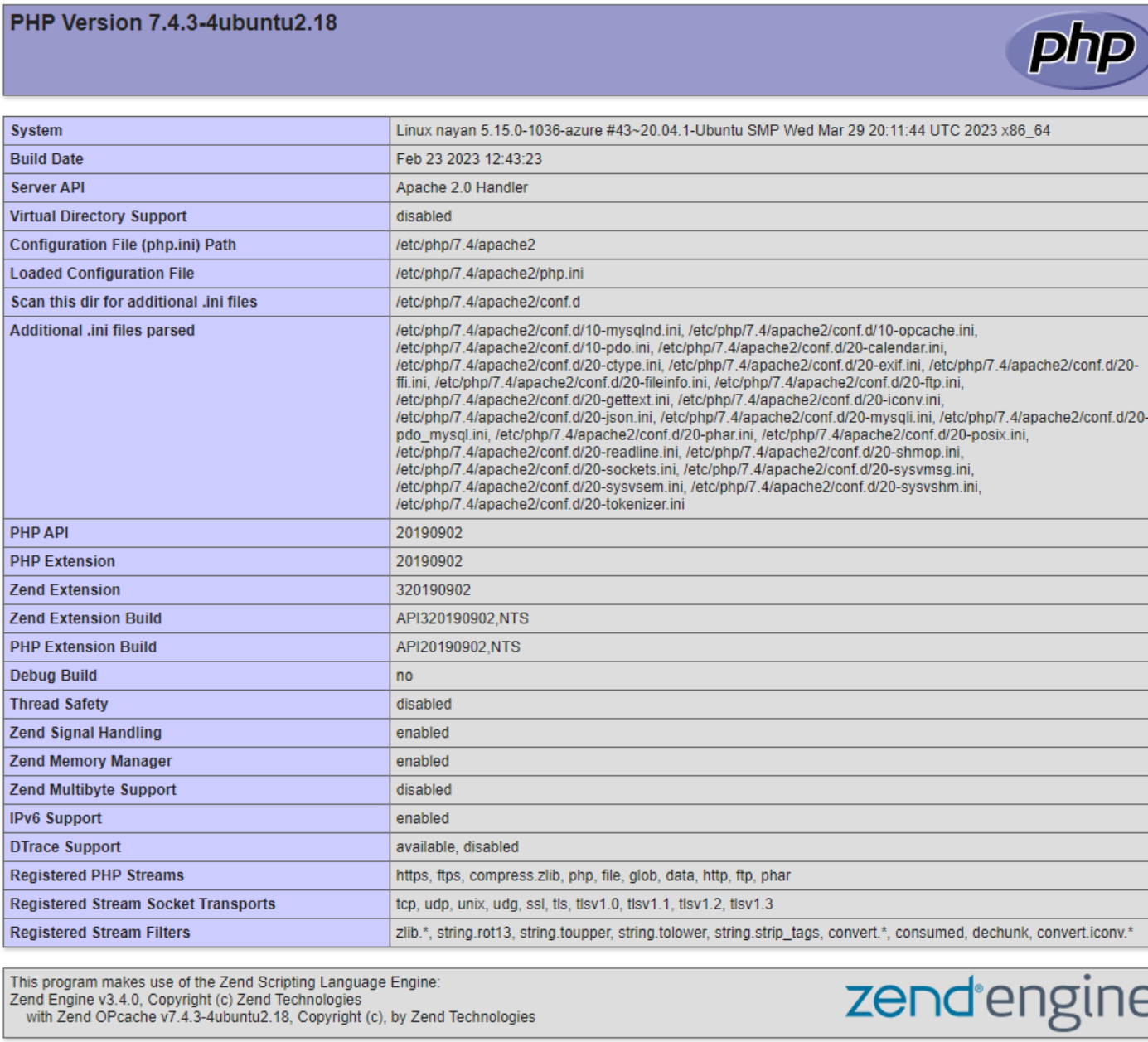
info.php (/var/www/html)

```
1  <html>
2  <?php
3  phpinfo();
4  ?>
5  </html>
```

4) The change the “info.php” file permissions to 0755.



5) Now with your web browser, go to http://35.204.55.123//info.php .



PHP Version 7.4.3-4ubuntu2.18

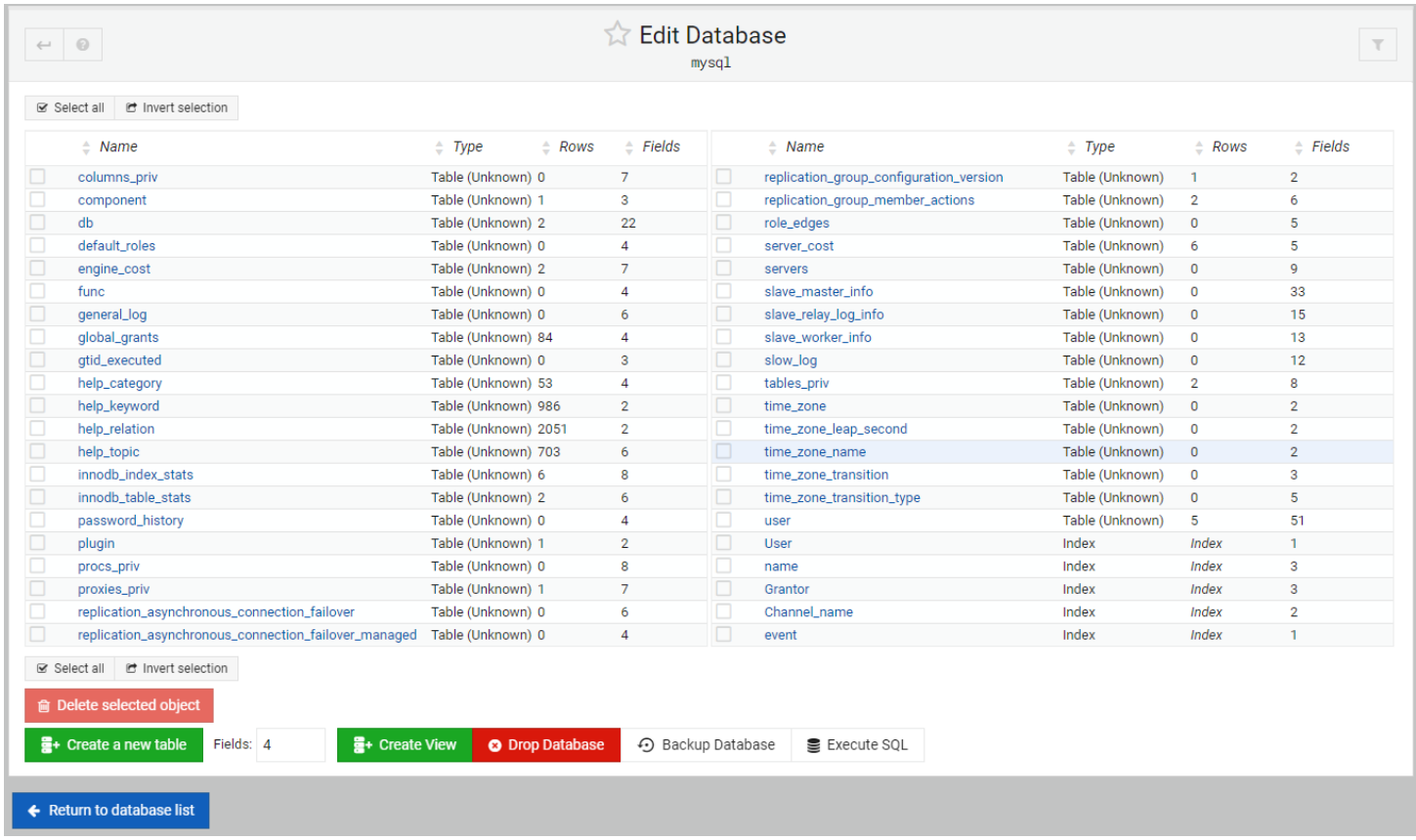
System	Linux nayan 5.15.0-1036-azure #43~20.04.1-Ubuntu SMP Wed Mar 29 20:11:44 UTC 2023 x86_64
Build Date	Feb 23 2023 12:43:23
Server API	Apache 2.0 Handler
Virtual Directory Support	disabled
Configuration File (php.ini) Path	/etc/php/7.4/apache2
Loaded Configuration File	/etc/php/7.4/apache2/php.ini
Scan this dir for additional .ini files	/etc/php/7.4/apache2/conf.d
Additional .ini files parsed	/etc/php/7.4/apache2/conf.d/10-mysqlnd.ini, /etc/php/7.4/apache2/conf.d/10-opcache.ini, /etc/php/7.4/apache2/conf.d/10-pdo.ini, /etc/php/7.4/apache2/conf.d/20-calendar.ini, /etc/php/7.4/apache2/conf.d/20-ctype.ini, /etc/php/7.4/apache2/conf.d/20-exif.ini, /etc/php/7.4/apache2/conf.d/20-ffi.ini, /etc/php/7.4/apache2/conf.d/20-fileinfo.ini, /etc/php/7.4/apache2/conf.d/20-ftp.ini, /etc/php/7.4/apache2/conf.d/20-gettext.ini, /etc/php/7.4/apache2/conf.d/20-iconv.ini, /etc/php/7.4/apache2/conf.d/20-json.ini, /etc/php/7.4/apache2/conf.d/20-mysqli.ini, /etc/php/7.4/apache2/conf.d/20-pdo_mysql.ini, /etc/php/7.4/apache2/conf.d/20-phar.ini, /etc/php/7.4/apache2/conf.d/20-posix.ini, /etc/php/7.4/apache2/conf.d/20-readline.ini, /etc/php/7.4/apache2/conf.d/20-shmop.ini, /etc/php/7.4/apache2/conf.d/20-sockets.ini, /etc/php/7.4/apache2/conf.d/20-sysvmsg.ini, /etc/php/7.4/apache2/conf.d/20-sysvsem.ini, /etc/php/7.4/apache2/conf.d/20-sysvshm.ini, /etc/php/7.4/apache2/conf.d/20-tokenizer.ini
PHP API	20190902
PHP Extension	20190902
Zend Extension	320190902
Zend Extension Build	API320190902,NTS
PHP Extension Build	API20190902,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
Registered Stream Socket Transports	tcp, udp, unix, udg, ssl, tls, tlsv1.0, tlsv1.1, tlsv1.2, tlsv1.3
Registered Stream Filters	zlib.*, string.rot13, string.toupper, string.tolower, string.strip_tags, convert.*, consumed, dechunk, convert.iconv.*

This program makes use of the Zend Scripting Language Engine:
Zend Engine v3.4.0, Copyright (c) Zend Technologies
with Zend OPcache v7.4.3-4ubuntu2.18, Copyright (c), by Zend Technologies

Part 10 - Setting up the MySQL Database Server

1) On the left hand side of Webmin, under Servers and then click on “MySQL Database Server”.
2) Then in the right hand pane, click “Start MySQL Server” if it’s not running.
3) Login with root and the database password you set in workshop 6 if it’s not logged in.

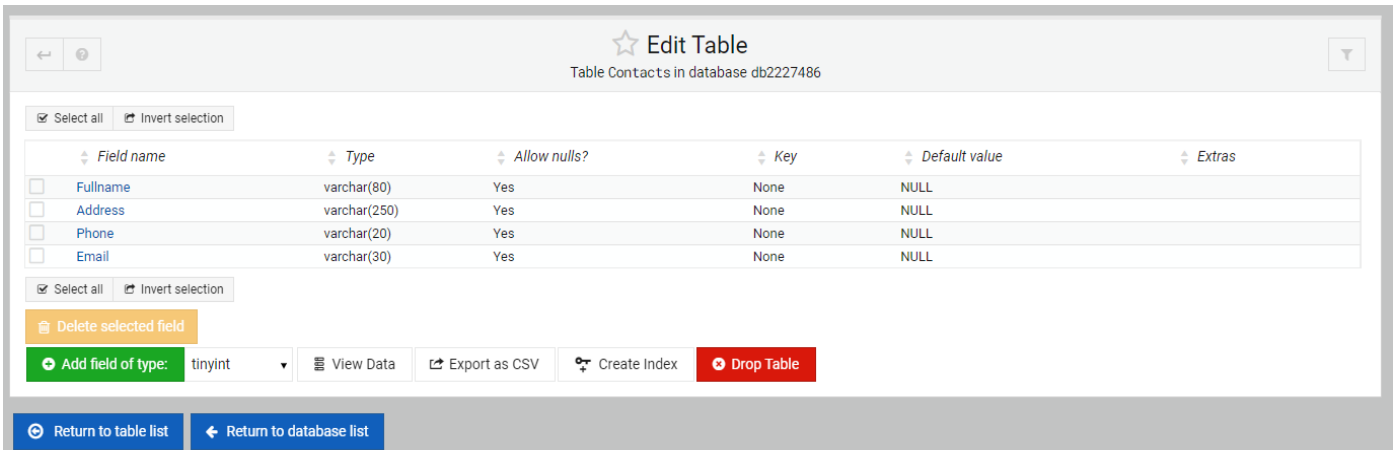
4) When the MySQL Database Server has started, you should see the right hand pane of Webmin change to display “MySQL Databases” containing the “information_schema”, ”mysql” and ”performance_schema” databases , as well as the “Global Options”.
5) Click on the “mysql” database and Webmin will display the database tables within the “mysql” database.
6) Then click “Return to database list” to return to the previous screen.



Creating a new MySQL database and table

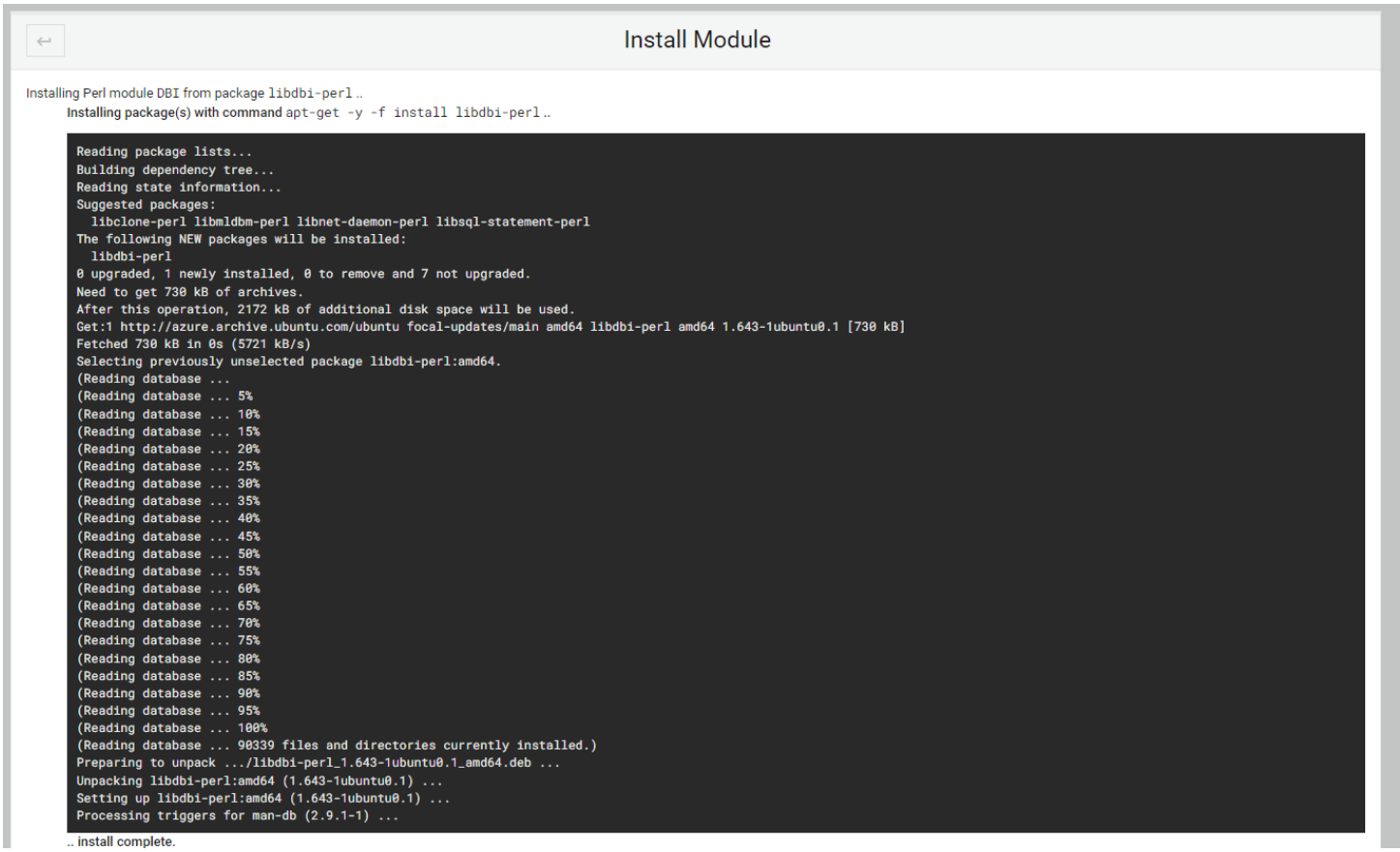
Note: Significant parts of this document were sourced from Dr Consolee Mbarushimana

1) On the left hand side of Webmin, under Servers and then click on “MySQL Database Server”.
2) Click “Create a new database”
3) Give your new database the name of your student ID prefixed with the letters “db”. Thus if your student ID is 1234567, creating a new database with the name of “**db1234567**”. Make sure you use your student ID. Name the initial table “**Contacts**” and populate it with the information shown below
4) Click “Create” to create the table.
5) On the next screen, click on your new database and your Contacts table, to display its fields or columns.



Part 11 - Entering data into the Contacts table

1) Go on “MySQL Database Server and install the missing PERL modules as shown below



2) Click "**Return to table list**" to go back to the "**Edit Database**" view.

3) Click on the "**Execute SQL**" button.

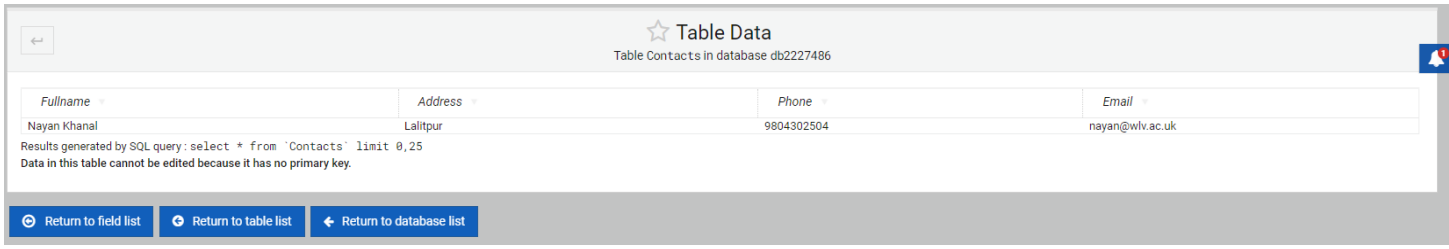
4) Enter the following SQL statement into the box and then click the "**Execute**" button. Make sure you get the spaces, commas, and single-quotes correct:

INSERT INTO Contacts VALUES ('Firstname Surname', 'Your address', 'Yourphone number', 'email@wlv.ac.uk');

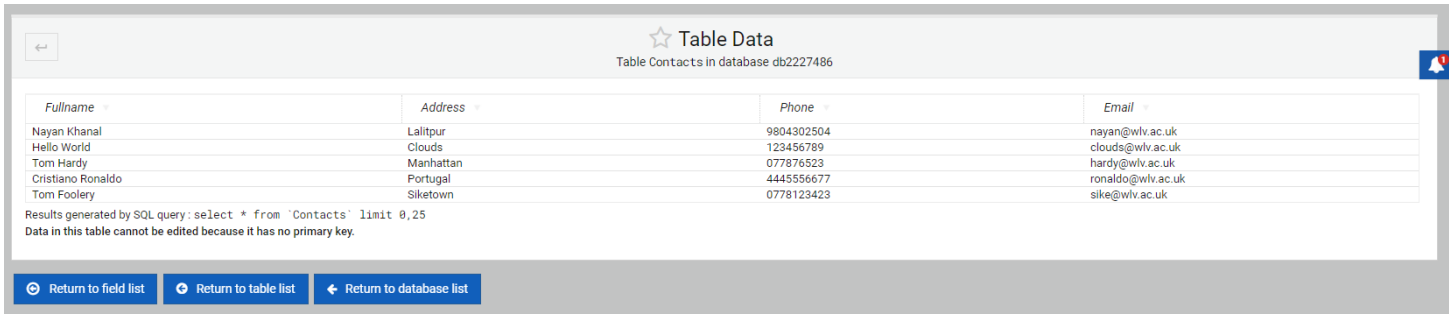
5) Then click "Return to table list"

6) Double Click on the Contacts table and then "**View Data**".

7) You should see the data that you have just entered into the "Contacts" table.

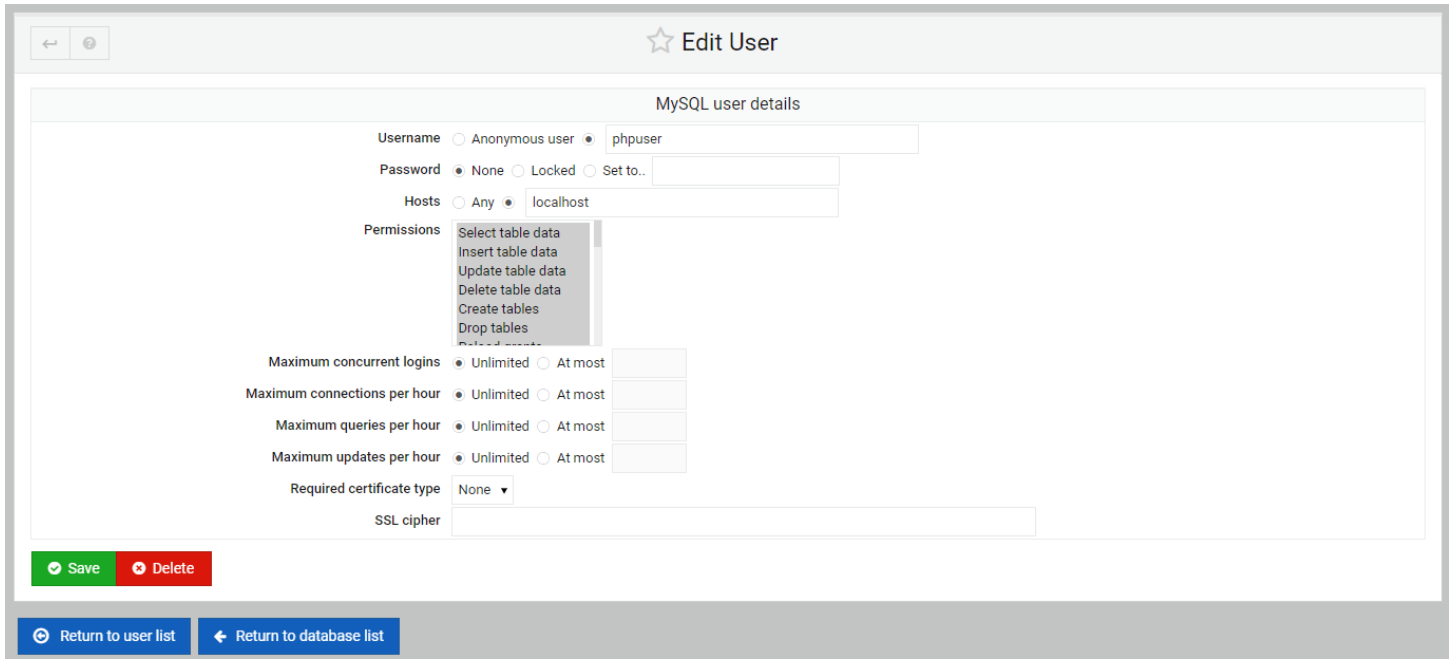


8) Repeat the procedure to create 4 more different contacts, using different values, and then capture the screen show all the contacts data, and paste it below:

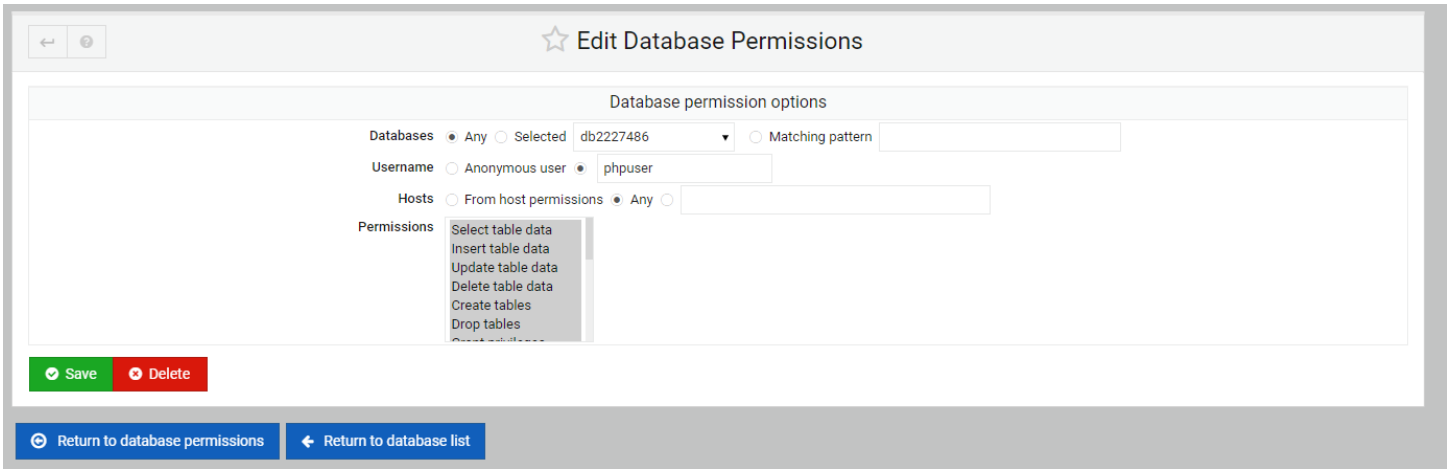


Part 12 - Connecting Apache/PHP to MySQL

- Go to the MySQL main screen showing all databases.
- Click on "**User Permissions**"
- Click on "**Create new user**"
- Create a new database user called "**phpuser**" with a password of "**Password123!**", set the Hosts to "**localhost**", and select all the permissions:



- Click "**Create**".
- Click "Return to database list"
- Click on "**Database Permissions**", and then click on "**Create new database permissions**"
- Select the Database of "**db1234567**" (make sure you select **your own database**), and set the rest of the details as shown below:



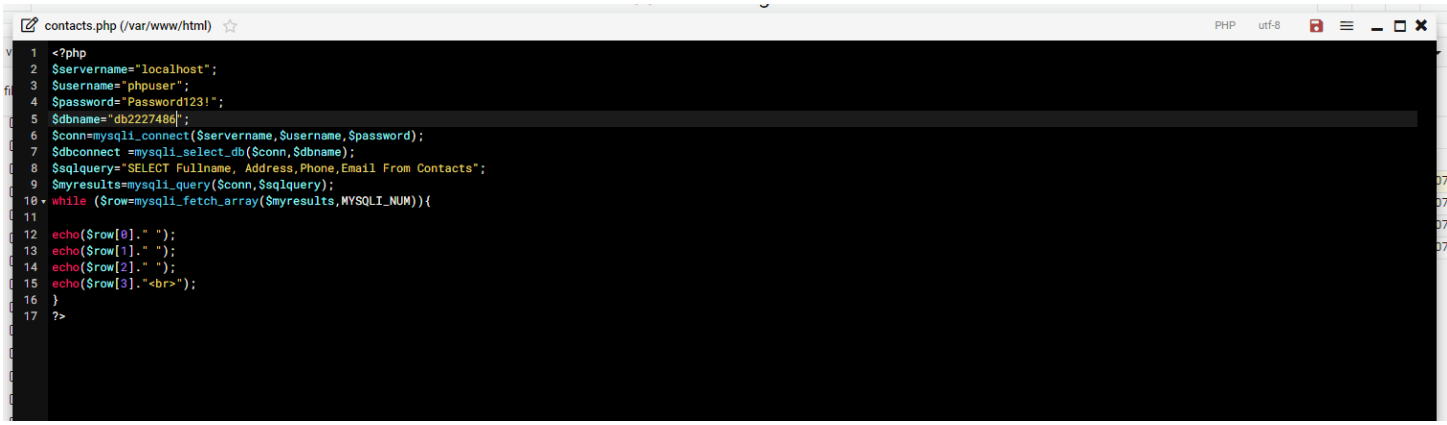
- Click "Create".
- Click "Return to database list"

- Stop and then re-start the MySQL Database server.

- Go back to the Webmin Filemanager, and browse to the /var/www/html/ directory.

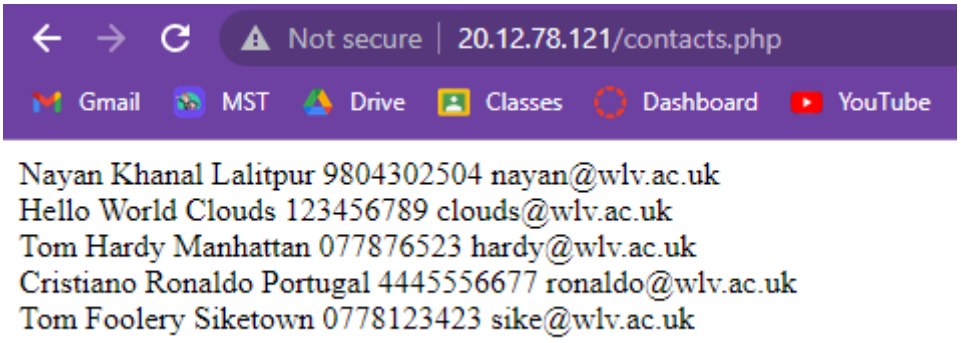
- Create a new file called "**contacts.php**".

- Enter the following code into the PHP file. Make sure you use **your own database name**:
- Make sure you don't get the curly brackets {} mixed up with the round ones ()!



- Save the file and then set its permissions to **0755** and both ownership fields to "**phpuser**"

- Now with your web browser, go to http://35.204.55.123/contacts.php .



This is the end of this workshop.