

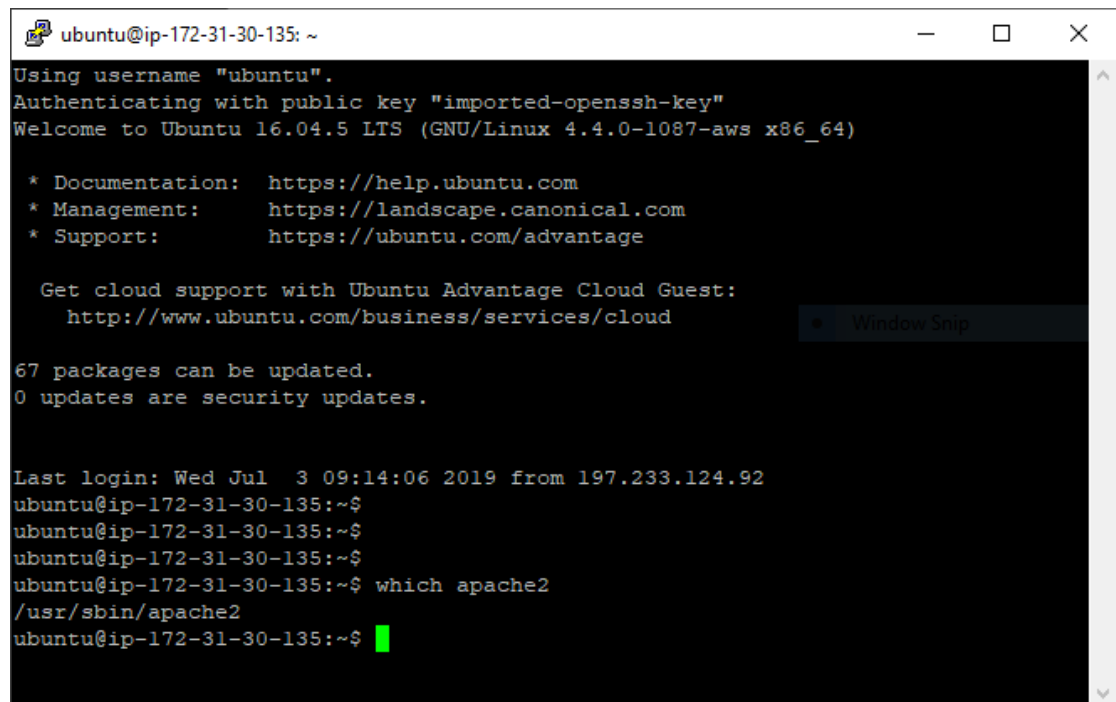
Web (Ubuntu)

Apache is a mission critical service in virtually all networks. Clients depend on the service to access web pages, as such security is key in all configurations of apache. Access to the service should be monitored and adequate security must be implemented.

Activities

Before starting with the activity, check that Apache is installed.

```
which apache2
```

A terminal window titled 'ubuntu@ip-172-31-30-135: ~' with standard window controls. The terminal output shows the login process for 'ubuntu' on 'Ubuntu 16.04.5 LTS (GNU/Linux 4.4.0-1087-aws x86_64)'. It lists documentation, management, and support links. It also shows that 67 packages can be updated, with 0 security updates. The last login was on Wednesday, July 3, 2019, at 09:14:06 from IP 197.233.124.92. The user then runs 'which apache2', and the output is '/usr/sbin/apache2'.

```
ubuntu@ip-172-31-30-135: ~
Using username "ubuntu".
Authenticating with public key "imported-openssh-key"
Welcome to Ubuntu 16.04.5 LTS (GNU/Linux 4.4.0-1087-aws x86_64)

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

Get cloud support with Ubuntu Advantage Cloud Guest:
http://www.ubuntu.com/business/services/cloud

67 packages can be updated.
0 updates are security updates.

Last login: Wed Jul  3 09:14:06 2019 from 197.233.124.92
ubuntu@ip-172-31-30-135:~$
ubuntu@ip-172-31-30-135:~$
ubuntu@ip-172-31-30-135:~$ which apache2
/usr/sbin/apache2
ubuntu@ip-172-31-30-135:~$
```

1. Install **Apache** on the server.

```
apt-get install apache2
```

```
ubuntu@ip-172-31-30-135: ~  
  
Get cloud support with Ubuntu Advantage Cloud Guest:  
http://www.ubuntu.com/business/services/cloud  
  
67 packages can be updated.  
0 updates are security updates.  
  
New release '18.04.2 LTS' available.  
Run 'do-release-upgrade' to upgrade to it.  
  
Last login: Fri Jul  5 20:03:22 2019 from 197.233.131.57  
ubuntu@ip-172-31-30-135:~$ sudo apt-get apache2  
E: Invalid operation apache2  
ubuntu@ip-172-31-30-135:~$ sudo apt-get install apache2  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
apache2 is already the newest version (2.4.18-2ubuntu3.10).  
The following packages were automatically installed and are no longer required:  
  linux-aws-headers-4.4.0-1084 linux-headers-4.4.0-1084-aws linux-image-4.4.0-10  
Use 'sudo apt autoremove' to remove them.  
0 upgraded, 0 newly installed, 0 to remove and 73 not upgraded.  
ubuntu@ip-172-31-30-135:~$
```

2. Make sure that apache is set to start up automatically when the server is powered on

```
sudo update-rc.d apache2 enable
```

3. Start up apache

```
sudo service apache2 start
```

4. Verify the status of the service to confirm that it is working. If not, then troubleshoot.


```
sudo service
```

```
apache2 status
```

```
ubuntu@ip-172-31-30-135: ~
Password:
polkit-agent-helper-1: pam_authenticate failed: Authentication failure
==== AUTHENTICATION FAILED ====
Failed to execute operation: Access denied
ubuntu@ip-172-31-30-135:~$ sudo update-rc.d apache2 enable
ubuntu@ip-172-31-30-135:~$ sudo service apache2 start
ubuntu@ip-172-31-30-135:~$ sudo service apache2 status
● apache2.service - LSB: Apache2 web server
   Loaded: loaded (/etc/init.d/apache2; bad; vendor preset: enabled)
   Drop-In: /lib/systemd/system/apache2.service.d
            └─apache2-systemd.conf
   Active: active (running) since Fri 2019-07-05 19:31:55 UTC; 1h 3min ago
     Docs: man:systemd-sysv-generator(8)
   CGroup: /system.slice/apache2.service
            └─1351 /usr/sbin/apache2 -k start
               1354 /usr/sbin/apache2 -k start
               1355 /usr/sbin/apache2 -k start

Jul 05 19:31:53 ip-172-31-30-135 systemd[1]: Starting LSB: Apache2 web server...
Jul 05 19:31:53 ip-172-31-30-135 apache2[1261]: * Starting Apache httpd web ser
Jul 05 19:31:55 ip-172-31-30-135 apache2[1261]: *
Jul 05 19:31:55 ip-172-31-30-135 systemd[1]: Started LSB: Apache2 web server.
Jul 05 20:33:00 ip-172-31-30-135 systemd[1]: Started LSB: Apache2 web server.
lines 1-16/16 (END)
```

5. In the web browser url window, use the IP address to access the server. This should display the Apache test page like the one below.



Apache2 Ubuntu Default Page

ubuntu

It works!

Ciao Marabekkka This is the default welcome page used to test the correct operation of the Apache2 server after installation on Ubuntu systems. It is based on the equivalent page on Debian, from which the Ubuntu Apache packaging is derived. If you can read this page, it means that the Apache HTTP server installed at this site is working properly. You should **replace this file** (located at `/var/www/html/index.html`) before continuing to operate your HTTP server.

If you are a normal user of this web site and don't know what this page is about, this probably means that the site is currently unavailable due to maintenance. If the problem persists, please contact the site's administrator.

Configuration Overview

Ubuntu's Apache2 default configuration is different from the upstream default configuration, and split into several files optimized for interaction with Ubuntu tools. The configuration system is **fully documented in `/usr/share/doc/apache2/README.Debian.gz`**. Refer to this for the full documentation. Documentation for the web server itself can be found by accessing the **manual** if the `apache2-doc` package was installed on this server.

The configuration layout for an Apache2 web server installation on Ubuntu systems is as follows:

```
/etc/apache2/
|-- apache2.conf
|   |-- ports.conf
|-- mods-enabled
|   |-- *.Load
|   |-- *.conf
|-- conf-enabled
|   |-- *.conf
|-- sites-enabled
|   |-- *.conf
```

Congratulations, your webserver is working! Now implement some basic functionality and a bit of security.

6. Backup all configuration files in the `/etc/apache2` directory. This should be standard

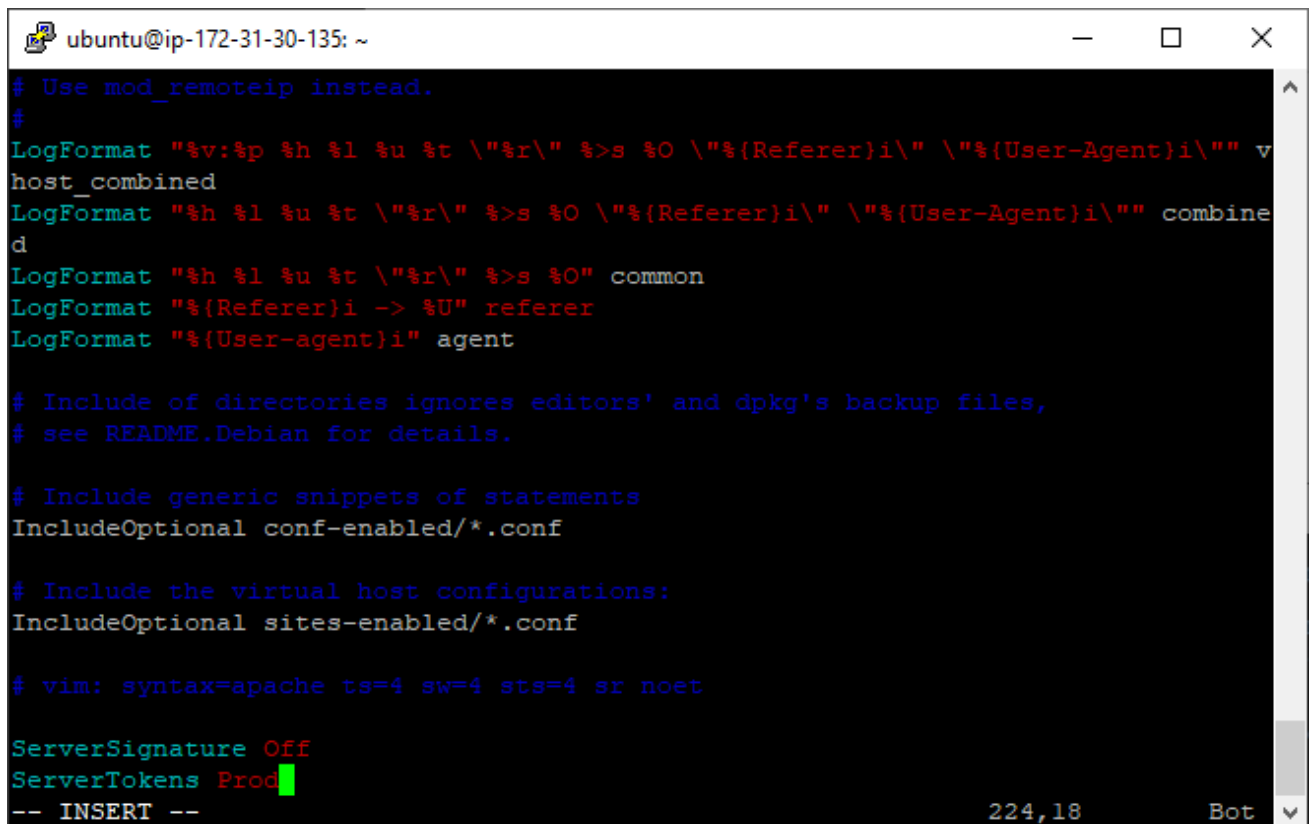
procedure, and will be helpful if something goes wrong. Create a new directory called `backups` inside `/home`, and copy all configuration files in `/etc/apache2`

7. Turn off server signatures. Disabling Apache web server signature can be achieved by editing Apache config file.

```
sudo vi /etc/apache2/apache2.conf
```

8. Add the following two lines at the end of Apache config file.

```
ServerSignature Off  
ServerTokens Prod
```



```
ubuntu@ip-172-31-30-135: ~  
# Use mod_remoteip instead.  
#  
LogFormat "%v:%p %h %l %u %t \"%r\" %>s %O \"%{Referer}i\" \"%{User-Agent}i\"" v  
host_combined  
LogFormat "%h %l %u %t \"%r\" %>s %O \"%{Referer}i\" \"%{User-Agent}i\"" combine  
d  
LogFormat "%h %l %u %t \"%r\" %>s %O" common  
LogFormat "%{Referer}i -> %U" referer  
LogFormat "%{User-agent}i" agent  
  
# Include of directories ignores editors' and dpkg's backup files,  
# see README.Debian for details.  
  
# Include generic snippets of statements  
IncludeOptional conf-enabled/*.conf  
  
# Include the virtual host configurations:  
IncludeOptional sites-enabled/*.conf  
  
# vim: syntax=apache ts=4 sw=4 sts=4 sr noet  
  
ServerSignature Off  
ServerTokens Prod  
-- INSERT --  
224,18 Bot
```

9. Test that the configuration syntax is ok.

```
sudo apachectl configtest
```

```
ubuntu@ip-172-31-30-135: ~  
Rules updated (v6)  
ubuntu@ip-172-31-30-135:~$ sudo ufw allow 'Apache'  
Using username "ubuntu".  
Authenticating with public key "imported-openssh-key"  
Welcome to Ubuntu 16.04.5 LTS (GNU/Linux 4.4.0-1087-aws x86_64)  
  
* Documentation:  https://help.ubuntu.com  
* Management:    https://landscape.canonical.com  
* Support:        https://ubuntu.com/advantage  
  
Get cloud support with Ubuntu Advantage Cloud Guest:  
http://www.ubuntu.com/business/services/cloud  
  
67 packages can be updated.  
0 updates are security updates.  
  
New release '18.04.2 LTS' available.  
Run 'do-release-upgrade' to upgrade to it.  
  
Last login: Fri Jul  5 21:26:32 2019 from 197.233.131.57  
ubuntu@ip-172-31-30-135:~$ sudo apachectl configtest  
Syntax OK  
ubuntu@ip-172-31-30-135:~$
```

10. Now restart Apache. If there is a syntax error, then troubleshoot.

```
sudo service apache2 restart
```

11. Open a web browser of your choice and test if the new configuration is working. Confirm that the service is running and accessible from a client computer

12. Navigate to the apache document root directory. This is the default location where apache will search for web pages. Adding pages to this directory, means that these can be accessed via http.

```
cd /var/www/html/
```

13. Create a new html file inside the directory, called `home.html`

```
touch home.html
```

14. Copy and paste this html code to the file and save.

```
<<!DOCTYPE html>
```

```
<html>
<head>
<title>Congratulations!!.</title>
</head>
<body style="background:black;">

<h3 style="color:white; color:orange; text-align:center;">TRUE
STORY</h3>

<p style="font-family:courier; color:white;" > (A lady comes in with
an external hard drive.)

Customer: "I backed up some pictures to this, but deleted them to
make room. I need to get those pictures."

Me: "Okay, well, let's see if we can recover them. Do you know what
folder the pictures would have been in?"

Customer: "What folder would I have put them in?"

Me: "Um... Often people make a folder called 'Pictures,' but they could
have been anywhere."

Customer: "Well, can you just give me step-by-step instructions on
where and how to find them, and then I can look?"

Me: "Well, no. I don't know where they are. That is what I am trying
to figure out."

Customer: "Well, my son put them on there and then deleted them to
make room."

Me: "Do you know when he deleted them? That would really help."
Customer: "I don't remember. When would he have deleted them?"

Me: "I really couldn't say."

(The conversation just kept going in circles, so I eventually looked
at every recoverable file before I found what I was looking for.)

</p>

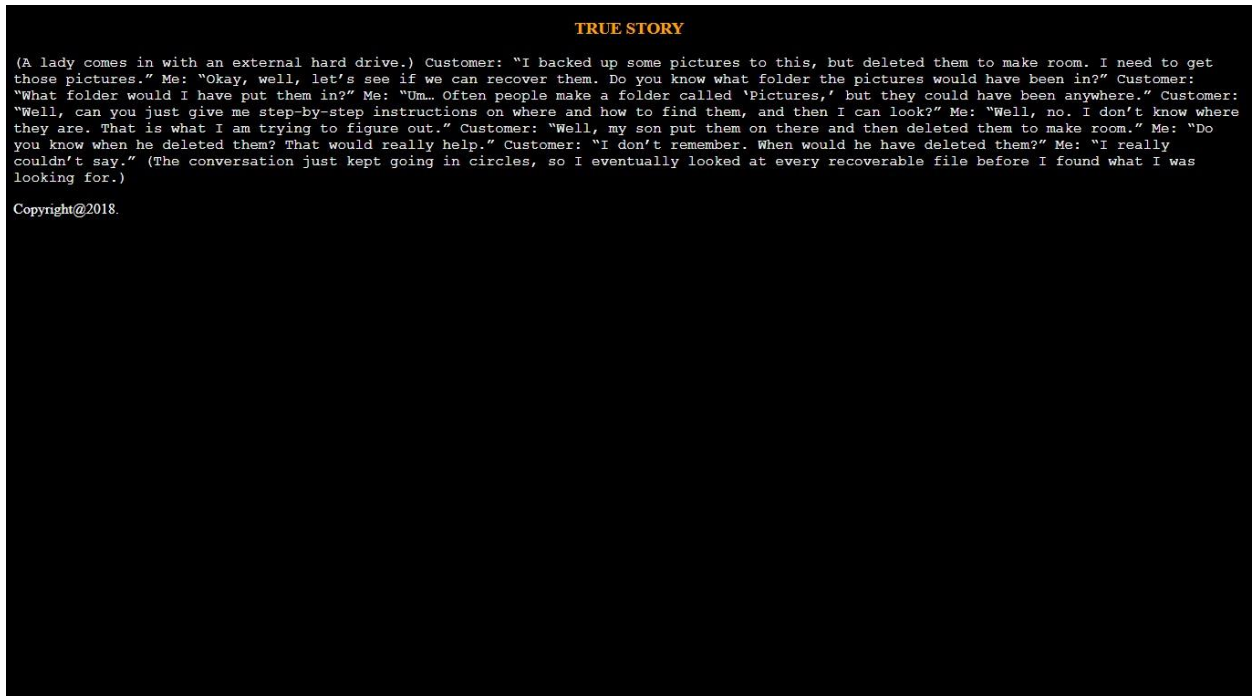
<footer style="color:white;">
Copyright@2018.
```

```
</footer>  
</body>
```

15. Change the apache index page from index.html to home.html

Discuss with your team members on how to go about it and implement it 😊👉

16. Test that the new web page is displaying.



17. Check running processes using the top command, and observe the user running apache2.

```
ubuntu@ip-172-31-30-135: ~  
top - 23:17:25 up 2:27, 1 user, load average: 0.00, 0.00, 0.00  
Tasks: 113 total, 1 running, 112 sleeping, 0 stopped, 0 zombie  
%Cpu(s): 0.0 us, 0.3 sy, 0.0 ni, 99.7 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st  
KiB Mem : 1014384 total, 674900 free, 70240 used, 269244 buff/cache  
KiB Swap: 0 total, 0 free, 0 used. 777368 avail Mem
```

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
1174	root	20	0	95368	1456	1320	S	0.0	0.1	0:00.00	lxdfs
1186	daemon	20	0	26044	2180	1988	S	0.0	0.2	0:00.00	atd
1206	root	20	0	4396	1212	1128	S	0.0	0.1	0:00.00	acpid
1220	root	20	0	65512	6280	5568	S	0.0	0.6	0:00.00	sshd
1236	root	20	0	13372	160	20	S	0.0	0.0	0:00.00	mdadm
1238	root	20	0	279256	7212	6036	S	0.0	0.7	0:00.01	polkitd
1330	root	20	0	14656	1820	1688	S	0.0	0.2	0:00.04	agetty
1332	root	20	0	14472	2184	2048	S	0.0	0.2	0:00.01	agetty
2348	root	20	0	0	0	0	S	0.0	0.0	0:00.02	kworker/0:4
2461	root	20	0	75816	4804	3608	S	0.0	0.5	0:00.06	apache2
2464	www-data	20	0	364972	6160	2600	S	0.0	0.6	0:00.42	apache2
2465	www-data	20	0	364972	6160	2600	S	0.0	0.6	0:00.42	apache2
2567	root	20	0	0	0	0	S	0.0	0.0	0:00.00	kworker/0:3
2573	root	20	0	92800	6584	5652	S	0.0	0.6	0:00.00	sshd
2575	ubuntu	20	0	45156	4680	3972	S	0.0	0.5	0:00.00	systemd
2576	ubuntu	20	0	61216	1916	4	S	0.0	0.2	0:00.00	(sd-pam)
2615	ubuntu	20	0	92800	3308	2380	S	0.0	0.3	0:00.08	sshd

18. By default Apache is configured to run as user and group **apache**. Create a new user called **webmaster** userID (**755**) and group **webmaster** and replace in the apache configuration files.

```
vi /etc/apache2/apache2.conf
```

Note (Do not forget to perform a syntax check before restarting the service, otherwise you will find it hard to troubleshoot when things don't work out. Trust me, you will regret it!)

19. Repeat step 16, but to make it easy, just filter the output to show processes running under the user **webmaster**, using the command;

```
top -u webmaster
```

20. Apache by default listens on port 80 for http and port 443 for https requests. Confirm this by using a tool called **netstat**. However this tool can display quite a lot of output, but to make better use of it, we should filter to show the listening ports, and established connections on different services running on the server;

```
netstat -plunta
```



```
ubuntu@ip-172-31-30-135: ~  
ubuntu@ip-172-31-30-135:~$ sudo netstat -plnta  
Active Internet connections (servers and established)  
Proto Recv-Q Send-Q Local Address           Foreign Address         State  
PID/Program name  
tcp        0      0 0.0.0.0:22              0.0.0.0:*               LISTEN  
1220/sshd  
tcp        0    464 172.31.30.135:22        197.233.131.57:29295    ESTABLISHED  
2573/sshd:  ubuntu [  
tcp6       0      0 :::80                   :::*                     LISTEN  
2461/apache2  
tcp6       0      0 :::22                   :::*                     LISTEN  
1220/sshd  
udp        0      0 0.0.0.0:68              0.0.0.0:*  
981/dhclient  
ubuntu@ip-172-31-30-135:~$
```

21. Record all the open ports.

22. Now change the default port used by apache to any unassigned port and confirm the change using netstat like in step 18. Do not forget to perform a syntax check before restarting the server.

23. It is possible to test that the server is working from the command line. To do this, install a tool called curl. Install **curl**

```
apt-get install curl
```

24. Open your running web page

```
curl http://localhost
```

If the html source code of your home page is displayed, then your server is responding to web page requests.

25. Finally, you have managed to install apache on a server with a working configuration. Share a screenshot with others. Share the knowledge, and remember teamwork is the best!!