C4 M1 L3 Qwiklab: Production and Test

1 hour 1 Credit

Rate Lab

Introduction

As a system administrator, it's important to always have a test environment where you can make changes without affecting the production environment that serves your users.

It's also important to have a clear reproduction case that can be used to verify you have fixed the problem you are trying to solve.

In this lab, you'll experiment with fixing a problem through first finding a reproduction case, then making changes in a test environment, and finally applying the changes to the production environment.

Heads up: Make sure to click the **"Start Lab"** button at the top of the screen. It may take a while for the lab to load. Please wait until the lab is running. To mark this lab as completed, make sure to click **"End Lab"** when you're finished!

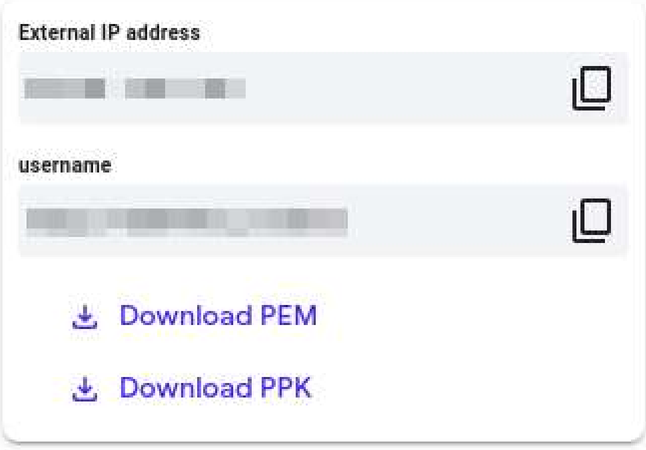
You'll have 60 minutes to complete this lab.

Start the lab

You'll need to start the lab before you can access the materials in the virtual machine OS. To do this, click the green “Start Lab” button at the top of the screen.

Note: For this lab you are going to access the **Linux VM** through your **local SSH Client**, and not use the **Google Console** (**Open GCP Console** button is not available for this lab).

After you click the “Start Lab” button, you will see all the SSH connection details on the left-hand side of your screen. You should have a screen that looks like this:



External IP address

[redacted]

username

[redacted]

Accessing the virtual machine

Please find one of the three relevant options below based on your device's operating system.

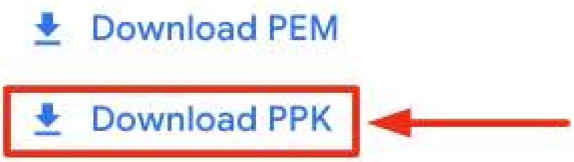
Note: Working with Qwiklabs may be similar to the work you'd perform as an **IT Support Specialist**; you'll be interfacing with a cutting-edge technology that requires multiple steps to access, and perhaps healthy doses of patience and persistence(!). You'll also be using **SSH** to enter the labs -- a critical skill in IT Support that you’ll be able to practice through the labs.

Option 1: Windows Users: Connecting to your VM

In this section, you will use the PuTTY Secure Shell (SSH) client and your VM’s External IP address to connect.

Download your PPK key file

You can download the VM’s private key file in the PuTTY-compatible **PPK** format from the Qwiklabs Start Lab page. Click on **Download PPK**.

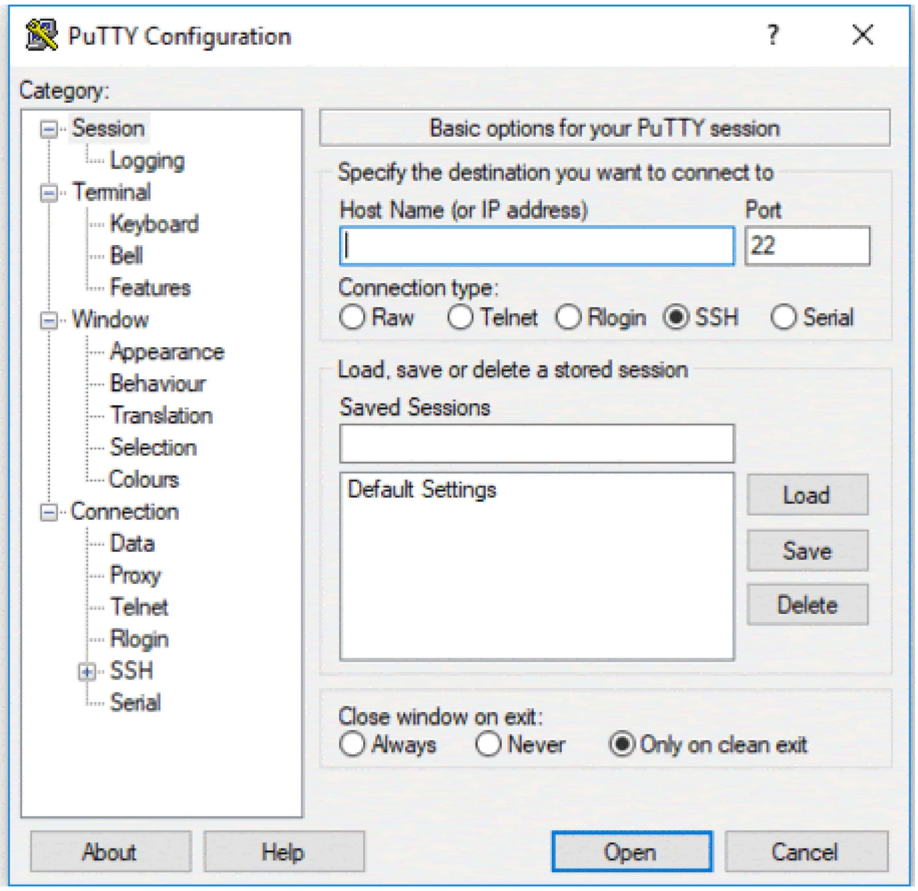


Connect to your VM using SSH and PuTTY

1. You can download Putty from here

2. In the **Host Name (or IP address)** box, enter username@external_ip_address.

Note: Replace **username** and **external_ip_address** with values provided in the lab.



PuTTY Configuration

Basic options for your PuTTY session

Specify the destination you want to connect to

Host Name (or IP address): |

Port: 22

Connection type: ○ Raw ○ Telnet ○ Rlogin ● SSH ○ Serial

Load, save or delete a stored session

Saved Sessions

Default Settings

Close window on exit: ○ Always ○ Never ● Only on clean exit

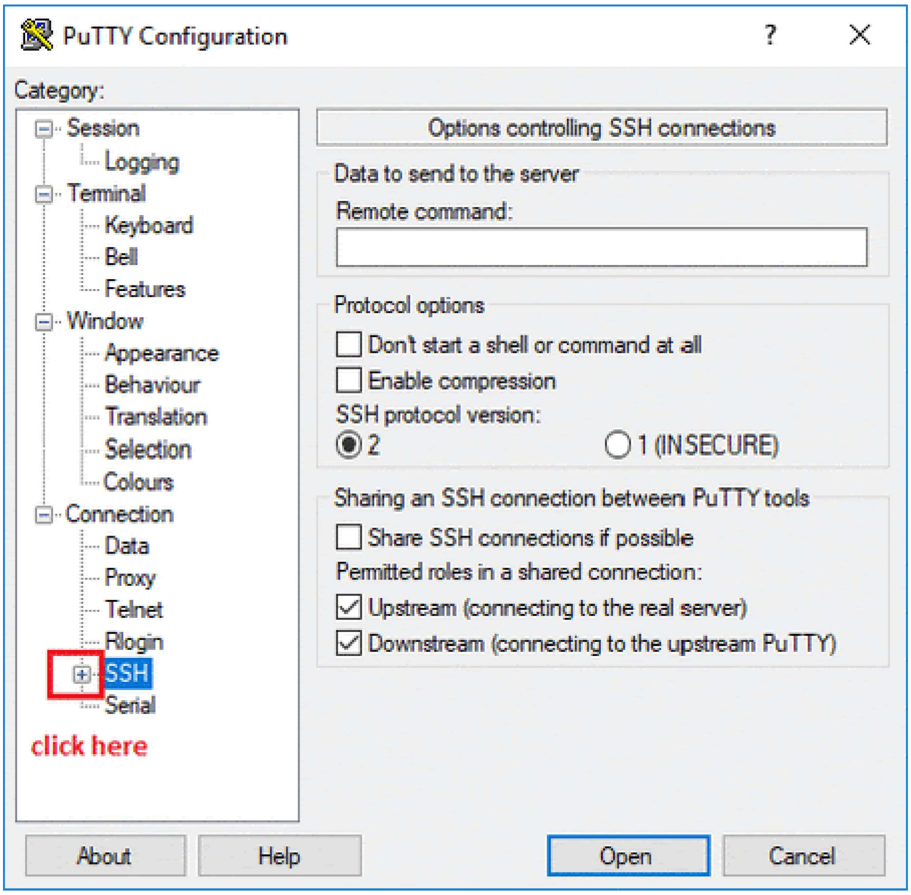
3. In the **Category** list, expand **SSH**.

4. Click **Auth** (don’t expand it).

5. In the **Private key file for authentication** box, browse to the PPK file that you downloaded and double-click it.

6. Click on the **Open** button.

Note: PPK file is to be imported into PuTTY tool using the Browse option available in it. It should not be opened directly but only to be used in PuTTY.



click here

Options controlling SSH connections

Data to send to the server

Remote command:

Protocol options

□ Don't start a shell or command at all

□ Enable compression

SSH protocol version:

● 2 ○ 1 (INSECURE)

Sharing an SSH connection between PuTTY tools

□ Share SSH connections if possible

Permitted roles in a shared connection:

☑ Upstream (connecting to the real server)

☑ Downstream (connecting to the upstream PuTTY)

7. Click **Yes** when prompted to allow a first connection to this remote SSH server. Because you are using a key pair for authentication, you will not be prompted for a password.

Common issues

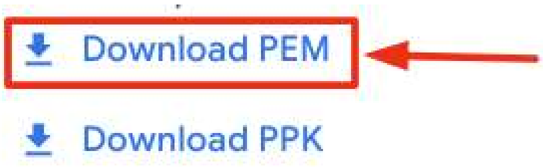
If PuTTY fails to connect to your Linux VM, verify that:

- You entered **<username>@<external ip address>** in PuTTY.
- You downloaded the fresh new PPK file for this lab from Qwiklabs.
- You are using the downloaded PPK file in PuTTY.

Option 2: OSX and Linux users: Connecting to your VM via SSH

Download your VM's private key file.

You can download the private key file in PEM format from the Qwiklabs Start Lab page. Click on **Download PEM**.



Connect to the VM using the local Terminal application

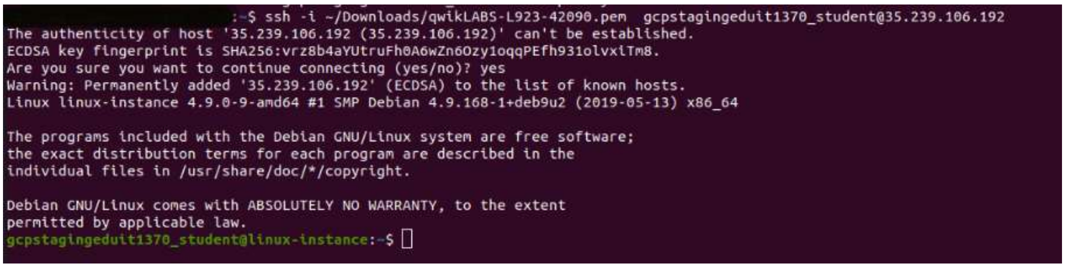
A **terminal** is a program which provides a **text-based interface for typing commands**. Here you will use your terminal as an SSH client to connect with lab provided Linux VM.

1. Open the Terminal application.
    - To open the terminal in Linux use the shortcut key **Ctrl+Alt+t**.
    - To open terminal in **Mac** (OSX) enter **cmd + space** and search for **terminal**.
2. Enter the following commands.

Note: Substitute the **path/filename for the PEM** file you downloaded, **username** and **External IP Address**.
You will most likely find the PEM file in **Downloads**. If you have not changed the download settings of your system, then the path of the PEM key will be **~/Downloads/qwikLABS-XXXXX.pem**

```
chmod 600 ~/Downloads/qwikLABS-XXXXX.pem
```

```
ssh -i ~/Downloads/qwikLABS-XXXXX.pem username@External Ip Address
```

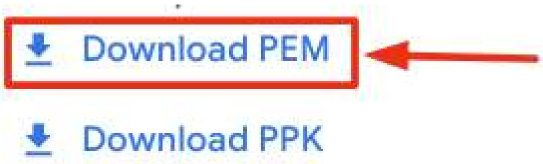


```
[redacted]:~$ ssh -i ~/Downloads/qwikLABS-L923-42090.pem  gcpstagingeduit1370_student@35.239.106.192
The authenticity of host '35.239.106.192 (35.239.106.192)' can't be established.
ECDSA key fingerprint is SHA256:vrz8b4aYUtruFh0A6wZn6Ozy1oqqPEfh931olvxiTm8.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '35.239.106.192' (ECDSA) to the list of known hosts.
Linux linux-instance 4.9.0-9-amd64 #1 SMP Debian 4.9.168-1+deb9u2 (2019-05-13) x86_64

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

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
gcpstagingeduit1370_student@linux-instance:~$ 
```

Option 3: Chrome OS users: Connecting to your VM via SSH

Note: Make sure you are not in **Incognito/Private mode** while launching the application.
Download your VM’s private key file.

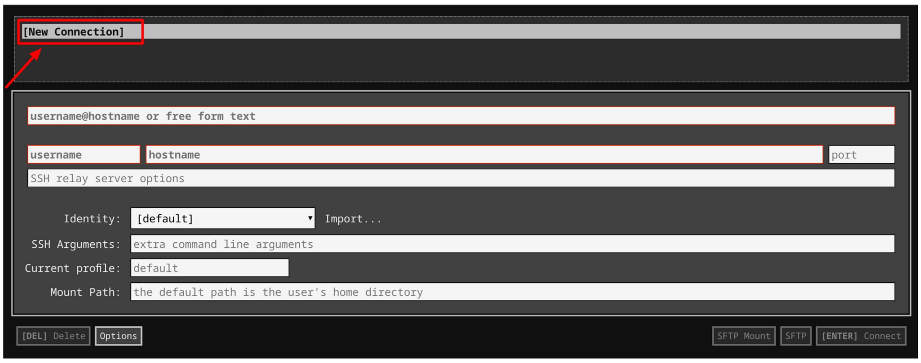
You can download the private key file in PEM format from the Qwiklabs Start Lab page. Click on **Download PEM**.



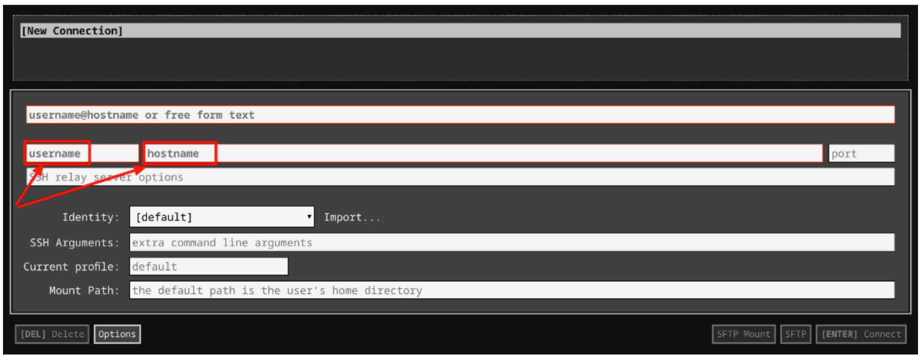
Connect to your VM

1. Add Secure Shell from here to your Chrome browser.

2. Open the Secure Shell app and click on **[New Connection]**.



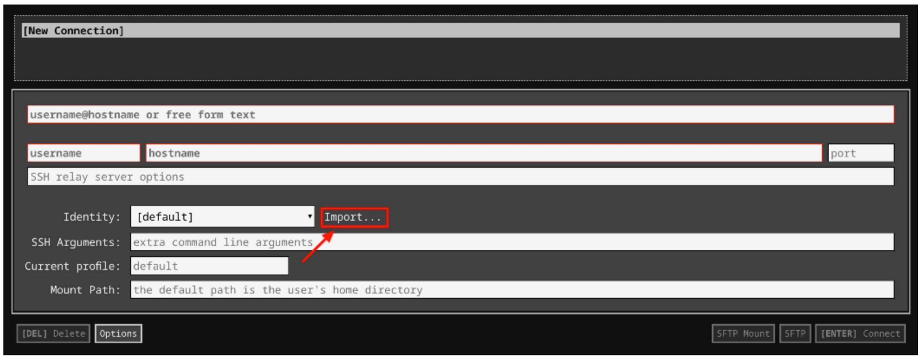
3. In the **username** section, enter the username given in the Connection Details Panel of the lab. And for the **hostname** section, enter the external IP of your VM instance that is mentioned in the Connection Details Panel of the lab.



4. In the **Identity** section, import the downloaded PEM key by clicking on the **Import…** button beside the field. Choose your PEM key and click on the **OPEN** button.

Note: If the key is still not available after importing it, refresh the application, and select it from the **Identity** drop-down menu.

5. Once your key is uploaded, click on the **[ENTER] Connect** button below.



[New Connection]

username@hostname or free form text

username | hostname | port

SSH relay server options

Identity: [default]

SSH Arguments: extra command line arguments

Current profile: default

Mount Path: the default path is the user's home directory

6. For any prompts, type **yes** to continue.

7. You have now successfully connected to your Linux VM.

You're now ready to continue with the lab!

Linux commands reminder

In this lab, we'll use a number of Linux commands that were already explained during Course 3. This is a reminder of what these commands do:

- `sudo <command>`: executes a command with administrator rights
- `cd <directory>`: changes the current directory to the one specified
- `ls <directory>`: lists the files in a directory
- `mv <old_name> <new_name>`: moves or renames a file from the old name to the new name
- `chmod <permissions> <file>`: changes the permissions of a file

While you can copy and paste the commands that are presented in this lab, we recommend typing them out manually, to help you understand and remember these commands.

The scenario

This lab has two separate VMs : `prod-server` and `test-instance`.

In this scenario, `prod-server` is the machine that is serving an institutional website. `test-instance` is a VM with the exact same configuration but without any users accessing it.

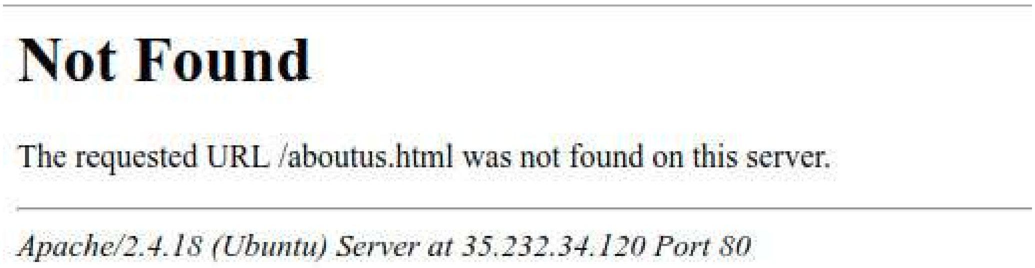
Looking at the internal ticket queue you see a ticket from a user telling you that when they try to access the "About Us" page in the institutional website, they are getting an error.

Reproduction case

As mentioned during the lesson, the reproduction case for a problem is the steps that led the user to an unexpected outcome. In this case, we know that this is related to the "About Us" page. Let's see if we can reproduce the error that the user mentioned.

In the connection detail panel, you will see the IP address associated with the instances. Copy the external IP of any instance to a new tab in your browser. This will take you to the website hosted in that machine. (Remember to use the http protocol, as our website is only available in http).

You will see the institutional website of our example company. If you click on the "About Us" link, you will get an error page saying Not Found.



Not Found

The requested URL /aboutus.html was not found on this server.

Apache/2.4.18 (Ubuntu) Server at 35.232.34.120 Port 80

This is the reproduction case for the problem that we want to fix:

- The necessary steps are: first navigate to the website being served by the machine and then click on the "About Us" link on that page. The link tries to access a page of the format `http://10.20.30.40/aboutus.html`.
- The expected outcome is that we should see an informational website about the company.
- The unexpected outcome is the error page that is generated instead.

You should verify that you get the same error on both the production and the test instances.

Fixing the problem in the test instance

Now that we have a clear reproduction case, let's try to figure out how to fix it.

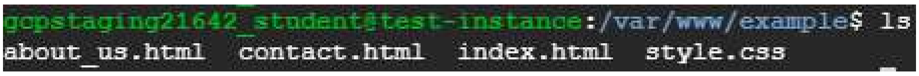
Go ahead and connect to `test-instance` by following the instructions given in the section `Accessing the virtual machine`. Click on `Accessing the virtual machine` from the navigation pane at the right side.

Note: Use **test-instance External IP address** in the connection details panel to connect to the test-instance.

This machine is running the Apache2 web server. We will look more closely at Apache2 later. For now, all you need to know is that the website is located in `/var/www/example`. Let's first change into that directory, and then list the contents:

```
cd /var/www/example/
```

```
ls
```



```
gcpstaging21642_student@test-instance:/var/www/example$ ls
about_us.html  contact.html  index.html  style.css
```

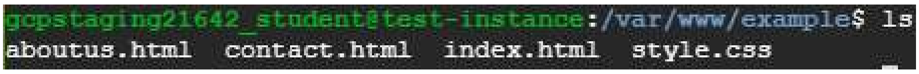
These are the files used to serve the website. Looking back at our reproduction case, the page that we were trying to access was `http://1.2.3.4/aboutus.html`. And the error message was "Not Found" which means that the web server can't find the requested page.

Why can't the web server find the page? There is an `about_us.html` file, but no `aboutus.html` file. Let's rename that file so that the web server can find it:

```
sudo mv about_us.html aboutus.html
```

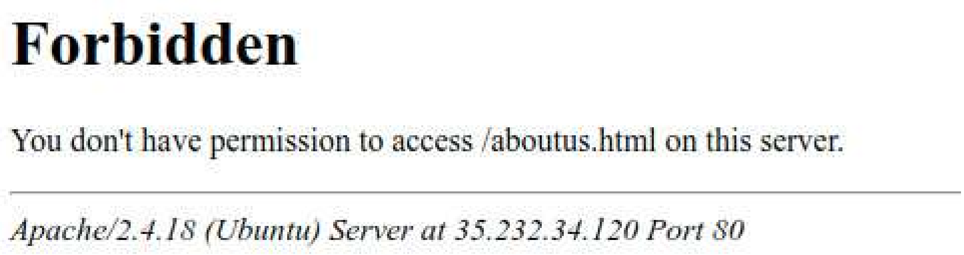
As with many other Linux commands, this command doesn't produce any output when it operates successfully. Let's check if it worked by listing the contents again.

```
ls
```



```
gcpstaging21642_student@test-instance:/var/www/example$ ls
aboutus.html  contact.html  index.html  style.css
```

Alright, we've renamed the file. Now, try visiting the website again. Did it work?



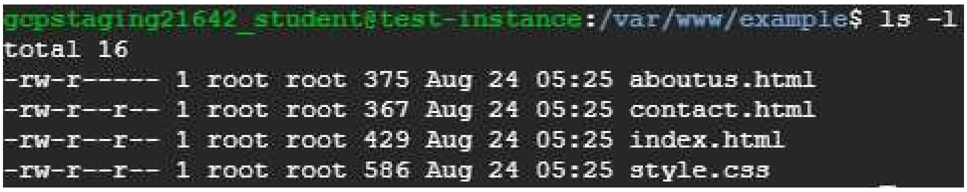
Forbidden

You don't have permission to access /aboutus.html on this server.

Apache/2.4.18 (Ubuntu) Server at 35.232.34.120 Port 80

No, it didn't. We get a different error now. The server says that the content is "Forbidden". This means that we don't seem to have enough permissions to access the requested page. Let's look at the permissions of the files in this directory, using the `-l` parameter for the `ls` command:

```
ls -l
```



```
gcpstaging21642_student@test-instance:/var/www/example$ ls -l
total 16
-rw-r----- 1 root root 375 Aug 24 05:25 aboutus.html
-rw-r--r-- 1 root root 367 Aug 24 05:25 contact.html
-rw-r--r-- 1 root root 429 Aug 24 05:25 index.html
-rw-r--r-- 1 root root 586 Aug 24 05:25 style.css
```

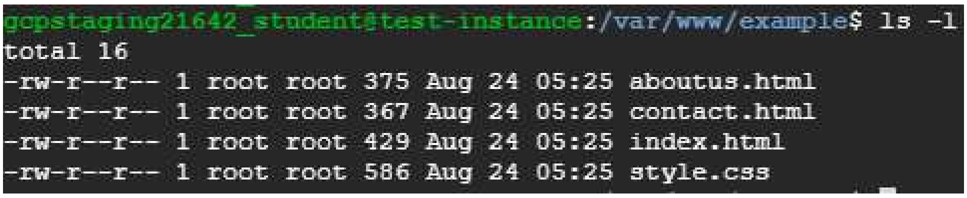
The first column of the output shows us the permissions of each of the files. We can see that while `contact.html`, `index.html` and `style.css` all have read permissions for owner, group and others, aboutus.html has read permissions for owner and group, but not for others. The web server runs with its own user and so it's considered an "other".

We need to add this missing permission to the file so that the webserver can read it. We can do that using the chmod command:

```
sudo chmod o+r aboutus.html
```

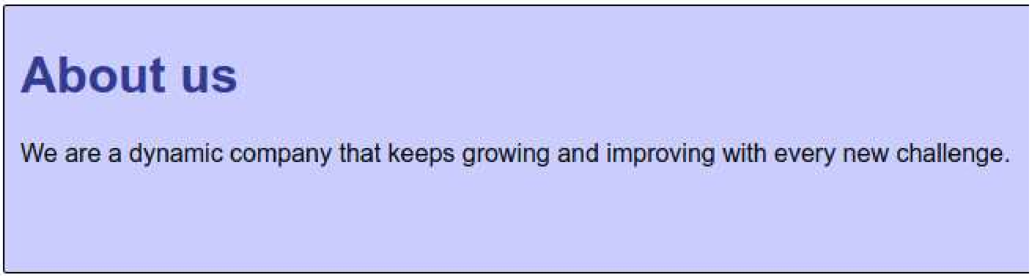
With this, we are adding the read permission to the rest of the users. Let's look at the contents of the directory again:

```
ls -l
```



```
gcpstaging21642_student@test-instance:/var/www/example$ ls -l
total 16
-rw-r--r-- 1 root root 375 Aug 24 05:25 aboutus.html
-rw-r--r-- 1 root root 367 Aug 24 05:25 contact.html
-rw-r--r-- 1 root root 429 Aug 24 05:25 index.html
-rw-r--r-- 1 root root 586 Aug 24 05:25 style.css
```

Alright, let's check if the webpage is working now. Try visiting the website again. Did it work?



About us

We are a dynamic company that keeps growing and improving with every new challenge.

Success!

Click *Check my progress* to verify the objective.

Fix the test instance

Fixing the production instance

We used our test instance to experiment safely with what the problem could be and how to fix it. Now that we have a working website in our test instance and we know what we need to do, we are going to fix our production instance.

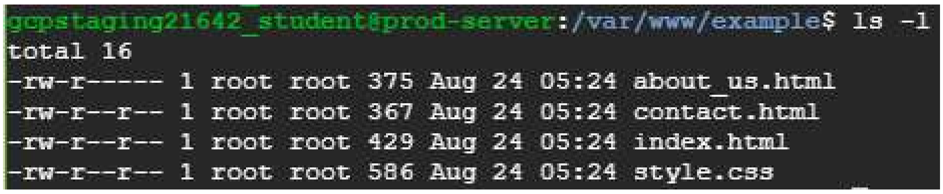
Now connect to `prod-server` by following the instructions given in the section `Accessing the virtual machine`. Click on `Accessing the virtual machine` from the navigation pane at the right side.

Note: Use **prod-server External IP address** in the connection details panel to connect to the prod-server.
We will repeat the steps that we did in our test instance, only this time we already know what we need to do.

First we move to the directory where the website is located and we double check that the state is the same as it was in the test instance before we fixed it:

```
cd /var/www/example/
```

```
ls -l
```



```
gcpstaging21642_student@prod-server:/var/www/example$ ls -l
total 16
-rw-r----- 1 root root 375 Aug 24 05:24 about_us.html
-rw-r--r-- 1 root root 367 Aug 24 05:24 contact.html
-rw-r--r-- 1 root root 429 Aug 24 05:24 index.html
-rw-r--r-- 1 root root 586 Aug 24 05:24 style.css
```

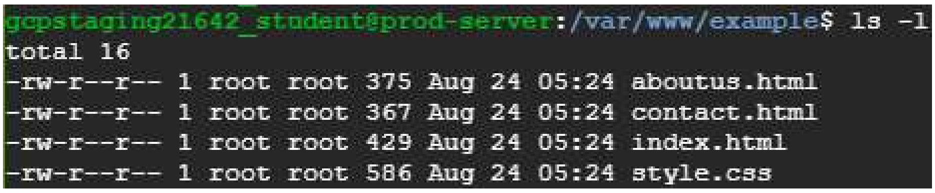
Now, we fix it by applying the two commands that we applied before:

```
sudo mv about_us.html aboutus.html
```

```
sudo chmod o+r aboutus.html
```

And we verify that the name and permissions are now correct:

```
ls -l
```



```
gcpstaging21642_student@prod-server:/var/www/example$ ls -l
total 16
-rw-r--r-- 1 root root 375 Aug 24 05:24 aboutus.html
-rw-r--r-- 1 root root 367 Aug 24 05:24 contact.html
-rw-r--r-- 1 root root 429 Aug 24 05:24 index.html
-rw-r--r-- 1 root root 586 Aug 24 05:24 style.css
```

And finally, we verify that we actually fixed the problem by going through our reproduction case: visit the website served by the prod-server, click on the "About Us" link and check that we get the content of the web page rather than an error.

Did it work?

Cool!

Click *Check my progress* to verify the objective.

Fix the production instance

Conclusion

Congrats! You've successfully found a reproduction case for a problem, identified the root cause, fixed the problem in a test instance, and then applied the change in the production server.

Along the way we learned about a couple of common problems while serving web pages: files with the wrong names or the wrong permissions. And we practiced fixing those problems using essential Linux commands like `mv` and `chmod`.

These are the first steps toward becoming more skilled and capable as a system administrator. Keep it up!

End your lab

When you have completed your lab, click **End Lab**. Qwiklabs removes the resources you've used and cleans the account for you.

You will be given an opportunity to rate the lab experience. Select the applicable number of stars, type a comment, and then click **Submit**.

The number of stars indicates the following:

- 1 star = Very dissatisfied
- 2 stars = Dissatisfied
- 3 stars = Neutral
- 4 stars = Satisfied
- 5 stars = Very satisfied

You can close the dialog box if you don't want to provide feedback.

For feedback, suggestions, or corrections, please use the **Support** tab.