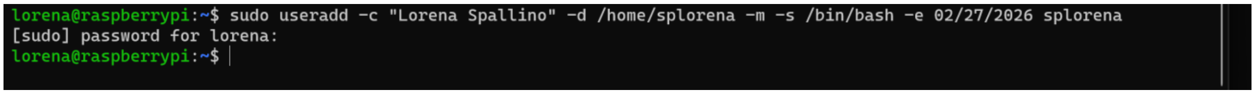
Network Operating Systems Experience – Part 1

Part A

1. **Create a user on the Ubuntu server with the following requirements:**
    a. **Username is the first 2 letters of your last name followed by your firstname**
    b. **The user's shell is /bin/bash**
    c. **The user must have a valid home directory**
    d. **The user's full name must be stored in the account information**
    e. **Account expires 2 years after today**

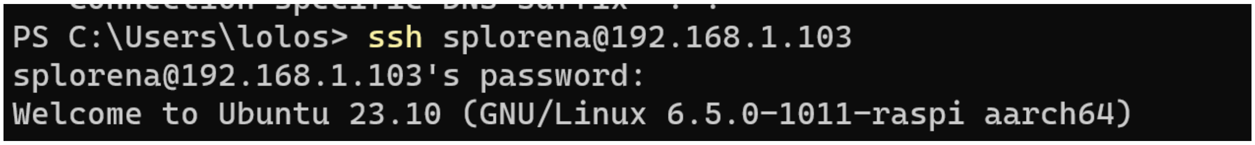
Below is a screenshot of the command I used to add the user with all the above specifications.



```
lorena@raspberrypi:~$ sudo useradd -c "Lorena Spallino" -d /home/splorena -m -s /bin/bash -e 02/27/2026 splorena
[sudo] password for lorena:
lorena@raspberrypi:~$ 
```

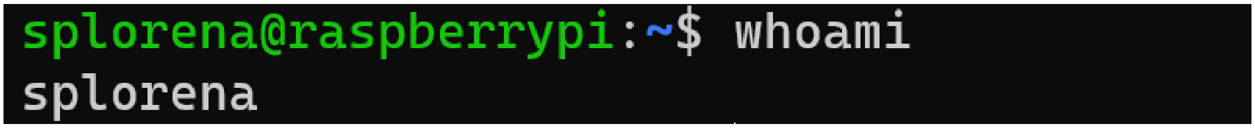
Log in as the new user and use the appropriate commands to display and provide screenshots of the user's (i) username and (ii) password information. Put screenshots of the 2 outputs below.

Below is a screenshot of how I logged into the newly created user. I created a password for this user and accessed the account with it.



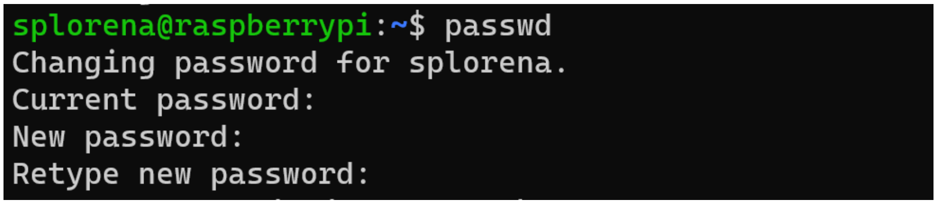
```
   Connection-specific DNS Suffix  . :
PS C:\Users\lolos> ssh splorena@192.168.1.103
splorena@192.168.1.103's password:
Welcome to Ubuntu 23.10 (GNU/Linux 6.5.0-1011-raspi aarch64)
```

Below is a screenshot displaying my username with the command whoami.



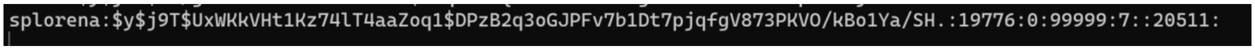
```
splorena@raspberrypi:~$ whoami
splorena
```

Then using a command to display the password, and change it if necessary:



```
splorena@raspberrypi:~$ passwd
Changing password for splorena.
Current password:
New password:
Retype new password:
```

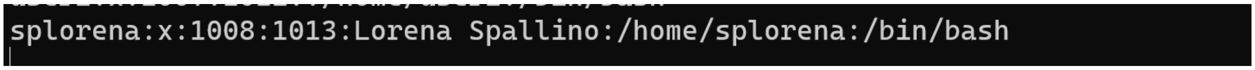
Additionally, I can view the encrypted password stored in the /etc/shadow file, as shown in the screenshot below. Of course, for security reasons the password is encrypted, and not written in plain text.



```
splorena:$y$j9T$UxWKkVHt1Kz74lT4aaZoq1$DPzB2q3oGJPFv7b1Dt7pjqfgV873PKVO/kBo1Ya/SH.:19776:0:99999:7::20511:
```

2. **Put a screenshot of the /etc/passwd file showing the new user that was added.**

Below shows the screenshot of the /etc/passwd file that evidently shows how the new user was added with the requirements, it shows that the user has a password, and is encrypted with the lowercase x in the second field, it shows the user and group id’s, how the user’s full name is in the information field, the valid home directory and finally the default shell.



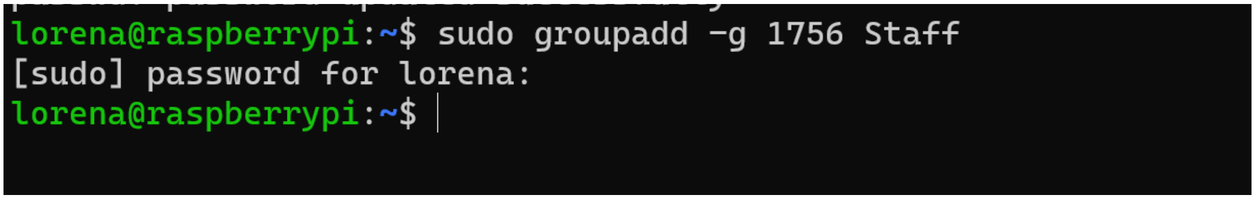
```
splorena:x:1008:1013:Lorena Spallino:/home/splorena:/bin/bash
```

3. **Explain 2 ways the groups can help to streamline user management.**

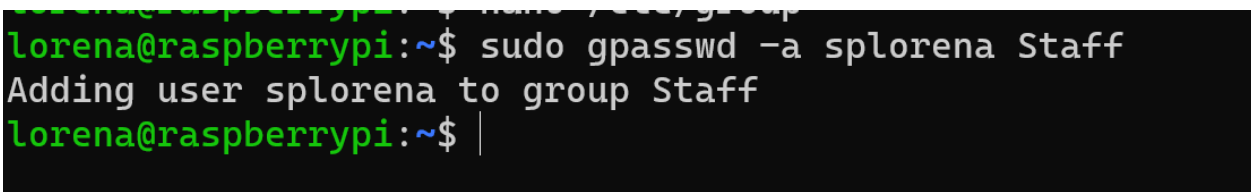
   Groups can help streamline user management in many ways. One way is that you can assign files and folders to groups in order to give that group either full or limited access to that file or folder. This means that the administrator can easily assign privileges or access level to members of a group all at once instead of individually, this saves time and effort. Another way that groups streamline user management is by allowing multiple people to have access to resources such as files or folders on a system by adding them to the appropriate groups and then removing them when needed. This can even have benefits to the security and management of user privileges.

4. **Create a group called Staff with a group id of 1756 and add your newly created user to that group. Show a screenshot of the groups file showing that the user was added to the group.**

Below are screenshots of the commands I used to firstly create the groups called Staff, I used the -g option to manually set the group id. Then in the second screenshot, I used the gpasswd command with the -a option to add the new user, splorena to the Staff group.

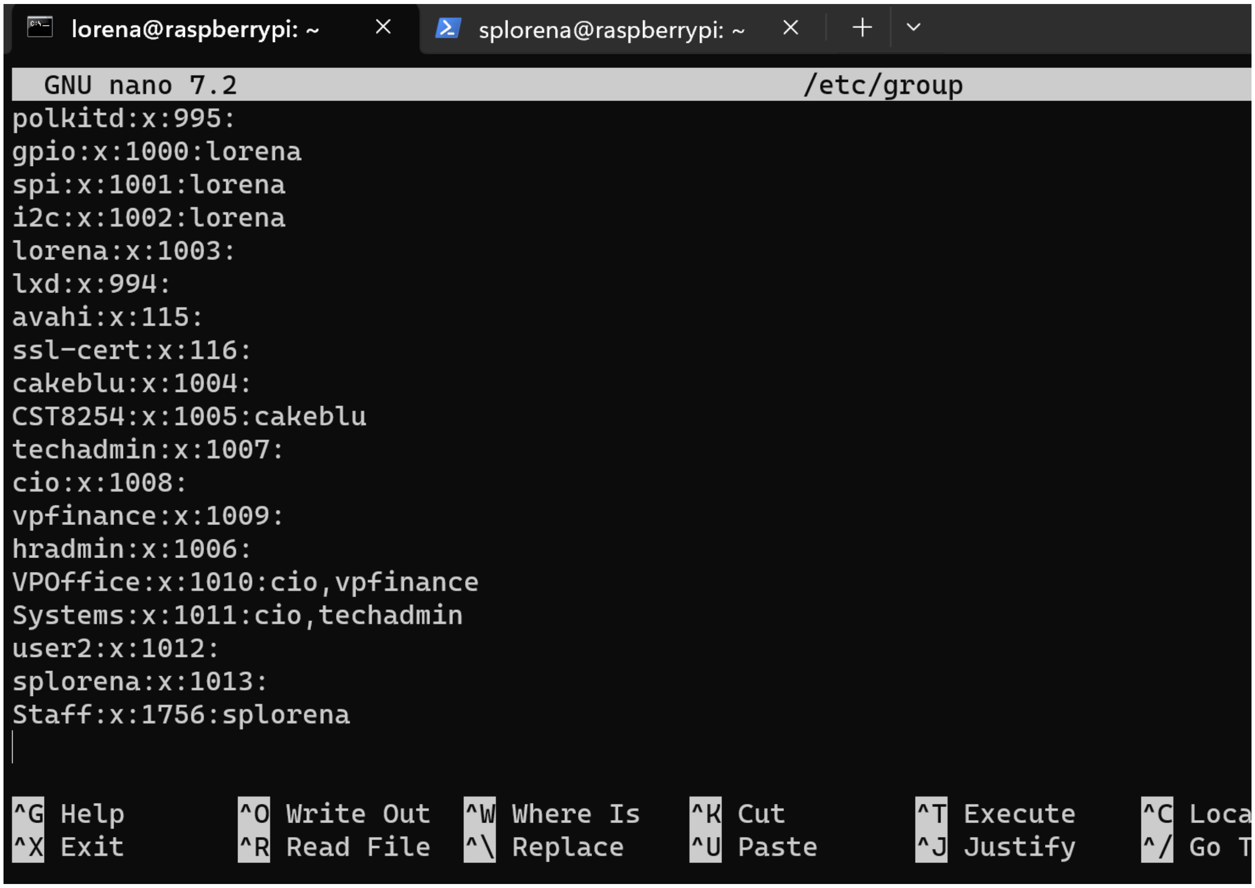


```
lorena@raspberrypi:~$ sudo groupadd -g 1756 Staff
[sudo] password for lorena:
lorena@raspberrypi:~$
```



```
lorena@raspberrypi:~$ sudo gpasswd -a splorena Staff
Adding user splorena to group Staff
lorena@raspberrypi:~$
```

The screenshot below shows the /etc/group file, which shows the group name, password (indicated by the x), group ID and group members. Since the Staff group was the most recently added, it is the last line in the file.



```
  GNU nano 7.2                                     /etc/group
polkitd:x:995:
gpio:x:1000:lorena
spi:x:1001:lorena
i2c:x:1002:lorena
lorena:x:1003:
lxd:x:994:
avahi:x:115:
ssl-cert:x:116:
cakeblu:x:1004:
CST8254:x:1005:cakeblu
techadmin:x:1007:
cio:x:1008:
vpfinance:x:1009:
hradmin:x:1006:
VPOffice:x:1010:cio,vpfinance
Systems:x:1011:cio,techadmin
user2:x:1012:
splorena:x:1013:
Staff:x:1756:splorena


^G Help       ^O Write Out  ^W Where Is   ^K Cut        ^T Execute    ^C Loca
^X Exit       ^R Read File  ^\ Replace    ^U Paste      ^J Justify    ^/ Go T
```

5. backup.sh is a script and currently has permissions of 644.

a) Can the script be executed? Explain your answer.

No, this script cannot be executed. When calculating the access levels numerically, level 644 translates to -rw-r--r-- , evidently displaying that no user at all, not the owner and not even in a group assigned to the script would have executing access.

b) **What command would you use to make it executable by anyone?**

To make this executable by anyone, including owner, group members and all other users, the command I would use is:

Prompt$: chmod 111 backup.sh

Now everyone would have execute access, the owner would have read, write, and execute, the group would have read and execute as well as all others.

Part B

Use the appropriate command to get the IP address of your laptop/desktop and the raspberry pi server and complete the following table below.

	Laptop/desktop	**Raspberry Pi**
IP address	192.168.1.174	192.168.1.103
Subnet Mask	255.255.255.0	192.168.1.255
Default Gateway or router	192.168.1.1	192.168.1.1
DNS servers	192.168.1.1	192.168.1.1

a) **What values are the same for each device and why?**

The values that are the same for each device are the default gateway and DNS servers. The default gateway is the same since they are both on the same network, pointing to the router’s address which provides the internet. The DNS servers are also the same and are actually the same address as the router since the router has its own DNS.

b) What part of the IP address are the same and why?

The first 3 sections are exactly the same for both ip addresses. This is because the first three segments are used to identify the network, and the last one identifies the device. Since they are both on the same network, they have the same network segment while the last section is different to uniquely identify each device on the same network.

Part C

Your company needs to run 3 websites on a single Apache webserver that they purchased. The websites are for the following departments Systems, Finance and Human Resources HR. Using the Apache server that was installed earlier, configure these 3 websites and display the following information to show that they are properly configured. Each website should display the following on their home page.

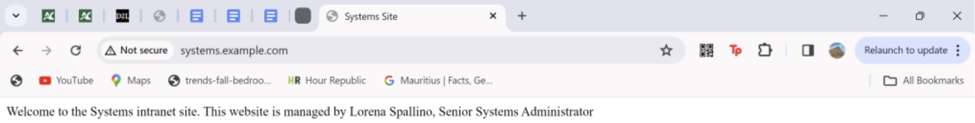
“Welcome to the [put the name of the department] intranet site. This website is managed by [put your name here], Senior Systems Administrator”

Please submit the following:

a) Screenshot of you accessing the homepage of each of the 3 websites.

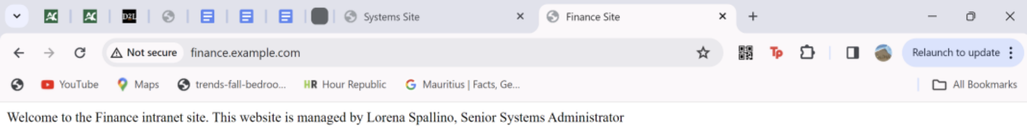
The screenshots below show each of the sites' homepages, which I accessed from my browser, by typing in the server name, which was set in each of the virtual hosts files.

The first screenshot shows the Systems site.



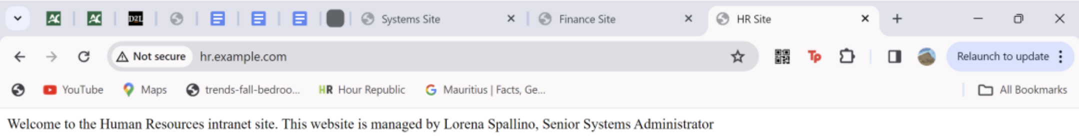
Welcome to the Systems intranet site. This website is managed by Lorena Spallino, Senior Systems Administrator

The second screenshot shows the Finance site.



Welcome to the Finance intranet site. This website is managed by Lorena Spallino, Senior Systems Administrator

And finally, the third screenshot shows the Human Resources (HR) site's Homepage.

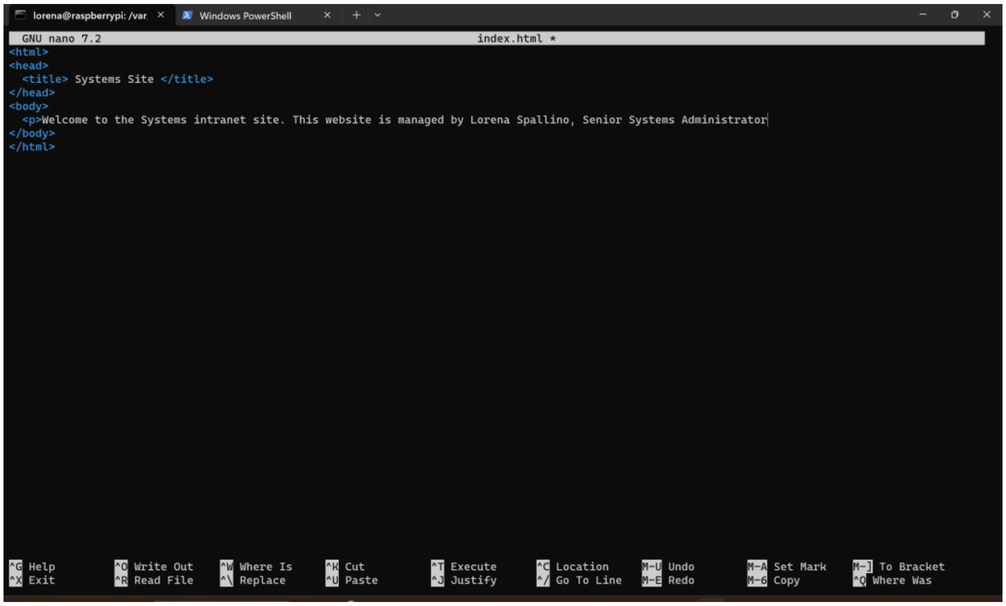


Welcome to the Human Resources intranet site. This website is managed by Lorena Spallino, Senior Systems Administrator

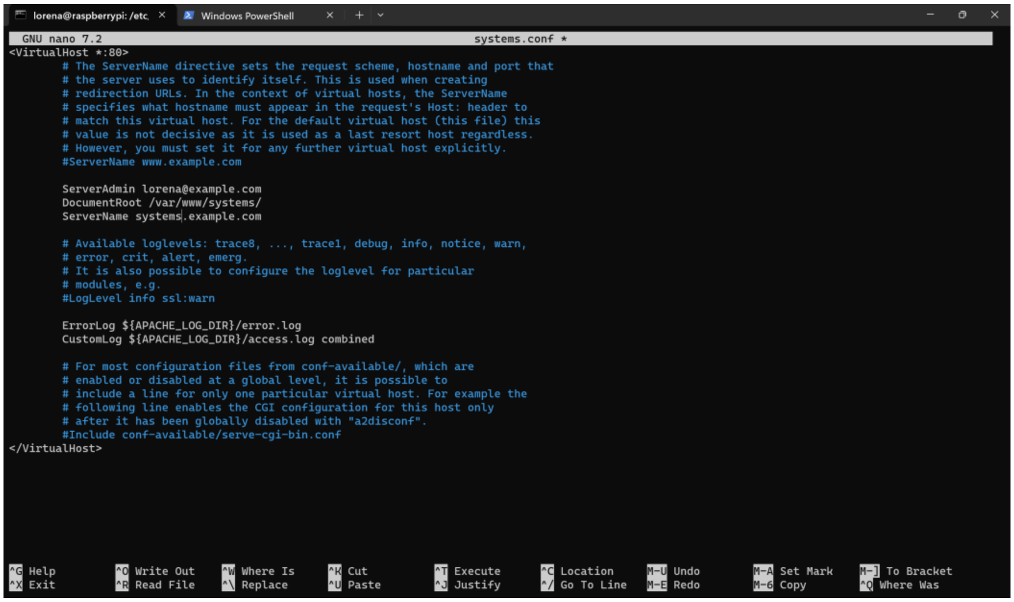
c) **Screenshot of any files that you have edited in the process.**

For each of the 3 sites, I had to edit the index.html file, the virtual hosts file, and the hosts file on my computer.

For the first site, the Systems site, the two following screenshots show the editing of the index.html file within the directory /var/www/systems/, in order to add the desired text to the homepage, as well as the systems.conf file which sets the virtual hosts of the site.

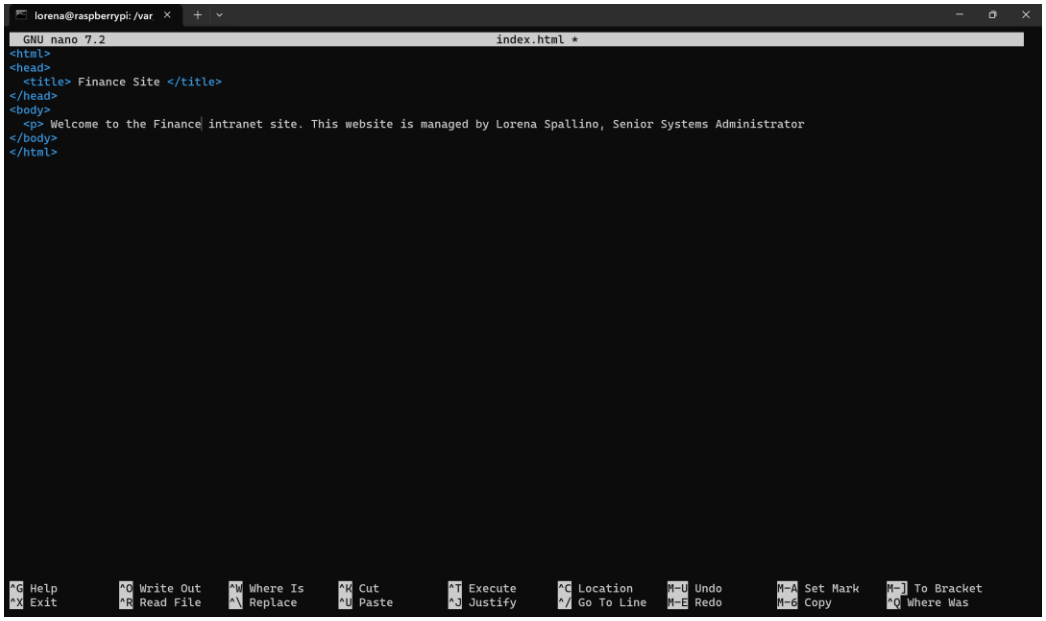


```
  GNU nano 7.2                              index.html *
<html>
<head>
  <title> Systems Site </title>
</head>
<body>
  <p>Welcome to the Systems intranet site. This website is managed by Lorena Spallino, Senior Systems Administrator
</body>
</html>
```

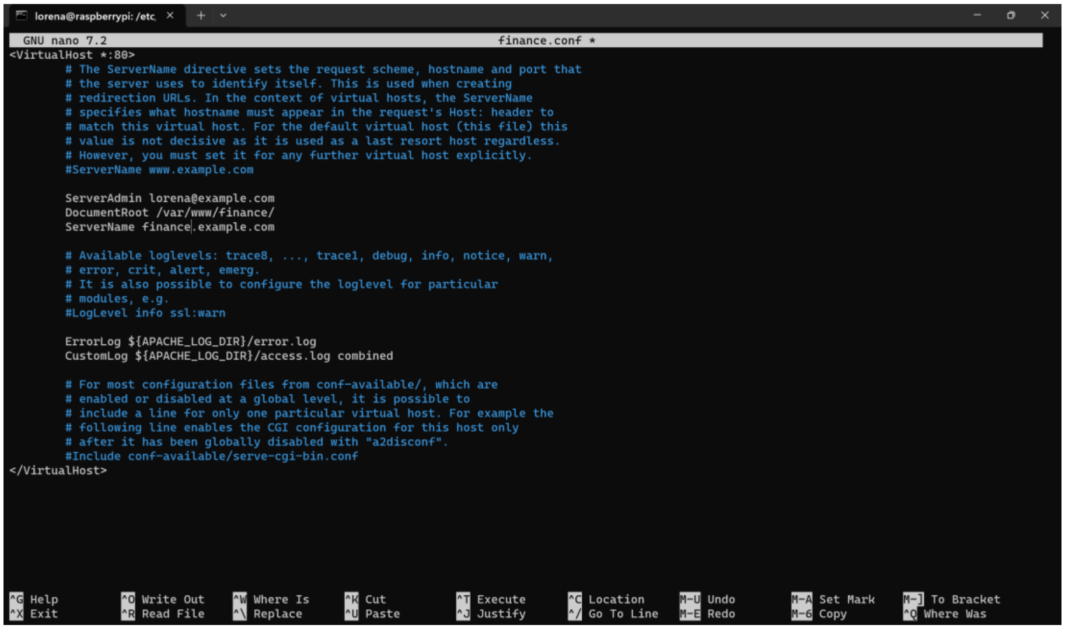


```
  GNU nano 7.2                              systems.conf *
<VirtualHost *:80>
        # The ServerName directive sets the request scheme, hostname and port that
        # the server uses to identify itself. This is used when creating
        # redirection URLs. In the context of virtual hosts, the ServerName
        # specifies what hostname must appear in the request's Host: header to
        # match this virtual host. For the default virtual host (this file) this
        # value is not decisive as it is used as a last resort host regardless.
        # However, you must set it for any further virtual host explicitly.
        #ServerName www.example.com

        ServerAdmin lorena@example.com
        DocumentRoot /var/www/systems/
        ServerName systems.example.com

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

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

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

For the second site, the Finance site, the two following screenshots show the editing of the index.html file within the directory /var/www/finance/ , in order to add the desired text to the homepage, as well as the finance.conf file which sets the virtual hosts of the site.

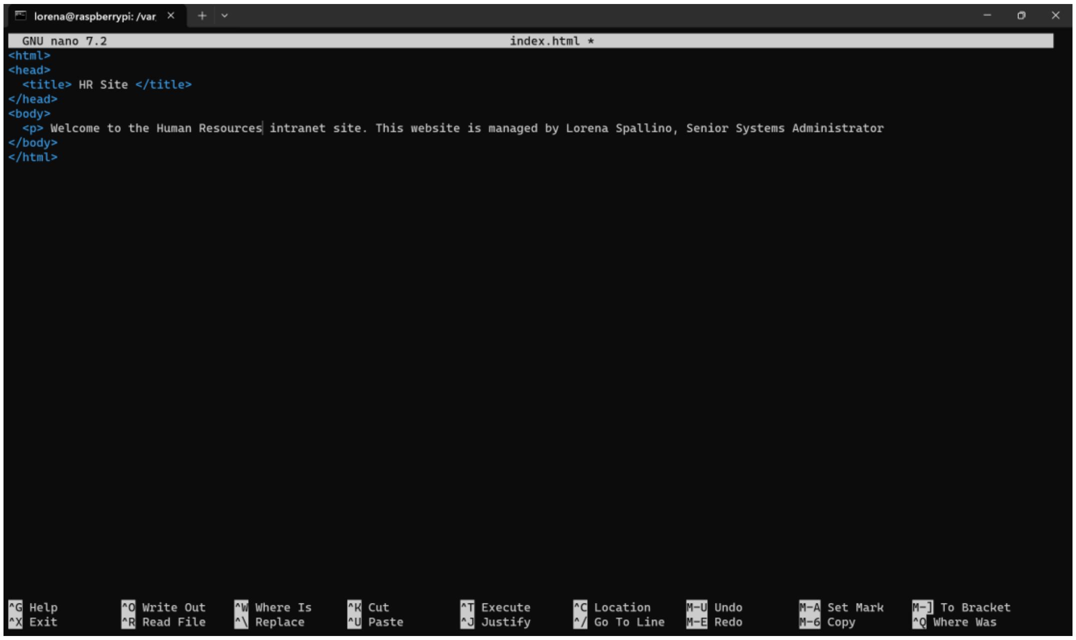


```
<html>
<head>
  <title> Finance Site </title>
</head>
<body>
  <p> Welcome to the Finance intranet site. This website is managed by Lorena Spallino, Senior Systems Administrator
</body>
</html>
```

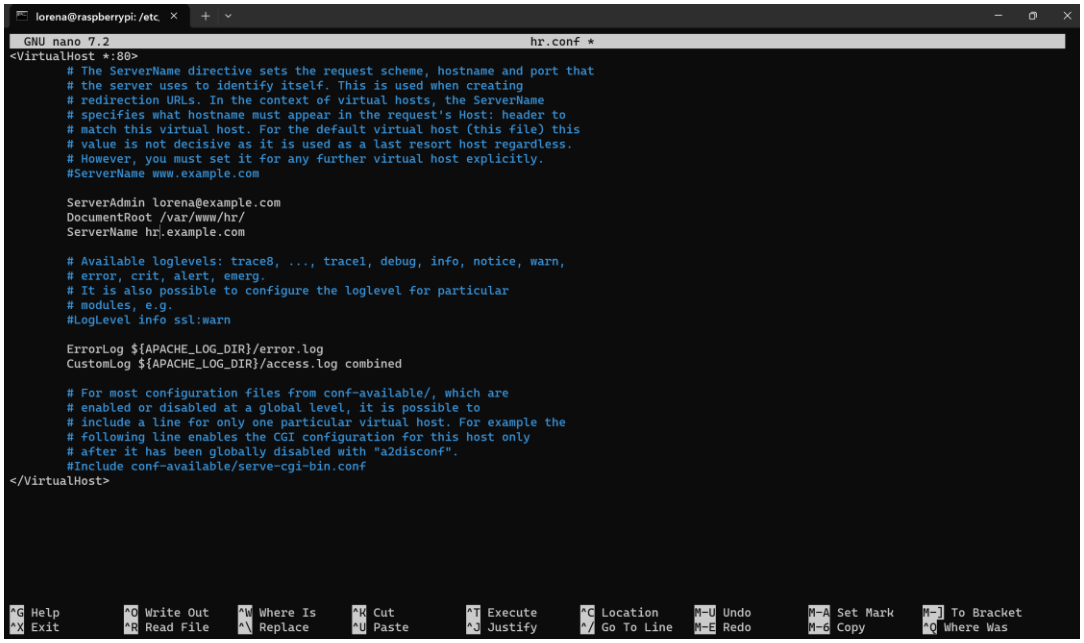


```
<VirtualHost *:80>
        # The ServerName directive sets the request scheme, hostname and port that
        # the server uses to identify itself. This is used when creating
        # redirection URLs. In the context of virtual hosts, the ServerName
        # specifies what hostname must appear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

        ServerAdmin lorena@example.com
        DocumentRoot /var/www/finance/
        ServerName finance.example.com

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

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

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

For the third, and final site, the HR site, the two following screenshots show the editing of the index.html file within the directory /var/www/hr/, in order to add the desired text to the homepage, as well as the hr.conf file which sets the virtual hosts of the site.

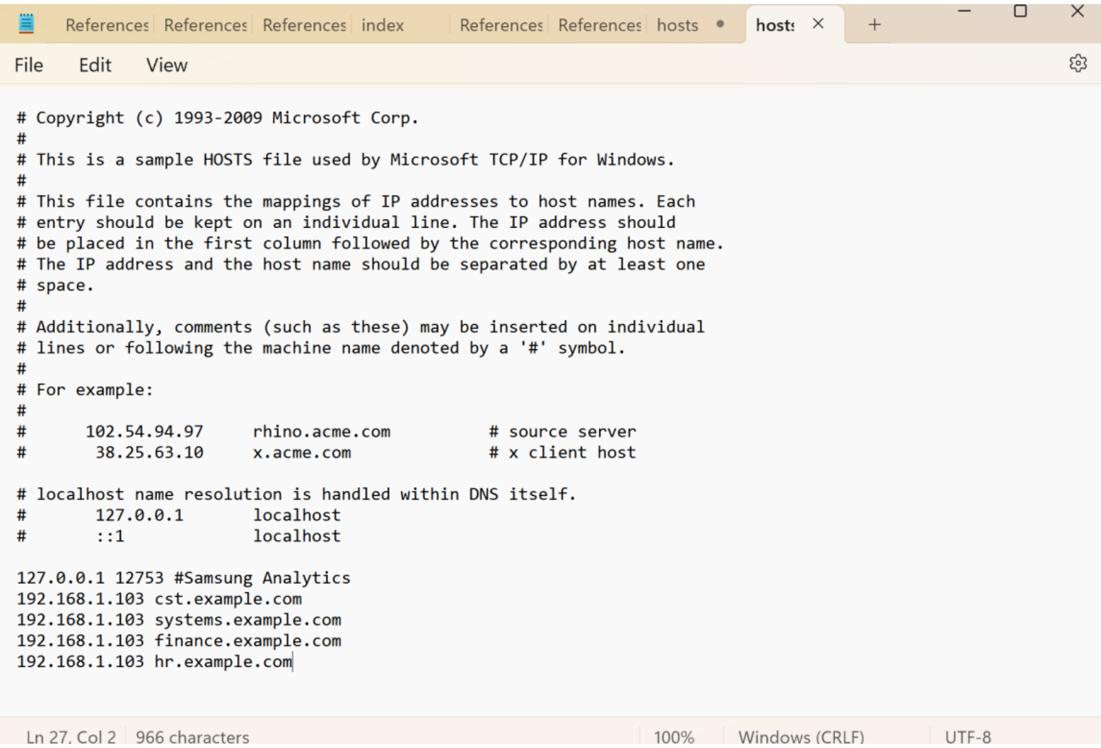


```
  GNU nano 7.2                                                     index.html *
<html>
<head>
  <title> HR Site </title>
</head>
<body>
  <p> Welcome to the Human Resources intranet site. This website is managed by Lorena Spallino, Senior Systems Administrator
</body>
</html>
```



```
  GNU nano 7.2                                                     hr.conf *
<VirtualHost *:80>
        # The ServerName directive sets the request scheme, hostname and port that
        # the server uses to identify itself. This is used when creating
        # redirection URLs. In the context of virtual hosts, the ServerName
        # specifies what hostname must appear in the request's Host: header to
        # match this virtual host. For the default virtual host (this file) this
        # value is not decisive as it is used as a last resort host regardless.
        # However, you must set it for any further virtual host explicitly.
        #ServerName www.example.com

        ServerAdmin lorena@example.com
        DocumentRoot /var/www/hr/
        ServerName hr.example.com

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

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

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

The final file that I had to edit was the hosts file on my Laptop. I had to add all three site's names after the ip address of my webserver in order for the sites to be loaded onto my browser. This is so that the browser loads the desired web pages from the apache server instead of looking to any other DNS for that site. The last three lines of the hosts file shows the three sites just created.



```
# Copyright (c) 1993-2009 Microsoft Corp.
#
# This is a sample HOSTS file used by Microsoft TCP/IP for Windows.
#
# This file contains the mappings of IP addresses to host names. Each
# entry should be kept on an individual line. The IP address should
# be placed in the first column followed by the corresponding host name.
# The IP address and the host name should be separated by at least one
# space.
#
# Additionally, comments (such as these) may be inserted on individual
# lines or following the machine name denoted by a '#' symbol.
#
# For example:
#
#      102.54.94.97     rhino.acme.com          # source server
#       38.25.63.10     x.acme.com              # x client host

# localhost name resolution is handled within DNS itself.
#       127.0.0.1       localhost
#       ::1             localhost

127.0.0.1 12753 #Samsung Analytics
192.168.1.103 cst.example.com
192.168.1.103 systems.example.com
192.168.1.103 finance.example.com
192.168.1.103 hr.example.com
```

References

Domain Name System (DNS). (n.d.). Oracle. Retrieved February 23, 2024, from https://www.oracle.com/ca-en/cloud/networking/dns/what-is-dns/

Do routers have a DNS server? (2022, April 9). Super User. Retrieved February 23, 2024, from https://superuser.com/questions/1715361/do-routers-have-a-dns-server

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groupadd - create a new group. (n.d.). Ubuntu Manpage. Retrieved February 23, 2024, from https://manpages.ubuntu.com/manpages/xenial/man8/groupadd.8.html

passwd - the password file. (n.d.). Ubuntu Manpage. Retrieved February 23, 2024, from https://manpages.ubuntu.com/manpages/bionic/en/man5/passwd.5.html

passwd - the password file. (n.d.). Ubuntu Manpage. Retrieved February 23, 2024, from https://manpages.ubuntu.com/manpages/bionic/en/man5/passwd.5.html

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