Linux Operating System Final Project

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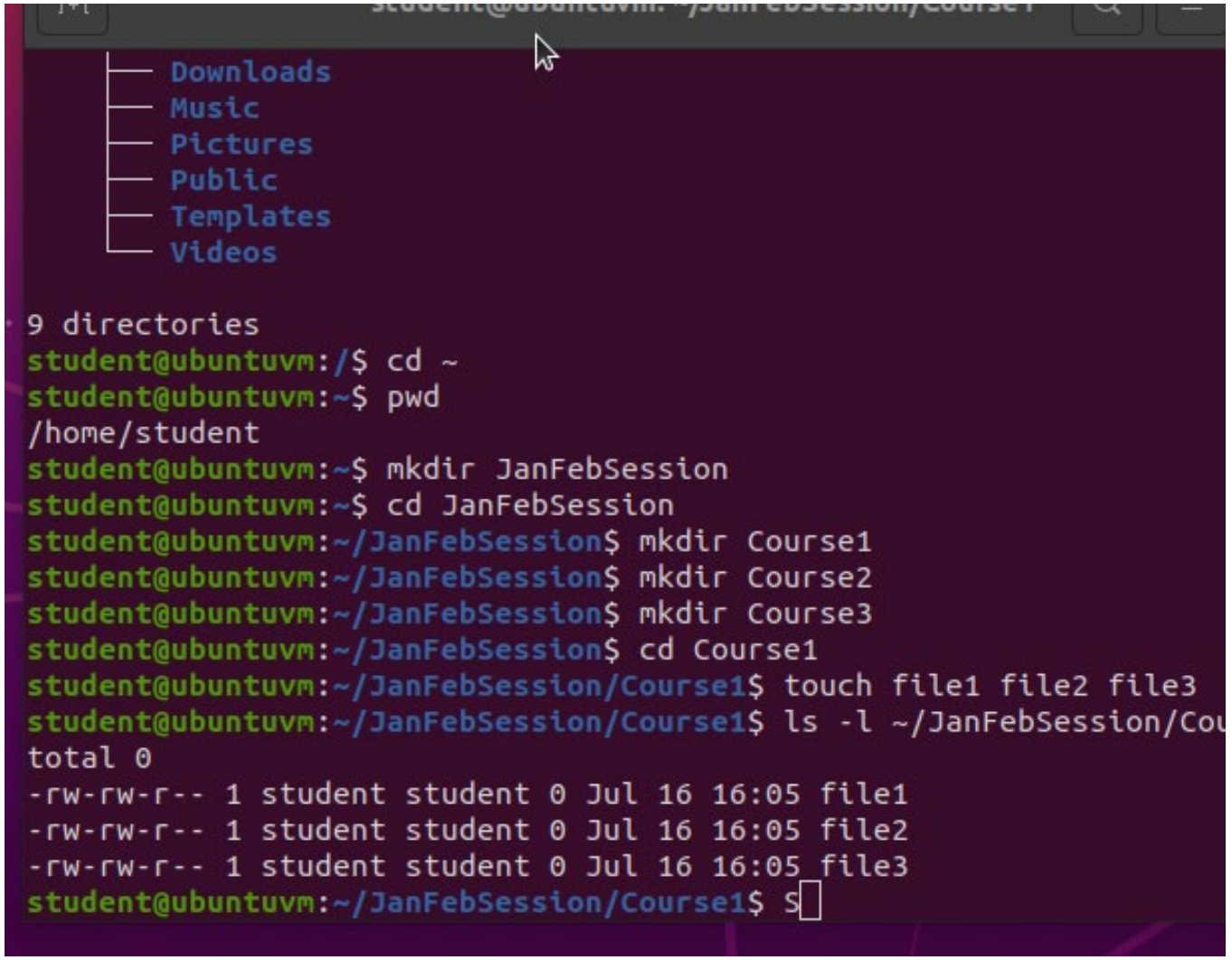
Introduction

The purpose of this project is to demonstrate the valuable skills acquired by following the steps in this course for the Linux Operating System.

The course involved navigating various software and system environments. The emphasis of the learning path was on gaining the skills and knowledge to become a Linux Administrator. It included navigating the Linux file system, writing shell scripts, managing users and groups, understanding IP configurations, and monitoring system performance. The course lays the foundation for an understanding of emerging technologies such as Virtualization and Cloud Computing, which is invaluable for a future career in Information Technology.

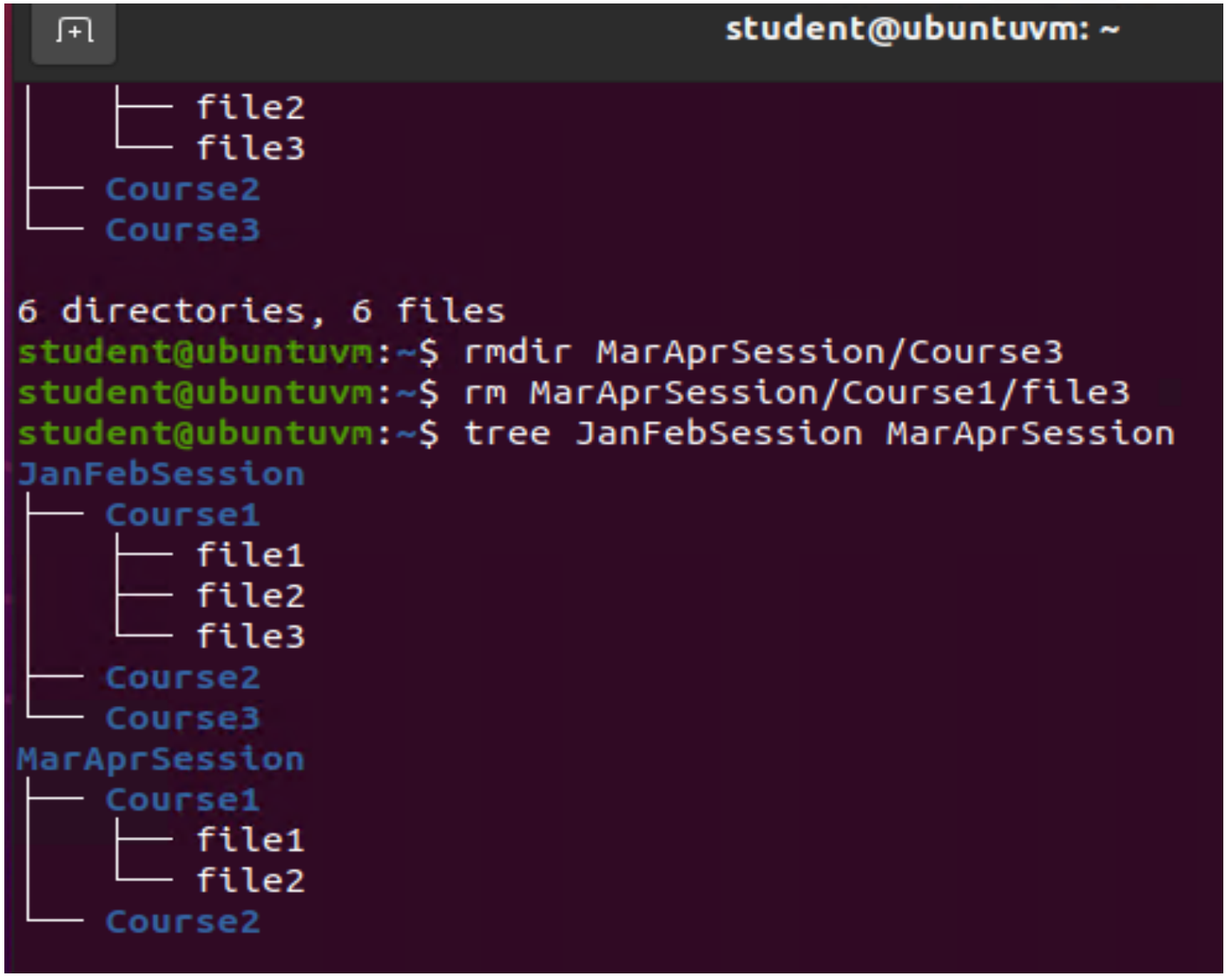
Linux Files System Hierarchy

- Navigate the Linux filesystem tree
- Create directories and files
- Copy and remove directories and files
- Locate directories and files



Create directories and files

Copy and remove directories and files



Locate directories and files

```
/home/student/JanFebSession/Course1/file1
student@ubuntuvm:~$ locate -S
Database /var/lib/mlocate/mlocate.db:
        38,705 directories
        426,268 files
        29,644,177 bytes in file names
        10,863,468 bytes used to store databas
student@ubuntuvm:~$ sudo updatedb
[sudo] password for student:
student@ubuntuvm:~$ locate -i course
/home/student/JanFebSession/Course1
/home/student/JanFebSession/Course2
/home/student/JanFebSession/Course3
/home/student/JanFebSession/Course1/file1
/home/student/JanFebSession/Course1/file2
/home/student/JanFebSession/Course1/file3
/home/student/MarAprSession/Course1
/home/student/MarAprSession/Course2
/home/student/MarAprSession/Course1/file1
/home/student/MarAprSession/Course1/file2
student@ubuntuvm:~$ locate -r /file1$
/home/student/JanFebSession/Course1/file1
```

Linux Shell Scripts

- Create a shell script
- Change script file permissions
- Set the PATH variable
- Make the PATH variable permanent

Create a shell script

What are the file permissions of the script?

Answer here:

- rw-for the owner = read and write only (no execute)
- rw- for the group = read and write only (no execute)
- r– for everyone else = read only (no write or execute)

Create a shell script (Continued)

- 2. What's the name of the user-defined variable in the script?
- Answer here: text

- 3. Which redirection meta-character is used in the script? What does it do?
- Answer here: >> -- redirects to the output to the file and appends rather than overwrite the file

- References:
- 1. Project recording
- 2. Instructional Video

Change script file permissions

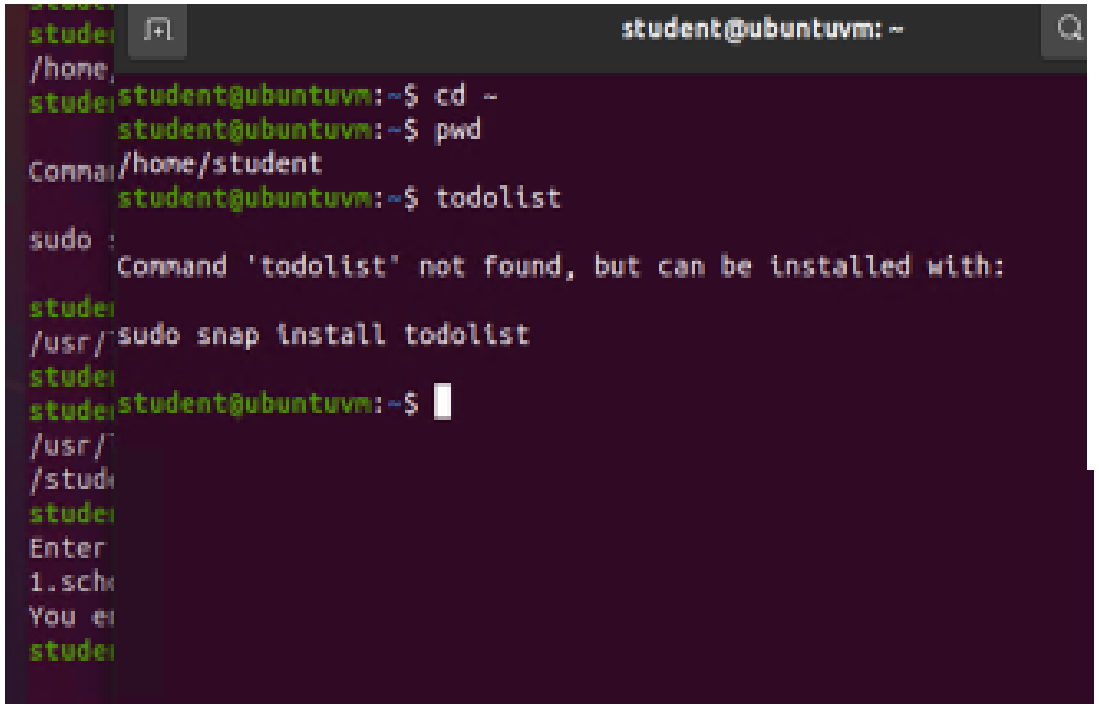
```
student@ubuntuvm:~$ cd ~
student@ubuntuvm:~$ pwd
/home/student
student@ubuntuvm:~$ nano todolist
student@ubuntuvm:~$ chmod 755 todolist
student@ubuntuvm:~$ ls -l todolist
-rwxr-xr-x 1 student student 201 Jul 21 11:34 todolist
student@ubuntuvm:~$ ./todolist
Enter today's to-do-list (Press ENTER to complete):
1.work. 2.family. 3.school.
You entered: 1.work. 2.family. 3.school.
student@ubuntuvm:~$
```

Set the PATH variable

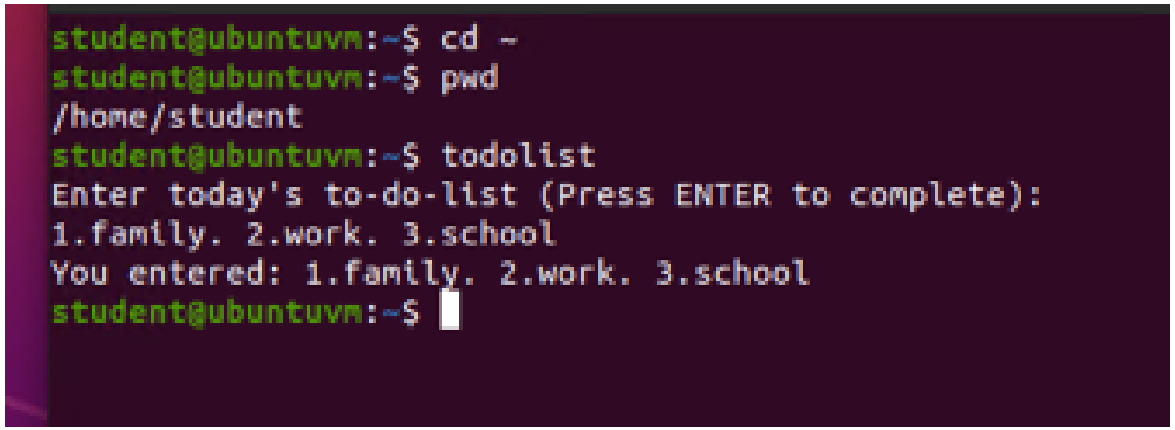
```
student@ubuntuvm:~$ cd ~
student@ubuntuvm:~$ pwd
/home/student
student@ubuntuvm:~$ todolist

Command 'todolist' not found, but can be installed with:

sudo snap install todolist

student@ubuntuvm:~$ echo $PATH
/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin
student@ubuntuvm:~$ PATH=$PATH:/home/student
student@ubuntuvm:~$ echo $PATH
/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin:/home
/student
student@ubuntuvm:~$ todolist
Enter today's to-do-list (Press ENTER to complete):
1.school. 2.work. 3.family.
You entered: 1.school. 2.work. 3.family.
student@ubuntuvm:~$
```

Make the PATH variable permanent

Before changing the PATH variable



<u>After</u> changing the PATH variable



User and Group Management

- Add users and groups in the Command Line Interface (CLI)
- Test user and group settings
- Add users in the Graphic User Interface (GUI)
- Remove users and groups

Add users and groups in CLI

- 1. What does the –*m* option in the useradd command do?
- Answer here: Create a home directory for the user

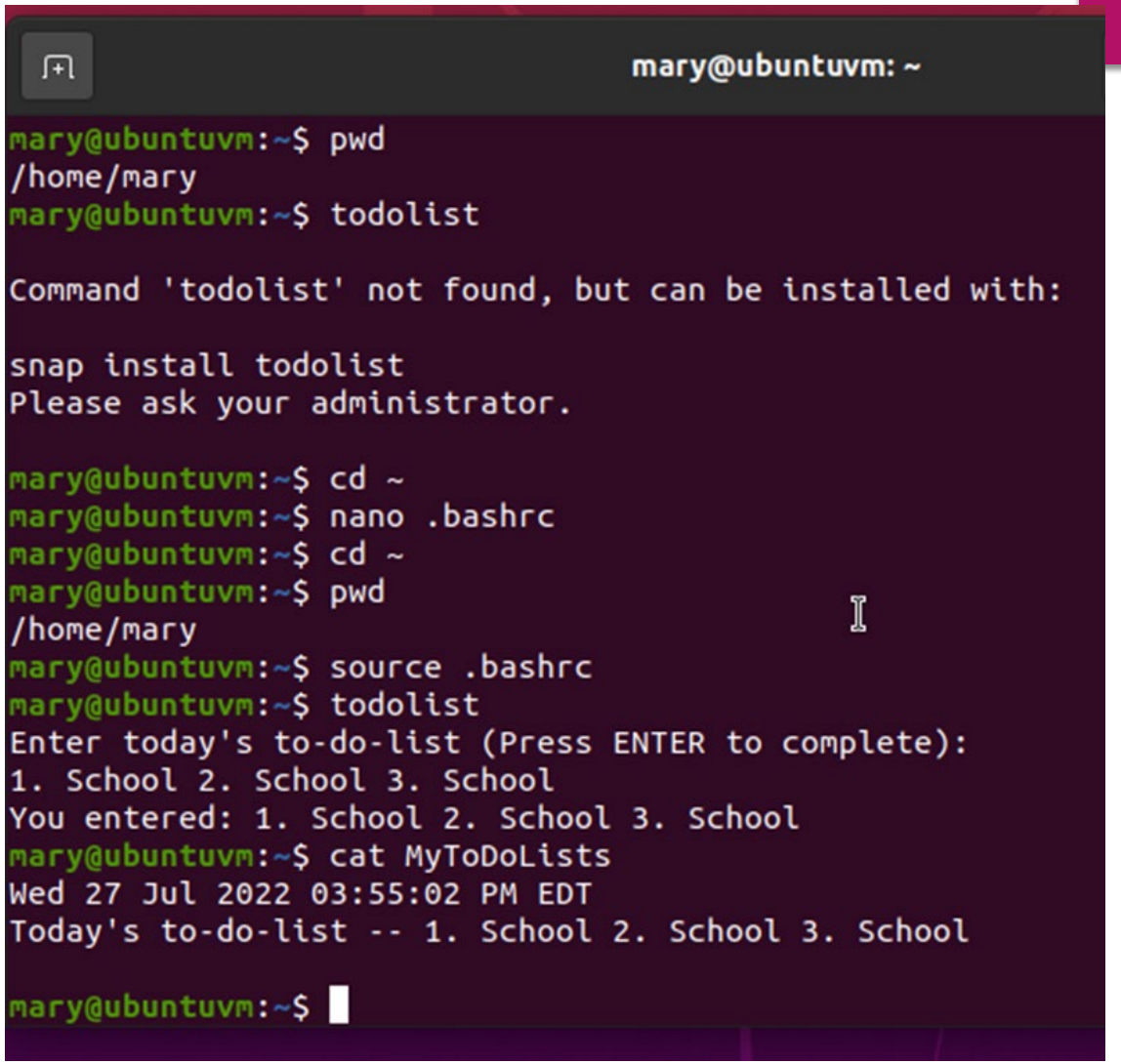
- 2. What does the -*3* option in the tail command do?
- Answer here: Show the last 3 lines of a file

- 3. Which line of the */etc/group* file lists members of the "students" group? Copy it here.
- Answer here: `students:x:1002:student,mary`

References:

1. Live Lecture
2. Project Help Video

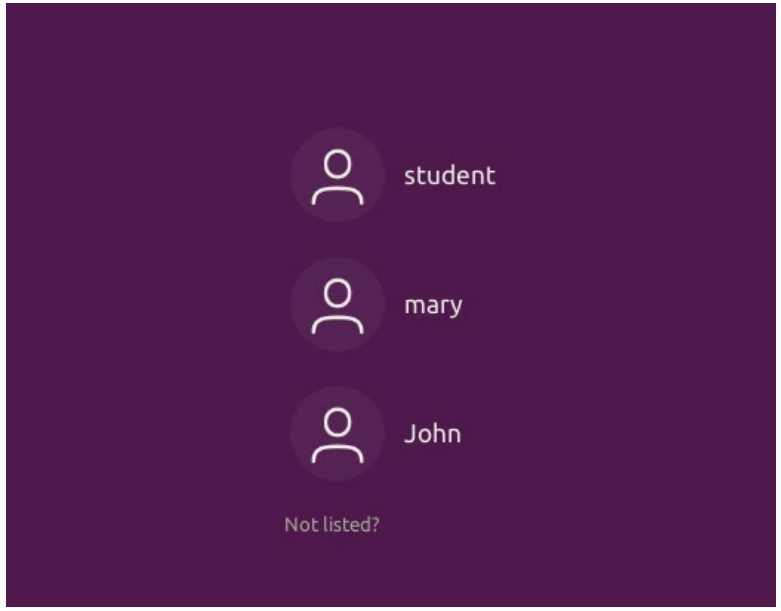
Test user and group settings



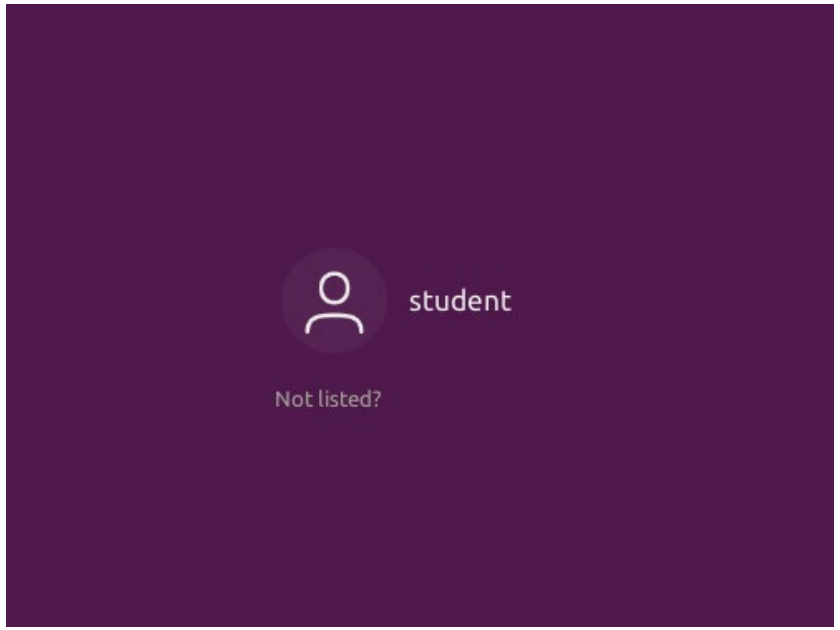
Add users in GUI

Remove users and groups

Before removing the new students with the GUI



After removing the new students with the GUI



Network Configuration

- Discover Host IP Configurations
- Manage Network Interfaces
- Manage User Network Utilities

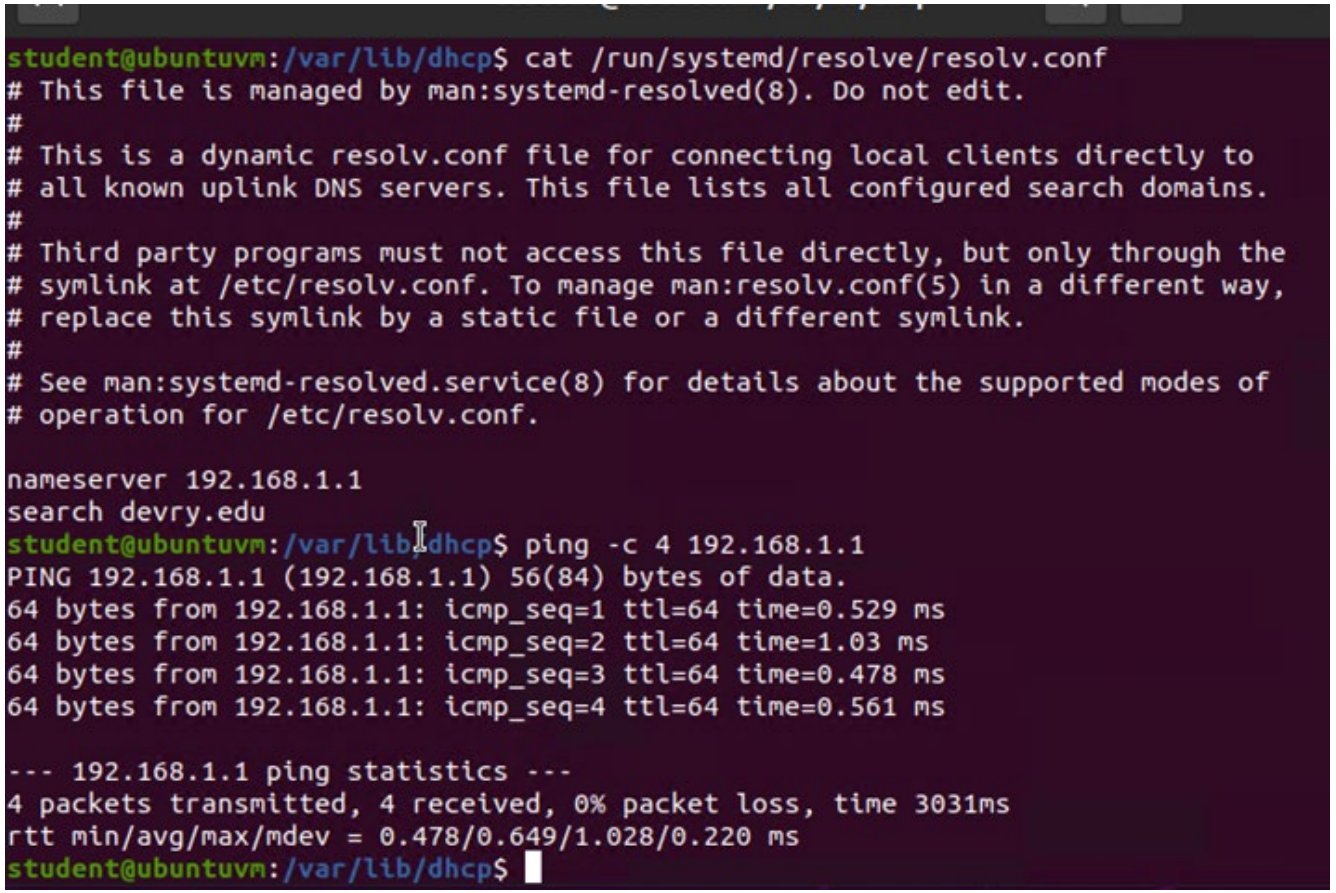
Discover host IP configurations

1. What is the IP address of your Ubuntu machine?
Answer here: 192.168.1.104

2. What is the IP address of its default gateway?
Answer here: 192.168.1.1

3. What is the IP address of its DHCP server?
Answer here: 192.168.1.1

4. What is the IP address of its DNS server?
Answer here: 192.168.1.1



Manage Network Interfaces

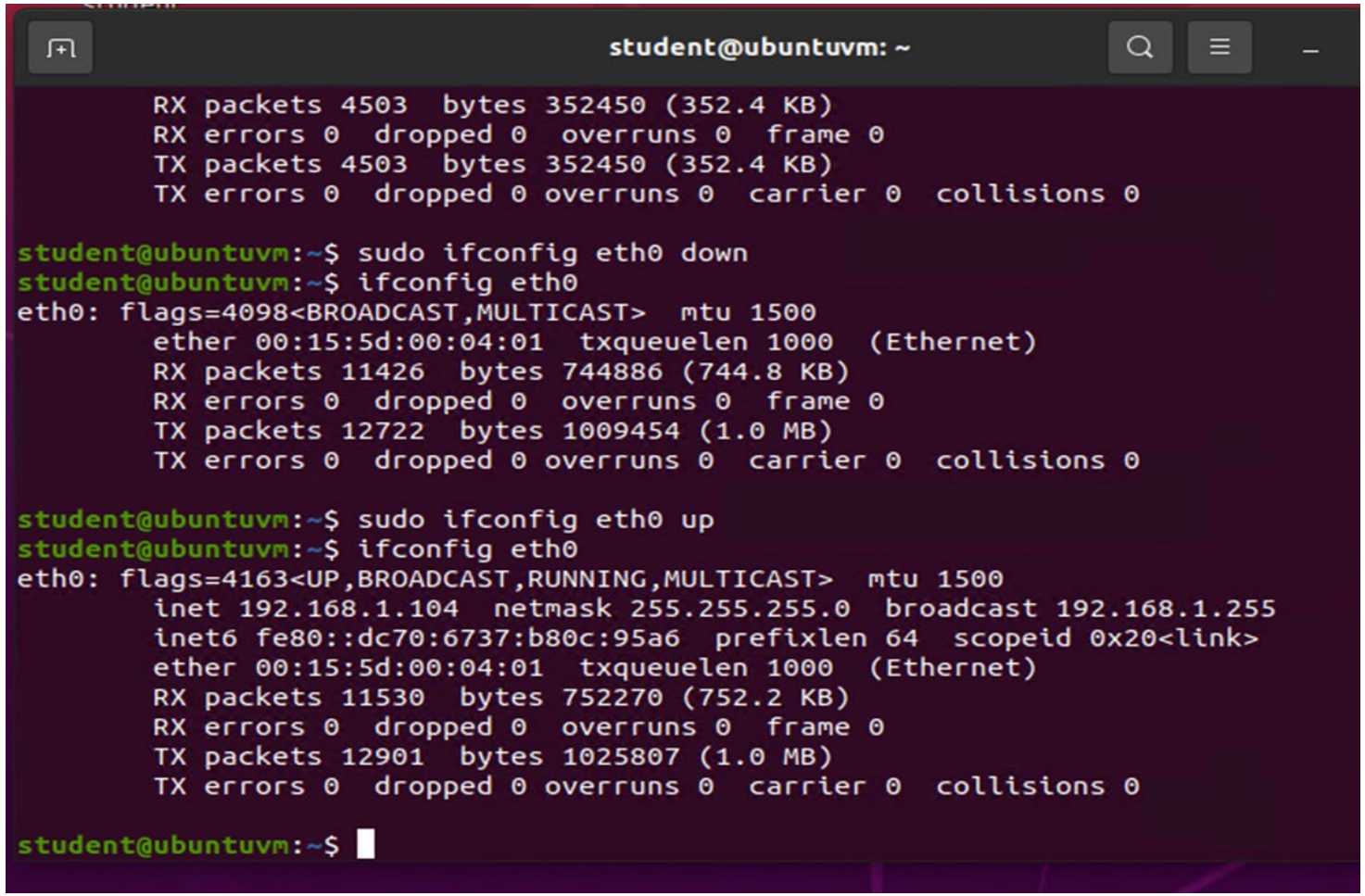
- 1. Which DHCP message is shown in the output of the sudo dhclient –v –r eth0 command? [hint: the message name is in uppercase.]
- Answer here: DHCPRELEASE

- 2. Which four DHCP messages are shown in the output of the sudo dhclient –v eth0 command?
- Answer here: DHCPDISCOVER, DHCPOFFER, DHCPREQUEST, DHSCPACK

References:

1. Project Assignment Video
2. Live Lecture

User Network Utilities



Operating Systems
System Performance Monitoring

- Monitor system processes
- Monitor user activities
- Monitor network bandwidth usage

Monitor Linux Processes

1. What is the default action of the 15 SIGTERM kill signal?
Answer here: Send the signal to kill the calculator

2. In the System Monitor window, click on % CPU to sort the processes by CPU load. Which process shows the highest percentage of CPU usage?
Answer here: /gnone-terminal-server or /gnome-shell

References:
1. Azure labs project – Ubuntu Terminal
2. Live Lecture

Monitor user activities

- Issue the **sudo accton on** command to turn on GNC accounting. Run the **sudo updatedb** command. Enter **lastcomm updatedb** to check if the *updatedb* command was executed before. Remember to turn off GNC accounting (**sudo accton off**) after answering the questions.
- 1. What flag value is displayed in the output?
- Answer here: The S flag is displayed indicating that the command was executed by the root user.

Monitor user activities
(Continued)

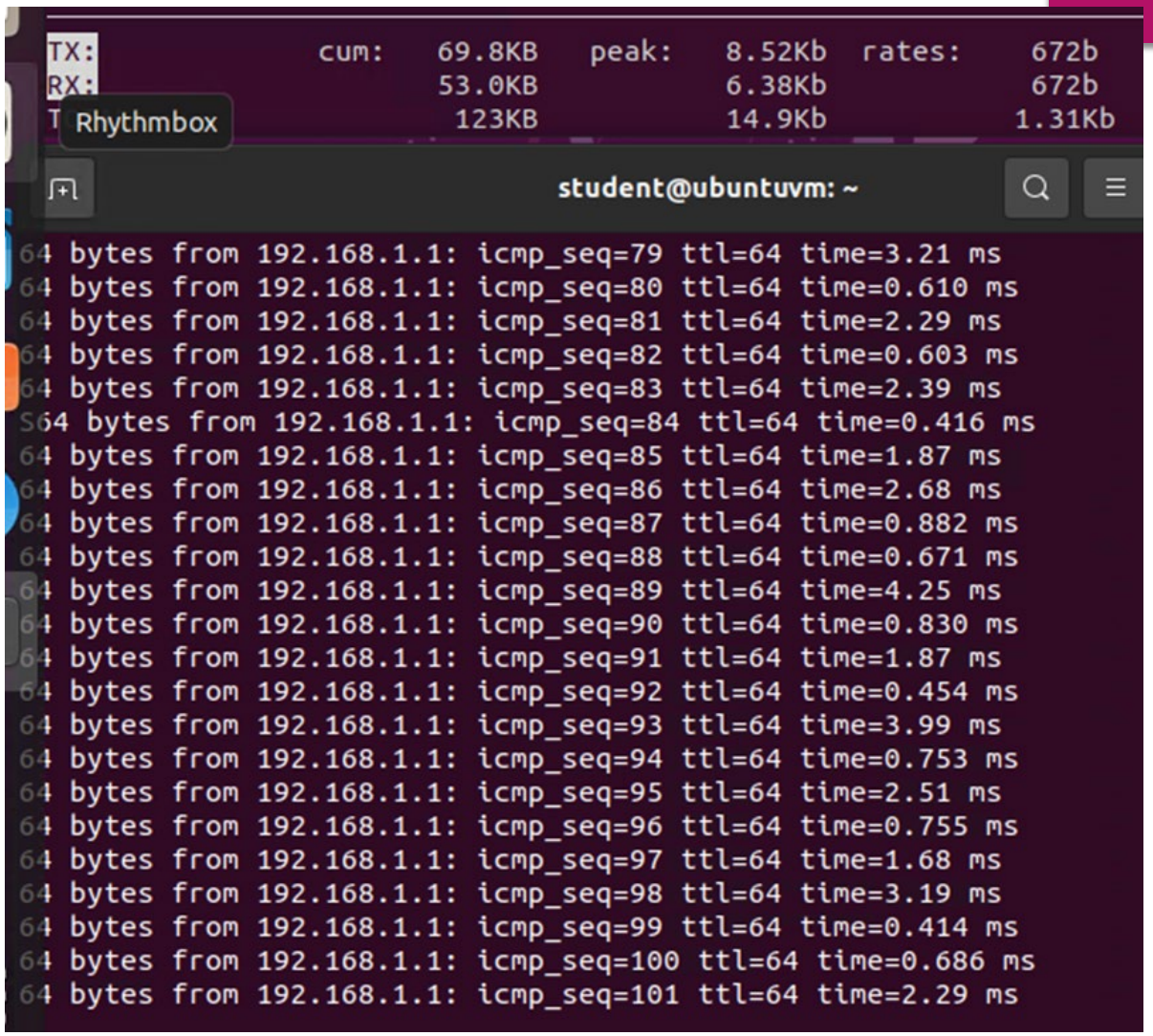
- 2. Why is the name of the user who ran the processes shown as root, not student?
- Answer here: When a regular user precedes the command with “sudo”, it tells the system to run the command as a superuser and gives the regular user root privileges to run a command.

References:

1. Azure Labs Project – Ubuntu Terminal

2. Prior weeks lessons

Monitor Network Bandwidth Usage



Challenges

- Getting used to the virtual machine environment was a challenge in the beginning.
- Adapting to a completely new operating system after having used a different one for many years.
- Retaining some of the command structure and syntax used in Linux.
- Gaining confidence in my ability to succeed on the CompTIA Linux+ Certification Examination. It will be an essential requirement for many IT positions. Particularly in the IoT field, which is where my interest is.

Career Skills Gained

- Some of the many skills I acquired during this course include the ability to think critically. As in when I use a set of commands and arguments in order to not only avoid getting error messages, but also to improve the efficiency and effectiveness of the script.
- Another skill I gained is that of learning the value of relying on reputable sources of information for research.
- I also learned the value of joining at least one professional technical organization as a source of networking, research and community engagement.

Conclusion

In conclusion I want to thank the faculty at DeVry University because I gained knowledge from several of the Professors as they adhere to a team-teach model which is something I had never been exposed to. But I also want to specifically thank my instructor, Professor Sapijaszko who was very engaged and encouraging every step of the way and always readily available to respond to concerns or problems. As far as the course and what I gained from it, I feel this is one of the most rewarding courses I've completed.

Thank you for watching!