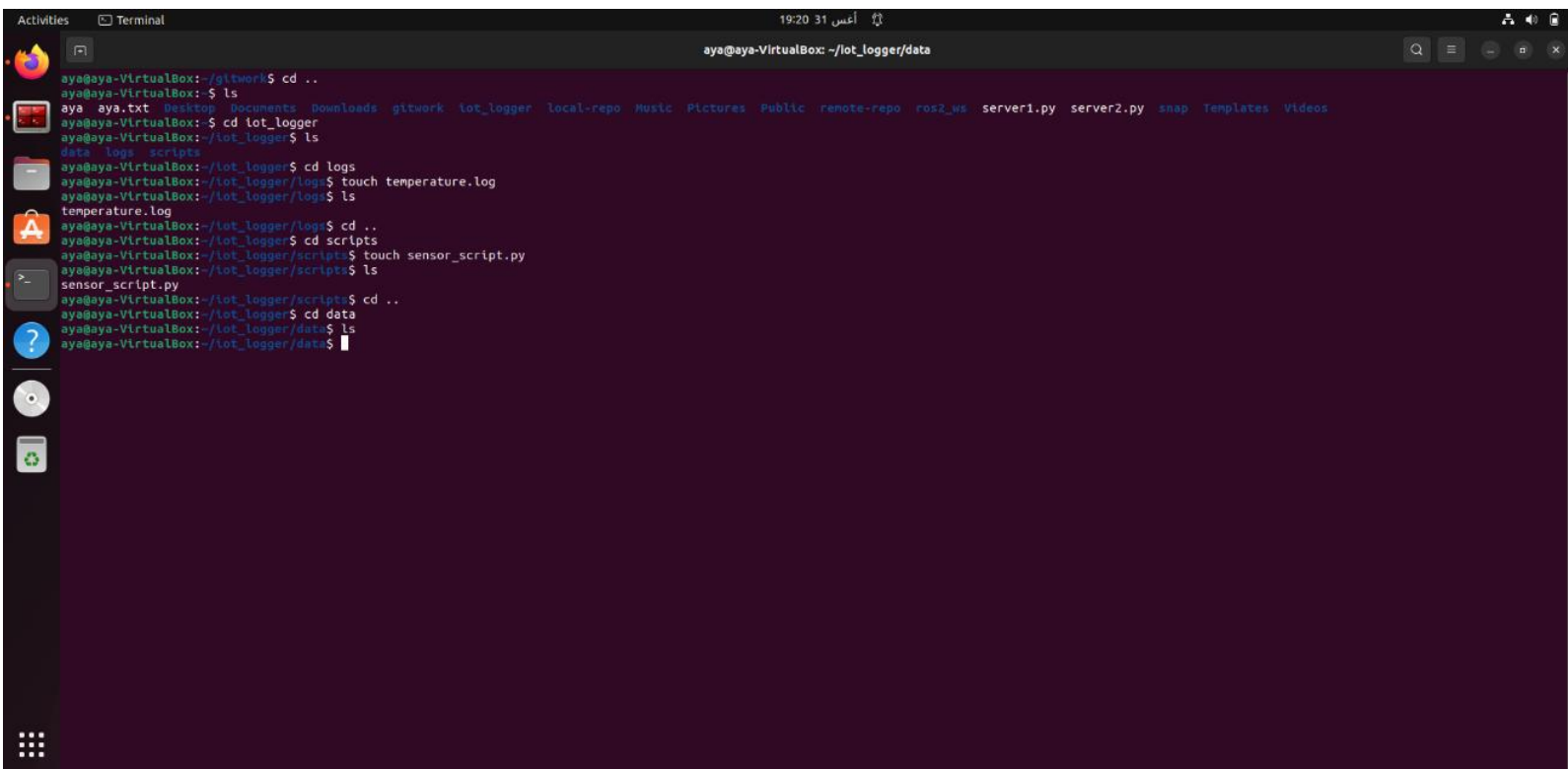


Task 2

- Inside `iot_logger`, create `logs/temperature.log` and `scripts/sensor_script.py`.
- Copy `/etc/services` into `data` and search for patterns like `ssh` or `http`.
- Use regex to find lines starting with `t` or containing numbers.
- Locate `.txt` files in `/home/` and remove temporary ones if needed.
- Create hard and symbolic links for `temperature.log`.
- Display directory structure to confirm organization.

A terminal window titled 'aya@aya-VirtualBox: ~/iot_logger/data' showing a series of commands and their outputs. The user navigates through the directory structure, creating files, and listing contents. The terminal output is as follows:

```
aya@aya-VirtualBox: ~/gitwork$ cd ..
aya@aya-VirtualBox: $ ls
aya aya.txt Desktop Documents Downloads gitwork iot_logger local-repo Music Pictures Public remote-repo ros2_ws server1.py server2.py snap Templates Videos
aya@aya-VirtualBox: $ cd iot_logger
aya@aya-VirtualBox: ~/iot_logger$ ls
data logs scripts
aya@aya-VirtualBox: ~/iot_logger$ cd logs
aya@aya-VirtualBox: ~/iot_logger/logs$ touch temperature.log
aya@aya-VirtualBox: ~/iot_logger/logs$ ls
temperature.log
aya@aya-VirtualBox: ~/iot_logger/logs$ cd ..
aya@aya-VirtualBox: ~/iot_logger$ cd scripts
aya@aya-VirtualBox: ~/iot_logger/scripts$ touch sensor_script.py
aya@aya-VirtualBox: ~/iot_logger/scripts$ ls
sensor_script.py
aya@aya-VirtualBox: ~/iot_logger/scripts$ cd ..
aya@aya-VirtualBox: ~/iot_logger$ cd data
aya@aya-VirtualBox: ~/iot_logger/data$ ls
```

```
Activities Terminal 21:26 31 أغسطس
aya@aya-VirtualBox: ~/lot_logger/data
aya@aya-VirtualBox:~$ cd lot_logger
aya@aya-VirtualBox:~/lot_logger$ cd data
aya@aya-VirtualBox:~/lot_logger/data$ cp /etc/services .
aya@aya-VirtualBox:~/lot_logger/data$
```

```
Activities Terminal 19:47 31 أغسطس
aya@aya-VirtualBox: ~/lot_logger/data
aya@aya-VirtualBox:~/lot_logger/data$ grep -l "ssh" services
ssh 22/tcp # SSH Remote Login Protocol
aya@aya-VirtualBox:~/lot_logger/data$ grep -l "http" services
# Updated from https://www.lana.org/assignments/service-names-port-numbers/service-names-port-numbers.xhtml .
http 80/tcp www # WorldWideWeb HTTP
https 443/tcp # http protocol over TLS/SSL
https 443/udp # HTTP/3
http-alt 8080/tcp webcache # WWW caching service
hkp 11371/tcp # OpenPGP HTTP Keyserver
aya@aya-VirtualBox:~/lot_logger/data$ grep "^t" services
tcpmux 1/tcp # TCP port service multiplexer
telnet 23/tcp
tftp 69/tcp tftpd
tftp 69/udp tftpd
tacacs 49/tcp # Login Host Protocol (TACACS)
tacacs 49/udp
rftp 69/udp
talk 517/udp
tinc 655/tcp # tinc control port
tinc 655/udp
telnet 23/tcp # Telnet over SSL
tproxy 8081/tcp # Transparent Proxy
tftp 69/udp # tftpd
aya@aya-VirtualBox:~/lot_logger/data$ grep "[0-9]" services
tcpmux 1/tcp # TCP port service multiplexer
echo 7/tcp
discard 9/tcp sink null
discard 9/udp sink null
sysstat 11/tcp users
daytime 13/tcp
netstat 13/udp
gold 17/tcp
chargen 19/tcp ttytst source
chargen 19/udp ttytst source
ftp-data 20/tcp
ftp 21/tcp
fsp 21/udp fspd
ssh 22/tcp # SSH Remote Login Protocol
telnet 23/tcp
snmp 25/tcp
time 37/tcp tftpd
time 37/udp tftpd
whois 43/tcp nicname
tacacs 49/tcp # Login Host Protocol (TACACS)
tacacs 49/udp
domain 53/tcp
```

```
Activities Terminal 19:45 31 أغسطس ايا@aya-VirtualBox: ~/lot_logger/data

aya@aya-VirtualBox:~/lot_logger/data$ grep -t "ssh" services
ssh # ssh Remote Login Protocol
22/tcp
aya@aya-VirtualBox:~/lot_logger/data$ grep -t "http" services
# Updated from https://www.iana.org/assignments/service-names-port-numbers/service-names-port-numbers.xhtml .
http 80/tcp www # WorldWideWeb HTTP
https 443/tcp # http protocol over TLS/SSL
https 443/udp # HTTP/3
http-alt 8080/tcp webcache # WWW caching service
hkp 11371/tcp # OpenPGP HTTP Keyserver

aya@aya-VirtualBox:~/lot_logger/data$
```

```
Activities Terminal 21:15 31 أغسطس ايا@aya-VirtualBox: ~

aya@aya-VirtualBox:~$ find -type f -name "*.txt"
/home/aya/.snap/firefox/common/.mozilla/firefox/2fwfpck3.default/pkcs11.txt
/home/aya/.snap/firefox/common/.mozilla/firefox/2fwfpck3.default/serviceworker.txt
/home/aya/.gitwork/file2.txt
/home/aya/.gitwork/file.txt
/home/aya/.remote-repo/file3.txt
/home/aya/.local/lib/python3.10/site-packages/paho_mqtt-2.1.0.dist-info/licenses/LICENSE.txt
/home/aya/.local-repo/file3.txt
/home/aya/.file4.txt
/home/aya/Documents/SIC/passkey.txt
/home/aya/.cache/tracker3/files/last-crawl.txt
/home/aya/.cache/tracker3/files/locale-for-mnner-apps.txt
/home/aya/.cache/tracker3/files/first-index.txt
aya@aya-VirtualBox:~$ rm file4.txt
aya@aya-VirtualBox:~$ ln -s ~/lot_logger/logs/temperature.log ~/temperature_hardlink.log
aya@aya-VirtualBox:~$ ln -s ~/lot_logger/logs/temperature.log ~/temperature_symlink.log
aya@aya-VirtualBox:~$ tree ~/lot_logger
~/lot_logger
├── data
│   ├── services
│   ├── logs
│   │   └── temperature.log
│   └── scripts
│       └── sensor_script.py
└── 3 directories, 3 files
aya@aya-VirtualBox:~$
```

Open-Ended Questions

- **Explain the different types of files in Linux (regular, directory, symbolic link, device, etc.) and how to check them with commands.**

There are several types of files. First is the regular file (-), which holds data like essay (document.txt) or a program (/bin/ls). Directories (d), such as the Downloads/ folder, and they are special files that act as containers for other files. Symbolic links (l) are simple pointers or shortcuts, like a link named current pointing to a real application folder. For hardware interaction, character device (c) files like /dev/tty1 provide serial access for a terminal, while block device (b) files like /dev/sda represent storage devices for block-level access. Finally, named pipes (p) and sockets (s) facilitate communication between processes.

Any file's type can be quickly checked by looking at the first character of the permissions string in the `ls -l` command output. Also we can use the `file` command, which examines the actual content of a file to determine its nature

- **What's the difference between a hard link and a symbolic link? Give real examples of when to use each.**

A hard link is another name for the exact same data on the disk. Deleting the original file doesn't affect the hard link, the data remains until all links are gone. It's useful for efficient backups and preventing data loss. A symbolic link is a shortcut that points to the file's path. If the original file is moved or

deleted, the symbolic link breaks. It's used for creating shortcuts to long paths, managing software versions, and linking across different disks. A prime example of hard links in action is the `rsnapshot` utility, a popular backup tool on Linux and Unix systems. `rsnapshot` relies entirely on hard links to maintain multiple, full-looking backups while conserving disk space. For symbolic link, a program installed in a deep folder like `/opt/my_app/bin/` can be hard to run, so we can create a symbolic link to it in `~/bin` directory. Now, we can just type the simple name to start the program from anywhere.

- **Is `rmdir` the same as `rm -r` when deleting directories? Explain.**

Both commands delete directories, but the difference is that `rmdir` only removes empty directories, while `rm -r` is a powerful command that deletes all the contents of the directory forcefully.