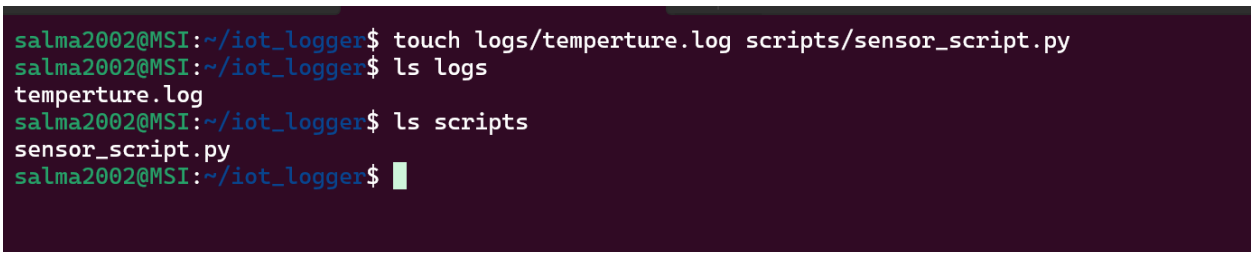
# Day 2 – Phase 2: File & Directory Management + Search

## Tasks:

- **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.**

```
salma2002@MSI:~/iot_logger/data$ grep -E '^t|[0-9]' services
tcpmux          1/tcp                           # TCP port service multiplexer
echo            7/tcp
echo            7/udp
discard         9/tcp           sink null
discard         9/udp           sink null
systat          11/tcp          users
daytime         13/tcp
daytime         13/udp
netstat         15/tcp
qotd            17/tcp          quote
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
smtp            25/tcp          mail
time            37/tcp          timserver
time            37/udp          timserver
whois           43/tcp          nicname
tacacs          49/tcp                          # Login Host Protocol (TACACS)
tacacs          49/udp
domain          53/tcp                          # Domain Name Server
domain          53/udp
bootps          67/udp
bootpc          68/udp
tftp            69/udp
gopher          70/tcp                          # Internet Gopher
finger          79/tcp
http            80/tcp          www             # WorldWideWeb HTTP
kerberos        88/tcp          kerberos5 krb5 kerberos-sec# Kerberos v5
kerberos        88/udp          kerberos5 krb5 kerberos-sec# Kerberos v5
iso-tsap        102/tcp         tsap            # part of ISODE
```

**• Locate .txt files in /home/ and remove temporary ones if needed.**

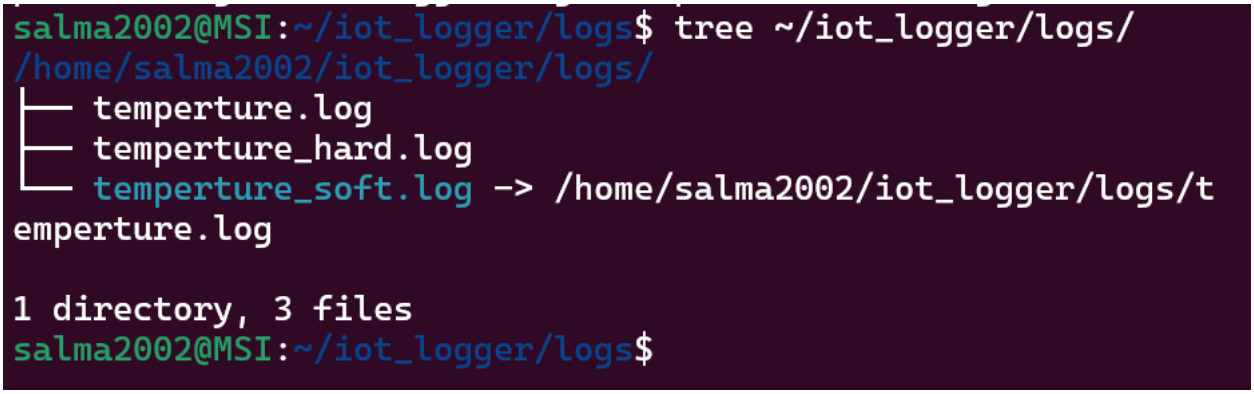
```
salma2002@MSI:~/Desktop$ cd ..
salma2002@MSI:~$ cd iot_logger
salma2002@MSI:~/iot_logger$ cd data
salma2002@MSI:~/iot_logger/data$ ls
services
salma2002@MSI:~/iot_logger/data$ touch temporary.txt
salma2002@MSI:~/iot_logger/data$ ls
services  temporary.txt
salma2002@MSI:~/iot_logger/data$ man find
```

```
salma2002@MSI:~/iot_logger/data$ find /home/salma2002/iot_logger -type f -name "*.txt"
/home/salma2002/iot_logger/data/temporary.txt
salma2002@MSI:~/iot_logger/data$ rm temporary.txt
salma2002@MSI:~/iot_logger/data$ ls
services
salma2002@MSI:~/iot_logger/data$
```

**• Create hard and symbolic links for temperature.log.**

```
salma2002@MSI:~/iot_logger/logs$ ln ~/iot_logger/logs/temper
ture.log ~/iot_logger/logs/temperture_hard.log
salma2002@MSI:~/iot_logger/logs$ ln -s ~/iot_logger/logs/tem
perture.log ~/iot_logger/logs/temperture_soft.log
salma2002@MSI:~/iot_logger/logs$
```

**• Display directory structure to confirm organization.**




## Open-Ended Questions:

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

**1. Regular Files**

Regular files are the most common type, used to store data. They can be:

- Text files → Contain human-readable characters (e.g., .txt, source code files).
- Binary files → Contain compiled programs or other non-readable data (e.g., executables).
- Media files → Store multimedia content like images, videos, and music (e.g., .jpg, .mp4).

**2. Directory Files**

A directory is a special type of file that holds references to other files or subdirectories.

- Example: /home/user/ contains a user's files and folders.

**3. Symbolic Links (Symlinks)**

A symbolic link is a pointer (shortcut) to another file or directory.

- It doesn't contain data itself, only the path to the target.
- Example: /usr/bin/python -> /usr/bin/python3.11

- If the target is deleted, the symlink becomes broken (dangling).

**4. Character Device Files**

Character device files represent devices that transfer data one character at a time.

- Common examples: keyboards, mice, and serial ports.
- Typically found in /dev/.
- Example: /dev/input/mouse2
- Can be created using the mknod command.

**5. Block Device Files**

Block device files represent devices that handle data in fixed-size blocks.

- Commonly used for disks and storage devices.
- Found in /dev/.
- Example: /dev/sda1 (a partition on a hard disk).

**6. FIFO (Named Pipes)**

FIFO files are used for inter-process communication (IPC).

- They allow processes to pass data so that it is read in the same first-in, first-out order it was written.
- Created with the mkfifo command.
- Example:
- mkfifo mypipe

**How to Check File Types**

Linux provides several ways to check file types:

- ls -l → Displays file type in the first character (- = regular, d = directory, l = symlink, c = character device, b = block device, p = pipe).

**Reference:** Types of files in Linux

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

In Linux, files are represented by inodes, which store metadata and point to the actual file data on disk. A file in the filesystem is essentially a name (link) that refers to an inode.

**Hard Links**

- A hard link is an additional filename that points directly to the same inode as the original file.
- Deleting the original file does not remove the data, because the inode remains as long as at least one link exists.
- Renaming or moving the original file also does not affect the hard link, since both names point to the same inode.
- Any modification to the data in the inode is reflected in all hard-linked files.
- Limitation: Hard links can only exist within the same filesystem.

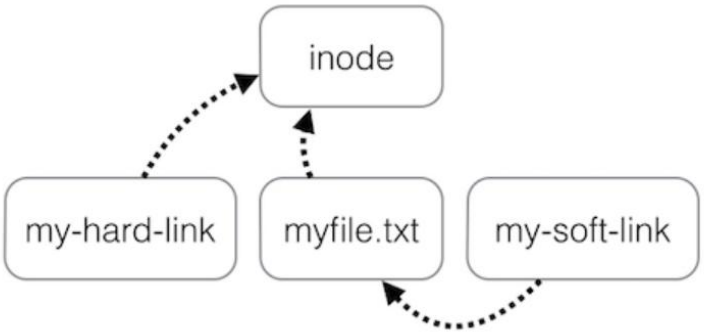
**Example use case:**
When you need multiple filenames pointing to the same physical data, such as maintaining different references to a configuration file without duplicating storage.

**Symbolic Links (Symlinks)**

- A symbolic link is a special file that stores the path to another file.
- Unlike hard links, a symlink does not point directly to the inode.
- If the target file is deleted, renamed, or moved, the symlink becomes a broken link (dangling).

- Symlinks can span across different filesystems because they reference names, not inodes.

  **Example use case:**
  When you want a shortcut or alias to a file or directory, such as linking /etc/nginx/sites-enabled/ to files in /etc/nginx/sites-available/.




**Reference:**
[What is the difference between a symbolic link and a hard link? – Stack Overflow]

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

No, they are not the same.

- rmdir: This command can only delete a directory if it is completely empty. If the directory contains any files or subdirectories, the command will fail.
- rm -r: This command recursively deletes a directory along with all its contents (files and subdirectories). It is more powerful and also more dangerous because it removes everything without requiring the directory to be empty.

  **Reference:** Difference between rmdir and rm -r