

```

elsayed@SIC:~$ export SENSOR_TYPE=temperature
elsayed@SIC:~$ echo $SENSOR_TYPE
temperature
elsayed@SIC:~$ mkdir -p scripts logs data
elsayed@SIC:~$ nano scripts/sensor_script.py
elsayed@SIC:~$ python3 scripts/sensor_script.py > logs/temperature.log 2>&1 &
[8] 7321
elsayed@SIC:~$ ps aux | grep sensor_script.py
elsayed   7321  0.2  0.1 19132 8832 pts/0    S   02:38   0:00 python3 scripts/sensor_script.py
elsayed   7339  0.0  0.0  9568 2816 pts/0    S+  02:38   0:00 grep --color=auto sensor_script.py
elsayed@SIC:~$ ls -l /proc/7321/fd
total 0
lrwx----- 1 elsayed elsayed 64 0^0^0^ 4 02:38 0 -> /dev/pts/0
l-wx----- 1 elsayed elsayed 64 0^0^0^ 4 02:38 1 -> /home/elsayed/logs/temperature.log
l-wx----- 1 elsayed elsayed 64 0^0^0^ 4 02:38 2 -> /home/elsayed/logs/temperature.log
lr-x----- 1 elsayed elsayed 64 0^0^0^ 4 02:38 66 -> '/home/elsayed/.local/share/gvfs-metadata/root (deleted)'
lr-x----- 1 elsayed elsayed 64 0^0^0^ 4 02:38 75 -> '/home/elsayed/.local/share/gvfs-metadata/root-e146948c.log (deleted)'
elsayed@SIC:~$ grep "2025" logs/temperature.log > logs/filtered.log
elsayed@SIC:~$ cp logs/*.log data/
elsayed@SIC:~$ unset SENSOR_TYPE
elsayed@SIC:~$ (ls -l; sleep 10) | grep .py
ps aux | grep grep
elsayed@SIC:~$ ps aux | grep grep
elsayed   7622  0.0  0.0  9564 2816 pts/0    S+  02:40   0:00 grep --color=auto grep
elsayed@SIC:~$ ls -l /proc/<pid>/fd
bash: pid: No such file or directory
elsayed@SIC:~$ ls -l /proc/7622/fd
ls: cannot access '/proc/7622/fd': No such file or directory
elsayed@SIC:~$ python3 scripts/sensor_script.py > logs/temperature.log 2>&1 &
[9] 7946
elsayed@SIC:~$ ps aux | grep sensor_script.py
elsayed   7321  0.0  0.1 19132 8832 pts/0    S   02:38   0:00 python3 scripts/sensor_script.py
elsayed   7946  0.1  0.1 19132 8832 pts/0    S   02:43   0:00 python3 scripts/sensor_script.py
elsayed   7972  0.0  0.0  9568 2816 pts/0    S+  02:43   0:00 grep --color=auto sensor_script.py
elsayed@SIC:~$ ls -l /proc/7321/fd
total 0
lrwx----- 1 elsayed elsayed 64 0^0^0^ 4 02:38 0 -> /dev/pts/0
l-wx----- 1 elsayed elsayed 64 0^0^0^ 4 02:38 1 -> /home/elsayed/logs/temperature.log
l-wx----- 1 elsayed elsayed 64 0^0^0^ 4 02:38 2 -> /home/elsayed/logs/temperature.log
lr-x----- 1 elsayed elsayed 64 0^0^0^ 4 02:38 66 -> '/home/elsayed/.local/share/gvfs-metadata/root (deleted)'
lr-x----- 1 elsayed elsayed 64 0^0^0^ 4 02:38 75 -> '/home/elsayed/.local/share/gvfs-metadata/root-e146948c.log (deleted)'
elsayed@SIC:~$ ls -l /proc/7946/fd
total 0
lrwx----- 1 elsayed elsayed 64 0^0^0^ 4 02:46 0 -> /dev/pts/0
l-wx----- 1 elsayed elsayed 64 0^0^0^ 4 02:46 1 -> /home/elsayed/logs/temperature.log
l-wx----- 1 elsayed elsayed 64 0^0^0^ 4 02:46 2 -> /home/elsayed/logs/temperature.log
lr-x----- 1 elsayed elsayed 64 0^0^0^ 4 02:46 66 -> '/home/elsayed/.local/share/gvfs-metadata/root (deleted)'
lr-x----- 1 elsayed elsayed 64 0^0^0^ 4 02:46 75 -> '/home/elsayed/.local/share/gvfs-metadata/root-e146948c.log (deleted)'
elsayed@SIC:~$ █

```

1. Difference between ' ' and " " in shell

- ' ' → literal, no variable expansion.
Example: 'echo \$USER' prints \$USER.
- " " → expands variables.
Example: "echo \$USER" prints your username.

2. [-f filename] vs [-d dirname]

- -f → check if file exists and is a regular file.
- -d → check if directory exists.

3. stdout/stderr redirection

- > → overwrite file with stdout.
- >> → append to file.
- 2> → redirect stderr.
- &> → redirect both.
- To confirm, check file descriptors in /proc/<pid>/fd.

4. For loop example

```
for i in 1 2 3; do
    echo "Number $i"
done
```

5. Simple bash calculator

```
#!/bin/bash
echo "Enter num1:"; read a
echo "Enter num2:"; read b
echo "Add: $((a+b))"
echo "Subtract: $((a-b))"
```