

Day5

Set an environment variable for sensor type.

```
tosson@LAPTOP-8TFQP2MT: ~$ export SENSOR_TYPE=temperature
tosson@LAPTOP-8TFQP2MT: ~$ echo $SENSOR_TYPE
temperature
tosson@LAPTOP-8TFQP2MT: ~$
```

Write scripts/sensor_script.py to simulate data logging (timestamps + random values).

```
tosson@LAPTOP-8TFQP2MT: ~/iot_logger/scripts$ nano sensor_script.py
tosson@LAPTOP-8TFQP2MT: ~/iot_logger/scripts$ chmod +x sensor_script.py
tosson@LAPTOP-8TFQP2MT: ~/iot_logger/scripts$ ./sensor_script.py
2025-09-04 14:00:43 - temperature: 21.51
2025-09-04 14:00:45 - temperature: 32.47
2025-09-04 14:00:48 - temperature: 21.87
2025-09-04 14:00:50 - temperature: 25.85
2025-09-04 14:00:52 - temperature: 24.71
2025-09-04 14:00:54 - temperature: 21.51
2025-09-04 14:00:56 - temperature: 24.59
^Z
[2]+  Stopped                  ./sensor_script.py
tosson@LAPTOP-8TFQP2MT: ~/iot_logger/scripts$ |
```

nano:

```
tosson@LAPTOP-8TFQP2MT: x + v
GNU nano 7.2 sensor_script.py *
#!/usr/bin/python3
import time, random
sensor = "temperature"
for i in range(10):
    value = random.uniform(20.0, 35.0)
    timestamp = time.strftime("%Y-%m-%d %H:%M:%S")
    print(f"{timestamp} - {sensor}: {value:.2f}")
    time.sleep(2)

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

Redirect script output to logs/temperature.log while running as a background process.

```
tosson@LAPTOP-8TFQP2MT: x + v
tosson@LAPTOP-8TFQP2MT:~$ cd iot_logger
tosson@LAPTOP-8TFQP2MT:~/iot_logger$ cd scripts
tosson@LAPTOP-8TFQP2MT:~/iot_logger/scripts$ ./sensor_script.py >> ../logs/temperature.log 2>&1 &
[3] 1028
tosson@LAPTOP-8TFQP2MT:~/iot_logger/scripts$ ps aux | grep sensor_script.py
root      1002  0.0  0.0  13760  6740 pts/0    T   13:55   0:00 sudo chown tosson:tosson sensor_script.py
tosson    1019  0.0  0.1  15348 10368 pts/0    T   14:00   0:00 /usr/bin/python3 ./sensor_script.py
tosson    1028  0.0  0.1  15448 10368 pts/0    S   14:05   0:00 /usr/bin/python3 ./sensor_script.py
tosson    1030  0.0  0.0   4104   2048 pts/0    S+  14:05   0:00 grep --color=auto sensor_script.py
tosson@LAPTOP-8TFQP2MT:~/iot_logger/scripts$ ps aux | grep sensor_script.py
root      1002  0.0  0.0  13760  6740 pts/0    T   13:55   0:00 sudo chown tosson:tosson sensor_script.py
tosson    1019  0.0  0.1  15348 10368 pts/0    T   14:00   0:00 /usr/bin/python3 ./sensor_script.py
tosson    1032  0.0  0.0   4104   2048 pts/0    S+  14:05   0:00 grep --color=auto sensor_script.py
[3]  Done
./sensor_script.py >> ../logs/temperature.log 2>&1
tosson@LAPTOP-8TFQP2MT:~/iot_logger/scripts$
```

Find the PID of the process, inspect file descriptors in /proc//fd

```
tosson@LAPTOP-8TFQP2MT: x + v
tosson      1019  0.0  0.1  15348 10368 pts/0    T   14:00   0:00 /usr/bin/
python3 ./sensor_script.py
tosson      1032  0.0  0.0   4104  2048 pts/0    S+  14:05   0:00 grep --co
lor=auto sensor_script.py
[3] Done ./sensor_script.py >> ../logs/temperature.log
2>&1
tosson@LAPTOP-8TFQP2MT:~/iot_logger/scripts$ ps aux | grep sensor_script.py
root        1002  0.0  0.0  13760  6740 pts/0    T   13:56   0:00 sudo chow
n tosson:tosson sensor_script.py
tosson      1019  0.0  0.1  15348 10368 pts/0    T   14:00   0:00 /usr/bin/
python3 ./sensor_script.py
tosson      1035  0.0  0.0   4104  2048 pts/0    S+  14:08   0:00 grep --co
lor=auto sensor_script.py
tosson@LAPTOP-8TFQP2MT:~/iot_logger/scripts$ ls -l /proc/1019/fd
total 0
lrwx----- 1 tosson tosson 64 Sep  4 14:09 0 -> /dev/pts/0
lrwx----- 1 tosson tosson 64 Sep  4 14:09 1 -> /dev/pts/0
lrwx----- 1 tosson tosson 64 Sep  4 14:09 2 -> /dev/pts/0
tosson@LAPTOP-8TFQP2MT:~/iot_logger/scripts$
```

Filter log data into another file.

```
tosson@LAPTOP-8TFQP2MT: x + v
tosson@LAPTOP-8TFQP2MT:~/iot_logger/scripts$ cd ~/iot_logger
tosson@LAPTOP-8TFQP2MT:~/iot_logger$ grep "temperature" logs/temperature.log
> logs/filtered.log
tosson@LAPTOP-8TFQP2MT:~/iot_logger$ head logs/temperature.log
test line from developer
2025-09-04 14:05:19 - temperature: 28.95
2025-09-04 14:05:21 - temperature: 28.91
2025-09-04 14:05:23 - temperature: 28.36
2025-09-04 14:05:25 - temperature: 23.74
2025-09-04 14:05:27 - temperature: 30.60
2025-09-04 14:05:29 - temperature: 29.34
2025-09-04 14:05:31 - temperature: 25.48
2025-09-04 14:05:33 - temperature: 28.11
2025-09-04 14:05:35 - temperature: 27.50
tosson@LAPTOP-8TFQP2MT:~/iot_logger$ grep "temperature:" logs/temperature.lo
g > logs/filtered.log
tosson@LAPTOP-8TFQP2MT:~/iot_logger$ cat logs/filtered.log
2025-09-04 14:05:19 - temperature: 28.95
2025-09-04 14:05:21 - temperature: 28.91
```

Use wildcards to copy logs to data/.

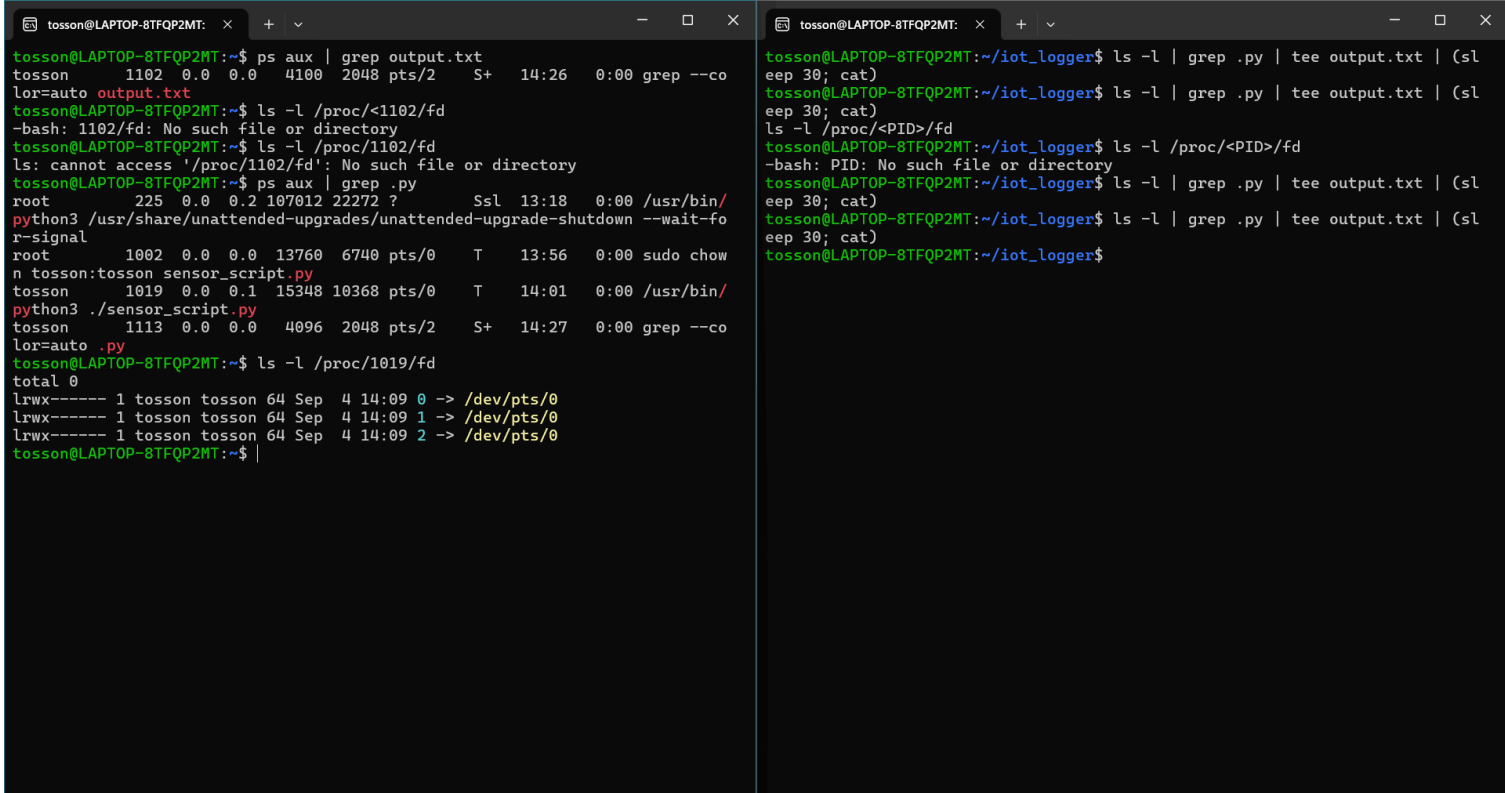
```
tosson@LAPTOP-8TFQP2MT: x + v
2025-09-04 14:05:33 - temperature: 28.11
2025-09-04 14:05:35 - temperature: 27.50
tosson@LAPTOP-8TFQP2MT:~/iot_logger$ grep "temperature:" logs/temperature.log > logs/filtered.log
tosson@LAPTOP-8TFQP2MT:~/iot_logger$ cat logs/filtered.log
2025-09-04 14:05:19 - temperature: 28.95
2025-09-04 14:05:21 - temperature: 28.91
2025-09-04 14:05:23 - temperature: 28.36
2025-09-04 14:05:25 - temperature: 23.74
2025-09-04 14:05:27 - temperature: 30.60
2025-09-04 14:05:29 - temperature: 29.34
2025-09-04 14:05:31 - temperature: 25.48
2025-09-04 14:05:33 - temperature: 28.11
2025-09-04 14:05:35 - temperature: 27.50
2025-09-04 14:05:37 - temperature: 23.60
tosson@LAPTOP-8TFQP2MT:~/iot_logger$ cp logs/*.log data/
tosson@LAPTOP-8TFQP2MT:~/iot_logger$ ls data/
filtered.log  services  temperature.log
tosson@LAPTOP-8TFQP2MT:~/iot_logger$
```

Clear variable when done.

```
tosson@LAPTOP-8TFQP2MT: x + v
g > logs/filtered.log
tosson@LAPTOP-8TFQP2MT:~/iot_logger$ cat logs/filtered.log
2025-09-04 14:05:19 - temperature: 28.95
2025-09-04 14:05:21 - temperature: 28.91
2025-09-04 14:05:23 - temperature: 28.36
2025-09-04 14:05:25 - temperature: 23.74
2025-09-04 14:05:27 - temperature: 30.60
2025-09-04 14:05:29 - temperature: 29.34
2025-09-04 14:05:31 - temperature: 25.48
2025-09-04 14:05:33 - temperature: 28.11
2025-09-04 14:05:35 - temperature: 27.50
2025-09-04 14:05:37 - temperature: 23.60
tosson@LAPTOP-8TFQP2MT:~/iot_logger$ cp logs/*.log data/
tosson@LAPTOP-8TFQP2MT:~/iot_logger$ ls data/
filtered.log  services  temperature.log
tosson@LAPTOP-8TFQP2MT:~/iot_logger$ unset SENSOR_TYPE
tosson@LAPTOP-8TFQP2MT:~/iot_logger$ echo $SENSOR_TYPE

tosson@LAPTOP-8TFQP2MT:~/iot_logger$
```

Challenge – Pipes & FD inspection



```
tosson@LAPTOP-8TFQP2MT: ~$ ps aux | grep output.txt
tosson    1102  0.0  0.0   4100   2048 pts/2    S+   14:26   0:00 grep --co
lor=auto output.txt
tosson@LAPTOP-8TFQP2MT: ~$ ls -l /proc/<1102/fd
-bash: 1102/fd: No such file or directory
tosson@LAPTOP-8TFQP2MT: ~$ ls -l /proc/1102/fd
ls: cannot access '/proc/1102/fd': No such file or directory
tosson@LAPTOP-8TFQP2MT: ~$ ps aux | grep .py
root      225   0.0  0.2 107012 22272 ?        Ssl  13:18   0:00 /usr/bin/
python3 /usr/share/unattended-upgrades/unattended-upgrade-shutdown --wait-fo
r-signal
root      1002  0.0  0.0  13760   6740 pts/0    T    13:56   0:00 sudo chow
n tosson:tosson sensor_script.py
tosson    1019  0.0  0.1  15348  10368 pts/0    T    14:01   0:00 /usr/bin/
python3 ./sensor_script.py
tosson    1113  0.0  0.0   4096   2048 pts/2    S+   14:27   0:00 grep --co
lor=auto .py
tosson@LAPTOP-8TFQP2MT: ~$ ls -l /proc/1019/fd
total 0
lrwx----- 1 tosson tosson 64 Sep  4 14:09 0 -> /dev/pts/0
lrwx----- 1 tosson tosson 64 Sep  4 14:09 1 -> /dev/pts/0
lrwx----- 1 tosson tosson 64 Sep  4 14:09 2 -> /dev/pts/0
tosson@LAPTOP-8TFQP2MT: ~$

tosson@LAPTOP-8TFQP2MT: ~/iot_logger$ ls -l | grep .py | tee output.txt | (sl
eep 30; cat)
tosson@LAPTOP-8TFQP2MT: ~/iot_logger$ ls -l | grep .py | tee output.txt | (sl
eep 30; cat)
ls -l /proc/<PID>/fd
tosson@LAPTOP-8TFQP2MT: ~/iot_logger$ ls -l /proc/<PID>/fd
-bash: PID: No such file or directory
tosson@LAPTOP-8TFQP2MT: ~/iot_logger$ ls -l | grep .py | tee output.txt | (sl
eep 30; cat)
tosson@LAPTOP-8TFQP2MT: ~/iot_logger$ ls -l | grep .py | tee output.txt | (sl
eep 30; cat)
tosson@LAPTOP-8TFQP2MT: ~/iot_logger$
```

What's the difference between ' ' and " " in shell?

single quotes (' ') preserve text exactly as written without expanding variables or commands, while double quotes (" ") allow expansion.

example:

```
echo 'Hello $USER' prints Hello $USER
echo "Hello $USER" prints Hello tosson
```

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

[-f filename] checks if a file exists and is a regular file, while [-d dirname] checks if a directory exists.

Explain stdout/stderr redirection, appending vs overwrite. How can you confirm redirection using file descriptors

stdout is normal output and **stderr** is error output. Using > sends output to a file and overwrites it, while >> adds output to the end of the file

Example:

ls > out.txt replaces the file's content, and ls >> out.txt appends to it

You can confirm redirection by checking the process's file descriptors in /proc/pid/fd .

Show an example of a for loop in bash. Then, write a simple bash calculator that does add/subtract

GNU nano 7.2

loop.sh *

```
#!/bin/bash
for i in {1..5}
do
    echo "Number: $i"
done
```

^G Help
^X Exit

^O Write Out
^R Read File

^W Where Is
^_ Replace

^K Cut
^U Paste

^T Execute
^J Justify

GNU nano 7.2

calc.sh *

```
#!/bin/bash

echo "Enter first number:"
read a
echo "Enter operator (+ or -):"
read op
echo "Enter second number:"
read b

if [ "$op" = "+" ]; then
    echo "Result = $((a + b))"
elif [ "$op" = "-" ]; then
    echo "Result = $((a - b))"
else
    echo "Invalid operator"
fi
```

^G Help
^X Exit

^O Write Out
^R Read File

^W Where Is
^_ Replace

^K Cut
^U Paste

^T Execute
^J Justify

^C Location
^/ Go To Line

```
tosson@LAPTOP-8TFQP2MT:~/iot_logger$ cd scripts
tosson@LAPTOP-8TFQP2MT:~/iot_logger/scripts$ nano loop.sh
tosson@LAPTOP-8TFQP2MT:~/iot_logger/scripts$ chmod +x loop.sh
tosson@LAPTOP-8TFQP2MT:~/iot_logger/scripts$ ./loop.sh
Number: 1
Number: 2
Number: 3
Number: 4
Number: 5
tosson@LAPTOP-8TFQP2MT:~/iot_logger/scripts$ nano calc.sh
tosson@LAPTOP-8TFQP2MT:~/iot_logger/scripts$ chmod +x calc.sh
tosson@LAPTOP-8TFQP2MT:~/iot_logger/scripts$ ./calc.sh
Enter first number:
1
Enter operator (+ or -):
+
Enter second number:
3
Result = 4
tosson@LAPTOP-8TFQP2MT:~/iot_logger/scripts$ |
```