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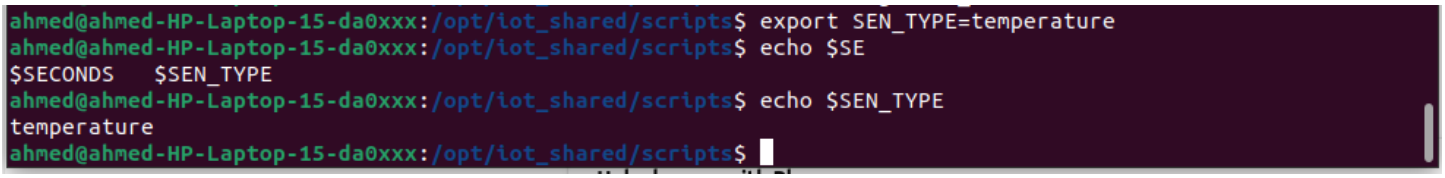
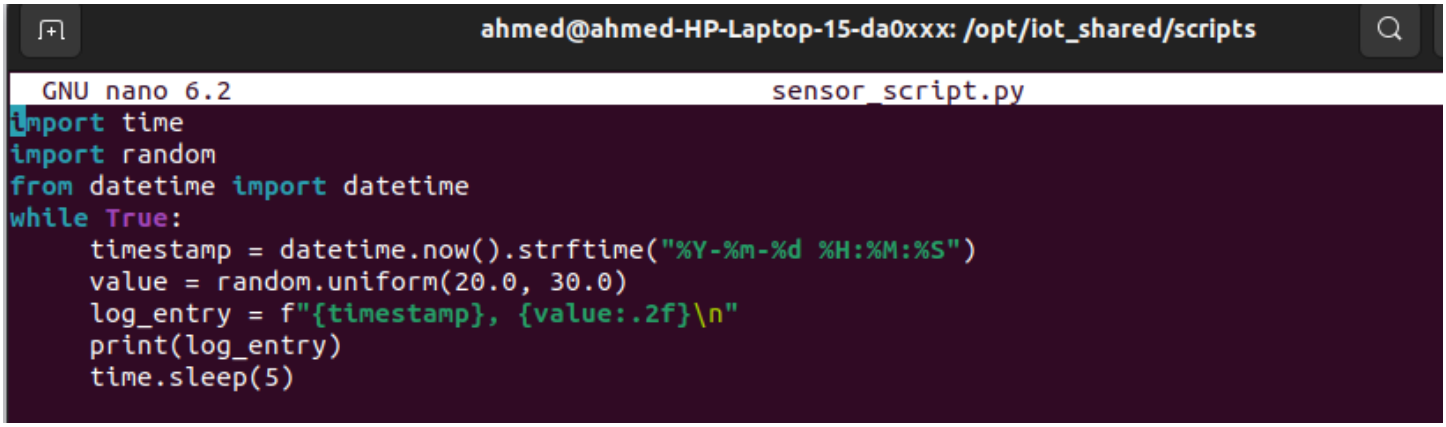
Group : IOT_701_O

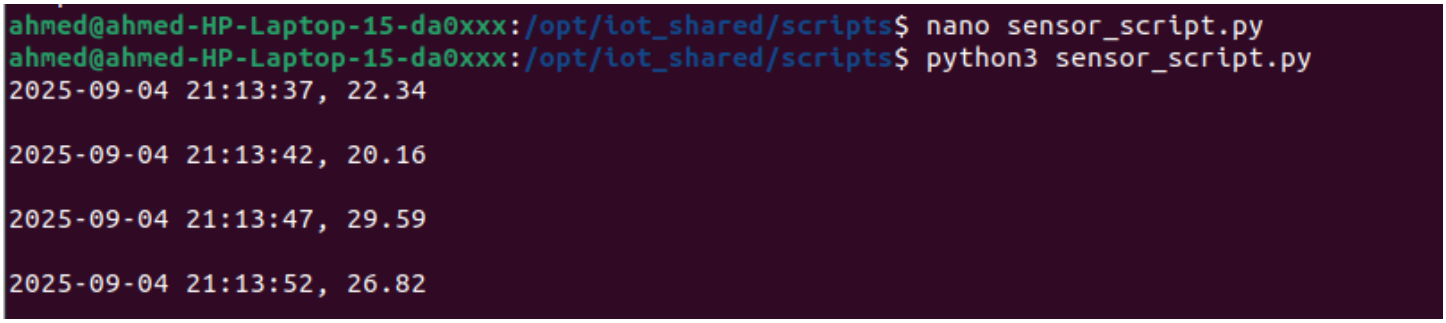
DAY5

Set an environment variable for sensor type.



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





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

```
ahmed@ahmed-HP-Laptop-15-da0xxx: /opt/iot_shared/scripts   ahmed@ahmed-HP-Laptop-15-da0xxx: ~
 GNU nano 6.2                                  sensor_script.py
import time
import random
from datetime import datetime
while True:
    timestamp = datetime.now().strftime("%Y-%m-%d %H:%M:%S")
    value = random.uniform(20.0, 30.0)
    log_entry = f"{timestamp}, {value:.2f}\n"
    print(log_entry, flush=True)
    time.sleep(5)
```

```
ahmed@ahmed-HP-Laptop-15-da0xxx:/opt/iot_shared/scripts$ nano sensor_script.py
ahmed@ahmed-HP-Laptop-15-da0xxx:/opt/iot_shared/scripts$ python3 sensor_script.py > ../logs/temperature.log 2>&1 &
[1] 170039
ahmed@ahmed-HP-Laptop-15-da0xxx:/opt/iot_shared/scripts$ tail -f ../logs/temperature.log
2025-09-04 21:25:32, 23.89

2025-09-04 21:25:37, 24.11

2025-09-04 21:25:42, 27.47

2025-09-04 21:25:47, 26.52

2025-09-04 21:25:52, 27.49

2025-09-04 21:25:57, 28.37

2025-09-04 21:26:02, 25.64
```

Find the PID of the process, inspect file descriptors in /proc/<pid>/fd.

```
ahmed@ahmed-HP-Laptop-15-da0xxx:/opt/iot_shared/scripts$ nano sensor_script.py
ahmed@ahmed-HP-Laptop-15-da0xxx:/opt/iot_shared/scripts$ jobs -l
[1]+ 170039 Running                 python3 sensor_script.py > ../logs/temperature.log 2>&1 &
ahmed@ahmed-HP-Laptop-15-da0xxx:/opt/iot_shared/scripts$ cat /proc/170039/fd
cat: /proc/170039/fd: Is a directory
ahmed@ahmed-HP-Laptop-15-da0xxx:/opt/iot_shared/scripts$ ls /proc/170039/fd
0  1  2
ahmed@ahmed-HP-Laptop-15-da0xxx:/opt/iot_shared/scripts$ ls -l /proc/170039/fd
total 0
lrwx------ 1 ahmed ahmed 64 Sep  4 21:30 0 -> /dev/pts/4
l-wx------ 1 ahmed ahmed 64 Sep  4 21:30 1 -> /opt/iot_shared/logs/temperature.log
l-wx------ 1 ahmed ahmed 64 Sep  4 21:30 2 -> /opt/iot_shared/logs/temperature.log
ahmed@ahmed-HP-Laptop-15-da0xxx:/opt/iot_shared/scripts$
```

```
ahmed@ahmed-HP-Laptop-15-da0xxx:/opt/iot_shared/scripts$ cat /proc/170039/fd/1
2025-09-04 21:25:32, 23.89

2025-09-04 21:25:37, 24.11

2025-09-04 21:25:42, 27.47

2025-09-04 21:25:47, 26.52

2025-09-04 21:25:52, 27.49

2025-09-04 21:25:57, 28.37

2025-09-04 21:26:02, 25.64

2025-09-04 21:26:07, 26.33
```

Filter log data into another file.

I will filter only the degree > 28.

```
ahmed@ahmed-HP-Laptop-15-da0xxx:/opt/iot_shared$ awk -F, '{ if ($2 > 28) print $0 }' logs/temperature.log
2025-09-04 21:25:57, 28.37
2025-09-04 21:26:17, 29.20
2025-09-04 21:26:32, 29.45
2025-09-04 21:26:42, 28.08
2025-09-04 21:28:13, 28.97
2025-09-04 21:28:58, 28.37
2025-09-04 21:29:08, 29.83
2025-09-04 21:29:33, 29.95
2025-09-04 21:29:38, 28.10
2025-09-04 21:29:58, 28.46
2025-09-04 21:30:53, 28.88
2025-09-04 21:31:13, 29.99
2025-09-04 21:31:48, 28.01
```

Use wildcards to copy logs to data/.

```
ahmed@ahmed-HP-Laptop-15-da0xxx:/opt/iot_shared$ ls
data  hard.log  logs  scripts  soft.log
ahmed@ahmed-HP-Laptop-15-da0xxx:/opt/iot_shared$ cp logs/*.log data/
ahmed@ahmed-HP-Laptop-15-da0xxx:/opt/iot_shared$ ls -l data/
total 28
-rw-r--r-- 1 ahmed ahmed 12813 Aug 31 16:26 services
-rw-rw-r-- 1 ahmed ahmed  9604 Sep  5 15:38 temperature.log
ahmed@ahmed-HP-Laptop-15-da0xxx:/opt/iot_shared$
```

Clear variable when done.

```
ahmed@ahmed-HP-Laptop-15-da0xxx:/opt/iot_shared$ export SENSOR_TYPE=temp
ahmed@ahmed-HP-Laptop-15-da0xxx:/opt/iot_shared$ echo $S
$SECONDS              $SHELL                $SRANDOM              $STM32CubeMX_PATH
$SENSOR_TYPE          $SHELLOPTS            $SSH_AGENT_LAUNCHER   $STM32_PRG_PATH
$SESSION_MANAGER      $SHLVL                $SSH_AUTH_SOCK        $SYSTEMD_EXEC_PID
ahmed@ahmed-HP-Laptop-15-da0xxx:/opt/iot_shared$ echo $SENSOR_TYPE
temp
ahmed@ahmed-HP-Laptop-15-da0xxx:/opt/iot_shared$ unset SENSOR_TYPE
ahmed@ahmed-HP-Laptop-15-da0xxx:/opt/iot_shared$ echo $SENSOR_TYPE

ahmed@ahmed-HP-Laptop-15-da0xxx:/opt/iot_shared$
```

Run a pipeline (e.g., ls -l | grep .py).

While it's running, inspect the FDs in /proc/<pid>/fd.

Hint: To give yourself time, put a sleep in one command of the pipeline so the process stays alive long enough for inspection.

```
ahmed@ahmed-HP-Laptop-15-da0xxx:/opt/iot_shared$ (ls -l; sleep 120) | grep ".py"
```

in another terminal

```
ahmed@ahmed-HP-Laptop-15-da0xxx:/opt/iot_shared$ ps aux | grep grep
ahmed       9202  0.0  0.0   9536  2560 pts/0    S+   16:02   0:00 grep --color=auto .py
ahmed       9251  0.0  0.0   9404  2560 pts/1    S+   16:02   0:00 grep --color=auto grep
ahmed@ahmed-HP-Laptop-15-da0xxx:/opt/iot_shared$ ls -l /proc/9202/fd
total 0
lr-x------ 1 ahmed ahmed 64 Sep  5 16:03 0 -> 'pipe:[55715]'
lrwx------ 1 ahmed ahmed 64 Sep  5 16:03 1 -> /dev/pts/0
lrwx------ 1 ahmed ahmed 64 Sep  5 16:03 2 -> /dev/pts/0
```

Open-Ended Questions:

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

' ' → used when we need the exact string inside it without any expanding

" " → used when we need to evaluate some expression inside the string

example :

NAME=Ahmed

echo 'Hello $NAME' # → Hello $NAME

echo "Hello $NAME" # → Hello Ahmed

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

-f → file exists and is a *regular file*.

-d → directory exists.

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

- every process has 3 std files (input-output-stderr)
- output → the output of the utility will be here
- stderr → contains error messages

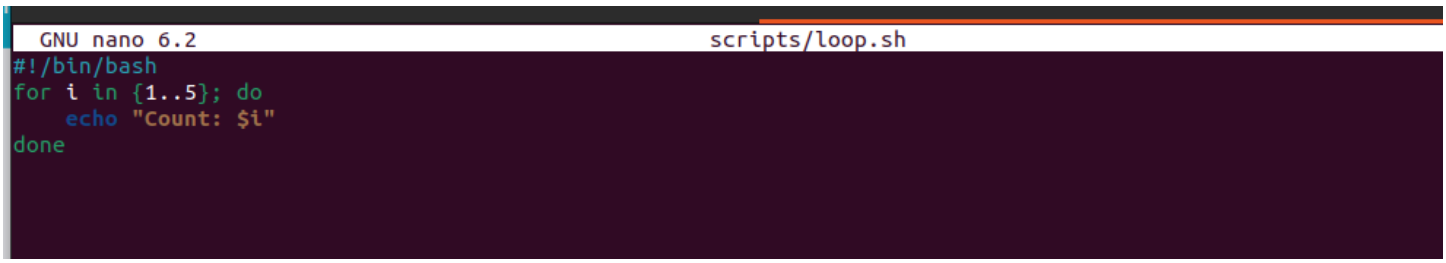
appending >> → will add the content at the tail of the file

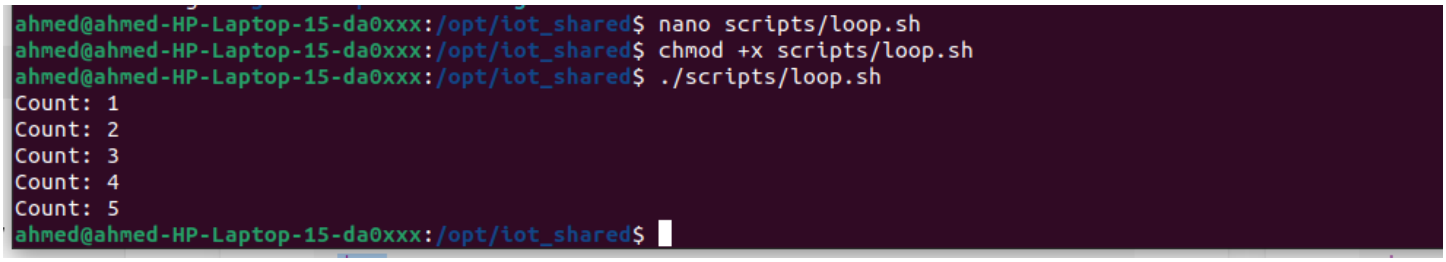
override > → remove old content and replace with a new one

- we can confirm redirection throw getting process id and inspect file descriptor

---

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





```
  GNU nano 6.2                                scripts/calc.sh
#!/bin/bash

echo "Enter first number:"
read a

echo "Enter second number:"
read b

echo "Choose operation (+ or -):"
read op

if [ "$op" = "+" ]; then
    result=$((a + b))
    echo "Result: $result"
elif [ "$op" = "-" ]; then
    result=$((a - b))
    echo "Result: $result"
else
    echo "Invalid operation"
fi
                                [ Read 20 lines ]
^G Help         ^O Write Out    ^W Where Is     ^K Cut          ^T Execute      ^C Location     M-U Undo
^X Exit         ^R Read File    ^\ Replace      ^U Paste        ^J Justify      ^/ Go To Line   M-E Redo
```

```
ahmed@ahmed-HP-Laptop-15-da0xxx:/opt/iot_shared$ nano scripts/loop.sh
ahmed@ahmed-HP-Laptop-15-da0xxx:/opt/iot_shared$ nano scripts/calc.sh
ahmed@ahmed-HP-Laptop-15-da0xxx:/opt/iot_shared$ chmod +x scripts/calc.sh
ahmed@ahmed-HP-Laptop-15-da0xxx:/opt/iot_shared$ ./scripts/calc.sh
Enter first number:
5
Enter second number:
3
Choose operation (+ or -):
+
Result: 8
ahmed@ahmed-HP-Laptop-15-da0xxx:/opt/iot_shared$
```