SIC-IOT702 / task 03 : capstone Task / phase 5

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Day 5 – Phase 5: Scripting Automation, Redirection & FDs

Boss's Request: Automate logging with Python and check file descriptors.

Tasks:

• Set an environment variable for sensor type.

```
zawawy34@zawawy34-VirtualBox:~$ VBoxClient --clipboard
zawawy34@zawawy34-VirtualBox:~$ export SENSOR_TYPE="temperature"
```

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

```
zawawy34@zawawy34-VirtualBox:~$ nano ~/iot_logger/scripts/sensor_script.py
```

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

```
zawawy34@zawawy34-VirtualBox:~$ python3 ~/iot_logger/scripts/sensor_script.py &
[1] 3023
zawawy34@zawawy34-VirtualBox:~$ [2025-09-04 03:26:00.541160] Starting temperature sensor data logging.
^C
```

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

```
zawawy34@zawawy34-VirtualBox:~$ ps aux | grep sensor_script.py | grep -v "grep"
zawawy34    3023  0.0  0.0  18916  9472 pts/0    S    03:26   0:00 python3 /home/zawawy34/iot_logger/scripts/sensor_script.py
zawawy34@zawawy34-VirtualBox:~$ ls -l /proc/^Cd
zawawy34@zawawy34-VirtualBox:~$ ls -l /proc/3023/fd
total 0
lrwx------ 1 zawawy34 zawawy34 64 0 03:54 4  سبت -> /dev/pts/0
lrwx------ 1 zawawy34 zawawy34 64 1 03:54 4  سبت -> /dev/pts/0
lrwx------ 1 zawawy34 zawawy34 64 2 03:54 4  سبت -> /dev/pts/0
```

• Filter log data into another file.

```
zawawy34@zawawy34-VirtualBox:~$ grep "VALUE: 2[6-9]" ~/iot_logger/logs/temperature.log > ~/iot_logger/logs/high_temp.log
```

• Use wildcards to copy logs to data/.

```
zawawy34@zawawy34-VirtualBox:~$ cp ~/iot_logger/logs/temperature.log ~/iot_logger/data/
zawawy34@zawawy34-VirtualBox:~$ cp ~/iot_logger/logs/*.log ~/iot_logger/data/
```

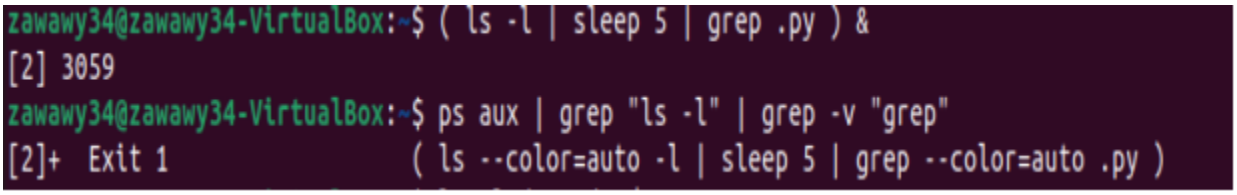
• Clear variable when done.

```
zawawy34@zawawy34-VirtualBox:~$ unset SENSOR_TYPE
```

```
zawawy34@zawawy34-VirtualBox:~$ ls -l /proc/3023/fd
total 0
lrwx------ 1 zawawy34 zawawy34 64 0 03:54 4  سبت -> /dev/pts/0
lrwx------ 1 zawawy34 zawawy34 64 1 03:54 4  سبت -> /dev/pts/0
lrwx------ 1 zawawy34 zawawy34 64 2 03:54 4  سبت -> /dev/pts/0
zawawy34@zawawy34-VirtualBox:~$
```

💡 Challenge – Pipes & FD inspection :

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



Open-Ended Questions:

1. **Quotation Marks in Shell:**
    - **Single Quotes (' ')**: Prevent all characters inside them from being interpreted by the shell. The content is taken literally. This is useful for preventing variable expansion ($), command substitution (`), or wildcard expansion (*). Example: echo 'The date is: $(date)' will print the literal string.
    - **Double Quotes (" ")**: Prevent wildcard expansion but allow variable expansion and command substitution. This is the most common choice for strings containing variables. Example: echo "The date is: $(date)" will print the actual current date.
2. **File Test Operators:**
    - The brackets [ ] are a conditional expression test.
    - [-f filename]: This tests whether filename exists and is a regular file. It returns true if it is and false otherwise. This is used to check if a file exists before trying to read from or write to it.
    - [-d dirname]: This tests whether dirname exists and is a directory. It returns true if it is and false otherwise. This is used to check if a directory exists before trying to create a file within it.
3. **Redirection & File Descriptors:**
    - **stdout (Standard Output)**: File Descriptor 1. This is where a command's normal output goes.
    - **stderr (Standard Error)**: File Descriptor 2. This is where a command's error messages are sent.
    - **Appending vs. Overwriting**:

        - >: **Overwrites** standard output. Example: echo "test" > file.txt will create or replace the content of file.txt.
        - >>: **Appends** to standard output. Example: echo "another test" >> file.txt will add the new text to the end of file.txt.
        - To redirect standard error, you must specify the file descriptor: 2>. For example, command 2> error.log redirects only the error output to error.log.
    - **Confirming Redirection**: You can confirm redirection using file descriptors by inspecting the /proc/<pid>/fd directory. For a process running ls -l > output.txt, the file descriptor 1 (stdout) will be a symbolic link pointing to the output.txt file instead of the terminal.

4. **Bash For Loop & Simple Calculator:**
    - **For Loop Example**:

```
for file in *.txt; do
  echo "Processing $file..."
  # Add other commands here
done
```

    - **Simple Bash Calculator**:

```
echo "Simple Bash Calculator"
echo "Enter a number:"
read num1

echo "Enter another number:"
read num2

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

```
if [ "$operation" == "+" ]; then
   result=$((num1 + num2))
   echo "Result: $result"
elif [ "$operation" == "-" ]; then
   result=$((num1 - num2))
   echo "Result: $result"
else
   echo "Invalid operation."
fi
```