

## Day 6 – Phase 6: Log Rotation, Scheduling, Archiving

- 1) log rotation is essential to prevent the sensor readings from growing endlessly (it is handled with logrotate).

<https://betterstack.com/community/guides/logging/how-to-manage-log-files-with-logrotate-on-ubuntu-20-04/>

```

aya@aya-VirtualBox: ~/iot_logger/logs
logrotate --version
logrotate 3.19.0

Default mail command:      /usr/bin/mail
Default compress command:  /bin/gzip
Default uncompress command: /bin/gunzip
Default compress extension: .gz
Default state file path:   /var/lib/logrotate/status
ACL support:               yes
SELinux support:          yes

aya@aya-VirtualBox:~$ cd iot_logger/logs
aya@aya-VirtualBox:~/iot_logger/logs$ cat /etc/logrotate.d/temperature
cat: /etc/logrotate.d/temperature: No such file or directory
aya@aya-VirtualBox:~/iot_logger/logs$ ls
hard_link  newfile  symbolic_link  temperature
aya@aya-VirtualBox:~/iot_logger/logs$ sudo vi /etc/logrotate.d/temperature
[sudo] password for aya:
aya@aya-VirtualBox:~/iot_logger/logs$ cat /etc/logrotate.d/temperature
/home/aya/iot_logger/logs/temperature {
    size 1M
    compress
}
```

- 2)

[illegible]

- 3) & 4) Automating tasks improves efficiency which is done by a cron to run a Python script at regular intervals.
- [https://medium.com/@zafer\\_kahraman/automating-your-python-script-execution-with-cron-jobs-7380dc6d8173](https://medium.com/@zafer_kahraman/automating-your-python-script-execution-with-cron-jobs-7380dc6d8173)

```
aya@aya-VirtualBox: ~/iot_logger/logs
aya@aya-VirtualBox:~/iot_logger/logs$ crontab -e
E1187: Failed to source defaults.vim
Press ENTER or type command to continue
crontab: installing new crontab
aya@aya-VirtualBox:~/iot_logger/logs$ crontab -l
# Edit this file to introduce tasks to be run by cron.
#
# Each task to run has to be defined through a single line
# indicating with different fields when the task will be run
# and what command to run for the task
#
# To define the time you can provide concrete values for
# minute (m), hour (h), day of month (dom), month (mon),
# and day of week (dow) or use '*' in these fields (for 'any').
#
# Notice that tasks will be started based on the cron's system
# daemon's notion of time and timezones.
#
# Output of the crontab jobs (including errors) is sent through
# email to the user the crontab file belongs to (unless redirected).
#
# For example, you can run a backup of all your user accounts
# at 5 a.m every week with:
# 0 5 * * 1 tar -zcf /var/backups/home.tgz /home/
#
# For more information see the manual pages of crontab(5) and cron(8)
#
# m h dom mon dow   command
*/5 * * * * Sensor_Type=temperature /usr/bin/python3 /home/aya/iot_logger/scripts/sensor_script.py >> /home/aya/iot_logger/logs/cron_execution.log 2>&1
aya@aya-VirtualBox:~/iot_logger/logs$ tail -n 50 /home/aya/iot_logger/logs/temperature
[2025-09-01 18:53:53] temperature: 27.69
[2025-09-01 18:53:55] temperature: 31.69
[2025-09-01 18:53:57] temperature: 25.22
[2025-09-01 18:53:59] temperature: 27.74
[2025-09-01 18:54:01] temperature: 22.87
[2025-09-01 18:54:03] temperature: 32.34
[2025-09-01 18:54:05] temperature: 31.89
[2025-09-01 18:54:07] temperature: 28.79
[2025-09-01 18:54:09] temperature: 29.69
[2025-09-01 18:54:11] temperature: 33.31
[2025-09-01 18:54:13] temperature: 33.76
[2025-09-01 18:54:15] temperature: 26.8
[2025-09-01 18:54:17] temperature: 26.89
[2025-09-01 18:54:19] temperature: 23.06
[2025-09-01 18:54:21] temperature: 34.99
[2025-09-01 18:54:23] temperature: 23.91
[2025-09-01 18:54:25] temperature: 27.4
[2025-09-01 18:54:27] temperature: 24.54
```

```
aya@aya-VirtualBox: ~/iot_logger/logs
[2025-09-01 18:55:29] temperature: 23.69
[2025-09-01 18:55:31] temperature: 22.4
aya@aya-VirtualBox:~/iot_logger/logs$ tail -n 50 /home/aya/iot_logger/logs/cron_execution.log
[2025-09-02 01:35:01] temperature: 28.37
[2025-09-02 01:35:03] temperature: 24.14
[2025-09-02 01:35:05] temperature: 29.07
[2025-09-02 01:35:07] temperature: 33.97
[2025-09-02 01:35:09] temperature: 33.95
[2025-09-02 01:35:11] temperature: 31.29
[2025-09-02 01:35:13] temperature: 20.65
[2025-09-02 01:35:15] temperature: 32.29
[2025-09-02 01:35:17] temperature: 26.52
[2025-09-02 01:35:19] temperature: 20.85
[2025-09-02 01:35:21] temperature: 21.51
[2025-09-02 01:35:23] temperature: 25.87
[2025-09-02 01:35:25] temperature: 33.72
[2025-09-02 01:35:27] temperature: 34.05
[2025-09-02 01:35:29] temperature: 30.08
[2025-09-02 01:35:31] temperature: 28.03
[2025-09-02 01:35:33] temperature: 26.33
[2025-09-02 01:35:35] temperature: 30.27
[2025-09-02 01:35:37] temperature: 26.68
[2025-09-02 01:35:39] temperature: 34.99
[2025-09-02 01:35:41] temperature: 29.2
[2025-09-02 01:35:43] temperature: 25.57
[2025-09-02 01:35:45] temperature: 32.87
[2025-09-02 01:35:47] temperature: 32.82
[2025-09-02 01:35:49] temperature: 24.92
[2025-09-02 01:35:51] temperature: 24.12
[2025-09-02 01:35:53] temperature: 22.22
[2025-09-02 01:35:55] temperature: 22.29
[2025-09-02 01:35:57] temperature: 25.1
[2025-09-02 01:35:59] temperature: 25.72
[2025-09-02 01:36:01] temperature: 22.27
[2025-09-02 01:36:03] temperature: 34.26
[2025-09-02 01:36:05] temperature: 26.08
[2025-09-02 01:36:07] temperature: 23.91
[2025-09-02 01:36:09] temperature: 22.04
[2025-09-02 01:36:11] temperature: 34.55
[2025-09-02 01:36:13] temperature: 21.65
[2025-09-02 01:36:15] temperature: 22.11
[2025-09-02 01:36:17] temperature: 27.64
[2025-09-02 01:36:19] temperature: 25.64
[2025-09-02 01:36:21] temperature: 21.0
[2025-09-02 01:36:23] temperature: 23.92
[2025-09-02 01:36:25] temperature: 29.67
[2025-09-02 01:36:27] temperature: 21.41
[2025-09-02 01:36:29] temperature: 20.17
```

To manually remove the jobs

```
aya@aya-VirtualBox:~/iot_logger/logs$ crontab -r
```

5)

```
aya@aya-VirtualBox: ~/iot_logger/data
aya@aya-VirtualBox:~/iot_logger$ tar -czf data/logs_backup.tar.gz logs/
aya@aya-VirtualBox:~/iot_logger$ cd data
aya@aya-VirtualBox:~/iot_logger/data$ ls
data  logs_backup.tar.gz  newfile  services

aya@aya-VirtualBox: ~/iot_logger
aya@aya-VirtualBox:~/Desktop$ cd ~
aya@aya-VirtualBox:~$ cd iot_logger
aya@aya-VirtualBox:~/iot_logger$ tar -tzf data/logs_backup.tar.gz
logs/
logs/symbolic_link
logs/cron_execution.log
logs/newfile
logs/temperature
logs/hard_link
```

6) Use cp → if I only want to simulate moving the archive to another folder on the computer while scp/rsync → if I want to send files to a server.

```
aya@aya-VirtualBox: ~/iot_logger
aya@aya-VirtualBox:~/iot_logger$ mkdir -p /home/aya/server/
aya@aya-VirtualBox:~/iot_logger$ scp data/logs_backup.tar.gz /home/aya/server/
aya@aya-VirtualBox:~/iot_logger$ ls -lh /home/aya/server/
total 32K
-rw-rw-r-- 1 aya aya 29K 03:38 2 سبت logs_backup.tar.gz
```

## Open-Ended Questions

1) Cron uses a time-based scheduler in which I define jobs in a crontab file with 5 fields:

```
* * * * * command_to_run
```

└── Day of week (0-6, 0=Sunday)

└── Month (1-12)

└── Day of month (1-31)

└── Hour (0-23)

└── Minute (0-59)

To run a script every 5 minutes, I added this line to the crontab:

```
*/5 * * * * /home/aya/iot_logger/myscript.py >> /home/aya/iot_logger/cron.log 2>&1
```

\*/5 → means "every 5 minutes", and \* \* \* → means "every hour, day, month".

Steps to set it up:

Open the crontab for editing: `crontab -e`

Add the line above and save.

Verify cron jobs: `crontab -l`

- 2) The log rotation is needed because without it the logs will grow indefinitely and fill up the disk space, so this keeps the logs manageable in size where the old logs can be archived or deleted automatically.

For example when I logrotate config for temperature.log, I have created a config file:

```
/etc/logrotate.d/temperature
/home/aya/iot_logger/logs/temperature.log {
    size 1M          # Rotate when the log is larger than 1 MB
    compress         # Compress old logs into .gz
}
```

- 3) The virtual machine has user space and kernel and it runs on top of a hypervisor (e.g., VirtualBox).; however, the container has user space only and uses the kernel of the host operating system (OS) which saves the storage as well as running on top of the host OS kernel. The container does not have to have the same OS as the host where the kernel is the same because they share it, but the userland (binaries, libraries, file system) can be different.

- 4) Some of the actions combined multiple Linux concepts:

Redirection & Process Monitoring: when running the Python script and redirecting its output to temperature.log while checking log growth with tail -f or ls -lh.

Cron & Logging: cron job runs the Python script every 5 minutes and appends results into a log file which combines the task scheduling with file management.

Archiving & File Management: when I used tar to compress old logs before moving them which combines storage management with backup practices.

This applies to real IoT systems as in IoT the devices generate continuous data where the “Redirection & Logging” is needed to store the sensor readings automatically.

Additionally, the “Cron & Scheduling” is required to collect data at fixed intervals without human intervention and the “Archiving & Cleanup” is used to prevent filling the storage of the small IoT devices.