**Name:** Basant Tarik Salah

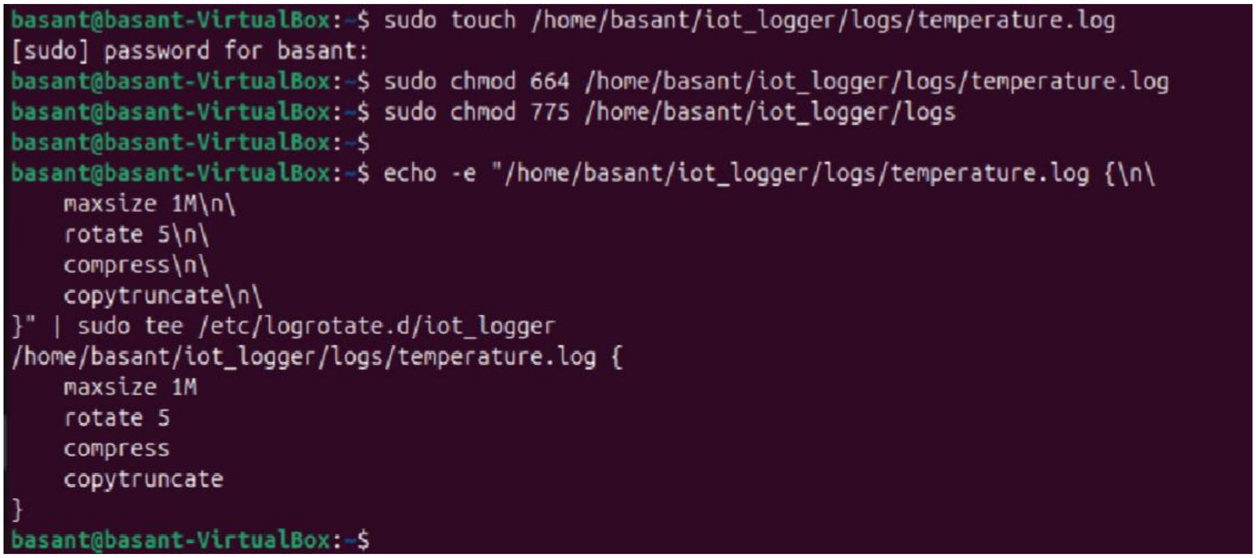
**Instructor:** Eng. Mohamed Abo-Khalil

SIC7_Task.Phase 6

# Prepare the system for production use

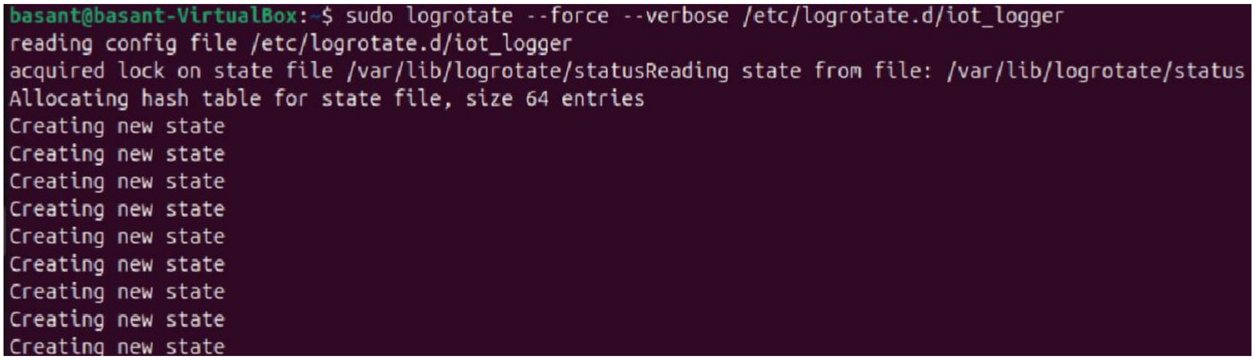
## Tasks

1. Configure log rotation for temperature.log (rotate at 1 MB, compress).

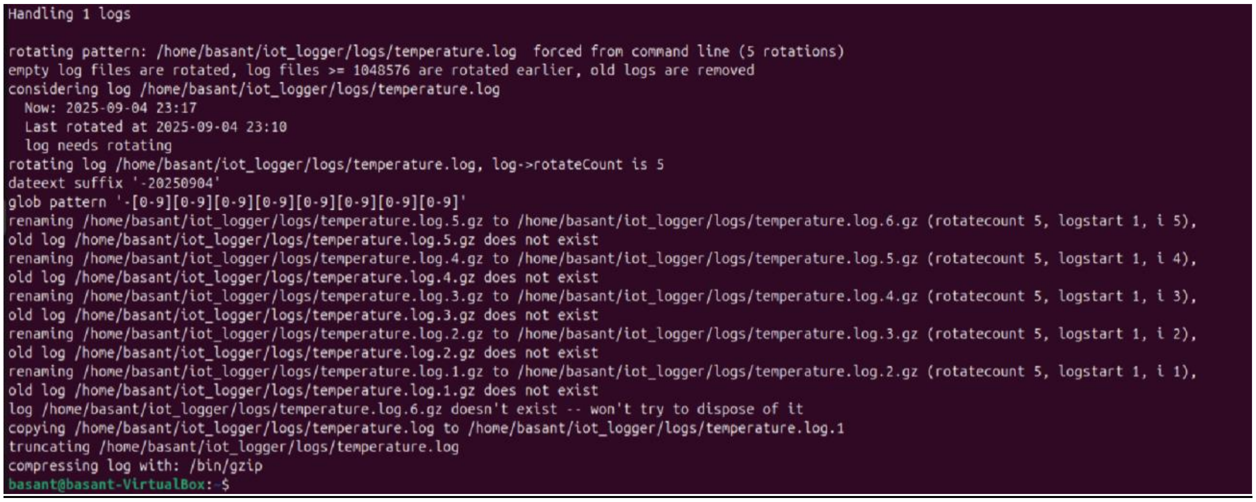


```
basant@basant-VirtualBox:~$ sudo touch /home/basant/iot_logger/logs/temperature.log
[sudo] password for basant:
basant@basant-VirtualBox:~$ sudo chmod 664 /home/basant/iot_logger/logs/temperature.log
basant@basant-VirtualBox:~$ sudo chmod 775 /home/basant/iot_logger/logs
basant@basant-VirtualBox:~$
basant@basant-VirtualBox:~$ echo -e "/home/basant/iot_logger/logs/temperature.log {\n\
    maxsize 1M\n\
    rotate 5\n\
    compress\n\
    copytruncate\n\
}" | sudo tee /etc/logrotate.d/iot_logger
/home/basant/iot_logger/logs/temperature.log {
    maxsize 1M
    rotate 5
    compress
    copytruncate
}
basant@basant-VirtualBox:~$
```

2. Test by forcing a rotation.

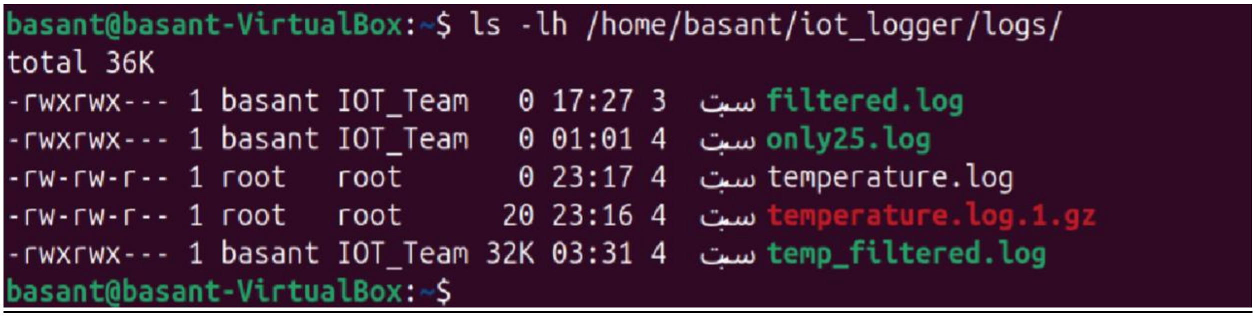


```
basant@basant-VirtualBox:~$ sudo logrotate --force --verbose /etc/logrotate.d/iot_logger
reading config file /etc/logrotate.d/iot_logger
acquired lock on state file /var/lib/logrotate/statusReading state from file: /var/lib/logrotate/status
Allocating hash table for state file, size 64 entries
Creating new state
Creating new state
Creating new state
Creating new state
Creating new state
Creating new state
Creating new state
Creating new state
Creating new state
```



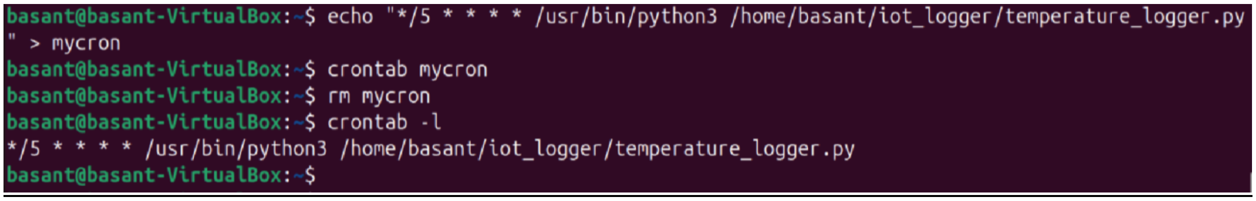
```
Handling 1 logs

rotating pattern: /home/basant/iot_logger/logs/temperature.log  forced from command line (5 rotations)
empty log files are rotated, log files >= 1048576 are rotated earlier, old logs are removed
considering log /home/basant/iot_logger/logs/temperature.log
  Now: 2025-09-04 23:17
  Last rotated at 2025-09-04 23:10
  log needs rotating
rotating log /home/basant/iot_logger/logs/temperature.log, log->rotateCount is 5
dateext suffix '-20250904'
glob pattern '-[0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9]'
renaming /home/basant/iot_logger/logs/temperature.log.5.gz to /home/basant/iot_logger/logs/temperature.log.6.gz (rotatecount 5, logstart 1, i 5),
old log /home/basant/iot_logger/logs/temperature.log.5.gz does not exist
renaming /home/basant/iot_logger/logs/temperature.log.4.gz to /home/basant/iot_logger/logs/temperature.log.5.gz (rotatecount 5, logstart 1, i 4),
old log /home/basant/iot_logger/logs/temperature.log.4.gz does not exist
renaming /home/basant/iot_logger/logs/temperature.log.3.gz to /home/basant/iot_logger/logs/temperature.log.4.gz (rotatecount 5, logstart 1, i 3),
old log /home/basant/iot_logger/logs/temperature.log.3.gz does not exist
renaming /home/basant/iot_logger/logs/temperature.log.2.gz to /home/basant/iot_logger/logs/temperature.log.3.gz (rotatecount 5, logstart 1, i 2),
old log /home/basant/iot_logger/logs/temperature.log.2.gz does not exist
renaming /home/basant/iot_logger/logs/temperature.log.1.gz to /home/basant/iot_logger/logs/temperature.log.2.gz (rotatecount 5, logstart 1, i 1),
old log /home/basant/iot_logger/logs/temperature.log.1.gz does not exist
log /home/basant/iot_logger/logs/temperature.log.6.gz doesn't exist -- won't try to dispose of it
copying /home/basant/iot_logger/logs/temperature.log to /home/basant/iot_logger/logs/temperature.log.1
truncating /home/basant/iot_logger/logs/temperature.log
compressing log with: /bin/gzip
basant@basant-VirtualBox:~$
```



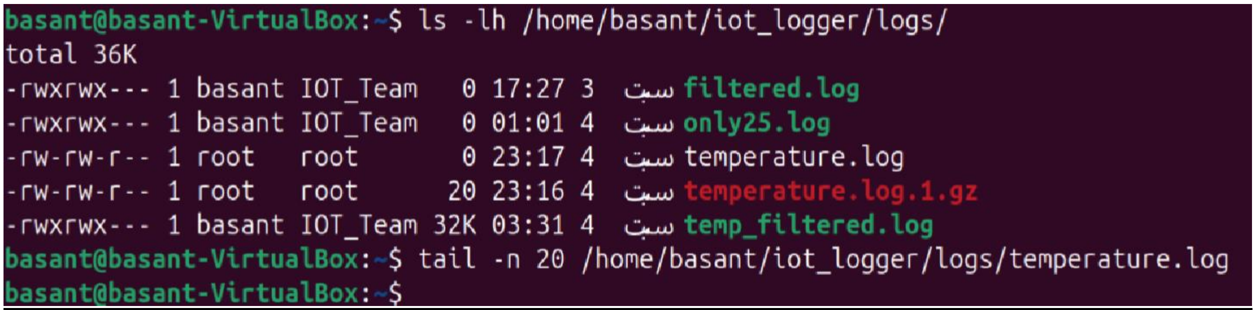
```
basant@basant-VirtualBox:~$ ls -lh /home/basant/iot_logger/logs/
total 36K
-rwxrwx--- 1 basant IOT_Team   0 17:27 3  سبت filtered.log
-rwxrwx--- 1 basant IOT_Team   0 01:01 4  سبت only25.log
-rw-rw-r-- 1 root   root       0 23:17 4  سبت temperature.log
-rw-rw-r-- 1 root   root      20 23:16 4  سبت temperature.log.1.gz
-rwxrwx--- 1 basant IOT_Team 32K 03:31 4  سبت temp_filtered.log
basant@basant-VirtualBox:~$
```

3. Schedule the Python script to run every 5 minutes with cron.



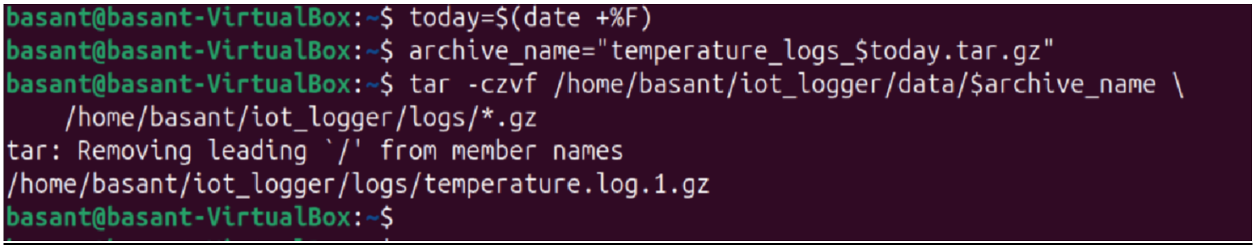
```
basant@basant-VirtualBox:~$ echo "*/5 * * * * /usr/bin/python3 /home/basant/iot_logger/temperature_logger.py
" > mycron
basant@basant-VirtualBox:~$ crontab mycron
basant@basant-VirtualBox:~$ rm mycron
basant@basant-VirtualBox:~$ crontab -l
*/5 * * * * /usr/bin/python3 /home/basant/iot_logger/temperature_logger.py
basant@basant-VirtualBox:~$
```

4. Verify log growth over time.

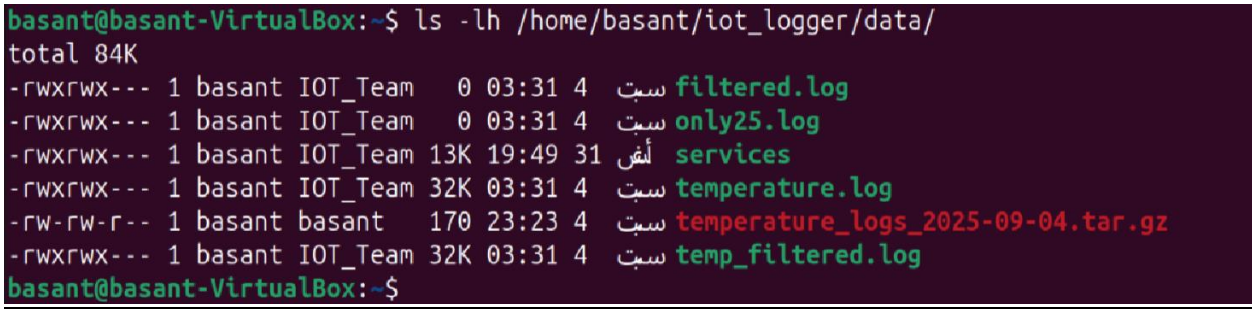


```
basant@basant-VirtualBox:~$ ls -lh /home/basant/iot_logger/logs/
total 36K
-rwxrwx--- 1 basant IOT_Team   0 17:27 3  سبت filtered.log
-rwxrwx--- 1 basant IOT_Team   0 01:01 4  سبت only25.log
-rw-rw-r-- 1 root   root       0 23:17 4  سبت temperature.log
-rw-rw-r-- 1 root   root      20 23:16 4  سبت temperature.log.1.gz
-rwxrwx--- 1 basant IOT_Team 32K 03:31 4  سبت temp_filtered.log
basant@basant-VirtualBox:~$ tail -n 20 /home/basant/iot_logger/logs/temperature.log
basant@basant-VirtualBox:~$
```

5. Compress old logs into .tar.gz in data/.

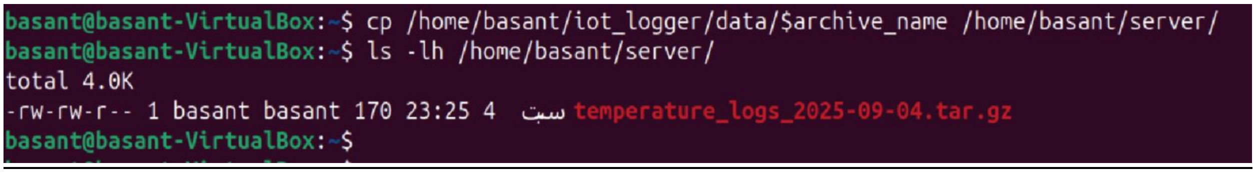


```
basant@basant-VirtualBox:~$ today=$(date +%F)
basant@basant-VirtualBox:~$ archive_name="temperature_logs_$today.tar.gz"
basant@basant-VirtualBox:~$ tar -czvf /home/basant/iot_logger/data/$archive_name \
    /home/basant/iot_logger/logs/*.gz
tar: Removing leading `/' from member names
/home/basant/iot_logger/logs/temperature.log.1.gz
basant@basant-VirtualBox:~$
```



```
basant@basant-VirtualBox:~$ ls -lh /home/basant/iot_logger/data/
total 84K
-rwxrwx--- 1 basant IOT_Team   0 03:31 4  سبت filtered.log
-rwxrwx--- 1 basant IOT_Team   0 03:31 4  سبت only25.log
-rwxrwx--- 1 basant IOT_Team 13K 19:49 31 أغس  services
-rwxrwx--- 1 basant IOT_Team 32K 03:31 4  سبت temperature.log
-rw-rw-r-- 1 basant basant   170 23:23 4  سبت temperature_logs_2025-09-04.tar.gz
-rwxrwx--- 1 basant IOT_Team 32K 03:31 4  سبت temp_filtered.log
basant@basant-VirtualBox:~$
```

6. Simulate sending archives to /home//server/ using cp, scp, or rsync. (hint: use can use scp and copy to destination directory in another path on the same machine just for simulation).



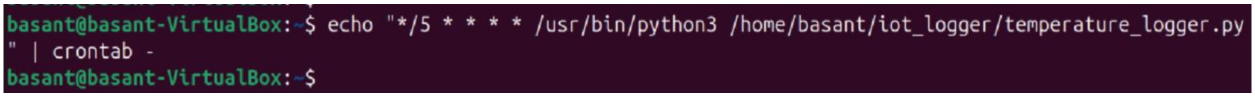
```
basant@basant-VirtualBox:~$ cp /home/basant/iot_logger/data/$archive_name /home/basant/server/
basant@basant-VirtualBox:~$ ls -lh /home/basant/server/
total 4.0K
-rw-rw-r-- 1 basant basant 170 23:25 4  سبت temperature_logs_2025-09-04.tar.gz
basant@basant-VirtualBox:~$
```

## Open Ended Questions

1. **How does cron scheduling work? Show a crontab entry to run a script every 5 minutes.**

Cron is a scheduler in Linux that runs commands automatically at specific scheduled times.
In the crontab entry the fields are used as follows: minute, hour, day, month, week, and day**.**

The following is an example for a crontab entry to run a script every 5 minutes:

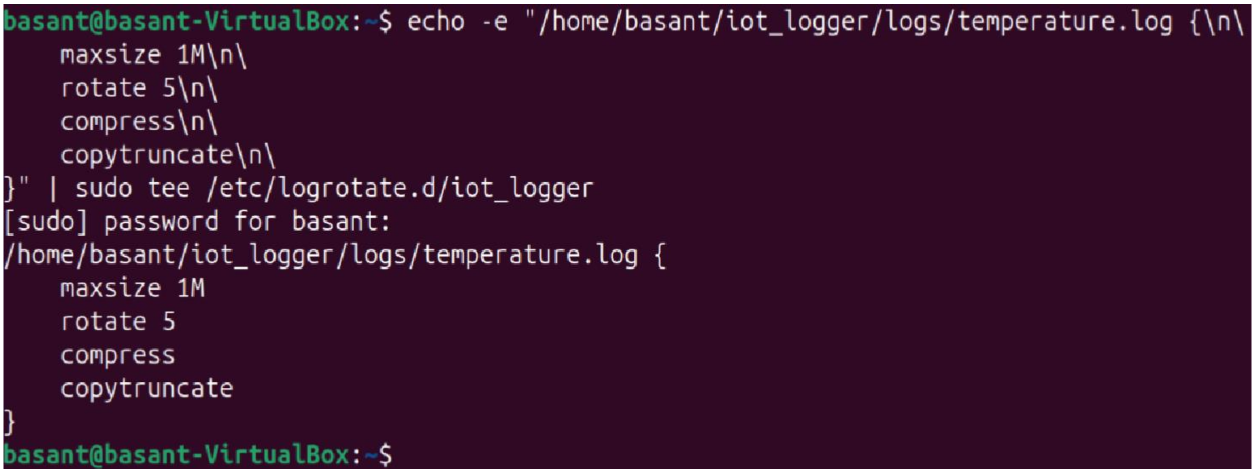


```
basant@basant-VirtualBox:~$ echo "*/5 * * * * /usr/bin/python3 /home/basant/iot_logger/temperature_logger.py
" | crontab -
basant@basant-VirtualBox:~$
```

2. **Why do we need log rotation? Show an example logrotate config for temperature.log.**

Because without log rotation, logs can grow indefinitely and fill the disk. While log rotation keeps logs under control, compresses old logs to save space and keeps only a few recent versions.

The following is example for logrotate config for temperature.log.



```
basant@basant-VirtualBox:~$ echo -e "/home/basant/iot_logger/logs/temperature.log {\n\
    maxsize 1M\n\
    rotate 5\n\
    compress\n\
    copytruncate\n\
}" | sudo tee /etc/logrotate.d/iot_logger
[sudo] password for basant:
/home/basant/iot_logger/logs/temperature.log {
    maxsize 1M
    rotate 5
    compress
    copytruncate
}
basant@basant-VirtualBox:~$
```

- maxsize 1M: rotate at 1 MB
- rotate 5: keep 5 old logs
- compress: gzip old logs
- copytruncate: continue writing to log while rotating

3. **Explain the difference between a Virtual Machine and a Container. Must containers use the same OS as the host? Why or why not?**

**Virtual Machine:** Runs a full operating system on top of a hypervisor. Each VM has its own kernel and OS. This makes it heavy but isolated.

**Container:** Shares the host OS kernel, but runs isolated apps with their own libraries. This makes it lightweight and faster.
Containers must use the same kernel as the host because they share it, but they can have different libraries and user environments.

4. **Reflection: Which actions in this project combined multiple Linux concepts (e.g., redirection + process monitoring)? How does this apply to real IoT systems?**

- **Redirection + background processes:** We ran Python in background and redirected output to logs.
- **Users + permissions:** by creating groups and controlled access.
- **Permissions + users/groups**: by making sure only IoT team can read/write logs.
- **Cron + Python scripts**: by running sensor data collection on schedule.
- **Log rotation + compression**: by managing files so they don’t overflow.

In real IoT systems, devices collect data, run continuously, manage logs, and send data to servers. Linux concepts the min key to make this reliable and secure as:

- **Cron** automates tasks to run regularly.
- **Logrotate** manages logs so storage doesn’t fill up.
- **Permissions** keep data safe.

These ensure data is protected, storage is managed, and the system runs smoothly, making IoT devices stable and production-ready.