



Exercise sheet 4 – OS architecture

Goals:

- Boot procedure and steps
- systemd usage
- User vs. kernel space

Exercise 4.1: Recap boot procedure (theoretical)

- (a) Describe the difference (advantages/disadvantages) between BIOS and UEFI
- (b) What are the advantages of GPT over MBR?
- (c) Is the BIOS compatible with the GPT?

Exercise 4.2: systemd (theoretical)

- (a) What is `systemd` doing?
- (b) What is a default target?
- (c) Can `systemd` start the kernel?
- (d) What is a `systemd <daemon>.service` file?
- (e) Where are the `systemd` config files located on the system?

Exercise 4.3: systemd (practical)

- (a) Run `OS_exercises/sheet_04_os_arch/systemd/installDaemon.sh` to install the daemon `demo_timer_daemon`. Every second, this daemon writes the current time into its log (`/var/log/demo_timer.log`) file.

Proposal for solution:

```
1 sudo OS_exercises/sheet_04_os_arch/systemd/installDaemon.sh
```

- (b) Start the daemon.

Proposal for solution: `sudo service demo_timer_daemon start`
or:
`sudo systemctl start demo_timer_daemon`

- (c) Check if the daemon is started. You can additionally check the log file with
`tail -f /var/log/demo_timer.log`

Proposal for solution: `sudo service demo_timer_daemon status`
or:
`sudo systemctl status demo_timer_daemon`

- (d) Stop the daemon.



Proposal for solution: `sudo service demo_timer_daemon stop`
or:
`sudo systemctl stop demo_timer_daemon`

- (e) Activate the daemon for the `multi-user.target`.

Proposal for solution: `sudo systemctl enable demo_timer_daemon`

- (f) Reboot the VM and check if the daemon is automatically started.

Proposal for solution: After the VM has rebooted:
`sudo service demo_timer_daemon status`
or:
`sudo systemctl status demo_timer_daemon`

- (g) Deactivate the daemon for the `multi-user.target`.

Proposal for solution: `sudo systemctl disable demo_timer_daemon`

Exercise 4.4: User vs. kernel space (theoretical)

- (a) Can a process running with root privileges directly access the kernel space?
- (b) How many processes has the kernel space?
- (c) Can a user space process access the memory of another process?
- (d) Can a user space process communicate with a device?
- (e) How can a user space process print something on a console (please consider the different spaces)?
- (f) How is a SVC identified?