Exercise sheet 4 – OS architecture

Goals:

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

Exercise 4.1: Recap boot procedure (theoretical) *(no solution prop. provided)*

(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) *(no solution prop. provided)*

(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, the `demo_timer_daemon` daemon writes the current time into its log file (`/var/log/demo_timer.log`).

(b) Start the daemon.

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

(d) Stop the daemon.

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

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

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

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

Exercise 4.4: User vs kernel space (theoretical) *(no solution prop. provided)*

(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 directly access the memory of another process?

(d) Can a user space process directly communicate with a device?

(e) How can a user space process print something on a console/terminal (please consider the different spaces)?

(f) How is an SVC identified?