Operating Systems

4 Filesystem and Memory

For the third exercise you have to use python3 as programming language

4.1 File Handle

Implement the following pseudocode-functions.

```
procedure write_to_file(filename):
   for i=0 to 25
      print_to_standard_out("Write Line: " + i + actual_timestamp())
      write_to_file(filename, “Write Line: ” + i + actual_timestamp())
      wait 1 second
procedure append_to_file(filename):
   for i=0 to 25
      print_to_standard_out("Append Line: " + i + actual_timestamp()))
      append_to_file(filename, “Append Line: ” + i + actual_timestamp())
      wait 1 second
procedure read_from_file(filename):
   for i=0 to number_of_rows(filename)
      print_to_standard_out(filename_row_number[i]))
      wait 1 second


procedure main()
      write_to_file(file1.txt):
      append_to_file(file2.txt):
      read_from_file (file1.txt):
      read_from_file (file2.txt):
```

Source: https://www.digitalocean.com/community/tutorials/how-to-handle-plain-text-files-in-python-3

What is the **output** of your implementation?

Where can you find information about the **file descriptor**? (Hint: A **process** is an instance of a computer program that is being executed)

What does **pos**, **flags** and **mnt_id** mean? (Hint: “/proc/<processid>/fdinfo”)

Let’s have a look at the files. What permissions do your files have? (Hint: “ls -lahi /proc/<processid>/fd/”)

For the next 3 Tasks you must install Ubuntu on your own Machine

1 CPU Core, 2 GB RAM, 32 GB HDD

https://ubuntu.com/tutorials/how-to-run-ubuntu-desktop-on-a-virtual-machine-using-virtualbox#1-overview (Linux and Windows)

https://www.youtube.com/watch?v=v1JVqd8M3Yc (Linux and Windows)

https://freegistutorial.com/install-ubuntu-22-10-on-m1-mac/ (Mac)

https://www.youtube.com/watch?v=EiO_CHfSn2s (Mac)

4.2 Run the script every 10 minutes

Use the Cron-Daemon to run the script from 4.1 every 10 minutes.

Source: https://wiki.ubuntuusers.de/Cron/

4.3 While 1

Add an infinite loop to your code.

```
procedure main()
  while(1)
    write_to_file(file1):
    append_to_file(file2):
```

Find out the **pid** (<processid>) of the process and look at "/proc/<processid>/maps". What does the values mean?

Look at "/proc/<processid>/smaps". What does the values **Size**, **Rss**, **Pss**, **Shared_Clean**, **Shared_Dirty**, **Private_Clean**, **Private_Dirty**, **Referenced**, **Swap** and **SwapPss** mean?

What is the **pagesize** of your system?

How can you print out all **major** and **minor pagefaults**?

Start htop and enter „swapoff –a" on the terminal. What happens?

Reboot your system and print out all your page faults again.

4.4 Fill the RAM

Implement the following python script "ram.py".

```
import sys, time
some_str = ' ' * 1024 * 1024 * 1024 * int(sys.argv[1])
while 1:
    print("true")
    time.sleep(1)
```

Start the python script on your Ubuntu. Start the script with the following arguments: 1, 2, 3, 4 and 5. (e.g.: python ram.py 1) What happens?

Start htop and enter „swapoff –a" on the terminal. Start the script with the following arguments: 1, 2, 3, 4 and 5. What happens now? What has changed?

Try to change your operating system, to run the python script with all arguments (1, 2, 3, 4 and 5).

https://askubuntu.com/questions/178712/how-to-increase-swap-space

Compare the "/proc/meminfo" or "htop" with a running ram.py and a not running ram.py.