INFO0940-1: Operating Systems (Groups of 2)
Project 2: a better OShell

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Submission before Wednesday, March 25, 2020

1 Introduction

In this assignment, students will add `sys` built-in commands to their shell developed in the first assignment. You will work with sys built-in commands and virtual file-system commands. This assignment will allow you to have a first approach with the Linux kernel architecture. Indeed, you must find the right files and methods to satisfy the requirements.

2 Requirements

The following requirements must be satisfied:

- You must use your code from the first assignment but are free concerning your code structure.
- In order to simplify the parsing, you can use `fgets`, `fread`, `fwrite`, `fopen`, `fclose` related functions on files (only for the code related to project 2).
- You must integrate the following sys built-in command to your shell:
  - `sys netstats`: Print the list of network interfaces with some network statistics about the reception (Rx) and the transmission (Tx). The error and drop rate respectively represent the percentage of packets received/sent with errors (e.g., CRC errors) and packets that were dropped (e.g., unintended VLAN tags) by the system. The required format is shown below:

    `[<if_name>]: Rx(pkts: <pkts_rcvd>, err: <err_rate>%, drop: <drop_rate>%) - Tx(pkts: <pkts_snt>, err: <err_rate>%, drop: <drop_rate>%)`

  - `sys devstats`: Display the number of devices for 3 power management runtime states[1] ("active", "suspended", and "unsupported") respectively. The command must respect the following format:

[1] Hint: have a look at `dirent.h`

```
Active: <nb_active_devices>
Suspended: <nb_suspended_devices>
Unsupported: <nb_unsupported_devices>
```

– `sys stats <pid>`: Get particular information of a specific process identified by its *pid*. If the *pid* is incorrect, an error is displayed. The command must respect the following format:

```
Process name: <process_name>
Process state: <process_state>
Process thread(s): <nb_threads>
```

- Your code must be readable. Use common naming conventions for variable names and comments.
- Your code must be robust and must not crash. In addition, errors handling must be managed in a clean way. Only fatal errors such as failed memory allocation will stop the shell. Other errors must be displayed on `stderr`.

3 Evaluation and tests

Your program can be tested on the submission platform. A set of automatic tests will allow you to check if your program satisfies the requirements. Depending on the tests, a **temporary** mark will be attributed to your work. Note that this mark does not represent the final mark. Indeed, another criteria such as the structure of your code, the memory management, the correctness and your report will also be considered.

4 Evaluation and tests

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5 Submission

Projects must be submitted before the deadline. After this time, a penalty will be applied to late submissions. This penalty is calculated as a deduction of

2^{N-1} marks (where N is the number of started days after the deadline).

Your submission will include your code (all the required `.c|.h` files in a directory named `src`) along with a Makefile which produces the binary file `oshell`.

Submissions will be made as a `src.tar.gz` archive, on the submission system. Failure to compile will result in an awarded mark of 0.
Bon travail...

6 Appendix : Example Output

```
OShell> sys netstats
[eno1]: Rx (pkts: 10714258, err: 3.32865787%, drop: 4.04732656%) -
Tx (pkts: 1198733, err: 28.08306885%, drop: 0.28079647%)
[virbr0-nic]: Rx (pkts: 0, err: 0.00000000 %, drop: 0.00000000%) -
Tx (pkts: 0, err: 0.00000000%, drop: 0.00000000%)
[eno2]: Rx (pkts: 0, err: 0.00000000 %, drop: 0.00000000%) -
Tx (pkts: 0, err: 0.00000000%, drop: 0.00000000%)
[lo]: Rx (pkts: 982, err: 1.12016296%, drop: 1.01832986%) -
Tx (pkts: 982, err: 0.00000000%, drop: 3.05498981%)
OShell>
OShell> sys stats 254
Process name: kswapd0
Process state: S (sleeping)
Process thread(s): 1
OShell>
OShell> sys devstats
Active: 141
Suspended: 32
Unsupported: 582
OShell>
```