Adv. Unix/Linux Sys. Prog. Homework 2 (May 2025)

1. Consider the shell that you are using in linux systems (or in windows, the command prompt). It contains many aspects of system programming concepts. Following the milestones below, please write your own shell to replace the `/bin/bash` or `/bin/tcsh` or whatever shell you are using.
   (a) The simplest version is to create a shell to accept commands from the user. Using the `fork` and `exec` functions, execute a simple command that the user inputs.
   (b) Allow the commands of the user to contain arguments.
   (c) Allow redirections of the `STDIN` and `STDOUT` using the `>, >>` and `<, <<` operators.
   (d) Allow detached processes, i.e., background processes.
   (e) Allow pipes, i.e., redirecting a `STDOUT` to a `STDIN` of a next process using the `|` operator.
   (f) Allow linking operators, i.e., do a job and if the return code is 0 (SUCCESS), then executing the following job (&&).
   (g) Play with the `mc` application. You can try to make your shell a text GUI version, i.e., Windows 1.0.

   Sample commands:
   (a) `ls -l`
   (b) `ls -l | wc -l`
   (c) `top -H`, followed by `Ctrl+C`
   (d) `cat < /proc/cpuinfo > myinfo`
   (e) `cat < /proc/cpuinfo | grep model`
   (f) `cat < /proc/cpuinfo | grep "model name"`
   (g) `cat < /proc/cpuinfo | grep "model name" | wc -l`
   (h) Write an “Hello world” C program and use GCC to compile it