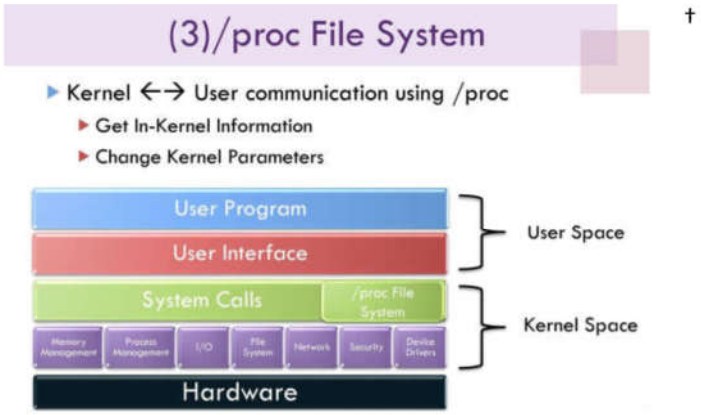
COMP301 - OPERATING SYSTEMS

Fall-2023
ASSIGNMENT - 2
DUE: 10th December 2023, 11:59PM

Background

The proc filesystem:

- Most Linux based operating systems such as Ubuntu provide access to the information about a process in a directory in the storage file system. The name of a directory of a process is its PID.
- This structure is known as the proc filesystem which is a pseudo-filesystem that provides an interface to the kernel data structures.
- It is commonly mounted at /proc. Most of it is read-only, but some files allow kernel variables to be changed for a specific process.



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- Since this filesystem is only for a running program (a process), it is only available for a process as long as the process is in memory/virtual memory. As soon as the process terminates, its respective directory is also deleted by the OS from the filesystem.
- In a nutshell, the information about a process in *proc* is essentially all the information (some of which we have studied in class and labs) that the OS has decided to make available for the advanced users/developers to make use of. Some of this info is just read-only while the other is read-and-write information which can change the behavior of a process.
- The objective of this assignment is to give you deeper understanding of a process through proc.
- To read more about the proc filesystem you can go to https://docs.kernel.org/filesystems/proc.html or look it up on the internet.

†courtesy kaist.ac.kr

Task 1

- Write a C program that takes a Process ID (PID) as a command-line argument.
- Use the /proc filesystem to retrieve and display the following information about the specified process:
    - Process ID (PID)
    - Parent Process ID (PPID)
    - Command used to start the process (including command line arguments)
    - Memory utilization information (from the status file)
    - List of open files (from the fd directory)
- Test the program using at least five different system programs and save screenshots.

Task 2

Write a C program that periodically retrieves and displays system information

- The program should display the following information:
    - Total and Free Memory
    - CPU Usage (percentage)
    - Disk Usage (percentage)
- The program should display a list of the top N processes consuming CPU and memory resources.
- Allow the user to specify the number of processes to display.
- Implement a dynamic updating mechanism to refresh the displayed information at regular intervals (e.g., every 5 seconds).
- Implement robust error handling to gracefully handle situations where /proc entries or system information cannot be retrieved.

SUBMISSION DETAILS:

1. Upload C files named as *YourRollNumberTask1.c*, *YourRollNumberTask2.c* etc.
2. Also Upload the Screenshots of outputs.
3. Always write the following at the start of code in comments:
    - Course Code + Course Name + Section,
    - Your Name,
    - Roll Number
    - Date of Lab
4. Upload the files to Moodle.

†*courtesy kaist.ac.kr*