Computer Architecture and Operating Systems
Monsoon 2019

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Assignment 1 (Total points: 45)

Due date: September 24, 2019; Time: 23:59 Hrs.

Writing Your Own System Call

As described in the class, the OS provides operations to users via system calls. System calls are functions, natively available to users via C library functions, provide access to almost all OS level functionality – *viz.* `open()`, `write()`, `fork()` *etc.*

You have to create your own system call in C, called `sh_task_info()`, which takes argument as PID. It would need to search out the `task_struct()` corresponding to the PID and print out all the fields corresponding to it and also save it in a file. The file name also needs to be supplied as an argument to the system call.

You also would require to handle errors in user inputs, such as incorrect arguments, through appropriate `errno` and function return values (*e.g.* `0` signaling correct input, while `1` signaling incorrect input).

You are supposed to use Linux/kernel distribution that you used for Assignment 0 part 1. For the assignment, you need to modify the kernel source to add the appropriate system call.

What To Submit

- You need to submit the `diff`, of the originally downloaded kernel source tree and the one with your changes. This patched code MUST match the one you have in our kernel source (running on a VM). We would verify this at the time of the demos.
- Write-up describing the following:
  - Description of your code and how you implemented the function – the logical and implementation details.
  - The inputs the user should give.
  - Expected output (and how to interpret it).
  - Error values and how to interpret them.
- A sample C program to test out your implementation of the system call.

Grading Rubric

- Successful compilation your diff against the base kernel source – 10 points.
- Correct functioning of your system call, testable through the supplied C program – 20 points.
- Correct handling of input errors (atleast two different types of errors should be handled) – 10 points.
- Description of the systems, how to test the system through your supplied C program and what to expect *etc.* – 5 points.

Late Submission Policy

- Submitted on or before Sept 27, 2019 (23:59 hrs) – No points deducted.
- Submitted after Sept 27, 2019 but on or before Sept 29, 2019 (23:59 hrs) – 5 points deducted.
- Submitted after Sept 29, 2019 but on or before Oct 1, 2019 (23:59 hrs) – 15 points deducted.
- Submitted after Oct 1, 2019 – no points shall be awarded.