

Operating Systems (SFWRENG 3SH3), Winter 2025
Prof. Neerja Mhaskar

Assignment 1 – Based on Process Management

- No late assignment accepted, unless an MSAF is provided.
- If an MSAF is provided, then you will get 5 days extension on the assignment.
- It is advisable to start your assignment early.
- Make sure to submit a version of your assignment ahead of time to avoid last minute uploading issues.
- Note that students/groups copying each other's solution will get a zero.
- The assignment should be submitted on Avenue under Assessments -> Assignments -> Assignment I -> [Group #] folder.
- In your C programs, you should follow good programming style, which includes providing instructive comments and well-indented code. **If this is not followed, marks will be deducted.**
- If working in a group of two, a **Readme** file containing information on your individual contributions should be provided.
- Use of generative AI is not allowed.

[10 points] Question 1: This question involves designing a kernel module.

Design a kernel module that creates a `/proc` file named `/proc/seconds` that reports the number of elapsed seconds since the kernel module was loaded. This will involve using the value of `jiffies` as well as the HZ rate. When a user enters the command

```
cat /proc/seconds
```

your kernel module will report the number of seconds that have elapsed since the kernel module was first loaded. Be sure to remove `/proc/seconds` when the module is removed through right implementation of `remove_proc_entry()` function.

This question should be completed using the Linux virtual machine you installed as part of Practice Lab1.

Some useful information: The `/proc` file system is a “pseudo” file system that exists only in kernel memory and is used primarily for querying various kernel and per-process statistics. Furthermore, the Linux kernel keeps track of the global variable `jiffies`, which maintains the number of timer interrupts that have occurred since the system was booted. The `jiffies` variable is declared in the file `<linux/jiffies.h>`.

Deliverables and Important instructions:

1. **seconds.c** - You are to provide your solution as a single C program named `seconds.c` that contains the entire solution for Question 1.
2. **The `seconds.c` file must also contain the information regarding the Linux distribution you have worked on.** Use the following command to get details regarding your distribution - ``lsb_release -a`` and ``uname -r``. **Please add this information in a multi-line comment.**
3. It is important that you name your C file `seconds.c` as the TA grading this question has a `Makefile` using this name to test your code.
4. Please refer to the `Proc file system.pdf` document to familiarize yourself with the `/proc` file system. A sample code to use the `/proc` file system has also been provided. For kernel Versions $\leq 6.2.x$ (as per the textbook edition) please refer to the `oldKernel` folder, otherwise refer to the `newKernel` folder (for newer Linux distributions). To find the kernel version please run the following command on the terminal ``uname -r``.