CS 409 Project 1 Learning Experience

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In Task 1, we learned about some basic operations in kernel mode, such as viewing loaded kernel modules, loading kernel modules, and unloading kernel modules. The /proc File System is the most important part of Task 1 because the proc file records kernel statistics and allows reading kernel statistics. So in the first problem of Task 1, we use the command cat/proc/jiffies to get the current value of jiffies. However, while designing the kernel module, we found that the command returned the alert "bad address". After some discussion and research, we found that this problem is caused by directly accessing a value that has been not moved to user space, i.e., directly accessing a value in the kernel, which is not allowed. So we used the function copy_to_user to transfer the value from the kernel to user space, then access and save the value of jiffies. Finally, we successfully read the current value of jiffies in /proc file system. Since we can get the current value of jiffies correctly, we can easily get the kernel's runtime after loading in the second problem of Task 1 by just using the value of jiffies.

In task 2, we need to write the contents of a specific pid in the proc system to kernel memory. so that we can get the status information of the specific pid. The second task lets us know that in addition to using the proc system to create entries, we can also use the proc system to write the pid information of a process to the kernel. At first we were able to write to /proc/pid without any problems, but when we typed cat /proc/pid, the command did not correctly return the current state of the process represented by the pid process identifier. This took us a long time to find the answer. Finally, we looked in the header file and found that the field defined was "__state". When we use this field, the function proc_read is able to read the correct state of the process. By practicing these two tasks, we have learned the basic kernel operation mechanism and the kernel development process. This gives us a deeper understanding of the operating system kernel.