CMPT-300
Assignment 4

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Please Indicate what components you have completed(Yes,Partial,No):
*(For any partial Completion Please give description in report)
**(Mark penalties will be assessed for claiming a part is present in code when it is not!)

Part A(25%):

Setup Environment(Yes,Partial,No):: Yes
Compile Kernel: Yes
Modified: Kernel: Yes

Part B(75%):

Kernel Space:

Error Handling: Yes (when info is null)
Basic Process Info(Info on input PID): Yes
Linked List Traversal(Relative PID Info): Yes

User-Space:
Testing Code: Yes

General Question:
Briefly Describe What you have learned in this assignment:

1. All the includes are from “include” folder
2. Linux kernel use printk() instead of printf()
3. Linux use doubly linked list to form a list of processes
4. EINVAL returns 22 if the input is null
5. All the field of prinfo does not change except cutime and cstime
6. cutime changes not as frequently as cstime

Part A: Briefly answer these questions(You only need a few sentences each).

1) What is QEMU and how did you use it in this assignment?

QEMU is an emulator, in this assignment, it is used to emulate the Linux kernel. It allows user to modify the kernel without crashing host OS if errors occurs.

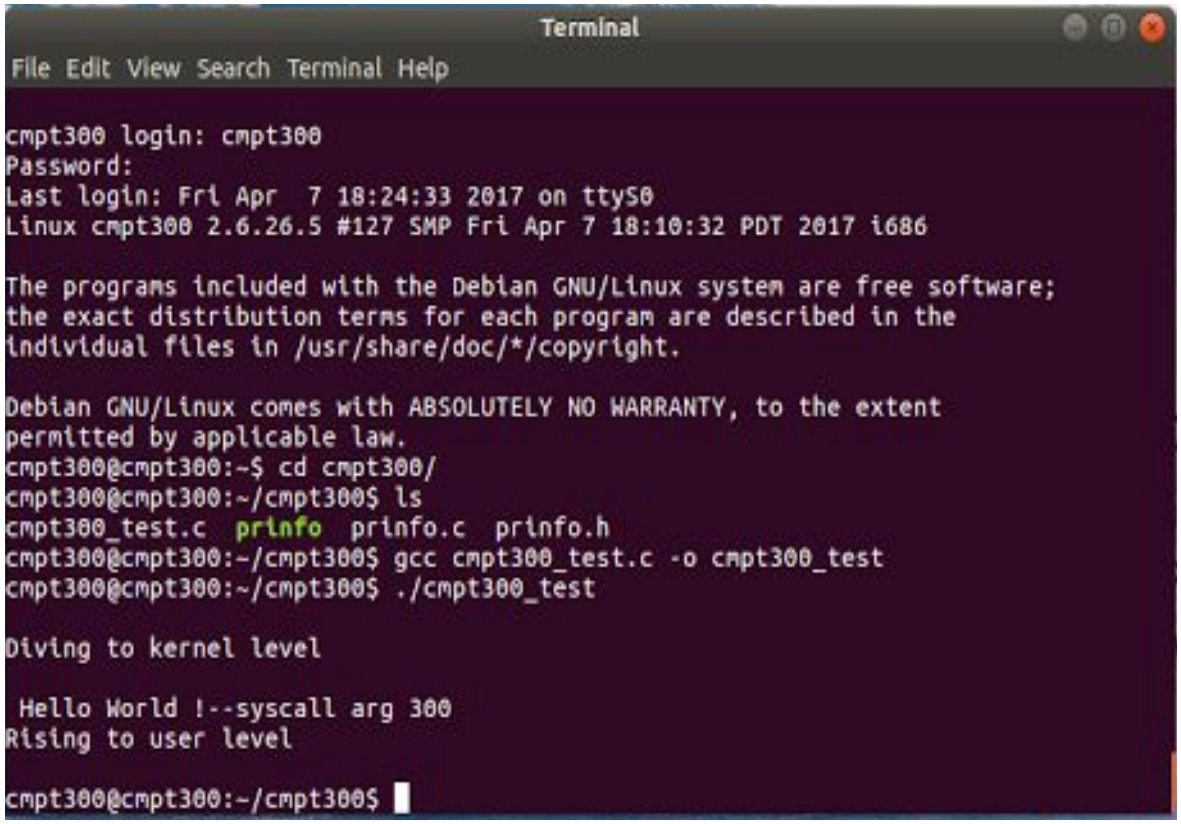
2) What is contained in arch/x86/kernel/syscall_table_32.S. How does the operating system use the syscall table?

This table maintains a list of system calls. The operating system looks the system call table when a system call is about to performed in user space.

3) How do you directly call a syscall from user-space?

Include <sys/syscall> library, and define the system call before main function. Then use syscall() function in main function.

4) Run your VM with the modified kernel and run your user-space testing code. Attach a screen shot to this report(The part where we see the diving to kernel level and the rising to user level).



Part B: Briefly answer these questions(You only need a few sentences each).

1) What is the purpose of a process “nice” value, and how did you find it?

Nice value is a number indicate the priority of the process. It is found by “proc” get the current process and assign its nice value to “info” by using task_nice() function.

2)
a) What data-structure is used in kernel space to traverse between related PIDs information?

Doubly linked list.

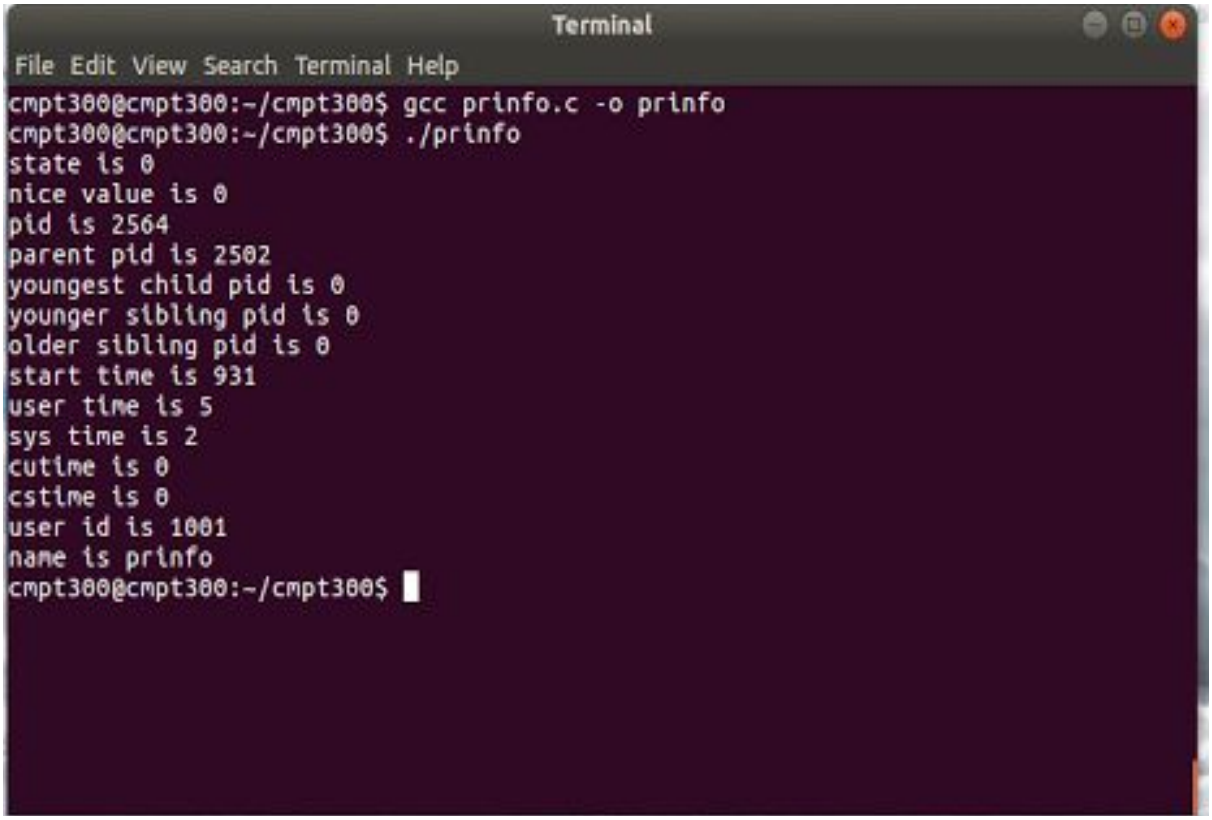
b) How did you traverse the data-structure?

Use list_for_each_entry() to function like a loop until the younger/older sibling or youngest children is found.

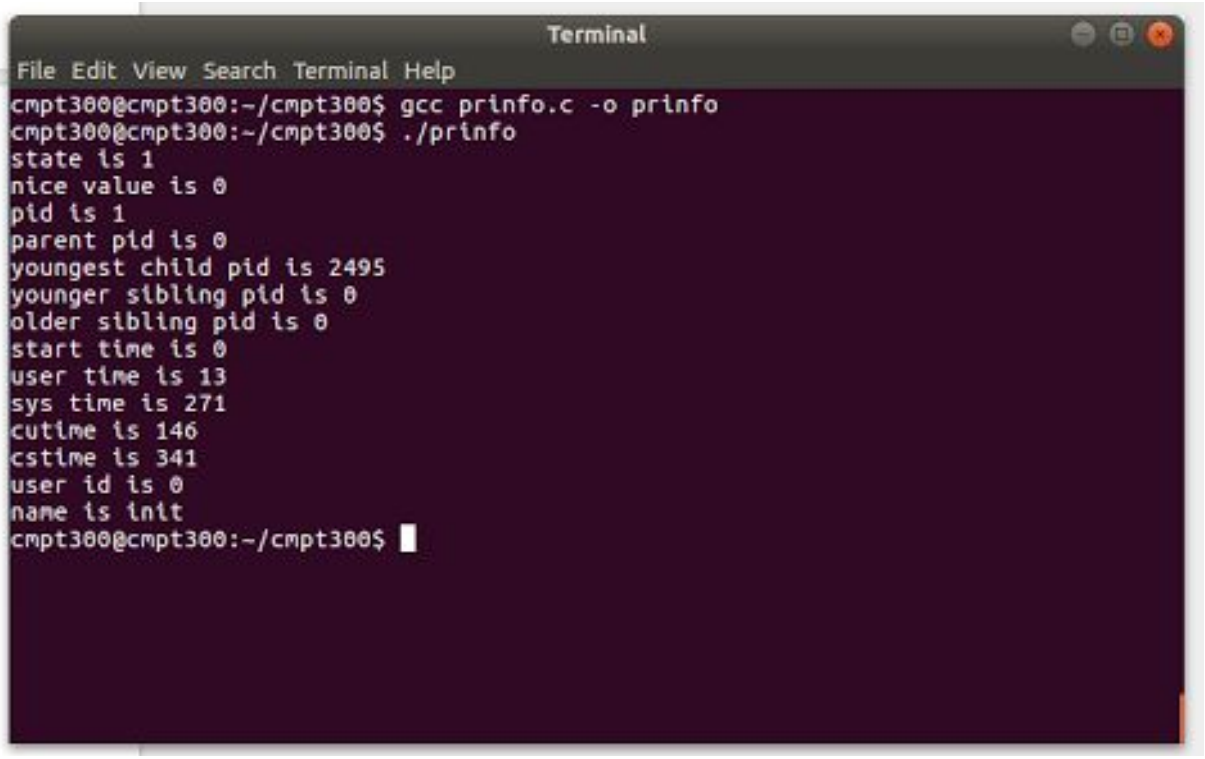
3) How do you pass the target PID from user-space to kernel space?

Use copy_from_user() to send information from user to kernel.

4) Attach three screen shots of your user-space testing code being run.
a) One screen shot of the testing coding running with the PID of your program(ex. use getpid()).



b) One screen shot of the testing coding using the PID of init (pid = 1).



c) One screen shot of the testing code handling an error(prinfo struct = null).