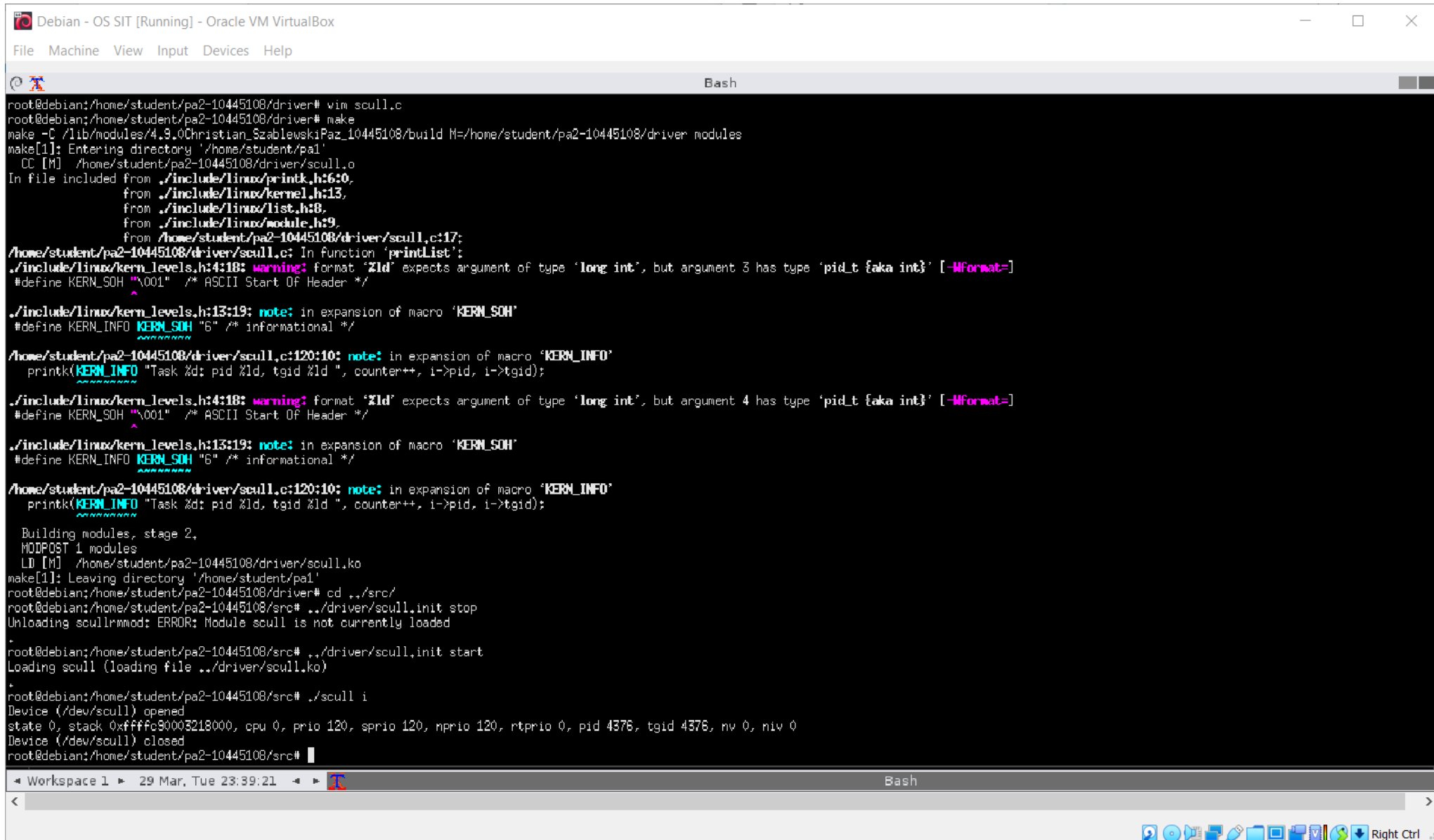


Christian Szablewski-Paz

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```
Debian - OS SIT [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help

Bash

root@debian:/home/student/pa2-10445108/driver# vim scull.c
root@debian:/home/student/pa2-10445108/driver# make
make -C /lib/modules/4.9.0Christian_SzablewskiPaz_10445108/build M=/home/student/pa2-10445108/driver modules
make[1]: Entering directory '/home/student/pa1'
  CC [M] /home/student/pa2-10445108/driver/scull.o
In file included from ./include/linux/printk.h:6:20,
                 from ./include/linux/kernel.h:13,
                 from ./include/linux/list.h:8,
                 from ./include/linux/module.h:9,
                 from /home/student/pa2-10445108/driver/scull.c:17:
./include/linux/kernel_levels.h:4:18: warning: format '%ld' expects argument of type 'long int', but argument 3 has type 'pid_t {aka int}' [-Wformat=]
#define KERN_SOH "\001" /* ASCII Start Of Header */
^
./include/linux/kernel_levels.h:13:19: note: in expansion of macro 'KERN_SOH'
#define KERN_INFO KERN_SOH "6" /* informational */
                  ^
/home/student/pa2-10445108/driver/scull.c:120:10: note: in expansion of macro 'KERN_INFO'
    printk(KERN_INFO "Task %d: pid %ld, tgid %ld ", counter++, i->pid, i->tgid);
           ^
./include/linux/kernel_levels.h:4:18: warning: format '%ld' expects argument of type 'long int', but argument 4 has type 'pid_t {aka int}' [-Wformat=]
#define KERN_SOH "\001" /* ASCII Start Of Header */
^
./include/linux/kernel_levels.h:13:19: note: in expansion of macro 'KERN_SOH'
#define KERN_INFO KERN_SOH "6" /* informational */
                  ^
/home/student/pa2-10445108/driver/scull.c:120:10: note: in expansion of macro 'KERN_INFO'
    printk(KERN_INFO "Task %d: pid %ld, tgid %ld ", counter++, i->pid, i->tgid);
           ^
Building modules, stage 2.
MODPOST 1 modules
LD [M] /home/student/pa2-10445108/driver/scull.ko
make[1]: Leaving directory '/home/student/pa1'
root@debian:/home/student/pa2-10445108/driver# cd ../src/
root@debian:/home/student/pa2-10445108/src# ../driver/scull.init stop
Unloading scullrmmod: ERROR: Module scull is not currently loaded
+
root@debian:/home/student/pa2-10445108/src# ../driver/scull.init start
Loading scull (loading file ../driver/scull.ko)
+
root@debian:/home/student/pa2-10445108/src# ../scull i
Device (/dev/scull) opened
state 0, stack 0xffffc90003218000, cpu 0, prio 120, sprio 120, nprio 120, rtprio 0, pid 4376, tgid 4376, nv 0, niv 0
Device (/dev/scull) closed
root@debian:/home/student/pa2-10445108/src#
```

Part E ./scull i output

Christian Szablewski-Paz

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Debian - OS SIT [Running] - Oracle VM VirtualBox

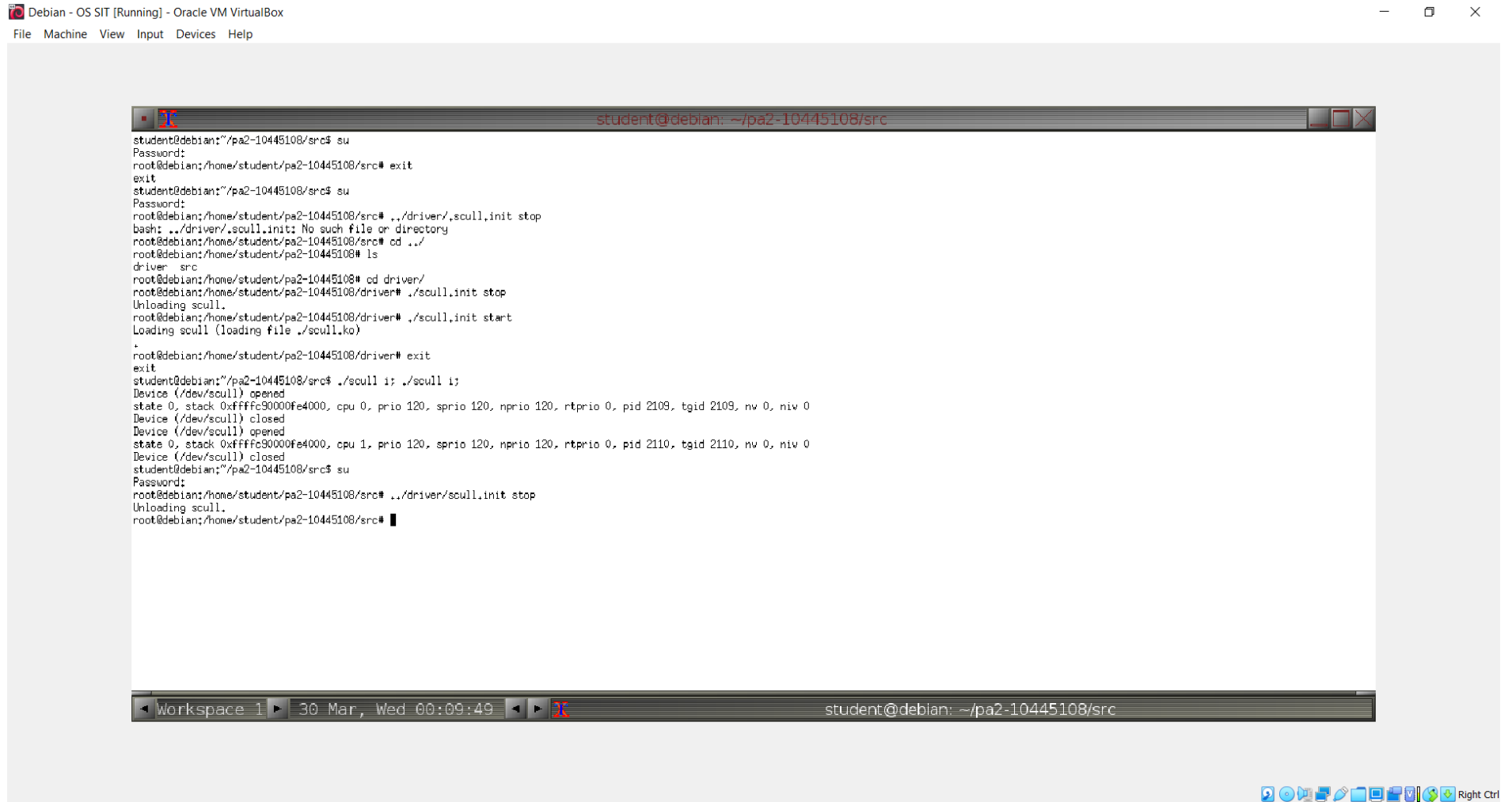
File Machine View Input Devices Help

```
student@debian: ~/pa2-10445108/src
[ 1208.320468] Task 3: pid 1895, tgid 1895
[ 1208.320470] Task 4: pid 1896, tgid 1896
[ 1226.518415] scull open
[ 1226.518485] scull close
[ 1226.519108] scull open
[ 1226.519161] scull close
[ 1249.675101] Task 1: pid 2109, tgid 2109
[ 1249.675104] Task 2: pid 2110, tgid 2110
[ 1435.221287] scull open
[ 1435.223110] scull close
tail: cannot open '6' for reading: No such file or directory
root@debian:/home/student/pa2-10445108/src# ../driver/scull.init stop
Unloading scull.
root@debian:/home/student/pa2-10445108/src# dmesg | tail - 6
==> standard input <==
[ 1226.519108] scull open
[ 1226.519161] scull close
[ 1249.675101] Task 1: pid 2109, tgid 2109
[ 1249.675104] Task 2: pid 2110, tgid 2110
[ 1435.221287] scull open
[ 1435.223110] scull close
[ 1554.441492] Task 1: pid 2154, tgid 2154
[ 1554.441495] Task 2: pid 2152, tgid 2152
[ 1554.441497] Task 3: pid 2153, tgid 2153
[ 1554.441499] Task 4: pid 2151, tgid 2151
tail: cannot open '6' for reading: No such file or directory
root@debian:/home/student/pa2-10445108/src# ../driver/scull.init start
Loading scull (loading file ../driver/scull.ko)
.
root@debian:/home/student/pa2-10445108/src# exit
exit
student@debian:~/pa2-10445108/src$ ./scull t
Device (/dev/scull) opened
state 0, stack 0xffff90001138000, cpu 0, prio 120, sprio 120, nprio 120, rtprio 0, pid 2182, tgid 2178, nv 0, niv 0
state 0, stack 0xffff90001138000, cpu 0, prio 120, sprio 120, nprio 120, rtprio 0, pid 2182, tgid 2178, nv 0, niv 0
state 0, stack 0xffff90001128000, cpu 0, prio 120, sprio 120, nprio 120, rtprio 0, pid 2180, tgid 2178, nv 0, niv 0
state 0, stack 0xffff90001128000, cpu 0, prio 120, sprio 120, nprio 120, rtprio 0, pid 2180, tgid 2178, nv 0, niv 0
state 0, stack 0xffff90001130000, cpu 0, prio 120, sprio 120, nprio 120, rtprio 0, pid 2181, tgid 2178, nv 0, niv 0
state 0, stack 0xffff90001130000, cpu 0, prio 120, sprio 120, nprio 120, rtprio 0, pid 2181, tgid 2178, nv 0, niv 0
state 0, stack 0xffff90000fd8000, cpu 1, prio 120, sprio 120, nprio 120, rtprio 0, pid 2178, tgid 2178, nv 0, niv 0
state 0, stack 0xffff90000fd8000, cpu 1, prio 120, sprio 120, nprio 120, rtprio 0, pid 2178, tgid 2178, nv 0, niv 0
Device (/dev/scull) closed
student@debian:~/pa2-10445108/src$
```

Part G-2, ./scull t output

Christian Szablewski-Paz

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```
Debian - OS SIT [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help

student@debian: ~/pa2-10445108/src
student@debian:~/pa2-10445108/src$ su
Password:
root@debian:/home/student/pa2-10445108/src# exit
exit
student@debian:~/pa2-10445108/src$ su
Password:
root@debian:/home/student/pa2-10445108/src# ../driver/.scull.init stop
bash: ../driver/.scull.init: No such file or directory
root@debian:/home/student/pa2-10445108/src# cd ../
root@debian:/home/student/pa2-10445108# ls
driver  src
root@debian:/home/student/pa2-10445108# cd driver/
root@debian:/home/student/pa2-10445108/driver# ./scull.init stop
Unloading scull.
root@debian:/home/student/pa2-10445108/driver# ./scull.init start
Loading scull (loading file ./scull.ko)
root@debian:/home/student/pa2-10445108/driver# exit
exit
student@debian:~/pa2-10445108/src$ ./scull i; ./scull i;
Device (/dev/scull) opened
state 0, stack 0xffffc90000fe4000, cpu 0, prio 120, sprio 120, nprio 120, rtprio 0, pid 2109, tgid 2109, nv 0, niv 0
Device (/dev/scull) closed
Device (/dev/scull) opened
state 0, stack 0xffffc90000fe4000, cpu 1, prio 120, sprio 120, nprio 120, rtprio 0, pid 2110, tgid 2110, nv 0, niv 0
Device (/dev/scull) closed
student@debian:~/pa2-10445108/src$ su
Password:
root@debian:/home/student/pa2-10445108/src# ../driver/.scull.init stop
Unloading scull.
root@debian:/home/student/pa2-10445108/src#
```

Part F, ./scull i twice in user space plus unloading and loading the module

Christian Szablewski-Paz

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Debian - OS SIT [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

```
student@debian: ~/pa2-10445108/src
Password:
root@debian:/home/student/pa2-10445108/src# exit
exit
student@debian:~/pa2-10445108/src$ su
Password:
root@debian:/home/student/pa2-10445108/src# ../driver/.scull.init stop
bash: ../driver/.scull.init: No such file or directory
root@debian:/home/student/pa2-10445108/src# cd ../
root@debian:/home/student/pa2-10445108# ls
driver  src
root@debian:/home/student/pa2-10445108# cd driver/
root@debian:/home/student/pa2-10445108/driver# ./scull.init stop
Unloading scull.
root@debian:/home/student/pa2-10445108/driver# ./scull.init start
Loading scull (loading file ./scull.ko)

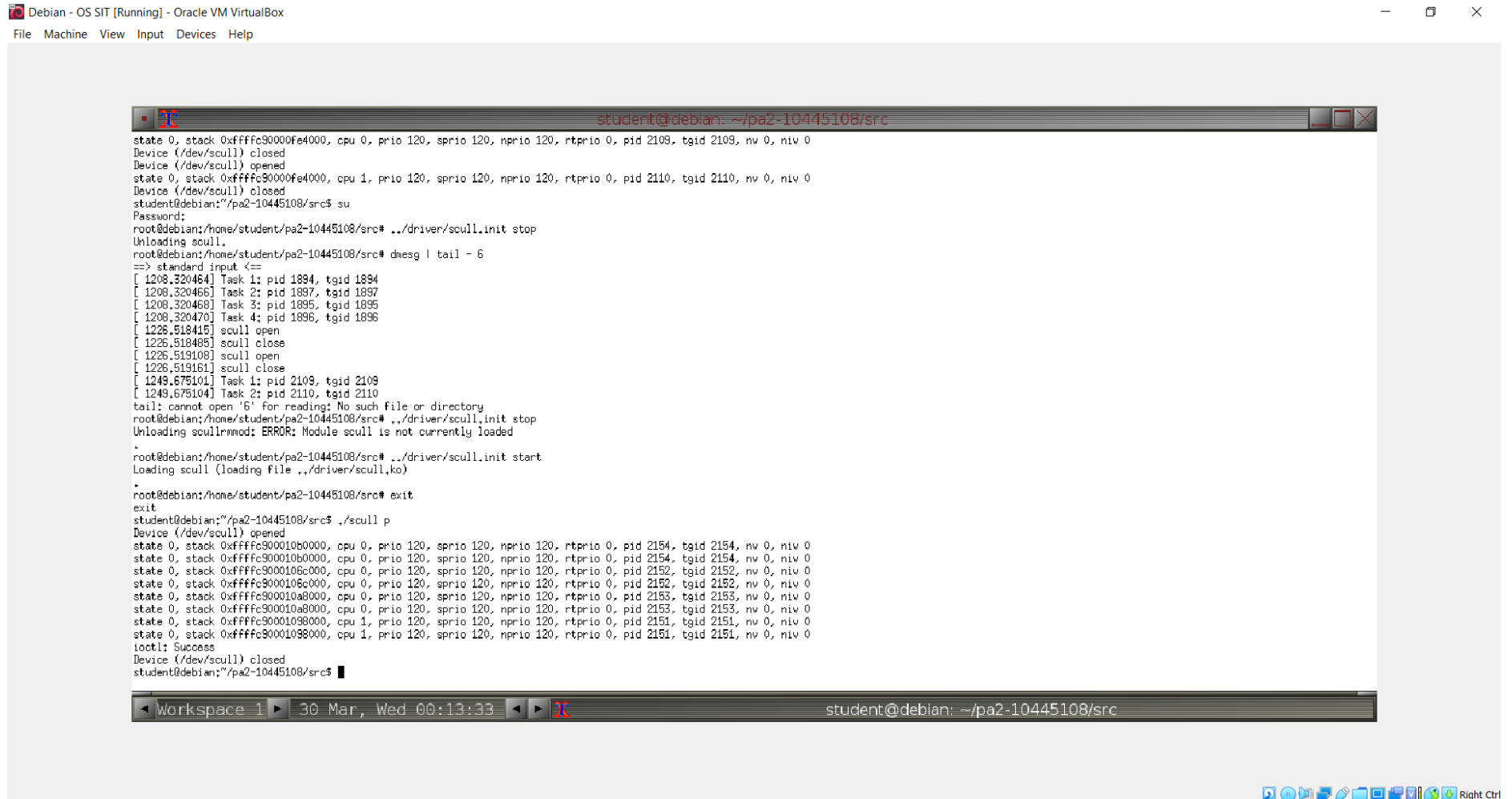
root@debian:/home/student/pa2-10445108/driver# exit
exit
student@debian:~/pa2-10445108/src# ./scull i; ./scull i;
Device (/dev/scull) opened
state 0, stack 0xffffc90000fe4000, cpu 0, prio 120, sprio 120, nprio 120, rtprio 0, pid 2109, tgid 2109, nv 0, niv 0
Device (/dev/scull) closed
Device (/dev/scull) opened
state 0, stack 0xffffc90000fe4000, cpu 1, prio 120, sprio 120, nprio 120, rtprio 0, pid 2110, tgid 2110, nv 0, niv 0
Device (/dev/scull) closed
student@debian:~/pa2-10445108/src$ su
Password:
root@debian:/home/student/pa2-10445108/src# ../driver/.scull.init stop
Unloading scull.
root@debian:/home/student/pa2-10445108/src# dmesg | tail - 6
==> standard input <==
[ 1208.320464] Task 1: pid 1894, tgid 1894
[ 1208.320466] Task 2: pid 1897, tgid 1897
[ 1208.320468] Task 3: pid 1895, tgid 1895
[ 1208.320470] Task 4: pid 1896, tgid 1896
[ 1226.518415] scull open
[ 1226.518485] scull close
[ 1226.519108] scull open
[ 1226.519161] scull close
[ 1249.675101] Task 1: pid 2109, tgid 2109
[ 1249.675104] Task 2: pid 2110, tgid 2110
tail: cannot open '6' for reading: No such file or directory
root@debian:/home/student/pa2-10445108/src#
```

Right Ctrl

Part F dmesg | tail - 6

Christian Szablewski-Paz

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```
state 0, stack 0xffffc90000fe4000, cpu 0, prio 120, sprio 120, nprio 120, rtprio 0, pid 2109, tgid 2109, nv 0, niv 0
Device (/dev/scull) closed
Device (/dev/scull) opened
state 0, stack 0xffffc90000fe4000, cpu 1, prio 120, sprio 120, nprio 120, rtprio 0, pid 2110, tgid 2110, nv 0, niv 0
Device (/dev/scull) closed
student@debian:~/pa2-10445108/src$ su
Password:
root@debian:/home/student/pa2-10445108/src# ../driver/scull.init stop
Unloading scull.
root@debian:/home/student/pa2-10445108/src# dmesg | tail - 6
==> standard input <==
[ 1208.320464] Task 1: pid 1894, tgid 1894
[ 1208.320466] Task 2: pid 1897, tgid 1897
[ 1208.320468] Task 3: pid 1895, tgid 1895
[ 1208.320470] Task 4: pid 1896, tgid 1896
[ 1226.518415] scull open
[ 1226.518485] scull close
[ 1226.519108] scull open
[ 1226.519161] scull close
[ 1249.675101] Task 1: pid 2109, tgid 2109
[ 1249.675104] Task 2: pid 2110, tgid 2110
tail: cannot open '6' for reading: No such file or directory
root@debian:/home/student/pa2-10445108/src# ../driver/scull.init stop
Unloading scull: ERROR: Module scull is not currently loaded
root@debian:/home/student/pa2-10445108/src# ../driver/scull.init start
Loading scull (loading file ../driver/scull.ko)
root@debian:/home/student/pa2-10445108/src# exit
student@debian:~/pa2-10445108/src$ ./scull p
Device (/dev/scull) opened
state 0, stack 0xffffc900010b0000, cpu 0, prio 120, sprio 120, nprio 120, rtprio 0, pid 2154, tgid 2154, nv 0, niv 0
state 0, stack 0xffffc900010b0000, cpu 0, prio 120, sprio 120, nprio 120, rtprio 0, pid 2154, tgid 2154, nv 0, niv 0
state 0, stack 0xffffc900010b0000, cpu 0, prio 120, sprio 120, nprio 120, rtprio 0, pid 2152, tgid 2152, nv 0, niv 0
state 0, stack 0xffffc900010b0000, cpu 0, prio 120, sprio 120, nprio 120, rtprio 0, pid 2152, tgid 2152, nv 0, niv 0
state 0, stack 0xffffc900010a8000, cpu 0, prio 120, sprio 120, nprio 120, rtprio 0, pid 2153, tgid 2153, nv 0, niv 0
state 0, stack 0xffffc900010a8000, cpu 0, prio 120, sprio 120, nprio 120, rtprio 0, pid 2153, tgid 2153, nv 0, niv 0
state 0, stack 0xffffc90001098000, cpu 1, prio 120, sprio 120, nprio 120, rtprio 0, pid 2151, tgid 2151, nv 0, niv 0
state 0, stack 0xffffc90001098000, cpu 1, prio 120, sprio 120, nprio 120, rtprio 0, pid 2151, tgid 2151, nv 0, niv 0
ioctl: Success
Device (/dev/scull) closed
student@debian:~/pa2-10445108/src$
```

Part G-1, ./scull p output

Christian Szablewski-Paz

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Debian - OS SIT [Running] - Oracle VM VirtualBox

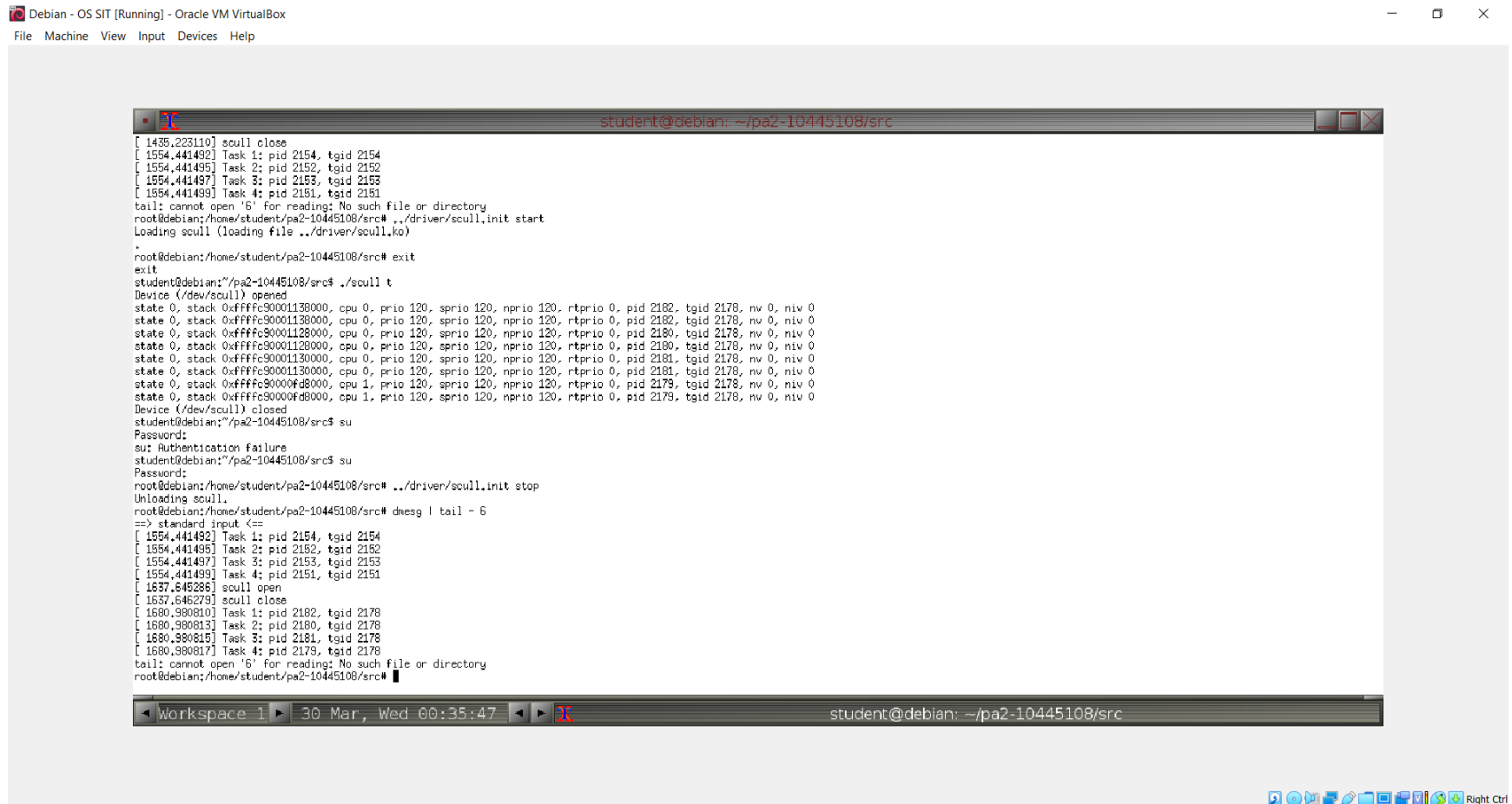
File Machine View Input Devices Help

```
student@debian: ~/pa2-10445108/src
student@debian:~/pa2-10445108/src$ ./scull p
Device (/dev/scull) opened
state 0, stack 0xffff900010b0000, cpu 0, prio 120, sprio 120, nprio 120, rtprio 0, pid 2154, tgid 2154, nv 0, niv 0
state 0, stack 0xffff900010b0000, cpu 0, prio 120, sprio 120, nprio 120, rtprio 0, pid 2154, tgid 2154, nv 0, niv 0
state 0, stack 0xffff9000106c000, cpu 0, prio 120, sprio 120, nprio 120, rtprio 0, pid 2152, tgid 2152, nv 0, niv 0
state 0, stack 0xffff9000106c000, cpu 0, prio 120, sprio 120, nprio 120, rtprio 0, pid 2152, tgid 2152, nv 0, niv 0
state 0, stack 0xffff900010a8000, cpu 0, prio 120, sprio 120, nprio 120, rtprio 0, pid 2153, tgid 2153, nv 0, niv 0
state 0, stack 0xffff900010a8000, cpu 0, prio 120, sprio 120, nprio 120, rtprio 0, pid 2153, tgid 2153, nv 0, niv 0
state 0, stack 0xffff90001098000, cpu 1, prio 120, sprio 120, nprio 120, rtprio 0, pid 2151, tgid 2151, nv 0, niv 0
state 0, stack 0xffff90001098000, cpu 1, prio 120, sprio 120, nprio 120, rtprio 0, pid 2151, tgid 2151, nv 0, niv 0
ioctl: Success
Device (/dev/scull) closed
student@debian:~/pa2-10445108/src$ su
Password:
root@debian:/home/student/pa2-10445108/src# dmesg | tail - 6
=> standard input <=
[ 1208.320468] Task 3: pid 1895, tgid 1895
[ 1208.320470] Task 4: pid 1896, tgid 1896
[ 1226.518415] scull open
[ 1226.518485] scull close
[ 1226.519108] scull open
[ 1226.519161] scull close
[ 1249.675101] Task 1: pid 2109, tgid 2109
[ 1249.675104] Task 2: pid 2110, tgid 2110
[ 1435.221287] scull open
[ 1435.223110] scull close
tail: cannot open '6' for reading: No such file or directory
root@debian:/home/student/pa2-10445108/src# ../driver/scull.init stop
Unloading scull.
root@debian:/home/student/pa2-10445108/src# dmesg | tail - 6
=> standard input <=
[ 1226.519108] scull open
[ 1226.519161] scull close
[ 1249.675101] Task 1: pid 2109, tgid 2109
[ 1249.675104] Task 2: pid 2110, tgid 2110
[ 1435.221287] scull open
[ 1435.223110] scull close
[ 1554.441492] Task 1: pid 2154, tgid 2154
[ 1554.441495] Task 2: pid 2152, tgid 2152
[ 1554.441497] Task 3: pid 2153, tgid 2153
[ 1554.441499] Task 4: pid 2151, tgid 2151
tail: cannot open '6' for reading: No such file or directory
root@debian:/home/student/pa2-10445108/src#
```

Part g-1 dmesg | tail - 6

Christian Szablewski-Paz

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```
Debian - OS SIT [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help

student@debian: ~/pa2-10445108/src

[ 1435.223110] scull close
[ 1554.441492] Task 1: pid 2154, tgid 2154
[ 1554.441495] Task 2: pid 2152, tgid 2152
[ 1554.441497] Task 3: pid 2153, tgid 2153
[ 1554.441499] Task 4: pid 2151, tgid 2151
tail: cannot open '6' for reading: No such file or directory
root@debian:/home/student/pa2-10445108/src# ../driver/scull.init start
Loading scull (loading file ../driver/scull.ko)
.
root@debian:/home/student/pa2-10445108/src# exit
exit
student@debian:~/pa2-10445108/src$ ./scull t
Device (/dev/scull) opened
state 0, stack 0xffff90001138000, cpu 0, prio 120, sprio 120, nprio 120, rtprio 0, pid 2182, tgid 2178, nw 0, niv 0
state 0, stack 0xffff90001138000, cpu 0, prio 120, sprio 120, nprio 120, rtprio 0, pid 2182, tgid 2178, nw 0, niv 0
state 0, stack 0xffff90001128000, cpu 0, prio 120, sprio 120, nprio 120, rtprio 0, pid 2180, tgid 2178, nw 0, niv 0
state 0, stack 0xffff90001128000, cpu 0, prio 120, sprio 120, nprio 120, rtprio 0, pid 2180, tgid 2178, nw 0, niv 0
state 0, stack 0xffff90001130000, cpu 0, prio 120, sprio 120, nprio 120, rtprio 0, pid 2181, tgid 2178, nw 0, niv 0
state 0, stack 0xffff90001130000, cpu 0, prio 120, sprio 120, nprio 120, rtprio 0, pid 2181, tgid 2178, nw 0, niv 0
state 0, stack 0xffff90000fd8000, cpu 1, prio 120, sprio 120, nprio 120, rtprio 0, pid 2179, tgid 2178, nw 0, niv 0
state 0, stack 0xffff90000fd8000, cpu 1, prio 120, sprio 120, nprio 120, rtprio 0, pid 2179, tgid 2178, nw 0, niv 0
Device (/dev/scull) closed
student@debian:~/pa2-10445108/src$ su
Password:
su: Authentication failure
student@debian:~/pa2-10445108/src$ su
Password:
root@debian:/home/student/pa2-10445108/src# ../driver/scull.init stop
Unloading scull.
root@debian:/home/student/pa2-10445108/src# dmesg | tail - 6
=> standard input <=
[ 1554.441492] Task 1: pid 2154, tgid 2154
[ 1554.441495] Task 2: pid 2152, tgid 2152
[ 1554.441497] Task 3: pid 2153, tgid 2153
[ 1554.441499] Task 4: pid 2151, tgid 2151
[ 1637.645286] scull open
[ 1637.646279] scull close
[ 1680.980810] Task 1: pid 2182, tgid 2178
[ 1680.980813] Task 2: pid 2180, tgid 2178
[ 1680.980815] Task 3: pid 2181, tgid 2178
[ 1680.980817] Task 4: pid 2179, tgid 2178
tail: cannot open '6' for reading: No such file or directory
root@debian:/home/student/pa2-10445108/src#
```

Part g-2, dmesg | tail - 6