

Waddhanabot Yi – 011718404

Summary of Kernel Module Implementation

'kmlab.c' - Kernel Module

- ****Includes and Libraries****: Utilizes essential kernel headers such as 'linux/module.h', 'linux/proc_fs.h', 'linux/workqueue.h', and others for module, proc filesystem, and kernel operations.
- ****Module Metadata****: Defines module license, author, and description, essential for kernel module metadata.
- ****Data Structures****: Introduces 'my_list_element', a structure for list elements, and employs Linux kernel's list and spinlock mechanisms for managing these elements in a thread-safe manner.
- ****Proc File Operations****: Establishes a proc directory ('KMLAB_PROC_DIR') and file ('KMLAB_PROC_FILE'), indicating the module's interaction with the proc filesystem.
- ****Read Functionality****: Implements 'km_read' function, likely for reading process-related information from the proc file, using a buffer and iterating over a linked list of process IDs.

'userapp.c' - User-Space Application

- ****Standard Library Usage****: Includes standard C libraries for file and process operations, showcasing its user-space nature.
- ****Utility Functions****: Contains functions like 'my_strlen', 'my_strepy', and 'itoa' for string and integer manipulations, hinting at its role in data handling or communication with the kernel module.
- ****User-Kernel Interaction****: Likely designed to interface with the kernel module, possibly for reading or writing data to the proc filesystem or conducting related tasks.

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botlittlemind@ubuntu1: ~/Desktop/cpts-360-lab-4-WBotCS-main/cpts-360-lab-4-WBotCS-main
botlittlemind@ubuntu1:~/Desktop/cpts-360-lab-4-WBotCS-main/cpts-360-lab-4-WBotCS-main$ chmod +x knlab_test.sh
botlittlemind@ubuntu1:~/Desktop/cpts-360-lab-4-WBotCS-main/cpts-360-lab-4-WBotCS-main$ ./knlab_test.sh
[sudo] password for botlittlemind:
rm -f userapp *.ko *.o *.mod.c Module.symvers modules.order
make -C /lib/modules/6.2.0-36-generic/build M=/home/botlittlemind/Desktop/cpts-360-lab-4-WBotCS-main/cpts-360-lab-4-WBotCS-main modules
make[1]: Entering directory '/usr/src/linux-headers-6.2.0-36-generic'
warning: the compiler differs from the one used to build the kernel
The kernel was built by: aarch64-linux-gnu-gcc-12 (Ubuntu 12.3.0-1ubuntu1-23.04) 12.3.0
You are using: gcc-12 (Ubuntu 12.3.0-1ubuntu1-23.04) 12.3.0
CC [M] /home/botlittlemind/Desktop/cpts-360-lab-4-WBotCS-main/cpts-360-lab-4-WBotCS-main/knlab.o
MODPOST /home/botlittlemind/Desktop/cpts-360-lab-4-WBotCS-main/cpts-360-lab-4-WBotCS-main/Module.symvers
CC [M] /home/botlittlemind/Desktop/cpts-360-lab-4-WBotCS-main/cpts-360-lab-4-WBotCS-main/knlab.mod.o
LD [M] /home/botlittlemind/Desktop/cpts-360-lab-4-WBotCS-main/cpts-360-lab-4-WBotCS-main/knlab.ko
BTF [M] /home/botlittlemind/Desktop/cpts-360-lab-4-WBotCS-main/cpts-360-lab-4-WBotCS-main/knlab.ko
Skipping BTF generation for /home/botlittlemind/Desktop/cpts-360-lab-4-WBotCS-main/cpts-360-lab-4-WBotCS-main/knlab.ko due to unavailability of vmlinux
make[1]: Leaving directory '/usr/src/linux-headers-6.2.0-36-generic'
gcc -o userapp userapp.c
PID$S: 13519 CPU TIME: 2477163520 ms
PID$S: 13520 CPU TIME: 2461163520 ms
botlittlemind@ubuntu1:~/Desktop/cpts-360-lab-4-WBotCS-main/cpts-360-lab-4-WBotCS-main$ #!/bin/sh

sudo rmmod knlab
make
sudo insmod knlab.ko
./userapp 10 &
./userapp 15 &
sleep 6
cat /proc/knlab/status
#!/bin/sh

sudo rmmod knlab
make
sudo insmod knlab.ko
./userapp 10 &
./userapp 15 &
sleep 6
cat /proc/knlab/status
Registered PIDs and times:
Registered PIDs and times:
PID$S: 13519 CPU TIME: 1457294336 ms
PID$S: 13520 CPU TIME: 1425294336 ms
PID$S: 13519 CPU TIME: 1457294336 ms
PID$S: 13520 CPU TIME: 1425294336 ms
botlittlemind@ubuntu1:~/Desktop/cpts-360-lab-4-WBotCS-main/cpts-360-lab-4-WBotCS-main$
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