

Group 1

- Both Makefile for loadable kernel modules error (for further grading, the grader's Makefiles were used)
- Modulo doesn't work in correct way

Rubrics	Full Points (70%)	group1
<b>1. User-space C application</b>	10	
No compile error	3	3
Correct print to the console	7	7
<b>2. Loadable Kernel Module</b>	20	
No compile error	5	0
Insert module w/o errors (or kernel panic)	5	5
Remove module w/o errors (or kernel panic)	5	5
Correct print to the console in kernel msg	5	5
<b>3. Write a calculator system call and calculator application in user app.</b>	25	
Output correct calculation (+,-,*,/) Each has 5 points	20	20
Return fail for the invalid case	5	5
<b>4. Hijack system call using LMK</b>	35	
No compile errors / kernel panic	5	0
Correct modulo operation after inserting LKM	15	0
Correct operation after removing LKM	15	15
<b>5. Write up</b>	10	10
Total	100	75

```
rtec@rtec: ~/Documents/cs596_2024fall/CS596-RT2024Fall-Group01/proj2/modules/mod_calc
rtec@rtec:~$ ~/Documents/cs596_2024fall/CS596-RT2024Fall-Group01
bash: /home/rtec/Documents/cs596_2024fall/CS596-RT2024Fall-Group01: Is a directory
rtec@rtec:~$ cd ~/Documents/cs596_2024fall/CS596-RT2024Fall-Group01
rtec@rtec:~/Documents/cs596_2024fall/CS596-RT2024Fall-Group01$ cd proj2
rtec@rtec:~/Documents/cs596_2024fall/CS596-RT2024Fall-Group01/proj2$ ls
apps kernel modules proj2_group01_txt
rtec@rtec:~/Documents/cs596_2024fall/CS596-RT2024Fall-Group01/proj2$ cd modules
rtec@rtec:~/Documents/cs596_2024fall/CS596-RT2024Fall-Group01/proj2/modules$ ls
hello mod_calc
rtec@rtec:~/Documents/cs596_2024fall/CS596-RT2024Fall-Group01/proj2/modules$ cd hello
rtec@rtec:~/Documents/cs596_2024fall/CS596-RT2024Fall-Group01/proj2/modules/hello$ make
make -C ~/Downloads/cs596-rpi-kernel-main ARCH=arm CROSS_COMPILE=arm-linux-gnueabihf- M=/home/rtec/Documents/c
s596_2024fall/CS596-RT2024Fall-Group01/proj2/modules/hello modules
make[1]: *** /home/rtec/Downloads/cs596-rpi-kernel-main: No such file or directory. Stop.
make: *** [Makefile:10: all] Error 2
rtec@rtec:~/Documents/cs596_2024fall/CS596-RT2024Fall-Group01/proj2/modules/hello$ cd ../mod_calc
rtec@rtec:~/Documents/cs596_2024fall/CS596-RT2024Fall-Group01/proj2/modules/mod_calc$ make
make ARCH=arm CROSS_COMPILE=arm-linux-gnueabihf- -C /home/cs596group1/Downloads/cs596-rpi-kernel-main M=/home/
rtec/Documents/cs596_2024fall/CS596-RT2024Fall-Group01/proj2/modules/mod_calc modules
make[1]: *** /home/cs596group1/Downloads/cs596-rpi-kernel-main: No such file or directory. Stop.
make: *** [Makefile:7: all] Error 2
rtec@rtec:~/Documents/cs596_2024fall/CS596-RT2024Fall-Group01/proj2/modules/mod_calc$
```

```
rtec@rtec: ~/Documents/cs596_2024fall/CS596-RT2024Fall-Group01/proj2/modules/mod_calc
rtec@rtec:~$ ~/Documents/cs596_2024fall/CS596-RT2024Fall-Group01
bash: /home/rtec/Documents/cs596_2024fall/CS596-RT2024Fall-Group01: Is a directory
rtec@rtec:~$ cd ~/Documents/cs596_2024fall/CS596-RT2024Fall-Group01
rtec@rtec:~/Documents/cs596_2024fall/CS596-RT2024Fall-Group01$ cd proj2
rtec@rtec:~/Documents/cs596_2024fall/CS596-RT2024Fall-Group01/proj2$ ls
apps kernel modules proj2_group01_txt
rtec@rtec:~/Documents/cs596_2024fall/CS596-RT2024Fall-Group01/proj2$ cd modules
rtec@rtec:~/Documents/cs596_2024fall/CS596-RT2024Fall-Group01/proj2/modules$ ls
hello mod_calc
rtec@rtec:~/Documents/cs596_2024fall/CS596-RT2024Fall-Group01/proj2/modules$ cd hello
rtec@rtec:~/Documents/cs596_2024fall/CS596-RT2024Fall-Group01/proj2/modules/hello$ make
make -C ~/Downloads/cs596-rpi-kernel-main ARCH=arm CROSS_COMPILE=arm-linux-gnueabihf- M=/home/rtec/Documents/c
s596_2024fall/CS596-RT2024Fall-Group01/proj2/modules/hello modules
make[1]: *** /home/rtec/Downloads/cs596-rpi-kernel-main: No such file or directory. Stop.
make: *** [Makefile:10: all] Error 2
rtec@rtec:~/Documents/cs596_2024fall/CS596-RT2024Fall-Group01/proj2/modules/hello$ cd ../mod_calc
rtec@rtec:~/Documents/cs596_2024fall/CS596-RT2024Fall-Group01/proj2/modules/mod_calc$ make
make ARCH=arm CROSS_COMPILE=arm-linux-gnueabihf- -C /home/cs596group1/Downloads/cs596-rpi-kernel-main M=/home/
rtec/Documents/cs596_2024fall/CS596-RT2024Fall-Group01/proj2/modules/mod_calc modules
make[1]: *** /home/cs596group1/Downloads/cs596-rpi-kernel-main: No such file or directory. Stop.
make: *** [Makefile:7: all] Error 2
rtec@rtec:~/Documents/cs596_2024fall/CS596-RT2024Fall-Group01/proj2/modules/mod_calc$
```

```
[ 83.951993] lkmhello: loading out-of-tree module taints kernel.
[ 83.952505] Hello world! Group01 in kernel space
[ 91.790254] Goodbye world! Group01 from kernel space
[ 119.628902] mod_calc: kprobe registered to hook sys_calc
pi@raspberrypi:~/Documents/g1 $ ./test_calc/test_calc 298 + 14
Result: 14
pi@raspberrypi:~/Documents/g1 $ ./test_calc/test_calc 298 - 14
Result: -14
pi@raspberrypi:~/Documents/g1 $ ./test_calc/test_calc 298 '*' 14
Result: 0
pi@raspberrypi:~/Documents/g1 $ ./test_calc/test_calc 298 / 14
Result: 0
pi@raspberrypi:~/Documents/g1 $ sudo rmmod mod_calc
pi@raspberrypi:~/Documents/g1 $ dmesg
```