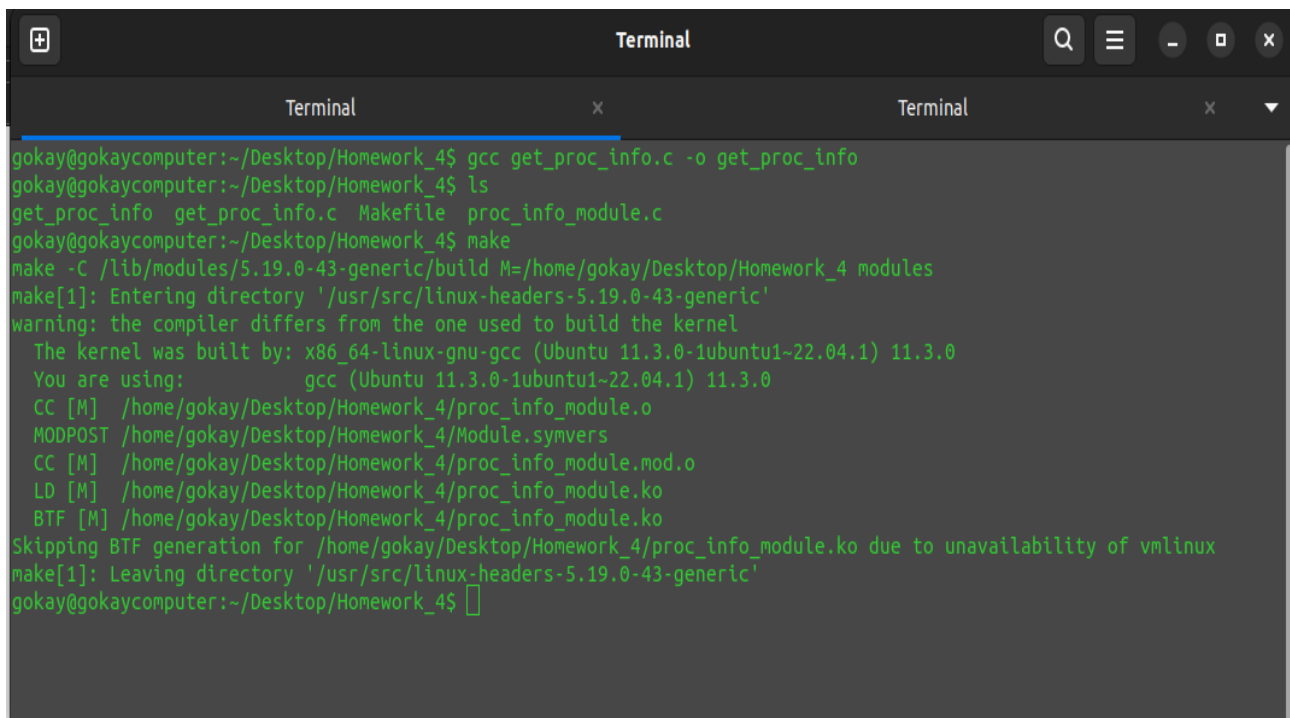


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Group Number: G18

CENG322 PROGRAMMING ASSIGNMENT-4 REPORT

In the first part of the programming assignment 4 we have created make file for compiling the kernel module and generating kernel object (.ko) file. After that we have given the following command from terminal respectively:

- 1.) gcc get_proc_info.c -o get_proc_info
- 2.) make



```
gokay@gokaycomputer:~/Desktop/Homework_4$ gcc get_proc_info.c -o get_proc_info
gokay@gokaycomputer:~/Desktop/Homework_4$ ls
get_proc_info  get_proc_info.c  Makefile  proc_info_module.c
gokay@gokaycomputer:~/Desktop/Homework_4$ make
make -C /lib/modules/5.19.0-43-generic/build M=/home/gokay/Desktop/Homework_4 modules
make[1]: Entering directory '/usr/src/linux-headers-5.19.0-43-generic'
warning: the compiler differs from the one used to build the kernel
The kernel was built by: x86_64-linux-gnu-gcc (Ubuntu 11.3.0-1ubuntu1~22.04.1) 11.3.0
You are using: gcc (Ubuntu 11.3.0-1ubuntu1~22.04.1) 11.3.0
CC [M] /home/gokay/Desktop/Homework_4/proc_info_module.o
MODPOST /home/gokay/Desktop/Homework_4/Module.symvers
CC [M] /home/gokay/Desktop/Homework_4/proc_info_module.mod.o
LD [M] /home/gokay/Desktop/Homework_4/proc_info_module.ko
BTF [M] /home/gokay/Desktop/Homework_4/proc_info_module.ko
Skipping BTF generation for /home/gokay/Desktop/Homework_4/proc_info_module.ko due to unavailability of vmlinux
make[1]: Leaving directory '/usr/src/linux-headers-5.19.0-43-generic'
gokay@gokaycomputer:~/Desktop/Homework_4$
```

Figure 1: compiling get_proc_info.c source code and generating kernel object file with make command

```

1 obj-m += proc_info_module.o
2 all:
3     make -C /lib/modules/$(shell uname -r)/build M=$(PWD) modules
4 clean:
5     make -C /lib/modules/$(shell uname -r)/build M=$(PWD) clean|

```

Figure 2: Makefile contents

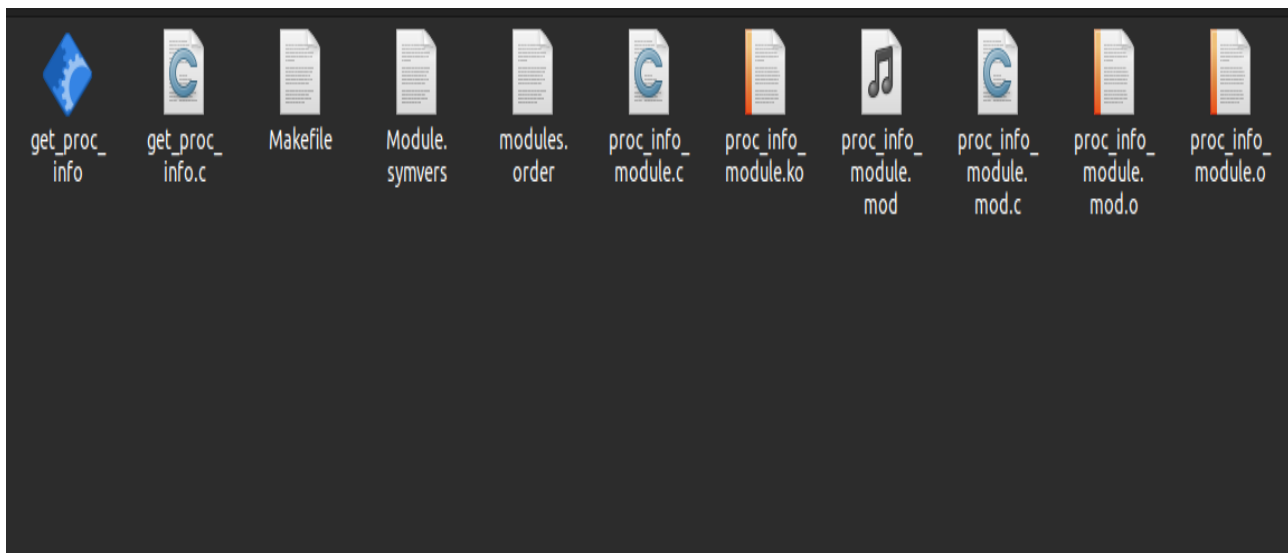
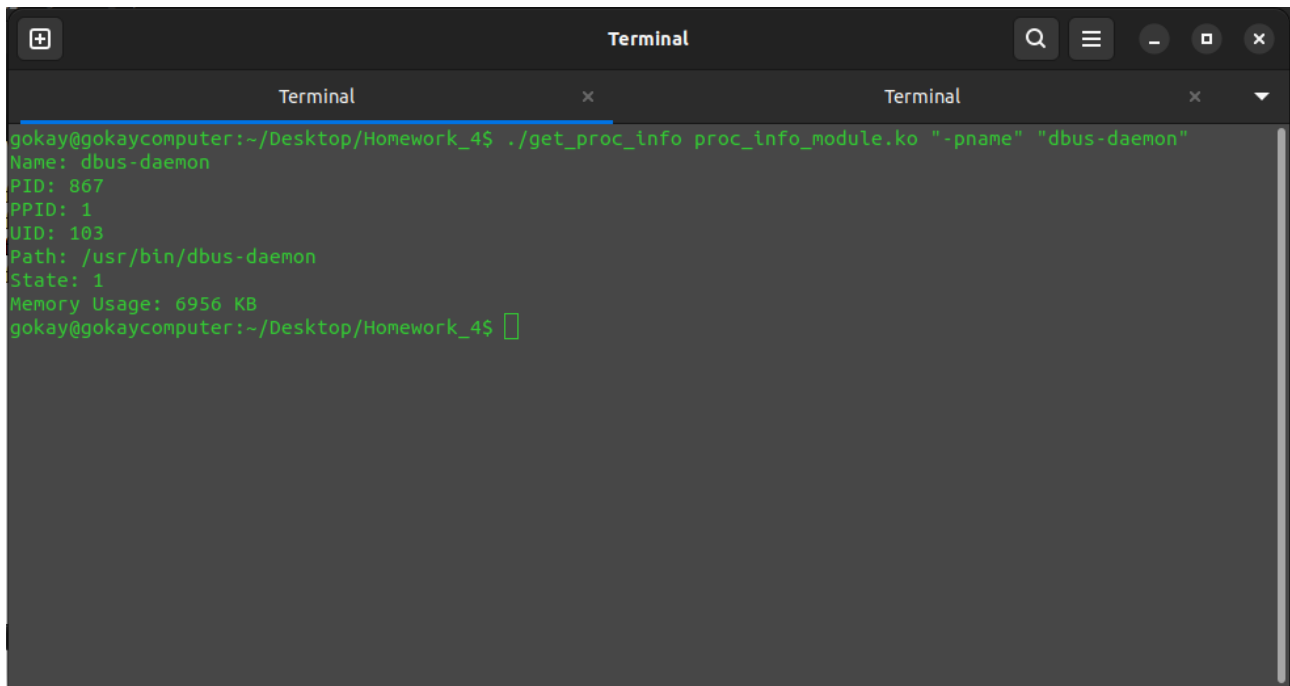


Figure 3: Created files after running make command and compiling get_proc_info source code

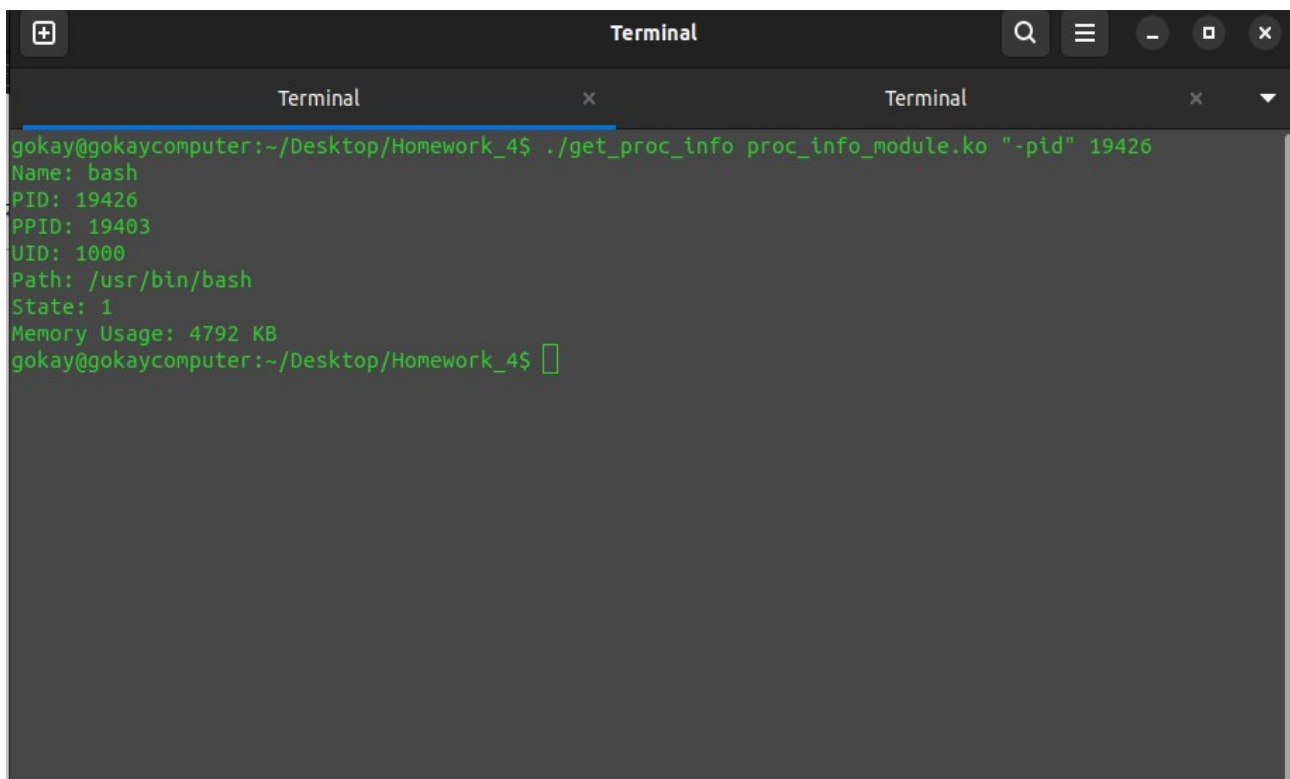
In the second part of the assignment we have inserted the kernel module with the following commands. Each command is used with either different process id or process name.

- 3.) ./get_proc_info proc_info_module.ko "-pname" "dbus-daemon"
- 4.) ./get_proc_info proc_info_module.ko "-pid" 19426
- 5.) ./get_proc_info proc_info_module.ko "-pid" "gedit"
- 6.) ./get_proc_info proc_info_module.ko "-pname" 3244



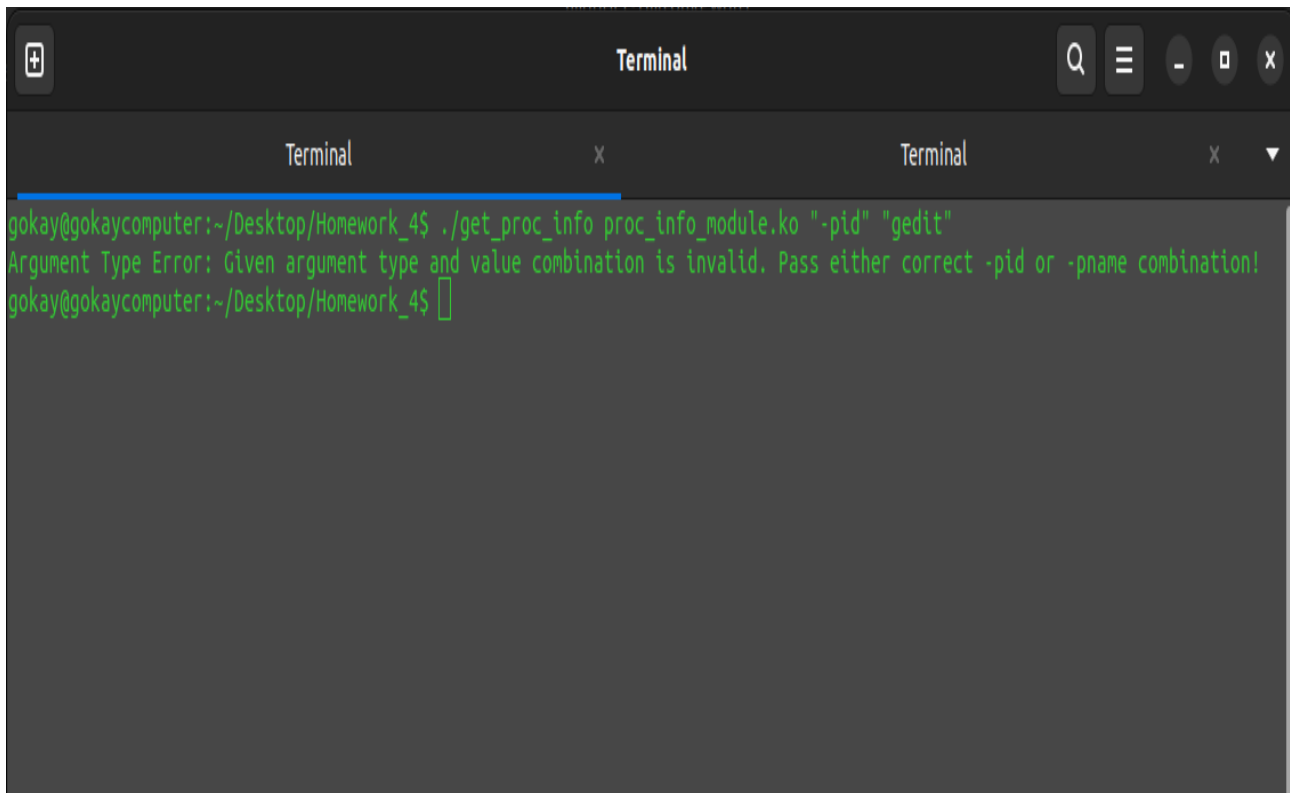
```
gokay@gokaycomputer:~/Desktop/Homework_4$ ./get_proc_info proc_info_module.ko "-pname" "dbus-daemon"
Name: dbus-daemon
PID: 867
PPID: 1
UID: 103
Path: /usr/bin/dbus-daemon
State: 1
Memory Usage: 6956 KB
gokay@gokaycomputer:~/Desktop/Homework_4$
```

Figure 4: Output of executing command number 3



```
gokay@gokaycomputer:~/Desktop/Homework_4$ ./get_proc_info proc_info_module.ko "-pid" 19426
Name: bash
PID: 19426
PPID: 19403
UID: 1000
Path: /usr/bin/bash
State: 1
Memory Usage: 4792 KB
gokay@gokaycomputer:~/Desktop/Homework_4$
```

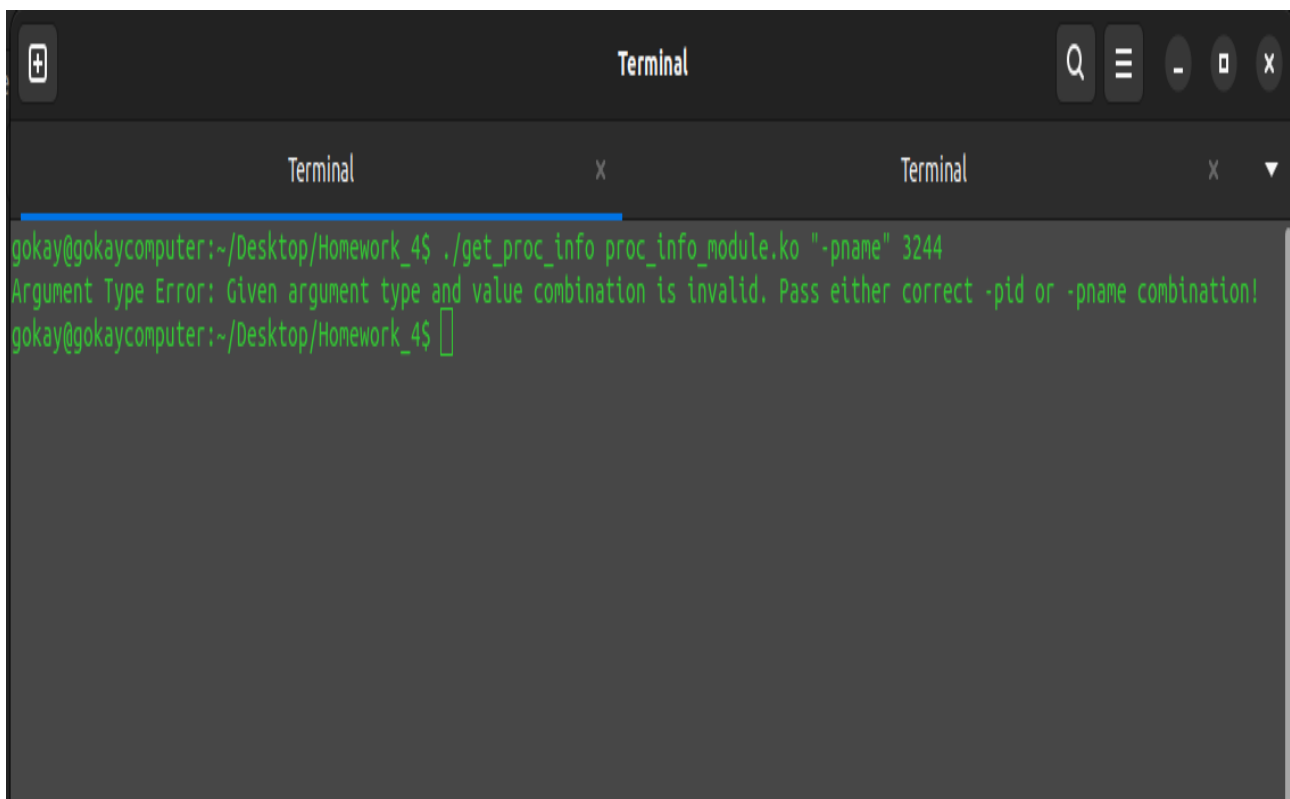
Figure 5: Output of executing command number 4



A terminal window titled "Terminal" with a search icon, a menu icon, and window control buttons. It shows two tabs, both labeled "Terminal". The active tab displays the following text:

```
gokay@gokaycomputer:~/Desktop/Homework_4$ ./get_proc_info proc_info_module.ko "-pid" "gedit"  
Argument Type Error: Given argument type and value combination is invalid. Pass either correct -pid or -pname combination!  
gokay@gokaycomputer:~/Desktop/Homework_4$
```

Figure 6: Output of executing command number 5



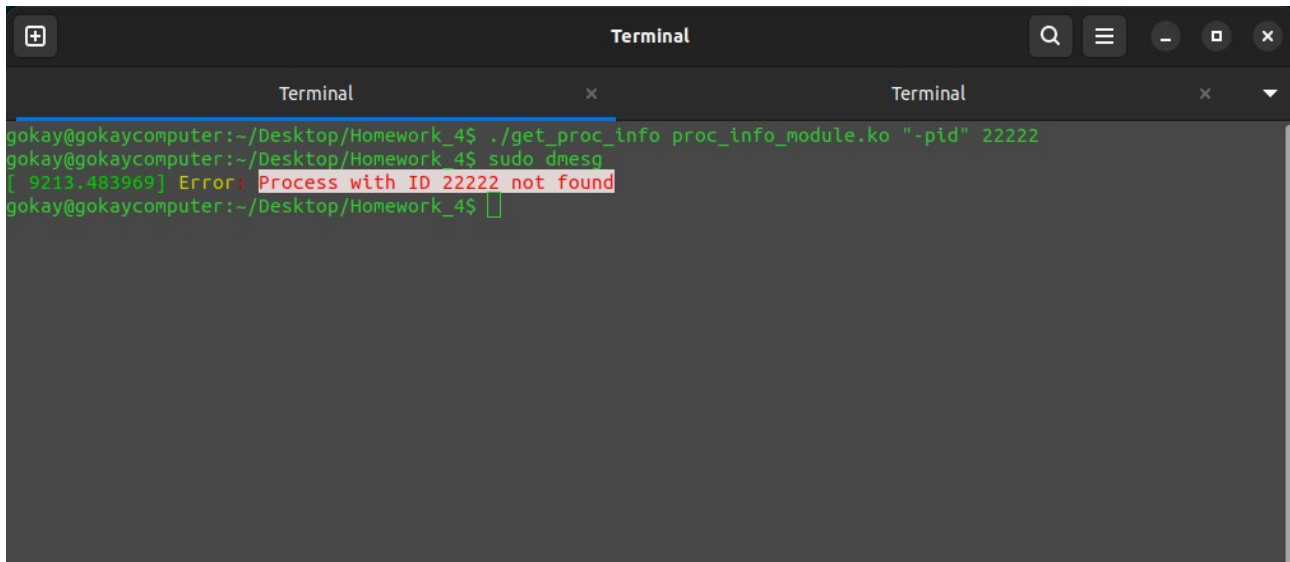
A terminal window titled "Terminal" with a search icon, a menu icon, and window control buttons. It shows two tabs, both labeled "Terminal". The active tab displays the following text:

```
gokay@gokaycomputer:~/Desktop/Homework_4$ ./get_proc_info proc_info_module.ko "-pname" 3244  
Argument Type Error: Given argument type and value combination is invalid. Pass either correct -pid or -pname combination!  
gokay@gokaycomputer:~/Desktop/Homework_4$
```

Figure 7: Output of executing command number 6

We have also provided some of the exceptional cases as follows:

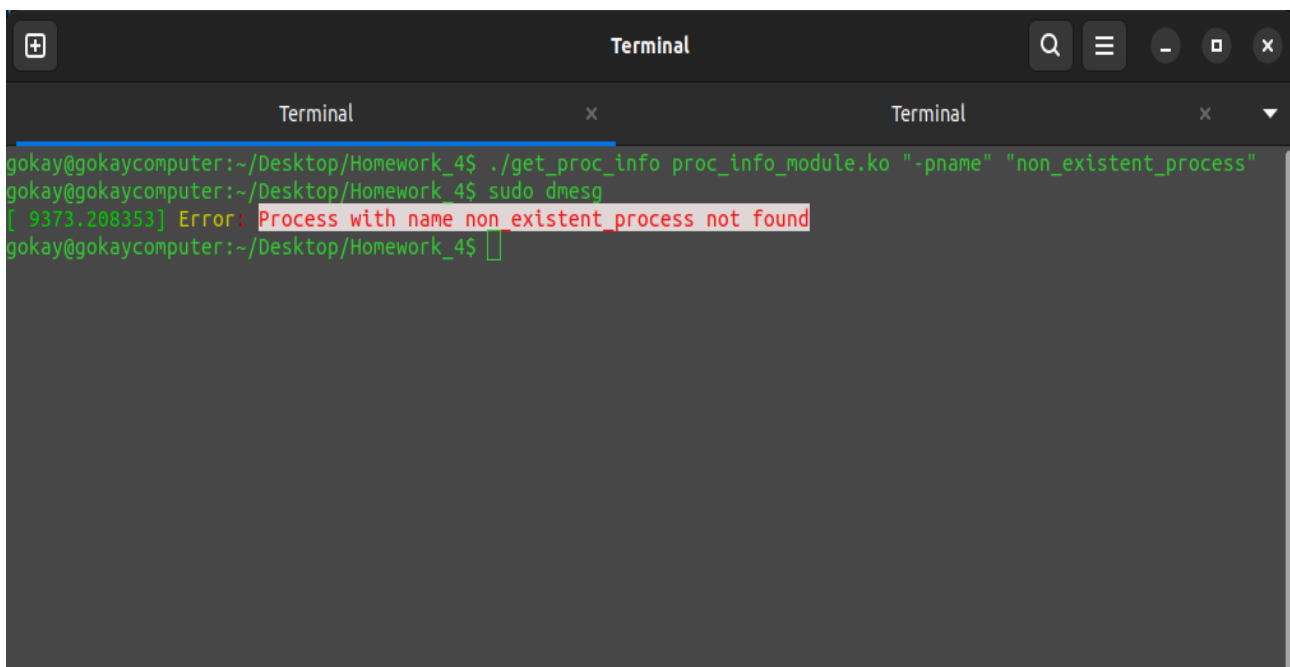
- 7.) `./get_proc_info proc_info_module.ko "-pid" 22222`
- 8.) `./get_proc_info proc_info_module.ko "-pname" "non_existent_process"`
- 9.) `./get_proc_info proc_info_module.ko "-pid" 0`
- 10.) `./get_proc_info proc_info_module.ko "-pname" ""`



A terminal window titled "Terminal" with a search icon, menu icon, and window control buttons. It shows two tabs, both titled "Terminal". The active tab displays the following commands and output:

```
gokay@gokaycomputer:~/Desktop/Homework_4$ ./get_proc_info proc_info_module.ko "-pid" 22222
gokay@gokaycomputer:~/Desktop/Homework_4$ sudo dmesg
[ 9213.483969] Error: Process with ID 22222 not found
gokay@gokaycomputer:~/Desktop/Homework_4$
```

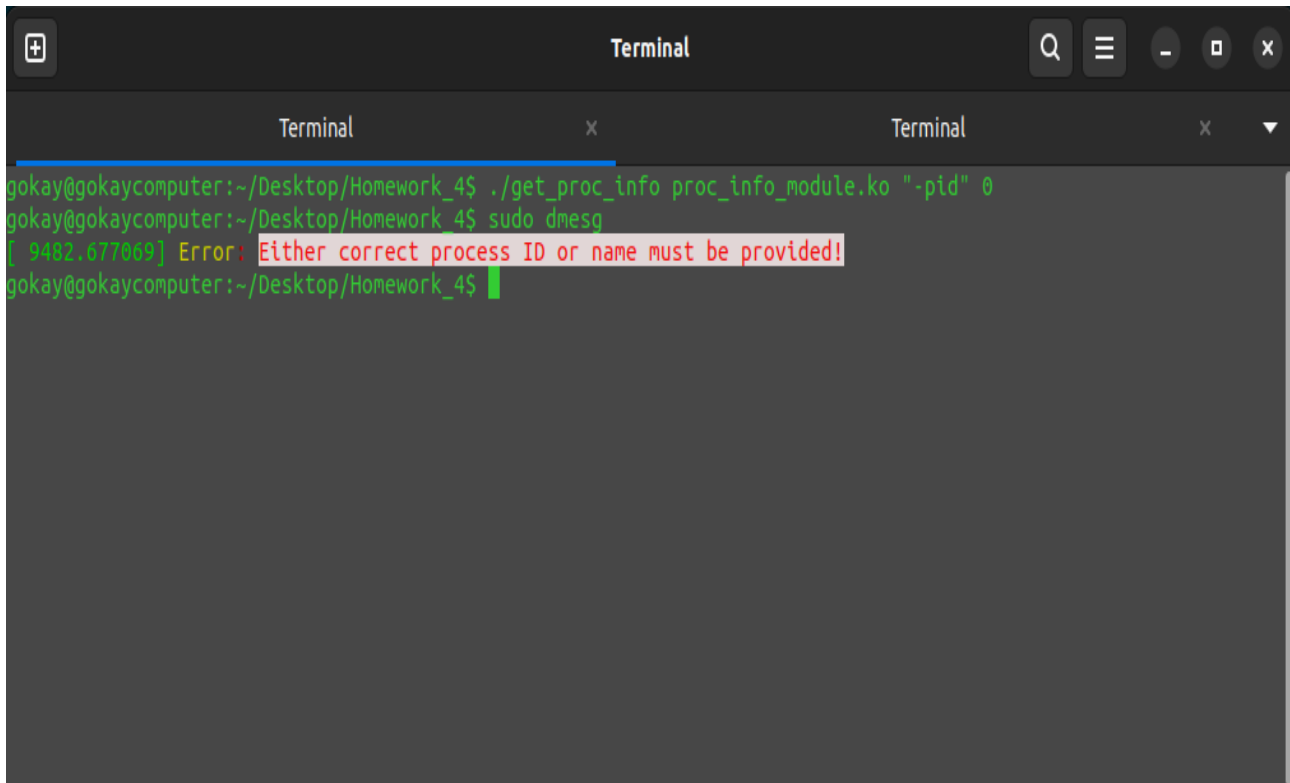
Figure 8: Process with the id 22222 is not found 7



A terminal window titled "Terminal" with a search icon, menu icon, and window control buttons. It shows two tabs, both titled "Terminal". The active tab displays the following commands and output:

```
gokay@gokaycomputer:~/Desktop/Homework_4$ ./get_proc_info proc_info_module.ko "-pname" "non_existent_process"
gokay@gokaycomputer:~/Desktop/Homework_4$ sudo dmesg
[ 9373.208353] Error: Process with name non_existent_process not found
gokay@gokaycomputer:~/Desktop/Homework_4$
```

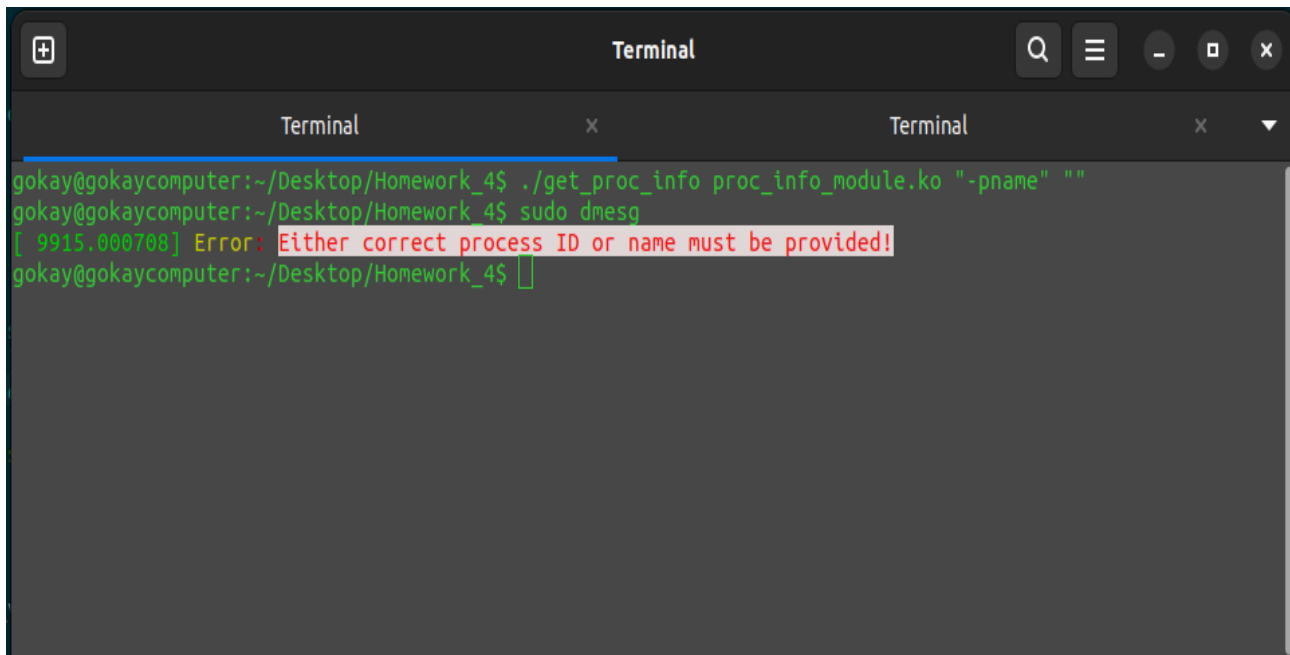
Figure 9: Process with the name "non_existent_process" is not found 8



A terminal window titled "Terminal" with a search icon, menu icon, and window control buttons. It shows two tabs, both labeled "Terminal". The active tab contains the following text:

```
gokay@gokaycomputer:~/Desktop/Homework_4$ ./get_proc_info proc_info_module.ko "-pid" 0
gokay@gokaycomputer:~/Desktop/Homework_4$ sudo dmesg
[ 9482.677069] Error: Either correct process ID or name must be provided!
gokay@gokaycomputer:~/Desktop/Homework_4$
```

Figure 10: Process with id 0 and name empty string ("") are default parameter values 9



A terminal window titled "Terminal" with a search icon, menu icon, and window control buttons. It shows two tabs, both labeled "Terminal". The active tab contains the following text:

```
gokay@gokaycomputer:~/Desktop/Homework_4$ ./get_proc_info proc_info_module.ko "-pname" ""
gokay@gokaycomputer:~/Desktop/Homework_4$ sudo dmesg
[ 9915.000708] Error: Either correct process ID or name must be provided!
gokay@gokaycomputer:~/Desktop/Homework_4$
```

Figure 11: Process with id 0 and name empty string ("") are default parameter values 10

