

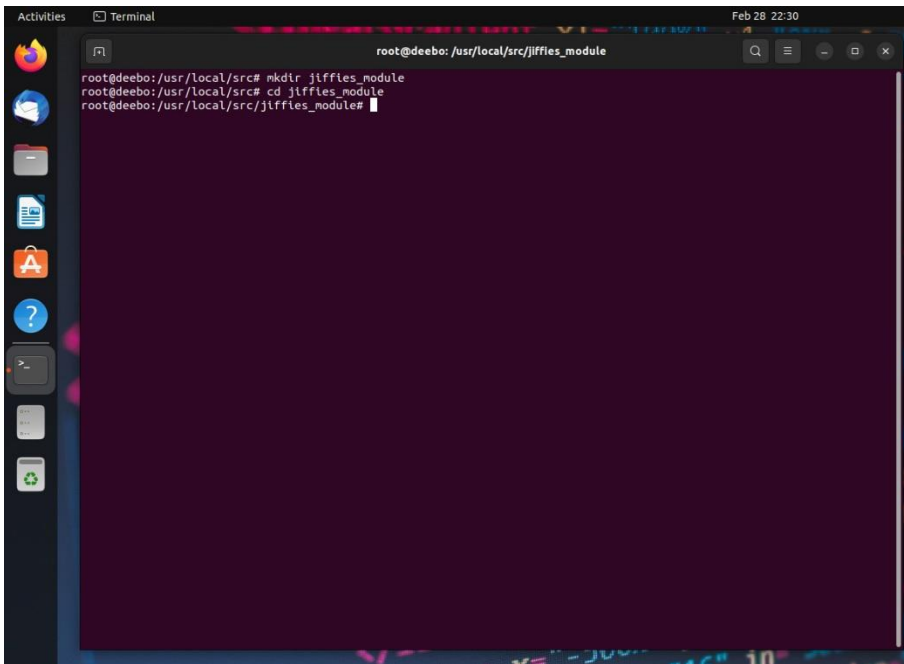
# Operating Systems

## Project 1

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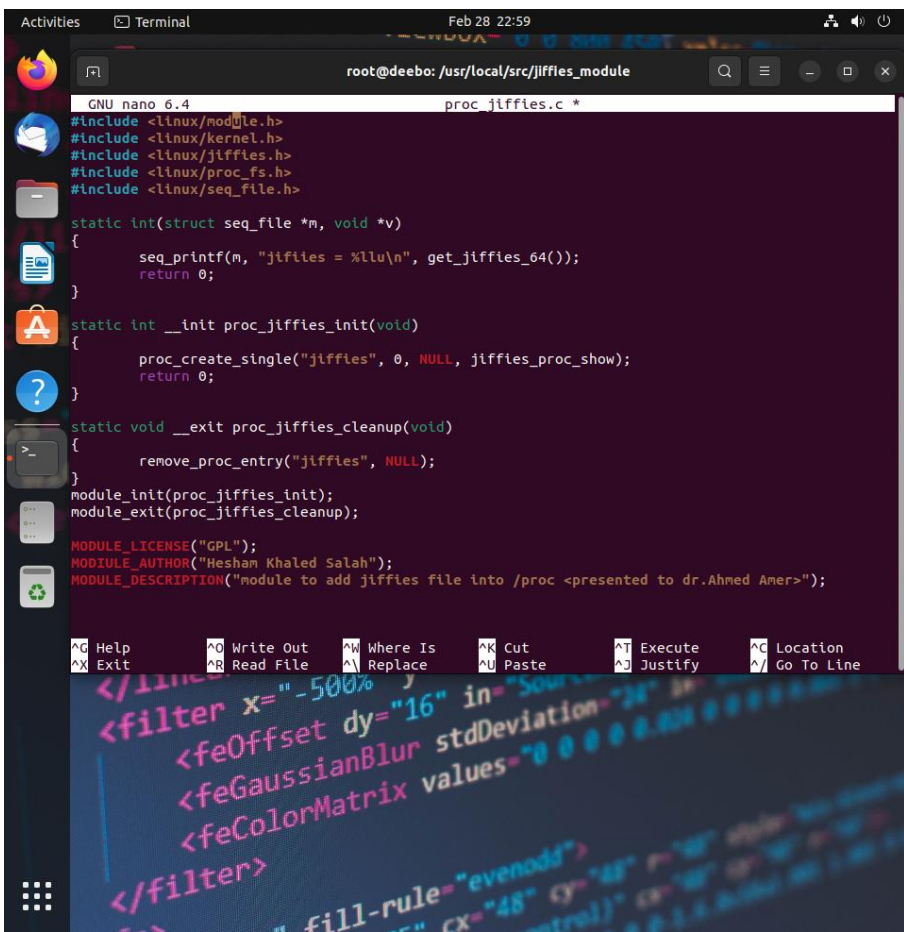
# First Module (Jiffies Module):

## Screenshots and steps:



```
root@deebo: /usr/local/src# mkdir jiffies_module
root@deebo: /usr/local/src# cd jiffies_module
root@deebo: /usr/local/src/jiffies_module#
```

making folder in /local/src and making new C file (our kernel module).



```
GNU nano 6.4 proc_jiffies.c *
#include <linux/module.h>
#include <linux/kernel.h>
#include <linux/jiffies.h>
#include <linux/proc_fs.h>
#include <linux/seq_file.h>

static int(struct seq_file *m, void *v)
{
    seq_printf(m, "jiffies = %llu\n", get_jiffies_64());
    return 0;
}

static int __init proc_jiffies_init(void)
{
    proc_create_single("jiffies", 0, NULL, jiffies_proc_show);
    return 0;
}

static void __exit proc_jiffies_cleanup(void)
{
    remove_proc_entry("jiffies", NULL);
}

module_init(proc_jiffies_init);
module_exit(proc_jiffies_cleanup);

MODULE_LICENSE("GPL");
MODULE_AUTHOR("Hesham Khaled Salah");
MODULE_DESCRIPTION("module to add jiffies file into /proc <presented to dr.Ahmed Amer>");
```

Typing code of our module  
And giving it an author name and description.

```
Activities  Gedit  Feb 28 23:12
*Makefile
/usr/local/src/jiffies_module

1 obj-m := proc_jiffies.o
2
3 all:
4     make -C /lib/modules/$(shell uname -r)/build M=$(PWD) modules
5
6 clean:
7     make -C /lib/modules/$(shell uname -r)/build M=$(PWD) clean
8
9 test:
10    sudo dmesg -C
11    sudo insmod proc_jiffies.ko
12    sleep 3s
13    sudo rmmod proc_jiffies.ko
14    dmesg
```

typing code of Makefile (Creating Makefile by typing nano Makefile in terminal)

```
root@deebo: /usr/local/src/jiffies_module

CC [M] /usr/local/src/jiffies_module/proc_jiffies.o
MODPOST /usr/local/src/jiffies_module/Module.symvers
CC [M] /usr/local/src/jiffies_module/proc_jiffies.mod.o
LD [M] /usr/local/src/jiffies_module/proc_jiffies.ko
BTF [M] /usr/local/src/jiffies_module/proc_jiffies.ko
Skipping BTF generation for /usr/local/src/jiffies_module/proc_jiffies.ko due to unavailability of vmlinux
make[1]: Leaving directory '/usr/src/linux-headers-5.19.0-31-generic'
root@deebo: /usr/local/src/jiffies_module# sudo insmod proc_jiffies.ko
root@deebo: /usr/local/src/jiffies_module# ls /proc
1 1693 1918 2043 26 38 60 7322 84 fs scsi
10 1696 1931 2084 262 39 61 7340 840 interrupts self
11 17 1932 2085 27 4 619 7349 870 iomem slabinfo
1112 1702 1934 21 2778 40 62 7350 872 ioports softirqs
1114 1725 1935 2101 28 41 621 7351 877 stat
1137 1735 1937 2114 29 43 622 7352 880 jiffies swaps
1180 1738 1938 2118 293 4317 664 7353 89 sys
12 1775 1940 2137 294 4331 667 74 95 kcore sysrq-trigger
13 1776 1941 2142 295 45 668 7462 96 keys sysvipc
1372 1778 1944 22 2952 46 669 75 acpi thread-self
14 1785 1947 222 296 4623 675 7521 asound tty_list
142 1799 1950 223 297 47 6787 76 bootconfig kpagecount
1422 1803 1951 2268 298 48 68 77 buddyinfo kpageflags
1430 1809 1959 2269 299 4841 693 775 bus loadavg
15 1847 196 23 3 49 694 776 cgroups version
16 1853 198 2323 300 5 695 7782 cmdline version_signature
1640 1858 1982 2329 301 56 696 78 locks vmlallocInfo
1651 1862 1984 2343 31 5013 697 7802 mdstat vmstat
1652 1869 199 2355 313 5078 698 781 meminfo zoneinfo
1658 1875 1996 2389 32 51 700 79 crypto
1659 1879 2 2407 33 53 703 8 mounts
1661 1884 20 2408 3339 54 7121 8143 dna mtrr
1662 1898 2019 2415 34 55 7149 8148 driver net
1667 19 2027 2416 35 56 7212 8162 dynamic_debug pagetypeinfo
1672 1907 2030 2420 350 57 7214 82 execdomains partitions
1680 191 2031 2422 37 58 73 83 fb pressure
1682 1916 2037 25 379 6 7321 837 filesystems schedstat
1683 1916 2037 25 379 6 7321 837 filesystems schedstat
```

Test our module and now we see jiffies in /proc folder successfully.

```
root@deebo: /usr/local/src/jiffies_module

1661 1884 20 2408 3339 54 7121 8143 dna mtrr
1662 1898 2019 2415 34 55 7149 8148 driver net
1667 19 2027 2416 35 56 7212 8162 dynamic_debug pagetypeinfo
1672 1907 2030 2420 350 57 7214 82 execdomains partitions
1680 191 2031 2422 37 58 73 83 fb pressure
1682 1916 2037 25 379 6 7321 837 filesystems schedstat
root@deebo: /usr/local/src/jiffies_module# cat /proc/jiffies
jiffies = 4297203246
root@deebo: /usr/local/src/jiffies_module# watch -n 1 cat /proc/jiffies
root@deebo: /usr/local/src/jiffies_module# while true
> do
> cat /proc/jiffies
> sleep 1
> done
jiffies = 4297238414
jiffies = 4297238608
jiffies = 4297238923
jiffies = 4297239190
jiffies = 4297239442
jiffies = 4297239694
jiffies = 4297239945
jiffies = 4297240195
jiffies = 4297240446
jiffies = 4297240696
jiffies = 4297240947
jiffies = 4297241198
jiffies = 4297241448
jiffies = 4297241705
jiffies = 4297241956
jiffies = 4297242207
jiffies = 4297242458
jiffies = 4297242708
jiffies = 4297242962
jiffies = 4297243217
^C
root@deebo: /usr/local/src/jiffies_module#
```

Test jiffies file single time and multiple times by while loop

## Making sure to remove the /proc/jiffies when removing the module

```
Activities Terminal Mar 9 14:55 root@deebo: /usr/local/src/jiffies_module

warning: the compiler differs from the one used to build the kernel
The kernel was built by: x86_64-linux-gnu-gcc-12 (Ubuntu 12.2.0-3ubuntu1) 12.2.0
You are using: gcc-12 (Ubuntu 12.2.0-3ubuntu1) 12.2.0
CC [M] /usr/local/src/jiffies_module/proc_jiffies.o
MODPOST /usr/local/src/jiffies_module/Module.symvers
CC [M] /usr/local/src/jiffies_module/proc_jiffies.mod.o
LD [M] /usr/local/src/jiffies_module/proc_jiffies.ko
BTF [M] /usr/local/src/jiffies_module/proc_jiffies.ko
Skipping BTF generation for /usr/local/src/jiffies_module/proc_jiffies.ko due to unavailability of vmlinux
make[1]: Leaving directory '/usr/src/linux-headers-5.19.0-35-generic'
root@deebo:/usr/local/src/jiffies_module# sudo insmod proc_jiffies.ko
root@deebo:/usr/local/src/jiffies_module# ls /proc
1 1431 2133 2399 2571 2809 313 4239 55 76 bootconfig kcore softirqs
10 1467 2145 2408 2575 2811 3163 4277 56 77 buddyinfo keys stat
11 15 2154 2402 2577 2820 32 4306 57 78 io key-users swaps
1161 16 2158 2408 2579 2826 3226 4319 59 79 cgroups kmsg sys
1186 1655 2164 2427 2580 2839 3290 44 6 8 cmdline kpagecgroup sysrq-trigger
12 17 2192 2451 2581 2844 33 46 60 80 consoles kpagecount sysvipc
12346 1807 2199 2471 2582 2865 34 4620 61 802 cpuinfo kpageflags thread-self
12348 184 22 2492 2583 2866 35 4621 68 803 crypto loadavg timer_list
12369 185 2281 2493 2586 29 3649 4624 682 807 devices locks tty
12372 19 2207 2498 2599 2967 37 47 685 82 diskstats ndstat uptime
1241 198 225 25 26 299 38 4758 686 83 dna meminfo version
12633 1997 226 2502 2601 3 39 48 687 84 driver misc version_signature
12780 2 23 2509 2618 300 391 4800 693 85 dynamic_debug modules vmallocinfo
12781 20 2315 2517 2624 301 4 4874 696 854 execdomains mounts vmstat
12965 200 2316 2521 2626 302 40 49 697 857 fb nrttr zoneinfo
12966 21 2327 2526 2633 303 41 4958 698 90 filesystems net
12970 2186 2328 2535 2644 304 4168 5 717 911 fs pagetypeinfo
13 2107 2332 2541 2670 3044 4188 50 718 913 interrupts partitions
13271 2113 2333 2549 2695 305 42 51 719 921 iomem pressure
13272 2116 2337 2551 2698 306 4203 52 720 96 ioports schedstat
1349 2117 2338 2567 27 307 4204 53 724 97 scsi self
14 2123 2370 2568 2727 31 4205 54 74 acpi
143 2127 2376 2569 31 3123 4221 541 75 asound kallsyms slabinfo

root@deebo:/usr/local/src/jiffies_module# sudo rmmod proc_jiffies.ko
root@deebo:/usr/local/src/jiffies_module# ls /proc
1 13271 1467 21 2164 2328 2471 2549 2583 2698 29 307 391 4306 4950 6 717 80 913 cpuinfo iomem locks scsi uptime
10 13277 15 2186 2192 2332 2492 2551 2598 27 2967 31 4 4319 5 60 718 802 921 crypto devices mdstat self version
11 13355 16 2187 2198 2333 2493 2567 2599 2727 299 3123 40 44 50 61 719 803 96 kallsyms meminfo slabinfo version_signature
1161 13431 1655 2113 22 2337 2498 2560 26 28 3 3163 41 46 51 68 720 807 97 diskstats dna kcore modules stat softirqs vmallocinfo
1186 13468 17 2116 2201 2338 25 2569 2601 2809 300 32 4168 4620 52 682 724 82 acpi keys mounts swaps vmlstat
12 1349 184 2117 2207 2370 2502 2571 2618 2811 301 3226 4188 4621 53 685 74 83 asound driver driver version_signature
12346 13513 185 2123 225 2376 2509 2575 2624 2820 302 33 42 47 54 686 75 84 bootconfig dynamic_debug filesystems kpagecgroup sysvipc
1241 13514 19 2127 226 2399 2517 2577 2626 2826 303 34 4203 4758 541 687 76 85 buddyinfo io key-users nrttr sysrq-trigger
12633 13521 198 2133 23 2400 2521 2579 2633 2839 304 35 4204 48 55 693 77 854 fb kmsg kpagecgroup pagetypeinfo sysvipc
12965 14 2 2146 2315 2402 2526 2580 2644 2844 304 37 4205 4800 56 696 78 857 cgroups kpagecount partitions thread-self
12970 143 28 2154 2316 2406 2535 2581 2670 2865 305 38 4221 4874 57 697 79 90 cmdline kpageflags timer_list
13 1431 200 2158 2327 2427 2541 2582 2695 2866 306 39 4277 49 59 698 8 911 consoles interrupts loadavg schedstat tty

root@deebo:/usr/local/src/jiffies_module#
```

## Second Module (Seconds Module):

### Screenshots and steps:

typing code of Makefile

```
Starred /usr/local/src/seconds_module

1 obj-m := proc_seconds.o
2
3 all:
4     make -C /lib/modules/$(shell uname -r)/build M=$(PWD) modules
5
6 clean:
7     make -C /lib/modules/$(shell uname -r)/build M=$(PWD) clean
8
9 test:
10    sudo dmesg -c
11    sudo insmod proc_seconds.ko
12    sleep 3s
13    sudo rmmod proc_seconds.ko
14    dmesg

root@deebo: /usr/local/src/seconds_module

sudo -i
d for deebo:
cd /usr/local/src
cd /usr/local/src/ cd seconds_module
r/local/src/seconds_module# nano proc_seconds.c
r/local/src/seconds_module# nano Makefile
r/local/src/seconds_module# make
* missing separator. Stop.
r/local/src/seconds_module# nano Makefile
r/local/src/seconds_module# rm Makefile
r/local/src/seconds_module# nano Makefile
r/local/src/seconds_module# gedit Makefile

dconf-WARNING **: 13:49:31.657: failed to commit changes to dconf: Failed to execute child process "
No such file or directory)

dconf-WARNING **: 13:49:31.657: failed to commit changes to dconf: Failed to execute child process "
No such file or directory)

dconf-WARNING **: 13:49:31.657: failed to commit changes to dconf: Failed to execute child process "
No such file or directory)
```

### Running the module (without errors)



```
Activities Terminal Mar 2 15:18 root@deebo: /usr/local/src/seconds_module

root@deebo:/usr/local/src/seconds_module# make
make -C /lib/modules/5.19.0-35-generic/build M=/usr/local/src/seconds_module modules
make[1]: Entering directory '/usr/src/linux-headers-5.19.0-35-generic'
warning: the compiler differs from the one used to build the kernel
The kernel was built by: x86_64-linux-gnu-gcc-12 (Ubuntu 12.2.0-3ubuntu1) 12.2.0
You are using: gcc-12 (Ubuntu 12.2.0-3ubuntu1) 12.2.0
make[1]: Leaving directory '/usr/src/linux-headers-5.19.0-35-generic'
root@deebo:/usr/local/src/seconds_module# sudo insmod proc_seconds.ko
root@deebo:/usr/local/src/seconds_module#
```

Test our module and now we see seconds in /proc folder successfully.

```
Activities Terminal Mar 2 15:18 root@deebo: /usr/local/src/seconds_module

root@deebo:/usr/local/src/seconds_module# make
make -C /lib/modules/5.19.0-35-generic/build M=/usr/local/src/seconds_module modules
make[1]: Entering directory '/usr/src/linux-headers-5.19.0-35-generic'
warning: the compiler differs from the one used to build the kernel
The kernel was built by: x86_64-linux-gnu-gcc-12 (Ubuntu 12.2.0-3ubuntu1) 12.2.0
You are using: gcc-12 (Ubuntu 12.2.0-3ubuntu1) 12.2.0
make[1]: Leaving directory '/usr/src/linux-headers-5.19.0-35-generic'
root@deebo:/usr/local/src/seconds_module# sudo insmod proc_seconds.ko
root@deebo:/usr/local/src/seconds_module# ls /proc
1 13 1475 1759 1986 2024 2114 2161 2243 2445 28 3086 33 46 5356 60 688 75 83 9144 acpi dna kcore modules softirqs vmallocinfo
10 1329 1679 1765 1912 2054 2117 2162 2252 2457 29 31 34 47 5394 61 694 76 8323 919 asound keys key-users ntrr mounts stat vnstat
10140 14 1682 1846 1936 2055 2146 2163 226 2472 299 3109 35 48 54 6130 697 77 844 9198 bootconfig dynamic_debug execdomains fb kpagecount partitions sysrq-trigger
10176 141 1694 1847 1937 2060 2147 2164 227 25 3 3129 37 49 55 62 698 773 847 920 buddyinfo cgroups filesystems kpageflags pressure thread-self
10192 1414 1698 1858 1939 2064 2149 2165 23 2504 300 3138 38 5 5548 6384 699 774 8598 921 bdi consoles loadavg mdstat crypto ioports tty uptime
10199 1470 17 1859 1946 2071 2150 2181 2315 2524 301 3139 384 50 56 648 718 78 8630 94 cgroups cndline fs interrupts loadavg mdstat crypto ioports tty uptime
11 15 1705 1863 196 2079 2152 2183 2315 26 302 3140 39 51 57 649 719 79 88 9491 cndline fs interrupts loadavg mdstat crypto ioports tty uptime
1142 16 1713 1864 1966 2063 2153 22 2322 2617 303 32 4 5116 58 650 720 7928 892 95 consoles interrupts loadavg mdstat crypto ioports tty uptime
1144 1608 1716 1868 198 2088 2154 220 2338 266 304 3201 40 5163 5846 68 721 795 894 9502 cpuinfo iomem locks mdtat meminfo misc seconds self version
1167 1665 1722 1869 199 2097 2155 2215 2357 2692 305 3220 41 528 5975 683 724 8 8942 9530 crypto ioports mdtat meminfo misc seconds self version
12 1686 1746 189 2 21 2159 2241 2363 2694 306 3235 43 53 5977 686 73 82 9115 9549 devices tty uptime
122 1672 1727 19 28 2184 2166 2242 2433 27 307 329 45 5321 6 687 74 8269 9116 9533 diskstats kallsyms misc slabinfo version_signature

root@deebo:/usr/local/src/seconds_module#
```

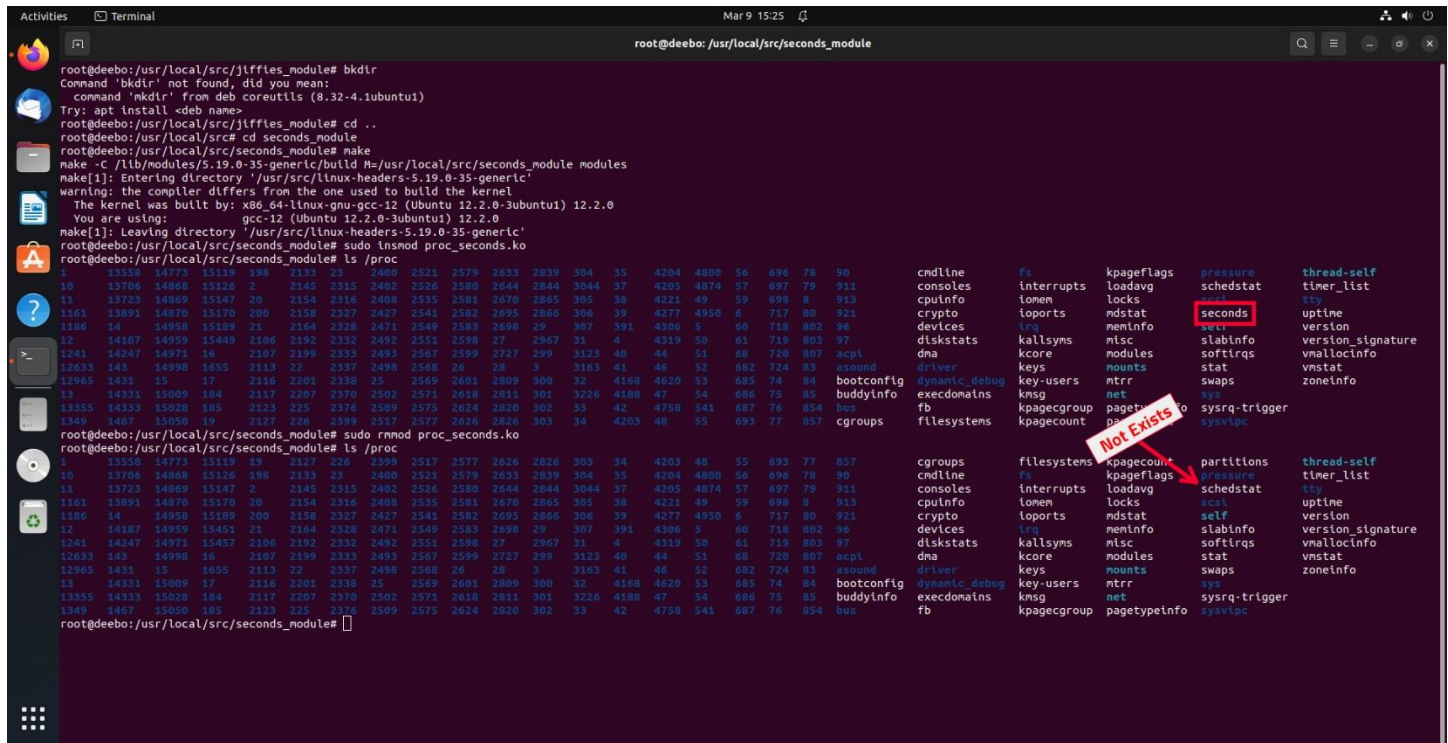
Test seconds file single times and multiple times by while loop

```
Activities Terminal Mar 2 15:21 root@deebo: /usr/local/src/seconds_module

root@deebo:/usr/local/src/seconds_module# make
make -C /lib/modules/5.19.0-35-generic/build M=/usr/local/src/seconds_module modules
make[1]: Entering directory '/usr/src/linux-headers-5.19.0-35-generic'
warning: the compiler differs from the one used to build the kernel
The kernel was built by: x86_64-linux-gnu-gcc-12 (Ubuntu 12.2.0-3ubuntu1) 12.2.0
You are using: gcc-12 (Ubuntu 12.2.0-3ubuntu1) 12.2.0
make[1]: Leaving directory '/usr/src/linux-headers-5.19.0-35-generic'
root@deebo:/usr/local/src/seconds_module# sudo insmod proc_seconds.ko
root@deebo:/usr/local/src/seconds_module# ls /proc
1 13 1475 1759 1986 2024 2114 2161 2243 2445 28 3086 33 46 5356 60 688 75 83 9144 acpi dna kcore modules softirqs vmallocinfo
10 1329 1679 1765 1912 2054 2117 2162 2252 2457 29 31 34 47 5394 61 694 76 8323 919 asound keys key-users ntrr mounts stat vnstat
10140 14 1682 1846 1936 2055 2146 2163 226 2472 299 3109 35 48 54 6130 697 77 844 9198 bootconfig dynamic_debug execdomains fb kpagecount partitions sysrq-trigger
10176 141 1694 1847 1937 2060 2147 2164 227 25 3 3129 37 49 55 62 698 773 847 920 buddyinfo cgroups filesystems kpageflags pressure thread-self
10192 1414 1698 1858 1939 2064 2149 2165 23 2504 300 3138 38 5 5548 6384 699 774 8598 921 bdi consoles loadavg mdstat crypto ioports tty uptime
10199 1470 17 1859 1946 2071 2150 2181 2315 2524 301 3139 384 50 56 648 718 78 8630 94 cgroups cndline fs interrupts loadavg mdstat crypto ioports tty uptime
11 15 1705 1863 196 2079 2152 2183 2315 26 302 3140 39 51 57 649 719 79 88 9491 cndline fs interrupts loadavg mdstat crypto ioports tty uptime
1142 16 1713 1864 1966 2063 2153 22 2322 2617 303 32 4 5116 58 650 720 7928 892 95 consoles interrupts loadavg mdstat crypto ioports tty uptime
1144 1608 1716 1868 198 2088 2154 220 2338 266 304 3201 40 5163 5846 68 721 795 894 9502 cpuinfo iomem locks mdtat meminfo misc seconds self version
1167 1665 1722 1869 199 2097 2155 2215 2357 2692 305 3220 41 528 5975 683 724 8 8942 9530 crypto ioports mdtat meminfo misc seconds self version
12 1686 1746 189 2 21 2159 2241 2363 2694 306 3235 43 53 5977 686 73 82 9115 9549 devices tty uptime
122 1672 1727 19 28 2184 2166 2242 2433 27 307 329 45 5321 6 687 74 8269 9116 9533 diskstats kallsyms misc slabinfo version_signature

root@deebo:/usr/local/src/seconds_module# cat /proc/seconds
no of seconds =88 seconds
root@deebo:/usr/local/src/seconds_module# cat /proc/seconds
no of seconds =90 seconds
root@deebo:/usr/local/src/seconds_module# cat /proc/seconds
no of seconds =99 seconds
root@deebo:/usr/local/src/seconds_module# cat /proc/seconds
no of seconds =101 seconds
root@deebo:/usr/local/src/seconds_module# cat /proc/seconds
no of seconds =103 seconds
root@deebo:/usr/local/src/seconds_module# while true
> do
> cat /proc/seconds
> sleep 1
> done
no of seconds =108 seconds
no of seconds =109 seconds
no of seconds =110 seconds
no of seconds =111 seconds
no of seconds =112 seconds
no of seconds =113 seconds
no of seconds =114 seconds
no of seconds =115 seconds
no of seconds =116 seconds
no of seconds =117 seconds
no of seconds =118 seconds
no of seconds =119 seconds
no of seconds =120 seconds
```

## Making sure to remove the /proc/seconds when removing the module



```
root@deeb0:/usr/local/src/jlffiles_module# mkdir bkdir
Command 'mkdir' not found, did you mean:
Try: apt install <deb name>
root@deeb0:/usr/local/src/jlffiles_module# cd ..
root@deeb0:/usr/local/src# cd seconds_module
root@deeb0:/usr/local/src/seconds_module# make
make -C /lib/modules/5.19.0-35-generic/build H=/usr/local/src/seconds_module modules
make[1]: Entering directory '/usr/src/linux-headers-5.19.0-35-generic'
warning: the compiler differs from the one used to build the kernel
The kernel was built by: x86_64-linux-gnu-gcc-12 (Ubuntu 12.2.0-3ubuntu1) 12.2.0
You are using: gcc-12 (Ubuntu 12.2.0-3ubuntu1) 12.2.0
make[1]: Leaving directory '/usr/src/linux-headers-5.19.0-35-generic'
root@deeb0:/usr/local/src/seconds_module# sudo lsmod proc_seconds.ko
root@deeb0:/usr/local/src/seconds_module# ls /proc
1 13556 14773 15119 198 2145 23 2400 2521 2579 2633 2839 304 35 4204 4800 56 696 78 90 cmdline consoles fs kpageflags pressure thread-self
10 13706 14866 15126 2 2145 2315 2402 2526 2580 2644 2844 3044 37 4205 4874 57 697 79 913 interrupts loadavg locks schedstat timer_list
11 13723 14869 15147 20 2154 2316 2408 2535 2581 2670 2865 305 38 4221 49 59 698 8 913 lomen locks self tty
1161 13891 14870 15170 200 2158 2327 2427 2541 2582 2695 2866 306 39 4277 4950 6 717 80 921 loports mdstat meminfo uptime
1186 14 14958 15189 21 2164 2328 2471 2549 2583 2698 29 307 391 4306 5 60 718 802 96 vty mscinfo self version
12 14187 14959 15449 2186 2192 2332 2492 2551 2596 27 2967 31 4 4319 50 61 719 803 97 kallsyms modules softirqs version_signature
1241 14247 14971 16 2107 2199 2333 2493 2567 2599 2727 299 3123 40 44 51 68 720 807 acpi dma keys mounts stat vmstat
12633 143 14998 1655 2113 22 2337 2498 2568 26 28 3 3163 41 46 52 682 724 83 asound driver key-users mtr swaps zoneinfo
12965 1431 15 17 2116 2201 2338 25 2569 2601 2809 300 32 4168 4620 53 685 74 84 bootconfig dynamic_debug buddyinfo fb sys sysrq-trigger
13 14331 15009 184 2117 2207 2370 2502 2571 2618 2811 301 3226 4188 47 54 686 75 85 bus kmsg net sysrq-trigger
13355 14333 15028 185 2123 225 2376 2589 2575 2624 2820 302 33 42 4758 541 687 76 854 cgroups kpagecgroup pagetypeinfo sysvipc
1346 1467 15040 19 2187 235 2389 2517 2577 2626 2826 303 34 4203 48 55 693 77 857 cgroups filesystems kpagecount partitions thread-self
1 13556 14773 15119 19 2127 226 2399 2517 2577 2626 2826 303 34 4203 48 55 693 77 857 cgroups filesystems kpagecount partitions thread-self
10 13706 14866 15126 198 2133 23 2400 2521 2579 2633 2839 304 35 4204 4800 56 696 78 90 cmdline consoles fs kpageflags pressure thread-self
11 13723 14869 15147 2 2145 2315 2402 2526 2580 2644 2844 3044 37 4205 4874 57 697 79 913 interrupts loadavg locks schedstat timer_list
1161 13891 14870 15170 200 2154 2316 2408 2535 2581 2670 2865 305 38 4221 49 59 698 8 913 lomen locks self tty
1186 14 14958 15189 21 2164 2328 2471 2549 2583 2698 29 307 391 4306 5 60 718 802 96 vty mscinfo self version
12 14187 14959 15451 21 2164 2328 2471 2549 2583 2698 29 307 391 4306 5 60 718 802 96 vty mscinfo self version
1241 14247 14971 15457 2106 2192 2332 2492 2551 2596 27 2967 31 4 4319 50 61 719 803 97 kallsyms modules softirqs version_signature
12633 143 14998 16 2107 2199 2333 2493 2567 2599 2727 299 3123 40 44 51 68 720 807 acpi dma keys mounts stat vmstat
12965 1431 15 1655 2113 22 2337 2498 2568 26 28 3 3163 41 46 52 682 724 83 asound driver key-users mtr swaps zoneinfo
13 14331 15009 17 2116 2201 2338 25 2569 2601 2809 300 32 4168 4620 53 685 74 84 bootconfig dynamic_debug buddyinfo fb sys sysrq-trigger
13355 14333 15028 184 2117 2207 2370 2502 2571 2618 2811 301 3226 4188 47 54 686 75 85 bus kmsg net sysrq-trigger
1346 1467 15040 19 2187 235 2389 2517 2577 2626 2826 302 33 42 4758 541 687 76 854 bus kpagecgroup pagetypeinfo sysvipc
root@deeb0:/usr/local/src/seconds_module#
```

## What I learned from the project:

1. Some shortcuts and commands in terminal.
2. Creating Linux module.
3. Creating Makefile and linking other files together.
4. Searching and dealing with errors.
5. Improving my skills.