

Operating Systems: Assignment 3

Name: Puru Pathak

NET ID: ppp280

Approach:

- In this assignment, I have used **FUSE** (Filesystem in Userspace) which provides a simple and secure library API.
- An example file from the FUSE library, hello.c has been modified and 3 functions have been added along with minor modifications to the inbuilt FUSE functions.
- In this project, I am going to read the information about the process from the /proc directory.
- /proc is a virtual file system, also known as process information pseudo file system. It contains the runtime system information.
- The status and the details for a process are listed in the /proc/*processid*/status path.
- The information from this directory has to be read by mounting to our own directory: myproc.
- FUSE 2.9.3 has been used on Ubuntu 14.0.3

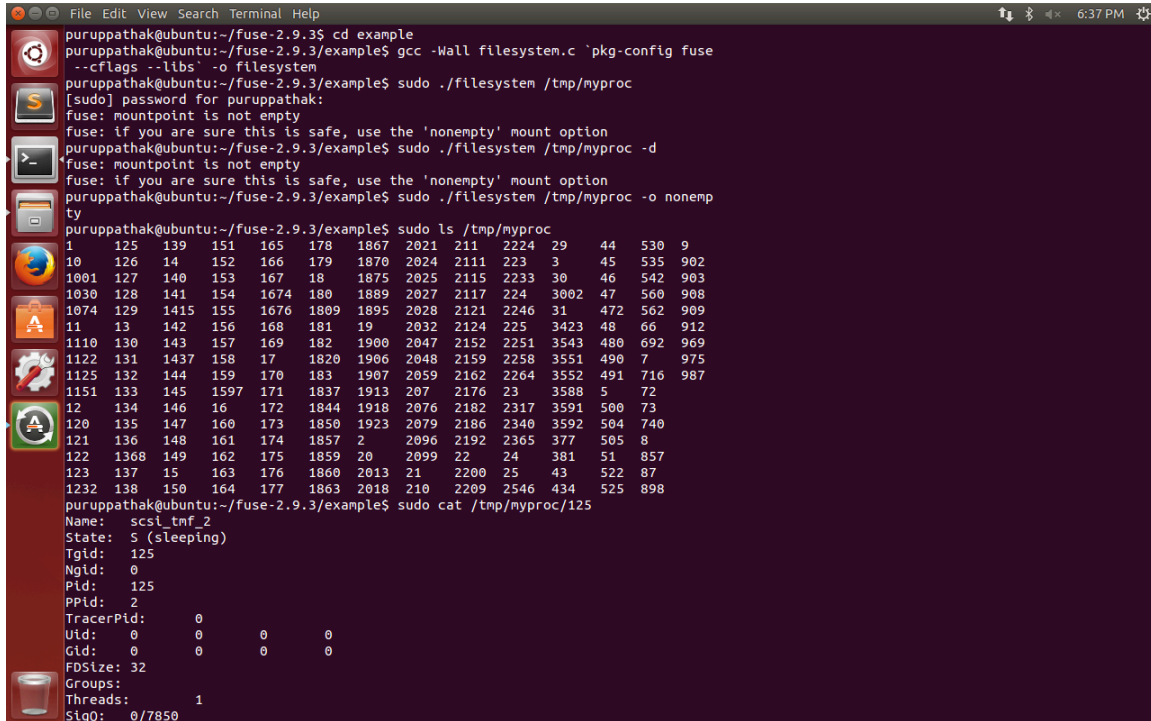
Implementation:

Modifications have been made to the following functions:

1. **Filesystem_getattr**: Checking if the path is one of the process id. If so, fetch the size.
2. **Filesystem_readdir**: Listing down the processes and putting the info in buffer.
3. **Filesystem_open**: Checking for a valid process id.

Screenshots:

- Compilation, execution and listing the directories (nonempty mount has been used):



```
File Edit View Search Terminal Help
puruppathak@ubuntu:~/fuse-2.9.3$ cd example
puruppathak@ubuntu:~/fuse-2.9.3/example$ gcc -Wall filesystem.c `pkg-config fuse`
--cflags --libs` -o filesystem
puruppathak@ubuntu:~/fuse-2.9.3/example$ sudo ./filesystem /tmp/myproc
[sudo] password for puruppathak:
fuse: mountpoint is not empty
fuse: if you are sure this is safe, use the 'nonempty' mount option
puruppathak@ubuntu:~/fuse-2.9.3/example$ sudo ./filesystem /tmp/myproc -d
fuse: mountpoint is not empty
fuse: if you are sure this is safe, use the 'nonempty' mount option
puruppathak@ubuntu:~/fuse-2.9.3/example$ sudo ./filesystem /tmp/myproc -o nonempty
puruppathak@ubuntu:~/fuse-2.9.3/example$ sudo ls /tmp/myproc
1      125    139    151    165    178    1867   2021   211    2224   29     44     530    9
10     126    14     152    166    179    1870   2024   2111   223    3      45     535    902
1001   127    140    153    167    18     1875   2025   2115   2233   30     46     542    903
1030   128    141    154    1674   180    1889   2027   2117   224    3002   47     560    908
1074   129    1415   155    1676   1809   1895   2028   2121   2246   31     472    562    909
11     13     142    156    168    181    19     2032   2124   225    3423   48     66     912
1110   130    143    157    169    182    1900   2047   2152   2251   3543   480    692    969
1122   131    1437   158    17     1820   1906   2048   2159   2258   3551   490    7     975
1125   132    144    159    170    183    1907   2059   2162   2264   3552   491    716    987
1151   133    145    1597   171    1837   1913   207    2176   23     3588   5      72
12     134    146    16     172    1844   1918   2076   2182   2317   3591   500    73
120    135    147    160    173    1850   1923   2079   2186   2340   3592   504    740
121    136    148    161    174    1857   2     2096   2192   2365   377    505    8
122    1368   149    162    175    1859   20     2099   22     24     381    51     857
123    137    15     163    176    1860   2013   21     2200   25     43     522    87
1232   138    150    164    177    1863   2018   210    2209   2546   434    525    898
puruppathak@ubuntu:~/fuse-2.9.3/example$ sudo cat /tmp/myproc/125
Name:  scsl_tmf_2
State:  S (sleeping)
Tgid:  125
Ngid:  0
Pid:   125
PPid:  2
TracerPid: 0
Uid:   0      0      0
Gid:   0      0      0
FDSize: 32
Groups:
Threads: 1
SigQ:  0/7850
```

- Fetching the status information for a certain process:

The screenshot shows a terminal window with a dark background. At the top, there's a menu bar with 'File', 'Edit', 'View', 'Search', 'Terminal', and 'Help'. Below the menu bar, there's a list of process IDs (PIDs) and their corresponding PPIDs (Parent Process IDs) in a grid-like format. The PIDs range from 1074 to 1232, and the PPIDs range from 129 to 164. The terminal output shows the command `sudo cat /tmp/myproc/125` being executed, which displays detailed status information for the process with PID 125. The process is named `scsi_tmf_2` and is in a `S (sleeping)` state. Other details include `Tgid: 125`, `Ngid: 0`, `Ppid: 125`, `PPid: 2`, `TracerPid: 0`, `Uid: 0`, `Gid: 0`, `FDSize: 32`, `Groups:`, `Threads: 1`, `Sig0: 0/7850`, `SigPnd: 0000000000000000`, `ShdPnd: 0000000000000000`, `SigBlk: 0000000000000000`, `SigIgn: ffffffff`, `SigCgt: 0000000000000000`, `CapInh: 0000000000000000`, `CapPrm: 0000003fffffffff`, `CapEff: 0000003fffffffff`, `CapBnd: 0000003fffffffff`, `Seccomp: 0`, `Cpus_allowed: ff`, `Cpus_allowed_list: 0-7`, `Mems_allowed: 1`, `Mems_allowed_list: 0`, `voluntary_ctxt_switches: 2`, and `nonvoluntary_ctxt_switches: 0`.

```

1074 129 1415 155 1676 1809 1895 2028 2121 2246 31 472 562 909
11 13 142 156 168 181 19 2032 2124 225 3423 48 66 912
1110 130 143 157 169 182 1900 2047 2152 2251 3543 480 692 969
1122 131 1437 158 17 1820 1906 2048 2159 2258 3551 490 7 975
1125 132 144 159 170 183 1907 2059 2162 2264 3552 491 716 987
1151 133 145 1597 171 1837 1913 207 2176 23 3588 5 72
12 134 146 16 172 1844 1918 2076 2182 2317 3591 500 73
120 135 147 160 173 1850 1923 2079 2186 2340 3592 504 740
121 136 148 161 174 1857 2 2096 2192 2365 377 505 8
122 1368 149 162 175 1859 20 2099 22 24 381 51 857
123 137 15 163 176 1860 2013 21 2200 25 43 522 87
1232 138 150 164 177 1863 2018 210 2209 2546 434 525 898

puruppathak@ubuntu:~/fuse-2.9.3/example$ sudo cat /tmp/myproc/125
Name: scsi_tmf_2
State: S (sleeping)
Tgid: 125
Ngid: 0
Ppid: 125
PPid: 2
TracerPid: 0
Uid: 0 0 0 0
Gid: 0 0 0 0
FDSize: 32
Groups:
Threads: 1
Sig0: 0/7850
SigPnd: 0000000000000000
ShdPnd: 0000000000000000
SigBlk: 0000000000000000
SigIgn: ffffffff
SigCgt: 0000000000000000
CapInh: 0000000000000000
CapPrm: 0000003fffffffff
CapEff: 0000003fffffffff
CapBnd: 0000003fffffffff
Seccomp: 0
Cpus_allowed: ff
Cpus_allowed_list: 0-7
Mems_allowed: 1
Mems_allowed_list: 0
voluntary_ctxt_switches: 2
nonvoluntary_ctxt_switches: 0
puruppathak@ubuntu:~/fuse-2.9.3/example$

```

References:

- www.fuse.sourceforge.net
- www.stackoverflow.com
- www.github.com