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E   Linux /proc filesystem

Th   nation for sysadmins in the /proc filesystem and it's time to
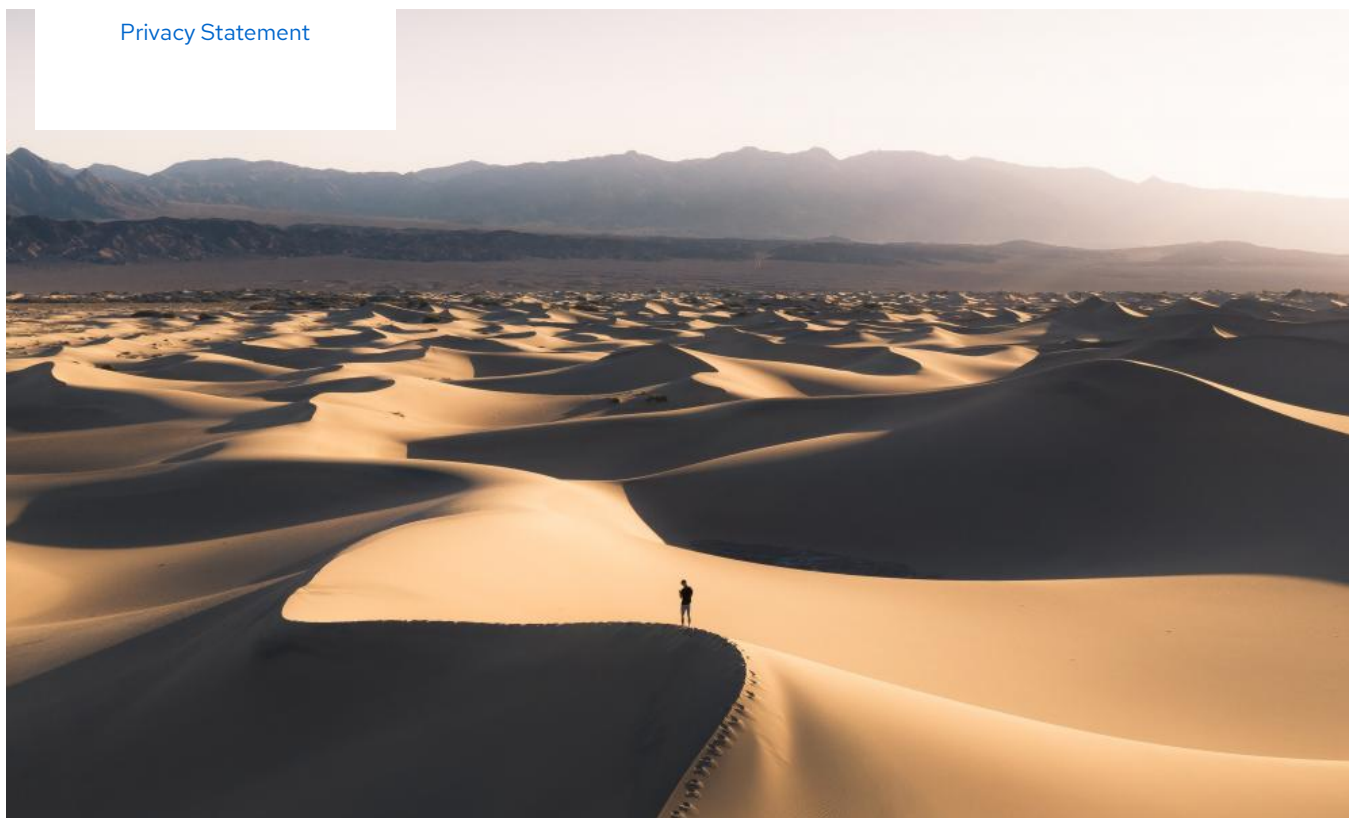ex

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The /proc filesystem appears to always exist because it's built at boot time and is removed at shutdown, but it is actually a virtual filesystem that contains a lot of relevant information about your system and its running processes. In this article, I'll take a deep dive into its contents and what value you, as a sysadmin, can glean from it.

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d directories under /proc as a standard user and not as root unless otherwise

If you look at the files under /proc, you'll see a lot of them (150+), depending on how many processes you have running.

```
$ ls /proc
1     174   26    2902   4109    531         fb
10    175   2601  2904   41275   546         filesystems
1004  176   2602  2907   41292   547         fs
<snip>
166   2589  2889  4000   47452   dma         vmstat
167   2594  2898  4005   475     driver      zoneinfo
168   2595  29    40986  522     execdomains
```

The numbered files are directories that correspond to process numbers or process IDs (PIDs). For example, in the first column, there are processes with the numbers 1, 10, 1055, 1057, 1059, and so on. Inside those process-numbered directories, there are more files that have to do with the processes themselves. Below is a listing of the /proc/411 directory.

```
$ ls /proc/411
ls: cannot read symbolic link /proc/411/cwd: Permission denied
ls: cannot read symbolic link /proc/411/root: Permission denied
ls: cannot read symbolic link /proc/411/exe: Permission denied
arch_status      fdinfo       numa_maps       smaps_rollup
attr             gid_map      oom_adj         stack
autogroup        io           oom_score       stat
auxv             latency      oom_score_adj   statm
cgroup           limits       pagemap         status
clear_refs       loginuid     patch_state     syscall
cmdline          map_files    personality     task
comm             maps         projid_map      timers
coredump_filter  mem          root            timerslack_ns
cpuset           mountinfo    sched           uid_map
cwd              mounts       schedstat       wchan
environ          mountstats   sessionid
exe              net          setgroups
fd               ns           smaps
```

There are a few files in each directory that regular users can't read. To list or open those files, you have to be root.

[If you'd like to see a practical use of /proc's info, check out: [How to clear swap memory in Linux](https://www.redhat.com/sysadmin)]

You'll notice that a long listing (ls -l /proc) reveals that the regular text files have a size of 0. Ordinarily, a zero-sized file means that it contains no content. However, these /proc files, like the /proc filesystem itself (procfs), are virtual. They *do* contain information or else why would they be there?

For example, display the cpuinfo file to the screen and you'll see what I mean.

```
$ cat /proc/cpuinfo
processor       : 0
vendor_id       : GenuineIntel
c
m        Subscribe now        x
m                             ore(TM) i5-7360U CPU @ 2.30GHz
s     Get the highlights in your
c          inbox every week.
c
physical id     : 0
siblings        : 1
core id         : 0
cpu cores       : 1
apicid          : 0
initial apicid  : 0
fpu             : yes
fpu_exception   : yes
cpuid level     : 22
wp              : yes
flags           : fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush
mmx fxsr sse sse2 ht syscall nx rdtscp lm constant_tsc rep_good nopl xtopology nonstop_tsc eagerfpu
pni pclmulqdq monitor ssse3 cx16 pcid sse4_1 sse4_2 x2apic movbe popcnt aes xsave avx rdrand
hypervisor lahf_lm abm 3dnowprefetch fsgsbase avx2 invpcid rdseed clflushopt md_clear flush_l1d
bogomips        : 4607.99
clflush size    : 64
cache_alignment : 64
address sizes   : 39 bits physical, 48 bits virtual
power management:
```

This file contains information about your CPU(s). Many of the regular text type files contain hardware and system information and you may `cat` them as you would any other text file. Remember to ignore that zero file size.

In the next installment of this `/proc` filesystem series, I'll explain the information given in the files. You can explore for yourself, too. Most of the files have names that describe the information that they contain. Some files are more valuable than others to the human mind. Not every file has `cpuinfo` or `meminfo`-level information in it that's valuable to a sysadmin, but the information is possibly important to developers, hardware manufacturers, or vendor troubleshooting personnel.

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Ken Hess

Ken has used Red Hat Linux since 1996 and has written ebooks, whitepapers, actual books, thousands of exam review questions, and hundreds of articles on open source and other topics. Ken also has 20+ years of experience as an enterprise sysadmin with Unix, Linux, Windows, and Virtualization. More about me

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