

CPSC 457 - Assignment 2

Question 4

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eric.austin1@zone29-wb:~/CPSC457/CPSC457
File Edit View Search Terminal Help
eric.austin1@zone29-wb:~/CPSC457/CPSC457$ strace -c ./scan.sh cpp 5
./Assignment2/scan.cpp 2395
./Assignment2/myFind.cpp 1392
./Assignment1/myWc.cpp 1214
./Assignment1/countLines.cpp 1199
./LearnC++/hello.cpp 104
Total size: 6304
% time    seconds  usecs/call   calls   errors syscall
-----
 87.01    0.013577    2715        5        1 wait4
  3.06    0.000477        7       68       47 openat
  2.27    0.000354       88        4        1 clone
  1.38    0.000216        9       23        1 mmap
  1.20    0.000187        5       33        6 close
  0.89    0.000139        8       17        7 stat
  0.77    0.000120       15        8        1 mprotect
  0.74    0.000116        5       20        1 fstat
  0.60    0.000093        4       19        1 rt_sigprocmask
  0.44    0.000069        7        9        1 read
  0.39    0.000061        3       16        1 rt_sigaction
  0.19    0.000030       10        3        1 pipe
  0.17    0.000027       27        1        1 munmap
  0.14    0.000022        5        4        1 brk
  0.13    0.000021        5        4        1 lseek
  0.10    0.000016        5        3        1 fcntl
  0.08    0.000013        4        3        2 ioctl
  0.06    0.000009        4        2        1 prlimit64
  0.05    0.000008        8        1        1 dup2
  0.05    0.000008        4        2        1 getpid
  0.04    0.000006        6        1        1 sysinfo
  0.04    0.000006        6        1        1 arch_prctl
  0.03    0.000004        4        1        1 uname
  0.03    0.000004        4        1        1 getuid
  0.03    0.000004        4        1        1 getgid
  0.03    0.000004        4        1        1 geteuid
  0.03    0.000004        4        1        1 getppid
  0.03    0.000004        4        1        1 getpgrp
  0.02    0.000003        3        1        1 getegid
  0.01    0.000002        2        1        1 rt_sigreturn
  0.00    0.000000        0        1        1 access
  0.00    0.000000        0        1        1 execve
-----
100.00    0.015604        257       65 total
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eric.austin1@zone29-wb:~/CPSC457/CPSC457\$ time ./scan.sh cpp 5

./Assignment2/scan.cpp 2395

./Assignment2/myFind.cpp 1392

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./Assignment1/countLines.cpp 1199

./LearnC++/hello.cpp 104

Total size: 6304

real 0m0.076s

user 0m0.007s

sys 0m0.024s

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./Assignment2/scan.cpp 2395
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Total size: 6304
% time      seconds  usecs/call   calls   errors syscall
-----
75.08      0.006645      6645        1         wait4
10.68      0.000945        17       53         read
 5.59      0.000495        10       48      43 openat
 1.93      0.000171        12       14        mmap
 1.48      0.000131        10       13         7 stat
 1.24      0.000110       110         1        clone
 1.12      0.000099         9       10      mprotect
 0.62      0.000055         7         7        fstat
 0.56      0.000050         8         6        write
 0.56      0.000050         7         7        close
 0.27      0.000024         8         3         brk
 0.19      0.000017        17         1      munmap
 0.19      0.000017        17         1       1 access
 0.18      0.000016        16         1      execve
 0.12      0.000011        11         1      pipe2
 0.09      0.000008         8         1   arch_prctl
 0.08      0.000007         7         1      fcntl
-----
100.00      0.008851        169       51 total
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```

```
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File Edit View Search Terminal Help
eric.austin1@zone29-wb:~/CPSC457/CPSC457$ time ./scan cpp 5
./Assignment2/scan.cpp 2395
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Total size: 6304

real    0m0.048s
user    0m0.010s
sys     0m0.012s
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```

We can see from the above screenshots that the C++ version of scan runs more quickly than the bash script version.

In both instances, I searched for the 5 largest .cpp files in my CPSC457 directory, consisting of 3 subdirectories.

The bash script scan.sh took 0.076s total against only 0.048 for scan.cpp. The difference is not huge (not even twice as long) but we can see the difference comes from the amount of time spent in system (kernel) mode.

Looking at the system call trace, we can see both spent the vast majority of time on wait4 system call (87% for scan.sh and 75% for scan.cpp). However, scan.sh made 5 of these calls whereas scan.cpp only made 1. Even though my c++ code has a bunch of ugly iterations over various data structures I constructed, the more efficient use of system calls (and less time waiting and context switching) made for better performance.