Strace with bash scan.sh

```
steven.canonalmagro@zone33-ef:~/CPSC457/week1$ strace -c bash scan.sh cpp 11
./scan.cpp 2524
./tutorial2/Student.cpp 1051
./tutorial2/sort.cpp 1042
./myFind.cpp 873
./tutorial2/fileIO.cpp 459
./tutorial2/test_student.cpp 367
./tutorial1/basic_io.cpp 343
./tutorial2/readWords.cpp 322
./tutorial1/str.cpp 259
./tutorial1/hello.cpp 237
./tutorial1/string.cpp 200
Total size: 7677
% time     seconds  usecs/call     calls    errors syscall
------ ----------- ----------- --------- --------- ----------------
 76.15    0.012248        2449         5         1 wait4
  5.48    0.000882          12        68        47 openat
  3.08    0.000495         123         4           clone
  2.08    0.000335          11        28        11 stat
  1.95    0.000313          13        23           mmap
  1.84    0.000296           8        33         6 close
  1.59    0.000256          12        20           fstat
  1.29    0.000207          10        19           rt_sigprocmask
  0.93    0.000150           9        16           rt_sigaction
  0.88    0.000142          17         8           mprotect
  0.85    0.000136          15         9           read
  0.74    0.000119          23         5         1 access
  0.30    0.000048          12         4           brk
  0.29    0.000046          15         3           pipe
  0.27    0.000043           8         5           geteuid
  0.26    0.000042           8         5           getuid
  0.25    0.000041           8         5           getgid
  0.25    0.000041           8         5           getegid
  0.22    0.000036           9         4           lseek
  0.20    0.000032          32         1           munmap
  0.17    0.000028           9         3         2 ioctl
  0.16    0.000026           8         3         1 fcntl
  0.12    0.000019          19         1           execve
  0.11    0.000018           9         2           prlimit64
  0.10    0.000016           8         2           getpid
  0.08    0.000013          13         1           dup2
  0.08    0.000013          13         1           sysinfo
  0.06    0.000010          10         1           rt_sigreturn
  0.06    0.000010          10         1           uname
  0.05    0.000008           8         1           getppid
  0.05    0.000008           8         1           getpgrp
  0.05    0.000008           8         1           arch_prctl
------ ----------- ----------- --------- --------- ----------------
100.00    0.016085                   288        69 total
```

time with bash scan.sh

```
steven.canonalmagro@zone33-ef:~/CPSC457/week1$ time bash scan.sh cpp 100
./scan.cpp 2524
./tutorial2/Student.cpp 1051
./tutorial2/sort.cpp 1042
./myFind.cpp 873
./tutorial2/fileIO.cpp 459
./tutorial2/test_student.cpp 367
./tutorial1/basic_io.cpp 343
./tutorial2/readWords.cpp 322
./tutorial1/str.cpp 259
./tutorial1/hello.cpp 237
./tutorial1/string.cpp 200
Total size: 7677

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

Strace with scan.cpp

```
steven.canonalmagro@zone33-ef:~/CPSC457/week1$ strace -c ./s cpp 100
Found 11 files:
./scan.cpp 2524
./tutorial2/Student.cpp 1051
./tutorial2/sort.cpp 1042
./myFind.cpp 873
./tutorial2/fileIO.cpp 459
./tutorial2/test_student.cpp 367
./tutorial1/basic_io.cpp 343
./tutorial2/readWords.cpp 322
./tutorial1/str.cpp 259
./tutorial1/hello.cpp 237
./tutorial1/string.cpp 200
Total size: 7677 bytes.
% time     seconds  usecs/call     calls    errors syscall
------ ----------- ----------- --------- --------- ----------------
 76.57    0.005713        5713         1           wait4
  7.30    0.000545          11        48        43 openat
  3.31    0.000247          13        19         7 stat
  2.72    0.000203          14        14           mmap
  2.00    0.000149          24         6           read
  1.81    0.000135          10        13           write
  1.66    0.000124          12        10           mprotect
  1.64    0.000122         122         1           clone
  0.98    0.000073          10         7           close
  0.88    0.000066           9         7           fstat
  0.31    0.000023          23         1         1 access
  0.25    0.000019          19         1           pipe2
  0.16    0.000012           4         3           brk
  0.16    0.000012          12         1           execve
  0.12    0.000009           9         1           fcntl
  0.12    0.000009           9         1           arch_prctl
  0.00    0.000000           0         1           munmap
------ ----------- ----------- --------- --------- ----------------
100.00    0.007461                   135        51 total
```

time with scan.cpp

```
steven.canonalmagro@zone33-ef:~/CPSC457/week1$ time ./s cpp 100
Found 11 files:
./scan.cpp 2524
./tutorial2/Student.cpp 1051
./tutorial2/sort.cpp 1042
./myFind.cpp 873
./tutorial2/fileIO.cpp 459
./tutorial2/test_student.cpp 367
./tutorial1/basic_io.cpp 343
./tutorial2/readWords.cpp 322
./tutorial1/str.cpp 259
./tutorial1/hello.cpp 237
./tutorial1/string.cpp 200
Total size: 7677 bytes.

real    0m0.017s
user    0m0.004s
sys     0m0.009s
```

4.   The scan.cpp file is faster than the bash scan.sh script file. The cpp scan file makes much fewer system calls as shown in the strace picture at 135 compared to the bash script file at 288. The bash script file spends a lot more time in kernel mode this is why its slower but the cpp uses both the user and kernel mode equally, making it the fastest.