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1. Strace a small program
   (a) Part A.
      i. The first system call to have an error is "access("/etc/ld.so.nohwcap", F OK)". The Error for this is no file that this is referencing is a hardware optimization library. It could be a reason that the program failed.
      ii. Next was "access("/etc/ld.so.preload", R OK)". This also failed because of a non-existant file.
      iii. After that call, the system tried to access the ld.so.nohwcap library again it failed this call because there was no file by that name.
      iv. Fourth, the program called "brk(0x97c6000)" and got a return value of the argument. Under the man page for this system call, it tells us that the return value will be the new system break on succes, and the current system break on failue. Since the argument is the current break, and the reutn is the same, this system called failed. This implies that the programs memory did not increase or decrease.
      v. Finally, the system call which proved catastrophic for the program was "open("MyOSclass", O RDONLY)" , the return for this was "-1 ENOENT" . The return value would have given the program a NULL return in the C code. Which would mean that the failure message would have been triggered. Which would mean that the program failed.
   (b) Part B.
      i. The two files ran nearly the same both times, the system call of "open("MyOSclass", O RDONLY)" gave a return value of 3. This means that system call succeeded and the file was opened, we know this because the return value was non-negative. Which, in the C code, gave a value of not NULL. This indicated that the program should print out the success message.
   (c) The function "fopen" is not a system call. It mainly corilates to the system call of "open".
   (d) The function "printf" is not a system call. It mainly corilates to the system call of "write".
2. Strace a Linux utility command. I chose awk.
   (a) mmap2 : maps files or devices into memory. Returns a void type and its arguments are mmap2(void *addr, size t length, int prot, int flags, int fd, off t pgoffset) .
   (b) fstat64 : it returns information about a file, no permissions are needed of the file. Returns an int type and its arguments are fstat(int fd, struct stat *buf).
   (c) brk : it changes the location of the program break, which defines the end of the process data segment. It returns an int type and its arguments are brk(void *addr).

(d) rt sigaction : it is used to change the acition taken by a process on the recipt of a signal. It returns an int and its arguments are sigaction(int signum, const struct sigaction *act, struct sigaction *oldact).

3. Strace on "ls".

   (a) mmap2 : Minimum 21 μs Maximum : 47 μs Mean : 26.869 μs

   (b) close : Minimum 11 μs Maximum : 24 μs Mean : 18.91 μs

   (c) fstat64 : Minimum 28 μs Maximum : 35 μs Mean : 30.2 μs

   (d) mprotect : Minimum 19 μs Maximum : 27 μs Mean : 23.33 μs

   (e) access : Minimum 19 μs Maximum : 68 μs Mean : 27.62 μs

   (f) read : Minimum 19 μs Maximum : 68 μs Mean : 27.625 μs

4. Strace on "htop"

Table 1: Strace Calls

System Call	Number of calls	Time spent in call
read	43987	4.425 ms
open	42813	1.610 ms
close	42866	1.090 ms
getdents	102	1.077 ms
stat64	14305	0.395 ms