Lab 1 Questions

Tobias Smith (40165892) - Team Room Temperature IQ Havers

1. **What Are The System Calls To Open, Read And Close A File?**
    a. open() is used to open a file, read() reads from a file, and close() closes a file. create() may be used if a file does not exist and it needs to be written to.
2. **Why Are The System Calls So Different If The Programs Do The Same Thing?**
    a. Java has to interface with the OS via the Java Virtual Machine (JVM). Based on this, one would expect more system calls and overall complexity from the Java program due to the JVM and the program making system calls. This is shown to be true in the count of system calls attached to the end of this document. As well as this, Java and C are different languages which work differently. The fact that the programs do the same thing is irrelevant with respect to the system calls made. As an example, suppose two programs were made to solve the equation “2x2 = ?”. One program might run “2x2 = 2+2 = 4”, using repeated addition, while the other might use “2x2 = 2 << 1 = 4”, using bit shifting. The programs are different and execute differently, but do the same thing.
3. **What Are Some Calls Made By The Java Program That Are Not Made By The C Program?**
    a. One call that the Java program makes that the C program does not make is “futex”. Futex is a shared-memory synchronization call used to cause a process to wait until a certain condition is true. Another Java-only call is “rt-sigaction”, which changes a current process’s action on a signal. These extra calls are because the JVM is an environment for processes (Java programs) to run in. The JVM requires extra setup and process management system calls to work.

C System Calls:

% time	seconds	usecs/call	calls	errors	syscall
62.51	0.001017	127	8		4 open
13.64	0.000222	55	4		3 stat
6.21	0.000101	10	10		mmap
4.24	0.000069	17	4		mprotect
4.18	0.000068	68	1		1 access
2.70	0.000044	11	4		brk
1.60	0.000026	8	3		munmap
1.23	0.000020	5	4		close
1.17	0.000019	3	5		fstat
1.11	0.000018	18	1		arch_prctl
0.80	0.000013	13	1		execve
0.61	0.000010	3	3		read
0.00	0.000000	0	2		write
100.00	0.001627		50		8 total

Java System Calls:

% time	seconds	usecs/call	calls	errors	syscall
81.57	0.012308	6154	2		futex
7.59	0.001145	49	23		14 open
2.64	0.000398	17	23		mmap
2.58	0.000390	39	10		7 stat
1.31	0.000198	66	3		2 access
1.13	0.000170	11	15		mprotect
0.79	0.000119	13	9		fstat
0.67	0.000101	12	8		read
0.64	0.000097	48	2		readlink
0.57	0.000086	9	9		close
0.15	0.000023	7	3		munmap
0.15	0.000022	22	1		execve
0.10	0.000015	3	4		brk
0.06	0.000009	9	1		arch_prctl
0.05	0.000007	7	1		clone
0.00	0.000000	0	2		rt_sigaction
0.00	0.000000	0	1		rt_sigprocmask
0.00	0.000000	0	1		getrlimit
0.00	0.000000	0	1		set_tid_address
0.00	0.000000	0	1		set_robust_list
100.00	0.015088		120		23 total