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OS – HW 8
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Problem 1: Global counters with OpenMP's parallel for over many trials
The two programs are identical, except that part A has #pragma omp critical covering each critical section, whereas part B has nothing. Each run does 10,000 iterations (5,000 increment, 5,000 decrement) so that the discrepancy could be more apparent in part B.

Part A: Using OpenMP's critical pragma directive
The critical sections were undisturbed every time

```
cassidy@nyota:~/eecs338/hw8$ ./p1a
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
```

Part B: Without the pragma directive, for reference
It's far less consistent, with a maximum discrepancy of nearly half

```
cassidy@nyota:~/eecs338/hw8$ ./p1b
0 -219 0 -15 1966 -320 304 -842 -522 155
33 -165 -182 317 -12 48 -157 55 -975 -246
100 33 54 -503 -369 -192 -650 -497 -40 303
766 224 109 -260 1220 -697 -367 245 -459 88
-102 237 -357 -43 157 -481 -709 -444 220 -222
-730 496 4686 -443 -523 -4870 -11 180 862 989
-1046 -341 -243 0 0 0 0 -156 -125 -93
0 0 0 -518 -631 -260 -80 833 534 -458
-111 -1152 255 -626 -733 -134 -371 -622 -340 -39
0 -1261 -146 -305 263 -118 -147 -341 -80 -3
```

As a note, I initially was incrementing/decrementing based on i rather than the thread number (so within each thread, it would increment every other iteration and decrement every other). The error was much smaller (no more than 0.5%)
```
0 -3 0 -9 3 -4 1 -1 -1 0 0 -8 -2 2 2 -5 3 0 -1 -13
0 0 2 -16 -1 -10 -9 -4 -4 -2 5 0 0 4 -5 16 0 -19 -40 -32
3 -37 -27 3 -2 -4 -5 -4 -3 1 3 -21 -4 0 -6 -8 8 -2 3 -20
-50 8 -4 -4 0 0 -16 -2 -23 -28 -22 4 -15 -5 -6 3 -3 -1 -26 -15
-25 -38 3 -1 -2 1 -6 -3 -5 -2 -15 0 4 -13 4 -3 -12 6 2 -4
```

Problem 2: Readers/Writers solution
The two reader threads print out the writer's message correctly.
 I couldn't print values of type pthread_t, so I cast the thread ids to ints, which all came out negative and very large, but they still get the point across.

```
cassidy@nyota:~/eecs338/hw8$ ./p2
-1227019456: I solemnly swear
-1218626752: I solemnly swear
-1227019456: to tell the truth
-1218626752: to tell the truth
-1227019456: the whole truth
-1218626752: the whole truth
-1218626752: and nothing but the truth
-1227019456: and nothing but the truth
-1227019456: so help me god
-1218626752: so help me god
```