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1. Problem Set

1. Under what circumstances does a multithreaded solution using multiple kernel threads provide better performance than a single-threaded solution on a single-processor system?

  If a program is frequently suffer from page fault or has to wait for other system events, multithreaded solutions can perform better than single-threaded solutions.

2. Which of the following components of program state are shared across threads in a multithreaded process?

a. Register values

b. Heap memory

c. Global variables

d. Stack memory

  The answer is (b) and (c). For (a) and (d), each thread has its separate set of register values and separate stack memory.

3. Performance Analysis

Sorting by python/C	Time
quicksort.py	4m30.854s
qsortTh.py	3m53.629s
quicksort.c	0m8.013s
qsortTh.c	0m10.544s

  From the table above we can see that the threaded version is faster than the unthreaded version in python, but is slower in C.

  For python, the possible reason is that this is not a CPU-bound computation.

  For C, the possible reason is the overhead of creating thread, acquiring and releasing mutexes and performing the context switches between the threads might make the application slower.