PHYS:5905 Homework 11

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1. Problem 2

   (a) The order is as follows:

   Hello World! I am thread 19 of 32 threads.
   Hello World! I am thread 21 of 32 threads.
   Hello World! I am thread 20 of 32 threads.
   Hello World! I am thread 24 of 32 threads.
   Hello World! I am thread 12 of 32 threads.
   Hello World! I am thread 27 of 32 threads.
   Hello World! I am thread 29 of 32 threads.
   Hello World! I am thread 14 of 32 threads.
   Hello World! I am thread 30 of 32 threads.
   Hello World! I am thread 7 of 32 threads.
   Hello World! I am thread 4 of 32 threads.
   Hello World! I am thread 0 of 32 threads.
   Hello World! I am thread 15 of 32 threads.
   Hello World! I am thread 17 of 32 threads.
   Hello World! I am thread 9 of 32 threads.
   Hello World! I am thread 28 of 32 threads.
   Hello World! I am thread 3 of 32 threads.
   Hello World! I am thread 22 of 32 threads.
   Hello World! I am thread 8 of 32 threads.
   Hello World! I am thread 23 of 32 threads.
   Hello World! I am thread 6 of 32 threads.
   Hello World! I am thread 5 of 32 threads.
   Hello World! I am thread 2 of 32 threads.
   Hello World! I am thread 13 of 32 threads.
   Hello World! I am thread 1 of 32 threads.
   Hello World! I am thread 16 of 32 threads.

Hello World! I am thread 31 of 32 threads.
Hello World! I am thread 11 of 32 threads.
Hello World! I am thread 18 of 32 threads.
Hello World! I am thread 26 of 32 threads.
Hello World! I am thread 10 of 32 threads.
Hello World! I am thread 25 of 32 threads.

real 0m0.011s

user 0m0.137s

sys 0m0.008s

The output is not reproducible and not predictable since the order of thread are random.

(b) I set up a share variable `executed` to store the number of threads that have executed the output code. When `executed == thread_id`, then the thread print the output. The output is:

Hello World! I am thread 0 of 32 threads.
Hello World! I am thread 1 of 32 threads.
Hello World! I am thread 2 of 32 threads.
Hello World! I am thread 3 of 32 threads.
Hello World! I am thread 4 of 32 threads.
Hello World! I am thread 5 of 32 threads.
Hello World! I am thread 6 of 32 threads.
Hello World! I am thread 7 of 32 threads.
Hello World! I am thread 8 of 32 threads.
Hello World! I am thread 9 of 32 threads.
Hello World! I am thread 10 of 32 threads.
Hello World! I am thread 11 of 32 threads.
Hello World! I am thread 12 of 32 threads.
Hello World! I am thread 13 of 32 threads.
Hello World! I am thread 14 of 32 threads.
Hello World! I am thread 15 of 32 threads.
Hello World! I am thread 16 of 32 threads.
Hello World! I am thread 17 of 32 threads.
Hello World! I am thread 18 of 32 threads.
Hello World! I am thread 19 of 32 threads.
Hello World! I am thread 20 of 32 threads.
Hello World! I am thread 21 of 32 threads.
Hello World! I am thread 22 of 32 threads.
Hello World! I am thread 23 of 32 threads.
Hello World! I am thread 24 of 32 threads.
Hello World! I am thread 25 of 32 threads.

Hello World! I am thread 26 of 32 threads.
Hello World! I am thread 27 of 32 threads.
Hello World! I am thread 28 of 32 threads.
Hello World! I am thread 29 of 32 threads.
Hello World! I am thread 30 of 32 threads.
Hello World! I am thread 31 of 32 threads.
real 0m0.028s
user 0m0.475s
sys 0m0.004s

2. Computing π

   The plot of run time vs. number of threads is shown in the following figure:

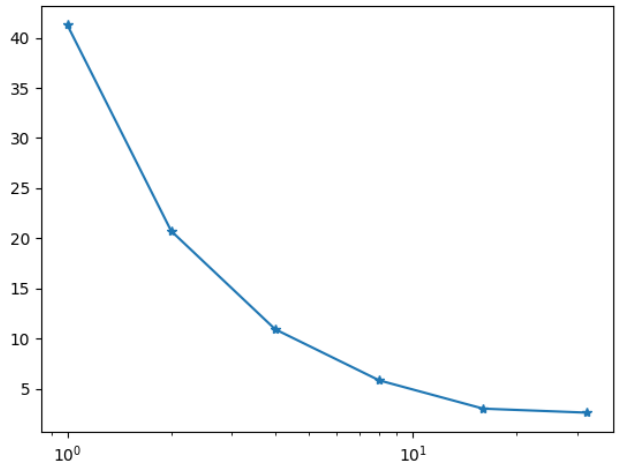

Figure 1: Run time vs. number of threads

The speedup is 15.85.