Lab3 Openmp report

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Lab2 outcome: (affect rate=0.01, epsilon=0.01)

Serial:
****
Dissipation converged in 691841 iterations.
With max DSV = 0.085123 and min DSV = 0.082570.
Affect rate = 0.020000; Epsilon: 0.030000.
Elapsed convergence loop time (clock): 461180000.
Elapsed convergence loop time (time): 462.
Elapsed convergence loop time (chrono): 461168.00.

disposable_1(threads #)
****
Dissipation converged in 691853 iterations.
With max DSV = 0.085123 and min DSV = 0.082570.
Affect rate = 0.020000; Epsilon: 0.030000.
Elapsed convergence loop time (clock): 1200020000.
Elapsed convergence loop time (time): 1213.
Elapsed convergence loop time (chrono): 1213531.62.

disposable_2
****
Dissipation converged in 691853 iterations.
With max DSV = 0.085123 and min DSV = 0.082570.
Affect rate = 0.020000; Epsilon: 0.030000.
Elapsed convergence loop time (clock): 1034570000.
Elapsed convergence loop time (time): 721.
Elapsed convergence loop time (chrono): 720877.19.

disposable_3
****
Dissipation converged in 691853 iterations.
With max DSV = 0.085123 and min DSV = 0.082570.
Affect rate = 0.020000; Epsilon: 0.030000.
Elapsed convergence loop time (clock): 1080910000.
Elapsed convergence loop time (time): 515.
Elapsed convergence loop time (chrono): 515243.78.

disposable_4
****
Dissipation converged in 691853 iterations.
With max DSV = 0.085123 and min DSV = 0.082570.
Affect rate = 0.020000; Epsilon: 0.030000.
Elapsed convergence loop time (clock): 970880000.
Elapsed convergence loop time (time): 386.
Elapsed convergence loop time (chrono): 386353.12.

disposable_8:
****
Dissipation converged in 691853 iterations.
With max DSV = 0.085123 and min DSV = 0.082570.
Affect rate = 0.020000; Epsilon: 0.030000.
Elapsed convergence loop time (clock): 1295940000.
Elapsed convergence loop time (time): 329.
Elapsed convergence loop time (chrono): 328439.47.

disposable_16:
****
Dissipation converged in 691853 iterations.
With max DSV = 0.085123 and min DSV = 0.082570.
Affect rate = 0.020000; Epsilon: 0.030000.
Elapsed convergence loop time (clock): 1679640000.
Elapsed convergence loop time (time): 318.
Elapsed convergence loop time (chrono): 317735.44.

disposable_28:
****
Dissipation converged in 691853 iterations.
With max DSV = 0.085123 and min DSV = 0.082570.
Affect rate = 0.020000; Epsilon: 0.030000.
Elapsed convergence loop time (clock): 1825990000.
Elapsed convergence loop time (time): 459.
Elapsed convergence loop time (chrono): 458682.50.

persistent_1:
****
Dissipation converged in 691853 iterations.
With max DSV = 0.085123 and min DSV = 0.082570.
Affect rate = 0.020000; Epsilon: 0.030000.
Elapsed convergence loop time (clock): 543850000.
Elapsed convergence loop time (time): 544.
Elapsed convergence loop time (chrono): 543916.75.

persistent_2:
****
Dissipation converged in 691853 iterations.
With max DSV = 0.085123 and min DSV = 0.082570.
Affect rate = 0.020000; Epsilon: 0.030000.
Elapsed convergence loop time (clock): 676230000.
Elapsed convergence loop time (time): 425.
Elapsed convergence loop time (chrono): 425467.19.

persistent_3:
****
Dissipation converged in 691853 iterations.
With max DSV = 0.085123 and min DSV = 0.082570.
Affect rate = 0.020000; Epsilon: 0.030000.
Elapsed convergence loop time (clock): 652530000.
Elapsed convergence loop time (time): 308.
Elapsed convergence loop time (chrono): 307589.66.

persistent_4:
****
Dissipation converged in 691853 iterations.
With max DSV = 0.085123 and min DSV = 0.082570.
Affect rate = 0.020000; Epsilon: 0.030000.
Elapsed convergence loop time (clock): 708250000.
Elapsed convergence loop time (time): 278.
Elapsed convergence loop time (chrono): 277316.09.

persistent_8:
****
Dissipation converged in 691853 iterations.
With max DSV = 0.085123 and min DSV = 0.082570.
Affect rate = 0.020000; Epsilon: 0.030000.
Elapsed convergence loop time (clock): 698690000.
Elapsed convergence loop time (time): 181.
Elapsed convergence loop time (chrono): 181111.52.

persistent_16:
****
Dissipation converged in 691853 iterations.
With max DSV = 0.085123 and min DSV = 0.082570.
Affect rate = 0.020000; Epsilon: 0.030000.
Elapsed convergence loop time (clock): 869960000.
Elapsed convergence loop time (time): 180.
Elapsed convergence loop time (chrono): 180056.14.

persistent_28:
****
Dissipation converged in 691853 iterations.
With max DSV = 0.085123 and min DSV = 0.082570.
Affect rate = 0.020000; Epsilon: 0.030000.
Elapsed convergence loop time (clock): 1121480000.
Elapsed convergence loop time (time): 233.
Elapsed convergence loop time (chrono): 232986.55.

Lab3 outcome

Omp_ disposable_1(threads #)
****
Threads requested: 1; Threads created: 1.
Dissipation converged in 691853 iterations.
With max DSV = 0.085123 and min DSV = 0.082570.
Affect rate = 0.020000; Epsilon: 0.030000.
Elapsed convergence loop time (clock) : 560040000.
Elapsed convergence loop time (time) : 560.
Elapsed convergence loop time (chrono) : 560042.125000.

Omp_ disposable_2
****
Threads requested: 2; Threads created: 2.
Dissipation converged in 691853 iterations.
With max DSV = 0.085123 and min DSV = 0.082570.
Affect rate = 0.020000; Epsilon: 0.030000.
Elapsed convergence loop time (clock) : 787410000.
Elapsed convergence loop time (time) : 394.
Elapsed convergence loop time (chrono) : 393721.781250.

Omp_ disposable_3
****
Threads requested: 3; Threads created: 3.
Dissipation converged in 691853 iterations.
With max DSV = 0.085123 and min DSV = 0.082570.
Affect rate = 0.020000; Epsilon: 0.030000.
Elapsed convergence loop time (clock) : 841020000.
Elapsed convergence loop time (time) : 280.
Elapsed convergence loop time (chrono) : 280367.031250.

Omp_ disposable_4
****
Threads requested: 4; Threads created: 4.
Dissipation converged in 691853 iterations.
With max DSV = 0.085123 and min DSV = 0.082570.
Affect rate = 0.020000; Epsilon: 0.030000.
Elapsed convergence loop time (clock) : 907930000.
Elapsed convergence loop time (time) : 227.
Elapsed convergence loop time (chrono) : 227005.578125.

Omp_ disposable_8
****
Threads requested: 8; Threads created: 8.
Dissipation converged in 691853 iterations.
With max DSV = 0.085123 and min DSV = 0.082570.
Affect rate = 0.020000; Epsilon: 0.030000.
Elapsed convergence loop time (clock) : 1150880000.
Elapsed convergence loop time (time) : 144.
Elapsed convergence loop time (chrono) : 143868.859375.

Omp_ disposable_16
****
Threads requested: 16; Threads created: 16.
Dissipation converged in 691853 iterations.
With max DSV = 0.085123 and min DSV = 0.082570.
Affect rate = 0.020000; Epsilon: 0.030000.
Elapsed convergence loop time (clock) : 1624130000.
Elapsed convergence loop time (time) : 101.
Elapsed convergence loop time (chrono) : 101520.031250.

Omp_ disposable_28
****
Threads requested: 28; Threads created: 28.
Dissipation converged in 691853 iterations.
With max DSV = 0.085123 and min DSV = 0.082570.
Affect rate = 0.020000; Epsilon: 0.030000.
Elapsed convergence loop time (clock) : -1688017296.
Elapsed convergence loop time (time) : 93.
Elapsed convergence loop time (chrono) : 93331.640625.

Omp_ persistent_1
****
Threads requested: 1; Threads created: 1.
Dissipation converged in 691853 iterations.
With max DSV = 0.085123 and min DSV = 0.082570.
Affect rate = 0.020000; Epsilon: 0.030000.
Elapsed convergence loop time (clock) : 514620000.
Elapsed convergence loop time (time) : 515.
Elapsed convergence loop time (chrono) : 514728.343750.

Omp_ persistent_2
****
Threads requested: 2; Threads created: 2.
Dissipation converged in 691853 iterations.
With max DSV = 0.085123 and min DSV = 0.082570.
Affect rate = 0.020000; Epsilon: 0.030000.
Elapsed convergence loop time (clock) : 732870000.
Elapsed convergence loop time (time) : 366.
Elapsed convergence loop time (chrono) : 366501.812500.

Omp_ persistent_3
****
Threads requested: 3; Threads created: 3.
Dissipation converged in 691853 iterations.
With max DSV = 0.085123 and min DSV = 0.082570.
Affect rate = 0.020000; Epsilon: 0.030000.
Elapsed convergence loop time (clock) : 790660000.
Elapsed convergence loop time (time) : 263.
Elapsed convergence loop time (chrono) : 263603.687500.

Omp_ persistent_4
****
Threads requested: 4; Threads created: 4.
Dissipation converged in 691853 iterations.
With max DSV = 0.085123 and min DSV = 0.082570.
Affect rate = 0.020000; Epsilon: 0.030000.
Elapsed convergence loop time (clock) : 843130000.
Elapsed convergence loop time (time) : 211.
Elapsed convergence loop time (chrono) : 210820.125000.

Omp_ persistent_8
****
Threads requested: 8; Threads created: 8.
Dissipation converged in 691853 iterations.
With max DSV = 0.085123 and min DSV = 0.082570.
Affect rate = 0.020000; Epsilon: 0.030000.
Elapsed convergence loop time (clock) : 1051760000.
Elapsed convergence loop time (time) : 131.
Elapsed convergence loop time (chrono) : 131494.265625.

Omp_ persistent_16
****
Threads requested: 16; Threads created: 16.
Dissipation converged in 691853 iterations.
With max DSV = 0.085123 and min DSV = 0.082570.
Affect rate = 0.020000; Epsilon: 0.030000.
Elapsed convergence loop time (clock) : 1583850000.
Elapsed convergence loop time (time) : 99.
Elapsed convergence loop time (chrono) : 99006.578125.

Omp_ persistent_28
****
Threads requested: 28; Threads created: 28.
Dissipation converged in 691853 iterations.
With max DSV = 0.085123 and min DSV = 0.082570.
Affect rate = 0.020000; Epsilon: 0.030000.
Elapsed convergence loop time (clock) : -1874867296.
Elapsed convergence loop time (time) : 87.
Elapsed convergence loop time (chrono) : 86583.867188.

The most appropriate threads number is 16 and the convergence time in 28 with Openmp is about 87s.

In my outcome, the actual threads are same with the requested Openmp threads.

How would you characterize the computational workload of our sample program?
* If I use serial program, the workload can reach to 8 or 9mins. So the workload for the sample program is not that big.

Which threading mechanism, pthreads or OpenMP, provided the best results in your case?
∗ OpenMP.

Would you say that pthread is more flexible, less flexible or the same as OpenMP?
∗ less flexible.

How well did your OpenMP programs meet the design criterion of preserving your original serial program? What constructs did you use that would cause your program not to compile with OpenMP disabled?
∗ It seems that I just call the api for openmp in the position where the ptherads are called in the previous lab2. So when OpenMP is disabled, the program can't initialize the threads.