

Lab 1 Serial. AMR Convergence

Basic Information:

Parameters: To run the lab program please follow the following format.

.a.out <affect rate><epsilon><data_file_name>

The following outputs were produced when running the program with the provided test files on the Oakley super computer cluster.

testgrid_1

Dissipation converged in 52 iterations.
Max DSV : 131.441040
Min DSV : 118.525566
Affect rate : 0.100000
Epsilon : 0.100000
Elapsed time (clock) in seconds : 0.000000
Elapsed time (time) in seconds : 0.000155
Elapsed time (chrono) in seconds : 0.000148
real 0m0.003s
user 0m0.001s
sys 0m0.001s

testgrid_2

Dissipation converged in 245 iterations
Max DSV : 61.624638
Min DSV : 55.475231
Affect rate : 0.100000
Epsilon : 0.100000
Elapsed time (clock) in seconds : 0.010000
Elapsed time (time) in seconds : 0.010700
Elapsed time (chrono) in seconds : 0.010691
real 0m0.022s
user 0m0.013s
sys 0m0.002s

testgrid_50_78

Dissipation converged in 1508 iterations.

Max DSV : 25.804934

Min DSV : 23.227625

Affect rate : 0.100000

Epsilon : 0.100000

Elapsed time (clock) in seconds : 0.130000

Elapsed time (time) in seconds : 0.131706

Elapsed time (chrono) in seconds : 0.1317

real 0m0.135s

user 0m0.134s

sys 0m0.001s

testgrid_200_1116

Dissipation converged in 14461 iterations.

Max DSV : 0.898287

Min DSV : 0.808463

Affect rate : 0.100000

Epsilon : 0.100000

Elapsed time (clock) in seconds : 15.240000

Elapsed time (time) in seconds : 15.245000

Elapsed time (chrono) in seconds : 15.245

real 0m15.250s

user 0m15.244s

sys 0m0.000s

testgrid_400_1636

Dissipation converged in 22285 iterations.

Max DSV : 1.305197

Min DSV : 1.174685

Affect rate : 0.100000

Epsilon : 0.100000

Elapsed time (clock) in seconds : 35.279999

Elapsed time (time) in seconds : 35.289619

Elapsed time (chrono) in seconds : 35.2896

real 0m35.300s

user 0m35.284s

sys 0m0.001s

testgrid_400_12206

Dissipation converged in 75269 iterations.

Max DSV : 0.095762

Min DSV : 0.086186

Affect rate : 0.100000

Epsilon : 0.100000

Elapsed time (clock) in seconds : 1089.869995

Elapsed time (time) in seconds : 1090.266467

Elapsed time (chrono) in seconds : 1090.27

real 18m10.328s

user 18m9.926s

sys 0m0.006s

When first thinking about what timing method was best for determining the runtime of a serial program my first instinct was to go with the library **chrono**. I discovered that the `timeval` struct in C,C++ gave a more precise runtime however `timeval` is using the function **gettimeofday()** which might not be the most accurate measurement if running on a machine where there is timesharing of the CPU. `Clock` uses CPU time which might be preferable in serial cases.

In the case of parallel programs, I think it might make more sense to use system time instead of CPU time. If one CPU processing threads finish earlier than others, it might throw off the timing results. For parallel programs, I think it would be better to use the `timeval` structs to get a more reasonable estimate of the overall runtime of the program.