Project 1, Milestone 2 – Multicore scaling studies

Details of processors:

I am using midways2, the information is showing below:

```
[wxh@midway2-login2 Week2]$ lscpu
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:            Little Endian
CPU(s):                56
On-line CPU(s) list:   0-55
Thread(s) per core:    2
Core(s) per socket:    14
Socket(s):             2
NUMA node(s):          2
Vendor ID:             GenuineIntel
CPU family:            6
Model:                 79
Model name:            Intel(R) Xeon(R) CPU E5-2680 v4 @ 2.40GHz
Stepping:              1
CPU MHz:               1400.000
CPU max MHz:           2401.0000
CPU min MHz:           1200.0000
BogoMIPS:              4799.89
Virtualization:        VT-x
L1d cache:             32K
L1i cache:             32K
L2 cache:              256K
L3 cache:              35840K
NUMA node0 CPU(s):     0-13,28-41
NUMA node1 CPU(s):     14-27,42-55
```

Best Gind Rate

For this problem it seems midway2 often crash. My result is about 2500 timesteps/s.

Get the same anwer:
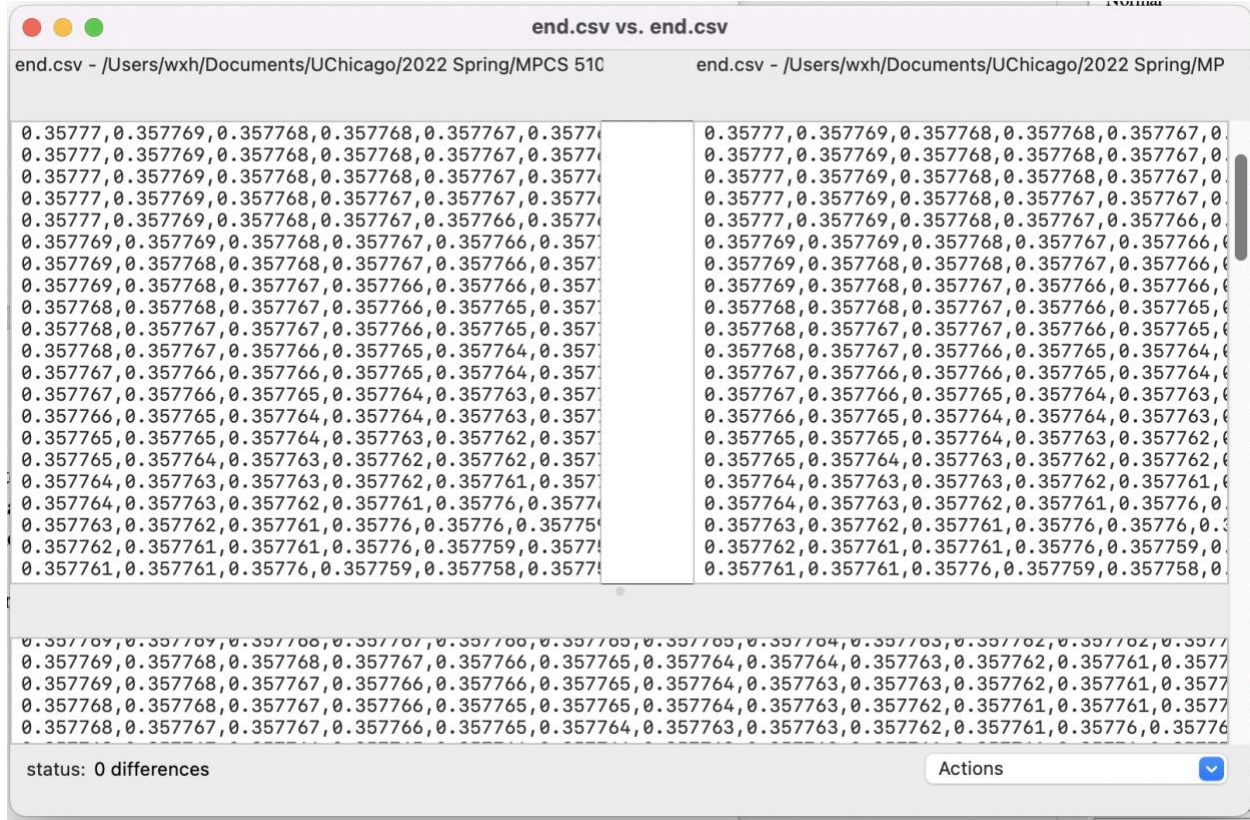
I use the following arguments:
N = 100 (Matrix Dimension)
NT = 10000 (Number of timesteps)
L = 1 (Physical Cartesian Domain Length)

T = 1e+06 (Total Physical Timespan)
u = 5e-07 (X velocity Scalar)
v = 2.85e-07 (Y velocity Scalar)

I used the FileMerge to compare the results of parallel and serial versions, which shows that 0 differences.
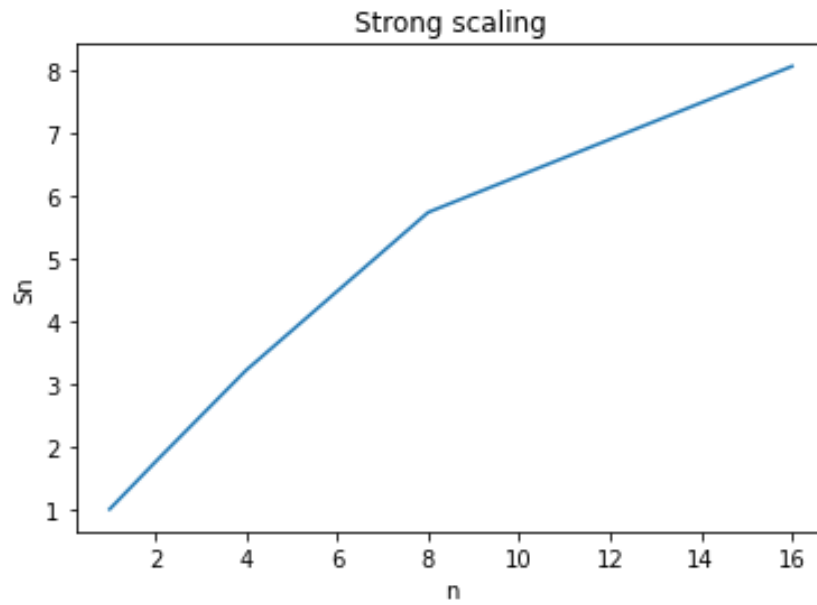

plot of a strong scaling

processor: midway2
compiler: g++

Cores	Time(s)	Sn
1	383	1
2	219	1.75
4	119	3.22
8	67	5.73
16	47.5	8.06

Strong scaling

Second strong scaling

processor: midway2
compiler: g++

Cores	Time(s)	Sn
1	1.812	1
2	0.966	1.86
4	0.502	3.58
8	0.323	4.42
16	0.228	7.89

Strong scaling
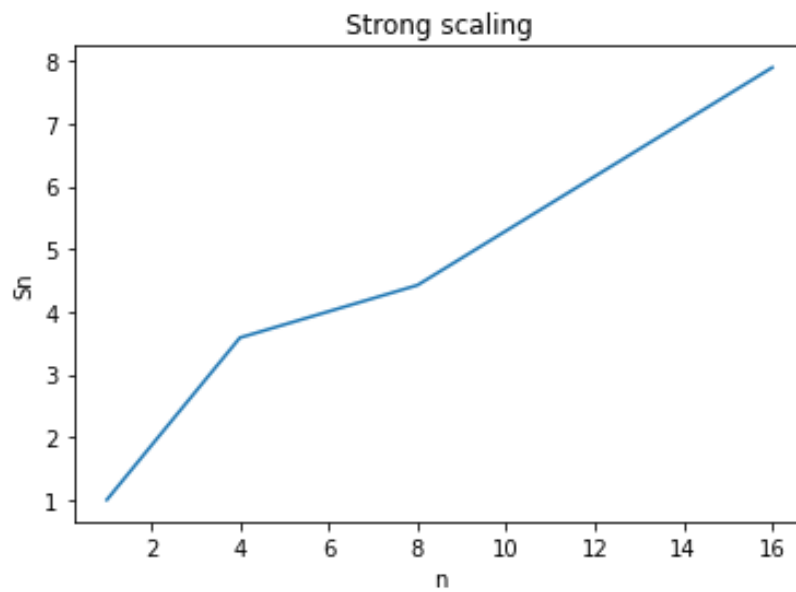
plot of a weak scaling

processor: midway2
compiler: g++

n	Gridpoints	N	Time(s)
1	640,00	800	23
2	1,280,000	1131	27
4	2,560,000	1600	30
8	5,120,000	2262	32
16	10,240,000	3200	46

Weak scaling