

Bench Marking

In this file I include the CPU times calculated from different pieces of code for different purposes. Each section is a different purpose and from within each the parameters are varied. The start and end times are times extracted from the CPU in some way. Only differences matter, like with potential energy.

These are all bench marked on Otter

1 Ensembles of system's of N sites

1. $N = 1$

```
W = 10
U = 6
Mu = 3
t = 1
systems = 1000
Time << 1 second
Started (s): 3.83600E-3
Ended (s): 2.51470E-2
Difference (s): 2.13110E-2
```

```
systems = 10,000
Started (s): 3.7820E-3
Ended (s): 0.17492
Difference (s): 0.17113
```

```
systems = 100,000
Started (s): 3.6350E-3
Ended (s): 1.72347
Difference (s): 1.71983
```

```
systems = 1,000,000
Started (s): 3.49600E-3
Ended (s): 17.0995255
Difference (s): 17.0960293
```

Based on these results the per single-site cluster time appears to be approximately $1.71 \cdot 10^{-6}$ s

2. $N = 2$

```
W = 10
U = 6
```

$\mu = 3$
 $t = 1$
systems = 1000
Started (s): 3.5730E-3
Ended (s): 0.10496
Difference (s): 0.10138

systems = 10,000
Time \tilde 1 second
Started (s): 3.45500E-3
Ended (s): 0.94636
Difference (s): 0.94290

systems = 100,000
Started (s): 3.70700E-03
Ended (s): 9.67840
Difference (s): 9.67470

systems = 1,000,000
Started (s): 3.66800E-3
Ended (s): 95.09273
Difference (s): 95.0890579

Average per two-site cluster: $9.51 \cdot 10^{-6}$ s

3. $N = 3$

$W = 10$
 $U = 6$
 $\mu = 3$
 $t = 1$
systems = 10,000
Started (s): 3.2700E-3
Ended (s): 4.25241
Difference (s): 4.24911

systems = 100,000
Started (s): 3.56400E-3
Ended (s): 42.28640
Difference (s): 42.28284

systems = 1,000,000
Started (s): 3.34100E-3
Ended (s): 413.15033
Difference (s): 413.14700

Average per three-site cluster: $4.13 \cdot 10^{-4}$ s

4. $N = 4$

$W = 10$

$U = 6$

$\mu = 3$

$t = 1$

systems = 10,000

Started (s): 2.80200E-3

Ended (s): 33.46545

Difference (s): 33.46265

systems = 100,000

Started (s): 3.56400E-3

Ended (s):

Difference (s):

systems = 1,000,000

Started (s):

Ended (s):

Difference (s):

Average per four-site cluster: