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Percolation

All results are generated from MacBook Pro (Retina, 15-inch, Late 2013)

$T=30$ and $N=\{10,25,50,100,250,500\}$

Fast

```
1 10 30 fast
2 Mean Threshold = 0.5936666666666669
3 Standard Deviation = 0.0666169354740521
4 Total Time = 0.008
5 Mean time = 2.666666666666667E-4
6 stddev time = 6.396838299494916E-4
7
8 25 30 fast
9 Mean Threshold = 0.5895466666666669
10 Standard Deviation = 0.048724161911960974
11 Total Time = 0.015
12 Mean time = 5.000000000000002E-4
13 stddev time = 9.737945687202023E-4
14
15 50 30 fast
16 Mean Threshold = 0.5949066666666667
17 Standard Deviation = 0.029412816035300614
18 Total Time = 0.031
19 Mean time = 0.0010333333333333338
20 stddev time = 0.0012726115785600324
21
22 100 30 fast
23 Mean Threshold = 0.5907033333333332
24 Standard Deviation = 0.01793137268690776
25 Total Time = 0.069
26 Mean time = 0.0023000000000000013
27 stddev time = 0.00191455405809794
28
29 250 30 fast
30 Mean Threshold = 0.5938751999999998
31 Standard Deviation = 0.00853322673496638
32 Total Time = 0.181
33 Mean time = 0.006033333333333337
34 stddev time = 0.0035669298431209888
35
36 500 30 fast
37 Mean Threshold = 0.5937224
38 Standard Deviation = 0.0055099576417421865
39 Total Time = 0.848
40 Mean time = 0.028266666666666683
41 stddev time = 0.009864367548223087
```

Slow

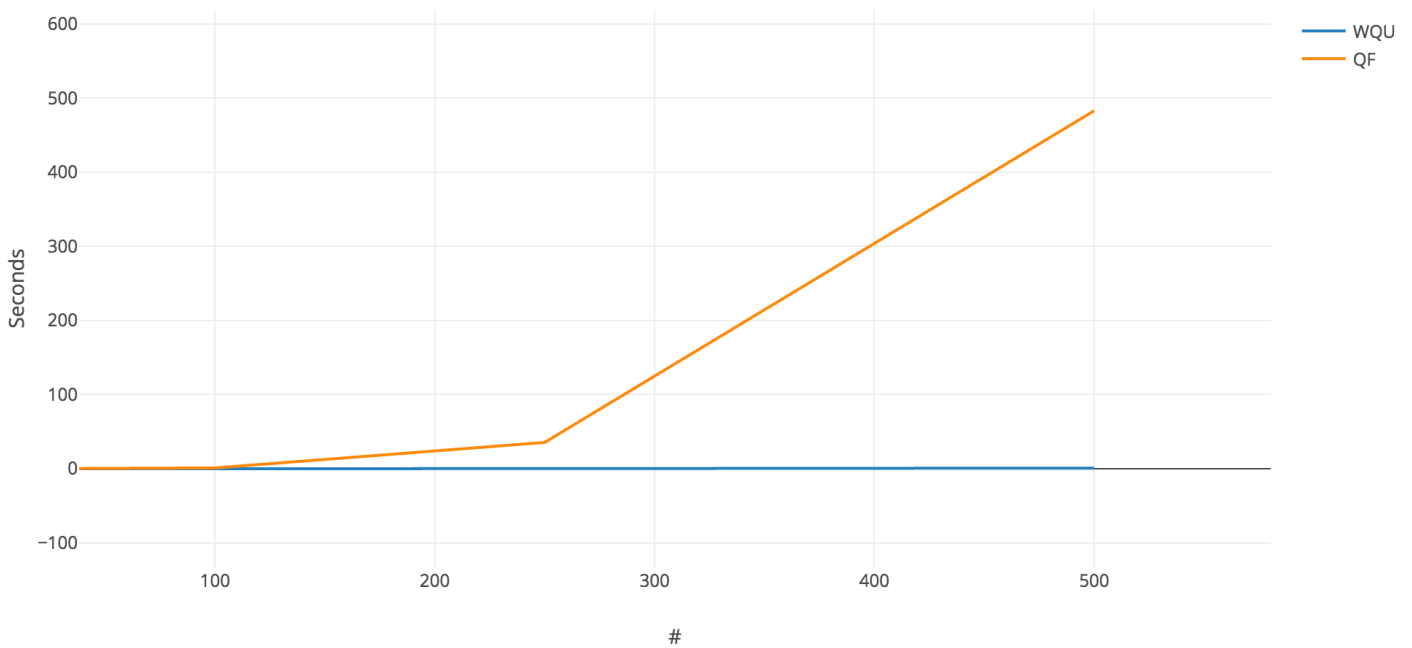
```

1 10 30 slow
2 Mean Threshold = 0.5990000000000001
3 Standard Deviation = 0.07415501006163629
4 Total Time = 0.014
5 Mean time = 4.666666666666668E-4
6 stddev time = 0.001136641554311871
7
8 25 30 slow
9 Mean Threshold = 0.5930666666666666
10 Standard Deviation = 0.03177946998682764
11 Total Time = 0.026
12 Mean time = 8.666666666666668E-4
13 stddev time = 0.0020800088417141874
14
15 50 30 slow
16 Mean Threshold = 0.5868133333333334
17 Standard Deviation = 0.02473283080321034
18 Total Time = 0.122
19 Mean time = 0.004066666666666669
20 stddev time = 0.0025179813114988496
21
22 100 30 slow
23 Mean Threshold = 0.5901700000000001
24 Standard Deviation = 0.01899295967566349
25 Total Time = 1.085
26 Mean time = 0.03616666666666667
27 stddev time = 0.006571009124901611
28
29 250 30 slow
30 Mean Threshold = 0.5936629333333333
31 Standard Deviation = 0.006780147160102323
32 Total Time = 35.466
33 Mean time = 1.1822000000000001
34 stddev time = 0.1157477638124651
35
36 500 30 slow
37 Mean Threshold = 0.5919939999999999
38 Standard Deviation = 0.004476928103217576
39 Total Time = 474.072
40 Mean time = 15.802400000000002
41 stddev time = 1.0383034437866947

```

Running time

vs Seconds for WQU and QF



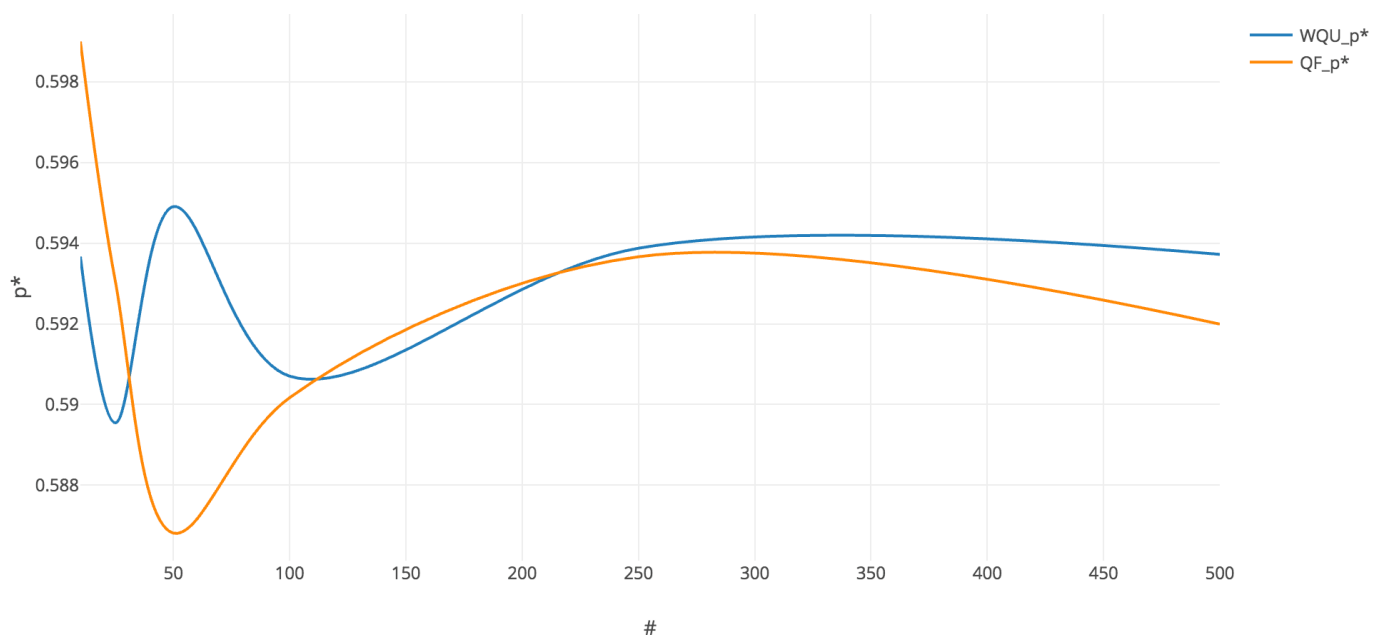
The difference between the Weighted Quick Union and Quick Find in terms of execution time is significant as we increase the size of N

The reason for this is because WQU is in $\log(N)$ time but QF is in N time.

P* estimates



p* for WQU and QF



The p^* is around 60%, nothing much difference between two algorithm. The result for p^* is kinda floating around in the beginning, but stabilized when N increases.