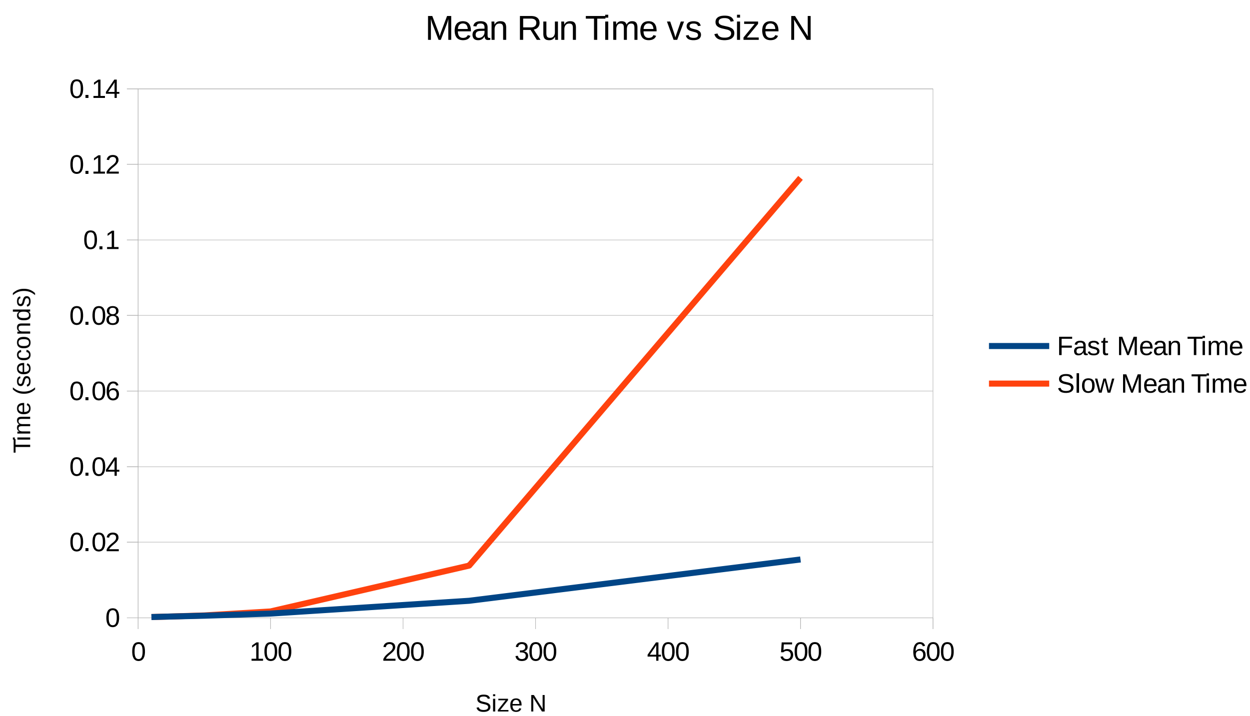
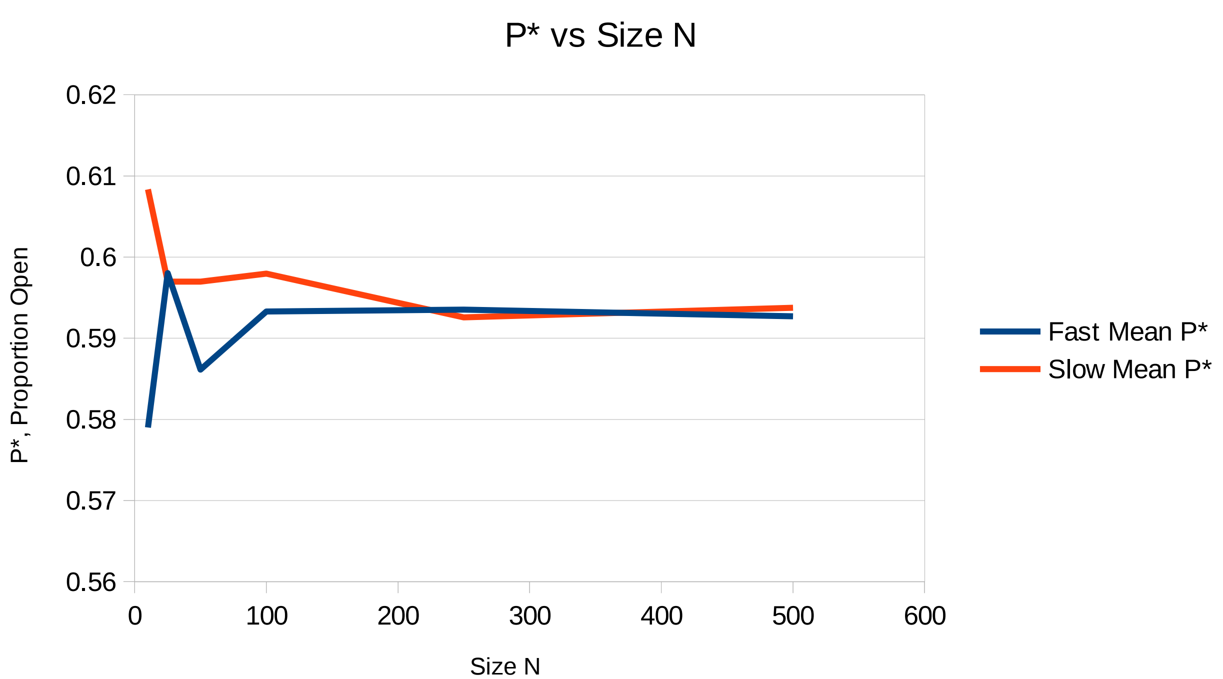

Mean Run Time vs Size N
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Time (seconds)
0
100
200
300
400
500
600
Size N
Fast Mean Time
Slow Mean Time


P* vs Size N
0.62
0.61
0.6
0.59
0.58
0.57
0.56
P*, Proportion Open
0
100
200
300
400
500
600
Size N
Fast Mean P*
Slow Mean P*

Data

Fast	500	250	100	50	25	10
Mean Threshold	0.5927025	0.5935365	0.5932900	0.5861333	0.5980267	0.5790000
Std Dev Threshold	0.0048162	0.0081715	0.0120799	0.0216445	0.0386490	0.0701403
Total Time	0.4636075	0.1354111	0.0332614	0.0171877	0.0111649	0.0058565
Mean Time	0.0154536	0.0045137	0.0011087	0.0005729	0.0003722	0.0001952
Std Dev Time	0.0044754	0.0022210	0.0012405	0.0009067	0.0007657	0.0006644

Slow	500	250	100	50	25	10
Mean Threshold	0.5937383	0.5925808	0.5979700	0.5969600	0.5969600	0.6083333
Std Dev Threshold	0.0049148	0.0100693	0.0152226	0.0230611	0.0476907	0.0718275
Total Time	3.4924054	0.4137738	0.0492107	0.0191978	0.0092586	0.0061019
Mean Time	0.1164135	0.0137925	0.0016404	0.0006399	0.0003086	0.0002034
Std Dev Time	0.0254129	0.0047513	0.0013183	0.0009513	0.0007628	0.0005971

Discussion

The graph clearly shows that the Weighted Quick Union was significantly more time-efficient than the normal Quick Union algorithm for this particular scenario. Marginal gains with a small size N may not yield a significant difference in runtime, but as N grows larger, the difference in runtime grows in a seemingly polynomial fashion. As size N grows, it appears the accuracy of P* increases. Experimental values indicate that a good estimate for P* is somewhere near 0.593 or approximately 59.3% of the cells being opened. Conversely, 1 – P* = 0.407 which indicates that approximately 40.7% of the cells would be blocked. The data shown in this document only uses 30 samples for each size of N. More samples would likely yield a more accurate value for P*.