

Exercise1:

Question 1:

1: 21.74 sec
2: 21.31 sec
3: 21.97 sec
4: 21.46 sec
5: 22.43 sec

avg: 21.78 sec

Question 2:

1: 10.45 sec
2: 10.81 sec
3: 10.69 sec
4: 10.72 sec
5: 10.68 sec

avg: 10.67 sec
speedup = 2.04

By inspecting the actual partition structure, we can see that the partitioning is not balanced: here is the result of the number of work-units in each partition.

[267, 261, 246, 250]

Even though this is close to equal partitioning (256 work-units each), this is still not optimal.

Question 3:

1: 5.90
2: 6.54
3: 6.53
4: 6.51
5: 6.19

avg: 6.33
speedup = 3.44

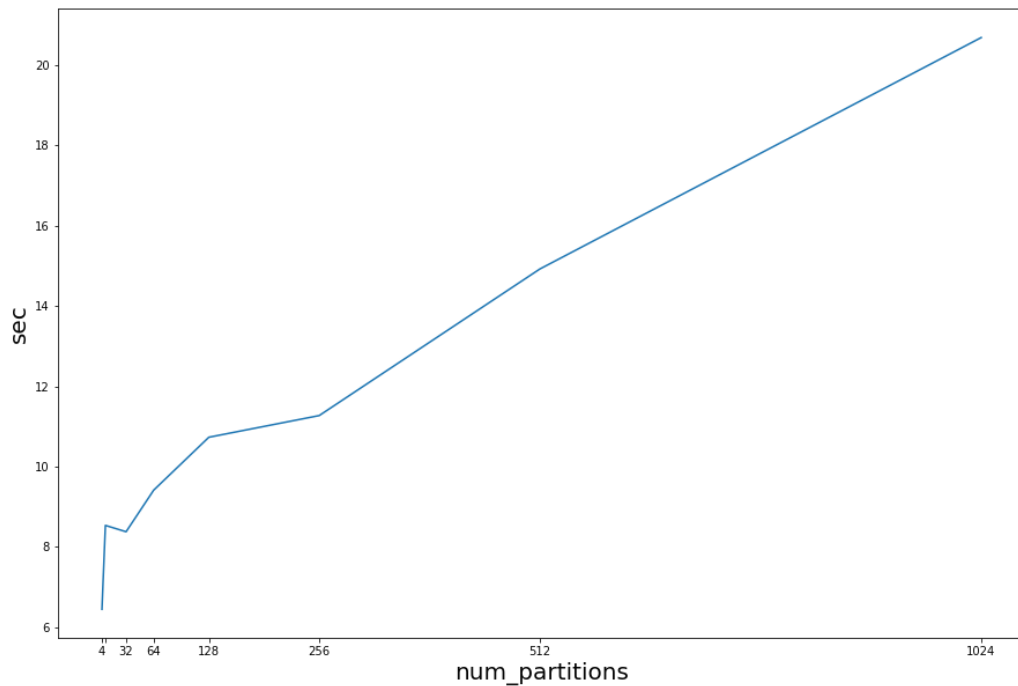
Even though partitioning improved by a little bit, the computation time improved significantly. The speedup is now closer to the desired value of 4.

Question 4:

num_partitions = [4, 8, 32, 64, 128, 256, 512, 1024]

ex_times (avg over 5 times) = [6.446, 8.536, 8.378, 9.414, 10.732, 11.272, 14.924, 20.69]

4	8	32	64	128	256	512	1024
6.466	8.536	8.378	9.414	10.732	11.272	14.924	20.69



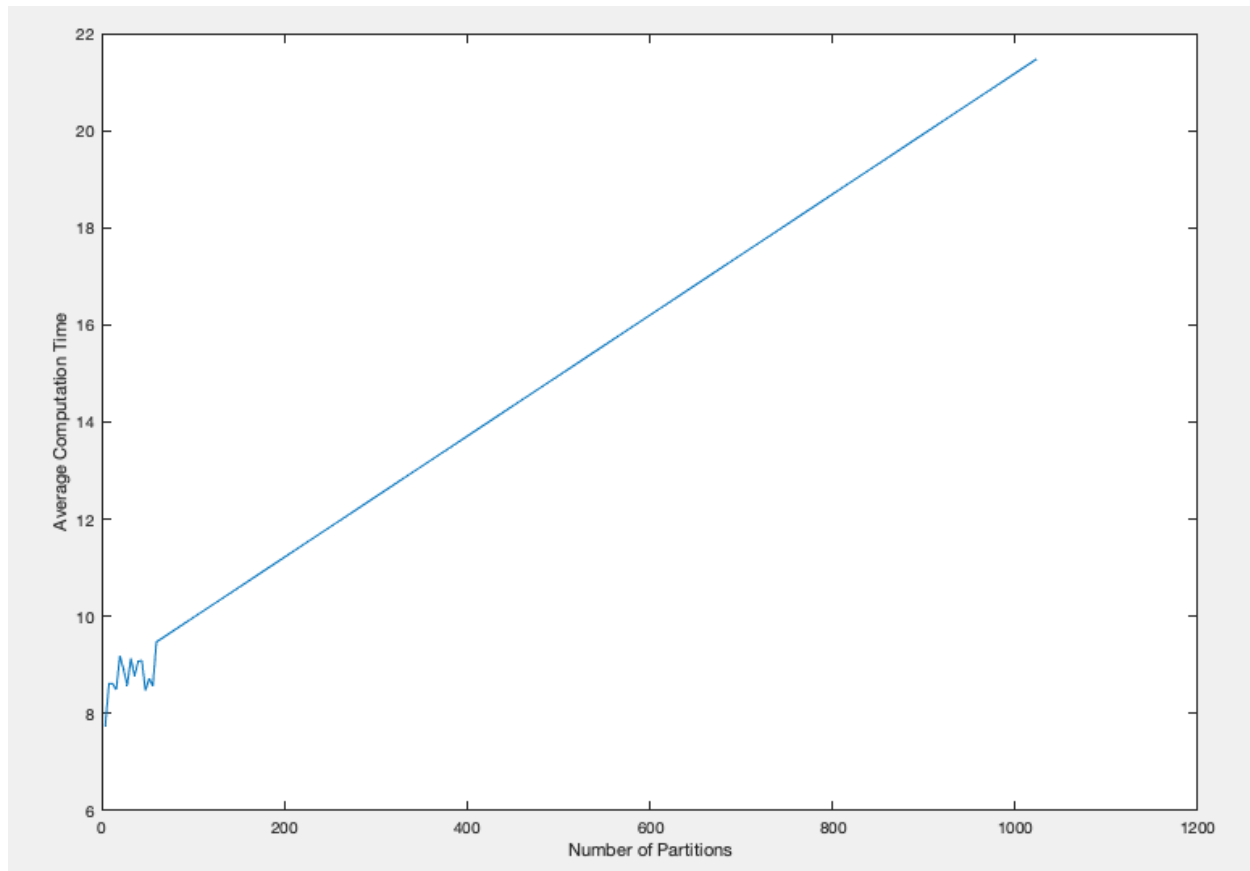
Although the overall trend is linear, using 4 partitions greatly deviates from the linear trend. It is not thus easy to conclude any constant overhead time for this behavior.

Exercise 2

Question 1:

N	Time (second)
4	7.745
8	8.616
12	8.614
16	8.49
20	9.19
24	8.917
28	8.582
32	9.139
36	9.072
40	8.771
44	9.072
48	9.091
52	8.721
56	8.566
60	9.474
1024	21.48

Plot N = 4 to N = 60



The best execution time is when $N = 4$. No matter how many partitions we use, it does not seem to have caused any speedup, but the execution time tends to increase as we increase the number of partitions. If the number of partitions is too small, the workloads are easily imbalanced. On the other hand, if the number of partitions is too large, there is too much overhead.

Question 2:

[5.97, 6.25, 6.63, 6.67, 6.14] sec

Avg: 6.33 sec

Workload for each partition V2: [32928, 33389, 31517, 30876]

Workload for each partition V3: [32178, 32178, 32177, 32177]

Workload distribution is optimal in V3 implementation. The workloads are well-balanced. The average execution time is: 6.33 sec. Speedup 1.22.