MTCS-103(P) Parallel Processing

Lab Assignment1 Report

Inputs of different sizes were generated by program (testercode.c) code which randomly selects a number between -9 to 9. This program takes as command line input the size of the output array and outputs a file names (inputs"size"), where "size" is a number of entries in the input file.

Sequential Search:

This program (Seqsearch.c) for search of target in file was coded and checked for correctness. It is correct for various test cases.

Parallel Search:

This program (Parsearch.c) for search of target in file was coded and compiled. After checking the Parallel program using the test suite developed from the sequential code, The execution time for various size (10^4, 10^5, 10^6, 10^7) of input file with different number of threads were recorded and tabulated in increasing order.

Then, Tabulated the speedup for various number of threads. (that is, Speedup = Execution Time / Number of Threads)

Tabulations for parallel search for a target:

Parallel Search for Target value using OpenMP								
N\Size	100	1000	10000	100000	1000000	10000000	100000000	SpeedUp
2	0.000585	0.000419	0.000554	0.002332	0.0224	0.215207	8.91297	0.6538905
3	0.000591	0.00075	0.001175	0.003641	0.027292	0.272717	4.773687	0.241897762
4	0.000717	0.000723	0.001011	0.004815	0.044097	0.533338	7.868264	0.301891607
5	0.000896	0.001202	0.001603	0.004883	0.040613	0.468091	7.098686	0.217599257
6	0.001379	0.001116	0.001489	0.005173	0.041321	0.489874	7.160301	0.183348881
7	0.001052	0.001483	0.001404	0.005183	0.039488	0.490019	6.960651	0.153046531
8	0.001213	0.001708	0.001658	0.005795	0.041575	0.496019	7.131928	0.137141
Serial	0.000131	0.00014	0.000239	0.001813	0.011468	0.113396	1.717328	0.263502143

Parallel Search for set:

Extended the parallel program (Parsearchset.c) for searching target set of integers. Tabulated and plotted the execution time and number of elements in the Target set. Then, Tabulated and plotted the speedup and number of elements in the Target set.

Tabulations for Parallel Search on a Target Set:

For Size: 10^4

Parallel Search for Target Set - Size 10^4				
	2	4	6	8
100	0.043478	0.046947	0.043377	0.042605
500	0.098372	0.249922	0.217491	0.215718
1000	0.190428	0.472128	0.425322	0.427116
5000	0.549684	1.316216	1.232386	1.232637
Speedu	0.110245	0.130326	0.079941	0.05994

For Size: 10^5

Parallel Search for Target Set - Size 10^5				
	2	4	6	8
100	0.207924	0.533822	0.469694	0.467475
500	1.148087	2.754428	2.490756	2.441447
1000	2.246092	5.418637	4.956684	4.998729
5000	10.81062	26.22667	23.76941	23.82473
10000	21.33449	47.77577	44.5157	45.04391
Speedup	3.574721	4.135466	2.540075	1.919407

For Size: 10^6

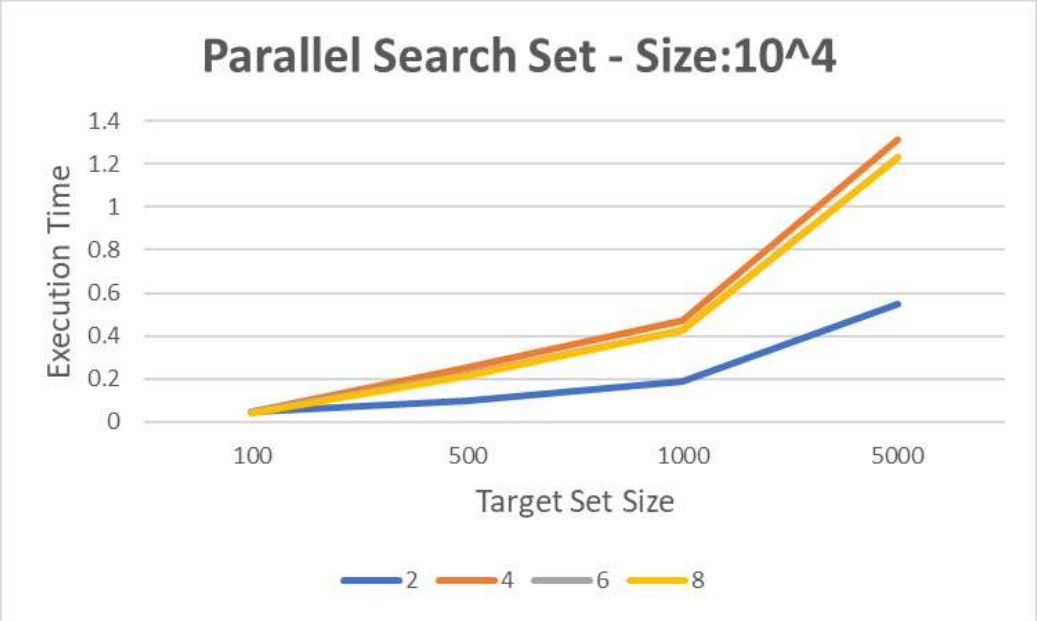
Parallel Search for Target Set - Size 10^6				
	2	4	6	8
100	2.449386	5.540012	5.10968	5.127259
500	11.49846	27.91089	25.12132	25.3382
1000	22.9736	55.64539	50.53045	50.68046
5000	119.0075	278.2532	253.2197	255.1219
10000	229.3909	553.754	503.1763	506.8354
Speedup	38.53199	46.05517	27.90525	21.07758

For Size: 10^7

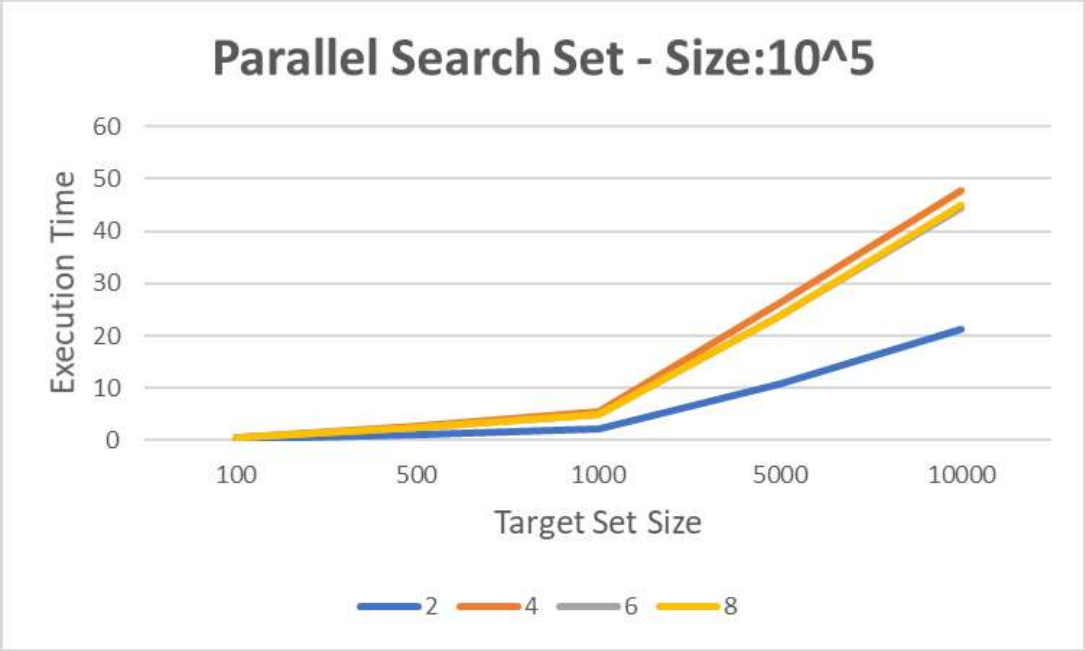
Parallel Search for Target Set - Size 10^7				
	2	4	6	8
100	23.63182	55.88157	51.85909	52.88753
500	132.0039	283.3297	259.9598	262.323
1000	834.1376	757.1734	688.6533	526.0909
5000	1257.348	2835.72	3298.331	2664.215
Speedup	280.8902	245.7565	179.1168	109.5474

Graphs for Parallel Search on a Target Set:

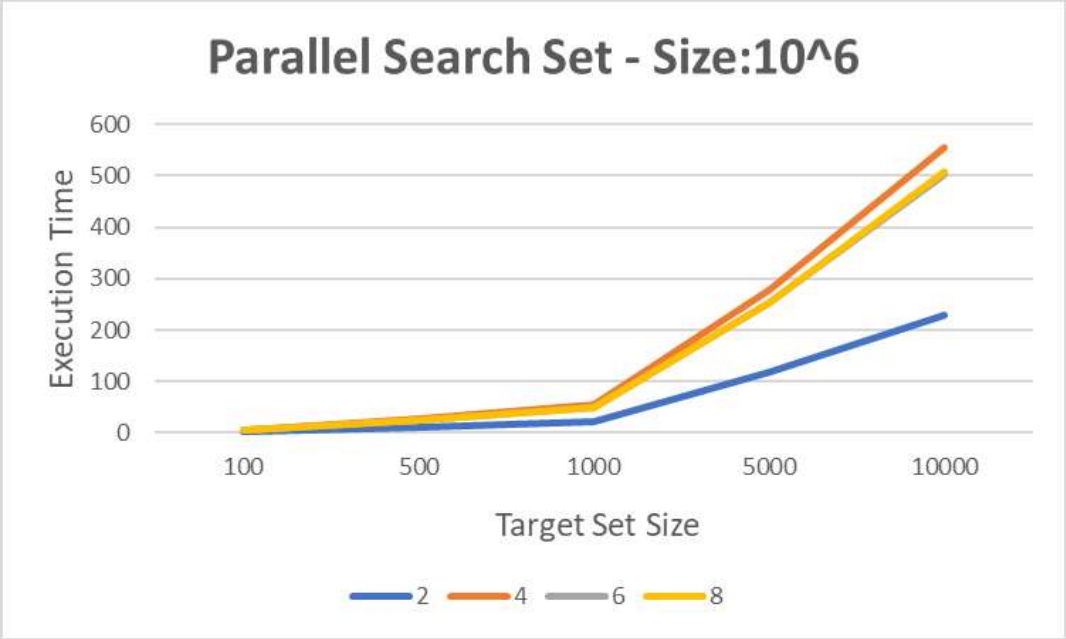
For Size: 10^4



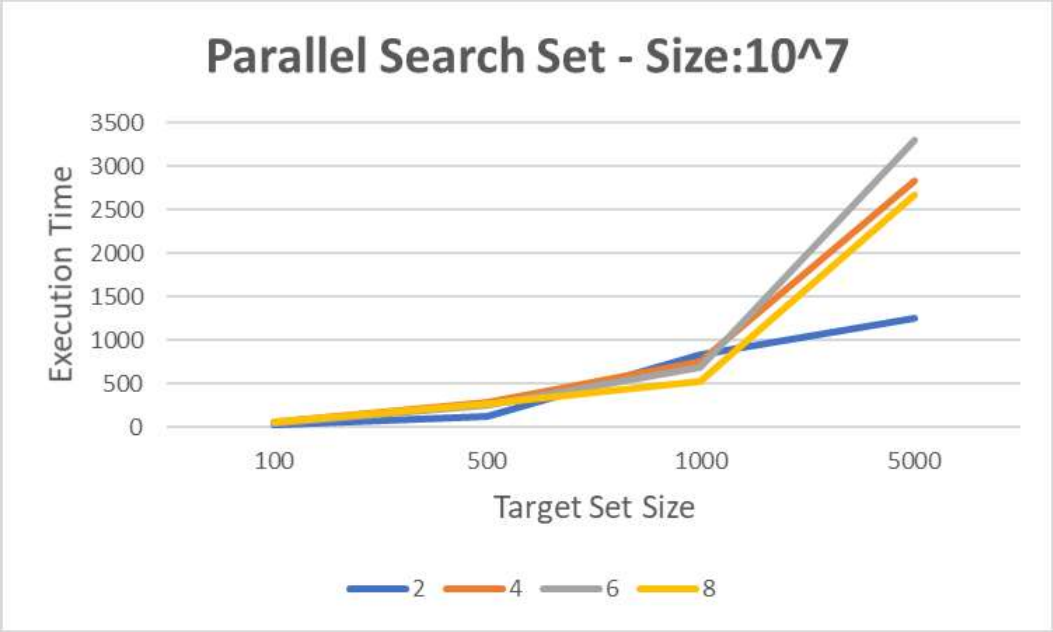
For Size: 10^5



For Size: 10^6

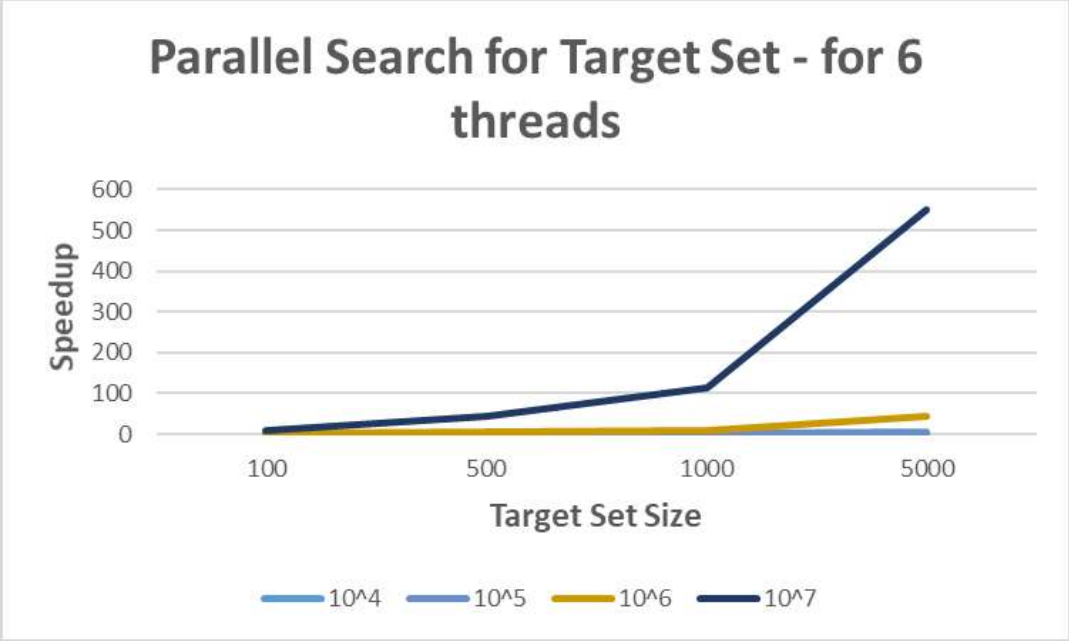


For Size: 10^7



Plot Speedup Vs the number of elements in the Target set.

For 6 threads:



By changing int to float, Execution time will increase because comparison between floats take more time than comparison between ints. But if machine has many floating point processing units, then the ovreall change in time might be negligible.

Inferences:

By Observing graphs of parallel program for searching target set, we can find that more threads for larger input size is leading to increase in Speedup.

The Maximum number of threads must be used to complete the given problem efficiently.

For parallel program, the plot between Speedup and target set size is increasing for bigger size input files.

When number of threads increases, speedup decreases for parallel program for searching target value.