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Task M2.T1P (Parallel Matrix Multiplication)

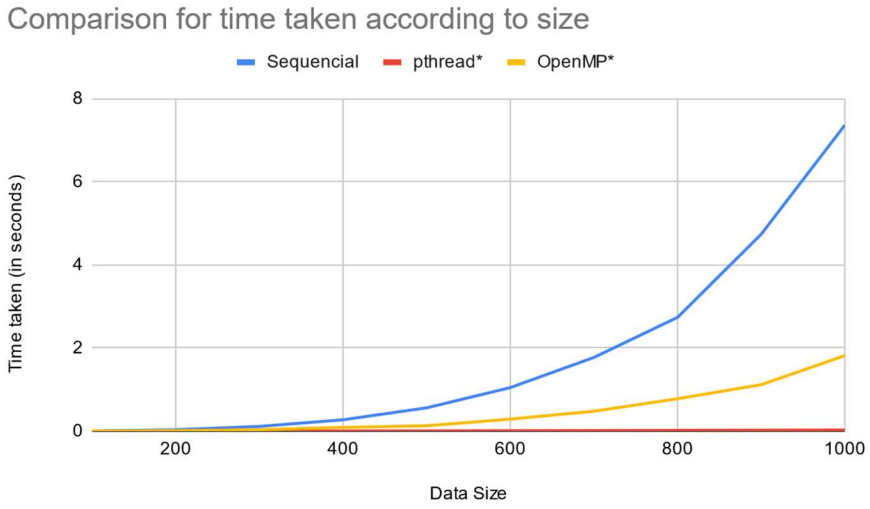
Codes are available on attached files.

Comparing methods according to data size with time taken (in seconds):

1. Between 100 and 1000 (with increment of 100)

	100	200	300	400	500	600	700	800	900	1000
Sequencial	0.003732	0.034201	0.113765	0.273223	0.560687	1.047661	1.773478	2.738366	4.738423	7.364651
pthread*	0.001217	0.001797	0.003193	0.004289	0.006413	0.009596	0.013153	0.021463	0.020337	0.027492
OpenMP*	0.001855	0.011482	0.035044	0.090319	0.129169	0.289267	0.478883	0.780043	1.117878	1.817399

Graph:

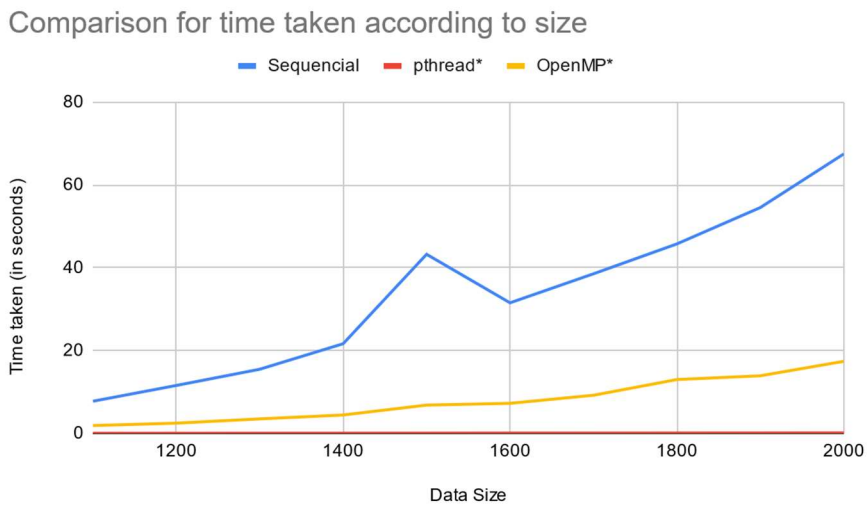


(Note that number of threads for pthread and OpenMP is 3)

2. Between 1000 and 2000 (with increment 100)

	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
Sequencial	7.75771	11.568381	15.48368	21.646721	43.248238	31.529757	38.53697	45.757814	54.543146	67.486083
pthread*	0.017937	0.021276	0.046706	0.026614	0.042508	0.049003	0.05744	0.065851	0.072808	0.082814
OpenMP*	1.889317	2.465816	3.499787	4.440655	6.827678	7.258742	9.206989	13.003153	13.910438	17.404277

Graph:

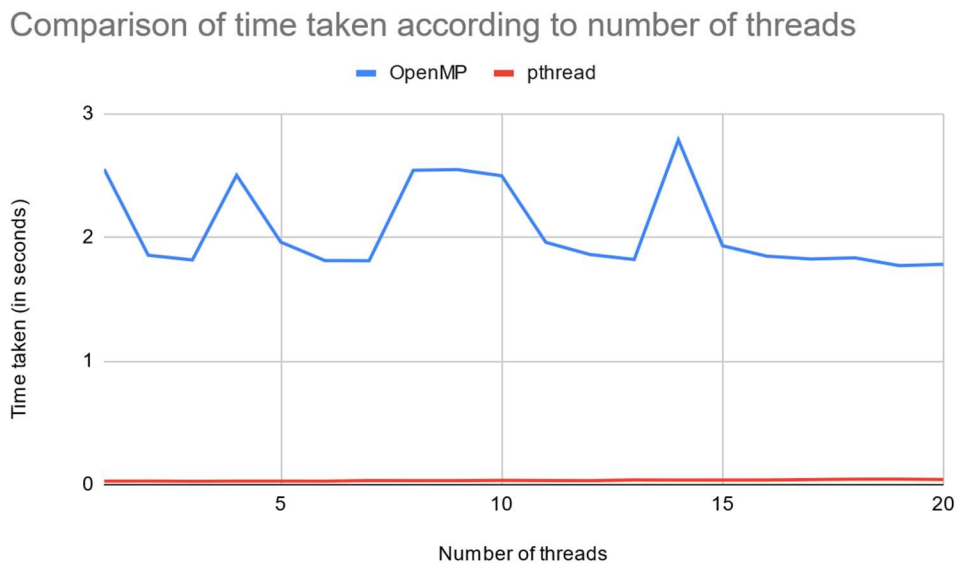


Comparing two parallel programming according to number of threads with time taken (in seconds):

	Threads									
	1	2	3	4	5	6	7	8	9	10
OpenMP	2.552725	1.855395	1.817399	2.502756	1.96197	1.812312	1.811139	2.542697	2.548511	2.498216
pthread	0.028334	0.02898	0.027117	0.028567	0.028782	0.027998	0.033052	0.032301	0.03238	0.034637

	Threads									
	11	12	13	14	15	16	17	18	19	20
OpenMP	1.959771	1.861374	1.821142	2.787854	1.932357	1.848093	1.825128	1.834643	1.77146	1.782356
pthread	0.033216	0.032083	0.037863	0.036779	0.03714	0.037486	0.04103	0.044165	0.044618	0.041603

Graph:



Based on my findings:

1. Using parallel programming does improve performance on matrix multiplication, which is how it must be compared with sequential programming, more than half of the execution time. However, pthread improves the performance significantly compared with OpenMP implementation. The pthread and OpenMP worked perfectly fine. I tested it, I print the first 5x5 elements after the multiplication result, and both worked perfectly fine.
2. Size of the matrices also affects the performance. In both size 100 x 100 and 1000 x 1000, pthread has the lowest execution time. In addition, we also learn that the time taken rises exponentially. However, we can only see that in sequential and OpenMP methods, pthread grows, but on a much smaller scale.
3. Number of threads also affects the performance for parallel programming. For pthread, it shows that at some point, increasing number of threads will increase its execution time. It goes as well for OpenMP, but it's more unpredictable. At some point, it will have lower execution time when you increase number of threads. Based on my findings, the unpredictability of OpenMP caused by sharing of variables. OpenMP also works perfectly fine.