

Take Home Lab 1

CS4532 Concurrent Programming
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❖ GitHub Repository : <https://github.com/PasinduUd/linked-list-pthreads-implementation>

Case 1

Implementation	No. of Threads							
	1		2		4		8	
	Avg	Std	Avg	Std	Avg	Std	Avg	Std
	Serial	14.76	1.2401					
One mutex for entire list	14.80	0.9211	17.57	1.5193	17.54	1.8002	21.54	4.4231
Read-Write lock	21.75	4.2364	14.30	4.3682	9.14	4.1731	7.28	1.3187

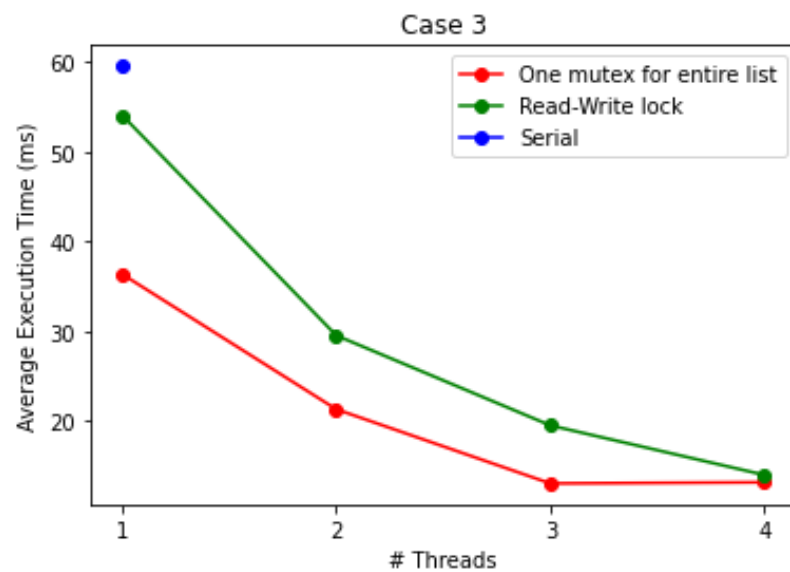
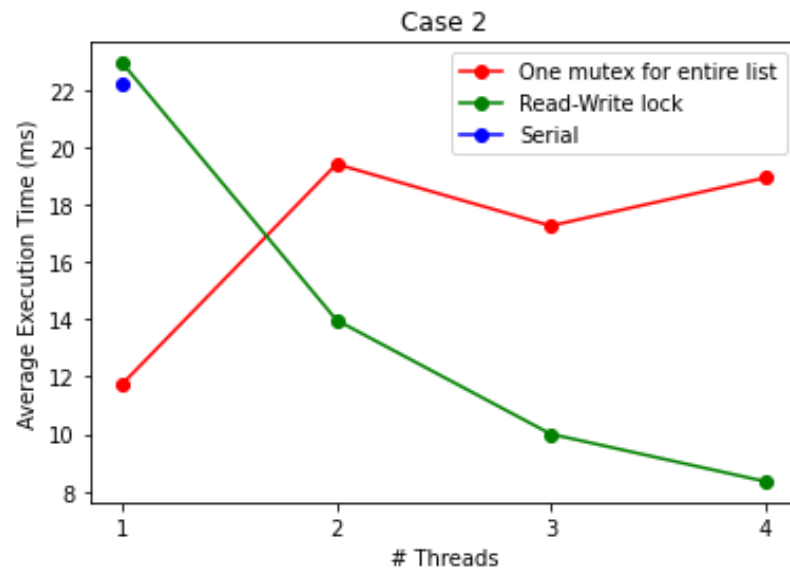
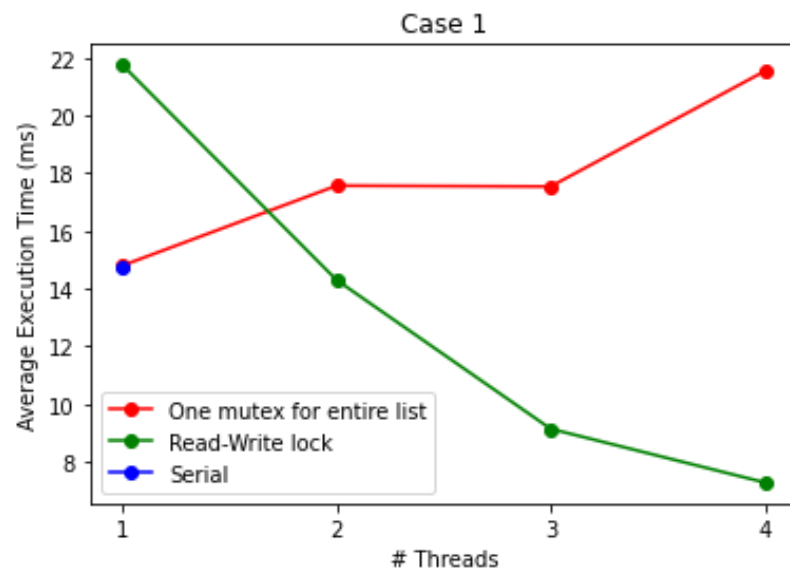
Case 2

Implementation	No. of Threads							
	1		2		4		8	
	Avg	Std	Avg	Std	Avg	Std	Avg	Std
	Serial	22.23	2.6850					
One mutex for entire list	11.75	4.8040	19.41	4.2022	17.26	2.8555	18.93	1.9188
Read-Write lock	22.93	1.6346	13.97	1.8827	10.00	3.2349	8.35	4.0186

Case 3

Implementation	No. of Threads							
	1		2		4		8	
	Avg	Std	Avg	Std	Avg	Std	Avg	Std
	Serial	59.55	10.3215					
One mutex for entire list	36.35	5.0018	21.29	1.6410	13.02	1.3482	13.15	1.5333
Read-Write lock	54.06	4.0746	29.52	2.1153	19.49	4.7641	13.97	0.8699

❖ Average execution time against the number of threads



❖ System Specifications

- Processor : Intel(R) Core(TM) i7-9750H CPU @2.60GHz, 2601Mhz, 6 Core(s), 12 Logical Processor(s)
- System Type : 64-bit operating system, x64-based processor
- RAM : 8.00 GB

❖ Observations

- Case 1 contains 99% read operations and 1% write operations. Case 2 contains 90% read operations and 10% write operations. Case 3 contains 50% read operations and 50% write operations. The average time increases when the number of write operations (insert and delete) increases regardless of the implementation. Can conclude that write operations are costlier than read operations.
- The average time for serial implementation increases in each case. This may be due to the increase in the number of write operations.
- Case 1 and Case 2 the average time for mutex implementation increases with the number of threads while in Case 3 it decreases. Case 1 and 2 have more read operations than write operations.
- In all 3 cases the average time for read write lock implementation decreases with the number of threads.
- In Case 3 a decreasing trend can be observed with all implementations with the number of threads and for each number of threads the mutex implementation shows lower average time compared to read write lock implementation.