MP2

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CS 484 PARALLEL PROGRAMMING
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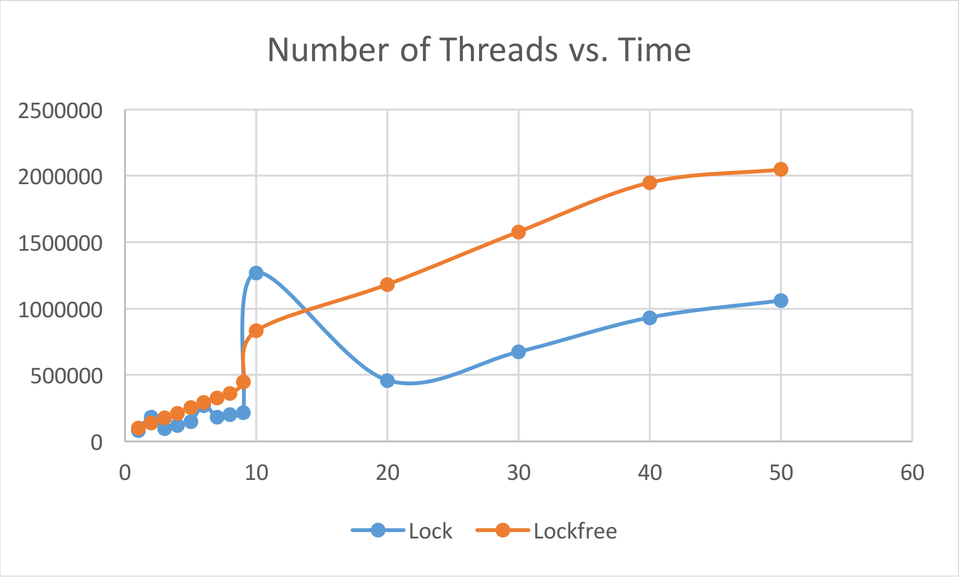
1.1 Queue Implementation

Data (# of Threads are the variable)

Threads	Lock	Lockfree
1	82395	103434
2	181426	139765
3	96813	179578
4	121699	212874
5	148130	254598
6	269514	293873
7	184096	326360
8	204204	360199
9	219269	448734
10	1269410	832801
20	459127	1182843
30	673968	1580033
40	932940	1950315
50	1060728	2048792

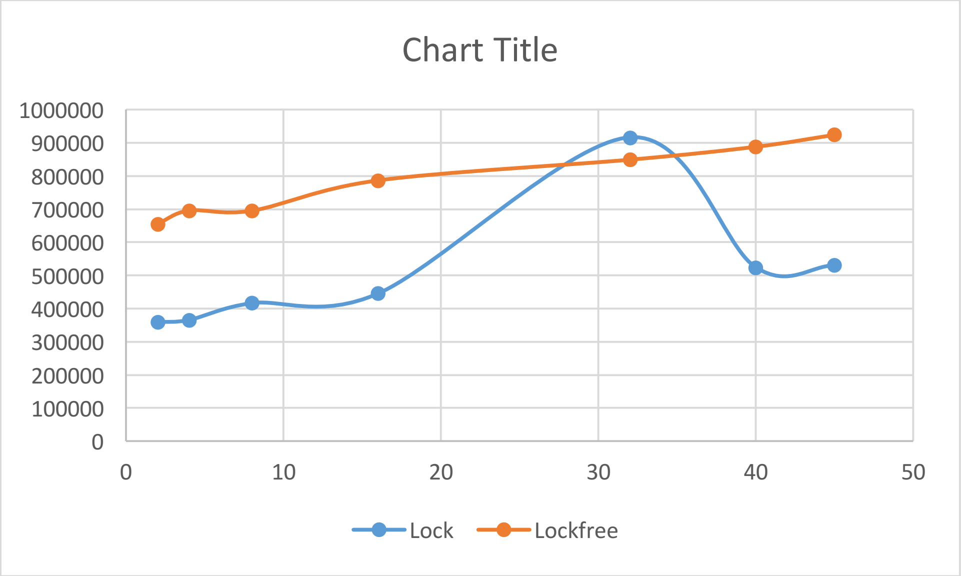
Graph



Data (# of insertions and deletions are variable):

Insertions/Deletions	Lock	Lockfree
2	359383	655602
4	365914	695623
8	416644	695391
16	445435	786990
32	916307	849675
40	523851	888777
45	530709	924891

Graph:



Analysis:

In general we see that our lock implementation of the program is faster than out lockfree (atomic) implementation. This is because in the lock implementation all the threads are taking a common variable in this case a mutex lock. In the case of the lockfree version each thread has their own atomic variable that is created and maintained. Since they have their own variable it takes a longer time to add or delete whereas in the lock implementation the threads can do other things that do not require a lock and is a less serial process. I only used one atomic function which was atomic_exchange(). I used this to create a lock for all the threads by making the entire critical section atomic to each thread. So in turns out that both of these programs are similar but it takes more time to create the atomic_exchange than it is for creating a shared mutex.