Operating Systems - 2
Programming Assignment - 4
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Question 2:

The goal of this assignment is to implement TAS, CAS and Bounded Waiting with CAS mutual exclusion (ME) algorithms studied in the class. Implement these algorithms in C++.
To test the performance of mutual exclusion algorithms, develop an application, me-test (mutual exclusion test) is as follows. Once the program starts, it creates n threads. Each of these threads will enter critical section (CS) k times.

Input:

Here, the input should be in the form
<n> <k> <l1> <l2>

Implementation:

For TAS:

For TAS, we used a function named test_and_set() which is an atomic function and it checks whether the lock is empty or not and if the lock is free, it gives breaks out of the loop and the critical section executes and after the critical section is over, it releases the lock. Using clear(). Here, we generate random sleep times as exponential distribution with mean l1 and l2 using an exponential distribution function.

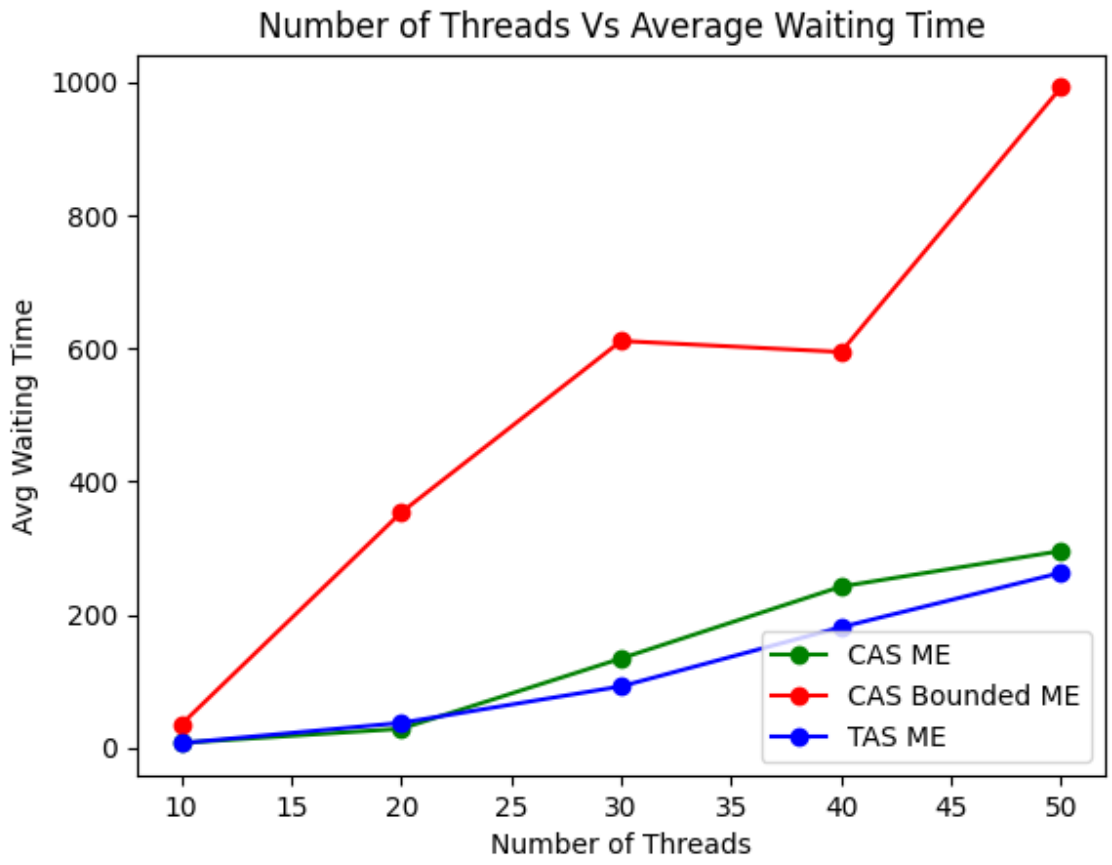
For CAS:

For CAS, we used a function named atomic_compare_exchange_strong() which has 3 attributes: lock, value we want it to be and the value it should be at the end of the execution. When the lock is false, it breaks out of the while loop because the condition becomes false. Then it runs the critical section and then releases the lock using lock = false. Here, we generate random sleep times as an exponential function with mean l1 and l2 using an exponential distribution function.

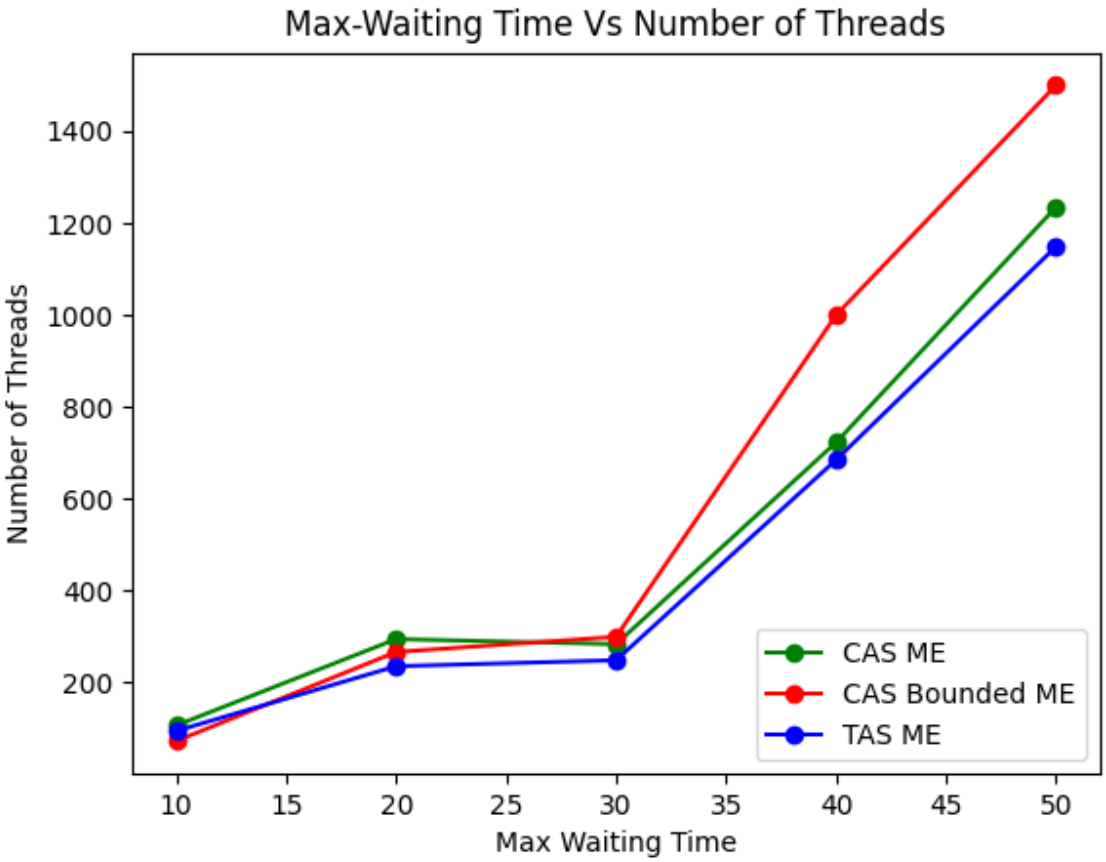
For CAS_Bounded:

For CAS-Bounded, we used the function named atomic_compare_exchange_strong() which has 3 attributes the same as above but here, we take an array of bools and check them too. Here, we generate random sleep times as an exponential function with mean l1 and l2 using an exponential distribution algorithm.

Analysis:



Here, in this graph, we can see that the average waiting time of CAS-Bounded will be greater than the other 2 Mutual Executions.



Here, we can see that all 3 Mutual exclusive algorithms take almost the same time but we can see that CAS-Bounded has slightly more Max-Waiting time than the other Mutual exclusive algorithms.