

REPORT CS20BTECH11028

Comparison of average waiting times and worst case waiting times of the Mutual Exclusion algorithms implemented using TAS, CAS, Bounded CAS

The Mutual exclusion algorithms are implemented using test and set, compare and swap and bounded waiting compare and swap. The average wait times and worst case wait times are compared in the form of graphs as shown below.

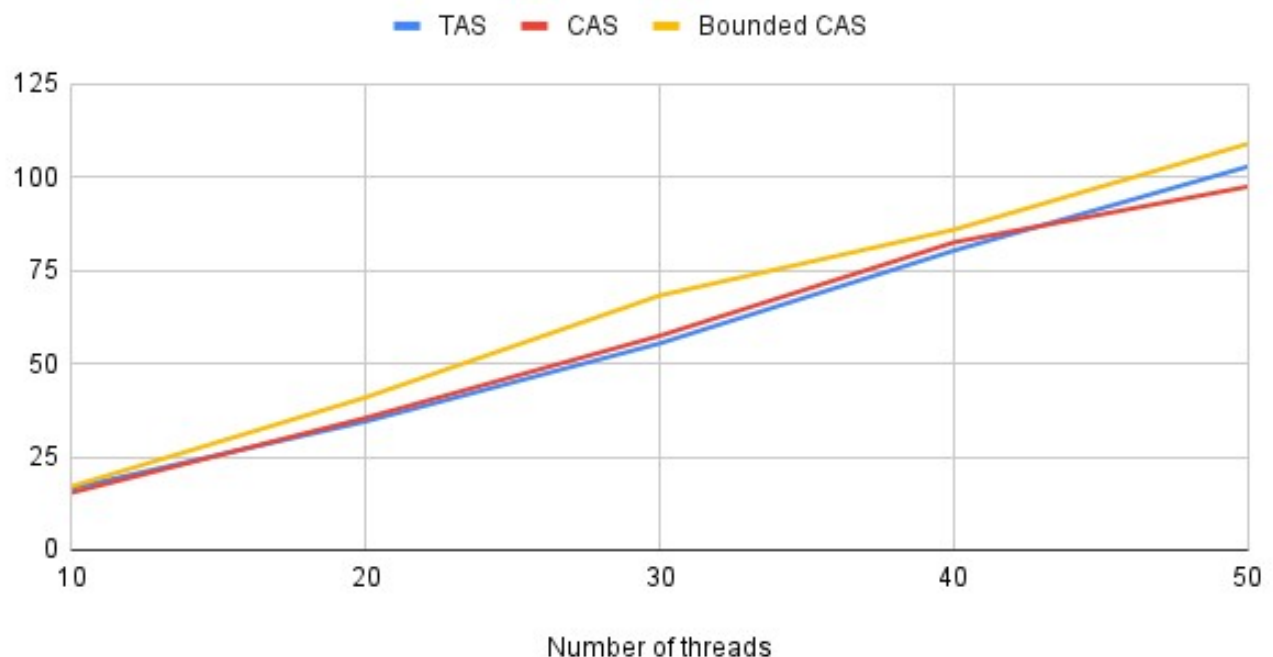
- The following graphs are drawn for $k = 10$, $\lambda_1 = 3$, $\lambda_2 = 5$
- We compare the worst case waiting times to know whether a thread is starving or not.

Average Waiting times vs Number of threads

X-axis: Number of threads

Y-axis: Average waiting time in seconds

Average waiting times vs Number of threads



Analysis from the graph:

We could see that the average waiting time to enter the critical section for each thread is almost same for TAS, CAS, but some what higher for bounded CAS when compared with TAS and CAS.

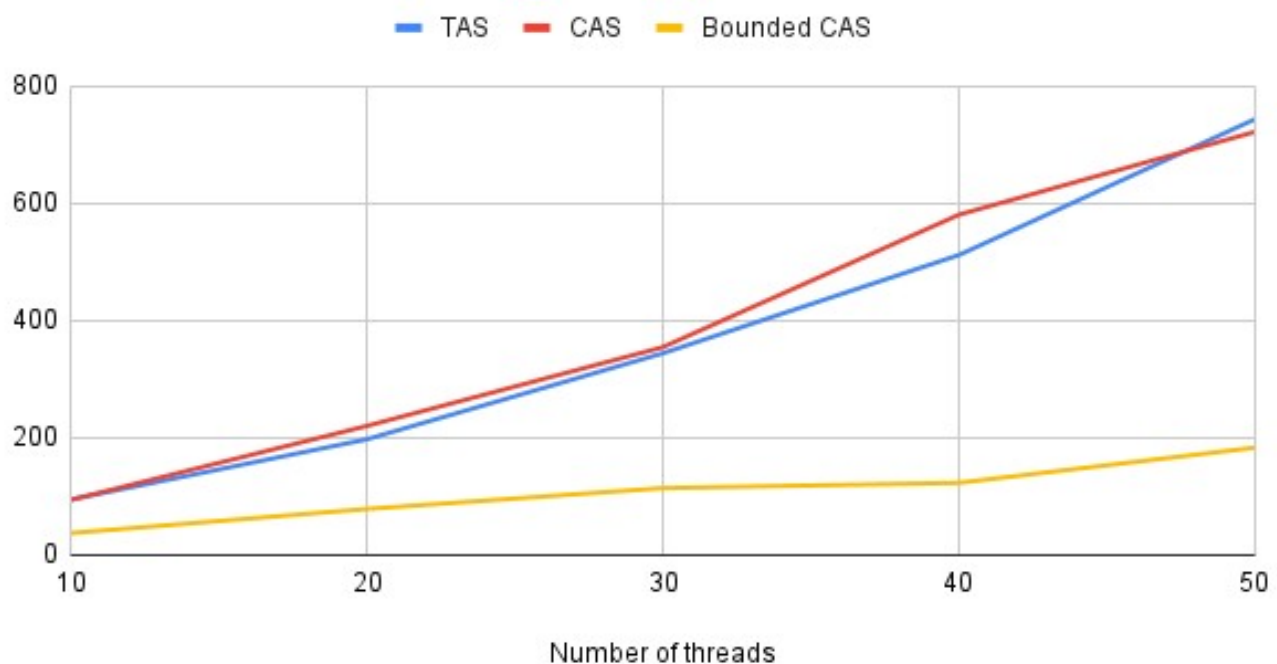
As we always check for the next waiting process and then do the progress in Bounded Wait CAS, this could have led to a higher average waiting time when compared with the TAS, CAS algorithms.

Worst Case waiting times vs Number of threads

X-axis: Worst Case waiting times in seconds

Y-axis: Number of threads

Worst Case wait times vs Number of threads



Analysis from the graph:

The worst case waiting times are much higher for TAS and CAS when compared with Bounded Waiting CAS. This shows us that if we use the Bounded CAS algorithm, the threads are generally not prone to starvation which is not the case with TAS, CAS algorithms. Hence the Bounded Wait CAS algorithm is useful to implement Mutual Exclusion if we want no process to starve.

Conclusion:

From the above analysis from graphs, we can conclude that ME algorithm using Bounded wait CAS is efficient, as the processes are not put to starvation but there is a slight increase in the average time for each process. When we use CAS, TAS for ME, we see that there is a higher chance of starvation,

Note:

- We plot each point averaging over five runs because that helps to check the chances and extent of starvation.
- The slighter differences between the TAS and CAS wait times and worst case wait times could be possibly because, we run for random amount of time in CS and remainder sections. This difference caused due to running for random amounts of time could be minimized as we plot each point by averaging over five runs.