OPERATING SYSTEMS 2(CS3523)

Programming Assignment – 4 Report

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The aim of the Assignment is to understand the working of the various mutual exclusion algorithms for the execution of the critical section.

1. TAS (Test and set)
2. CAS (Compare and swap)
3. Bounded-CAS (Bounded compare and swap)

Working of the code :

- The program takes the input and stores them as global variables from the file “inp-params.txt” which contains,
  1. n – number of threads
  2. k – number of times each thread runs
  3. lambda1 – the mean of the delayed values for the critical section
  4. lambda2 – the mean of the delayed values for the remainder section

- Class myTime (contains hr, min, sec) is defined to store time values and class thread_stats is defined to store the waiting times, request time, entry time and the exit time.

- A function getTime is declared which gets the local time and returns it and
  A function addWaitingTime is declared which updates the waiting times.

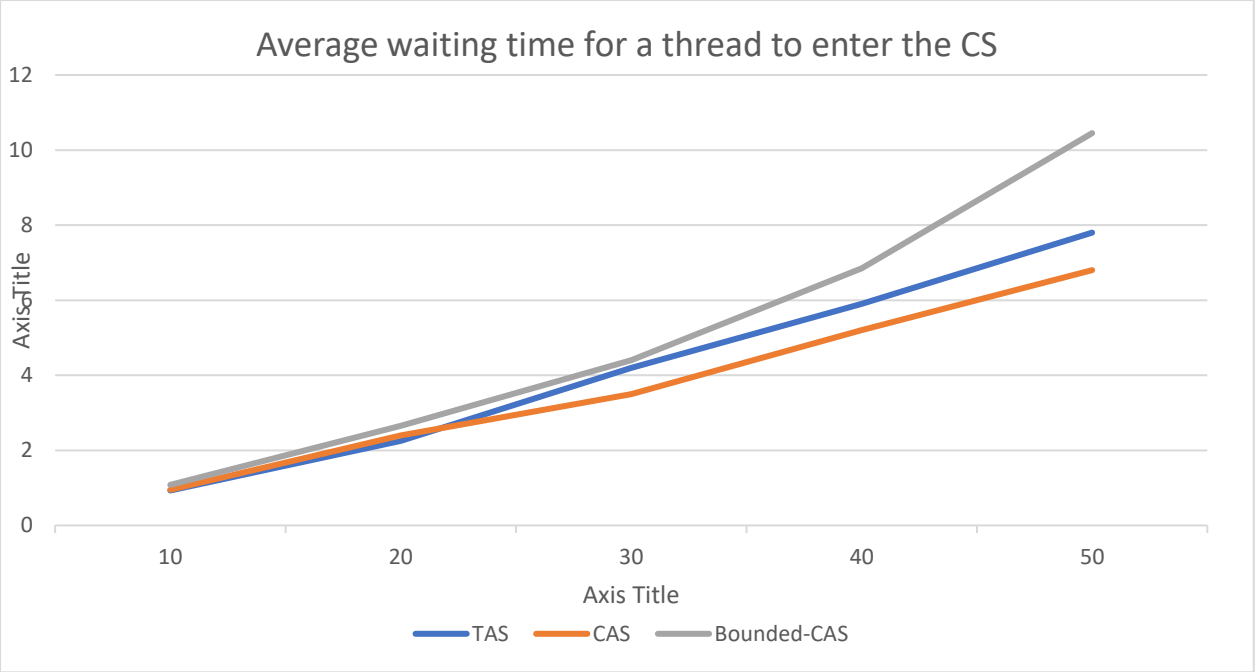
- N threads are created to execute the testCS function. In the function we get the id of the thread and use atomic_flag_test_and_set_explicit as a lock in the TAS, declared a function ‘compare and swap’ and used it as a lock in CAS and Bounded-CAS. An array waiting is used in Bounded-CAS which ensures bounded waiting for each thread

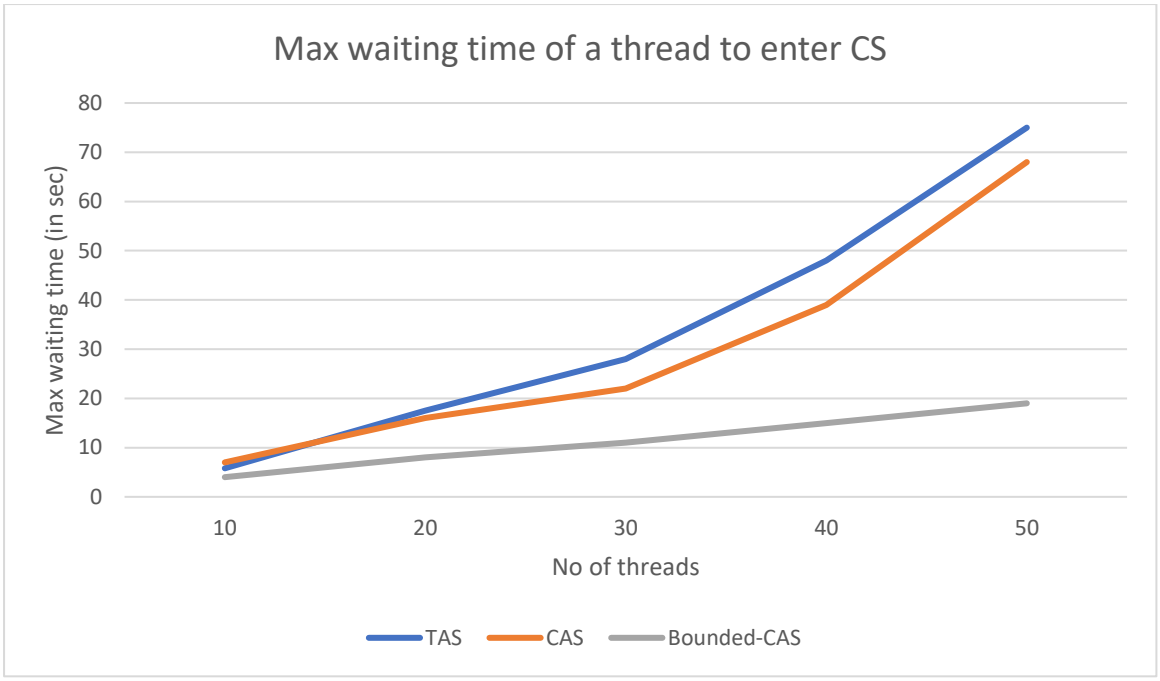
- The function ‘compare and swap’ is used such that at any given time only one thread can be in the function by using a mutex lock (to make it atomic) and similarly a mutex lock is used whenever the getTime function is called.

- A random generator is used to generate integers which are passed to a exponential distribution to get a time for which a thread is put to sleep simulating the critical section and the remainder section. The mean of the exponential distribution is given in the input file.

- A log file will be generated according to the algorithm used which shows all the timing of request, entries and exits of the various processes and the average waiting time and maximum waiting times are printed in the terminal.

Comparing the different algorithms




Max waiting time of a thread to enter CS
Max waiting time (in sec)
80
70
60
50
40
30
20
10
0
10
20
30
40
50
No of threads
TAS
CAS
Bounded-CAS