Operating Systems-2 Assignment 2 Report

Related Terms:

- Entry Section: A segment of the code which is common to all the threads and where threads request & wait to enter the critical section.

- Critical Section: A segment of the code where race condition can happen. So, only one thread should enter this section at a time.

- Exit Section: A segment of the code where threads exit the critical section and another thread is allowed to enter the critical section.

- Waiting Time: It is the time that a threads waits in the entry section to get into the critical section.

Design & Implementation of code:

The design of all the three programs is quite similar except the implementation of the mutual exclusion algorithm.

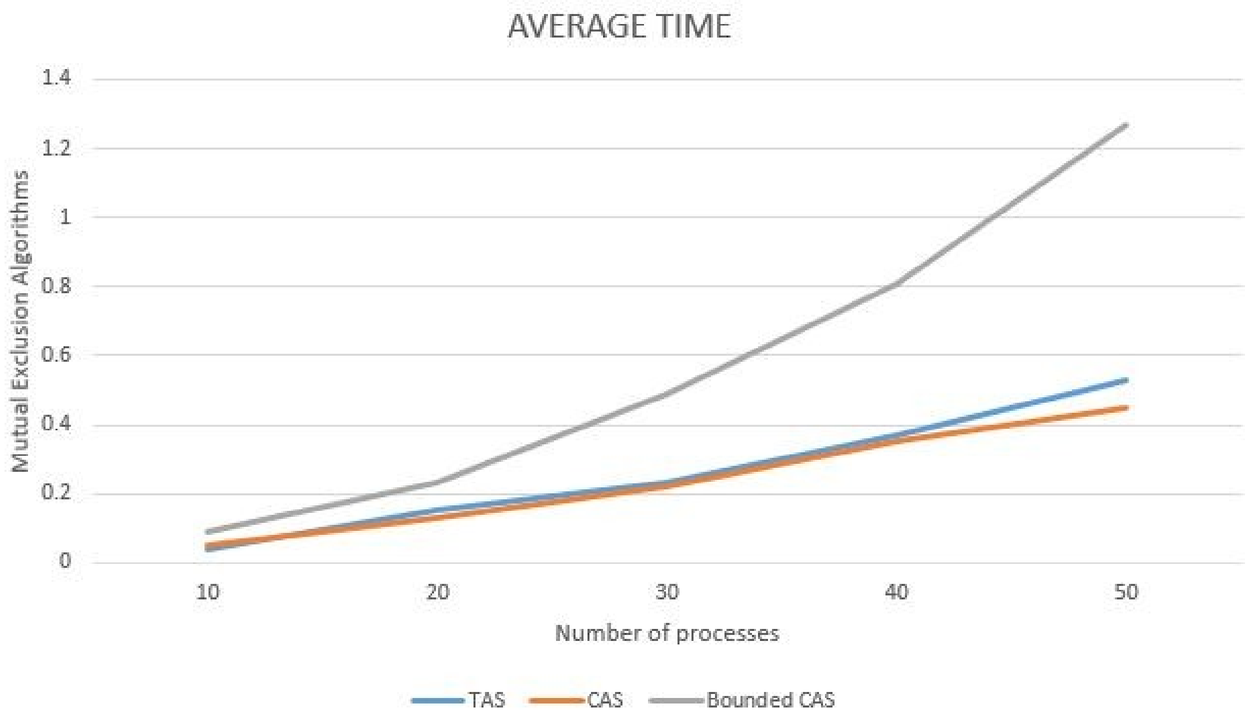
- First of all, main() reads the input from the "inp-params.txt" and store them globally.
- Then, an array of threads is created.
- The lock variable is an atomic variable.
- To generate random numbers, we use default_random_engine.
- To implement the exponential distribution of time, we use exponential_distribution<> in library <random>.
- We pass the TestCS function to each thread and all of them run simultaneously.
- Each thread measures the time at which it entered each section by using functions from library <chrono> and prints that to a log file.
- To get the waiting time of each thread, we just subtract the time from entering the Critical Section and time from entering the Entry Section.
- To simulate the Critical Section and Remainder Section, we put the thread to sleep

for some time using usleep() which takes parameters in microseconds.

- To simulate the CAS atomically, we use compare_exchange_strong and for TAS, we use atomic_flag_test_and _set.
- For CAS-bounded, we just used a new local variable j and an atomic array wait to keep a check that no process should starve.

Graphs:

Graph is plotted for (k,lam_1,lam_2) = (10,5,20) and n varies from 10 to 50.



As we can see from the graphs, Efficiency is : CAS > TAS > CAS-bounded.
But CAS-bounded ensures that no thread will starve and also decreases the maximum waiting time.