# ASSIGNMENT 3

ABHAY SHANKAR K: CS21BTECH11001

- For all the following graphs, the thread sleep time is an exponential random variable with mean 10ms.
- The output file `output.txt` contains each CS request, entry and exit, along with the times measured relative to the start of the process.
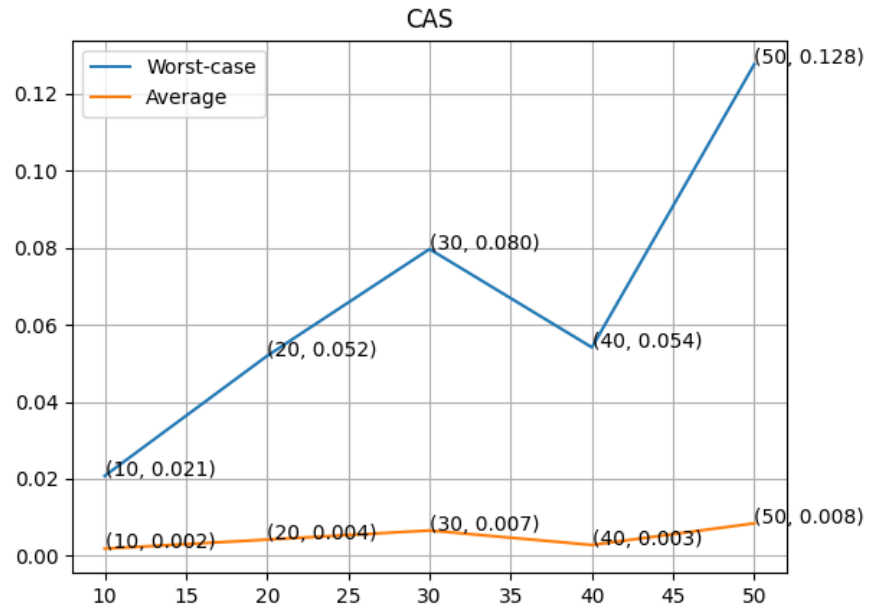
1. TAS

- Worst case and average diverge due to unbounded waiting
- Average time low because of OS scheduling.
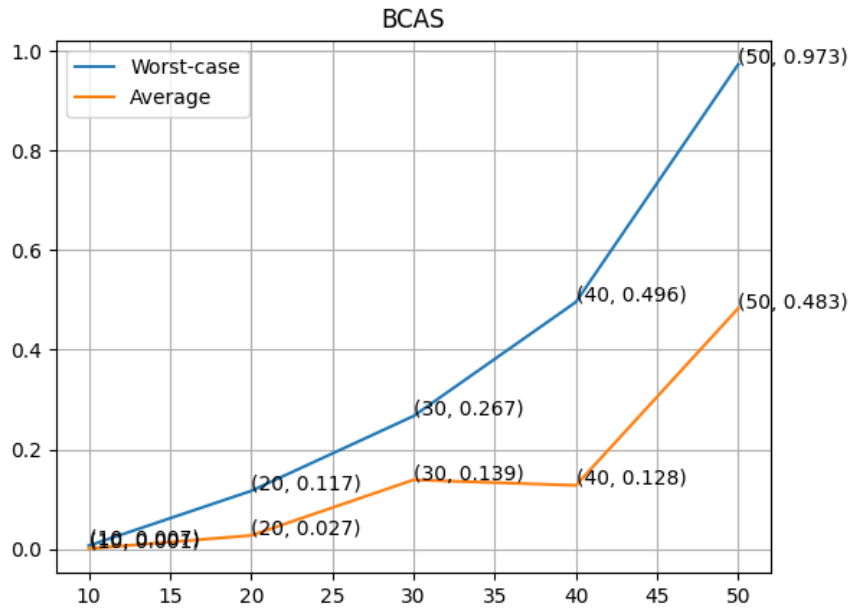- Some average times less than the input average becuase of multiple cores.
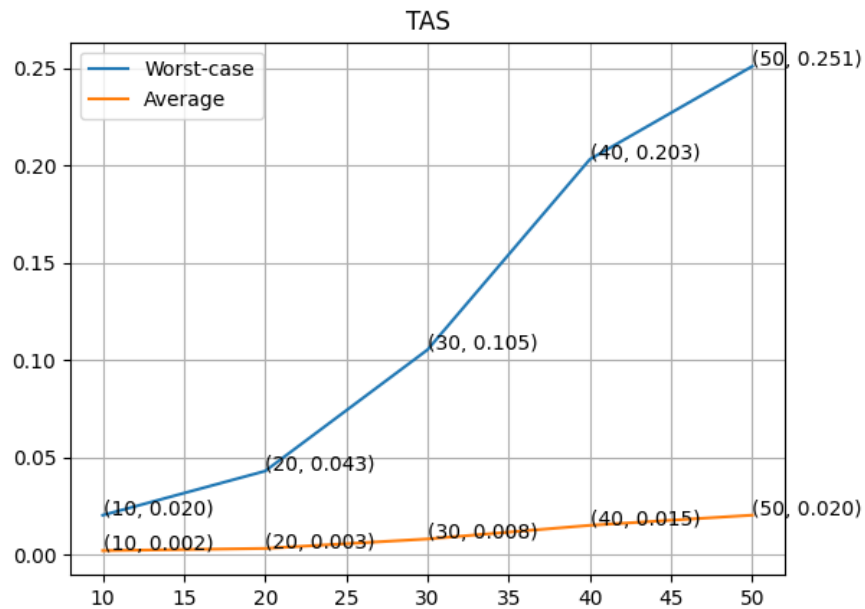
2. CAS

- Worst case and average diverge due to unbounded waiting
- Extremely low waiting time due to CPU optimizations.

CAS

3. BCAS

- Worst case and average do not diverge due to bounded waiting
- However, waiting time is much higher than others because the thread receiving ownership of the lock may be swapped out.
- Alternatively, the scheduler may, through aging etc., ensure some semblance of boundedness in the other two far more efficiently than the manual implementation in BCAS.

BCAS

	(50, 0.973)
	(40, 0.496) (50, 0.483)
	(30, 0.267)
	(20, 0.117) (30, 0.139) (40, 0.128)
(10, 0.007)	(20, 0.027)

Legend: Worst-case, Average

4. Average

- The average time for BCAS is much higher, due to aforementioned reasons.
- TAS and CAS have nearly identical graphs, due to similarity of internal implementation.
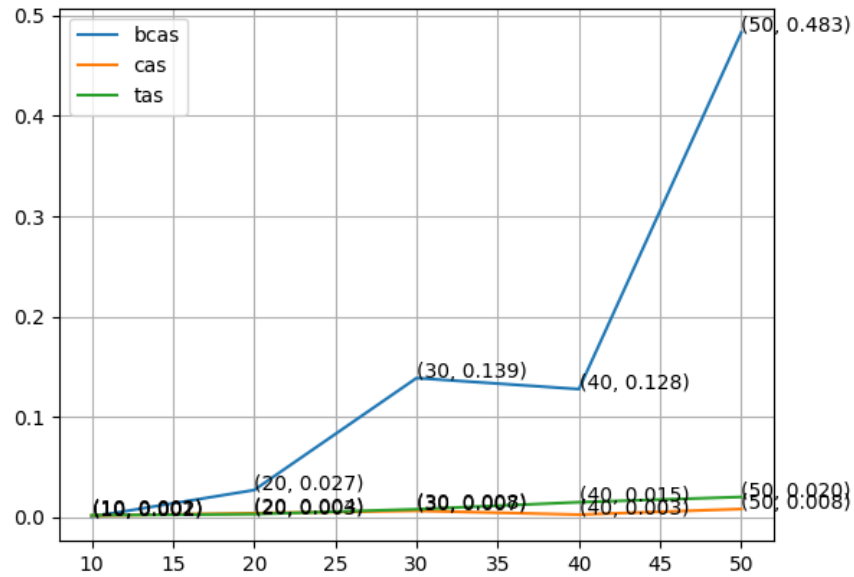
5. Worst-case

- For CAS and TAS, the worst-case is $\sim 10\times$ the average, since the sleep duration is exponential.
- For BCAS, due to naive scheduling, the bottleneck is the thread polling and not the critical section itself, so the average is much closer to the worst-case.