

# Classical IPC Problems

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*In computer science, the readers-writers problems are examples of a common computing problem in concurrency. There are at least three variations of the problems, which deal with situations in which many concurrent threads of execution try to access the same shared resource at one time.*

*Some threads may read and some may write, with the constraint that no thread may access the shared resource for either reading or writing while another thread is in the act of writing to it.*

## First readers-writers problem

We have a shared memory (critical area) which can be protected by mutual exclusion (mutex). This means no two threads can access the area at the same time. This is not optimal, because even if two threads just want to read the area at the same time, the data will be locked for the second thread until the first one finishes reading. This is the motivation for the first readers-writers problem. Another constraint is added to allow readers should not be waiting on an area which is open for reading. --> *readers preference*

## Second readers-writers problem

The first solution is sub-optimal because it could happen that a writer is waiting for a reader to unlock an area and meanwhile other readers are jumping in, thus letting the writer starve. This is the motivation for the second rwp, no writer that is placed in the queue, shall be waiting longer than necessary. --> *writers preference*

## Third readers-writers problem

In fact the second solution can lead to starvation of readers because they are not allowed to intervene other writers and only the last writer releases the semaphore. The third rwp adds a constraint that no thread shall be allowed to starve. The operation of obtaining a lock on shared data will always terminate in a certain amount of time.

Other classical ipc-problems such as the dining philosophers or the sleeping barber problem describe a potential problem in which a deadlock occurs, thus are motivations to find solutions for these deadlocks. The readers writers problem on the other hand is about when readers and writers should be allowed to access a critical area and lock or unlock it respectively.