Assignment 3

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Readers-Writers Problem

1. The time values are given in our benchmark measurement (ns), in image 1 below:

```
hamza@ubuntu:~/Desktop$ ./ass3
glob value 3000

Avg. Read time 132.669433
Max Read time 40664.000000
Min Read time 0.000000

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Avg. Write time 38505829.693333
Max Write time 999990415.000000
Min Write time 0.000000
```

Image 1: Reader Starving

There is a starvation problem since the time taken to write is larger than the time taken to read. This is because the semaphore: *rw_mutex*, is utilized for longer by the CPU in write, and this unfair distribution of resources leads to starvation for the reader. This was concluded by comparing the average write time with the average read time, from this it can be seen that: *(avg write time) > (avg read time).*

2. There is starvation.

3. Solved by creating a third semaphore, queue which preserves the ordering of requests.

4. From image 2 below, it can be seen that the starvation problem has been solved, since:

(avg read time) > (avg write time).

```
hamza@ubuntu:~/Desktop$ ./ass3q2
glob value 3000

Avg. Read time 493204080.868467
Max Read time 999902202.000000
Min Read time 0.000000


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Avg. Write time 14448285.540000
Max Write time 572384624.000000
Min Write time 0.000000
```

Image 2: Starvation solved