

Thread Synchronization

Prof. Jin-Soo Kim(jinsookim@skku.edu)
TA – Jinhong Kim(jinhong.kim@csl.skku.edu)
Computer Systems Laboratory
Sungkyunkwan University
<http://csl.skku.edu>



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Examples

Example 1

- **Make program**
 - 5 Reader + 1 Writer
 - Writer updates value 1,000,000 times
 - Each reader reads value 10,000,000 times
- **Use pthread_mutex**

Example 2

- **Implement same thing using pthread_spinlock**
 - pthread_spinlock_t s
 - pthread_spin_init(&s, PTHREAD_PROCESS_PRIVATE)
 - pthread_spin_[un]lock(&s)
 - pthread_spin_destroy(&s)

- **What is the difference?**

Readers-Writer Lock

- **Reader blocks other reader**
 - Do we need this?
- **Implementation**
 - Using two mutexes (r , g)
 - The counter b tracks the number of blocking readers
 - One mutex r protects b and is only used by readers
 - The other mutex g ensures mutual exclusion of writers

Readers-Writer Lock

■ Pseudocode

Begin Read

- Lock r .
- Increment b .
- If $b = 1$, lock g .
- Unlock r .

End Read

- Lock r .
- Decrement b .
- If $b = 0$, unlock g .
- Unlock r .

Begin Write

- Lock g .

End Write

- Unlock g .

Example 3

- Implement same thing with readers-writer lock