Algorithm 6.21: Readers and writers with semaphores

semaphore readerSem ← 0, writerSem ← 0

integer delayedReaders ← 0, delayedWriters ← 0

semaphore entry ← 1

integer readers ← 0, writers ← 0

SignalProcess

if writers = 0 and delayedReaders > 0

 delayedReaders ← delayedReaders − 1

 signal(readerSem)

else if readers = 0 and writers = 0 and delayedWriters > 0

 delayedWriters ← delayedWriters − 1

 signal(writerSem)

else signal(entry)

StartRead

p1: wait(entry)

p2: if writers > 0

p3:   delayedReaders ← delayedReaders + 1

p4:   signal(entry)

p5:   wait(readerSem)

p6: readers ← readers + 1

p7: SignalProcess

EndRead

p8: wait(entry)

p9: readers ← readers − 1

p10: SignalProcess

StartWrite

p11: wait(entry)

p12: if writers > 0 or readers > 0

p13: delayedWriters ← delayedWriters + 1

p14: signal(entry)

p15: wait(writerSem)

p16: writers ← writers + 1

p17: SignalProcess

EndWrite

p18: wait(entry)

p19: writers ← writers − 1

p20: SignalProcess