**Kennesaw State University**

**College of Computing and Software Engineering**

**DEPARTMENT OF COMPUTER SCIENCE**

**CS 3502 / Operating Systems / Section 01**

**Assignment 3**

**Alex Kimbell /** [**jkimbel2@students.kennesaw.edu**](mailto:jkimbel2@students.kennesaw.edu)

**October 3rd, 2017**

**Summary and Purpose of the Assignment**

The purpose of the assignment is to study the behavior of synchronization by comparing the Producer/Consumer and Readers/Writers problems and altering the parameters to their solutions.

**Results**

Consprod Default

Simulation of Consumer-Producer Problem

-----------------------------------------------------------

Psim3 project: Consumer-Producer Synchronization

Simulation date: Fri Sep 29 14:47:45 2017

-------------------------------------------------------------

Mutex Sem % usage: 0.297574 avg num items used: 1

% of time spent in res usage: 0.297574

% of time spent waiting: 0.0150793

-------------------------------------------------------------

-------------------------------------------------------------

Full Sem

Number of operations requesting items: 27

Maximum number of items: 24, avg num free items: 17.9766

--------------------------------------------------------

-------------------------------------------------------------

Empty Sem

Number of operations requesting items: 51

Maximum number of items: 24, avg num free items: 12.6783

Avg waiting time: 23.1021Avg. num waiting processes: 1

--------------------------------------------------------

Bounded- Buffer Simulation Results:

Producer total wait time: 494.288

Consumer total wait time: 52.1813

-------------------------------------------------------------

End of simulation Consumer-Producer Synchronization Fri Sep 29 14:47:45 2017

Reawrit Default

Psim3 project: Concurrent Readers/Writers Problem

Simulation date: Tue Oct 3 11:53:56 2017

-------------------------------------------------------------

MUTEX % usage: 0.311212 avg num items used: 1

% of time spent in res usage: 0.311212

% of time spent waiting: 0.260102

-------------------------------------------------------------

-------------------------------------------------------------

WRT

Number of operations requesting items: 129

Maximum number of items: 1, avg num free items: 0

Avg waiting time: 2.15934Avg. num waiting processes: 42.1188

--------------------------------------------------------

Total readers that arrived: 130

Total writers that arrived: 94

Total readers that completed: 130

Total writers that completed: 94

Average readers wait period: 18.0479

Average writers wait period: 8.72803

-------------------------------------------------------------

End of simulation Concurrent Readers/Writers Problem Tue Oct 3 11:53:56 2017

Reawrit Inter-Arrival Decrease

Psim3 project: Concurrent Readers/Writers Problem

Simulation date: Tue Oct 3 12:01:49 2017

-------------------------------------------------------------

MUTEX % usage: 0.336619 avg num items used: 1

% of time spent in res usage: 0.336619

% of time spent waiting: 0.302014

-------------------------------------------------------------

-------------------------------------------------------------

WRT

Number of operations requesting items: 125

Maximum number of items: 1, avg num free items: 0

Avg waiting time: 2.13635Avg. num waiting processes: 30.3139

--------------------------------------------------------

Total readers that arrived: 321

Total writers that arrived: 90

Total readers that completed: 321

Total writers that completed: 90

Average readers wait period: 13.0404

Average writers wait period: 5.47077

-------------------------------------------------------------

End of simulation Concurrent Readers/Writers Problem Tue Oct 3 12:01:49 2017

**Conclusion**

Semaphores and synchronization policies are very important and having a better understanding of them results in being able to tune a system to its fullest capabilities.

**Assignment Questions**

1. What are the main differences between the two models and with the previous models?
   * The previous models have all allowed for the easy changing of parameters at run time. These models however have to be altered in the files themselves to change the outcomes.
2. Explain how synchronization affects the behavior of the processes in the simulation run.
   * Synchronization can affect the speed at which the simulation runs, both negatively and beneficially.
3. Identify the "slower" process in the simulation runs.
   * The reader/writer is slower as it spends more time waiting than producer/consumer.
4. What aspect of an operating system is the model representing?
   * The models represent the synchronization of the OS and how the OS manages shared resources.
5. What performance measures does the model compute?
   * Wait time
6. What is noticeable in the dynamic behavior of the system?
   * I did not notice too much dynamic behavior as most of the parameters are set.
7. What other performance measures can this model compute?
   * It can measure overall synchronization and semaphore performance.