Experimentation and Analysis

Usage: ./assign1 <producers> <consumers> <products> <Q size> <algo type> <quantum> <seed>

First Come First Serve

10 producers 10 consumers 5 products 10 size queue
./assign1 10 10 5 10 0 2 50

Total processing time: 0.105555s
Producer throughput: 2949.97prods/m
Consumer throughput: 2849.22prods/m
Turn-around Min: 0.00061202, Max: 0.00166178, Average: 0.00109696
Wait Min: 0.000266075, Max: 0.00130296, Average: 0.00078063

100 producers producing 100 products for 10 consumers
./assign1 100 10 100 10 0 2 50

Total processing time: 1.08371s
Producer throughput: 6113.39prods/m
Consumer throughput: 5542.84prods/m
Turn-around Min: 0.0515471, Max: 0.107519, Average: 0.0976963
Wait Min: 0.051018, Max: 0.107285, Average: 0.0973731

100 producers producing 100 products for 1000 consumers
./assign1 100 1000 100 10 0 2 50

Total processing time: 0.517159s
Producer throughput: 12010.9prods/m
Consumer throughput: 23577.2prods/m
Turn-around Min: 0.000157118, Max: 0.348017, Average: 0.0393163
Wait Min: 4.91142e-05, Max: 0.347777, Average: 0.0390332

100 producers producing 100 products for 1000 consumers but the queue only holds one product
./assign1 100 1000 100 1 0 2 50

Total processing time: 0.278641s
Producer throughput: 21889.8prods/m
Consumer throughput: 21616.6prods/m
Turn-around Min: 0.000103951, Max: 0.044488, Average: 0.00188759
Wait Min: 3.60012e-05, Max: 0.044008, Average: 0.00128779

./assign1 100 1000 5000 100 0 100 50
Total processing time: 5.34533s
Producer throughput: 56171.8prods/m
Consumer throughput: 56131.9prods/m
Turn-around Min: 8.39233e-05, Max: 0.453544, Average: 0.00570556
Wait Min: 1.3113e-05, Max: 0.0312519, Average: 0.00423585

Round Robin
Same tests as fcfs but with 100 quantum

./assign1 10 10 5 10 1 100 50
Total processing time: 0.917735s
Producer throughput: 2914.63prods/m
Consumer throughput: 326.921prods/m
Turn-around Min: 0.408654, Max: 0.816474, Average: 0.714432
Wait Min: 1.02232, Max: 3.67593, Average: 2.98134

./assign1 100 10 100 10 1 100 50
Total processing time: 6.41984s
Producer throughput: 1068.22prods/m
Consumer throughput: 960.67prods/m
Turn-around Min: 0.100409, Max: 2.13397, Average: 1.06053
Wait Min: 0.102208, Max: 18.9022, Average: 7.33563

./assign1 100 1000 100 10 1 100 50
Total processing time: 1.23703s
Producer throughput: 5240.84prods/m
Consumer throughput: 4853.65prods/m
Turn-around Min: 0.000931025, Max: 1.07057, Average: 0.525948
Wait Min: 0.000873089, Max: 5.98741, Average: 1.99411

./assign1 100 1000 100 1 1 100 50
Total processing time: 1.13473s
Producer throughput: 5711.09prods/m
Consumer throughput: 5293.11prods/m
Turn-around Min: 7.79629e-05, Max: 1.01312, Average: 0.491742
Wait Min: 3.50475e-05, Max: 5.5774, Average: 1.85043

./assign1 100 1000 5000 100 1 100 50
Total processing time: 6.71206s
Producer throughput: 45302.5prods/m

Consumer throughput: 44704.8prods/m
Turn-around Min: 3.91006e-05, Max: 2.6597, Average: 0.528049
Wait Min: 2.59876e-05, Max: 30.1071, Average: 6.84545

50 quantum
./assign1 100 1000 5000 100 1 50 50
Total processing time: 8.01409s
Producer throughput: 55415.9prods/m
Consumer throughput: 37439prods/m
Turn-around Min: 7.41482e-05, Max: 2.77954, Average: 1.07314
Wait Min: 3.69549e-05, Max: 61.2606, Average: 17.4081

In the case with first come first serve we have higher throughputs overall and lower turnaround time because the products only live once in the queue compared to being put back. Same with wait time being higher for the same reasons. In any case where the consumer throughput is low for round robin the overall process time is extremely high compared to the fcfs. However in situations where throughput is nearly equal the overall process time almost matches fcfs. Round robin fairly deals with starvation at the cost of waiting and turn around but when proportionally more consumers are allowed the process is nearly equal to the same situation with fcfs. This is demonstrated in the last test for both.As a bonus I did a test with quantum halved which resulted in more process and wait time as expected.