Help Session [HW4]

CS 370 (Operation system)

Fall 2018

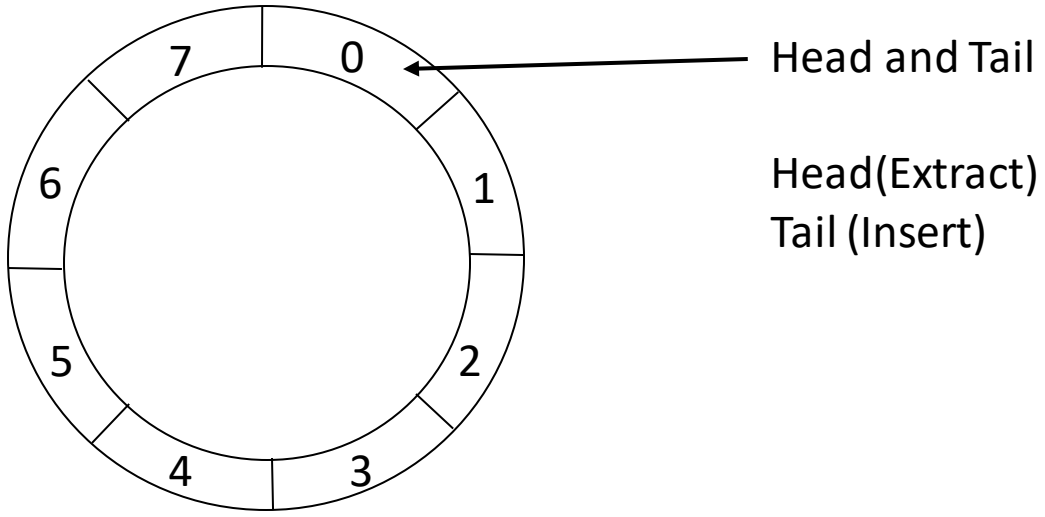
Assignment Review

Producer-Consumer Problem

- Synchronization among multiple Java Threads
- One Producer, One Consumer
- Bounded Circular Buffer

Bounded Buffer

- Capacity of the Buffer should be exactly 1000 elements
- FIFO
- Single Instance of Buffer used by both Producer and Consumer



Producer

- Generates a random number

```
Random random = new Random();
Double bufferElement = random.nextDouble() * 100.0;
```

- Insert elements to the Buffer
- If the Buffer is full, wait for consumer to consume at-least one item
- Required to produce 1,000,000 elements in total
- Maintains sum of every produced item

Consumer

- Consumes elements from Buffer in the same order as inserted
- If Buffer is empty, wait for Producer to produce at-least one element
- Maintaines sum of every consumed items

Creating Thread

- Can use ‘extends Thread’ or ‘implements Runnable’
- Use ‘synchronized’ to make sure that Buffer is accessed concurrently without conflict
- Use Thread.join() to specify driver to wait for completion of a Thread

Sample Code:

```
synchronized (buffer) {
buffer.add(i);
buffer.notify(); }
```

Correctness Verification

- To verify the correctness of your program both the producer and consumer are required to maintain running totals of the values of the items added-to/removed-from the buffer.
- Example

Consumer: Consumed 100,000 items, Cumulative value of consumed items=4996680.774

Producer: Generated 100,000 items, Cumulative value of generated items=4996680.774

- Producer consumer reports sum of total produced/consumed items every 100,000 items

Restrictions

- 10-point deduction if you use an unbounded buffer for this assignment or if your buffer holds more than 1000 items at a time
- 9-point deduction if you use Thread.sleep() to synchronize access to the buffer. You can only use wait() and notify() as the primitives to synchronize access to the buffer
- 10-point deduction if you use any classes from the java.util.concurrent package
- 10-point deduction if you use external libraries
- 8-point deduction if you use boolean flag to toggle between producer and consumer

Submission

- single .zip file that contains:
  - All Java files related to the assignment
  - a Makefile that performs both a make clean as well as a make all,
  - a README.txt file containing a description of each file and any information you feel the grader needs to grade your program
- You should call the Class that drives your program ProducerConsumer
- The archive file should be named as <Lastname>-<Firstname>-HW4.zip

[Do not submit the src folder from your eclipse project just the zip containing above mentioned files]