【2018 JAVA 物件導向程式設計 Homework 11】

● 注意事項

1. 請使用 JAVA 語言，配合IntelliJ IDEA 寫本次作業並進行測試，並安裝、使用 JAVA SE Development Kit(JDK) 8 函式庫。

2. 請依據作業規定設定 IntelliJ IDEA 專案名稱與 package name，若未依照規定將根據狀況扣分。

3. 嚴禁抄襲其他同學作業，參與者(抄襲與被抄襲)**本學期總成績不及格**處理。

4. 請對你的程式碼有深入瞭解，demo 時助教會問。

5. 對題目有問題可以寄信問助教群(java_ta@net.nsysu.edu.tw)或是到實驗室(EC5018)詢問，但不幫忙 debug。

6. 逾期以零分計算，不接受補交，有任何因素導致無法如期繳交，請事先告知；Demo 時間會另外通知。

● 作業規定與上傳

1. IntelliJ IDEA 專案名稱:<學號>_HW11

2. Package path：myjava.homework

3. 作業請繳交專案之 tar 或 zip archive 並上傳至網路大學。

4. 請於 2018 年 5 月 31 日(週四) 23:59 前上傳完畢，逾期以零分計算，不接受補交，再次強調，有任何因素導致無法如期繳交，請事先告知，Demo 時間另外通知。

- **Homework Explanation**

1. Consider multithreading application of Producer-Consumer problem. There are two producer-consumer pairs, and they share a common buffer :

   Producer 1 generates number 1~10

   Consumer 1 reads number 1~10

   Producer 2 generates number 11~20

   Consumer 2 reads number 11~20

2. Implement synchronizing access using the Lock and Condition interface, and you cannot use "`synchronized`" to do this work.

3. You will use *await, signal, signalAll* methods in this homework. Also implement your own bounded buffer as a circular buffer, and buffer size is an input parameter.

- **Sample Output**

此範例輸出為 buffer size = 3, 且僅有一對生產者-消費者之情形, 故和本題輸出並不相同, 但同學需參考下列輸出格式為本題輸出格式

```
Initial State (buffer cells occupied: 0)
buffer cells:    -1    -1    -1
                ---- ---- ----
                 WR

Producer writes 1 (buffer cells occupied: 1)
buffer cells:     1    -1    -1
                ---- ---- ----
                  R    W
```

```
Consumer reads 1 (buffer cells occupied: 0)
buffer cells:    1    -1    -1
                ----  ----  ----
                      WR

Buffer is empty. Consumer waits.
Producer writes 2 (buffer cells occupied: 1)
buffer cells:    1     2    -1
                ----  ----  ----
                 R     W

Consumer reads 2 (buffer cells occupied: 0)
buffer cells:    1     2    -1
                ----  ----  ----
                      WR

Producer writes 3 (buffer cells occupied: 1)
buffer cells:    1     2     3
                ----  ----  ----
                 W           R

Consumer reads 3 (buffer cells occupied: 0)
buffer cells:    1     2     3
                ----  ----  ----
                WR


Producer writes 4 (buffer cells occupied: 1)
buffer cells:    4     2     3
                ----  ----  ----
                 R     W

Producer writes 5 (buffer cells occupied: 2)
buffer cells:    4     5     3
                ----  ----  ----
                 R           W

Consumer reads 4 (buffer cells occupied: 1)
buffer cells:    4     5     3
                ----  ----  ----
                 R     W

Producer writes 6 (buffer cells occupied: 2)
buffer cells:    4     5     6
                ----  ----  ----
                 W     R

Producer writes 7 (buffer cells occupied: 3)
buffer cells:    7     5     6
                ----  ----  ----
                      WR
```

```
Producer writes 9 (buffer cells occupied: 2)
buffer cells:    7    8    9
                ---- ---- ----
                 W    R

Consumer reads 8 (buffer cells occupied: 1)
buffer cells:    7    8    9
                ---- ---- ----
                 W         R

Consumer reads 9 (buffer cells occupied: 0)
buffer cells:    7    8    9
                ---- ---- ----
                 WR

Producer writes 10 (buffer cells occupied: 1)
buffer cells:   10    8    9
                ---- ---- ----
                 R    W
```

```
Producer done producing
Terminating Producer
Consumer reads 10 (buffer cells occupied: 0)
buffer cells:   10    8    9
                ---- ---- ----
                      WR


Consumer read values totaling: 55
Terminating Consumer
```