

【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