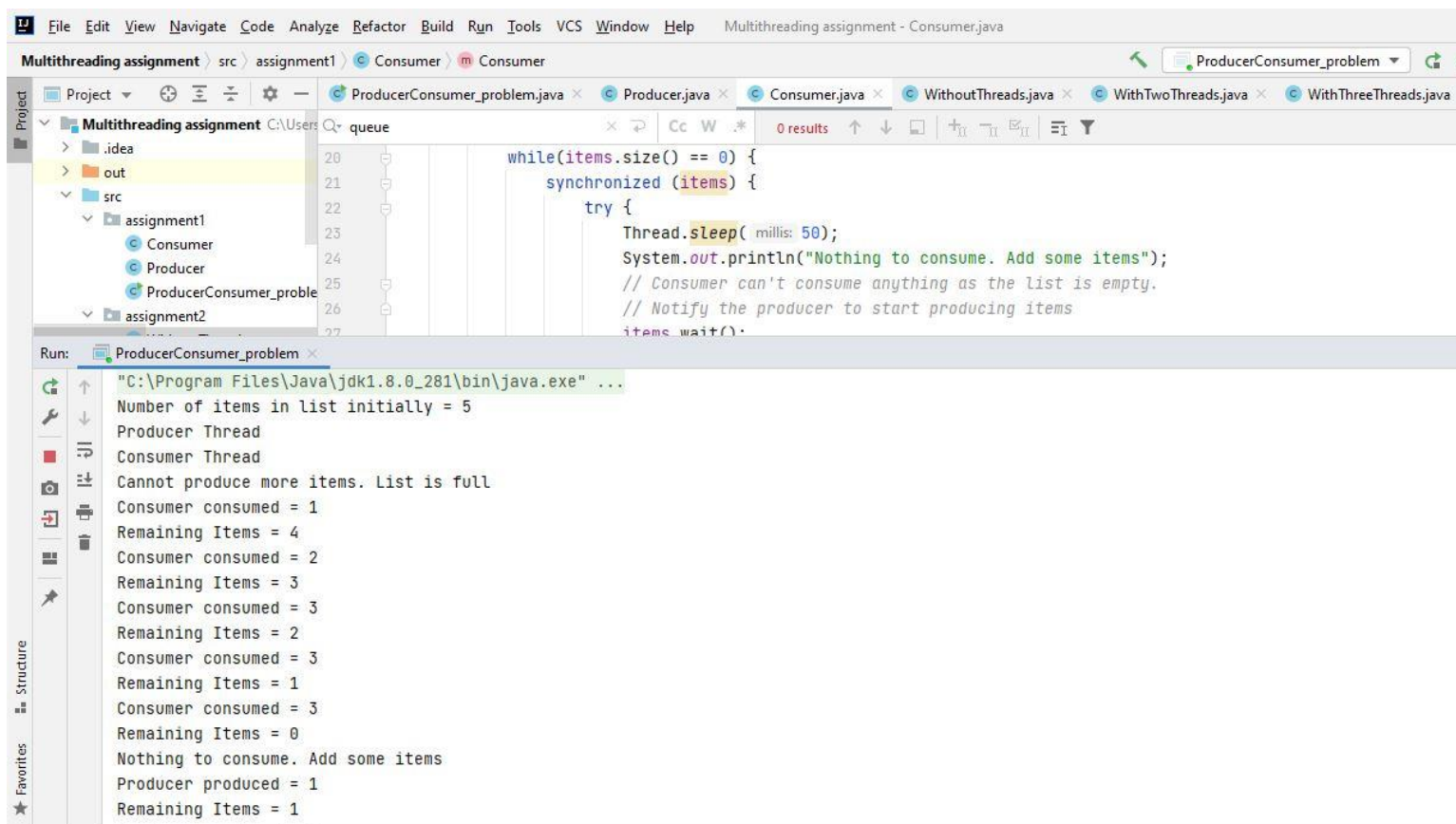


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SAU 2021: Multi-Threading Assignment

1: Producer Consumer problem:



```
File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help Multithreading assignment - Consumer.java

Multithreading assignment > src > assignment1 > Consumer > Consumer

Project
  Multithreading assignment C:\Users\...
    .idea
    out
    src
      assignment1
        Consumer
        Producer
        ProducerConsumer_problem
      assignment2

queue
20 while(items.size() == 0) {
21     synchronized (items) {
22         try {
23             Thread.sleep( millis: 50);
24             System.out.println("Nothing to consume. Add some items");
25             // Consumer can't consume anything as the list is empty.
26             // Notify the producer to start producing items
27             items.wait();
28         } catch (InterruptedException e) {
29             e.printStackTrace();
30         }
31     }
32 }

Run: ProducerConsumer_problem
"C:\Program Files\Java\jdk1.8.0_281\bin\java.exe" ...
Number of items in list initially = 5
Producer Thread
Consumer Thread
Cannot produce more items. List is full
Consumer consumed = 1
Remaining Items = 4
Consumer consumed = 2
Remaining Items = 3
Consumer consumed = 3
Remaining Items = 2
Consumer consumed = 3
Remaining Items = 1
Consumer consumed = 3
Remaining Items = 0
Nothing to consume. Add some items
Producer produced = 1
Remaining Items = 1
```

2: Count number of words in a string:

a) Without Threads: **Time taken to execute = 73ms**

c) Using 4 threads : **Time taken to execute : 7ms**

The screenshot displays an IDE window titled "Multithreading assignment - WithFourThreads.java". The left sidebar shows a project structure with a folder "Multithreading assignment" containing subfolders "src" and "out". The "src" folder contains files "assignment1", "Consumer", "Producer", "ProducerConsumer_problem", "assignment2", "WithFourThreads.java", "WithoutThreads.java", "WithTwoThreads.java", and "WordCounter". The "assignment2" folder is expanded, showing "WithFourThreads.java" selected.

The main editor shows the code for "WithFourThreads.java". The code defines four threads (fthread, sthread, trd3, trd4) and starts them. It then calculates the time taken to count words with 4 threads and prints the result.

```
105  
106  
107  
108 String str3 = str1;  
109 String str4 = str2;  
110 thread1 fthread = new thread1(str1);  
111 thread2 sthread = new thread2(str2);  
112 third_thread trd3 = new third_thread(str3);  
113 fourth_thread trd4 = new fourth_thread(str4);  
114 fthread.start();  
115 sthread.start();  
116 trd3.start();  
117 trd4.start();  
118 long finalTime = System.currentTimeMillis();  
119 long diff = finalTime - initialTime;  
120 System.out.println("Time taken to count words with 4 threads = " + diff + "ms");  
121  
122
```

The bottom panel shows the "Runs" tab with the output of the program:

```
Time taken to count words with 4 threads = 7ms  
No of words = 389  
No of words = 356  
No of words = 389  
No of words = 356  
  
Process finished with exit code 0
```

The bottom status bar indicates "All files are up-to-date (moments ago)" and "Event Log" with the time "11:51".