PDP homework 2 Documentation - Mos Daniele 935

Github repository:

https://github.com/Daniele1209/University-year-3-projects/tree/main/Parallel and distributed programming/Lab2 producer-consumer

Classes used:

- Consumer
  - has a final sum parameter to help compute the dot product
  - operation counter to keep count of the current operation done in the producer thread
- Producer
  - has the 2 arrays

- We declare 2 queues: workQueue and finishQueue which are synchronized queue classes from the queue library
- Use 2 threads, one for producer and another for consumer which take as arguments the queues declared earlier
- We start the threads which use the 'run' function of each object
- The producer run function we enqueue the False bool - used to keep track if the producer thread finished in consumer

- Go one by one element in both arrays and compute the product, enqueued in the workQueue afterwards
- In the consumer run function we go one by one in the range of array length, check if the worker queue in empty and if not execute a get operation on the workQueue
- Compute the sum of the product, saved in the finalSum variable
- If the queue is empty we check if the last element in the finish queue is True or not, if it is stop the run function
- In the end execute a thread join for the producer and consumer

Run example:

- array1 = [1, 2, 3, 4]
- array2 = [5, 6, 7, 8]

```
PRODUCER -> 1 * 5
PRODUCER -> 2 * 6
PRODUCER -> 3 * 7
CONSUMER -> product at position: 0 = 5
CONSUMER -> Sum = 5
CONSUMER -> product at position: 1 = 12
PRODUCER -> 4 * 8
CONSUMER -> Sum = 17
CONSUMER -> product at position: 2 = 21
Producer finished !
CONSUMER -> Sum = 38
CONSUMER -> product at position: 3 = 32
CONSUMER -> Sum = 70
Consumer finished !
Main thread has finished !
```