Lab 2 – Producer/consumer problem

There are two threads, the producer and the consumer. The producer computes the products of the pairs of numbers read from a file and pushes them to the buffer, whereas the consumer reads the products from the buffer and sums them up. The two basically compute the dot product (scalar product) of two vectors.

A unique lock makes use of the RAII mechanism of C++, which means that the mutex is automatically unlocked when the execution of the program goes out of scope (this unique_lock is necessary, because a conditional variable in C++ requires as a parameter a mutex wrapped in a unique lock).
The conditional variable synchronizes the two threads by making one wait until the other sends a notification to resume the execution of the other.

Platform:
Laptop: ASUS Strix 15 GL503GE
OS: PopOS 21.04
Kernel: x86_64 Linux 5.13.0-7614-generic
CPU: Intel Core i7-8750H @ 12x 4.1GHz [70.0°C]
GPU: NVIDIA GeForce GTX 1050 Ti
RAM: 6461MiB / 7804MiB

Benchmark:
1000 pairs → 3.01305 seconds
10000 pairs → 3.16186 seconds
100000 pairs → 4.8379 seconds