April 23rd, 2025

Oblig 5: Synchronization

Mandatory Assignment 5 in IN3030 / IN4330 - v2025

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Deadline: April 29th, 2025 23:59:00

This oblig is about implementation of one synchronization primitive using another.

You are to implement a variant of waitNext from 2023's exam.
You are welcome to base your solution on the published WaitNextC.java.

You are to write a program that implements a new synchronization primitive called waitAndSwap3 with the following semantics:
When a thread makes the first call of waitAndSwap3, it waits. When a second thread calls waitAndSwap3, it waits. When a third thread calls waitAndSwap3, it waits. When a fourth thread calls waitAndSwap3, it releases the third thread and then the second thread and then the first thread whereafter it waits. When a fifth thread calls waitAndSwap3, it waits. When a sixth thread calls waitAndSwap3, it waits. When a seventh thread calls waitAndSwap3, it releases the sixth, the fifth and the fourth thread in that order.
And so on for all the following calls to waitAndSwap3.
The effect is that the threads are released from waitAndSwap3 in the following call order:
3, 2, 1, 6, 5, 4, 9, 8, 7, 12, 11, 10, …
We can say that the threads are "swapped" as groups of three.

You are welcome to base your solution on the published WaitNextC.java.

You are to write a test program that demonstrates that your waitAndSwap3 works.
You are welcome to do this using the test output method debugPrintln and the variSpeed method from the WaitNextC.java program.

Hand in the test program including the implementation of waitAndSwap3 and suitable output showing your synchronization method works as intended. Explain in a report that follows the report guidelines.

NOTE: you are to use only semaphores for synchronization and you can use *only* the acquire and release methods except that you can use access methods such as availablePermits but *only inside test output* similar to the printSems method.

IMPORTANT: there must be substantial amounts of code and a good deal of the report done before you can qualify for a second try. This means that if either the code or the report is missing, you will automatically fail with no offer of a second try.