<u>Title</u>
Laundry Service

<u>Topics Covered</u>
Multi-Threaded Programming Design
Synchronization Programming

<u>Introduction</u>
A laundry service needs to wash and dry loads for each customer. Each customer will come in with a bag of dirty clothes of size small, medium, or large, and give it to the attendant. The attendant is responsible for putting the load on a conveyor belt on which the clothes will be taken to wash and dry. After the laundry is washed and dried, the attendant returns the freshly cleaned clothes from the conveyor belt back to the customer. Finally, the laundry service manager wants to record the time it takes to process each order individually, and the total time it takes to process all of the orders.

<u>Assignment</u>
For this assignment, you will be provided with a JSON file containing the list of laundry loads. The first step is to accept each load at the cash register. This should take **1 second** per load, regardless of size. Loads should be taken in order, and the timing to process that load should begin after the 1 second at the register.

```
{
        "Loads" : [
                "Small",
                "Medium",
                "Large",
                "Large",
                "Large"
        ]
}
```

The laundry service has designated washing machines/dryers for each size of load, so that each load can be processed in its entirety at one time. The details are as follows:

Washing Machine/Dryer (Small): 5 sets total, 2 seconds to wash and dry
Washing Machine/Dryer (Medium): 3 sets total, 3 seconds to wash and dry
Washing Machine/Dryer (Large): 2 sets total, 5 seconds to wash and dry

For the purposes of this assignment, assume that the washing machine and dryer are one machine (e.g. To process a small load of laundry, it takes **2 seconds total** to wash and dry, **not** 2 seconds to wash and another 2 seconds to dry). Additionally, it takes **1 second** for the attendant to transfer a load from one place to another, regardless of the load's size.

Your task is to implement the entire cycle of a load of laundry:

1. Accept the order at the register.
2. Begin timing.
3. Have the attendant take the load and put it on the conveyor belt.
4. Wash and dry the load.
5. Have the attendant take the load off of the conveyor belt and return it to the customer.
6. Conclude timing.

Sample Program

```
9:45:00.00 Starting order 1!
9:45:01.00 Starting order 2!
9:45:02.00 Starting order 3!
9:45:03.00 Starting order 4!
9:45:04.07 Completed order 1!
9:45:04.09 Starting order 5!
9:45:06.03 Completed order 2!
9:45:09.03 Completed order 3!
9:45:10.02 Completed order 4!
9:45:15.12 Completed order 5!
All orders completed!

Order Processing Began At 9:45:00.00.
Order 1 took 00:00:04.07 to process.
Order 2 took 00:00:05.03 to process.
Order 3 took 00:00:07.03 to process.
Order 4 took 00:00:07.02 to process.
Order 5 took 00:00:11.03 to process.
Order Processing Concluded at 9:45:15.12.
Execution took 00:00:15.12.
```

Grading Criteria (4.0%)

0.25% - JSON File I/O

0.25% - Order start/completion print statements

2.5% - Semaphores and locks implementation

1.0% - Program outputs durations correctly