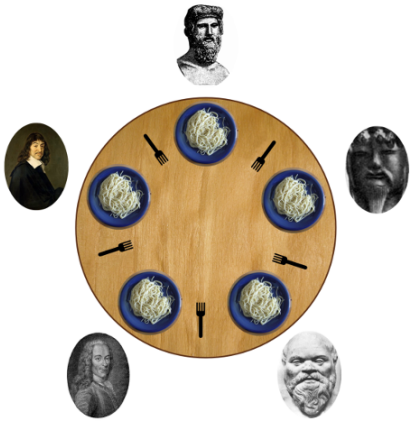
ENGI 7894/9869 Assignment 3
Due Date: July 5, 2016



In the classical Dining Philosophers problem, 5 philosophers are seated around a round table with a fork between each pair. A philosopher may only eat when he/she is holding both forks next to him/her (they're really hungry so use 2 forks to eat instead of 1). A philosopher will alternately think, try to pick up the forks next to him/her, and if successful, start eating, after which he/she starts thinking again. You may suppose there is a limitless supply of food and the philosophers' appetite is also limitless. Now assume that the philosophers don't speak to each other (they are too busy thinking and eating), and that each philosopher follows the protocol below:

1. Think for a random amount of time (between 0 and 10 seconds).
2. Become hungry, so try to pick up left fork.
3. If successful, wait 4 seconds, then try to pick up right fork. Otherwise, keep waiting until the left fork becomes available.
4. If successful in picking up the right fork, begin eating. Otherwise, keep waiting until the right fork becomes available.
5. Eat for a random amount of time (between 0 and 5 seconds).
6. Put down his/her left fork.
7. Put down his/her right fork, and return to step 1.

It can be shown that the above protocol will eventually enter a deadlocked state if run long enough.

For this assignment, you are asked to consider a scenario where instead of just one table with 5 philosophers, there are 5 tables, each with 5 philosophers, and a sixth table where there are no philosophers sitting, but there are also 5 forks placed in the same arrangement as the other tables.

If deadlock occurs at any table, one of the philosophers drops any fork he/she is holding, and moves to a random unoccupied seat at the sixth table. Eventually, the sixth table will also have 5 philosophers seated at it, and therefore, it too will eventually enter a deadlocked state.

In this assignment, you are asked to simulate the above protocol using a thread for each philosopher and determine how long it takes for the sixth table to enter a state of deadlock. Also, assuming the philosophers are initially labelled with the first 25 uppercase letters of the English alphabet, you are asked to output the label of the philosopher who last moved to the sixth table before it became deadlocked.

You may use a simulated clock as instructed in Assignment 2, or a real-time clock for each thread. If you use a real-time clock you may scale all the times above by a constant factor in order to make your simulation run faster.