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Dining Philosophers Project

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Challenges Faced

In attempting to solve the dining philosophers problem, this project caused a few difficulties for us. Our original idea was to only allow philosophers to pick up the left chopstick if not already acquired by a philosopher, and then try to pick up the right chopstick if it's not already picked up. This implementation only allowed for 4 chopsticks to be held by a philosopher at a time to prevent deadlocks. If all 5 chopsticks could be held, then it was possible to run into a situation where all 5 philosophers are each holding one chopstick and thus a deadlock ensues.

Although our initial idea worked in theory, when running a simulation we saw that philosophers 1, 3, and 5 were eating a lot, but philosophers 2 and 4 were either eating very little, or not at all. Although this technically solved the problem, we wanted to optimize this by allowing the philosophers to eat a similar amount of times. This is when we came up with the "star method" so that they take turns eating in a particular order, thus allowing a fair amount of eating and thinking.

The star method solves a lot of problems such as preventing deadlocks, not allowing a philosopher to eat when it's not their turn, and ensuring they all eat an equal amount. However, this solution does not account for if philosophers eat or think for a random amount of time; we assume each philosopher eats and thinks for the exact same amount of time, every time.

Future Optimizations

When two of the philosophers are eating, whichever philosopher is "next to eat" in the wave can pick up their one available chopstick early. This will save little time, but is still an optimization.