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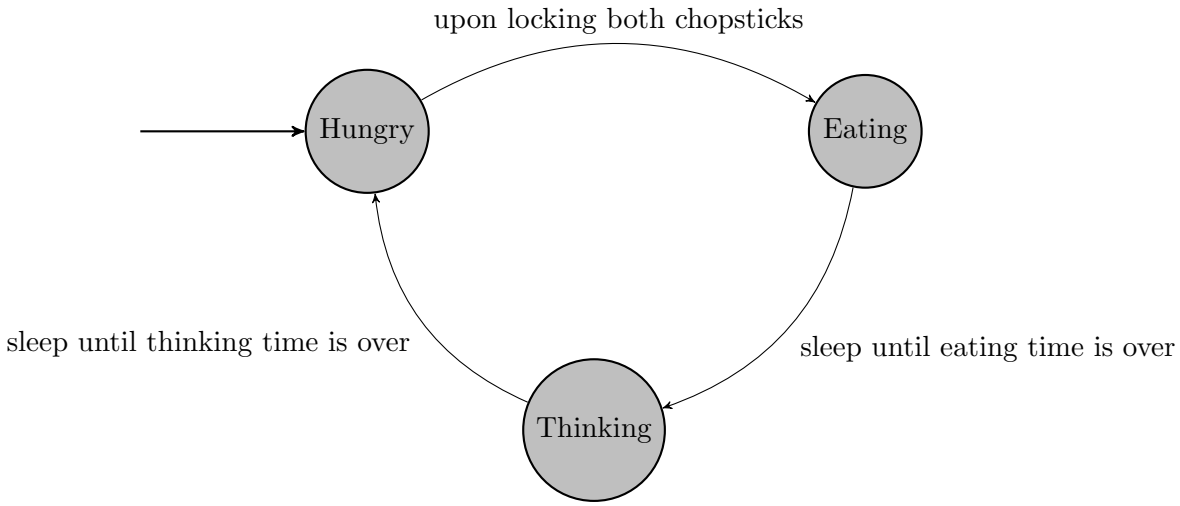
Spring 2017 21402228
Project 1 CS342-2

Solution for the project

In this project the solution for the dining philosophers problem was asked to be implemented. I used pthread_mutex_t's as my chopstick objects and constructed a struct for each philosopher. This struct keeps the pthread id as pthread_t, which philiosopher it is as an integer,the totalHungryTime as a unsigned long int , another unsigned long int to calculate the standard deviation, the generated eat and think times as integers and two pthread mutexes for the chopsticks as well as two timeval structs to measure time. In the main function, I get the arguments given and do an error check. If the program passes this check, then it starts initializing the chopsticks, then initializing the philiosophers then creates a thread. in the end, the main function waits for the threads to join it, then destroys the mutexes and prints out the statistics for each philosopher.
The state diagram for the transitions is given bellow.



Statistics

I ran the program with 11 philosophers (arguments: 11 100 500 100 500 uniform 100). Here are the statistics for each.

Means

- $\mu_1 = 282ms$
- $\mu_2 = 140ms$
- $\mu_3 = 141ms$
- $\mu_4 = 189ms$
- $\mu_5 = 175ms$
- $\mu_6 = 82ms$
- $\mu_7 = 113ms$
- $\mu_8 = 302ms$
- $\mu_9 = 161ms$
- $\mu_{10} = 123ms$
- $\mu_{11} = 642ms$

Standard Deviations

- $\sigma_1 = 428ms$
- $\sigma_2 = 109ms$
- $\sigma_3 = 149ms$
- $\sigma_4 = 235ms$
- $\sigma_5 = 183ms$
- $\sigma_6 = 199ms$
- $\sigma_7 = 113ms$
- $\sigma_8 = 327ms$
- $\sigma_9 = 229ms$
- $\sigma_{10} = 135ms$
- $\sigma_{11} = 184ms$

Plots

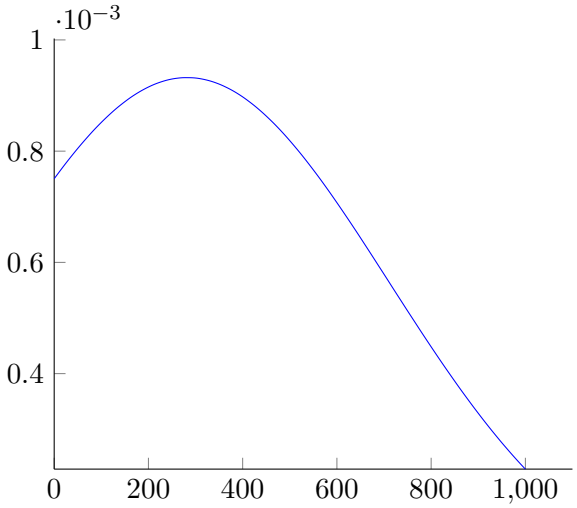


Figure 1: Normal Distributions of hungry time for philosopher 1

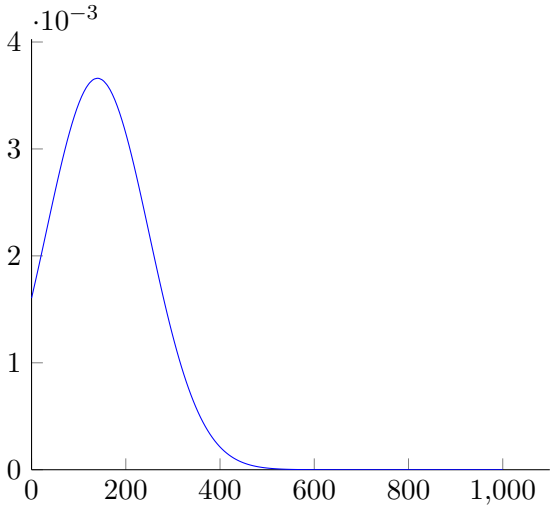


Figure 2: Normal Distributions of hungry time for philosopher 1

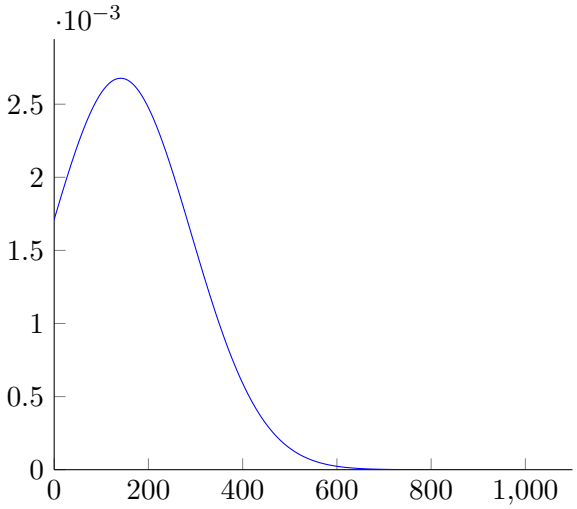


Figure 3: Normal Distribution of hungry time for philosopher 3

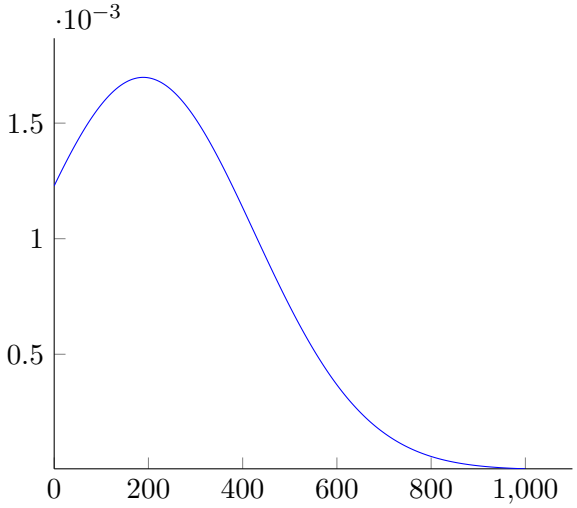


Figure 4: Normal Distribution of hungry time for philosopher 4

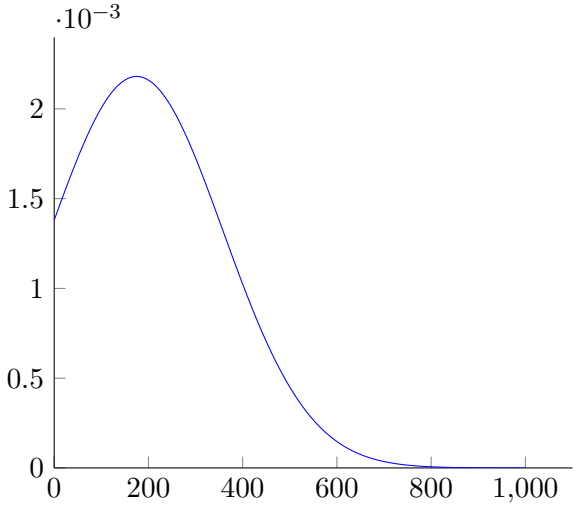


Figure 5: Normal Distribution of hungry time for philosopher 5

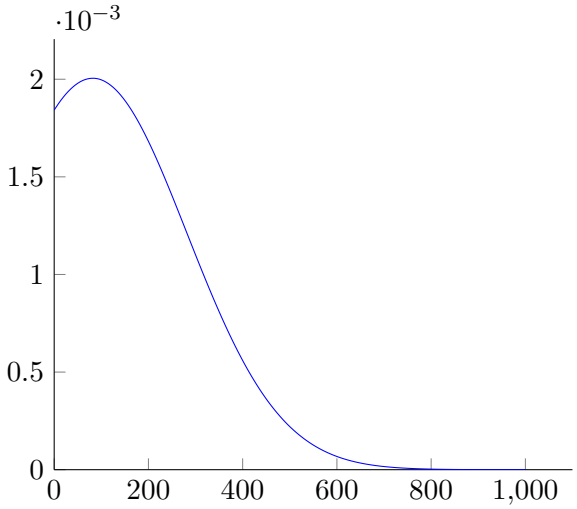


Figure 6: Normal Distribution of hungry time for philosopher 6

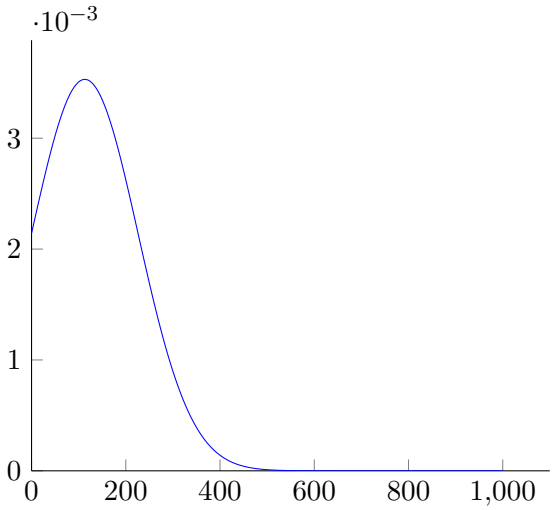


Figure 7: Normal Distribution of hungry time for philosopher 7

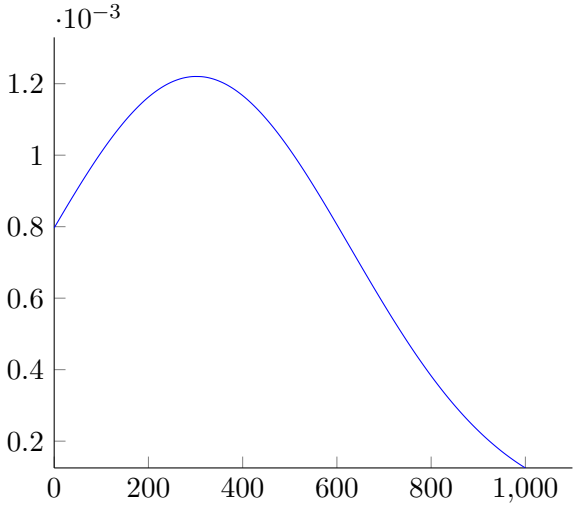


Figure 8: Normal Distribution of hungry time for philosopher 8

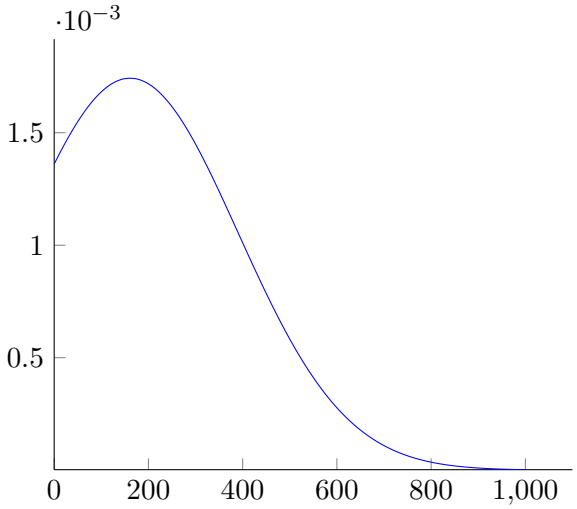


Figure 9: Normal Distribution of hungry time for philosopher 9

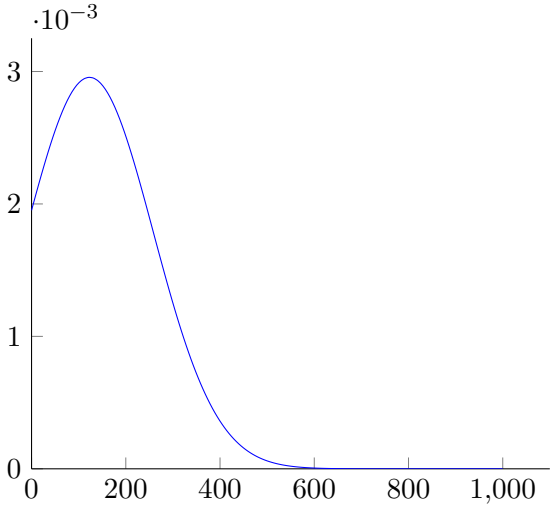


Figure 10: Normal Distribution of hungry time for philosopher 10

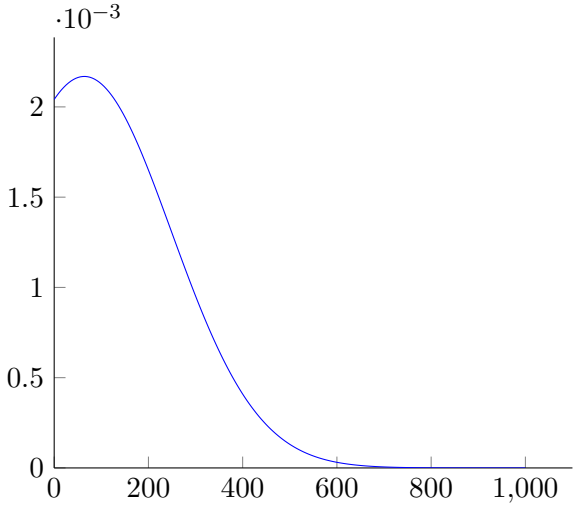


Figure 11: Normal Distribution of hungry time for philosopher 11