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CSC 360

Assignment 2 Design Document

Threads

There is one thread for each clerk and customer. The clerk threads notify the customer threads when they are available and wait for customers to finish their service. The customer threads record simulation time, waits for a wave from clerks and sends a signal to clerks when service is done. Customer threads also output averages when all customers have been processed.

Mutexes

There are two mutexes to guard processes from each queue.

Main Thread

The main thread is idle after taking input and creating threads.

Data Structures

Customers and clerks are represented by structures and queues are FIFO arrays of these data structures. When incrementing or decrementing these arrays, mutexes are locked for the respective queues.

Convars

There are two wave convars, one for clerks to signal each line to send the next customer. These are associated with the respective mutexes of each line. There are also four finish convars for customers to signal each clerk that they are finished their service. These are associated with whichever customer class the clerk is currently serving.

```
Mutex[j] locks

        Queue[j] is incremented

Mutex[j] unlocks

If queue[j] is not empty (priority to queue[1])

Lock mutex[j]

        Clerk[i] sends waves to queue[j]
```

```
Clerk[i] waits for finish cond

    Mutex[j] locks

        Customer[k] from queue[j] starts service timer

        Customer[k] from queue[j] sends finish cond

    Mutex[j] unlocks

Mutex[j] unlocks
```