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Event Driven Simulation

The include directory contains two .h files: event.h and eventQueue.h

event.h:: I have created all the necessary structures in this file and functions to initialise them and push/pop functions for the linked lists.

eventQueue.h:: This contains the three functions: add, delete and action necessary for the simulation. I have created two action functions, one for the case when there is a common and the other one when there is seperate queue for each teller.

The src directory contains main.c

main.c:: It contains two functions for simulation, one for each case and main function.

In the main function, first we call both the simulation functions and simulate the data and print their outcomes.

Then for plotting the graph, all the other variables are taken from the command line arguments and the number of tellers is varied from 1 to 20, their data is also printed after printing the line "plotting the graph" and the graph is plotted using this data and is saved in the output directory with the name <AverageTimeSpent.png>.

I could not understand what did the following statement meant:

"Every time a Function Pointer is called, it must be logged to show that you using function Pointer."

So I am just clarifying here that I have used function pointers for all the queues, whether they be eventQueue, tellerQueue or the list of tellerQueues. I have made a list of tellerQueues so that it would be easier to select the shortest tellerQueue(or random).

To run the program, type make in the terminal and then use the command:

./qSim #customers #tellers simulationTime averageServiceTime

I came across a problem that in case of common queue, mostly the idle_time is coming out to be 0. I did consider the condition that if the arrival time of the first customer waiting in the common queue is more than the current_time, the teller at the head of the eventQueue should wait for a random idle_time, but it is never happening in my program. I couldn't sort it out because the arrival_time depends on the rand() function, which I cannot change.

And since I did not use generic lists, it was a little confusing to make many different lists and different node structures for each of them.

Analysis:

=>Variation in number of tellers:

As the number of tellers is increased, average time spent and maximum waiting time decreases in both the cases and teller idle time increases, just as one would expect.

=>Differences in common and seperate queues:

The maximum waiting time is always less in the case of common queue. As for the other data, I did not find any pattern, they are more or less the same in each case.

=>GNUPLOT

The graph's trend is decreasing exponential(as expected) but as the simulation_time is increased, more crests and troughs appear in the graph. My reasoning for that would be- maybe on increasing the range for rand() function the value of time_spent changes randomly in each simulation, as it depends on the service_time which is given to be a function of simulation_time.

Some screenshots of the graphs with the command line argument and a screenshot of four different test cases(as specified in the assignment pdf) have been included in the results directory for reference.