COEN 383 ADVANCED OPERATING SYSTEMS

Multi-threaded Ticket Sellers

Design

This program is written in C using pthread library to create threads and mutex. Also, we have used condition functions to wait and broadcast.

Assumptions:

1. The simulation time quantum is one minute.
2. The seller's thread is assumed to be in one of four states: waiting, serving, processing, and completing.
3. A new clock is generated whenever a seller completes the transaction to maintain the synchronization of time quantum across different sales.
4. The seating arrangement for the concert is represented using a 2D matrix, and mutex locks are used to ensure that only one thread manipulates the matrix at a time.
5. The simulation assumes a fixed number of time slices and customers.
6. The simulation duration is determined by the number of time slices and the length of each slice.
7. The number of sellers and their types are specified as command-line arguments.

Data Structure:

We have created six structures as a part of data structures to store different information such as:

- **Customer**: To store the customer information such as Customer ID and Arrival Time.
- **Customer Queue**: To maintain a queue for customers served by different types of seller.
- **Row**: To store information about the next available seat and mutex.
- **Pthread_args**: To combine the information about the seller and customer served by it.
- **Seat_state**: To maintain the status of each seat.
- **Seat_manager**: Allocates the seats to all sellers according to the seller type.

Test Results:

When the number of customers per queue is 5, 10,15 the program produces the following results:

Input N = 05

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Multi-threaded Ticket Sellers
Input N = 05
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	No of Customers	GotSeat	Returned	Throughput
H	5	5	0	0.08
M	15	15	0	0.25
L	30	27	3	0.45

	Avg response Time	Avg turnaround time
H	0.000000	52.00
M	0.066667	25.93
L	3.066667	30.13

Input N = 10

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Multi-threaded Ticket Sellers
Input N = 10
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	No of Customers	GotSeat	Returned	Throughput
H	10	8	2	0.13
M	30	29	1	0.48
L	60	45	15	0.75

	Avg response Time	Avg turnaround time
H	0.800000	28.20
M	3.600000	28.30
L	4.150000	24.93

Input N = 15

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Multi-threaded Ticket Sellers
Input N = 15
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	No of Customers	GotSeat	Returned	Throughput
H	15	13	2	0.22
M	45	38	7	0.63
L	90	49	41	0.82

	Avg response Time	Avg turnaround time
H	0.600000	26.00
M	4.911111	27.42
L	8.466667	17.89

Final Concert Seat Chart:

When input N is 15

Final Concert Seat Chart

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H101	H102	H103	H104	H105	H106	H107	H108	H109	H110
H111	H112	H113	M213	M114	M311	L209	L409	L608	L107
M309	M112	M113	M310	M212	L508	L607	L408	L208	L308
M210	M111	M308	M211	L507	L106	L307	L606	L407	L207
M109	M306	M208	M110	M209	M307	L506	L605	L105	L306
M101	M102	M301	M302	M103	M201	M104	M202	M105	M203
M303	M304	M204	M106	M205	M107	M108	M206	M305	M207
L206	L505	L406	L205	L305	L405	L104	L604	L504	L603
L103	L404	L204	L304	L503	L403	L102	L203	L303	L502
L402	L202	L602	L101	L501	L302	L201	L601	L401	L301

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Multi-threaded Ticket Sellers

Input N = 15

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