

Project 1 Summary

CS 5348.001 - Operating Systems Concepts

I. About the Simulation

Customer is the primary actor in this simulation. When a customer enters theater, he knows which movie wants to watch, this is simulated by random number and saved in an array.

Customer will wait in the line seeing box office agent at first. Communicating with box office is simulated by passing the customer's number and the movie code to box office agent.

If ticket is not sold out, customer will go on seeing ticket taker. Similarly, giving ticket to ticket taker is simulated by passing customer's number to ticket taker.

After ticket is torn, there will be a random number deciding whether go to concession to buy snack. This simulates the customer randomly go to concession. Passing customer's number and order code to concession work simulates the customer ordering at concession.

In order to avoid causing the problem that the first customer served to leave as soon as any customer finish serving, I use separate semaphore for each customers.

II. Difficulties Encountered

The first problem I encountered is that all the methods about thread cannot be compiled. It seems I didn't link to the thread library when I compiled my program. Then I add '-lpthread' into the compile command line and it works.

Besides, there is a warning saying 'sem_init' is deprecated. But the example code uses 'sem_init' to init semaphores. So I don't know what's the problem and what I should do at that time. I looked into the warning on Google and stackoverflow, and uploaded the program to the csgrads1 server and try to compile it. It turns out that C compiler on csgrads1 server and OS X are different. Only the C compiler on csgrads1 can compile 'sem_init'. Since then, I switch to csgrads1 server to code the project.

While 'sem_init' works on csgrads1, there is another error from C compiler. The error says 'for' loop initial declaration used outside C99 mode. That means for(int i = 0; i < 10; i++) is illegal. I looked into this error on Internet, and tried to add '-std=c99' in the compile command line and it works.

III. What I Learner

Through this project, I got deeper understand of C programming language. C language is a lower layer language. It doesn't have any data structures, so that I have to implement.

For example, in this project, I need a queue for customers in the box office. I used an array and two pointer to implement a simple queue. One of the two pointers points to the head of the queue, moves when data is dequeued. The other pointer points to the tail of the queue, moves when data is enqueued.

Also, I learned more details of how concurrency works in an operating system. Especially how and in which circumstance to use mutual exclusion. And how to use semaphore to protect resource and control threads.

For example, in this project, the amount of available tickets has to be applied mutual exclusion, because this info is not supposed to be modified by more than one thread at a time. So I have a semaphore which is inited as 1 and each time a thread need modify the tickets info, the thread has to wait for the semaphore.