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Computer Architecture
Assignment 5: Multithreading Book Order System
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Design

Data structures: This assignment required us to create a multithreaded book order function that follows a producer-consumer model. The input consists of three database files of customers, orders, and categories. Book orders are individually handled by a consumer processor threads placed in separate queues, one for successful book orders and another for unsuccessful ones.

Functionality: Threads are created and given a category with a queue of orders. If an empty queue is given, then it is verified if the producer processor thread is finished and the thread will enter a conditional wait and send a wakeup signal when adding to the queue. If not, then the thread will die. The thread ids are stored in an array for ease of access. Joining of threads is made is easy with a simple for loop implementation.

Memory: When the program is valgrinded, the memory usage comes out to 1704 Bytes of data allocated.

Complexity Analysis

The worst case time complexity to insert a customer in the database is $O(1)$, and the worst case time complexity to insert an order in the database with q number of queues is $O(1/q)$.