Assignment: 5

Question 2

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Assumptions-

- The information for the number of cars allowed in the drive-through area was not given. So, I assumed it to be k itself. Also, the time for which the car takes to reach the pizza collection place is also assumed to be k itself.
- As it was not given what to do in case of chef being occupied when the chef needs to leave, I assumed that he would finish the pizza he is making and then leave.
- It is assumed that the chef is occupied till the pizza is made I.e., even when the pizza is in the oven, the chef is occupied.
- It is assumed that the time given for the making of the pizza is the entire time I.e., the chef will take 3 seconds from this time to make the pizza and the rest of the time will be taken by the oven to make the pizza.
- A doubly linked list has been along with the semaphores to keep track of who wants to access the semaphore. It was said that we cannot use queues but till the time it was cleared, I completed most of my code. Hence, I just changed the code for question 1 such that it does not use queues or anything like that but changing this 800(600 where already done by then) line code would have been hectic for me hence, I continued with the doubly linked list implementation.
- It is assumed that the max number of pizzas is 1000. This can easily be changed as this has been defined using the hash tag define statement at the start of the program. Just that value needs to be changed to change this variable if a greater number of pizzas are required.
- The program will take the time which is taken by any stimulus to happen I.e., if something happens at 5^{th} second according to the input, then it will happen after 5 secs of running the code.
- Colour coding is not done as it was not mentioned in the question as to which colour should be given to what information.
- If there is no chef at the time when the customer arrives, he is directly rejected.

Implementation-

- The entire implementation uses threads, semaphores, mutex locks, and a doubly linked list.
- We make threads for the chefs, customers, and pizza orders.
- There are semaphores for-
    1. Chefs-sem – this semaphore is initialized to the value 1 and indicates if a chef is already allocated to a pizza or not.
    2. Ovens – this semaphore is initialized to the number of ovens and indicates the number of ovens free.

3. Drivethru – this semaphore is initialized to the number of cars which can enter the drive through area at a time and indicates the number of cars which can enter the drive through area at a particular time.

- Doubly linked lists are made for-
    1. Oven_waiting – this is used to store the chefs who are waiting for oven allocation.
    2. Chef_waiting – this is used to store the pizzas which are waiting for chef allocation.
    3. Order_waiting – this is used to store the customers who are waiting in the line to pick their order.
    4. Drivethru_waiing – this is used to store the cusomers who are waiting for drive through allocation.
    5. Chefs_present – this keeps track of the chefs which are present at a particular moment.