Assignment 2

Question 3: Banking system

APPROACH USED FOR SYNCHRONIZATION :

Used wait and signal for synchronization of banker and customer threads.

- **Multithreading :** Single thread is created for bank service and multiple threads based on the number of customers arriving are created for availing the services.
- **Workflow :** Once the customer arrives it asks for a particular service i.e. draft processing, cheque processing or net banking.

  If the bank is available at that time or is in wait state will give service to the customer and generate a unique token id for that service.

  If the bank is busy at that time then the customer will move to wait state and once the task of the bank is completed it will notify one of the waiting customers and serve it.
- **Synchronization :** Both types of threads share a common object which has 2 variables i.e token id and service and it is synchronized using wait and notify approach.

Service time of the bank is 5 msec and every customer arrives after 1 msec. To implement this both types of threads are paused for the respective duration.

1. **LIMITATIONS :**
   I. **Starvation :** Wait time for the customers not serviced is high in our approach. Consider a scenario that customers arriving requests only for two services among three(cheque and draft) but the bank offers service that is not asked by the customer(i.e net banking) then the time of execution will increase and the bank will keep on generating the service. Bank has the priority to provide a service irrespective of customers' need.In this case all customer threads may starve and the bank will not notify any of the customers.
   II. **Priority based on wait :** Notify will invoke any of the threads(customer) waiting for the shared object, so it may happen that if a customer asks for a particular service may wait and bank notify some other customer that arrives after him.
2. **OVERCOME :**
   I. **Using Queue :** Maintain a Queue for the waiting time of customers that will keep track of customers waiting for a long time. Instead of notifying customers randomly, notify based on the waiting time (if a customer is waiting for long, then that customer will have higher priority). This will increase the efficiency of the bank.
   II. **Priority based implementation :** Instead of generating a service independently, the bank should provide the service according to the custormers' request. This will avoid starvation.