Sleeping Barber Problem

- There is a barber shop with n chairs for waiting customers, one barber's chair and one barber.
- If a customer enters the shop and there are no free chairs the customer leaves the shop.
- If a customer enters the shop and the barber is sleeping, the customer wakes up the barber and gets a haircut.
- If the barber is busy but chairs are available then, a customer enters the shop, takes a seat, and waits for his turn.
- If the barber finishes a haircut and there are waiting customers, the barber cuts the hair of the next customer.
- If there are no customers to be served, the barber goes to sleep in his chair.

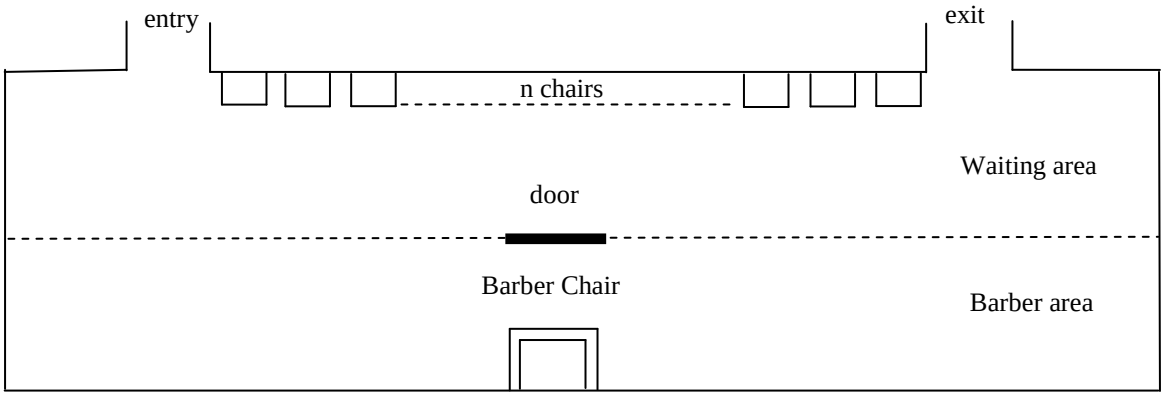

Figure: The situation of the sleeping barber problem

Solution

Shared data

```
semaphore barber;
semaphore mutex;  //for mutual exclusion
semaphore customer;  //number of customer in waiting room
int NumberOfSeats;  //total no of seats vacant in waiting room
```

Initially

```
barber=0;
mutex=1;
customer=0;
NumberOfSeats=n;
```

The Structure of Barber Process

```
do
{
        wait (customer);  //if none is available go to sleep
        wait (mutex) ;
        NumberOfSeats++;
```

```
        signal (barber);
        signal (mutex)
        //haircut
} while (true);
```

The Structure of Customer Process

```
do
{
        wait (mutex);  // enter critical section
        if( NumberOfSeats>0)
        {
                NumberOfSeats - - ;
                signal (customer);
                signal (mutex);
                wait (barber);
                //haircut
        }
        else
        {
                signal (mutex);
                // leave without a haircut
        }
} while (true);
```

Questions asked in semester exam:

Question: A barber shop consists of a waiting room with n chairs and a barber room with one barber chair. If there are no customers to be served, the barber goes to sleep. If a customer enters the barbershop and all chairs are occupied, then the customer leaves the shop. If the barber is busy but chairs are available, then the customer sits in one of the free chairs. If the barber is asleep, the customer wakes up the barber. Write an algorithm for the above synchronization problem using semaphores.

[2014-2015] [10 Marks]