

# EOPSY Project Task 5 – Synchronisation using semaphores – Filip Wasilewski

## The task

The objective of this task was to simulate the barber problem. To quote the task:

There are N1 barbers serving only women, N2 barbers serving only men and N3 barbers serving both women and men. Each barber has one barber's chair. In a waiting room there are M chairs. When the barber finishes cutting a customer's hair, he dismisses him and goes to the waiting room to see if there are others waiting, that he can cut. If there are, he brings one of them back to the chair and cuts hair (it lasts a random time). If there are none, he returns to the chair and sleeps in it. When a client arrives, he/she checks what barbers are doing. If there is any barber sleeping (who is able to serve the client), the customer wakes him up, and sits in the chair. If all barbers (able to serve the client) are busy, the customer stays in the waiting room if there is a free chair. If there is no free chair, the customer leaves.

## Solution – approach

In this kind of problem, there has to be some middle ground for the processes to operate on. After all, we want them to cooperate on the same set of data, although we want to ensure the processes will not race for the modification of variables, but we want steady results each time!

The middle ground (and therefore – critical region) was defined as a shop itself. Here we have the smallest building block of our shop, a seat:

```
-----  
typedef struct {  
    bool taken;  
    int id;  
    bool male;  
}seat;  
-----
```

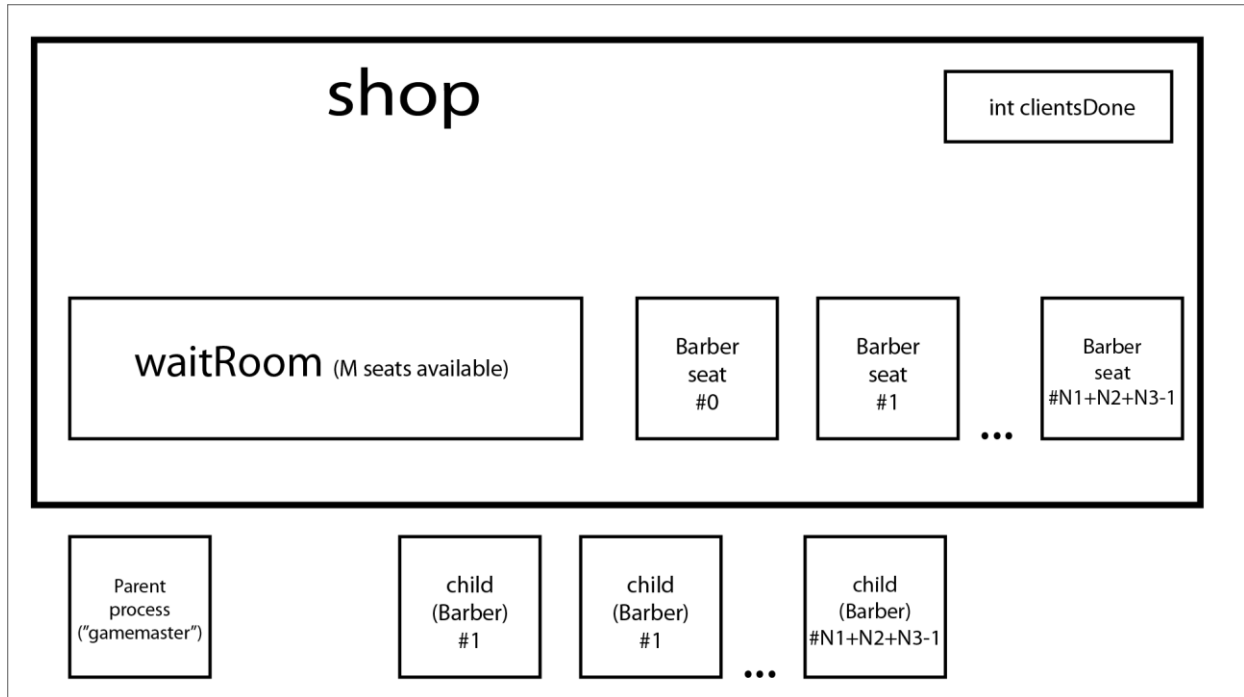
From this seat we build our final shop, that looks like this:

```
-----  
typedef struct{  
    seat waitRoom[M];  
    seat barberSeats[ALL_BARBERS];  
    int clientsDone;  
}BARBER_SHOP;  
-----
```

It is worth pointing out that the ALL\_BARBERS variable is defined as a sum of N1, N2 and N3

The value clientsDone is a variable that helps barbers to know when to quit. After the last person has been dealt with, the barbers finish working, each one of them gives a number of people they have serviced.

And here is the graphical representation of the solution model:



The main base of operation of my solution is this:

1. The program operation is based on N1, N2, N3 and M values, which mean respectively. :
  - N1 – number of only-female barbers
  - N2 – number of only-male barbers
  - N3 – number of barbers, who can cut anyone
  - M – number of seats in the waiting room

These values are hardcoded in the #define part of a program:

```
-----  
#define N1 2  
#define N2 3  
#define N3 1  
#define M 2  
-----
```

There is a safety check, if for example the user set these values all to 0, or respectively all barbers are 0, or clients that should come are 0.

2. Each barber starts off as sleeping, since the clients are supplied to program after successful creation of all barbers, as well as learning their profession (Which N-group do they belong to).
3. As for the division of duties, parent process is the „gamemaster” responsible for feeding new clients in the shop (as well as determining their gender). Child processes are serving as our barbers.
4. Processes increment the clientsDone value and work until the last client has been served. When that happens, child processes exit, and parent process collects all exit codes, detaches memory as well as semaphores.
5. The processes use semaphores to ensure none of the important data is lost. I use it in the following way:
  - There are  $N_1+N_2+N_3+1$  semaphores – each for one barber seat and one for the whole waitroom.
  - Parent process looking for a place for a new client checks first each barber seat, raising semaphore for this seat, looking if the taken var is true, and lowering semaphore before skipping to the next one. If there are no free barber seats, parent process checks waitingRoom, raising its semaphore beforehand.
  - If barber finishes cutting, it raises semaphore for both himself and waiting room, to ensure he can swap clients with no errors.

I have chosen this approach, because each barber seat should be autonomic, since there is individual barber in each of them, that works an unclear amount of time (1-5 seconds). Having so many semaphores ensures, that the program will allow them to operate freely, but without stepping on other processes variables, that are swapped in realtime.

Therefore we can say, that the shop itself is not a critical region, but waiting room as well as barber seats are.

6.

## Child processes as barbers

Our child operation algorithm works like this:

1. When created, call function to find out what profession is child.
2. Prepare semaphore struct for raising semaphores for both child chair, as well as wait room
3. While not all the clients have been served, stay in the loop (at the start the barber is set to sleep):
  - If the barber is sleeping, check the seat, and when client appears in the seat, wake up
  - If woken up and there is a client in the seat, sleep 1-5 seconds (random selected)
  - Increment clientsDone variable, as well as variable how many clients were served by this child.
  - If clientsDone is equal to all clients number, quit loop
  - Look through waiting room. If there is a client that can be served, take him to chair. If not, go to sleep.
4. When out of loop, give information on how many clients have been served.
5. Exit with code 0

## Parent process as „gamemaster“

Our parent process algorithm of working can be described as:

1. Allocate shared memory component used by all processes
2. Create semaphore set with  $N1+N2+N3+1$  semaphores
3. In loop, fork to create all needed child processes
4. Sleep for 2 seconds
5. Start feeding clients to the shop. Do the following loop CLIENT\_NUM times:
  - Sleep 1-5 seconds (decided at random)
  - Define gender of a client (if there are no barbers fit for this gender, change it, so the program doesn't block)
  - First check barber seats. By raising the semaphore of a specific chair, checking if it is taken, checking if the profession of barber allows this client. If yes, place the client here, if not – move on the next one. Lower semaphore for this seat.
  - After all the seats were checked, with no positive result, raise semaphore for waiting room. Look for seats.
  - If still no places were found, the client goes away. Change clientsDone by 1.
6. After the loop, collect child processes exit codes.
7. Remove semaphore set
8. Remove shared memory
9. Exit with code 0

## Example of operation of algorithm

TEST 1 - one of each kind of barber, 2 places in waitroom, 60 clients

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Started Execution with parameters:

N1 (female): 1,

N2 (male): 1,

N3 (both): 1,

M (places): 2.

Barber sum: 3

Clients to come: 60

---

shop[2753]: Barber 0 successfully created!

shop[2753]: Barber 1 successfully created!

shop[2753]: Barber 2 successfully created!

shop[2753]: All the children successfully created!

Barber[2]: Profession = 2

Barber[1]: Profession = 1  
Barber[0]: Profession = 0  
shop[2753]: Feeding clients to shop!  
shop[2753]: New male client has come with id: 0!  
shop[2753]: Free place for 0 found at seat 1!  
Barber[1]: Taking care of client 0!  
shop[2753]: New male client has come with id: 1!  
shop[2753]: Free place for 1 found at seat 2!  
Barber[2]: Taking care of client 1!  
shop[2753]: New female client has come with id: 2!  
shop[2753]: Free place for 2 found at seat 0!  
Barber[0]: Taking care of client 2!  
Barber[1]: Client 0 was served and went away!  
Barber[1]: No one at the barber seat, going to sleep!  
shop[2753]: New male client has come with id: 3!  
shop[2753]: Free place for 3 found at seat 1!  
Barber[1]: Taking care of client 3!  
Barber[2]: Client 1 was served and went away!  
Barber[2]: No one at the barber seat, going to sleep!  
Barber[0]: Client 2 was served and went away!  
Barber[0]: No one at the barber seat, going to sleep!  
shop[2753]: New female client has come with id: 4!  
Barber[1]: Client 3 was served and went away!  
Barber[1]: No one at the barber seat, going to sleep!  
shop[2753]: Free place for 4 found at seat 0!  
Barber[0]: Taking care of client 4!  
shop[2753]: New male client has come with id: 5!  
Barber[0]: Client 4 was served and went away!  
Barber[0]: No one at the barber seat, going to sleep!  
shop[2753]: Free place for 5 found at seat 1!  
Barber[1]: Taking care of client 5!  
shop[2753]: New male client has come with id: 6!  
shop[2753]: Free place for 6 found at seat 2!  
Barber[2]: Taking care of client 6!  
shop[2753]: New female client has come with id: 7!  
shop[2753]: Free place for 7 found at seat 0!  
Barber[0]: Taking care of client 7!  
Barber[1]: Client 5 was served and went away!  
Barber[1]: No one at the barber seat, going to sleep!  
Barber[2]: Client 6 was served and went away!  
Barber[2]: No one at the barber seat, going to sleep!  
shop[2753]: New female client has come with id: 8!  
Barber[0]: Client 7 was served and went away!  
Barber[0]: No one at the barber seat, going to sleep!  
shop[2753]: Free place for 8 found at seat 0!  
Barber[0]: Taking care of client 8!  
shop[2753]: New male client has come with id: 9!  
shop[2753]: Free place for 9 found at seat 1!  
Barber[1]: Taking care of client 9!  
Barber[0]: Client 8 was served and went away!  
Barber[0]: No one at the barber seat, going to sleep!  
shop[2753]: New male client has come with id: 10!

shop[2753]: Free place for 10 found at seat 2!  
Barber[2]: Taking care of client 10!  
Barber[1]: Client 9 was served and went away!  
Barber[1]: No one at the barber seat, going to sleep!  
shop[2753]: New male client has come with id: 11!  
Barber[2]: Client 10 was served and went away!  
Barber[2]: No one at the barber seat, going to sleep!  
shop[2753]: Free place for 11 found at seat 1!  
Barber[1]: Taking care of client 11!  
Barber[1]: Client 11 was served and went away!  
Barber[1]: No one at the barber seat, going to sleep!  
shop[2753]: New female client has come with id: 12!  
shop[2753]: Free place for 12 found at seat 0!  
Barber[0]: Taking care of client 12!  
shop[2753]: New male client has come with id: 13!  
shop[2753]: Free place for 13 found at seat 1!  
Barber[1]: Taking care of client 13!  
Barber[1]: Client 13 was served and went away!  
Barber[1]: No one at the barber seat, going to sleep!  
Barber[0]: Client 12 was served and went away!  
Barber[0]: No one at the barber seat, going to sleep!  
shop[2753]: New male client has come with id: 14!  
shop[2753]: Free place for 14 found at seat 1!  
Barber[1]: Taking care of client 14!  
shop[2753]: New male client has come with id: 15!  
shop[2753]: Free place for 15 found at seat 2!  
Barber[2]: Taking care of client 15!  
shop[2753]: New female client has come with id: 16!  
shop[2753]: Free place for 16 found at seat 0!  
Barber[0]: Taking care of client 16!  
Barber[1]: Client 14 was served and went away!  
Barber[1]: No one at the barber seat, going to sleep!  
Barber[0]: Client 16 was served and went away!  
Barber[0]: No one at the barber seat, going to sleep!  
Barber[2]: Client 15 was served and went away!  
Barber[2]: No one at the barber seat, going to sleep!  
shop[2753]: New female client has come with id: 17!  
shop[2753]: Free place for 17 found at seat 0!  
Barber[0]: Taking care of client 17!  
Barber[0]: Client 17 was served and went away!  
Barber[0]: No one at the barber seat, going to sleep!  
shop[2753]: New female client has come with id: 18!  
shop[2753]: Free place for 18 found at seat 0!  
Barber[0]: Taking care of client 18!  
shop[2753]: New female client has come with id: 19!  
shop[2753]: Free place for 19 found at seat 2!  
Barber[2]: Taking care of client 19!  
Barber[0]: Client 18 was served and went away!  
Barber[0]: No one at the barber seat, going to sleep!  
shop[2753]: New male client has come with id: 20!  
shop[2753]: Free place for 20 found at seat 1!  
Barber[1]: Taking care of client 20!

Barber[2]: Client 19 was served and went away!  
Barber[2]: No one at the barber seat, going to sleep!  
shop[2753]: New male client has come with id: 21!  
shop[2753]: Free place for 21 found at seat 2!  
Barber[2]: Taking care of client 21!  
shop[2753]: New female client has come with id: 22!  
shop[2753]: Free place for 22 found at seat 0!  
Barber[0]: Taking care of client 22!  
Barber[2]: Client 21 was served and went away!  
Barber[2]: No one at the barber seat, going to sleep!  
Barber[1]: Client 20 was served and went away!  
Barber[1]: No one at the barber seat, going to sleep!  
shop[2753]: New male client has come with id: 23!  
shop[2753]: Free place for 23 found at seat 1!  
Barber[1]: Taking care of client 23!  
Barber[0]: Client 22 was served and went away!  
shop[2753]: New male client has come with id: 24!  
shop[2753]: Free place for 24 found at seat 2!  
Barber[0]: No one at the barber seat, going to sleep!  
Barber[2]: Taking care of client 24!  
shop[2753]: New female client has come with id: 25!  
shop[2753]: Free place for 25 found at seat 0!  
Barber[0]: Taking care of client 25!  
shop[2753]: New female client has come with id: 26!  
shop[2753]: Client checks waitroom for place!  
shop[2753]: Free place for 26 found at waiting room seat 0!  
Barber[1]: Client 23 was served and went away!  
Barber[1]: No one at the barber seat, going to sleep!  
Barber[2]: Client 24 was served and went away!  
Barber[2]: Taking care of client 26!  
Barber[0]: Client 25 was served and went away!  
Barber[0]: No one at the barber seat, going to sleep!  
shop[2753]: New female client has come with id: 27!  
shop[2753]: Free place for 27 found at seat 0!  
Barber[0]: Taking care of client 27!  
Barber[2]: Client 26 was served and went away!  
Barber[2]: No one at the barber seat, going to sleep!  
shop[2753]: New male client has come with id: 28!  
shop[2753]: Free place for 28 found at seat 1!  
Barber[1]: Taking care of client 28!  
Barber[0]: Client 27 was served and went away!  
Barber[0]: No one at the barber seat, going to sleep!  
shop[2753]: New male client has come with id: 29!  
shop[2753]: Free place for 29 found at seat 2!  
Barber[2]: Taking care of client 29!  
shop[2753]: New female client has come with id: 30!  
shop[2753]: Free place for 30 found at seat 0!  
Barber[0]: Taking care of client 30!  
shop[2753]: New female client has come with id: 31!  
shop[2753]: Client checks waitroom for place!  
shop[2753]: Free place for 31 found at waiting room seat 0!  
Barber[1]: Client 28 was served and went away!

Barber[1]: No one at the barber seat, going to sleep!  
shop[2753]: New male client has come with id: 32!  
shop[2753]: Free place for 32 found at seat 1!  
Barber[1]: Taking care of client 32!  
Barber[2]: Client 29 was served and went away!  
Barber[2]: Taking care of client 31!  
shop[2753]: New male client has come with id: 33!  
shop[2753]: Client checks waitroom for place!  
shop[2753]: Free place for 33 found at waiting room seat 0!  
Barber[1]: Client 32 was served and went away!  
Barber[1]: Taking care of client 33!  
Barber[0]: Client 30 was served and went away!  
Barber[0]: No one at the barber seat, going to sleep!  
Barber[2]: Client 31 was served and went away!  
Barber[2]: No one at the barber seat, going to sleep!  
shop[2753]: New female client has come with id: 34!  
shop[2753]: Free place for 34 found at seat 0!  
Barber[0]: Taking care of client 34!  
Barber[1]: Client 33 was served and went away!  
Barber[1]: No one at the barber seat, going to sleep!  
shop[2753]: New male client has come with id: 35!  
Barber[0]: Client 34 was served and went away!  
Barber[0]: No one at the barber seat, going to sleep!  
shop[2753]: Free place for 35 found at seat 1!  
Barber[1]: Taking care of client 35!  
Barber[1]: Client 35 was served and went away!  
Barber[1]: No one at the barber seat, going to sleep!  
shop[2753]: New female client has come with id: 36!  
shop[2753]: Free place for 36 found at seat 0!  
Barber[0]: Taking care of client 36!  
shop[2753]: New male client has come with id: 37!  
shop[2753]: Free place for 37 found at seat 1!  
Barber[1]: Taking care of client 37!  
shop[2753]: New female client has come with id: 38!  
shop[2753]: Free place for 38 found at seat 2!  
Barber[2]: Taking care of client 38!  
Barber[2]: Client 38 was served and went away!  
Barber[2]: No one at the barber seat, going to sleep!  
Barber[0]: Client 36 was served and went away!  
Barber[0]: No one at the barber seat, going to sleep!  
Barber[1]: Client 37 was served and went away!  
shop[2753]: New female client has come with id: 39!  
shop[2753]: Free place for 39 found at seat 0!  
Barber[1]: No one at the barber seat, going to sleep!  
Barber[0]: Taking care of client 39!  
Barber[0]: Client 39 was served and went away!  
Barber[0]: No one at the barber seat, going to sleep!  
shop[2753]: New male client has come with id: 40!  
shop[2753]: Free place for 40 found at seat 1!  
Barber[1]: Taking care of client 40!  
shop[2753]: New male client has come with id: 41!  
shop[2753]: Free place for 41 found at seat 2!



Barber[2]: Taking care of client 41!  
Barber[1]: Client 40 was served and went away!  
Barber[1]: No one at the barber seat, going to sleep!  
shop[2753]: New male client has come with id: 42!  
shop[2753]: Free place for 42 found at seat 1!  
Barber[1]: Taking care of client 42!  
Barber[2]: Client 41 was served and went away!  
Barber[2]: No one at the barber seat, going to sleep!  
Barber[1]: Client 42 was served and went away!  
Barber[1]: No one at the barber seat, going to sleep!  
shop[2753]: New male client has come with id: 43!  
shop[2753]: Free place for 43 found at seat 1!  
Barber[1]: Taking care of client 43!  
shop[2753]: New male client has come with id: 44!  
shop[2753]: Free place for 44 found at seat 2!  
Barber[2]: Taking care of client 44!  
Barber[1]: Client 43 was served and went away!  
Barber[1]: No one at the barber seat, going to sleep!  
Barber[2]: Client 44 was served and went away!  
Barber[2]: No one at the barber seat, going to sleep!  
shop[2753]: New female client has come with id: 45!  
shop[2753]: Free place for 45 found at seat 0!  
Barber[0]: Taking care of client 45!  
Barber[0]: Client 45 was served and went away!  
Barber[0]: No one at the barber seat, going to sleep!  
shop[2753]: New male client has come with id: 46!  
shop[2753]: Free place for 46 found at seat 1!  
Barber[1]: Taking care of client 46!  
shop[2753]: New female client has come with id: 47!  
shop[2753]: Free place for 47 found at seat 0!  
Barber[0]: Taking care of client 47!  
Barber[1]: Client 46 was served and went away!  
Barber[1]: No one at the barber seat, going to sleep!  
shop[2753]: New male client has come with id: 48!  
shop[2753]: Free place for 48 found at seat 1!  
Barber[1]: Taking care of client 48!  
Barber[1]: Client 48 was served and went away!  
Barber[1]: No one at the barber seat, going to sleep!  
Barber[0]: Client 47 was served and went away!  
Barber[0]: No one at the barber seat, going to sleep!  
shop[2753]: New female client has come with id: 49!  
shop[2753]: Free place for 49 found at seat 0!  
Barber[0]: Taking care of client 49!  
shop[2753]: New female client has come with id: 50!  
shop[2753]: Free place for 50 found at seat 2!  
Barber[2]: Taking care of client 50!  
Barber[0]: Client 49 was served and went away!  
Barber[0]: No one at the barber seat, going to sleep!  
shop[2753]: New female client has come with id: 51!  
shop[2753]: Free place for 51 found at seat 0!  
Barber[0]: Taking care of client 51!  
Barber[0]: Client 51 was served and went away!

Barber[0]: No one at the barber seat, going to sleep!  
shop[2753]: New female client has come with id: 52!  
shop[2753]: Free place for 52 found at seat 0!  
Barber[0]: Taking care of client 52!  
Barber[2]: Client 50 was served and went away!  
Barber[2]: No one at the barber seat, going to sleep!  
shop[2753]: New male client has come with id: 53!  
shop[2753]: Free place for 53 found at seat 1!  
Barber[1]: Taking care of client 53!  
Barber[0]: Client 52 was served and went away!  
Barber[0]: No one at the barber seat, going to sleep!  
shop[2753]: New male client has come with id: 54!  
shop[2753]: Free place for 54 found at seat 2!  
Barber[2]: Taking care of client 54!  
Barber[1]: Client 53 was served and went away!  
Barber[1]: No one at the barber seat, going to sleep!  
shop[2753]: New male client has come with id: 55!  
shop[2753]: Free place for 55 found at seat 1!  
Barber[1]: Taking care of client 55!  
Barber[2]: Client 54 was served and went away!  
Barber[2]: No one at the barber seat, going to sleep!  
Barber[1]: Client 55 was served and went away!  
Barber[1]: No one at the barber seat, going to sleep!  
shop[2753]: New female client has come with id: 56!  
shop[2753]: Free place for 56 found at seat 0!  
Barber[0]: Taking care of client 56!  
Barber[0]: Client 56 was served and went away!  
Barber[0]: No one at the barber seat, going to sleep!  
shop[2753]: New male client has come with id: 57!  
shop[2753]: Free place for 57 found at seat 1!  
Barber[1]: Taking care of client 57!  
shop[2753]: New male client has come with id: 58!  
shop[2753]: Free place for 58 found at seat 2!  
Barber[2]: Taking care of client 58!  
Barber[2]: Client 58 was served and went away!  
Barber[2]: No one at the barber seat, going to sleep!  
Barber[1]: Client 57 was served and went away!  
Barber[1]: No one at the barber seat, going to sleep!  
shop[2753]: New female client has come with id: 59!  
shop[2753]: Free place for 59 found at seat 0!  
shop[2753]: No more clients to come!  
Barber[0]: Taking care of client 59!  
Barber[0]: Client 59 was served and went away!  
Barber[0]: Finished work, people serviced: 22!  
Barber[2]: Finished work, people serviced: 16!  
Barber[1]: Finished work, people serviced: 22!  
shop[2753]: All the barbers finished work!

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TEST 2 – extreme case, one place in waiting room, one barber (unisex), 50 clients

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Started Execution with parameters:

N1 (female): 0,

N2 (male): 0,

N3 (both): 1,

M (places): 1.

Barber sum: 1

Clients to come: 50

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shop[2724]: Barber 0 successfully created!

shop[2724]: All the children successfully created!

Barber[0]: Profession = 2

shop[2724]: Feeding clients to shop!

shop[2724]: New male client has come with id: 0!

shop[2724]: Free place for 0 found at seat 0!

Barber[0]: Taking care of client 0!

shop[2724]: New female client has come with id: 1!

shop[2724]: Client checks waitroom for place!

shop[2724]: Free place for 1 found at waiting room seat 0!

Barber[0]: Client 0 was served and went away!

Barber[0]: Taking care of client 1!

shop[2724]: New male client has come with id: 2!

shop[2724]: Client checks waitroom for place!

shop[2724]: Free place for 2 found at waiting room seat 0!

Barber[0]: Client 1 was served and went away!

Barber[0]: Taking care of client 2!

Barber[0]: Client 2 was served and went away!

Barber[0]: No one at the barber seat, going to sleep!

shop[2724]: New male client has come with id: 3!

shop[2724]: Free place for 3 found at seat 0!

Barber[0]: Taking care of client 3!

shop[2724]: New female client has come with id: 4!

shop[2724]: Client checks waitroom for place!

shop[2724]: Free place for 4 found at waiting room seat 0!

Barber[0]: Client 3 was served and went away!

Barber[0]: Taking care of client 4!

Barber[0]: Client 4 was served and went away!

Barber[0]: No one at the barber seat, going to sleep!

shop[2724]: New male client has come with id: 5!

shop[2724]: Free place for 5 found at seat 0!

Barber[0]: Taking care of client 5!

Barber[0]: Client 5 was served and went away!

Barber[0]: No one at the barber seat, going to sleep!

shop[2724]: New male client has come with id: 6!

shop[2724]: Free place for 6 found at seat 0!

Barber[0]: Taking care of client 6!

Barber[0]: Client 6 was served and went away!

Barber[0]: No one at the barber seat, going to sleep!  
shop[2724]: New female client has come with id: 7!  
shop[2724]: Free place for 7 found at seat 0!  
Barber[0]: Taking care of client 7!  
shop[2724]: New male client has come with id: 8!  
shop[2724]: Client checks waitroom for place!  
shop[2724]: Free place for 8 found at waiting room seat 0!  
Barber[0]: Client 7 was served and went away!  
Barber[0]: Taking care of client 8!  
shop[2724]: New male client has come with id: 9!  
shop[2724]: Client checks waitroom for place!  
shop[2724]: Free place for 9 found at waiting room seat 0!  
shop[2724]: New male client has come with id: 10!  
shop[2724]: Client checks waitroom for place!  
shop[2724]: No place found for client 10! Client went away!  
Barber[0]: Client 8 was served and went away!  
Barber[0]: Taking care of client 9!  
Barber[0]: Client 9 was served and went away!  
Barber[0]: No one at the barber seat, going to sleep!  
shop[2724]: New female client has come with id: 11!  
shop[2724]: Free place for 11 found at seat 0!  
Barber[0]: Taking care of client 11!  
shop[2724]: New male client has come with id: 12!  
shop[2724]: Client checks waitroom for place!  
shop[2724]: Free place for 12 found at waiting room seat 0!  
Barber[0]: Client 11 was served and went away!  
Barber[0]: Taking care of client 12!  
shop[2724]: New male client has come with id: 13!  
shop[2724]: Client checks waitroom for place!  
shop[2724]: Free place for 13 found at waiting room seat 0!  
shop[2724]: New male client has come with id: 14!  
shop[2724]: Client checks waitroom for place!  
shop[2724]: No place found for client 14! Client went away!  
Barber[0]: Client 12 was served and went away!  
Barber[0]: Taking care of client 13!  
shop[2724]: New male client has come with id: 15!  
shop[2724]: Client checks waitroom for place!  
shop[2724]: Free place for 15 found at waiting room seat 0!  
Barber[0]: Client 13 was served and went away!  
Barber[0]: Taking care of client 15!  
shop[2724]: New male client has come with id: 16!  
shop[2724]: Client checks waitroom for place!  
shop[2724]: Free place for 16 found at waiting room seat 0!  
Barber[0]: Client 15 was served and went away!  
Barber[0]: Taking care of client 16!  
shop[2724]: New female client has come with id: 17!  
shop[2724]: Client checks waitroom for place!  
shop[2724]: Free place for 17 found at waiting room seat 0!  
Barber[0]: Client 16 was served and went away!  
Barber[0]: Taking care of client 17!  
shop[2724]: New male client has come with id: 18!  
shop[2724]: Client checks waitroom for place!

shop[2724]: Free place for 18 found at waiting room seat 0!  
Barber[0]: Client 17 was served and went away!  
Barber[0]: Taking care of client 18!  
Barber[0]: Client 18 was served and went away!  
Barber[0]: No one at the barber seat, going to sleep!  
shop[2724]: New female client has come with id: 19!  
shop[2724]: Free place for 19 found at seat 0!  
Barber[0]: Taking care of client 19!  
shop[2724]: New female client has come with id: 20!  
shop[2724]: Client checks waitroom for place!  
shop[2724]: Free place for 20 found at waiting room seat 0!  
Barber[0]: Client 19 was served and went away!  
Barber[0]: Taking care of client 20!  
Barber[0]: Client 20 was served and went away!  
Barber[0]: No one at the barber seat, going to sleep!  
shop[2724]: New female client has come with id: 21!  
shop[2724]: Free place for 21 found at seat 0!  
Barber[0]: Taking care of client 21!  
shop[2724]: New female client has come with id: 22!  
shop[2724]: Client checks waitroom for place!  
shop[2724]: Free place for 22 found at waiting room seat 0!  
Barber[0]: Client 21 was served and went away!  
Barber[0]: Taking care of client 22!  
shop[2724]: New female client has come with id: 23!  
shop[2724]: Client checks waitroom for place!  
shop[2724]: Free place for 23 found at waiting room seat 0!  
Barber[0]: Client 22 was served and went away!  
Barber[0]: Taking care of client 23!  
shop[2724]: New male client has come with id: 24!  
shop[2724]: Client checks waitroom for place!  
shop[2724]: Free place for 24 found at waiting room seat 0!  
Barber[0]: Client 23 was served and went away!  
Barber[0]: Taking care of client 24!  
Barber[0]: Client 24 was served and went away!  
Barber[0]: No one at the barber seat, going to sleep!  
shop[2724]: New male client has come with id: 25!  
shop[2724]: Free place for 25 found at seat 0!  
Barber[0]: Taking care of client 25!  
shop[2724]: New male client has come with id: 26!  
shop[2724]: Client checks waitroom for place!  
shop[2724]: Free place for 26 found at waiting room seat 0!  
Barber[0]: Client 25 was served and went away!  
Barber[0]: Taking care of client 26!  
Barber[0]: Client 26 was served and went away!  
Barber[0]: No one at the barber seat, going to sleep!  
shop[2724]: New female client has come with id: 27!  
shop[2724]: Free place for 27 found at seat 0!  
Barber[0]: Taking care of client 27!  
shop[2724]: New male client has come with id: 28!  
shop[2724]: Client checks waitroom for place!  
shop[2724]: Free place for 28 found at waiting room seat 0!  
Barber[0]: Client 27 was served and went away!

Barber[0]: Taking care of client 28!  
shop[2724]: New male client has come with id: 29!  
shop[2724]: Client checks waitroom for place!  
shop[2724]: Free place for 29 found at waiting room seat 0!  
Barber[0]: Client 28 was served and went away!  
Barber[0]: Taking care of client 29!  
shop[2724]: New female client has come with id: 30!  
shop[2724]: Client checks waitroom for place!  
shop[2724]: Free place for 30 found at waiting room seat 0!  
shop[2724]: New female client has come with id: 31!  
shop[2724]: Client checks waitroom for place!  
shop[2724]: No place found for client 31! Client went away!  
Barber[0]: Client 29 was served and went away!  
Barber[0]: Taking care of client 30!  
shop[2724]: New male client has come with id: 32!  
shop[2724]: Client checks waitroom for place!  
shop[2724]: Free place for 32 found at waiting room seat 0!  
Barber[0]: Client 30 was served and went away!  
Barber[0]: Taking care of client 32!  
shop[2724]: New male client has come with id: 33!  
shop[2724]: Client checks waitroom for place!  
shop[2724]: Free place for 33 found at waiting room seat 0!  
Barber[0]: Client 32 was served and went away!  
Barber[0]: Taking care of client 33!  
Barber[0]: Client 33 was served and went away!  
Barber[0]: No one at the barber seat, going to sleep!  
shop[2724]: New female client has come with id: 34!  
shop[2724]: Free place for 34 found at seat 0!  
Barber[0]: Taking care of client 34!  
shop[2724]: New male client has come with id: 35!  
shop[2724]: Client checks waitroom for place!  
shop[2724]: Free place for 35 found at waiting room seat 0!  
Barber[0]: Client 34 was served and went away!  
Barber[0]: Taking care of client 35!  
shop[2724]: New female client has come with id: 36!  
shop[2724]: Client checks waitroom for place!  
shop[2724]: Free place for 36 found at waiting room seat 0!  
shop[2724]: New male client has come with id: 37!  
shop[2724]: Client checks waitroom for place!  
shop[2724]: No place found for client 37! Client went away!  
Barber[0]: Client 35 was served and went away!  
Barber[0]: Taking care of client 36!  
shop[2724]: New male client has come with id: 38!  
shop[2724]: Client checks waitroom for place!  
shop[2724]: Free place for 38 found at waiting room seat 0!  
Barber[0]: Client 36 was served and went away!  
Barber[0]: Taking care of client 38!  
Barber[0]: Client 38 was served and went away!  
Barber[0]: No one at the barber seat, going to sleep!  
shop[2724]: New female client has come with id: 39!  
shop[2724]: Free place for 39 found at seat 0!  
Barber[0]: Taking care of client 39!

shop[2724]: New male client has come with id: 40!  
shop[2724]: Client checks waitroom for place!  
shop[2724]: Free place for 40 found at waiting room seat 0!  
Barber[0]: Client 39 was served and went away!  
Barber[0]: Taking care of client 40!  
Barber[0]: Client 40 was served and went away!  
Barber[0]: No one at the barber seat, going to sleep!  
shop[2724]: New male client has come with id: 41!  
shop[2724]: Free place for 41 found at seat 0!  
Barber[0]: Taking care of client 41!  
shop[2724]: New female client has come with id: 42!  
shop[2724]: Client checks waitroom for place!  
shop[2724]: Free place for 42 found at waiting room seat 0!  
Barber[0]: Client 41 was served and went away!  
Barber[0]: Taking care of client 42!  
shop[2724]: New female client has come with id: 43!  
shop[2724]: Client checks waitroom for place!  
shop[2724]: Free place for 43 found at waiting room seat 0!  
Barber[0]: Client 42 was served and went away!  
Barber[0]: Taking care of client 43!  
Barber[0]: Client 43 was served and went away!  
Barber[0]: No one at the barber seat, going to sleep!  
shop[2724]: New female client has come with id: 44!  
shop[2724]: Free place for 44 found at seat 0!  
Barber[0]: Taking care of client 44!  
Barber[0]: Client 44 was served and went away!  
Barber[0]: No one at the barber seat, going to sleep!  
shop[2724]: New female client has come with id: 45!  
shop[2724]: Free place for 45 found at seat 0!  
Barber[0]: Taking care of client 45!  
Barber[0]: Client 45 was served and went away!  
Barber[0]: No one at the barber seat, going to sleep!  
shop[2724]: New female client has come with id: 46!  
shop[2724]: Free place for 46 found at seat 0!  
Barber[0]: Taking care of client 46!  
shop[2724]: New male client has come with id: 47!  
shop[2724]: Client checks waitroom for place!  
shop[2724]: Free place for 47 found at waiting room seat 0!  
Barber[0]: Client 46 was served and went away!  
Barber[0]: Taking care of client 47!  
shop[2724]: New male client has come with id: 48!  
shop[2724]: Client checks waitroom for place!  
shop[2724]: Free place for 48 found at waiting room seat 0!  
shop[2724]: New male client has come with id: 49!  
shop[2724]: Client checks waitroom for place!  
shop[2724]: No place found for client 49! Client went away!  
shop[2724]: No more clients to come!  
Barber[0]: Client 47 was served and went away!  
Barber[0]: Taking care of client 48!  
Barber[0]: Client 48 was served and went away!  
Barber[0]: Finished work, people serviced: 45!  
shop[2724]: All the barbers finished work!

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