INF

FAKULTÄT FÜR
INFORMATIK

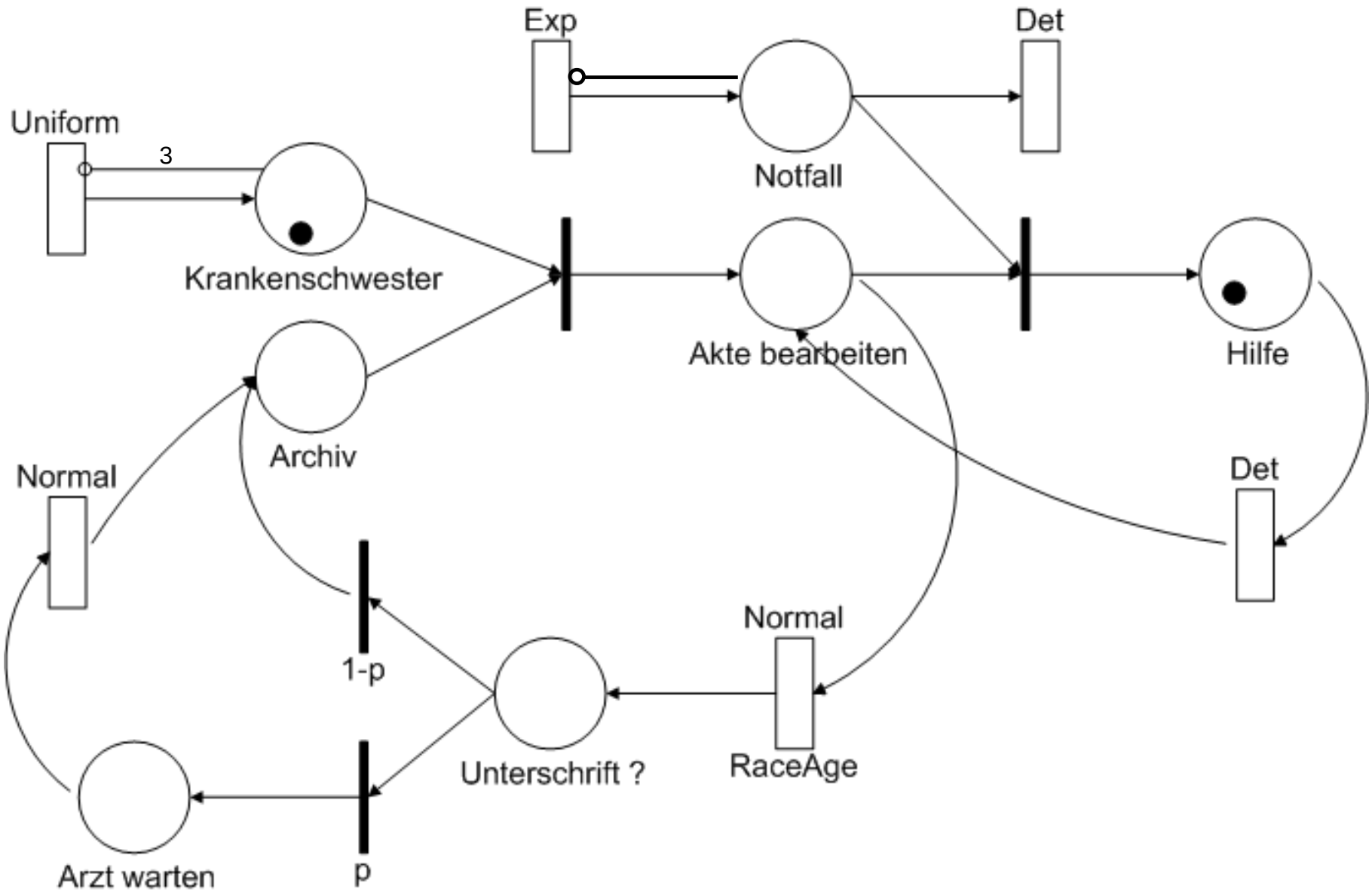
Modeling with Stochastic Petri Nets

Hospitals, Computers and Restaurants

Modelling Exercise 1 – A Health Record

This model follows the circulation of a single health record in a hospital

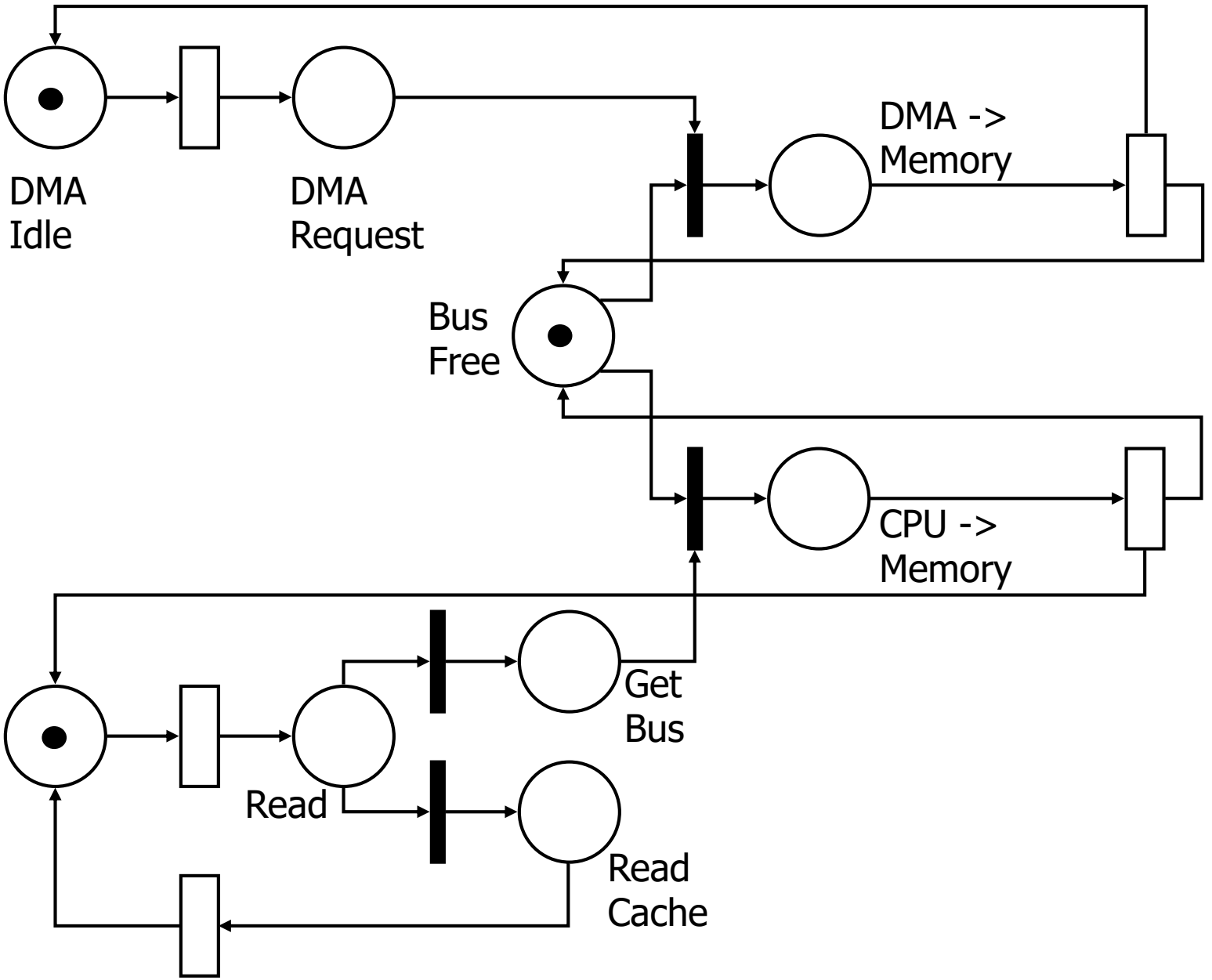
- The health record is initially located in the hospital archive.
- Nurses come to get the record at random intervals. If the record is available, the nurse removes it and starts working on it. Otherwise she waits.
- Up to three nurses may wait for the record at the same time.
- An emergency can happen independently at random intervals.
- While working on a record, the nurse will respond to any emergency, interrupting the work for a certain amount of time.
- If the nurse does not respond to the emergency in time, it will be handled by somebody else.
- When the nurse is finished with a record, with probability “p” a signature of the doctor is required. He needs some time to check and sign the health record.
- Afterwards, the file goes back into the archive and the nurse leaves.
- Initially there is one nurse waiting for the file and one is responding to an emergency
- Which transitions are race age, which are enabled?


Exp
Det
Uniform
3
Notfall
Krankenschwester
Akte bearbeiten
Hilfe
Archiv
Normal
Det
1-p
Normal
Unterschrift ?
RaceAge
Arzt warten
p

Modelling Exercise 2 – CPU

Modeling memory access patterns inside a computer:

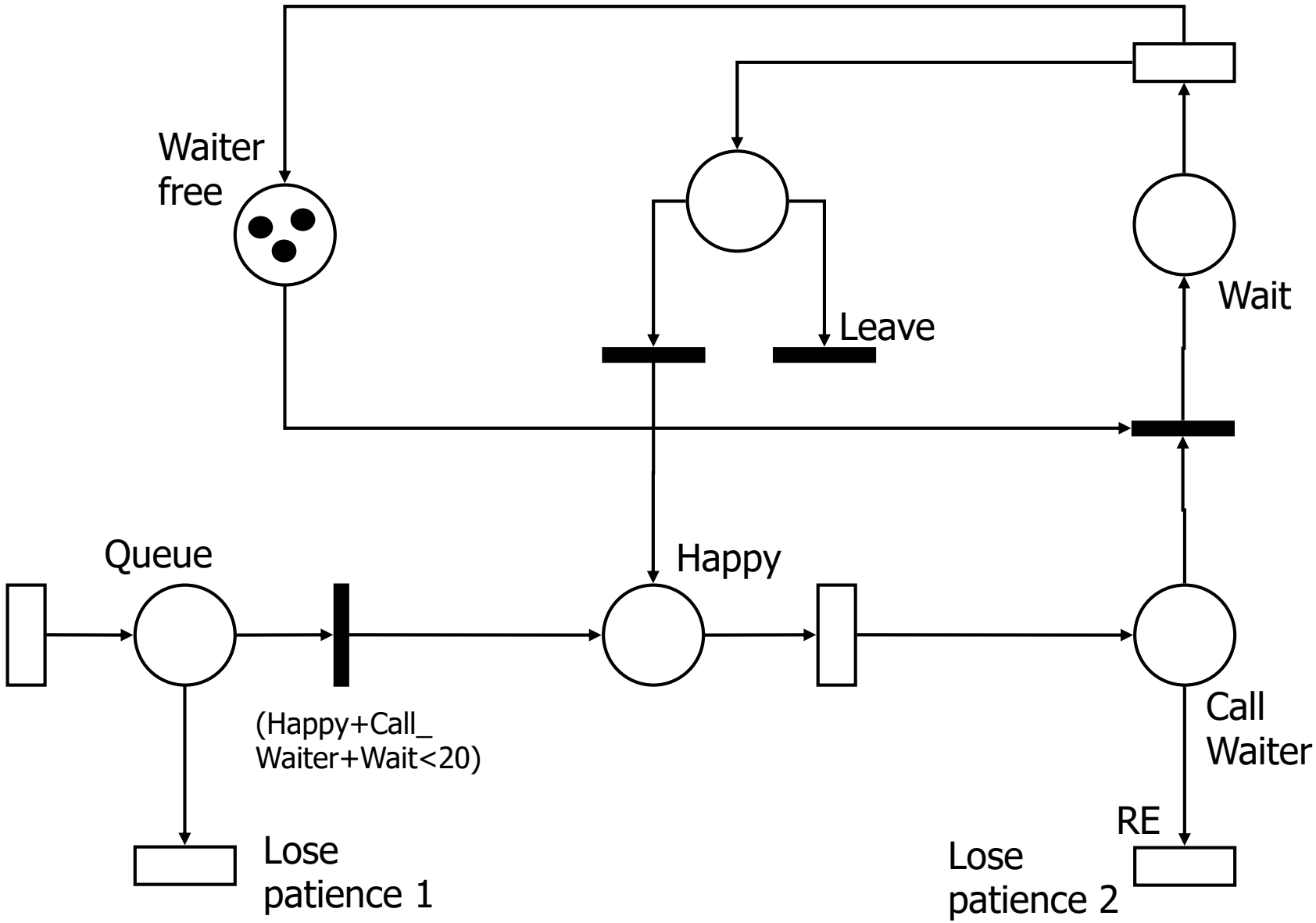
- A computer system contains a CPU and a DMA unit. Both try to access the main memory independently in certain intervals.
- In order to access the main memory, the bus must be free.
- The CPU has a cache, the DMA does not.
- There is a given probability that the information needed by the CPU can be found in the cache. Otherwise, it must be fetched from main memory.
- Reading information from the main memory requires different amounts of time for CPU and DMA.
- Currently the DMA is accessing the main memory and the CPU is idle.
- Which transitions are race age, which are enabled?

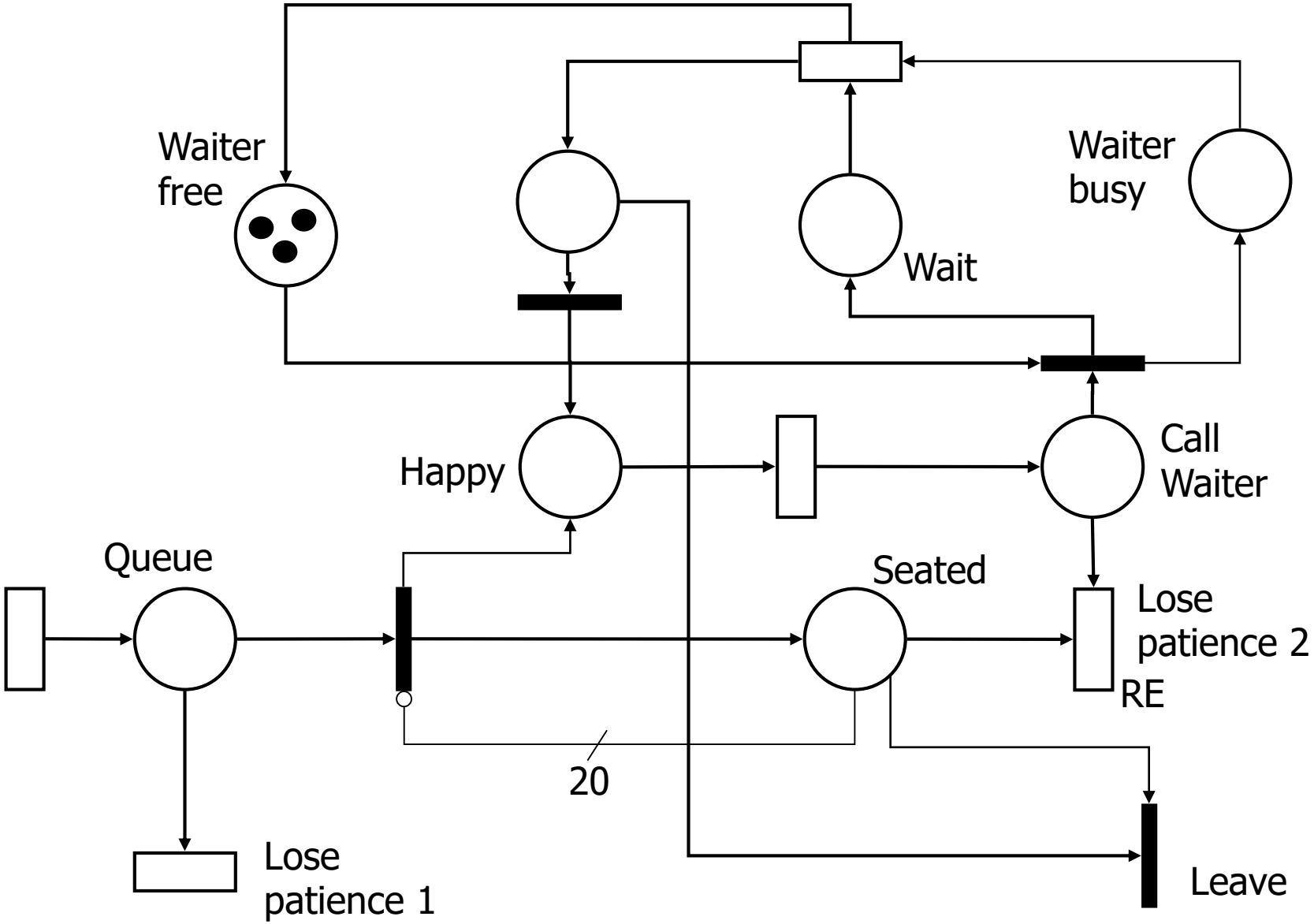

DMA
Idle
DMA
Request
DMA ->
Memory
Bus
Free
CPU ->
Memory
Get
Bus
Read
Read
Cache

Modelling Exercise 3 – Restaurant

Modeling the part of a restaurant that directly deals with its customers:

- Customers arrive at a restaurant and enter a queue.
- The restaurant has three waiters and 20 tables.
- Customers in the queue who are not seated within a certain time will leave.
- Seated customers call the waiter at certain intervals. If one does not arrive after a certain time, the customer leaves.
- Serving a seated customer takes a certain time.
- A certain fraction of services is paying, after which customers leave.
- Current there are 5 guests in the restaurant, two of which are being served.
- Which transitions are race age, which are enabled?


Waiter
free
Leave
Wait
Queue
Happy
(Happy+Call_
Waiter+Wait<20)
Call
Waiter
RE
Lose
patience 1
Lose
patience 2


Waiter free
Wait
Waiter busy
Happy
Call Waiter
Queue
Seated
Lose patience 2
RE
20
Lose patience 1
Leave