QLOCK

Daniel Gaina

Kyushu University

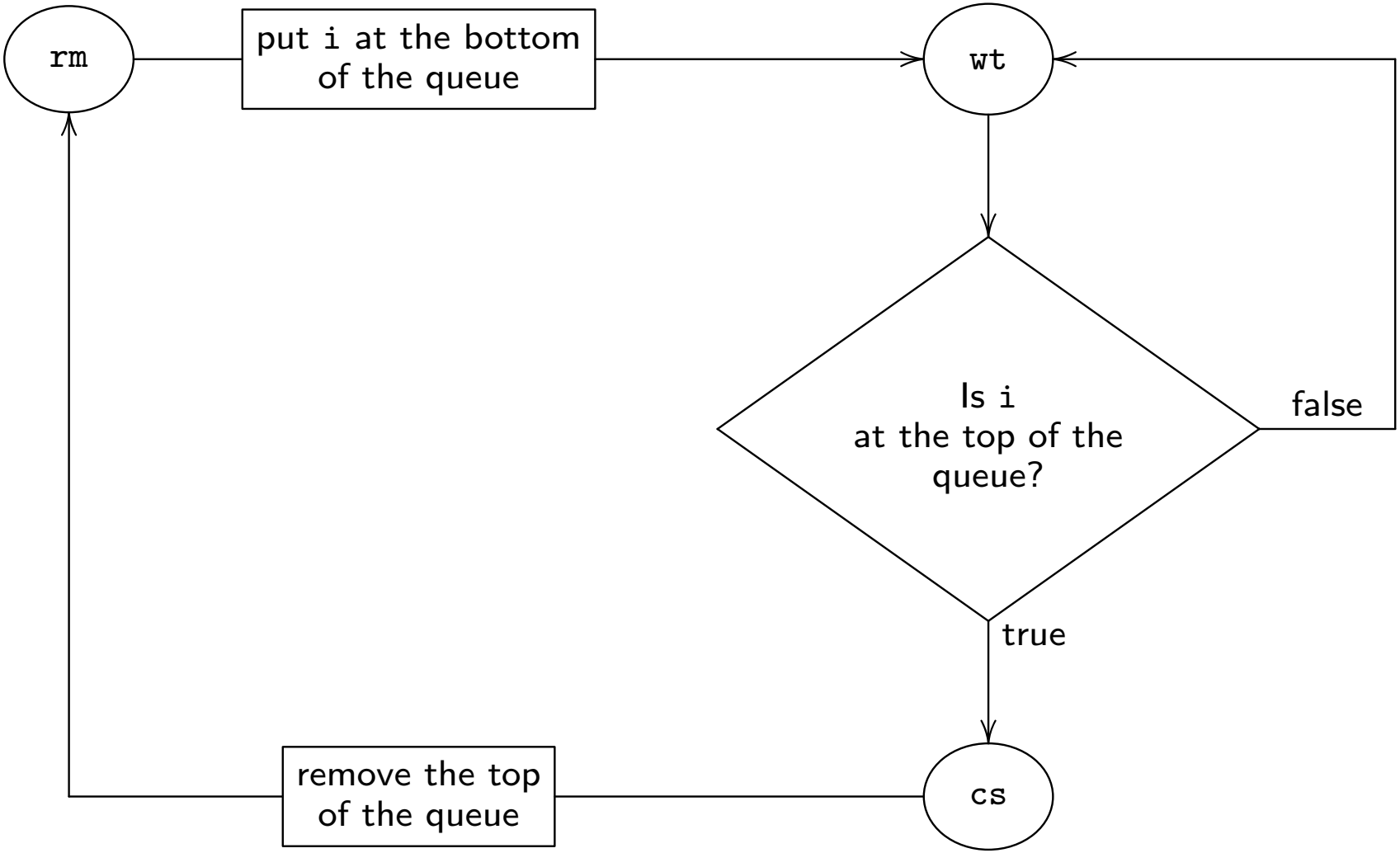
Mutual exclusion protocol

Assume that many agents (or processes) are competing for a common resource, but that at any given moment of time only one agent can use the resource, that is, the agents exclude or prevent each other from accessing the resource.

A protocol that can guarantee this kind of mutual-exclusion property is called a mutual exclusion protocol.

Short description

- Initially, each process `i` is in the `reminder section (rm)` .
- After process `i` puts its name at the bottom of a waiting queue, `i` is in the `waiting section (wt)`.
- Process `i` will be in the critical section and have access to the information when it will be the first in the queue.
- When it leaves the source process `i` will be removed from the queue entering again in the remainder section.


rm
put i at the bottom of the queue
wt
Is i at the top of the queue?
false
true
cs
remove the top of the queue

Properties to prove

1. Only one agent can be in the critical section at a given moment.
2. Given any state S there exists a reachable state R from S which is indistinguishable from the initial state by means of observers, that is, all agents are in the remainder section and the waiting queue is empty.