

Discrete-event models

part 3: modelling with Petri Nets

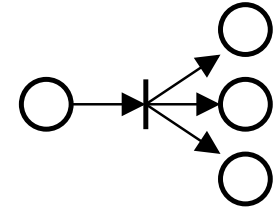
Dr. Bystrov

School of Engineering
Newcastle University

PN building blocks: Fork-join

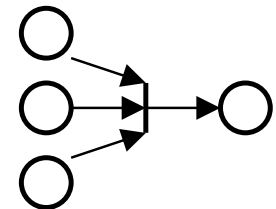
- "Fork" starts concurrent processes.

- Increases concurrency.



- "Join" synchronises concurrent processes.

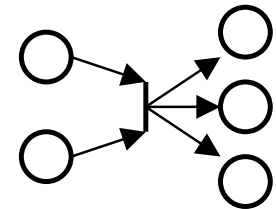
- Reduces concurrency



- Combined fork-join.

- Synchronises concurrent processes.

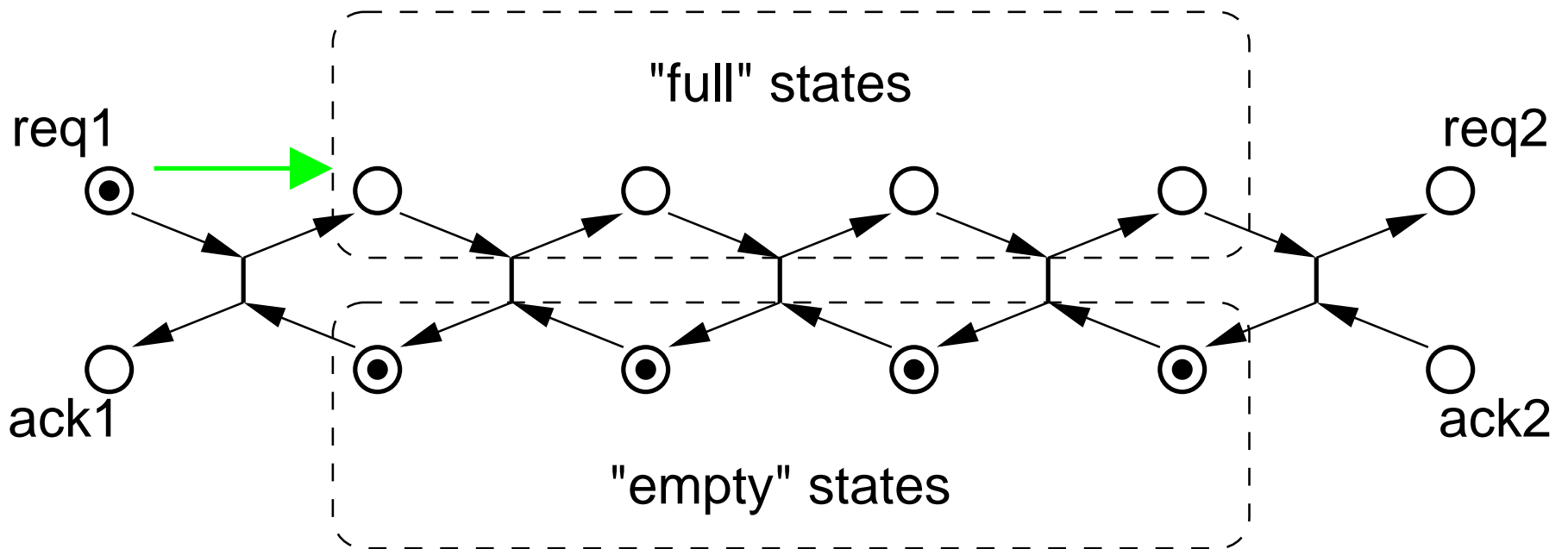
- Generates new concurrency.



- Less synchronisation \Rightarrow more freedom \Rightarrow faster system!

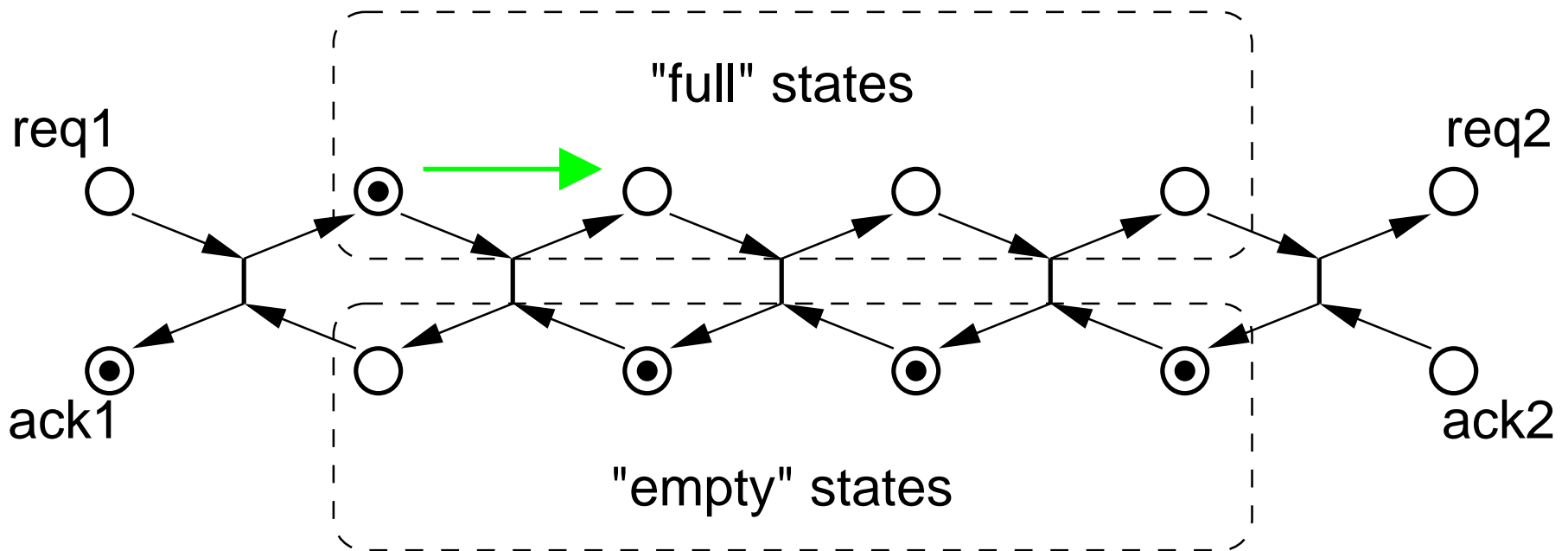
Pipeline model

- What is a pipeline (First In – First Out, FIFO)
- Difference between a pipeline and a shift register
- Behavioural model of a linear pipeline (Petri Net)



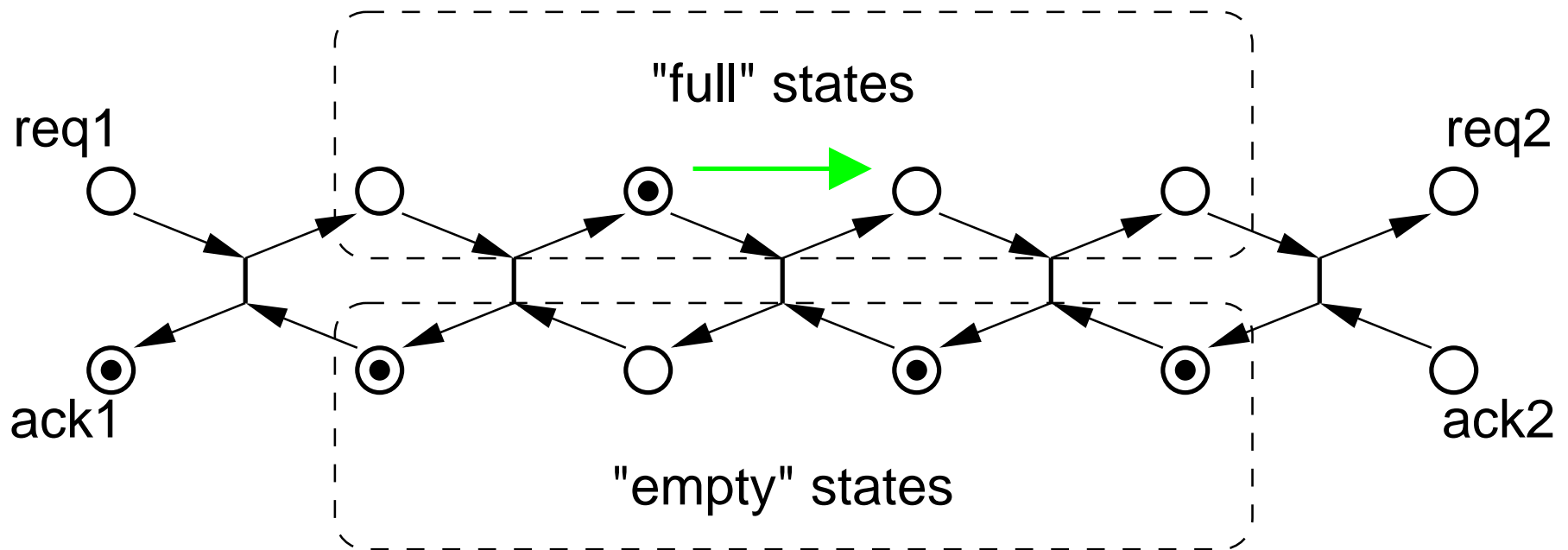
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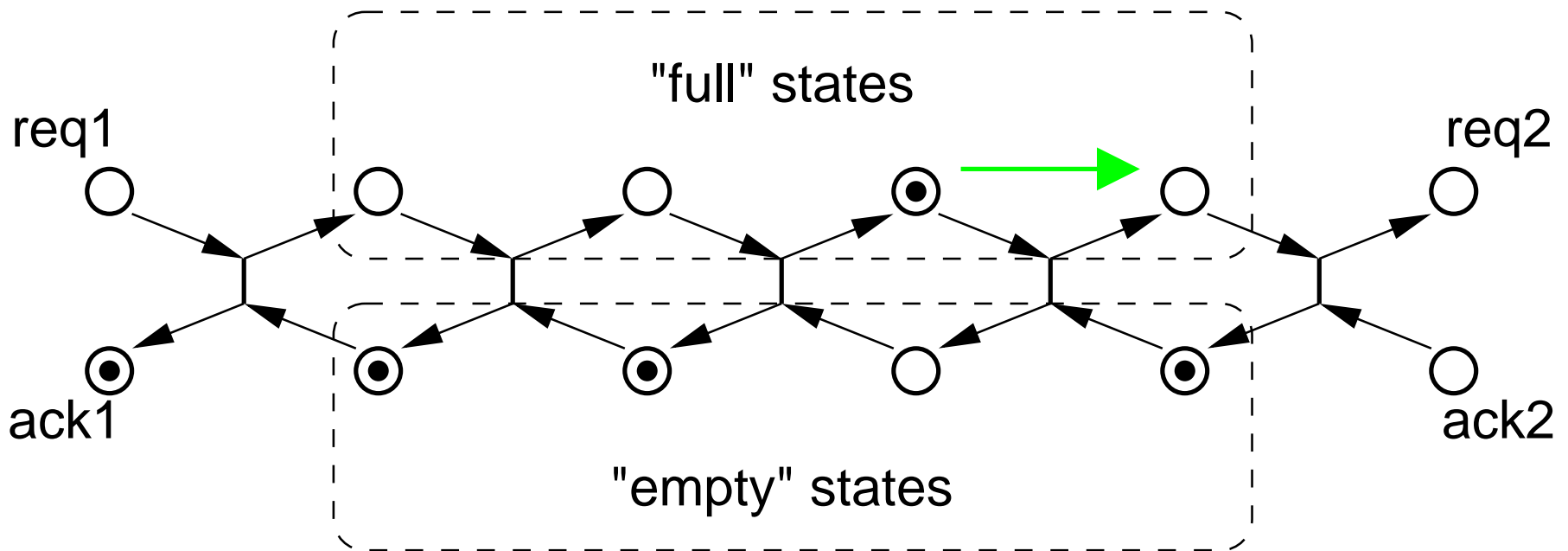
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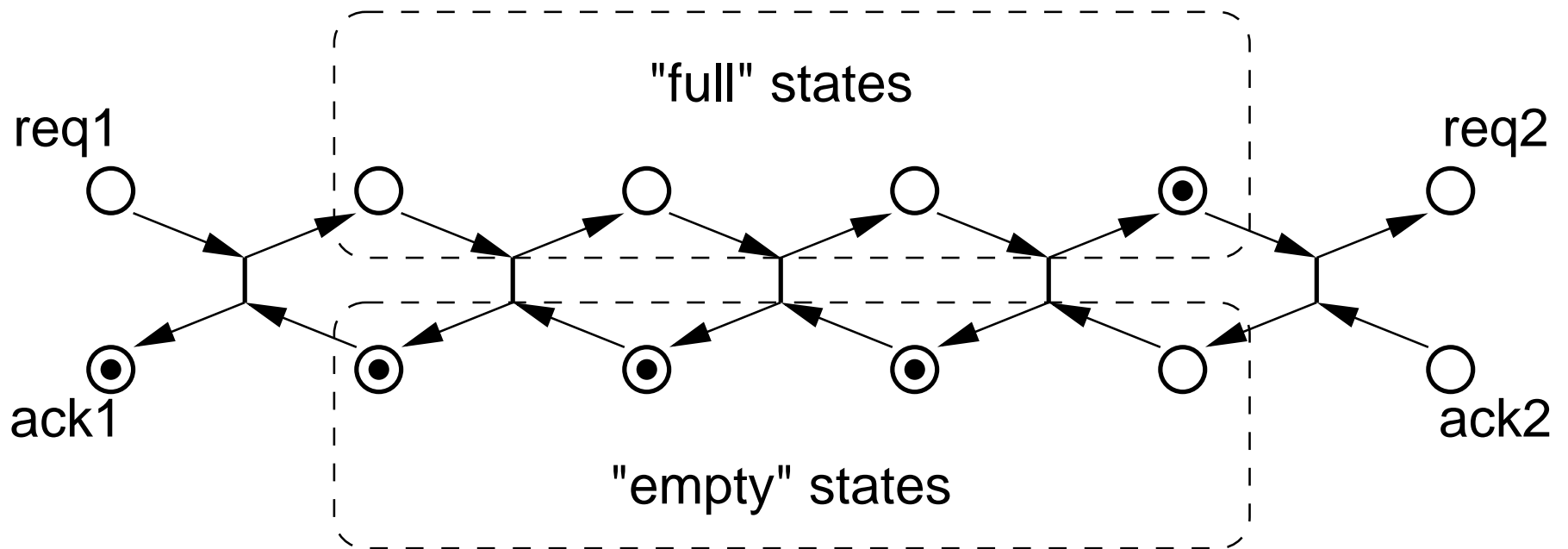
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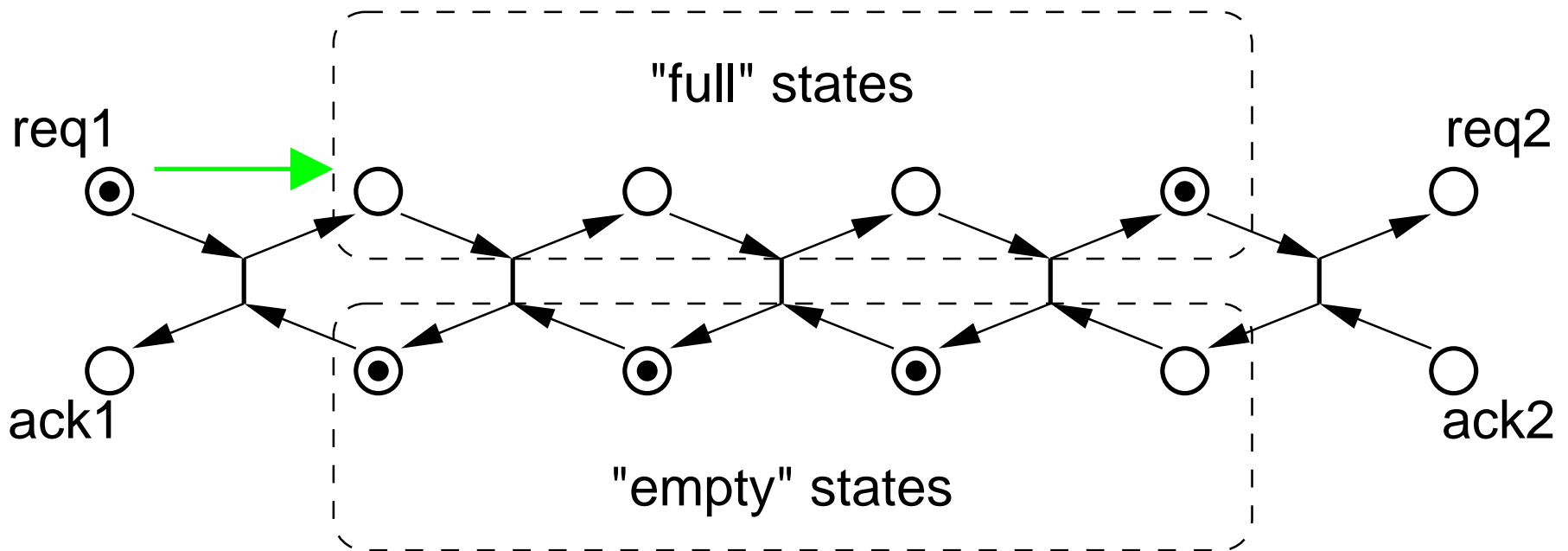
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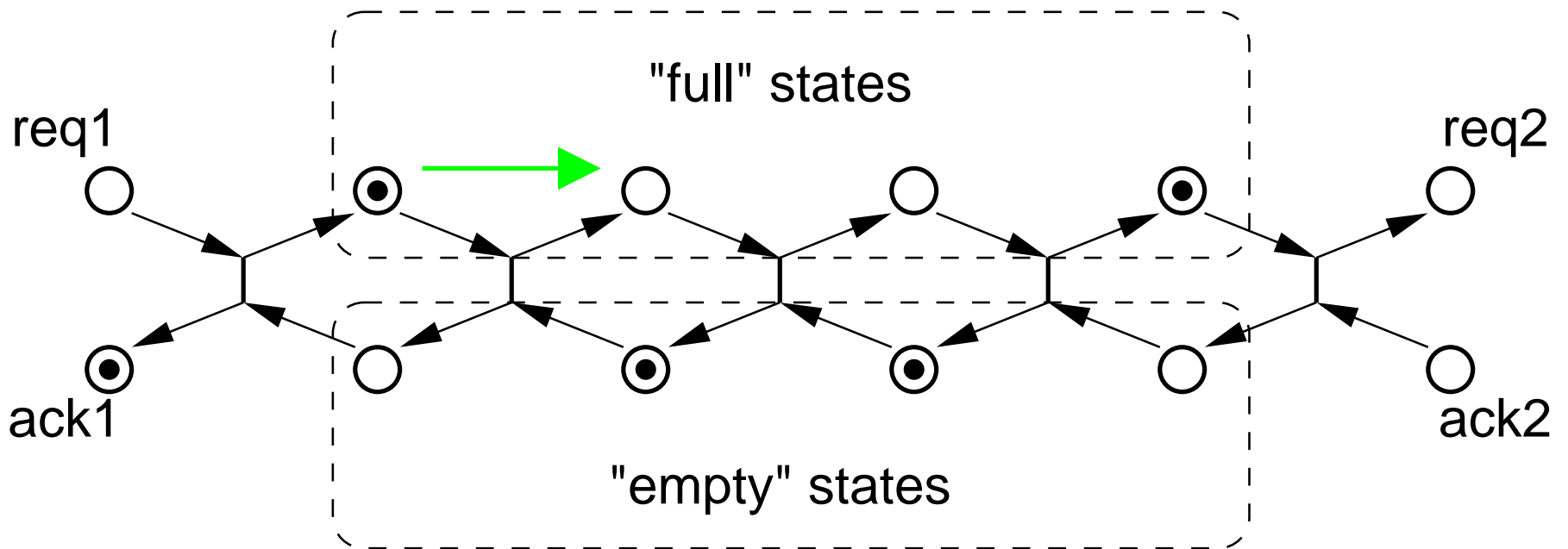
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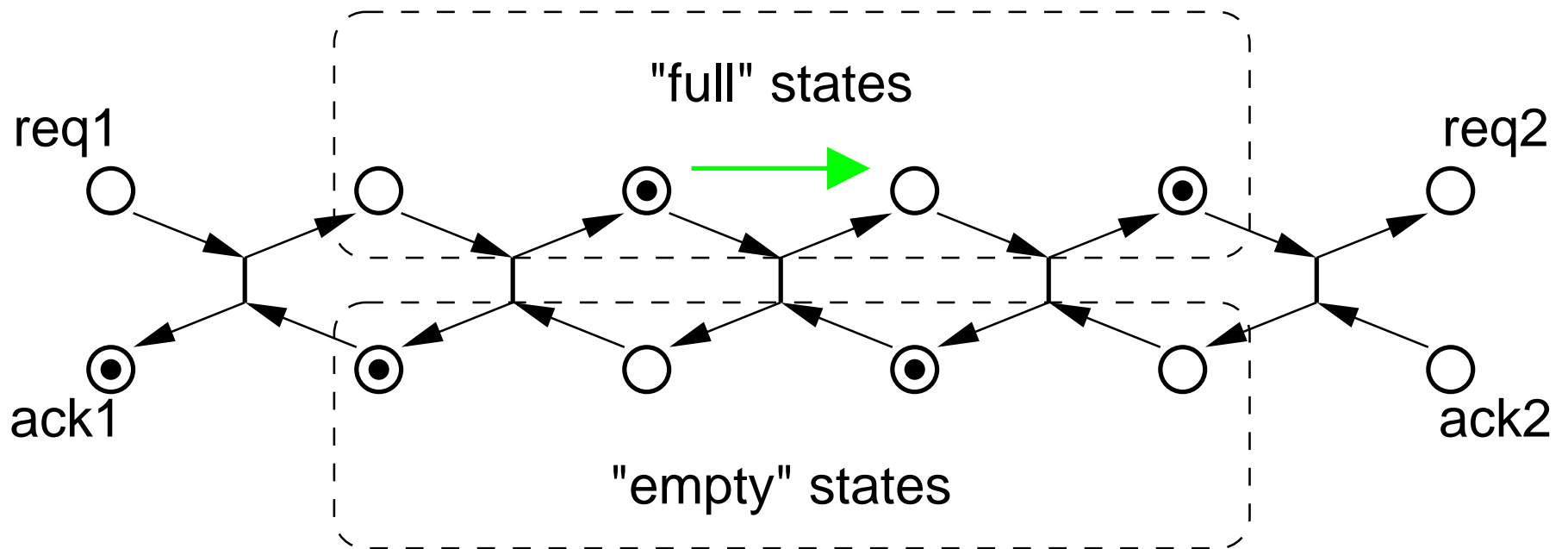
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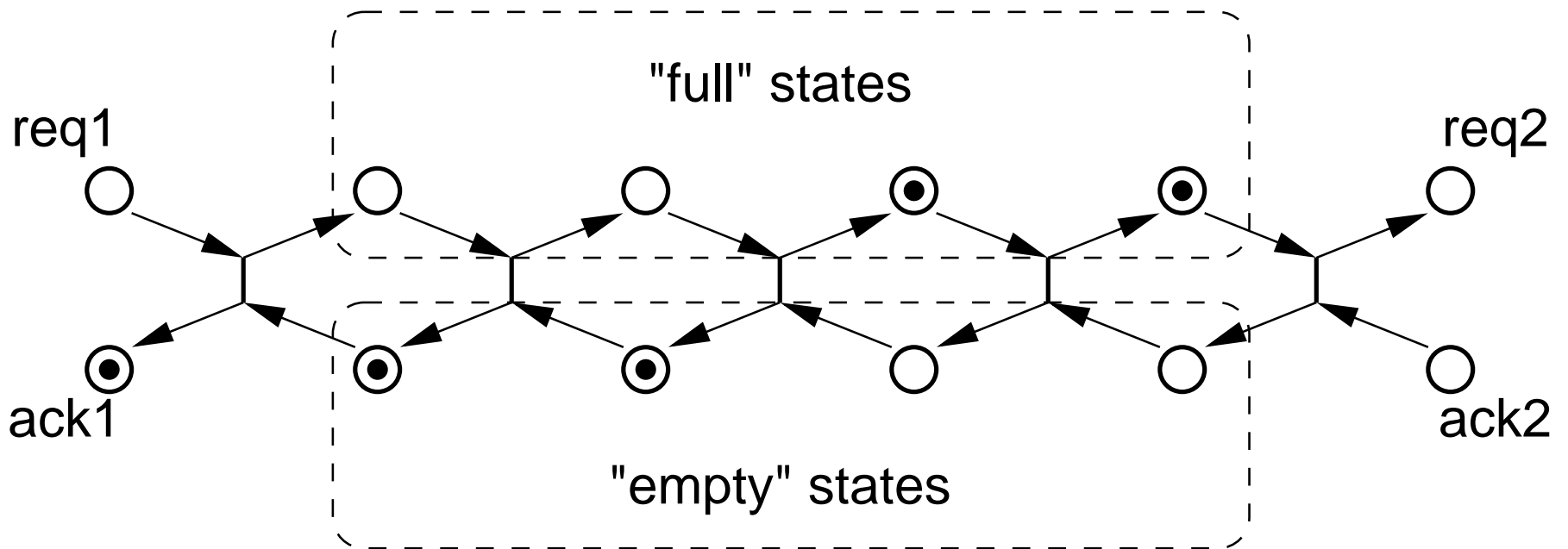
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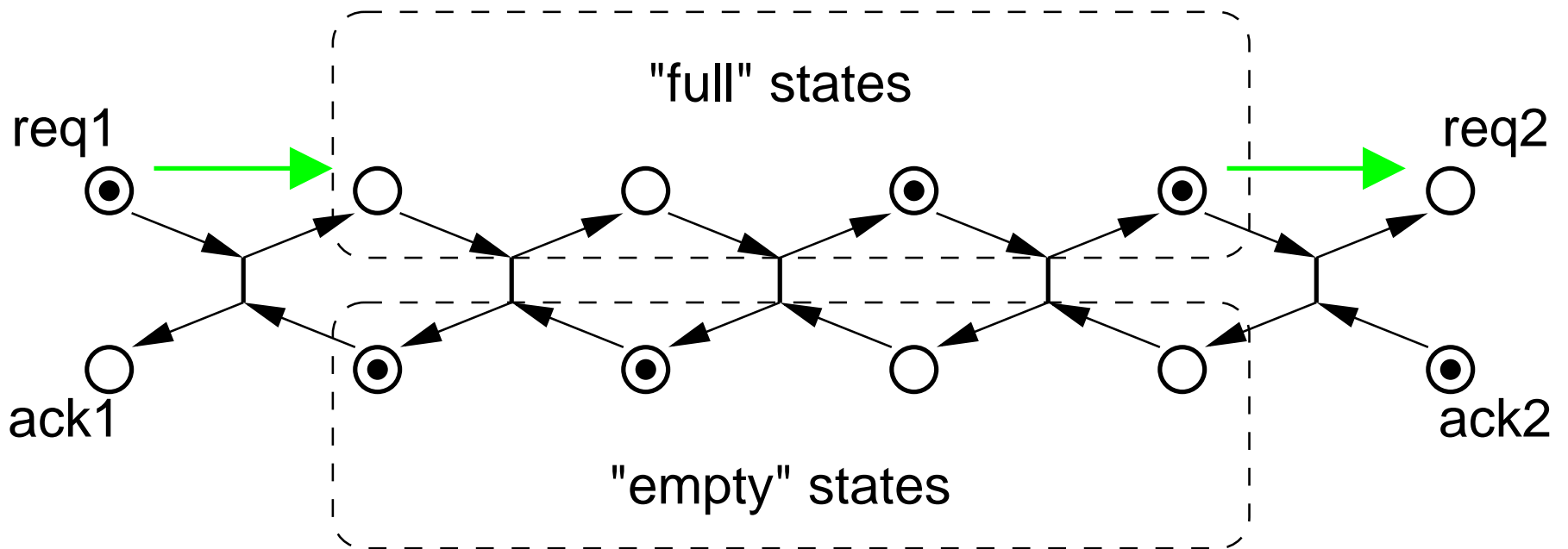
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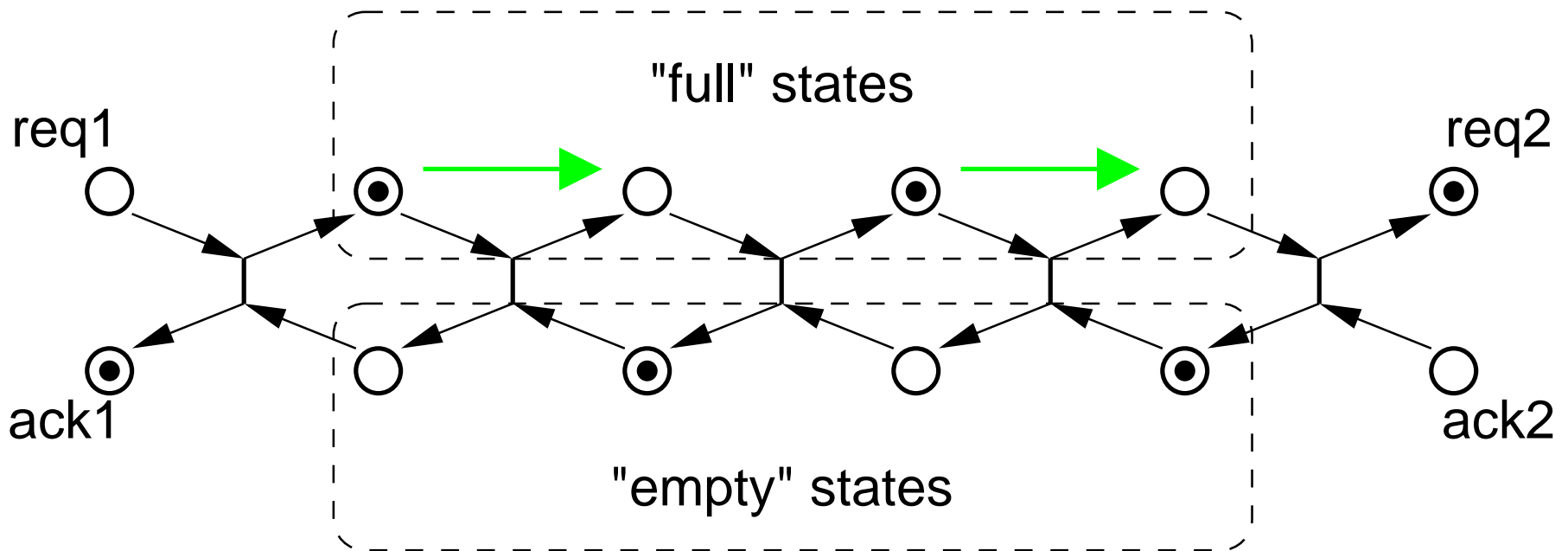
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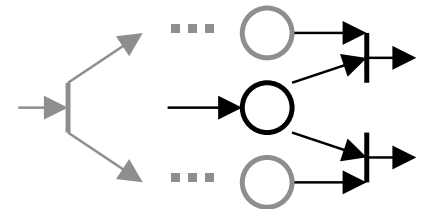
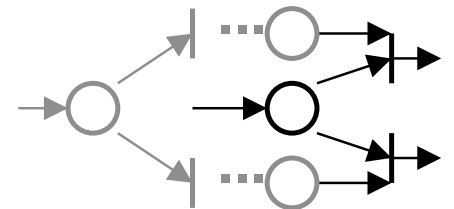
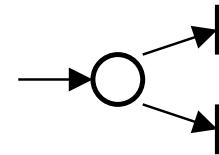
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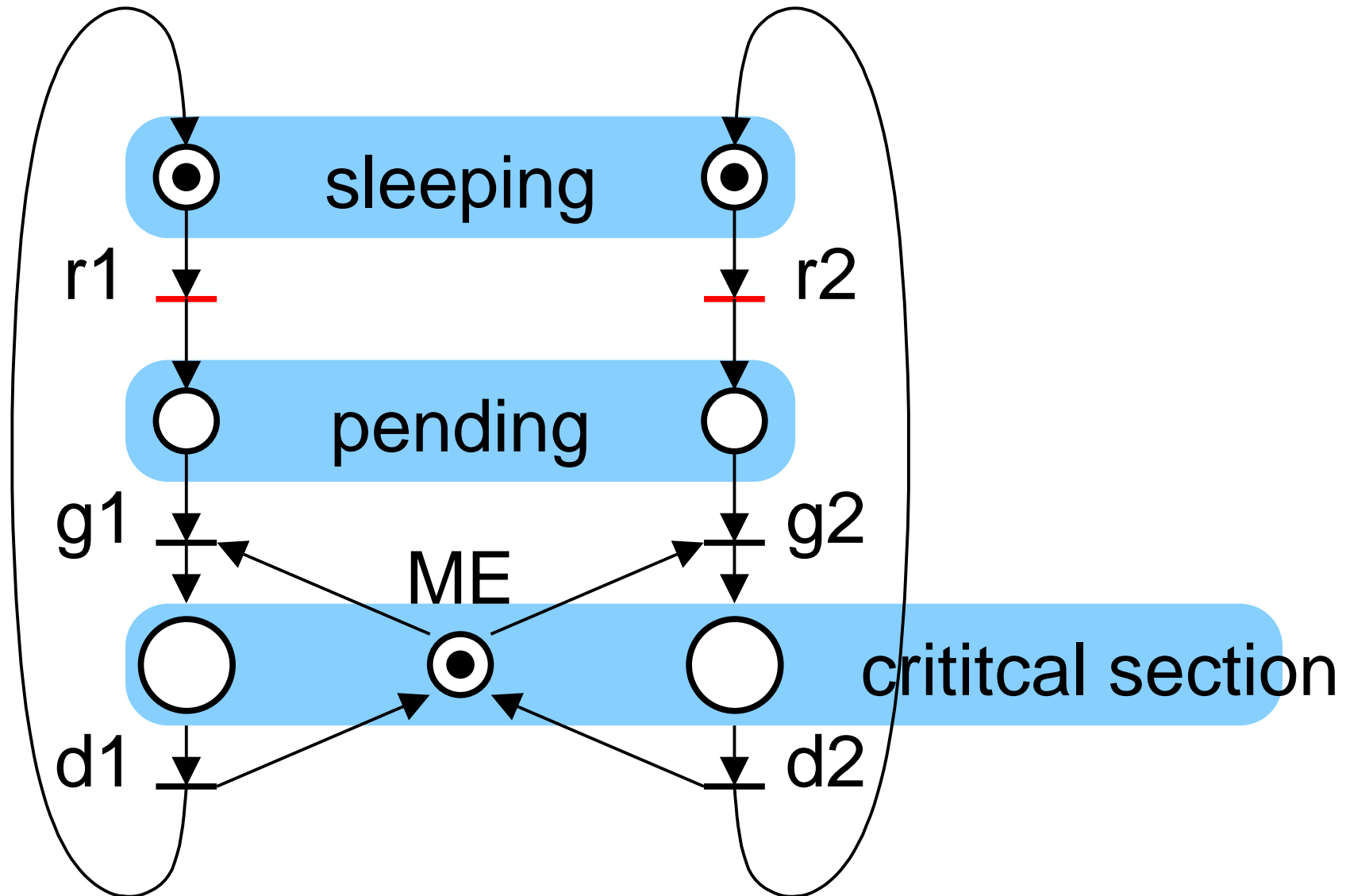


PN building blocks: choice

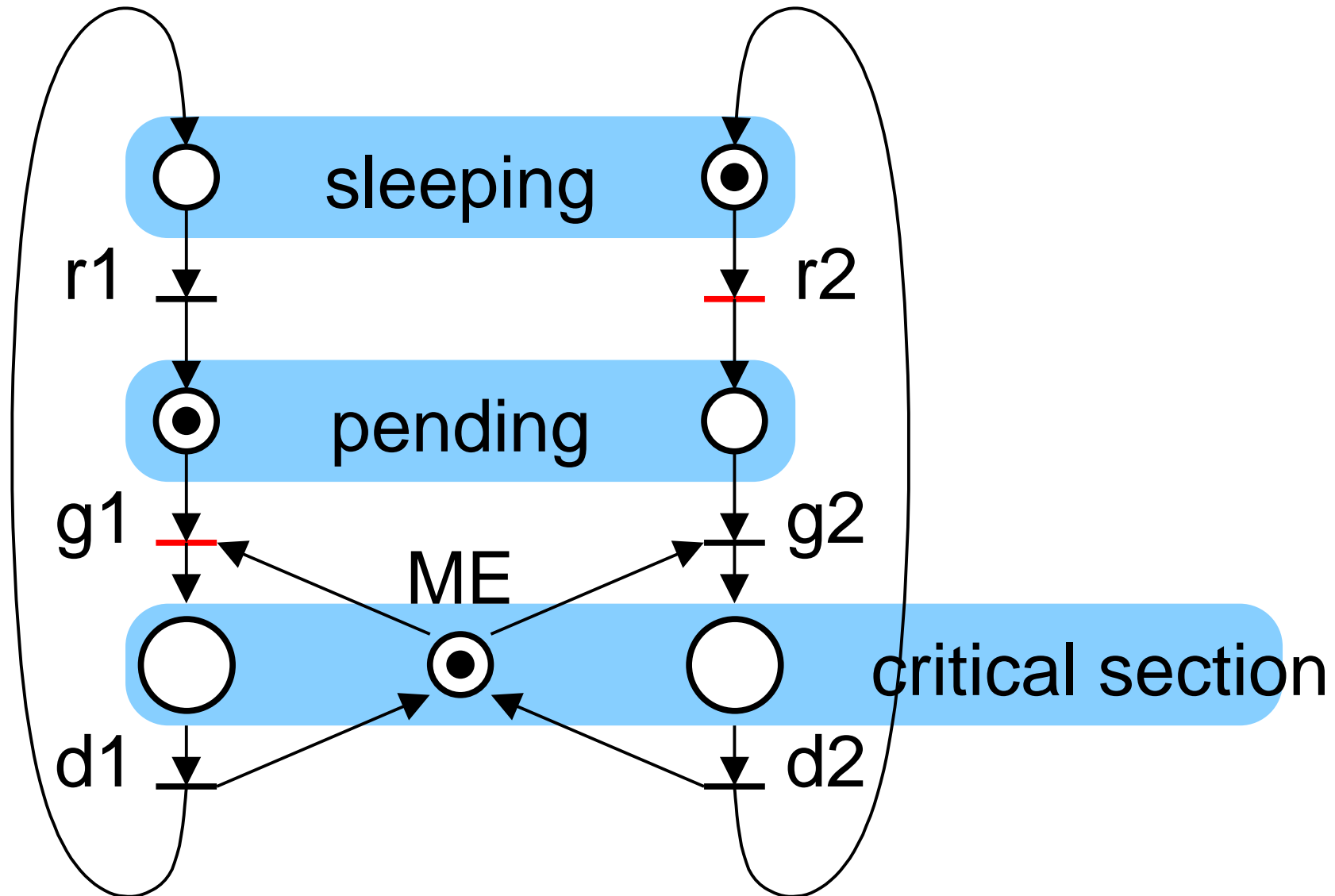
- Free choice
 - usually represents the lack of knowledge about its mechanism;
 - often takes place in the environment.
- Controlled choice
 - the control mechanism is known and represented in the model;
 - can be implemented as a device.
- Arbitration
 - Buridan's Ass problem [Aristotle];
 - can be implemented as a device.
- Confusion (we are not going to use it...)
 - should be refined for implementation.



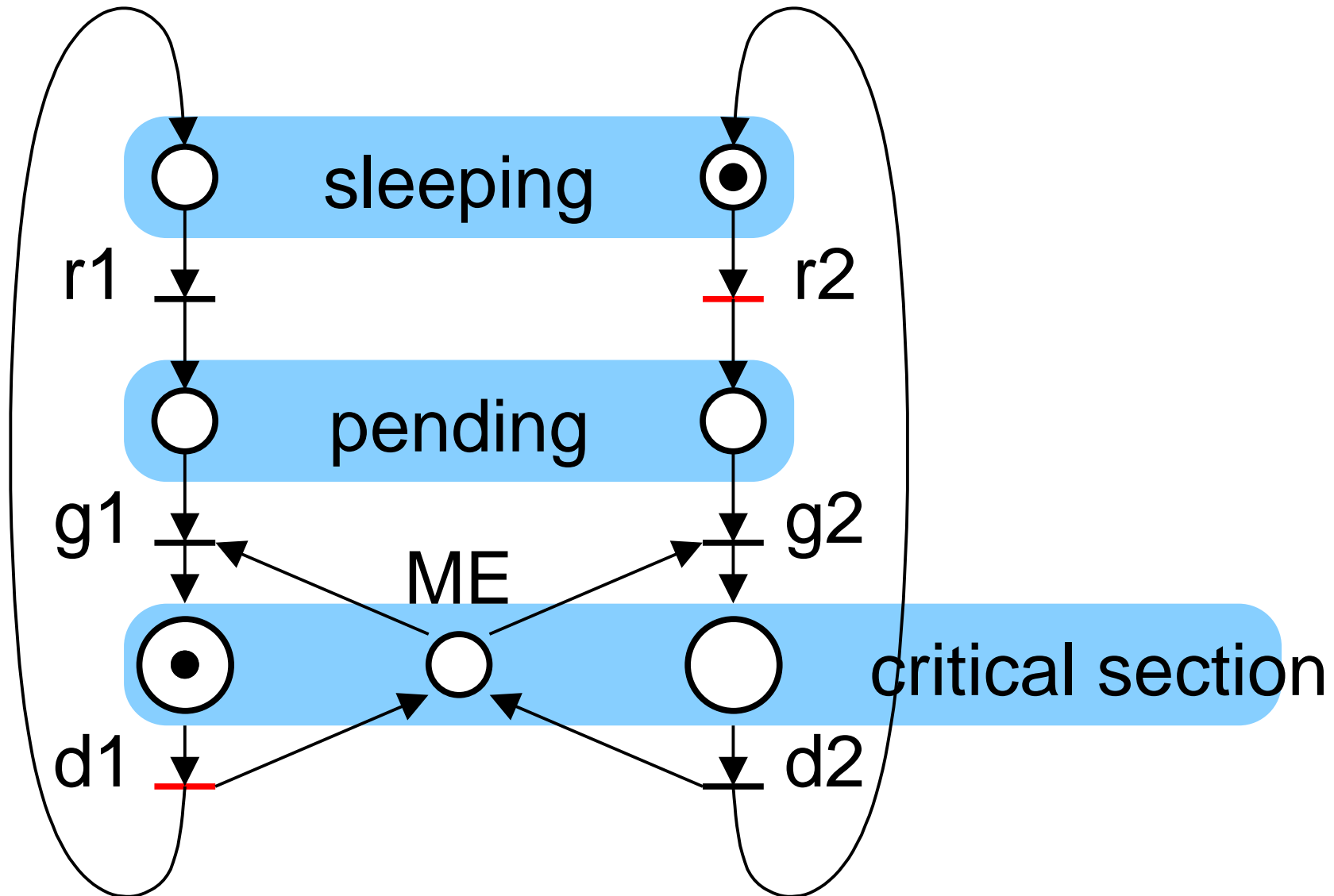
Asynchronous arbiter model



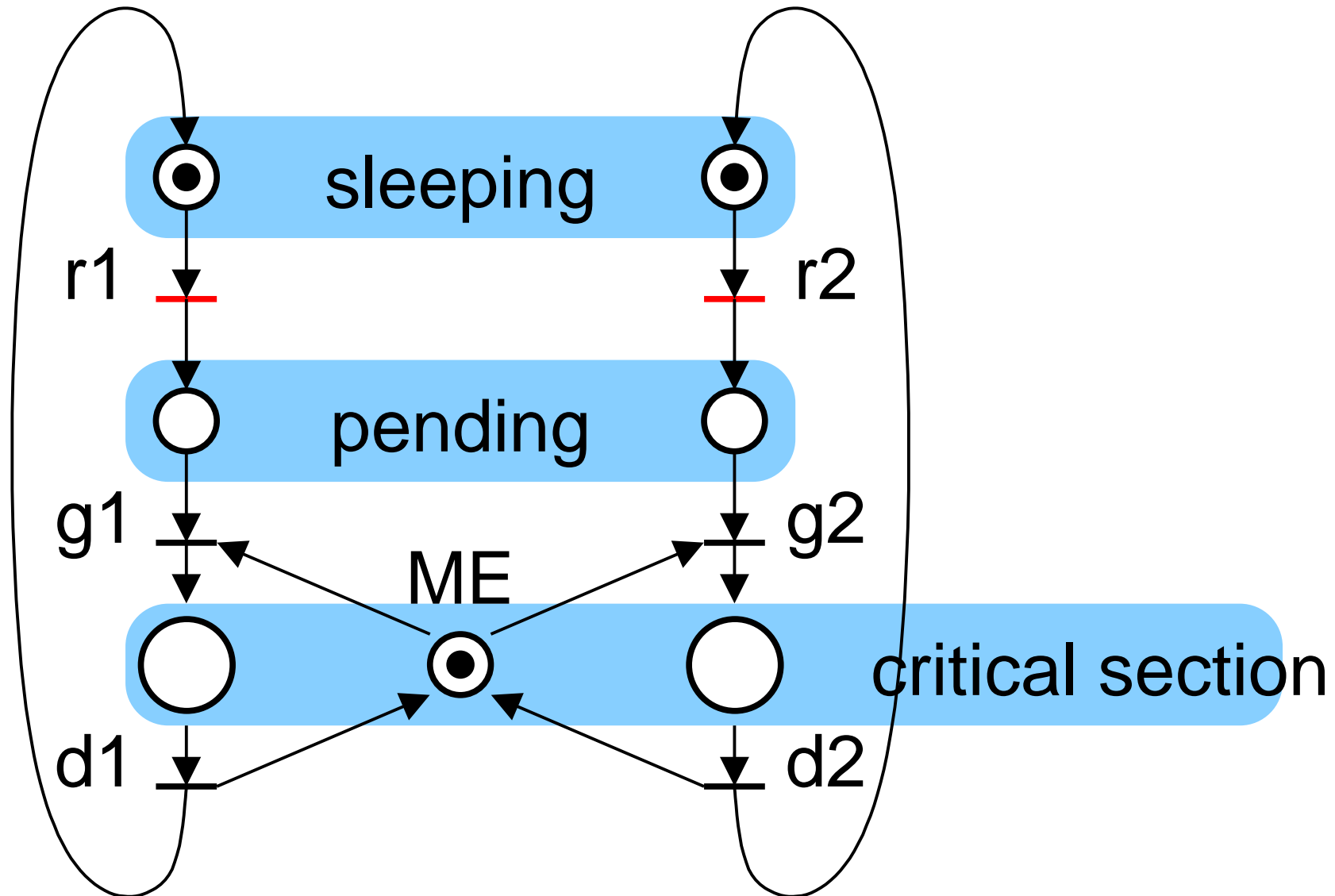
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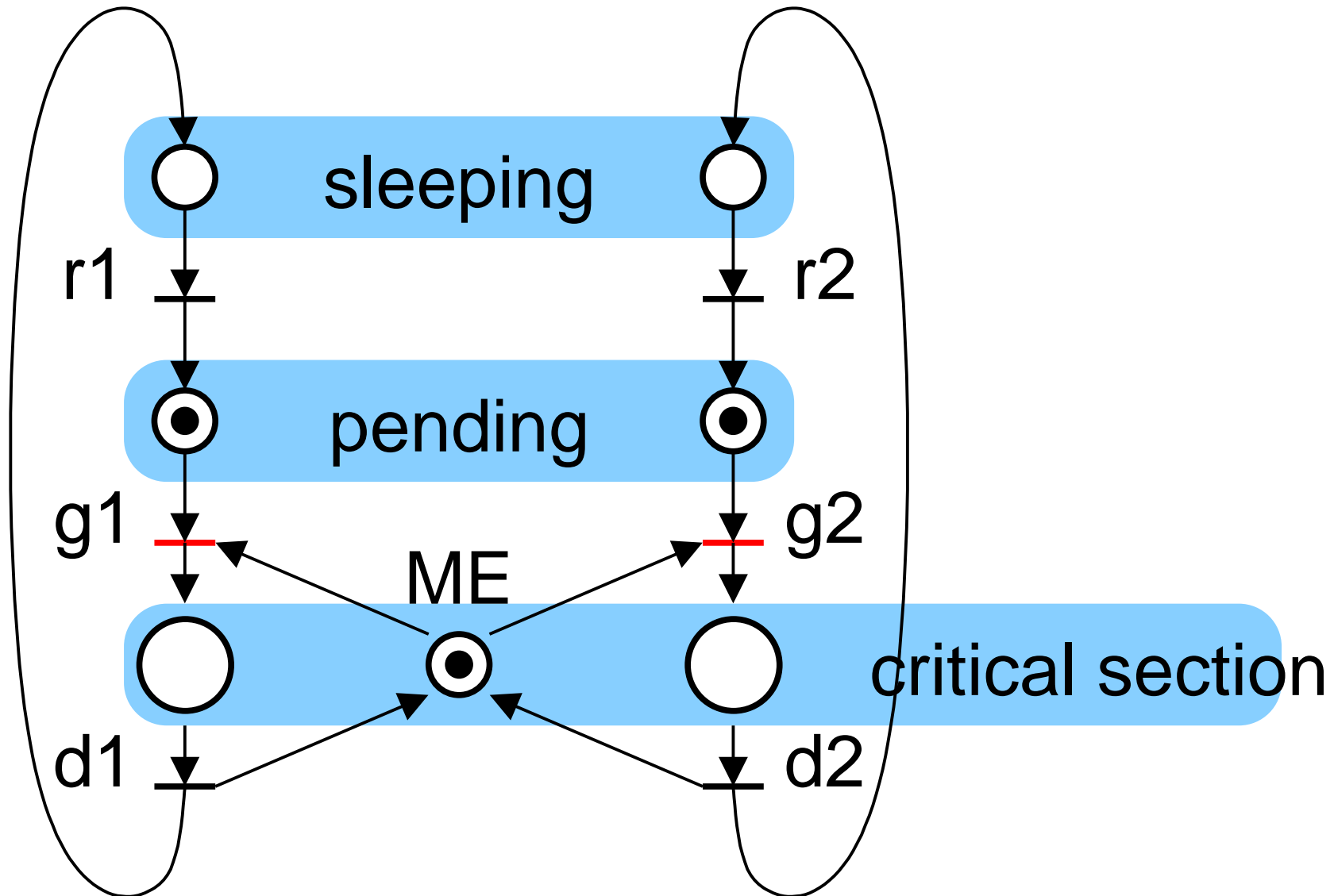
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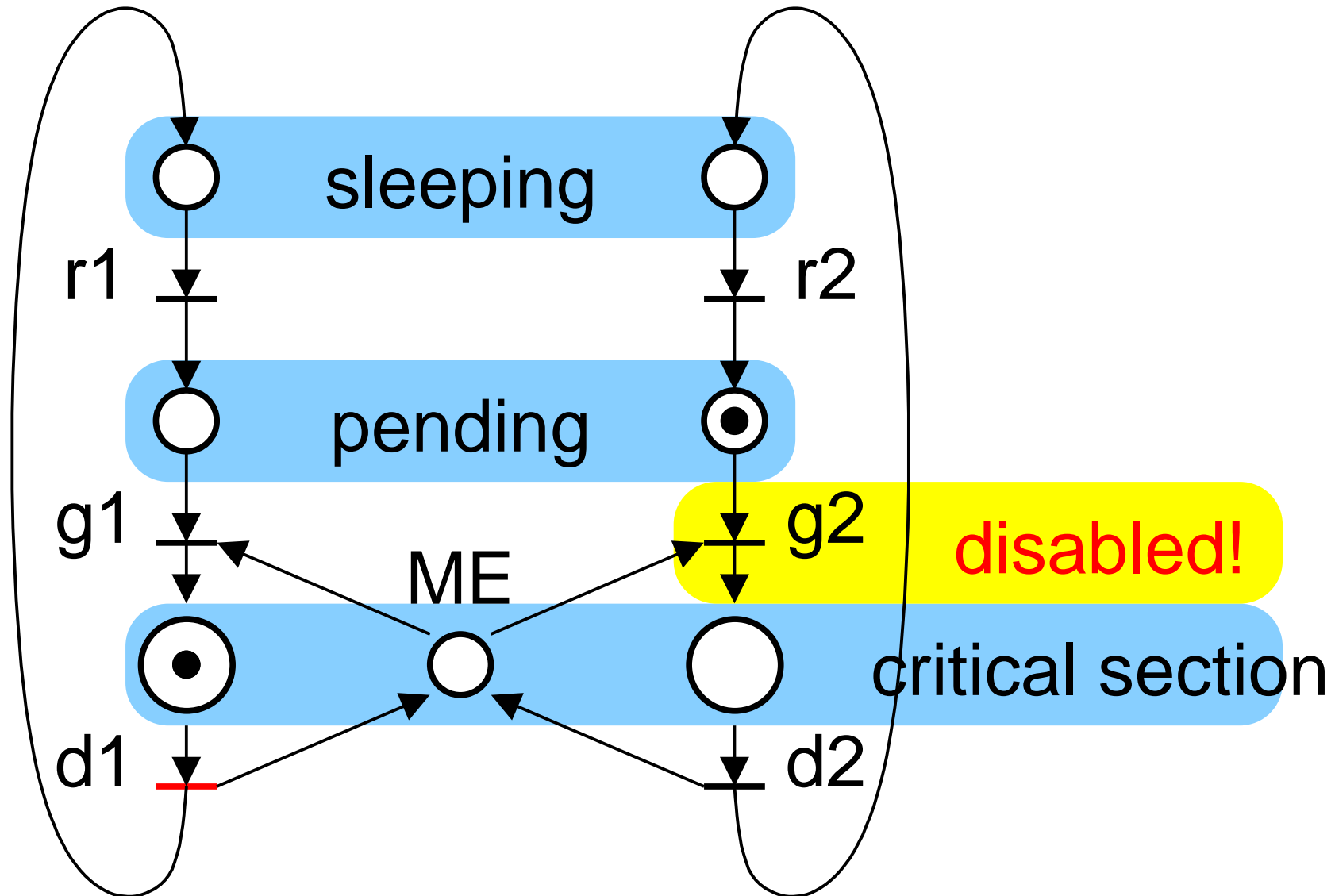
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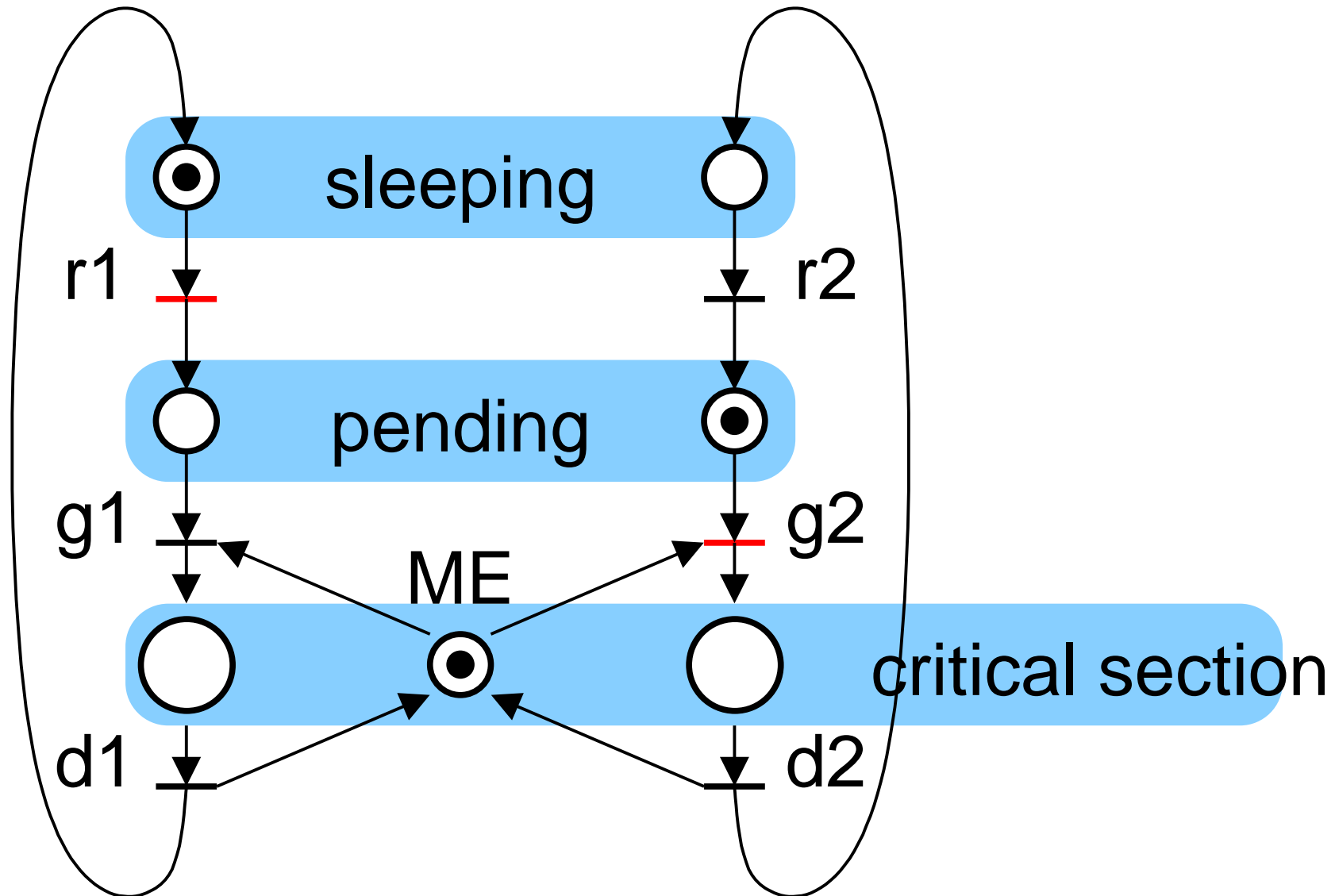
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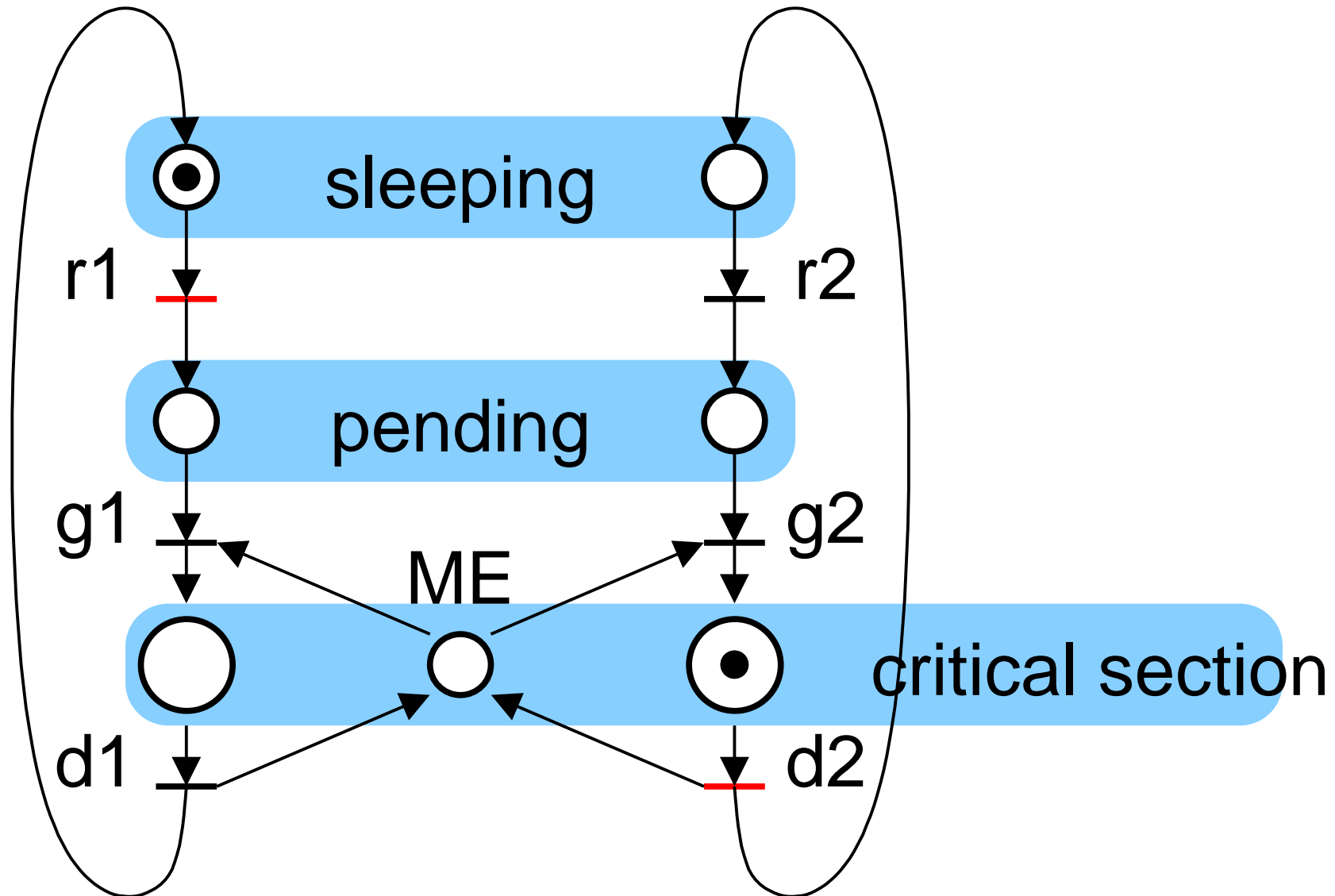
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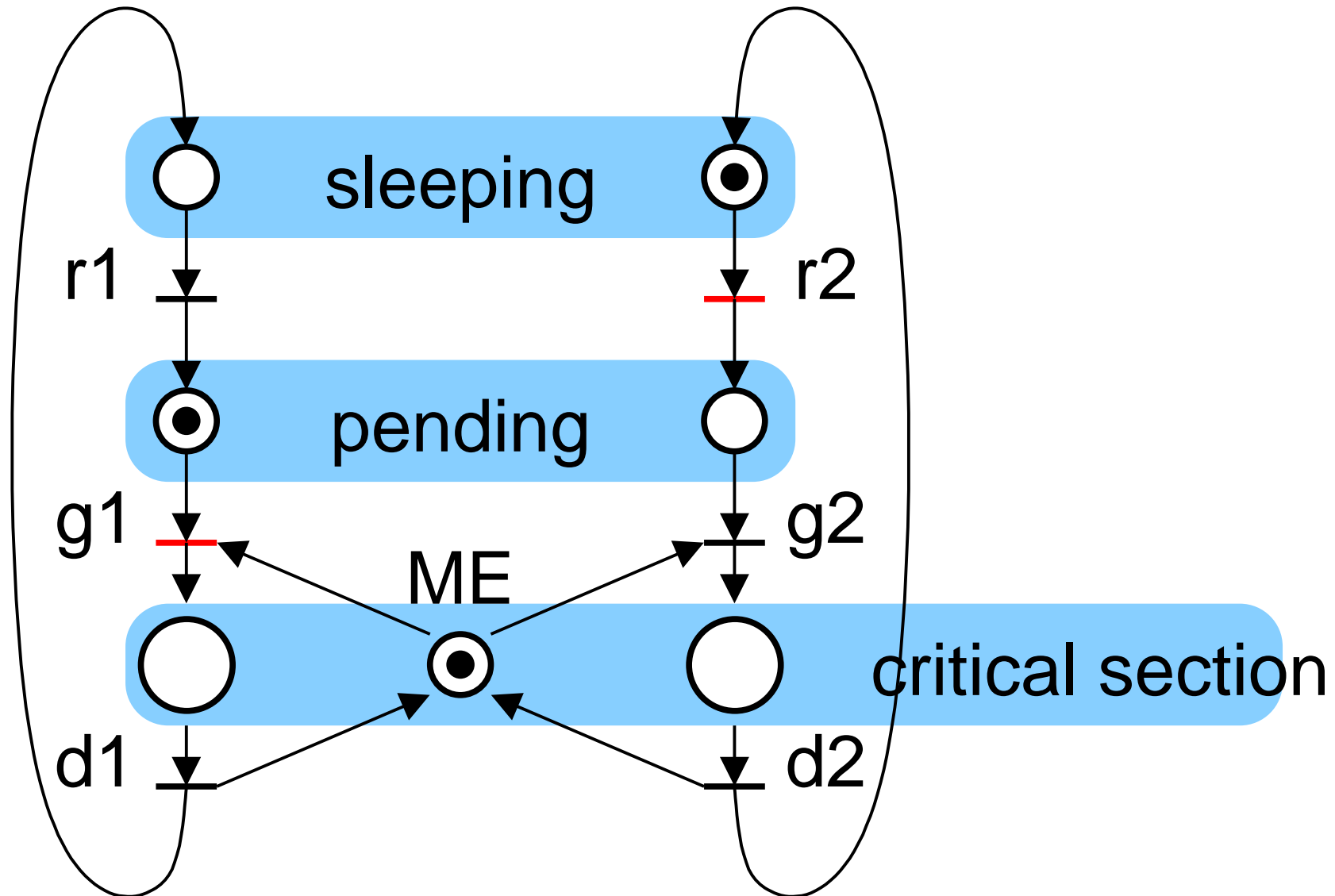
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Summary

- Fork-join
- Pipeline Petri net example
- Choice-merge
- Arbiter Petri net example

Next: Examples of constructing Petri net models