

Logic and Modelling

— Applications of Modal Logic —

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Where is Modal Logic Applied?

Modal logic is applied in industry for

- ▶ **program verification,**
- ▶ **protocol validation.**

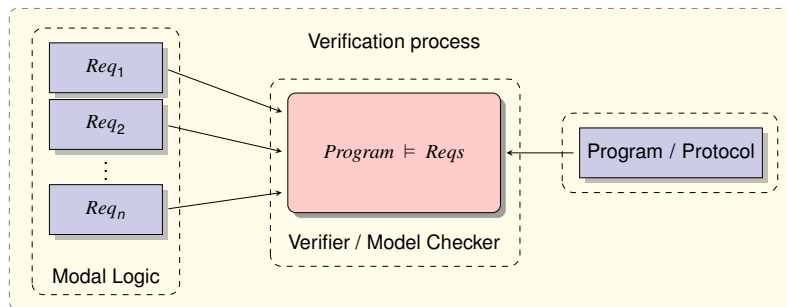
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The requirements are formulated in a variant of modal logic.

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Variants of modal logic used in industry:

- ▶ linear time logic,
- ▶ computational tree logic,
- ▶ μ -calculus.

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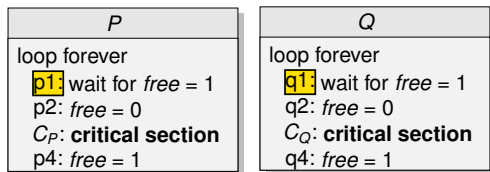
You can then formulate properties like:

- ▶ There always is a path to successful termination.
- ▶ Never two processes are in the same critical section.
(Needed in case of shared resources.)

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How does it work? The verifier...

- ▶ translates program execution into a graph (state space),
- ▶ checks the validity of the modal formulas.

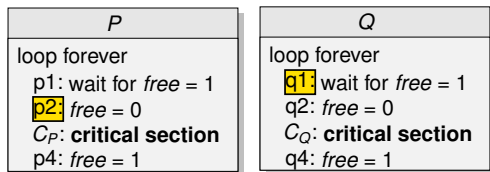


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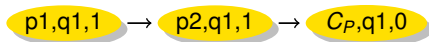
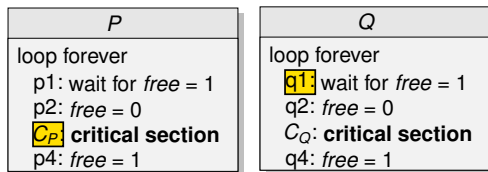


p1,q1,1 → p2,q1,1

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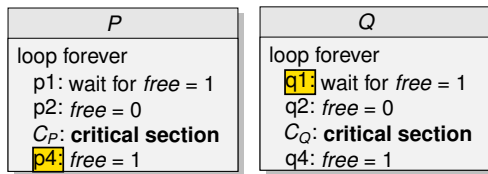
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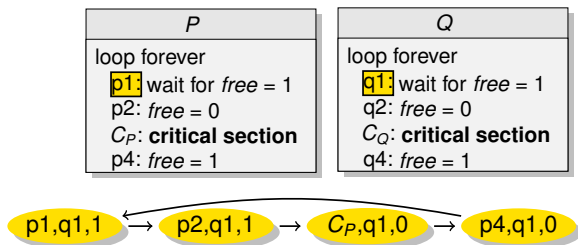
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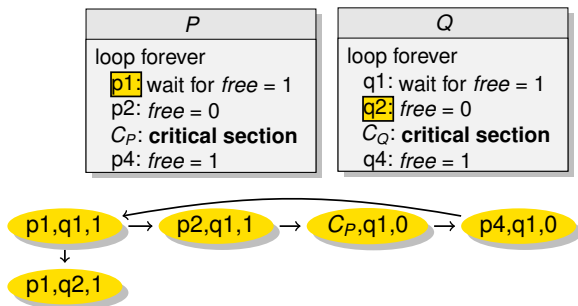
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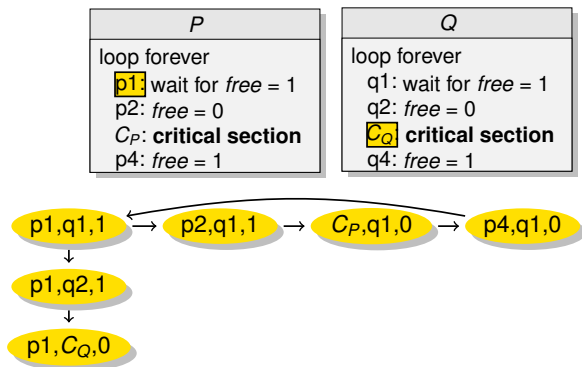
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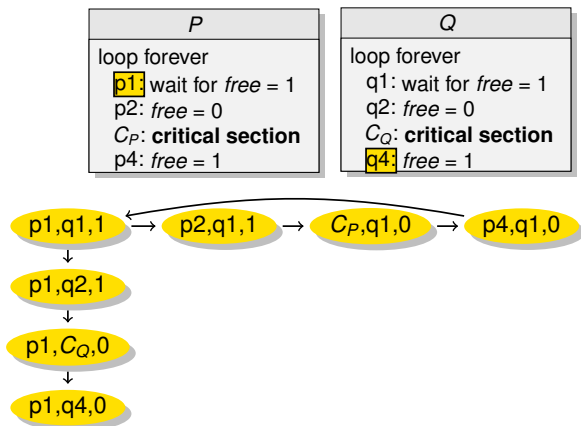
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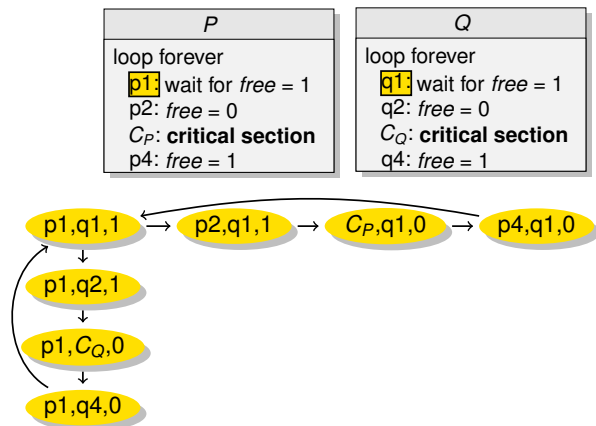
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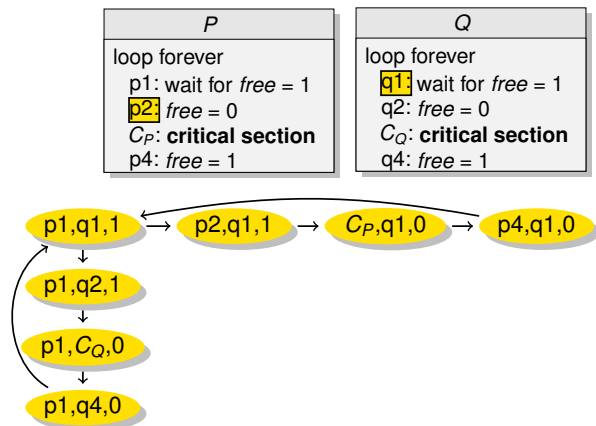
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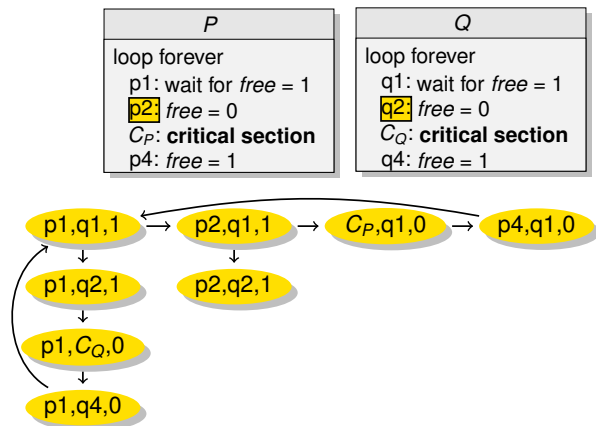
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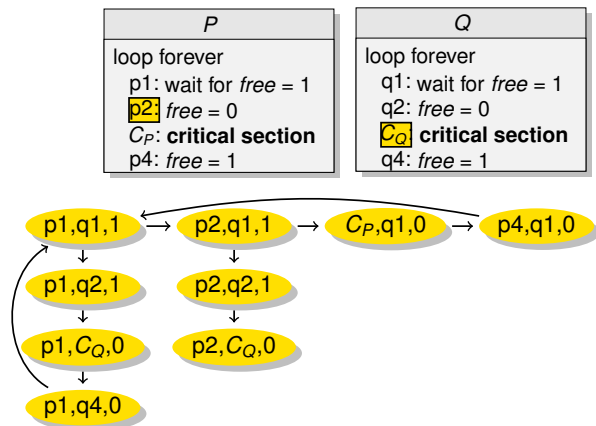
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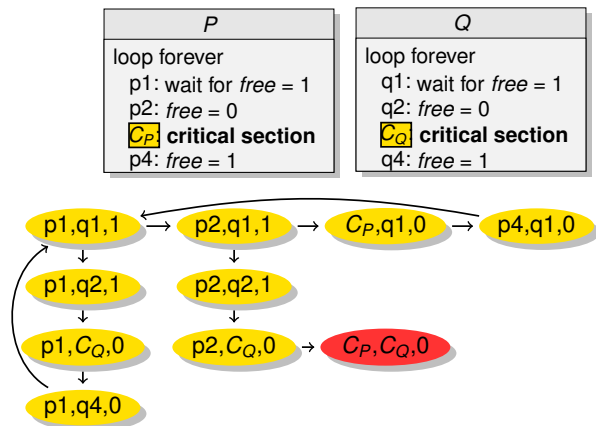
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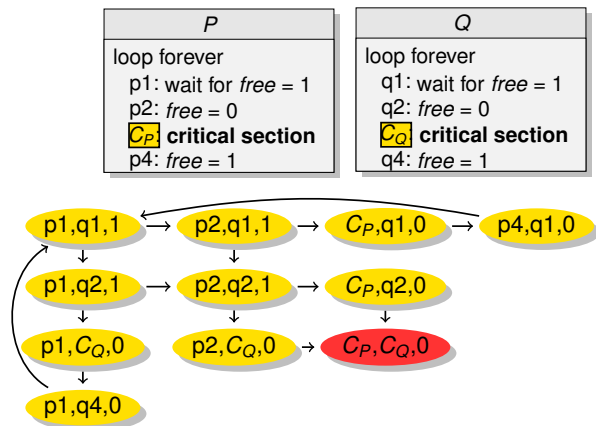
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