Strong simulation for one counter nets is PSPACE-complete

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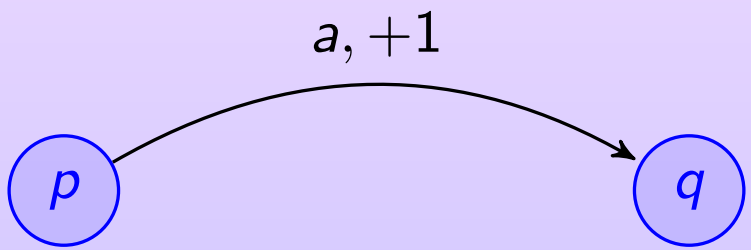
Plan

1. Model
2. Simulation
3. History
4. Results
5. Future work

One-Counter Nets

(Q, Act, δ) $\quad \delta \subseteq (Q \times Act \times \{-1, 0, +1\} \times Q)$



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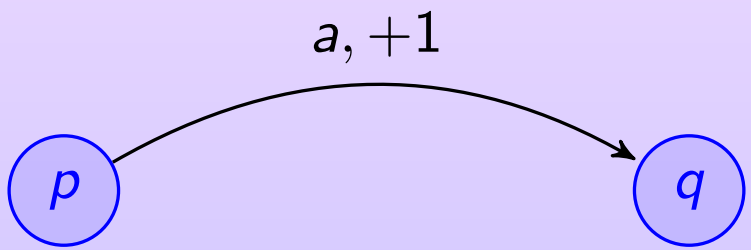
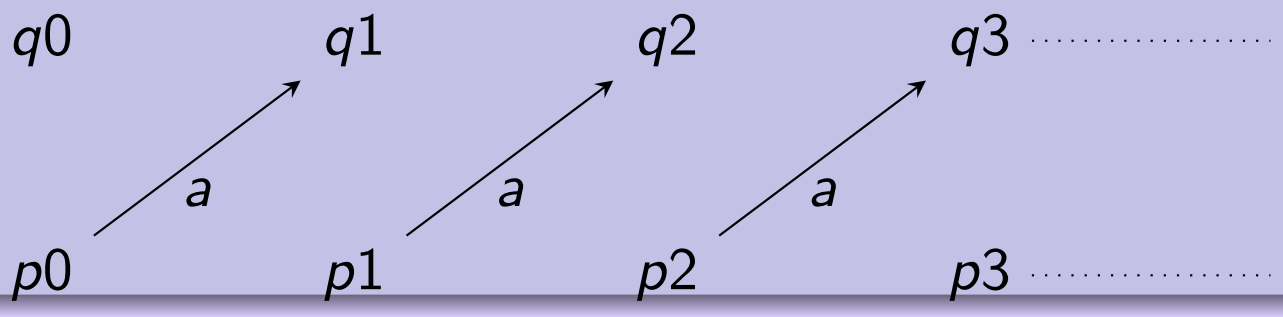


Induced LTS over $Q \times \mathbb{N}$



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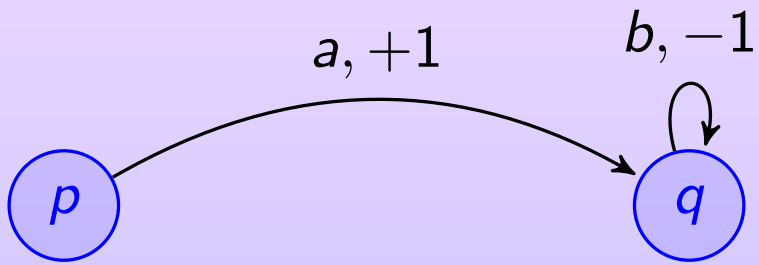

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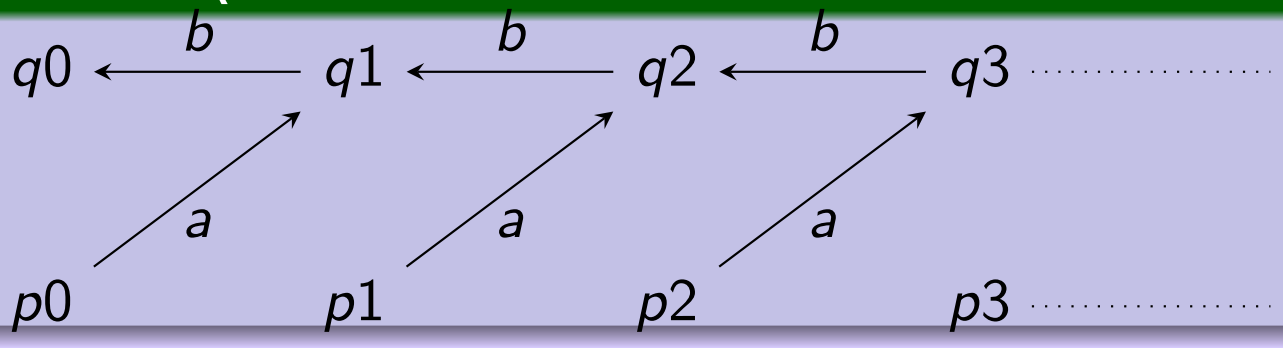

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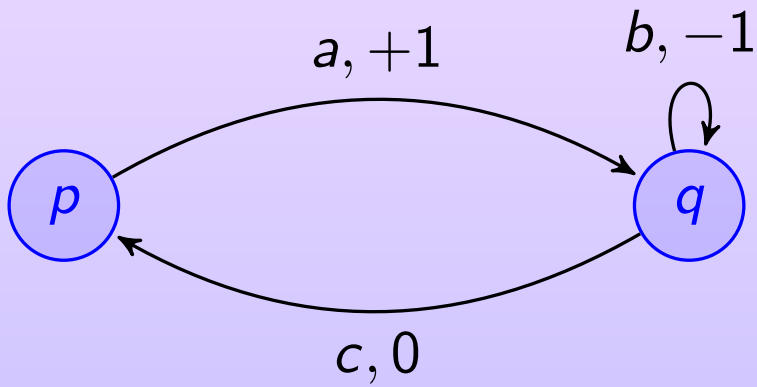

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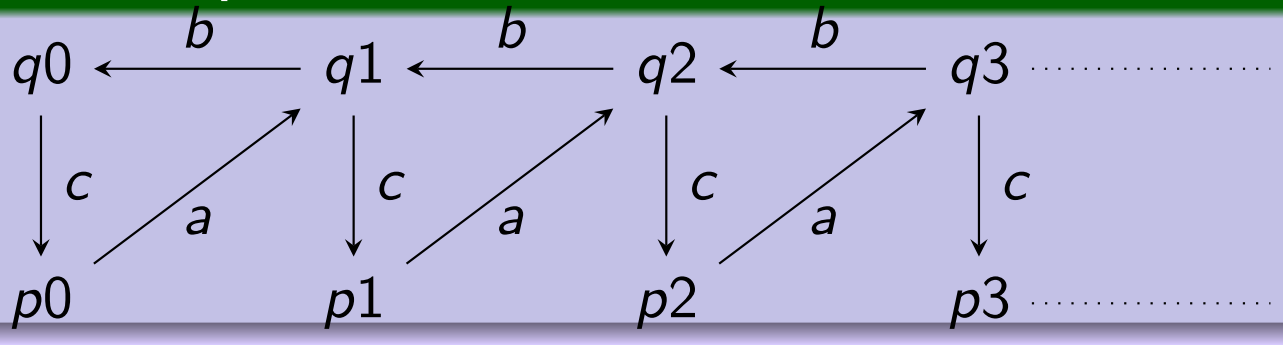
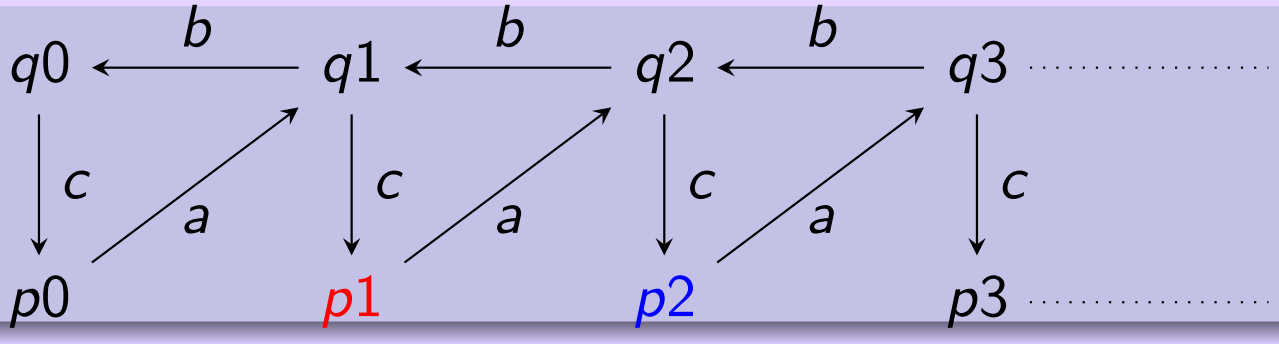


Simulation Games

. . . are played in rounds between Spoiler and Duplicator on the pair of configurations:



Round description on the next slide.

Winning conditions:

1. If a player cannot move the other wins.
2. Infinite plays are won by Duplicator.

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In each round

α *vs.* β

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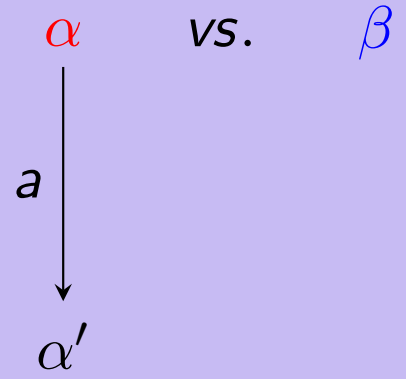

1. Spoiler moves from α

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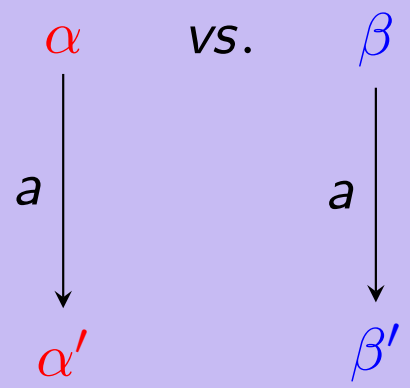

1. Spoiler moves from α
2. Duplicator responds from β

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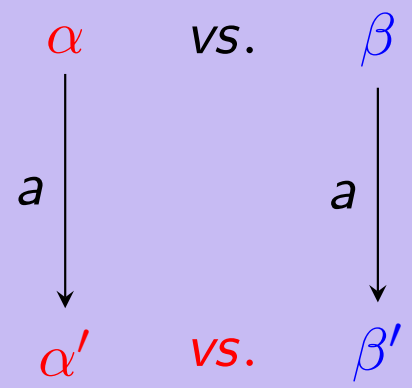

1. Spoiler moves from α
2. Duplicator responds from β
3. game continues from α' vs. β'

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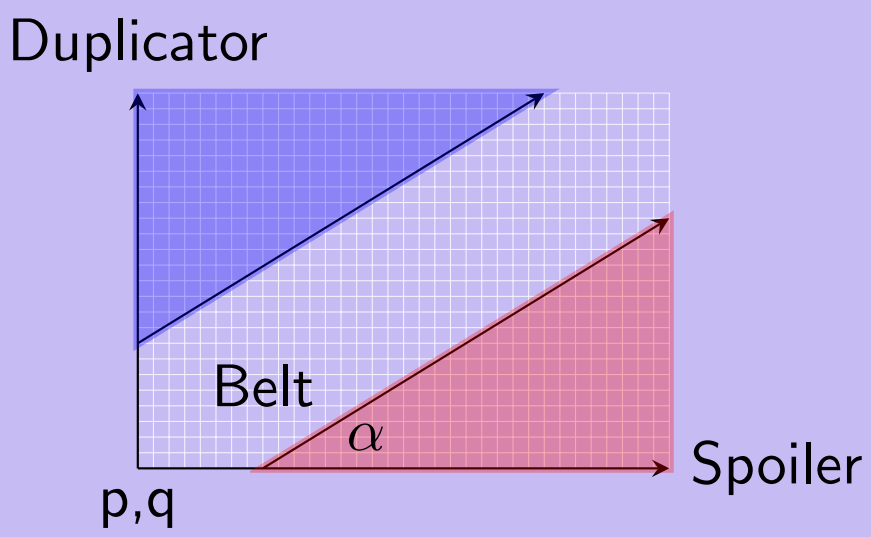

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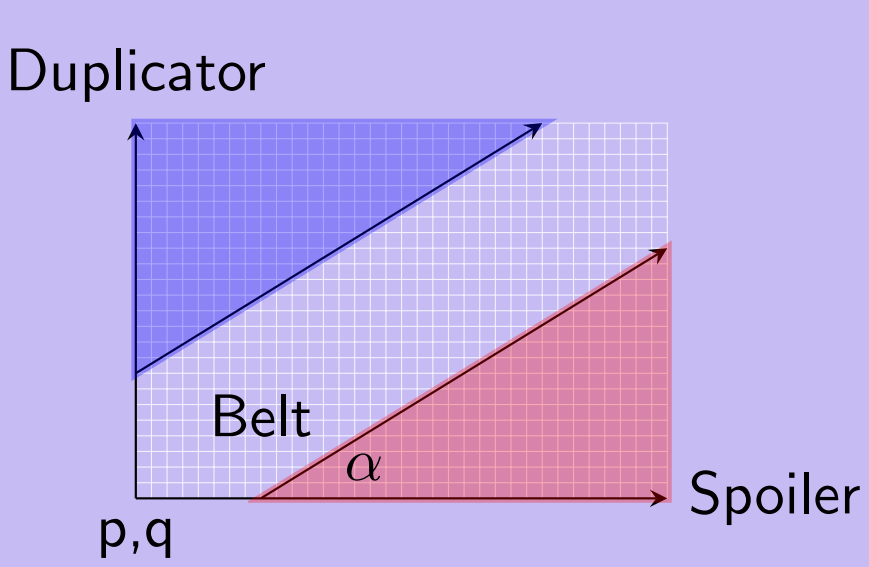

- Slope α is $poly(|Net|)$.

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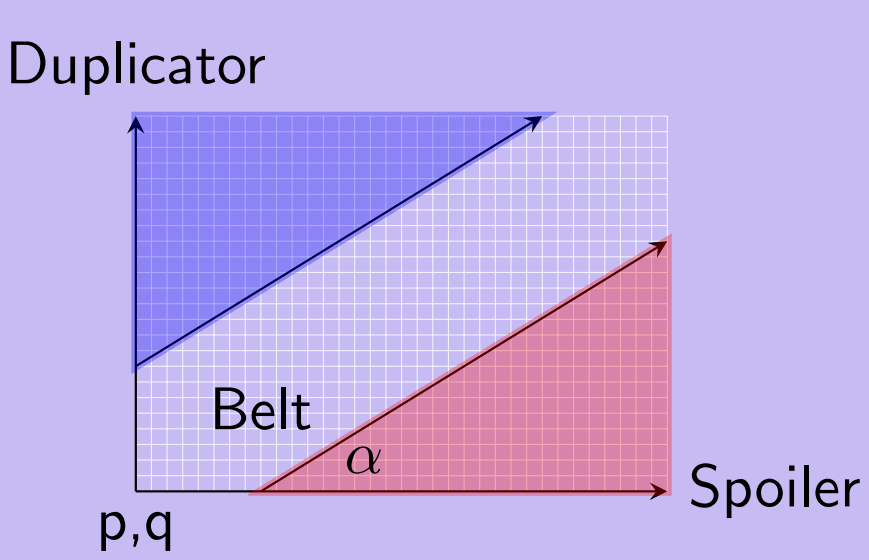

- Slope α is $poly(|Net|)$.
- Pattern inside the belt is regular.

Our contribution

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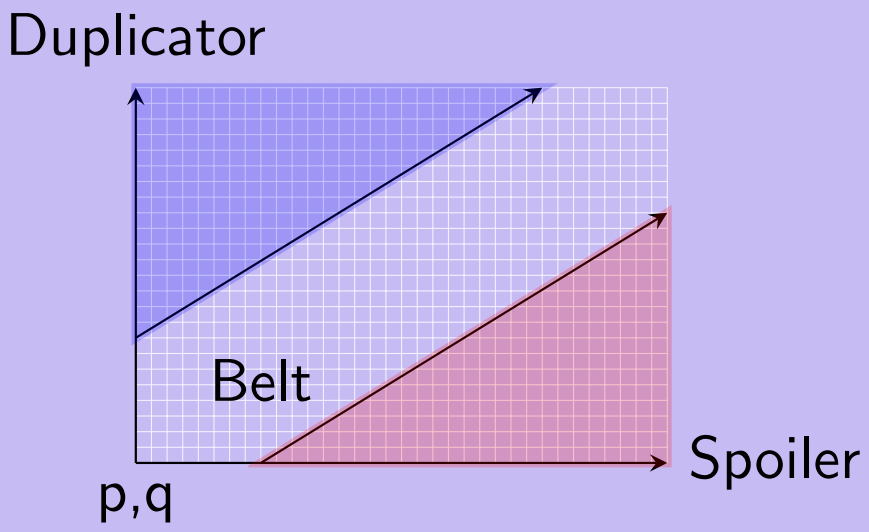

- New proof of the belt theorem.

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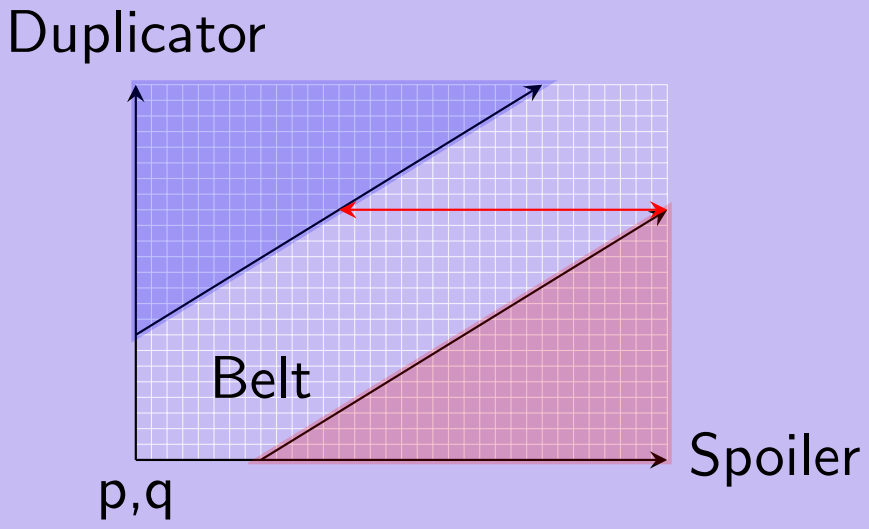

- New proof of the belt theorem.
- Width of the belt is $poly(|Net|)$.

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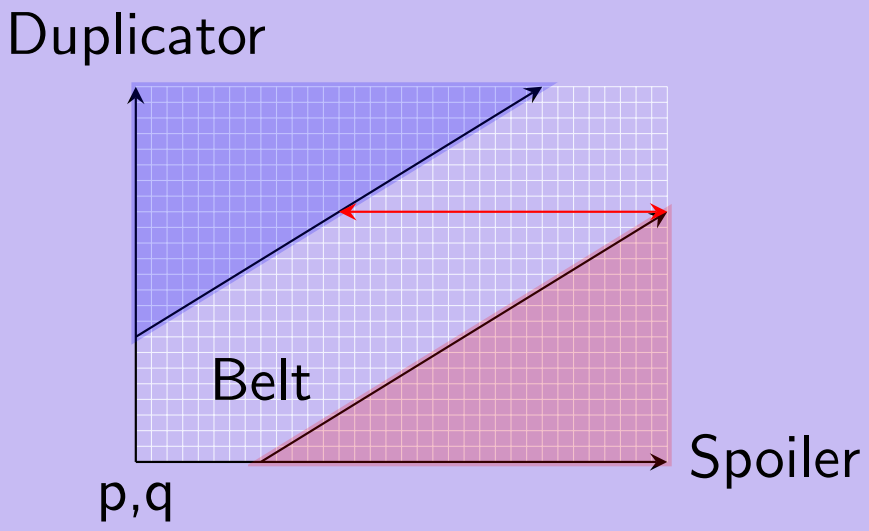

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One Counter Automata

OCA vs. OCN is decidable.

Thank You.

Questions?