Polymorphic P Systems: How Much Win?

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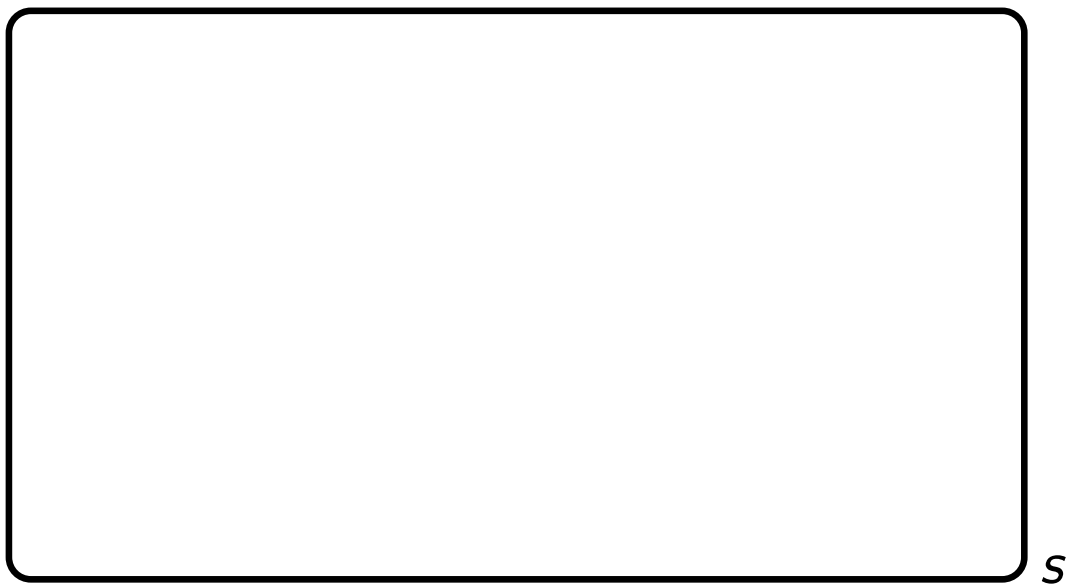
BWMC 2015

Polymorphic P Systems [A. Alhazov, S.Ivanov, Yu. Rogozhin, 2010]

The Skin



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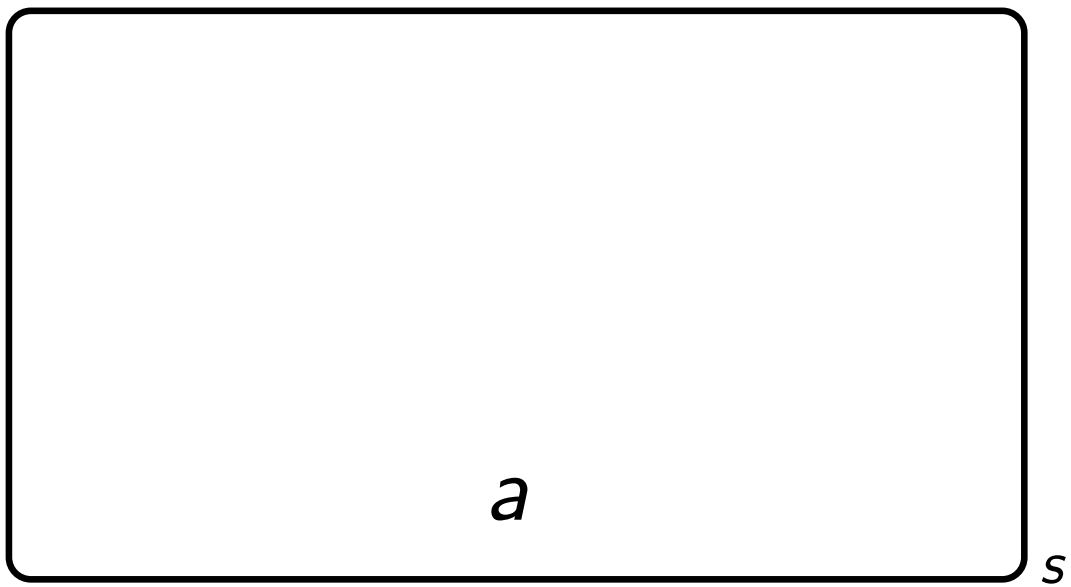

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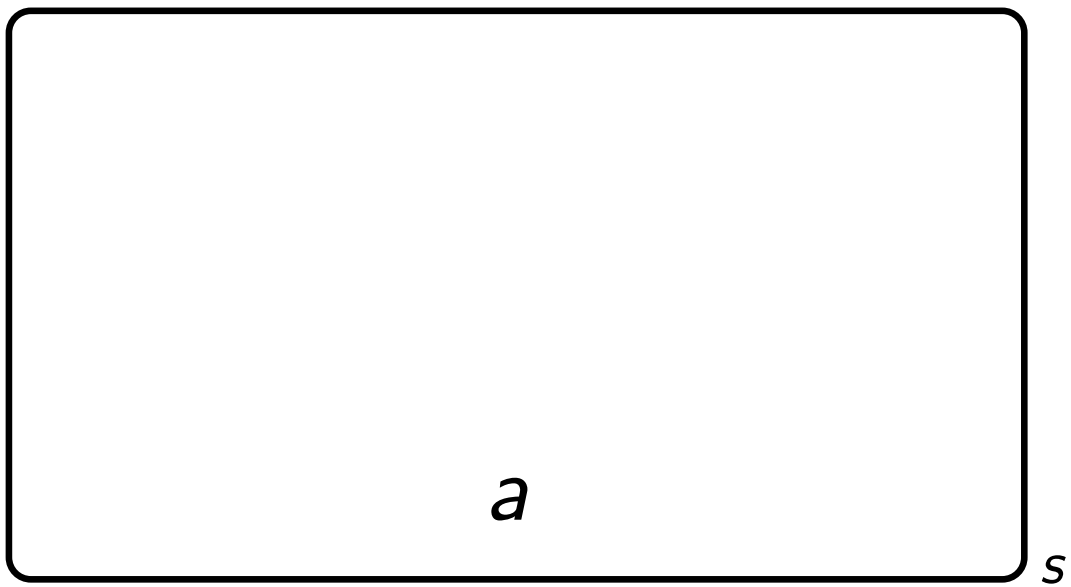

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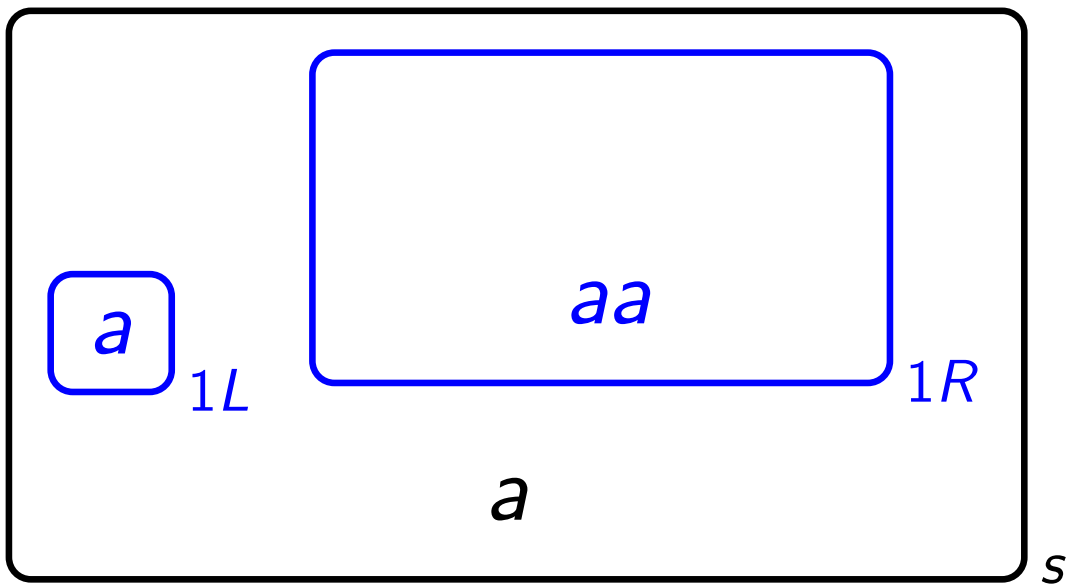

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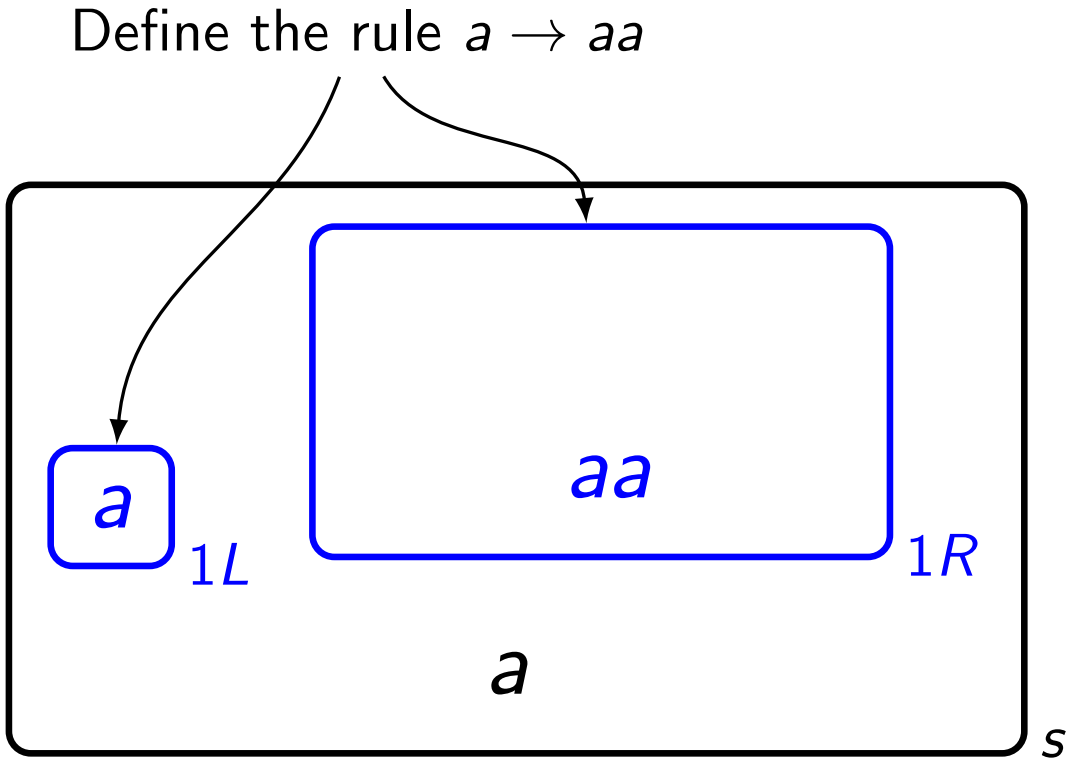

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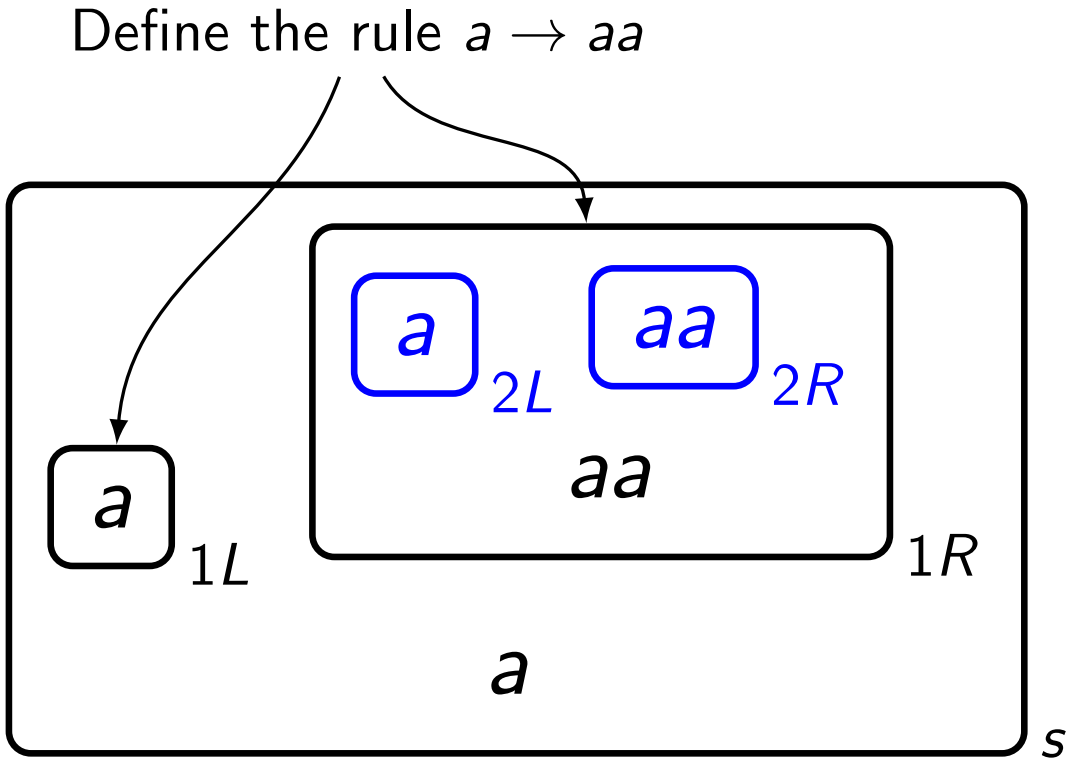

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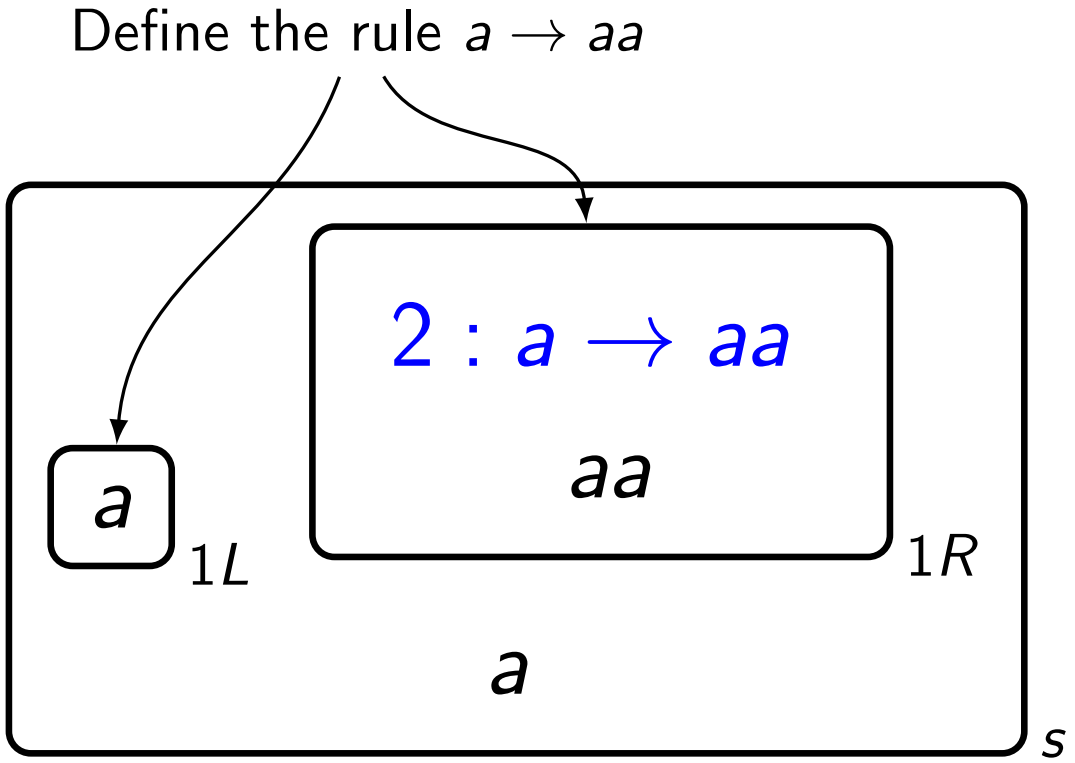
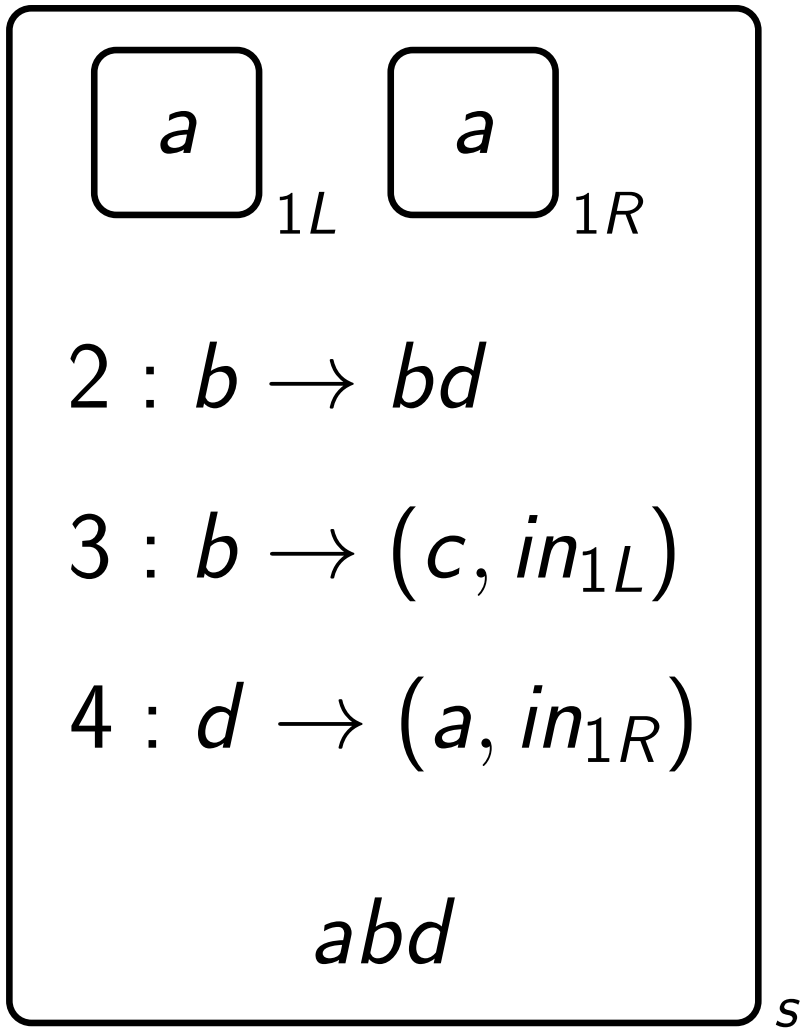


Generating $n!$



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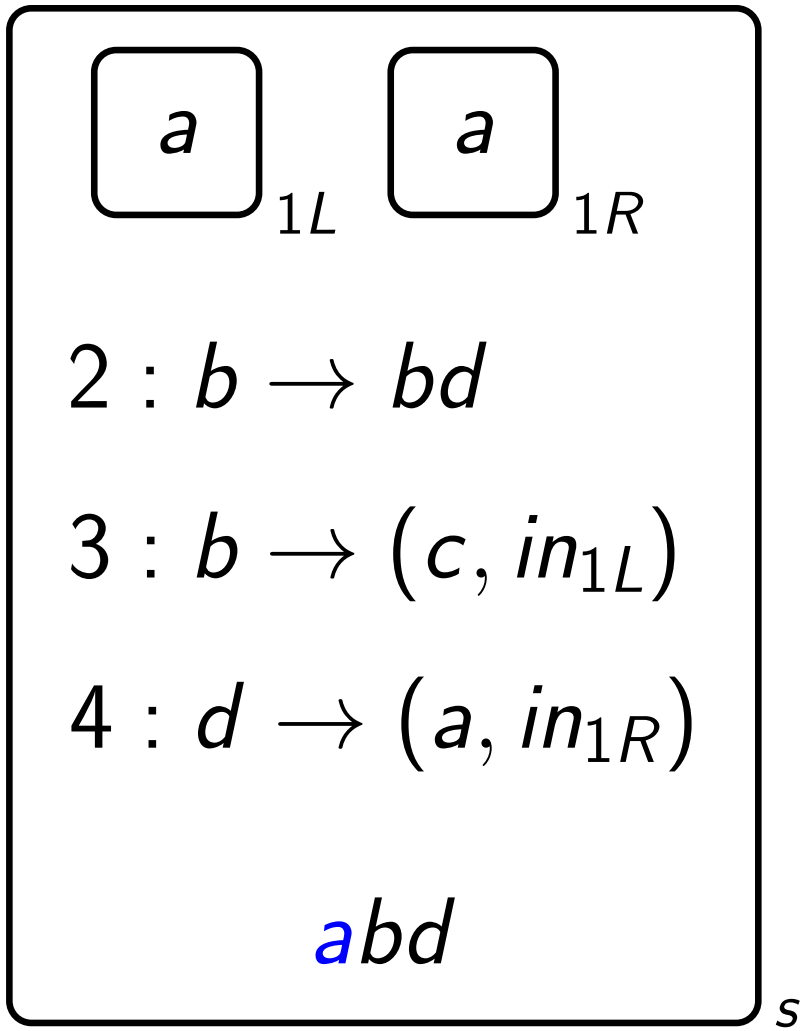

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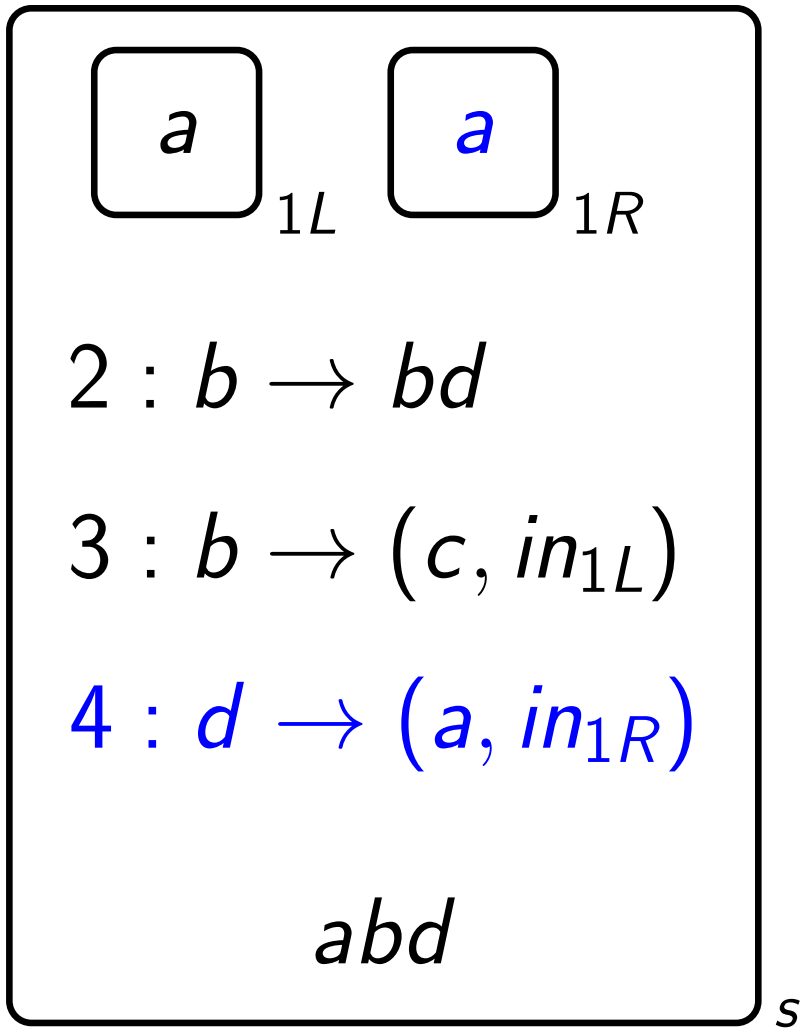

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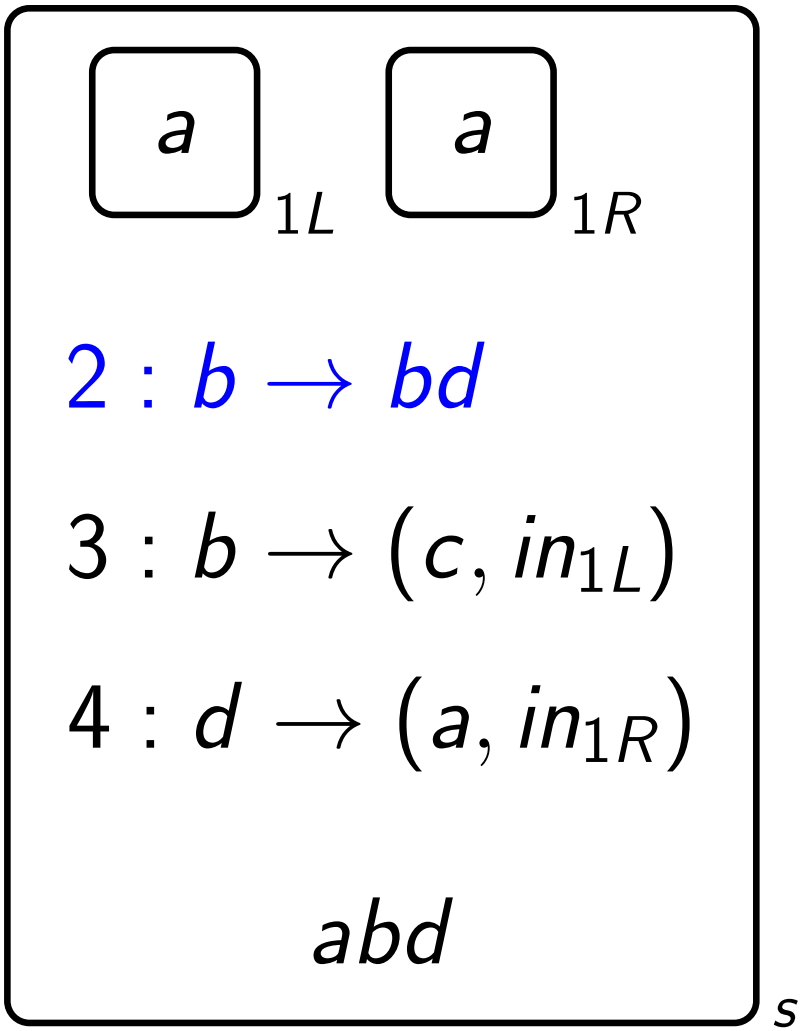

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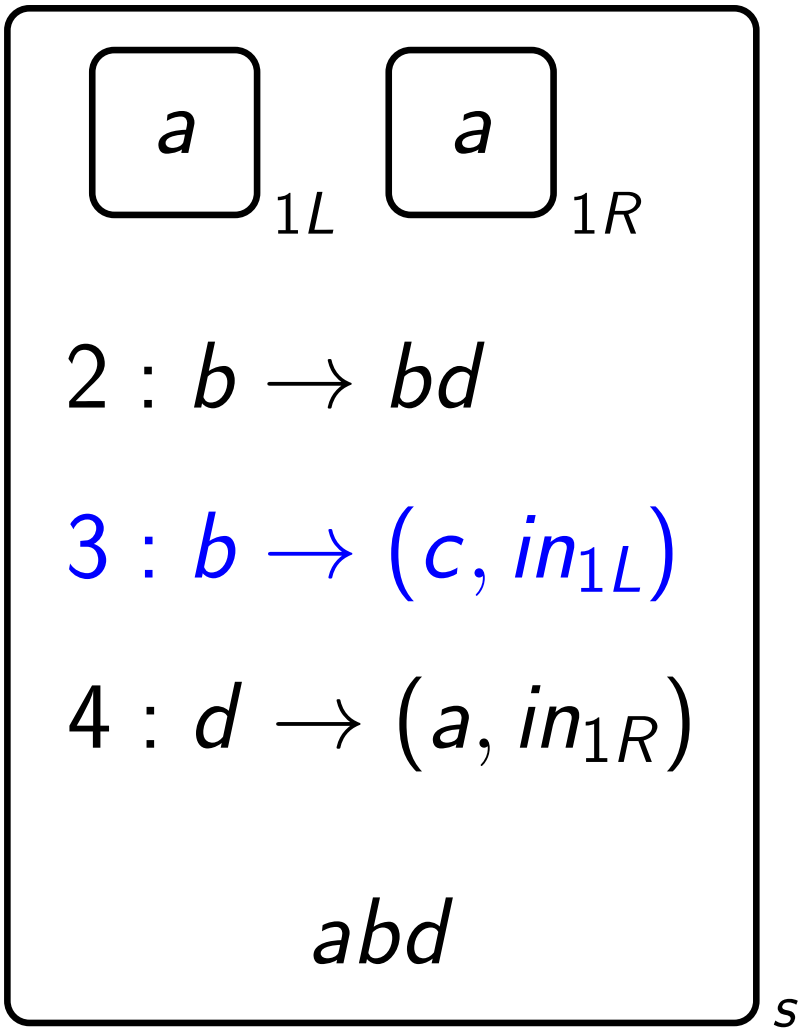

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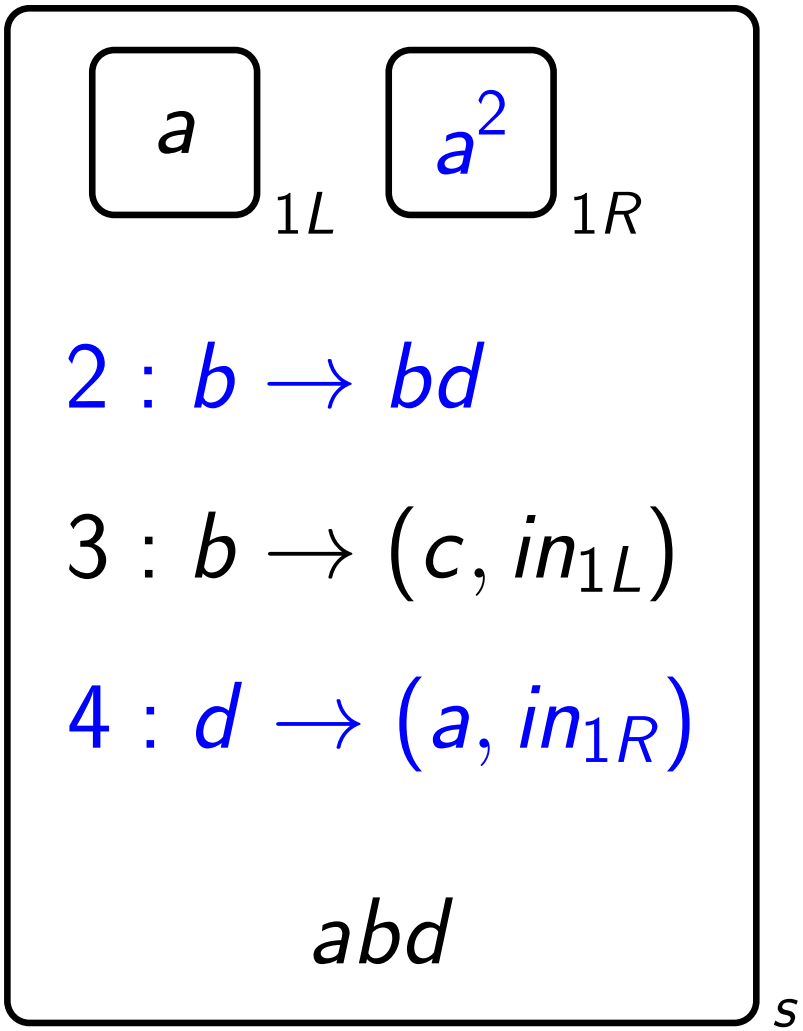

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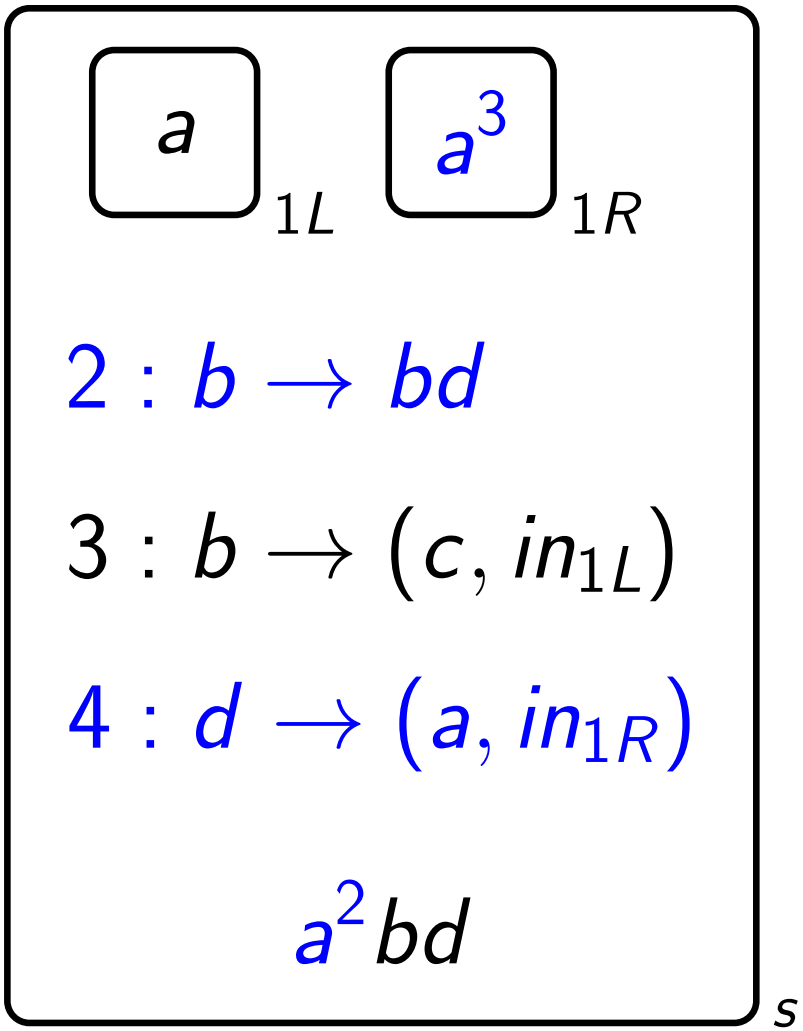

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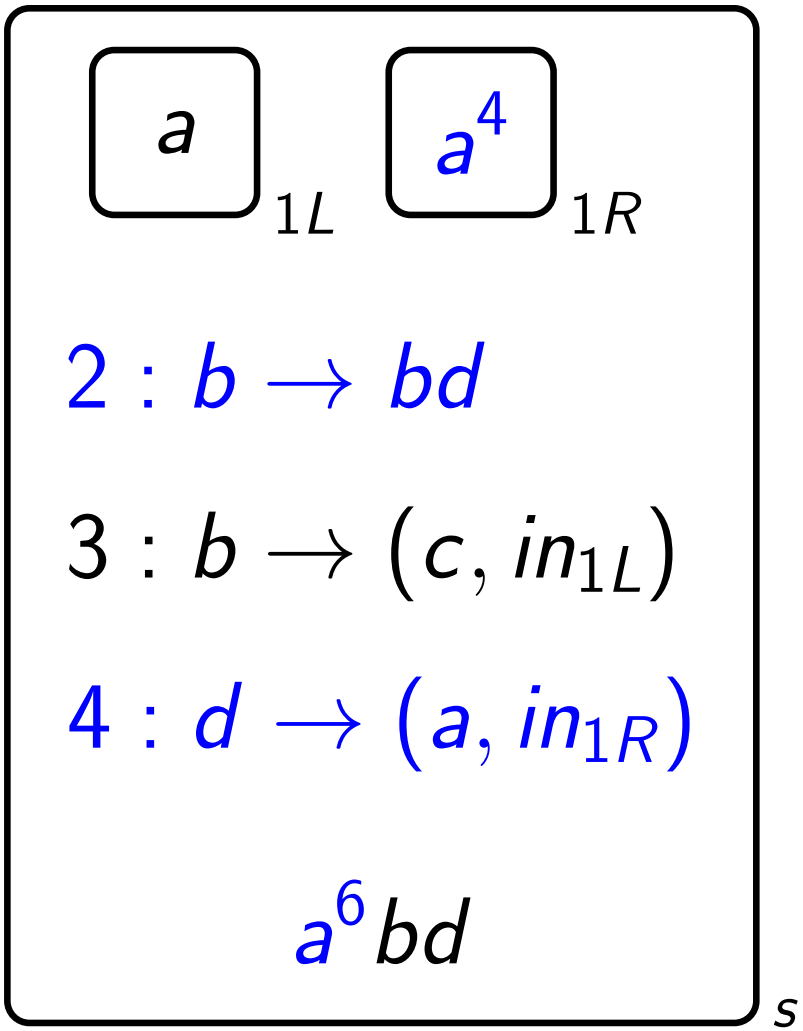

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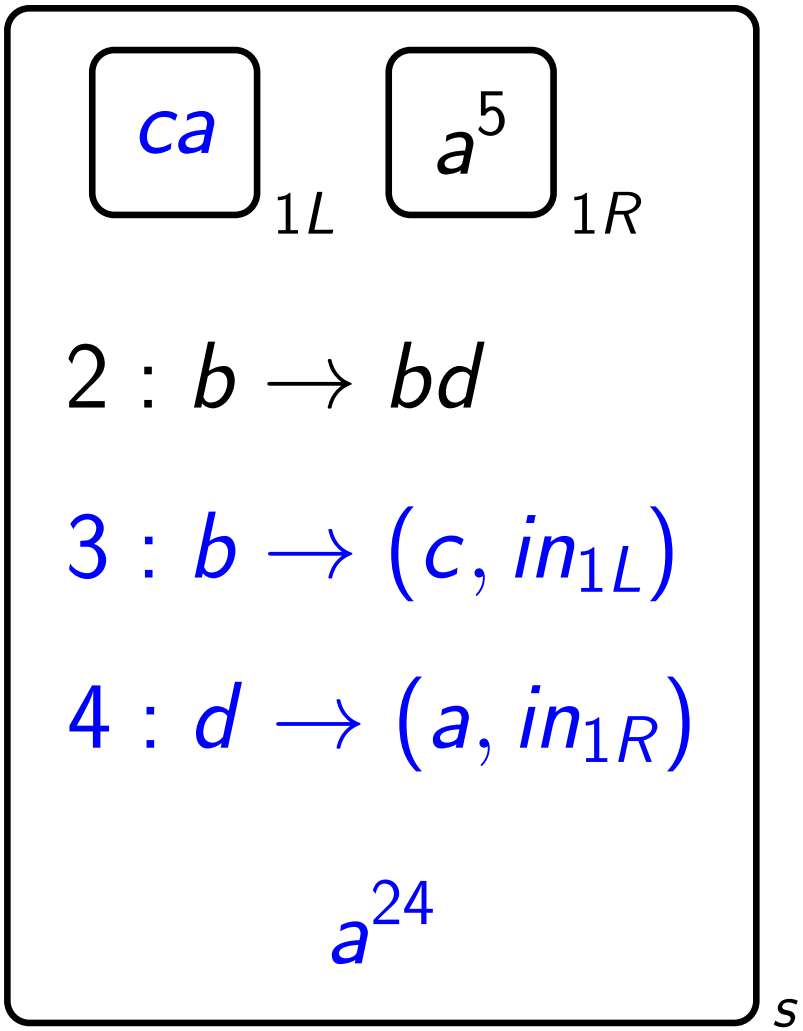
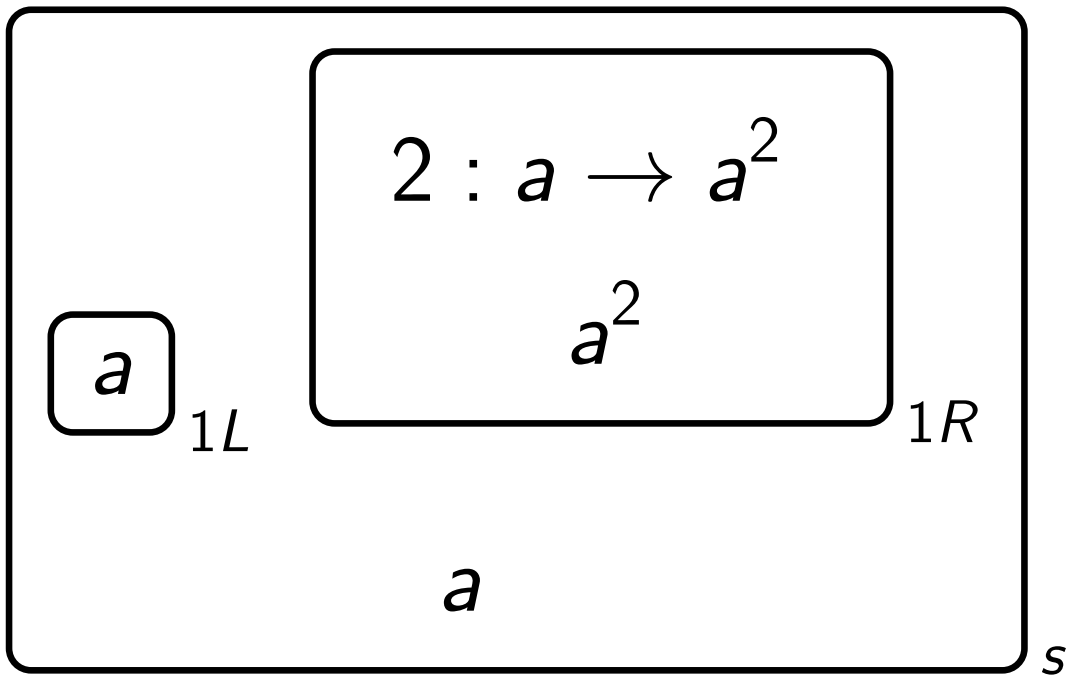


Superexponential Growth

Skin contents

0. a



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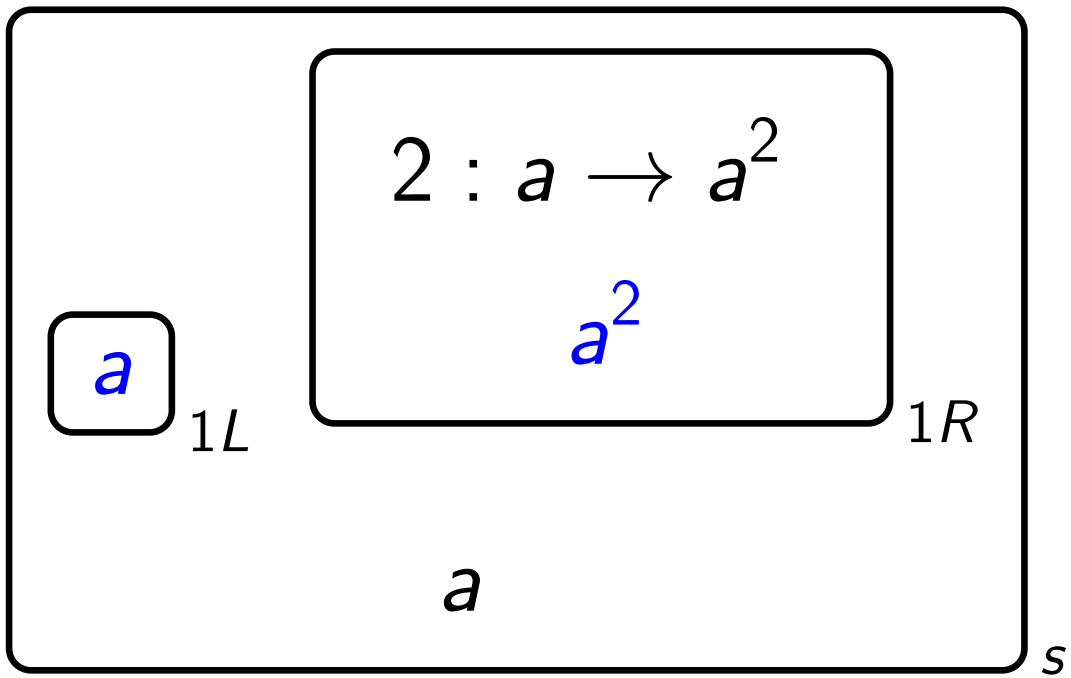

Superexponential Growth

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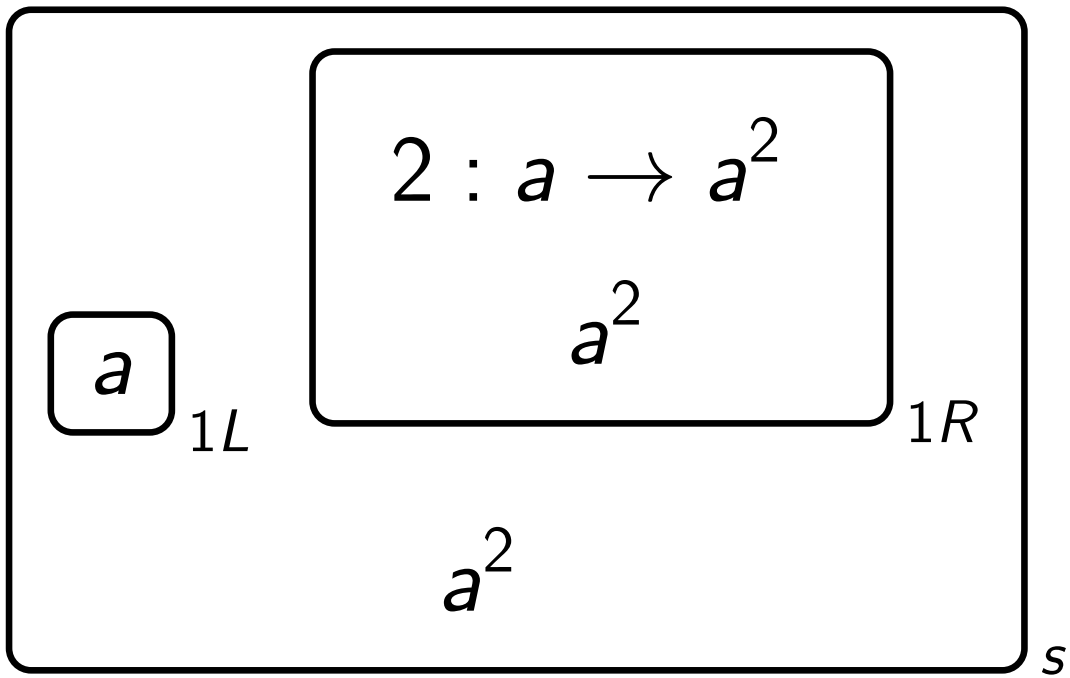
0. a
1. a^2



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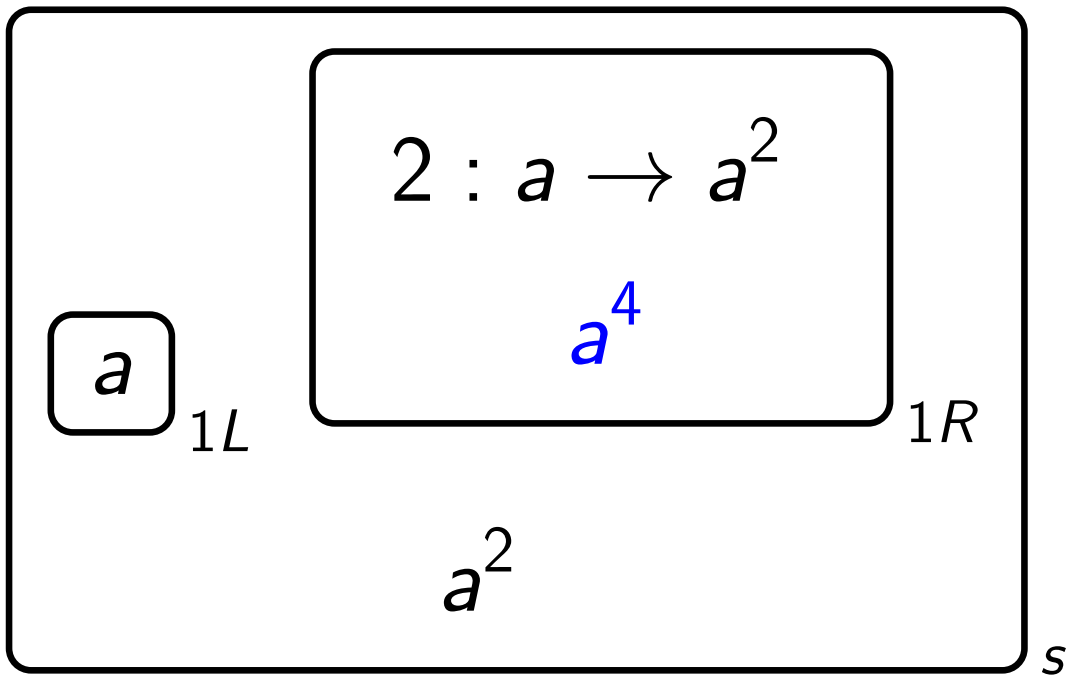
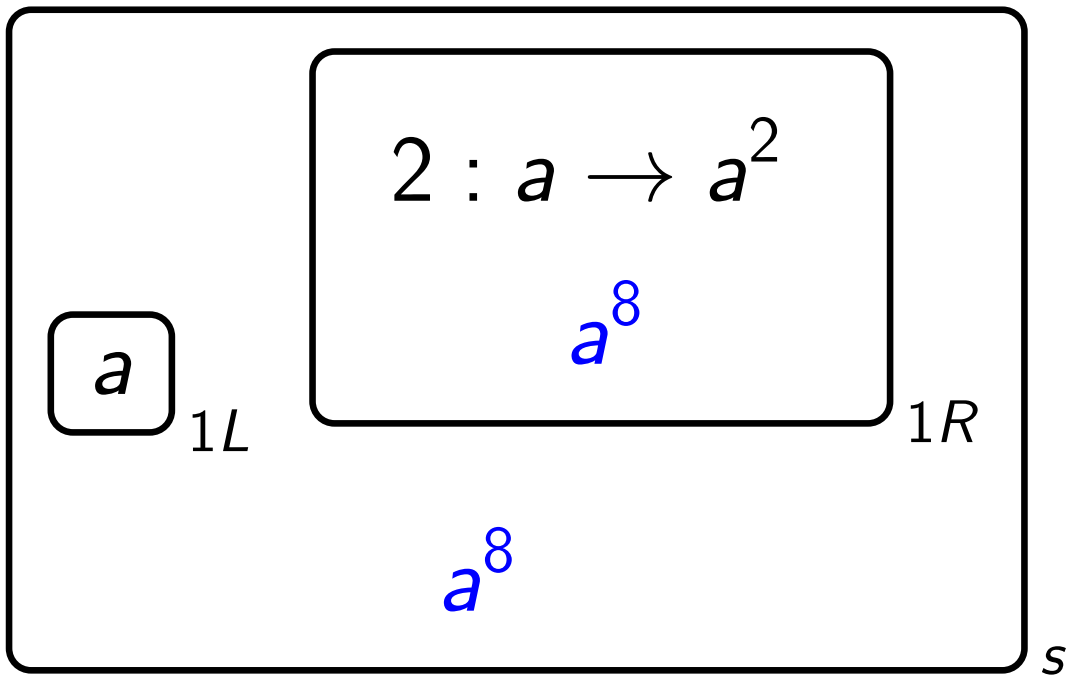


Superexponential Growth

Skin contents

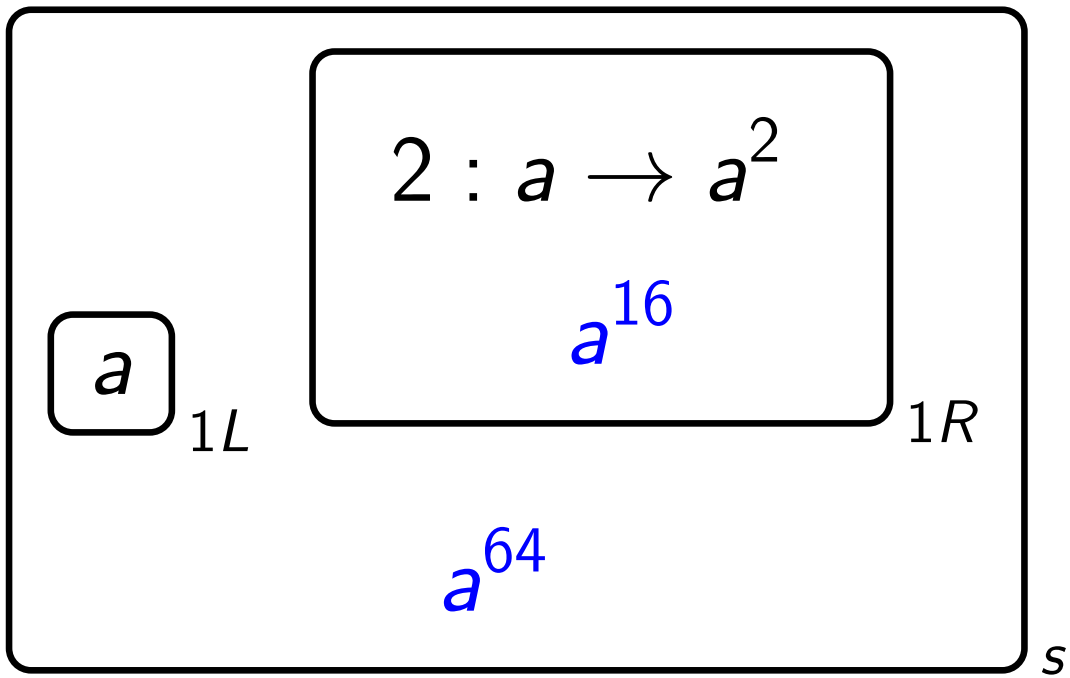
0. a
1. a^2
2. a^8



Superexponential Growth

Skin contents

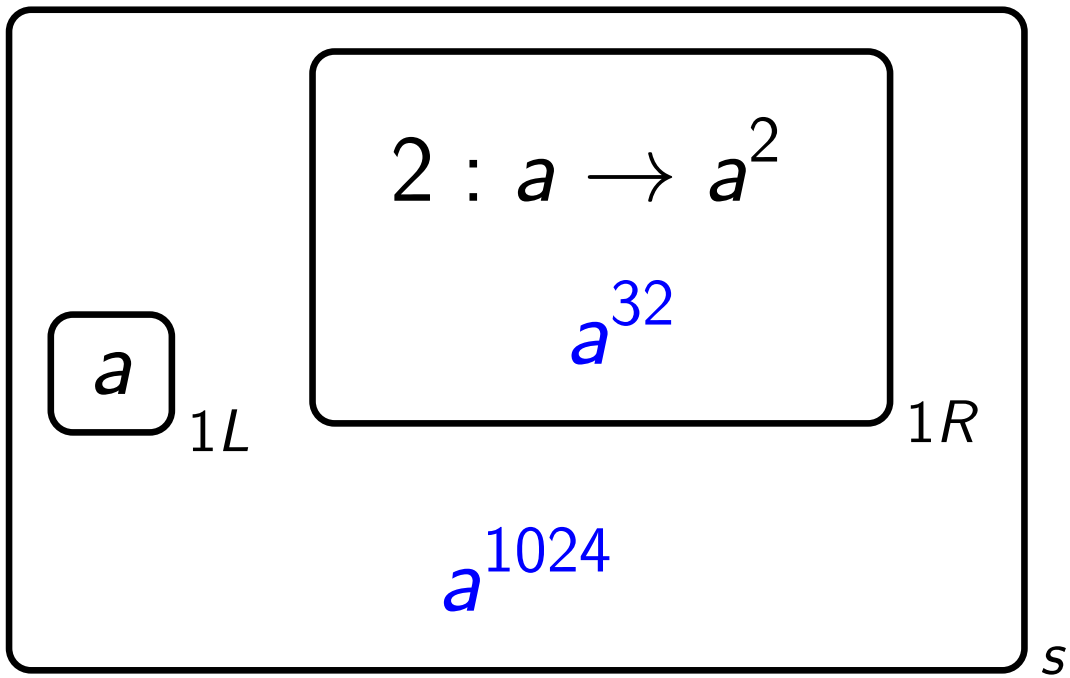
0. a
1. a^2
2. a^8
3. a^{64}



Superexponential Growth

Skin contents

0. a
1. a^2
2. a^8
3. a^{64}
4. a^{1024}



Superexponential Growth

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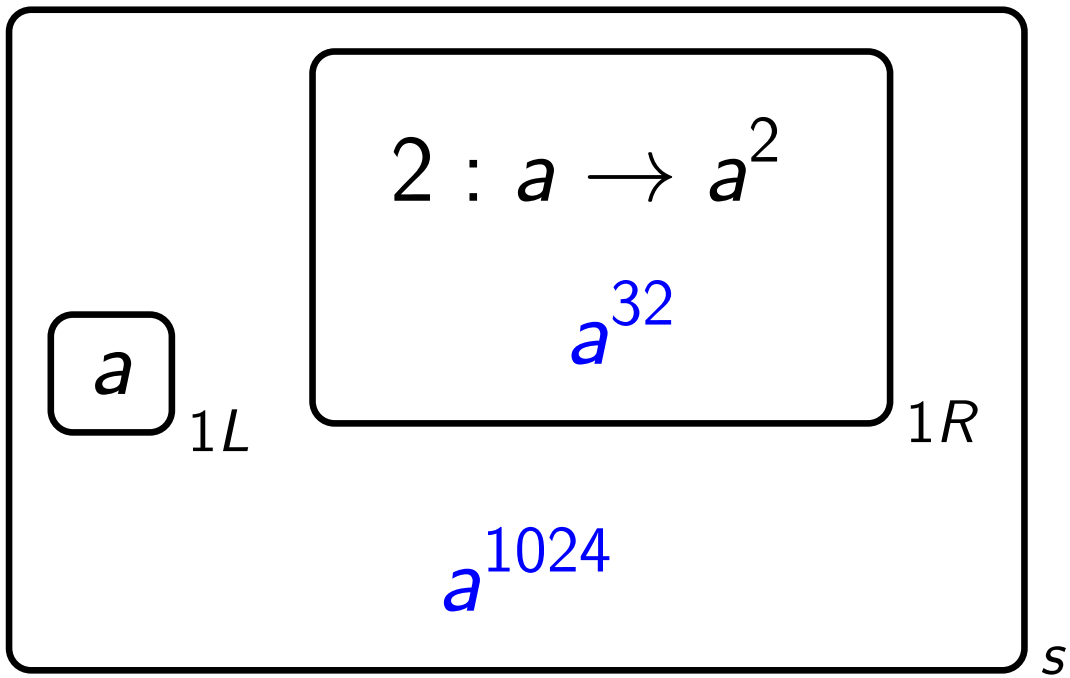
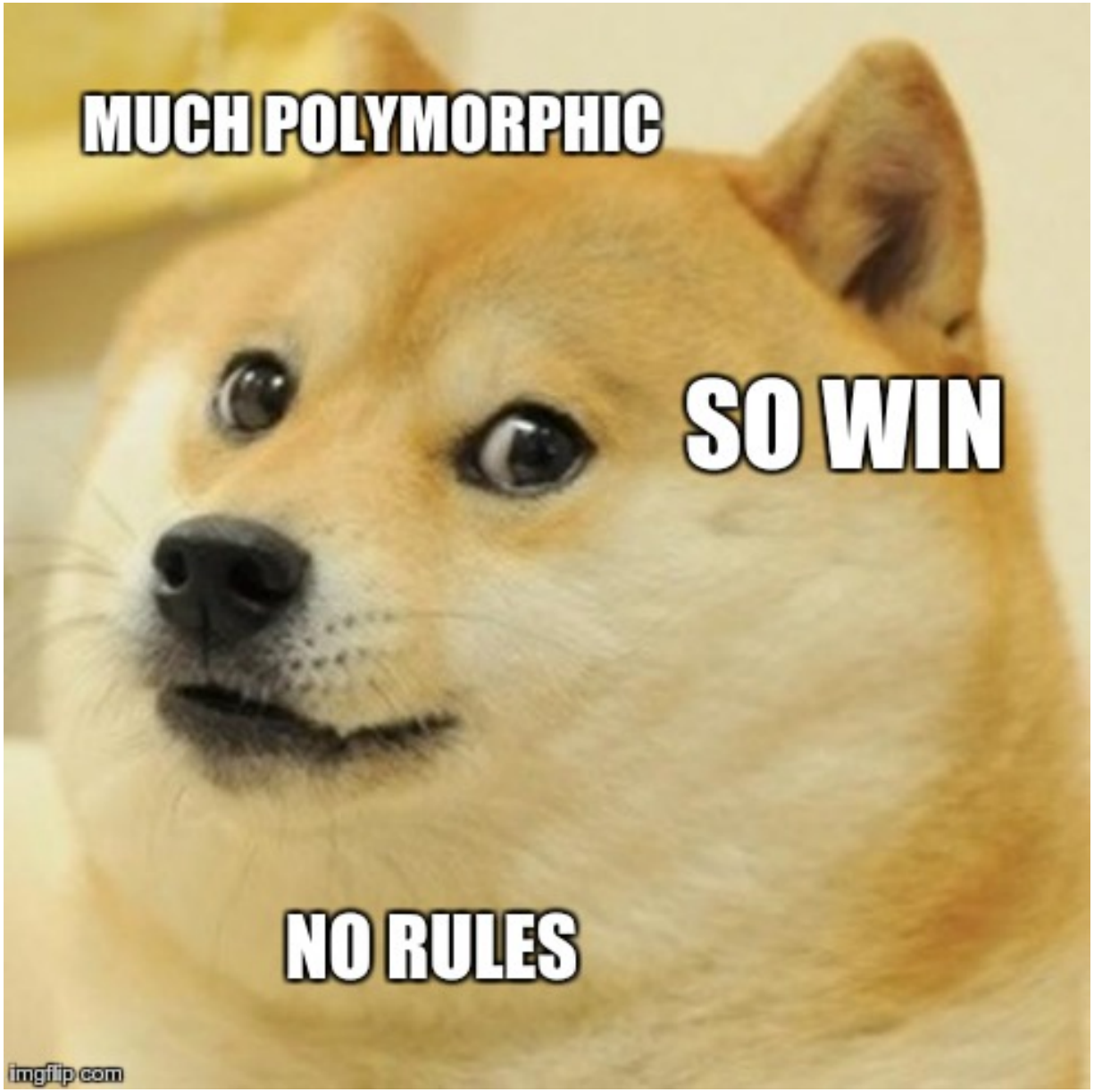
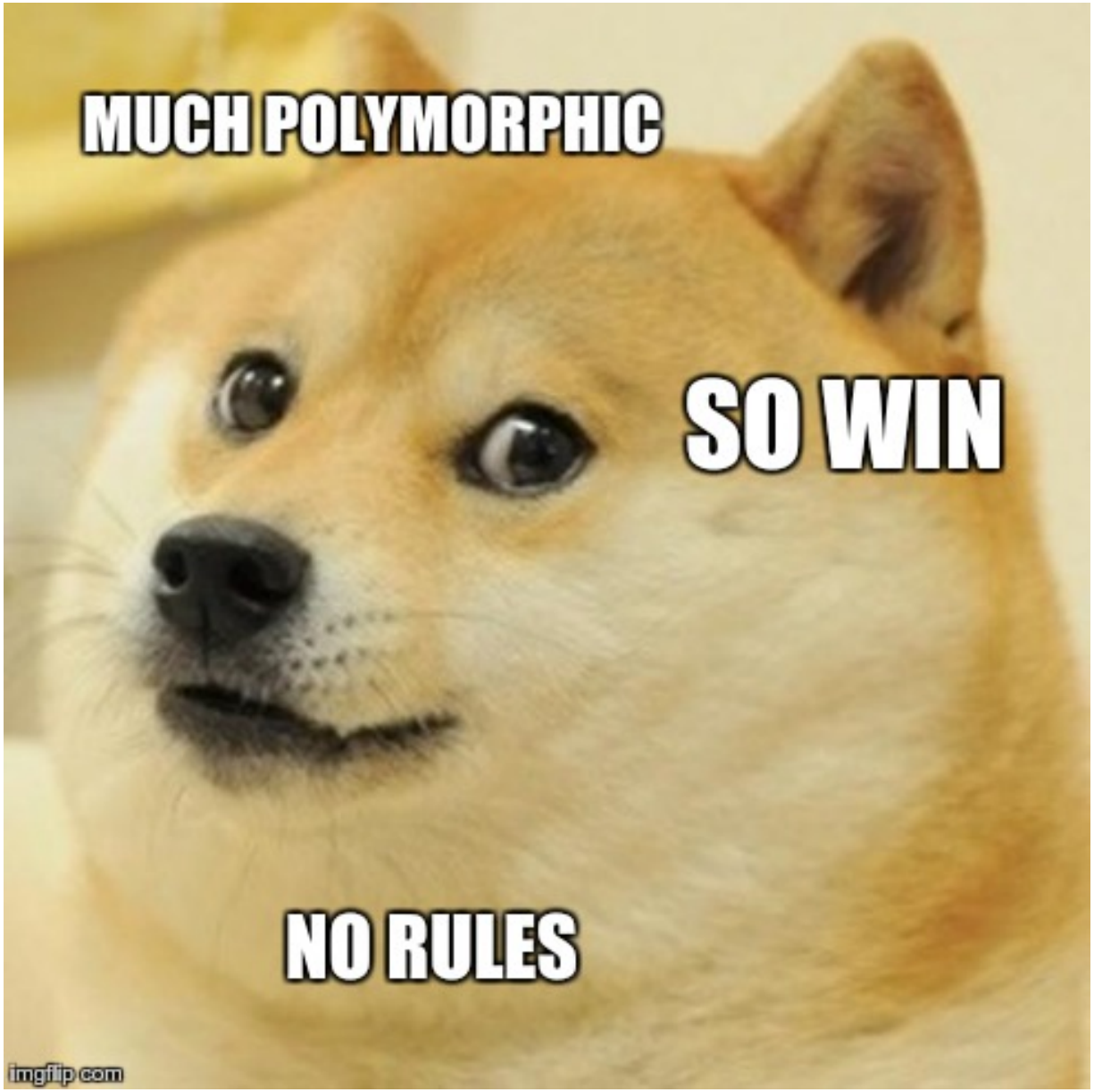
n. $a^{2^{\frac{n(n+1)}{2}}}$



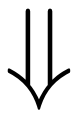

MUCH POLYMORPHIC
SO WIN
NO RULES
imgflip.com

How Much Win?



Intuitive Reasoning

Efficient solutions beyond P



Fast exhaustive search

Intuitive Reasoning

Efficient solutions beyond P

$\Downarrow$ (unless P = NP)

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- Adleman's experiment
- SAT with P systems

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Candidates must be tracked

Questions

Polymorphism can replicate symbols a lot

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How about identities?

- interpretations of symbols

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If No, how much speed-up?

Relevance for HPC

Program = Data

- Programs working in parallel on programs :-)

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- Simple protocol of self-modification

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Easier implementable?

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Easier implementable?

- easily?

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How about identities?

- interpretations of symbols

Conjecture: No.

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