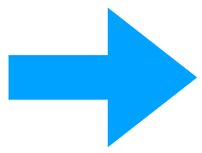
Open problem session, Autoboz 2020

Reachability problem: Given a Petri net $\mathcal{N}$, and markings M_0 and M

can marking M_0 reach marking M in $\mathcal{N}$?

non-elementary complexity

[Czerwinzki, Lasota, Lazic, Leroux, Mazowiecki, '19]



Study subclasses of Petri nets

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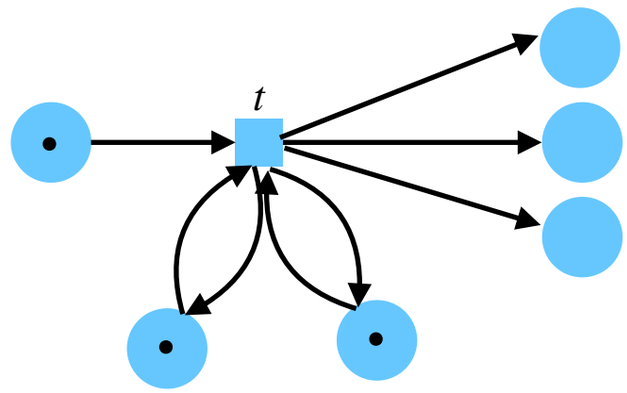
→ Study subclasses of Petri nets

→ **Branching Immediate Observation nets**

Joint work with J. Esparza, M. Raskin
@ Technical University Munich

Branching Immediate Observation (BIO) nets

A Petri net is a BIO net if all of its transitions are of the form:



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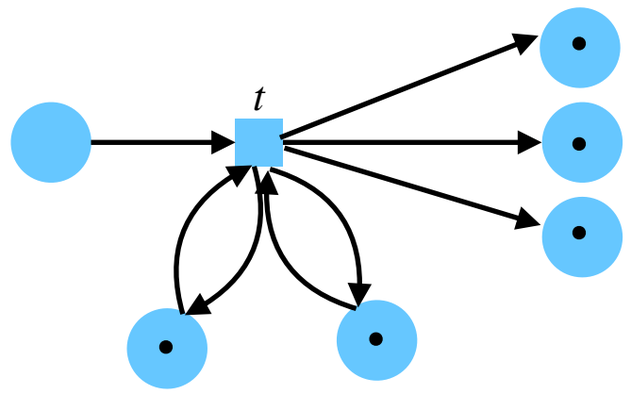

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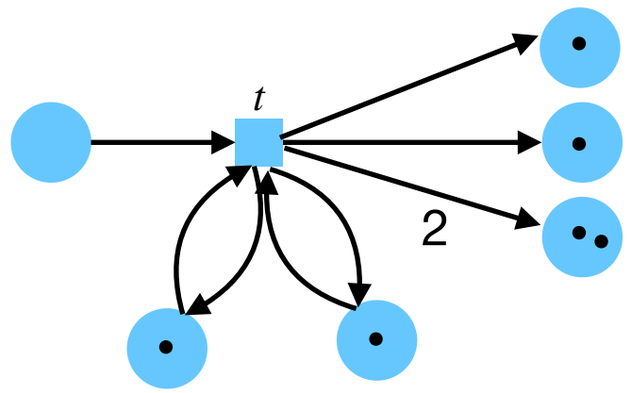

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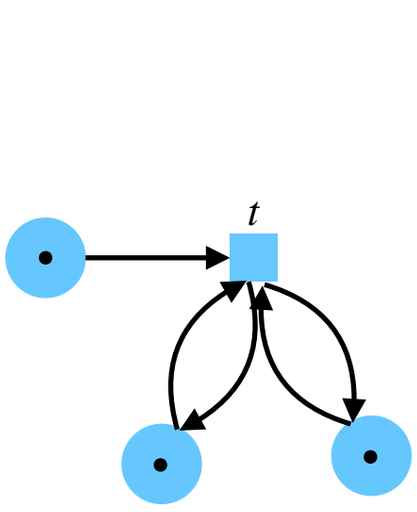

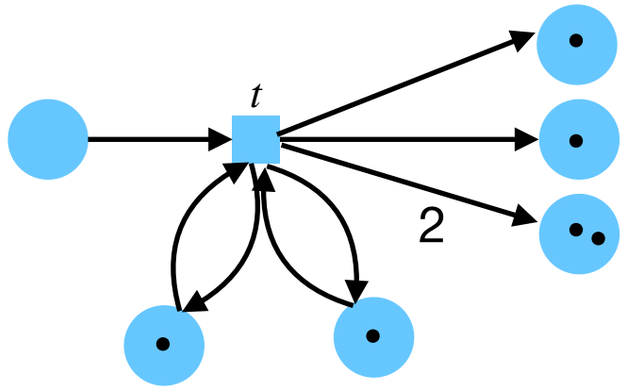

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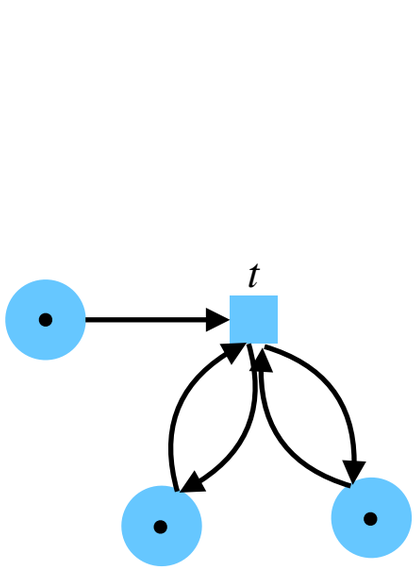

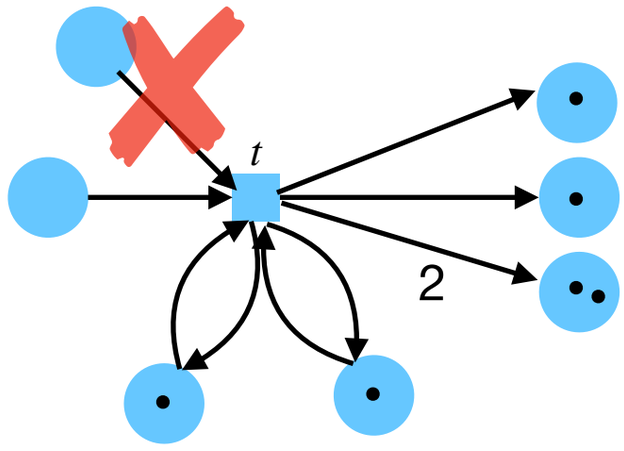

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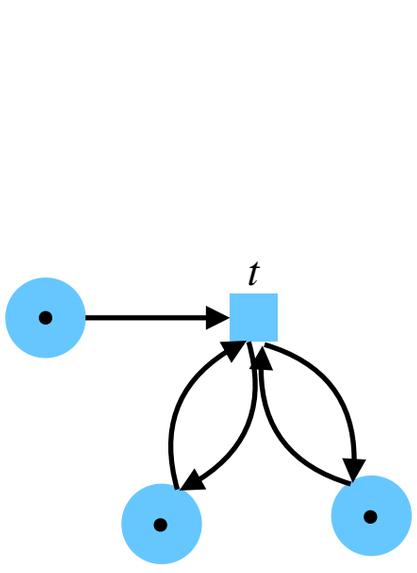

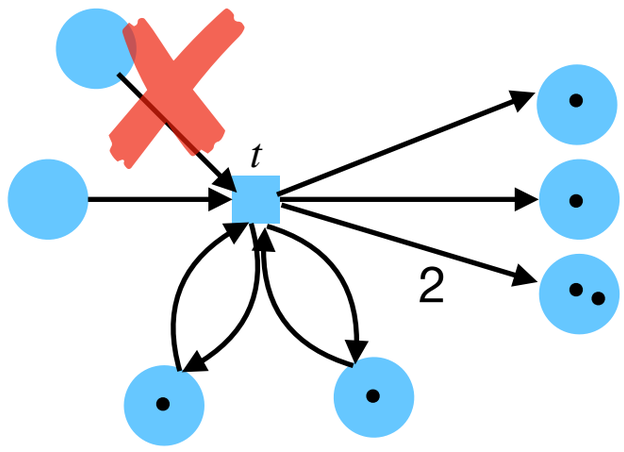

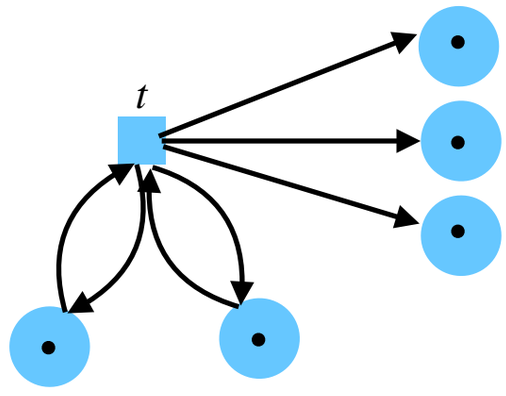

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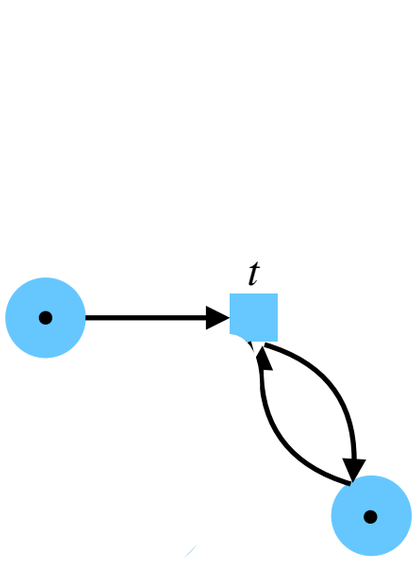

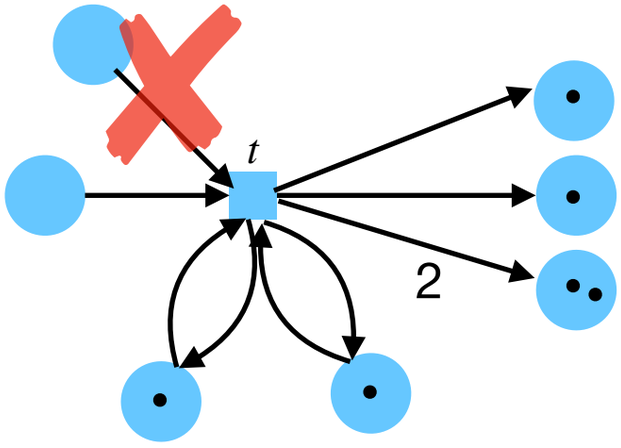

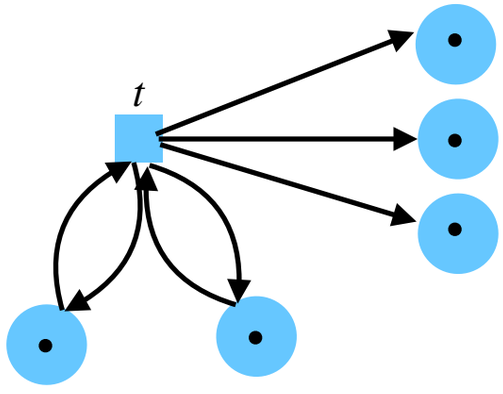

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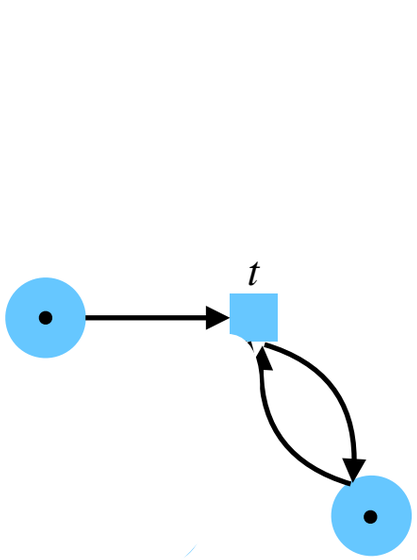

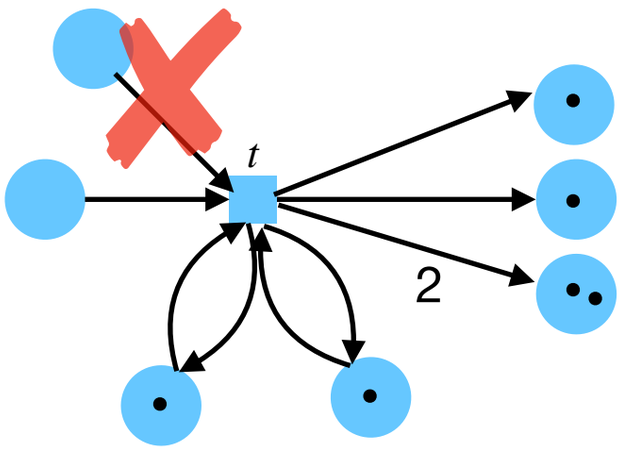

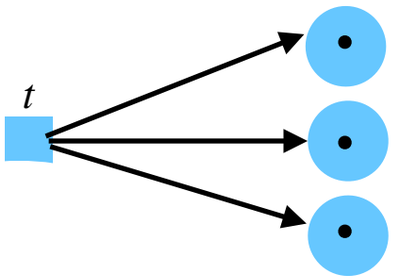

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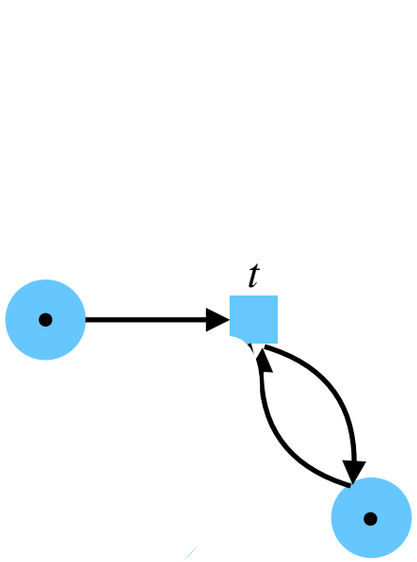

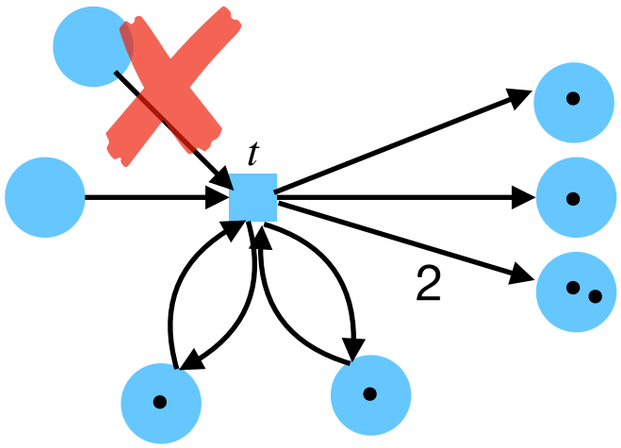

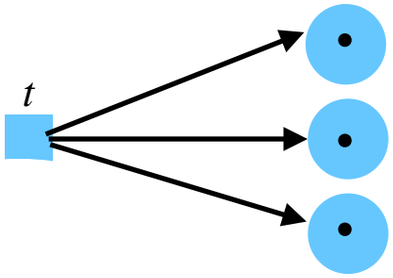

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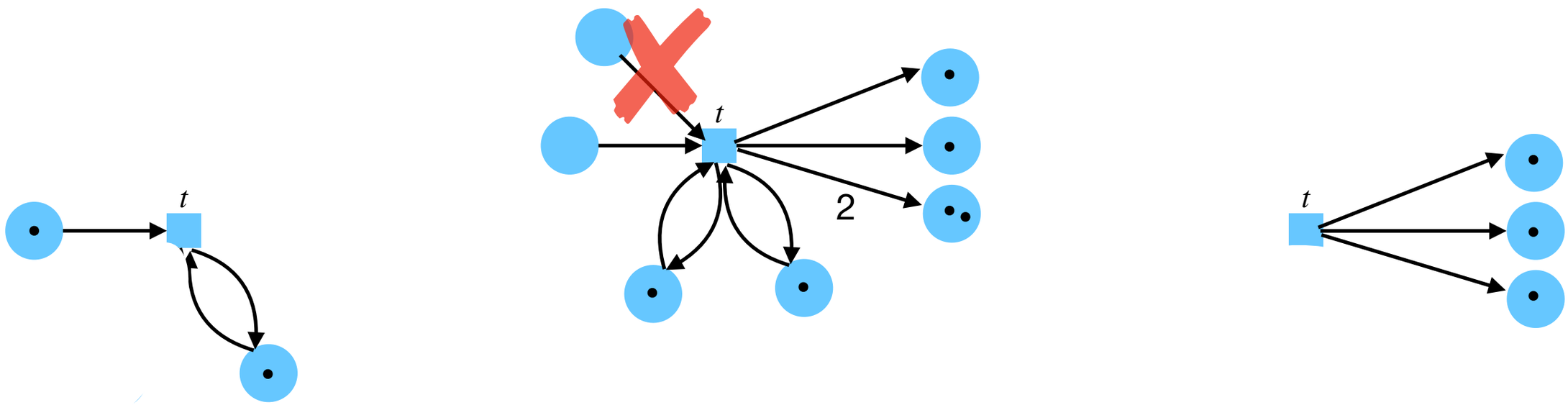

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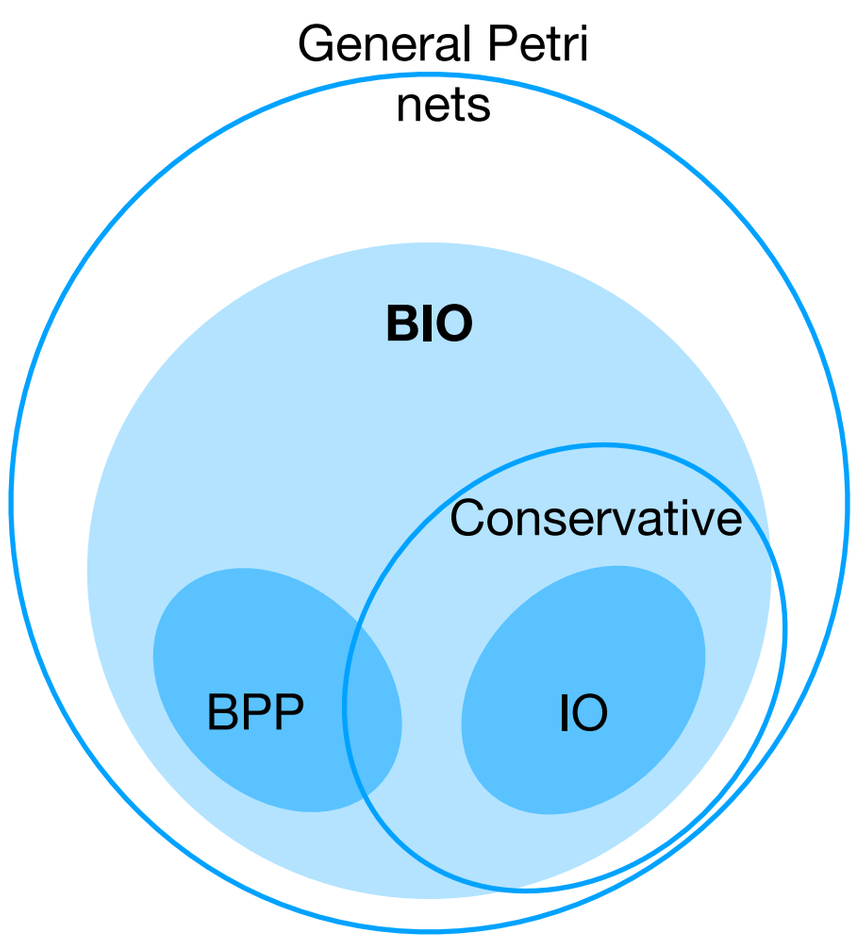
- Token creation and destruction
- Communication
- Generalize communication-free nets (BPP nets) and immediate observation (IO) nets

Branching Immediate Observation (BIO)

- unbounded (token creation and destruction)



Branching Immediate Observation (BIO)

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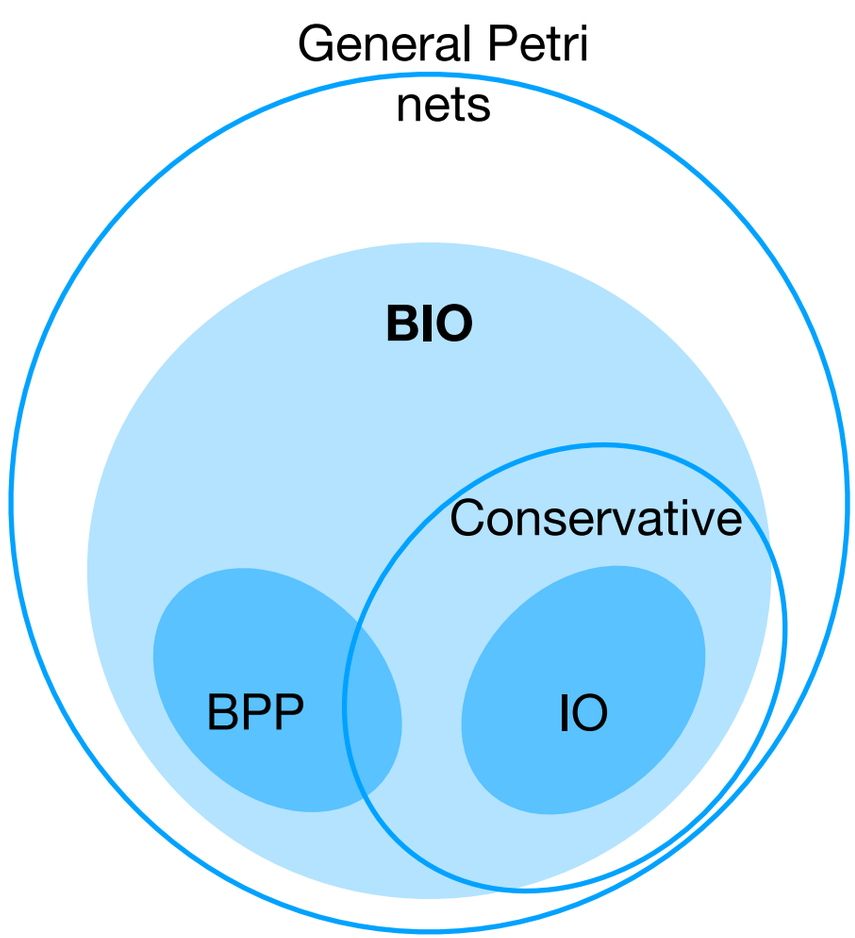
- **PSPACE-complete** reachability problem



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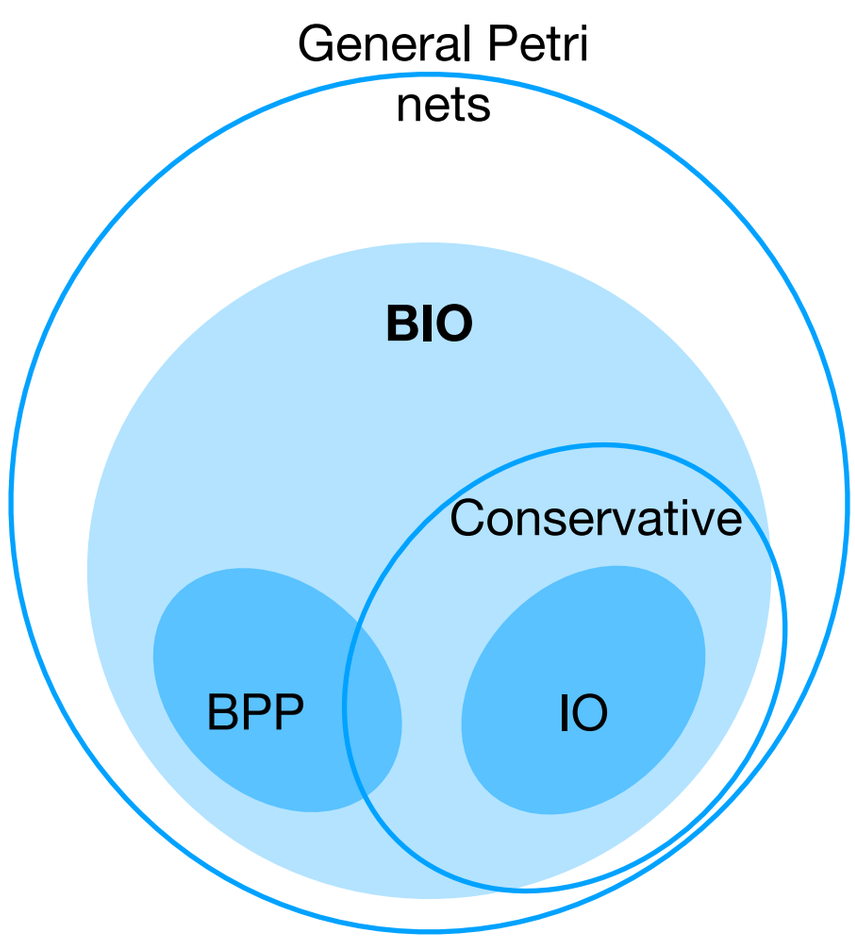

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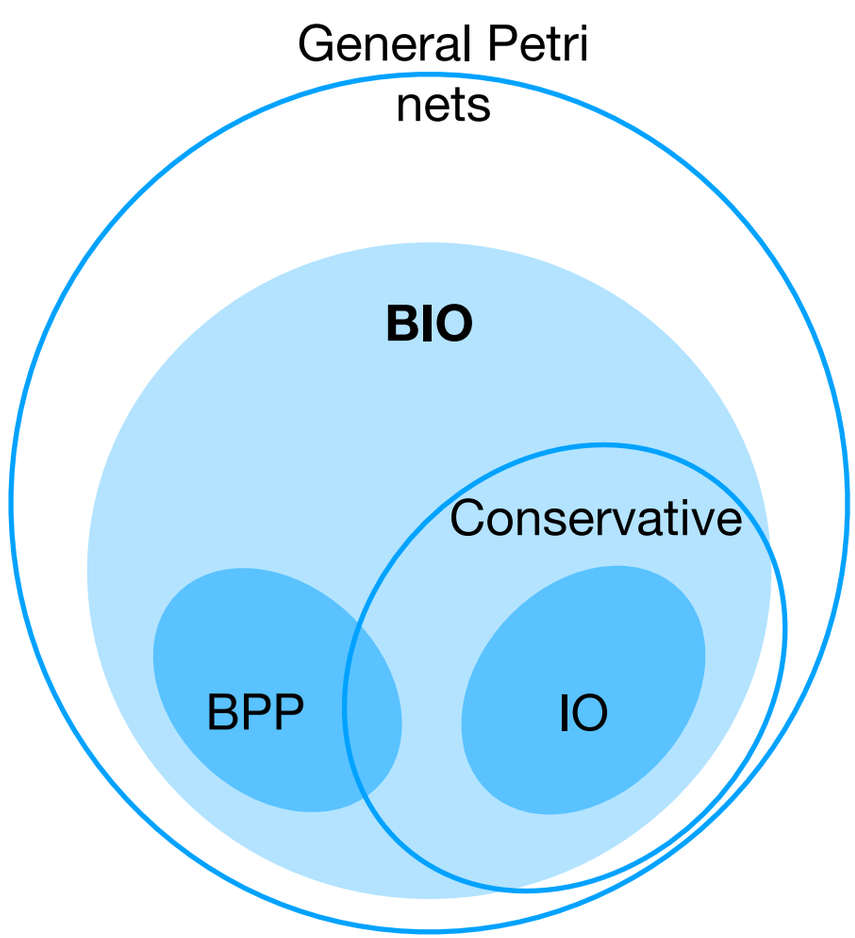
- pre^***-flat** reachability relation → use of model-checking tools like FAST



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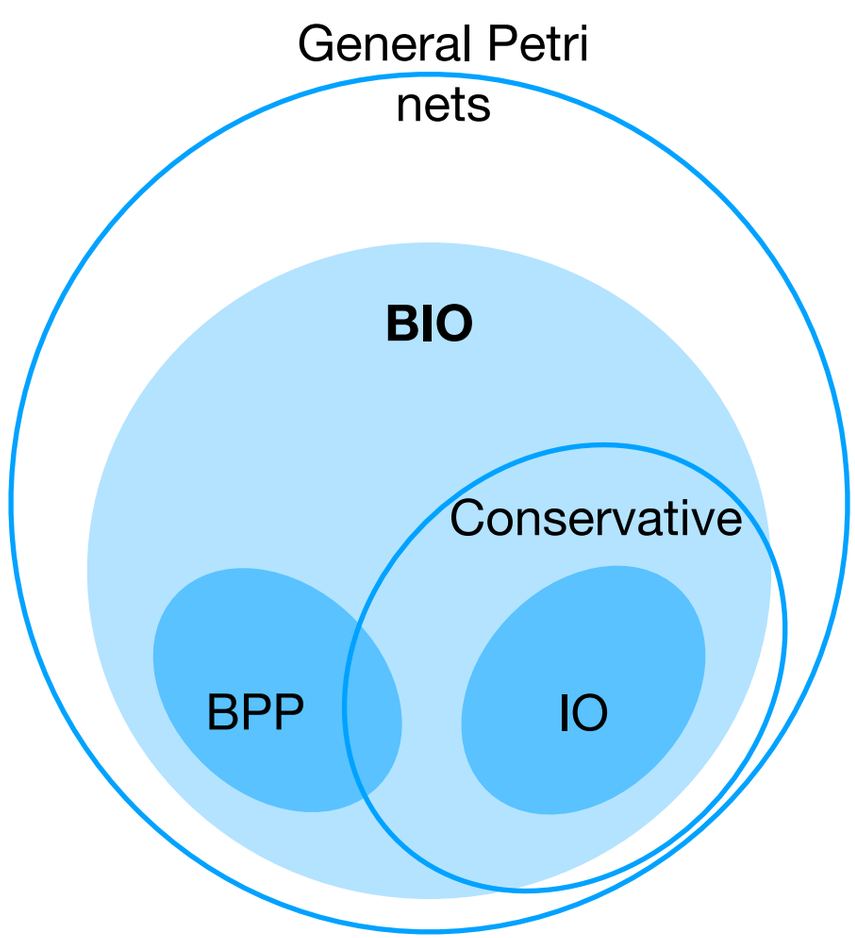

Open Problems:

- Applications for BIO nets (e.g. chemical reaction networks)
- Consequences of this result in other domains (data nets, process calculi, formal languages…)

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