

CPN Tools

An Introduction in the Context of openETCS

Stefan Rieger

TWT GmbH Science & Innovation

Stuttgart, Germany

24/10/2013

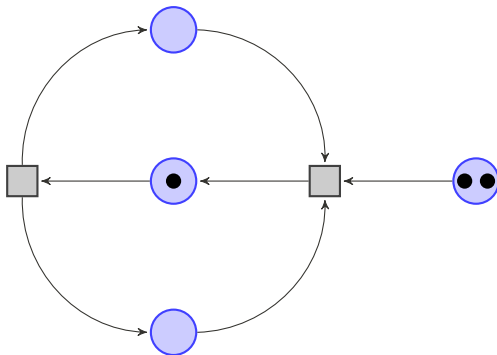
Outline

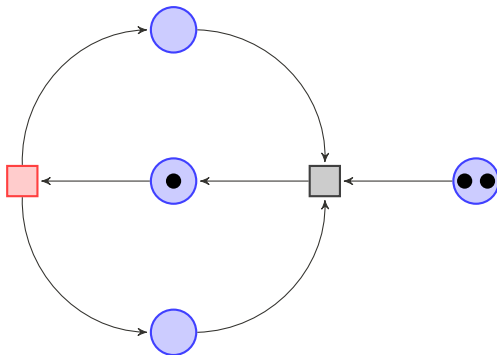
- 1 Petri Nets
 - The Token Game

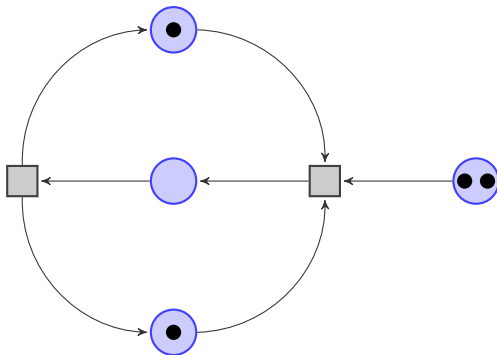
- 2 Colored Petri Nets
 - Introducing Colors
 - CPN Tools
 - Start of Mission Model

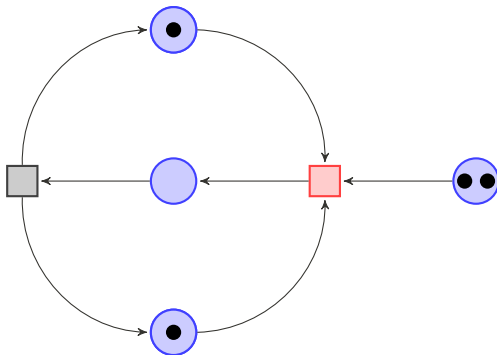
Petri Nets

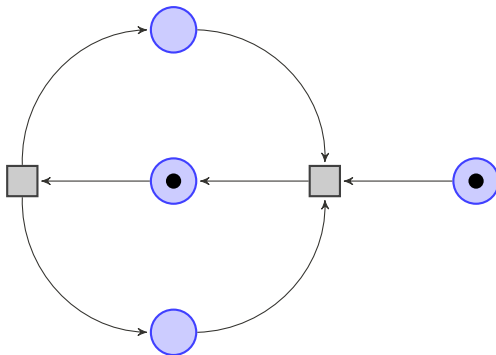
- Formal model
- Clearly defined formal semantics
- Characterized by the *token game*

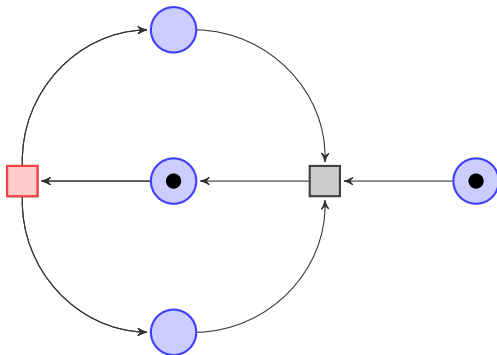


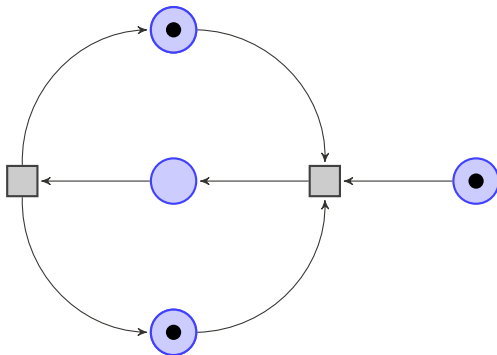


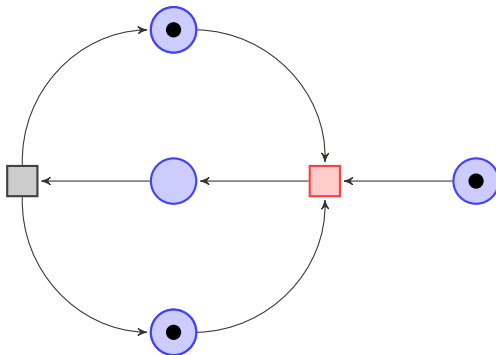


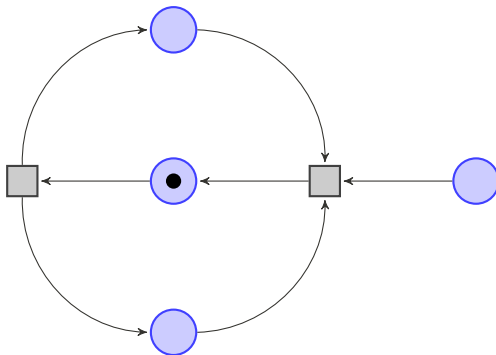


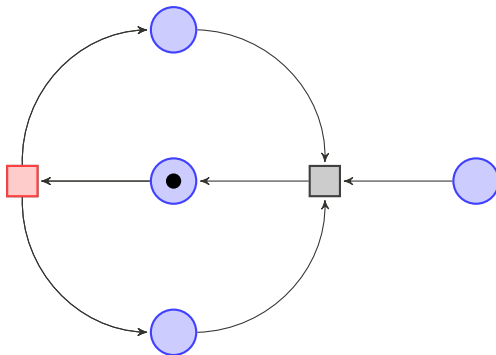


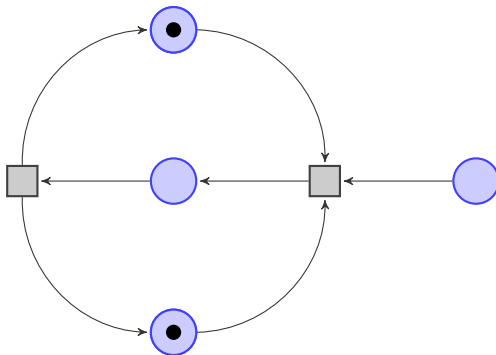


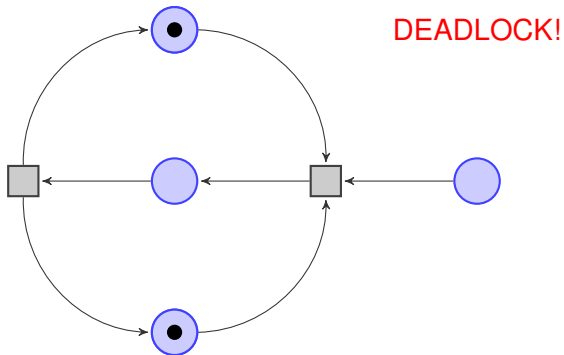








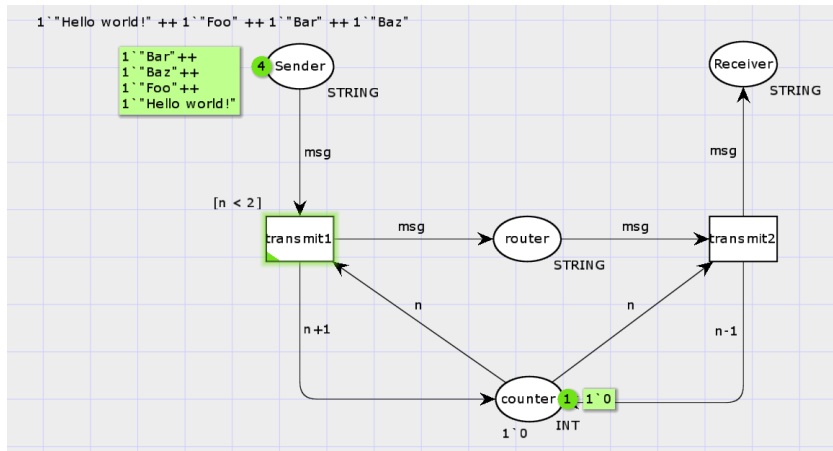




Introducing Colors

- A *color* can be any kind of datatype
- Tokens are colored and thus represent data
- Places can hold tokens of a specific color
- Transitions may transform tokens
- Additional constructs:
 - Transition guards
 - Actions
 - Inhibitor arcs

An Example



CPN Tools

- Tool for modeling and simulating Petri nets
- Support for exhaustive verification & model checking
- Based on functional programming language ML
- Hierarchy support
- Open Source
- Active development
- Documentation and video tutorials available

<http://cpntools.org/>

Model of “Start of Mission”

- “Start of Mission” modeled according to spec
- Model available on GitHub
- Several issues identified (document in work)

