Workcraft

A Framework for Interpreted Graph Models

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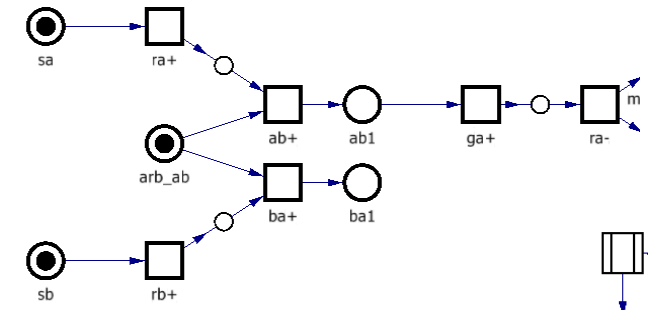
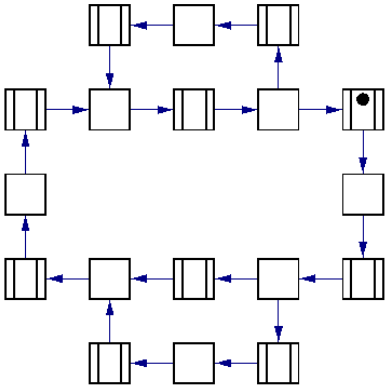
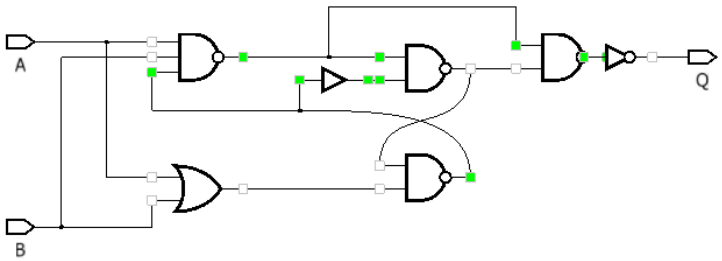
Interpreted Graph Models

- Static graph structure
  - Nodes
  - Arcs
- Additional entities
  - Tokens
  - Node states
  - Arc states
  - Etc
- Examples:
  - Petri Nets
  - Static Data Flow Structures
  - Gate-level circuits







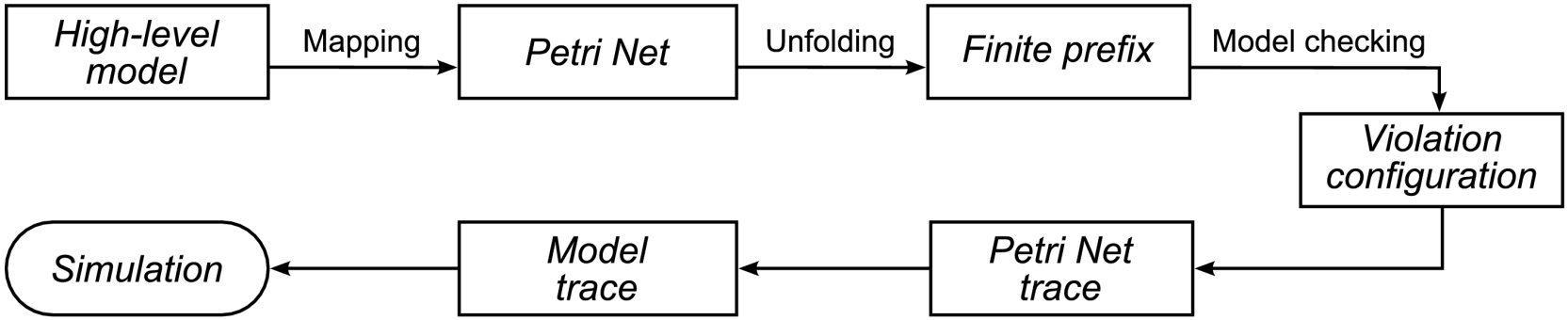
Workcraft — objectives

- For researchers
  - define new Interpreted Graph Models
    (such as extended Petri Nets with inhibitor arcs, timing etc.)
  - inherit visual editing and simulation features from the framework

- For system designers
  - a consistent multi-formalism framework
  - convenient analysis and verification features

Petri Nets as low-level 'language'

- It is often not reasonable to develop special theory for higher-level models
- Petri Nets have richly developed theory and efficient tools
  - Petri Net Mapping approach: express high-level models in terms of PNs for analysis/verification



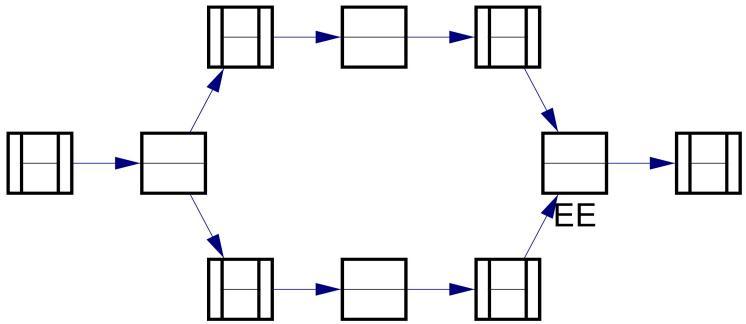
Technical details

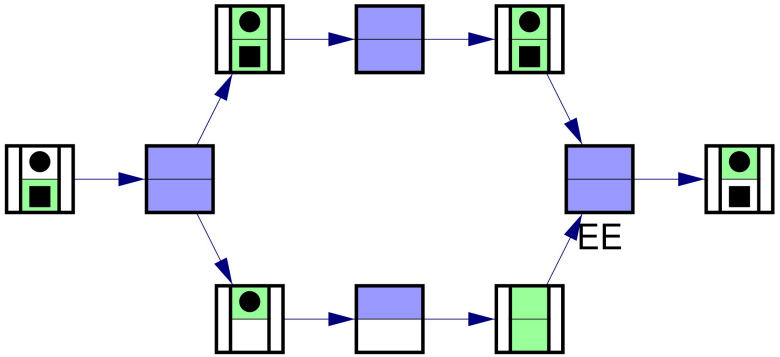
- Framework is written in Java
  - Works cross-platform
- Plug-in based architecture
  - Plug-ins are Java Classes
  - Model types, node types, tools, import/export functions are plug-ins
- For computationally intensive functions (e.g. verification)

  Java tools are just an interface to external command-line tools
  - Highly efficient but still very flexible cross-platform operation

(live demo)

Use case — Static Data Flow Verification



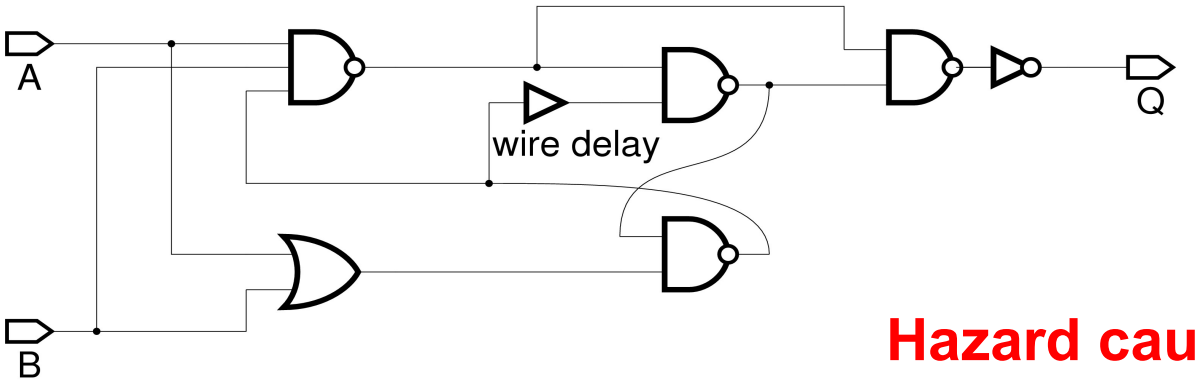


Original state

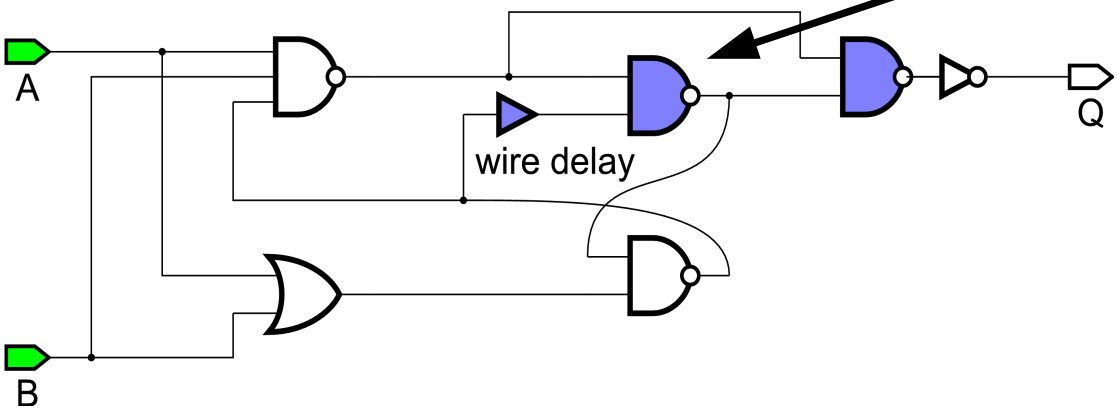
29 steps

Deadlock state

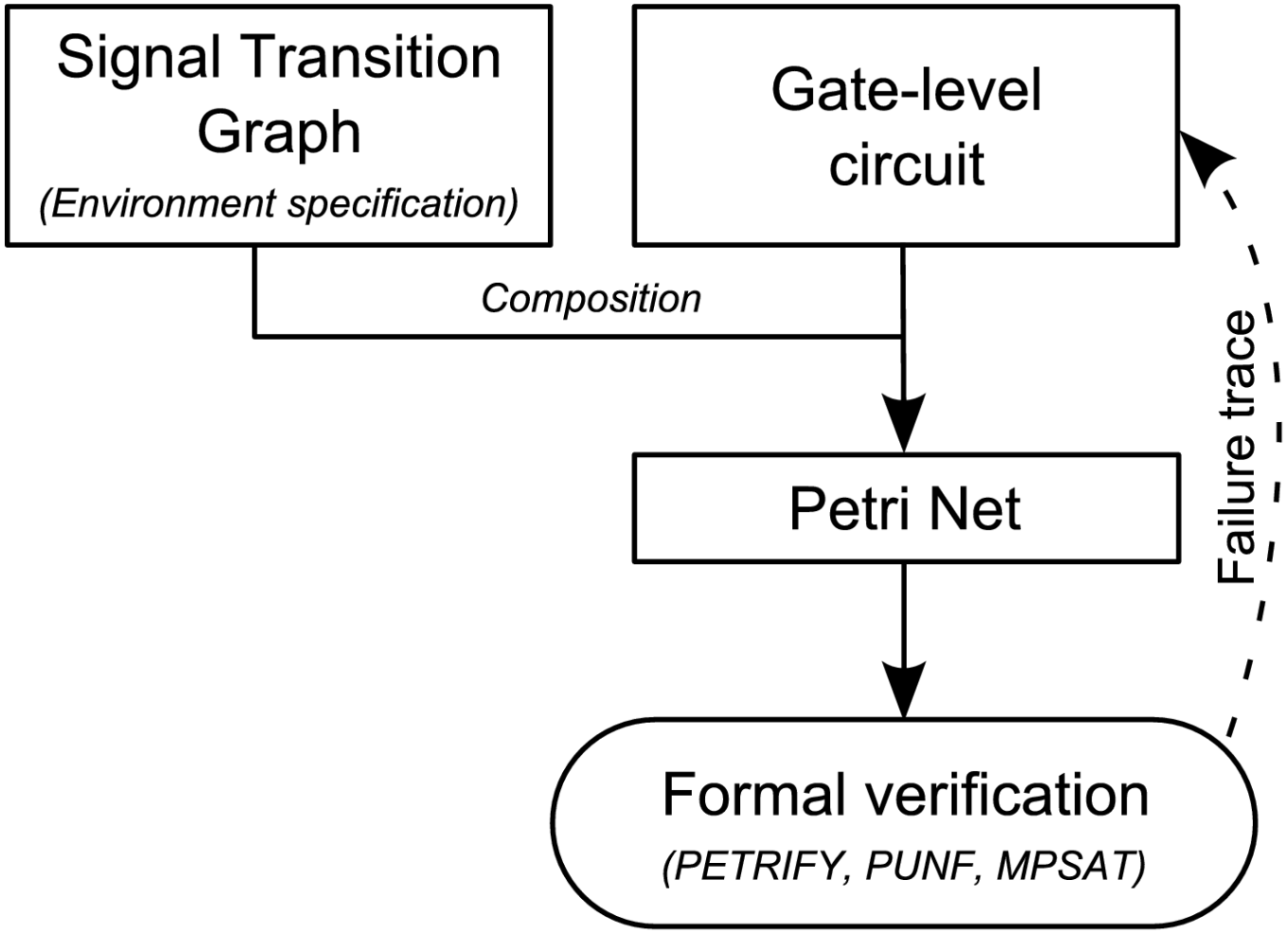
Use case — Asynchronous circuit verification



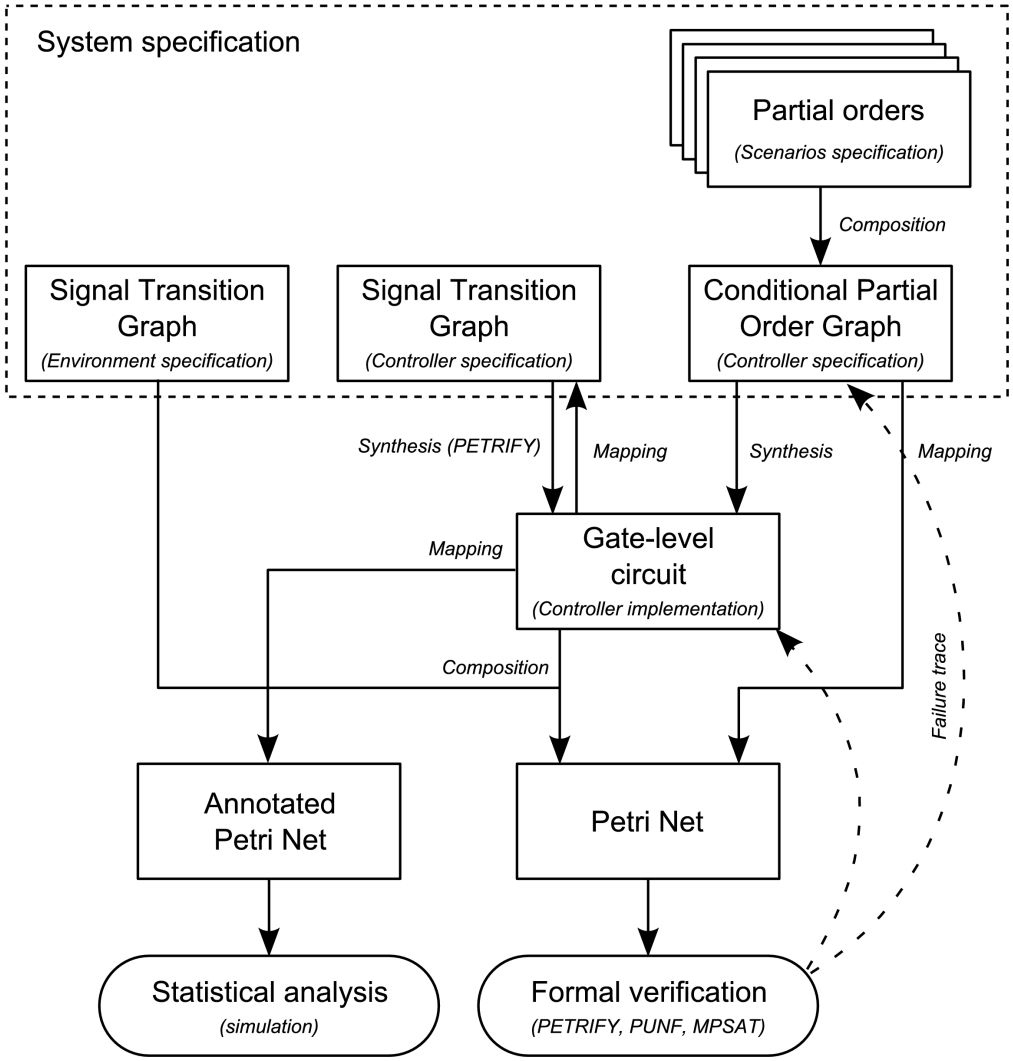
Hazard caused by wire delay



Model interoperability/co-verification



More complex interoperability



Conclusions

- Workcraft is a framework for Interpreted Graph Models
  - Provides visual editing and simulation features
  - Provides automated verification features
- Workcraft has been used for several practical applications
  - SDFS verification
  - Circuit verification (e.g. the design of a multiresource arbiter by Golubcovs et al.)
  - CPOG-based synthesis

Available free of charge for academic use at

workcraft.org

End

Thank you!

Questions?