Exploring Modeling Pragmatics with Ptolemy and KIELER

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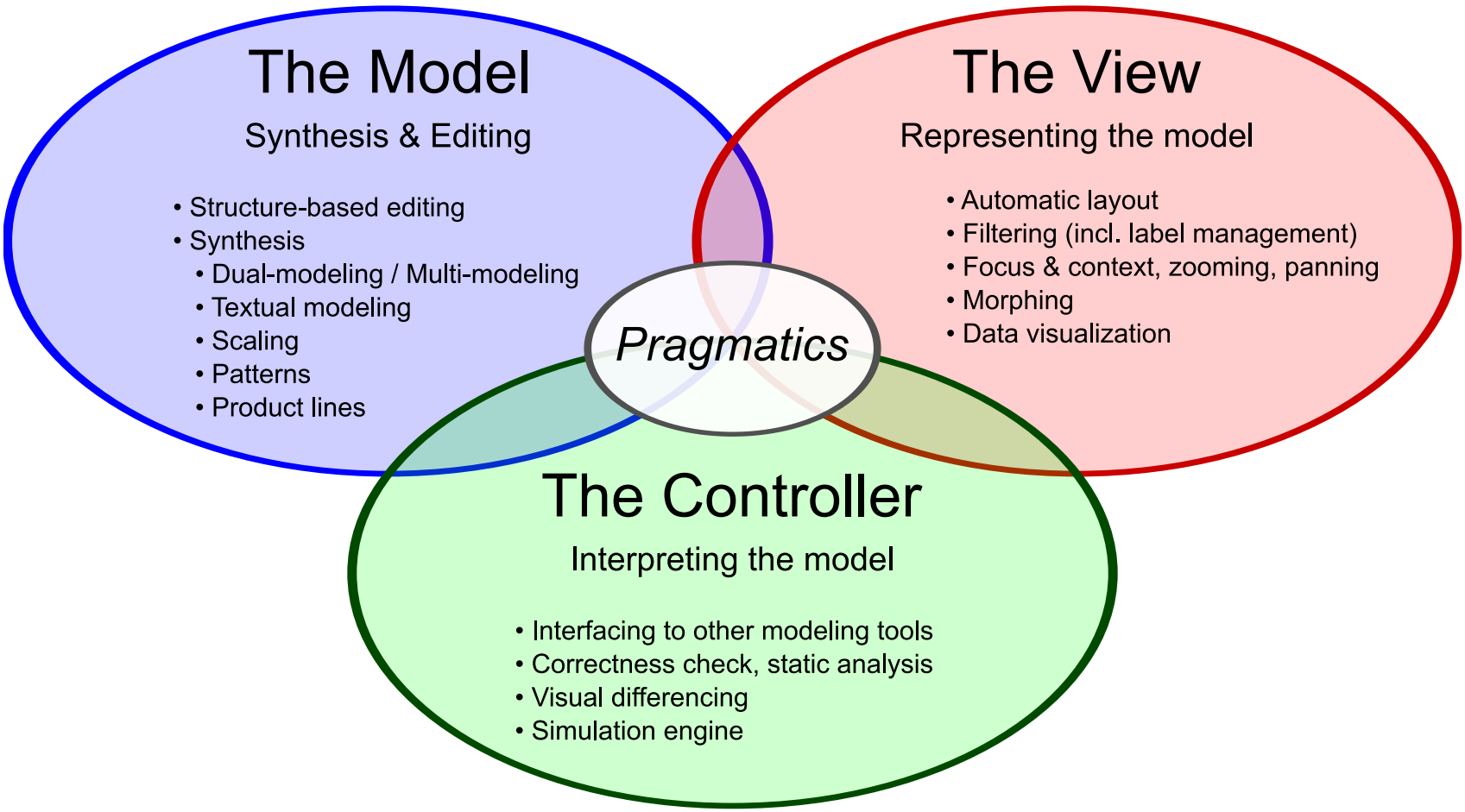
3. Vergil using KIELER layout features
4. Summary and Outlook

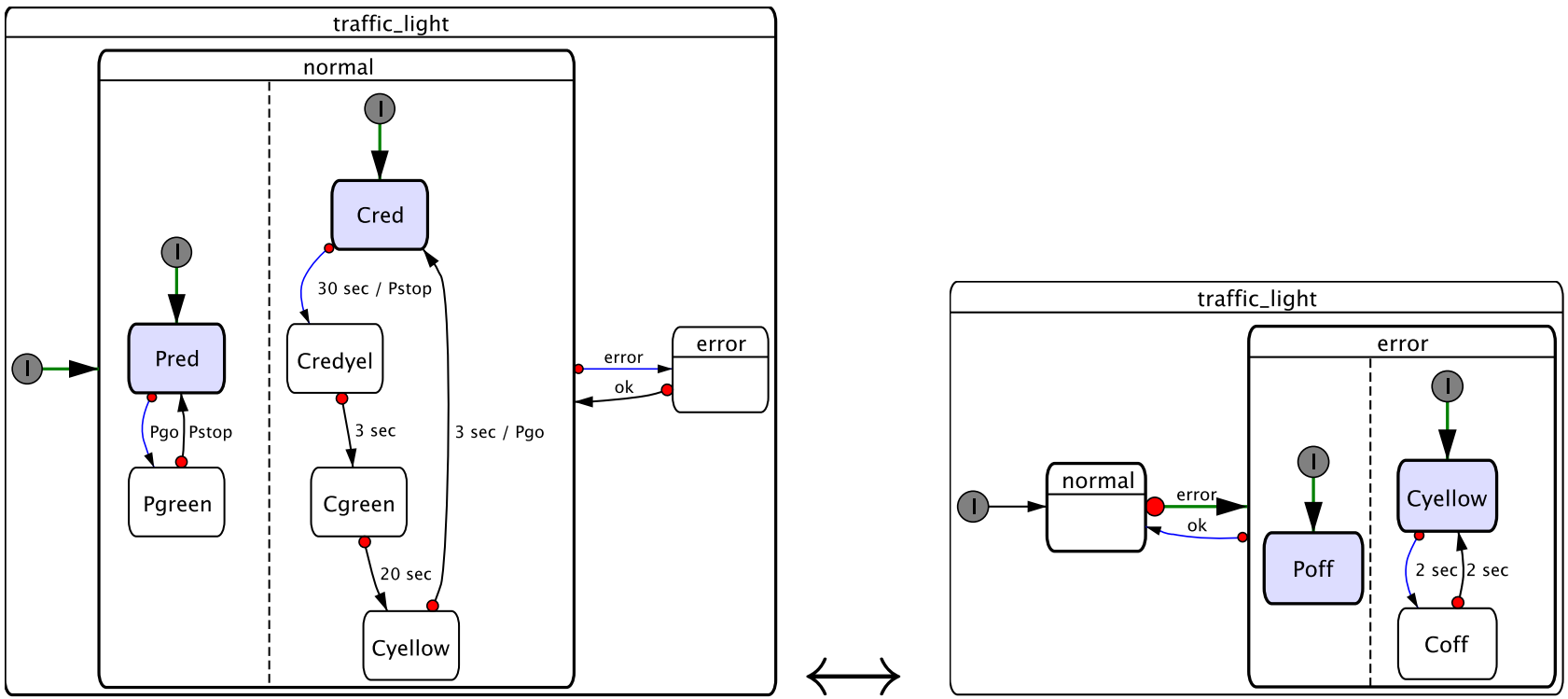
KIEL — Kiel Integrated Environment for Layout

- Enhance Pragmatics of graphical modeling
- Free user of manual layouting of diagrams
- New ways of user interaction and presentation of graphical models
- Consistently apply Model-View-Controller paradigm
- KIELER: KIEL for the Eclipse RichClientPlatform

Model-View-Controller in KIELER



Example: Dynamic Charts



Graphical Models: Ptolemy vs. Eclipse Domain Specific Modeling

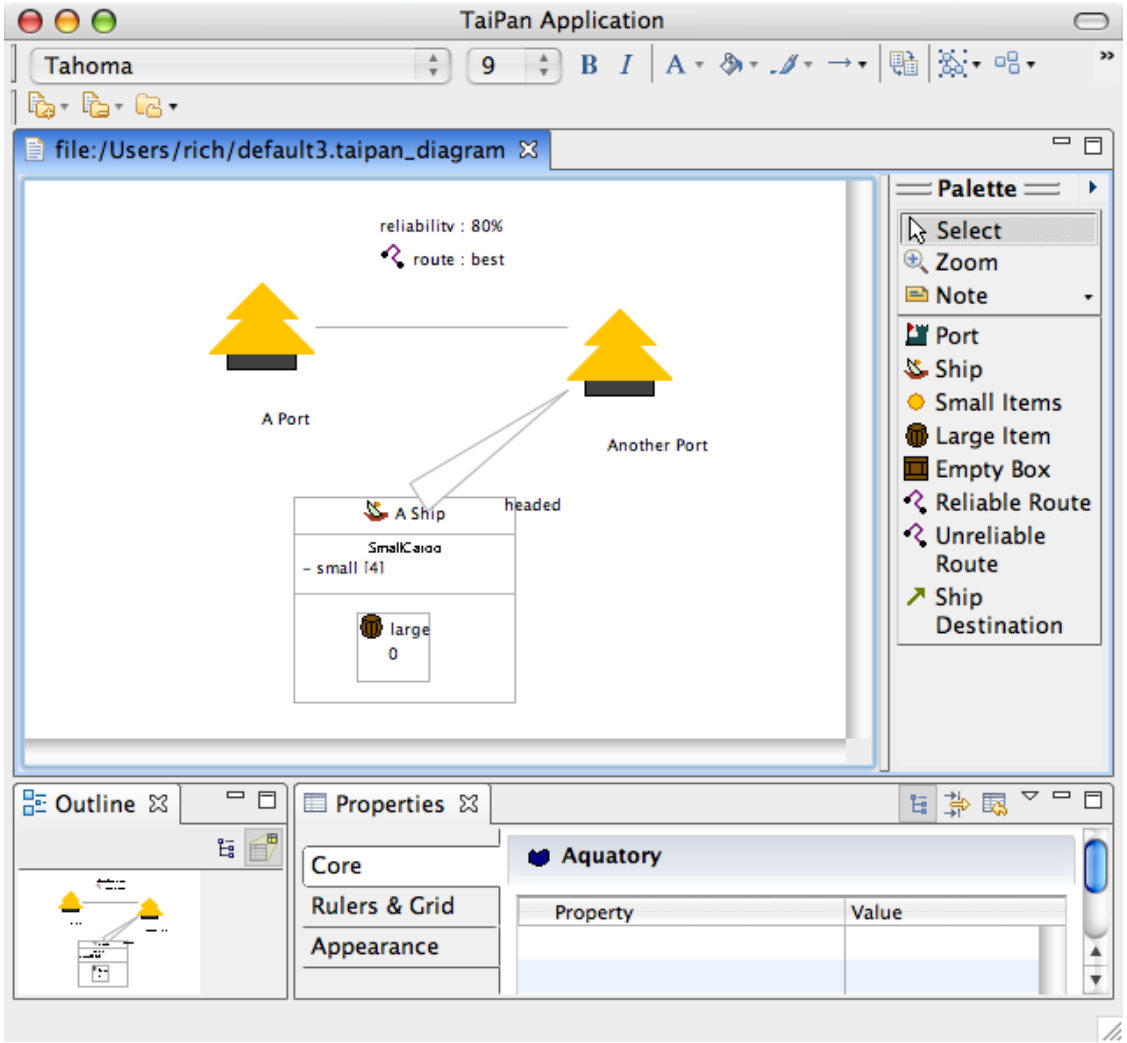
Ptolemy

- Mainly one graphical syntax
- Many different semantics — models of computation
- Strong focus on semantics — simulation of models

Eclipse GMF — Graphical Modeling Framework

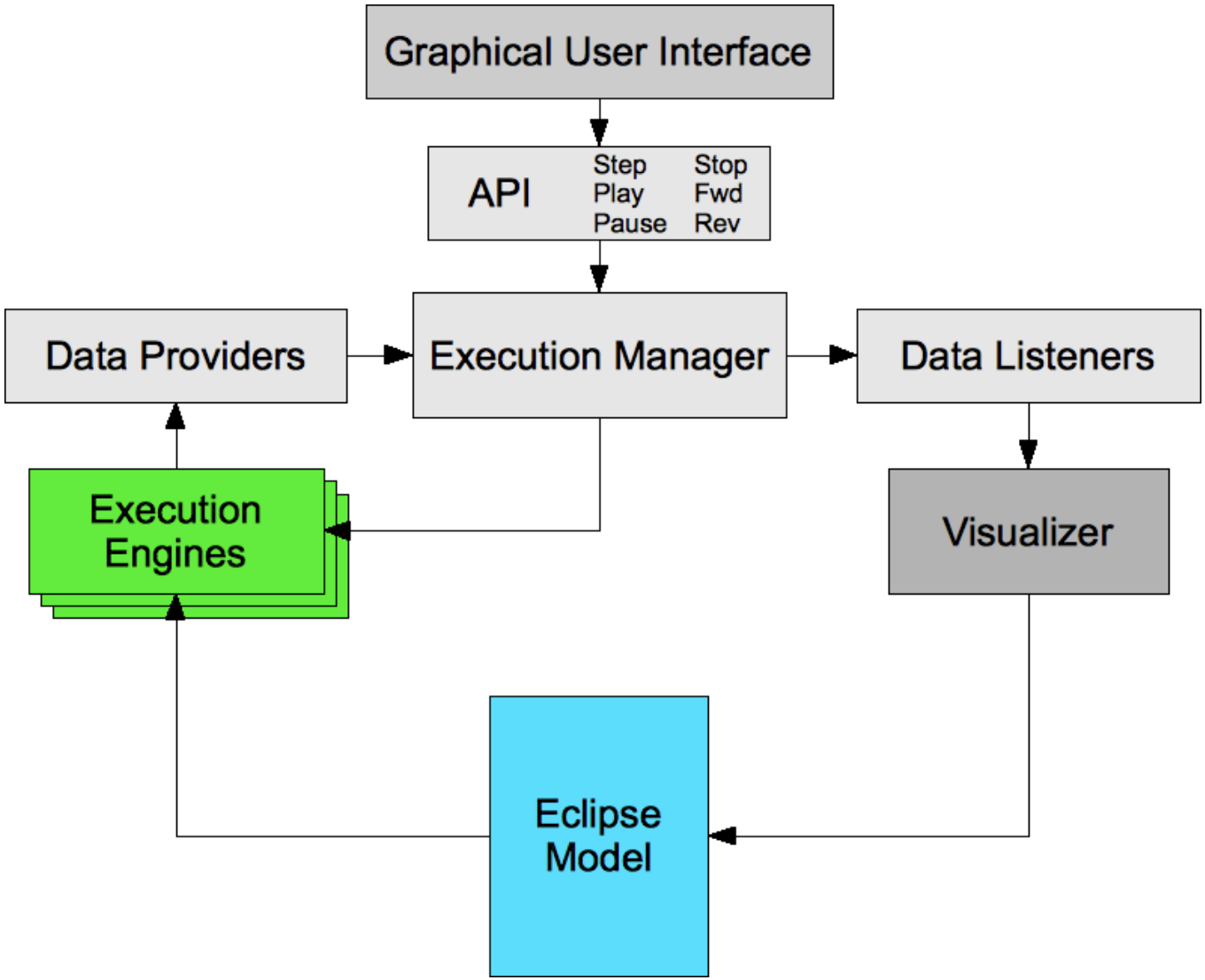
- Framework to build Domain Specific Languages (DSLs)
- Multiple custom graphical syntaxes
- Only graphical editor — only syntax no semantics
- Generative approach: Custom code generation frameworks with powerful template languages

Domain Specific Language Example

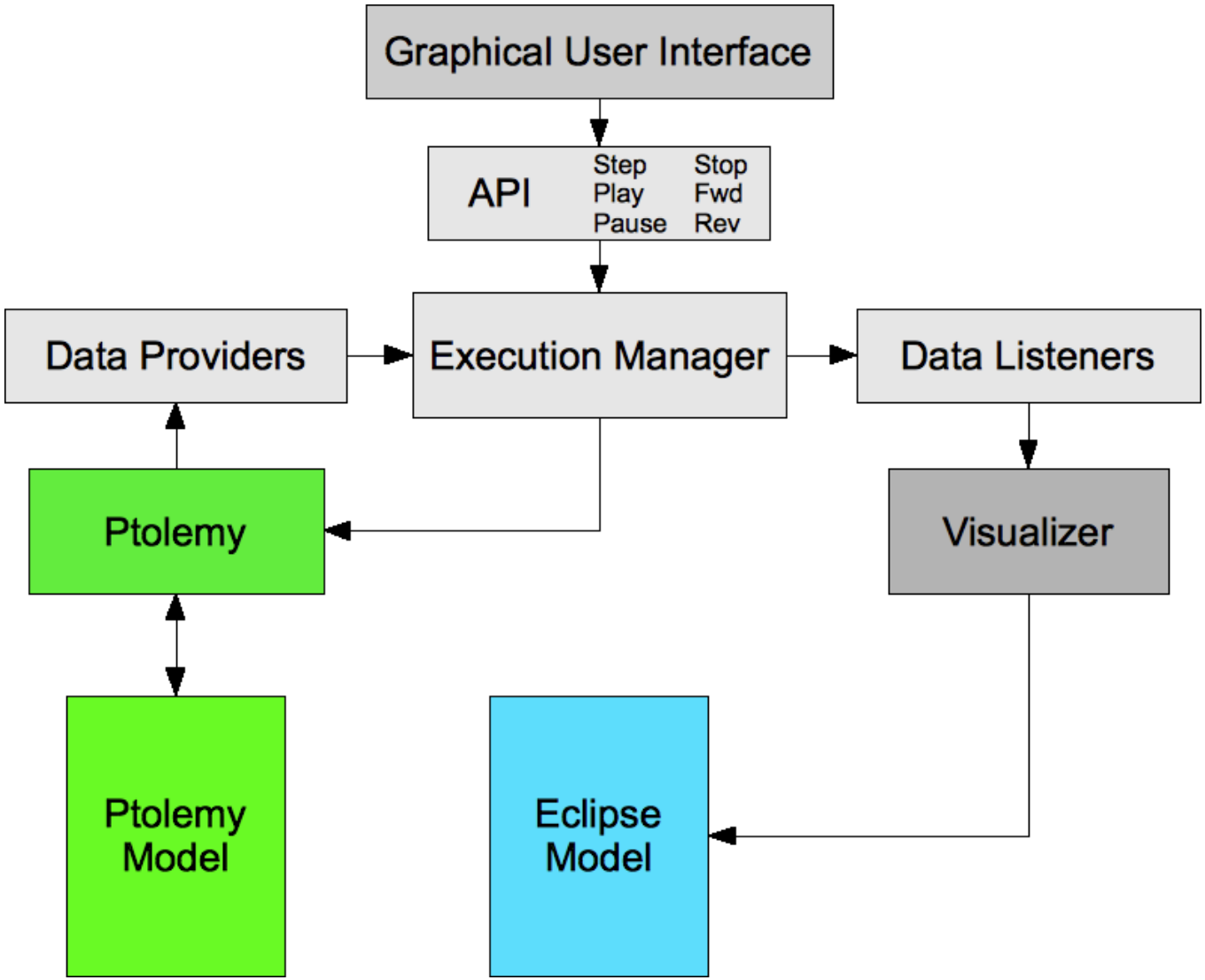


http://wiki.eclipse.org/index.php/GMF_Tutorial

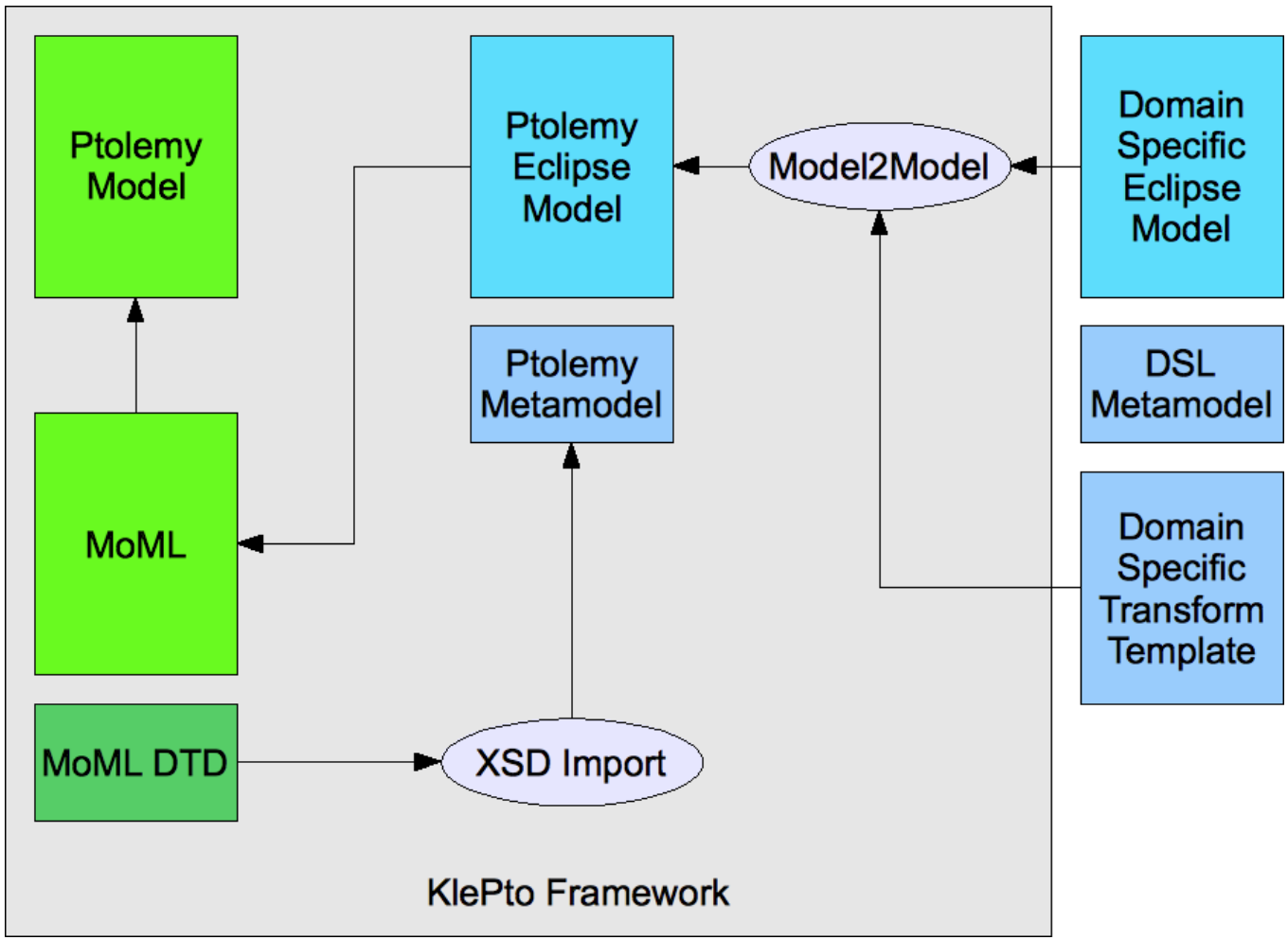
Introducing execution support to Eclipse models



KIELER leveraging Ptolemy semantics — KlePto

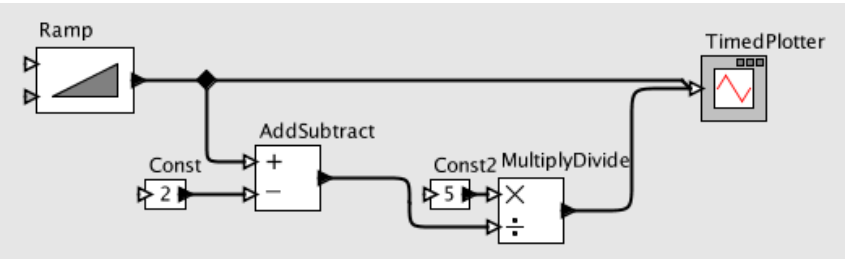


From Eclipse Models to Ptolemy

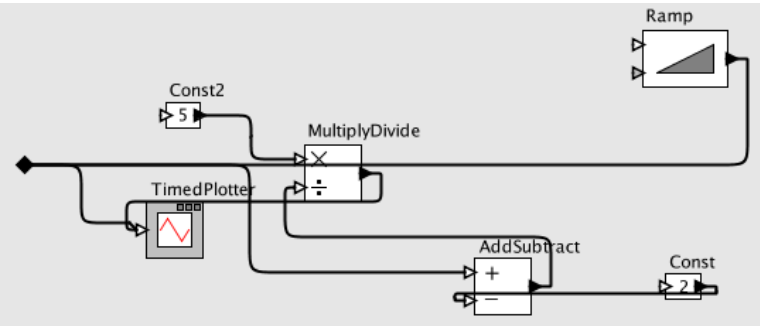


Vergil using KIELER layout features

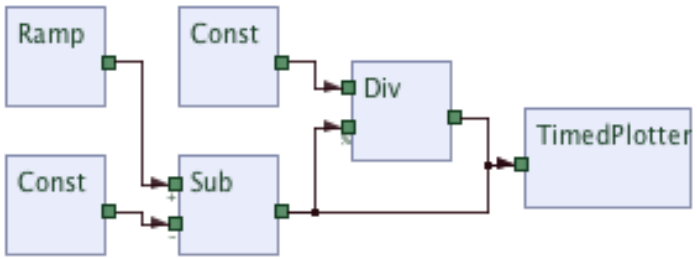
Key enabler for KIELER paradigms: Automatic Layout



Original Diagram



GraphViz based Layout



KIELER Layout of Dataflow Diagrams

Algorithm Approaches

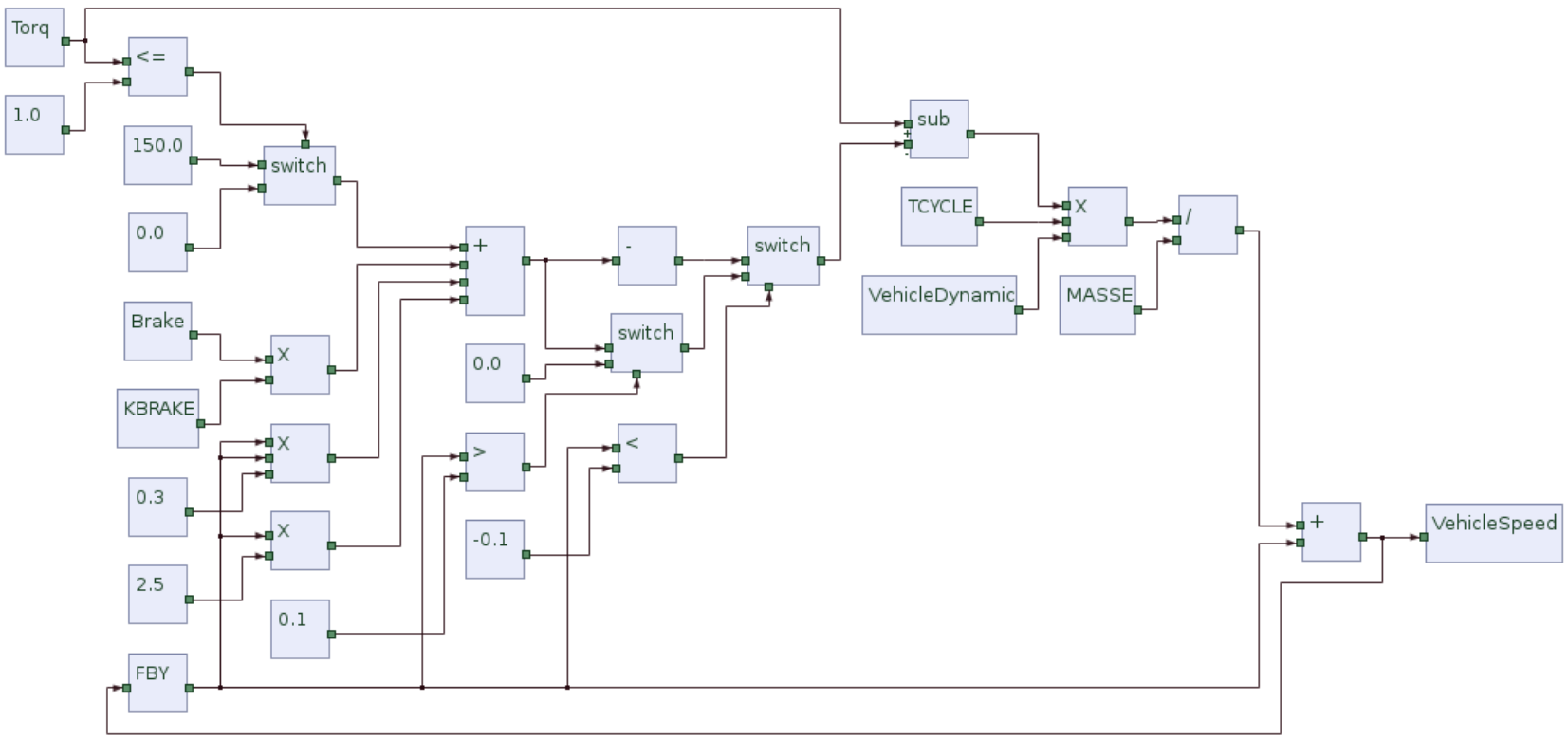
The Layered Approach (a.k.a. Hierarchical Layout)

1. Cycle removal
2. Layer assignment
3. Reduction of edge crossings
4. Node placement
5. Edge routing

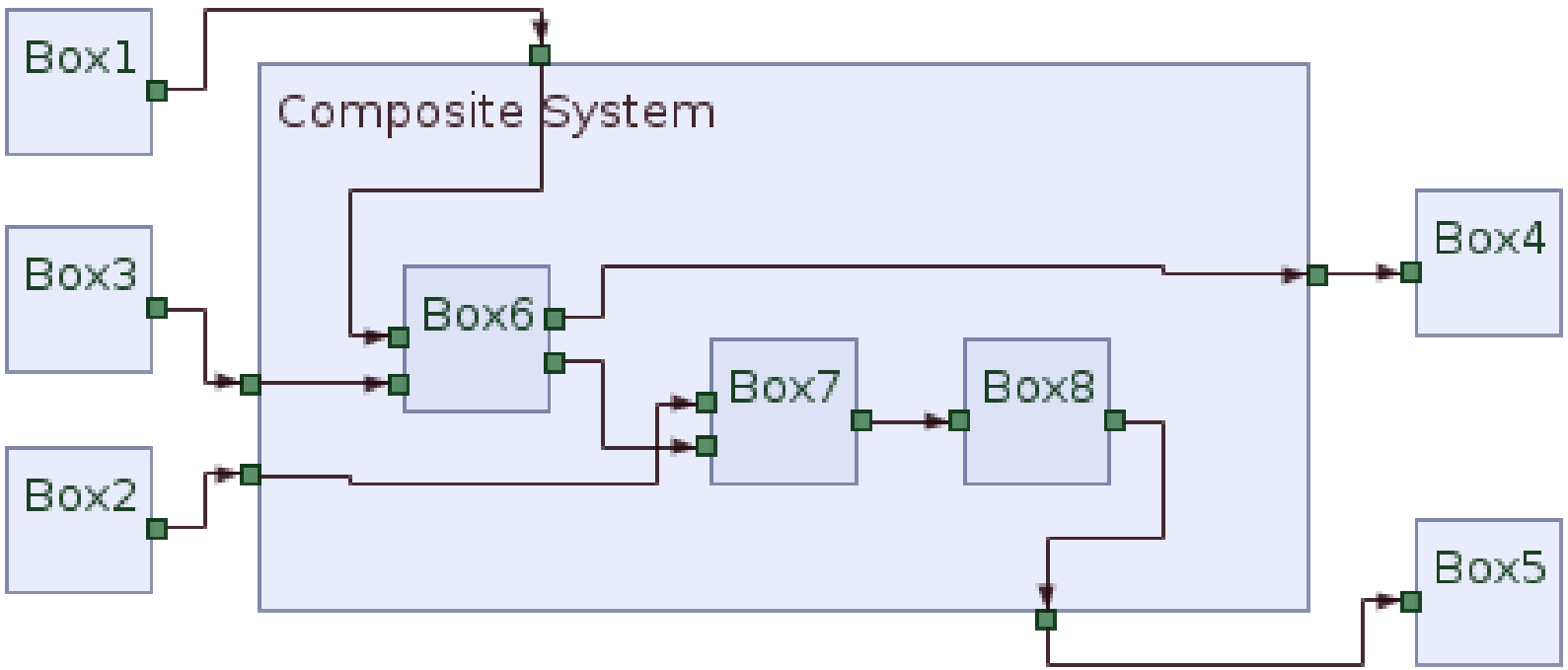
The Topology-Shape-Metrics Approach (a.k.a. Orthogonal Layout)

1. Planarization *(topology)*
2. Orthogonalization *(shape)*
3. Compaction *(metrics)*

Example Layouts



Displaying Hierarchy Explicitly



Summary

- KIELER is a framework to enhance pragmatics of graphical modeling
- Key enabler is automatic layout
  - New layout algorithms developed supporting port constraints
  - These standalone Java algorithms could be used in other contexts (Vergil)
- Introduction of execution of models in Eclipse
  - Employ Ptolemy as generic simulation engine
  - Ptolemy metamodel generated from MoML DTD

Future Work

- Implementation of Eclipse Execution Manager and configuring M2M transformation from Eclipse to Ptolemy
- Enhancing layout algorithms (especially orthogonal layouter)
- Build advanced interaction paradigms on top of the auto-layout
  - Structure-Based-Editing
  - View Management for simulations
- Create more Eclipse graphical example editors
  - IEC 61499 Function Blocks
  - Esterel Technologies SCADE
  - Ptolemy?