Taming Graphical Modeling

Reinhard von Hanxleden
Hauke Fuhrmann

Christian-Albrechts-Universität zu Kiel, Germany
www.informatik.uni-kiel.de/rtsys

SYNCHRON 2010, Frejus
1 Problems of Graphical Modeling

2 Approach: KIELER

3 Evaluation
Mathworks’ Simulink
Examples 2
Examples 3

Problems of Graphical Modeling Approach: KIELER Evaluation

Student
Financial Institution
Grade Administrator
Instructor
Registrar
Researcher

Obtain student grant
Obtain student loan
Reimburse course fees
Pay fees
Drop out of school
Graduate from school
Finish seminar
Enroll in seminar

Activity

reset buffer
process command
monitor status

startup

got command
no command

command done
status done
is complete
rerun

shutdown
WYSIWYG Drag-n-Drop Freehand Editing
Complex Diagrams
Complex Diagrams
Problems of Graphical Modeling Approach: KIELER Evaluation

Loosing the Context

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The image shows a computer screenshot of a graphical modeling tool, likely used for system simulation or control systems. The diagram includes nodes and connections indicating a process involving speed control, acceleration, deceleration, and integration. Key elements include:

- Nodes for actuating or decelerating
- Connectors for speed and acceleration
- Integration of omega_cmd to get phi_cmd
- Decision points for speed limits and control

The context suggests a focus on real-time control systems, possibly for automotive or industrial applications, where precise control over speed and acceleration is critical.
Loosing the Details
Semiotics
Semiotics

- Syntax
- Pragmatics
- Semantics

Problems of Graphical Modeling Approach: KIELER Evaluation
KIELER Objectives
KIELER Objectives

- Free user of manual mechanical work.
  - Manual placing of graphical objects.
  - Manual navigation in complex models.
Free user of manual mechanical work.
- Manual placing of graphical objects.
- Manual navigation in complex models.

Focus on **pragmatics**.
- New interaction methodologies.
- New analysis methodologies.
- New ways to synthesize models.
KIELER Semiotics

- Semantics
- Pragmatics
- Syntax
KIELER Semiotics

Semantics

Syntax

KIELER

Pragmatics

Dynamic Views
KIELER Semiotics

- Semantics
- Syntax
- Pragmatics
  - Dynamic Views
    - Automatic Layout
    - View Management
Automatic Layout
Problems of Graphical Modeling Approach: KIELER Evaluation

Diagram Editor View

Layout Algorithm

X=10
Y=5
X=5
Y=12
X=18
Y=10
Problems of Graphical Modeling Approach: KIELER Evaluation

KIELER Infrastructure for Meta Layout

Diagram Editor View

KIELER Infrastructure for Meta Layout

Layout Algorithm

X=10 Y=5
X=5 Y=12
X=18 Y=10
Problems of Graphical Modeling Approach: KIELER Evaluation

KIELER Infrastructure for Meta Layout

Diagram Editor View

KGraph

Layout Algorithm

X=10
Y=5
X=5
Y=12
X=18
Y=10

Algorithm
Glue Code
extract graph
apply layout
transform graph
attach layout result

Diagram
Glue Code
attach layout result
transform graph
Algorithm
Glue Code
extract graph
apply layout
- Eclipse
- GMF
- Graphiti (ongoing)
- ...
Problems of Graphical Modeling Approach: KIELER Evaluation

KIELER Infrastructure for Meta Layout

KGraph

Diagram Editor View

Layout Algorithm

- Eclipse
- GMF
- Graphiti (ongoing)
- ...

- GraphViz (Dot, Neato, FDP, Twopi, Circo, Radial)
- Open Graph Drawing Framework (OGDF) (Class Diagram, Layer-Based, Force Directed, Orthogonal, Planarization, ...)
- Zest (GEF)
- Own Implementations (Ports, Layer-Based, Planarization, ...)
- ...

Glue Code

extract graph

apply layout

transform graph

attach layout result
Build upon Layout: View Management

- Structure-Based Editing
- Textual Editing
- Simulation
View Management

Trigger

Effect
View Management

- ButtonTrigger
- SelectionTrigger
- SimulationEventTrigger
- ...
View Management

- ButtonTrigger
- SelectionTrigger
- SimulationEventTrigger
- ...

- AutoLayoutEffect
- HighlightEffect
- CollapseEffect
- FilterEffect
- ArrowEffect
- SimulationEffect
- ...

Trigger

Effect
View Management

- ButtonTrigger
- SelectionTrigger
- SimulationEventTrigger
- ...

- AutoLayoutEffect
- HighlightEffect
- CollapseEffect
- FilterEffect
- ArrowEffect
- SimulationEffect
- ...

Trigger → Combination → Effect
View Management

- ButtonTrigger
- SelectionTrigger
- SimulationEventTrigger
- ...

- AutoLayoutEffect
- HighlightEffect
- CollapseEffect
- FilterEffect
- ArrowEffect
- SimulationEffect
- ...

Diagram:

```
  Trigger -- Combination -- Effect
  
  KIELER Runtime
```
Evaluation of Structure-Based Editing

![Bar Chart]

- **Manual**
  - Class
  - Practical
  - KIELER-Team

- **Auto-Layout**
  - Class
  - Practical
  - KIELER-Team

- **Structure-Based**
  - Class
  - Practical
  - KIELER-Team
Problems of Graphical Modeling Approach: KIELER Evaluation

H. Fuhrmann, R. von Hanxleden, Taming Graphical Modeling, MODELS 2010

http://informatik.uni-kiel.de/rtsys/kieler

Jahresfest der Informatik 2009
Justin Time
Hauke Fuhrmann
Dies ist ein Test. Wenn ich groß bin, werde ich mal ein Taschenbuch.
H. Fuhrmann, R. von Hanxleden, *Taming Graphical Modeling*, MODELS 2010

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