Adding Rule-Based Model Transformation to Modelling Languages in MetaEdit+

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Universiteit Antwerpen

If you can Model, you can Transform

To demonstrate that transformation languages can be modelled explicitly

- their concrete and abstract syntax
- their execution semantics (building on a transformation kernel)

… independent of implementation technology

- AToM³ and AToMPM
- **MetaEdit+**

Model transformations are useful.

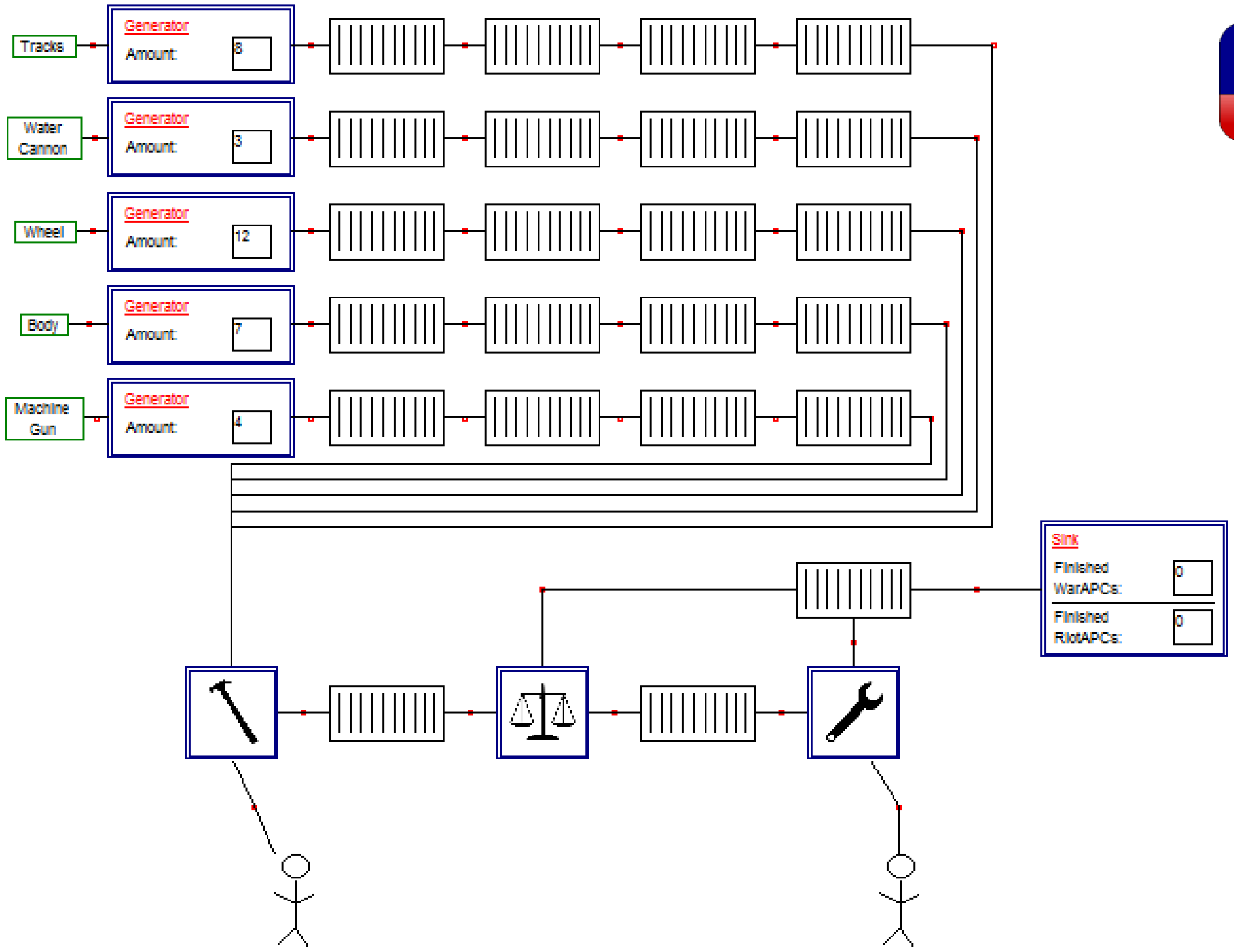
We focus on modelling operational semantics of a DSL using rule-based model transformations.

This is done in the commercial tool MetaEdit+.

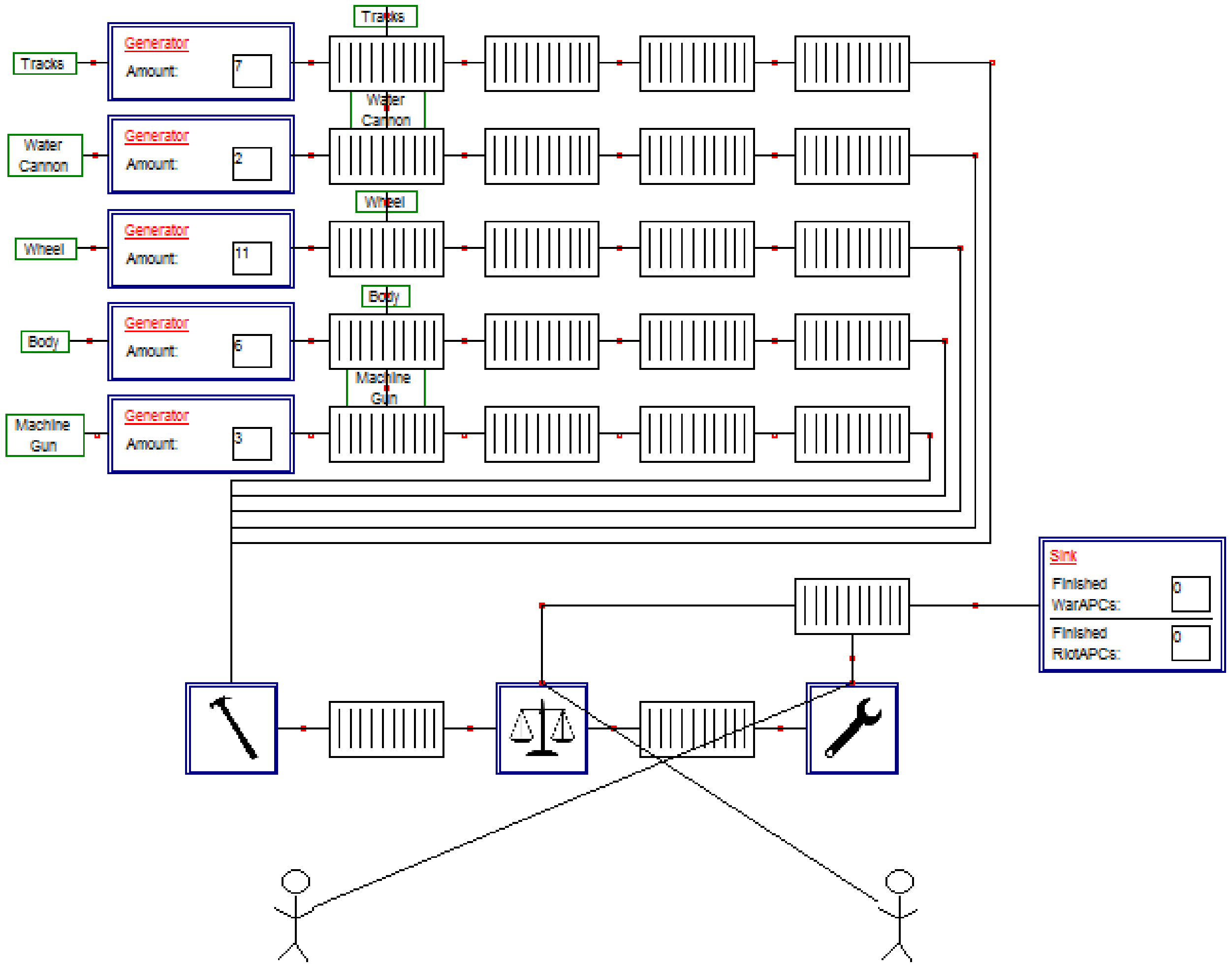
This tool has no model transformation support.

Contents

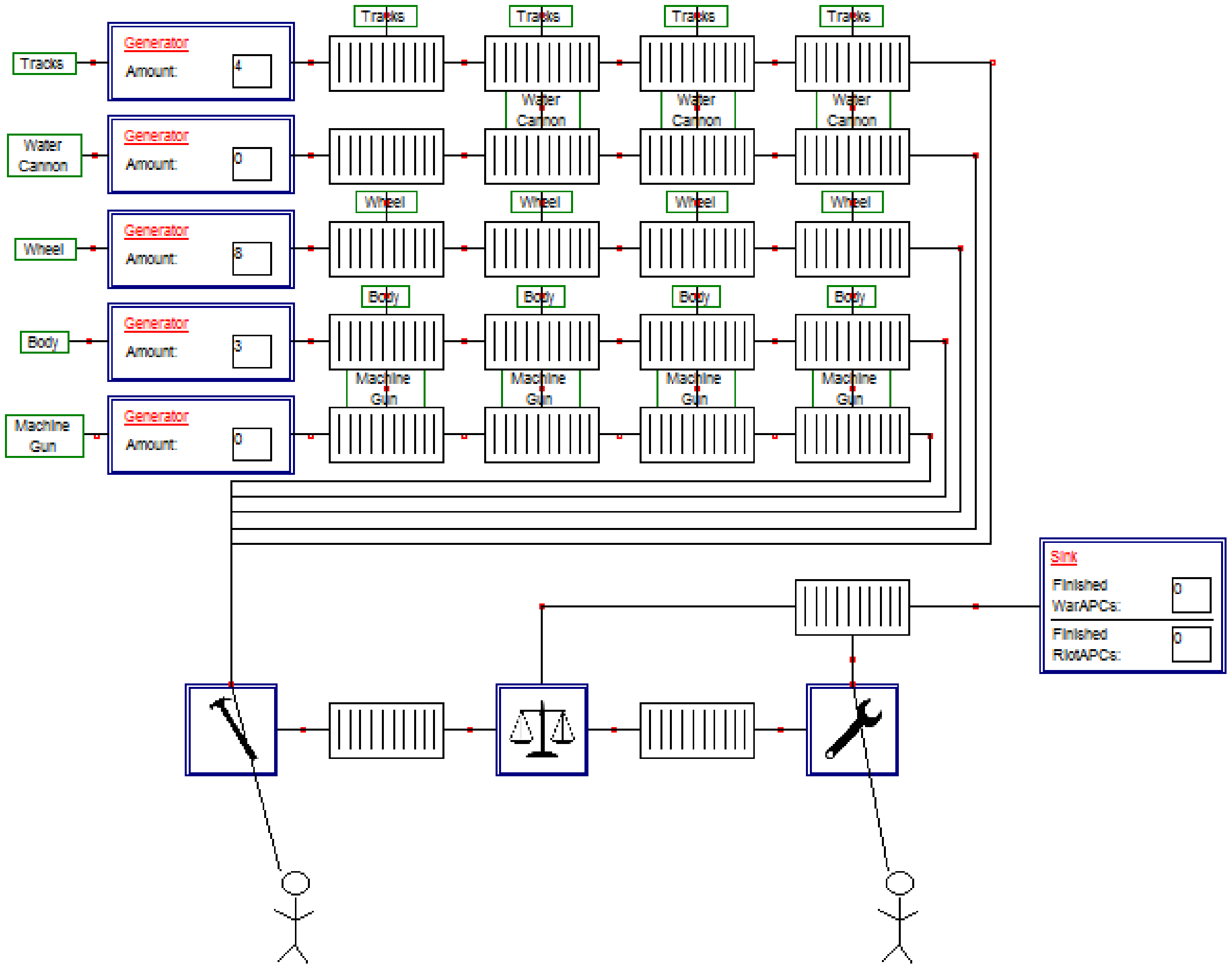
Example Case: Production System Language



Example Case: Production System Language



Example Case: Production System Language



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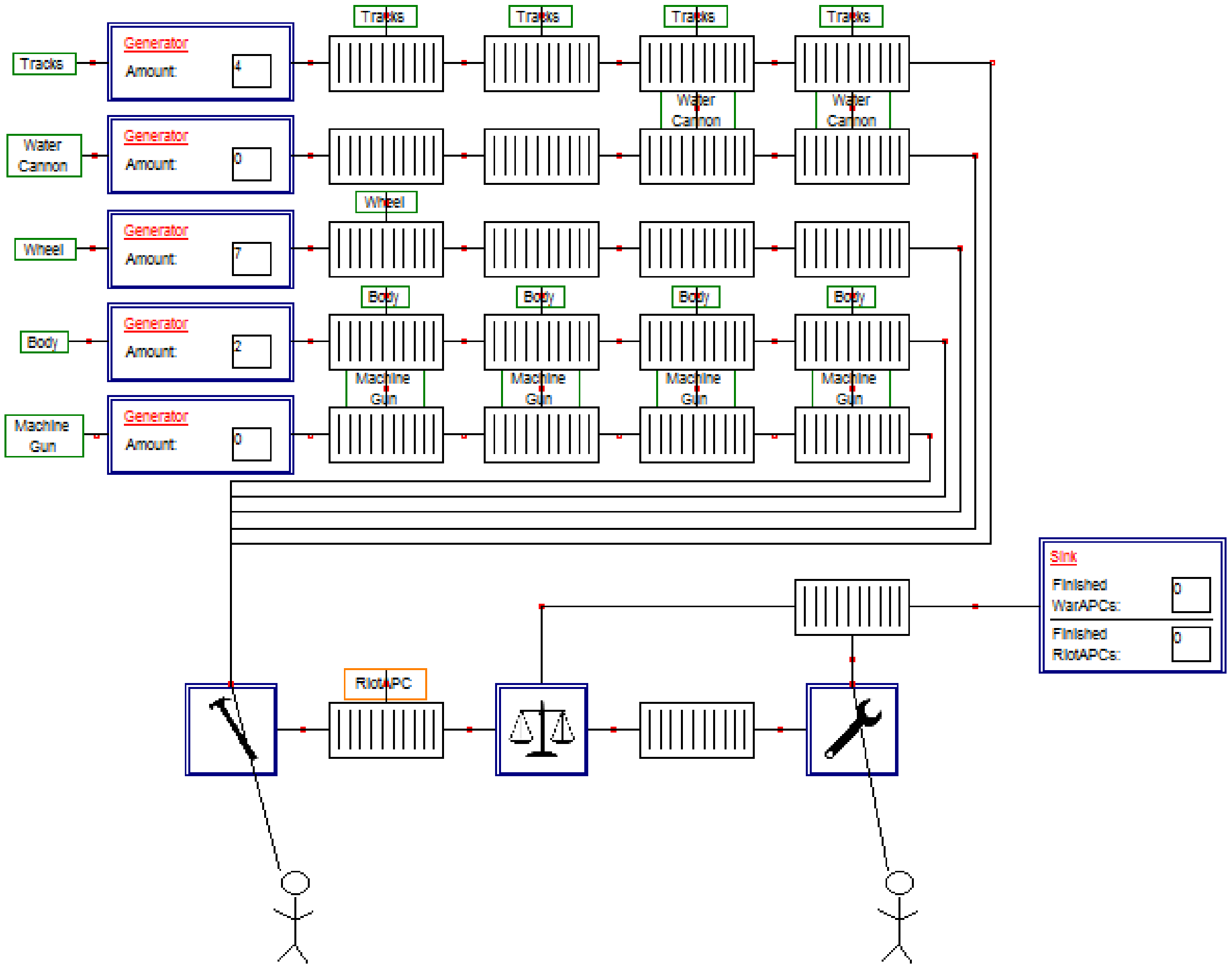

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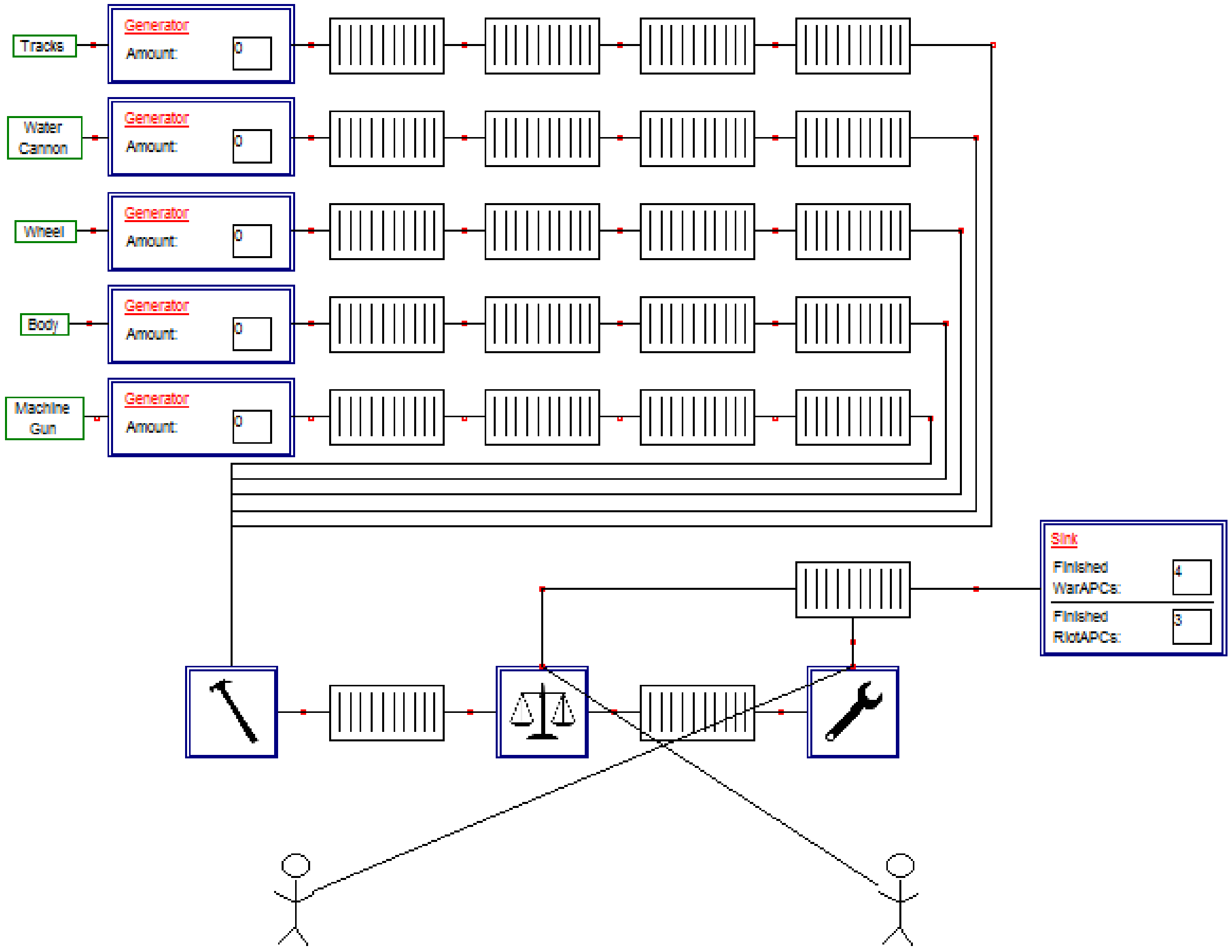
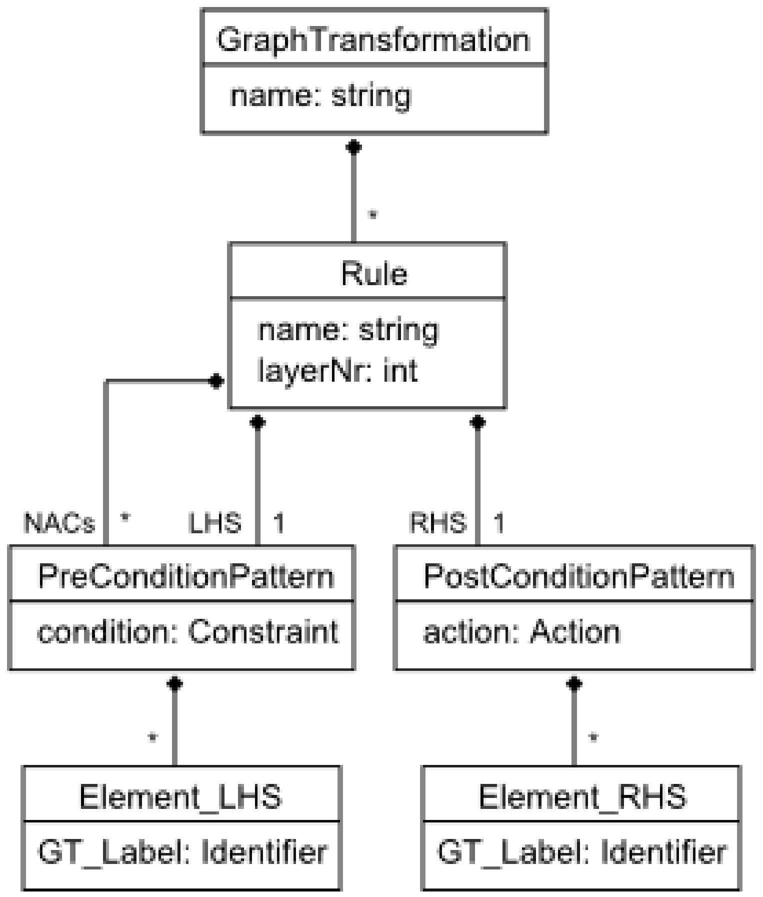


Explicitly Modelling the Transformation Language



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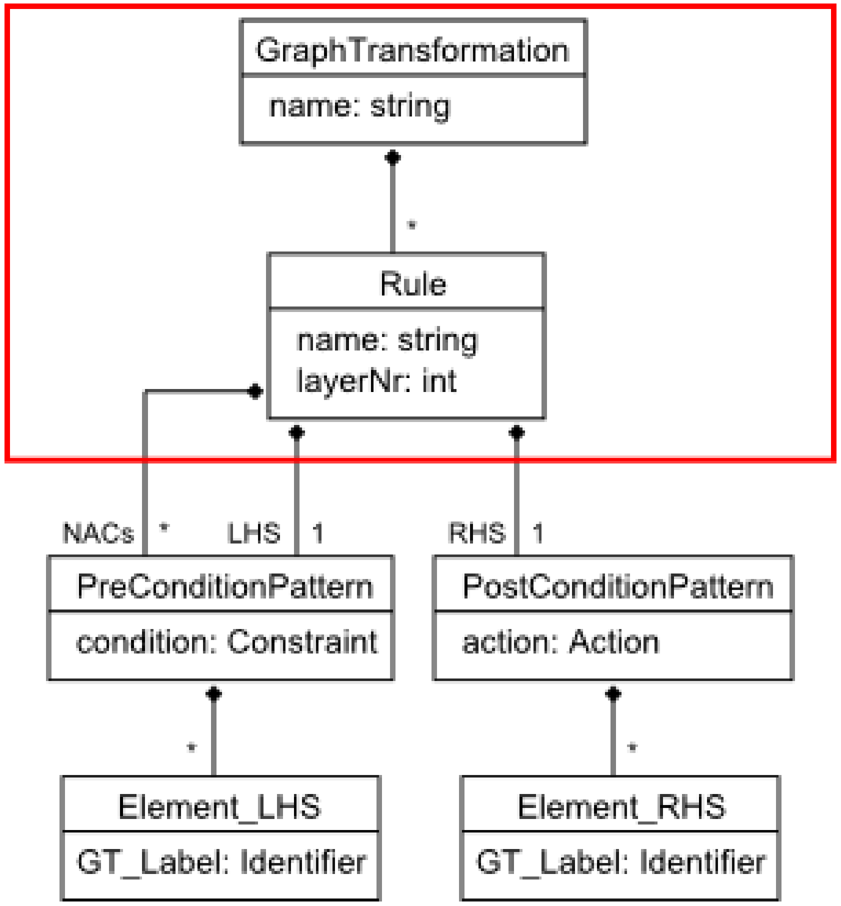

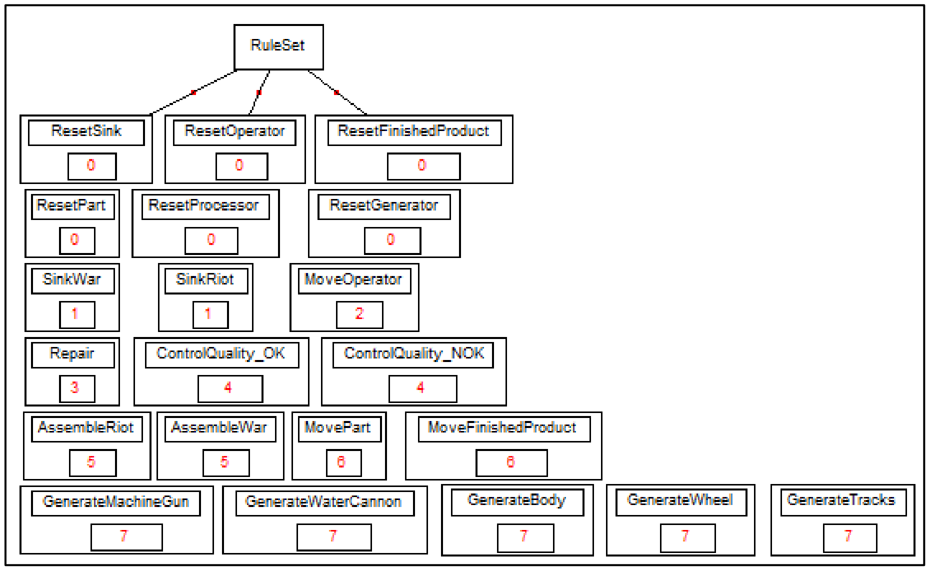

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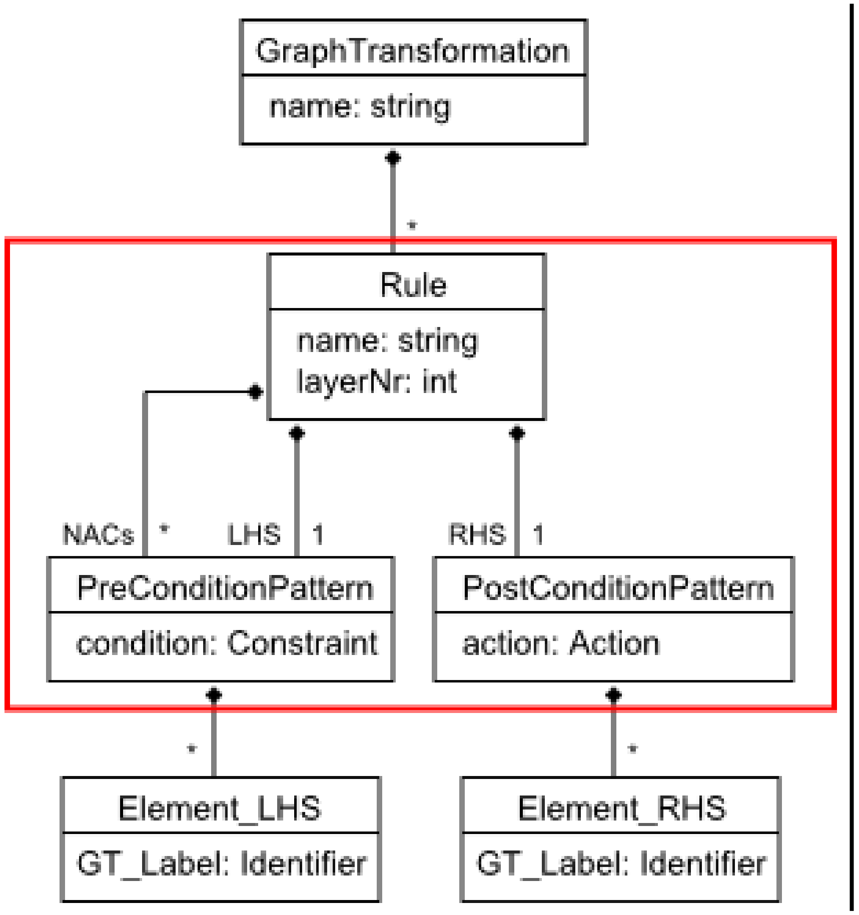

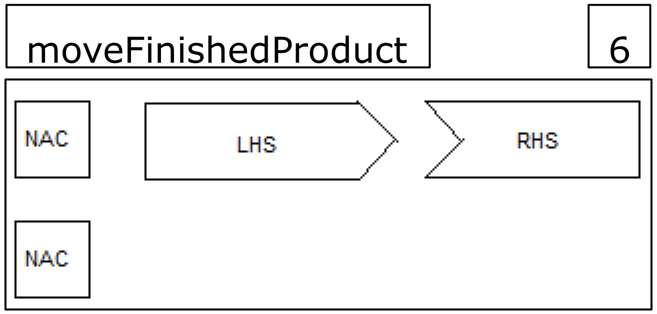

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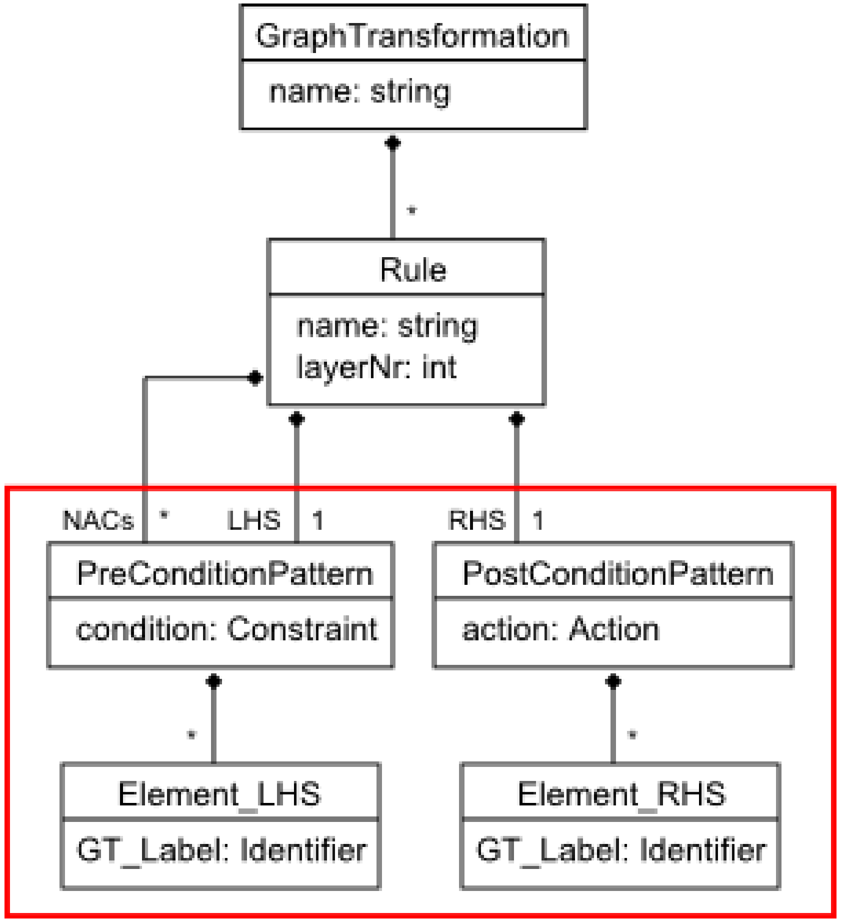
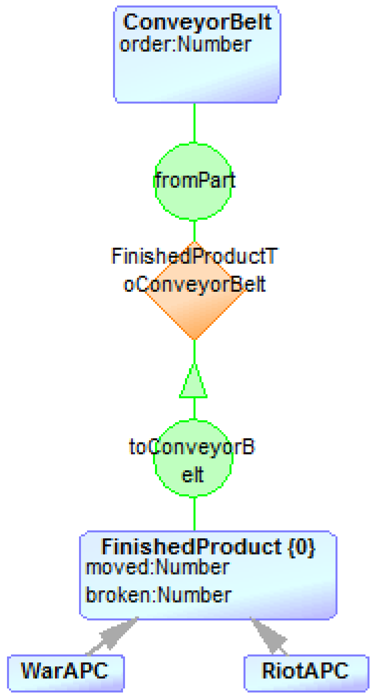
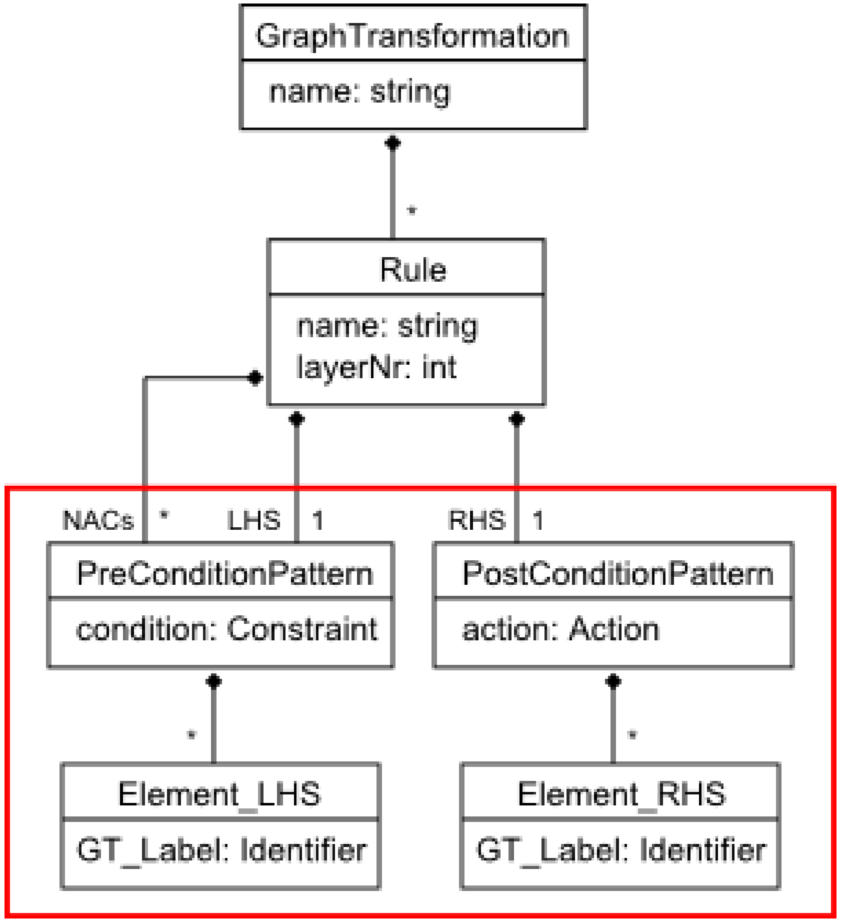
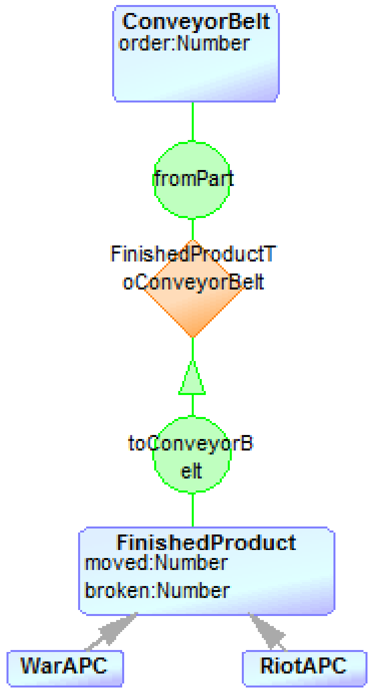




Kühne, T., Mezei, G., Syriani, E., Vangheluwe, H., Wimmer, M., 2010. Explicit transformation modeling. In: Ghosh, S. (Ed.), Models in Software Engineering. Vol. 6002 of Lecture Notes in Computer Science. Springer Berlin / Heidelberg, pp. 240-255

Explicitly Modelling the Transformation Language

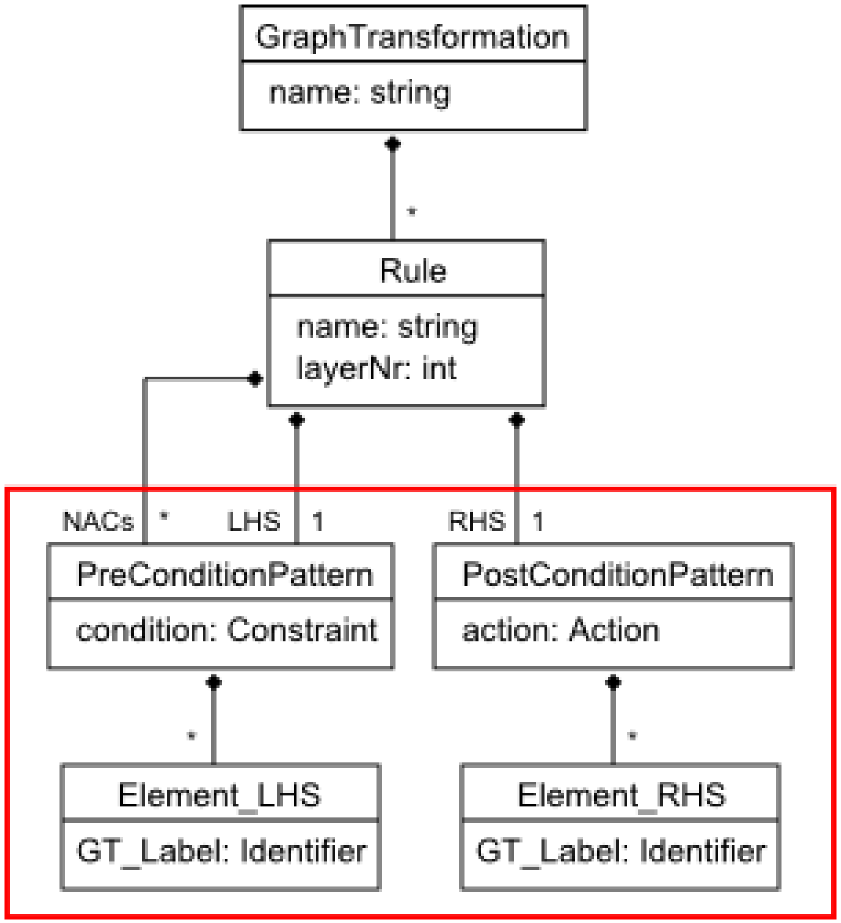


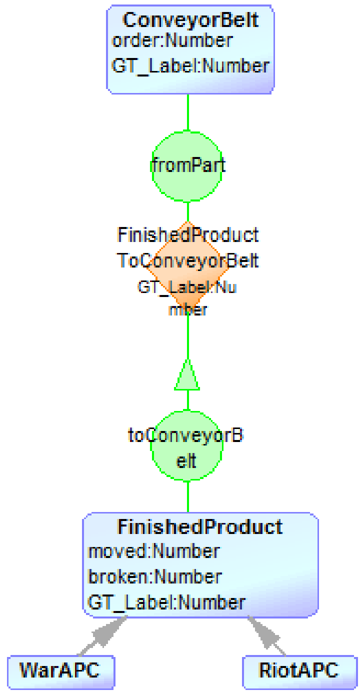


Relax

Kühne, T., Mezei, G., Syriani, E., Vangheluwe, H., Wimmer, M., 2010. Explicit transformation modeling. In: Ghosh, S. (Ed.), Models in Software Engineering. Vol. 6002 of Lecture Notes in Computer Science. Springer Berlin / Heidelberg, pp. 240-255

Explicitly Modelling the Transformation Language

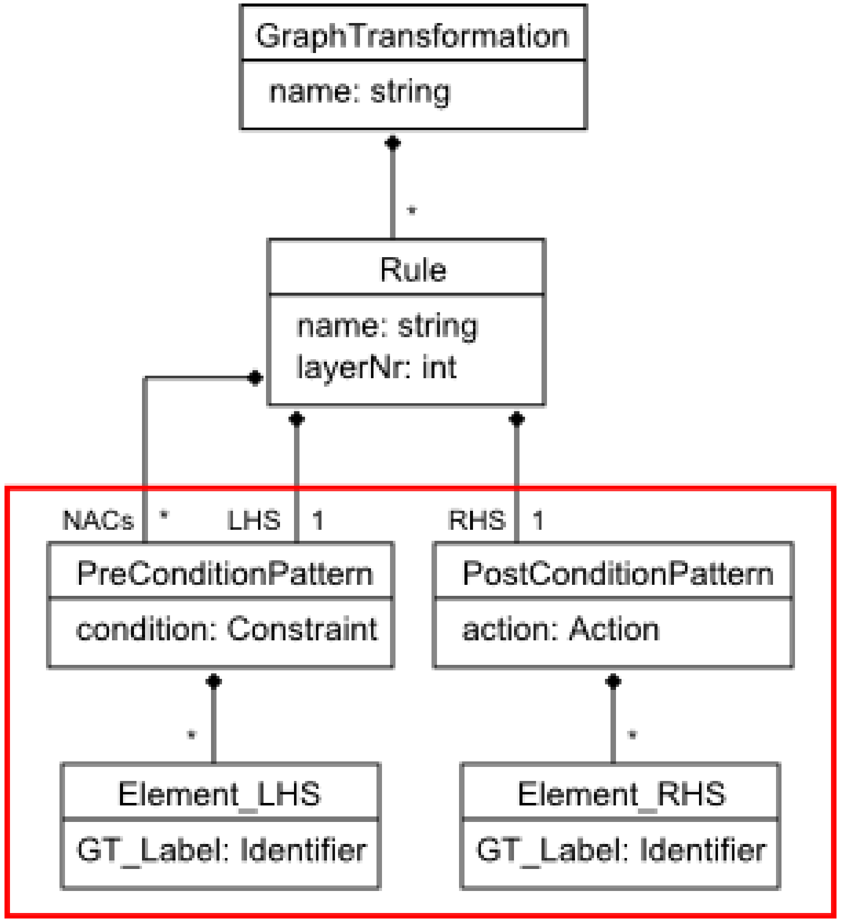


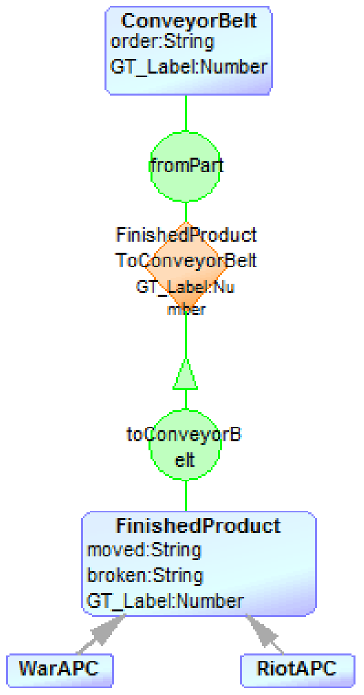


Augment

Kühne, T., Mezei, G., Syriani, E., Vangheluwe, H., Wimmer, M., 2010. Explicit transformation modeling. In: Ghosh, S. (Ed.), Models in Software Engineering. Vol. 6002 of Lecture Notes in Computer Science. Springer Berlin / Heidelberg, pp. 240-255

Explicitly Modelling the Transformation Language

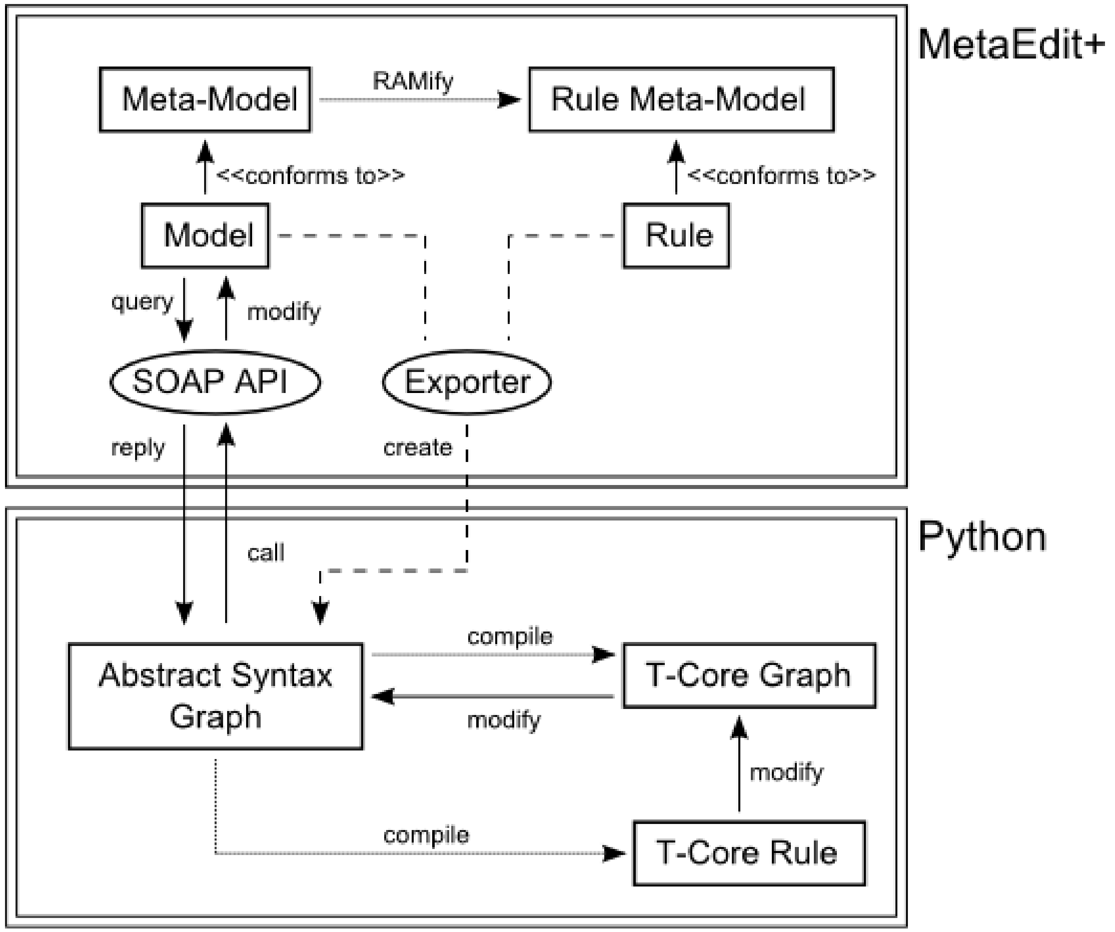




Modify

Kühne, T., Mezei, G., Syriani, E., Vangheluwe, H., Wimmer, M., 2010. Explicit transformation modeling. In: Ghosh, S. (Ed.), Models in Software Engineering. Vol. 6002 of Lecture Notes in Computer Science. Springer Berlin / Heidelberg, pp. 240-255

Architecture



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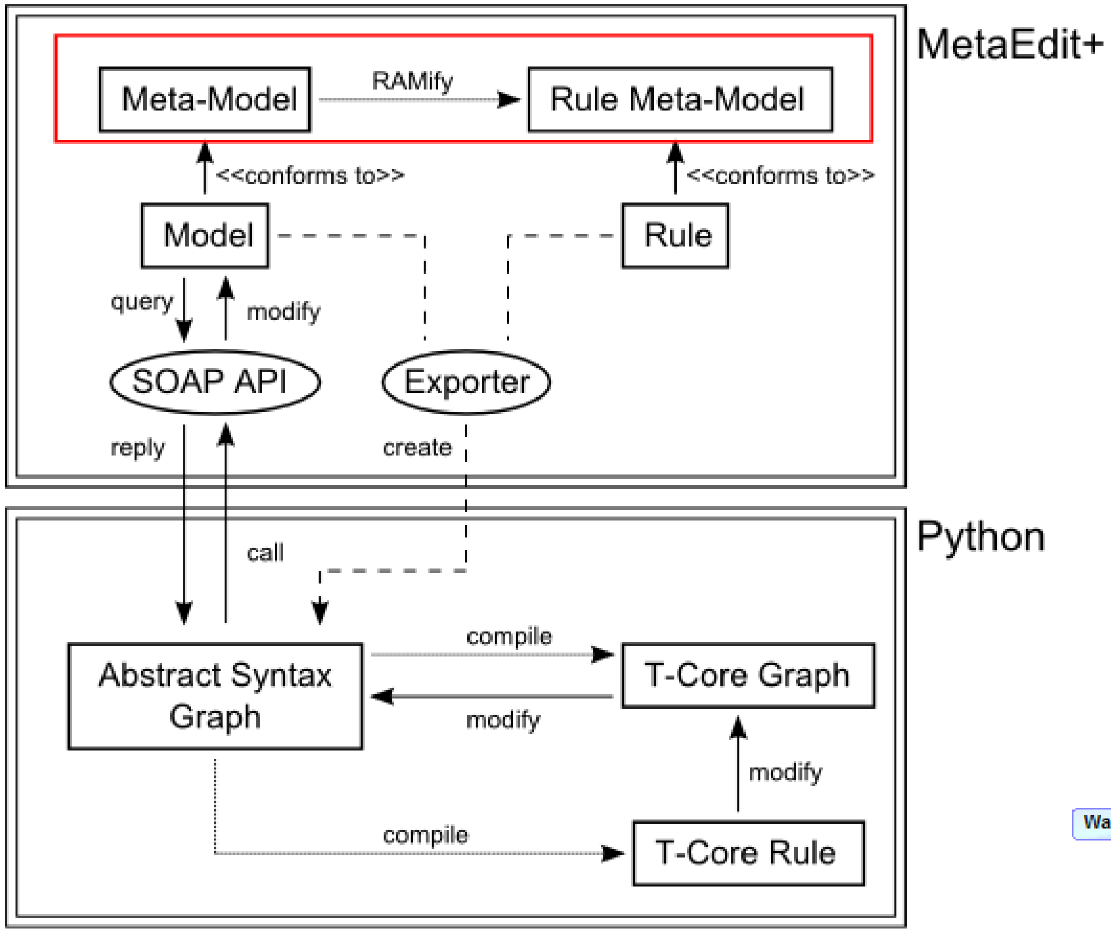
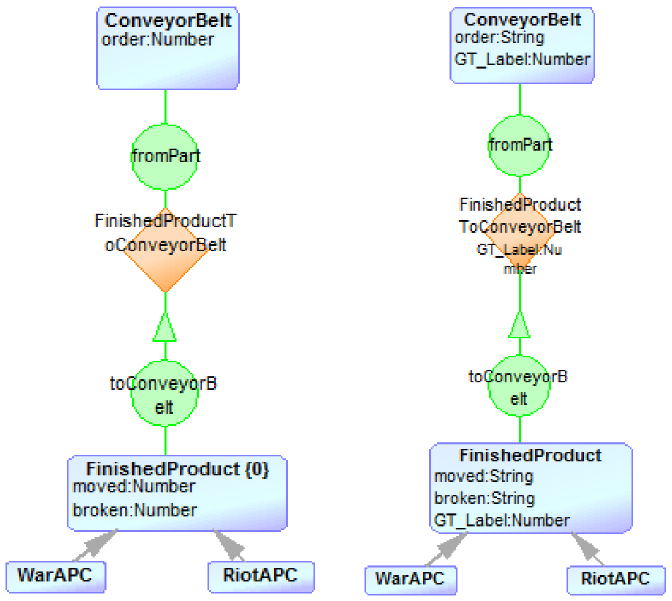
Architecture: Visual Rule Editor





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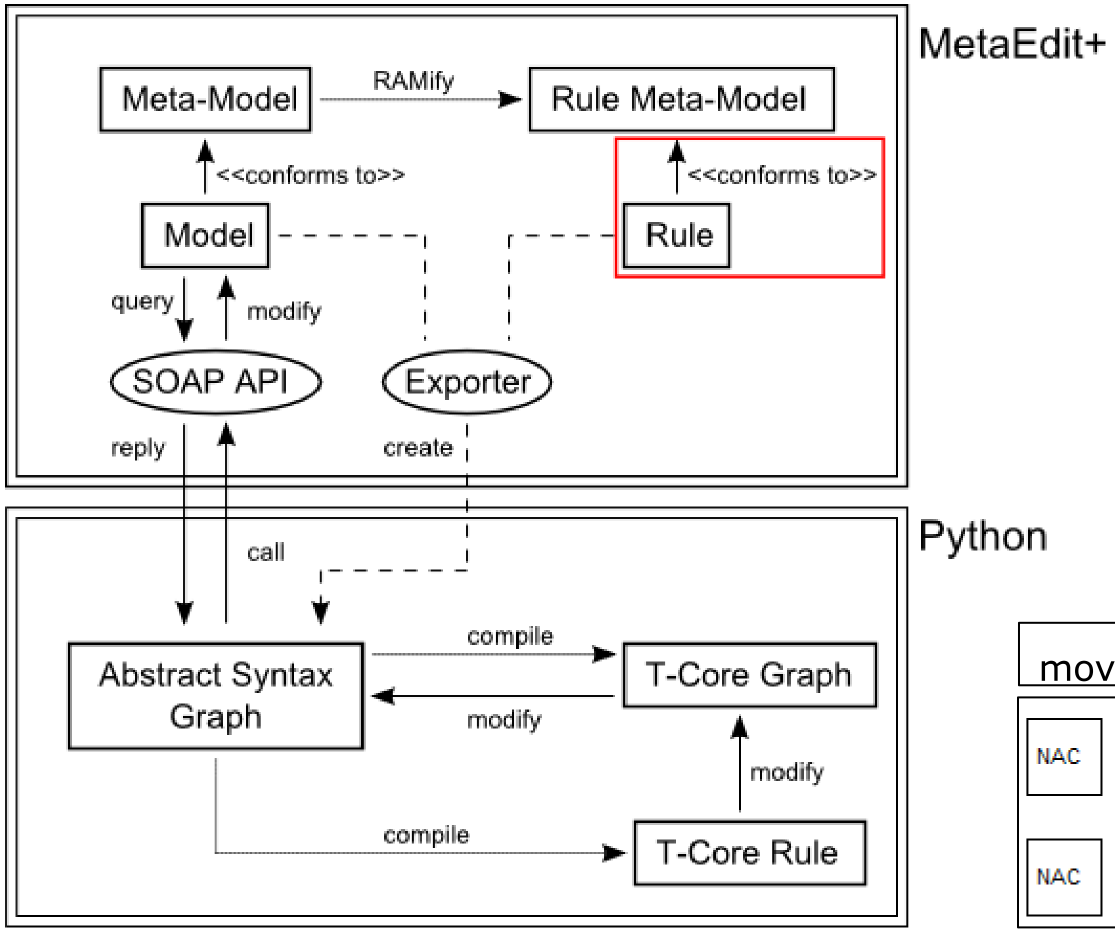
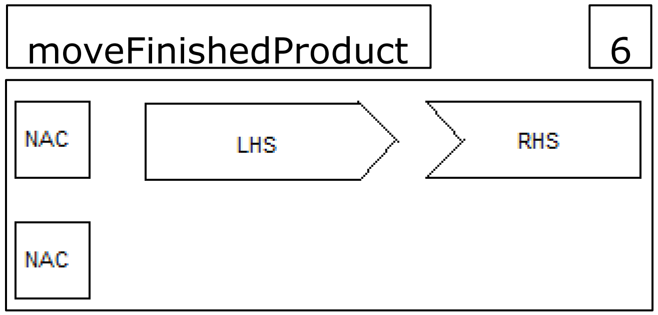
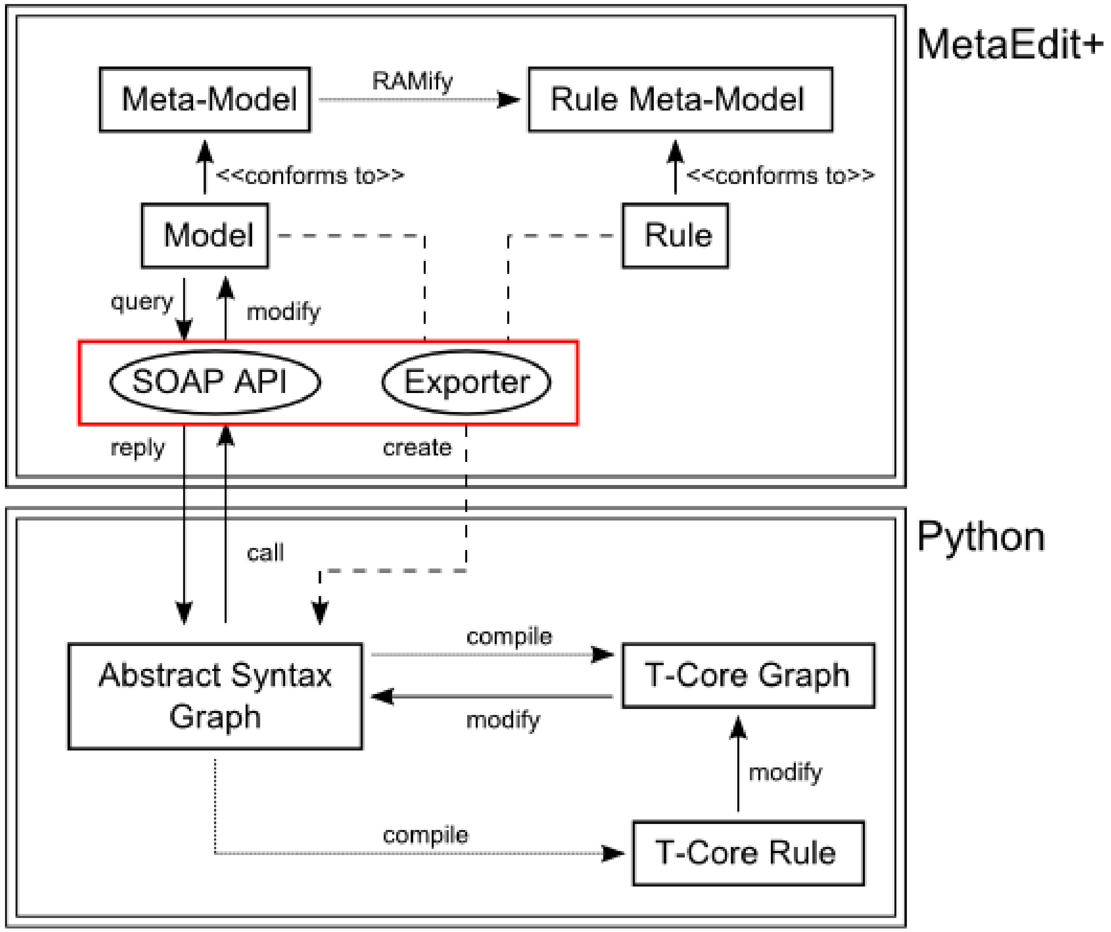




Architecture: MetaEdit+ Components



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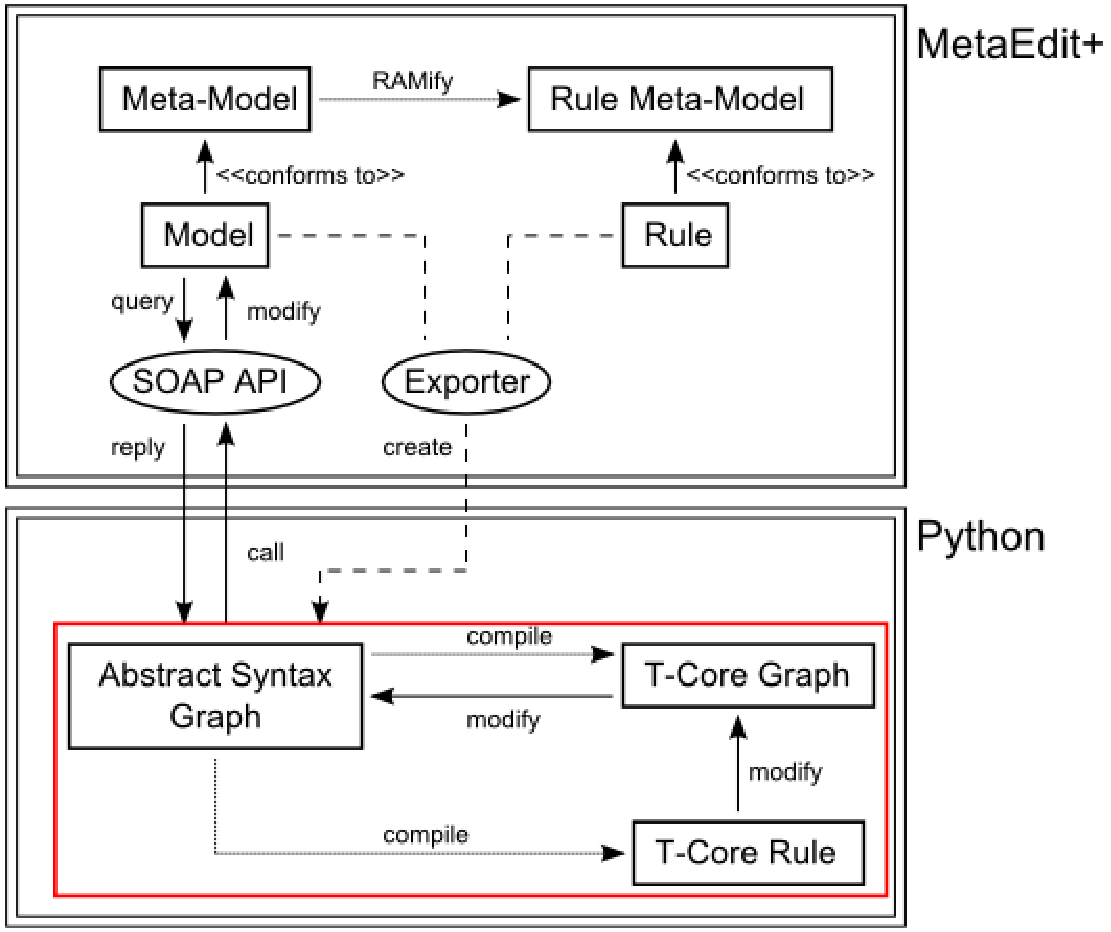
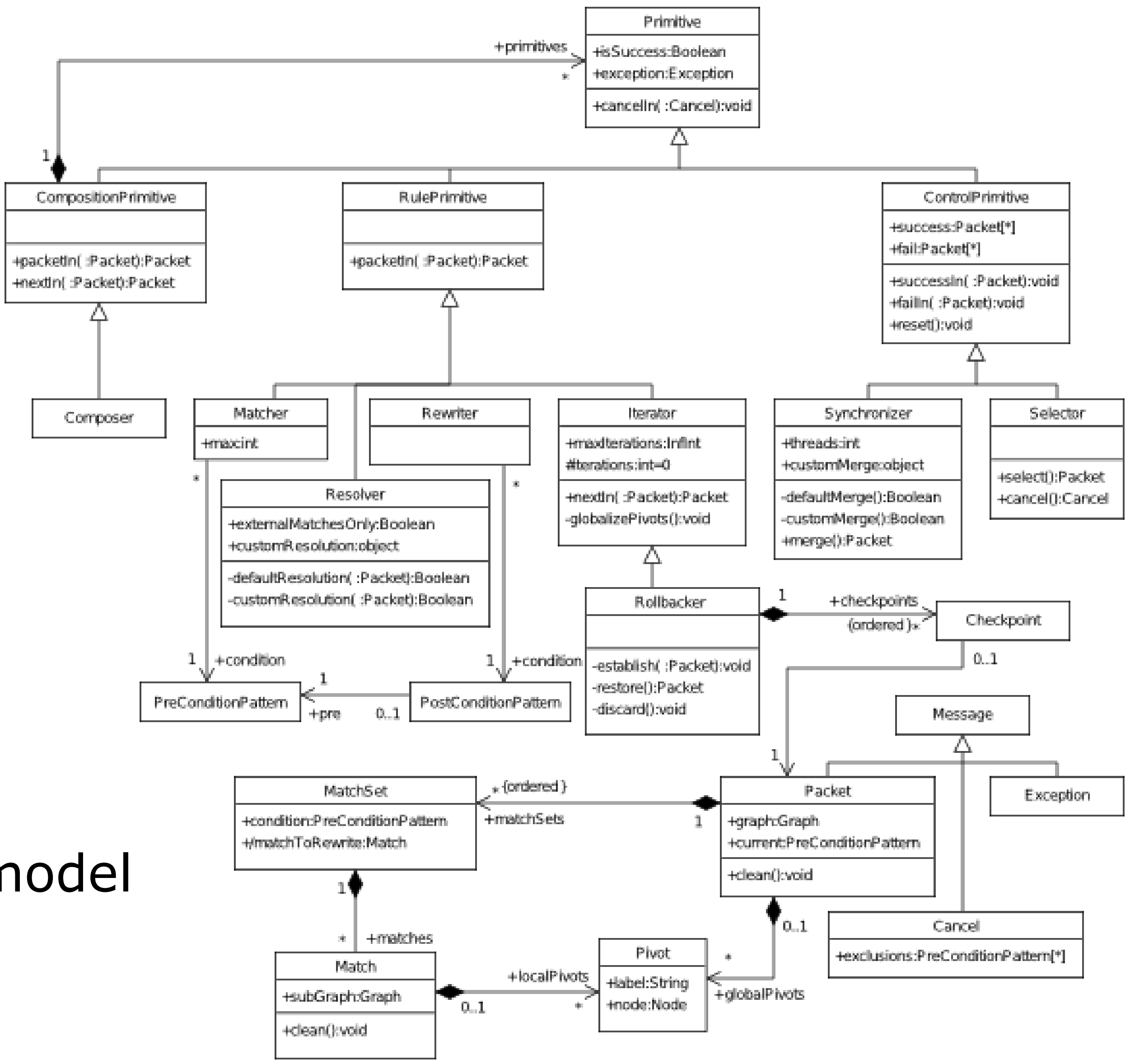
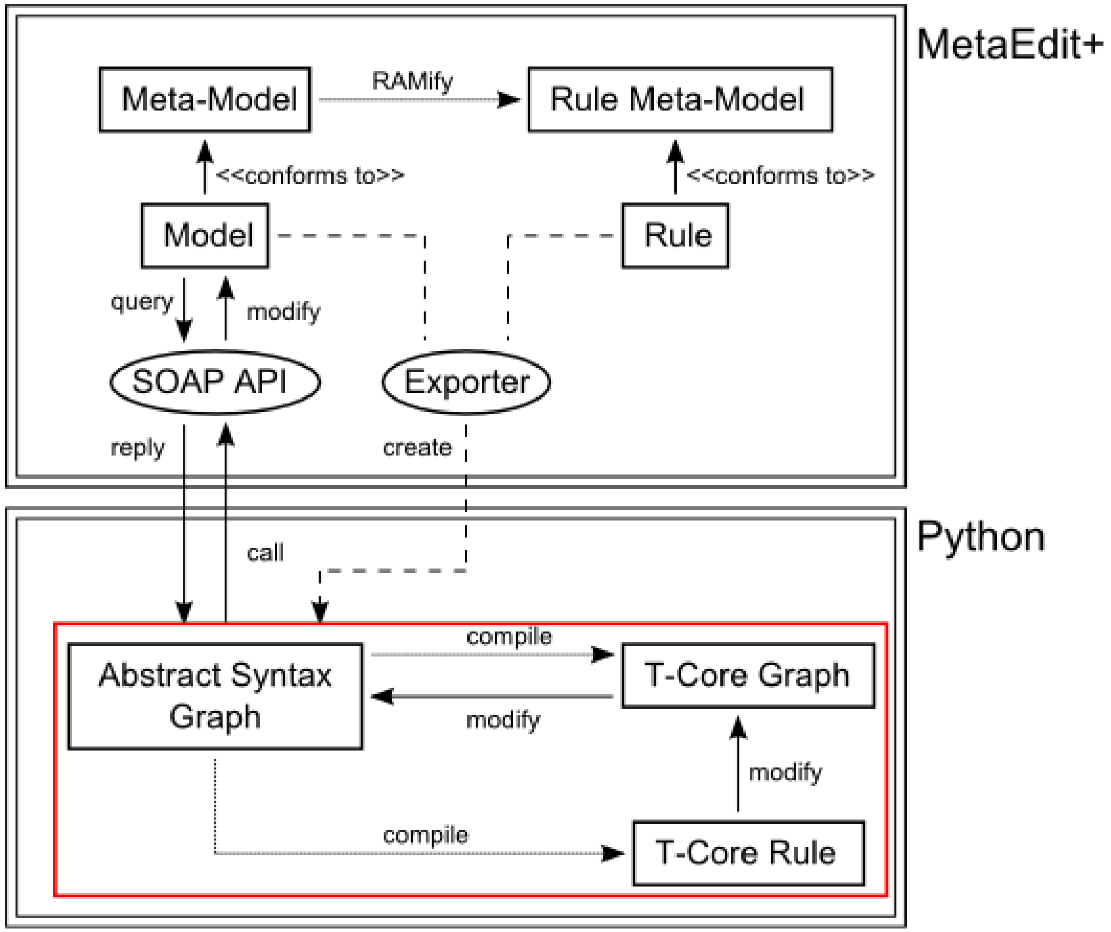
Architecture: Python Backend





T-Core Metamodel

Architecture: Python Backend



Demo

Conclusions

Demonstrated that transformation languages can be modelled explictly

- their concrete and abstract syntax
- their execution semantics (building on a transformation kernel)

… independent of implementation technology

- AToM³ and AToMPM
- **MetaEdit+**

Future Work

- Explicit modelling of CS in transformation rules
- RAMification process for CS – Mapping – AS
- Automatic RAMification
  - Already implemented in AToM³ and AToMPM
  - Now also possible in MetaEdit+
- Other Environments
  - Eclipse/GMF
  - GrGen.NET

Questions?

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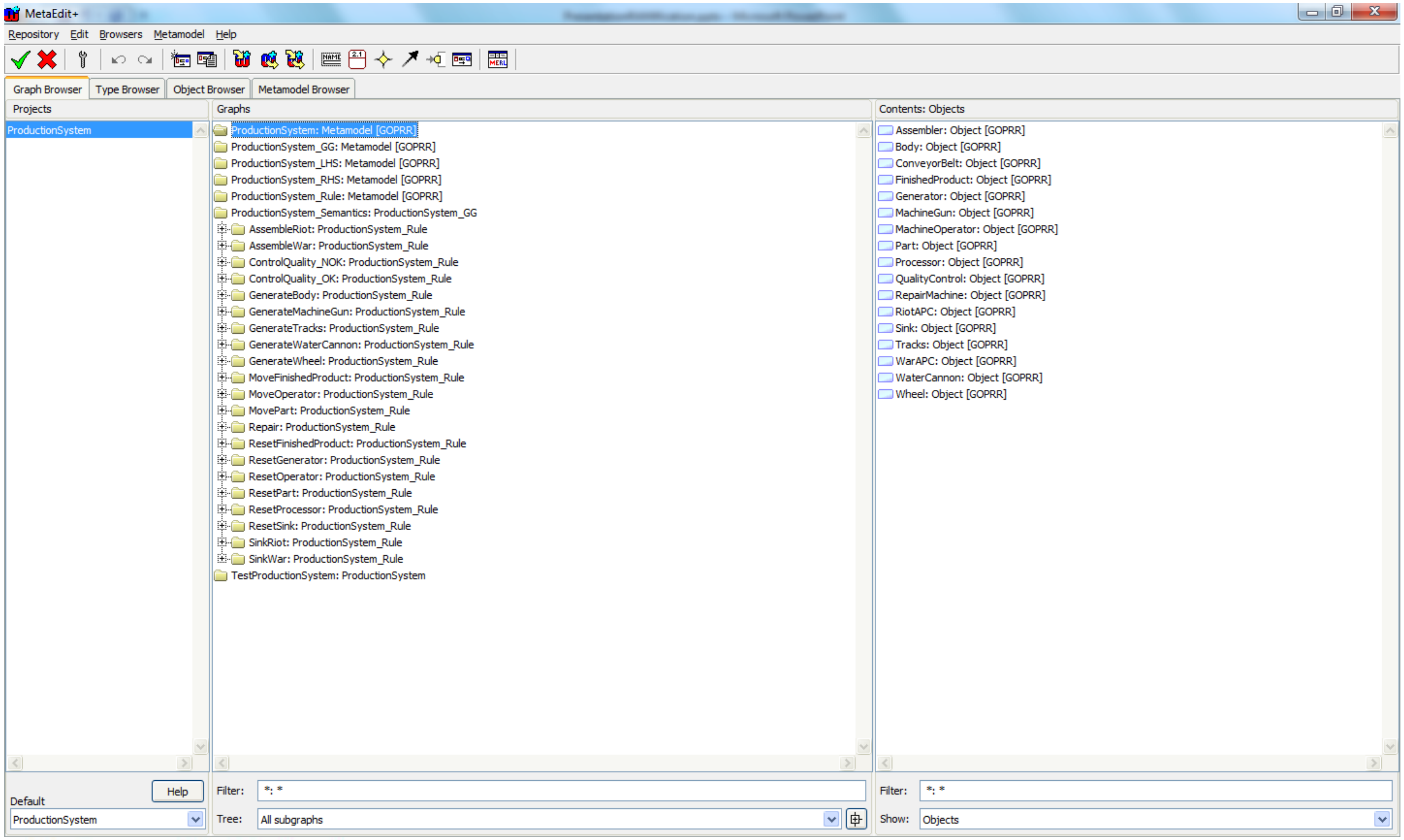
Appendix: Screengrabs


MetaEdit+
Repository Edit Browsers Metamodel Help
Graph Browser Type Browser Object Browser Metamodel Browser

Projects

- ProductionSystem

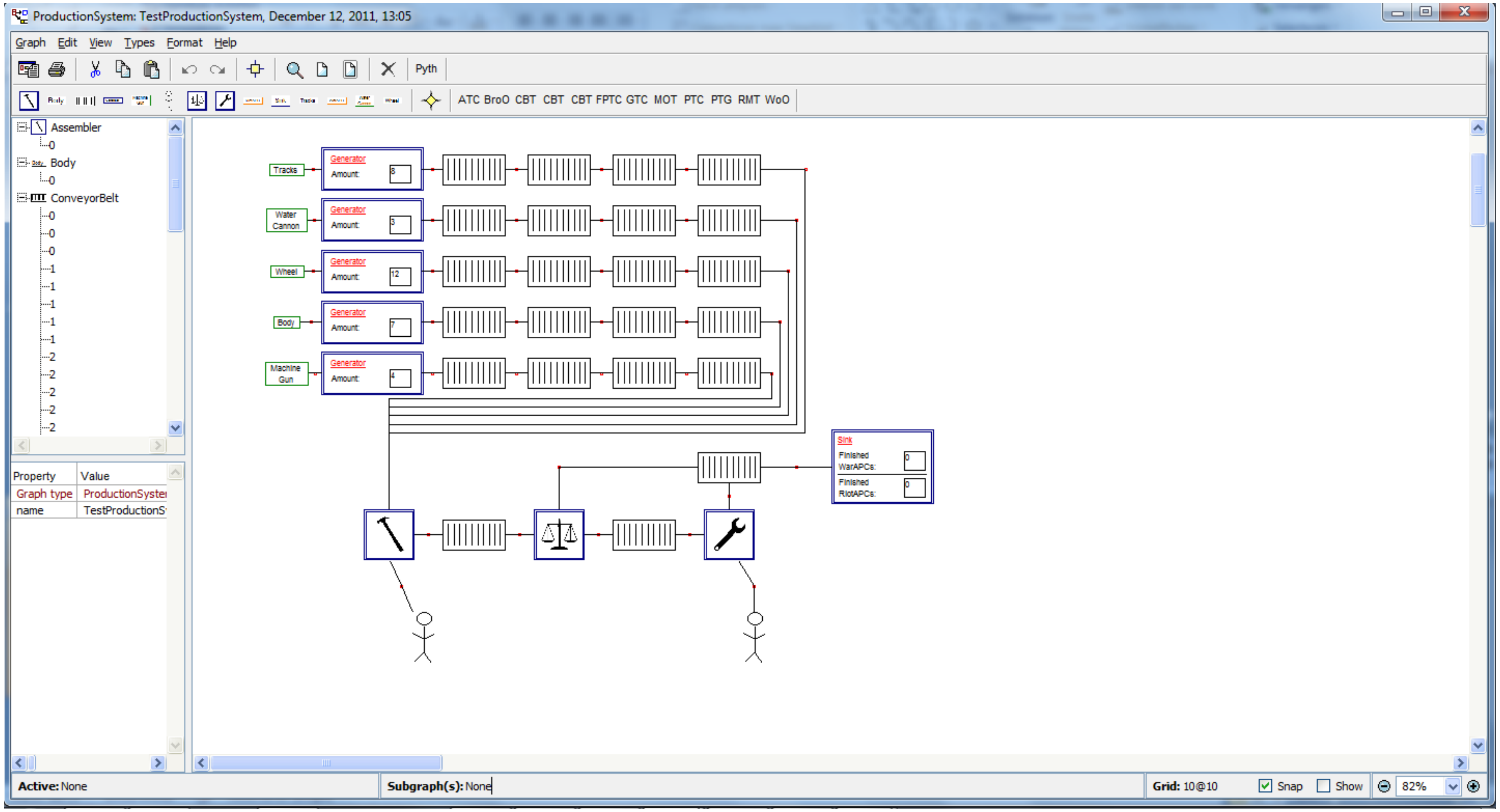
Graphs

- ProductionSystem: Metamodel [GOPRR]
- ProductionSystem_GG: Metamodel [GOPRR]
- ProductionSystem_LHS: Metamodel [GOPRR]
- ProductionSystem_RHS: Metamodel [GOPRR]
- ProductionSystem_Rule: Metamodel [GOPRR]
- ProductionSystem_Semantics: ProductionSystem_GG
  - AssembleRiot: ProductionSystem_Rule
  - AssembleWar: ProductionSystem_Rule
  - ControlQuality_NOK: ProductionSystem_Rule
  - ControlQuality_OK: ProductionSystem_Rule
  - GenerateBody: ProductionSystem_Rule
  - GenerateMachineGun: ProductionSystem_Rule
  - GenerateTracks: ProductionSystem_Rule
  - GenerateWaterCannon: ProductionSystem_Rule
  - GenerateWheel: ProductionSystem_Rule
  - MoveFinishedProduct: ProductionSystem_Rule
  - MoveOperator: ProductionSystem_Rule
  - MovePart: ProductionSystem_Rule
  - Repair: ProductionSystem_Rule
  - ResetFinishedProduct: ProductionSystem_Rule
  - ResetGenerator: ProductionSystem_Rule
  - ResetOperator: ProductionSystem_Rule
  - ResetPart: ProductionSystem_Rule
  - ResetProcessor: ProductionSystem_Rule
  - ResetSink: ProductionSystem_Rule
  - SinkRiot: ProductionSystem_Rule
  - SinkWar: ProductionSystem_Rule
- TestProductionSystem: ProductionSystem

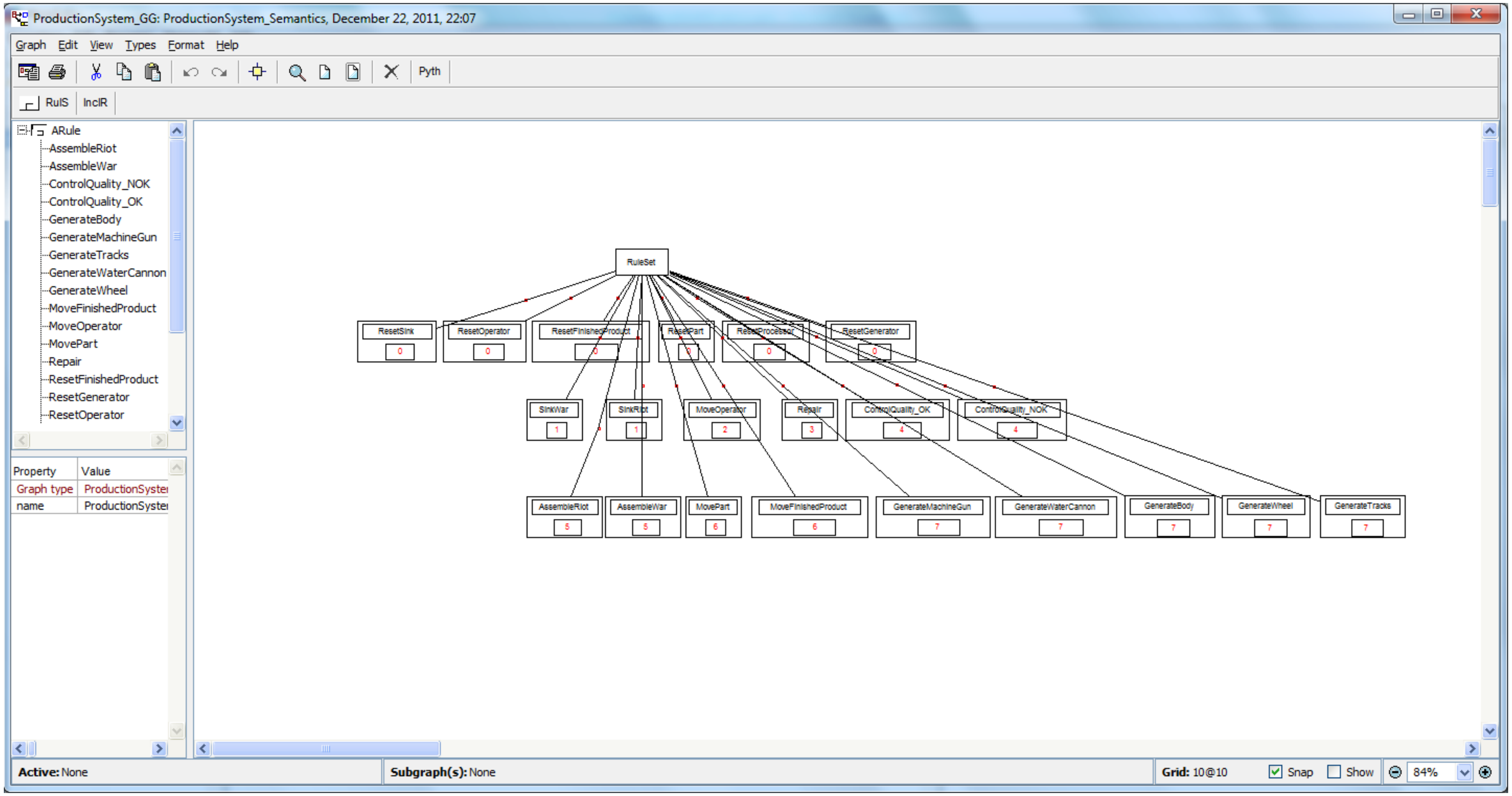
Contents: Objects

- Assembler: Object [GOPRR]
- Body: Object [GOPRR]
- ConveyorBelt: Object [GOPRR]
- FinishedProduct: Object [GOPRR]
- Generator: Object [GOPRR]
- MachineGun: Object [GOPRR]
- MachineOperator: Object [GOPRR]
- Part: Object [GOPRR]
- Processor: Object [GOPRR]
- QualityControl: Object [GOPRR]
- RepairMachine: Object [GOPRR]
- RiotAPC: Object [GOPRR]
- Sink: Object [GOPRR]
- Tracks: Object [GOPRR]
- WarAPC: Object [GOPRR]
- WaterCannon: Object [GOPRR]
- Wheel: Object [GOPRR]

Default: ProductionSystem
Help
Filter: *: *
Tree: All subgraphs
Filter: *: *
Show: Objects



Property	Value
Graph type	ProductionSyste
name	TestProductionS

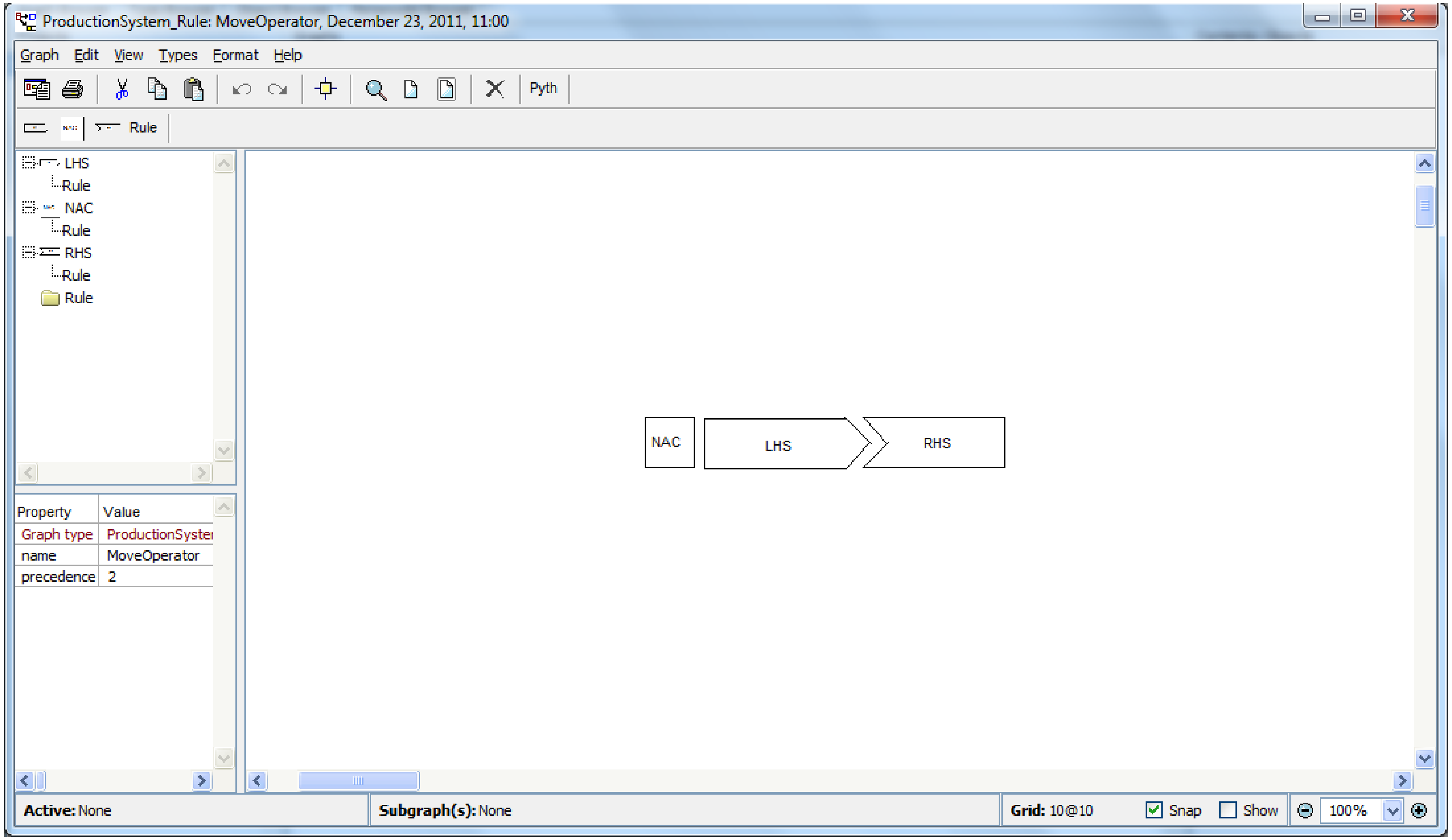


ProductionSystem_GG: ProductionSystem_Semantics, December 22, 2011, 22:07

ARule
- AssembleRiot
- AssembleWar
- ControlQuality_NOK
- ControlQuality_OK
- GenerateBody
- GenerateMachineGun
- GenerateTracks
- GenerateWaterCannon
- GenerateWheel
- MoveFinishedProduct
- MoveOperator
- MovePart
- Repair
- ResetFinishedProduct
- ResetGenerator
- ResetOperator

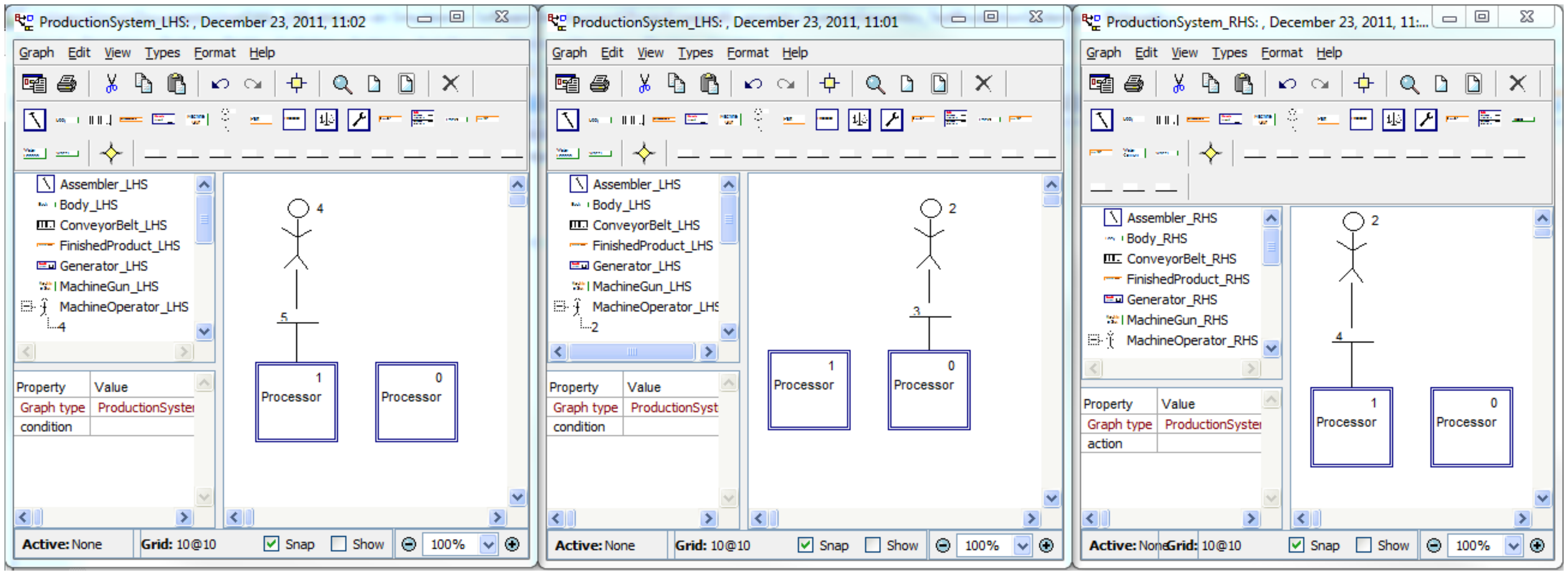
Property	Value
Graph type	ProductionSyste
name	ProductionSyste

Active: None **Subgraph(s):** None **Grid:** 10@10 [✓ Snap] Show 84%


ProductionSystem_Rule: MoveOperator, December 23, 2011, 11:00
Graph Edit View Types Format Help
Pyth
Rule
LHS
Rule
NAC
Rule
RHS
Rule
Rule
NAC
LHS
RHS
Grid: 10@10
Snap
Show
100%

Property	Value
Graph type	ProductionSyster
name	MoveOperator
precedence	2

Active: None **Subgraph(s):** None



Property	Value
Graph type	ProductionSyste
condition	

Property	Value
Graph type	ProductionSyst
condition	

Property	Value
Graph type	ProductionSyste
action	