Leveraging Executable Language Engineering for Domain-Specific Transformation Languages (Position Paper)

EXE 2016, Saint-Malo, France

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Observations

- **Domain Specific Transformation Language (DSTL)** = model transformation language tailored for specific tasks (*eg.* strings renaming, code generation)

- DSTLs more and more common:
  - Two papers on DSTLs at *ICMT'16* in a dedicated "*Model Transformation Languages*" session
  - This year *TTC'16* use case: data-flow based DSTL
  - **Increasing need for methods to develop DSTLs**

- Progress in executable Domain-Specific Modeling language (xDSML) engineering:
  - Generic *syntactic* services (eg. editors using Xtext or Sirius)
  - Generic *runtime* services (eg. debugger using GEMOC studio)
  - **Easier and easier to obtain a tool-supported xDSML**

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Questions

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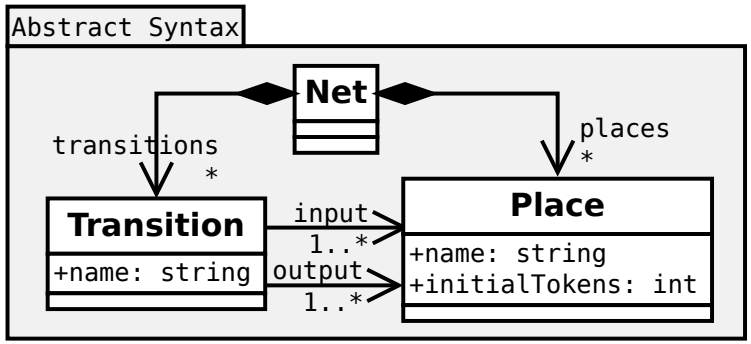
Example of Petri nets xDSML and model



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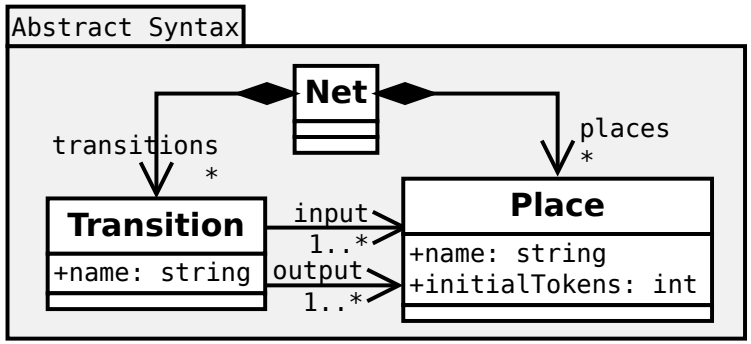

Petri net model

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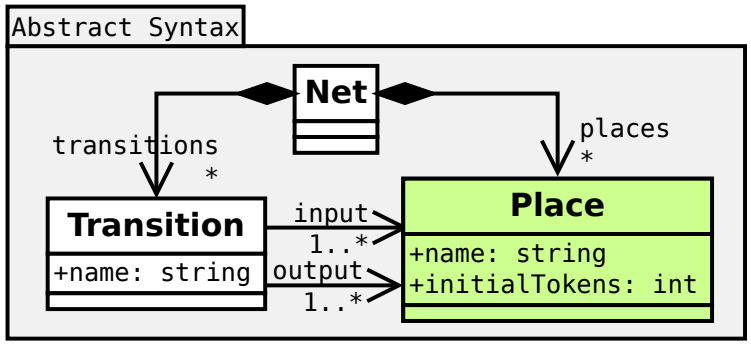

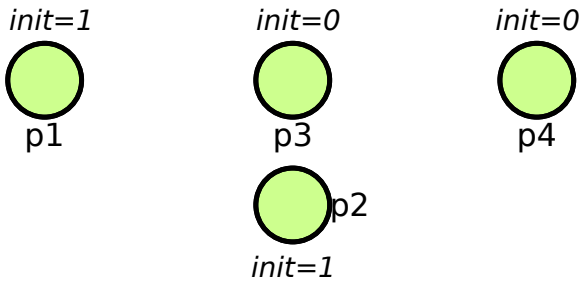

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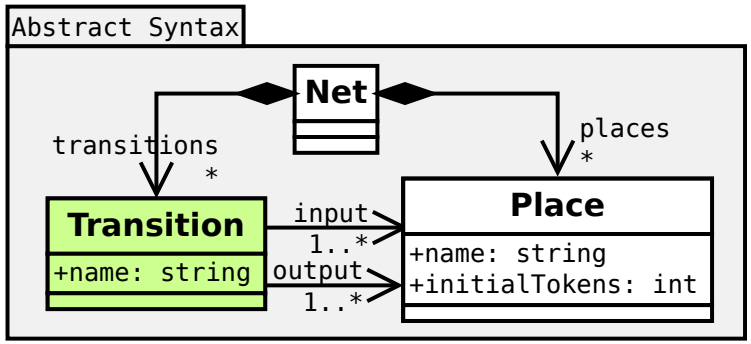

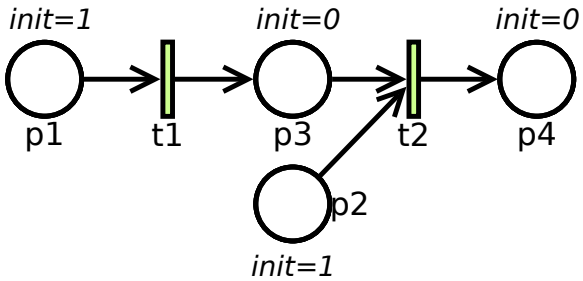

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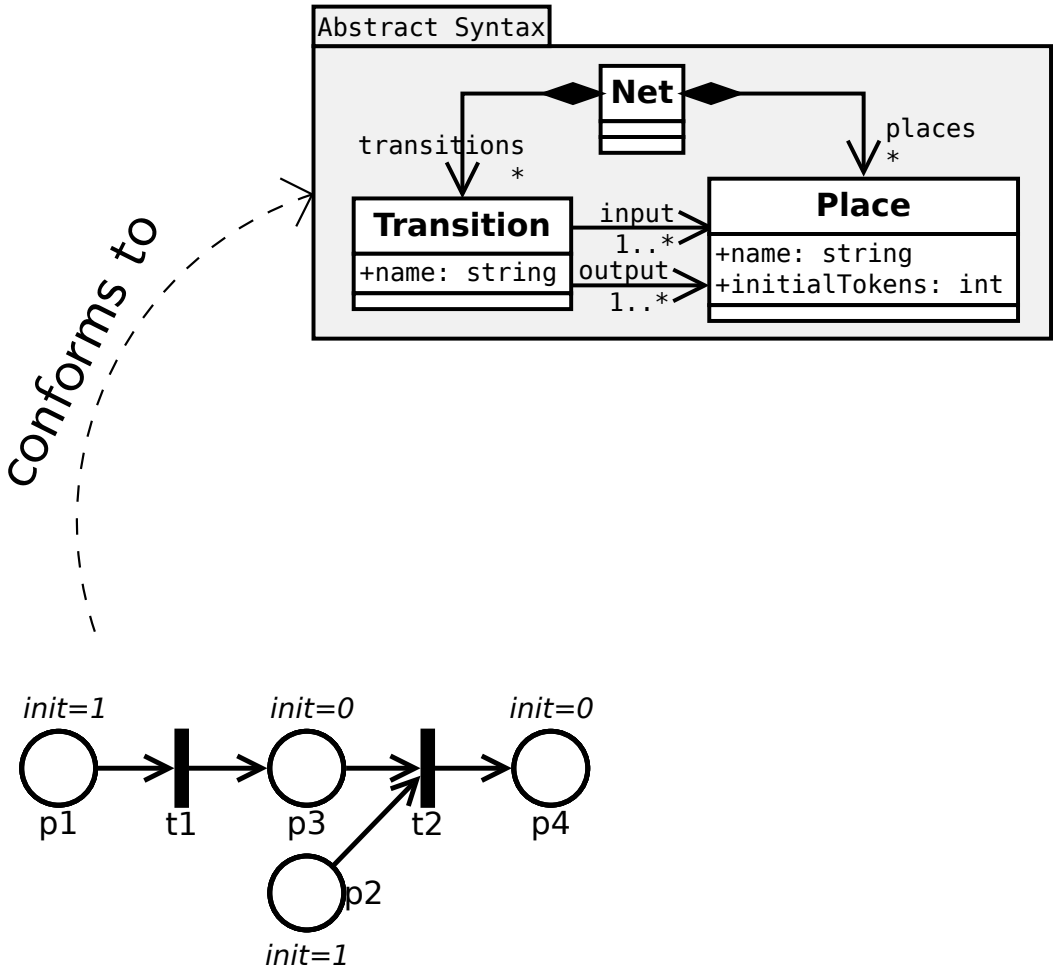

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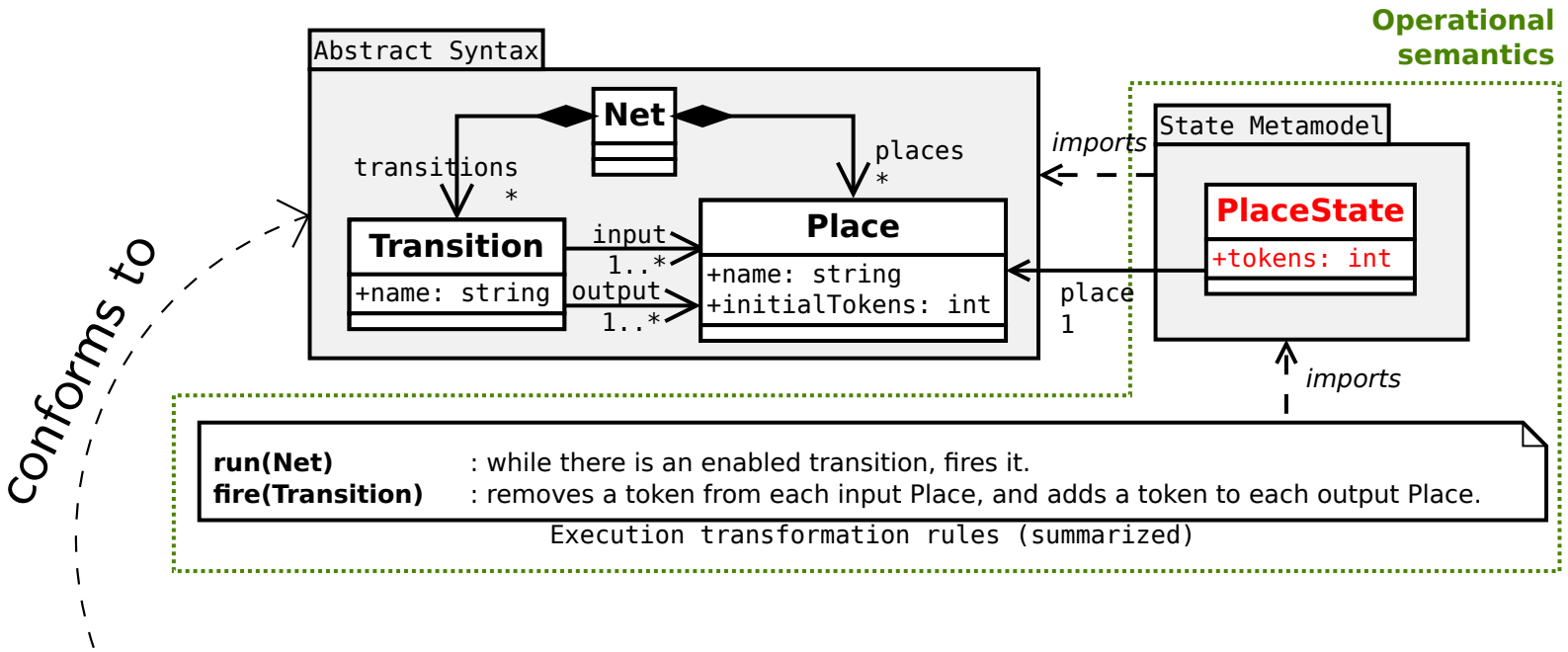

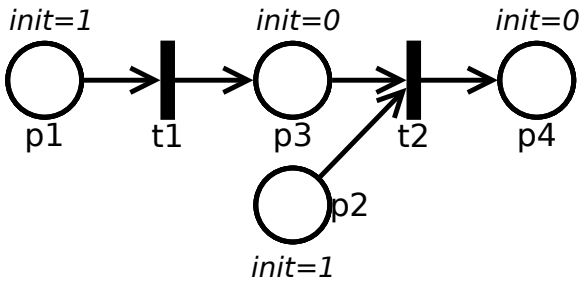

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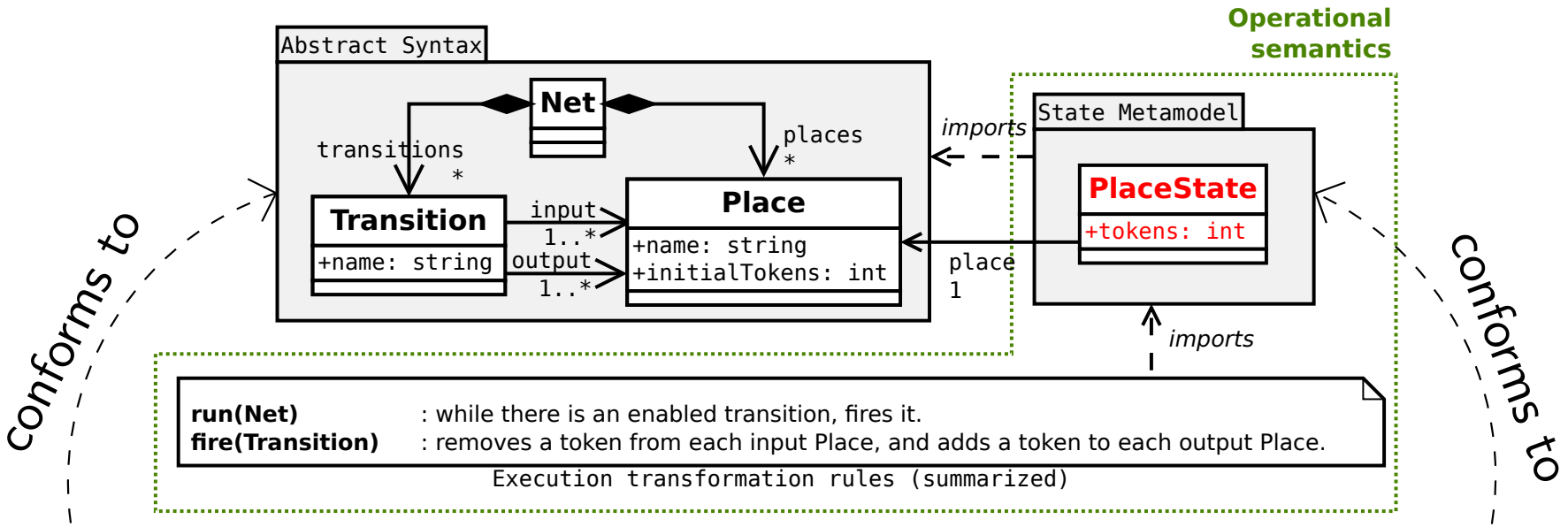
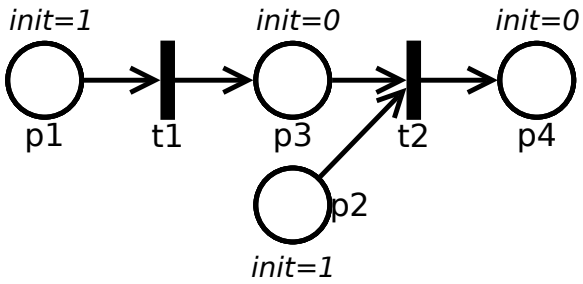
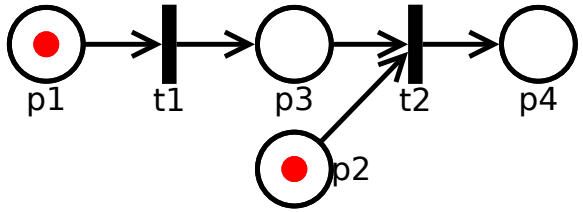




Petri net model

initialization



Executed model

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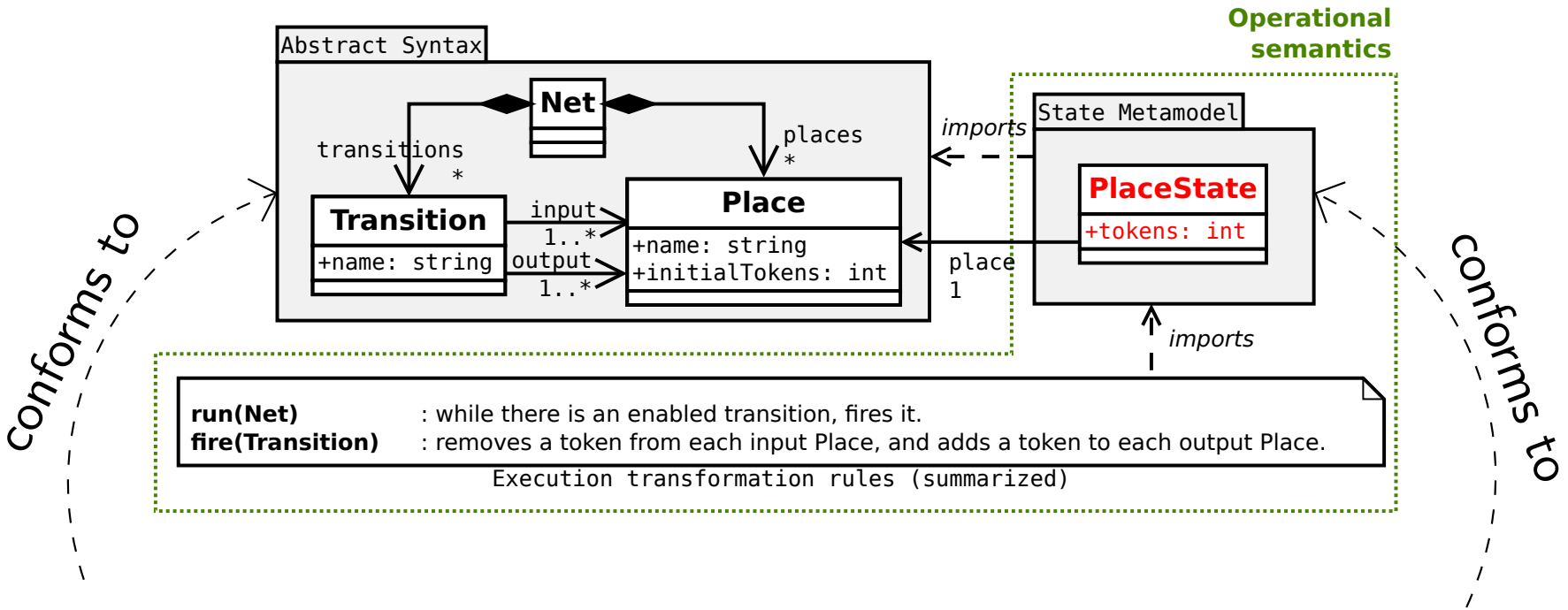

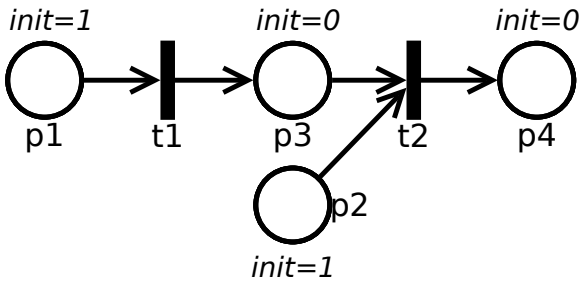

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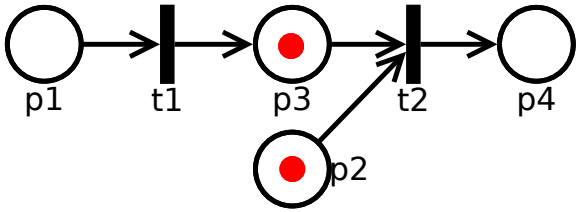

Executed model

(t1 fired)

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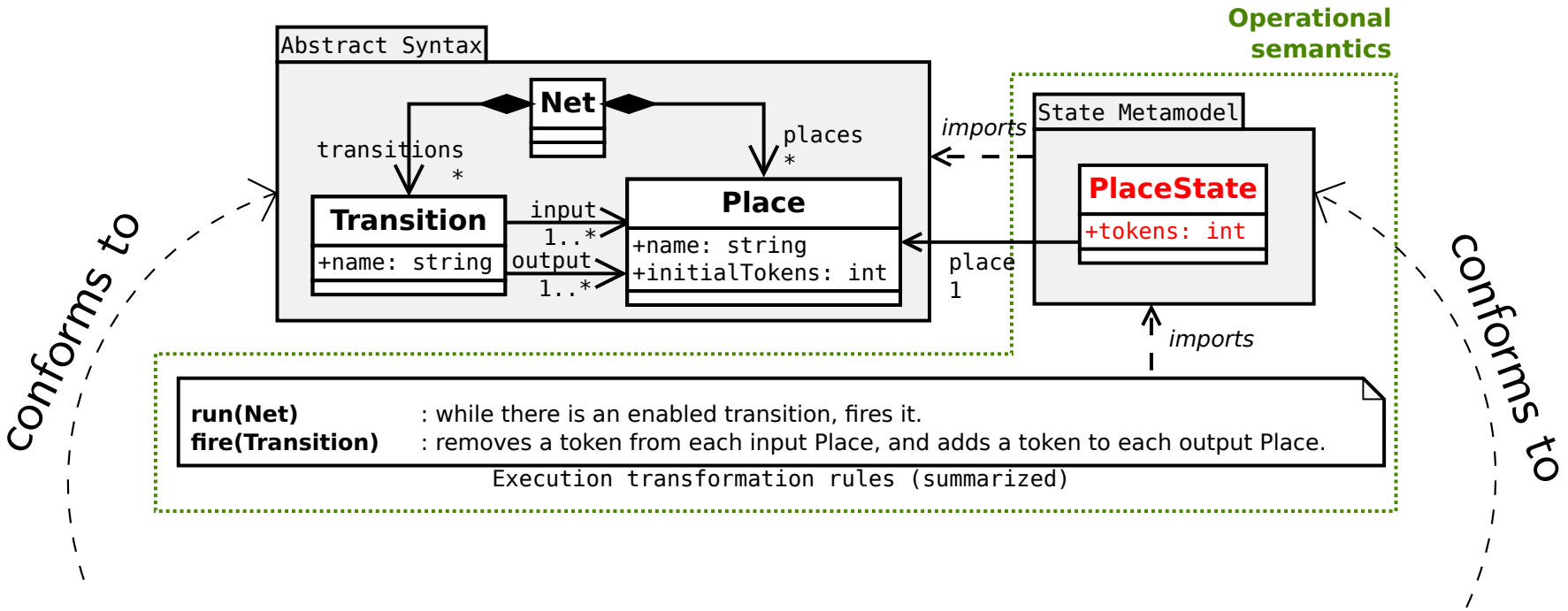

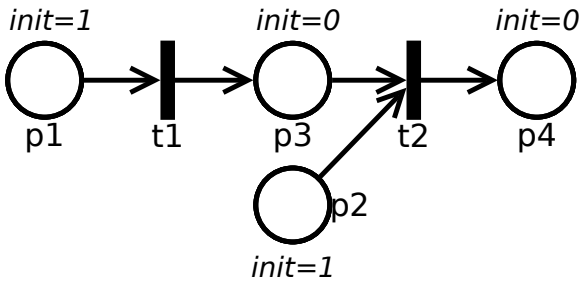

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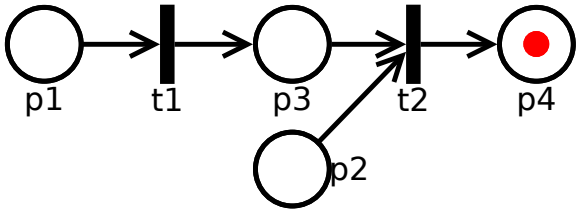
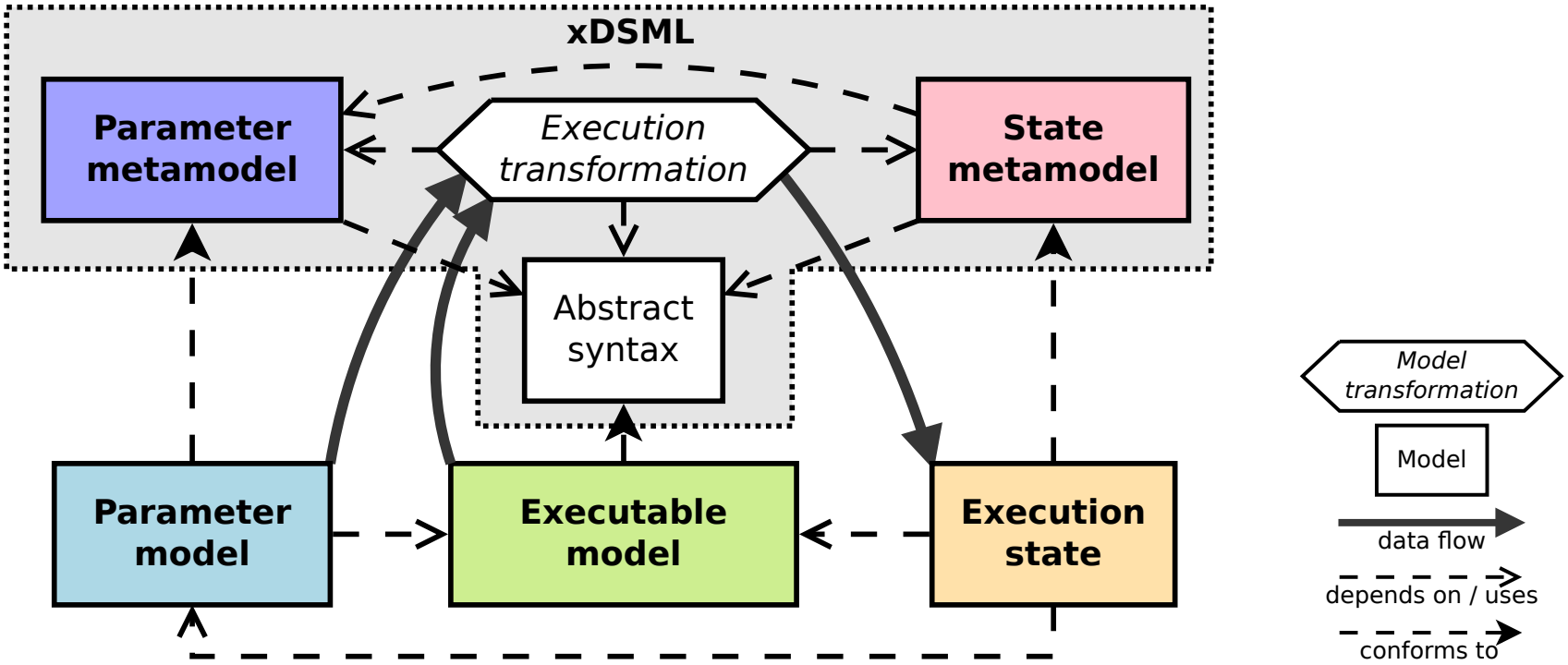


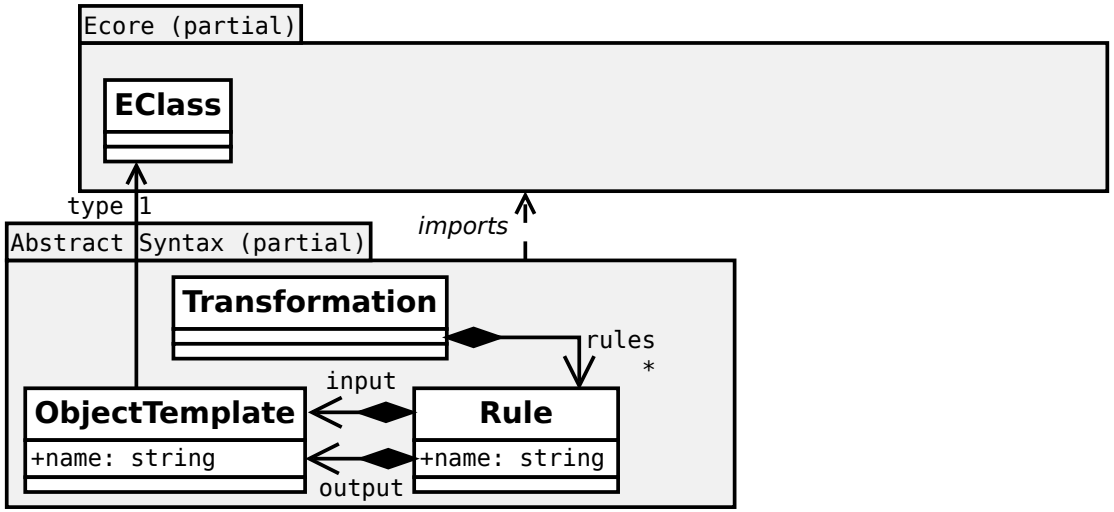
Executed model

(t1 fired) (t2 fired)

Generalizing xDSMLs



Example of MiniTL DSTL and model



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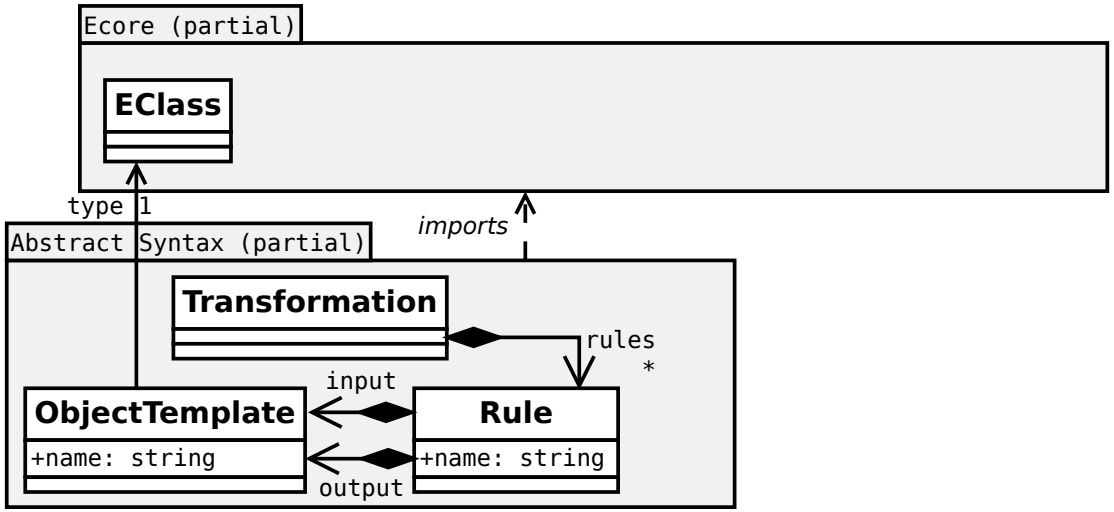

MiniTL model

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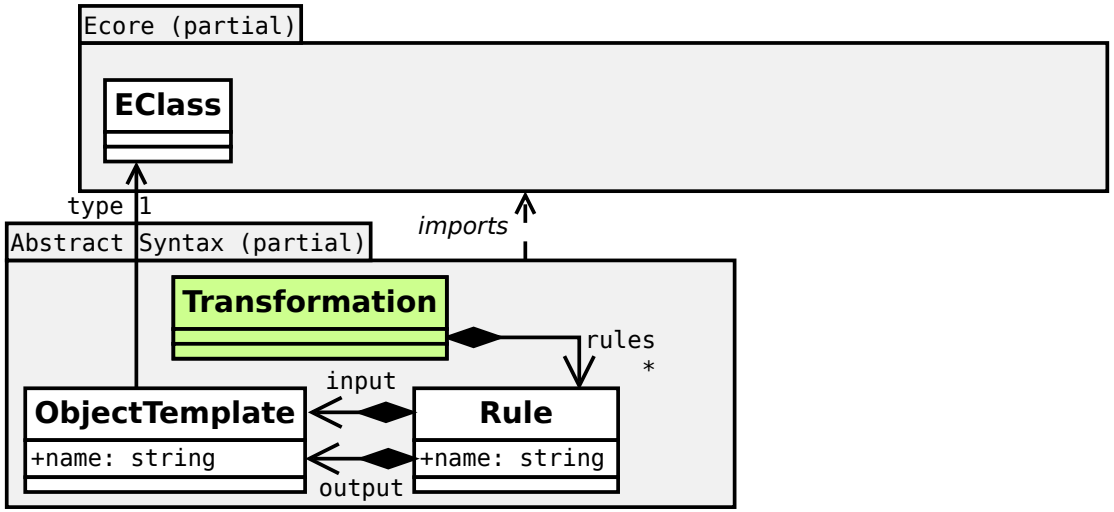


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MiniTL model

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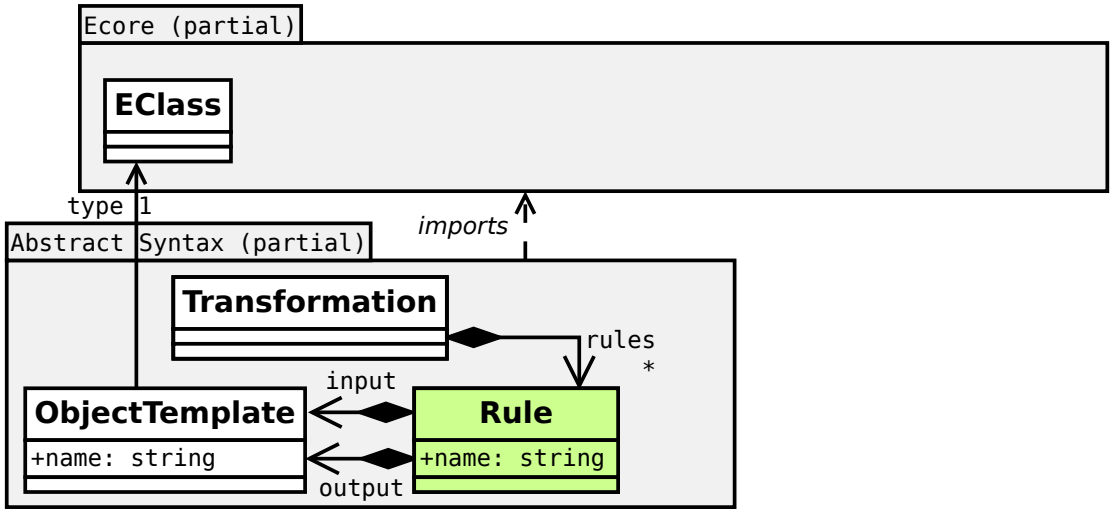


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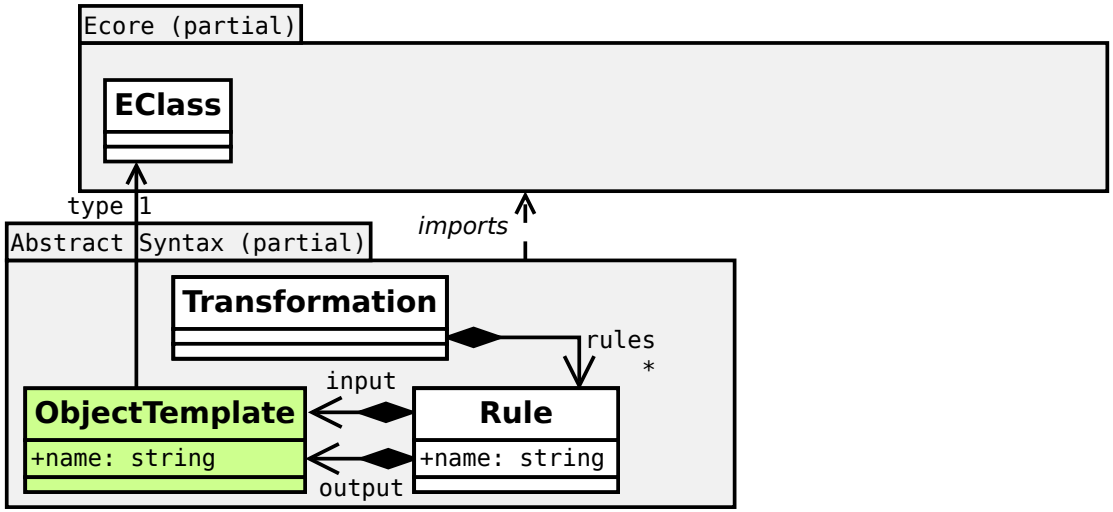


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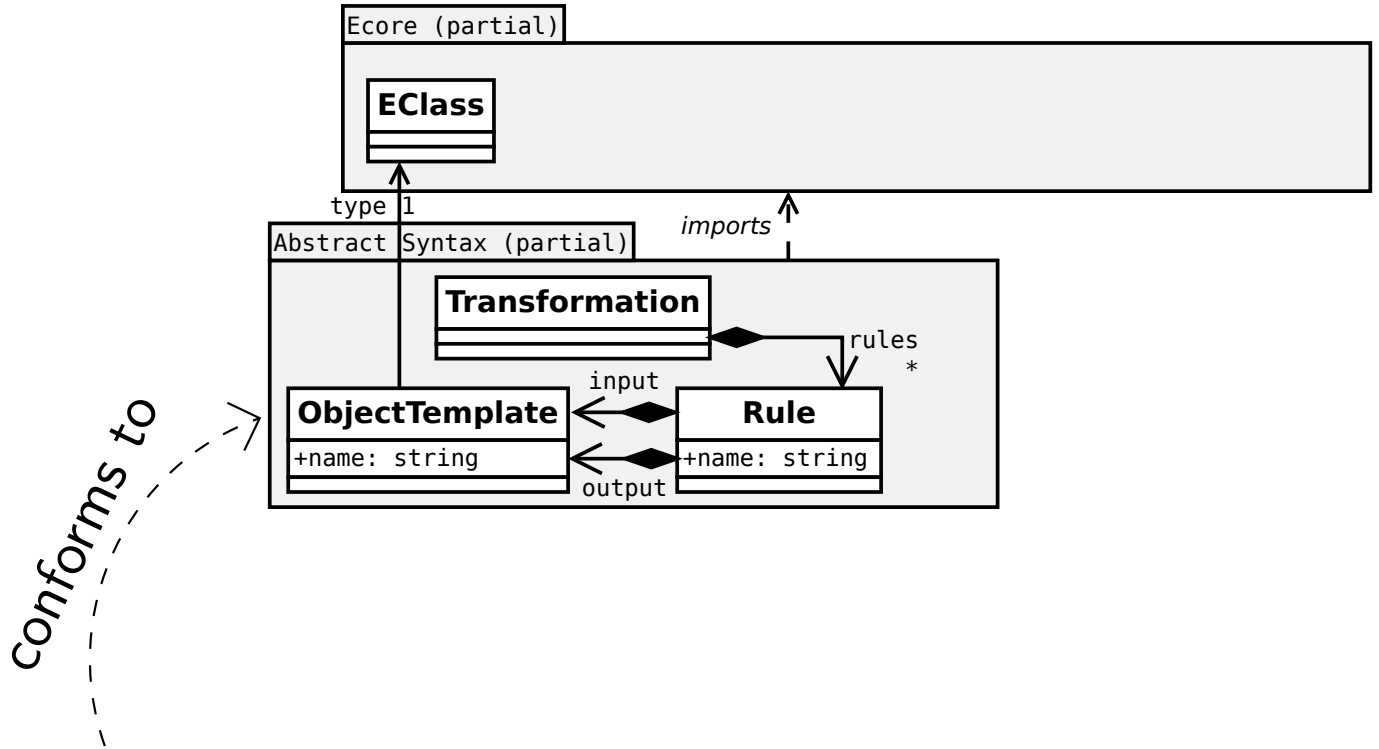


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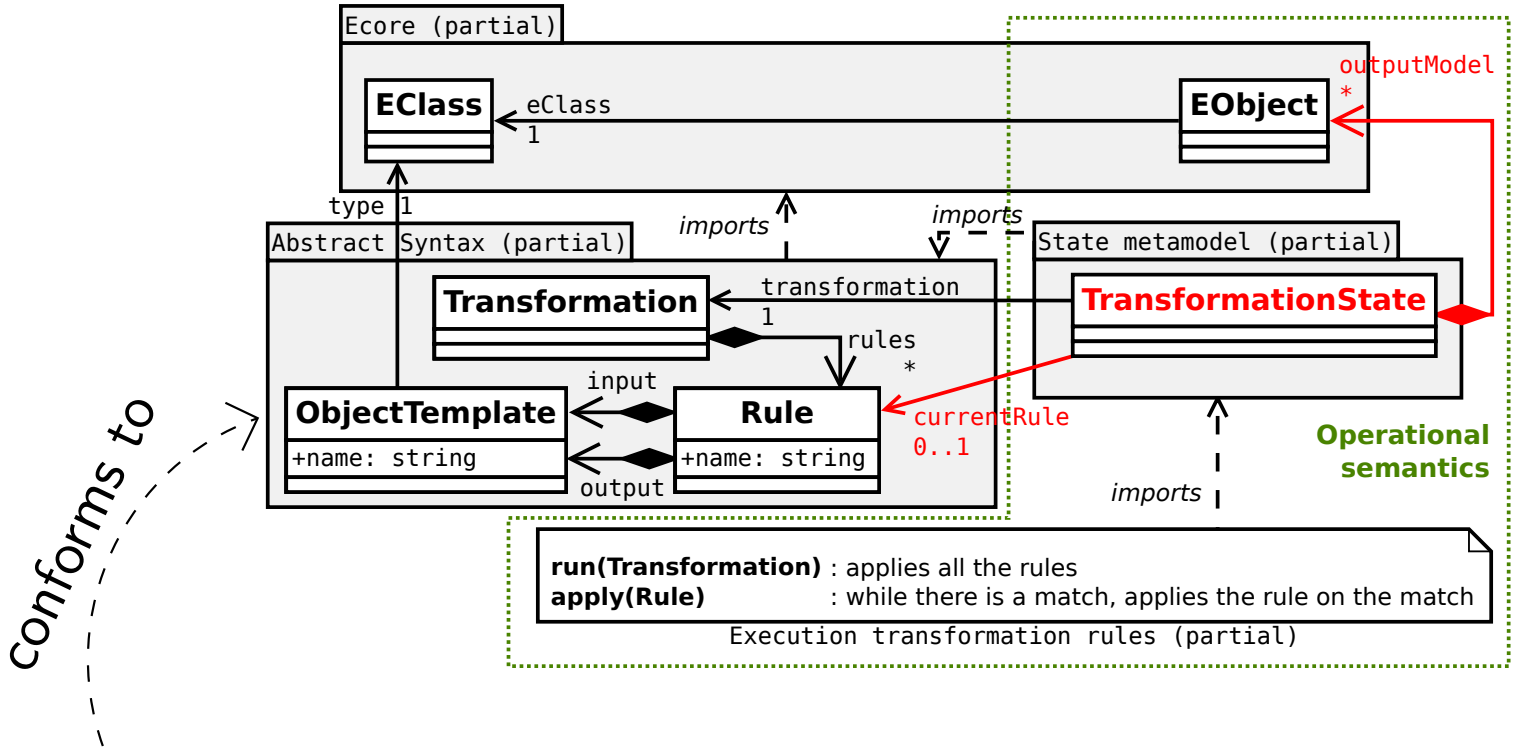


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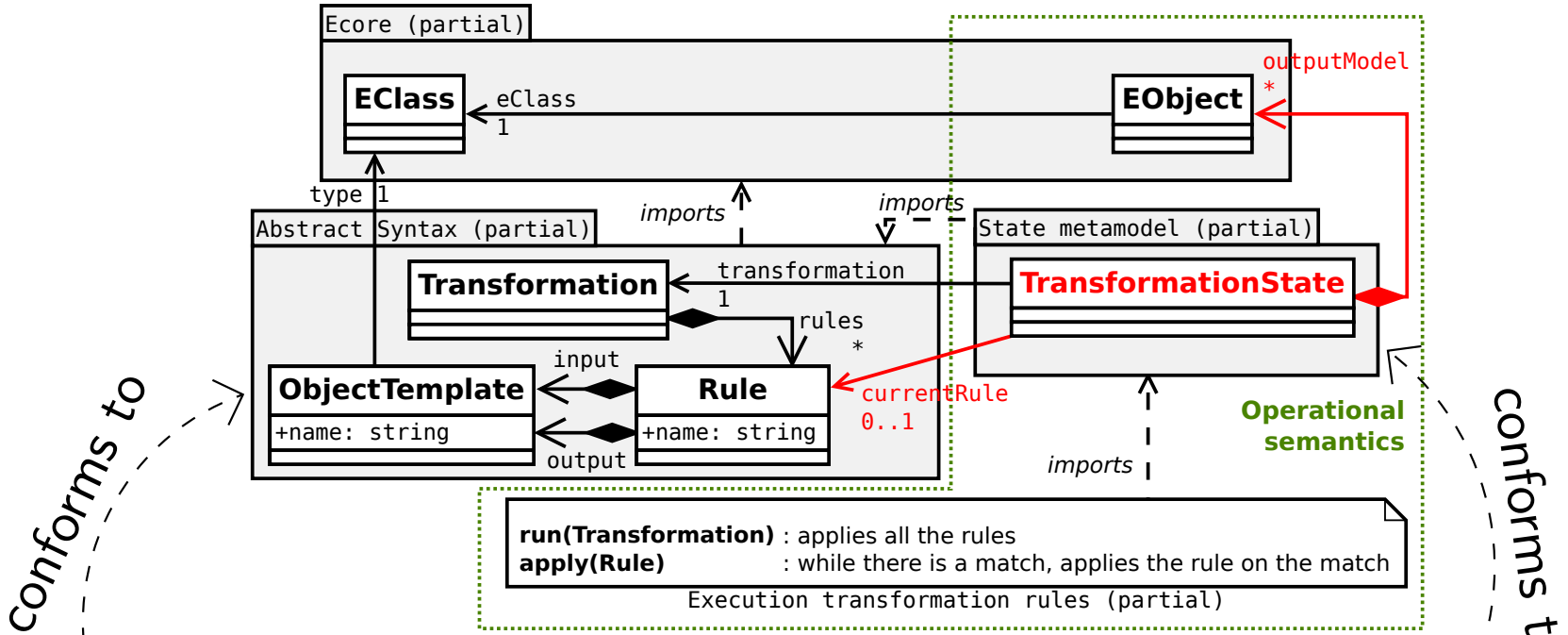


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MiniTL model

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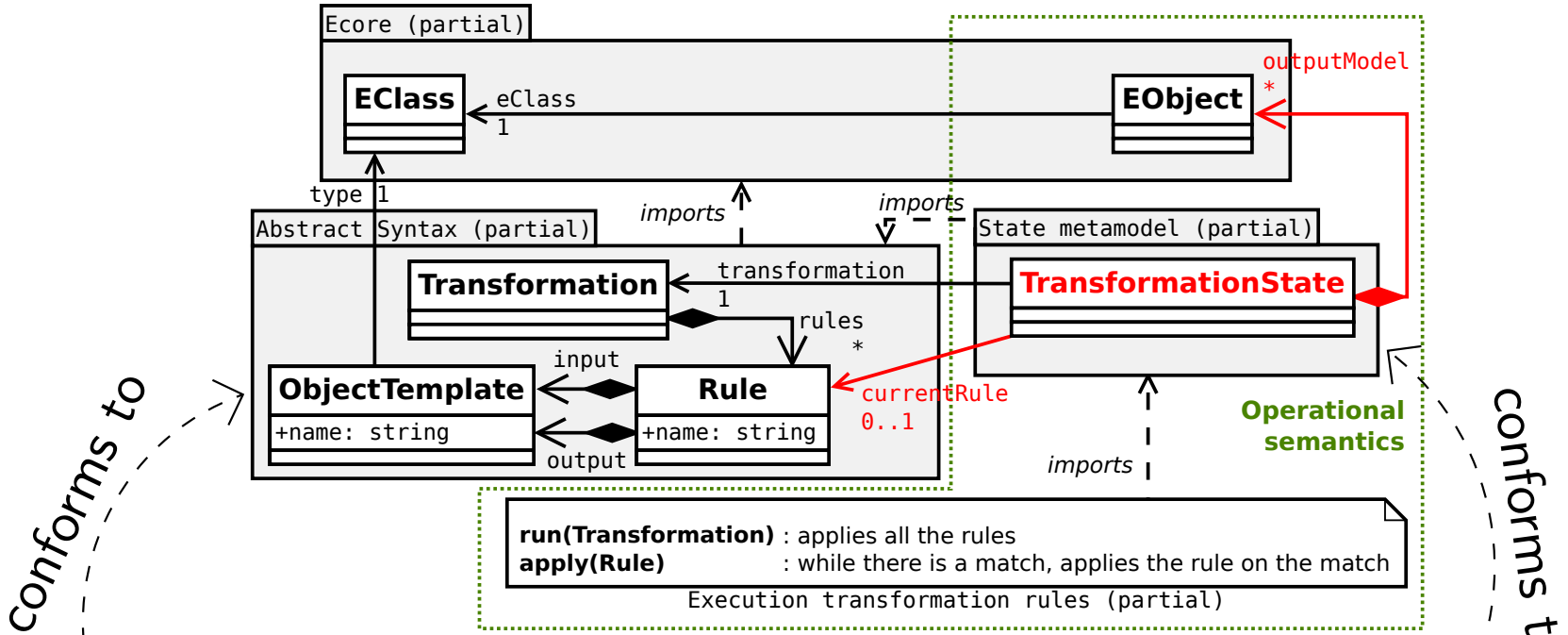
Output model

Executed model

Example of MiniTL DSTL and model

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MiniTL model

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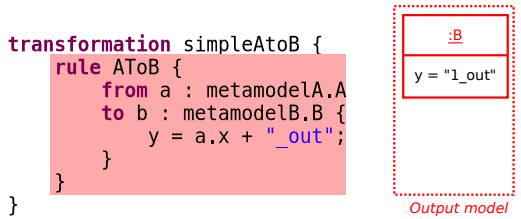

Executed model

(AToB app.)

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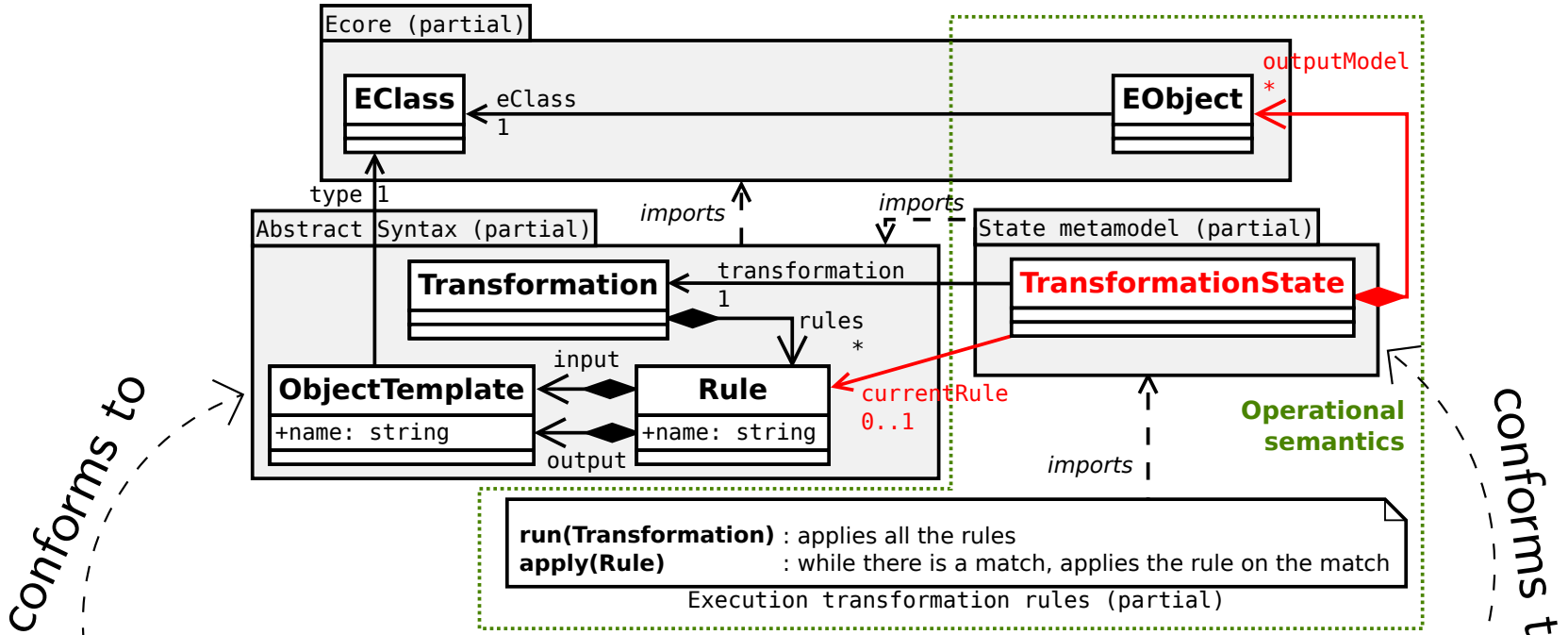


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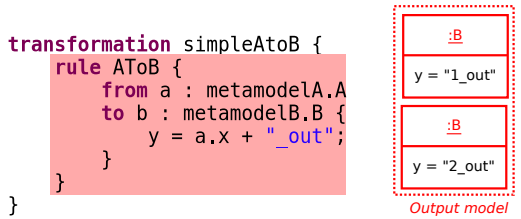
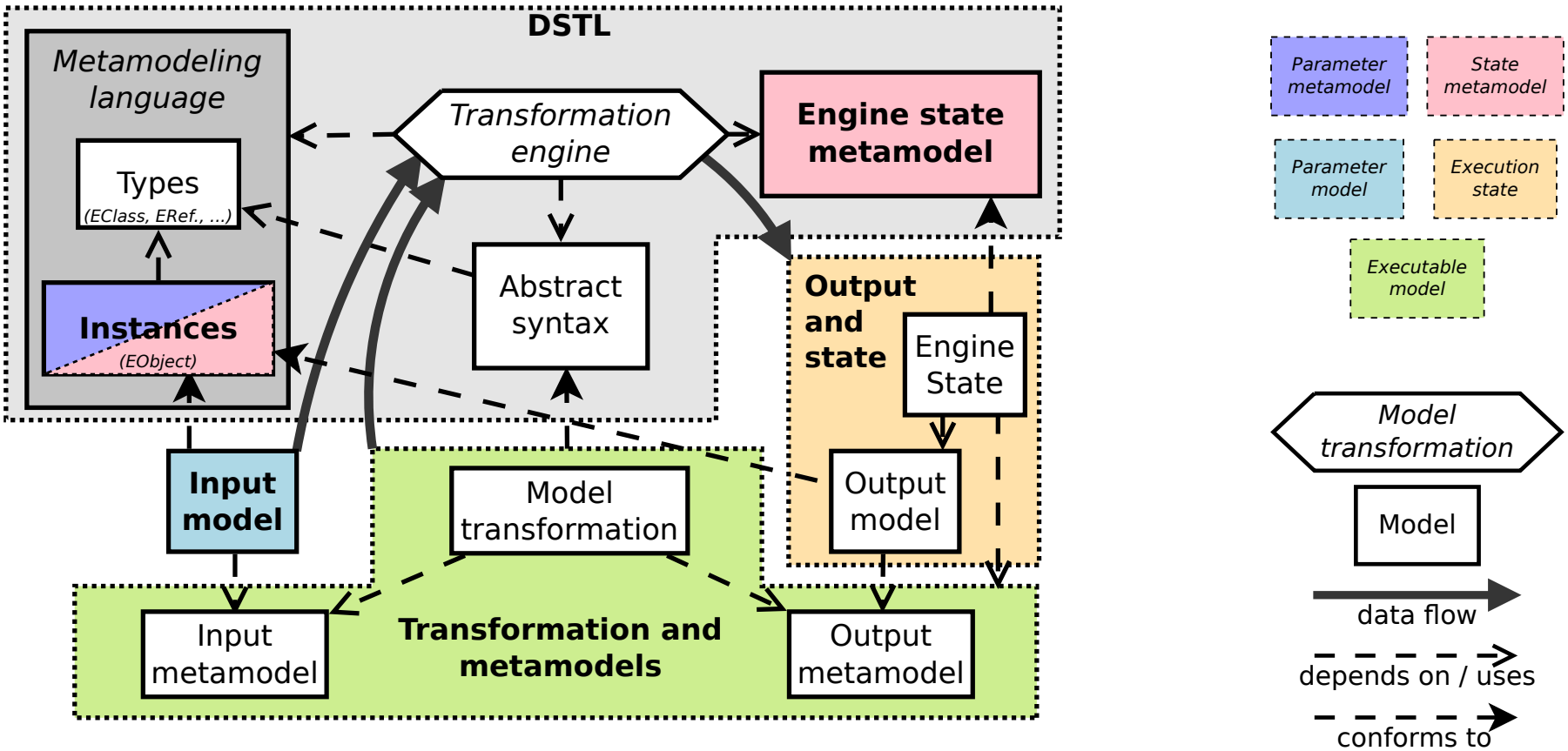


Executed model

(AToB app.) (AToB app.)

Generalizing DSTLs as specific xDSMLs



Research directions

- Experiment with **generic and generative approaches** for DSTL engineering:
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  - Define/adapt new generic approaches for DSTL engineering
- Evaluate the **implications of DSTL specificities** : *eg.* can we generate a usable/relevant debugger using generic approaches?
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Conclusion and future work

- Just an observation: **DSTLs are a sort of xDSMLs**, complex and with interesting characteristics
- Prospects:
  - Use state of the art xDSML engineering for DSTL engineering?
  - Consider DSTLs as nice case studies for model execution?

Future work

- **Short term:** Experiment (more) xDSML engineering on some transformation languages, *eg.* MiniTL
- **Long term:** analyse a DSTL to automatically provide it with a *white-box testing framework* (test model generation, coverage metrics, fault localization, etc.)

Done!

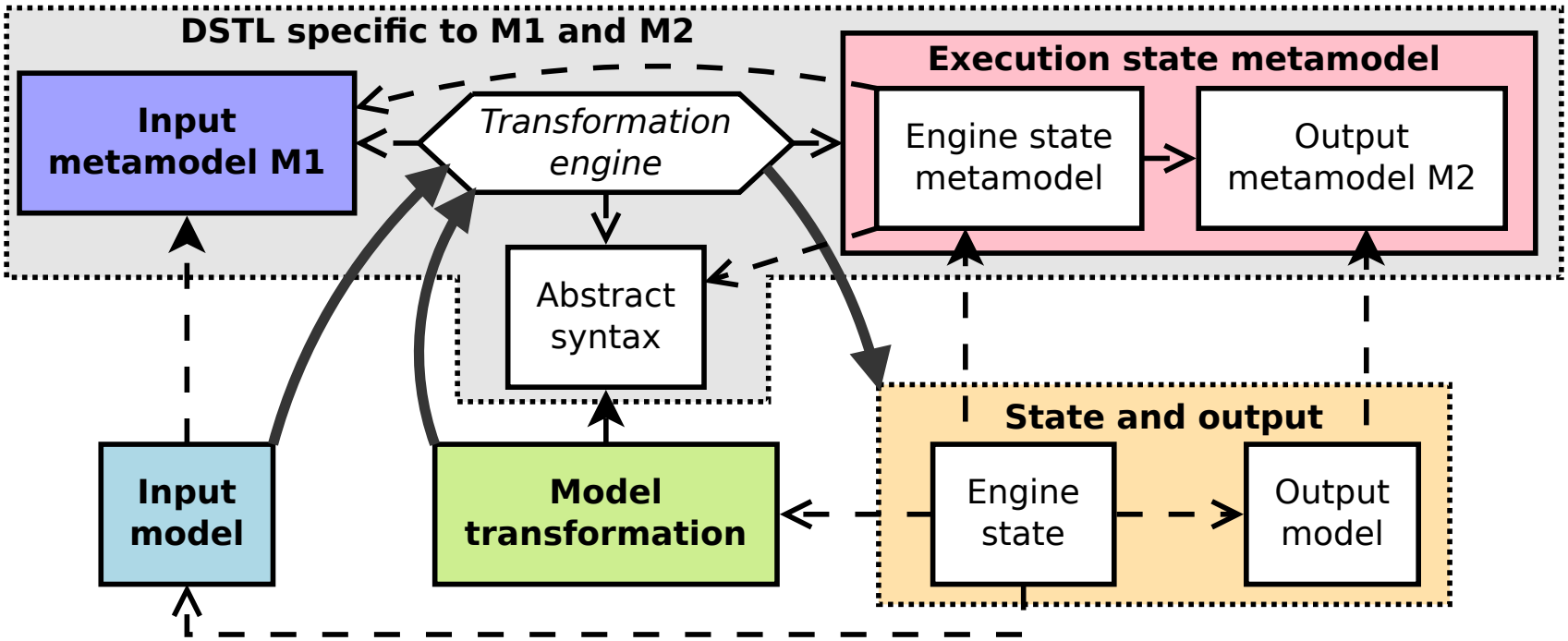
Thank you! ☺

Implementation of MiniTL example:
`https://github.com/tetrabox/minitl`

Contact:
erwan.bousse@tuwien.ac.at
`http://big.tuwien.ac.at/staff/ebousse`

Research project:
TETRA Box: `http://modeltransformation.net/tetrabox/`
we have funding and an open position for a PhD student!

Generalisation of Metamodel-specific DSTLs



Screenshot of MiniTL debugging session