Domain-Level Debugging for Compiled DSLs with the GEMOC Studio

(Tool Demo)

Erwan Bousse Tanja Mayerhofer Manuel Wimmer

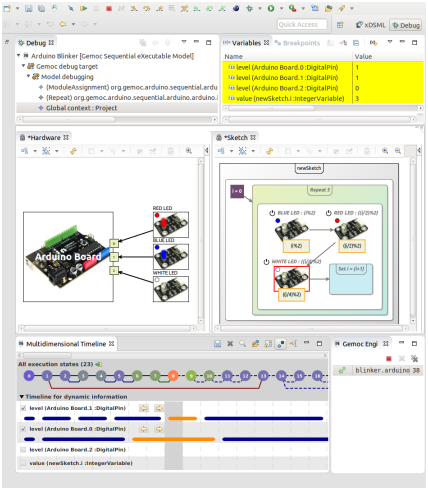
TU Wien (Austria)

September 17, 2017

(Domain-level) interactive debugging

- Many existing approaches to define **Domain Specific Languages (DSLs)** with execution semantics.
- Enable the use of **interactive debugging** (ie. breakpoints, step into, etc.) to understand and investigate defects.

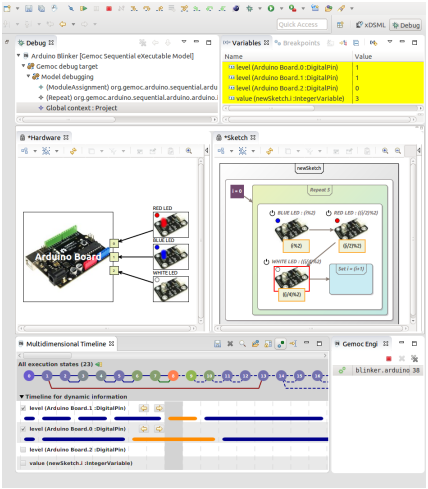
- Two main kinds of DSLs to consider:
  - interpreted DSLs (with operational semantics)
  - compiled DSLs (with translational semantics)



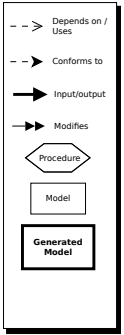
(Domain-level) interactive debugging

- Many existing approaches to define **Domain Specific Languages (DSLs)** with execution semantics.
- Enable the use of **interactive debugging** (ie. breakpoints, step into, etc.) to understand and investigate defects.

- Two main kinds of DSLs to consider:
  - interpreted DSLs (with operational semantics)
  - compiled DSLs (with translational semantics)



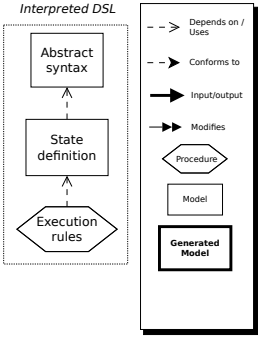
Interpreted VS compiled DSLs



Runtime services

Provides services at runtime by observing occuring *steps* and the changing *state*

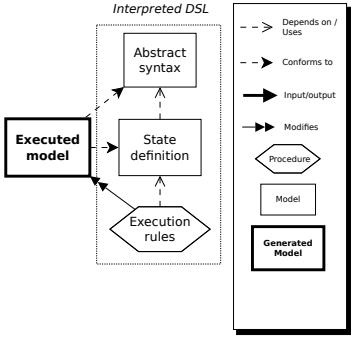
Interpreted VS compiled DSLs



Runtime services

Provides services at runtime by observing occuring *steps* and the changing *state*

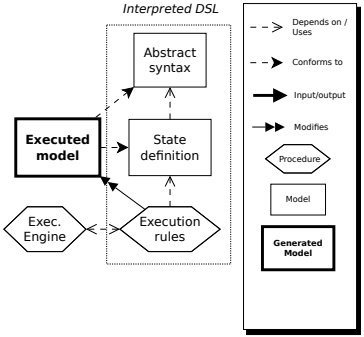
Interpreted VS compiled DSLs



Runtime services

Provides services at runtime by observing occuring *steps* and the changing *state*

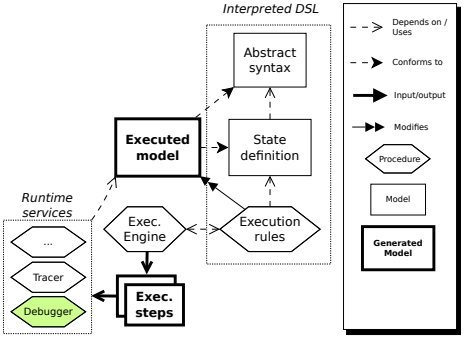
Interpreted VS compiled DSLs



Runtime services

Provides services at runtime by observing occuring *steps* and the changing *state*

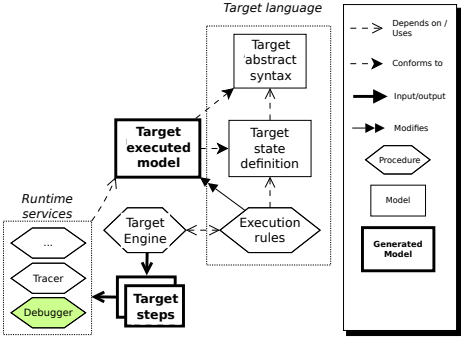
Interpreted VS compiled DSLs



Runtime services

Provides services at runtime by observing occuring *steps* and the changing *state*

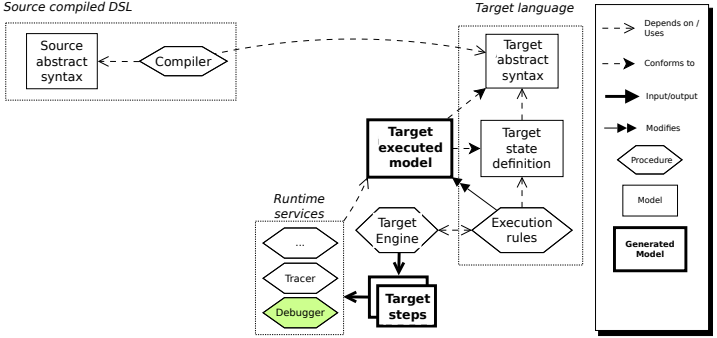
Interpreted VS compiled DSLs



Runtime services

Provides services at runtime by observing occuring *steps* and the changing *state*

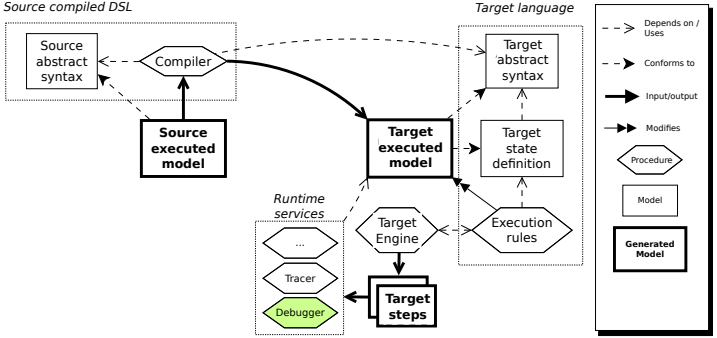
Interpreted VS compiled DSLs



Runtime services

Provides services at runtime by observing occuring *steps* and the changing *state*

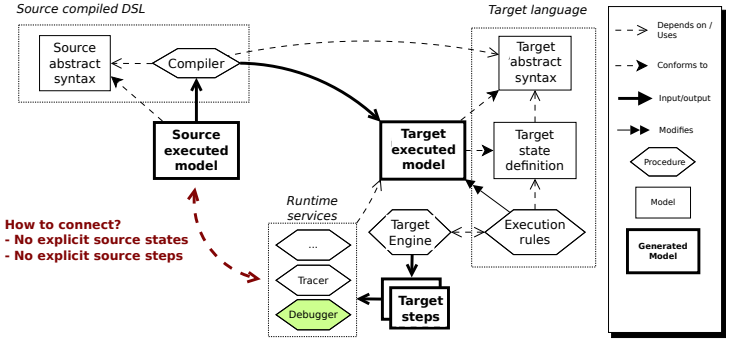
Interpreted VS compiled DSLs



Runtime services

Provides services at runtime by observing occuring *steps* and the changing *state*

Interpreted VS compiled DSLs



Runtime services

Provides services at runtime by observing occuring *steps* and the changing *state*

Problem

How to provide domain-level interactive debugging when executing models conforming to compiled DLSs?

Idea

At runtime, automatically translate on-the-fly *target* states and steps into *source* states and steps, which can then be observed by domain-level tools.

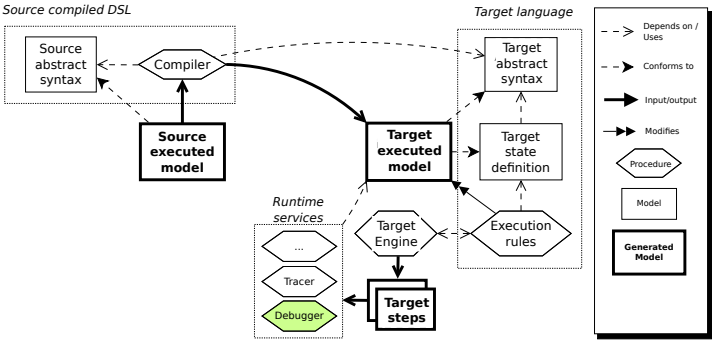
Problem

How to provide domain-level interactive debugging when executing models conforming to compiled DLSs?

Idea

At runtime, automatically translate on-the-fly *target* states and steps into *source* states and steps, which can then be observed by domain-level tools.

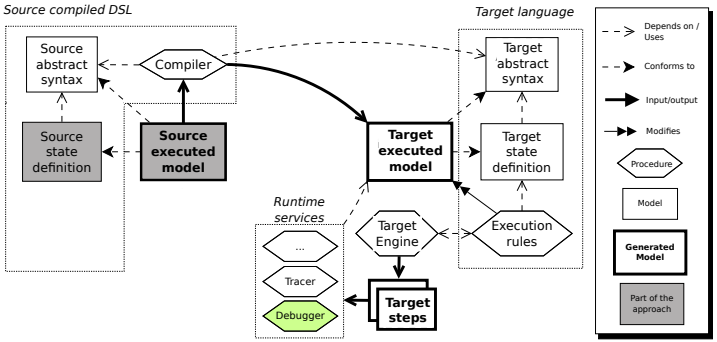
Overview



Result

The same runtime services can be (re)used for both interpreted and compiled DSLs!

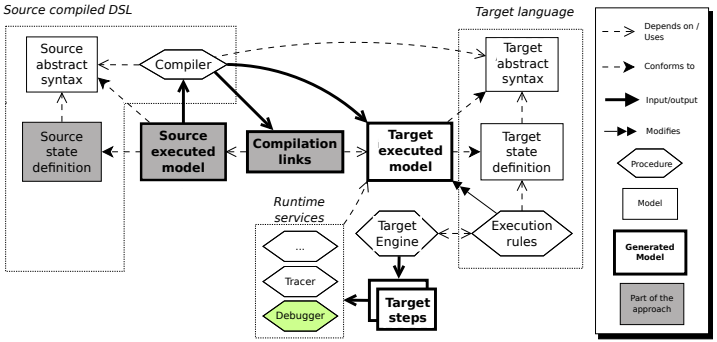
Overview



Result

The same runtime services can be (re)used for both interpreted and compiled DSLs!

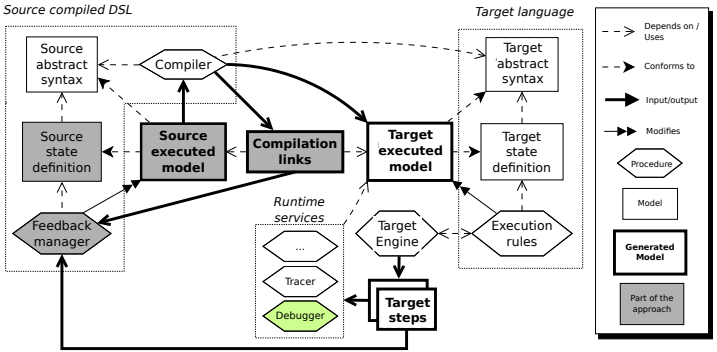
Overview



Result

The same runtime services can be (re)used for both interpreted and compiled DSLs!

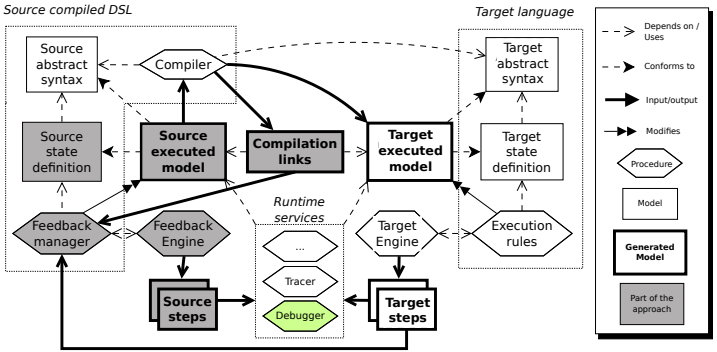
Overview



Result

The same runtime services can be (re)used for both interpreted and compiled DSLs!

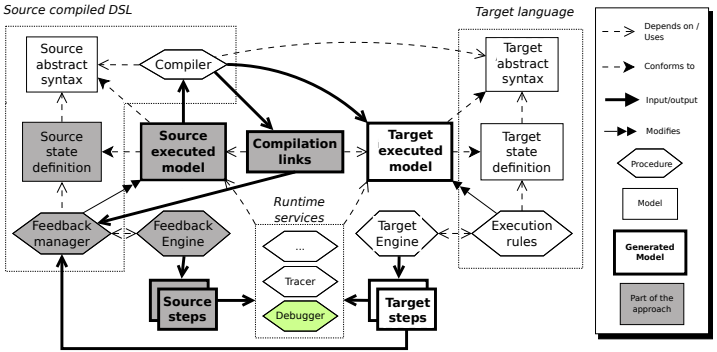
Overview



Result

The same runtime services can be (re)used for both interpreted and compiled DSLs!

Overview



Result

The same runtime services can be (re)used for both interpreted and compiled DSLs!

Demo

Demo. . .

Conclusion

- Providing interactive debugging for compiled DSLs is not trivial
- **Idea:** a *feedback manager* to translate target steps back to the source domain
- **Evaluation:** median execution slowdown of 1,8 times due to feedback
- **Future work:** manage non GEMOC-ready compilers (eg. *code generators*)

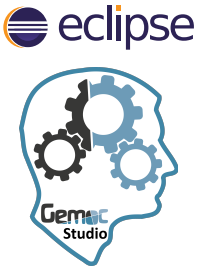
- **Eclipse Research Consortium GEMOC**: sustains the GEMOC studio as a research platform to experiment on the globalization of, possibly executable and heterogeneous, modeling languages
- Contributors are welcome!

http://gemoc.org/
https://github.com/eclipse/gemoc-studio-modeldebugging

Conclusion

- Providing interactive debugging for compiled DSLs is not trivial
- **Idea:** a *feedback manager* to translate target steps back to the source domain
- **Evaluation:** median execution slowdown of 1,8 times due to feedback
- **Future work:** manage non GEMOC-ready compilers (eg. *code generators*)

- **Eclipse Research Consortium GEMOC**: sustains the GEMOC studio as a research platform to experiment on the globalization of, possibly executable and heterogeneous, modeling languages
- Contributors are welcome!



http://gemoc.org/
https://github.com/eclipse/gemoc-studio-modeldebugging