

HenshinTGG: TGG-Extension of HenshinEMF

BANFF Bidirectional Transformations
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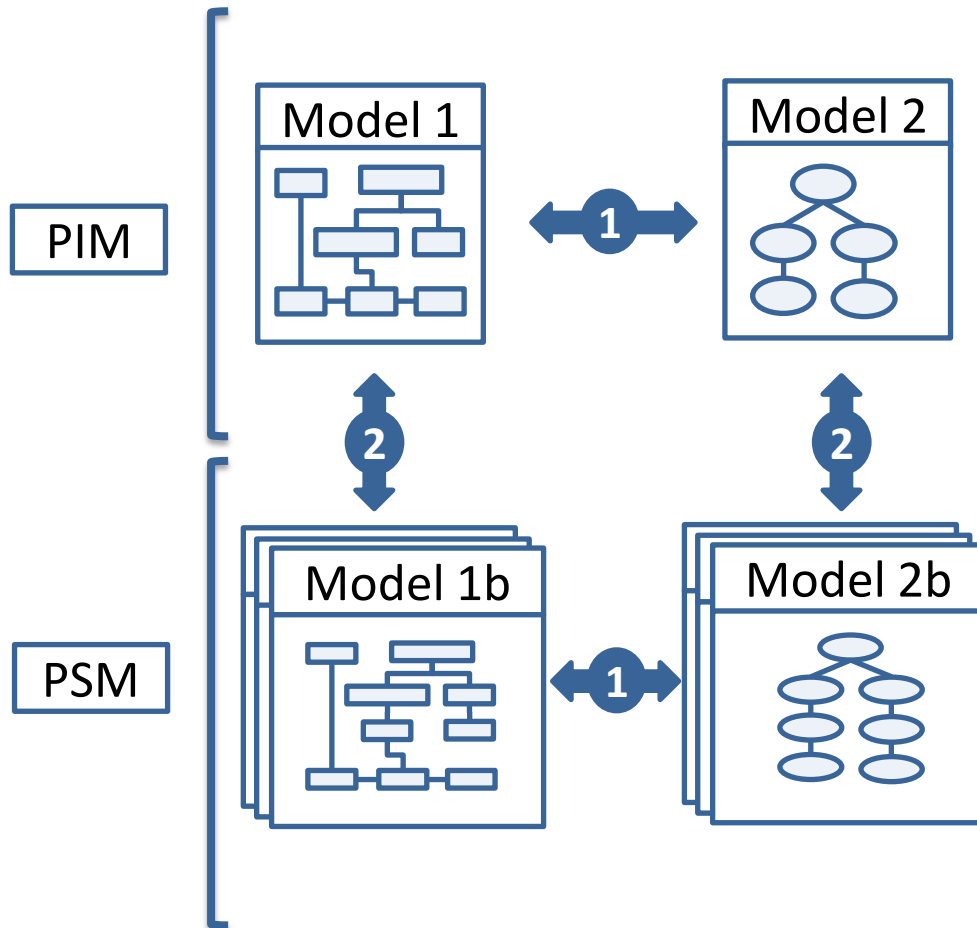


OVERVIEW



- **CD2RDBM**
- **DSL-Translation via TGGs**
- **Conclusion**

Interrelated Models in Model Driven Engineering

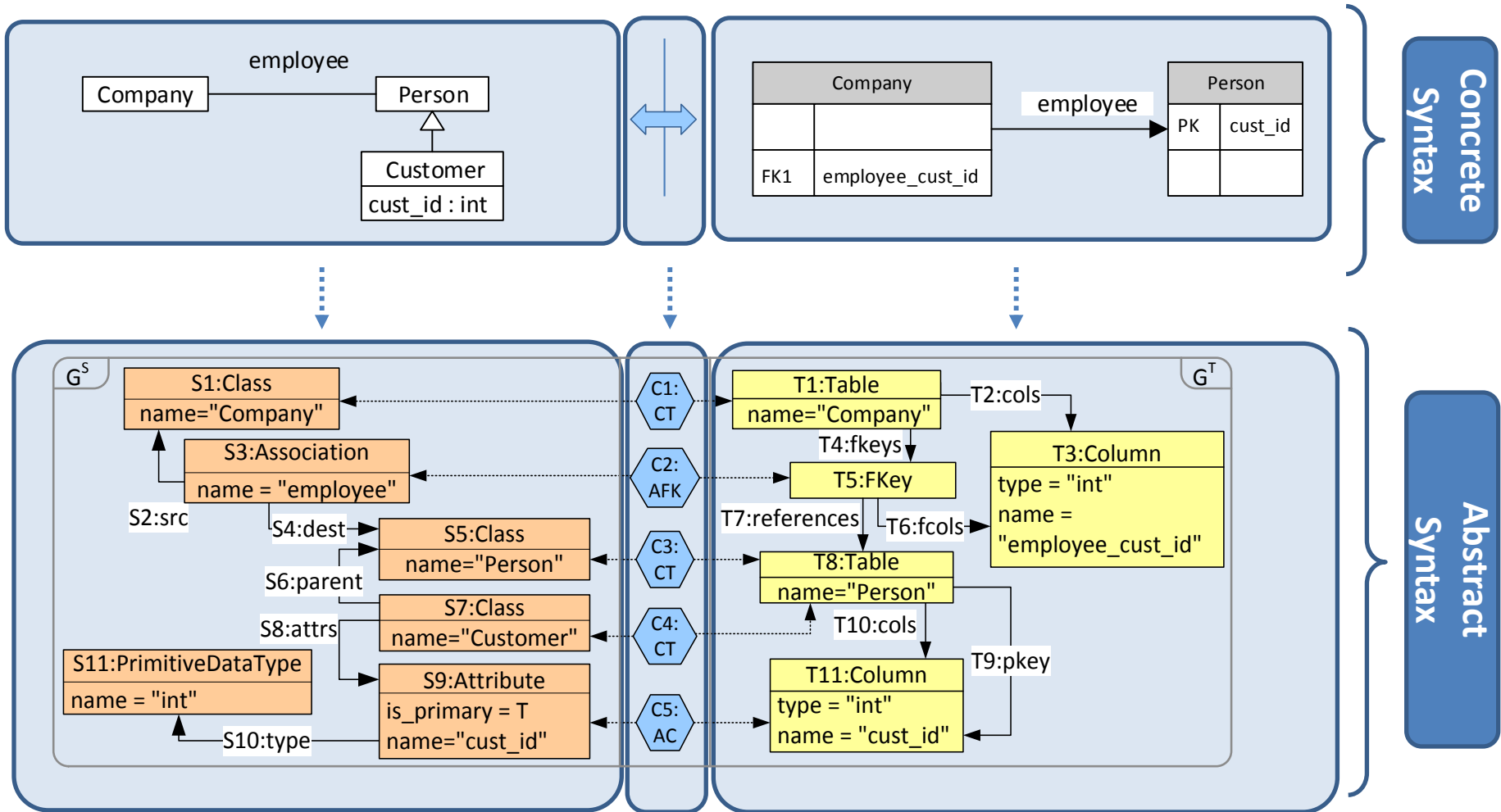


Model Transformations

- 1 PIM ↔ PIM (horizontal):**
DSL1 ↔ DSL2,
Model Translation/ Integration/
Synchronisation, e.g.:
UML Class Diag. ↔ RDBM
BPMN ↔ BPEL
Sequence Diag. ↔ St. Machines
- 2 PIM ↔ PSM (vertical):**
Model/Code generation,
reverse engineering, e.g.:
Class Diag. ↔ Class Diag.
Class Diag. ↔ Java

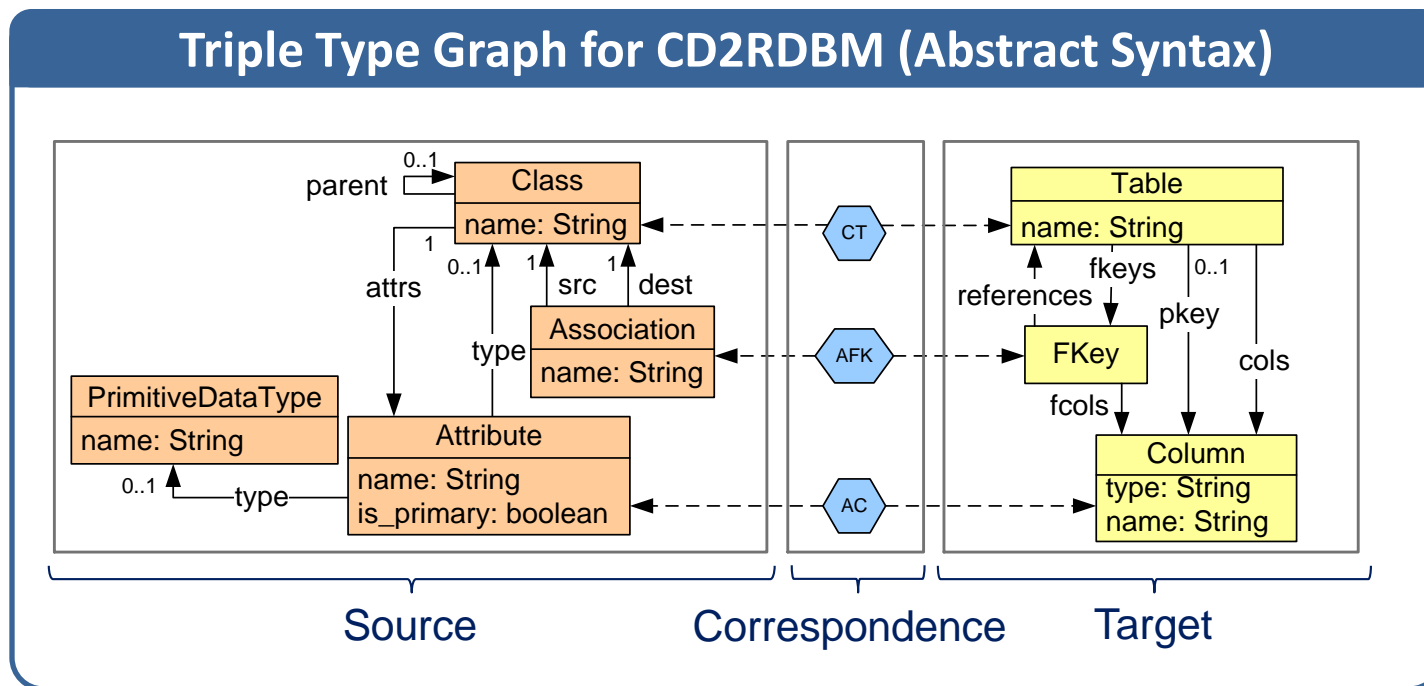
[HEO+13]

CD2RDBM: Integrated Model



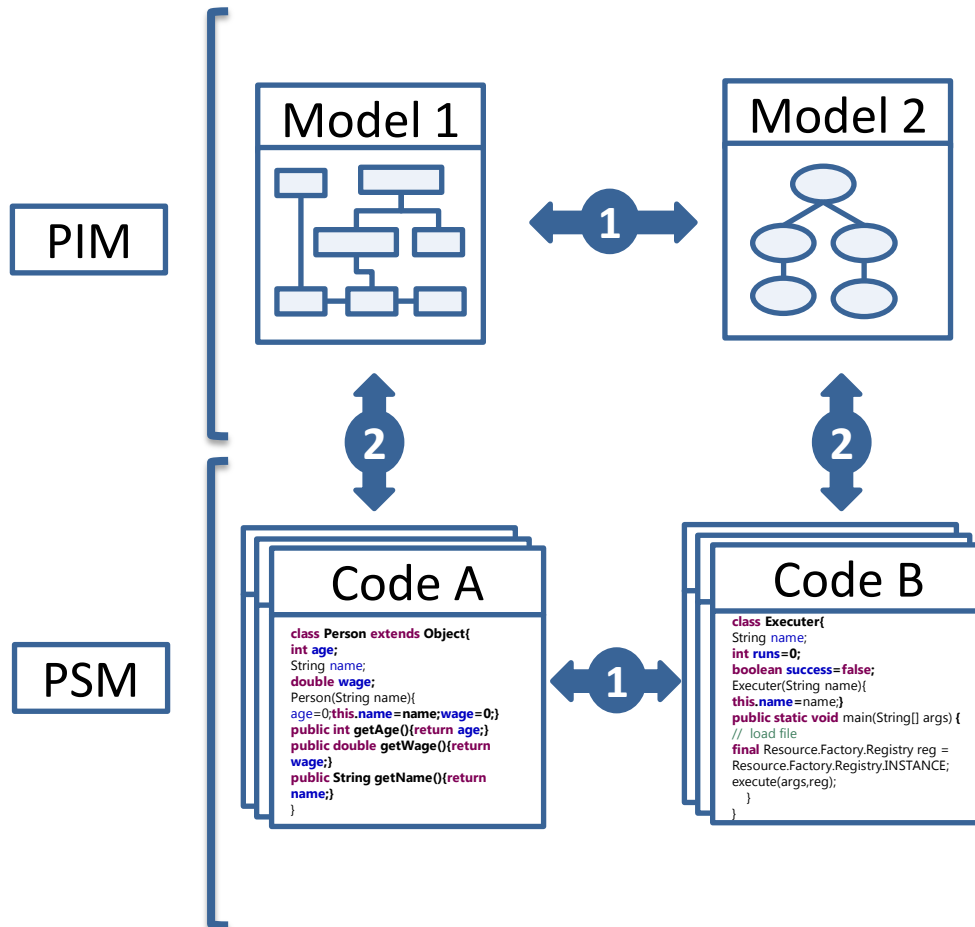
Triple Graph Grammar (TGG)

- $TGG = (TG, SG, TR)$,
 TG = type graph, SG = start graph ($SG = \emptyset$), TR = set of triple rules



[Schürr94]

Interrelated Models in Model Driven Engineering

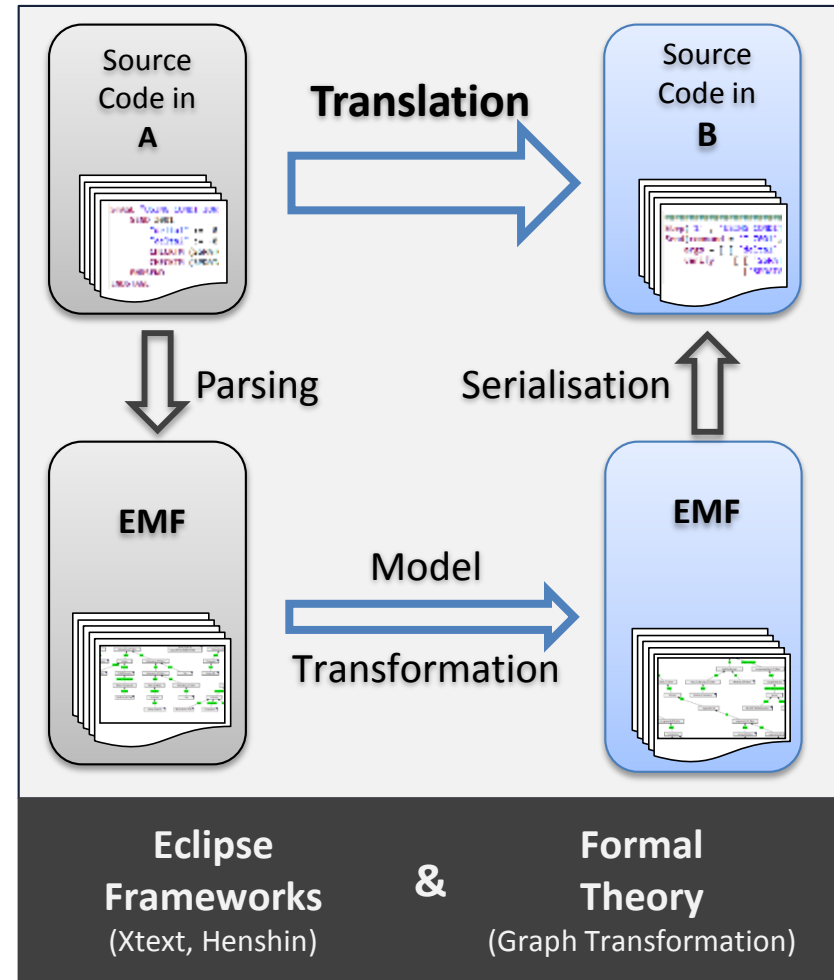
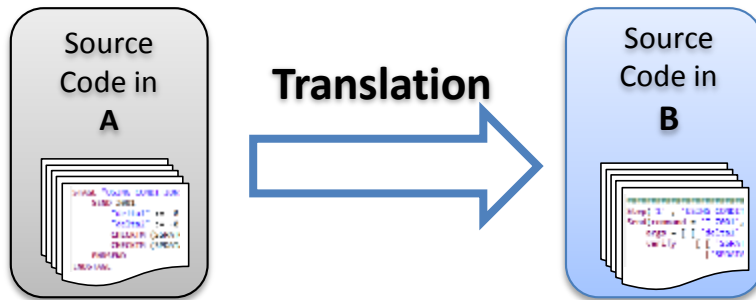


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DSL-Translation via TGGs: Conceptual Overview



3 Main phases

- Parsing (Xtext)
- FW-Transformation (HenshinTGG)
- Serialisation (Xtext)

Example DSLs: L_{REPEAT} , L_{WHILE}

L_{REPEAT} :

- Loops: **REPEAT ... UNTIL** <cond>, i.e., at least one execution
- Further constructs: **READ** <var>, <exp> **AND** <exp>, <exp> **EQ** <exp>, ...

```

1  /# "myloop" #/
2  REPEAT
3      READ a
4      READ b
5      READ c
6  UNTIL ((a EQ b) AND
7          (b EQ c))

```

L_{WHILE} :

- Loops: **while**, i.e., at least zero executions
- Further constructs: **input()**, <exp> **&&** <exp>, <exp> **==** <exp>, ...

```

1  /# "myloop" #/
2  def _f0() {
3      a = input(); b = input(); c = input();
4  };
5  _f0();
6  while((!(a == b) || !(b == c))) {
7      _f0(); }

```

Further Reading



[EEE+07]	H. Ehrig, K. Ehrig, C. Ermel, F. Hermann, and G. Taentzer: Information Preserving Bidirectional Model Transformations . <i>Proc. FASE'07</i> . Springer (2007).
[EEPT06]	H. Ehrig, K. Ehrig, U. Prange, and G. Taentzer: Fundamentals of Algebraic Graph Transformation . EATCS Monographs in Theoretical Computer Science. Springer (2006).
[GHL12]	Giese, H., Hildebrandt, S., Lambers, L.: Bridging the Gap Between Formal Semantics and Implementation of Triple Graph Grammars. Ensuring Conformance of Relational Model Transformation Specifications and Implementations . <i>Software and Systems Modeling</i> , Springer (2012).
[GW09]	Giese, H., Wagner, R.: From model transformation to incremental bidirectional model synchronization . <i>Software and Systems Modeling</i> 8(1), Springer (2009).
[HEGO10]	F. Hermann, H. Ehrig, U. Golas, Fernando Orejas: Efficient Analysis and Execution of Correct and Complete Model Transformations Based on Triple Graph Grammars . <i>Proc. of MDI'10</i> , ACM (2010).
[HEOG10]	F. Hermann, H. Ehrig, F. Orejas, U. Golas: Formal analysis of functional behaviour for model transformations based on triple graph grammars . In: <i>Int. Conf. on Graph Transformations</i> , Springer (2010).

Further Reading



[HEO+13]	F. Hermann, H. Ehrig, F. Orejas, K. Czarnecki, Z. Diskin, Y. Xiong, S. Gottmann, T. Engel: Model synchronization based on triple graph grammars: correctness, completeness and invertibility. In: <i>Software & Systems Modeling</i> , Springer 2013.
[KW07]	Kindler, E., Wagner, R.: Triple graph grammars. concepts, extensions, implementations, and application scenarios. <i>Tech. Rep. TR-ri-07-284</i> , Department of Computer Science, University of Paderborn (2007).
[LAVS12]	Lauder, M., Anjorin, A., Varró, G., Schürr, A.: Bidirectional model transformation with precedence triple graph grammars. In: <i>Proc. Eur. Conf. on Modelling Foundations and Applications (ECMFA'12)</i> , LNCS, vol. 7349. Springer (2012).
[Schürr94]	Schürr, A.: Specication of Graph Translators with Triple Graph Grammars. <i>Proc. of WG 1994</i> . LNCS, Springer (1995).
[SK08]	Schürr, A., Klar, F.: 15 years of triple graph grammars. In: <i>Int. Conf. on Graph Transformations (ICGT 2008)</i> . LNCS, vol. 5214, Springer (2008).