Case Study: *uniNDTotal* Consistency Relation

October 2, 2013

1 Motivation and origin

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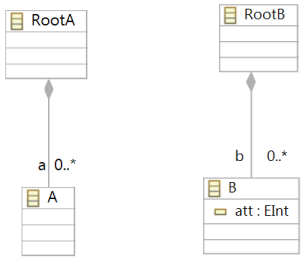
2 Specification

2.1 Metamodels (*M,N*)



(a) M (b) N

Figure 1: Metamodels

2.2 Consistency relation (*R*)

Type: *uniNDTotal*, *one <> some*

For every M instance there exists **one** N instance such that both are related by R;

For every N instance there exists **exactly one** M instance such that both are related by R.

	injective	entire	simple	surjective
R	✓	✓		✓

Definition

For every A in *RootA* there exists **one** B in *RootB*; [1]
For every B in *RootB* there exists **exactly one** A in *RootA*.

[1] This direction is non deterministic since any B is consistent regardless of its attribute value.

3 Test instances (*m*,*n*)

3.1 One A

Figure 2: One A (m)

3.2 No As

(no As (m))

3.3 One B attribute 0

Figure 3: One B with attribute value 0 (n)

3.4 One B attribute 15

Figure 4: One B with attribute value 15 (n)

3.5 Transformations to assess

	m	n	$\overrightarrow{R}$	$\overleftarrow{R}$
T1	One A	One B attribute 0	✓	
T2	No As	One B attribute 15		✓
T3	One A	One B attribute 15	✓	

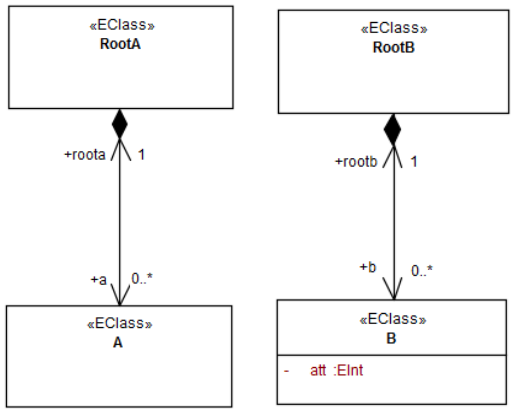
4 Tools assessment

4.1 *eMoflon*

4.1.1 Specification implementation

Specification environment: Enterprise Architect [4]

Metamodels



(a) M (b) N

Figure 5: Metamodels modelled as *EA Ecore Diagrams*

Consistency Relation

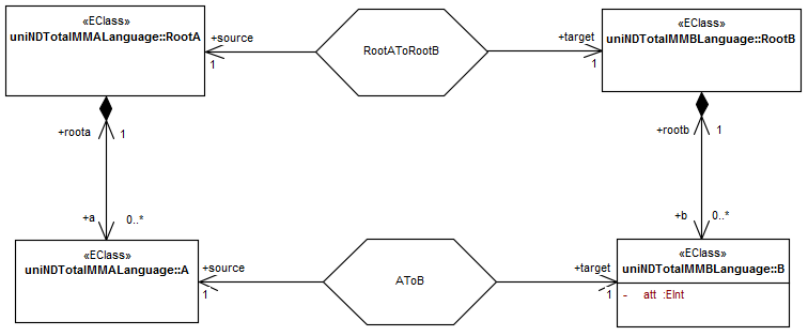


Figure 6: *TGG Schema Diagram*

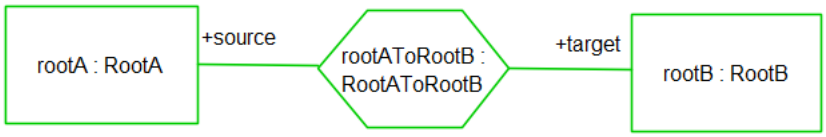


Figure 7: *TGG Rule Diagram* RootAToRootB

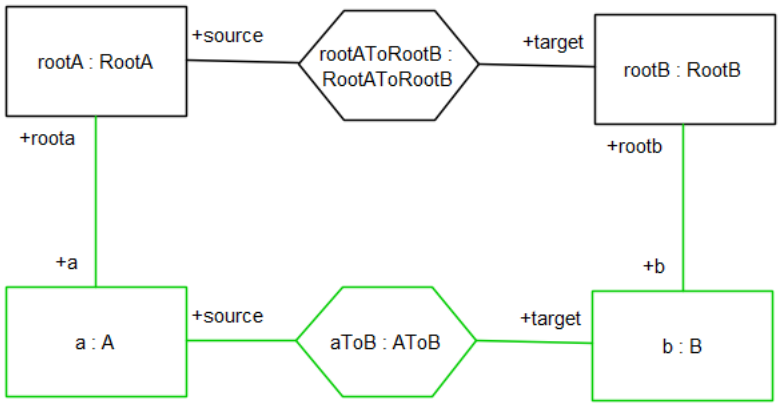


Figure 8: *TGG Rule Diagram* AToB

4.1.2 Instances transformation results

Integration environment: Eclipse Modelling Tools [5]

T1 - One A / One B attribute 0 ($\overrightarrow{R}$)

(a) m (b) n

Figure 9: T1 result

T2 - No As / One B attribute 15 ($\overleftarrow{R}$)

(a) m (b) n

Figure 10: T2 result

T3 - One A / One B attribute 15 ($\overrightarrow{R}$)

(a) m (b) n

Figure 11: T3 result

4.1.3 Assessment

correct	✓
hippocratic	
undoable	
history-ignorant	
simply-matching	
matching	
least-change	

4.2 *Echo*

4.2.1 Specification implementation

Specification environment:

Metamodels

Consistency Relation

4.2.2 Instances transformation results

Integration environment:

4.2.3 Assessment

correct	
hippocratic	
undoable	
history-ignorant	
simply-matching	
matching	
least-change	

4.3 *Focal*

4.3.1 Specification implementation

Specification environment:

Metamodels

Consistency Relation

4.3.2 Instances transformation results

Integration environment:

4.3.3 Assessment

correct	
hippocratic	
undoable	
history-ignorant	
simply-matching	
matching	
least-change	

4.4 Summary table and comparison

5 Discussion

References

[1] http://homepages.inf.ed.ac.uk/perdita/

[2] Stevens, Perdita. "Bidirectional model transformations in QVT: Semantic issues and open questions." Model Driven Engineering Languages and Systems. Springer Berlin Heidelberg, 2007. 1-15.

[3] Stevens, Perdita. "Observations relating to the equivalences induced on model sets by bidirectional transformations." Electronic Communications of the EASST 49 (2012).

[4] http://www.sparxsystems.com/products/ea/index.html

[5] http://www.eclipse.org/