Data Integration: Metadata

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Schematic discrepancies

The information in the schema of one database may correspond to the information in the instance of another database.

Postulates

1. the same constant may be a relation name, a column name and an attribute value
2. schema elements should be first-class objects
3. queries may define more than one relation, each with varying number of columns.

Correspondences

- attribute value $\iff$ relation name
- attribute value $\iff$ column name
- column name $\iff$ relation name
A successor of SchemaSQL [LSS01].

Features

- metavaraibles, ranging over relation and column names
- dynamically varying relation schemas (INTO, ON)

Database schemas
DA: Exams(Sid,Exam,Grade)

DB: Theory(Sid,Grade), AI(Sid,Grade), Systems(Sid,Grade)

DC: Students(Sid,Theory, AI, Systems)
Attribute values $\iff$ relation names

DA2DB

select E.Sid as "Sid", E.Grade as "Grade"
into E. Exam
from DA.Exams as E

DB2DA

select T.Sid as "Sid", R as "Exam", T.Grade as "Grade"
into "Exams"
from DB :R as T
Attribute values $\iff$ column names

**DA2DC**

```sql
select E.Sid as "Sid", E.Grade on E.Exam
into "Students"
from DA.Exams as E
```

**DC2DA**

```sql
select C.Sid as "Sid", A as "Exam", C.A as "Grade"
into "Exams"
from DC: R as C, R:A
where R="Students" and A <> "Sid"
```
FISQL queries

Semantics

- a generalization of SQL semantics
- metavariables range over relation and column names
- output: special treatment for dynamic schemas

FIRA

- extension of relational algebra
- operators map federated databases to federated databases
- new operators: partition, transpose,....

FISQL can be translated to FIRA and vice versa.
L.V.S. Lakshmanan, F. Sadri, and I.N. Subramanian. 
SchemaSQL – A Language for Interoperability in Relational Multi-Database Systems. 

C.M. Wyss and E. L. Robertson. 
Relational Languages for Metadata Integration. 