ENTWICKLUNG BESCHLEUNIGEN | SERVICE VERBESSERN | VERTRIEB OPTIMIEREN

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Data Integration using Semantic Technology: A use case

Jürgen Angele, ontoprise
Michael Gesmann, Software AG

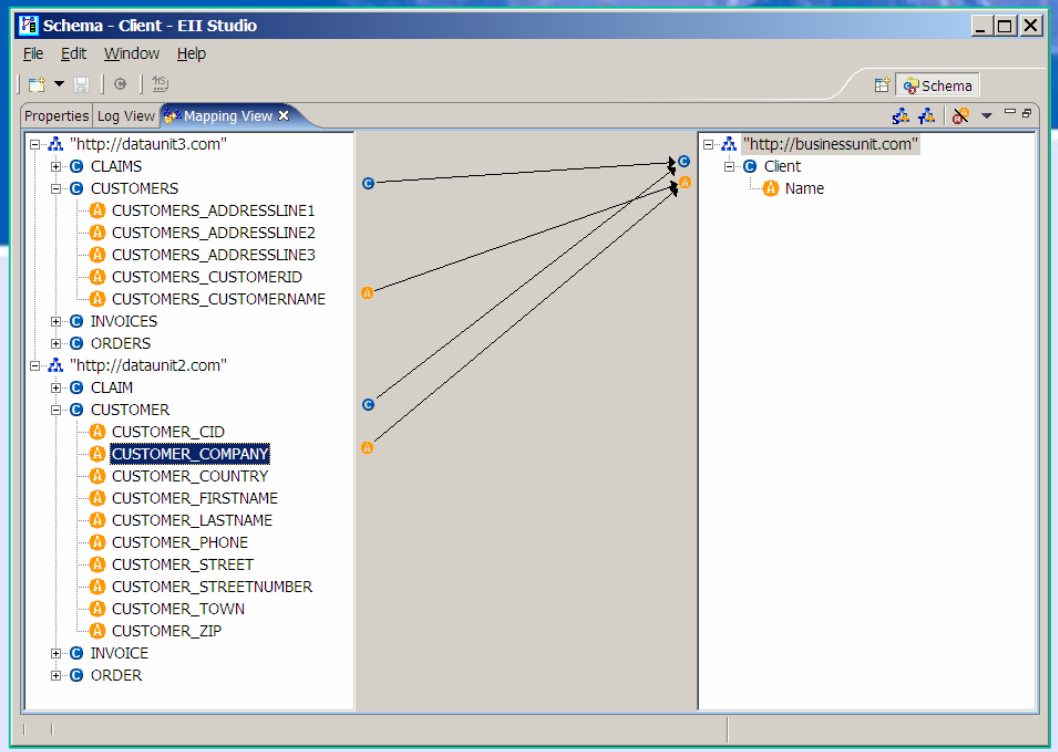
Software AG's Information Integrator

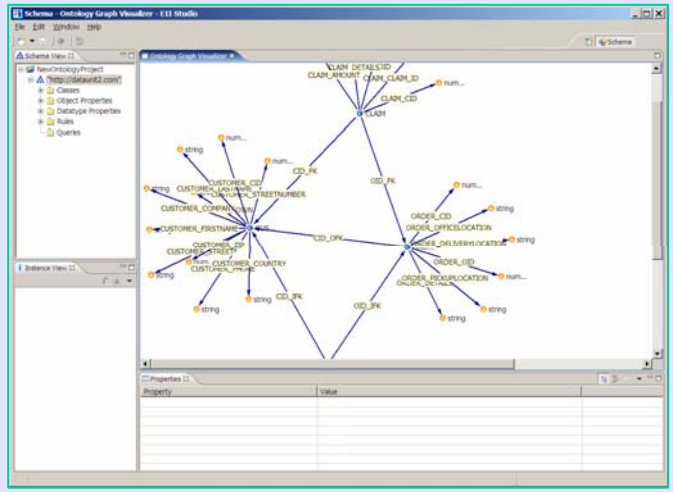
crossvision

Information Integrator Studio

software AG

Powered by: ontoprise





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Kinds of Integration Problems

It is generally estimated that for each $1 spent for an application, companies spend on average $5 to $9 for the integration.

© IBM, Nelson Mattos

What is the **problem** of information integration?

- **structural heterogeneity** – different application systems store their data in different structures
- **semantic heterogeneity** – intended meaning of information items is different in the various application systems
- **inconsistency and redundancy problems** – data in different application systems might be partially inconsistent or redundant

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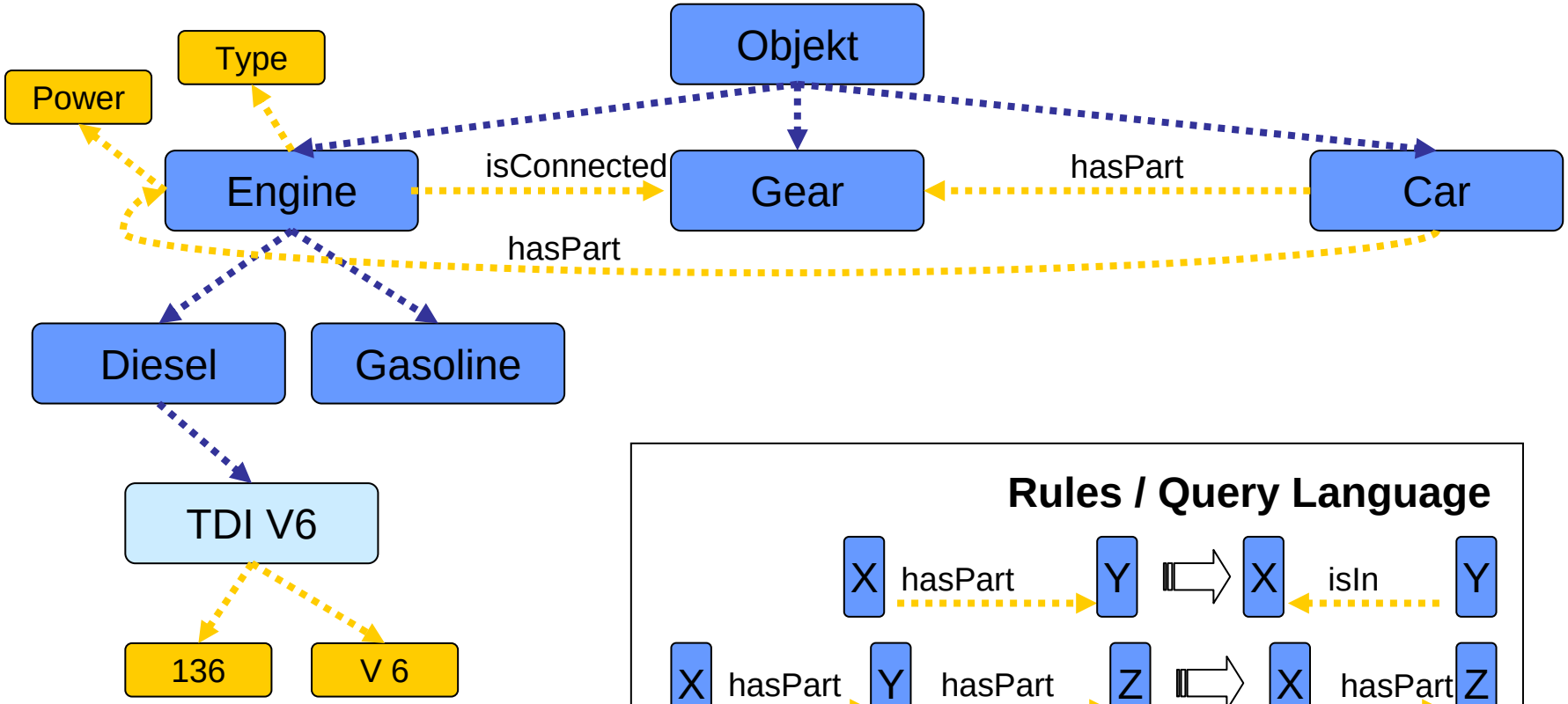
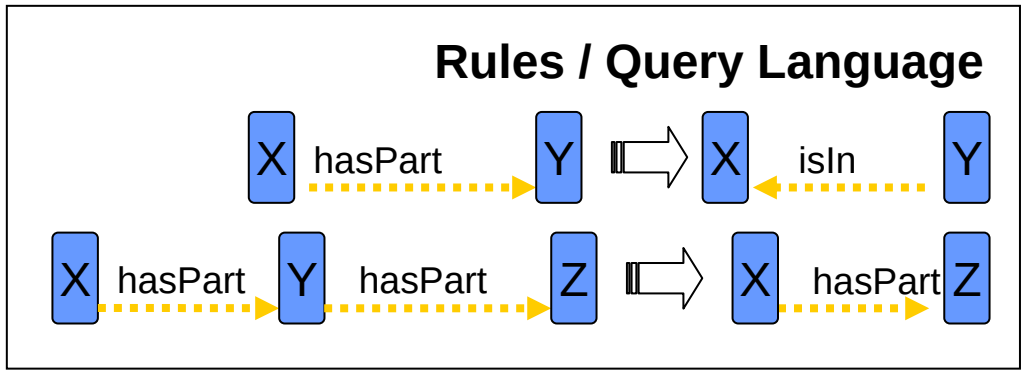
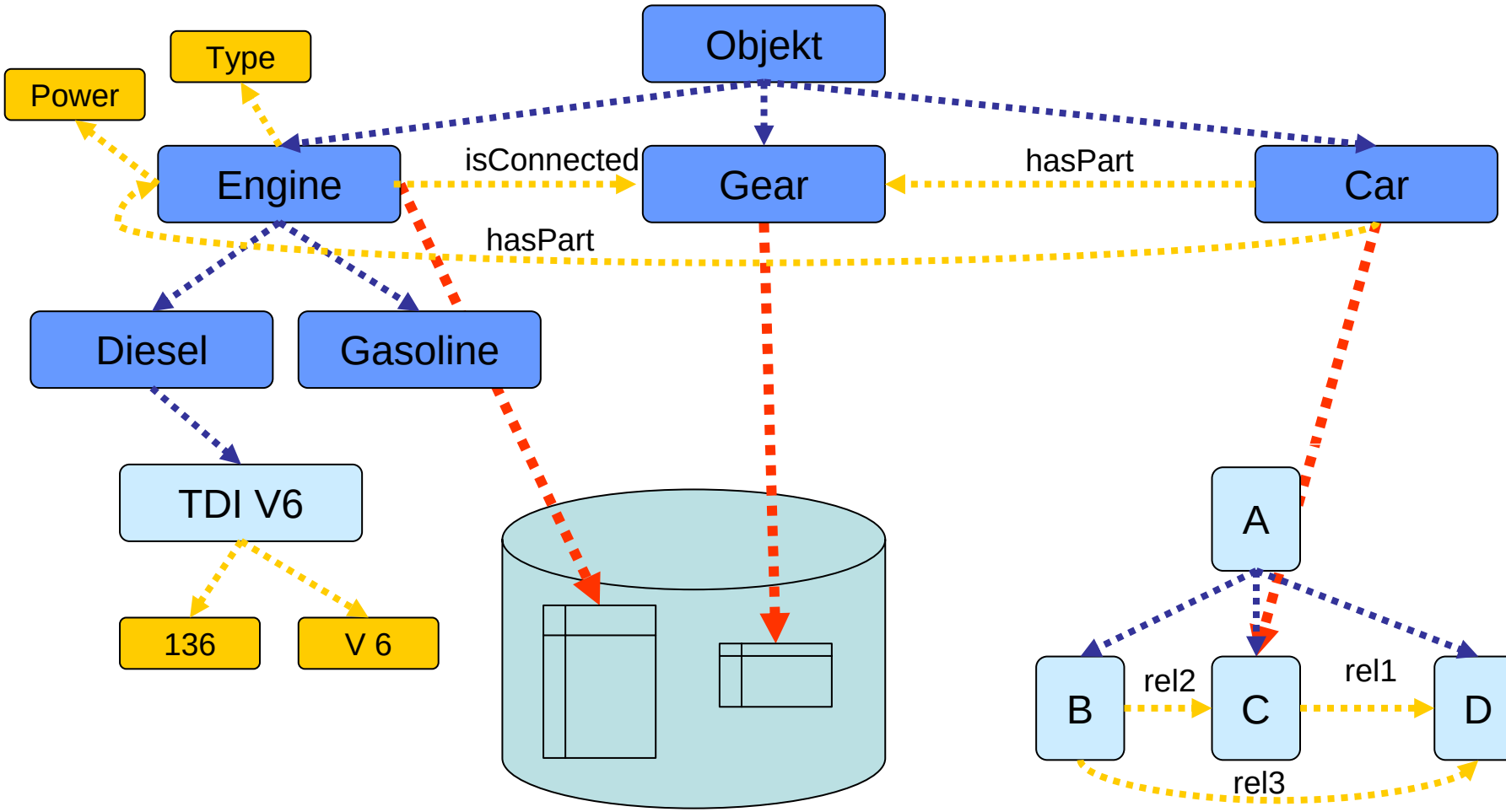
Ontology





- **Representation Language: F-Logic, WRL**
- **standards: RDF, OWL**

Mapping an Ontology with Data



- **Mapping to Databases, Webservices, Search Engines**
- **Mapping to Ontologies**

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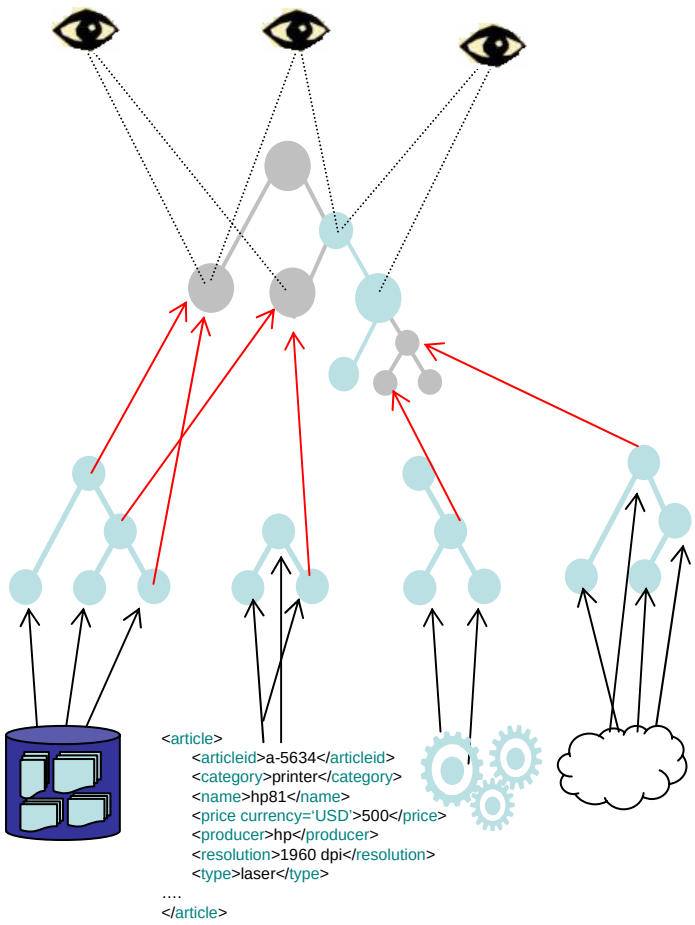
Concept



views

business ontology

manual mappings

data source ontologies

automatical mappings

data sources

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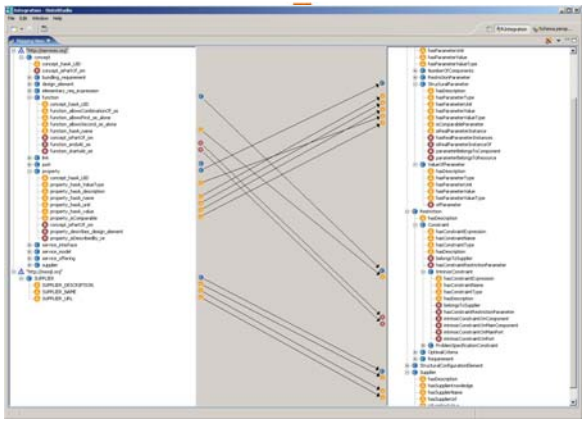
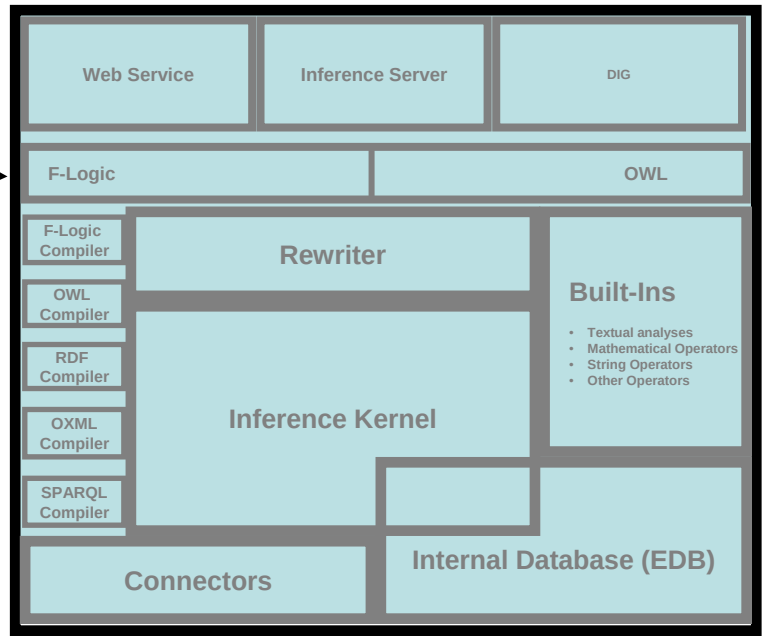
Information Integrator Studio / Semantic Server

Studio



Semantic Server



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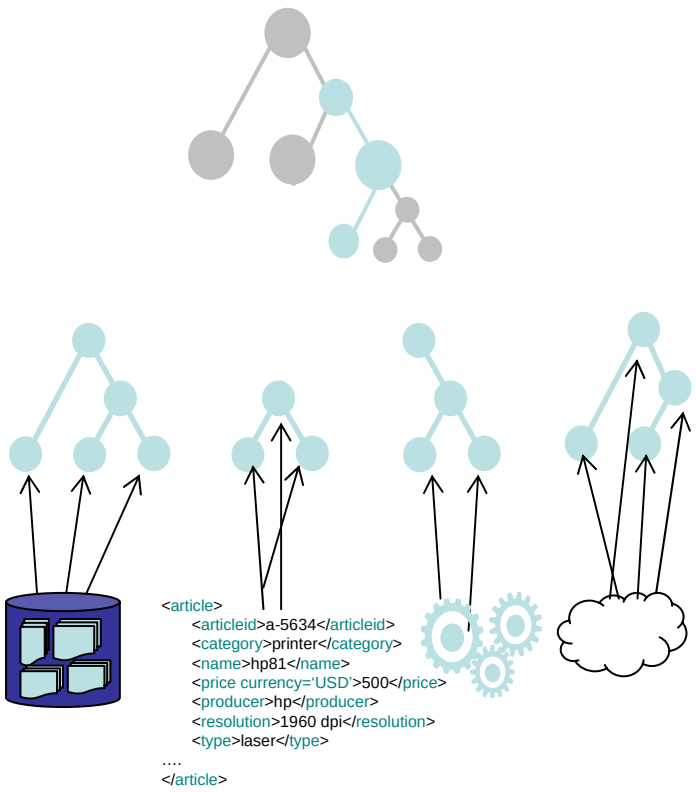
Concept



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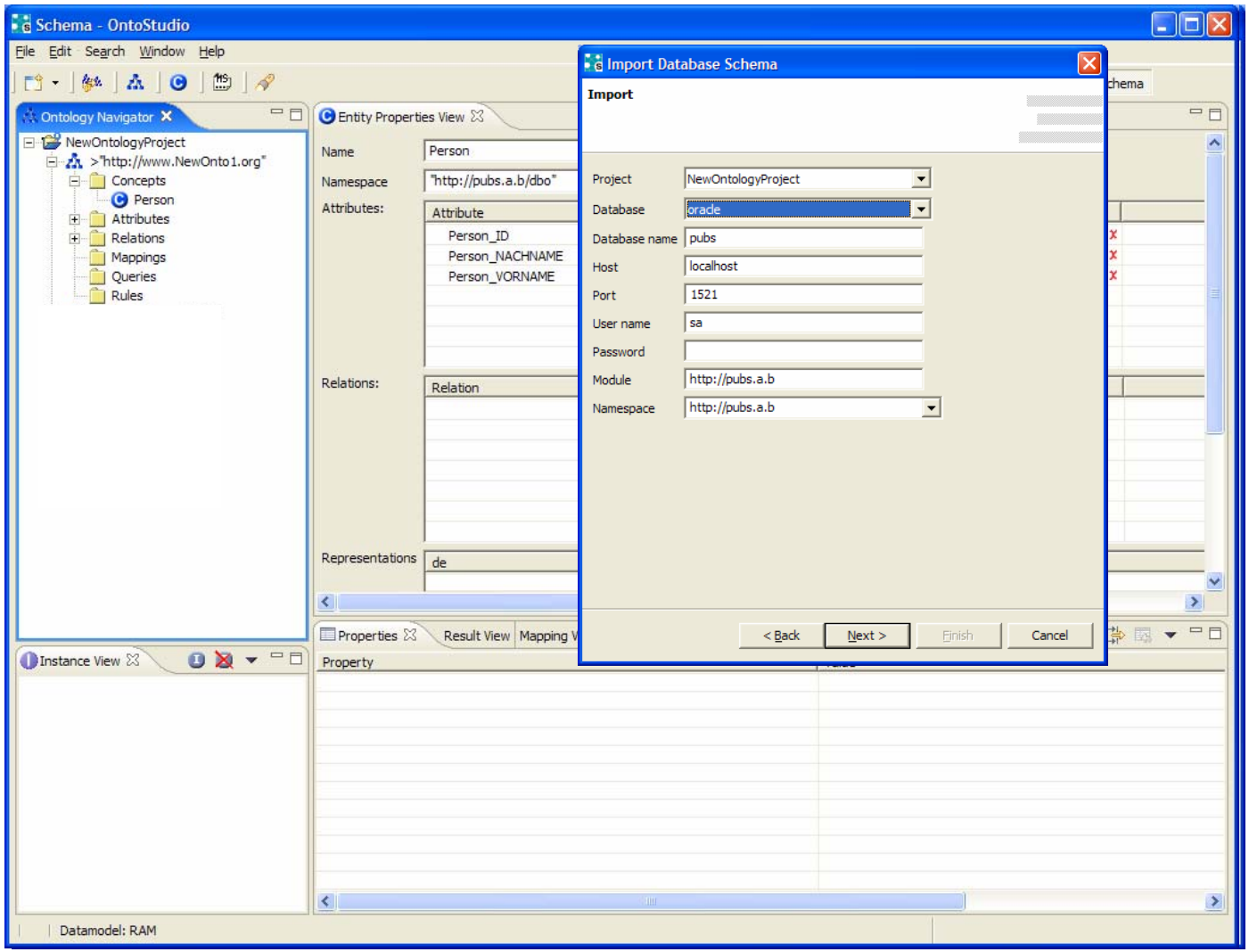

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Datasource Mapping Rules

FORALL VAR1, VAR2, VAR3, VAR4, VAR5, VAR6, VAR7, VAR8

c(authors_1347752484,VAR1):authors
[authors_au_id->>VAR1;authors_au_lname->>VAR2…..]

<-

dbaccessuser("\"dbo\".\"authors\"",
F("au_id", VAR1, "au_lname", VAR2,….),
"mssqlserver2000","pubs","localhost:1433","sa","").

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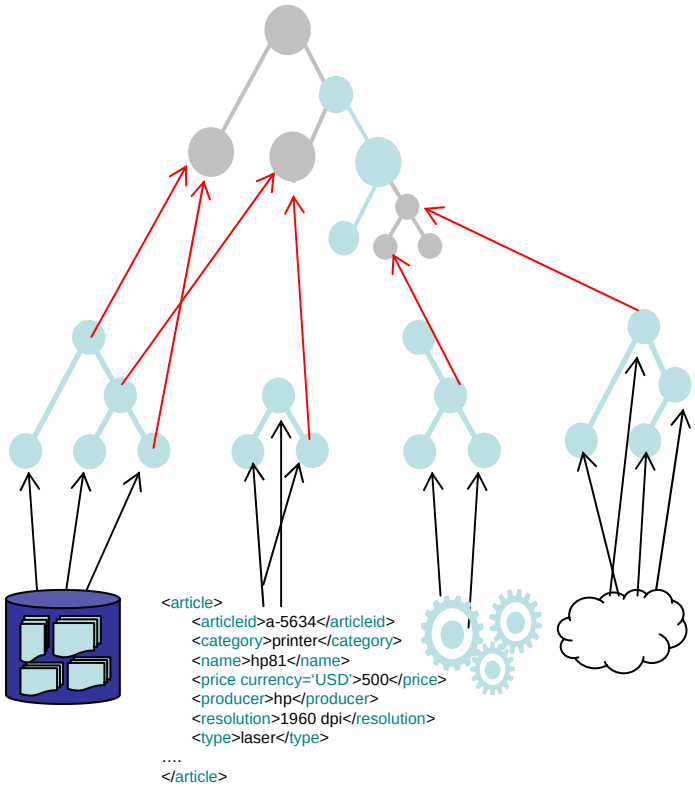

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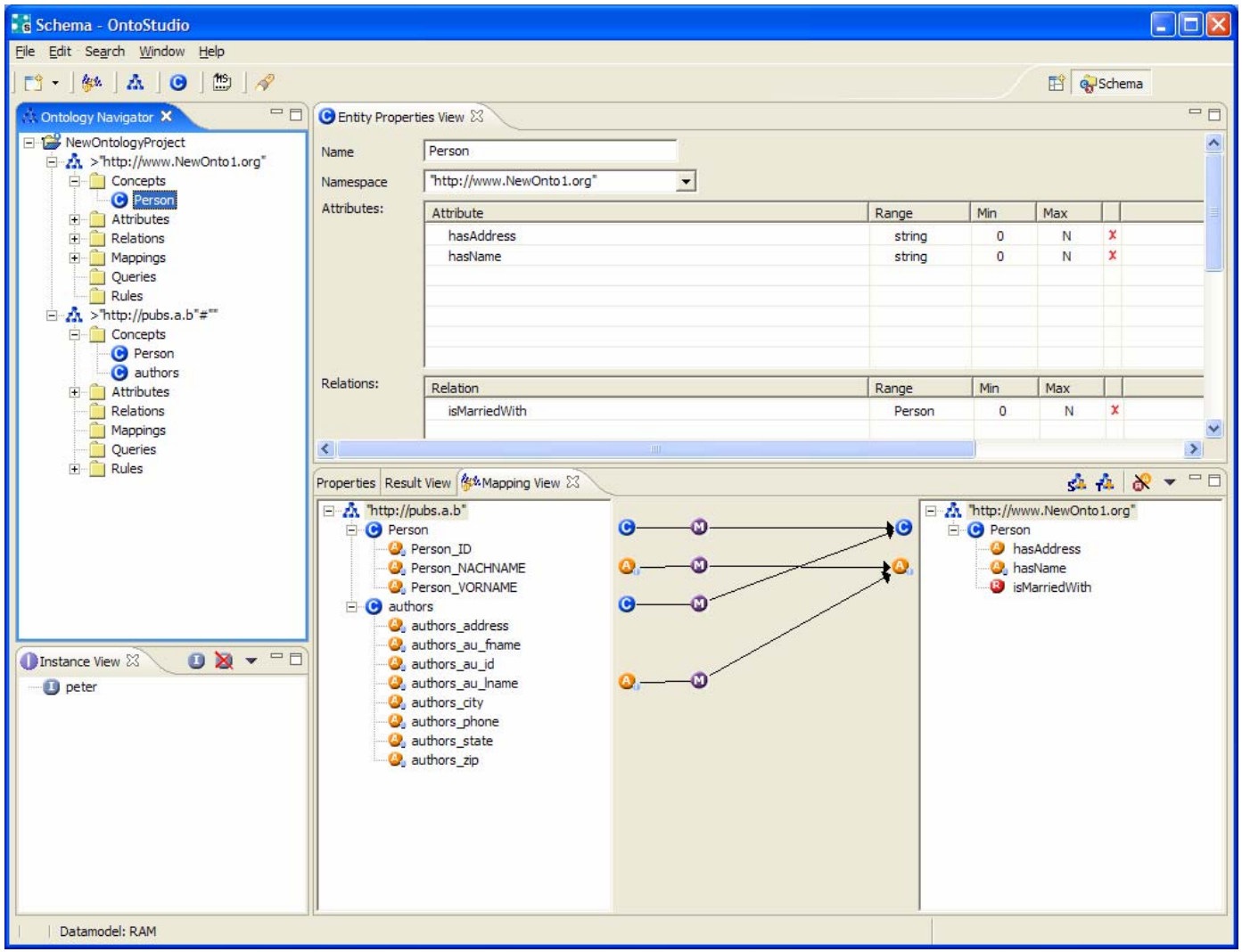

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Mapping Rules

FORALL VAR0, VAR1, VAR2, VAR3, VAR4, VAR5, VAR6, VAR7, VAR8

VAR0:Person
[hasName->>VAR2…..]
<-
VAR0:authors
[authors_au_id->>VAR1;authors_au_lname->>VAR2…..] .

FORALL VAR0,VAR1,VAR2,VAR3

VAR0:LaserPrinter[hasResolution->>VAR1; hasPrice->>VAR3;…]

<-
VAR0: Printer[ptype->>“Laser“; pres->>VAR1; pp->> VAR2]
AND VAR3 is VAR2*1.3.

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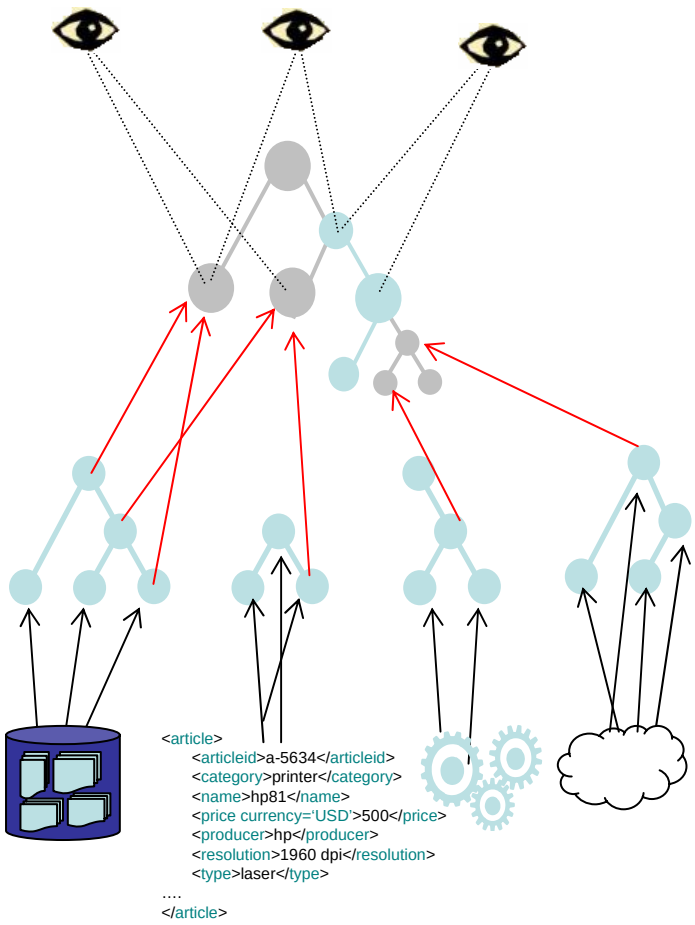
Concept



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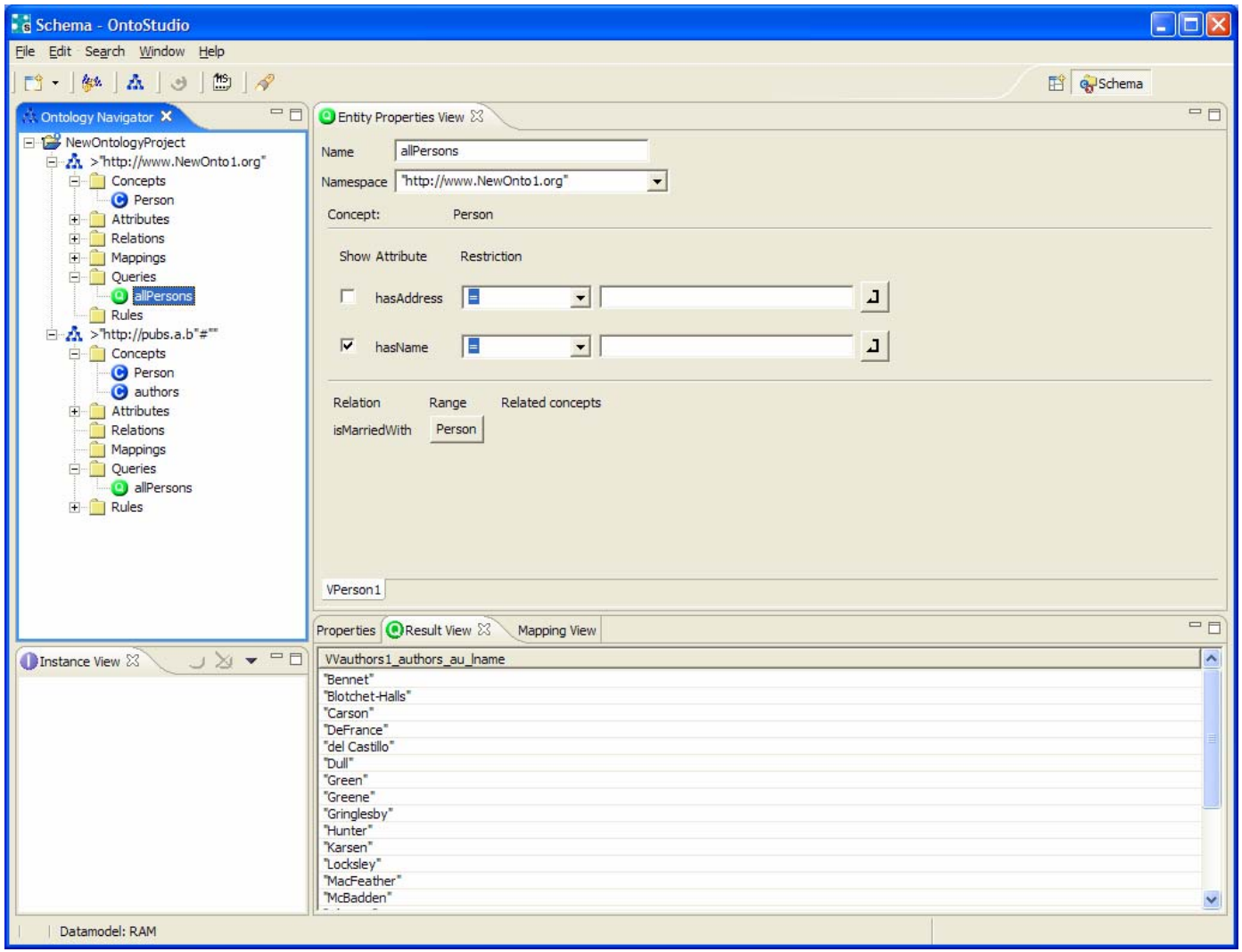


Runtime Performance

Which is the right evaluation sequence for the rule bodies?

Constraint satisfaction problem:

- **avoid table scans**
- **use key information, unique index information,….**

Solution:

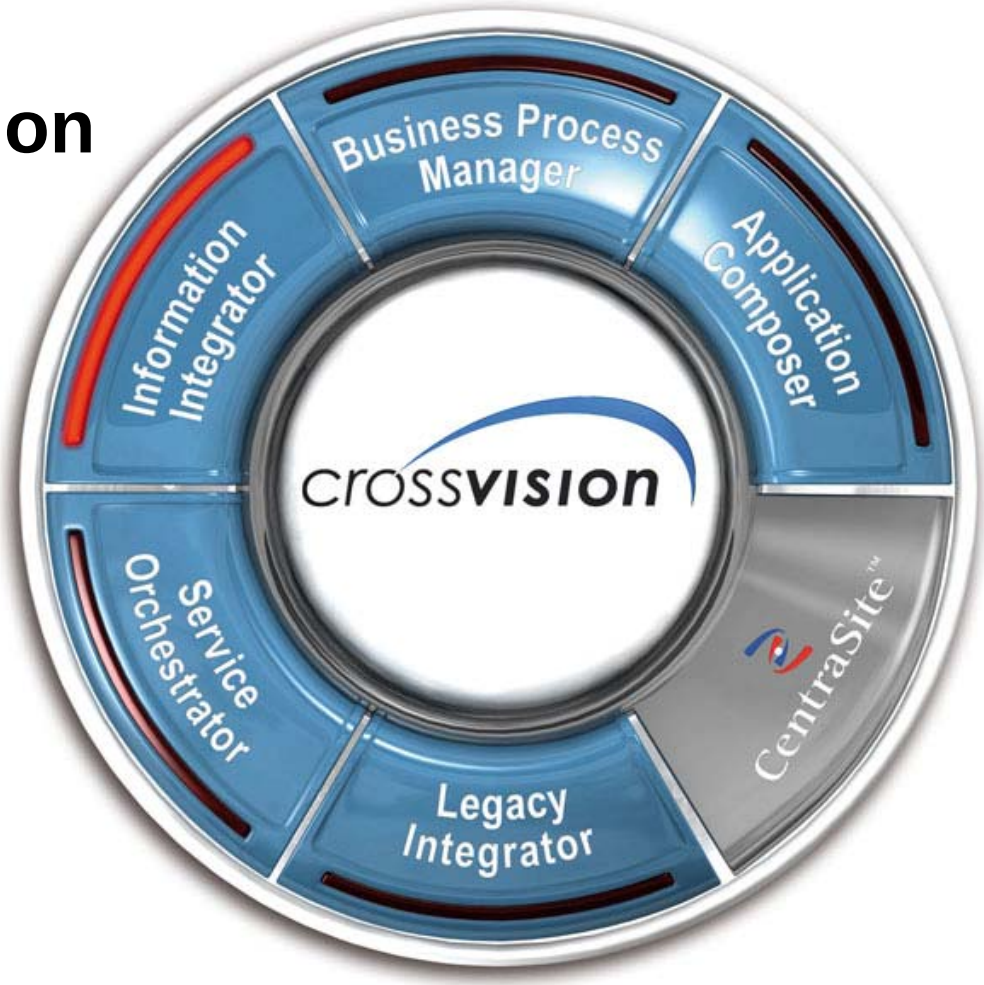
- **heuristics**
- **optimizer**

Software AG

- located in Darmstadt, Germany
- established in 1969
- about 2800 Employees
- customers in 73 countries
- core businesses:
  - Enterprise transaction systems (data management and processing)
  - crossvision – SOA integration suite

Software AG – crossvision – Information Integrator

Semantic Integration



Customer Information Gateway

Does a customer raising a support issue for a specific project have a valid maintenance contract for that product?

What is a customer‘s experience with our products?

- **client**
- **contact information**
- **contract**

- **customer**
- **contact information**
- **support case**

Customer Information Gateway – Source ontologies

Class „File151“
property „AA“ type integer
property „AB“ type date
property „AC“ type date
property „AD“ type string
…
Class „File87“
…

Customer Information System (Adabas)

File 151
Fields „AA“, „AB“, „AC“, „AE“

File 87
Fields „AA“, „AB“, „AC“

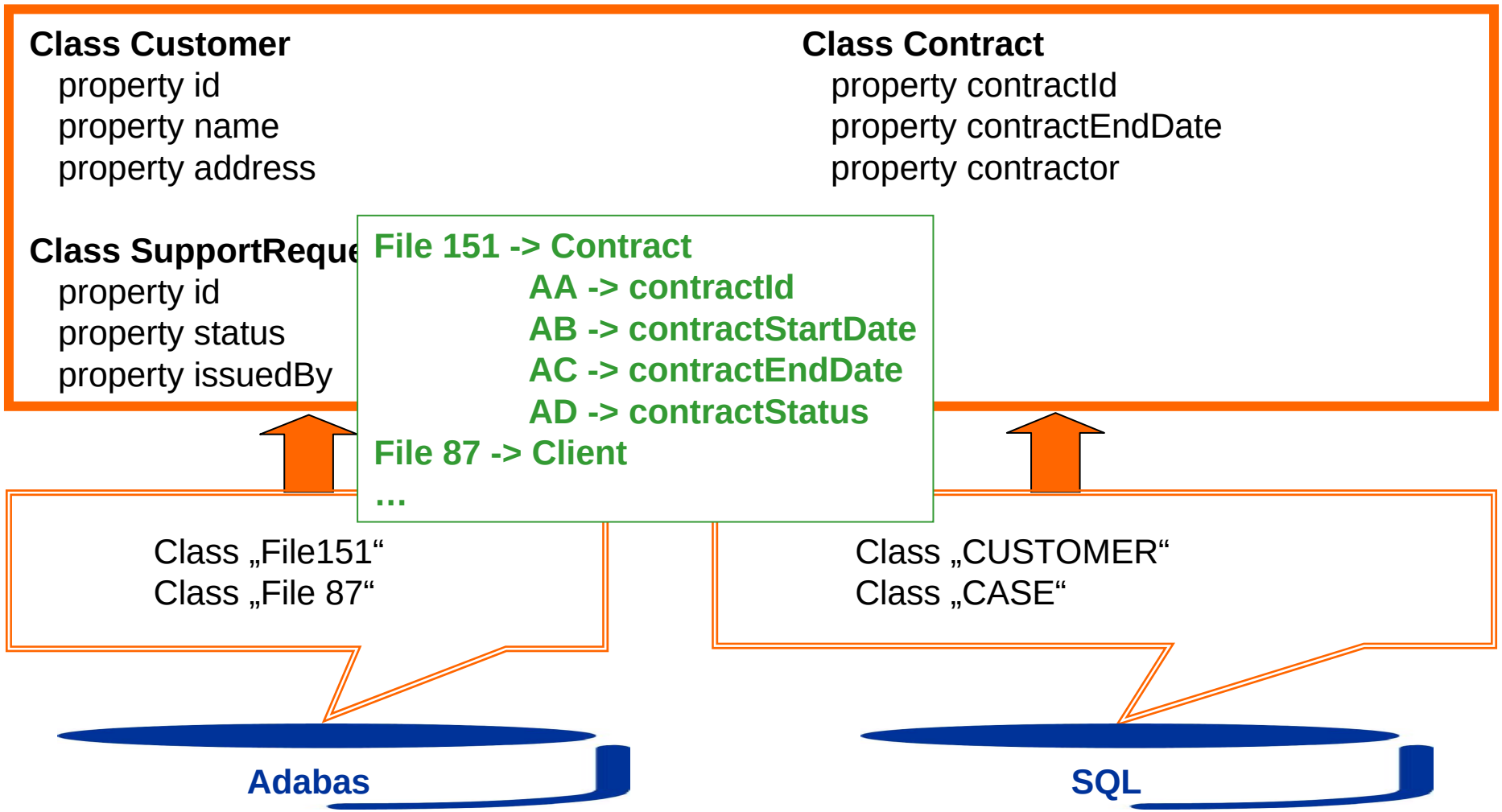
Class „CUSTOMER“
property „cid“ type integer
…
Class „CASE“
property „desc“ type string
property „cust “ type integer
property „belongsTo“ type „CUSTOMER“
…

Support Information System (SQL)

Table „CUSTOMER“

Table „CASE“

Customer Information Gateway - Mapping



Customer Information Gateway - Mapping

Class Customer
property id
property name
property address

Class SupportReques
property id
property status
property issuedBy

Class Contract
property contractId
property contractEndDate
property contractor

Class „File151“
Class „File 87“

- **Object identity**
- **Data type transformations**
- **Encoding of values**
- **Generation of object references**
- **Generation of inverse references**
- **N:M relations**

Customer Information Gateway - Queries

For given SupportRequest search for the corresponding Contract

Class Customer
- property id
- property name
- property address

Class SupportRequest
- property id
- property status
- property issuedBy

Class Contract
- property contractId
- property contractEndDate
- property contractor

Customer Information Gateway

For given Customer search for all their SupportRequests

Class Customer
- property id
- property name
- property address

Class SupportRequest
- property id
- property status
- property issuedBy

Class Contract
- property contractId
- property contractEnd
- property contractor

Customer Information Gateway – Query Performance

- Avoid full scans on source data
- Exploit data sources‘ query capabilities
  - filter predicates (more than one)
  - joins
  - indexes
  - uniqueness

Customer Information Gateway – Summary

- First (simple) use case
- Different data sources
- Mappings and queries
- Beside data integration not many additional rules
- Performance

- Continue work in context of EU projects
  - NEON
  - Semantic Gov

Customer Information Gateway

Let‘s pump information we have never seen before from the data!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