

Mathematical Logics

Applications of Description Logic

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**Originally by Luciano Serafini and Chiara Ghidini
Modified by Fausto Giunchiglia and Mattia Fumagalli*

Motivation of uses of DL

1. Relational databases: Enterprise DB consistency, constrained Q/A
2. ER models: automatic validation of requirements
3. Knowledge Graphs: consistency, constrained Q/A in Data Integration, Web applications

1. Introduction
2. Relational databases
3. ER models
4. Knowledge Graphs

Limitations of databases w.r.t. DL

Employee			
Name	Role	Nationality	Supervises
Fausto	Professor	Italian	Rui
Rui	Student	Chinese	Bisu
Bisu	Student	Indian	-

- No negation
- No disjunction
- Ambiguous support for incomplete information (null values)
- The database represents a *single model*.
- Hence, inference is just model checking.

Defining a TBox and ABox for a database

Employee			
Name	Role	Nationality	Supervises
Fausto	Professor	Italian	Rui
Rui	Student	Chinese	Bisu
Bisu	Student	Indian	-

Individual Class Attribute Relation

TBox = {Professor \sqsubseteq Employee, Student \sqsubseteq Employee}

ABox = {Professor(Fausto), Student(Rui), Student(Bisu),
Nationality(Fausto, Italian), Nationality (Rui, Chinese),
Nationality (Bisu, Indian), Supervises(Fausto, Rui),
Supervises(Rui, Bisu)}

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