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OBDA: Theory and Practice

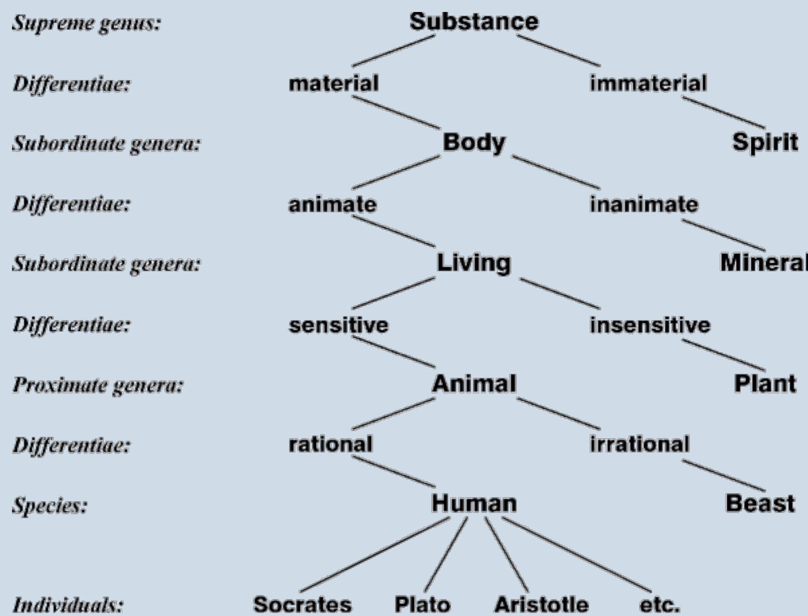
Ian Horrocks
Information Systems Group

What is an Ontology?

What is an Ontology?

A fundamental branch of **metaphysics**

- Studies “being” or “existence” and their **basic categories**
- Aims to find out what **entities** and **types of entities** exist



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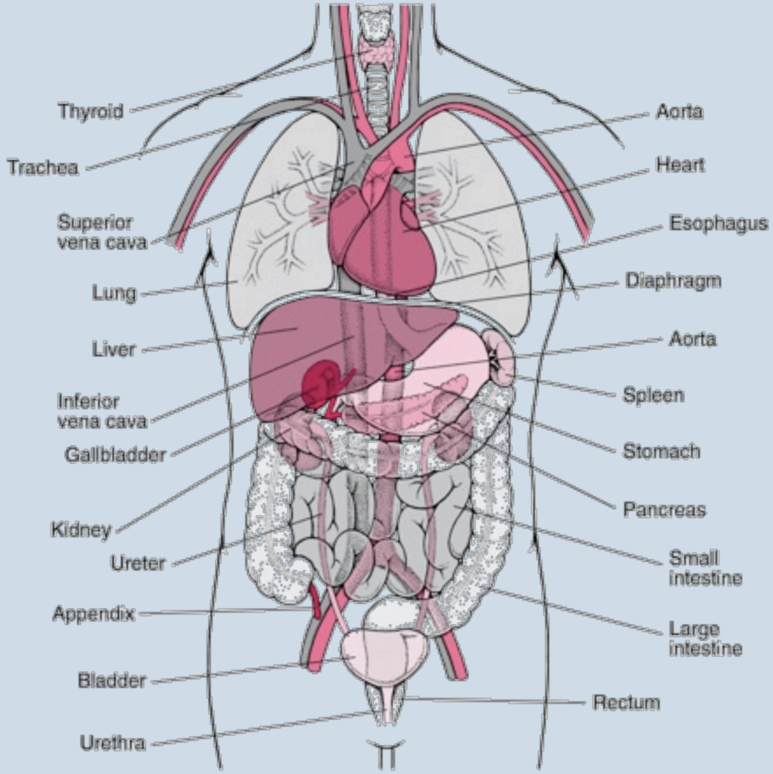

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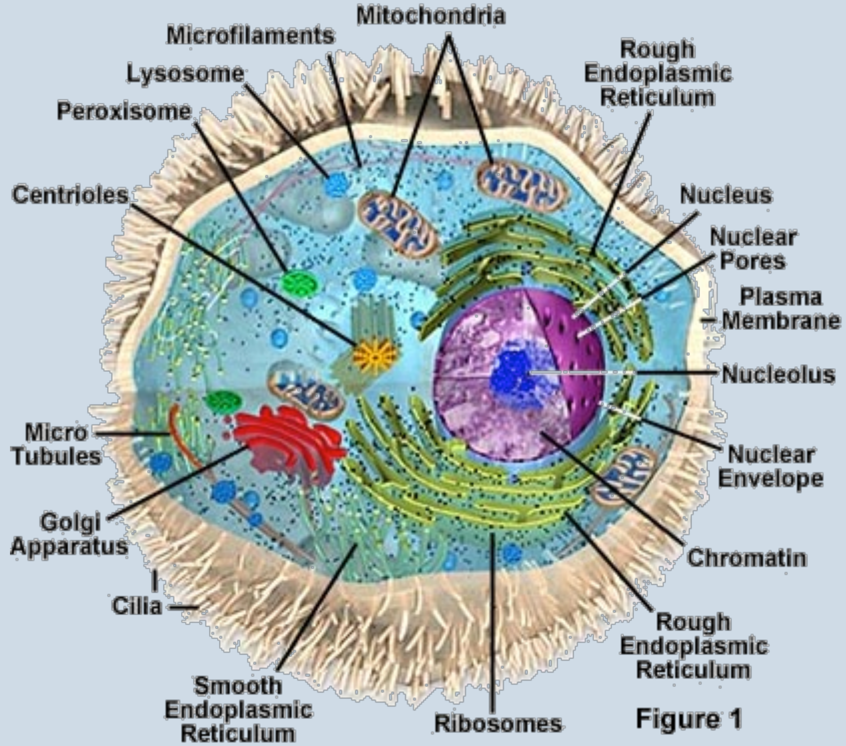

Figure 1

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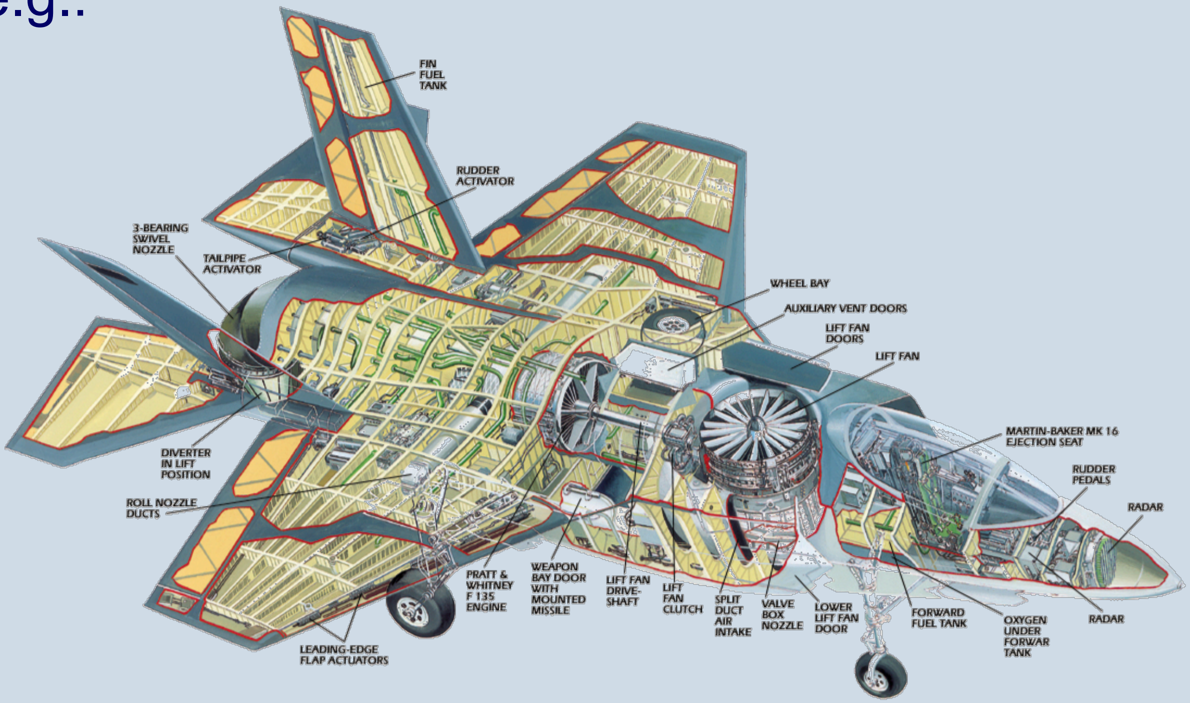

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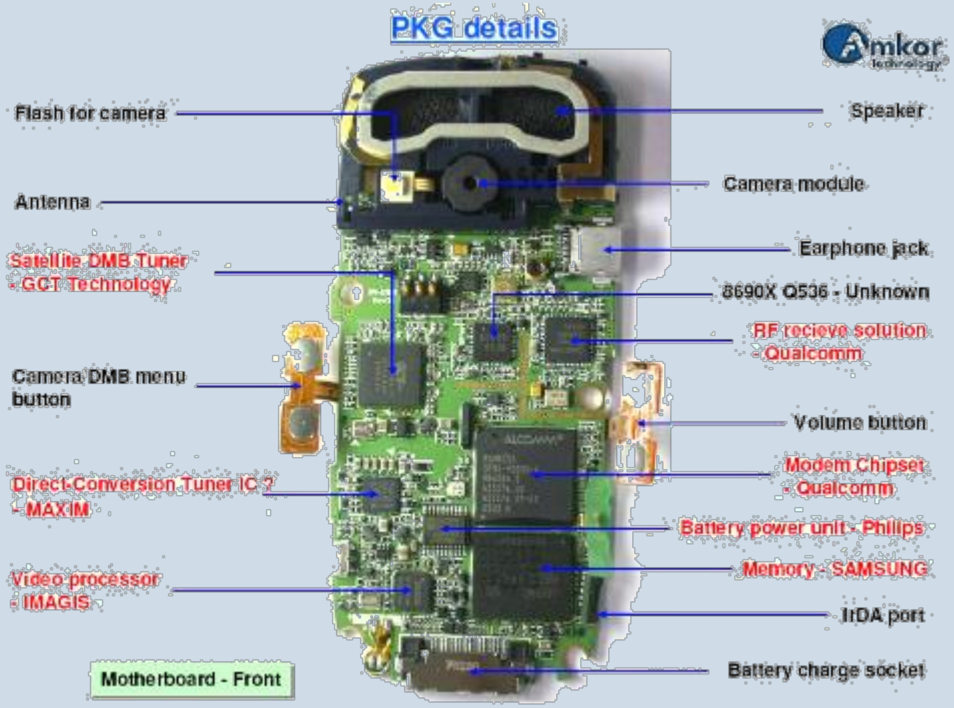

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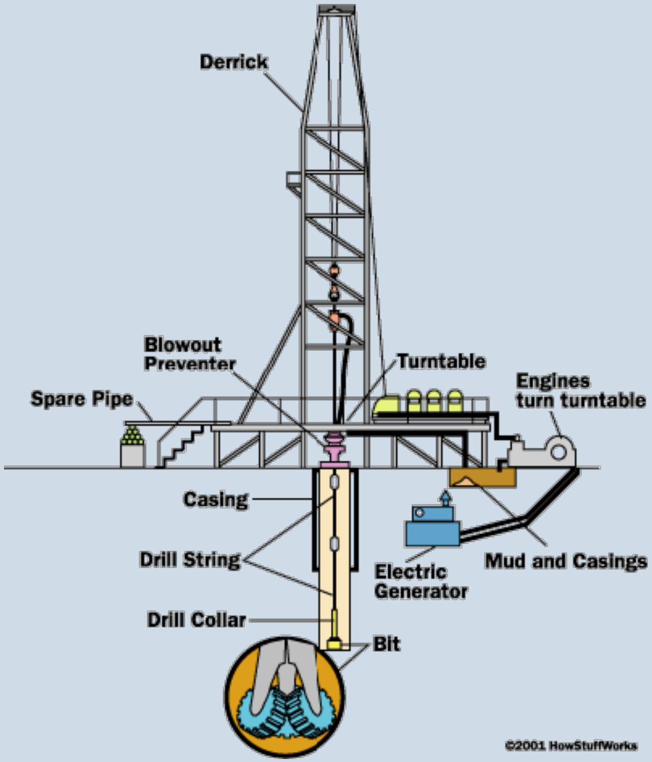

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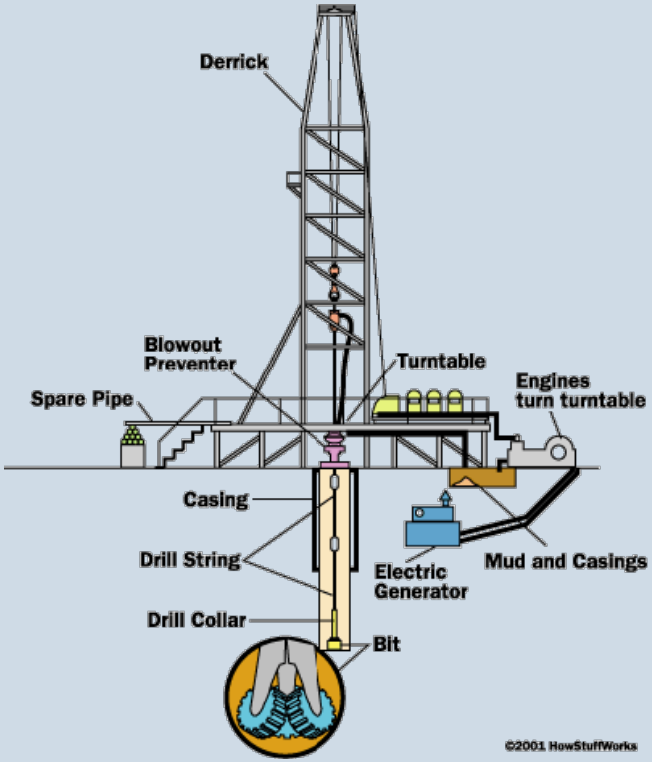

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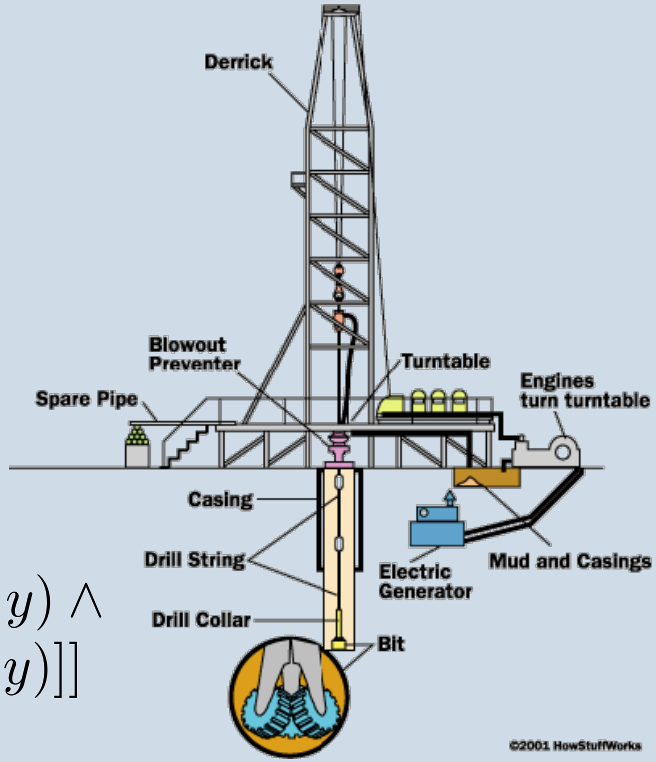

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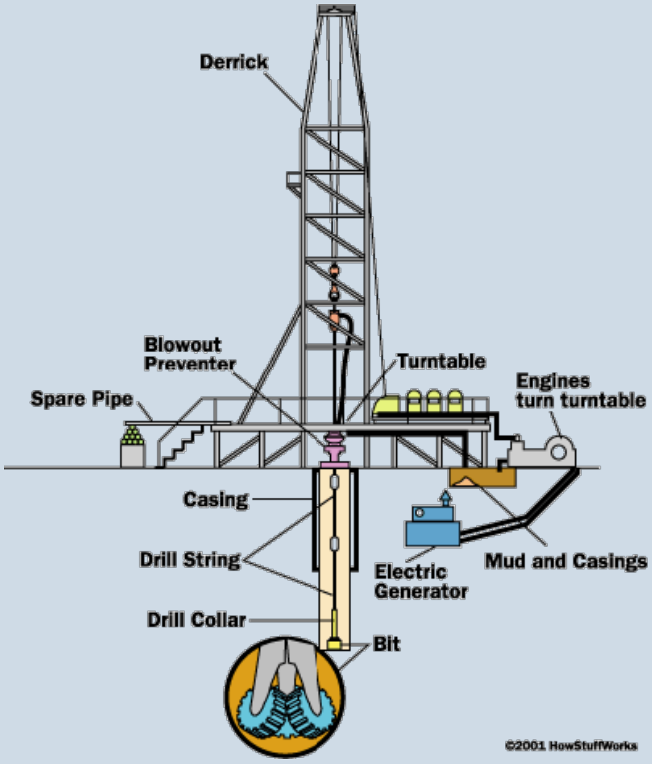

Applications: Semantic Web

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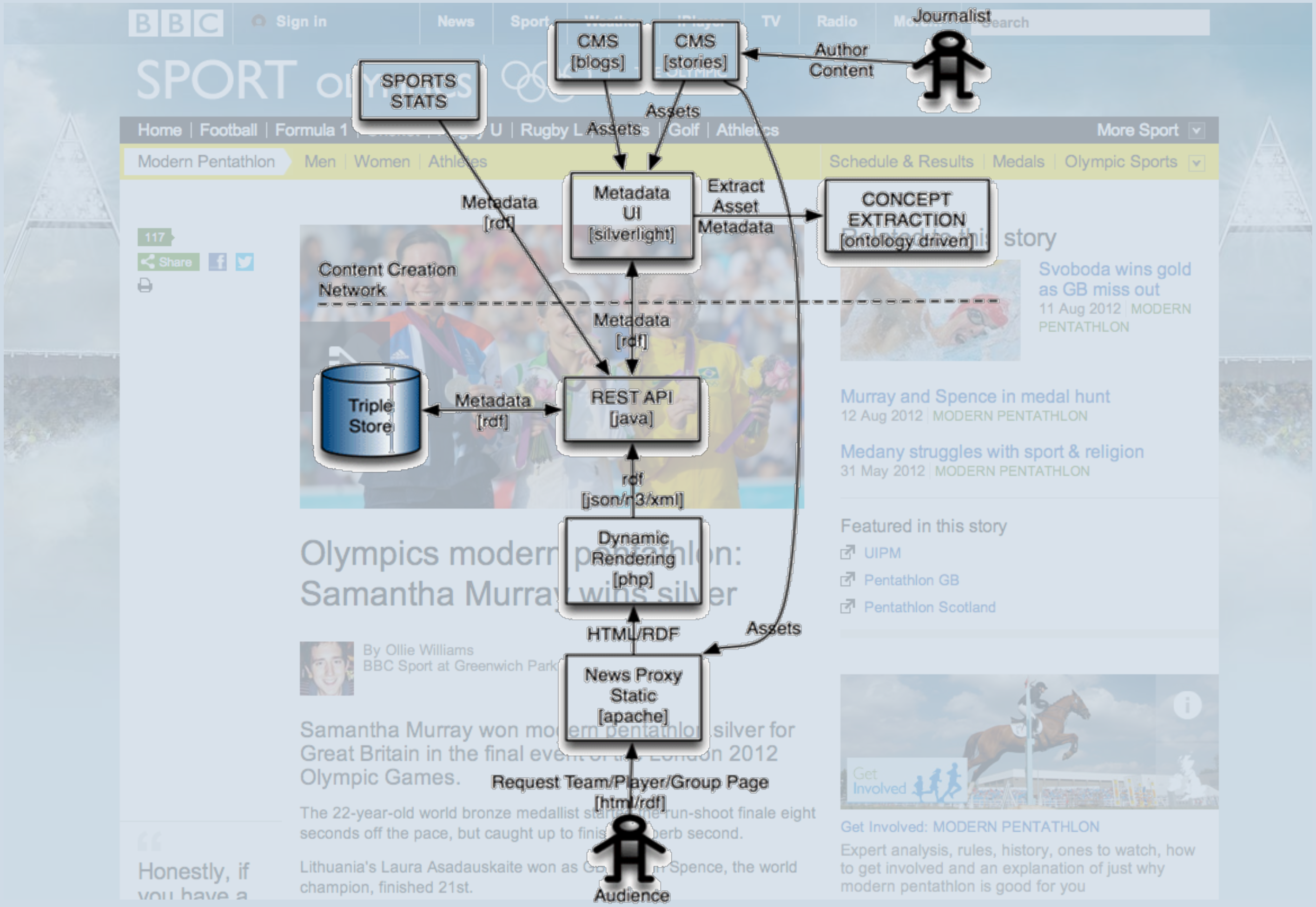

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Semantic Technologies

- SemWeb motivated development of **robust infrastructure**:

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  - Languages

W3C OWL
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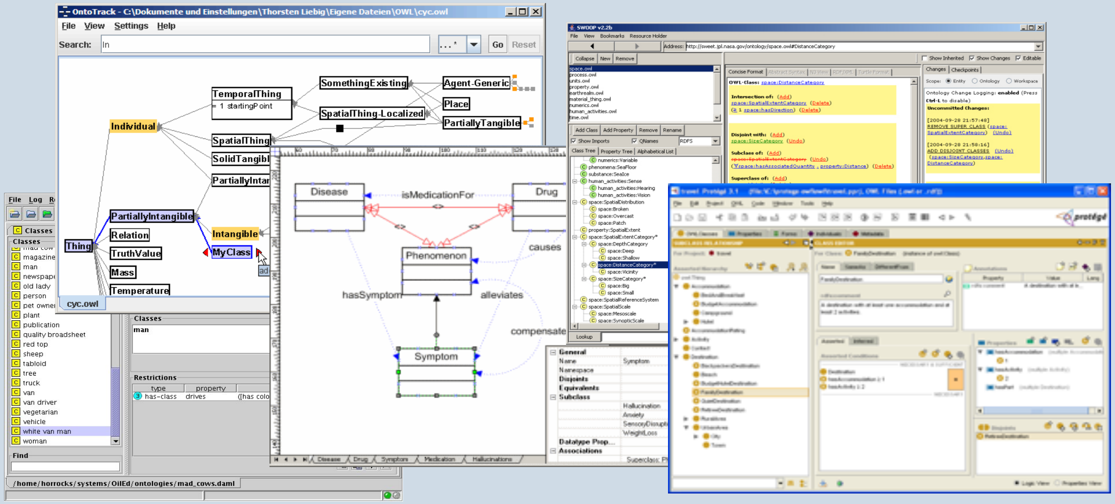

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Semantic Technologies

- SemWeb motivated development of **robust infrastructure**:
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    - Development tools
- Increasingly used in “Intelligent Information Systems”, and in particular **Ontology Based Data Access (OBDA)**

Applications: HCLS

- **OBO foundry** includes more than 100 biological and biomedical ontologies
- **Siemens** "actively building OWL based clinical solutions"
- **SNOMED-CT** (Clinical Terms) ontology
  - used in healthcare systems of more than 15 countries, including Australia, Canada, Denmark, Spain, Sweden and the UK
  - also used by major US providers, e.g., Kaiser Permanente
  - ontology provides common vocabulary for recording clinical data

Applications: Energy Supply Industry

- **EDF Energy** offer personalised energy saving advice to every customer

- **OWL ontology** used to model relevant environmental factors
- **Oxford's HermiT reasoner** used to match customer circumstances with relevant pieces of advice

Applications: Intelligent Mobile Platform

- **Samsung** developing Intelligent Moblile Platform to support context-aware applications
- IMP monitors environment via **sensor data** (GPS, compass, accelerometer, ...)
- **OWL ontology** used to model environment and **infer context** (e.g., coffee with friends)
- Applications exploit context to enable more **intelligent behaviour**

Applications: **OBDA**

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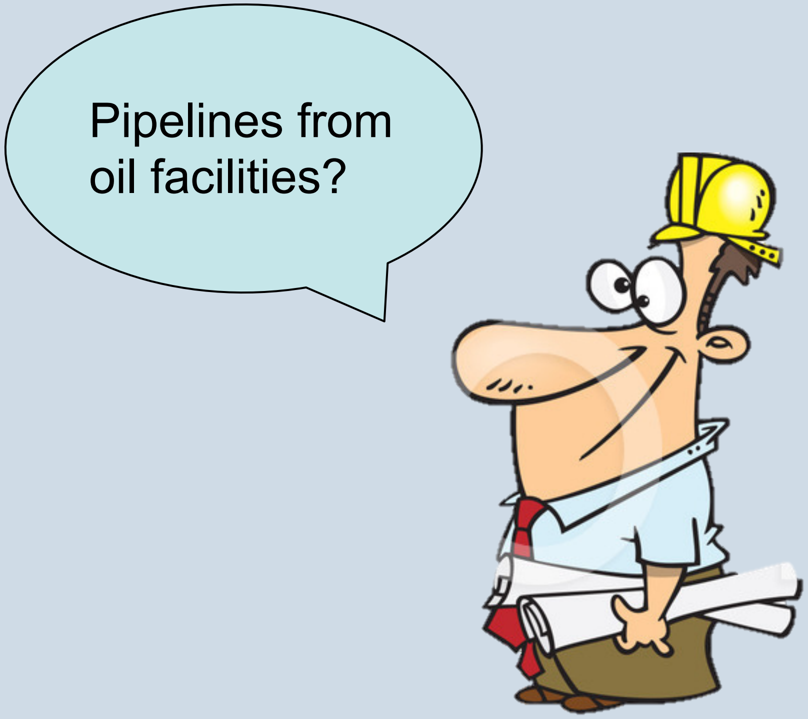

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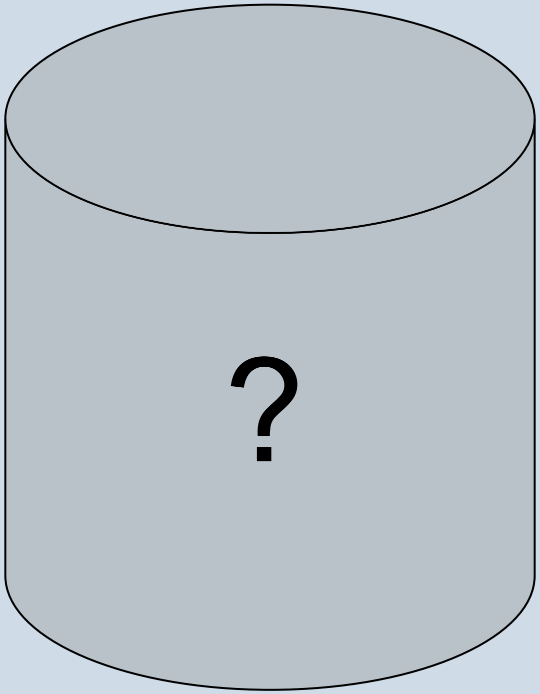

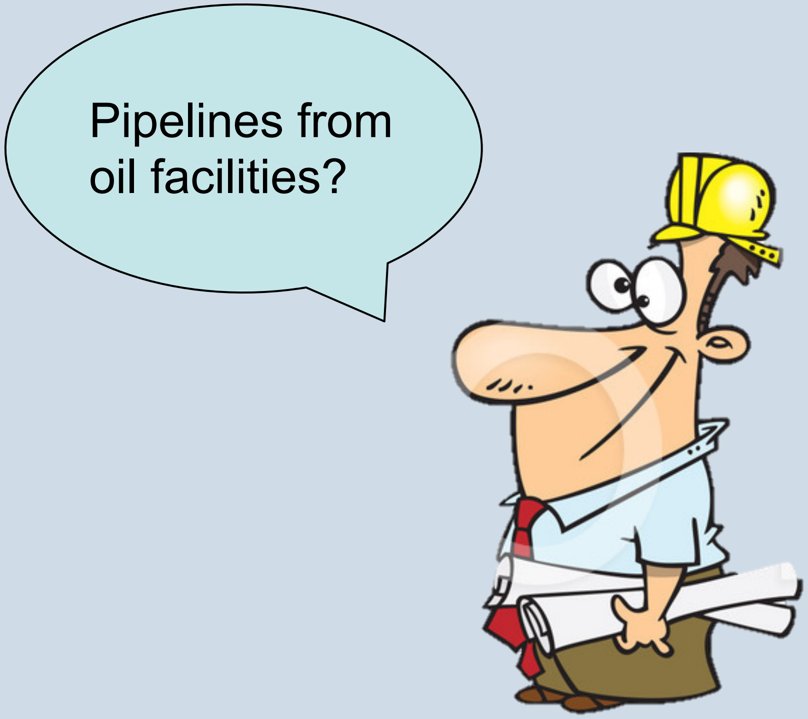

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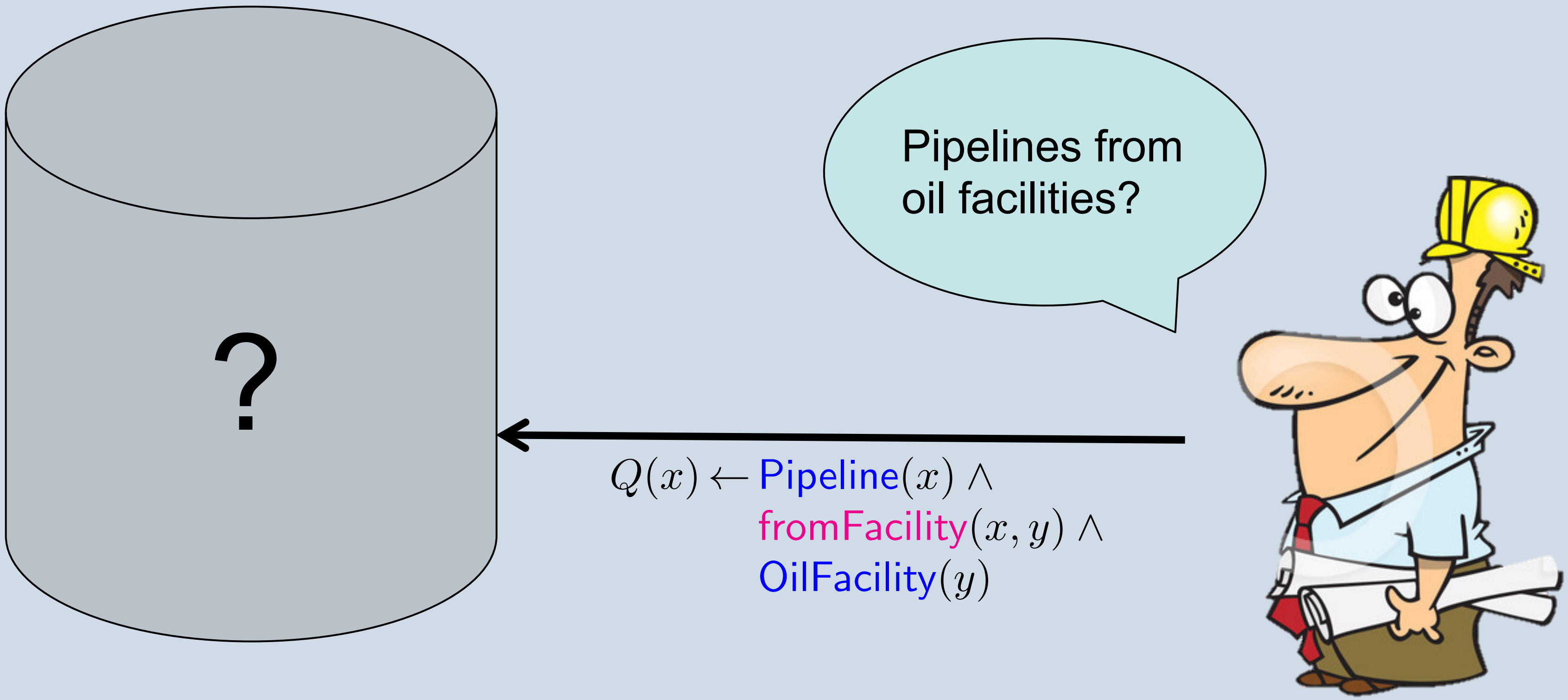

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Applications: **OBDA**

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Pipelines from oil facilities?

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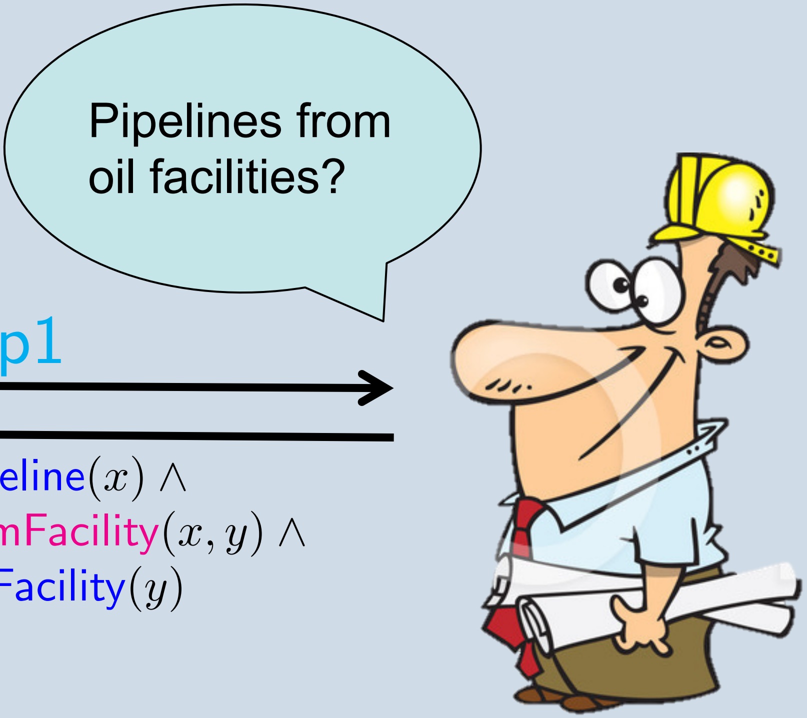

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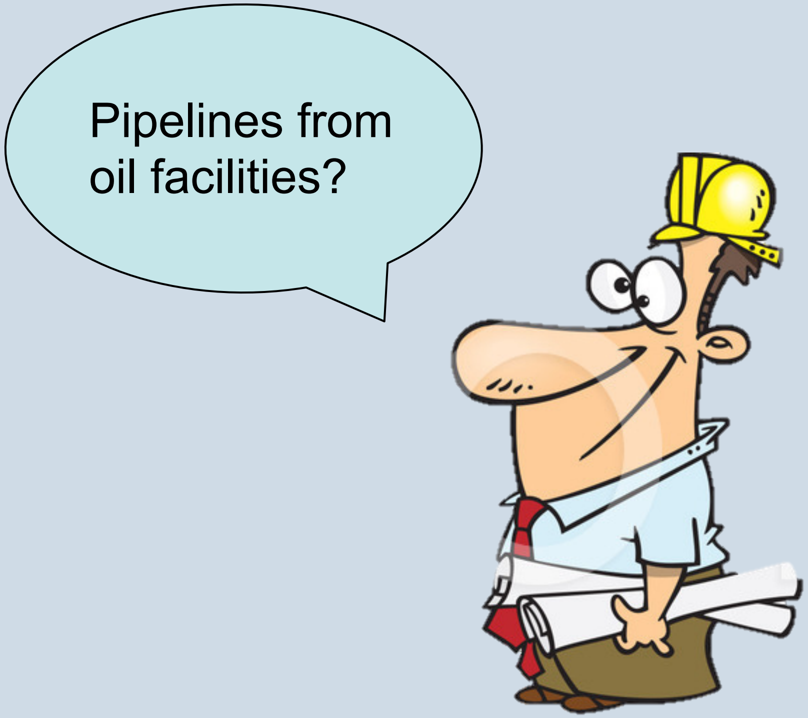

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OBDA: Practical Issues

- Scalability is always an issue, particularly when we have
  large and heterogeneous data sources

- Can be a large (startup) cost for
  building and maintaining ontologies (and mappings)

- Users may still have difficulty
  formulating queries

Optique Objectives

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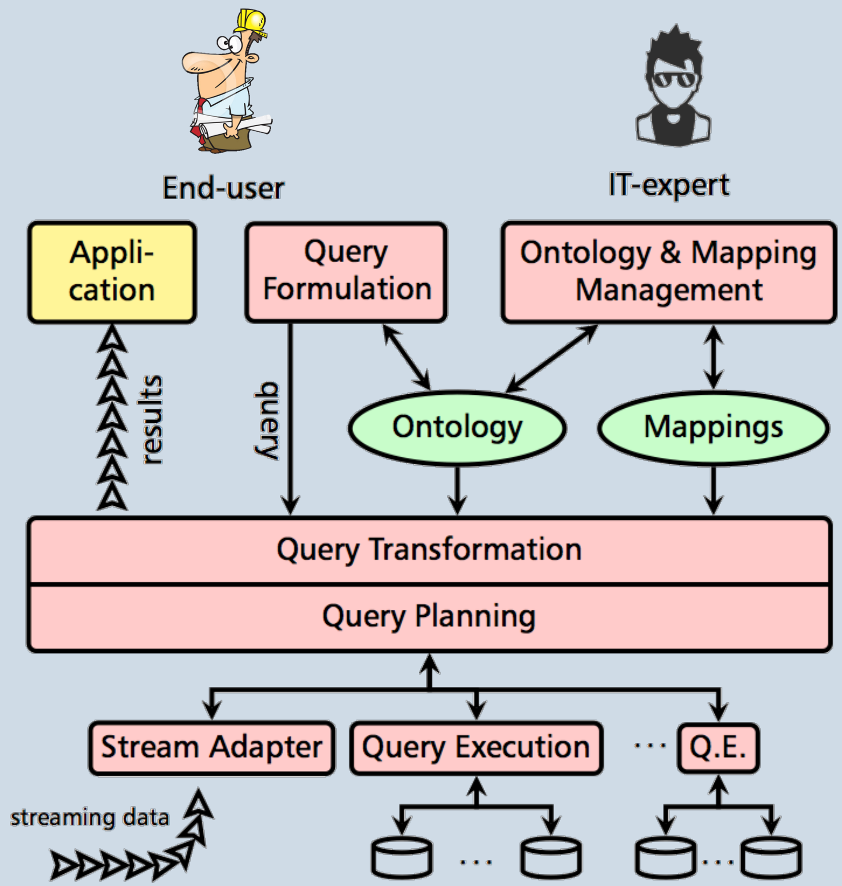
- Enable users to rapidly formulate **intuitive queries** using familiar vocabularies and conceptualisations
- Return **timely answers** from large scale and heterogeneous data sources

Optique Solution



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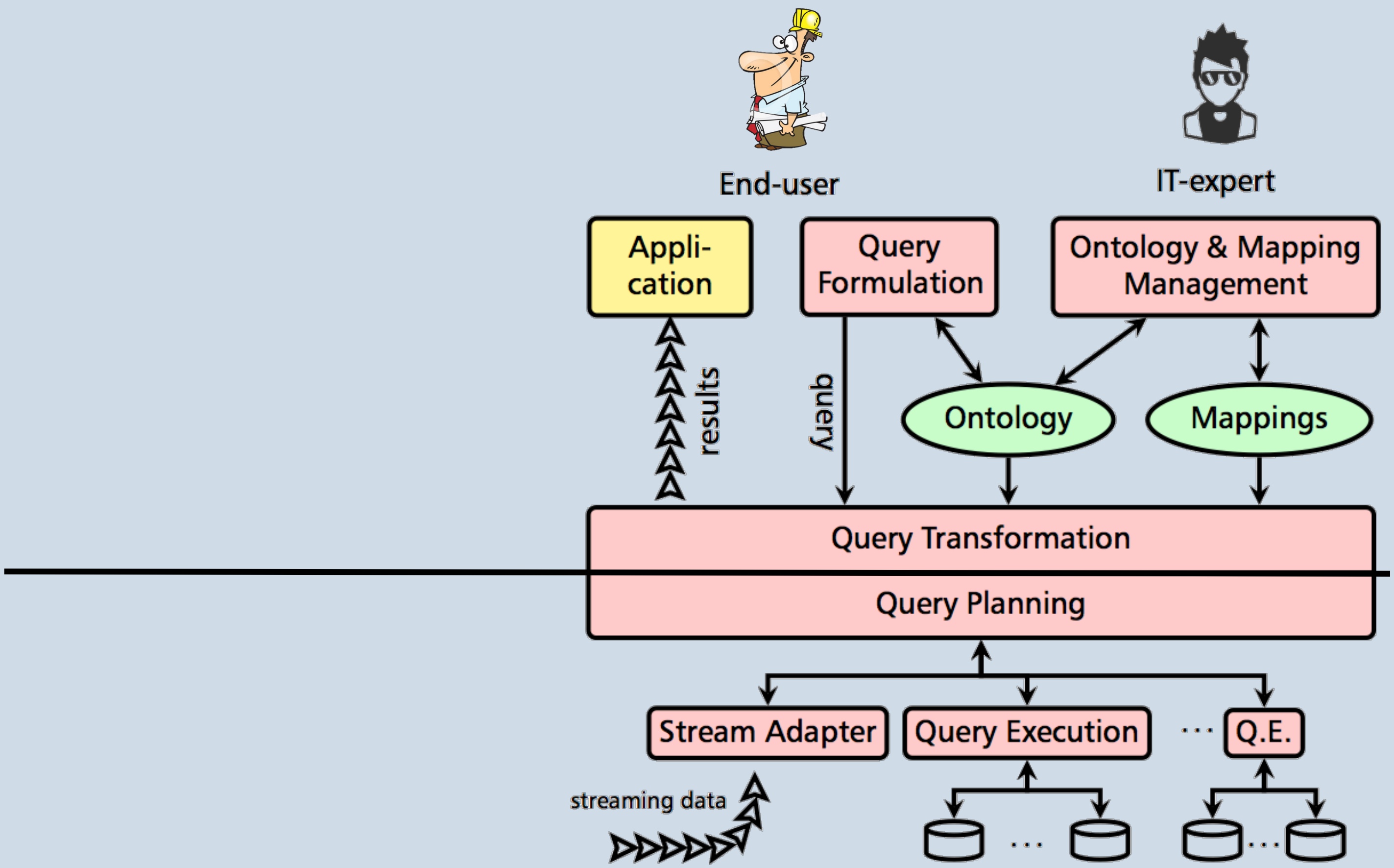

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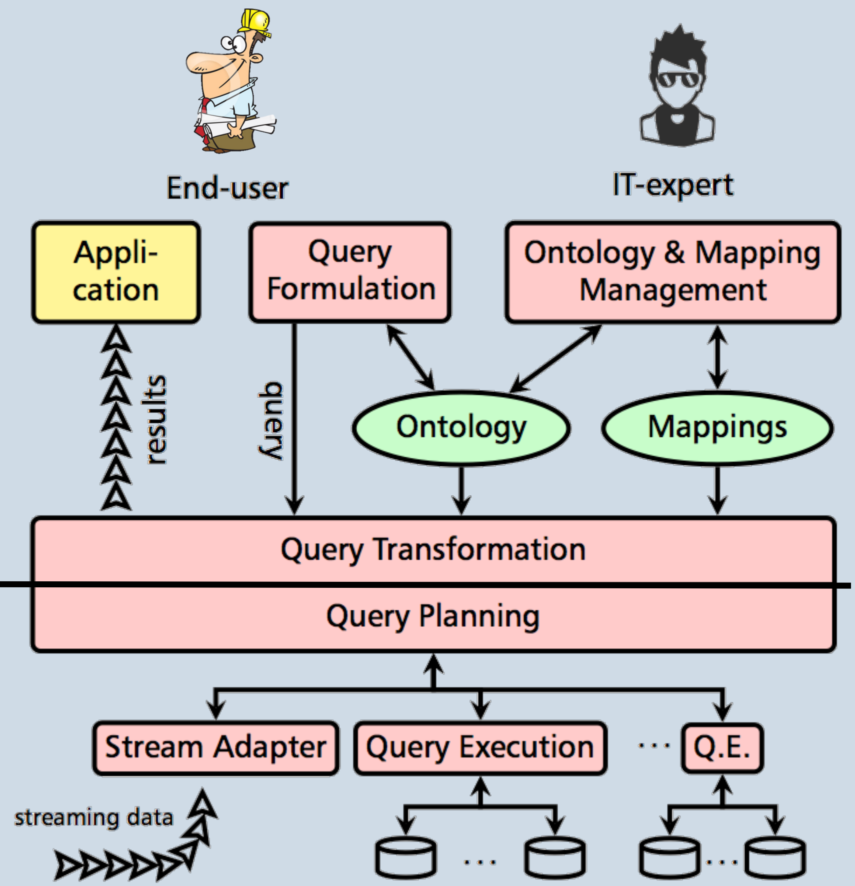

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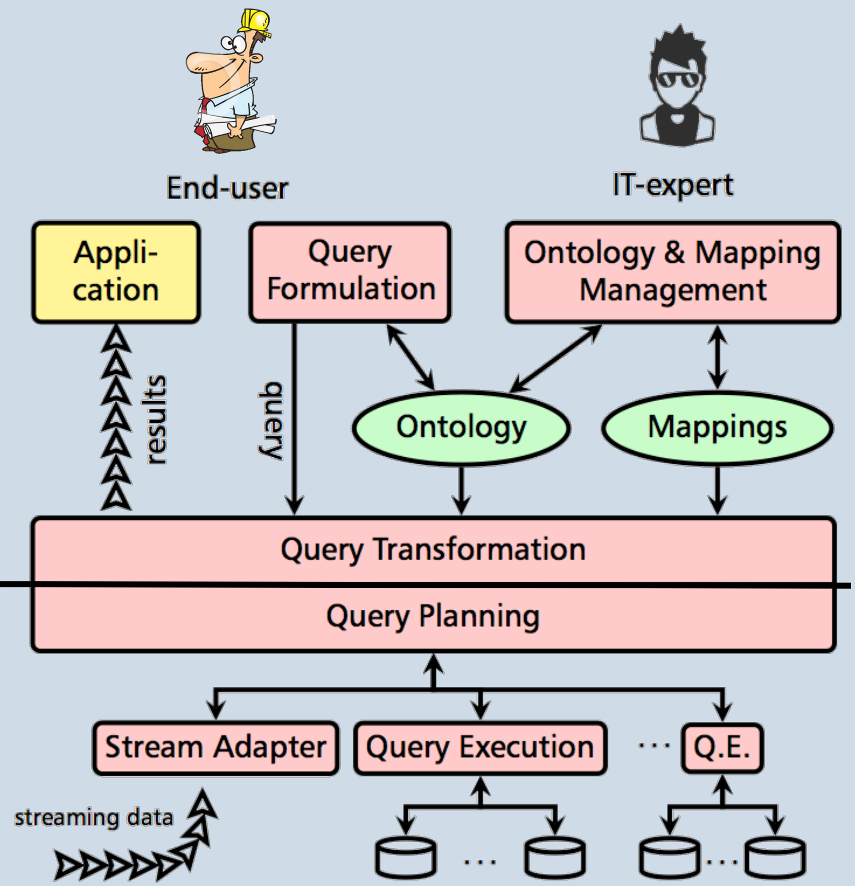

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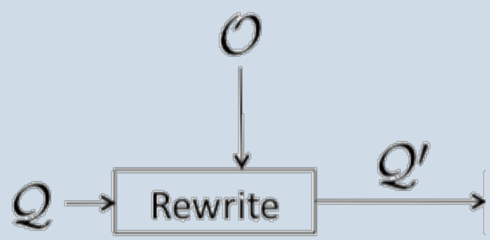

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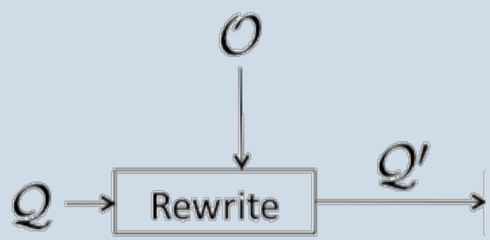

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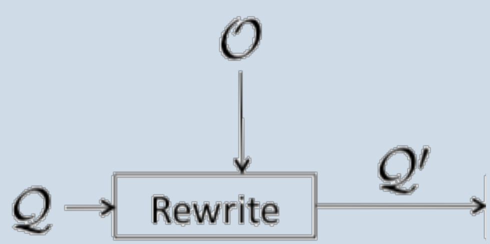

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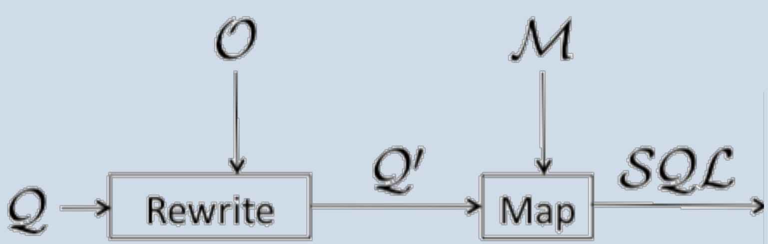

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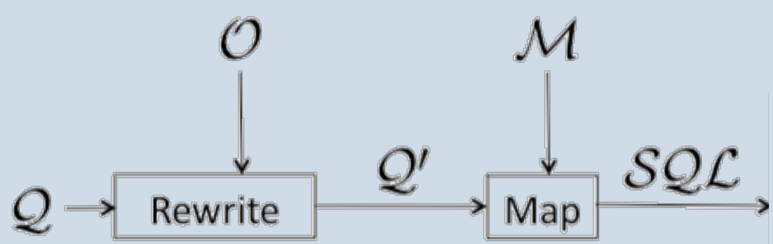

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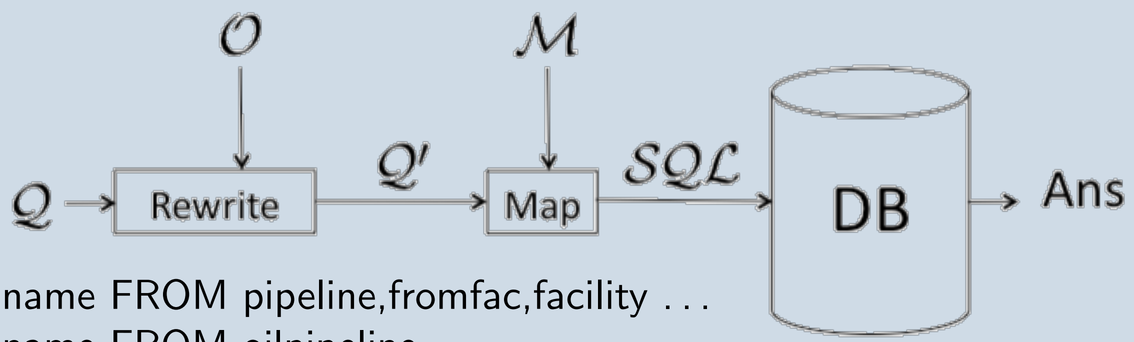
- **Evaluate** (SQL) query against DB



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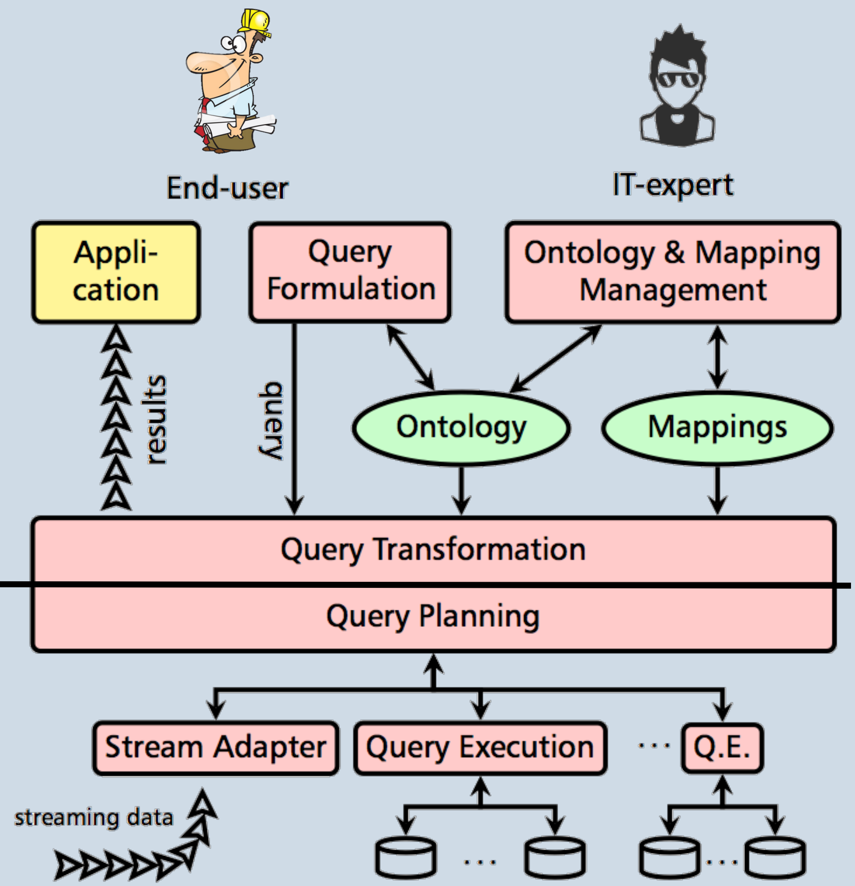

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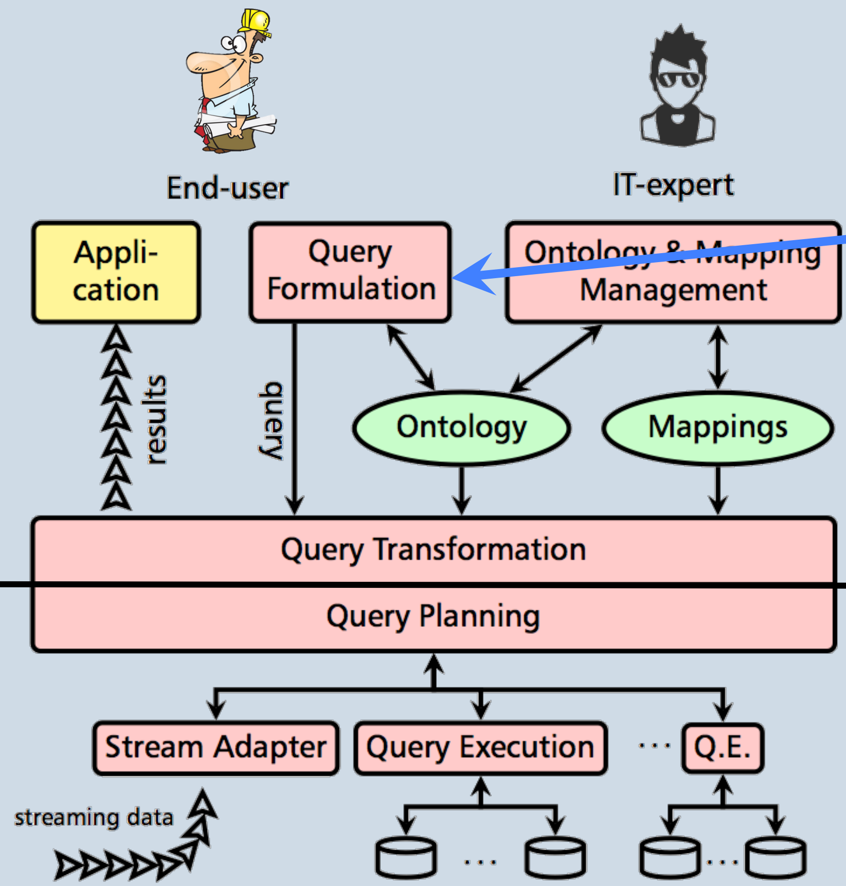

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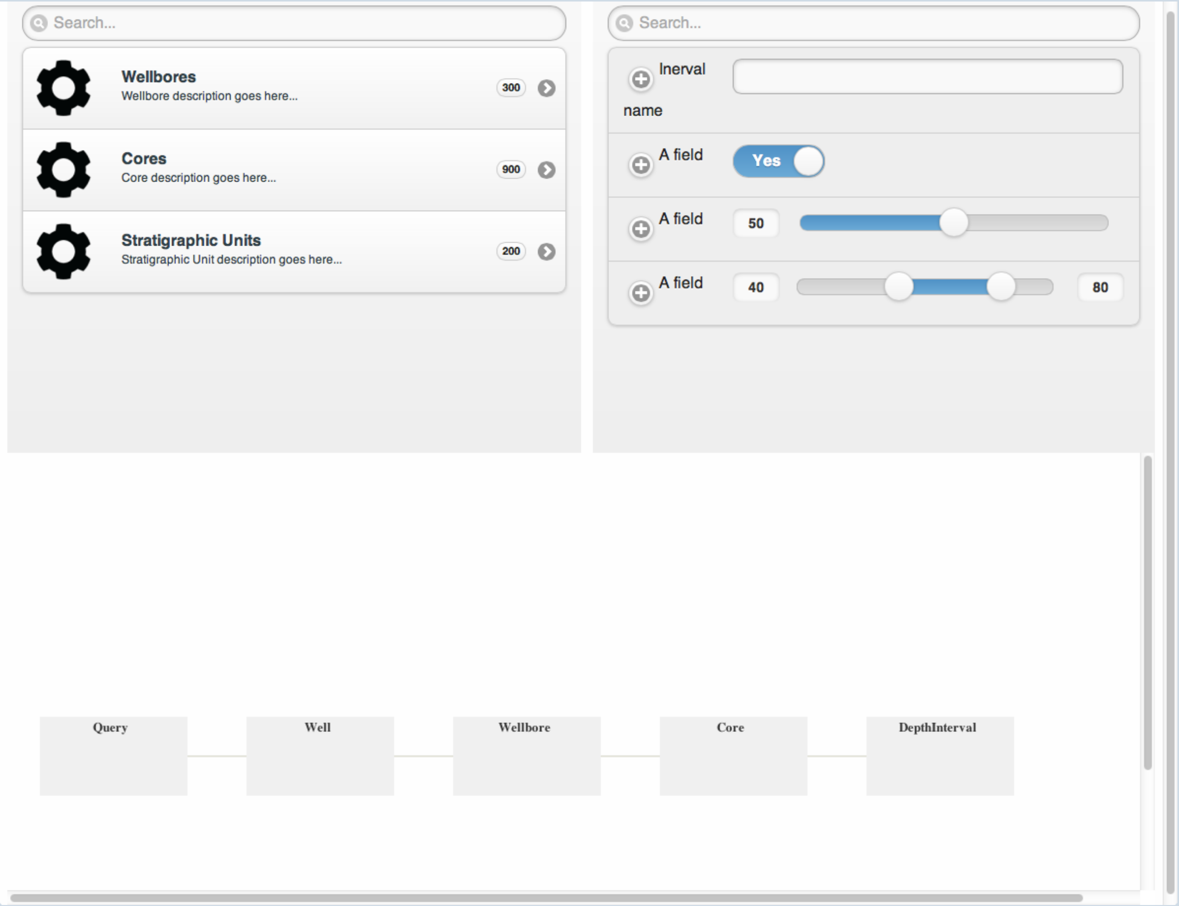

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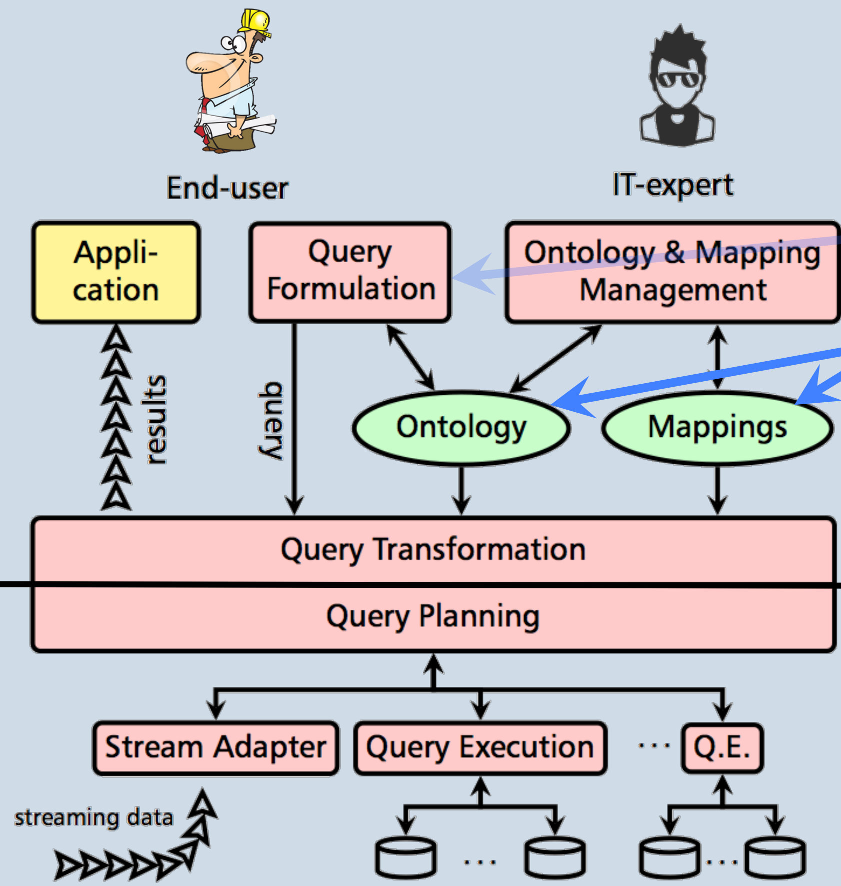

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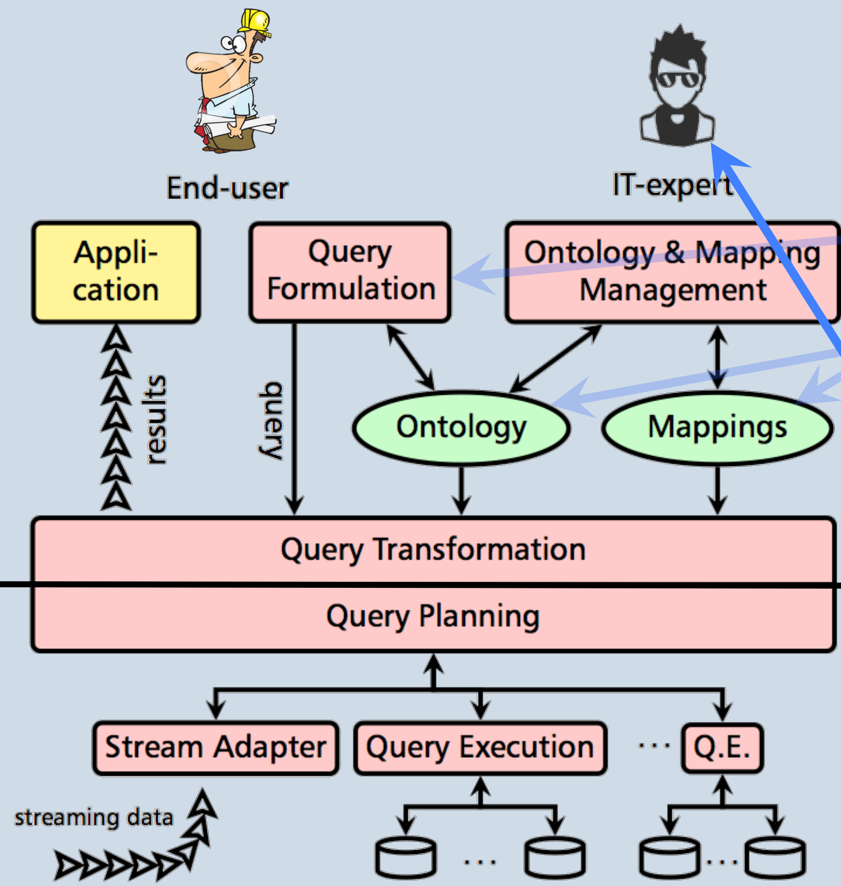

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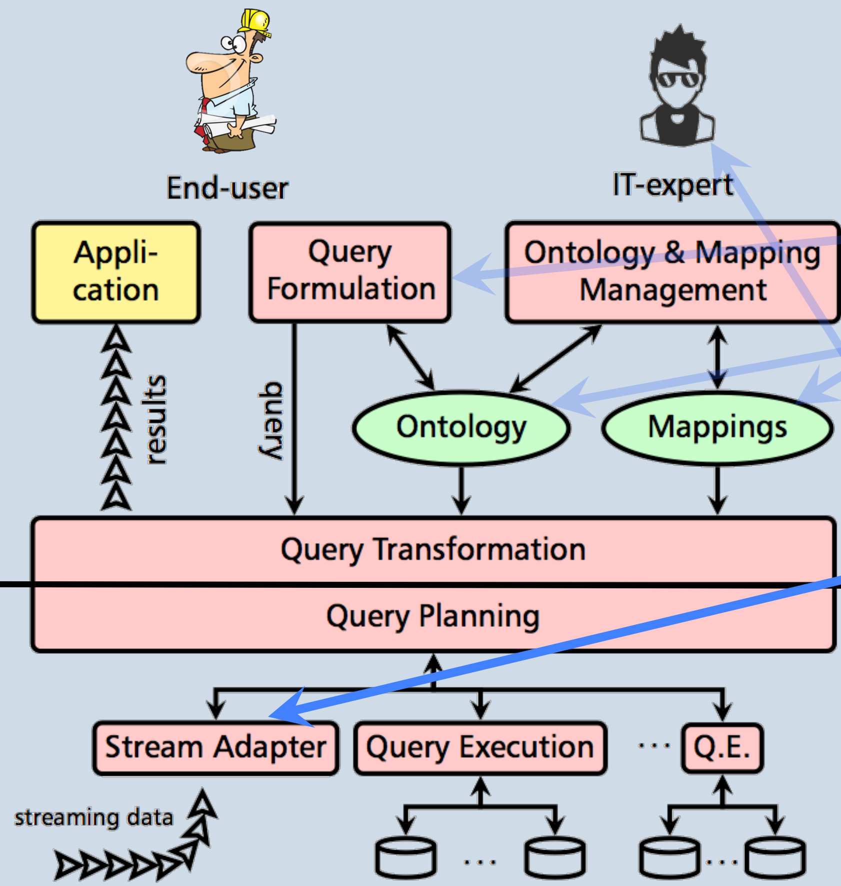

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Adapter to support streaming data

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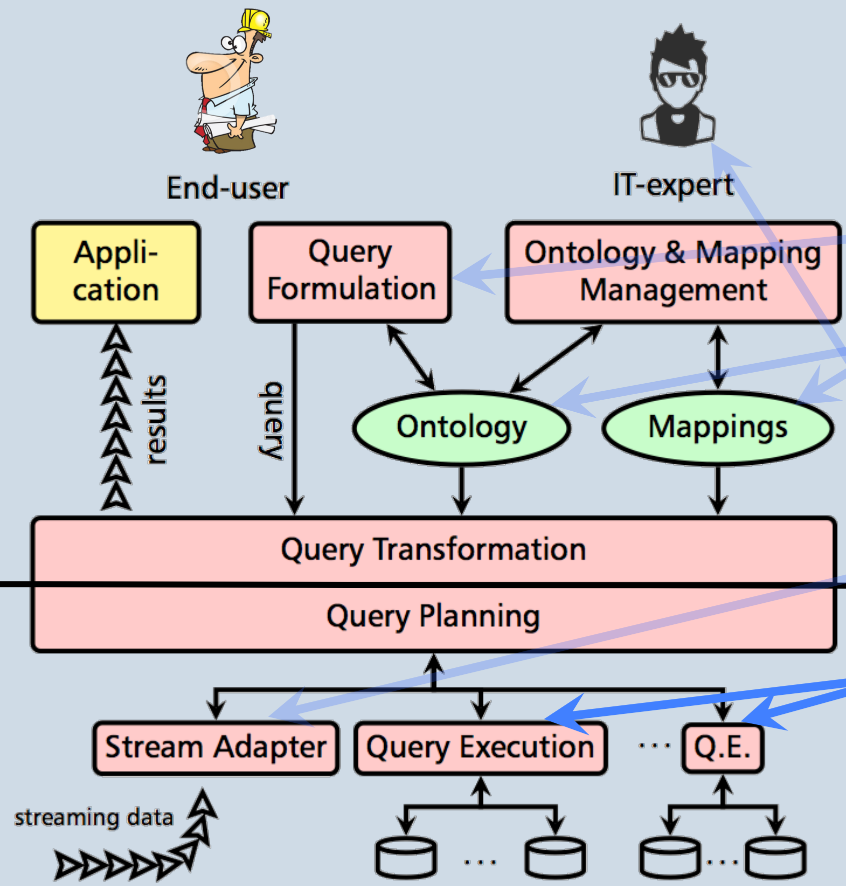

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Distributed query execution

UiO University of Oslo

UNIVERSITY OF OXFORD

Statoil

fluid Operations

National and Kapodistrian UNIVERSITY OF ATHENS

SIEMENS

SAPIENZA UNIVERSITÀ DI ROMA

TUHH

Hamburg University of Technology
Department of Telecommunications

DNV

Freie Universität Bozen
Libera Università di Bolzano
Free University of Bozen · Bolzano

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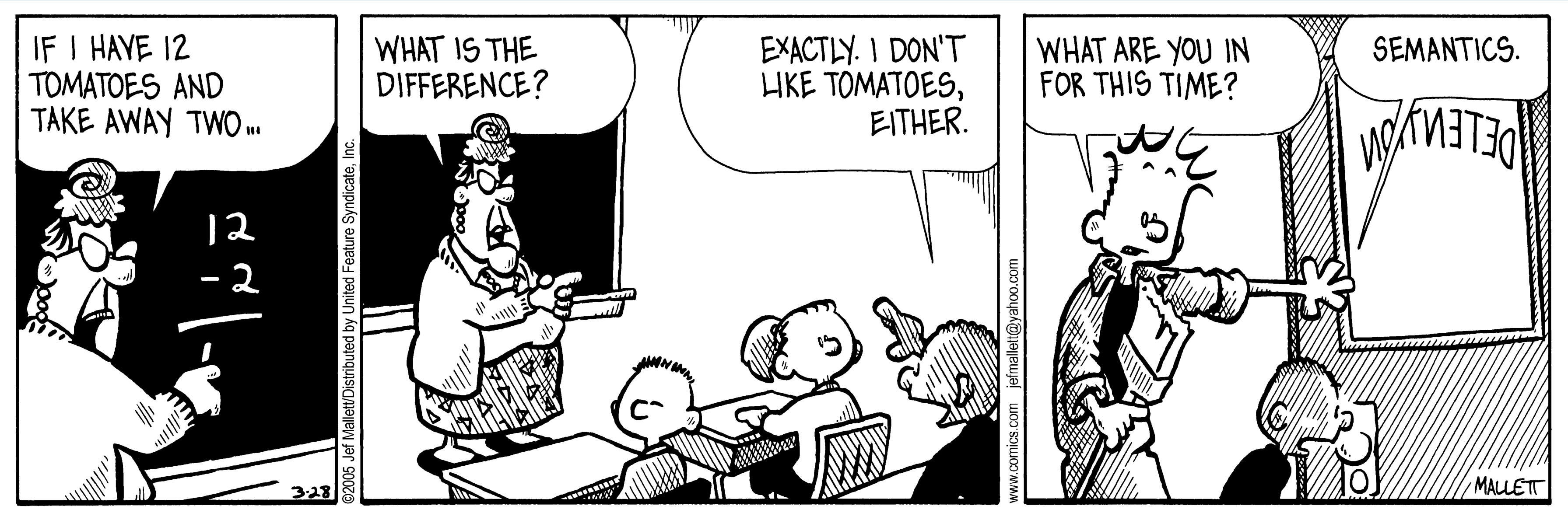
Thank you for listening



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Any questions?

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