The Eclipse/GMT MoDisco Component

Overview

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Outline

- Introduction

- Background

- Discovery Principles

- Motivating Examples

- Component Description

- Benefits of the Approach

- Organization

- Roadmap

- First Use Cases Descriptions

Introduction

- MoDisco for "**Model Discovery**"

- Eclipse GMT component for model-driven reverse-engineering (MDRE)

- Extraction of models from legacy systems
  - Different natures and technologies

- A Generic and extensible metamodel-driven approach to model discovery
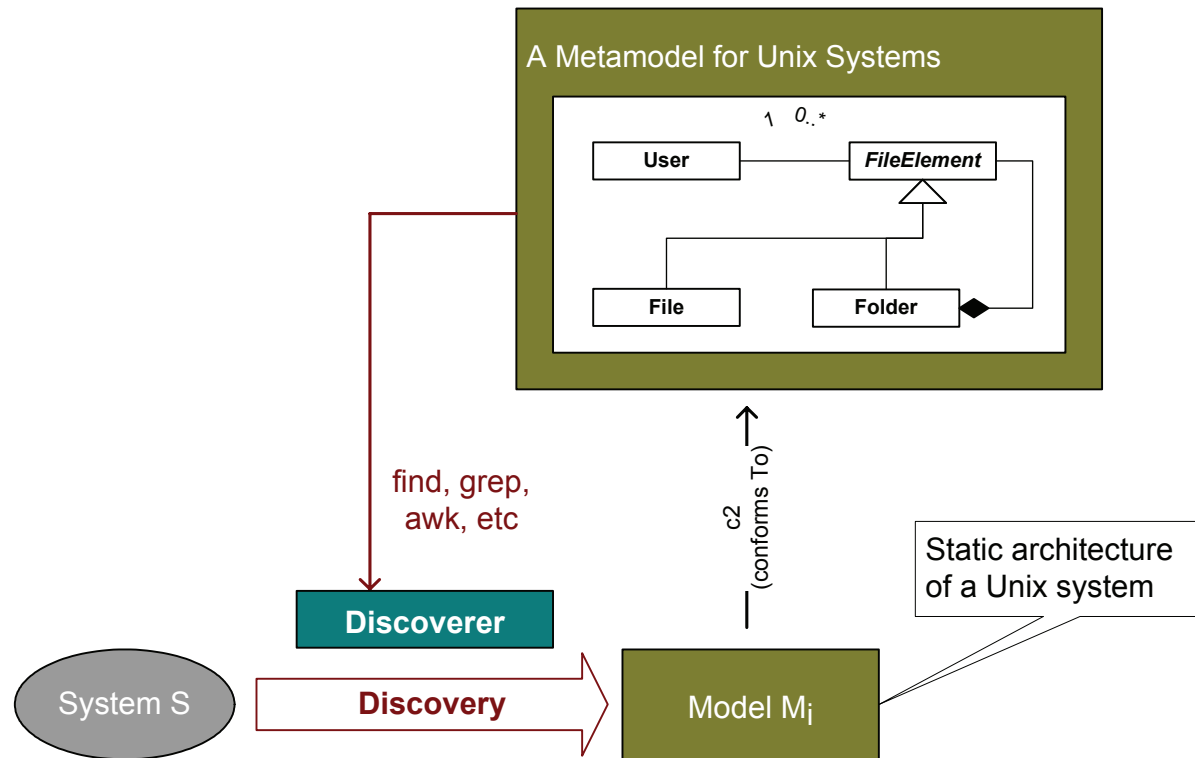
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Background

- Develop and manage systems becoming more and more complex

- Important issue:

  - **Reverse-engineering of legacy systems**

- **MoDisco** component's goal:

  - Provide an extensible base framework for performing **metamodel-driven reverse engineering** (MDRE)

- The key to success:

  - Adoption by leading industrials

  - Development of a wide user community in different application domains
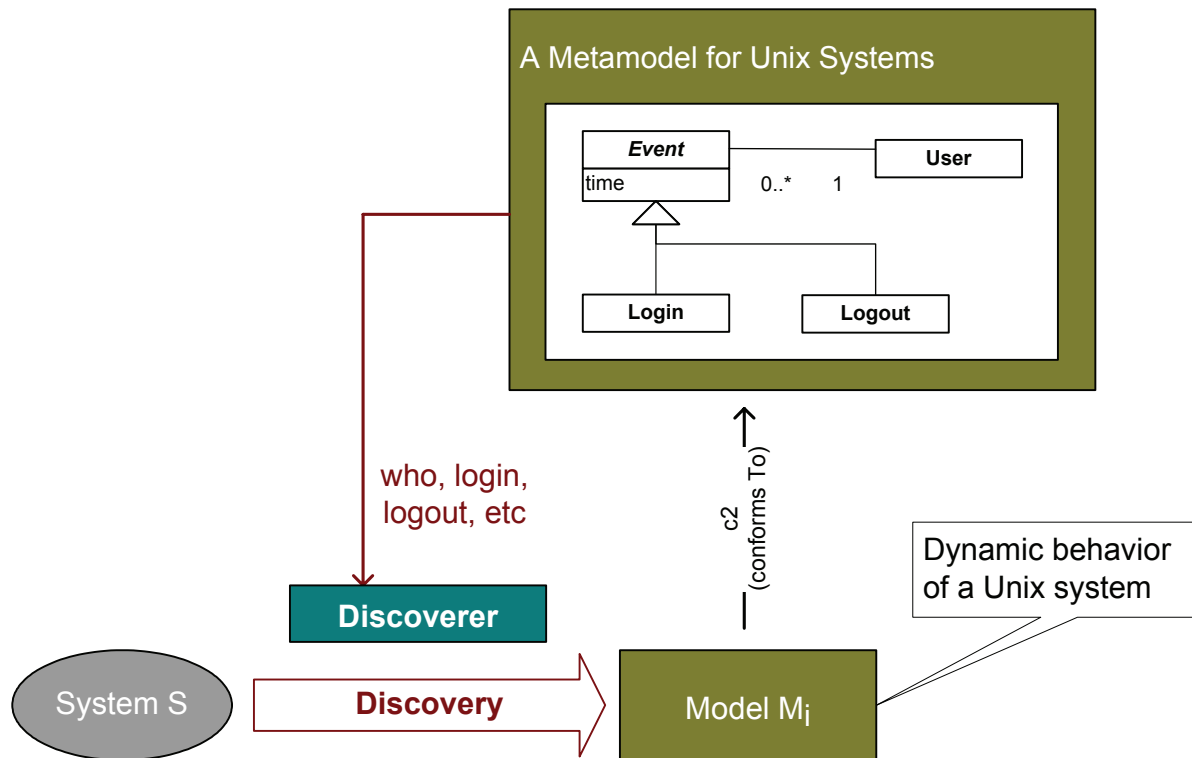
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Discovery Principles
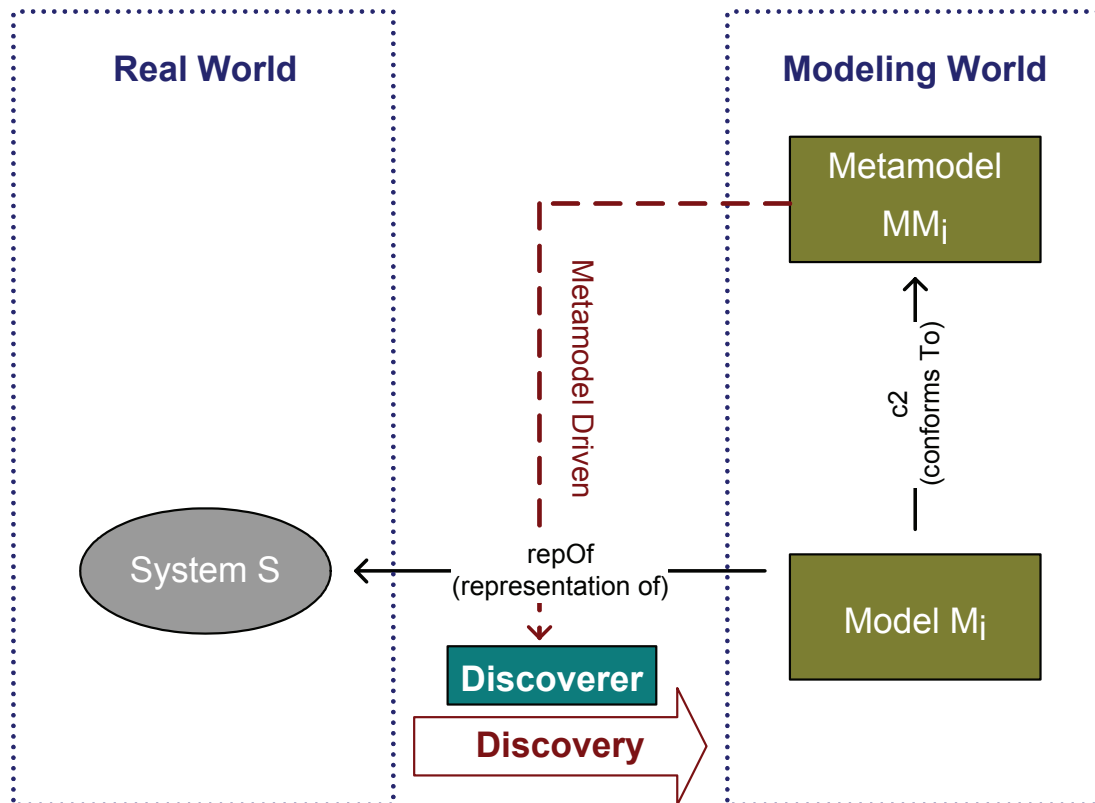
- ## Step 1:
  - ### Define the metamodel

- ## Step 2:
  - ### Create the "discoverer"

- ## Step 3:
  - ### Build the model

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Motivating Examples (1/4)

A Metamodel for Unix Systems

1 $0..*$

User — FileElement

File   Folder

find, grep, awk, etc

c2 (conforms To)

Discoverer

Static architecture of a Unix system

System S → **Discovery** → Model M_i

- Example of the Unix file system

- Study of a **static** view on the system
 - Snapshot of the system at time t

Motivating Examples (2/4)

A Metamodel for Unix Systems

Event
time

0..*   1

User

Login

Logout

who, login, logout, etc

Discoverer

c2 (conforms To)

Dynamic behavior of a Unix system

System S

Discovery

Model M$_i$

- Example of the Unix users' actions

- Study of the **dynamic** behavior of the system
  - Execution trace of the system

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Motivating Examples (3/4)

- Conclusions:
  - The same general discovery process is applied in both examples
    - Only the nature of the "discoverers" is changing
  - Need of a system classification
    - A decision tree more than an absolute classification
      - Different points of view are possible on a same system
    - A support and methodology for facilitating the development of the "discoverers"
      - For instance, encouraging the use of the introspection capabilities in the case of a reflexive system

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Motivating Examples (4/4)

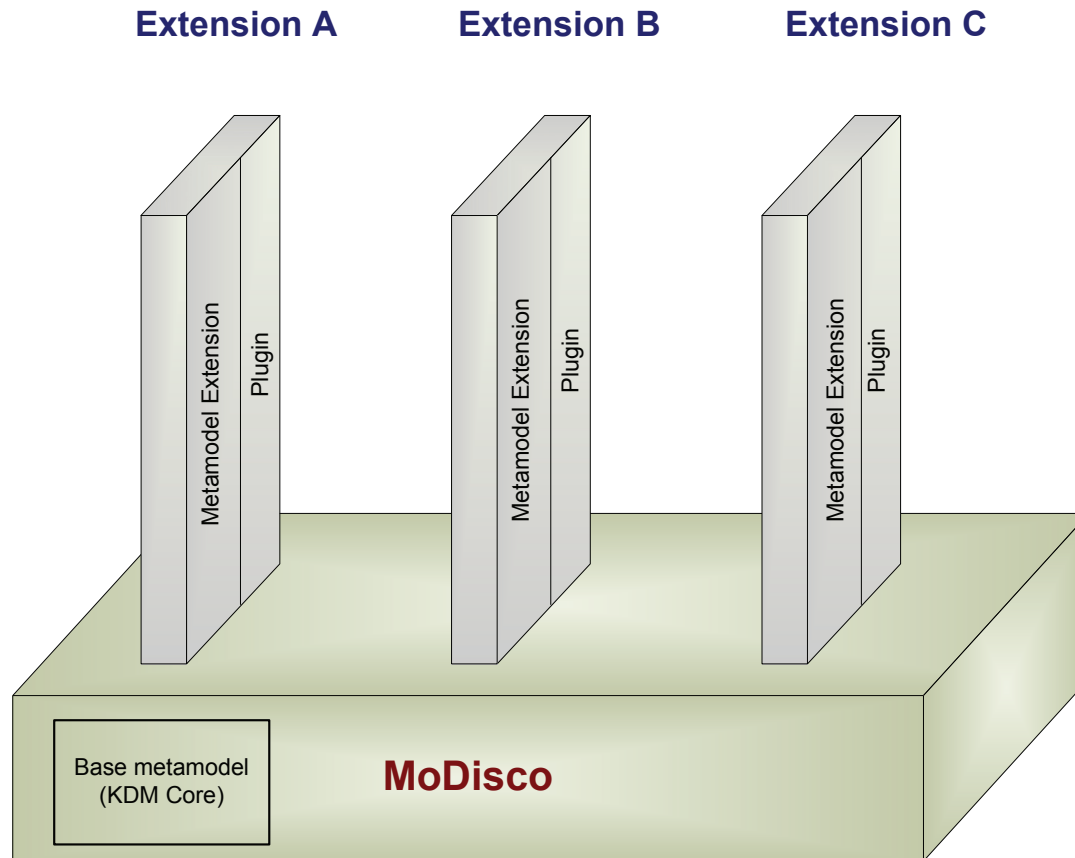- A possible system classification (basic very first version):
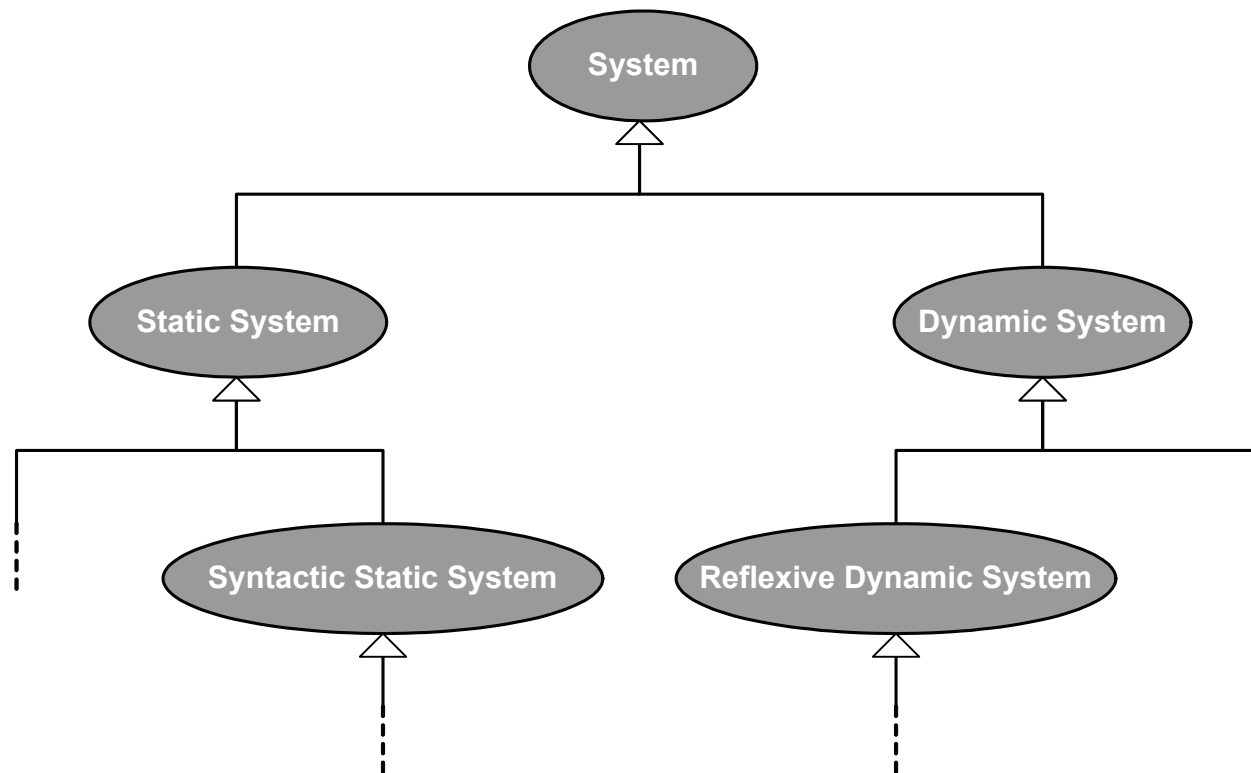
Component Description (1/2)

- A base generic and extensible framework
  - A core metamodel (based on the OMG™ KDM specification)
  - A metamodel extension's mechanism
  - Facilities for manipulating models
  - A methodology for designing extensions of this framework
    - An extension (or "blade") is a couple: extension of the core metamodel + plugin
    - Different extensions for different domains in various fields

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Component Description (2/2)

- Overall vision of **MoDisco**:

Extension A   **Extension B**   **Extension C**

Metamodel Extension   Plugin

Metamodel Extension   Plugin

Metamodel Extension   Plugin

Base metamodel
(KDM Core)

MoDisco

Benefits of the Approach

- A unified model-based approach and a metamodel-driven methodology:
  - Work in the homogeneous world of the models
  - Match different requirements
    - Data integration, tools interoperability, systems migration, etc
  - Use models properties and facilities
    - Transformations, weavings, extractions, etc
- A possible wide user community

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Organization (1/2)

- Creation of MoDisco supported by the **ModelPlex European Integrated Project** (FP6-IP #034081)

- Initial committers & contributors :

  - Hugo Bruneliere (INRIA)
  - Mikael Barbero (INRIA)

Organization (2/2)

- Contributors and/or interested parties (industrials and academics):

  – INRIA

  – University of Nantes

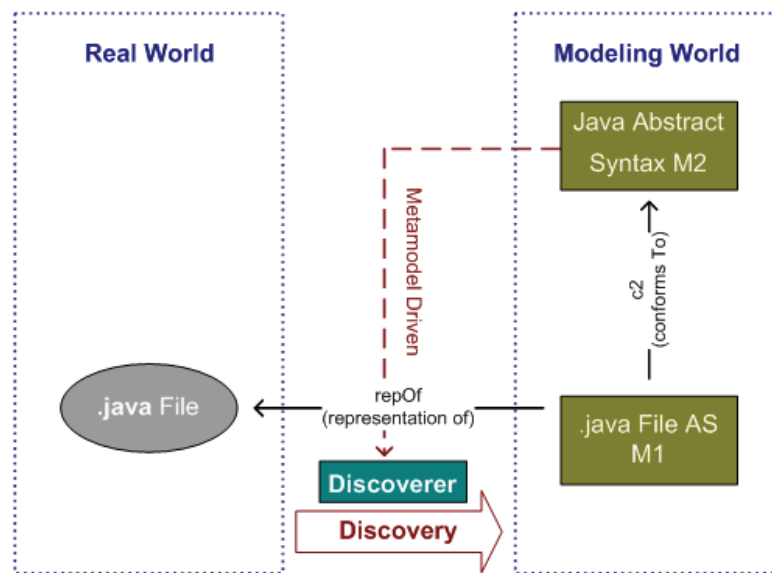 – MIA Software

  – Sodius

  – Obeo

Roadmap

- **1.** Creation and initialization of the project (general description, web site, newsgroup, etc).

- **2. Elaboration of several use cases provided by different partners. A use case is usually composed of a specification and an implementation.**

- **3.** Consolidification of the common toolbox and of the initial framework for building model discoverers. Improvement of the guidelines, methodological support and basic documentation.

- **4.** Improvement of the framework as additional use cases are built and contributed.

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First Use Cases Descriptions (1/3)

- ## Java Abstract Syntax

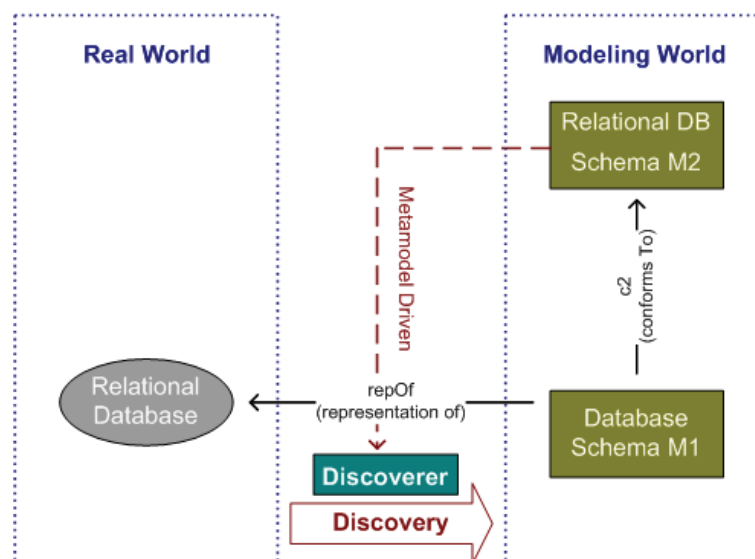 – Example of produced model (in XMI):

```
<statements xsi:type="java.ast:ExpressionStatement">
    <expression xsi:type="java.ast:MethodInvocation">
        <arguments xsi:type="java.ast:StringLiteral" escapedValue="&quot;Done !&quot;" literalValue="Done !"/>
        <expression xsi:type="java.ast:QualifiedName" fullyQualifiedName="System.out">
            <name fullyQualifiedName="out" identifier="out"/>
            <qualifier xsi:type="java.ast:SimpleName" fullyQualifiedName="System" identifier="System"/>
        </expression>
        <name fullyQualifiedName="println" identifier="println"/>
    </expression>
</statements>
```

First Use Cases Descriptions (1/3)

- ## Relational Database Schema

- – Example of produced model (in Ecore):

```
<tables name="employees" key="#//@tables.1/@columns.0">
    <columns name="employeeNumber" dataType="int(11)" defaultValue="" keyOf="#//@tables.1"/>
    <columns name="lastName" dataType="varchar(50)" defaultValue=""/>
    <columns name="firstName" dataType="varchar(50)" defaultValue=""/>
    <columns name="extension" dataType="varchar(10)" defaultValue=""/>
    <columns name="email" dataType="varchar(100)" defaultValue=""/>
    <columns name="officeCode" dataType="varchar(10)" defaultValue=""/>
    <columns name="reportsTo" dataType="int(11)" null="true"/>
    <columns name="jobTitle" dataType="varchar(50)" defaultValue=""/>
</tables>
```
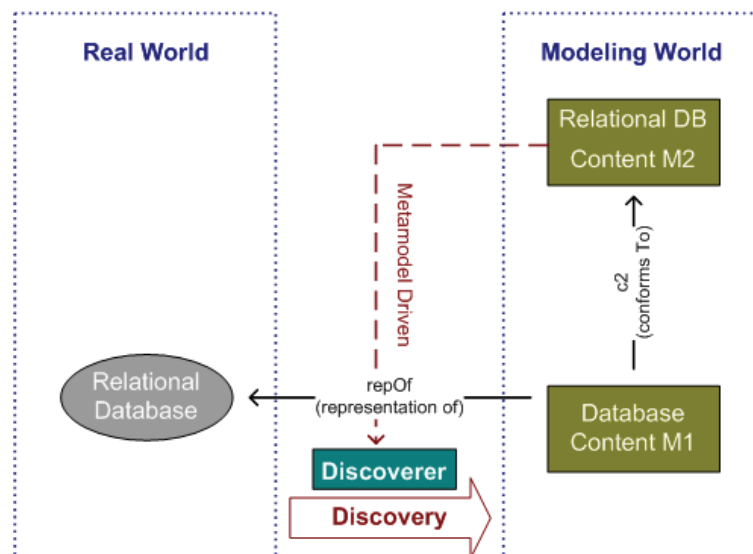
First Use Cases Descriptions (1/3)

- ## Relational Database Content

- – Example of produced model (in Ecore):

```
<tables name="employees">
  - <tuples>
      <elements value="1002"/>
      <elements value="Murphy"/>
      <elements value="Diane"/>
      <elements value="x5800"/>
      <elements value="dmurphy@classicmodelcars.com"/>
      <elements value="1"/>
      <elements/>
      <elements value="President"/>
  </tuples>
```

End

- ## Thank you
  - ### Questions?
  - ### Comments?

- ## MoDisco website
  - ### http://www.eclipse.org/gmt/modisco

- ## MoDisco newsgroup
  - ### eclipse.modeling.gmt.modisco

- ## Contacts
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