



Meta-Modelling as a Concept: The Conceptualisation of Modelling Methods

Tutorial Team

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AGENDA

PART I:

- Motivation
- Foundations & Technologies
- Conceptualization & Development
- Best Practices

PART II:

- Hands-On Session

PART III:

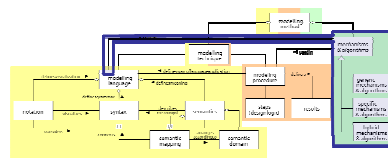
- Conclusion
- Outlook

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Scenario Description

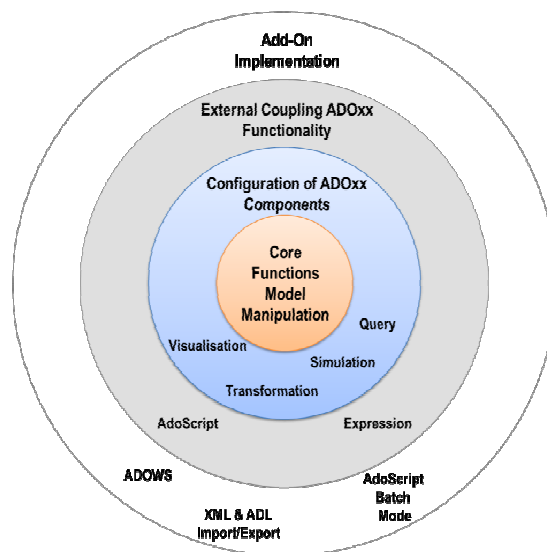
Case:

An algorithm for analysing structural similarities is implemented that queries business process models and creates a comparison matrix listing structural similarities.

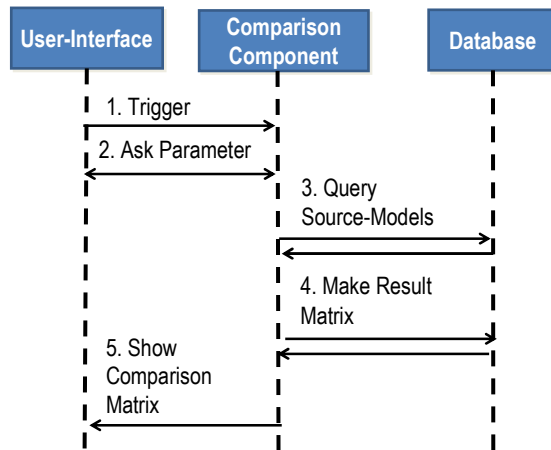
GOAL:

Demonstrate how models can be queried with AQL and ADOscripts, as well as indicate how to create and manipulate a model.

ADOxx Functionality on Meta Level



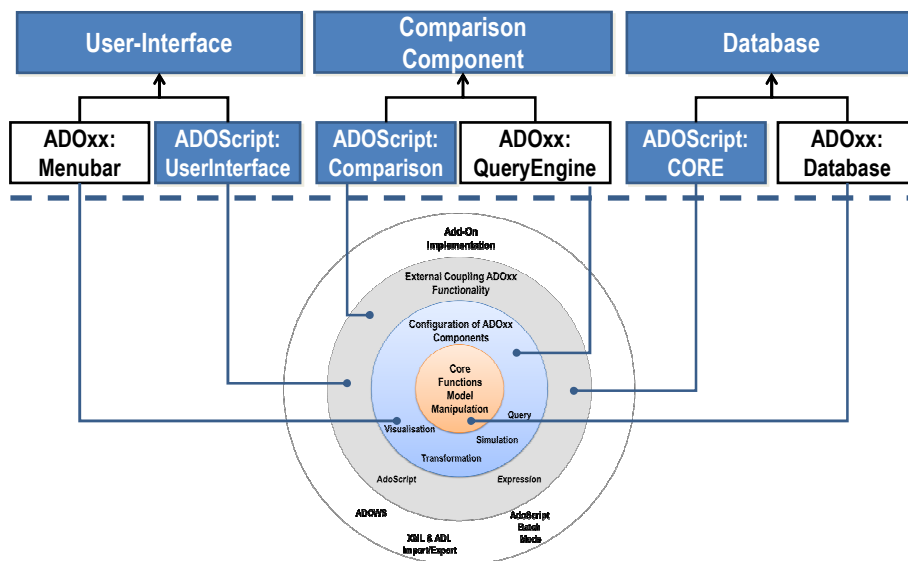
Description of Algorithm

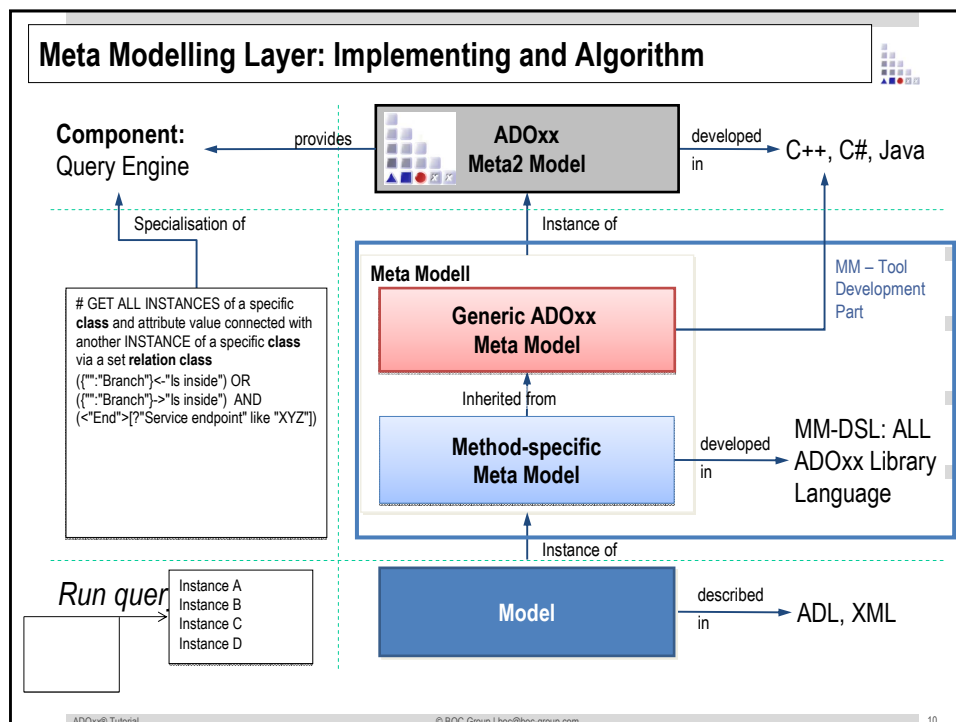
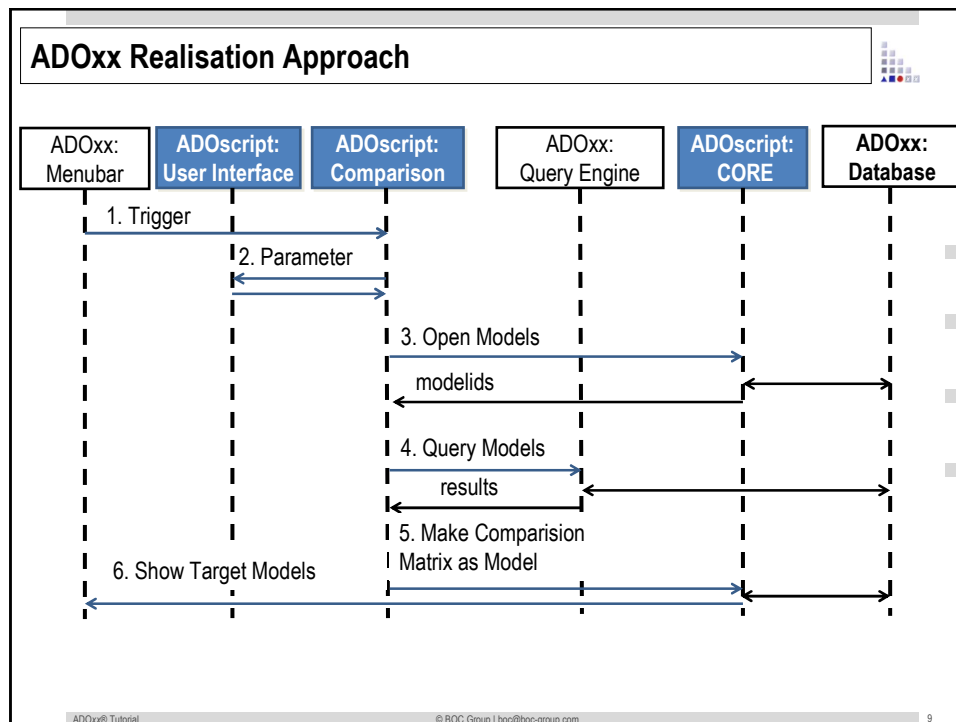


Additional Aspects:

- Implementation as plug-In to be used in other modelling languages.
- Comparison queries should be adaptable but start with comparing used objects.
- Migration from modelling language without plug-In to modelling language with plug-In has to be considered.

Mapping ADOxx Functionality





Added Value of Metamodelling Platform



Used meta-modelling functionality for realisation of the scenario:

•**ADOScrip**: ADOScript can generate a new model “Comparison Matrix” to present the results of the business process comparison. This technique can also be used for graph-rewriting.

•**AQL: ADOxx Query Language**

- **ADOxx query engine** is provided by the platform and can analyze business process models.
- **ADOScripts** can invoke the query engine and hence compare in a stepwise approach business processes

•**Hyperlinks and INTERREF**: Similar to the first scenario, the resulting model can use **INTERREFS** and **Hyperlink** for better navigation from the resulting “Comparison Matrix” to the originally compared business processes.

ADOxx Realisation Hands-On



1. Modelling Language Extensions to enable this algorithms

1. New model type “Comparison Model”
2. New class “Box”, “Row Name” for Comparison Matrix Element

2. Configure ADOxx

1. Configure Menubar
2. Write AQL statements for query engine

3. Implement Algorithm with ADOScript

1. ADOScript User Interface
2. Invoking query engine with ADOScript
3. Create target model “Comparison Matrix and place matrix elements according the results of the query.

Used ADOxx Functionality: Implementing an Algorithm

Introduction

Setup of Implementation Environment

Modelling Language Implementation

Classes

Relations

Class Attributes and Attributes

GRAPHREP

ATTRREP

CLASS Cardinality

CONVERSION

Model Pointer

Attribute Facets

Model Types

Mechanisms & Algorithms Implementation

Core Functions for Model Manipulation

Database

Visualisation

Query

Transformation

Configuration of ADOxx Components

Visualisation

Query

External Coupling ADOxx Functionality

ADOscript Triggers

ADOscript Language Constructs

Visualisation ADOscript

Visualisation Expression

Query ADOscript

Transformation ADOscript

ADD-ON Implementation

ADOxx Web-Service

XML / ADL Import – Export

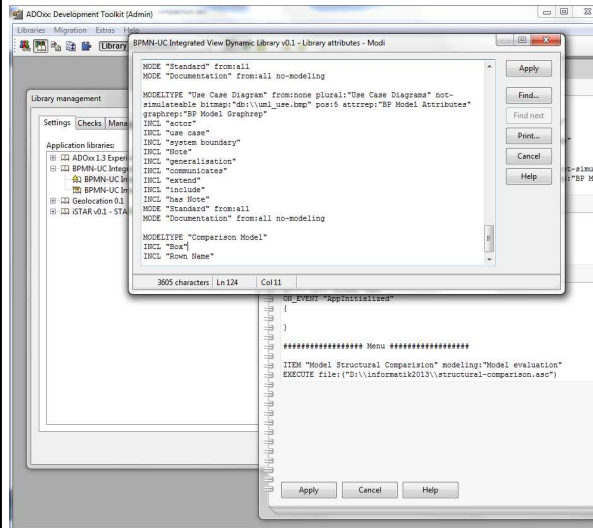
ADOscriptBatch Mode

HANDS-ON

Analysis of Structural Similarities

2. SCENARIO: IMPLEMENTING AN ALGORITHM

Define new Modeltype „Comparison Matrix“

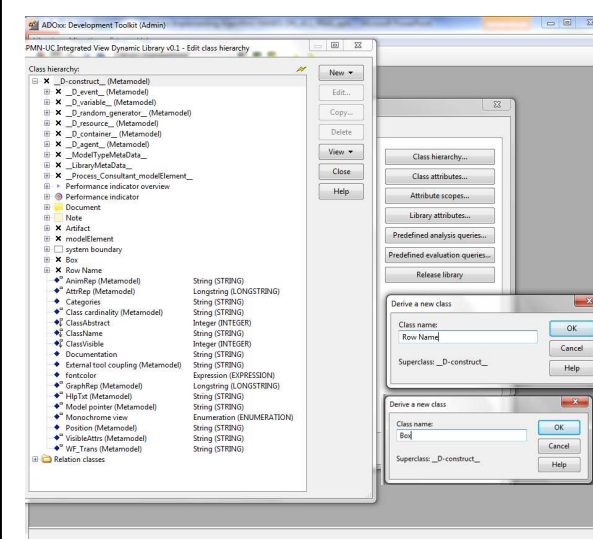


New Modeltype:

- Select "BPMN-UC Integrated View Dynamic Library" and open Library attributes.
- Got to Add Ons
- Add the Modeltype "Comparison Matrix" in the Modi attribute
- When the classes are defined, you need to INCLUDE "Box" and "Row name"

MODELTYPE "Comparison Model"
INCL Box
INCL Row name

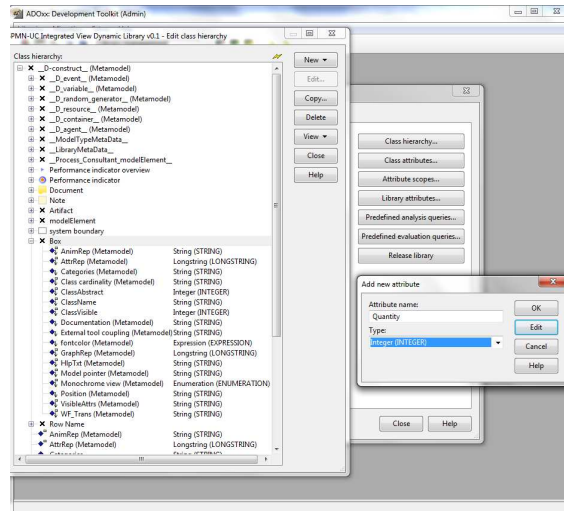
Make New Modeltype



New Modeltype:

- Select "BPMN-UC Integrated View Dynamic Library" and open Library attributes.
- Open Class hierarchy, view "Metamodel" and "Class hierarchy" in the View button, select D-construct and click new class.
- Name new classes: "Box" and "Row Name"
- Box and Row Name are now sub-classes of D-construct

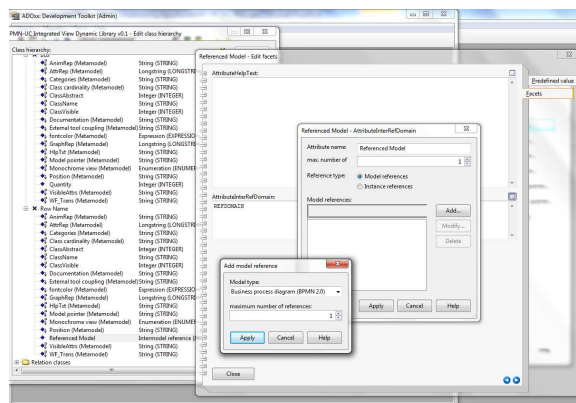
Add Attributes for Classes „Box“ and „Row Name“



Add Attributes

- Select "Box" and click New, attribute.
- Make "Quantity" as type INTEGER.
- Select "Row Name" and click New, attribute.
- Make "Referenced model" an INTERREF to target modeltype "BPMN"
- Make "Row name" a STRING.

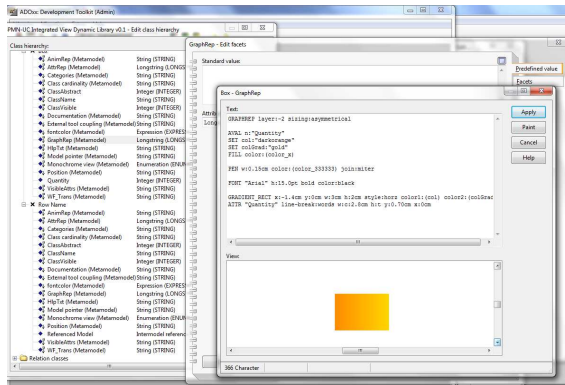
Edit INTERREF



Specification of INTERREF

- EDIT Facet
- Select AttributeInterrefDomain
- Select "Model reference"
- Max number of references is 1
- Select Business Process Diagram
- Max number of references is 1

Add GRAPHREP



Specification of GRAPHREP

- Select "Box"
- Click on Attribute "GraphRep"
- Open the GraphRep Editor
- Enter text, paint it and apply.

GRAPHREP layer:-2 sizing:asymmetrical
 AVAL n:"Quantity"
 SET col:"darkorange"
 SET colGrad:"gold"
 FILL color:(color_x)
 PEN w:0.15cm color:(color_333333) join:miter
 FONT "Arial" h:15.0pt bold color:black
 GRADIENT_RECT x:-1.4cm y:0cm w:3cm h:2cm style:horz color1:(col) color2:(colGrad)
 ATTR "Quantity" line-break:words w:c:2.8cm h:t y:0.70cm x:0cm

GRAPHREP

GRAPHREP layer:-2 sizing:asymmetrical

AVAL n:"Quantity"
 SET col:"darkorange"
 SET colGrad:"gold,"

FILL color:(color_x)

PEN w:0.15cm color:(color_333333) join:miter
 FONT "Arial" h:15.0pt bold color:black

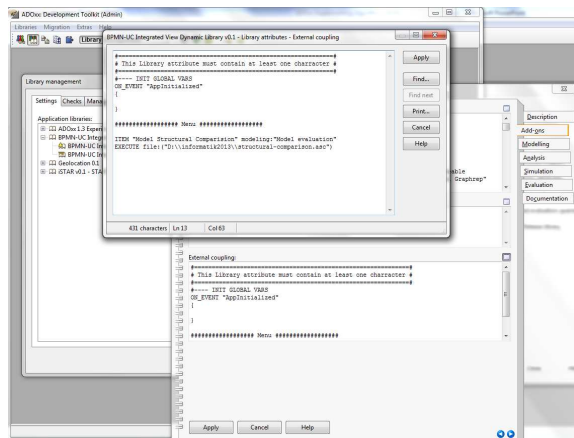
GRADIENT_RECT x:-1.4cm y:0cm w:3cm h:2cm style:horz color1:(col) color2:(colGrad)
 ATTR "Quantity" line-break:words w:c:2.8cm h:t y:0.70cm x:0cm

GRAPHREP
 FONT "Arial" h:10pt bold color:black

AVAL reference:"Referenced model"
 AVAL rowname:"Row name"

IF(LEN reference > 0)
 ATTR "Referenced model" line-break:words x:-1.4cm y:0.75cm w:c:2.8cm h:c:1.5cm format:"%m"
 ELSIF (LEN rowname > 0)
 ATTR "Row name" line-break:words x:-1.4cm y:0.75cm w:c:2.8cm h:c:1.4cm
 ELSE
 ATTR "Name" line-break:words x:-1.4cm y:0.75cm w:c:2.8cm h:c:1.4cm
 ENDIF

Add Menubar



Add Menubar

- Select Dynamic Library.
- Open Library Attributes
- Select Add-On
- Open External Coupling
- Add Menubar in External Coupling

Menu

ITEM "Model Structural Comparison" modeling:"Model evaluation"
EXECUTE file:("D:\informatik2013\structural-comparison.asc")

Copy and Configure ADOscript

```
#####
# Structural Comparison
#####

#-----
# Parameter setup
#-----

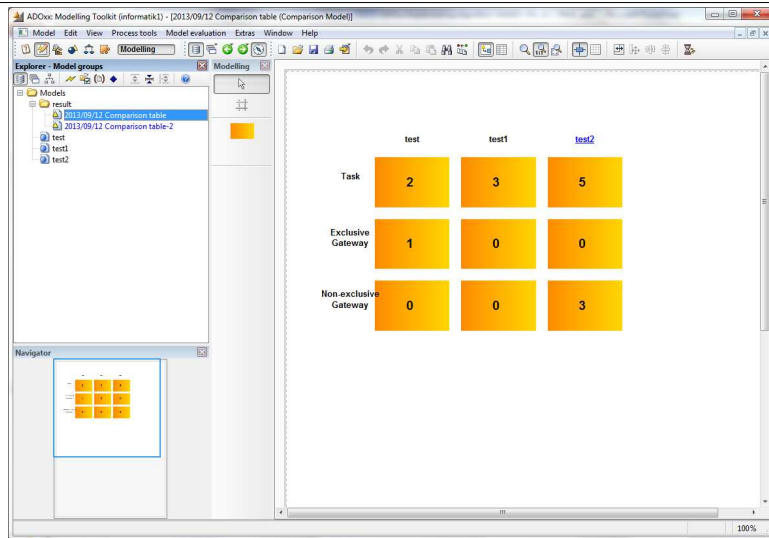
SETL strtkn_element:"Task,Exclusive Gateway,Non-exclusive Gateway,X"
SETL aqltkn_statements:"(<"Task">)&("Exclusive Gateway">)&("Non-exclusive Gateway">)"
SETL int_cnt_elements:(tokcnt((strtkn_element),","))

SETL str_modeltype-1:"Business process diagram (BPMN 2.0)"
SETL str_modeltype_name:"Comparison Model"

#-----
# Source Model and Target Model selection
#-----

...
```

Result



Any Questions?

