



MECHANISMS & ALGORITHMS IMPLEMENTATION ON ADOxx

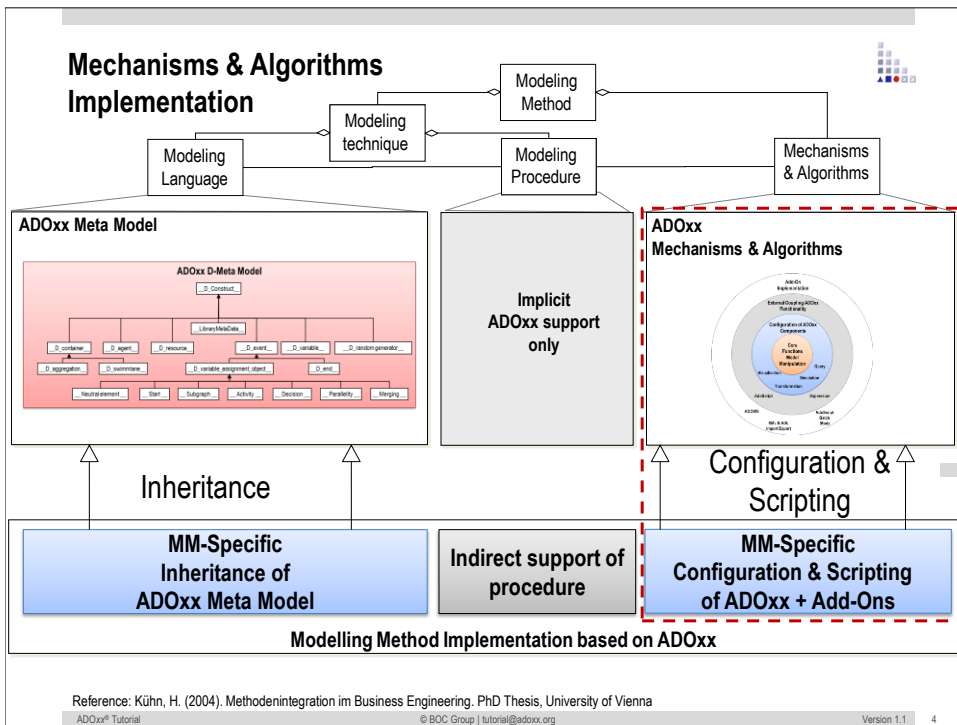
What is ADOxx?



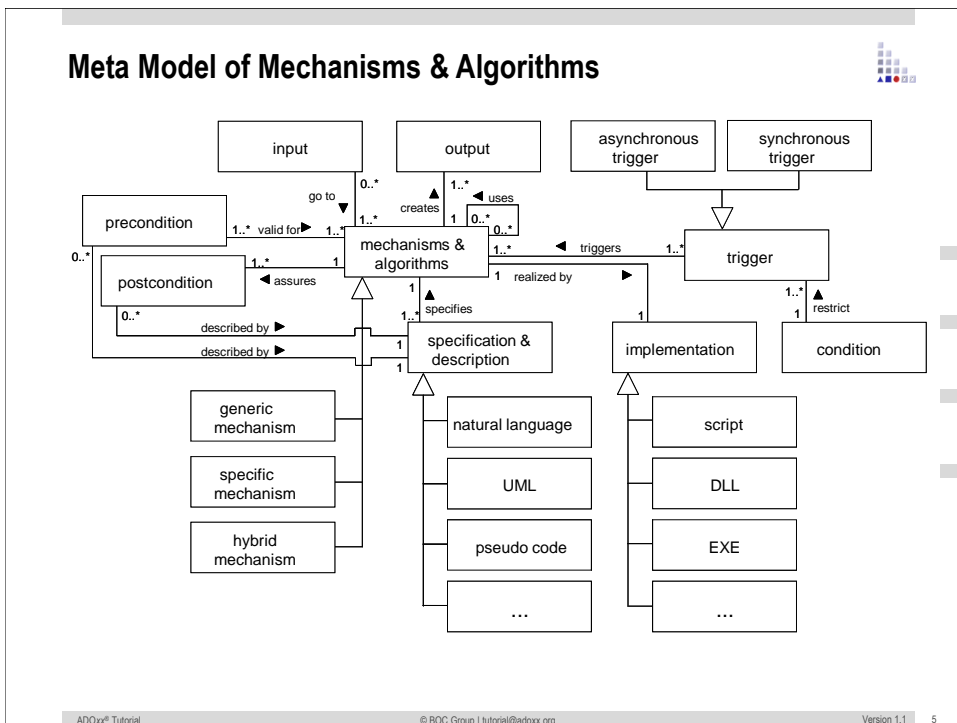
**“ADOxx IS A META MODELLING
DEVELOPMENT AND
CONFIGURATION PLATFORM FOR
IMPLEMENTING MODELLING
METHODS.”**

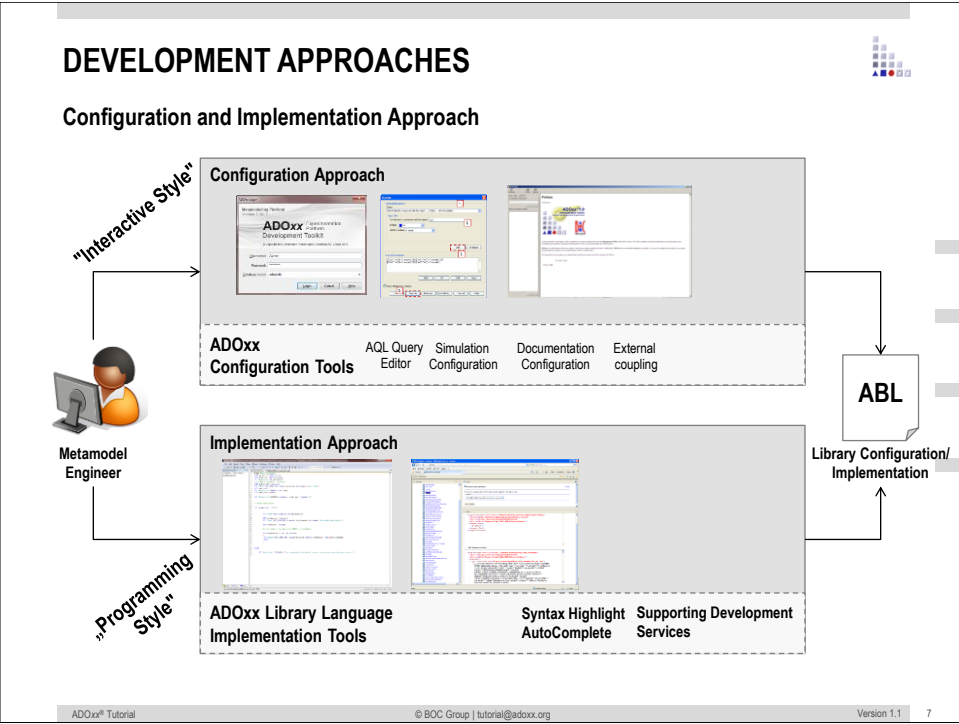
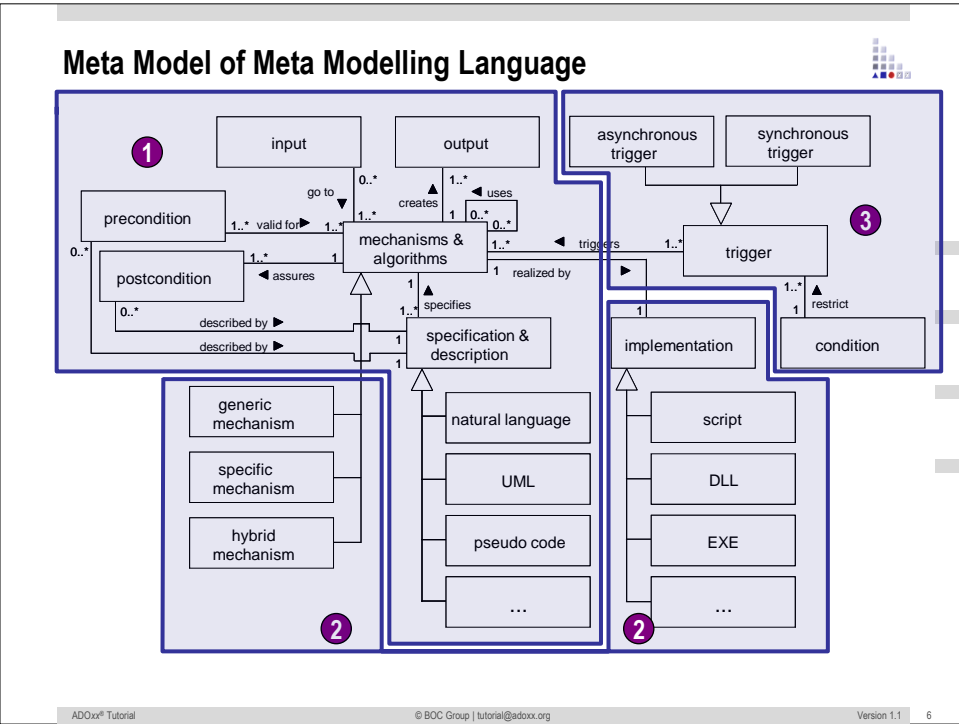
**MECHANISMS & ALGORITHMS
IMPLEMENTATION**

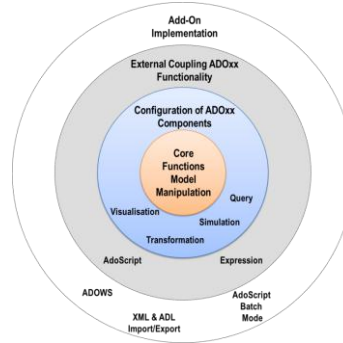




Meta Model of Mechanisms & Algorithms







1. CORE FUNCTIONS FOR MODEL MANIPULATION

Core Functions for Model Manipulation

Data Base
Visualisation
Query
Transformation
Simulation

1. CORE FUNCTIONS FOR MODEL MANIPULATION DATA BASE

Core Functionality

- ▶ **User Management**
create, delete, define access rights
- ▶ **Model Group Management**
create, delete, rename
- ▶ **Model Management**
create, delete, rename, version
- ▶ **Library Management**
import/export, check,
manipulate
- ▶ **Component Management**
switch on / off components
- ▶ **Efficient Storage**
user, model groups, models and libraries

1. CORE FUNCTIONS FOR MODEL MANIPULATION VISUALISATION

Graphical Representation

- Graphical Presentation of models in the user interface
- Drag and Drop: Creation and Move, Delete, Edit
- Cardinality conformity check
- Notebook representation
- Grid visualisation, Snap Grid
- Generation of graphic files (bmp, jpg, png, etc.)
- Zoom Functionality (zoom, world-area, right mouse, etc.)
- Table based representation
- Printer Functionality
- Page Layout
- Connector behaviour

1. CORE FUNCTIONS FOR MODEL MANIPULATION QUERY

Platform basic functionalities in the analysis component

Standardized queries:



Standardized queries as „to complete text“, which are completed by the user. For execution, no AQL knowledge is required.

User-defined queries:



Queries which are defined by the user through standardized queries in AQL syntax. For execution AQL knowledge is required.

¹⁾ **AQL** = ADOxx Query Language

Standardized & User-defined Queries

1.

Query:
Get all objects connected with the object ... of class ... with the relation ...

2.

Input field
Get all objects connected with the object w2
of class W/
with the relation Is inside

3.

Add Evaluate

3.

Execute Attributes... Model info... Cancel Help

Query:
Get all objects of class...
Get all objects of class ... with attribute ...
Get all objects of class ... with the number of rows in record attribute ...
Get all objects of class ... with record attribute ... and with column ...
Get object ... of class ...
Get all objects connected with the object ... of class ... with the relation ...
Get all connectors of relation ...
Get all connectors of relation ... with attribute ...

Not specific for a method and their modelling language, but use the classes and attributes of the modelling language

Generally held queries – „Wording is standardized“

Queries, which are complete defined by the user by using AQL

Queries which are combined by the user through usage of standardized queries

Session dependent, regarding of evaluation parameters

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1. CORE FUNCTIONS FOR MODEL MANIPULATION

b. TRANSFORMATION

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Standard Export / Import

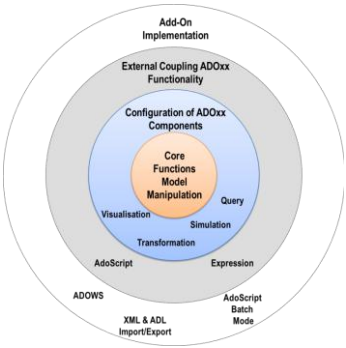
- ▶ **Generation of ADL**
Text file in complimentary ADOxx Definition Language
- ▶ **Generation of XML**
Text file in complimentary ADOxx defined XML syntax

XML Export Sample

```
<?xml version="1.0" encoding="UTF-8" ?>
<!DOCTYPE ADOXML (View Source for full doctype...)>
- <ADOXML version="3.1" date="28.06.2012" time="13:32" database="adoxx13" username="sample1" adoversion="Version 1.0">
- <MODELS>
- <MODEL id="mod.13813" name="model-1" version="1.1" modeltype="Sample" libtype="bp" applib="ADOxx 1.3 Dynamic Experimentation Library - START">
- <MODELATTRIBUTES>
- <INSTANCE id="obj.13814" class="E" name="E1">
- <ATTRIBUTE name="Position" type="STRING" NODE x:4cm y:11cm w:2cm h:2cm index:1</ATTRIBUTE>
- <ATTRIBUTE name="External tool coupling" type="STRING" />
- <ATTRIBUTE name="a1" type="INTEGER">0</ATTRIBUTE>
- <RECORD name="a2" />
- <ATTRIBUTE name="a3" type="STRING" />
- <ATTRIBUTE name="b1" type="INTEGER">0</ATTRIBUTE>
- <RECORD name="b2" />
- <ATTRIBUTE name="b3" type="STRING" />
- <ATTRIBUTE name="e1" type="INTEGER">0</ATTRIBUTE>
- <RECORD name="e2" />
- <ATTRIBUTE name="e3" type="STRING">11</ATTRIBUTE>
- <ATTRIBUTE name="a4" type="INTEGER">0</ATTRIBUTE>
- <ATTRIBUTE name="b4" type="STRING" />
- </INSTANCE>
+ <INSTANCE id="obj.13817" class="A" name="A1">
+ <INSTANCE id="obj.13826" class="B" name="B1">
+ <INSTANCE id="obj.13832" class="C" name="C-13010">
+ <INSTANCE id="obj.13835" class="D" name="D-13013">
+ <INSTANCE id="obj.16408" class="B" name="B-16408">
+ <INSTANCE id="obj.16604" class="V" name="V1">
+ <INSTANCE id="obj.17004" class="W" name="W1">
+ <INSTANCE id="obj.17007" class="B" name="B-16408-17007">
+ <INSTANCE id="obj.17291" class="E" name="E-17291">
+ <INSTANCE id="obj.17294" class="E" name="E-17294">
+ <INSTANCE id="obj.17297" class="E" name="E-17297">
+ <INSTANCE id="obj.17328" class="E" name="D-13013-17321">
+ <INSTANCE id="obj.17334" class="E" name="C-13010-17318">
+ <CONNECTOR id="con.13841" class="aRb">
+ <CONNECTOR id="con.13842" class="aRb">
+ <CONNECTOR id="con.13843" class="aRb">
+ <CONNECTOR id="con.13844" class="aRb">
+ <CONNECTOR id="con.13845" class="aRb">
+ <CONNECTOR id="con.16607" class="Is inside">
- </MODEL>
</MODELS>
</ADOXML>
```

ADL Export Sample

```
INSTANCE <E1> : <E>
  ATTRIBUTE <Position>
  VALUE "NODE x:4cm y:11cm w:2cm h:2cm index:1"
  ATTRIBUTE <External tool coupling>
  VALUE ""
  ATTRIBUTE <a1>
  VALUE 0
  ATTRIBUTE <a2>
  VALUE
  ATTRIBUTE <a3>
  VALUE ""
  ATTRIBUTE <b1>
  VALUE 0
  ATTRIBUTE <b2>
  VALUE
  ATTRIBUTE <b3>
  VALUE ""
  ATTRIBUTE <e1>
  VALUE 0
  ATTRIBUTE <e2>
  VALUE
```



2. CONFIGURATION OF ADOxx COMPONENTS

2. CONFIGURATION OF ADOXX COMPONENTS VISUALISATION

Attribute Dependent Graphical Notation

```

GRAPHREP layer:-1 sizing:asymmetrical

# select type for color
AVAL atype:"Type-Selection"

# set default color
SET f:"white"

IF (atype = "type-1")
    SET f:"blue"                # if type 1 selected => color is blue
ELSIF (atype = "type-2")
    SET f:"yellow"              # if type 2 selected => color is yellow
ELSIF (atype = "type-3")
    SET f:"red"                 # if type 3 selected => color is red
ENDIF

FILL color:(f)                  # set color with variable

# drawing main box
RECTANGLE x:-3cm y:-3cm w:6cm h:6cm

ATTR "V-Text" x:-0cm y:-2.5cm w:c h:t # type text from attribute "V-
Text"

```

2. CONFIGURATION OF ADOXX COMPONENTS QUERY

Platform basic functionalities in the analysis component

Predefined queries:



Professional queries, which are business or method specific defined. For the execution of these, no AQL knowledge required.

Relationtables:



Relationtables make relations (connectors or references) between two objects of same or different models.

¹⁾ **AQL** = ADOxx Query Language

Predefined queries are...



- Queries on models, model content and dependencies of models
- Session-independent
- Defined by the user and therefore easy to use
- Specific for the used model and their modelling language
- A configuration of the basic functionalities of the ADOxx Platform. These queries can:
 - Be defined for models of a specific type
 - Combined into groups (topics)

Creation of method-specific Queries



Steps which are necessary:

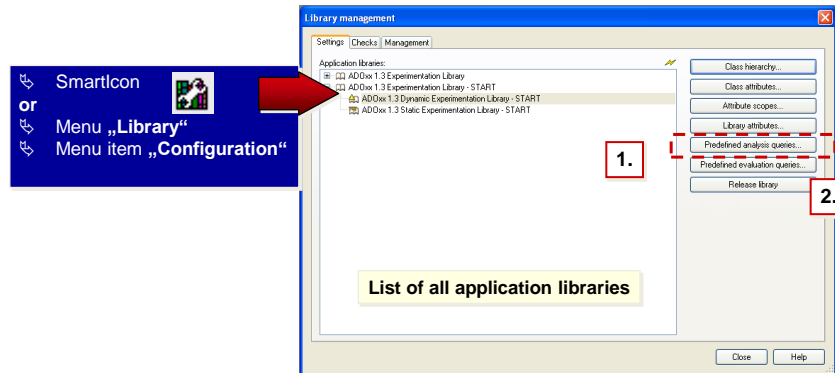
1. Define menu item
2. Define input fields
3. Define AQL queries
4. Define result attributes



Start Analysis Query Function

Choose Library
(D- or S-Library)

„Predefined analysis queries“



In order to edit the analysis queries you can use selection dialogs in the library management

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Query Functions

Available functions:

New: Create a new menu item or a new query

Edit: Edit an existing query

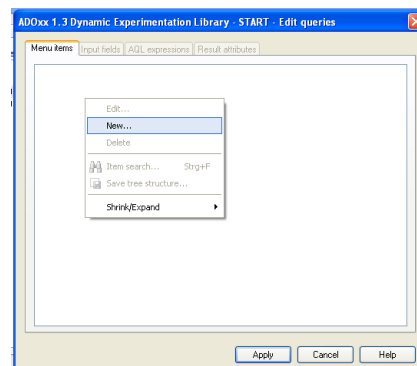
Delete: Delete an existing query from the library

Search entries: Call of the ADOxx search function

Save tree-structure: Save the content of the text file

Show/close: Diverse view options

The appeal of all these function is under the context menu of the list



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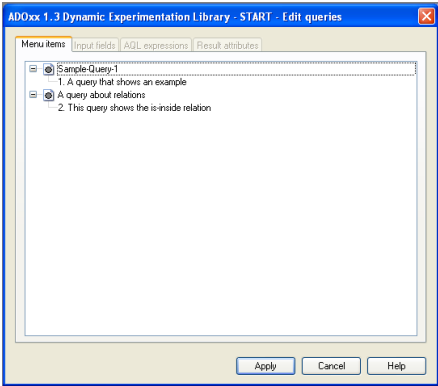
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1. Define Menu Item

The creation of a new analysis query is defined through following steps:

- ▶ Create query
- ▶ Define input fields
- ▶ Define AQL-queries
- ▶ Define result attributes

For all of these steps there is a chapter in the dialog



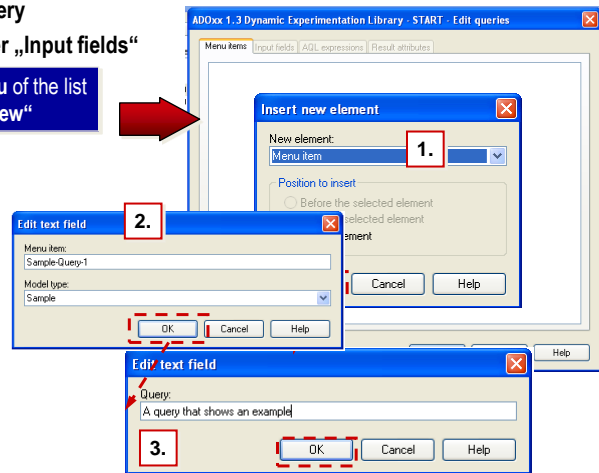
Note: Before creating a new predefined query, it is necessary to put it manually together and test it in the ADOxx-BPM-Toolkit with the „Query/reports“ function. By using this approach you get als the AQL code which is necessary in the later procedure.

Define Query Appearance

Mark the new query

Switch to Chapter „Input fields“

- ↗ Context menu of the list
- ↗ Menu item „New“



2. Define input fields

Each query consists of an individual set of parts:

Text

Input Field

Enumeration Field

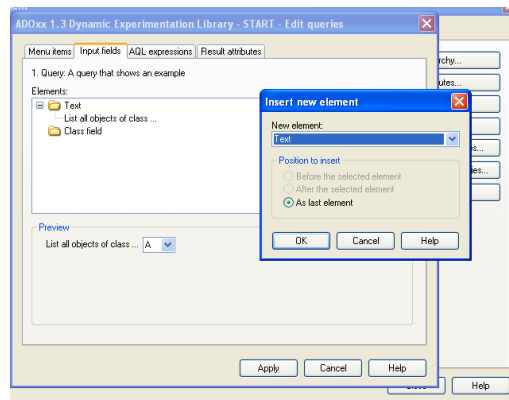
Attribute Value Field

Attribute Enumeration Field

Attribute Field

Class Field

Relation Field



Types of Input Fields

Following types of fields are available:

Input fields: For Attributes of type Text (**STRING**, **LONGSTRING**), time (**TIME**), date (**DATE**), date and time (**DATETIME**), integer (**INTEGER**) und double (**DOUBLE**).

Enumeration value field: For attributes of Type enumeration (**ENUMERATION**) und enumerationlist (**ENUMERATIONLIST**).

Attribute value field: For the takeover of attribute values from attributes of different classes.

Enumerated attribute field: For the takeover of attribute values from enumerated attributes of different classes.

Attribute field: For choosing of attributes from a list of all attributes of all classes.

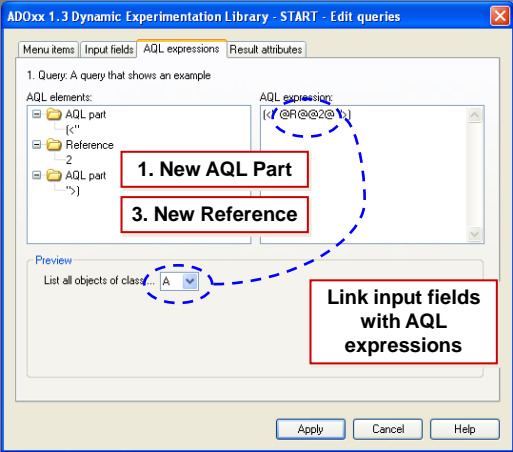
Class field: For choosing of a class from a list of all classes of the active modeltype.

3. Define AQL-Queries (1)

To make your query functional, it is necessary to deposit it as an AQL-query.

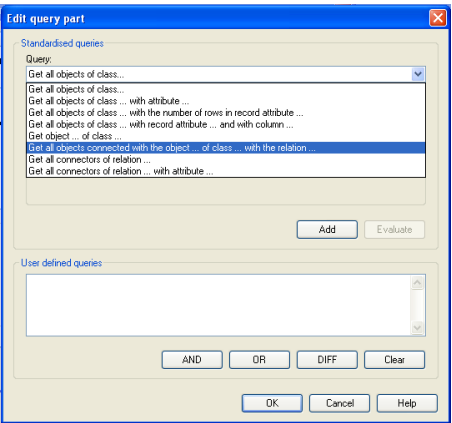
Switch to the chapter „AQL expressions“

1. Choose Option „AQL Part“
2. Copy manually designed AQL statement
3. Add „References“ to link input fields with query
4. Follow proposal to place input fields into query statement



Define AQL-Queries (2)

Detail view on AQL part:
Either manually type in the statement or click on the query.

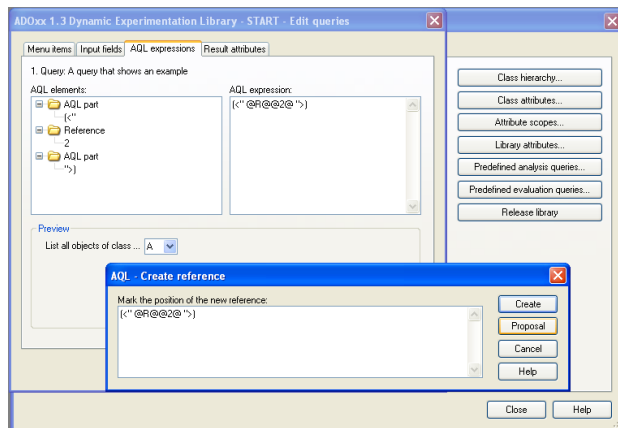


Note:
The shown AQL input support is from the construction same as the function „Query/reports“ in the ADOxx-BPM-Toolkit.

Define AQL-Queries (3)

In the next steps it is necessary to transform the query part.

1. Contextmenu of the list entry „AQL part“
2. Menu point „New“



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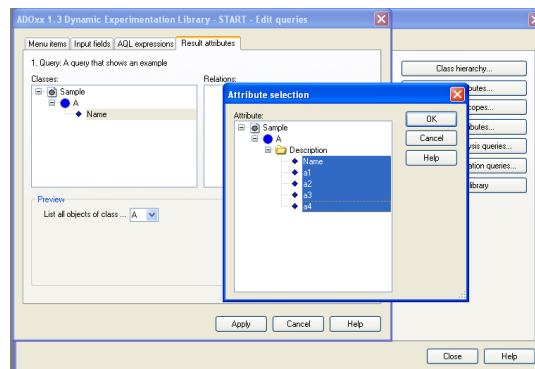
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4. Result Attributes (1)

In the chapter „Result attribute“ it is specified which objects and attributes should be in the result representation.

1. Switch to chapter „Result attributes“
2. Choose Option „Attribute“
3. Determine Position
4. Confirm



Contextmenu of the list „Classes“
Menu item „New“

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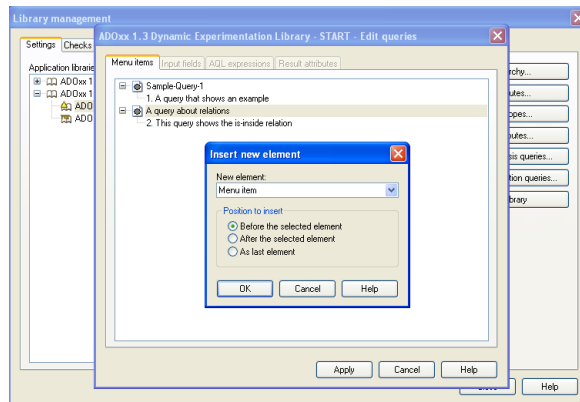
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New Menu Item

Besides the creation of queries, you can also create new menu items, in order to structure the queries.

In the Query-choose window select a querygroup

- ▶ Select option „Menu point“
- ▶ Determine position
- ▶ Confirm
- ▶ Input title
- ▶ Choose modeltype
- ▶ Confirm



- ▶ Contextmenu of shortlist
- ▶ Menu item „New“

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New Menu Item – Details

When creating new menu items should be noted:

every menu point is exactly **assigned to one modeltype**

The menu items in the selection dialog correspond exactly to the ADOxx-based Toolkit

After the creation of the menu item it must be added an query to it, because the menu item won't be saved.

Through input of tilde (~) in the menu name the following word will be an accelerator (keyboard shortcut)

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AQL Notation



- ▶ Extended Backus Naur Form (EBNF) notation is used for describing the AQL syntax
- ▶ Terminal symbols
 - ▶ symbols which cannot be split up further
 - ▶ are included by inverted commas '...'
- ▶ Non-terminal symbols
 - ▶ are included by <...>
- ▶ Symbols {...}, [...] and | serve to formulate rules in a more compact form :
 - ▶ {...} arbitrary number of iterations (even 0-times)
 - ▶ [...] optional (0- or 1-time)
 - ▶ | alternative
- ▶ Rules start with a non-terminal symbol, followed by "::=" and the symbol's definition

HINT: Keep in mind that AQL is cAse sEnSiTiVe

AQL Terminal symbols (I)



- ‘<’ and ‘>’ in this order are used to represent a class, a relation, a model, a model type, etc. (e.g. <"Rectangle"> , <"My Model 01"> , <"My First Model Type">)
- ‘:’ is used for specifying the class of a certain object, or the model where a specific class is included (e.g. <"Red Rectangle 01">:<"Rectangle"> , <"Rectangle">:<"My Model 01">:<"My First Model Type">)
- ‘>’ and ‘<’ in this order are used for filtering the results of a query by a specified class (e.g.: <"B"><<"requires" >"A"> has as results all objects that fulfill the query criteria <"B"><<"requires" AND are of class A)
- ‘->’ , ‘<-’ , ‘->>’ , ‘<<-’ , ‘-->’ , ‘-->>’ , ‘<--’ are used for creating AQL expressions that involve relations in the query criteria (will be detailed in the future slides)

AQL Terminal symbols (II)



- '{' and '}' are used to represent the object with the specified name (e.g.: `{"Rectangle"}`)
- '[' and ']' are used to introduce a criteria to an AQL expression (`[?"Radius">"10"]`)
- '(' and ')' are used for deciding the order in which logical operators are evaluated i.e. `'a OR b AND c'` and `'(a OR b) AND c'` return different results
- '?' is used for imposing a condition on an attribute in the query criteria (e.g.: `<"A">[?"Description" like ""OK""]` returns all objects of class A, whose attribute „Description“ contains the word „OK“)
- '!' is used for imposing a condition on a variable during the simulation (e.g.: `(<"A">[!"objectCount">"10"]) OR (<"B">[!"objectCount"<="10"])` returns all objects of class A, if the variable object Count is higher than 10 and all objects of class B otherwise.

AQL Non-terminal symbols and key words (I)



Names of classes, names of objects, names of relations, names of attributes, names of variables and constants are denoted by inverted commas (e.g.: `"A"`, `"Rectangle"`, `"requires"`, `"Colour"`)

`<Class> ::= '<class_name>'`

Represents a class (e.g. `<"requires">`)

If the class is not included in the current model, the class has to be denoted explicitly through model name and model type

`<Class>:'<ModelName>':'<ModelType>`

(e.g.: `<"Rectangle">:<"My Model 01">:<"My First Model Type">`)

`<Object> ::= '<object_name>'`

Represents an object within a concrete model (e.g. `<"Red Rectangle 01">`)

Should the name of the objects be ambiguous, the name of the class has to be appended to the object's name: `<Object>:'<Class>`

(e.g.: `<"Red Rectangle 01">:<"Rectangle">`)

if the object referenced is not part of the current model, the object has to be denoted explicitly through model name and model type:

`<Object>:'<Model name>':'<Model type>`

(e.g.: `<"Red Rectangle 01">:<"My Model 01">:<"My First Model Type">`)

`<Object>:'<Class>':'<Model name>':'<Model type>`

(e.g.: `<"Square 01">:<"Square">:<"My Model 02">:<"My First Model Type">`)

AQL Non-terminal symbols and key words (II)



<Relation> ::= '<relation_name>'

represents a relationclass (e.g. **<"requires">**)

<Attribute> ::= '<attribute_name>'

represents the name of an attribute (e.g. **<"Color">**, **<"Description">**)

<Value> ::= <Constant> | '!' <Variable> | '?' <Attribute>

a value is either a constant, a variable preceded by the symbol '!' or an attribute preceded by the symbol '?'

<Operator> ::= '>' | '>=' | '=>' | '=' | '<=' | '<' | '!=' | 'like' | 'unlike'

'like' and 'unlike' are used for alphanumerical signs

? and * are wildcards: „*“ substitutes for any zero or more characters and „?“

substitutes for any one character or less (123??? will match 12313 or 1233, but not 1239919991)

the other operators are used for comparing numerical values

<LogicalOperator> ::= 'AND' | 'OR' | 'DIFF'

'AND' : the result is the intersection set of the two expressions

'OR' : the result is the union set of the two expressions

'DIFF' : the result is the difference of the two expressions

'AND' links more strongly than 'OR' and 'OR' more strongly than 'DIFF'

AQL Non-terminal symbols and key words (II)



<AQL expression> ::= '[' [<Object>] [',' <Object>] ']'

the result of an AQL expression is a set of objects (0,1 or more)

<AQL expression> ::= '[' <AQL expression> ')'

expressions may contain parentheses

<AQL expression> ::= <AQL expression> {<LogicalOperator> <AQL expression>}

expressions can be linked to one or more expressions by logical operators

<AQL expression> ::= <AQL expression> '>'<Class>'<'

expression results can be filtered by a specific class

AQL Statements (I)

'<' <class> '>'

the result is all objects of the specified class

Example:

<"A">

<"Square"."SecondModel001"."My Second Model Type">

<"A"> [?"Name" like "????e?"]

<"B"> <- "requires"

AQL Statements (II)

► <AQL expression> '->' | '<-' | '->>' | '<<-' <Relation>

- The result contains all objects which are linked through the he given relation with at least one object from the AQL expression
- '->' returns all direct targets of the relation
- '<-' returns all direct start objects of the relation
- '->>' returns all transitive targets of the relation
- '<<-' returns all transitive start objects of the relation

Example:

► {"A1"}->"requires "

► {"A4"}<-"requires"

► <"A">->"requires"

► <"A"><-"requires"

► {"Rectangle01"}<-"owns"

► ({ "A2" }->>"requires") -> "has list"

► {"A4"}<<-"requires"

► <"Rectangle"><<-"owns"

► <"A">->"requires" >"B"<

AQL Statements (III)



<AQL expression> '->' | '<-' '<' <Relation> '>'

The result contains all connectors of the specified relation which have as start or target object one of the objects in the AQL expression

'->' returns all connectors originating from the objects of the AQL expression

'<-' returns all connectors ending in the objects of the AQL expression

Please note similarities and differences with before: if you use the '<' and '>' symbols, the result contains the connectors and if you don't use them, it contains the objects

Example:

```
<"B">-><"requires">
```

```
<"A"><-"requires">
```

```
{"List003"} <- <"has list">
```

```
{"A1"} -> <"has list">
```

AQL Statements (IV)



<AQL expression> '-->' | '-->' <Attribute>

The result contains all objects which are referenced in the specified attribute of any of the objects in the AQL expression

The '-->' operator returns is all objects which are transitively referenced in the specified attribute of any of the objects in the AQL expression

Example:

```
<"A"> --> "IsRunBy"
```

```
<"A"> -->> "IsRunBy"
```

```
{"A5"} --> "IsRunBy"
```

```
{"A5"} -->> "IsRunBy"
```

```
{"A5"} -->> "IsRunBy" >"Rectangle"<
```

Statements (V)

<AQL expression> '<--'

The result contains all objects which refer any of the objects in the AQL expression

Example:

<"Rectangle"> <--

AQL Statements (VI)

- ▶ <AQL expression> '[' <Value> <Operator> <Value> ']'
- ▶ The result contains all objects, whose attributes fulfill the defined criteria
- ▶ Constants (numbers, strings) can only be at the right of the operator
- ▶ To the left of the operator there are only attributes or variable references
- ▶ Note: Queries with variable references as dynamic components in the performer assignment are only allowed in the simulation

Example:

- ▶ (<"A"> [?"Description" like ""]) AND (<"A"> [?"A_cost" >=10])
- ▶ <"A"> [?"Description" like ""Test*"]
- ▶ (<"Rectangle"> [?"Name" like "M*"]) AND (<"Rectangle"> [?"Area" <= 20])
- ▶ <"A"> [?"Name" like "????e?"]

AQL Statements (VII)

<AQL expression> '['<Value>'] '['<Value> <Operator> <Value>']'

The result contains all objects of the start query where their record attribute or attribute profile fulfills the defined criteria

The first value specifies the name of the record attribute or attribute profile.

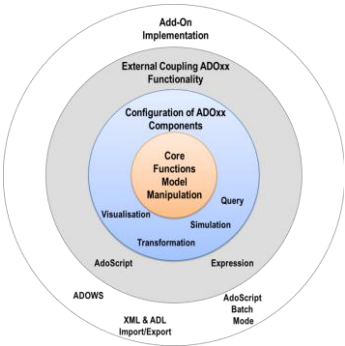
See above the rules for the second expression

Note: In case of a record attribute, the criteria is always fulfilled, if at least a table row of the record attribute meets the defined criteria.

Example:

record attribute: `<"List">["?Classification"]["?State" = "Authorized"]`

attribute profile: `<"A"> ["?Availability"] ["?Days per week" >= 3]`



3. EXTERNAL COUPLING ADOXX FUNCTIONALITY

What is AdoScript?



AdoScript is the macro language of ADOxx. It is based on LEO and is build procedural. Through AdoScript the user has access to a huge number of ADOxx functionalities.

AdoScript is a mighty tool which allows huge extension possibilities with low programming effort.

Examples:

- New menu entries
- Integration of new tools
- Realisation of specific model checking
- Realisation of new interfaces
- Additional add-on-programming

How is AdoScript used?



AdoScript can be executed on different ways. So it can be used where it is needed:

As menu entry: For manual execution
(e.g. transformation procedures, evaluation scenarios)

In events: If specific actions are executed, an AdoScript can be automatically called.
(e.g. a special dialogue replaces the standard dialogue window)

Notebook via Programmcall

Automatic over Command prompt

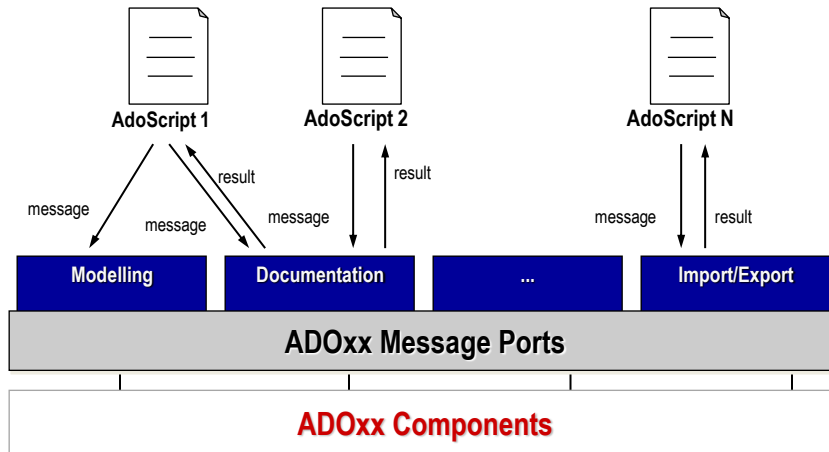
```
ECHO CC "AdoScript" FREAD file:("batchupd.adoscript")
EXECUTE (text) CC "Application" EXIT |
areena -ubatchupd -pbatchupd -dADOxxdb -ssqlserver -e
```

From AdoScript-Shell

Integration of AdoScript:

The Message Port-Concept

AdoScript can be integrated with „External binding“ or „Programm call“.



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Programmable through scripting APIs

- ▶ **Method-specific development of functionalities through scripting**
- ▶ Function calls/APIs of the platform (realized in C++) are possible through scripting language AdoScript.
- ▶ Categorisation of APIs called „Messageport“.

Component APIs

Messageport **Acquisition**
 Messageport **Modeling**
 Messageport **Analysis**
 Messageport **Simulation**
 Messageport **Evaluation**
 Messageport **ImportExport**
 Messageport **Documentation**
 Messageport **AQL**

About 400 APIs are available.

UI APIs

Messageport **AdoScript**
 Messageport **CoreUI**
 Messageport **Explorer**

Manipulation APIs

Messageport **Core**
 Messageport **DB**
 Messageport **UsrMgt**

Application APIs

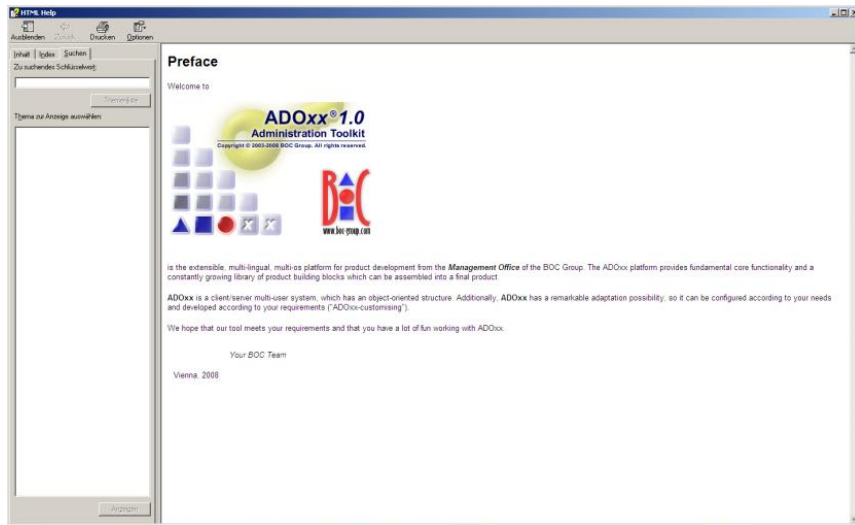
Messageport **Drawing**
 Messageport **Application**

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Documentation of MessagePorts and AdoScript Call Signatures



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Useful Hint

Every Command Call stores the result in global variables

=> HINT:

Store right after the CC required global variables in local variable to avoid overwriting by the next CC

Tracking the global variables with “debug”

=> HINT:

Use the keyword debug during CC “xxx” debug” to track the status of variables

Variables are allocated with values, distinguish if you manipulate the variable v1, or the value of the variable (v1)

=> HINT:

- use VAL and STR to convert strings to integer and vice versa
- use tokcnt to count tokens in a result list
- use () to get the value of a variable
- use CM to convert into centimetre

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Library Attribute "External binding"

Through the library attribute „External binding“ it is possible to extend the available ADOxx functionality. For every component a library specific menu item can be defined, which is bind to a executable script. Besides in the external coupling the coupling to software of other producers can be configured.

```
ON_EVENT "AppInitialized"
{
    #do smthg.
}
```

Ex. Event

```
ITEM "ADOxx-Standard-Methode"
acquisition:"~Hilfe"
modeling:"~Hilfe"
analysis:"~Hilfe"
simulation:"~Hilfe"
evaluation:"~Hilfe"
importexport:"~Hilfe"

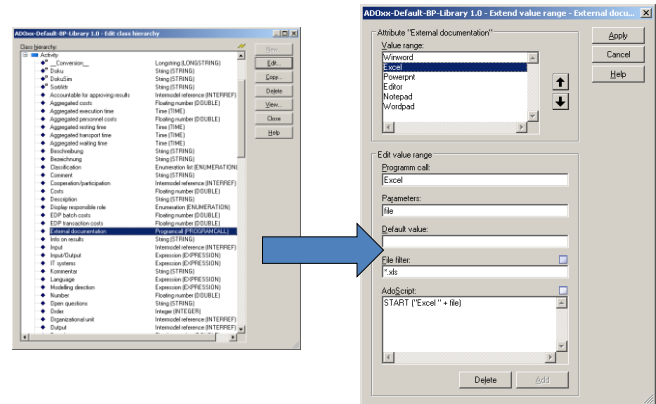
CC "Application" GET_PATH "adostd.hlp"
START ("\" + path + "\"")
```

Ex. Menu

AdoScript via Notebook

Attribute type PROGRAMCALL

Execution of AdoScript commands over program calls attributes in the notebook of objects.



Automatically over the command prompt

AdoScript integration over command line parameter on startup of tools:

```
ECHO CC "AdoScript" FREAD file:("batchupd.adoscript")
EXECUTE (text) CC "Application" EXIT |
areena -ubatchupd -pbatchupd -dADOxxdb -ssqlserver -e
```

Command Line Parameter

- ▶ -uUser
- ▶ -pPassword
- ▶ -dDatabase
- ▶ -sDBServerSystem
- ▶ -eInlineHandOver vs. File Execution

AdoScript Shell Window

Debug/Development Facility

ITEM "Shell window" modeling:"Extras,,Menu Entry

SET endbutton:"ok"Script Code for Shell Window

WHILE (endbutton = "ok")

{

CC "AdoScript" EDITBOX text:(adoscript)

title:"Enter the code you want to test..."

oktext:"Go!"

IF (endbutton = "ok")

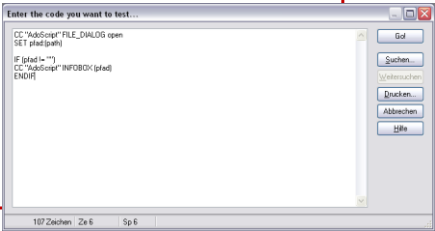
{

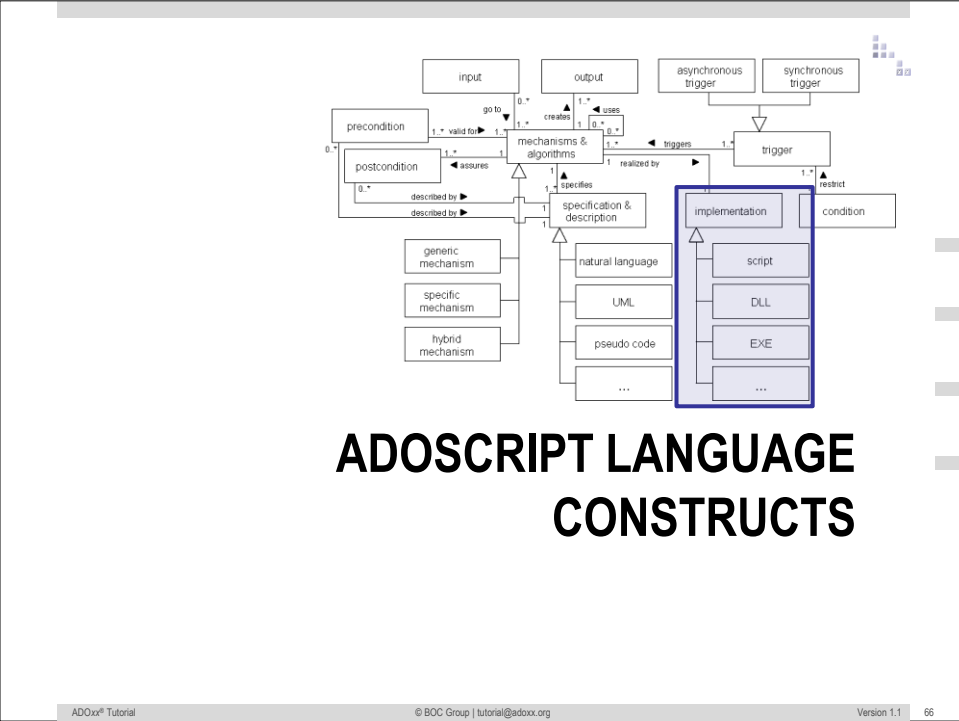
SET adoscript:global:(text)

EXECUTE (text)

}

}





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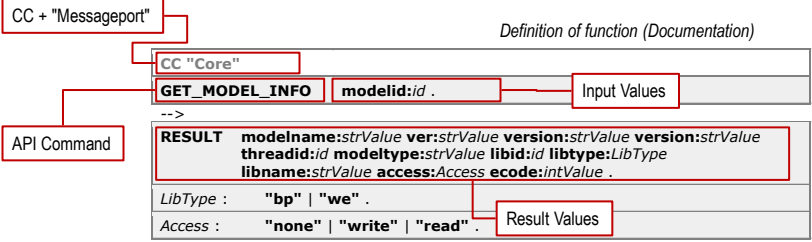
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API Command Structure

Example of script command- Read of the model information



```
# Reading out of the ModelID of a model currently open  
CC "Modeling" GET_ACT_MODEL  
# Errorcheck ecode  
IF (ecode = 0) {  
  # Command Call(Keywords in Capitals)  
  CC "Core" GET_MODEL_INFO modelid:(VAL modelid)  
  # Handling of Return Values  
  CC "AdoScript" INFOBOX ("The active model is \" + modelname + "\" (" +modeltype  
  + ")")  
} ELSE {  
  # ecode returned  
  CC "AdoScript" ERRORBOX "No model is opened!"  
}
```

Code Example

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AdoScript Basics



Variable declaration

SET, LEO

Control structures

IF/ELSIF/ELSE, WHILE, FOR, BREAK, EXIT, PROCEDURE,
FUNCTION

External programs / File callings (AdoScript, EXE, DLL)

EXECUTE, SYSTEM, START, CALL

Sending of messages to ADOxx Component (Messageports)

CC, SEND

LEO Expressions

Usage of expressions for call parameters.

AdoScript Operators



Logical

AND, OR, NOT

Comparison

< > <= >= = <> !=

Arithmetical

+ - * / - (unary)

Strings

s + t, n * s, s / t, s SUB i, LEN s

Converting

STR value, VAL string

AdoScript Functions



Arithmetical

```
abs(x), max(x, y), min(x, y), pow(x, y), sqrt(x),
exp(x), log(x), log10(x)
```

Strings

```
search(source, pattern, start),
bsearch(source, pattern, start),
copy(source, from, count),
replall(source, pattern, new), lower(source),
upper(source)
```

Lists

```
token(source, index[, separator]),
tokcnt(source[, separator]),
tokcat(source1, source2[, separator]),
tokdiff(source1, source2[, separator]),
tokisect(source1, source2[, separator]),
tokunion(source1, source2[, separator]),
```

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AdoScript: Procedure Concepts



```
ProcedureDefinition :      PROCEDURE [global]
ProcedureName
[ MainParameter ] { FormalProcParameter }
{ StatementSequence } .
MainParameter :      TypeName:paramName .
FormalProcParameter :
    paramName:TypeNameOrReference .
TypeNameOrReference :      TypeName | reference .
TypeName :      string | integer | real | measure | time
|
array | expression | undefined .
ProcedureName :      keyword .
ProcedureCall :      anyLeoElement .
```

```
PROCEDURE MYPROC integer:n val:string result:reference
{
    SET result:(val + STR n)
}
```

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AdoScript: Functions concept



```
FunctionDefinition ::= FUNCTION functionName[:global]
                    { FormalFuncParameter }
                    return:expression .

FormalFuncParameter ::= paramName:TypeName .
TypeName             ::= string | integer | real | measure |
                    time | expression | undefined .
```

Example:

```
FUNCTION fak n:integer
    return:(cond (n <= 1, 1, n * fak (n - 1)))

SET m:(fak (10))
```

Expressions in AdoScript



Expressions can be used direct as arguments in calls.

Use closures () in order to delineate arguments of an expression.

Example

```
SET n:(copy (vn, 0, 1) + ". " + nn)
IF ( cond( type( n ) = "integer", n = 1, 0 ) )
{
    ...
}
EXECUTE ("SET n:(" + n + ")")
```

Summary of AdoScript Language Elements

AdoScript language elements

Command execution

EXECUTE

SEND

CC

SYSTEM

START

CALL

Allocation elements

SET

SETG

SETL

Control elements

IF

ELSIF

ELSE

WHILE

FOR

BREAK

NEXT

EXIT

Definition of Procedures/Functions

PROCEDURE

FUNCTION

LEO (Return Format) Handling

LEO

LEO parse

StatementSeq :	{ Statement } .
Statement :	Execute Send CC System Start Call Set SetL SetG Leo IfStatement WhileStatement ForStatement BreakStatement ExitStatement FunctionDefinition ProcedureDefinition ProcedureCall .
Execute :	ExecuteFile ExecuteEx .
ExecuteFile :	EXECUTE filescriptText [scope:ScopeSpec] .
ExecuteEx :	EXECUTE scriptText [scope:ScopeSpec] .
ScopeSpec :	separate same child .
Send :	SEND msgText to:msgPortName [answer:varName] .
CC :	CC msgPortName [debug] [raw] anyLeoElement .
System :	SYSTEM strExpr [with-console-window] [hide] [result:varName] .
Start :	START strExpr [cmdshow:CmdShow] .
CmdShow :	showmaximized showminimized showminnoactive shownormal .
Call :	CALL dll:strExpr function:strExpr { InputParam } [result:varName] [freemem:strValue] .
InputParam :	varName:anyExpr .
Set :	SET { VarAssignment } .
SetL :	SETL { VarAssignment } .
SetG :	SETG { VarAssignment } .
VarAssignment :	varName:anyExpr .
Leo :	LEO [parseCmd] { accessCmd } .
parseCmd :	parse:stringExpr .
accessCmd :	get-elem-count:varName set-cur-elem-index:intExpr get-keyword:varName is-contained:varName [strExpr] get-str-values:varName [strExpr] get-int-values:varName [strExpr] get-real-values:varName [strExpr] get-tmm-value:varName [strExpr] get-time-value:varName [strExpr] get-modifier:varName:strExpr .
IfStatement :	IF booleanExpr { StatementSequence } ELSEIF booleanExpr { StatementSequence } ELSE { StatementSequence } .
WhileStatement :	WHILE booleanExpr { StatementSequence } .
ForStatement :	ForNumStatement ForTokenStatement .
ForNumStatement :	FOR varName from:numExpr to:numExpr [by:numExpr]

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AdoScript Programm Guidelines

- ▶ If your are programming AdoScript, please consider following rules:
 - ▶ Files which contain AdoScript should be named file.asc
 - ▶ The returning result of a message port command should be under the command.

```
GET_CLASS_NAME classid:intValue .  
# --> RESULT ecode:intValue classname:strValue isrel:intValue
```

- ▶ Indent a block with two spaces
- ▶ Don't use the tabulator to indent blocks
- ▶ Decompose the complexity of the programm by using procedures and functions.

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VISUALISATION

AdoScript

3. EXTERNAL COUPLING

ADOXX FUNCTIONALITY

Sample on Visualisation with ADOscript

1. Count how many objects of class E have been modelled in actual model
 2. Create a new model in a selected modelgroup with Target-Result as an object
 3. The radius of the target result is the count of modelled Es.
- => The more Es have been modelled, the bigger is the resulting circle.

Visualisation AdoScript - Example

```
## Get active Model
CC "Modeling" GET_ACT_MODEL
SETL id_startmodel:(modelid)

# make an info box for debuggin reasons - convert value of id_actmodel
into a string
CC "AdoScript" INFOBOX ("Hello " + STR(id_startmodel) + "!")
title:"Start model id!"

## count how many objects of class "E" have been modelled in that model

# get the id of class "E"
CC "Core" debug GET_CLASS_ID classname:"E"
SETL id_class:(classid)

#----- This GET_CLASS_ID sets
following global variables
#----- [ecode:intValue]
[classid:intValue]

# get all objectss of class "E"
CC "Core" debug GET_ALL_OBJS_OF_CLASSID modelid:(id_startmodel)
classid:(id_class)
```

Visualisation AdoScript – Example (cont'd)

```
IF (LEN (objids) = 0)
{
  CC "AdoScript" ERRORBOX ("You have no instances of class '" + (cname)
+ "'!")
  EXIT
}
SETL debug count_of_objects: (tokcnt(objids))

CC "AdoScript" INFOBOX ("Hello " + STR(count_of_objects) + "!")
title:"Count of objects of class E!"

## Creating a new model
CC "CoreUI" MODEL_SELECT_BOX mgroup-sel without-models
title:"Zielmodellgruppe"
                                boxtext:"Selektieren Sie die Ziel-
Modellgruppe in der Datenbank:"

# ----- This MODEL SELECT BOC sets a
couple of global variables
# ----- [ modelids: idList |
threadids: idList ] [ mgroupids: idList ] [ appmodelids: idList ] [
extraValues ]
# ----- the global variable
mgroupids is used in CREATE MODEL
```


Visualisation AdoScript - Example (cont'd)



```
CC "Core" CREATE_MODEL modeltype:"Result-Type 1"
                        modelname:"My First own result"
                        version:"1.0"
                        mgroups:(mgroupids)

# open the new created model AND to make the new model ACTIVE
IF (ecode = 0)
{
    CC "Modeling" CREATE_WINDOW_FOR_LOADED_MODEL modelid:(modelid)
}

## Create objects in the new model

# get the model ide of the new model
CC "Modeling" GET_ACT_MODEL
SETL id_resultmodel:(modelid)

# make an info box for debuggin reasons - convert value of id_actmodel
into a string
CC "AdoScript" INFOBOX ("Hello " + STR(id_resultmodel) + "!")
title:"Result model id!"
```

Visualisation AdoScript - Example (cont'd)



```
# get the id of class "Result-of-Count"
CC "Core" debug GET_CLASS_ID classname:"Result-of-Count"
SETL id_class:(classid)

# create the object
CC "Core" debug CREATE_OBJ modelid:(id_resultmodel) classid:(id_class)
objname:"A new Result-of-Count"
SETL id_object:(objid)

IF (ecode != 0) {
    CC "AdoScript" ERRORBOX ("The object could not be created. \n"+
                            "Maybe one with the same name already
exists?")
}

# get the attribute "number of counts" of the class
CC "Core" GET_ATTR_ID classid:(id_class) attrname:"number of counts"
SETL id_attr:(attrid)
```

Visualisation AdoScript - Example (cont'd)



```
IF (ecode != 0)
{
    CC "AdoScript" ERRORBOX "The selected object does not contain an
attribute called \"Name\"!"
    EXIT
}

# set the name of the selected object
CC "Core" debug SET_ATTR_VAL objid:(id_object) attrid:(id_attr)
val:(count_of_objects)
IF (ecode != 0)
{
    CC "AdoScript" ERRORBOX "Could not set the attribute value!"
    EXIT
}

##
```

VISUALISATION EXPRESSION

3. EXTERNAL COUPLING ADOXX FUNCTIONALITY



Expressions



AdoScript vs. Expressions

AdoScript	Expressions
• Allows embedding external functionality	• No external functionality
• Read and write access to most attributes	• Read access to most attributes, write access only to own attribute
• Must be triggered explicitly by the user	• Are triggered automatically
• Can embed Expressions	• N/A
• Can not be changed by the modeler	• Can be changed by the modeler if not defined as "fixed"
• Usually synchronous execution	• Can be synchronous or asynchronous (idle-processing)
• Any complexity	• Usually less complex than AdoScripts
	• Careful with closed models (values can be outdated)

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3 Types of Expressions



- **LeoExpressions:**
Provide a basic set of functions and operators
Support for calculation of values, manipulation of strings and other basic operations
Used inside LEO based languages
- **CoreExpressions:**
Extension of LeoExpressions
Only used in EXPRESSION attributes
- **AdoScriptExpressions:**
Extension of LeoExpressions
Additional functions can be created (using the keyword FUNCTION)
Only used in AdoScripts

Expressions – Operations (1)



Logical Op.	AND, OR, NOT	Boolean expressions
Comparison Op.	< > <= >= = <> !=	Bigger, smaller, equal, diverse
Arithmetic Op.	+ - * / - (unary)	
String Op.	s + t	Concatenation of Strings s and t
	n * s	Replication: String s is replicated n-times
	s / t	Count: how often can String s be found in t
	s SUB i	The i-th character in String s
	LEN s	Length of Strings s

Expressions – Operations (2)



Conversion Op.	STR val	String representation of Value val
	VAL str	Numerical representation of Strings str
	CMS measure PTS measure	Conversion of a Unit (in cm or points) to a real number (e.g.: CMS 3.5cm → 3.5).
	CM real PT real	Conversion of a real number to a Unit (in cm or points; e.g.: CM 3.5 → 3.5cm).
	uistr(val, n)	Conversion of a real number to a string in the local format (OS) with n digits.
	uival(str)	Conversion of a String in the local format (OS) to a real number.
Sequence Op.	,	The comma is used to define a sequence of expressions. The result is always the value of the last expression.

Expressions – Predefined functions (1)



Arithmetic Functions	abs(x) max(x, y) min(x, y) pow(x, y) sqrt(x) exp(x) log(x) log10(x)	Arithmetic functions
	sin(x) cos(x) tan(x) asin(x) acos(x) atan(x) sinh(x) cosh(x) tanh(x)	Trigonometric functions
	random()	Random value 0 >= n < 1
	round(x)	Round-to-nearest, i.e. if decimal >= 0.5
	floor(x) ceil(x)	Round up/down

Expressions – Predefined functions (2)



String-func.	search(source, pattern, start)	Searches in <i>source</i> for <i>pattern</i> , starting at <i>start</i> (0-based), returns index or -1
	bsearch(source, pattern, start)	Search begins at end of source string (backwards)
	copy(source, from, count)	Copies <i>count</i> characters from <i>source</i> beginning at <i>from</i> (0-based)
	replall(source, pattern, new)	Replaces all occurrences of <i>pattern</i> in <i>source</i> with <i>new</i>
	lower(source)	Transforms to lower-case
	upper(source)	Transforms to upper-case
	mstr(string)	Puts the string between "" and escapes special characters

Expressions – Predefined functions (3)



List Funct	<code>tokcnt(source[, sep])</code>	Counts tokens in <i>source</i> separated by <i>sep</i> (default = single whitespace)
	<code>tokcat(source1, source2[, separator])</code>	Concatenates two lists
	<code>tokunion(source1, source2[, separator])</code>	Union of two lists
	<code>tokisect(source1, source2[, separator])</code>	Intersection of two lists
	<code>tokdiff(source1, source2[, separator])</code>	Difference of two lists
Color Funct	<code>rgbval(colorname)</code>	24bit RGB-Value of the color (by name)
	<code>rgbval(r, g, b)</code>	Calculates the RGB-Value for the provided color values.

Expressions – Control structures



Expressi ons	<code>set(var, expr)</code>	<i>Expr</i> will be stored in <i>var</i> . Variable <i>var</i> is created implicitly.
	<code>cond(cond1, expr1, ..., expr_else)</code>	Evaluate <i>cond1</i> , if true return <i>expr1</i> , if false return next condition or return <i>expr_else</i> .
	<code>while(cond, loopexpr[, resultexpr])</code>	While <i>cond</i> is true, evaluate <i>loopexpr</i> . Return <i>resultexpr</i> .
	<code>fortok(varname, source, sep, loopexpr[, resultexpr])</code>	For each element in the list <i>source</i> , evaluate <i>loopexpr</i> . The current element is stored in <i>varname</i> . The list elements are separated by <i>sep</i> . Return <i>resultexpr</i> .

Expressions – Error handling, type checks



Error handling	<code>try (expr, failexpr)</code>	Returns <i>expr</i> , if it succeeds, otherwise returns <i>failexpr</i> .
Type check	<code>type (expr)</code>	Returns the type of the expression. Possible values: "string", "integer", "real", "measure", "time", "expression,, or "undefined,,.

Expressions in AdoScript



Types of expressions

Core Expressions:

- Are used to define attributes with the type EXPRESSION
- Can access functions for Core Expressions

AdoScript Expressions:

- Are used in AdoScript
- Can be externalized in functions
- Can access externalized function (defined through keyword FUNCTION)

Core Expressions



Functions for Core Expressions

- ▶ The following functions can be used in Core Expressions

<code>aval()</code>	<code>rcount()</code>	<code>asum()</code>
<code>avalf()</code>	<code>row()</code>	<code>amax()</code>
<code>maval()</code>	<code>rasum()</code>	<code>awsum()</code>
<code>paval()</code>	<code>prasm()</code>	<code>pmf()</code>
<code>pavalf()</code>	<code>allobjs()</code>	<code>class()</code>
<code>irtmodels()</code>	<code>aql()</code>	<code>mtype()</code>
<code>irtobjs()</code>	<code>prevsl()</code>	<code>mtclasses()</code>
<code>profile()</code>	<code>nextsl()</code>	<code>mtrelns()</code>
<code>ctobj()</code>		<code>allcattrs()</code>
<code>cfobj()</code>		<code>alliattrr()</code>
<code>conn()</code>		<code>allrattrr()</code>

- ▶ Additionally all LEO expressions and functions can be used

Core Expressions



Attributes of the type EXPRESSION

- ▶ An expression attribute contains both a formula and the calculated value
- ▶ There are two modes for using expression: fixed and editable
- ▶ Fixed expressions store the formula in the default value of the attribute
- ▶ An error message will be returned, if an error occurs when evaluating a formula.
- ▶ The last valid result is returned, if an inter-model expression can not be evaluated (when trying to access a not loaded model)
- ▶ Expression attributes are always evaluated when an event occurs which can change the value. The changes are shown directly in the user interface

Core Expressions



Attributes of the type EXPRESSION: Definition of expressions as an attribute

Syntax

```
ExprDefinition:   EXPR type:ResultType
                  [format:FormatString]
                  expr:[fixed:]CoreExpression
ResultType :      double | integer | string | time
```

Example

```
EXPR type:string expr:("\Name = \" + aval(\"Name\")")
```

AdoScript Expressions Application



Expressions can be used directly as arguments of calls and be embedded directly in AdoScript code.

Parenthesis are used to delimit the arguments of an expression.

```
SET n:(copy (vn, 0, 1) + ". " + nn)

IF ( cond( type( n ) = "integer", n = 1, 0 ) )
{
    ...
}

EXECUTE ("SET n:(" + n + ")")
```

Expressions can also be moved to dedicated functions so they can be reused.

AdoScript Expressions



Functions in AdoScript

It is possible to define LEO expressions as reusable functions through the keyword FUNCTION.

Syntax

```
FunctionDefinition ::= FUNCTION functionName[:global]
                    { FormalFuncParameter }
                    return:expression .
FormalFuncParameter ::= paramName:TypeName .
TypeName             ::= string | integer | real | measure |
                    time | expression | undefined .
```

Example

```
FUNCTION helloWorld world:string
    return:("Hello " + world + "!")

SET hello:(helloWorld("world"))
CC "AdoScript" INFOBOX (hello)
```

QUERY AdoScript

3. EXTERNAL COUPLING ADOXX FUNCTIONALITY



ADOscript for Queries



```
EvalAqlExpression : EVAL_AQL_EXPRESSION expr:strValue ( modelid:intValue | modelscope ) .
--> RESULT ecode:intValue objids:strValue
```

EVAL_AQL_EXPRESSION will evaluate the AQL string specified by the argument **expr**.

The return variable **ecode** is 0 if the evaluation yielded no error.
The list of found objects or models is returned in the variable **objids** (separated by blanks).

ADOscript for Queries (Examples)



Example 1: Get all objects of class „A“ in a certain model

```
CC "AQL" EVAL_AQL_EXPRESSION expr:"<\A\>" modelid:(modelid)
```

```
IF (ecode = 0)
{
    CC "AdoScript" INFOBOX ("Found objects: " + objids)
}
ELSE
{
    CC "AdoScript" INFOBOX "An error has occurred!"
}
}
```

Example 2: Get all models of modeltype "Working Environment Model"

```
CC "AQL" EVAL_AQL_EXPRESSION expr:"<\,Sample\>" modelscope
```

```
IF (ecode = 0)
{
    CC "AdoScript" INFOBOX ("Found models: " + objids)
}
ELSE
{
    CC "AdoScript" INFOBOX "An error has occurred!"
}
}
```

ADOscript for Queries (Examples)



```
CC "Modeling" GET_ACT_MODEL
# make first query with all objects inside V1
CC "AQL" EVAL AQL_EXPRESSION expr:"({\"V1\": \"V\"})<-
\"Is inside\"} OR ({\"V1\": \"V\"}->\"Is inside\"})"
modelid:(modelid)
SETL st1:(objids)
# make second query with all A in model
CC "AQL" EVAL AQL_EXPRESSION expr:"(<\"A\">)"
modelid:(modelid)
SETL st2:(objids)
# union of the two AQL result sets
SETL st_allobjectids:(tokunion(st1,st2))
IF (ecode = 0)
{
    CC "AdoScript" INFOBOX ("Found objects: " +
st_allobjectids)
}
ELSE
{
    CC "AdoScript" INFOBOX "An error has occurred!"
}
}
```

ADOscript for Queries (Examples)



Following Interref a5 of object A1

```
CC "Modeling" GET_ACT_MODEL

CC "AQL" debug EVAL AQL_EXPRESSION expr:"({\"A1\"} -->
\"a5\")" modelid:(modelid)

SETL st1:(objids)

IF (ecode = 0)
{
    CC "AdoScript" INFOBOX ("Found objects: " + st1)
}
ELSE
{
    CC "AdoScript" INFOBOX "An error has occurred!"
}
}
```

TRANSFORMATION

AdoScript

3. EXTERNAL COUPLING ADOXX FUNCTIONALITY

Transformation Example 1

```
## Open Model
CC "Modeling" GET_ACT_MODEL
SETL id_source_model:(modelid)

SETL s_classname_source:("A")
SETL s_classname_target:("E")

# BEGIN set new model
CC "CoreUI" MODEL SELECT BOX mgroup-sel without-models
title:"Zielmodellgruppe"          boxtext:"Selektieren Sie die Ziel-
Modellgruppe in der Datenbank:"

CC "Core" CREATE_MODEL modeltype:"Sample"
                        modelname:"My First sample"
                        version:"1.0"
                        mgroups:(mgroupids)
SETL id_target_model:(modelid)

# END set new model

CC "Core" GET_ALL_OBJS_OF_CLASSNAME modelid:(id_source_model)
classname:(s_classname_source)
SETL id_objects:(objids)
```

Transformation Example 2

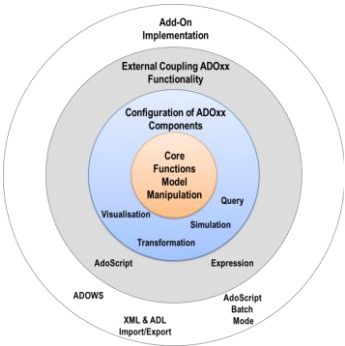
```
# BEGIN set x, y pos
SETL xoffset:5cm
SETL yoffset:5cm
SETL xpos:5.0cm
SETL ypos:5.0cm
SETL counter:1
FOR id_object in:(id_objects)
{
    # get class ID from class name
    CC "Core" GET_CLASS_ID classname:(s_classname_source)

    # get all Notebook attributes
    CC "Core" GET_ALL_NB_ATTRS classid:(classid)

    # and show them
    CC "AdoScript" INFOBOX (attrids)
    CC "Core" GET_ATTR_VAL objid:(VAL (id_object)) attrid:(VAL
("9"))
    SETL s_attr_name:(val)

    # Make new model
    CC "Core" GET_CLASS_ID classname:(s_classname_target)
    SETL id_class_target:(classid)

    CC "Core" debug CREATE_OBJ modelid:(id target_model)
    classid:(id_class_target) objname:(s_attr_name)
    CC "Modeling" debug SET_OBJ_POS objid:(objid) x:"5cm" y:"5cm"
}
}
```

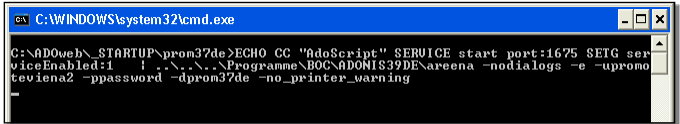


4. ADD-ON IMPLEMENTATION

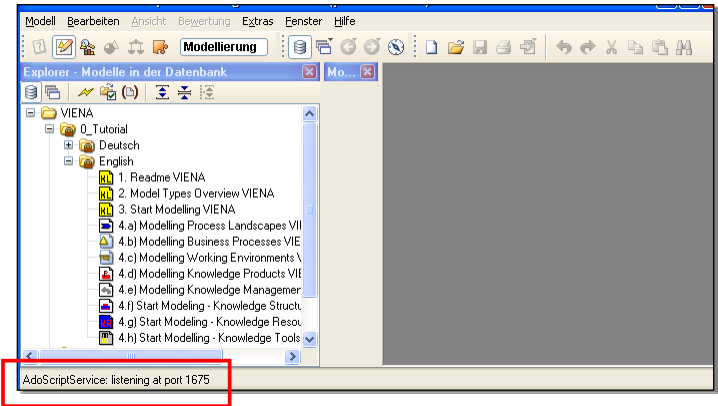
ADOxx WebService

4. ADD-ON IMPLEMENTATION

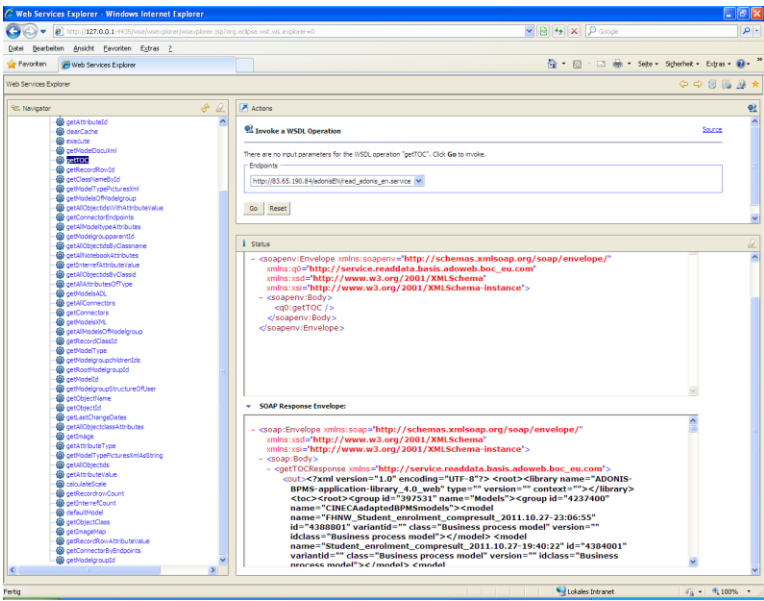
ADOxx WebService Port



```
C:\WINDOWS\system32\cmd.exe
C:\ADOxx\STARTUP\prn37de>ECHO CC "AdoScript" SERVICE start port:1675 SETG serviceEnabled:1 ... \Programme\BOC\ADONIS39DE\areena -nodialogs -e -upromo -tevienna2 -ppassword -dprn37de -no_printer_warning
```



ADOxx WebService Interaction



XML/ADL IMPORT-EXPORT 4. ADD-ON IMPLEMENTATION

XML – ADD-ON Example

EXPERTS QUESTIONNAIRE ON COMPREHENSIVE APPROACH

Q1: Key aspects and components of the "Comprehensive Approach"

How important are (from your point of view/experience) the different focus/definition components of the "Comprehensive Approach"?

	Very important	Of medium relevance	Not particularly important	Cannot assess/Do not know
International joining of forces	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Standardization/Governance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improvement of the general acceptance of multi-level/broad-scope security concepts and measures	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Review of Systems (shared inventory of currently used instruments)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Overall societal outreach	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Civil-military coordination (political-strategic level)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Civil-military cooperation/CMC (tactical-operational level)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Citizen resilience/strengthening of individual responsibility and self-help capacity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Effects-based approach to operations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Comprehensive model of information warfare	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

AdoScript
BATCH MODE
4. ADD-ON
IMPLEMENTATION

Batch Mode - example



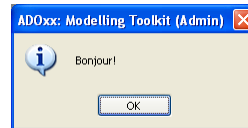
An AdoScript can be specified on the areena command line. It is executed after the initialization of ADOxx is completed. The AdoScript is read from a file or from the standard input stream. In both cases the -e option has to be set, eventually together with a file name specification.

► Example 1

```
# Execute the AdoScript contained in startup.asc
areena -uAdmin -ppassword -dado35 -sdb2 -estartup.asc
```

► Example 2

```
# Specifying an AdoScript via stdin
echo CC "AdoScript" INFOBOX "Bonjour!" | areena -uAdmin -
ppassword -dado35 -sdb2 -e
```



We thank you for your attention!

In case of any questions, please contact

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