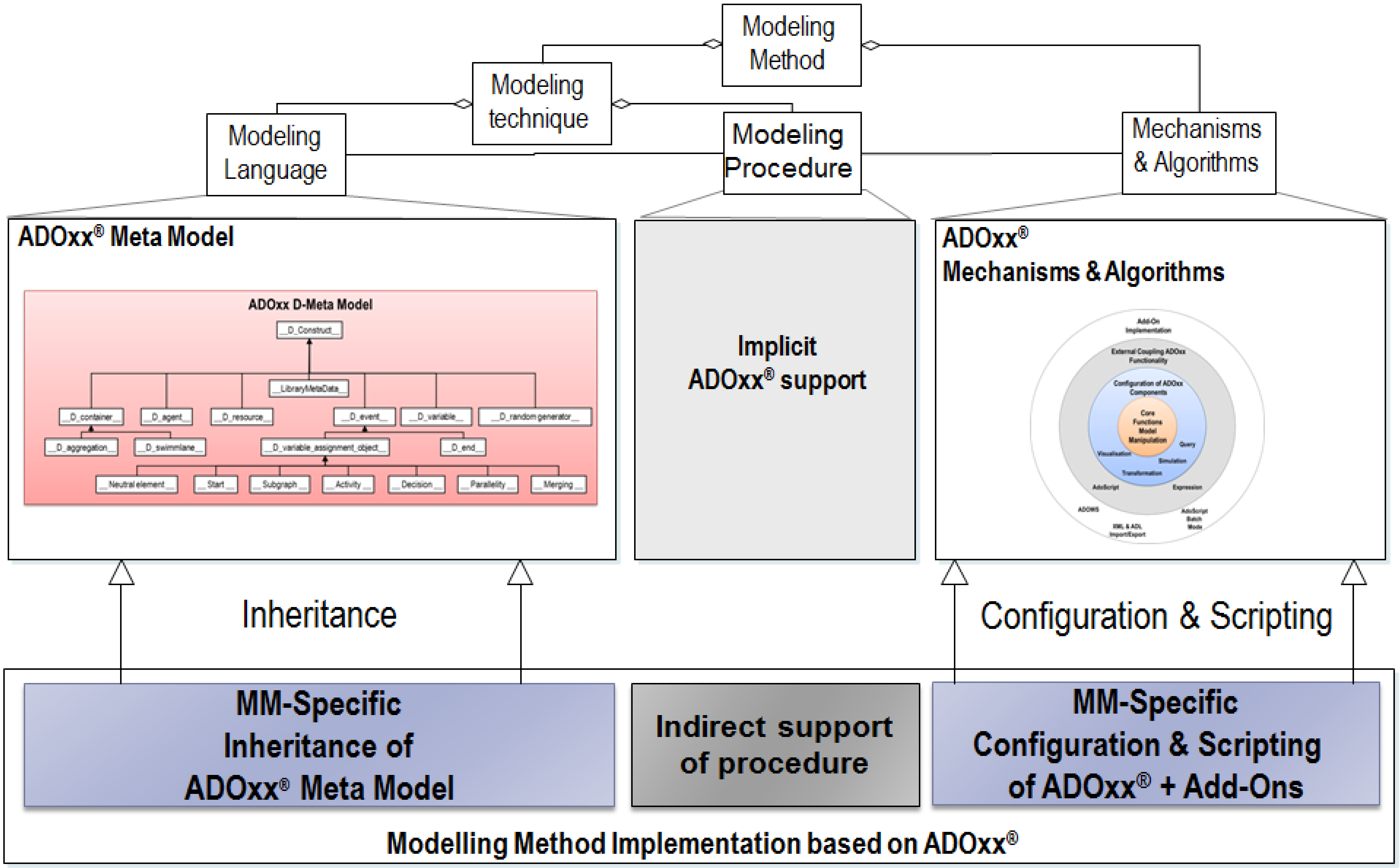
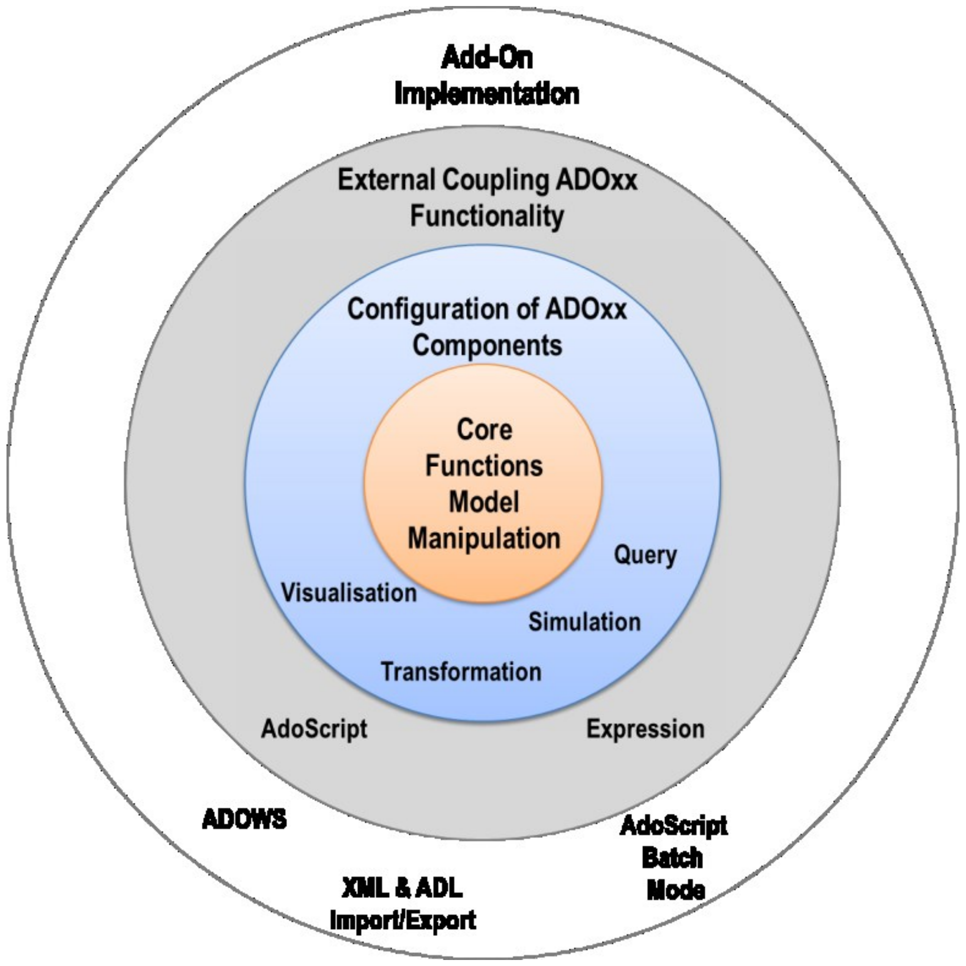
Introduction

Introduction



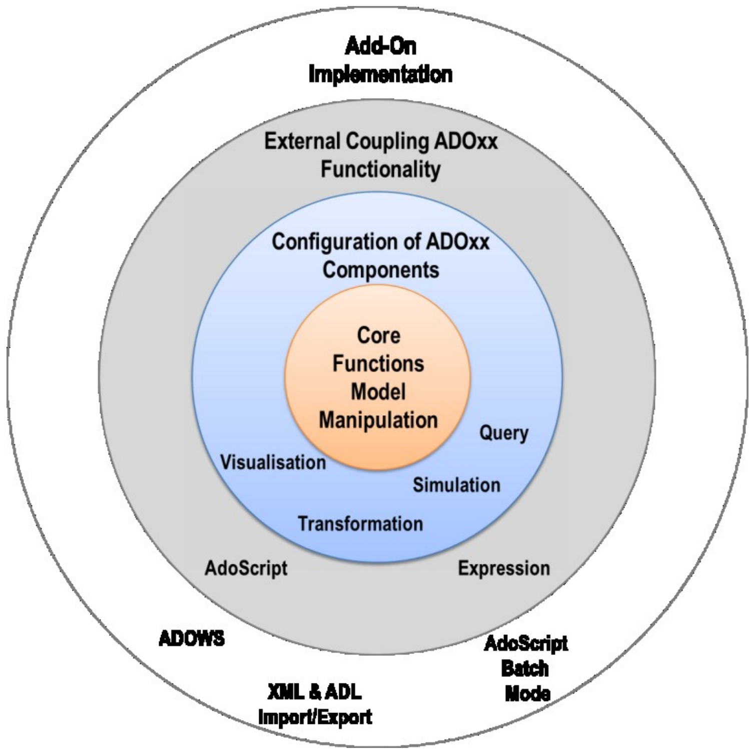
Introduction



Core Functions

Core Functions

- Core Functions for Model Manipulation
  - Database
  - Visualization
  - Query
  - Transformation



Core Functions

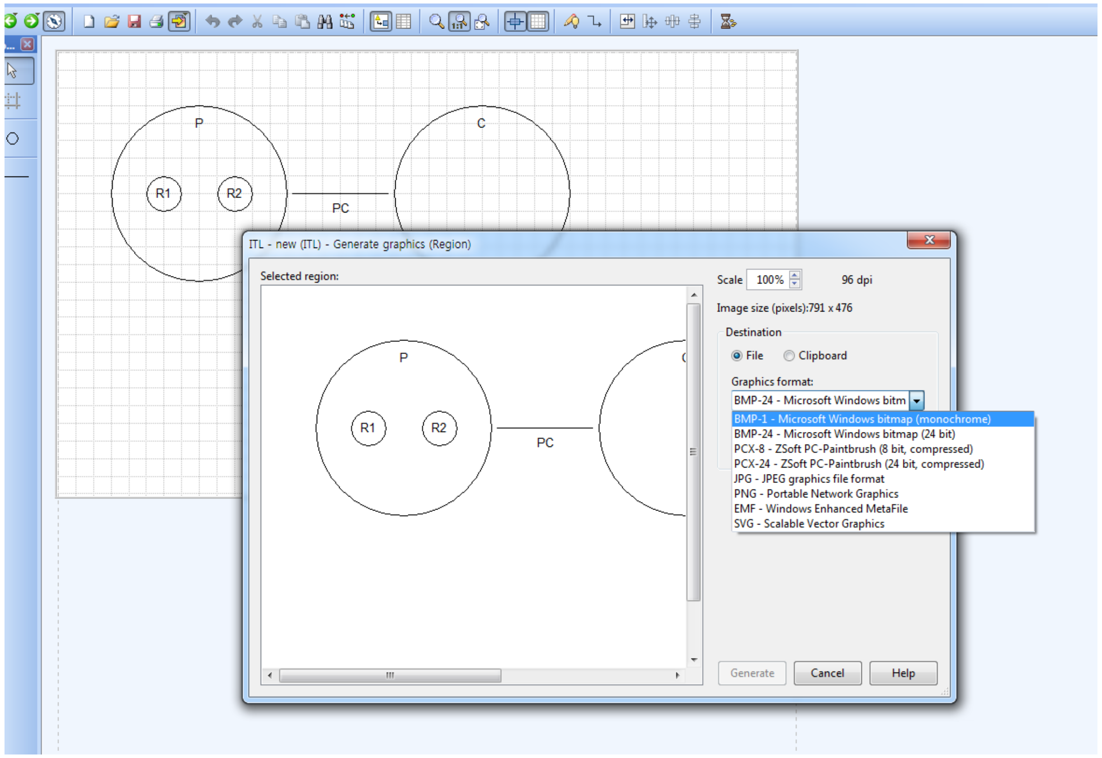
- Database
  - ADOxx Development Toolkit
    - User Management
    - Model Management
    - Library Management
    - Component Management

Core Functions

- Visualization
  - Graphical Presentation of models in the user interface
  - Drag and Drop: Creation and Move, Delete, Edit
  - Cardinality conformity check
  - Notebook representation
  - Zoom Functionality (zoom, world-area, right mouse, etc.)

Core Functions

- Visualization
  - Grid visualisation, Snap Grid
  - Generation of graphic files (bmp, jpg, png, etc.)

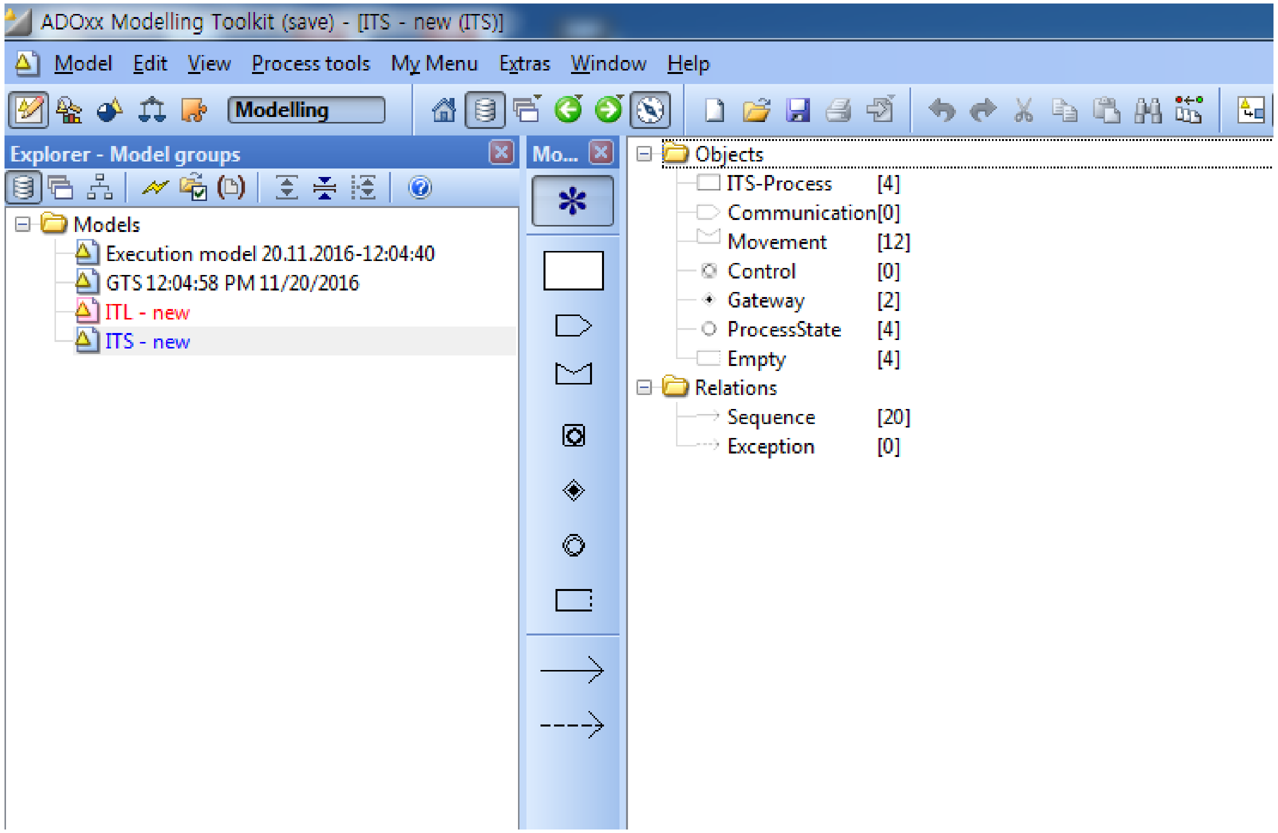


Scale 100% 96 dpi
Image size (pixels):791 x 476
Destination
File [✓ File] Clipboard
Graphics format: BMP-24 - Microsoft Windows bitm

BMP-1 - Microsoft Windows bitmap (monochrome)
BMP-24 - Microsoft Windows bitmap (24 bit)
PCX-8 - ZSoft PC-Paintbrush (8 bit, compressed)
PCX-24 - ZSoft PC-Paintbrush (24 bit, compressed)
JPG - JPEG graphics file format
PNG - Portable Network Graphics
EMF - Windows Enhanced MetaFile
SVG - Scalable Vector Graphics

Core Functions

- Visualization
  - Table based representation



ADOxx Modelling Toolkit (save) - [ITS - new (ITS)]

Models
- Execution model 20.11.2016-12:04:40
- GTS 12:04:58 PM 11/20/2016
- ITL - new
- ITS - new

Objects

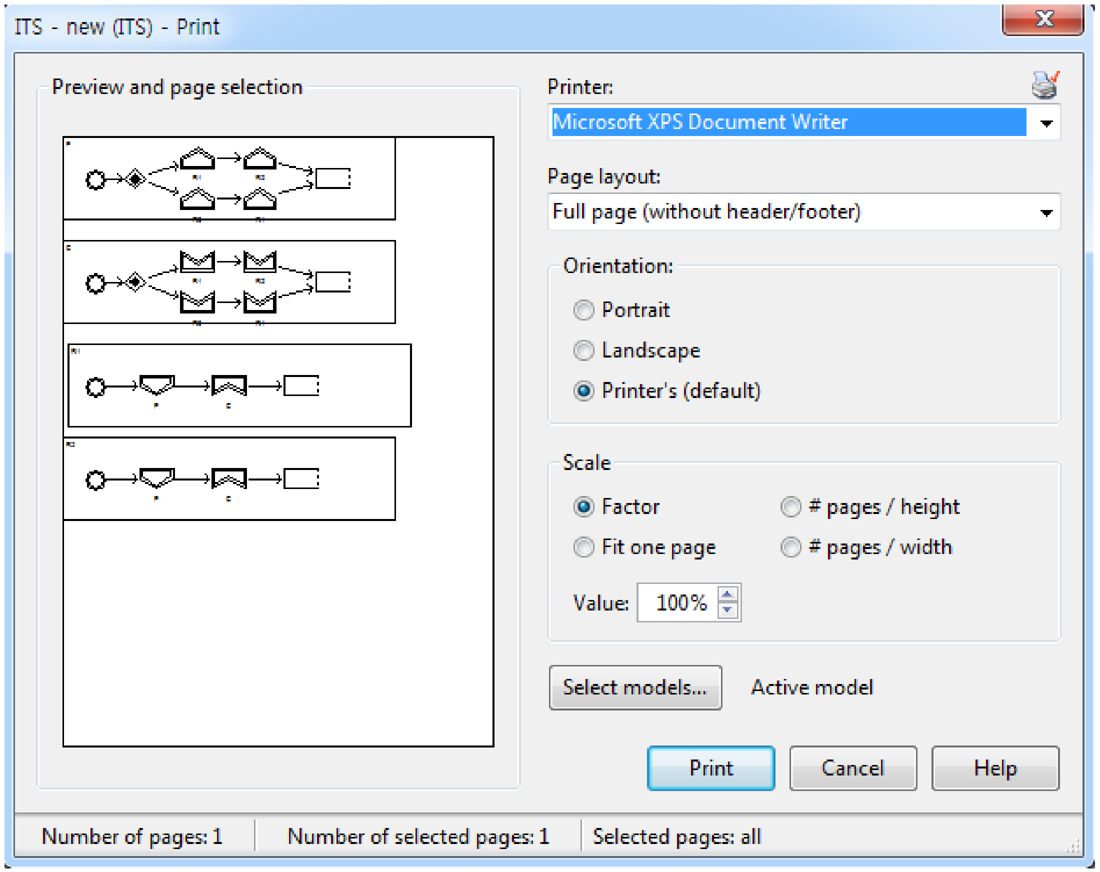
ITS-Process	[4]
Communication	[0]
Movement	[12]
Control	[0]
Gateway	[2]
ProcessState	[4]
Empty	[4]

Relations

Sequence	[20]
Exception	[0]

Core Functions

- Visualization
  - Printer Functionality



ITS - new (ITS) - Print

Printer: Microsoft XPS Document Writer

Page layout: Full page (without header/footer)

Orientation:
- Portrait
- Landscape
- [✓ Printer's (default)]

Scale
- [✓ Factor]
- Fit one page
- # pages / height
- # pages / width

Value: 100%

Number of pages: 1 | Number of selected pages: 1 | Selected pages: all

Core Functions

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

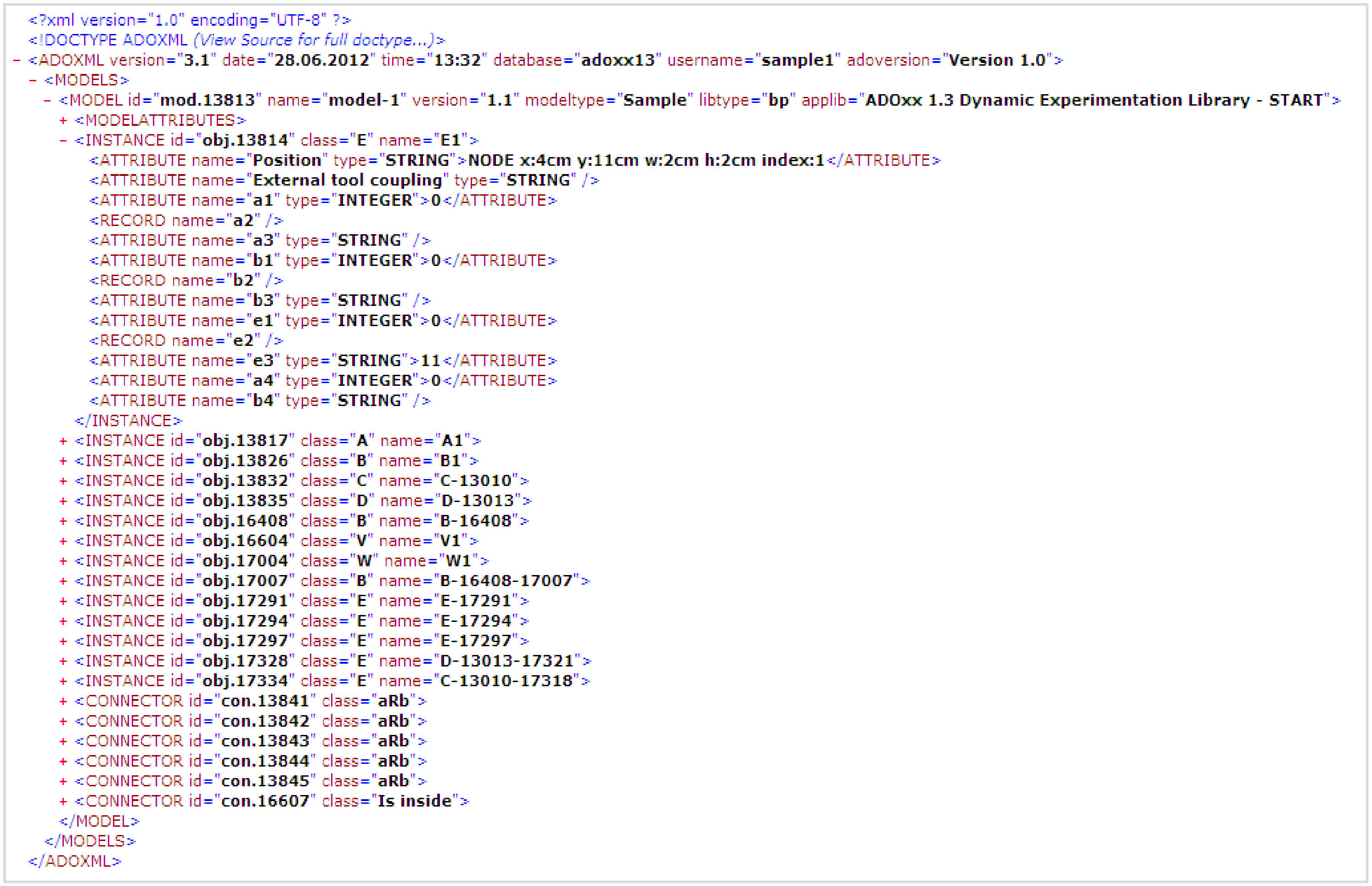
Core Functions

- ADL 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
```

Core Functions

- XML 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>
```

Configuration of ADOxx Components

Configuration of ADOxx Components

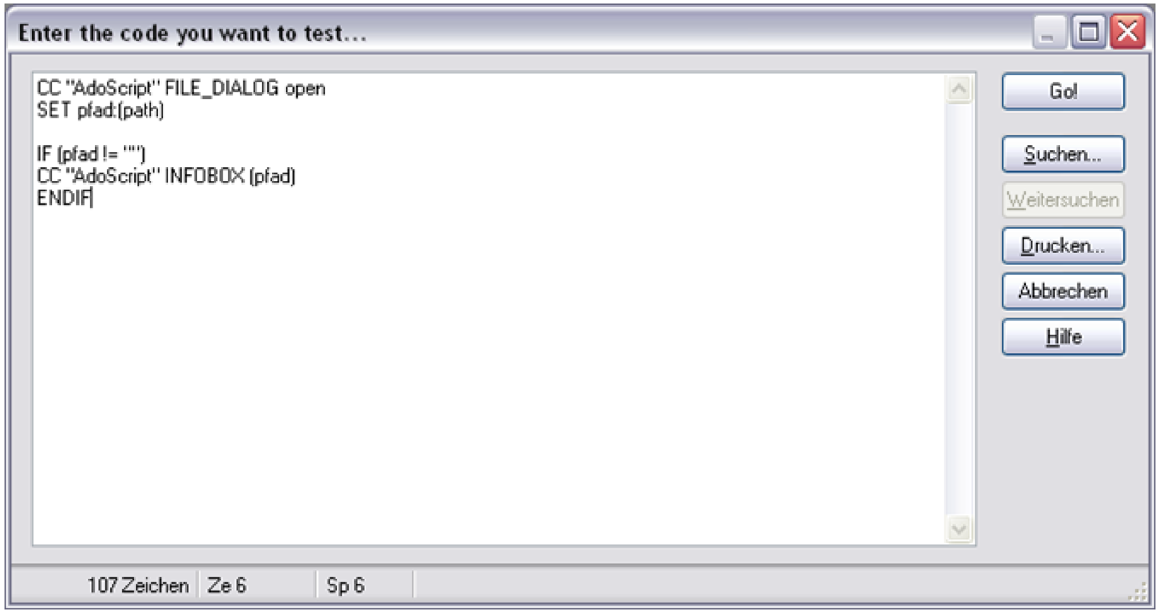
- Visualization
  - Graphical Notation

```
GRAPHREP

AVAL atype:”Type-Selection”
SET f:”white”

IF (atype = “type-1”)
   SET f:”blue”
ELSIF (atype = “type-2”)
   SET f:”yellow”
ENDIF

FILL color:(f)
RECTANGLE x:-1cm y:-1cm w:2cm h:2cm
```

Development Environments

Development Environments

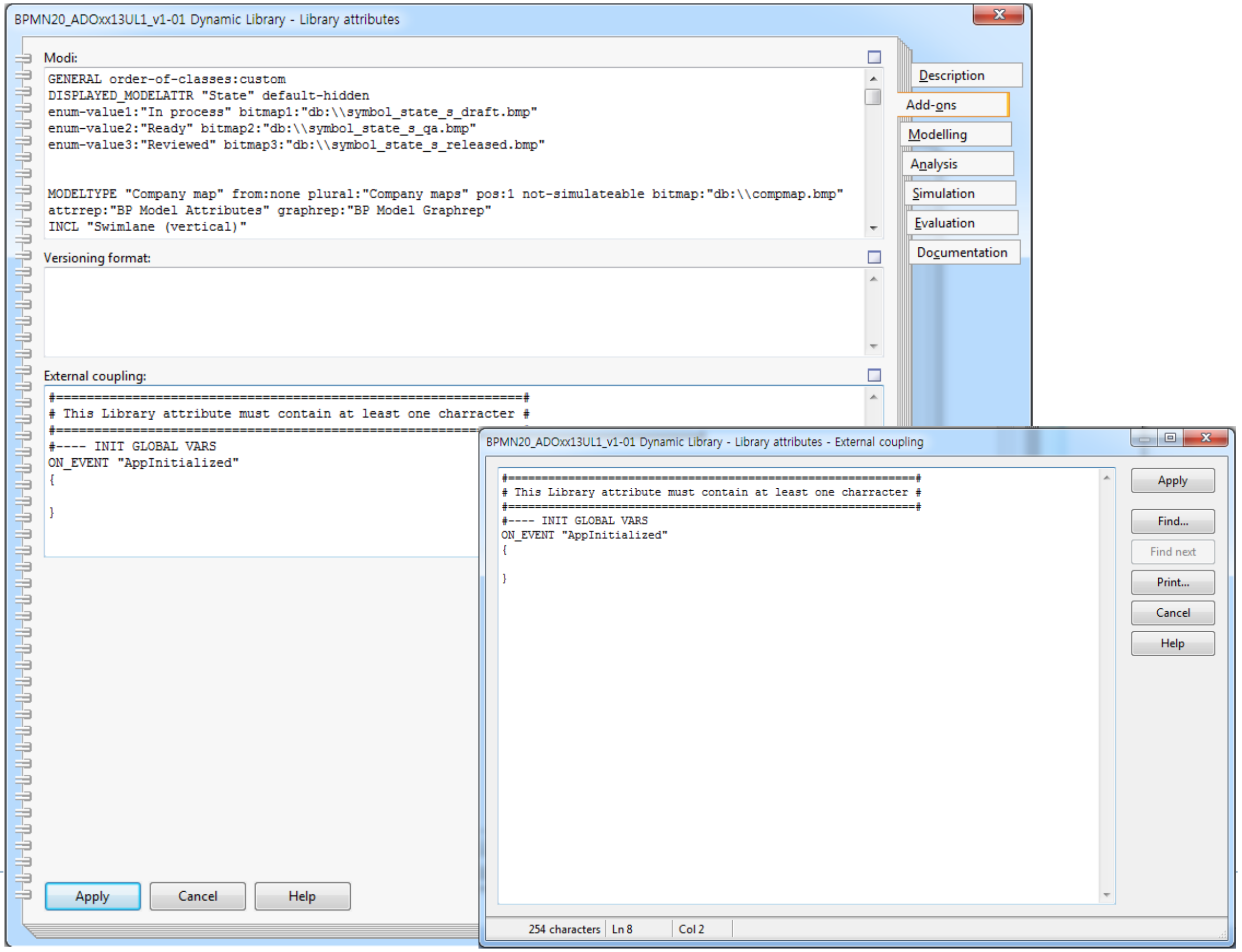
- Code execution
  - Shell window
    - Run code within the modeling toolkit



```
CC "AdoScript" FILE_DIALOG open
SET pfad:(path)

IF (pfad != "")
CC "AdoScript" INFOBOX (pfad)
ENDIF
```

Development Environments

- Code execution
  - Shell window



Modi:

```
GENERAL order-of-classes:custom
DISPLAYED_MODELATTR "State" default-hidden
enum-value1:"In process" bitmap1:"db:\\symbol_state_s_draft.bmp"
enum-value2:"Ready" bitmap2:"db:\\symbol_state_s_qa.bmp"
enum-value3:"Reviewed" bitmap3:"db:\\symbol_state_s_released.bmp"


MODELTYPE "Company map" from:none plural:"Company maps" pos:1 not-simulateable bitmap:"db:\\compmap.bmp"
attrrep:"BP Model Attributes" graphrep:"BP Model Graphrep"
INCL "Swimlane (vertical)"
```

Versioning format:

External coupling:

```
#=============================================================#
# This Library attribute must contain at least one charracter #
#=============================================================#
#---- INIT GLOBAL VARS
ON_EVENT "AppInitialized"
{

}
```

BPMN20_ADOxx13UL1_v1-01 Dynamic Library - Library attributes - External coupling
Apply
Find...
Find next
Print...
Cancel
Help

```
#=============================================================#
# This Library attribute must contain at least one charracter #
#=============================================================#
#---- INIT GLOBAL VARS
ON_EVENT "AppInitialized"
{

}
```

254 characters | Ln 8 | Col 2

Development Environments

- Code execution
  - Shell window

```
ITEM "Shell window" modeling: "Extras"

IF (type (adoscript) = "undefined")
{
   SETG adoscript: ""
}
SET endbutton: "ok"
WHILE (endbutton = "ok")
{
   CC "AdoScript" EDITBOX text: (adoscript)
      title: "Enter the code you want to test..."
      oktext: "Go!"
   IF (endbutton = "ok")
   {
      SETG adoscript:(text)
      EXECUTE (text)
   }
}
```

Development Environments

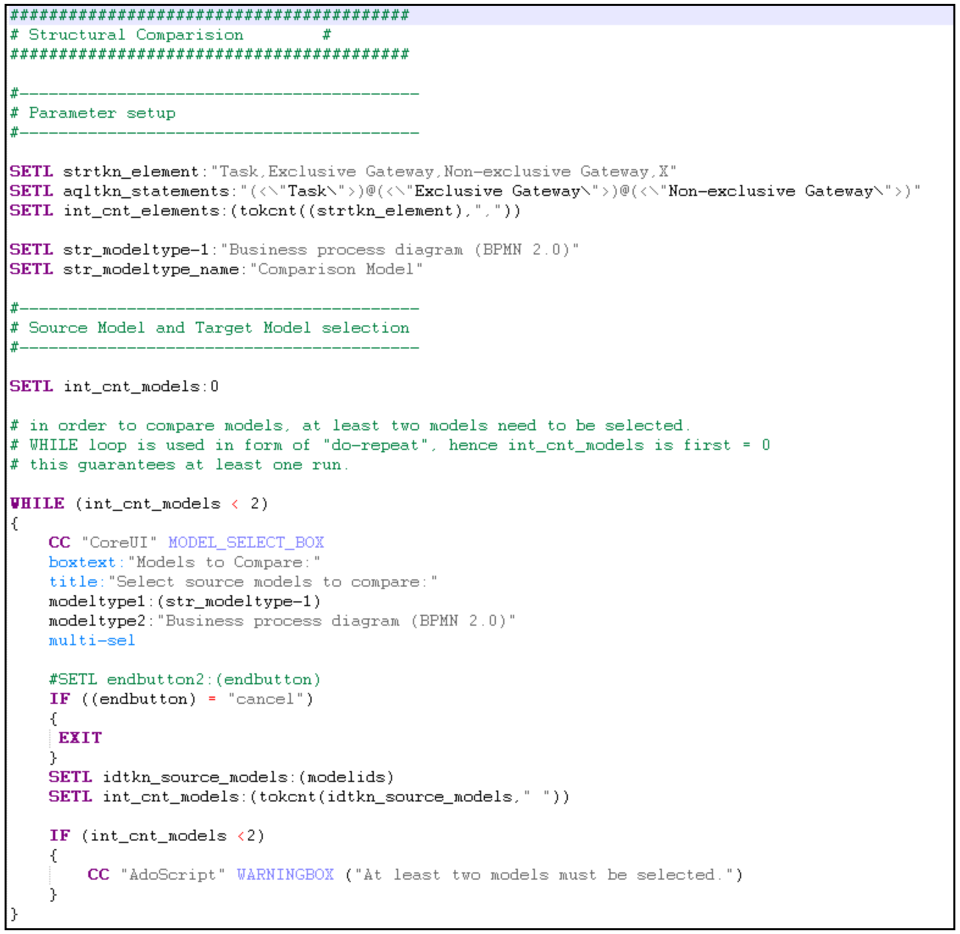
- Notepad ++
  - https://notepad-plus-plus.org/download/v7.5.6.html
  - AdoScript Syntax Add-On
    - Download in OMiLAB Korea board

Development Environments

- Notepad ++
  - Language → Define you language…
  - Import… → Select “AdoScriptSytax.xml”
  - Copy “AdoScript.xml” to (Notepad++ installation path)\plugins\APIs
    - Default: “C:\Program Files\Notepad++\plugins\APIs”

Development Environments

- Notepad ++
  - *.asc file



```
#########################################
# Structural Comparision        #
#########################################

#-----------------------------------------
# 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
#-----------------------------------------

SETL int_cnt_models:0

# in order to compare models, at least two models need to be selected.
# WHILE loop is used in form of "do-repeat", hence int_cnt_models is first = 0
# this guarantees at least one run.

WHILE (int_cnt_models < 2)
{
    CC "CoreUI" MODEL_SELECT_BOX
    boxtext:"Models to Compare:"
    title:"Select source models to compare:"
    modeltype1:(str_modeltype-1)
    modeltype2:"Business process diagram (BPMN 2.0)"
    multi-sel

    #SETL endbutton2:(endbutton)
    IF ((endbutton) = "cancel")
    {
     EXIT
    }
    SETL idtkn_source_models:(modelids)
    SETL int_cnt_models:(tokcnt(idtkn_source_models," "))

    IF (int_cnt_models <2)
    {
        CC "AdoScript" WARNINGBOX ("At least two models must be selected.")
    }
}
```

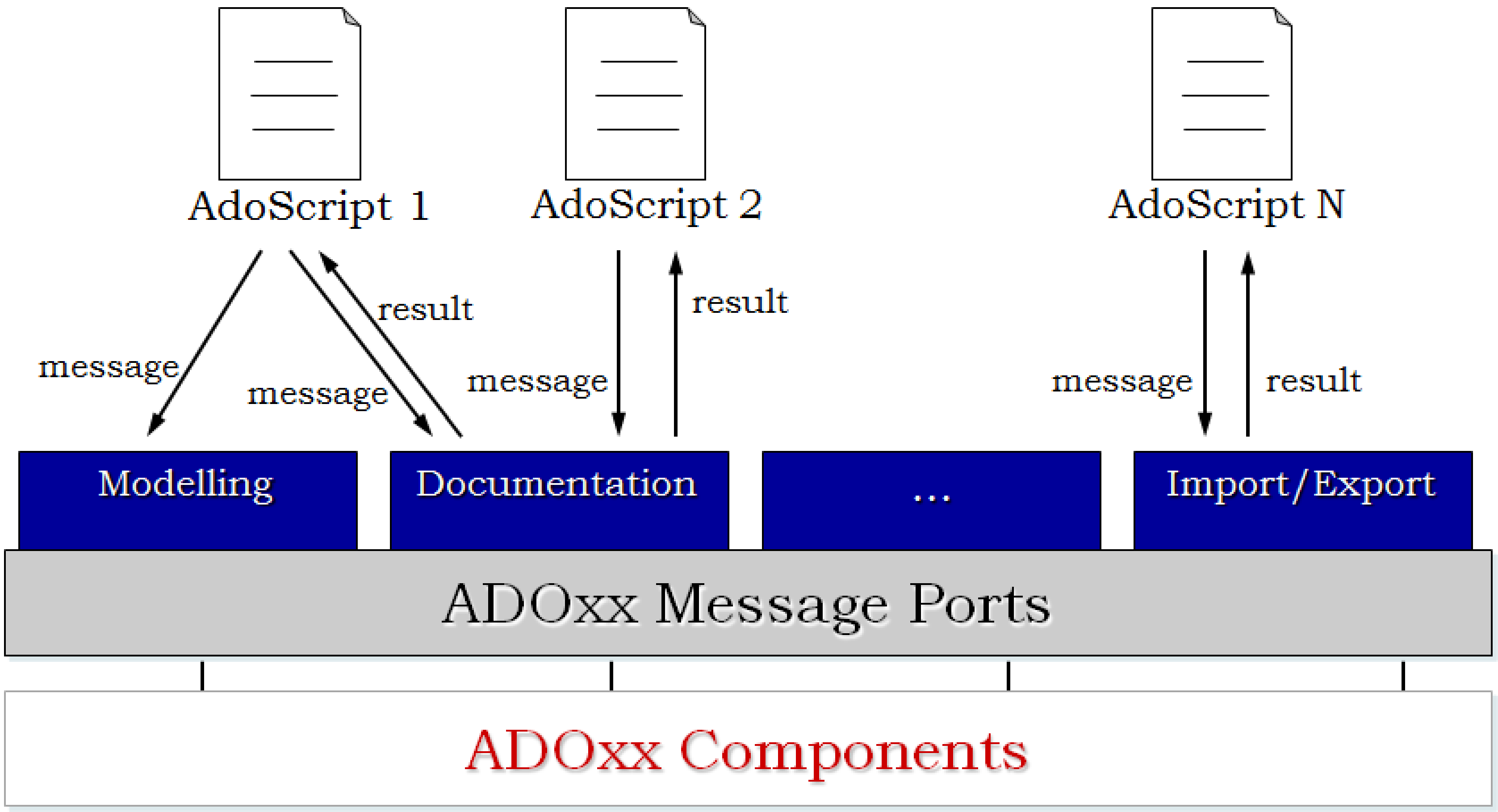
AdoScript

AdoScript

- AdoScript
  - Macro language of ADOxx
  - Examples:
    - New menu entries
    - Integration of new tools
    - Realisation of specific model checking
    - Realisation of new interfaces
    - Additional add-on-programming

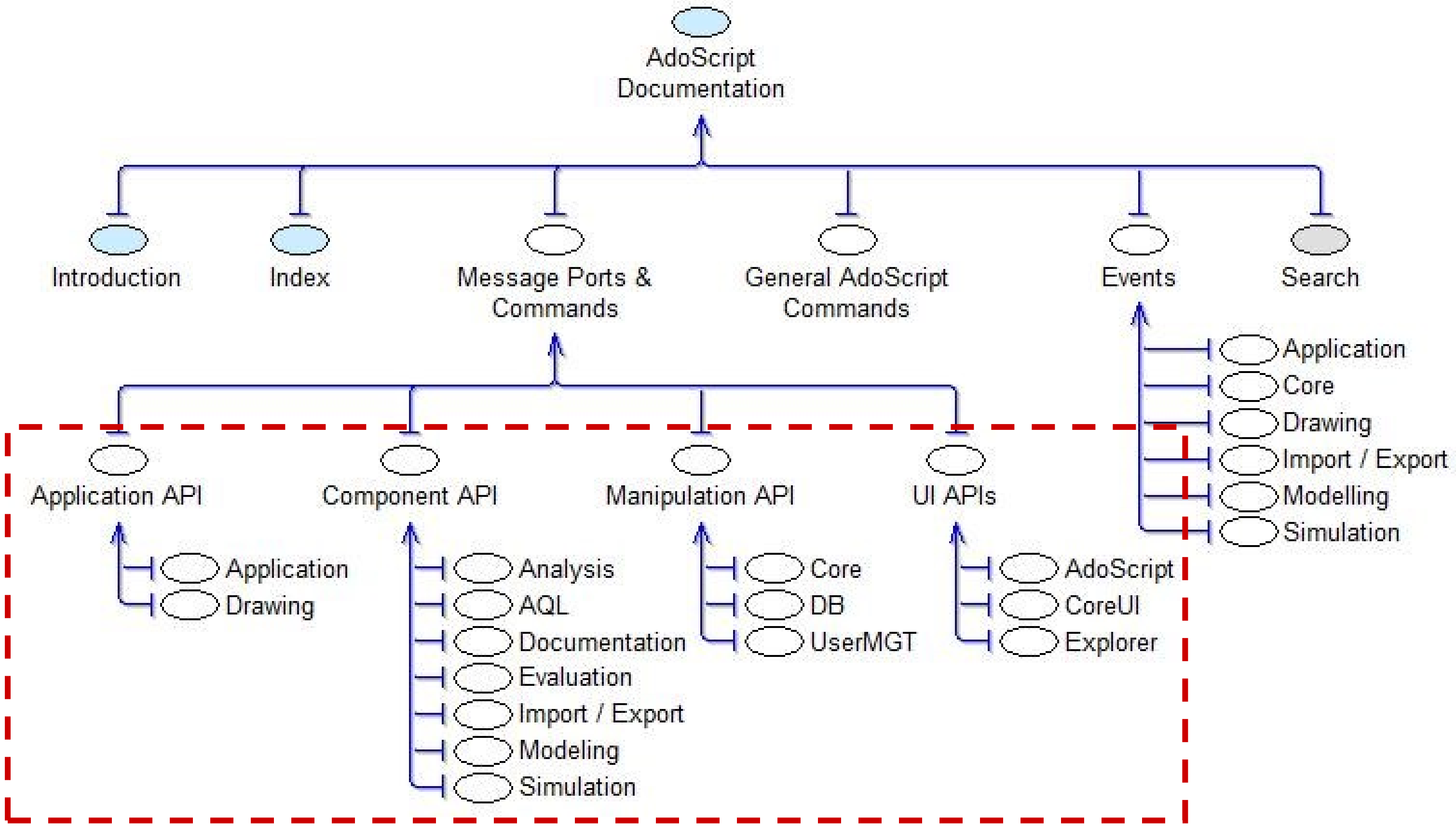
AdoScript

- AdoScript



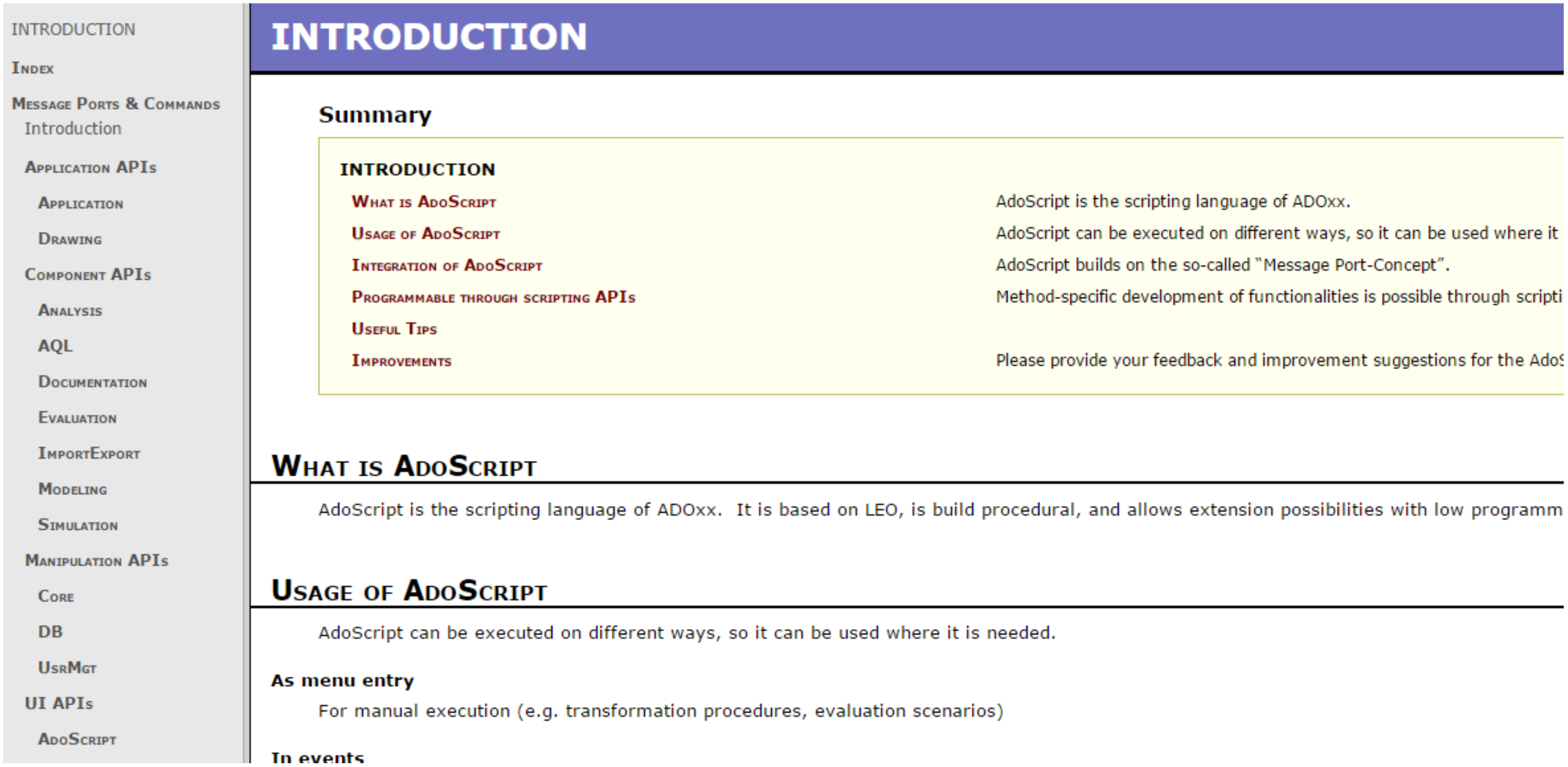
AdoScript

- AdoScript



AdoScript

- ADOxx Homepage
  - AdoScript Documentation
    - https://www.adoxx.org/AdoScriptDoc/index.html



INTRODUCTION

Summary

INTRODUCTION

What is AdoScript	AdoScript is the scripting language of ADOxx.
Usage of AdoScript	AdoScript can be executed on different ways, so it can be used where it
Integration of AdoScript	AdoScript builds on the so-called "Message Port-Concept".
Programmable through scripting APIs	Method-specific development of functionalities is possible through scripti
Useful Tips	
Improvements	Please provide your feedback and improvement suggestions for the Ados

What is AdoScript

AdoScript is the scripting language of ADOxx. It is based on LEO, is build procedural, and allows extension possibilities with low programm

Usage of AdoScript

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)

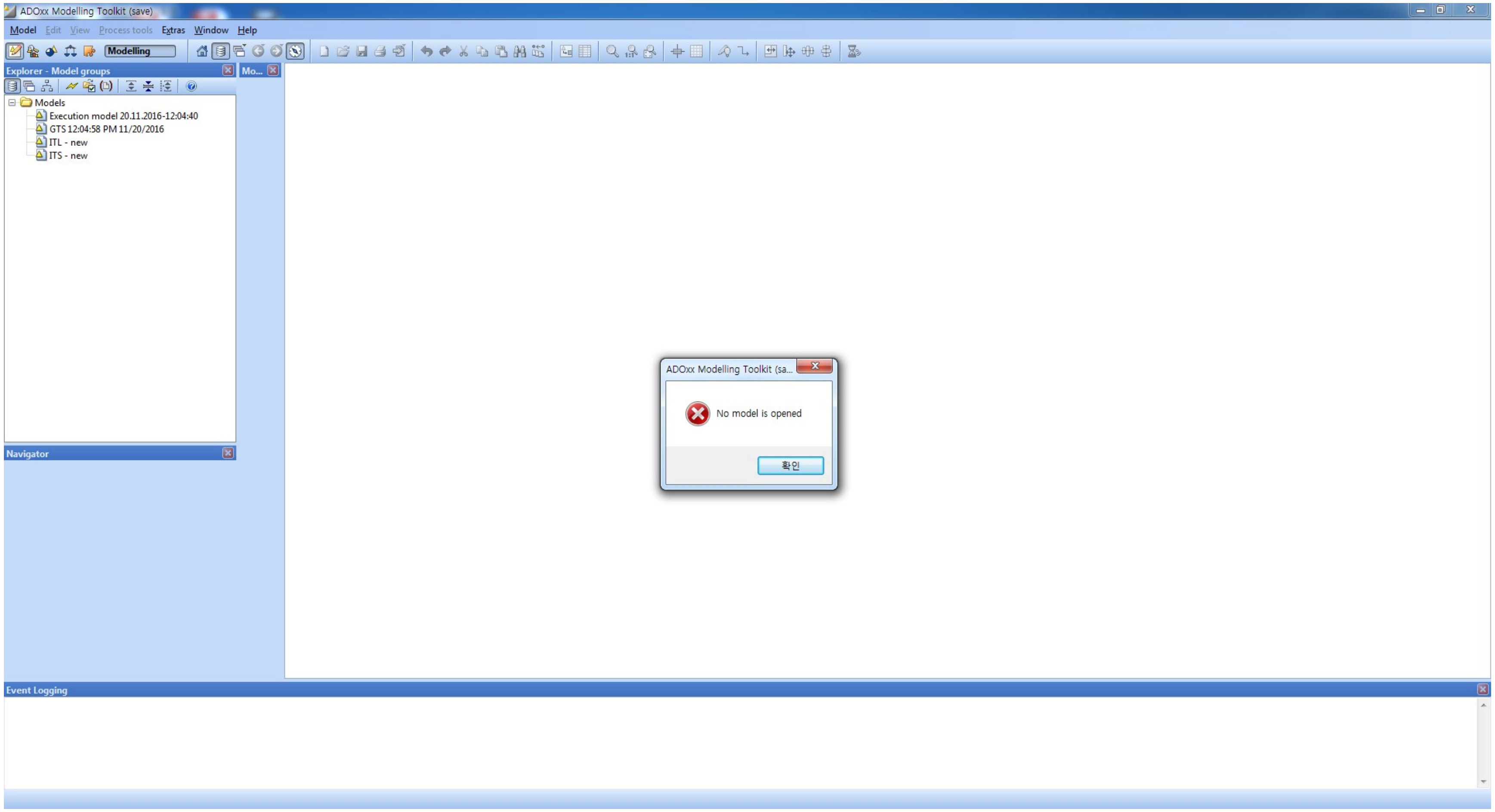
In events

AdoScript

- Example

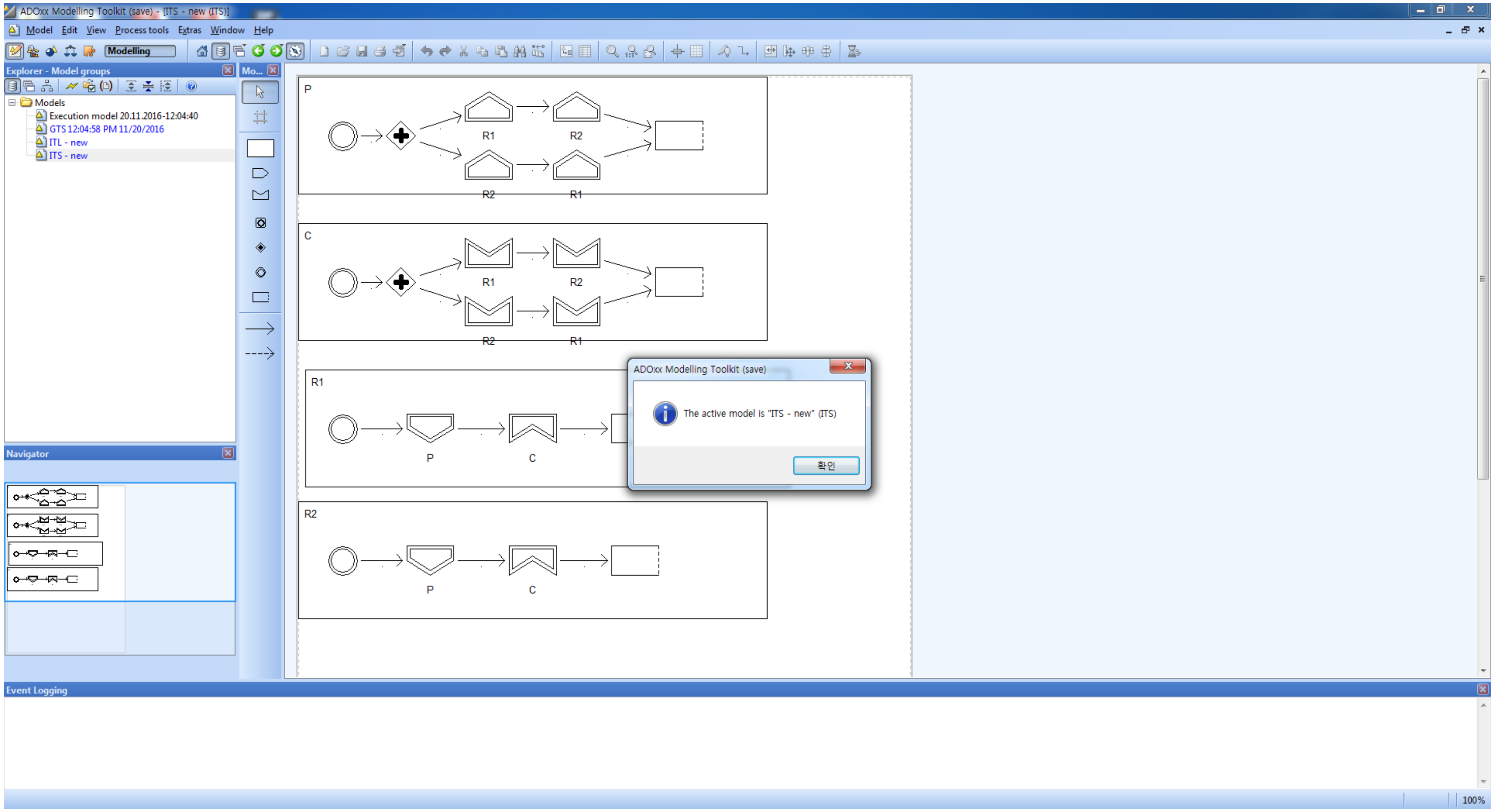
```
# Reading out of the ModelID of a model currently open
CC "Modeling" GET_ACT_MODEL
# Errorcheck
IF (modelid != -1) {
 # Command Call(Keywords in Capitals)
 CC "Core" GET_MODEL_INFO modelid:(modelid)
 # Handling of Return Values
 CC "AdoScript" INFOBOX ("The active model is \"" + modelname + "\" (" +modeltype + ")")
} ELSE {
  # error returned
  CC "AdoScript" ERRORBOX "No model is opened!"
}
```

AdoScript


ADOxx Modelling Toolkit (save)
Model Edit View Process tools Extras Window Help
Modelling
Explorer - Model groups
Mo...
Models
Execution model 20.11.2016-12:04:40
GTS 12:04:58 PM 11/20/2016
ITL - new
ITS - new
Navigator
Event Logging
ADOxx Modelling Toolkit (sa...
확인

No model is opened

AdoScript


ADOxx Modelling Toolkit (save) - [ITS - new (ITS)]
Model Edit View Process tools Extras Window Help
Modelling
Explorer - Model groups
Navigator
Event Logging
P
R1
R2
C
100%

Models
- Execution model 20.11.2016-12:04:40
- GTS 12:04:58 PM 11/20/2016
- ITL - new
- ITS - new

ADOxx Modelling Toolkit (save)

The active model is "ITS - new" (ITS)

확인

AdoScript

- AdoScript
  - AdoScript Code File
    - *.asc file
  - Code Path
    - Local
      - `"C:\adoscript.asc"`
        - `"C:\\adoscript.asc"`
    - DB
      - `"db:\adoscript.asc"`
        - `"db:\\adoscript.asc"`

AdoScript

- General AdoScript Commands
  - SET / SETL / SETG
    - Assign values to new or existing AdoScript runtime variables
    - SETG
      - Variable exists for the whole ADOxx session
    - SET
      - Variable exists in the current scope
    - SETL
      - Local variable

AdoScript

- General AdoScript Commands

```
IF (booleanExpr) {
   Statements
}
ELSIF (booleanExpr) {
   Statements
}
ELSE {
   Statements
}
```

AdoScript

- General AdoScript Commands

```
FOR varName in:strExpr [sep:strExpr]
{
   Statements
}

SET result:"0"
FOR ei in:"12 23 34" {
   SET result:(result + ei)
}
```

AdoScript

- General AdoScript Commands

```
FOR varName from:numExpr to:numExpr [by:strExpr]
{
   Statements
}

SET result:"0"
FOR ei from:1 to:3 {
   SET result:(result + STR ei + STR (ei+1))
}
```

AdoScript

- General AdoScript Commands

```
WHILE (booleanExpr)
{
  Statements
}
```

AdoScript

- General AdoScript Commands
  - BREAK
    - With BREAK the enclosing WHILE or FOR statement is left.
  - NEXT
    - With NEXT the next loop for the enclosing WHILE or FOR statement is executed.

AdoScript

- Type Conversion
  - STR val
    - Converts a value into a string
  - VAL str
    - Parses the string and returns that value
  - CM realVal
    - Converts a real value in centimetres into a centimetre

AdoScript

- APIs
  - CC "Core" GET_MODEL_ID modelname:strValue [version:strValue] modeltype:strValue
  - CC "Core" GET_MODEL_ID objid:intValue
    - Parameters
      - modelname : strValue
      - version : strValue
      - modeltype : strValue
      - objid : intValue
    - Returns
      - ecode : intValue
      - modelid : intValue

AdoScript

- APIs
  - CC "Modeling" GET_ACT_MODEL
    - Returns
      - modelid : intValue

AdoScript

- APIs
  - CC "Core" GET_CLASS_ID [relation] classname:strValue [bp-library | we-library]
  - CC "Core" GET_CLASS_ID objid:id
    - Parameters
      - classname : strValue
      - objid : intValue
      - relation : modifier
      - bp-library : modifier. id is retrieved in the ADOxx Dynamic Library
      - we-library : modifier. id is retrieved in the ADOxx Static Library
    - Returns
      - ecode : intValue
      - classid : intValue
      - isrel : intValue. isrel is 1 if the class is a relation and 0 otherwise

AdoScript

- APIs
  - CC "Core" GET_CLASS_NAME classid:intValue
    - Parameters
      - classid : intValue
    - Returns
      - ecode : intValue
      - classname : strValue
      - isrel : intValue. isrel is 1 if the class is a relation and 0 otherwise

AdoScript

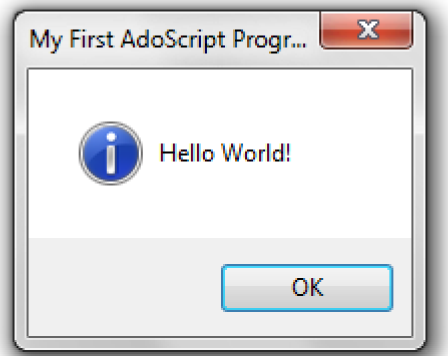
- APIs
  - CC "Core" GET_ATTR_VAL objid:id attrname:strValue
    - Parameters
      - objid : intValue
      - attrname : strValue
    - Returns
      - ecode : intValue
      - val : anyValue

AdoScript

- APIs
  - CC "Core" SET_ATTR_VAL objid:id attrname:strValue val:anyValue
    - Parameters
      - objid : intValue
      - attrname : strValue
      - val : anyValue
    - Returns
      - ecode : intValue

AdoScript

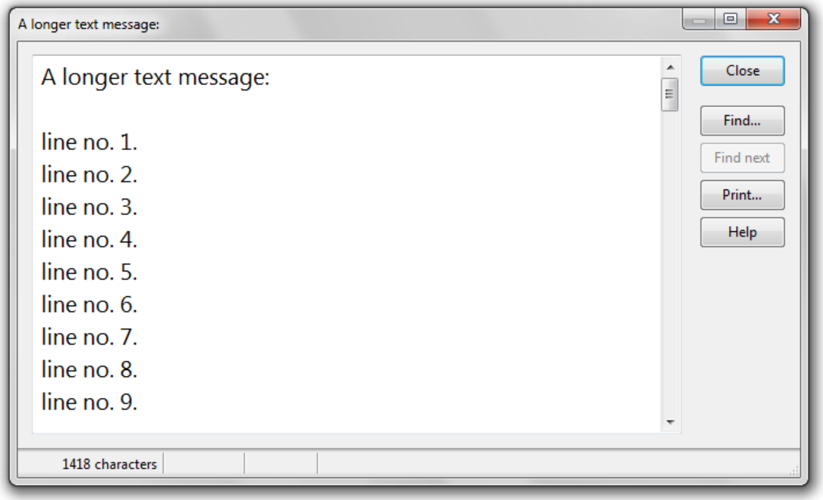
- APIs
  - CC "AdoScript" INFOBOX strValue [title: strValue]
    - Parameters
      - <main parameter> : strValue. Displayed in the message window
      - title : strValue. Title of the message window


My First AdoScript Progr...

Hello World!

AdoScript

- APIs
  - CC "AdoScript" VIEWBOX text:strValue [title:strValue] [fontname:strValue] [fontheight:intValue]
    - Parameters
      - text : strValue. Text to be displayed
      - title : strValue. Title of the window
      - fontname: strValue
      - fontheight : intValue


A longer text message:

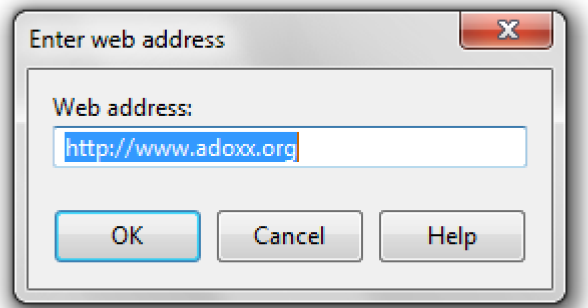
A longer text message:

line no. 1.
line no. 2.
line no. 3.
line no. 4.
line no. 5.
line no. 6.
line no. 7.
line no. 8.
line no. 9.

1418 characters

AdoScript

- APIs
  - CC "AdoScript" EDITFIELD caption:strValue [title:strValue] [text:strValue]
    - Parameters
      - caption : strValue. Sets the caption of the text field.
      - title : strValue. Sets the title of the edit box.
      - text : strValue. Sets the default text.
    - Returns
      - ecode : 0 | 1. ecode is set to 0 if the user hits the OK button, otherwise to 1.
      - text : strValue


Enter web address

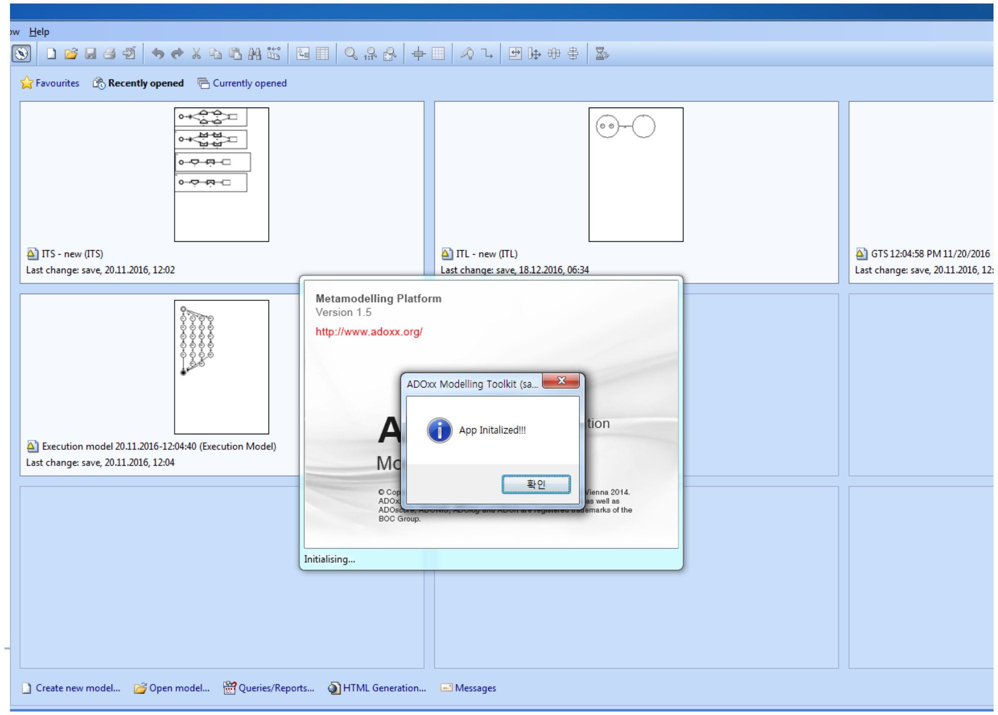
Web address:

http://www.adoxx.org

AdoScript

- Code execution
  - Event

```
ON_EVENT "AppInitialized"
{
   CC "AdoScript" INFOBOX ("App Initialized!!!")
}
```



ITS - new (ITS)
Last change: save, 20.11.2016, 12:02

ITL - new (ITL)
Last change: save, 18.12.2016, 06:34

GTS 12:04:58 PM 11/20/2016
Last change: save, 20.11.2016, 12:

Execution model 20.11.2016-12:04:40 (Execution Model)
Last change: save, 20.11.2016, 12:04

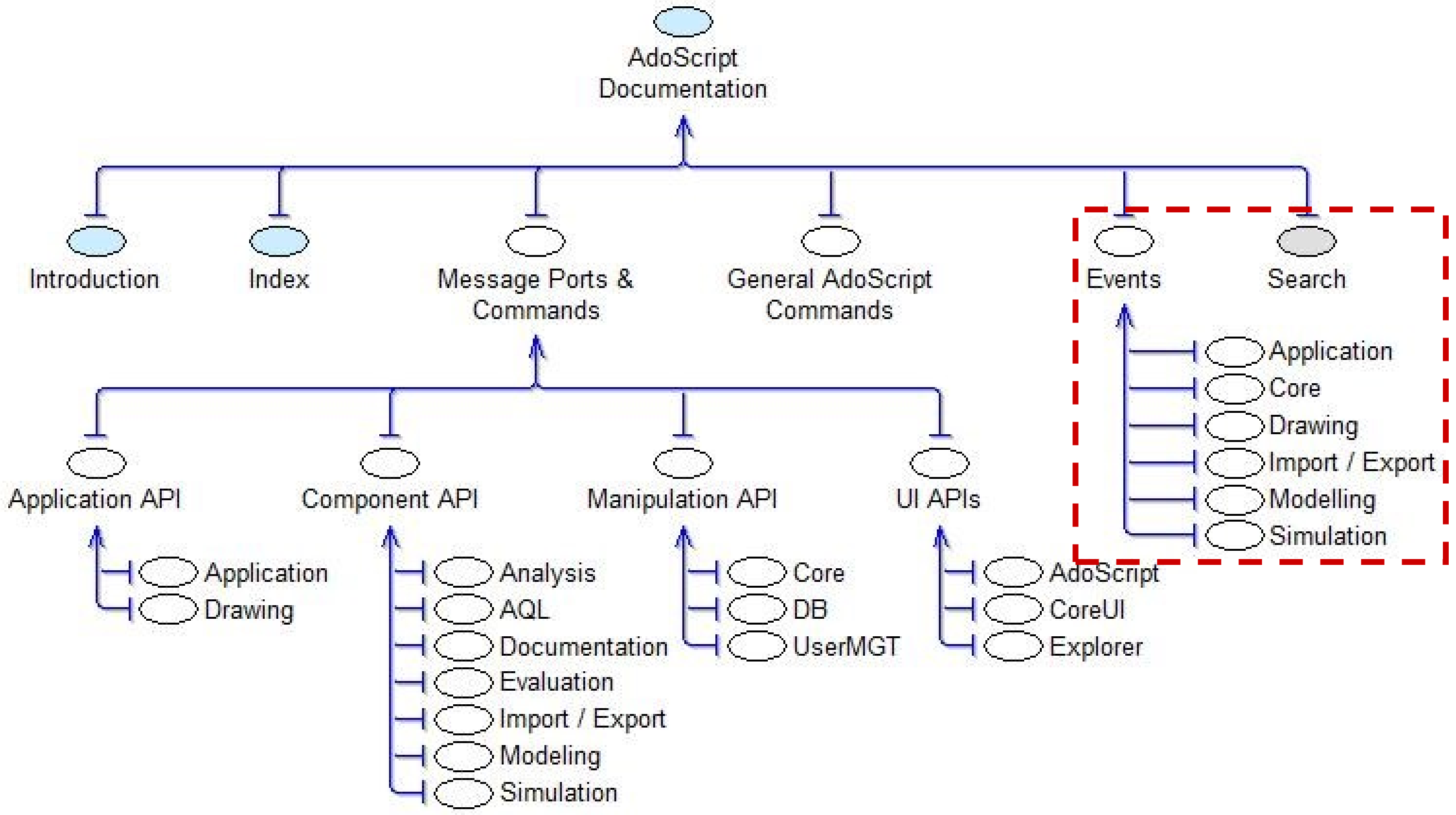
Metamodelling Platform
Version 1.5
http://www.adoxx.org/

ADOxx Modelling Toolkit (sa...
App Initalized!!!

Initialising...

AdoScript

- Code execution
  - Event



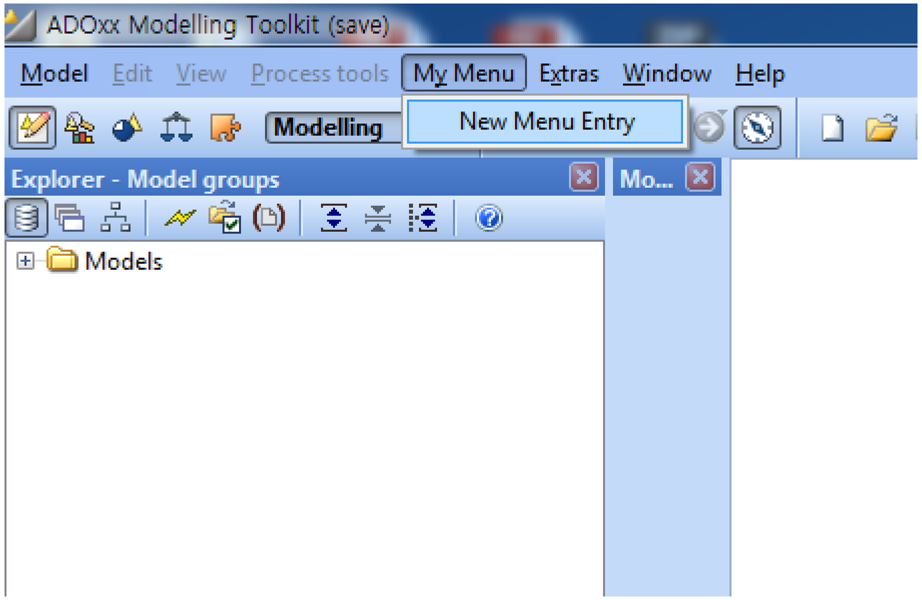
AdoScript

- Code execution
  - Event
    - AppInitialized
    - BeforeCreateRelationInstance
    - CreateInstance
    - DelateInstance
    - BeforeDeleteInstance
    - SetAttrivuteValue
    - …

AdoScript

- Code execution
  - Menu entry

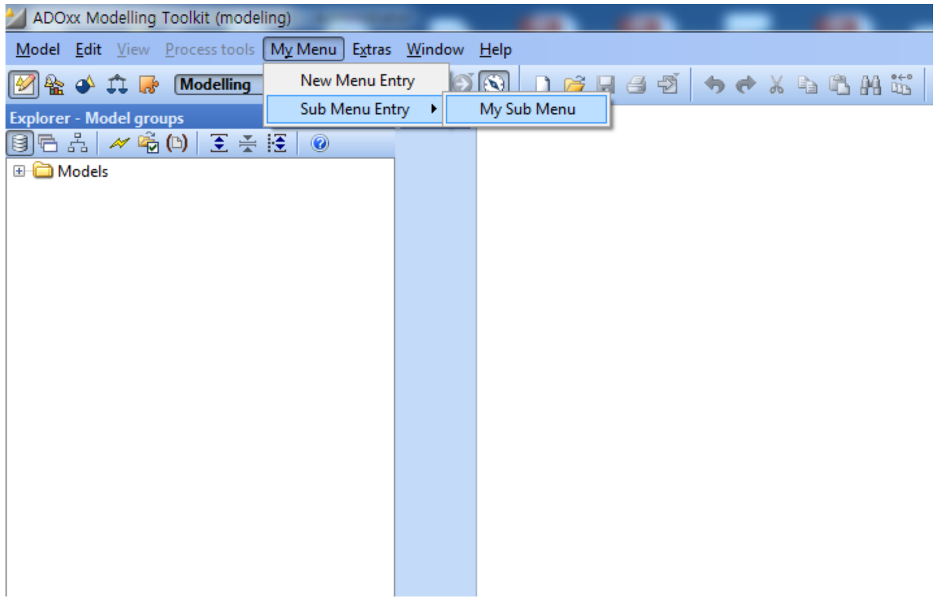
```
ITEM "New Menu Entry" modeling:"My Menu"
EXECUTE file:("C:\\adoscript.asc")
```


ADOxx Modelling Toolkit (save)
Model Edit View Process tools My Menu Extras Window Help
New Menu Entry
Modelling
Explorer - Model groups
Mo...
Models

AdoScript

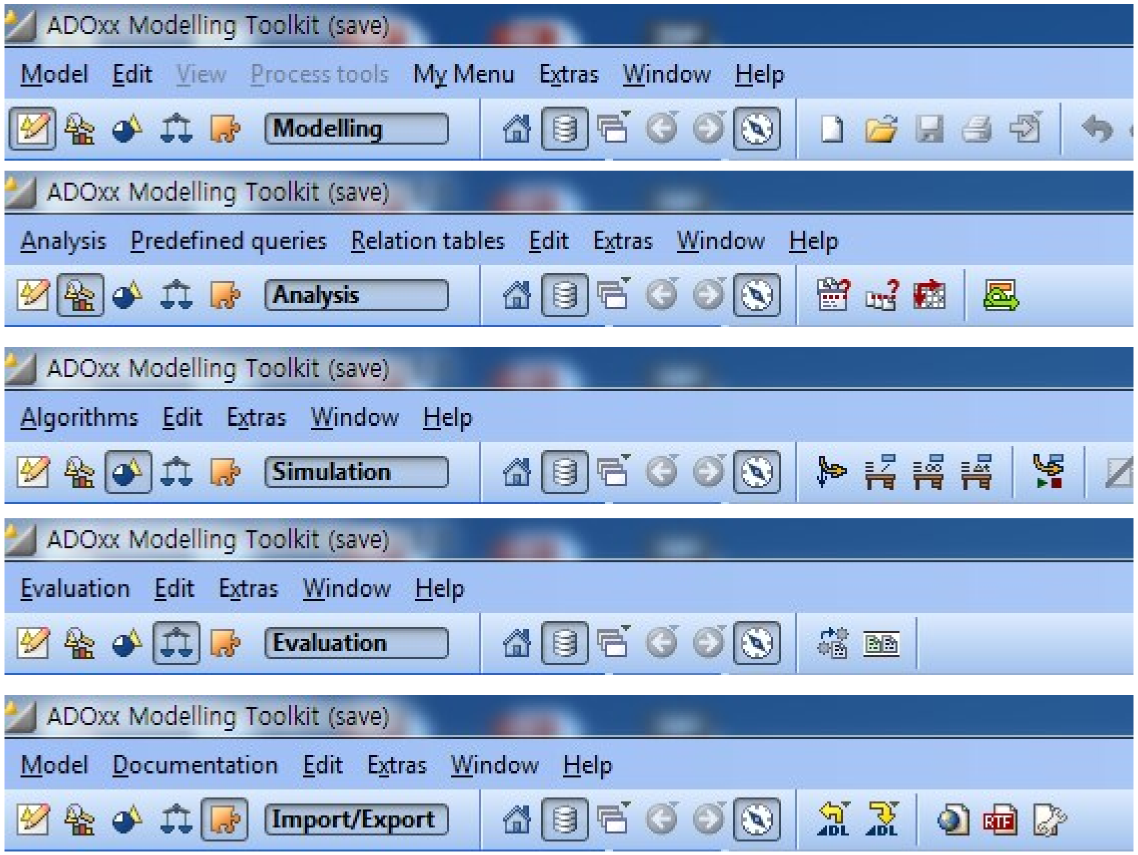
- Code execution
  - Sub Menu entry

```
ITEM "My Sub Menu" modeling:"My Menu" sub-of:"Sub Menu Entry"
EXECUTE file:("C:\\adoscript.asc")
```



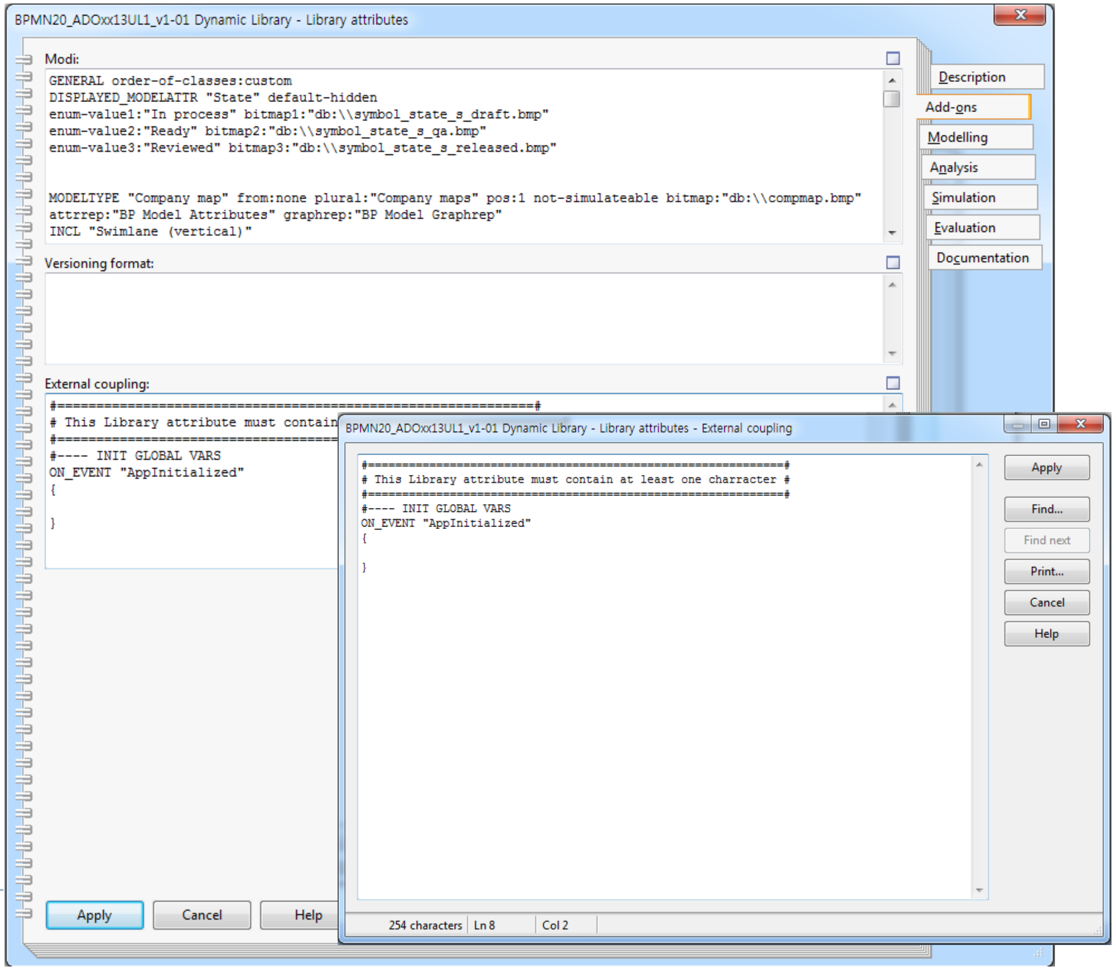
AdoScript

- Code execution
  - Menu entry
    - Components
      - Modeling
      - Analysis
      - Simulation
      - Evaluation
      - Import/Export


ADOxx Modelling Toolkit (save)
Model Edit View Process tools My Menu Extras Window Help
Modelling
ADOxx Modelling Toolkit (save)
Analysis Predefined queries Relation tables Edit Extras Window Help
Analysis
ADOxx Modelling Toolkit (save)
Algorithms Edit Extras Window Help
Simulation
ADOxx Modelling Toolkit (save)
Evaluation Edit Extras Window Help
Evaluation
ADOxx Modelling Toolkit (save)
Model Documentation Edit Extras Window Help
Import/Export

AdoScript

- Code execution
  - Menu entry and Event



```
GENERAL order-of-classes:custom
DISPLAYED_MODELATTR "State" default-hidden
enum-value1:"In process" bitmap1:"db:\\symbol_state_s_draft.bmp"
enum-value2:"Ready" bitmap2:"db:\\symbol_state_s_qa.bmp"
enum-value3:"Reviewed" bitmap3:"db:\\symbol_state_s_released.bmp"


MODELTYPE "Company map" from:none plural:"Company maps" pos:1 not-simulateable bitmap:"db:\\compmap.bmp"
attrrep:"BP Model Attributes" graphrep:"BP Model Graphrep"
INCL "Swimlane (vertical)"
```

```
#============================================================#
# This Library attribute must contain at least one charracter #
#============================================================#
#---- INIT GLOBAL VARS
ON_EVENT "AppInitialized"
{

}
```

Expression

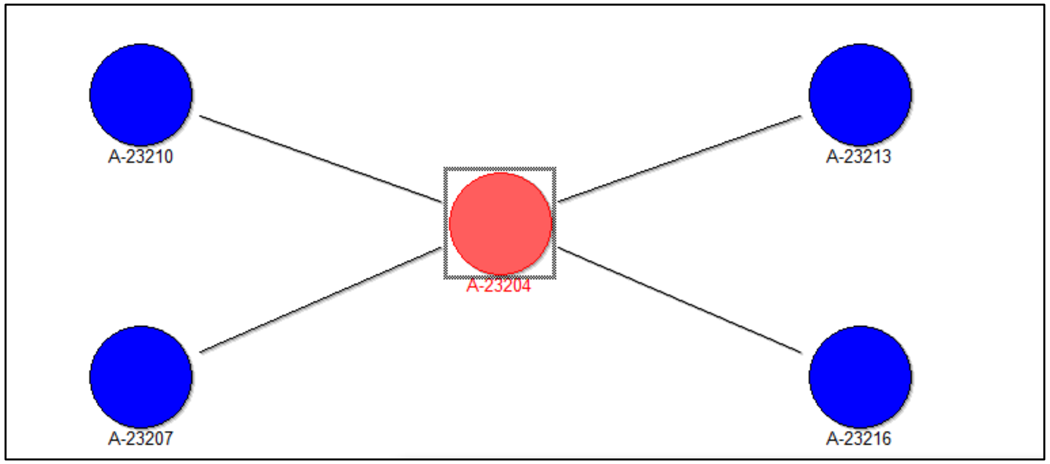
Expression

- Expression

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)

Expression

- Expression
  - Find connected instance



Expression

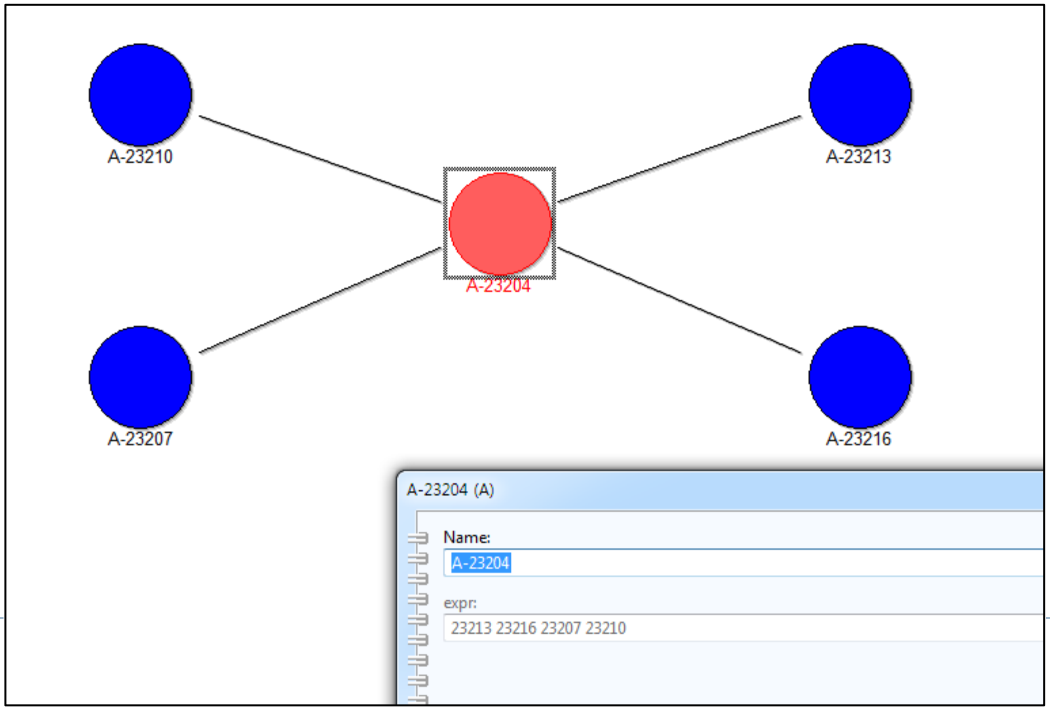
- Expression
  - AdoScript

```
SETL sConnectedObjs:("")
SETL iCurrentObjid:(???)

CC "Core" GET_CONNECTORS objid:(iCurrentObjid)
SETL aConnectors:(objids)

FOR sCid in:(aConnectors)
{
          CC "Core" GET_CONNECTOR_ENDPOINTS objid:(VAL sCid)
          SETL iFobj:(fromobjid)
          SETL iTobj:(toobjid)

          IF (iFobj != iCurrentObjid)
          {
                    SETL sConnectedObjs:(tokunion(sConnectedObjs, STR iFobj))
          }
          ELSE
          {
                    SETL sConnectedObjs:(tokunion(sConnectedObjs, STR iTobj))
          }
}
```

Expression

- Expression

```
EXPR type:string expr:fixed:
{
   set (toObjects, ctobjs("myRelation")),
   set (fromObjects, cfobjs("myRelation")),
   set (linkedObjects, tokunion(toObjects, fromObjects)),
   linkedObjects
}
```



A-23204 (A)

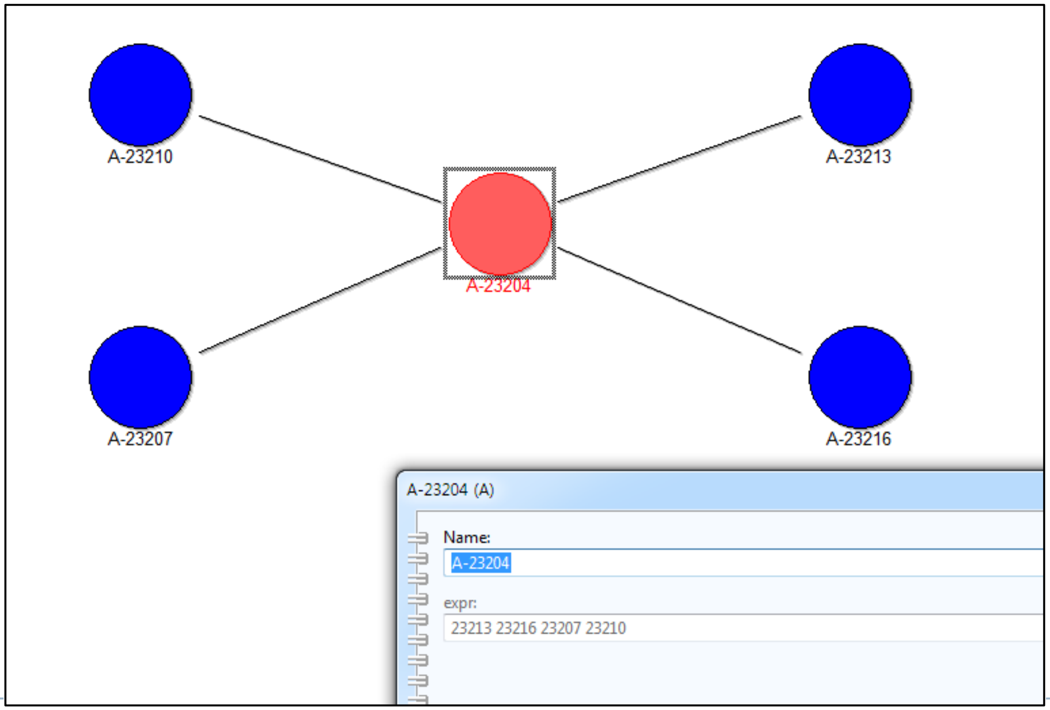
Name:
A-23204

expr:
23213 23216 23207 23210

Expression

- Expression
  - Expression type Attribute

  - Expression codes are triggered automatically



A-23204 (A)

Name:
A-23204

expr:
23213 23216 23207 23210

Expression

- Expression

```
EXPR type:ResultType [ format:FormatString ] expr:[ fixed:] CoreExpression
```

```
EXPR type:string expr:fixed:
{
   set (toObjects, ctobjs("myRelation")),
   set (fromObjects, cfobjs("myRelation")),
   set (linkedObjects, tokunion(toObjects, fromObjects)),
   linkedObjects
}
```

Expression

- Expression
  - Operations

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

Expression

- Expression
  - Operations

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.

Expression

- Expression
  - Functions

Arithmethic 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

Expression

- Expression
  - Functions

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

Expression

- Expression
  - Functions

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

Expression

- Expression
  - Control structures

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

Expression

- Expression
  - Error handling, Type checks

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

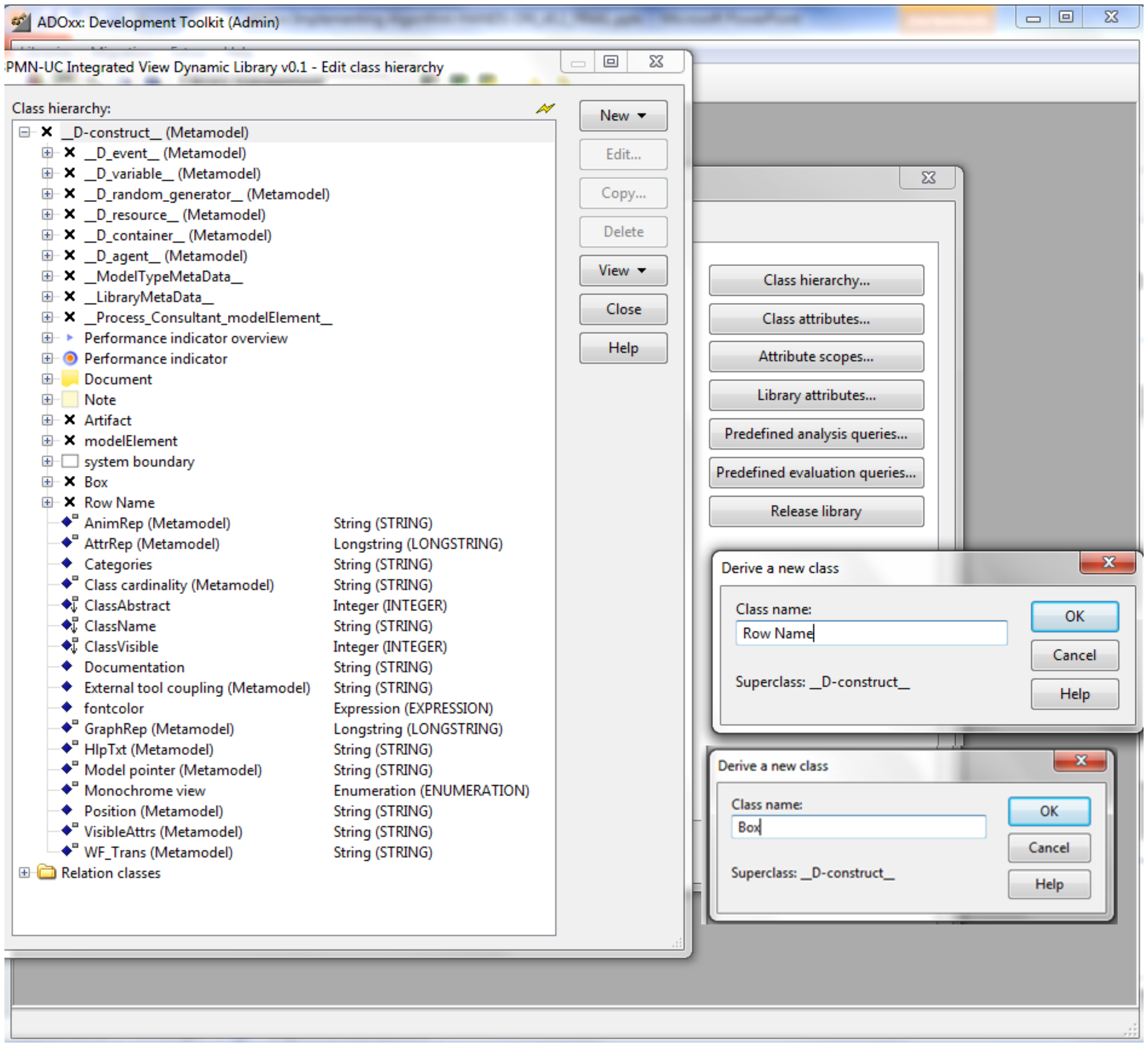
Expression

- Expression
  - Functions

```
aval()          rcount()        asum()
avalf()         row()           amax()
maval()         rasum()         awsum()
paval()         prasum()        pmf()
pavalf()        allobjs()       class()
irtmodels()     aql()           mtype()
irtobjs()       prevsl()        mtclasses()
profile()       nextsl()        mtrelns()
ctobj()                         allcattrs()
cfobj()                         alliattrs()
conn()                          allrattrs()
```

Practice

Practice



ADOxx: Development Toolkit (Admin)
PMN-UC Integrated View Dynamic Library v0.1 - Edit class hierarchy
New
Edit...
Copy...
Delete
View
Close
Help
Class hierarchy...
Class attributes...
Attribute scopes...
Library attributes...
Predefined analysis queries...
Predefined evaluation queries...
Release library
Derive a new class
OK
Cancel
Help

Class hierarchy:

- _D-construct_ (Metamodel)
  - _D_event_ (Metamodel)
  - _D_variable_ (Metamodel)
  - _D_random_generator_ (Metamodel)
  - _D_resource_ (Metamodel)
  - _D_container_ (Metamodel)
  - _D_agent_ (Metamodel)
  - _ModelTypeMetaData_
  - _LibraryMetaData_
  - _Process_Consultant_modelElement_
  - Performance indicator overview
  - Performance indicator
  - Document
  - Note
  - Artifact
  - modelElement
  - system boundary
  - Box
  - Row Name

AnimRep (Metamodel)	String (STRING)
AttrRep (Metamodel)	Longstring (LONGSTRING)
Categories	String (STRING)
Class cardinality (Metamodel)	String (STRING)
ClassAbstract	Integer (INTEGER)
ClassName	String (STRING)
ClassVisible	Integer (INTEGER)
Documentation	String (STRING)
External tool coupling (Metamodel)	String (STRING)
fontcolor	Expression (EXPRESSION)
GraphRep (Metamodel)	Longstring (LONGSTRING)
HlpTxt (Metamodel)	String (STRING)
Model pointer (Metamodel)	String (STRING)
Monochrome view	Enumeration (ENUMERATION)
Position (Metamodel)	String (STRING)
VisibleAttrs (Metamodel)	String (STRING)
WF_Trans (Metamodel)	String (STRING)

- Relation classes

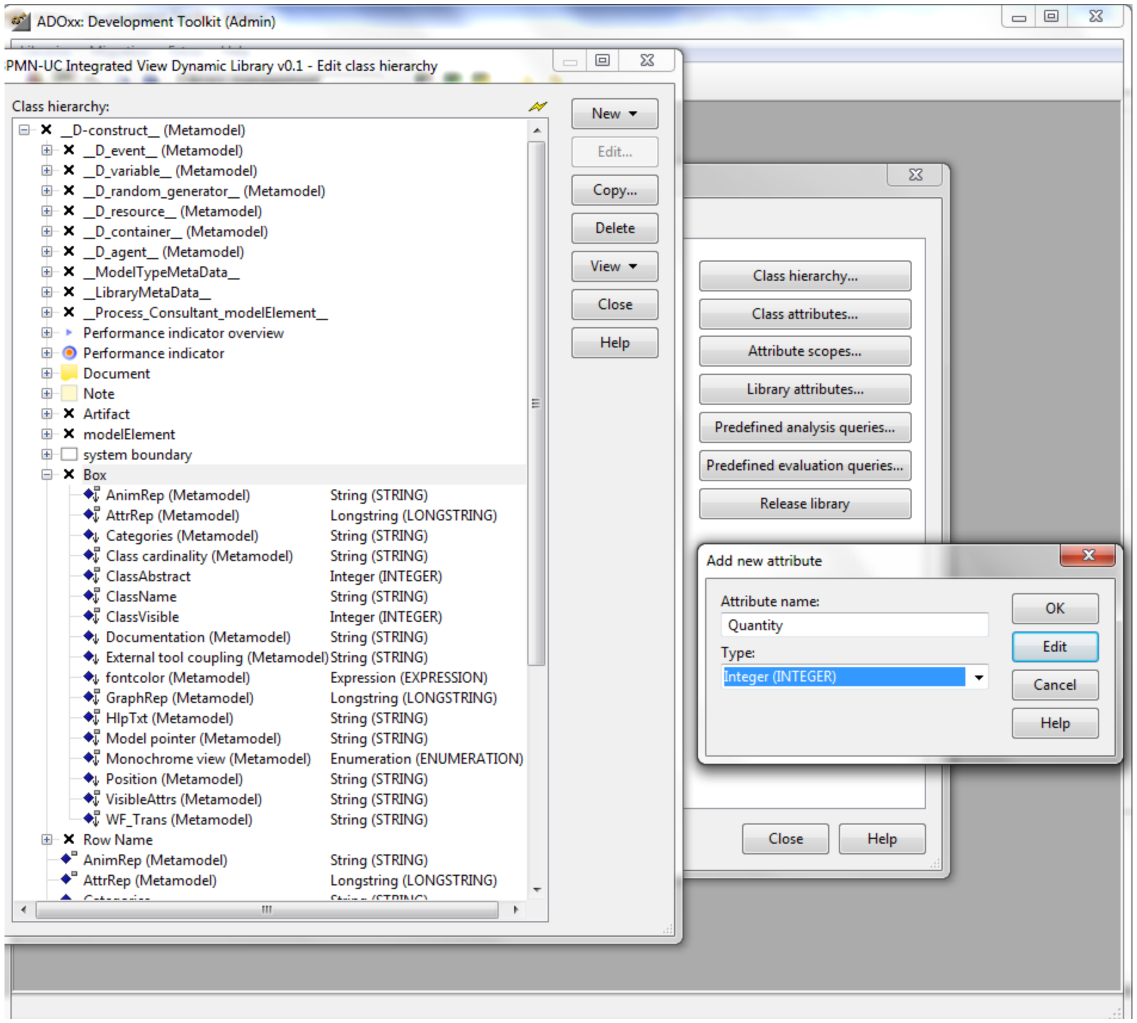
Derive a new class
Class name: Row Name
Superclass: _D-construct_

Derive a new class
Class name: Box
Superclass: _D-construct_

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__

Practice



Class hierarchy:

```
_D-construct_ (Metamodel)
  _D_event_ (Metamodel)
  _D_variable_ (Metamodel)
  _D_random_generator_ (Metamodel)
  _D_resource_ (Metamodel)
  _D_container_ (Metamodel)
  _D_agent_ (Metamodel)
  _ModelTypeMetaData_
  _LibraryMetaData_
  _Process_Consultant_modelElement_
  Performance indicator overview
  Performance indicator
  Document
  Note
  Artifact
  modelElement
  system boundary
  Box
    AnimRep (Metamodel)               String (STRING)
    AttrRep (Metamodel)               Longstring (LONGSTRING)
    Categories (Metamodel)            String (STRING)
    Class cardinality (Metamodel)     String (STRING)
    ClassAbstract                     Integer (INTEGER)
    ClassName                         String (STRING)
    ClassVisible                      Integer (INTEGER)
    Documentation (Metamodel)         String (STRING)
    External tool coupling (Metamodel)String (STRING)
    fontcolor (Metamodel)             Expression (EXPRESSION)
    GraphRep (Metamodel)              Longstring (LONGSTRING)
    HlpTxt (Metamodel)                String (STRING)
    Model pointer (Metamodel)         String (STRING)
    Monochrome view (Metamodel)       Enumeration (ENUMERATION)
    Position (Metamodel)              String (STRING)
    VisibleAttrs (Metamodel)          String (STRING)
    WF_Trans (Metamodel)              String (STRING)
  Row Name
  AnimRep (Metamodel)                 String (STRING)
  AttrRep (Metamodel)                 Longstring (LONGSTRING)
```

Attribute name: Quantity

Type: Integer (INTEGER)

Add Attributes

- Select "Box" and click New, attri bute.
- Make "Quantity" as type INTEG ER.
- Select "Row Name" and click Ne w, attribute.
- Make "Referenced model" an IN TERREF to target modeltype "B PMN"
- Make "Row name" a STRING.

Practice

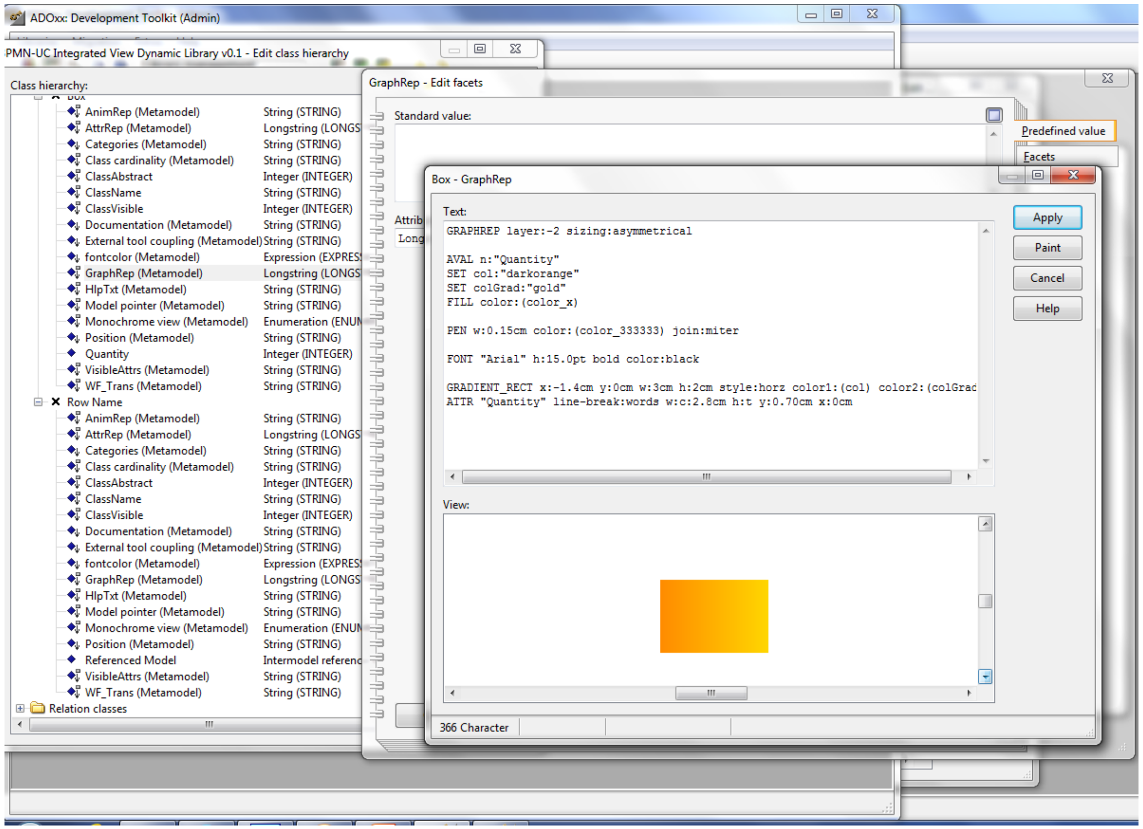
Box

```
NOTEBOOK
CHAPTER "Description"
ATTR "Name"
ATTR "Quantity"
```

Row Name

```
NOTEBOOK
CHAPTER "Description"
ATTR "Name"
ATTR "Row name"
ATTR "Referenced model"
```

Practice



```
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
```

Box	
AnimRep (Metamodel)	String (STRING)
AttrRep (Metamodel)	Longstring (LONGS
Categories (Metamodel)	String (STRING)
Class cardinality (Metamodel)	String (STRING)
ClassAbstract	Integer (INTEGER)
ClassName	String (STRING)
ClassVisible	Integer (INTEGER)
Documentation (Metamodel)	String (STRING)
External tool coupling (Metamodel)	String (STRING)
fontcolor (Metamodel)	Expression (EXPRES
GraphRep (Metamodel)	Longstring (LONGS
HlpTxt (Metamodel)	String (STRING)
Model pointer (Metamodel)	String (STRING)
Monochrome view (Metamodel)	Enumeration (ENUM
Position (Metamodel)	String (STRING)
Quantity	Integer (INTEGER)
VisibleAttrs (Metamodel)	String (STRING)
WF_Trans (Metamodel)	String (STRING)
Row Name	
AnimRep (Metamodel)	String (STRING)
AttrRep (Metamodel)	Longstring (LONGS
Categories (Metamodel)	String (STRING)
Class cardinality (Metamodel)	String (STRING)
ClassAbstract	Integer (INTEGER)
ClassName	String (STRING)
ClassVisible	Integer (INTEGER)
Documentation (Metamodel)	String (STRING)
External tool coupling (Metamodel)	String (STRING)
fontcolor (Metamodel)	Expression (EXPRES
GraphRep (Metamodel)	Longstring (LONGS
HlpTxt (Metamodel)	String (STRING)
Model pointer (Metamodel)	String (STRING)
Monochrome view (Metamodel)	Enumeration (ENUM
Position (Metamodel)	String (STRING)
Referenced Model	Intermodel referenc
VisibleAttrs (Metamodel)	String (STRING)
WF_Trans (Metamodel)	String (STRING)
Relation classes	

Specification of GRAPHREP

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

Practice

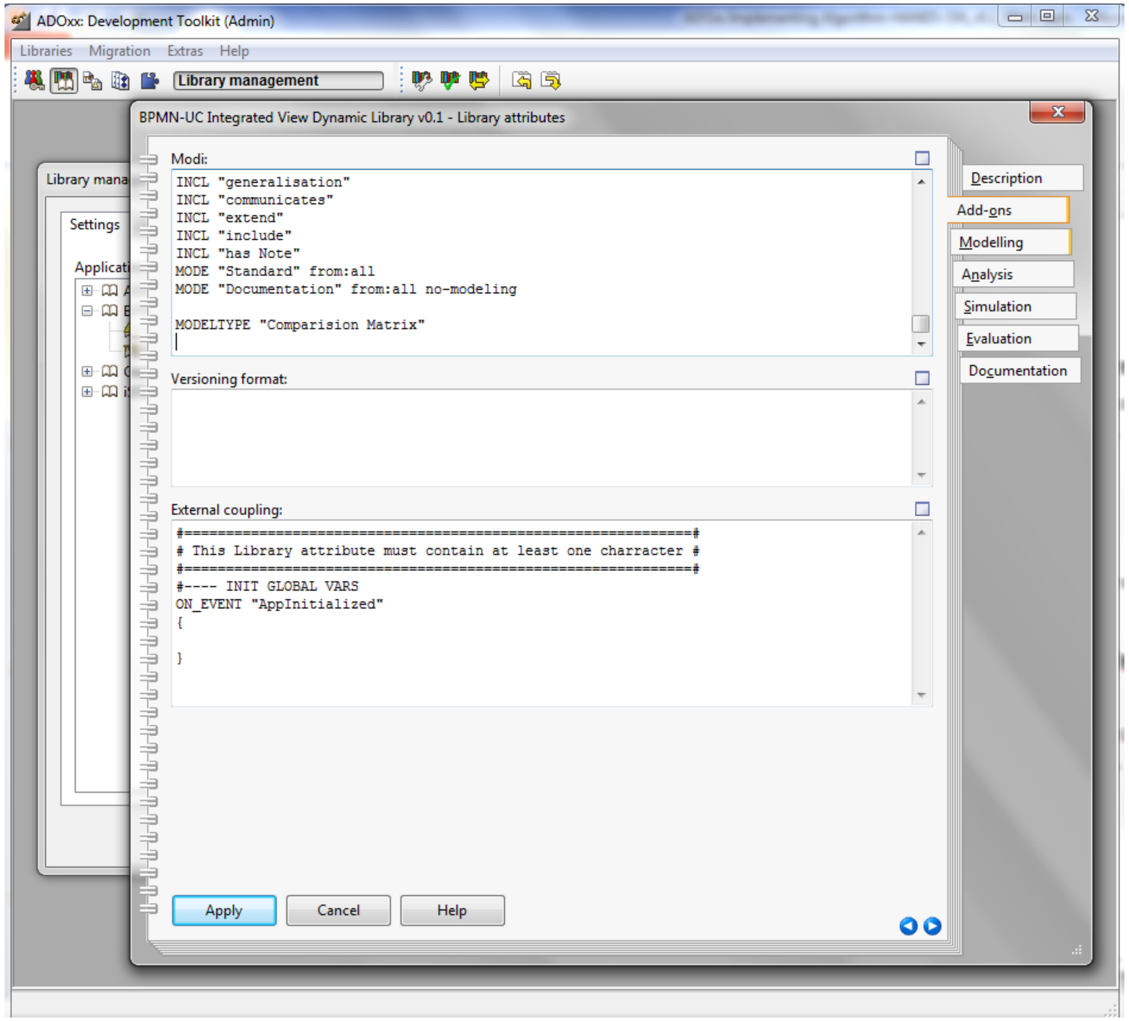
Box

```
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
```

Row Name

```
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
```

Practice



```
INCL "generalisation"
INCL "communicates"
INCL "extend"
INCL "include"
INCL "has Note"
MODE "Standard" from:all
MODE "Documentation" from:all no-modeling

MODELTYPE "Comparision Matrix"
```

```
#==============================================================#
# This Library attribute must contain at least one charracter #
#==============================================================#
#---- INIT GLOBAL VARS
ON_EVENT "AppInitialized"
{

}
```

New Modeltype:

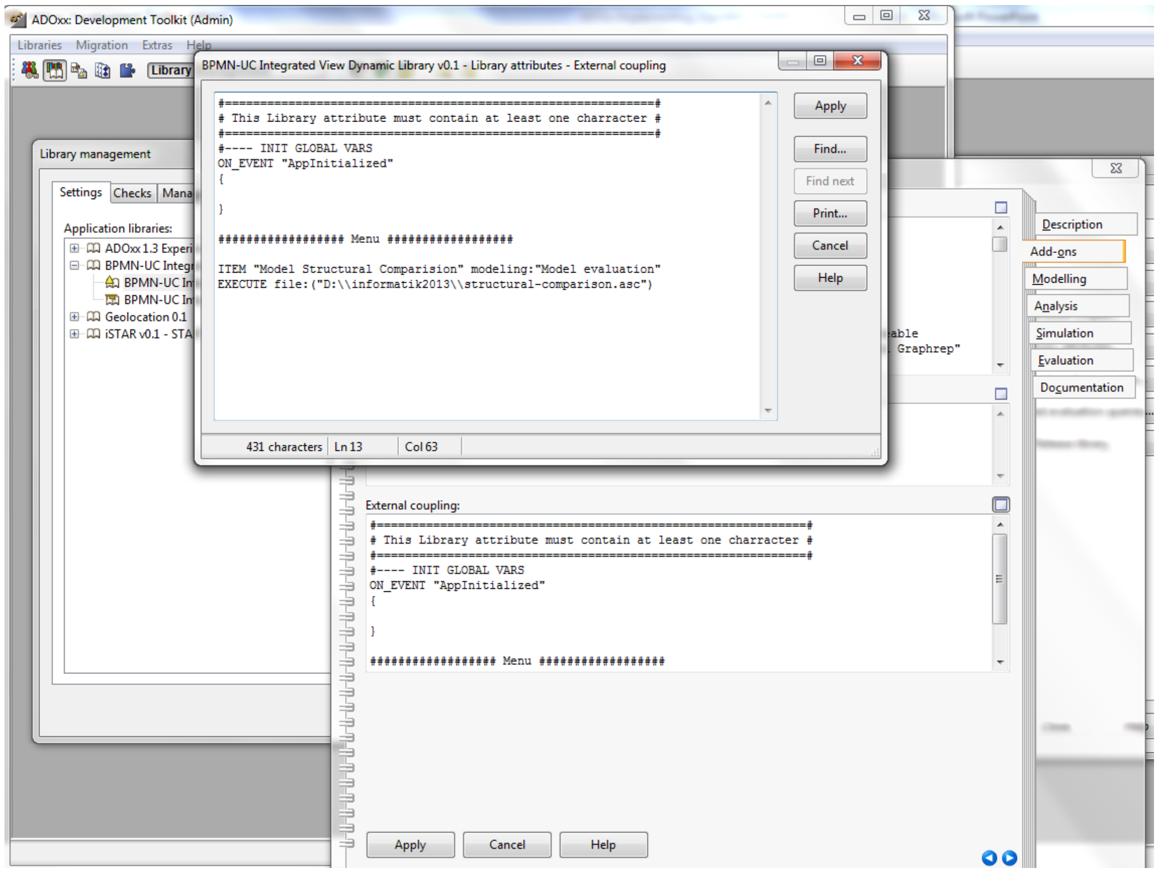
- Select “BPMN-UC Integrated View Dynamic Library” and open Library attributes.
- Got to Add Ons
- Add the Modeltype “Comparison Matrix” in the Modi attribute

MODELTYPE “Comparison Model”
INCL “Box”
INCL “Row Name”

Practice

```
#########################################
# Structural Comparision                #
#########################################

#----------------------------------------
# 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
#----------------------------------------

…
```

Practice



```
#==============================================================#
# This Library attribute must contain at least one charracter #
#==============================================================#
#---- INIT GLOBAL VARS
ON_EVENT "AppInitialized"
{

}

################## Menu ##################

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

431 characters | Ln 13 | Col 63

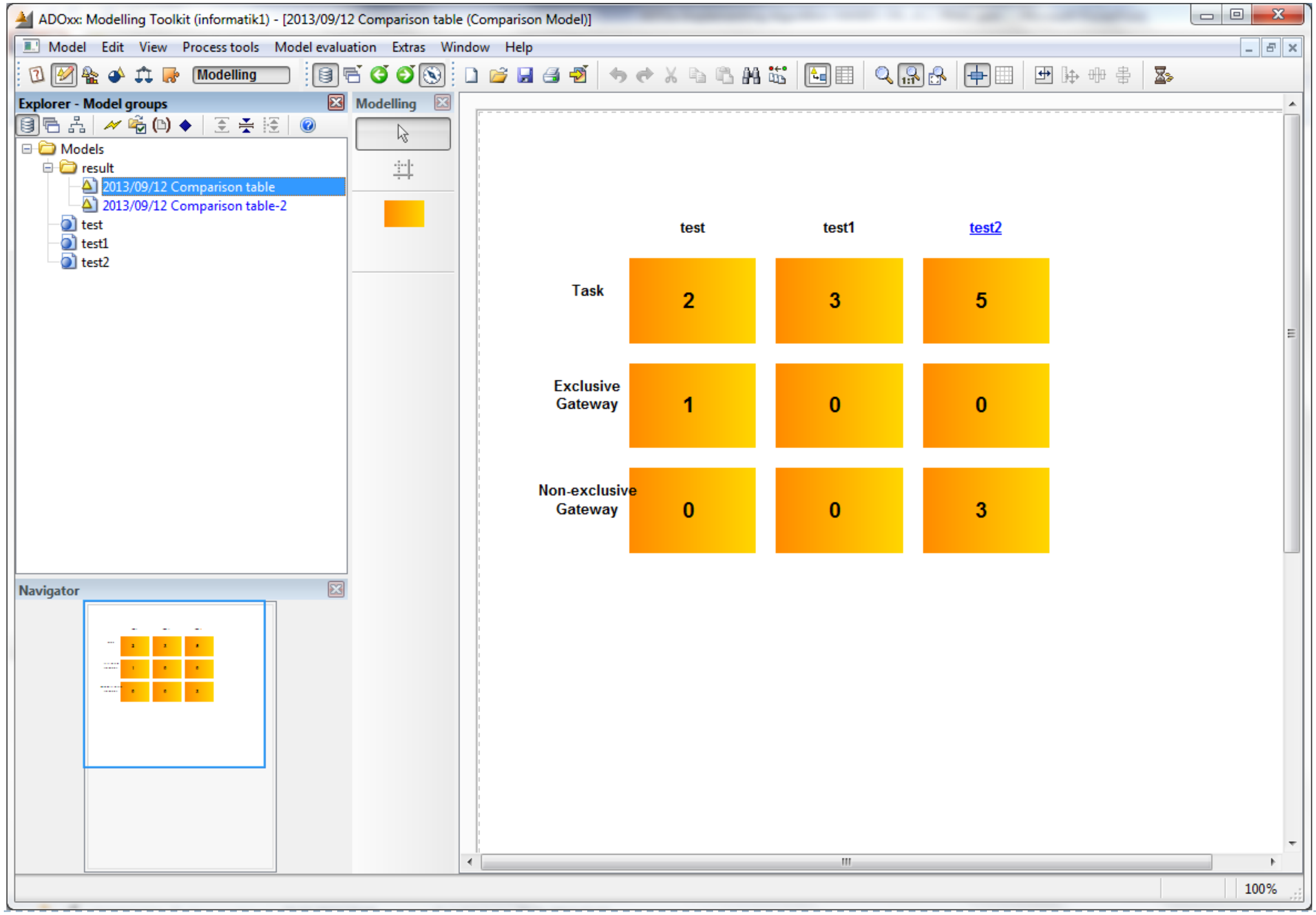
```
#==============================================================#
# This Library attribute must contain at least one charracter #
#==============================================================#
#---- INIT GLOBAL VARS
ON_EVENT "AppInitialized"
{

}

################## Menu ##################
```

Add Menubar

- Import "*structural-comparison.asc*"
- Select Dynamic Library.
- Open Library Attributes
- Select Add-On
- Open External Coupling
- Add Menubar in External Coupling

```
################## Menu ##################

ITEM "Model Structural Comparision" modeling:"Model evaluation"
EXECUTE file:("db:\\structural-comparison.asc")
```

Practice


ADOxx: Modelling Toolkit (informatik1) - [2013/09/12 Comparison table (Comparison Model)]
Model
Edit
View
Process tools
Model evaluation
Extras
Window
Help
Modelling
Explorer - Model groups
Models
result
2013/09/12 Comparison table
2013/09/12 Comparison table-2
test
test1
test2
Navigator
100%

	test	test1	test2
Task	2	3	5
Exclusive Gateway	1	0	0
Non-exclusive Gateway	0	0	3