Introduction to MDM
Part 3 - Case study - From modeling to UI
Master Data Management

Education

Pierre Bonnet, IS Consultant, January 2012
Based on the work achieved with Ms Tran Thi Linh of IFI solution Hanoi
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pierre.bonnet@orchestranetworks.com
skype: pierre.orchestra

www.orchestranetworks.com

Objective

Based on a case study about user acceptance test management

- Understand the core semantic data modeling
- Understand how the data model is used to build a concrete MDM system
- Understand what a logical data model is

Case study functional description

We want to build a MDM collecting all information related to user test acceptance of a system

- Test campaign definition
- Test campaign execution
- Test scenario
- Test step
- Test report
- Detailed test result

Business dictionary

(Test) Campaign definition

- A campaign is defined through an ordered set of test scenarios
- This set describes how to test a system

(Test) Campaign execution

- A campaign execution collects all outcomes related to a test of a system with referenced data
  - start date of the campaign execution
  - end date of the campaign execution
  - version of the system tested
  - configuration used to test the system
  - all status and bugs

Business dictionary

(Test) Scenario

- A scenario describes an ordered set of steps to test
- A scenario is defined through some reference data such as
  - functional objective
  - type: manual or automatic execution
  - category: test data, test data model, test permission, etc.
  - initial database: which data base is used to achieve the test

Example of a scenario

- Name = "Create Permission for user, then check each users whether permissions are implemented correctly or not"
- Type = manual
- Category = data set
- Initial database = empty

Business dictionary

(Test) Step

- A step describes an atomic action that the user or the system must achieve to enforce a test
- A step is defined through some reference data such as
  - functional objective
  - all input and expected output test data required to achieve the test and to check whether outcomes are conformed

Example of a step

- Name = "Create Permission for user on dataset RealEstate"
- Category = create
- Data input = PermissionDataset-user1
- Action code = Submit&Closed
- Expected data output = PermissionDataset-user1
- Return = Create successful

Business dictionary

Test report

- A test report collects all information related to test of a scenario within a campaign execution
  - test date
  - actor achieving the test
  - execution time of the test
  - test status (ok, ko, n/a)

- The user can re-execute a same scenario several times within a campaign execution
  - each test scenario is then identified with help of a sequence number from 1 to unbounded

Business dictionary

Detailed test result

- A detailed test result collects detailed information about outcomes of a test step within a test scenario, namely for a test report as described previously
  - result
  - status (ok, ko, n/a)
  - bugs description

Business rules

Scenario

- A scenario can be reused by many campaign definitions

Step

- A step is defined for a scenario only

Campaign execution

- A campaign execution is based on the same scenarios and steps than its related campaign definition

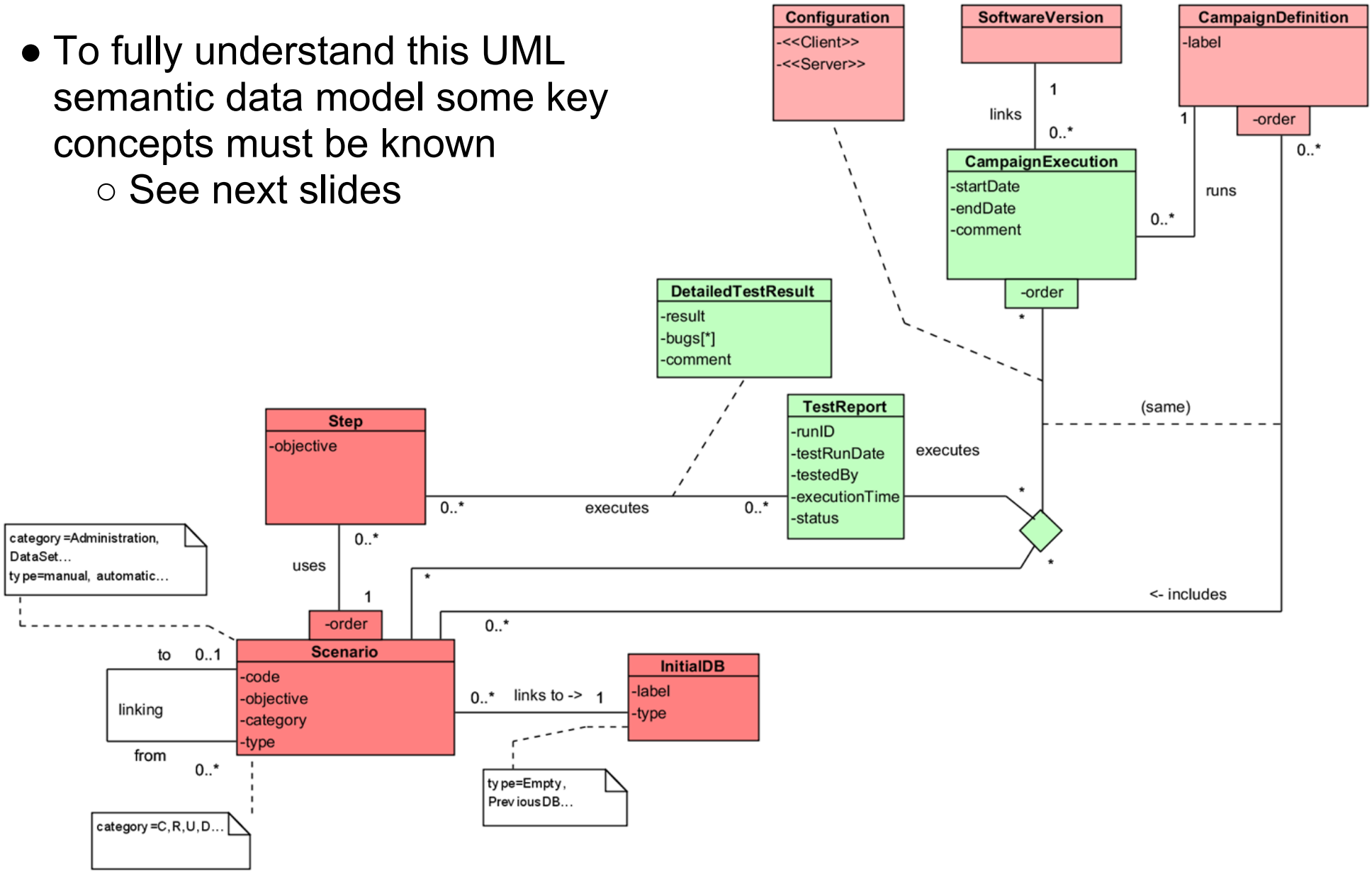
This is the first set of business rules
Others will be defined later during the modeling process

Semantic data modeling

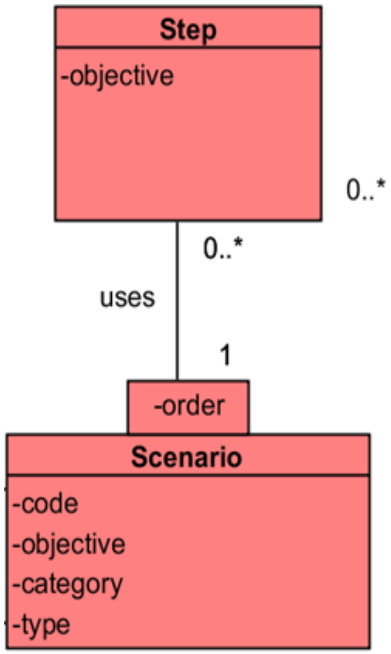
Representing in a formal way
business concepts and business rules
described above

Semantic Data Model

- To fully understand this UML semantic data model some key concepts must be known
  - See next slides



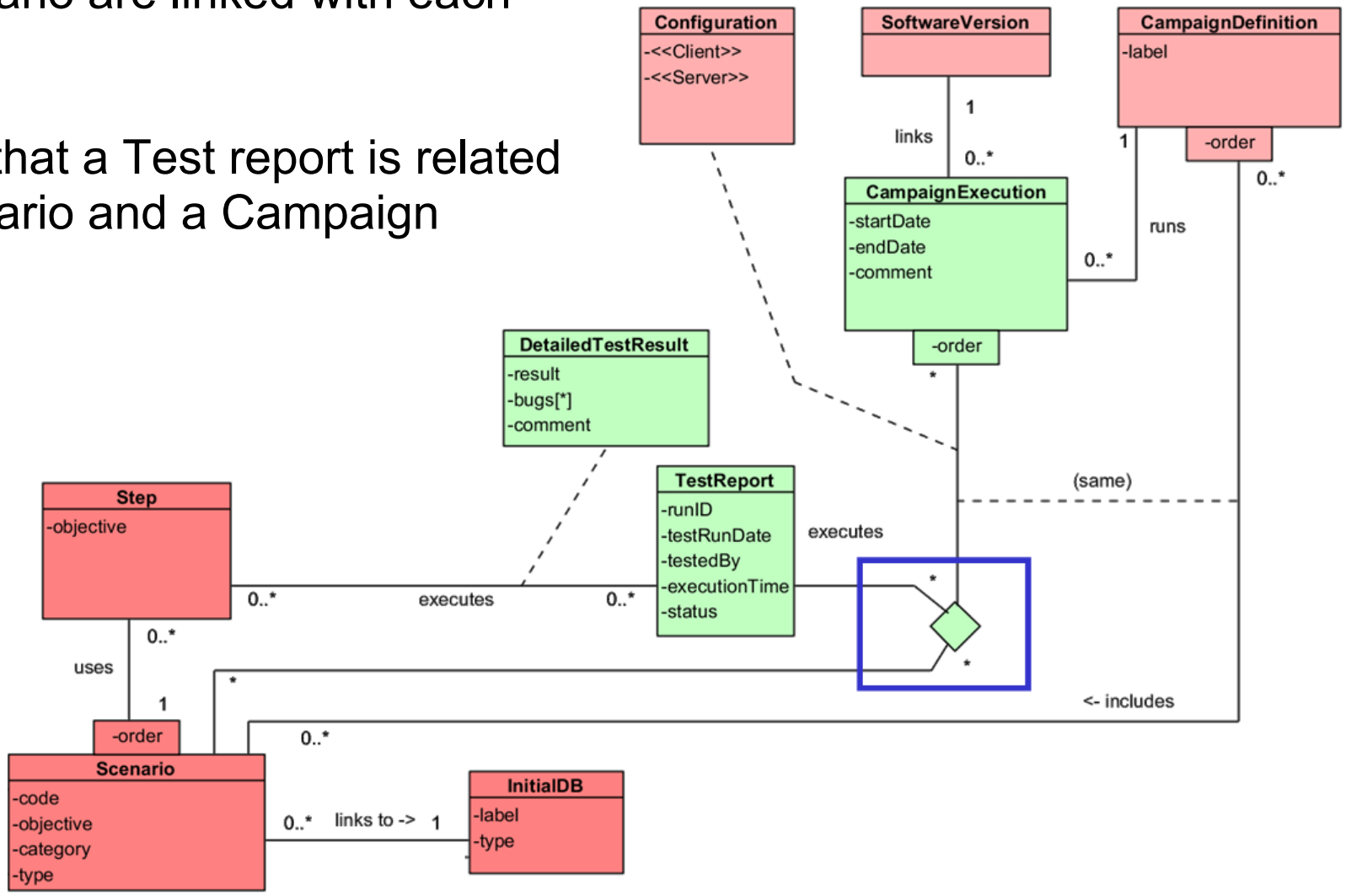
UML key concepts - Qualifier attribute



- Order is a qualifier attribute
- A Scenario uses zero to unbounded Steps in a well-identified ordering
- A Step is used by one Scenario only

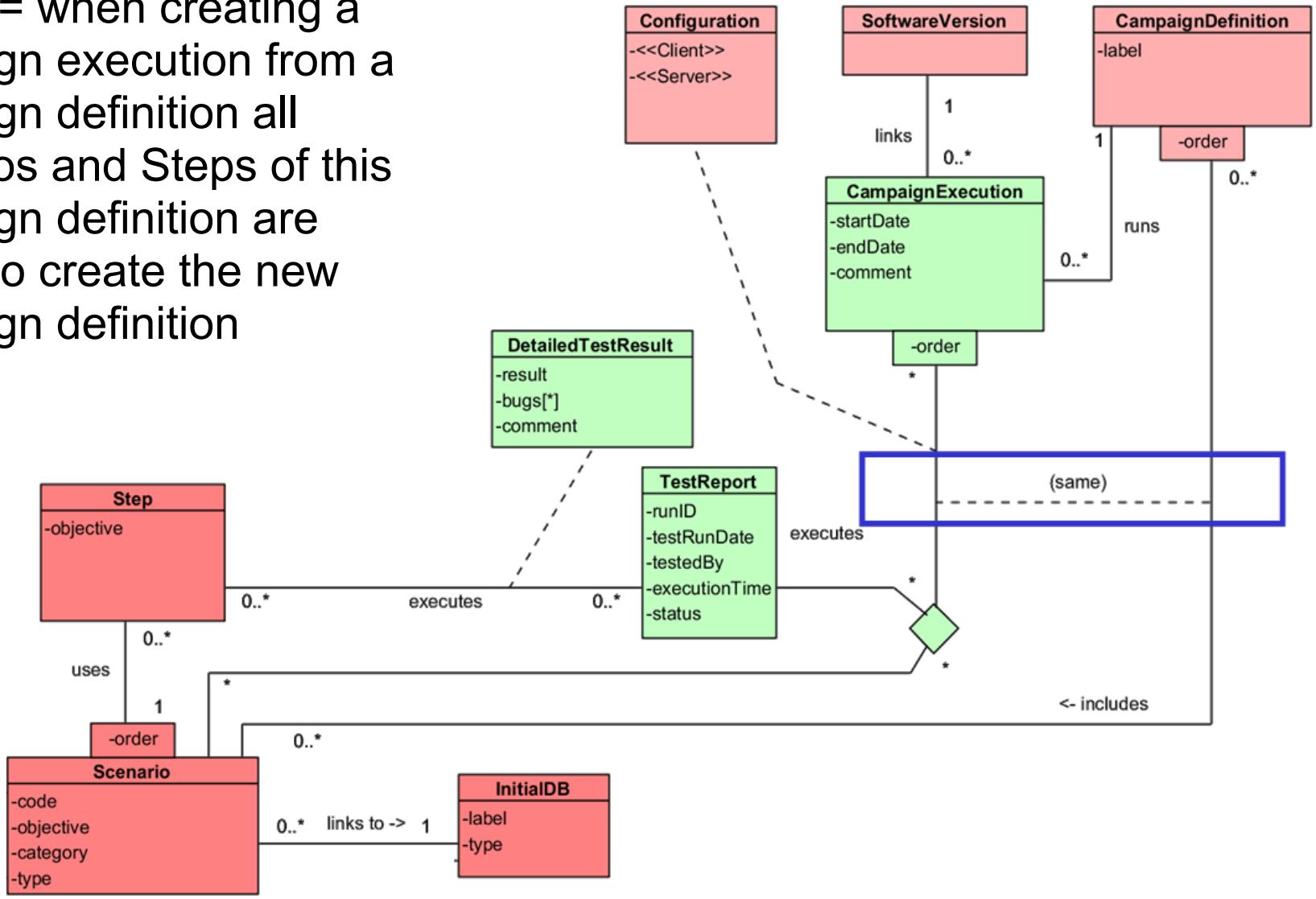
UML key concepts - Ternary relationship

- Campaign execution, Test report and Scenario are linked with each other
- It means that a Test report is related to a Scenario and a Campaign execution



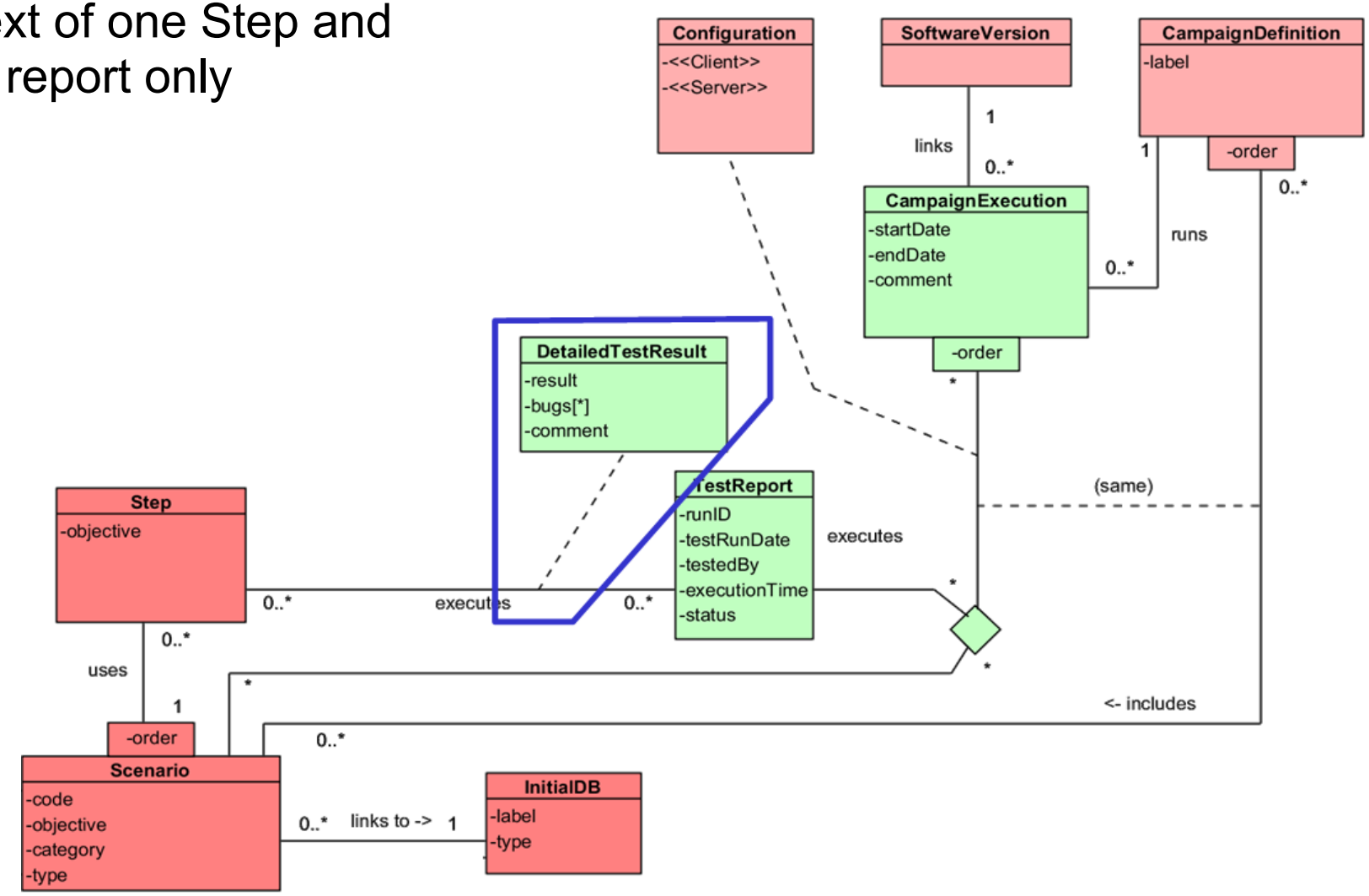
UML key concepts - Constraint on relationship

- (Same) = when creating a Campaign execution from a Campaign definition all Scenarios and Steps of this Campaign definition are reused to create the new Campaign definition



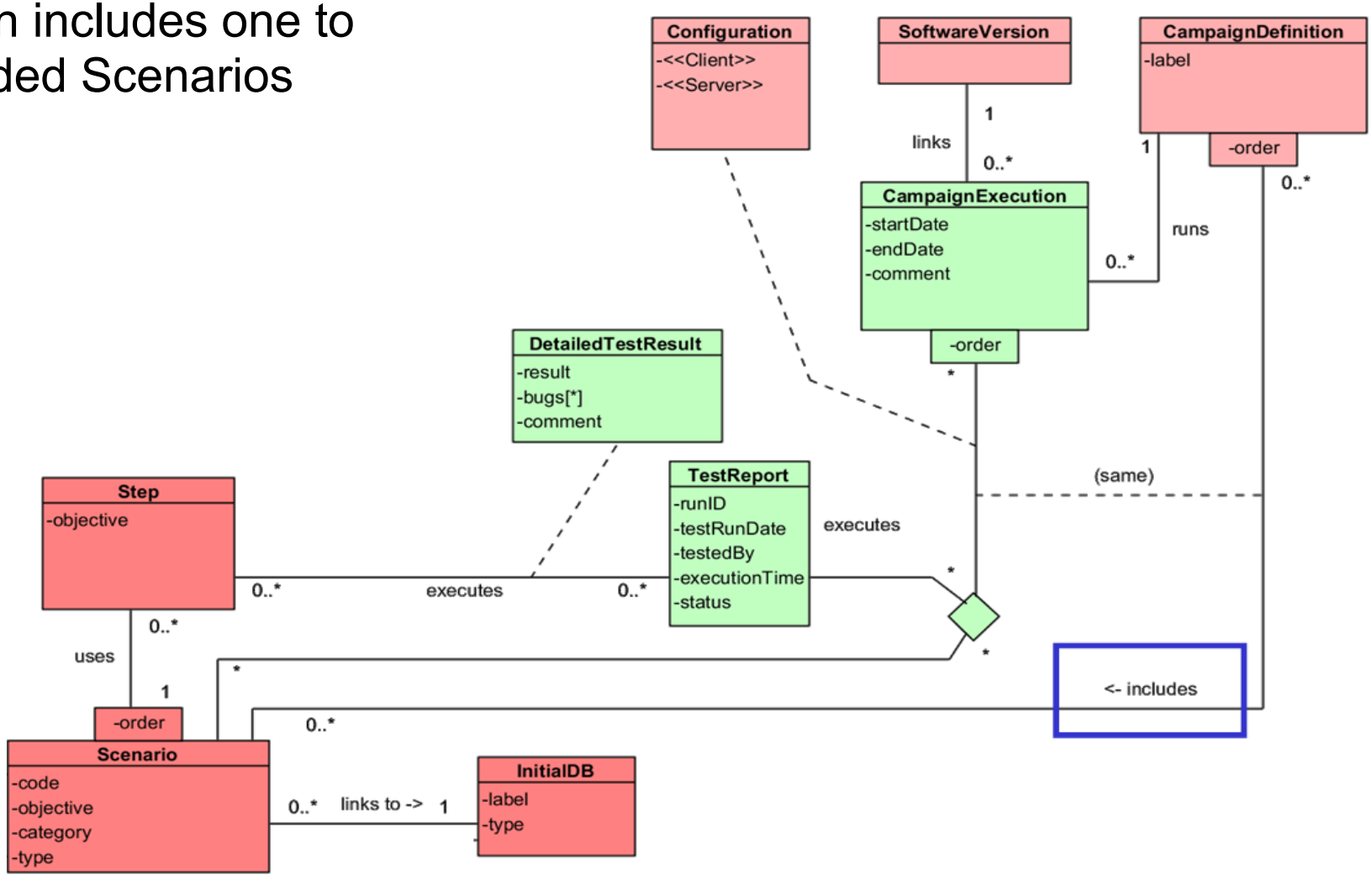
UML key concepts - Associative class

- A Detailed test result exists in the context of one Step and one Test report only



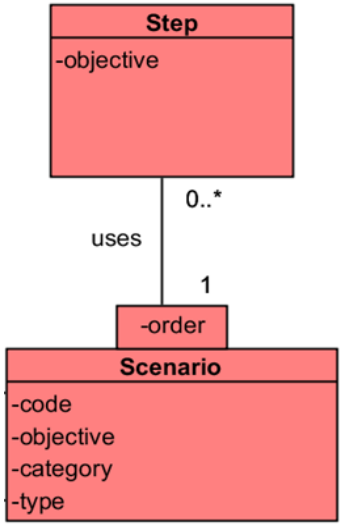
UML key concepts - Naming convention

- '<- includes' = a Campaign definition includes one to unbounded Scenarios

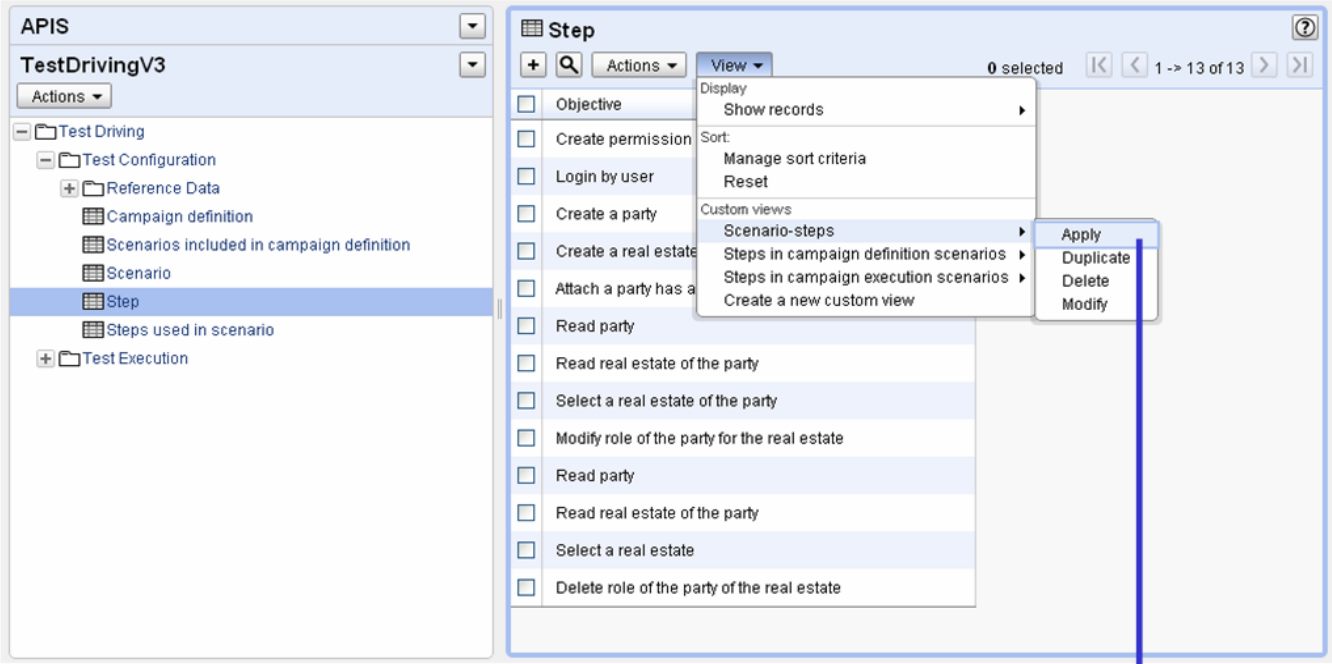


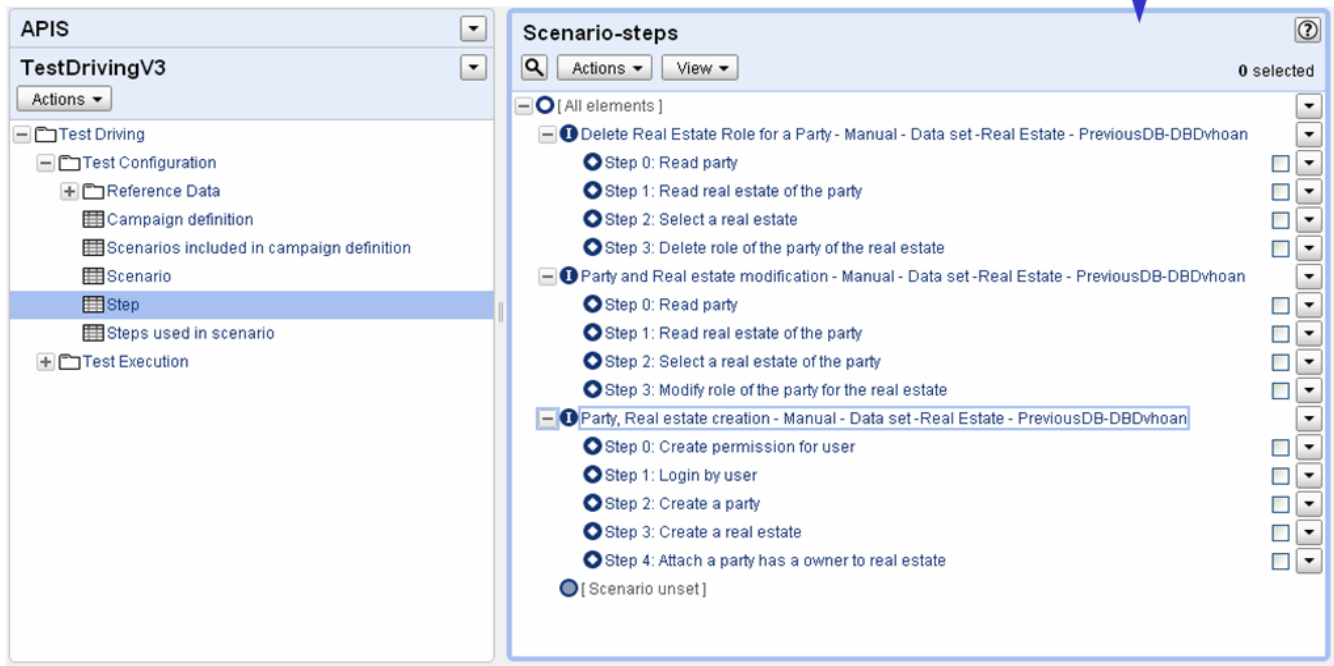
User Interface

How the semantic data model is used by
a MDM system?



The MDM system follows the semantic data model through a mechanism of data hierarchy views





Scenario without step

APIS

TestDrivingV3

Actions

- Test Driving
  - Test Configuration
    - Reference Data
    - Campaign definition
    - Scenarios included in campaign definiti
    - Scenario
    - Step
    - Steps used in scenario
  - Test Execution

Scenario-steps

Actions View 0 selected

- [All elements]
  - Delete Real Estate Role for a Party - Manual - Data set -Real Estate - PreviousDB-DBDvhoan
  - Party and Real estate modification - Manual - Data set -Real Estate - PreviousDB-DBDvhoan
  - Party, Real estate creation - Manual - Data set -Real Estate - PreviousDB-DBDvhoan
  - [Scenario unset]

Scenario with steps

APIS

TestDrivingV3

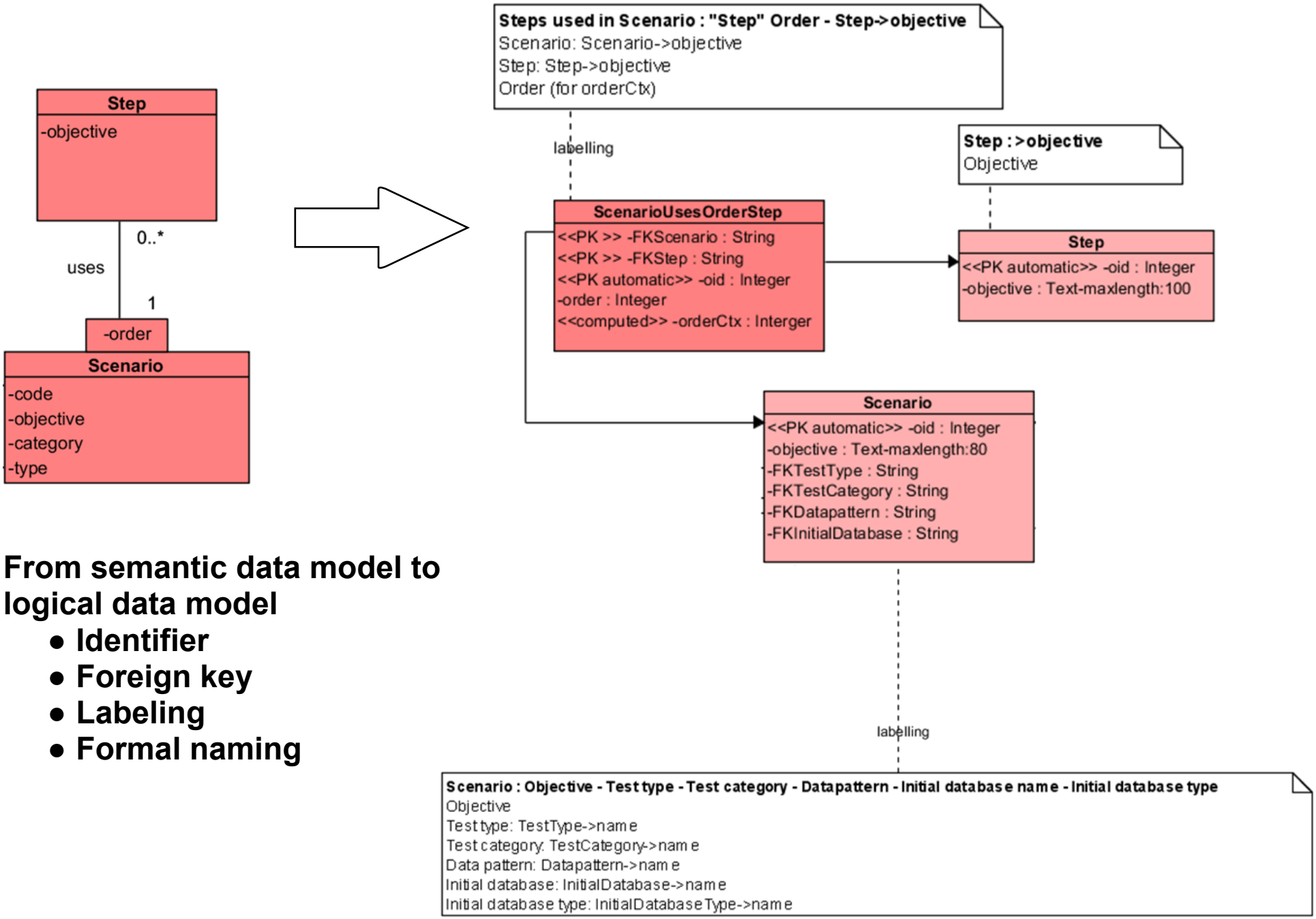
Actions

- Test Driving
  - Test Configuration
    - Reference Data
    - Campaign definition
    - Scenarios included in campaign definiti
    - Scenario
    - Step
    - Steps used in scenario
  - Test Execution

Scenario-steps

Actions View 0 selected

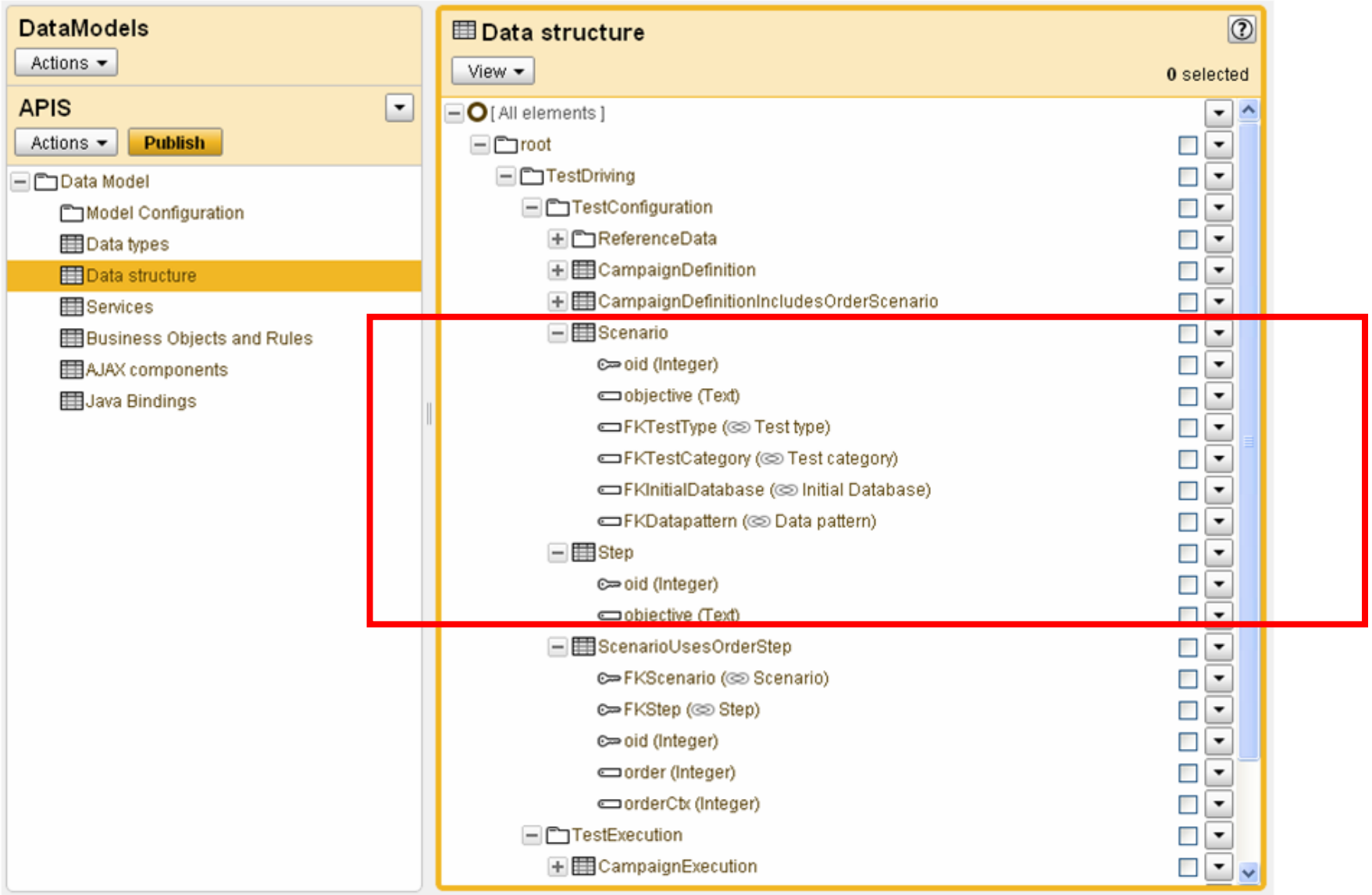
- [All elements]
  - Delete Real Estate Role for a Party - Manual - Data set -Real Estate - PreviousDB-DBDvhoan
    - Step 0: Read party
    - Step 1: Read real estate of the party
    - Step 2: Select a real estate
    - Step 3: Delete role of the party of the real estate
  - Party and Real estate modification - Manual - Data set -Real Estate - PreviousDB-DBDvhoan
    - Step 0: Read party
    - Step 1: Read real estate of the party
    - Step 2: Select a real estate of the party
    - Step 3: Modify role of the party for the real estate
  - Party, Real estate creation - Manual - Data set -Real Estate - PreviousDB-DBDvhoan
    - Step 0: Create permission for user
    - Step 1: Login by user
    - Step 2: Create a party
    - Step 3: Create a real estate
    - Step 4: Attach a party has a owner to real estate
  - [Scenario unset]



From semantic data model to logical data model

- Identifier
- Foreign key
- Labeling
- Formal naming

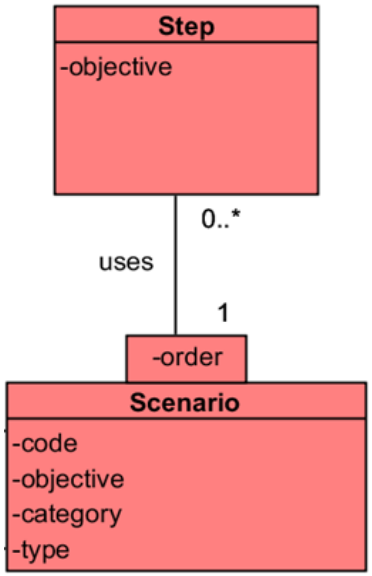
Logical data model

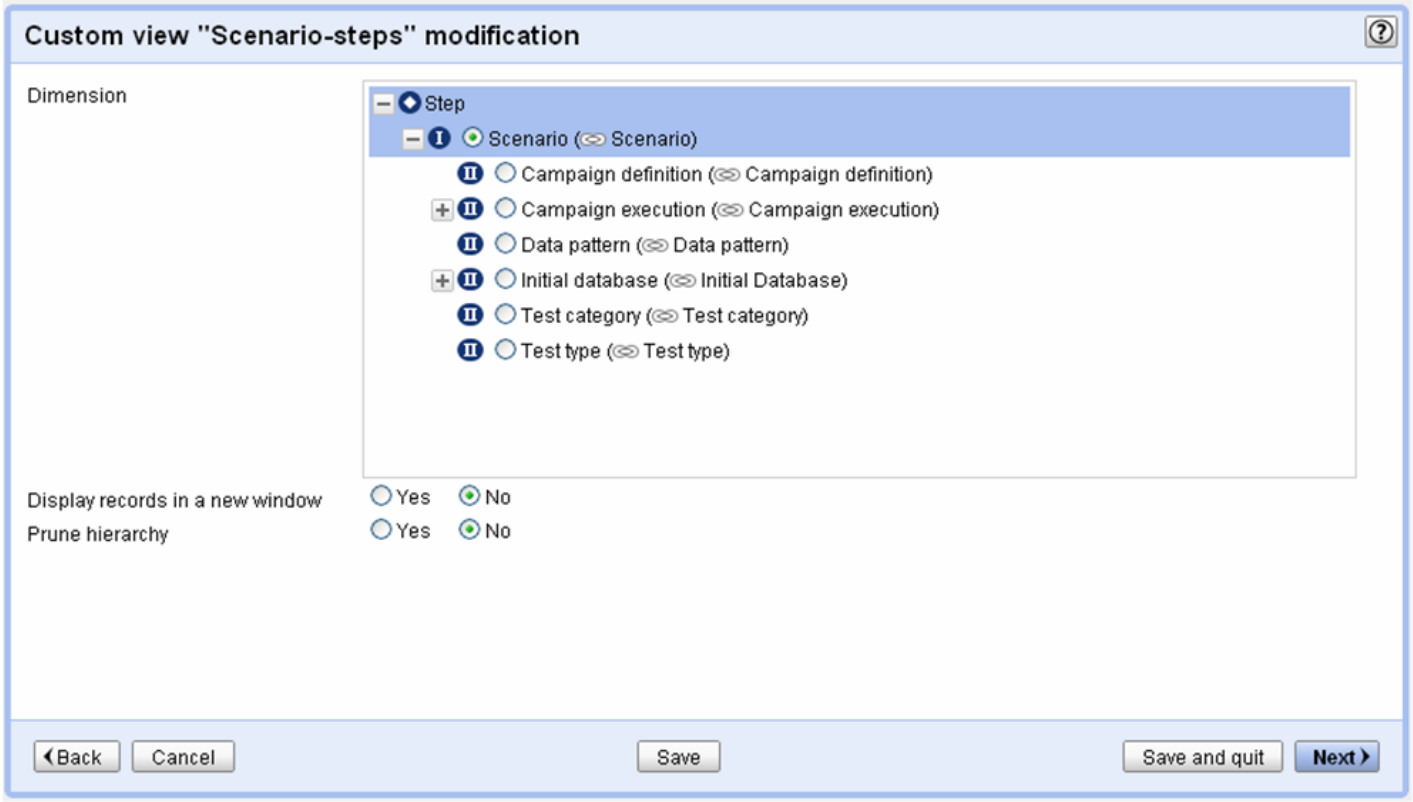


Data hierarchy configuration (1/2)

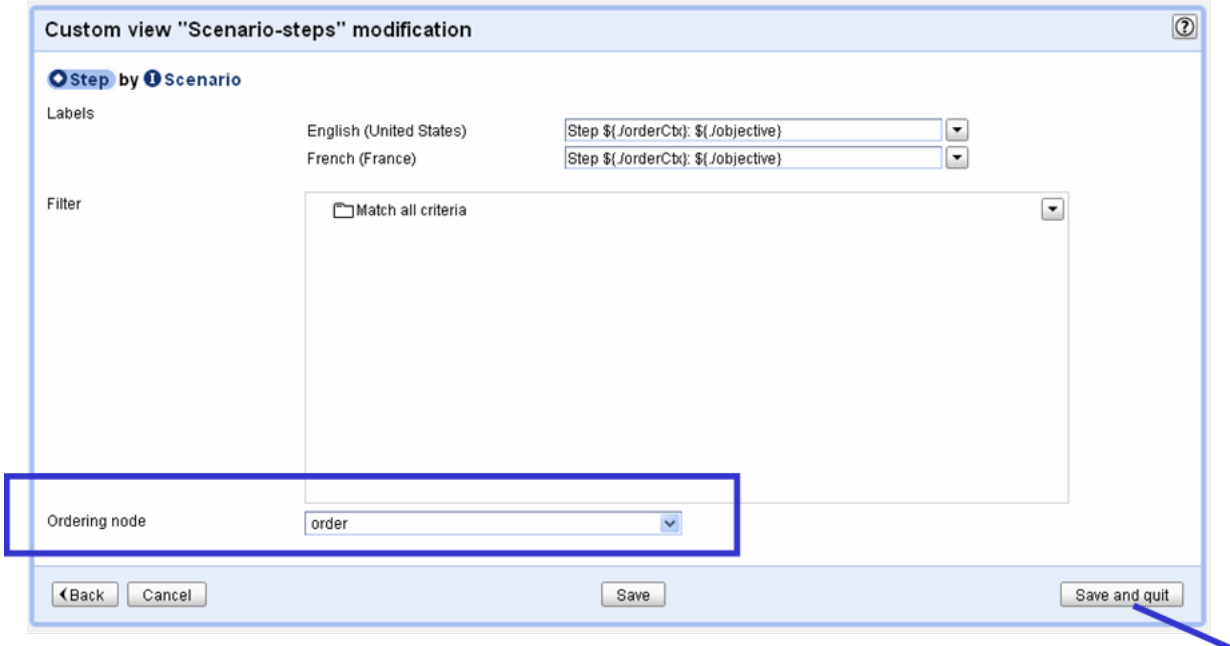
- The MDM system follows the semantic data model to display all possible data hierarchies from a leaf table (aka node)
  - here the Step table plays the leaf role

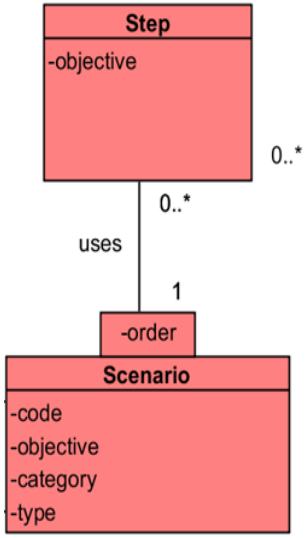
- Then the user selects the group Scenario (aka dimension) to obtain a hierarchy view from Steps by Scenario

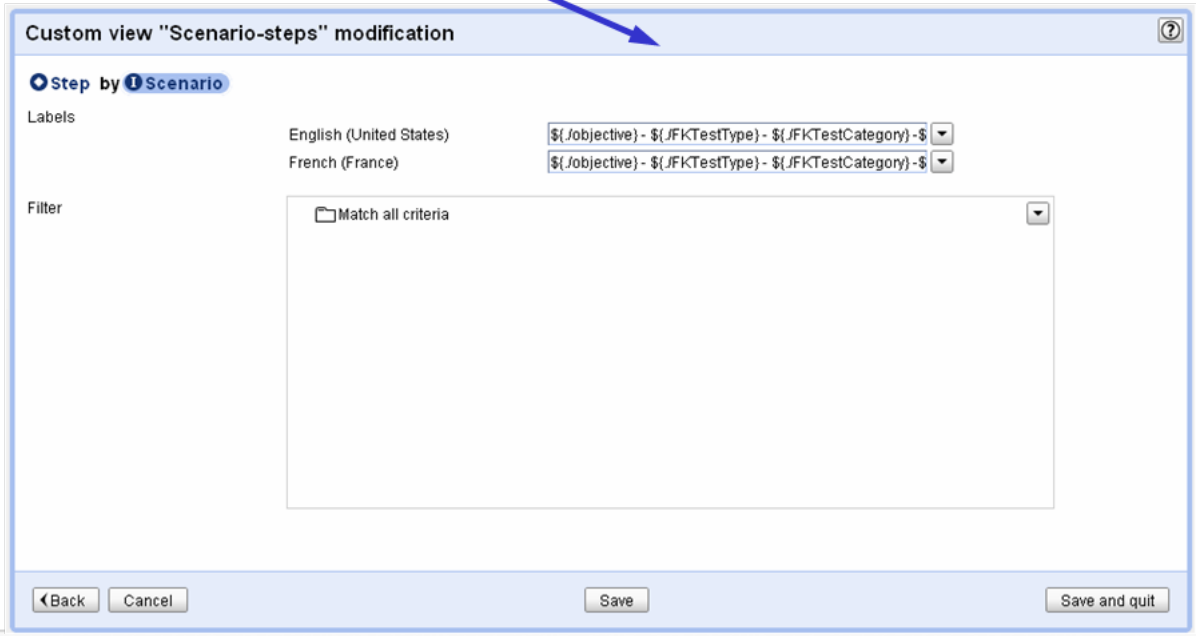




Data hierarchy configuration (2/2)

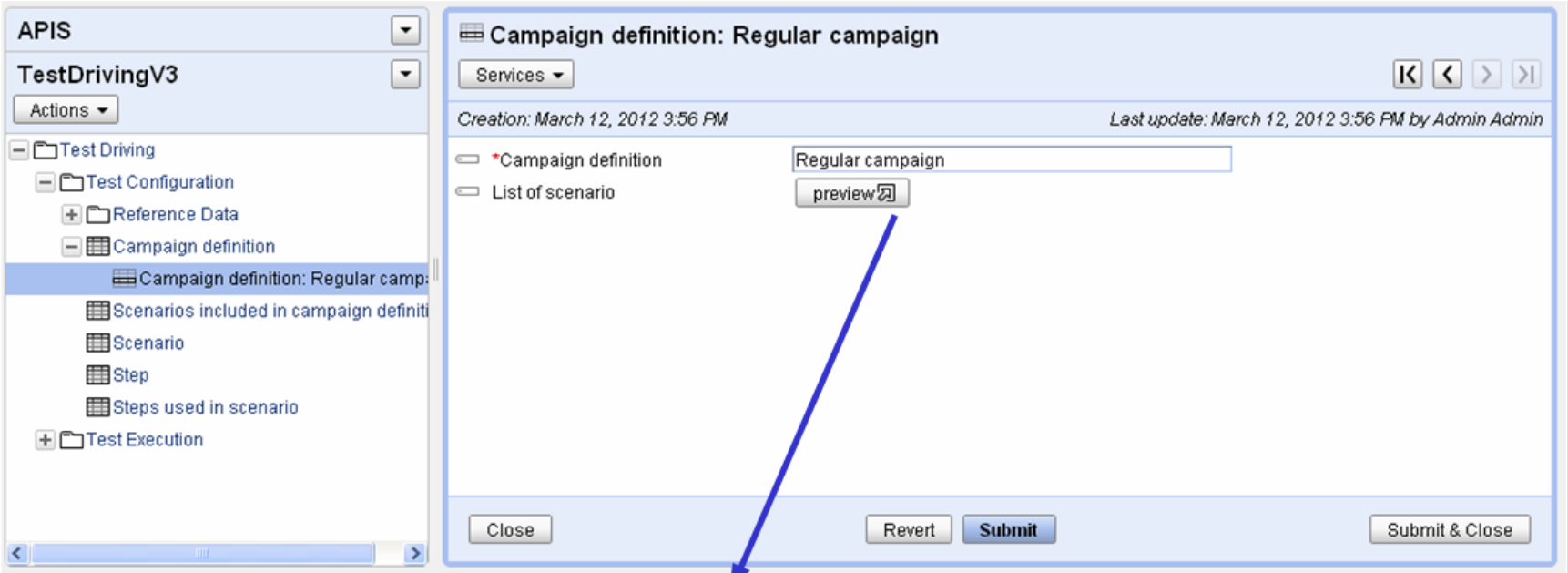




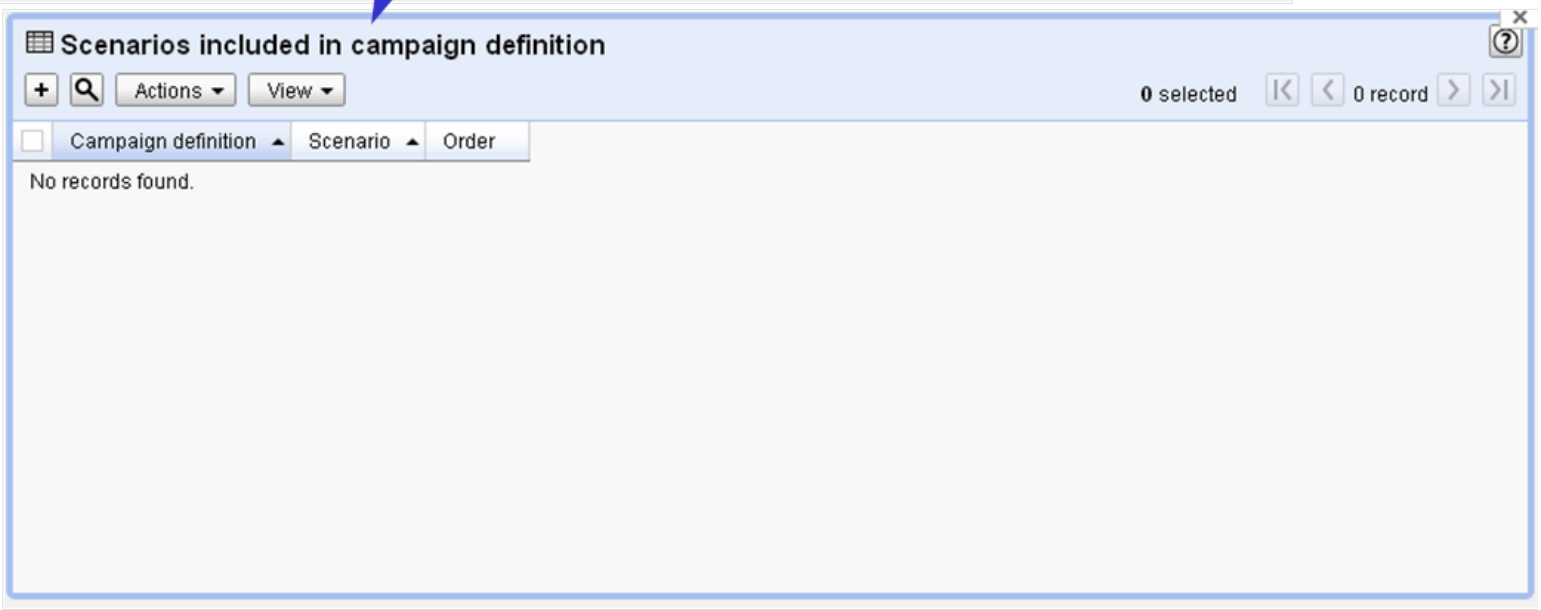


- **The MDM follows the semantic data model by suggesting the use of the order qualifier attribute to enforce an ordering of the Steps within a Scenario**
- **Moreover the labeling of each data hierarchy level is customized**

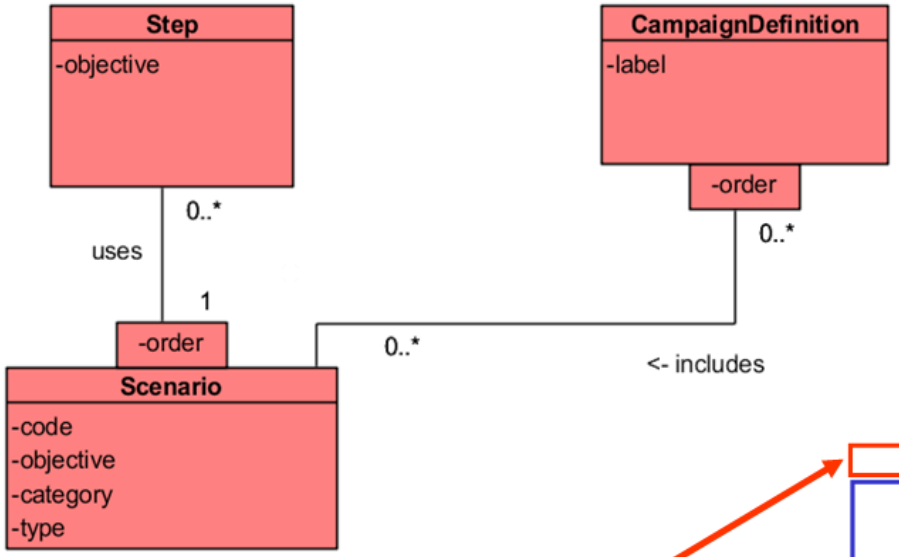
Campaign definition and its Scenarios (1/3)

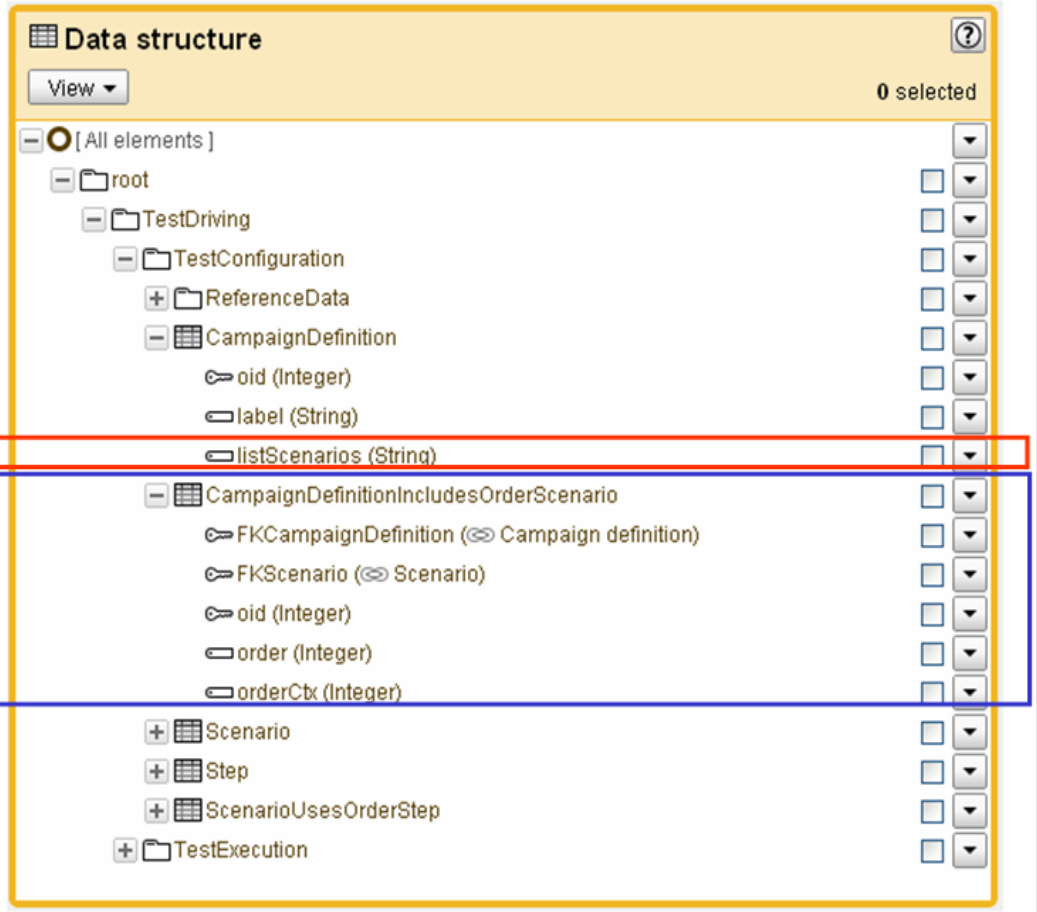


- **When authoring a campaign definition the MDM displays its scenarios automatically**



Campaign definition and its Scenarios (2/3)

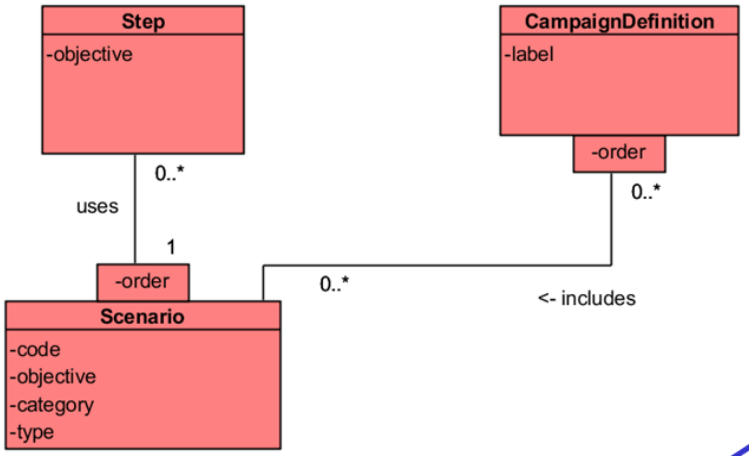


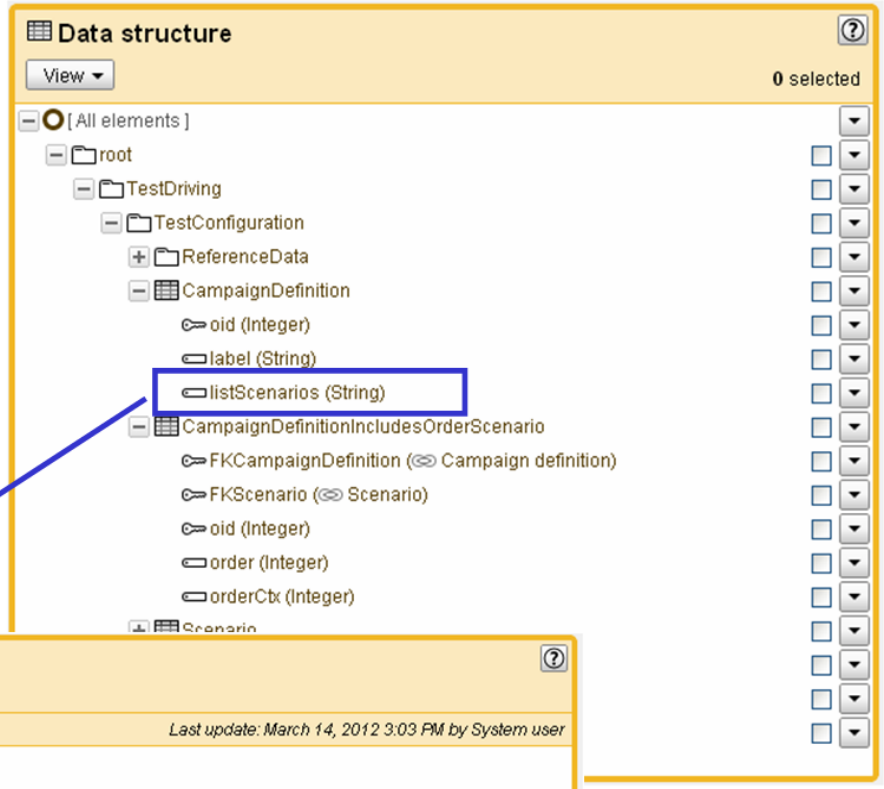


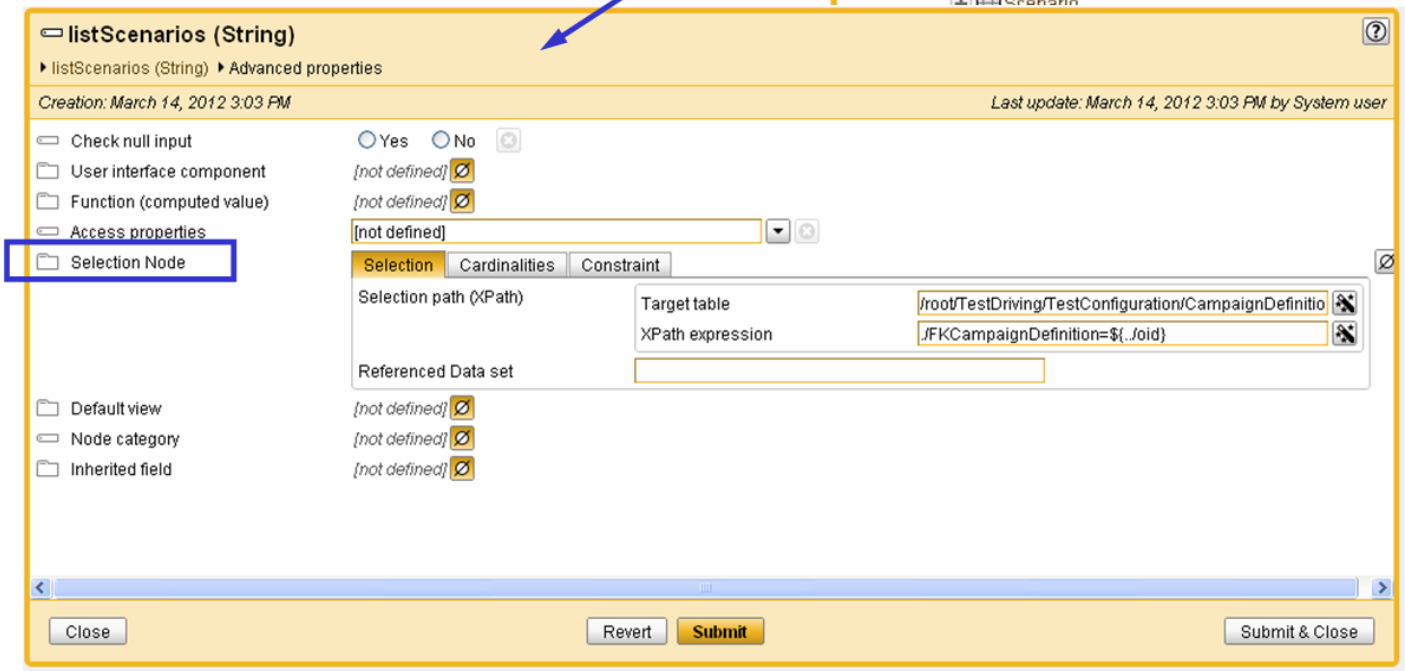
User navigation link computed automatically by the MDM system

Join table to manage the many-to-many relationship between Campaign definition and Scenario

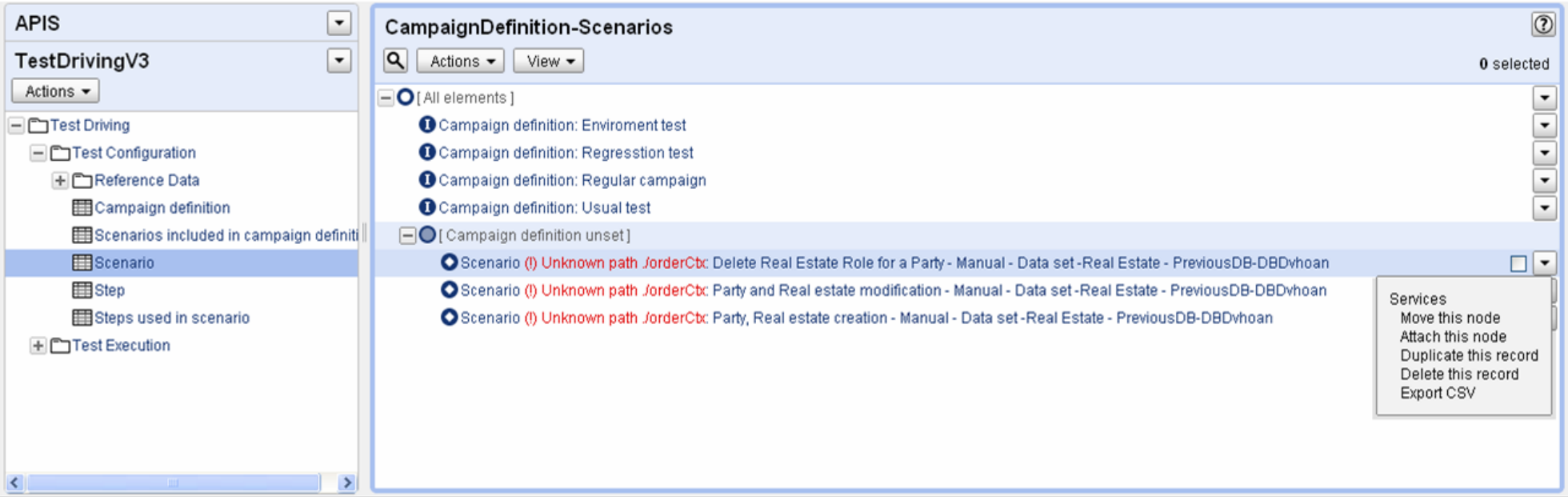
Campaign definition and its Scenarios (3/3)







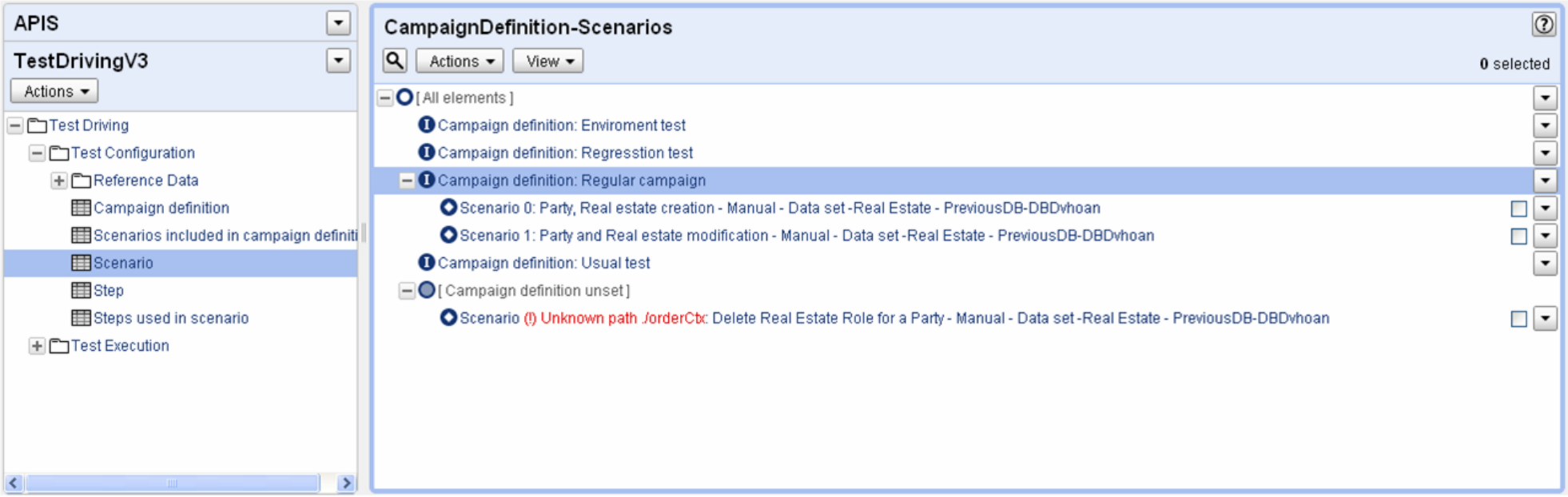
Attachment of a scenario to a campaign definition (1/2)



- **Data hierarchy with**
  - **leaf (aka node) = Scenario**
  - **group (aka dimension) = Campaign definition**

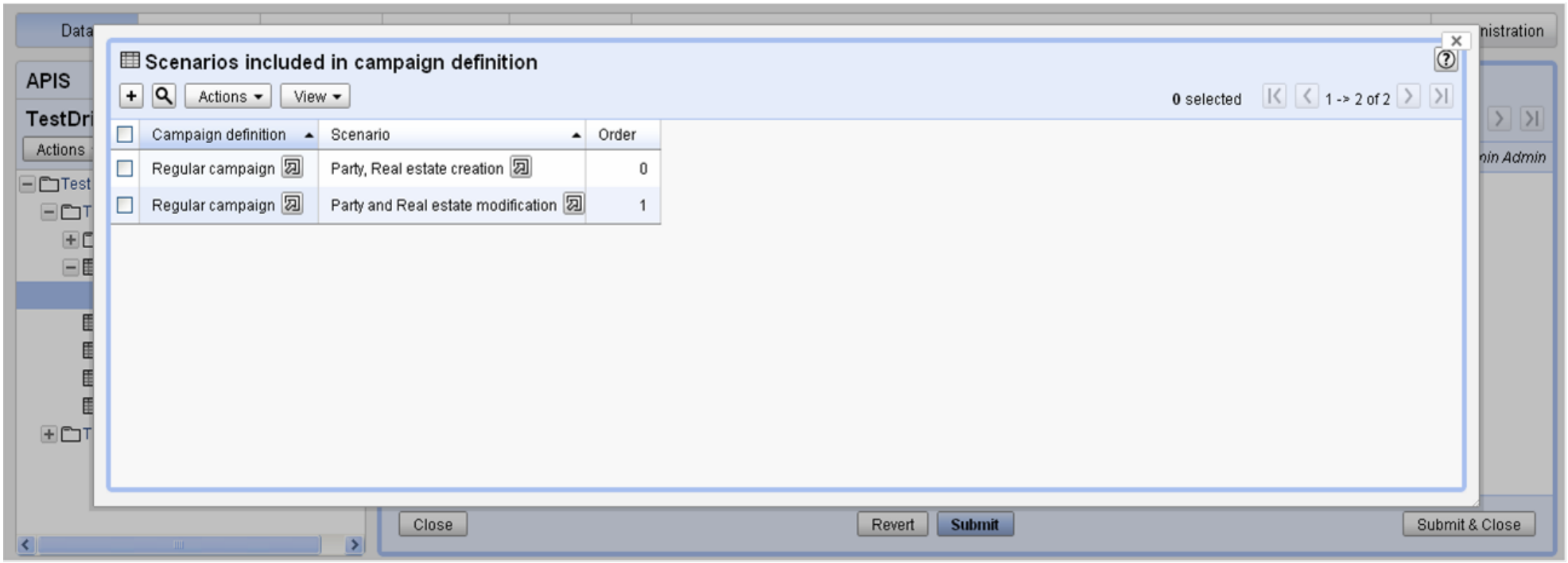
- **Three scenarios are not yet attached to a campaign definition**
  - **The popup menu allows the user to manage nodes and then attach them to the right group, namely a Campaign definition**

Attachment of a scenario to a campaign definition (2/2)



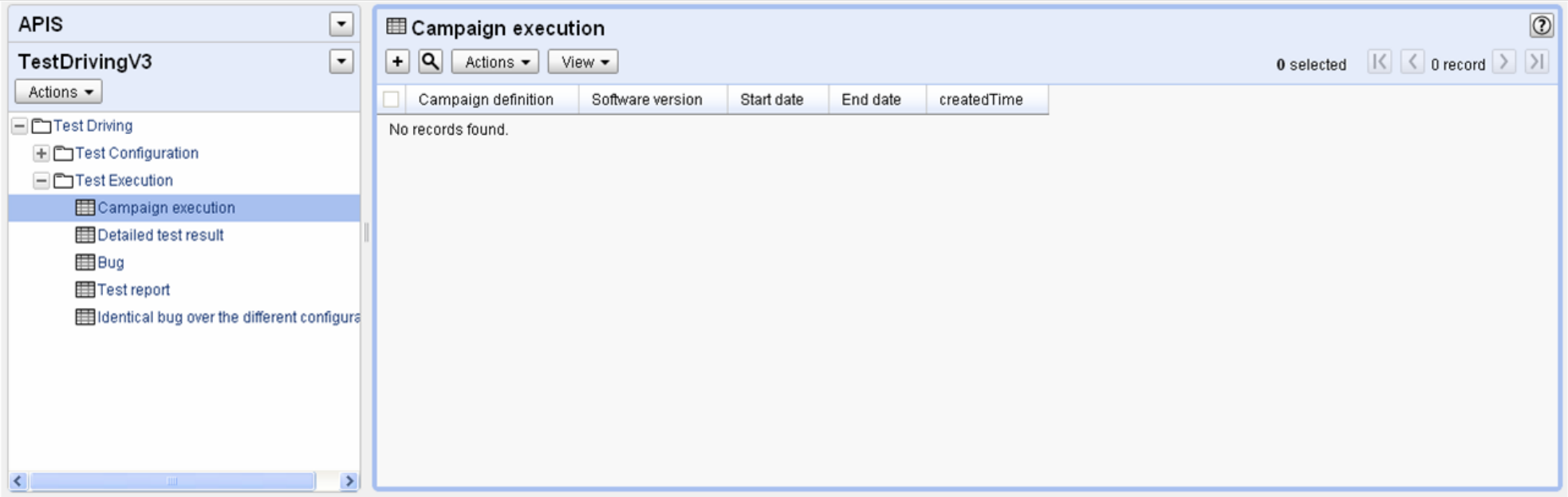
- **The user has attached two scenarios to the Campaign definition 'Regular campaign'**
    - **Since the data hierarchy is ordering each Scenario can be moved to a right position in the Campaign definition (0, 1, 2, etc.)**

A campaign definition and its scenarios



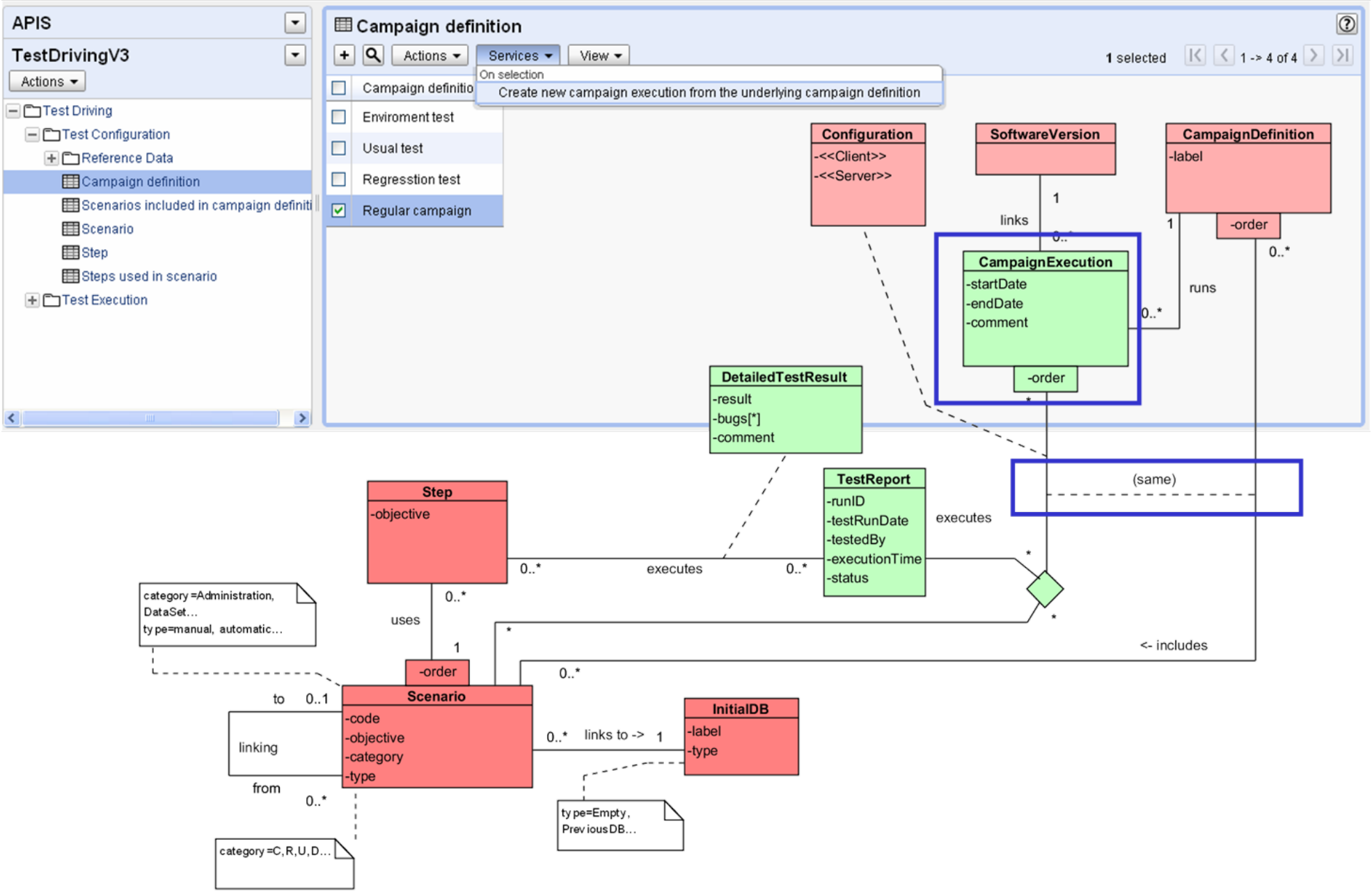
- **Now the consultation of the Campaign definition 'Regular campaign' shows the two scenarios that have been attached previously**

Starting context: no campaign execution

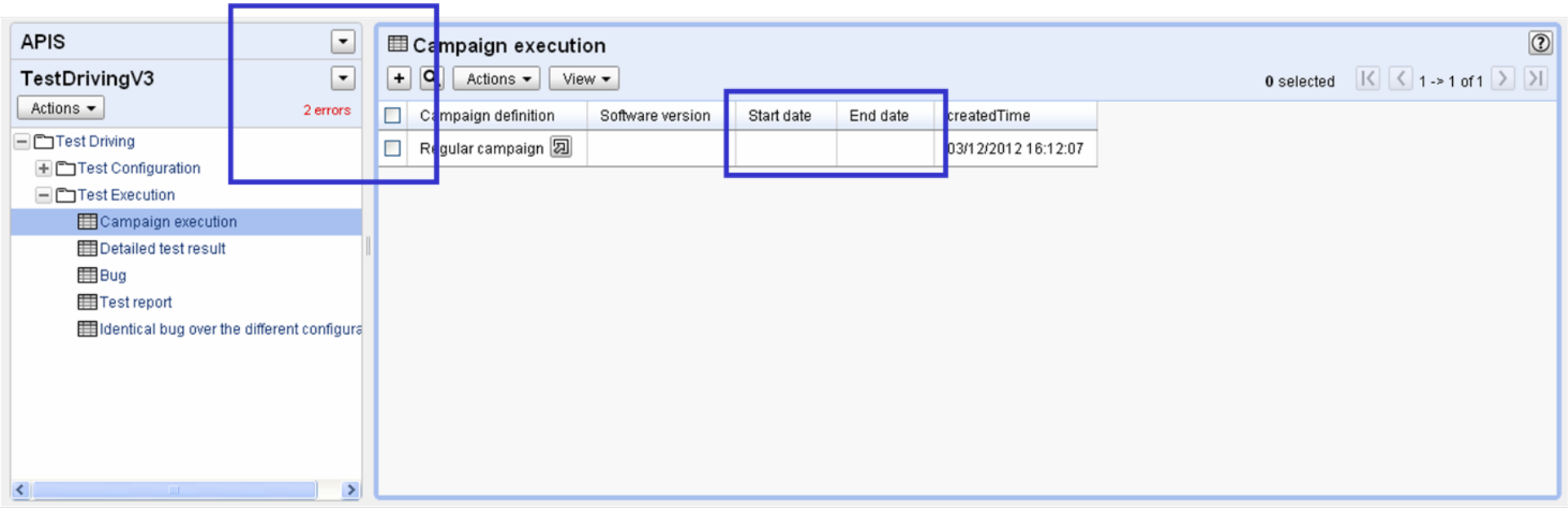


- **This screen shows the initial situation without any Campaign execution defined in the MDM system**

Creation of a campaign execution from a campaign definition



Campaign execution with two validation rules in failure

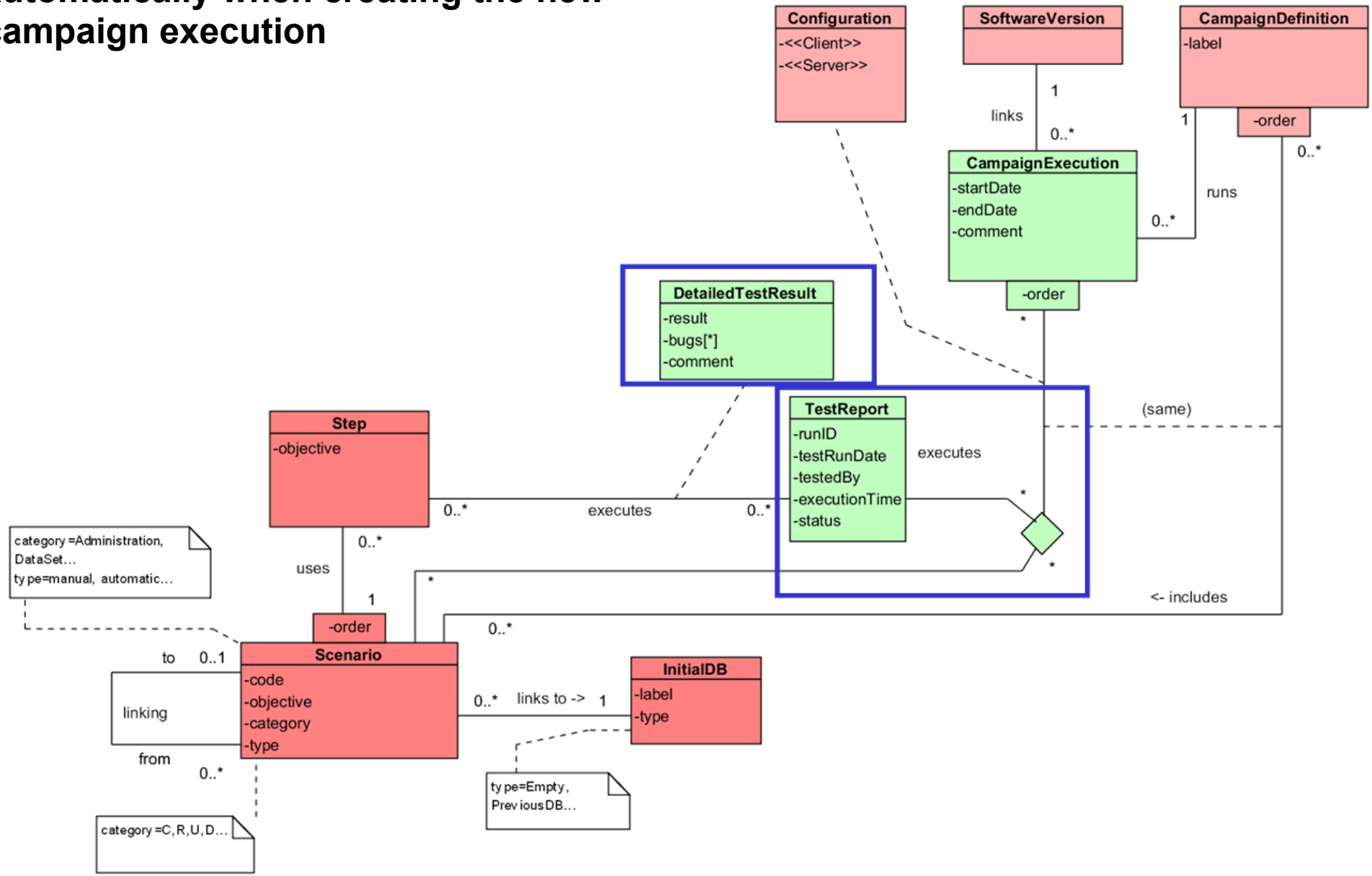


The user enforces the correction

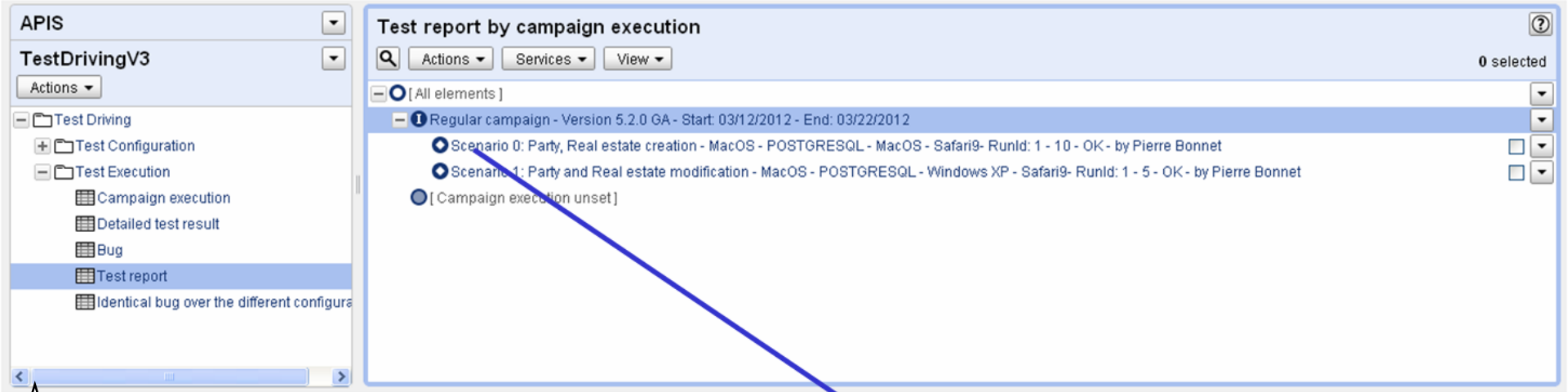
Campaign execution with its scenarios

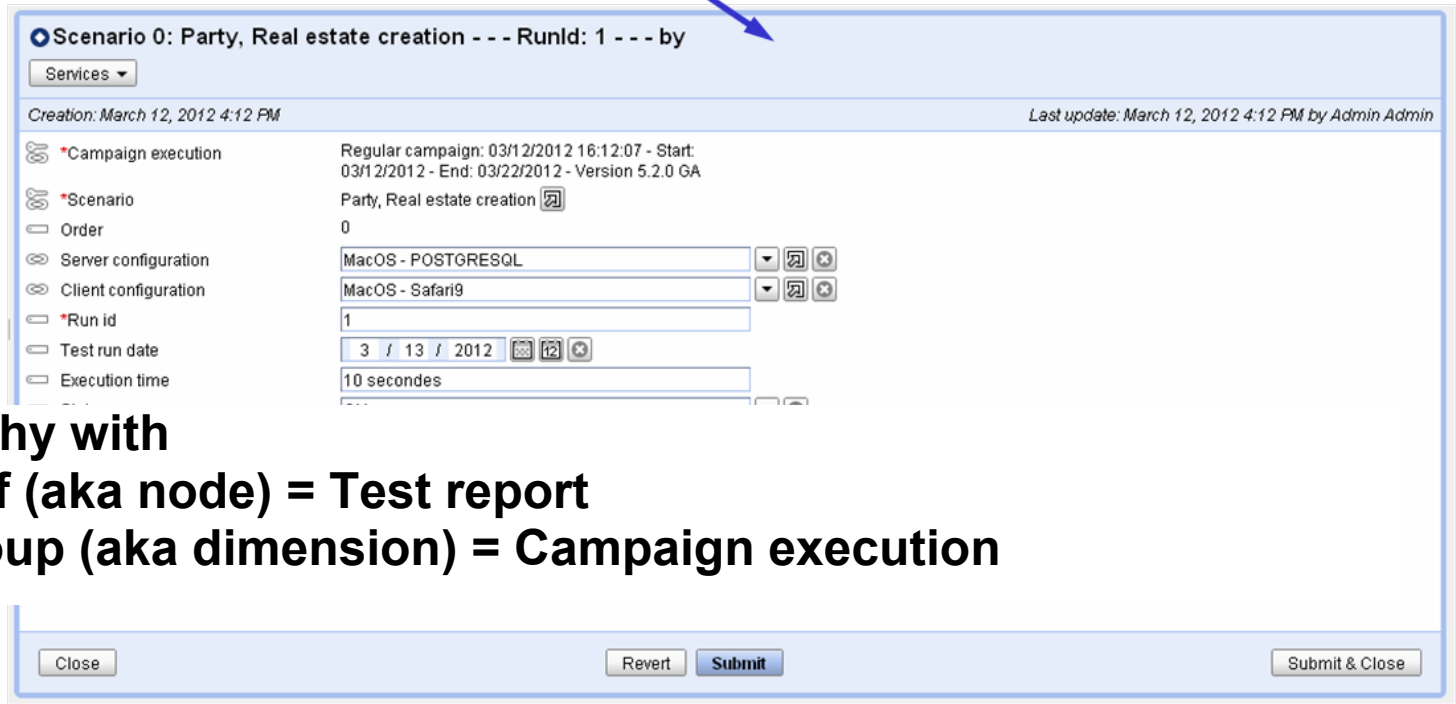
- **Data hierarchy with**
  - **leaf (aka node) = Scenario**
  - **group (aka dimension) = Campaign execution**
- **This screen shows the two scenarios that have been attached to the campaign execution automatically**

Test report and Detailed test result have been populated automatically when creating the new campaign execution



Automatic feeding of Test report and data authoring





- **Data hierarchy with**
  - **leaf (aka node) = Test report**
  - **group (aka dimension) = Campaign execution**

Automatic feeding of Detailed test report and data authoring (1/2)

APIS

TestDrivingV3

Actions

- Test Driving
  - Test Configuration
  - Test Execution
    - Campaign execution
    - Detailed test result
    - Bug
    - Test report
    - Identical bug over the differe

Test report with detailed test result by campaign execution

Actions | View | 0 selected

- [All elements]
  - Regular campaign - Version 5.2.0 GA - 03/12/2012 - 03/22/2012
    - Party, Real estate creation - 0 - MacOS - POSTGRESQL - MacOS - Safari9 - 1 - 03/13/2012 - 10 - OK - Pierre Bonnet
      - Create permission for user - -
      - Login by user - -
      - Create a party - -
      - Create a real estate - -
      - Attach a party has a owner to real estate - -
    - Party and Real estate modification - 1 - MacOS - POSTGRESQL - Windows XP - Safari9 - 1 - 03/12/2012 - 5 - OK - Pierre Bonnet
      - Read party - -
      - Read real estate of the party - -
      - Select a real estate of the party - -
      - Modify role of the party for the real estate - -
  - [Campaign execution unset]

Create permission for user - -

Creation: March 12, 2012 4:12 PM — *Last update: March 12, 2012 4:12 PM by Admin Admin*

Test report	Regular campaign: 03/12/2012 16:12:07 - Start: 03/12/
Step	Create permission for user
status	OK
Comment	No more issue for this step either in direct or indirect use by the system

Submit & Close

- **Data hierarchy with**
  - **leaf (aka node) = Detailed test result**
  - **group (aka dimension) = Campaign execution**

Automatic feeding of Detailed test report and data authoring (2/2)

- **Detailed test results values after data authoring**

New execution of an existing test report - 'runId' management (1/2)

APIS

TestDrivingV3

Actions

- Test Driving
  - Test Configuration
  - Test Execution
    - Campaign execution
    - Detailed test result
    - Bug
    - Test report
    - Identical bug over the different configura

Test report by campaign execution

Actions | Services | View | 0 selected

- [All elements]
  - Regular campaign - Version 5.2.0 GA - Start: 03/12/2012 - End: 03/22/2012
    - Scenario 0: Party, Real estate creation - MacOS - POSTGRESQL - MacOS - Safari9- RunId: 1 - 10 - OK - by Pierre Bonnet
    - Scenario 1: Party and Real estate modification - MacOS - POSTGRESQL - Windows XP - Safari9- RunId: 1 - 5 - OK - by Pierre Bonnet
  - [Campaign execution unset]

create new runId

APIS

TestDrivingV3

Actions

- Test Driving
  - Test Configuration
  - Test Execution
    - Campaign execution
    - Detailed test result
    - Bug
    - Test report
    - Identical bug over the different configuration

Test report by campaign execution

Actions | Services | View | 0 selected

- [All elements]
  - Regular campaign - Version 5.2.0 GA - Start: 03/12/2012 - End: 03/22/2012
    - Scenario 0: Party, Real estate creation - MacOS - POSTGRESQL - MacOS - Safari9- RunId: 1 - 10 - OK - by Pierre Bonnet
    - Scenario 0: Party, Real estate creation - - - RunId: 2 - - - by
    - Scenario 1: Party and Real estate modification - MacOS - POSTGRESQL - Windows XP - Safari9- RunId: 1 - 5 - OK - by Pierre Bonnet
  - [Campaign execution unset]

after modification

APIS

TestDrivingV3

Actions

- Test Driving
  - Test Configuration
  - Test Execution
    - Campaign execution
    - Detailed test result
    - Bug
    - Test report
    - Identical bug over the different configuration

Test report by campaign execution

Actions | Services | View | 0 selected

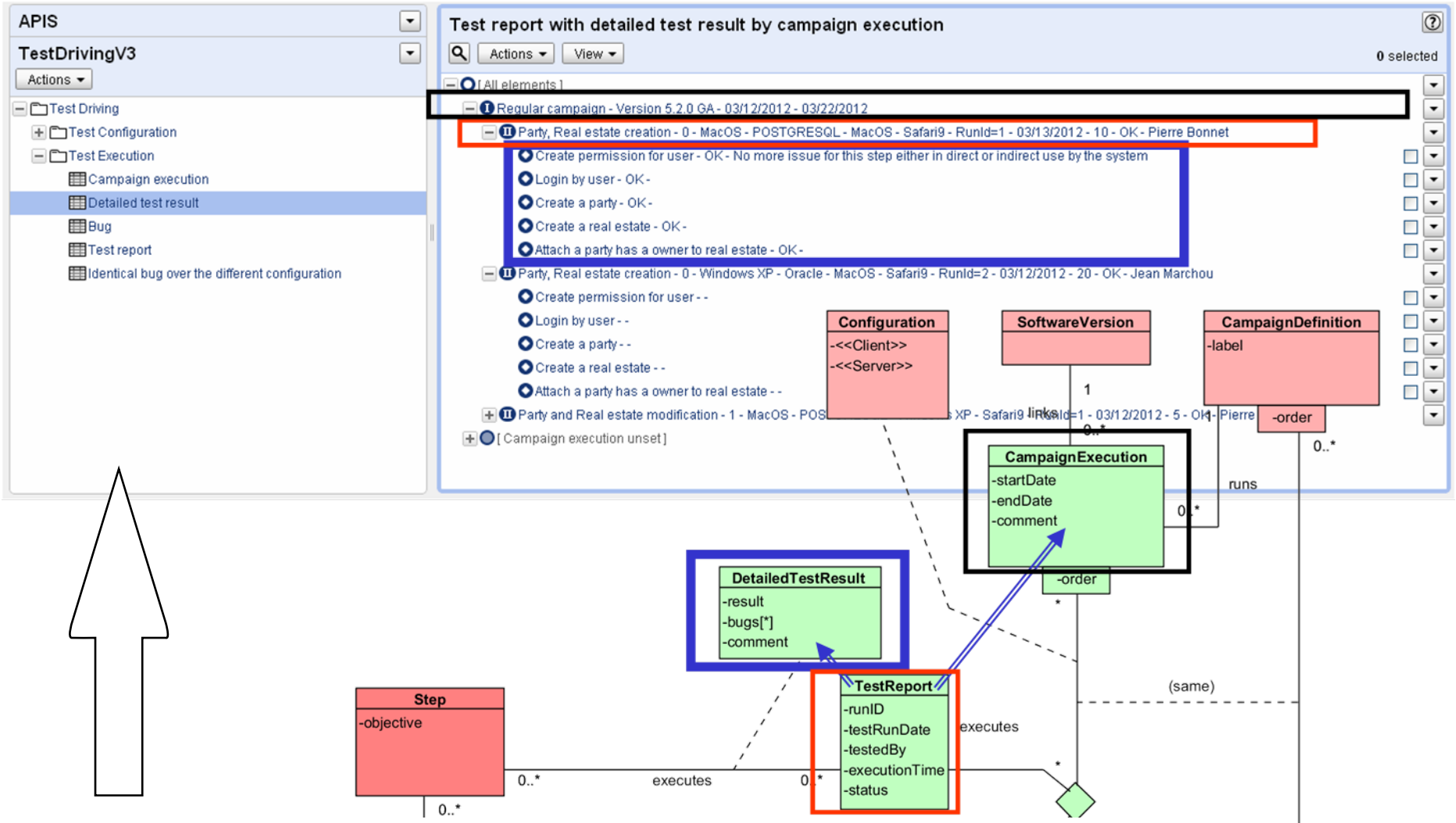
- [All elements]
  - Regular campaign - Version 5.2.0 GA - Start: 03/12/2012 - End: 03/22/2012
    - Scenario 0: Party, Real estate creation - MacOS - POSTGRESQL - MacOS - Safari9- RunId: 1 - 10 - OK - by Pierre Bonnet
    - Scenario 0: Party, Real estate creation - Windows XP - Oracle - MacOS - Safari9- RunId: 2 - 20 - OK - by Jean Marchou
    - Scenario 1: Party and Real estate modification - MacOS - POSTGRESQL - Windows XP - Safari9- RunId: 1 - 5 - OK - by Pierre Bonnet
  - [Campaign execution unset]

TestReport
-runID
-testRunDate
-testedBy
-executionTime
-status

New execution of an existing test report - 'runId' management (2/2)

- **The service 'Create new runid' allows the user to create a new scenario execution within a same campaign execution**
  - **(Scenario 0, runId=0) and (Scenario 0, runId=1) for the same Campaign execution named 'Regular campaign'**

Campaign execution with test reports and detailed test results



- **Data hierarchy with**
  - **leaf (aka node) = Detailed test result**
  - **sub group 1 (aka dimension 1) = Campaign execution**
  - **sub group 2 (aka dimension 2) = Test report**

Creation of new campaign execution from the same definition (1/2)

APIS

TestDrivingV3

Actions

- Test Driving
  - Test Configuration
    - Reference Data
    - Campaign definition
    - Scenarios included in campaign definiti
    - Scenario
    - Step
    - Steps used in scenario
  - Test Execution

Campaign definition

Actions | Services | View

1 selected | 1 -> 4 of 4

On selection

Create new campaign execution from the underlying campaign definition

Campaign definitio	
Enviroment test	
Usual test	
Regresstion test	
Regular campaign	

APIS

TestDrivingV3

Actions

- Test Driving
  - Test Configuration
  - Test Execution
    - Campaign execution
    - Detailed test result
    - Bug
    - Test report
    - Identical bug over the different configura

Campaign execution

Actions | View

0 selected | 1 -> 2 of 2

Campaign definition	Software version	Start date	End date	createdTime
Regular campaign	Version 5.2.0 GA	03/12/2012	03/22/2012	03/12/2012 16:12:07
Regular campaign	Version 5.1.3	03/12/2012	04/12/2012	03/12/2012 17:45:47

Creation of new campaign execution from the same definition (2/2)

APIS

TestDrivingV3

Actions

- Test Driving
  - Test Configuration
  - Test Execution
    - Campaign execution
    - Detailed test result
    - Bug
    - Test report
    - Identical bug over the different configura

Executions by campaign

Actions | View | 0 selected

- [All elements]
  - Campaign: Enviroment test
  - Campaign: Enviroment test
  - Campaign: Regresstion test
  - Campaign: Regular campaign
    - Regular campaign 03/12/2012 16:12:07 - Version 5.2.0 GA - Start: 03/12/2012 - End: 03/22/2012
    - Regular campaign 03/12/2012 17:45:47 - Version 5.1.3 - Start: 03/12/2012 - End: 04/12/2012
  - Campaign: Usual test
  - [Campaign definition unset]

APIS

TestDrivingV3

Actions

- Test Driving
  - Test Configuration
  - Test Execution
    - Campaign execution
    - Detailed test result
    - Bug
    - Test report
    - Identical bug over the different configuration

Test report by campaign execution

Actions | Services | View | 0 selected

- [All elements]
  - Regular campaign - Version 5.1.3 - Start: 03/12/2012 - End: 04/12/2012
    - Scenario 0: Party, Real estate creation - - - RunId: 1 - - - by
    - Scenario 1: Party and Real estate modification - - - RunId: 1 - - - by
  - Regular campaign - Version 5.2.0 GA - Start: 03/12/2012 - End: 03/22/2012
    - Scenario 0: Party, Real estate creation - MacOS - POSTGRESQL - MacOS - Safari9- RunId: 1 - 10 - OK - by Pierre Bonnet
    - Scenario 0: Party, Real estate creation - Windows XP - Oracle - MacOS - Safari9- RunId: 2 - 20 - OK - by Jean Marchou
    - Scenario 1: Party and Real estate modification - MacOS - POSTGRESQL - Windows XP - Safari9- RunId: 1 - 5 - OK - by Pierre Bonnet
  - [Campaign execution unset]

New business rules

Enrichment of the initial data modeling

When a campaign definition is updated

We want no impact on existing campaign execution

- Issue #1: what happens if a scenario is deleted?
  - current situation: all records in Test report with a FK to this scenario will be in failure
  - target=> two ways for deleting a scenario are offered to the user
  - deleting a scenario must be encapsulated by a java service checking that there is no campaign execution for this scenario. Reading Test report table. If at least one campaign execution exist for this scenario then the deletion is not permitted
  - a new service ‘Inactivate scenario’ allows the user to remove logically a scenario so that when a new campaign execution is created this scenario is no longer used. A service ‘Activate scenario’ allows for rendering normal the scenario. A new boolean field ‘active’ in the Scenario table is added to tackle this need

When a campaign definition is updated

We want no impact on existing campaign execution

- Issue #2: what happens if a step is deleted?
  - current situation: all records in Detailed test result with a FK to this step will be in failure
  - target=> two ways for deleting a step are offered to the user
  - a step can be deleted within a scenario only if this scenario is not used in a campaign execution. This checking is the same as one described for the scenario deletion. A java service must be developped to meet this need
  - a new service ‘Inactivate step’ allows a same user procedure than for the scenario but applied to a step. A new boolean field ‘active’ in the Step table is added

When a campaign definition is updated

We want no impact on existing campaign execution

- Issue #3: what happens if a scenario or a step is added?
  - Test report and Detailed test result are not impacted => no impact on existing campaign execution
- Issue #4: what happens if a step or a scenario is updated
  - Test report and Detailed test result are not impacted but existing campaign execution will automatically inherit from these modification

Creating a new Campaign definition based on an existing one

- Issue #5: what happens when creating a new campaign B from an existing one A
  - Creation of a new record in Campaign definition for B
  - CampaignDefinitionIncludesOrderScenario of A are used to create a new set of records in campaignDefinitionIncludesOrderScenario for B - And all scenarios and their steps attached to A are recreated as new ones and attached to the campaign B

What can a user do on a Campaign Execution

- Issue #6: adding or removing a record in Test report table
  - no because it will be considered as a modification of the campaign definition

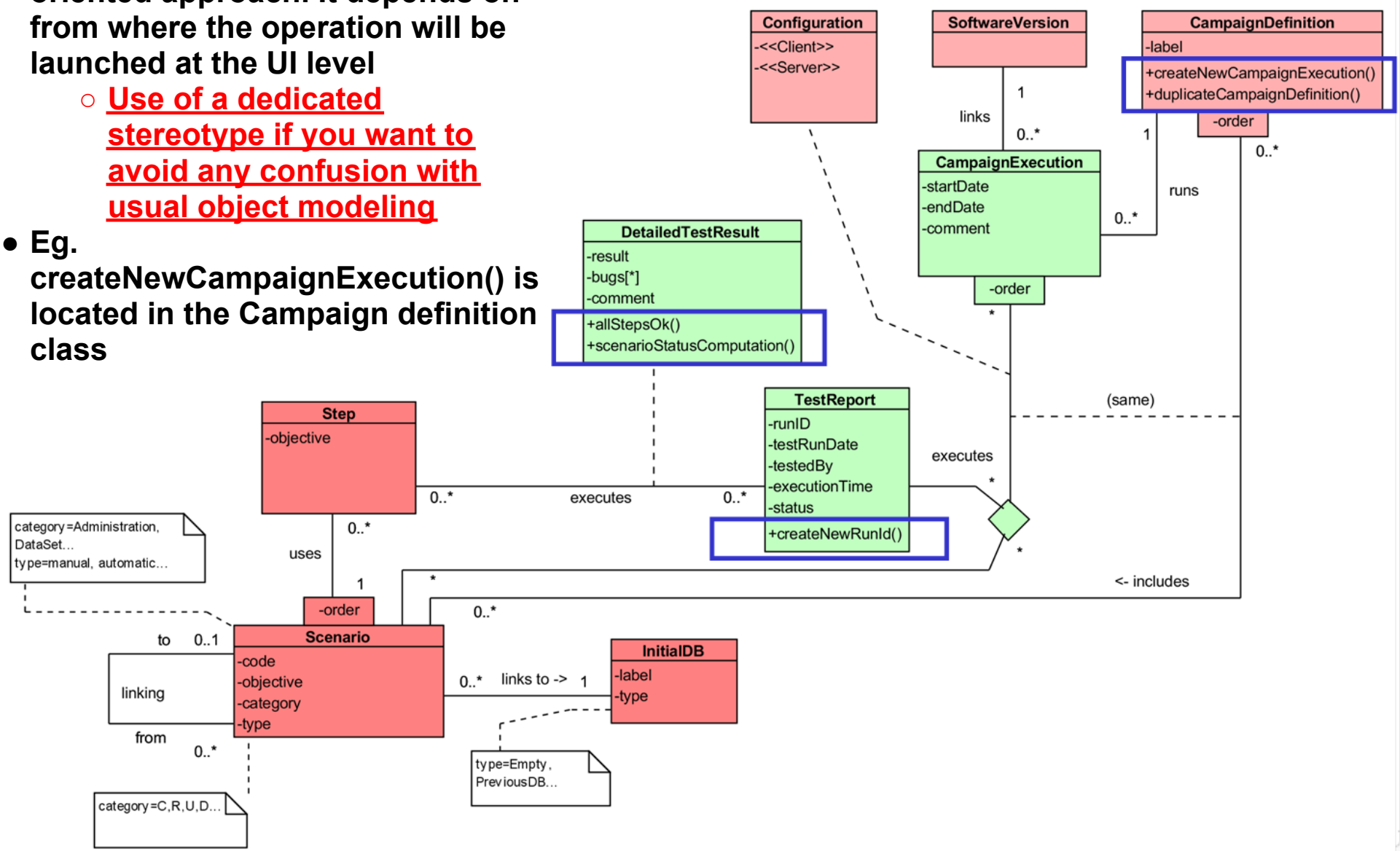
- Issue #7: adding or removing a record in Detailed test result table
  - adding => yes the user add a step or reuse an existing one but he must manually create the record in Detailed test result
  - removing => no. the user can already set as n/a the status

Service name	Functional description
Create new campaign execution from the underlying campaign definition	o/ Campaign Definition table: -> on single record o TODO: ➢ create a new Campaign Execution over defined Campaign definition 1. Populate Scenarios to Test report table 2. Populate Steps to Detailed test result table
Create new runId	o/ Test report table: -> on single record o TODO: ➢ Create new Test report record with new RunId but remains information: -Campaign execution -Scenario -Order -Server configuration (if defined) -Client configuration (if defined) ➢ Create corresponding Detailed test results
All steps OK	o/ Detailed test result table: - on view [Test report with detailed test result by campaign execution] (i.e. *Detailed test result by II Test report by I Campaign execution)* - at Test report level oTODO: ➢ Set all steps status within a test case (Scenario)= OK ➢ Set Scenario status = OK
Scenario status calculation	o/ Detailed test result table: - on view [Test report with detailed test result by campaign execution] (i.e. *Detailed test result by II Test report by I Campaign execution)* - at Test report level oTODO: ➢ Calculate Scenario status based on containing steps status : All steps = OK -> Scenario = OK At least one step = KO -> Scenario = KO One step = N/A and all other step = OK -> Scenario = N/A
Duplicate Campaign definition	o/ Campaign definition table oTODO: ➢ Duplicate Campaign definition record within table ➢ Populate including Scenarios to join table CampaignDefinition-scenarios.

Catalog of services (business rules) the MDM system must enforce to ensure the integrity and quality of data

Services are located within the semantic data model as operations

- The table owner of an operation is not decided from a pure object oriented approach. It depends on from where the operation will be launched at the UI level
  - Use of a dedicated stereotype if you want to avoid any confusion with usual object modeling
- Eg. createNewCampaignExecution() is located in the Campaign definition class



Lesson learnt

Findings

Lesson learnt

- Semantic data modeling is a formal way of representing data business concepts and a first set of business rules
- A second level of business rules requires a formal specification of services that are located as operations within the semantic data modeling
- A derivation of the semantic data modeling into the logical data modeling allows to render executable the model by a MDM system and then prevent for useless hard-coding software development
- The MDM system must follow the data model to ensure the computation of all possible data hierarchy views and the modeler must configure the suitable ones for users depending on their needs and profiles

In this presentation we didn't tackle these topics

- Some data business concepts must be modeled through a business state life-cycle. Therefore the semantic data modeling is not only a static point of view on data but also a dynamic representation

- Eg. A Campaign execution might have such state values over time
  - Not started, started, suspended, cancelled, archived
  - And depending on these states some operations on the Campaign execution are permitted or not

- Organizational issues
  - Data approval workflow (activity diagram)
  - Permission management (master data)

To get further information

Please attend the fourth part of this MDM introduction training course

This fourth part is dedicated to the enforcement of an Enterprise Data Architecture

Stay tuned

pierre.bonnet@orchestranetworks.com
skype: pierre.orchestra

www.orchestranetworks.com