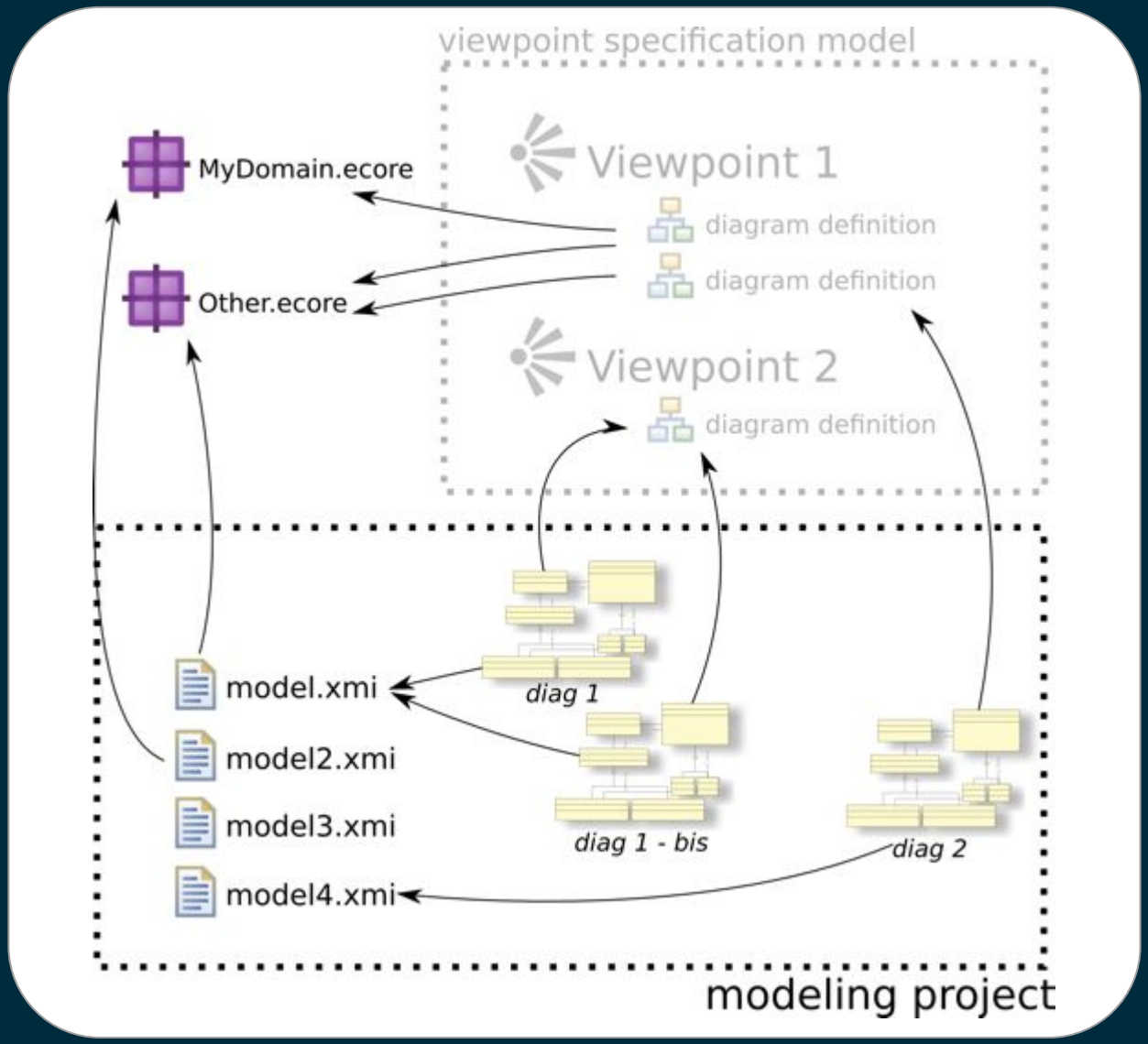
Robust and Scalable Modeling Workbenches

with Sirius

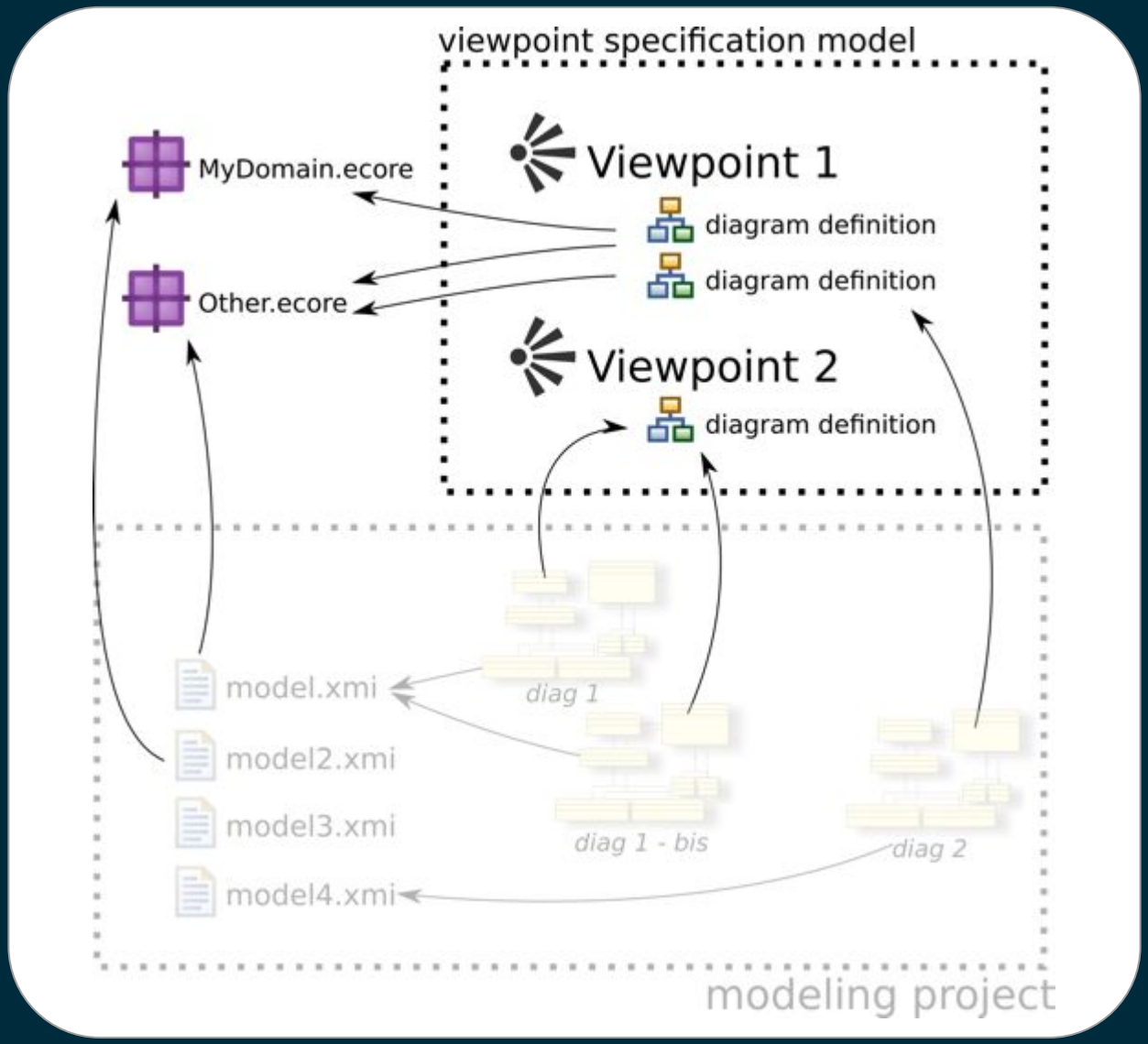
eclipsecon
Reston, March 9, 2016

Maxime Porhel
Obeo

A dedicated tooling



A dedicated tooling



A dedicated tooling

SIRIUS ROCKS

Visual

Diagrams, tables and trees

Declarative

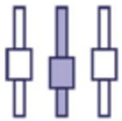
No code generation

Easy

Your modeling workbench in hours

A dedicated tooling

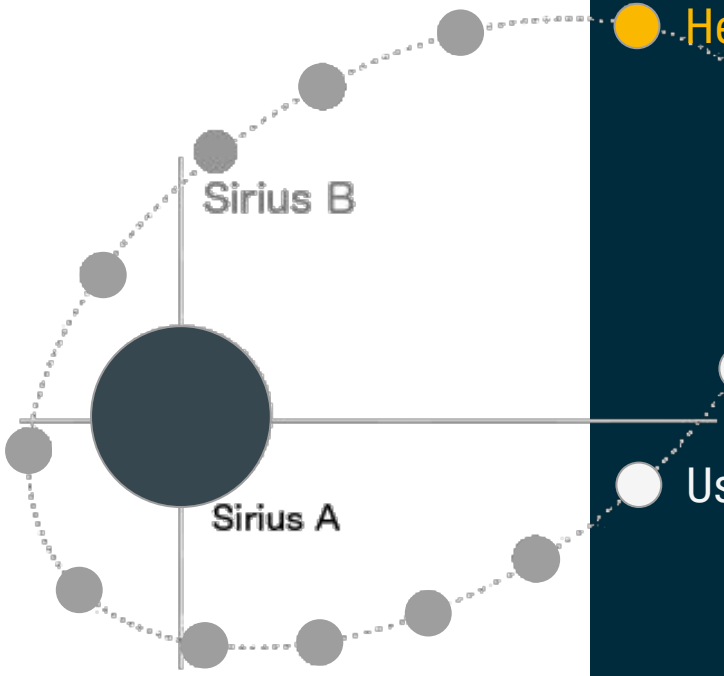
WHY SIRIUS?



Reduce the Tooling Learning Curve

Decrease the Cost of your Tools

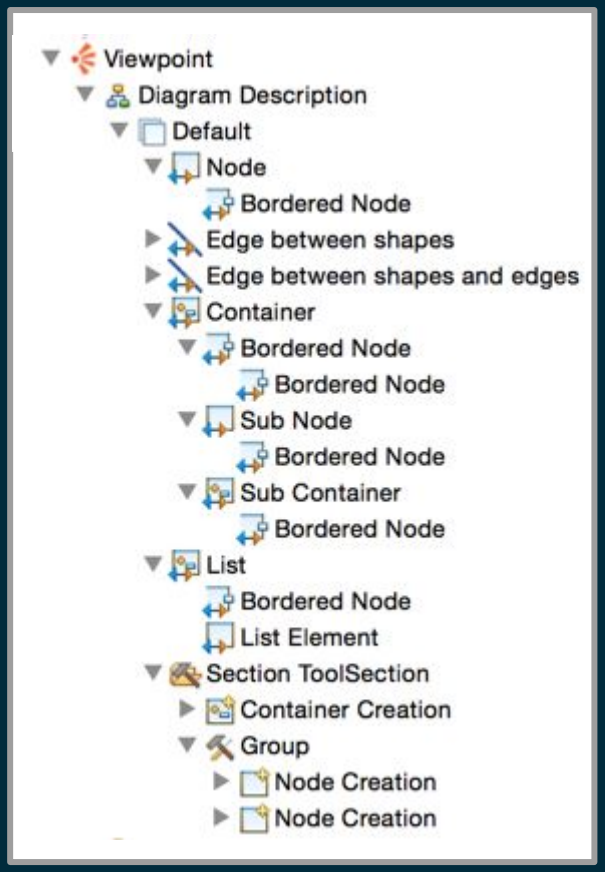
Outline

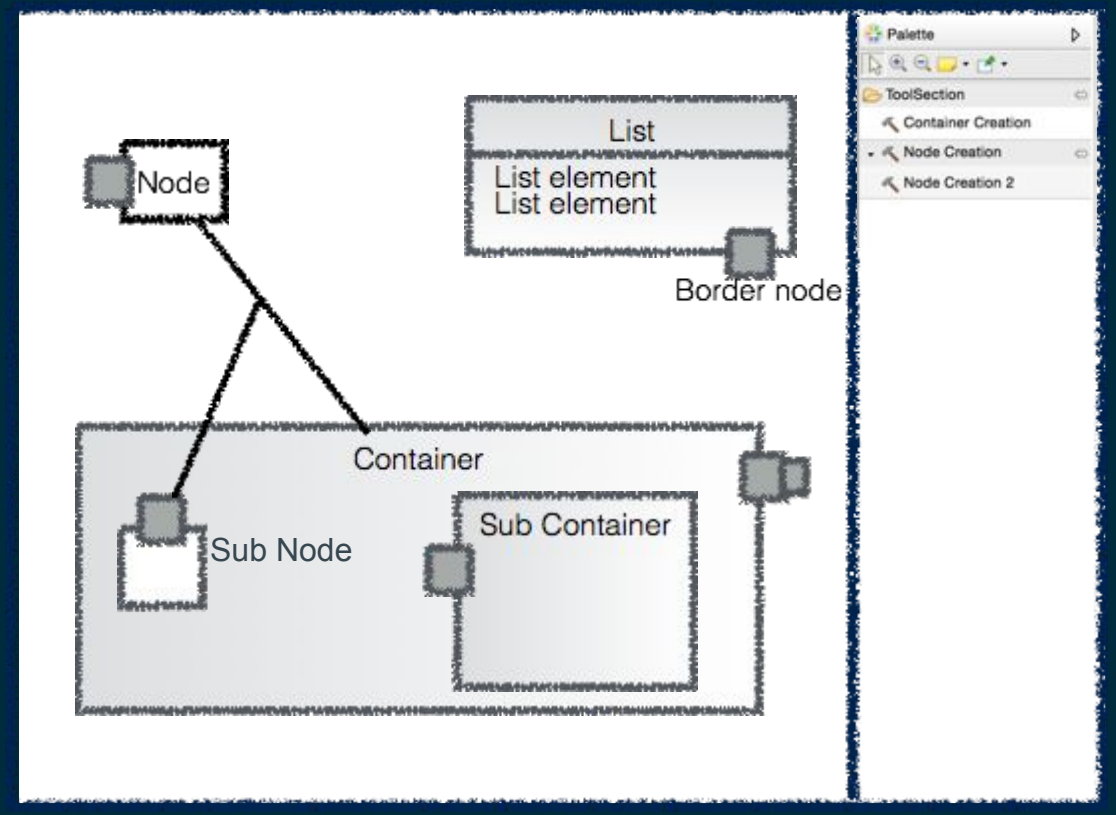


- Help Sirius find the elements to display
- Synchronization options and advanced tools
- Additional mappings and tools contribution
- Style and color customization
- Use the best query language for the task

Viewpoint specification model

Mappings and tool declaration



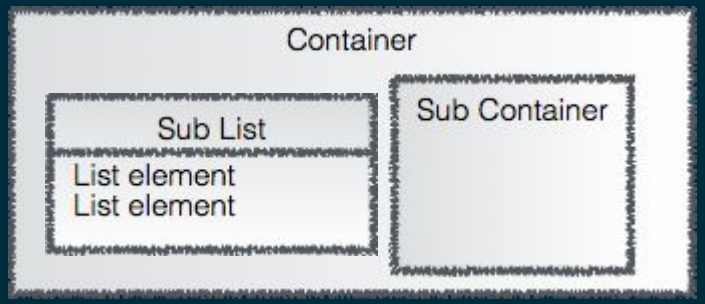


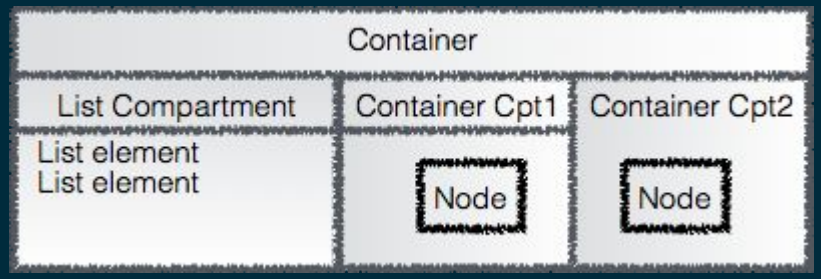
Viewpoint specification model

Several kind of containers

Supported children presentations:

- **Free form**
- **List**
  - node mappings to define list elements
- **Compartments**
  - container mappings to define compartments
  - fixed or dynamic
  - **vertical / horizontal stacks**





Viewpoint specification model

Naive approach

- Domain Class

- No Semantic Candidates Expression

- Precondition expression to filter

Note:

- **Green**: EClass qualified name
- **Yellow**: interpreted expression

Demo

Mapping Evaluation

Naive approach

- Empty semantic candidates expression
  -> Sirius looks for candidates into all loaded semantic/domain model
- **eAllContents()** on each domain resource content
- **Not efficient**
- **No control on the displayed elements**

Diagram elements computation

From the **element** to refresh (and its description/mapping):

- Get **available mappings** to refresh
  - activated Viewpoints, activated Layers
  - children mappings + reused mappings

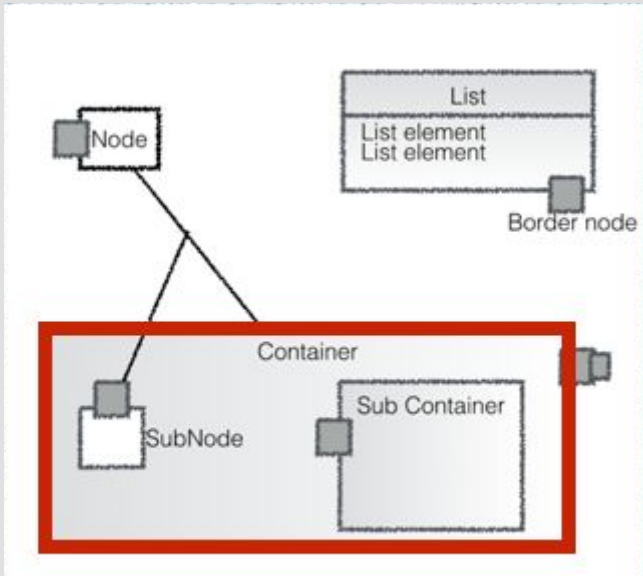


Diagram elements computation

From the **element** to refresh (and its description/mapping):

- For **each** mapping found
  - Evaluation of the **semantic candidates expression** from the current domain element
    (or eAllContents() on each domain resource if empty)
  - Filter with the specified **domain class**
  - On **each** candidate, evaluate the **precondition**
  - Create the diagram element, assign a style

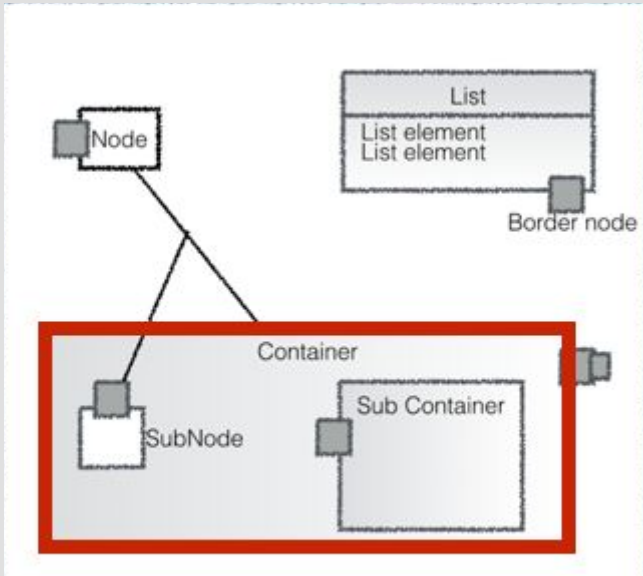


Diagram elements computation

Worst conditions

empty semantic candidates

+ big models

+ many (sub) mappings

+ many complex precondition expressions

⇒ **Poor performances**

Diagram elements computation

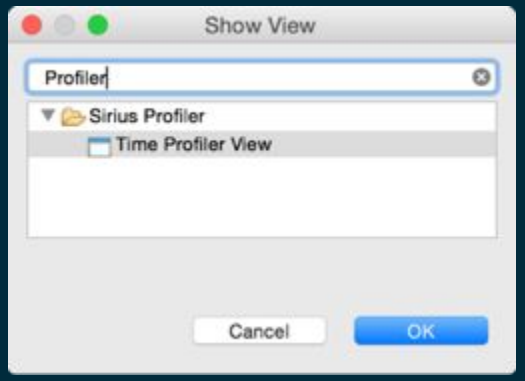
Your role

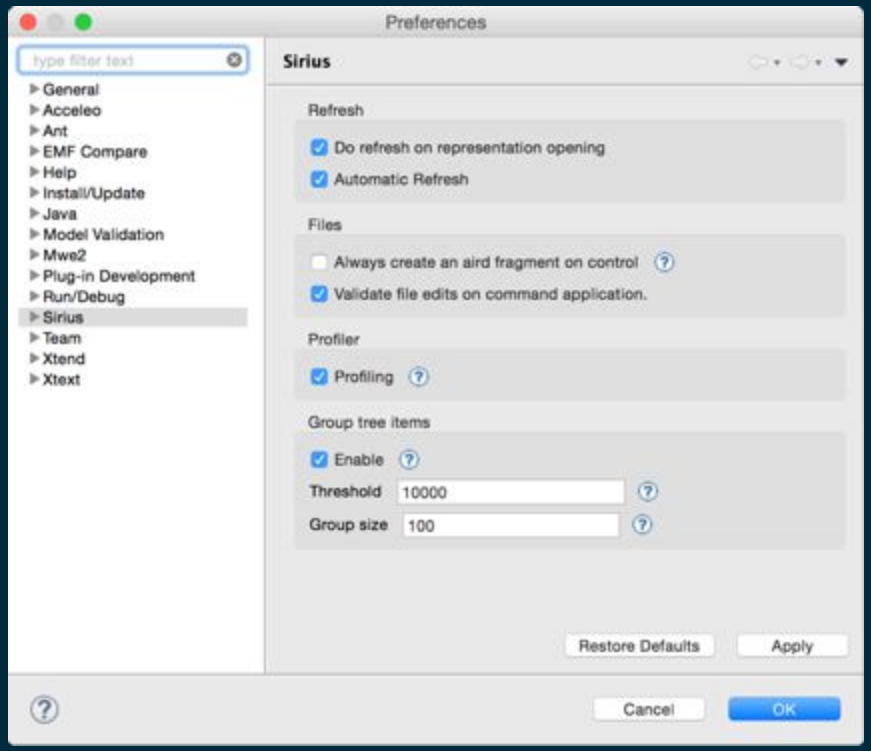
Try as much as possible to write efficient semantic candidates expression:

- Avoid **empty semantic candidates expression** and **eAllContents** when possible
- Follow the structural features defined in the meta model
- Use the **inverse cross references** to look for elements with a reference to another element.
  - **eInverse(Type)** in AQL and Acceleo3
  - access to the **ECrossReferenceAdapter** from a Java service
- Use the **specialized** interpreters when possible (**var:** / **service:** / **feature:**)
- Try to integrate your **precondition** in your **semantic candidate expression**

```
aql: mainExpression -> select( e | e.precondition)
```

Sirius Profiler

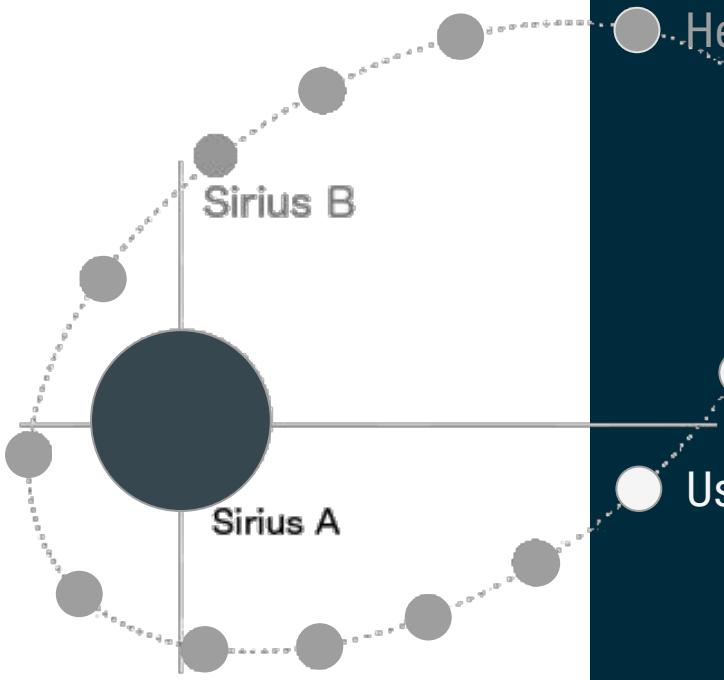




Time Profiler View — Reinit profiler | Refresh View | Print to console

Task Category	Task Name	Time (ms)	Time (hh:mm:ss,ms)	Occurences	Minimum
Acceleo	feature:eOperations	0	0:0:0,0	36	0
Acceleo	service:getVisibleAnnotations(diagram)	2	0:0:0,2	12	0
Other	Other	22	0:0:0,22	0	1
DDiagram	Get edge's candidates	18	0:0:0,18	24	1
DDiagram	Compute edge source/target views	5	0:0:0,5	48	0
DDiagram	Get edge's candidates	13	0:0:0,13	24	1
Acceleo	feature:eType	0	0:0:0,0	12	0
Acceleo	service:eContainerEContainer	0	0:0:0,0	12	0
Acceleo	feature:eContainer	0	0:0:0,0	12	0
Acceleo	feature:eSuperTypes	0	0:0:0,0	18	0
Acceleo	Check precondition expressions	1	0:0:0,1	24	0
DDiagram	Get node's candidates	6	0:0:0,6	12	0
Other	Other	6	0:0:0,6	0	1
DDiagram	Updating all edges	37	0:0:0,37	24	0
Other	Other	141	0:0:0,141	0	20

Outline



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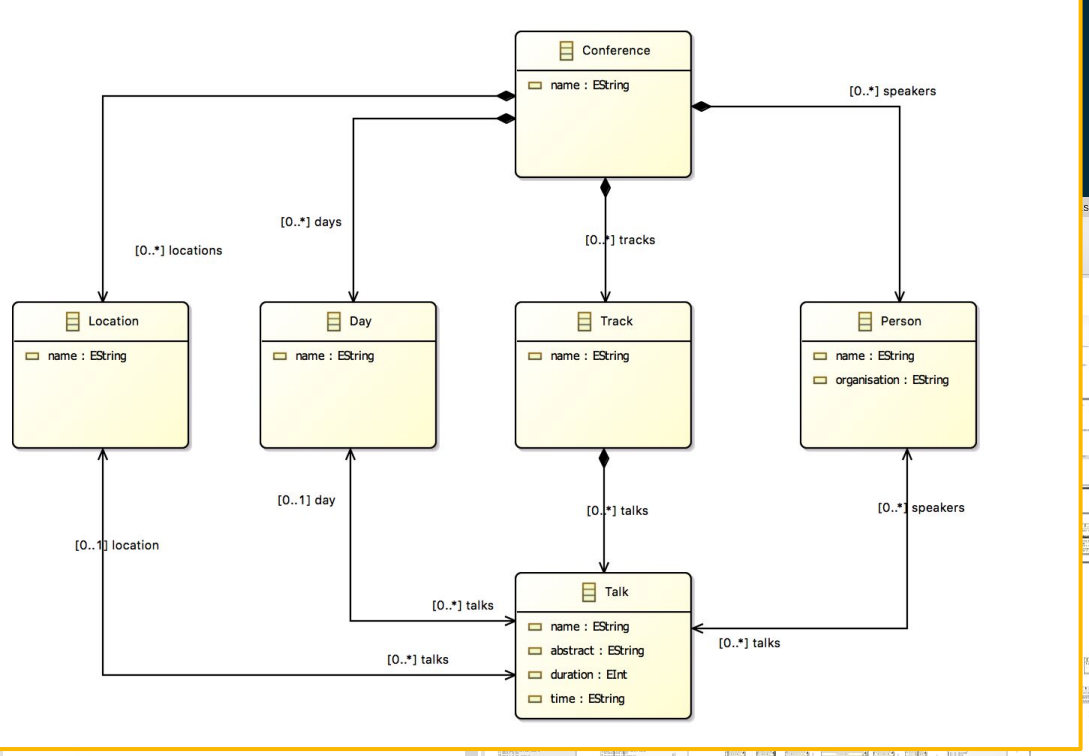
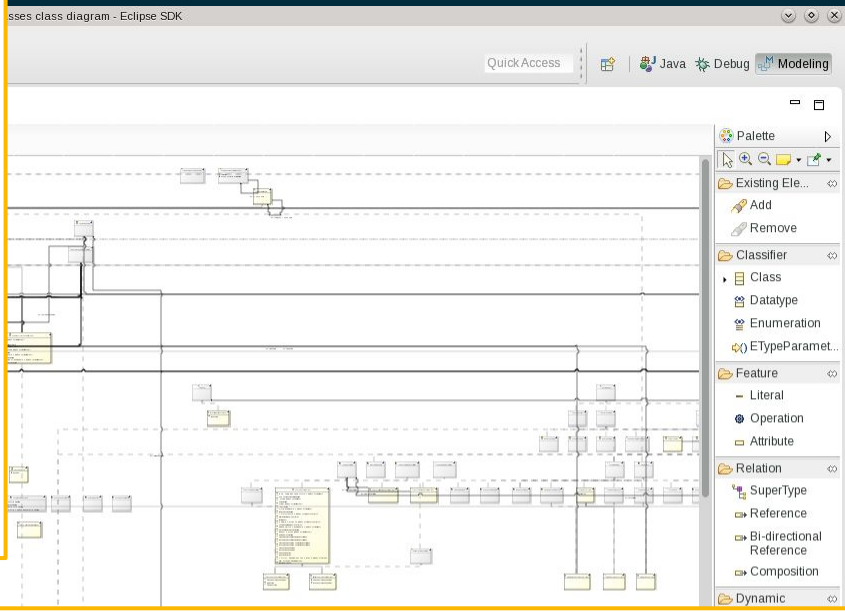
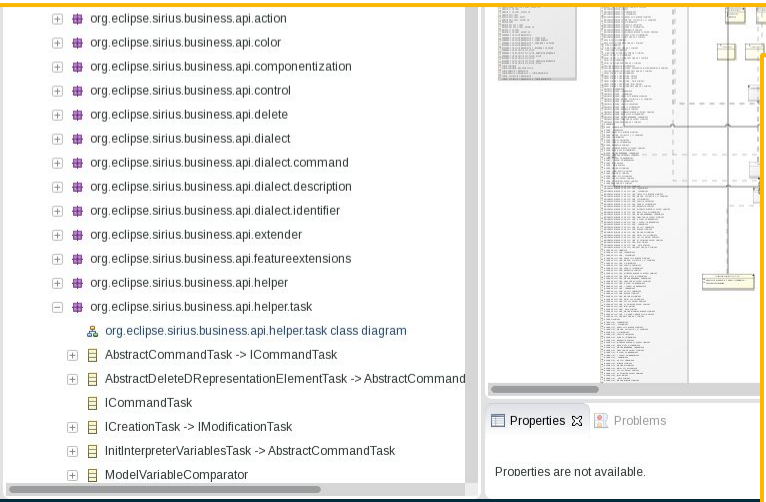
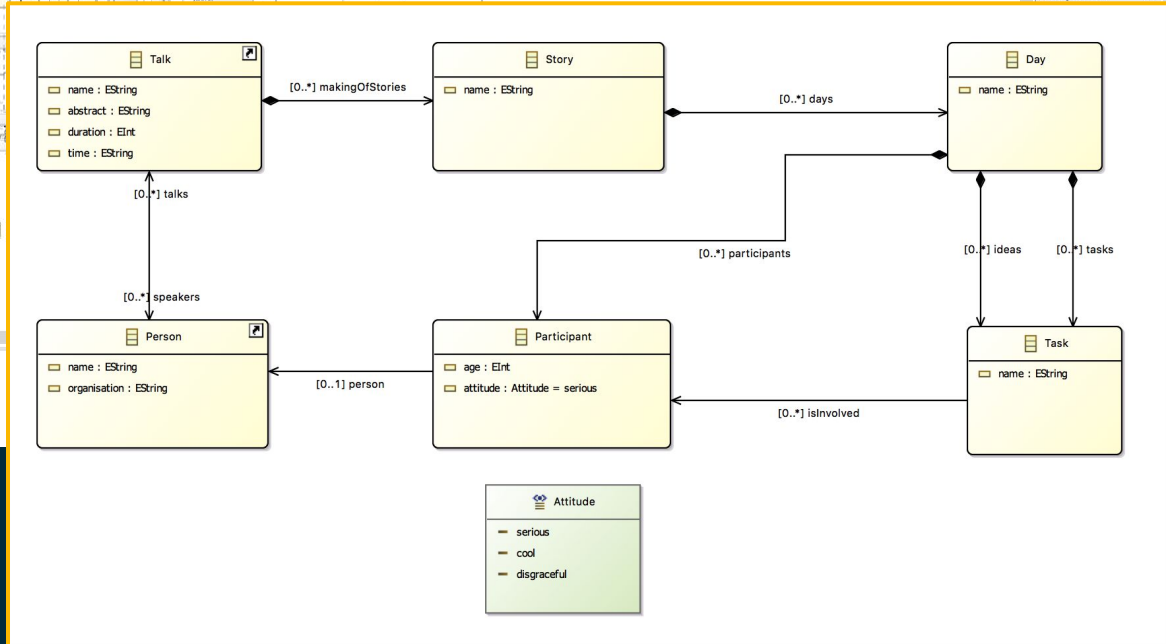
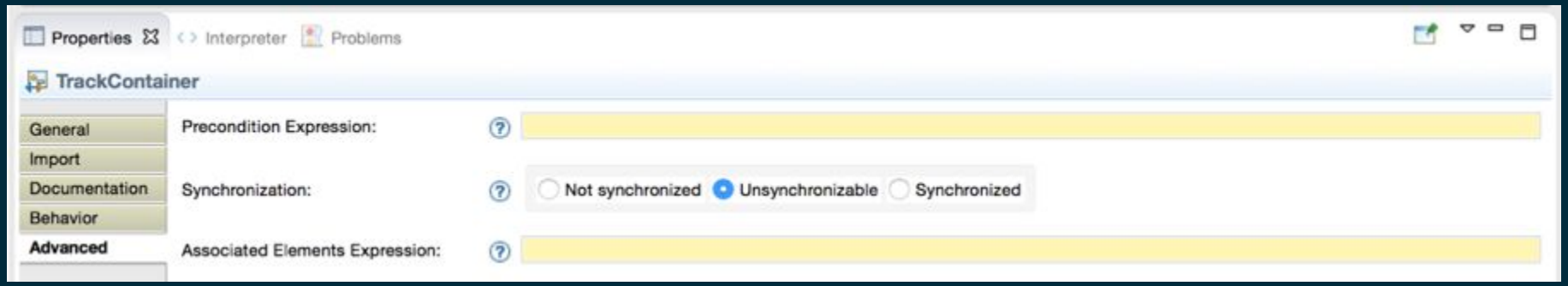

Conference
name : EString
[0..*] speakers
[0..*] days
[0..*] tracks
[0..*] locations
Location
name : EString
Day
name : EString
Track
name : EString
Person
name : EString
organisation : EString
[0..1] day
[0..*] talks
[0..*] speakers
[0..1] location
[0..*] talks
[0..*] talks
[0..*] talks
Talk
name : EString
abstract : EString
duration : EInt
time : EString

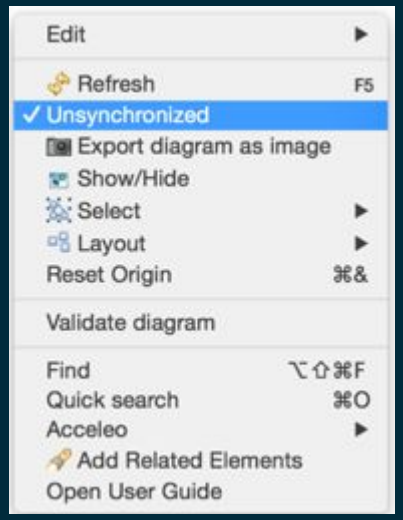

sses class diagram - Eclipse SDK
Quick Access
Java
Debug
Modeling
Palette
Existing Ele...
Add
Remove
Classifier
Class
Datatype
Enumeration
ETypeParamet...
Feature
Literal
Operation
Attribute
Relation
SuperType
Reference
Bi-directional Reference
Composition
Dynamic

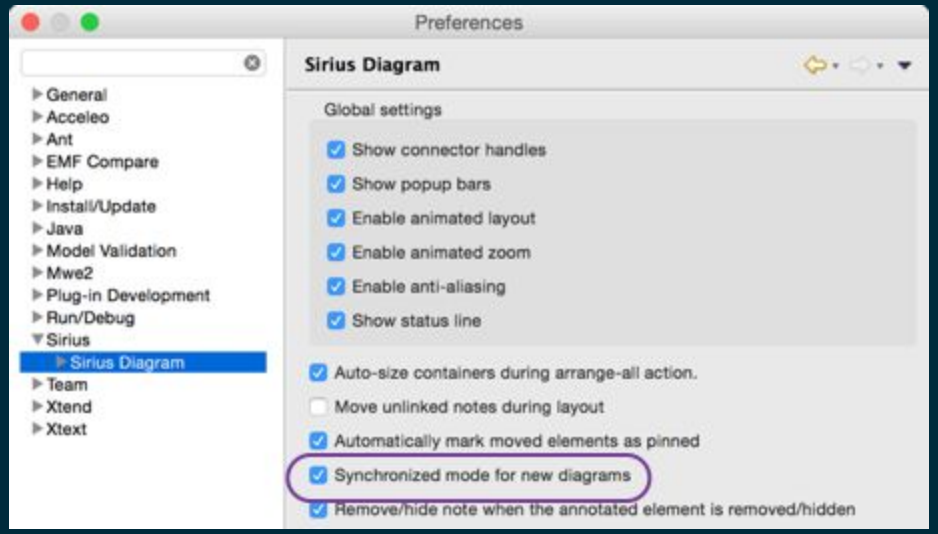

org.eclipse.sirius.business.api.action
org.eclipse.sirius.business.api.color
org.eclipse.sirius.business.api.componentization
org.eclipse.sirius.business.api.control
org.eclipse.sirius.business.api.delete
org.eclipse.sirius.business.api.dialect
org.eclipse.sirius.business.api.dialect.command
org.eclipse.sirius.business.api.dialect.description
org.eclipse.sirius.business.api.dialect.identifier
org.eclipse.sirius.business.api.extender
org.eclipse.sirius.business.api.featureextensions
org.eclipse.sirius.business.api.helper
org.eclipse.sirius.business.api.helper.task
org.eclipse.sirius.business.api.helper.task class diagram
AbstractCommandTask -> ICommandTask
AbstractDeleteDRepresentationElementTask -> AbstractCommand
ICommandTask
ICreationTask -> IModificationTask
InitInterpreterVariablesTask -> AbstractCommandTask
ModelVariableComparator
Properties
Problems
Properties are not available.


Talk
name : EString
abstract : EString
duration : EInt
time : EString
[0..*] makingOfStories
Story
name : EString
[0..*] days
Day
name : EString
[0..*] talks
[0..*] participants
[0..*] ideas
[0..*] tasks
[0..*] speakers
Person
name : EString
organisation : EString
[0..1] person
Participant
age : EInt
attitude : Attitude = serious
[0..*] isInvolved
Task
name : EString
Attitude
serious
cool
disgraceful

Mapping synchronization







Mapping synchronization

- **Synchronized** mapping: Sirius looks for mapping candidates
- **Unsynchronized** mapping: Sirius refreshes styles and sub elements.

- Allows to create **contextual diagrams**:
  - User controls the elements he wants to see on his diagram
  - Sirius does not create elements for non-synchronized mappings
  - Delete from diagram is enabled

Mapping synchronization

- Specifier must create some **‘insertion’** tools
  - Selection Wizards
  - Drop tools (from Model Explorer)
  - Double clics
  - Menus

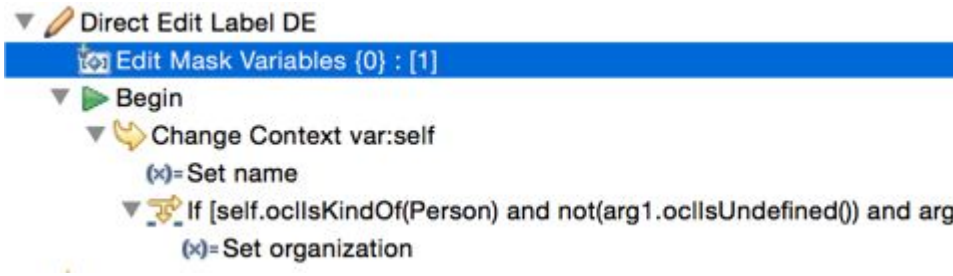
- Mappings of **edge**, **border nodes**, **list elements** often put as **synchronized**

Advanced tools:

Easy edit mask creation

- **{0} : {1}**
- split user text into **String** variables

Direct edit (F2)



Advanced tools:

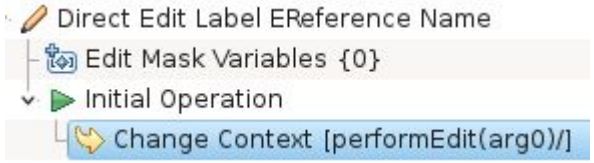
Java services can be used to do more.

Ecore Tools:

direct edit of **EStructuralFeatures** (nodes/edges)

- « Something » => change name of feature
- «:SomeType » => only change the eType
- «1» => only set cardinality to 1..x
- « * » => only set cardinality to x..*
- « /Something » => make the feature derived
- « = something » => set the default value literal
- [...]

Java service



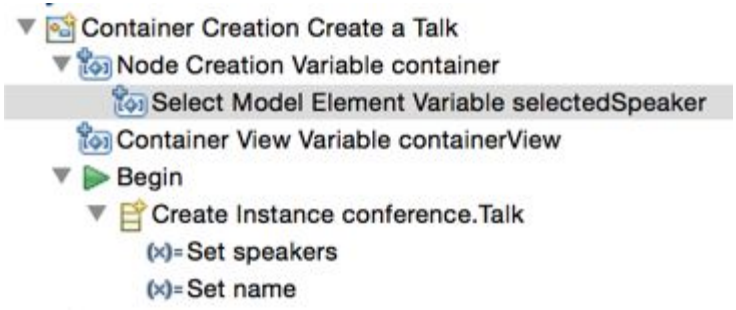

```
public EReference performEdit(EReference ref, String editString) {
    if ("0".equals(editString.trim())) {
        ref.setLowerBound(0);
    } else if ("1".equals(editString.trim())) {
        ref.setLowerBound(1);
    } else if (CARDINALITY_UNBOUNDED.equals(editString.trim())) {
        ref.setUpperBound(-1);
    } else if (CARDINALITY_UNBOUNDED_ALTERNATIVE.equals(editString.trim())) {
        ref.setUpperBound(-1);
    } else {
        editName(ref, editString);
        editCardinality(ref, editString);
    }
    return ref;
}
```

Advanced tools:

Displays a selection dialog
when the user execute a tool

List or tree
Single / Multiple result

Element select variable

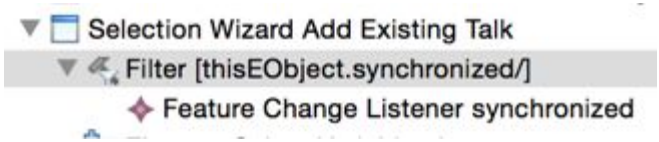


Advanced tools:

To control the visibility of a palette tool

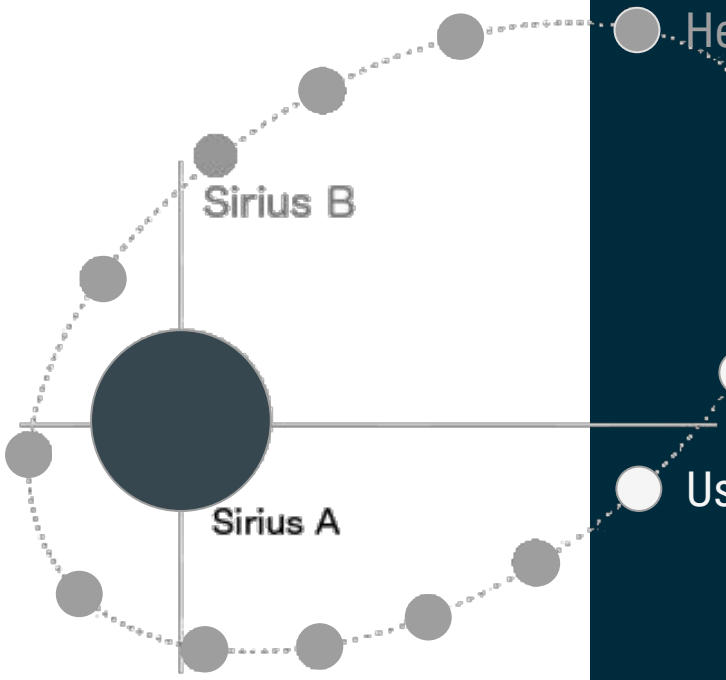
Reacts to model changes
(Sirius or semantic)

Filter listener



Demo

Outline



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Provide mappings and tools

Viewpoint Specification Project

- Ready to deploy Eclipse plugin

Provide mappings and tools

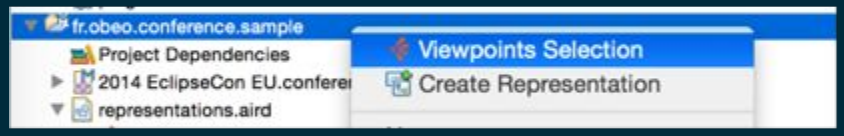
Viewpoint Specification Model

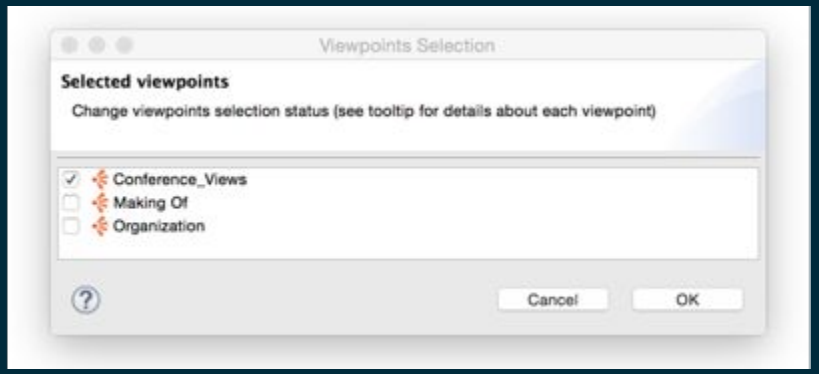
- 1..* per **Viewpoint Specification Project**
- EMF model, can have links to other **VSM**
- Possibility to extends/complete **VSM** defined in other plugins

Provide mappings and tools

Viewpoint

- Declares **Diagram** / **Table** / **Tree description**
- but also **Diagram Extension**
- Activation controlled by the user





Provide mappings and tools

Diagram Description

- 1 default **Layer**
- 0..* additional Layers

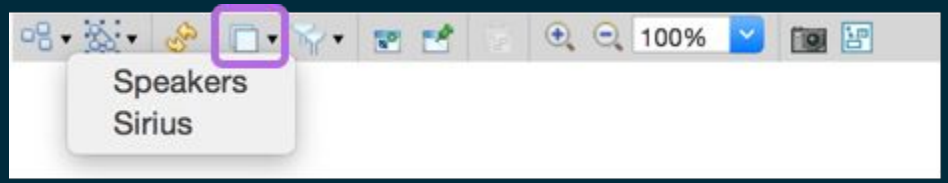
Diagram Extension Description

- references a **diagram description** (defined anywhere)
- provides additional Layers

Provide mappings and tools

Layer

- **optional**?
- **active per default**?
- contains top level mappings and tool section



- activation controlled by the user if optional

Provide mappings and tools

Node / Container / Edge mapping import

- to spezialize mappings
- provide new styles / children mappings

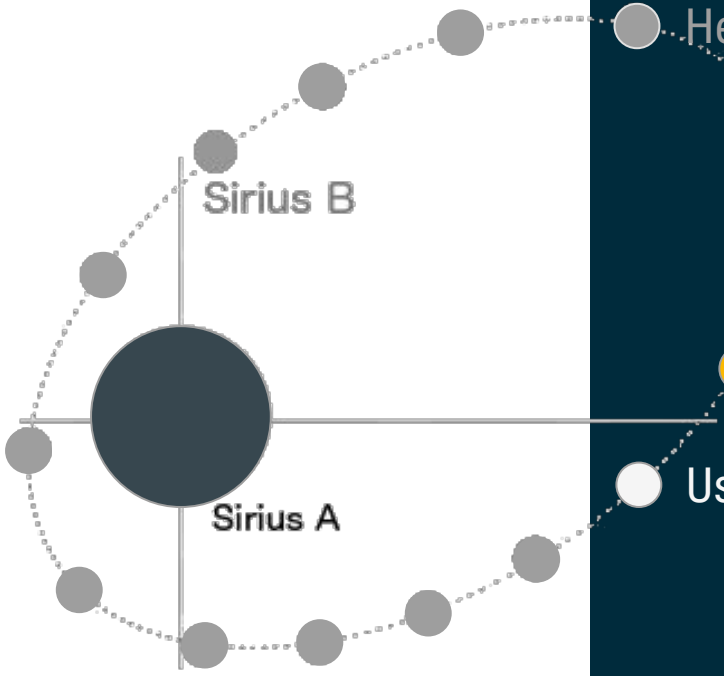
Provide mappings and tools

Tool Section

- contains other tool sections
- declares or reuses tools

Demo

Outline



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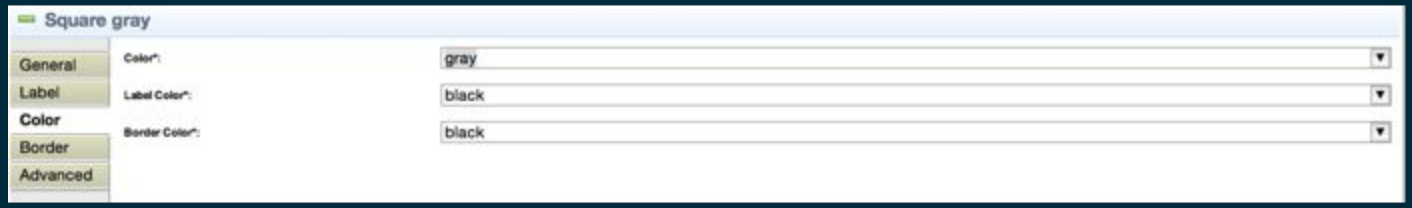
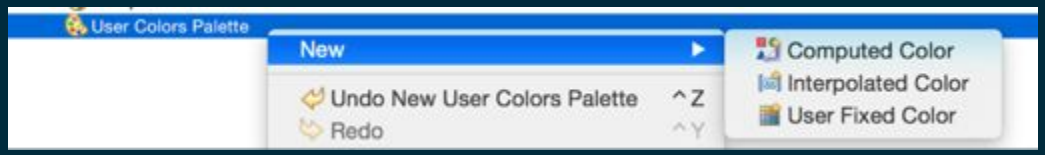
User colors

Predefined colors



User Color Palette



- **User fixed color**: RGB, System color chooser
- **Computed Color**: interpreted expression to compute R, G, B
- **Interpolated Color**
  - Define several color steps (value/color)
  - Expression to compute a value from the element to decorate

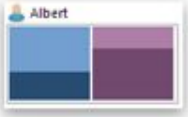
Conditional Styles

- Available for every kind of mapping
- **0..*** conditional style
- Each conditional style contains a **different style**

Conditional Styles

Node styles

				
Basic Shape Square	**Basic Shape Stroke**	**Basic Shape Triangle**	**Basic Shape Dot**	**Basic Shape Ring**

						
Square	**Lozenge**	**Ellipse**	**Note**	**Gauge**	**Image**	**Custom**

Conditional Styles

Container styles

Gradient	Image

Conditional Styles

Edge styles

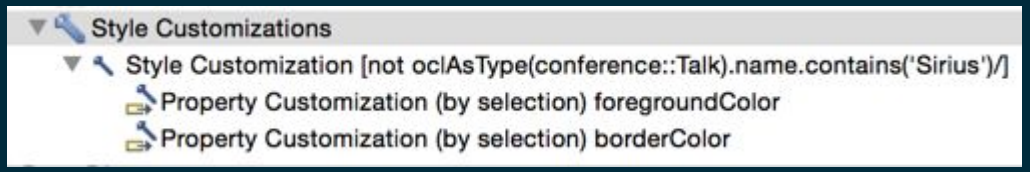
- Routing style (oblique, manhattan, tree)
- Line style
- Source / Target arrows
- Begin / Center / End labels

Conditional Styles

- Precondition must be **exclusive**
- Sirius takes the first whose precondition evaluation returns true.

- The **‘default’** style is taken if no conditional style can be applied

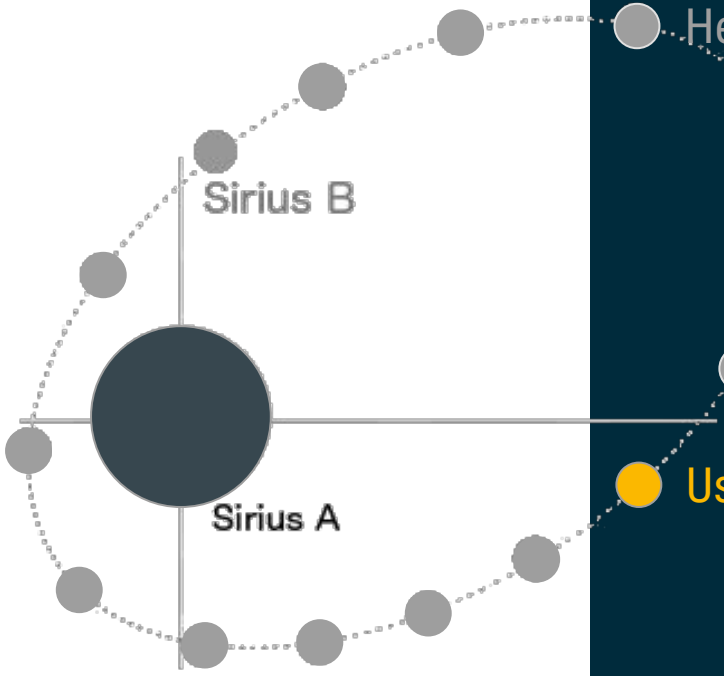
Style Customizations



- Defined in a Layer
- Style Customization has a precondition
- More **fine grained customization** (than the Conditional Styles)
- Property Customization
  - target one **EStructuralFeature** of the Sirius style descriptions
  - applied on all **styles** or selected ones

eclipse.org/sirius/gallery.html

Outline



- Help Sirius find the elements to display
- Synchronization options and advanced tools
- Additional mappings and tools contribution
- Style and color customization
- Use the best query language for the task

Provided interpreters

- **var:** direct access to Sirius variables
- **feature:** direct access to the named features of the current element
  (and EMF pseudo-features)
- **service:** direct call of a Java method
  (that follows some naming conventions, see documentation)
- **aql:** Acceleo Query Language
  (introduced with Sirius 3.0, **recommended** since 3.1)
- **[/]**: Acceleo3 expression

Notes:
. extensible through extension point
. tooltip: the expected type of result and the available variables
. completion on empty expression: available interpreters

Provided interpreters

AQL

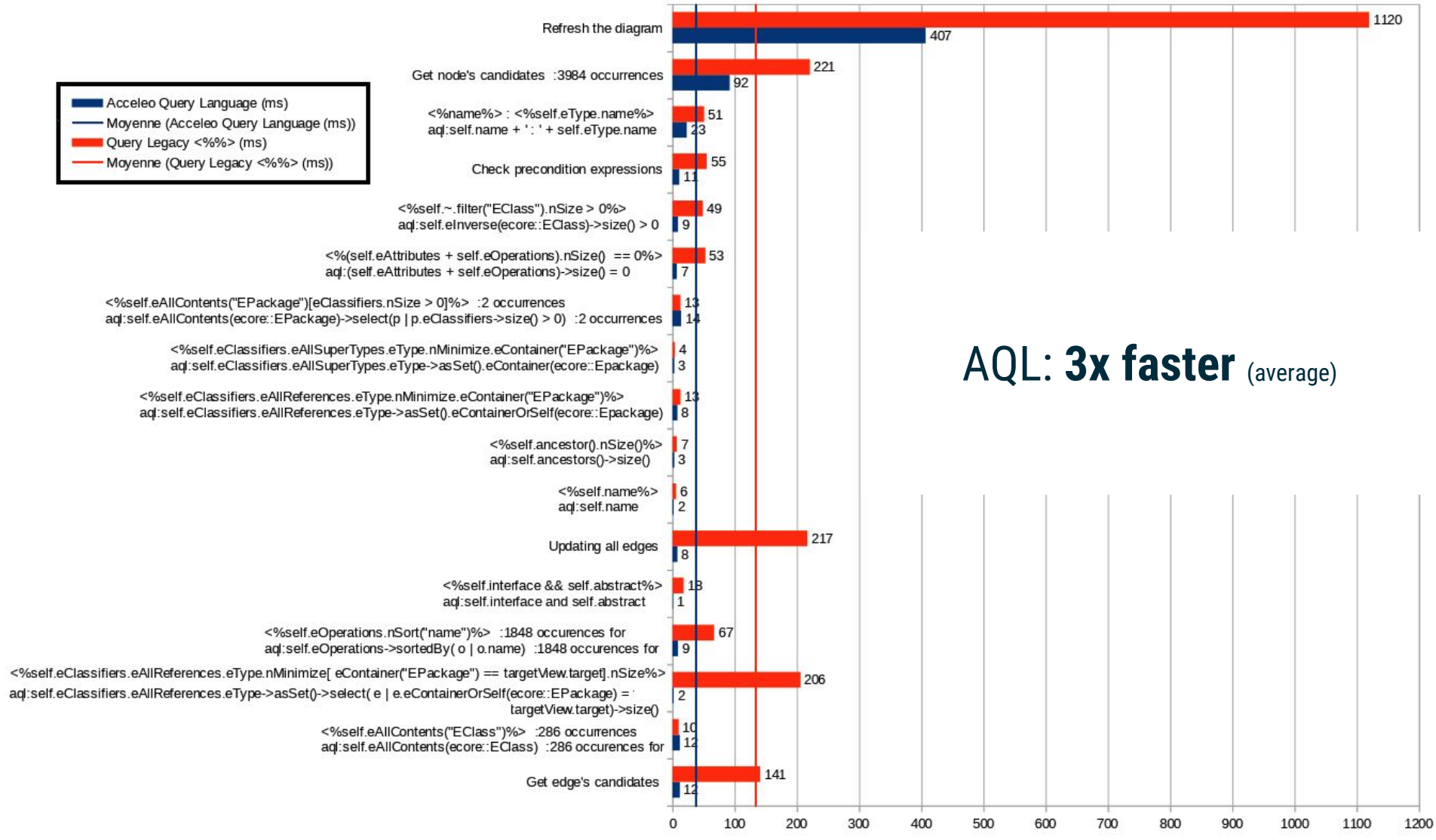
- **stronger type information** than Acceleo3 - allows stronger type analysis
- implementation specifically tailored for the **Sirius** use case
- complex or custom logic: **Java Services**
- **predicatable** ordering and performance overhad
- simple for querying EMF models
- evaluation: **fast** and collect errors
- validation: **strong** and precise

Recommended query language for Sirius 3.1.0

Provided interpreters

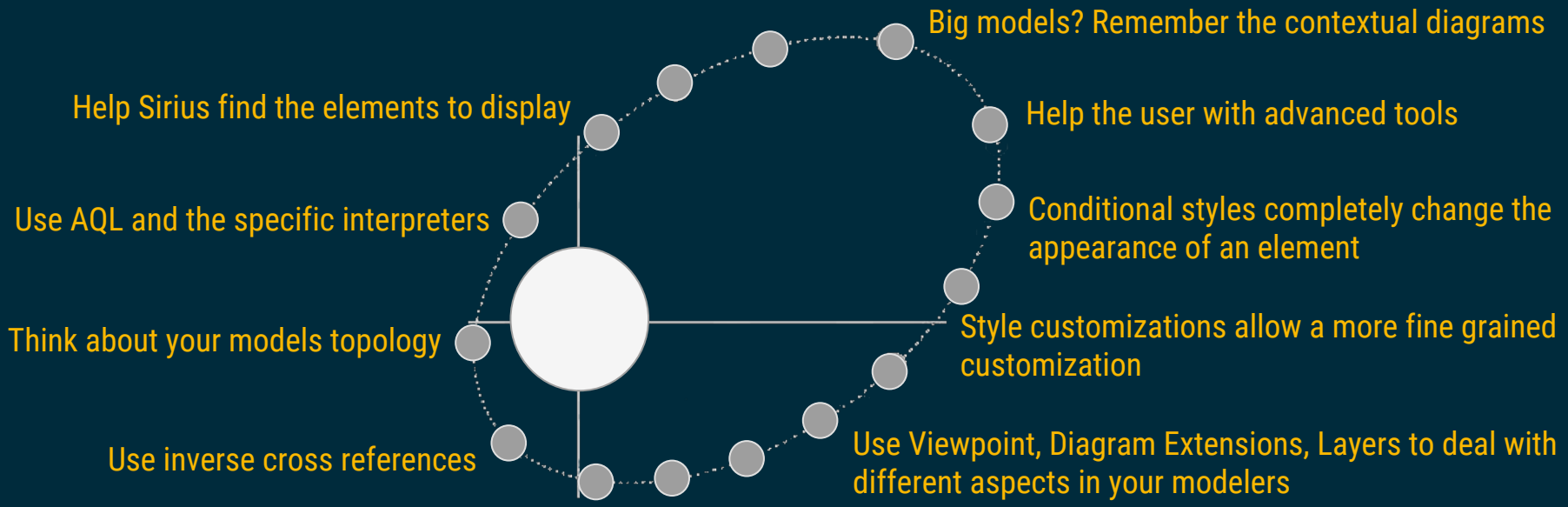
Provided interpreters

AQL vs Query Legacy



AQL: **3x faster** (average)

Takeaways



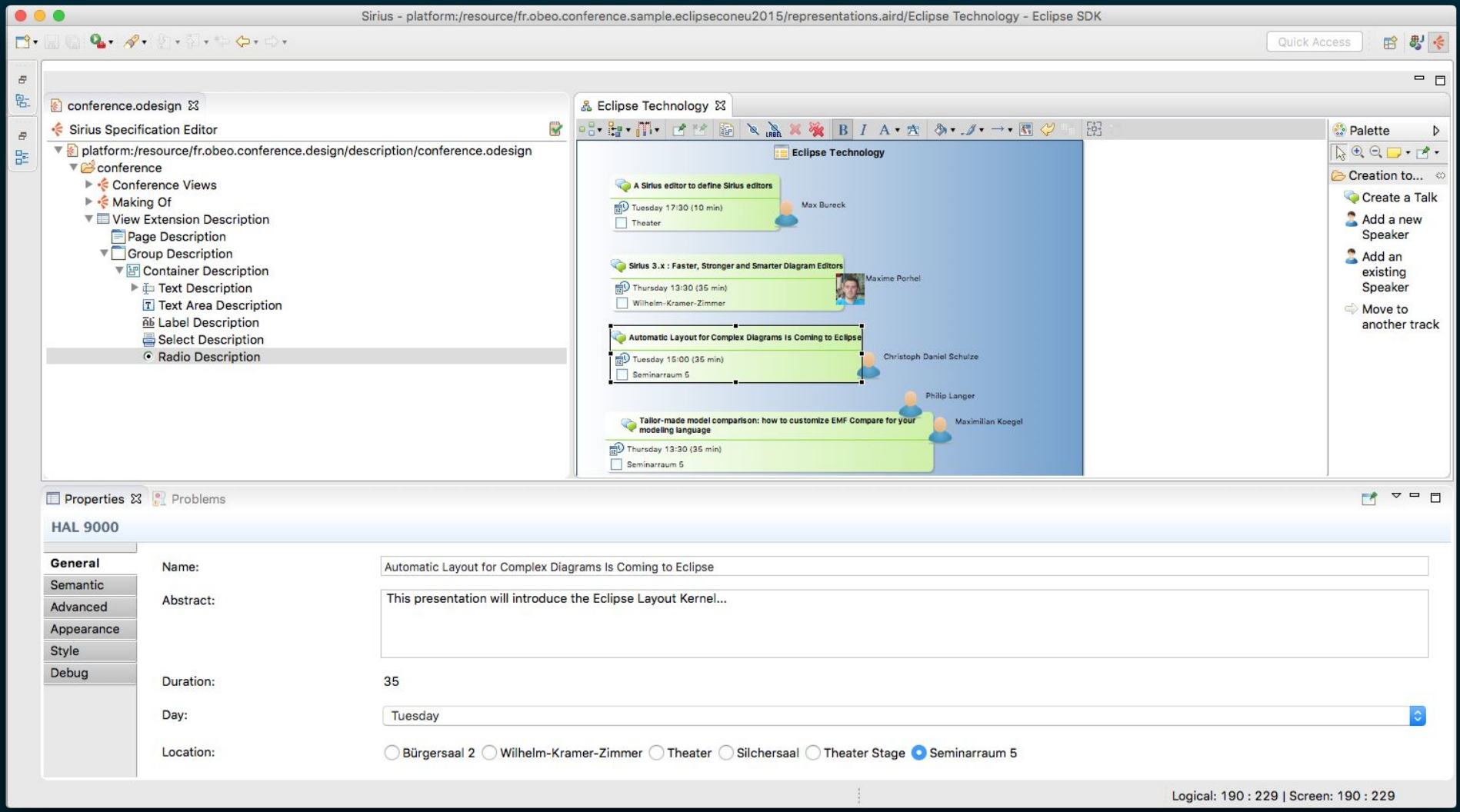
Performances depends on your .odesign specification

Measure, Improve, Repeat

Research projects
Funding
Sys2Soft
DGE
DIRECTION GÉNÉRALE DES ENTREPRISES

Work in Progress

Properties view customization in Sirius 4



Stay tuned

"Keep on the good work!! :)

"Awesome day at #SiriusCon in Paris.

"Overall well done!

"Was nice to meet enthusiastic community!

"The right formula to maintain!

siriuscon.org

Thank you!

OBEO

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