Integrating Xtext and Sirius: Strategies and Pitfalls

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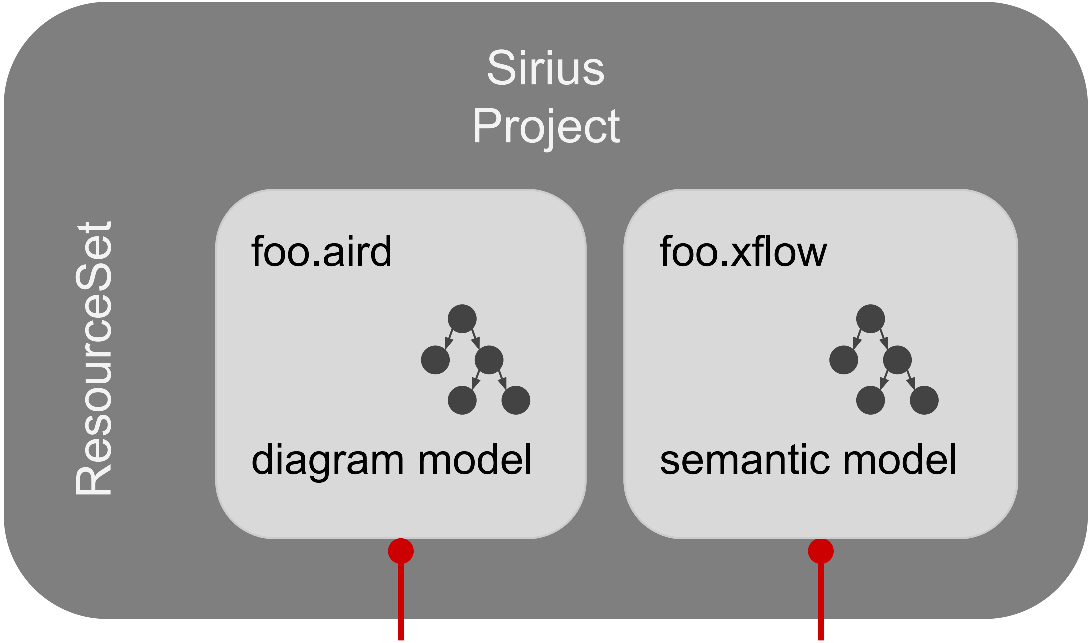
Agenda

- Three modes of integration
  - Persisting the model using Xtext
  - References between Xtext and Sirius models
  - Embedding an Xtext editor in Sirius
- Conclusion

Persisting the Model Using Xtext

Diagram Model vs Semantic Model



Sirius Project

ResourceSet

foo.aird

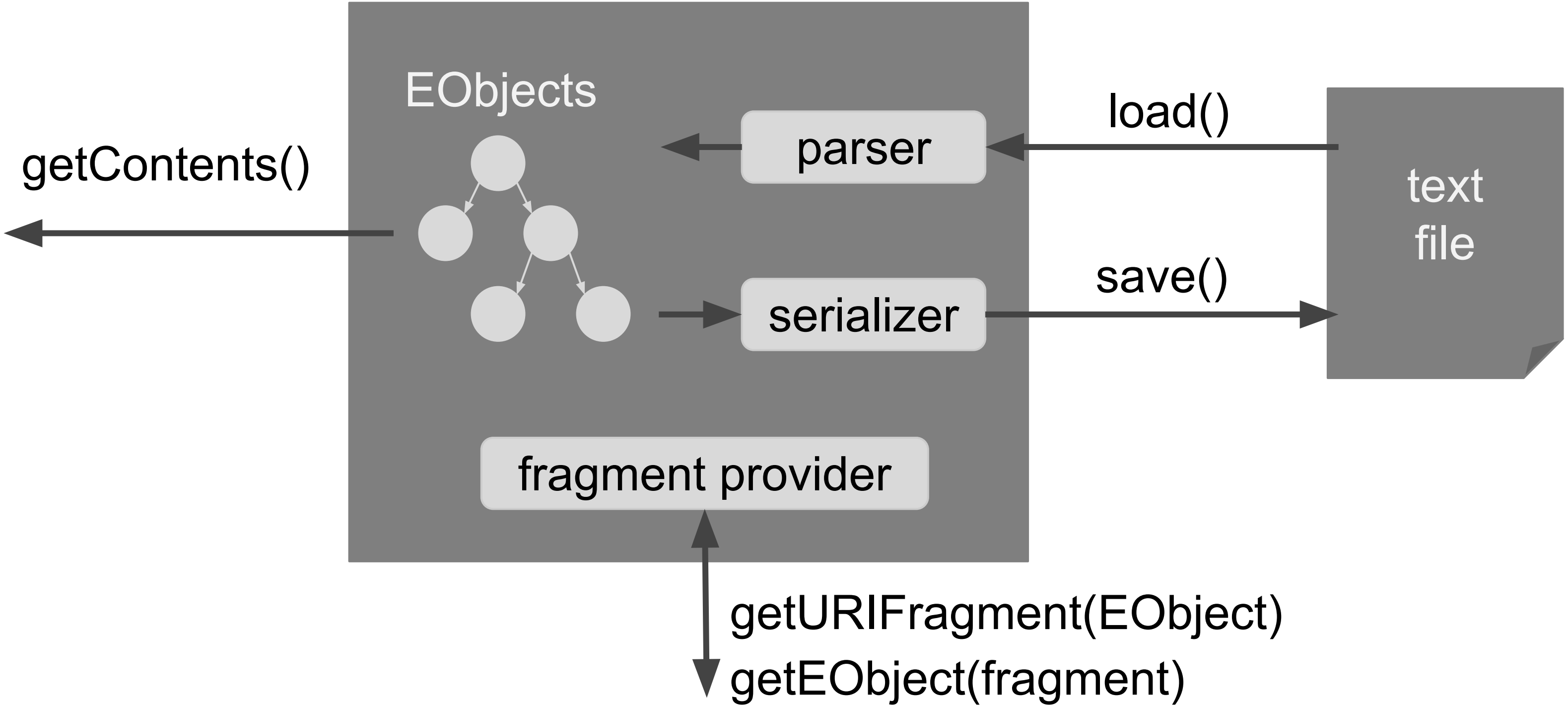
diagram model

foo.xflow

semantic model

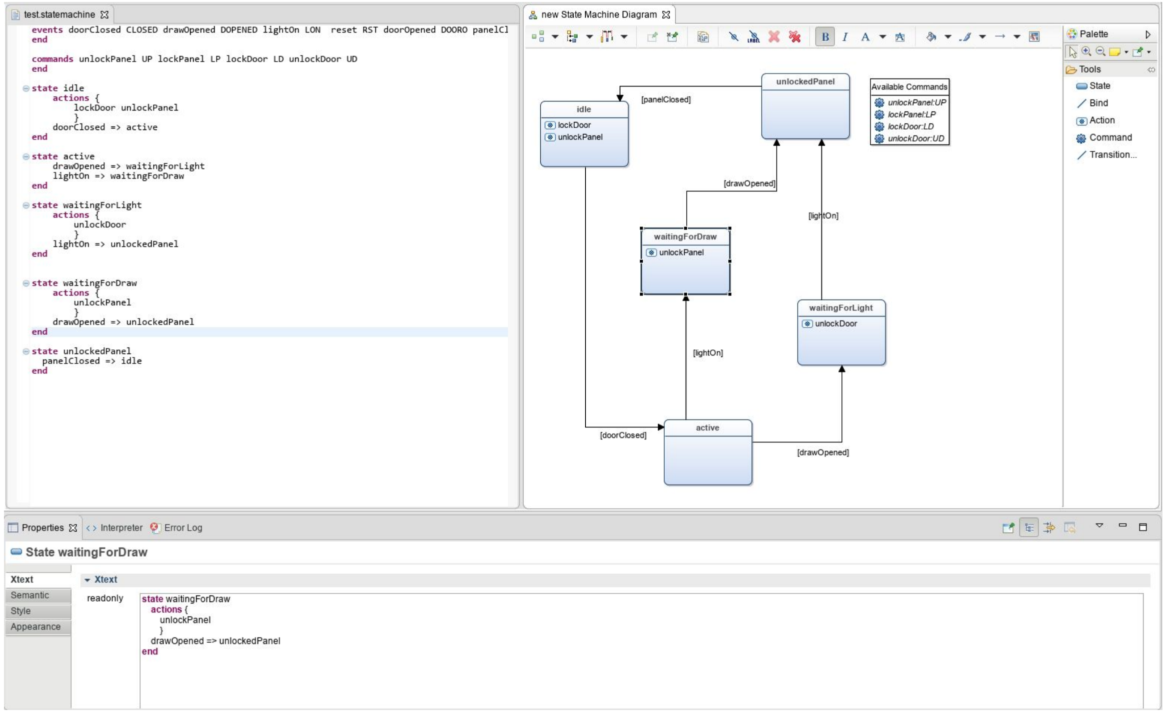
by default persisted as XMIResources

XtextResource



Persist the Semantic Model with Xtext

Sync through filesystem

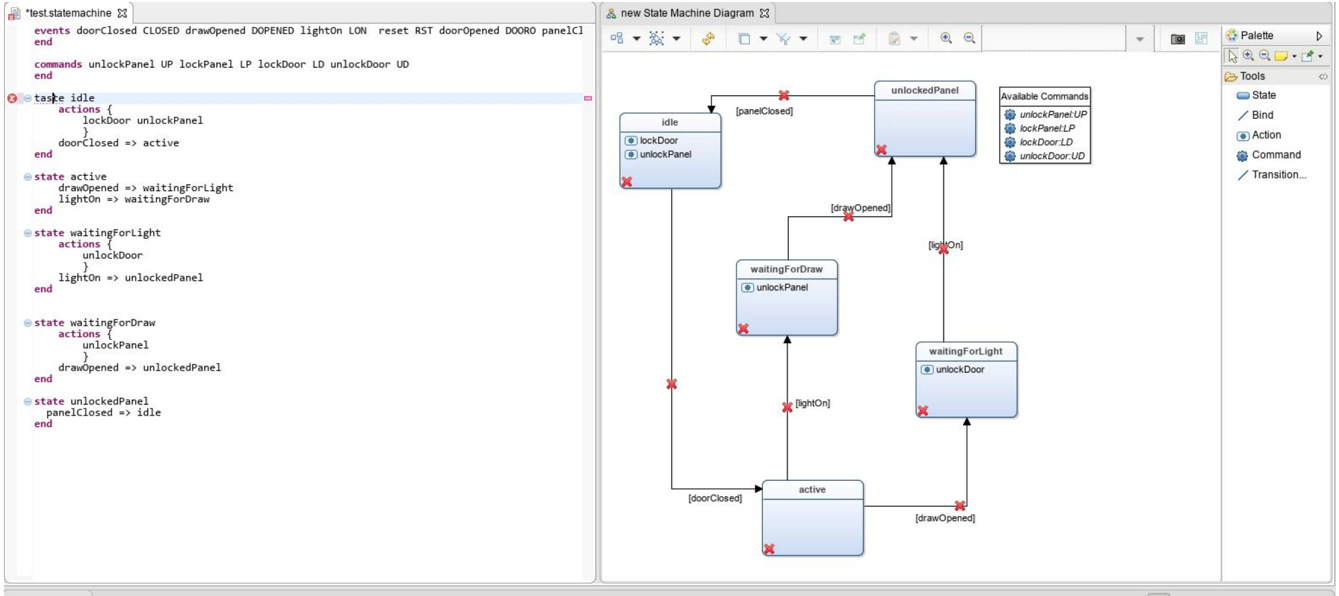


```
events doorClosed CLOSED drawOpened DOPENED lightOn LON  reset RST doorOpened DOORO panelCl
end

commands unlockPanel UP lockPanel LP lockDoor LD unlockDoor UD
end

state idle
    actions {
        lockDoor unlockPanel
        }
    doorClosed => active
end

state active
    drawOpened => waitingForLight
    lightOn => waitingForDraw
end

state waitingForLight
    actions {
        unlockDoor
        }
    lightOn => unlockedPanel
end


state waitingForDraw
    actions {
        unlockPanel
        }
    drawOpened => unlockedPanel
end

state unlockedPanel
  panelClosed => idle
end
```

```
state waitingForDraw
  actions {
     unlockPanel
     }
  drawOpened => unlockedPanel
end
```

Diagram Refresh Strategy

- Automatic Refresh (default)
  - lead to diagram re-init when the model is un-parseable
  - diagram content gets lost
- Setup a specific strategy to trigger the refresh



*test.statemachine

```
events doorClosed CLOSED drawOpened DOPENED lightOn LON  reset RST doorOpened DOORO panelCl
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    actions {
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end


state waitingForDraw
    actions {
        unlockPanel
        }
    drawOpened => unlockedPanel
end

state unlockedPanel
  panelClosed => idle
end
```
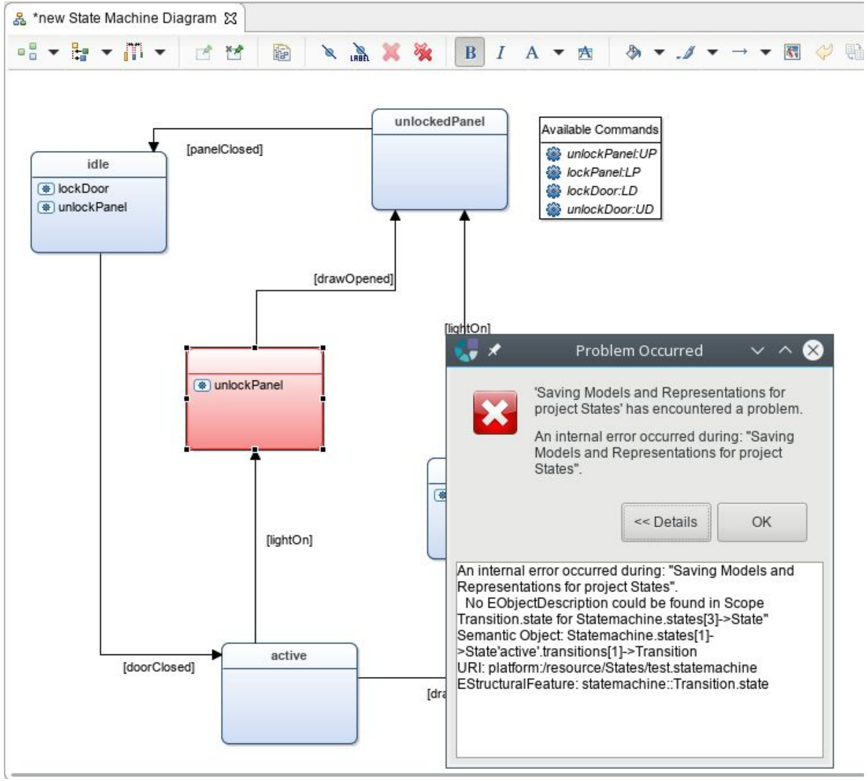

Grammar Adaptations

- Avoid errors when the user tries to save
- Not every string is an ID
  - Consider using STRING rule instead of ID in the grammar
- Lose grammar, strict validation
- Tools should create serializable elements by default
- Highlight offending elements in diagram



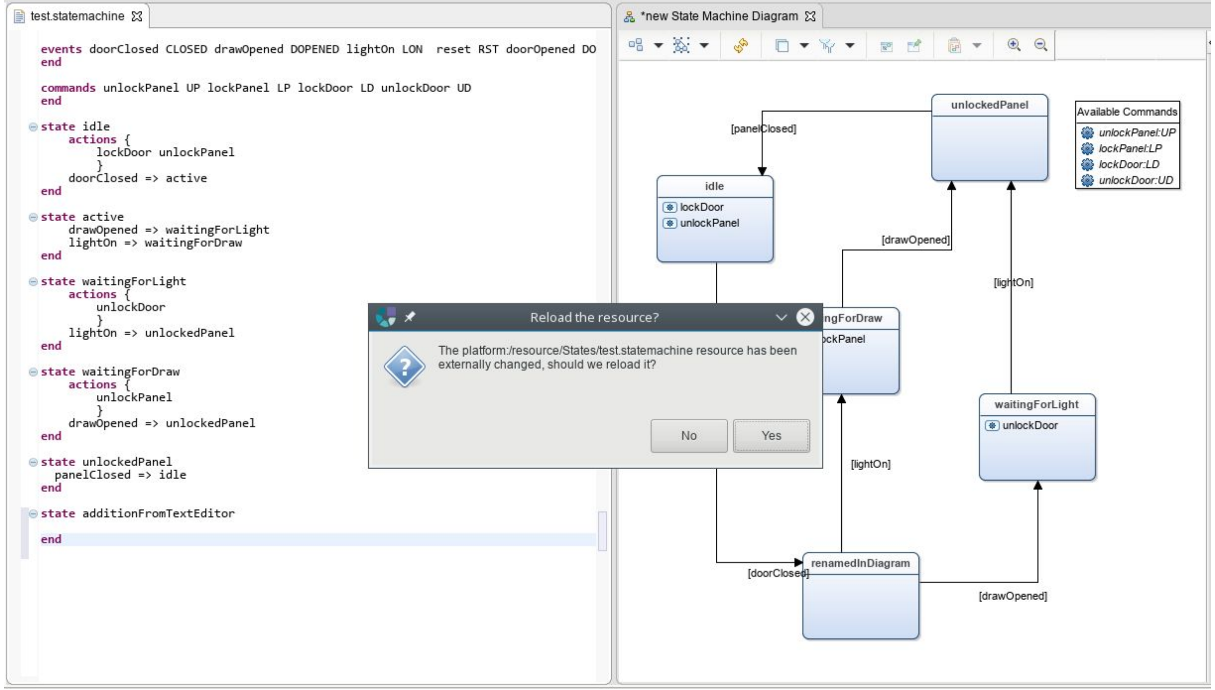
'Saving Models and Representations for project States' has encountered a problem.

An internal error occurred during: "Saving Models and Representations for project States".

```
An internal error occurred during: "Saving Models and
Representations for project States".
  No EObjectDescription could be found in Scope
Transition.state for Statemachine.states[3]->State"
Semantic Object: Statemachine.states[1]-
>State'active'.transitions[1]->Transition
URI: platform:/resource/States/test.statemachine
EStructuralFeature: statemachine::Transition.state
```

Concurrent Dirty States

Prevent editing in the other syntax when one is dirty



test.statemachine

```
events doorClosed CLOSED drawOpened DOPENED lightOn LON  reset RST doorOpened DO
end

commands unlockPanel UP lockPanel LP lockDoor LD unlockDoor UD
end

state idle
    actions {
        lockDoor unlockPanel
        }
    doorClosed => active
end

state active
    drawOpened => waitingForLight
    lightOn => waitingForDraw
end

state waitingForLight
    actions {
        unlockDoor
        }
    lightOn => unlockedPanel
end

state waitingForDraw
    actions {
        unlockPanel
        }
    drawOpened => unlockedPanel
end

state unlockedPanel
  panelClosed => idle
end

state additionFromTextEditor

end
```

Reload the resource?

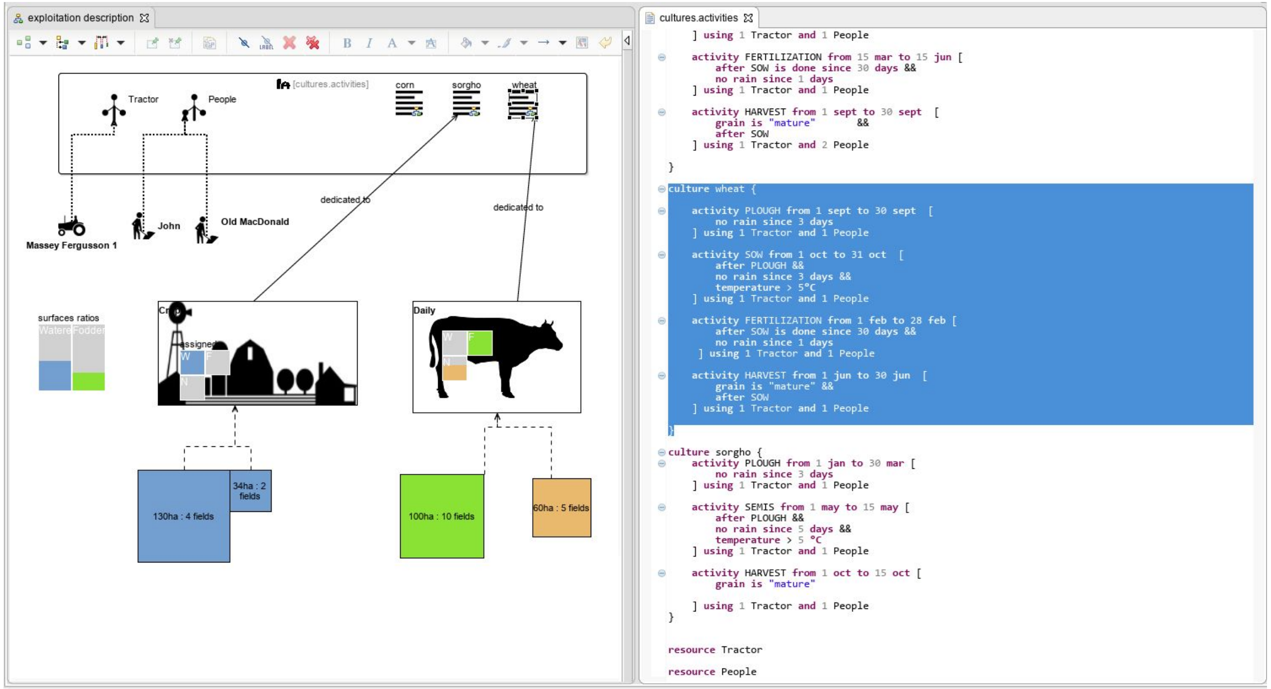
The platform:/resource/States/test.statemachine resource has been externally changed, should we reload it?

References Between Xtext and Sirius Models

Xtext and Sirius Models Combined

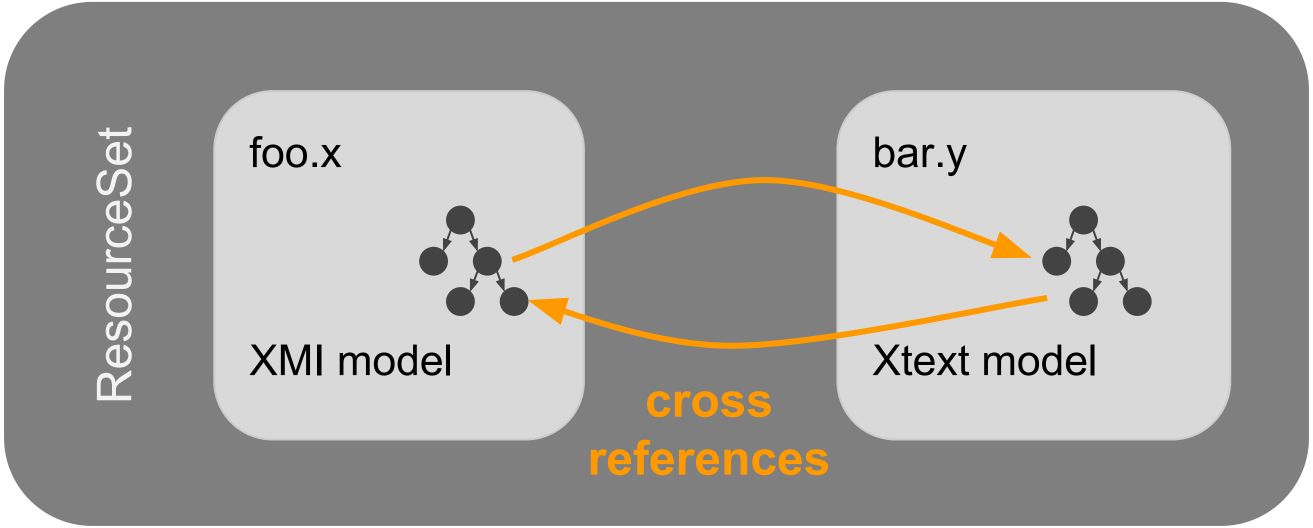
Xtext and Sirius are aware of each others models

Cross-references between them



```
    ] using 1 Tractor and 1 People

    activity FERTILIZATION from 15 mar to 15 jun [
        after SOW is done since 30 days &&
        no rain since 1 days
    ] using 1 Tractor and 1 People

    activity HARVEST from 1 sept to 30 sept  [
        grain is "mature"       &&
        after SOW
    ] using 1 Tractor and 2 People

}

culture wheat {

    activity PLOUGH from 1 sept to 30 sept  [
        no rain since 3 days
    ] using 1 Tractor and 1 People

    activity SOW from 1 oct to 31 oct  [
        after PLOUGH &&
        no rain since 3 days &&
        temperature > 5°C
    ] using 1 Tractor and 1 People

    activity FERTILIZATION from 1 feb to 28 feb [
        after SOW is done since 30 days &&
        no rain since 1 days
     ] using 1 Tractor and 1 People

    activity HARVEST from 1 jun to 30 jun  [
        grain is "mature" &&
        after SOW
    ] using 1 Tractor and 1 People

}

culture sorgho {
    activity PLOUGH from 1 jan to 30 mar [
        no rain since 3 days
    ] using 1 Tractor and 1 People

    activity SEMIS from 1 may to 15 may [
        after PLOUGH &&
        no rain since 5 days &&
        temperature > 5 °C
    ] using 1 Tractor and 1 People

    activity HARVEST from 1 oct to 15 oct [
        grain is "mature"

    ] using 1 Tractor and 1 People
}


resource Tractor

resource People
```

EMF Cross-references



XMI uses URIs: `href="<resource URI>#<fragment>"`

e.g. `href="bar.y#ab378f1789d1"`

Names vs URIs

I am giving this talk with Cédric.
Name-based linking (Xtext)

I am giving this talk with ECE2017#116.
URI-based linking (Sirius)

Differences

Resolution mechanism

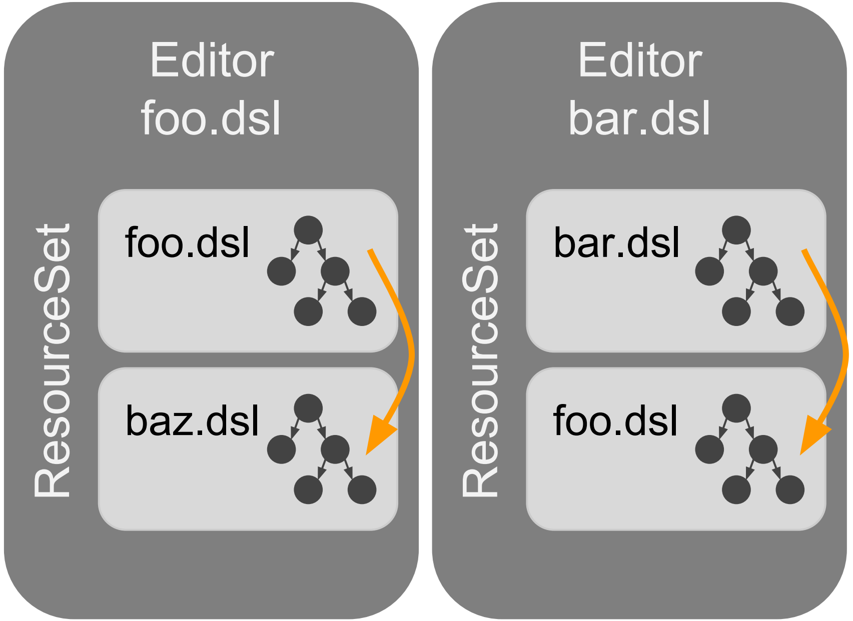
Coupling of resources

Syntax errors

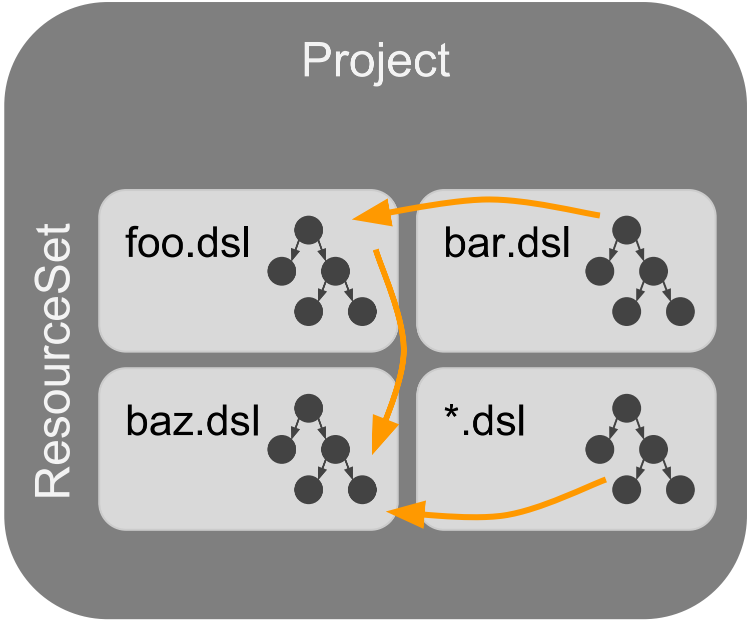
Rename

Suitability for users

Models And Identities



Xtext



Sirius

Make Sirius Refer to Xtext

- Implement an IFragmentProvider
  - make name (and type) part of the XMI-ID
- Implement Xtext support for *.aird files
  - allows Sirius to participate in Xtext rename refactoring
- Navigate to Xtext editor from the diagram
- Define fixed synchronization points
- Compare based on compare & merge instead of plain reload

Make Xtext Refer to Sirius/XMI

- Implement Xtext support for the XMI model
    - make elements referable from Xtext
    - make cross-links openable
    - participate in Xtext refactorings
- Navigate to Sirius editor from Xtext
- Rename on the Sirius side must trigger a rename refactoring in Xtext

Either way

- Cross-referencing will rely on the Xtext index
  - Xtext nature on project + build-automatically must be on
  - check the index with CTRL-SHIFT-F3

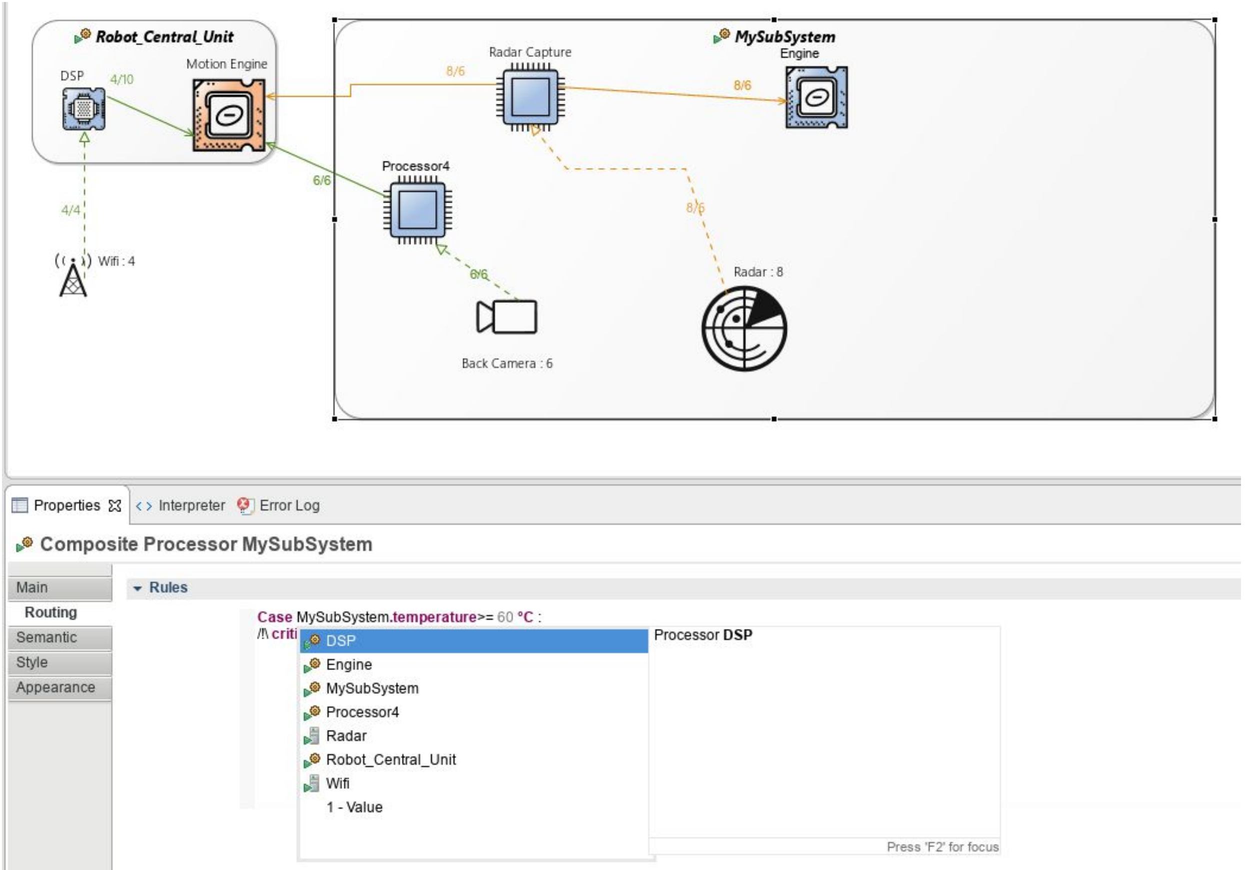
- Dirty-state integration is tricky
  - Refs from Xtext are not updated correctly when Sirius model changes
  - Avoid Xtext rename refactoring when diagram has unsaved changes

Embedding an Xtext Editor into Sirius

Embedding Xtext

XtextEmbeddedEditor + Custom properties widget

Store Xtext model in a string-valued attribute



```
Case MySubSystem.temperature>= 60 °C :
/!\ criti
```

Processor **DSP**

Requires Pretty Deep Integration

- Configuring XtextEmbededdEditor widget
- Syncing Transactions
- Using Sirius dirty state instead of the last-saved state
- Rename refactoring will be hard

Conclusion

You can integrate Xtext and Sirius

- Use EMF as the base of any kind of integration
- Basic level of integration is quite easy
- Deep integration can be tricky, keep an eye on
    - Linking cross-references
    - Using resource sets
    - Transactions
    - Consistency
- But in the end you’ll get a great tool mixing textual and graphical representations

Examples are online

- FowlerDSL: https://github.com/ObeoNetwork/Xtext-Sirius-integration/
- Farming (Gemoc) : https://github.com/gemoc/farmingmodeling
- Flow: https://github.com/ObeoNetwork/Flow-Designer

Blog post “Linking Xtext Models With EMF Models”

And a White Paper **“Xtext / Sirius - Integration, The Main Use-Cases”** coming soon.

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