

exbase

Produktivitätssteigerung bei der Implementierung
domänenspezifischer Sprachen durch effektive
Wiederverwendung

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für Bildung
und Forschung



Christian-Albrechts-Universität zu Kiel

Xtext

Language Development Framework

STATE MACHINES

The image shows two Eclipse IDE windows. The left window, titled `*FowlerDsl.xtext`, contains the following DSL code:

```
grammar org.eclipse.xtext.example.FowlerDsl with org.eclipse.xtext.common.Terminals

generate fowlerdsl "http://example.xtext.org/FowlerDsl"

StateMachine :
  {StateMachine}
  'events'
  (events+=Event)*
  'end'
  'commands'
  (commands+=Command)*
  'end'
  (states+=State)*;

Event :
  (resetting?='resetting')? name=ID code=ID;

Command :
  name=ID code=ID;

State :
  'state' name=ID
  ('actions' '{' (actions+=[Command])+ '}')?
  (transitions+=Transition)*
  'end';

Transition :
  event=[Event] '=>' state=[State];
```

The right window, titled `*sample.fowlerdsl`, shows the generated state machine code:

```
events
  startEvent START1
  stopEvent STOP2
end

commands
end

state start
  startEvent => unknown
end

state stop
  stopEvent =>
end

state emptyState
  No transitions
end
```

A context menu is open over the `unknown` reference in the `start` state, offering options: `Change to 'emptyState'`, `Change to 'start'` (highlighted), and `Change to 'stop'`.

The bottom of the IDE shows the `Problems` view with the following content:

- 2 errors, 0 warnings, 0 others
- Errors (2 items):
 - Couldn't resolve reference to State 'unknown'. sample.fowlerdsl
 - No transitions sample.fowlerdsl

PL / SQL

The image shows a screenshot of an IDE with several windows and a problem list. The main window displays the following PL/SQL code:

```
app_message_pkg.sql
create or replace
package body app_message_pkg
is
-----
-- Create a new message
-----

procedure createAppMessage (
    p_mesg_type      in
    p_mesg_name      in
    p_mesg_text      in
)
is
begin
insert into app_messages
values (p_mesg_type, p_mesg_name, p_mesg_text);
exception
when others
then
    if sqlcode = -1
    then
        null;
    end if;
end createAppMessage;

end app_message_pkg;
/
show errors
```

The `install.sql` window contains:

```
install.sql
start sequences
start app_messages
start app_message_pkg

exec app_message_pkg.createAppMessage('ERROR', 'NAME_NOT_UNIQUE', 'The name must be unique.');
```

A tooltip for the `insert` statement reads: "Guideline 25 violated: Always specify the target columns when executing an insert command."

The `*app_messages.sql` window contains:

```
*app_messages.sql
drop table app_messages cascade constraints;

create table app_messages (
    mesg_id      number(10),
    mesg_type    varchar2(30) constraint mesg_mesg_type_nn not null,
    mesg_name    varchar2(30) constraint mesg_mesg_name_nn not null,
    mesg_text    varchar2(200) constraint mesg_mesg_text_nn not null
);

comment on table app_messages is 'Application messages';
comment on column app_messages.mesg_id is 'Primary Key';
comment on column app_messages.mesg_type is 'Type of message';
comment on column app_messages.mesg_name is 'Unique name of the message';
comment on column app_messages.mesg_text is 'Message text';

alter table app_messages
add constraint mesg_pk
primary key (mesg_id)
using index;

alter table app_messages
add constraint mesg_un
unique (mesg_name)
using index;
```

The Problems window shows 3 errors:

- Guideline 25 violated: Always specify the target columns when executing an insert command.
- Guideline 47 violated: Never handle unnamed exceptions using the `others` keyword.
- Guideline 54 violated: Always use a string variable to execute dynamic SQL.

Xtext

Facts

9 Active Committers

~ 1.500.000
Lines of Code

10% Handwritten

~ 130 Test Languages

~3.000 Unit Tests

~400 Newsgroup
Messages per Month

100 Pages Documentation

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 eclipse

itemis

Xtext
in Action




```
module SimpleArithmetics  
  
def boxVolume(l,w,h) : l*w*h;  
  
def cubeVolume(l) : boxVolume(l,l,l);
```

- SimpleArithmetics
 - boxVolume(l,w,h)
 - cubeVolume(l)



The Grammar

```

grammar org.eclipse.xtext.example.arithmetics.Arithmetics with org.eclipse.xtext.common.Terminals

import "http://www.eclipse.org/emf/2002/Ecore" as ecore
generate arithmetics "http://www.eclipse.org/Xtext/example/Arithmetics"

Module :
    'module' name=ID
    (statements+=Statement)*;

Statement:
    Definition | Evaluation;

Definition:
    'def' name=ID ('('args+=DeclaredParameter (',' args+=DeclaredParameter)*')')?
    ':' expr=Expression ';;';

DeclaredParameter:
    name=ID;

Evaluation :
    expression=Expression ';;';

Expression:
    Addition;

Addition returns Expression:
    Multiplication (({Plus.left=current} '+' | {Minus.left=current} '-') right=Multiplication)*;

Multiplication returns Expression:
    PrimaryExpression (({Multi.left=current} '*' | {Div.left=current} '/') right=PrimaryExpression)*;

PrimaryExpression returns Expression:
    '('Expression')' |
    {NumberLiteral} value=NUMBER |
    {FunctionCall} func=[AbstractDefinition]('('args+=Expression (',' args+=Expression)*')')?
;

```

A close-up photograph of a traffic light. The light is yellow and has three circular lenses. The bottom lens is illuminated with a bright green light, while the top and middle lenses are dark. The traffic light is mounted on a metal arm. In the background, there is a blurred view of a city street with buildings and a clear blue sky. A semi-transparent white banner is overlaid across the middle of the image, containing the word "Validation" in a bold, black, sans-serif font.

Validation

```

module SimpleArithmetics

def boxVolume(l,w,h) : l*w*h;

def cubeVolume(l) : boxVolume(l,l,l);

cubeVolume(10);
// = 1000
cubeVolume(2);
// = 8
boxVolume(1,3,5);
// = 15

```

- SimpleArithmetics
 - boxVolume(l,w,h)
 - cubeVolume(l)

0 items

Description	Resource	Path	Locat



Quickfixes



SimpleArithmetics.calc

```
module SimpleArithmetics  
  
def boxVolume(l,w,h) : l*w*h;  
  
def cubeVolume(l) : boxVolume(l,l,l);  
|  
cubeVolume(10);  
// = 1000  
cubeVolume(2);  
// = 8  
boxVolume(1,3,5);  
// = 15
```

Outline

- SimpleArithmetics
 - boxVolume(l,w,h)
 - cubeVolume(l)

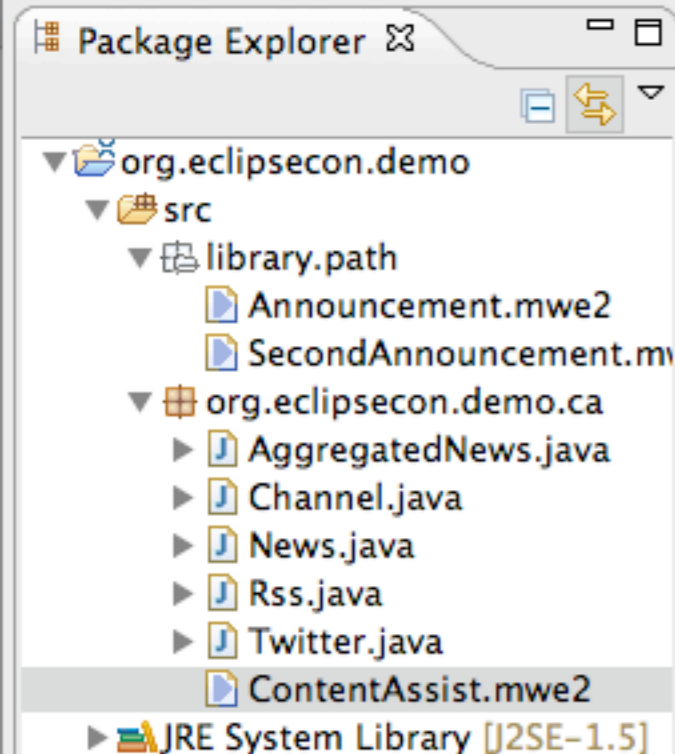
Problems

0 items

Description	Resource	Path	Locat

A man and a woman are sitting in the back of a blue SUV. The man, wearing a blue and white plaid shirt, is pointing towards the right. The woman, wearing a pink shirt, is holding a large, unfolded map. They appear to be on a road trip or a field excursion. The background shows a blurred landscape with trees and a clear sky.

Content Assist

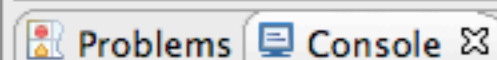
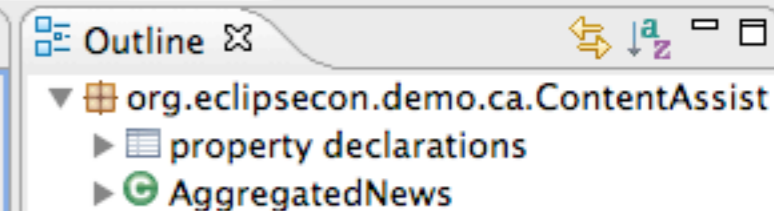


```
ContentAssist.mwe2
module org.eclipsecon.demo.ca.ContentAssist

var twitterMessage = "Hello ContentAssist!"

AggregatedNews {
  news = {
  }

  news = {
    message = twitterMessage
    channel = Rss {}
  }
}
```



No consoles to display at this time.



```
module org.eclipsecon.demo.ca.ContentAssist
```

```
var twitterMessage = "Hello ContentAssist!"
```

```
⊖ AggregatedNews {
```

```
⊖   news = auto-inject {  
       message = twitterMessage  
   }
```

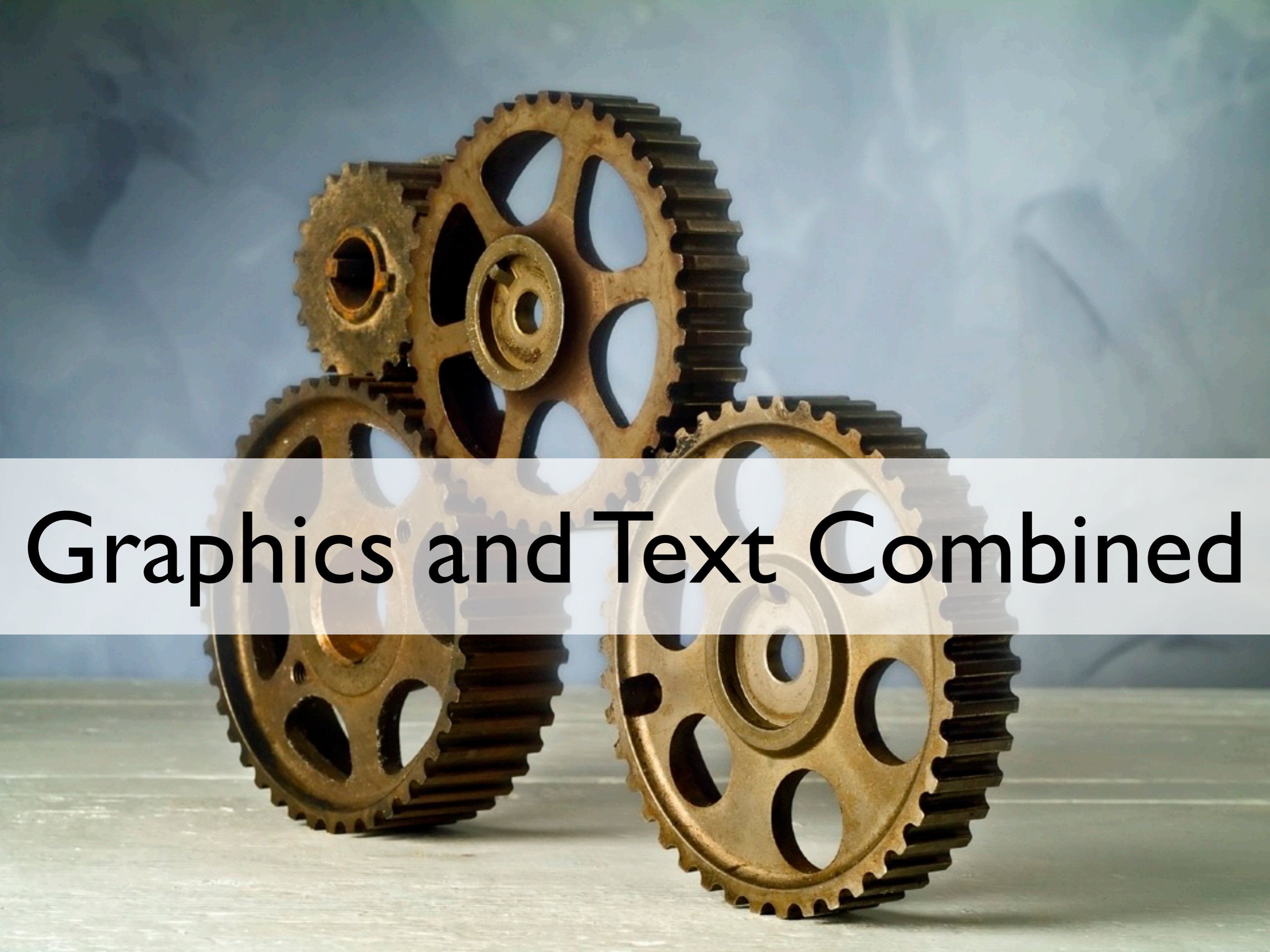
```
⊖   news = {  
       message =
```

```
⊖   news = {  
       message = twitterMessage  
       channel = Rss {}
```

```
   }  
}
```

t.mv

5]

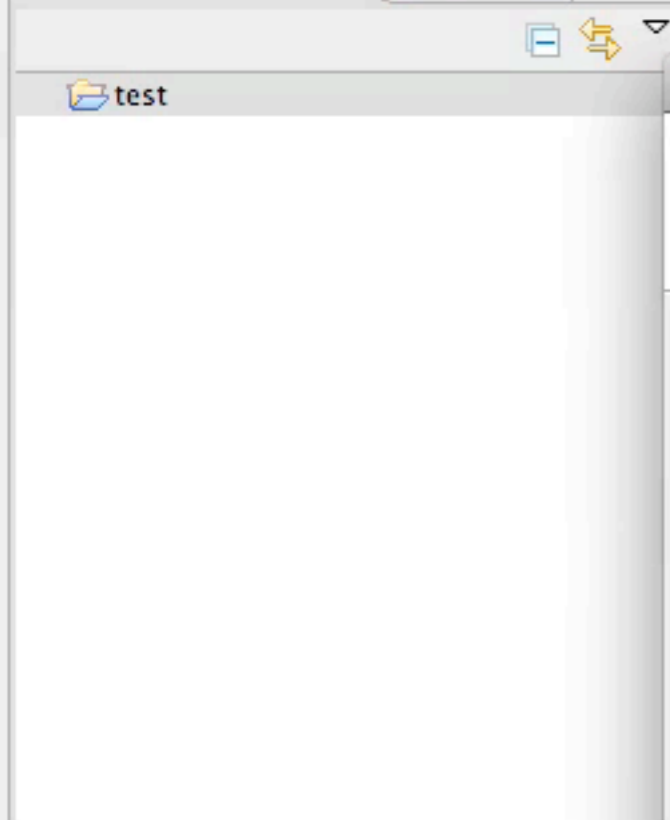


Graphics and Text Combined

Create a Diagram



Package Expl Hierarchy

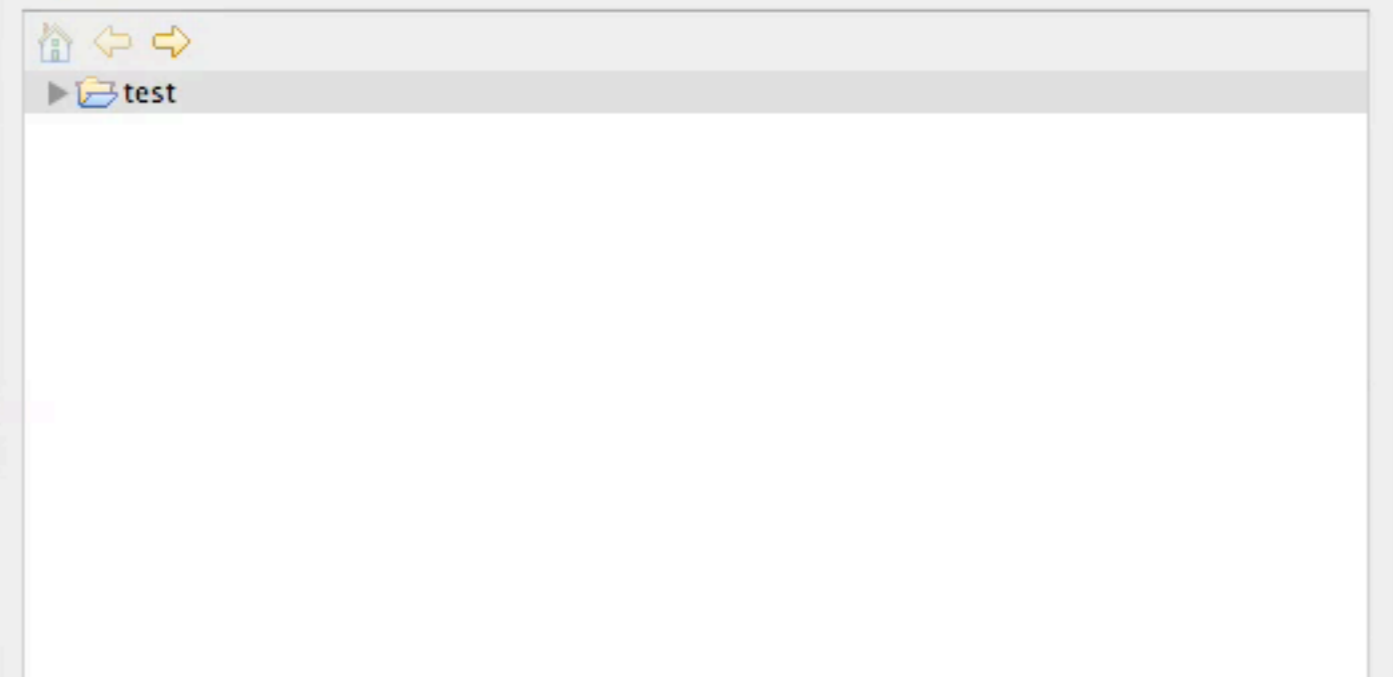


Outline An outline is not available.

New Entities Diagram

Create Entities Domain Model
Select file that will contain domain model.

Enter or select the parent folder:
test



File name: test.entity

Advanced >>

? < Back Next > Cancel Finish

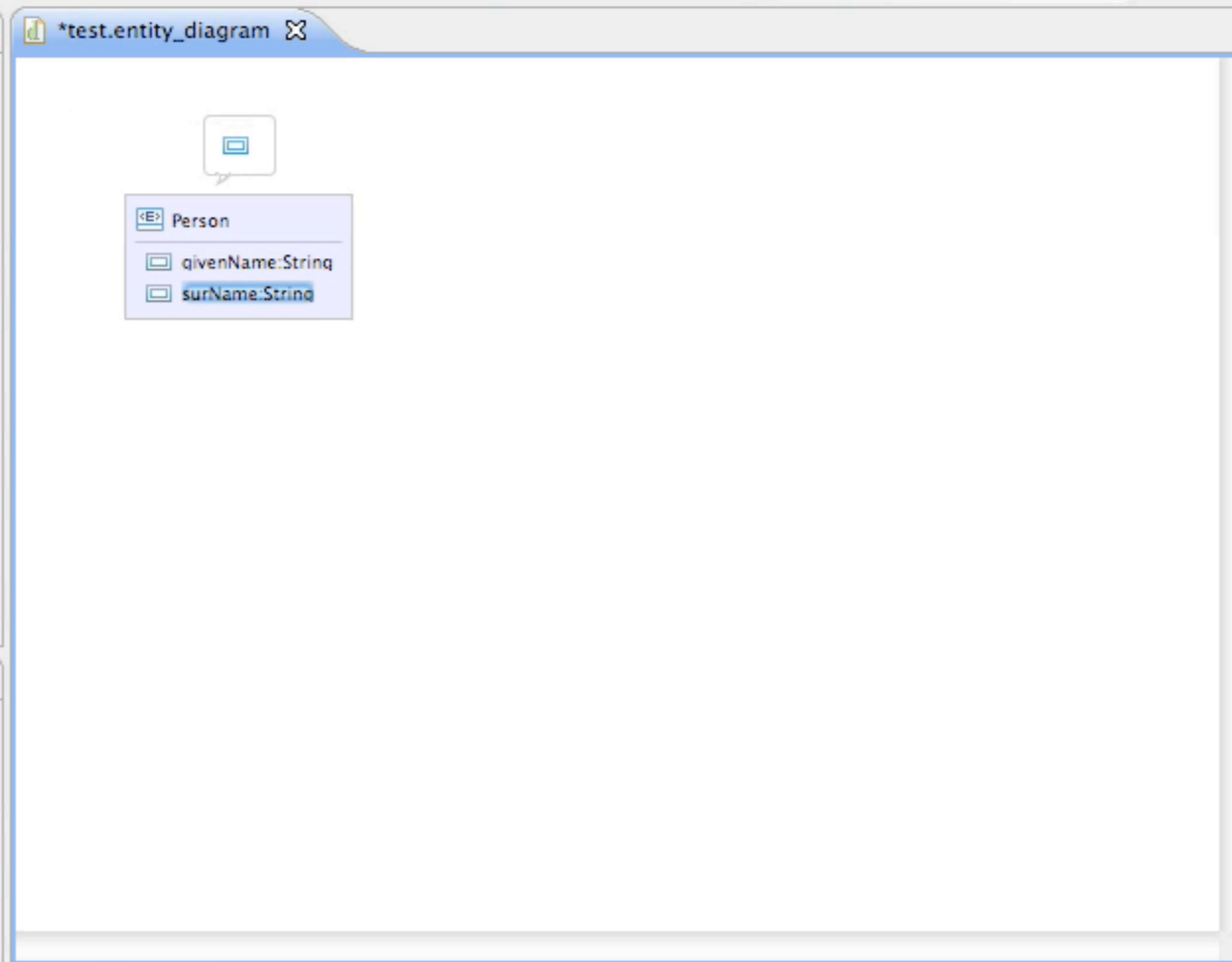
location	/Users/koehnlein/Documents/devel/gmftools/runtime-EclipseApplication-2/test
name	test
path	/test

Save Diagram

Toolbar with icons for file operations, GMF, and editing. Font: Tahoma, Size: 9, Bold (B), Italic (I), Underline (A). Zoom: 100%

Package Explorer and Hierarchy view showing the project structure:

- test
 - test.entity
 - test.entity_diagram



Palette view showing available diagram elements:

- Entity
- SuperType
- SimpleProperty
- ReferenceProp...

Outline view showing a simplified view of the diagram elements:

- Person
- givenName:String
- surName:String

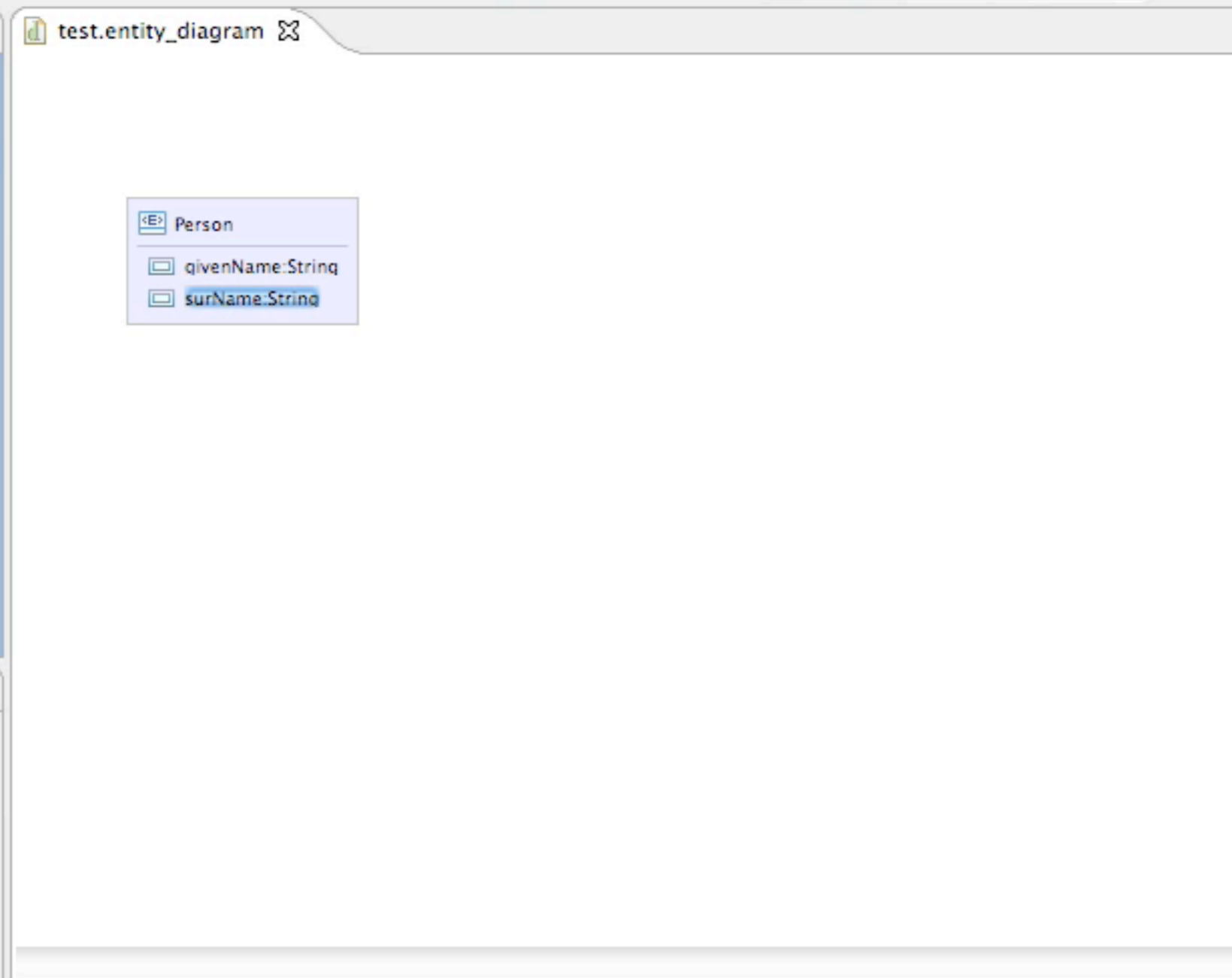
Properties view for the selected 'SimpleProperty' element:

Property	Value
Name	surName
Type	String

Toolbar with icons for file operations, GMF, and editing. Font: Tahoma, Size: 9. Zoom: 100%.

Package Explorer and Hierarchy view showing the project structure:

- test
 - test.entity
 - test.entity_diagram



Palette view showing available diagram elements:

- Entity
- SuperType
- SimpleProperty
- ReferenceProp...

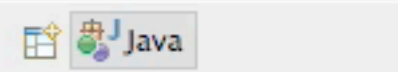
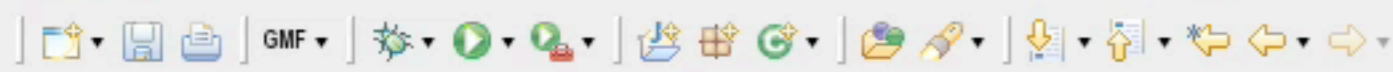
Outline view showing a simplified view of the class structure:

- Person
 - givenName:String
 - surName:String

Properties view for test.entity:

Property	Value
▼ Info	
derived	false
editable	true
last modified	23. Oktober 2009 17:34:57
linked	false
location	/Users/koehnlein/Documents/devel/gmftools/runtime-EclipseApplication-2/test
name	test.entity

Edit Textual Model



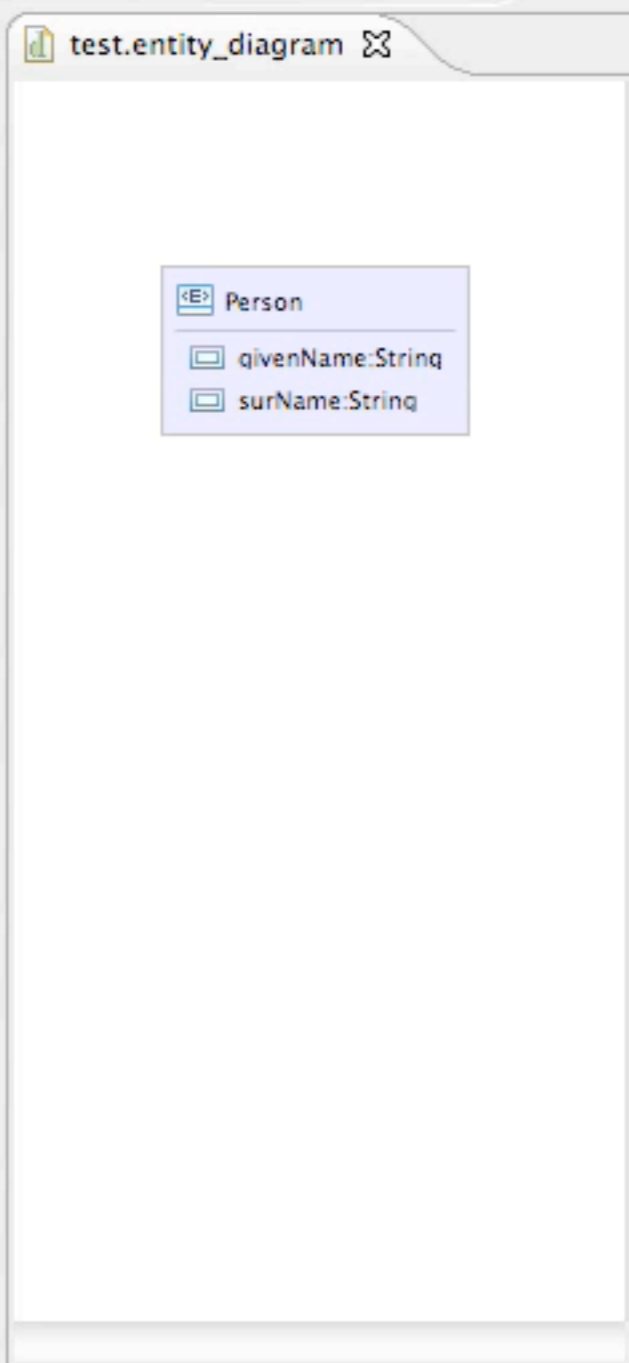
Package Expl Hierarchy

- test
 - test.entity
 - test.entity_diagram

```

entity Person {
    property givenName : String
    property surName : String
    address
}

entity Address {
    property street : String
    property number : Number
    property city : String
}
    
```



Palette

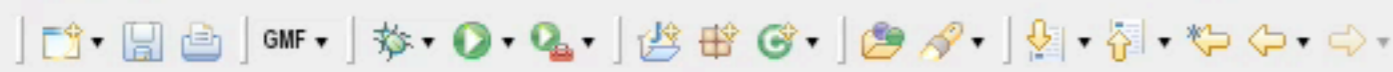
- Entity
- SuperType
- SimpleProperty
- ReferenceProp...

Outline

- Model
 - Person
 - Address

Properties

Property	Value
▼ Info	
derived	false
editable	true
last modified	23. Oktober 2009 17:34:57
linked	false
location	/Users/koehnlein/Documents/devel/gmftools/runtime-EclipseApplication-2/test
name	test.entity



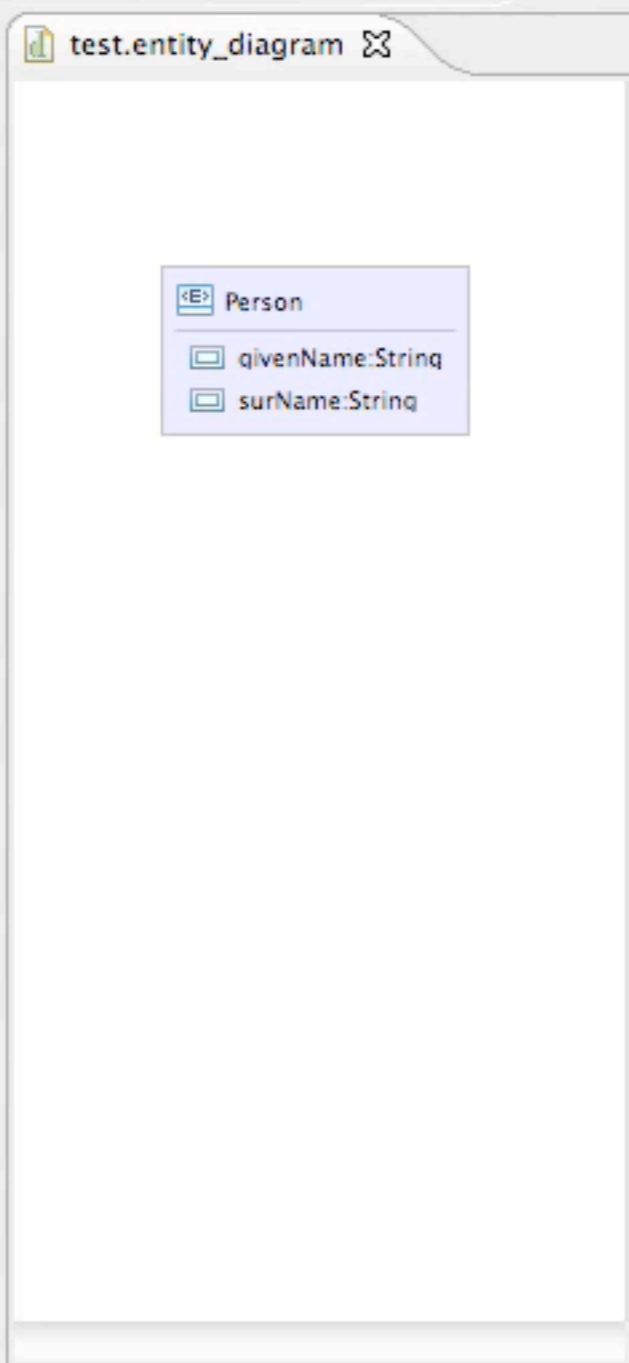
Package Expl Hierarchy

- test
 - test.entity
 - test.entity_diagram

```

entity Person {
    property givenName : String
    property surName : String
    addresses refs many Address
}

entity Address {
    property street : String
    property number : Number
    property city : String
}
    
```



Palette

- Entity
- SuperType
- SimpleProperty
- ReferenceProp...

Outline

- Model
 - Person
 - Address

Properties

Property	Value
▼ Info	
derived	false
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location	/Users/koehnlein/Documents/devel/gmftools/runtime-EclipseApplication-2/test
name	test.entity

~~ex~~base



exbase

- *Wiederverwendbare Programmiersprache*



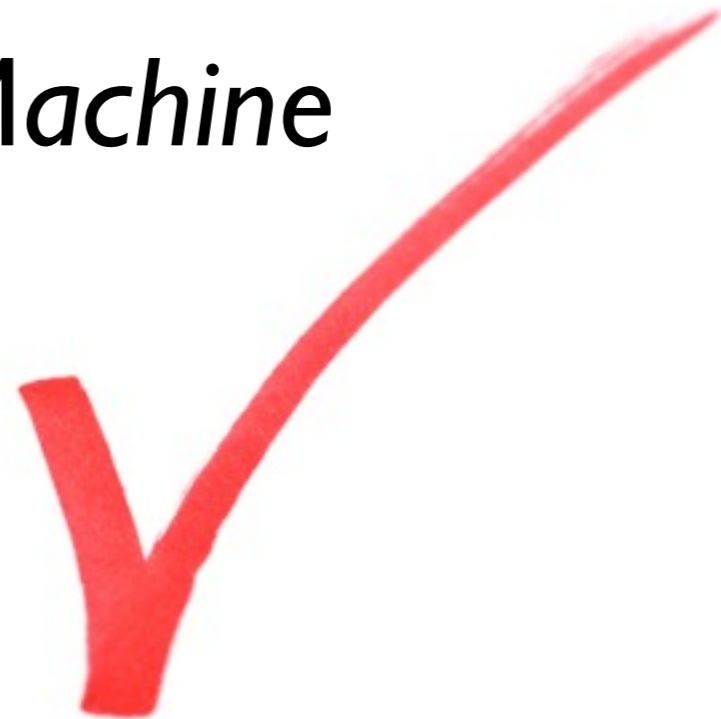
eXbase

- *Wiederverwendbare Programmiersprache*
- *Implementiert in Xtext*



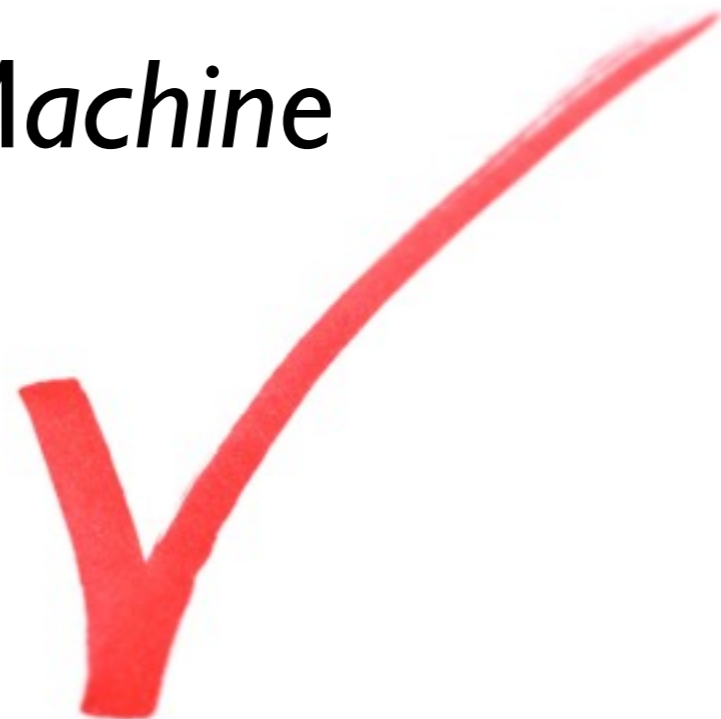
eXbase

- *Wiederverwendbare Programmiersprache*
- *Implementiert in Xtext*
- *Bindet auf die Java Virtual Machine*



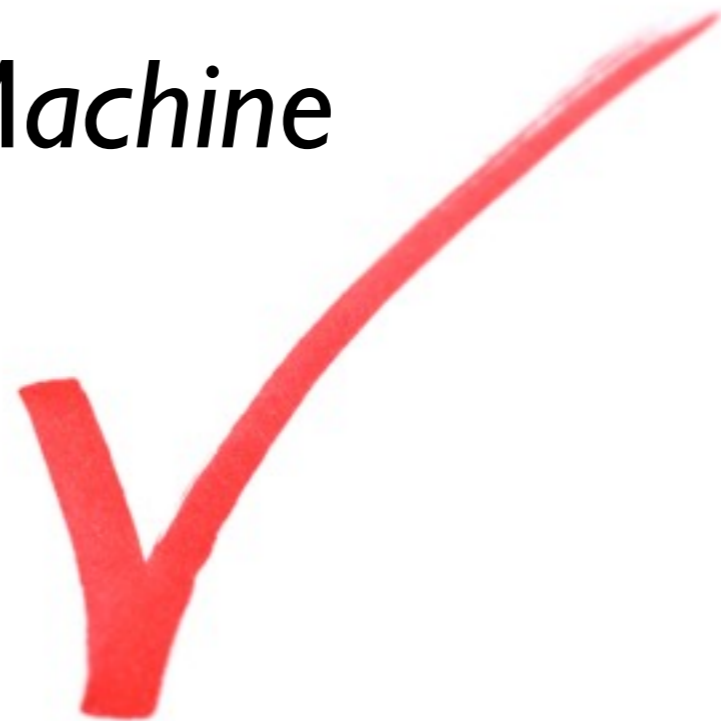
eXtensible base

- *Wiederverwendbare Programmiersprache*
- *Implementiert in Xtext*
- *Bindet auf die Java Virtual Machine*
- *Alle Aspekte anpassbar*



eXbase

- *Wiederverwendbare Programmiersprache*
- *Implementiert in Xtext*
- *Bindet auf die Java Virtual Machine*
- *Alle Aspekte anpassbar*
- *Interpreter und Compiler*



STATE MACHINES

The image shows two Eclipse IDE windows. The left window, titled `*FowlerDsl.xtext`, contains the following DSL code:

```
grammar org.eclipse.xtext.example.FowlerDsl with org.eclipse.xtext.common.Terminals

generate fowlerdsl "http://example.xtext.org/FowlerDsl"

StateMachine :
  {StateMachine}
  'events'
  (events+=Event)*
  'end'
  'commands'
  (commands+=Command)*
  'end'
  (states+=State)*;

Event :
  (resetting?='resetting')? name=ID code=ID;

Command :
  name=ID code=ID;

State :
  'state' name=ID
  ('actions' '{' (actions+=[Command])+ '}')?
  (transitions+=Transition)*
  'end';

Transition :
  event=[Event] '=>' state=[State];
```

The right window, titled `*sample.fowlerdsl`, shows the generated state machine code:

```
events
  startEvent START1
  stopEvent STOP2
end

commands
end

state start
  startEvent => unknown
end

state stop
  stopEvent =>
end

state emptyState
  No transitions
end
```

A context menu is open over the `unknown` reference in the `start` state, offering options: `Change to 'emptyState'`, `Change to 'start'` (highlighted), and `Change to 'stop'`.

The bottom of the IDE shows the `Problems` view with the following content:

- 2 errors, 0 warnings, 0 others
- Errors (2 items):
 - Couldn't resolve reference to State 'unknown'. sample.fowlerdsl
 - No transitions sample.fowlerdsl