Xtext

When Modeling meets Productivity

Sven Efftinge - itemis

I

Eclipse JDT

Java - org.eclipse.xtext/src/org/eclipse/xtext/scoping/impl/AbstractDeclarativeScopeProvider.java - Eclipse SDK - /Users/efftinge/Workspaces/ws-xtext

Debug | Java

Package Exp | Component

org.eclipse.xtext.parser.impl
org.eclipse.xtext.parsetree
org.eclipse.xtext.parsetree.impl
org.eclipse.xtext.parsetree.recon
org.eclipse.xtext.parsetree.recon
org.eclipse.xtext.resource
org.eclipse.xtext.resource.contair
org.eclipse.xtext.resource.ignore
org.eclipse.xtext.resource.impl
org.eclipse.xtext.scoping
org.eclipse.xtext.scoping.impl
AbstractDeclarativeScopeProvi
AbstractExportedObjectsAwar
AbstractGlobalScopeDelegatin
AbstractGlobalScopeProvider.j
AbstractScope.java
AbstractScopeProvider.java

*AbstractDeclarativeScopeProvider.java

polymorphicFindScopeForReferenceName(EObject, EReference) : IScope

```
                getPredicate(context, reference.getEReferenceType()),
                errorHandler);
        EObject current = context;
        while (scope == null && current != null) {
            scope = dispatcher.invoke(current, reference);
            current = current.eContainer();
        }
        current = context;
        while (scope == null && current != null) {
            scope = dispatcher.invoke(current, reference.getEReferenceType());
            if (scope!=null)
                logger.warn("scope_<EClass>(EObject,EClass) is deprecated. Use scope_<EC
            current = current.eContainer();
        }
        return scope;
    }

    protected IScope polymorphicFindScopeForReferenceName(EObject context, EReference ref
        Predicate<Method> predicate = getPredicate(context, reference);
        PolymorphicDispatcher<IScope> dispatcher = new PolymorphicDispatcher<IScope>(Coll
                .singletonList(this), predicate, errorHandler);
        EObject current = context;
        IScope scope = null;
        while (scope == null && current != null) {
            scope = dispatcher.invoke(current, reference);
            current = current.eContainer();
            current.
        }
        return scope
    }

    public void setE
        this.errorHa
    }

    public Polymorph
        return error
    }

}
```

eAdapters() : EList<Adapter> - Noti
eAllContents() : TreeIterator<EObjec
eClass() : EClass - EObject
eContainer() : EObject - EObject
eContainingFeature() : EStructuralFe
eContainmentFeature() : EReference
eContents() : EList<EObject> - EObj
eCrossReferences() : EList<EObject>
eDeliver() : boolean - Notifier
eGet(EStructuralFeature feature) : Ol
eGet(EStructuralFeature feature, boo

Press '^Space' to show Template Propos

Returns the value of the given feature of this object.

It returns the resolved value, i.e., it returns

```
eObject.eGet(feature, true)
```

Parameters:
feature the feature of the value to fetch.
Returns:
the value of the given feature of this object.
See Also:
eGet(EStructuralFeature, boolean)
@ignore
@model
@generated

Press 'Tab' from proposal table or click for focus

Outline

org.eclipse.xtext.scoping.impl
import declarations
AbstractDeclarativeScopeProvider
NAMED_DELEGATE : String
NAMED_ERROR_HANDLER : String
logger : Logger
delegate : IScopeProvider
delegateGetScope(EObject, EReference) :
setDelegate(IScopeProvider) : void
getDelegate() : IScopeProvider
errorHandler : ErrorHandler<IScope>
getPredicate(EObject, EClass) : Predicate
getPredicate(EObject, EReference) : Predi
getScope(EObject, EReference) : IScope
polymorphicFindScopeForClassName(EO
polymorphicFindScopeForReferenceNam

Type Hierarchy

AbstractDeclarativeScopeProvider, working set: Wi

AbstractDeclarativeScopeProvider
ArithmeticsScopeProvider
BeeLangTestLanguageScopeProvider
ContentAssistTestLanguageScopeProvide
DomainmodelScopeProvider
ExBeeLangTestLanguageScopeProvider
IgnoreCaseImportsTestLanguageScopePr
IgnoreCaseNamespacesTestLanguageScc
LazyLinkingTestLanguageScopeProvider
RecursiveScopeProvider
Mwe2ScopeProvider
MyDslScopeProvider
ScopeProvider
SimpleBeeLangTestLanguageScopeProvic
XdocScopeProvider
new AbstractDeclarativeScopeProvider()
new AbstractDeclarativeScopeProvider()
new AbstractDeclarativeScopeProvider()

Call Hierarchy

Members calling 'polymorphicFindScopeForRefer

polymorphicFindScopeForReferenceName(
getScope(EObject, EReference) : IScope
delegateGetScope(EObject, EReferen
delegateGetScope(EObject, EReferen
getGlobalScope(EObject, EReference)
getJvmTypeScope(EObject, EReferen
getScope(EObject, EReference) : ISco
getScope(EObject, EReference) : ISco
getScope(EObject, EReference) : ISco
getTypeForName(QualifiedName, EO
getUnconvertedLinkText(EObject, ER
setDefaultValueImpl(EObject, EReferen
testCreateReferableScope() : void - c
testGetAllContents() : void - org.ecli
testNested() : void - org.eclipse.xtex
testPolymorphic() : void - org.eclips
testScopeByReference() : void - org.e
testScopeByReference2() : void - org

Line | Call

Javadoc | Declaration | Properties | Console | Search | Debug | Search | JUnit

org.eclipse.xtext.scoping.impl.AbstractDeclarativeScopeProvider

A scope provider that invokes methods reflectively. At first it looks for methods of the following signature: `IScope scope_[EClassName]_[EReferenceName](MyType context, EReference ref)`

That is if `getScope(EObject, EReference)` is called where EReference is e.g. Property.type and the ctx is an instance of Property, than the corresponding signature could be:

```
IScope scope_Property_type(Property prop, EReference ref)
```

AbstractDe...peProvider

NAMED_DELEGATE
NAMED_ERROR_HANDLER
delegate
errorHandler
logger

Writable | Smart Insert | 138 : 21

Tuesday, November 2, 2010

Debug - org.eclipse.xtext/src/org/eclipse/xtext/scoping/impl/AbstractDeclarativeScopeProvider.java - Eclipse SDK - /Users/efftinge/Workspaces/ws-xtext

Debug | Java

Debug | Type Hierarchy

Daemon Thread [Thread-0] (Suspended (Syntax error on token(s), misplaced construct(s))
Bug311337TestLanguageRuntimeModule$MyDslScopeProvider(AbstractDeclarativeSco
Bug311337TestLanguageRuntimeModule$MyDslScopeProvider(AbstractDeclarativeSco
DefaultLinkingService.getScope(EObject, EReference) line: 54
DefaultLinkingService.getLinkedObjects(EObject, EReference, AbstractNode) line: 108
LazyLinkingResource.getEObject(String) line: 93
SynchronizedXtextResourceSet(ResourceSetImpl).getEObject(URI, boolean) line: 219
EcoreUtil.resolve(EObject, ResourceSet) line: 202
EcoreUtil.resolve(EObject, EObject) line: 262
ChildImpl(BasicEObjectImpl).eResolveProxy(InternalEObject) line: 1475
ChildImpl.getLink() line: 120

Variables | Breakpoints | Expressions

Name	Value
this	Bug311337TestLanguageRuntimeModule$MyDslScopeProvide
context	ChildImpl (id=148)
reference	EReferenceImpl (id=151)
cachedEType	null
cachedIsFeatureMap	false

AbstractDeclarativeScopeProvider.java

```
protected IScope polymorphicFindScopeForReferenceName(EObject context, EReference reference) {
    Predicate<Method> predicate = getPredicate(context, reference);
    PolymorphicDispatcher<IScope> dispatcher = new PolymorphicDispatcher<IScope>(Collections
            .singletonList(this), predicate, errorHandler);
    EObject current = context;
    IScope scope = null;
    while (scope == null && current != null) {
        scope = dispatcher.invoke(current, reference);
        current = current.eContainer();
        current.
    }
    return scope;
}

public void setErrorHandler(PolymorphicDispatcher.ErrorHandler<IScope> errorHandler) {
    this.errorHandler = errorHandler;
}

public PolymorphicDispatcher.ErrorHandler<IScope> getErrorHandler() {
    return errorHandler;
```

Display

c

context : EObject
clone() : Object - Object
char
class
com
com.apple
com.apple.crypto
com.apple.crypto.provider
com.apple.dnssd
com.apple.eawt
com.apple.eio

Console | Tasks | Call Hierarchy | Search | JUnit | Regex Util | History | Javadoc

org.eclipse.xtext.linking.lazy.Bug311337Test - testNoCyclicLinkingException

Runs: 647/2205 Errors: 0 Failures: 0

org.eclipse.xtext.conversion.impl.DeclarativeValueConverterServiceTest [Runner: JUnit 3] (1.774 s)
org.eclipse.xtext.parsetree.transientvalues.TransientValuesTest [Runner: JUnit 3] (0.616 s)
org.eclipse.xtext.parser.XtextParserTest [Runner: JUnit 3] (2.159 s)
org.eclipse.xtext.AllContentsPerformanceTest [Runner: JUnit 3] (0.896 s)
org.eclipse.xtext.generator.resource.ResourceTest [Runner: JUnit 3] (0.001 s)
org.eclipse.xtext.parsetree.formatter.XtextFormatterTest [Runner: JUnit 3] (0.508 s)
org.eclipse.xtext.valueconverter.IDValueConverterTest [Runner: JUnit 3] (0.807 s)
org.eclipse.xtext.parser.PartialParserCrossContainmentSingleTest [Runner: JUnit 3] (0.419 s)
org.eclipse.xtext.parser.unorderedGroups.ParserExTest [Runner: JUnit 3] (18.241 s)
org.eclipse.xtext.parsetree.formatter.FormatterTest [Runner: JUnit 3] (3.627 s)
org.eclipse.xtext.linking.lazy.Bug289059Test [Runner: JUnit 3] (0.279 s)

Failure Trace

I

GIT

TestProject.java

Java Structure Compare

- Compilation Unit
  - Import Declarations
    - java.io.ByteArrayInputStream
    - java.io.InputStream
    - org.eclipse.core.resources.IFile
  - TestProject
    - createFile(String, byte[])

Java Source Compare

```
import java.io.File;                                    import java.io.ByteArrayInputStream;
import java.io.IOException;                             import java.io.File;
import java.net.URL;                                    import java.io.IOException;
                                                        import java.io.InputStream;
import org.eclipse.core.resources.IFolder;              import java.net.URL;
import org.eclipse.core.resources.IProject;
import org.eclipse.core.resources.IProjectDesc          import org.eclipse.core.resources.IFile;
import org.eclipse.core.resources.IWorkspaceRo          import org.eclipse.core.resources.IFolder;
import org.eclipse.core.resources.ResourcesPlu          import org.eclipse.core.resources.IProject
import org.eclipse.core.runtime.CoreException;          import org.eclipse.core.resources.IProject
import org.eclipse.core.runtime.IPath;                  import org.eclipse.core.resources.IWorkspa
import org.eclipse.core.runtime.Path;                   import org.eclipse.core.resources.Resource
import org.eclipse.core.runtime.Platform;               import org.eclipse.core.runtime.CoreExcept
import org.eclipse.jdt.core.IClasspathEntry;            import org.eclipse.core.runtime.IPath;
import org.eclipse.jdt.core.ICompilationUnit;           import org.eclipse.core.runtime.Path;
import org.eclipse.jdt.core.IJavaProject;               import org.eclipse.core.runtime.Platform;
import org.eclipse.jdt.core.IPackageFragment;           import org.eclipse.jdt.core.IClasspathEntr
import org.eclipse.jdt.core.IPackageFragmentRo          import org.eclipse.jdt.core.ICompilationUn
import org.eclipse.jdt.core.IType;                      import org.eclipse.jdt.core.IJavaProject;
import org.eclipse.jdt.core.JavaCore;                   import org.eclipse.jdt.core.IPackageFragme
import org.eclipse.jdt.core.JavaModelExceptior          import org.eclipse.jdt.core.IPackageFragme
import org.eclipse.jdt.launching.JavaRuntime;           import org.eclipse.jdt.core.IType;
import org.osgi.framework.Bundle;                       import org.eclipse.jdt.core.JavaCore;
```

Synchronize

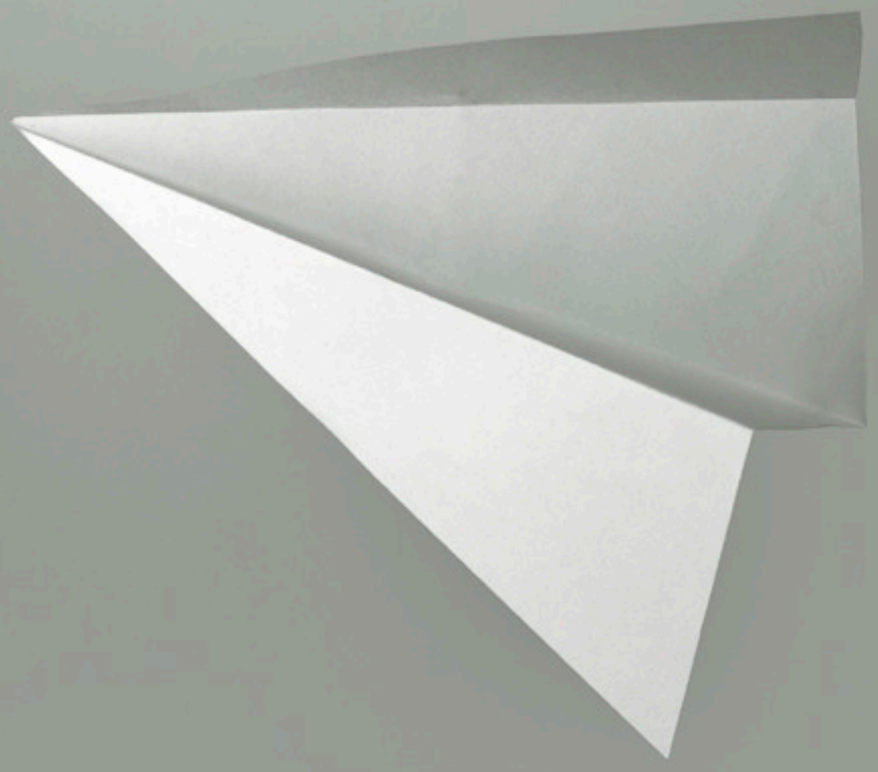
Git model participant (org.eclipse.egit)

- org.eclipse.egit.doc [outgoing change] [egit master]
- org.eclipse.egit.ui [outgoing change] [egit master]
- org.eclipse.egit.ui.test [outgoing change] [egit master]
- Git Change Set
  - /home/lock/workspace/runtime-EclipseApplication/egit
    - 986e38: Fixes obtaining common ancestor in Synchroni
      - org.eclipse.egit.core.test [egit master]
        - src
          - org
            - eclipse
              - egit
                - core
                  - synchronize
                  - test
                    - TestProject.java
                    - TestRepository.java
      - org.eclipse.egit.core [egit master]
      - org.eclipse.egit.ui [egit master]
    - 9d4a7f: Clean up the MANIFEST.MF
    - 871750: Merge "Cleanup temp dirs after test execution"
    - b831ae: Merge "Decoration of ignored projects"
    - 63ab5f: Merge "Change Change-Id when unchecking am
    - e1d7e3: History View: Create Branch/Tag on commit
    - 9b354e: Decoration of ignored projects
    - c4f3c3: Cleanup temp dirs after test execution
    - c25e0b: Change Change-Id when unchecking amend

So what's the Problem?

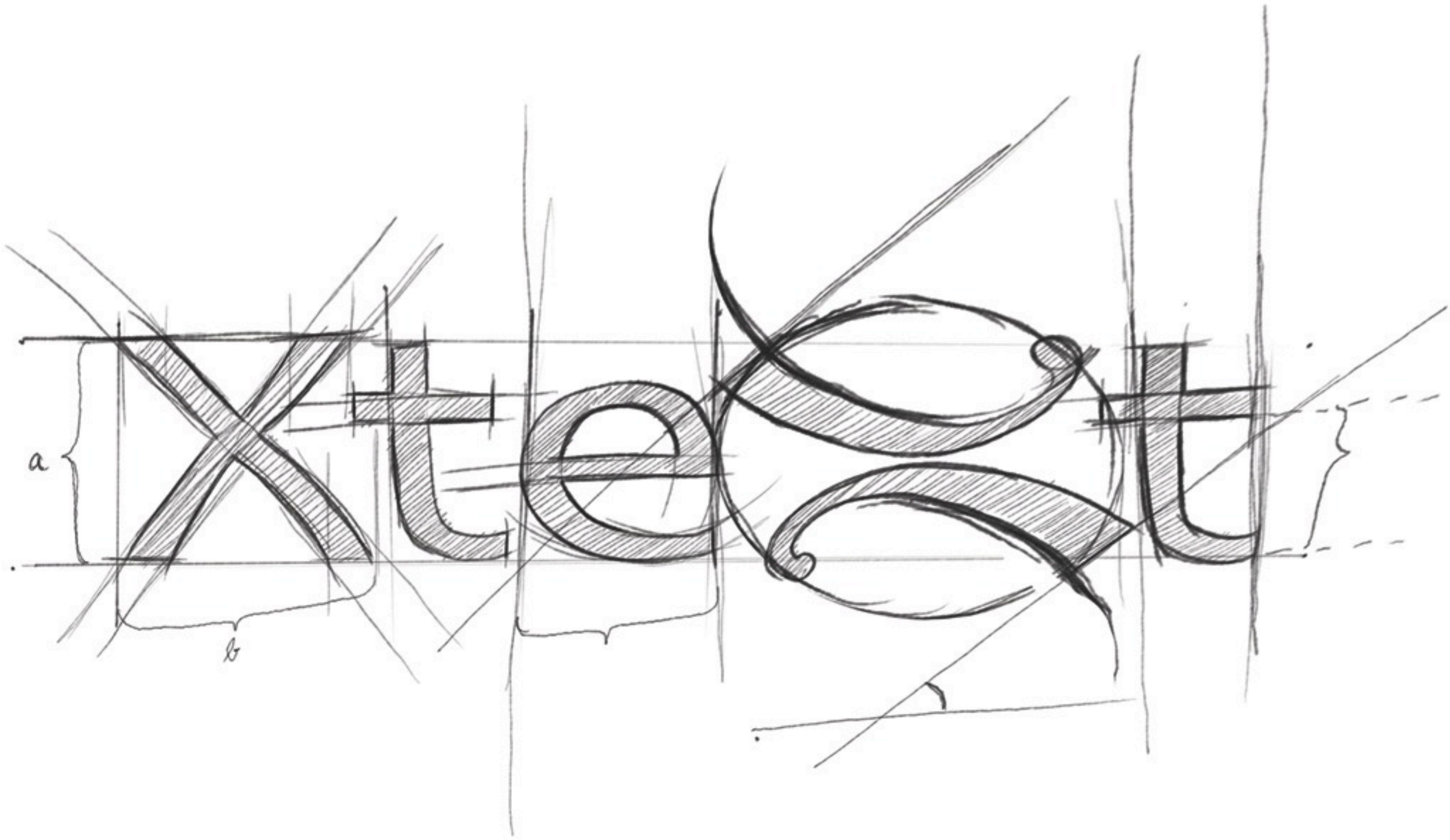
It's the Language

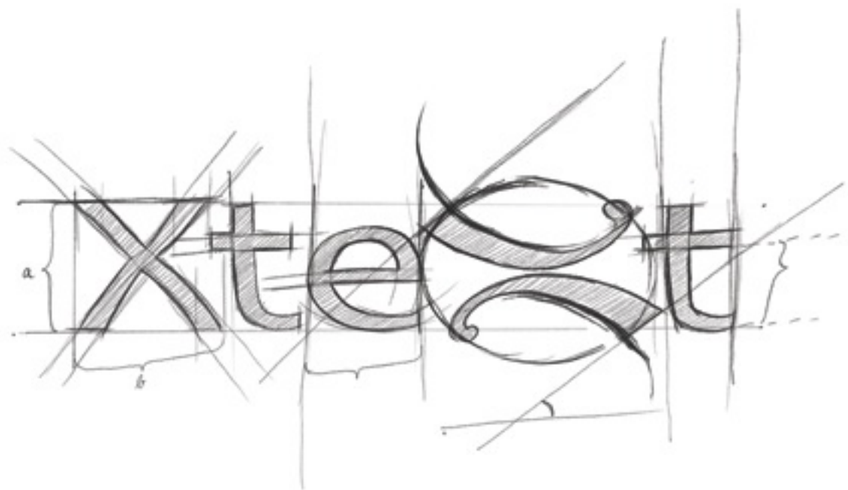
not the Tooling!

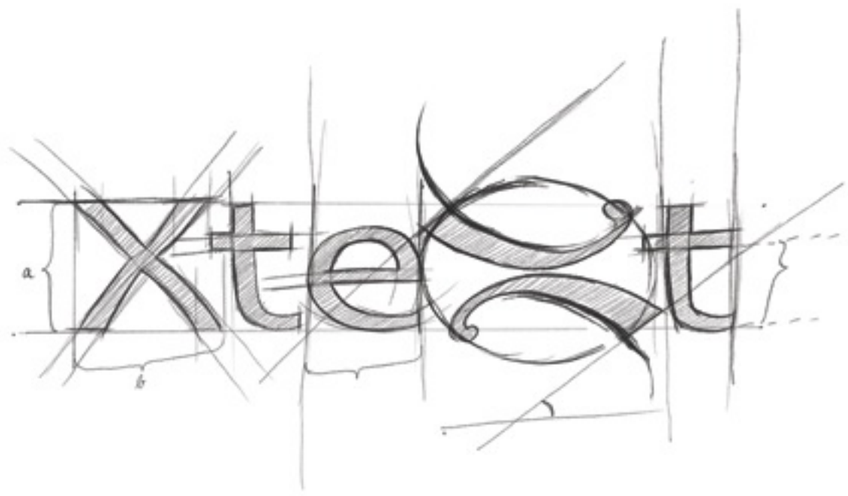


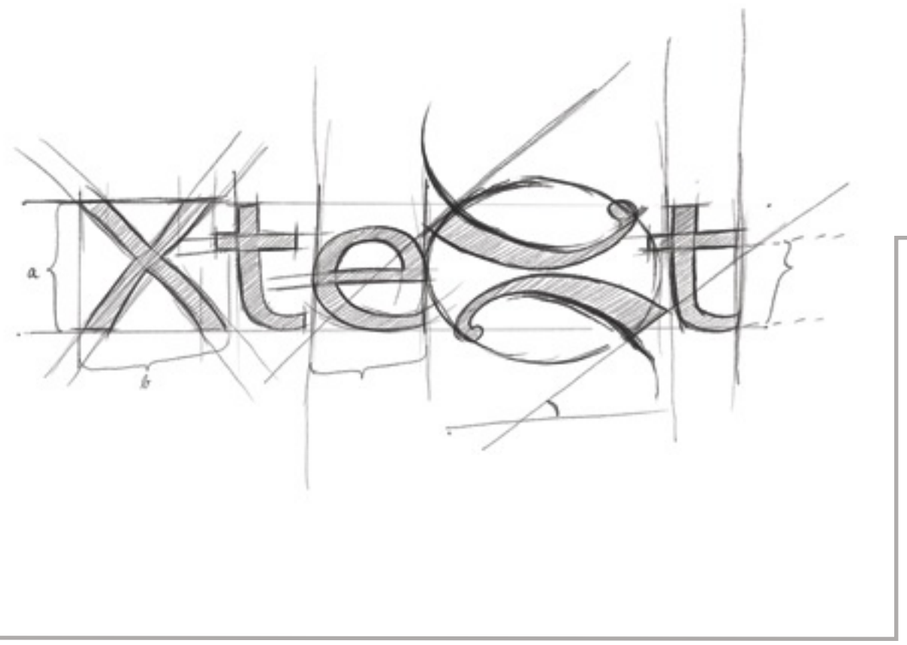
Level of Abstraction

Reuse existing, proven technology and apply the lessons learned


a
b

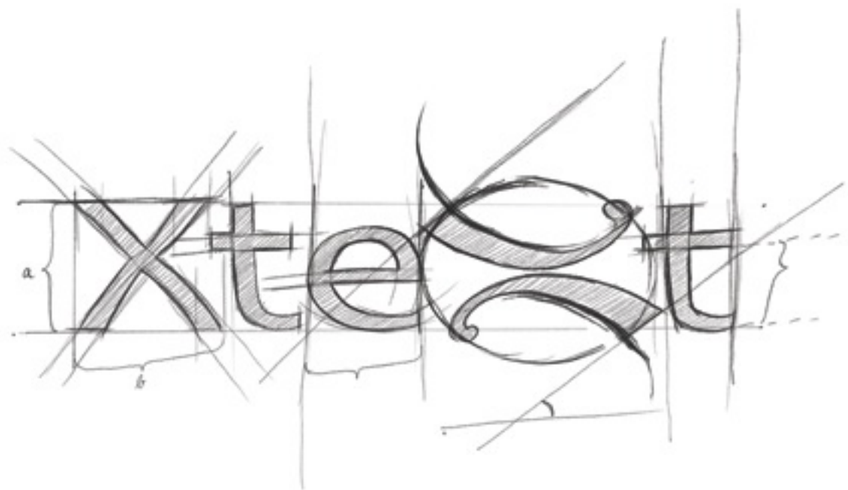

Xtext





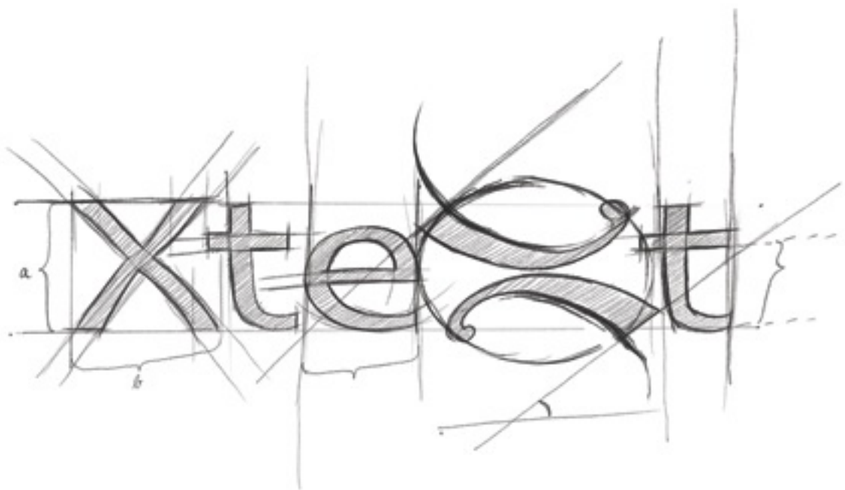
Eclipse IDE Framework (JFace Text, etc.)

Java Development Tools (JDT)



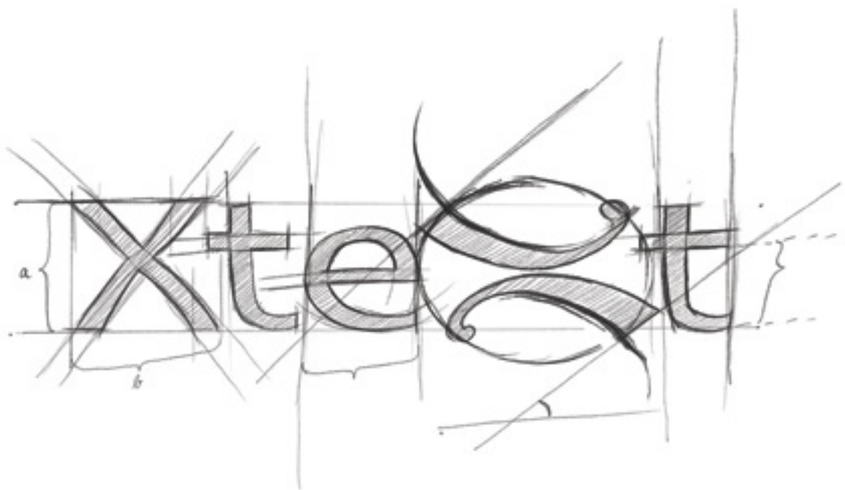
Eclipse IDE Framework (JFace Text, etc.)

Java Development Tools (JDT)



Eclipse IDE Framework (JFace Text, etc.)

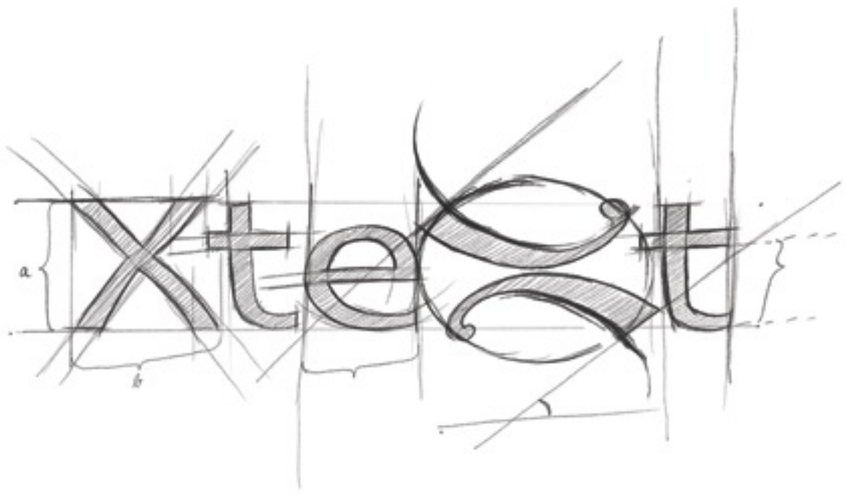
Java Development Tools (JDT)



Eclipse IDE Framework (JFace Text, etc.)

Eclipse Modeling Framework (EMF)

Java Development Tools (JDT)

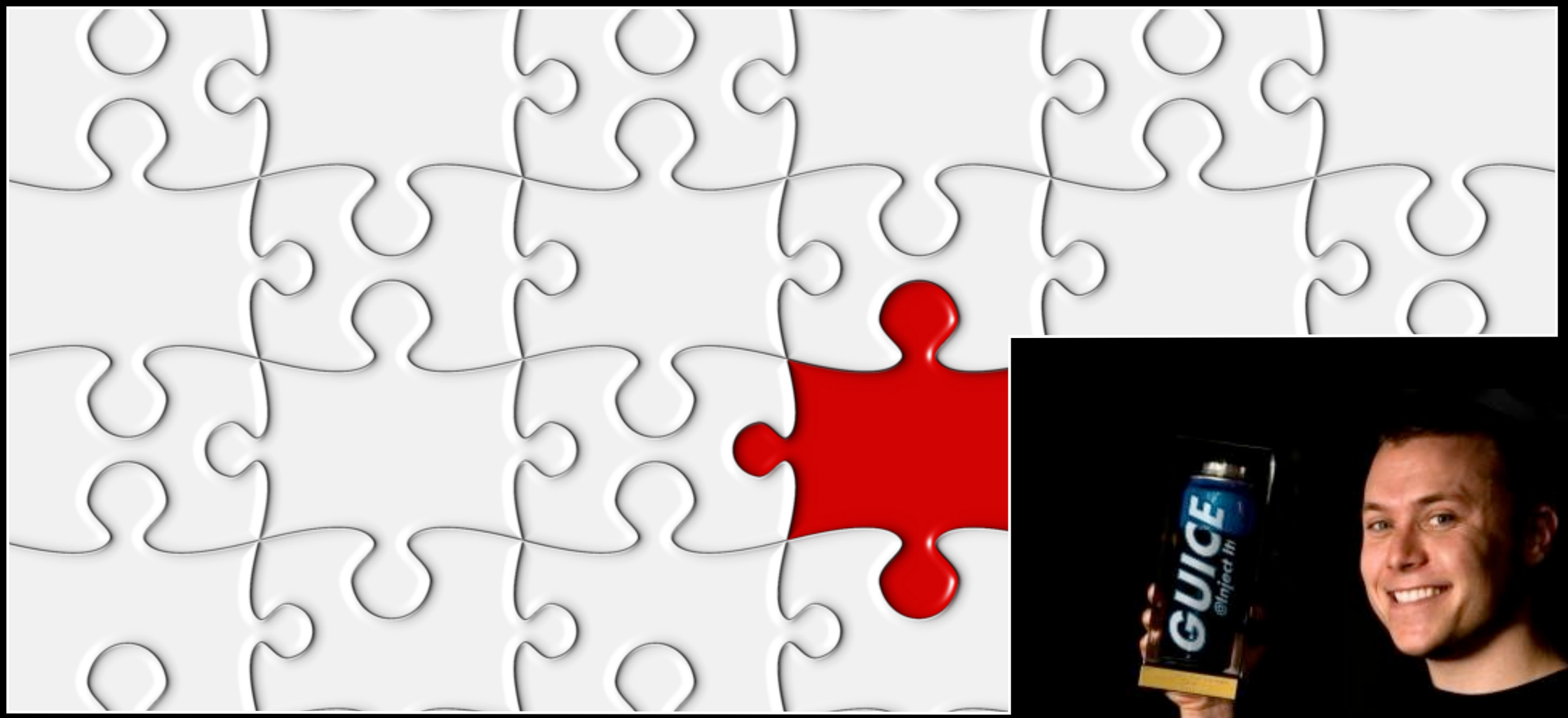


Antlr Parser Generator

Eclipse IDE Framework (JFace Text, etc.)

Eclipse Modeling Framework (EMF)

Xtext is Highly Adaptable



Advanced Language-Specific Editing Features by Default

Advanced Language-Specific Editing Features by Default

Syntax Coloring

Advanced Language-Specific Editing Features by Default

Syntax Coloring

Wizards

Advanced Language-Specific Editing Features by Default

Content Assist

Syntax Coloring

Wizards

Advanced Language-Specific Editing Features by Default

Content Assist

Syntax Coloring

Code Folding

Wizards

Advanced Language-Specific Editing Features by Default

Content Assist

Find References

Syntax Coloring

Code Folding

Wizards

Advanced Language-Specific Editing Features by Default

Global Indexing

Content Assist

Find References

Syntax Coloring

Code Folding

Wizards

Advanced Language-Specific Editing Features by Default

Go To Declaration

Global Indexing

Content Assist

Find References

Syntax Coloring

Code Folding

Wizards

Advanced Language-Specific Editing Features by Default

Go To Declaration

Global Indexing

Content Assist

Find References

Syntax Coloring

Code Folding

Wizards

Bracket Matching

Advanced Language-Specific Editing Features by Default

Go To Declaration

Global Indexing

Content Assist

Find References

Syntax Coloring

Auto Editing

Code Folding

Wizards

Bracket Matching

Advanced Language-Specific Editing Features by Default

Go To Declaration

Global Indexing

Content Assist

Find References

Syntax Coloring

Incremental Builders

Auto Editing

Code Folding

Wizards

Bracket Matching

Advanced Language-Specific Editing Features by Default

Go To Declaration

Global Indexing

Content Assist

Outline View

Find References

Syntax Coloring

Incremental Builders

Auto Editing

Code Folding

Wizards

Bracket Matching

Advanced Language-Specific Editing Features by Default

Go To Declaration

Global Indexing

Content Assist

Outline View

Find References

Validation

Syntax Coloring

Incremental Builders

Auto Editing

Code Folding

Wizards

Bracket Matching

Advanced Language-Specific Editing Features by Default

Template Proposals

Go To Declaration

Global Indexing

Content Assist

Outline View

Find References

Validation

Syntax Coloring

Incremental Builders

Auto Editing

Code Folding

Wizards

Bracket Matching

Advanced Language-Specific Editing Features by Default

Template Proposals

Go To Declaration

Global Indexing

Content Assist

Outline View

Quick Fixes

Find References

Validation

Syntax Coloring

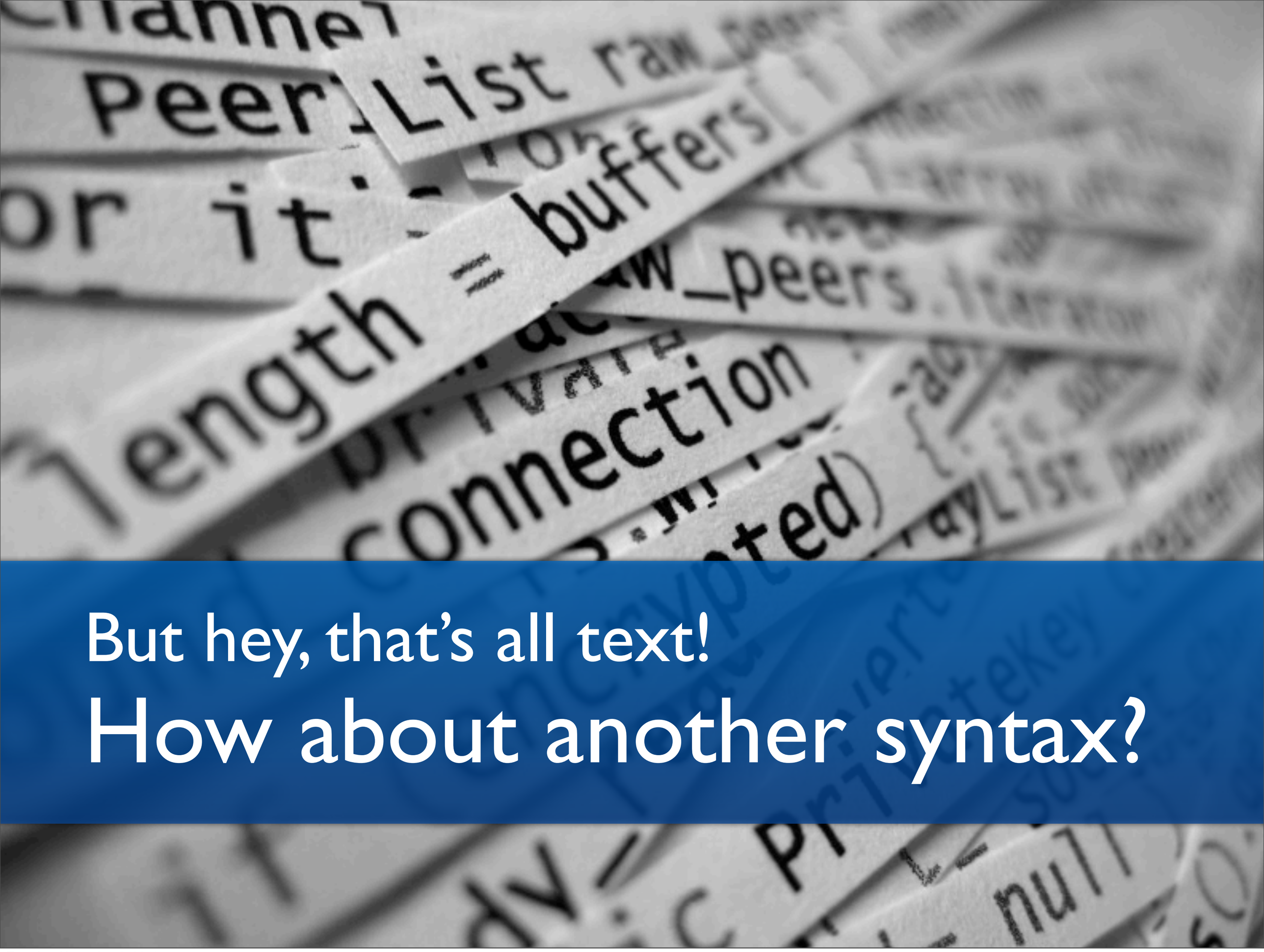
Incremental Builders

Auto Editing

Code Folding

Wizards

Bracket Matching



But hey, that's all text!

How about another syntax?

Debug Java

Xtext.xtext

Generic Editor – Xtext.xtext

Model

- platform:/resource/org.eclipse.xtext/src/org/eclipse/xtext/Xtext.xte
  - Grammar org.eclipse.xtext.Xtext
    - Referenced Metamodel
    - Referenced Metamodel ecore
    - Parser Rule Grammar
      - Type Ref
      - Group
    - Parser Rule GrammarID
    - Parser Rule AbstractRule
    - Parser Rule AbstractMetamodelDeclaration
    - Parser Rule GeneratedMetamodel
    - Parser Rule ReferencedMetamodel
    - Parser Rule ParserRule
    - Parser Rule TypeRef
    - Parser Rule Alternatives
    - Parser Rule UnorderedGroup

Properties

Defines Hidden Tokens	☐
Hidden Tokens	...
Name	org.eclipse.xtext.Xtext
Used Grammars	Grammar org.eclipse.xtext.common.Termin ...

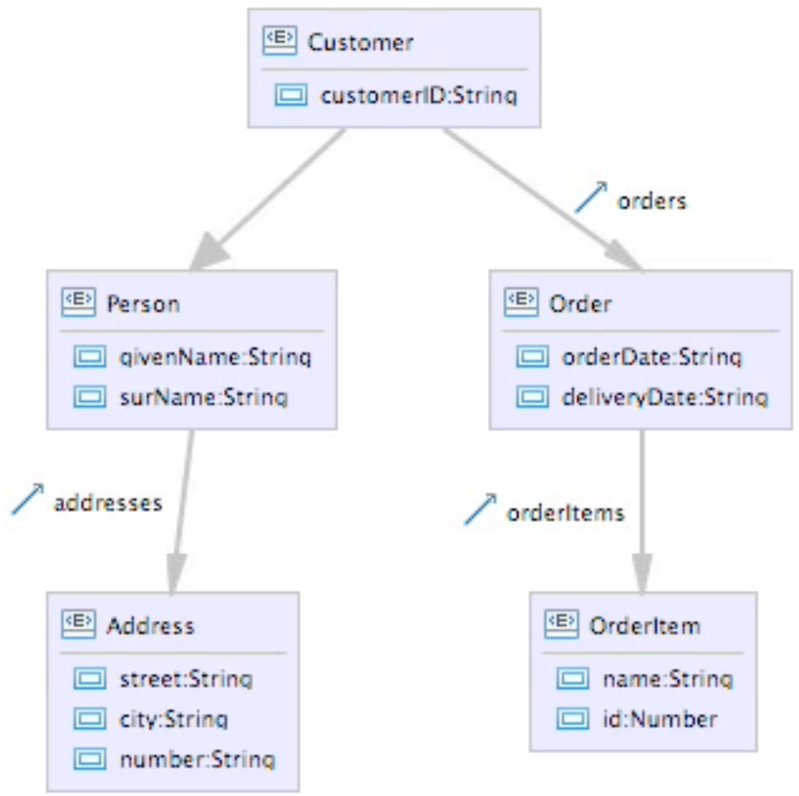
Xtext.xtext

```
/*******************************************************************************
 * Copyright (c) 2008,2010 itemis AG and others.
 * All rights reserved. This program and the accompanying materials
 * are made available under the terms of the Eclipse Public License
 * which accompanies this distribution, and is available at
 * http://www.eclipse.org/legal/epl-v10.html
 *******************************************************************************/
grammar org.eclipse.xtext.Xtext with org.eclipse.xtext.common.Termi

import "classpath:/org/eclipse/xtext/Xtext.ecore"
import "http://www.eclipse.org/emf/2002/Ecore" as ecore

Grammar:
    'grammar' name=GrammarID ('with' usedGrammars+=[Grammar|Grammar
    (definesHiddenTokens?='hidden' '(' (hiddenTokens+=[AbstractRule
    metamodelDeclarations+=AbstractMetamodelDeclaration*
    (rules+=AbstractRule)+
;

GrammarID returns ecore::EString:
  ID ('.' ID)*;

AbstractRule : ParserRule | TerminalRule | EnumRule;

AbstractMetamodelDeclaration :
    GeneratedMetamodel | ReferencedMetamodel;
/*
 * constraint: typeSelect(GeneratedMetamodel).size() == typeSelect(
 * generated metamodels have to have different aliases
 */
GeneratedMetamodel :
    'generate' name=ID ePackage=[ecore::EPackage|STRING] ('as' alia

/*
 * referenced metamodels may share aliases with other referenced me
 * and with generated metamodels
 */
ReferencedMetamodel :
    'import' ePackage=[ecore::EPackage|STRING] ('as' alias=ID)?;

ParserRule :
    name=ID ('returns' type=TypeRef)? (definesHiddenTokens?='hidden
        alternatives=Alternatives
```

Selected Object: Grammar org.eclipse.xtext.Xtext

Java – test/test.entity – Eclipse SDK

test.entity_diagram



Palette

- Entity
- SuperType
- SimpleProperty
- ReferenceProp...

test.entity

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

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


entity Order {
  orderItems refs many OrderItem
  property orderDate : String
  property deliveryDate : String
}

entity OrderItem {
  property name : String
  property id : Number
}

entity Customer extends Person {
  property customerID : String
  orders refs many Order
}
```

Writable | Insert | 9 : 27

Tuesday, November 2, 2010

Tuesday, November 2, 2010

Xtext is

a scalable, easy to use
language development framework

Xtext is

a scalable, easy to use
language development framework
based on Eclipse and EMF

Xtext is

a scalable, easy to use
language development framework
based on Eclipse and EMF
bringing JDT-like editing experience
to **your language**.