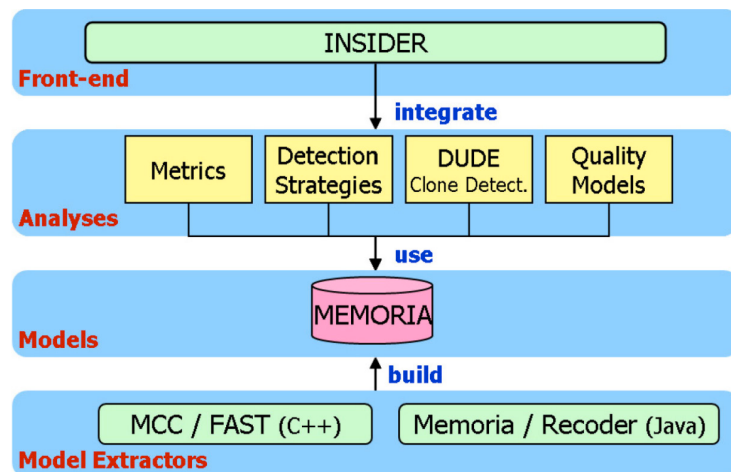




XCore: Support for Developing Program Analysis Tools

Alexandru Ștefănică
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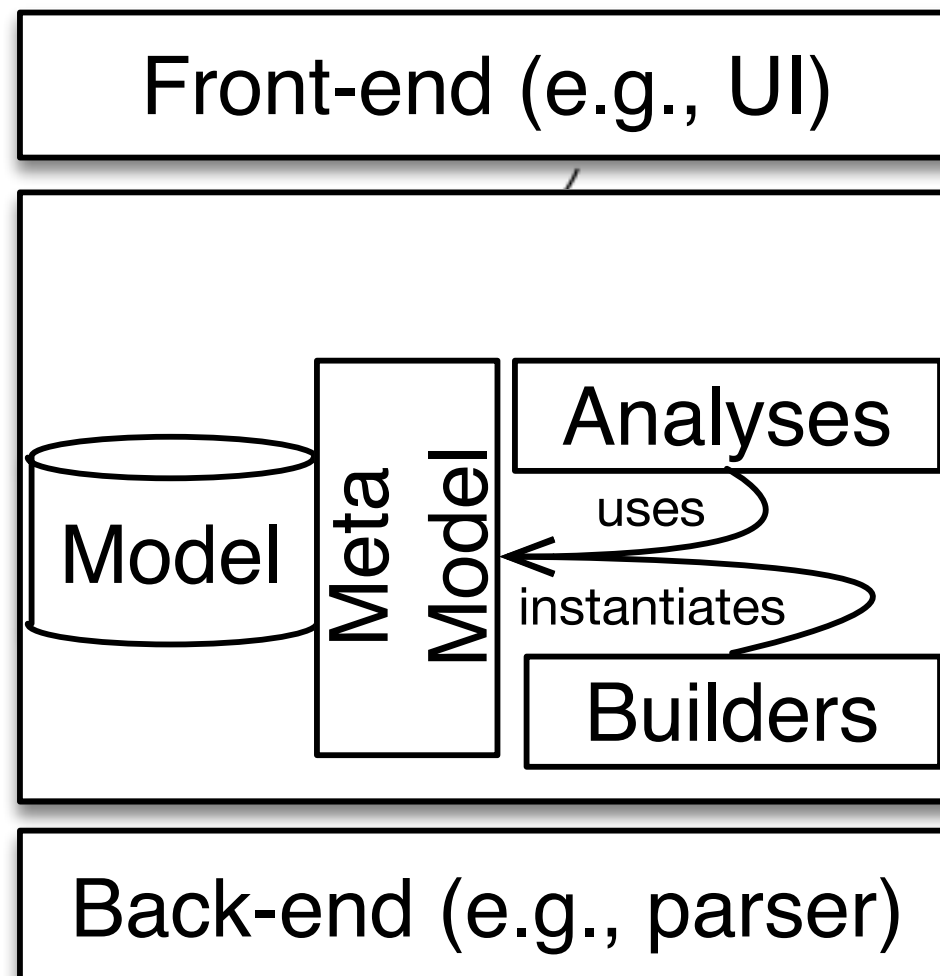
Analysis tools **generic** architecture



iPlasma / Mcc



Randoop



TEDi

developed

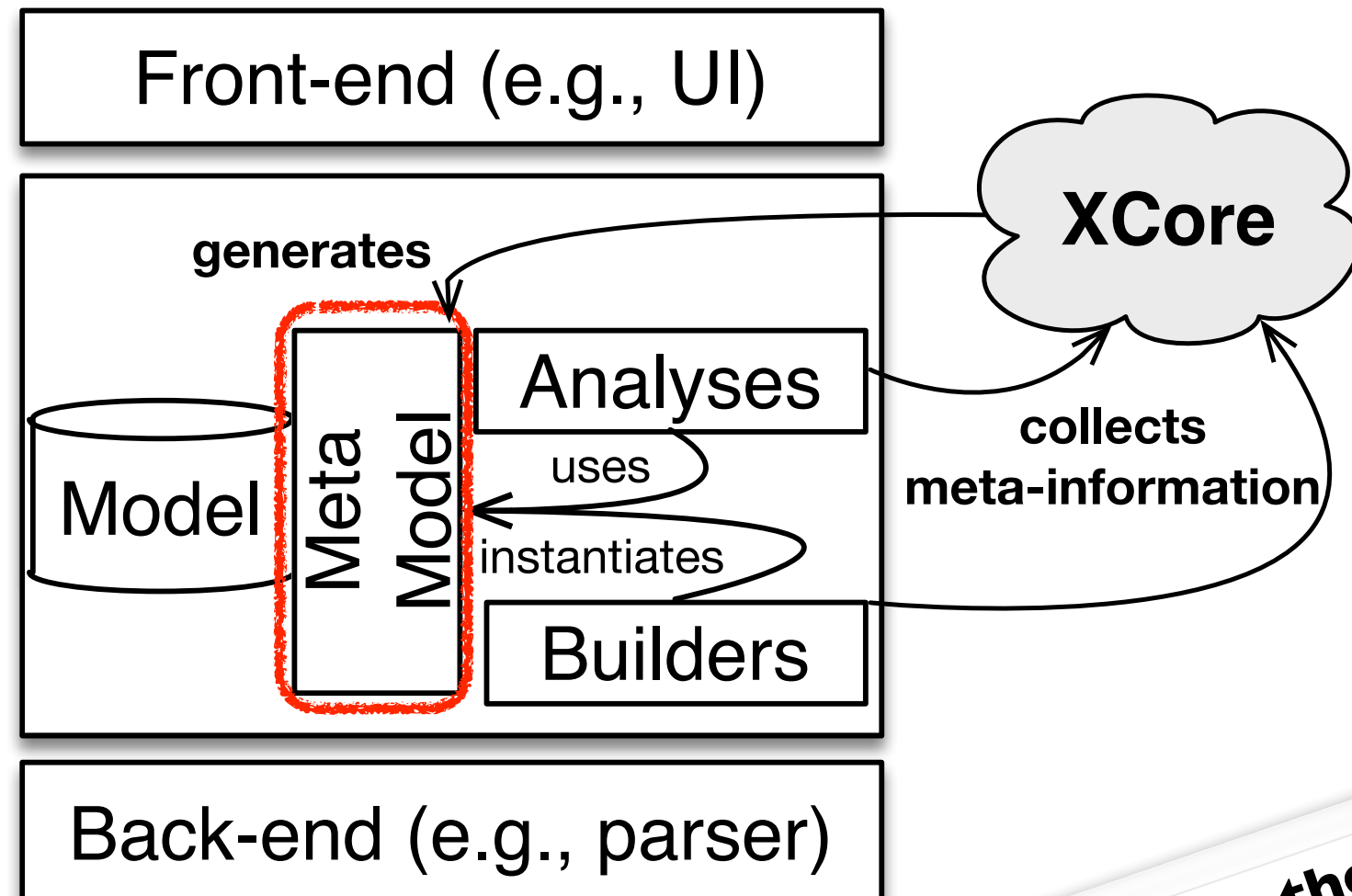


WALA

T. J. WATSON LIBRARIES FOR

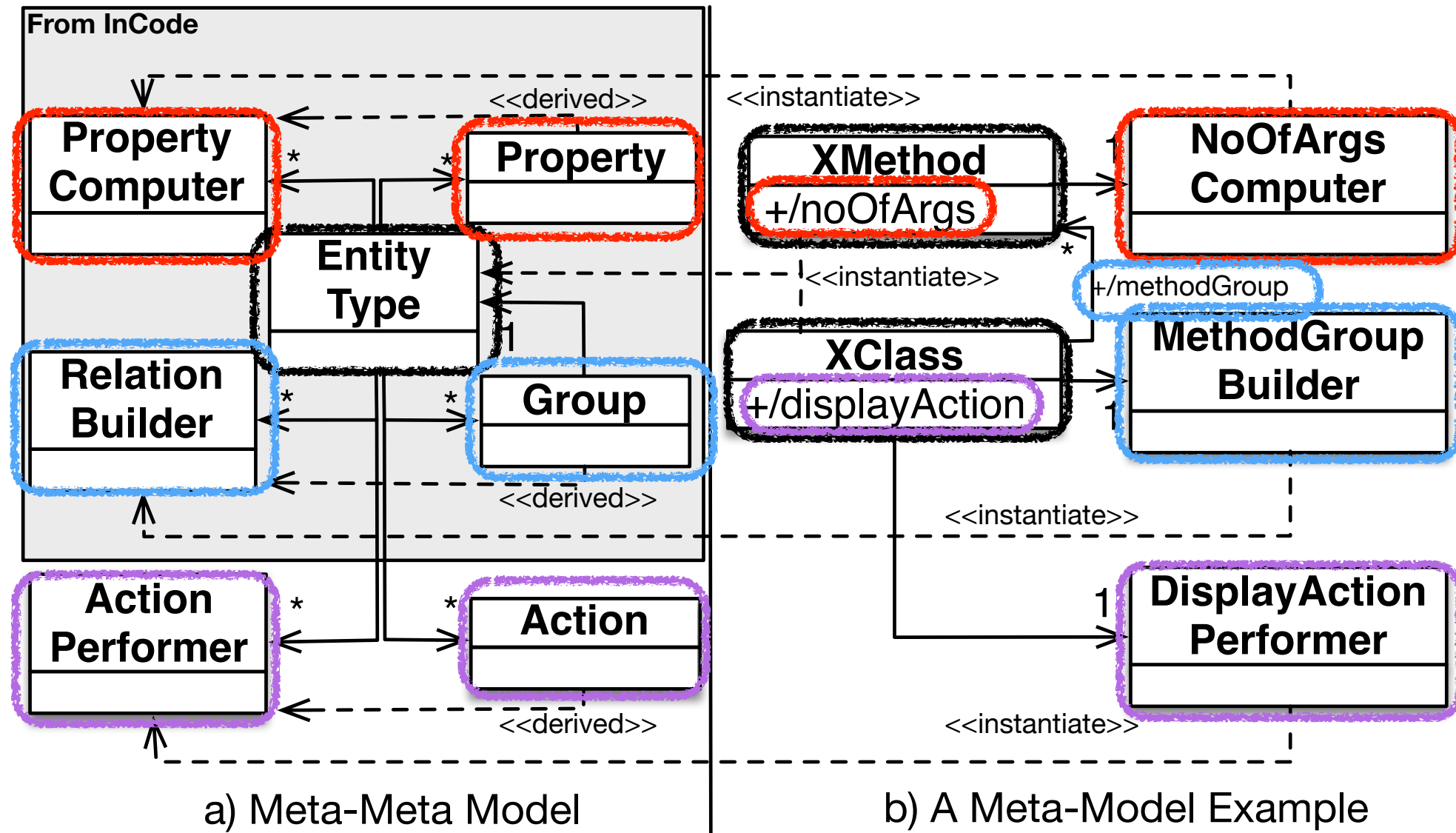
used

Why **XCore**?



Implementing the **model representation** (and its related mechanisms) is a recurring task

Describing the model

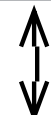


XCore - Eclipse plugin

The Eclipse Project of the **Tool**

```
/**
 * Documentation
 */
@PropertyComputer
class NoOfArgs implements
IPropertyComputer<Integer,XMethod>
{
    public Integer compute() {...}
}
```

```
//Generated by XCore
interface XMethod {
    /**
     * Documentation
     */
    public Integer noOfArgs();
}
class XMethodImpl implements XMethod
{
    ...
}
```



Eclipse IDE



XCore

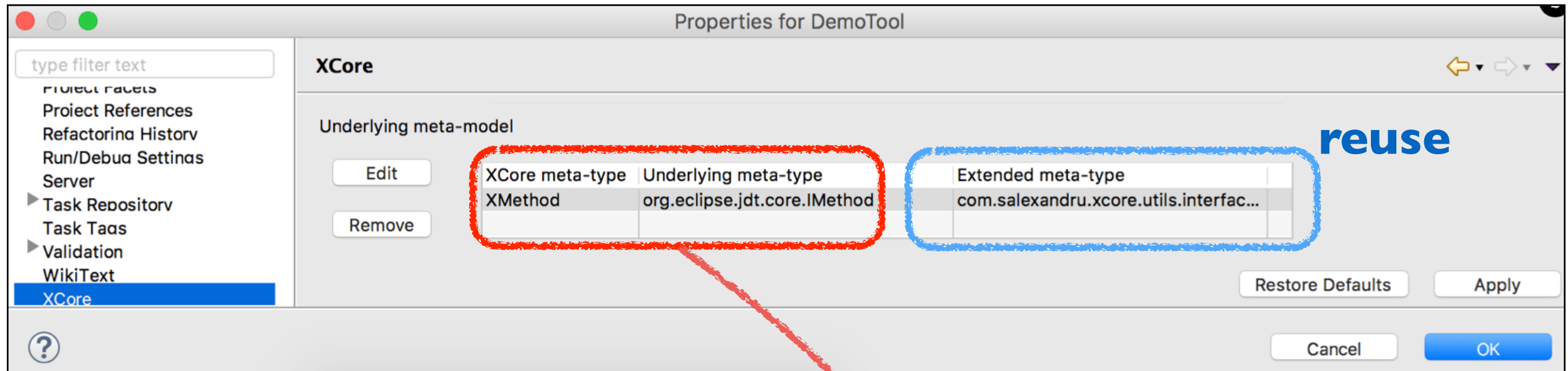
Annotation
Processor

**build
time**

generates

@PropertyComputer
@RelationBuilder
@ActionPerformer

Additional features



available

```
@PropertyComputer
public class NoOfArguments
    implements IPropertyComputer<Integer, XMethod> {

    @Override
    public Integer compute(XMethod entity) {
        IMethod tmp = entity.getUnderlyingObject();
        return tmp.getParameterCount();
    }
}
```

set

```
@RelationBuilder
public class MethodGroup implements
    IRelationBuilder<XMethod, XClass> {

    @Override
    public Group<XMethod> buildGroup(XClass
        IType tmp = entity.getUnderlyingObject()
        Group<XMethod> res = new Group<>();
        try {
            for(IMethod aMet : tmp.getMethods())
            {
                XMethod m =
                    Factory.getInstance()
                        .createXMethod(aMet);
                res.add(m);
            }
        } catch (JavaModelException e) {}
        return res;
    }
}
```


Additional features

Underlying meta-model

Edit

Remove

XCore meta-type	Underlying meta-type	Extended meta-type
XMethod	org.eclipse.jdt.core.IMethod	com.salexandru.xcore.utils.interfac...

Extra Underlying meta-models

Add New Meta-Model Type

Edit

Remove

XCore meta-type	New Underlying meta-type	Transformer
XMethod	com.ibm.wala.types.MethodReference	xcoreview.transformations.JdtMeth...

original binding

Extra-binding

```
@PropertyComputer
public class NumberOfCalls implements IPropertyComputer<Integer, XMethod> {

    @Override
    public Integer compute(XMethod entity) {
        IJavaProject p = entity.getUnderlyingObject().getJavaProject();

        return cg.getNodes(entity.asMethodReference()).size();
    }
}
```

Pros & Cons

Generate the meta-model source code

Reuse an XCore-based tool

specialise the meta-model of another tool

Easy to extend

just add annotated classes

Problems with incremental compilation

all annotated classes are needed

Future Work

“Merge Tool Into ...” feature
combine two XCore-based tools



XCore: Support for Developing Program Analysis Tools

<https://github.com/SAlexandru/XCore>

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