Bringing MDA to Eclipse, using a pragmatic approach

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One day I was thinking ...

- Is coding really the best to develop?
- Why is development sometimes so boring?
- Why are other coders so slow?
- Why do other guys always write such crappy code?
- A football team works best with 11 guys
  - *so why is pair programming so popular?*
- Is “new technology” always better?
  - *Of course, but why?*

Ingredients for this presentation

- **Eclipse**
  - Code centric software development
  - From a Java IDE to a platform
- **Model Driven Development**
  - Software development paradigms
  - Model transformations and code generation
- **Pragmatism**
  - Beautiful solutions are only beautiful when they *work beautifully*

What can you expect?

- Brief history of Eclipse
- Software development paradigms
- Model-Driven Architecture / Development
- MDA & Eclipse: a happy marriage?
- Examples / Demos
- Conclusions & Future

Very brief history of Eclipse

- First there was Visual Age Micro Edition
- Then Eclipse 1.0
- Then Eclipse 2.0
- Then Eclipse 3.0
- And now we have Callisto

Or without version numbers:

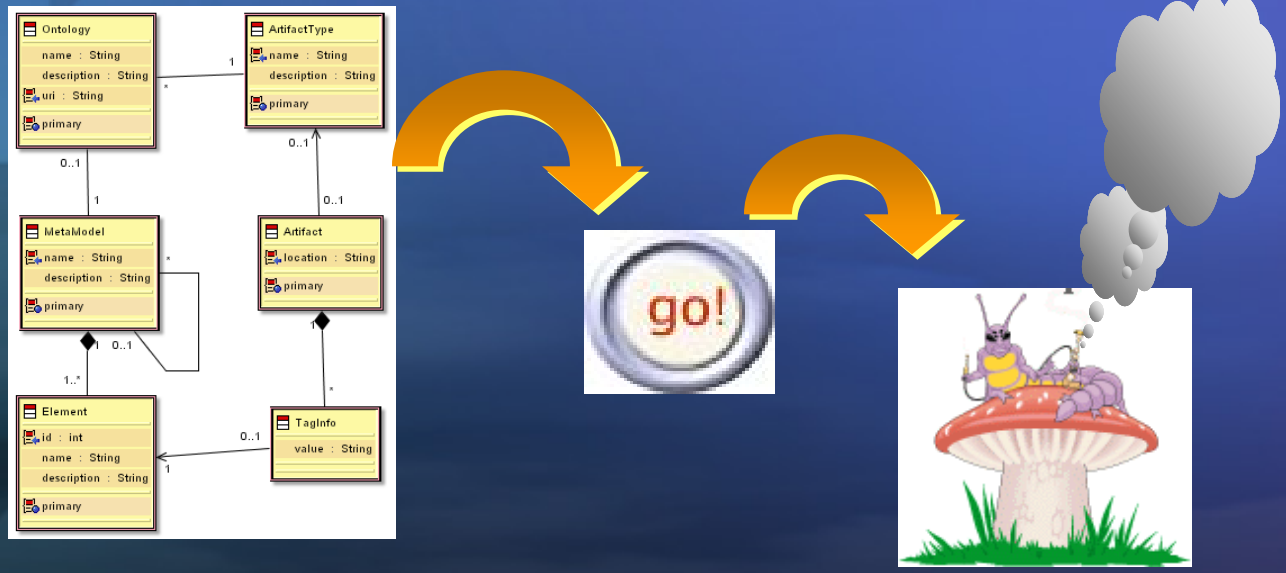
- In essence you can also look at it in this way:
  - J2ME
  - J2SE
  - J2SE with refactoring support
  - More focus on platform and external projects
  - 10 projects are bundled with Eclipse into Callisto: focus on J2EE, web tooling, EMF etc ...
- The next step: MDA?

Software Development Paradigms

- **It looks like the world is divided in two:**
  1. **The agile, lightweight, extreme, test-driven, hardly any process, no-bullshit, hip, brain-aided software engineering *(what most people want)***
  2. **The heavy-weight, fully-documented, requirements driven, non-creative, boring old-fashioned software engineering *(what most people actually do)***
- **People tend to**
  - **Put code-centric development using Eclipse in (1)**
  - **Put Model-Driven Development or MDA in (2)**
- **WHY?**

Fairy tale MDA promise:

- **MDA!!**
  - **Model application & services completely in UML**
  - **Push some buttons in our MDA tool**
  - **Presto-magic, your business app is done!**



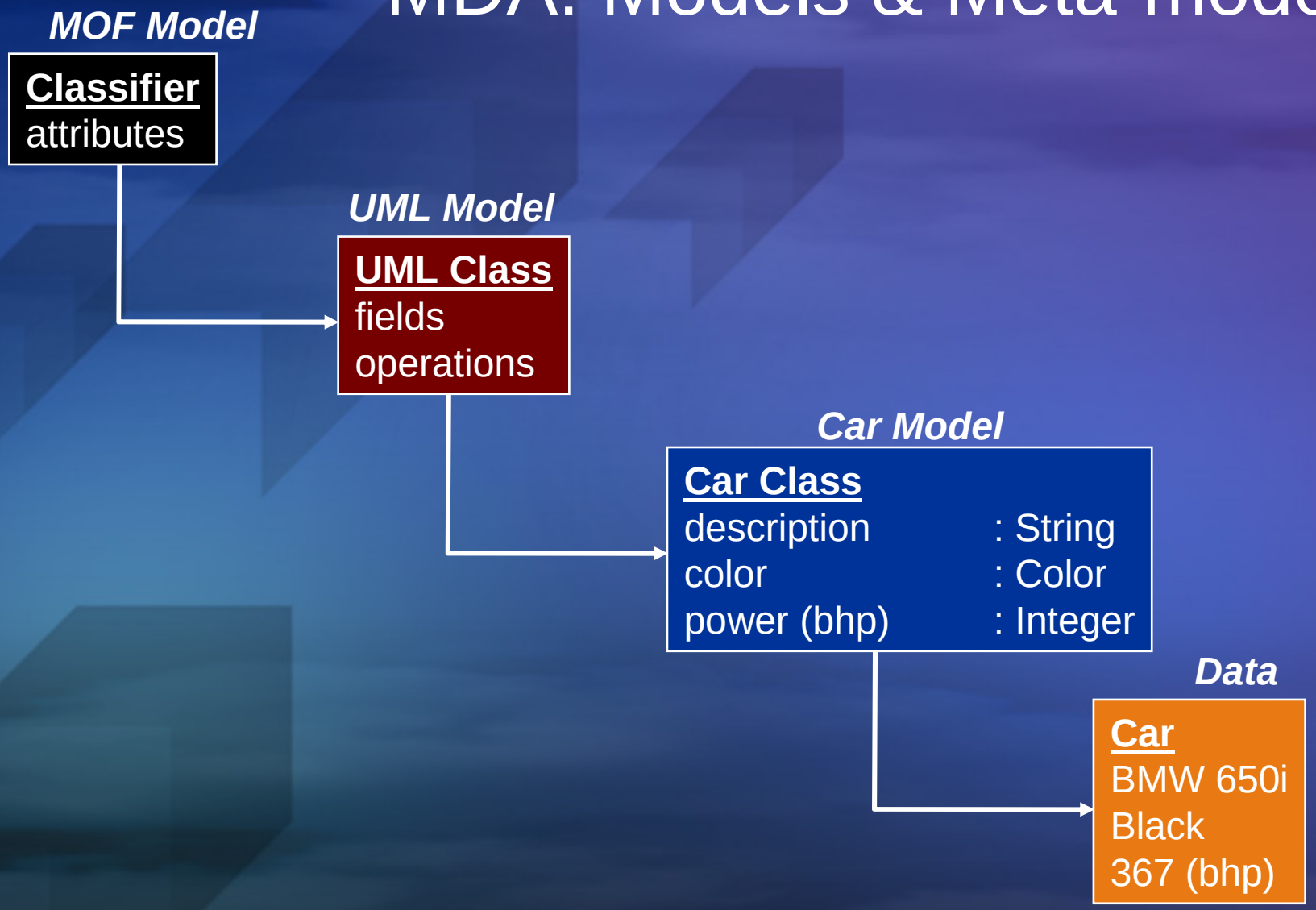
We no longer believe in miracles ...

- **Critics:**
  - **OMG's MDA: "you can model everything in UML and generate a complete application."**
  - **Will UML will ever be able to deliver on this complete promise.**
  - **Does MDA require too much skill?**
  - **Can we really share models?**
  - **Can MDA handle integration with legacy apps?**
  - **Is it worth the bother to do all this modeling?**
  - **Isn't MDA just another go at the CASE Monster?**
- **Indeed, UML/MDA is neither perfect nor a silver bullet**
- **However, pragmatic MDA is a very real solution!**

So, what is pragmatic MDA?

- **MDA : Model Driven Architecture**
  - Models and Meta-models
  - Model-to-Model transformations
  - Code Generation
  - Better: *text* Generation
    - Ant build scripts
    - Deployment descriptors
    - Documentation
    - Etc.
- **Pragmatic**
  - Use an agile process
  - Model → Generate → Adapt → Test (very small loops)

MDA: Models & Meta-models



How to use MDA?

Classifier
attributes

UML Class
fields
operations

Car Class

description	: String
color	: Color
power (bhp)	: Integer

Data
BMW 650i
Black
367 (bhp)

Code Generation

```
public class Car {

    private String description;
    private Color color;
    private int power;

    public Color getColor() {
        return color;
    }
    public void setColor(Color color) {
        this.color = color;
    }
…
}
```

```
Car car = new Car();
car.setDescription("BMW 650i");
car.setColor(Color.BLACK);
car.setPower(367);
```

Back to the main topic:

- **Bringing MDA to Eclipse**
  - **Offering MDA support on the Eclipse Platform**
- **Required:**
  - **Modeling environment**
  - **Integration with existing views (trees, properties)**
  - **Good integration with coding capabilities**
  - **Easy Model to Code navigation**

MDA and Eclipse

- **Offerings:**
  - **Generative Modeling Tools (GMT) & openArchitectureWare**
  - **NEW: Eclipse Modeling Project**
    - **Eclipse top-level project**
    - **Contributions from Borland, IBM and Compuware**
    - **Only just started but contains EMF, GMF and GMT**
  - **Compuware's OptimalJ**
  - **Borland Together Architect**

www.ddj.com/dept/architect/184415500

The commercial side of Eclipse

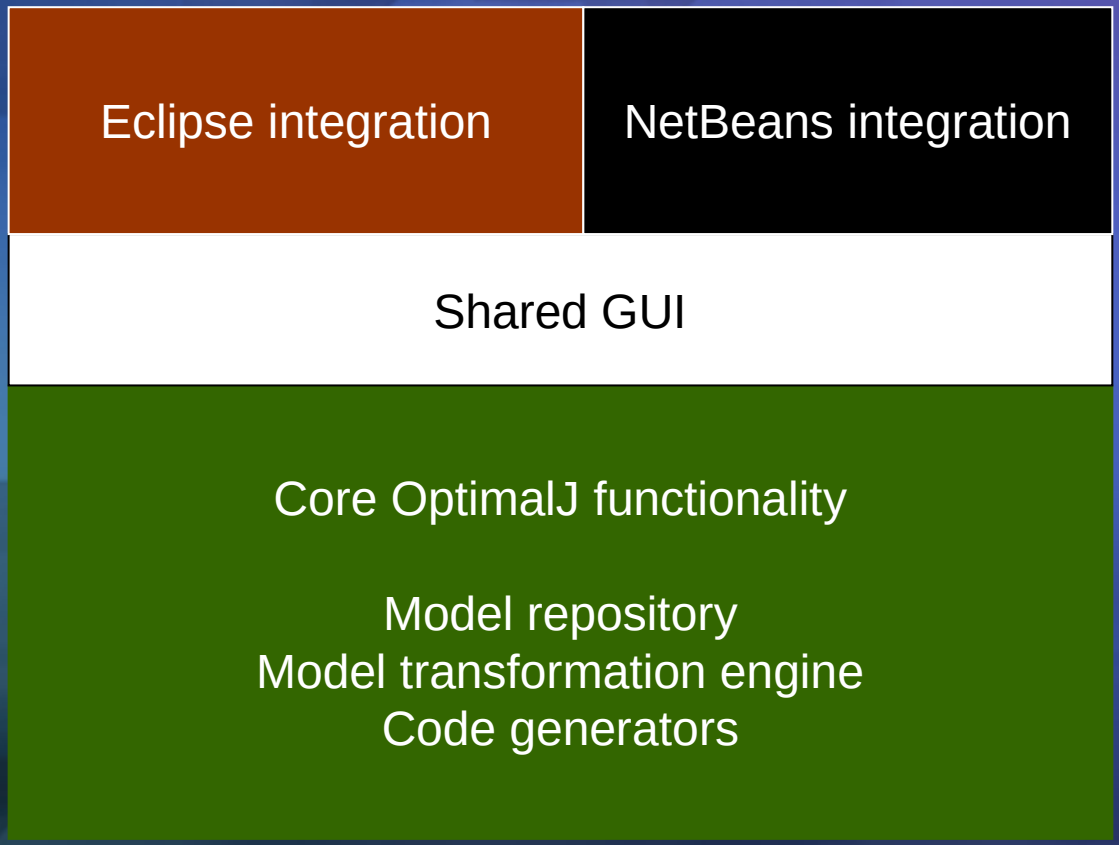
- Eclipse and Callisto are open-source but not so are:
  - BEA Workshop
  - XMLBuddy Pro
  - Borland Together
  - Compuware's OptimalJ
  - Canoo
  - MyEclipse
  - Rational Application Developer / Software Architect
  - Omondo EclipseUML2 studio
  - http://www.eclipse.org/community/commercialplugins.php
  - The Eclipse Foundation maintains good balance between opens-source and commercial software

Bringing MDA to Eclipse - examples

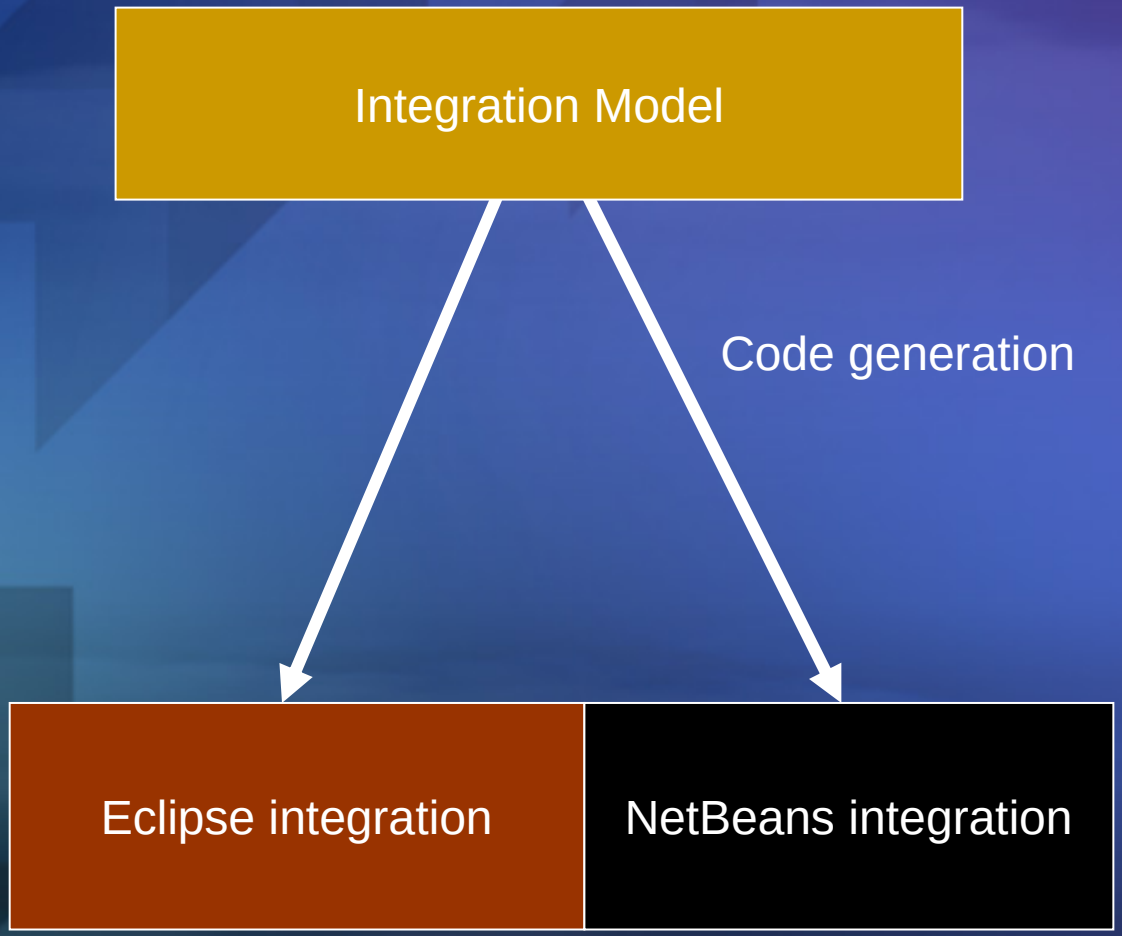
- **Enough said, let's have a look at some real things**
  - **Example 1: MDA with MDA**
  - **Example 2: Generating Swing wizards**
  - **Example 3: Developing Business Applications using pre-defined patterns.**

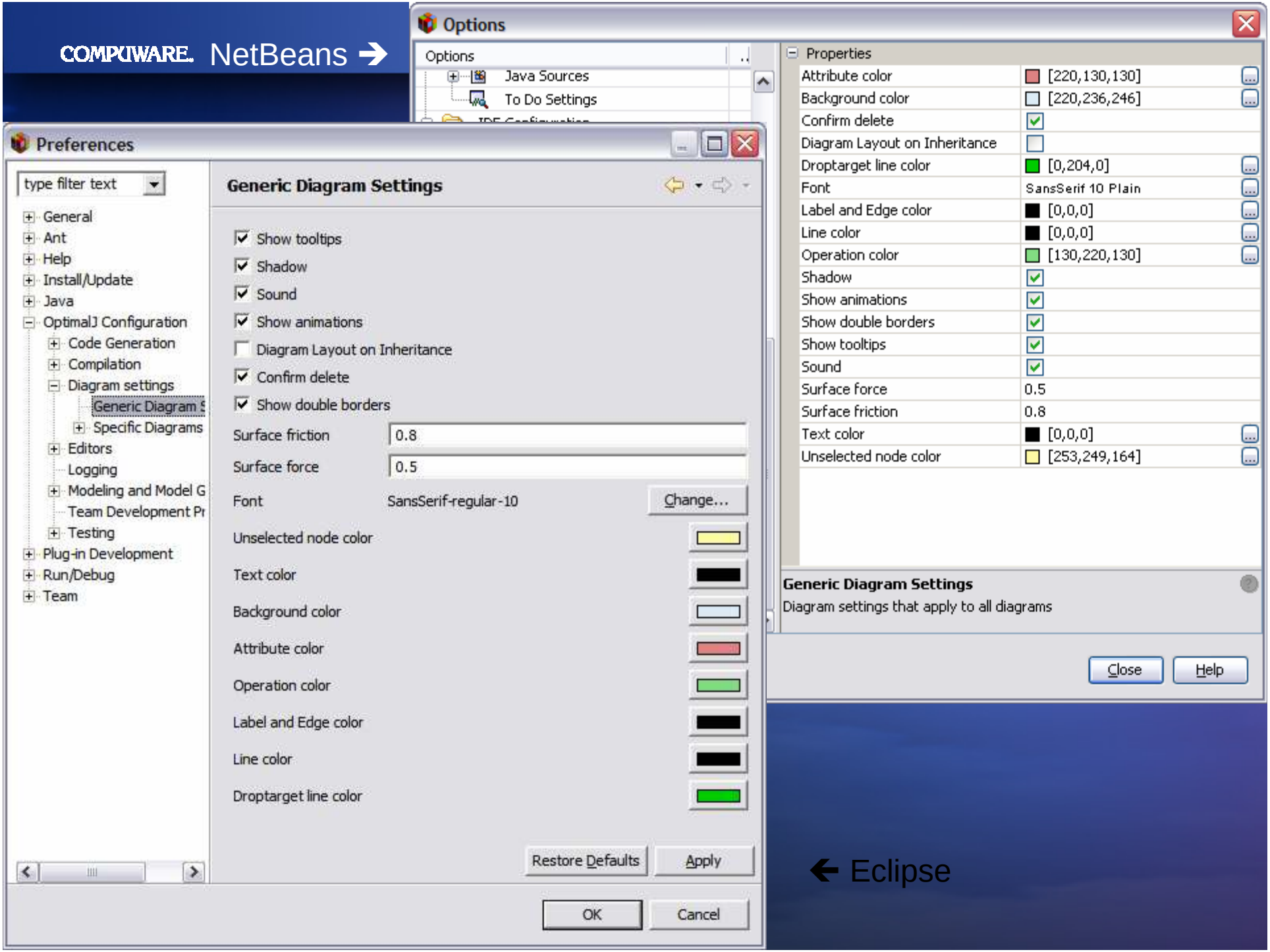
MDA with MDA:

- **Developing parts of OptimalJ with MDA**



The MDA way


Integration Model
Code generation
Eclipse integration
NetBeans integration


COMPUWARE. NetBeans →
Options
Options
Java Sources
To Do Settings
Properties
Attribute color [220,130,130]
Background color [220,236,246]
Confirm delete
Diagram Layout on Inheritance
Droptarget line color [0,204,0]
Font SansSerif 10 Plain
Label and Edge color [0,0,0]
Line color [0,0,0]
Operation color [130,220,130]
Shadow
Show animations
Show double borders
Show tooltips
Sound
Surface force 0.5
Surface friction 0.8
Text color [0,0,0]
Unselected node color [253,249,164]
Generic Diagram Settings
Diagram settings that apply to all diagrams
Close
Help
Preferences
type filter text
General
Ant
Help
Install/Update
Java
OptimalJ Configuration
Code Generation
Compilation
Diagram settings
Generic Diagram S
Specific Diagrams
Editors
Logging
Modeling and Model G
Team Development Pr
Testing
Plug-in Development
Run/Debug
Team
Generic Diagram Settings
Show tooltips
Shadow
Sound
Show animations
Diagram Layout on Inheritance
Confirm delete
Show double borders
Surface friction 0.8
Surface force 0.5
Font SansSerif-regular-10
Change...
Unselected node color
Text color
Background color
Attribute color
Operation color
Label and Edge color
Line color
Droptarget line color
Restore Defaults
Apply
OK
Cancel
← Eclipse

Preferences, the MDA way

MOF Classifier
attributes

MOF Model

MOF Classifier
attributes

UML Class
fields
operations

Settings Meta-Model

Settings Class
properties

Car Class

description	: String
color	: Color
power (bhp)	: Integer

OptimalJ Settings Model

Generic Diagram Settings

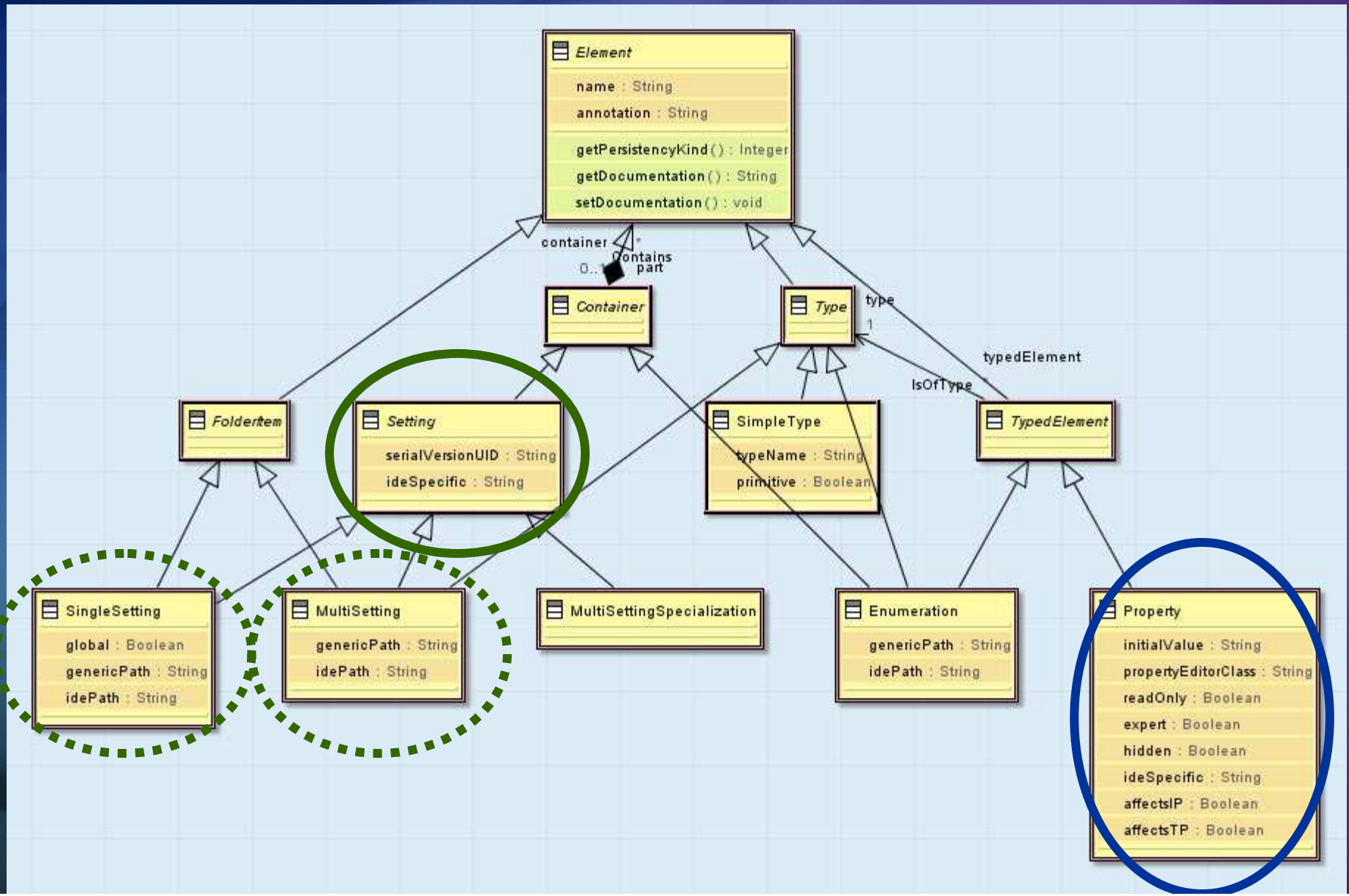
Text Color	: Color
Line Color	: Color
Shadow	: boolean

Car
BMW 650i
Black
367 (bhp)

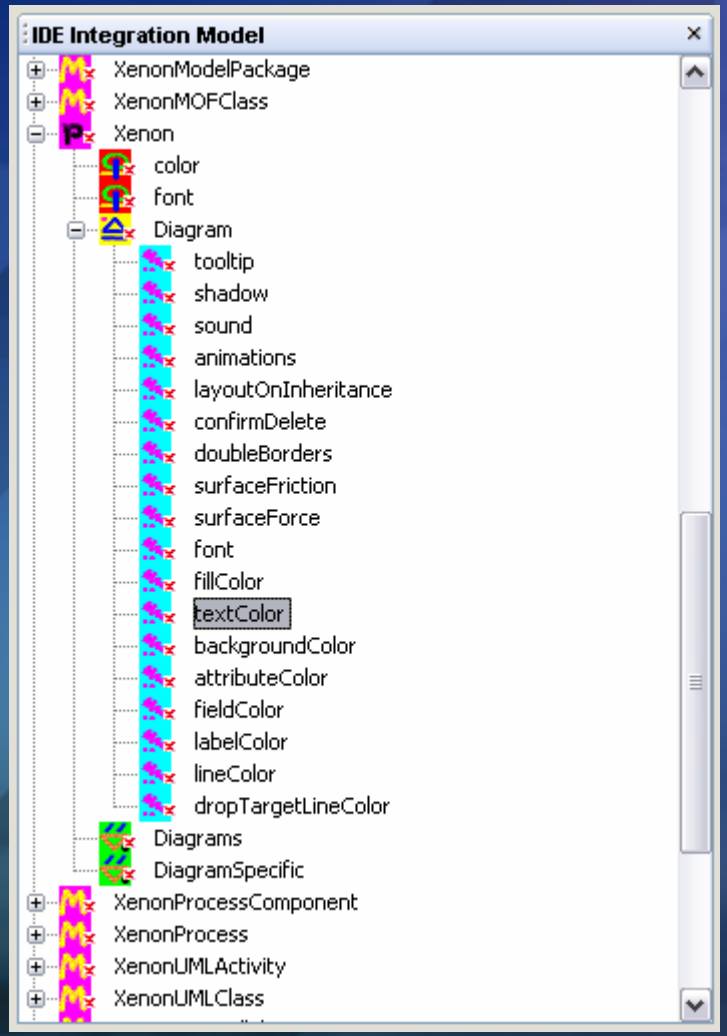
Data

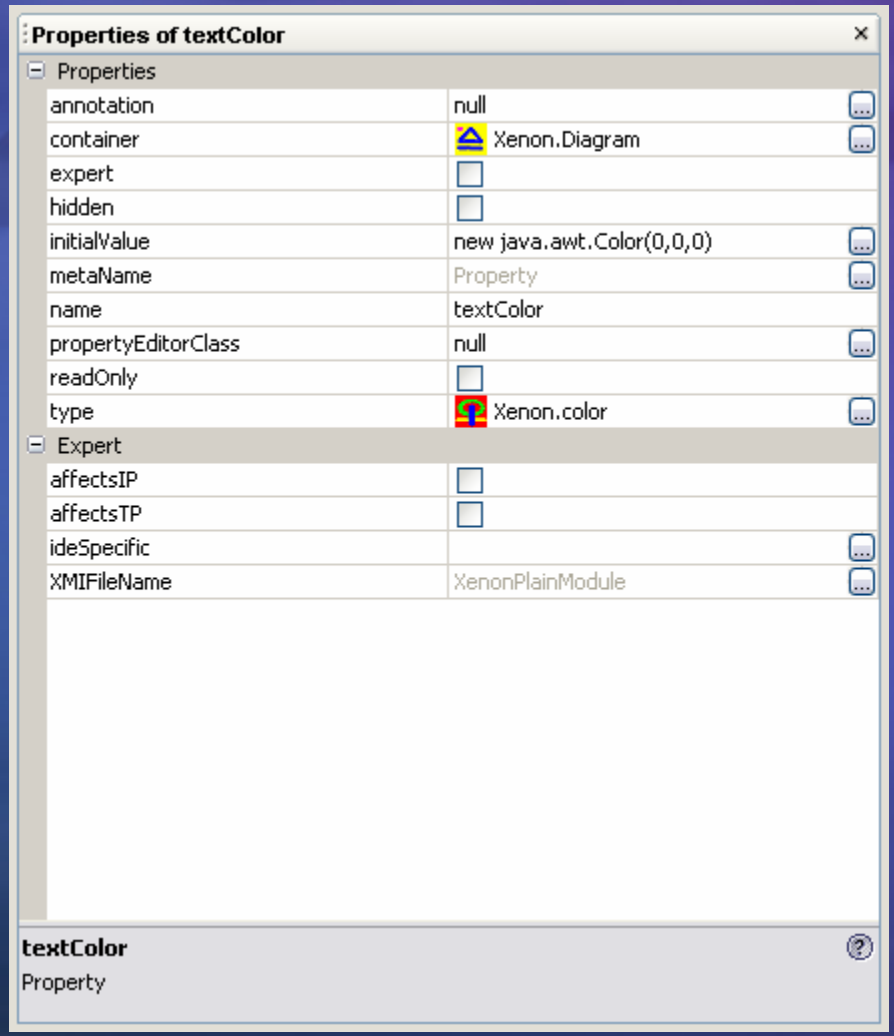
Current Settings
Black (text color)
Black (line color)
true (shadows)

Preferences: the meta-model



Preferences : the model





PreferencePage.tpl

```
/**
 * Eclipse preference page for <module.name>
 */
public class <UCF(setting.name)>PreferencePage extends PreferencePage
    implements IWorkbenchPreferencePage {

    private Composite mainPanel;

    protected Control createContents(Composite parent) {
        mainPanel = new Composite(result, SWT.NONE);
        ...
        Composite panel = new Composite(mainPanel, SWT.NONE);
        ...
        <BLOCK("createContents")></BLOCK>
        ...
    }
    <CREATEWIDGETS(imports, module, setting)>
}
```

CreateWidgets.tpl

```
<TEMPLATE PUBLIC CREATEWIDGETS(Set imports, Module module, Setting setting)>
    <FOR(Property property IN setting.part)>
        <IF (Util.hasBooleanType(property))>
            <BOOLEANWIDGET(imports, setting, property)>
        <ELSEIF (property.type.name.equals("color"))>
            <COLORWIDGET(imports, setting, property)>
         ...
         </IF>
    </FOR>

</TEMPLATE>
```

Example II: generating Swing wizards

- Investigation into generation of wizards
- Wizard model
- Code generation templates
- Run-time library

Example III: Business Applications

- Business applications have a lot common features
  - Database
  - Application server
  - Front-end
- But technology is changing very rapidly ...
  - EJB 1.x / 2.x and now 3.0
  - Hibernate, TopLink, Spring, ...
  - Struts, JSF, Tiles, Ajax, ...
- Can MDA help here as well?

Developing Business Apps

- What if somebody would have already developed a code-generator for:
  - EJB
  - Struts
  - Hibernate
- Developing Business Applications with pre-defined patterns.
- This can increase productivity a lot.
- Commercial tools such as OptimalJ offer this

Conclusions

- Eclipse: from Java IDE to technology platform
- MDA: from academic exercise to pragmatic development approach
- Eclipse & MDA:
  - Commercial tools
  - Open source initiative: Eclipse Modeling Project

Future & more information

- Dr Dobb's article on MDA tools:
  - www.ddj.com/dept/architect/184415500
- Keep an eye on the Eclipse Modeling Project
  - www.eclipse.org/modeling/
- OptimalJ Architecture Edition (the flagship)
  - Available on Eclipse soon
  - Tell your friends that you have already seen it ;-)

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