OCL Tools Report based on the IDE4OCL Feature Model

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The Vision of an IDE4OCL
(Integrated Development Environment for OCL)

Vision without action is a daydream.
Action without vision is a nightmare.

*Japanese proverb*
IDE4OCL Research

<table>
<thead>
<tr>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Research (idea of IDE4OCL)</td>
<td>Pilot Evaluation (2 OCL Tools)</td>
<td>Extended Evaluation (7 OCL Tools)</td>
</tr>
<tr>
<td>Set of 21 Predefined Features</td>
<td>Initial Feature Model</td>
<td>Detailed Feature Model</td>
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<tr>
<td>OCL Workshop Paper</td>
<td>First Statistical Analysis</td>
<td>OCL Workshop Paper</td>
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<td>Survey Among Workshop Participants</td>
<td>OCL Workshop Paper</td>
<td>Data on Selected OCL Tools</td>
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<td>Discussion with Workshop Participants</td>
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On-line Survey and Interviews
The OCL Tool Landscape
Feature Model refined
<table>
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<tr>
<th>Selected OCL Tools</th>
<th>Feature Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dresden OCL</td>
<td>implemented</td>
</tr>
<tr>
<td>Eclipse OCL</td>
<td>third-party tool</td>
</tr>
<tr>
<td>Oclarity</td>
<td>under development</td>
</tr>
<tr>
<td>OCLE</td>
<td>planned</td>
</tr>
<tr>
<td>SQUAM OCL</td>
<td>not supported</td>
</tr>
<tr>
<td>TOPCASED VF</td>
<td></td>
</tr>
<tr>
<td>USE</td>
<td></td>
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</tbody>
</table>
Comparison of OCL tools based on the IDE4OCL feature model

Auto-indentation
User Friendly Support: Editing Support

Type
- predefined, alternative feature

Description
Helps to better convey the structure of OCL. Indentation can be used inside nested structures.

State in Dresden OCL
Implemented

Details for Dresden OCL

Dresden OCL
(version 3.1.0 from 2011-01-17)

Feature Model
Feature model last updated on
- 2011-04-04T08:03:54

Information provided by
- Birgit Demuth
- Claus Wilke

Description
Owner: Technische Universität Dresden, Germany
License: LGPL
Homepage: http://www.dresdenocl.org/
Standard: OCL 2.2 / OCL 2.3

Dresden OCL's first version was released in 1999 as Dresden OCL Toolkit. Dresden OCL is designed for openness and modularity. It is made available as open source. Our
### Comparison of OCL tools based on the IDE4OCL feature model

<table>
<thead>
<tr>
<th>Feature Qualified Name</th>
<th>Feature Name</th>
<th>Dresden OCL</th>
<th>Eclipse OCL</th>
<th>Dexterity</th>
<th>OCLE</th>
<th>SQUAM OCL</th>
<th>TOPCASED VF</th>
<th>USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language and Model</td>
<td>Supported OCL Compliance Evaluates Compliance Valued Logic</td>
<td>implemented</td>
<td>implemented</td>
<td>not supported</td>
<td>implemented</td>
<td>third-party tool</td>
<td>not supported</td>
<td>not supported</td>
</tr>
<tr>
<td>Language and Model</td>
<td>Accessing private and protected features of an object</td>
<td>implemented</td>
<td>implemented</td>
<td>not supported</td>
<td>implemented</td>
<td>third-party tool</td>
<td>not supported</td>
<td>implemented</td>
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<tr>
<td>Language and Model</td>
<td>allInstances()</td>
<td>implemented</td>
<td>implemented</td>
<td>not supported</td>
<td>implemented</td>
<td>third-party tool</td>
<td>not supported</td>
<td>implemented</td>
</tr>
<tr>
<td>Language and Model</td>
<td>Association End Navigability</td>
<td>not supported</td>
<td>not supported</td>
<td>not supported</td>
<td>implemented</td>
<td>third-party tool</td>
<td>not supported</td>
<td>implemented</td>
</tr>
<tr>
<td>User Friendly</td>
<td>Support: Editing Support: Auto-indentation: Auto completion: Debugging: Automatic Test Cases: Basic Editing</td>
<td>planned</td>
<td>planned</td>
<td>not supported</td>
<td>planned</td>
<td>implemented</td>
<td>not supported</td>
<td>implemented</td>
</tr>
</tbody>
</table>

Legend: implemented, not supported, under development, planned, third-party tool.
### OCL Tool Landscape Coverage

<table>
<thead>
<tr>
<th>OCL Tool</th>
<th>Core</th>
<th>Additional Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dresden OCL</td>
<td>IDE4OCL</td>
<td>Modeling Tool, Repository, MDE Tool, FV Tool, Testing Tool</td>
</tr>
<tr>
<td>Eclipse OCL</td>
<td>IDE4OCL</td>
<td>Modeling Tool, Repository, MDE Tool, FV Tool, Testing Tool</td>
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<td>Oclarity</td>
<td>IDE4OCL</td>
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<td>IDE4OCL</td>
<td>Modeling Tool, Repository, MDE Tool, FV Tool, Testing Tool</td>
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<tr>
<td>TOPCASED-VF</td>
<td>IDE4OCL</td>
<td>Modeling Tool, Repository, MDE Tool, FV Tool, Testing Tool</td>
</tr>
<tr>
<td>USE</td>
<td>IDE4OCL</td>
<td>Modeling Tool, Repository, MDE Tool, FV Tool, Testing Tool</td>
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Native IDE4OCL Components

reuses

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<tr>
<th></th>
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<th>Oclarity</th>
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</thead>
<tbody>
<tr>
<td>OCL Parser</td>
<td>+</td>
<td>+</td>
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<tr>
<td>OCL Evaluator</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>Eclipse OCL</td>
<td></td>
<td>+</td>
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<tr>
<td>OCL Editor</td>
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<td>Impact Analyser</td>
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<td>OCL Libraries</td>
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<td>OCL Doc</td>
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<td>OCL Extensions</td>
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<td>OCL Checker</td>
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Summary

• Refined feature model
• Feature model in a web framework online
  – http://ide4ocl.opoki.com/featuremodel/
• 7 publicly documented OCL tools in this framework
  – First comparative and quantitative evaluation of these tools
  – Qualitative comparison could not achieved
• Top-level architecture of the OCL tools in terms of the OCL tools landscape
Outlook

• Qualitative evaluation of OCL tools
• Discussion of the feature evaluation values such as extending by partially implemented and fully tested
• Involve further OCL tools
• Develop feature model as reference model for OCL tools?
• Discuss cooperation in further development of OCL tool support
Thank You for Coming and Keeping Together!

Coming together is a beginning.
Keeping together is progress.
Working together is success.

*Henry Ford (1863 – 1947)*
Backup Slides
Further OCL Tools to Involve?

- EOS (Manuel Clavel et al.)
- ECO/Gaffr for Visual Studio (Jonas Hogstrom, Hans Karlsen@CapableObjects)
- Kent OCL Library (Dave Akehurst et al.)
- MIP OCL2 Parser (Steve Wartik) supporting Enterprise Architect
- OSLO (Christian Hein@Fraunhofer Berlin) – Open Source Library for OCL
- ... ?

- HOL-OCL (Achim Brucker, Burkhart Wolff)
- KeY Tool (Reiner Hähnle)
- UMLtoCSP (Jordi Cabot)
- ... ?
List of modeling tools with OCL support

Sunday, 25 July 2010 13:32 Birgit Domuth

Here you find a list of UML and MDE tools in alphabetic order that provide OCL support by different manner and power (parsing, static checking, evaluation, code generation, ...). Note that many UML tools provide only an OCL constraint specification feature. But OCL expressions should be at least able to be parsed. Otherwise this tool is not worth to be called as a "tool with OCL support".

An overview about UML tools can be found at unifaces.freebase.com

Please let me know if you know further modeling tools with OCL and/or write own OCL Portal entries with more detailed information about OCL tools.

- Arctyler by Interactive Objects
- ArgoUML (Open Source)
- Borland Together
- Eclipse Model Development Tools (MDT)
- ECO for Visual Studio by CapableObjects
- Enterprise Architect by Sparx Systems
- Fujaba (Open Source)
- Innovator by MID
- MagicDraw UML by NoMagic
- Oclarity for Rational Rose
- Papyrus UML (Open Source)
- TOPCASED (Open Source)
Debugging Features

- Tracing
- Variable Watching
- Breakpoints
- Step by Step Execution
- Value Insertion
- Automating Test Cases
Evaluation Compliance Features

- Association end navigability
- 4-valued-logic (mandatory)
- Semantics as defined in the specification (mandatory)
- allInstances()
- Pre-values and oclIsNew() in postconditions
- OclMessages
- Accessing private and protected features of an object
Syntax and Semantics Extension Features

- OCL embedding
- OCL extending
- Alternative concrete syntax
  - Parsing support
  - Printing support
Refactoring support

- Renaming
- Extracting
- Removing
- Changing OCL context
- Co-refactoring and co-evolution
- Further refactorings
Dresden OCL Refactoring Support

- Renaming
- Extract variable
- Inline Variable
- Remove unused variable
- Remove redundant brackets
- Split expressions
- Separate context classifiers
- Split expression atomic
- Merge expressions
- Merge context classifiers
- Merge atomic expressions
- Split conditional rules
- Remove/materialize self
- Remove/materialize type
Error Handling Features

- Static semantics
- Dynamic semantics
Architectural Support Features

- Batch mode
- Interfaces to other components from the OCL landscape
  - Modeling tool
  - MDE tool
    - Code generation
    - Model Transformation
  - Formal verification tool
  - Repository
    - Version management
      - File-based version management
      - Model-based version management
  - Testing tool
Features in all tools

• Basic editing
• Document interface
• Syntax highlighting
• Syntax compliance

Further most wanted features

• Auto-completion
• Debugging
• Refactoring support