

Keynote Summary

The Model Repository: More than just XML under version control Domain-Specific Modeling: 20 years of progress?


Steven Kelly, Ph.D. - MetaCase

ABSTRACT: There is increased awareness within the modeling arena of the need for a central repository of system description information. This is brought on by a growing recognition that only with a strong central repository can modeling tools be integrated, cope with large projects, provide full life-cycle support, produce complete documentation, perform system-wide validation and verification, and adequately control a project. In examining the various approaches chosen or proposed by various tool providers and users vendors, it is apparent that for many a model repository is nothing more than an off-the-shelf version control system into which XML files are saved. However, as this talk will demonstrate, current version control systems and XML cannot be successfully employed as a model repository.

BIOGRAPHY: Dr. Steven Kelly is the CTO of MetaCase and co-founder of the DSM Forum. He has over ten years of experience of building metaCASE environments and acting as a consultant on their use in Domain-Specific Modeling. As architect and lead developer of MetaEdit+, MetaCase's domain-specific modeling tool, he has seen it win or be a finalist in awards from Byte, the Innosuomi prize for innovation awarded by the Finnish President, Net.Object Days, and the Software Development Jolt awards. Ever present on the program committee of the OOPSLA workshops on Domain-Specific Modeling, he co-organized the first workshop in 2001. He is author of over 20 articles, most recently in journals such as Dr. Dobb's and ObjektSpektrum, and is a member of the editorial board for the Journal of Database Management. He has an M.A. (Hons.) in Mathematics and Computer Science from the University of Cambridge, and a Ph.D. from the University of Jyväskylä. His computer education began with machine code, Assembler and BASIC, and came to rest in Smalltalk. Outside of work, he has co-authored the first grammar of the Kenyan Orma language, and is a soccer player in the Finnish Third Division.


The Model Repository: More than just XML under version control

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The Model Repository: More than just XML under Version Control

or:
DSM: 20 Years of Progress?

Monday 20th October 2008
8:30am – 9:30am
Steven Kelly,  MetaCase

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Model Repository Requirements

- ⇔ Be integrated
- ↗ Cope with large projects
- ∪ Provide full life-cycle support
- 📄 Produce complete documentation
- ☑ Perform system-wide validation and verification
- 🖐 Adequately control a project

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XML under Version Control

- ⇔ Be integrated
 - ⊗ Disconnected models
- ↗ Cope with large projects
 - ⊗ Fail to scale
- ↻ Provide full life-cycle support
 - ⊗ Filing cabinet is not a life cycle
- 📄 Produce complete documentation
 - ⊗ No support – luckily XML is human-readable
- ☑ Perform system-wide validation and verification
 - ⊗ No support – cope with problems later
- 🖐 Adequately control a project
 - ⊗ Free-for-all, merge by hand

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XML under Version Control, v2.0

- ⇔ Be integrated
 - D.I.Y.
- ↗ Cope with large projects
 - D.I.Y.
- ↻ Provide full life-cycle support
 - D.I.Y.
- 📄 Produce complete documentation
 - D.I.Y.
- ☑ Perform system-wide validation and verification
 - D.I.Y.
- 🖐 Adequately control a project
 - D.I.Y.

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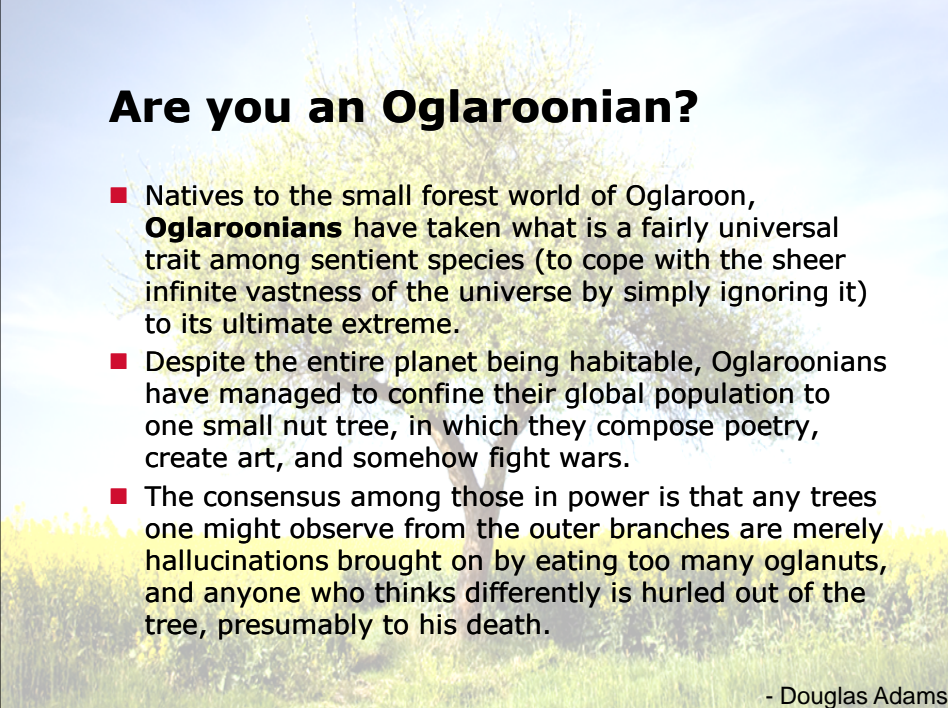
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XML under Version Control, v3.0

- Seven easy steps to a solution:
 1. Wait for several projects to make D.I.Y. solutions
 2. Wait for community / evolution to identify the best
 - 6: one for each requirement
 3. Persuade authors to release as open source
 - Unencumbered license
 4. Persuade authors to integrate them
 5. Wait for results
 6. Persuade original tool owners to incorporate results
 7. Wait for integrated version
- Even if this worked, it is doomed from the start...

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Are you an Oglaroonian?

- Natives to the small forest world of Oglaroon, **Oglaroonians** have taken what is a fairly universal trait among sentient species (to cope with the sheer infinite vastness of the universe by simply ignoring it) to its ultimate extreme.
- Despite the entire planet being habitable, Oglaroonians have managed to confine their global population to one small nut tree, in which they compose poetry, create art, and somehow fight wars.
- The consensus among those in power is that any trees one might observe from the outer branches are merely hallucinations brought on by eating too many oglanuts, and anyone who thinks differently is hurled out of the tree, presumably to his death.

- Douglas Adams

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The World is Not a Tree


- Car architecture diagram
 - CAN bus
 - Wheels
- Electronic circuit
- Function call tree
- Hierarchical database
 - Network database
 - Relational database
- Trees make life easy for us
 - Easy to parse e.g. XML
 - Good for teaching, prototypes^(?)
 - When you have a hammer, everything looks like a nail



007
a Tree is Not Enough

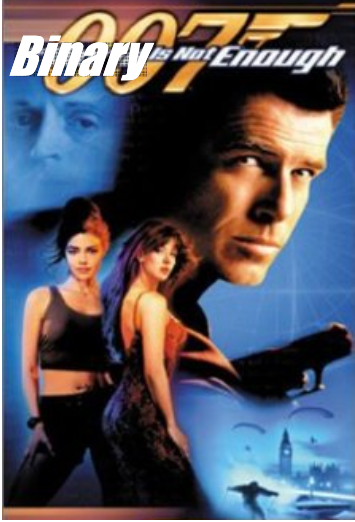
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The World is Not Binary

- We like having just 2 of things
 - Yin and Yang ☯
 - Black and white
 - Good and evil
- Some relations *are* simple
 - A dog has a tail
 - Transition from Start to State
- But others *are* complex
 - Family has father, mother, kids
 - Inheritance, n-ary, assoc. class
- Sticking to 2 is easier at first
 - Good for teaching, prototypes^(?)
 - When you have a hammer, everything looks like a nail...
 - thumbs too if you feel no pain!




007
Binary is Not Enough

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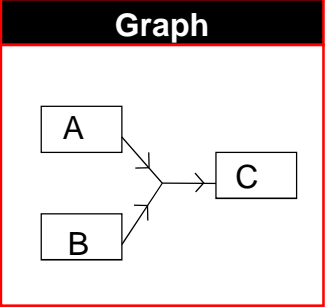
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N-ary: 1 relationship, 2..N objects

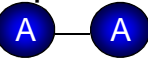
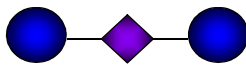
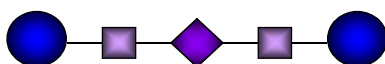
Graph


- Lemma 1: a line is a role
- Lemma 2: a junction is a relationship
- Works for binary too: one formalism enough for both


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What's in a Relationship?

- Increase in relationship-like concepts
 - Relational, network, binary, Ecore 
 - ER 
 - OPRR 
- We added concepts...
 - ...but we never said what the line was!


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Object Binding, Property Holding

- A relationship binds objects together
 - e.g. 'marriage' for man & wife
- A relationship has properties
 - e.g. 'date of marriage'
- Binding concerns objects & relationship
- Properties only concern the relationship
 - Roles too may have properties
- **Separate binding from property holding**
 - Lines are the binding, blobs have properties


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Graphs and Bindings

- Binding \Rightarrow Relationship (Role Object)*
 - But where to store it? Or who 'owns' it?
- Graph 'knows' its contents
 - so can know facts involving several of them
- Bindings contained within a graph
- Graph \Rightarrow Object* Binding*
- **Object does not 'know' its relationships**
 - Has different bindings in different graphs \Rightarrow reuse


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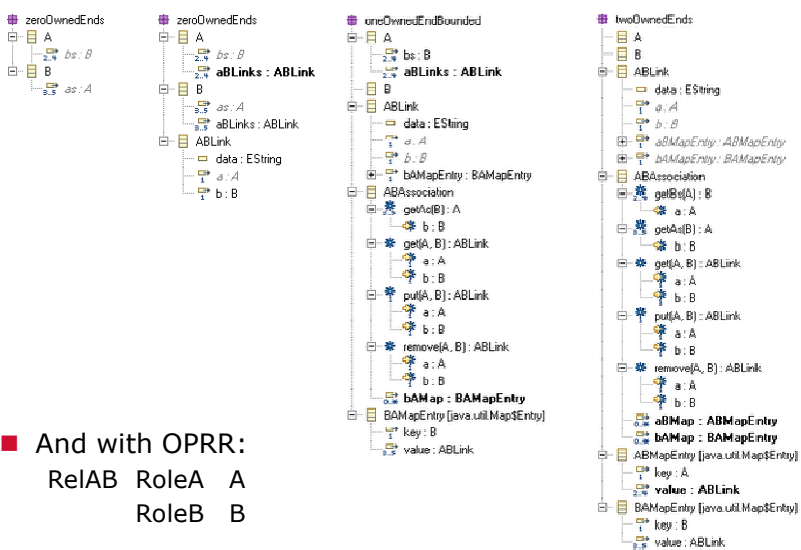
Aren't All Meta-Languages Alike?

- Sapir-Worff hypothesis: (linguistics)
language influences how we understand the world
- Alfred North Whitehead (mathematics)
"by relieving the brain of all unnecessary work,
a good notation sets it free
to concentrate on more advanced problems"
- Ludwig Wittgenstein (philosophy)
"The limits of my language indicate
the limits of my world."
- George Boole (computer science)
"That language is an instrument of human reason,
not merely a medium for the expression of thought,
is a truth generally admitted"

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Modeling Associations With Ecore




- And with OPRR:
RelAB RoleA A
RoleB B

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Multi-Everything: repository design

- Multi-parent (not tree)
- Multi-role (n-ary)
- Multi-model (interlinked)
- Multi-occurrence (reuse objects)
- Multi-representation (same object in several places)
- Multi-form (diagram, matrix, table etc.)
- Multi-tool (open on same model)
- Multi-language (method integration)
- Multi-language version (evolution)
- Multi-platform (Windows, Linux, Mac etc.)
- Multi-user (simultaneous sharing, see others' updates)
- Multi-environment (integration, interchange)

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Data Interchange

- Several proposals for common interchange languages
 - CDIF, IRDS, KM3
- None has achieved significant adoption or support
 - Europe ahead of U.S.
- Why?
 - Mis-match between different tools' meta-metamodels
 - Many tools' formats not sufficiently normalized
 - Meta-meta-metamodels too weak (lowest common den.)
 - Meta-(meta)-metamodels designed for one metamodel
- Time for all tools to move forward together
 - Decide on a common core meta-metamodel that works
 - Each tool converges towards it on own timescale
 - Allow extensions, declare omissions

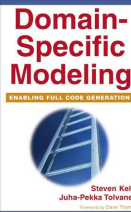
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Further reading


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Domain-Specific Modeling
ENABLING FULL CODE GENERATION
Steven Kelly
Juha-Pekka Tolvanen
Cambridge University Press

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The CASE Repository, Welke 1988

“There is increased awareness within the CASE arena of the need for a central repository of system description information. This is brought on by a growing recognition that only with a strong central repository can CASE tool sets:

- Be integrated
- Cope with large projects
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■ WOPRR, multi-*, n-ary, not tree, reuse, interchange...

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Thank you!

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