A Paradigm for Teaching Modeling Environment Design

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ABSTRACT

Model-based design is easy to praise, but non-trivial to follow, especially when designing from scratch. We describe a paradigm for instructing students in the art and science of Model-Integrated Computing (MIC), as well as a motivating example which demonstrates the phases of the design of a modeling environment.

0. BASIC CONCEPTS

- Module Interconnection: associate components through interfaces
- Aspects: multiple views or slices of the same model
- Hierarchy: encapsulation and hiding through containment
- Object association: association between objects
- Specialization: object refinement through inheritance

1. DOMAIN KNOWLEDGE

Before creating a modeling environment, the domain concepts must be understood:

Example: Kinds of Publications

Domain knowledge: There are many kinds of publications, but they all have certain common characteristics. Use domain knowledge obtained from years of thinking and best-practices in best practices.

Example: Authors of publications

Domain knowledge: Publications have authors, and authors are typically associated with more than one publication. Consider how to reuse authors across publications, and avoid re-entering information.

2. CONCEPTS ENCODING

Once the concepts are understood, the domain concepts are mapped using the basic concepts of modeling.

Example: Kinds of Publications

Concepts used: Specialization

Example: Authors of publications

Concepts used: Hierarchy

3. TRANSLATORS & 4. ARTIFACTS

Models are only useful if they can be translated or interpreted into some other useful form.

Example: Generate database

Example: Generate HTML version of bibliography

"SO WHAT?"

The designer learns that there is a difference between a useful modeling environment, and one for the sake of having one. Designs evolve, and a "fixed-point" of usability vs. overhead is reached. Metamodelling reduces the overhead of creating the GUI and syntax parser.

FOR MORE INFORMATION

Download the tool: http://www.eecs.berkeley.edu/~spinkle/opsla/
GME Information: http://www.isis.vanderbilt.edu/
Chess website: http://chess.eecs.berkeley.edu/

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