

Product Derivation with Feature Diagrams and Requirements Models

Requirements Engineering II

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30.11.2009

Agenda

- Domain vs. Feature Diagram Model
- Feature Diagrams and Formulas
- Logic Truth Maintenance System
- Mapping Features to Models
- Mapping Process
- Template to Instance Process

Domain & Application Feature Model

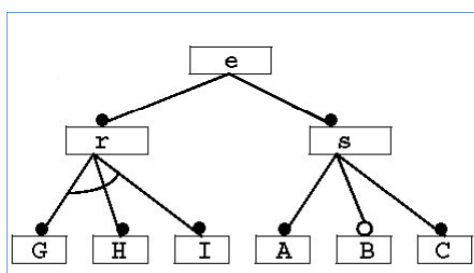
Domain Feature Model:

- Defines the commonality and the variability of the software product line
- Defines the set of applications the software product line is planned for (-> the scope of the product line)

Application Feature Model:

- Exploits the commonality and the variability of the software product line during the development of a product line application
- Describes a set of all possible valid configurations

Feature Model & Formalization



Feature Model

```

e : r s ;
r : G | H | I ;
s : A [B] C ;
  
```

Iterative Tree Grammar

Iterative tree grammars can be mapped to propositional formulas. Algorithms can be used to automatically detect and report contradictions.

Logic Truth Maintenance System

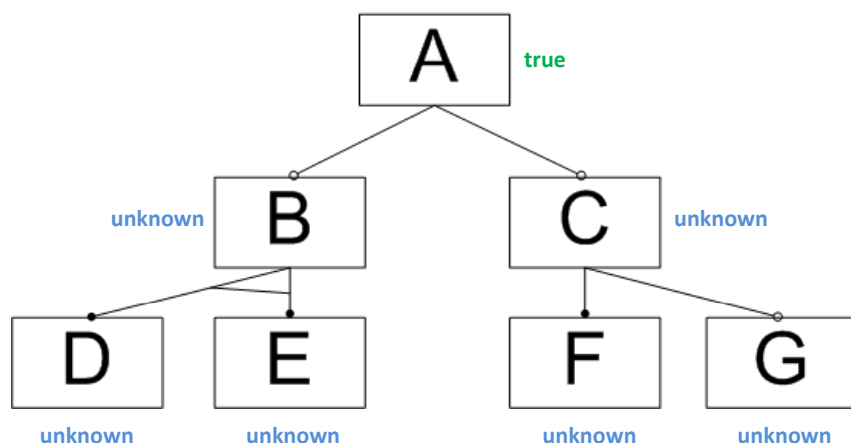
Scenario:

- User selects feature for a desired application
- This selection has so implications

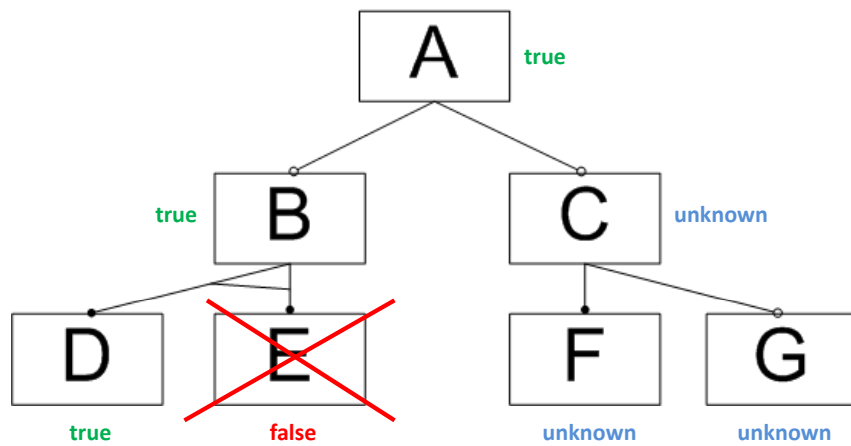
Use of LTMS:

- AI program that propagates the implications of this selection through the feature tree, so that the user cannot write incorrect specification

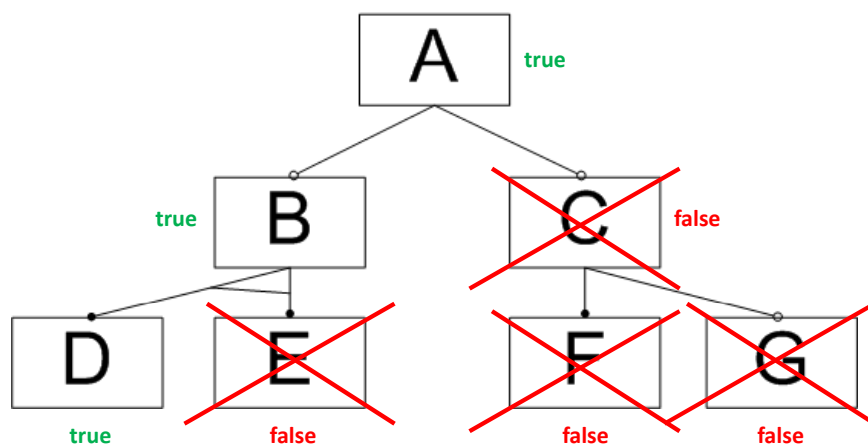
Example (Start)



Example (User selects B & D)



Example (Output)



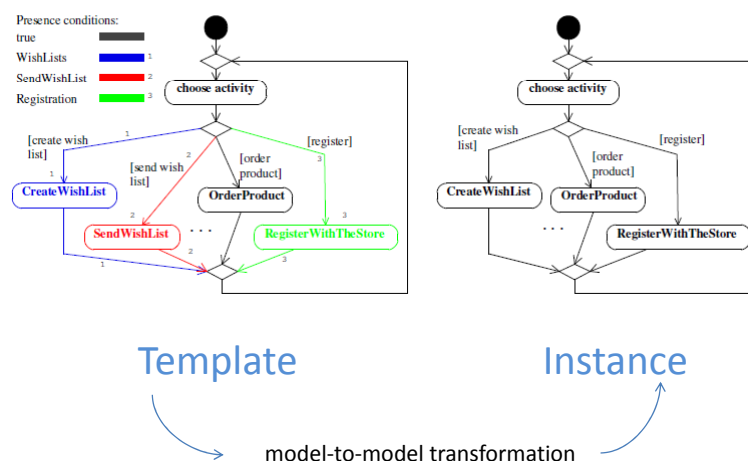
Mapping Features to Models

Idea:

Adding annotations such as presence conditions (PC) and meta-expressions (ME) to well known models to show features and features attributes.

PC can be implicit (IPC - system dependencies) or explicit (user's choice)

Instantiation Process



Mapping and Transformation Process

1. Define annotation design for PC and ME
2. Define IPC design
3. Decide on annotation mechanisms and rendering options
4. Decide on additional processing

Manually define how to superimpose annotations to a given model

1. Evaluation of MEs and explicit PCs
2. Removal analysis
3. Element removal and patch application
4. Simplification

Automatically resolve the feature choice to get a product instance

Example Class Diagram Template

Presence conditions:

