Toward Integration of Policies into DSMLs

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Motivation

• Take a **Domain-Specific Modeling Language (DSML)**.
• Take an Event-Condition-Action (ECA) Policy language (**feature**) not previously foreseen during the language **design** phase.
• Update the language to support policies.
Motivation

- Adding policies to a DSML requires:
  - Knowledge of policies
  - Modification of the existing language metamodel
Motivation

DSML Meta-Model + Policy Language Meta-Model = Updated DSML Meta-Model
Generate DSML-Specific Linker
Meta Models

Book Store Meta-Model

Domain Linker Meta-Model
DSML-Specific Linker (Final)

Book Store Meta-Model

Domain Linker Meta-Model
DSML-Specific Linker (Final)

Book Store Meta-Model

Domain Linker Meta-Model
Generate DSML-Specific Linker

Key:
- Metamodel
- Instance
- Generated
- Provided
- User Generated

Policy

Linker Composer

Abstract Linker

DSML

DSML Linker Composer

DSML Specific Linker

DSML Policy Composer

DSML Policy
DSML-Specific Linker Instance

User specifies:
• Which nodes have policies.
• Which events that node responds to.
• Which actions are supported by that node.
Approach

Key:
- Metamodel
- Instance
- Generated
- Provided
- User Generated
Generate DSML-Policy Meta
Updated DSML Meta-Model
Updated DSML Meta-Model

- `<enumeration>`
  - `CompOp`
    - AND
    - OR
  - `AtomOp`
    - GT
    - LT
    - EQ
    - NEQ
    - GTE
    - LTE

- `BookStore_Event`
  - event

- `BookStore_Action`
  - action
    - owner
    - location

- `BookStore_Policy`
  - policyName : EString

- `BookOld_BookStore_Event`

- `BookStore_Policy`
  - policyName : EString

- `SellBook_BookStore_Action`

- `Book`
  - name : EString
  - isbn : EString

- `BookStore`
  - owner : EString
  - location : EString

- `BookStore_AtomicCondition`
  - attribute : BookStore_Attributes
  - op : AtomOp
  - value : EString

- `BookStore_CompositeCondition`
  - op : CompOp

- `BookStore_Condition`
  - cond
  - cond0..1
  - cond1

Updated DSML Meta-Model
Updated DSML Meta-Model
Updated DSML Meta-Model
Updated DSML Meta-Model
Approach
Generate DSML-Policy Meta

Key:
- --- Metamodell
- ---- Instance
- (G) Generated
- (P) Provided
- (U) User Generated

Diagram:
- Policy (P) → Linker Composer → Abstract (P)
- DSML (P) → DSML Composer → Linker (G)
- Linker (G) → DSML Specific Linker (G)
- DSML (G) + Policy
- DSML (U) + Policy
Updated DSML - Instance

- Book Store
  - Book - Great Expectations
  - Book Store Policy - BookOldPolicy
    - Book Old Book Store Event
    - Book Store Atomic Condition location
    - Book Store Action
Other Applications - CML

Communication Modeling Language Meta-Model
References


Questions