An EMF Framework for Event-B

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EMF

- Eclipse Modelling Framework (Ed Merks et al.)
- Meta-modelling notation (abstract syntax)
- Code Generator
  - Model repository (database)
  - Edit support (providers)
- Runtime Support for building tools:
  - Command framework, Persistence, Dynamic (programmatic) EMF
- Lots of related technologies
  - Compare/merge, M2M, M2Text
Rodin platform for Event-B
Motivation for Event-B EMF

• UML-B – reimplementation to give tighter integration
• Text editor
• Teamworking – EMF Compare/Merge
• Model transformations
• Code generation
Front-End Approach

Text Editor
Teamwork
UML-B

Rodin Database
Event-B IDE
(static checker, prover)

EMF front-end for Event-B

Other EMF based models
(e.g. UML, Epsilon based)

Persistence
Marker
API

*.bum,
*.buc, ...

*.bum,
Event-B Metamodel

- Core package
  - Abstract basis
  - Extension mechanism
  - Project

- Machine package

- Context package

Abstract Core
Abstract Core

Loads of Inheritance! Allows generic code (like rodinDB does)
Abstract Core
Extension Mechanism

EMF map facility:
Attributes can be retrieved by key (key = rodin attribute ID)

Attribute types reflect Rodin
(e.g. Camille Text : String)
Extension Mechanism

Any element can be given new children by subtyping AbstractExtension.
Extension Mechanism - restricting new children’s parents

Modified JET code templates adjust child providers if this annotation is present
All concrete classes inherit from an abstract one
Machine
Event
Context
Inter-Resource References

- Refines Machine, Refines Event, Sees Context
- Some tools work on multiple resources
  - Need direct model references
  - EMF proxy facilities for resolving/loading when needed
- Some tools work on a single resource
  - Don’t want to load referenced resources
  - Leave proxies unresolved
  - Often they are un-resolvable (i.e. do not exist)
Solution – Dual Representation

- List of References (EMF proxies)
  - Use Lazy proxy construction
  - URI fragment = reference name (persisted)
  - When resolve attempted....
  - ... Automatically construct rest of URI ...
    - Project/resource from containing component

- List of Names
  - Transient (no storage)
  - Derived from proxy fragments (by getter)
  - Can be edited .. Notifies parent ...
  - .. Proxy fragments kept in step (even if not resolvable)
Machine
Persistence

• Overrides EMF’s default XMI persistence
• Load and Save into Rodin DB via API
• Synchronisers for each element type
  – Registered via extension point
  – Allows for new elements to be defined by plugins
  – Volatile extensions (no synchroniser)
• Attributes
  – Can be Dealt with explicitly in Synchroniser... or
  – Left to Generic Attribute handler
  – Nothing is lost
Persistence – to XMI

- May wish to store components outside of Rodin DB
- Option to load/save using EMF’s XMI serialisation
- E.g. copy in SVN for teamworking
A Framework for Diagrammatic Modelling Extensions in Rodin

Developed by:

Colin Snook and Vitaly Savicks – University of Southampton,
Extending Event-B (1)

- EMF Event-B Core
- Event-B Core
- Rodin Platform

New Extension

EMF

Rodin DB
Extending Event-B (2)
Refinement Participant

(My New Extension)
New Refinement Participant
Defines how to handle references

(EMF Event-B Core Extension)
Abstract Extension Refiner
Provides generic deep clone of abstract mode

References
1) Vertical - reference to corresponding abstract element (e.g. refines)
2) Horizontal - reference cloned within new refined model
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Now we want Diagrams!

EMF Event-B Core

Diagram

DiagramOwner

* diagrams

EMF

Diagram Extension
Contributes to Event-B Navigator

EMF Event-B Core Extension

Diagram Extension

Or double click to open
Translation to Event-B

(My Diagram Extension)

Declare Generator for My Diagram

Offer these Generator Rules

command handler extension point

rule extension point (source element type, rule class)

Rule Class - methods:

• enabled? for this source element?
• dependencies ok? - defer until later
• fire - return list of descriptors for generating new elements (avoid rollback)

(Diagram Extension Framework)

Configurable Event-B Generator
Diagram Copier - Refinement Participant

- Model is already refined by the previous Refinement Participant
- But diagram layout is lost
- Diagram Copier Refinement participant
  - Finds all the diagram layout files relevant to a Machine/Context
  - Copies them,
  - Updates their file name for the new machine/context
  - Updates references within them to the corresponding refined elements
End