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An EMF Framework for Event-B

Developed by:

Colin Snook – University of Southampton,

Fabian Fritz – Heinrich Heine University, Düsseldorf,

Alexei Illiasov – Newcastle University

Deploy
Integrated Project IST 214158
Industrial deployment of advanced system engineering methods for high productivity and dependability
www.deploy-project.eu

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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

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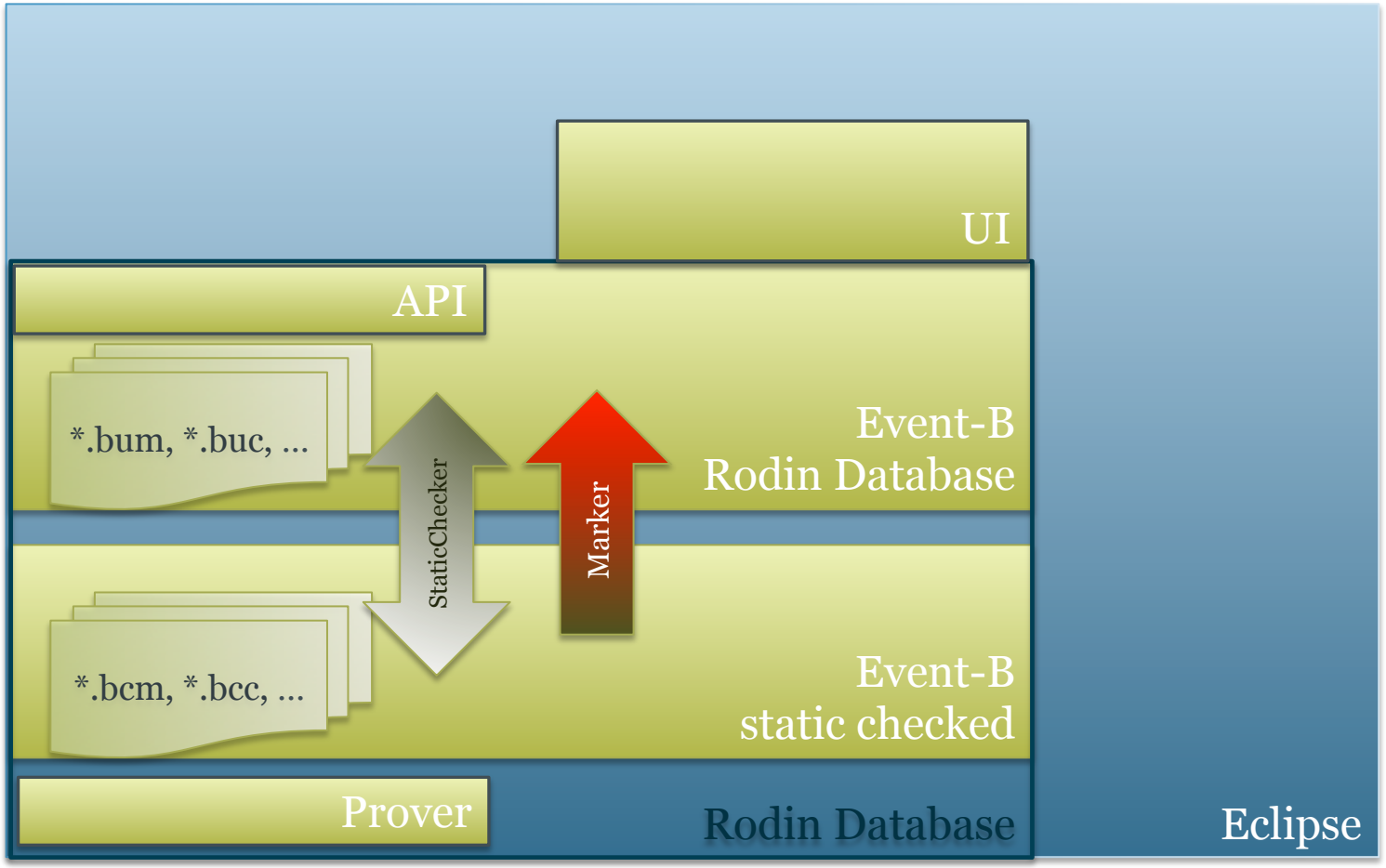
Rodin platform for Event-B



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Motivation for Event-B EMF

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

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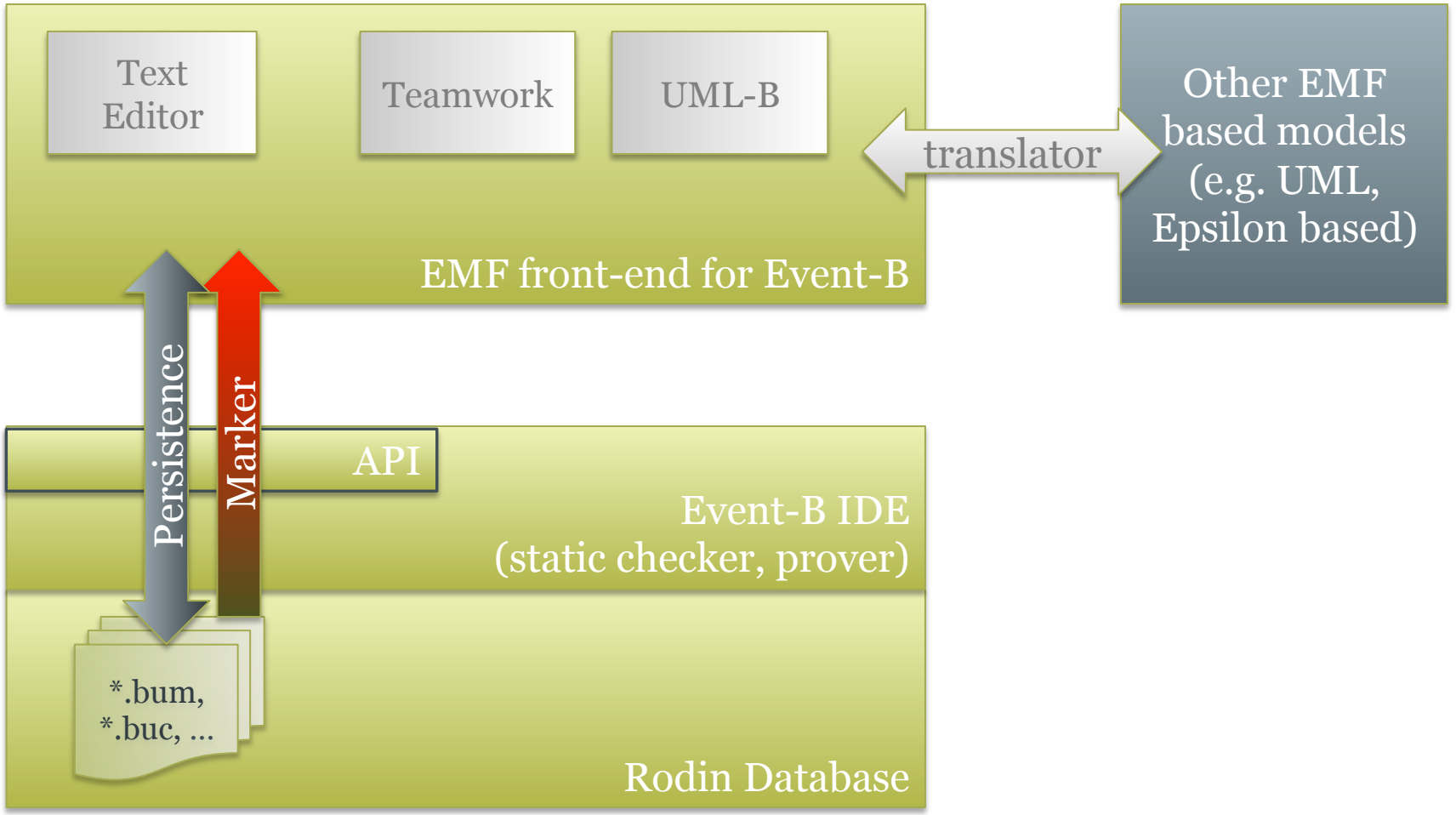
Front-End Approach



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Event-B Metamodel

- Core package
  - Abstract basis
  - Extension mechanism
  - Project
- Machine package
- Context package

http://wiki.event-b.org/index.php/EMF_framework_for_Event-B

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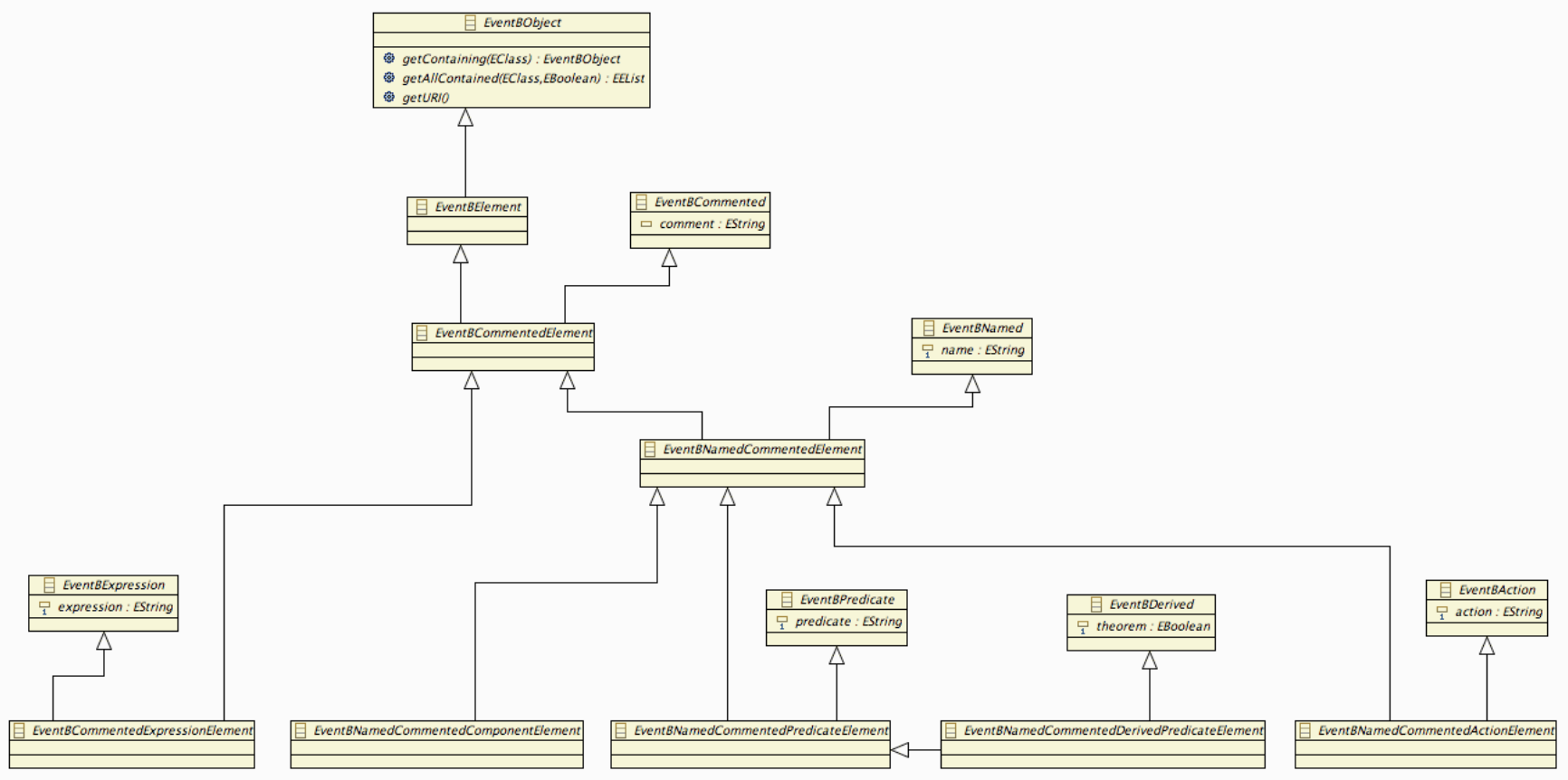
Abstract Core



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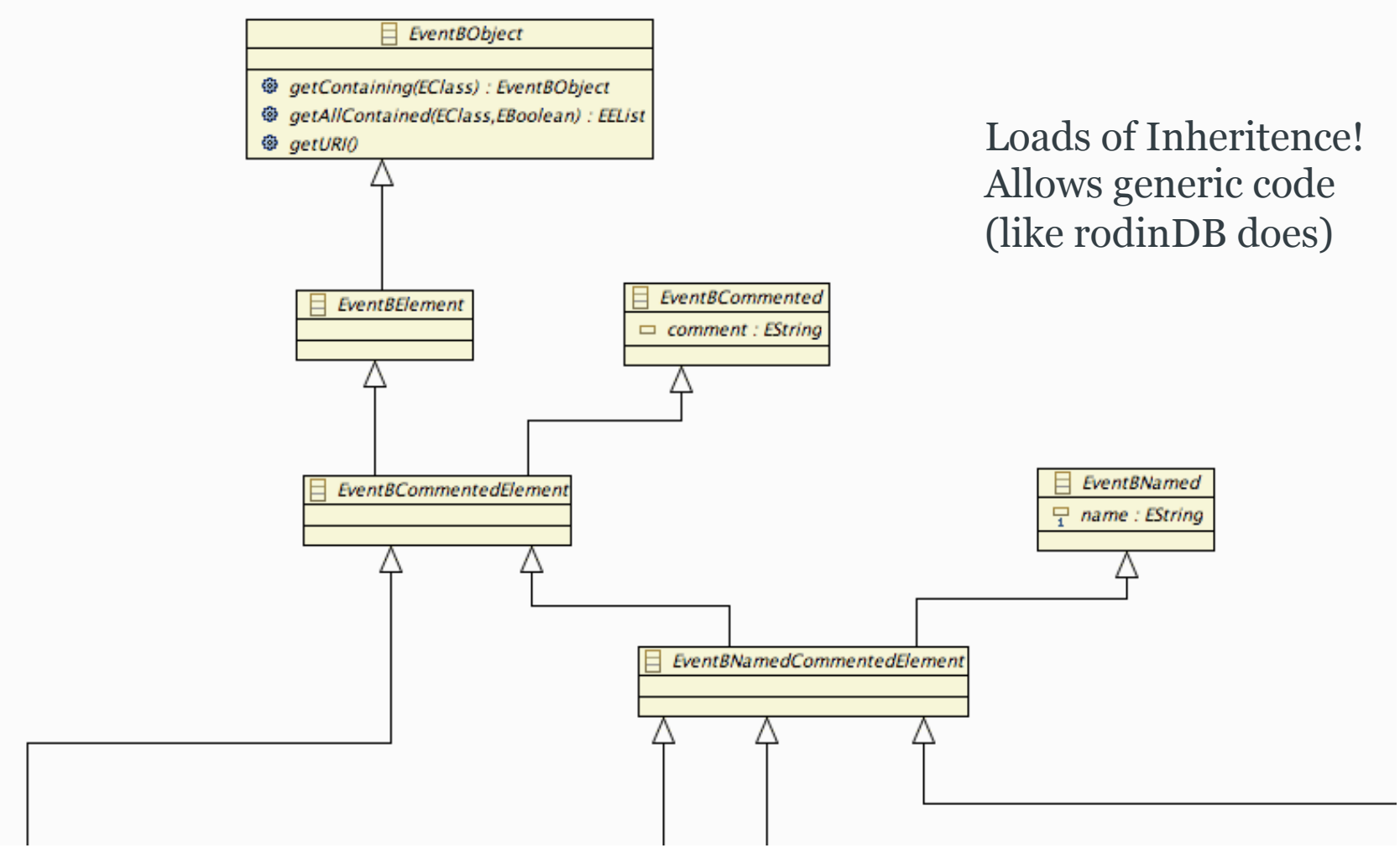
Abstract Core



Loads of Inheritence!
Allows generic code
(like rodinDB does)

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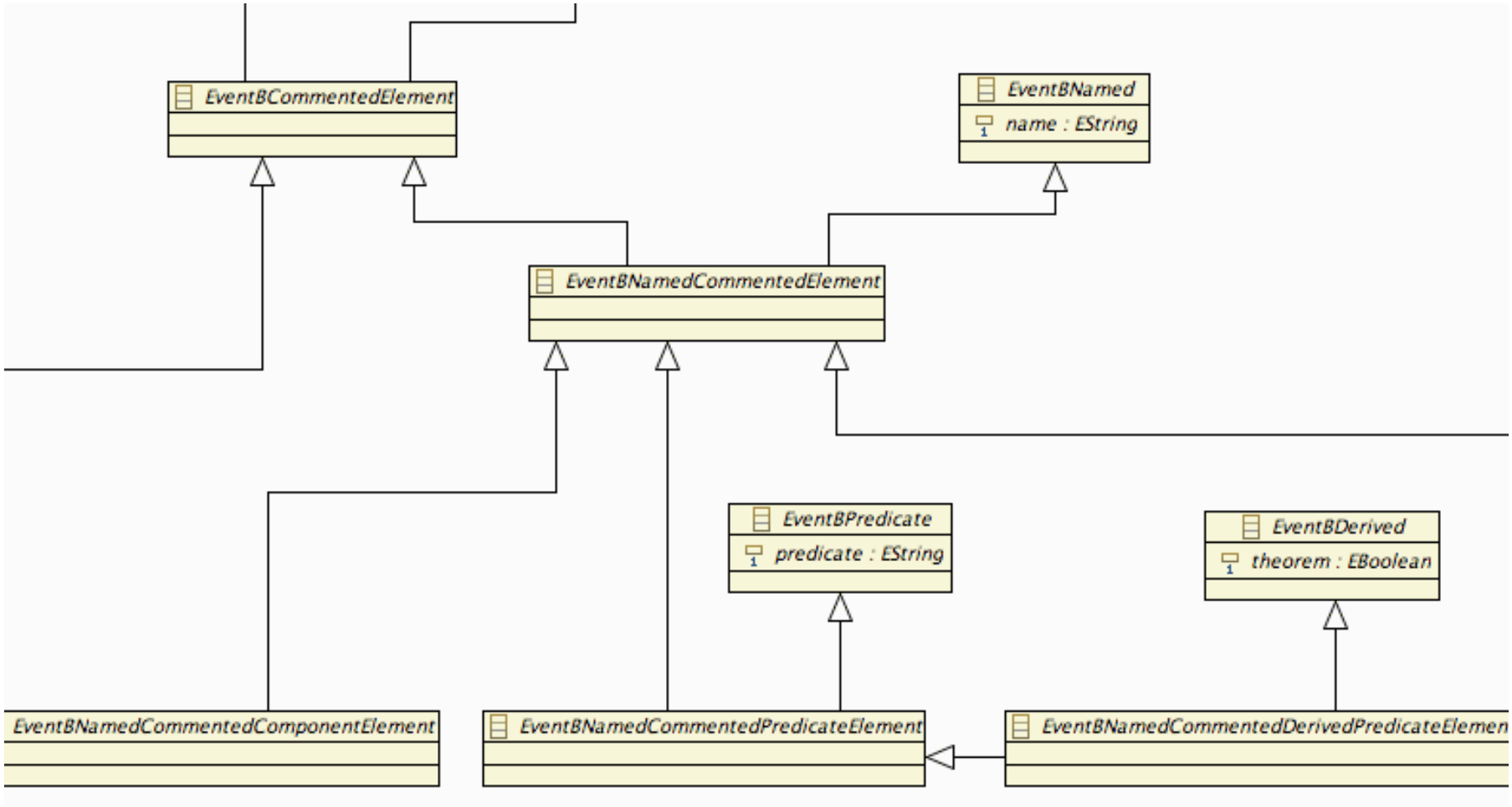
Abstract Core



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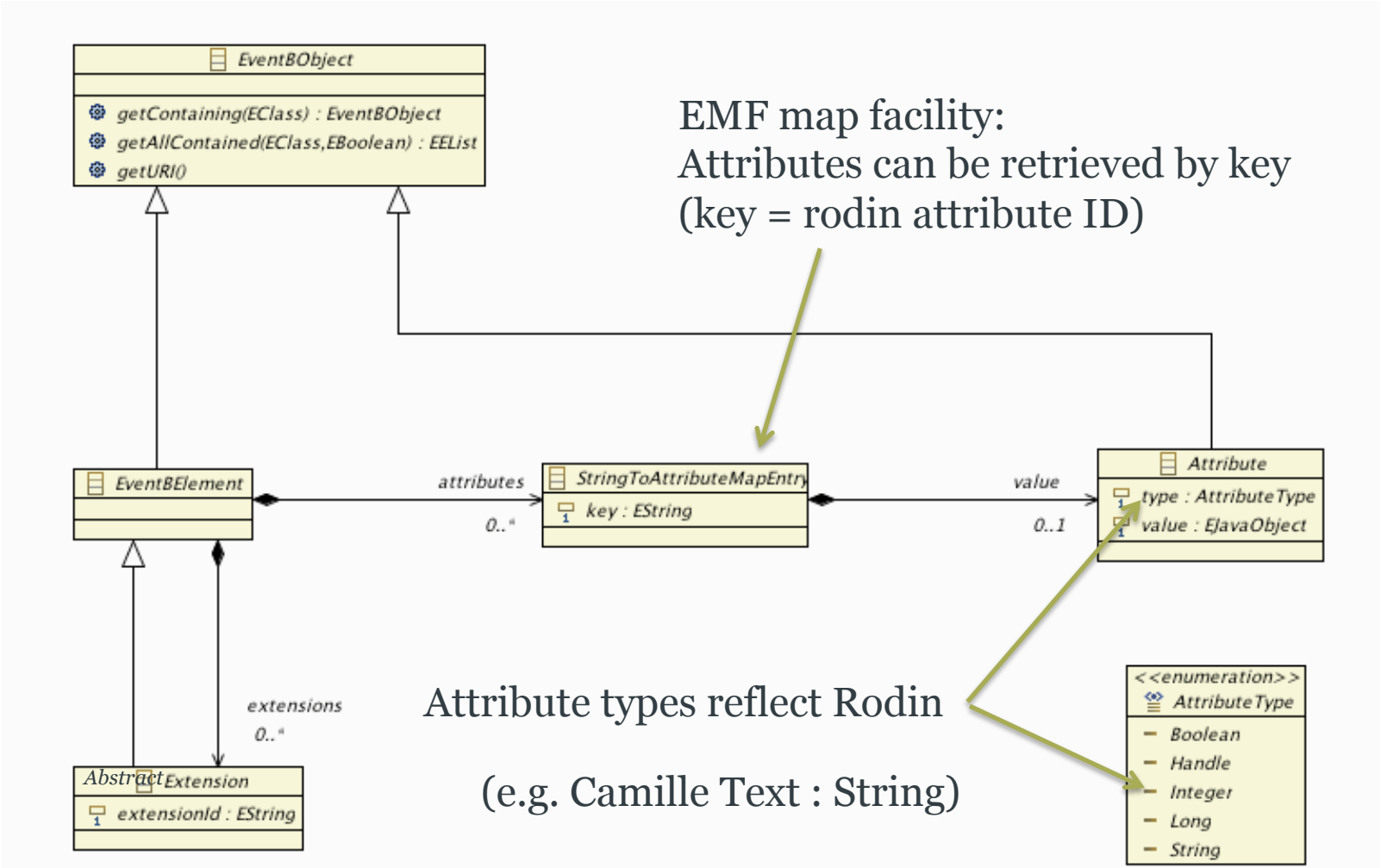
Extension Mechanism



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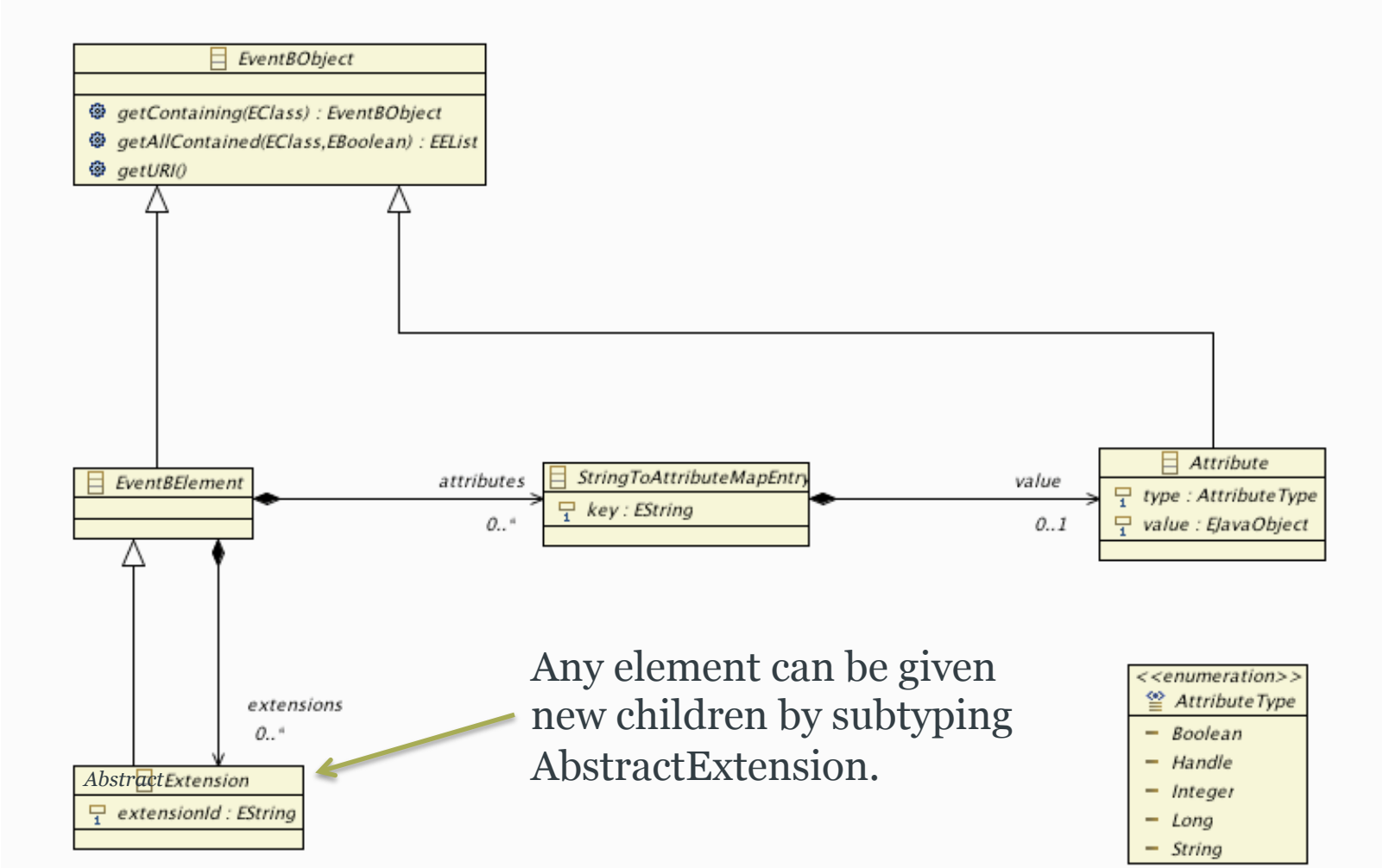
Extension Mechanism



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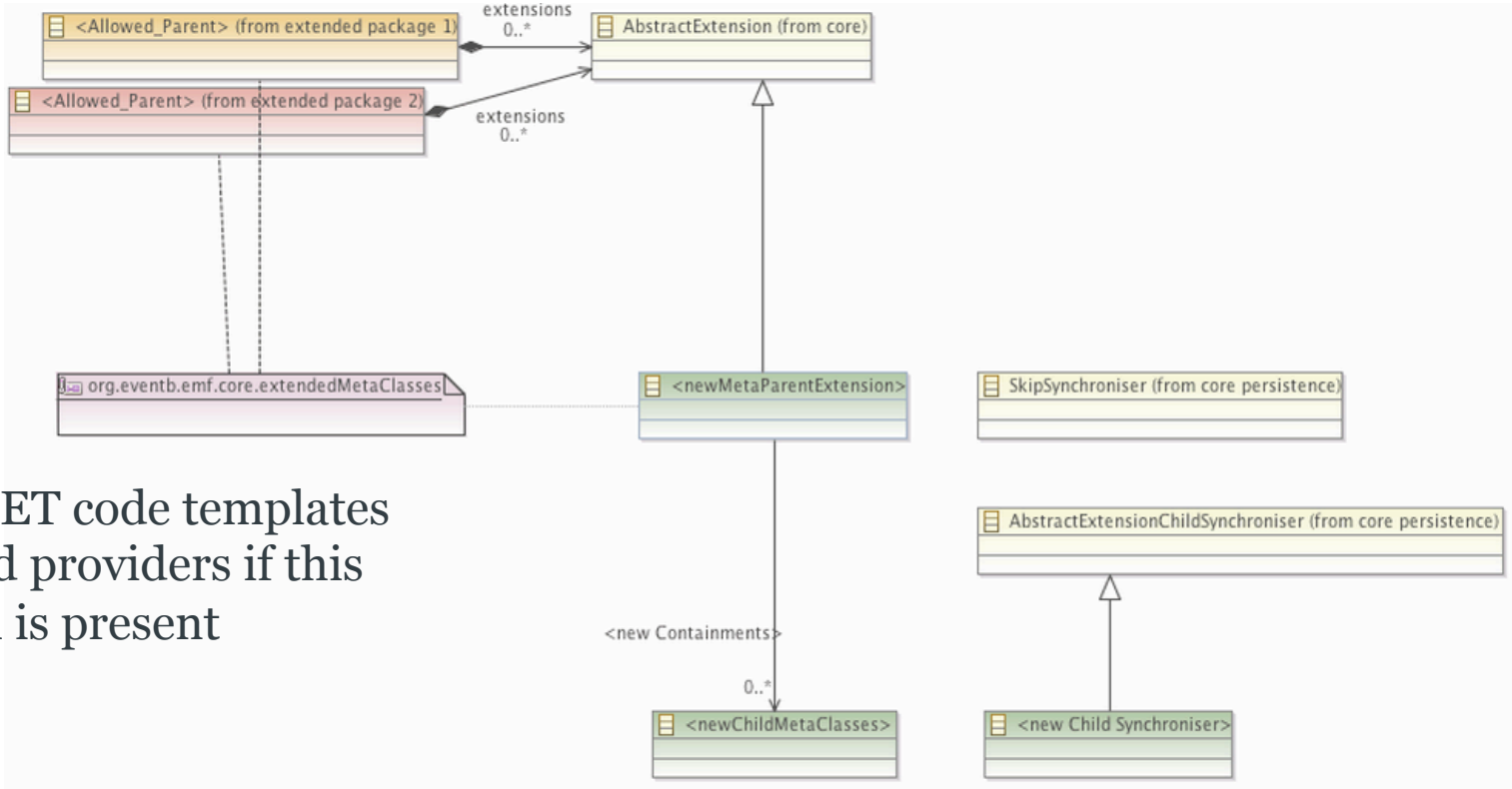
Extension Mechanism - restricting new children's parents



Modified JET code templates adjust child providers if this annotation is present

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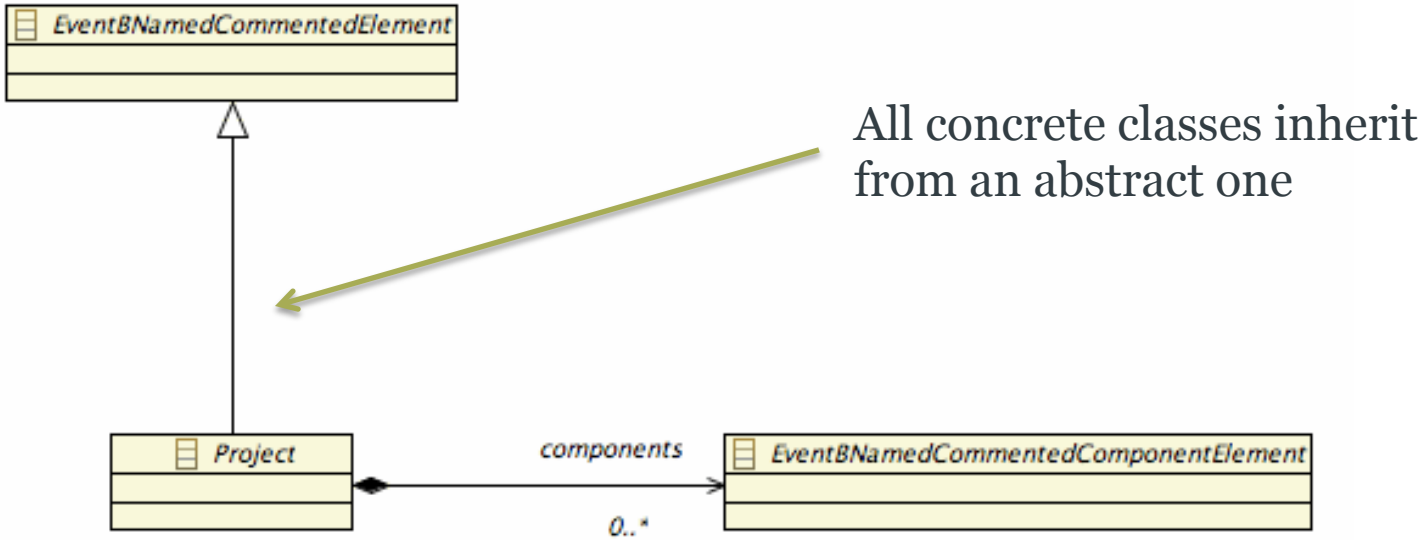
Project



All concrete classes inherit from an abstract one

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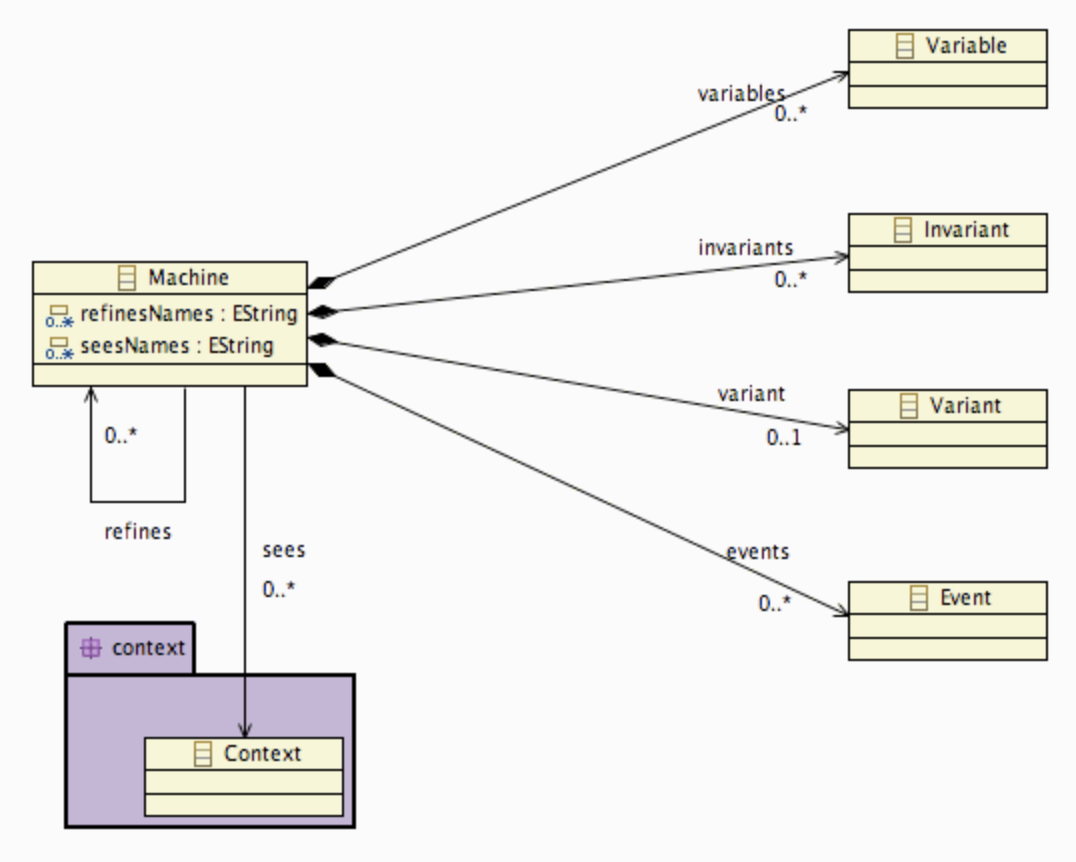
Machine



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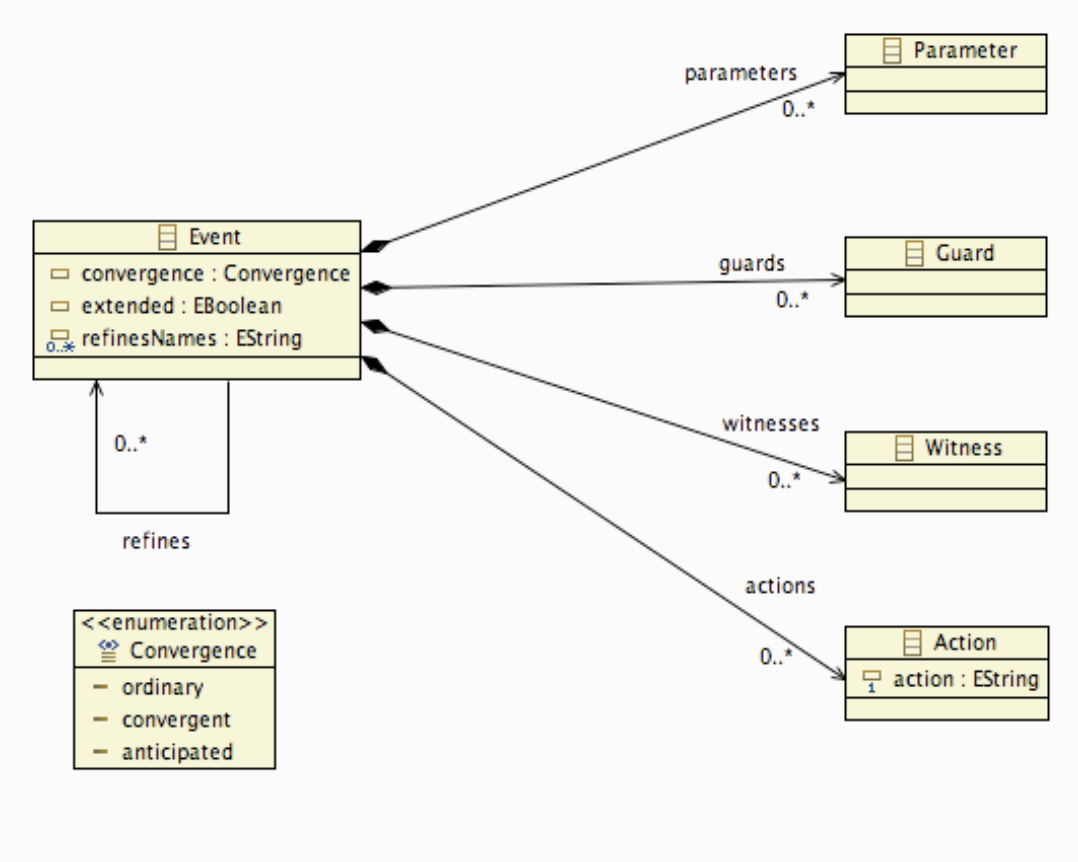
Event



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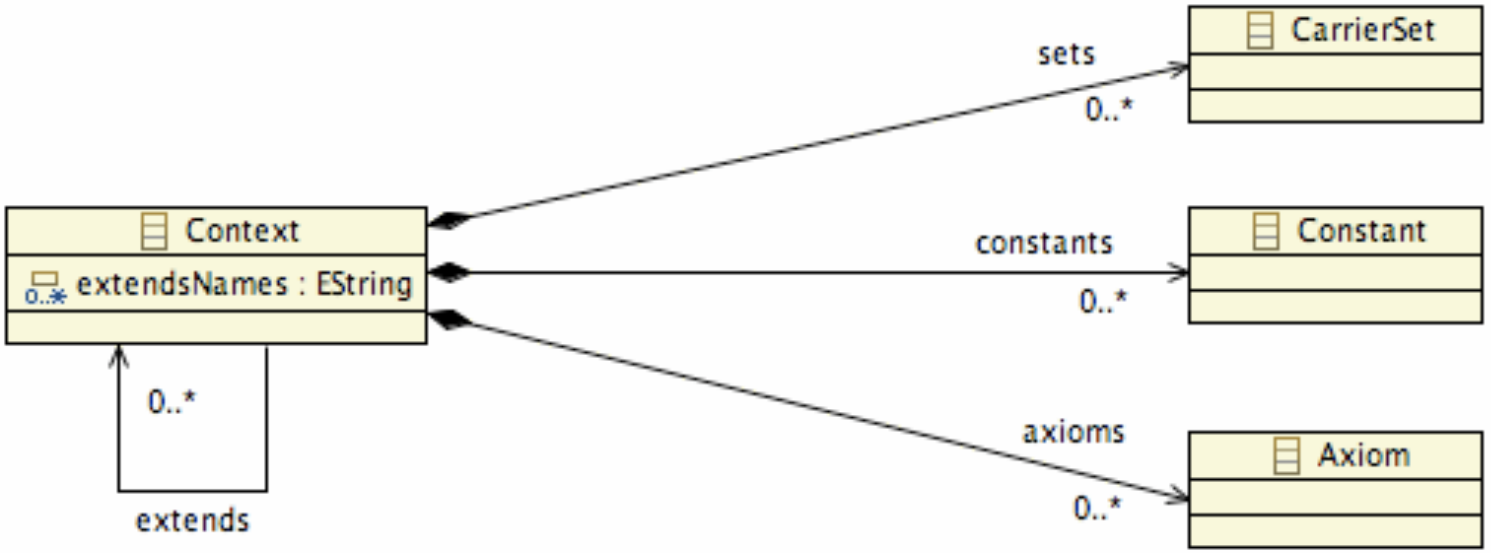
Context



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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)

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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)

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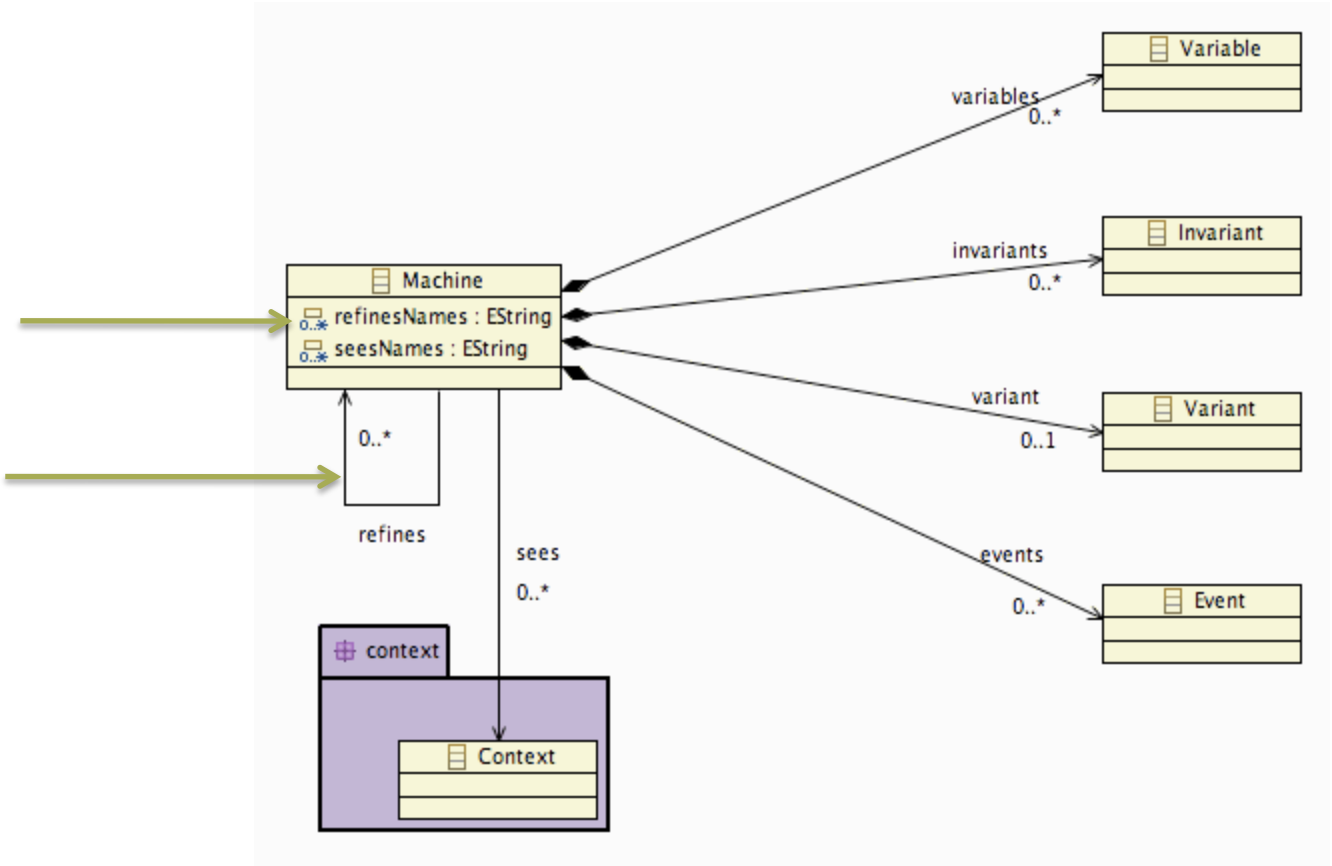
Machine



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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

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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

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A Framework for Diagrammatic Modelling Extensions in Rodin

Developed by:

Colin Snook and Vitaly Savicks – University of Southampton,

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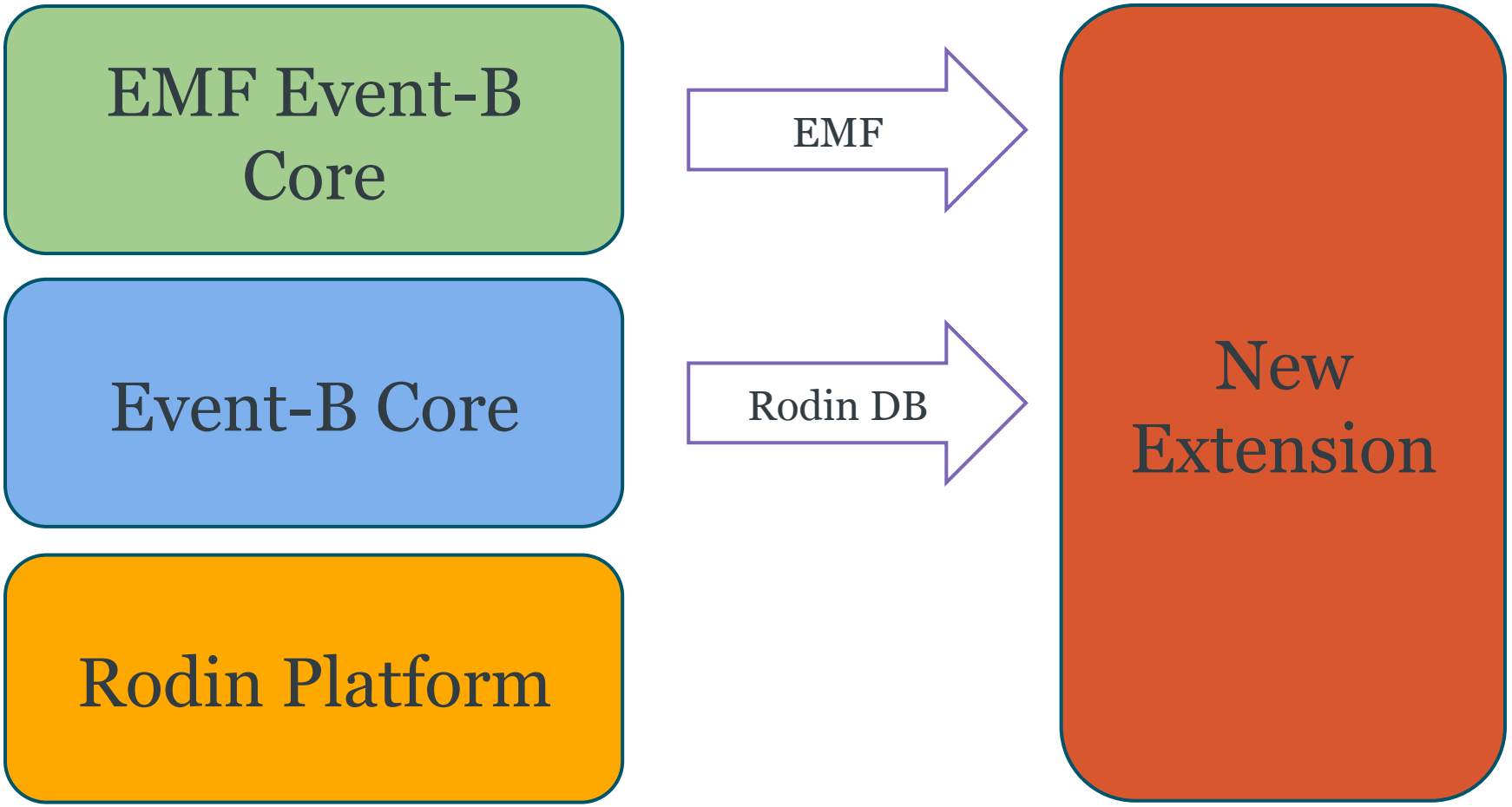
Extending Event-B (1)



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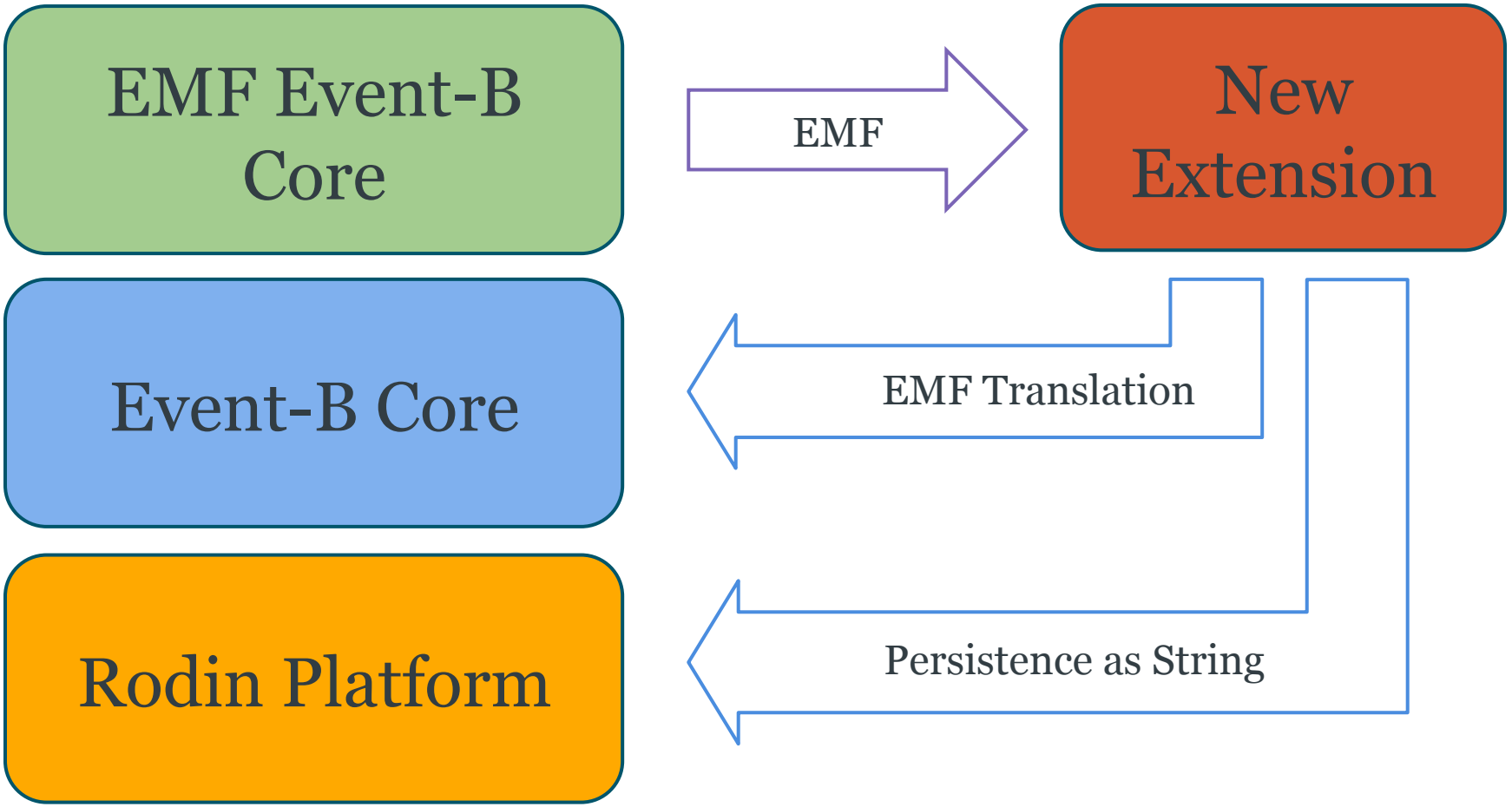
Extending Event-B (2)



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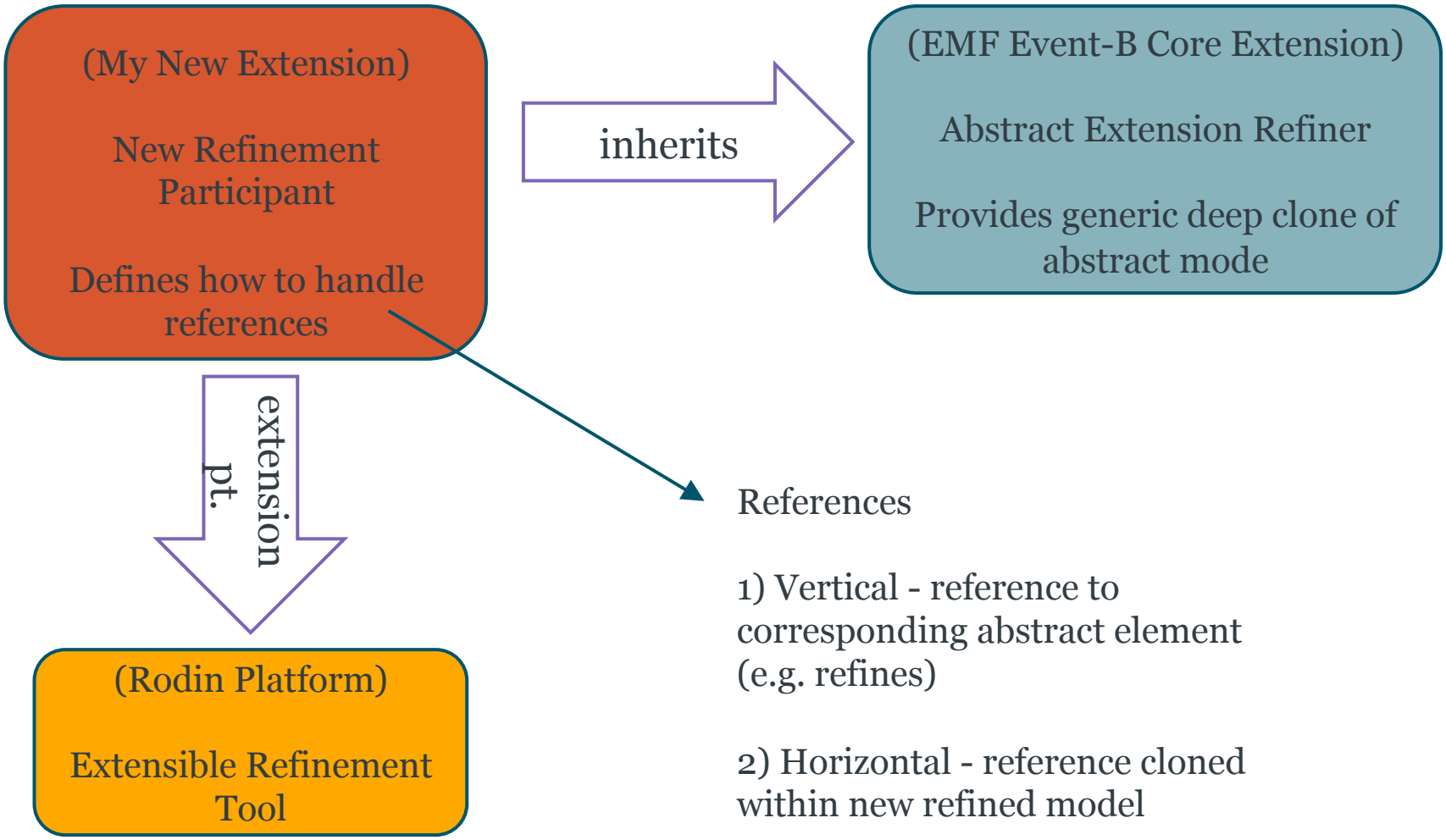
Refinement Participant



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A Framework for Diagrammatic Modelling Extensions in Rodin

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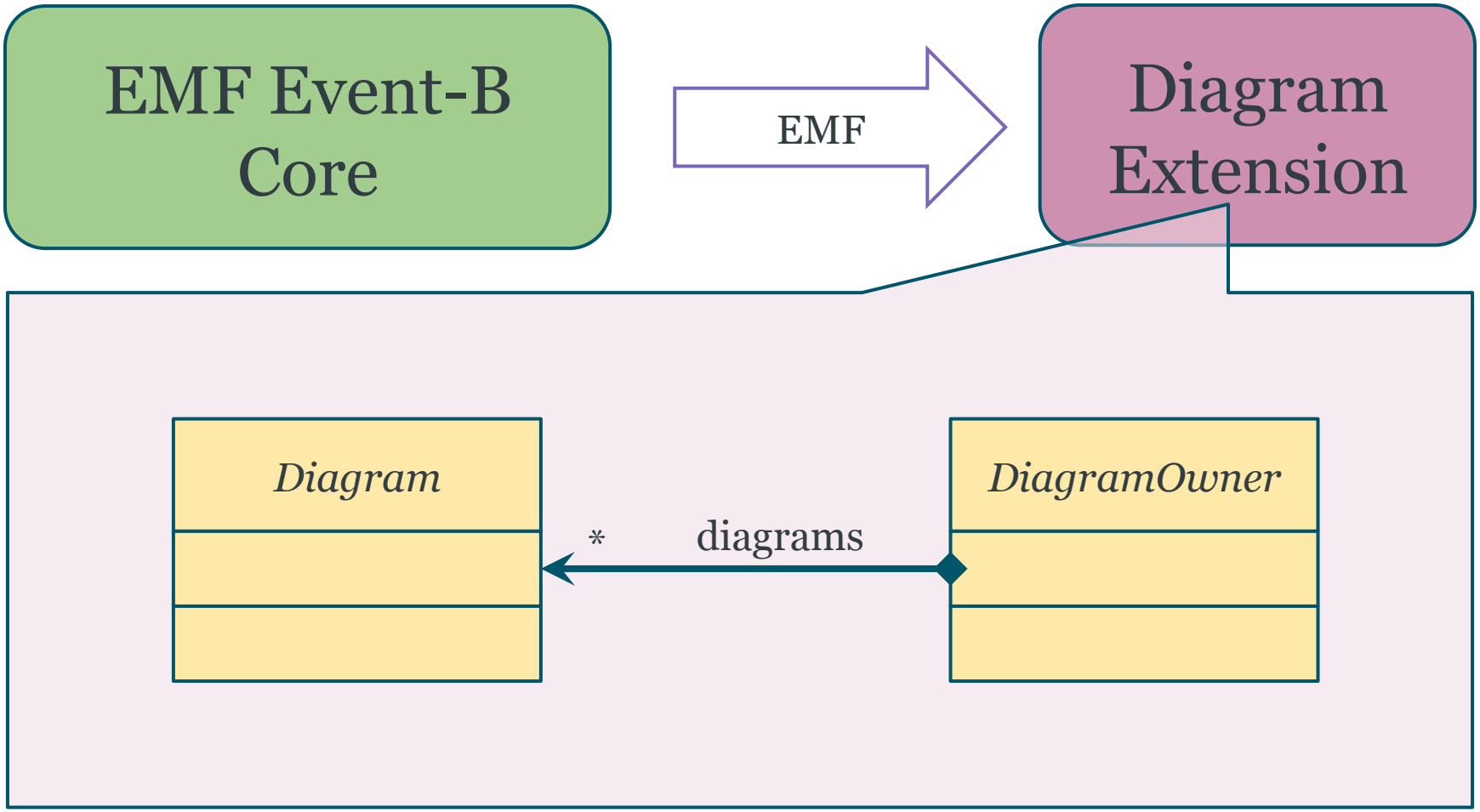
Now we want Diagrams!



Contributes to Event-B Navigator

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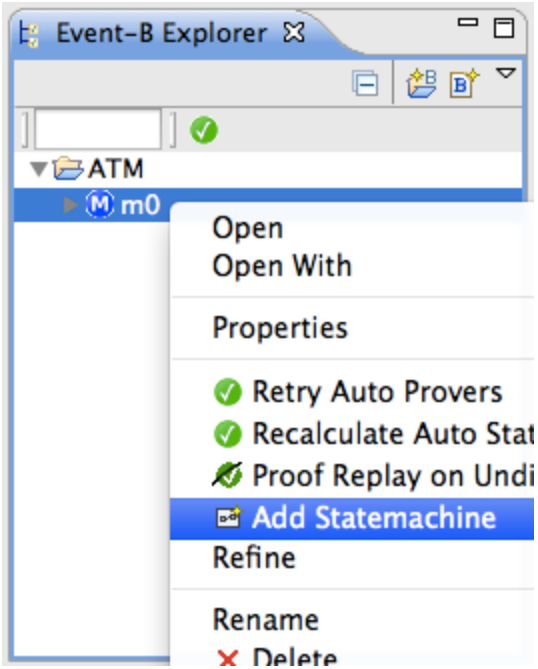


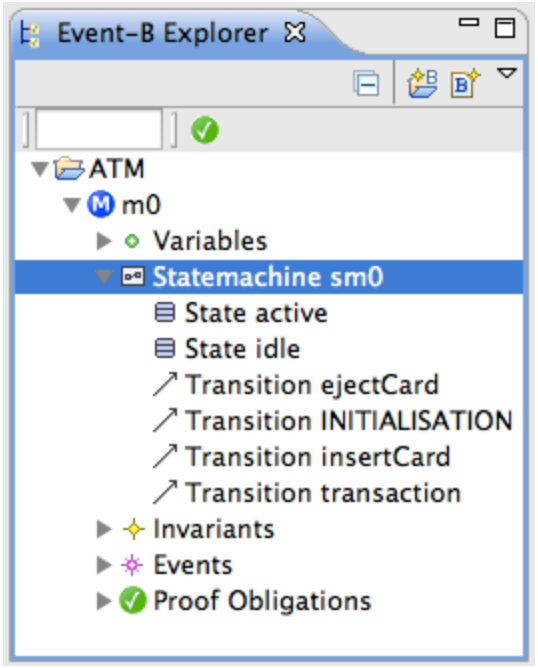
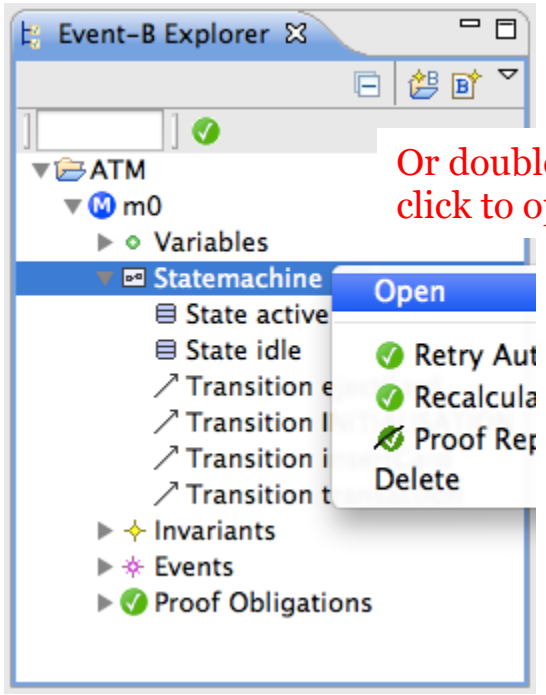


Diagram Extension



Or double click to open

EMF Event-B Core Extension

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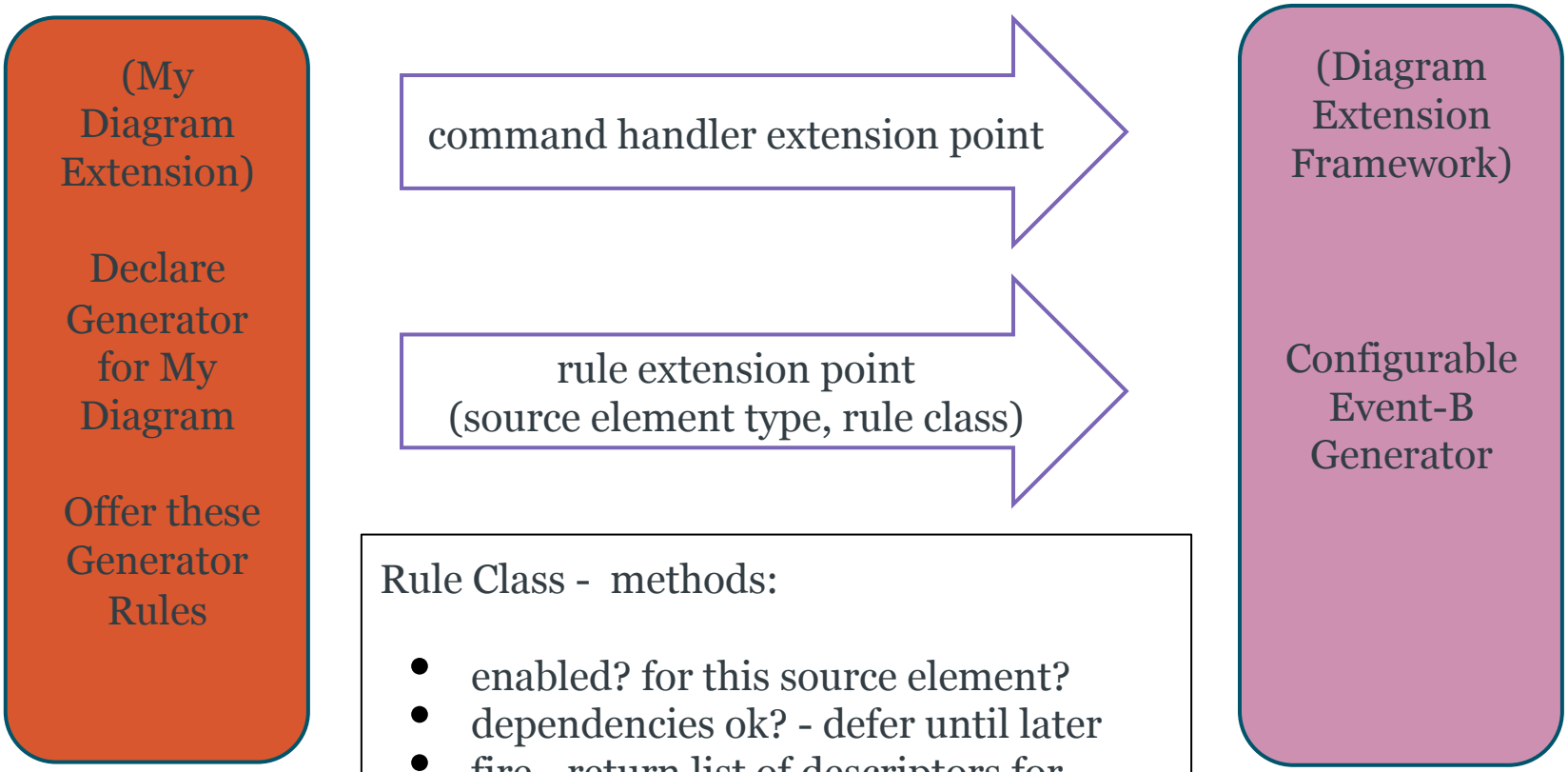
Translation to Event-B



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 Copier - Refinement Participant

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- 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

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End