

An EMF Framework for Event-B

Developed by:

Colin Snook – University of Southampton,

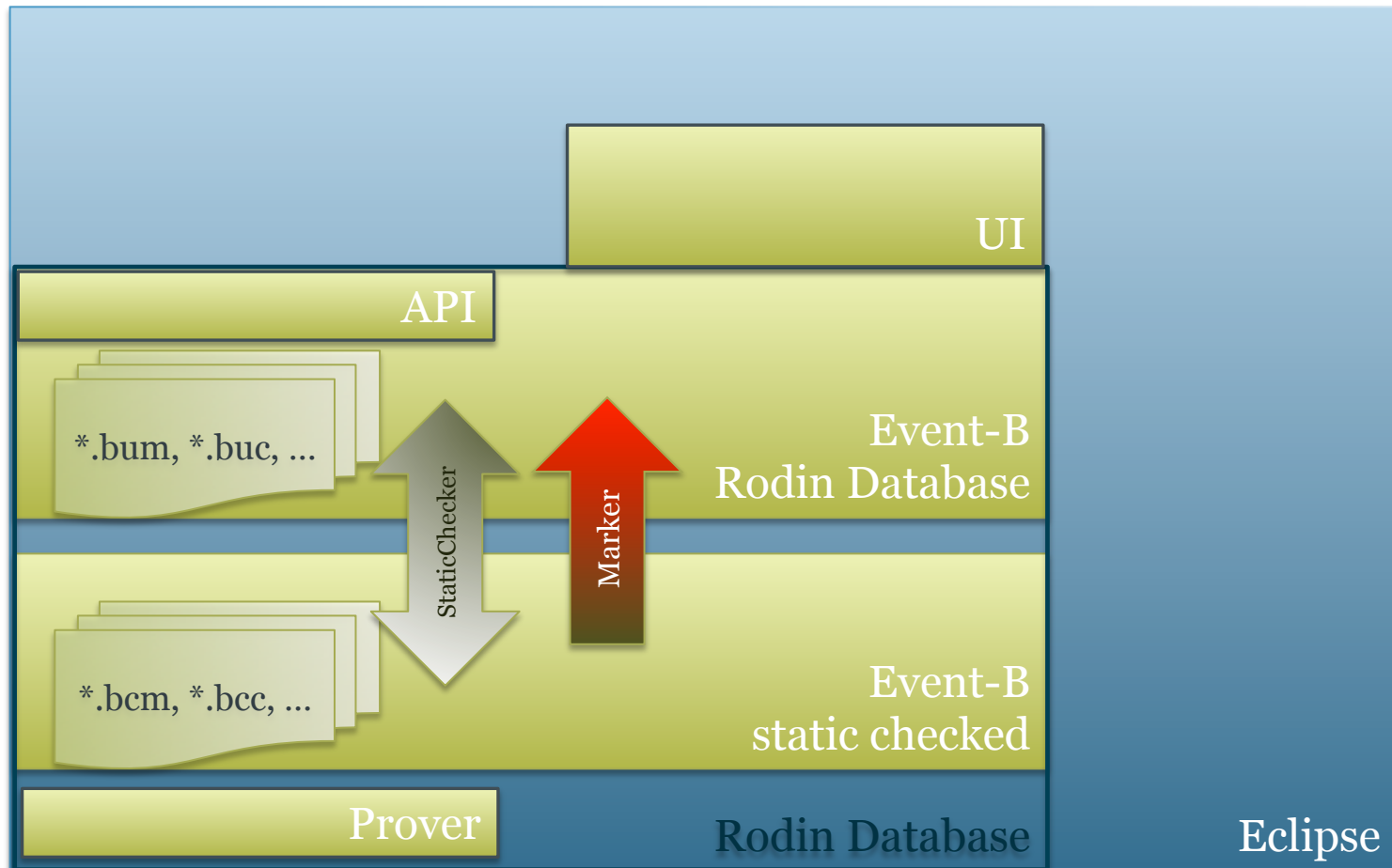
Fabian Fritz – Heinrich Heine University, Düsseldorf,

Alexei Illiasov – Newcastle University

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

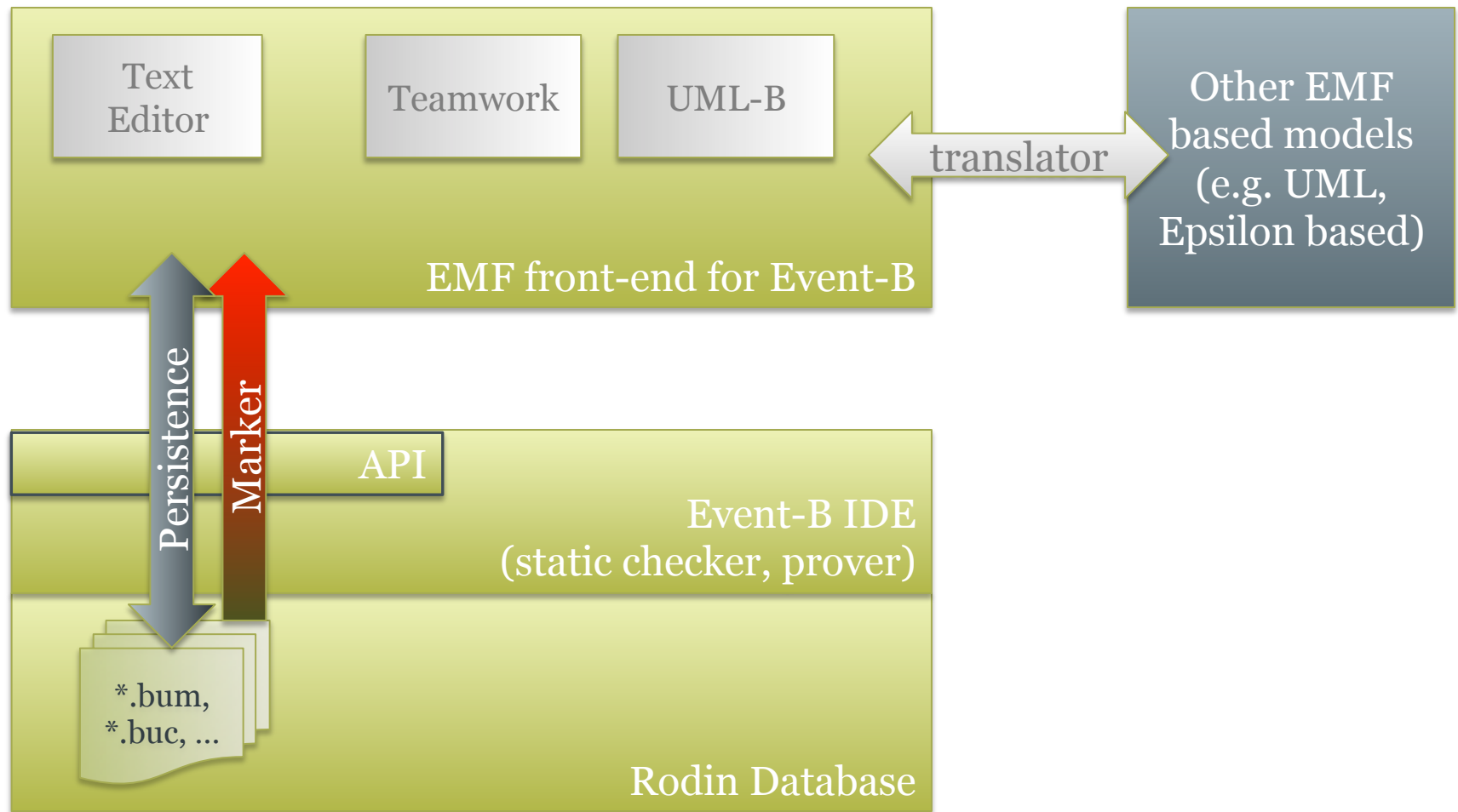
Rodin platform for Event-B



Motivation for Event-B EMF

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

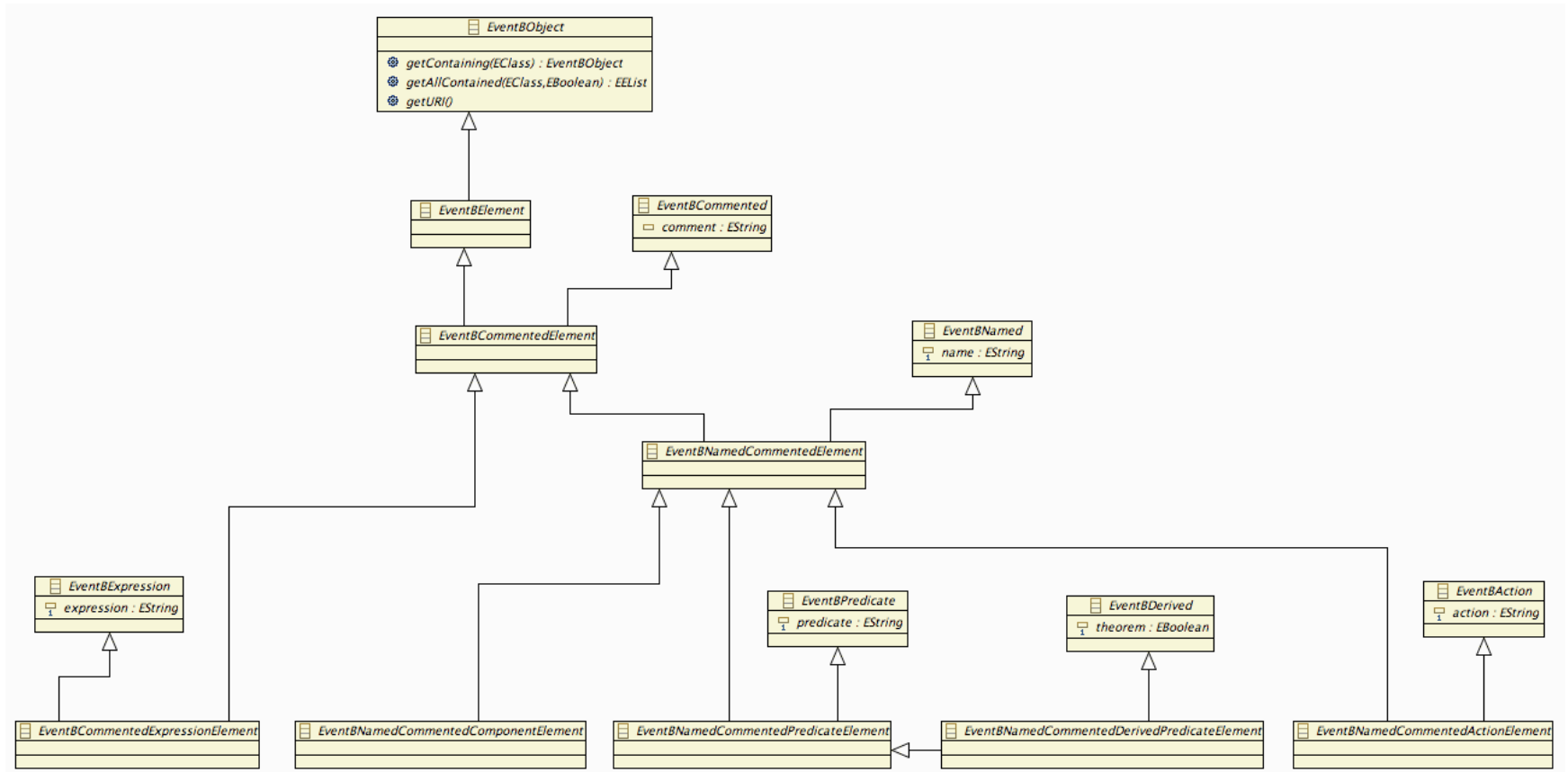
Front-End Approach



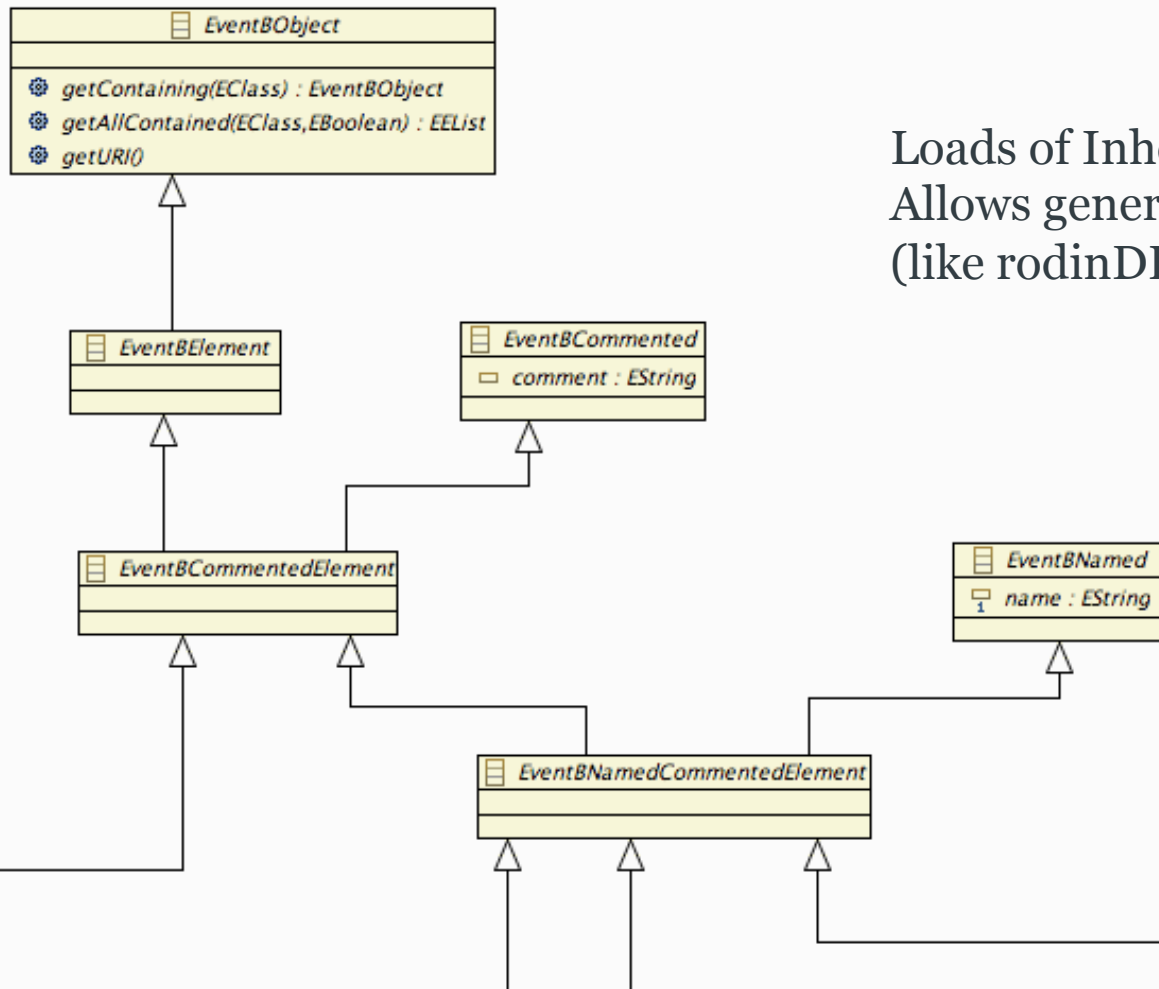
Event-B Metamodel

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

Abstract Core

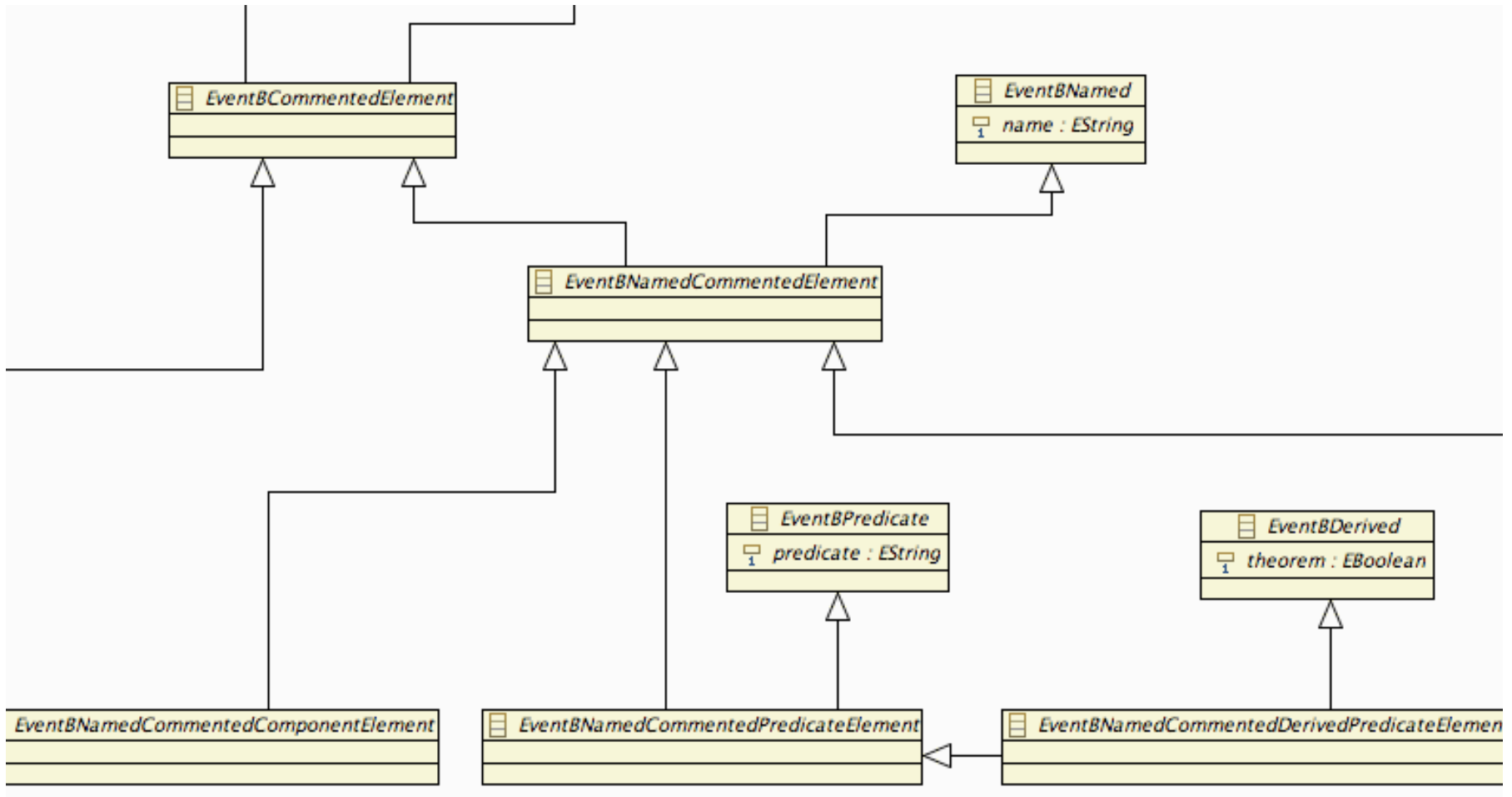


Abstract Core

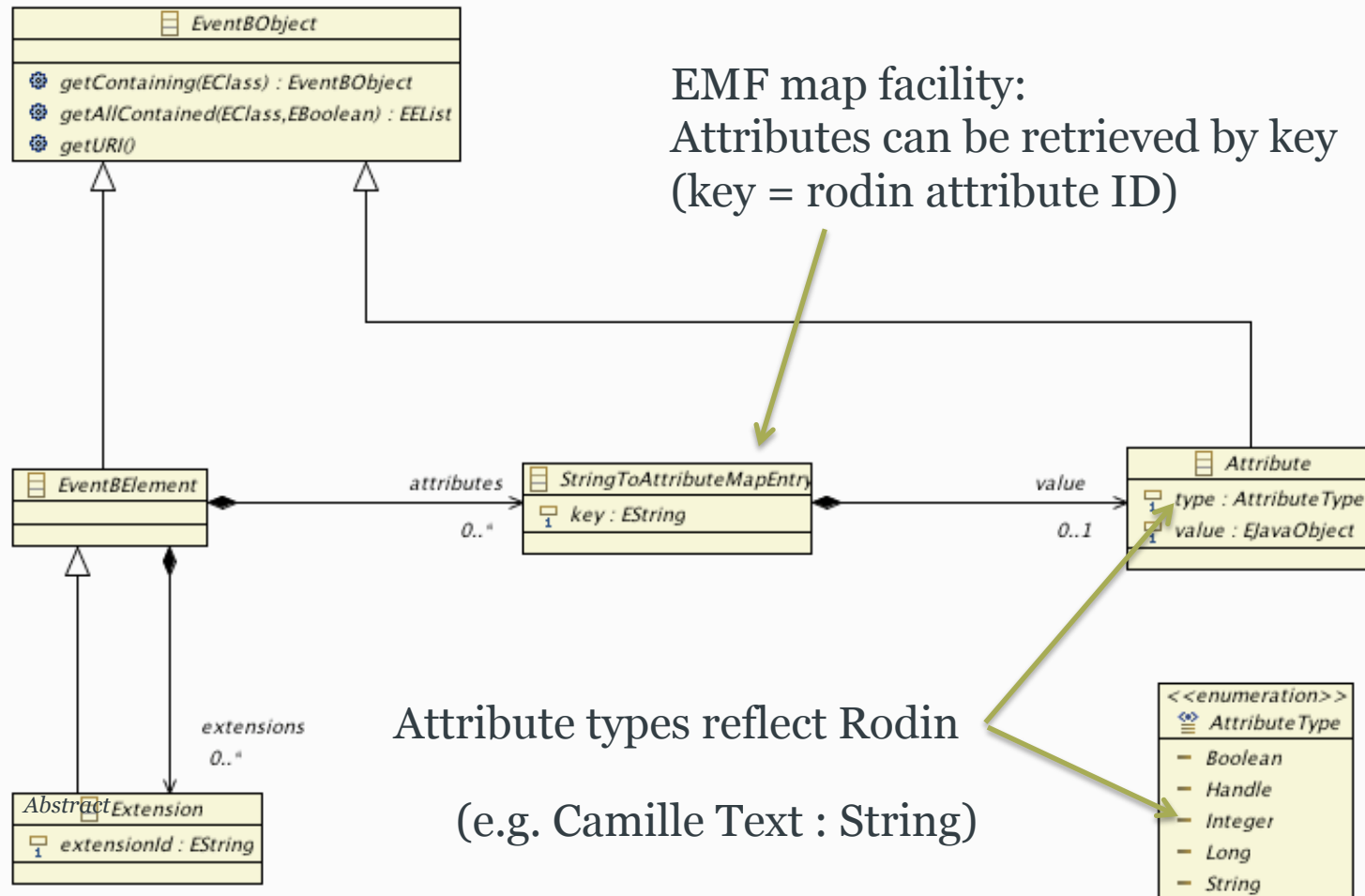


Loads of Inheritance!
Allows generic code
(like rodinDB does)

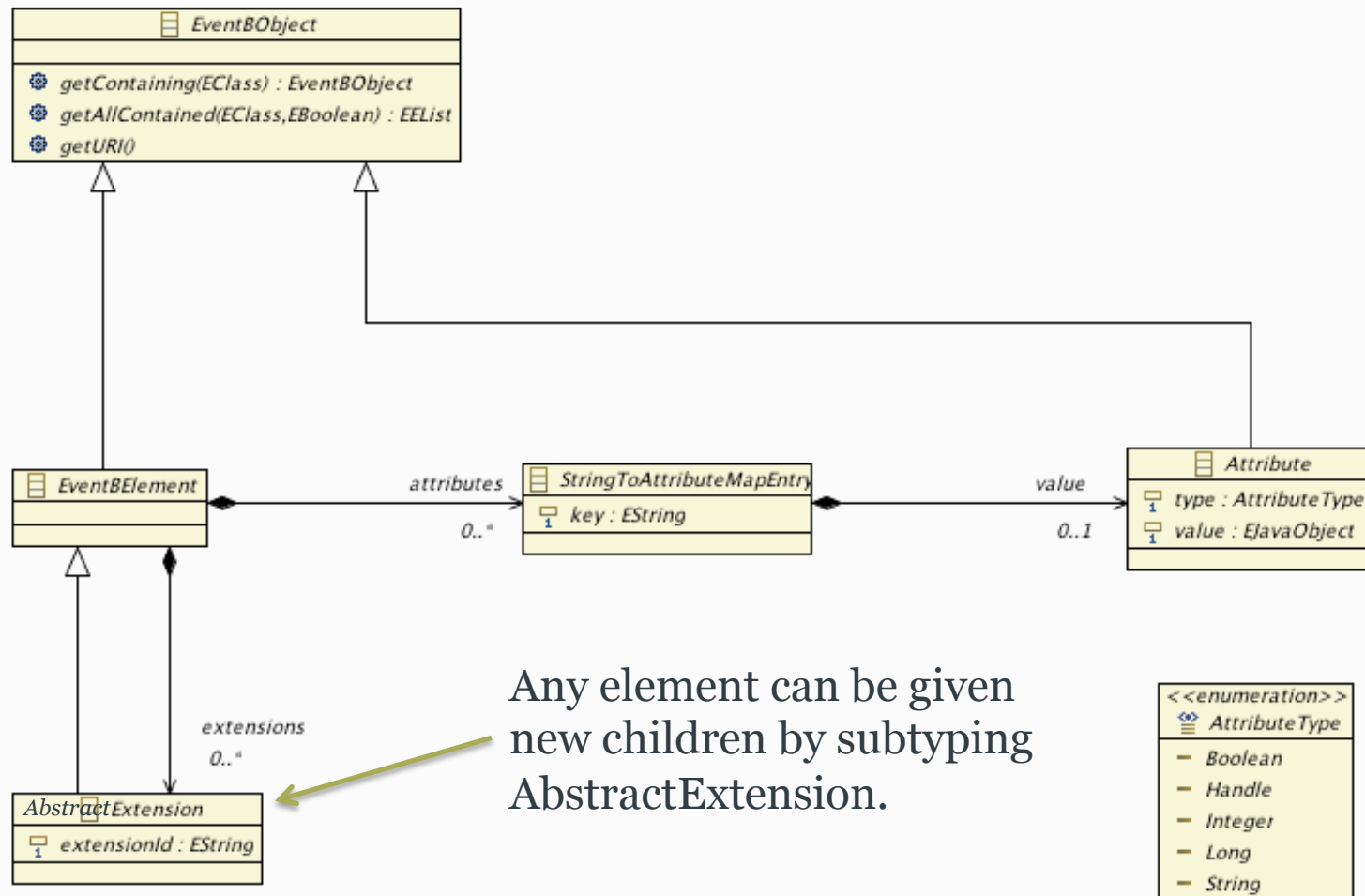
Abstract Core



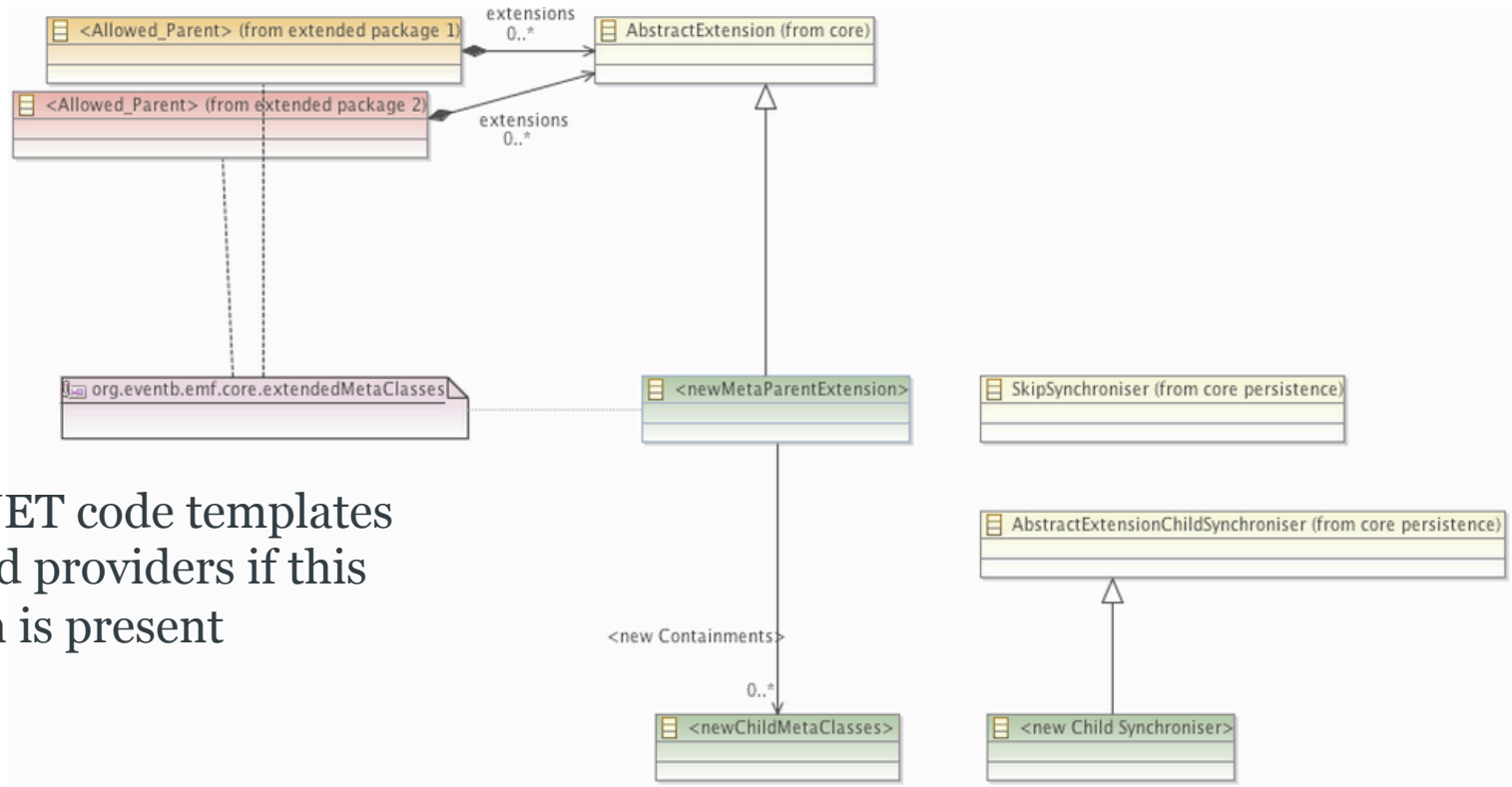
Extension Mechanism



Extension Mechanism

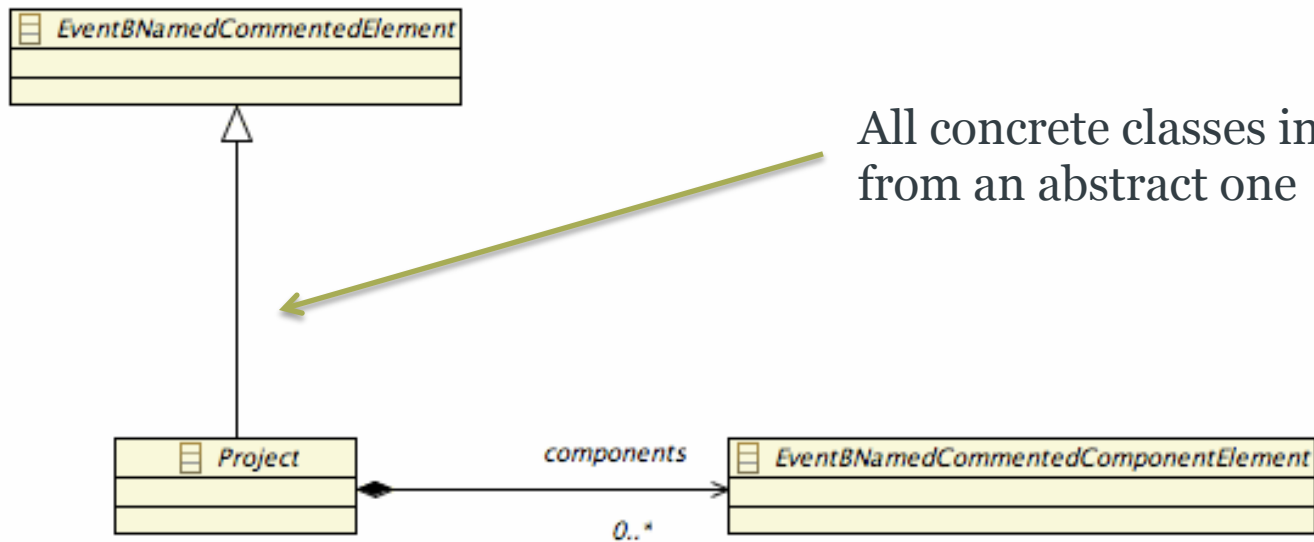


Extension Mechanism - restricting new children's parents



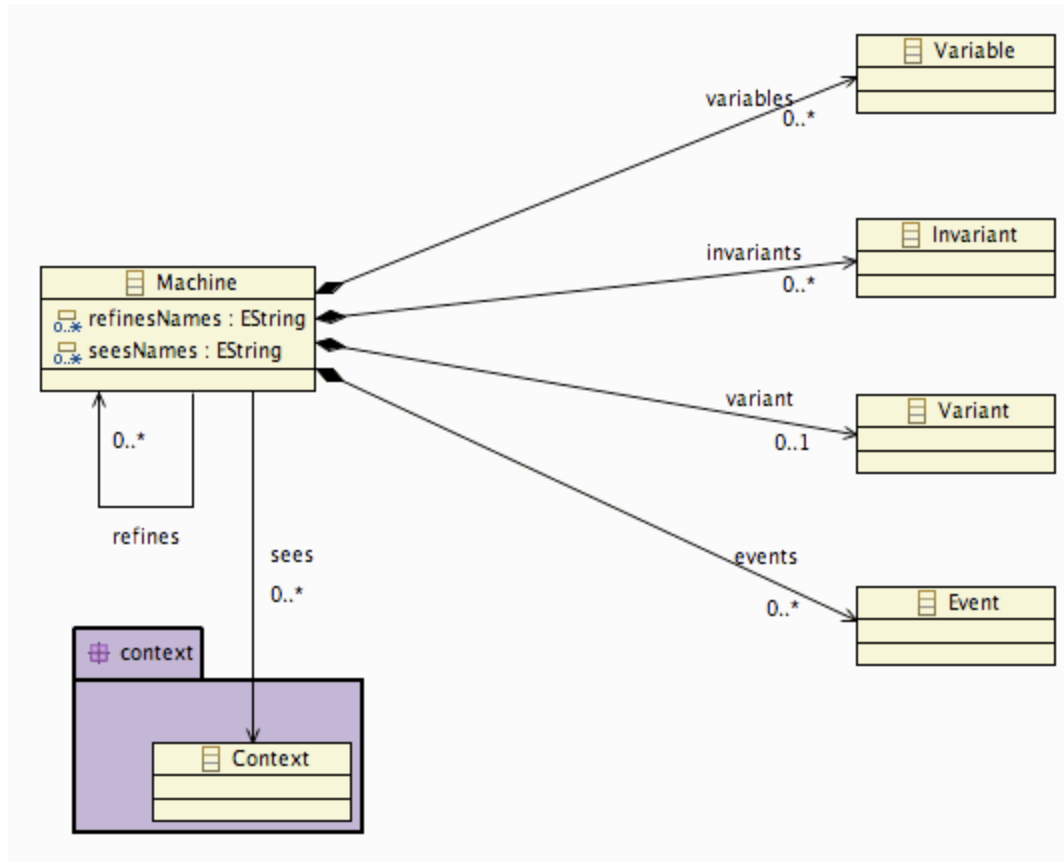
Modified JET code templates
adjust child providers if this
annotation is present

Project

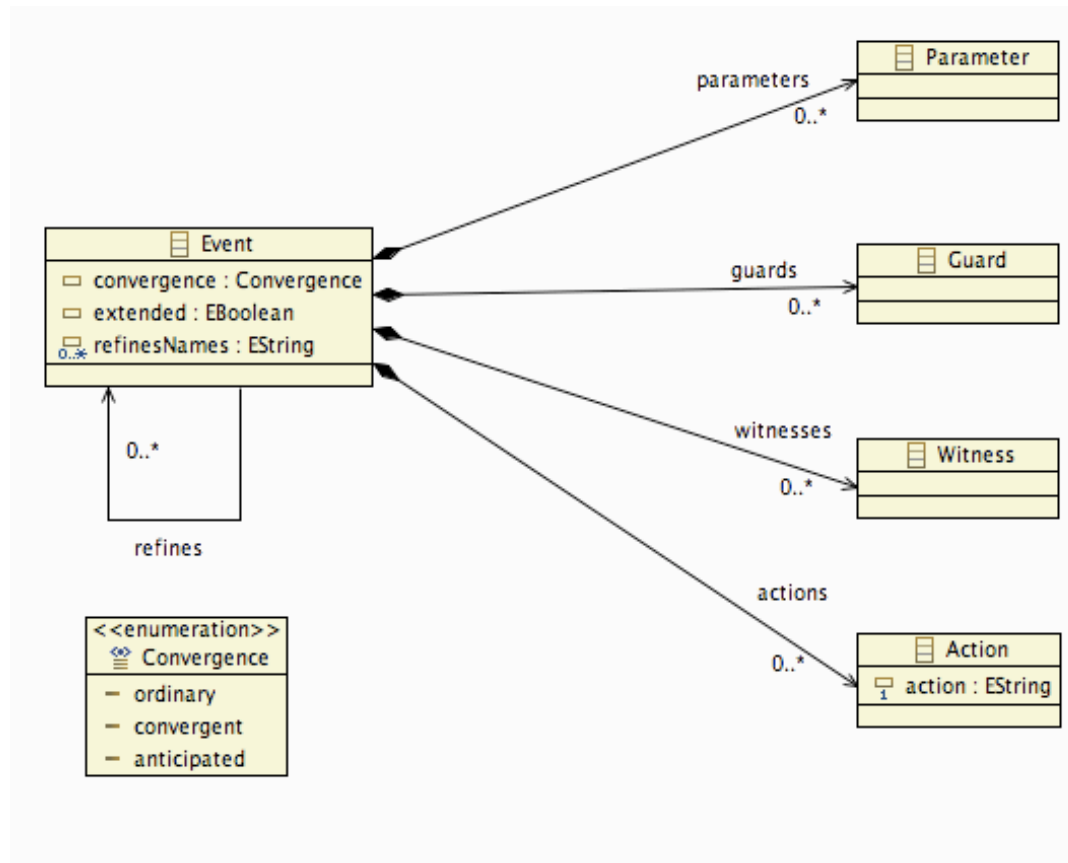


All concrete classes inherit from an abstract one

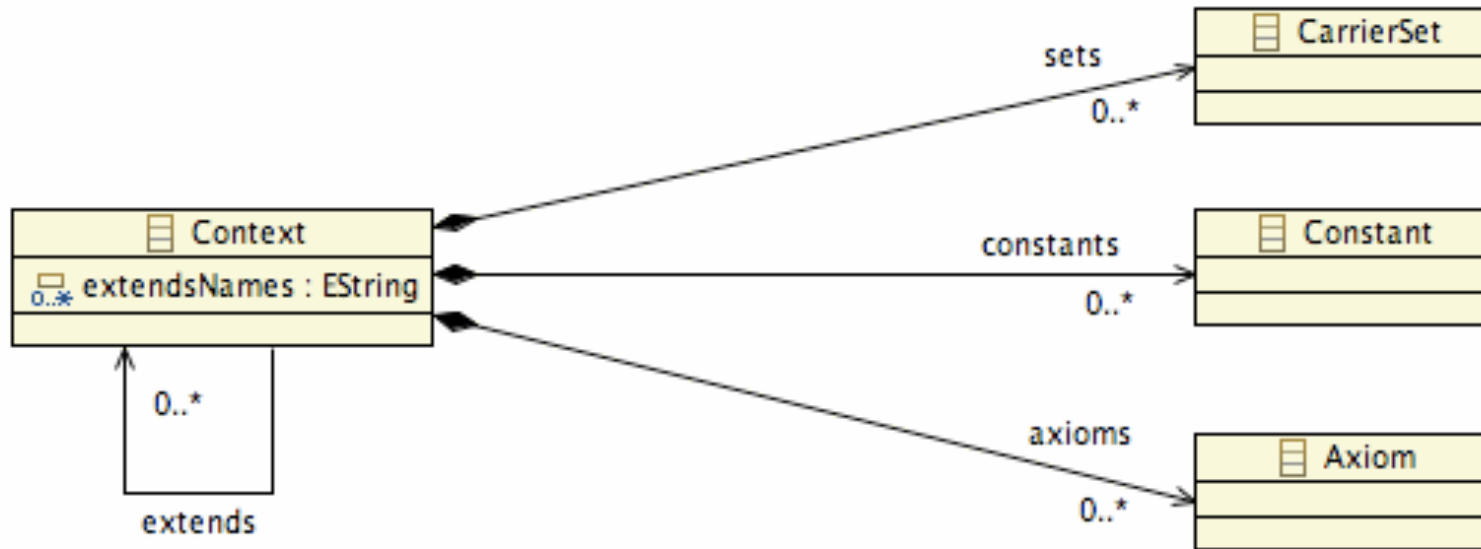
Machine



Event



Context



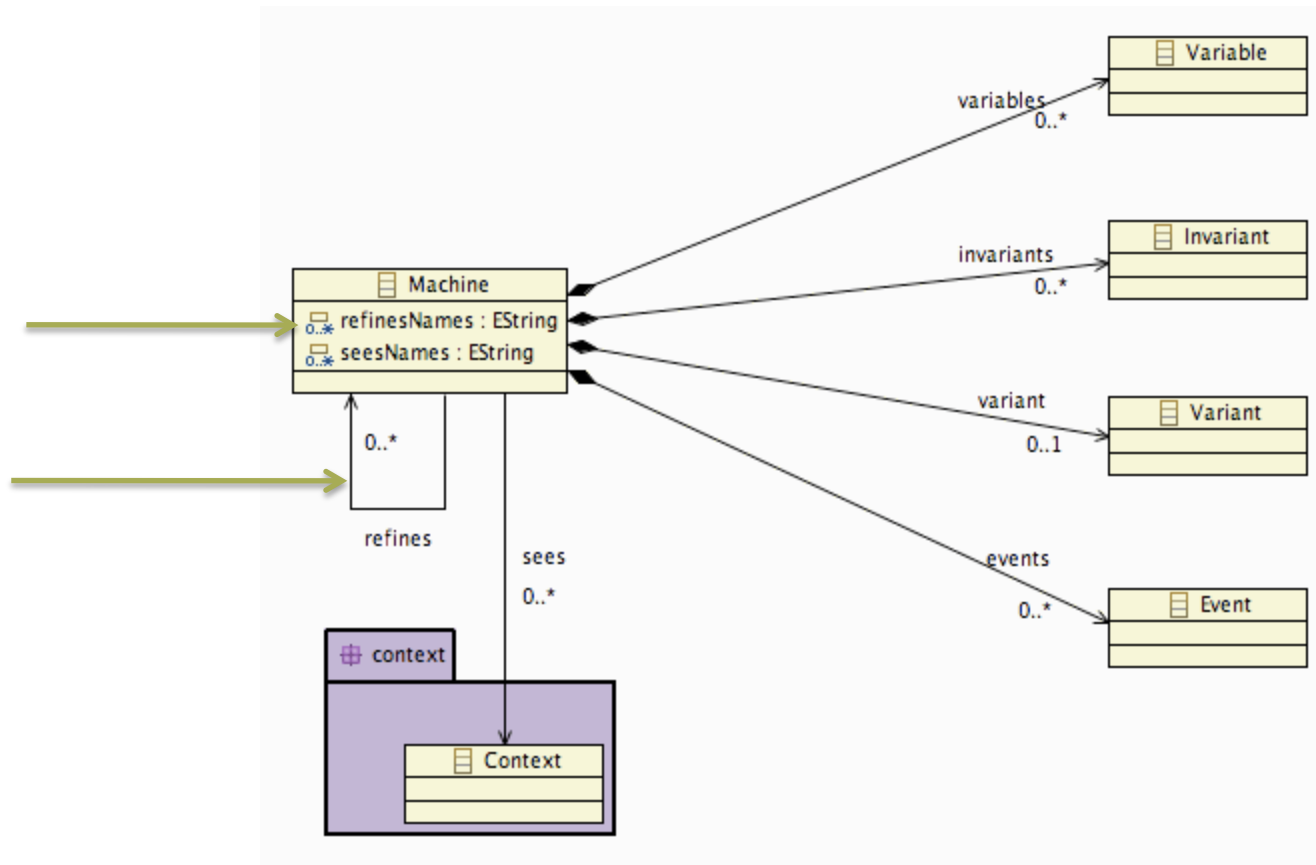
Inter-Resource References

- 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

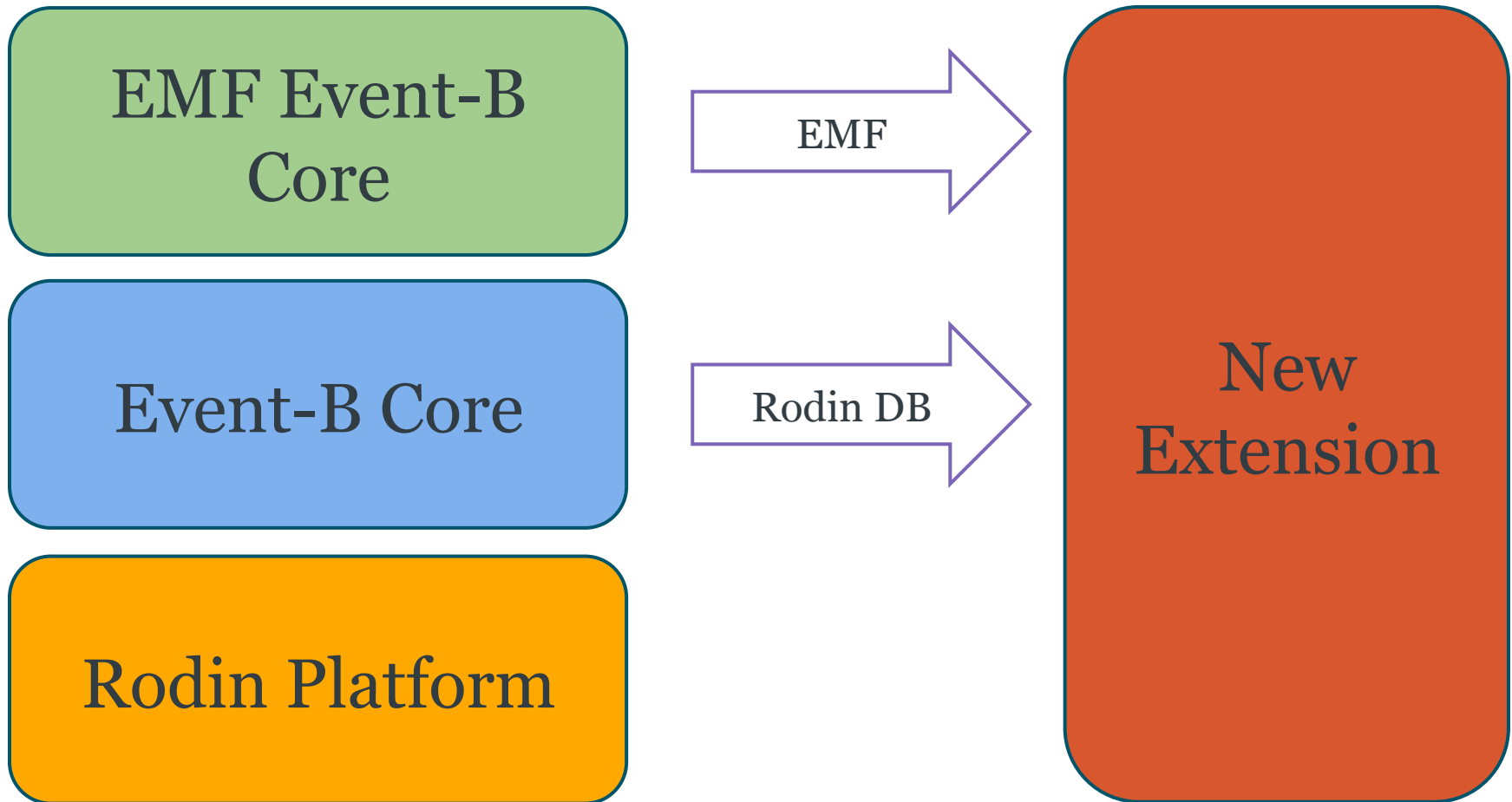
- May wish to store components outside of Rodin DB
- Option to load/save using EMF's XMI serialisation
- E.g. copy in SVN for teamworking

A Framework for Diagrammatic Modelling Extensions in Rodin

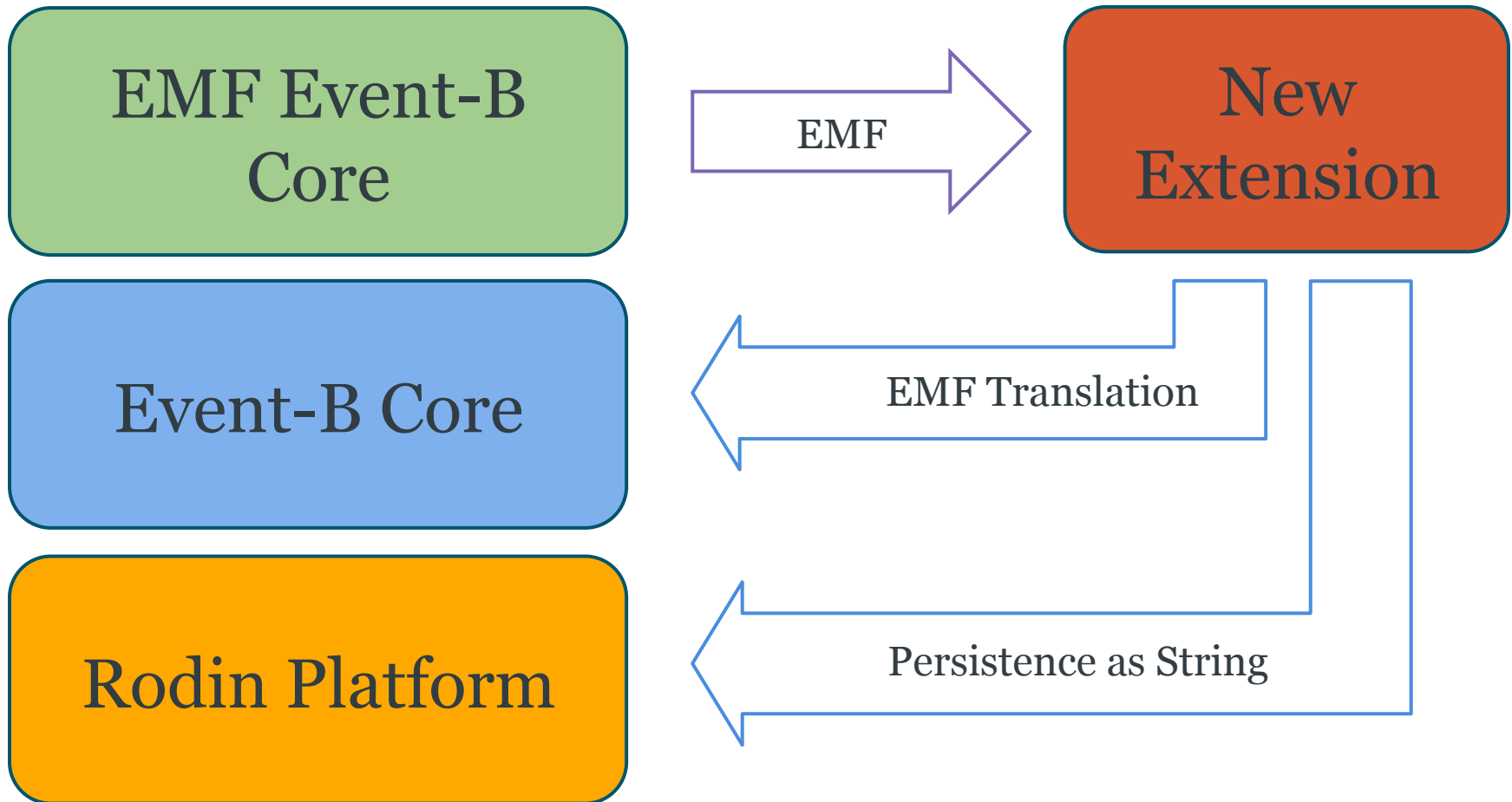
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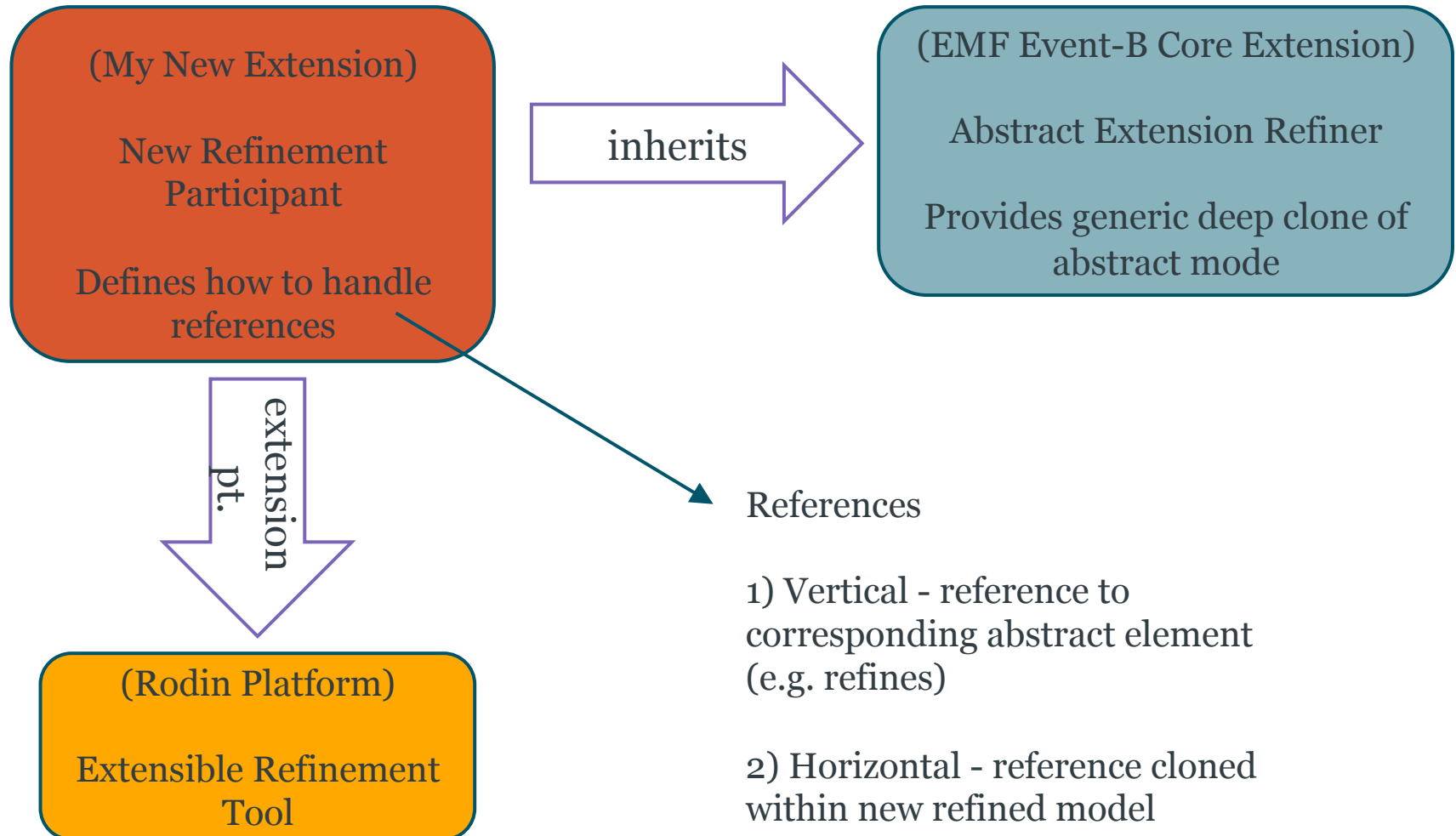
Extending Event-B (1)



Extending Event-B (2)



Refinement Participant

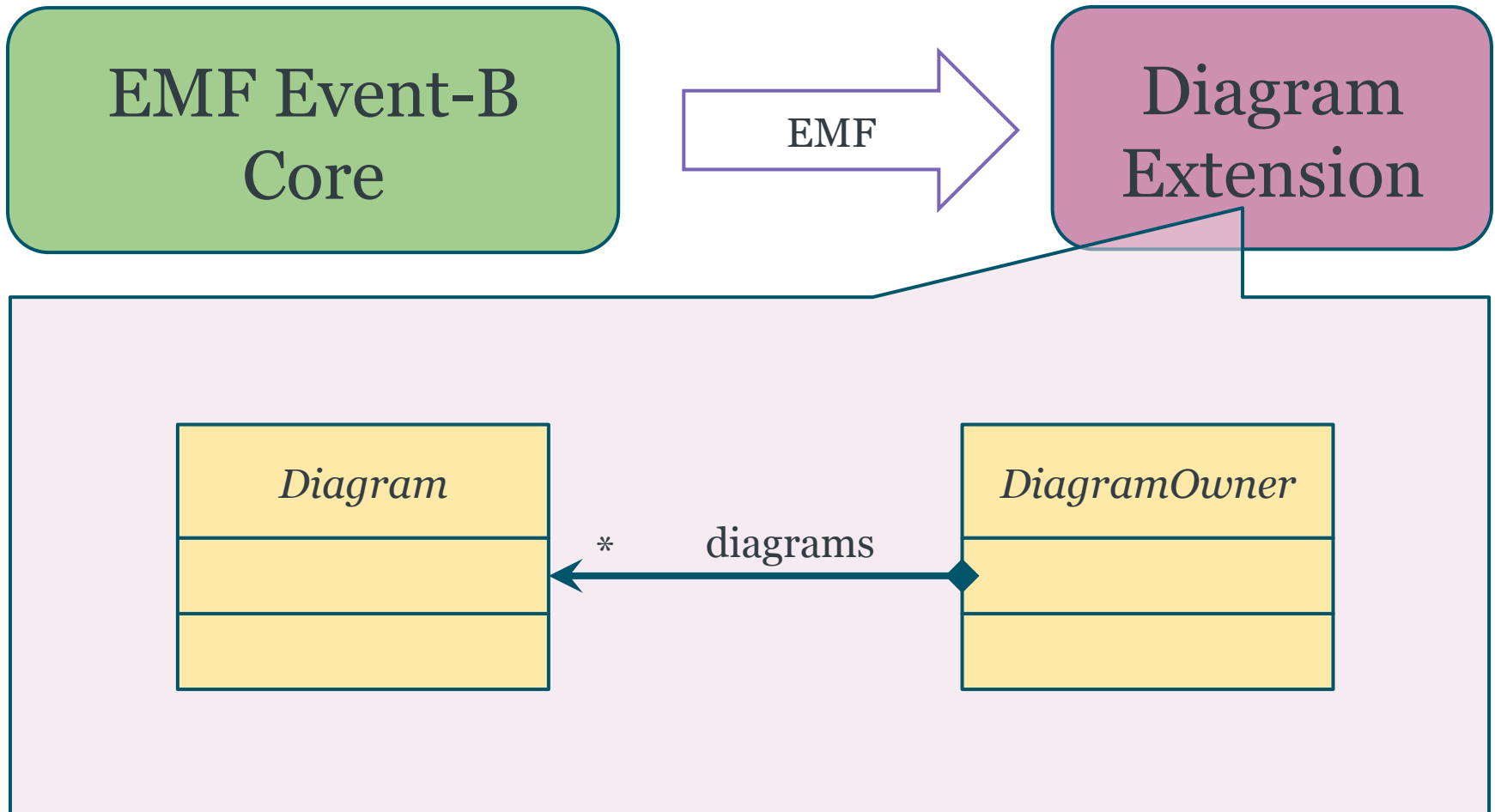


A Framework for Diagrammatic Modelling Extensions in Rodin

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Now we want Diagrams!



Contributes to Event-B Navigator

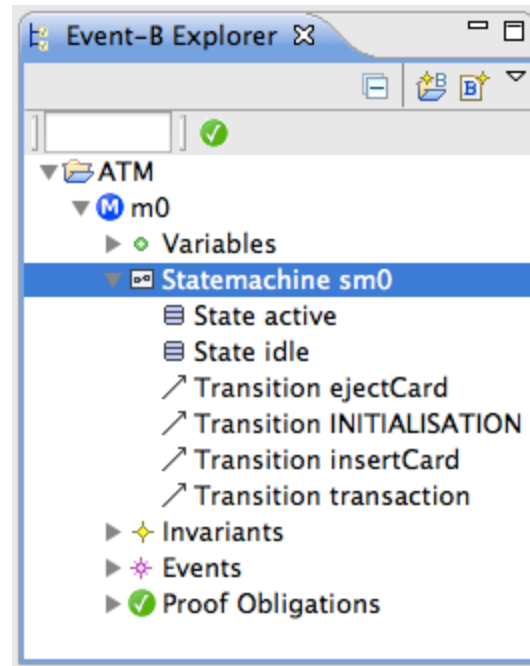
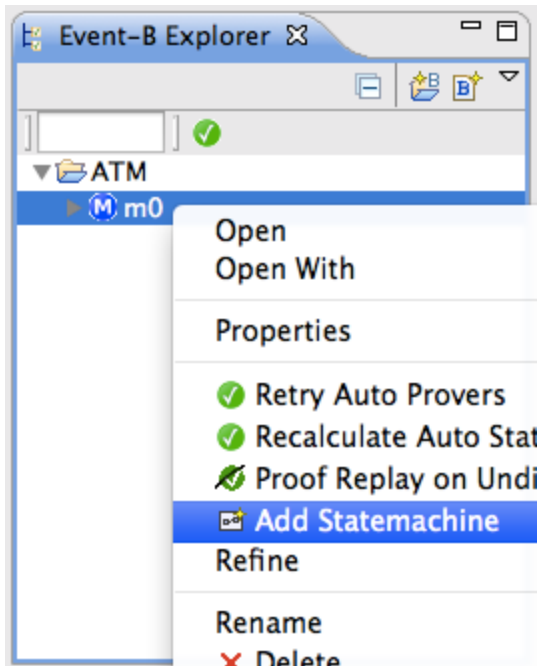
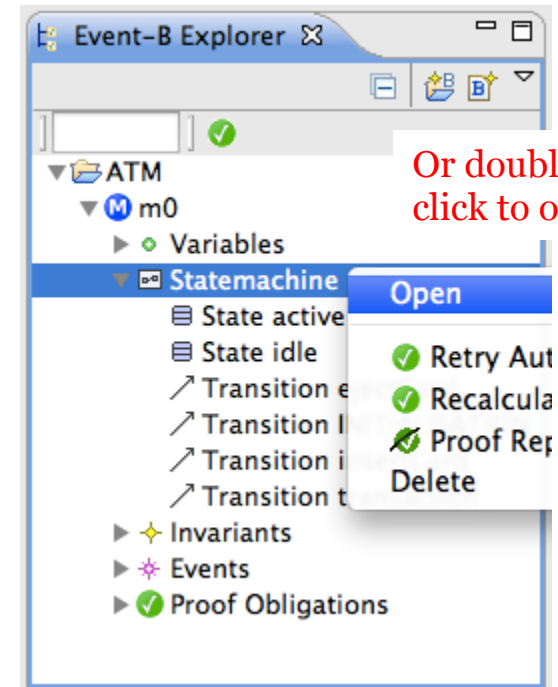


Diagram
Extension



Or double
click to open

EMF Event-B Core
Extension



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