

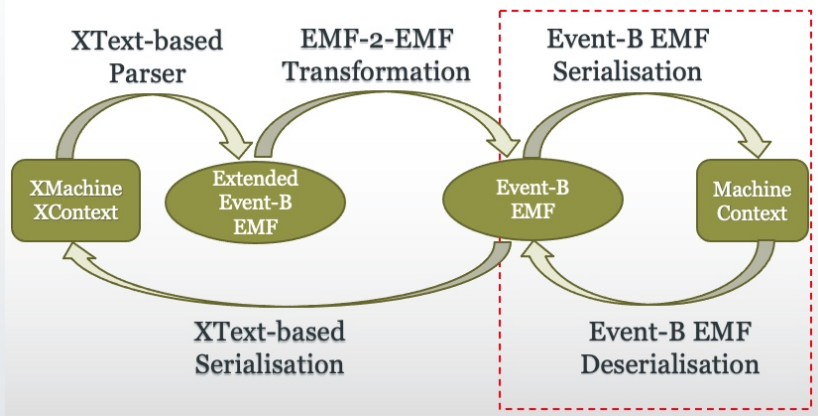
Towards CamilleX 3.0

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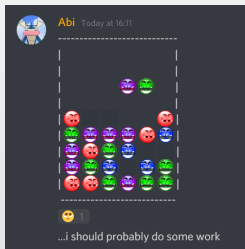
- ▶ CamilleX overview
- ▶ Proposed features
 - ▶ Ordering of modelling elements
 - ▶ Variables/constants declaration
 - ▶ Support for context instantiation



- ▶ direct syntax extensions, e.g., machine inclusion, record structure, etc.
- ▶ Indirect syntax extensions, e.g., containing UML-B diagrams.
- ▶ (see [Hoang et al. \[2021\]](#))

- ▶ We teach Event-B modelling to (~ 300) 1st-year students
- ▶ Practical exercises/demos using CamilleX.
- ▶ Increasing engagement with using Rodin.

My Rewards



CamilleX Overview

Towards CamilleX 3.0
Element Ordering
Identifier Declaration
Support Context Instantiation

The Problem (1/2)

- ▶ Event-B EMF: Elements stored in **different collections**.
 - ▶ **sets, constants, axioms** for contexts
 - ▶ **variables, invariants, events** for machines
 - ▶ The order between different elements is lost
- ▶ Order of the elements are assumed
 - ▶ e.g., sets -> constants -> axioms in contexts
 - ▶ e.g., variables -> invariants -> events in machines
- ▶ Extended elements also does not have order
 - ▶ Record-related axioms/invariants ([Fathabadi et al. \[2021\]](#)) are generated **after** the normal axioms/invariants

Element Ordering

The Problem (2/2)

```
1 // CamilleX context with Record
2 sets S
3 axioms
4   @axm1 :  $\forall s \cdot s \in S \Rightarrow s \in \text{ran}(A)$ 
5 record r
6   A : one S
```

```
1 // Translated Rodin context
2 sets S r
3 constants A
4 axioms
5   // Type of A will be unknown
6   @axm1 :  $\forall s \cdot s \in S \Rightarrow s \in \text{ran}(A)$ 
7   // record field translation axiom
8   @axm_r_A :  $A \in r \rightarrow S$ 
```

- ▶ Event-B EMF(prototype) will store the modelling elements in a generic collection, named **orderedChildren**
 - ▶ existing collections will become derived attributes
 - ▶ to minimise the impact of the changes
- ▶ Update CamilleX to allow the **interleaving of modelling elements**.
- ▶ Updating generator for record structure to use the ordering (to be done)

- ▶ Each modelling element will be prefixed with a singular keyword, such as **axiom**, **invariant**, **event**
 - ▶ Can eliminate the block **axiom**, **invariants**, **events**
- ▶ Identifiers can be declared together with their types and (initial) values

```
1 variables a
2 invariants
3   @a-typeof: a ∈ ℕ
4 event INITIALISATION
5 begin
6   @a-init: a := 0
7 end
```

```
1 variable a : ℕ = 0
```

Context Instantiation (Ideas)

- ▶ Directly extending CamilleX syntax
 - ▶ abstract sets and constants
 - ▶ instantiation and imported theorems

```
1 context c0
2 abstract sets S
3 abstract constants c
4 axiom A (S, c)
5 theorem @thm1 : thm (S, c)
```

```
1 context d0
2 sets T
3 constants d
4 axiom A (S, c)
5 instantiates c0
6   with S = T; c = d
7 uses @thm1 ...
```

- ▶ Flatten the into facility provided by the instantiation plugin [Verdier and Voisin \[2021\]](#).

Questions?

- Asieh Salehi Fathabadi, Colin Snook, Thai Son Hoang, Dana Dghaym, and Michael Butler. Extensible record structures in Event-B. In *ABZ 2021*, 2021.
- Thai Son Hoang, Colin Snook, Dana Dghaym, Asieh Salehi Fathabadi, and Michael Butler. The CamilleX framework for the Rodin Platform. In *ABZ 2021*, 2021.
- Guillaume Verdier and Laurent Voisin. Context instantiation plug-in: a new approach to genericity in Rodin. (in Rodin Workshop 2021), 2021.

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