OntoEventB

A Generator of Event-B contexts from Ontologies

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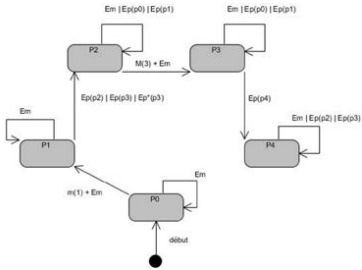
Plan

1. The context
2. The proposed approach
3. The OntoEventB framework
4. Conclusion and Future works

Plan

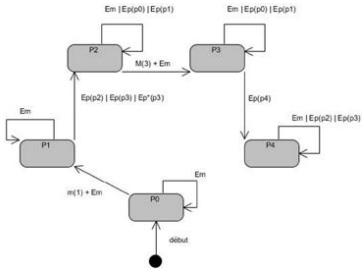
Introduction

- In a system design process, several relevant properties can be checked using formal methods.



Introduction

- In a system design process, several relevant properties can be checked using formal methods.
- These properties are expressed and checked according to the semantics associated with the used formal technique :
  - *proofs theory, logic based reasoning, model checking, trace analysis, simulation, etc.*



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AXIOMS

- a1: *height_of_train* $=$ 4200 expressed in MILLIMETERS in TRAIN model
- a2: *height_of_tunnel* $=$ 6 expressed in METERS in TUNNEL model
- a3: *safety_distance* $=$ 750 expressed in MILLIMETER in SAFETY model
- th: $\langle$theorem$\rangle$ *height_of_train* $+$ *safety_distance* $\leq$ *height_of_tunnel*

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- This domain and environment knowledge is most often described using knowledge models (**ontologies**)

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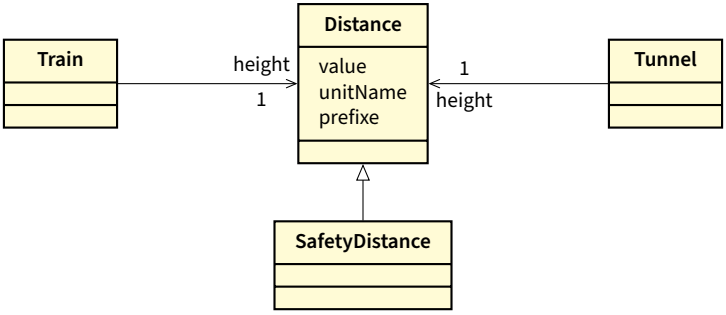

AXIOMS

th: ⟨theorem⟩ $train.height.value + safetydistance.value \leq tunnel.height.value$

...

wd1: $train.height.unitName = safetydistance.unitName = tunnel.height.unitName$

wd2: $train.height.prefixe = safetydistance.prefixe = tunnel.height.prefixe$

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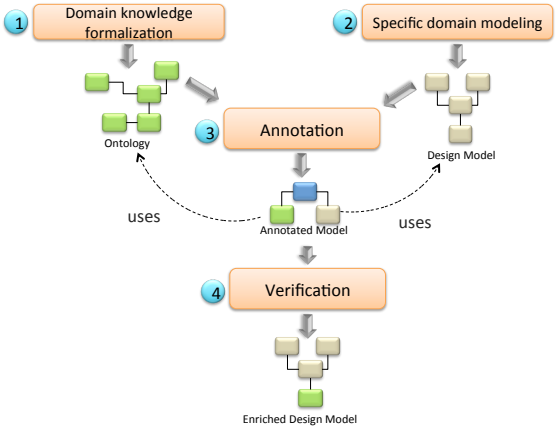
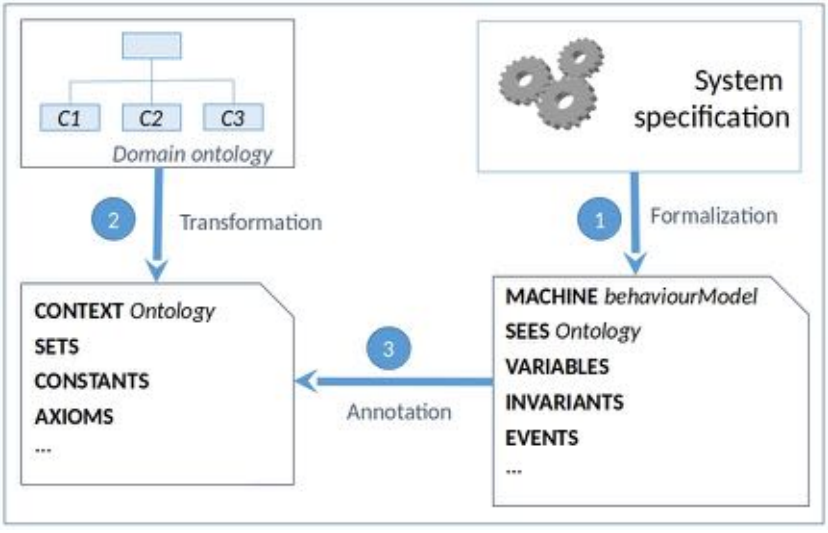
The proposed approach



The Event-B based approach



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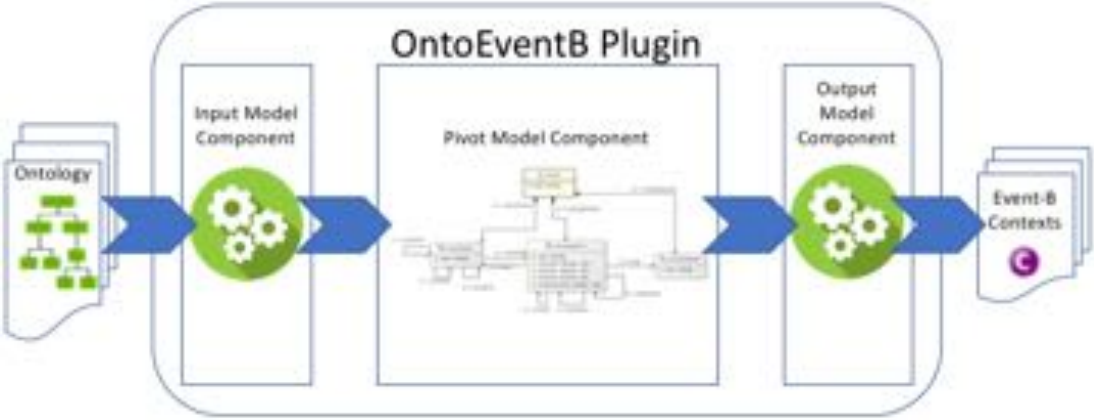
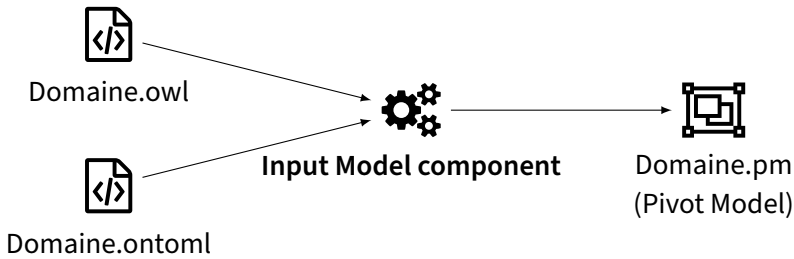
The OntoEventB architecture



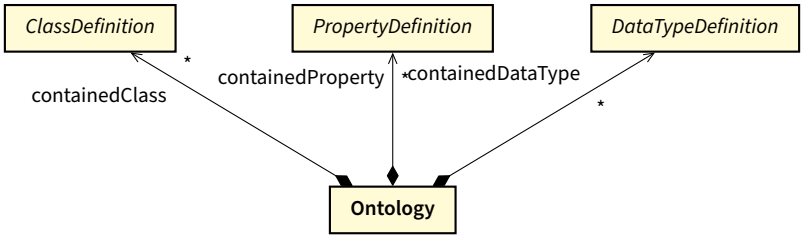
The Input Model component

The Input Models component can treat Web ontologies described using OWL language or Plib ontologies described with OntoML formalism.



The Pivot Model component

The Pivot Model component contains an intermediate model which summarizes common pertinent concepts used by a great number of ontology description languages.



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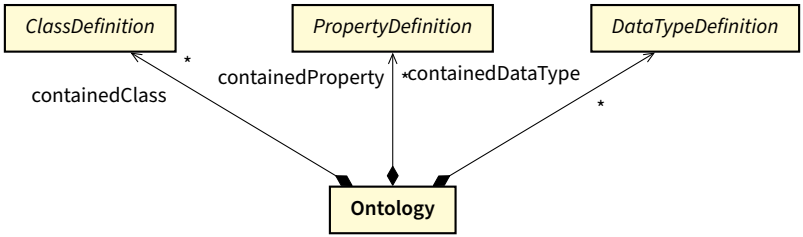
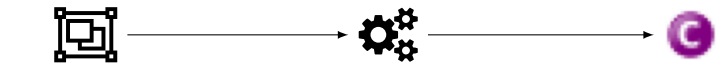


The Pivot Model component has the possibility of generating a PM file (Pivot Model textual representation).

The Output Model component

The Output Model component receives generic concepts computed by the Pivot Model component and transforms them into Event-B Context definitions.



The OntoEventB plug-in (1/3)

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3. the **PM**$\mapsto$**Event-B** feature : generates an Event-B context from a Pivot Model file,

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3. the **PM**$\mapsto$**Event-B** feature : generates an Event-B context from a Pivot Model file,
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The OntoEventB plug-in (2/3)

- To use the OntoEventB plugin in your Rodin platform, you must install :
  - the xText plugin :

    `http://download.eclipse.org/modeling/tmf/xtext/updates/composite/releases/`
  - the OntoEventB plugin :

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- You can visit the OntoEventB Websites available on these links :

  `https://wdi.centralesupelec.fr/software/OntoEventB`

  `https://github.com/idiraitsadoune/OntoEventB`

The OntoEventB plug-in (3/3)

DEMO

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Conclusion

- Our results show that it is possible to *handle formally domain knowledge in formal system developments* with Event-B and Rodin platform.

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- Our results show that it is possible to *handle formally domain knowledge in formal system developments* with Event-B and Rodin platform.
- *Ontologies have been formalised within Event-B* as contexts and *a Rodin plug-in has been developed* for this purpose.

Future works

- Extending the Pivot Model for providing the possibility to express properties by using predicates.

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- Extending the OntoEventB plugin to interact with other formal methods.

➜ developing an extension to support the integration of ontologies in the **Isabelle/HOL** framework.

Thank you !

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