

From Event-B Models to Code

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Abstract

Event-B is a formal approach to modelling systems, based on set theory, predicate logic and arithmetic. Various techniques are used during modelling, including refinement, and decomposition. This article describes an extension to the Event-B approach, which we call Tasking Event-B, that facilitates automatic generation of source code, from annotated Event-B models. We believe that automatic code generation makes a useful contribution to the Rodin tool-set, by contributing a link in a coherent tool-chain. Automatically generating code from the Event-B model can be seen as a productivity enhancement. It removes a source of errors, that of manually coding for each development. To validate the approach we have undertaken case studies and taken part in an industrial collaboration. We present a number of case-studies to illustrate our work, in this article.

1 Introduction

Event-B [1] is one of a number of formal methods that may be used to model systems where a high degree of reliability is required. Event-B was inspired by its predecessor which we know as *Classical-B* [2], It is a modelling language, used with a supporting tool platform, Rodin [3]; so named from the project in which it was developed [4].

In this section we discuss formal methods in general, introduce Event-B to the reader, and compare Event-B with some other formal approaches. We discuss automatic code generation from formal models, and potential target programming languages.

In Sect. ?? we...

1.1 Formal Methods

1.2 Event-B Rationale

1.3 Related Approaches

- VDM
- Z

1.4 Code Generation Rationale

1.5 Targets for Code Generation

- Ada
 - Java
 - FMI-C

2 More about Event-B

2.1 Refinement

2.2 Decomposition and Composition

2.3 Theories

2.4 ProB

3 Tasking Event-B

3.1 The Language and Semantics

3.2 Theories for TEB

3.3 State-machines

4 Tooling

4.1 The Rodin Platform and Eclipse

4.2 IL1/CLM

4.3 Templates

4.4 Interfaces

5 Conclusions

Conclusions

References

- [1] J. R. Abrial. *Modeling in Event-B: System and Software Engineering*. Cambridge University Press, 2010.
- [2] J.R. Abrial. *The B Book - Assigning Programs to Meanings*. Cambridge University Press, 1996.
- [3] J.R. Abrial, M. Butler, S. Hallerstede, T.S. Hoang, F. Mehta, and L. Voisin. Rodin: An Open Toolset for Modelling and Reasoning in Event-B. *Software Tools for Technology Transfer*, 12(6):447–466, November 2010. <http://dx.doi.org/10.1007/s10009-010-0145-y>.
- [4] RODIN Project. at <http://rodin.cs.ncl.ac.uk>.