

Tutorial proposal for FM'08

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Topic: Event-B and the Rodin Platform.

Abstract on the Objectives and Contents:

This tutorial is an introduction to the construction of complex systems using Event-B and the Rodin Platform.

Event-B is a mathematical formalism (based on first-order logic and set theory) used to develop formal models of discrete transition systems. These models are elaborated before effectively building these systems which are thus intended to be correct by construction.

Discrete transition system is the unifying paradigm which can be used in many different areas: sequential, distributed, concurrent, parallel. It also covers larger systems where one takes into account not only the future software but also its (fragile) environment.

Models are made of constants and variables related by possibly complex invariants. Their dynamics is defined by means of transitions (called events) made of guards (the enabling conditions) and actions (supposed to modify variables in parallel).

Models are developed by means of successive refinements steps: from quite simple and abstract to very concrete. When a model becomes too complicated, it can be decomposed into smaller ones communicating in a systematic fashion.

Proofs and model-checking are performed at each step of the development. They insure that each model is coherent and that it indeed refines its abstraction (if any).

The Rodin Platform is the tool set which has been developed (as funded by the European Project Rodin) to ensure a mechanical aid to the user of this approach. This platform is open source and implemented on Eclipse. It works on Windows, Linux and Mac-OS. It contains a database support which contains the developed models. This database is surrounded by various plugins: provers, model-checkers, animators, UML transformers, etc. New plugins can be added.

The intent of the tutorial is to explain all this in greater details by means of various practical examples and tool demonstrations.

Outline of Lectures:

- Introduction to formal methods and Event-B
- A simple introductory example
- Distributed computing examples
- Electronic circuits modeling
- Doing mathematics with the Rodin Platform
- Large examples

Prerequisite:

No special prerequisite is necessary. However, delegates might have a certain interest in formal modeling

Duration:

Full day (6 hours).

Biography of Instructor:

The instructor is Jean-Raymond Abrial who, with the help of many others, developed the Event-B formalism and managed the development of the Rodin Platform.

Reference:

J.-R. Abrial, Modeling with Event-B: Software and System Engineering (to be published by Cambridge University Press).