TUTORIALS INFORMATION

DEVS Modelling and Simulation

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Abstract

DEVS is a popular formalism for modelling complex dynamic systems using a discrete-event abstraction. During a bounded time interval, only a finite number of relevant events can occur. The state variables are considered to change instantaneously, with the state being constant in between two state changes. Main advantages of DEVS are its rigorous formal definition, and its support for modularity; models can be nested. Thanks to its precise specification as well as its modularity, DEVS frequently serves as simulation "assembly language" to which models in other formalisms are mapped. It is suited for both manual modelling, as we for automated generation. This furthermore makes it possible to combine models in different formalisms together, by mapping both to DEVS.

This tutorial provides an introductory, hands-on tutorial on the practical usage of the DEVS formalism. Both Classic DEVS and Parallel DEVS will be introduced. The formalisms are explained in a bottom-up way, starting from simple autonomous Atomic DEVS models, up to the running of the simulation experiments. Each aspect of the DEVS formalism is considered by means of a minimal running example: a simple traffic light. While the focus is on the practical use of DEVS modelling simulation, the necessary theoretical foundations are interleaved, albeit at a high level of abstraction. Finally, the link is briefly made with realtime simulation.

Examples are presented using PythonPDEVS, though the foundations and techniques apply to other DEVS simulations tools as well. PythonPDEVS, all used examples, and related publications can be downloaded from http://msdl.cs.mcgill.ca/projects/DEVS/PythonPDEVS