One page description

Parallel DEVS [1] is a popular formalism for modelling complex dynamic systems using a discrete-event abstraction. But whereas a number of tools have been constructed by academia and industry, parallel simulation is still not supported in most of them. Even where it is supported, performance studies are often done ad-hoc, without any comparison to other tools.

In this paper, we introduce our tool called DEVS-Ex-Machina [2]: a Parallel DEVS simulation kernel supporting parallel simulation. In contrast to the few Parallel DEVS simulation kernels that do support parallel simulation, we support multiple synchronization protocol. It is through the synchronization algorithm that parallelism in the model becomes exploitable, and the ideal synchronization protocol is therefore dependent on the model [3].

Not only do we support multiple synchronization protocols, but we offer these through a modular framework, making additional protocols possible. Since model behaviour can change during simulation, runtime switching between synchronization protocols is also supported. We compare simulation performance with adevs [4], deemed one of the most efficient Parallel DEVS simulation kernels at this time. Comparisons are done for sequential simulation performance, parallel simulation performance, and memory consumption. For our tool, we also present results for the different synchronization protocols. Results are compared in-depth, showing the effect of some fundamentally different choices in the design of our tool and adevs.

References

[1] Chow ACH and Zeigler BP. Parallel DEVS: a parallel, hierarchical, modular, modeling formalism. In *Proceedings of the 1994 Winter Simulation Multiconference.* pp. 716–722.

[2] Cardoen B, Manhaeve S, Tuijn T et al. Performance analysis of a PDEVS simulator supporting multiple synchronization protocols. In *Proceedings of the 2016 Symposium on Theory of Modeling and Simulation - DEVS.* pp. 614 – 621.

[3] Fujimoto RM. *Parallel and Distributed Simulation Systems.* 1st ed. New York, NY, USA: John Wiley & Sons, Inc., 1999.

[4] Nutaro JJ. adevs. `http://www.ornl.gov/ 1qn/adevs/`, 2015.