Abstract

The general scope of the paper consists of improving the verification of simulation models through the integration of formal methods. We offer a formal verification approach of DEVS models based on Z notation. DEVS is a formalism that allows the description and analysis of the behavior of discrete event systems, i.e., systems whose state change depends on the occurrence of an event. A DEVS model is essentially validated by the simulation which permits of verifying whether it correctly describes the behavior of the system. However, a simulation does not cover all possible cases that means the model is validated only for the expected behaviors. For this reason, we have integrated the Z formal specification language in the DEVS formalism to detect errors before simulation which is still an important step for the validation. This integration consists of: (1) transforming a DEVS model into an equivalent Z specification and (2) verifying the consistency of the DEVS model on the resulting specification using the tools developed by the Z community. Such consistency is fulfilled by determinism and completeness. Thus, a DEVS model is subjected to an automatic formal verification before proceeding to its simulation.
References


Index Terms

Computer Science  Information Sciences

Keywords

DEVS, Discrete Event Simulation , Z, Formal Methods, Formal Verification