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 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