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An Introduction to DEVS Standardization

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Abstract: Since the early 1970s, the M&S (modeling and simulation) community has been trying to formulate approaches to modeling as system specification formalisms. As seen in the previous chapters of this book, the proliferation of DEVS-based M&S engines has brought the need to improve and standardize DEVS tools, facilitating the work of DEVS designers independently of the programming language implementations or algorithmic code expressions used. To understand the problem, let us consider that DEVS categorically separates the Model, the Simulator, and the Experimental frame. Building on this separation of concerns, the DEVS Protocol specifies the abstract simulation engine that correctly simulates DEVS atomic and coupled models. Interpreted in a distributed simulation context, the DEVS abstract simulator gives rise to a general protocol that has specific mechanisms for declaring who takes part in the simulation (the federates). It also specifies how federates interact in an iterative cycle that controls how time advances, when federates exchange messages, and perform internal state updating. A significant feature in comparison to simulation based on the HLA standard, is that if the federates in simulation are DEVS compliant then the simulation can be proved to be correct in the sense that the DEVS closure under coupling theorem guarantees a well-defined resulting structure and behavior.