

Although SystemC is considered the most promising language for system-on-chip functional modeling, it doesn't come with power modeling capabilities. This work presents PowerSC, a novel power estimation framework which instruments SystemC for power characterization, modeling and estimation. Since it is entirely based on SystemC, PowerSC allows consistent power modeling from the highest to the lowest abstraction level. Besides, the framework's API provides facilities to integrate alternative modeling techniques, either at the same or at different abstraction levels. As a result, the required power evaluation infrastructure is reduced to a minimum: the standard SystemC library, the PowerSC library itself and a C++ compiler. Although RTL power macromodeling is a mature research topic, it is not yet broadly accepted in the industrial environment. One of the main reasons impairing its widespread use as a power estimation paradigm is that each macromodeling technique makes some assumptions that lead to some sort of intrinsic limitation, thereby affecting its accuracy. Therefore, alternative macromodeling methods can be envisaged as part of a power modeling toolkit from which the most suitable method for a given component should be automatically selected. This paper describes a new multi-model power estimation engine that selects the macromodeling technique leading to the least estimation error for a given system component depending on its input-vector stream properties. A proper selection function is built after component characterization and used during estimation. Experimental results show that our multi-model engine improves the robustness of power analysis, reducing significantly the average and the maximum estimation errors, as compared to conventional single-model estimation.