Adapting and Optimizing the Systemic Model of Banking Originated Losses (SYMBOL) Tool to the Multi-core Architecture

Abstract:
Currently, multi-core system is a predominant architecture in the computational word. This gives new possibilities to speedup statistical and numerical simulations, but it also introduce many challenges we need to deal with. In order to improve the performance metrics, we need to consider different key points as: core communications, data locality, dependencies, memory size, etc. This paper describes a series of optimization steps done on the SYMBOL model meant to enhance its performance and scalability. SYMBOL is a micro-funded statistical tool which analyses the consequences of bank failures, taking into account the available safety nets, such as deposit guarantee schemes or resolution funds. However, this tool, in its original version, has some computational weakness, because its execution time grows considerably, when we request to run with large input data (e.g. large banking systems) or if we wish to scale up the value of the stopping criterium, i.e. the number of default scenarios to be considered. Our intention is to develop a tool (extendable to other model having similar characteristics) where a set of serial (e.g. deleting redundancies, loop enrolling, etc.) and parallel strategies (e.g. OpenMP, and GPU programming) come together to obtain shorter execution time and scalability. The tool uses automatic configuration to make the best use of available resources on the basis of the characteristics of the input datasets. Experimental results, done varying the size of the input dataset and the stopping criterium, show a considerable improvement one can obtain by using the new tool, with execution time reduction up to 96 % of with respect to the original serial version

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