High Performance Computing Applications in Computational Finance

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In the continuously expanding field of Computational Finance, researchers and financial engineers have been developing new and advanced quantitative methods to solve financial issues. Pricing Models, Counterparty Credit Risk framework, portfolio End-of-Day evaluation and optimization are only some of the numerous topics involving the use of High Performance Computing. Parallel computing techniques may actually be implemented to replicate the evolution of interest rates [3], to speed up the scenarios simulation [2],[4], or financial products pricing [1] by solving a PDE with finer grids. We provide an overview of the main technologies and techniques which are today employed in Finance. We describe a few examples of common problems faced in Financial modeling and we highlight their computational aspects and proper choice of tools.

References

[1] M. A. H. Dempster, Juho Kanniainen, John Keane, Erik Vynckier, *High Performance Computing in Finance - Problems, Methods and Solutions.* CRC Press, 2018.

[2] Russel E. Caflisch, *Monte Carlo and Quasi Monte Carlo Methods.* Acta Numerica, 1998.

[3] Salvatore Cuomo, Vittorio Di Somma, Federica Sica, *An application of the one-factor Hull-White model in an IoT financial scenario.* Journal of Sustainable Cities and Society, Apr 2018.

[4] Linlin Xu and Giray O'kten, *High Performance Financial Simulation Using Randomized Quasi-Monte Carlo Methods.* Department of Mathematics, Florida State University, Tallahassee, 2008.