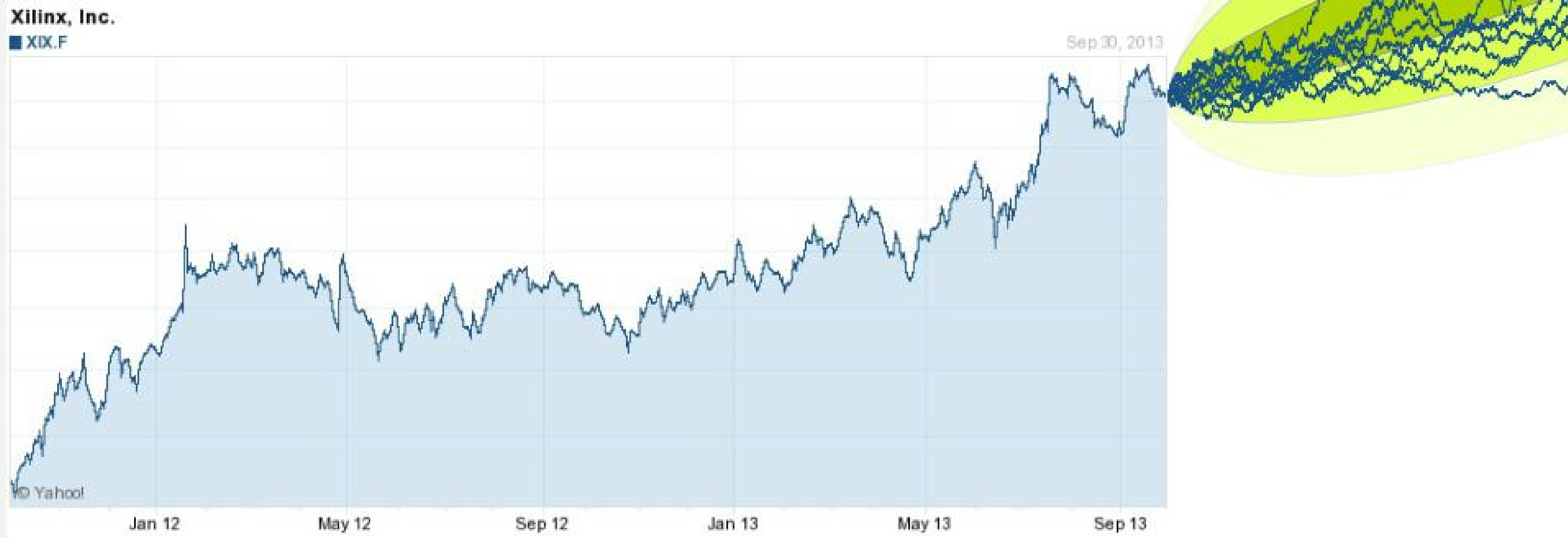


Methodology for Rapid Accelerator Development Applied to Financial Applications

Christian Brugger and Norbert Wehn

Department Electrical- and Computer Engineering

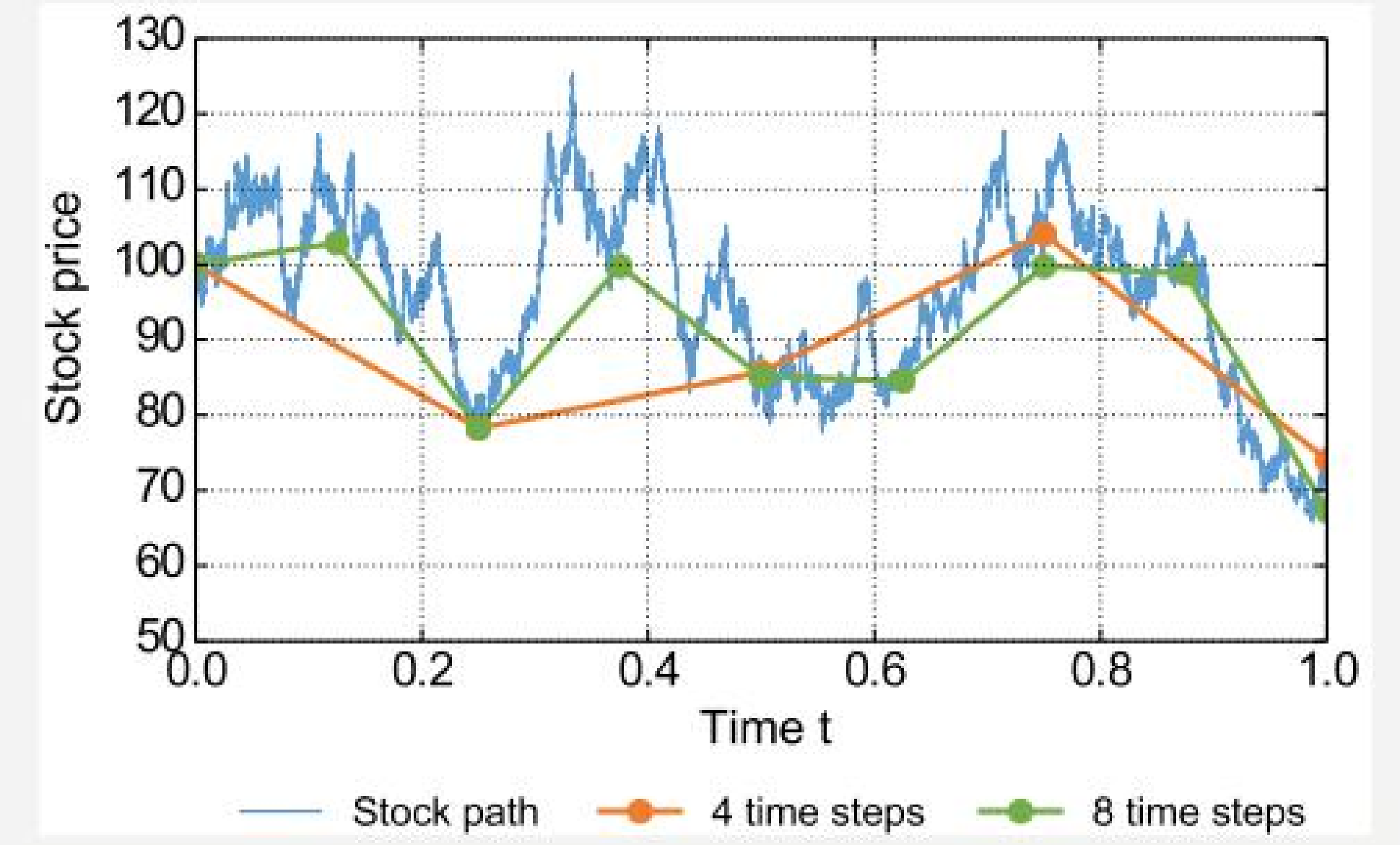
Option Pricing in the Heston Model



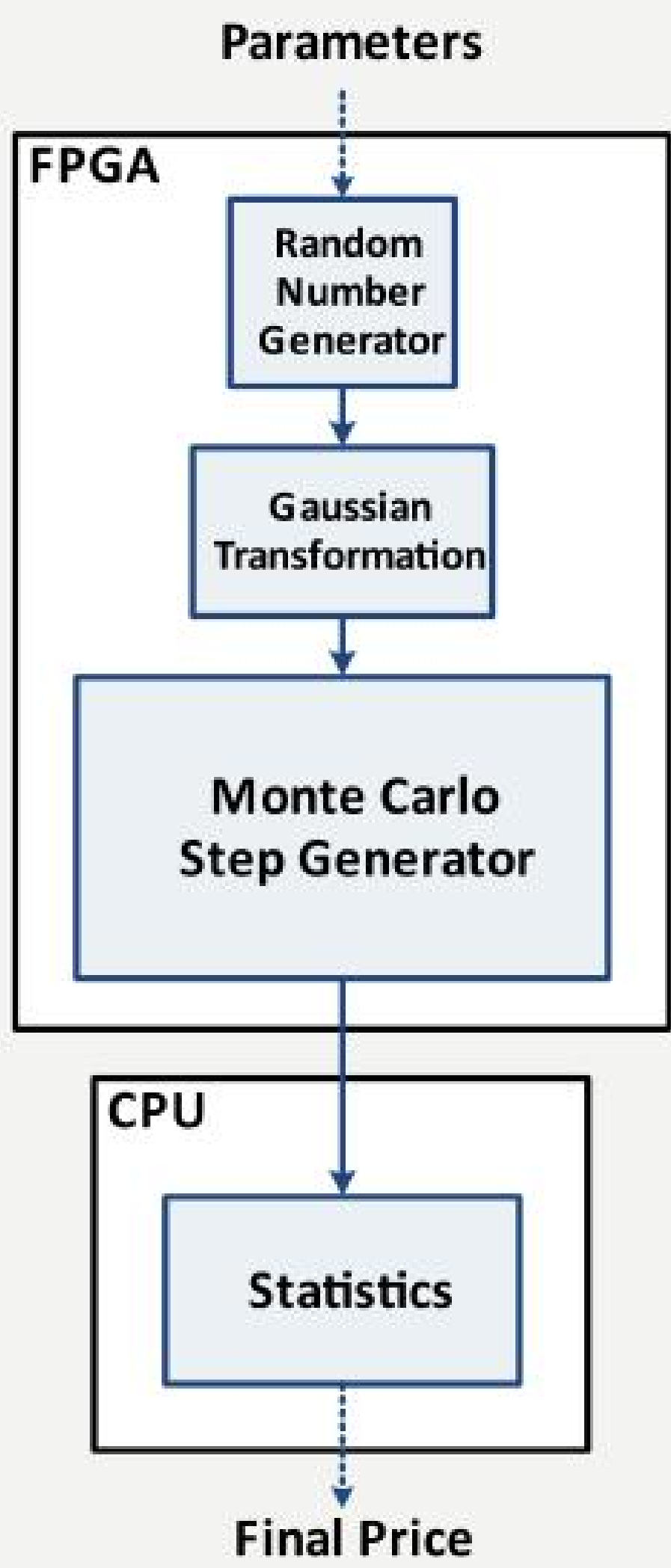
Multilevel Monte Carlo

$$S_{t_{i+1}} = S_{t_i} + rS_{t_i}\Delta t + S_{t_i}\sqrt{V_{t_i}}\Delta W^S$$

$$V_{t_{i+1}} = V_{t_i} + \kappa(\theta - V_{t_i})\Delta t + \eta\sqrt{V_{t_i}}\Delta W^V$$

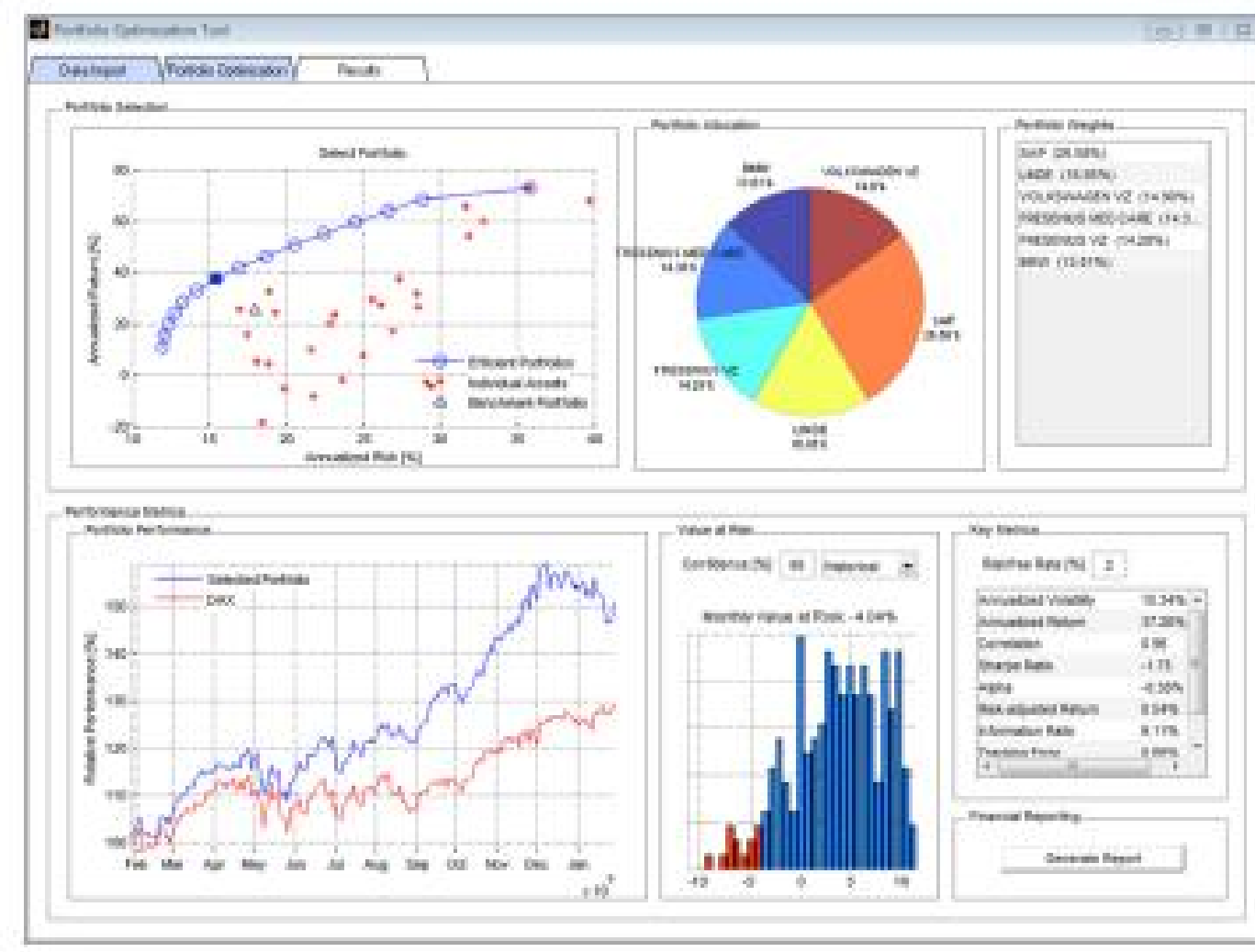


Hybrid CPU/FPGA Architecture



Rapid Accelerator Development

Portfolio Optimization

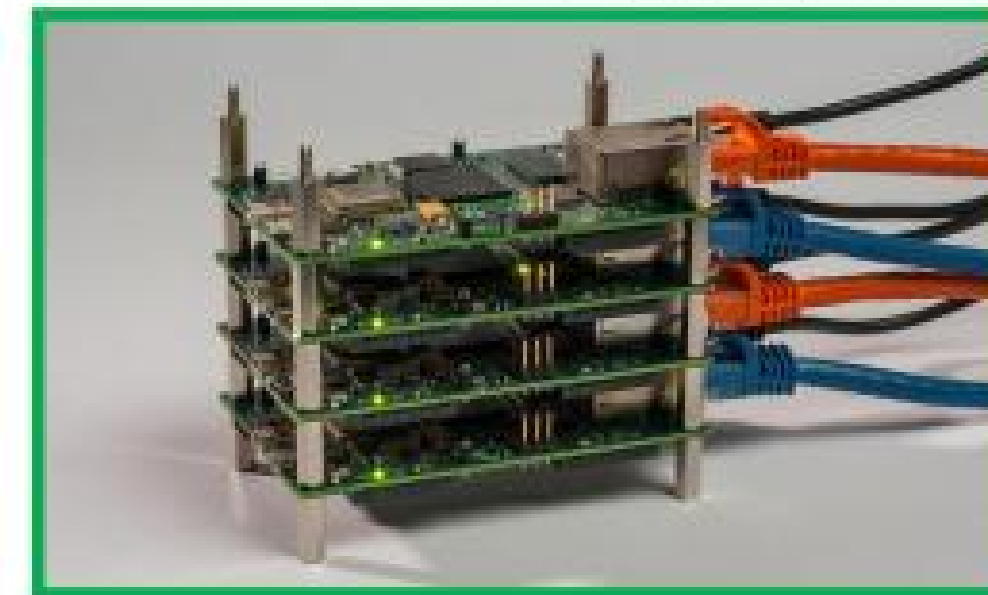


Intel Compute Cluster



17 Nodes
13.9 Minutes
430 kJ
520 W

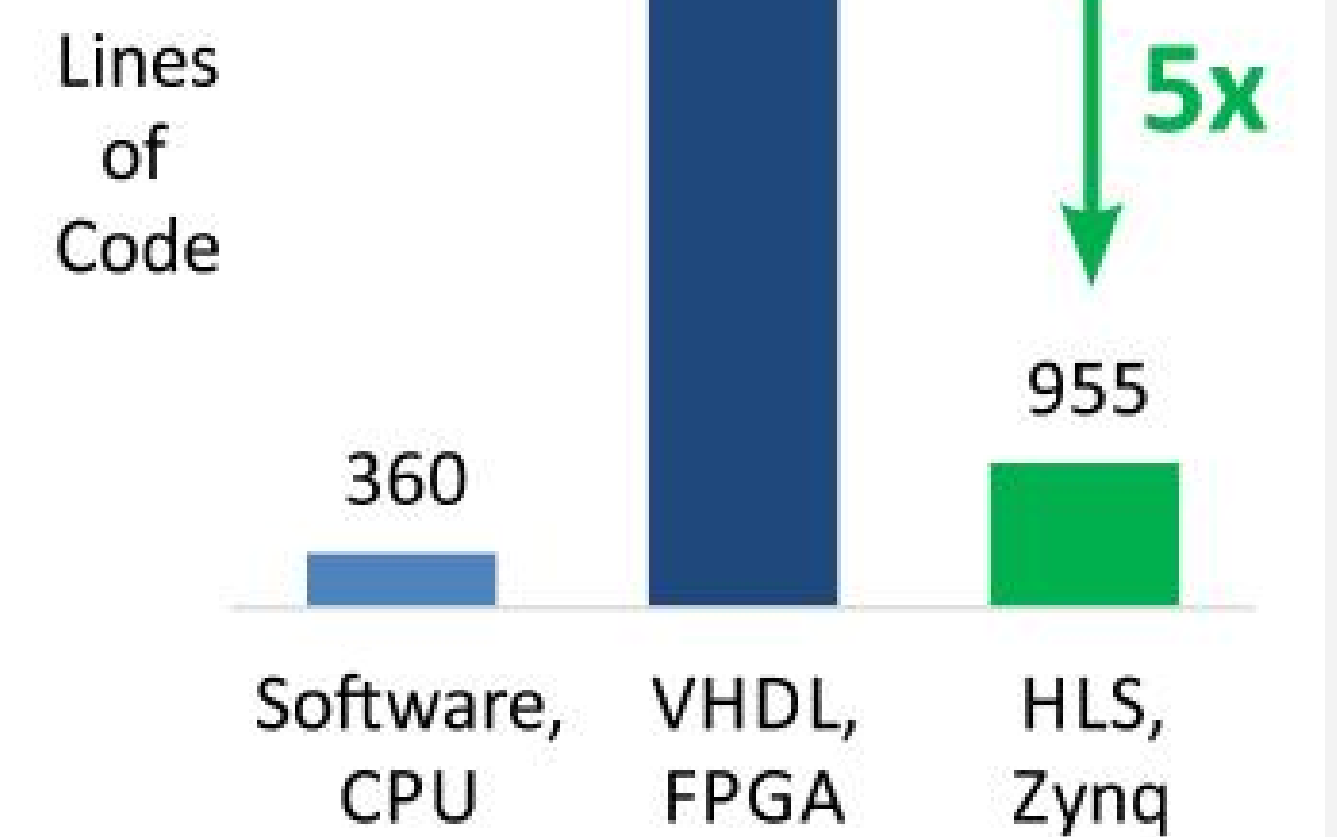
Custom Computing Systems



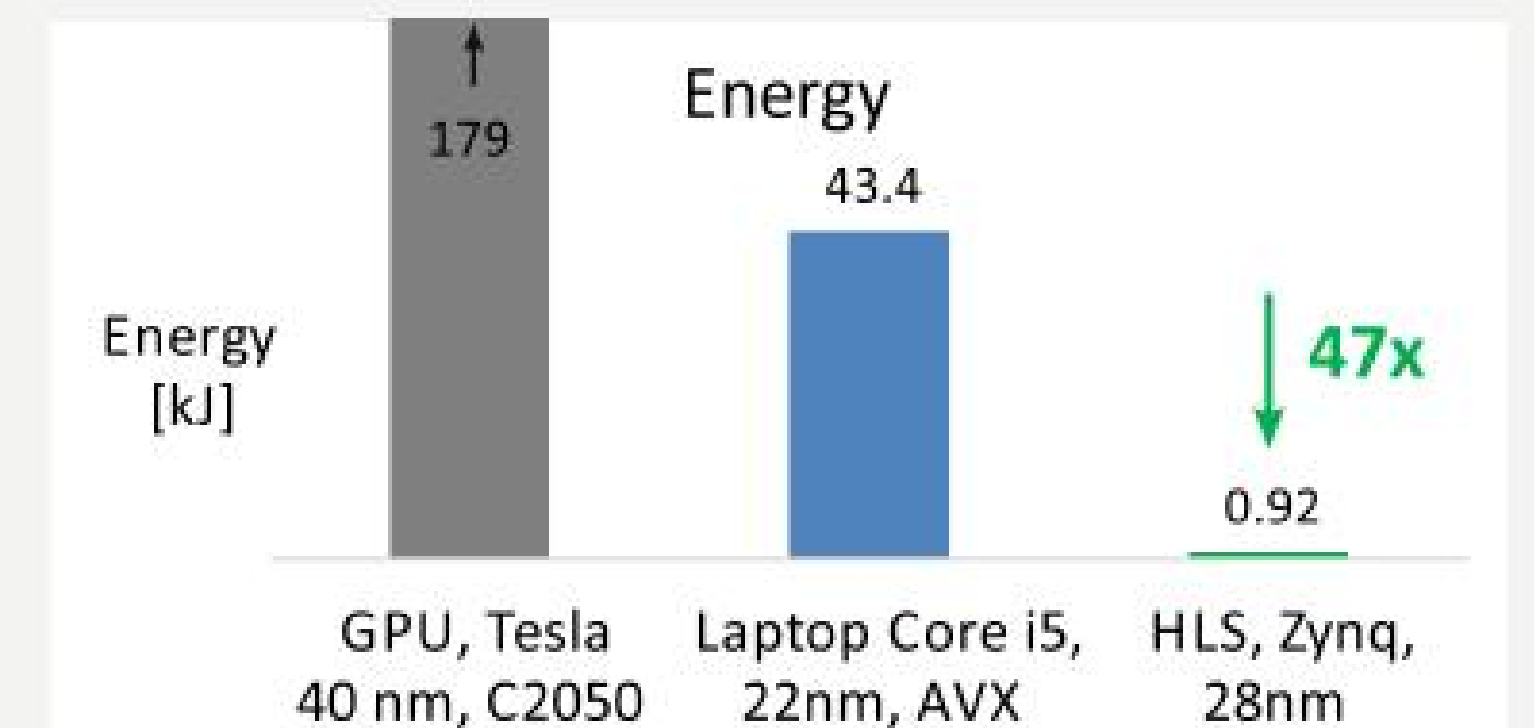
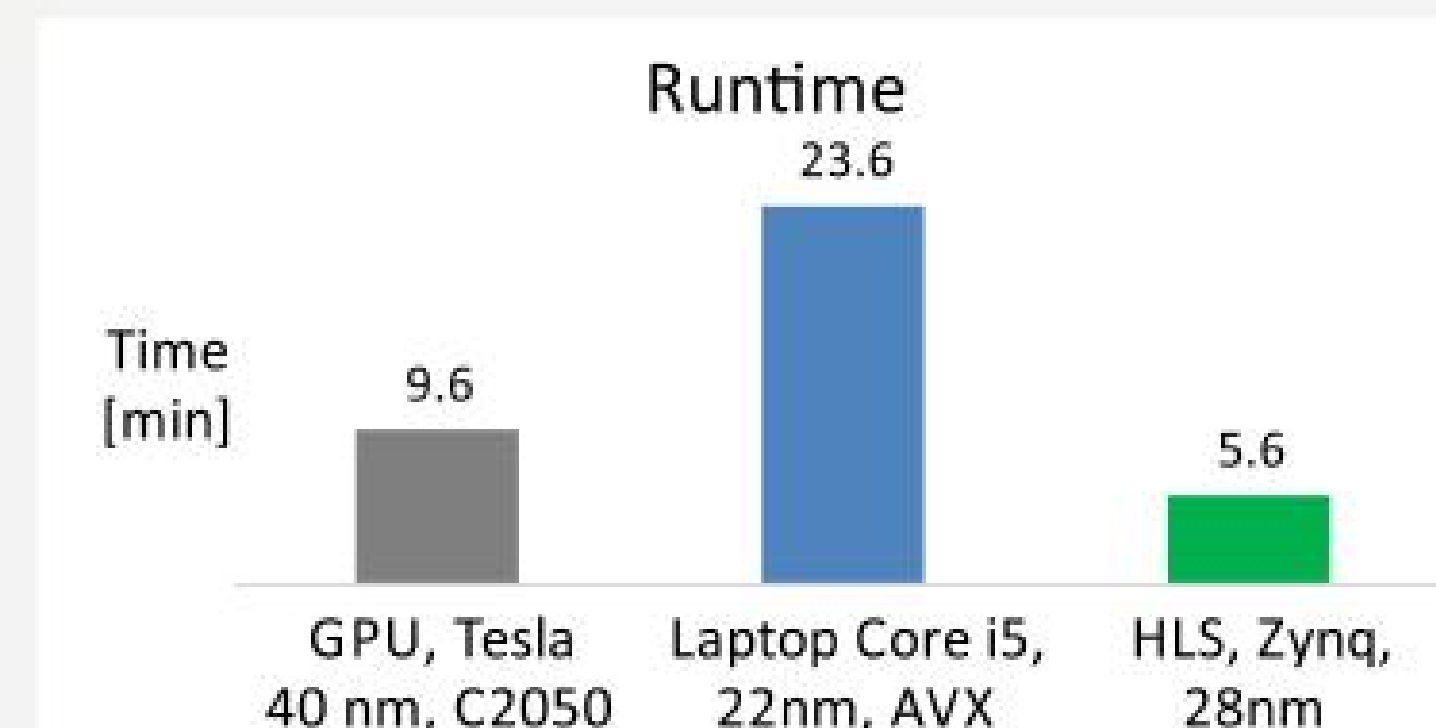
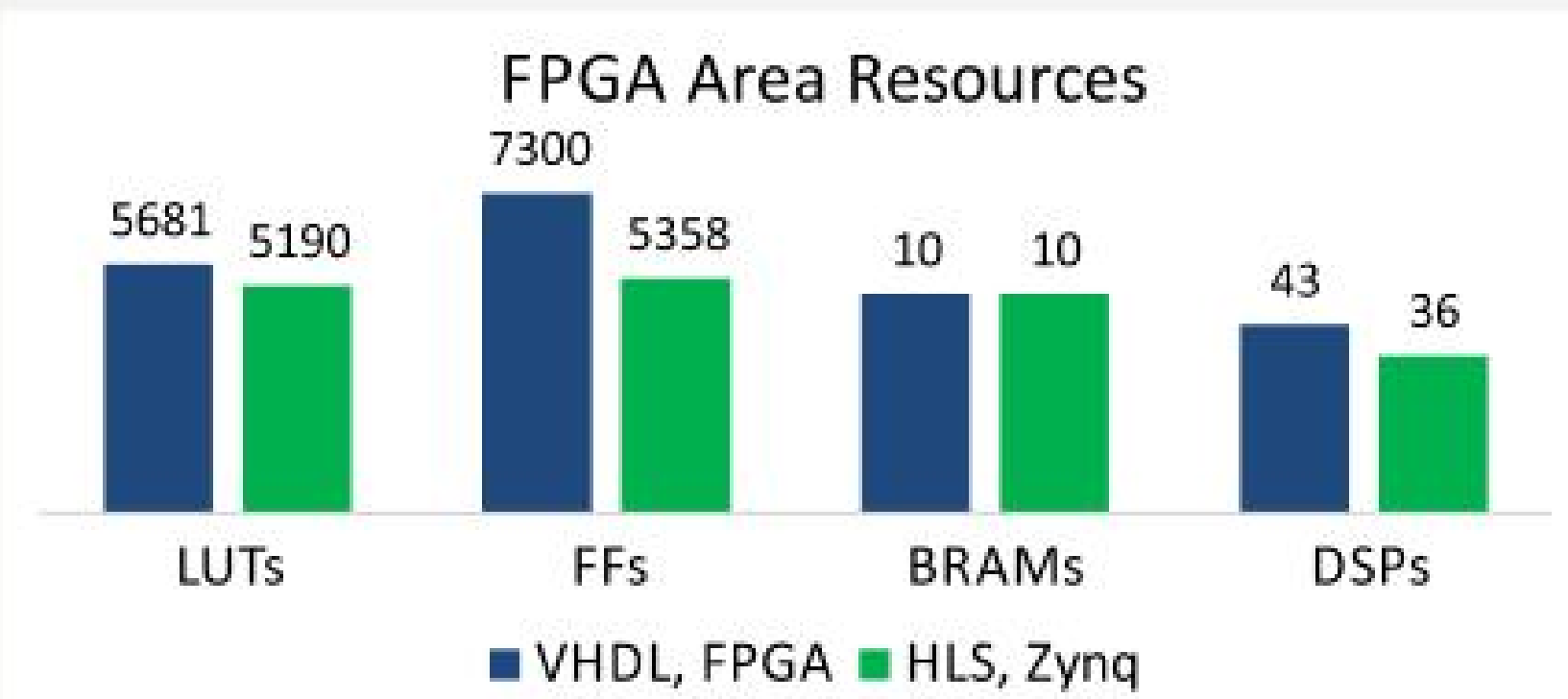
4 Nodes
13.9 Minutes
9.2 kJ
11 W

47x

Implementation Effort



Detailed Comparison



VHDL, FPGA Methodology



de Schryver, Christian, et al. "An energy efficient FPGA accelerator for Monte Carlo option pricing with the Heston model." Reconfigurable Computing and FPGAs (ReConFig), 2011 International Conference on. IEEE, 2011.

HLS, Zynq Methodology

