CPUs with ARM architecture for high performance computing

Vsevolod Nikolskii, Vladimir Stegailov

HSE, JIHT RAS

In the report the computational pipelines of modern ARM Cortex-A57 and Nvidia Denver2 processors are discussed in detail taking into account available data on x86_64 processors Haswell. The work considers the contribution of mechanisms of instruction level parallelism and vectorization to the theoretical peak performance of the processors. This study presents a highly optimized test, that demonstrate how the use of microarchitecture properties allows one to approach the theoretical performance in practice for a given processor. The results are compared with the popular benchmarks HPL and Empirical Roofline Toolkit. In conclusion they are discussed in the context of the performance of real-life applications in high-level programing languages.