Performance Evaluation of High performance Heterogeneous Computing Platforms

Arsalan Shahid
School of Computer Science and Informatics, University College Dublin, Belfield, Dublin 4, Ireland
Email: arsalan.shahid@ucdconnect.ie
URL: hcl.ucd.ie

***Abstract* --** Heterogeneous multicore architectures have emerged as a mainstream and promising technology for obtaining performance boost in computing platforms. When it comes to efficiency of a processors' platform, energy consumption and throughput are considered as the key objective parameters. Moreover, there always exist a trade-off between these two objectives. In past, researcher have been proposing a lot of energy consumption models (linear and non-linear) [1-3]. Using hardware and software performance counters is considered as a valuable approach for estimating energy consumption of a system [4, 5]. It has becomes extremely important to understand which performance counters are important for energy estimation modelling and which are not. Heterogeneous parallel processing laboratory (HCL) has one of very complex multicore cluster, formally known as HCL-Server, at University College Dublin (UCD) having a Xeon Phi, GPU and FPGA; working all together as accelerators. Using the said resource, currently, we are involved in studying performance counters in various architectures including CPUs, i.e., GPUs and Xeon Phis.

In NESUS Ph.D. symposium 2017 to be held in Calabria, Italy, I intend to present a talk on performance counters based performance evaluation approaches in modern computing architectures. The talk would cover useful tools for extracting performance event counts. Moreover, the session aims to have an open discussion with experts regarding the use of performance event counts in energy/throughput estimation of a system.

References

1. Ramapantulu, L., Tudor, B. M., Loghin, D., Vu, T., & Teo, Y. M. (2014, September). Modeling the energy efficiency of heterogeneous clusters. In *2014 43rd International Conference on Parallel Processing* (pp. 321-330). IEEE.
2. Marowka, A. (2017). Energy-aware modeling of scaled heterogeneous systems. *International Journal of Parallel Programming*, (pp. 1-20), Springer.
3. Diop, T., Jerger, N. E., & Anderson, J. (2014, March). Power modeling for heterogeneous processors. In *Proceedings of Workshop on General Purpose Processing Using GPUs* (p. 90). ACM.
4. Lopez-Novoa, U., Mendiburu, A., & Miguel-Alonso, J. (2015). A survey of performance modeling and simulation techniques for accelerator-based computing. *IEEE Transactions on Parallel and Distributed Systems*, *26*(1), (pp. 272-281), IEEE.
5. Yasin, A. (2014, March). A top-down method for performance analysis and counters architecture. In *Performance Analysis of Systems and Software (ISPASS), 2014 IEEE International Symposium on* (pp. 35-44). IEEE.