12th Joint Conference on Mathematics and Computer Science, June 14 – 17, 2018, Cluj, Romania1

## Towards green computing in Erlang<sup>1</sup>

## Áron Attila Mészáros, Gergely Nagy, István Bozó, Melinda Tóth

Department of Programming Languages and Compilers, Eötvös Loránd University, Budapest {archy, nagygeri97, bozoistvan, tothmelinda}@caesar.elte.hu

Energy efficiency in computing was identified as low energy usage of the hardware for a while. However, nowadays, we can talk about energy efficiency in terms of software as well. Therefore, we have to investigate how the different design decisions and programming language constructs affect the energy consumption. The green computing is a relatively new research area, guidelines are required for the software developers in terms of energy efficiency. In our research we are focusing on the functional programming language Erlang. We have investigated the effect of different language constructs, data structures and styles of programming on energy usage. Additionally we present a tool to measure and visualise the consumed energy.

## References

- István Bozó, Dániel Horpácsi, Zoltán Horváth, Róbert Kitlei, Judit Kőszegi, Máté Tejfel, and Melinda Tóth. RefactorErl, Source Code Analysis and Refactoring in Erlang. In Proceeding of the 12th Symposium on Programming Languages and Software Tools, Tallin, Estonia, 2011.
- Srinivas Pandruvada. Running average power limit rapl. https://01.org/blogs/2014/runningaverage-power-limit---rapl. [Accessed: 2018.03.10.].
- [3] Vincent M. Weaver. Reading rapl energy measurements from linux. http://web.eece.maine.edu/~vweaver/projects/rapl/index.html. [Accessed: 2018.03.10.].
- [4] Rui Pereira, Marco Couto, Jácome Cunha, João Paulo Fernandes, and João Saraiva. The influence of the java collection framework on overall energy consumption. CoRR, abs/1602.00984, 2016.
- [5] Gustavo Pinto, Fernando Castor, and Yu David Liu. Understanding energy behaviors of thread management constructs. SIGPLAN Not., 49(10):345–360, October 2014. ISSN 0362-1340.
- [6] L. G. Lima, F. Soares-Neto, P. Lieuthier, F. Castor, G. Melfe, and J. P. Fernandes. Haskell in green land: Analyzing the energy behavior of a purely functional language. In 2016 IEEE 23rd International Conference on Software Analysis, Evolution, and Reengineering (SANER), volume 1, pages 517–528, March 2016.
- [7] V. Tiwari, S. Malik, and A. Wolfe. Power analysis of embedded software: a first step towards software power minimization. *IEEE Transactions on Very Large Scale Integration (VLSI)* Systems, 2(4):437–445, Dec 1994. ISSN 1063-8210.

 $<sup>^{1}</sup>$ The project has been supported by the European Union, co-financed by the European Social Fund (EFOP-3.6.3-VEKOP-16-2017-00002).