

EPerf Summary

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EPerf is a tool meant to analyse the energy impact of applications, in order to encourage greener coding practices by allowing developers to understand which parts of their applications have the greatest energy impact (which is not necessarily the same as performance).

EPerf predicts the energy usage of an application through a optimization model, which takes in the readings of various sensors as inputs. This tool uses a feature called RAPL in Intel chips to measure and estimate the energy cost of applications. However, RAPL is not perfect and does have limitations such as its domain and sampling rate. As a result, EPerf also uses low-level information such as cache misses to estimate the energy consumption at a more accurate, application-specific, nanosecond scale. These types of measurements necessitate low-level access to the server.

At the moment, EPerf has an average error rate of 6% on single socket servers and 19% on multi-socket servers. It also can only estimate at the process level at the moment, but it is designed to infer information down to the subroutine level, allowing programmers to know exactly what parts of their software is causing higher energy consumption.

Extending this project to actually operate at the subroutine level, as well as improving its accuracy on non-RAPL servers are both potential paths forward. Additionally, while the tool is currently implemented as a shell script, the use of kernel modules would improve the detail and granularity of measurement, as well as the performance of the tool itself. That said, care would need to be taken to prevent any security issues since kernel modules operate at level 0.

Overall, this tool is a valuable resource and can be further improved to make it more practical and accurate.