On Reducing the Energy Consumption of Software Product Lines

Édouard Guegain*[1], Clément Quinton*[1], and Romain Rouvoy[1]

[1]Self-adaptation for distributed services and large software systems (SPIRALS) – Univ. Lille, CNRS, Inria, Centrale Lille, UMR 9189 CRIStAL – F-59000 Lille, France

Résumé

Over the last decade, several studies considered green software design as a key development concern to improve the energy efficiency of software. Yet, few techniques address this concern for Software Product Lines (SPL). In this paper, we, therefore, introduce two approaches to measure and reduce the energy consumption of an SPL by analyzing a limited set of products sampled from this SPL. While the first approach relies on the analysis of individual feature consumptions, the second one takes feature interactions into account to better mitigate the energy consumption of resulting products.

Our experimental results on a real-world SPL indicate that both approaches succeed to produce significant energy improvements on a large number of products, while consumption data were modelled from a small set of sampled products. Furthermore, we show that taking feature interactions into account leads to more products improved with higher energy savings per product.

*Intervenant