ASCETiC: Adapting Service lifeCycle towards EfficienT Clouds

Description

Adapting Service lifeCycle towards EfficienT (ASCETiC) was focused on providing novel methods and tools to support software developers aiming to optimise energy efficiency and minimise the carbon footprint resulting from designing, developing, deploying, and running software in Clouds. At the same time, quality of service, experience and perception was taken into account, so energy efficiency will complement them and boost cloud efficiency at several dimensions.

This project focused on Cloud services made of several shared software components, which are likely to be used and reused many times in many different applications. The major contribution to the carbon footprint of Cloud services is the energy consumed in its operation, thus the primary aim of ASCETiC has been to relate software design and energy use, which depends on the deployment conditions and the correct operation of the service by means of an adaptive environment.

The project had the following main objectives:

a. Development of models for green and efficient software design, supporting sustainability and high quality of service levels at all stages of software development and execution;
b. Development and evaluation of a framework with identified energy efficiency parameters and metrics for Cloud services;
c. Development of methods for measuring, analysing, and evaluating energy use in software development and execution, complementing quality measures;
d. Energy and quality efficiency integration into service construction, deployment, and operation leading to an Energy Efficiency Embedded Service Lifecycle.

ASCETiC resulted in the implementation of an open-source Cloud stack providing energy efficiency at software, platform, and infrastructure layers. We provided incremental versions of ASCETiC with respect to energy efficiency, approaching the problem in three levels: static, intra-layer and inter-layer adaptation. We have demonstrated the ASCETiC solution in two commercial use cases.

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