

ECOLOBRE - Software Eco-Design within a Resource Budget

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Challenges and Internship objectives. Energy efficiency has been addressed for many years at the hardware level. However, powerful and less expensive IT infrastructures have led to less optimization of software. Software design approaches aim to meet user needs and expectations in terms of performance, economic costs, and other quality of service (QoS) criteria, and consider user satisfaction as a compass. This proposal takes a different perspective by questioning user expectations and targets the sufficiency of uses to achieve digital sufficiency.

A report by ADEME and ARCEP [1] proposes several prospective scenarios involving eco-design and digital sobriety. Eco-design refers to the design of a product, good, or digital service with the intention of reducing its negative impact on the environment throughout its life cycle. Eco-design is iso-service, striving to maintain service quality and performance while improving energy efficiency. Digital sobriety goes further by questioning the necessity and relevance of digital products and services. It aims to design, manufacture, and use digital equipment and services while taking into account fundamental societal issues and planetary boundaries. Sobriety and eco-design are not mutually exclusive strategies, and all available levers must be mobilized. Recently, the concept of digital sufficiency [2] was proposed to go further by aiming for an absolute, rather than relative, reduction in the environmental footprint of digital technology by directly or indirectly reducing the absolute level of demand for resources and energy.

This internship proposal will apply the concept of resource budgeting to software usage. It aims to keep resource consumption during execution below a certain threshold, which must be acceptable from the user's point of view to avoid significantly affecting the quality of experience (QoE). This budget must be taken into account throughout the software lifecycle, starting with the requirements definition phase, then during the design and execution phases. This internship will examine how to translate the concept of resource budget into software requirements and what mechanisms can help evaluate and adhere to this budget.

Terms and conditions

- Production of open source documentation and code (licenses: GFDL and LGPL).
- Preference for using open source software.
- Version control with the GitLab platform of Télécom SudParis.

This subject is part of the research works of the [DisSEM](#) group working on Distributed Systems, Software Engineering and Middleware, in the [ACMES](#) team of the [SAMOVAR](#) laboratory, and of the [MoVe](#) team of the [LIP6](#) laboratory at [Sorbonne University](#) (Paris).

References

- [1] ADEME and ARCEP. Évaluation de l'impact environnemental du numérique en France et analyse prospective à 2030 et 2050. https://www.arcep.fr/uploads/tx_gspublication/etude-prospective-2030-2050_mars2023.pdf, 2023.
- [2] Tilman Santarius, Jan C.T. Bieser, Vivian Frick, and et al. Digital sufficiency: conceptual considerations for ICTs on a finite planet. *Ann. Telecommun.*, 78:277–295, 2023.