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Software Life Cycle Assessment (SLCA) in the wild

Geerd-Dietger Hoffmann[1], Arne Tarara[2]

Abstract: Software Life Cycle Assessment (SLCA) is a critical topic gaining increasing attention due to the environmental impacts of software production, deployment, usage, and disposal. While Life Cycle Assessment (LCA) is well-established in the context of physical products, SLCA is still an evolving field in the software industry. This talk will present a simple and practical approach to conducting a Software Life Cycle Assessment for a piece of code, along with discussions on important concepts and tradeoffs for smaller projects. While a physical product has a clear status in relation to the LCA software is ever evolving and is constantly changed and redeployed. Hence a new approach is needed to the point in time evaluation. The concept of a transparency platform is introduced which accounts for the ever changing nature of software while enforcing the highest standards in software measurement and traceability.

The SLCA process outlined here involves analyzing the various phases of software development, deployment, usage, and disposal to identify potential environmental impacts and sustainability issues. In the development phase, the speaker will share their journey of measuring the environmental impact of their development activities, highlighting the challenges and assumptions made to estimate energy consumption accurately. He proposes the concept of a Software Carbon Database, where energy usage data is collected and stored, enabling continuous assessment of software's environmental impact. The talk will emphasize the need for a standardized database format to account for all aspects of the software's life cycle and explains the purpose of the Software Carbon Database in this context. The deployment phase is briefly touched upon, focusing on the energy consumed during a simplified Docker build.

Addressing the complexities of estimating usage phase impacts, the talk will argue that modern software is continuously evolving, making it challenging to predict and measure usage accurately. To overcome this, the author introduces a middleware solution that tracks energy usage per API call and updates the Software Carbon Database in real-time, providing a more accurate and dynamic assessment.

Lastly, the disposal phase is considered, with the author using the Green Metrics Tool to measure the energy consumed during the removal of software components.

In conclusion, this talk will present a pragmatic and contemporary approach to Software Life Cycle Assessment, designed to fit the agile and rapidly evolving nature of modern software development. The proposed methodology relies on real-life data, offers traceability, and can be easily adopted by development teams to promote sustainable software practices. Lastly we will discuss recommendations to improve data quality for the disposal and delivery phase, which are typically handled by service providers at the moment.

[1] Green Coding Berlin, Jablonskistr. 24, 10405 Berlin didi@green-coding.berlin
[2] Green Coding Berlin, Jablonskistr. 24, 10405 Berlin arne@green-coding.berlin