Research contributions of the German Environment Agency on sustainable software and future steps in sustainable software development and green coding

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Abstract: Digitalization gives rise to new business models and services that are predominantly based on software-related innovations. The disciplines of software development have so far not been subject to any limitation by technology, because inefficient programming is often compensated for by more efficient hardware, e.g. by ever faster processors. Software often consumes an unnecessarily large amount of hardware resources, and software programs with the same functionality can even consume different amounts of energy in the idle-mode. High hardware utilization - due to inefficient or bloated software - in turn affects the hardware renewal cycle in addition to high energy consumption. Software-related obsolescence of hardware is another problem that absolutely must be addressed in the future. The German Environment Agency has already been dedicated to the topic of "sustainable software" for about a decade and has carried out preliminary work and research projects in this context in order to address these problems. In order to promote transparency in the software development community and to provide developers with tools to reduce the energy consumption of software, the research project "SoftAWERE" was launched. This project was prepared by research related to the "Blue Angel" for resource and energy efficient software products. The "Blue Angel" represents the world's first label for such products and includes criteria for energy and resource efficiency as well as the potential useful life of the hardware and autonomy of use. Requirements such as the provision of security updates for five years, open data formats, modularity and freedom from advertising are all part of this eco-label. Thus, the "Blue Angel" for resource- and energy-efficient software products encompasses the concept of sustainability in a broad spectrum and also emphasizes the importance of user sovereignty. In general, through various research projects in the area of sustainable software development, the German Environment Agency aims to raise awareness of the energy and resource consumption of software in the scientific community as well as in the coding community and to focus on the transparency of these aspects. This contribution for EnviroInfo presents the German Environment Agency's research projects and at the same time outlines the future steps towards sustainable software development.

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