

A Green approach to save energy consumed by software

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Abstract— The availability of various services (i.e. eBank, eHospital) through the cloud has facilitated daily lives. It allows to make energy and money savings by preventing people from moving to accomplish a small task (for instance see his account at the bank). Furthermore, the availability of these services through mobile devices and their widely usage has a positive impact on energy saving. It is also worthwhile to consider technology addicts developing/using applications or software when estimating the growing impact of software on energy consumption.

The emission of greenhouse gases is being reduced thanks to technological progress. However, the increasing number of applications' users causes additional consumption. Therefore, in order to get a better efficiency, developers needs to be guided to optimize their development to establish *green* software.

In this poster, we've made a state of the art for these research questions by summarizing related works in this field and then we compare them.

We aim at establishing an estimation model for the consumed energy. We then investigate its performance and accuracy on a development project. The model will be used as an energy consumption measurement tool that guides developers building greener software.

The contribution to power measurement literature will continue by bringing improvement to the estimation of the consumption of other components; such as memory, disk and network, which are neglected in related models in literature. It

will allow us to have a higher accuracy in estimating the energy consumption of a program.

Using Java agents, the methods will be re-implemented automatically in order to observe their energy consumption. We will seek to be more precise in locating the most intensive pieces of code in each function to help developers optimize their codes.

The similar energy estimation tools in literature are analyzed in the paper. The research area of *green software* development is relatively new, and major part of the tools only provides with an estimation of the energy consumption of an application without involving the source code. Moreover, the recent tools, which have began to take into account the source code, do not take into account all the components that consume energy and / or request to integrate the code manually. Hence, there is a lack of precision and a difficulty of using these tools.

After this state of the art, an energy consumption estimation tool is proposed. It has been implemented so as to measure only the consumption due to the CPU, but it may be used for other components quickly and easily, in a near future.

The proposed tool is expected to be improved, and it is planned to dynamically identifying the locations of the head of the largest energy consumer code. This will allow developers to optimize their own codes to obtain *greener software*.

Keywords— *Green Software, Green IT, Sustainable Software, Energy Efficiency.*