

Energy Efficient Programming Attributes in Mobile Applications Environment

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Abstract

Reducing energy consumption in ICT systems has been a concern since the earliest days of computing. There has been huge investment in hardware energy efficiency research such as low-power circuit design, virtualization, thin client and cloud computing among others, however the overall ICT energy consumption is still increasing. This is due to the fact that energy consumption not only depends on hardware features, but also on software usage and software internal characteristics. Poor choice of algorithms and data structures impact energy consumption. For this reason software developers are becoming conscious of writing energy efficient applications more so for mobile applications since mobile devices are energy constrained by nature. A number of empirical research on software energy consumption has been conducted. This paper seeks to establish programming attributes that are proven to be energy efficient in these studies through the adoption of desktop research design and internet being the tool. We observed that bundling small HTTP requests could save energy, query optimization in MySQL Server and use of sleep instruction in the Apache web server are energy efficient, darker colors are more energy efficient than lighter colors in OLED smartphones display, work-stealing parallel framework is more energy efficient when performing fine-grained CPU intensive computations than a thread-based implementation, Cross platform frameworks have a significant impact on energy consumption which greatly increases compared to an equal native application, the chosen programming language has a significant impact on energy consumption. However a certain degree of conflict is observed, the impact of refactoring has been addressed by multiple researchers but recommendations whether it is an energy efficient practice conflicts. Energy efficient programming practices help mobile applications developers in developing energy efficient applications which in long run improve mobile battery life leading to sustainability.