

RESEARCH AND CONTRIBUTIONS IN ENERGY EFFICIENCY AND CONTEXT AWARENESS OF MOBILE SYSTEMS AND APPLICATIONS

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Abstract

This habilitation thesis describes the achievements I have obtained since when I received the PhD scientific title of Politehnica University of Timisoara back in 2005, in the field of Computer and Information Technology. An overview of my activity and the main research work and topics is presented in the first section of the thesis. My recent activity addressed several research topics: energy-efficient and power-aware applications and systems, energy profiling of virtualization solutions, device and workload characterization using power signatures, indoor positioning techniques based on wireless infrastructures, component level energy profiling and runtime threadlevel energy accounting.

In these fields of expertise, I have published over 70 scientific and academic works as single author (9), first author (34) or co-author, 4 ISI journal with cumulative impact factor 2,74, 22 ISI proceedings papers, and 41 BDI journals and proceedings papers. I was also involved in more than 10 national and international projects obtained by competition, 4 of them as a project manager or local partner manager.

In Chapter 2 I describe the contribution to an execution framework for power-aware applications running on battery powered devices. This research direction has been supported by two national grants I have managed between 2006 and 2011. Power-aware applications are software applications that implement application specific power management algorithms in order to reduce and optimize the energy consumption of the system while running them. The main goal of this research effort was to promote power consumption management and optimization of mobile and embedded systems at higher abstraction layers of such systems. The main outcome of these projects was to establish a general theoretical background and applicative rules and patterns in order to obtain efficient mobile systems and applications from the point of view of the consumption and the prototype implementation of the framework.

In Chapter 3 I describe the contribution to energy efficiency profiling and evaluating of virtual machines. This work has been carried out during implementation of an FP7-ICT project eMuCo – Embedded



Multi-Core Processing for Mobile Communication. Our research effort explores how virtualization influences the power consumption of both physical systems and virtual systems and which is the most efficient way to implement such applications. The main goal of this work has been the study on the power consumption impact of virtualization solutions for common desktop and laptop computers. This work explored how virtualization influences the power consumption of both physical systems and virtual systems and which is the most efficient way to implement such applications. The main contribution to the project is the study on energy and thermal efficiency of virtualization solutions implemented on the two OS used today: Windows and Linux. In order to achieve this result the evaluation methodology and measurement setup have been proposed and implemented.

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The full abstract at:

http://www.upt.ro/img/files/2015-2016/doctorat/abilitare/marcu/Abstract_Marcu.pdf

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