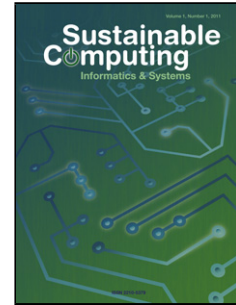


Accepted Manuscript

Title: Non-invasive cyber-physical system for data center management

Author: Maurizio Rossi Luca Rizzon Roberto Passerone Ivan Minakov Davide Sartori Davide Brunelli



PII: S2210-5379(16)30051-8
DOI: <http://dx.doi.org/doi:10.1016/j.suscom.2017.09.003>
Reference: SUSCOM 188

To appear in:

Received date: 1-4-2016
Revised date: 16-1-2017
Accepted date: 18-9-2017

Please cite this article as: Maurizio Rossi, Luca Rizzon, Roberto Passerone, Ivan Minakov, Davide Sartori, Davide Brunelli, Non-invasive cyber-physical system for data center management, <![CDATA[Sustainable Computing: Informatics and Systems]]> (2017), <http://dx.doi.org/10.1016/j.suscom.2017.09.003>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Non-invasive Cyber-Physical System For Data Center Management

Maurizio Rossi^{a,*}, Luca Rizzon^b, Roberto Passerone^b, Ivan Minakov^b, Davide Sartori^a, Davide Brunelli^a

^a*Department of Industrial Engineering (DII), University of Trento, Trento, Italy.*

^b*Department of Information Engineering and Computer Science (DISI), University of Trento, Trento, Italy.*

Abstract

We present a Cyber-Physical System (CPS) designed to improve the efficiency of Cloud Data Centers. The hardware part of the system consists of a number of dual functionality devices powered with scavenged thermal energy. The devices can perform two different functions: i) act as wireless sensing nodes to monitor environmental parameters inside the server room that are important for system reliability and security; ii) provide active cooling to the CPUs of the data center as *smart heat-sinks*. Starting from the empirical characterization of the energy harvesting module, we determine the amount of energy that can be harvested from a CPU heat dissipation while performing different tasks. We then analyze the amount of energy required to supply the low power sensors or to actuate the cooling fan. The CPS exploits a software simulator of the network of smart heat-sinks to predict the status of the devices. The simulator works in conjunction with a management algorithm used to administrate the cloud infrastructure and the network of *smart heat-sinks* for pursuing global objectives, i.e., maximizing the power efficiency of the data center, while keeping the wireless sensing network alive. Experimental data and simulation results of the framework validate the effectiveness of the proposed method.

Key words: Internet of Things, Cyber-Physical Systems, Thermoelectric

*Corresponding author

Email addresses: maurizio.rossi@unitn.it (Maurizio Rossi)

Download English Version:

<https://daneshyari.com/en/article/6903042>

Download Persian Version:

<https://daneshyari.com/article/6903042>

[Daneshyari.com](https://daneshyari.com)