

You are cordially invited to the PhD Defense on:

**Total Cost of Ownership Optimization for Edge and Cloud
Data-Centers**

Mrs. Panagiota Nikolaou
University of Cyprus, Cyprus

Friday, December 6, 2019
10:00-11:00 EET

Room 148, Building 12
Faculty of Pure and Applied Sciences, New Campus

Abstract

The number of intelligent Internet-connected devices is growing daily and will soon be in the order of tens of billions, forming the Internet of Things (IoT). Each of these devices is pushing data to the Internet that are soon expected to reach tens of exabytes. This rapid data growth will put an unprecedented pressure on the current Internet infrastructure and the centralized (Cloud) data-centers (DC). Coping with this imminent, data flood requires both to enhance the processing capabilities of the current servers but also rethinking of the way we communicate and process data across the Internet. To this end, during the last few years, DC have increased in numbers, size and utilization. Large DCs that consist of thousands to tens of thousands of servers are used to deliver services, such as e-mail, web search, social networking, maps etc., to billions of users. Additionally, a new paradigm has emerged that promotes the offering of Cloud services at the Edge, closer to users. One key ramification of these developments is an increase in the cost and energy consumption of DCs and, consequently, there is a growing need for efficient methodologies and techniques to improve a DC's design and make more efficient its utilization. The main goal of this thesis is to minimize the total cost of ownership (TCO) of a DC while meeting the service level agreement of different workloads running in a DC. This requires the development of methods and models that enable exploring the design space of a DC. In particular, we first present the results of a correlation analysis that highlight the TCO as an optimization metric and also identifies the main parameters that affect it. We then analyze the implications of DRAM failures and DRAM protection techniques on the TCO and determine the appropriate protection technique that provides the most TCO savings without compromising the availability of the system. We also evaluate the possible TCO gains of an Edge deployment compared to a Cloud one as well as of an Energy efficient Edge deployment that employs under-volting. Finally, we propose and analyze the TCO implications of a dynamic technique that monitors performance counters and determines when to operate a CPU in nominal or undervolted settings.

Short Bio:

Panagiota Nikolaou is a Ph.D. candidate at the Computer Science Department of the University of Cyprus. Panagiota has received M.Sc. and B.Sc. degrees in Computer Science from the same University. She is currently a full-time researcher and active member at the Xi Computer Architecture laboratory. Her research interests include total cost of ownership evaluation for edge and cloud deployments, memory reliability, power optimizations and CPU voltage margins characterization. She has worked as an intern for two months at IROC technologies in Grenoble in 2015. During her Ph.D. she has been involved in EU FP7 and Horizon2020 funded research projects.

Host: Dr. George Pallis (gpallis-AT-cs.ucy.ac.cy)