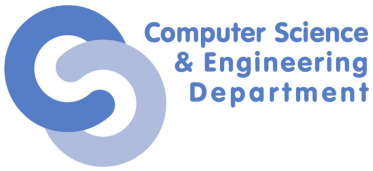
University POLITEHNICA of Bucharest

Automatic Control and Computers Faculty,
Computer Science and Engineering Department


# Habilitation Thesis

in Computers, Information Technology and System Engineering

# Secure and efficient operations' processing in distributed datacenters

**Author:**
Mihai Carabaș

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# Abstract

Computer Science and Information Technology provide nowadays uninterrupted and high performance services. To achieve this, we have to ensure secure and efficient operation processing in distributed datacenters. In this context, we proposed new approaches in three areas: datacenter infrastructure where we relate on hypervisors, datacenter operations where we use different tools to monitor and heal the datacenter components and applications that run on top of the hardware in datacenter that provides the previously mentioned services.

In this habilitation thesis, I present my scientific, professional and academic achievements performed inside University POLITEHNICA of Bucharest in the last eight years. I have obtained my bachelor degree in Computer Science and Engineering at the Faculty of Automatic Control and Computers (UPB) in 2011 (GPA 9.57/10), with a specialization in systems programming and my master degree also in Computer Science and Engineering at the Faculty of Automatic Control and Computers (UPB) in 2013 (GPA 10/10), specialization in network security. Afterwards, I obtained my PhD title in 2017 with my thesis *Improving and Extending Virtualization in Modern Computing Environments* in Computer and Information Technology – mention *Excellent* at the Faculty of Automatic Control and Computers (UPB). I have been part and coordinating various national and international research projects (ATTRACT, PROTECTIVE-H2020, SIMARGL-H2020, SIMULATE, PLATFORMĂ NAŢIONALĂ INTEGRATĂ – WIRELESS CAMPUS, RoEduNet4, Platformă digitală cu resurse educationale deschise (EDULIB), Data4Water: Excellence in Smart Data and Services for Supporting Water Management H2020-TWINN-2015, Condegrid, VDAQ-CEX, SOVAREX, SCOP, PISA) with more than 45 published papers.

At the time of writing this thesis, I am working as an Associate Professor at the Department of Computer Science, Faculty of Automatic Control and Computers at the University POLITEHNICA of Bucharest (UPB) responsible for the courses: Introduction in Operating Systems, Operating Systems, Cluster, Cloud and Grid Computing. In parallel with the teaching and research activities at University POLITEHNICA of Bucharest, I am also part of the RoEduNet team (Romanian NREN - National Research and Education Network). Another essential part of my research and academic carrier is the high-performance datacenters I manage within the University POLITEHNICA of Bucharest. Last but not least is my collaboration with CERN accelerator (Alice project), where we provide resources to run computational workloads and contribute to computation frameworks.

The applied research and implementation after my PhD thesis was done to create a scalable, high-available environment in datacenters, allowing to run distributed real-world applications. The research presented in this thesis is divided in three main areas: **datacenter infrastructure** where I present hypervisor related projects, **datacenter operations** where we are using different tools to monitor the activity inside the datacenter, **applications** that run on the datacenter infrastructure divided in two categories: **HPC cluster applications** that run inside the datacenter and **HPC grid applications** (at CERN) that use the resources spread all over the world.