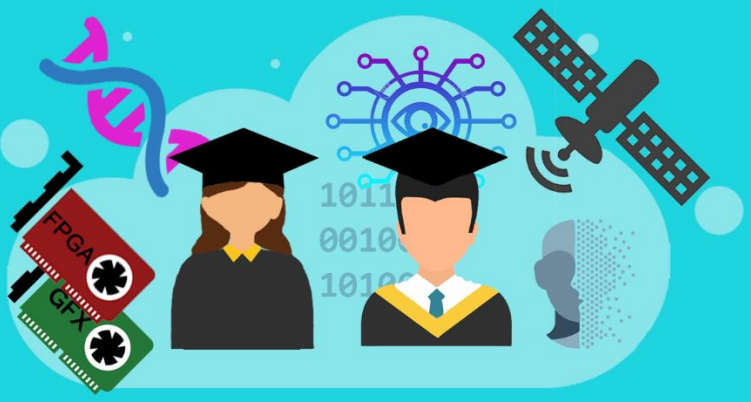
Diploma Thesis

Microproccessors and Digital Systems Laboratory



Exploring the impact of heterogeneity on the performance of cloud applications

Nowadays, there is an ever-increasing number of workloads pushed and executed on the Cloud. To effectively serve and manage these huge computational demands, data center operators and cloud providers have embraced workload co-location and multi-tenancy as first class system design concern. In addition, the continuous advancements in the computers' hardware technology have led to a heterogenous pool of systems lying under data center environments. Current state-of-the-art schedulers and orchestrators rely on typical metrics, such as CPU or memory utilization, for placing incoming workloads on the available pool resources, thus, not taking into consideration the interference effects each task cause, when co-located with others, as well as the impact of systems' underlying diversity on the performance.

In this thesis, we will explore the impact of underlying hardware infrastructure on the performance of cloud applications. Specifically, we will examine how changes in the underlying hardware architecture and system specifications affect the execution time of cloud applications, when executed under interference. We will consider three different system architectures, including two different Intel Xeon systems and an IBM Power8. The thesis will include in-depth occupation with state-of-the-art cloud technologies, such as Docker[1] containers and the Kubernetes[2] orchestrator.

PREREQUISITES:

Good knowledge of BASH scripting and the Linux operating system.

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[1] https://www.docker.com/

[2] 2 https://kubernetes.io/