Nuno Morais

Master of Science

Monitoring and deploying services on edge devices

Dissertação para obtenção do Grau de Mestre em

Engenharia Informática

Orientador: João Leitão, Assistant Professor,
NOVA University of Lisbon

Júri

Presidente:	Name of the committee chairperson
Arguente:	Name of a raporteur
Vogal:	Yet another member of the committee

FACULDADE DE
CIÊNCIAS E TECNOLOGIA
UNIVERSIDADE NOVA DE LISBOA

December, 2019

Monitoring and deploying services on edge devices

Este documento foi gerado utilizando o processador (pdf)LaTeX, com base no template "novathesis" [1] desenvolvido no Dep. Informática da FCT-NOVA [2].
[1] https://github.com/joaomlourenco/novathesis [2] http://www.di.fct.unl.pt

Resumo

Lorem ipsum em Português.

Palavras-chave: Palavras-chave (em Português) ...

Abstract

Lorem ipsum in english.

Keywords: Keywords (in English) ...

Índice

Lista de Figuras

Lista de Tabelas

Listagens

Capítulo 1

Introduction

1.1 Context

Nowadays, the Cloud Computing paradigm is the standard for development, deployment and management of services, it has proven to have massive economic benefits that make it very likely to remain permanent in future of the computing landscape. It provides the ilusion of unlimited resources available to services, and has changed the way developers, users and businesses rationalize about applications [0]. Currently, most software present in our everyday life such as Google Apps, Amazon, Twitter, among many others is deployed on some form of cloud service.

However, currently, the rise in popularity of mobile applications and IoT applications differs from the centralized model proposed by the Cloud Computing paradigm. When all computations reside in the data center (DC), far from the source of the data, problems arise: from the physical space needed to contain all the infrastructure, the increasing ammount of bandwidth needed to support the information exchange from the DC to the client, the latency in communication from the client to the DC as well as the security aspects that arise from offloading data storage and computation, have directed us into a post-cloud era where a new computing paradigm emerged, Edge Computing.

Edge computing takes into consideration all the computing and network resources that act as an "edge"along the path between the data source and the DC and addresses the increasing need for supporting interaction between cloud computing systems and mobile or IoT applications [2]. However, when accounting for all the devices that are external to the DC, we are met by a huge increase in hetereogeneity of devices: from Data Centers to private servers, desktops and mobile devices to 5G towers and ISP servers, among others.

1.2 Motivation

The aforementioned hetereogeneity implies that there is a broad spectrum of computational, storage and networking capabilities along the edge of the network that can be leveraged upon to perform different types of computation that rely on the individual characteristics of the devices performing the tasks, which can vary from from generic computations to aggregation, summarization, and filtering of data. [1]

To fully materialize the Edge Computing paradigm, tools must be developed that allow the federation and search over a large number of heteregenous devices. These tools must leverage on efficient topologies and aggregation protocols.

1.3 Expected Contribution

Capítulo 2

Motivation

2.1 What is the problem

Capítulo 3

Related Work

3.1 Topology Management

3.1.1 Random overlays

3.1.2 Structured overlays

3.1.3 Self-adapting overlays

3.2 Aggregation

3.2.1 Types of aggregation

3.2.2 Relevant aggregation protocols

3.3 Resource Discovery

3.4 Offloading computation to the edge

Capítulo 4

Planning

4.0.1 Proposed solution

4.0.2 Scheduling

Bibliografia

[0] M. Armbrust, A. Fox, R. Griffith, A. D. Joseph, R. Katz, A. Konwinski, G. Lee, D. Patterson, A. Rabkin, I. Stoica e et al. "A View of Cloud Computing". Em: *Commun. ACM* 53.4 (abr. de 2010), 50–58. ISSN: 0001-0782. DOI: 10.1145/1721654.1721672. URL: https://doi.org/10.1145/1721654.1721672.

[1] J. Leitão, P. Á. Costa, M. C. Gomes e N. M. Preguiça. "Towards Enabling Novel Edge-Enabled Applications". Em: *CoRR* abs/1805.06989 (2018). arXiv: 1805.06989. URL: http://arxiv.org/abs/1805.06989.

[2] W. Shi, J. Cao, Q. Zhang, Y. Li e L. Xu. "Edge Computing: Vision and Challenges". Em: *IEEE Internet of Things Journal* 3 (out. de 2016), pp. 1–1. DOI: 10.1109/JIOT.2016.2579198.

Apêndice

Appendix 2 Lorem Ipsum

Anexo I

Annex 1 Lorem Ipsum