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Monitoring and deploying services on edge devices

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[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) . . .

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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 [1]. 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 [5]. 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. [3]

Furthermore, with recent advances in the IoT industry, it is safe to assume that in the future almost all consumer eletronics will play a role in producing as well as consuming data. Therefore, the number of devices at the edge and the data they produce will increase rapidly, transporting the data to be processed in the Cloud will become unfeasable in the future.

Systems that require real-time processing of data may not even be feasible with Cloud Computing. When the volume of data increases, transporting the data in real time to a Data Center is impossible, for example, a Boeing 787 will create around 5 gygabytes of data per second [2], and Google's self-driving car generates 1 Gygabyte every second [4], which is infeasible to transport to the DC for processing.

There have been efforts to move computation towards the Edge of the network, Fog Computing [6], which is an extension of cloud computing from the core of the network to the edge of the network, has shown to benefit applications [7], Content Distribution Networks [] and Cloudlets [] are an extension of this paradigm and are extensibly used nowadays.

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 that allow the programmer to automatically deploy and maintain QoS and security of services that are deployed across interconnected Edge and Cloud devices.

As previously mentioned, when decentralizing computation from the DC, there is a rapid increase in number of devices, and given that it is not possible to track all of them at once, the best approach this number of devices is gossip. Gossip is a communication strategy employed in distributed systems to provi

The most efficient and scalable topology for aggregation is self-balanced trees,

1.3 Expected Contribution

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Motivation

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Apêndice A

Appendix 2 Lorem Ipsum

Anexo I

Annex 1 Lorem Ipsum