CSSE7014 Distributed Computing
Assignment 2
Semester 1, 2017

Paul Kogel (44644743), Ramdas Ramani (44743767)

May 4, 2017

Contents

1 Introduction

Fog computing is a new, exciting computing paradigm [1].

The introduction is clear with several definitions of the computing paradigm under study for comparison. The structure of the report is presented.

2 Architectures and Models

Compare and contrast different architectures and models with examples to back the arguments.

RAM

3 Common Issues

Comments on issue related to communication paradigms, fault tolerance, consistency, reliability, etc. Marking criteria: Quality discussion and explanation on relevant issues as required with clear examples. Discussions of potential enhancement to address any performance issues are provided.

As described in the previous section, fog computing is both highly dynamic, and heterogeneous: link quality, and the topology change constantly. This results in multiple issues that are no usually encountered for cloud computing.

In their survey on fog computing, Yi et al. identify seven main issues related to fog computing. We summarise these issues in the following.

3.1 Networking

The highly dynamic nature of fog-based systems poses many challenges to existing networking mechanisms. As the network topology constantly changes, updates on the structure have to be propagated quickly. Network links have to be considered as generally unreliable. The network is inherently distributed, as each node has the ability to act as router [xx]. Using existing technologies such as SDN or NFV is expected to be difficult.

3.2 Quality of Service

3.3 Interfacing and programming model

In a general overview of fog computing, [xx] describe a "'fog abstraction layer" that forms an essential part of the fog software architecture, and enables developers to easily implement applications that run on a heterogeneous set of fog nodes.

Implementing such an abstraction layer, however, is expected to be challenging. Different nodes on the same network might be based on different platforms, and feature widely varying resources [quote on this?]. In addition, accounting for the highly dynamic nature of the network, e.g. frequent topology changes, appears to be a hard problem to solve [??].

3.4 Security and Privacy

Fog computing applications will process a great amount of personal, and sensitive data. For example, in the field of home automation, a fog computing system will have to analyse many different sensor values, which might give insights into behavioural patterns of the home's inhabitants. Protecting this data will be challenging. Though it has been argued that moving data from the datacenter closer to the user makes it easier for him/her to control the data, we believe that due to the heterogeneity inherent to fog computing, the opposite might be true. In accordance with that, [xx] see a major challenge in providing authentication across different layers.

Besides keeping data private, maintaining network security is also an important aspect. With fog computing, a huge number of devices is set to be connected to a network, giving an attacker potential access to them. Using encryption [xx] might help to address this. As with privacy, though, we expect that the heterogeneous nature of fog-based networks makes the implementation of effective network-wide security difficult.

PAUL

4 Applications

Various examples (across different disciplines) provided with clear arguments why they are relevant.

5 References

[1] F. Bonomi, R. Milito, J. Zhu, and S. Addepalli, "Fog computing and its role in the internet of things," in *Proceedings of the first edition of the MCC workshop on Mobile cloud computing*, pp. 13–16, ACM, 2012.