Cloud and Fog Computing: A Mechanism Design Perspective

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Abstract

In this thesis, two computing techniques, namely cloud computing and fog computing, have been explored through the lens of mechanism design (a subfield of game theory). Cloud computing, with its infrastructure-less service, is plaguing pervasively to the users with a rapid pace. Both service providers and the users (agents will be used interchangeably) can be strategic in nature and because of that the cloud computing technique is ventured with the notion of mechanism design that deals with modelling agents participating in strategic setting. We share a huge amount of virtual infrastructure to the users in cloud computing and several challenges emerge due to these sharing activities. Literature survey reveals that we have some interesting work in Cloud computing where money is involved. However it is observed that there might be a situation (for example during the disaster management or say free space will be provided to make websites to some users by a service provider or to provide community services regarding healthcare which may result a better society) when the cloud computing resources may be distributed free of cost. This problem is addressed in Chapter 3. In Chapter 4, Data-

as-a-service (DaaS) model for Cloud Computing is studied. Here, small clouds will collaboratively work to provide efficient services to the users on demand and can compete with the big giants of the cloud service providers to stay in the market. How to provide flexibility to the users if they are unable to complete their tasks within the allocated time frame (stipulated completion time) in cloud computing scenario is addressed in Chapter 5. In this monetary setting, the users pay in exchange of the services they get from the service provider. In the IoT+Fog+Cloud architecture, with the unprecedented growth of IoT devices, one of the challenging issues that needs to be tackled is to match the fog service providers (FSPs) to the IoT devices when IoT devices (the users) put forward their demand in terms of some preferences. This fog computing scenario when the IoT devices are present in the system is addressed in Chapter 6.