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A Survey On Ad-hoc Mobile Cloud Computing Modeling Using Cloudlet Approach

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ABSTRACT

Mobile Cloud Computing is one of the most important branches of cloud computing. MCC can be defined as cloud computing extended by mobility, and a new ad-hoc infrastructure based on mobile devices. It is deployed for various purposes in area where mobile nodes are free to move to any location. Such locations can be made to have Local cloud Data Center known as Cloudlet that can communicate with set of mobile nodes. The MCC model based on cloudlet approach is flexible with various workload sizes that can be offloaded to the cloudlets by mobile nodes when required. The ability of the mobile devices will be exploited in utilizing its context awareness such as its locations. Infrastructure as a service would be provided by cloudlets to the mobile nodes that will be connected to it. In this paper we have reviewed different papers on Mobile Cloud Computing Approaches.

Keywords:*—Mobile Cloud Computing, Cloudlet, Ad-Hoc, Wi-Fi Connection.*

I. INTRODUCTION

Mobile Ad-hoc Network (MANET) is a set of number of mobile devices which provides an environment over a shared wireless medium to communicate with each other. When these mobile devices such as laptops, mobile phones and smart phones come together with cloud computing resources in a new budding field, then it is known as mobile cloud computing. Mobile cloud computing expands cloud computing with mobility by the provision of the ability to store data and processing services on demand by using a cloud computing platform to the mobile devices user. Cloudlet is one of the concept of mobile cloud computing. A cloudlet is a trusted, resources rich computer or cluster of computers that is well connected to the enterprise cloud and available for use by nearby mobile devices. This cloudlet would be placed in common regions such as universities, airports and railway stations so that mobile devices can benefit the low latency offered by connecting as a thin client to the cloudlet.

2. LITERATURE SURVEY

2.1 By Mohammad AL-Rousan et. al.[1] "AMCC: Ad-hoc based Mobile Cloud Computing Modeling"

In this title authors proposed an ad-hoc model for mobile based cloud computing using cloudlet approach. This model makes the use of Random Way Point (RWP) for mobility mechanism and the Destination Sequenced Distance Vector (DSDV) for routing protocol. To study the behavior of a mobile cloud computing model in terms of the performance

to find out the benefits and drawbacks in order to achieve an appropriate solution for the mobility problem is the proposal of this research paper. Mobile cloud infrastructure as a service for the mobile cloud applications consists of an enterprise cloud in addition to cloudlets that mobile nodes are connected to a cloudlet by (Wi-Fi) in high bandwidth. When connecting to the cloudlet, the mobile device offloads its workload to a local cloudlet consists of a number of multi core computers by means of association to enterprise cloud servers. These cloudlets would be located in many common areas, such as coffee shops, universities and airports. Mobile device performs in the vein of a thin client connecting to the distant (enterprise) server through 3G. A mobile user will use the nearest cloudlet that covers limited area to provide the services such as storing, processing, content delivery.

Figure 1. Cloudlet server additional components.

A cloudlet acts as a temporary service server since it updates the state of the node at the end of the communication (when job is done) to the enterprise cloud. If a cloudlet is obtainable by mobile device users, then it will be very beneficial for those who need such a resource rich server to offload their workloads. It helps the users staying at a coffee shop, universities, waiting at the railway station or airport within a specific range. But, if a client with a cloudlet or enterprise cloud, then we talk about one possible movement which will be the client movement because cloudlet and enterprise cloud are central stable servers. It becomes a key point to monitor the context of current user's location, when the cloudlet's user going out of the range. In such case, connection should be dynamically adapted for the contexts to keep the job progress while any moves of cloudlet members. For keeping the connection on to the mobile device, an ad-hoc network among the cloudlets will be created. The cloudlets have the same role, since they process data on behalf of user's mobile devices. For this purpose, they are peer to each other and each cloudlet can establish a connection with other cloudlets. Thus, the model which is proposed in this paper is aimed at reducing end-to-end packet delay, better system scalability, and mobility management with the help of cloudlet approach.

2.2 Marinelli, E.E. et al. [2] "Hyrax: cloud computing on mobile devices using mapreduce"

In this title authors described a platform, named Hyrax, derived from Hadoop that supports cloud computing on Android smartphones. Hyrax allows client applications to conveniently utilize data and execute computing jobs on networks of smartphones and heterogeneous networks of phones and servers. Hyrax allows applications to use distributed resources abstractly, oblivious to the physical nature of the cloud. It is concluded that there is a huge difference in the amount of data that phones and servers can process in a given amount of time. Considering the difference in CPU utilization and the amount of time spent on map tasks, it appears that CPU and memory are the biggest resource bottlenecks for Hyrax on the Android platform.

2.3 Jaraveh Y. et al. [3] "A comprehensive cloud computing experimental framework"

Introduced the CloudExp, a modelling and simulation environment for the cloud computing. CloudExp can be used to evaluate a wide spectrum of cloud components such as the processing elements, data centres, storage, web- based applications, networking, virtualization, Service Oriented Architecture (SOA), management, automation and Business

Process Management (BPM). CloudExp introduces the Rain workload generator which emulates real workloads in the cloud environments. Also, the MapReduce processing model has been integrated in CloudExp in order to handle the processing of big data problem.

2.4 Fan X et al. [4] "A survey on Mobile Cloud Computing"

In this title the authors reviewed the existing works and gave overview of recent advances in mobile cloud computing. The author investigated representative infrastructure of MCC (mobile cloud computing) and analyzed key components. In the survey, terminologies and concepts are clarified, and a definition of mobile cloud computing is provided based on an understanding of underlying technologies and applications. Two classes architecture framework were described for mobile cloud computing that are Hyrax and cloudlets. Moreover, the emerging MCC models and services are discussed, and challenging issues are identified.

2.5 Kovachev D. et al. [5] "Mobile community cloud computing: Emerges and evolves"

In this title the authors proposed Mobile Community Cloud Platform (MCCP) as a cloud computing system that can leverage the full potential of mobile community growth. They presented the design of cloud computing architecture that supports building and evolving of the mobile communities.

2.6 Satyanarayanan M. et al. [6] "The case for vm-based cloudlets in mobile computing"

In this title the authors proposed an architecture, in which a mobile user exploits virtual machine (VM) technology to rapidly instantiate customized service software on a nearby cloudlets and then uses that service over a wireless LAN. The mobile device typically functions as a thin client with respect to the service. A cloudlet is a trusted, resource-rich computer or cluster of the computers that are well-connected to the Internet and available for use by nearby mobile devices.

2.7 Jaraweh Y. et al. [7] "Resource efficient mobile computing using cloudlet infrastructure"

In the title the authors introduced a Cloudlet based MCC system aiming at reducing the consumption of power and the network delay while using MCC. He merged the MCC concepts with Cloudlet framework and proposed a new framework for the MCC model. Experimental results showed that when the proposed model is used, it reduces the power consumption from the mobile device, besides reducing the communication latency when the mobile device requests a job to take place remotely while keeping high quality of service.

2.8 Quwaider M. et al. [8] "Cloudlet-based efficient data collection in wireless body area networks"

In this title the authors proposed a cloudlet-based efficient data collection system in Wireless Body Area Networks (WBANs). The goal is to have a large scale of monitored data of WBANs to be available at the end user or to the service provider in reliable manner. A prototype of the WBANs, including the Virtual Machine (VM) and Virtualized Cloudlet (VC) has been proposed for the simulation characterizing efficient data collection in the WBANs. This infrastructure will be efficiently able to handle the large size of data generated by WBANs system, by storing these data and performing analysis operations on it.

2.9 Jaraweh Y. et al. [9] "Scalable cloudlet-based mobile computing model"

In this title the authors integrated MCC concepts with the Cloudlet framework and

proposed a new scalable framework for the MCC model. The practical experimental results using multi- media applications show that using the proposed model reduces the power consumption of the mobile devices as well as reducing the communication latency when the mobile device requests a job to be performed remotely while satisfying the high quality of service requirements.

2.10 Sinha A. et al. [10] "Survey on mobile cloud computing"

In this title the authors surveyed existing work in mobile computing through the prism of cloud computing principles. They gave a definition of mobile cloud computing and by this provided an overview of the results from this review, in particular, models of mobile cloud applications. They also highlighted the research challenges in the area of the mobile cloud computing. They concluded with the recommendations for how this better understanding of the mobile cloud computing can help building more powerful mobile applications.

2.11 Fernando N, et al. [10] "Mobile cloud computing: A survey"

In this title the authors provided an extensive survey of the mobile cloud computing research, while highlighting specific concerns in MCC. They presented a taxonomy based on the key issues in this area, and discussed the different approaches taken to tackle these issues. They pointed out that MCC has overlapped with other areas such as the mobile peer-to-peer computing, application partitioning and context-aware computing, but yet has its own unique set of challenges. The future could also explore the potential of local mobile clouds formed from the collections of computers in ubiquitous devices in shoes, clothing, watches, furniture and other everyday objects, as indeed such embedded computers will become more powerful.

2.12 Guan L. et al. [11] "A survey of research on mobile cloud computing"

In this title the authors reviewed the current research efforts towards Mobile Computing. They presented several challenges for the design of MCC services. A concept model has been proposed to analyze related research work. Then, they surveyed the recent MCC architecture, application partition and offloading, and context-aware service.

2.13 Altamimi M. et al. [12]

In this title the authors proposed new green solutions that saves smartphone energy. The green solution is achieved by what we call Mobile Cloud Computing. The MCC migrates the content from the main cloud data centre to local cloud data centre temporary. The Internet Service Provider (ISP) provides MCC, which holds the required contents for the smartphone network. Their analysis and experiments show that our proposed solution significantly reduces energy consumption by 63% - 70%.

2.14 Quwaider M. et al. [13] "Cloudlet-based for big data collection in body area networks"

In this paper the authors presented a large scale BANs system in the presence of cloudlet-based data collection with the objective to minimize end-to-end packet cost by dynamically choosing data collection to cloud using cloudlet based system. While reducing packet-to-cloud energy, the proposed work also attempts to minimize the end-to-end packet delay by choosing dynamically a neighbour cloudlet, so that the overall delay is minimized. Then, it will lead to have monitored data in the cloud in real time manner.

2.15 Hong J.A. et al. [14] "A study of secure data transmissions in mobile cloud computing from the energy consumption side"

In this presented a paper that explores energy efficiency of the mobile devices. When

transferring the data securely over various communication networks including high-speed 4G networks such as LTE and Wibro.

2.16 Broch J. et al. [16] "A performance comparison of multi-hop wireless ad hoc network routing protocols"

Compared the performance of multi-hop wireless ad-hoc network routing protocols. The tested Four Routing Protocols are: Destination-Sequenced Distance Vector (DSDV), Temporally-Ordered Routing Algorithm (TORA), Dynamic Source Routing (DSR) and Ad-Hoc On Demand Distance Vector (AODV). By using *ns* network simulator ad-hoc routing protocols were evaluated. It was concluded that DSDV is good with low mobility. TORA has large overhead. So it fails to converge with more sources. DSR is very good at all the rates of speed, but has large packet overhead. AODV is almost as good as DSR, but has more transmission overhead.

III. CONCLUSION

This survey paper presents various connectivity approaches for Ad-hoc based MCC. Cloudlet approach for such kind of requirements has been well depicted. Our future work is to add security features in this approach so that communication with mobile nodes can be made secure.

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