Management of QoS in Sensor Cloud

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Abstract—Sensor cloud is a new concept in cloud computing which provides sensor management platform that works as interface between physical and internet world. It is a collection of sensor nodes which are activated on demand and forms a group virtual sensors (VS). These VSs are located in different locations which transfers collected data into nearest data center. The Proposed System concentrates on Scheduling a particular DC which assembles data from various VS and serves the request of clients/end users. Scheduling a particular DC depends on several network constraints such as Average processing time, data delivery cost, service delay of an application and QoS. Simulation results areshown for the proposed system.

Keywords—WSN, Cloud Computing, Sensor Cloud, Data Center

I INTRODUCTION

Recent research has acknowledged the sensor-cloud infrastructure as a potential substitute of traditional Wireless Sensor Networks (WSNs) [2][3]. Now day‘s sensors are used for various fields such as environment, healthcare and government services. Whenever user requests for sensor information, Cloud computing IT resources can provide users with virtual servers [3]. By using this virtual sensors users need not worries about the locations of the servers. Sensor Cloud infrastructure uses numerous physical sensors to form virtual sensor. Sensor cloud is a new concept in cloud computing [2], which is known as a sensor management platform that acts as an intermediate layer between physical and internet world (cyber world). Sensor Cloud infrastructure uses physical resources (i. e. sensors) within the cloud environment and delivers Sensors-as-a Service (SeaaS) to end-users .Hence such a new technology permits the end users to visualize the sensor nodes as a service, rather than hardware. Sensor services are divided into sensor system management and sensor data management [2]. Sensor Cloud infrastructure explains sensor system management. The existing system focuses on accepting one or more clients request for various types of sensor data which are located in different regions in the form of sensor as a service (SeaaS). For every request from end user, distinct VS are formed, the data from the various VS are transfer into nearest DC for temporary storage and all data from temporary DC are transmitted into a randomly selected DC which can be used to serve for end user [1]. This random selection of DC leads to reduction in QOS, more traffic delay and chances of loss of data. So goal of the work is to design a system which selects a particular DC that serves a user application

II RELEATED WORK

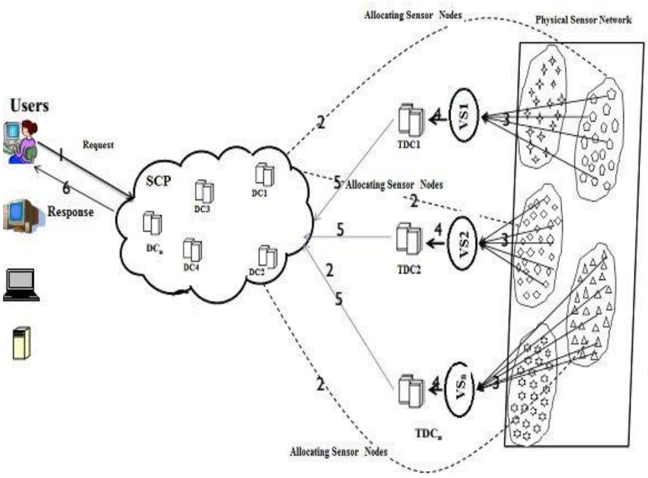
Prior to this work, [1] address the problem of scheduling a DC which collects the information from several VSs and transfers the same to the user who sends request. The work is based on general pairwise choice framework. Sensor-Cloud Infrastructure achieves physical sensor on IT infrastructure [2][3]. This Sensor-Cloud infrastructure consists of virtual sensors which send sensed information to cloud. Virtual Sensor groups can be formed as and when user needs them [10] [4]. A framework of sensor-cloud connection to use the sensor data and also a content-based pub-sub model which shortens the incorporation of sensor network with cloud based community and emphases on sensor cloud theoretical modeling [5] [6]. In addition to this [7] addresses the problem that how to track multiple targets in Sensor-Cloud. A highly efficient tabu search algorithm is proposed for optimizing locations of cloud datacenters, software components and a planning problem [8] and also a novel approach which based on a Markov chain model that solves the issue of detection of overloaded host which depends on calculating the mean inter migration time under given QoS value and they also uses a Multisize Sliding Window workload estimation technique to handle unknown non-stationary workloads [9]. R. C. Ben-Yashar and S. I. Nitzan describes how to calculate the optimal decision rule based on general pairwise choice framework. And this works assumes four assumptions while calculating optimal decision rule.

III PROBLEM SCENARIO

The existing system focuses on accepting one or more clients request for various types of sensor data which are located in different regions in the form of sensor as a service (SeaaS). For every request from end user, distinct VS are formed.

The data from the various VS are transfer into nearest DC for temporary storage and all data from temporary DC are transmitted into a randomly selected DC which can be used to serve for end user [1]. This can be shown in fig 1. The above figure explains

1. Sending request to sensor cloud
2. Sensor cloud provider allocating the physical sensor as per the user request
3. Formation of virtual sensor (VS) group
4. Transferring data from VS to temporary data centers
5. Migrating sensed data from temporary data centers to permanent data centers present in sensor cloud
6. Sending responses to end user.



SCP- Sensor cloud provider
TDC- Temporary Data Center
DC- Data Center, VS- Virtual Sensor

Fig.1 Working of Existing System

PROPOSED SYSTEM

We are scheduling a DC which is calculated based on several networking constraints such as Migration cost, delivery cost, service delay, QoS.

A. Symbols and Formulae[1]

The formulae used in calculation are as follows

Table1: List of symbols

Symbols	**Description**
P	Number of packets
P	Size of Packets
d(u,dci)	Distance between user to permanent DC
η_1	Migration Constant
η_2	Transmission rate from DC to an end-user

The average processing time for processing a _P' number of packets each of size _p' bytes is given by

Average Processing Time = $(P*p)/\eta_1$ **(1)**

The delivery cost for transferring service response to user is given by

Delivery Cost= $d(u,dci)^2/\eta 2$ **(2)**

Service Delay in transferring service response is

Service Delay = $\sum$ (Average Processing Time + Delivery Cost) **(3)**

Finally QoS can be calculated as

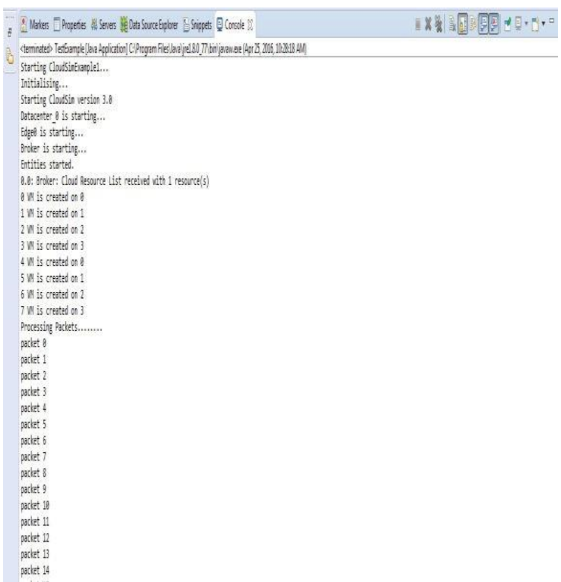
$$QoS = \frac{P^p}{\text{Service Delay}} \quad (4)$$

IMPLEMENTATION

The Cloud Sim 3.0.2 Simulator has Choose to perform the implementation process since it is a modern simulation tool. We have simulated for different number of hosts and VMs, each host contains number of VMs capable of processing a packet. The simulation result is shown in Figure 2.

SIMULATION RESULT

The simulation result is shown in Figure 3. Initially we have simulated for four hosts, eight VMs and hundred tasks. Andparallely calculated Average Processing time, delivery cost, service delay and QoS.



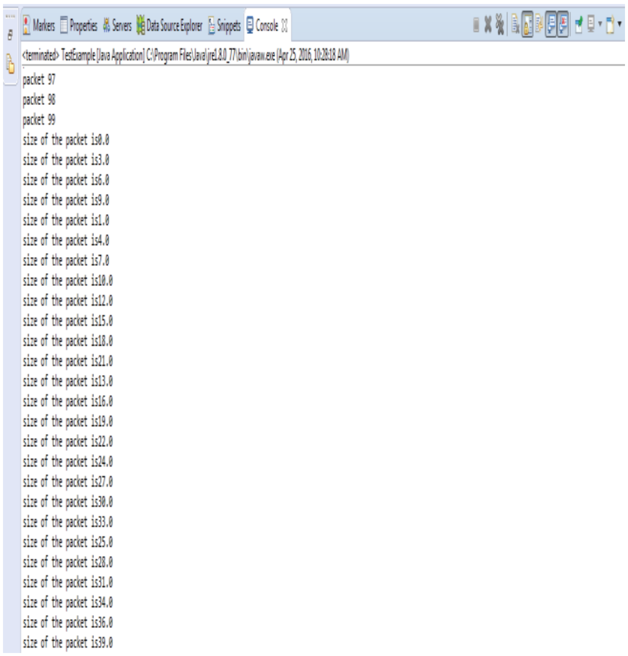


Fig. 2 Showing requests

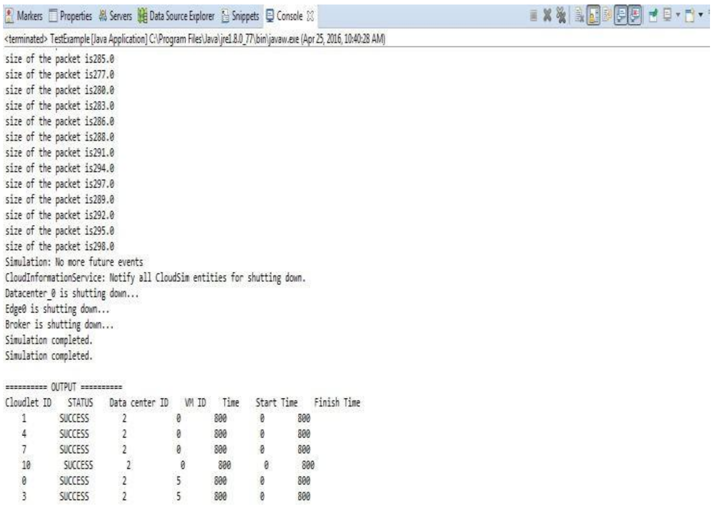


Fig. 4displaying cloudlets

CONCLUSION

The proposed work concentrates on sensor cloud infrastructure. In sensor cloud, data /information from all the physical sensors together forms a group called Virtual Sensor (VS) and data from these VSs are transferred into geographically located geospatial DC for temporary storage. Data from this temporary storage are migrated into a single VM present within DC for further processing. This can be done based on scheduling of DC by maximizing QOS for each application/user.

REFERENCES

[1] Subarna Chatterjee, Sudip Misra and Samee U. Khan, "Optimal Data Center Scheduling for Quality of Service Management in Sensor-cloud", in IEEE Transactions in Cloud Computing, 2015

[2] M. Yuriyama and T. Kushida, –Sensor-cloud infrastructure physical sensor management with virtualized sensors onvcloudcomputing,‖ invInternational Conference on Network-Based Information Systemsv, 2010.

[3] M. Yuriyama, T. Kushida, and M. Itakura, –A new model of accelerating service innovation with sensor-cloud infrastructure,‖ in Annual SRII Global Conference (SRII) , March 2011, pp. 308Ì.

[4] S. Madria, V. Kumar, and R. Dalvi, –Sensor cloud: A cloud of virtual sensors,‖ Software, IEEE , vol. 31, no. 2, pp. 70, Mar 2014.

[5] M. M. Hassan, B. Song, and E.-N.Huh, –A framework of sensor-cloud integration opportunities and challenges,‖ in Proceedings of the 3rd International Conference on Ubiquitous Information Management and Communication, ser. ICUIMC '09. New York, NY, USA: ACM, 2009, pp. 618–. [Online]. Available:

Fig. 3 Displaying size of packets

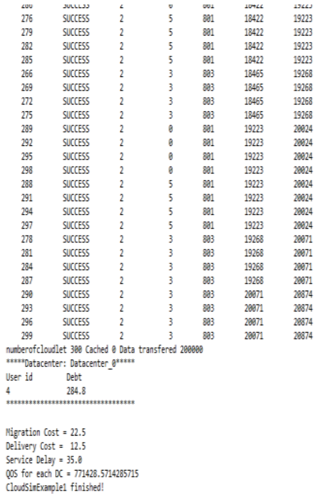


Fig. 5 Displaying Calculated values

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[6] S. Misra, S. Chatterjee, and M. S. Obaidat, –On theoretical modeling of sensor-cloud: A paradigm shift from wireless sensor network,‖ IEEE Systems Journal (Accepted) , 2014.

[7] S. Chatterjee and S. Misra, –Target tracking using sensor-cloud: Sensor- target mapping in presence of overlapping coverage,‖ IEEE Communications Letters , vol. PP, no. 99, pp. 1±, 2014.

[8] F. Larumbe and B. Sanso, –A tabu search algorithm for the location of data centers and software components in green cloud computing networks,‖ IEEE Transactions on Cloud Computing , vol. 1, no. 1, pp. 22• , Jan 2013.

[9] A. Beloglazov and R. Buyya, –Managing overloaded hosts for dynamic consolidation of virtual machines in cloud data centers under quality of service constraints,‖ IEEE Transactions on Parallel and Distributed Systems , vol. 24, no. 7, pp. 1366_, July 2013.

[10] S. Misra, A. Singh, S. Chatterjee, and M. Obaidat, –Mils-cloud: A sensor-cloud-based architecture for the integration of military tri-services operations and decision making,‖ IEEE Systems Journal , vol. PP, no. 99, pp. 1¹, 2014.

[11] R. C. Ben-Yashar and S. I. Nitzan, –The optimal decision rule for fixed-size committees in dichotomous choice situations: The general result,‖ International Economic Review , vol. 38, no. 1, pp. pp. 175†, 1997. [Online]. Available: http://www.jstor.org/stable/2527413