

INTEGRATION OF WIRELESS SENSOR NETWORKS WITH CLOUD : A SURVEY

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ABSTRACT

In the present technologies, both sensor networks and cloud computing plays a vital role. By combining these two technologies, definitely it will help in easy management in storing data. There are some constraints in wireless sensor networks like resource constraints, network lifetime, and energy constraints. These issues can be overcome by integrating sensors with cloud. This paper reveals some of the issues of sensor and how the integration can be applied to certain applications.

I. INTRODUCTION

Cloud computing is defined as an “A technology for enabling convenient, on demand network access to a shared pool of computing resource” [1]. In the recent survey done by the IDG enterprises, it is stated that 70% of the organizations have already moved to at least one application or a portion of their infrastructure to cloud [2].

The cloud computing services is based on “Pay-per-Use”. There are three basic services available namely Software-as-a-Service (SaaS), Platform – as-a-Service (PaaS) and Infrastructure-as-a-Service (IaaS). There are three forms of cloud computing namely public, private and hybrid. A public cloud is

implemented using a shared data center infrastructure which can be shared by multiple organizations. A private cloud is one in which the services and infrastructure are maintained in a private network. Only the authorized persons can access the data. A hybrid cloud is a combination of public and private with many providers.

A wireless sensor network with a large number of tiny sensor nodes can be used as an effective way for gathering data in various environments. A mobile wireless sensor network consists of tiny sensor nodes which has three basic components: a sensing subsystem for data acquisition from the physical surrounding environment, a subsystem for local data processing and storing a wireless transmission subsystem for data transmission. Furthermore, a battery is critical for a sensor node [11].

This paper reveals a discussion on integrating wireless sensor networks with the cloud computing. The objective of this framework is to facilitate the data from WSN to the cloud computing field so that the data can be fully utilized.

II. LITERATURE REVIEW

Recently many research works are carried on in combining cloud and sensors for many applications. In fact, many of them have highlighted the advantages of using cloud with sensor to extend the limited resources of sensors. Janani Devevi et.al. [3] proposed

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a method of framework for integrating WSN and cloud for patient monitoring system. According to their approach, the patient monitoring details can be stored in the public cloud. So that it can be enabled by anyone.

The CSIRO ICT centre [4] has deployed sensor nodes in the Springbrook rainforest to measure the growing conditions. These sensors monitor air temperature, rainfall, moisture, fog density. All these data measures are available through the cloud.

Sukanya et.al. [5] have proposed a data processing framework, which aimed to transmit desired data to the mobile users in a very fast and secured manner. According to their framework the data collected from the sensor nodes are first send to the cloud for processing and storage. Later the cloud sends those data to the mobile end users whenever it is requested. The cloud gateway processes the sensed data not only by encryption and decryption process but also compression of data is also performed.

Pereira.et.al[6] has developed a platform on MCC where Mülle sensors can interact with mobile device which can access to the cloud through Internet. Soliman et.al [7] proposed a software solution to Smart Home by integrating IoT with the cloud computing.

Fan et.al [8] proposed a sensor data solutions based on Hadoop cloud computing framework. Sajjade. et.al [9] proposed a new framework of integrating sensors with cloud which provides reliability, availability and extensibility of data storage. Wei

Wang et.al [10] explains the strengthening of storage and processing for WSN with cloud.

Rao.et.al[14] have described how IoT and cloud computing overcome the big data issues.

III. PROPOSED FRAMEWORK

In the present stage, most of the companies continue their migration of both applications and computing infrastructure with the combination of sensors and cloud. This integration not only benefits the organization but it is also useful to the environment. As sensor networks works with the help of battery, with limited storage it is still an issue in the researcher's field. This can be withdrawn with the integration of sensor with cloud.

Sensor-Cloud can be used in many real-life applications like environmental monitoring, disaster monitoring, telemetric, agriculture, irrigation, healthcare, and many more areas. By integrating sensors with cloud will enable huge volume of data can be shared by different groups of people. Data collected from the sensors should be aggregated, managed and stored. Each sensed data has to be monitored and send to the local database. Instead, it can be directly send to the cloud which can be used from anywhere. The cloud storage is very elastic. The memory is the cloud is unlimited where the sensor data can be stored without any loss. By implementing this method, the data can be accessed by anyone from any part of the world through a proper connection.

Since cloud providers give proper security firewalls, only authorized person can access their account, the data can be more secured. As cloud provides free data storage, the organizations can utilize it. Sensor-Cloud provides agile services and the users can provision the expensive technological infrastructure resources with less cost [12].

The integration of wireless sensor networks with cloud allows the high-speed processing of data using immense processing capability of cloud. To improve the energy efficiency and memory usage in a Sensor-Cloud infrastructure, there should be a middleware which can tackle the adverse situation in case of continuous and long-duration monitoring of data. This can be done through the gateway that is acting as a middleware and collects the huge sensor data from sensor nodes [13].

As there are numerous networks to deal with this integration, a proper and efficient scheme has to be developed. However, integrating the existing sensors with cloud will enable an open, extensible, scalable, interoperable, and easy to use, adaptable network of sensors for numerous applications.

IV. CONCLUSION

In this paper, the opportunities for adopting the technology to handle more complex situations of real world applications through the Sensor-Cloud infrastructure have been discussed. However there are still some issues like monitoring, security which are to be solved.

REFERENCES

- [1]. Rohit Bhadaurai, Sugata Sanyal, "Survey on Security Issues in Cloud Computing and Associated Mitigation Techniques", International Journal of Computer Applications 47(18):47-66, June 2012.
- [2]. 2016 IDG Enterprise Cloud Computing Survey, 2016.
- [3]. S.Janani Devi, G.S. Sreetha Devi, G.M. Tamilselvan, "Wireless Sensor Network integrating with cloud computing for patient monitoring", International Journal of Engineering Sciences & Emerging Technologies, Volume 6, Issue 3, pp: 316-323, Dec. 2013.
- [4]. <http://www.csiro.au/science/sensors-and-networks-technologies.html>
- [5]. Sukanya. C.M., Priya. K.V, Vince Paul, Sonnkara Narayanan. P.N, "Integration of Wireless Sensor Networks and Mobile Cloud – A survey", International Journal of Computer Science and Information Technologies, Vol. 6 (1), 159-163, 2015.
- [6]. Pereira, Jens Eliasson, Rumen Kyusakov, Mia Johannsson. "Enabling Cloud Connectivity for Mobile Internet of Things Applications", IEEE Seventh International Symposium on Service-Oriented System Engineering, pp.518-526, 2013.
- [7]. Moataz Soliman, Tobi Abidun, Tarek Hamouda, Jiehan Zhou, Chung-Horn Lung, "Smart-Home: Integrating Internet of

Things with Web Services and Cloud Computing", IEEE International Conference on Cloud Computing Technology & Science, pp.317-320, 2013.

- [8]. Tonggrang Fan, Xuang Zhang, Feng Gao, "Cloud Storage Solution for WSN Based on Internet Innovation Union", International Journal of Database Theory & Applications, Vol.6(3), pp.49-58, 2013.
- [9]. Sajjad Hussain Shah, FazleKabeer Khan, Wajhid Ali, Jamshed Khan, "A New Framework to integrate Wireless Sensor Networks with Cloud Computing" IEEE Aerospace Conference, pp.1-6, 2013.
- [10]. Wei Wang, Kevin Lee, David Murray, "Integrating Sensors with the cloud using dynamic proxies", IEEE 23rd International Symposium on Personal Indoors and Mobile Radio Communications", pp.1466-1471, 2012.
- [11]. S.Manju Priya, Dr. S. Karthikeyan, An Efficient Clustered Multipath Routing to improve lifespan in WSN, International Journal of Computer Science Issues, Vol. 9, Issue 2, No 2, March 2012.
- [12]. Doukas C., Maglogiannis I, "Managing wearable sensor data through cloud computing", Proceedings of the IEEE 3rd International Conference on Cloud Computing, 2011.
- [13]. Kumar L. P. D., Grace S. S., Krishnan A., Manikandan V. M., Chinraj R., Sumalatha M. R., "Data filtering in wireless sensor

networks using neural networks for storage in cloud", Proceedings of the IEEE International Conference on Recent Trends in Information Technology, 2012.

- [14]. B. B. P. Rao, P. Saluja, N. Sharma, A. Mittal, S. V. Sharma, "Cloud computing for internet of things and sensing based applications", 6th International Conference on Sensing Technology, 18-20 Dec 2012.

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