On-Demand Cloud Based Scheduling for Location Based Services

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Abstract-*In traditional wireless sensor network the sensor are deployed in the interested environment for the collection of data to application or user. The data which is gathered from the environment is based on sensor wakeup intervals i.e. the sensor are aimed to collect data periodically. The sink node is used to share the data to higher level The problem faced by the existing is that user gets data without his interest/request and received data may be redundant in nature because of periodic collection of data by sensors. In this paper the CloudIoT potentials are utilized to provide the sensing service to user based on scheduling scheme. Where user will get data based on his interest and when request is made. So this scheme helps the user to stop the redundant data being collected by him and as well it also prevents from waste data storage in cloud. It also helps to save the constraints resources of sensors such as energy. The developed system overcomes the limitation present in traditional system.*

Keywords-IoT; cloudIot; Sensing service; Cloud computing; WSN; On-deman data;

I. INTRODUCTION

The cloud has become an integral part of the IT industry to provide most of the services to its end users and carry out large operation which it allows the user and organization to access the available computing resources from anywhere over the Internet. Cloud computing with huge size of virtualized computing resources, distributed in nature are available for user. The services till now available in this computing are Infrastructure as a service (IaaS), Platform as a service (PaaS) and Software as a Service (SaaS). The advantages provided by the cloud are used by Internet of Things (IoT) to even more provide the powerful services to the IoT users. The IoT are nothing but the things connected to Internet, these things are smart in nature and includes objects like actuators and sensors capable of collecting and processing the data sending it to desired target such as cloud and sink node, a node in wireless sensor network (WSN).

International Telecommunication Unit (ITU) states IoT as "from anytime, anyplace connectivity for anyone, we will now have connectivity for anything" [1]. IoT is becoming an important part of smart life and used in application like traffic monitoring, smart cities and homes, surveillance etc. and controlled through cloud from anywhere i.e. remotely [2]. The IoT object consist of a limited and small amount of resources like storage, processing power and battery to save these resources from exhaustion the IoT and cloud is converged to get a new domain called as CloudIoT. CloudIoT combines the advantages of the two dominant technologies i.e. cloud and IoT to offer excellent services to users. Cloud overcomes the computing limitations lack by the IoT using its ubiquities computing and IoT provides the collected data to cloud from deployed environment.

CloudIoT provides several new models such as Ethernet as a service (EaaS), Sensing as as service (SaaS), Data as as service (DaaS) etc.[3].We make use of sensing as as service model. CloudIoT is categorized into three levels 1) Hardware level: This is a level 0, where data collection is carried out using sensor and smart object as well as it includes other purpose hardware like actuators. 2) Middleware level: It acts as an intermediate between the hardware and application used to interact and carry out computing on a collected data. 3) Application: Used by user for communication with other two layers [4]. This encouraged us to study the CloudIoT model more certainly retaining its powerful features to provide a scheme that will additionally enhance the model and provide the data to user on demand.

This paper is organized in the following manner: Literature survey is detailed in section-II, proposed system is depicted in section-III and conclusion is presented at the end in section-IV.

II. LITERATURE SURVEY

Maria Fazio et el [5] in their paper deals with two models for providing sensing service to user. They are data centric model and device centric model. The data centric model focuses on reporting of data to user from Monitoring Infrastructure (MI). In this the purpose of data is unknown to MI. The Device centric model gives the ability to directly interact with MI for its customization based on user requirement through virtual infrastructure. The deployed

architecture called as Cloud4sens make use of both the models for the provisioning of data as a service. They uses this model for the integration of several heterogeneous MI and provision of data using different communication technologies from different geographical location and MI types. The cloud4sens uses SWE abstraction for interaction with heterogeneous MI. The purpose of using SAL is to provide a layer, to show connected system in an abstract manner and to format data in standard method using SWE.

This paper presents two strategies for managing sensing resources in the cloud and providing them as a service. The first strategy follows the data-centric model, where the cloud offers environmental data to its clients as a service, without any knowledge of how data are measured and processed. In our proposed model we provide service based on location of the registered user and the registered user will get data from cloud and all the processing will be done at cloud. The cloud which uses the IoT to the get the required services such as sensing as a service (SaaS) from Wireless Sensor Network (WSN) uses Data-centric model.

Igor L. Santos et el [6] The cloud acts as an intermediate layer between smart things and applications. Such an intermediate layer hides the complexity of smart things necessary to implement applications. The IoT can benefit from the cloud's virtually unlimited resources to implement service management and composition for utilizing smart things and the data they produce, whereas the cloud can benefit from the IoT by extending its scope to deal with real-world objects (smart things) in a distributed and dynamic way. CoS is composed of virtual nodes built on top of physical WSAN nodes and provides support to several applications that might in turn require access to functionalities at the infrastructure-as-a-service (IaaS), platform-as-a-service (PaaS), and software as-a-service (SaaS) levels. Application owners can automatically and dynamically provision such virtual nodes on the basis of application requirements.

From this paper we make best use of cloud and WSAN environments. We extract the CoS feature, it's a combination of cloud computing and IoT. Where cloud acts as intermediate layer between smart things and apps. IoT can benefit from clouds virtually unlimited resources, whereas cloud can benefit from the IoT by extending its scope to deal with real-world objects and also to meet requirements of app in resource constrained nature and to prolong their lifespan.

In our proposed model we use cloud as intermediate layer for storing the data and scheduling, which is an efficient technique compared to other approaches. We use sensors that work based on demand of the registered user which increases the lifespan of sensor and efficiency of sensor.

Jiang Rui et el [7] The Internet and wireless communication technologies, which is developed of the object to object network. The Internet of things will go deep into all aspects of physical world, further strengthen the social informatization, it greatly influences and improves people's life style, improves the work efficiency. Therefore, the emergence of the Internet of things has caused the global communications industry and governments attention, showing a booming trend. As an emerging industry, the Internet of things huge development potential and attractive prospects for development will promote the prosperity of the global information industry development, bring new sources of growth in all walks of life.

The technology of Internet of things and cloud computing is introduced, from the concept and definition, characteristics, system architecture and key technology in detail, focusing on Internet of things industry chain and business models related to operators, and some reasonable suggestions are given. Cloud computing has high speed Internet connection and the advantages of the almost unlimited storage and computing power Cloud computing integrates multiple computer entity to become a powerful computing system through the use of grid computing technology and the super computing power is assigned to the end user through the relevant technology. The biggest advantage of cloud computing is like super computer parallel processing for the application and the cost is very low. In our proposed model we use cloud as an intermediate layer which is used for storage and to process the data. This paper describes the basic ideas and methods of the combination of cloud computing and the Internet of things. Our model uses cloud computing with the integration of IoT.

The Internet of things technology aims to build a set of networks in which each object is connected. In the Internet of things, all mechanical equipment has the storage and computing power. It improves the convenience greatly and meets the needs that people cannot imagine before. Cloud computing technology combines parallel computing, distributed computing and grid computing. The developing of the Internet of things depends on high efficient storage and computing power, which is the advantage of cloud computing technology.

After doing literature survey, several limitation are found they are:

- Sensor has to wakeup based on given wakeup interval.
- Network traffic is increased.

- Data on storage system (cloud) is redundant.
- No scheduling is available for sensors.
- User may collect data when he is not interested.
- Exhaust of sensors limited/fixed resources.
- Not efficient in managing energy and quality of service.

III. PROPOSED MODEL

Proposed model consists of four models a) Sensor b) IoT c) Cloud d) Application and e) User. Today the use of sensor has increased dramatically for collecting data. This are low cost hardware device available for doing several purpose work. The sensors are used for the collection of data, it is a source of data to the application and user. Usually the sensor are installed in the region from which the data is required such as temperature, pressure required from region. The sensors are small in size for this purpose they come with small amount of resources like battery and processing power, to save these resources the task of processing are transferred to cloud. Here the methane and distance calculating sensor are used.

The IoT in this paper consist of an Arduino board and Wi-Fi module. They are used to transfer the communication request from cloud to sensor and sensor to cloud. It also collects the data from sensors and upload the data to cloud.

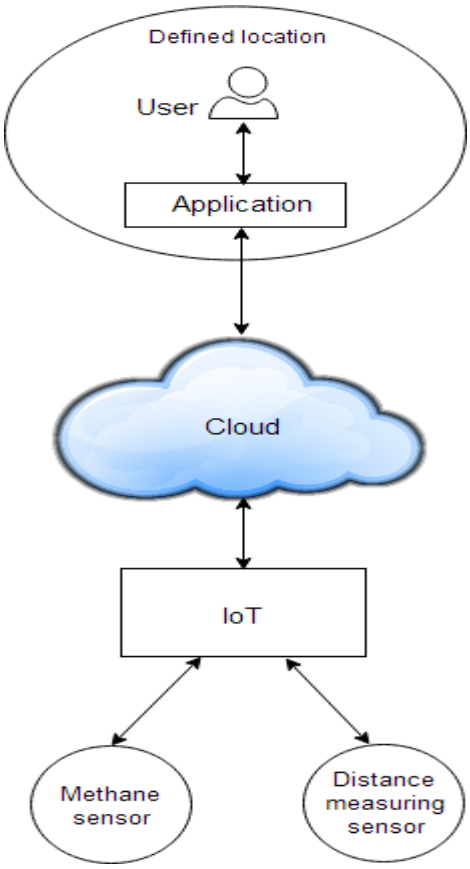

Fig. 1. Block diagram of proposed system.

The cloud plays an important role in this paper as it used to schedule the request and send to sensors. It also is used to store the data after the data is sent by sensors. This act as central of this paper keeps user location, sends data to user if user comes in prescribes location.

Application servers an interaction medium for user. The application is an android application which can be installed on the android phone with data to connect to cloud. The user transmit it request to the cloud which schedules for data.

User is a human being who interact for data which he required from region of interest. The user has the following role to do, to get register with cloud for accessing data and sending request for data, to send notification when data is required and it takes an appropriate based on the collected data from cloud.

Working of the model: Firstly, a region of interest is defined for the user, in this harversine formula is used to find the location of the user. The formula is as given below.

$$a = \sin^2(\Delta\varphi / 2) + \cos\varphi 1 \times \cos\varphi 2 \times \sin^2(\Delta\lambda / 2)$$

$$c = 2 \times a \tan 2(\sqrt{a} \times \sqrt{(1-a)})$$

$$d = R \times c$$

Where 'φ' is latitude, 'λ' is longitude, 'R' is earth's radius (mean radius = 6,371km), 'c' is angular distance, 'd' is distance between two points.

When a user enter into that location it will send a notification to cloud about its presence within the location. Before it can send any notification to cloud it has to get registered with the cloud using his application. Once the user is get registered he is allowed to send notifications. As soon as the user sends its location to cloud, the cloud send a schedule request to IoT part which forwards the schedule request to sensors. Now the sensors are activated and allowed to sense the data. Once the sensors sensed the data the data sent back to IoT to process the data and convert it into required form for sending it to cloud. Such as converting analog value to a digital value because now most of the devices comes with digital processing capabilities. The IoT again forward process data to cloud. The cloud stores the data and check credentials of user. Till that the user updates its location so that the cloud can know the exact location and then cloud verifies the updated data to confirm its presence within location then at the end it sends the data to the user through android application.

This paper make use of the available features of cloud and IoT or new domain called as CloudIoT to give the

additional features by providing on-demand cloud based scheduling.

Some of the advantages gained after implementing this paper are as follows

- User gets on-demand data or when requested.
- Sensors are free from wasting resources for unnecessary wakeup and sensing service.
- Money and time is saved from "pay as use" policy by reducing redundant data.
- Network traffic is reduced because of scheduling process.
- User can choose region based on his interest of region.
- Parameter/policy can be defined for providing sensing data.

IV. CONCLUSION

This paper achieves a goal of providing on-demand sensing service. The main objective of the project is to provide on-demand sensing service where sensors work only when needed, sensing data is gathered on demand based on application interest which reduces redundancy. One of the major drawbacks of existing system is that sensors report sensing data periodically without knowledge about demand of users, so a high volume of data may be redundant, wastage of storage and energy.

The proposed system exploits cloud's capability to trigger sensing in sensor nodes on demand thus increasing the performance of sensors. The proposed system offers three main benefits: sensors are made to work when needed, sensing data is collected on demand to reduce redundancy. Sensing service quality that is latency, sensing interval can be set based on requirements or payments of application user.

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