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"A STUDY ON MERGING CLOUD WITH INTERNET OF THINGS" : FUTURE AND CHALLENGES

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Abstract

Cloud computing and Internet on Things (IOT) both are two different and pervasive paradigm that is growing by day by day, making them as important component of future internet. In this paper we focus attention on merging of cloud with IOT which we can say CloudIoT paradigm. Every device of our daily use needs to implement IoT. Now a days we can connect our smartphones, laptops, PC's with the internet. An enterprise which has many branches located at different places all over world also shares data over the internet. This is possible with cloud computing. Cloud provides the service over a network by delivering computing power. There are lots of issues in implementation of both Cloud computing and Internet of Things. So this can be resolved by merging both technologies together. This paper provides an overview of merging cloud with Internet of Things for enterprise data center to maintain the quality, security and performance.

Keywords*: Cloud Computing, IOT, Challenges*

1. INTRODUCTION

IoT is a network of physical devices embedded with sensor, actuators etc. to communicate with other devices and environment without human interventions. With the use of this people can connect anytime and anywhere as per their necessity.

IoE(Internet of Everything) built around the global interconnection of people, process and context. The massive development tends to rise in threats. As people rely more on this new connectivity so security, reliability and resilience of data becomes more critical. Additionally some middleware for scalability, security and semantic representation should also be provided to integrate data all over the world.

On the other hand cloud computing has become ideal way to deliver enterprise applications and preferred solutions for the companies by extending their infrastructure or launching new innovations. The most commonly used commercial provider data center is "Public Cloud" model. Its resources and functionality should be available to customer as per their demand.

Cloud computing provides 3 types of services :

a. Iaas(Infrastructure as a Service): Provides services pay as you go such as data storage, networking, virtualization, and capacity.

b. Paas(Platform as a Service): It is a platform on which hardware and software tools are available.

c. SaaS(Software as a Service): It is software provided by third party over internet.

Once any organization is connected to the cloud will get the above services from any location.

The merger of Cloud with IoT is a cost-effective way to do a business.

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2. IoT ARCHITECTURE

An IoT platform has basically four building blocks:

a. Sensors and Actuators

b. Gateways & Data Acquisition System

c. Edge IT

d. Network and Cloud

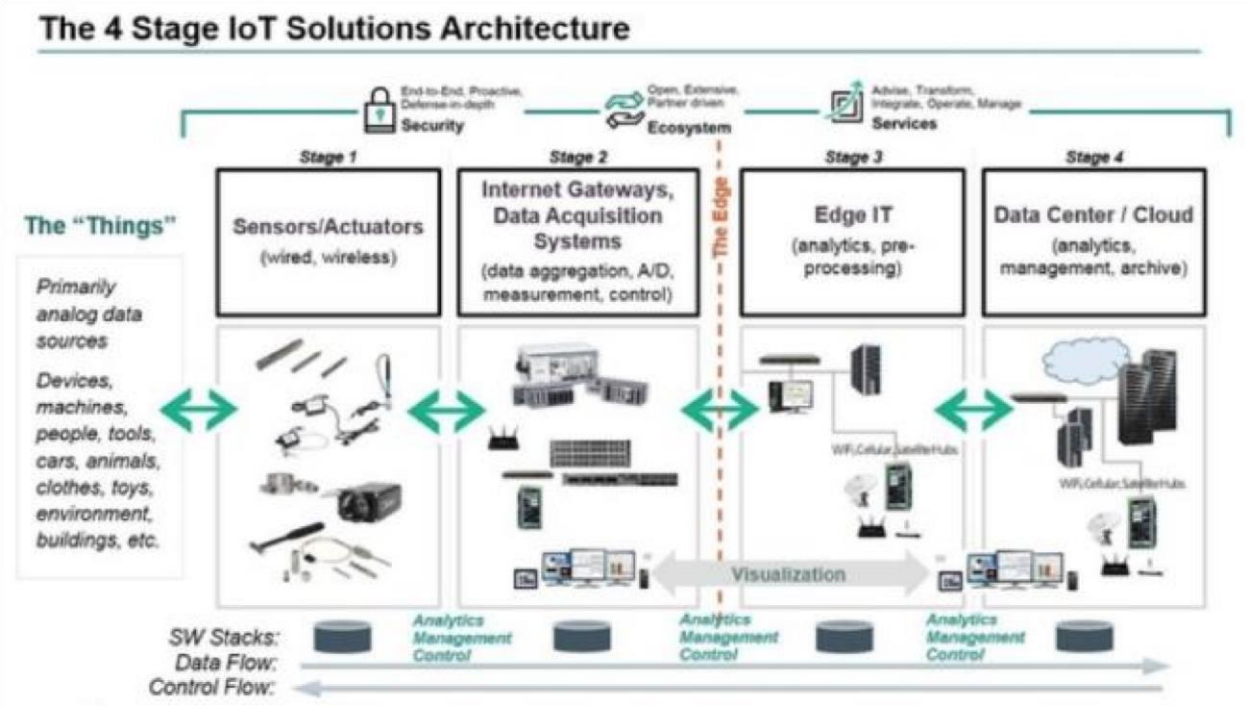

Figure 1. The 4 stage IoT Architecture

a. Wireless Sensors and Actuators

Sensor converts the information obtained from outside world into the data. While actuators are able to interpose the physical reality. For example they can adjust the room temperature.

b. Gateways & Data Acquisition System

The data comes from sensor is in the analog form which needs to converted into digital form for further processing. Data acquisition performs this conversion. c. Edge IT

Once the data has been digitized, edge It system enhanced analytics and pre-processing on data.

d. Network and Cloud

Data that need more depth in processing gets forwarded into cloud center. after meeting all requirements data sent back to the physical world.

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3. ROLE OF IoT IN CLOUD COMPUTING

IoT and Cloud both are complement to each other. Both together works to increase the efficiency and speed of tasks. IoT provides you a transfer of data without human intervention while cloud stores the data make available over the network.
Different IoT companies access data from Cloud as a Big Data. Following table shows a relationship between cloud computing and Internet of Things.

Table 1. Relationship between Cloud computing and IoT

	Internet of Things	Cloud Computing
Displacement	Pervasive (things placed everywhere)	Ubiquitous (resources are usable from everywhere)
Components	Real word things	Virtual resources
Computational	Limited computational capacities	Virtually unlimited computational capacities
Storage	No storage or limited storage capacities	Virtually unlimited storage capacities
Role of the internet	Internet as a point of convergence	Internet for service delivery
Big Data	Big Data source	Means to manage Big Data

4. CHALLENGES BY INTEGRATING IoT AND CLOUD TOGETHER

a. Storage of Data

The public cloud is suitable for IoT because of its availability and scalability. IoT uses real-time data which is temporary and no long term retention. The data can be keep to make decision and afterwards delete it. It saves the space and cost.

b. Managing a large amount of data

When millions of devices are interconnected through the IoT with cloud then managing a large amount of data can be vast. Hence performance of the system is at stake. c. Security of data

Cloud based IoT provides transport of data from real world to the Cloud. As IoT uses a data for communication so there should be security provided by the enterprises to avoid IoT vulnerabilities. Security can be provided by including a authorization and authentication to user, by applying encryption on data, and by configuring each IoT device.

d. Network

All devices of IoT are connected through a network. So to move a data around a network internet connection must be provided with high bandwidth. Alternatively direct connection services also needs to look from cloud providers such as AWS Direct connect and Microsoft Azure ExpressRoute to establish a link between user location and cloud service providers.

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5. APPLICATIONS OF MERGING IoT WITH CLOUD

IoT with Cloud are used in numerous fields as shown below.

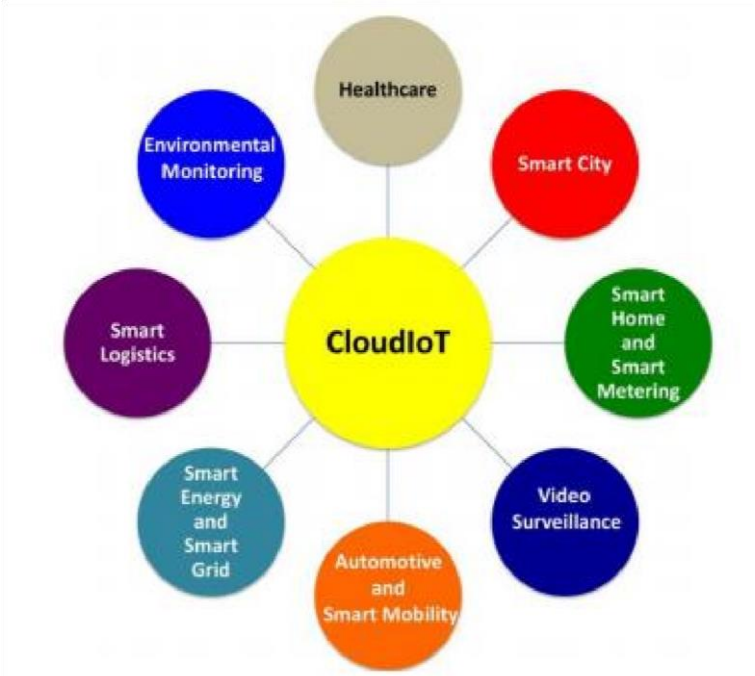

Figure 2. Applications of Merging CloudIoT

a. Healthcare System

In healthcare IoT can be used to monitor patients' blood pressure, sugar etc. also generate an alert to notify a doctor so doctor can take a immediate decision to improve patients' health.

b. Smart Home Automation

It facilitates the smart home appliances which operate differently on presence and absence of person. Like Switching system, smart lock, smart washing machines, smoke or fire detector etc.

c. Smart City

A smart traffic controller, it has installed a decibel meters at certain select but heavy traffic signals to control the honker. Smart parking system to locate free parking space with the help of GPS.

d. Smart Logistics

All logistics vehicles are connected to the integrated network and monitoring system. It uses vehicle mounted terminal to upload data to the IoT.

e. Smart Grid

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This is real time system for power transmission which implement real time monitoring and early warning of disaster for minimizing the damage caused by natural disaster.

6. Conclusion

The Cloud based IoT comes to assistance by improved performance, storage capacities, processing capabilities and also reduce the cost of business. This paper has been discussed the concept of Cloud computing, Internet of Things, its architecture and applications. It also reviewed the challenges of IoT with Cloud.

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