International Journal of Engineering & Technology, 7 (2.33) (2018) 683-684

International Journal of Engineering & Technology

Website: www.sciencepubco.com/index.php/IJET

Research paper

A review on the integration of cloud computing and internet of things

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Abstract

Internet of Things (IoT) is a technology of interest, becoming so invasive which generate huge amount of data and hence it is significant to integrate with Cloud computing, a delivery model provisioned with virtual resources and storage capacity. This IoT and Cloud computing integration referred as 'Cloud of Things' bears key issues and the one is Security which hampers growth of it. This paper highlights those key issues and smart applications of Cloud of Things.

Keywords: *Cloud Computing; Internet of Things; Cloud of Things; Security; Smart Application*

1. Introduction

Internet of Things (IoT) and Cloud Computing play a crucial role in recent days, need to be integrated since IoT it is a ability of network devices to sense and collect data but with limited storage ,resources and processing power .In contrast, Cloud have virtual unlimited storage and capabilities[1]. Though IoT and Cloud Computing are two independent technologies, homogenizing these brought revival in several fields to support applications such as smart home, smart health, smart city, video surveillance, smart grid, etc.,

2. Internet of things

In IoT, 'things' refers to any communicating objects over the Internet, deployed through technologies [6]: Radio Frequency Identification (RFID) tags for automatically capture data, Wireless sensor networks which are sensor devices for tracking things. The architecture of IoT considered as five layers as shown in fig 1: Perception, Network, Application, Middleware and Business layers [7].

Perception layer: The lowest layer Perception is to perceive or collect useful information or data from environment and digitize it.

Network layer: The Network layer represents an object abstraction layer that collects the perceived data and sends to the Internet.

Middleware layer: Middleware layer receives data from Network layer, which manages, and stores and process data.

Application layer: Application layer receives data from the Middleware layer and presents the information specific to the applications thus provides the customers with smart high-quality facilities.

Business layer: Business layer maintains the whole IoT system.

3. Cloud computing

Cloud provides is an emerging internet-based computing technology that uses Internet and central servers to maintain data and applications. It is a cheaper solution of keeping large storage, sharing huge data and computing resources.

The architecture of Cloud is built on the four layers:

- Datacenter
- Infrastructure
- Platform
- Application.

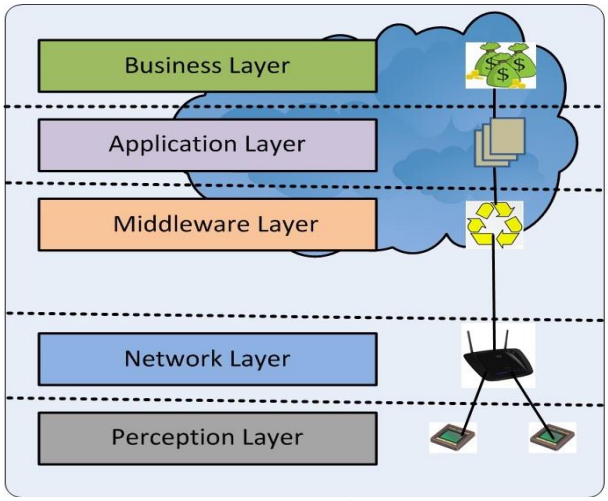


Fig.1: Layers of IOT.

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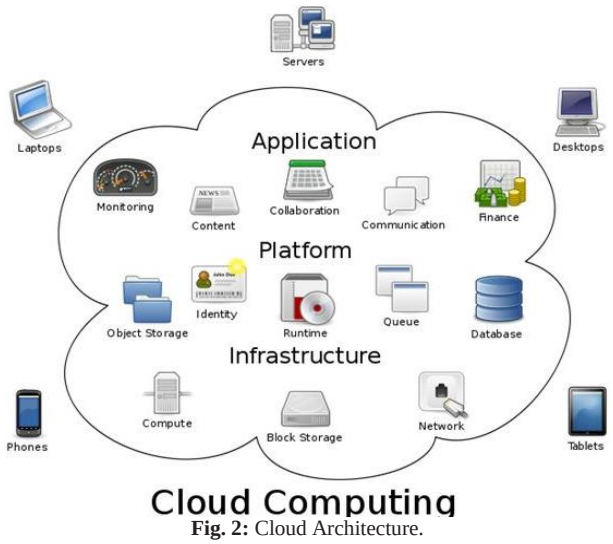


Fig. 2: Cloud Architecture.

The three different services is shown in figure2 are provided by Cloud are:

Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS) [3].

In SaaS, complete application is offered to the customers as service. PaaS refers to services that provide on-demand platform for developing, testing and delivering software applications and IaaS service offers processing, storage, and network resources, allowing the consumer to control the operating system, storage and applications.

Different types of Clouds have been identified as

1) Private Cloud is owned, operated by single organization and computing resources are deployed for that organization.
2) Community Cloud provisioned for limited access to specific community of consumers that have resources shared.
3) Public Cloud applications, storage, data are available and accessible to the general public.
4) Internet Of Things

IoT enlarges the opportunities of Cloud service and thus cloud provides reality of IoT vision [9], and gave birth to variety of use-cases that impact our everyday life.

Smart health [5]: Cloud of Things plays an effective way and a place of comfort for patients providing ever-present medical services such as patient monitoring, diagnosis, etc., This prospecting healthcare applications generate a huge amount of sensitive data that needs a sensitive processing.

Smart home: Cloud IoT has a great impact in smart home environments, which enables automation, remote monitoring, management of appliances and systems for creating a comfortable home and effective life style.

Smart cities: Cloud IoT leads to the generation of services that interact with the environment for wise management of natural resources and high quality life, and aimed to offer new generation services for geo-awareness like smart parking, smart waste management, river monitoring so on.,

Smart energy and Smart grid: As energy conservation and management is increasingly important, Cloud of Things emerged that provide intelligent management of energy distribution and consumption. Especially smart grid innovation will enable business growth rewarding customers with new products.

Video surveillance: Video surveillance technologies together with Cloud IoT leads ease and efficiently store, manage, and process video contents originating from video sensors and to automatically extract knowledge for several security related applications and thus used for crime detection, traffic management.

4. Issues in cloud of things

Several issues involved while integrating Cloud and Internet of things as sensitive data collected by smart devices and stored in cloud [4].

- Standardization. Poor standards of Cloud IoT is considered as a big issue towards its big leap. As different things are going to be connected some web interfaces or mapping of protocols to be done in the gateway.
- Data storage. Location of time sensitive is another issue that matters. It should be stored closest to the location of user so that it is accessed with minimum time.
- Power and energy competence. Cloud of things involves several data transmission from several things to the Cloud, which consumes more power.
- Security and privacy. When IOT smart devices share data with other devices and stores data in cloud some security issues like data leakage, modification, integrity and unauthorized access arises [2] [10].

5. Conclusion

This paper focuses on the key issues and applications possible in the integration of IoT with Cloud computing, but still this adoption issues are considered as challenges as Cloud IoT paradigm plays a vital role in the Future Internet.

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