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Cloud Computing for Internet of Things & Sensing Based Attributions

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ABSTRACT:

Cloud Computing has been adapted by various sectors due to its diversified benefits in terms of applications, services. The Internet of Things (IoT) is becoming the next Internet-related revolution. It allows billions of devices to be connected and communicate with each other to share information that improves the quality of our daily lives. The integration of Cloud Computing with the IoT is the most effective way on which to overcome these issues. This paper provides an overview of the integration of the Cloud into the IoT by highlighting the integration benefits and implementation challenges. Internet of Things (IoT) is a concept that envisions all objects around us as part of internet. IoT coverage is very wide and include variety of objects like smart phones, tablets, digital cameras sensors etc. Hence, cloud acts as a front end to access Internet of Things. Applications that interact with devices like sensors have special requirements of massive storage to storage big data, huge computation power to enable the real time processing of the data, and high speed network to stream audio or video. The Internet of Things (IoT) refers to uniquely identifiable objects (things) and their virtual representations like structure.

Keywords: Internet of Things (IoT), Cloud Computing, Smart Sensors

1. INTRODUCTION:

The Internet of Things (IoT) refers to uniquely identifiable objects (things) and their virtual representations in an Internet like structure. Internet of Things refer to everyday objects that are readable, recognizable, locatable, addressable, and/or controllable via the Internet using either RFID, wireless LAN, wide-area network, or other means. These objects includes not only the day to day usable electronic devices or the products of higher technological development such as vehicles and equipment, but also include things like food,

clothing, and shelter; materials, parts, and subassemblies; commodities and luxury items; landmarks, boundaries, and monuments; Ubiquitous computing refers to a new genre of computing in which the computer completely permeates the life of the user. The impact caused by the Internet of Things (IoT) to human life will be as huge as the internet has caused in the past decades, so the IoT is recognized. Secondly, an overcoming of the limitations of the mobile telephony infrastructure. And thirdly, an intelligence in the applications and services that make use of the vast amount of data created via the IoT Sensor networks and convert this data into useful information to enable real time decision making and scientific discoveries. However, to date, limited support has been provided for the development of integrated environmental monitoring and modelling applications Specifically, environmental dynamism makes it difficult to provide computational resources that are sufficient to deal with changing environmental conditions. This paper proposes that the Cloud Computing model is a good fit for IOT applications with the dynamic requirements of environmental monitoring and modelling. Cloud Computing has become one of the frontier research areas of this decade. The National Institute of Standards and Technology defines the cloud computing as, a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort or service provider interaction.

2. LITERATURE REVIEW

For the purpose of this paper we study and analyse previous literature which has been published in the field of cloud computing and Internet of Things, and their integration. The following paragraphs present the papers which contributed significantly study. To begin with, a survey of the different security risks that pose a threat to the cloud is presented in. Also, it was given a survey more specific to the different security issues. That has emanated due to the nature of the service delivery models of a cloud computing system. Moreover, an exploration of the roadblocks and solutions to provide a trustworthy cloud computing environment presented in. Cloud computing is an evolving paradigm with tremendous momentum, but its unique aspects exacerbate security and privacy challenges .Concerning the integration of Internet of Things and Cloud Computing, there have been made some

previous studies. A propose of a new platform for using cloud computing capacities for provision and support of ubiquitous connectivity and real-time applications and services for smart cities' needs is given in .Additionally, a presentation of a framework for data procured from highly distributed, heterogeneous, decentralized, real and virtual devices (sensors, actuators, smart devices) that can be automatically managed, analysed and controlled by distributed cloud-based services.

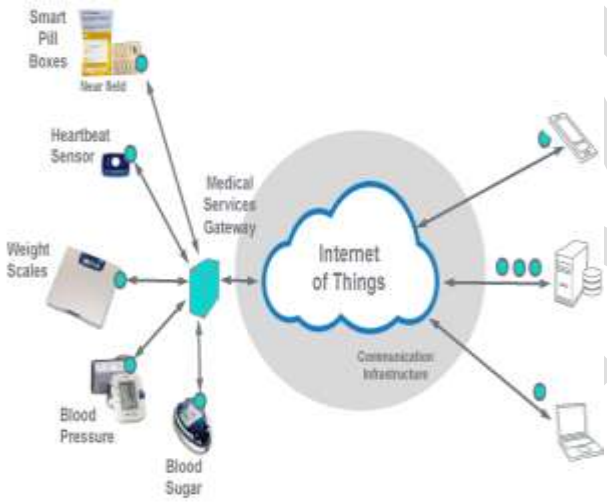

Fig. 1: Internet of Things

3. CLOUD ANTONYM

3.1 Cloud Computing

Cloud Computing enables a convenient, on demand and scalable networks access to a pool of configurable computing resources. Cloud Computing has virtually unlimited capabilities in terms of storage and processing power.

3.1.1Typically classified in the following four ways:

Public Cloud: In Public cloud the computing infrastructure is hosted by the cloud vendor. The customer has no visibility and control over where the computing infrastructure is hosted. The computing infrastructure is shared between any organizations.

Private Cloud: The computing infrastructure is dedicated to a particular organization and not shared with other organizations. Some experts consider that private clouds are not real examples of cloud computing. Private clouds are more expensive and more secure when compared to public clouds.

Hybrid Cloud: Organizations may host critical applications on private clouds and applications with relatively less security concerns on the public cloud. The usage of both private and public clouds together is called hybrid cloud.

Community Cloud: is type of cloud hosting in which the setup is mutually shared between many organizations that belong to particular community, i.e. banks and trading firms. It is multi-tenant setup that is shared among several organizations that belong to a specific group which has similar computing apprehensions.

3.1.2 Three Types of Cloud Computing

1. IaaS (Infrastructure-as-a-Service)
2. PaaS (Platform-as-a-Service)
3. SaaS (Software-as-a-Service)

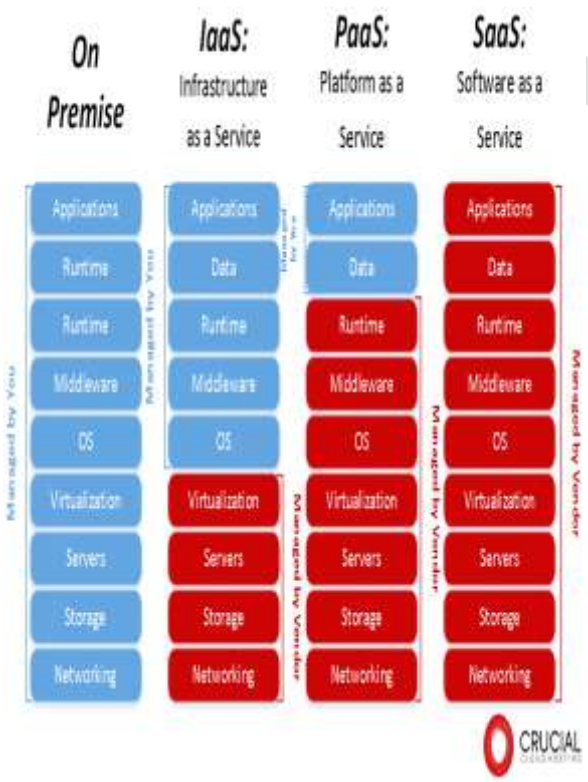

Fig. 2 Types of Cloud Computing

4. IoT Architecture:

IoT architecture varies from solution to solution, based on the type of solution which we intend to build. IoT as a technology majorly consists of four main components, over which an architecture is framed.

- Gateway, Sensors
- Devices, Cloud

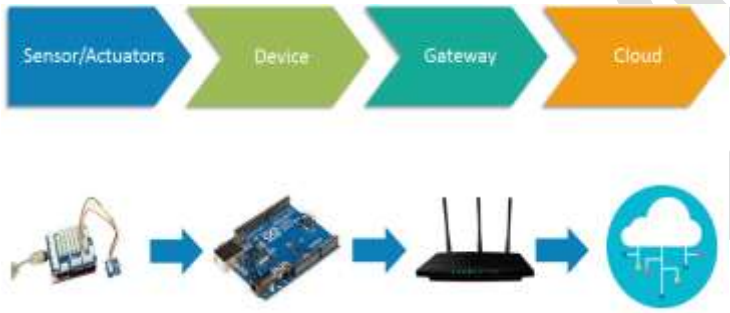

Fig 3: IoT Architecture

4.1 Basic Elements of IoT Architecture:

Our approach to IoT architecture is reflected in the IoT architecture diagram which shows the building blocks of an IoT system and how they are connected to collect, store and process data.

- Things....
- Gateways. ...
- Cloud gateway facilitates data compression and secure data transmission between field gateways and cloud IoT servers. ...
- Streaming data processor ensures effective transition of input data to a data lake and control applications. ...
- Data lake...
- Big data warehouse.

5. Designed Architecture for Sensor-Cloud Platforms:

Basic Architecture of the Cloud-Based Platform:

The basic architecture of the Cloud-based platform. The IoT nodes consist of various physical sensors capable of communicating with the Internet. The cloud extracts profile data from the sensors, thus representing them as virtual sensors via the web interface. The cloud also provides REST full APIs to offer functionalities such as discovering physical sensors and reading sensing data from them. Upstanding of virtual sensors and enable the end users to manipulate IoT devices associated with the platform in an intuitive way, thereby reducing the burden under the premise of performing some action. An intuitive way, thereby reducing the burden under the premise of performing some actions.

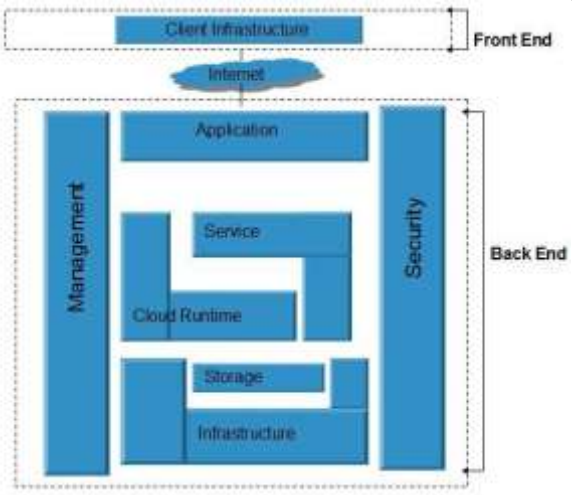

Fig. 4 Basic architecture of Cloud-based platform

5.1 Designed Sensor Cloud Application:

The detailed functional configuration of the cloud-based web application for preserving the profiles of physical sensors. This application is deployed on the Amazon Elastic Compute Cloud in the Amazon Web Servicescloud. The cloud plays a simple role in the proposed platform by providing a repository of profile information associated with the linked physical sensors through a more user-friendly way. The user authentication allows the system to verify the identity of all users accessing to the network resources. The resource manager hosts the resource descriptions of physical sensors and provides the functionalities to register, maintain, lookup and remove these descriptions.
The DB connector provides interfaces to connect to the database.

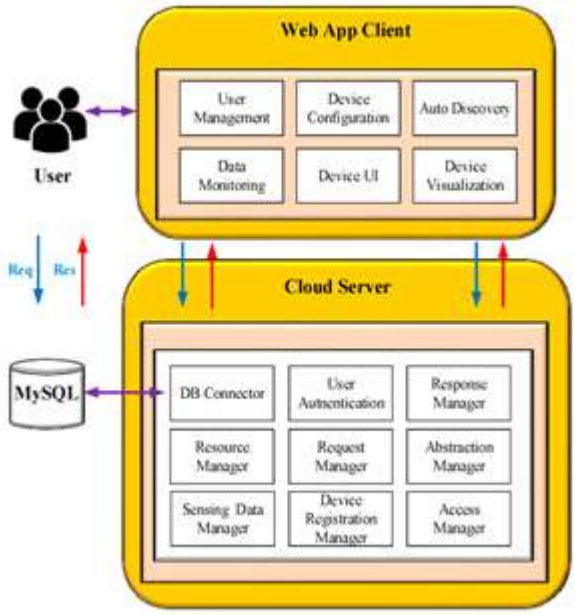

Fig. 5: Functional configuration of the cloud-based web application

5.1.1 Comparison between Cloud Computing and Internet of Things:

Cloud computing in simple terms means accessing data and programs from a centralised pool of compute resource that can be ordered and consumed on demand. Typically clouds deployments are described in 3 different models; Public, Private or Hybrid.

Private Cloud Services is a secure cloud that only the specified organisation can access. The additional security offered by a private cloud model is ideal for any organisation, including enterprise that needs to store and process private data or carry out sensitive tasks. For example, a private cloud service could be utilised by a financial company that is required by regulation to store sensitive data internally and who will still want to benefit from some of the advantages of cloud computing within their business infrastructure, such as on demand resource allocation.

Public Cloud Service is like a Private cloud although the main differentiator is that resources used to process and store data can be shared with other organisations, and data transferred over a public network such as the internet. Third party providers will deliver cloud services over the internet and are normally charged by CPU cycles, storage, or bandwidth that they require.

Hybrid Cloud is a cloud computing environment which uses a mix of on premise, private cloud and third party public cloud services. With the hybrid cloud model, IT decision makers have more control over both the private and public components than using a pre-packaged public cloud platform.

The internet of Things, meanwhile refers to the connection of devices other than the usual such as computers to the Internet. Cars, kitchen appliances and other sensors can be connected through the IoT. The IoT is an enabler for change. It enables systems and devices to be automated in a cost effective, intelligent manner supporting real-time control and monitoring. Having all the relevant information available (real time along with historical trend data) provides the ability to combine and process this data in an innovative manner resulting in more effective and efficient control or decision making.

5.1.2 Challenges in Cloud Computing to enable the IOT:

Security and Privacy

Security and privacy are the main challenge in cloud computing. These challenges can reduced by using security applications, encrypted file systems, data loss software.

Interoperability

The application on one platform should be able to incorporate services from the other platform. This is known as Interoperability. It is becoming possible through web services, but to develop such web services is complex.

Portability

The applications running on one cloud platform can be moved to new cloud platform and it should operate correctly without making any changes in design, coding. The portability is not possible, because each of the cloud providers uses different standard languages for their platform.

Service Quality

The Service-Level Agreements (SLAs) of the providers are not enough to guarantee the availability and scalability. The businesses disinclined to switch to cloud without a strong service quality guarantee.

Computing Performance

High network bandwidth is needed for data intensive applications on cloud, this results in high cost. In cloud computing, low bandwidth does not meet the desired computing performance.

Reliability and Availability

Most of the businesses are dependent on services provided by third-party, hence it is mandatory for the cloud systems to be reliable and robust.

6. CONCLUSION

In this paper, we surveyed the literature in order to identify the complementary aspects of Cloud and IoT and the main drivers for integrating them into a unique environment. Since the adoption of the Cloud IoT paradigm enabled several new applications, we derived the main research challenges of interest for each of them. We further analyzed such challenges in order to identify current research directions. Finally, we surveyed available platforms and projects by comparing their main aspects and identified open issues and future research directions in this fields.

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