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Review Article

Security Issues, Challenging and Integration of IoT and Cloud Computing Technology

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Abstract *- Cloud computing and the Internet of Things IoT, unique technologies, are each part of our lives. Their mass adoption and utilization are predicted to increase further, making them essential components of the Internet of the destiny. A novel paradigm where Cloud and IoT are merged collectively is foreseen as disruptive and a catalyst for many application scenarios. In this paper, we awareness our interest in the mixing of Cloud and IoT, which we name the Cloud IoT paradigm. Several works inside the literature have surveyed the Cloud and IoT separately: their essential properties, features, underlying technologies, and open problems. However, to the satisfaction of our knowledge, those works lack detailed evaluation of the Cloud IoT paradigm. To bridge this gap, in this paper, we review the literature about the mixing of Cloud and IoT. We then describe the software scenarios that have been presented inside the literature, in addition to platforms - both commercial and open-source -and projects implementing the Cloud IT paradigm. Finally, we perceive open troubles, key challenges and destiny guidelines on this promising field.*

Keywords *- Internet of Things IOT, Mobile Cloud Computing, Cloud Computing, Privacy, Security, MQTT*.

I. INTRODUCTION

It is important to examine the general technical aspects involved in the field of computing. Indeed, this is definitely the case with Cloud Computing and the Internet of Things (IoT) - two principles that share many common features. The combination of these multiple concepts can help and enhance this technology. Cloud computing has revolutionized the way technology can be acquired, managed and distributed. It is widely accepted that Cloud computing can be used for future services. Although many views Cloud computing as a new technology, it is, in fact, involved and integrates various technologies such as grid, utility computing virtualization, networking and data services. iCloud computing provides services that enable them to distribute computer resources over the Internet. As it is, it's not surprising that the origins of cloud technology lie in the grid, computer usage, communication services and software services, as well as distribution computers and the same computer. On the other hand, IoT can be considered as a powerful infrastructure and a global network of self-regulating devices in a very smart way. IoT is moving to a stage where everything around us is connected to the Internet and capable of communicating with minimal human effort. IoT typically consists of multiple objects with limited storage and computing capacity. Well, cloud computing and IoT are the future of the Internet and the next generation of technology. However, cloud services rely on interchangeable service providers, while IoT technologies rely on diversity rather than interdependence.[1]

Cloud computing and IoT are two different disciplines, and although they both have their own constitution and have specific terminology, they are very much interconnected in our daily lives. The integration of Cloud and IoT is called cloud-IoT imagery. By integrating these two technologies into the so-called Cloud IoT, we hope to fragment the current and future Internet.
In research, industry or education, integrating Cloud and IoT is a really important, interesting and promising aspect. We will definitely explore the importance of the integration of the Cloud and the IoT and discuss what challenges we have to integrate them and how to meet them in real-time.

We can also easily explore the common features and benefits of integration to integrate the Cloud and the Internet of Things. Not everything is cheap for everyone and not free for everyone. If you are an internet user, you should buy everything for it. When it comes to IoT devices and cloud servers, it is not easy for anyone to bear it. But using open sources is very beneficial for us. In this paper, we use mostly open-source ones. We use a non-expensive IoT device to integrate IoT and Cloud servers, and we use Azure Virtual Machine as a cloud that is fully available as a student version and open-source protocol. It is independent of. Usually, this looks like we are transmitting text messages over the Internet. The transmitted message is easy for the intruder to catch, and it is not good for both the sender and the recipient. Any of your personal information or message is very confidential with respect to secrecy. As a result of security purposes, it is very much risky. For that, you just need to transfer your The message is secure. Here we use a specific protocol term MQTT as a

result of security benefits. First, we encode the entire text or string and then pass it through the MQTT protocol.[2] By this time, if an intruder can take 2 chances to view a text file, they won't see it even though they are encrypted. Your file is completely secure. When the text is moved to the desired location, the receiver can decode the encrypted file and collect the information securely. Security build-up is done very conveniently using the MQTT protocol. Here we transfer the image via the MQTT protocol, and we use facial recognition as an application. When we are using an IoT device and transferring the images in the protocol to the remote server, it is very complicated and can cause an error. Otherwise, we can easily send any type of video file of any size or any other file instead of transferring the image file. It also gives you the option of transferring the file securely.

II. BACKGROUND AND LITERATURE REVIEW

A. Internet of Things (IoT)

Although the term Internet of Things is 16 years old, the original idea of connected devices dates back to at least the 70s. Previously, this idea was often referred to as embedded Internet or extensive computing. The original term Internet of Things was used by Kevin Ashton in his work at Proctor Gamble in 1999. Ashton, who works in supply chain optimization, wants to draw the attention of senior management towards a new exciting technology called RFID. Since the Internet was the latest trend in 1999, he called his show The Internet of Things. In short, the Internet of Things provides the end-user with an unprecedented way of inter-communication with the Web using the Internet. In the fast-growing telecommunication sector, IoT is delivering a huge revolution, mainly related to wireless communication. The Internet of Things (IoT) footer is actually based on rational and self-configuring content, which is interconnected with subsets of networks around the world. We can easily assess and examine everything in the world, and by doing so, it is possible for us to reduce cost, loss, waste, devastation, etc. By integrating intelligent components with an IoT device, we can bring things that are more important than our priorities. IoT devices are the ability to connect to the Internet and collect and process information from various sources.[3]
Thermos tones, smart cars, smart cities, smart hospitals, a variety of electronic applications, alarm clocks for fire signals, etc., are found in bulk for IoT devices. Now, we're talking about how these apps can help you easily use any IoT device. Suppose you are out of the house and come home after some time. Looking at the weather now, the windows of your house, the fan windows open or the window along with the fan is closed if the sun is shining. How can you do this? You can do this easily with the help of some IoT devices that use the Internet. Using the same technology, you can easily manage a smart hospital or car.[4]

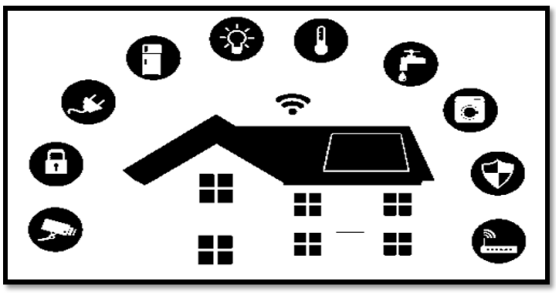

Fig.1 IoT Smart Home

B. Cloud Computing

Cloud computing enables convenient, on-demand and scalable network access to the configured computing resource pool. Cloud computing has virtually unlimited capabilities in terms of storage and processing power. Here are some definitions of cloud computing:[5]

- Cloud computing is a model for enabling on-demand network access to a shared pool of configurable resources (such as networks, servers, storage, applications and services) with minimal management effort or fast service provider interaction. Issued. (National Institute of Standards and Technology (NIST)).
- Largely scalable IT-enabled capabilities for external customers using technology is a distributed computing style. (Gartner)
- The emerging IT development, deployment and distribution model enables real-time delivery of products, services and solutions over the Internet. (IDC)
- 'Cloud computing' describes a service model, which is IT delivery, infrastructure components, architecture and primarily economic modelling, grid computing as a service, virtualization, utility computing, hosting and software (SaaS).
- Public Cloud Computing infrastructure is hosted by the cloud vendor in the Public Cloud.
- Private Cloud: The computing infrastructure is dedicated to a specific organization and cannot be shared with other organizations.
- Hybrid cloud organizations can host complex applications in the private Cloud and very few security issues in the public Cloud. The use of private and public clouds is called hybrid clouds.
- Community cloud: A type of cloud hosting in which the setup is shared between a number of organizations within a specific community, such as banks and merchants. This is a multi-tenant setup that is shared between multiple entities of a particular group, which have similar computing fears.

Three types of cloud computing are summarized as shown in Figure 2:

- IaaS (Infrastructure-as-a-Service)
- PaaS (Platform-as-a-Service)
- SaaS (Software-as-a-Service)

Cloud computing implements a utility model for generating and consuming computing resources, in which

the cloud stores all types of computing resources (such as cloud services). Cloud users (application developers or application users) can access cloud services over the Internet, and Cloud users pay only for the time and services they need. The Cloud can also be scaled to support a large number of service requests. Examples of cloud computing platforms include Amazon Web Services, Google App Engine and Microsoft's Windows Azure Platform.

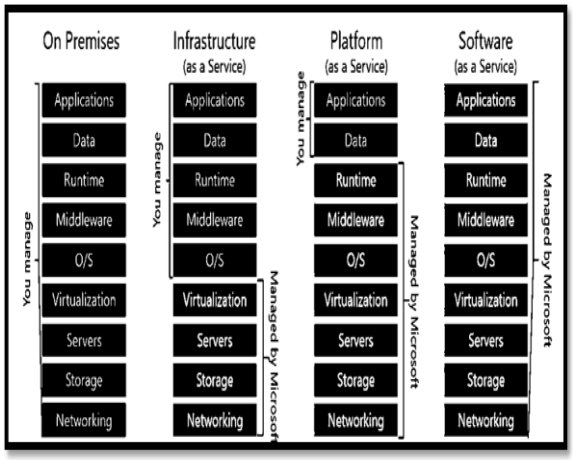

Fig. 2 Types of cloud computing

C. Why Cloud Of Things

The number of connected devices has already exceeded the entire population of the Earth and is expected to grow even faster. With Web 3, the Web is reaching almost everywhere, and the number of connected devices is increasing, an increase in the data generated. With IoT stuttering, it certainly contributes to a big chunk of Big Data. Environmental sensors, monitoring sensors, various actuators all generate data at volume, variation and speed. It is not possible to process data at the end of IoT. This is where cloud computing comes in. Both IoT and cloud computing have seen different developments. But their integration has many shared interests that are recognized in the literature and can be seen in the years to come. It seeks the concept of the Assimilation Cloud of Things (COT) or Cloud-IoT example.

III. THEORETICAL WORK

A. Integration of Cloud and Internet of Things

Integrated IoT and cloud computing create a new model, which we call Cloud IoT here. The two worlds of Cloud and IoT have seen independent evolution. However, many mutually beneficial results obtained from their combination have been identified in the literature and will be addressed in the future. On the one hand, IoT can benefit from virtually unlimited capabilities and resources to overcome the technical limitations of the Cloud (e.g., storage, processing and power). Essentially, the Cloud provides an efficient solution for applications that use IoT service management and composition and the data or data they create. On the other hand, Cloud can benefit from IoT to deliver more services in a more distributed and dynamic way and in many real-life situations.[6]

Most of the papers in the literature do not actually see the Cloud in a broader context, meaning they believe that the Cloud fills in some gaps in IoT (e.g., limited storage). Alternatively, look for IoT cloud filling gaps (average size). Due to the variety of tools, technologies and processes IoT has, it lacks the essentials such as vulnerabilities, interoperability, flexibility, reliability, efficiency, availability and security. In fact, cloud IoT facilitates the flow between data collection and data processing and allows for faster setup and integration of new content while keeping costs low for deployment and complex data processing. Cloud IoT has introduced new smart services and applications that have a significant impact on daily life. Most of the applications described below also benefit from Machine-to-Machine Communication (M2M), not just when things need to be changed and then sent to the Cloud. These applications include:

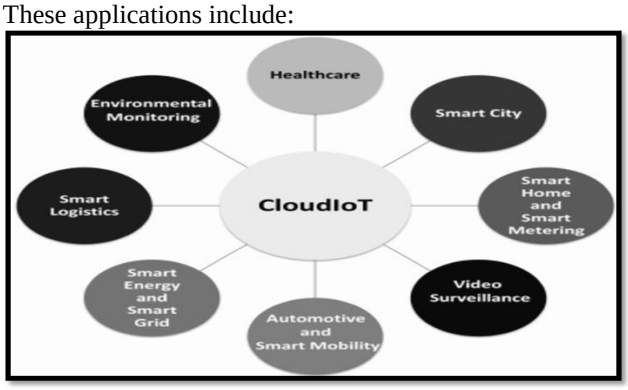

Fig. 3 Application scenarios driven by the CloudIoT paradigm

B. Quality of service in Integration of Cloud and Internet of Things

Heterogeneous networks are (by default) versatile resources; to provide more than one service or service. This does not mean that there are not only many types of traffic on the network but also the ability of a single network to support all applications without compromising on the quality of the Service (QoS). There are two classes of application: navigation and minimization of traffic delays (e.g. for monitoring low sample rates), and bandwidth and critical delays inelastic (real-time) traffic (e.g. noise or traffic monitoring), which can be further discriminated against data-related services (e.g., high-resolution low-resolution videos) with different QoS requirements. Therefore, a controlled, appropriate way to provide different network vendors, each with its own QoS requirements, is required. It is not easy to provide QoS authentication on wireless networks, as components often cause 'gaps' in device authentication due to resource allocation and administrative issues on shared wireless media. Service Quality in Cloud computing is another major area of research that will require more attention as data and tools are available in the Cloud. Dynamic planning and resource allocation algorithms based on the particle manufacturing process are being developed. With high power applications and as IoT grows, this can turn into a bottle. However, while working with the clouds has great benefits, there are issues in the area of service quality (QoS). QoS refers to the levels of performance, reliability

and availability provided by the operating system platform or hosted infrastructure

Table 1. Benefits Of Integration Iot With Cloud Computing

Item	***IoT***	***Cloud Computing***
Characteristics	IoT is Pervasive (things are everywhere). These are real-world objects.	Cloud is Ubiquitous(resources are available from everywhere). These are virtual resources
Processing capabilities	Limited computational object.	Virtually unlimited computational capabilities
Storage capabilities	Limited storage or no storage capabilities	Unlimited Storage capabilities
Connectivity	It uses the Internet as a point of convergence	It uses the Internet for service delivery
Big Data	It is a source of big data	It is a means by which to manage the big data

IV. IMPLEMENTATIONS WORK

A. Benefits of integrating IoT with Cloud

As the IoT suffers from limited capacity in terms of operational capacity and storage, it should also contend with issues such as performance, security, privacy, reliability. IoT integration in the Cloud is the best way to overcome most of these barriers. Cloud can even benefit IoT by expanding its scope with real-world applications in a powerful and distributed way and providing new services for millions of devices in different health contexts. In addition, iCloud provides easy-to-use and low-cost utility and end-user services. Cloud also simplifies the flow and collection of IoT data and provides fast, inexpensive installation and integration of complex data processing and distribution. The benefits of integrating IoT on the Cloud are discussed in this section next.[7]

- Communication
- Storage
- Processing
- Scale
- New models

- SaaS (Sensitivity as a service), which allows access to sensor data;
- EaaS (Ethernet as a Service), the primary role of providing broadband connectivity to control remote devices;
- SAaaS (Sensitivity and Actuation as a Service), which provides automation management skills.
- IPMaaS (identity and policy management as a service), which provides access to policy and management of identity documents.
- DBaaS (Database as a Service), which provides intelligent data management;
- SEaaS (Sensor Event as a Service), which sends messaging services generated by sensor events;
- SenaaS (Sensation as of a Function), which provides remote sensing management;
- DaaS (Data as a Service), which provides full access to any type of data

B. Cloud-based IoT Architecture

According to several previous studies, the architecture of known IoT devices is generally divided into three different layers: application, understanding and network. Many think that the network layer is the cloud layer, known as the Cloud-based IoT architecture. The cognitive layer is used to identify objects and collect data collected from their surroundings. In contrast, the main purpose of the network is to transmit the collected data to the Internet / iCloud. Finally, the application layer provides a variety of services connectors.

V. ANALYSIS OF WORK

A. Cloud-Based IoT Applications

The Cloud-based IoT approach has introduced a number of applications and smart services, which have affected end users' daily lives. TABLE 2 presents a brief discussion of certain applications which have been improved by the Cloud-based IoT paradigm

Application Field	**Description**
Healthcare	Cloud-based IoT has brought many benefits and opportunities to the healthcare sector. It can effectively expand and improve health care services and keep the field innovative (e.g. drug/drug management, hospital management).
Smart Cities	The middleware of smart cities for the future can be provided through IoT, retrieving data from infrastructure acquisitions, IoT technologies and data transparency. This will lead to the development of services that can communicate with the surrounding environment (e.g. Smart street lamps, large belly, ShotSpotter).
Smart Homes	A large number of iCloud-enabled IoT applications have enabled automation for home tasks, where the acquisition of various embedded devices and Cloud computing enabled internal functionality (e.g. home security management, smart metering, energy saving).
Video surveillance	By adopting Cloud-based IoT, intelligent video surveillance will be able to manage, store and process video content from video sensors easily and efficiently; and this will

	automatically get the details out of the scenes. It has been one of the top tools for many security-related applications (e.g. CCTV Wireless Cameras, Movement Detection System).
Automotive and Smart Mobility	The integration of Cloud computing into the Global Positioning System (GPS) and other transportation technologies represents a promising opportunity to solve many of the challenges that exist (e.g. traffic forecasting and notification, remote vehicles).
Smart energy and smart grid	Cloud computing and IoT can work together effectively to provide consumers with good energy management (e.g. smart meters, useful materials, renewable energy sources).
Smart logistics	It allows and reduces the automated movement of goods between producers and consumers while at the same time facilitating the tracking of freight (e.g., the shipping industry, tracking)
Environmental monitoring	By combining iCloud and IoT, a high-quality information system can be integrated that will link a business that monitors a large area with well-placed sensors (e.g. pollution source monitoring, water quality monitoring, air quality monitoring).

B. Challenges Facing Cloud-Based IoT Integration

There are many challenges that can hinder the successful integration of the Cloud-based IoT paradigm. These challenges include:[8]

- **Security and privacy:** Cloud-based IoT makes it possible to move data from the real world to the Cloud. Indeed, one of the most important unresolved issues is how to provide compliant rules and policies while ensuring that only authorized users receive sensitive information; this is important when it comes to preserving users' privacy, especially when data integrity has to be ensured.
- **Heterogeneity:** One of the most important challenges facing the Cloud-based IoT approach concerns the broad heterogeneity of devices, platforms, operating systems, and services available and which can be used for new or improved applications.
- **Big data:** With many predicting that Big Data will reach 50 billion IoT devices by 2020, it is important to pay close attention to travel, access, storage and processing at the expense of big data that will be produced. Indeed, if we are technologically advanced, it is clear that IoT will be one of the main sources of big data and that iCloud is able to perform long-term data storage, in addition to incorporating it into the complex analysis. The handling of large amounts of data generated is a major problem since the operation of the application all depends on the properties of this data management service. Finding the right data management solution that will allow Cloud to handle large amounts of data remains a major problem.
- **Performance:** Transferring large amounts of data generated from IoT devices to the Cloud requires a large bandwidth. Because of this, the main issue is getting enough network performance to transfer data to Cloud environments; indeed, this is because Broadband's growth is inconsistent with sustainability and ecological integration. In many cases, services and data delivery should be available in high performance. This is because time travel may be affected by unbearable issues and real-time applications significantly affect efficiency.
- **Legal aspects:** Legal aspects are very important in recent research on specific programs. For example, service providers must adapt to different international laws. On the other hand, users should make donations in order to contribute to the collection of data
- **Monitoring:** Monitoring Cloud Computing first action when it comes to performance, resource management, capacity planning, security, SLAs, and troubleshooting. As a result, the Cloud-based IoT approach dies like the same monitoring requirements from the Cloud, although there are still some related challenges associated with velocity, volume, and various aspects of IoT
- **Large scale:** The Cloud-based IoT paradigm enables us to design new applications that aim to integrate and analyze data from the real world on IoT devices. This requires working with billions of devices distributed across multiple locations. The sheer scale of emerging programs raises many new issues that are difficult to overcome. For example, achieving consolidation power and storage capacity requirements becomes difficult. In addition, the monitoring process has made the distribution of IoT devices more complicated, as IoT devices have to deal with communication problems and latency dynamics.

VI. CONCLUSION

Cloud computing and IoT is Advance technology in the computer era. Both technologies provide the facilities to access the data accessing using the Internet. In this paper, we discuss the combined architecture of Cloud and IOT, Privacy of IoTCloud (iCloud), security issues of Both technologies and improve the combined access methods of Cloud and IoT. We also discuss the present challenge is facing both technologies.

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