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The Effect of Cloud Computing With IOT

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Abstract:
Cloud computing cloud is nothing but a remote storage location. Cloud computing refers to storing and retrieving any type of data over the internet from data centers. The data can be of any type like application data, videos, photos, documents, audio and more. whereas IoT refers to connecting specific devices to the Internet. But not the regular devices like computers, laptops, and smartphones. If we connect some devices to resolve any specific issue that comes under the Internet of Things. For example connecting cars, bikes, transportation devices, home appliances, kitchen appliances, medical equipment, and industrial devices connecting to the internet using IoT.Their adoption and use are expected to be more and more pervasive, making them important components of the Future Internet. A novel paradigm where Cloud and IoT are merged together is foreseen as disruptive and as an enabler of a large number of application scenarios.

Cloud Computing:

Cloud computing is the next evolutionary step in Internet-based computing, which provides the means for delivering ICT resources as a service. The ICT resources that can be delivered through cloud computing model include computing power, computing infrastructure (e.g., servers and/or storage resources), applications, business processes and more. Cloud computing infrastructures and services have the following characteristics, which typically differentiate them from similar (distributed computing) technologies:

- **Elasticity and the ability to scale up and down:** Cloud computing services can scale upwards during high periods of demand and downward during periods of lighter demand. This elastic nature of cloud computing facilitates the implementation of flexibly scalable business models, e.g., through enabling enterprises to use more or less resources as their business grows or shrinks [1].

- **Self-service provisioning and automatic deprovisioning:** Contrary to conventional web-based Application Service Providers (ASP) models (e.g., web hosting), cloud computing enables easy access to cloud services without a lengthy provisioning process. In cloud computing, both provisioning and de-provisioning of resources can take place automatically [2].

- **Application programming interfaces (APIs):** Cloud services are accessible via APIs, which enable applications and data sources to communicate with each other [3].

- **Billing and metering of service usage in a pay-as-you-go model:** Cloud services are associated with a utility-based pay-as-you-go model. To this end, they provide the means for metering resource usage and subsequently issuing bills [4].

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- **Performance monitoring and measuring:** Cloud computing infrastructures provide a service management environment along with an integrated approach for managing physical environments and IT systems [5].

- **Security:** Cloud computing infrastructures offer security functionalities towards safeguarding critical data and fulfilling customers' compliance requirements [6] .

The two main business drivers behind the adoption of a cloud computing model and associated services including:

- **Business Agility:** Cloud computing alleviates tedious IT procurement processes, since it facilitates flexible, timely and on-demand access to computing resources (i.e. compute cycles, storage) as needed to meet business targets.

- **Reduced Capital Expenses:** Cloud computing holds the promise to lead to reduced capital expenses (i.e. IT capital investments) (CAPEX), through enabling conversion of CAPEX to operational expenses (i.e. paying per month, per user for each service) (OPEX). This is due to the fact that cloud computing enables flexible planning and elastic provisioning of resources instead of upfront overprovisioning. Depending on the types of resources that are accessed as a service, cloud computing is associated with different service delivery models [7].

- **Infrastructure as a Service (IaaS):** IaaS deals with the delivery of storage and computing resources towards supporting custom business solutions. Enterprises opt for an IaaS cloud computing model in order to benefit from lower prices, the ability to aggregate resources, accelerated deployment, as well as increased and customized security. The most prominent example of IaaS service Amazon's Elastic Compute Cloud (EC2), which uses the Xen open-source hypervisor to create and manage virtual machines.

- **Platform as a Service (PaaS):** PaaS provides development environments for creating cloud-ready business applications. It provides a deeper set of capabilities comparing to IaaS, including development, middleware, and deployment capabilities. PaaS services create and encourage deep ecosystem of partners who commit to this environment. Typical examples of PaaS services are Google's App Engine and Microsoft's Azure cloud environment, which both provide a workflow engine, development tools, a testing environment, database integration functionalities, as well as third-party tools and services.

- **Software as a Service (SaaS):** SaaS services enable access to purpose-built business applications in the cloud. Such services provide the pay-go-go, reduced CAPEX and elastic properties of cloud computing infrastructures.

Cloud services can be offered through infrastructures (clouds) that are publicly accessible (i.e. public cloud services), but also by privately owned infrastructures (i.e. private cloud services). Furthermore, it is possible to offer services supporting by both public and private clouds, which are characterized as hybrid cloud services.

IoT / Cloud Convergence:

Internet-of-Things can benefit from the scalability, performance and pay-as-you-go nature of cloud computing infrastructures. Indeed, as IoT applications produce large volumes of data and comprise multiple computational components (e.g., data processing and analytics algorithms), their integration with cloud computing infrastructures could provide them with opportunities for cost-effective on-demand scaling. As prominent examples consider the following settings:

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- A Small Medium Enterprise (SME) developing an energy management IoT product, targeting smart homes and smart buildings. By streaming the data of the product (e.g., sensors and WSN data) into the cloud it can accommodate its growth needs in a scalable and cost effective fashion. As the SMEs acquires more customers and performs more deployments of its product, it is able to collect and manage growing volumes of data in a scalable way, thus taking advantage of a "pay-as-you-grow" model. Moreover, cloud integration allows the SME to store and process massive datasets collected from multiple (rather than a single) deployments.

- A smart city can benefit from the cloud-based deployment of its IoT systems and applications. A city is likely to deploy many IoT applications, such as applications for smart energy management, smart water management, smart transport management, urban mobility of the citizens and more. These applications comprise multiple sensors and devices, along with computational components. Furthermore, they are likely to produce very large data volumes. Cloud integration enables the city to host these data and applications in a cost-effective way. Furthermore, the elasticity of the cloud can directly support expansions to these applications, but also the rapid deployment of new ones without major concerns about the provisioning of the required cloud computing resources.

- A cloud computing provider offering pubic cloud services can extend them to the IoT area, through enabling third-parties to access its infrastructure in order to integrate IoT data and/or computational components operating over IoT devices. The provider can offer IoT data access and services in a pay-as-you-fashion, through enabling third-parties to access resources of its infrastructure and accordingly to charge them in a utility-based fashion.

These motivating examples illustrate the merit and need for converging IoT and cloud computing infrastructure. Despite these merits, this convergence has always been challenging mainly due to the conflicting properties of IoT and cloud infrastructures, in particular, IoT devices tend to be location specific, resource constrained, expensive (in terms of development/ deployment cost) and generally inflexible (in terms of resource access and availability). On the other hand, cloud computing resources are typically location independent and inexpensive, while at the same time providing rapid and flexibly elasticity. In order to alleviate these incompatibilities, sensors and devices are virtualized prior to integrating their data and services in the cloud, in order to enable their distribution across any cloud resources. Furthermore, service and sensor discovery functionalities are implementing on the cloud in order to enable the discovery of services and sensors that reside in different locations.cloud computing infrastructures, IoT/cloud infrastructures and related services can be classified to the following models:

- **Infrastructure-as-a-Service (IaaS) IoT/Clouds:** These services provide the means for accessing sensors and actuator in the cloud. The associated business model involves the IoT/Cloud provide to act either as data or sensor provider. IaaS services for IoT provide access control to resources as a prerequisite for the offering of related pay-as-you-go services.

- **Platform-as-a-Service (PaaS) IoT/Clouds:** This is the most widespread model for IoT/cloud services, given that it is the model provided by all public IoT/cloud infrastructures outlined above. As already illustrate most public IoT clouds come with a range of tools and related environments for applications development and deployment in a cloud environment. A main characteristic of PaaS IoT services is that they provide access to data, not to hardware. This is a clear differentiator comparing to IaaS.

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- **Software-as-a-Service (SaaS) IoT/Clouds:** SaaS IoT services are the ones enabling their uses to access complete IoT-based software applications through the cloud, on-demand and in a pay-as-you-go fashion. As soon as sensors and IoT devices are not visible, SaaS IoT applications resemble very much conventional cloud-based SaaS applications. There are however cases where the IoT dimension is strong and evident, such as applications involving selection of sensors and combination of data from the selected sensors in an integrated applications. Several of these applications are commonly called Sensing-as-a-Service, given that they provide on-demand access to the services of multiple sensors. Note that SaaS IoT applications are typically built over a PaaS infrastructure and enable utility based business models involving IoT software and services.

Role of Cloud Computing in IoT

Transformation is an ever going trend, which is becoming an absolute need of the hour in today's fast paced world. With technology churning every bit of information in a refined new format, there is a lot of scope when it comes to data storage and manipulation.

As smart phones and social media begin to rule the roost, there is a lot of conversation happening around what's coming next. The evident answer of the hour is, the Internet of Things or IoT. With the Internet churning out huge chunks of data every second, there is a pending strain on the data infrastructure, making it necessary to look for solutions to ease the use of data storage. Since the rise of the Cloud, there is a massive shift towards using it as a means of storage for people and businesses alike. Given the scalability and the data dynamics, there is a lot of stress being given on the use of Cloud computing to make data available remotely.

Putting this scalability to use, the Cloud has proved to be an efficient tool for transferring data through the traditional Internet channels as well as through a dedicated direct link.

The traditional method is not preferred extensively; however, at the same time, many businesses prefer to the use the direct link to transfer data to the Cloud, given the quality of the data and the security it ensures during the transfer phase. This is not all; the Cloud has become an integral part of the Internet world. Simply put, the cloud can be termed as an enabler when it comes to IoT. The Cloud is undoubtedly an ideal solution to meet all data driven needs of businesses. As this technology is developing, it is providing an agile platform for developers to create meaningful apps to establish better data devices over the Internet.

How Cloud Computing Aids IoT?

The underlying idea behind IoT and the Cloud computing is increase efficiency in the day to day tasks, without disturbing the quality of the data being stored or transferred. Since the relationship is mutual, both the services complement each other effectively. The IoT becomes the source of the data, while the Cloud becomes the ultimate destination for it to be stored. As we progress through the years, we will see a lot of changes happening; some of these changes will be gradual while others will be more rapid. Companies likes Amazon AWS, Google and Microsoft will become the undisputed leaders of Cloud IoT Services, making the challenge even more worthwhile. As the Cloud gathers more attention and speed slowly, there are a multitude of Cloud service providers which are beginning to offer pay per use models to businesses. This way, businesses only need to pay for what the computer resources they use.

Some more Reasons which Highlight the Importance of the Cloud in the World of IoT are:

Reduced cost of ownership: Inflation is a never ending menace which every business has to face sooner or later. The Cloud technology provides ample resources to businesses so that they do not have to spend through the nose on setting up their infrastructure.

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In the absence of on-site systems, hardware and software, the IT department is more focused on their day to day up keeping activities, which are often an evident benefit with the Cloud.

Business continuity programs:
The Cloud computing is capable of running businesses even in the midst of sudden disasters. Since the data is maintained on additional separate servers, there is no imminent danger to the private data, making the Cloud an indispensable part of Internet based firms.

How will the IoT and the Cloud Expand?
Startups: As more and more Cloud vendors pop up, startups will continue to evolve and become more efficient, making the technology flow stronger yet smoother. The transition from one source to another will become a cinch, making the Cloud a strong place to function.

Developing countries:
The strongest and biggest source of revenue for the Cloud comes from the developing countries, as they are trying to play catch up with the times. However, this revenue will drastically dip, once these countries are able to adopt their technology to the Cloud, marking the adaptation as complete.

Conclusion:
These definitions and examples provide an overview of IoT and cloud convergence and why it is important and useful. More and more IoT applications are nowadays integrated with the cloud in order to benefit from its performance, business agility and pay-as-you-go characteristics. In following chapters of the tutorial, we will present how to maximize the benefits of the cloud for IoT, through ensuring semantic interoperability of IoT data and services in the cloud, thus enabling advanced data analytics applications, but also integration of a wide range of vertical (silo) IoT applications that are nowadays available in areas such as smart energy, smart transport and smart cities.

We will also illustrate the benefits of IoT/cloud integration for specific areas and segments of IoT, such as IoT-based wearable computing.

References:
[1] https://www.sitepoint.com/4-major-technicalchallenges-facing-iot-developers/

[2] https://blog.apnic.net/2015/10/20/5-challenges-of-the-internet-of-things

[3] M. Weiser, R. Gold, The origins of ubiquitous computing research at PARC in the late 1980s, IBM Systems Journal. (1999).

[4] Zhang Guoli,“Cloud Computing Platform Architecture in the E-Learning Area”, IEEE 2nd International Conference on Computer and Automation Engineering (ICCAE)

[5] Sohan Singh Yadav, ZengWen Hua,"CLOUD: A ComputingInfrastructure on Demand”, 2nd International Conference on Computer Engineering and Technology (ICCET)

[6] Liu, Yu, et al. "Combination of Cloud Computing and Internet of Things (IOT) in Medical Monitoring Systems." management 8.12 (2015)

[7] Taherkordi, Amir, and Frank Eliassen. "Scalable modeling of cloud-based IoT services for smart cities." 2016 IEEE International Conference on Pervasive Computing and Communication Workshops (PerCom Workshops). IEEE, 2016.