

Analysis of Implementation of Internet of Things Using Cloud Services

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Abstract- IoT systems permit users to achieve deeper automation, analysis, and integration within a system. They enhance the reach of these areas and their accuracy. IoT employs existing and emerging technology for sensing, networking, and robotics. Changing times have demanded the change in conventional working models. The large-scale use of Internet and its make use of technologies like Internet of Things has widened the horizons of their applications.

However, the actual realization of Internet of Things (IoT) can be made possible only through the readily available location-independent services like the Cloud computing. This paper focus to present the role of Cloud computing services in IoT implementation and how they are most suitable for Internet of Things concept. It explicitly explains those parameters from the point of view of IoT implementation and performance.

Indexed Terms- Internet of Things (IoT), Cloud Computing, Implementation.

I. CLOUD COMPUTING SERVICES

Cloud Computing is observed the latest breed of technology with the immense flexibility of budget, speed, and infrastructure. It provides self-service capabilities to users with extensible features to upgrade usage based on requirement. The cloud computing technology provides particular types of services that users can access the cloud platform.

- i. Infrastructure-as-a-Service provides access to fundamental resources such as physical machines, virtual machines, virtual storage, etc. Apart from these resources, the IaaS also offers:
 - Virtual machine disk storage
 - Virtual local area network (VLANs)

- Load balancers
 - IP addresses
 - Software bundles
- ii. Platform-as-a-Service provides the runtime environment for applications. It also offers development and deployment tools involved to develop applications. PaaS has a feature of point-and-click tools that allows non-developers to create web applications.
 - iii. Software-as-a-Service (SaaS) model allows providing software application as a service to the end users. It mention to software that is deployed on a host service and is accessible via Internet. There are several SaaS applications listed below:
 - Billing and invoicing system
 - Customer Relationship Management (CRM) applications
 - Help desk applications
 - Human Resource (HR) solutions



Figure 1: The Cloud services deployment model

II. INTERNET OF THINGS AND CLOUD COMPUTING

Internet of Things is the upcoming technology which will completely improve the existing system of technology. According to the definition stated by ITU, “The IoT describes a worldwide network of billions or trillions of objects that can be accumulated from the worldwide physical environment, propagated via the Internet, and transmitted to end-users.

Services are accessible for users to communicate with these smart objects over the Internet, query their states, as well as their associated information, and even control their actions”. Its main concept is to create a large network which consists of different smart devices and networks to facilitate the information sharing of global things from any place and at any time.

The devices are made smart by using Radio Frequency Identification tags. These devices communicate with the help of networks. The data accumulated by them are stored and computed on the Cloud services which are location-independent. The cloud service is best suited for this purpose as they provide a convenient way to access resources without having to create expensive infrastructure for it. The services can be availed based on the plans available according to the usage desired. The role of Cloud in IoT is illustrated in Fig. 2.



Figure 2: The role of cloud in Internet of Things

Cloud computing involves cloud service providers who offer the services to its occupants which in turn

use the cloud services through certain contracts with the providers. The cloud providers aim to supply sharing of resources between the tenants to meet the dynamic demands. The occupants benefit as they can pay only for the resources they require, thus removing the start-up expenses and being able to quickly scale up or scale down resources during the demand fluctuations. The end-user of a system can interact with a cloud provider directly or indirectly via the occupants. In this paper, we are focusing on the Internet of Things devices’ communication with the cloud services.

III. USE OF CLOUD SERVICES IN IOT

3.1 Always available

The cloud services are location-independent and always available, which is the prime necessity of Internet of Things technology. The smart devices should be able to interact with each other every time so cloud is the best bet for such necessities.

3.2 Quick scaling up/down

Cloud services can scale up quickly, so adding any number of devices to the system is made quite simple by Cloud service providers. This supports in effective management of devices during peak hours and otherwise as well.

3.3 Better resource management

Cloud services can help manage restraints on resources. For example, due to finite power of the batteries and storage space, the computational jobs on smart phones can be moved on to the cloud. It will support lay off the load from such devices on to the cloud servers.

3.4 Cross device functionality

Cloud services can work across a variation of things or devices. This is one quality of cloud which makes it most appropriate for Internet of Things which has a large number of devices communicating with each other like sensors, cameras, smart phones etc.

3.5 Different clouds for different needs

Cloud services are presents in public, private and hybrid models. These can be used for different needs. For example, in Internet of Things model, the health records of patients can be stored on private cloud for

use by the doctors. However the healthcare data like heart-rate, temperature etc. required for health monitoring can be stored on public clouds.

3.6 Secure data storage

The use of cloud services for storing data is fetching increasingly popular in IoT. This has ensured that the cloud service providers provide the best data storage plans with maximum security levels being promised. This is necessary for the service providers to manage the market competition and rising demands.

3.7 No extra cost of infrastructure

The use of cloud for IoT also provides a cost benefit which is the most profitable of all its features. There is no extra cost for resources and infrastructure. The cloud infrastructure can be used by paying small costs according to the schemes of service providers.

IV. CONCLUSION

The Internet of Things technology is a encouraging new field in Information and Communications technology (ICT). It can prompt the smart factor into the functionalities of diverse fields. The applications of IoT scale from Smart cities to Agriculture, Tourism, and Healthcare etc. The implementation of IoT needs the coordination of various technologies like Wireless networks, Cloud computing and networks. This paper presented the role of Cloud services in IoT. A comprehensive reasoning of the various factors was done which suggest the appropriateness of Cloud for IoT. The always-on feature of Cloud services among many others is best suited for the Internet of Things (IoT).

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