Chapter 7
Examining Different Applications of Cloud-Based IoT

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ABSTRACT

The integration of Cloud computing and IoT provides the capability of omnipresent sensing services and powerful, efficient storage as well as processing of sensor data beyond the capability of distinct things or devices. The ability of Cloud platform in providing automatic and reliable decision making will boost the development of newer and innovative applications, like smart healthcare, cities, buildings, agriculture practices and buildings, etc. This chapter surveys a few key application areas where Cloud-based IoT technology can mark its impact. The Cloud-based architecture has been proposed for these applications, simultaneously examining and identifying the challenges involved. The salient points identified in this chapter will help researchers and scientists to explore newer applications based on the Cloud-IoT platform.

INTRODUCTION

With the development of wireless communication technologies, ubiquitous objects can be interactive and are connected to the Internet. These objects inter-connected through internet with in-built sensing and computing capabilities constitute the Internet of Things (IoT). It is anticipated that by 2020, there will be around 50 billion number of IoT devices while the population will reach 7.6 billion (Hou et al., 2016). A huge amount of data will be generated by these devices having different format

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and meaning. However, due to small physical size and energy consumption, the IoT devices normally have very limited capabilities. Therefore, a cloud platform for IoT devices is must to support millions of IoT devices and provide various innovative and exciting Cloud IoT applications for the end-users.

The integration of Cloud Computing platform with IoT can enable pervasive sensing, powerful and reliable processing of sensing data and automated decision making beyond the potential of discrete IoT devices, thus motivating novelties in both areas. For an instance, cloud platforms allow the storage of sensed data and this data can be used prudently for intelligent monitoring and actuation with the help of smart things. New set of rules or techniques for data management, and artificial learning can be realized and executed centrally or in distributed manner through cloud platform in order to accomplish automatic and reliable decision making (Sivakumar et al., 2017). The efforts so made will further enhance the development of newer and interesting applications, such as cities with smart infrastructure, agriculture, smart energy distribution, healthcare and smart management of transportation. However, new challenges arise when IoT and cloud platform are integrated. There is a dire need for new and innovative network architectures and protocols that will facilitate seamless integration and big data streaming from IoT to the cloud platform.

Generally the IoT services are being offered as an isolated vertical solution in which all components of the applications are tightly linked to the specific perspective of an application. Integrating IoT services with the Cloud can ease the delivery and the deployment of these services by exploiting all the flexibility of Cloud models. In this context, the Cloud Computing framework facilitates the development of applications from an abstract viewpoint of the IoT systems.

Several solutions have been proposed or suggested to use Cloud architectures to discover sensors and actuators, to enable their connection and to create platforms capable of supporting omnipresent connectivity and various real-time applications for smart cities. Another situation in which Cloud and Internet of Things can integrate with each other to provide improved services is the smart energy management. To provide smart distribution and consumption of energy (Botta, 2016), the data collected from different sensing nodes attached to the network can be divested to a Cloud platform to exploit its computational capabilities for taking comprehensive decisions about the energy usage and distribution. These examples do not cover all aspects where there can be a cooperation between Cloud and IoT but, in these cases, IoT systems can derive many benefits from the unlimited computational capacity of cloud, thus allowing scalability and flexibility in their applications. One can face a situation in which there is peak demand of the resource usage from an IoT system or these resources can be released because the demand is poor. Finally, in each of these cases, the pay-per-use model has an important role in reducing the deployment cost of such infrastructures.