

# Application of Cloud Computing and Internet of Things in the Construction of Smart City

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**Abstract:** With the development of cloud computing and other new generation of information technologies, Internet of Things based on cloud computing in the construction of smart cities are playing an increasingly important role. The construction of smart city is a development trend, and it is a supporting service system needed for a modern lifestyle. Based on the author's learning and practical experience, this work first analyzed the basic concepts of cloud computing, Internet of Things and smart city, then summarized the key capabilities in the construction of smart city, and finally put forward the application strategies of cloud technology and Internet of Things technology.

## 1. Introduction

Smart city is a new concept produced in the new era of economic development and accompanied by people's demand for urban construction and the advancement of related technologies. Information technology represented by the Internet of Things and cloud computing is constantly innovating and applying [1]. These technologies are spreading at a faster rate in business activities and social development and are increasingly affecting people's daily lives. At the same time, with the continuous rapid growth of the economy and the continuous improvement of various facilities in the city, more and more people are pouring into the city. Improving the efficiency of infrastructure and systematizing management is the priority for city development [2-3]. Therefore, cloud computing and Internet of Things technologies are gradually receiving the attention of governments and experts.

## 2. Basic Concepts of Cloud Computing, Internet of Things and Smart City

Internet of Things usually refers to a network formed by the interactive communication among objects. Through intelligent technology, the limitation of space distance can be broken to realize the object exchange, character exchange and communication across separated place, thereby realizing the purpose of monitoring and managing equipment. It refers to two aspects: one is that Internet of Things is a network based on the Internet and is an extension of the Internet; the other is that the objects of Internet of Things can communicate information with each other, so that they can restrict and control each other to integrate all electronic terminals. Based on the above theories, Internet of Things is defined as a network that can connect any object to the Internet through infrared sensor, (RFID) radio frequency identification, laser scanner, global positioning system and other information sensing devices based on the agreed protocol, so as to exchange information and communication and to achieve intelligent identification, tracking, positioning, management and monitoring of objects [4]. Internet of Things technology is not difficult to understand. It uses intelligent technology to achieve communication among people and objects. It includes an internet platform and mobile communication module for information transmission, an intelligent sensor with identification capability, a radio frequency identification device and a wireless transmission device.

Cloud computing refers to the addition, use and delivery of Internet-based services. In detail, cloud computing involves dynamic, easily extensional and often virtualized resources provided by the Internet. Internet of Things is closely related to cloud computing. The existing large-scale Internet of Things is based on the development of cloud computing platforms, so in fact, cloud computing can be called the "brain" of the Internet of Things. (1) The function of the cloud computing platform [5]. The main functions of the cloud computing platform include uploading information by various devices on the network, receiving and timely processing the information by the cloud computing platform, and feeding back the processed information to the uploading device. The cloud computing platform controls and manages various devices in the network and enables the processed information resources to be uniformly serviced on demand through the information processing process. (2) Advantages of the cloud computing platform. Li Hong and others point out that firstly, since the Internet of Things needs the support of the dynamic, efficient, and large-scale expansion of the computer resource processing center, and the cloud computing platform has these advantages, therefore, the cloud computing platform is the core to realize the Internet of Things. Combined with the processing mode of cloud computing, the processing of massive data as well as dynamic management and real-time analysis can be realized, and the processing efficiency is high.

Smart city is a new city state that senses, analyzes and integrates the key information of the core system of city operation using computer information technology and communication technology to intelligently respond to various needs of people's livelihood, environmental protection, public city security, city services, industrial and commercial activities and to achieve high efficiency of city infrastructure and improvement of the systematic management [6]. In short, it uses new information technology to achieve intelligent management and operation of the city, provide a basis for the residents living in the city to enjoy a comfortable life and ensure the sustainable, harmonious and healthy growth of the city.

### **3. Key Capabilities in the Construction of Smart City**

The ultimate goal of the smart city in its construction process is to realize intelligent development of the city and integrate life, safety, transportation, finance, and medical care in city construction, which makes it easier for people to use and promotes the overall construction and management of the city. Therefore, three key capabilities are needed in the construction of smart city. Firstly, the capability of comprehensively sensing information. With the development of China's cities, the number and types of city information are gradually increasing [7]. Therefore, in order to meet the needs of smart city construction, it must have the ability of comprehensively sensing information in its construction process, so that it can comprehensively collect city information, organize and analyze it, so as to realize information metadata management. Secondly, the capability of processing large amount of information. Information processing capability is the key to the normal operation of smart city construction. Therefore, in order to meet the information management integration in the construction of smart city, it must have a powerful information processing system, so that it can realize the intelligent development of the city. Thirdly, the capability of intelligent service. City service is a direct reflection of the city construction level. In the process of building a smart city, the overall management and construction of the city require intelligent service capability within the system, so as to support the operation of the entire smart city system and manage the information of all walks of life [8].

## **4. Application Countermeasures of Cloud Technology and Internet of Things Technology**

### **4.1 Application of cloud technology and Internet of Things technology in medical and health services**

Internet of Things enables the perception layer, the network layer and the application layer to realize telemedicine for patients, so as to help patients with online treatment. For example, using cloud technology to establish a medical database and platform, inputting information of patients

according to their symptoms, and using cloud computing processing technology to timely match information in the hospital background terminal database around the country can realize computer diagnosis and shorten the time for people to go the hospital. Combining cloud technology with Internet of Things technology, carrying out remote medical registration for patients who cannot be diagnosed definitely based on cloud technology, and networking the national hospitals the Internet can realize "multiple treatments for one patient" [9]. Whether single or combined, cloud technology and the Internet of Things can provide efficient information resources and processing technologies for the construction of medical and health services for smart city, and they can shorten the time of medical treatment and alleviate the burden of current social medical care.

#### **4.2 Application of cloud technology and Internet of Things technology in road traffic**

Road traffic is an important part of the city infrastructure in the construction of smart city. The use of the Internet of Things and cloud technology can better promote the management of road traffic and improve the pressure of city traffic. For example, there are services such as traffic signal control, electronic toll collection, positioning and navigation, traffic flow monitoring and vehicle diagnosis in the current construction of smart city in China .The above services all use the Internet of Things technology to divide the city into regions and use the Internet to realize remote control and charging, thus providing more comprehensive information for the implementation and management of city traffic. The real-time road report of road traffic is to use the cloud computing background to quickly calculate the road conditions based on the road conditions, and to play a role in timely dispersing traffic. In addition, the application of cloud technology combined with Internet of Things technology in the construction of smart city can accurately provide road transportation information and establish an intelligent service system.

#### **4.3 Application of cloud technology and Internet of Things technology in city public services**

The management of city public services marks the level of city development. Using cloud technology and Internet of Things technology to construct smart city can effectively improve the level of city public services. For example, using GPS and GIS cloud technology in the construction of smart city can complete the information processing and communication of government, enterprises and the public and realize the public service platform of smart city based on Internet of Things. Using Internet of Things in the construction of the public service platform based on Internet of Things can solve the problem of difficult contribution of city resources and disunity of city resource signal. Using cloud technology can solve the problem of difficult and opaque information processing on the public information platform, thus providing a good public service platform for city construction.

#### **4.4 Application of cloud computing and Internet of Things in the security sharing mechanism of smart city**

In addition to the application introduction in the above public service system, the role of cloud computing and Internet of Things technology in the city security sharing mechanism cannot be ignored. Using cloud computing and Internet of Things can form real-time monitoring and information integration of the overall situation of the city, and provide reference for the development and rationalization of the city's development plan. At the same time, in the design process of city service system, accessing components and other various types of common components can achieve effective connection of various types of module integration and provide support for the transformation of some systems, such as automation reform of city power distribution and water network transformation, so it is a basic work of modernization [10]. Security issues are important when using cloud computing and Internet of Things technologies, and the problem of human-induced damage, interference and information theft of related equipment and network should be avoided through strict management and control, and innovative technologies that can improve the safety index.

## 5. Summary

The construction of smart city based on cloud computing platform and the comprehensive application of Internet of Things can, to a certain extent, greatly improve the efficiency and quality of governmental management of public affairs and public services, and promote the construction and development of smart city more quickly.

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