Application of SINK Data Management Technology in Data Management of Internet of Things

Wei Gao[1, a], Lijuan Shi [2], Wanli Zhang [2]

[1]Changchun University of Finance and Economics, Changchun 130122, China

[2]Electronic Information Engineering College of Changchun University, Changchun 130022, China

[a]2452444525@qq.com

Keywords: Internet of Things; Network data management; Information technology.

Abstract: In the development of modern electronic information technology, the Internet of Things (IoT), as an emerging product in the field of network technology, has attracted extensive attention. The wide application of IoT will inevitably produce a large amount of commodity information data, which requires the modern computer information technology to effectively manage the IoT network data. In this paper, the application of commonly used SINK IoT network data information management technology in network data management was introduced.

1. Introduction

The Internet of Things (IoT) is a data network that covers the data information of all things in the world and is constructed based on modern electronic computer technology and the Internet by using modern information technologies such as network FIRD and network data wireless communication. In this data network, all items can be considered as commodities that can be circulated and transacted through the Internet, and no third-party intervention is required except for the buyer and the seller. Its core essence is to use the automatic acquisition and identification of information of RF to realize the sharing and transaction of network information resources through the computer Internet. Therefore, the central information database is the most important part of IoT, where a large amount of data information on the circulation and transaction of IoT commodities is stored, and these data information must be effectively managed to ensure the correct operation of the IoT.

2. The Overall Structure of SINK Data Management Technology

SINK data management technology is primarily applied to the tracking and collection of IoT information data and the management of important data. Different from the traditional network data management technology centered on the position of data information, SINK data management technology, with the network at the data center as the core, regards the whole IoT information as the perceived data stream or data source, the item information as the sensory data, and the collection and management of data as the data management technology in actual network application. Any subordinate operations and sub-modules are related to the collection, storage, query and analysis of IoT data information. In a sense, SINK IoT network data management technology can be considered as a large distributed database devoted to recording and managing IoT network data information. Its specific structure is shown in Figure 1:
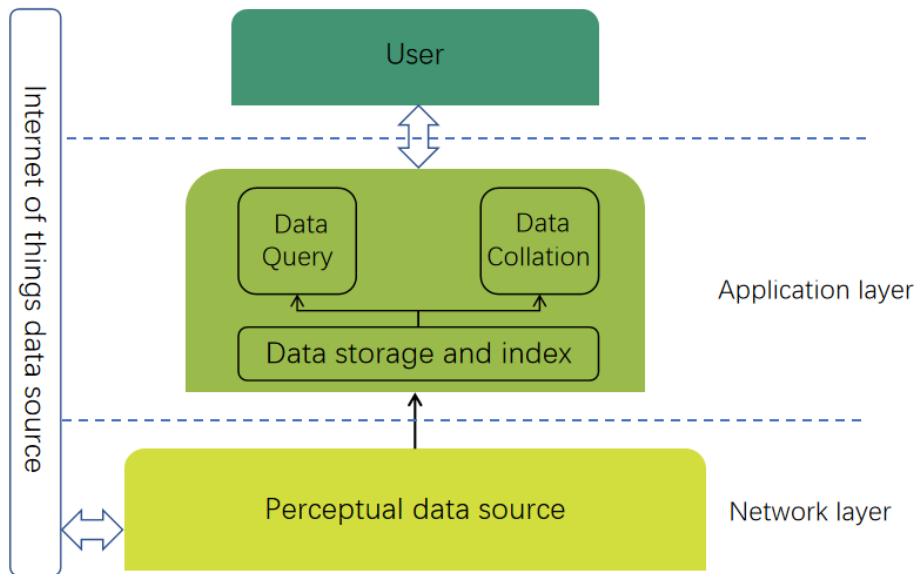
Figure 1. Management mode of SINK network data management technology

SINK IoT network data management technology is a fully distributed information operating system without scope framework and center data nodes consisting of a large number of low-cost network data computing nodes with high computational ability. The system can conduct autonomous intelligent management on the PC and the network cloud information center in an unattended environment. In the SINK network data management system, the management is located in the network layer of data collection and the application layer of data storage. The network layer can provide the latest real-time item data of the IoT, and collect and process data. After the processing is completed, the processing results are sent to the application layer that mainly inquires and processes the IoT network data, then sends the data to the database of the application layer for system storage. The database itself provides index permission entry, so the database administrators or users can access the IoT information according to their own needs.

3. Actual Application of SINK Network Data Management Technology under the Background of IoT

3.1 Establishment of IoT Information Data Model

In the real world, the data model is the most important representation of the characteristics of data itself. While in the field of network information technology and IoT, the data model is a direct and accurate description of the internal data of the database, with the consistency and integrity of the network data information as its focus. Although traditional network databases or related management technologies can establish business-oriented or transaction-oriented network information data, SINK IoT network data management system can not only establish the above two network data information models, but also can perform deep processing of the data model according to time series, and establish comprehensive data models with the same data characteristics by modifying the file information format, as shown in Figure 2:
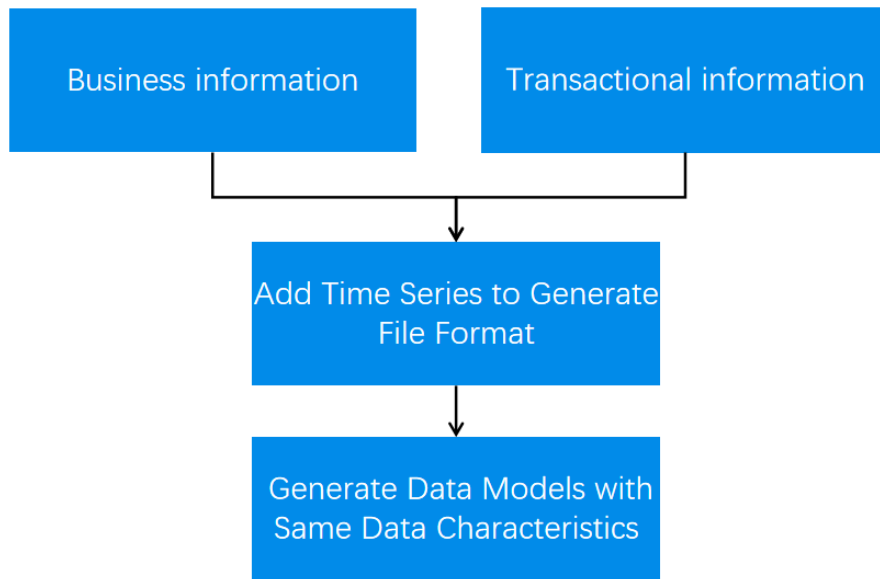
Figure 2. Schematic diagram of data model construction

For the end users of the IoT, they do not need to care about the details of the distributed processing of the IoT information model, but directly enjoy the IoT information. If the users want to write a relatively complicated commodity information model by themselves, the staff of SINK IoT network information management system can provide relevant material processing for them to establish a targeted commodity information model. Objectively speaking, the commodity information model in the IoT must be a simple and flexible data set which allows the users to freely write, without caring about how the IoT information platform maps and executes the programs of data set.

3.2 Concentrated Distributed Storage of IoT Center Data

In the SINK IoT network data management system, all the storage and actual operations on IoT information data are provided in the form of information services, while the IoT information models for storage and operation are diverse. Therefore, the data storage technology for IoT data management must support distributed transmission with the features of high transmission rate and high throughput rate. In order to meet the needs of different types of IoT data models and their transmission and storage, SINK IoT network data management system adopts distributed data storage setting, so that the reliability of the transmission of IoT network data can be effectively ensured. That is, three backups of each IoT data will be saved in the system before transmission, and all the modifications on the IoT data will be performed on the backup data, and the system logs and the unified version number will be generated to distinguish the data usage time and ensure the data unity. Because there are multiple logical server terminals in the SINK IoT network data management system to provide data indexing service for a large number of IoT users, while the distributed data storage mode of the SINK data management system can utilize multiple logical servers for data storage and transmission, which solves the enormous storage of the IoT data.

3.3 Analysis and Management of IoT Data Information

The fundamental application of SINK IoT network data management technology is to provide users with efficient services based on IoT information. Therefore, in addition to IoT information storage, system management services should be provided. The biggest feature of SINK IoT network data management system is that it can perform massive reading and analysis of massive IoT data, and its overall rate is higher than the upload rate of IoT information. The SINK IoT data management system adopts column-based storage mode in modern distributed database to manage data. That is, the IoT information is divided according to the list and then stored, which is the most advanced data management mode.

3.4 Virtual Optimization of IoT Data Center Server

The virtual optimization of the IoT network data center server is an important application of the SINK IoT data management system. In modern IoT data transmission and application, the most important purpose of IoT data management is to integrate Internet data resources and transmit them to users in the form of data models or services. If virtual optimization is not performed on the important storage database of IoT, data conflicts are bound to be caused between different application demands and different data servers, which will lead to an extremely high and unbalanced actual application rate of the database CPU. SINK network data management technology can deploy different IoT application data in logical servers.

4. Summary

The application of SINK IoT network data management technology can effectively solve the rapid growth and insufficient data management ability of IoT data. From the perspective of data management, SINK IoT data management technology is a combination of access technology of massive data, distributed storage technology and overall management technology. From the perspective of application, SINK IoT data management technology can not only effectively analyze and process data, but also can promote the development of the IoT, thus it is a vital research topic.

References

[1] Hossein Nahid Titkanloo, Abbas Keramati, Roxana Fekri. Data aggregation in multi-source assessment model based on evidence theory[J]. Applied Soft Computing. 2018.

[2] Edwin Prem Kumar Gilbert, Baskaran Kaliaperumal, Elijah Blessing Rajsingh, M. Lydia. Trust based data prediction, aggregation and reconstruction using compressed sensing for clustered wireless sensor networks[J]. Computers and Electrical Engineering. 2018.

[3] Rezvani, M, Ignjatovic, A, Bertino, E, Jha, S. Secure Data Aggregation Technique for Wireless Sensor Networks in the Presence of Collusion Attacks[J]. IEEE Transactions on Dependable and Secure Computing. 2015 (1).

[4] Suat Ozdemir, Yang Xiao. Integrity protecting hierarchical concealed data aggregation for wireless sensor networks[J]. Computer Networks. 2011 (8).

[5] Shilei Sun, Antonio J. Talló, n-Ballesteros, Dragan S. Pamu & ccaron, ar, Feng Liu, Wei-Dong Fang, Wei He, Zhi-Wei Gao, Lian-Hai Shan, Lu-Yang Zhao. Analysis of NGN-Oriented Architecture for Internet of Things[J].Frontiers in Artificial Intelligence and Applicat . 2016.