Design and Analysis of a Universal Cloud Storage and Internet of Things Data Service Platform

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Abstract. The Internet of Things combines the information network composed of sensor nodes, radio frequency and other detection tools, and realizes the interconnection and intercommunication of human society and physical systems on the Internet platform. The Internet of Things technology can be widely used in various fields of life, life and production management, the method will be greatly improved, the scale of management will also increase, and the productivity and resource utilization will also increase. The use of cloud computing is the development trend of the object-oriented Internet. This article mainly studies the design and research of the general Internet cloud platform system.

Keywords: Internet of Things · Cloud Storage · Data Service Platform

1 Introduction

In recent years, the Internet of Things has attracted the attention of all walks of life in a short period of time, but the concept and characteristics of the Internet of Things are still unclear. The research and development of the Internet of Things at home and abroad is still in its infancy. The standard system model of the Internet of Things and The structure has not yet formed, and my country is still far behind foreign countries. This is due to the weak integration capability of large-scale application systems, the basic bottleneck of the information industry and the lack of basic technology in certain technical fields. Compared with the international advanced technology, our country is at the low end of the industrial chain.

2 Overview of the Internet of Things

The Internet of Things is the future development direction of ICT. It is considered to be the development of the information industry after ICT and the Internet. The Internet of Things (IOT) is a global real-time information sharing system based on RFID technology and EPC standards. The Internet of Things has gradually become a collection of traditional networks and sensors. Dedicated wireless network and ubiquitous computing technology in one information and communication technology.

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The breakthrough of the Internet of Things technology and the development of China's emerging industries are facing huge opportunities. In terms of technology, my country's network communication technology can become the world's leading network communication technology on the basis of its existing capabilities during the comprehensive expansion of the Internet of Things communication. In the industrial field, IoT applications will create new markets and formats, such as application infrastructure services, M2 application services, industrial IoT, etc., and will promote the transformation and modernization of IoT-related industries such as RFID and sensors. The cultivation of enterprise groups has created good conditions and brought huge expansion space for intelligent processing enterprises, software and integration enterprises, servers, and communication network equipment.

3 Overview of Cloud Computing

Cloud computing is a new concept based on the Internet. It usually contains dynamic virtual resources and can be easily expanded. Therefore, its services can be easily added, delivered and used on the Internet. The concept of cloud computing is used to describe large-scale networks. Calculation. When the concept of cloud computing was introduced to China, the telecommunications network was called the cloud. However, the coverage of cloud computing has expanded, ignoring the Internet and its infrastructure. The Internet is also considered a part of the cloud. The definition of cloud computing can be divided into a narrow sense and a broad sense. One is to provide services in accordance with demand and expansion mode, called cloud computing. It has a wide meaning, usually refers to the services and services provided through the network according to demand, and the scope of these services It is very broad, including software, the Internet, that is, the computer as a commodity [2].

4 Based on Multi-channel Data Integration Technology

4.1 Smart Sensor Equipment

Compared with ordinary sensors, smart sensors have the following advantages: complete functions, application software technology can improve the accuracy of information collection, a good smart sensor is a set of microprocessor sensors and instruments with embedded communication and diagnostic functions, The monitoring system or operators provide information to improve efficiency and reduce maintenance costs.

With the development of semiconductor technology, the electronic automation industry has made great progress. The advancement of smart sensor technology has been strongly encouraged by many well-known companies and universities at home and abroad to actively develop and produce smart sensors with higher integrated performance and better performance. Good results have been achieved to a certain extent. In the field of household smart sensors, the pt600 series sensors have good results. The developers have used the world's advanced sensors and transmitter integrated circuits and accessories. In terms of production technology, the military production line has high precision. It has good stability and good performance. According to the specific needs

of users, the product can be re-developed with high-performance single-chip microcomputers to improve production efficiency. Smart sensor is a sensor that can simulate the activities of biological senses and mental organs. It uses microprocessors and intelligent programs to coordinate work. After production is completed, a large number of experiments are required to determine the stability of the effect. It can be used as a more Independent intelligent processing unit reduces hardware requirements and improves detection performance. It has the following five functions:

(1) It has the functions of information storage and transmission. Sensors are usually scattered in a grouping system, which imposes high requirements on the control system. In order to improve the control capability of the system, smart sensors only need the communication function as a unit. On the one hand, it needs to accept the order of the control center; on the other hand, in order to realize the necessary functions, it needs to collect and process the data and information transmitted to the control center.
(2) Automatic calculation and compensation function. The smart sensor has the functions of automatic calculation and automatic compensation. It only needs to ensure that the sensor signal can receive its own calculation function, thereby reducing the pressure on the central data processing system.
(3) Automatic detection and automatic calibration. When the sensor is faulty, the smart sensor will automatically diagnose, the data can be viewed online, the internal calibration program can also correct the logarithmic data under the action of the microprocessor, especially EPROM greatly improves the effect of the smart sensor, ordinary sensors do not belong to this In this case, it can be replaced or repaired on site only when there is a problem.
(4) Composite detection function. The most common natural signals are electricity, sound, force, light, heat, chemistry, etc. The signals must be detected with very sensitive detection performance. Sensitive sensors can detect these signals in two ways. Smart sensors can measure various chemical and physical quantities at the same time, and the information obtained can more comprehensively reflect the information of the detected substance. This sensor can simultaneously measure the acceleration, velocity and displacement of a point on the object.
(5) Intelligent sensor integration function. Integrated smart sensors are the work of integrated functional circuits. Due to the continuous improvement of IC functions, integrated circuits with certain functions are placed in smart sensors to provide related functions for sensor data processing. This kind of smart sensor has many aspects. First, it has a high signal-to-noise ratio. The sensor signal can be amplified by an integrated circuit during the transmission process, thereby improving the signal-to-noise ratio. The integrated circuit and the sensor are integrated on the same chip, and the zero point, temperature drift and zero point drift of the sensor are calibrated through the automatic calibration unit, which greatly improves the working efficiency of the sensor [3].

4.2 Sensor Network Design

(1) Overall design of sensor network
The sensor network is a task-based network. Users do not need to send information to nodes, but directly query the events involved in the sensor network. The network will return the information of specific events to the user. This way of querying or transmitting information is closer to humans. The way of communication between people. Therefore, the sensor network is usually considered as a data-driven network. In the sensor network, when the sensor node is constantly changing, the tracking target node can appear in any position. The sensor network is very sensitive to the location and event information of the target, and the time of the moving target and location information is provided by different nodes. Different sensor network characteristics must be considered when developing sensor network applications. Only when sensor network systems can meet the requirements of actual applications can performance be improved. Unlike general networks, sensor networks need to study the characteristics of sensor networks. Special technology.

There are many different applications of wireless sensor networks. Wireless sensors can work normally for a long time under special environmental conditions, and can detect environmental changes without frequent maintenance or additional power supply. The applications of line sensor networks include traffic monitoring, video surveillance, and air traffic control, Automobiles, robots, industrial automation and home health monitoring.

5 Virtualization and Load Balancing Technology of Middle Layer Provide Private Cloud Implementation

5.1 Introduction of IaaS Platform Based on Cloud Computing Technology

(1) Introduction of IaaS platform
Consumers can access the Internet through complex IT infrastructure, which is called infrastructure as a service. Internet services such as storage and database are part of Iaas.

(2) Application mode of IaaS platform
The New York Times is an example of IaaS, which can process hundreds of EC2Amazon instances within 36 h. Without EC2, the New York Times may take days or even months to process the data.

IaaS can be used for both private and public purposes. An IaaS service provider is a shared infrastructure that does not include CPU cache, GPU, and other components. The entire server is open to attackers, even with hypervisors, some clients The operating system can also access the underlying platform without control.

(3) Use cloud computing technology to build an IaaS platform
According to the authoritative definition of NIST, cloud computing has three service models: SaaS, PaaS and IaaS.

① SaaS: Users can use cloud computing infrastructure to provide various services on the client interface, and cannot directly access cloud computing infrastructure, including servers, storage, operating systems, and networks.

② PaaS: In this service mode, users do not manage or control the underlying infrastructure. Operators can deploy application development processes according to user needs in the cloud computing infrastructure layout development environment, and users can also deploy application development processes according to their own needs. Without affecting the underlying infrastructure. The environment configuration and business plan must be managed by the operator to save development and testing costs.
③ IaaS: Users can access basic computing resources such as storage, processing, and networks, and can deploy and operate software, including applications and operating systems, on the overall infrastructure provided by operators according to their needs. However, it is the operator's responsibility to manage or control the cloud computing infrastructure, and users may be restricted by the control of network components when selecting operating systems, deploying applications, and deploying storage space.

5.2 Design of Massively Parallel Computing Processing Framework

Parallel processing is a calculation method that can use two or more processors at the same time. These processors can handle all aspects of the plan. The main purpose of this method is to solve complex large-scale calculation problems. Program parallelism is the first step in using parallel algorithms. This step is mainly to distribute certain parts of the program to different processors in parallel. Parallel processes are not automatic and require manual scheduling. Single-processor programs are usually slower than multi-processor programs. At present, in the fields of large-scale database management, crime control, artificial intelligence, weather forecasting models, and scientific research, parallel computing technology is relatively mature, and parallel algorithms are the main foundation of parallel computing programs. Algorithms, parallel languages, hardware and software are the physical content of parallel computing.

The following strategies should be followed in the process of algorithm design of parallel computing technology.

Divide and conquer algorithm: decompose the whole job into multiple jobs, search multiple jobs on multiple processors, find out the topological work order of multiple jobs, and then execute them in turn.

Reordering: reordering all parts of an algorithm using dynamic or static programming statements (Fig. 1).

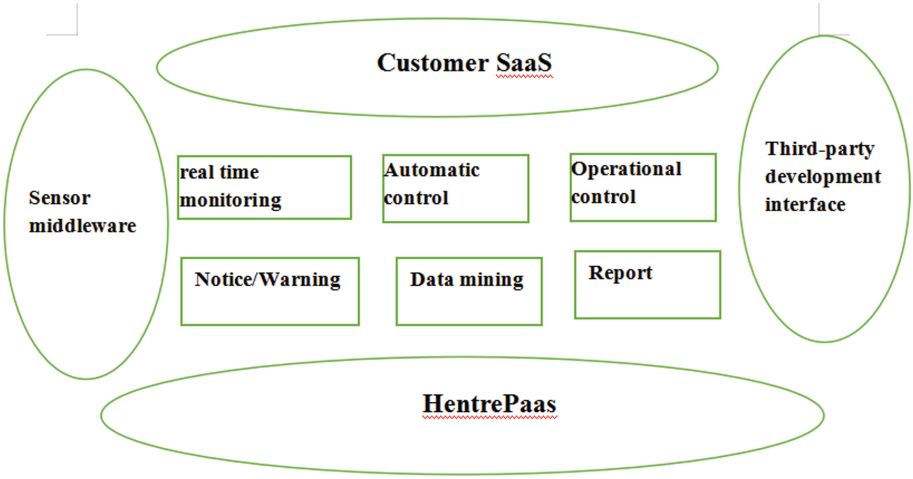

Fig. 1. Overall framework of data service platform

6 Design of Data Service Platform

6.1 Customer SaaS Design

(1) Introduction to SaaS Design

SaaS is a new software application mode. With the development of application software and Internet technology, it is similar to application service provider, on-demand software and management software. The software service is provided by users through the Internet. The core software is deployed on the development server. Customers must provide developers with their actual needs and order the required software services. Suppliers must provide services to customers through the Internet. Service fees are charged according to users' service life. Users do not need to maintain the software, We only need to manage the company's business activities through the web software provided by the supplier, and at the same time, we only need to purchase the software once.

(2) Customer SaaS feature design

① Configuration and customization

In order to meet the public demand, the customer modifies the application interface to make the application look like the customer's brand. Many applications serve as the customer's brand icon to serve the customer. However, unless this option is initially designed, the customer cannot change the page layout [4].

② Accelerate function delivery

SaaS is usually updated faster than traditional software applications, usually weekly or monthly, because the applications are centrally managed, so new distributions can be placed directly on the applications without requiring customers to install new software.

③ Open integration protocol

SaaS can't access the company's internal system, so most SaaS provide integration protocols and APIs running on WAN. API usually uses HTTP, rest, soap, JSON and other technologies. The popularity of SAAS and the standardization of other Internet services, as well as their AP technologies, lead to the development of mashews, which combines the data, representation and functions of multiple services.
④ Collaboration
Inspired by social networking services and other Web2.0 features, many SaaS provide users with the ability to collaborate and share information.

(3) Design of SaaS CRM
According to the actual demand and the research of existing products, this paper thinks that CRM based on SaaS should have the following characteristics:

① Customer service, customer management, e-sales, viewpoint management, time management case, sales management and contact management are the basic functions of CRM software under SaaS mode. These software also include e-commerce, knowledge management, business intelligence, call center, partnership management, etc. Usually, each company has different requirements. A software service should be able to target multiple companies. Some companies are limited by the scope of business and can only use a few modules, while others need all module functions. For the first simulation test of the same module, different companies have different requirements. If foreign companies are involved, In CRM customer service, the time display format must be considered. Therefore, SaaS software should provide various customer selection interfaces.
② Different business logic uses the same function module. Customer relationship management system is composed of several functional modules, each module has different operation logic, but the business logic of the same functional module is different, and the business requirements are also different. For example, the monthly sales performance of manufacturing and retail industries is mainly based on weekly sales and monthly sales, and there may be differences between different business logics. The first simulation test of saascrm should provide different business logics and services in the same module. Enterprises can define and modify client business logic.
③ Data Hosting: the company's official data is stored in the database, which can better solve the problem of company data leakage when users use the software.
④ Independent data backup for users: the system shall facilitate users to backup data to the computer, and solve the problems that users worry about, such as software termination, non return of data by suppliers or some software, enterprise data storage, etc. (Fig. 2).

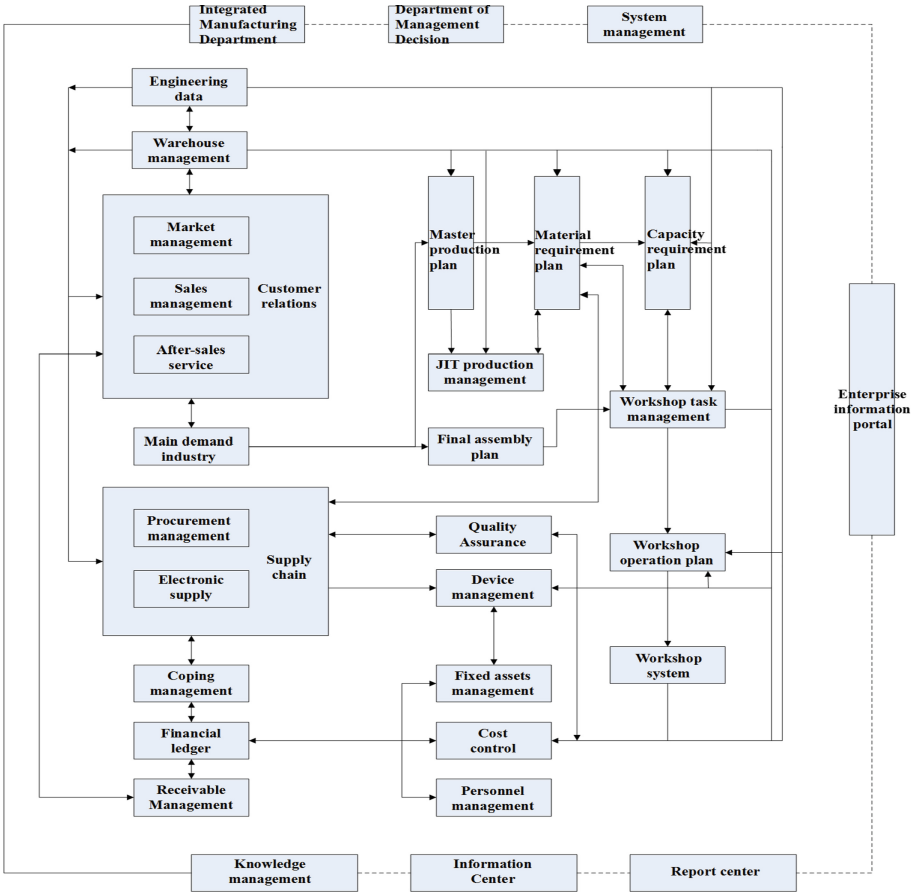

Fig. 2. CRM framework of SaaS mode

6.2 Design of Wireless Sensor Network Middleware

Different from traditional networks, wireless sensor networks have the characteristics of communication bandwidth, power consumption, limited storage and computing capabilities, heterogeneous nodes, and dynamic topology. It is not easy to construct and apply in a dynamic and complex distributed environment. Middleware technology is packaged through the bottom layer. The concept provides programmers with a new high-level abstract method. A comprehensive solution should include a mechanism for effectively using system resources and an operating environment. It is expected that the environment will be able to run multiple applications and support data integration and planning goals. Adaptive monitoring, standardized service support and collaboration of management strategies [5].

(1) Design of wireless sensor network middleware system

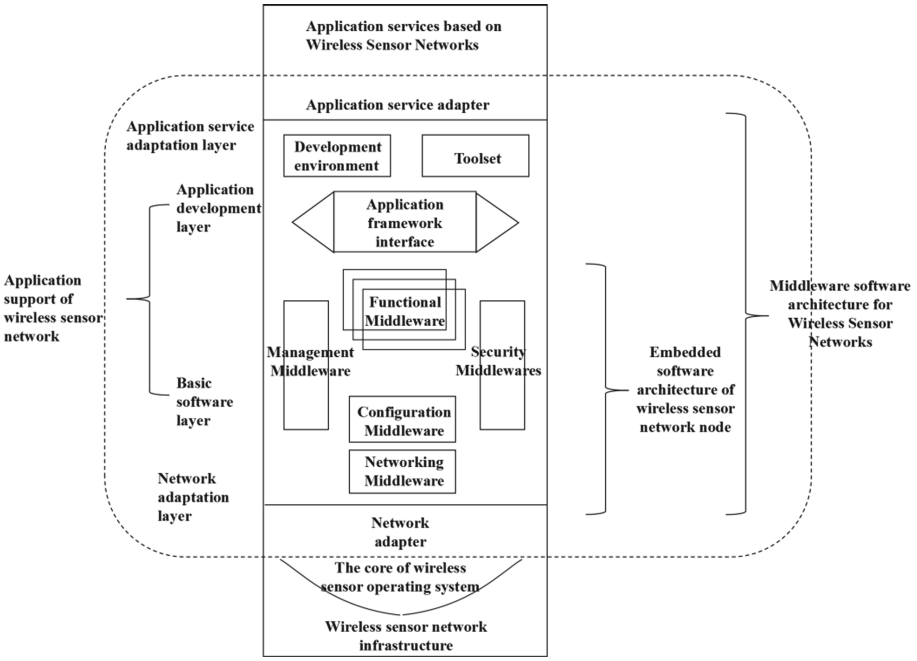

Fig. 3. Middleware software architecture of wireless sensor network

The software architecture of WSN middleware is shown in Fig. 3, which is mainly composed of network adaptation layer, core layer, application development layer and application service adaptation layer.

① Network adapter layer. In this layer, the network adapter implements the underlying network encapsulation.
② Core software layer. The core software layer includes a series of middleware components with flexibility, modularity and portability.
③ Application development level. The application framework interface provides the description and definition of various functions of WSN, and the specific implementation is provided by the basic software layer.
④ The adaptive layer of application services. The application service adapter layer encapsulates various application services and solves the problems of core software layer changes and inconsistent interfaces.

6.3 Third-Party Development Interface Design

A successful platform requires cooperation or access with a third-party platform. This cooperation is mainly achieved by calling the other party's interface. In order to adapt to different applications, a large number of auxiliary development interfaces have been added to the platform system to support the development of third-party applications.

During the design and development process, a lot of customization and testing of the interface were carried out.

① Determine which interfaces are needed: Determine the specific function of each interface, and these characteristics will not overlap.
② Interface design and detailed analysis: determine the sending parameter name, parameter, data type, length and accuracy, receiving parameter name, parameter, data type, length and accuracy, and data format of each interface.
③ Code: This design does not directly use other system interfaces in different parts of the program, but writes a class to encapsulate other system interfaces. If other systems have many interfaces, you can build a special project or package to deal with, such as interface changes, you can limit the changes to the minimum. When a data failure occurs, you need to find the root cause of the problem, especially when the other system interface does not write the log, and the data exchange process for receiving data from another interface is complicated. At the beginning, there are a lot of second-hand data that are difficult to express. When calling each other, write log data into the interface. Some of the generated data is problematic, while others are caused by problematic data. For data verification and execution failure, a clear reminder is designed for the caller Li, Dai, [1].

7 Concluding Remarks

Data service platform is a very feasible data processing system. Firstly, it uses SaaS to process users. Secondly, it is a programming system platform that can be developed by a third party. The design method is flexible, and the software and hardware functions can be expanded, upgraded and programmed, the system calls the data collected by various sensors, including data memory and program memory, and also has optional additional processor peripherals. Due to the flexibility of the overall design of the system, the development process of the platform system can be accelerated.

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