

# Architecture Design of Large-Scale Production of Edible Fungi Based on Cloud Service Platform

Zhongyi Bai, Lei ZHAO

Jilin University, Changchun, Jilin 130062, China

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**Abstract:** In view of the quality and safety issues of the edible fungus industry, based on the relevant technical regulations of edible fungus GAP and safe production, combined with modern information technologies such as cloud platform, two-dimensional code identification technology, mobile Internet and other modern information technologies, the edible fungus safety production management and quality traceability system has been developed. Practical application in production. Guided by innovation and entrepreneurship, this paper studies the choice of e-commerce platform for edible fungi, and discusses the marketing of edible fungi products under e-commerce environment in detail. According to the characteristics of short production cycle and high output per unit area of edible fungi, the information management system of edible fungi industrialized production is designed, the product coding, production archives, material input detection and warehouse information database of edible fungi production link are established, and the traceability query module is set. Consumers and relevant management departments can understand the production process of edible fungi through traceability query, Ensure the standardization of the production process of edible fungi in all links. The overall architecture and main operation process of the edible fungus agricultural product quality traceability system based on the cloud platform, and the key technologies such as module functions, business logic, and coding rules are described.

## 1. Introduction

At present, China's agriculture is mainly divided into plant planting, animal breeding and edible fungi cultivation. Among them, the planting industry is called green agriculture, the mariculture industry is called blue agriculture, and the edible fungi are called white agriculture [1]. There are many kinds of edible fungi. At present, there are 16,000 kinds of fungi in my country, including nearly 1,000 kinds of edible fungi, and about 200 kinds are widely eaten [2]. In order to ensure the healthy and orderly development of edible fungi industry, first, it is necessary to formulate technical regulations and quality safety system for standardized cultivation and production, so that there are laws to follow for standardized pollution-free production of edible fungi, and to ensure that all indexes of products meet the requirements of domestic and foreign markets [3]. Second, through the establishment of market access system and product quality and safety traceability system, we should strengthen safety testing, improve the supervision system, and implement "green action" to ensure product quality and safety [4].

Edible fungi, as an important agricultural product, have also become an important part of innovation and entrepreneurship. They have also developed vigorously with the construction of agricultural modernization. At the same time, some social funds have also increased investment. College students and migrant workers have returned to their hometowns to start businesses and develop the edible fungi economy. The transformation and upgrading of the bacteria industry has become a trend [5]. The industrialized production of edible fungi is a systematic project, involving biotechnology, automatic control technology, information technology, packaging and processing technology, etc. If any link is not in place, it will affect product yield, output, product quality, cost and benefit [6]. Some industrialized edible fungi production enterprises install automatic environmental control equipment, remotely control the environmental control equipment in

combination with environmental monitoring information, and adjust the production environment, so as to achieve the best environmental indicators for the growth of edible fungi. With the continuous popularization and development of agricultural informatization, it has been gradually applied in all aspects of edible fungi. With the continuous popularization and development of agricultural informatization, it has been gradually applied in all aspects of edible fungi [7].

## 2. Architecture Design

### 2.1 System Business Function Design

The system is designed based on the cloud platform architecture, through the construction of a quality and safety production management software platform that provides individualized application systems and business processes for a single edible mushroom enterprise [8]. The system consists of the management platform of edible fungi production enterprises, client software of enterprise production management, product traceability query system, etc., including peripheral devices such as production image storage and certification equipment, two-dimensional code label printer, cloud storage, traceability and query terminal [9]. When designing the platform, we should first consider the rigorous and orderly sales business process of edible fungus products, and also consider the price requirements, activity requirements and other information changes that individual mushroom farmers may put forward when selling edible fungus products. The main function is to record the information of various inputs and production materials in the production process, including the basic information of the product such as manufacturer, production batch, whether it is qualified, shelf life, etc. The person in charge et al [10]. As a user group of cloud services, their demand is to obtain data information through the cloud platform and complete it in a short time. A cloud service is a virtual service.

It is a service based on the Internet, which can communicate and expand through the Internet, and it is charged through the Internet. The origin of cloud service is mainly because it is a virtual service and connects a series of systems through the network. Visual Studio 2010 with mature technology, good compatibility and strong user adaptability is selected as the development tool for the design and development of the system. NetFRAME takes ork4.0 as the internal component and SQLServer2005 as the database management system. The cloud platform provides data storage services for enterprise data centers and provincial data centers. After the product is on the market, enterprise users report the corresponding product information to the provincial data center for consumer inquiry. Consumers connect to provincial data centers to inquire about product details through various channels (mobile phones, terminals, computers). As shown in Figure 1.

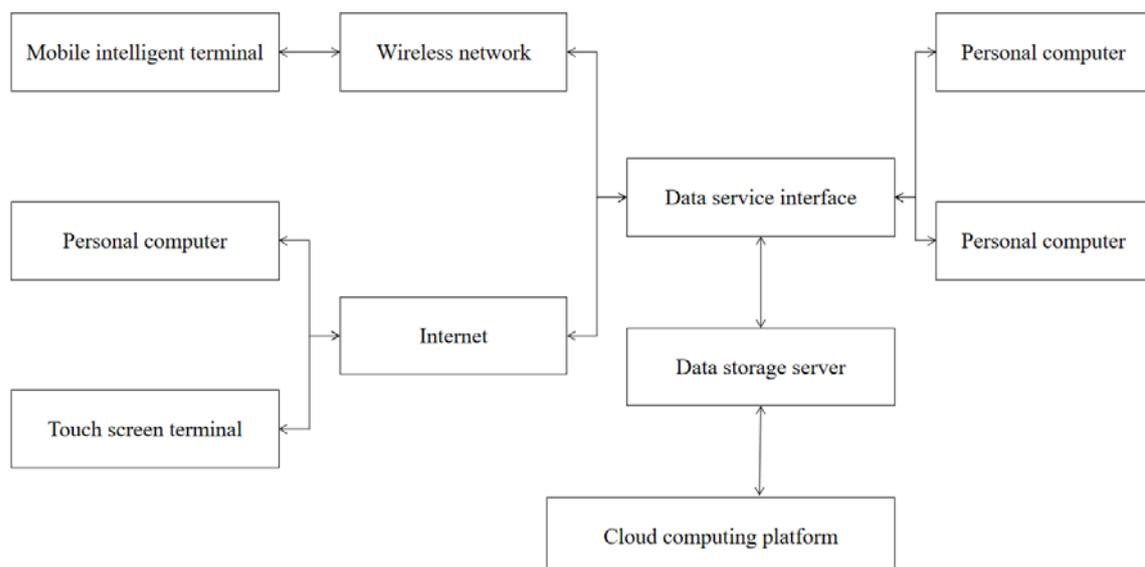


Fig.1 System Hierarchy

## **2.2 Information Platform Construction**

With the advent of the information age, computer and Internet users in China are very extensive. At present, most of the edible fungi industry has realized information management, especially some edible fungi production enterprises and large-scale cultivation bases, which make the production and processing of edible fungi more efficient. Accurate labels of edible fungus products make it convenient for all kinds of users to quickly search for relevant edible fungus products. It can realize the sales ranking function of edible fungus products, provide suggestions on the selection of edible fungus products for various users of e-commerce service platform, and urge mushroom farmers to improve the quality of their edible fungus products. QR code printing management is the core function of the system, which needs to be connected with bar code printer equipment and traceability label paper, and write corresponding modules to call printing programs for printer equipment.

In order to realize the market brand effect of traceable products, the system designed label paper with unified identification, and designed label paper with 40mm×90mm, 35mm×50mm and 35mm×30mm according to different product packaging specifications. Most of these systems are maintained and managed by their own technicians, or used by purchasing the services of the H party. Due to the limited scale and technology of edible fungi enterprises, it is relatively difficult to maintain and upgrade these systems. Once there is a problem in a certain part of the system, the whole system will not work normally. After having relatively stable sales and popularity and certain experience, we can enter other e-commerce platforms, and then learn the way of trading and sales on the new e-commerce platform. In this way, we can learn faster, save time, and apply what we have learned immediately. The cloud service platform has a service platform called IaaS platform. The current software system and server can improve the operating environment and manage the software system through the IaaS platform, which solves the problem of high cost of enterprise software. At present, the software can run safely and efficiently with the interactive architecture of cloud service platform, which is a problem that needs to be considered at present. Cloud service platform should give full play to its advantages to provide personalized services for edible fungi production, ensure the safe and efficient operation of system software, and meet the needs of edible fungi production enterprises, and focus on optimizing system services by interactive architecture of cloud service platform for large-scale production of edible fungi.

## **3. Research on Multi-Source Heterogeneous Massive Data Management Architecture of Edible Fungi Internet of Things**

### **3.1 Research on Metadata Management of Edible Fungi Internet of Things Data**

In different professional industries, the specific meaning of metadata may be different, but its essence is the same. Metadata actually refers to the integration and management of data. It needs to encode the applied data and information according to certain rules to form an own system. The production management module includes five sub-modules: basic archives, raw material management, warehouse management, fruiting management and system management. The raw material management sub-module provides enterprises with raw material management and processing functions in the early stage of edible fungi production, such as raw material warehousing, picking, bagging, bagging and sterilization. As an online trading website, the e-commerce service platform for edible fungus products serves ordinary consumers, mushroom farmers, edible fungus sellers, edible fungus suppliers, edible fungus purchasers and edible fungus manufacturers.

Taking the batch as a unit, the quality information of edible fungi related to each production process in the production process is used as the basic data for traceability, and the manufacturer information, production site information, bacterial culture time, etc. are used as the basic parameters to form a unique, acceptable Identify and trace the production information, and store the information in the database. The relevant information is automatically recorded when the position of the batch product is transferred. In this way, relevant information can be queried according to the

traceability code. At present, it is widely used in the fields of meteorological monitoring, environmental control, bacteria rod management, etc. Its types include sensors such as air temperature and humidity, CO<sub>2</sub>, light intensity, soil nutrient, pressure, wind speed, wind direction, rainfall, evaporation, speed, direction, water temperature, etc. Metadata expression of sensor nodes in the Internet of Things of Edible Fungi takes sensor nodes as digital expression objects based on cloud service platform, specifically as follows: sensor node = (sensor baseinfo, sensor field dim, sensor field, sensor value) sensor baseinfo is the basic description information of sensor nodes. SensorField is the meaning of sensor node acquisition value, SensorFieldDim is the dimension of sensor node acquisition value, and Sensor Value is the sensor node acquisition value. The specific contents of the dictionary are shown in Table 1.

Table 1 Data Description And Dimensional Dictionary of Common Edible Fungus Sensors

Name	Company	Name	Company	Name	Company
Air temperature	°C	Soil temperature20CM	°C	Water level	m
Air humidity	%	Soil temperature40CM	°C	Water conductivity	Ms/cm
Light intensity	KInx	Soil moisture20CM	%	Water salinity	Mg/L
CO <sub>2</sub> Concentration	%	Soil moisture40CM	%	PH Value of Water	Nothing
Wind speed	M/s	Soil salinity	%.	DBH	cm
Wind direction	Nothing	Evaporation capacity	Kg/s	Soil conductivity	mS/cm
Rainfall	mm	Soil pH value	Nothing		

### 3.2 Research on Data Service Architecture of Large-Scale Cloud Service System for Edible Fungi

The distributed data sharing platform of multi-source edible fungi Internet of Things (hereinafter referred to as the platform) adopts the distributed service-oriented architecture, and divides the sensor data management process into four core links: sensor node smart book, data adaptive access, data storage and data release. Each link is its own system (platform subsystem, hereinafter referred to as the subsystem), and the subsystems interact with each other through the data bus based on the data interaction format. The advantage of this structure is that each subsystem has a clear division of labor and clear thinking. When accessing massive data, it can distribute the load balance to each link, improve the load capacity of the platform, reduce the symmetry of each link and facilitate expansion. The key to the interactive architecture of cloud service platform for large-scale production of edible fungi is to solve the technical support required for the migration and management of existing application systems, data information analysis and application, and the environmental security of system operation.

The data center is based on the cloud computing platform, and has the functions of production data collection, classification, storage, recording, processing, statistics, analysis, management, retrieval, query, application and other functions covering the entire production process of edible fungi, so as to meet the needs of enterprises, consumers and consumers. The needs of different types of users in government functional departments. The system configures the dongle information according to the enterprise registration information, and encrypts the information. The system automatically reads the dongle for verification during the running process. It can be used after the verification, otherwise an error report will pop up. The file upload sub module provides large file upload services for image certificate storage, detection report and data presentation. The system uses the global static object to cache each new access data in the form of key value. This storage method can avoid the interaction with the database when querying real-time data, and greatly improve the query speed of real-time data. In order to speed up the query of historical data, each data table sets indexes for the time field and Sn field. The data service platform serves as the core and function of edible fungus large-scale cloud service platform, and provides basic data and service support for various intelligent models and business application systems based on the platform.

#### 4. Conclusions

Constructing a large-scale cloud service platform for edible fungi can solve the contradiction between the demand and investment in the field of production and technical popularization of edible Chinese yam, provide the demand for users at all levels, and provide a solution for low-cost and rapid construction of the edible fungi business application service system. During the trial operation of demonstration enterprises, there are still some shortcomings of personalized applications, which need to be further rectified and improved to meet the application needs of different enterprises. From the national level, we attach great importance to innovation and entrepreneurship. We have successively issued a number of documents and policies to support innovation and entrepreneurship, strengthened support and services for science and technology-based small and medium-sized enterprises, and raised the innovation and Entrepreneurship of the whole people to a higher level. The system's traceability query module allows consumers and management departments to understand the production process of edible fungi through traceability query to ensure the standardization of the production process of edible fungi in all aspects. The system uses indo with s XP platform, SQL Server database, Visual Studio.NET 2008 development environment and C# development language to realize the safety management of edible fungi production information, which provides the basis for the quality and safety control and traceability of edible fungi transportation, processing and sales. In view of the particularity of large-scale production of edible fungi, the interactive architecture of cloud service platform should comprehensively consider the product function and service quality, and at the same time meet the needs of edible fungi enterprises, minimize the system operation and maintenance costs.

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