

## Design and Implementation of Web-Based Food Regulatory Information Resources Management Platform

Wenya Tian

Information Technology Department, Zhejiang Economic & Trade Polytechnic Xiasha Higher Education Park, Xuelin Street NO.280, Hangzhou, China

*twy@zjiet.edu.cn*

Received June 22, 2010; Revised January 11, 2010

Food security has become one of the heated issues in society because of the frequent occurrence of food security incidents in recent years. So far all regulatory agencies in Hangzhou have established their food regulatory information systems. However, because of the mutual independence and heterogeneousness among these systems, it is hard to share the information and to take concerted steps among regulatory agencies, and this caused some vulnerability management. Thus it is necessary to establish an integrated information resources management platform for food regulation in order to enhance food security regulation. A web-based Food Regulatory Information Resources Management Platform is designed and implemented in this paper. It is a new attempt in the field of food security regulation.

**Keywords:** food security; information sharing; integrated; platform.

---

### 1 Introduction

In the past few years food security incidents have been happening frequently. Defective food in those incidents caused great harm to the health of people and had a bad influence on the public. Improving food security regulation and supervision has become one of the important tasks for food security regulatory agencies. At present the food Regulatory system divides the work according to the food chain. Each food regulatory agency regulates its own part mainly and cooperates with each other by taking charge of food security jointly. Because of the mutual independence and heterogeneousness among these systems it is hard to share the information and take concerted steps among regulatory agencies, and this caused some vulnerability management. With the development of e-government each food regulatory agency in Zhejiang province has established food regulatory information systems, respectively, but these systems are independent and heterogeneous. Therefore it is necessary to establish an integrated Food Regulatory Information Resources Management Platform in order to improve food security Regulation and realize the Regulatory information sharing.

## 2 Overall framework

The overall framework of this web-based Food Regulatory Information Resources Management Platform is divided into 5 layers. The information security and the system operating & maintenance management have also been considered [1]. The overall framework of the platform is shown in Figure 2.1.

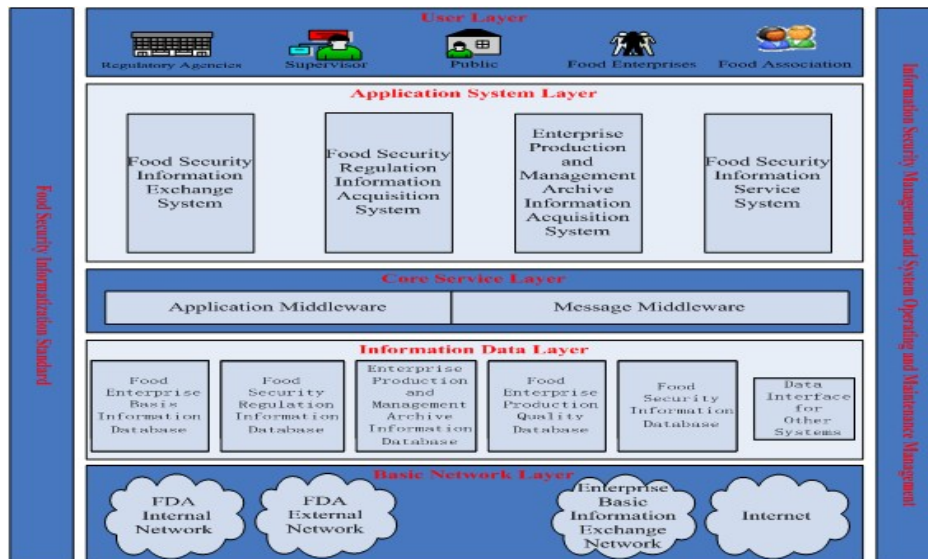


Figure 2.1: The overall framework of the platform

The basic network layer consists of FDA (Food & Drug Administration) local network (internal), FDA local network (external) and Enterprise basic information exchange network, and computers, operating systems, database systems and communication systems that are involved with the platform. The information data layer is the data information center of the platform. The core service layer provides the core service function that can fit different applications and it supports the operation of the applied logic as a basic service platform. The application system layer is mainly used to establish the web-based Food Regulatory Information Resources Management Platform.

## 3 Network structure

To establish and use the platform it is necessary to consider the present network resources of Hangzhou FDA, external network resource of government affairs and enterprise basic data internetwork resources comprehensively in order to realize computer network communication among this platform, food security regulatory agencies and food enterprises.

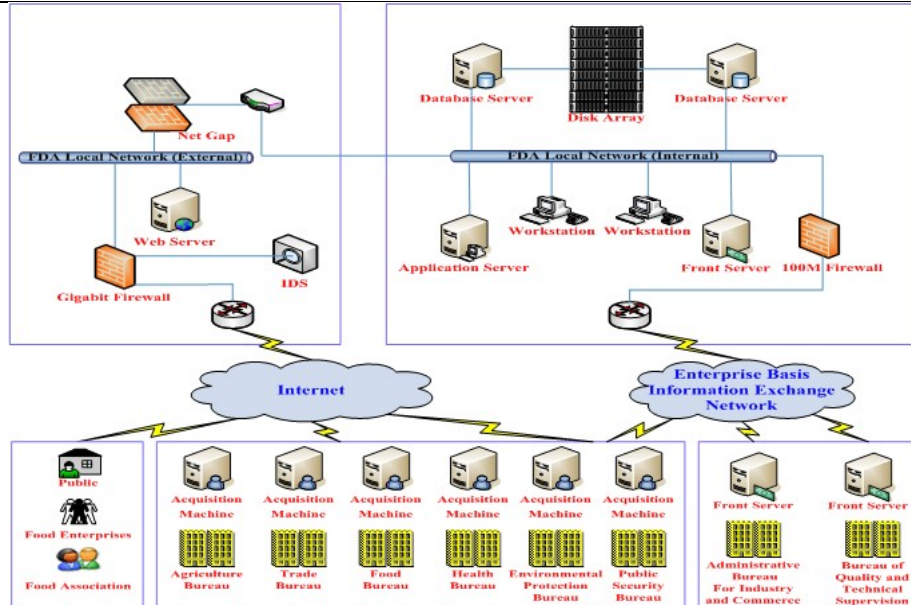


Figure 3.1: The network structure

The network of web-based Food Regulatory Information Resources Management Platform consists of four parts according to the purpose.

(1) **FDA Local Network (Internal)**. It supports the operation of FDA information systems and it is the center of food Regulatory information. The database server, front server and application server are all deployed in this area. A net gap has been used for network isolation between the internal network and external network. The FDA Local Network (Internal) is isolated from the enterprise basic information exchange network by using a 100M firewall.

(2) **FDA Local Network (External)**. The FDA Local Network (External) is used to offer service for the external users. A web server has been deployed here and the food security information service system runs on this server. Moreover there is a gigabit firewall and an IDS system for network defense [2].

(3) **Enterprise Basic Information Exchange Network**. The Hangzhou Enterprise Basic Information Exchange system has been established already. It connects the Administrative Bureau for Industry and Commerce (ABIC), the Bureau of Quality and Technical Supervision (BQTS), the State Taxation Bureau (STB), the Local Taxation Bureau (LTB), the Bureau of Statistics (BS) and the Economic Information Center (EIC). The web-based Food Regulatory Information Resources Management Platform extends the real-time data exchange to some other agencies based on the Hangzhou Enterprise Basic Information Exchange system. The real-time data exchange among the agencies in Figure 3.1 has been implemented by using this network and some servers.

(4) **Internet**. It is used to establish the interconnection between the Food Regulatory

Information Resources Management Platform and external users, which include the public, food enterprises and food associations.

#### 4 Design of food security database

The web-based Food Regulatory Information Resources Management Platform consists of the following five parts and the data interface for other systems.

**(1) Food Enterprise Basic Information Database.** The food enterprise information of this platform is extended as the basis of the Hangzhou Enterprise Basic Information Exchange system. The ABIC, the BQTS, the STB, the LTB jointly take charge of data update and maintenance.

**(2) Food Security Regulatory Information Database.** This database records the Regulation archive information of food security regulatory agencies. The Regulation archive information consists of Regulatory information and industry information. The food security Regulatory information is gathered from the food security regulatory agencies by data interface and data acquisition. The agencies, which have joined the Hangzhou Enterprise Basic Information Exchange system, get the Regulation archive information from food security information exchange system [3]. The other agencies gather the Regulation archive information from the Food Security Regulatory Information Acquisition system.

**(3) Enterprise Production and Management Archive Information Database.** This database holds the food security and some other relevant information in the process of food enterprise production and management. That information is gathered from the food enterprises by the Enterprise Production and Management Acquisition system.

**(4) Food Enterprise production Quality Database.** The Food Enterprise Production Quality Database is designed for real-time track of food quality and sanitation. It is important to establish an effective mechanism to regulate the food security. This database saves the basic information of production and its manufacturer. In the future the dynamic regulatory information will also be saved in this database.

**(5) Food Security Service Information Database.** This database is used by the Food Security Information Service system. It includes the laws and policies about food security, food security knowledge, food quality testing information etc.

#### 5 Application systems

**5.1. The technical architecture of application systems.** The B/S mode and C/S mode are both adopted in the overall technical architecture of application systems: the B/S mode is applied to the Food Security Information Exchange system, Food Security

Regulatory Information Acquisition system and Food Security Information Service system; the C/S mode is applied to the Enterprise Production and Management Archive Information Acquisition system [4]. The B/S mode is implemented by MVC framework based on J2EE. The application logic, process and display logic are implemented by different components by using the design model as MVC [5]. This platform is object-oriented and based on component technology so that the system, which is developed with this platform, has the advantages of flexibility and expandability [6].

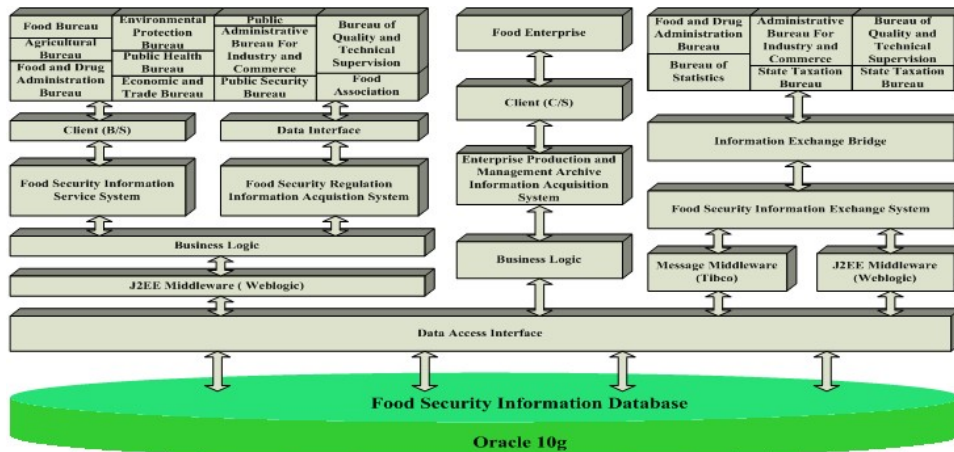


Figure 5.1: The technical architecture of the application system

**5.2. Technical platform selection.** The technical platform selection includes database, application middleware and message middleware selection. The web-based Food Regulatory Information Resources Management Platform has high requirements on the database platform such as stability, expandability, high security, substantial development tools and excellent service quality. Thus the Oracle 10g enterprise version has been considered as the appropriate database platform. From consideration of the cost, compatibility, security and stability, the BEA WebLogic Server has been adopted for the application middleware developing. It builds on the enterprise core, supports SOA and possesses excellent message transmission capability [7]. The Enterprise Message Services (EMS), Business Works (BW) and database adapter of Tibco message middleware production have been selected for the message middleware developing.

**5.3. The composition of application systems.** The application systems consist of the following four parts.

**5.3.1. The design of Food Security Information Exchange system.** The Food Security Information Exchange system is used for exchanging the enterprise basic information, which comes from ABIC, BQTS, STB, LTB, and BS to FDA. It is the basis of the Food Regulatory Information Resources Management Platform, and it has realized the food security regulatory information sharing and exchanging in the existing system of the ABIC and the BQTS. The modules of system are shown in Figure 5.2.

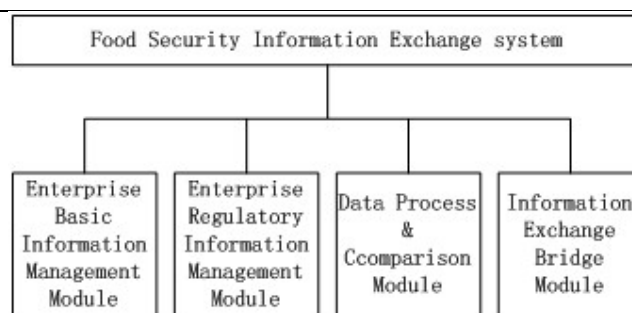


Figure 5.2: Modules of the Food Security Information Exchange system

The Enterprise Basic Information Management Module is used for extraction of food enterprise information. It provides the basic information service for the Food Regulatory Information Resources Management Platform. The Enterprise Regulatory Information Management Module extracts the regulatory information and then sends the information to the Front Server by using the Exchange system. The Data Process & Comparison Module is in charge of information checking and comparison to ensure the integrity and accuracy. The Information Exchange Bridge Module has been settled between the Front Server and internal business system. It supports the duplex data processing and exchanging between the exchange system and the internal information system.

**5.3.2. Food Security Regulatory Information Acquisition system.** The Food Security Regulatory Information Acquisition system is designed for acquisition of regulatory archive information from the Economic and Trade Bureau (ETB), the Agricultural Bureau (AB), the Food Bureau (FB), the Public Health Bureau (PHB), the Environmental Protection Bureau (EPB) and the Public Security Bureau (PSB). It provides the function of inquiry and statistics at the same time. A data interface has been designed in this system for the exchange of regulatory data between the existing application systems of each regulatory agency and this system. This system is implemented by B/S mode.

**5.3.3. Enterprise Production and Management Archive Information Acquisition system.** This system is used for collecting the food security information in the process of food enterprise production and management so that the manufacturer of product and destination of the product can be traced, the information of product can be found and the defective product can be recalled. All of these help the food enterprises standardize their production and management. This system adopts the C/S mode for implementation.

**5.3.4. Food Security Information Service system.** The Food Security Information Service system is the window of food security information service and food security governmental affairs, the platform of on-line cooperative office for food security regulatory agencies and the channel of obtaining food security information for the public.

## 6 Conclusion

A Web-Based Food Regulation Information Resources Management Platform has been designed in this paper. This platform enables food security regulatory information to be shared and collaboration among regulatory agencies becomes easier. This is a new attempt and exploration for improving food security regulation. The platform has been brought into operation for several months and it works well.

## Acknowledgements

The authors thank the Editor-in-Chief and anonymous reviewers for their comments and suggestions. The work is supported by the Science and Technology Department of Zhejiang Province (NO. 2010C33047).

## References

- [1] Wang J, Yu A R, Zhang X Y et al, *A dynamic data integration model based on SOA* [c], ISECS International Colloquium on Computing, Communication, Control, and Management. Sanya: [s.n.], 2009: 196-199.
- [2] Labid K and Venuri V R, *Application of principal component analysis to the detection and visualization of computer network attacks*. Annals of Telecommunications, 2005, 61 (1-2): 218-234.
- [3] Wang Miao, Ling Jie and Hao Yan-jun. *Research and Application of the Security Domain Division Technique in the E-Government System*. Computer Engineering and Science, 2010, 32(8):52-55.
- [4] Zhang Li. *Application of MVC pattern in data middleware*. Computer Engineering, 2010, 36(9): 70-72.
- [5] Yuan Li-xiang and Wang Wen-yong, Luo Guang-chun. *Study on device grid technology*. Computer Applications, 2005, 25(12): 2914-2915.
- [6] Lu Xudong and Wan Jiancheng. *Study of development methodology in web applications*. Computer Engineering and Applications, 2006,42(13): 97-101.
- [7] Michael Girdley, Rob Woollen and Sandra L Emerson. *J2EE Applications and BEA WebLogic Server*. Publishing House of Electronics Industry, 2002. 114-115.



Tian Wenya received her masters degree in Computer Science from Zhejiang University in China in 2006. Her research interests include Semantic Web, Software Platform Technology and E-learning. She is now a Professor in Zhejiang Economic and Trade Polytechnic College, China.