The Design of E-Government Affairs Hall Based on Cloud Platform

Zhang Hongjun

Information Engineering Academy, Shandong Management University, Jinan Shandong, China
ghxyzhj@163.com

Abstract

In recent years, with the continuous development of information technology, people's requirement for one-stop and prompt e-government service is growing. This paper utilized recent years emerged cloud platform technology and proposed an e-government system based on cloud platform, which was designed for the public and had a close relationship with the coordination of government departments and enterprises. The concept of e-government system based on cloud platform was detailed and basic framework was designed on the basis of discussing various types of currently traditional e-government systems. And on this basis, e-government affairs hall based on cloud platform was designed and implemented, the framework of knowledge discovery and data mining subsystem, the framework of cloud data center and the framework of software architecture of this affairs hall were implemented respectively.

Keywords: Web Service, E-Government, Data Center, Cloud Platform, Framework

1. Introduction

E-government system is an information service and processing system based on the Internet technology, which is designed for affairs within government offices, other government agencies, enterprises and the public [1]. The main functions of the government are economic administration, market supervision, social management and public service. And e-government is to make the above four functions electronized and networked and make information reform to the government with modern information technology, so as to improve the level of administration according to law by government departments [1]. In order to adapt to the rapid development of information and communication technology, we will need to redefine the relationship among citizens, enterprises and government, and through the establishment of an "attachable government", realize efficient and convenient transmission for services to citizens and enterprises anytime, anywhere.

That strengthening the construction of e-government platform to enhance the level of government services is significant to promote the reform of administrative system, the supervision on administrative power, the degree of government information publicity, prevent corruption from the source and build a service-oriented government [2]. Governments around the world are constantly launching more electronic services, which until now, are still far from meeting the needs of the people.

This paper utilizes the emerging technology cloud platform to design and implement the e-government system based on cloud platform, which is for the purpose of facilitating resource sharing so that it greatly facilitates various enterprises, the general public and other government departments which are in close contact with the government. Part 2 of this paper analyzed several kinds of currently common e-government, Part 3-4 set out the framework of e-government system based on cloud platform and designed an example of the e-government hall and made analysis to such e-government system. Part 5 is the

conclusion.

2. Classification for E-Government System

E-government is a new application system that government agencies manage and serve the society with network technology. It is a public service platform which integrates modern information and communication technology to reorganize and optimize the structure and work process of the government, thus brings "sunlight" to the government affairs. Therefore, the construction of e-government has become an important criteria to measure the comprehensive strength of a country nowadays [3].

It is of great significance to promote the innovation of government administration by improving e-government construction to realize the informatization of government administration. To establish e-government thus to promote the development of e-government is a worldwide trend and it is an inevitable trend that electronic information technology will be applied to government administration [4].

E-government has an abundant content. In general, we usually make analysis according to the service object; the e-government system mainly includes the following categories: the Government to Government e-government system (G2G); Government to Business e-government system (G2B); Government to Citizen's e-government system (G2C) [5].

2.1. G2G

G2G refers to the e-government between the superior and subordinate governments, governments of different places, and different departments within the government [6]. It mainly includes the following:

1. Electronic regulatory policy system. Mainly to provide legal basis for the government organs and their staff to ensure that there are laws to abide by and the laws are strictly observed. In other words, we are going to show the currently valid various legal systems, laws and regulations, policies and regulations in implementation to all the working staff and government departments.

2. Electronic official document system. To transfer the reply, notification, announcement, reports, notices, application and other electronic documents between government departments or superior and subordinate governments, while ensuring the security of the information; this way, we can improve the government document transmission efficiency and make the government information transfer quickly and conveniently within the same government or between different governments.

3. Electronic judicial file system. Share the judicial information (including prosecution cases of procuratorial organs, the judicial trial case and Criminal Records of public security organs) among the public security organs and other judicial offices, so as to continuously improve the judicial personnel's comprehensive ability and enhance the efficiency of the judicial organs.

4. Electronic financial management system. In order to allow relevant departments and the leadership timely monitor and grasp the financial status, it is to submit the various financial expenditure aggregated in the breakdown list, the appropriation payment data, the income, their related graphics and text descriptions, government budget and the implementation status of all levels each year to the audit departments of all levels, organs of state power and related agencies.

5. Electronic office system. Office workers in government organizations complete the daily office affairs through the electronic network, such as office supplies procurement application, equipment procurement application, daily leave vacation, travel approval, vehicle application, as well as various forms and templates, file downloading, file copy,

and expense reimbursement, *etc*., which are often used during office process; this way, we improve work efficiency and save cost and time.

6. Electronic training system. In order to meet the constantly increasing requirements by the information construction on government departments, we must strengthen trainings on information technology related professional skills for the government organ's working staff, change the original centralized training mode, and provide a variety of different types of online training courses for them, so that the staff can be access to more convenient and efficient training through the network, participate in online certification exam, and register for training courses.

7. Performance evaluation system. Establish a scientific and complete evaluation system; assess the completion status of each Department and in accordance with the preset work standards and tasks and objectives, and implement scientific assessment and measurement [7] for the performance of the government.

2.2. G2B

G2B e-government refers to that the government handles the certification application, electronic procurement and tendering, and tax payment through the electronic network system in the purpose of streamlining business process management and providing following information services for the enterprises with high efficiency and conveniences [8]:

1. Electronic bidding and purchasing

In order to reduce the transaction costs for enterprises, reduce the black box operation and private fraud, and cut the expenditure of government procurement, it is to publish the bidding information and government procurement through the network to help enterprises, especially small and medium enterprises, by providing them with government procurement related policies and procedures, so that the government procurement can really operate in the sun.

2. Electronic tax

In order to reduce government spending and meantime facilitate tax related formalities, many businesses will no longer require enterprises to come to the tax bureaus, which instead, can be completed in the office or home by government tax network system, such as learning the tax policy, tax bulletin inquiry, tax registration, tax allocation, tax declaration and other businesses.

3. Electronic license processing

Most normal businesses can be completed through the electronic e-government system, which covers license, approval and certificate management of construction permits, land and house property, statistics, and environmental assessment report, as well as business license's online application, online acceptance, electronic examination, issuance, registration and project change request, write off application, annual inspection and so on; this way, it reduces the burden on enterprises, and shortens the handling cycle; in the past the enterprises would have to run a lot of departments for these licenses and certificates, but now, all can be done only through the Internet.

4. Information consulting services

The government opens to public completely the international trade statistics, the government economic white paper, laws and regulations database and other database information, which provides conveniences for enterprises.

5. Electronic services for small and medium sized enterprise

The service includes helping form a mutually beneficial e-commerce application solution between the e-commerce providers and small and medium enterprises, as well as providing unified authentication on the government website for all enterprises entering the website, *etc*., This way, we can better play the role of the government in enhancing the visibility of small and medium enterprises and guidance on the international competitiveness, and strengthen the advantages of the collection and macro management.

2.3. G2C

G2C refers to that the government authority provides various services for the citizens through the e-government network system [9]. G2C mainly includes the following categories:

1. Education and training services. The government funded all libraries and schools to have access to the Internet and takes the lead in the building of the national online education platform; the government funds to continuously enrich the variety of educational resources, and provide free of charge for all students and schools; to adapt to the challenges of the information age, and focus on strengthening the training and education on information technology.

2. Employment services. In order to better promote employment, we make full use of various network and electronic technology platforms such as the Internet, telephone, micro blog, wechat and other new media to release job opportunities for citizens, and even provide the corresponding employment training according to the need. For example, establish the labor market and human resource market website, collect the job database information and timely release them, and help establish cooperation relations between the supply and demand parties, *etc.;* analyze local employment situation at regular intervals and timely release it, and provide online courses, online interactive employment training, and full employment guidance.

3. Electronic medical services. Establish special medical handy service platforms for the public, so that the patient can query the practitioner's qualification, professional expertise, and visiting time; in addition, you can complete online booking. Also publicize the rank, specialty, and medical insurance fixed-point situation, thus allowing the patient to choose the right hospital and doctor; the government organizes various kinds of medical information and medical insurance policies to display in the convenient service platform to provide a full range of online medical services; citizens can also check local public health account information and account balances of the personal health insurance card by medical handy service platform.

4. Social insurance network services. To improve the coverage and service level of the social insurance system, build the social insurance network covering local and even the whole society through the social security online service platform, so that most of the social insurance services can be completed just staying at home, such as online registration of newly insured unit, personal accounts used for social insurance, query of the handling status of the social insurance card, checking the personal interest record, querying the social insurance bills, querying payment records and online payment of social insurance, *etc.,*

5. Citizen information service. Through the feedback and online comments, we can improve the work of the government, and collect the views of citizens; to publicize the background information on the website of the candidate of the election to promote citizens' understanding of the candidates; so that citizens can obtain access to government regulations, laws and regulations database in an easy and convenient way at a low cost or even free.

6. Traffic management services. Establish an electronic traffic service website on the

internet to provide real-time information query on bus, train, and car, as well as the driver's record check and vehicle annual inspection appointment and other management and services.

7. Electronic taxation for citizen. Citizens can declare and pay property tax, personal income tax and other personal tax through the network electronic taxation system.

8. Electronic certificate service. It facilitates the handling of civil documents by allowing handling birth certificate, proof of death, marriage certificate, divorce certificate and other relevant certificates through website [10].

3. E-Government System Based on Cloud Platform

Overall, compared with the developed countries, the application in the big data for China's e-government is still at its preliminary stage. In some regions of China, inadequate infrastructures for the construction of the website and inefficient use of information resource result in that website of government at all levels is not yet interconnected, thus limits the maximized data integration and the information resources sharing. At present in China, official information publication is inadequate and the content is not rich or deep that most government information resources are hidden, especially for the interactive government services, platform for communicating government with netizens is not perfect and its channel is simple, thus the effect that government fully interacts with netizens is not completely achieved [11]. Therefore, the e-government system based on cloud platform is put forward.

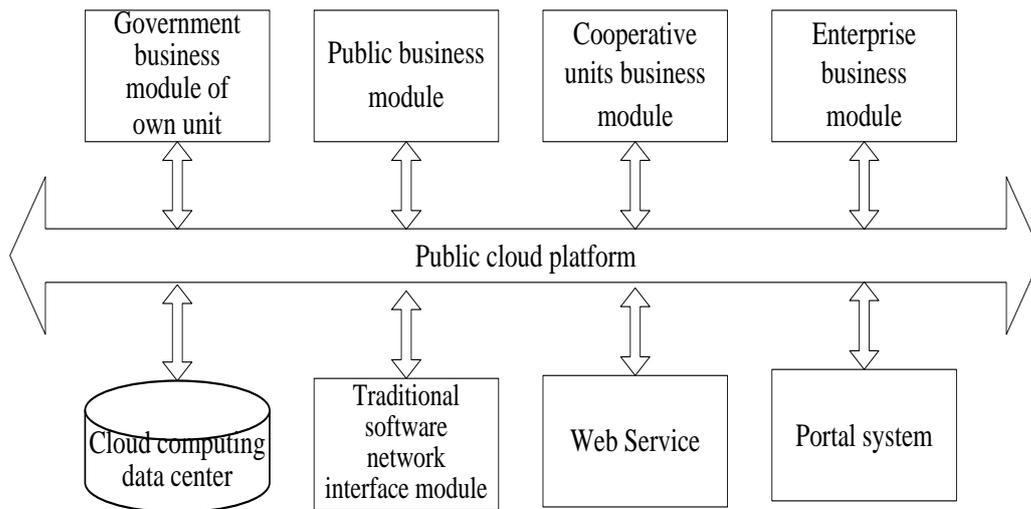### 3.1. Concept of E-Government System Based on Cloud Platform

E-Government system based on cloud platform refers to the e-government system established by the government, enterprises and citizens which will provide open and one-stop service for citizens and enterprises. This kind of e-government has the following characteristics:

Openness. The purpose of e-government system based on cloud platform is to provide convenient government services for enterprises and citizens, so the system will be open to all enterprises and citizens; by strengthening its advertising and publicity, we can constantly improve its social awareness, and it can provide convenient and quick services for enterprises and the citizens anytime, anywhere.

Universality. The government, enterprises and citizens can always benefit from the e-government system based on cloud platform; and only with the three parties' perfect combination, can the government provide better services for enterprises and citizens.

Service. Through the e-government system based on cloud platform, citizens can continue to reflect existing problems in the life to the government, and the enterprise can communicate directly with the government; the government completes scientific decision-makings through summary and analysis, and provides services for people through communications, information publicity and other means.

3.2. Framework of E-Government System Based on Cloud Platform

Figure 1. Framework of E-Government System Based on Cloud Platform

Six modules in Figure 1, will share various resources and cloud computing data center through cloud sharing platform. The Web Service technology is used through portal system human-computer interaction in the process of implementing this framework.

In the upper layer of Figure 1, government business module of own unit, public business module, cooperative units business module and enterprise business module are specially built for different user groups, as functions required varies with user groups. Enterprise business module is to provide convenience for enterprises to deal with administrative approvals, government business module of own unit is for all kinds of business handled by internal government staff, cooperative units business module is for other government agencies that and contacted frequently with this unit, and public business module mainly serves for general citizens.

The portal system in the system is a public entrance, and it is actually a highly integrated Service Web client-side system. Its various users, including administrative personnel, service personnel, ordinary people, linkage users, enterprise users, *etc.*, can carry out corresponding business activities through this portal system.

The bottom layer of the system is the interconnection network of the TCP/IP protocol, and the communication between each function module is completed through SOAP protocol; so the system deployment and operation environment will be easily satisfied.

The framework adopts cloud computing data center, and the entire database is classified into two categories: the most senior management department and secondary management department. In each category area, there is a primary data center, which is the top database server in the area, and the others are called general database servers.

4. E-Government Affairs Hall Based on Cloud Platform

For e-government system based on cloud platform, its concept was set out and its framework is designed and analyzed previously. Program of e-government affairs hall based on cloud platform is proposed on this basis. The online affairs hall can maximize data sharing on cloud platform, so as to realize one-stop processing for relevant business. The design framework of affairs hall will be described in detail in three aspects as follows.

4.1. Framework of Cloud Data Center
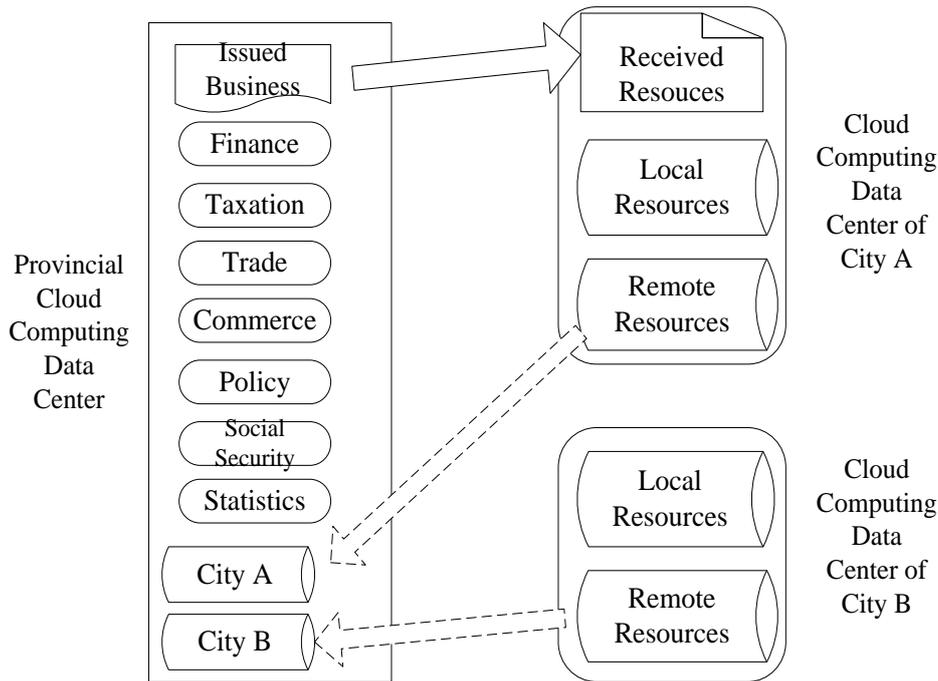
Figure 2. Framework of Cloud Data Center of E-Government Affairs Hall

Figure 2, is the framework of cloud computing data center for e-government affairs hall. The framework mainly consists of two parts: Provincial cloud computing data center and regional cloud computing data center.

China's government affairs are managed at administrative levels of province (autonomous region, municipality) and city (region, autonomous prefecture and leagues), then that in the cloud computing data center is established with provincial cloud computing data center and regional cloud computing data center. These two centers interconnect to better serve for e-government system.

While building provincial cloud computing data centers, the government can rent public cloud computing data centers, or establish a separate cloud computing data center of its own. The provincial cloud computing data center specially serves for e-government of some province, deploys all kinds of business applications of provincial government agencies, and provides secondary cloud data centers of subordinate cities and regions with resource borrowing and data backup when exceptional conditions happen At the same time, the provincial cloud computing data centers need to develop standardized templates for website design, business processing applications, *etc.,* and sends them to the secondary cloud computing data centers in cities and regions to rapidly make standardized applications and to deploy. In addition, the government should also provide a platform for unified application data services and software development of government affairs to provide basis for the subsequent unified application.

Any city or region should build cloud computing data center of any city or region and its subordinate units to achieve the backup and recovery of provincial cloud computing data center from regional business virtual machines, at the same time, when cloud resources of cities and regions are inadequate, deploy business virtual machines to provincial cloud computing data centers for operation to realize rapid resources expansion in emergencies.

Cloud computing data center of e-government affairs hall can integrate quickly and easily business systems of every government department, such as finance, taxation, trade,

commerce, public security, social security, statistics, *etc*.; and also can guarantee the integrity and reliability of the basic and integrated data, and establish a data warehouse in the data center; Cloud computing data center will integrate valuable data in existing business systems and management information systems to the data center, while in integration make extraction, transformation, filter, security transmission for data, and build complete basic and integrated database in the data center, and based on which establish a data warehouse. This solution can effectively improve the image of government departments and provide detailed data and reliable basis for macro decision-making by the government.

4.2. Framework of Software System

The system framework is shown in Figure 3.
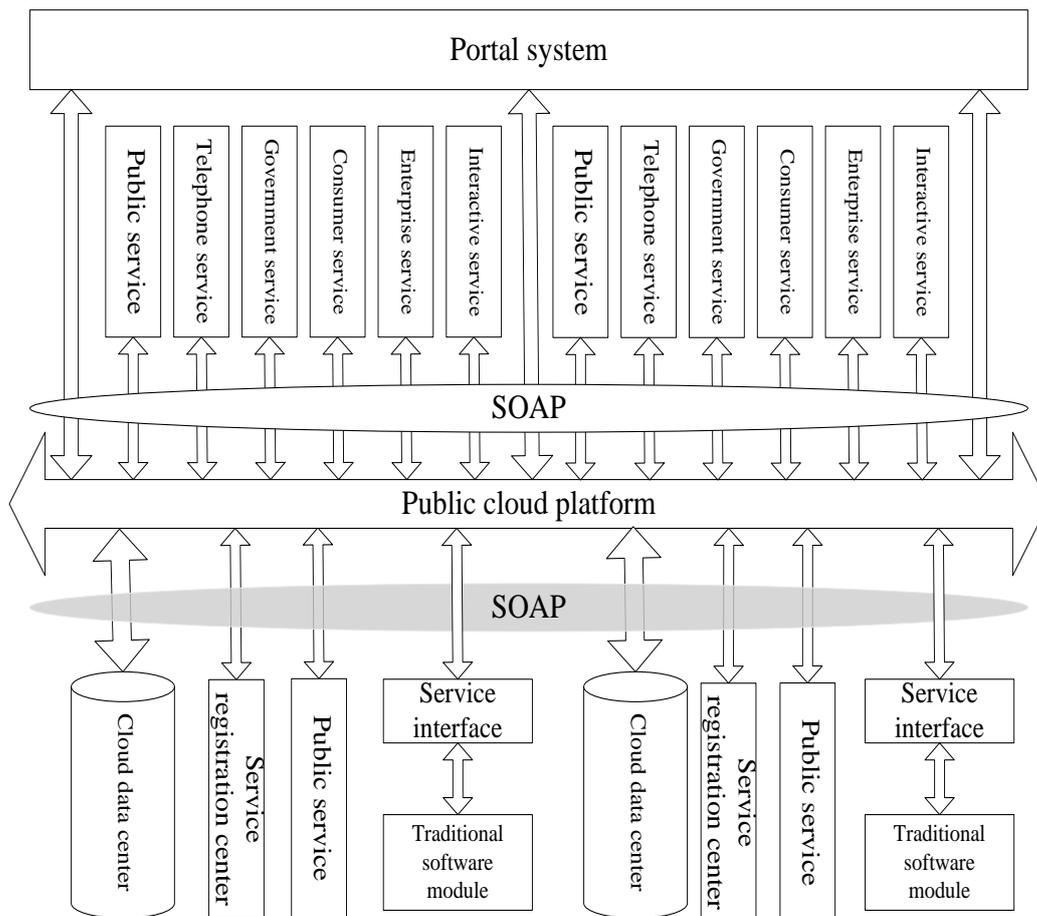
Figure 3. E-Government Affairs Hall Software Realization Framework

Figure 3, shows the software realization framework of the e-government affairs hall. The various services, service registration centers and databases have been repeated in order to show their distribution. Of course, in real time realization, all parts of the system need to be deployed and set up according to the actual needs.

Realization of the system needs to use Web Service technology, which has been discussed in detail in the second section. The service registration center in the map realize service registration of the Web Service, and meanwhile each of the Web Service registration center should have a mutual communication function in order to achieve discovery and positioning function of the registration service.

The general and instrumental functional modules are unified into the public service to

achieve the greatest possible service sharing. The special functions of some kind of business are included in the corresponding special services, which will help highlight its particularity.

For the traditional non Web Service system software modules, which are already in sound running, we can design the corresponding web service interface layer for them as far as possible through analysis and investigation, which will not only realize mutual communication between those traditional software modules and the new services based on Web Service framework, but also allow new Web Service client-side to invoke functions of those modules by using SOAP protocol. This plan will provide a smooth transition from the existing system to the new system and at the same time will realize software reusing to the maximum extent.

The portal system in the system is a public entrance, and it is actually a highly integrated Service Web client-side system. Its various users, including government officials, ordinary citizens, consumers, interactive users, enterprise users, *etc*., can carry out corresponding business activities through this portal system.

The management function is not given in the figure, as it is mainly oriented at the personnel engaged in the information process in the system, who generally have a higher authority to carry out work in the system; so its operating mode is quite different from that of ordinary users.

Due to the adoption of Web Service distributed technology, the regionalism of the service has little effect on the overall framework of the software, so no special consideration is given to the regional characteristics.

The bottom layer of the system is the interconnection network of the TCP/IP protocol, and the communication between each function module is completed by using SOAP protocol, so the system deployment and operation environment will be easily satisfied.

4.3. Framework of Knowledge Discovery and Data Mining Subsystem

In the following Figure, the knowledge discovery and data mining subsystem of the e-government affairs hall based on cloud platform is designed. This framework is based on public cloud platform, where information exchange is carried out by exchanging structured and fixed information in web through SOAP protocol and through that to exchange information with service registration center, algorithm mining agent service, cloud data center and knowledge database and knowledge service.

In the field of data mining, patterns discovered by the function of data mining mainly are association rules, classification, clustering, concept description and deviation detection. And same patterns will be used in the application of e-government data mining technology. For example, in tax authorities, they can utilize deviation detection of data mining to analyze and mine taxpayers of the same type, and then tax evasion problems may be found.

The result of data mining is mainly reflected on the knowledge discovery of these patterns, which is an extremely complicated process. The core problem is what method should be used to effectively mine knowledge from the known database and knowledge database .Common methods to mine data in the e-government affairs mainly include decision tree method, statistics method, induction, neural network method, genetic algorithm, rough set method, artificial intelligence, fuzzy set method, *etc*., All the above algorithms are kept in the mining algorithm library.

The main function of E-government data mining is to seek knowledge for various business activities, work and decision making of the government, data mining process of general e-government affairs should include three stages--data preparation, mining processing, knowledge representation and interpretation. Data preparation is a stage to provide e-government data mining with mining objects. It makes preparations for mining objects with aiming at the results which required analysis, and its main content includes data preprocessing (such as extraction, transformation, purification, understanding, *etc*.,)

and the establishment of processing set of data mining. Improve the quality of data mining through the data preparation to reduce clutter, redundancy and imperfection of the data. Mining operation is the core of data mining, which mines data mining process set that established at the data preparation stage mainly through choose the best mining algorithm from a variety of algorithms by using a data mining algorithm executive machine to discover valuable knowledge.

The knowledge mined out may be not what we need, so the results will be sent to the stage of representation and interpretation. After storing the results in knowledge database through knowledge management service and knowledge application service, optimize and analyze mining results by optimizing algorithm to extract the most valuable information to present to users in the form of chart and other visual means in the application software platform.
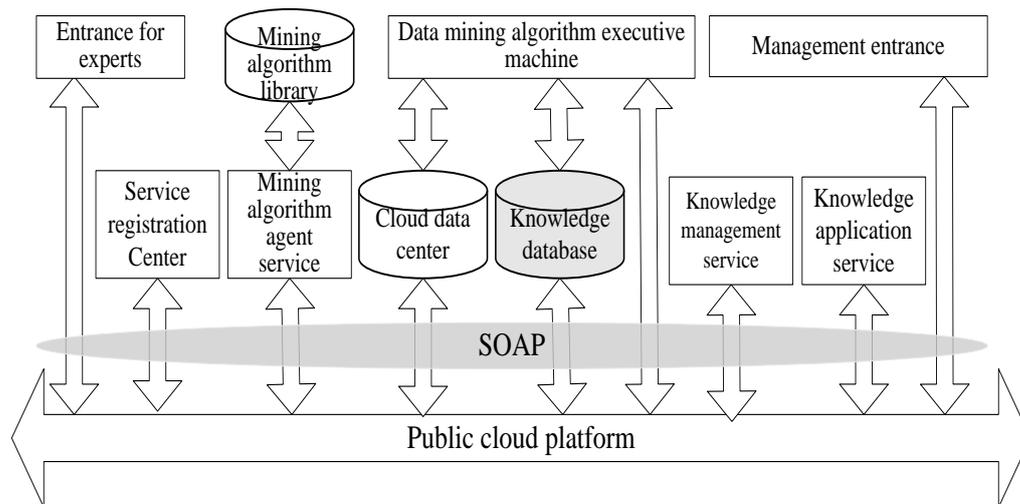
Figure 4. Data Mining and Knowledge Discovery Subsystem Framework of E-Government Affairs Hall

Knowledge obtained through data mining, after all, is automatically analyzed and obtained by a computer through algorithms and requires human to identify. Therefore, entrance for experts and management entrance are reserved in the framework. After entering into the knowledge base, the expert will practices manual intervention in the authenticity and reliability of the knowledge, and will remove pseudo data and unreliable data. While the administrator enters through administrator access who mainly makes manual adjustment to the mining algorithm and knowledge discovery algorithm.

5. Conclusions

In this paper, e-government affairs hall based on cloud platform was designed and implemented, and detailed in three aspects-- framework of cloud computing data center, framework of distributed software and framework of data mining and knowledge discovery subsystem.

Although the research object of this paper is the e-government affairs hall based on cloud platform, its research results can also be applied to other types of information management systems.

The author hopes that this research can arouse the attention of relevant departments, so that the window of e-government affairs hall, which faces the mass public people, can play a greater role in the construction process of harmonious society and service-oriented government.

Acknowledgment

References

[1]   Y. Quan, "Analysis of Security Measures for Chinese E-Government Information", Technological Development of Enterprise, vol. 24, **(2014)**, pp. 76-77.

[2]   L. Lihua, "Promoting E-government Construction & Improving Organ Services Level", Beijing Electronics, vol. 10, **(2006)**, pp. 24-25.

[3]   G. Weiying, "Enlightenment for China from the Implementation of E-government in Foreign Countries", Reform & Opening, vol. 1, **(2015)**, pp. 43-44.

[4]   S. Lei, "E-government Construction and Government Administration Innovation in China", China: Jilin University, **(2004)**.

[5]   The State Council Development Research Center Research Group, E-government Development in China and the System Construction, Comparison between the Economic and Social System, vol. 26, **(2002)**, pp. 92-99.

[6]   L. Tingting, "Researches on the Ruling Capacity of Local Government Based on E-government – Take the Empirical Research of Shaanxi Province as an Example", China: Shanxi Normal University, **(2007)**.

[7]   W. Hongcai, "Researches on E-government and Its Application in the Real Estate Regulatory Work", China: Shandong Normal University, **(2005)**.

[8]   Yu Lifeng, E-government in the Real Estate Industry Regulation, China: Tianjin University, (2007).

[9]   Y. Shiyun, "Development and Countermeasures of E-government", China Science and Technology Forum, vol. 4, **(2001)**, pp. 17-22.

[10] W. Tianyou, "E-Government Development Strategy Researches on Ningxia", China: Minzu University of China, **(2011)**.

[11] G. Xiaoting, "New Pattern for Opening E-government Interactive Services in Big Data Time", Journalism Research Herald, vol. 23, **(2015)**, pp. 168-176.

Author

Zhang Hongjun, received his master's degree in computer software and theories from Shandong Normal University, Shandong, China, in 2007. He is currently the associate professor at Information Engineering Academy of Shandong Management University, China. His research interests include artificial intelligence and e-government.