

Design and Implementation of County Government Decision Support Information Network System

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Abstract — This paper describes the design of the architecture and software of County Government Decision Support Information Network System, which can supply all kinds of information and help leaders do scientific decision. The network is implemented in the form of combination of LAN and WAN. The software includes three parts: DBMS, DSS and Front-end Application System. In the last part, a practical application is given.

I. INTRODUCTION

With the rapid development of computer technology, all sorts of networks are being built in our country. Enterprises, universities, banks and so on are all busy in building their own information network systems. It is also necessary to set up County Government Information Network System (CGINS).

A. Background of CGINS

County is the lowest level of our national government, and CGINS is a very important part of National Information Infrastructure (NII). Central government has deployed to build Central-Province-City-County four-level information network.

It is well known that there are many shortcomings in traditional government working mode, in order to improve the efficiency of management and make decision more scientific, it is not only necessary and imperative but also feasible to develop and build CGINS.

B. Goals of CGINS

The specific goals of CGINS are as follows: (1)To connect all computers of the whole county physically, (2)To provide connectivity to Province Information Network (PINet) and INTERNET, (3)To realize data communications

between any two clients, (4)To provide all kinds of public information, such as local news, weather forecast, advertisement, etc., (5)To help leaders make scientific decision on many things, (6)To be economical, scaleable, reliable and interoperable system.

In total, CGINS should be such a system which can connect all bureaus of the whole county, collect all kinds of data from villages, enterprises and official departments, support scientific decision and supply abundant information and services for people.

This paper presents the analysis, design and implementation of CGINS. In section II, we analyze the characteristics of general counties of our country, then give the design of the network architecture fitting for counties. In section III, the three parts of application software are introduced respectively. Network security is discussed in section IV.

II. NETWORK ARCHITECTURE & OPERATING SYSTEM

A. Network Architecture

To meet the diverse requirements discussed above, CGINS is implemented in the form of combination of LAN and WAN. The CGINS physical architecture utilizes the bus style, which makes it easy to add more computers to the network. It is also economic. The adoption of HUB gets rid of its shortcomings.

First, the distribution of bureaus and villages is introduced, then the architecture of CGINS is given.

In general, there are two main administrations in a county: County Committee and County Government, they are often located in different buildings. Secret Bureau which is one of the departments of County Committee is responsible for the running and maintenance of the whole network system. So it is pretty natural to build the backbone LAN in the building of County Committee, all servers are located in the computer

room of Secret Bureau.

Typically, there are more than twenty bureaus distributed in different places among the County, there are also many villages far from the Network Center. All these official departments including County Government are equipped with computers and needed to be connected to the network system. Because of their distribution features, these computers can only be connected with the network as remote clients via public telephone line instead of ordinary cable. In

addition, every official department can be extended from single computer to a subnet, then connected to the network system through network bridge. To manage the remote clients more efficiently, it is suggested to use Remote Access Server (RAS). With RAS, once the connection is established, the remote client works just as a local one.

The network architecture is shown in Fig. 1.

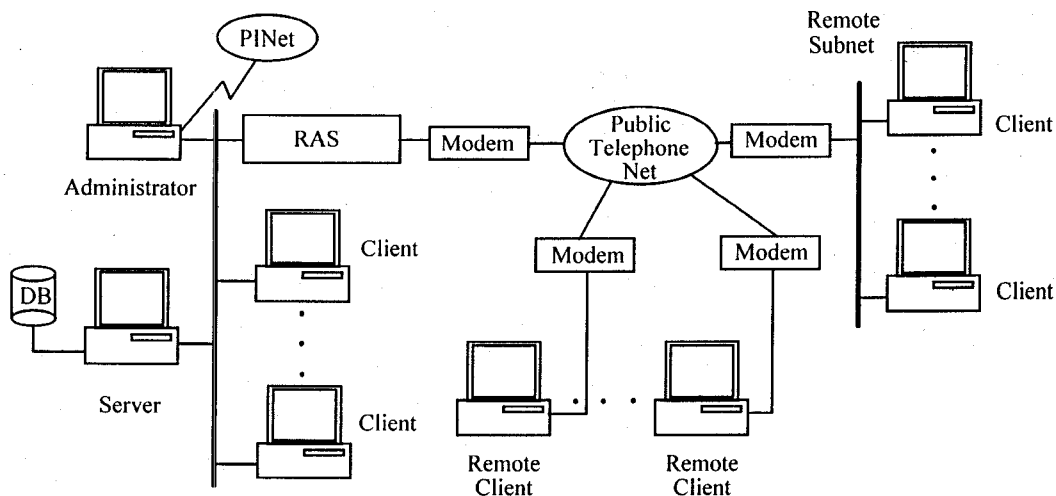


Fig. 1 The Architecture of County Government Decision Support Information Network

B. Network Operating System

Network Operating System is very important to the quality of the whole system. At present, there are mainly two kinds of network operating systems: Windows NT Server and NetWare. Windows NT Server is suggested in CGINS. Windows NT Server has many virtues: (1)Scaleability: it has nothing to do with desktop, it can run on Intel X86 system, RISC or DEC Alpha, etc. Thus, clients have more freedom in choosing computers. (2)Open Structure: It not only supports NDIS, but also TDI, these standards help Windows NT communicate with other network products and make it possible to use many kinds of network products and protocols. (3)Complete 32-bit structure: it has many threads when running, so it can support more powerful applications. (4)Client/Server function: it support database with Client/Server structure. In total, its advantages make it be the best server operating system. Windows 95 is installed in

workstations, which has abundant interfaces and supplies excellent developing environment. As to the transport protocol, TCP/IP is adopted for its simplicity and efficiency.

III. SOFTWARE DESIGN

The software includes DBMS, DSS and Front-end Application System. The main goal of the software is to manage all kinds of information efficiently, to supply decision support on the basis of information management, and to give clients a simple tool to use, to manage the network and its users and to fetch, deliver or browse information, etc.

This system is of Client/Server computing mode, which is the most popular computing mode now and has many advantages compared with Host Processing System and File Processing System. In Client/Server computing mode,

clients send their requests and the servers process and compute data after they receive these requests, then return the results to clients. This kind of computing mode makes the full use of resources of clients and servers. What is the most important, only requests and results are transported on the net, thus the data running on the net decrease greatly.

In the following, the three parts of the application system are discussed respectively in detail.

A. DBMS

DBMS runs on the Database Server. Microsoft SQL 6.0 is adopted as the DBMS of CGINS. It combines with Windows NT Server precisely. It has integrated security function, reliable distributive data and event management. The inlaid data copy supplies reliable approach to storage management. It also supports quick request. In CGINS, SQL 6.0 is responsible for the management of all kinds of information stored in DB Server and accepts the request from clients, then returns results to the clients after processing.

During building databases with SQL Server, developer should analyze the data types and classify the databases at first, then compute the size of all these databases and event logs. On the base of analysis, it is very easy to build data devices, storage devices, databases and their data objects. About twenty databases are built in DB Server. Every bureau has its own database, storing data or other information which comes from villages or is input by their own.

The copy and maintenance of databases are also very important, which include the copy and recovery of databases and event logs.

B. DSS

County Government DSS is realized through the comprehensive analysis of information which comes from inside or outside. On the basis of analysis and according to experience(Heuristic Knowledge) or traditional computing models, the decision is given. There are four kinds of decision support analysis for a county.

(1)Historical data analysis: It mainly uses graph to analyze data, then forecast and give a decision according to computing model. For example, County Economic Committee first analyze the county's economics from January to August of this year, then compare it with that of the last year. On the basis of the analysis and compare, the system can forecast the achievement of the whole year, and

give a method to help leaders decide what policy to be adopted next and make the corresponding plans.

(2)Multi-factor analysis: It is a method supplying global optimum. For example, at present, most counties of the whole country all develop agriculture, industry, forest, fishing, business at the same time, but they have different proportion. The system can use linear planning, dynamic planning and so on to compute, then decide which proportion is the best. As the result, the system directs the leaders to distribute many kinds of resources reasonably.

(3)Part-Whole analysis: It is to make decision according to the situation of typical villages or bureaus. It then helps leaders do further research and progress the whole work.

(4)Comprehensive analysis: It is to analyze on the basis of comprehensive information, such as time, places and classes, etc. For example, after analyzing the river information, rain quantity, the damages, the system can forecast the river situation, then give what should be done next.

C. Front-end Application System

Different client has a different front-end application, which is decided by the characteristic class of individual client. There are four kinds of clients in this system:

(1)System Administrator: to monitor the running of the network system, administrate user accounts, back up databases, be responsible for the network security management, fetch information from Province Information Network System and etc. Generally speaking, System Administrator is one of the officials in Secret Bureau.

(2)Leader Client: mainly to browse and print information on network, do scientific decision with the help of DSS, etc.

(3)Bureau Client: to browse and print information on network, input certain information, etc.

(4)Village Client: to be responsible for its own information management, to input data and other information, to browse and print granted information, etc.

Obviously it will take much time to develop front-end application for each kind of clients, so the application is divided into several modules first, then they are assembled according to the class of the clients. Thus much time is saved.

The Front-end Application System can be divided into eight modules, as shown in Fig. 2.

(1)System Manager: It manages user accounts, set passwords, etc.

(2)County News Manager: It manages County News,

which includes two aspects: Important News and Common News. They are about what happens in the county.

(3)Current Event and Policy Manager: It manages information obtained from Province Information Network (PINet), which includes International News, National News and Province News. In system administrator workstation, there is a special program which can translate this information and put it into DB Server, so all clients of the net can share different information according to their specific granted privilege.

(4)Data Table Manager: This module manages all data tables on the DB Server, and processes them. Every village client can use this module to add, delete, update data to certain tables. It also can compute the data automatically, paint the statistic graphs and report the data to DB Server.

(5)Official Letter Manager: This module is responsible for the editing, delivery, receipt and print of official letter. In the editing environment, the official letter can be reported to DB Server easily, and receiver also can read the official letter in this environment. Once a clients has a letter, he will be notified when he logs in and can browse and manage the letter using a simple letter manager.

(6)Market Situation Manager: This module manages advertisement of industry, agriculture, science and so on.

(7)Nature & Weather Manager: This module is responsible for the notification of weather, river and calamity, etc.

(8)Culture Field Manager: Users can watch TV using a additional television board, etc.

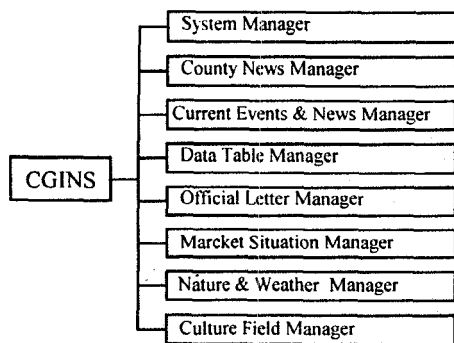


Fig. 2 Front-end Application System

What need to be mentioned is that Official Letter Management module and other public information modules have the functions of text editing and information questing.

Clients can edit their information, official letter and other texts using their favorite font , size and color. They also can do Key Questing and Fuzzy Questing, namely clients can find all information including the key words they supply. These two questing methods bring much convenience and flexibility to clients.

IV. NETWORK SECURITY

Network Security plays an very important role in network system. Without security, it is possible for the system to collapse unexpectedly. In CGINS, there are several security methods to protect the system, which will be discussed in the following.

At first, user authorization is adopted, namely, all users must have an authorized name and password if they want to log in the network and get information. In CGINS, every user must supply two kinds of names and passwords, one is used to log in network, the other is used to connect to Database.

Secondly, system administrator can control the user's approach to the network system through access control. There are two aspects: Object Access and Sentence Access. Using these two methods, administrator can grant or revoke object and sentence privileges of each user.

Thirdly, as to those secret official letters, they can be encoded before transmitted on network. After receiving the letter, the receiver need decode it first. In addition, network anti-virus software is used to protect the system against viruses.

When the network system is to connect with INTERNET in the future, it should adopt Firewall.

V. CONCLUSIONS

Using the design scheme related above, we have built Huoqiu Government Decision Support Information Network System successfully. This system is an open, scaleable and extendible network system. At present, the system is running for test, and its advantages and efficiency has been confirmed. Surely such an information network system has a broad application future.

VI. REFERENCES

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