

PERBANAS E-CAMPUS (ELECTRONIC CAMPUSS) DESIGN AND IMPLEMENTATION OF COLLEGE AND FACULTY DIGITAL OFFICE SYSTEM

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ABSTRACT

In recent years, a series of circulars about educational informatization issued subsequently by the Ministry of Education have encouraged colleges to build their own E-Campus by means of information technology, which promotes building of the higher education's informatization. Amongst them, college and faculty digital office system is an important part of the E-Campus. This article introduces the college and faculty digital office system developed independently by the E-Commerce College of Perbanas Institute of Informatics Faculty, including the design proposal, system structure and main functions of the system, and several key problems in development and implementation of the system. Meanwhile, it also takes some functions of the system as examples to brief its detailed implementation process.

Keywords: Educational Informatization, E-Campus, digital office system, .Net

1 INTRODUCTION

In 1990, Prof. Kenneth C.Green of Claremont University in America first put forward the concept of "Campus Computing". Influenced by him, Beijing University and Hong Kong University kicked off together the first international research of higher education informatization ACCS (Asian Campus Computing Survey) in Asia, which started the E-Campus of universities and colleges in our country[1]. In order to welcome the knowledge revolution of new age, every university or college endeavored to build its own Information superhighway. The digital library,

online teaching, electronic teaching plan, electronic homework, paperless operation and so on based on campus network are coming up, which continuously improves the building of E-Campus. To build a digital intelligent office environment is no doubt the most important part of the E-Campus system. [2] Most of the research and

implementation of campus digital office system at present focus on the macro-level of college. However, to make the college a true meaning of "E-campus", the college must rely on moving forward of the digital office extent of teaching, scientific research and administration. In college, most of the teaching and scientific researches are carried out by faculty as unit, so the digital office system has become the most important implement of campus informatization and the hot topic of campus informatization layout and construction.

Through investigating in the OA status of some colleges and faculties, the E-commerce College of Perbanas Institute of Informatics Faculty concludes the mutual requirement of the system, and on that base develop the college and faculty digital office system independently which lay emphasis on management of teaching, registry and scientific research and also offer common functions as an office automation system. The system was put into operation officially by E-commerce College in early 2005.

2 ANALYSIS OF REQUIREMENTS ON THE DIGITAL OFFICE SYSTEM

2.1 Analysis of status of the college

At present, the faculties have implemented digital office to certain extent, but most of the implements are functioned based on single computers, and conventional document was only stored in the computer of every clerk, which caused difficulties in sharing information, updating delay and poor security and so on.

- (1) Teaching, office work and scientific research document are separated from each other in many information islands, so the day-to-day communication could only rely on printers or removable storage devices.
- (2) The daily transaction processing basically depends on the transfer of traditional

medium of paper document, which is insufficient and also constrained by space and time.

- (3) Decisions made by college leaders are in lack of support by reliable and scientific data, and relevant information is also discrete and not systematic.
- (4) The original MIS applied for scientific research, teaching, books and documents in the college don't have a general interface among them, hence, it is difficult to realize information sharing.
- (5) Unsmooth information communication causes difficulties to assess and collect information of workload of teachers and information are not visualized and difficult to compare.

2.2 Analysis of the requirement on the digital office system

In view of the routine working mode, work requirement and setup of the college's organizational structure, the system users are divided into four categories, and the requirement of each category are as below:

- (1) College leaders: They are responsible for coordination and management, analysis and decisions. So they need to receive regular work reports from other staff, follow up the whole picture of the college, and be able to consult various information at any moment when necessary.
- (2) Scientific research secretaries, teaching secretaries and assistants: They are responsible for transferring information between the university and the college, and work as a bridge for outward and inward communication. They need to transfer a mass volume of data, and communicate with other staff involved in the system frequently.
- (3) Office directors and documenters: They are responsible for management of office equipment and library resource of the college. They need a special office management system.
- (4) Teachers and students: They mainly receive and submit information. They don't need complicated office processing.

However, it is necessary for teachers to follow up various kinds of student information for

convenience of contacts during the teaching process.

3 OVERALL ANALYSIS AND DESIGN OF THE SYSTEM

3.1 System target

The overall object of the college and faculty digital office system is to build an office information system which covers entire college and faculty offices by means of advanced and mature computer and communication technology, to exchange information between the college and the outside world through network technology, to build an information network of high quality and efficiency and to provide services for leaders of the college and departments in making decisions and daily work, which will realize office modernization, resource digitization, networked transmission and scientific decision making.

The college and faculty digital office system helps to solve two basic problems: one is to make the management standard, rational, and efficient, and carry forward advanced management concepts; the other is to provide support for leaders to make decisions through data collection and analysis. To put it more specifically, implementation of OA (office automation) will advance the ability of faculty members to cooperate with each other; promote communication and sharing among them; strengthen monitoring and management by leaders of the college and departments, and enhance the support to leaders in decision making; boost work efficiency and transparency; accelerate the work speed and improve working quality; reduce the management cost, elevate the management level and promote the management standardization.

Analysis of the system target and the college and faculty's daily workflow, the digital office system can be divided into four main functional modules: digital office environment, college affair management, intelligent assistance and support for decision making, and system management and external portal. A detailed configuration is illustrated in Table 1.

3.2 Brief introduction of functions of the digital office system

(1) Digital office environment It is the basic application of the whole system, which builds a unified digital office platform, simulates day-to-day workflow pattern and realizes coordinated office processing. It includes document management, task

management, business flow management, address book, e-mail and schedule management. [3] [4].

Document management: It realizes the management of individual files, upload and download of files, sharing of documents at the server side and etc. The system provides the public and individual document archives in which users may classify and store various documents of their own. It supports online/offline edit of Word, Excel, Access and other common files.

Task management: It provides the individual task management, and assignment of task by college leaders, and follows up the whole process of task fulfillment. Relevant information about the task finished by users and stored at the server side could be used to collect workload statistics and make comments later on.

Business flow management: It is the core module of the system, which realizes electronic operation of business flow. It presets leave application, financial application, equipment application and other business flows, and also supports user-defined business flows.

Table 1. College and Faculty Digital Office System Functional Module

Digital office system	File management	Task management	Business flow management
	E-Mail system	Instant communication	Office tools
College affair management	Personnel management	Teaching management	Research Management
	Asset management	Library management	
Intelligent assistance and decision-making support	Teaching analysis	Research analysis	Teaching resource analysis
	Workload assessment		
System management and external portal	College website	System management	

Instant communication and E-mail management: It could display online users, and realize online real-time communication. The teacher address book realizes electronic management of business cards, including addition, modification, deletion, query, printout, simple classification and statistics. These functions could implement quick and efficient transmission of different kinds of information (letter, document,

report and so on) among different branches, departments or staff. The function of communication with the external E-mail system can also be realized.

Schedule management: It could be used to manage individuals' schedule and query the schedule of leaders, teachers and so on.

Individual schedule management could be used to make appointment, arrange meetings and entrust work. One can look up easily various appointments which have been arranged through calendar-type graphical interfaces.

Mobile office: In order to meet the demand of leaders to send back information, follow up situation of the school from time to time, make important decisions or approve any important document during their frequent trips, the digital office system could be linked with Internet through the college's server, and one could log on the college's office system and realize real mobile office whenever or wherever as long as the system is linked with Internet.

(2) College affair management Relevant modules are set up to complete different tasks in view of routine work of staff of different functions inside the college's organizational structure, which is a supplement and extension to the digital personal office. It includes Personnel management: It mainly realizes routine work of the college's leaders, office directors and assistants, including teachers/students' file management, attendance management (towards the administrative staff, automatic recording of system logon), payroll management, student's assessment and so on.

Teaching management: It mainly realizes routine work of teaching secretaries and college teachers, including teacher notification, curriculum management, student grade reports and online classroom.

Scientific research management: It mainly realizes routine work of scientific research secretaries, including teacher notification, project application management, scientific research project management, postgraduate bulletin and grade reporting.

Student management: It mainly realizes routine work of assistants and teaching secretaries, including student notification, student information management, advice box and so on.

Asset management: It mainly realizes routine work of office directors, including information and status of equipment, examination and approval of equipment use and return reminder.

Book management: It mainly realizes routine work of documenters, including borrow register, book management, return reminder and so on.

(3) Intelligent assistance and support for decision-making The digital system not only manages the data but also assists us to create and make intelligent decision. The module is designed for college leaders who find it difficult to make correct decisions due to information complexity and could store and analyze mass volume of data, and helps leaders to manage and make decisions.

It includes:

Data center: It is an aggregate of all information and data that could be shared in the entire system and it is also a knowledge center for all users of the system to query.

Teaching analysis, scientific research analysis, teacher team analysis, student status analysis and workload/quality analysis: It is the system that supports college leaders and managers to make decisions. It could select necessary data from the data center through customized statistics report forms and generate multiform statistics reports.

(4) System management and external portal The portal management technology is adopted to realize the release and display of inward and outward information. They include:

- College website The college website could be divided into three parts:

Teacher portal: notice query, curriculum arrangement, project application, student assessment, online classroom, teacher address book and so on.

Student portal: notice query, curriculum arrangement, feedback, teacher assessment, online classroom, student address book and so on.

External portal: news release, information display and so on.

- System management

It mainly realizes configuration and setup of the system to make the system adapt itself to actual situation of the college. It mainly includes access setup, staff setup and system parameter setup and so on. Its functions mainly include limitation of users' logon period and IP address range that could access the system and manage users' information.

3.3 System architecture design

Digital office is different from traditional OA, or building of MIS. It has an Internet structure and its building clew is from top to bottom, i.e. the whole intranet should be first regarded as an integrity whose objects are all online users, and should have a base which is called intranet platform just like a PC that should have an operating system as its base. The intranet platform is responsible for managing all user objects, all network resources (including network application), hierarchical authorization on network resources, open standards of network resource, and supply of common network services(e.g. E-mail, forum, navigation, searches, and bulletin). Based on the platform, it could be plugged with various business applications (could be understood as traditional MIS) which are all network resources.

Users access the network through a unified browser interface, and the network could provide relevant information, functions and services according to user authority and provide users a networked office system.

3.4 Selection of development platform and language

The digital office system is a universal application system. In view of its ease of use, practicability and ease of management, we select the mature and popular Windows 2000 Server as network operating system; C#+ASP.NET as the development tool; and Microsoft SQL Server as the database system with an eye on the compatibility and low cost of the system at the same time. The system built by C#+ASP.NET + Microsoft SQL Server+ Windows 2000 Server adopts uniformly Microsoft development environment, which is built on NET FRAMEWORK platform.

Therefore, it reduces system conflicts, promotes development efficiency, and also optimizes the system performance. [5] The .NET technology mainly used in the system is a brand new concept put forward by Microsoft, and it represents an aggregation, environment, and base for programming. It aims at taking Internet itself as the base to build a new operating system and extending the design concepts of Internet and the operating system. To end users, realization of .NET technology advances greatly computer functions, and operation of computers becomes much simpler. They will completely get rid of human-factor hardware constraints, access the multidimensional space and time of Internet by means of any

equipment, through any system, at any time and place and implement integrations across applications.

Developers distribute the application logic to the network in virtue of XML-based loose coupling technology provided by the .NET technology, which realizes cross-platform access.

C# it adopts is a new generation of object-oriented programming language released by Microsoft in 2001 which could be used in the network environment of .NET platform to develop new software. Its adoption of virtual machine technology renders itself with strong portability and security, and provides strong support for building complicated, extendable and portable Web applications. [6]

4 REALIZATION OF PARTIAL FUNCTIONS

In fact, these new functions are used to manipulate tables, and it could be divided into two categories: one is to query the table and the other is to edit the table (insert, modify and delete). Therefore, the core concept to realize these functions is the same, with the only difference in consumption and breakdown of different tables. Of course, they are different in page output, and content of database tables thus built. This article takes the teacher curriculum query as an example to explain basic principles for realization of functions in this system.

Instruction of the “teacher curriculum query” function: all the curriculum related information can be queried by any of the three key words: teacher’s name, curriculum name and the time of curriculum.

The realization approaches are as below:

(1) Establish the database

We establish a database named CLASS by using Microsoft SQL Server 2000, in which we build a table of the same name, and set class ID as the primary key (also including course name, teacher, object, term, class time, and venue, altogether seven columns). And then we input the data entries according to the current curriculum.

(2) Get the data result of SQL Access the database through ADO is created by using Sql Connection class, use a function of Command structure to create Command object firstly, and also specify SQL statement and the connection object to execute. In the query process, we use parameters, create parameters by means of Add () method of this object’s Parameters property and

assign them values so that the parameter is consistent with the textbox.

Then we return a DataReader object by using ExecuteReader() method of the Command object, bind the object to a DataGrid control, and finally return the result to the page layout through it.

(3) Data display

DataGrid control is used to display the content of data entry in table forms and it supports the selection, sorting, paging, and modification of data entry. Meanwhile we use <Columns> and </Columns> labels to define the column that would be included or defined.

(4) Supplementary remarks

Anyhow, for the operation of deletion, insertion and modification, a complete new table to users will be returned after completion of their respective tasks. Therefore, another method is needed to work with the database: first, we should create a DataAdapter object (which is used to fill in DataSet) so that it includes all the data in the table edited, then we create another one and fill in DataSet, and bind it to the DataGrid control.

5 SEVERAL KEY PROBLEMS THAT SHOULD BE PAID ATTENTION TO DURING DESIGN AND DEVELOPMENT

5.1 Able to integrate with E-Campus system

The college and faculty digital office system is an important part of E-Campus system in universities or colleges. E-Campus includes two categories: one is the office transaction processing (office automation), and the other is processing of business management, and the two are harmonized together. According to actual situation of universities or colleges, the college and faculty digital office system should run under the overall framework of E-Campus. Therefore, when designing and developing the digital office system, one should take the overall architecture (e.g. platform, interface, data exchange and other indexes) into consideration.

5.2 Security

One big disadvantage of B/S/D is that it is rather weak in security control and faces an unknown user base if it is built on Internet. How to effectively solve the problem is also one key point that we should take into consideration. Therefore, we set up a three-tier safeguard: (1) a firewall is set up between the intranet and internet to reduce outside attacks on the Server; (2) verify logon of users at all levels. Users who pass the verification could access the system according to their own authority. Users in the system could be divided into system administrators, common administrators and common users, and they are also authorized for their operations on SOL Server based on their duties; (3) the backup and recovery of data. Back up the database by means of import and export functions provided by SQL Server. In case that data is lost or destroyed accidentally, it could be restored by data restoration function provided by the database.

5.3 Processing mass volume of data information from composite documents

The carriers of information processed by the digital office system exist in forms of document, reports, letters, faxes and so on, and so the digital office system is a typical document management system. They are different from the information of traditional data type, such as “unstructured data”, “composite document data” or “object data”. The relational database system (e.g. Oracle, DB/2, SQL Server, and FoxPro) is commonly regarded as suitable to display or storage of traditional data type (structured information), but unable to display or store the composite document data with highest efficiency. Therefore, the concepts of “document database” and “object storage” are introduced into the field of database, which aims at efficiently display and store “composite document data” based on new requirements. In view of its request on processing composite document data, the digital office system must be built on document database as the core, and is combined selectively with relational databases at the same time.

5.4 Customizing workflow

In the digital office system, many modules are related to workflow problems. Each workflow may have different flow processes at different times; the transactor could be changed frequently

due to personnel changes; to define a flow also relates to the restructuring of business process which is rather complicated. Therefore, a perfect digital office system should have a flexible flow customization function. When user's service is changed, the system administrator merely needs simple setup to make the system adapt to new requirement and it is unnecessary for programmers to modify.

6 SYSTEM CHARACTERISTICS

6.1 System practicability

So far, most digital office software in our country has been developed based on Lotus Notes in the mode of client/server, which doesn't adapt to the development of Internet or meet the demand of mobile office. The system adopts nowadays popular B/S/D structure, and users could access information and communicate with others simply by the browser, which truly realizes zero installation and zero maintenance of the client side, separates the development environment from the application environment, makes the development environment independent of the users' foreground application environment, avoids troubles to develop the same application system for different operating systems, and is convenient for the extension and change of user groups, management of the application system and installation, maintenance and upgrade of software. The system serves as the college and faculty website to the outside, and the platform to realize online office, mobile office and remote management to the inside. Even if leaders of the college and departments are on business trips, they still could examine and approve documents, give instructions and realize mobile office by this system via Internet.

6.2 Popular operation interface

A friendly system interface, simple operation, and ease to study and use are very important to users. WWW technology has many characteristics such as open, integratable, restructurable, easy operation and so on which show the inevitable trend of computer technology's development at present. It provides the easiest and most direct manner for people to surf in the ocean of information, to get needful information and handle different affairs.

The system could manage both traditional document data and unstructured data such as graphs, image and so on. Office document stored in

the Server's unstructured multimedia file database as an object is managed and maintained so that users could easily exchange and share relevant information.

6.3 Openness and expansibility

System design adopts a standard interface and the hardware platform adopts a standard network interface and ODBC(Open Database Connectivity), which realizes easy linkage of the system with other application systems. The adoption of modular and structural design makes it easier to expand system functions and services.

7 CONCLUSIONS

At present, the digital office system in the E-Commerce College of Perbanas Institute of Informatics Faculty is implemented very well: the page views reach 80,000 in one year and 25 staffs of the college carry on their work in that platform.

According to the appraise of the economic benefit of the system, the college can save papers ($80,000/500=160$ rim * $30,000=4,800,000$ Rupiah), equal to Rp. 4,800,000 and printer $80,000*200=16,000,000$, equal to Rp. 16,000,000 which means totally Rp. 20,800,000 can be saved per year.

Furthermore, the implement of the system enhanced the staff's ability to cooperate with each other, strengthened the support to decision-making by leaders of college and departments, enhanced work efficiency and quality, reduced management cost and promoted management level.

As the digital office system has good applicability, we are working on the popularities of the system to other colleges and faculties in anticipate of pushing the overall development of colleges digital office forward in our country.

REFERENCES

- [1] Corporate Portals: Revolutionizing Information Access to Increase Productivity and Drive the Bottom Line by Heidi Collins, 2000, ISBN 0-8144-0593-2, AMACOM, Broadway, New York.
- [2] Practical Intranet Development by John Colby, Gareth Downes-Powell, Jeffrey Haas, and Darren J. Harkness, 2003.
- [3] Liferay Portal Enterprise Intranets: A practical guide to building a complete corporate intranet with Liferay by Jonas X. Yuan, 2008, ISBN 978-1-847192-72-1, PACKT, Lincoln Road, Birmingham, UK.
- [4] Building Portals, Intranets, and Corporate Web Sites Using Microsoft Servers (Addison-Wesley Microsoft Technology Series) by James J. Townsend, Dmitri Riz, and Deon Schaffer, 2004.
- [5] Intranets: A Guide to Their Design, Implementation and Management by Paul Blackmore, 2001, ASLIB
- [6] Communicating Design: Developing Web Site Documentation for Design and Planning by Dan Brown. 2006, Pearson Education, Berkeley, CA.
- [7] Information Architecture for the World Wide Web: Designing Large-Scale Web Sites by Louis Rosenfeld and Peter Morville, 2006, O'Reilly Media, Sebastopol, CA.

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Digital Signal Processing. Digital System Design. Embedded Systems. High Level Programming. Introduction to Machine Learning. Mathematics for Signals and Systems. Real-time Digital Signal Processing. Department of Computing modules. The project will involve the specification, design, implementation and testing of a pre-production prototype of a new product or technical solution. Year 4. Optional modules. You will choose seven or eight modules, with one humanities or business-related module, and at least one choice from Electrical and Electronic Engineering, and another from Computing. There are 30 optional modules available, and the list below gives an idea of what will be available: Electrical and Electronic Engineering. Coding Theory. Campus students, faculty, staff, and alumni College and Summer Program applicants Berklee Online students. Log Out. Campus Tools Menu. The Office of Student Success connects Berklee students with the resources available at the College that can help them achieve personal, academic and career success. Personal Counseling. Counseling and Advising Center at Berklee.