



One Belt, One Road Background, International Logistics Professional Online Training and Education System Design

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Abstract. In the traditional teaching system, when the number of concurrent users is high, the system takes up more CPU resources in the process of running, which leads to the performance degradation of the system in the process of working. Therefore, an online training and education system for international logistics specialty is designed. In the system, the user layer, interactive display layer, business processing layer, application support layer and data layer are designed. In the hardware aspect, the overall design diagram of the hardware structure is designed, and the crystal oscillator circuit is studied in detail. In the software aspect, UML is used for visual modeling, and UML is introduced Net framework as the core component of system development; in the database design, the database structure table is established, and the database query optimization is carried out. The system test results show that the designed system has smaller CPU occupancy and more stable memory usage.

Keywords: One belt · One road · International logistics · Online training · Education system

1 Introduction

In recent years, due to the acceleration of the globalization process, the trade links between countries are getting closer and closer, and the demand for international logistics is growing rapidly. International logistics needs to follow the theory of international division of labor and cooperation, adapt to the international requirements, with the help of international logistics network, logistics technology and logistics facilities, to complete the exchange and circulation of goods in different countries and regions. With the deepening of China's reform and opening up, China's demand for modern logistics technology and equipment is also increasing. Therefore, in-depth understanding and research on international logistics are essential skills for students majoring in e-commerce [1, 2]. "One Belt And One Road" international channel, with the core city as the support, with the key economic and trade industrial park as the cooperation platform, to jointly create a new channel of international economic cooperation including China, Russia, China, Central Asia, West Asia and China, Indo-China Peninsula and other international economic cooperation corridors. Bangladesh-China-India-Myanmar Economic Corridor.

“One belt, one road” links up the three major regions of East, central and West, forming a two-way international radiation space layout with the core of our territory as the core, enhancing the depth of economic development and industrial layout, and fostering the growth pole of economic development in less developed areas. As one belt, one road and other national strategies promote the rapid development of foreign trade and economic cooperation, the overall efficiency of domestic logistics nodes will be significantly improved, and a three-dimensional international logistics infrastructure system will be formed, taking ports and air ports as the center, and railway, highway and waterway as the network. Foreign research on international logistics simulation teaching system started earlier, and the simulation teaching system of international logistics course has been established for many years and reached a stable stage [3, 4]. International logistics involves buyers, sellers, banks, production enterprises, storage enterprises, freight forwarders, shipping agents, transport teams, port yards, customs, tally companies and inspection and Quarantine Bureau. In the process of international logistics management, how to set the operation authority of each role and divide the functions of the system is the most complex part of the international logistics business simulation teaching system. In the original teaching system, when there are more concurrent users, the system takes up more CPU resources in the process of running, which leads to the performance degradation of the system. Therefore, this paper designs an online training and education system for international logistics specialty. The specific research ideas are as follows:

Firstly, the user layer, interactive display layer, business processing layer, application support layer and data layer are designed.

Secondly, the overall design block diagram of hardware structure is designed, and the crystal oscillator circuit is studied in detail.

Then, in the aspect of software, UML is used for visual modeling, and UML is introduced as the core component network framework of system development;

After that, in the design of database, the database structure table is established and the database query optimization is carried out.

Finally, summarize the full text.

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The overall architecture of international logistics business simulation teaching system is divided into five levels: user layer, interactive display layer, business processing layer, application support layer and data layer. The user layer mainly includes three roles: teacher, student and system administrator [5, 6]. The system administrator carries out the relevant operation in the system management module, the teacher carries out the relevant operation in the experimental task management module, and the students carry out the relevant operation in the international logistics business management module. The overall architecture design of the international logistics business simulation teaching system is as follows (Fig. 1):

As shown in the figure above, the international logistics business simulation teaching system mainly includes five layers: user layer, interactive presentation layer, business

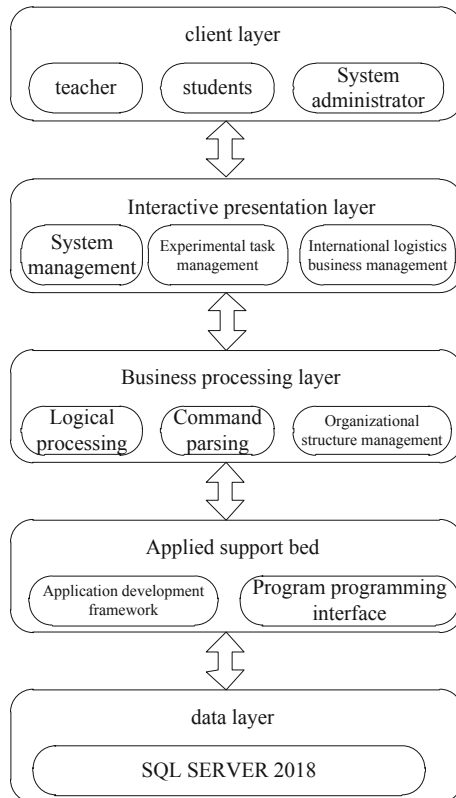


Fig. 1. Overall architecture design diagram

processing layer, application support layer and data layer. Among them, the user roles involved in the user layer include teachers, students and system administrators; the interactive presentation layer mainly consists of system management, experimental task management and international logistics business management; the business processing layer mainly includes logic processing, instruction parsing and organizational structure management; the application support layer mainly consists of application development framework and program programming. The database of international logistics business simulation teaching system is SQL Server 2018.

2.1 Hardware Design

The system is developed with .Net technology, the web server is Windows 2003 server operating system, IIS6 is installed to publish web pages, and the database server is Windows 2003 server operating system. The client only needs the ordinary computer with IE6.0 browser. The overall design diagram of the hardware structure of the system is as follows (Fig. 2):

In the hardware design, crystal oscillator circuit is the key circuit in the hardware circuit of the system. The memory in the system will double the frequency through external

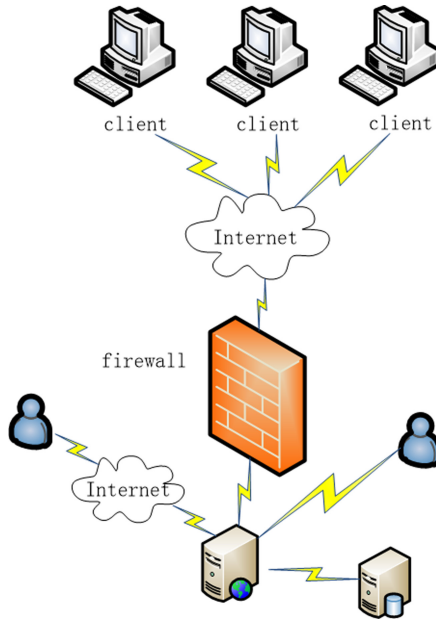


Fig. 2. Overall design of hardware structure

crystal oscillator. According to the requirements of memory, two crystal oscillators with different frequencies are designed to adapt to the working mode and sleep mode, and the frequencies are 17.354 MHz and 36.574 MHz respectively. The principle of crystal oscillator circuit is shown in the figure (Fig. 3):

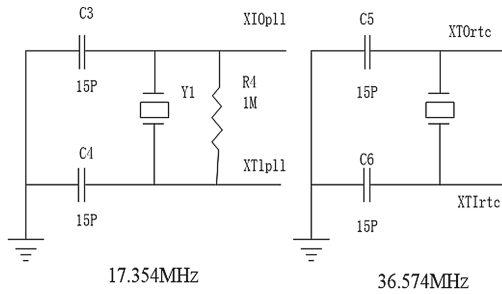


Fig. 3. Crystal oscillator circuit diagram

For most of the crystal oscillator, the corresponding controller is integrated in the system, so the crystal oscillator circuit structure is relatively simple. However, after welding the circuit board, there may be false soldering or short circuit, so it is necessary to debug the circuit. Before the system is powered on as a whole, the jumper [7, 8] near the power supply circuit should be cut off, that is, the main board should be powered off. Use a voltmeter to measure whether the output voltage of the conversion circuit is

3.3V. When the measured voltage is normal, plug in the jumper to continue debugging. After the circuit is powered on, the oscilloscope is used to capture the waveforms of the two crystal oscillators to verify whether the parameters are correct and whether the captured waveforms are in the normal range. So far, the hardware design of the system is completed.

2.2 Visual Modeling

Unified Modeling Language (UML), also known as unified modeling language or standard modeling language, is an OMG standard that started in 1997. It is a graphical language that supports modeling and software system development. It provides modeling and visualization support for all stages of software development, from requirement analysis to specification, to construction and configuration. This system uses UML modeling technology to design. The important content of UML can be defined by the following five kinds of diagrams: (1) use case diagram, which describes the system function and points out the operator. (2) Static diagram, including class diagram, object diagram and package diagram. (3) Behavior diagram, describing the dynamic model of the system and the interaction between the constituent objects. (4) Interaction diagram, describing the interaction between objects. (5) The component diagram describes the physical structure of the code component and the dependency relationship between the components. UML modeling process can be divided into four stages: initial stage, refinement stage, construction stage and handover stage. This paper adopts .Net development platform .NET development platform is a programming model with tools and an environment for developing, deploying and running .NET applications. It mainly includes three aspects: ASP .NET, CLR and .NET framework class. .NET framework class (system class) provides a variety of core functions suitable for different language environments, and provides a large number of core functions that can be used when constructing asp NET applications (and non asp NET applications). Like all other .NET classes, system classes exist as assemblies. An assembly in .NET is similar to a com DLL or an EXE file -- it is an executable file that holds class code. For example, the math class, including its properties and method definitions, is located in the mscorlib. DLL assembly. As the core component of the .NET development platform, the .NET framework provides an environment for building, transplanting and running web services and other applications. .NET component is a precompiled class module with DLL extension. At run time, the program is activated by the user and loaded into the memory. .NET components are used to create network and windows applications, which enable the functions required by an application to be displayed externally [9, 10]. NET platform also includes web form, which is a standard interface that can be downloaded from the Internet. A web form contains text boxes for users to enter data. The user can then submit the form to the receiver. A crucial part of .NET platform is network server. A collection of web server query protocols and standards. The application program can use the network server to exchange data through the computer network. ASP .NET is the main development language to realize web application under .NET framework. It is a program framework based on general language and can be used in a web server to build powerful web application. The basic architecture of ASP .NET is as follows (Fig. 4):

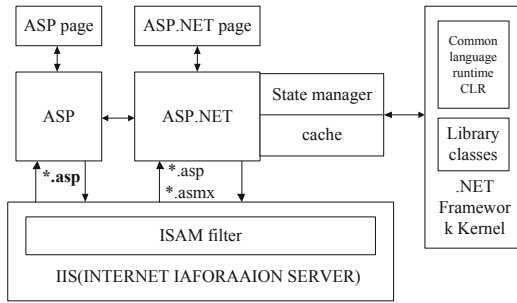


Fig. 4. Basic architecture of ASP .NET

In the process of visual modeling, using ASP .Net can have high scalability, ASP .NET has many improvements in providing greater scalability. Server to server communication has been greatly enhanced, which makes it possible to allocate an application proportionally on several servers [11]. An example of this is the ability to run XML parsers, XSL transformations, and even resource consuming session objects on different servers. In addition, in the process of compiling code, the first request to the ASP .NET page on the server is to compile its ASP .NET code and save a cache backup in memory. The result, of course, is a huge performance improvement. In addition, it is easy to configure in the process of modeling, and the configuration of ASP .NET can be completed through the pure text file. Configuration files can be uploaded and modified while the application is running. There is no need to restart the server. There are no metabase and registration challenges. It also has some advantages in the development process, and does not need to restart the server to configure and replace the compiled code. ASP .NET simply redirects all new requests to new code.

2.3 Design Database

In the process of establishing the database, MySQL language is used to develop and complete the establishment of each function data table. In the process of designing the database table, we need to analyze the needs of the database. The database is the basis of the whole teaching multiple information display system. Therefore, according to the overall architecture of the system and the design of the functional modules in the system, the database table needs to include the basic information table of students and teachers, the information table of professional classes in Colleges and departments, the resource table of grades and courses, and so on, The database structure table designed in this paper is obtained (Table 1):

The design of the database table needs to be reasonable according to the index and other related situations, and it is described in detail from the field and field type of the database table. Data access is to obtain data from the database through specific tools, and users can add, modify and delete the required data. Generally speaking, data access is to CRUD the data in the database: Create, Retrieve, Update and Delete. The standard of comprehensive database query optimization is to provide a shorter response time when multiple users query concurrently. Therefore, the system must realize load balancing

Table 1. Database structure table

Name	Data type	Default value
User name	Varchar	Null
Password	Varchar	Null
Gender	Varchar	Null
ID number	Varchar	Null
Date of enrollment	Datetime	Null
Contact information	Int	Null
Professional class of the Department	Int	Null
Photo	Varchar	Null
Course number	Int	Null
Course name	Varchar	Null
Class information	Varchar	Null
Course credit	Int	Null
Record number	Int	Null
Score	Float	Null
Student evaluation	Varchar	Null
Resource name	Nvarchar (max)	Null
Collection number	Int	Null

to maximize the efficiency of the system. When the access to the application system reaches the peak, the response speed of the system does not fluctuate significantly. So far, the design of the system is completed.

3 System test

3.1 Build System Test Platform

In order to verify the validity of the system designed in this paper in terms of business logic and function, in the system performance test, the response time of transactions, the number of concurrent users and system resources are tested, and the system performance is analyzed. Because the system designed in this paper uses B/S (Browser/Server) mode design, the Web Server uses IIS6.0, the development technology uses IIS6.0ASP.NET architecture combined with SQLServer2018 database. In the test process, the commercial stress test tool LoadRunner 8.0 was used to simulate the concurrent operation of users and test whether the CPU and memory performance of the system was stable under multiple concurrent operations when a large number of users logged in at the same time. Parameter configuration of the test environment is shown in the following Table 2:

In the process of system testing, the selected testing tool is the English version of HP LoadRunner 8.1, and its working mode order is: first record the script, then set the scene,

Table 2. Test environment requirements

Environment	Parameter	Describe
Virtual Server Environment	Purpose of the host	Online examination System application server
	OS	Win 2003 Server
	quantity	1
	CPU	1
	memory	1G
	Corresponding IP	192.168.1.104
Client environment	Purpose of the host	Pressure load generator
	models	PC
	The operating system	Window Xp
	CPU	P4
	memory	512M
	Browser version	IE7.0
	Corresponding IP	172.16.68.2

run the test in the obtained scene, and finally summarize and analyze the test results. In the process of system performance testing, in order to verify that the performance of the designed system has been improved compared with the original system, we need to use the system in this paper and the original system for experiments. When simulating a large number of user loads, it can be achieved by changing the relevant parameters. In order to make the test process more real and reliable, we set a data concurrent collection point in advance and enable IP shielding to simulate the real concurrent state of a large number of users in the running process of the system. In order to make the experimental results more reliable, we can continue to pressurize the system during the experiment, and set the scene according to the actual needs. The test tool LoadRunner used in this paper can provide powerful report analysis function, which can analyze the parameters of the system and the server in detail, and generate reports. The process of virtual user login scenario in system test is as follows:

(1) Log in the international logistics professional online training and education system; (2) input the virtual user name and password to complete the login; (3) input the relevant menu navigation from the online training and education system, enter the online education and training through the online course connection, and exit the system after completing the course learning. In this process, in the process of testing the number of concurrent users, the initial number of concurrent users is designed to be 20. In the follow-up process, the number of concurrent users is gradually increased. First, start 2, and increase 2 every 5 s. After reaching the specified number of users, it will continue to run for about 5 min.

3.2 Test Results and Analysis

Under the above experimental conditions, the CPU usage of the two systems in the test process is obtained, as shown in the figure below (Fig. 5):

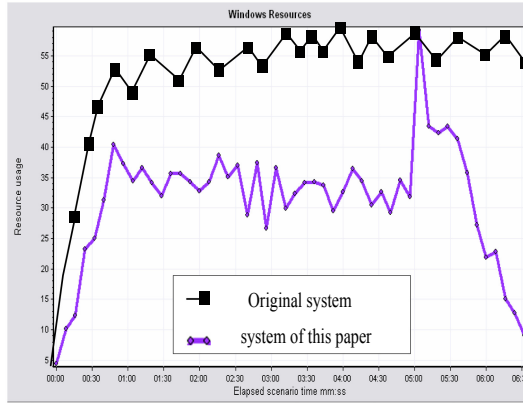


Fig. 5. CPU usage of the two systems

As can be seen from the above figure, in the whole process of scene testing, the system in this paper has a high peak value of about 80.1% in about 5 min and 13 s during the execution of the simulated scene. In the whole test process, the average CPU utilization rate of the system server in this paper is 31.3%, and the average CPU utilization rate of the original system is 58.2%. Generally speaking, the CPU performance of the two systems in the test process is balanced, but the CPU utilization rate of the system in this paper is smaller.

During the test, the memory usage of the two systems is shown in the following figure (Fig. 6):

As can be seen from the above figure, the number of logged in users increases with the passage of time in the test process. In the data analysis of the original system, we can see that the remaining physical memory of the original system decreases continuously. From the beginning of the test to the end of the test, the maximum value of the remaining memory is 232 m, and the minimum value of the remaining memory is 212 m. According to these two data, we can deduce that the length of the test is longer. In the test time of 5 min, the remaining available amount of the original system memory is reduced, the average available physical memory is about 222 m, and the utilization rate of memory is about 57%. In the system designed in this paper, the maximum and minimum values available in the test process are 228 m and 223 m respectively, and the memory utilization rate is about 56%. There is no obvious performance bottleneck in the test process of the two systems. Generally speaking, the memory of the two systems is enough, but the overall trend of the memory usage of the original system is declining. In the follow-up process, if more concurrent numbers are used, the problem of insufficient memory may

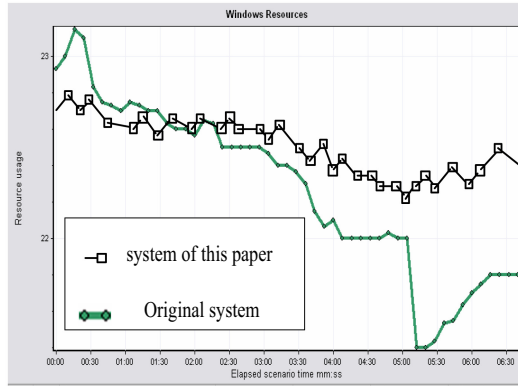


Fig. 6. Memory usage

appear. To sum up, in the process of testing, the performance of the system designed in this paper is improved to a certain extent compared with the original system.

4 Conclusion

The main task of the online training and education system of international logistics specialty is to realize the online education based on Internet and oriented to logistics specialty. When the students log in to the system, they can carry out distance learning at any time, and the system administrator can maintain all kinds of relevant course information, so that the users and operators of logistics talent training distance education system can obtain certain social and economic benefits.

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