

E-commerce Practice Teaching Software Design Based on Online Payment and Settlement

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Abstract—The development of enterprising E-commerce gives birth to the growth of professional e-commerce. The practical teaching based e-commerce teaching needs to rely on the practical teaching software's of e-commerce. The development of practical teaching based e-commerce which is based on online payment and settlement, is in line with the portraits of design sharing, scalability and reliability, with the design idea of WEB systematic procedures, adopts SQL2005 database and B/S framework which is based on the five open technical interfaces, JAVA, EJB,J2EE,XML, imitating the payment clearing system, the commercial banking system and the front-end payment instrument system from the five functions of systematic management, informational management, trade between B2C and payment and certificate. Students can understand the system, structure and procedure of online payment and settlement system by directly feeling the online paying and settling system of e-commerce can establish the models of e-commerce manipulation and can enhance the capability of practicing and their comprehensive qualities.

Index Terms—E-commerce, practice teaching software, online payment.

I. INTRODUCTION

E-commerce is a new kind of modern commercial operation mode, which brings network as a platform, relies on information and technology, and takes economic efficiency as its main purpose. With the development of the social economy and the strengthening of globalization trends, the computer information technology and software development technology is widely used in various links of e-commerce [1]. Due to many limitations in traditional business platforms, the online shopping based on e-commerce becomes more and more popular. More and more enterprises do economic transactions with the e-commerce platform, and the evaluation based on payment and settlement can tell whether the e-commerce platform is good or not. Therefore, enterprises make new demands for the construction of e-commerce website and platform [2].

At present, e-commerce requires enterprises not only to achieve B2B, B2C e-commerce, but also for the services of customer relationship management, procurement management, inventory management and financial analysis etc, the requirements of e-commerce software with the functions of transaction management, online ordering, electronic account, solicit comments, advertising, service delivery, consulting business, online payment etc. E-commerce has changed the traditional business concept, management methods and means of payment, through the Internet to set up a bridge between enterprises' e-

commerce and users, network marketing, online procurement and electronic payment are necessary methods for enterprise to use e-commerce to do business, electronic commerce software makes the transaction process can be completed safely and smoothly[3].

II. MATERIALS AND METHODS

The development of the enterprise electronic commerce has spawned the growth of electronic commerce professional, the electronic commerce teaching with practical teaching as the core needs to rely on e-commerce practical teaching software [4]. At present e-commerce practical teaching software is dominated by commercial software, software design and application are according to the fixed mode to carry out the operation, the teachers have lower rights to modify software during teaching process, cannot targeted to carry on the electronic commerce professional practice teaching, therefore, we begin to study the development of the e-commerce practice teaching software of adaptive school teaching. Electronic commerce practical teaching software is developed based on the electronic commerce as the core, in the design of software sharing, extensible principle and high reliability, with digital, information and other modern educational technology as a means, by network information as the carrier, constructing the electronic commerce teaching software to serve the network payment and settlement [5].

A. Design idea

The developing ideas of e-commerce practical teaching software are the applications of online payment and settlement in the electronic commerce area, using the process design ideas, based on the opening technology interface of J2EE and XML, enhanced the security of practical teaching software; fully considering the later product design and reengineering and modification of each unit's process [6]. In the system design, we must consider the convenience of the software development project deployment, but also consider the flexible extensibility and system integration of software, and also think over from the software development cost and software applicability, through XML to achieve the data service, even if the system out of the database can also realize the dynamic data exchange, e-commerce practical teaching software working principle see Fig 1. Electronic commerce practical teaching software provide a basic component of e-commerce Web site standards and common processes for students, also provides extension interface, students can according to the need to expand the component into the system component library for use. The completed experimental project is exported system in the form of the standard War package, which can be saved or published on the server, through the

application of XML technology, the software can realize dynamic electronic commerce data display when it break away from the database, improving project adaptability, and at the same time reducing the operation cost and the configuration complexity of the system. Electronic commerce practical teaching software provides page editing and structure editing function, which can give full play of students' creative design and character design, realizing the teaching objectives of application and innovation experiment of practical skills.

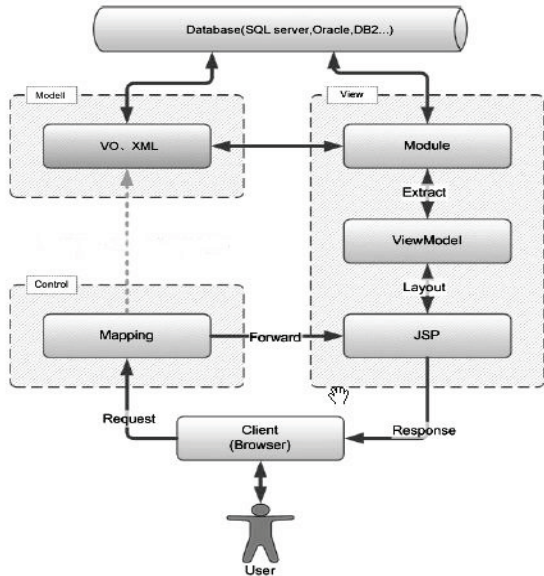


Figure 1. The working principle of e-commerce practice teaching software

B. Software function

Electronic commerce practical teaching software is mainly used for the developing experiment, can also be used as a developmental tool for electronic commerce pioneering experiment course, which is also used for the teachers lead students to carry out development of commercial application projects, mainly realizes the five functions of the simulation of business activities, teaching experiment and practice, simulation entrepreneurship and practice, entrepreneurship and reverse interest and train. The simulation of business activities is through the students participate in the system development of e-commerce practical teaching projects, fostering and training students' acuity of e-commerce, enhancing the ability of students' assessment, judgment, and transformation of electronic commerce system. The teaching experiment and practice are through the e-commerce practical teaching software can simulate the various aspects of business process in e-commerce of enterprise, consumer, government departments, banks, logistics companies and other different roles, combining theory and practice together to strengthen students' ability of participating in the experiment teaching. The simulation of entrepreneurship and practice is through the different roles' simulation in the e-commerce practical teaching software, through a combination of daily practical teaching and the simulation of entrepreneurial practical activities to cultivate students' entrepreneurial awareness gradually, fostering entrepreneurial spirits. The adverse interest and training are making students bypasses the technical threshold, using the appli-

cation effect in business of practical teaching software to improve students' interest, and then providing the data source, enterprise data, program files, pictures, application script and other data resources to provide students their own learning, and ultimately the reverse interest promotes the cultivation of students' skills and knowledge, so as to improve the students practical skills level [7]. Through the practical business operations involved in the practice teaching of e-commerce software, making students set up the whole idea of e-commerce system, helping students to learn and develop practical software which has business applications and commercial value, so as to improve the students' abilities to solve the problem of students weak network marketing theory and single technology of using site to carry out the construction, promoting the students' practical operation ability of students' information website and electronic commerce website [8].

C. Software design

while designing the e-commerce practical teaching software, we are fully considering multifunction in one, the page design platform supported by online page design tool, business components support for e-commerce functionality, the content management modules which manage and distribute important commercial content, the editing versioning control support of application project code, the testing platform for online application feature, unified business information portal for personal information and commercial applications and enterprise electronic architecture platform which is ease for set up and extended. E-commerce practical teaching software development platform authority distribution see table 1. E-commerce practical teaching software including the authority distribution of development platform, development platform multifunctional edit, development platform page management and other functions, which can realize the three modes' editing, including edit mode, code model and the preview mode, edit mode is that use editor to make graphical interface design, the code mode can view and modify the webpage content through the code, understanding the internal operation mechanism in the process of software design and development, the preview mode is the examination and check of the generated program and results, the electronic commerce practical teaching software development platform developing functional module is shown in Table 2, the electronic commerce practical teaching software development platform developing functional editor, see table 3.

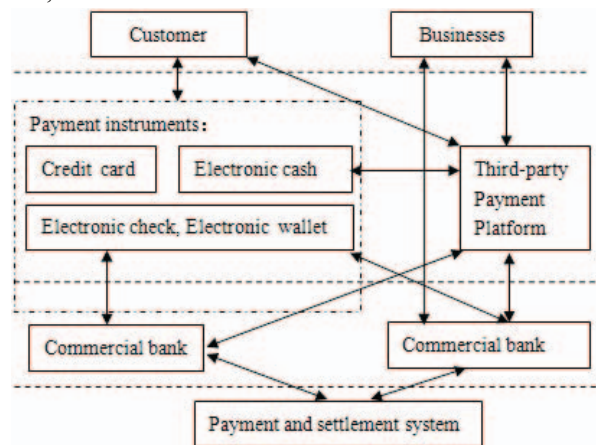


Figure 2. The processes of online payment and settlement system

Table I.
E-COMMERCE PRACTICAL TEACHING SOFTWARE DEVELOPMENT
PLATFORM AUTHORITY DISTRIBUTION

Function Module	Technology Process	Object Achievement
Administrator	System Initial-ization	The system data is restored to the initial state
	Teacher Management	Identification of registered teachers
Teacher	Teacher Information	The improvement of teachers' personal information, including e-mail, contact information, and passwords modification
	Class Management	Addition and deletion of class data
	Student rights assignment	Assign students operating roles and identify positions

Table II.
ELECTRONIC COMMERCE PRACTICAL TEACHING SOFTWARE
DEVELOPMENT PLATFORM DEVELOPING FUNCTIONAL MODULE

Function Module	Technology Process	Object Achievement
Student registration	Role registration	Select the role and enter into the experimental environment with the registered account
Page design	Design application programs UI	Select dynamic business modules which support quick formation of business application programs, and use multifunctional editor and business modules to understand the details of the code model and the actual technical applications, and show the result of a transaction and enhance interest in learning by bypassing the technical threshold, and then go back to learn the technical details of the page design and implementation process
File management	Version synchronization	Tools of version update and file synchronization
	Resource upload	Upload the pictures, FLASH, EXE on the page to application server and test them
Dynamic module	Navigation module	Dynamic scalable navigation modules enable users to position Mall quickly
	Commodity display module	Take the actual situation into consideration and select the proper display mode and style for merchandise from the functional modules
	Cart module	For necessary modules of e-commerce transaction system, the drop-down menu design is proper for future system construction and maintenance
	Order track module	Design the order track module by linking the drop-down menu and the underlying database query module, and this is for the late data statistics
	Mall bulletin module	Include the information of discounts, promotions, announcements, notifications, and so on
	advertising module	Addition, modification and release function of product advertisements
	Link module	Addition and release function of the information of cooperated malls
	Online survey module	Design survey items for related products and analyze the demands of customer
	Information release module	Addition, modification and release functions of the business information and product information
	Consultation feedback module	Business consulting and information feedback, establish interactive mechanism
Registration and login module	Provide modules and codes to help students to a build registration and login interface for uses quickly	

Table III.
ELECTRONIC COMMERCE PRACTICAL TEACHING SOFTWARE
DEVELOPMENT PLATFORM DEVELOPING FUNCTIONAL EDITOR

Technology Process	Object Achievement
Hyperlink	Link to internal and external web pages, images, audio and video files in the system
Anchor	Achieve connections within the system, as the function of the bookmark
Design picture form	Insert local, network or server images under different circumstances
Generate dynamic subtitles	Generate dynamic text and increase the dynamic effects of the pages for Web News
Design form and label	Visitors send the messages to the webmaster by means of form, so webmasters can collect feedback and exchange information with visitors
Use the buttons and the functional block	Various types of buttons and background editing, human-computer interaction window
Domain, container and sub-page	Variety of forms of HTML
Text editing area	Edit text files and layout

Table IV.
E-COMMERCE PRACTICAL TEACHING SOFTWARE MALL SYSTEM
ARCHITECTURE

Function menu	Description of function menu	Achievement
Application framework	View layer: JSP, Function realization: SERVLET	Analyze and study applications and processes of mall, and learn software framework from the perspective of software architecture
	Business object: BEANS, Database middleware: XML, Database: SQL SERVER	
Site function	Include the WEB site architecture management, WEB site functional module management and system role-based authorization management	Analyze WEB site functions

III. RESULTS AND DISCUSSION

A. Design of mall modules in e-commerce practice teaching software

Electronic commerce practical teaching software store design with the process WEB system process design, uses the SQL2005 database and the architecture of B/S, based on JAVA, EJB, J2EE, XML open interface technology, use table, view, storage files and file group, function design, query, update and other command to realize functions, write the trigger, cursor, transaction and other functions into stored procedure and function. Students without basic information technology can flexibly construct electronic commerce teaching environmental, in accordance with the standard components and general process can flexibly combine and invoke system components to complete the design and development of the electronic commerce project, teachers provide standard interface and data information through the e-commerce practical teaching software to grasp the students' learning depth and learning progress, improve practical teaching quality, promote the students to improve their practical ability, independent ability, comprehensive application of the theory of knowledge and ability to adapt to social needs, achieve the teaching target of development and open experiment, E-commerce practical teaching software mall system architecture is shown in Table 4, the electronic commerce practical teaching software mall planning construction and maintenance module is shown in Table 5, e-

commerce practical teaching software mall bank and customer management module design, see table 6.

B. Design of online payment and settlement modules in e-commerce practice teaching

When we completed the e-commerce practical teaching software store design, we begin to design the electronic commerce practical teaching software for online payment and settlement. The software of online payment and settlement are through the three levels' simulation of the payment and settlement system, commercial banks and front-end payment tool, which is completely showing the knowledge and the realized system of online payment and settlement to enable students can observe, operate, think the work principle and process from bottom payment and settlement system to top payment instruments, in-depth understanding of online payment and settlement theory and operations [8]. On the basis of that, we are equipped with the ability to design payment scheme for different electronic commerce project, lay a solid foundation for the successful e-commerce project and analysis of e-commerce system, online payment and settlement business process is shown in Fig2.

Through the in-depth understanding for the banking business system and payment business system and the analysis research for payment tools under information, combined with the e-commerce practical teaching software of payment instruments and payment ways, which are designed based on online payment and settlement under the electronic commerce environment, so that the students can get intuitive feeling through the system level business, understanding the way and characteristics of the economic activity supported by financial system in the environment of e-commerce, and experiencing the practical application related to the knowledge of online payments and settlements, verification payment and settlement principles or rules, through the system flexible experimental content composition design to complete the teaching cognitive and verified experiment tasks, realizing teaching objectives of cognitive and verified experiment [9]. The electronic commerce practical teaching software based on online payment and settlement includes five modules of system management, information management, B2C transaction, B2B transaction and certificate and payment module, online payment and settlement system management module is shown in Table 7, online payment and settlement information management module is shown in Table 8, online payment and settlement B2C transaction module in table 9, online payment and settlement of teaching B2B transaction module is shown in table 10, teaching certificate and payment of online payment and settlement module is shown in table 11.

The development of e-commerce practice teaching software which is based on online payment and settlement has played an important role in the process of e-commerce practice teaching [10]. The design and development of software emphasizes the stage of software operation. The software design process and prior software evaluation can ensure the stability of software operation, and protect the security of the transaction and payment. Software design reflects the full payment and clearing system in e-commerce links. Through simulating real financial trading environment, students can experience the online payment and settlement system directly, which helps students to

analyze and understand the construction of online payment and settlement system and build an intuitive operation mode for e-commerce [11]. Adoption of practice teaching software has transferred the theory-based teaching into practices development teaching. This change enables students to develop their potential abilities initiatively, and they can experience the entrepreneurial practice teaching without leaving the campus. During the process, students improve their abilities of cognition, innovation and application; fully grasp the knowledge and skills of the operating management of e-commerce business, and cultivate their comprehensive quality for e-commerce major [12].

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E-COMMERCE PRACTICE TEACHING SOFTWARE DESIGN BASED ON ONLINE PAYMENT AND SETTLEMENT

Table V.
ELECTRONIC COMMERCE PRACTICAL TEACHING SOFTWARE MALL PLANNING CONSTRUCTION AND MAINTENANCE MODULE

<i>Function menu</i>	<i>Description of function menu</i>	<i>Achievement</i>
Membership management	Achieve the identification and confirmation of system users	Analyze, implement planning, record uses, and organize processes
Product display	System background achieves the addition of product display. Field properties include the product name, origin of the goods, the purchase price, online quote, product category, date of production, and expired date	Manage the process of product display, applied to e-commerce process, and reflect the overall framework
Product recommendation	System background achieves the addition of recommended product. Field properties include the product name, origin, the purchase price, product category, production date, images and description of the recommended product	Create the product recommendation from different aspects and build a unique e-commerce mall from the view of operator
Bulletin board	System background achieves the addition of bulletin release. Field properties include the bulletin title, content, image, and remark	Manage the information and advertisement, and show mall advertising promotion from the bulletin board,
Links	System background achieves the addition of links. Field properties include the name, address, and instruction of the link	External links and internal links, and learn the overall processes of the website
Product comment	Client makes comment and submits to system background	Enable customers to exchange purchasing experiences
Product category	System background achieves the addition of product category. Field properties include the product name and type	Implement and manage the process of product display, applied to the whole process, and reflect the overall framework of the website
Related information	System background achieves the addition of related information. Field properties include information title, content, images, and remark	Embody the role of consultation
Guestbook	System background supports customer evaluations, which is conducive to the improvement of mall	Achieve the text interaction between foreground and background
Online survey	System background achieves the addition of the online survey. Field properties include survey title and content	Analyze the market dynamics and customer needs, and then improve the mall services
Ranking of product sales	System background achieves the addition of ranking of product sales. Field properties include function name, function type, ranking, style, and function description	Strengthen the product promotion through the ranking of product sales
Search query	Customers search for information in the foreground, which is supported by the background database	Achieve the data interaction between foreground and background
Information maintenance	System background achieves the maintenance and management of mall information, and submits to the system database	Improve the overall layout and design capability of student mall comprehensively from the foreground design to the background maintenance

Table VI.
E-COMMERCE PRACTICAL TEACHING SOFTWARE MALL BANK AND CUSTOMER MANAGEMENT MODULE DESIGN

<i>Function menu</i>	<i>Description of function menu</i>	<i>Achievement</i>
Account management	The background achieves the management of registered user account. Field properties include opened, in use, freezing and expired	Take full management to bank account, and understand the one-to-one and one-to-many relation in the database table
Financial management	Manage the deposits and loan of bank account	Prepare for financial analysis
Statement output	Manage the output of business statement	Collect all kinds of statements
Relationship Management	Manage customer relationship from the background	It is the permission of mall operator, and achieves the relationship management
Customer ordering function	Manage the order records of registered users	Review, edit and modify the ordered products
Deletion function	Modify or delete the customer data	Extending function for customer relationship
Information management	Modify and maintain personal information and system information	Information management and maintenance is associated with the database

Table VII.
ONLINE PAYMENT AND SETTLEMENT SYSTEM MANAGEMENT MODULE

<i>Function menu</i>	<i>Description of function menu</i>	<i>Achievement</i>
Class management, teacher management, teacher assignment, scale of marks, data maintenance	Establish the one-to-one and one-to-many relationship between classes, teachers, teacher and class	Manage the relationship data
Bank management	Manage commercial banks and the BIS account	Approve the registered accounts of commercial and BIS banks
Payment platform management	Manage the accounts in payment platform	Maintain the platform
Merchant management	Manage the merchant accounts	Maintain merchants separately
Customer management	Manage the customer accounts	Maintain customers separately
Question bank management	Divide and manage the questions banks according to subjects	Maintain the test category

Table VIII.
ONLINE PAYMENT AND SETTLEMENT INFORMATION MANAGEMENT MODULE

<i>Role</i>	<i>Function menu</i>	<i>Description of function menu</i>	<i>Achievement</i>
teacher	Class management, course management, customer management, mail management, log and information management	Achieve the sharing of data information to student management, teaching management, and appraisal management, and check the experiment progress of students freely	Achieve interactive study between teachers and students, and a remote management and evaluation of course content
student	Registration, identification, login, online exercise, online test, result query	Identify the role of students, and maintain the personal information network	Online distance learning and examination

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Table IX.
ONLINE PAYMENT AND SETTLEMENT B2C TRANSACTION MODULE

<i>Role</i>	<i>Function menu</i>	<i>Description of function menu</i>	<i>Achievement</i>
Register member	To check purchased products, payment, order status, feedback of shopping information	Achieve the B2C e-commerce processes of registration, purchase, generating order, payment and delivery	Experience the B2C business mode and master the processes of online orders
Mall manager	Manage product categories, announcements, staff in different departments, suppliers and logistics companies	Coordinate the B2C mall and logistics company, and manage the supply chain	Organize and design the management permission of mall personnel, understand the characteristics of organizing and managing e-commerce system
Sales department	Deal with new orders, backorders, unpaid orders, cancelled orders, and completed orders	Deal with all kinds of orders, and be responsible for product sales	Experience the transaction processes of confirmed orders, and verify the convenience of online business
Financial department	Manage customer orders, purchase orders for out of stock products	Manage the mall orders, internal purchase orders and accounts	Financial management and capital flow confirmation in e-commerce environment
Purchasing department	Manage the procurement of products, purchase orders for out of stock products and product warning	Achieve the management to procurement of products, set of the product warning limit, and out of stock products	The procurement is the core of mall business; experience the procurement management in the e-commerce environment
Storage and transportation department	Records of the storage and transportation for warning product, normal products and backorders	Manage the product storage and transportation, deal with various types of waybills, and select the logistics company to deliver the products	Provide storage and transportation for confirmed orders, and experience the product storage and distribution in the e-commerce environment
Logistics company	Deal with logistics business, check of records of accepted business and logistics offers	Deal with logistics delivery notes passed by the storage and transportation department	Handle logistics business, and experience the status and function of logistics in e-commerce

Table X.
ONLINE PAYMENT AND SETTLEMENT OF TEACHING B2B TRANSACTION MODULE

<i>Role</i>	<i>Function menu</i>	<i>Description of function menu</i>	<i>Achievement</i>
Users foreground	Register and log in, purchase products, inquiry products, recommend goods yard	Browse the supply and demand information of enterprises	Learn the method of member registration, and master the process of online transaction
Enterprise background management	Manage the paid orders, completed orders and backorders	Deal with orders, finish the transactions, and handle various types of order status	Experience the business results, and master the treatment of various types of orders
	Product management, product distribution, increase inventory, manage supply and demand information, record financial income and expenditure	Manage products, cooperative goods yard and the type of transactions	Master the managing method of membership information, understand content management mode and learn how to publish the supply and demand information
Trading location administrator	Category, bulletin management, basic information maintenance, management of supply and demand information, and mall log management	Set the management of trading distributions, and determine the accuracy and legitimacy of information	Manage the operation and maintenance of B2B business, and experience the operating mechanism of the trading locations
B2B yard management	Handle normal orders, backorders, paid orders, and orders with problem	Manage the goods yard and handle orders	Handle the storage and delivery of goods in the trading market, and recognize the services of goods yard

Table XI.
TEACHING CERTIFICATE AND PAYMENT OF ONLINE PAYMENT AND SETTLEMENT MODULE

<i>Role</i>	<i>Function menu</i>	<i>Description of function menu</i>	<i>Achievement</i>
Certificate application	Personal digital certificate, enterprise digital certificate, application of the EMAIL certificate, approval and inspection of certificate	Submit the application form of CA certificate to the CA Management Center	Experience the application process and format of digital certificate
Certificate usage	Login certificate, inspect certificate, and send signed and encrypted e-mail	Use a digital certificate to login secure site, and signed messages	Learn how to use the digital certificate
Certificate configuration	Import root certificate and personal certificate, upgrade and cancel certificate	Configuration of personal and server certificates	Learn how to install and update digital certificates
Certificate granting	Uses apply for inspecting and preparing certificates, issue, upgrade and delete certificates	Apply for approving and inspecting digital certificates, prepare and cancel certificates.	Learn the business of digital certificate management center, and master the method of preparing the certificates
Large-value payment	System structure of large-value payment , daily operation, business processing, data backup	Large-value payment system and simulation business	Learn the business processes, and understanding the role of large-value payment system
Bulk payment	System structure of bulk payment , daily operation, business processing, data backup	Bulk payment system and simulation business	Learn the business processes, and understanding the role of bulk payment system
Third-party payment	Account application, funds management, business management, data management, finance management and reporting system	Recognition of third-party payment platform system, operating mode	Manage and maintain through the third-party payment platform, and understand the operating principle of the third-party payment platform