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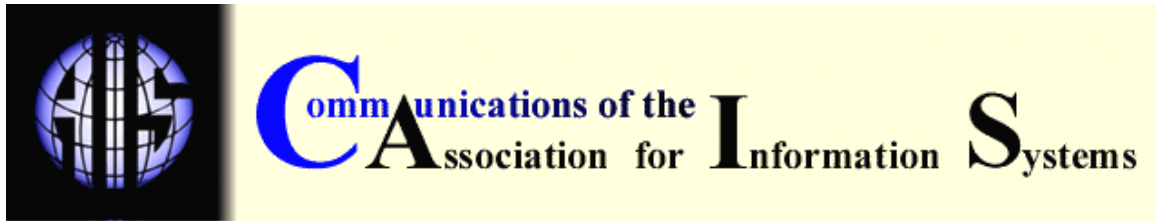
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SYSTEMS DEVELOPMENT AND MANAGEMENT METHODOLOGY IN TEACHING E-COMMERCE TECHNOLOGY

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ABSTRACT

While many business schools developed programs or courses on e-commerce, there is a need for a course that truly focuses on the technology. Specifically, the course should address the knowledge of tools, techniques, and developmental methodology of e-commerce systems. In this paper, we address the developmental methodology for an e-commerce technology course. We focus on the development of an infrastructure and management of an e-commerce application development environment. We also discuss a systems development methodology that addresses both the business and technology aspects of e-commerce.

Keywords: e-commerce technology, electronic commerce, e-commerce course, e-commerce teaching, e-commerce systems.

I. INTRODUCTION

During the past few years, a number of universities developed electronic commerce or e-commerce curricula. [King et al., 2001]. In most cases, an e-commerce curriculum contains an introductory course, which typically covers topics such as Internet technology, electronic marketing, e-commerce models, electronic payments, and security [King et al., 2002]. Although this course answers what an e-commerce is, it does not answer *how* to develop an e-commerce system. Furthermore, the introductory course hardly requires any prerequisite, making it non-challenging. Experience shows that students in the CIS or MIS program are eager to learn the technology that drives today's IT market. Employers of the e-commerce world also desire people who possess knowledge of both business and technology [Tobias, 2000]. Thus, a well-rounded curriculum should contain a course on e-commerce technology. Such a course should not only address various technological issues related to e-commerce systems, but it should also provide a hands-on opportunity to students that focuses on real-life situations.

While business schools are the focus of the e-commerce curricular development [King et al., 2001], a few computer science programs are also involved in e-commerce education [Tikekar and Wilson, 2001; Bloss, 2001]. Obviously, the courses in the latter programs were focused on the technology, and the methodology used to teach it is through a set of unrelated homework assignments. Thus, the business aspect of e-commerce was missing while providing the hands-

on experience in e-commerce technology. Bloss [2001] realized this problem and mentioned the need of integrating business with technology. In this paper, we focus on the development of an environment where students can develop e-commerce systems as part of the course, while a faculty member can manage the development of the systems from semester to semester. This methodology is particularly suitable for the campuses where dedicated computer laboratory or support personnel are not readily available to support a program or course.

II. KNOWLEDGE AREAS OF E-COMMERCE TECHNOLOGY

To understand fully how an e-commerce system works, some fundamental knowledge must be acquired. This knowledge generally spans programming, networking, database, and systems development methodology. Thus, before embarking into an e-commerce technology course, students need to acquire some fundamental knowledge by taking one or more courses in each of the above subject areas.

Whether considering developing an e-commerce system as part of a course, or not, various technical and management issues need to be addressed. As shown in Figure 1, an e-commerce application development environment can be considered as consisting of five major components: network, hardware, software, developmental tools, and people. These components work together to generate an e-commerce application. The circle in Figure 1 represents this application. In terms of the management of the development environment, these components can also be grouped into three broad areas of knowledge: infrastructure, application development, and management.

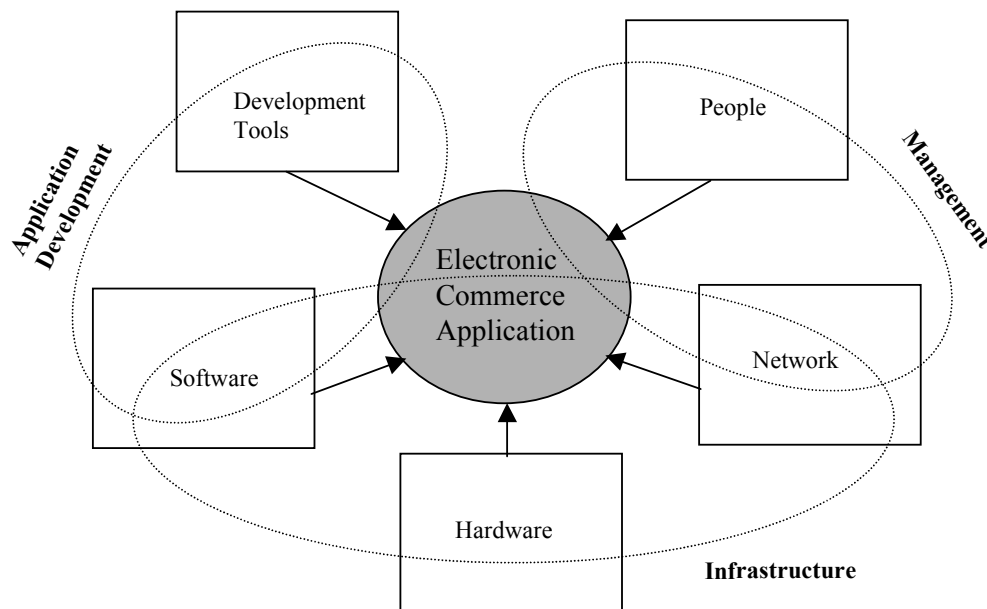


Figure 1. Building Blocks of an Electronic Commerce Application Development Environment

The infrastructure needs to be in place before considering any application development. To develop an application, one needs to consider issues such as the business model of the system, tools and techniques used, and the developmental methodology applied. As the systems development activities span over a time-period, management of the users within the security parameters of the organization is an ongoing activity. When developing a system as part of a

course, the security parameter becomes important when a course is offered from one semester to the next.

III. INFRASTRUCTURE REQUIREMENTS OF AN E-COMMERCE SYSTEM

To develop an e-commerce system as part of a course, the most important challenge for a faculty member is to manage students from semester to semester. The best solution is to have a dedicated laboratory supported by an assistant who can work with the systems administrator of the centralized network. For large universities this solution may not be a problem, but for most educational institutions, developing a dedicated e-commerce laboratory requires commitment of resources from the administration. The alternative approach is to exploit the existing computing infrastructure, including the network, hardware, and software.

Most academic institutions now support one or more student laboratories with networked personal computers (PCs). These laboratory PCs are managed centrally, and often they cannot be configured according to project requirements. However, once the appropriate hardware and software for the e-commerce system are available in the network, these PCs can be used to further develop the system.

HARDWARE REQUIREMENTS

The hardware architecture for a typical merchant is illustrated in Figure 2. Three PCs are identified with shaded rectangles that are involved in a typical e-commerce application. Two are server-type PCs and the third is a regular office PC. The latter is used by a faculty member to

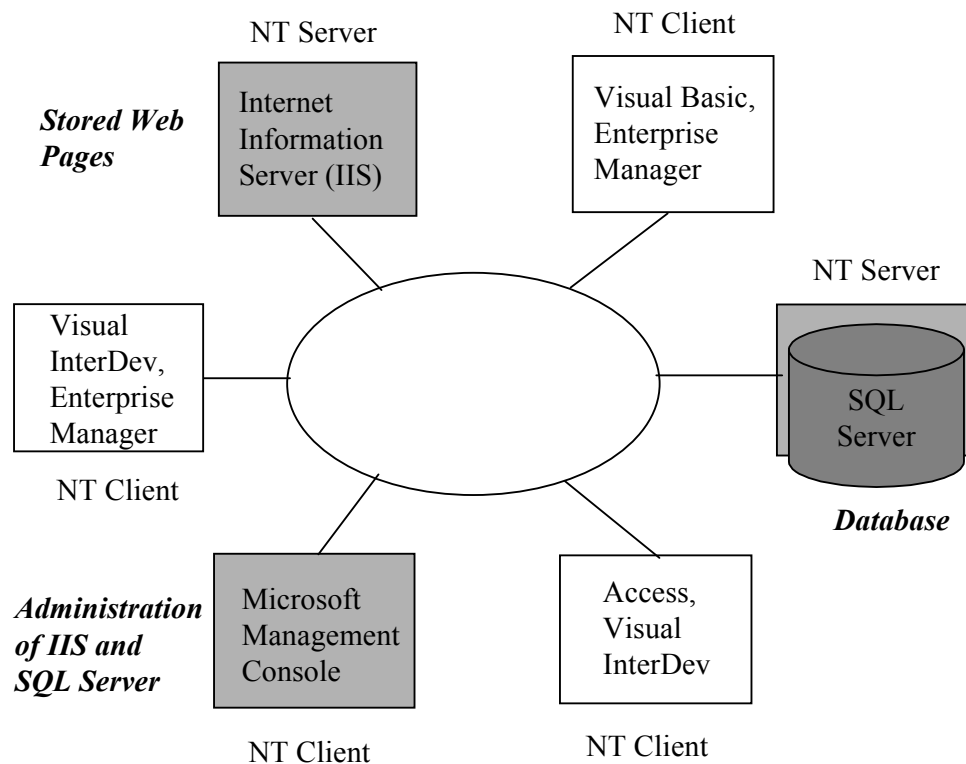


Figure 2: Architecture of an Electronic Commerce Application Development and Management Environment in a PC Network with Microsoft Software.

manage the application development environment. To start with a simple e-commerce application for the student merchant, one server-type PC is sufficient to load the necessary software.

SOFTWARE REQUIREMENTS

Several software components are required to develop and manage an e-commerce application. They include: a network operating system, a Web server, and a database server. The Web server is used to host the Web pages, and the database server is used to store product-related information of the e-commerce application. Figure 2 illustrates the software requirements of an e-commerce application. Microsoft Windows NT/2000 operating system is the most popular network operating system in a PC networking area, and is typically available in a university. As shown by the dark rectangles in Figure 2, the NT/2000 server is installed in the server-type PCs, and the NT/2000 client or Windows 95/98 is installed in the other PC. The last PC identifies a faculty member's personal computer that is used to manage students accessing the Web server and database server.

Web Server

The Web server is the most important software of an e-commerce application that provides the Web presence for a merchant. As shown in Figure 2, the Web server software is installed in a PC running the NT/2000 Server. Microsoft *Internet Information Server (IIS)* is the choice for the Web server because it comes bundled with the Windows NT/2000 operating system and is widely used in industry. Its configuration requires setting up a default Web site, a home directory, and a default Web page. The *Internet Service Manager*, which is installed with the IIS, is the administrative tool for the management and configuration of the Internet Information Server.

One of the simple ways to learn about a Web server is to start with the Microsoft Personal Web Server (PWS) for Windows 95, 98 or NT, which can be downloaded free from the Microsoft site. Personal Web server can be used to set-up and configure a Web site in a local host. Morrison and Morrison [2000] provide an excellent overview of the Microsoft Personal Web Server and its step-by-step configuration.

Database Server

Database is an essential component of an e-commerce application. It holds information on the electronic merchandise. An e-commerce database is accessed concurrently by many users over the Internet. Thus, a network database is essential in developing a true e-commerce application.

A network database includes a client portion and a server portion. The server is installed in a PC running a server-side operating system, and the client is installed in one or more computers running a client-side operating system (Figure 2). The database server contains the actual database and database-management tools, and the client is used for operating and managing the database from a remote PC. Many databases can be created in a single server and many users can access and manipulate a database from multiple computers. Incidentally, the database server can be installed in the same computer that runs the Web server. This arrangement does not compromise the performance of the database or the Web server in an application development environment.

Microsoft *SQL Server* is a popular network database because most networked-PCs run on the Windows operating system. It comes bundled with the Windows NT/2000 server and with a few other Microsoft software bundles. The SQL Server provides a user-friendly graphical user interface, and its security is tightly integrated with that of the Windows operating system. Thus, a network administrator can easily map a user's database access permission to that of the network. When the SQL Server is installed, the *Enterprise Manager* management tool is automatically installed with both the server and client versions. Thus, the SQL server can be managed either from the server computer or from a remote computer within the network.

IV. MANAGING THE APPLICATION DEVELOPMENT ENVIRONMENT

To develop e-commerce applications, students need to access the Web server and the database server. They may also need a file-transfer capability to transfer files to and from the university network. In general, students have limited rights in a computing network. Thus the management of students' access each semester becomes the responsibility of a faculty member whether he or she performs this responsibility personally or delegates it to a laboratory assistant. The faculty member must ensure that the security protocols of the university network are not compromised. This requirement can be achieved by leaving the majority of the security functionality to the network administrator, while obtaining limited authority to manage the Web server and the database server.

MANAGEMENT OF THE WEB SERVER

The Web site should be managed by the network administrator, but the faculty member should obtain appropriate administrative permission to manage the directory that is configured to host the class Web site. Once this permission is obtained, the faculty member can create folders for each e-commerce project and provide appropriate (e.g., read, write,) permissions to the students to manage their folders. Typically, obtaining an *operator* privilege in the Microsoft IIS is sufficient for a faculty member to manage students from semester to semester.

MANAGEMENT OF THE DATABASE SERVER

To manage the Microsoft SQL Server, a faculty member typically needs to obtain the *security administrator* permission, which allows him or her to create other users and assign permission to them to create and manipulate databases. At the beginning of the semester, the faculty member needs to create a username and assign a password for each student (or a student group) developing a database. However, in most e-commerce applications, data is typically accessed through program codes embedded in the Web pages using a valid username and password. In this case, a faculty member may want to create the required database and a dummy user for all students.

MANAGEMENT TOOLS

The management of the Web server and the database server is an ongoing process during the course of a semester. Considering the primary role of a faculty member is to teach the course, it is important to streamline the management of the students. The management of student folders in the Web server can be performed simply by mapping the Web site directory into the faculty member's PC, and the SQL server can be managed using the Enterprise Manager in the same PC. An alternative approach is to use the *Microsoft Management Console (MMC)* – an administration tool to manage network servers from a remote PC within the network. It also comes bundled with the Windows NT/2000 server. To manage the IIS and SQL server, the MMC needs to be installed in the faculty member's personal computer (see Fig. 2). After installation, two *snap-ins* need to be added to the MMC window – one for the Web server and the other for the SQL server.

V. DEVELOPING THE E-COMMERCE APPLICATION

An e-commerce application can be considered as consisting of three major parts or components:

- the user interface, which enables the user to interact with the application programs
- the business logic, which contains rules specifically designed for a particular business, and
- data storage, which contains data for the business and the business transactions

The data is typically stored in a database, which is designed to accommodate the needs of the business. When developing an application with the current technology, the user interface

and the business logic cannot be separated, and together, they make up what we can term as application processes (Figure 3).

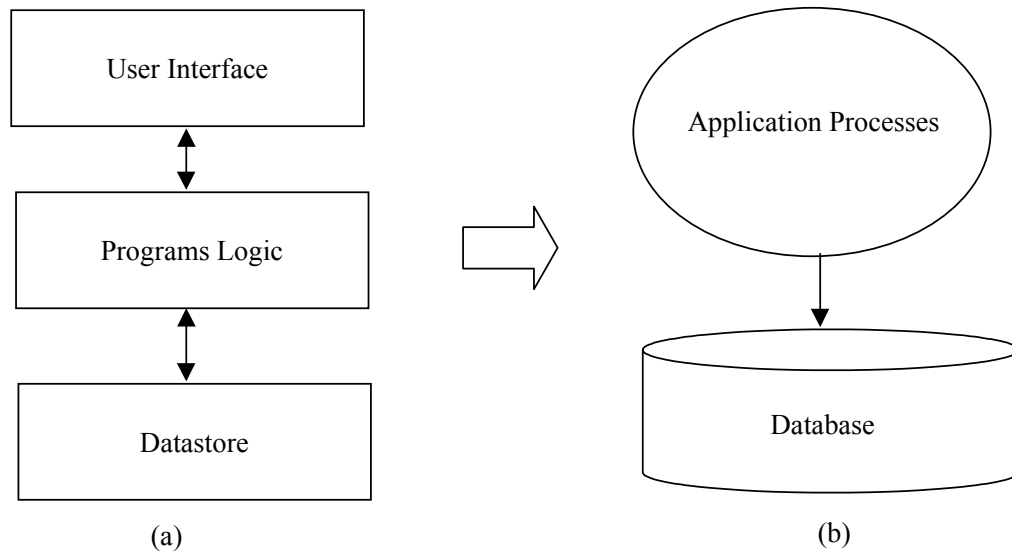


Figure 3: Layers of an e-Commerce System. (a) Logical view and (b) application view

Most of these processes are developed and managed by a merchant, while others are maintained by third party businesses. The following are some generic application processes:

- Electronic catalog display
- Catalog browsing
- Shopping cart
- Checkout
- Payment
- Payment Processing
- Receipt
- Shipment Processing

Each of these processes may require several sub-processes to complete a business cycle. The methodology of development of each of these processes may vary from merchant to merchant, but in general, most of these processes require development of several interrelated Web pages that interact with the database. It should be clear that for e-businesses, which require real-time payment and shipment processing, the systems of the merchant, financial institutions, and shipping companies interact. To reduce the complexity and the cost, often a merchant performs the payment and shipping processes manually via the traditional methods of telephone calls and bank-card terminals. Thus for practical reasons, the systems development in a semester-long course requires the assumption that the students will develop only the business processes that are typically maintained by a merchant.

SYSTEMS DEVELOPMENT METHODOLOGY

To develop a successful e-commerce system, one should apply a structured methodology of systems development, which is difficult to accomplish in a semester-long course. An alternative approach is to use Rapid Application Development (RAD) methodology, especially prototyping. We divide the systems development activities into several phases, where each phase contains one or more tasks, a timeline, and a presentation. The tasks and the timelines are organized in such a way that they complement the lecture topics covered in the class. Students are guided through the tasks by outlining expectations in their presentations and final

documentation. Each presentation is considered as a milestone for the completion of a phase. A typical, semester-long systems development life cycle goes through a schedule shown in Table 1. As seen, students go through stages of forming groups, identifying a business problem, developing a systems architecture, developing the database and program codes, and finally generating a document for the system.

TABLE 1. Systems Development Methodology of an e-Commerce Application

Phase	Task	Time	Presentations
Project Initiation	Formation of Project group	1 week	
	Identify business problem	1 week	Describe the problem and proposed solution
Systems Analysis & Design	Develop application architecture	4 weeks	Describe the application architecture
Systems Development	Coding and database development	8 weeks	
Closing	Develop documentation	2 weeks	Present the live system

To manage various presentations, a schedule is created that identifies each student-group and the time of presentation in each phase. In the first presentation, students identify a business problem and a proposed solution to the problem. This presentation initiates the project. The second presentation encompasses the application architecture. It involves identifying and describing all application processes and sub-processes, and the database design. Figure 4 presents a part of this presentation. It illustrates the interaction between the various Web pages that the students plan to develop to implement application processes or sub-processes. It also shows the communication of the Web pages with the database. A description of the functionality of each of these Web pages is an essential part of the presentation.

During the next phase, students develop the system, which requires database development, coding, and testing. Note that there is a longer time span for the systems development and there is no formal presentation. Students in this phase typically interact with the instructor for various developmental and management issues, which typically include the following:

- Creating folders for each student group in the Web server
- Providing access permission to one or more group members in the group-folder
- Providing FTP permission to the group folder
- Developing a home page for all group projects of the semester
- Resolving any programming and database-related issues.

In developing the application, students utilize different tools and techniques, and apply programming methods that are typically discussed in lectures. The development concludes by the third and final presentation, where students present their live e-commerce systems and submit the final documentation. The document generally contains all outputs generated during the project development.

E-COMMERCE PROGRAMMING, TOOLS, AND TECHNOLOGIES

Development of e-commerce systems require specific knowledge of tools, technologies, and programming, especially developing dynamic Web pages that communicate with the database. This requires the knowledge of client-side processing and server-side processing. It is also crucial to understand the programming environment. Active Server Pages (ASP) and Java Server Pages (JSP) are two leading environments for developing dynamic Web pages. Both require writing codes embedded in HTML; however, ASP uses scripting languages like VBScript

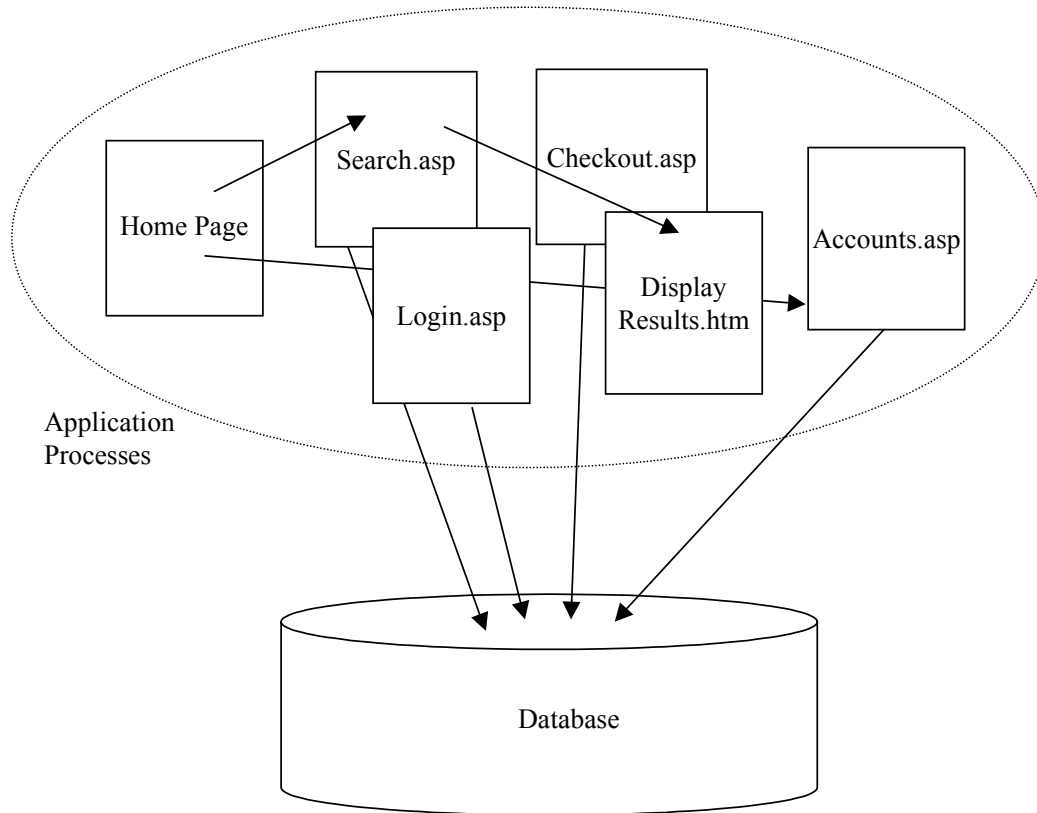


Figure 4: Application Architecture of an E-Commerce System

and JavaScript, whereas JSP uses Java programming. There are also specific requirements to develop and deploy Web applications. For example, ASP uses ODBC (Open Database Connectivity) while JSP uses JDBC (Java Database Connectivity) as a connection mechanism to communicate with the database.

Many software tools are available to develop dynamic Web pages. Notepad is a text editor that is commonly used to develop a Web page; however, it requires a significant investment of time to develop large Web pages. Popular editors that help expedite Web programming include EditPlus, FrontPage, and Dreamweaver. Microsoft Visual InterDev is a tool that is suitable for developing dynamic Web pages using the ASP technology.

For the database, Microsoft Access is suitable for initial development. Once the tables, queries, and relationships are developed, the database can be transferred to the SQL Server by simply using data-transfer tools available both in Access and SQL Server.

VI. TEACHING THE COURSE

An e-commerce technology course should address knowledge in areas of Web programming, tools, and technologies that are necessary to develop a successful business system. However, these knowledge areas are still evolving and so are the textbooks.

TEXTBOOKS

In recent years, several e-commerce programming books emerged in the market. Some of these are written for professional developers [Jerke, 2000; Crouch, 2000; Walther and Levin,

2000], some are suitable for laboratory use [Morrison and Morrison, 2000; Friedrichsen, 2001], and a few are devoted to ASP programming [Kalata, 2001; Morneau and Batistick, 2001]. Of these, the last two texts are suitable for classroom teaching. In developing e-commerce systems in spring 2001, we followed Walther and Levin's professional book on e-commerce. In teaching the course in fall 2001 and spring 2002, we mainly followed the text, *Internet Programming* by Kalata [2001]; however, some supplemental materials were provided by the author.

COURSE CONTENT AND TEACHING METHODOLOGY

The course contained brief lectures, several case problems, a semester-long group project, three presentations, and two tests. The lectures included topics such as e-commerce infrastructure, hardware and software requirements, client-side scripts, server-side scripts, object-oriented programming, programming structures, Document Object Model (DOM), ASP object model, Web-database programming, ActiveX Data Objects (ADO), and Open Database Connectivity (ODBC). Examples of tools and techniques and the developmental methodology of dynamic Web pages were provided within the lectures. The case problems required the application of knowledge discussed in the lectures. The final test was a take-home, which required the application of the individual student's learning through the development of a small e-commerce application. The details of the course syllabus can be found on the author's Web site, <http://b3308-bpa.cl.uh.edu/isam5931/Course/ASP/ASP.htm>.

RESULTS OF THE SYSTEMS DEVELOPMENT

Students worked in groups and developed several prototypes of e-commerce systems that included dynamic Web pages for catalogs, search capabilities, marketing materials, shopping carts, and customer accounts. The projects included a library checkout system, book order system, teaching assistant sign-in system, fruit ordering system, music and video purchasing system, and an auto auction system. In all cases, the students used Microsoft Access as their database, but later some students transferred their data to the SQL Server database. Experience gained through the prototype version can be used to develop scaled up versions in real-life environments¹.

The Appendix displays a few sample Web pages of the systems. The following are brief descriptions of three systems.

- *Teaching Assistant Sign-in System:* In this case, the names of the actual teaching assistants (TAs) at the university PC laboratory were used. The system provided capabilities for searching for a TA using the first name, last name, instructor's name, or course name. It also displays names and pictures of all TAs, and upon selecting a name, one can find his or her office hours. Teaching assistants can use the system to sign in and sign out of the laboratory, and the system provides a log of all check-in and check-out hours. It also allows posting a message for a teaching assistant. Figure 5 shows the initial architecture of the system that students used in their presentation. The system used 11 asp pages and 5 database tables. The system becomes valuable because data can be added at any semester and students, lab managers, or faculty members can view the TA information from anywhere using the Web.
- *AI's Auto Auction:* This system is realistic. It allows a member to login and view a category of autos, then view a listing of all autos in a category; and upon selecting a particular auto, details of the auto including a photograph is displayed. A member can then bid a price for an auto. On the other hand, an employee can also log on to the system to add or delete a car from the system, view it, and accept a bid on a car. This system uses 21 asp pages and 5 database tables.

¹ Live demonstrations of the prototypes can be found in the author's Web site (<http://b3308-bpa.cl.uh.edu/isam5931/Course/ECM/Projects.htm>). The Web site also includes demonstrations of the final tests.

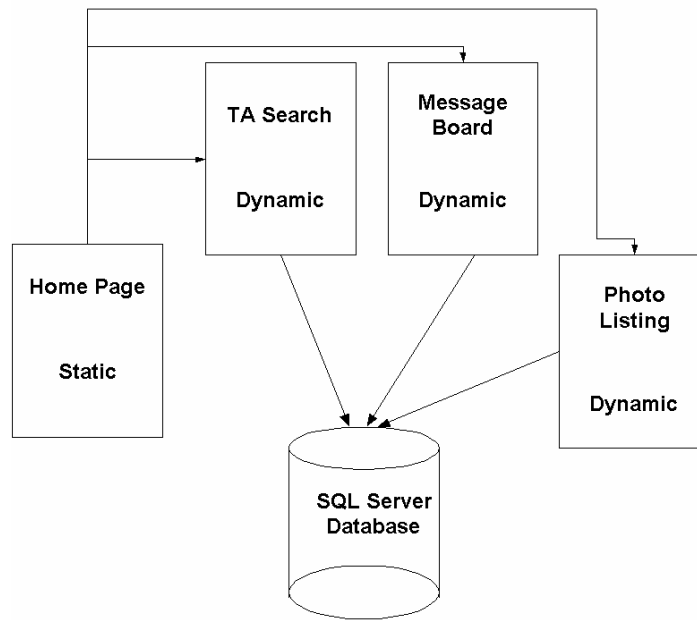


Figure 5. Application Architecture of Teaching Assistant Sign-In System

- *CEM Store*: Named after the first initials of three students who developed this system, it comes close to a real-life e-commerce system. This system sells music and movies. It includes a shopping cart, a customer account, and the payment mechanism. In the main screen, it provides a list of hot selling music. The user can view music and movies by category, select an item, add one or more items in the

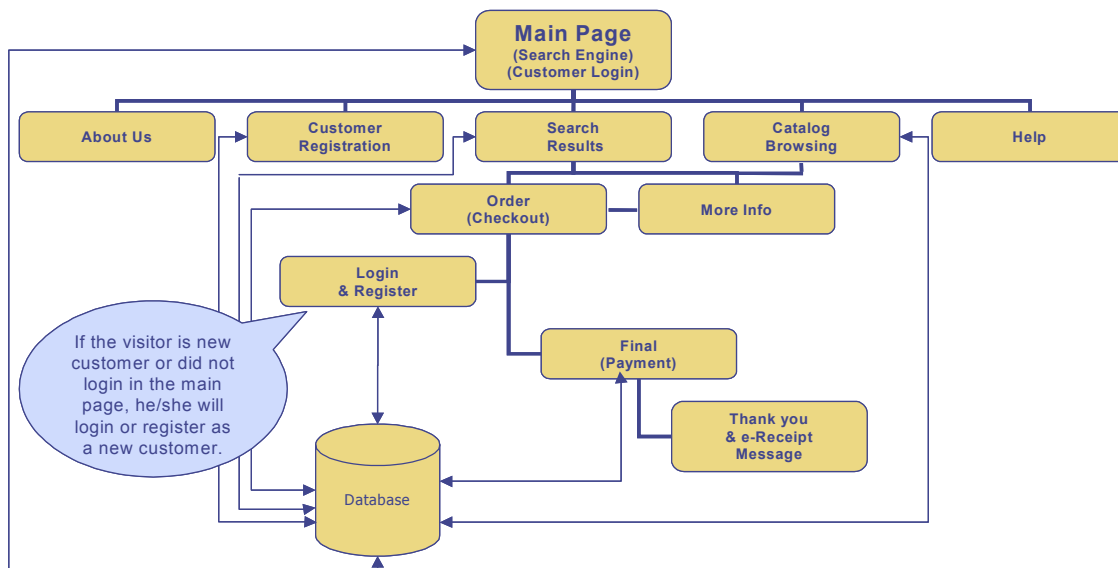


Figure 6: Application Architecture of CEM Store System

shopping cart, and finally proceed to checkout. In the checkout, the user enters his or her personal information including payment details. Figure 6 shows an architecture of the system that students used in their first presentation. The system also allows a customer to view existing orders. This system uses 15 asp pages and 3 database tables.

CHALLENGES OF THE COURSE AND FUTURE DIRECTION

Because of the variety of activities and the need to manage students' accounts, the course required constant attention from the instructor. During the second semester of the course, some of the management functionality of the Web server was delegated to a senior student working as a teaching assistant.

The e-commerce project did not address all business processes typically encountered by a real-life business. It included only the merchant activities. A complete system should include the payment and shipment processes. However, these activities typically require integration of third-party software and real bank accounts. In the coming semesters, we will focus on the feasibility of implementing a real payment process. New developments such as XML and .Net technologies will also be considered.

VII. CONCLUSION

In this paper we discussed the need for an e-commerce technology course, which not only should address various technological issues related to electronic commerce, but should also provide opportunities for students to develop real-life systems. We outlined the steps of development and management of an e-commerce application development environment. We also outlined a systems development methodology, which can be followed by an instructor to manage the development of applications within a semester long course. Brief discussions on the necessary tools, course contents, texts, and results of the development, are also provided. Following the systems development methodology, students developed several prototypes of e-commerce systems.

Most of the software discussed in setting up the e-commerce system deal with the Microsoft products due to the availability of all necessary products and the ease of use and integration of these products. However, many other network, Web server, and database server software products are available to set up the system. For example, free software such as *Linux* and *Apache* are popular for network operating system and Web server, respectively. *Oracle* is the most popular database server that is commonly used in industry and is commonly available in university environment.

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REFERENCES

- Bloss, A. (2001), "Teaching Fundamentals for Web Programming and E-Commerce in a Liberal Arts Computer Science Curriculum," *J. Computing in Small Colleges*, Vol. 16, No. 2.
- Crouch, M. (2000), *Web Programming with ASP and COM*, Reading, MA: Addison-Wesley.
- Friedrichsen, L. (2001), *Data-Driven Web Sites with Microsoft Access 2000: Tools for E-Commerce*, Cambridge, MA: Course Technology.
- Jerke, N. (2001), *Visual Basic Developer's Guide to E-Commerce with ASP and SQL Server*, San Francisco, CA: SYBEX.

Kalata, K. (2001), *Internet Programming with VBScript and JavaScript*, Cambridge, MA: Course Technology.

King, C. G., Frank, S. L., and Platt, R. G. (2001), "E-Commerce Courses: Overview of Nature and Content," *Journal of Education for Business*, July/August.

King, D., Lee, J., Warkentin, M., and Chung, H. M. (2002), *Electronic Commerce 2002: A Managerial Perspective*, Upper Saddle River, NJ: Prentice Hall.

Morneau, K. and Batistick, J. (2001), *Active Server Pages*, Cambridge, MA: Course Technology,.

Morrison, M. and Morrison, J. (2000), *Database-Driven Web Sites*, Cambridge, MA: Course Technology.

Tikekar, R. and Wilson, D. (2001), "Implementing an E-Commerce Curriculum in a CIS Program," *J. Computing in Small Colleges*, Vol. 16, No. 2.

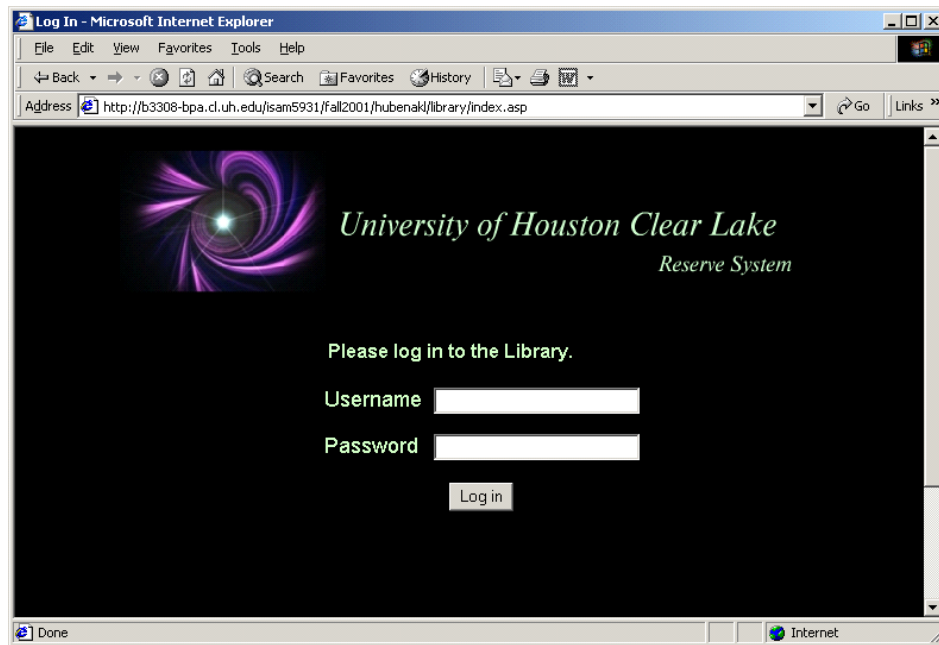
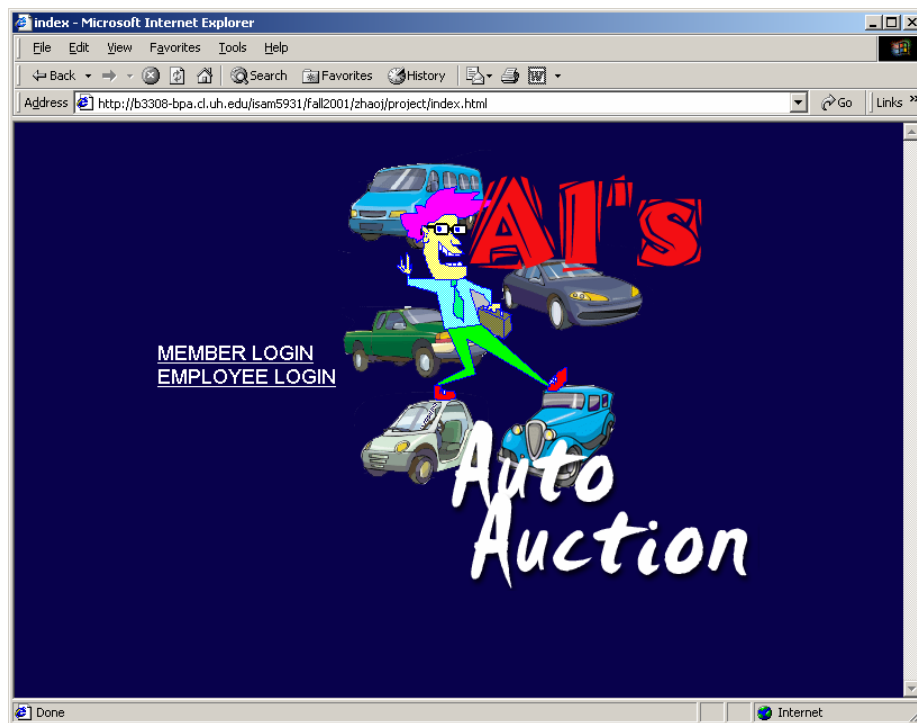
Tobias, Z. (2000), "Pioneer for a New Economy," *Computerworld*, v 34, No. 48.

Walther, S. and Levine, J. (2000), *Sams Teach Yourself E-Commerce Programming with ASP in 21 Days*, Indianapolis, IN: Sams Publishing.

APPENDIX. WEB PAGES OF SELECTIVE E-COMMERCE SYSTEMS



Figure A-1: Home page of *BookDepot.com*

Figure A-2: Home Page of *Library Reservation System*Figure A-3: Home Page of *AI's Auto Auction*

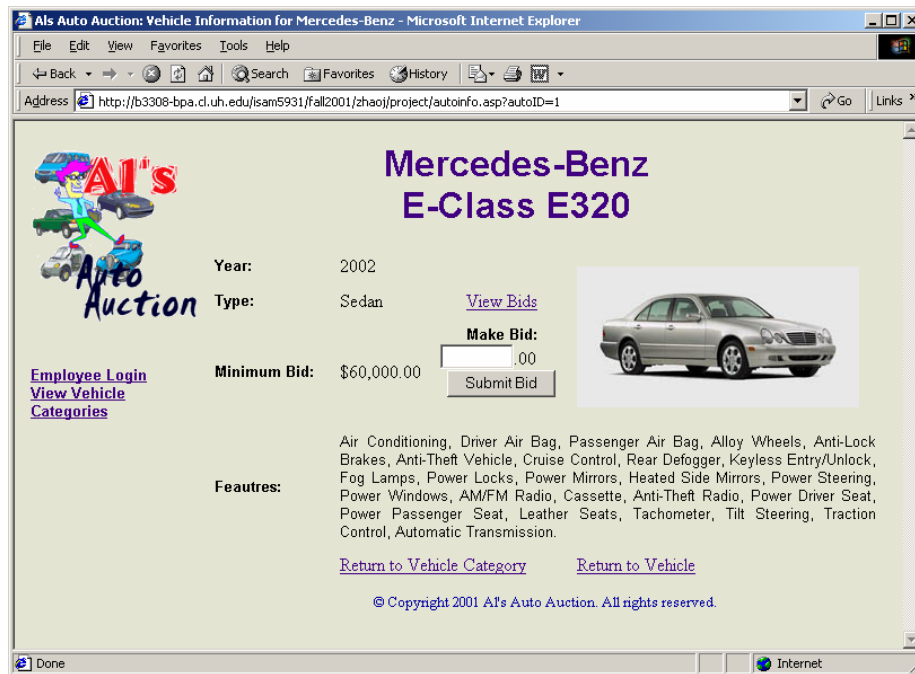


Figure A-4: Price Bidding Page for AI's Auto Auction

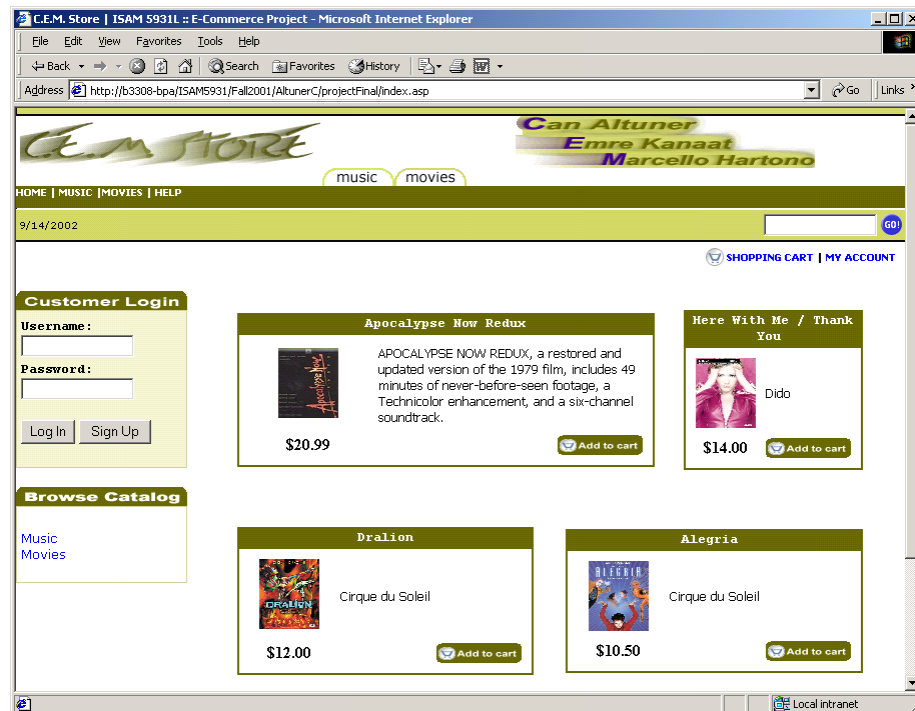
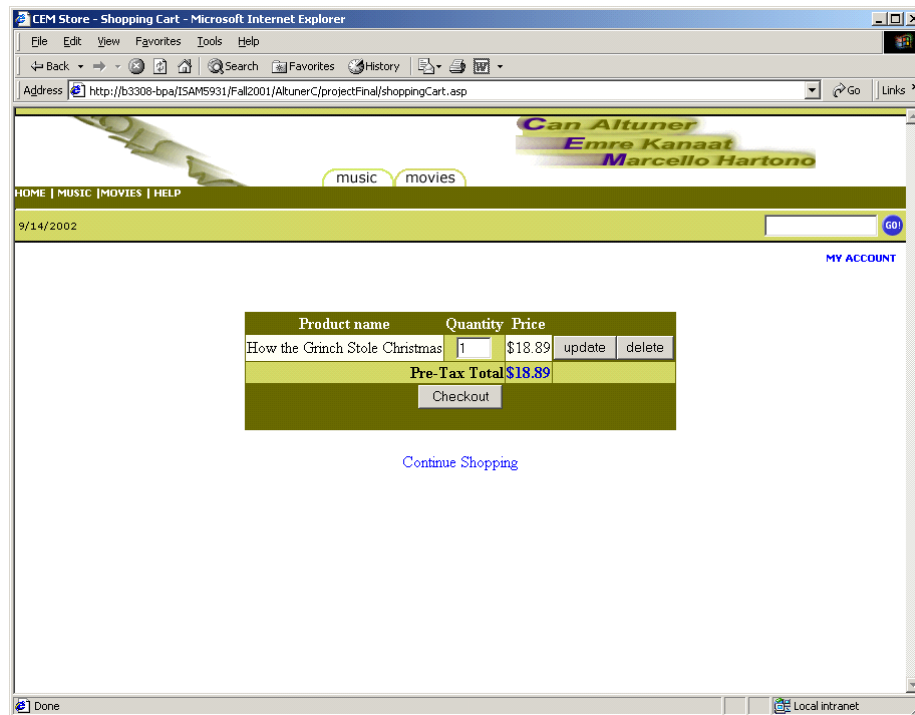


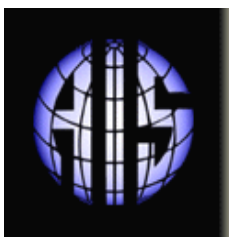
Figure A-5: Home Page of CEM Store

Figure A-6: Shopping Cart Page for the *CEM Store*

ABOUT THE AUTHOR

Mohammad A. Rob is Assistant Professor of Management Information Systems at the University of Houston-Clear Lake (UHCL). Before joining UHCL, he worked as a programmer/analyst in several companies and participated in the development and management of multiple information systems. He teaches courses such as systems analysis and design, e-commerce technology, active server pages, and IT project management. He is active in MIS curriculum development. His current research focuses on e-commerce technology, online payment mechanisms, and geographical information systems.

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