E-Commerce System (Bookworm Shop)

by

Ms. Bubpha Luangpikulthong

A Final Report of the Three-Credit Course
CS 6998 System Development Project

Submitted in Partial Fulfillment
of the Requirements for the Degree of
Master of Science
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Project Title	E-Commerce System (Bookworm Shop)
Name	Ms. Bubpha Luangpikulthong
Project Advisor	LCDR Dr. Wuttipong Pongsuwan
Academic Year	November 2004

The Graduate School of Assumption University has approved this final report of the three-credit course, CS 6998 System Development Project, submitted in partial fulfillment of the requirements for the degree of Master of Science in Computer Information Systems.

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ABSTRACT

Bookworm is a book retail shop selling computer books, novels, fictions, encyclopedia and so on. The Internet seems to fit the answer perfectly. With the web site that can give all the products information and can reach all the clients from anywhere and anytime, the store can attract more customers into the store. With the virtual shop that they can display all their merchandises all days, the store can save the cost of renting, salary of employees and advertising.

The E-Commerce (Bookworm) System Project was designed to help improve manual operations. The tools of structured analysis such as Context Diagram, Data Flow Diagram, and Data Dictionary used analysis phase. The detailed design is carried out through file design, software design, and screen design.

In the proposed system, all data are kept in the database server. The Web Application uses ASP (Active Server Pages). Scripts are host in the Shared hosting with SSL built in. The virtual shop will decrease the expenditures of the company due to the rentals and printed product catalogs.

ACKNOWLEDGEMENTS

This project is successfully done with the great help and cooperation of many people. Especially, the writer would like to express her gratitude to her advisor LCDr.Dr. Wuttipong Pongsuwan for his encouragement and advice through the course of this project.

The writer particularly appreciates the sharing of all available information by advertisement on Web, which are useful to her report.

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I. INTRODUCTION

1.1 Background of the Project

Nowadays, the Internet and the World Wide Web have become a major part of everyday business in Thailand. The Internet is now not only a useful tool for students but for business as well. Many companies have begun to use the World Wide Web as a showcase for the products. A lot of companies are now also providing online shopping for convenience of their clients. As a result, more people are now turned to online shopping on the Internet instead of going out.

Due to the increasing rate of the use of the Internet and the online shopping behavior, the fast access to data and the ease of the payment method, there are 3 choices for the payment of online shopping services:

(1) Bank transfer

(2) Pay when get the parcel post

(3) By credit card, Bookworm shop will hire outsourcing to take care of this process that is to verify and receive the money in a reliable and trusted site.

1.2 Objectives of the Project

The objectives of the project are defined as follows:

(1) To study the existing system of selling products and analyze the strong and weak points of the system.

(2) To study the work process and possible ways for selling products via the Internet.

(3) To study the gain and loss that the company will get from selling the products online.

(4) To define the user requirement on a proposed system for selling products through the Internet.

(5) To effectively gather the information into the computer system for further reference, all details of the products is recorded completely.

(6) To increase productivity in operation by enhancing work efficiency and accuracy. To enhance corporate images.

1.3 Scope of the Project

The project will cover the E-Commerce System, which includes:

(1) To analyze and design the E-Commerce System on the Internet.

(2) To analyze and design database for support the E-Commerce System on the Internet.

(3) To design screen on web site for staffs to operate activities such as finding product information, updating product item quantity and generating summary report.

(4) To design screen on web site for customers to do activities such finding product information and purchasing products via the Internet.

1.4 Deliverables

The System Management Project deliverables focus on 3 portions. First is system analysis, which are Data Modeling Entity Relationship Diagram (ERD), Process Modeling Functional Decomposition and Data Flow Diagram (DFD), and Network Modeling. The second portion is *system design*, which included Feasibility Analysis, Physical Entity Relationship Diagram, Physical Data Flow Diagram, Network Topology Diagram, Interface and input/output design and System Structure. Third portion is *system implementation*, which will deliver the system operation.

1.5 Project Plan

This project consists of three phases:

(1) The system analysis phase; this phase studies and defines the existing system, identifies the existing problems, develops context diagram and data flow diagram, defines the new system requirement, cost and benefit analysis.

(2) The system design phase, this phase specifies the technical requirement for the target solution, designs database, data modeling, network design, input and output design and coding program.

(3) The system implementation phase, this phase builds and tests the actual solution.

No.	Task Name	September				October				November				December			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
	I. System Analysis																
1	Identify the Existing Problems																
2	Develop Work Flow of the System																
3	Identify the contents of Work Flow																
4	Define the New System Requirement																
5	Cost and Benefit Analysis																
	II. Detail Analysis and Design																
6	Develop ERD of the Proposed System																
7	Develop DFD of the Proposed System																
8	Database Design																
9	Data Dictionary																
	III. System Implementation																
10	Screen Layout																
11	Programming																
12	Data Conversion and Testing																
13	Delivery																

Figure 1.1. Project Plan of E-Commerce System (Bookworm Shop).

II. THE EXISTING SYSTEM

2.1 Background of the Organization

Bookworm was a small retail shop first established in the year 2000. It started out as a little shop selling only magazines and cartoon books at Fortune tower. One year later, they had begun to import textbooks, novels, fictions, encyclopedia and so on. Due to the increase in the number of clients and to take advantages of the economies of scale, Bookworm decided to open a new store at the MBK Hall in the year 2002. Recently, Bookworm decided to open two new stores at the World Trade Center and Central Ladprao. This was also to capture more clients in the new market areas.

For the efficiency of the management, Bookworm is divided into 4 distinct departments. Each department has its own responsibilities as follows:

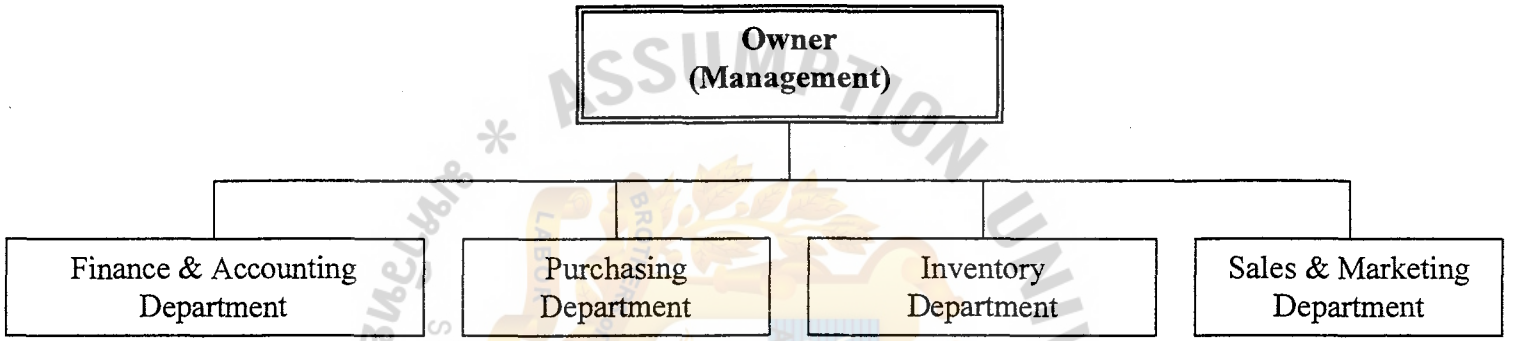

Figure 2.1. The Organization Chart of Bookworm Co.,Ltd.

(1) Finance & Accounting

(a) Keep track of expenditures and revenues records.

(b) Calculate gross and net profit.

(c) Send out invoices and bills.

(d) Take care of the salary of all employees and arrange welfare.

(e) Keep track of clients' payment in the case of money transfer and ensure payments from debtors.

(f) Collect money from customer.

(2) Purchasing

(a) Search for and decide which products to order.

(b) Make order for the merchandizes to be sold in the stores.

(c) Research for the best selling products and find out the demand of the clients.

(d) Contact and select the best Supplier.

(e) Contact agents for the newly released.

(3) Inventory

(a) Collect the details of the present and future products.

(b) Update the list of the sold products.

(4) Sales & Marketing

(a) Take care of customers.

(b) Make contact with Purchasing Department for the best selling and the out-of-stock items that are in orders.

(c) Send out the products ordered by mail, telephone or Internet.

To understand the existing system, we use Context Diagram to describe what the existing does and how the data flows from one process to other. The context diagram is in Figure 2.2.

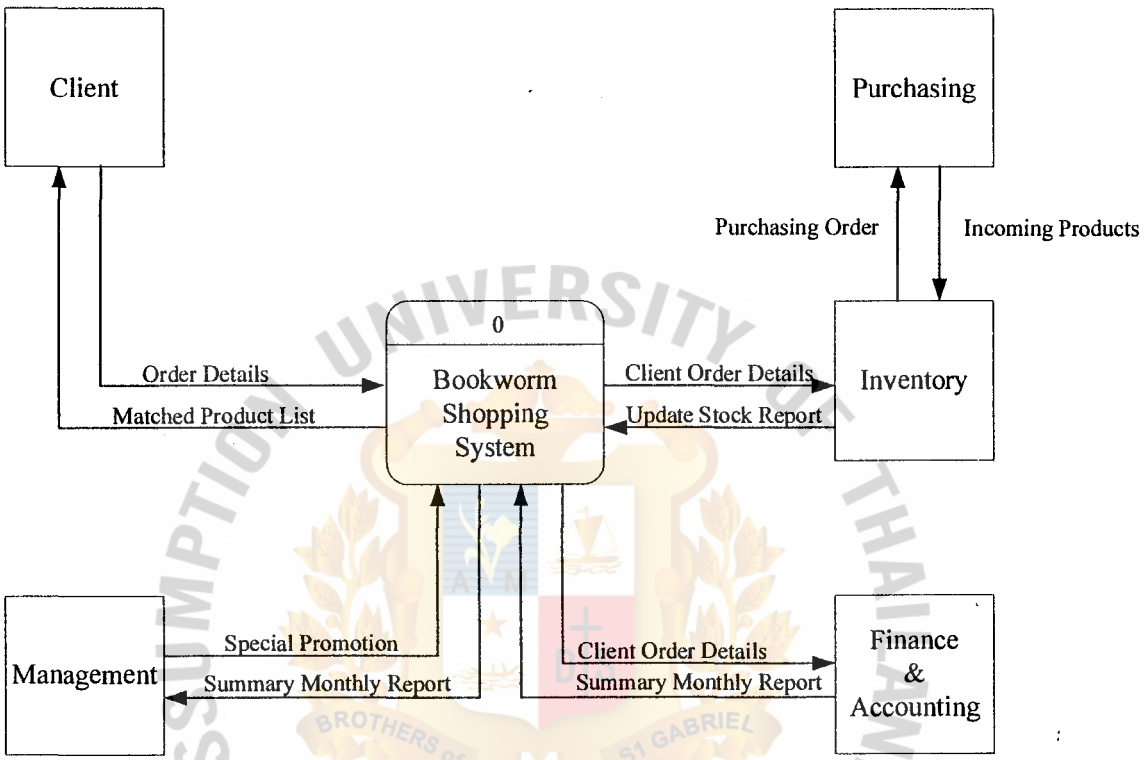

Figure 2.2. Context Diagram of Existing System.

2.2 Current Problems and Areas for Improvement

The current problems of Bookworm are mainly economical and can be defined as follows:

(1) In order to attract clients in many market areas, Bookworm needs to have multiple branches. As a result, the expenditures of the company will increase due to the increased number of its employees and the rentals. Because of the rising cost, the product prices will be affected as well.

(2) With more product lines, Bookworm needs more space for displaying products that will push up the cost of rental.

(3) If the clients want the information on the newly arrived items, they need to call or visit the stores, which is not convenient for some clients.

(4) Groups of clients are limited due to the limited numbers of branches and the inadequate space to display all the products.

(5) In each branch all data are not linked together because all data of branches are kept at each branch.

Web site and Internet technology can help solve these problems. Because of the virtual shop online, clients can reach the store from anyplace at anytime. The online catalogue will also help reduce the cost of printing the real catalogue. It only takes a few minutes to enter the data in the store's database then the clients can browse through all the products they want. Because of unlimited space, all the products will be displayed. Furthermore, it can provide all the constantly updated information for both new arrivals and the existing products. The Web site is opened to order 24 hours a day and 7 days a week. A World Wide Web search engine or portal sites can be used to advertise the web site. Bookworm will register the domain name with a Thai search engine and portal sites such as Sanook.com, Hunsa.com, etc.

2.3 Existing Computer System

At the present, Bookworm uses computers to collect and manage all data including the quantity of the products. Microsoft Access is used to keep the data and as a database management system. Each branch has its own database because of the complexity and the higher cost of shared data.

III. THE PROPOSED SYSTEM

3.1 System Specification

The user requirement is obtained by interviewing the executives, employees and some clients of Bookworm about what they would not like in the proposed system. From such interviews, we learned that everybody required a friendly system that can easily and quickly retrieve the data and have security. Therefore, we decided to create a new Internet system that has a web site acting as the back office and front office and use a database to keep all data. The system will be programmed to retrieve, add, update and delete the data from the database by a web site. In summary, the requirements of Bookworm can be divided into Input/Output Requirements, Data File and Database Requirements, Computer Program Requirements. The details are as follows:

(1) Input/Output Requirements:

This type of requirements must consist of 2 main sections as clients and administration. Each of them has separate requirements as follows:

For Clients

Input Requirements:

(a) The client should not have to enter their information at every order.

(b) The system must have a preview page to let clients verify their order details before they post the requisition.

(c) The system must have the page that clients can retrieve their passwords in case they cannot remember.

(d) The system must have a register page for guests to join the membership of the system.

(e) In the shopping cart page, the system must let clients enter the number of the products they want to order.

(f) The clients must be able to decide on the payment method themselves.

(g) The system should not be complicated and have only a few steps to acquire the information clients need.

(h) The system must have a newsletter section to send email promotions regarding new products, new services, etc. Not only members will get that email, guests must be able to get that email as well.

(i) The system should have Help tools when the clients have problems such as some problems often have.

Output Requirements:

(a) Import data must be prominently displayed.

(b) The system must show all newly arrived items, best sellers and special price items automatically.

(c) Clients must be able to order the products in just a few steps.

(d) The system must retrieve the book details to help the clients decide which products to buy.

(e) The system must have a search engine to help clients to easily access their desired products.

For Administration

Input Requirements:

(a) This section must be accessible to authorized users only.

(b) The system must have the products details input form, email input form, and a page to update product details which can be retrieved by using product ID or product title, updated date.

Output Requirements:

(a) The system must have a transaction details page to show the ordering process.

(b) The system must have a search engine for transaction details which can be browsed by ordered date, process of order, product, and pay status.

(c) The system must be able to generate a summary report by best seller, worst seller, and be able to summarize on daily, monthly, yearly and on specified date.

(2) Data File and Database Requirement

The database must store all the data concerning products and clients such as:

(a) Product information should contain all the data about author, title, ISBN, subject, quantity, price and etc.

(b) Client information must have all the data about client details, ordered products, etc.

(c) Author information should contain all the data about author details.

(d) Transaction details must keep data about order detail, process of ordering (shipping, waiting for product arrival, received), and etc.

(3) Computer Program Requirements

When the wrong data is entered, it should be able to be corrected at anytime. Before an order is placed by a client, the preview page must be shown to confirm the information and order are correct.

To make the program run smoothly and without errors, the program will have some fields that require entries to the database such as client's address. All the data must be verified before being saved in the database.

3.2 System Design

(A) Proposed Business Data (Data Modeling)

For entity used in storing data in the proposed system, the proposed system selected Relational database design to design the database that helps to map the tables to be the fifth normal form.

Normalization is the approach to relational database schema and can apply for any database application. The concept is the way data attributes are grouped to from stable, flexible and adaptive entities.

1NF A Relation is in 1NF if and only if every attribute in every row can contain only 1 value (No repeating group of attribute values)

2NF A Relation is in 2NF if and only if it is in 1NF and every non-key attribute is fully on the primary key.

3NF A Relation is in 3NF if and only if it is in 2NF and no non-key attribute is "Transitively Dependent" on the primary key.

BCNF A Relation is in BCNF if and only if every determinant is a candidate key.

4NF A Relation is in 4NF if and only if, whenever where is a MVD are functionally dependent on the determinant.

5NF A Relation is in 5NF if in cannot be spit into smaller relation and then rejoined without its facts and meanings.

The database will keep data in 4 parts. The details are as follows:

(1) Product details

(a) Product ID

(b) Author ID

(c) Title

(d) Imprint

(e) Edition

(f) Physical Description

(g) ISBN

(h) Subject

(i) Type

(j) Book cover's picture in front

(k) Activities of changing amount (sold, purchased, ordered)

(l) Amount change

(m) Updated Date

(n) Percent of discount

(o) Normal price

(p) Quantity of product in stock

(q) The lastest date that update product detials

(2) Clients details

(a) Customer ID.

(b) First Name

(c) Last Name

(d) Address

(e) City

(f) Country

(g) Zip code

(h) Fax

(i) Telephone

(j) Activate account status

(k) Email which will be used as username

(l) Password

(m) Registered date

(3) Order details

(a) Customer ID.

(b) Product ID.

(c) Method of payment

(d) Ordered Date

(e) Paid status

(f) Received status

(g) Order quantity per item

(h) Date when parcel post arrived

(i) Estimate date to get the parcel post.

(j) Purchasing price.

(k) Delivery status.

(4) Author details

(a) Author ID.

(b) First Name

(c) Last Name

(d) Address

(e) City

(f) Country

(g) Zip code

(h) Fax

(i) Telephone

(j) Pseudonym

The database will be designed as shown in Context Entity Relationship Diagram as in Figure 3.1, Key-Based Entity Relationship Diagram is in Figure 3.2, and Fully attributed Entity Relationship Diagram is in Figure 3.3.

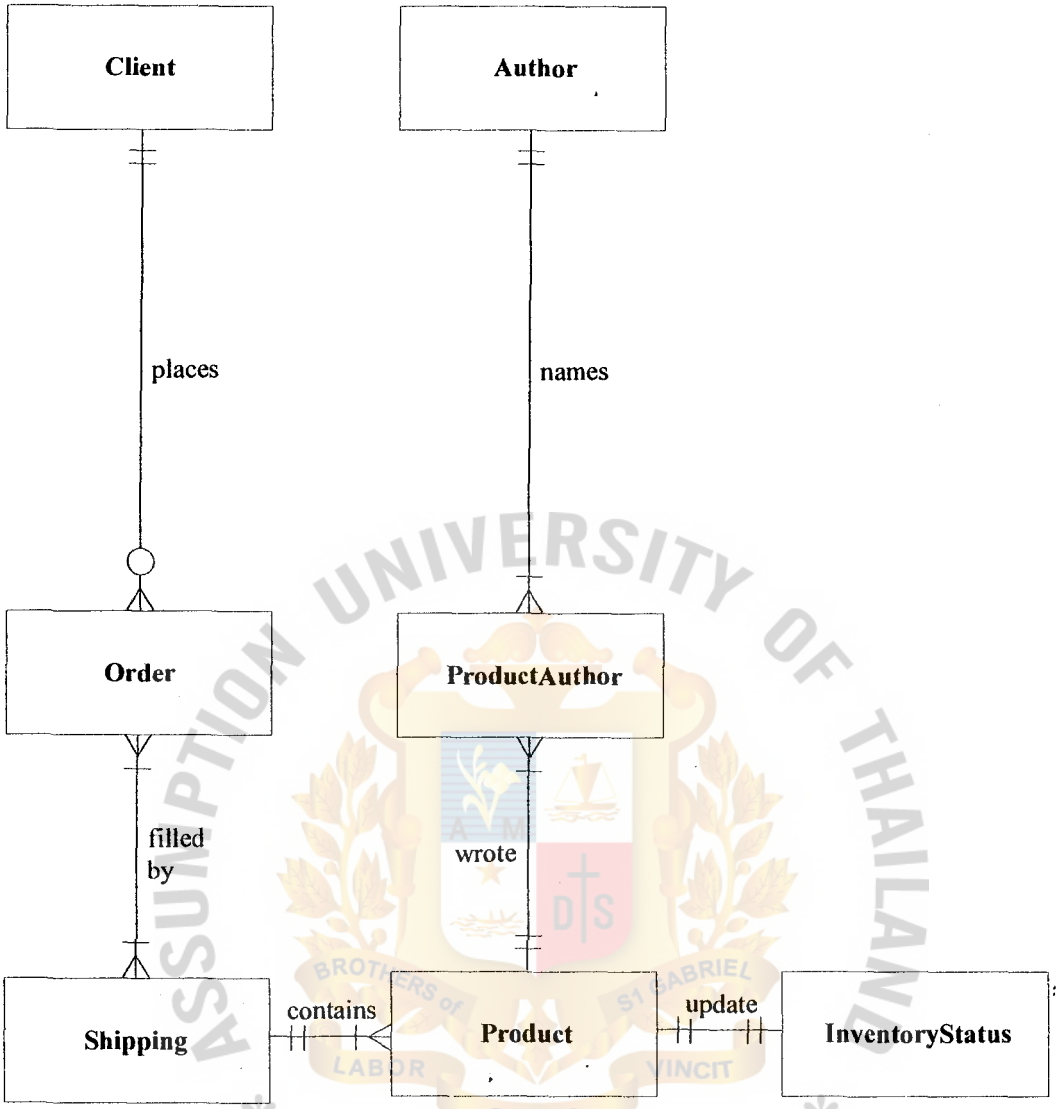

Figure 3.1. Context Entity Relationship Diagram of the Proposed System.

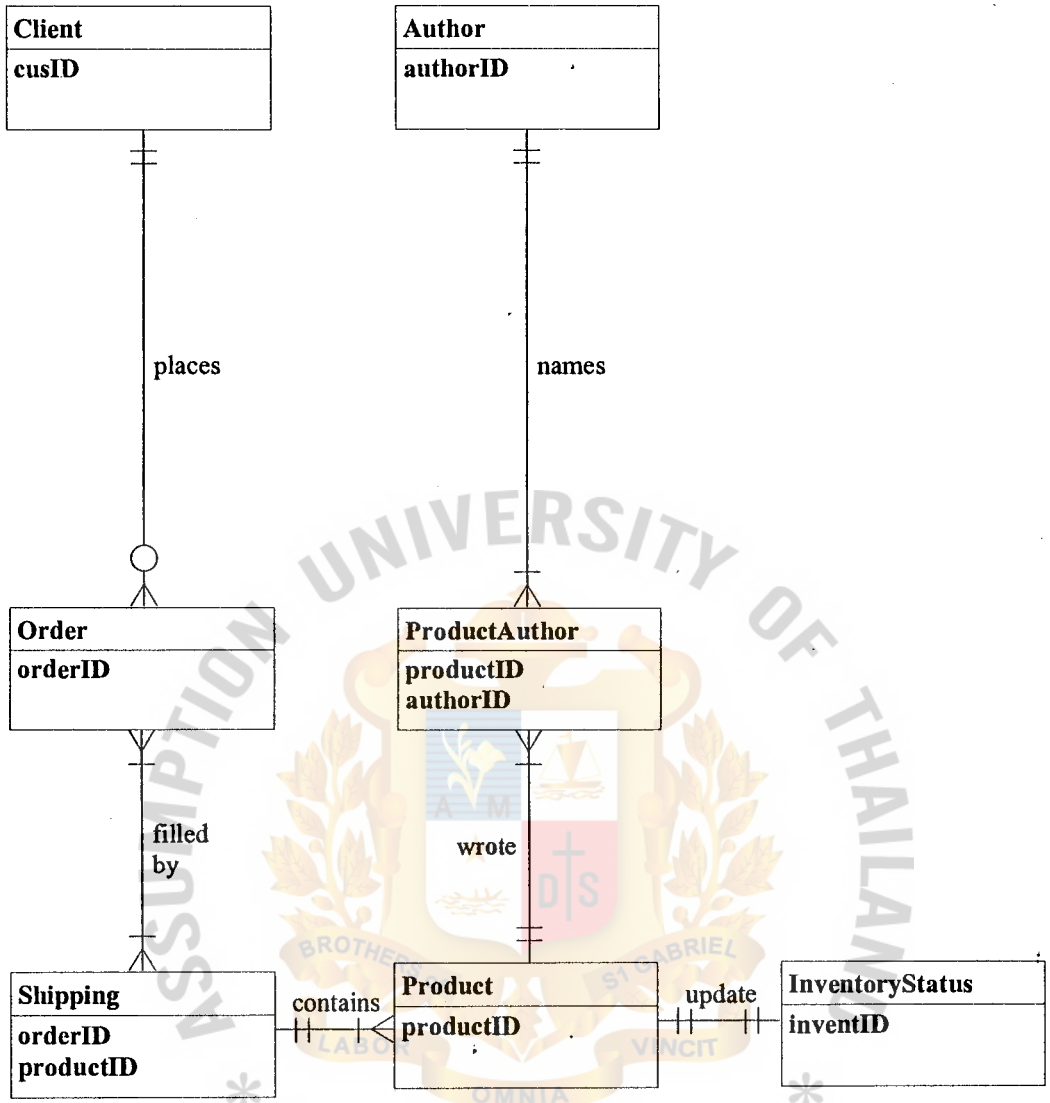

Figure 3.2. Key-Based Entity Relationship Diagram of the Proposed System.

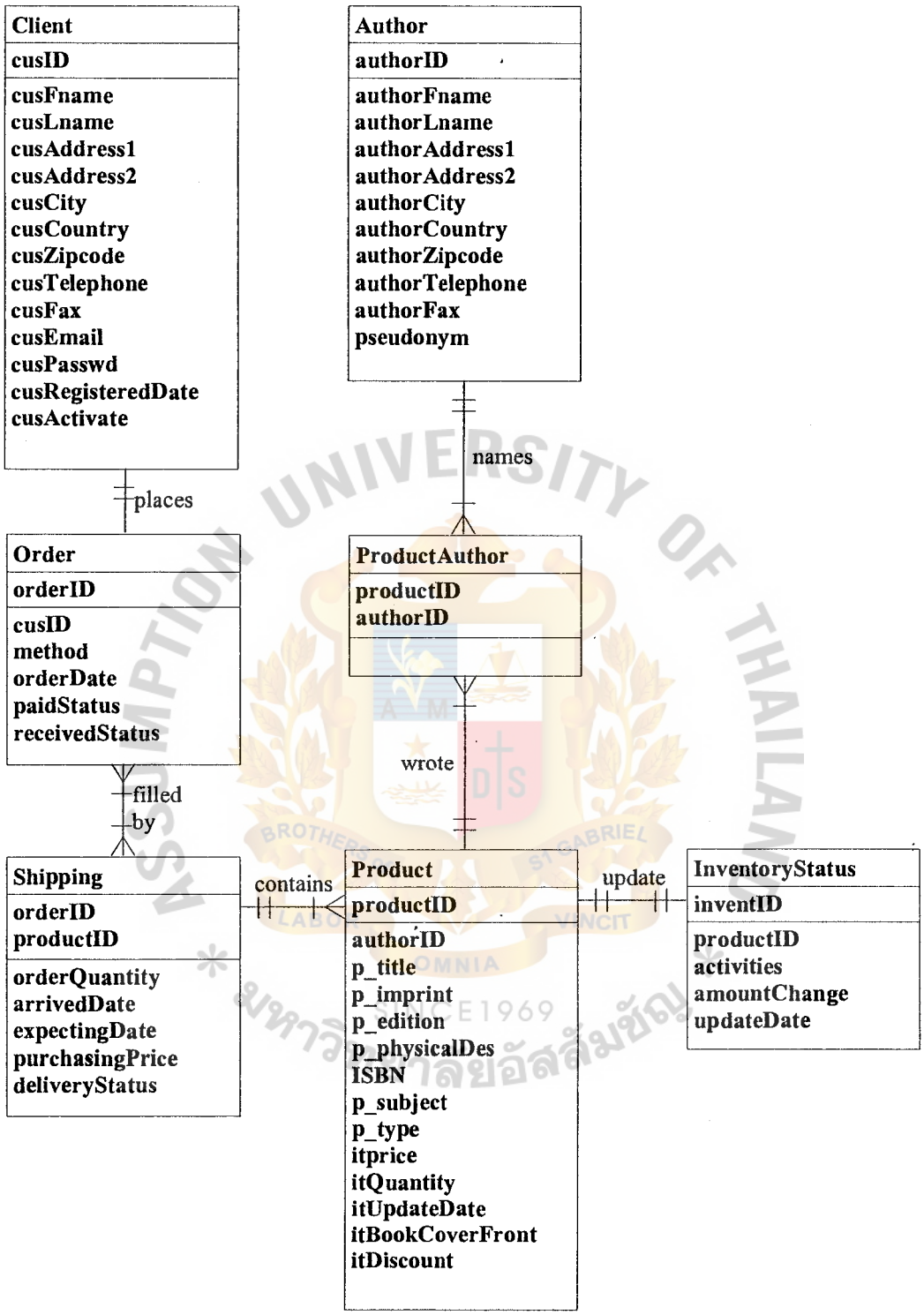

Figure 3.3. Fully Attributed Entity Relationship Diagram of the Proposed System.

(B) Proposed Business Processes

From user requirements, the web site will consist of 2 main sections, administration and clients. Each of them will have separate pages as follows:

(1) For Administration

(a) Login: To allow only authorized user to enter admin areas.

(b) Add/Update product information: To add or update quantity, product information.

(c) Add Author Information: To add author information.

(d) Email: To sent email to clients in mailing list or specific receiver.

(e) Transaction details: To display transaction details by date, client ID, process, etc.

(f) Summary: To display summary of sold products by title, best sellers, worst sellers, etc.

(2) For Client

(a) Login: To let clients log in to the member area.

(b) Retrieve password: To let clients request their password in case that they have lost it.

(c) Search engine: To let clients search for products by key words, titles, author, etc.

(d) Shopping cart: To use when buying products.

(e) Payment: To choose what method they want to pay.

(f) Best sellers: To display best seller items.

(g) Product Information: To give information to clients before they decide to buy the merchandise.

(h) Search engine result: To display the results that match the clients need after searching entire database.

(i) Coming soon: To display coming soon items.

(j) Sales and Specials: To display sales and specials items.

(k) Track recent orders: Clients can track their ordered items.

To understand the proposed system, we use Context Diagram and Data Flow Diagram to describe what the new system will do and how the data will flow from one process to other. The Context Data Flow Diagram is in Figure 3.4, Functional Decomposition Diagram is in Figure 3.5, and Data Flow Diagrams are in Figure 3.6 until 3.13.

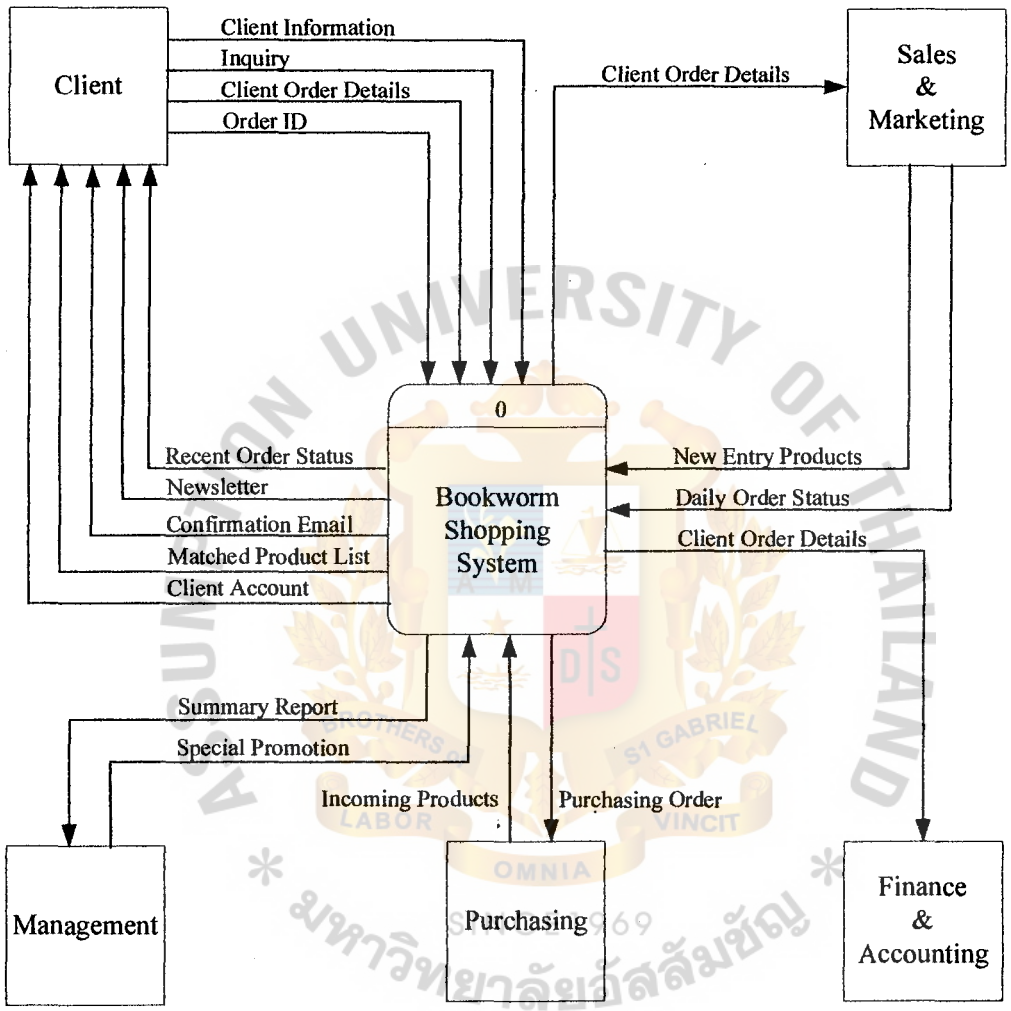

Figure 3.4. Context Diagram of the Proposed System.

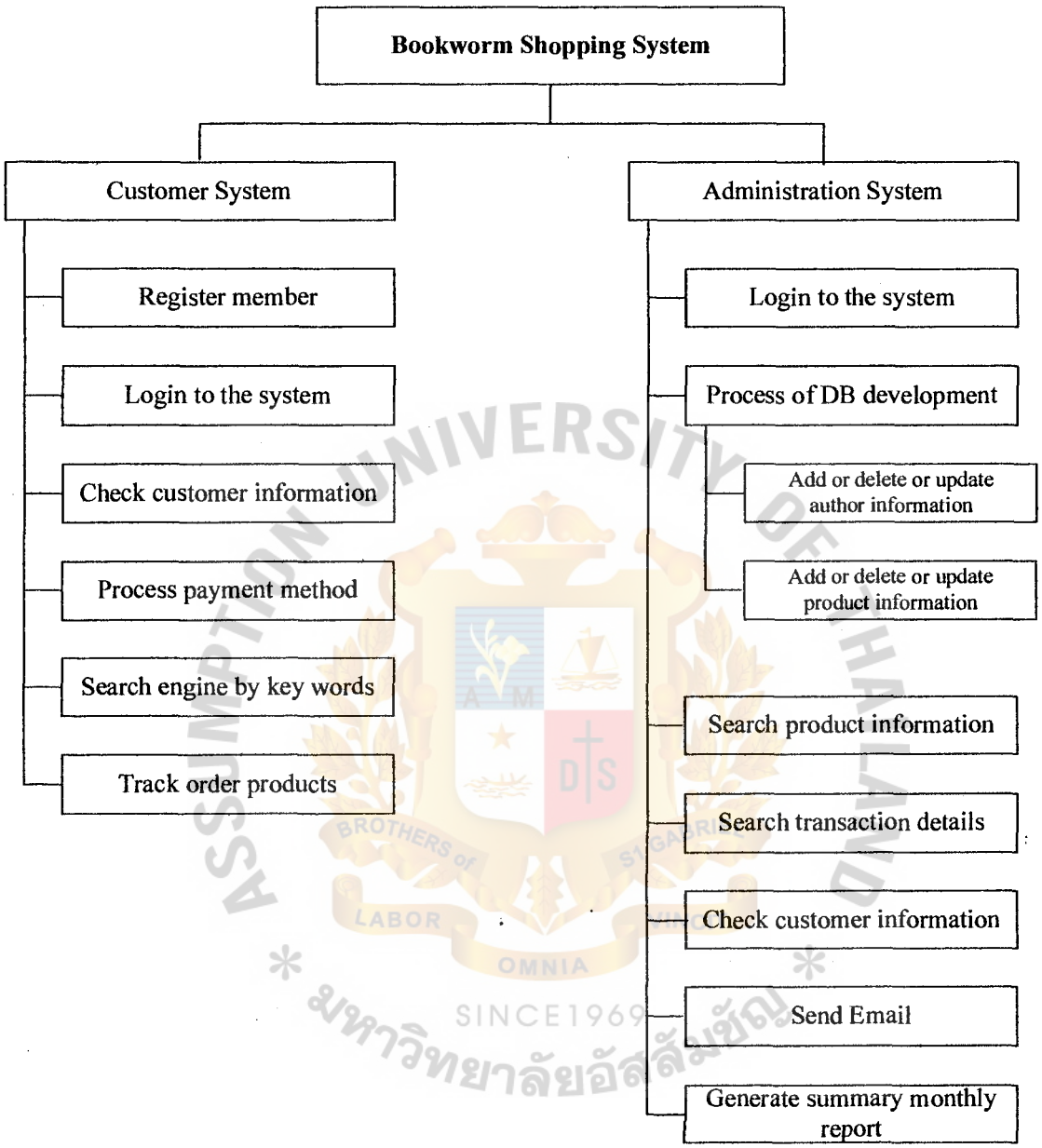

Figure 3.5. Function Decomposition Diagram of the Proposed System.

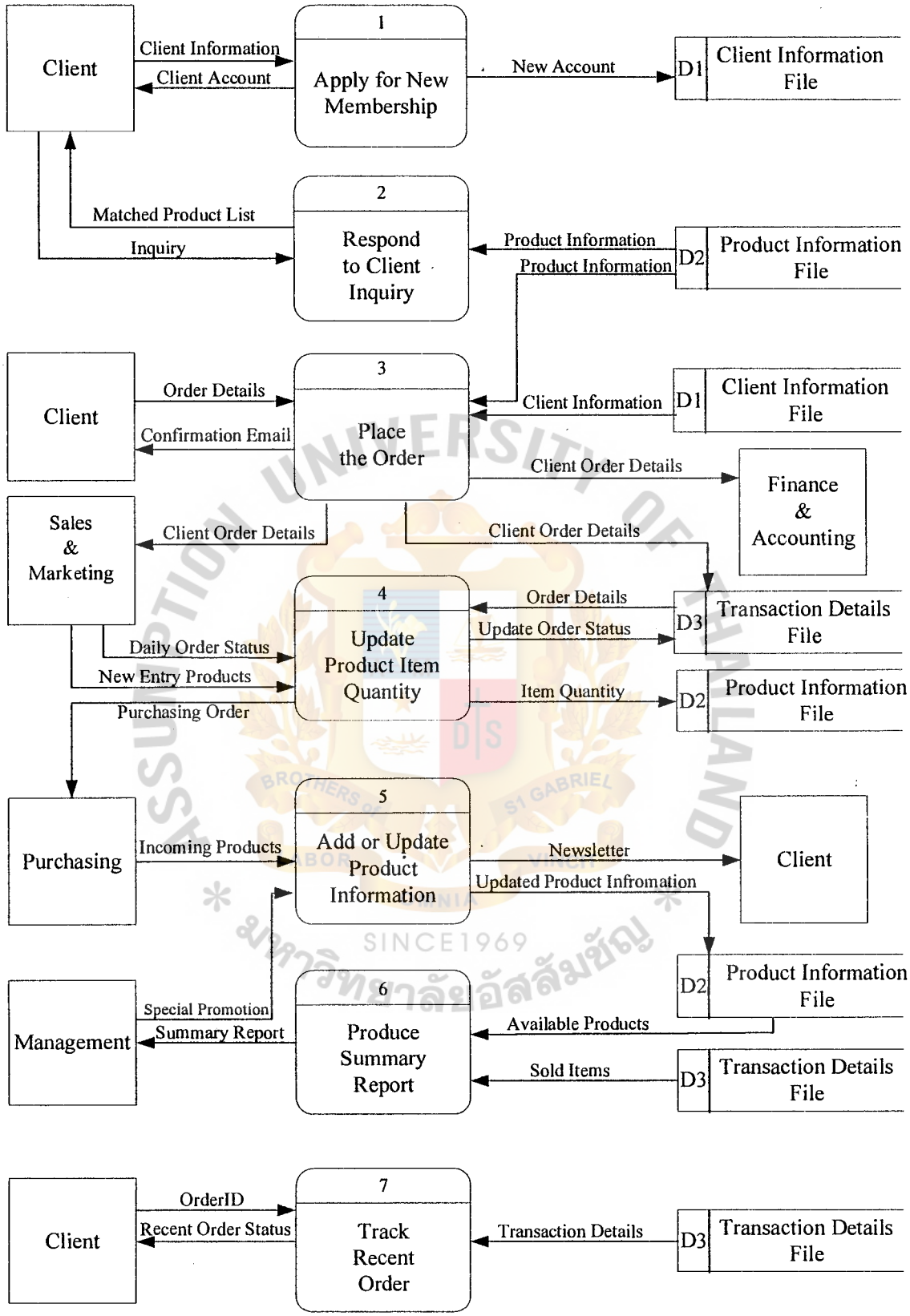

Figure 3.6. Level 0 Data Flow Diagram of the Proposed System.

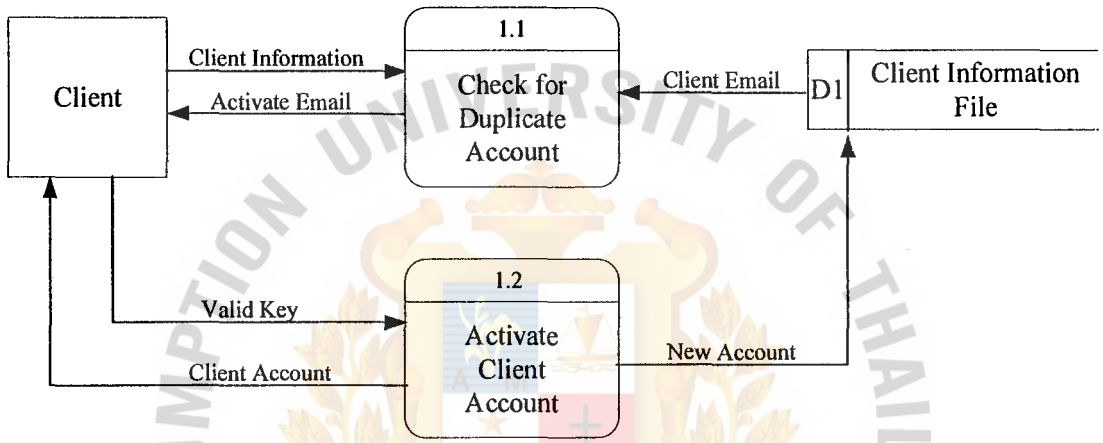

Figure 3.7. Level 1 Data Flow Diagram of Apply for New Membership of the Proposed System.

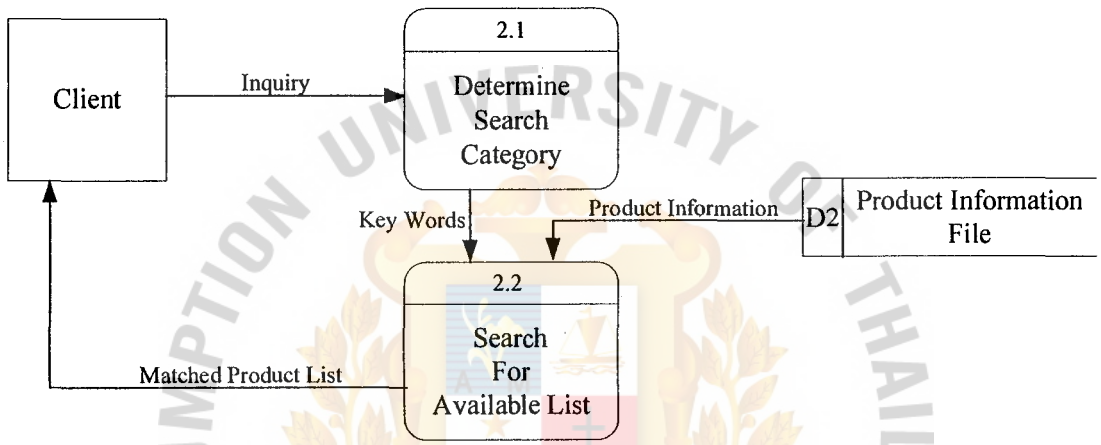

Figure 3.8. Level 1 Data Flow Diagram of Respond to Client Inquiry of the Proposed System.

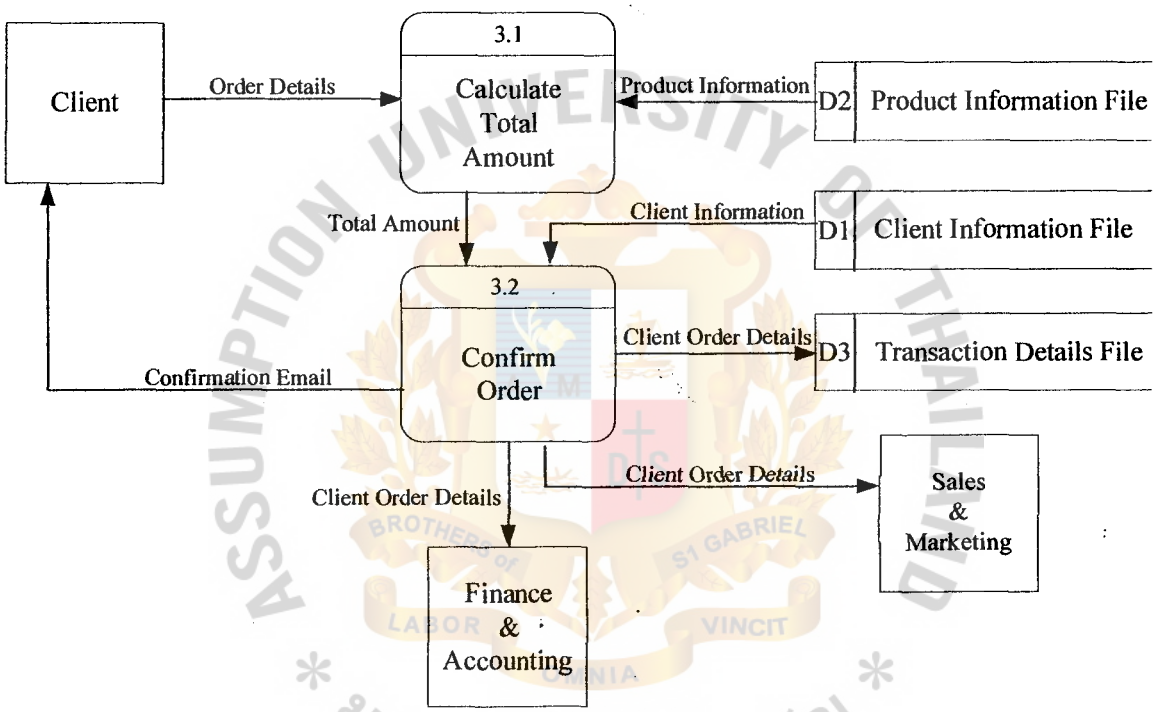

Figure 3.9. Level 1 Data Flow Diagram of Place the Order of the Proposed System.

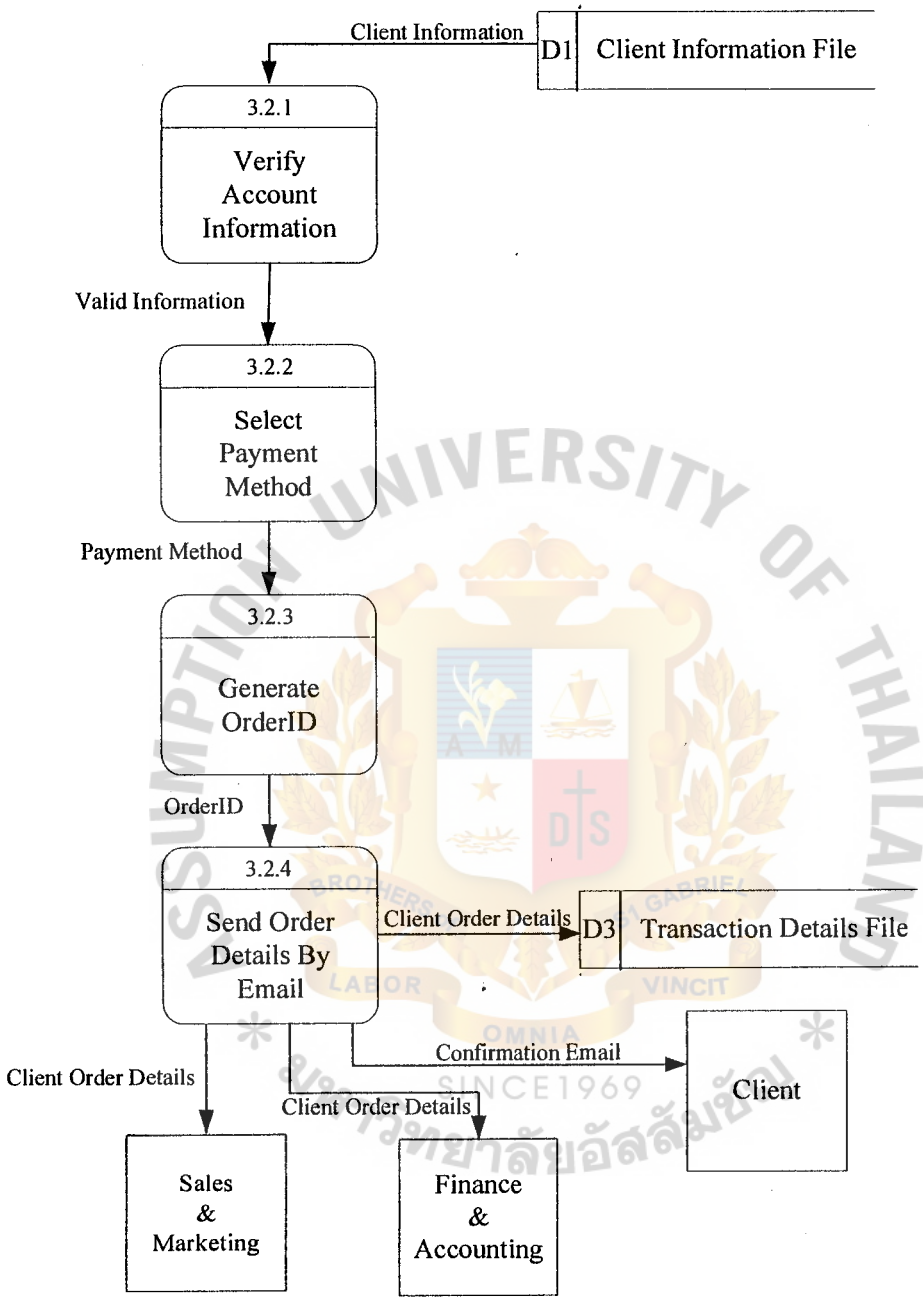

Figure 3.10. Level 2 Data Flow Diagram of Confirm Order of the Proposed System.

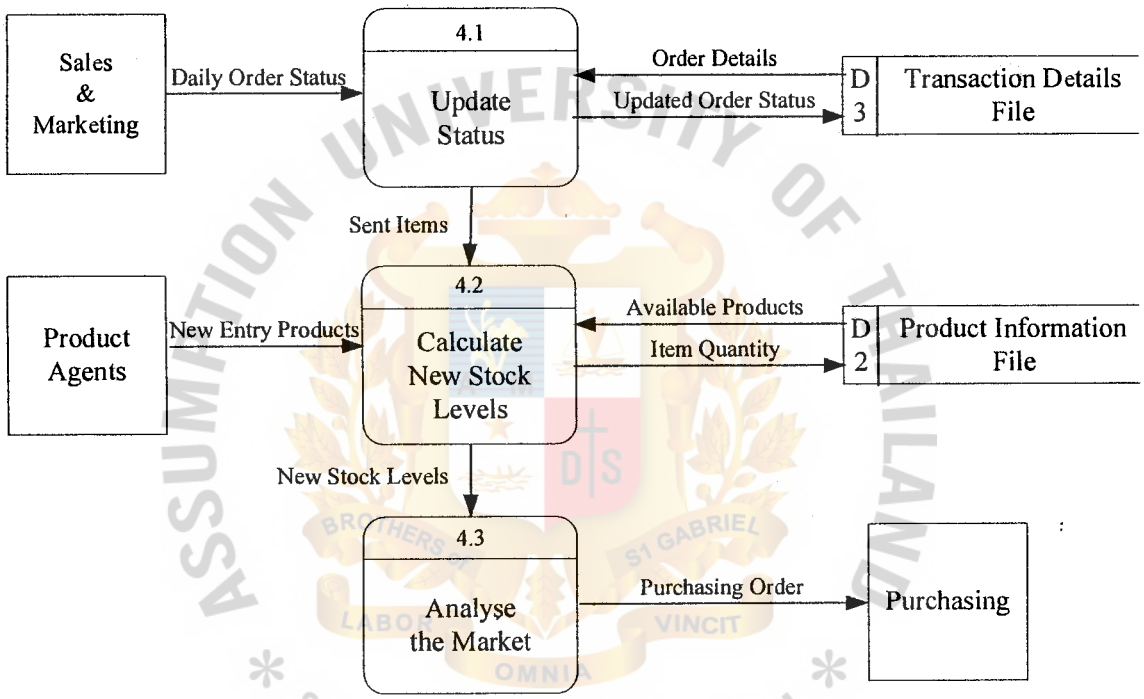

Figure 3.11. Level 1 Data Flow Diagram of Update Product Item Quantity of the Proposed System.

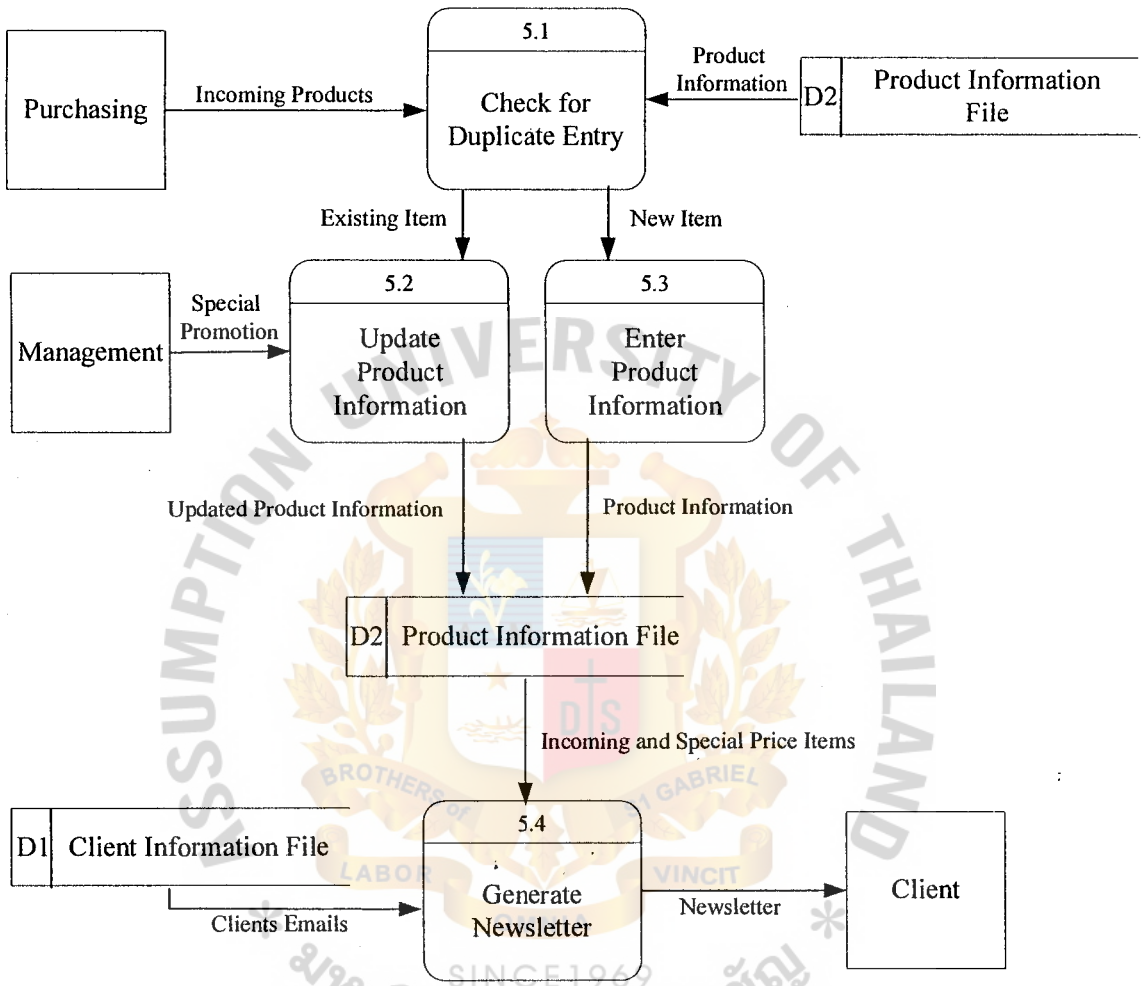

Figure 3.12. Level 1 Data Flow Diagram of Add or Update Product Information of the Proposed System.

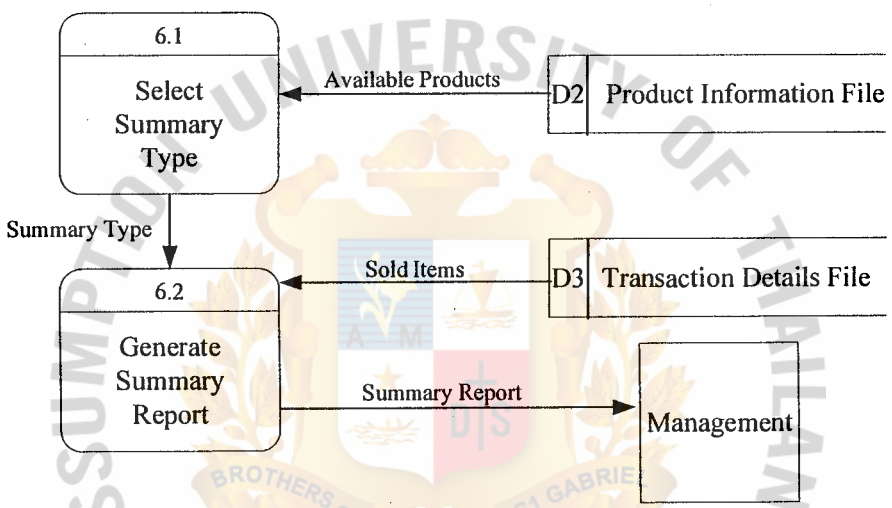

Figure 3.13. Level 1 Data Flow Diagram of Produce Summary Report of the Proposed System.

3.3 Hardware and Software Requirement

Web site is a series of files that reside on a special computer, called a Web server, connected to the Internet. For clients to visit the site, they must actually connect to that Web server via the Internet and view the files. Web servers and the Internet connections that link them to visitors must be fast and powerful enough to quickly respond to all the visitors' request to view the site.

Some businesses prefer to have complete control of purchasing, setting up and managing their own Web server hardware and software. Most small and medium-size e-commerce businesses prefer to turn to an Internet Service Provider (ISP) or Web hosting company, instead of investing in the hardware, software, and infrastructure necessary to get online. For a monthly fee, ISPs and Web hosting companies will connect the site to the Internet at high speed via one of their Web servers, allowing the site to be viewed by anyone with an Internet connection and a Web browser. The host provides the site with space on a server, and also offers Web server software, access to its high-speed, e-commerce features, and more.

For web hosting, it will be focused on 3 points.

(1) Shared hosting or dedicated server

Shared hosting is an arrangement in which the site is housed on the same host server with several other Web sites. This is an economical solution for smaller sites.

Another choice, paying the host for a dedicated server, a solution used by larger and busier sites, provide faster access and ensures that the site will be accessible to visitors 100 percent of the time (instead of sharing Web server speed and power with other sites).

(2) Availability

For running an e-commerce business, the site must be accessible to customers 24 hours a day. ISPs and Web hosts maximize the availability of the site they host using techniques like load balancing and clustering.

(3) SSL Encryption

An encrypted SSL connection requires that all information sent between a client and a server to be encrypted by sending software and decrypted by receiving software, protecting private information from interception over the Internet. In addition, all data sent over an encrypted SSL connection is protected with a mechanism for detecting tampering, for automatically determining whether the data has been altered in transit. This means that users can confidently send private data, such as card numbers, to a web site, trusting that SSL keeps it private and confidential.

We have decided to use Shared hosting in the beginning. The computers are required in each department (to check email from the system, add or update products information, update order status, etc) and the computer to share the file by using LAN. Bookworm will have a file server to share files and use a server. So, we identify alternative candidate solutions. Some candidate solutions will be posed by designing ideas and opinions from system owners and users. Others may come from various sources including system analysts, system designers, technical consultants, and other IS Professionals.

3.3.1 Candidate Solution

Candidate 1

Cost to develop:

Software:

MS Windows NT server 2000	35,000	Baht
MS Visual InterDev	20,000	Baht
MS SQL Server version 7.0	25,000	Baht
Adobe Photoshop 7.0	18,000	Baht
Macromedia Flash 7.0	15,000	Baht
MS Windows 2000 4 Sets @20,000	80,000	Baht
MS Office 2000 4 Sets @10,000	40,000	Baht
Total price of software	233,000	Baht

Hardware:

Server 1 Set	35,000	Baht
Client 4 Sets @25,000	100,000	Baht
Modem (56K External)	1,350	Baht
LAN Card 5 Sets @1,000	5,000	Baht
Hub (Switching hub)	2,500	Baht
Printer	10,000	Baht
UPS (On-line UPS 1000 VA)	2,500	Baht
Scanner (Flatbed)	2,000	Baht
Total price of hardware	158,350	Baht

Internet Setup:

VeriSign Payment Service setup fee	6,700	Baht
Web hosting first time setup fee	12,000	Baht
Domain Registration Per Annual	2,000	Baht
Hosting fee Per Annual	50,000	Baht
ISP fee Per Annual	56,400	Baht
VeriSign Payment Service Per Annual	32,000	Baht
Total price of Internet Setup	159,100	Baht
Total price of development	550,450	Baht

Candidate 2

Cost to develop:

Software:

MS Windows NT server 2000	35,000	Baht
Allaire HomeSite 5	10,000	Baht
MS SQL Server version 7.0	25,000	Baht
Adobe Photoshop 7.0	18,000	Baht
Macromedia Flash 7.0	15,000	Baht
MS Windows 2000 4 Sets @20,000	80,000	Baht
MS Office 2000 4 Sets @10,000	40,000	Baht
Total price of software	213,000	Baht

Hardware:

Server 1 Set	35,000	Baht
Client 4 Sets @25,000	100,000	Baht
Modem (56K External)	1,350	Baht
LAN Card 5 Sets @1,000	5,000	Baht
Hub (Switching hub)	2,500	Baht
Printer	10,000	Baht
UPS (On-line UPS 1000 VA)	2,500	Baht
Scanner (Flatbed)	2,000	Baht
Total price of hardware	158,350	Baht

Internet Setup:

VeriSign Payment Service setup fee	6,700	Baht
Web hosting first time setup fee	12,000	Baht
Domain Registration Per Annual	2,000	Baht
Hosting fee Per Annual	50,000	Baht
ISP fee Per Annual	56,400	Baht
VeriSign Payment Service Per Annual	32,000	Baht
Total price of Internet Setup	159,100	Baht
Total price of development	540,450	Baht

Candidate 3

Cost to develop:

Software:

MS Windows NT server 2000	35,000	Baht
Macromedia Dreamwaver	12,000	Baht
MS SQL Server version 7.0	25,000	Baht
Adobe Photoshop 7.0	18,000	Baht
Macromedia Flash 7.0	15,000	Baht
MS Windows 2000 4 Sets @20,000	80,000	Baht
MS Office 2000 4 Sets @10,000	40,000	Baht
Total price of software	225,000	Baht

Hardware:

Server 1 Set	35,000	Baht
Client 4 Sets @25,000	100,000	Baht
Modem (56K External)	1,350	Baht
LAN Card 5 Sets @1,000	5,000	Baht
Hub (Switching hub)	2,500	Baht
Printer	10,000	Baht
UPS (On-line UPS 1000 VA)	2,500	Baht
Scanner (Flatbed)	2,000	Baht
Total price of hardware	158,350	Baht

Internet Setup:

VeriSign Payment Service setup fee	6,700	Baht
Web hosting first time setup fee	12,000	Baht
Domain Registration Per Annual	2,000	Baht
Hosting fee Per Annual	50,000	Baht
ISP fee Per Annual	56,400	Baht
VeriSign Payment Service Per Annual	32,000	Baht
Total price of Internet Setup	159,100	Baht
Total price of development	542,450	Baht

3.3.2 Candidate System Matrix

The candidate systems matrix, which documents similarities and differences between candidate system, is a useful tool for effectively capturing, organizing, and communicating the characteristics for candidate solutions. The characteristics of candidate system matrix consists of portion of system computerization, benefits, server and workstations, software tools needed, application software, method of data processing, Output devices and implications, Input devices and implications and storage devices and implications.

Table 3.1. Candidate Systems Matrix.

Characteristics	Candidate 1	Candidate 2	Candidate 3
Portion of System Computerized	Create E-commerce and develop database system of Bookworm shop.	Same as candidate 1	Same as candidate 1
Benefit	This solution can fulfill user requirements because of the following: - Having specific commands help and correct in writing ASP Code.	This solution can fulfill user requirements because of the following: - Having specific commands help and correct in writing ASP Code. - Having specific tool help in generating HTML code and Javascript.	This solution can fulfill user requirements because of the following: - Having specific tool help in generating HTML code and Javascript.
Servers and Workstations	1 PentiumIV 3GHz (Server) 4 PentiumIV 1.6GHz (client)	Same as candidate 1	Same as candidate 1
Software Tools Needed	MS Visual InterDev.	Allaire HomeSite 5	Macromedia Dreamwaver
Application Software	Custom Solution	Custom Solution	Custom Solution
Method of Data Processing	LAN and Microsoft Windows NT 2000	Same as candidate 1	Same as candidate 1
Output of Data and Implications	EPSON LQ2170 (Dot Matrix)	Same as candidate 1	Same as candidate 1
Input Devices and Implications	Keyboard, Mouse and Scanner	Same as candidate 1	Same as candidate 1
Storage Devices and Implications	Harddisk IBM 40 GB	Same as candidate 1	Same as candidate 1

3.3.3 Feasibility Analysis

The proposed system is considered on feasibility analysis. The activities or benefits that occur in developing the proposed system will be measured. There are generally four categories of feasibility tests as follows:

(1) Operational feasibility: Determines whether a proposed system is desirable within the existing managerial and organizational framework.

(2) Technical feasibility: Determines whether a proposed system can be implemented with the available hardware, software, and technical resources.

(3) Scheduled feasibility: Determines whether how reasonable timetable of a proposed system is.

(4) Economic feasibility: Determines whether the benefits of a proposed system outweigh the costs.

All three candidates, shown Table 3.1, has to depend on Feasibility Study shown in Table 3.2, called feasibility analysis matrix. It determines whether which candidate solution referred to the candidate systems matrix is feasible, or achievable, given the organization's resources and constraints. There are four major areas of feasibility that must be addressed, as mentioned above, that are operational feasibility, technical feasibility, economic feasibility, and schedule feasibility. The candidates will be given scores for each criterion. After scoring, a final score is recorded in the last row for assessment. This matrix format can be most useful for defending our recommendation to management.

After analyzing the feasibility analysis matrix of each candidate, the second candidate is selected to be proposed to managing director for approval so that system design will be initiated.

Table 3.2. Feasibility Analysis Matrix.

Feasibility Criteria	Weight	Candidate 1	Candidate 2	Candidate 3
Operational Feasibility	25%	Fully supports user required functionality but less than candidate 2 Score : 95	Fully support user required functionality Score : 100	Fully supports user required functionality but less than candidate 2 Score : 80
Technical Feasibility	30%	Easy to create complex ASP code but difficult to create HTML code such as importing Macromedia Flash to HTML page. And easy to expand system by not affecting the system. Score : 80	Easy to create complex ASP code and HTML code. And easy to expand system by not affecting the system. Score : 95	Easy to create complex HTML code but does not support ASP code. And Easy to expand system by not affecting the system. Score : 70
Economic Feasibility Cost to develop: Payback period (discounted): Net present value: ROI: Detailed calculations:	25%	 ~550,450 baht. ~ 3 years ~973,155.baht. 77% Appendix A. Score: 80	 ~ 540,450 baht. ~ 2 years and 8 months ~ 1,193,444 baht 95% Appendix A. Score : 90	 ~542,450 baht. ~ 3 years ~863,638 baht. 69% Appendix A. Score : 60
Schedule Feasibility	20%	5 months Score : 90	4 months Score : 100	6 months Score : 80
Ranking	100%	86.25	96.25	72.50

3.4 Data Communication and Network

Bookworm has standardized database and database management system. They have standardized SQL Server their personal computer Relational Database Management System (RDBMS) by choice, as well as their preferred distributed, enterprise RDBMS of choice. Bookworm attempts to implement relational database because the relational database provides many advantages and it is the most suitable for many database management system technologies today. Firstly, the relational database can reduce complexities of database structure. Secondly, it minimizes data redundancy, and only intentional columns are duplicated.

This system is designed to use distributed and connect workstations and it uses the Internet to connect with the customer. The network diagram of Bookworm is shown in Figure 3.14.

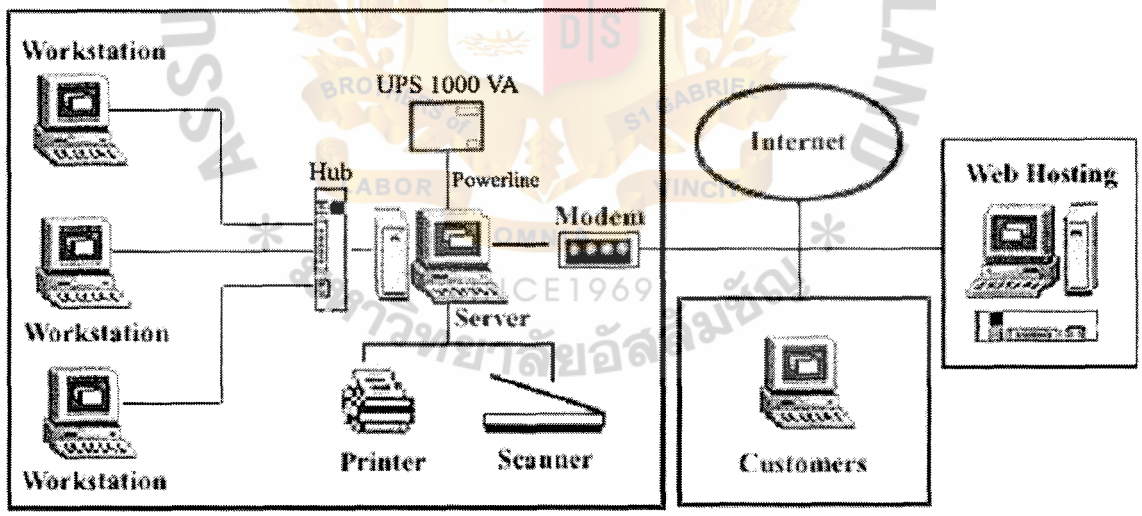

Figure 3.14. Hardware configuration of the Proposed System.

The server serves as the information system's server (database server) which means all the data are kept in one place for the use of data consistency. If the data are

stored in more than one place, we will not know which data is the most reliable or up to date or which one should be used.

3.5 Security and Control

The risk and threats to the computer system in unexpected or unfortunate situations that would interrupt the operations or cause a loss of data, incorrect input of data, unauthorized access, unauthorized changing of program, damage of the data, fraud, disaster or disruption to the system. The goal of computer security is to design the system to ensure that they are under control to maintain confidentiality, integrity and availability. The system analysts have to discuss the project team for the level of security needed and must approach this concern in realistic ways in considering the probability of specific threats. The security and controls can be separated into 2 kinds:

(1) Physical Security

The physical security is the term used to describe protection provided outside the computers system. Typical physical security facilities are guards, locks, and fences to deter direct attack but physical security must consider the perils from the natural disasters, human vandals and the unauthorized access and use.

The perils from the natural disasters are impossible to prevent, but through careful planning it is possible to reduce the damage they inflict. The perils from the natural disaster are from flood, water, and fire. Therefore the designing for the proposed system must ensure that the security from the perils of the natural disasters can protect the system. Another peril is power loss which the proposed system has to protect from the power loss by using Uninterruptible Power Supply (UPS). An UPS system serves as a control buffer between the external source and the computer system. If the external

power fails, the UPS system permits operation to continue for a period of time after outage. This allows operators to either "power down" normally or switch to back up power source.

Another peril in person to person transactions, security is based on physical cues. Consumers accept the risks of using credit cards in places like department stores because they can see and touch the merchandise and make judgements about the store. On the Internet, without those physical cues, it is more difficult for customers to assess the safety of the business.

We have decided to use SSL to secure our web site. The Secure Socket Layer (SSL) protocol capabilities address fundamental concerns about communication over the Internet and other TCP/IP networks:

(a) SSL server authentication allows a user to confirm a server's identity. SSL-enabled client software can use standard techniques of public-key cryptography to check that a server's certificate and public ID are valid and have been issued by a certificate authority (CA) listed in the client's list of trusted CAs. This confirmation might be important if the user, for example, is sending a credit card number over the network and wants to check the receiving server's identity.

(b) SSL client authentication allows a server to confirm a user's identity. Using the same techniques as those used for server authentication, SSL-enabled server software can check that a client's certificate and public ID are valid and have been issued by a certificate authority (CA) listed in the server's list of trusted CAs. This confirmation might be important if the server, for

example, is a bank sending confidential financial information to a customer and wants to check the recipient's identity.

(c) An encrypted SSL connection requires all information sent between a client and a server to be encrypted by the sending software and decrypted by the receiving software, thus providing a high degree of confidentiality. Confidentiality is important for both parties to any private transaction. In addition, all data sent over an encrypted SSL connection is protected with a mechanism for detecting tampering that is for automatically determining whether the data has been altered in transit.

The SSL protocol includes two sub-protocols: the SSL record protocol and the SSL handshake protocol. The SSL record protocol defines the format used to transmit data. The SSL handshake protocol involves using the SSL record protocol to exchange a series of messages between an SSL-enabled server and an SSL-enabled client when they first establish an SSL connection. This exchange of messages is designed to facilitate the following actions:

(a) Authenticate the server to the client

(b) Allow the client and server to select the cryptographic algorithms, or ciphers, that they both support.

(c) Optionally authenticate the client to the server.

(d) Use public-key encryption techniques to generate shared secrets.

(e) Establish an encrypted SSL connection.

For credit card we have decided to use the VeriSign Payment Service from www.verisign.com. To verify and capture the money from clients, we

use VeriSign because they are of prominent reputation in security and are reliable.

The system requires clients to log in before they can purchase any product, which means clients need to have an account with the system or they have to sign up for an account before using the system. The system uses client's email as a username to avoid duplicating accounts. In the case of members forgetting their password and trying to register again, the password will automatically send to the members' email after the alert message pops up on the screen to remind the members that they used to have an account with the system before.

(2) Logical Security

The logical security of the proposed system is separated into 3 levels. These are identification, authentication, and authorization.

(a) Identification

The identification is the first level of logical security of the proposed system. The reason to do the identification is to protect from the intruder destruction or theft of the data. Before the staff use the computer, they must key the login name of each staff to tell the computer who they are. It means if the users do not key their login, they cannot use the computer. Therefore identification can protect unauthorized persons access the computer.

(b) Authentication

The authentication is the second level of the logical security. After the users put the identification or login name, the next level is to put the user's authentication to prove the user password. For the best security of the user authentication, we add the function that is an additional information method. The additional information method is the method to protect unauthorized users from access to the computer by assigning the time to key the password such as if the user cannot key the password within 10 seconds, the machine will shut down automatically. Some other function is a specific machine (that means each machine is not in the same program). The user must put the password before using program.

(c) Authorization

The authorization is the third level of the logical security. The authorization is the method to separate the user to access each file. So each user does not have the same authority to access each file for security in the system. Some users may have full authority to use the file including read, write, delete and update and some users may read the file only. This method increases data accuracy from the modification for the use.

3.6 System Cost Evaluation and Comparison

(1) Costs of Retail Shop System

Table 3.3. The Retail Shop System Cost Analysis, Baht.

Cost Items	Years					
	1	2	3	4	5	6
Hardware Costs	0	0	0	0	0	0
Software Costs	0	0	0	0	0	0
Internet Costs	0	0	0	0	0	0
Maintenance Costs	30,000	40,500	57,500	76,500	97,500	120,500
Training Costs	0	0	0	0	0	0
Staff Costs	200,000	450,000	550,000	580,000	620,000	680,000
Utility Costs	20,000	20,000	20,000	20,000	20,000	20,000
Miscellaneous Costs	10,000	40,000	55,000	60,500	69,000	89,000
Total Costs	260,000	550,500	682,500	737,000	806,500	909,500
Cumulative Costs	260,000	810,500	1,493,000	2,230,000	3,036,500	3,946,000

(2) Costs of Virtual Shop System

Table 3.4. The Virtual Shop System Cost Analysis, Baht.

Cost Items	Years					
	1	2	3	4	5	6
Hardware Costs	158,350	20,000	20,000	20,000	20,000	20,000
Software Costs	213,000	20,000	15,000	10,000	10,000	10,000
Internet Costs	159,100	140,400	140,400	140,400	140,400	140,400
Maintenance Costs	0	30,500	32,500	35,500	37,500	40,500
Training Costs	50,000	20,000	10,000	8,000	8,000	8,000
Staff Costs	300,000	150,000	145,000	155,000	167,000	180,000
Utility Costs	20,000	10,000	10,000	10,000	10,000	10,000
Miscellaneous Costs	10,000	10,000	10,000	10,000	10,000	10,000
Total Costs	910,450	400,900	382,900	388,900	402,900	418,900
Cumulative Costs	910,450	1,311,350	1,694,250	2,083,150	2,486,050	2,904,950

(3) The Comparison of the System Costs between the Retail Shop System and the Virtual Shop System.

Table 3.5. The Comparison of the System Costs between the Retail Shop System and the Virtual Shop System.

Cost Items	Years					
	1	2	3	4	5	6
Retail Shop System	260,000	810,500	1,493,000	2,230,000	3,036,500	3,946,000
Virtual Shop System	910,450	1,311,350	1,694,250	2,083,150	2,486,050	2,904,950
Different Cost	-650,450	-500,850	-201,250	146,850	550,450	1,041,050

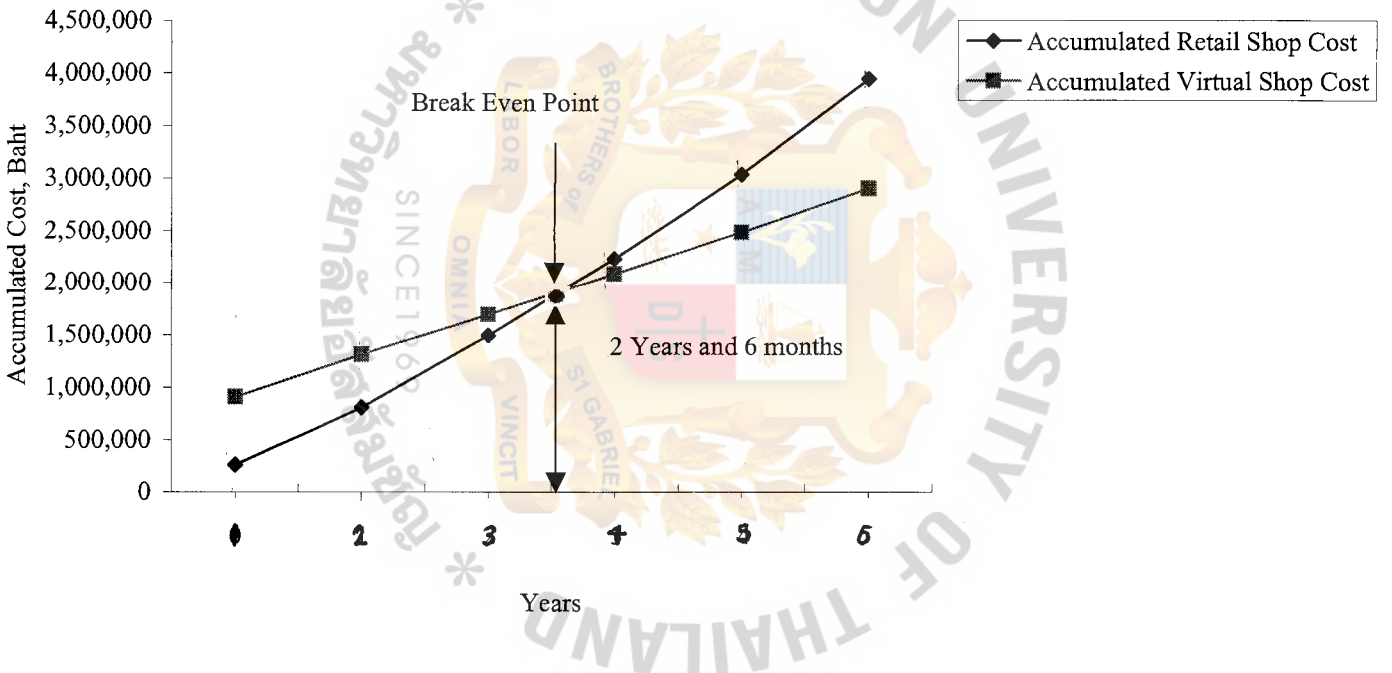

Figure 3.15. Cost Comparison between the Retail Shop System and the Virtual Shop System.

The comparison of the system cost between Costs of Retail Shop System and Cost of Virtual Shop System.

Costs of Retail Shop System.

(1) Order processing and invoice raising is slow and inaccurate because many types of products have to be checked at every step such as process customers order, purchase requisition, order acknowledgment and invoice preparation.

(2) Report generation is slow and unreliable. When the management needs any information, it takes approximately a week to get information. Every data item has to be listed out and rearranged in order to get the information required.

(3) Order and sales records are not updated regularly so that the management can't plan in replenishing stock.

(4) Billing errors such as pricing mistakes and billing customers for items not shipped or back-ordered. Overbilling can result in customer dissatisfaction; underbilling results in a loss of assets to the company.

Costs of Virtual Shop System.

(1) Reduce the time for order processing and invoices.

(2) Provide sufficient information for management and reduce the time for report generation.

(3) Order and sales records are updated immediately when printing invoice and the systems will be linked to inventory systems to update the stock balance also.

(4) It reduces redundancy of data in billing.

IV. PROJECT IMPLEMENTATION

4.1 Overview of Project Implementation

After the phase when we did the interview, study, definition, configuration, analysis and design, there is another important phase; the construction or implementation phase. It is the phase that will build and test the actual solution. The implementation phase consists of five important processes. They are programming, testing for ensuring that application is efficient, effective and practical. Later we will establish the training and create the document of user know how system work. The final process is to transfer data to the new system.

4.2 Stages of Implementation

4.2.1 Programming

The programmers generate the program following the design system that is separated into two parts. One is web application for customers use to order products and another part is established for staffs to manage the system to add or delete or update product information and search products in the stock for purchase.

4.2.2 Testing

The purpose of software testing is to check reliability that requires error detection and removal. Customers and staffs who are both user and data owner, check software testing. The testing process is separated into two parts as follows:

(1) Tested software by Customers

We have transfer product information page to server and allow customers to change customer profile by themselves. All products information are loaded from server for testing page to make sure they are not too heavy with graphics that

will slow down the loading time and minimize the size of our images when possible.

The important testing is the payment testing via the Internet for making sure we have enough security control to protect the customer information.

(2) Tested software by Staffs

Staffs who take care of web site. They must check the broken links, incorrect phone numbers, and grammatical or spelling errors for making sure the product is clear and exactly what customers need to do to purchase.

4.2.3 Installation

After the software testing is checked; the programmer will correct it completely. Due to the fact that we do not have the old system, we will transfer the new system to the server fully. We are not affected from transferring to the new system.

On the Bookworm web site, we also contact with ISP (Internet Service Provider) to create the domain name of our web site.

4.2.4 Conversion

After the testing phase is done, the virtual shop will be launched and start accepting online transactions. The online payments system with major Accounting & Finance department will enable Bookworm shop to accept credit cards or purchase cards.

4.2.5 Training

Most of the users are not familiar with computers. We will run a training course. The training course provides the basic computer knowledge and teaches computer application. After the course, users can practice by themselves for better comprehension.

4.2.6 Documentation

The purpose of documentation is to be a user manual that describes the nature and functions of the system and be a reference when users face a problem. Users use it to solve basic problems and do not wait for technicians to repair it.

V. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

From Cost Analysis, we can see that launching a virtual shop might be the best way to lower the cost. The customers can get information anytime they are available not only when the shop is open, and to put a product catalog online to save the time and expense of printing and mailing. It also reduces the cost of store renting and staff hiring.

Internet may not be the best place to sell the product but it will be the best place to promote and give product information. Some customers do not feel free to enter their details or credit card information. For every successful e-commerce business, there are dozens that fail by not addressing basic risks and pitfalls along the way. So to take full advantage of the e-commerce opportunity, we need to make sure we base the web business on a solid foundation that covers every element of e-commerce:

(1) Establish identity. The right domain name, or URL, can make the difference between a memorable e-commerce identity and getting lost in the online crowd.

(2) Find the right web hosting. The web hosting should be stable and let customers access it 24 hours a day 7 days a week, and connect into high speed for target customers.

(3) Build an attractive storefront. Plan the structure of the site, focusing on making it easy for customers to learn what they need to know, make a purchase decision, and then buy quickly.

(4) Let customers know they can trust us. In the anonymous world of the Internet, customers will communicate private information, like credit card

numbers or phone numbers, to our e-commerce site only if they are sure the site is legitimate and the information they send us is protected.

(5) Make it easy for customers to pay.

Clearly, building the elements of e-commerce into the web business is a big job, but it is too important to ignore if we want our e-business to grow and thrive. Beside Internet can promote the product, it can reduce the time of each process in the system as follows:

(1) Applying for new membership, after grabbing the data from customers with paper and pen and enter and put that data into the system. The proposed system lets customers enter their information to the system directly.

(2) Respond to customer inquiry, the proposed system reduces the waiting time of product inquiry between branches.

(3) Produce summary report, the proposed system generates summary reports by using sql query, which is faster and more reliable.

(4) Track recent order, customers can check their order status by themselves by logging to the member area.

Table 5.1 shows the time performance on each process of the proposed system compared with the existing system. It shows that each process of the proposed system performs in less time than each process of the existing system which has to operate many work steps in retail shop system. So, it can be concluded that the proposed system is more efficient and effective than the existing system.

Table 5.1. The Degree of Achievement of the Proposed System.

Process	Existing System	Proposed System
Apply Membership	10 minutes	1 second
Respond Inquiry	5 minutes	1 second
Place Order	1 second	1 second
Update Product Quantity	1 second	1 second
Add / Update Product Information	1 second	1 second
Produce Summary Report	5 hours	1 second
Track Order	10 minutes	1 second

5.2 Recommendations

In the near future, Bookworm can increase its product line and the system will still be able to support the growth. The changes of new products, service or even new advertising can easily be added to the system by changing the look of input form interface.

With slight modifications, this system can grow to member's area, not only can the members buy the products here but they can sell or exchange the products as well.

APPENDIX A

PAYBACK ANALYSIS

Table A.1. Payback Analysis for Client-Server System Alternative (Candidate 1), Baht.

Cost Items	Years					
	1	2	3	4	5	6
Development cost	- 550,450.00					
Internet cost		- 140,400.00	- 140,400.00	- 140,400.00	- 140,400.00	- 140,400.00
Operation and maintenance cost		- 48,500.00	- 51,895.00	- 55,527.65	- 59,414.59	- 63,573.61
Discount factors for 12%	1.000	0.893	0.797	0.712	0.683	0.567
Time-adjusted costs (adjusted to present value)	-	- 168,687.70	- 153,259.12	- 139,500.49	- 136,473.36	- 115,653.03
Cumulative time-adjusted costs over lifetime	- 550,450.00	- 719,137.70	- 872,396.82	-1,011,897.30	-1,148,370.66	- 1,264,023.70
Benefit derived from operation of new system increase 13% per year	-	485,000.00	548,050.00	619,296.50	699,805.05	790,779.70
Discount factors for 12%	1.000	0.893	0.797	0.712	0.683	0.567
Time adjusted benefits(current to present value)		433,105.00	436,795.85	440,939.11	477,966.85	448,372.09
Cumulative time-adjusted benefits over lifetime	-	433,105.00	869,900.85	1,310,839.96	1,788,806.80	2,237,178.89
Cumulative lifetime time-adjusted costs + benefits	- 550,450.00	- 286,032.70	- 2,495.96	298,942.66	640,436.14	973,155.20

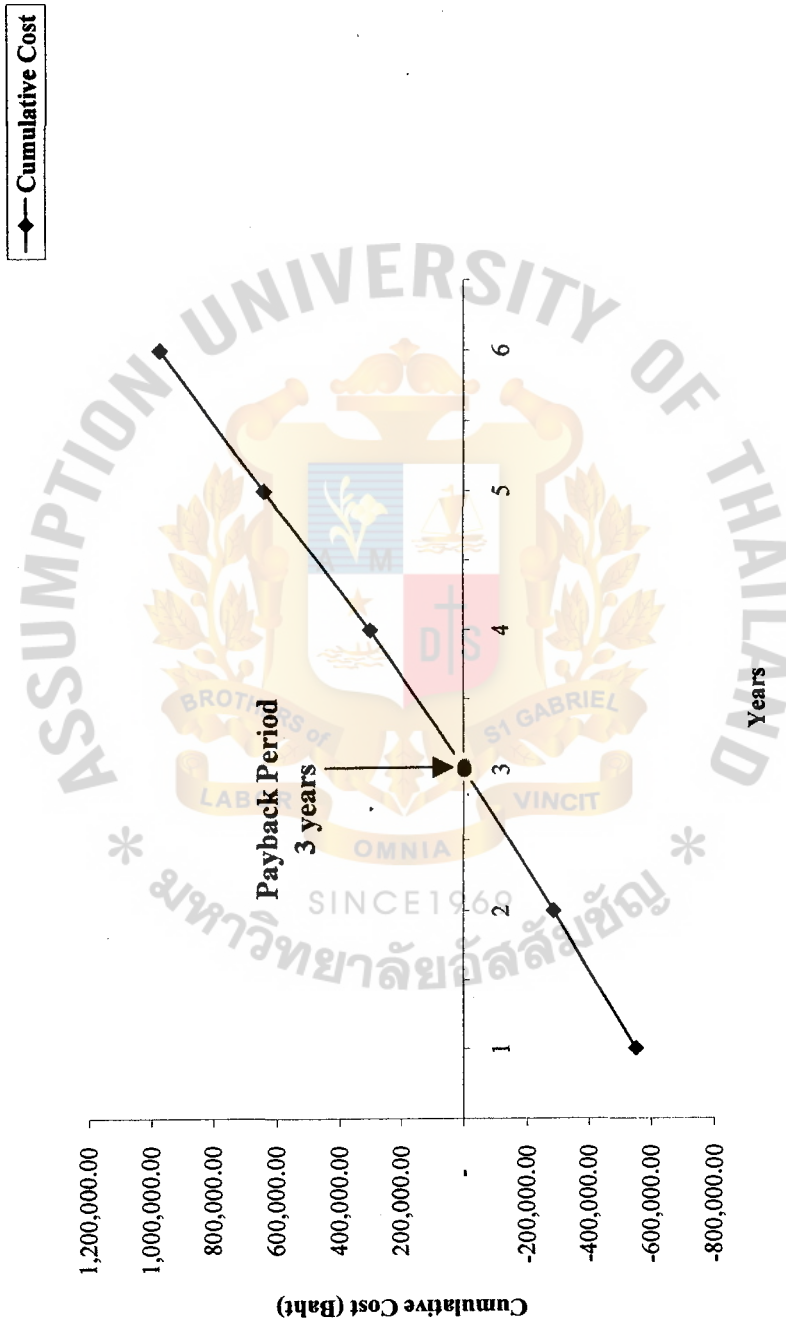

Figure A.1. Payback Analysis for Client-Server System Alternative (Candidate 1).

Table A.2. Net Present Value Analysis for Client-Server System Alternative (Candidate 1), Baht.

Cash flow description	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Total
Development cost	- 550,450.00						
Internet cost		- 140,400.00	- 140,400.00	- 140,400.00	- 140,400.00	- 140,400.00	
Operation and maintenance cost		- 48,500.00	- 51,895.00	- 55,527.65	- 59,414.59	- 63,573.61	
Discount factors for 12%	1.000	0.893	0.797	0.712	0.683	0.567	
Present value of annual costs:	- 550,450.00	- 168,687.70	- 153,259.12	- 139,500.49	- 136,473.36	- 115,653.03	
Total present value of lifetime costs:							-1,264,023.70
Benefit derived from operation of new system	-	485,000.00	548,050.00	619,296.50	699,805.05	790,779.70	
Discount factors for 12%	1.000	0.893	0.797	0.712	0.683	0.567	
Present value of annual costs:		433,105.00	436,795.85	440,939.11	477,966.85	448,372.09	
Total present value of lifetime costs:							2,237,178.89
Cumulative lifetime time-adjusted costs + benefits							973,155.20

ROI OF CANDIDATE 1 : (2,237,178.89-1,264,023.70)/1,264,023.70
973,155.20/1,264,023.70 = 0.769 = 77%

Table A.3. Payback Analysis for Client-Server System Alternative (Candidate 2), Baht.

Cost Items	Years					
	1	2	3	4	5	6
Development cost	- 540,450.00					
Internet cost		- 140,400.00	- 140,400.00	- 140,400.00	- 140,400.00	- 140,400.00
Operation and maintenance cost		- 48,500.00	- 51,895.00	- 55,527.65	- 59,414.59	- 63,573.61
Discount factors for 12%	1.000	0.893	0.797	0.712	0.683	0.567
Time-adjusted costs (adjusted to present value)	-	- 168,687.70	- 153,259.12	- 139,500.49	- 136,473.36	- 115,653.03
Cumulative time-adjusted costs over lifetime	- 540,450.00	- 709,137.70	- 862,396.82	-1,001,897.30	-1,138,370.66	-1,254,023.70
Benefit derived from operation of new system increase 18% per year	-	485,000.00	572,300.00	675,314.00	796,870.52	940,307.21
Discount factors for 12%	1.000	0.893	0.797	0.712	0.683	0.567
Time adjusted benefits(current to present value)		433,105.00	456,123.10	480,823.57	544,262.57	533,154.19
Cumulative time-adjusted benefits over lifetime	-	433,105.00	889,228.10	1,370,051.67	1,914,314.23	2,447,468.42
Cumulative lifetime time-adjusted costs + benefits	- 540,450.00	- 276,032.70	26,831.29	368,154.37	775,943.57	1,193,444.72

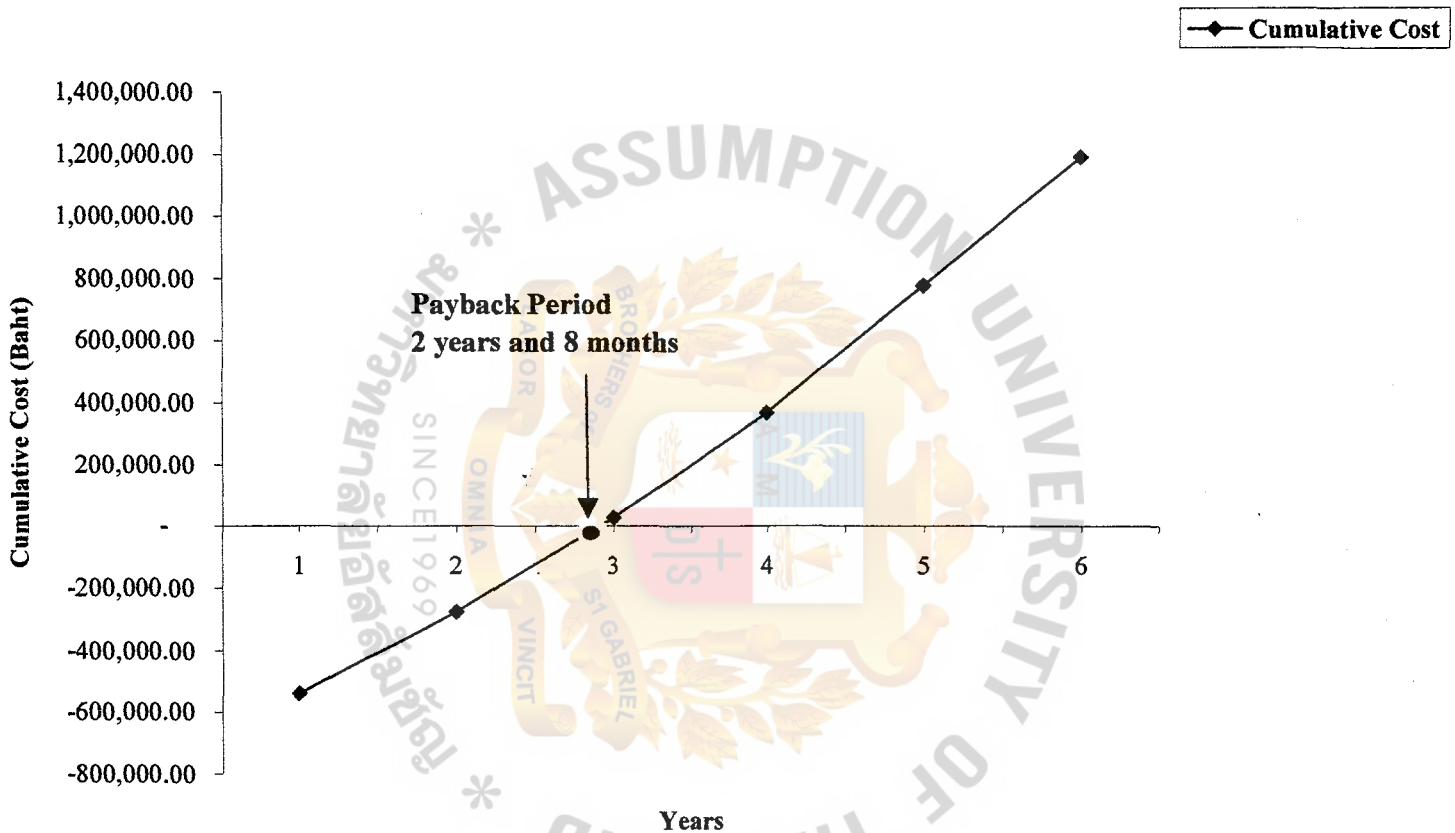

Figure A.2. Payback Analysis for Client-Server System Alternative (Candidate 2).

Table A.4. Net Present Value Analysis for Client-Server System Alternative (Candidate 2), Baht.

Cash flow description	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Total
Development cost	- 540,450.00						
Internet cost		- 140,400.00	- 140,400.00	- 140,400.00	- 140,400.00	- 140,400.00	
Operation and maintenance cost		- 48,500.00	- 51,895.00	- 55,527.65	- 59,414.59	- 63,573.61	
Discount factors for 12%	1.000	0.893	0.797	0.712	0.683	0.567	
Present value of annual costs:	- 540,450.00	- 168,687.70	- 153,259.12	- 139,500.49	- 136,473.36	- 115,653.03	
Total present value of lifetime costs:							-1,254,023.70
Benefit derived from operation of new system	-	485,000.00	572,300.00	675,314.00	796,870.52	940,307.21	
Discount factors for 12%	1.000	0.893	0.797	0.712	0.683	0.567	
Present value of annual costs:		433,105.00	456,123.10	480,823.57	544,262.57	533,154.19	
Total present value of lifetime costs:							2,447,468.42
Cumulative lifetime time-adjusted costs + benefits							1,193,444.72

ROI OF CANDIDATE 2 : (2,447,468.42-1,254,023.70)/1,254,023.70

1,193,444.72/1,254,023.70 = 0.951 = 95%

Table A.5. Payback Analysis for Client-Server System Alternative (Candidate 3), Baht.

Cost Items	Years					
	1	2	3	4	5	6
Development cost	- 542,450.00					
Internet cost		- 140,400.00	- 140,400.00	- 140,400.00	- 140,400.00	- 140,400.00
Operation and maintenance cost		- 48,500.00	- 51,895.00	- 55,527.65	- 59,414.59	- 63,573.61
Discount factors for 12%	1.000	0.893	0.797	0.712	0.683	0.567
Time-adjusted costs (adjusted to present value)	-	- 168,687.70	- 153,259.12	- 139,500.49	- 136,473.36	- 115,653.03
Cumulative time-adjusted costs over lifetime	- 542,450.00	- 711,137.70	- 864,396.82	-1,003,897.30	- 1,140,370.66	- 1,256,023.70
Benefit derived from operation of new system increase 10% per year	-	485,000.00	533,500.00	586,850.00	645,535.00	710,088.50
Discount factors for 12%	1.000	0.893	0.797	0.712	0.683	0.567
Time adjusted benefits(current to present value)		433,105.00	425,199.50	417,837.20	440,900.41	402,620.18
Cumulative time-adjusted benefits over lifetime	-	433,105.00	858,304.50	1,276,141.70	1,717,042.11	2,119,662.28
Cumulative lifetime time-adjusted costs + benefits	- 542,450.00	- 278,032.70	- 6,092.31	272,244.40	576,671.44	863,638.59

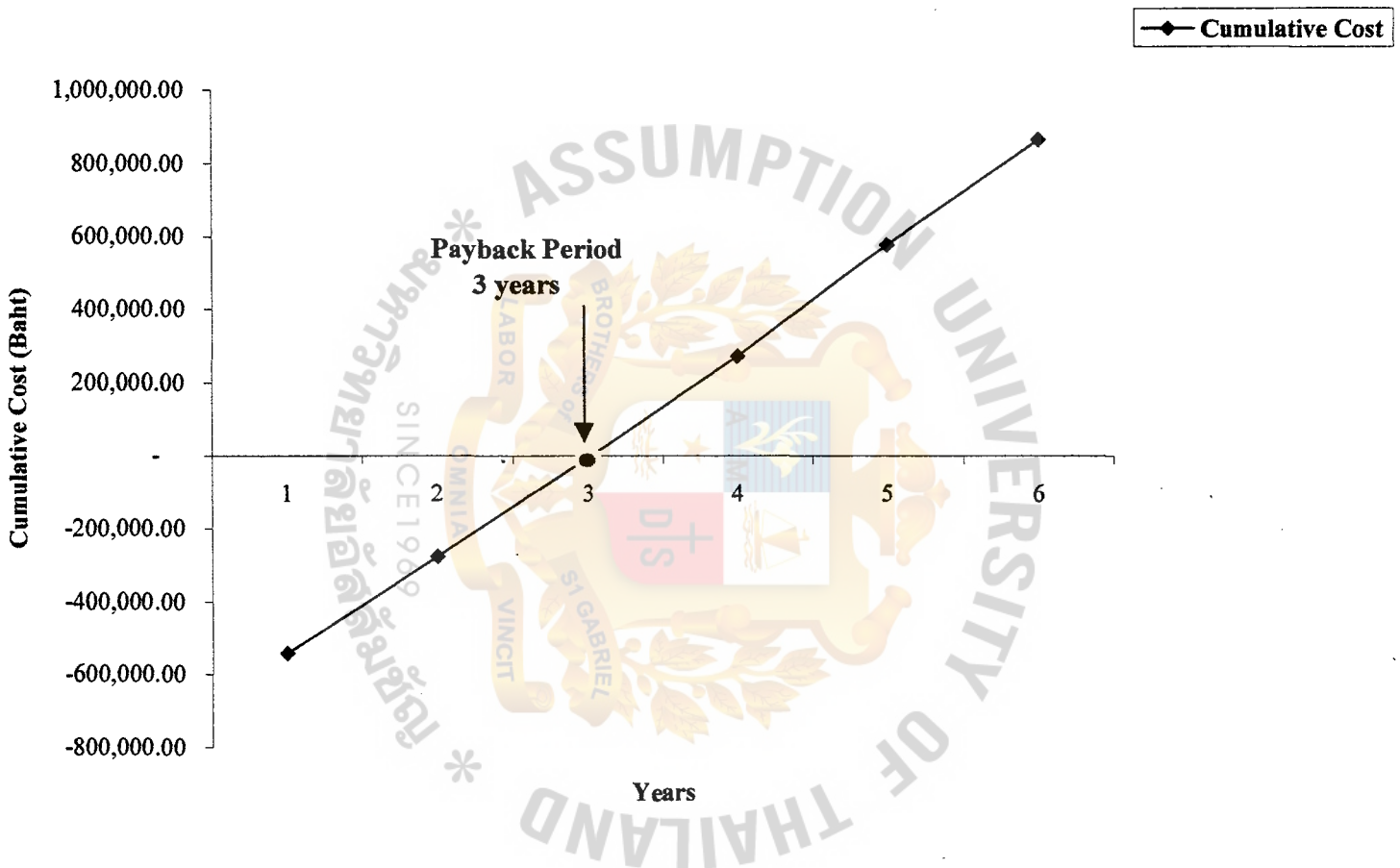

Figure A.3. Payback Analysis for Client-Server System Alternative (Candidate 3).

Table A.6. Net Present Value Analysis for Client-Server System Alternative (Candidate 3), Baht.

Cash flow description	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Total
Development cost	- 542,450.00						
Internet cost		- 140,400.00	- 140,400.00	- 140,400.00	- 140,400.00	- 140,400.00	
Operation and maintenance cost		- 48,500.00	- 51,895.00	- 55,527.65	- 59,414.59	- 63,573.61	
Discount factors for 12%	1.000	0.893	0.797	0.712	0.683	0.567	
Present value of annual costs:	- 542,450.00	- 168,687.70	- 153,259.12	- 139,500.49	- 136,473.36	- 115,653.03	
Total present value of lifetime costs:							-1,256,023.70
Benefit derived from operation of new system	-	485,000.00	533,500.00	586,850.00	645,535.00	710,088.50	
Discount factors for 12%	1.000	0.893	0.797	0.712	0.683	0.567	
Present value of annual costs:		433,105.00	425,199.50	417,837.20	440,900.41	402,620.18	
Total present value of lifetime costs:							2,119,662.28
Cumulative lifetime time-adjusted costs + benefits							863,638.59

ROI OF CANDIDATE 1 : (2,119,662.28-1,256,023.70)/1,256,023.70

863,638.59/1,256,023.70 = 0.687 = 69%

APPENDIX B

PROCESS SPECIFICATION

Bookworm Shopping System Process

Process #: 0

Location:

Bookworm_context (CONTEXT)

Input Flows:

Daily Order Status
OrderID
Order Details
Client Information
New Entry Products
Inquiry
Special Promotion
Incoming Products

Output Flows:

Client Order Details
Recent Order Status
Confirmation Email
Matched Product List
Newsletter
Client Account
Summary Report
Purchasing Order
Client Order Details

Apply for New Membership Process

Process #: 1

Location:

bookworm_dfd_level0 (0)

Input Flows:

Client Information

Output Flows:

Client Account
New Account

Check for Duplicate Account Process

Process #: 1.1

Location:

level1_process1 (1)

Input Flows:

Client Information
Client Email

Output Flows:

Activate Email

Activate Client Account Process

Process #: 1.2

Location:

level1_process1 (1)

Input Flows:

Valid Key

Output Flows:
New Account
Client Account

Respond to Client Inquiry — Process

Process #: 2

Location:

bookworm_dfd_level0 (0)

Input Flows:
Inquiry
Product Information

Output Flows:
Matched Product List

Determine Search Category — Process

Process #: 2.1

Location:

level1_process2 (2)

Input Flows:
Inquiry

Output Flows:
Key Words

Search For Available List — Process

Process #: 2.2

Location:

level1_process2 (2)

Input Flows:
Key Words

Output Flows:
Matched Product List

Place the Order — Process

Process #: 3

Location:

bookworm_dfd_level0 (0)

Input Flows:
Order Details
Product Information
Client Information

Output Flows:
Confirmation Email
Client Order Details

Calculate Total Amount — Process

Process #: 3.1

Location:

level1_process3 (3)

Input Flows:
Order Details

Product Information
Output Flows:
Total Amount

Confirm Order — Process

Process #: 3.2

Location:

level1_process3 (3)

Input Flows:
Client Information
Total Amount

Output Flows:
Client Order Details
Client Order Details
Client Order Details
Confirmation Email

Verify Account Information — Process

Process #: 3.2.1

Location:

level2_process3 (3.2)

Input Flows:
Client Information

Output Flows:
Valid Information

Select Payment Method — Process

Process #: 3.2.2

Location:

level2_process3 (3.2)

Input Flows:
Valid Information

Output Flows:
Payment Method

Generate OrderID — Process

Process #: 3.2.3

Location:

level2_process3 (3.2)

Input Flows:
Payment Method

Output Flows:
OrderID

Send Order Details by Email — Process

Process #: 3.2.4

Location:

level2_process3 (3.2)

Input Flows:
OrderID

Output Flows:
Client Order Details
Confirmation Email
Client Order Details
Client Order Details

Update Product Item Quantity Process

Process #: 4

Location:

bookworm_dfd_level0 (0)

Input Flows:
Daily Order Status
New Entry Products
Order Details

Output Flows:
Purchasing Order
Item Quantity
Update Order Status

Update Status Process

Process #: 4.1

Location:

level1_process4 (4)

Input Flows:
Daily Order Status
Order Details

Output Flows:
Updated Order Status
Sent Items

Calculate New Stock Levels Process

Process #: 4.2

Location:

level1_process4 (4)

Input Flows:
Sent Items
New Entry Products
Available Products

Output Flows:
Item Quantity

Analyse the Market Process

Process #: 4.3

Location:

level1_process4 (4)

Input Flows:
New Stock Levels

Output Flows:
Purchasing Order

Add or Update Product Information Process

Process #: 5

Location:

bookworm_dfd_level0 (0)

Input Flows:

Incoming Products

Special Promotion

Output Flows:

Newsletter

Check for Duplicate Entry Process

Process #: 5.1

Location:

level1_process5 (5)

Input Flows:

Incoming Products

Product Information

Output Flows:

Existing Item

New Item

Update Product Information Process

Process #: 5.2

Location:

level1_process5 (5)

Input Flows:

Existing Item

Special Promotion

Output Flows:

Updated Product Information

Enter Product Information Process

Process #: 5.3

Location:

level1_process5 (5)

Input Flows:

New Item

Output Flows:

Product Information

Generate Newsletter Process

Process #: 5.4

Location:

level1_process5 (5)

Input Flows:

Incoming and Special Price Items

Clients Emails

Output Flows:

Newsletter

Produce Summary Report Process

Process #: 6

Location:

bookworm_dfd_level0 (0)

Input Flows:

Available Products

Sold Items

Output Flows:

Summary Report

Select Summary Type Process

Process #: 6.1

Location:

level1_process6 (6)

Input Flows:

Available Products

Output Flows:

Summary Type

Generate Summary Report Process

Process #: 6.2

Location:

level1_process6 (6)

Input Flows:

Summary Type

Sold Items

Output Flows:

Summary Report

Track Recent Order Process

Process #: 7

Location:

bookworm_dfd_level0 (0)

Input Flows:

OrderID

Transaction Details

Output Flows:

Recent Order Status

APPENDIX C

DATABASE DESIGN

Table C.1 Client Information Table.

No	Field Name	Field Type	Field Size	Decimal	Key Type
1	cusID	Char	10	-	Primary Key
2	cusFname	Char	30	-	Attribute
3	cusLname	Char	30	-	Attribute
4	cusAddress1	Char	30	-	Attribute
5	cusAddress2	Char	30	-	Attribute
6	cusCity	Char	30	-	Attribute
7	cusCountry	Char	30	-	Attribute
8	cusZipcode	Char	10	-	Attribute
9	cusTelephone	Char	10	-	Attribute
10	cusFax	Char	10	-	Attribute
11	cusEmail	Char	30	-	Attribute
12	cusPasswd	Char	10	-	Attribute
13	cusRegisteredDate	Date	10	-	Attribute
14	cusActivate	Boolean	-	-	Attribute

Table C.2 Order Table.

No	Field Name	Field Type	Field Size	Decimal	Key Type
1	orderID	Char	10	-	Primary Key
2	cusID	Char	10	-	Foreign Key
3	method	Char	30	-	Attribute
4	orderDate	Date	10	-	Attribute
5	paidStatus	Boolean	-	-	Attribute
6	receivedStatus	Boolean	-	-	Attribute

Table C.3 orderDetails Table.

No	Field Name	Field Type	Field Size	Decimal	Key Type
1	orderID	Char	10	-	Primary Key
2	productID	Char	10	-	Primary Key
3	orderQuantity	Integer	10	-	Attribute
4	arrivedDate	Date	10	-	Attribute
5	expectingDate	Date	10	-	Attribute
6	purchasingPrice	Decimal	15	2	Attribute
7	deliveryStatus	Char	10	-	Attribute

Table C.4 Author Information Table.

No	Field Name	Field Type	Field Size	Decimal	Key Type
1	authorID	Char	10	-	Primary Key
2	authorFname	Char	30	-	Attribute
3	authorLname	Char	30	-	Attribute
4	authorAddress1	Char	30	-	Attribute
5	authorAddress2	Char	30	-	Attribute
6	authorCity	Char	30	-	Attribute
7	authorCountry	Char	30	-	Attribute
8	authorZipcode	Char	10	-	Attribute
9	authorTelephone	Char	10	-	Attribute
10	authorFax	Char	10	-	Attribute
11	pseudonym	Char	30	-	Attribute

Table C.5 productAuthor Table

No	Field Name	Field Type	Field Size	Decimal	Key Type
1	productID	Char	10	-	Primary Key
2	authorID	Char	10	-	Primary Key

Table C.6 productDetails Table.

No	Field Name	Field Type	Field Size	Decimal	Key Type
1	productID	Char	10	-	Primary Key
2	authorID	Char	10	-	Foreign Key
3	p_title	Char	30	-	Attribute
4	p_imprint	Char	30	-	Attribute
5	p_edition	Char	20	-	Attribute
6	p_physicalDes	Char	30	-	Attribute
7	ISBN	Char	20	-	Attribute
8	p_subject	Char	30	-	Attribute
9	p_type	Char	20	-	Attribute
10	itprice	Decimal	15	2	Attribute
11	itQuantity	Integer	10	-	Attribute
12	itUpdateDate	Date	10	-	Attribute
13	itBookCoverFront	Char	30	-	Attribute
14	itDiscount	Integer	15	-	Attribute

Table C.7 productTransation Table.

No	Field Name	Field Type	Field Size	Decimal	Key Type
1	inventID	Char	10	-	Primary Key
2	productID	Char	10	-	Foreign Key
3	activities	Char	10	-	Attribute
4	amountChange	Integer	10	-	Attribute
5	updateDate	Date	10	-	Attribute

APPENDIX D

DATA DICTIONARY

activities Data Element

Data element attributes

Storage Type: Char

Length: 30

Null Type: Not Null

Location:

Entity --> InventoryStatus

---

amountChange Data Element

Data element attributes

Storage Type: Char

Length: 10

Null Type: Not Null

Location:

Entity --> InventoryStatus

---

arrivedDate Data Element

Data element attributes

Storage Type: Date

Length: 10

Null Type: Not Null

Location:

Entity --> Shipping

---

authorAddress Data Element

Data element attributes

Storage Type: Char

Length: 30

Null Type: Not Null

---

authorAddress1 Data Element

Data element attributes

Storage Type: Char

Length: 30

Null Type: Not Null

Location:

Entity --> Author

---

authorAddress2 Data Element

Data element attributes

Storage Type: Char

Length: 30

Null Type: Not Null

Location:

Entity --> Author

---

authorCity Data Element

Data element attributes

Storage Type: Char

Length: 30

Null Type: Not Null

Location:

Entity --> Author

---

authorCountry — Data Element

Data element attributes

Storage Type: Char

Length: 30

Null Type: Not Null

Location:

Entity --> Author

---

authorFax — Data Element

Data element attributes

Storage Type: Char

Length: 10

Null Type: Not Null

Location:

Entity --> Author

---

authorFname — Data Element

Data element attributes

Storage Type: Char

Length: 30

Null Type: Not Null

Location:

Entity --> Author

---

authorID — Data Element

Data element attributes

Storage Type: Char

Length: 10

Null Type: Not Null

Location:

Entity --> ProductAuthor

Entity --> Product

Entity --> Author

---

authorLname — Data Element

Data element attributes

Storage Type: Char

Length: 30

Null Type: Not Null

Location:

Entity --> Author

---

authorTelephone — Data Element

Data element attributes

Storage Type: Char

Length: 10

Null Type: Not Null

Location:

Entity --> Author

---

authorZipcode — Data Element

Data element attributes

Storage Type: Char

Length: 10

Null Type: Not Null

Location:

Entity --> Author

---

cusActivate — Data Element

Data element attributes

Storage Type: Char

Length: 30

Null Type: Not Null

Location:

Entity --> Client

---

cusAddress — Data Element

Data element attributes

Storage Type: Char

Length: 30

Null Type: Not Null

---

cusAddress1 — Data Element

Data element attributes

Storage Type: Char

Length: 30

Null Type: Not Null

Location:

Entity --> Client

---

cusAddress2 — Data Element

Data element attributes

Storage Type: Char

Length: 30

Null Type: Not Null

Location:

Entity --> Client

---

cusCity — Data Element

Data element attributes

Storage Type: Char

Length: 30

Null Type: Not Null

Location:

Entity --> Client

---

cusCountry — Data Element

Data element attributes

Storage Type: Char
Length: 30
Null Type: Not Null

Location:

Entity --> Client

---

cusEmail — Data Element

Data element attributes

Storage Type: Char
Length: 30
Null Type: Not Null

Location:

Entity --> Client

---

cusFax — Data Element

Data element attributes

Storage Type: Char
Length: 10
Null Type: Not Null

Location:

Entity --> Client

---

cusFname — Data Element

Data element attributes

Storage Type: Char
Length: 30
Null Type: Not Null

Location:

Entity --> Client

---

cusID — Data Element

Data element attributes

Storage Type: Char
Length: 10
Null Type: Not Null

Location:

Entity --> Order
Entity --> Client

---

cusLname — Data Element

Data element attributes

Storage Type: Char
Length: 30
Null Type: Not Null

Location:

Entity --> Client

---

cusPasswd — Data Element

Data element attributes

Storage Type: Char
Length: 10
Null Type: Not Null

Location:

Entity --> Client

---

cusRegisteredDate — Data Element

Data element attributes

Storage Type: Date
Length: 10
Null Type: Not Null

Location:

Entity --> Client

---

cusTelephone — Data Element

Data element attributes

Storage Type: Char
Length: 10
Null Type: Not Null

Location:

Entity --> Client

---

cusZipcode — Data Element

Data element attributes

Storage Type: Char
Length: 10
Null Type: Not Null

Location:

Entity --> Client

---

deliveryStatus — Data Element

Data element attributes

Storage Type: Char
Length: 30
Null Type: Not Null

Location:

Entity --> Shipping

---

edition — Data Element

Data element attributes

Storage Type: Char
Length: 20
Null Type: Not Null

---

expectingDate — Data Element

Data element attributes

Storage Type: Date

Length: 10
Null Type: Not Null
Location:
Entity --> Shipping

---

imprint Data Element
Data element attributes
Storage Type: Char
Length: 30
Null Type: Not Null

---

inventID Data Element
Data element attributes
Storage Type: Char
Length: 10
Null Type: Not Null
Location:
Entity --> InventoryStatus

ISBN Data Element
Data element attributes
Storage Type: Char
Length: 20
Null Type: Not Null
Location:
Entity --> Product

---

itBookCoverFront Data Element
Data element attributes
Storage Type: Char
Length: 30
Null Type: Not Null
Location:
Entity --> Product

---

itDiscount Data Element
Data element attributes
Storage Type: Char
Length: 30
Null Type: Not Null
Location:
Entity --> Product

---

itprice Data Element
Data element attributes
Storage Type: Decimal
Length: 15
Null Type: Not Null
Location:
Entity --> Product

---

itQuantity — Data Element

Data element attributes

Storage Type: Char
Length: 10
Null Type: Not Null

Location:

Entity --> Product

---

itUpdateDate — Data Element

Data element attributes

Storage Type: Date
Length: 10
Null Type: Not Null

Location:

Entity --> Product

---

material — Data Element

Data element attributes

Storage Type: Char
Length: 20
Null Type: Not Null

---

method — Data Element

Data element attributes

Storage Type: Char
Length: 30
Null Type: Not Null

Location:

Entity --> Order

Note — Data Element

Data element attributes

Storage Type: Char
Length: 30
Null Type: Not Null

---

orderDate — Data Element

Data element attributes

Storage Type: Date
Length: 10
Null Type: Not Null

Location:

Entity --> Order

---

orderID — Data Element

Data element attributes

Storage Type: Char
Length: 10
Null Type: Not Null

Location:
Entity --> Order
Entity --> Shipping

---

orderQuantity Data Element
Data element attributes
Storage Type: Char
Length: 10
Null Type: Not Null
Location:
Entity --> Shipping

---

p_edition Data Element
Data element attributes
Storage Type: Char
Length: 20
Null Type: Not Null
Location:
Entity --> Product

---

p_imprint Data Element
Data element attributes
Storage Type: Char
Length: 30
Null Type: Not Null
Location:
Entity --> Product

---

p_physicalDes Data Element
Data element attributes
Storage Type: Char
Length: 30
Null Type: Not Null
Location:
Entity --> Product

---

p_subject Data Element
Data element attributes
Storage Type: Char
Length: 30
Null Type: Not Null
Location:
Entity --> Product

---

p_title Data Element
Data element attributes
Storage Type: Char
Length: 30
Null Type: Not Null
Location:

Entity --> Product

---

p_type — Data Element

Data element attributes

Storage Type: Char
Length: 20
Null Type: Not Null

Location:

Entity --> Product

---

paidStatus — Data Element

Data element attributes

Storage Type: Char
Length: 30
Null Type: Not Null

Location:

Entity --> Order

---

physicalDes — Data Element

Data element attributes

Storage Type: Char
Length: 30
Null Type: Not Null

---

price — Data Element

Data element attributes

Storage Type: Decimal
Length: 15
Null Type: NotNull

---

productID — Data Element

Data element attributes

Storage Type: Char
Length: 10
Null Type: Not Null

Location:

Entity --> Shipping
Entity --> ProductAuthor
Entity --> InventoryStatus
Entity --> ProductTitle
Entity --> Product

---

pseudonym — Data Element

Data element attributes

Storage Type: Char
Length: 30
Null Type: Not Null

Location:

Entity --> Author

---

purchasingPrice — Data Element

Data element attributes

Storage Type: Decimal
Length: 15
Null Type: Not Null

Location:

Entity --> Shipping

---

receivedStatus — Data Element

Data element attributes

Storage Type: Char
Length: 30
Null Type: Not Null

Location:

Entity --> Order

---

title — Data Element

Data element attributes

Storage Type: Char
Length: 30
Null Type: Not Null

---

titleID — Data Element

Data element attributes

Storage Type: Char
Length: 10
Null Type: Not Null

Location:

Entity --> ProductTitle
Entity --> Title

---

titleName — Data Element

Data element attributes

Storage Type: Char
Length: 30
Null Type: Not Null

Location:

Entity --> Title

---

updateDate — Data Element

Data element attributes

Storage Type: Date
Length: 10
Null Type: Not Null

Location:

Entity --> InventoryStatus

Activate Email — Data Flow

Location:

level1_process1 (1)
Source: Check for Duplicate Account (Process)
Dest: Clients (External Entity)

Available Products Data Flow
Location:
bookworm_dfd_level0 (0)
Source: Product Information File (Data Store)
Dest: Produce Summary Report (Process)
level1_process4 (4)
Source: Product Information File (Data Store)
Dest: Calculate New Stock Levels (Process)
level1_process6 (6)
Source: Product Information File (Data Store)
Dest: Select Summary Type (Process)

Client Account Data Flow
Location:
Bookworm_context (CONTEXT)
Source: Bookworm Shopping System (Process)
Dest: Clients (External Entity)
bookworm_dfd_level0 (0)
Source: Apply for New Membership (Process)
Dest: Clients (External Entity)
level1_process1 (1)
Source: Activate Client Account (Process)
Dest: Clients (External Entity)

Client Email Data Flow
Location:
level1_process1 (1)
Source: Client Information File (Data Store)
Dest: Check for Duplicate Account (Process)

Client Information Data Flow
Location:
Bookworm_context (CONTEXT)
Source: Clients (External Entity)
Dest: Bookworm Shopping System (Process)
bookworm_dfd_level0 (0)
Source: Clients (External Entity)
Dest: Apply for New Membership (Process)
Source: Client Information File (Data Store)
Dest: Place the Order (Process)
level1_process1 (1)
Source: Clients (External Entity)
Dest: Check for Duplicate Account (Process)
level1_process3 (3)
Source: Client Information File (Data Store)
Dest: Confirm Order (Process)

level2_process3 (3.2)
Source: Client Information File (Data Store)
Dest: Verify Account Information (Process)

Client Order Details Data Flow
Location:
Bookworm_context (CONTEXT)
Source: Bookworm Shopping System (Process)
Dest: Sales & Marketing (Each branchs) (External Entity)
Source: Bookworm Shopping System (Process)
Dest: Finance & Accounting (External Entity)
bookworm_dfd_level0 (0)
Source: Place the Order (Process)
Dest: Sales & Marketing (Each branchs) (External Entity)
level1_process3 (3)
Source: Confirm Order (Process)
Dest: Transaction Details File (Data Store)
Source: Confirm Order (Process)
Dest: Sales & Marketing (Each branchs) (External Entity)
Source: Confirm Order (Process)
Dest: Finance & Accounting (External Entity)
level2_process3 (3.2)
Source: Send Order Details by Email (Process)
Dest: Transaction Details File (Data Store)
Source: Send Order Details by Email (Process)
Dest: Finance & Accounting (External Entity)
Source: Send Order Details by Email (Process)
Dest: Sales & Marketing (Each branchs) (External Entity)

Clients Emails Data Flow
Location:
level1_process5 (5)
Source: Client Information File (Data Store)
Dest: Generate Newsletter (Process)

Confirmation Email Data Flow
Location:
Bookworm_context (CONTEXT)
Source: Bookworm Shopping System (Process)
Dest: Clients (External Entity)
bookworm_dfd_level0 (0)
Source: Place the Order (Process)
Dest: Clients (External Entity)
level1_process3 (3)
Source: Confirm Order (Process)
Dest: Clients (External Entity)
level2_process3 (3.2)
Source: Send Order Details by Email (Process)
Dest: Clients (External Entity)

Daily Order Status Data Flow

Location:

Bookworm_context (CONTEXT)

Source: Sales & Marketing (Each branchs) (External Entity)

Dest: Bookworm Shopping System (Process)

bookworm_dfd_level0 (0)

Source: Sales & Marketing (Each branchs) (External Entity)

Dest: Update Product Item Quantity (Process)

level1_process4 (4)

Source: Sales & Marketing (Each branchs) (External Entity)

Dest: Update Status (Process)

Existing Item Data Flow

Location:

level1_process5 (5)

Source: Check for Duplicate Entry (Process)

Dest: Update Product Information (Process)

Incoming and Special Price Items Data Flow

Location:

level1_process5 (5)

Source: Product Information File (Data Store)

Dest: Generate Newsletter (Process)

Incoming Products Data Flow

Location:

Bookworm_context (CONTEXT)

Source: Purchasing (External Entity)

Dest: Bookworm Shopping System (Process)

bookworm_dfd_level0 (0)

Source: Purchasing (External Entity)

Dest: Add or Update Product Information (Process)

level1_process5 (5)

Source: Purchasing (External Entity)

Dest: Check for Duplicate Entry (Process)

Inquiry Data Flow

Location:

Bookworm_context (CONTEXT)

Source: Clients (External Entity)

Dest: Bookworm Shopping System (Process)

bookworm_dfd_level0 (0)

Source: Clients (External Entity)

Dest: Respond to Client Inquiry (Process)

level1_process2 (2)

Source: Clients (External Entity)

Dest: Determine Search Category (Process)

Item Quantity Data Flow

Location:

bookworm_dfd_level0 (0)

Source: Update Product Item Quantity (Process)

Dest: Product Information File (Data Store)

level1_process4 (4)

Source: Calculate New Stock Levels (Process)

Dest: Product Information File (Data Store)

Key Words Data Flow

Location:

level1_process2 (2)

Source: Determine Search Category (Process)

Dest: Search For Available List (Process)

Matched Product List Data Flow

Location:

Bookworm_context (CONTEXT)

Source: Bookworm Shopping System (Process)

Dest: Clients (External Entity)

bookworm_dfd_level0 (0)

Source: Respond to Client Inquiry (Process)

Dest: Clients (External Entity)

level1_process2 (2)

Source: Search For Available List (Process)

Dest: Clients (External Entity)

New Account Data Flow

Location:

bookworm_dfd_level0 (0)

Source: Apply for New Membership (Process)

Dest: Client Information File (Data Store)

level1_process1 (1)

Source: Activate Client Account (Process)

Dest: Client Information File (Data Store)

New Entry Products Data Flow

Location:

Bookworm_context (CONTEXT)

Source: Sales & Marketing (Each branchs) (External Entity)

Dest: Bookworm Shopping System (Process)

bookworm_dfd_level0 (0)

Source: Sales & Marketing (Each branchs) (External Entity)

Dest: Update Product Item Quantity (Process)

level1_process4 (4)

Source: Product Agents (External Entity)

Dest: Calculate New Stock Levels (Process)

New Item Data Flow

Location:

level1_process5 (5)

Source: Check for Duplicate Entry (Process)

Dest: Enter Product Information (Process)

New Stock Levels Data Flow

Location:

level1_process4 (4)

Source: Calculate New Stock Levels (Process)

Dest: Analyse the Market (Process)

Newsletter Data Flow

Location:

Bookworm_context (CONTEXT)

Source: Bookworm Shopping System (Process)

Dest: Clients (External Entity)

bookworm_dfd_level0 (0)

Source: Add or Update Product Information (Process)

Dest: Clients (External Entity)

level1_process5 (5)

Source: Generate Newsletter (Process)

Dest: Clients (External Entity)

Order Details Data Flow

Location:

Bookworm_context (CONTEXT)

Source: Clients (External Entity)

Dest: Bookworm Shopping System (Process)

bookworm_dfd_level0 (0)

Source: Clients (External Entity)

Dest: Place the Order (Process)

Source: Transaction Details File (Data Store)

Dest: Update Product Item Quantity (Process)

level1_process3 (3)

Source: Clients (External Entity)

Dest: Calculate Total Amount (Process)

level1_process4 (4)

Source: Transaction Details File (Data Store)

Dest: Update Status (Process)

OrderID Data Flow

Location:

Bookworm_context (CONTEXT)

Source: Clients (External Entity)

Dest: Bookworm Shopping System (Process)

bookworm_dfd_level0 (0)

Source: Clients (External Entity)

Dest: Track Recent Order (Process)

level2_process3 (3.2)

Source: Generate OrderID (Process)
Dest: Send Order Details by Email (Process)

Payment Method Data Flow
Location:
level2_process3 (3.2)
Source: Select Payment Method (Process)
Dest: Generate OrderID (Process)

Product Information Data Flow
Location:
bookworm_dfd_level0 (0)
Source: Product Information File (Data Store)
Dest: Respond to Client Inquiry (Process)
Source: Product Information File (Data Store)
Dest: Place the Order (Process)
level1_process3 (3)
Source: Product Information File (Data Store)
Dest: Calculate Total Amount (Process)
level1_process5 (5)
Source: Product Information File (Data Store)
Dest: Check for Duplicate Entry (Process)
Source: Enter Product Information (Process)
Dest: Product Information File (Data Store)

Purchasing Order Data Flow
Location:
Bookworm_context (CONTEXT)
Source: Bookworm Shopping System (Process)
Dest: Purchasing (External Entity)
bookworm_dfd_level0 (0)
Source: Update Product Item Quantity (Process)
Dest: Purchasing (External Entity)
level1_process4 (4)
Source: Analyse the Market (Process)
Dest: Purchasing (External Entity)

Recent Order Status Data Flow
Location:
Bookworm_context (CONTEXT)
Source: Bookworm Shopping System (Process)
Dest: Clients (External Entity)
bookworm_dfd_level0 (0)
Source: Track Recent Order (Process)
Dest: Clients (External Entity)

Sent Items Data Flow
Location:
level1_process4 (4)
Source: Update Status (Process)

Dest: Calculate New Stock Levels (Process)

Sold Items Data Flow

Location:

bookworm_dfd_level0 (0)

Source: Transaction Details File (Data Store)

Dest: Produce Summary Report (Process)

level1_process6 (6)

Source: Transaction Details File (Data Store)

Dest: Generate Summary Report (Process)

Special Promotion Data Flow

Location:

Bookworm_context (CONTEXT)

Source: Management (External Entity)

Dest: Bookworm Shopping System (Process)

bookworm_dfd_level0 (0)

Source: Management (External Entity)

Dest: Add or Update Product Information (Process)

level1_process5 (5)

Source: Management (External Entity)

Dest: Update Product Information (Process)

Summary Report Data Flow

Location:

Bookworm_context (CONTEXT)

Source: Bookworm Shopping System (Process)

Dest: Management (External Entity)

bookworm_dfd_level0 (0)

Source: Produce Summary Report (Process)

Dest: Management (External Entity)

level1_process6 (6)

Source: Generate Summary Report (Process)

Dest: Management (External Entity)

Summary Type Data Flow

Location:

level1_process6 (6)

Source: Select Summary Type (Process)

Dest: Generate Summary Report (Process)

Total Amount Data Flow

Location:

level1_process3 (3)

Source: Calculate Total Amount (Process)

Dest: Confirm Order (Process)

Transaction Details Data Flow

Location:

bookworm_dfd_level0 (0)

Source: Transaction Details File (Data Store)
Dest: Track Recent Order (Process)

Update Order Status Data Flow
Location:
bookworm_dfd_level0 (0)
Source: Update Product Item Quantity (Process)
Dest: Transaction Details File (Data Store)

Updated Order Status Data Flow
Location:
level1_process4 (4)
Source: Update Status (Process)
Dest: Transaction Details File (Data Store)

Updated Product Information Data Flow
Location:
bookworm_dfd_level0 (0)
Source: Add or Update Product Information (Process)
Dest: Product Information File (Data Store)
level1_process5 (5)
Source: Update Product Information (Process)
Dest: Product Information File (Data Store)

Valid Information Data Flow
Location:
level2_process3 (3.2)
Source: Verify Account Information (Process)
Dest: Select Payment Method (Process)

Valid Key Data Flow
Location:
level1_process1 (1)
Source: Clients (External Entity)
Dest: Activate Client Account (Process)

APPENDIX E

WEB DESIGN FOR CUSTOMER

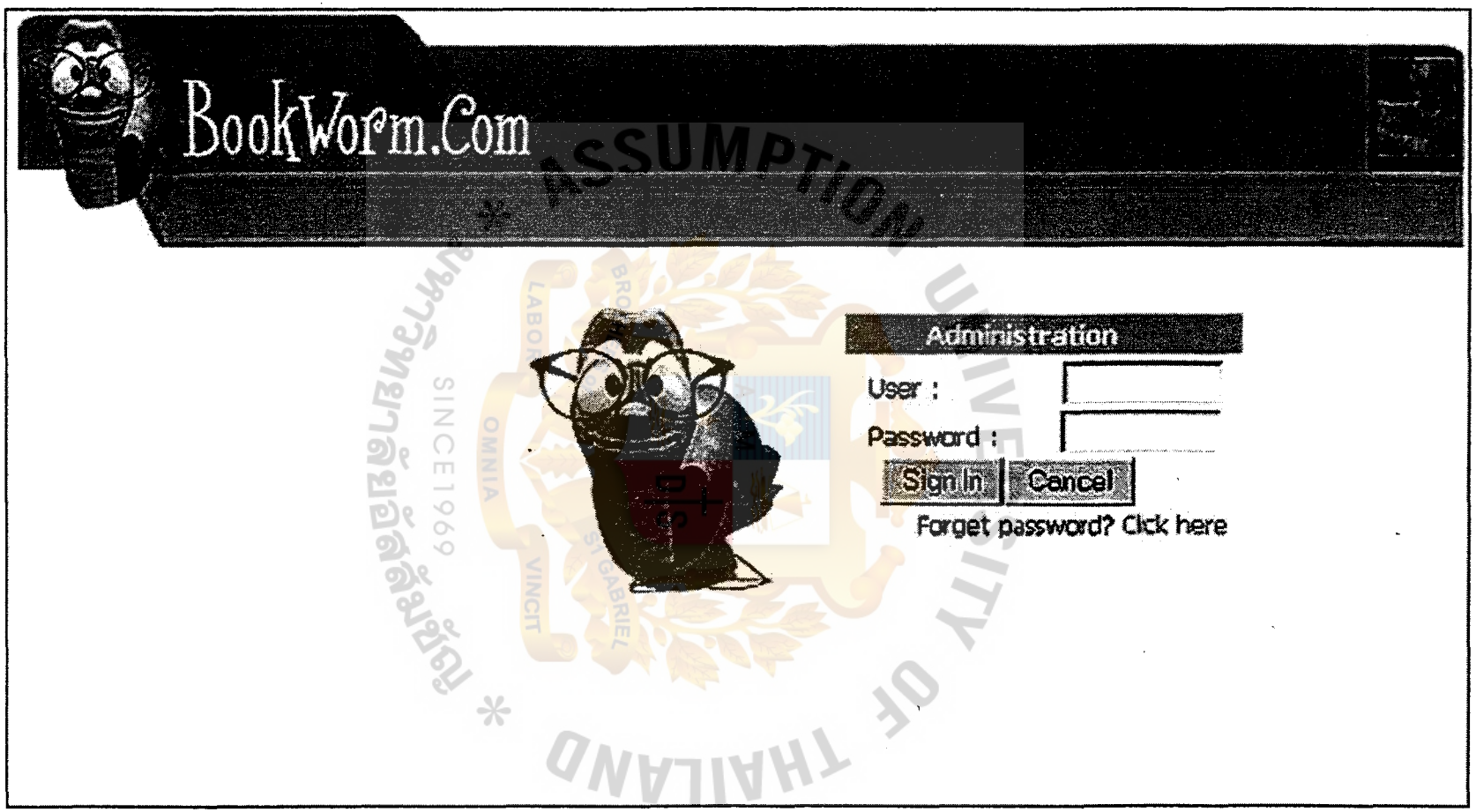

Figure E.1. Administration : Login Page.

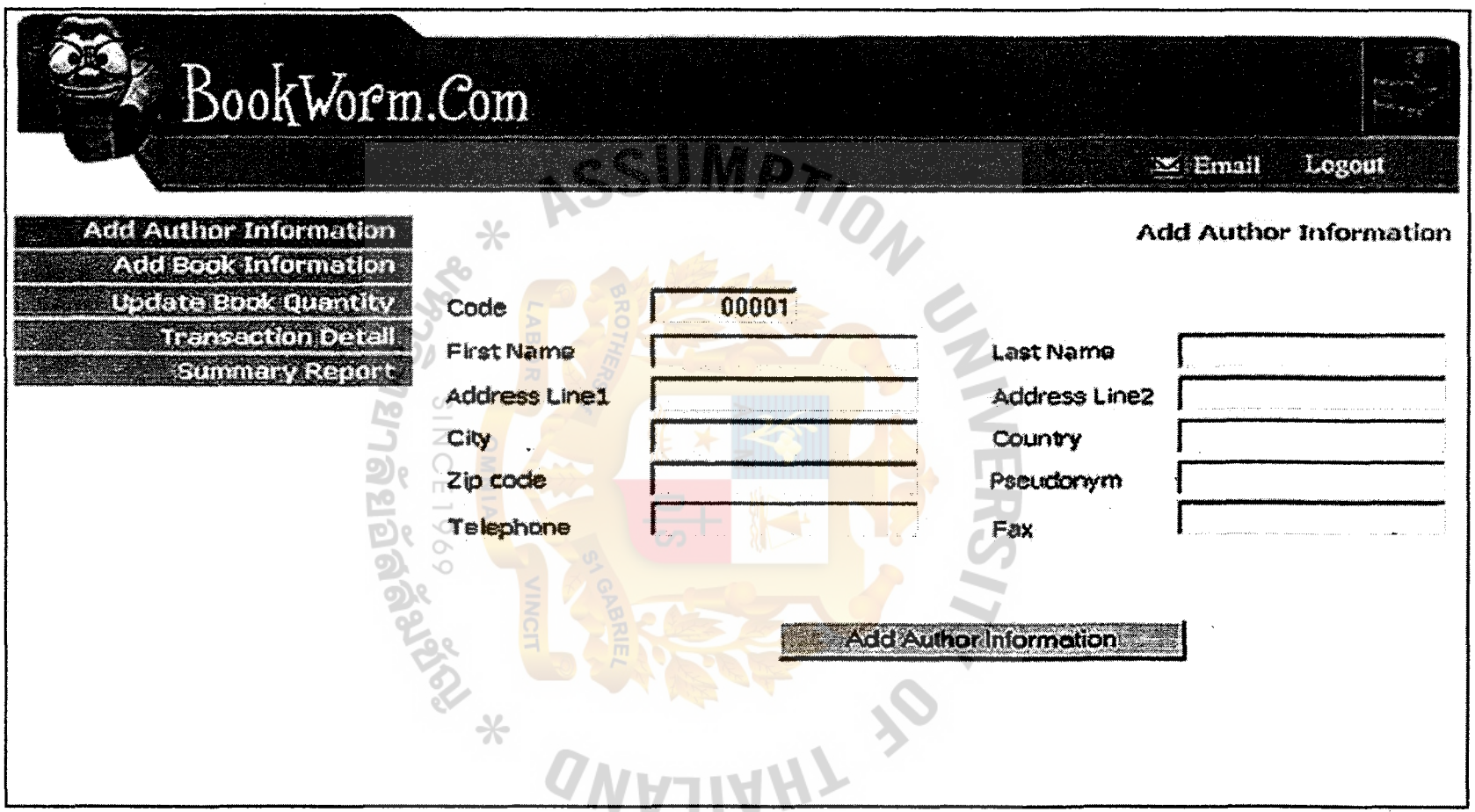

Figure E.2. Administration : Add Author Information Page.

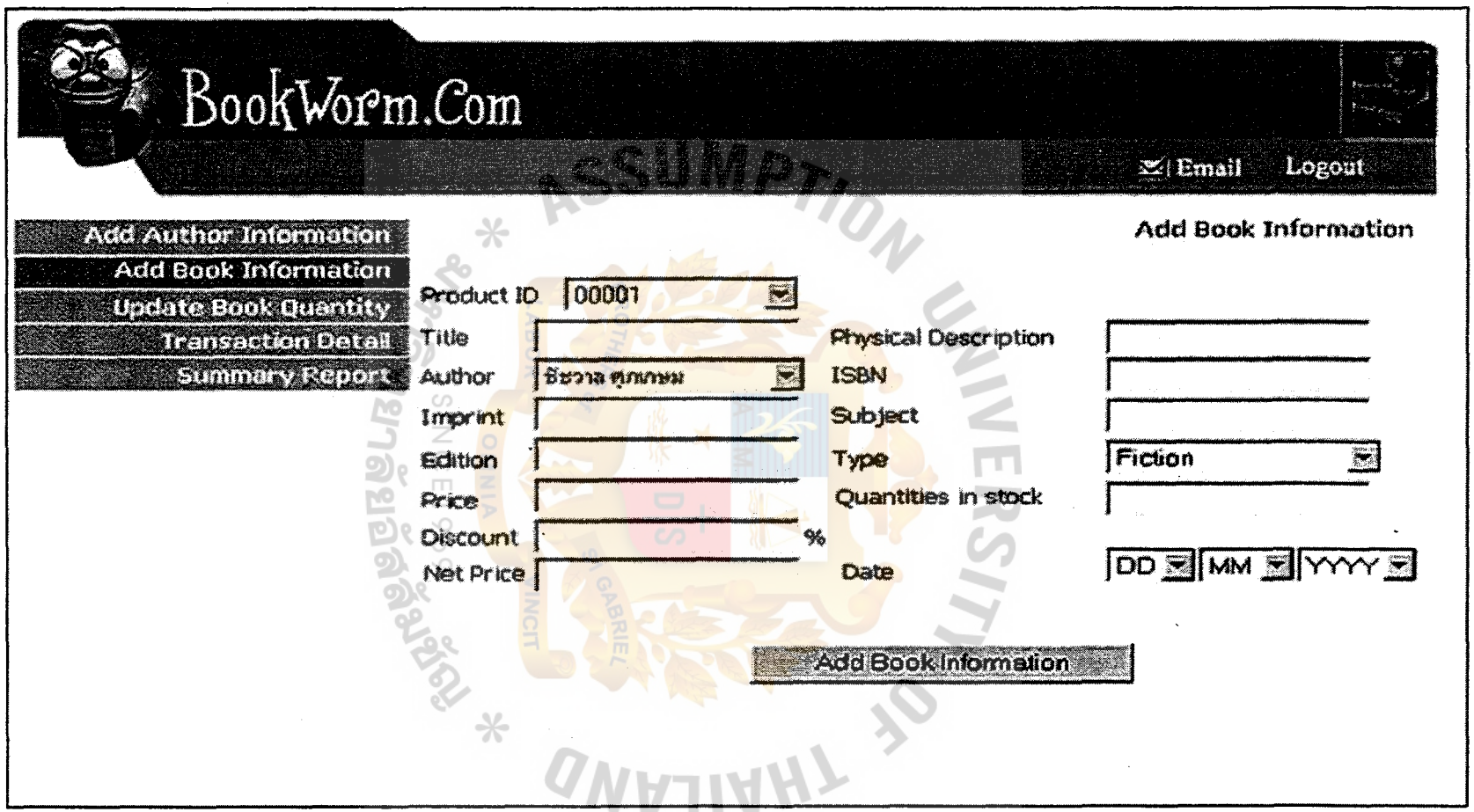

Figure E.3. Administration : Add Book Information Page.

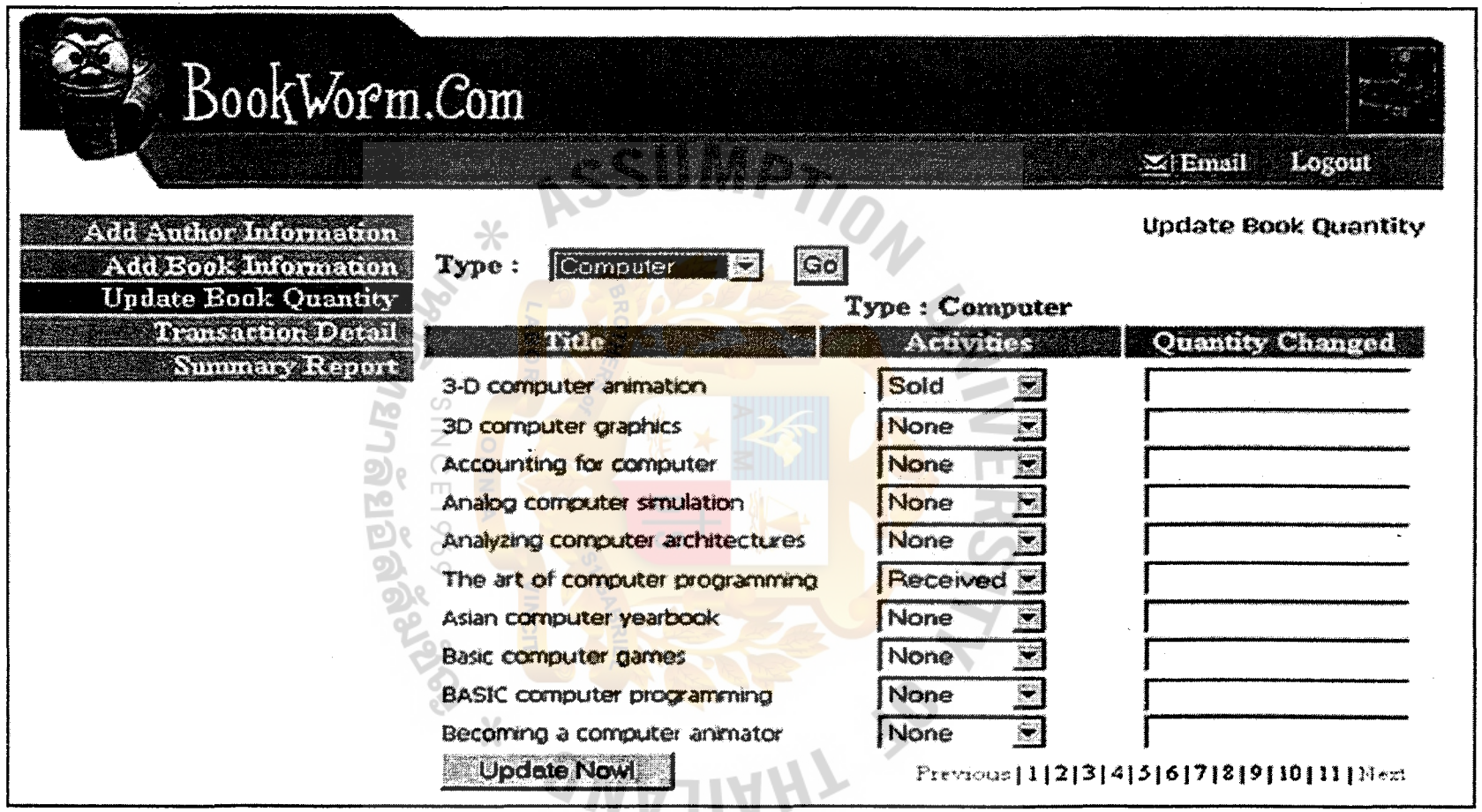

Figure E.4. Administration : Update Book Quantity Page.

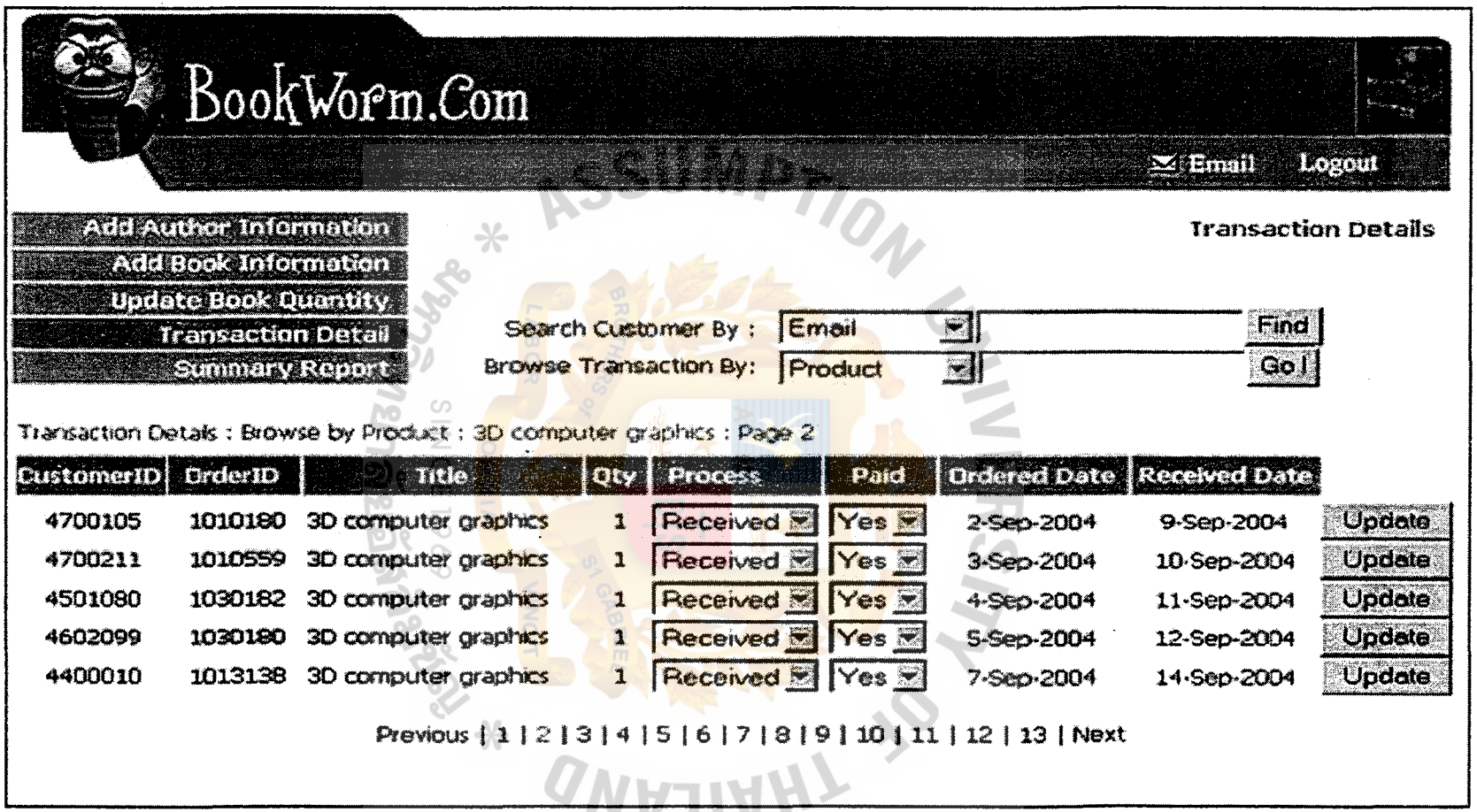

Figure E.5. Administration : Transaction Details Page.

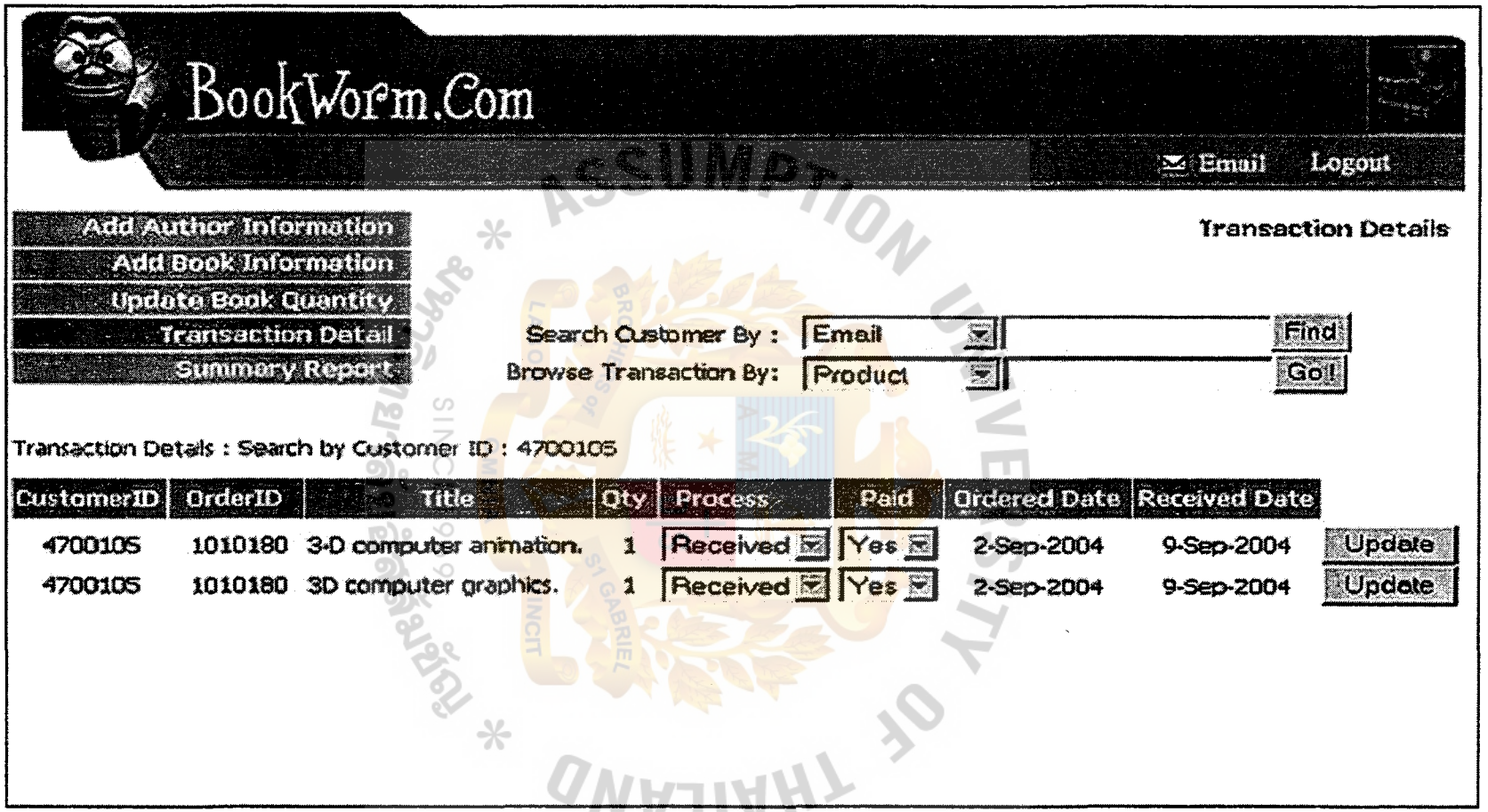

Figure E.6. Administration : Search Result of Transaction Details Page.

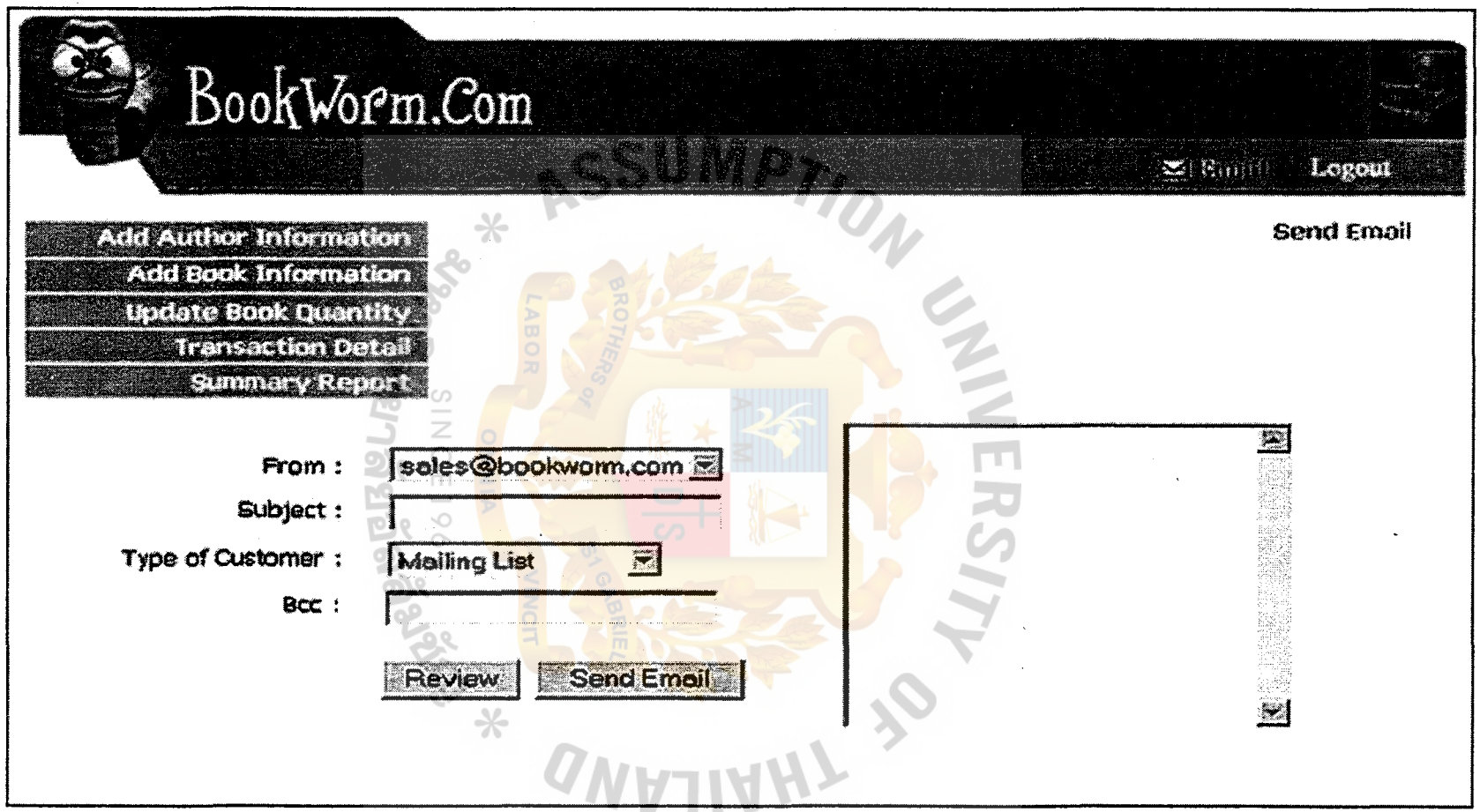

Figure E.7. Administration : Send Email Page.

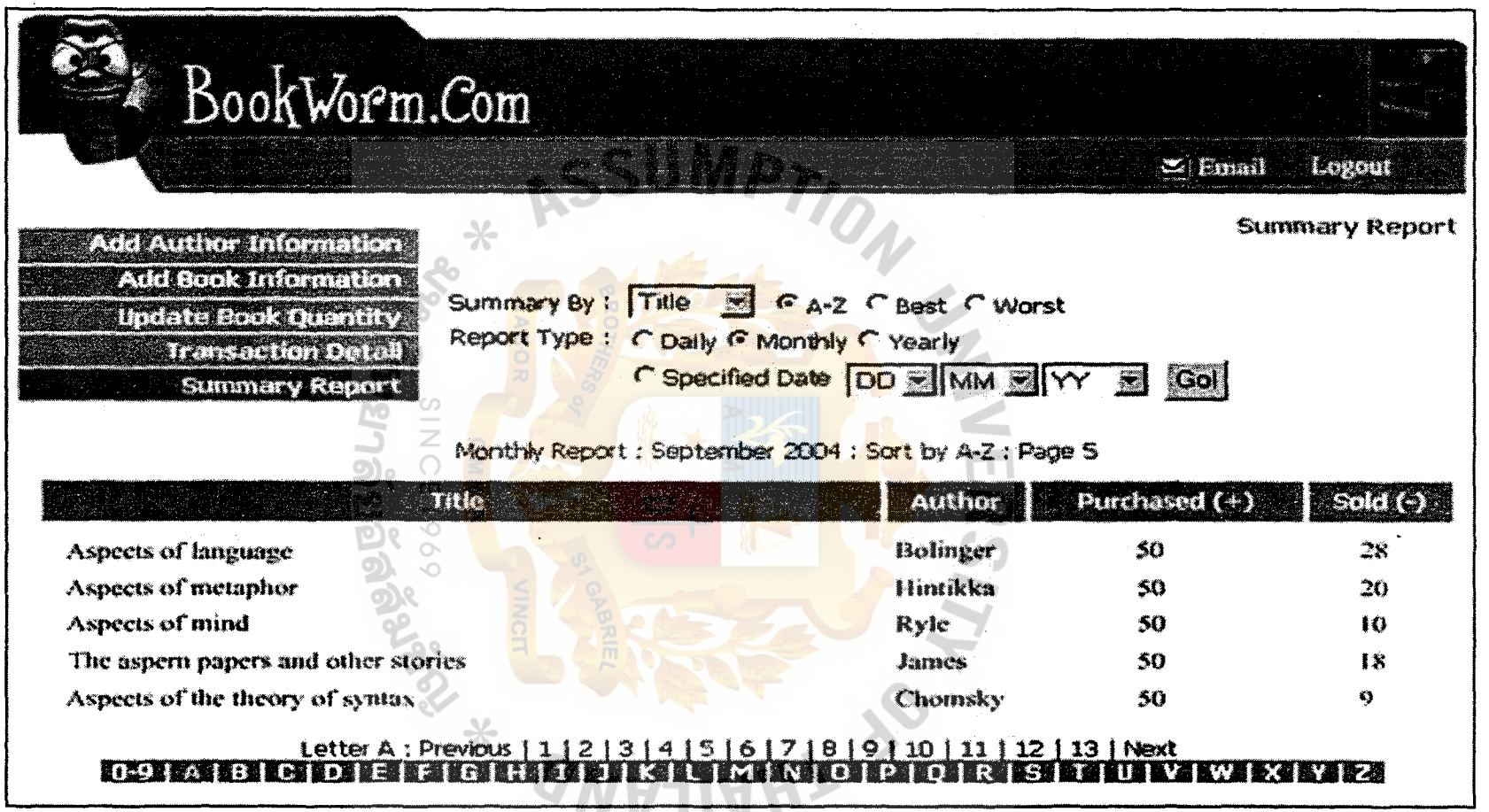

Figure E.8. Administration : Summary Report Page : Monthly Report.

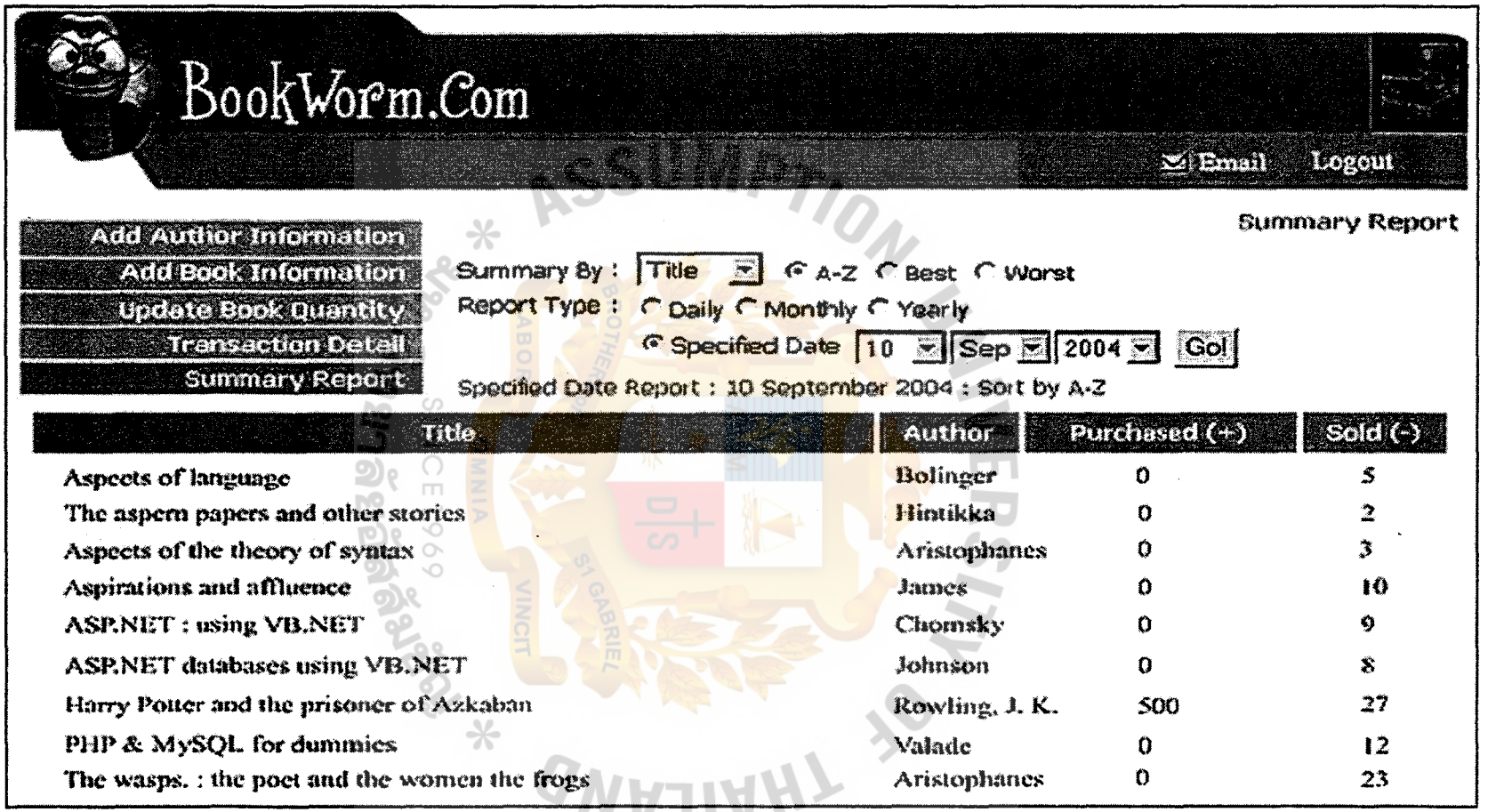

Figure E.9. Administration : Summary Report Page : Specified Date : Sort by A-Z.

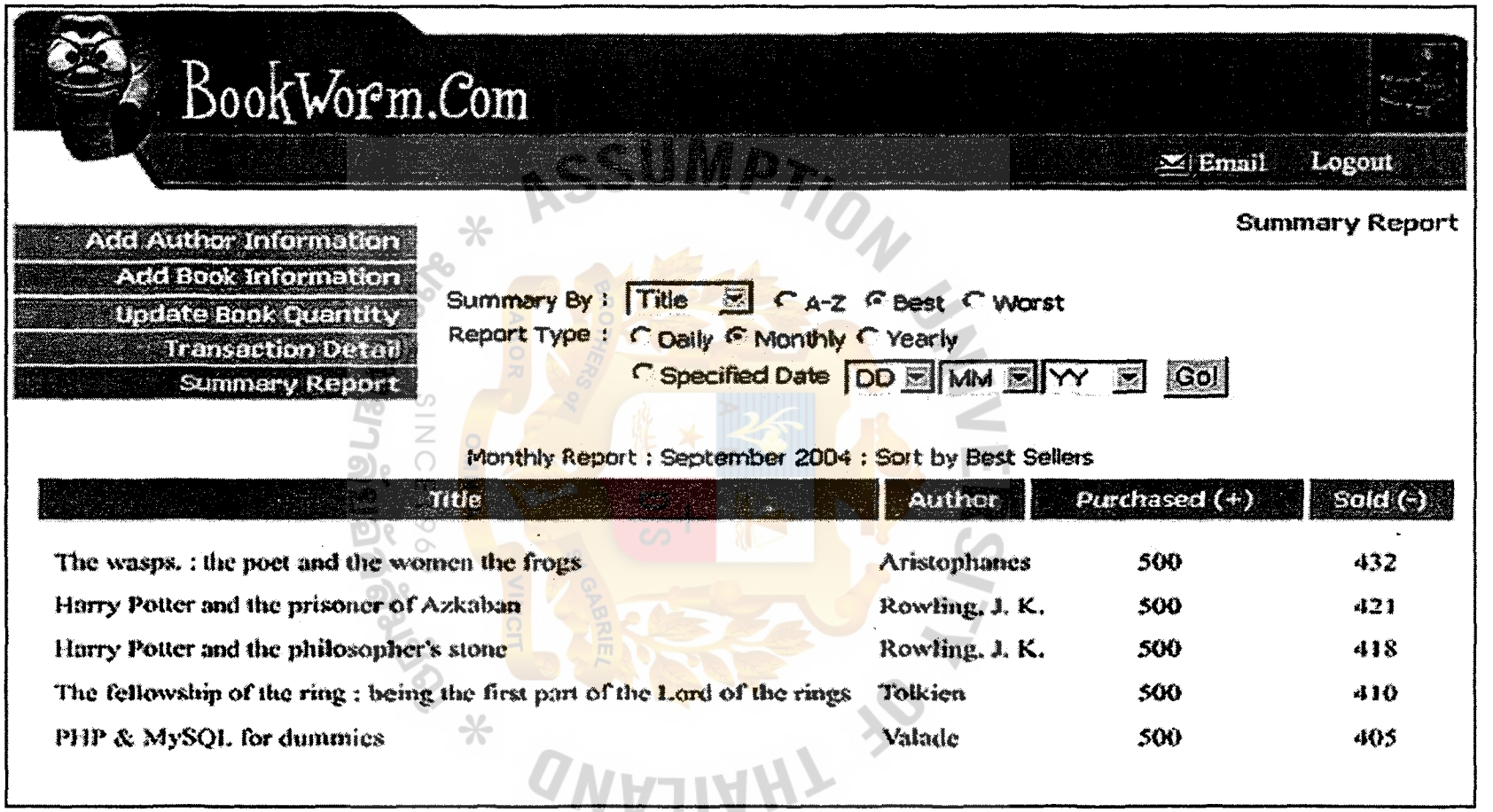

Figure E.10. Administration : Summary Report Page : Sort by Best Sellers.

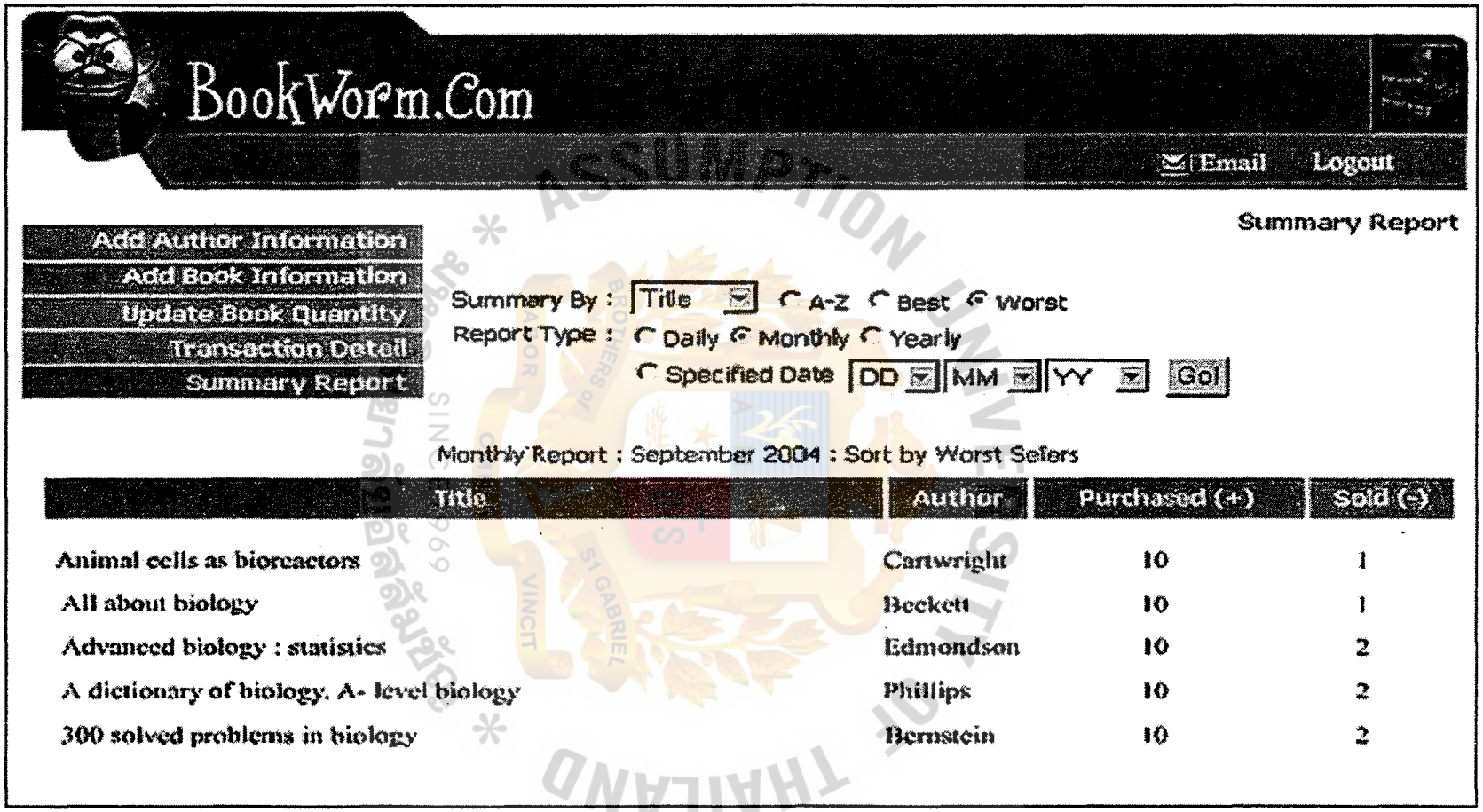

Figure E.11. Administration : Summary Report Page : Sort by Worst Sellers.

APPENDIX F

WEB DESIGN FOR ADMINISTRATION

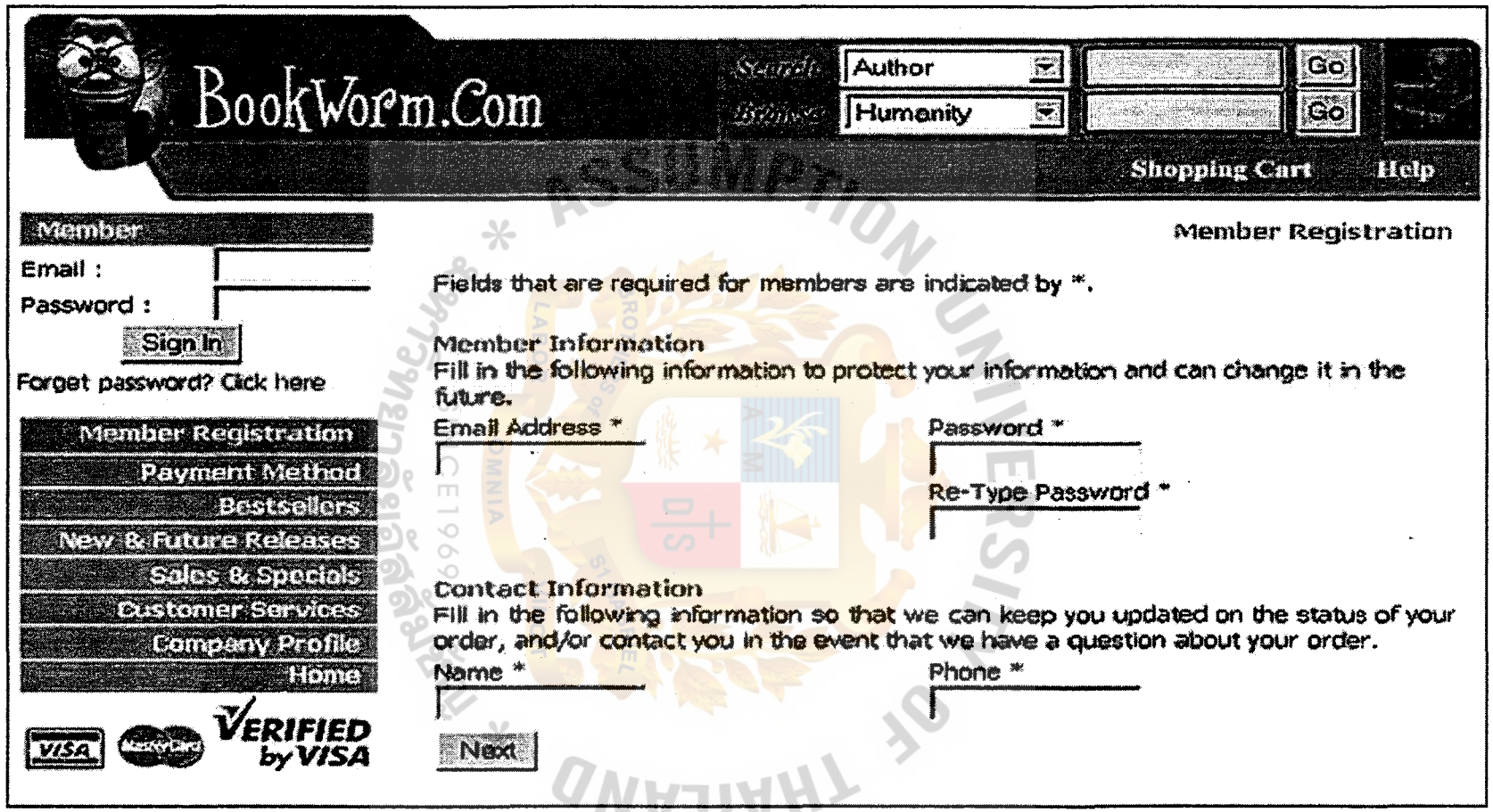

Figure F.1. Client : Member Registration : Profile Page.

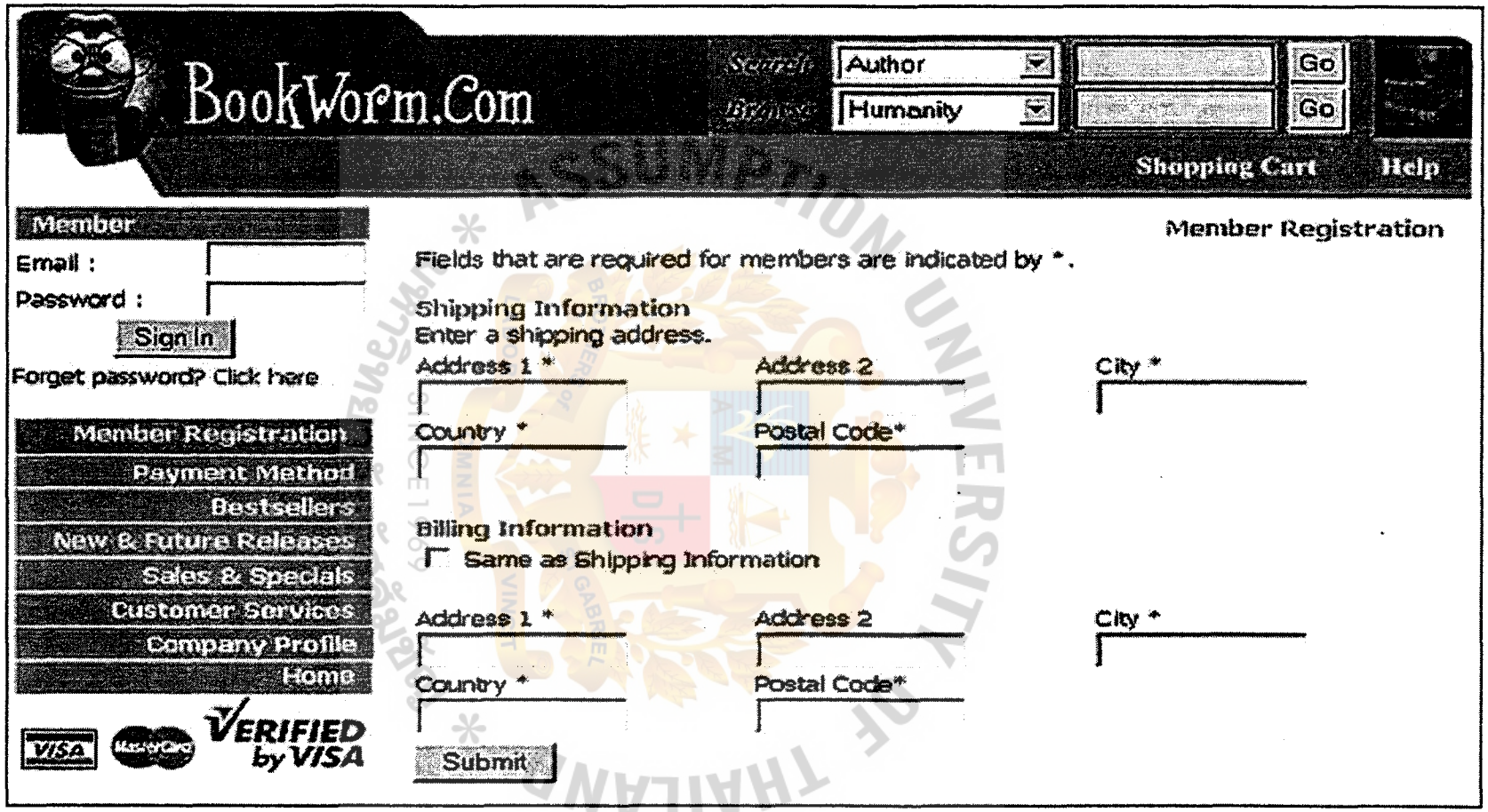

Figure F.2. Client : Member Registration : Profile Page.

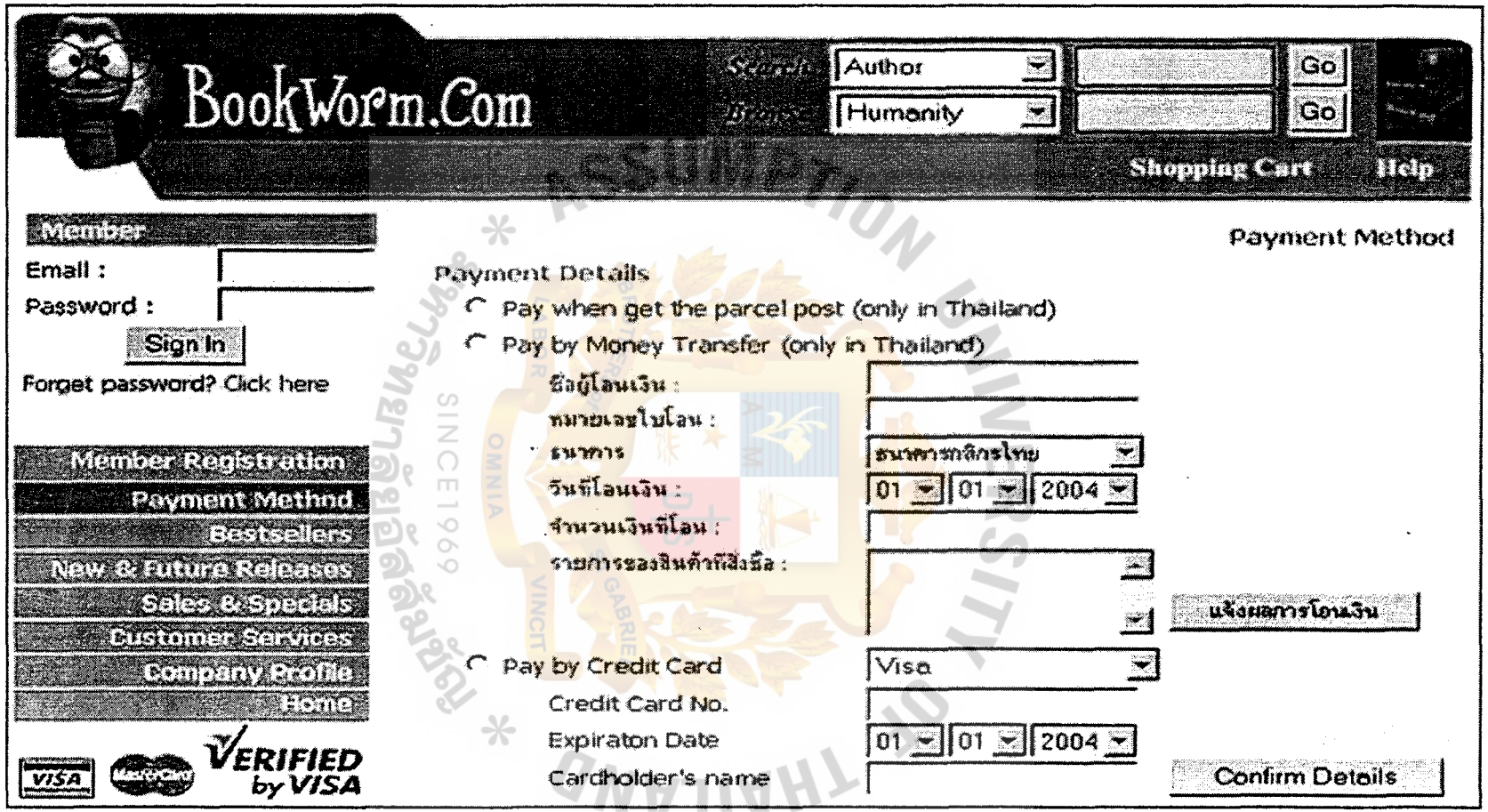

Figure F.3. Client : Payment Method Page.

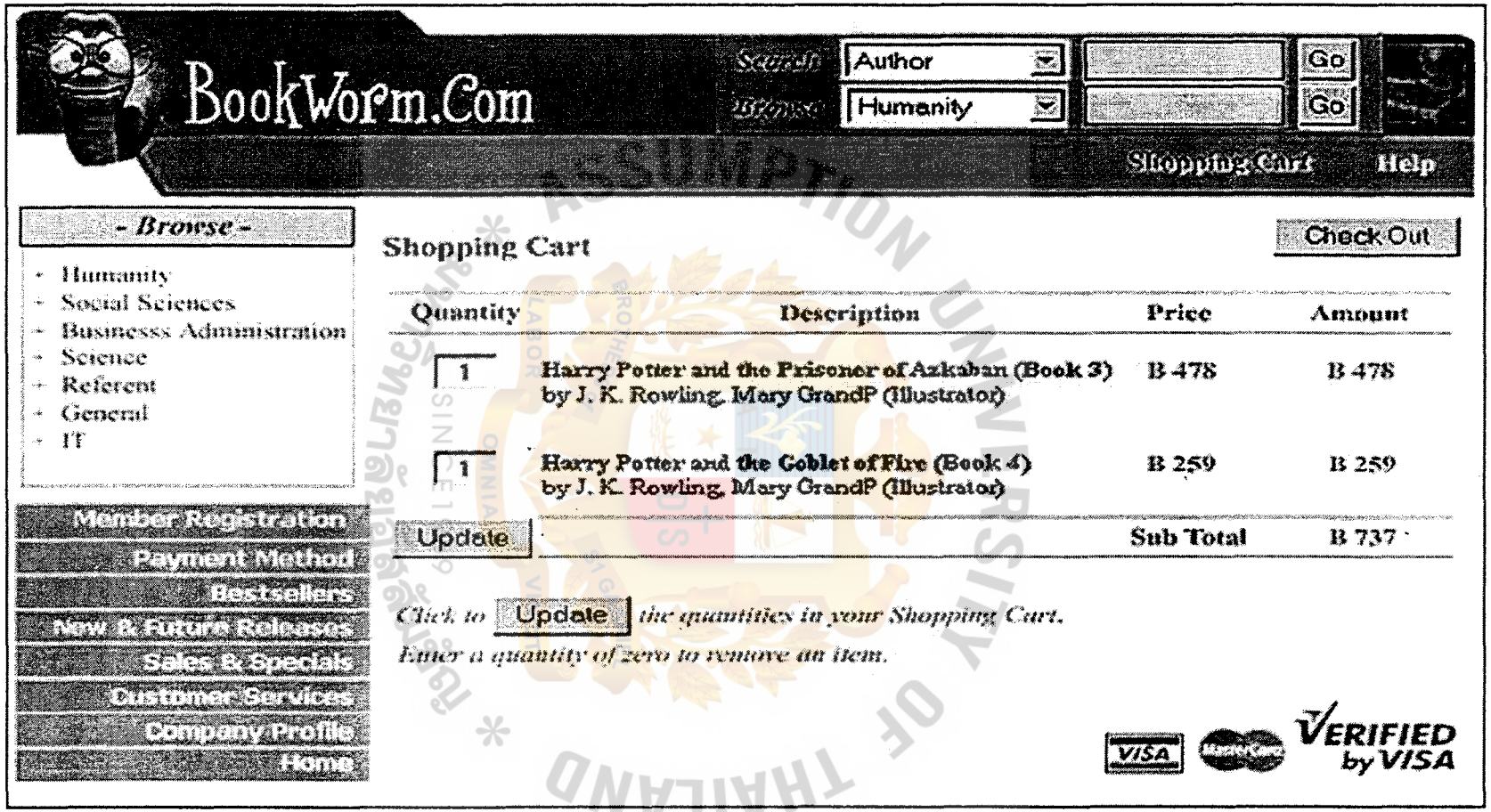

Figure F.4. Client : Shopping Cart Page.

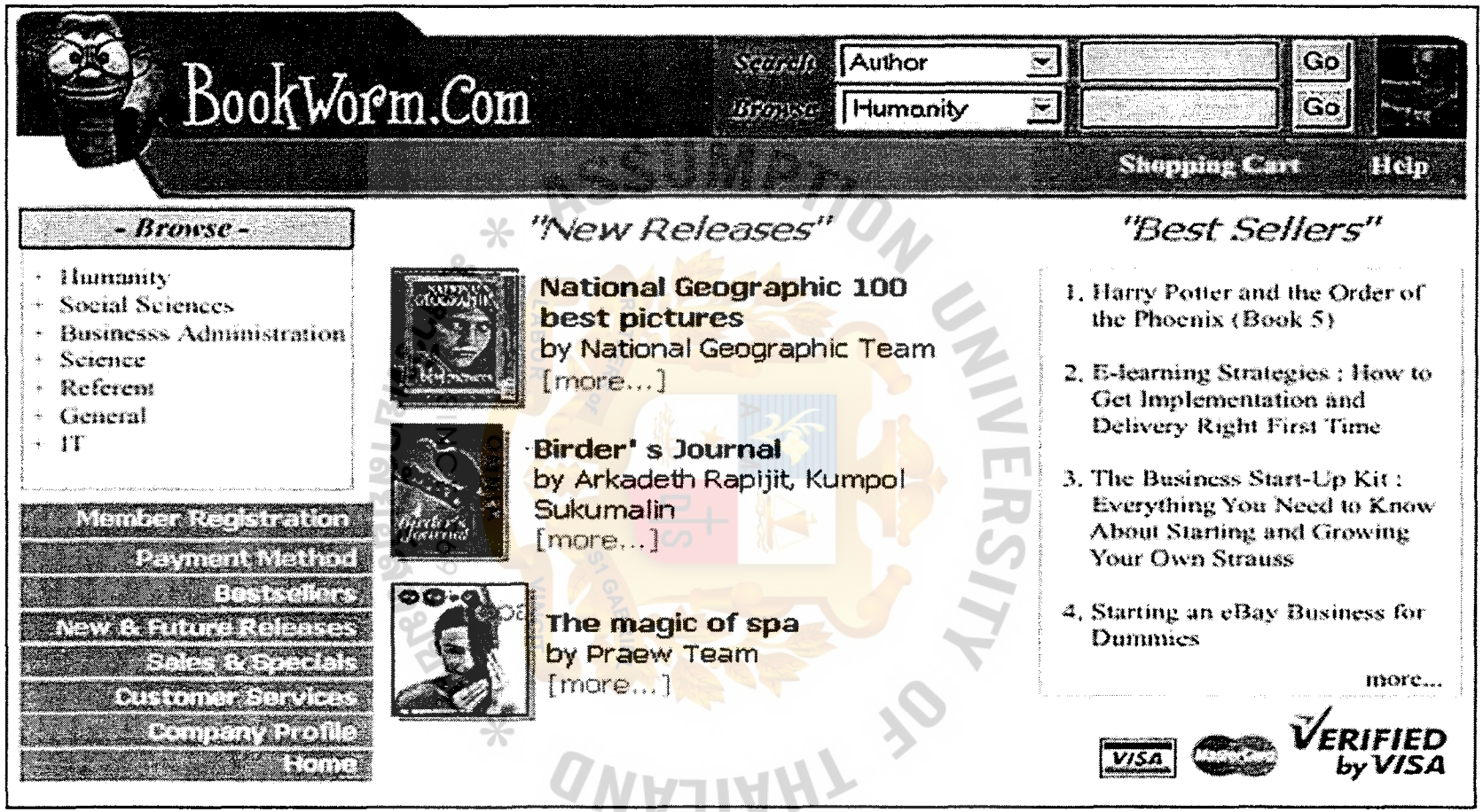

Figure F.5. Client : Main Menu Page.

Figure F.6. Client : Best Sellers Page.

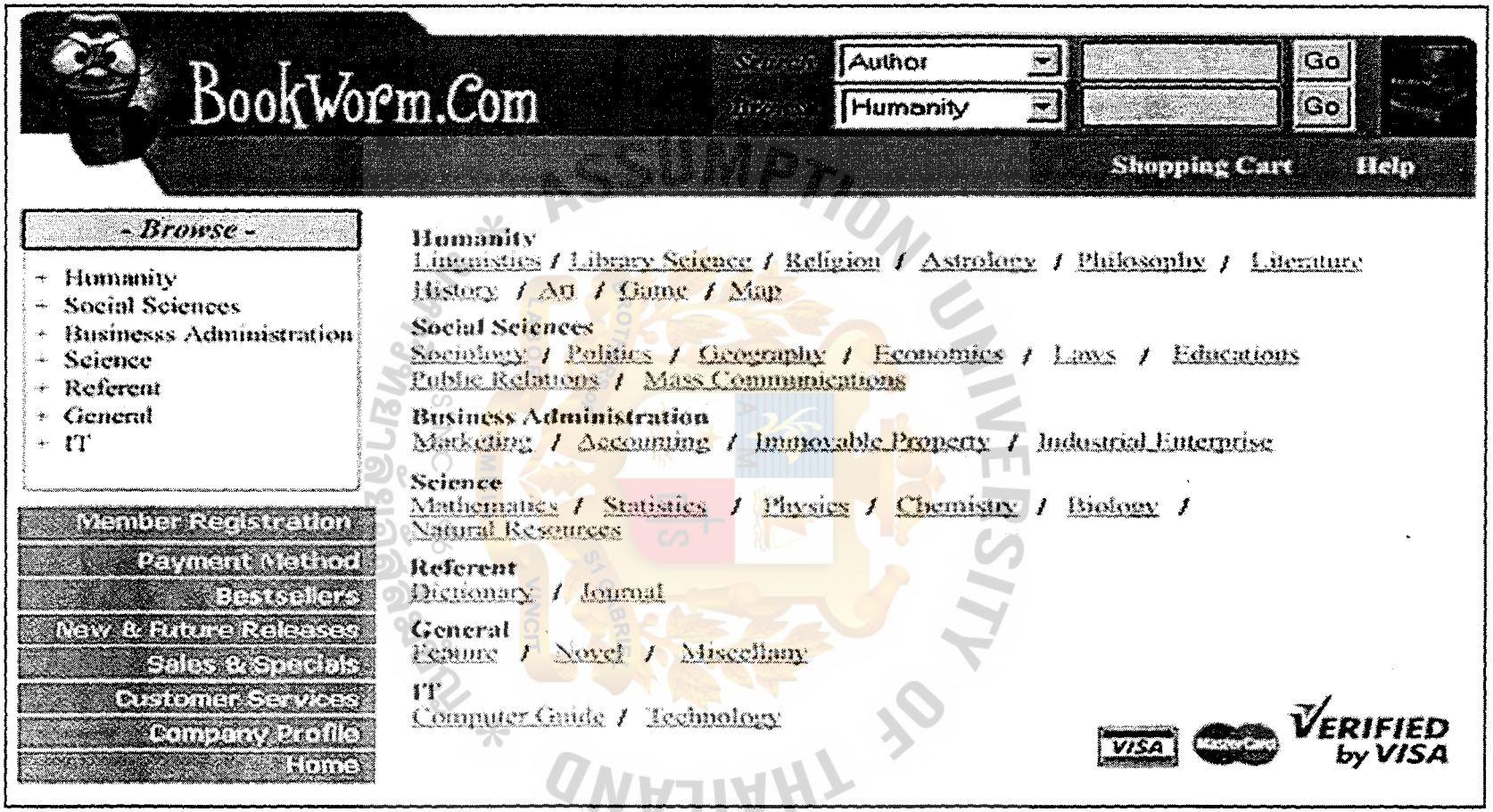

Figure F.7. Client : Browse by Genre Page.

Figure F.8. Client : Coming Soon Page.

Figure F.9. Client : Sales & Specials Page.

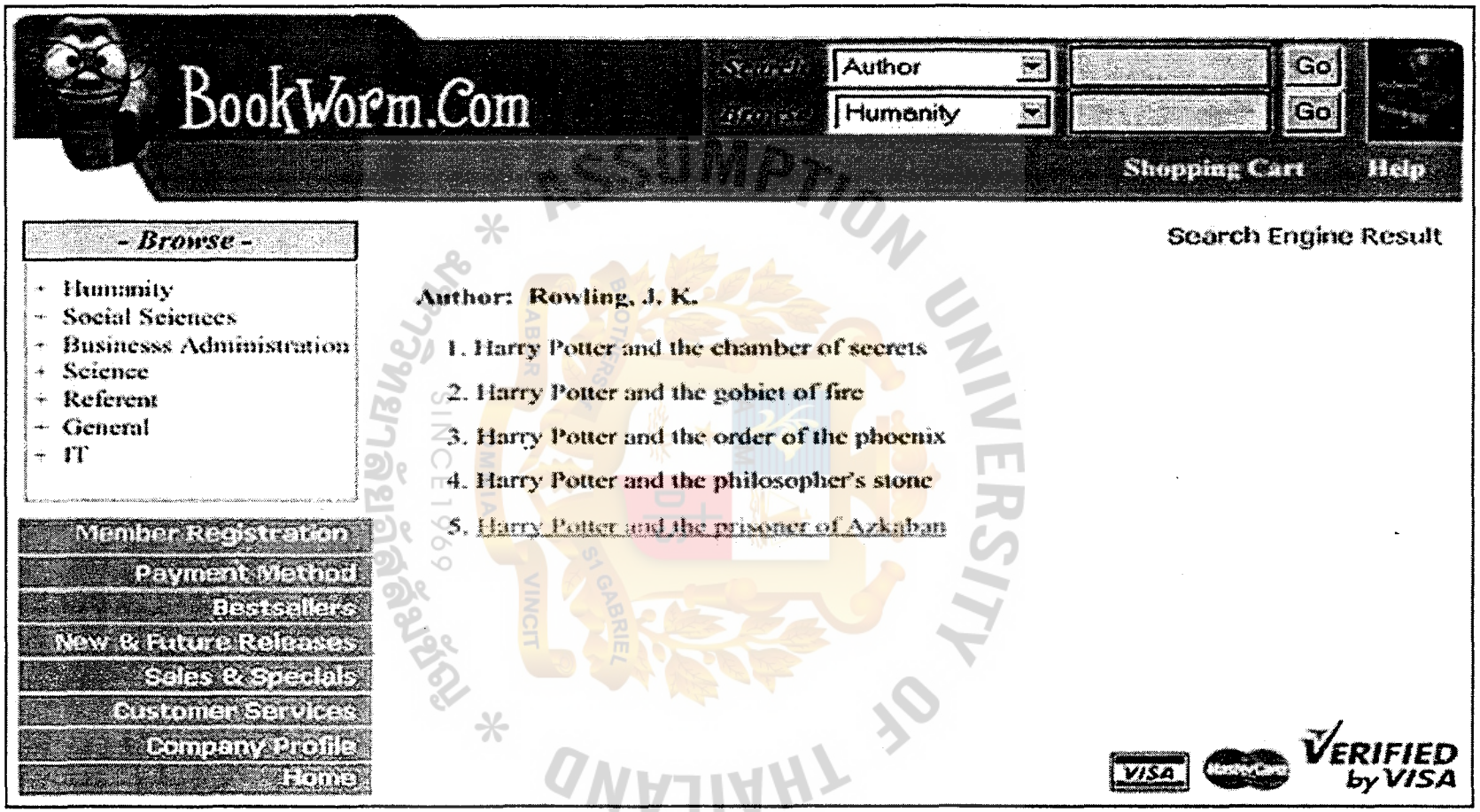

Figure F.10. Client : Search Engine Result Page.

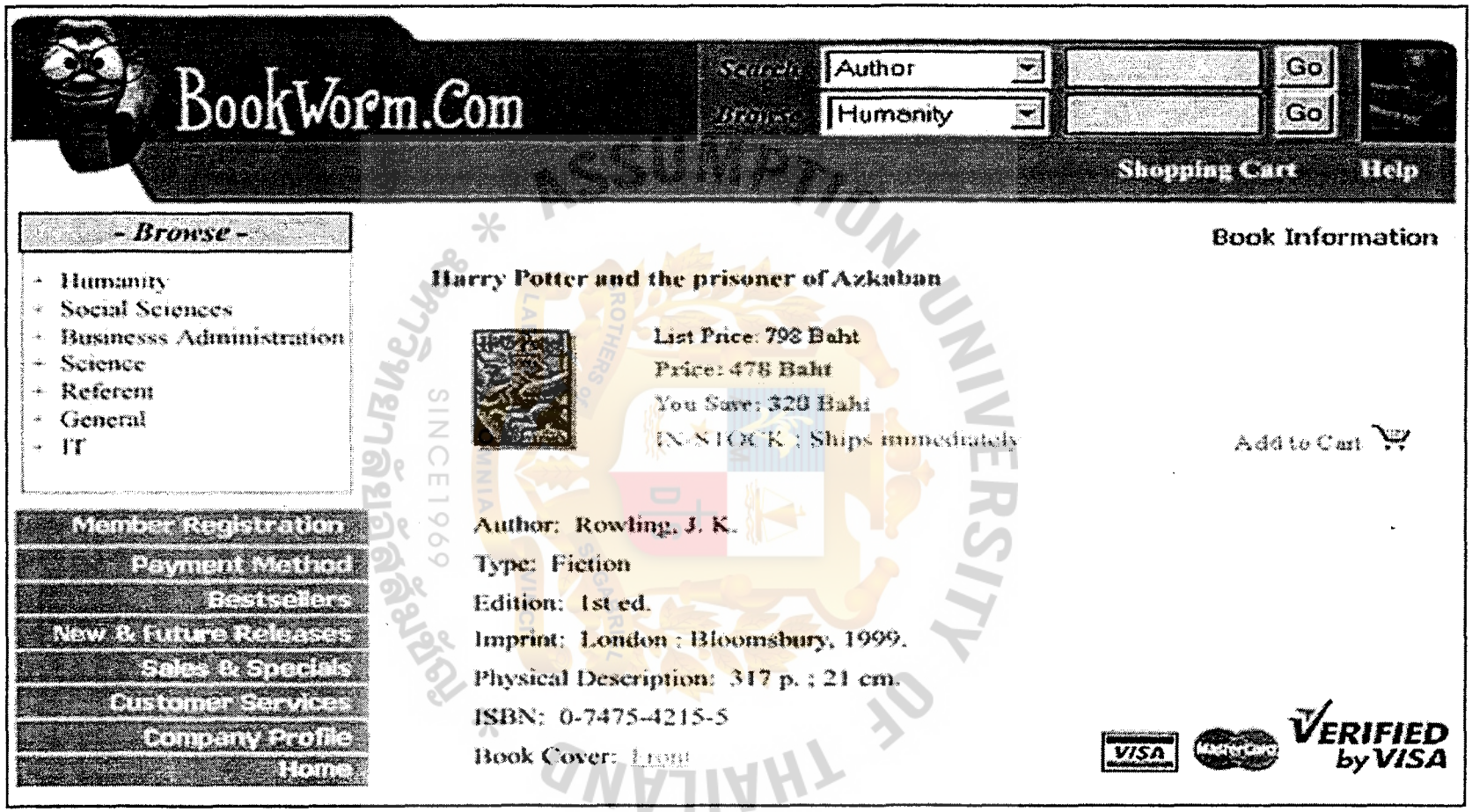

Figure F.11. Client : Book Information Page.

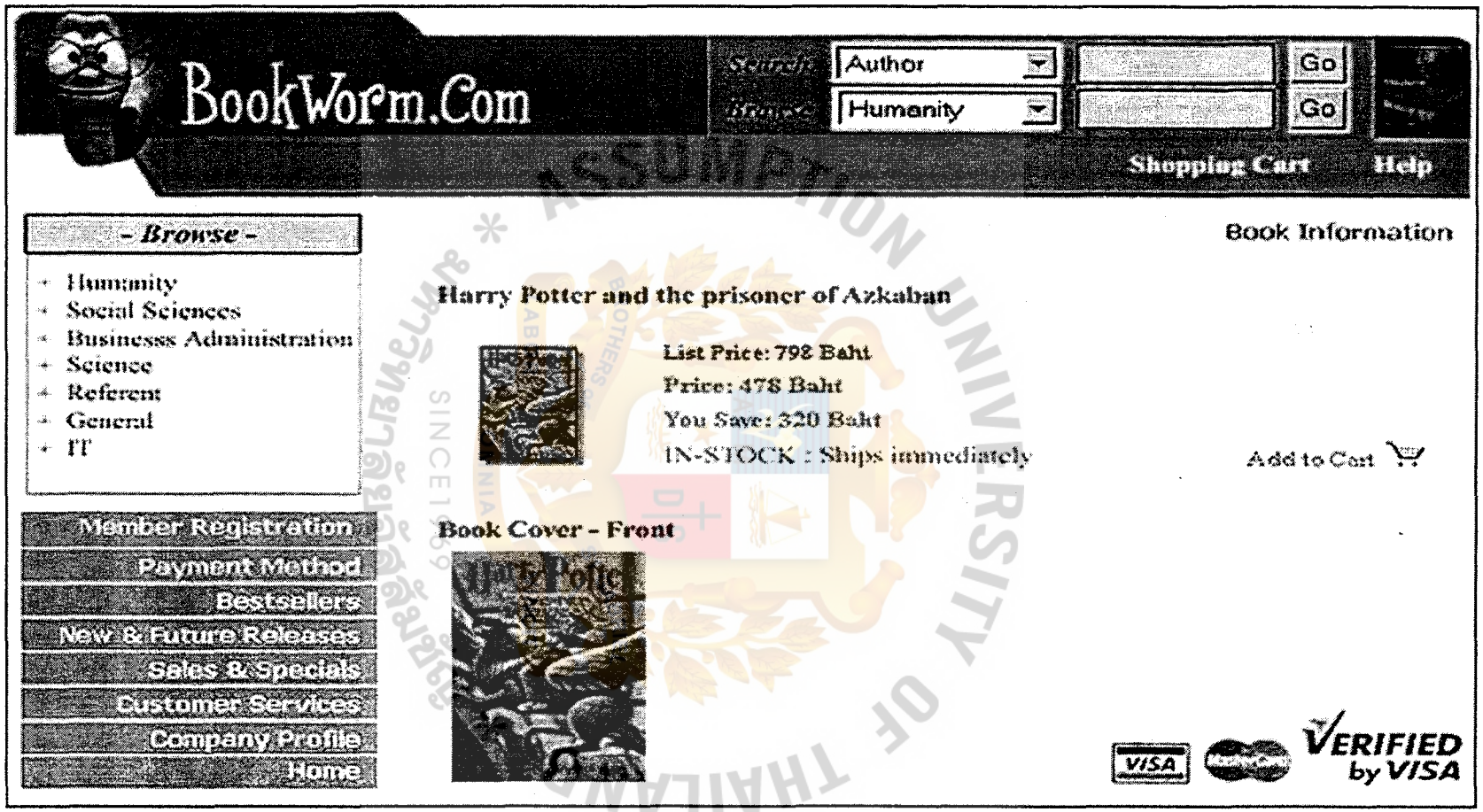

Figure F.12. Client : Book Information Page (Display Book Cover).

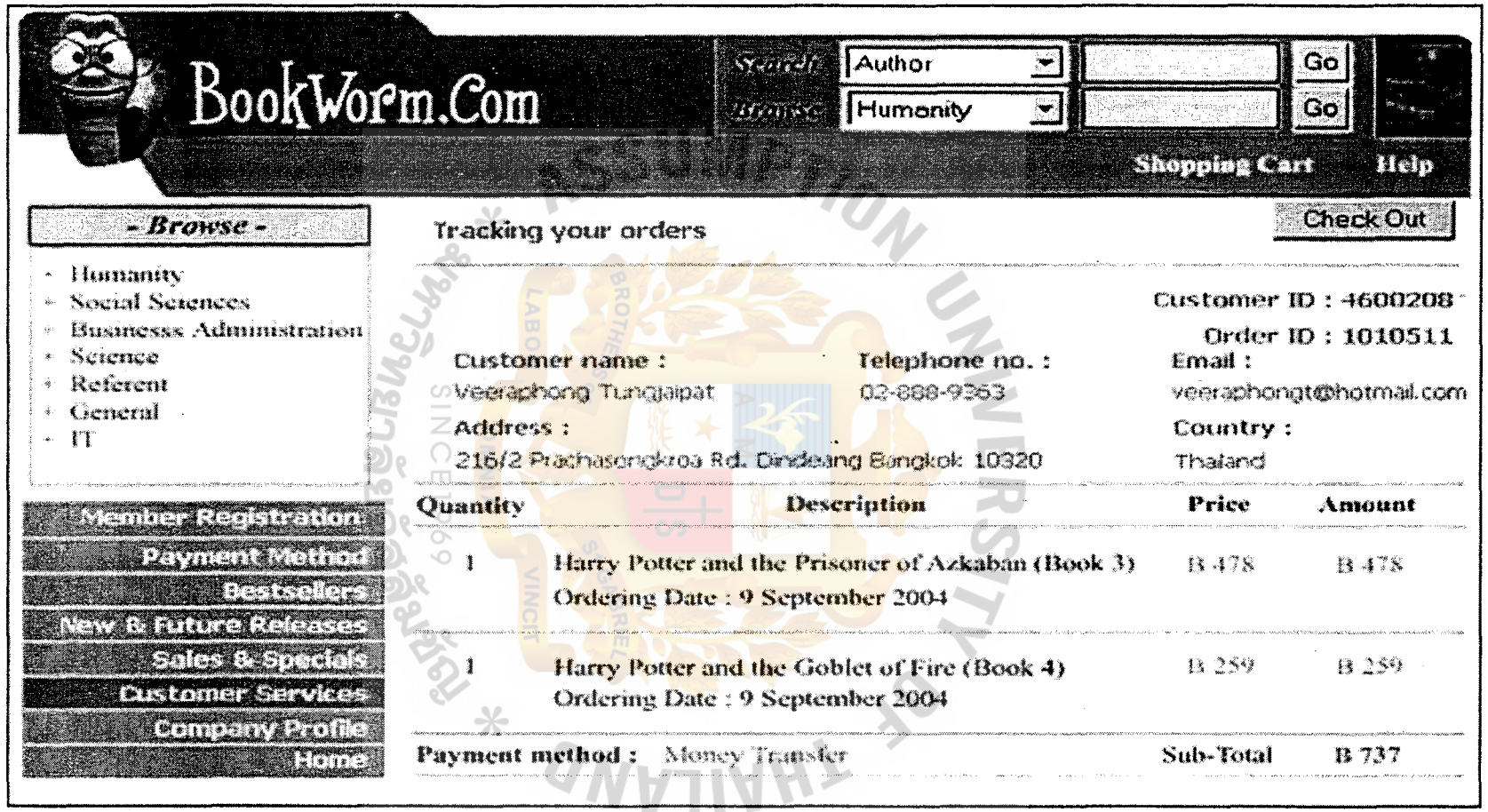

Figure F.13. Client : Customer Services : Track Order Page.

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