

Improving Electronic Commerce Through Gathering Customer Data

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Tej Shah

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On my honor as a University student, on this assignment I have neither given nor received unauthorized aid as defined by the Honor Guidelines for Papers in Humanities Courses.

Approved James Lark III (Technical Advisor)

Approved Edmund Russell (TCC Advisor)

Preface

I participated in the Electronic Commerce Capstone project due to my interest in Internet technologies. I also am interested in working with databases. My familiarity with database technologies is a result of completing many database courses at the University of Virginia. In addition, I worked with databases through jobs at Electronic Data Systems and Framatome Technologies. I am familiar with Internet development and information technologies due to job experience at Framatome Technologies and courses at the University of Virginia. This Capstone project offered me an opportunity to learn about the interaction between databases and the Internet. I chose to work on the development of the customer information-gathering module within the electronic commerce system since the module offered the best opportunity to work with database-Internet interaction. The knowledge that I have acquired from the design and implementation of the technologies in this project will benefit me in the work force.

I would like to thank my Capstone advisor, James W. Lark III, for advising and guiding the Capstone Team. I would also like to thank all Capstone Team members—Mike Bowersox, Chris Carrier, Steve O’Neill, and Vibha Sazawal, for contributing to the electronic commerce system development. I appreciate the cooperation and resources provided by Communications Industry Researchers, Inc. (CIR), especially Lawrence Gasman and Robert Nolan. Finally, I would like to thank my Technology, Culture, and Communication advisors Professor Mark Shields and Professor Edmund Russell at the University of Virginia for their invaluable advice and guidance in this project.

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Glossary of Terms

Browser -- mechanism that allows a person to view the company's web pages and access certain company resources. The browser allows for searching, purchasing, and viewing throughout the entire process. Examples of common browsers are Netscape Navigator or Microsoft Internet Explorer.

Customer -- a visitor who accesses a company's web site with purchasing interests.

Customer profile – a personal document containing information regarding interests and preferences of a customer.

Electronic commerce – the purchasing of goods between businesses and customers over the Internet.

Input forms – electronic web pages that allow customers to enter information and web sites to process the information.

Internet cookies -- a device placed by the host web site to collect information about visitors through non-interactive means.

Open Profiling Standard (OPS) – the futuristic technology that involves the transfer of information harbored in customer profiles at various levels in a secure and reliable manner.

Session Objects -- operate in a similar manner to Internet cookies and are referred to as Internet Cookies in this project.

Web page – the visual display resulting from code written by a web site for placement on the World Wide Web.

Web site – the location of a host server on the World Wide Web.

Abstract

For companies and businesses to compete successfully in the world today, they need to efficiently gather and process information about their customers. With the rapid growth of commerce over the Internet, new opportunities to collect information have arisen. The information-gathering technologies discussed in this report are online questionnaires, Internet cookies, and customer profiles. Communications Industry Researchers, Inc. (CIR) needs an evaluation of these technologies and a design for collecting customer information in their electronic commerce system. The evaluation and design in this report are useful tools for companies with similar goals as CIR.

A team of University of Virginia engineering students and I provided CIR with an electronic commerce system that can support Internet transactions. The objective of this project was to provide a customer information-gathering module capable of integration into the electronic commerce system. Secondary objectives are to discuss the Open Profiling Standard and to document design and implementation issues with the various technologies.

The impacts of this project affect all companies and customers involved with electronic commerce. The deliverables to CIR are the electronic commerce system, the customer information-gathering module, and the documentation of technologies evaluated. The information-gathering module collects customer data through the use of online forms and Internet cookies. CIR received the deliverables and is currently using them. The customer data collected by the system is beneficial to CIR for decision- making.

Chapter 1: Introduction

This report discusses the latest technologies for gathering customer information on the Internet and presents a design of a customer information-gathering module for Communications Industry Researchers, Inc. (CIR). This report also describes how the information-gathering module is an important component in the company's electronic commerce system. CIR, a telecommunications research company, desires to establish an online presence with its products to capitalize on the rapid growth of electronic commerce and Internet shopping. Electronic commerce technologies allow CIR to gather information about customers electronically. The information-gathering technologies of relevance in this project are online input forms, Internet cookies, and customer profiles. General definitions and buzz words applicable to electronic commerce are presented in the report since many of these terms have multiple definitions in the English language, but specific meanings when related to the field of electronic commerce. A carefully designed module for gathering information on a company's customers is necessary for understanding customers' interests and making future product and company policy decisions affecting customers.

The main benefits for CIR of the electronic commerce system and information-gathering module are listed below.

1. An electronic source for collecting information on customers.
2. The ability for CIR to sell selected portions of reports if desired by customers rather than entire reports.
3. A greater choice in payment options for customers.

4. A method for obtaining customer feedback.
5. A method for customers to search through documents using keywords and topics.
6. An expansion in the company's customer base due to vast number of Internet users.

The benefits of this project on a broader scale are a design for building an electronic commerce system and collecting customer information that serves as a model for companies in a similar situation as CIR, documentation of troubleshooting issues that are useful for companies with their own implementation problems, and a review of a futuristic technology for information-gathering known as the Open Profiling Standard.

1.1 Problem Definition

Communications Industry Researchers, Inc. (CIR), based in Charlottesville, Virginia, is a prominent company in the field of knowledge about the telecommunications industry. The company was interested in gathering information about customers to create more attractive products that tailor to the customers' interests. The company planned to store this information in databases and access the customer information databases when making product and policy decisions. The company contained very little knowledge about its customers' interests. CIR's decision of which telecommunication technologies to research for future reports was often a difficult one since the decision was based on customers' interests. CIR offered customers the ability to pay through checks and credit cards. The benefits of increasing the number of payment options were difficult to assess since CIR lacked information regarding customer payment preferences.

Through an online electronic commerce system that allows transactions over the Internet, filling databases with information about these customers using online input forms, Internet cookies, and customer profiles provides the company with a quick, user-friendly solution. A growing number of businesses are in a similar situation as CIR. These businesses are establishing new electronic commerce systems or modifying present systems to create a more powerful source for collecting customer information over the Internet useful for decision-making.

Electronic commerce involves all purchase transactions between businesses and customers over the Internet. Customers are also those visitors who access the company's home pages with purchasing interests, not just those who actually make transactions. Customers include other businesses and everyday consumers. Customer profiles provide businesses with all levels of information. The profiles harbor such general data as user names, email addresses, geographic location, sex, and race and personal data such as height, weight, favorite colors, and favorite foods. Users control the amount of access to their profiles through the new, widely supported Open Profiling Standard (OPS) that Netscape Navigator and Microsoft Internet Explorer will soon incorporate into their web browsers. Internet cookies are a non-interactive tracing method used by companies to follow customers through the Internet and log transactions made while journeying.

1.2 Literature Review

The viability and future of electronic commerce are hot issues due to the rapid expansion of the information highway. New companies are quickly establishing their presence on the Internet. Companies are constantly revamping and improving their web

sites. Experts have an optimistic outlook for the future of electronic business transactions. They predict \$134 billion worth of business-to-business transactions and \$10 billion worth of consumer spending over the Internet by the year 2000 (Graves, 1997). Companies are investing large amounts of money into building web sites capable of handling electronic commerce functions. Scott Sedik, the product marketing director at the electronic commerce software company iCat, commented on the present status of these companies. “Companies have invested hundreds of thousands or millions [of dollars] in building these colossal web sites, and now the CEOs are demanding a return on investment,” (Graves, 1997).

While most electronic commerce transactions are between businesses, consumer transactions are expected to increase with the incorporation of the web browser into the operating system. Bill Gates, CEO of software giant Microsoft, is jointly working with Netscape, America Online, and Sun Microsystems to resolve bandwidth and security issues that remain with the browsers. Bill Gates’s plans of “the browsers becoming part of the operating system” will result in “a positive correlation between the quality of society...and communication infrastructure,” according to Netscape Chairman Dr. Jim Clark (Chen, 1991). The main obstacles impeding higher levels of consumer transactions are trust, payment systems, and security (Littwin, 1996). In a 1997 BCG/eTrust Privacy survey, 78% of consumers stated that assurance of privacy and 86% stated assurance of security will increase their comfort with Internet transactions (OPS Resource Center, 1997). Businesses and electronic commerce software companies are collaborating to tackle these issues.

When talking about gathering customer data and ensuring security, the recent buzz across the frontier of the Internet is the Open Profiling Standard (OPS). OPS technology is based on vCard, Digital Certificates, and HTTP. A vCard is an electronic business card that allows transmission of personal information. Digital Certificates use cryptographic methods to verify personal identification. HTTP is the World Wide Web's communications protocol. Leading privacy organizations have endorsed OPS (OPS Resource Center, 1997). Microsoft, Netscape, Oracle, and Firefly corporations are jointly working together to incorporate OPS into an application-development platform (King, 1997).

Pat Hensley, Max Metral, Upendra Shardanand, Donna Converse, and Mike Myers detailed the design and implementation of OPS in June 1997 in their "Proposal for an Open Profiling Standard" report. OPS will allow users to create and store profiles containing valuable data on their preferences. Users will store their profiles either on their hard-drive or on a secure part of the Internet. As users surf the World Wide Web, various companies' pages will request access to a part or all of the user profile to gather customer data for purposes related to commerce (mostly electronic commerce). The companies will inform the user how they plan to use the data from the profile, and may even offer an incentive (monetary discount or gift) to gain access to the profile. Since the profile contains many levels of information, the user can then grant the company access to as much of the profile as the user desires. Due to the security of OPS and its wide support, OPS is quickly developing into the spark that electronic commerce needs (King, 1997).

The use of online questionnaires instills comfort in consumers apprehensive about security and privacy. The use of Internet cookies is recommended by King in her "OPS: A

Better Recipe for Cookies?” article in *Internet World*, since cookies are non-interactive and a good source for customer traveling and transaction logging. The sole use of online questionnaires does not allow for collecting this type of information. The Open Profiling Standard is the best solution for designing of customer profile. The reason for the selection of OPS is due to recommendations of experts such as Susan Scott, the executive director of TRUSTe, an electronic commerce company. “OPS is a critical first step towards building parameters for consumer privacy protection online and necessary to ensure the growth of online commerce.” A powerful electronic commerce system needs to integrate the various information-gathering components into a detailed web design. A complete listing of references is included in the annotated bibliography.

1.3 Rationale and Scope of Project

The economy is greatly influenced by electronic commerce due to an increase in online purchasing by consumers. With the convergence of shopping and the Internet, people and businesses are flocking online as if the Internet is a gold mine. The rapid growth of electronic commerce in the past years has gathered the attention of those looking to capitalize on the vast information and new customer market possibilities. Experts agree that information will play a pivotal role in the future of electronic commerce. The Internet allows businesses to gather information from customers through online questionnaires, customer profile information, and “cookies”.

Presently, most businesses gather information about Internet customers through online questionnaires. Many customers choose not to complete these questionnaires because of the amount of time required to complete them as well as a lack of a reward for

completing them. Several companies use cookies to follow customers through the World Wide Web, but cookies are sometimes detected and disabled by web browsers and do not provide much insight into customer preferences. Customer profiles are presently not used but are gathering attention and acclaim by parties with vested interests in electronic commerce. The present obstacle is that customers are feeling that their profiles are not secure. A combination of cookies, customer profiles, and online questionnaires with incentives for customers to offer information may provide companies with the data desired. Incentives include monetary discounts and/or gifts.

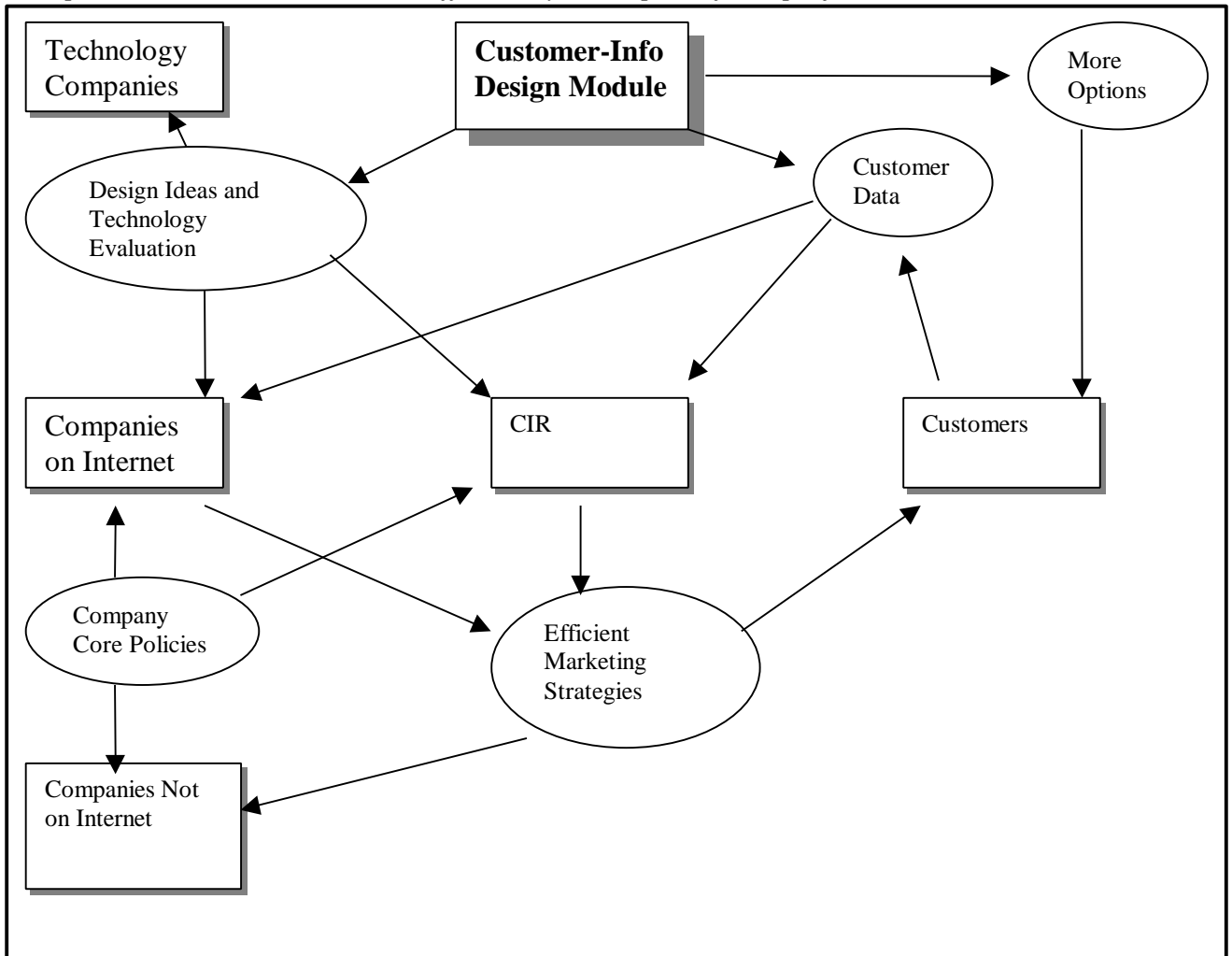
I am a member of a five person group working on a Capstone Project with Communications Industry Researchers, Inc. (CIR) . The company plans to go online with its publications and newsletters. Developing a client-server system was the purpose of this project. This electronic commerce system includes modules for sales, marketing, customer support, and payment. I was responsible for developing a module that collects customer information from CIR's online pages so that the company may better market their products to these people. The method for collecting data involved the use of online forms (interactive) and Internet cookies (non-interactive). Designs for the future use of customer profiles (mostly non-interactive) were also created.

Directly, the scope of this study is limited to Communications Industry Researchers, Inc. (CIR). The study and the information module provide the company with avenues for present and future collection of customer information through the Internet. Indirectly, my study aids those companies in the process of gathering customer information by discussing my experiences with new information-gathering technologies and creating an information-gathering design for CIR (see Figure 1.3). Since not all

companies are in the same market as CIR and require the same level of customer information, transposing the results of this design to other companies may be inappropriate.

Figure 1.3 Flow Chart of Impact of Information-Gathering Module

The flow chart below depicts the various entities (represented as squares) and activities (represented as ovals) which are affected by the impact of this project.



1.4 Overview of Contents

This report contains background information on electronic commerce technologies. The focus is on technologies used by businesses to gather information about

their customers. An analysis of the present and future use of these technologies--online forms, Internet cookies, and customer profiles, is included in this report. A detailed discussion of the implementation of the information module, the hardware and software utilized, and the troubleshooting issues encountered is provided to prevent companies from "reinventing the wheel". A summary of the experiences involved with implementing this module is followed by interpretations and recommendations.

Chapter 2: Analysis of Information Gathering Technologies

2.1 Online Forms

Online forms are web pages that prompt customers for information, store the information in variables, and send the data for processing through a posting method. For this project, the form action was an active server page that processed the data, sent the data to the database, and posted a confirmation message. Many web development languages, such as HyperText Markup Language (HTML), are capable of creating forms. Companies must decide what customer information is of value and create forms that prompt customers for only that information. Excess information can overload databases and is costly to store and process.

2.2 Internet Cookies

Internet Cookies are devices that follow customers through the Internet and store desired information. The cookies record information such as web pages visited, transactions made, etc. about the customer for a specified period. This information is usually sent to a log file or a database for storage. The customer often is never aware when a cookie is placed because user interaction is not required for cookies to operate. Microsoft Internet Explorer and Netscape Navigator have options that can warn users and disable the cookies when a web site places cookies on users.

Cookies are implemented into web pages using JAVA or on active server pages using Visual Basic Script language. Session objects are more limited than cookies in life expiration and storing a variety of information. Session objects usually last for the

duration of the user session or until timeout due to user inactivity. Inactivity consists of the customer not moving or clicking the mouse or entering any text from the keyboard. Session objects otherwise operate in the same manner and serve the same purpose as Internet cookies. Appendix B contains code for session object placement in the information-gathering module.

2.3 Open Profiling Standard

The Open Profiling Standard (OPS) is foremost a standard for collecting customer information. The customer enters personal information and saves the file. This file is known as a customer profile. The customer profile and its standard are very similar to the vCard technology for electronic business cards. OPS profiles, though, contain several levels of information. The top level contains the most general information, such as name and address. The middle levels contain information on the user's age, sex, and other more personal information than the top level. The bottom level contains personal preferences and interests of the customer such as favorite colors and favorite foods. OPS encrypts the customer profile during storage to ensure privacy.

Netscape, Microsoft, and over a hundred other vendors have committed to incorporating the OPS standard into their products. Once OPS is fully implemented and ready for use, customers will notice that several companies will ask for access to the customer profiles upon arrival to the company web site. The company will ask for a specific level of access to the profile. For example, the company may ask for Level I access. Level I access is the top level of the customer profile. Level II access includes levels 1 and 2 and, therefore, includes the top level and a middle level. The business must

disclose how they plan to use the information. If the business plans to sell the information to other companies, the business must reveal that intent. The customer has the right to refuse any access or only grant access to the levels that the customer feels comfortable releasing. Profile transmission is protected by the latest security technologies, digital-certificate technology and Secure Socket Layer encryption.

OPS developers predict that businesses will offer incentives such as monetary discounts on products or gifts in exchange for access to the customer profiles. The customers not only benefit from the discounts or gifts but also from the increase in transmission security compared to present standards. The customers also do not have to take the time to manually enter their information into a form for each company web site they visit. The customer simply fills out the customer profile once at the start and updates the information when necessary. Businesses benefit from an increase in customer information and since the information is divided into levels, they can easily control the amount of information collected.

Chapter 3: Implementation of Information Module

3.1 Capstone Project Team

Capstone projects involve the University of Virginia, in conjunction with businesses, assigning real-world business issues to groups of Systems Engineering students for resolution. I am in a group with five students working on a Capstone project with Communications Industry Research (CIR). These students are Mike Bowersox, Chris Carrier, Steve O'Neill, Vibha Sazawal, and I. We work as a team under the direction of our technical advisor Professor James Lark. The group provided CIR an electronic commerce system for its publications.

3.2 Equipment and Resources Used

The hardware required for development was an Intel Pentium Pro PC with 64 megabytes of RAM. The Capstone group connected the PC to the Internet. The group also created the system database on Microsoft SQL Server software. We used Microsoft Visual Studio Enterprise Edition (which includes Microsoft Visual Basic and Visio) for design and creation of various modules. Microsoft Internet Explorer was the browser used for testing and observing the CIR system. I created several of the information gathering module web pages using Microsoft's FrontPage Express software. I incorporated the active-server page and Visual Basic Script technologies into the web pages under direction from Hussain's ActiveX manual.

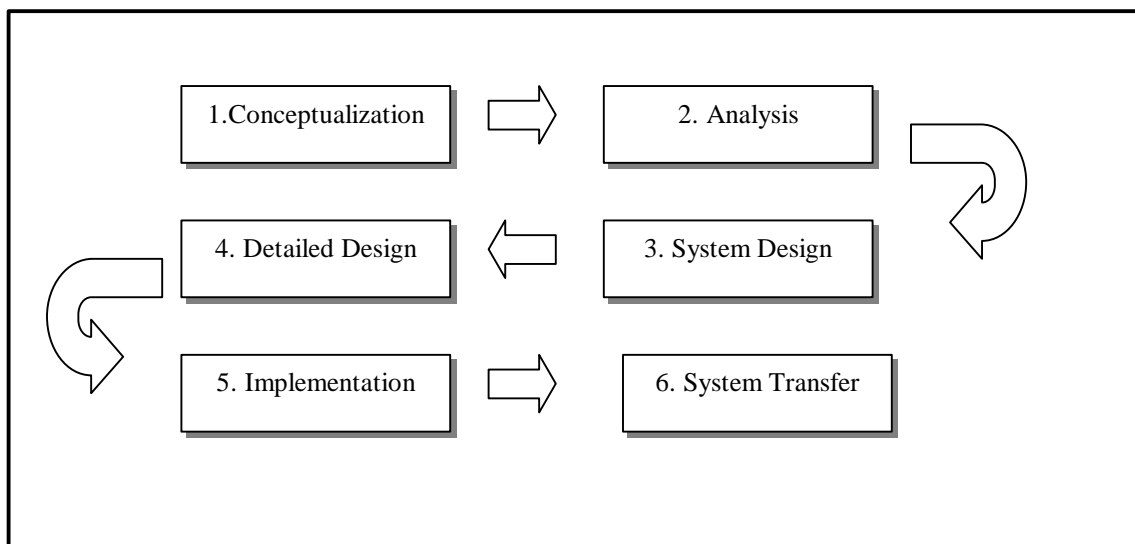
For this project, many personnel served as resources. I engaged in direct correspondence with Capstone Team members, my technical advisor, CIR Chairman

Lawrence Gasman, and CIR employee Rob Nolan. Through weekly meetings with Professor Lark and occasional meetings with the clients, progress on accomplishing the goals and phases of the project was regularly checked. Professor Mark Shields and Professor Edmund Russell served as Technology, Culture, and Communication (TCC) advisors for this project. Under their direction and advice, the standards for documentation and ethical implications involved in the project are examined.

3.3 Statement of Method

Blaha and Premerlani's Object-Oriented Modeling and Design for Database Applications guided the development of this project by providing a methodology (see Figure 3.3). The methodology involved the completion of the following steps for the Capstone electronic commerce project and my individual customer-information gathering module in the project (see Figure 3.3).

Figure 3.3 Electronic Commerce System Methodology



Conceptualization:

This activity began with research. The Capstone group conducted research through library searches (University of Virginia's VIRGO database), Internet World magazines searches, and web searches. We gathered requirements through frequent client communications and interactions. This step involved participation by my entire Capstone team.

Analysis:

Through client meetings, the group collected the initial requirements of CIR. Due to high expectations by the client, the initial requirements required modification to attain feasibility. The next step consisted of examining and organizing the data collected. The team ordered and installed necessary software and hardware. My Capstone team created a Systems Analysis document for this phase for submission to CIR.

System Design:

The development of the system architecture was the key focus in this phase. The group separated the various aspects of the project into concrete modules. These modules include Information Distribution, Security Management, Payment Management, and Market Clearing. Through a collaborated effort by the entire Capstone team, we established the core policies and guidelines affecting development of each module. The team created a System Architecture document for this step for submission to CIR.

Detailed Design:

Mike Bowersox and I designed the module for the customer information-gathering in this phase. We adhered to the core, previously established principles when designing the module. Our method for collecting data utilizes online forms (interactive) and cookies

(non-interactive). and Open Profiling Standard customer profiles (mostly non-interactive). I created a resource library containing Internet links to relevant information in the field of Open Profiling Standard customer profiles. Client approval of the design for the module was required before implementation.

Implementation:

For this phase, the team initially created the base electronic commerce system for CIR. This step involved establishing the server as a web site, setting up the database, and including the necessary database tables. Each team member then connected their individual module to the base system. The information gathering module incorporated the use of several HTML (HyperText Markup Language) page forms and active-server pages. The forms allow customers to enter personal data. The active-server pages place cookies on customers and transmit cookie and customer information into the database. Information is also downloaded from the database into the forms for purposes of customer modification of personal data. Examination of the database's records after entering various test case scenarios provided a black-box testing method.

System Transfer:

A final step for my Capstone team and me was to install the new electronic commerce system on the CIR system and document all aspects of the system. The team has completed installation but not documentation yet. The documentation provides CIR with an opportunity for future consultants to easily understand the electronic commerce system and make desired modifications.

3.4 Design Process

The information-gathering module was designed based on the requirements and expectations of CIR. The company desired a form to allow new customers to provide information about themselves and returning customers to update their information. CIR also wanted each customer to enter a password after completion of the customer-input form. The password is required for future access to the company web site for security purposes and for recognition of customer in the CIR database. Finally, CIR asked for a database to store customer input information and logging information. Logging information pertains to customer browser type (usually Netscape Navigator or Internet Explorer) and to tracing which company web pages customers visit and the date, time, and the order the pages are visited.

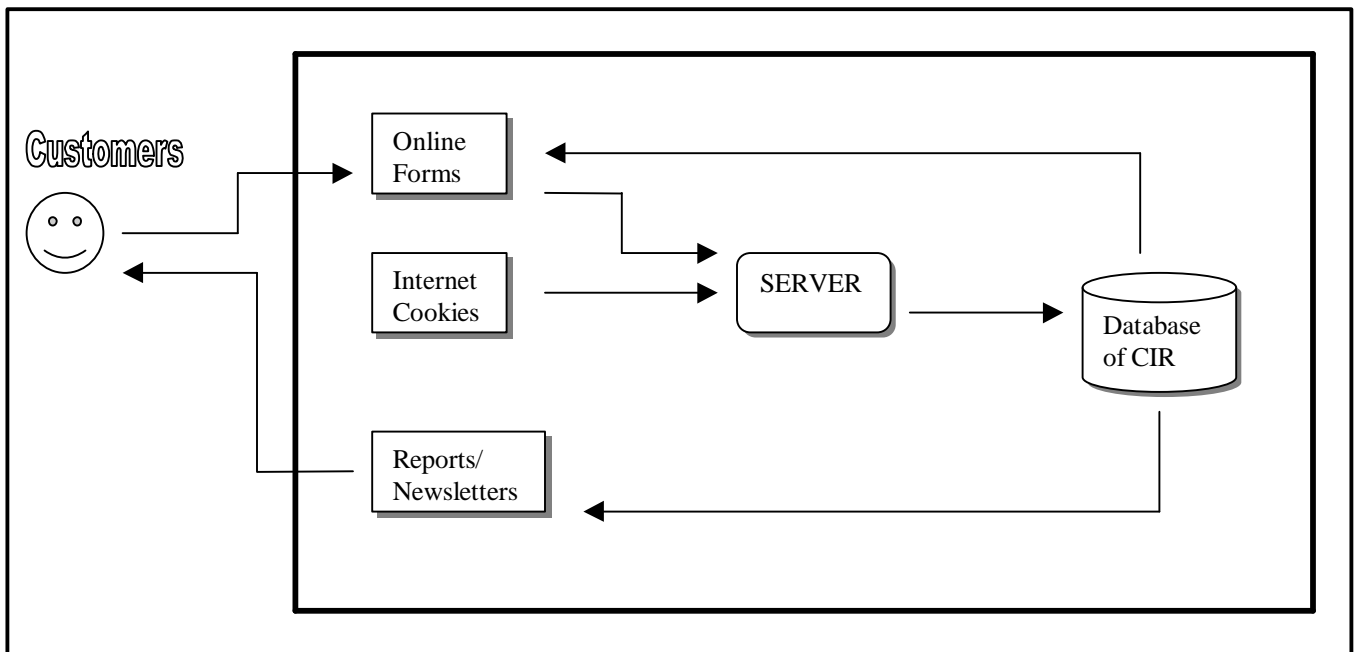
After determination of CIR's requirements, many steps were completed to produce a functional information-gathering module. The first step required determining what customer information was of value to CIR. I created an entity-relation diagram to determine the key entities required for collecting information. Creation of a design for the necessary tables for storing the information in a database was the next step. A design of the form (Appendix A) for customer information input was necessary. Mike and I implemented these designs using a variety of technologies.

3.5 Technologies Utilized

The technology used in implementing the module was dependent upon the phase of the project. For design purposes, I modeled the entity-relation diagram for my module using the software product ERWin, designed the customer information tables using VISIO

software, and developed the customer information input form using Microsoft's FrontPage Express (see Appendix A). Implementation of the modeled tables in a SQL Server database through SQL (Standard Query Language) commands was the next step. The addition of HTML (HyperText Markup Language) code and VB Script (Visual Basic Script) code allowed for full functionality. The code was necessary for directing the form where to send, or post, the entered information. The information was sent to an active server page (code for this active server page is in Appendix B). The code for all active server pages and some HTML pages was HTML and/or VB Script. Mike and I created the web pages by entering the code into Notepad. The code for Internet cookies, or Session objects, was embedded in the web pages using VB Script. The interaction of the information-gathering techniques with the customers and database are depicted in Figure 3.5.

Figure 3.5 Database Interaction for Information-Gathering Module



3.6 Resolution of Troubleshooting Issues

This section discusses solutions and hints for issues that arose during development. Issues first occurred during the customer input form creation. The information the customer inputs for each input box requires a separate variable to store the information values. The reason for this requirement is because the active server page, which processes the information, needs to access these variables. Also regarding the customer input form page, the “action” of the form is the confirmation active server page. The “submit” button created on the form executes this action.

The next batch of issues occurred during creation of the confirmation active server page (code for page is in Appendix B). To send the information to the database, establishing connection with the database was necessary. The code for this issue is in Appendix B. The next step in sending information to the database was creating Standard Query Language (SQL) commands to transfer values of variables into the database. The SQL Server database requires a specific, unconventional syntax for the SQL commands. These commands are also in the code in Appendix B. The first attempt at implementation of Internet cookies involved the use of Visual Basic Script. Since cookies were placed and collected information predominantly through “response” objects, this issue cause a conflict with client expectations. Response objects involve the customer performing an action, such as clicking on a button, in order for the cookies to start operating. CIR wanted to trace customers and their transactions through all the company web pages and did not want the customers having to click a button on each web page so the cookie can collect the information. Session objects provided a solution to this dilemma. Session objects are automatically enacted upon loading of the web page. The code for placing a Session object and collecting location, date, and time information is in Appendix B.

Chapter 4: Results

Communications Industry Researchers, Inc. (CIR) received a fully functional electronic commerce system. Now the company's newsletters and reports are electronically accessible by the server through a database. CIR's clients, therefore, possess the ability now to access the documents that previously existed only in paper format over the Internet. The electronic commerce system has modules for information distribution, security management, payment management, and market clearing. The information-gathering module allows CIR to place information about customers in a customer database.

4.1 Tour of Information-Gathering Module

When customers access the CIR site for the first time, they are required to input their information on a HTML form page. Information gathered from this step will include name, address, title, company, business address, city, state, zip code, country, fax number, telephone number, E-mail address, and password. If the customers have already visited the CIR site and completed this information page, then they need only enter their name and E-mail address to access CIR's electronic commerce web site. The company will give returning customers the option to update their information that the database contains. A form web page will provide returning customers with their current information. Based upon this information the customers will be able to choose to modify any or all data. The new information is then sent into the database through updates.

The information gathered from new customers will also interface with the database after completion of the input form. The data is then sent to the database and new customer entities are created. After entities are either created or modified, or returning customers enter their E-mail address and name, access to the CIR electronic commerce system is granted.

4.2 Online forms summary about its use in the Information Module

Completion of a basic online form is required for all new customers to the web site. This form collects a customer's personal and business information. The information passes from the client's computer onto the server and into tables in the database. A confirmation page notifies the user that the information is successfully entered in the database. The input form serves as the most useful source for customer information for CIR. The database is mostly filled with information acquired through the form.

4.3 Internet cookies summary about its use in the Information Module

Internet cookies provided limited but useful information about CIR customers' preferences. The cookies are placed on customers as soon as they visit the customer input form. Visitation of the input form is presently a mandatory procedure in entering the CIR web site. The life of the cookies expires once the customers leave the web site or remains inactive for over twenty minutes. While the customers visit the various CIR web pages contained within the different modules, information about the customers' browsers, modules visited, and transactions completed is stored in a file known as a logfile. Once the customer leaves the web site and the cookie expires, the information contained in the

logfile is sent to tables in the database. These tables contain useful means for gathering statistics for CIR on their customers and success of the different modules.

4.4 Customer profiles summary

The CIR information-gathering module does not involve the use of customer profiles. Due to the fact that the Open Profiling Standard (OPS) is still in a stage of development, information about customer profiles, OPS's implementation, and OPS's benefits was accumulated and organized into a resource center. This resource center provides CIR with a useful base for future implementation of the OPS technology. The resource center is the possession of CIR and, therefore, public access to this center is contingent on CIR granting permission. The resource center contains links and documents on the history of OPS, the technical workings of OPS, the implementation and use of OPS, and the most recent news stories on customer profiles and OPS.

Chapter 5: Conclusion

The electronic commerce system provided to CIR gives the company and its customers an advantage over the competition by offering more opportunities for transactions; CIR now reaches a wider customer base. People who never did business with the company before are now registered in the company database tables. CIR customers have more options for payment and purchasing. They can pay electronically through an online account with the company or through an Internet bank. The customers can also pay the old-fashioned way through credit cards.

The online forms and Internet cookies are useful methods for obtaining information about customers visiting the company web site. The online forms provide basic customer data and require user interaction. The cookies provide more subtle data about customer preferences and modules visited without any user interaction. Data collected from both methods are easily stored in databases of the server. Querying the databases provides CIR with insight into the information recorded.

5.1 Impact of Customer Data

With the recently acquired customer data, CIR is better able to make decisions on a variety of topics. CIR bases research decisions regarding what topics to pursue and what products to offer the customers on customer feedback and interests. Policy decisions on modules and the electronic commerce system are influenced by the resulting data of the Internet cookies. Billing and credit decisions are shaped by past customer track records with the company.

5.2 Limitations of Study

The limitations of this project are due to ever-changing technologies and proprietary information. Technology changes rapidly, especially Internet technology. The Open Profiling Standard is a new technology. Full implementation of OPS is not expected until the end of 1998. Therefore, development using customer profiles adhering to the OPS standard was not possible. Many of the results, such as customer data acquired, certain code, and the OPS resource links, belong to CIR and are not public information presently.

5.3 Recommendations for Further Study

Customer profiles and the Open Profiling Standard technology provide numerous avenues for future data collection. Presently, the technology is not in a stage where it is ready for use or implementation. Microsoft and Netscape are aiming to incorporate the technology and capabilities into the new versions of their browsers due in late 1998.

The Open Profiling Standard provides customers with timesaving, more secure, more reliable, and better controlled capabilities over what they choose to disclose to the company. The Open Profiling Standard provides companies with another source for collecting information quickly and efficiently on their customers and storing the information in a database. The information collected is usually more personal and more representative of the company's interests, therefore allowing the company to better understand their customers by organizing and querying the information gathered.

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Annotated Bibliography

Blaha, Michael and William Premerlani. Object-Oriented Modeling and Design for Database. Upper Saddle River, New Jersey: Prentice-Hall, Inc. 1998.
This textbook provides an approach and the skills necessary for successful database design and modeling. A methodology useful for modeling is emphasized. The authors intend for audiences of various technical levels to beneficially use the book as a learning tool.

Chen, Elaine. "Web to Spark Change but Issues Remain." Electronic News April 1, 1996 v42 p.20.
Intended for those interested in the future direction of the Internet, the article discusses issues that top corporations are tackling. The article briefly mentions Microsoft's Bill Gates' plans of "browsers will become part of the operating system" will result in "a positive correlation between the quality of society...and communication infrastructure" according to Dr. Clark.

Graves, Lucas. "It's Alive! After a Year of Dire Predictions, E-Commerce Bounces Back from the Dead." Marketing Computers Feb 1997 v17 p.10-12.
The article qualitatively and quantitatively discusses recent and future electronic commerce growth. The author cites research group predictions of electronic commerce becoming a billion dollar industry for consumer spending and over a hundred-billion dollar phenomenon for business transactions by the turn of the century. Favorable shifts in attitudes toward electronic shopping by American adults and company CEO's are also discussed in the article.

Hensley, Pat and Max Metral, Upendra Shardanand, Donna Converse, and Mike Myers. "Proposal for an Open Profiling Standard." June 2, 1997.
Intended for those interested in the inner workings of OPS (the Open Profiling Standard) profiles, the article discusses the technical aspects of profile exchange. A definition of profile exchange and an analysis of the importance and issues concerned with exchanging profile data are discussed in the article. This document is the first in a three part series.

Hensley, Pat and Max Metral, Upendra Shardanand, Donna Converse, and Mike Myers. "Implementation of OPS Over HTTP." June 2, 1997.
This document is the second in a series of three documents discussing OPS specifications. The article explains how to implement and use OPS over the Internet. The article considers issues with read and write access privileges to the profile. The author suggests the use of JAVA applets to provide OPS with compatibility across all JAVA capable browsers.

Hensley, Pat and Max Metral, Upendra Shardanand, Donna Converse, and Mike Myers. "Standard Practices for OPS Systems." June 2, 1997.

This document is the third in a series of three documents discussing OPS specifications. The article discusses how users can manage their profile and grant permission to have portions of the profile accessed. Transactions and the exchange of profile information are recorded in a log in the manner explained in the article. The focus of the article is informing users of the various profile sections and permission settings.

Husain, Kamran. "Active X Developer's Resource." Prentice Hall Computer Books, 1997.

Discusses Active X technology and how to create and use active server pages. The author includes chapters on Visual Basic Script in this manual. This book is intended for a beginner to intermediate level developer.

King, Nelson. "OPS: A Better Recipe for Cookies?" Internet World October 1997: 13.

Intended to discuss the issue of OPS (the Open Profiling Standard) replacing Internet cookies, the article provides a comprehensive briefing on the use and progress of OPS. The author relates the use of the consumer profile by OPS compatible Internet browsers to the views held by the major Internet browser providing companies. While the author mentions the need to maintain the use of cookies, she feels the momentum and progress of OPS will revolutionize electronic commerce.

Littwin, Angela. "Internet Analysts Take a Hard Look at the Feasibility of Electronic Commerce." Telecommunications Oct 1996 v30 p.68.

The article relates discussion from an Internet conference that feels electronic commerce is the next step in the evolution of the Internet. The conference discusses issues and possible solutions for consumer privacy, transaction security, reliability, payment standardizing, and electronic commerce marketing. The article states the importance of electronic commerce flourishing and draws attention to the need of a joint venture between several top companies for successful electronic commerce.

Llibre, Juan T. "Don't Lose Your Session!" [<http://www.activeserverpages.com/juan>] 1997.

These online web pages discuss Session objects and their implementation. The author discusses solutions to several frequently encountered issues when using Session objects. This article is for an audience with familiarity in Internet development and Session objects or Internet cookies.

OPS Resource Center. "What is the Open Profiling Standard?"

[<http://people.firefly.net/OPS/QandA.html>] 1997.

This online article provides information on OPS and answers commonly asked questions about the profiling standard. Issues such as the importance, security,

and operation of OPS are addressed. This article is geared to an audience with little or no understanding of OPS and customer profiles.

OPS Resource Center. "Firefly, Netscape and Microsoft Cooperate to Build upon Previously Proposed OPS Standard for Personalization with Privacy." [<http://people.firefly.com/press/6.11.97.OPS.pr.html>] June 11, 1997. This online article addresses the hype from various companies about the new OPS technology. The press release is concerned with the present and future plans of OPS technology as it relates to the various interested companies. The sectors of the market affected by OPS and the likely benefits are discussed. This article is geared to an audience with little or no understanding of OPS and customer profiles.

Pike, Dennis W. "A Graphical User Interface for a World Wide Web Based Credit Scoring Evaluation System." Thesis. University of Virginia. 1997. This thesis is intended to discuss issues concerned with obtaining customer credit information over the web. The author is a graduate from the University of Virginia Systems Engineering curriculum in 1997.

Wilder, Clinton. "Pouring Cash into the Internet." Information Week Jan 1, 1996 p.14. The author feels that electronic commerce is the next step in the evolution of the Internet and will undoubtedly experience rapid growth over the next few years. The article discusses issues and possible solutions for security in making transactions. Comments are made on the various companies tackling these security issues and their progress. The article predicts markets that will reap the most benefits from electronic commerce.

Appendix A: Customer Input Form

The customer input form for CIR (format is a HTML Internet web page):

CIR Personal Information Input

This form allows you to be registered in the CIR database. If you are a new customer, please complete the following information. If you are a return user, please update any changes to the information. Upon acceptance into the database, you will be allowed to search reports and view executive summaries.

Please complete the following identification information:

First name
Last name required
Middle initial

Please provide the following personal contact information:

Street address
Address (cont.)
City
State/Province
Zip/Postal code
Country
Home Phone

Please provide the following company information:

Company Name
Street address required
Address (cont.)
City required
State/Province
Zip/Postal code required
Country required
Work Phone required
FAX

E-mail required

Please enter a password for future visits

Password required

Copyright information goes here.

Appendix B: Internet Cookie/Session Object Code

FILETYPE: ACTIVE SERVER PAGE
PURPOSE: 1. PROCESSES CUSTOMER INPUT FORM INFORMATION
2. DISPLAYS A CONFIRMATION MESSAGE TO CUSTOMER
3. PLACES THE SESSION OBJECT ON CUSTOMER TO TRACE ACTIONS

```
CODE:
<%
Session("username") = Session.SessionID
Session("page1_name") = "personal.asp"
Session("page1_date") = formatdatetime(now(), VBShortDate)
Session("page1_time") = time
Session("browser") = navigator.appName
%>
<html>

<head>
<meta http-equiv="Content-Type"
content="text/html; charset=iso-8859-1">
<meta name="GENERATOR" content="Microsoft FrontPage Express 2.0">
<title></title>
<%
emailaddress=Request.Form("Contact_Email")
pass=Request.Form("Password")
firstname=Request.Form("Personal_FirstName")
lastname=Request.Form("Personal_LastName")
middlename=Request.Form("Personal_MiddleInitial")

wstaddress1=Request.Form("Contact_StreetAddress")
wstaddress2=Request.Form("Contact_Address")
workcity=Request.Form("Contact_City")
workstate=Request.Form("D1")
workzip=Request.Form("Contact_ZipCode")
workcountry=Request.Form("Contact_Country")
workphone=Request.Form("Contact_WorkPhone")
fax=Request.Form("Contact_FAX")

hstaddress1=Request.Form("Contact_StreetAddress2")
hstaddress2=Request.Form("Contact_Address2")
homecity=Request.Form("Contact_City2")
homestate=Request.Form("D2")
homezip=Request.Form("Contact_ZipCode2")
homecountry=Request.Form("Contact_Country2")
homephone=Request.Form("Contact_HomePhone")

' Testing Session variables

id = Session("username")
page1_name = Session("page1_name")
page1_date = Session("page1_date")
page1_time = Session("page1_time")
page2_name = Session("page2_name")
```

```
page2_date = Session("page2_date")
page2_time = Session("page2_time")
'browser = Session("browser")
```

'Send Sessions to Logfile

```
Dim fs, f
Set fs = CreateObject("Scripting.FileSystemObject")
Set f = fs.OpenTextFile("c:\testfile.txt", 8, -2)
f.WriteLine ("BEGIN SESSION")
f.WriteLine ("Customer name: " &firstname& " "&lastname )
f.WriteLine ("Session ID: " &id )
f.WriteLine ("Session page information: " &page1_name & " " & page1_date & " " & page1_time)
f.WriteLine ("Session page information: " &page2_name & " " & page2_date & " " & page2_time)
f.WriteLine ("Browser: ")
f.WriteLine ("END SESSION")
f.WriteLine ("")
f.Close
```

'Confirmation Page

```
response.write "Your Session ID is " &id & Chr(60) &"br" &Chr(62)
response.write "Your Session page1 is " &page1_name & " " & page1_date & " " & page1_time &
Chr(60) &"br" &Chr(62)
response.write "Your Session page2 is " &page2_name & " " & page2_date & " " & page2_time &
Chr(60) &"br" &Chr(62)
'response.write "Your Session browser is " &browser & Chr(60) &"br" &Chr(62)
```

```
response.write "Your name has been recorded as " & firstname & " " & middlename & " " & lastname &
Chr(60) &"br" &Chr(62)
```

```
response.write "Your email has been recorded as " & emailaddress & Chr(60) &"br" &Chr(62)
```

```
response.write "Your password has been recorded as " & pass & Chr(60) &"br" &Chr(62)
```

```
response.write "Your password will be needed for future visits! Please remember it!" & Chr(60) &"br"
&Chr(62)
```

```
response.write Chr(60) & "a href=" & Chr(34) & "name2.asp" & _
Chr(34) & Chr(62) & "link to name2" & Chr(60) & "/a" & Chr(62)
```

'Send to Database

```
set conntemp=server.createobject("adodb.connection")
```

'login name and password are have been omitted

```
conntemp.open "###", "###"
```

'sqlstring is of type variant (string)

```
sqlstring = "insert into customer values (" & firstname _
& ", " & middlename & ", " & lastname _
& ", " & wstaddress1 & ", " & wstraddress2 _
& ", " & workcity & ", " & workzip & ", " & workstate _
& ", " & workcountry & ", " & hstraddress1 _
```

```
& ", " & hstaddress2 & ", " & homecity & ", " & homezip _  
& ", " & homestate & ", " & homecountry & ", " & workphone _  
& ", " & fax & ", " & homephone _  
& ", " & emailaddress & ", " & pass & ", " & " 0)"  
'returnedSet is of type RecordSet  
set returnedSet = conntemp.execute(sqlstring)  
numFields = returnedSet.fields.count - 1  
  
%>  
</head>  
<body>  
</body>  
</html>
```