DESIGN DEVELOPMENT AND IMPLEMENTATION OF AGRICULTURE ONLINE SERVICE SYSTEM

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A Minor Thesis for Partial Fulfilment of the Degree of Master of Science in Computer Science

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DECLARATION

This thesis contains no material that has been accepted for the award of any other degree or diploma in any University or Tertiary Institution. To the best of my knowledge and belief it contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

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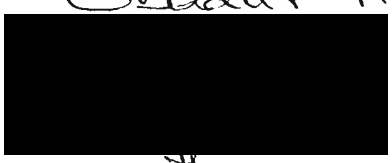
Signature: 

Date 20th November 2001

ABSTRACT

Agriculture Online Service (AOS) is aimed to provide services online in web environment, on World Wide Web. The system developed is a one-stop shop that sells agricultural products online and provides agricultural information to customers. This system enables the customer to search the database and buy product/s online. The system also provides specific and up to date information on agricultural crops. Various specific agricultural sites can be accessed from this site. The System consists of a number of Active Server Pages that are designed to work with each other in complete harmony and is simple to use. A user visiting the Online Service site can commence shopping immediately. Most pages are interlinked to each other for convenience and easy access. The Active Server Pages, Microsoft's most powerful technology is used for the development of AOS System.

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TABLE OF CONTENTS

ABSTRACT

Chapter 1: Introduction 1
1.1 Project Description 3
1.2 Project Objectives 4
1.3 Tools and Technologies Used 4
1.3.1 Web Servers 4
1.3.2 Web Browsers 5
1.3.3 Open Database Connectivity (ODBC) Compliant 5
1.3.4 ODBC Connection 5
1.3.5 HTML (Hypertext Markup Language) 6
1.3.6 ASP (Active Server Pages) 6
1.3.6.1 ASP Applications Development Requirements 7
1.3.6.2 Technical Requirements for Developing ASP 8
1.3.7 Transmission Control Protocol/ Internet Protocol (TCP/IP) 8
1.3.8 File Transfer Protocol (FTP) 8
1.4 Web Technical 8
1.5 Web Design 9
1.6 MIME (Multipurpose Internet Mail Extension) 9
1.7 Internet Technology 9

Chapter 2: Web Application Development Environment 11
2.1 Active Server Pages Technology 11
2.2 ASP Application 12
2.3 Global.asa File 13
2.4 Global.asa Event Routines 13
2.5 ASP Objects 14
2.5.1 Application Object 14
2.5.2 Session Object 15
2.5.3 Request Object 15
2.5.4 Response Object 16
2.5.5 Server Object 16
2.5.6 ObjectContext 17
2.6 How Active Server Pages work? 17
2.7 Database in Web Applications 20
2.7.1 ActiveX Database Objects (ADO) 20
2.7.2 Object Linking and Embedding Database (OLE DB) 20
2.7.3 Open Database Connectivity (ODBC) 21
2.7.4 Microsoft Data Access Component (MDAC) 21
2.7.5 Remote Data Service (RDS) 22
2.8 Introduction of ADO Object Model 22
2.8.1 ADO Objects 22
2.8.2 Data providers 23
2.8.3 Microsoft Access 24
2.8.4 Data Access and Data Link 24
2.8.5 Create Database in MS Access 25
2.8.5.1 Create Table 25

2.8.5.2 Establish Relationship 25
2.8.5.3 SQL Statement 26
2.8.6 Data Access 27
2.8.6.1 Open Connection to Data Source 27
2.8.6.2 Execute SQL Command 27
2.8.6.3 Retrieve Information 28
2.8.6.4 Close Objects 29
2.8.6.5 Send Data 29
2.9 ASP Summary 30

Chapter 3: Design and Development of Agriculture Online System 31
3.1 Introduction 31
3.2 Requirements Analysis and Definition 31
3.3 Requirement Management Tools 32
3.4 Requirements Specification 32
3.5 System Specification 33
3.5.1 Maintenance 33
3.5.2 Feasibility 33
3.5.2.1 Technical Feasibility 34
3.5.2.2 Economic Feasibility 34
3.5.2.3 Legal Feasibility 34
3.6 System Design 35
3.6.1 The Store: 35
3.6.2 The Catalogue: 36
3.6.3 Shopping Bag: 36
3.6.4 Checkout/Payment: 36
3.6.5 Agriculture Information: 36
3.6.6 Feedback: 36
3.7 System Requirements 38
3.7.1 Software Requirements 38
3.7.2 Hardware Requirements 38

Chapter 4: Application of Agriculture Online Service System 39
4.1 Introduction 39
4.2 Descriptions of Each Page of AOS 39
4.3 Relationship Between ASP Pages 42
4.4 Construction of Agriculture Online Service System 42
4.5 Installation of ODBC 43
4.6 Creation of Database Tables 44

Chapter 5: Conclusion and Further Research 47
5.1 Conclusion 47
5.2 Further Research 48

Chapter 6: User Manuals 49
Appendix A: References 57
Appendix B: Implementation Program Code (In Floppy)

LIST OF FIGURES

Figure 1: Inherited Objects from ASP 17

Figure 2: Processing an ASP request 19

Figure 3: ADO's relationship with other components 22

Figure 4: Relationship between Connection, Recordset and Field Objects 24

Figure 5: Agriculture Online Service System Design 35

Figure 6: Communication between users and administrators 37

Figure 7: Relationship between ASP pages 42

Chapter 1: Introduction

Electronic commerce is one of the most rapidly growing area of the Internet. It facilitates the exchange of information, goods, services and payments associated with market transactions. E-commerce provides information, negotiation and settlement where the buyers identify and evaluate their needs and the sources to fulfil them and the sellers arrange to provide their goods and identify potential customers. These steps evolve around the exchange of information. Subsequently, prospective buyers and sellers negotiate the terms of the intended transaction by jointly identifying possible solutions with the goal of reaching a consensus, usually in the form of a contract. Eventually, the contract is executed and the goods and financial compensation are exchanged as per the previously stipulated conditions.

Guttman et. al. 1998 and Maes et al 1999, described customers actions and decisions involved in buying and using goods and services under six fundamental stages that guide consumer behavior.

- Need Identification: The product information causes the buyer to become aware of some unmet need.
- Product Brokering: Retrieved information and personal criteria for exchange preferences or any special quality requirements enable the buyer to evaluate product alternatives and to specify products.
- Merchant Brokering: Merchant alternative is based on buyer provided criteria for example price, warranty, availability, delivery time and reputation.

- Negotiation: The exact term of the transaction is stipulated.
- Purchase and Delivery: On successful negotiation, the predefined information on money and commodities takes place.
- Product Service and Evaluation: The last stage involves after sales product support, customer service and the evaluation of transactions outcome.

Segev et. al. 1995, outlines online retailing is among the most active commercial applications of web information systems. Consequently integrated marketing concepts for online retailing are becoming key issues in a word of increasingly dynamic and global business environments. There is an urgent need to focus business activities on customer preferences in order to be able to respond instantly to constantly changing demands.

Commercial organisations participating in electronic markets are no longer stable but have to adapt continuously to the shifting environment. Due to poor understanding of user requirements and a lack of willingness to modify existing organisational structures, the full economic potential of electronic business models has been realised until recently. With the ongoing introduction of new technologies, strategic management decisions considered innovation as a crucial parameter.

In such a dynamic and competitive environment, customizing web information systems received utmost attention. With the evolution of electronic market, web surfers can now order goods online. As more and more consumers turn to the Internet for their shopping needs, the design, development and implementation of Agriculture Online Service would benefit consumers by selling and providing online information on agricultural products.

1.1 Project Description

The project is designed essentially on a web based database application which furnish assistance to users to search agriculture products and agriculture information online and retrieve information from the database by displaying pages, collect information from the user and store this information back to the database. The user will be able to search for any product and will be able to buy the product online. The project provides a one-stop shop where the user can shop and get information on agricultural crops. Various specific sites are also linked. The user can navigate other sites specific to their needs.

Active Server Pages (ASP) being the most powerful and easy to learn server-side scripting is used for making fast, dynamic and interactive pages without being requiring to worry about the capabilities of clients browsers which must be done if to rely on client-side scripting like client-side Java Script or client-side Visual basic Script (VB Script). In Agriculture Online Systems, both the user and the system administrator will have interaction over the database system. The proposed system will let the administrator to add, update, modify or delete any product from the database. The Administrator can change the price of any agricultural items as and when required. The user or client will be able to search the database to check the availability of the product, the entire list of products, place items to shopping cart, remove items from shopping cart and proceed to checkout by supplying details such as name, address, phone number, payment options and credit card details online. The user can also navigate to other sites for any specific agriculture information.

The proposed Agriculture Online Service is a one-stop shop that provides online shopping and online information on various aspects of agricultural products including production, agronomy, breeding and protection from pests and diseases.

1.2 Project Objectives

To create a web site which is dynamic, fast and interactive without requiring us to worry about the capabilities of the clients' browsers with following tasks.

- Design an online shopping store
- Creating a catalog for agriculture products
- Implementing a versatile shopping bag
- Facilitating online payment options
- Provide online agriculture information.

1.3 Tools and Technologies Used

1.3.1 Web Servers

Web server provides services to web clients under Hypertext Markup Language (HTML) environment that access HTML document repositories or CGI applications. The following server that support ASP are used.

- Microsoft Internet Information Server (IIS) Version 4.0
- Microsoft Windows NT 4.0 Option Pack
- Microsoft Personal Web Server 4.0
- Windows 95, 98 and NT Workstation

1.3.2 Web Browsers

The following programs used, provided easy navigation of web sites on the net and displayed HTML and ASP pages.

- Internet Explorer 5.0
- Netscape Navigator 5.0

1.3.3 Open Database Connectivity (ODBC) Compliant

- Microsoft Access
- Microsoft Excel

1.3.4 ODBC Connection

ODBC connection was used to link web server and ODBC compliant file by following steps.

1. Copy MS Access file to a virtual directory on the server.
2. Run NT Server at Desktop
3. Write: c:\winnt\system32\odbcad32.exe and click OK
4. Go to System DSN and click Add
5. Choose Driver: {Microsoft Access Driver(*.mdb) and Click on Finish
6. Write the name of Data Source File that will be referred to ASP files while retrieving data.
7. Find the database to be connected
8. Click OK

1.3.5 HTML (Hypertext Markup Language)

HTML provides rich sets of tags that are embedded in documents to specify about how to format contents on the page. The tags also enable to establish hyperlinks from contents of one document to content of other document. It also provides mechanisms for invoking programs and services on web servers.

1.3.6 ASP (Active Server Pages)

Active Server Pages (ASP) is Microsoft's most recent web server technology which is designed to make it easier for web application developers to develop sophisticated web applications and is an integral part of the Active Platform, Microsoft's core Internet Technology. The Active Platform is a common set of languages, standards and services that can be used to develop either client-side or server-side applications. The Active Platform paradigm makes easier to develop a broad spectrum of applications that run on the server and on the client. It also makes easy to transform a desktop application into a full-blown client/ server application. ASP is suitable for an application that performs multiple database queries and carries out complex calculations on the data returned. ASP has following benefits.

- Easy to learn
- Makes easy to leverage existing investments
- Makes easy to leverage existing skills
- Compile free
- Extensible
- Protects business algorithms and information

ASP extends standard HTML by adding build-in objects and server-side scripting, allow access to database and other server side Active X components. ASP 'executes' on server side environment in IIS 3.0 or higher that uses Active X scripting like Java Script or VB Script. When an ASP page is requested by a browser, the web server generates a page with HTML code and send it back to the browser. ASP can combine HTML to create more dynamic, fast and interactive web pages. With the static HTML, the user types web address and the browser sends request for web page to the web server. The web server receives request, retrieves HTML file and send back to the browser. The user's browser translates HTML file and display results to browser window.

1.3.6.1 ASP Applications Development Requirements

The minimum hardware and software required for developing ASP applications are as follows:

- Pentium-based computer
- 32 MB RAM
- 100 MB free hard drive space
- Windows NT Server 4.0 with TCP/IP networking support
- IIS 3.0 or higher
- PWS if using Windows 95
- Database that supports ODBC (MS access, SQL Server)
- Microsoft Visual Interdev is useful

1.3.6.2 Technical Requirements for Developing ASP

- Familiarity with Windows NT 4.0
- Understanding of Windows security
- Familiarity with Visual Basic or Scripting language (J Script or VB Script)

1.3.7 Transmission Control Protocol/ Internet Protocol (TCP/IP)

TCP/IP are the basic protocols which computers, servers and clients use to communicate over the Internet.

1.3.8 File Transfer Protocol (FTP)

FTP is an Internet protocol and service which enables users to transfer files between computers on a network. FTP servers are the most common information services on the Internet.

1.4 Web Technical

Active Server Pages have been developed to store and retrieve information over Internet from databases. Electronic commerce rapidly use ASP to interface database such as Microsoft Access to the web servers, hence enabling data like product information to be retrieved and distributed over the net. This approach enables data to be securely presented over the net. Database are generally accessed by ASP, PERL or CGI scripts which manage and manipulate files and databases ensuring that a site can be easily maintained either locally or remotely.

1.5 Web Design

Web pages can be dynamically created to provide information to users browsing web site. The web pages enhance the experience of browsing by presenting information in which the user is most likely interested. The web page design should therefore be eye-catching and good enough to appeal the users.

1.6 MIME (Multipurpose Internet Mail Extension)

MIME is a specification that builds on standard Internet mail to allow the interchange by mail of more complex documents than can be handled by standard email. MIME uses Internet as a network medium. The store and forward mechanisms of email enable the messages to be transmitted as communication channels are available and the recipient reads the message at their convenience. At MIME the operation of both the sending and receiving workstations at the same time is not required.

1.7 Internet Technology

A collection or interconnection of many servers that collectively provide and use information and connection services. This network of computer networks now includes a community that literally spans the globe and counts among its members nearly every country in the world. The Internet (Net) provides many standard services and protocol that allow individuals to access the huge number of resources available on the Net. Internet is a robust technology that has the potential for providing a common data platform throughout the world. Its electronic network connects servers to facilitate navigation from one web page to the other more efficiently. Internet is growing day by day and more and more people are embracing

this technology. It is becoming the most popular medium in everyday life. The Internet technology has given birth to electronic commerce which will become much more popular as more people become aware and feel confident with e-commerce. Internet technology of e-business will gain momentum with time as people realize the importance of time and money which they could easily save for example comparing the price of any particular item from two different shops on their computer without even physically visiting two different stores. And this will save time and customers can get the best deal just by clicking on their PCs.

Chapter 2: Web Application Development Environment

Web application development requires knowledge of Microsoft's Component Object Model, Object Linking and Embedding Database (OLE DB), three-tier architecture of DCOM, Internet Information Server, ASP, SQL server, Site Server, Index Server, Simple Mail Transfer Protocol (SMTP) Server, Microsoft Transaction Server and Microsoft Access. Web database is accessible via ODBC techniques. ODBC provides an interface that allows applications to access data from different data sources by using SQL statements. Microsoft provides software Visual InterDev 6.0, which enables testing, and debugging of the Web database.

2.1 Active Server Pages Technology

ASP is a powerful scripting tool used with Web database, it enables creation of dynamic, fast, and interactive Web sites regardless of the browser capabilities of the client. This is an alternative to client-side scripting. ASP is an open, compile-free application environment in which it is possible to combine HTML, scripts and ActiveX servers' components to create dynamic and powerful Web-based business solutions. ASP enables server-side scripting for IIS with native support for VB Script and Java Script. ASP evolved into an open technology framework. Using any languages however VB Script is the most common one can create ASP pages. ASP was introduced with IIS Version 3.0. It is Microsoft's alternative to CGI scripts and Java Server Pages, which lets web pages to interact with other program databases. ASP is Microsoft's technology for creating dynamic Web sites and is one of the most popular tools of building web sites. An ASP file has an "asp" extension instead

of "htm" or "html" to denote server-side code to the hosting Web server. Because an ASP file is a text file with the extension "asp" that contains a combination of text, HTML tags, and ASP script commands, we can use any text editor to create or change an ASP file. ASP runs on four platforms: PWS for Windows 95-98; PWS for Windows NT Workstation; IIS on Windows NT Server and Chili! ASP for various Platforms. Each of these platforms has little differences in functionality, with IIS being the most powerful Web server available from Microsoft.

2.2 ASP Application

ASP application runs in a thread, which is the smallest unit of execution of a process. It provides a better solution than CGI for web applications in Windows environments. ASP applications run many times faster than their CGI counterparts and can incorporate HTML pages, forms, scripts and ActiveX Components. A group of many related ASP pages have following significant approaches.

- Global scope for the application
- Instance of object shared among pages in the application
- Events trigger special application scripts
- Every application can be executed in its own memory space
- An application can be stopped without affecting the other
- An ASP application can have only one Global.asp file.

2.3 Global.asa File

The Global.asa file contains events that are activated when Application and Session objects are created (_OnStart) and destroyed (_OnEnd). The Global.asa file is located in the application's root directory and has following characteristics:

- Global.asa file is an optional file and one application can have only one Global.asa file. This file creates global objects and variables used in application and perform processing when application and session events occur.
- Global.asa file can contain other script routines, which are only accessible from within the file. It cannot be referenced from other ASP pages in the application.
- Global.asa name must be given to the file for use and be placed in root directory of the application.

2.4 Global.asa Event Routines

- **Application_OnStart:** Occurs when the first user access web application for the first time.
- **Application_OnEnd:** Occurs after the last user's session is terminated.
- **Session_OnStart:** Occurs when each user first accesses the web site. Useful in retrieving personalised information.
- **Session_OnEnd:** Occurs when each user's session time out. The default timeout is 20 minutes after the users last request.

2.5 ASP Objects

ASP environment includes several built-in objects that let script developers access many aspects of the Internet server-side environment that traditional CGI scriptwriters are accustomed to. ASP has also enhanced the traditional CGI server side of the Web, by providing a way to keep track of a user's session. This means that developers have a method to create powerful, dynamic and Web-based solutions using the language that developers are familiar with. ASP build-in objects can be used without declaring them in the ASP Scripts. When a user requests an ASP object through URL, the event results in the creation of a Request object. And when the server receives the Request object, it responds to the request, resulting the creation of Response object. The Application, Session, Request, Response, ObjectContext and Server objects are the basic and most important ASP objects, which are explained below.

2.5.1 Application Object

Application object stores application wide state information. It shares application-level information and control settings for the entire life of the application. Scripts, which run in an application, can share information across all user sessions. Application object is used to create variables that are shared by all users of the application. An application includes all files and directories in a Web Servers Virtual Directory.

2.5.2 Session Object

Session objects maintain information on a per-user basis in this object. A session is the personal storage of each user visiting the site. It stores information about the change settings for the user's current Web-server session. Session objects store information in cookies at the user machine. Therefore, only browsers that support cookies can maintain the Session State. Session is the continuous usage of an application by the same user for a period of time. We can store information for a particular user in the Session object. When using the Session object, all value stored in it will remain on the Web server until the session expires. Session objects has following properties and methods:

- **SessionID**: Returns the session identification, which is guaranteed to be unique only as long as the Web server is not restarted.
- **TimeOut**: The maximum time of user inactivity until the session considered abandoned, measured in minutes.
- **LCID**: The locale identifier, which can be read and set for the session.
- **CodePage**: The code page that will be used for symbol mapping
- **Abandon**: The method when called in, destroy the Session Object and releases its resources

2.5.3 Request Object

Request Object consists of all information that is passed to the server from the browser. And allow access to data that has been sent with forms. They are used to

get information from the user. Data used with request object comes with predefined property collections as follows:

- **Client-Certificate**: a collection of certificates identifying the requesting browser
- **Cookies**: a collection of http compliant cookies or pieces of data sent from the browser
- **QueryString**: a collection of variables for the current form
- **Form**: a collection of named variables for the current form
- **ServerVariables**: a collection of Web server-based variables

2.5.4 Response Object

The Response object delivers and controls data being sent back to the user's browser. With this object scriptwriters, we can control several aspects relating to how this information is sent back, in addition of controlling what gets sent back to the user's browser. Response object writes HTML and various other information, including cookies and headers, back to the client.

2.5.5 Server Object

Server object provides server functionality for use in ASP. These Objects can make access to methods and properties available on the server. CreateObject method is one of the most useful methods of Server object, which is used to create instances of ActiveX server components available on the server. There may be any component available on the server as an ActiveX Automation server, such as those that come with ASP, from third party, or custom built.

2.5.6 ObjectContext

ObjectContext allows committing or aborting transactions, which are managed by Transaction Server.

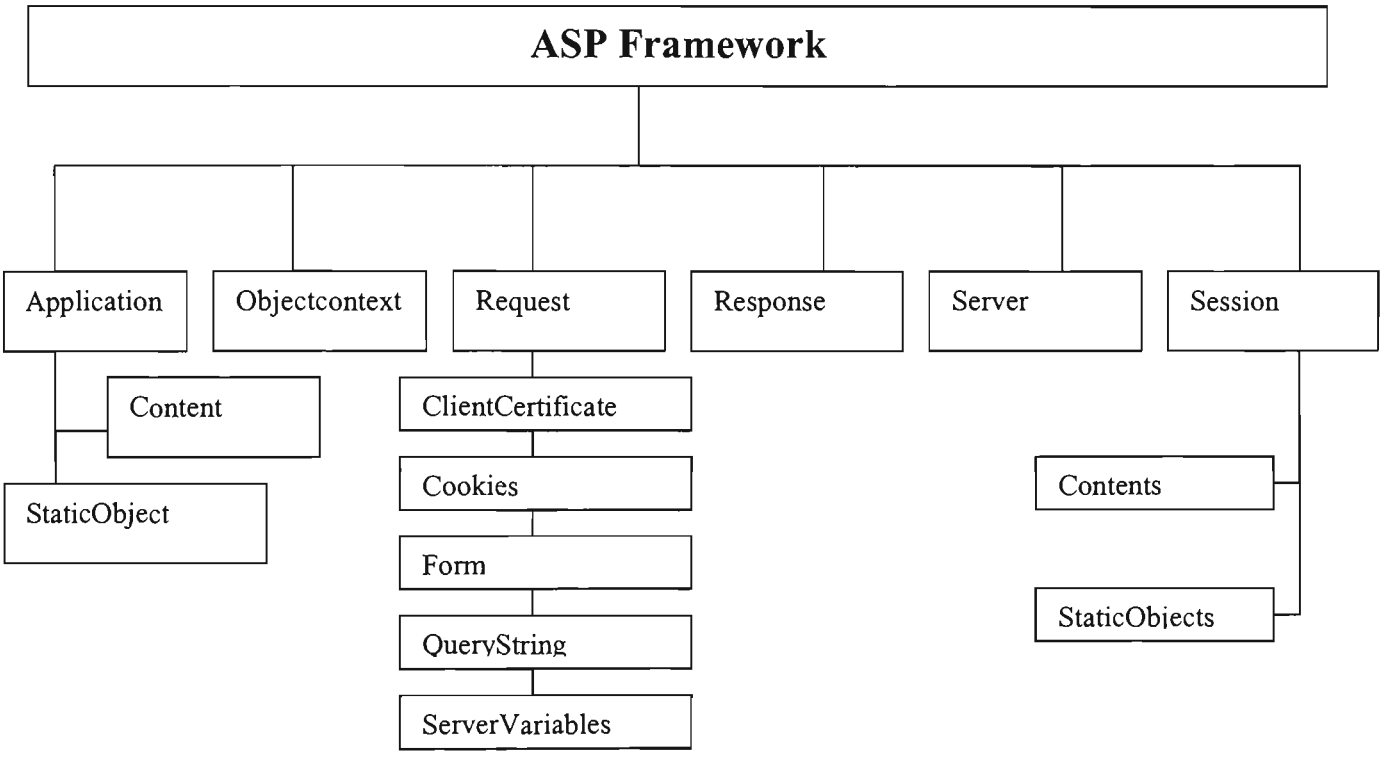


Figure1: Inherited Objects from ASP

2.6 How Active Server Pages work?

When a user requests a page from the server, the Web server checks the file extension to see whether a special program (such as the Active Server Pages engine) must be invoked to process the request. If there is an "asp" extension, the Web server determines that it should invoke ASP to process the requested page. In case

the page was not requested before or was changed since the last request, then that must be parsed and the syntax checked and compiled by the Web server. Otherwise, the page might be read from a cache of recently processed pages, which aids in performance. During the parsing process, the HTML and scripting code are separated. IIS determines which scripting engine is responsible for which part of the script and delegates the work of syntax checking and compiling to the proper scripting engine.

All objects that the language engine cannot handle are requested from IIS, which is also responsible for handling inputs and outputs for external ActiveX Objects that are created and used inside the script. If it is not able to supply the object, an error is generated. Script output and static HTML code in the ASP file are merged and the final HTML is send back to the user in an HTTP response.

The users request is sent to Web server by the browser. The Web server then grabs the page from the hard drive or memory and the entire page is then processed by the Web server and the scripts in the page are executed as a result of which HTML page is created and is sent to the browser.

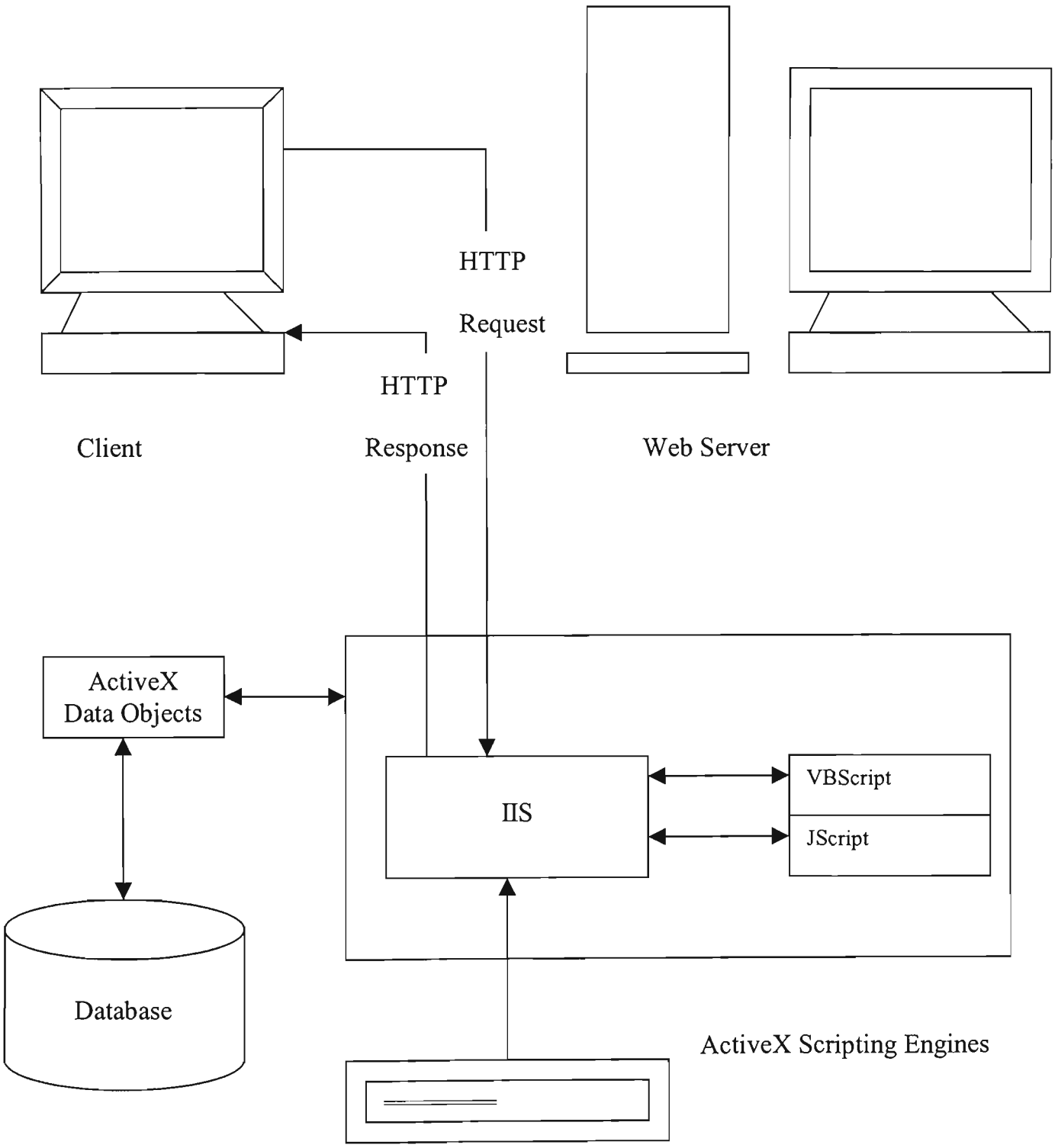


Figure2: Processing an ASP request

2.7 Database in Web Applications

The database in web applications can be accessed by using following technologies:

2.7.1 ActiveX Database Objects (ADO)

ADO provides high–level interface for data of all types. It provides consistent and high- performance access to the data whether to create a front-end database client or middle-tier business object by using application tool or the browser. ADO is the single data interface we need to know for 1- to many client/server and web server data-driven solution development. It provides the interface between database and Active Server Pages (ASP). ADO is a set of interfaces through which we can access OLE DB from any language, and since ADO is application-level data access object, it is easy to use programming-language neutral, provider neutral, and also allows simple access to underlying OLE DB. ADO also provides many objects that help to connect to database and manipulate its data.

ADO can be accessed in VBScript, JavaScript and any other language that handle objects, since it is programming-language neutral. Because ADO is provider neutral, we can use various providers to access the database, where we employ a fast low-level provider like OLE DB for SQL server or a comfortable provider such as ODBC.

2.7.2 Object Linking and Embedding Database (OLE DB)

OLE DB provides low–level interface to data across the organization. It is an open specification designed to build on success of ODBC by providing an open standard for accessing all types of data. OLE DB is a system-level programming interface, which provides access to various information and data sources located anywhere. Since OLE DB is a system-level, the programmer has full control over all interfaces.

OLE DB data can be located anywhere, in database, files or other sources. OLE DB designed to build on the success of Open Database Connection when providing an open standard to access data. It's also designed for relational and non-relational information sources. OLE DB provides high-performance access to any data source, including emails, file systems, text, graphics, custom, business objects and many more databases. Microsoft's ODBC industry-standard data access interface provides unified way to access relational data as part of the specifications of OLE DB.

2.7.3 Open Database Connectivity (ODBC)

ODBC is an open standard that provides a common set of widely accepted Application Programming Interface (API) calls to manipulate database. ODBC provides an interface that allows applications to access data from different data sources. It is based on Call-Level Interface (CLI) specifications from X/Open and ISO/IEC for database APIs and uses SQL. ODBC is an open, vender-neutral way to uniformly access data stored in various formats and databases. It is very widely used interface to access relational data. ODBC makes possible to connect to MS Access, MS SQL Server, Oracle. Written applications make ODBC calls to work with many databases, instead of writing programs specifically for a particular database. ODBC uniformly access data stored in different databases with different format.

2.7.4 Microsoft Data Access Component (MDAC)

MDAC contain all software components for data access. It is the collection of software components that can be downloaded from Microsoft site and install on computer.

2.7.5 Remote Data Service (RDS)

RDS is a collection of objects that enable us to communicate with data providers located on remote machines or in separate processes. RDS can be used within Microsoft Internet Explorer to retrieve data from database on Internet.

2.8 Introduction of ADO Object Model

ADO model is one of the best models of Microsoft data access. It is designed, as an easy to use application level interface to Microsoft's most powerful data access paradigm. ADO is implemented with a small footprint, minimal network traffic, and minimal layers between front end and data source to provide a lightweight, high-performance interface. ADO is called using a metaphor, OLE Automation interface, which is available from any tool and language in today's market. ADO can be related with other components as follows:

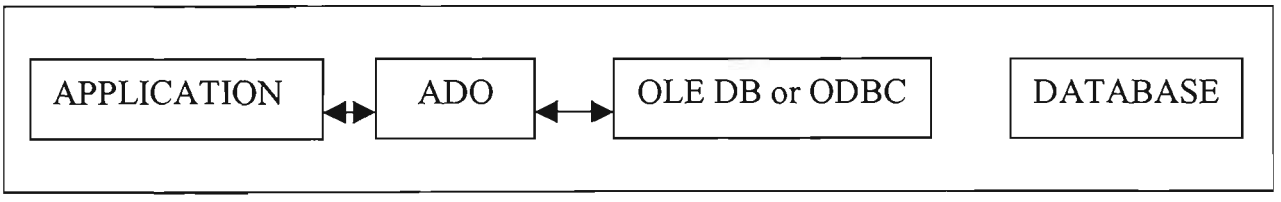


Figure3: ADO's relationship with other components

2.8.1 ADO Objects

Following are the main ActiveX data Objects:

- **Connection Object:** Represent every features of a connection to a database. We must open a connection with the connection object before we can

communicate with a data source. A connection object is used to communicate with database such as MS Access.

- **Recordset Object:** Represent rows of data returned from the data source. Consist of records returned from a database query and a cursor into those records.
- **Command Object:** Represent a command that can be executed against a data source. Provide the possibility to define specific commands that intend to execute against the database several times with changing parameter.
- **Property Object:** Contain dynamic information about an ADO object provided from the underlying provider.
- **Field Object:** Contains data from a single column and information about this data.
- **Error Object:** Contains extended error information returned from the provider.
- **Parameter Object:** A single parameter associated with the command object based on query or stored procedure.

2.8.2 Data providers

Data providers are the connection link between the database and the data consumer. It represents the database for a data consumer for any application. The objects, which are used in most scripts with database access, are Connection, Recordset, and Field objects which can be related as follows:

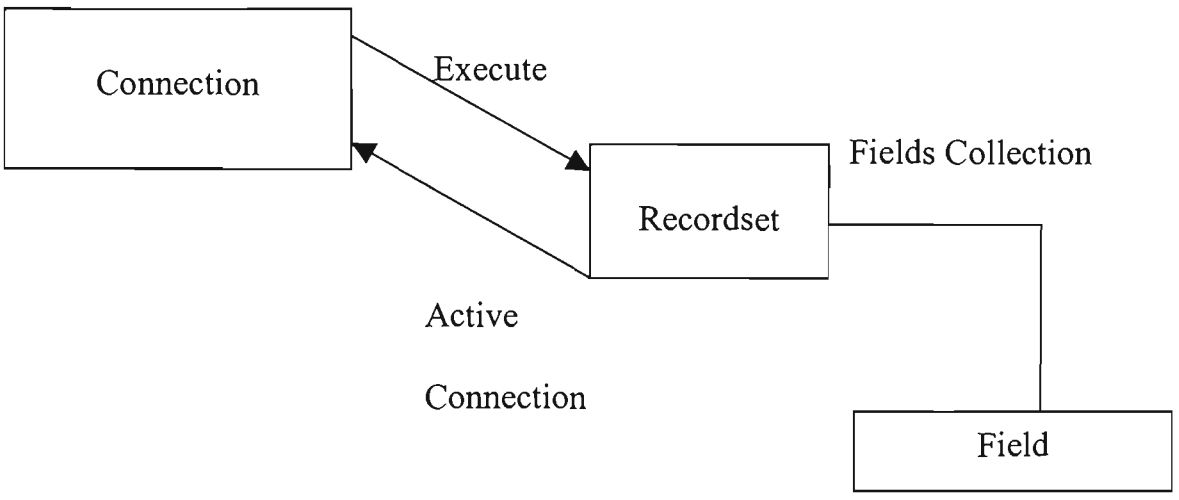


Figure4: Relationship between Connection, Recordset and Field Objects.

2.8.3 Microsoft Access

Microsoft Access 95-98 is a Microsoft relational database product for Windows 95-98 and Windows NT. It is available as a part of the Office suite of products. Microsoft Access provides a strong suite of querying capabilities and can be programmed by using ASP. Microsoft Access also provides OLE DB and ODBC support, enabling links to spreadsheets, documents, and other database.

2.8.4 Data Access and Data Link

Microsoft Access System is used to create the database by following steps:

- Create the database
- Create tables with attributes
- Establish relationship between tables
- Establish queries
- Transfer query codes to the program

2.8.5 Create Database in MS Access

- Start, Programs, and then Microsoft Access
- Check the Create Blank Database radio, and click OK
- Choose directory and type database name
- Click create button.

2.8.5.1 Create Tables

- Start open database, and then click 'New' button
- Check Design new to create the table and click OK
- Empty design table containing Field name, Data type and Description will appear
- Enter field name and select data
- Enter optional field description
- Create primary key. Bring cursor on selected field and click primary key button
- Save the table.

2.8.5.2 Establish Relationship

- Open database
- Click Tools from the tool bar
- From show tables select the required tables and click Add button
- Click Close button

- For relationship between two tables, drag primary key from the first table to foreign key of the other. A table relationship screen containing names of two tables, primary, and foreign keys will appear
- Click checkbox beside Enforce Referential Integrity and press Create
- Two tables will appear on relationship screen with relationship in between.

2.8.5.3 SQL Statement

1. Open MS Access database.
2. Change to Queries tab.
3. Click 'New' button to create new query.
4. Click OK in new query window to create new query in Design View.
5. Add desired tables for query by choosing in the Show Table window and click Add button.
6. Close the Show Table window.
7. The join with a line between fields of the tables, joins the tables together
8. Drag and drop the desired fields in upper frame into field row of the first column in the lower frame.
9. Drag and drop the desired fields in the field row of the second column of the lower frame, and go on for all fields needed in the query, which can be dragged from any tables and added. The aggregation function, count function, adding criteria etc can also be used. The SQL statements can be used in ASP script.
10. Save the query.

2.8.6 Data Access

To execute an SQL command within ASP and to display results in an HTML involves the use of ActiveX Data Objects (ADO) to establish connection to the data source and to manipulate its data. This can be accomplished under following steps:

2.8.6.1 Open Connection to Data Source

First of all create a connection object and use that object to establish connection to the data source. To create connection object, we use Server object's CreateObject method and then we invoke the Open method of connection object by giving the name we select during ODBC resource set up.

<% SetCon=Server.CreateObject("ADODB.Connection")%>

<% Con.Open "DSN" %>

2.8.6.2 Execute SQL Command

After establishment of connection specify SQL statement to execute. SQL statements are assigned to a variable with following syntax:

<% strQuery = "SELECT * FROM PRODUCT" %>

With SELECT query, Execute method returns a Recordset object that contains data which can be accessed by:

<% Set rsInfo = Con.Execute(strQuery) %>

For UPDATE, INSERT or DELETE , we can simply Execute the method:

<% Con.Execute ("DELETE FROM PRODUCT WHERE" & "Product.name='Mango'") %>

To retrieve all records by order, we can specify:

<% strQuery = "SELECT * FROM PRODUCT ORDER BY name"

Set rsInfo = Con.Execute(strQuery) %>

2.8.6.3 Retrieve Information

With SQL SELECT statement, the execute method provides forward-only Recordset object, so a while loop based on EOF property can be used. The EOF property is automatically appended to the end of every recordset. Which doesn't contain any data. It is to inform that the code that it has reached the end of the records contained in the Recordset. Following is the syntax:

```
<%
        Do While Not rsInfo.EOF
        Response.Write(rsInfo("Name"))
        RsInfo.MoveNext
        Loop %
%>
```

The Recordset object references the first row of data that is the result of an SQL command. To move to the next row, we call the MoveNext method. When this method advances past the last row of data, the EOF condition becomes True, which results in breaking out the Do-While loop.

<% Do While Not rsInfo.EOF %>

<% rsInfo.MoveNext Loop %>

2.8.6.4 Close Objects

In the end, invoke the Close method on both objects to nullify any reference and to free system resources. To eliminate the object completely from memory, its variable is set to nothing.

```
<%

rsInfo.Close

Set rsInfo = Nothing

Con.Close

Set Con = Nothing

%>
```

We do not need to close the open connection every time when using ASP, because ASP finish processing and closes it automatically.

2.8.6.5 Send Data

When a user clicks the submit order button, the data are sent to the database, the Transaction Server checks transfer of the data and enable the staff to let them know that the Web is being presently accessed. Working of database connection is determined by following syntax:

```
<%@ TRANSACTION=Required Language=VBScript %>

    If    objDBConn.Errors.Count > 0 Then

        ObjectContext.SetAbort

    End if
```

2.9 ASP Summary

Active Server Pages (ASP) is easy, exciting and one of the most powerful technology used for Web applications. It extends standard HTML by adding built-in objects, server-side scripting and by allowing access to database and other server-side Active X components. ASP includes executable scripts integrated with HTML files. HTML development and scripting development become the same process, enabling us to focus directly on the look and feel of our Web site, weaving dynamic elements into our pages. ASP makes server-side scripting available to users of various programming skills levels. By learning a little VBScript and embedding the code within Web page, the user who is not a programmer can achieve professional results. It translates into tangible benefits, enabling Web providers to provide interactive business solutions.

Chapter 3: Design and Development of Agriculture Online System

3.1 Introduction

This chapter presents the design and development of Agriculture Online System. The design of Agriculture Online System consists of ASP pages and is based on database technology. The requirements specification, hardware, and software requirements and analysis of the requirements are focussed. The detailed design issues, designing Web page contents, structuring Web pages and database connectivity are described.

3.2 Requirements Analysis and Definition

Every software project starts with requirement analysis. Requirements serve various purposes for software development, and it defines the aims. Software requirements serve as the basis for all the future design; coding and testing that will be performed on the project. The requirements start out as high-level general statements about the functionality of the software as is perceived by the user. Requirements are further defined through performance, look and feel and other criteria. Requirement is an ongoing process. The ability to track the requirements is a key process area in software development. Requirements are defined, as the characteristics that identify the accomplishment levels needed to achieve specific objectives for a given set of conditions.

3.3 Requirement Management Tools

Steven and Martin 1995 define requirement management as the identification, derivation, allocation and control in a consistent, traceable, co-relatable, verifiable manner of all the system functions, attributes, interfaces and verification needs that a system must meet. Requirement management if performed well, reduces the time of developers and reduces errors and eliminates mix-up versions. Jones et al 1995 found following features for the requirement management tools:

- Identification of each individual requirements.
- Assigning destination and sorting of requirements.
- Group collection revision identification.
- Provide basic data interface like document import/parsing tool, analysis tools, publication tool, database/data files and engineering design tools.

3.4 Requirements Specification

The objective of the project described in this thesis is to provide agriculture online services to customers. In the proposed project an online store will provide facilities where customers would be able to search agriculture products and would be able to buy agriculture products online. Customers will also be able to visit other specific sites for more research on any particular product. The user can also utilise the e-mail system for any query or feed back about the system.

The organisation can maintain the database; they can insert, display, modify, and delete data. They can also retrieve the order details submitted by the client, read, and send e-mail.

We can extend the capacity of the technology for distributed applications and easy database connection, which is provided by distributed COM, to match the requirements of our clients.

Using database on the Web, some navigation may hide in the database, and this happens due to the user needs.

3.5 System Specification

Collecting specification during requirement analysis creates system specification. System specification specifies the technical requirements of the systems very clearly, completely and consistently. System specification is the foundation of the project and is input to and output from the system. It also includes information on maintenance and feasibility concepts as described below:

3.5.1 Maintenance

After every system is built, all the steps required for the build up of the software including specification, planning, design, testing and documenting of the software needs to be maintained. During the software maintenance three main activities of error-correction, modification and enhancements are included in the title software maintenance. The important qualities for system maintenance includes minimum error, well designed well-structured, well-documented and reliable software.

3.5.2 Feasibility

Feasibility plays an important role in measuring of how practical, beneficial and economical, the system is. It is measured throughout the life of the system because of the changes in the complexity and scope of the system. A system, which is

feasible at one time, may not be feasible at another time because of constant changes in demands and requirements with the time. Feasibility can be of following types and should always be kept in mind while designing any system:

3.5.2.1 Technical Feasibility

Technical feasibility measures the availability of resources and expertise to run and maintain the system. The technology required for Agriculture Online Service already exists and is used by many other business organizations. All development tools of hardware and software required for the implementation of the systems are available in the market. The users skills are good enough to run the system, therefore there will not be any technical problem to run the system online.

3.5.2.2 Economic Feasibility

Economic feasibility measures cost–effectiveness of the project. For the development of Agriculture Online System, the cost of software and hardware, the charge of the ISP and the labour cost can be found out in the market. Since the software and hardware are easily available at competitive price and the technology is already in the market, it is therefore economically feasible. The small business will use this system to meet the growing demands of e-commerce, which is becoming much more popular as more and more people are turning to Internet for their day to day business needs.

3.5.2.3 Legal Feasibility

Agriculture Online System is a standalone application and is used to provide Agriculture Services online to clients. This system is developed as a new, one-stop shop and it does not violate any copyright rules. The customers would be able to

access the system online and would be able to buy agriculture products online without being worrying about the privacy of their personal information which will be protected under the privacy act and will not be revealed to any unauthorized person. The system is legally feasible.

3.6 System Design

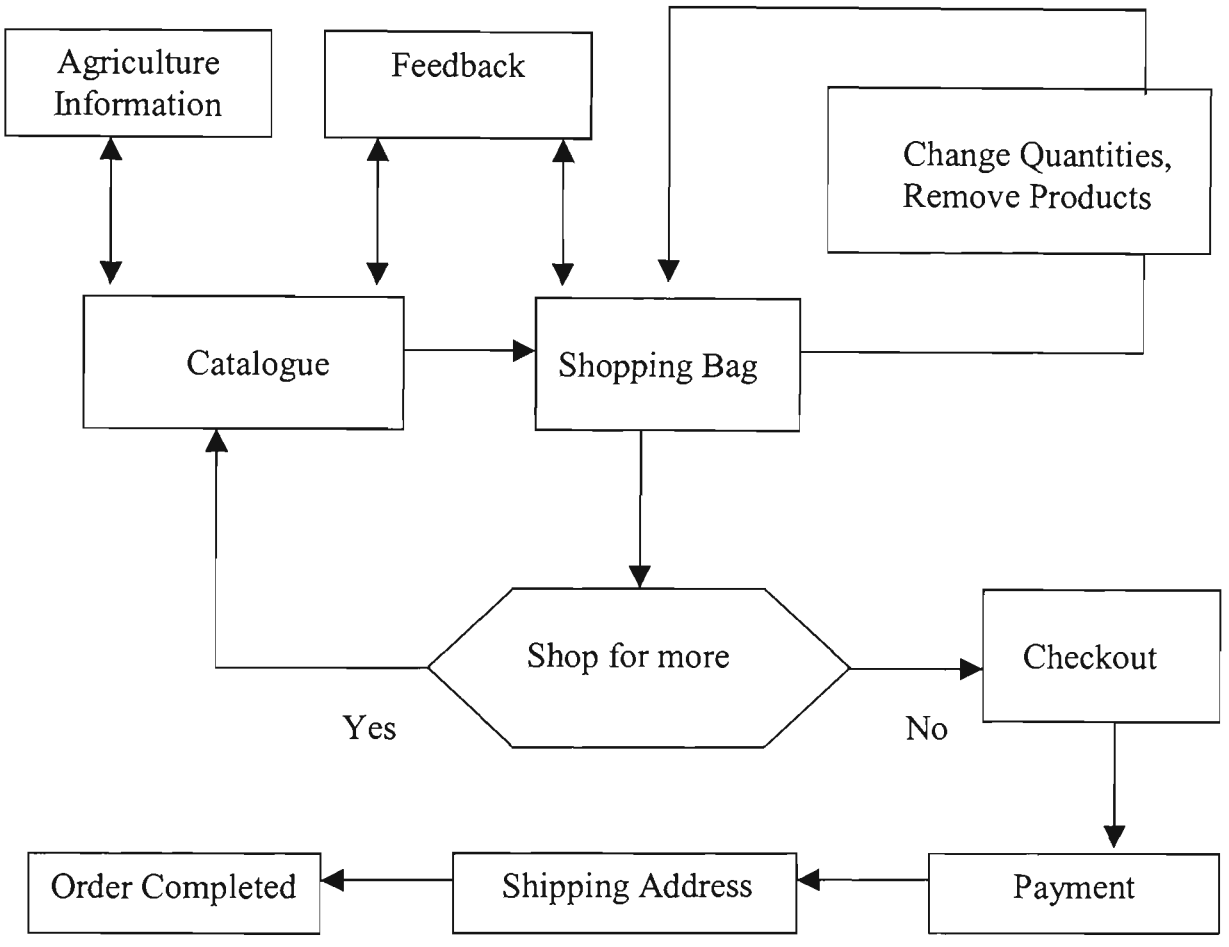


Figure5: Agriculture Online Service System Design.

3.6.1 The Store:

Customers can browse the catalogue and add products on the shopping bag. They can search for any product-by-product name or category of products by category name. They can change product quantities and go for more shopping or to checkout.

At checkout customers arrange their method of payment and provide the address where the product will be shipped.

3.6.2 The Catalogue:

An online catalogue will give customers the idea about present products in store. A customer would be able to search the catalogue and select the product he/ she wishes to buy.

3.6.3 Shopping Bag:

Customers can add one or more products to the shopping bag and they can also change product quantities or remove products from the shopping bag, should they change their mind.

3.6.4 Checkout/Payment:

After shopping is completed the customers will proceed to checkout to pay for their shopping. The customers can pay by credit card and supply the shipping address. The product will then be sent to the destination.

3.6.5 Agriculture Information:

Customers can get specific information on agriculture products. The specific agriculture sites are linked to various categories of products that would assist with customer's inquiries.

3.6.6 Feedback:

Customers can send their feed back about the service they receive or any concern or suggestions they would like to put forward. They can send their feedback online or by fax, phone or email.

Internet Information Server 4.0 on Window NT has Simple Mail Transfer Protocol (SMTP). This service allows to send e-mails from Web pages like contact forms, support request form, and mass mailing and also to receive e-mail for server-side processing.

The messages are sent easily using (*NewMail*) object, which is provided by the Collaboration Data Object for Windows NT Server (CDNTS). We can send plain text messages, massages formatted with HTML, on-line images and e-mail with attachments.

There is another feature that can be used only via (*Session*) Object of CDNTS; which is retrieving e-mails sent to accounts on the Web server. It is a convenient means of working with e-mail on the server side.

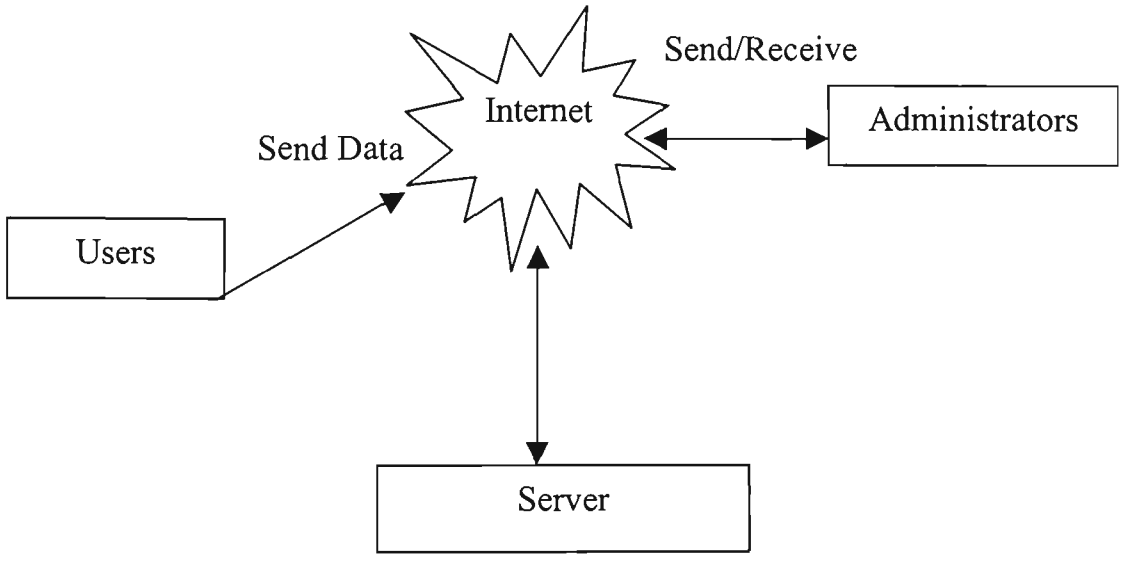


Figure6: Communication between users and administrators.

3.7 System Requirements

Following is the list of the software and hardware required for the project:

3.7.1 Software Requirements

1. Microsoft Windows NT Server Service Pack 4.0.
2. Microsoft Internet Explorer4.0, IE 4.01 is required for Personal Web Server.
3. Microsoft Windows Sever Optional Pack (includes Microsoft IIS 3.0 Or 4.0, FrontPage98 Server extension, Microsoft Transaction Server, Microsoft Index Server, Site Server Express, Certificate Server).
4. Microsoft Visual InterDev 6.0 and Microsoft Access.

3.7.2 Hardware Requirements

1. Intel Pentium II 350 MHz processor.
2. 64MB of RAM (128MB of Ram recommended).
3. Disk drives 2 GB.
4. CD-ROM 24X speed.

Chapter 4: Application of Agriculture Online Service System

4.1 Introduction

Agriculture Online Service (AOS) System consists of a number of Active Server Pages that are designed to work with each other in complete harmony. A user visiting the Online Service site starts with the Default.asp that is the first page of Agriculture Online Service. This page enables the user to search for any agricultural product-by-product name like mango or banana or by product category name like fruit or vegetable. This page also provides information to the user about Today's Discount products. With this page the user can start shopping immediately. The user can also navigate to other pages and ultimately visit other web sites to get more and specific information of their product needs.

4.2 Descriptions of Each Page of AOS

1 The first page of AOS is Default.asp that gives all the necessary information to the user. The user can start shopping immediately by selecting the today's discount products. The user can search the product from Default.asp page. The user can navigate most of the pages from this first page as those pages are linked together.

2 The second page is prodsearch.asp that gives the information of the product/s that is searched by the user. This page contains information about the product name, item number and price. The user can start shopping from this page as well. As every product has add to cart button on this page, which when clicked put the selected product to the shopping cart directly.

3 The third page is the shopcart.asp that contain information about the product/s currently added to the shopping cart and this page is displayed when the user add any product to the shopping cart. This page contain information on quantity, item no., item name, unit price and total price of the product. This page automatically calculates the total price and shipping charges for the selected product. A user can see the product list from this page as well.

4 The fourth page is submitorder.asp this page is displayed when the user clicks submitorder button. This page contains all the information of the product that the customer has bought and the information that the customer has entered. This page is the acknowledgement that contains the order number and the date on which the order was received. This is the final page for shopping purpose. This page is also linked to the first page and other pages as well.

5 The fifth page is agriinfo.asp. This page provides specific agricultural information. A user can select the product he/she is interested in from the listed headings and follow the link.

6 The sixth page is fruitsvegetables.asp. This page provides the information to the user about various vegetables their production, storage, seasonal availability and pests and diseases. This page is linked to various other web sites. By clicking any of the listed headings on this page the user can visit other sites, which specifically provide in depth information on most aspects of the selected products.

7 The seventh page is wheat.asp. This page contains links to various web sites. A user can go to other web sites to look for the current information on wheat crops.

8 The eighth page is rice.asp. This page is similar to the seventh page. From this page the user can directly go to other web sites which provide current information of rice crops and its management strategies.

9 The ninth page is sugarcane.asp. This page provides current information on sugarcane.

10 The tenth page is other.asp. This page provides general information on agricultural products. This page is linked to various useful sites and enables the customers to visit other sites to look for any other information they need.

11 The eleventh page is feedback.asp. This page gets the information from users about the feedback the user wants to give. Feedback can be sent online, or by other conventional methods like by post or fax. Users can also call the online service on the given telephone number.

12 The twelfth page is Header.inc. This page is attached to all the ASP pages. This page carries the AOS logo. First page appears when header page with logo is clicked.

13 The thirteenth page is Footer.inc. This page like Header.inc page is also attached to every ASP page. This page contains links to shopcart, agriculture information and feedback.

4.3 Relationship Between ASP Pages

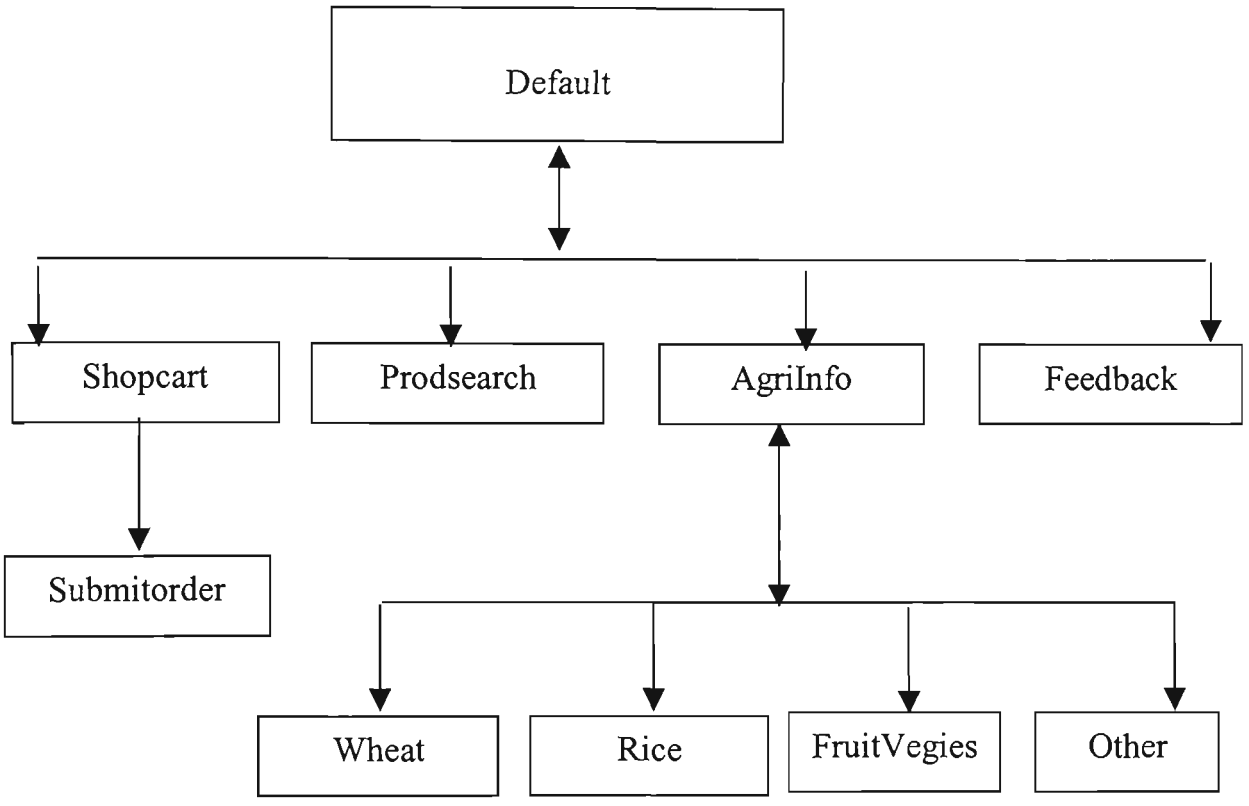


Figure7: Relationship between ASP pages.

4.4 Construction of Agriculture Online Service System

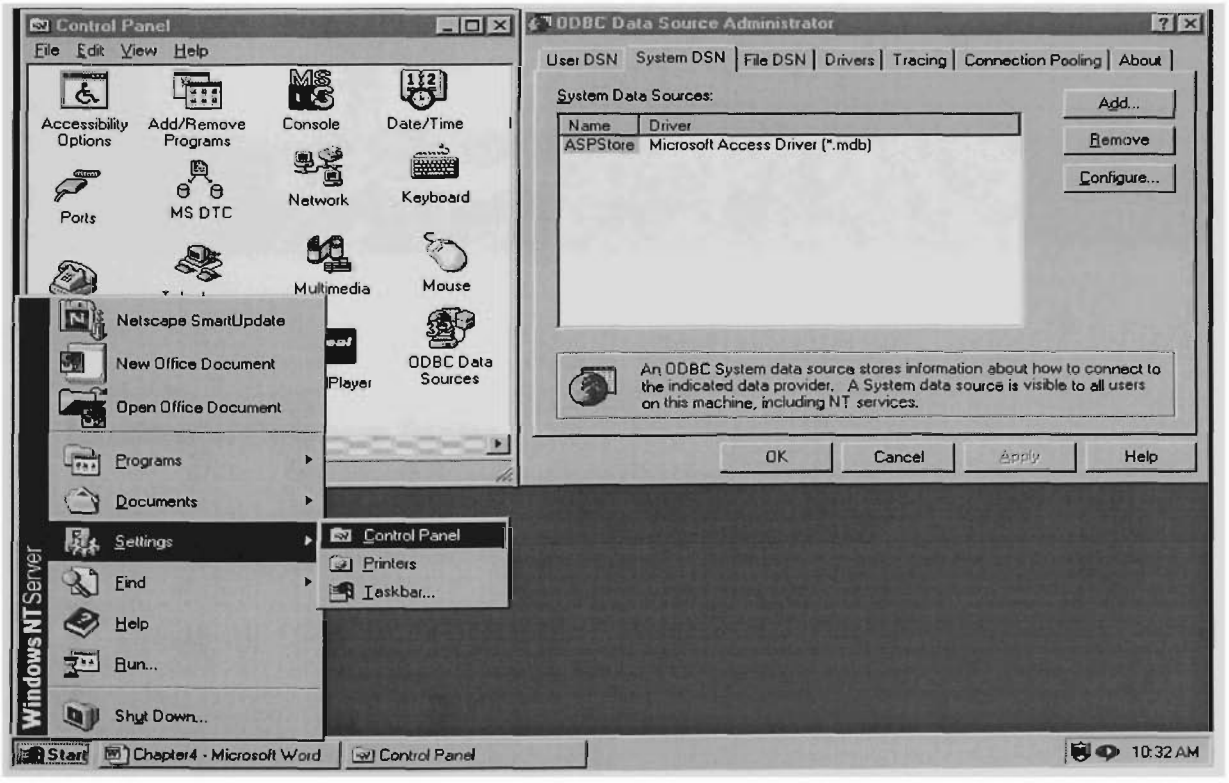
For construction of Agriculture Online Service System the following elements were used:

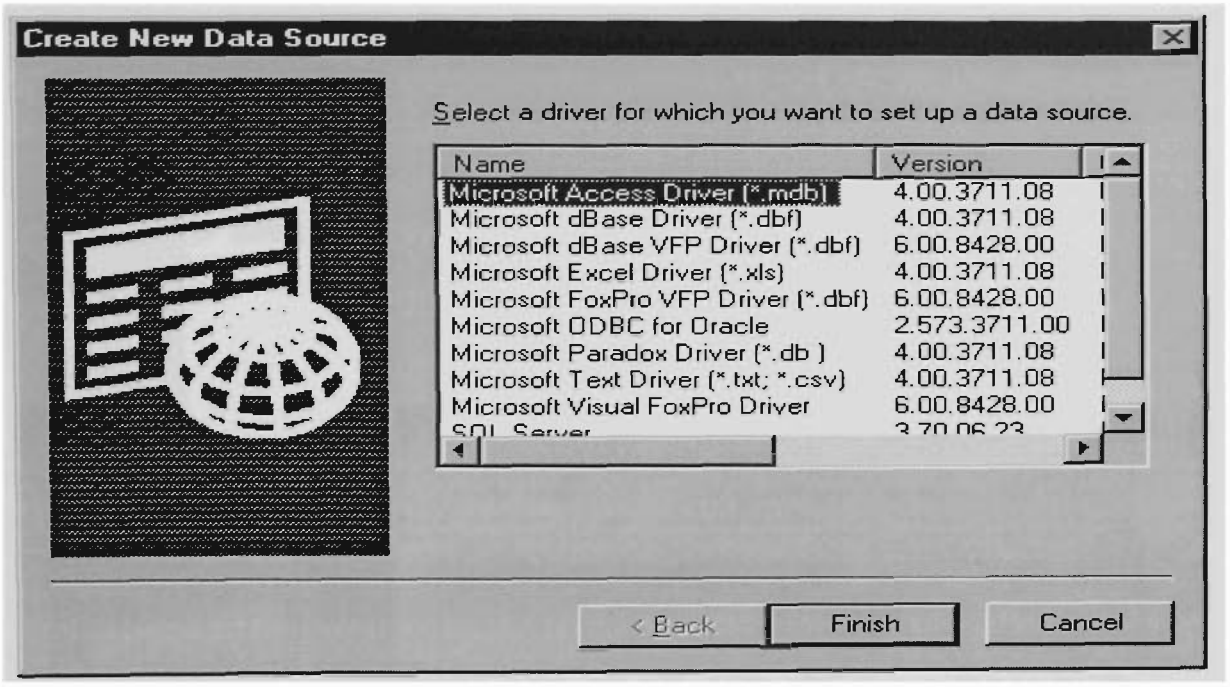
- Microsoft Access database
- Microsoft Internet Information Server (IIS) 4.0 that allows ODBC (Open Database Connectivity) on the Web server directly from the web browser to connect Microsoft Access database).

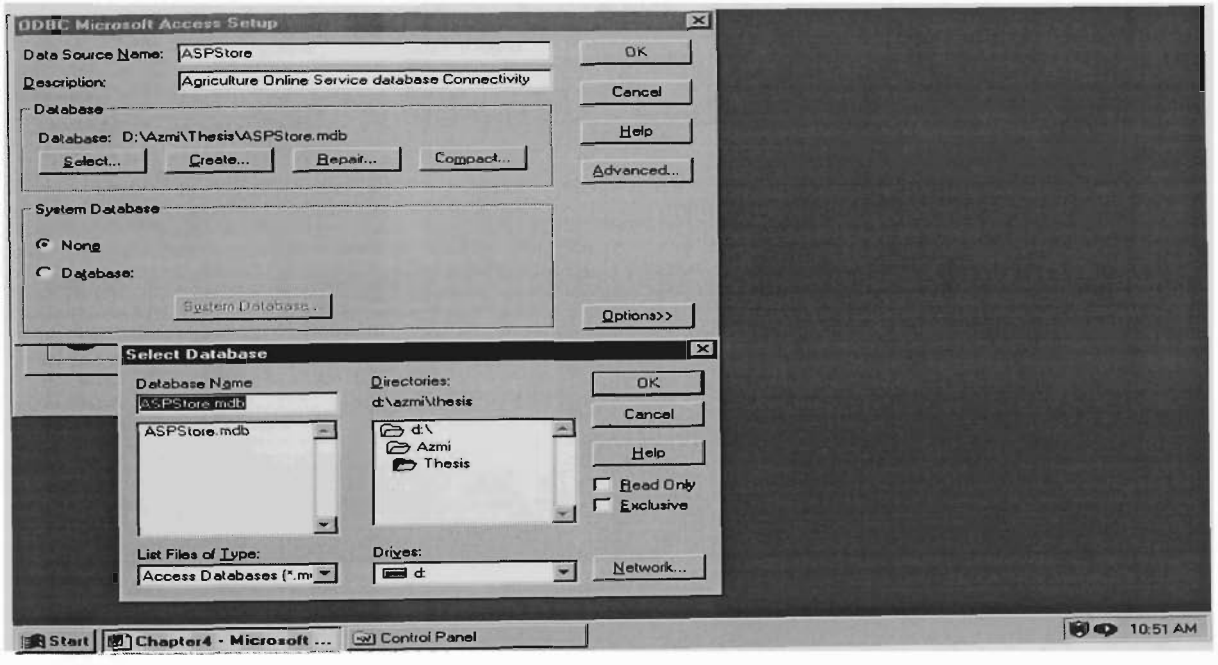
4.5 Installation of ODBC

Following steps are performed to install Open Database Connectivity (ODBC):

- From Start go to Settings, Control panel and click ODBC Data Source icon
- Click on System DSN tab
- Select Microsoft Access Driver and click add
- Select Microsoft Access Driver from the list and then click finish
- Double click Microsoft Access Driver
- Microsoft Access Set-up Window appears
- In Data Source Name text box write ASPStore and click on select tab
- In Database Name text box write ASPStore.mdb

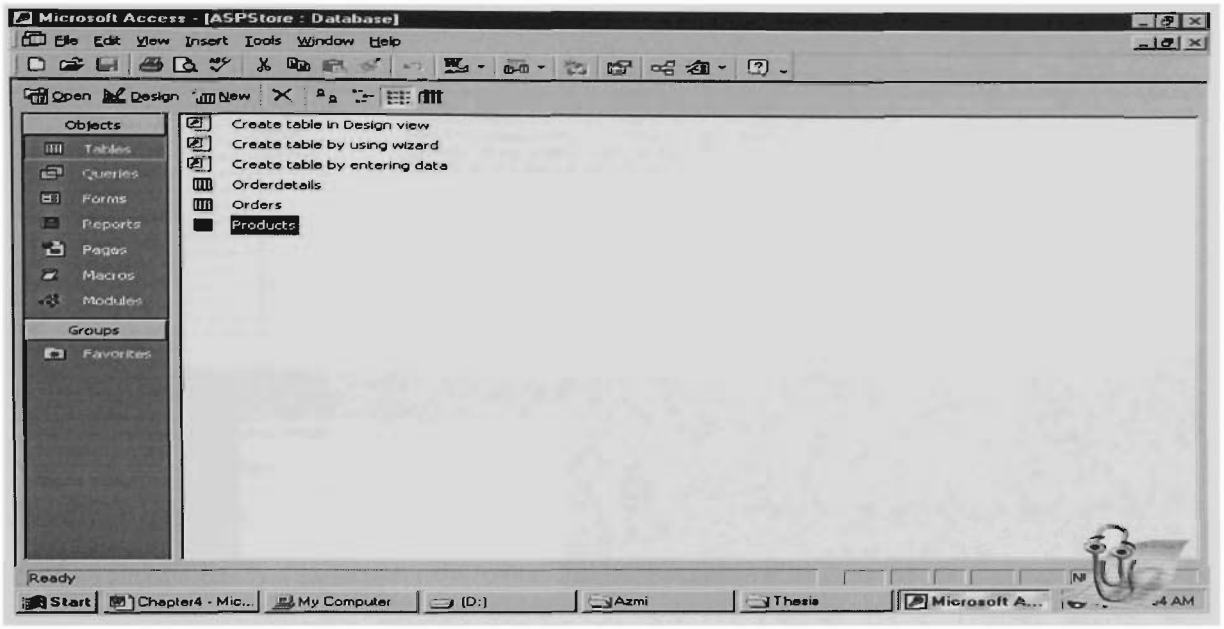


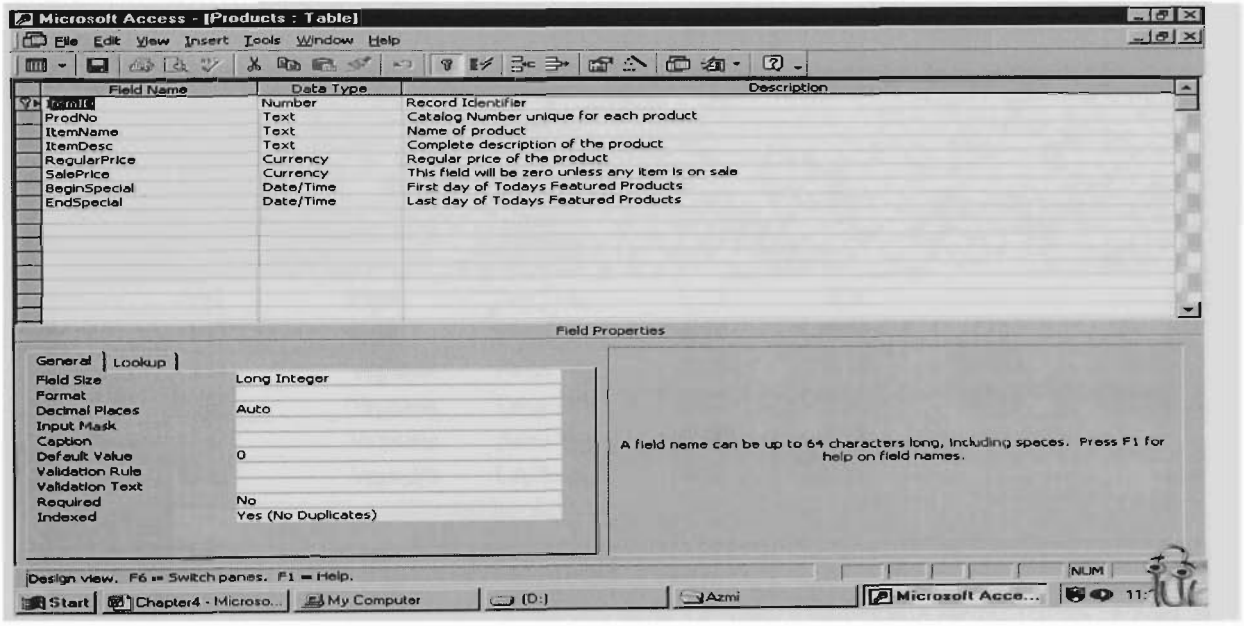


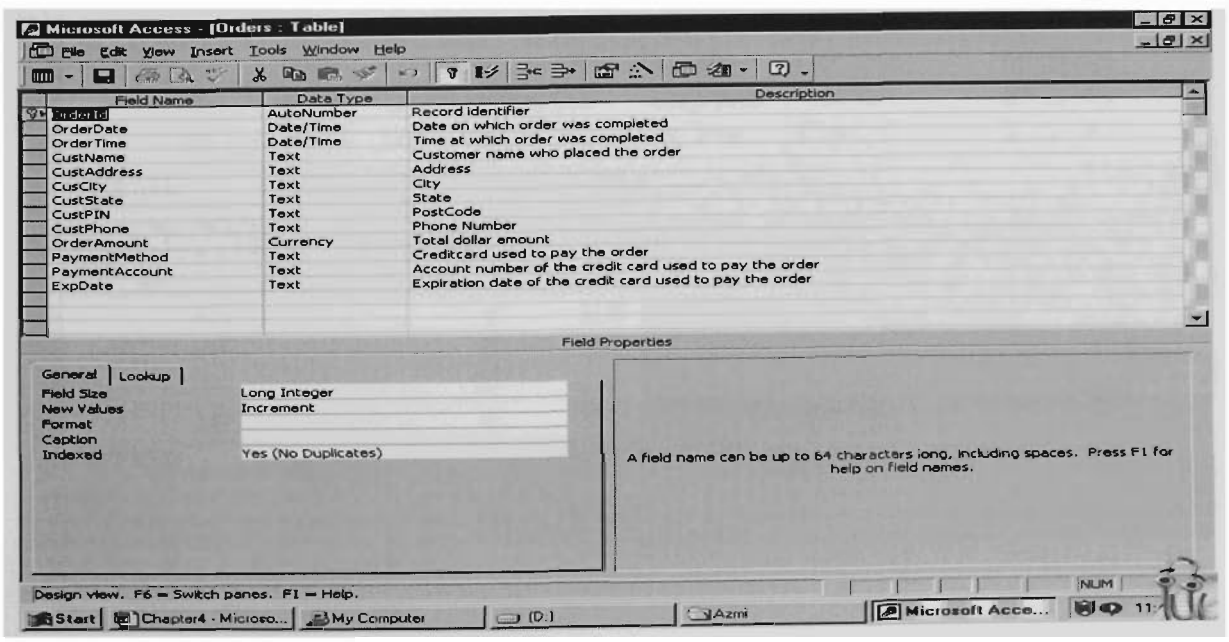


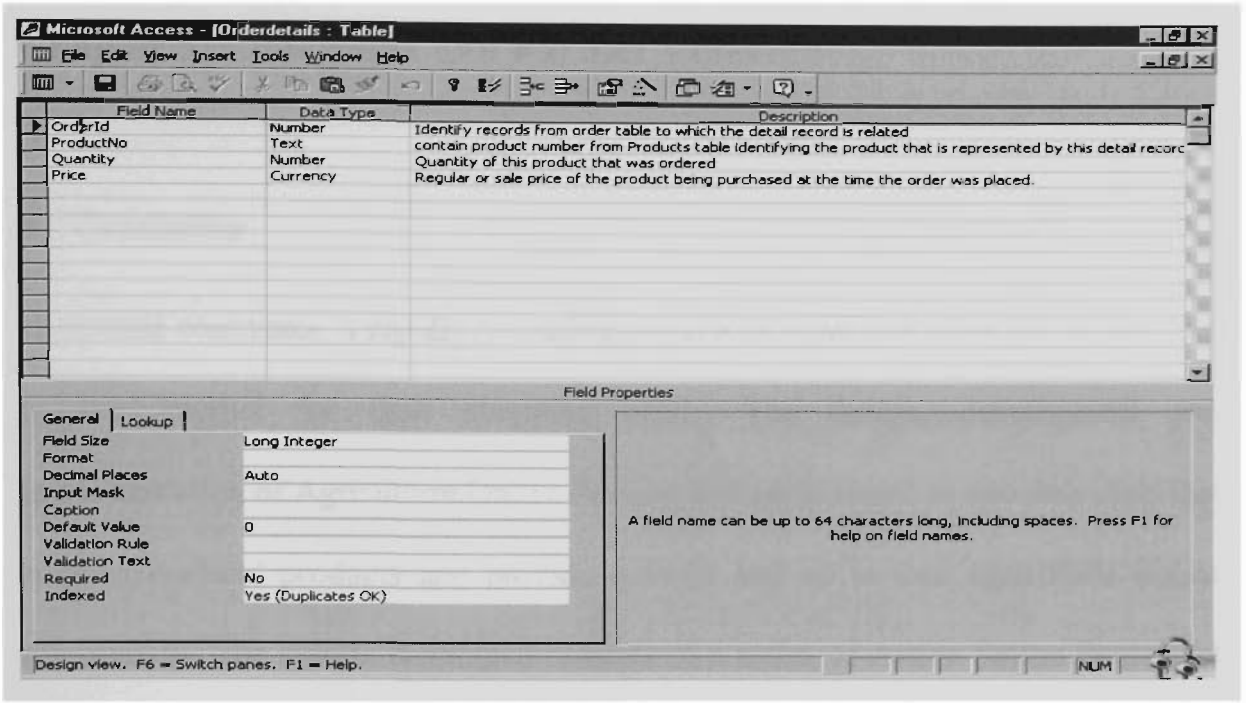
4.6 Creation of Database Tables

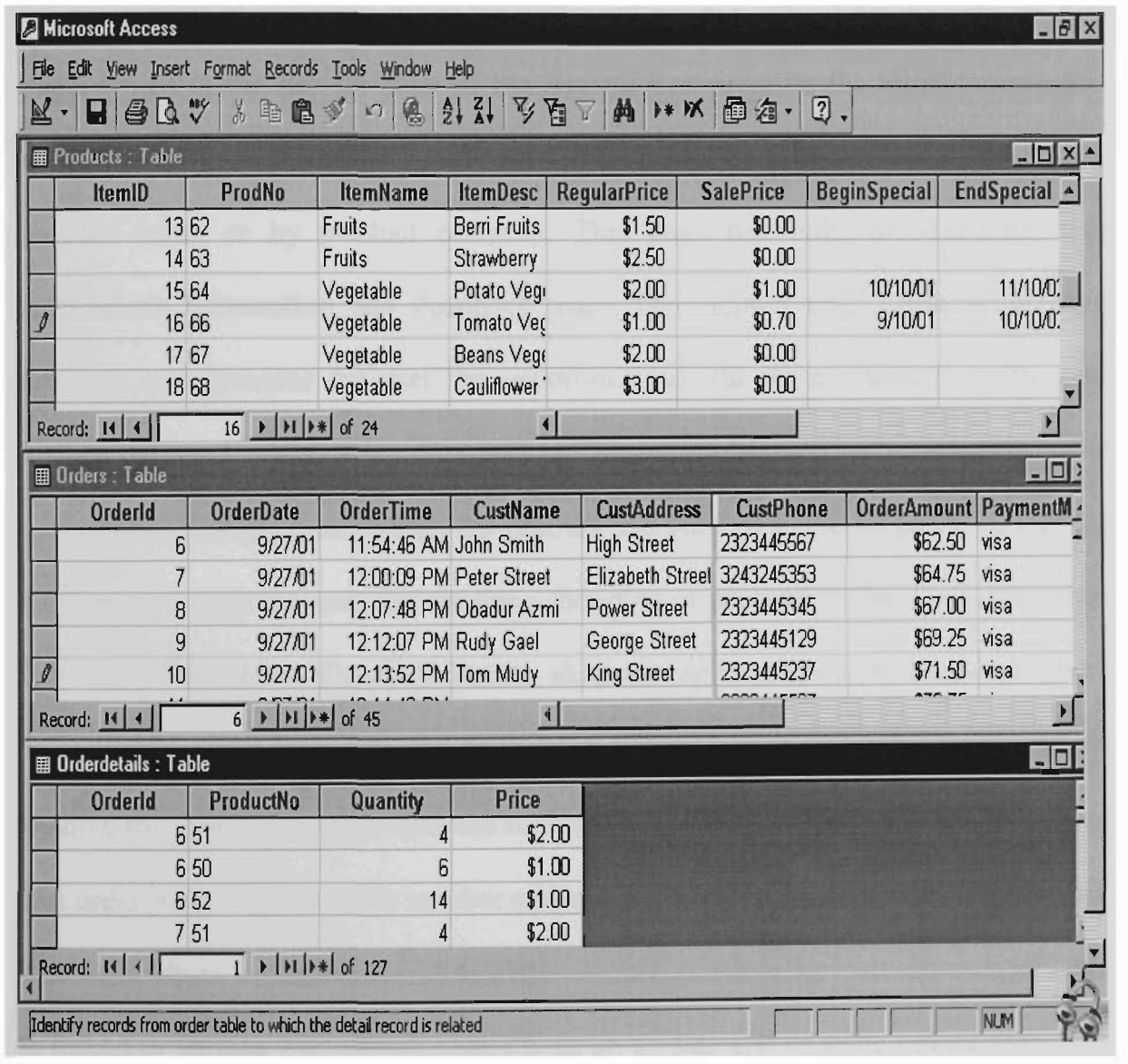
- Open Microsoft Access Database, select Tables and Click Design
- Create the table by specifying the Field Name, Data Types and Description as exampled below:


Microsoft Access - [ASPStore : Database]
File Edit View Insert Tools Window Help
Open Design New
Objects
Tables
Queries
Forms
Reports
Pages
Macros
Modules
Groups
Favorites
Create table in Design view
Create table by using wizard
Create table by entering data
Orderdetails
Orders
Products
Ready
Start
Chapter4 - Mic...
My Computer
(D:)
Azmi
Thesis
Microsoft A...
4 AM


Microsoft Access - [Products : Table]
File Edit View Insert Tools Window Help
Field Name
Data Type
Description
ItemID Number Record Identifier
ProdNo Text Catalog Number unique for each product
ItemName Text Name of product
ItemDesc Text Complete description of the product
RegularPrice Currency Regular price of the product
SalePrice Currency This field will be zero unless any item is on sale
BeginSpecial Date/Time First day of Todays Featured Products
EndSpecial Date/Time Last day of Todays Featured Products
Field Properties
General Lookup
Field Size Long Integer
Format
Decimal Places Auto
Input Mask
Caption
Default Value 0
Validation Rule
Validation Text
Required No
Indexed Yes (No Duplicates)
A field name can be up to 64 characters long, including spaces. Press F1 for help on field names.
Design view. F6 = Switch panes. F1 = Help.
NUM
Start
Chapter4 - Microso...
My Computer
(D:)
Azmi
Microsoft Acce...
11:


Microsoft Access - [Orders : Table]
File Edit View Insert Tools Window Help
Field Name
Data Type
Description
OrderID AutoNumber Record identifier
OrderDate Date/Time Date on which order was completed
OrderTime Date/Time Time at which order was completed
CustName Text Customer name who placed the order
CustAddress Text Address
CusCity Text City
CustState Text State
CustPIN Text PostCode
CustPhone Text Phone Number
OrderAmount Currency Total dollar amount
PaymentMethod Text Creditcard used to pay the order
PaymentAccount Text Account number of the credit card used to pay the order
ExpDate Text Expiration date of the credit card used to pay the order
Field Properties
General Lookup
Field Size Long Integer
New Values Increment
Format
Caption
Indexed Yes (No Duplicates)
A field name can be up to 64 characters long, including spaces. Press F1 for help on field names.
Design view. F6 = Switch panes. F1 = Help.
NUM
Start
Chapter4 - Microso...
My Computer
(D:)
Azmi
Microsoft Acce...
11:


Microsoft Access - [Orderdetails : Table]
File Edit View Insert Tools Window Help
Field Name
Data Type
Description
OrderId
Number
Identify records from order table to which the detail record is related
ProductNo
Text
contain product number from Products table identifying the product that is represented by this detail record
Quantity
Number
Quantity of this product that was ordered
Price
Currency
Regular or sale price of the product being purchased at the time the order was placed.
Field Properties
General
Lookup
Field Size
Long Integer
Format
Decimal Places
Auto
Input Mask
Caption
Default Value
0
Validation Rule
Validation Text
Required
No
Indexed
Yes (Duplicates OK)
A field name can be up to 64 characters long, including spaces. Press F1 for help on field names.
Design view. F6 = Switch panes. F1 = Help.
NUM


Microsoft Access
File Edit View Insert Format Records Tools Window Help
Products : Table
ItemID
ProdNo
ItemName
ItemDesc
RegularPrice
SalePrice
BeginSpecial
EndSpecial
13 62 Fruits Berri Fruits $1.50 $0.00
14 63 Fruits Strawberry $2.50 $0.00
15 64 Vegetable Potato Veg $2.00 $1.00 10/10/01 11/10/0
16 66 Vegetable Tomato Veg $1.00 $0.70 9/10/01 10/10/0
17 67 Vegetable Beans Veg $2.00 $0.00
18 68 Vegetable Cauliflower $3.00 $0.00
Record: 16 of 24
Orders : Table
OrderId
OrderDate
OrderTime
CustName
CustAddress
CustPhone
OrderAmount
PaymentM
6 9/27/01 11:54:46 AM John Smith High Street 2323445567 $62.50 visa
7 9/27/01 12:00:09 PM Peter Street Elizabeth Street 3243245353 $64.75 visa
8 9/27/01 12:07:48 PM Obadur Azmi Power Street 2323445345 $67.00 visa
9 9/27/01 12:12:07 PM Rudy Gael George Street 2323445129 $69.25 visa
10 9/27/01 12:13:52 PM Tom Mudy King Street 2323445237 $71.50 visa
Record: 6 of 45
Orderdetails : Table
OrderId
ProductNo
Quantity
Price
6 51 4 $2.00
6 50 6 $1.00
6 52 14 $1.00
7 51 4 $2.00
Record: 1 of 127
Identify records from order table to which the detail record is related
NUM

Chapter 5: Conclusion and Further Research

5.1 Conclusion

Electronic commerce is rapidly becoming popular as more and more consumers turn to the Internet for their shopping needs. The design, development and implementation of Agriculture Online Service System is aimed as one-stop shop that sells agricultural products and provide specific and up to date agriculture online information. The system developed consists of a series of Active Server Pages that work in complete harmony. When the user visits the site, he/she begins with the first page, which is the default page of the System that presents the basic information needed to navigate the entire site. From default page, the user can search product by product name or by product category. This page has links to Shopping cart, Agriculture Information and Feedback page. This default page contains discount products and provides the user the opportunity to add those discount products to his/her shopping cart directly. The Add to Cart button besides each product give the user opportunity to quickly select the product and put that to the shopping cart. From the Shopcart page the user can continue shopping or proceed to checkout. When the user clicks Proceed to Checkout button, shopcart.asp is reloaded in checkout mode. This checkout mode directs the form to a different page, submitorder.asp which finalize the customers order and add that to the database and provide a summary of that order including the order number and order date to the customer for their record. The Agriculture Information button when clicked, displays agricultural category that is linked to various agricultural sites for an up to date and specific information. The users of the system can send feedback by clicking the feedback button.

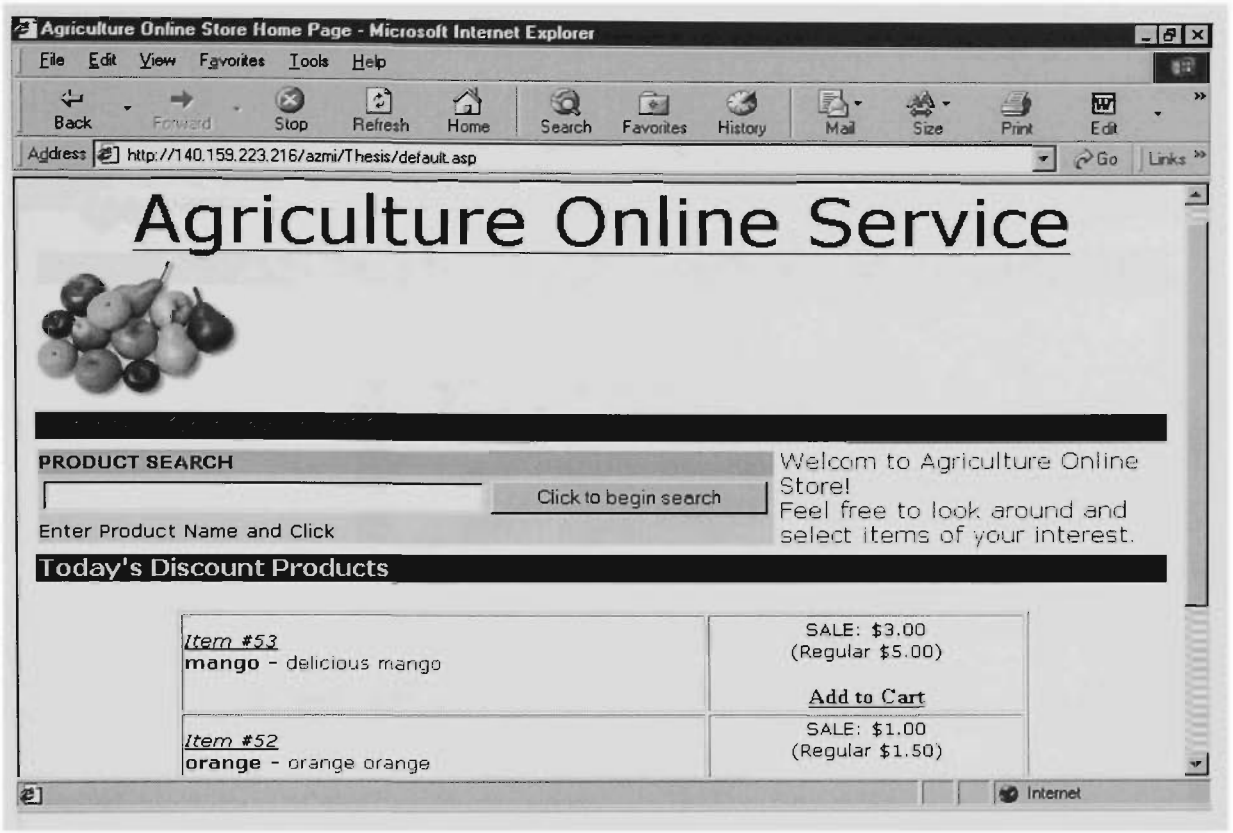
5.2 Further Research

This system provides a basic service of online shopping for day-to-day consumers and information on agricultural products. Following further improvements in the systems is suggested:

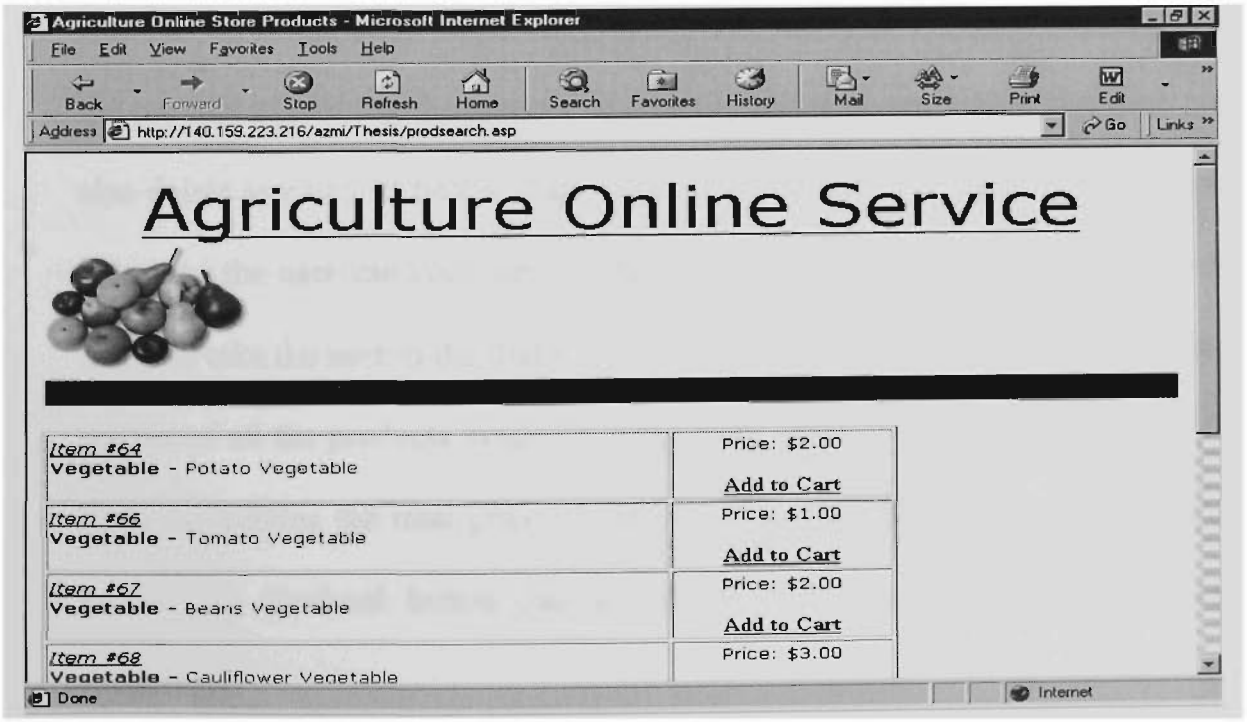
- Addition of a procedure to verify the information of customer's credit card number and expiry date.
- Addition of a procedure to log in to the systems so that the registered users need not type their details every time they place the order.
- Addition of a procedure to automatic notification of newly placed orders to company's shipping department.

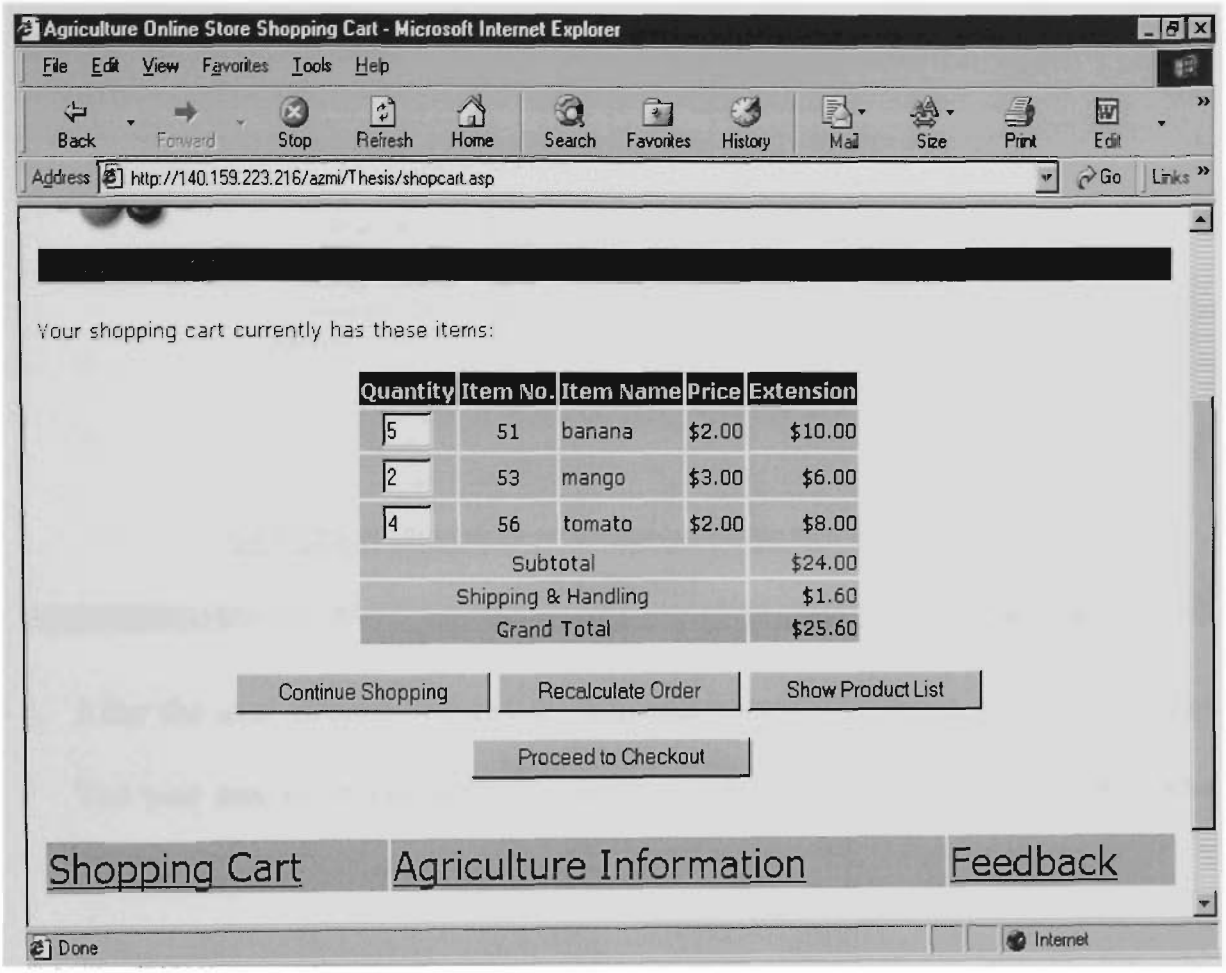
Chapter 6: User Manuals

1. This is the first page, which is the default site of Agriculture Online Service. From this site the user can start shopping immediately. This default site displays a number of discount product/s, which are on sale. The user can select the discount items and put in shopping cart by clicking Add to Cart button. This site also provides the search facility where the user can search for a particular product by typing the name of the product in the product search box and click to begin search. The user can type any particular product name for example banana. If the product banana exists in the store, the details will be displayed for the user. However, the users can also search by typing the product category for example if the user type vegetable in the product search box and click to begin search, a list of all vegetables available in store will be displayed and the user can select from that list to put in his/her cart by clicking Add to Cart button. All pages of Agriculture Online Service contain Header and Footer. Header contains Heading: Agriculture Online Service and a picture of fruits. By clicking on either of these, the user will come back to the first default page from any of the other asp pages. Footer contains three different links: Shopcart, Agriculture Information and Feedback, which will take the user to their respective sites when clicked.

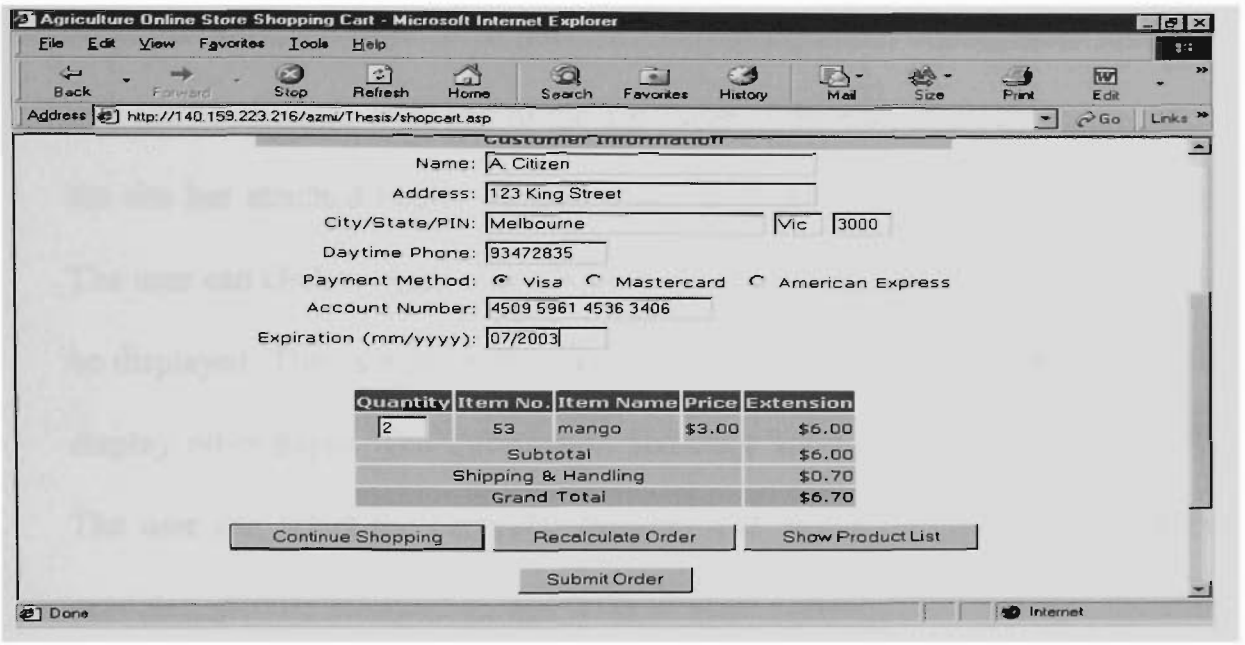


2. This page returns the response of users query. In the default page if the user writes vegetable, the following page displayed, contains the information of all vegetables available in the store. The user can select the vegetable of his/her likings and put to shopping cart by clicking the Add to Cart Button.



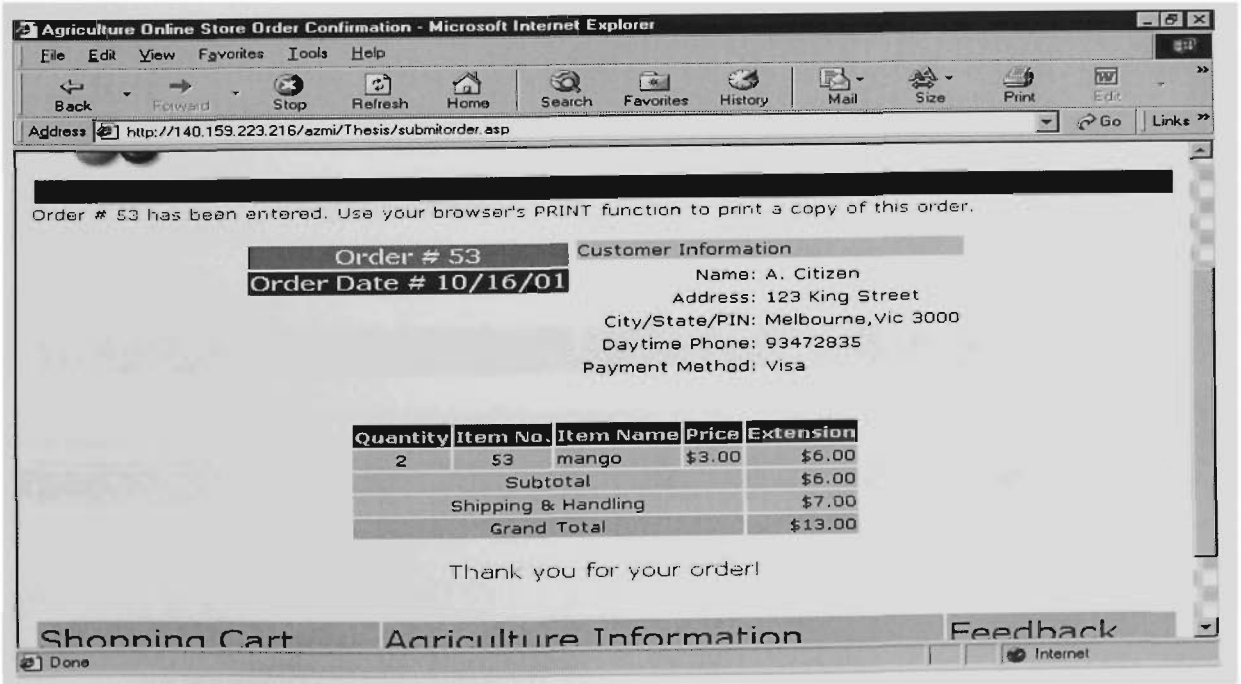


3. The above page is displayed when the user clicks Add to Cart button. This page contains all information about the product. The user can change the quantity of the product by writing the number of quantity in the quantity box. The user can also delete any item if he/she changes mind by writing 0 in quantity box. From this page the user can continue shopping by clicking continue shopping button that will take the user to the first page. The Show Product list button will display the list of all the products available in the store when clicked. Recalculate order button calculates the total price of the products. The above page also contains Proceed to checkout button that should be clicked when the user finished shopping.

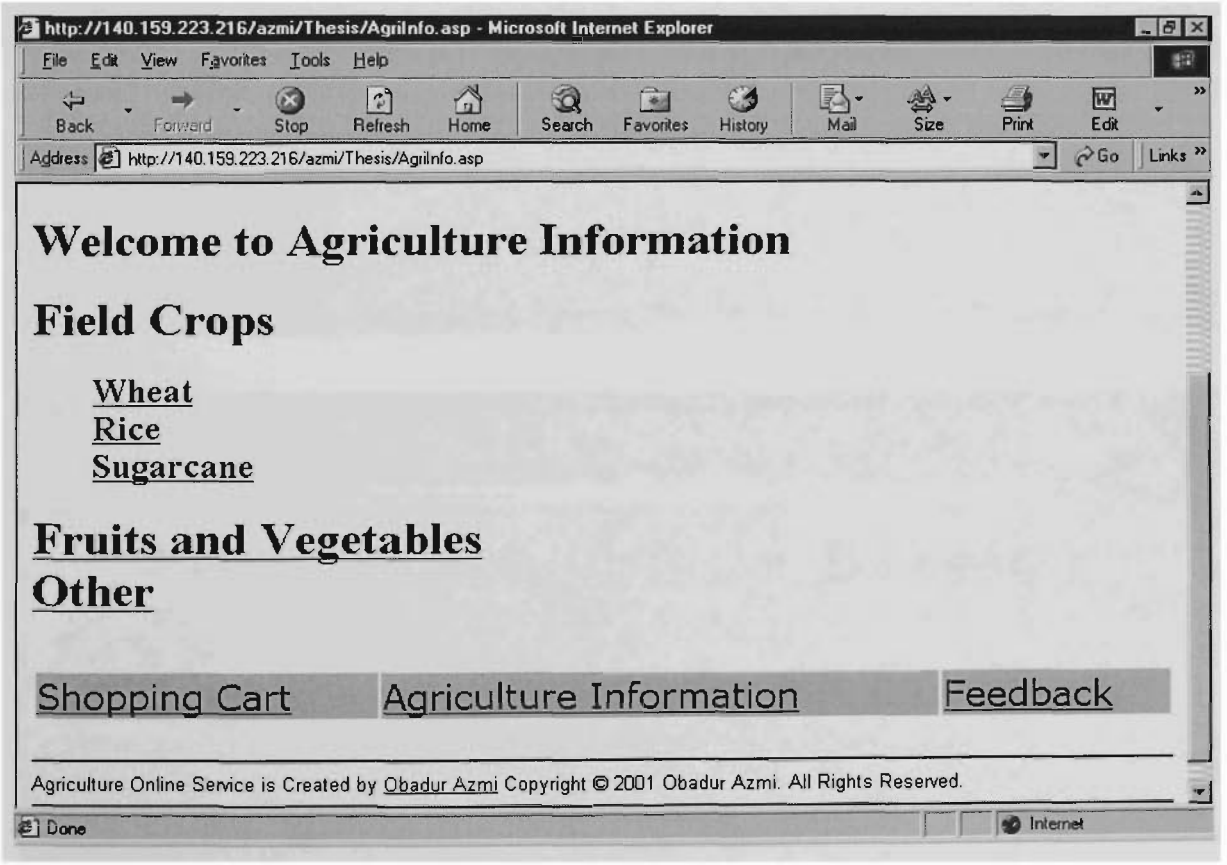


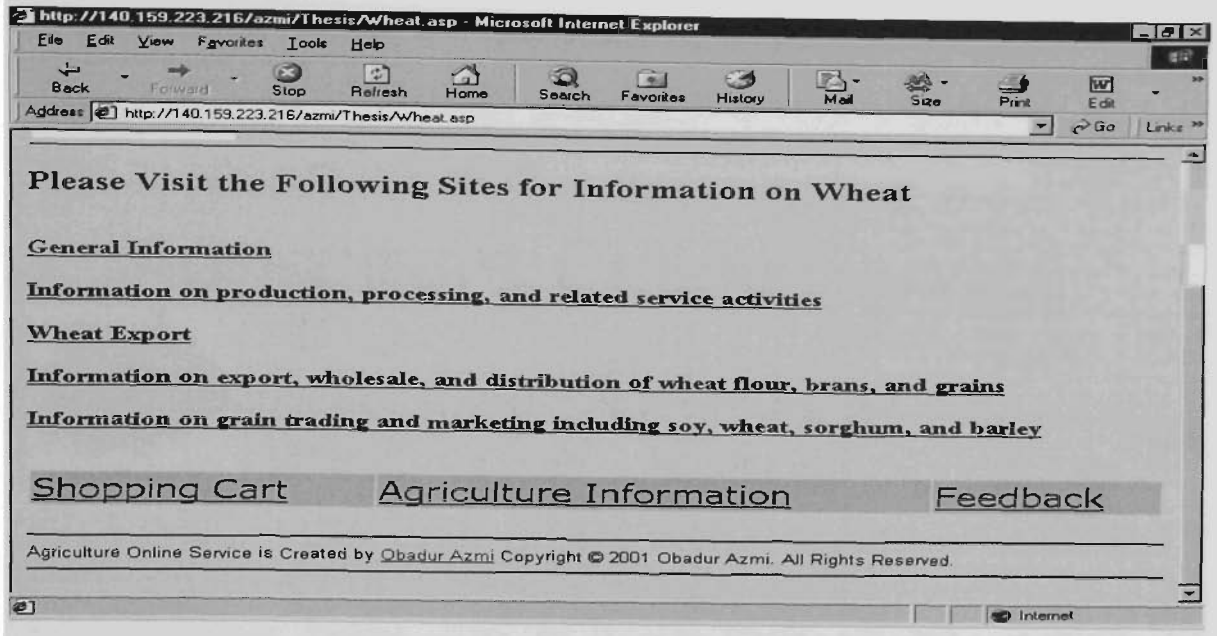
4. After the user clicked Proceed to checkout button, the above page will appear. The user can write the necessary information in the text box, check the order details and click Submit order button.

5. The following page is displayed when the user clicks Submit order button. This page contains all the details the user has supplied by writing in text boxes and the product that the user bought. This page also contains order number and order date for customers to keep for records and any future enquiry.



6. Next part of the System is to provide information about Agricultural products that can be obtained from any of the asp pages of the site. Since all asp pages of the site has attached Footer.inc file, which is linked to Agriculture information. The user can click to Agriculture Information button and the following page will be displayed. The user can follow the links by clicking on the headings that will display other pages. The information has been given under different category. The user can select the particular category and follow the link. Each category provides specific information and links to other agriculture sites where the user can get an up to date information on almost every aspect including, crop agronomy, breeding, storage and management etc.

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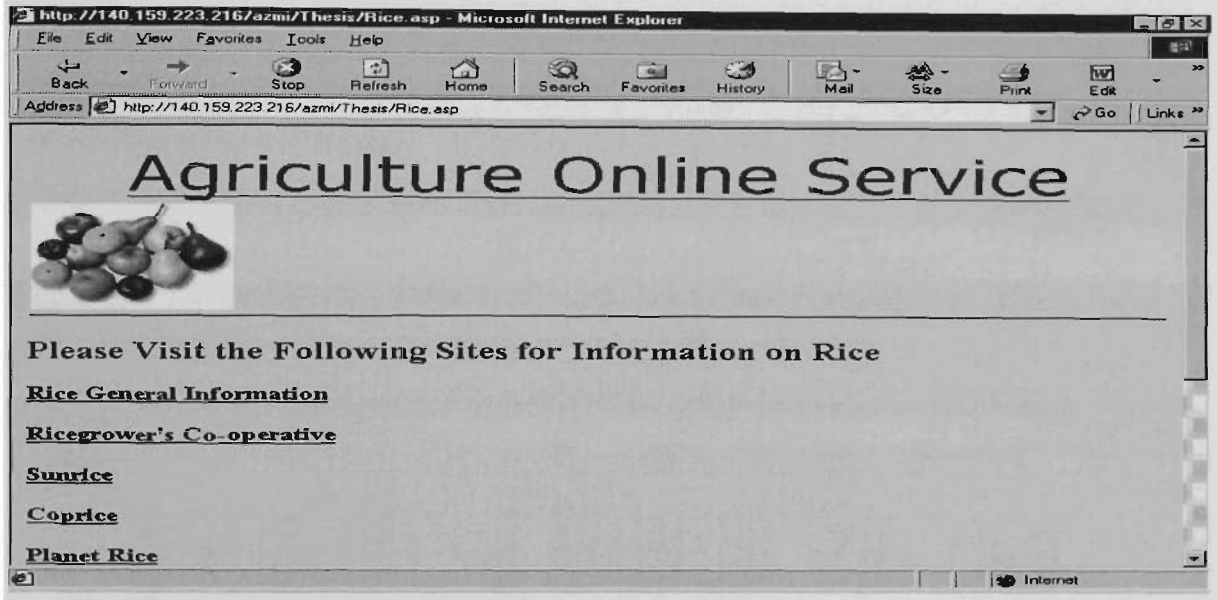
File Edit View Favorites Tools Help
Back Forward Stop Refresh Home Search Favorites History Mail Size Print Edit
Address http://140.159.223.216/azmi/Thesis/Wheat.asp
Go Links
Please Visit the Following Sites for Information on Wheat
General Information
Information on production, processing, and related service activities
Wheat Export
Information on export, wholesale, and distribution of wheat flour, brans, and grains
Information on grain trading and marketing including soy, wheat, sorghum, and barley
Shopping Cart
Agriculture Information
Feedback
Agriculture Online Service is Created by Obadur Azmi Copyright © 2001 Obadur Azmi. All Rights Reserved.
Internet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Back Forward Stop Refresh Home Search Favorites History Mail Size Print Edit
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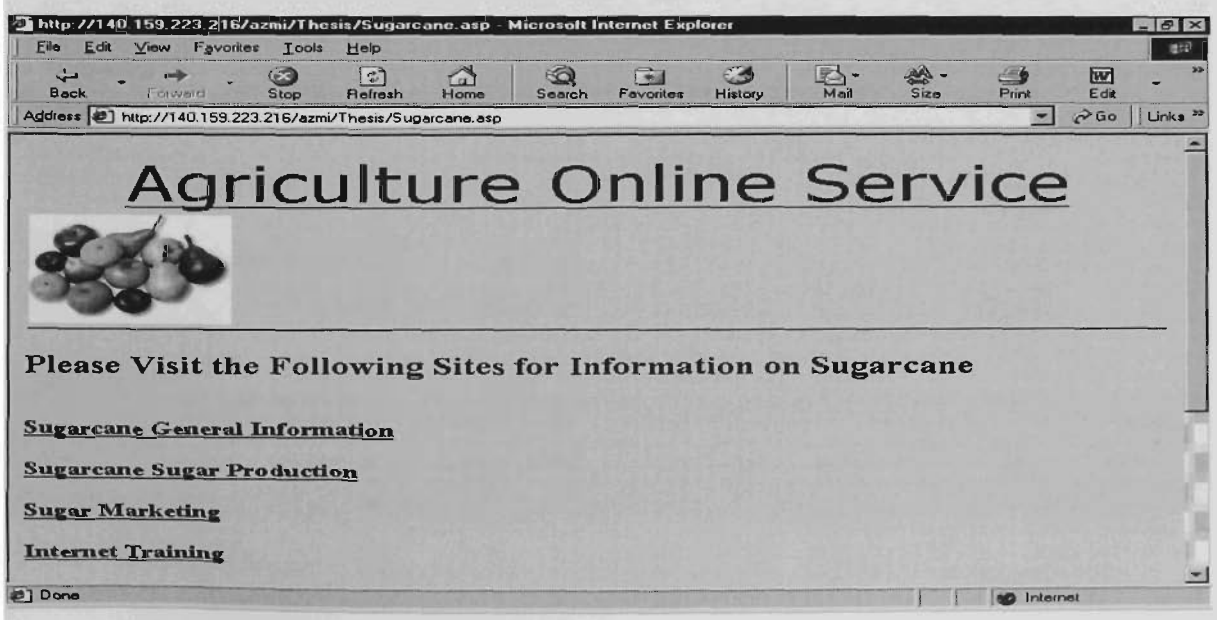
Go Links
Agriculture Online Service
Please Visit the Following Sites for Information on Rice
Rice General Information
Ricegrower's Co-operative
Sunrice
Coprice
Planet Rice
Internet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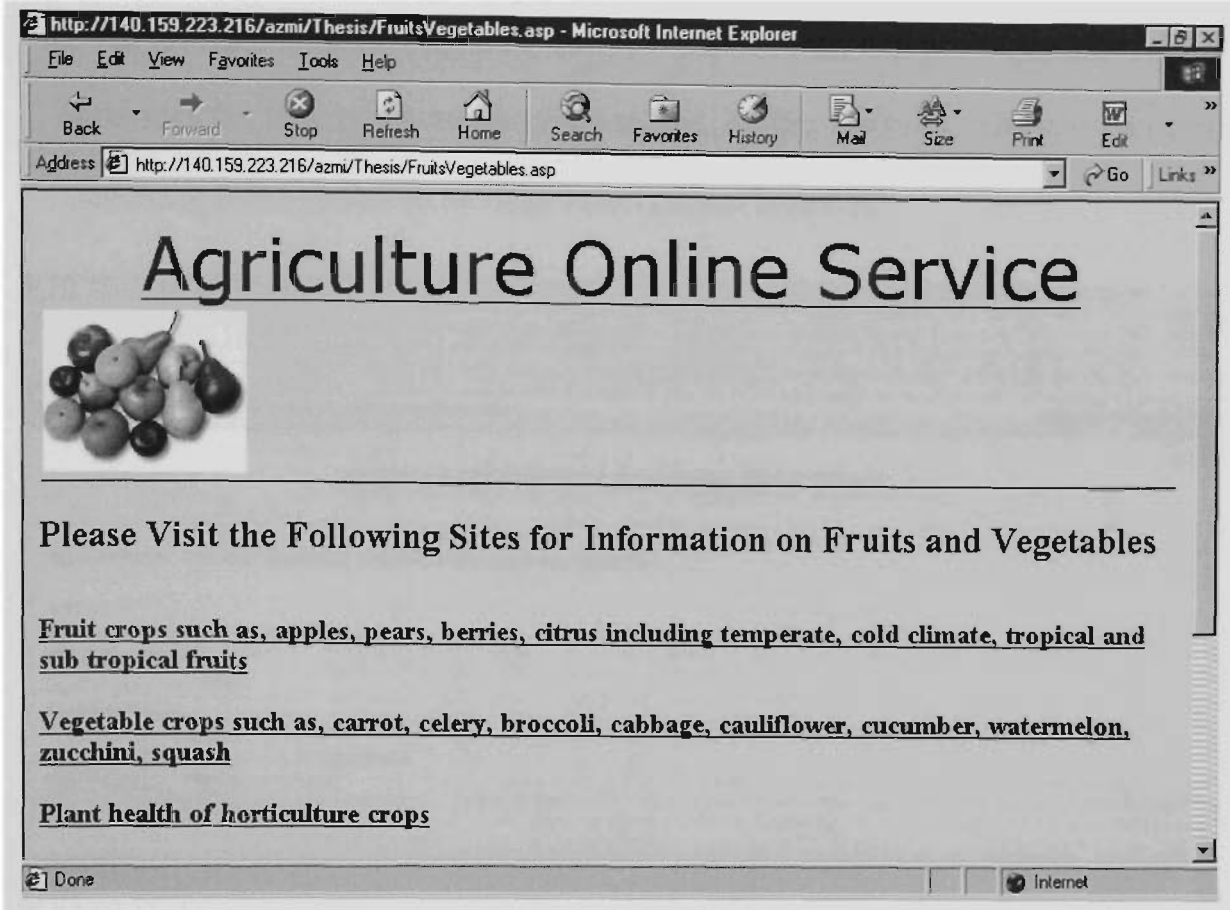
Address http://140.159.223.216/azmi/Thesis/Sugarcane.asp
Go Links
Agriculture Online Service
Please Visit the Following Sites for Information on Sugarcane
Sugarcane General Information
Sugarcane Sugar Production
Sugar Marketing
Internet Training
Done
Internet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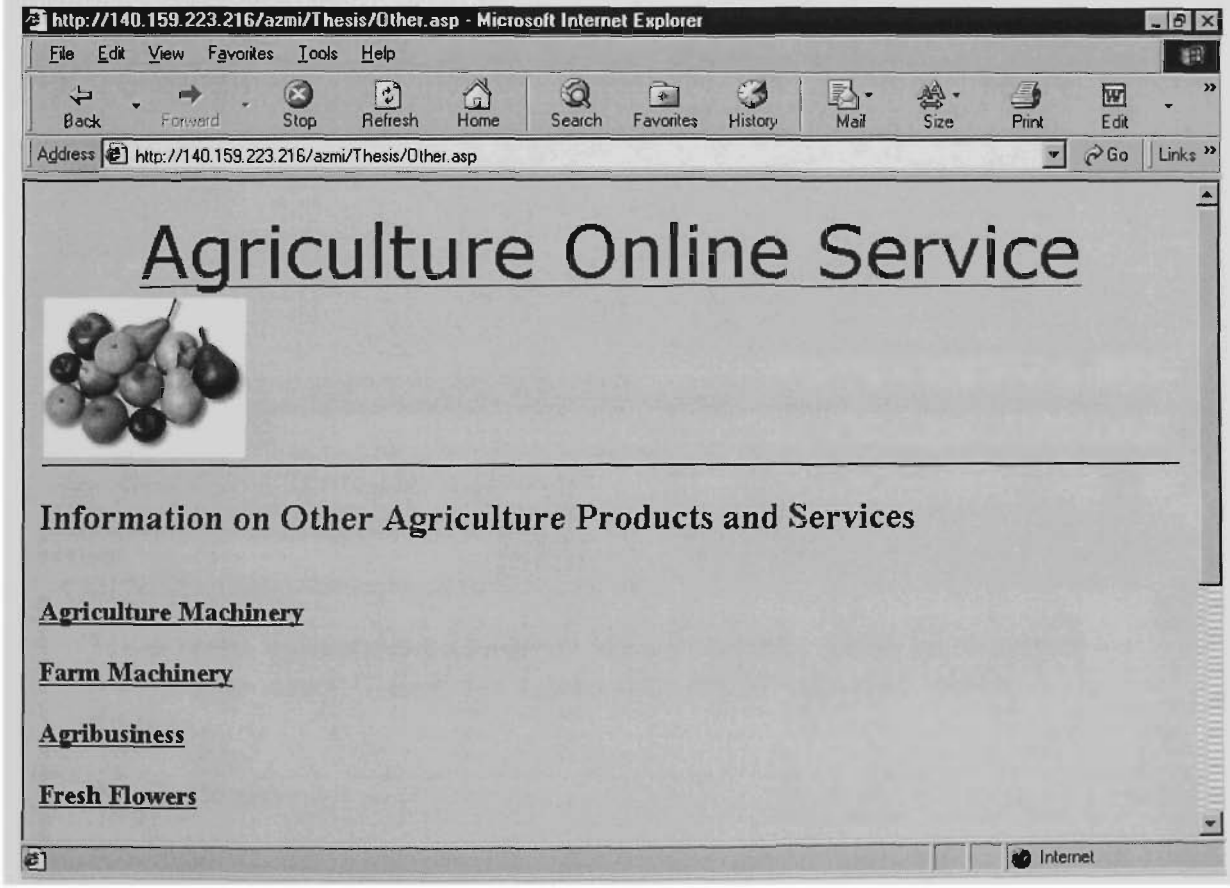
File Edit View Favorites Tools Help
Back Forward Stop Refresh Home Search Favorites History Mail Size Print Edit
Address http://140.159.223.216/azmi/Thesis/FruitsVegetables.asp
Go Links
Agriculture Online Service
Please Visit the Following Sites for Information on Fruits and Vegetables
Fruit crops such as, apples, pears, berries, citrus including temperate, cold climate, tropical and sub tropical fruits
Vegetable crops such as, carrot, celery, broccoli, cabbage, cauliflower, cucumber, watermelon, zucchini, squash
Plant health of horticulture crops
Done
Internet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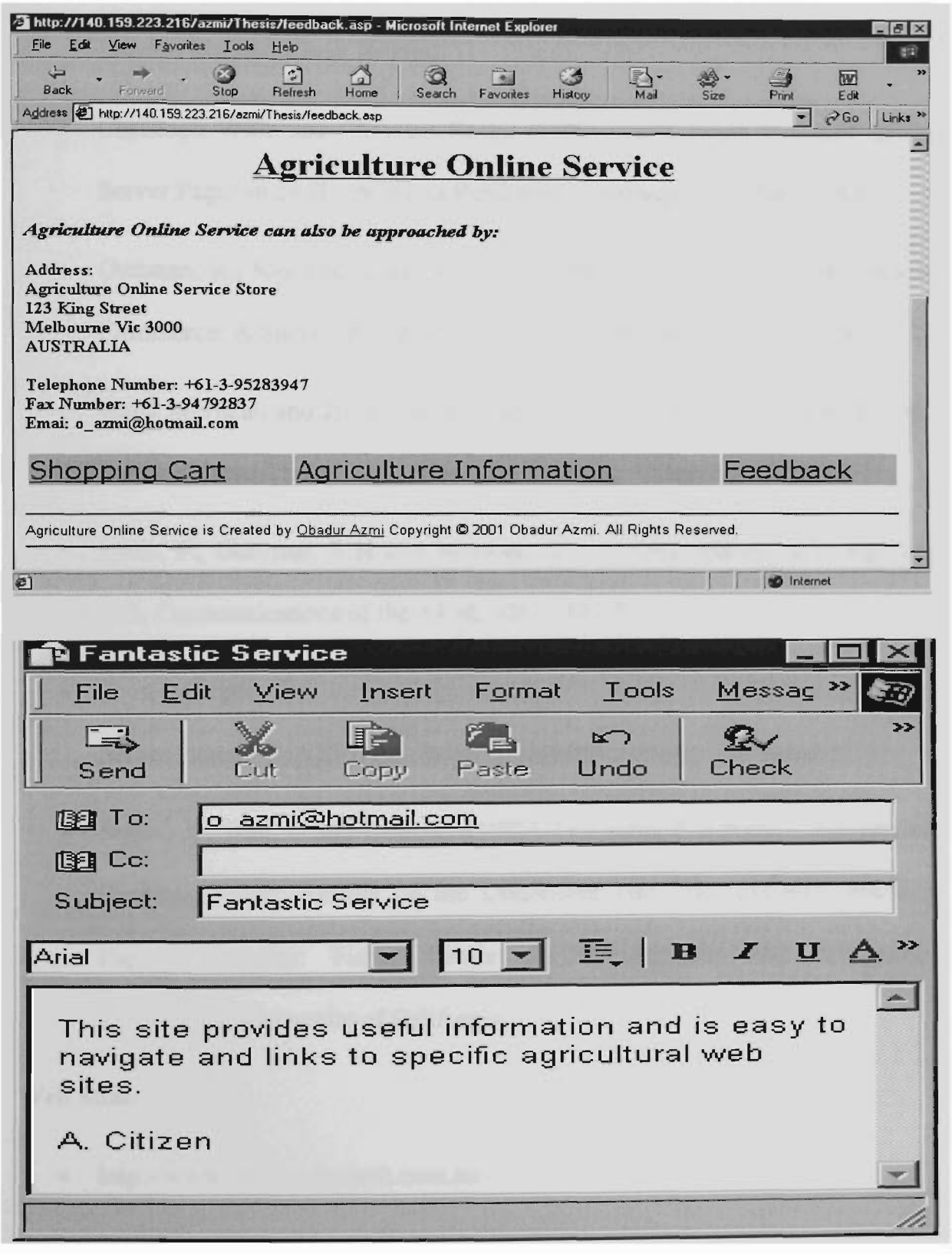
File Edit View Favorites Tools Help
Back Forward Stop Refresh Home Search Favorites History Mail Size Print Edit
Address http://140.159.223.216/azmi/Thesis/Other.asp
Go Links
Agriculture Online Service
Information on Other Agriculture Products and Services
Agriculture Machinery
Farm Machinery
Agribusiness
Fresh Flowers
Internet

7. This feedback page is displayed when the user clicks Feedback button. This page provides the facility where the user can send his/her feedback. The user can send feedback either online or by other conventional methods.



Appendix A: References

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- Segev, A., Wan, D and Bean, C. (1995). Designing Electronic Catalogue for Business Value: Results of the Commerce Net Pilot (=CMIT Working Paper). Berkeley: Fisher Centre for Management and Information Technology. University of California.

Web Sites:

- http://www.wheat-research.com.au
- hhttp://www.ricegrowers.com.au

- http://www.sugaraustralia.com.au
- http://www.agriculture.gov.au
- http://www.postharvest.com.au
- http://www.farmnet.com.au
- http://www.ento.csiro.au
- http://www.awb.com.au/awb/user/default.asp
- http://www.pbgrains.com.au