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Mobile order entry system based on the wireless technology

Sumit Imsuksri

MOBILE ORDER ENTRY SYSTEM BASED ON THE WIRELESS TECHNOLOGY

A Project

Presented to the

Faculty of California State University,

San Bernardino

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

in

Computer Science

by

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Dr. Ernesto Gomez

ABSTRACT

The sales representatives play a significant role in the success of manufacturers and wholesalers. Manufacturing and wholesale sales representatives held about 1.8 million jobs in 2000. Three of every 5 salaried representatives worked in wholesale trade—mostly for distributors of machinery and equipment, groceries and related products, and motor vehicles and parts. Others were employed in manufacturing and mining.

Their primary duties are to attract wholesale and retail buyers and purchasing agents to their merchandise, and to address any of their client's questions or concerns. Aided by a laptop computer connected to the Internet, they can access the customer information and sell products to their customers immediately. This project, a Mobile Order Entry System using cell phones will give sales representatives a state-of-the-art alternative in accessing and selling products to their customers through cell phones instead of using laptop computers. This option offers benefits over the current method: saves time, provides sales representatives the convenience in accessing the Internet through cell phones, and reduces many processes in distantly accessing the company database. A database is designed using high-level conceptual modeling, which includes four steps of design: requirements collection and analysis, conceptual design, logical design, and physical design respectively. The conceptual design is implemented in a relational database management system (RDBMS), using mySQL server database. The architecture of the system shows how to integrate the web application, Wireless Application Protocol (WAP) application, and database into a system. The system is developed in Windows 2000 Server operating environment integrated with the WAP server and the phone emulator licensed by Nokia Company and web server licensed by Bea Company. The functionalities of the system are validated and ready to use for a business corporation.

ACKNOWLEDGEMENTS

First of all, I would like to thank my project committee members, Dr. Botting and Dr. Gomez for their valuable ideas and suggestions contributed substantially to this project.

And thanks to my project advisor, Dr. Mendoza for the precious guidance and support during this entire project. Without her recommendation, and help, this project would not be accomplished.

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CHAPTER ONE

INTRODUCTION

With the advance of the Internet, e-commerce has not only grown to enormous proportions such as online banking, trading and shopping and but has proven to be such a success that it is widespread and easy to access from almost anywhere in the world. Ahead of this success, wireless telecommunications have become a new and popular trend in technology that provides users with the ability to have all they possibly need in a pocket-sized device. People are willing to have an alternative way in accessing real-time information such as, news, weather, and stock by their wireless devices such as, cell phones or PDAs (Personal Data Assistants).

Mobile communications gradually developed throughout the 1920s-1940s. It was in the mid-1940s, when commercial mobile telephony began. For the last couple of years, the wireless industry has been experiencing tremendous growth. According to a recent study, the total number of wireless subscribers reached 200 million worldwide in the year 2000, and will reach around 1 billion by late 2003. The third-generation wireless system (3G) will be the next-generation packet-based wireless network with greater bandwidth (384K-2Mbps, compared to 2G's 19.2Kbps). And the increasing bandwidth will not only provide higher volume, but also enable high-quality audio/video data services.

As the wireless technology continues to improve and expand, people will demand more interactive and powerful wireless applications that can provide the simpler, effective, and intelligent method of accessing information anywhere and anytime. One of the latest innovations in the business world, WAP - the Wireless Application Protocol has been gaining more attention in recent years. WAP is a set of protocols that allow the development of applications and services for mobile phones and other mobile devices. The WAP standard, designed by an organization called WAP Forum (www.wapforum.org) aims to imitate the current Internet standards. The development can be described as taking the existing Internet standards and modifying them to meet the specific needs of these devices and networks. The founding members of the WAP Forum are Ericsson, Motorola, Nokia, and Phone.com. To develop the Mobile Order Entry System, there are some issues that are important to consider in its design.

- Limitations of wireless data network - wireless data networks present a more constrained communication environment compared to wired networks. Because of fundamental limitations of power, available spectrum, and mobility, wireless data networks tend to have less bandwidth, more latency, less connection stability, and less predictable availability.
- Limitations of power and form-factor mass-market handheld devices - A mobile phone is not a personal computer. The limited availability of power is a major factor when dealing with these devices. And the most important limitation is that the mobile does not have a keyboard or mouse, and the display typically averages 4 lines of text.

Motivations

The motivation of the project comes from the feasibility of integrating an order entry system with the wireless technology by using a WAP application.

The motivations for Mobile Order Entry System are:

a) To conduct the research in the feasibility of the accessibility of the mobile technology to PC (Personal Computer) through the WAP gateway.

b) To help sales representatives save a plenty of time and reduce several processes in distantly accessing the company database.

c) To build the Mobile Order Entry System, which can be used as a future prototype for other businesses.

Project Goals

The main objective of this project is to develop an order entry system that allows manufacturing and wholesale sales representatives to order products for customers through their cell phones. Sales representatives will only need a cell phone in order to retrieve product information remotely from the server. And the requested order will be sent simultaneously to the remote database stored on the PC. The benefit of this project will help sales representatives save plenty of time and reduce several processes in accessing the company remote database. The concept of the overall system is described in the decision tree of the Mobile Order Entry System as shown in the figure 1.1.

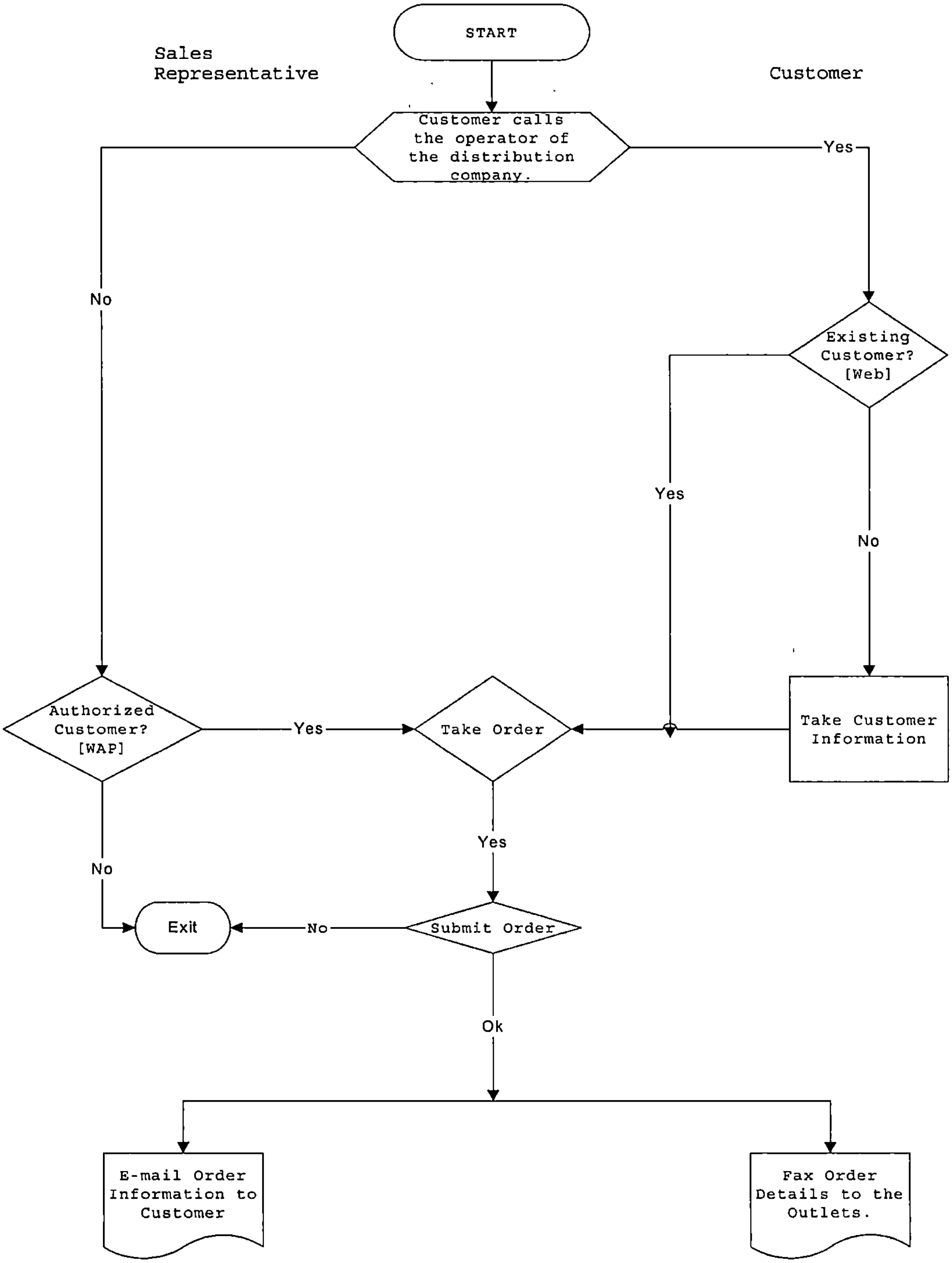

START
Sales Representative
Customer
Customer calls the operator of the distribution company.
Yes
No
Existing Customer? [Web]
Yes
No
Authorized Customer? [WAP]
Yes
Take Order
Take Customer Information
No
Yes
Exit
No
Submit Order
Ok
E-mail Order Information to Customer
Fax Order Details to the Outlets.

Figure 1.1. Decision Diagram of the Mobile Order Entry System

CHAPTER TWO

SYSTEM REQUIREMENTS

SPECIFICATION

Architecture of the Mobile Order Entry System

To develop the entire Mobile Order Entry System, the three-tier environment is designed to utilize both the World-Wide Web model and the WAP model. The first tier, the client, is a web browser and mobile phone for the user interface. The client will be accessed through or controlled by the second tier. The second tier, also known as the middle tier is where the majority of business logic stays. Having the business logic in one place would facilitate the maintenance or modification of the system performance later. The third tier is the combination of the database and the existing application and is accessible by the middle tier. The client on the first tier cannot access directly the database in the backend or third tier.

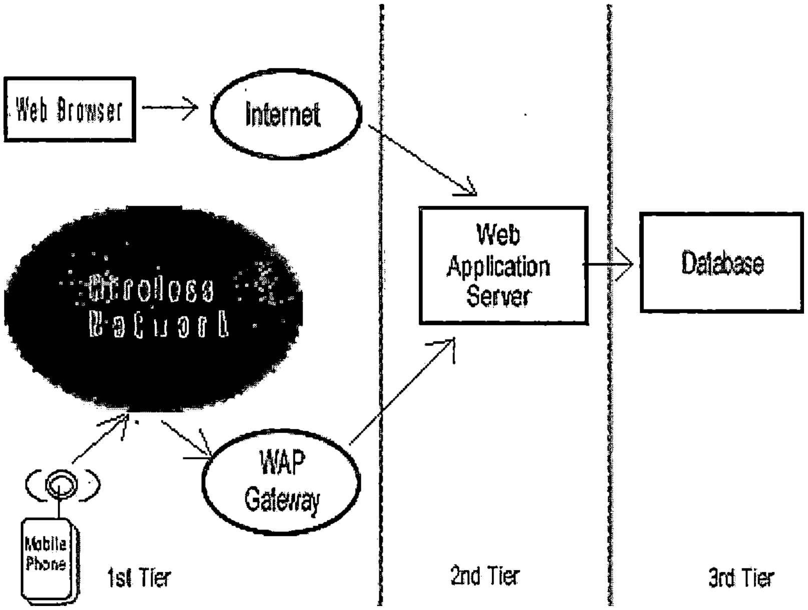


Figure 2.1. Mobile Order Entry System Architecture

The criteria for choosing the appropriate technology for this project are:

(i) Platform Independence - allows the programmer easily to create code on one platform and execute it without a change on another one.

(ii) Object Orientedness - promotes code reusability and increases developer productivity.

(iii) Modularity and Efficiency - allows the architect easily to create multiple tiers.

The World-Wide Web Model

The Internet World-Wide-Web (WWW) architecture has a very powerful and flexible programming model. The network application, known as a browser, is used in sending requests for named data objects to a network server and the network server responds with the data encoded in standard formats.

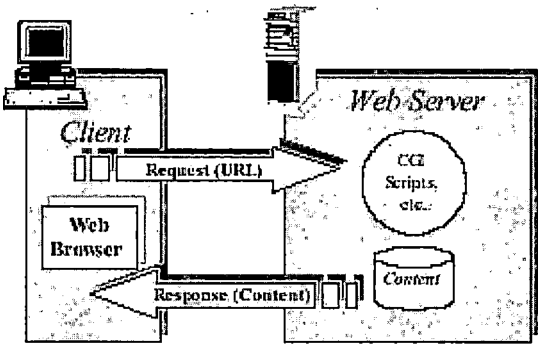


Figure 2.2. World-Wide-Web Programming Model

The WWW standard defines a set of standard component in building the general-purpose application environment, including:

- Standard content formats- All servers and content on the WWW are named with an Internet-standard *Uniform Resource Locator* (URL).
- Standard Protocols- Standard networking protocols allow any web browser to communicate with any web

server. The most commonly used protocol on the WWW is the HyperText Transport Protocol (HTTP).

- Standard naming model- All servers and content on the WWW are named with an Internet-standard *Uniform Resource Locator* (URL).
- Content typing- All WAP content is given a specific type consistent with WWW typing. This allows WAP user agents to correctly process the content.

The Wireless Application Protocol Model

The WAP programming model is similar to the WWW programming model. Optimizations and extensions have been made in order to match the characteristics of the wireless environment. Wherever possible, existing standards have been adopted or have been used as the starting point for the WAP technology.

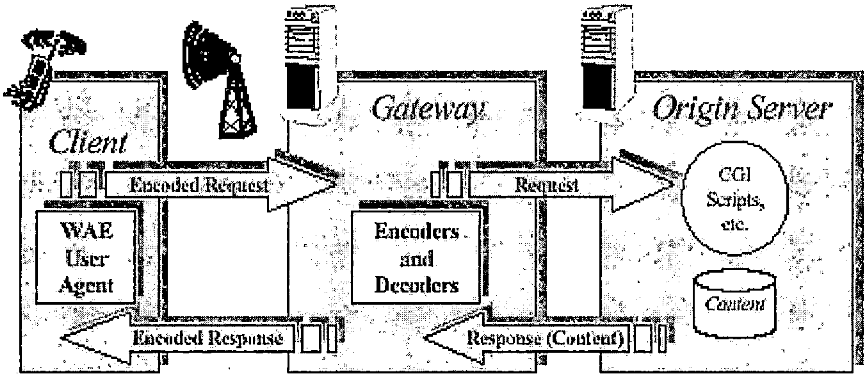


Figure 2.3. Wireless Application Protocol Programming Model

The WAP model specifies the standard model that enables communication between mobile terminals and network servers, including:

- Standard content formats- WAP content formats are based on WWW technology and include display markup, calendar information, electronic business card objects, images and scripting language.
- Standard Communication Protocols- WAP communication protocols enable the communication of browser requests from the mobile terminal to the network web server.
- Standard naming model- WWW-standard URLs are used to identify WAP content on origin servers.
- Content typing- All WAP content is given a specific type consistent with WWW typing. This allows WAP user agents to correctly process the content based on its type.

The technology that made the connection between the wireless domain and the WWW possible is the proxy technology. The WAP proxy has the following functionalities:

- Protocol Gateway - The protocol gateway translates requests from the WAP protocol stack (WSP, WTP, WTLS, and WDP) to the WWW protocol stack (HTTP and TCP/IP).
- Content Encoders and Decoders - The content encoders translate WAP content into compact encoded formats to reduce the size of data over the network.

The Wireless Application Protocol Architecture

The WAP architecture provides a layered, scaleable, and extensible environment for application development for mobile communication devices. The lightweight protocol stack (Figure 2.4) is designed to achieve all requirements of the WAP Forum architecture.

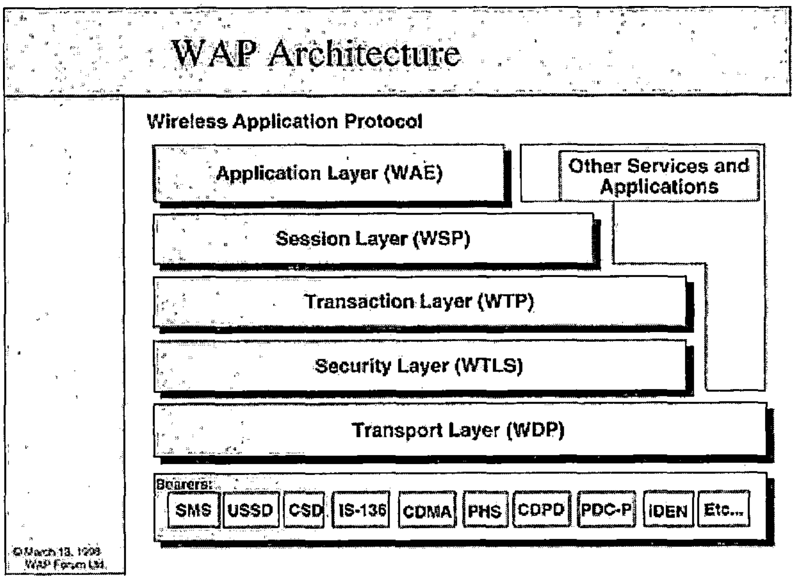


Figure 2.4. Wireless Application Protocol Architecture

Wireless Application Environment. The Wireless Application Environment(WAE) is a general-purpose application environment dependent on the combination of Mobile Telephony technologies and World Wide Web(WWW). The purpose of the WAE is to support an interoperable environment that will allow operators and service providers to build applications and services that can reach a wide variety of different wireless platforms.

WAE supports the following functionalities:

- Wireless Markup Language(WML) - a lightweight markup language, similar to HTML, but optimized for use in hand-held mobile terminals;
- WMLScript -a lightweight scripting language, similar to JavaScript;
- Wireless Telephony Application -telephony services and programming interfaces
- Content Formats -a set of well-defined data formats, including images, phone book records and calendar information.

Wireless Session Protocol. The Wireless Session Protocol(WSP) provides the application layer of WAP with a consistent interface for two session services. The first is a connection-oriented service that operates above the transaction layer protocol WTP. The second is a connectionless service that operates above a secure or non-secure datagram service (WDP).

The Wireless Session Protocols currently consist of services suited for browsing applications (WSP/B). WSP/B provides the following functionalities:

- HTTP/1.1 functionality and semantics in a compact over-the-air encoding,
- Long-lived session state,
- Session suspend and resume with session migration,
- A common facility for reliable and unreliable data push, and
- Protocol feature negotiation.

The protocols in the WSP family are optimized for low-bandwidth bearer networks with relatively long latency. WSP/B is designed to allow a WAP proxy to connect a WSP/B client to a standard HTTP server.

Wireless Transaction Protocol. The Wireless Transaction Protocol (WTP) runs on top of a datagram service and provides a light-weight

Transaction -oriented protocol that is suitable for implementation in "thin" clients (mobile stations). WTP operates efficiently over secure or non-secure wireless datagram networks and provides the following features:

- Three classes of transaction service: unreliable one-way requests, reliable one-way requests, and reliable two-way request-reply transactions.
- Optional user-to-user reliability - WTP user triggers the confirmation of each received message.
- Optional out-of-band data on acknowledgements.
- PDU concatenation and delayed acknowledgement to reduce the number of messages sent.
- Asynchronous transactions.

Wireless Transport Layer Security. WTLS is a security protocol based upon the industry-standard Transport Layer Security (TLS) protocol, formerly known as Secure Sockets Layer (SSL). WTLS is intended for use with the WAP transport protocols and has been optimized for use over narrow-band communication channels. WTLS provides the following features:

- Data integrity - WTLS contains facilities to ensure that data sent between the terminal and an application server is unchanged and uncorrupted.
- Privacy - WTLS contains facilities to ensure that data transmitted between the terminal and an application server is private and cannot be understood by any intermediate parties that may have intercepted the data stream.
- Authentication - WTLS contains facilities to establish the authenticity of the terminal and application server.
- Denial-of-service protection - WTLS contains facilities for detecting and rejecting data that is replayed or not successfully verified. WTLS makes many typical denial-of-service attacks harder to accomplish and protects the upper protocol layers. WTLS may also be used for secure communication between terminals.

Applications are able to selectively enable or disable WTLS features depending on their security requirements and the characteristics of the underlying network (eg, privacy may be disabled on networks already providing this service at a lower layer).

Wireless Datagram Protocol. The Transport layer protocol in the WAP architecture is referred to as the Wireless Datagram Protocol (WDP). The WDP layer operates above the data capable bearer services supported by the various network types.

As a general transport service, WDP offers a consistent service to the upper layer protocols of WAP and communicates transparently over one of the available bearer services. Since the WDP protocols provide a common interface to the upper layer protocols, the Security, Session and Application layers are able to function independently of the underlying wireless network. This is accomplished by adapting the transport layer to specific features of the underlying bearer. By keeping the transport layer interface and the basic features consistent, global interoperability can be achieved using mediating gateways.

Bearers. The WAP protocols are designed to operate over a variety of different bearer services, including short message, circuit-switched data, and packet data. The bearers offer differing levels of quality of service with respect to throughput, error rate, and delays. The WAP protocols are designed to compensate for or tolerate these varying levels of service. Since the WDP layer provides the convergence between the bearer service and the rest of the WAP stack, the WDP specification (WDP) lists the bearers that are supported and the techniques used to allow WAP protocols to run over each bearer. The list of supported bearers will change over time with new bearers being added as the wireless market evolves.

Security Model

WAP enables a flexible security infrastructure that focuses on providing connection security between a WAP client and server. WAP can provide end-to-end security between WAP protocol endpoints. If a browser and origin server desire end-to-end security, they must communicate directly using the WAP protocols. End-to-end security may also be achieved if the WAP proxy is trusted or, for example, located at the same physically secure place as the origin server.

Project Components

The components needed to implement the Web Application Architecture are a Web Browser or a Graphical User Interface (GUI), a Web Application Server, and a Database Server. And the components needed in the WAP Application

Architecture are mobile devices, WAP gateway, and a shared Web Application Server and Database with Web Application Server.

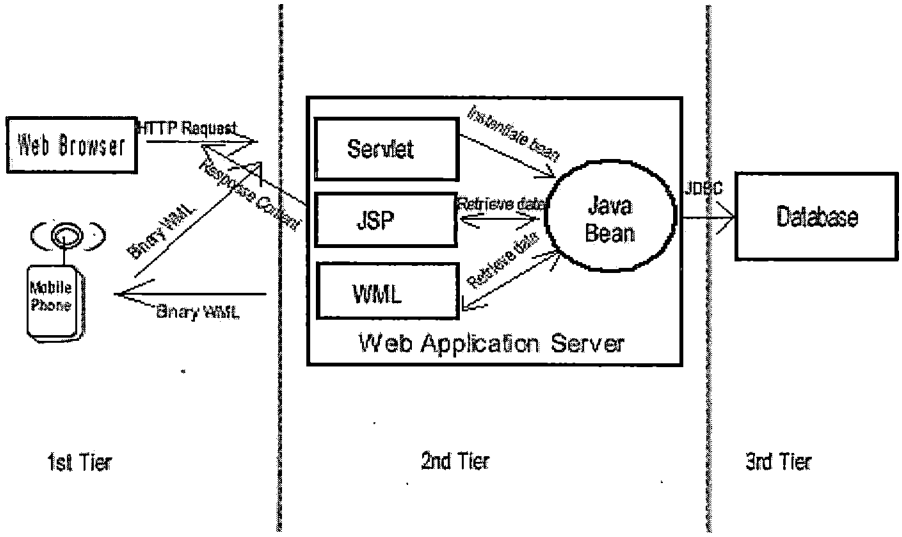


Figure 2.5. Project Components

Web Browser. The web browser acts as the front end and accesses a web server with an HTTP request. A request is received by the servlet as a controller that is responsible for processing the request. The servlet may instantiate a JavaBean and initializes it with the information depending on the type of the request or the servlet can directly access the database. Then it will forward the request to the appropriate JSP page. The JSP page only takes care of retrieving data from any JavaBean or servlet. The data is then translated to the HTML templates. The JSP page is returned to the web browser as a response stream.

Wireless Application Protocol Devices. WAP Devices do not include only a mobile phone, but also a PDA or a handheld computer. For this project, the Mobile Order Entry System is compatible with Nokia 3330/3395 /6210/7110 Mobile Handset Simulator.

The features of the WAP phone (Nokia 3330) used in this project are following:

- Weight: 133 g (with standard battery)
- Dimensions: 113 x 48 x 22 mm, 97 cc
- Talktime: 2 h 30 min - 4 h 30 min
- Standby time: 55 - 260 h
- Key features: WAP, chat messaging, animated screen savers, downloadable game packs, vibra feature, voice dialing, picture viewer, predictive text input, new Bumper and Space Impact games, Xpress-on™ covers
- Enhancement: surf the mobile Internet with the WAP browser, personalize the phone with cool animated screensavers, use chat messaging for

fast conversation with friends and take part in all kinds of fun activities

- Operating frequency: EGSM 900/1800 networks in Europe, Africa and Asia

Wireless Application Protocol Gateway. When implementing services in Wireless Application Protocol (WAP), information is translated into Wireless Markup Language (WML) by a two-way device called a WAP gateway. For example, servlets and Java Server Pages (JSP) are sent to the WAP Gateway, encoded the information, converted it to Binary WML, and sent it over the air. The content encoders translate WAP content into compact encoded formats to reduce the size of data over the network.

Web Application Server. According to its functionality and maturity, WebLogic 6.0 is chosen as an application server in the Mobile Order Entry System. The WebLogic implements J2EE APIs and supports functionalities, such as clustering, which allows for scalability - the workload can be split between machines, and multiple machines; load balancing - sharing the server load between several machines; and fail over - if a server fails, the other servers in the cluster step into the breach.

Database. The Relational Database Management System (RDBMS) developed in the Mobile Order Entry System is a shared database for both World-Wide-Web and WAP Application Architectures. The database is stored in the MySQL RDBMS. MySQL is a multi-platform, industrial grade, relational database engine that can be used for huge database applications. The Mobile Order Entry System is also compatible with other RDBMSs: ORACLE, IBM, DB2, or Microsoft SQL Server.

Functionalities of the Mobile Order Entry System

Functional Partition

Within the Mobile Order Entry System, there are five types of operation: customer search, customer management, order management, product management, and sales administrator management. Each operation is divided in sub functions: create, edit, and delete.

The communication techniques, performed by these operations are session values, application attributes, http get, and http post through servlets, jsp, browsers, and WAP devices.

Customer Search. In customer search, browsers or WAP devices performs the request (HTTP GET) through the servlet. The servlet receives the request and then searches for the data in the database. Once found by servlet, the data is stored in the Customer JavaBean in the session. Then, the servlet forwards the request to the JSP page. The JSP page retrieves the data from the JavaBean in the session and presents the customer information to the browser in HTML form.

Customer Management. The customer management is aimed to handle all customer information maintained in the system database. Sales representatives can manipulate customer information. Here are the management operations that can be implemented by the sales representatives:

- Create new customer
- Edit customer information
- Search customer

Order Management. In the order management, sales representatives are allowed to perform all of the following functions for their customer.

- Take order
- Edit order

- o Delete order
- o Deliver order

Product Management. Only a sales administrator has the control over the product management. And there are two operations in this section.

- o Add product

Both the sales administrator and the sales representative can perform the following operation:

- o View product

Sales Administrator Management. A sales administrator manages and controls all of the information in these three areas.

- o Sales representatives management
- o Customers management
- o Products management

Description of JDBC Interface

The JDBC is designed as a relatively portable bridge to relational databases. JDBC is a technology that enables JSP based application to interact directly with the database engines and is an integral part of the Java Platform.

CHAPTER THREE

DATABASE DESIGN

The database used in the Mobile Ordering System has been designed by a high-level conceptual model. The goals of a database design are to: 1) to provide an accurate and clear structure of information; 2) to meet all of the required information content of the specified users (sales representatives, customers, and suppliers); 3) to provide a design that will support the functional requirements of the application, the user-defined operations (or transactions). Figure 3.1. shows a simplified description of the database design process.

Requirements Collection and Analysis

In this step, we need to know all of the users' need and requirements as detailed and completely as possible. The information requirements for the Mobile Order Entry Database are listed below:

- First, a customer acquires product information through either the order catalog sent by mail or the visit of a sales representative of the distribution company.

- A customer may order products directly by calling the distribution company. Available sales representative can log into the order entry system from the Internet and order products for customers.
- A customer may also order products when visited by the sales representative. The sales representative will order products for the customer through the sales representative's cell phone.
- A customer information can be deleted only if there is no outstanding order, which was made by this customer.
- A sales representative handles at least one customer.
- A sales representative can add at least one customer.
- A sales representative can update at least one customer.
- A sales representative can delete at least one order.
- A sales representative can update an order in the 'ordering' status only. If the status of order is 'delivered', then a sales representative will not be able to make any change, since the outlet is in the process of delivering the order to the customer.

- A sales representative information can be deleted only if there is no outstanding order, which was made by this sales representative.
- Information stored for sales representative includes: name, salesID number, address, sex, user name, and password. A sales representative can deal with one customer at a time but can deal with several customers.
- The order is obtained from the customer by the sales representative. Order information includes product description, quantity, and price. Tax and shipping costs are not included in this project. As long as the order is not yet submitted, changes can be done: delete products ordered, change the quantity ordered, and add new products to the order. Once an order is made, the system automatically acquires an order number.
- Once the order is submitted, no changes can be done the order.
- A submitted order will cause an automatic email to the customer that the order has been placed and sales

representative can fax the order detail to the outlet, which supply and deliver products.

- It is assumed that all products will be supplied by only one outlet.
- A product information can be deleted only if the product is not in any outstanding order.
- The supplier receives the order information contained customer's information. The supplier will send the product to customers by using the outside carriers, such as UPS or USPS. This process belongs to the inventory system, which is excluded from the order entry system.
- A sales administrator handles at least one sales representative.
- A sales administrator can update at least one product.
- A sales administrator can add at least one product.

Conceptual Design

Once all the requirements have been collected and analyzed, the next step is to use a high-level data model to create a conceptual schema. The conceptual schema will provide a concise description of the data requirements of the users, including detailed descriptions of entity types, relationships, and constraints.

Figure 3.1 shows the entity-relationship diagram that graphically describes the entities and their relationship among each other.

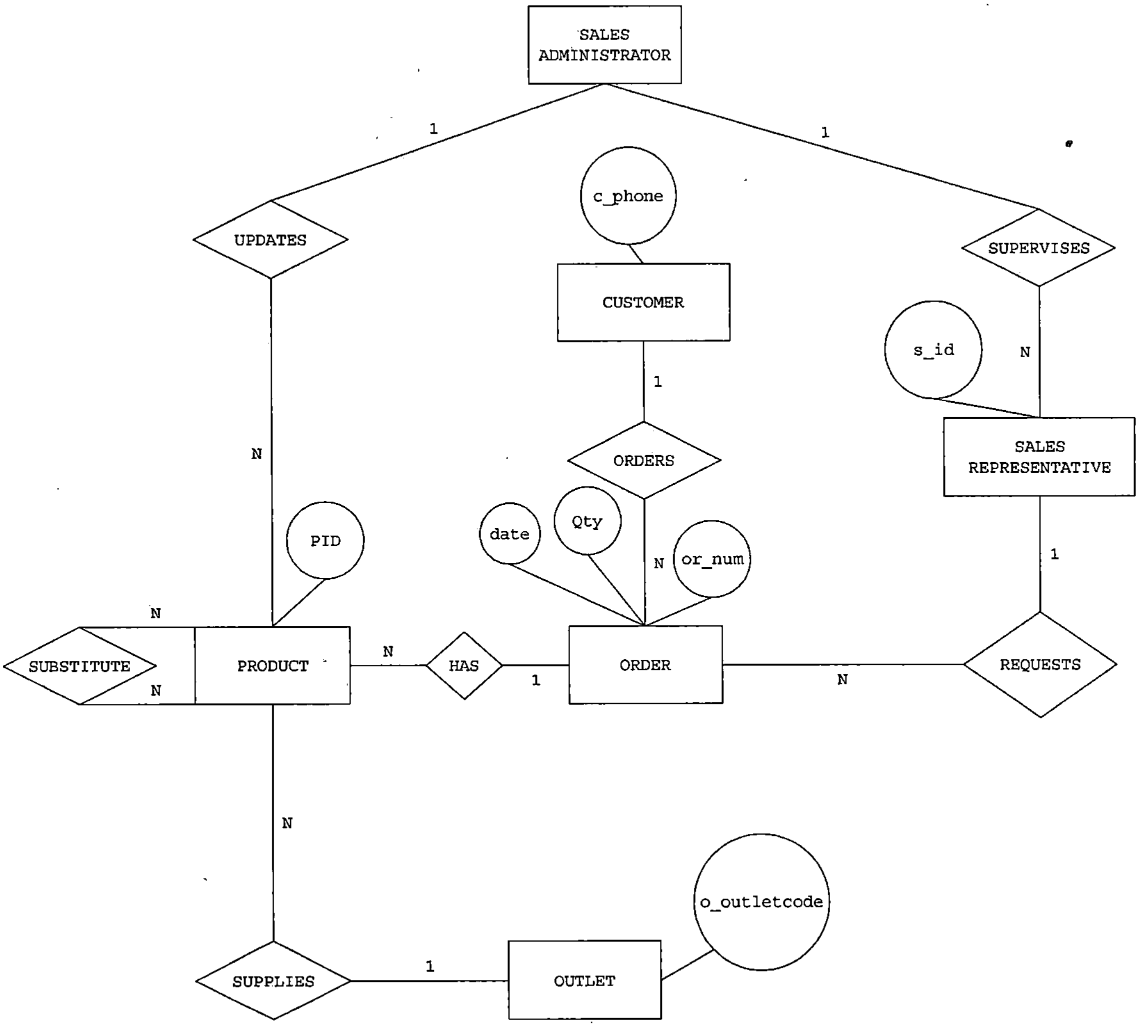


Figure 3.1. Entity Relational Model Mobile Order Entry System

The Universal Modeling Language (UML) goes beyond database design. It is a strategy for organizing systems as collections of attributes, relationship, and also the operations on the objects. These operations can be used to specify the functional requirements during the database design. The UML notation is presented in Figure 3.2.

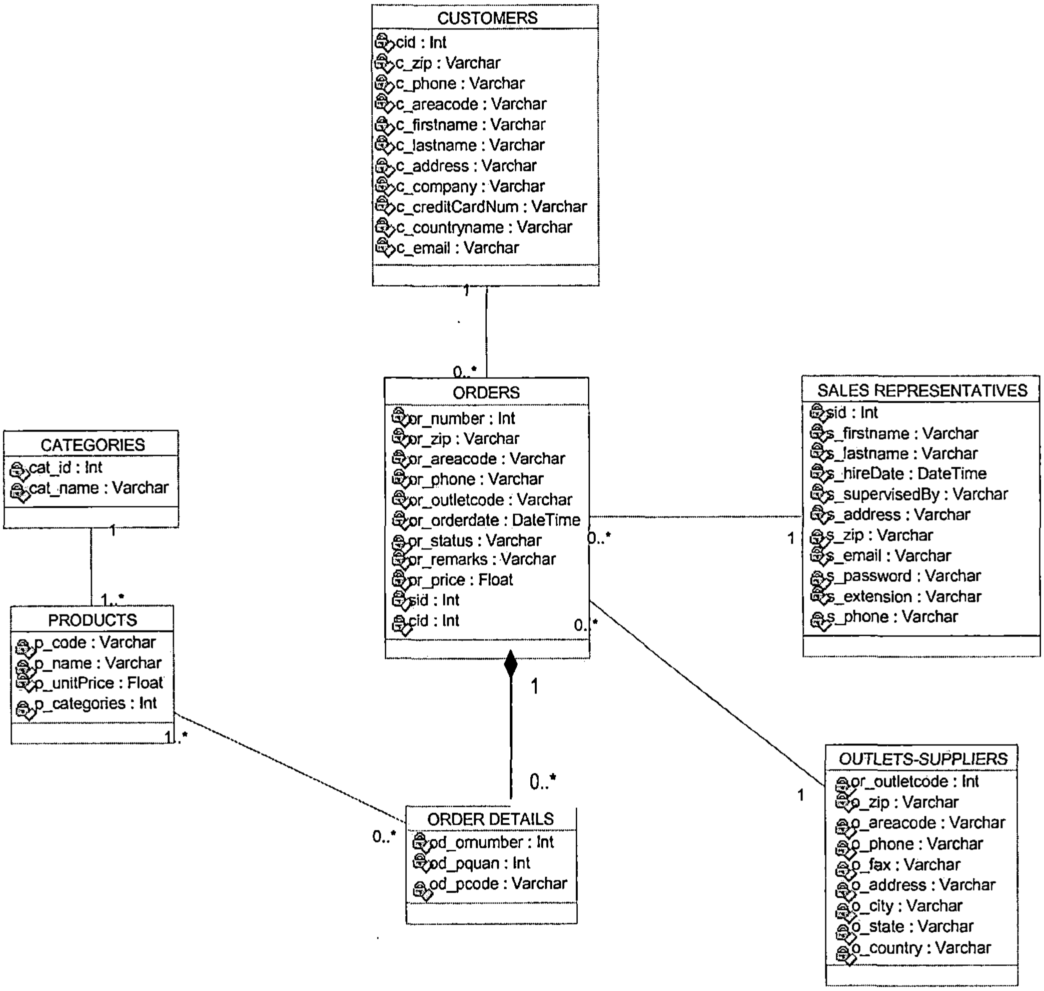


Figure 3.2. Universal Modeling Language(UML)of the Mobile Order Entry System

Logical Design

The process in transforming from the high-level data model into the implementation data model is called the logical design or data model mapping. In this phase, the high-data model (ER diagram and UML diagram) is translated into relational tables.

In Figure 3.2, there are seven class diagrams. These class diagrams represent seven tables in the database. The entities and their attributes are given in Table 3.1 to Table 3.7.

Table 3.1. Sales Representative Entity

Field Name	Description	Type	Length
sid	Unique sales representative ID.	int	9
s_firstname	First name of sales representative.	varchar	30
s_lastname	Last name of sales representative.	varchar	30
s_hireDate	Hire date.	varchar	15
s_supervisedBy	Supervisor of sales representative.	varchar	20
s_address	Contacted address that sales representative uses.	varchar	30
s_zip	Zip code area of sales representative.	int	5
s_email	Contacted e-mail of sales representative.	varchar	30
s_password	Password that was created by sales representative.	varchar	7
s_extension	Phone extension	int	4
s_phone	Phone number	int	10

Table 3.2. Customer Entity

Field Name	Description	Type	Length
cid	Unique customer ID	int	3
c_zip	Zip code area of customer	int	5
c_phone	Phone number	int	10
c_areacode	Area code where customer lives.	int	3
c_firstname	First name of customer.	varchar	20
c_lastname	Last name of customer	varchar	20
c_address	Contacted address that customer uses.	varchar	30
c_company	Company that customer is currently employed.	varchar	30
c_creditCardNum	Credit card number that customer uses.	int	16
c_countryname	Country where customer resides in.	varchar	20
c_email	Contacted e-mail that customer uses.	varchar	30
sid	The Sales representative ID.	int	9

Table 3.3. Order Entity

Field Name	Description	Type	Length
or_number	Unique main order ID	int	5
or_zip	Zip code of customer where order has to be sent to.	int	5
or_areacode	Area code of customer where order has to be sent to.	int	3
or_phone	Phone of customer who requested for the order.	int	10
or_outletcode	The Unique outlet ID of the outlet where order is sent.	int	3
or_orderdate	The date of the order that has been made.	varchar	200
or_status	The status of the order at that moment.	varchar	10
or_remarks	Remarks for the order.	varchar	200
or_price	Total price of the order.	float	10
sid	The sales representative ID of the sales representative who made the order.	int	9
cid	The customer ID of the customer who requested for the order.	int	3

Table 3.4. Order-Detail Entity

Field Name	Description	Type	Length
od_ornumber	Unique order detail ID	int	5
od_pquan	Quantities of the order detail	int	2
od_pcode	Unique product ID of the product	varchar	6

Table 3.5. Product Entity

Field Name	Description	Type	Length
p_code	Unique product ID	varchar	6
p_name	Name of product	varchar	50
p_unitPrice	Price per unit of product	float	7
p_categories	Unique category ID of category that product belongs to.	int	3

Table 3.6. Category Entity

Field Name	Description	Type	Length
cat_id	Unique category ID	int	3
cat_name	Name of category	varchar	50

Table 3.7. Outlet Entity

Field Name	Description	Type	Length
o_outletcode	Unique outlet ID	int	3
o_zip	Zip code of outlet	int	5
o_areacode	Area code of outlet	int	3
o_phone	Phone number	int	10
o_fax	Fax number	int	10
o_address	Address of outlet	varchar	30
o_city	City where outlet locates.	varchar	20
o_state	State where outlet locates.	varchar	10
o_country	Country where outlet locates.	varchar	10

- Creating Tables

The Mobile Order Entry System has the database named wlt. The wlt database is created from the MySQL Admin Control. The wlt database are consisted of 7 tables:

1. table salesRep
2. table customer
3. table order_master
4. table order_detail
5. table products
6. table categories
7. table outlet

To create these tables in MySQL database, the commands in the wldb.sql file are used to populate all seven tables, using this command, "MySQL wlt < wldb.sql". The command file wldb.sql contains SQL command for creating these seven tables: salesRep, customer, order_master, order_detail, products, categories, and outlet. See Table 3.8.

Table 3.8. SQL Create Command

```
CREATE TABLE salesRep (
     sid int(9) not null,
     s_firstname varchar(30) not null,
     s_lastname varchar(30) not null,
     s_hireDate varchar(15),
     s_supervisedBy varchar(20),
     s_address varchar(30),
     s_zip int(5) not null,
     s_email varchar(30),
     s_password varchar(7),
     s_extension int(4),
     s_phone int(10),
     primary key(sid)
);
CREATE TABLE customer (
     cid int(3) not null auto_increment,
     c_zip int(5) not null,
     c_phone int(10) not null,
     c_areacode int(3) not null,
     c_firstname varchar(20),
     c_lastname varchar(20),
     c_address varchar(30),
     c_company varchar(30),
     c_creditCardNum int(16) not null,
     c_fax int(10),
     c_countryname varchar(20),
     c_email varchar(30),
     sid int(9) not null,
     primary key (cid),
     key salesId(sid)
);
CREATE TABLE order_master (
     or_number int(5) not null auto_increment,
     or_zip int(5) not null,
     or_areacode int(3) not null,
     or_phone int(10) not null,
     or_outletcode int(3) not null,
     or_orderdate varchar(200),
     or_delivery varchar(15),
     or_status varchar(10),
     or_remarks varchar(200),
     or_price float(10),
     sid int(9) not null,
     cid int(3) not null,
     primary key (or_number),
     key salesId(sid),
     key custId(cid),
     key outlet_id(or_outletcode)
);
CREATE TABLE order_detail (
     od_ornumber int(5) not null,
     od_pquan int(4)not null,
     od_pcode varchar(6) not null,
     primary key(od_ornumber, od_pcode),
     key prod(od_pcode)
);
CREATE TABLE products (
     p_code varchar(6) not null,
     p_name varchar(50) not null,
     p_unitPrice float(7),
     p_categories int(3) not null,
     primary key(p_code),
     key cat(p_categories)
);
CREATE TABLE categories (
     cat_id int(3) not null,
     cat_name varchar(50),
     primary key(cat_id)
);
```

```
CREATE TABLE outlet (

     o_outletcode int(3) not null,

     o_zip int(5),

     o_areacode int(3),

     o_phone int(10),

     o_fax int(10),

     o_address varchar(30),

     o_city varchar(20),

     o_state varchar(10),

     o_country varchar(10),

     primary key (o_outletcode)

);
```

CHAPTER FOUR

PROJECT IMPLEMENTATION

When developing a WAP application, one must consider the limitations of mobile devices and determine the most efficient and flexible way to provide suitable content. This section discusses these considerations.

1. Simple user interfaces

Most mobile devices have extremely simple user interfaces. WML and WMLScript were specifically designed to address these limitations. While some WAP Gateways have the ability to automatically translate HTML to WML. In practice, it is encouraged to generate WML directly and tailor the interface to the specific needs of the wireless user. Developing a corresponding WML front-end leverages the previous engineering effort to develop the business logic and content of an application, while providing significant user interface benefits. Because of the limitation of graphical displays on most WAP-enabled devices, it is often desirable to allow users to customize the application to allow them to see only those services of interest. Tools such as Personalization are well suited for providing this sort of flexibility in an application.

2. Limited memory

Most WAP devices have little memory. When grouping WML cards into WML decks, one should be aware that a deck is the smallest download unit. In other words, information is downloaded to a mobile client in decks, not cards. Because of the memory limitations, it is highly suggested to avoid decks with large amounts of cards.

3. Supporting multiple client types

Typically, a WAP application is an extension of an existing HTML browser-based application. The back-end functionality should not require modification in offering the same services to mobile clients. Instead, a corresponding WML front-end can be developed to leverage the same back-end functionality. There are two strategies for handling both HTML and WML client types. There can be separate URLs for HTML and WML entry points, or a single URL can be used which will generate content according to the browser type of the requestor. The browser type can be determined by examining the User-Agent request header of an HTTP request. The display sizes of WAP-enabled devices currently range from four lines of text to about eight lines of text (although this is likely to change dramatically in the near future).

4. Session tracking

Session tracking is useful to keep track of a user's progress over multiple servlets or pages. As described in Using WebLogic HTTP Servlets, tracking is accomplished by storing session data in a javax.servlet.http.HttpSession object that can be retrieved given the session ID. The session ID is typically stored in a cookie that is set in the client. However, WAP does not support cookies.
One alternative is to use URL rewriting which causes the session ID to be encoded into hyper-links on the page that the servlet sends back to the browser. The session ID is then retrieved from the URL parameters when the link is activated. However, the length of the session ID can cause problems for WAP-enabled devices because many devices limit URLs to 128 characters. To ensure secure sessions with a uniformly random distribution, it is necessary for session IDs to contain a certain number of characters.

A better alternative is to include a WML postfield element containing the session ID along with any WML element. In WML, the element indicates navigation to a URL.

The element may contain one or more postfield elements. These elements specify information to be submitted to the origin server during the request. In the example WML code (with scriptlet) below, the session ID is obtained from the session and used to set the value of the WebLogicSession postfield.

```
  <go href="index.jsp" method="post">
    <postfield name="WebLogicSession" value="<%=
  session.getId() %>"/>
  </go>
```

The code above will cause an HTTP POST to the URL index.jsp with a message entity containing WebLogicSession=*sessionID* where *sessionID* is the ID obtained from the session.getId() call. From within index.jsp, the session ID can then be obtained by getting the parameter from the HTTP request with the call request.getParameter("WebLogicSession").

The main processes in implementing the Mobile Order Entry System are described below.

Developing the Graphic User Interface (GUI)

The Mobile Order Entry System has two ways to access the system: Internet website, and mobile device. In this chapter, the implementation of GUI of the system by these two categories will be explained.

- Web-site design

The Web-site design of the Mobile Order Entry System is initially developed using the graphic design from the Adobe Photoshop software. A graphic template is developed, so it can be reused and modified for the rest of the Web pages. The programming languages used in developing the web GUI are the Hyper Text Markup Language (HTML) and Java Server Pages (JSP).

Most of the web pages in the system were developed by JSP because of its compatibility with other components in the system. The GUI components used include Text Field, Hyperlinks, Tables, and Select Option.

- Mobile interface design

The mobile interface design was developed by the WAP technology. The mobile emulator from Nokia was chosen as the Mobile interface. Nokia is one of the WAP forum members who developed the WAP standard.

The Mobile GUI is written using Wireless Markup Language (WML). WML is analogous to HTML for HTTP applications. It is an XML-based language that is specifically designed to interface with the micro-browsers that exist in WAP-enabled devices. A WML document is a collection of one or more *cards*. Each card is considered a well-defined unit of interaction. The general rule of thumb is that a card carries enough information to fit in one screen of a mobile device. One or more cards can be logically grouped into a *deck* of cards.

Creating the Database

MySQL is used for the Mobile Order Entry Application. MySQL is a multi-platform used for huge database application. One can download the late version of MySQL for Linux, Unix, or Windows based system for free at http://www.mysql.com. Once the MySQL program is installed on the computer, one can start the program by finding the icon, named winmysqladmin.exe. One can manipulate the data by choosing the table create, add, drop, etc.

A new database can be created in the MySQL database, either directly from the started program or by using the command, mysqladmin create wlt. Only the user with administrative privilege can create the table. The name of the Mobile Order Entry Database is wlt. To create the tables in MySQL database use the commands in the wldb.sql file, using this command "mysql wlt < wldb.sql". The command file wldb.sql contains the SQL command for creating the seven tables.

Getting the Wireless Application Protocol Server Started

1. Install Java(TM) Runtime Environment 1.3.0

2. Install Java HotSpot(TM) Server VM 2.0

3. Install the Nokia Active Server 2.0.1 Professional Edition

4. Install the Nokia WAP Toolkit 2.1

5. Install the Nokia Active Server product

For further information, please see http://www.nokia.com/corporate/wap/

Getting the WebLogic Server Started

To run a WAP application on the WebLogic Server, one must configure the MIME types associated with WAP in the weblogic.properties file as shown below.

```
weblogic.httpd.mimeType.text/vnd.wap.wml=wml
weblogic.httpd.mimeType.text/vnd.wap.wmlscript=wmls
weblogic.httpd.mimeType.application/vnd.wap.wmlc=wmlc
weblogic.httpd.mimeType.application/vnd.wap.wmlscriptc=wm
lsc
weblogic.httpd.mimeType.image/vnd.wap.wbmp=wbmp
```

The weblogic.properties file has the above MIME types configured by default.

Getting the Mobile Phone (Nokia Emulator) Started

The new Nokia 3330 sports a wide range of enhanced features perfect for the mobile lifestyles of today. One can surf the mobile Internet with the WAP browser, personalize the phone with cool animated screensavers, use chat messaging for fast conversation with friends and take part in all kinds of fun activities. Before running the Nokia Emulator on the machine, the Nokia Mobile Internet Toolkit must be installed first. This Nokia Mobile Internet Toolkit Product is an authoring and simulation environment for mobile internet content such as WAP, XHTML Basic, and Wireless CSS. June 2000 WAP conformance is delivered via the 'WAP June 2000' prototype phone simulator and the 'local' encoders (WAP and WMLScript). The WAP Server Simulator is tested for WAP 1.1 conformance.

System Requirements:

- Requires Installation of Java Runtime Environment (JRE) version 1.3. This can be obtained from http://www.javasoft.com. JRE 1.3.1 is recommended, when installing the Toolkit. If JRE 1.3 is missing, JRE 1.3.1 will be installed automatically.

- Requires Pentium-class 300MHz or faster, 128MB RAM (256MB recommended), Windows NT 4.0 with SP4 or Windows 98, or Windows 2000 with SP2, 64K color, 800x600 resolution, 50MB of hard disk space (70MB recommended).

CHAPTER FIVE

SYSTEM VALIDATION

System validation is a significant process to finalize the overall performance of the developed system. The goal of system validation is to assure that all performance requirements are met. The three interrelated performance tests are: unit testing, integrating testing, and system testing. If any error has been founded during these tests, the correction of any possible error will be validated at the moment.

Unit Testing

The unit testing is the initial step in the entire system testing process. The unit test is conducted and evaluated at the functional units of the system. In order to ensure all checking, the checklists of functional units are created in a table. The results of the functionality units are either pass or fail. The functional units of the Mobile Order Entry System are Customer Management Unit, Order Management Unit, Sales Representatives Management Unit, and Product Management Unit.

In Customer Management Unit, each of the following operations needs to be verified.

- Create new customer is tested by clicking the add new customer function. Once, the customer form shows on the screen, the different values are entered and checking all entered values is done through the view customer information. The form validation is used for checking all the required fields of the customer such as, company name, first name, last name, credit card number, and so on.
- View customer information is tested by querying all information for a customer from database through both web browser and WAP device. If the information of a customer shows completely without missing or repeating any information, then view operation is working well.
- Edit customer information is tested by editing different values and checking them with the view customer operation. If the customer's information in the database reflects the modified data, then the edit customer information is working well.
- Delete customer information will be allowed only when there is no processed order or an outstanding order.

In this project, the customer information is never deleted.

- Search customer is tested by searching for different values and if the customer information is shown correctly in the form, then the search customer is working well.

In Order Management Unit, each of the following operation needs to be verified.

- Take order is tested by creating different sets of new order values and checking values through the view order operation. If the new orders appear in the view mode, then take order is working well.
- Update order is tested by updating different sets of new values and checking values through the view order operation. If all order information has been updated, then the update order function is working well.
- View order was tested by logging as a sales representative and querying orders from the database, each sales representative should be able to view only their order information. And if order information shows completely without missing or repeating any

information, then view order operation is working well.

- Delete order was tested by deleting a different set of order values and checking deleted values through the view order operation. If order values were deleted, then the delete order operation is working properly.
- Delivery order was tested by changing a different set of order values and checking the changed values through the view order operation. If the order status was changed from 'ordering' to 'delivery' status, then the delivery order operation is working well.

In Product Management Unit, each of the following operation needs to be verified.

- Add product was tested by adding different sets of values and checking the values through the view operation as a sales administrator. If the product's information shows completely without missing or repeating any information, then add new product operation is working well.
- View product information was tested by querying all products from database through both web browser and WAP device. If the product's information shows

completely without missing or repeating any information, then view operation is working fine.

- o Delete product is allowed only when there is no the outstanding order.

The following table describes the validations of the Mobile Ordering System.

Table 5.1. The Validations of the Mobile Ordering System

Functional Units	Criteria of Testing	Results
Two-levels user login	o Tested by logging in as a different user, either a sales administrator or sales representative. o If sales administrator logs in successfully, then system brings up to administrator web page otherwise, brings up the sales representative web page.	Pass
Sales representative Create	Role: sales administrator o Only the sales administrator role can add a new sales representative. o Click adding new sales representative, the blank form is displayed. o Fill in the values in popup window to remind that there is missing value in the required fields, such as password, or sales Id. o The primary key of the sales representative,	Pass

	which is in the salesID field, is automatically generated and cannot be replicated.	
Sales representative Delete	Role: sales administrator o Tested by deleting sales representative and check the deleted value from querying database or viewing by view operation. o Sales representative is allowed to be deleted, only if, there are no outstanding order. o In the implementation in this project, the sales representative information is allowed to be stored without deleting. o Display the message" No Sales Representative currently stores in the database", if the delete operation performs on the empty database.	Pass
Sales representative Edit	Role: sales administrator o Tested by clicking the edit function on any of sales representative name you would like to edit the information, the information of sales representative should show up in the form with the update button. o After editing and click updating button, the information of sales representative will be updated. o The primary key of the sales representative,	Pass

	which is in the salesID field, will not be generated, but it will be replicated with the same saleID.	
Sales representative View	Role: sales administrator o Sales administrator has the capability of viewing any of the sales representative information in the database.	Pass
Customer Create	Role: sales representative o Tested by adding different sets of the customer information into the customer form and checking the values through the view operation. o Check if the customer form is submitted without filling out all of the required fields, the reminding message will pop up. o The primary key of the customer, which is in the custID field, is automatically generated and cannot be replicated.	Pass
Customer Delete	Role: sales administrator o Tested by deleting different sets of the customer information into the customer form and checking the values through the view operation. o The delete customer function is allowed only if, there is no outstanding order.	Pass

	o In the implementation in this project, the customer information is allowed to be stored without deleting.	
Customer Edit	Role: sales representative o Tested by editing different sets of the customer information into the customer form and checking the values through the view operation.	Pass
Customer View	Role: sales representative o Tested by searching each of the customer information in database field, if it is shown properly and completely.	Pass
Product Create	Role: sales administrator o Tested by logging in as a sales administrator, add the different set of products. And check the values through the view operation o Check if the product form is submitted without filling out all of the required fields, the reminding message will pop up.	Pass
Product Delete	Role: sales administrator o Tested by logging in as a sales administrator, delete the different set of products. And check the values through the view operation o To delete the product, there will allow only when there is no the outstanding order. o In the implementation of	Pass

	this project, the product has never out in the stock.	
Product View	Role: sales administrator o Tested by logging in as a sales administrator, and check new product from the product list through the view operation. Role: sales representative o Testing by logging in as a sales representative, after adding products. We must be able to view the new added product from the product menu.	Pass
Order Create	Role: sales representative o Testing by logging in as a sales representative, add orders by clicking on the add order button. And then display through the view operation	Pass
Order Delete	Role: sales representative o Testing by logging in as a sales representative, delete orders by clicking on the delete order button. And then display through the view operation.	Pass
Order View	Role: sales representative o Display the list of order by querying the order information from database table. And check if the order is properly display.	Pass
Order Update	Role: sales representative o Testing by logging in as a sales representative, check the order update by modifying the exiting	Pass

	order. And then display through the view operation.	

Integration Testing

After each of functional unit has passed the standard of the system performance, the integration of system components still needs to be checked. The integration testing is a systematic technique for verifying the proper functions of interfaces with other units of the Mobile Order Entry System. The following table is a summary of the Integration Testing results of this system.

Table 5.2. The Summary of the Integration Testing Results of this System

Component Integrated	Criteria of Test	Results
The web pages, forms and their JDBC driver connection	o Check the proper type of driver and test their connection between each forms and pages. o Test the proper coding of web pages and forms by finding errors of web pages and forms.	Pass Pass
The Web browser, WAP device, Web Logic application server, and WAP server.	o Assure the proper communication among these components.	Pass

System Testing

In the final phase, called the system test, the Mobile order Entry Application is completely tested to meet all functional and performance requirements. Two systematic criteria: usability and communication environment, were performed to ensure the completeness of the system.

- Usability - The system was tested on the ease of use, accuracy, and performance.
- Communication Environment - The system was tested on the overall performance, functionality, and compatibility.

CHAPTER SIX

CONCLUSIONS AND FUTURE DIRECTIONS

The Mobile Order Entry System provides an effective and intelligent way of accessing information anywhere and anytime. The Mobile Order Entry System provides the user with real-time database updates. It allows multiple accesses from clients.

The criteria in the architecture design are the choice of technology. The capabilities of the technology are chosen based on these criteria: (i) Platform Independence, (ii) Object Orientedness, and (iii) Modularity and Efficiency. For the WAP application development, the limitations of mobile devices are considered by determining the most efficient and flexible way to provide suitable content, such as simple user interfaces, limited memory, supporting multiple, client types, and session tracking.

Future Modification and Enhancement

- Ensure the security for WAP Gateway
- Integrate the system with other mobile devices such as palm pilot, pocket pc, and so on.
- Implement mobile wireless application for different type of the business by using the same prototype.

- Integrate with the inventory system including:
    - Calculate shipping fee, total sales, and commission for each sales representative.
    - Check the available products in the stock.
    - Check the bad credit customer.
- Improve the graphic user interface (GUI) such as the 3D and interactive features.
- Improve functionalities and features including:
    - Delete Customer/product- The system check shows the warning message to have a customer/product deleted next time, if there is an outstanding order.
    - Allow products to be supplied by more than an outlet. The system recommends the outlet for customer based on: cheaper product's price, closer to customer's address.

APPENDIX A:

USER MANUAL

This manual provides information for the first-time users in how to use the Mobile Order Entry System. Users need to understand some of the conventions that have special meaning:

Table A.1. Conventions Table

Convention	Purpose
Bold	Represents the command shown on the screen, such as the Options, Submit, and Search Command keys.
Bold-Italic	Represents the attribute name of the system's form, such as the *username* and *password*.
Italic	Represents the hyperlink of the Internet address, such as the *www.csusb.edu*.

Table A.2. Buttons Table

Operation	Description
Options	Specifies a single choice option in a select element.
Select	Allows the user to choose from a list of options.
View Categories	Allows the user to see a list of categories.
View Product	Allows the user to see all products available in the chosen category.
Edit	Allows the user to enter and place text in the entry field.

Ok	Press ok when the user is done with any operation.
Submit	Allows the user wants to submit the selected information.
Back	Go back to the previous operation.

Visiting his/her customers, a sales representative has the ability to access the information from a remote system using a Nokia cell phone. In the area of the Internet hyperlink input enter *http://www.hostname.com/windex.wml* then press OK. The following picture is the main page of the WAP application. Click Options and Submit to go to the log in page. Or this page will redirect to the log in page, which is shown in the next following picture after 5 sec.

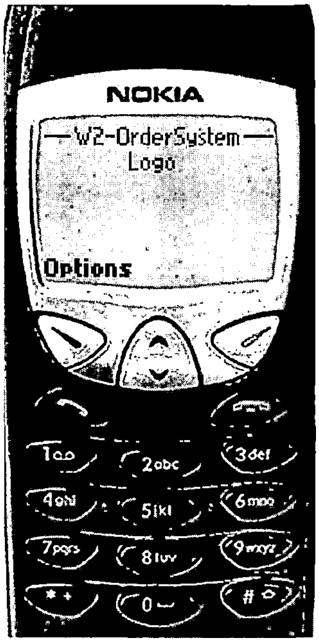
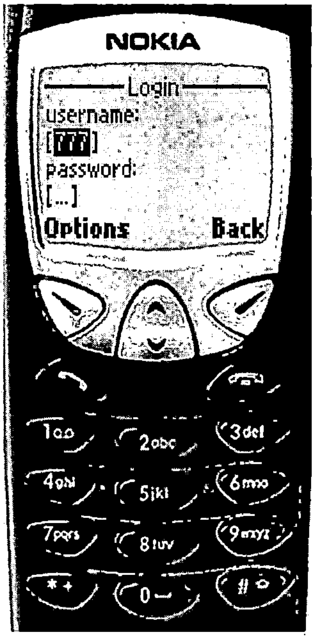


Figure A.1. Mobile Order Entry System Main Menu

In the logging page, enter **username** and **password** into the text box. If sales representative wants to edit the input, use the arrow to move up or down to select the information and Click **Options** and **Edit** to enter the input.



Login

username:

[???]

password:

[...]

Options Back

Figure A.2. Log-In Page

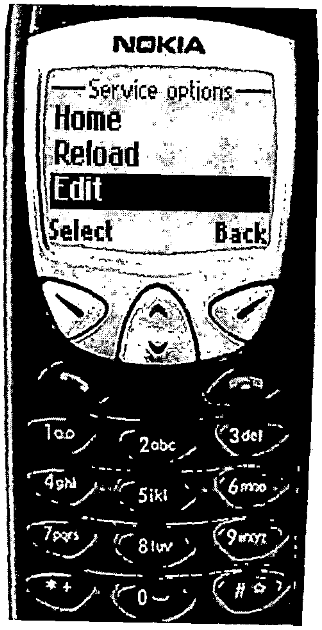


Figure A.3. Edit Operation

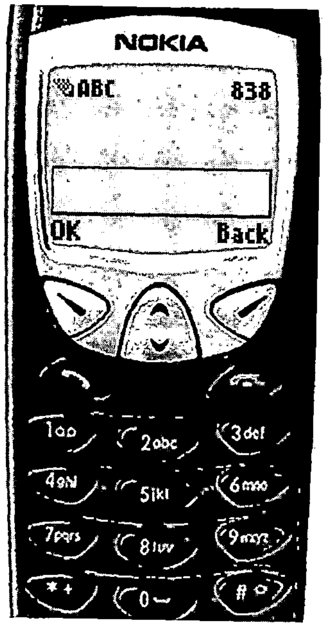
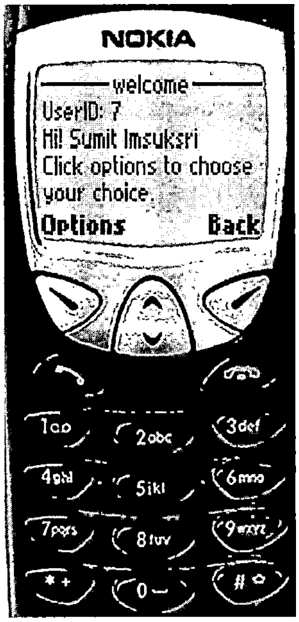


Figure A.4. Input Page of the Log-In Page

Once the account and password are verified, welcome page is displayed; otherwise, the unregistered user page will show. The welcome page is displaying the sales representative's ID, first name, and last name.


welcome

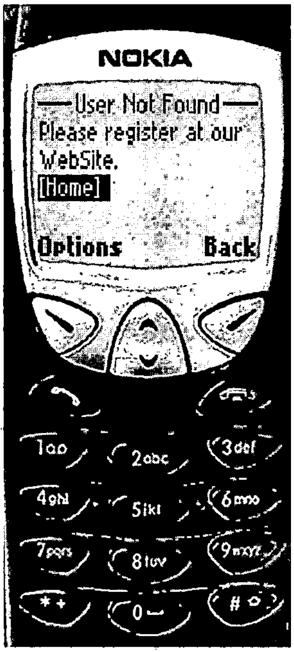
UserID: 7

Hi! Sumit Imsuksri

Click options to choose your choice.

Figure A.5. Welcome Page [User Found]

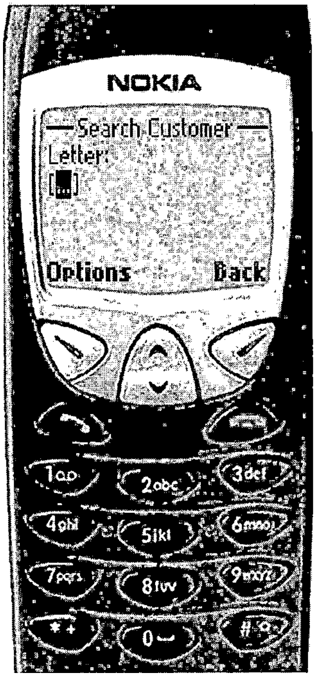
If an unregistered user has logged into the system, the unregistered page will show. The user's information must be created at the company database in order to continue with the next process.



—User Not Found—
Please register at our WebSite.
[Home]

Figure A.6. User Not Found Page

After the log in page, the next page will ask the sales representative to search their visited customer by their first letter of the company name. Then, click **Options** and **Edit** to enter the input and then **Submit** the information.



Search Customer

Letter:

[■]

Figure A.7. Search Customer Menu

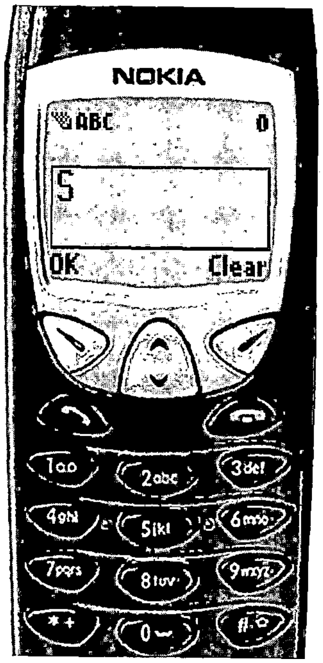


Figure A.8. Input Page of the Search Customer Menu

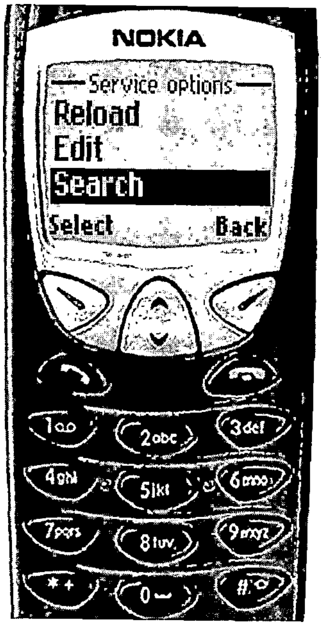


Figure A.9. Search Operation

The following picture shows all company names specified by the first letter in the search. Sales representative can choose the company that he/she wants to order the products by using the arrow to move up or down. Then, press **Select** and **Submit** the information or **back** to search again.

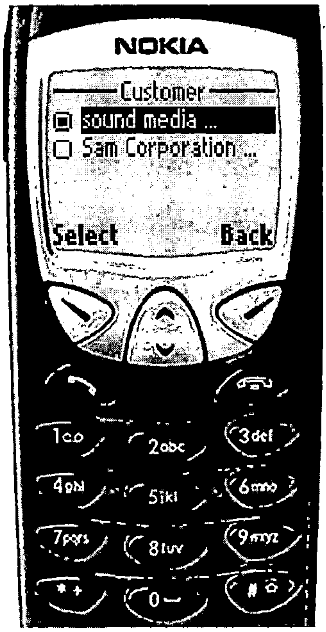


Figure A.10. Customer Found Menu [search by first letter of company name]

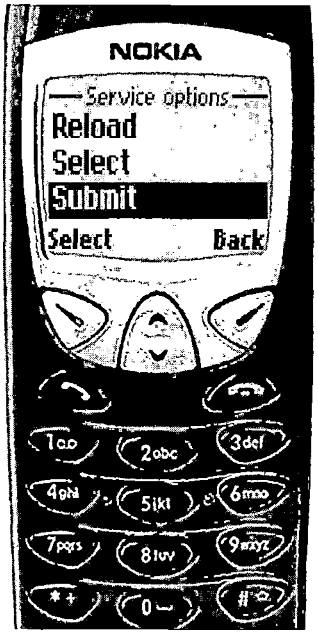
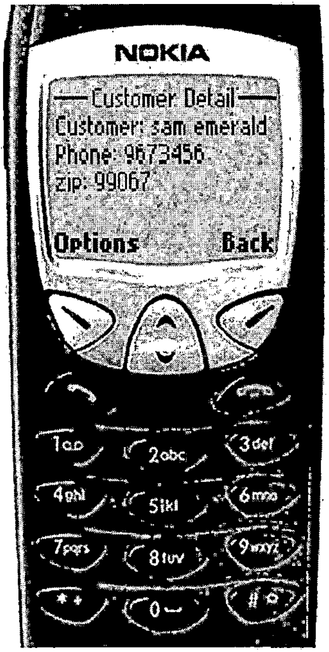


Figure A.11. Submit Operation

After selecting the company, the customer detail page is displayed to assure that sales representative retrieves the right information the same as the customer he/she wants to order products for. If correct, press **Options** and **View Categories** in order to view product to order.



Customer Detail
Customer: sam emerald
Phone: 9673456
zip: 99067

Figure A.12. Customer Detail

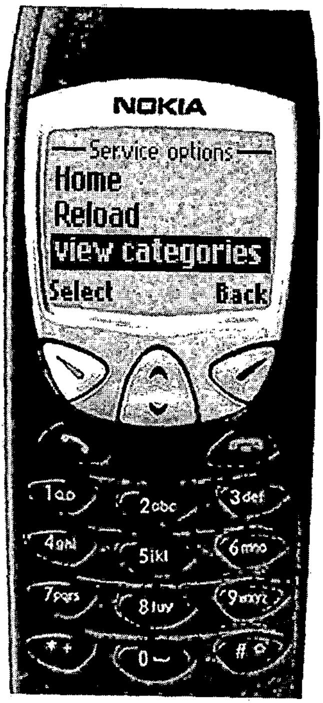


Figure A.13. View Categories Operation

The following page shows all categories of products. Choose **Select** and **View Product** to see all products available in the chosen category.

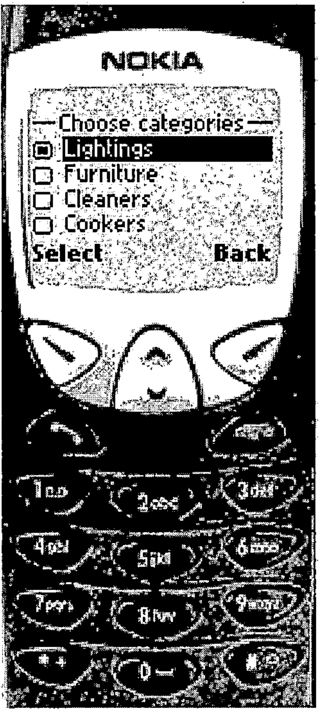


Figure A.14. Categories Detail Menu

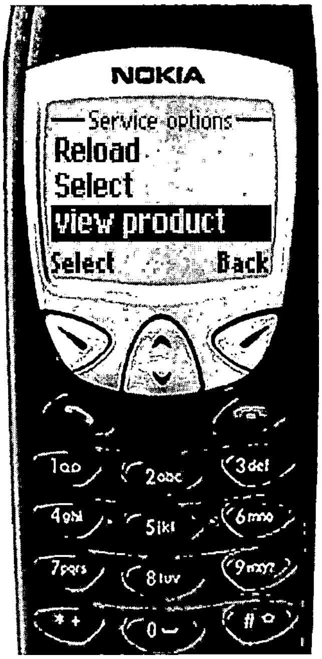


Figure A.15. View Product Operation

The following screen shows all products in the chosen category.

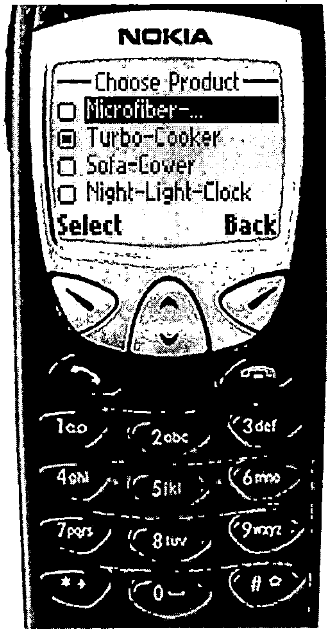
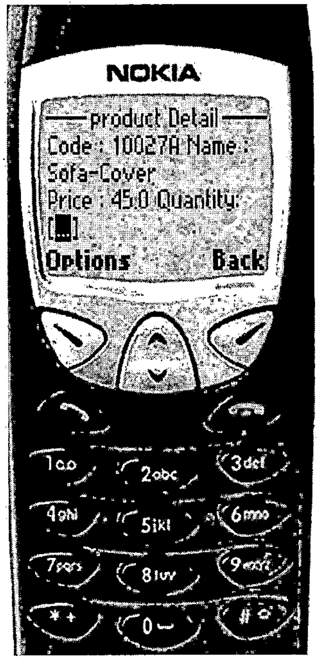


Figure A.16. Product Search Menu

After selecting the product, sales representative needs to enter the amount of the quantities by press **Options** and **Edit.** Then, he/she is allowed to type the number in the text box. When ready to order, press **Options** and **Submit.**



product Detail

Code : 10027A Name :
Sofa-Cover
Price : 45.0 Quantity:
[ ]

Options Back

Figure A.17. Product Detail Menu

The following page is the confirmation page. The purpose is to give brief information of the requested order. If sales representative is sure to order this product, then press Options and **Confirm**.

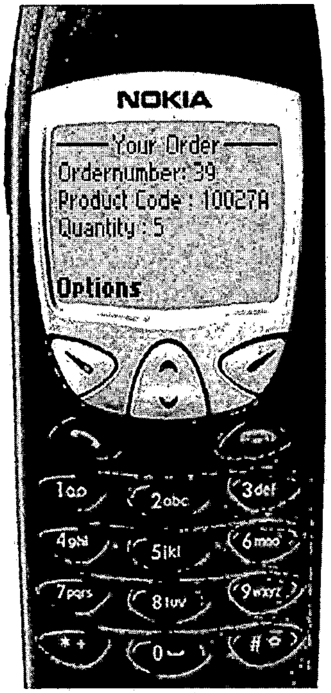
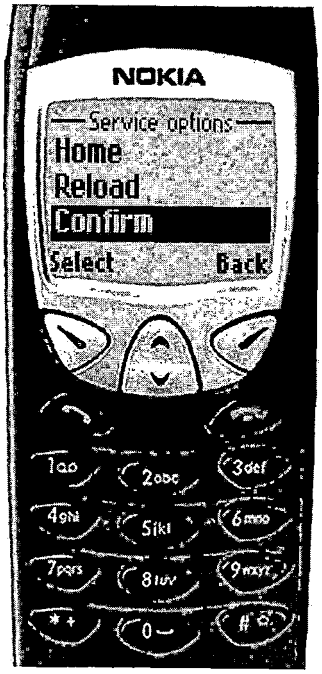

Your Order
Ordernumber: 39
Product Code : 10027A
Quantity : 5

Figure A.18. Order Information Menu



Service options

Home

Reload

Confirm

Figure A.19. Confirm Operation

The following page is the more products & notify order page. Select **More Products** if sales representative wants to order more products onto the order. Select **Notify Order** if sales representative wants to remind the customer regarding to his/her order.

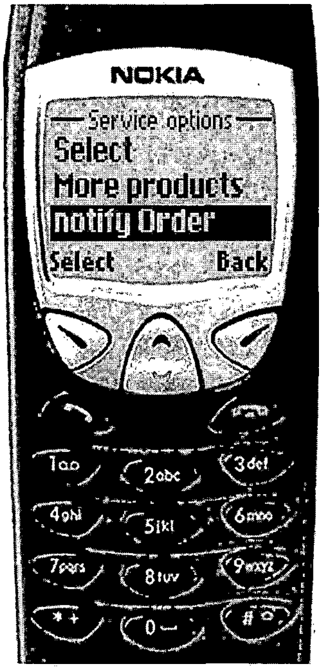
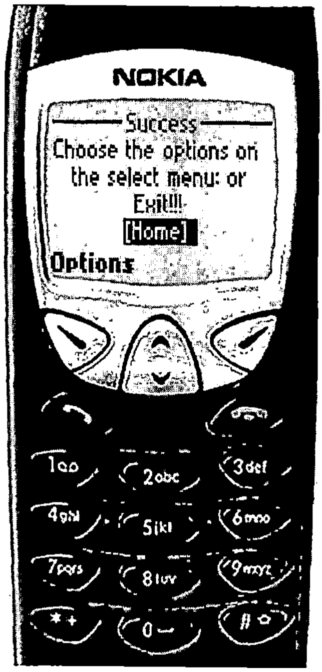


Figure A.20. More Products & Notify Order Operations



Success

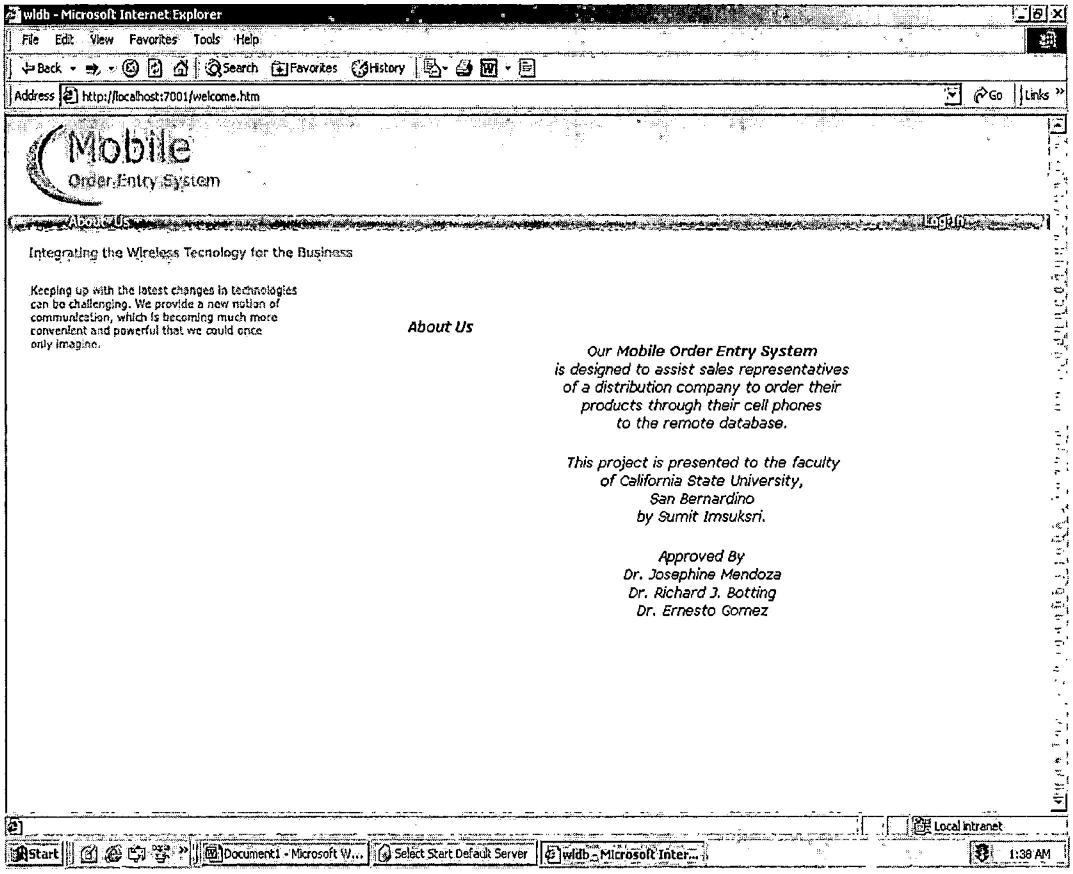
Choose the options on the select menu: or Exit!!!

[Home]

Options

Figure A.21. Success Menu

The sales representative can take orders for his/her customers not only via the WAP-based system, but also through web-based system. The following picture is the introduction page of the web-based system.


wldb - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address http://localhost:7001/welcome.htm
Go Links
Mobile
Order Entry System
About Us
Log In
Local intranet
Start
Document1 - Microsoft W...
Select Start Default Server
wldb - Microsoft Inter...
1:38 AM

Integrating the Wireless Tecnology for the Business

Keeping up with the latest changes in technologies can be challenging. We provide a new notion of communication, which is becoming much more convenient and powerful that we could once only imagine.

About Us

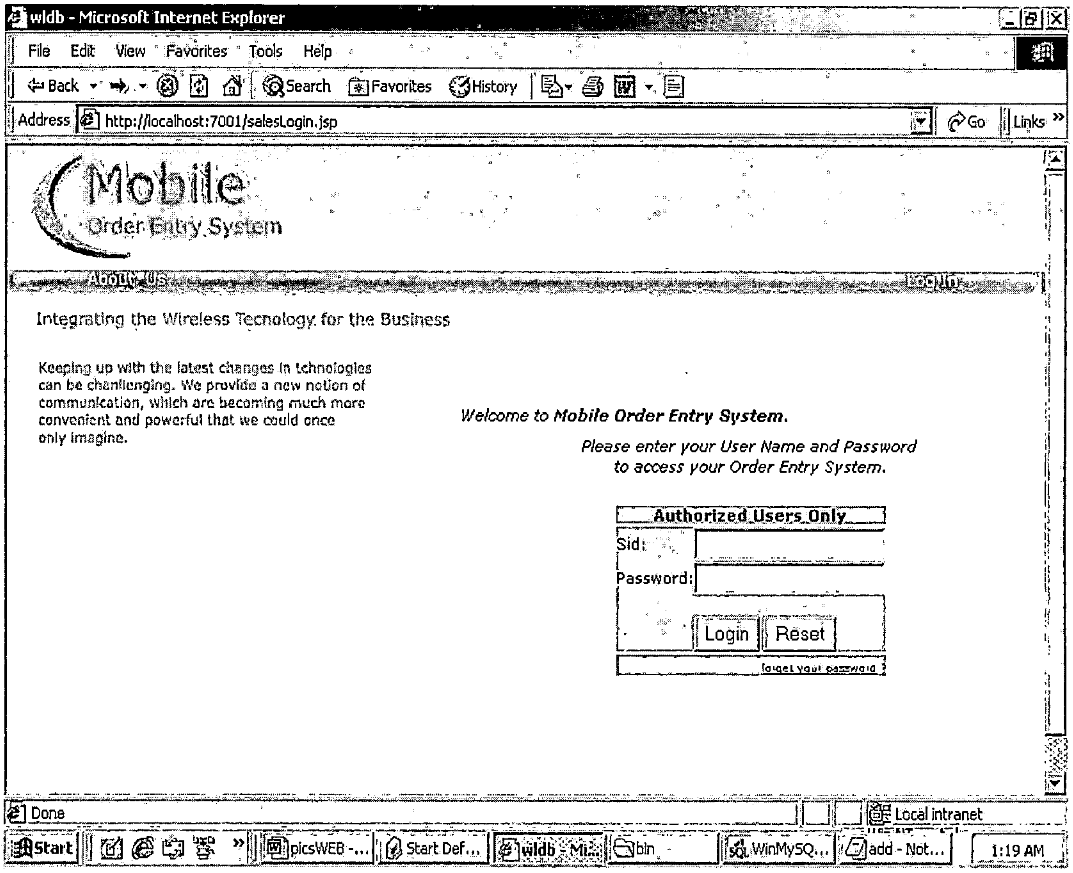
*Our **Mobile Order Entry System***
is designed to assist sales representatives
of a distribution company to order their
products through their cell phones
to the remote database.

This project is presented to the faculty
of California State University,
San Bernardino
by Sumit Imsuksri.

Approved By
Dr. Josephine Mendoza
Dr. Richard J. Botting
Dr. Ernesto Gomez

Figure A.22. Mobile Order Entry System Web-based Main Page

The system provides two levels of users: sales administrator and sales representatives. Sale administrator has more privileges than sales representatives. A sales administrator can add new sales representative and add new products. To log into the system, the assigned **sid** and **password** are entered.



Integrating the Wireless Tecnology for the Business

Keeping up with the latest changes in tchnologies can be chanllenging. We provide a new notion of communication, which are becoming much more convenient and powerful that we could once only imagine.

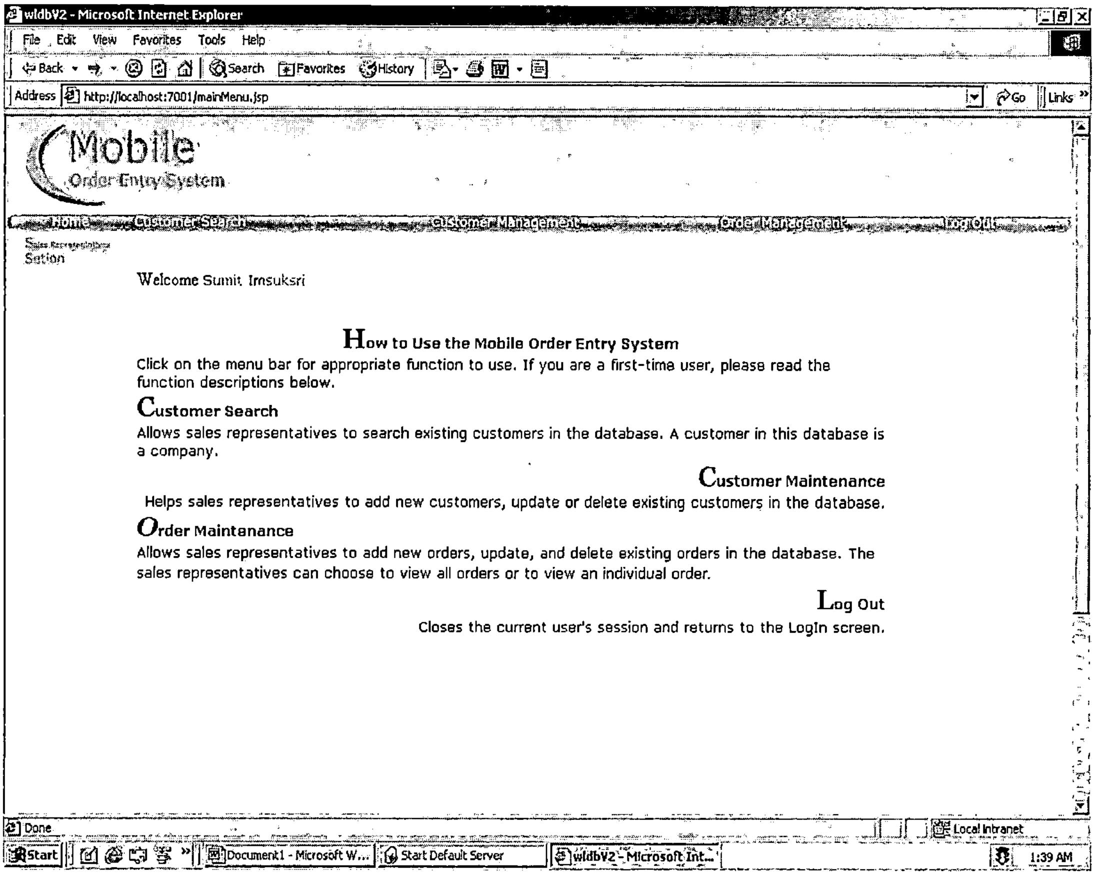
*Welcome to **Mobile Order Entry System**.*

Please enter your User Name and Password to access your Order Entry System.

Authorized Users Only

Figure A.23. Sales Representatives Log-In Page.

The following screen is the main menu. It will show a brief instruction for first-time users. Sales representative will see the welcome greeting with his/her first and last name.


wldbV2 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address http://localhost:7001/mainMenu.jsp
Go Links
Mobile
Order Entry System
Home
Customer Search
Customer Management
Order Management
Log Out
Sation
Done
Local intranet
Start
Document1 - Microsoft W...
Start Default Server
wldbV2 - Microsoft Int...
1:39 AM

Welcome Sumit Imsuksri

How to Use the Mobile Order Entry System

Click on the menu bar for appropriate function to use. If you are a first-time user, please read the function descriptions below.

Customer Search

Allows sales representatives to search existing customers in the database. A customer in this database is a company.

Customer Maintenance

Helps sales representatives to add new customers, update or delete existing customers in the database.

Order Maintenance

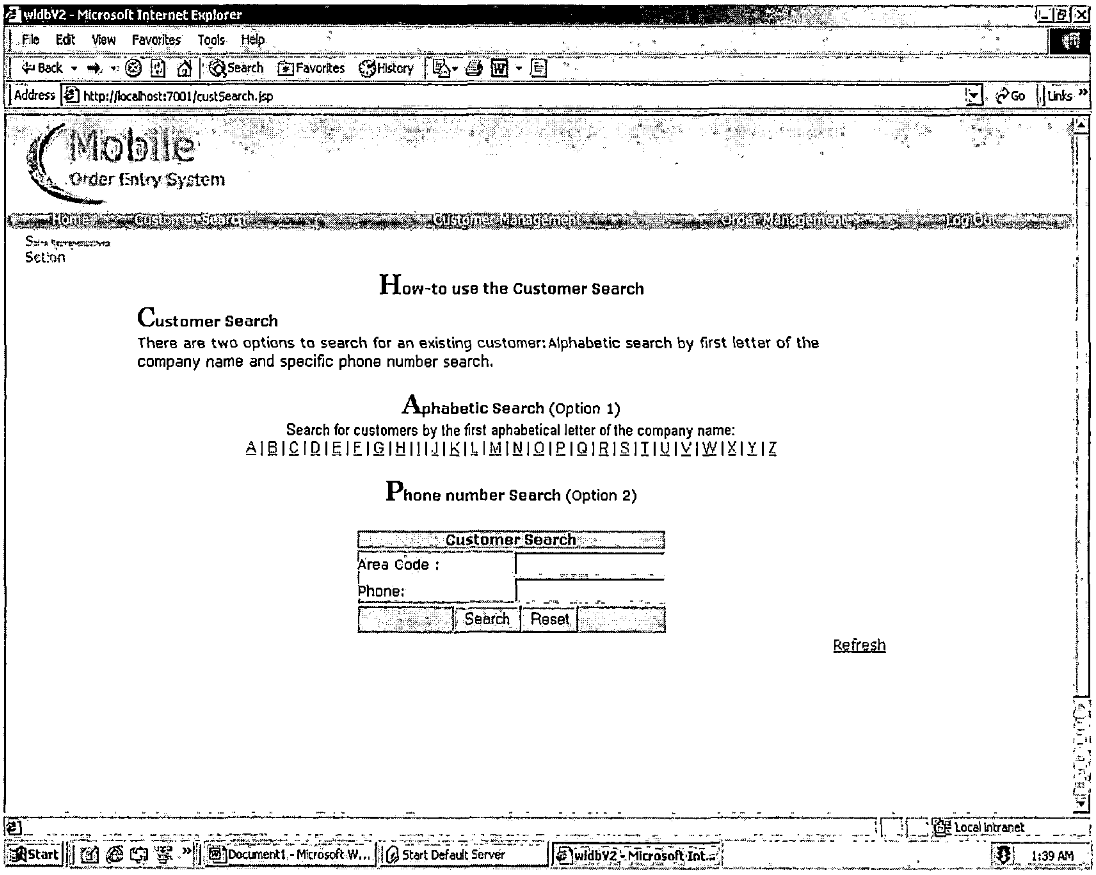
Allows sales representatives to add new orders, update, and delete existing orders in the database. The sales representatives can choose to view all orders or to view an individual order.

Log Out

Closes the current user's session and returns to the LogIn screen.

Figure A.24. Main Menu with Simple Instructional Steps

After selecting the **Customer search,** the sales representative can either click directly from the list of the alphabetical letter of the company name or by input the **Area code** and **Phone** of their customer. Click **Search** when he/she is ready.



wldbV2 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address http://localhost:7001/custSearch.jsp
Go Links
Mobile
Order Entry System
Home
Customer Search
Customer Management
Order Management
Log Out
Sales Representative
Section

How-to use the Customer Search

Customer Search

There are two options to search for an existing customer:Alphabetic search by first letter of the company name and specific phone number search.

Aphabetic Search (Option 1)

Search for customers by the first aphabetical letter of the company name:

A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z

Phone number Search (Option 2)

Customer Search

Area Code :

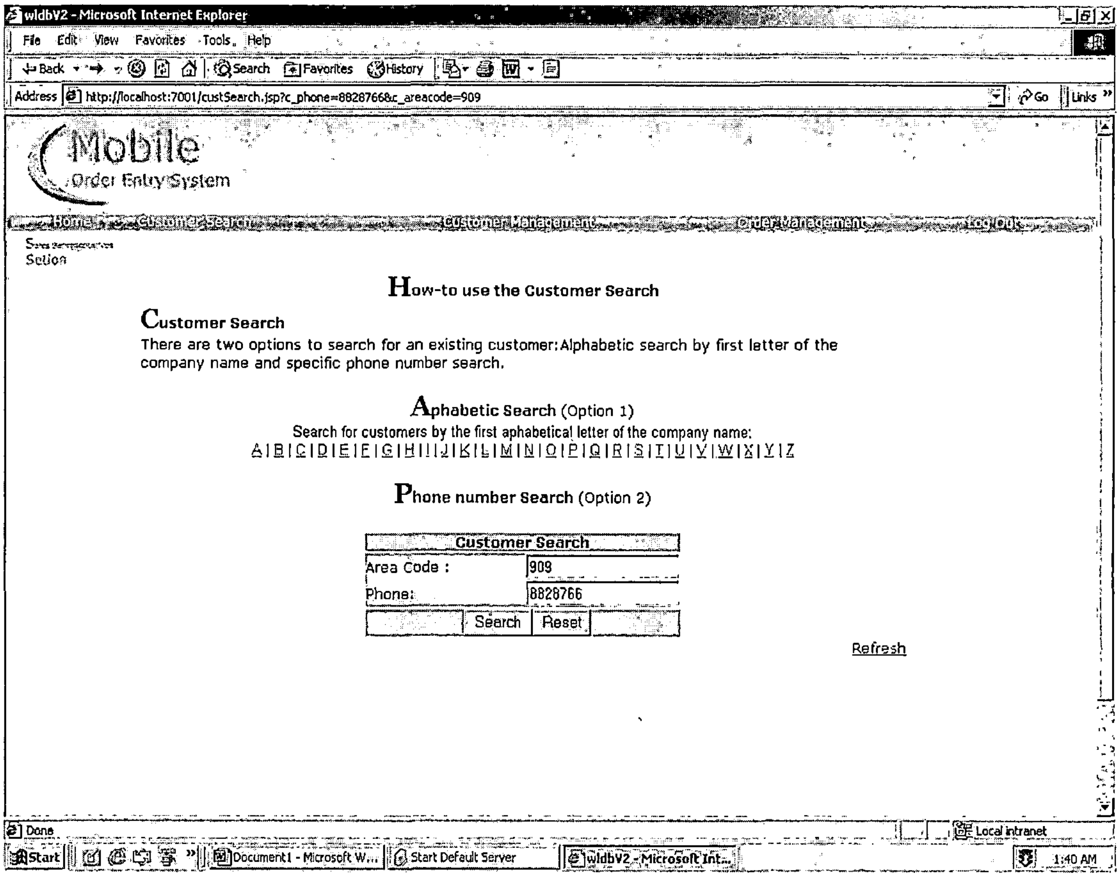
Phone:

Search Reset

Refresh

Figure A.25. Searching Customer Page

After selecting the **Customer search,** the sales representatives can either click directly from the list of the alphabetical letter of the company name or by input the **Area code** and **Phone** of their customer. Click **Search** when you are ready.


wldbV2 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Mobile
Order Entry System
Home
Customer Search
Customer Management
Order Management
Log Out
Done
Local intranet
Start
Document1 - Microsoft W...
Start Default Server
wldbV2 - Microsoft Int...
1:40 AM

Address http://localhost:7001/custSearch.jsp?c_phone=8828766&c_areacode=909

[illegible]
Setion

How-to use the Customer Search

Customer Search

There are two options to search for an existing customer:Alphabetic search by first letter of the company name and specific phone number search.

Aphabetic Search (Option 1)

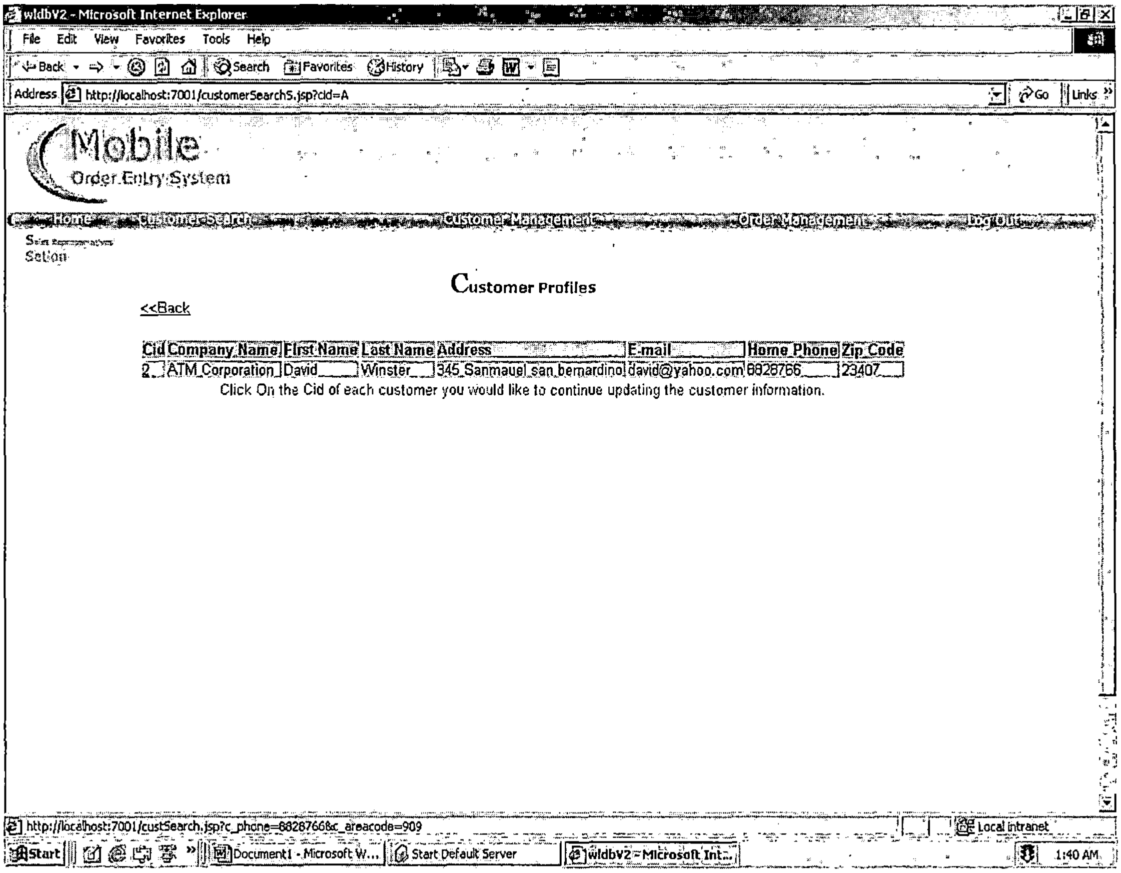
Search for customers by the first aphabetical letter of the company name:
A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z

Phone number Search (Option 2)

Customer Search	
Area Code :	909
Phone:	8828766
Search	Reset

Refresh

Figure A.26. Searching Customer Page [Continued]


wldbV2 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address http://localhost:7001/customerSearchS.jsp?cid=A
Go Links
Mobile
Order Entry System
Home Customer Search Customer Management Order Management Log Out
Sales Representatives
Setion
http://localhost:7001/custSearch.jsp?c_phone=8828766&c_areacode=909
Local intranet
Start Document1 - Microsoft W... Start Default Server wldbV2 - Microsoft Int...
1:40 AM

Customer Profiles

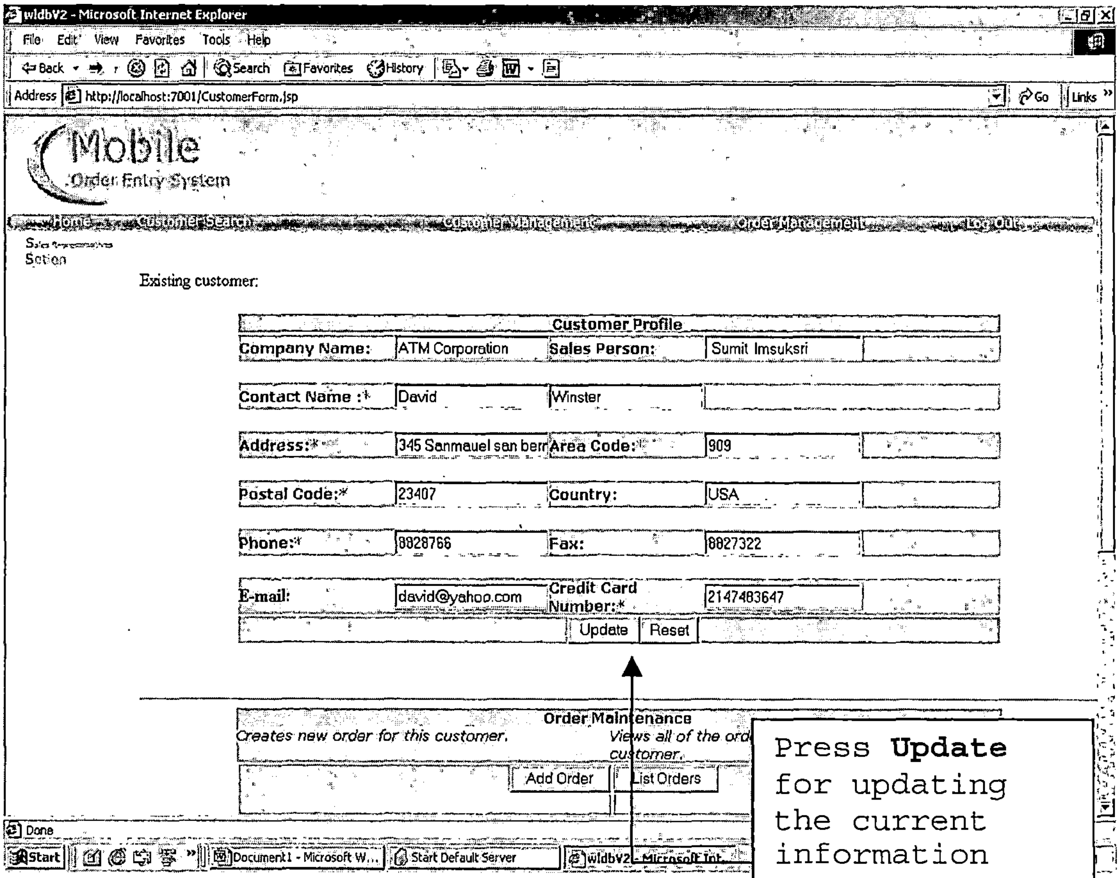
<<Back

Cid	Company Name	First Name	Last Name	Address	E-mail	Home Phone	Zip Code
2	ATM Corporation	David	Winster	345 Sanmauel san bernardino	david@yahoo.com	8828766	23407

Click On the Cid of each customer you would like to continue updating the customer information.

Figure A.27. Customer Found Page

After submitting the inputs, the customer information will show all of the customer profile. Sales Representative can update the customer information by changing and then clicking **Update.**


wldbV2 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address http://localhost:7001/CustomerForm.jsp
Go Links
Mobile
Order Entry System
Home Customer Search Customer Management Order Management Log Out
Done
Start Document1 - Microsoft W... Start Default Server wldbV2 - Microsoft Int...

Existing customer:

Customer Profile				
Company Name:	ATM Corporation	Sales Person:	Sumit Imsuksri	
Contact Name :*	David	Winster		
Address:*	345 Sanmaeuel san berr	Area Code:*	909	
Postal Code:*	23407	Country:	USA	
Phone:*	8828766	Fax:	8827322	
E-mail:	david@yahoo.com	Credit Card Number:*	2147483647	

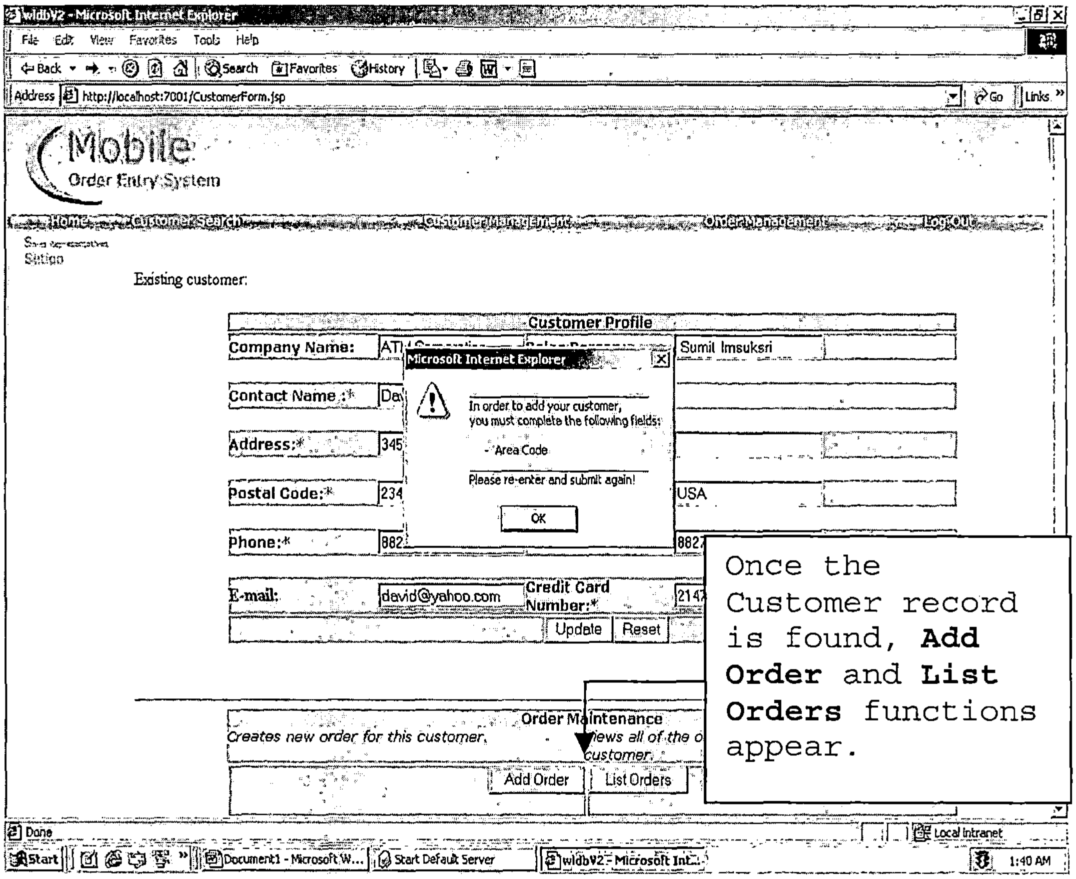
Order Maintenance

Creates new order for this customer.

Views all of the ord customer.

Press **Update** for updating the current information

Figure A.28. Customer Information Page


widbV2 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address http://localhost:7001/CustomerForm.jsp
Go Links
Mobile
Order Entry System
Home Customer Search Customer Management Order Management LogOut
Done
Local intranet
Start Document1 - Microsoft W... Start Default Server widbV2 - Microsoft Int...
1:40 AM

Sittipo

Existing customer:

Customer Profile

Company Name:	ATI		Sumit Imsuksri
Contact Name :*	Da		
Address:*	345		
Postal Code:*	234		USA
Phone:*	882		882
E-mail:	devid@yahoo.com	Credit Card Number:*	2147

Update Reset

Microsoft Internet Explorer

In order to add your customer,
you must complete the following fields:

- Area Code

Please re-enter and submit again!

OK

Order Maintenance

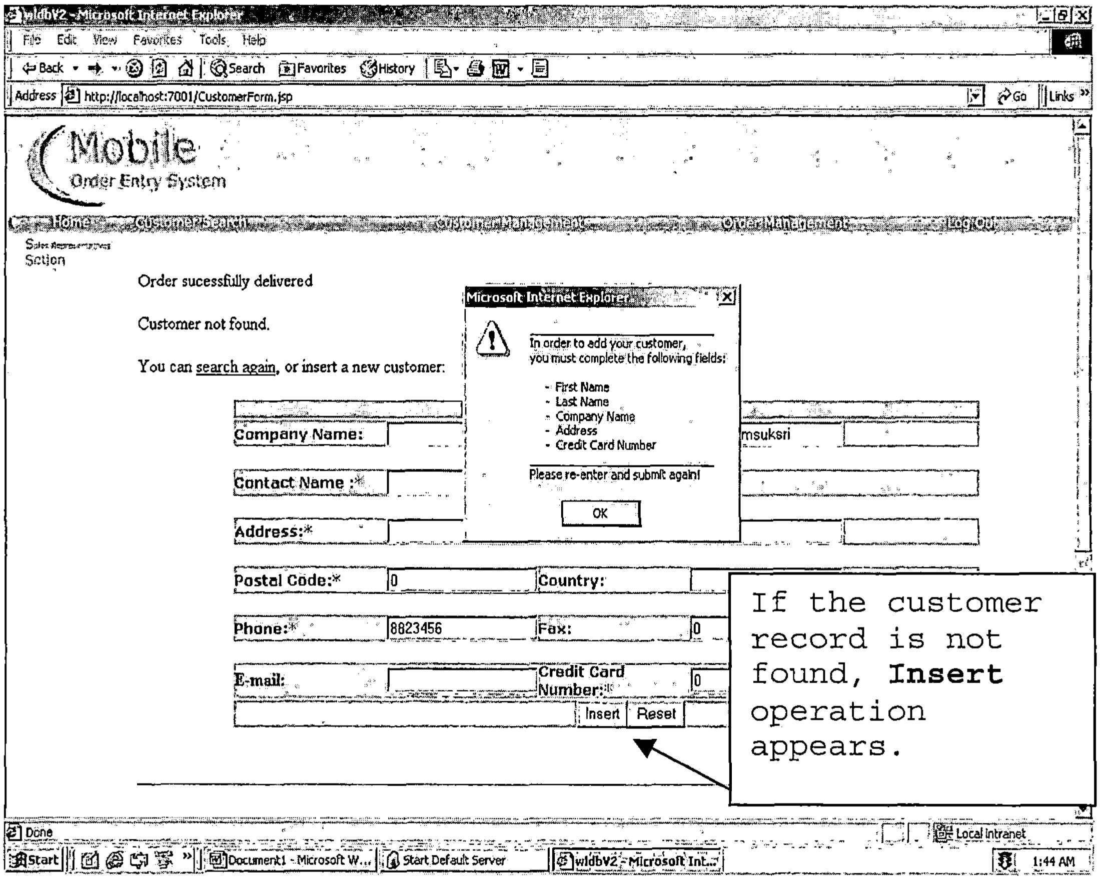
Creates new order for this customer. | Views all of the o customer.

Add Order List Orders

Once the Customer record is found, **Add Order** and **List Orders** functions appear.

Figure A.29. Customer Information Page with Add Order and List Orders Operations

The following page is shown if **search** operation is not being able to find the matched customer record. Sales Representative can add new customer by input all the customer information, then click the **insert** operation. Once the customer form is submitted, the system checks if sales representatives submitted without filling out all of the required fields, the reminding message will pop up.


wldbV2 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address http://localhost:7001/CustomerForm.jsp
Go Links
Mobile
Order Entry System
Home Customer Search Customer Management Order Management Log Out
Sales Representative
Section
Done
Local intranet
Start
Document1 - Microsoft W...
Start Default Server
wldbV2 - Microsoft Int...
1:44 AM

Order sucessfully delivered

Customer not found.

You can search again, or insert a new customer:

Microsoft Internet Explorer

In order to add your customer, you must complete the following fields:

- First Name
- Last Name
- Company Name
- Address
- Credit Card Number

Please re-enter and submit again!

OK

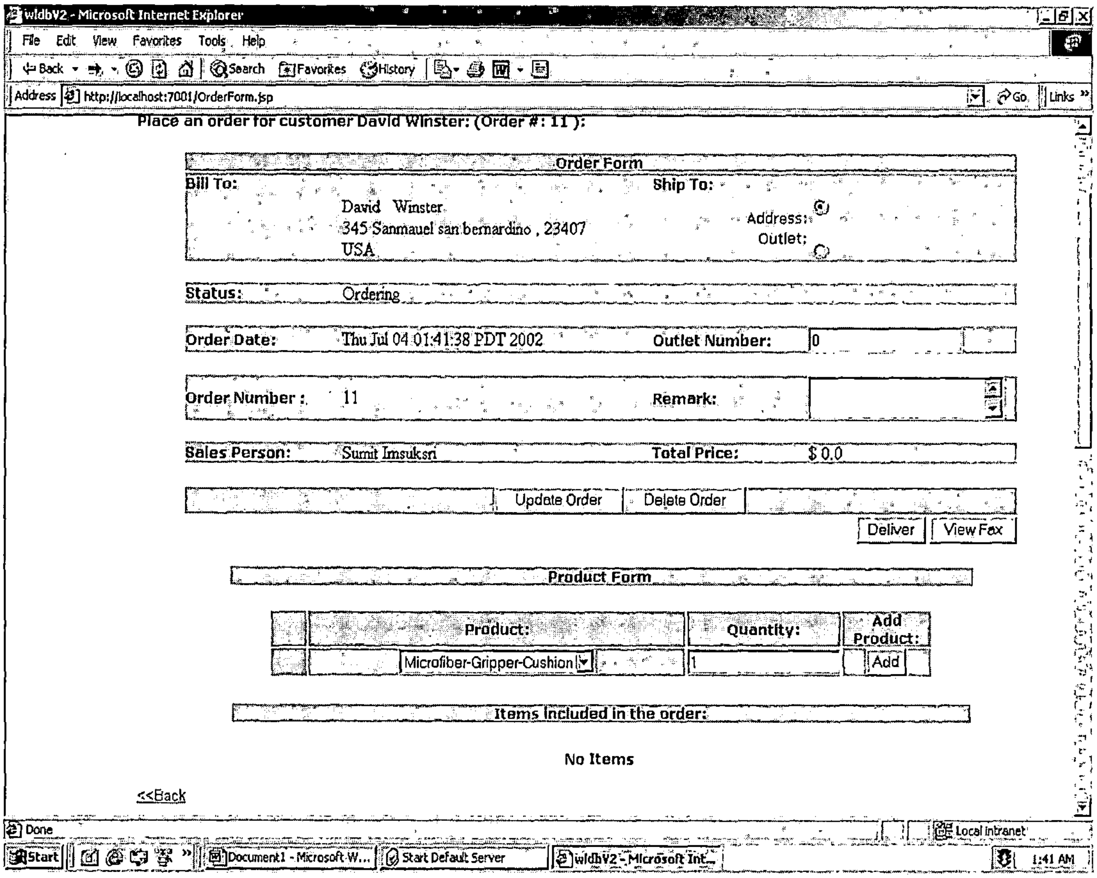
Company Name:			msuksri
Contact Name :*			
Address:*			
Postal Code:*	0	Country:	
Phone:*	8823456	Fax:	0
E-mail:		Credit Card Number:*	0

Insert Reset

If the customer record is not found, **Insert** operation appears.

Figure A.30. Customer Information Page with Insert and Reset Operations

The following page is shown when **Add Order** operation has been submitted. Sales Representative can add products into this order and update order information by an **Update Order** operation.



wldbV2 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address http://localhost:7001/OrderForm.jsp
Go Links
Update Order
Delete Order
Deliver
View Fax
Add
<<Back
Done
Local intranet
Start
Document1 - Microsoft W...
Start Default Server
wldbV2 - Microsoft Int...
1:41 AM

Place an order for customer David Winster: (Order #: 11):

Order Form

Bill To:
David Winster
345 Sanmauel san bernardino , 23407
USA

Ship To:
Address: ●
Outlet: ○

Status: Ordering

Order Date: Thu Jul 04 01:41:38 PDT 2002 | Outlet Number: 0

Order Number : 11 | Remark:

Sales Person: Sumit Imsuksri | Total Price: $ 0.0

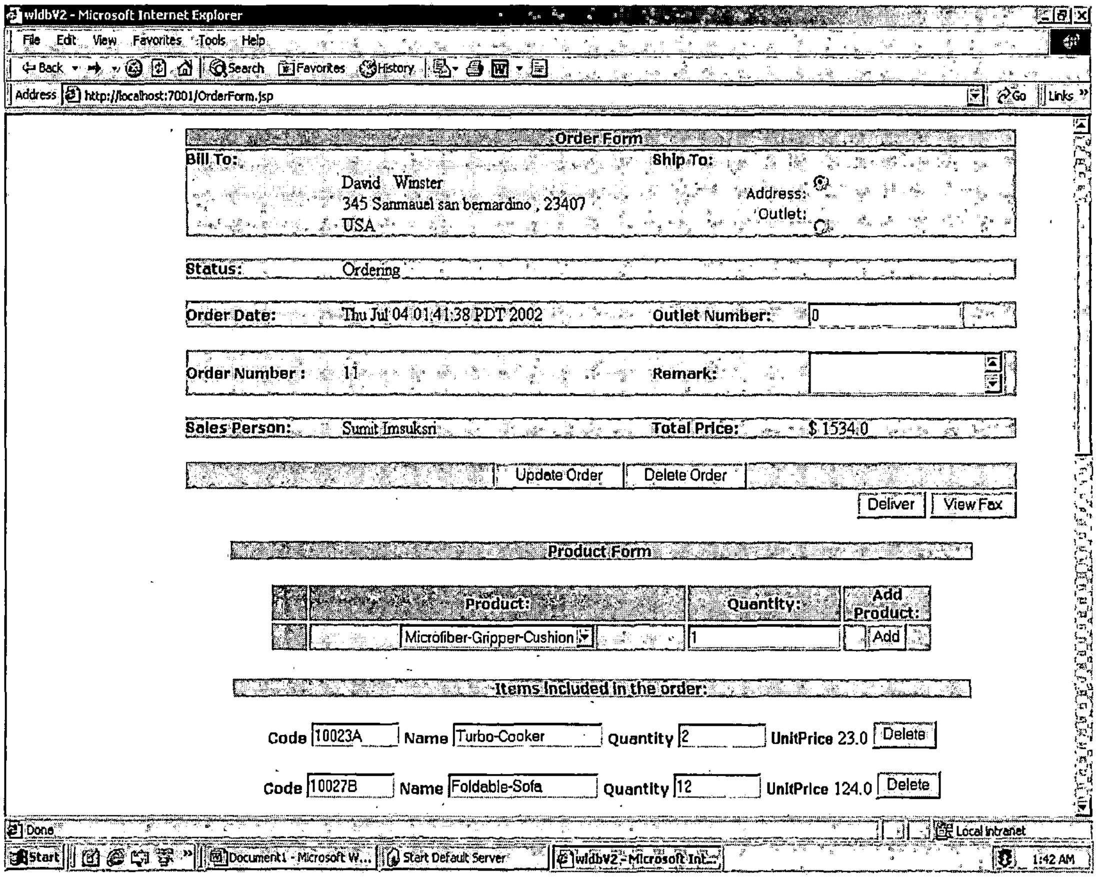
Product Form

Product:	Quantity:	Add Product:
Microfiber-Gripper-Cushion	1	Add

Items Included in the order:

No Items

Figure A.31. Order Information Page with Update Order, Delete Order, Deliver, and View Fax Operations


wldbV2 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address http://localhost:7001/OrderForm.jsp
Go
Links
Done
Local intranet
Start
Document1 - Microsoft W...
Start Default Server
wldbV2 - Microsoft Int...
1:42 AM

Order Form

Bill To: David Winster
345 Sanmauel san bernardino , 23407
USA

Ship To:
Address:
Outlet:

Status: Ordering

Order Date: Thu Jul 04 01:41:38 PDT 2002

Outlet Number: 0

Order Number : 11

Remark:

Sales Person: Sumit Imsuksri

Total Price: $ 1534.0

Update Order | Delete Order

Deliver | View Fax

Product Form

	Product:	Quantity:	Add Product:
	Microfiber-Gripper-Cushion	1	Add

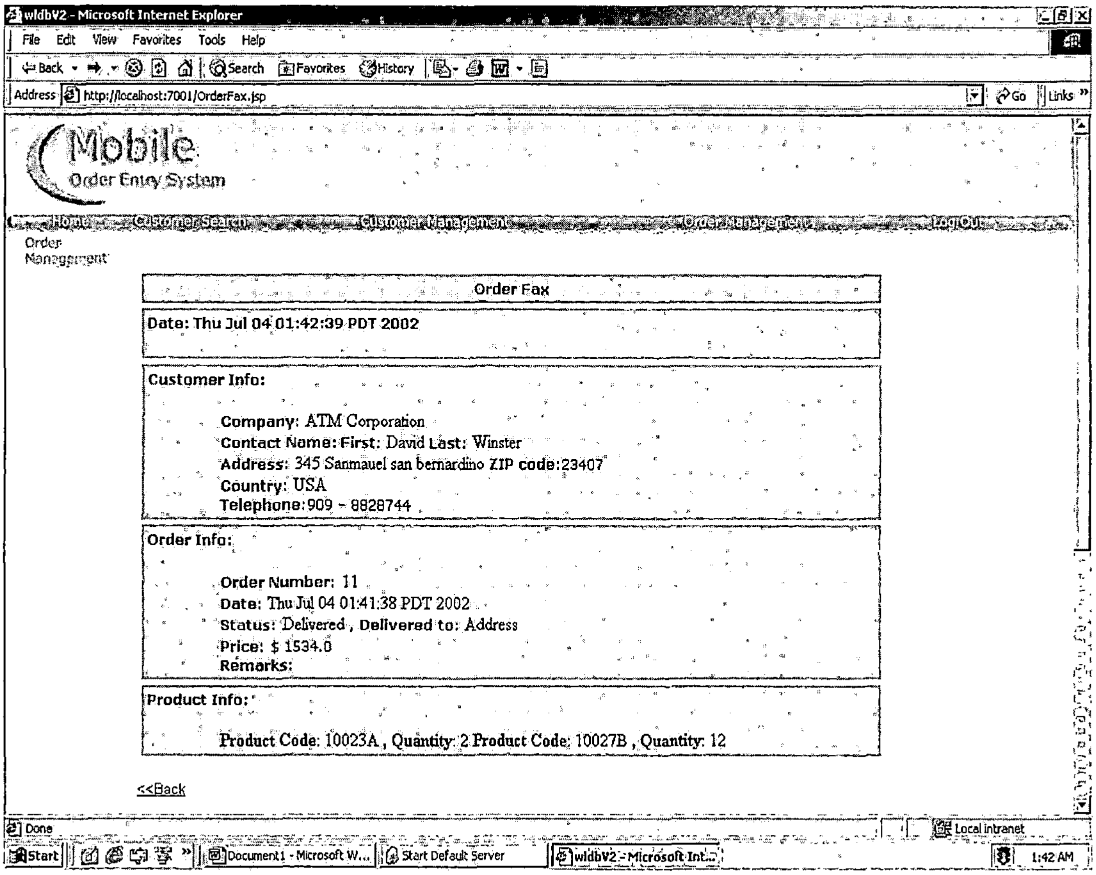
Items Included in the order:

Code 10023A Name Turbo-Cooker Quantity 2 UnitPrice 23.0 Delete

Code 10027B Name Foldable-Sofa Quantity 12 UnitPrice 124.0 Delete

Figure A.32. Order Detail Page

After click the **View Fax** operation, it shows the following page. Sales Representative will fax this order information to the company outlet.


wldbV2 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address http://localhost:7001/OrderFax.jsp
Go Links
Mobile
Order Entry System
Home Customer Search Customer Management Order Management LogOut
Order Management

Order Fax

Date: Thu Jul 04 01:42:39 PDT 2002

Customer Info:

Company: ATM Corporation
Contact Name: First: David Last: Winster
Address: 345 Sanmauel san bernardino ZIP code:23407
Country: USA
Telephone: 909 - 8828744

Order Info:

Order Number: 11
Date: Thu Jul 04 01:41:38 PDT 2002
Status: Delivered , Delivered to: Address
Price: $ 1534.0
Remarks:

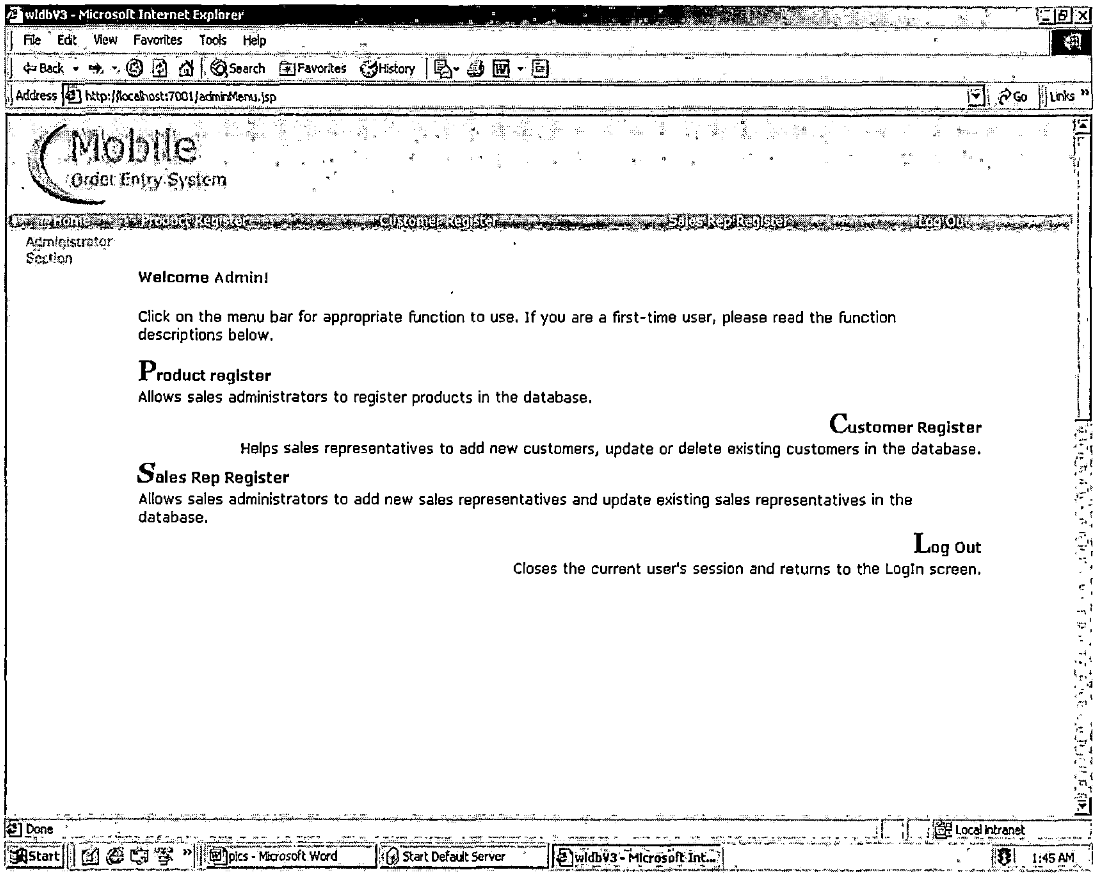
Product Info:

Product Code: 10023A , Quantity: 2 Product Code: 10027B , Quantity: 12

<<Back

Figure A.33. Faxing Information Page

The following screen is the admin-main menu. It will show a brief instruction for first-time users. There are three sub menus in Administrator Section: Product Register, Customer Register, and Sales Rep Register.



Welcome Admin!

Click on the menu bar for appropriate function to use. If you are a first-time user, please read the function descriptions below.

Product register
Allows sales administrators to register products in the database.

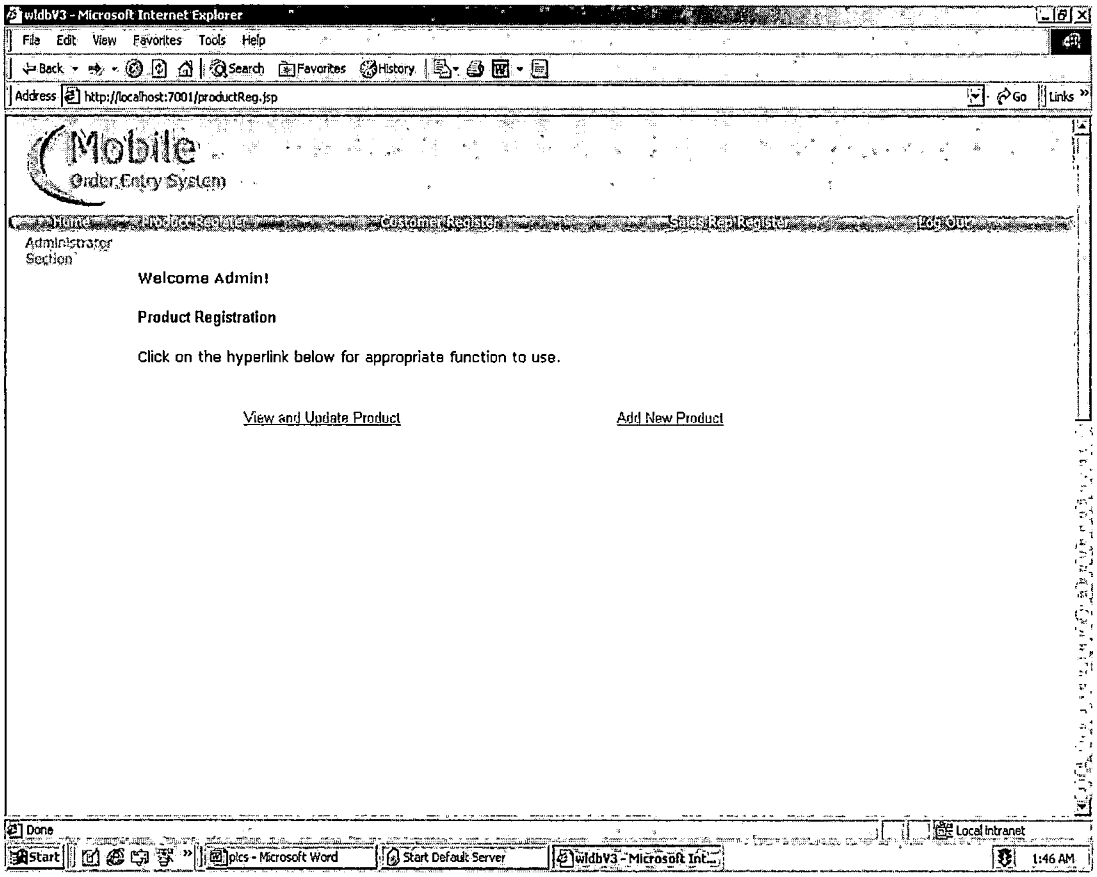
Customer Register
Helps sales representatives to add new customers, update or delete existing customers in the database.

Sales Rep Register
Allows sales administrators to add new sales representatives and update existing sales representatives in the database.

Log Out
Closes the current user's session and returns to the LogIn screen.

Figure A.34. The Admin Main-Menu Page

There are two functions: View and Update Product and Add New Product in Product Register Section.



wldbV3 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address http://localhost:7001/productReg.jsp
Go Links
Mobile
Order Entry System
Home Product Register Customer Register Sales Rep Register Log Out
Administrator Section
Done
Local intranet
Start plcs - Microsoft Word Start Default Server wldbV3 - Microsoft Int...
1:46 AM

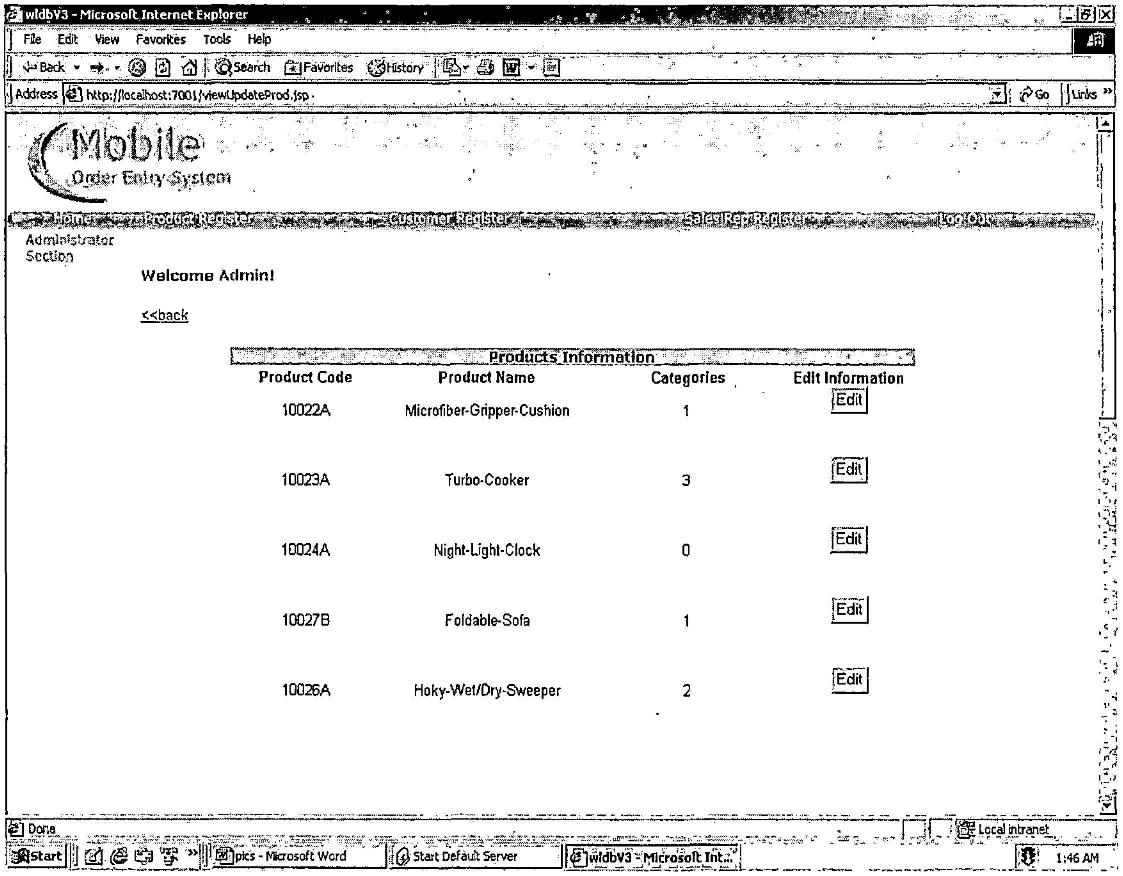
Welcome Admin!

Product Registration

Click on the hyperlink below for appropriate function to use.

View and Update Product   Add New Product

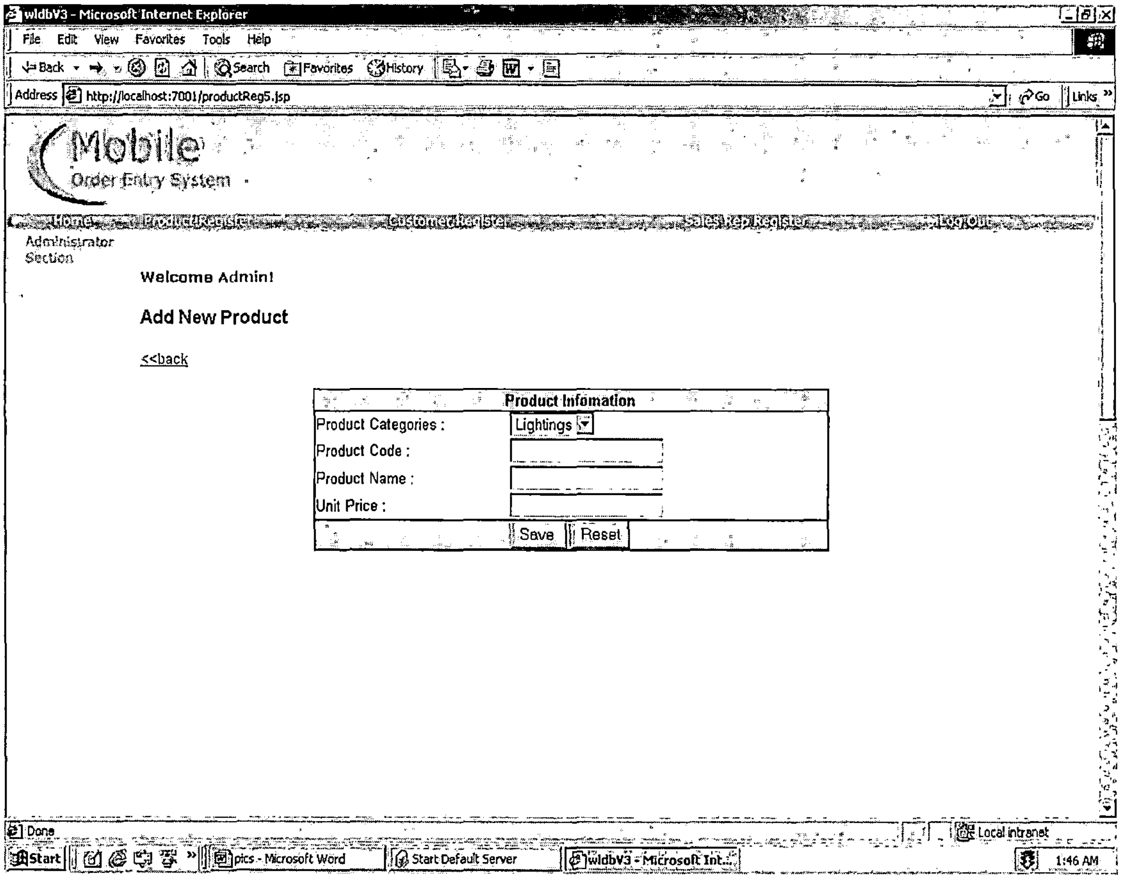
Figure A.35. Product Register Page


wldbV3 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address http://localhost:7001/viewUpdateProd.jsp
Go Links
Mobile
Order Entry System
Home Product Register Customer Register Sales Rep Register Log Out
Administrator Section
Welcome Admin!
<<back
Done
Local intranet
Start pics - Microsoft Word Start Default Server wldbV3 - Microsoft Int...
1:46 AM

Products Information

Product Code	Product Name	Categories	Edit Information
10022A	Microfiber-Gripper-Cushion	1	Edit
10023A	Turbo-Cooker	3	Edit
10024A	Night-Light-Clock	0	Edit
10027B	Foldable-Sofa	1	Edit
10026A	Hoky-Wet/Dry-Sweeper	2	Edit

Figure A.36. View and Update Product Page


wldbV3 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address http://localhost:7001/productReg5.jsp
Go Links
Mobile
Order Entry System
Home Product Register Customer Register Sales Rep Register Log Out
Administrator Section
Done
Local intranet
Start
pics - Microsoft Word
Start Default Server
wldbV3 - Microsoft Int...
1:46 AM

Welcome Admin!

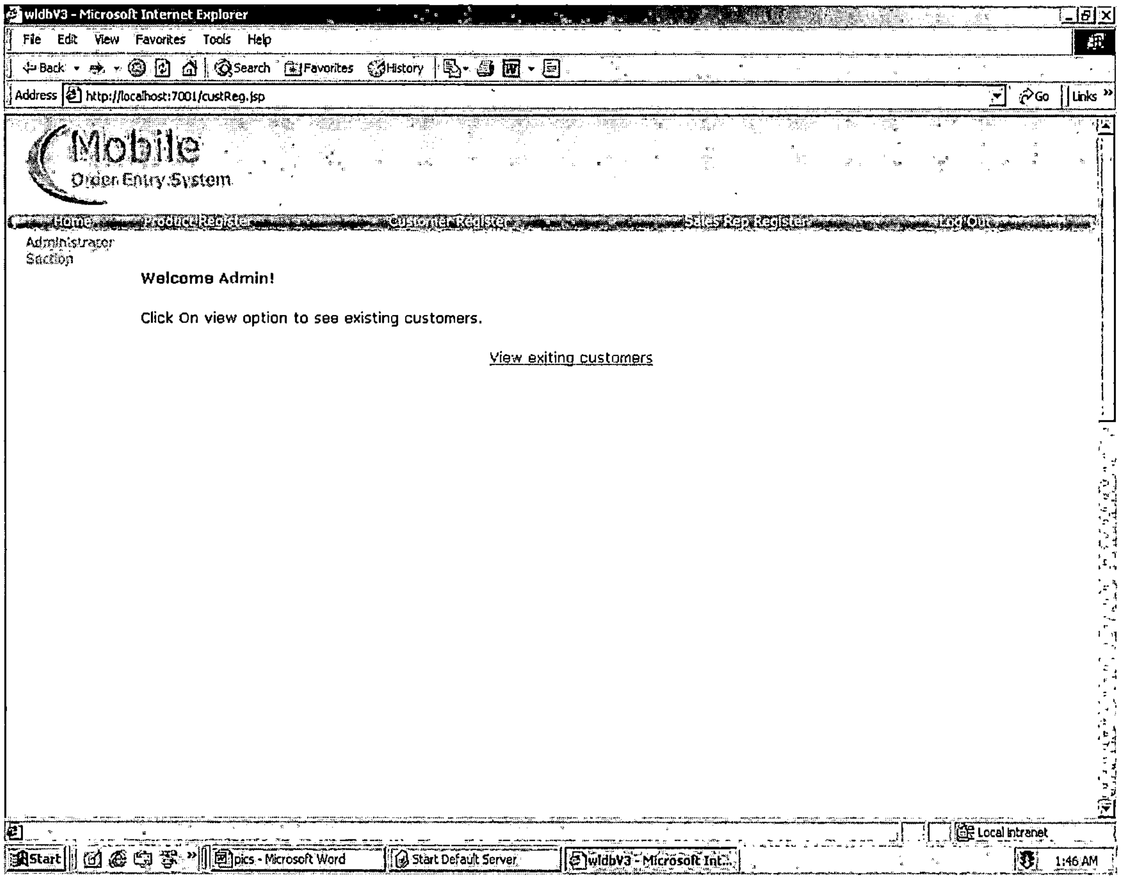
Add New Product

<<back

Product Infomation	
Product Categories :	Lightings
Product Code :	
Product Name :	
Unit Price :	
	Save Reset

Figure A.37. Add New Product Page

In Customer Register section, Admin can only view all existing customers information.

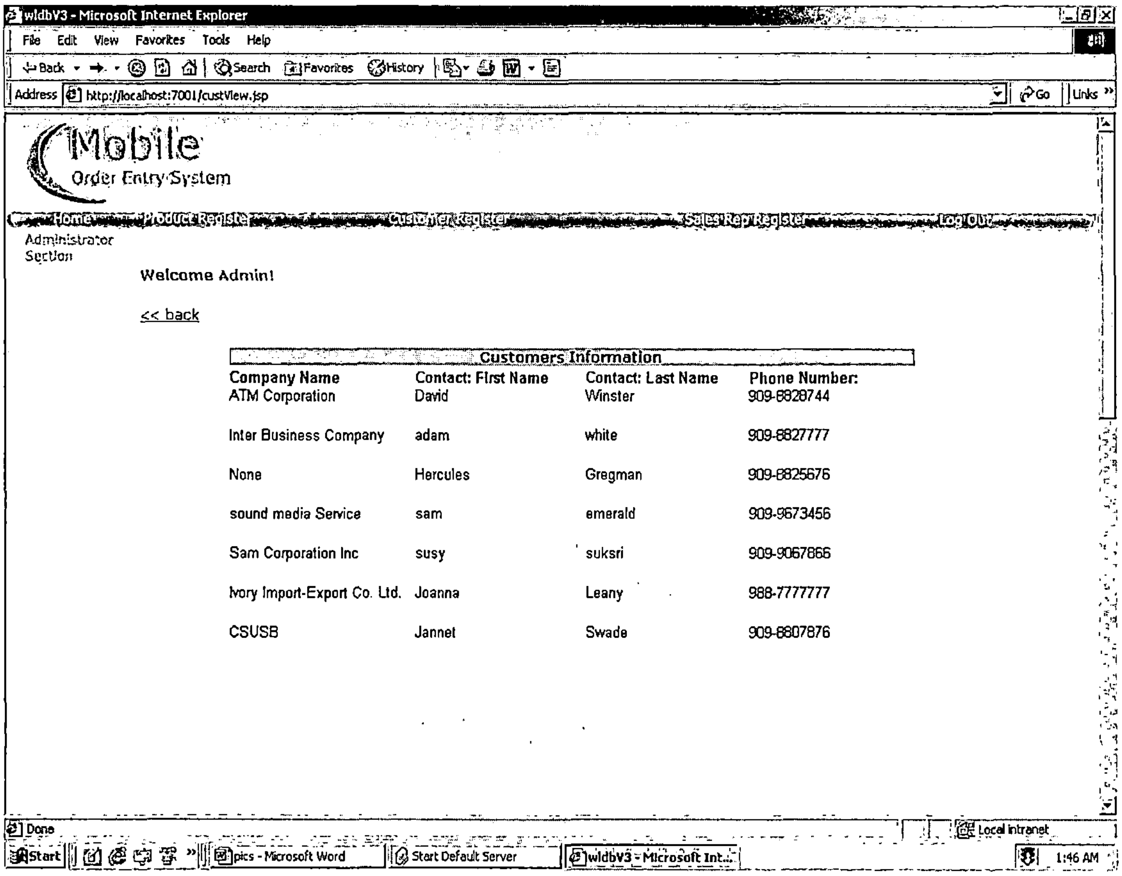

wldbV3 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address http://localhost:7001/custReg.jsp
Go Links
Mobile
Order Entry System
Home Product Register Customer Register Sales Rep Register Log Out
Administrator
Section
Local intranet
Start pics - Microsoft Word Start Default Server wldbV3 - Microsoft Int...
1:46 AM

Welcome Admin!

Click On view option to see existing customers.

View exiting customers

Figure A.38. Customer Information Page


wldbV3 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address http://localhost:7001/custView.jsp
Go Links
Home Product Register Customer Register Sales Rep Register Log Out
Done
Local intranet
Start pics - Microsoft Word Start Default Server wldbV3 - Microsoft Int...
1:46 AM

Mobile
Order Entry System

Administrator Section

Welcome Admin!

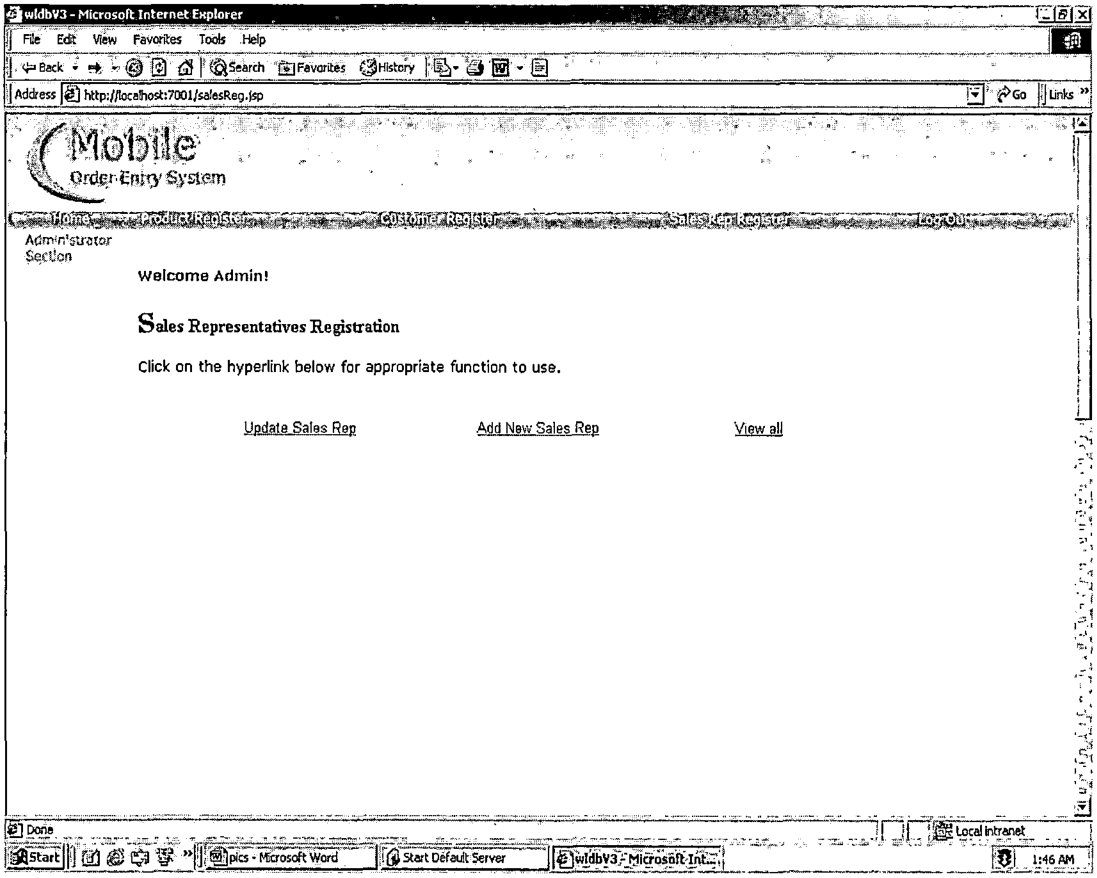
<< back

Customers Information

Company Name	Contact: First Name	Contact: Last Name	Phone Number:
ATM Corporation	David	Winster	909-8828744
Inter Business Company	adam	white	909-8827777
None	Hercules	Gregman	909-8825676
sound media Service	sam	emerald	909-9673456
Sam Corporation Inc	susy	suksri	909-9067866
Ivory Import-Export Co. Ltd.	Joanna	Leany	988-7777777
CSUSB	Jannet	Swade	909-8807876

Figure A.39. Customer Information Page [continued]

There are three functions in Sales Rep Register Section: Update Sales Rep, Add New Sales Rep, and View all.



wldbV3 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address http://localhost:7001/salesReg.jsp
Go Links
Mobile
Order Entry System
Home Product Register Customer Register Sales Rep Register Log Out
Administrator Section
Done
Local intranet
Start
pics - Microsoft Word
Start Default Server
wldbV3 - Microsoft Int...
1:46 AM

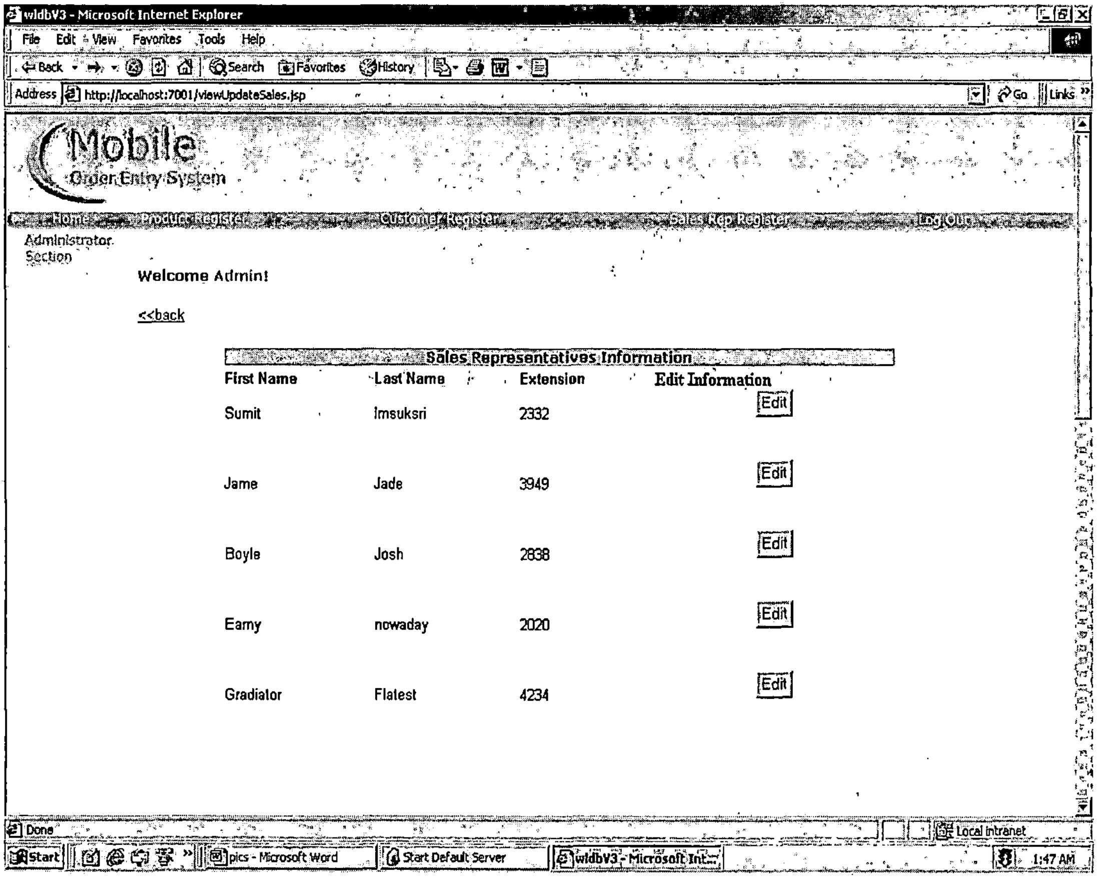
Welcome Admin!

Sales Representatives Registration

Click on the hyperlink below for appropriate function to use.

Update Sales Rep　Add New Sales Rep　View all

Figure A.40. Sales Register Page


wldbV3 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address http://localhost:7001/viewUpdateSales.jsp
Go Links
Mobile
Order Entry System
Home Product Register Customer Register Sales Rep Register Log Out
Done
Local intranet
Start pics - Microsoft Word Start Default Server wldbV3 - Microsoft Int...
1:47 AM

Administrator Section

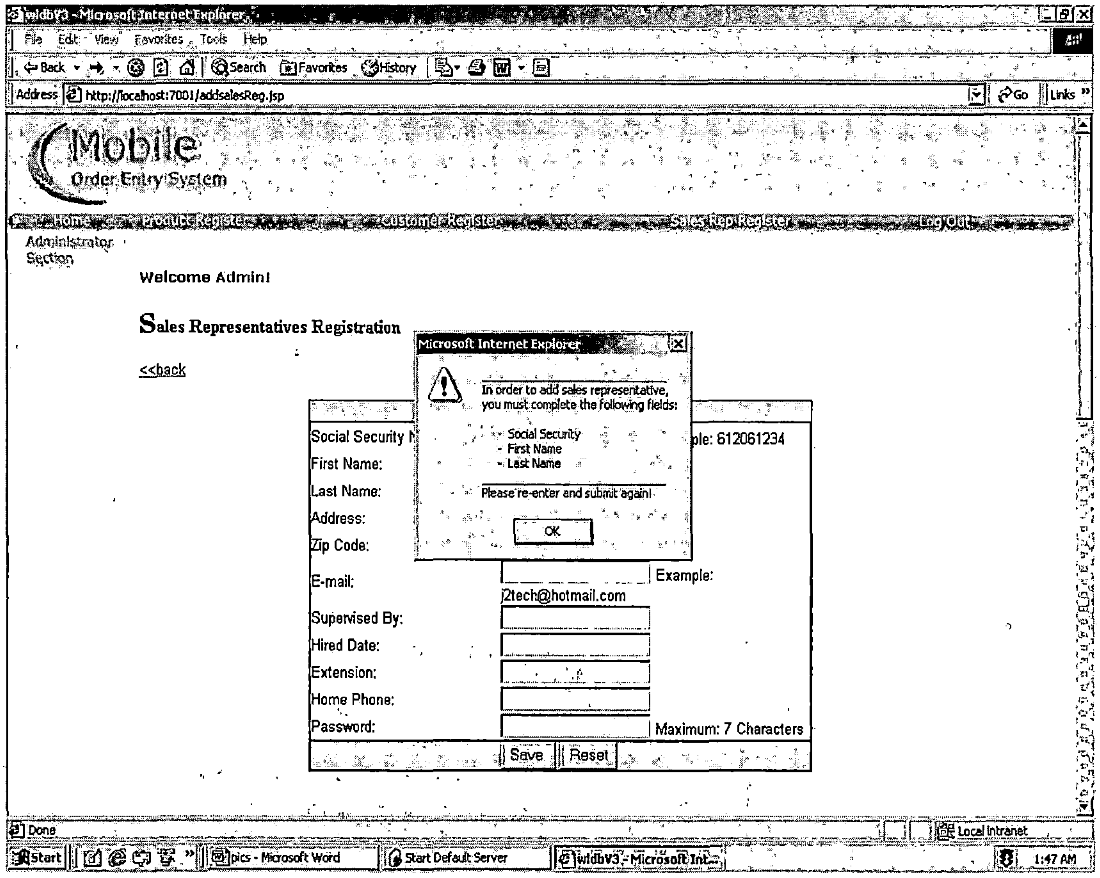
Welcome Admin!

<<back

Sales Representatives Information

First Name	Last Name	Extension	Edit Information
Sumit	Imsuksri	2332	Edit
Jame	Jade	3949	Edit
Boyle	Josh	2838	Edit
Earny	nowaday	2020	Edit
Gradiator	Flatest	4234	Edit

Figure A.41. Update Sales Representatives Information Page


wldbV3 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address http://localhost:7001/addsalesReg.jsp
Go Links
Mobile Order Entry System
Home Product Register Customer Register Sales Rep Register Log Out
Done
Local intranet
Start
pics - Microsoft Word
Start Default Server
wldbV3 - Microsoft Int...
1:47 AM

Administrator Section

Welcome Admin!

Sales Representatives Registration

<<back

Microsoft Internet Explorer

In order to add sales representative, you must complete the following fields:

- Social Security
- First Name
- Last Name

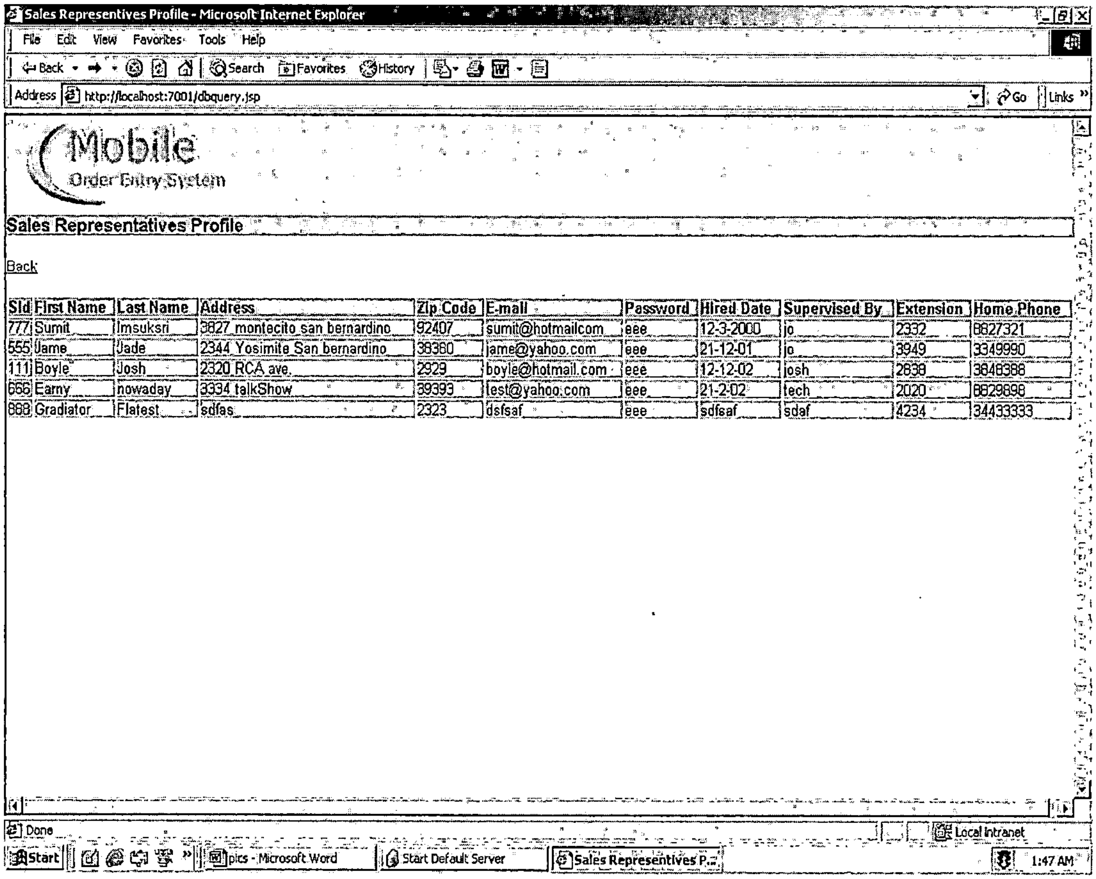
Please re-enter and submit again!

OK

Social Security N	ple: 612061234
First Name:	
Last Name:	
Address:	
Zip Code:	
E-mail:	Example: j2tech@hotmail.com
Supervised By:	
Hired Date:	
Extension:	
Home Phone:	
Password:	Maximum: 7 Characters

Save Reset

Figure A.42. Add New Sales Representatives Page



Address http://localhost:7001/dbquery.jsp

Sales Representatives Profile

Back

SId	First Name	Last Name	Address	Zip Code	E-mail	Password	Hired Date	Supervised By	Extension	Home Phone
777	Sumit	Imsuksri	3827 montecito san bernardino	92407	sumit@hotmailcom	eee	12-3-2000	jo	2332	8827321
555	Jame	Jade	2344 Yosimite San bernardino	38380	jame@yahoo.com	eee	21-12-01	jo	3949	3349990
111	Boyle	Josh	2320 RCA ave.	2929	boyle@hotmail.com	eee	12-12-02	josh	2838	3848388
666	Earny	nowaday	3334 talkShow	39393	test@yahoo.com	eee	21-2-02	tech	2020	8829898
888	Gradiator	Flatest	sdfas	2323	dsfsaf	eee	sdfsaf	sdaf	4234	34433333

Figure A.43. Sales Representatives Information Page

APPENDIX B:

SYSTEM MANUAL

B.1 Source File Organization And Naming Conventions

The source files can be divided into three main parts, WEB programming, WAP, programming, and Object-Oriented programming. The following path contains both of the WEB programming files and WAP programming files.

$(HOME)/bea/ wlserver6.0/config /mydomain /applications/DefaultWebApp_myserver.

For the object-oriented programming such as, class files are stored in the following path: $(HOME)/bea/ wlserver6.0/config /mydomain applications/DefaultWebApp_myserver /WEB-INF/temp/jsw/cf. The differences between WEB files' names and WAP files' names are their extension and the w letter. For example, index.jsp page is used for the WEB application file, instead of windex.wml is used for the WAP application file.

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