CALL CENTER MANAGEMENT

PROJECT WORK DONE AT P-784
JAYAMARUTHI SOFTWARE SYSTEMS PVT LTD,
CHENNAI.

PROJECT REPORT

Submitted in partial fulfillment of the requirements for the award of the degree of

MASTER OF COMPUTER APPLICATIONS
OF BHARATHIAR UNIVERSITY, COIMBATORE.

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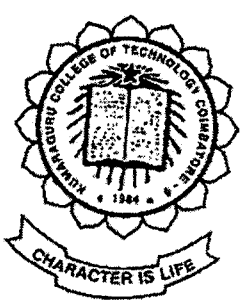

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May-2002

CERTIFICATE

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CALL CENTER MANAGEMENT

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9/5/02

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DECLARATION

DECLARATION

I here by declare that the project entitle **"CALL CENTER MANAGEMENT "** submitted to **Bharathiar University** as the project work of Master Of Computer Applications Degree, is a record of original work done by me under the supervision and guidance of Mr. Nagendran, **JAYAMARUTHI SOFTWARE SYSTEMS PVT LTD.,CHENNAI** and this project work has not found the basis for the award of any Degree /Diploma/ Associateship/ Fellowship or similar title to any candidate of any university.

Place : Coimbatore

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SYNOPSIS

Synopsis

This project work entitled "Call Center Management" is an Web based application which is developed for Jayamaruthi Software Systems Pvt Ltd, Chennai using ASP as the Front End and SQL Server 2000 as the Back End Tools.

Call Center Management is one of the Customer Relationship Management System which is developed for the Service Industry. The objective of this application is to cater services to the customers and manufacturers.

A Call Center is the common term for a business operation in which customers and Service Agents are remote from each other yet interact, through telephone and web. Customers post their Queries in the form of Complaint or Query. Posted queries are placed in a waiting queue. The queue is serviced for every 30 minutes period. Agents serve customers by providing required solution , by forwarding the queries to some qualified person, who are placed in Hierarchical Structure. The customers can get their responses either through the web or from the operators.

Typically, a call center has the ability to handle a considerable volume of calls at the same time . Call centers are used by organization that uses the telephone or Web to sell or service products and services.

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INTRODUCTION

1 . Introduction

1.1 Project Overview

This project work entitled "Call Center Management" is a web-based product which is designed to accept input from Customers directly or from Call Center Operators.

The web site allows the user (the Customer/Call Operator) to enter the name of the Customer and his request and redirect the same to the concerned authorities. The application must then handle escalation of the request in case proper action is not taken within the stipulated time frame. The application must also notify the Customer about the status of his request periodically.

The user will type the site's URL and enter the home page of the site. This page will be in two formats – one for the Customer based application and other for the Call Operator based application. Both will accept a Username and Password for a login. Once the user logs into the application they will be provided with a screen where they can enter their request with all necessary input. When a Call Operator is using the application, there would be another step of validating the Customer name as the Customer might call the operator on the phone. Once all the required information is keyed in, the application must redirect the Customer request to respective authorities and provide the Customer with a unique Tracking ID. The Customer can then use this Tracking ID to verify the status of the request. Once the request is posted successfully, the Customer or the Call Operator will be taken to the main screen again.

Customers post their Queries in the form of Complaint or Query. Posted queries are placed in a waiting queue. The queue is serviced for every 30 minutes period. Agents serve customers by providing required solution, by forwarding the queries to some qualified person, who are placed in hierarchical structure. The customers can get their responses either through the web or from the operators.

The operator provides the minimum days, maximum days and the grace days for each and every product based on the CRM principles followed by the manufacturer .At the same time he also keys in the various levels and the persons E-mail ID through which the query has to be forwarded. The level of authority depends upon the manufacturers CRM strategy.

ACD (Automatic Call Distributor) is a VB code which keeps on checking the status of the query .As per the Status of the query ,the ACD forwards the query to the appropriate person by using the "first come, first served basis". Initially, the query is posted to the person in the 0^{th} level .If he provides the response within the stipulated period the response is given to the customer ,else if he fails the query is forwarded to the next higher level of authority say, level 1.An intimation is to be given to the person in the 0^{th} level, stating that the message had been forwarded to the person in the level 1.This process has to be carried out until the response is posted. If the person provides the response, the upcoming process must be skipped. The number of levels depends upon the manufacturers service policy. The application also maintains a database of all the manufacturers, retailers and products that the application has currently been subscribed with.

1.2 Organization Profile

JAYAMARUTHI SOFTWARE SYSTEMS (P) LTD is an off shore company of MARUTHI CONSULTING in U.S.A.Jayamaruthi Software Systems (P) Ltd, is a growing company in providing IT consulting and software Services. The growth of the individuals who work has spurred Jayamaruthi at various levels to keep ahead of the rest, and constantly rise to the challenges that beckon them at the frontiers of technology.

A system approach to HR facilities consultants from various professions and backgrounds to work together, broadening the individual knowledge and skills and blending expertise in various industry and service practices. The company offers various solutions which covers a wide range of business areas including E-commerce and E-business enabling, warehouse and inventory management, and customer management for industries including financial services, insurance, retail, telecommunication, utilities and manufacturing. They provide value to their customers by offering several benefits to them including speed to market, high quality people and processes, cutting edge technology expertise and a full service portfolio.

Jayamaruthi Software Systems is running successfully with their own clients of U.S.A. The Chief Executive Officer Sri.Skanda.K.Ganesan comes with a wealth of experience in the Finance and PoS discipline. Mr.Skanda has provided optimal solutions to large business firms in the Bay Area like VISA International and is known for his technological skills in the Microsoft environment.

Jayamaruthi specializes in :

eStrategy -- Business Re Engineering
Business Architecture
Training

eBiz -- Supply-Chain Management (SCM)
Customer-Relationship Management (CRM)
Business Intelligence
Enterprise Resource Planning(ERP)

eCore-Skills -- Network Engineering
Middleware
Client/Server Architecture
Web Development
Database
Quality Analysis

eBrain -- Maintenance & Support
Quality Analysis
Development

SYSTEM STUDY AND ANALYSIS

2. System Study and Analysis

2.1 Existing System Environment-Limitations

The existing system has not provided much chance for the employees to enhance their services to their customers. Employees do find much difficulty in assessing their wants and needs.

In the existing system the customers are not able to post their queries, complaints at anywhere and at anytime. The customers had to spend much time in posting their queries and complaints in person to the manufacturers or to the retailers. This leads to the customers dissatisfaction. Since the existing system is not web based ,the system did not enjoyed the advantages of the web based application .

With respect to the Manufacturers the existing system did not served to be an CRM providing tool, a Marketing tool .Through the Call Centers the Manufactures can attract many customers through out the world. Wide area connectivity is not possible from the existing system. The existing system did not serve to be a better relationship management tool.

2.2 Proposed System

The proposed system consists of the following features,

- **Web –Based** : The system is a Web based application .The application provides a user friendly environment for the customers who are dispersed geographically.

- **Operator Friendly** : The system provides user-friendly at Operator End . The system provides a user friendly environment to the operators. The operator has to be able to operate his part according to the requirements of the customer.

- **Automatic Escalation** : A support request from a customer is tracked all the way till it is completed. Incase of any delay from the Supplier or Manufacturers side ,the support request is escalated to notify the next superior person in the firm, so that necessary action is taken.

- **Security** : Multi level security where critical information may / will be hidden from other users .The application should implement two levels of security .Secure Sockets Layer(SSL) can be implemented at the core level and Database level security can be set for validating the username and password .Password level security can be set and the user level for logging in purpose to prevent misuse of the apphcation.

- **Customizable** : The information view can be customized as per the requirements of the industry. The services provided by the Call Center can be changed as per the requirements of the Industry.

- **CRM :** The system is capable of implementing customer relationship management (CRM) . CRM aims at achieving customer empowerment and satisfaction and to maximize customer loyalty and revenue.CRM systems provides a chance to understand better about customer wants and needs.

- **Give customers choice :** The service provided by the system must be able to cope up the customers standards and by the media of their choice . Customer can thus be addressed by his or her name .The system provides the users to use Web based media service or Telephone based media services whichever suits them.

- **Provide access anytime anywhere :** Access to services will be every hour of every day, from where ever the customer chooses .The system is a web based product the customers may be able to give their queries or problems at any time.

- **Enable customers to help themselves :** Customers will have access to information and can choose self-service . Many customers will prefer to find information or initiate transactions on their own.

- **Knowing the Customers :** Manufacturers have to know the customer needs and wants through every customer contact. The Manufacturers may capitalize on the knowledge gained by them ,so that they are capable of building better relationships with their customers and to cater as per their needs. To help Manufacturers to concentrate alone in Production , Service can be handled through a separate department called the Call Centers.

- **Enable employees to deliver great service :** Employees are the cornerstone to great service and must be enabled with the right tools, processes and information so that they are empowered to help the customer every time .They might not be able to provide service to their customers unless their problem has been fully known. They might be able to enhance speedy customer service by all means.

- **Treat every customer contact as an opportunity for market growth or revenue generation :** Every transaction, whether sales oriented or not, results in a direct impact on the future growth of the organization. More and more the call center is the "face of the business" to the customer, and the impression and opportunities developed through that contact have a direct impact on market share, market growth and revenue generation opportunities. Customer segmentation strategies will result in overall growth for the business. All services on one server saves administration and maintenance. The application is capable of serving as an strategic marketing tool for the manufacturers.

The Goal of the Proposed System are

- Increase the availability of employees or customers
- Extend the information supply to customers
- Process requests more efficiently.

All this is to ensure:

- Increased customer satisfaction
- Long-term customer loyalty
- Differentiation from competitors

The new system consists of following modules,

(i) Customer Login

(ii) New User Registration

(iii) Registering Queries

(iv) Automatic Escalation

(v) Reporting the Responses to the Customers

Description of the Modules

(i)Customer Login

The customers are provided with the Customer Home Page (CHP) where the customer can login. It is protected with password to secure security to the customers from unauthorized persons. The application should be capable of validating customers login id and password.

(ii)New User Registration

The application should check whether the user is already registered or not. If the user is not registered he should be taken to the new user sign-in registration form.

(iii)Registering Queries

This module is concerned with registering queries. In this module the details regarding the name ,query type, query description, problems, query posting date are registered. Checking for duplicate entries at all stages (Customers, Products, Services, Requests) etc.

(iv) Automatic Escalation

This modules is written in Visual Basic. The code in this module will be running in the server. The queries accumulated from the customers will be automatically posted to appropriate person.

(v) Reporting response to the customer

The customers must be promptly notified about the Response provided by the Service Engineers to the Customers / Retailers / Manufacturers as per actions by email or any messaging service.

2.3 Requirements on new system

2.3.1 Functional Requirements :

When a Customer/Call Operator register themselves on to this system, they will be given a username and password (which is customizable by the user). Using this information the user can log into this system and post their requests for service or any other request and/or comments regarding the same of any service comments that they would like to post. Once their request has successfully been posted the user should be given a Tracking ID that they will use in all future queries about the particular request. The user will be notified periodically about the status of pending requests and the application should duly notify the user when the request is completed. This notification can be done via email or by messaging.

List of Inputs

From the User's perspective:

(i) Username
(ii) Password
(iii) Full Name
(iv) Organization Details (if any)
(v) Address
(vi) Phone, FAX, Mobile and/or Pager numbers
(vii) Email

From the Request's perspective:

(i) Product/Service request

(ii) Request description

(iii) Comments

(iv) Notification method (by email or by messaging)

From the Application's perspective:

(i) Status of the request

Information Processing required

The following processing is required at the application level at various points during the life of a request posting.

(i) Verification of the Customer registration

(ii) Validation of the password

(iii) Checking the Tracking ID for query purposes

(iv) Generating a Tracking ID when a request is posted

(v) Sending Status to Customers/Retailers/Manufacturers as per actions by email or messaging.

(vi) Checking for duplicate entries at all stages (Customers, Products, Services, Requests) etc.

Information Processing required from the Operators side.

The following processing is required at the application level at various points during the life of a request posting at the operators end.

(i) Verification of the Customer registration

(ii) Checking the Tracking ID for query purposes

(iii) Generating a Tracking ID when a request is posted

(iv) Sending Status to Customers/Retailers/Manufacturers as per actions by email or messaging.

(v) Checking for duplicate entries at all stages (Customers, Products, Services, Requests) etc.

2.3.2 Performance Requirements

Security

The application should implement two levels of security. Secure Sockets Layer (SSL) can be implemented at the core level and database level security can be set for validating the username and password. Password level security can be set and the user level for logging in purpose to prevent misuse of the application.

Availability

The application is a web site and must be available online 24 hrs a day. There must be a backup server in case the main server fails.

Capacity

The application will be accessed by many users and the database must be capable of handling multiple requests at the same time.

Response Time

The response time for the application depends on the network traffic and the internet connection speeds of the client. The server must be able to handle requests from various sources and respond with the fastest possible speed.

2.3.3 Design Constraints

Hardware Requirements

- A server that will host the web site
- Computers and modems for development and telephone lines

Software Requirements

OS	:	Windows 95/98/NT/2000/XP
Server	:	Windows NT/2000 running IIS
Client	:	Internet Explorer 5 or above
Development	:	Internet Explorer 5 or above with support for ASP,HTML and Scripting languages

User-Interface Screen Formats

The users are provided with screens to login, enter details of requests, and view the status of the requests and post comments on the services offered to them. The screens will be designed in HTML using scripting languages such as JavaScript, VBScript . The client will be a thin-client with only the web browser at their end and all the processing will be server side using ASP.

2.3.4 Other Requirements

Operations required by the User

(i) Registration

Registration is required before the Customer can use this application. Registration includes supplying the application with a username and password for access into the site.

(ii) Log In

Once the username and password are accepted by the system, the customer will use this information to log into the application every time.

(iii) Data Input

When the customer has to post any information, he has to supply all the required information as per the screens. The screens will notify the user for all the required fields.

(iv) Query

The customer can query on the status of their request based on the Tracking ID given to them when they posted a request in the application.

2.4 User Characteristics

This site is for users who are familiar with browsing through the Internet and who wish to submit their requests to manufactures and/or retailers .The customers should be able to interpret using oral and written instructions.

- users self-select using menus.
- users are involved only during the initial phase of posting the queries.
- users have to provide their feedback either:
  (i) Online Feedback
  (ii) Operator Feedback

PROGRAMMING ENVIRONMENT

Software Configuration

Technology

OS	: Windows 95/98/NT/2000/XP
Server	: Windows NT/2000 running IIS
Client	: Internet Explorer 5 or above
Development	: Internet Explorer 5 or above with support for ASP, HTML and Scripting languages

Software Specification

Client side

- Windows 95
- Internet Explorer ,Netscape Navigator
- Internet Connection Tools

Server Side

- Windows NT 4.0
- Web Explorer
- SQL Server 2000 as Backend
- Active Server Pages for Server side Scripting

Software Requirements

Operating System	: Windows 95/98/NT/2000/XP
Front End Tool	: ASP
Back End Tool	: Microsoft SQL Server 2000
GUI tool	: Visual Interdev, FrontPage
Project Management Tool	: Microsoft Word

3.2 Description of Software and Tools Used

Introduction to ASP:

An ASP file can contain text, HTML tags and scripts. Scripts in an ASP file are executed on the server

What is ASP?

- ASP stands for Active Server Pages
- ASP is a program that runs inside IIS
- IIS stands for Internet Information Services
- PWS is a smaller - but fully functional - version of IIS
- ASP is a Microsoft Technology
- To run IIS we must have Windows NT 4.0 or later
- To run PWS we must have Windows 95 or later
- Instant ASP is another technology that runs ASP without Windows

How Does ASP Differ from HTML?

- When a browser requests an HTML file, the server returns the file
- When a browser requests an ASP file, IIS passes the request to the ASP engine. The ASP engine reads the ASP file, line by line, and executes the scripts in the file. Finally, the ASP file is returned to the browser as plain HTML

ASP objects:

An Object is something that typically has methods, Properties, or collections. An object's methods determine the things we can do with the object. An object's properties can be read or set to specify the state of the object. An object's collections constitute different sets of key and value pairs related to the object.

- Application
- Object Context
- Request
- Response
- Server
- Session

- **Application Object:**

The Application object is used to share information among all users of a given application. An ASP-based application is defined as all the .asp files in a virtual directory and its subdirectories. Because more than one user can share the Application object, there are Lock and Unlock methods to ensure that multiple users do not try to alter a property simultaneously.

- **Request Object:**

When a browser asks for a page from a server, it is called a request. The ASP Request object is used to get information from the user.

- **Response Object**:

Response object is used to send output to the client.

- **Object Context Object**

The Object Context object is used to commit or abort a transaction, managed by Component Services that has been initiated by a script contained in an ASP page.

- **ASP Error Object**

We can use the ASP Error object to obtain information about an error condition that has occurred in script in an ASP page. The ASP Error object is returned by the Server. GetLastError method. The ASP Error object exposes read-only properties.

- **Server Object**

The Server object provides access to methods and properties on the server. Most of these methods and properties serve as utility functions.

- **Session Object**

We can use the Session object to store information needed for a particular user-session. Variables stored in the Session object are not discarded when the user jumps between pages in the application; instead, these variables persist for the entire user-session.

The Web server automatically creates a Session object when a user who does not already have a session requests a Web page from the application. The server destroys the Session object when the session expires or is abandoned.

Communicating with a Database Using ActiveX Data Objects (ADO)

ActiveX Data Objects (ADO) comes with ASP and allows pages to easily connect to database. ADO works with any OLEDB source, which includes ODBC-compliant sources. So it will work with most databases currently being used.The ADO model contains six objects.

The Connection object connects to the data source. Obtaining a connection is the first step to working with databases.The Recordset object allows working with the data in a table.The Recordset object contains a set of rows from a table. It can be used to read through the rows of a table, modify the rows of a table, or collect new data to be added to the table.The Error object represents an error generated by the data sources. The Errors collection is used when a single failed method call is allowed to generate multiple errors.The Field object represents a single column in a table. The Command object provides another way to create a Recordset object. It combines the Recordset object and the Connection object. The Parameters collection contains any parameters needed by the command. The parameters are stored in a parameter object.

Java Script :

Perhaps the best-known scripting language prior to the introduction of VBScript was JavaScript. JavaScript is used to create interactive web applications supported by the Netscape browser. JavaScript offers many of the same advantages as VBScript. JavaScript is simple to use, lightweight, and dynamic. Developers can easily embed code functionality for interactive applications inside a web page.

The Internet Explorer 3.0 supports JavaScript directly through a scripting engine in the file jscript.dll. In fact, we can use both VBScript and JavaScript in a single web page.

Font control:

Styles provide all the text control features normally found in word processors; font size, weight, family and decorative features such as underlining.

Text spacing:

Styles provide margin, padding and border spacing features which are block formatting information equivalent to 'paragraph formats' in word processors.

Positioning:

Styles allow the element they apply to be located away from the normal position it would adopt when rendered by the browser. Absolute positioning allows the element to appear anywhere.

Superimposition:

With absolute positioning a possibility, elements can overlap. The style mechanism defines the z-order that resolves which elements appear on top.

Visibility and display:

Elements can take up visual space in a document, or they cannot be allocated any at all, much like hidden form fields. If they do take up space, then they can be visibly present (the normal case) or just withhold that space from other uses, like the Netscape proprietary <SPACER> tag.

Clipping:

The content of a styled element takes up a set area, known as a bounding box. If the element's content exceeds the capacity of the bounding box, it may be clipped. Clipping means the overflowing parts of the content do not appear.

Filters:

Internet Explorer 4.0 supports a filter enhancement to styles that allows additional effects to be laid on top of other style information.

VBScript

VBScript is a subset of Visual Basic for Applications. Therefore, VBScript programming has many similarities to Visual Basic for Applications programming. Many of the powerful features of Visual Basic for Applications, such as classes and API calls, were omitted to make the language portable and secure.

Although VBScript is just text and can be written with a simple text editor, a graphical design tool for VBScript is available. This visual layout tool is called ActiveX Control Pad. ActiveX Control Pad allows us to combine HTML code, ActiveX controls, HTML layouts, and VBScript or JavaScript. ActiveX Control Pad works in conjunction with the HTML Layout control. The HTML Layout control is a drawing board that allows us to visually add and manipulate controls. ActiveX Control Pad will be discussed in detail later in this book.

VBScript promises the same boom in ActiveX development that we have seen in OCX controls development. Because VBScript, with the support of the Internet Explorer, can automate ActiveX components, vendors can design ActiveX controls to perform particular Internet tasks.

We already have a rich assortment of ActiveX controls in the form of OCX controls, but these controls are typically not optimized for downloading across the Internet. For example, many of these controls contain sizable design-time components that cause long delays during a download.

VBScript does not have an Integrated Debugging Environment (IDE). This means that code debugging can be rather demanding. Typically, we run the script in a browser and troubleshoot any errors that may occur. Perhaps the most useful debugging component is a well-placed MsgBox, and until a complete IDE is available, development will remain cumbersome.

Compatibility with existing browsers is another issue for VBScript. Although the Internet Explorer supports both VBScript and JavaScript, the Netscape browser does not currently support VBScript. In the future, we may see support from Netscape and others, but for now, interactive web sites that use VBScript are limited to platforms running the Internet Explorer.

JavaScript Versus VBScript

JavaScript and VBScript have many similarities. In fact, anyone who has mastered VBScript will find JavaScript just as easy to learn. Since the Internet Explorer supports both languages, knowledge of the fundamentals of both is valuable. The key differences between JavaScript and VBScript are covered in the paragraphs that follow.

Syntax

As stated before, the most obvious difference is syntax. JavaScript uses curly braces to denote functions, whereas VBScript uses Function...End Function and Sub...End Sub. In fact, JavaScript supports only functions, whereas VBScript supports functions and subroutines. If we want to create a function that behaves like a subroutine in JavaScript, simply omit the return value.

Objects

Neither JavaScript nor VBScript is truly object-oriented. Without digressing into a full definition of object-oriented programming, we can safely say that neither language exhibits all of the characteristics of a truly object-oriented language. Neither language, for example, supports the concept of inheritance.

JavaScript, however, makes stronger use of objects than does VBScript. JavaScript allows for the definition of classes for the subsequent creation of objects. To define a class, we create a function that specifies the class name and the class's properties and methods.

VBScript does not support object creation or user-defined classes. VBScript supports only reusable functions and subroutines. In order to use VBScript to manage the above information for multiple students, we would have to create separate variables for each student we wanted to track. We could accomplish this by using arrays, for example.

Language Scalability

A primary difference between VBScript and JavaScript is scalability. Once we learn VBScript, we are well on our way to learning Visual Basic for Applications. Although JavaScript has similarities to C++, it is a new language.

Other Scripting Languages

Because Microsoft has designed ActiveX Scripting to be an open standard, other scripting languages may soon join JavaScript and VBScript. The Internet Explorer can support any scripting language that takes advantage of ActiveX Scripting. Third-party vendors may choose to design their own scripting languages.

IIS:

Internet Information Services (IIS) Microsoft's brand of Web server software, using Hypertext Transfer Protocol (HTTP) to deliver World Wide Web documents. It incorporates various functions for security, allows for CGI applications, and also provides for Gopher and File Transfer Protocol (FTP) servers. In versions 4.0 and earlier, IIS was named Internet Information Server.

SQL SERVER

Internet Integration

SQL Server is an ideal database engine for powering Websites. With Internet Information Server. SQL Server can add database capabilities to web sites. Through tight integration with Internet Information Server, SQL Server can be queried and updated via popular web browsers. SQL Server's native ODBC lets it interoperate smoothly with the Internet Information Server. SQL Server Web Assistant let's one automatically update HTML pages on the fly, either data triggered or scheduled using SQL Server's built-in scheduling system.

Transaction Processing

Consistency and recoverability of a database are guaranteed in case of system failure, even in the middle of complex updates by more than one user. SQL Server treats all database changes inside a transaction as a single unit of work. By definition, either an entire transaction is completed safely and all the resulting changes are reflected in the database, or the transaction is rolled back and all changes to the database are undone. Using a two phase commit protocol, SQL Server can even supports synchronized transactions, which span more than one server, helping to guarantee that all the servers on the network will be maintained in a consistent state.

Implicit Concurrency Control

Another benefit of SQL Server's transaction processing design is implicit concurrency control. SQL Server employs Dynamic Locking, a locking architecture that keeps concurrent users from interfering with each other during queries and updates. Page-level locking is the default, with optional insert row-level locking. All SQL Server locking is implicit --the programmer does not have to worry about locking commands. The process of obtaining a lock is exceptionally fast since lock information is stored in a memory resident table. Multiple levels of locking are supported, and SQL Server always picks the least restrictive lock needed to support the operation.

SQL Server's built-in intelligence is capable of supporting both ad hoc and programmed updates to the database using any available software with complete safety-a crucial requirement if a server is to be an open platform for popular client applications.

High Availability (Dynamic backup and automatic recovery)

SQL Server avoids costly downtime for routine maintenance tasks. Nothing is more detrimental to productivity than network resources that become periodically unavailable. SQL Server's Dynamic backup allows one to backup database even while user are actively reading and writing to them – a fundamental requirement for mission-Critical applications. In case of system failure (Operating system Crashes, Power Outages, etc), SQL Server's automatic recovery mechanism recovers all databases to the last state of consistency in a matter of minutes, with no administrator intervention. The applications can be up and running again right away. SQL Server's high availability design even allows one to perform database design or diagnostics while the system is on-line.

Client-Server Architecture

It makes it possible for multiple front-ends to share information, enabling one to choose the most appropriate tool for the job. SQL Server makes efficient use of networks. Because database queries are processed at a centralized server, network traffic is reduced.

Rich, Windows-Based system administration

SQL Enterprise Manager provides graphical management of database objects such as tables, views, stored procedures and triggers. Visual Basic-based scripting can extend these capabilities to automate remote operations across multiple servers.

Network Independence

Unlike database servers, which run only on proprietary operating systems or support only proprietary network protocols, SQL Server is network independent. Because SQL Server relies on open industry standards, it can run most popular networks.

Scrollable Cursor Support

SQL Server's cursors support simplifies development of rich data browsing applications with capabilities such as forward/backward scrolling, positioned updates and deletes and flexible concurrency control options.

Single Process, Multithreaded Architecture

Microsoft SQL Server provides consistently high performance in a Client/Server DBMS. It is optimized for Windows NT, and uses a very efficient design that incorporates multiple native threads within a single process to handle user requests – allowing queries to be processed in parallel with very little overhead and no runtime memory allocation. This architecture is also memory efficient. The major advantage is the throughput. SQL Server does not slow down as multiple users are added to the network.

Client Advantage:

- Easy to use
- Supports multiple hardware platform
- Supports multiple software applications
- Familiar to the user

Server Advantage:

- Reliable
- Sophisticated Locking
- Fault tolerant
- High-performance hardware
- Centralized control

ERWIN

PLATINUM ERwin is a database design tool to help us to design, generate, and maintain high-quality, high-performance database applications. From a logical model of our information requirements and business rules that define our database, to a physical model optimized for the specific characteristics of our target database, Erwin lets us to visualize the proper structure, key elements, and optimized design of our database. ERwin automatically generates tables and thousands of lines of stored procedure and trigger code for leading databases. Its "complete-compare" technology allows iterative development so our model is always synchronized with our database. By integrating with leading development environments, ERwin also speeds the creation of data-centric applications.

ERwin scales across the enterprise by integrating with PLATINUM ModelMart, a model management system that allows database designers, application developers, and end users to share ERwin model information.

Benefits:

- Ensures consistency, reuse, and integration of enterprise data by providing the "blueprint" IT needs to understand, analyze, and communicate database structure.
- Improves productivity among developers when database designs are divided, shared, and reused.
- Easy to use graphical environment makes it easy to view the optimum structure, key elements, and optimized design of the database.
- Saves time by accelerating the creation of high-quality, high-performance transactional and data warehouse databases.

SYSTEM DESIGN AND DEVELOPMENT

4 . System Design and Development

4.1 Input Design

Input design is the part of the overall system design which requires very careful attention .Most expensive part in this is the collection of input data in terms of equipments and persons involved. If a data going in to a system is incorrect then processing and output will magnify these errors.

Several stages during input design that are to be carried out are ,

- Data recording
- Data verification
- Data correction

The users are provided with screens to login, enter details of requests, and view the status of the requests and post comments on the services offered to them. The screens will be designed in HTML using scripting languages such as JavaScript, VBScript etc. The client will be a thin-client with only the web browser at their end and all the processing will be server side using ASP.

The user will type the site's URL and enter the home page of the site. When a Customer or Call Operator register themselves on to this system, they will be given a username and password (which is customizable by the user).

Using this information the user can log into this system and post their requests for service or any other request and/or comments regarding the same of any service comments that they would like to post. Once the user logs into the application they will be provided with a screen where they can enter their request with all necessary input.

Once their request has successfully been posted the user should be given a Tracking ID that they will use in all future queries about the particular request. Notification about the status of the query would be done via email or by any messaging service. Once the request is posted successfully, the Customer or the Call Operator will be taken to the main screen again.

List of Inputs

From the User's perspective:

(i) Username
(ii) Password
(iii) Full Name
(iv) Organization Details (if any)
(v) Address
(vi) Phone, FAX, Mobile and/or Pager numbers
(vii) Email

From the Request's perspective:

(i) Product/Service request
(ii) Request description
(iii) Comments
(iv) Notification method (by email or by messaging)

From the Application's perspective:

(i) Status of the request

Screens

The system provides numerous highly controlled user interfaces .Some of the user interfaces are

Web Based Screens

Login Form : User logs in giving his user-id and password.

Sign – in Form : New users can register with this form.

Query Form : In this form, user registers his compliant /queries.

Feedback Form : In this form, user has to give feedback for On-line based application and Operator based application.

Operator Based Screens

Login Form : User logs in giving his user-id to the operator.

Sign – in Form : New users can register with this form through the operator.

Dealer Form : The various Dealers/Manufacturers who are getting tie up with the Call Center can be entered. This form is provided with ADDITION, MODIFICATION, DELETION operations.

Product Form : The various Products that are dealt by the Call Center can be entered in this form. This form is provided with ADDITION, MODIFICATION , DELETION operations.

Service Form : This form contains the details of the Service engineers . This form is provided with ADDITION, MODIFICATION, DELETION operations.

4.2 Output Design

Outputs from the computer systems are required primarily to communicate results of processing to users(including machine-based system).they are also used to provide 'Hard Copy ' of the results for the later consultation.

The output of this system is a report which provides the user the response to their appropriate queries posted by them.The output consists of the

(i) Response

(ii) Date of posting the response

(iii) Name of the Service Engineer who had posted the Response.

(iv) Query posted date

(v) The query to which the Response had been posted.

(vi) Number of days taken for providing the response.

The customers who had posted their response through web can get their response from the web. The customers posting their queries through phone can get their response from the phone. The users can also get their status of the query.

The Manufacturer's or the Retailer's can get the Report regarding the Queries posted.

Output Specification :

System Analyst has two specific objectives at this stage:

- To interpret the results of the computer part of the system to users in a form which they can understand and which meets their requirements.
- To communicate the output design specification to programmers in a way, which is ambiguous, comprehensive and capable of being translated in to programming language.

Screens

The system provides numerous highly controlled user interfaces .Some of the user interfaces are

Status Form : This form gives the status about the query. The user can view the status of query in Tree format.

Response Form : This form provides various response posted from the Service Engineers who are from the manufacturers side.

Report Form : This form provides the queries related to a specific product for the manufacturers or to the retailers based on the given starting and ending date.

4.3 Database Design

Table Name : User_table

Primary Key : user_id

Column Name	Datatype
User_id	int
Login_id	varchar(20)
Password	varchar(20)
Firstname	varchar(20)
Lastname	varchar(20)
Address	varchar(100)
Phone	varchar(20)
Fax	varchar(20)
Mobile	varchar(20)
Pager	varchar(20)
Email	varchar(50)
DOB	datetime
Hint_ques	varchar(50)
Hint_ans	varchar(50)

Table Name :Escalation_table

Foreign keys :query_id,product_id

Column Name	Datetype
Query_id	int
Product_id	int
Minimum_days	int
Maximum days	int
Grace_days	int

Table Name : Query_table

Primary key :query_id

Foreign keys :user_id,product_id

Column Name	Datatype
Query_id	int
User_id	int
Product_id	int
Date_of_purchase	datetime
Bill_no	varchar(20)
Status	varchar(20)
Problems	varchar(50)
Query_type	varchar(20)
Query_posting_date	datetime
Query_status	varchar(20)
Query_description	varchar(50)

Table Name : Dealer_table

Primary Key : Dealer_id

Column name	Datatype
Dealer_id	int
Dealer_name	varchar(20)
Dealer_address	varchar(100)
Phone_no	varchar(20)
Fax	varchar(20)
Mobile	varchar(20)
Pager	varchar(20)
Email	varchar(50)
Dealer_code	varchar(20)

Table Name : Dealer_product_table

Foreign keys : product_id,dealer_id

Column Name	Datatype
Product_id	int
Dealer_id	int

Table Name : web_feedback_table

Foreign key :user_id

Column Name	Datatype
User_id	int
Response_time	varchar(20)
User_friendly	varchar(20)
Suggestions	varchar(100)
Ratings	varchar(20)

Table Name : operator_feedback_table

Foreign key :user_id

Column Name	Datatype
User_id	int
Response_time	varchar(20)
Operator_response	varchar(20)
Suggestions	varchar(100)
Ratings	varchar(20)

Table Name: dealer_service_table

Foreign keys :dealer_id, service_user_id

Column Name	Datatype
Dealer_id	int
Service_user_id	int

Table Name:Product_table

Primary Key :product_id

Column Name	Datatype
Product_id	int
Product_name	varchar(20)
Model	varchar(20)
Date_of_purchase	datetime
Guarantee_period	varchar(20)
Brand_name	varchar(20)
Product_code	varchar(20)

Table Name : product_service_table

Foreign keys :product_id,service_user_id

Column Name	Datetype
Product_id	int
Service_user_id	int

Table Name :Service_user_table

Primary_key :service_user_id

Column Name	Datatype
Service_user_id	int
Service_code	varchar(20)
Firstname	varchar(20)
Lastname	varchar(20)
Designation	varchar(30)
Level	varchar(10)
Address	varchar(100)
Phone	varchar(20)
Fax	varchar(20)
Mobile	varchar(20)
Pager	varchar(20)
Email	varchar(50)
DOB	datetime

Table Name : Response_table

Primary Key :response_id

Foreign key :service_user_id

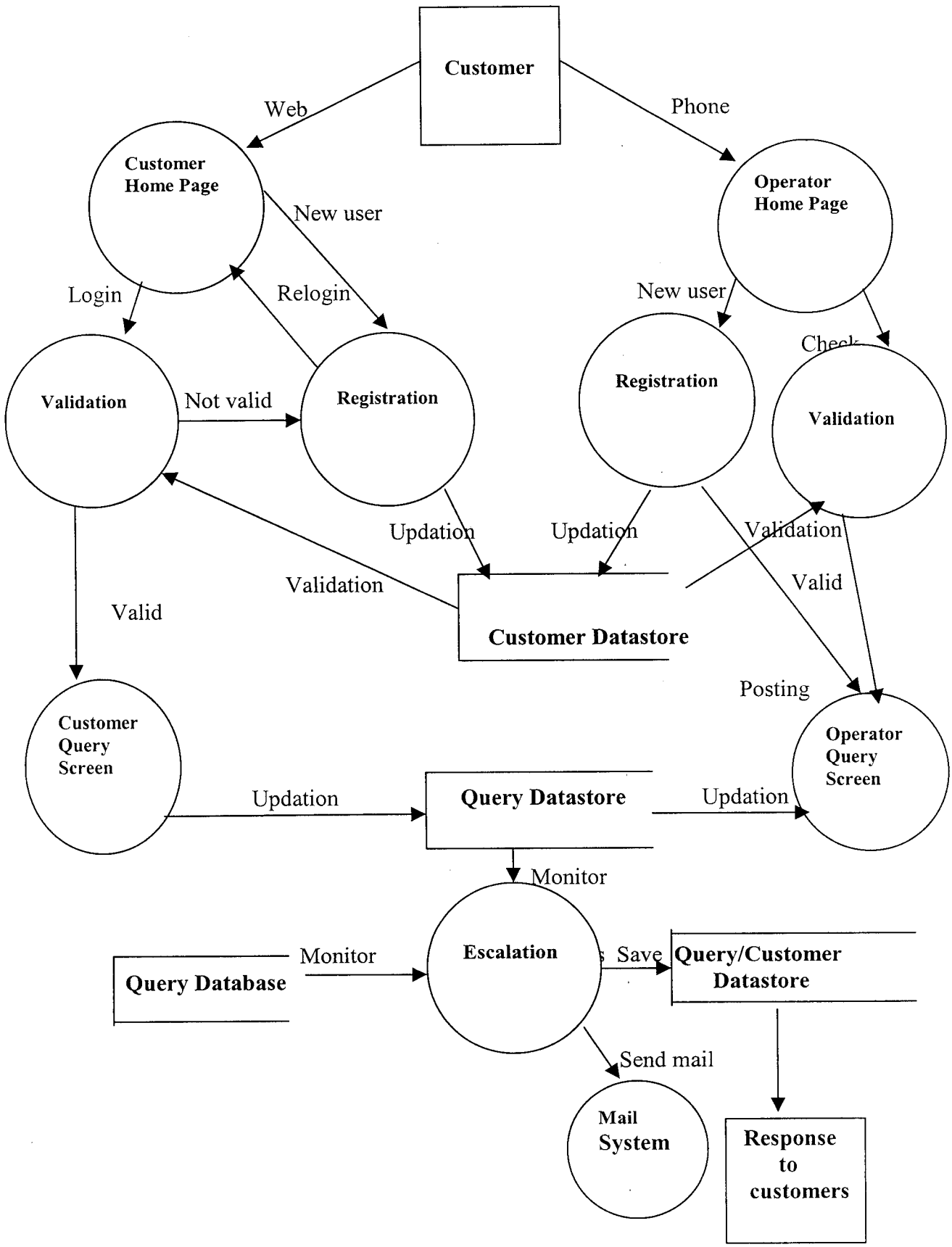
Column Name	Datatype
Response_id	int
Service_user_id	int
Response	varchar(50)
Response_posting_date	datetime
Response_type	varchar(20)
Response_status	varchar(20)

4.4 Process Design

Data Flow Diagram

A data flow diagram is a graphical technique that depicts information flow and the transforms that are applied as data move from input to output. In this graph the nodes represent the processing activities and the arcs specify the data items to be transmitted between processing nodes. The data flow diagram may be used to represent system software at any level of abstraction. The DFD provides a mechanism for functional modeling as well as information flow modeling. The Data Flow Diagram might represent data flow between concurrent processes, or data flow in a distributed computing system where each node represents a geographically remote processing unit. Unlike flow charts, Data flow diagrams do not indicate the decision logic or the conditions under which the various processing nodes in the diagram might be activated. Data flow diagrams are an excellent means of communicating with the customers during the requirement analysis and they are also useful for representation of external and top level internal design specifications, naming conventions. Data flow oriented design is an architectural design method that allows a convenient transition from the analysis model to a design description of program structure.

The Design phase is mainly concerned with the identifying software components (functions, data streams & data stores), specifying relationships among components specifying software structures.


Customer
Web
Phone
Customer Home Page
Operator Home Page
New user
Login
Relogin
New user
Validation
Not valid
Registration
Registration
Validation
Updation
Updation
Validation
Validation
Valid
Valid
Customer Datastore
Posting
Customer Query Screen
Operator Query Screen
Updation
Query Datastore
Updation
Monitor
Monitor
Escalation
Save
Query Database
Query/Customer Datastore
Send mail
Mail System
Response to customers

Objectives of Testing

- Testing is the process of executing a program with the intent of finding an error.
- A good test case is one that has a high probability of finding an as yet undiscovered error.
- A successful test is one of that uncover an as yet an undiscovered error.

The system on a whole were tested for the following:

- Validation of inputs
- Sequential tests
- Consistency of application

The objective of testing is to discover errors. To fulfill these objectives a series of tests were planned and executed.

Module Testing:

Each module is tested for errors. Module Testing is done to check whether each and every module is working as per the requirements under various conditions.

Login Testing :

The login process was tested with both authorization and unauthorized login. Access was denied for invalid login ids and incorrect passwords. Passwords were changed and addition and deletion of users were done. The results were as expected.

SYSTEM IMPLEMENTATION AND TESTING

5.System Implementation And Testing

5.1 System Implementation

Implementation is the key stages in achieving a successful new system because, usually it involves a lot of upheaval in the user department. It must therefore be carefully be planned and controlled. Normally, this involves setting a coordinating committee, which will act as a sounding board for ideas, complaints and problems.

Apart from planning the two other major tasks of preparing for implementation and education and training of users and testing of the system. Education of the users should really have taken place much earlier in the project when they were being involved in the investigation and design work, at the Implementation stage the emphasis must be on training in new skills to the staff so that they could be able to cope up with the new system. Once the staff has been trained, system can be tested. The whole system should be tested for flaws. Once the coordinating committee is satisfied with the training and the testing, changeover can begin.

5.2 System Testing

A strategy for software testing integrates software test case design methods into a well-planned series of steps that results in the successful construction of software. A software testing strategy should be flexible enough to promote the creativity and customization that are necessary to adequately test all large software based systems. It should also promote reasonable planning and progresses.

Testing is a vital to the success of the system. System testing makes a logical assumption that is all parts of the system are correct; the goal will be successfully achieved.

Display Testing :

Display testing was conducted to ensure that all the display procedures are working properly.The display information are checked whether the information is properly displayed in various modules

Unit Testing :

Here, each individual program was tested using the test data. The outputs as per the requirements were found satisfactory. Thus it was possible to conclude that every program in the software was functionally correct. The interrelated modules were also tested in an exhaustive fashion that will make the whole software work properly.

Integrated Testing:

The individual programs are combined together to form modules. Integrated tests were performed on each of the modules and again the validity was checked. After that, all modules were brought under a single module and the integrity test was found to be successful.

This system was validated in such a way that even the slightest deviation in inputting the data will invoke error messages and provide guide lines regarding the input.

5.3 Refinements Based on Feedback

This application is provided with two set of feedbacks. They are

(i) Operator feedback

(ii) Online feedback

The feedbacks are received from the users of the system. The feedback is used to get suggestions or comments about the system. The feedbacks provided by the users are of great importance. From the feedback we may be able to get valuable suggestions from the users. The suggestions may be implemented in the system. Observing users executing the tasks and collecting data and feedback. Feedback is organized, analyzed, and interpreted. These process helps to identify the problems which are encountered by the users, giving the reasons for the problems and offering possible solutions by rectifying the problem.

The feedback that we received from the users of the application are very encouraging and appreciative ,their suggestions were made worthwhile and are seriously considered.

CONCLUSION

6.Conclusion

The product is a Call Center Management which provides solution for any Agriculture, Manufacturing, Servicing and Commercial sectors. This is a web-based product designed to accept input from Customers directly or from Call Center operators.Thus it makes easy for customers to post their query to the Call Centers and get back the required information

The call center management has been developed to care the customer support activity. This has removed the difficulty of maintaining manual records. The service executive may attend the complaints efficiently. The customer service activity comprises of attending to customer calls/complaints and carrying out proper response.

Call center technology is changing customer behavior, causing significant reallocations of human and other resources, forcing changes in job roles with new responsibilities. The call center is a new technology which offers tremendous opportunities.

Since this application is web based, computer illiterate 's may find some difficulty in using this system because this application do not have any tutorials to help the users. The emails forwarded in this system depends on the Network traffic ,so the fastness of the application depends highly on the Network traffic. These limitations can be rectified in the future.

SCOPE FOR FURTHER DEVELOPMENT

7. Scope For Future Development

This system can be integrated with other MIS systems or may be allowed to function independently. File uploading can be integrated in this, in which files can be copied into the destination directory through the use of scripting. Also it is also possible to send mails regarding the status of the complaints to individuals. This can be done by embedding VB Components into the HTML page.

- Voice response applications can be developed to provide better user interface.
- The application can be enhanced in the future by providing mailing services by the application to the customers for better service.
- The application could also have a Search Engine tool, which may enable the customers to know their queries with short period of time.
- Unified messaging can also be implemented in the future, which allows users to manage all their voice, fax, and e-mail messages from a single application on their multimedia - equipped PC or laptop.

Change Over

Once all the preparatory work of implementation had taken place the system has been tested and the staff trained –the change over from old to new system began . Change over is the state of moving over from old manual system to the new computer –based system.

In order for the change over, the clerical file had to be converted into computer format and media and then input to the computer to form the new computer files. When the files have been set up on the computer, the changeover properly takes place. There where several possible methods to achieve this, e.g direct changeover, parallel running and staged changeover.

The implementation coordinating committee chose the most appropriate method that is the direct changeover in our case of execution. The users are satisfied with the results and the new system is working properly under the system analyst.

Creating an Effective Change Management Plan

Planning and managing change, both cultural and technological, will be one of the most challenging elements of the project. Understanding the key areas of change management, and the associated traps and pitfalls and other areas have to be encountered, which is critical to the success. The transition to new tools and technology, including key areas to be considered when planning major technical improvements and system changes.

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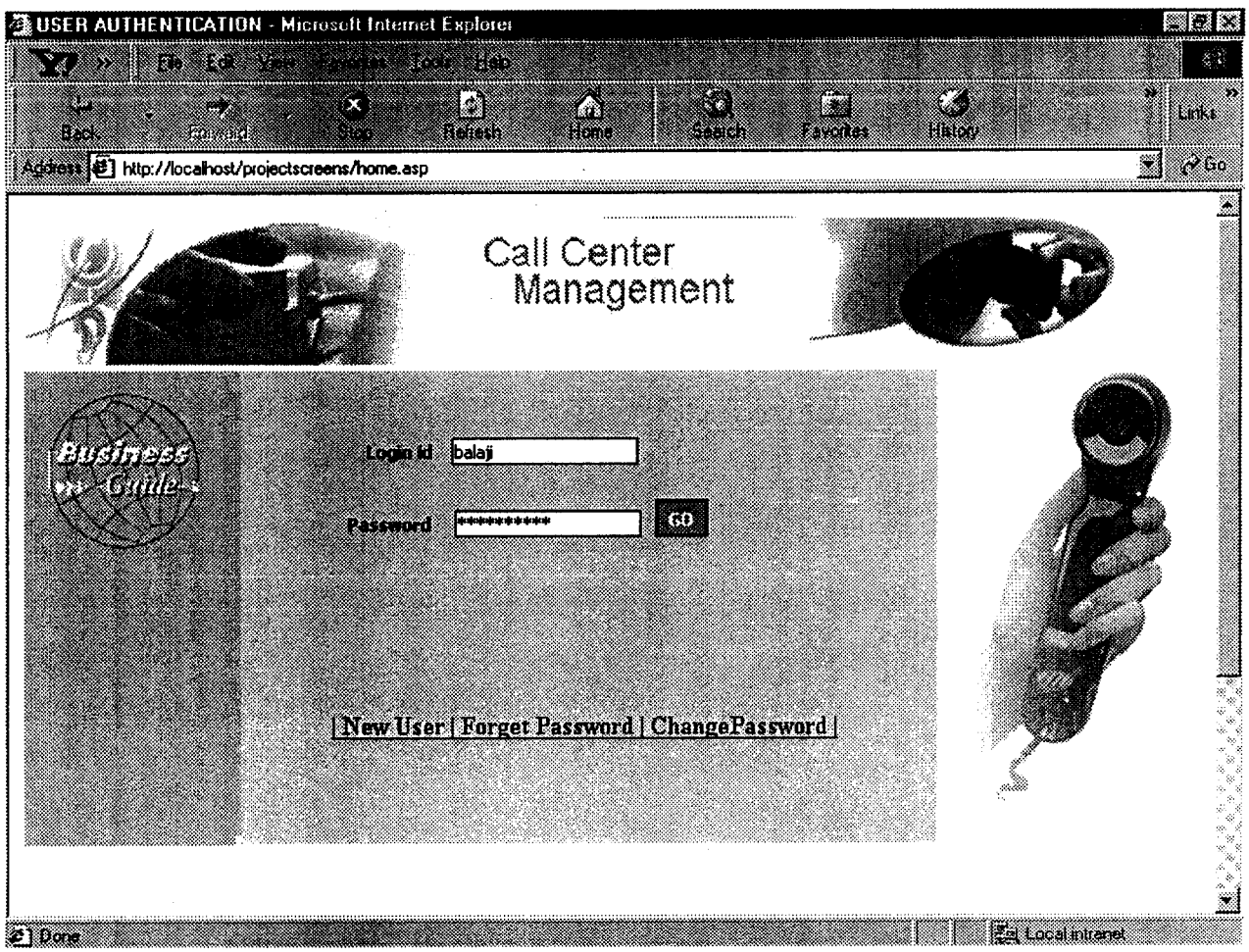
www.aspfree.com	as on March 2002
www.aspwire.com	as on April 2002

ANNEXURES

SCREENS


USER AUTHENTICATION - Microsoft Internet Explorer
Back
Forward
Stop
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Management
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Guide
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Done
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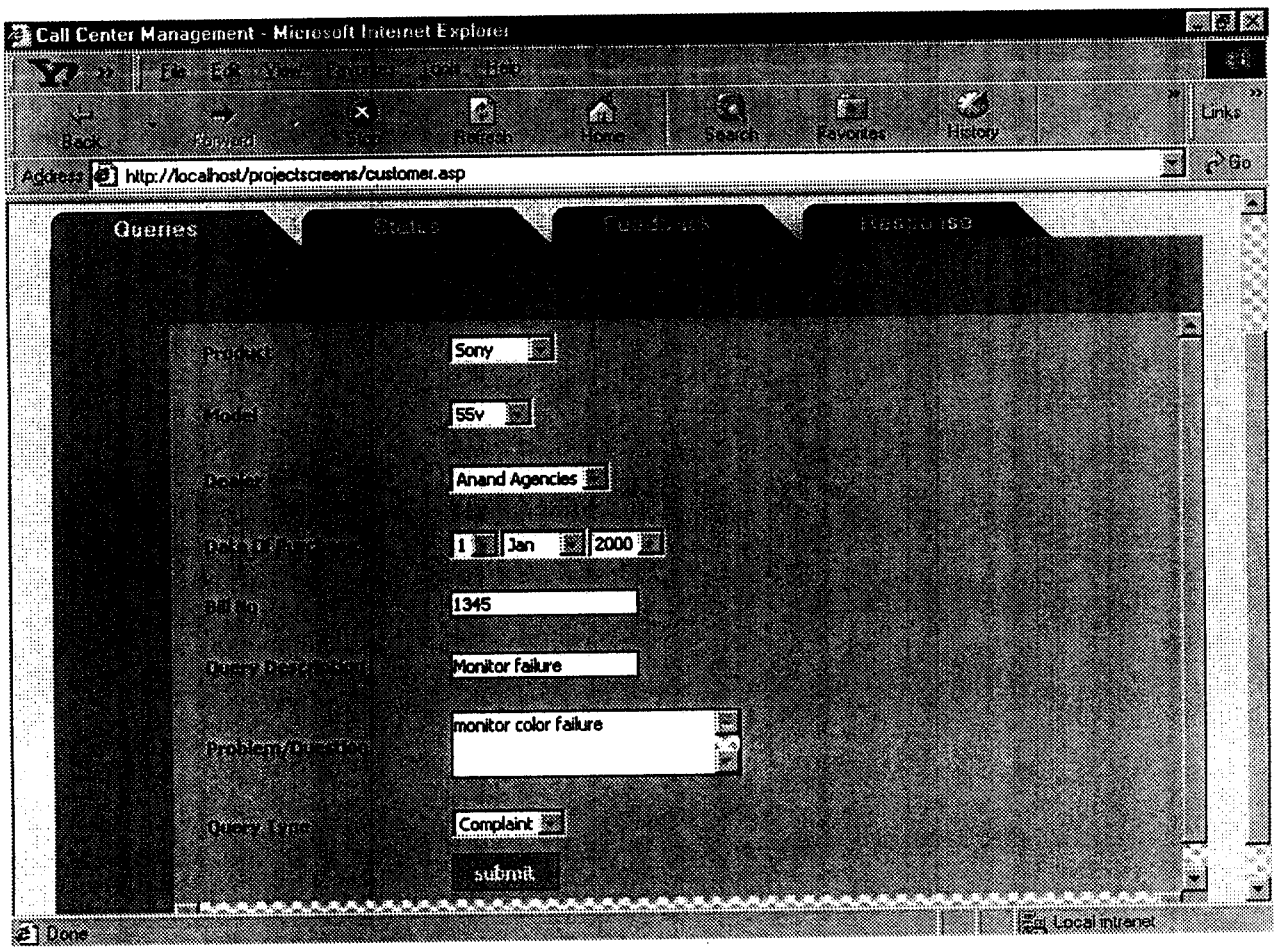
Call Center Management - Microsoft Internet Explorer
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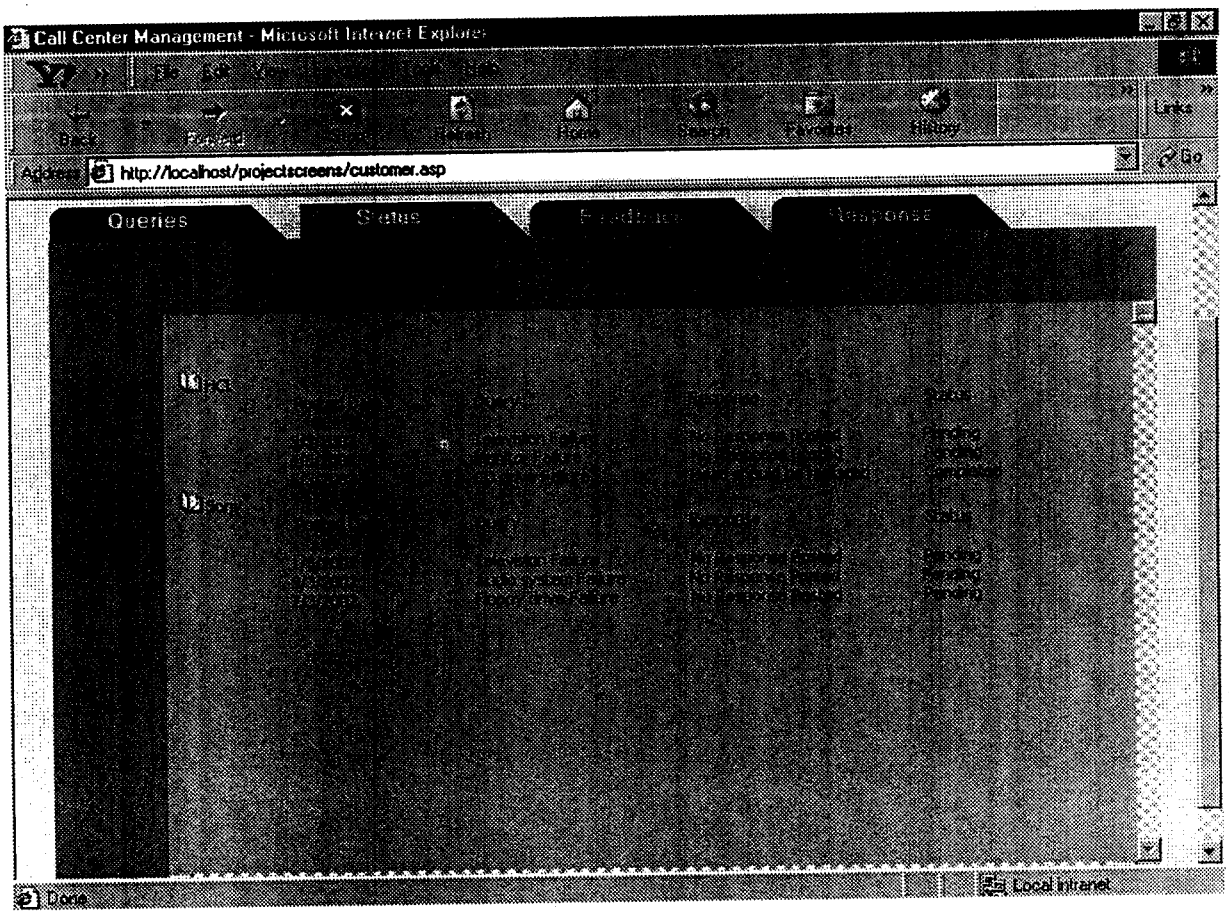
Call Center Management - Microsoft Internet Explorer
Address
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Queries
Status
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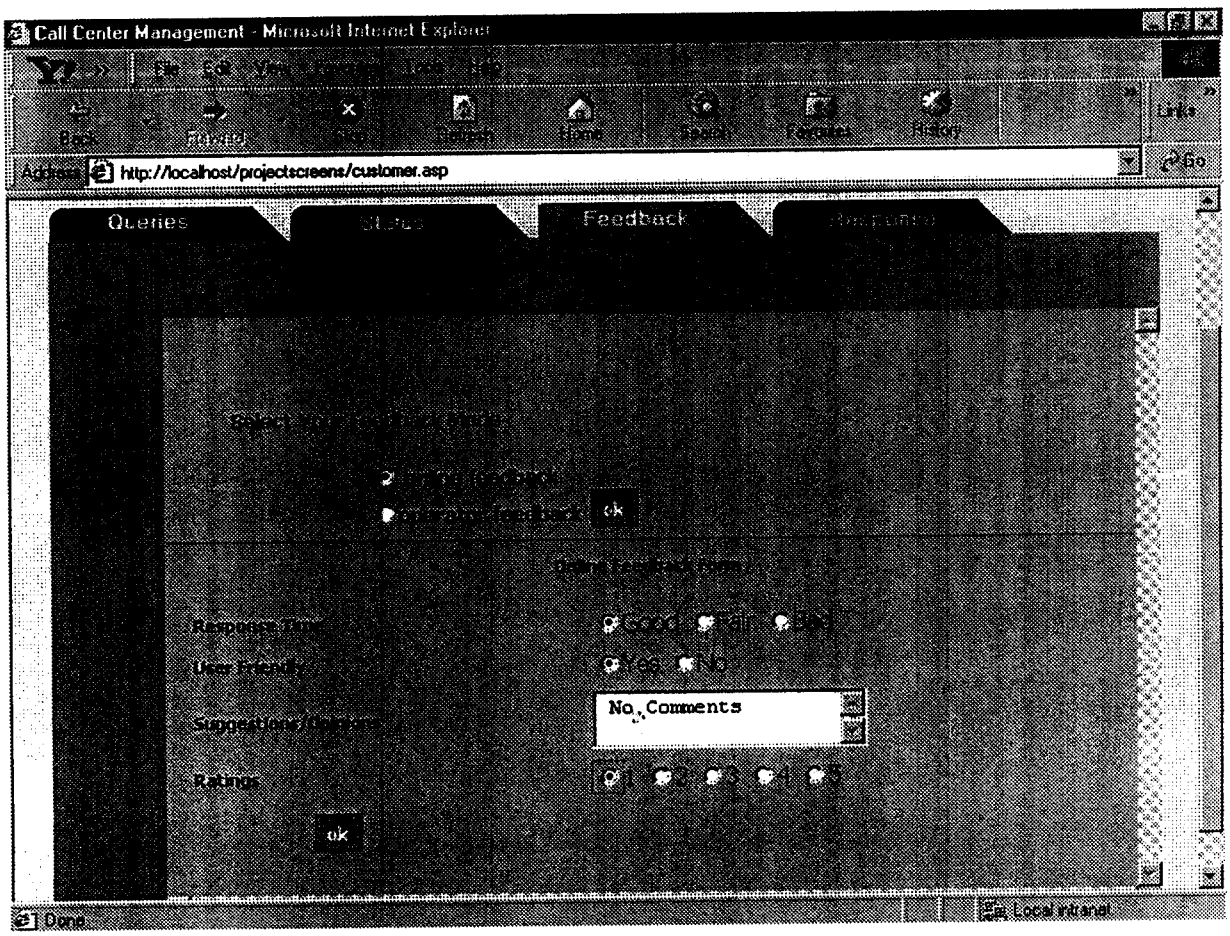
Local intranet


Call Center Management - Microsoft Internet Explorer
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Response Time
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Bad
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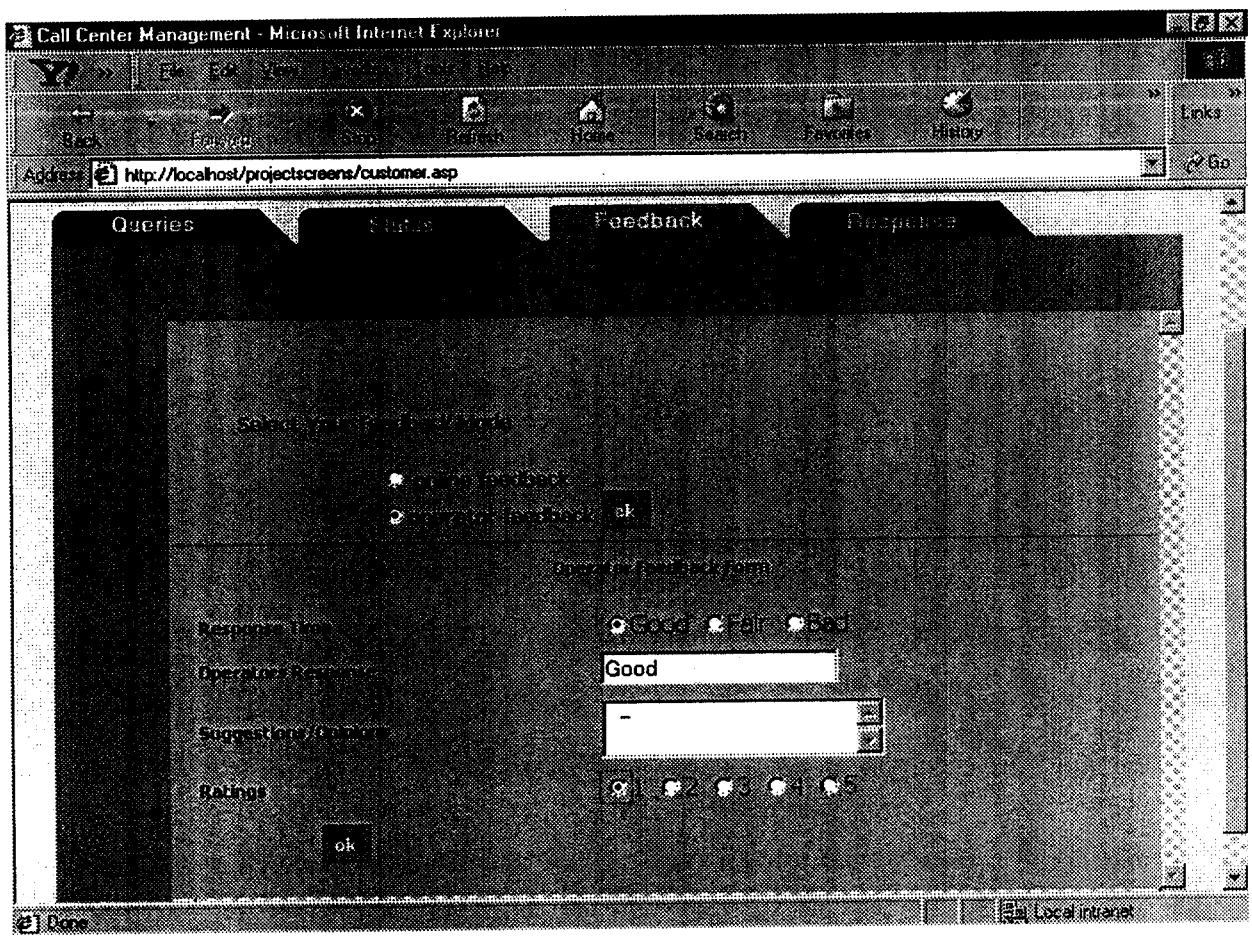
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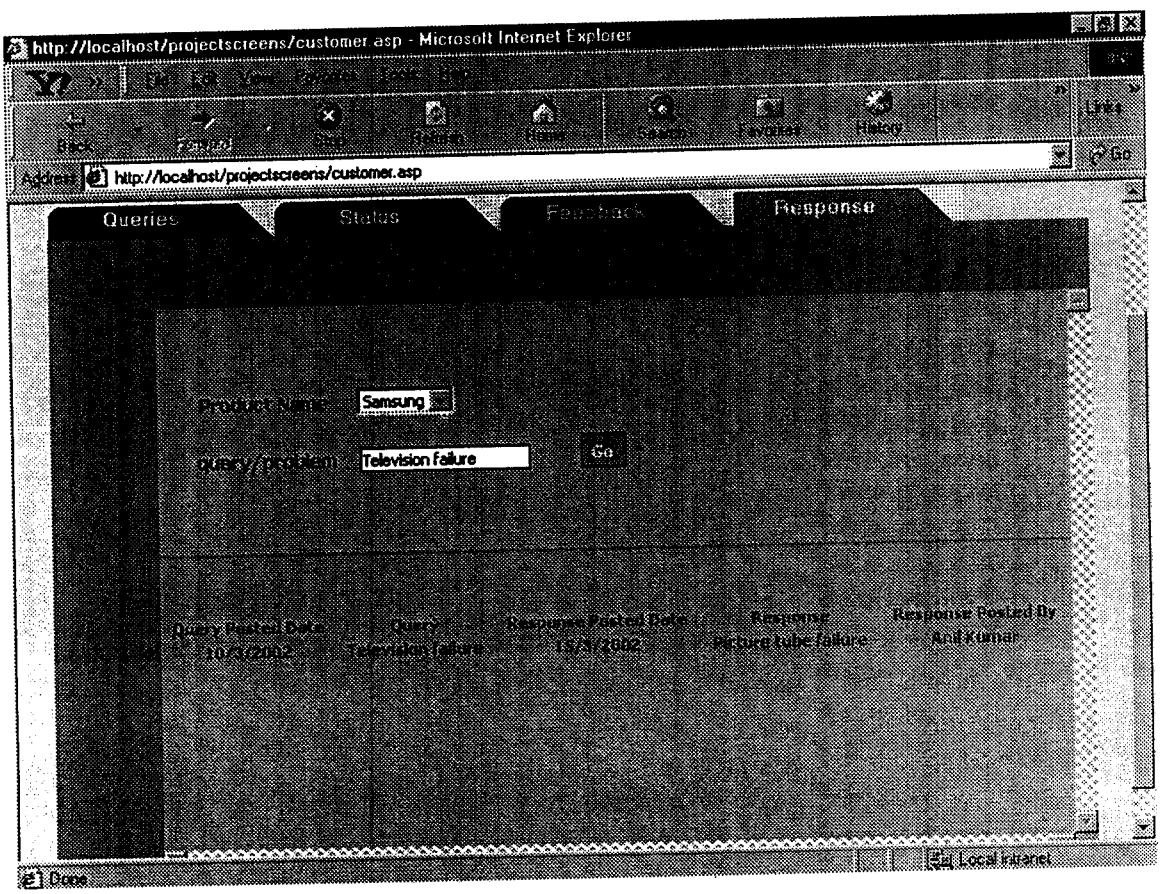
http://localhost/projectscreens/customer.asp - Microsoft Internet Explorer
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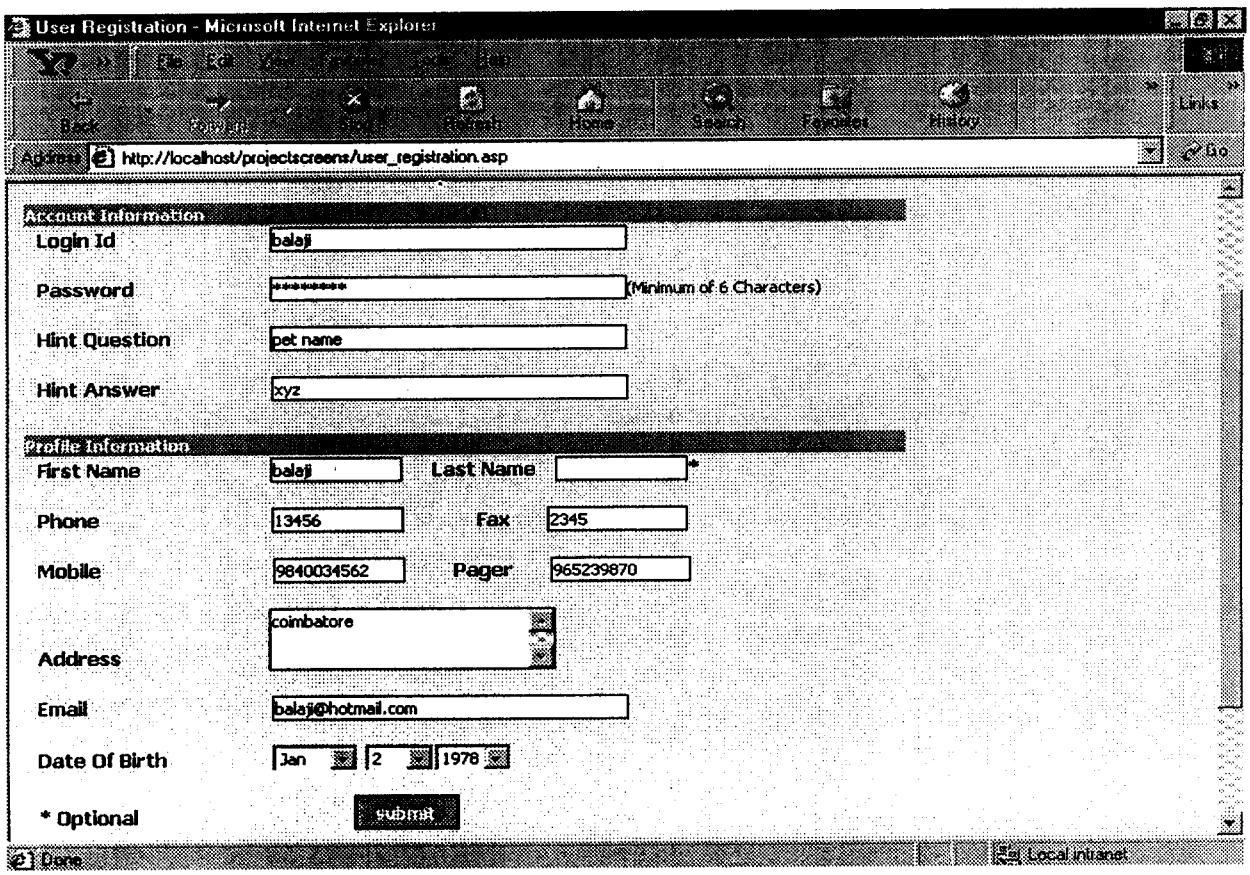
User Registration - Microsoft Internet Explorer
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Hint Question
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Hint Answer
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Profile Information
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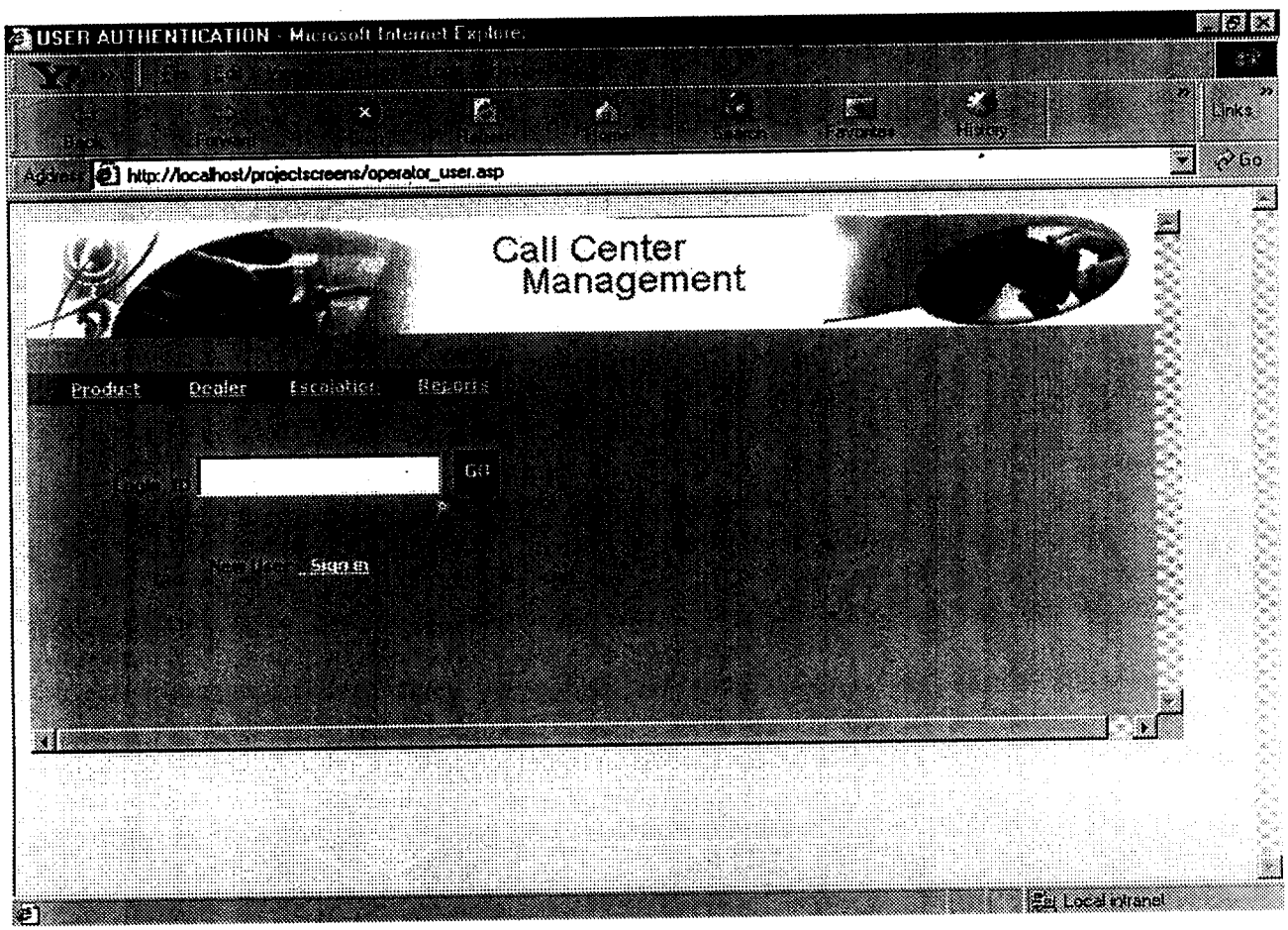
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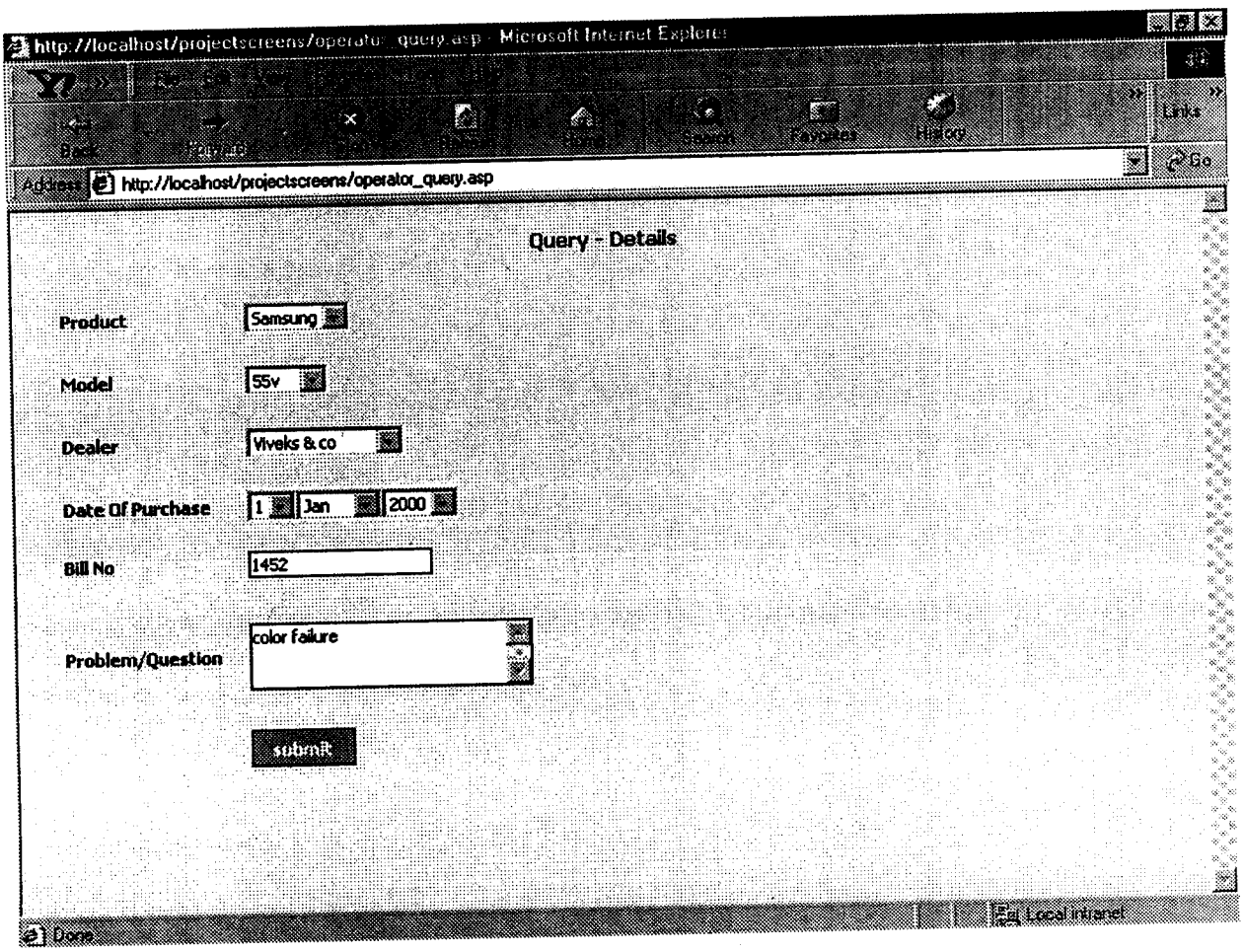
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Query - Details
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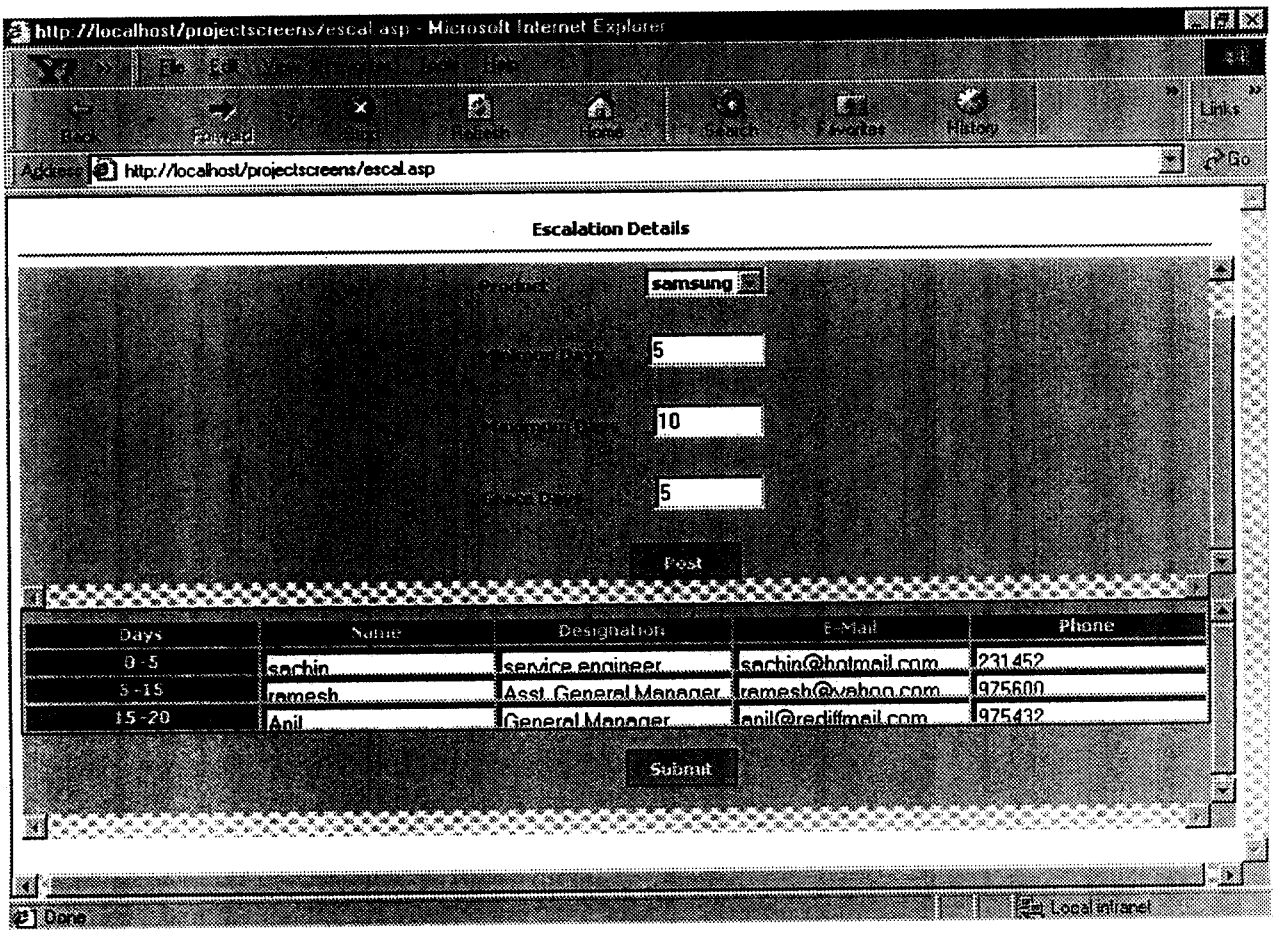
http://localhost/projectscreens/escal.asp - Microsoft Internet Explorer
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General Manager
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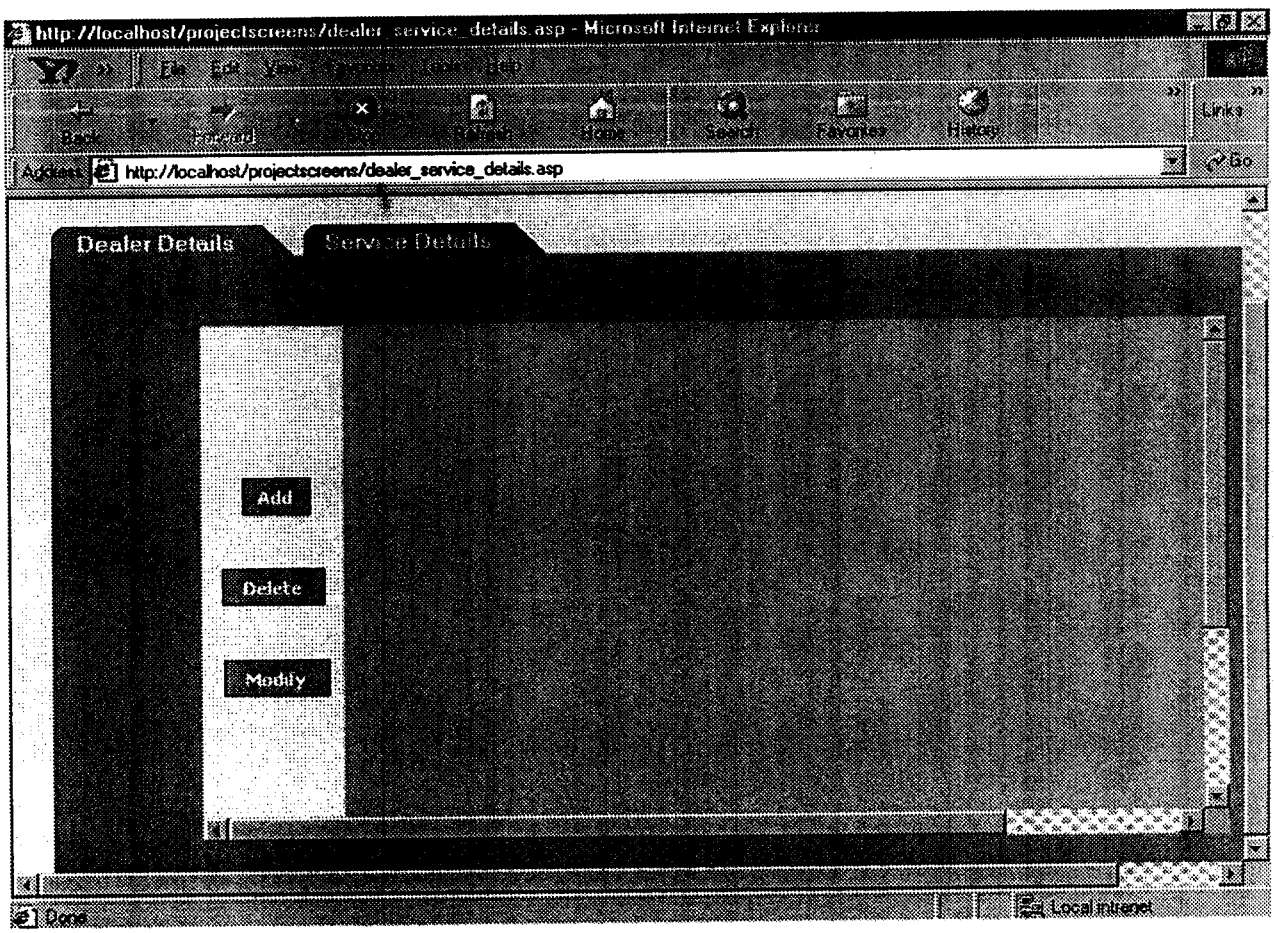
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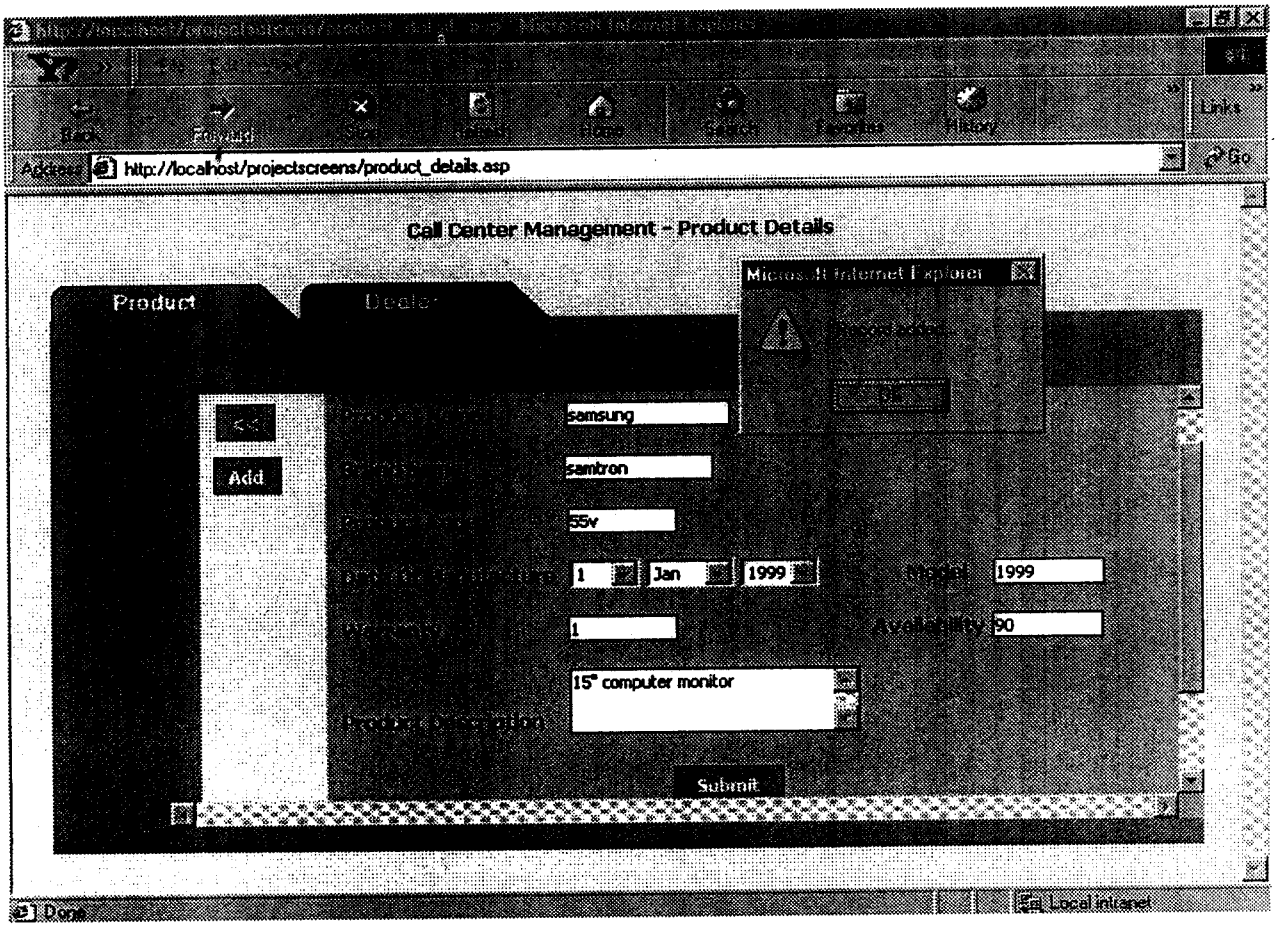
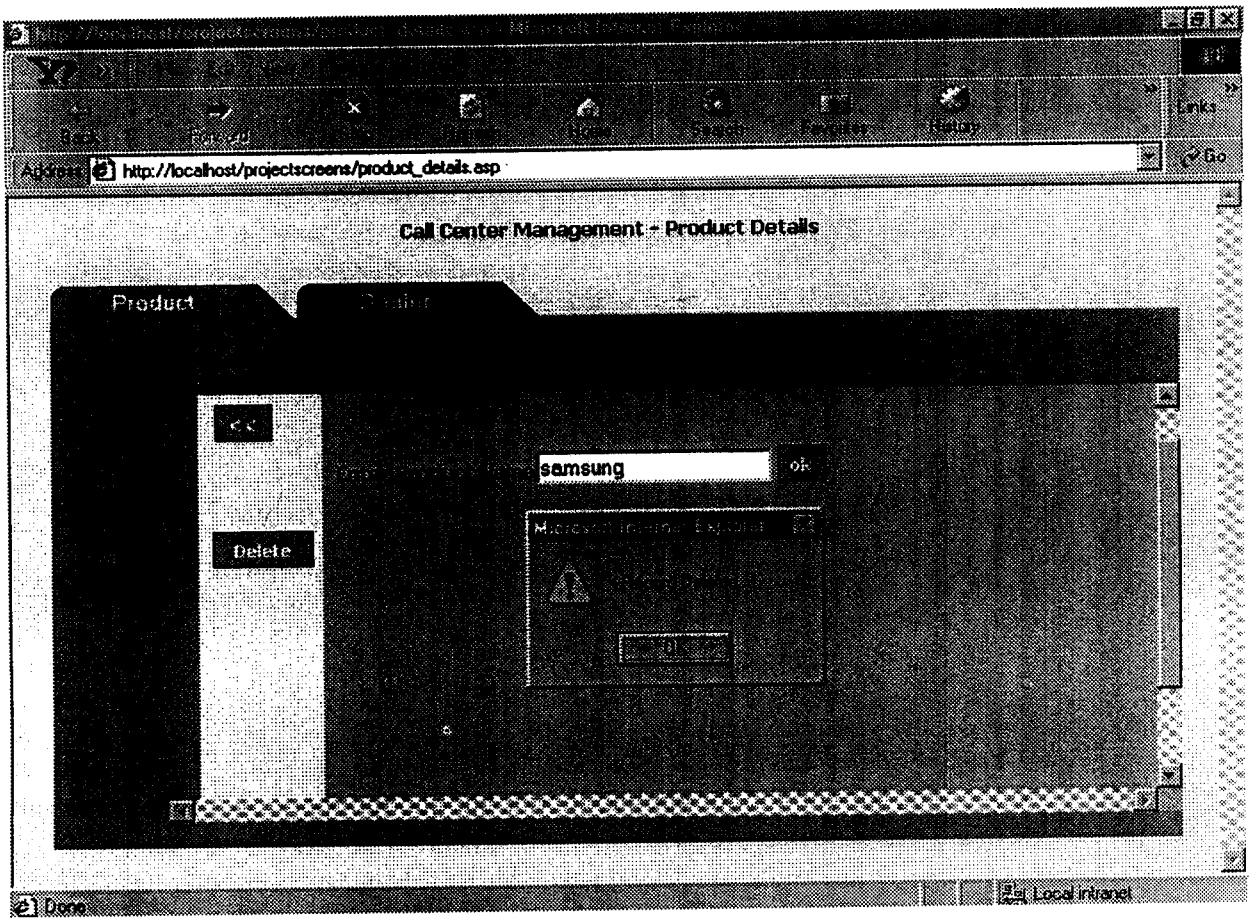
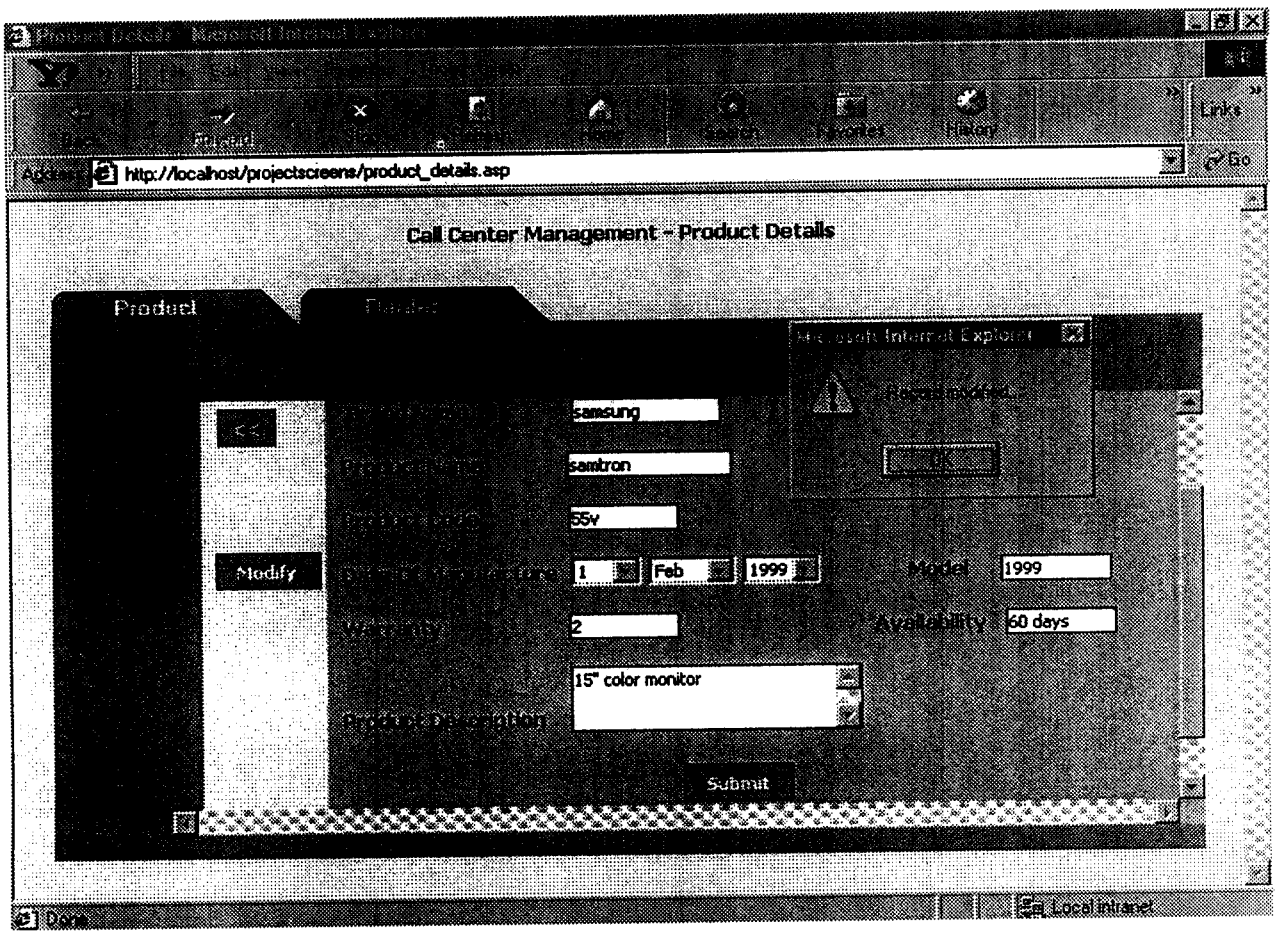
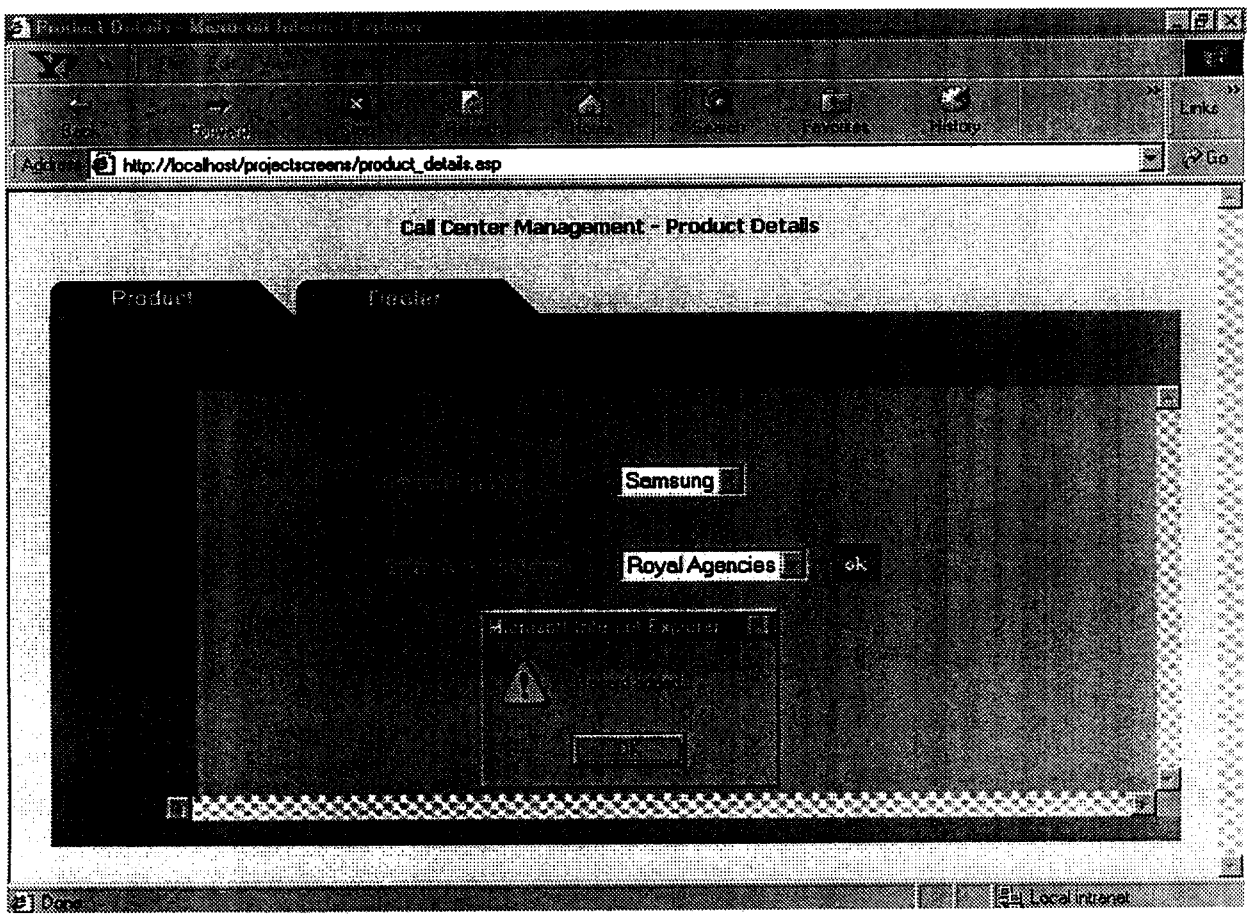
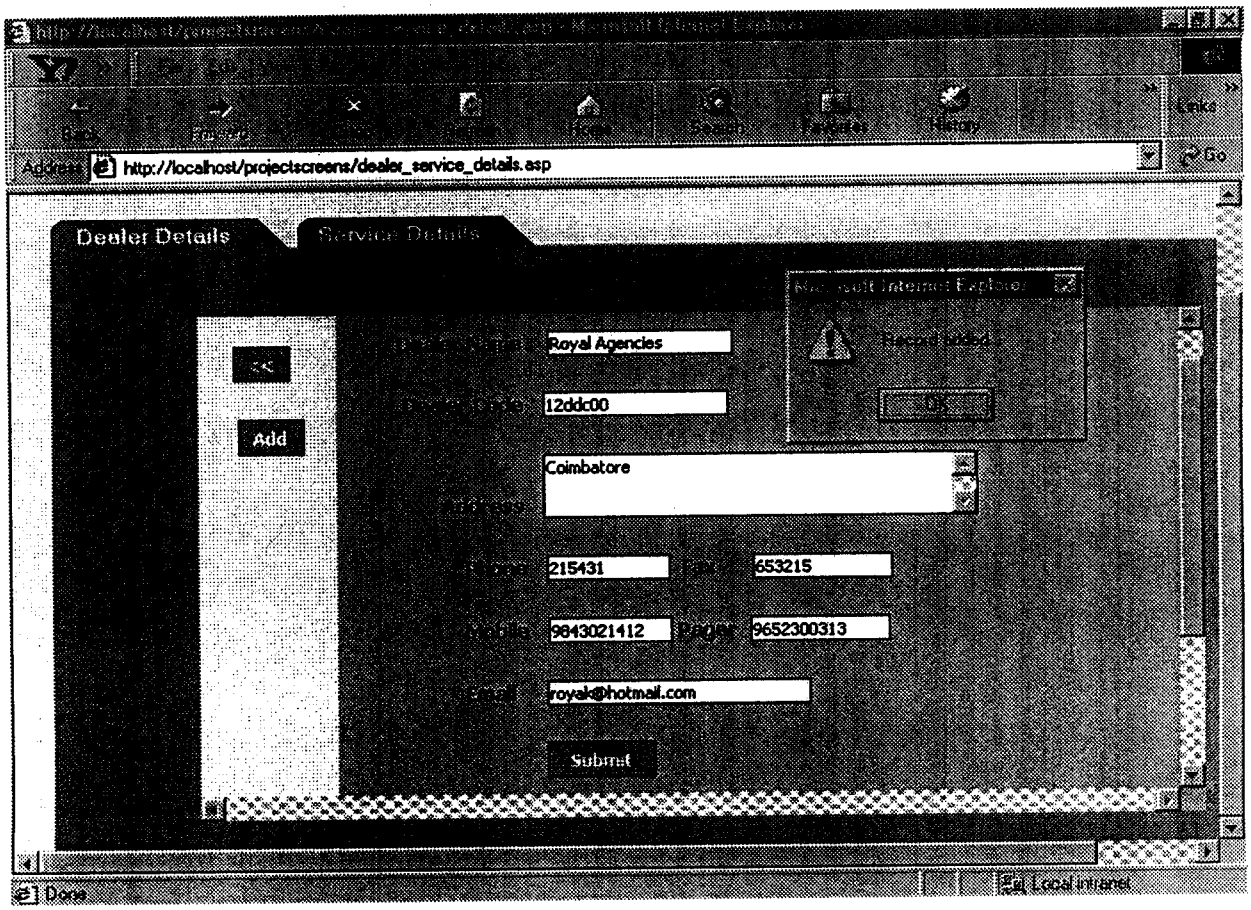
Links
Address
http://localhost/projectscreens/dealer_service_details.asp
Go
Dealer Details
Service Details
Add
Delete
Modify
Done
Local intranet

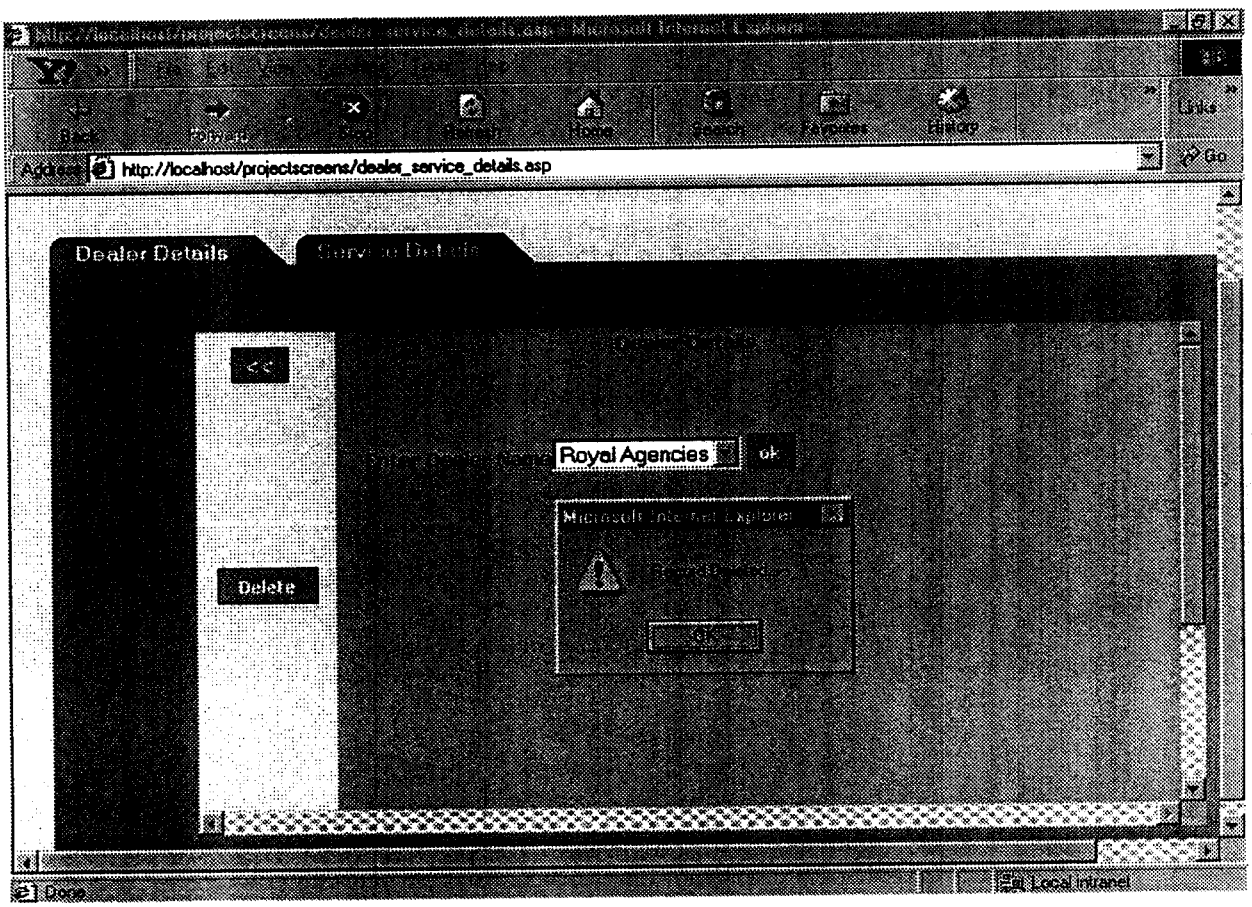

Back
Forward
Stop
Refresh
Home
Search
Favorites
History
Links
Address
http://localhost/projectscreens/product_details.asp
Go
Call Center Management - Product Details
Product
Dealer
<<
Add
samsung
samtron
55v
1
Jan
1999
1999
1
Availability
90
15" computer monitor
Submit
Done
Local intranet

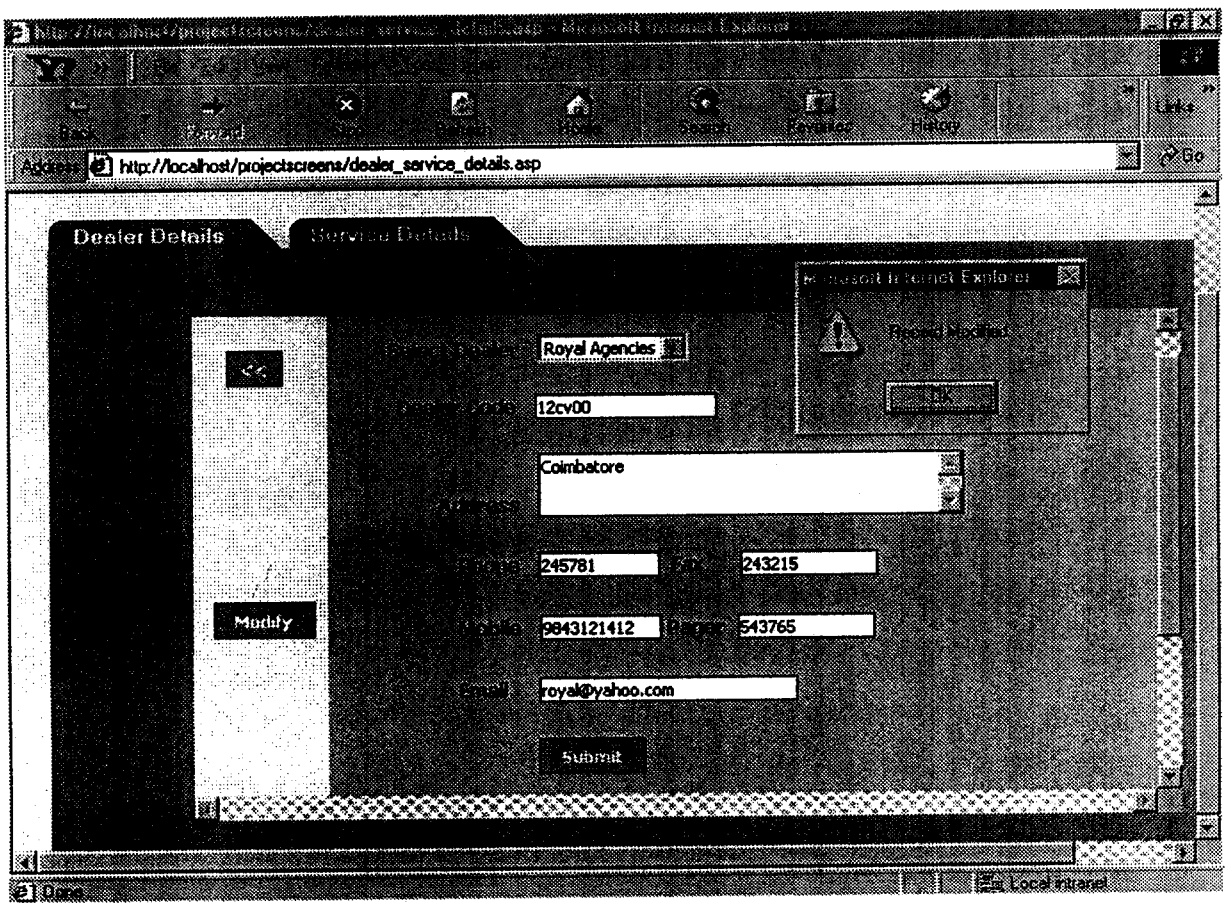

http://localhost/projectscreens/product_details.asp
Call Center Management - Product Details
Product
<<
Delete
samsung
ok
Done
Local intranet

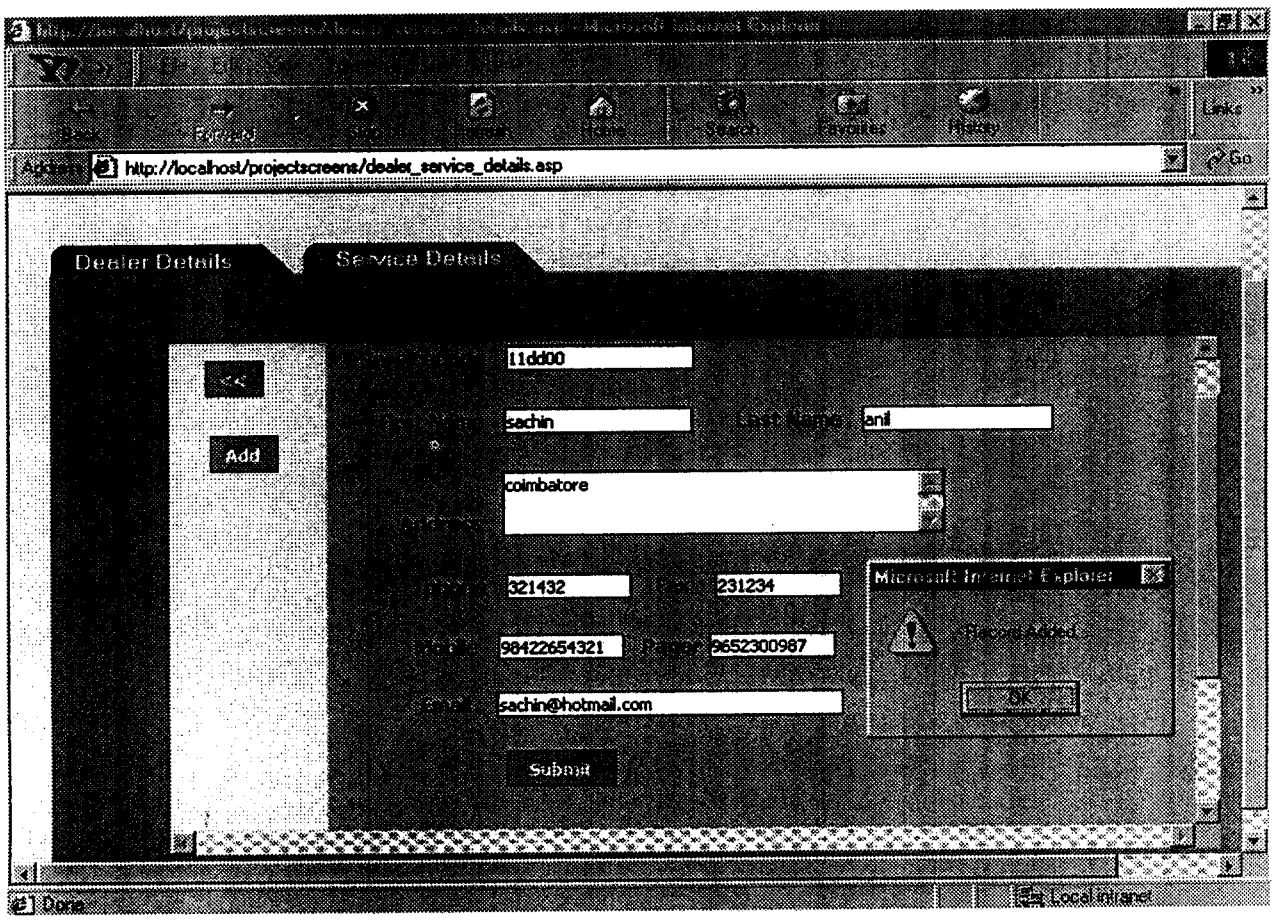

http://localhost/projectscreens/product_details.asp
Call Center Management - Product Details
Product
<<
Modify
Samsung
samtron
55v
1
Feb
1999
Model
1999
2
Availability
60 days
15" color monitor
Submit
Local intranet

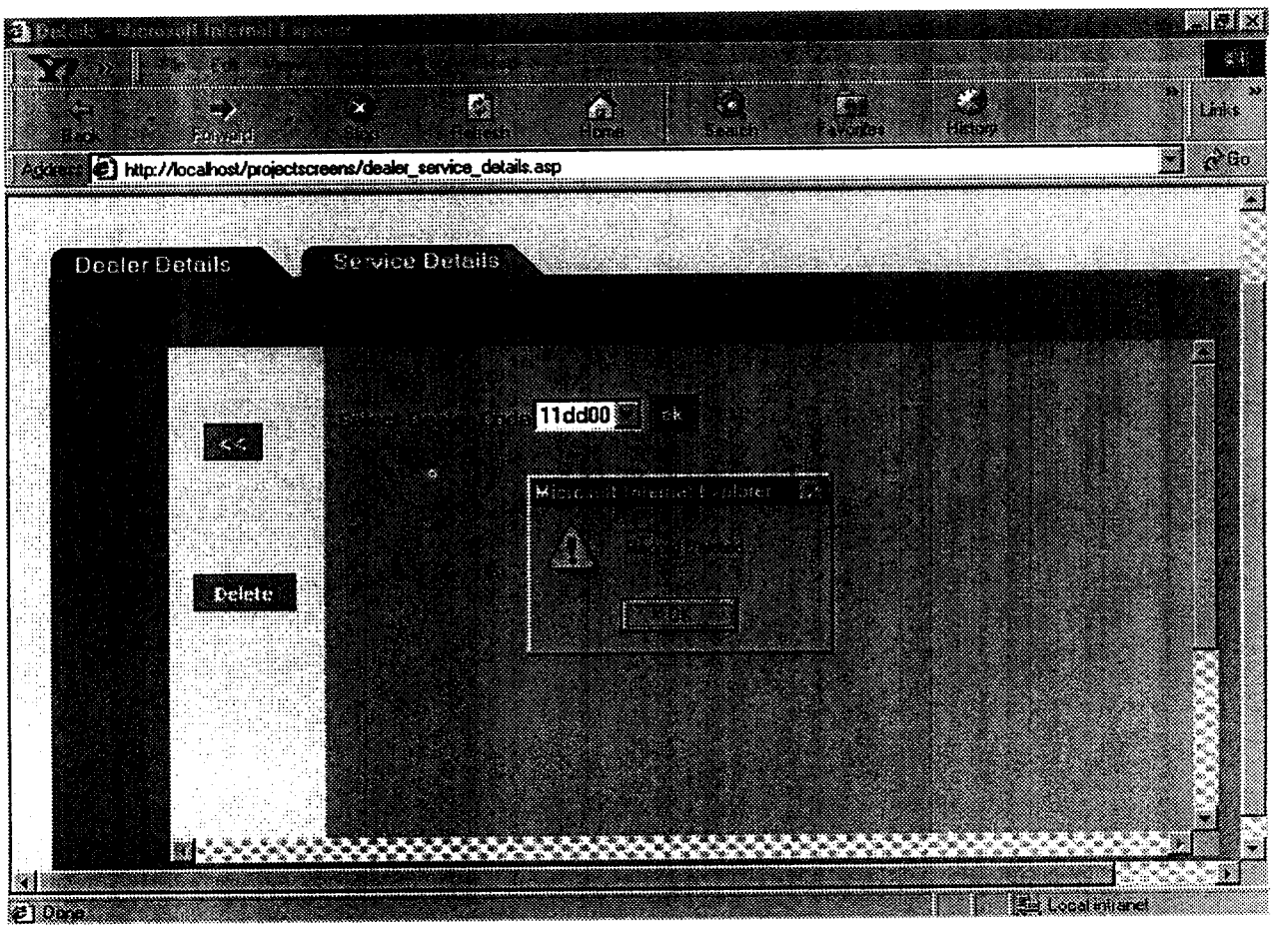

http://localhost/projectscreens/product_details.asp
Call Center Management - Product Details
Samsung
Royal Agencies
ok
Local intranet

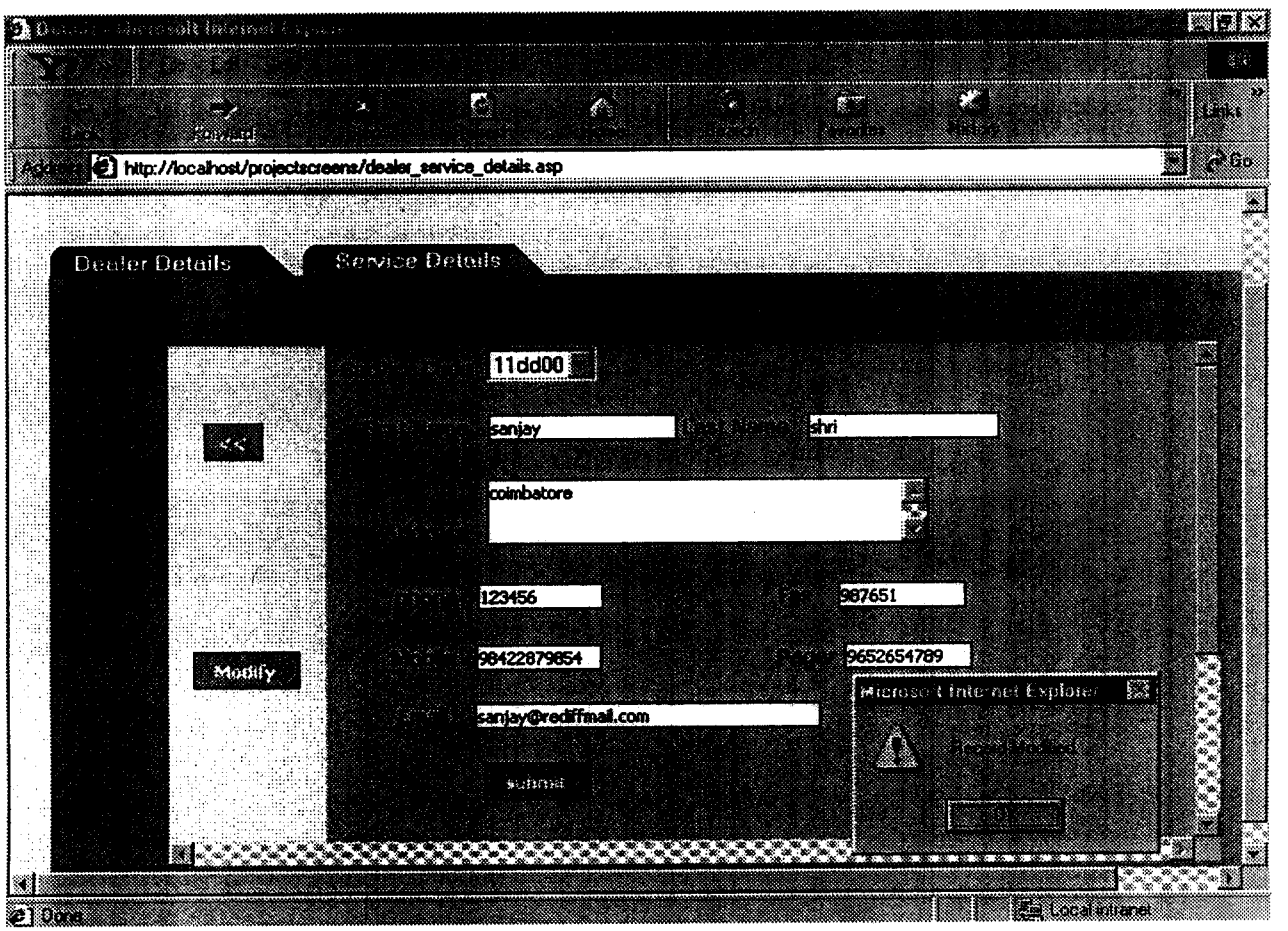

Address http://localhost/projectscreens/dealer_service_details.asp
Dealer Details
Service Details
<<
Add
Royal Agencies
12ddc00
Coimbatore
215431
653215
9843021412
9652300313
royal@hotmail.com
Submit
Record Added
OK
Done
Local intranet


http://localhost/projectscreens/dealer_service_details.asp
Dealer Details
Royal Agencies
ok
Delete
Done
Local intranet


http://localhost/projectscreens/dealer_service_details.asp
Dealer Details
Service Details
Royal Agencies
12cv00
Coimbatore
245781
243215
9843121412
543765
royal@yahoo.com
Submit
Modify
<<
Local intranet


http://localhost/projectscreens/dealer_service_details.asp
Dealer Details
Service Details
Add
11dd00
sachin
anil
coimbatore
321432
231234
98422654321
9652300987
sachin@hotmail.com
Submit
OK
Done
Local intranet


http://localhost/projectscreens/dealer_service_details.asp
Dealer Details
Service Details
11dd00
Delete


http://localhost/projectscreens/dealer_service_details.asp
Dealer Details
Service Details
11dd00
sanjay
shri
coimbatore
123456
987651
9842279854
9652654789
sanjay@rediffmail.com
submit
Modify
Done
Local intranet

DEFINITIONS & ACCRONYMS

Definitions and Acronyms

ACD	: Automatic Call Distributor is a Visual Basic code which runs in the server. ACD processes calls on a first come, first served basis. The calls are placed in a queue depending upon the status of the query it automatically starts the escalation process by transmitting the query to appropriate service person.
Customer/User	: Person(s) accessing the web site to enter their requests.
Client	: Person(s) or organization who will maintain the web site.
Contract	:Legally binding document agreed upon by client and supplier/developer.It includes the technical, organizational, cost and scheduled requirements of a product.
Developer	: Is the same as supplier within this report.
Application	: The web site, also the product, which deals with Call Center Management of any Service Industry.
CHP	: Customers Home page.
OHP	: Operators Home page.
CRM	: Customer Relationship Management
Supplier	: Person(s) or organization that is developing the product.