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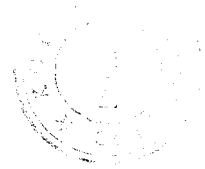


**CUSTOMER RELATIONSHIP MANAGEMENT
FOR
MACRO INFOTECH PRIVATE LIMITED - BANGALORE**

PROJECT REPORT

P-1014

Submitted in partial fulfillment of the
Requirements for the award of the degree of
Master of Computer Applications
Bharathiar University, Coimbatore



Submitted by

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PROJECT REPORT 2002 - 2003

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16-04-2003

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Completion Certificate

This is to certify that Mr. Rajesh Kumar.T. has successfully completed the Project Titled **"CRM for Macro Infotech"** in the stipulated time specified. We are satisfied with his work and the project will be implemented soon.

Time Duration:

Start Date : **16/12/2002.**

End Date : **15/03/2003.**

No of Days Present: **65 Days**

No of Days absent with Permission: **8 Days**

No of Days absent without Permission: **Nil**

With regards,

For MACRO INFOTECH PVT. LTD.,



C.P.Paripoorna
Director

DECLARATION

I here by declare that the project work entitled

“CUSTOMER RELATIONSHIP MANAGEMENT

FOR

MACRO INFOTECH PRIVATE LIMITED– BANGALORE”

submitted to Kumaraguru College of technology, Coimbatore affiliated to Bharathiar University as the project work of **Master Of Computer Application Degree**, is a record of original work done by me under the supervision and guidance of **Mr. Mahadevasamy M.C.A**, Macro Infotech Pvt. Ltd., Bangalore and **Mr. S. Mohanavel B.E., M.B.A., DCPA**, Senior Lecturer, CSE Department, Kumaraguru College of Technology, Coimbatore and the 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

This project work entitled “Customer Relationship Management for Macro Infotech Private Limited – Bangalore” is a web-based application, which is developed uniquely for Macro Infotech Pvt. Ltd, Bangalore using ASP and SQL Server 2000 as the major tools.

The main objective of this software is to increasing the customer relationship with the company. CRM (Customer Relationship Management) is a customer focused business strategy designed to optimize profitability, revenue and customer satisfaction through the specific vision of building customer loyalty. By fostering increased customer satisfaction and retention, CRM makes top-line growth.

The main functionality of this project is enhancing the company’s interaction with their clients, Customer Support and product marketing. In order to enhance the interaction various modules are designed as Interaction Room, Mail System, and On-line feedback. For the customer support, On-line project status and client’s download section modules are provided and finally for product marketing, product download section module is provided.

The security of this web application is provided by RBAC (Role- Based Access Control) and UASM (User Authentication Security Model). These security models provide a well-secured environment for the company.

Various users of this application are clients, client associates, guests and company associates. Each user is provided with some role, which holds some access rights on this web application.

Through this web application Macro Infotech can enhance their CRM division and their clients also benefits by faster interaction and customer support functionalities.

ORGANIZATION PROFILE

Macro Infotech Pvt. Ltd. is promoted by a team of dynamic and dedicated software professional and engineers, with six years of experience in data services for government and leading private companies. Macro Infotech is located in Bangalore, the silicon plateau of India

Macro is established in the year 1995 and it has focused exclusively on the Internet domain and Development and is constantly building upon its expertise. Since its inception, has cemented a focal team of professionals, successfully completed over 33 client engagements. Our joint development engagement with Departments of Government of Karnataka has seen us complete numerous high profile projects. As a result of this interaction, our inherent processes have matured to an appreciable extent.

Macro's unique approach to be a leader is distinctively evident in the way the products had been built around the latest and best technologies. Considering the impact of technology to come, all the products and software are designed to work in as many technologies with open architecture on varied heterogeneous platforms and operating systems.

Macro's Areas of expertise are Customized Solutions, Data Warehouse, Multimedia, and Web Application Development.

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1. PRODUCT DEFINITION

1.1. PROBLEM STATEMENT

Problem statement addresses the need for this CRM product. In this competitive world customers are the real asset for a company. The longer the customer stays with a company, the more the company is benefited. Reducing the customer defections would increase the companies profit considerably. So from the above statements you realize how worthy a customer is. Thus increasing the relationship with a customer would help a company to keep customer intact.

In the existing manual process there is no faster and efficient interaction with the clients. They have to depend only on feedback, enquiry and requirement specification form or on some site enquiries to carry out the following

- Product modifications/enhancements
- Product marketing
- User training and clarifications
- Product feedbacks and etc...

CRM comes to play in increasing the customer relationship with the company. It is a customer focused business strategy designed to optimize profitability, revenue and customer satisfaction through the specific vision of building customer loyalty. By fostering increased customer satisfaction and retention, CRM makes top-line growth.

1.2. FUNCTIONS TO BE PROVIDED

This is a web based product that is customized exclusively for Macro Infotech and it fits in to the companies CRM. The functionalities that are to be provided are as follows,

a. Enhanced Interaction

- i. Timely interaction between the customers and the company will improve the collaborative process that exists between them.

- ii. Faster interaction between them pace up the companies work, thus customers can get their requirements quickly.
- iii. This Timely and Faster interaction would enhance the interaction process.

b. Project Status

Customer delegates some job to the company, which are termed as Project. Providing the status of the projects would help the customers to track their projects.

c. Product Marketing

Marketing is an essential part of every company, only through which a company can earn more number of customers and it also helps the company to expose its ability and deliverables.

1.3. PROCESSING ENVIRONMENT

1.3.1. Hardware

Recommended Hardware requirement

- 1. Processor – Pentium III
- 2. Speed – 600MHZ
- 3. Main Memory – 128 MB RAM
- 4. Cache – 512 KB
- 5. Monitor – 14 “/ Color
- 6. Keyboard – 104 keys / Standard
- 7. Mouse – Three button scroll mouse
- 8. Modem – 64 KBPS

1.3.2. Software

Recommended Software requirement

- 1. Operating System – Windows 98 or any higher version
- 2. Browser – Internet Explorer 5.0 or Netscape Navigator 5.0
- 3. Internet Connection package

1.4. USER CHARACTERISTICS

The users of this product are as follows

a. Client

Clients play a vital role in the structure of the product as this product is developed mainly to improve the relationship with them. This user is an authorized person on client's workplace, who is well at computer operations.

These users can possess the following rights to

- i. Interact with the company associates.
- ii. Monitor their project status.
- iii. Give feedbacks.
- iv. Download products.

b. Client Associate

This user is the associate of the client who is given some of the rights that the client user possesses. Client associates may or may not be well furnished in computer operations but they are trained to use the need product functionalities.

c. Guest

This user has to register online to get access the product functionalities. They are not given any training on product operations but they are notified about it. These users can possess the following rights to

- i. Interact with company associates.
- ii. Download demo of the products
- iii. Give feed backs about the demo products

d. Macro Associate

This user is the associates of Macro infotech. They may be of any departments but they are well at computer and product operations.

These users can possess the following rights to

- i. Interact with the clients and guest users.
- ii. Update the project status.

iii. Use mailing system to send mails to clients and guest users.

e. Administrator

This user has the full control of this application with every access rights. The main responsibility of the administrator is to “Manage the product security”.

1.5. SOLUTION STRATEGY

Solution Strategy addresses the approach for the functions to be provided. Functions to be provided are

a. Enhanced Interaction

Solution Strategy for enhanced interaction is provided by the following

i. Interaction Room

The interaction room, where the patrons (client and client associate) can communicate online with the macro associates. Through which patrons get training, clarifications and also some valuable information. Guest users can also make some enquires through this function.

ii. Mailing System

Mailing system enables the macro associates to send e-mails to the clients. Through this they can make communication quick and efficient

iii. Online Feedbacks

Patrons can use this online feedback to give their remarks and suggestion regarding the company’s service and their products

b. Project Status

Solution Strategy for project status monitoring is provided by “Online project status”. This provides you the online status information regarding the project. Thus the company can provides transparency service to their clients.

c. Product Marketing

Solution strategy for product marketing is provided by “Downloads”. Here you have two sections as

i. Product Downloads

This enables the users to download the company's demo software product along with the feature list of that product and also some other supporting software freely. These demo products possess a stipulated live time. After the live time of the product, company sends a mail to the user regarding the company's services and their deliverables. Thus product marketing is carried out.

ii. Client Downloads

This is a part of customer support, where the company provides the client's requirement on-demand

1.6 ACCEPTANCE CRITERIA

The product will be deemed acceptable if:

- a. All the aspects of the requirements specified are fulfilled.
- b. The product is delivered within the stipulated time period.

2. PROJECT PLAN

2.1 LIFE-CYCLE MODEL

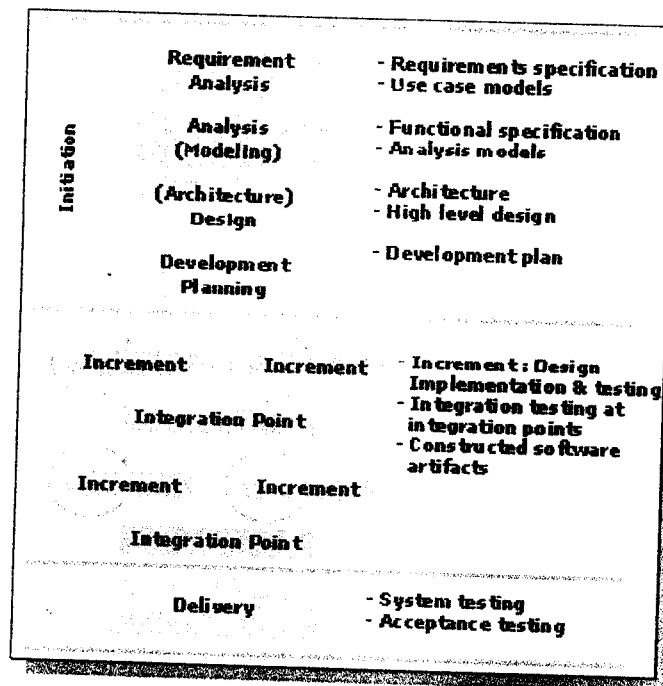
The software life cycle encompasses all activities required to define, develop, test, deliver, operate and maintain a software product. Life cycle model used here is “Phased Life-Cycle Model”.

The phased model segments the software life cycle into a series of successive activities. Each phase requires well-defined input information, utilizes well-defined processes and results in well-defined products. Resources are required to complete the process in each phase, and each phase is accomplished through the application of explicit methods, tools and techniques.

The major phases of project lifecycle are described in the following table

Phase	Description
Requirement Analysis	<ul style="list-style-type: none">➤ Gather details of requirements from the clients.➤ Finalize the User Interface and Flows.
Analysis & Design	<ul style="list-style-type: none">➤ Prepare an Analysis model, comprising of Structural and Dynamic Models of the system.➤ Prepare a Design model, converting from Analysis model.
Implementation	Coding
Testing	Testing the system
Deployment	Deploy the system at Client site.

Following diagram shows the process model with all the phases.



A. Requirement Analysis

A.1. Purpose

The purpose of this phase is to collect and records requirements. It includes use case diagrams as per the UML.

A.2. Activities

During this phase, the following information is collected and recorded.

- Functional Requirements
- Operations constraints
- Nature of changes that is likely to occur
- User wish-list that may require future consideration

Requirements are collected through interviews.

A.3. Deliverables

- Use case model, consisting of a set of use case diagrams.
- Requirements document listing operational constraints, nature of changes likely to occur, user wish-list.

B. Analysis and Design

B.1. Purpose

The purpose of this phase is to analyze the requirements and identify analysis models and functional specification. These models help in understanding the requirements.

B.2. Activities

During this phase, the collected requirements will be analyzed to identify the following.

- Core domain classes and static associations between these classes.
- Sequence diagrams to narrate core use cases.
- State diagram
- Activity diagram

B.3. Deliverables

Analysis models and functional specification documents.

C. Architecture Design

C.1. Purpose

The purpose of this phase is to design a structure for the software that includes the various subsystems, and their interrelationships.

C.2. Activities

The typical activities to be conducted during this phase include,

- Decompose use cases into abstract services.
- Identify subsystems or components to provide the above services.
- Identify infrastructure subsystems or components.
- Conduct a technical risk analysis to identify the technical unknowns and assumptions

C.3. Deliverables

- Realize all the identified use cases.
- Allow scope for changes to requirements.
- Pose constraints against changes that violate the architecture.

D. Development planning

D.1. Purpose

The purpose of this phase is to plan for iterative and incremental development of the software.

D.2. Activities

The activities include the following

- Analyze the architecture to identify candidates for increments.
- Identify independent and infrastructure increments. Such increments create the infrastructure for the rest of the software.
- Identify integration points. This is based on the dependencies.
- Decide milestones, and teaming. This is driven by the technical requirements and size of each increment.

D.3. Deliverables

- Detailed project schedule with activities, teaming, milestones for various increments and integration points.
- Integration test planning.

E. Implementation and Testing

E.1. Purpose

- To construct the increments
- To perform integrations and integration testing at the integration point

E.2. Activities

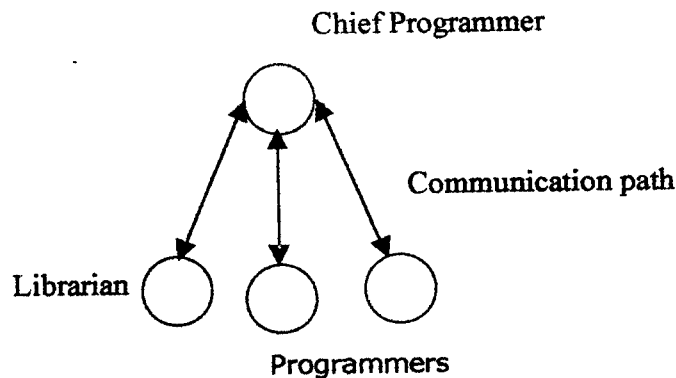
- Detail Design
- Implementation
- Preparation of unit test cases
- Unit testing

E.3. Deliverables

Constructed and tested components

2.2. TEAM STRUCTURE

Programming team structure followed in this product development is “Chief Programmer teams”. In this team there are 4 members, out of which there is 1 chief programmer, 1 Librarian and 2 programmers. The team structure is shown below



TEAM STRUCTURE

Team Member	Role
Chief Programmer	Designs the product, implements critical parts of the product and makes all major technical decisions.
Librarian	Maintains program listings, design documents, test plans and all the documents that are prepared regarding the project in a central location.
Programmer	Write codes, debug, document and unit test it.

2.3. PROGRAMMING LANGUAGES AND DEVELOPMENT TOOLS

Programming languages	– ASP, HTML, JAVA SCRIPT
Web Server	– IIS 5.0
Data base	– MS-SQL SERVER
Development environment	– VISUAL INTERDEV
Multimedia Tools	– JASC PHOTO SHOP PRO

a. Programming languages

i. ASP - Active Server Page

Microsoft Active Server Page (ASP) is a server-side scripting environment in which you can combine HTML pages, scripts and ActiveX server components together in order to create and run dynamic, interactive, high-performance web server applications.

It offers the following

1. **Browser independence.** ASP can run complex page building logic on the server and send only results to the client.

2. **Platform independent - Operating system incompatibilities** no longer are an issue. Whether you use Windows, Macintosh, UNIX, or even DOS, you can use the applications just like everyone else.

3. **Database constructed pages** that allow viewing, updating and additions to server databases

4. **Easy to use components** running on the server (not the client). Build in third party components that require no browser scripting ability. Yet accomplish complex tasks that are difficult with browser scripting.

5. **Display different web pages**, depending on the capability of a user's browser

6. **Increased performance** - The applications run on powerful server farms which allow for faster, more efficient computing.

7. **Remote accessibility** - You can access the applications from any location in the world with simply an internet connection and a standard web browser.

8. **Save money on hardware** - Because the applications are on run on server farms, your hardware needs are unimportant. There is no need to be concerned about RAM, disk space, or increasing CPU speed.

ii. HTML - hyper text markup language

A markup language derived from the Standard Generalized Markup Language (SGML). Used to create a text document with formatting specifications that tells a software browser how to display the page or pages included in the document. All HTML document is a plain ASCII text file created using the text editor with codes inserted in the text to define elements in the documents.

This markup language is used to design the web pages.

iii. JAVA SCRIPT

JavaScript is a scripting language developed by Netscape. The JavaScript enabled browser like Netscape Navigator or the Microsoft Internet Explorer is required to run scripts in JavaScript. JavaScript is an object oriented language designed primarily for authors constructing HTML documents. Scripts added to HTML documents can perform a wide variety of functions, including making decisions and accessing data based on user entries, adding interactive elements-such as radio buttons-to a web page and performing complex mathematical calculations.

Java script is used for client-side validation and for creating window on-demand.

b. Web Server

IIS - Internet Information Server

Microsoft Internet Information Server is a network file and application server included with the Microsoft Windows NT Server operating system. It is a software services that support Web site creation, configuration, and management, along with other Internet functions. Internet Information Servers include Network News Transfer Protocol (NNTP), File Transfer Protocol (FTP), and Simple Mail Transfer Protocol (SMTP).

Microsoft Windows 2000 Server's built-in Web server, Internet Information Services (IIS) 5.0, makes it easy to share

documents and information across a company intranet or the Internet.

IIS 5.0, the fastest Web server for Windows 2000 Server

Some Security Features of IIS 5.0

- i. Digest Authentication
- ii. Server-Gated Cryptography
- iii. Certificate Storage

Some Administration features

- i. Restarting IIS Restarts your Internet services without requiring you to restart your computer.
- ii. Process Accounting Reports how Web sites use CPU resources on the server.
- iii. Process Throttling Limits the percentage of time the CPU spends processing out-of-process scripts
- iv. Improved Custom Error Messages Allow you to send informative messages to clients when HTTP errors occur on their Web sites.

IIS 5.0 natively supports scripts in ASP pages written in both VBScript and Jscript. Also existing ASP applications can be easily ported to IIS 5.0.

IIS holds the ASP pages. It processes the ASP files and sends the HTML pages to the user's browser on-demand.

c. Data base

SQL SERVER

SQL Server is a relational database design to support applications with client/server architecture, in which the database is resident in a central computer called as server, with information shared by several users that run applications in their local computers or clients. Such architecture provides greater data integrity, since all the users are working with the same application. The client/server architecture considerably reduces the network traffic, since it returns to the user just the data requested.

d. Development tool

VISUAL INTERDEV

Visual InterDev is a web development system that provides all the tools for creating dynamic Internet and intranet Web applications. Visual InterDev provides a robust, integrated development environment to address the many capabilities of the Web. You can integrate various technologies, like ActiveX controls and Active Server Components, to create a powerful application. The integrated development environment enables you to use scripting languages like VBScript and JavaScript to create dynamic applications and Web pages.

This integrated development environment is used for building this application.

e. Multimedia Tool

JASC PHOTO SHOP PRO

Jasc Paint Shop Pro 6 contains all the tools you need for creating, editing, and retouching your images. It is powerful enough for the professional who needs to create multi-layered graphics. It also comes with animation package (Jasc Animation Shop), to create animations.

This multimedia tool is used to create button, logo, gif file and other graphics.

2.4. DOCUMENTS TO BE PREPARED

List the documents that is developed for this project are as follows

- a. System definition consisting of product definition and a project plan
- b. Software Requirement Specification
- c. Design Document
- d. Test plan
- e. Users Manual

3. SOFTWARE REQUIREMENT SPECIFICATION

3.1. Product Overview

This is a web based product developed for a software solution providing company (Macro Infotech) that enable clients to leverage in their businesses.

3.1.1. Purpose

The main purpose of this product is to

- a. Improve the interaction and relationship with the company clients.
- b. Maintain high degree of customer satisfaction
- c. Empower the company staff to honor their commitment to meet or exceed the customer specifications and requirements

3.1.2. Scope

Scope of this product is to provide service transparency through

- a. Faster Interaction (Interaction rooms, mailing system and feedbacks).
- b. Online-project status.
- c. On-line product marketing.

3.1.3. Definition and Abbreviation

1. CRM -Customer Relationship Management

CRM generally refers to a program that provides integrated functionality for marketing, sales and customer support requirements.

It is a customer focused business strategy designed to optimize profitability, revenue and customer satisfaction through the specific vision of building customer loyalty.

2. IR- Interaction Room

An online chat room, where members can make communication.

3. Mailing System - A system that allows peoples to send e-mails.

4. E-mail - Messages of any kind, sent from one person to another via computer.

- 5. **Mail-box**- Electronic box that act as a container for e-mails.
- 6. **File Attachment** – A facility in the mailing system that allows sending e-mails by attaching files with it.
- 7. **Logins** - User ID and Password are collectively called as logins
- 8. **UASM** – User Authentication Security Model

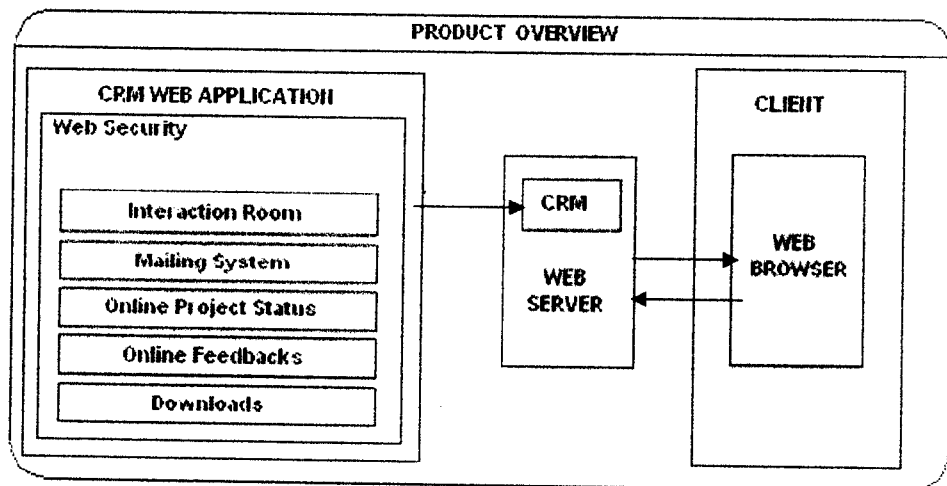
A security system that provides security to an object through logins

- 9. **RBSM** – Role Based Security Model

A security system that provides security to an object based on the rights a role possesses.

3.1.4. Product Overview

The product titled **CRM for Macro Infotech** leverage the Customer Relationship Management department by providing some useful features which improves the relationship with their clients.



The CRM Application begins with user login, only through which the users can get into the website for accessing various functionality. Login information (user ID and password) are provided to the clients by the company and for the guest users they have to get register through online registration.

Web security: Security to this product is provided by UASM and RASM, where RASM is managed by the administrator. With RBSM, security is managed at a level that corresponds closely to the organizations structure. In this security model access decisions are

based on the roles that individual users is assigned and where each role is confined with some privileges. Web Security is handled by administrator. Administrator is one of the users, who have the full control of the product with every privilege and coordinate things for better functionality of the application. Once the application is setup and all the templates are made, administrator can manage the product through the provided interface.

Interaction Room: Through this component patrons (client and client associate) can communicate online with the macro associates. There by patrons get training, clarifications and also some valuable information. Guest users can also make some enquires through this component. Through this CRM component users can make textual interaction, save interaction and exchange files.

Mailing System: Mailing system enables the company associates to send e-mails to the clients by which they can make communication quick and efficient. This component provides Mail composer with file attachments,

Mail-box (that includes inbox and outbox) and Mail review options (that contains Date-wise and user-wise mail reviews).

Online project status: Through this component clients can get status of their project from the company. The status information of the project varies upon the type of the project they assigned. This project status is provided to the clients periodically.

Online Feedbacks: Through this component clients can provide their feedbacks about the company's service. Feedback contains comments and suggestions. Online feedback includes client's feedback and product feedback.

Downloads: Downloads includes two sections as Product downloads and on-demand downloads. Product downloads contains company demo products that can be downloaded and used by any CRM users.

On-demand downloads contains files that client request for, thus provided on-demand to the clients.

3.2. Development Environments

Product development environment is provided by the hardware and software specification that are used to develop this product.

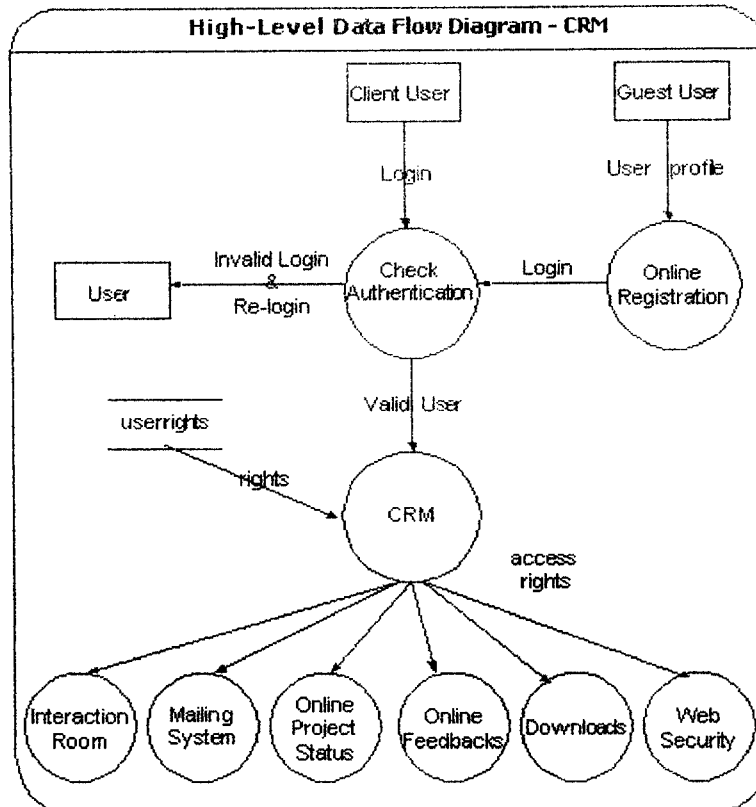
3.2.1. Hardware Specification

- a. Processor – Pentium IV
- b. Speed – 1.2 GHZ
- c. Main Memory – 128 MB RAM
- d. Cache – 512 KB
- e. Monitor – 14 “/ Color
- f. Keyboard – 104 keys / Standard
- g. Mouse – Three button scroll mouse
- h. Modem – 256 KBPS

3.2.2. Software Specification

- a. Programming languages – ASP, HTML, JAVA SCRIPT
- b. Web Server – IIS 5.0
- c. Data base – MS-SQL SERVER
- d. Development environment – VISUAL INTERDEV
- e. Multimedia Tools – JASC PHOTO SHOP PRO
- f. Internet connection package

3.3. High-level data flow diagrams



3.4. Logical data dictionary

The data dictionary provided below is for the high-level data flow diagram

Item	Name	Purpose	Derived From	Sub Items
1.	Login	To get into the CRM web site	Site Authentication	User ID, Password
2.	Re-login	To given an alert message to the user when an incorrect login information is given.	Site Authentication	Nil
3.	User profile	For guest user registration	User registration	Name, Address, user ID, Password, etc.,
4.	Rights	Privilege, for a particular CRM operation	Web security	Access number, Role ID

3.5.Functional specifications

3.5.1. Functional Requirement 1 : User registration and Logins

The initial requirement of this product is to allow the users to login in to the web site, for which user authentication (login information) is to be stored in the database. Client's authentication is to be provided by the company and for the guest users, they have to get register online. After the user registration privileges are to be assigned to the users. Client profiles are also to be entered in this process.

3.5.2. Functional Requirement 2 : Role based deliverables

This product is delivered to the users according to the role a user holds. Where each role possesses a set of privileges. So every user operations are to monitor against the user privilege.

3.5.3. Functional Requirement 3 : Database Updation

Database updation is also an important requirement. As it is a web-based product there is a possibility of concurrent user operations which lead to database inconsistency. So proper database lock are to be provided while the values are updated in the database.

3.6. Performance Specifications

Various performance requirements addressed here as follows,

- a. The product should be able to handle at a minimum of 30 concurrent users.
- b. Window creation on user actions can take a maximum of 30 seconds on a 56kbps modem speed.
- c. The product should be able to handle 20 simultaneous database updations.
- d. Multiple mail delivery should be possible.
- e. Page expire should be of maximum limit in order to make use of cached pages. There by the response time decreases.
- f. No two user logins are allowed from the same machine.

3.7. Exception Handling

Exception handling, including the actions to be taken and the messages to be displayed in response to undesired situations or events.

Exception conditions	Appropriate displays
Violation of User privileges	Access Denied
Incorrect Authentication	Invalid Authentication, Please re-login.
Page access after logout	Page Expires, please login.
Temporary resource failure	Temporary loss of communication.

3.8. Acceptance criteria

The product will be deemed acceptable

- a. If all the aspects of the requirements specified are fulfilled.
- b. If the product is delivered after the stipulated time period.

3.9. Design Constraints

3.9.1. Standards Compliance

The Macro, AXEL coding standards will be followed.

3.9.2. Hardware Limitations

Pentium, Data Fax Modem, Telephone Line Connection.

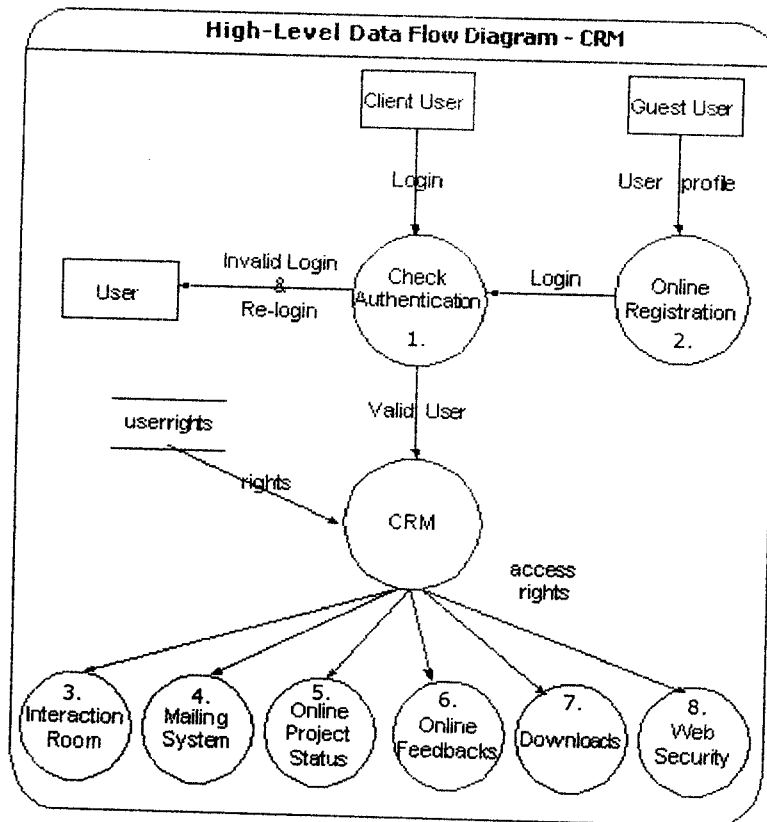
3.9.3. Software Limitations

- Interdev
- Windows 2000

4. DESIGN DOCUMENT

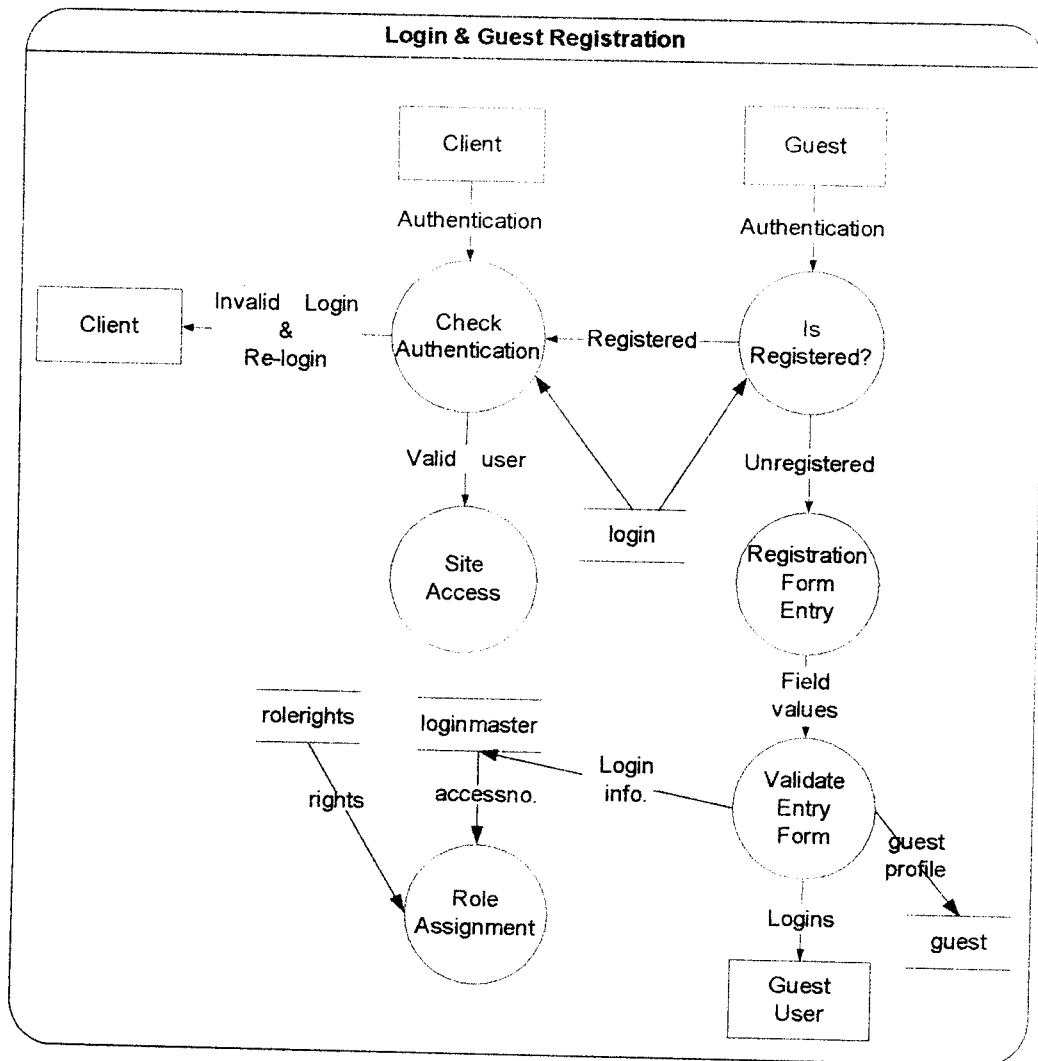
4.1. DATAFLOW DIAGRAMS

Level 0 DFD



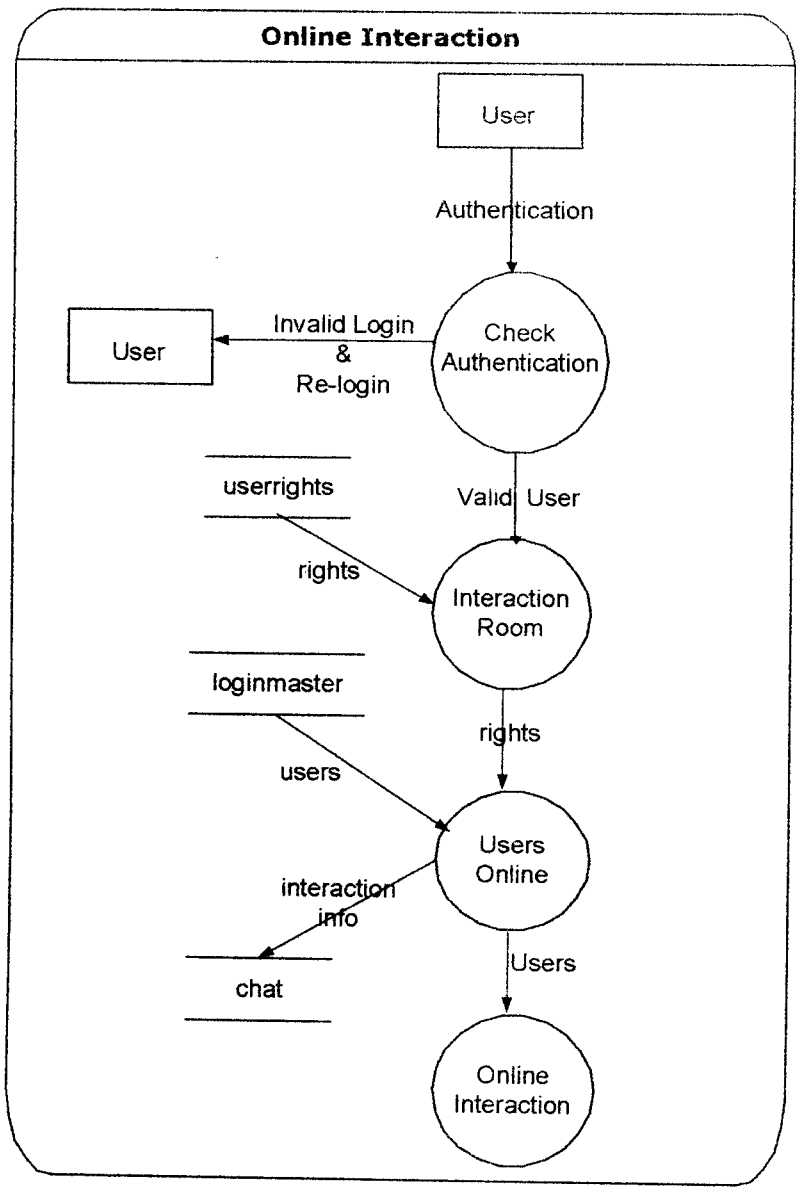
This is a level 0 Data Flow Diagram which shows you the overall structure of the data flow in the CRM application. Processes are numbered in order to refer in the preceding levels.

Level 1 DFD (1. Login & 2. Registration)



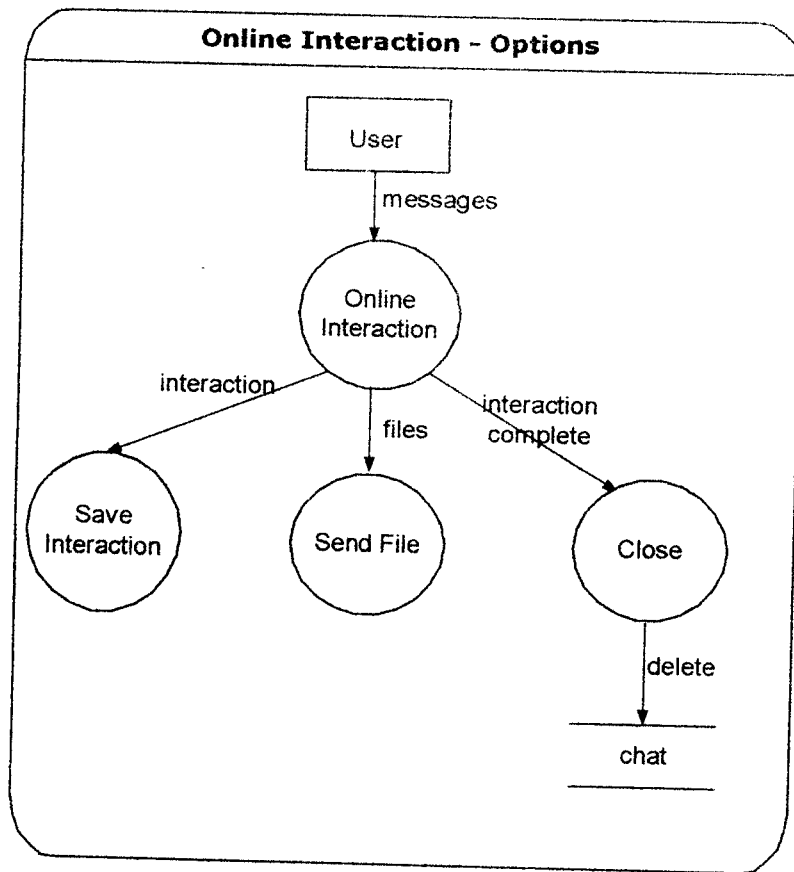
This Data Flow Diagram shows you two processes (login process and guest registration) and their interrelationship. As guest users are not provided with the authentication by the administrator they have to register through this registration process.

Level 1 DFD (3. Online Interaction)



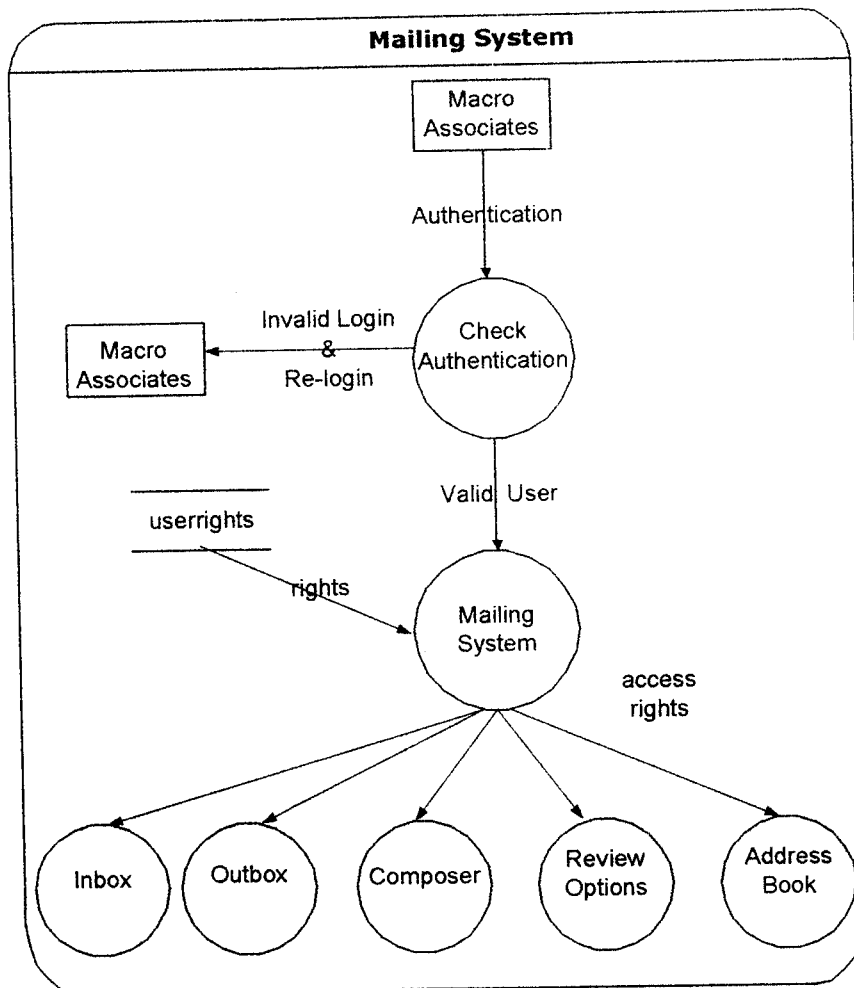
This Data Flow Diagram shows you interaction process. In order get access this process the users have to first login. Once the users are logged in to the application, they are marked as online users in the database which are exposed to other users. In the interaction process the users select other online users for interaction.

Level 2 DFD (3. Online Interaction - Options)



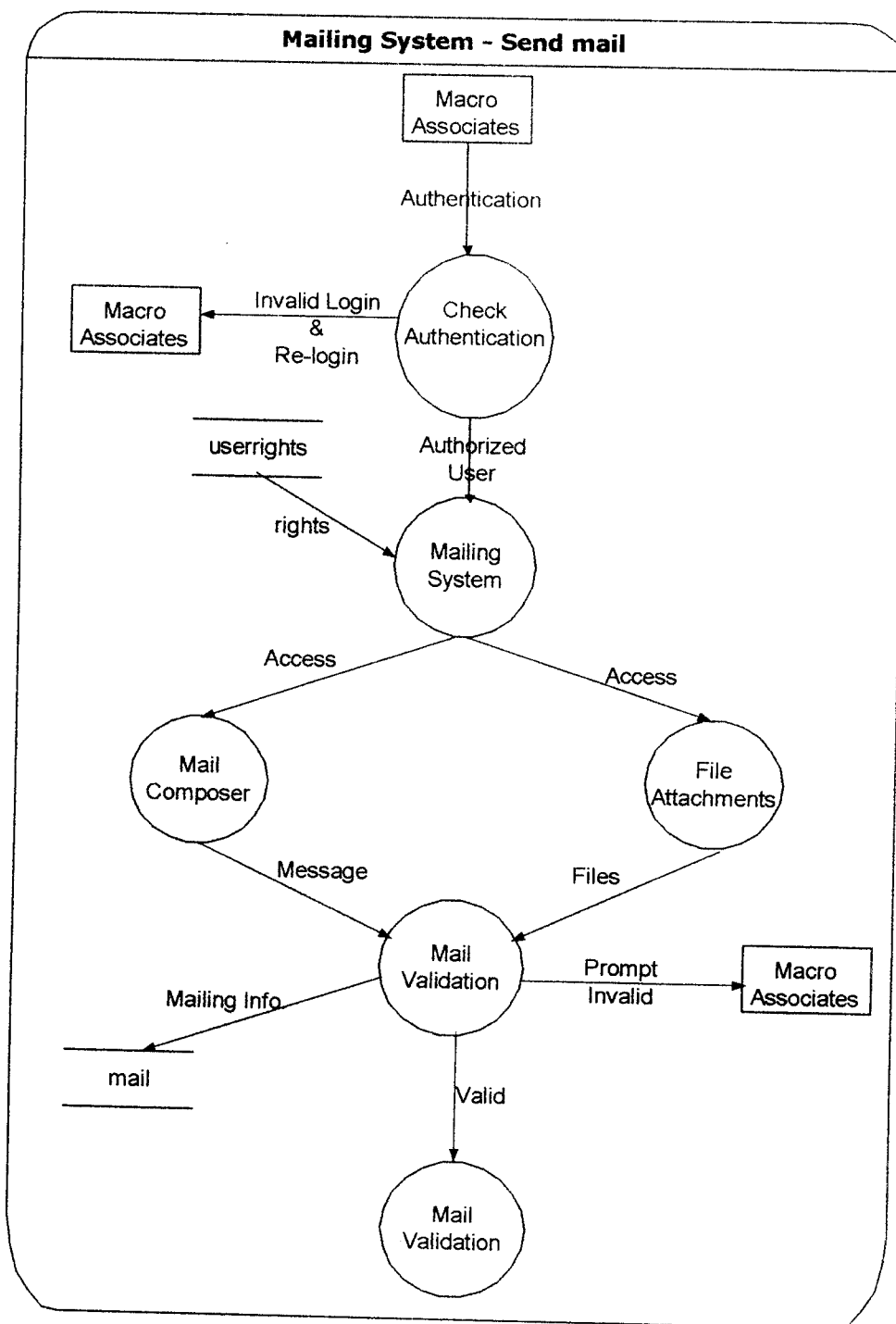
This Data Flow Diagram shows you the various operations in the interaction process. At the time of interaction textual data are stored in the database. Once the user closes the interaction window the corresponding data stored in the database are deleted.

Level 1 DFD (4. Mailing System)



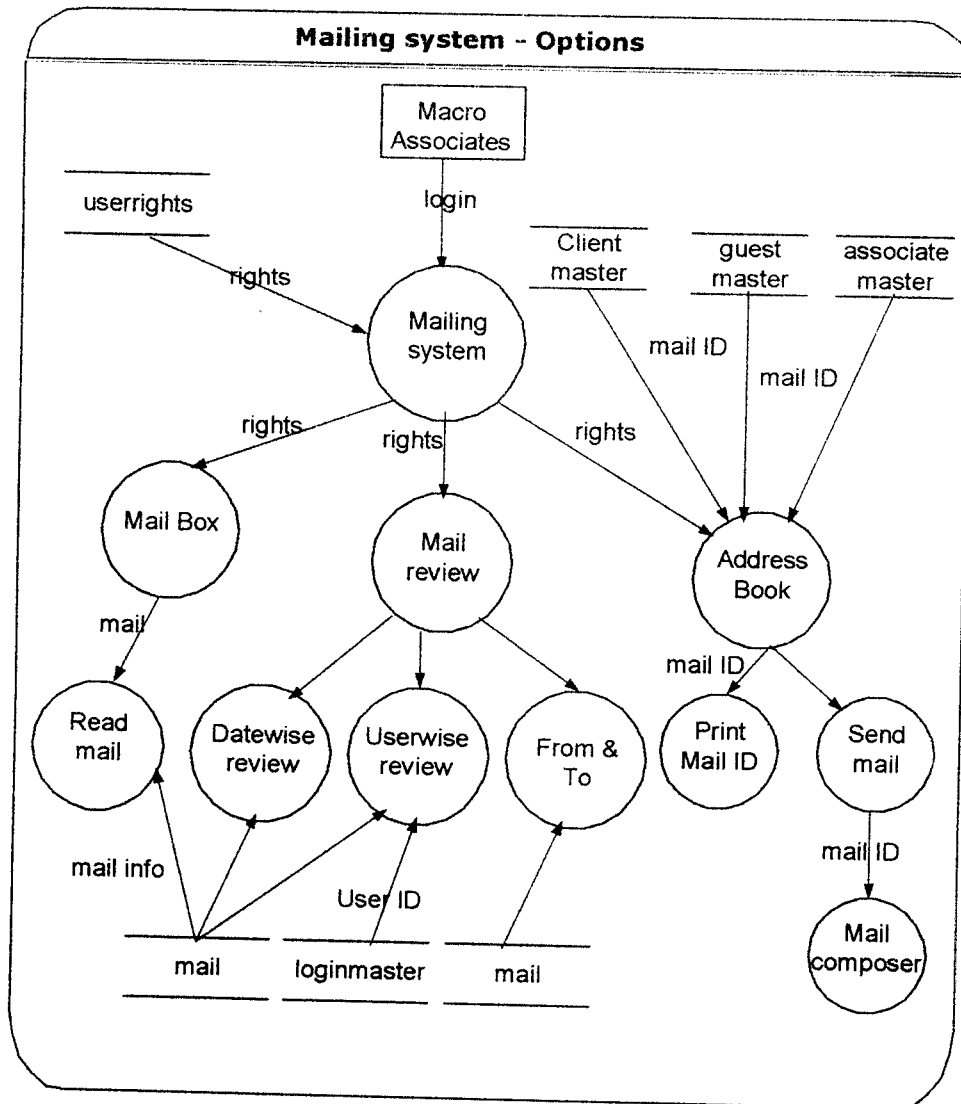
This Data Flow Diagram shows you the various operations in the mail module. To get access these operations the user has to login to the application. Once the user logged in to the web application the options are visible to the user according to the rights they possess.

Level 2 DFD (4. Mailing System – Send mail)



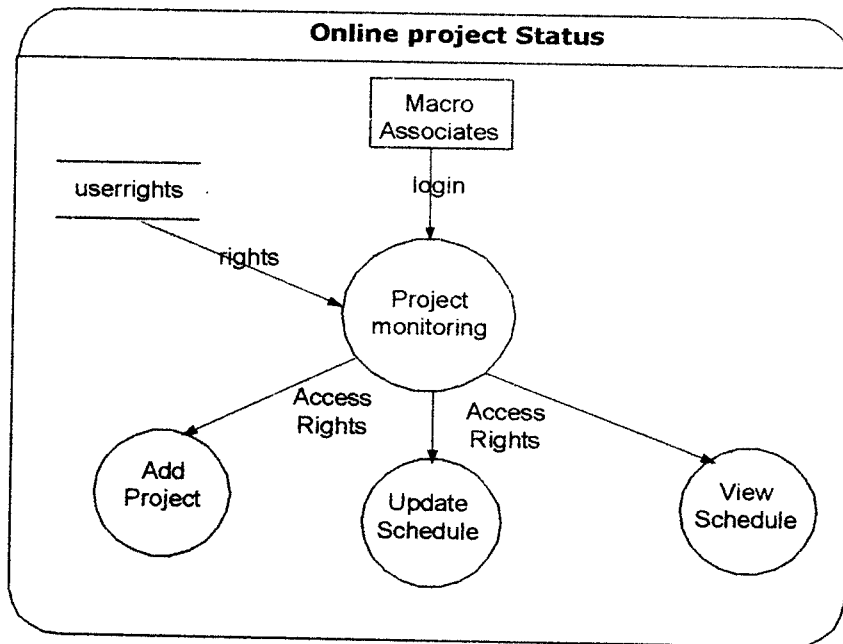
This Data Flow Diagram shows you how the mails are sent and where these informations are stored in the database.

Level 2 DFD (4. Mailing System – Options)



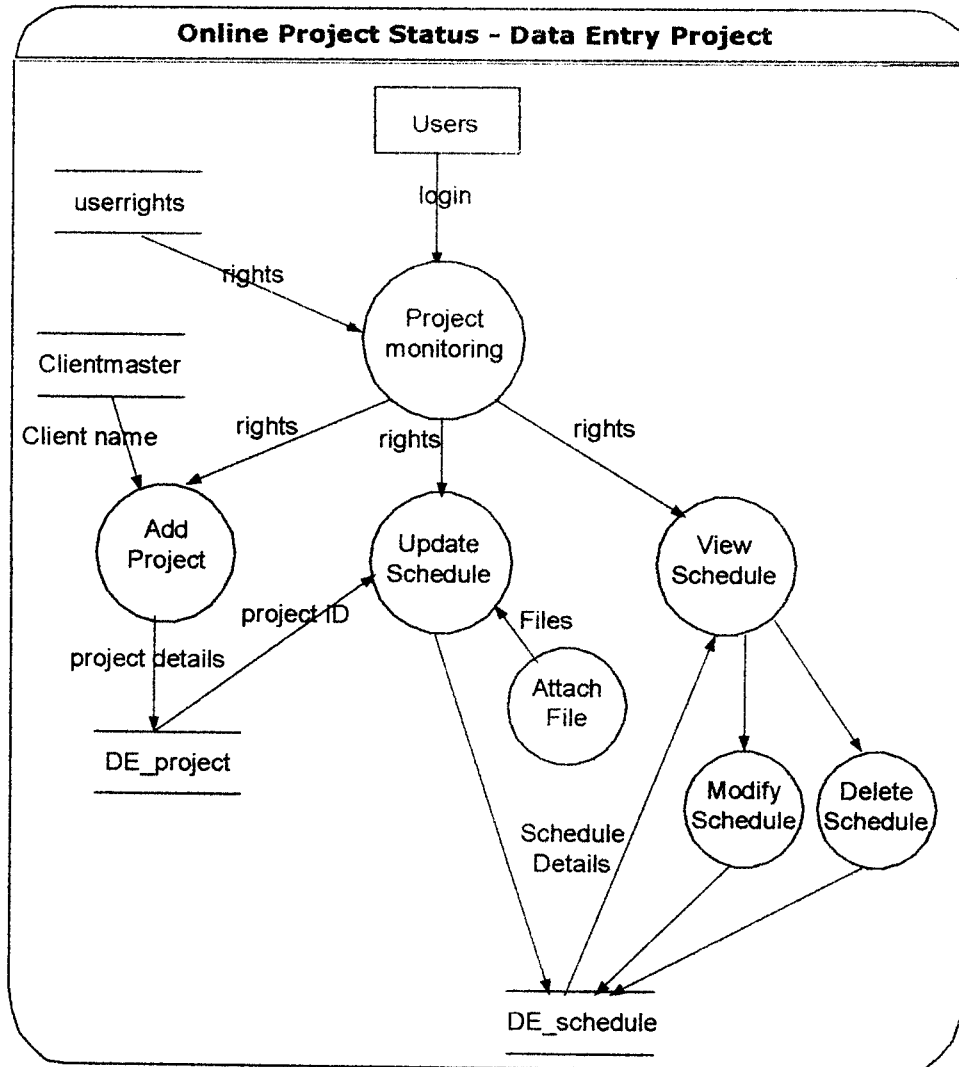
This Data Flow Diagram shows you how the data flow in the various operations of the mail module. Mail Box process in the above diagram contains both inbox and outbox. Mail review process displays the mail content from the database that is sent by the macro associates. Address book process allow the users to print the mail ID's and select the mail ID's to send mails.

Level 1 DFD (5. Online Project Status)



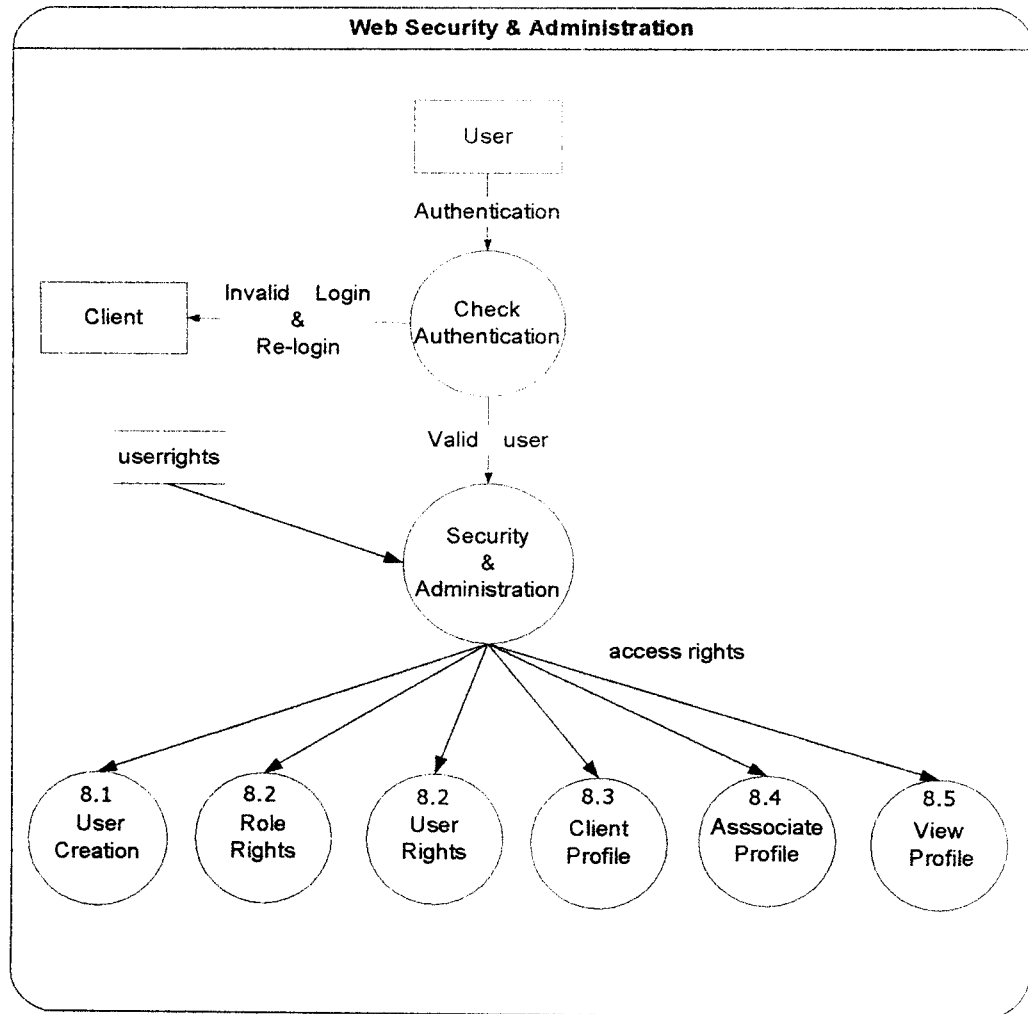
This Data Flow Diagram shows you the various processes handled in the project status module. In order to get access this process the user has to first login and should also have the access rights to use this process.

Level 2 DFD (5. Online Project Status – Data Entry Project)



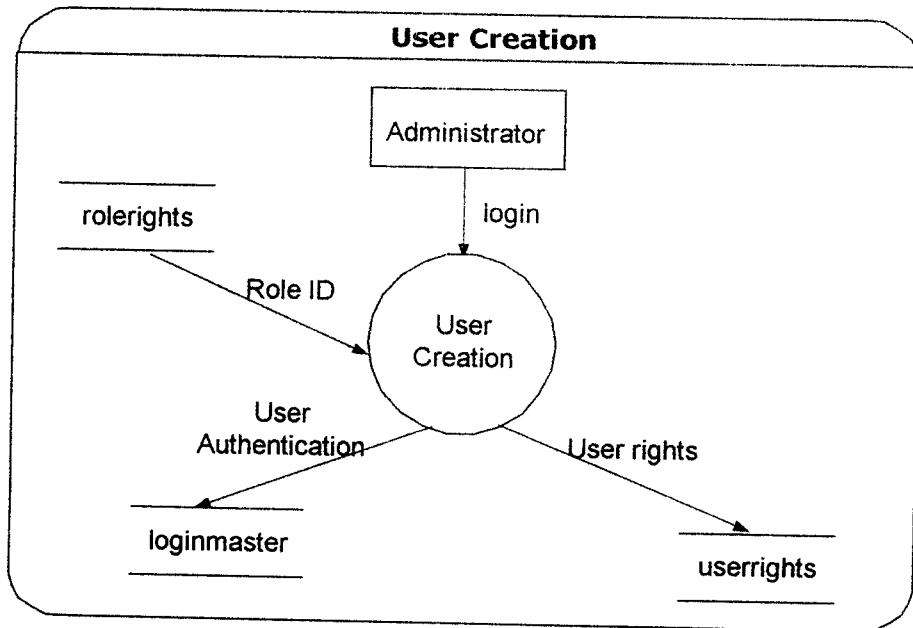
This Data Flow Diagram shows you how the data flows in the project status module. The access rights of various processes are provided by the “userrights” table, project informations are stored in the “DE_project” table and project schedules are stored in the “DE_schedule” table. Schedules are posted by the macro associates and views by the clients.

Level 1 DFD (8. Web Security)



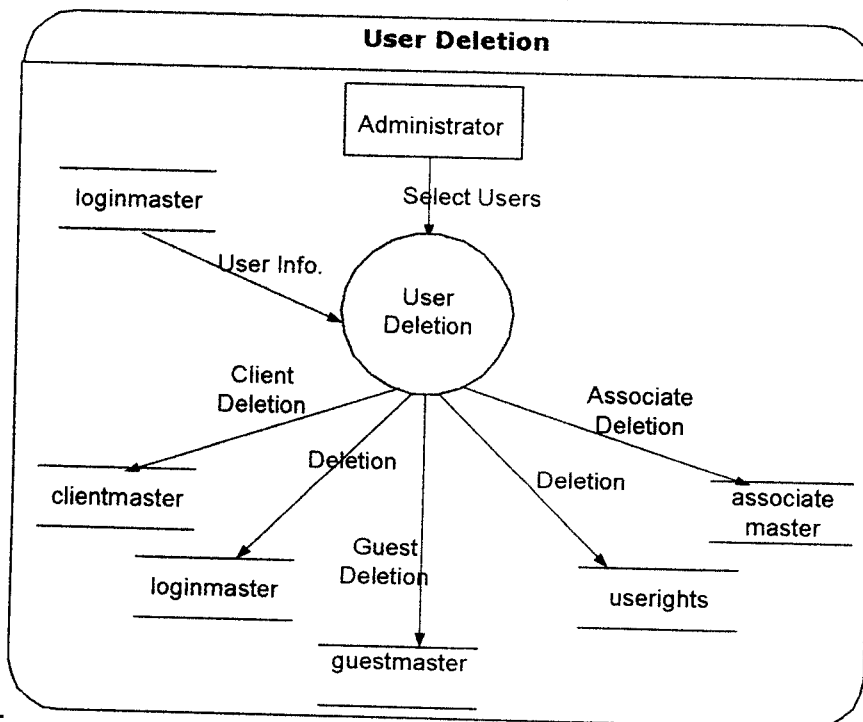
This Data Flow Diagram shows the various operations in the security and administration process. This process is handled by the administrator of this application and he/she can also delegate some of this process to other macro associates. In order to get access this process the user have to login in the application.

Level 2 DFD (8.1. User Creation)



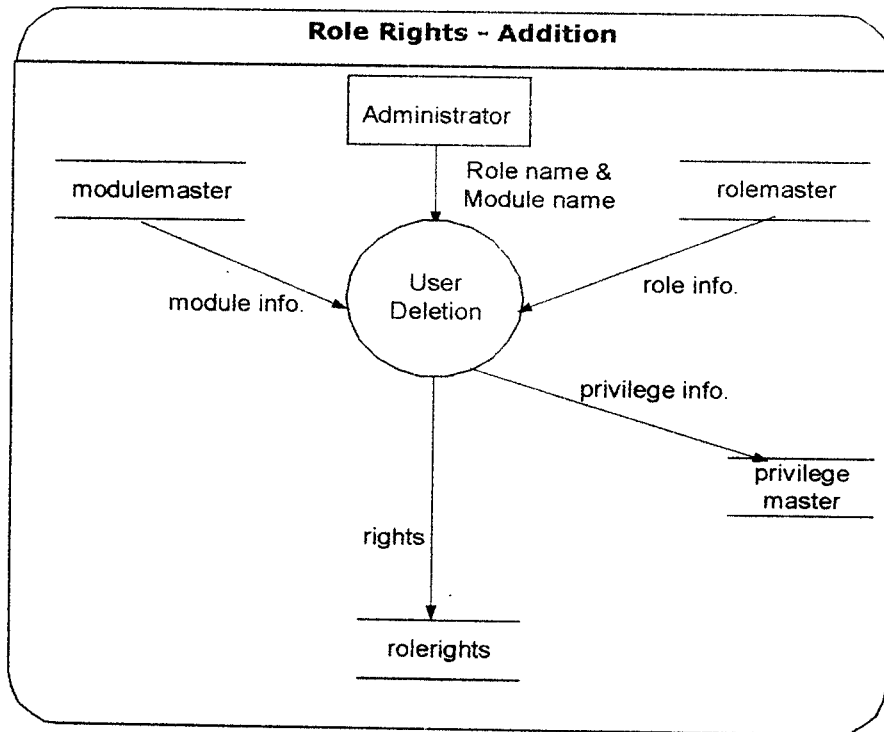
This Data Flow Diagram shows you how the user authentications and their rights are recorded in the database.

Level 2 DFD (8.1. User Creation -Deletion)



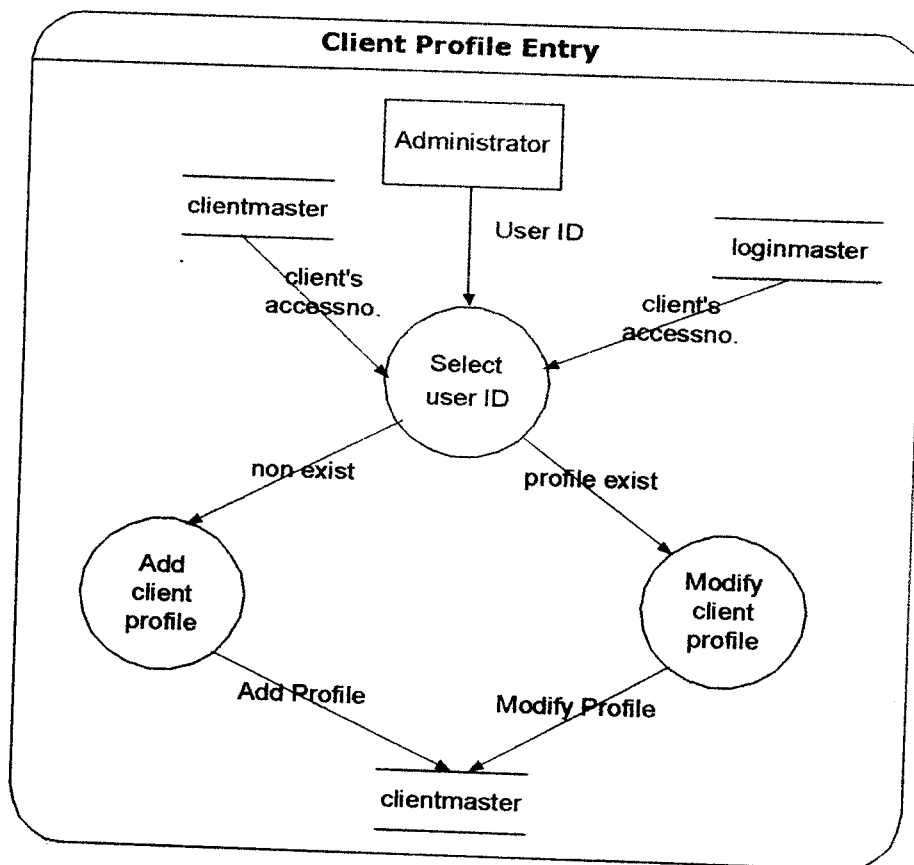
This Data Flow Diagram shows you how the user informations are deleted.

Level 2 DFD (8.2. Role Rights - Addition)



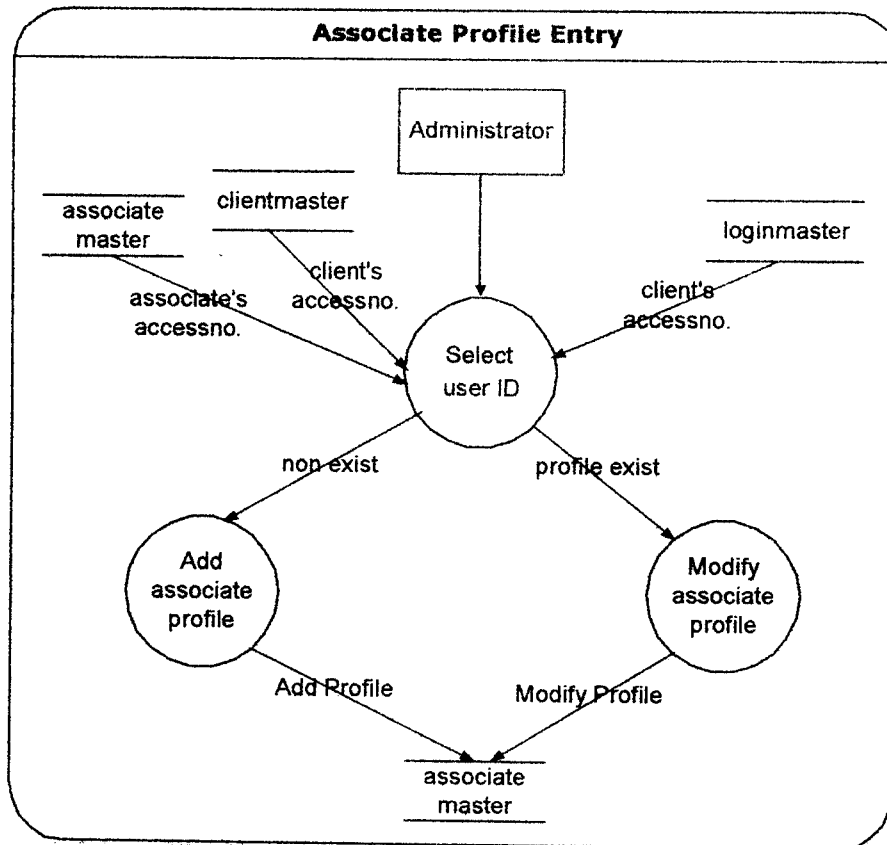
This Data Flow Diagram shows you how the rights are assigned to a role. The rights are assigned module wise to a role, which is assigned to the user at the user creation process.

Level 2 DFD (8.3. Client Profile Entry)



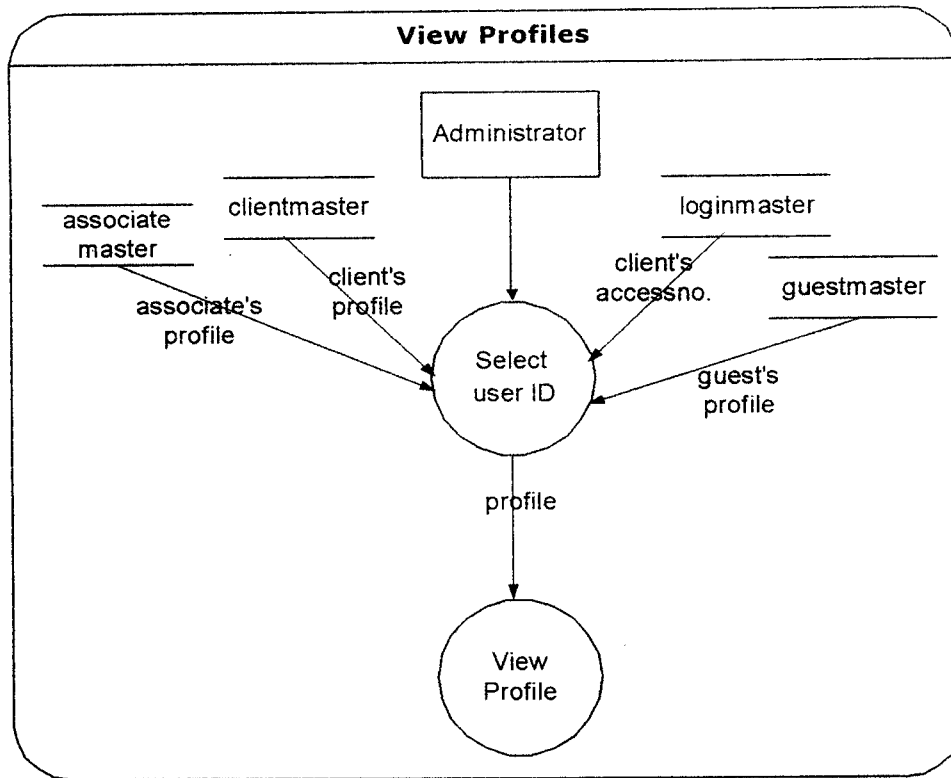
This Data Flow Diagram shows you how the client profile entry process is carried out. This includes adding profile and modifying profile. The user who carries out this process should have the access rights for execution of the above process.

Level 2 DFD (8.4. Associates Profile Entry)



This Data Flow Diagram shows you how the client's associate profile entry process is carried out. This includes adding profile and modifying profile. The user who carries out this process should have the access rights for execution of the above process.

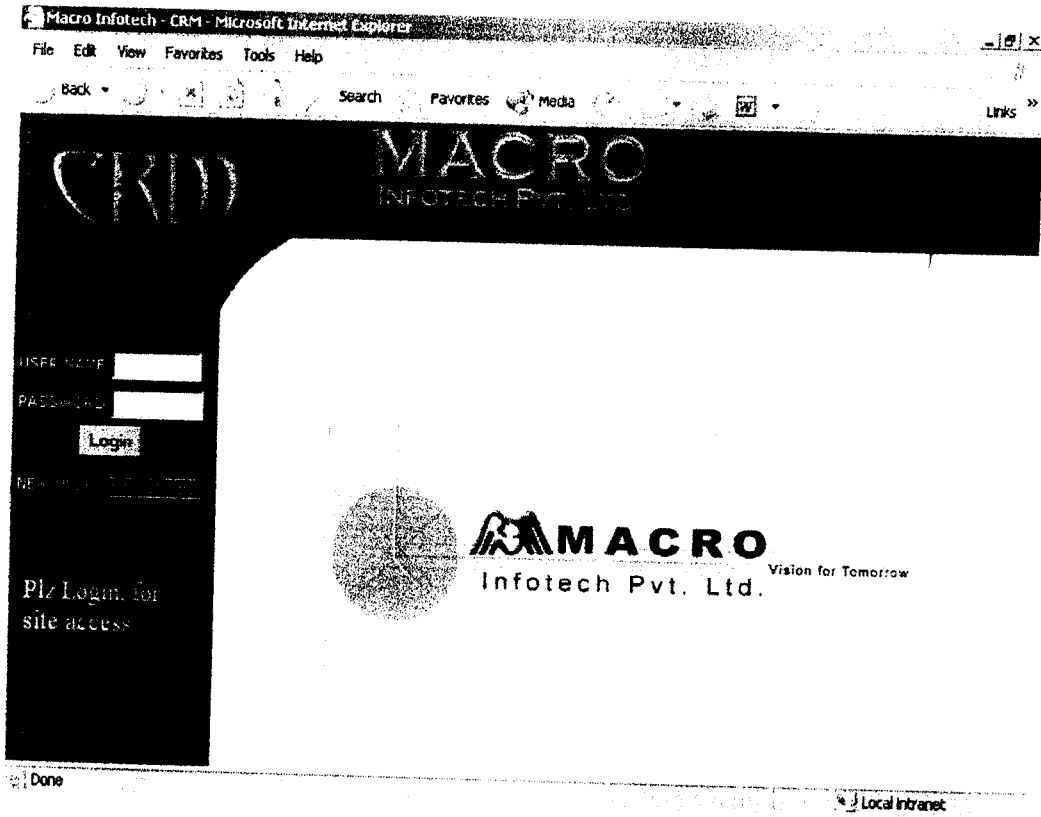
Level 2 DFD (8.5. View Profiles)



This Data Flow Diagram shows you how the profiles of every user are viewed. In this process the informations flow from various tables that holds the informations of clients, client associates and guest users.

4.2. SAMPLE SCREENS

1. Front screen



2. Guest Registration Form

Guest User Area

Registration Form

Registration Info

User ID
(#Length : Max=15 & Min=5##)

Password
(#Length : Max=10 & Min=5##)

Conform Password

Personal Info

Name

Address For Communication

Occupation

Phone Number

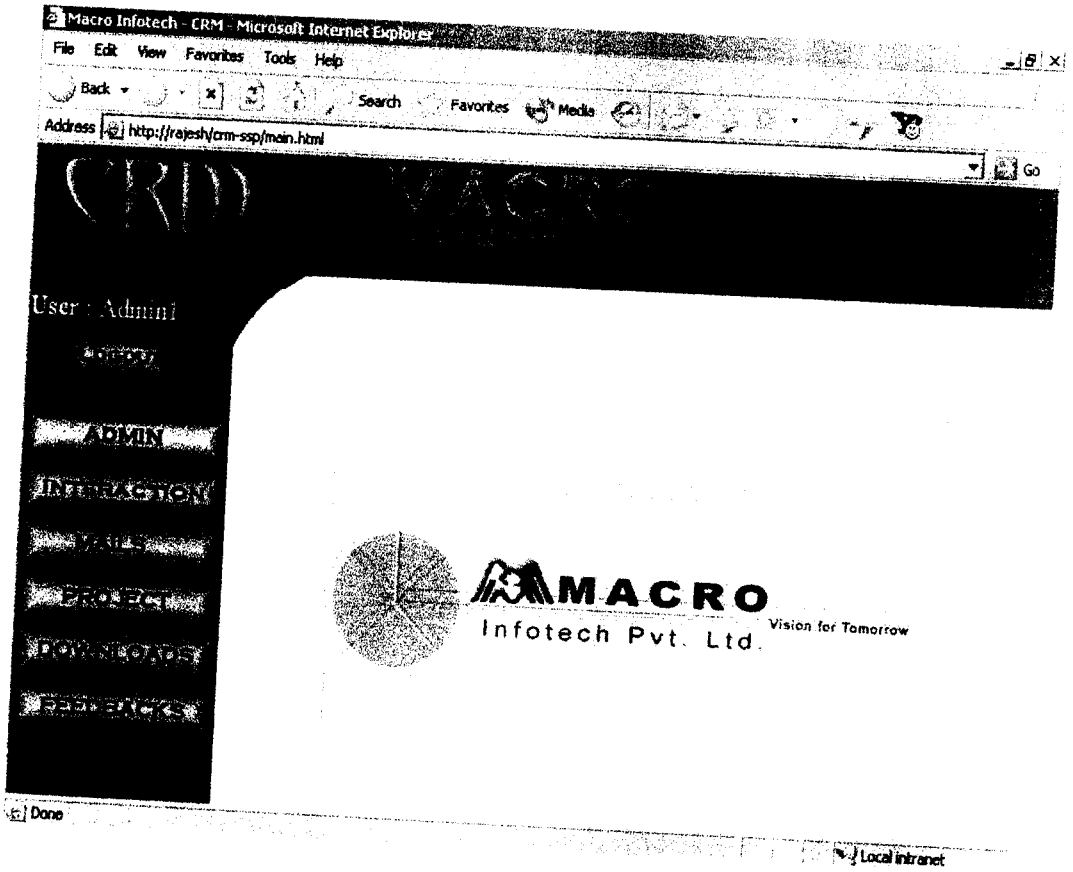
Fax Number*

Mail ID

Web Site Address*

Register

3. Link Page



4. Role Rights Page

Address: http://rajesh/crm-ssp/administration/role.asp?event=add

Role Rights | User Creation | **User Rights** | Client Profile | Associate Profile | View Profile

ROLES

Add | Delete | View

Add Rights

Role Name:

Module name: View

Role Name : Govern
Module name : Product Administration

Privilege ID	Description	ADD
100101	Role Rights Page	<input type="checkbox"/>
100102	User Creation Page	<input type="checkbox"/>
100103	User Rights Page	<input type="checkbox"/>
100104	User Search Page	<input type="checkbox"/>
100105	Associate Profile Page	<input type="checkbox"/>
100106	View Profile Page	<input type="checkbox"/>

Done Local Intranet

5. User Creation page

http://rajesh/crm-ssp/administration/user.asp?event=user

File Edit View Favorites Tools Help

Back Search Favorites Media

Address http://rajesh/crm-ssp/administration/user.asp?event=user Go Links

Role Rights **User Creation** User Rights Client Profile Associate Profile View Profile

USER

Create Delete Modify View

Create User

User Group Client Role Vital

User ID Client7

Password client7

Create User

Done Local intranet

6. User Rights page

http://rajesh/crm-ssp/administration/privilege

File Edit View Favorites Tools Help

Back Search Favorites Media

Address http://rajesh/crm-ssp/administration/privilege.asp?event=modulerrights Go Links

Role Rights User Creation User Rights Client Profile Associate Profile View Profile

PRIVILEGE

Add Deleta View

Privilege

Add Privileges

User ID

Module name View

Module-Wise User Rights

Module name : Interaction Room
User ID : Client1

Privilege ID	Description	Add
100201	Client Interaction	<input type="checkbox"/>
100202	Guest Interaction	<input type="checkbox"/>
100203	Macro Staff Interaction	<input checked="" type="checkbox"/>

Done Local Intranet

7. Interaction Room Page

The screenshot shows a Microsoft Internet Explorer browser window displaying the Macro Infotech CRM system. The address bar shows the URL <http://rajesh/crm-ssp/main.html>. The page title is "Macro Infotech - CRM - Microsoft Internet Explorer".

The main content area is titled "Interaction Room" and displays three tables of online users:

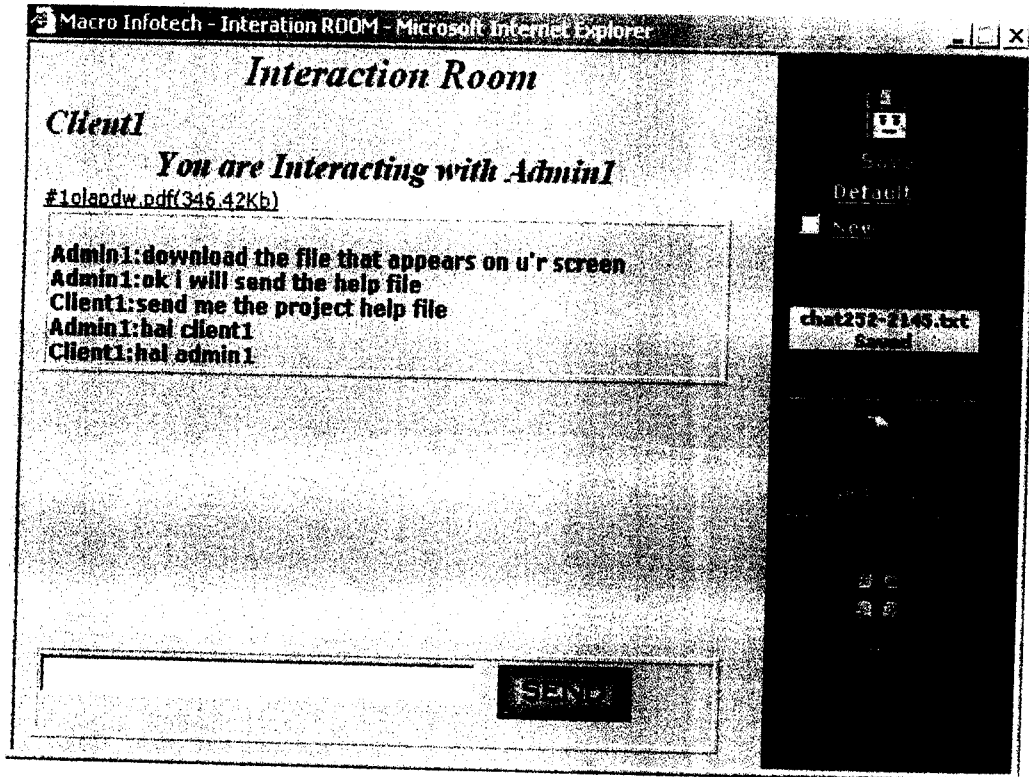
On Line Users	On Line Users	On Line Users
Macro	Client	Guest
Staff1	Client1	Guest2
		Guest7

The left navigation menu includes the following items:

- User: Admin1
- HOME
- ABOUT
- INTERACTION
- MAIL
- PROJECT
- DOWNLOADS
- FEEDBACKS

The status bar at the bottom shows the current URL as http://rajesh/crm-ssp/interaction_room/online_users.asp and indicates a "Local Intranet" connection.

8. Interaction Window



9. Mailing System – Front Page

Macro Infotech - CRM - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites Media Go

Address http://rajesh/crm-ssp/main.html

CRM MACRO

User: Admin

ADMIN

INTERACTION

MAILS

PROJECT

DOWNLOADS

SERVICES

Macro Mail

Macro Mail	
Inbox	0
Composer	
Outbox	7
Options	
Address Book	

http://rajesh/crm-ssp/mailling_system/m_front.asp Local intranet

10. Mail Composer Page

The screenshot shows a web browser window with the address bar displaying `http://rajesh/crm-ssp/mailling_system/m_composer.asp`. The browser's menu bar includes File, Edit, View, Favorites, Tools, and Help. The address bar also contains search, favorites, and media icons. The main content area features a dark header with the text "Macro Mail" and a navigation bar with buttons for INBOX, OUTBOX, COMPOSER, OPTIONS, and ADDRESS BOOK. Below the navigation bar, the word "COMPOSER" is prominently displayed. The form includes fields for "To", "Bcc", and "Subject", each with a corresponding text input area. To the right of the "Bcc" field is a button labeled "Add Mail ID's". Below these fields is an "Attachments" section with a button labeled "Add/Edit" and a small icon. At the bottom of the form is a large text area labeled "Mail Content".

11. Online project Status

DE Project - Schedule Details	
Send mails regarding the posted message along with the Schedule ID	
Schedule ID	sch1002
Posted Date	2/24/2003
Subject	Schedule23
Schedule Received	Schedules received from 1. Alsur 150 records 2. coxtown 200 records
Work Completed	Records completed 1. Danaswadi 120 records
Work Remaining	Work Remaining 1. Magadi 100 records 2. Alsur 150 records 3. coxtown 200 records
Remarks	Alsur records are not clear
Downloads	#1)airdeme.ppt..(583Kb) #2)db-crmsa.mdb..(492Kb)
Send mails regarding the posted message along with the Schedule ID	
<input type="button" value="BACK"/>	
<input type="button" value="Submit"/>	

12. Client Downloads

Macro Infotech - CRM - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites Media Go

Address http://rajesh/crm-ssp/main.html

CRD MACRO INFOTECH PVT. LTD.

User : Admin

CLIENT DOWNLOADS

Date	Description	File Name	Size	Type
10/2/2003	Patch File to add new schemes In Margin Money Scheme(MMS)	AS-MMS	4MB	reg
20/2/2003	Enhanced tutorial for Scheme Monitoring System	SMS-HELP	3.4MB	pdf
2/3/2003	Time Sheet Updater from treeware.com	time.1245sheet	2 MB	exe

Done Local intranet

13. Product Feedback Form

Macro Infotech - CRM - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites Media Go

Address http://rajesh/crm-ssp/main.html

CRD **MACRO**
INFOTECH

User : Admin1

Logout

Admin

Interaction

Mails

Project

Downloads

Feedbacks

PRODUCT FEEDBACK

User ID

Product Name

User Friendly Excellent Moderate

Your Benefits

Drawbacks

Estimated Cost(Rs.) 0.00

Have you used any other MACRO Products? If so

Product Name

Number of Past downloads

http://rajesh/crm-ssp/productfb.html Local intranet

5. IMPLEMENTATION

The implementation phase of this software development is concerned with translating design specifications into source code. The primary goal of implementation is to write source code and internal document so that conformance of the code to its specifications can be easily verified, and so that debugging, testing, and modification are eased. This goal is achieved by making the source code as clear and straightforward as possible.

5.1. Coding technique

Coding technique used in this project is “**Structured Coding Technique**”. This technique enhances the clarity of the source code. The main goal of the structured coding is to linearize control flow so that the execution sequence follows the sequence in which the code is written. The dynamic structure of a program as it executes then resembles the static structure of the written text. This enhances readability of code, which eases understanding, debugging, testing, documentation and modification of programs.

5.2. Module wise specification

Module wise specification briefs about the components, objects, controls and techniques used in the implementation of this CRM application.

a. Interaction module

Interaction module deals with three main operations, they are

i. Textual interaction

In order to carry out the textual interaction “**Application Object**” is used. This is a built-in ASP object which is used for sharing the information among the users of an application. Interactions among the users are private, so the each couple of users who involve in the interaction hold an Application Object where they put their textual message.

ii. File transfer

In order to carry out the file transfer operation a special component “**ASPUploadComponent**” is used. This is an upload component created by Macro Infotech itself. Through this component file transfer is carried out easily.

iii. Save interaction

In order to carry out the save interaction operation a Microsoft component “**CommonDialog**” is used. Through this component location to save the interaction can be specified.

b. Mail module

In order to send the mails a standard mail component for Windows NT platform “**CDONTS**” is used. CDONTS stands for **Collaboration Data Objects for NTS Components** which is a server object that facilitate to send the mails easily. It provides the various mail options such as

- Mail attachments
- Multiple recipients
- Carbon copy, Blank Carbon copy

For the file attachments “**ASPUploadComponent**” is used.

For the data wise mail review Microsoft “**Calendar Control**” is used. Through this control dates can be selected for the date wise review.

c. Online project status module

In this module project status is shown to the clients. A Microsoft component “**Office Web Component**” is used to show a graphical chart for the percentage of project completion in the software project development division. For posting files regarding the project status “**ASPUploadComponent**” is used.

d. Web security module

In this module web site security is carried using **Role-Based Access Control (RBAC)** technique. **RBAC** appears to be a promising method for controlling what information computer users can utilize the programs that they can run, and the modifications that they can make. With **RBAC**, access decisions are based on the roles that individual users have as part of this application.

6. TEST PLAN

Software Testing is an important element of software quality assurance and represents the ultimate review of specification, design and coding. The increasing visibility of software as a system element and the costs associated with a software failure are motivating forces for well planned, thorough testing.

6.1. UNIT TEST

Unit testing comprises the set of tests performed by an individual programmer prior to integration of the unit into a larger system. A program unit is usually small enough that the programmer who developed it can test it in great detail, and certainly in greater detail than will be possible when the unit is integrated into an evolving software product. Thus the goal of unit testing is to discover errors in the individual modules of the system.

Guest User's registration module

In this module the details of the guest user such as user ID, password and some personal information. Each of these field values are tested for validity. Such as

- a. User-id that is specified by the guest user is checked for uniqueness.
- b. Length of the user-id and password are validated against the specified condition.
- c. Values in the personal information are validated against the appropriate type.

User's Login module

This module takes the user-id and password for user authentication. The users who are registered with the site logs in to the link page from which they can navigate to every functionality. The user id and the password entered are checked for appropriate type entry in the client side and the corresponding values are checked against the database.

Interaction Room module

The user entering into this module selects the user-id by clicking on the user-id to whom they like to interact. Here in this module various testing are carried out, they are

- a. Whether the user-id displayed according to their privileges
- b. Whether windows are created and popped up correctly on both sides of the user's monitor, when a user clicks a user-id.
- c. Whether multiple interactions work properly.
- d. Whether textual interaction are displayed correctly.
- e. Whether files exchanged are transmitted properly.
- f. Whether interaction are stored in the specified location.
- g. Whether the proper database updation are carried out

Mailing module

In the mailing module macro associates are allowed to send mails. Here in this module various testing are carried out, they are

- a. Whether the mails are transmitted properly to the specified mail-id along with the attachments if any and whether those mails are displayed in the outbox
- b. Whether mails are received in the inbox.
- c. Whether the mails are reviewed properly.
- d. Whether the mails printed have complete content.
- e. Whether mail deletion operation are carried successfully.
- f. Whether the proper database updation are carried out

Online project status module

In this module the clients get their project status from the company. Here testing are carried out to check the following

- a. Whether the posted project status are appropriate.
- b. Whether the project status is personalized to the clients
- c. Whether the related files are uploaded appropriately

- d. Whether the proper database updation are carried out

Online feedbacks module

In this module the clients and guest users give their feedbacks to the company. Here testing are carried out to check the following

- a. Whether the users are restricted to enter the inappropriate feedback forms
- b. Whether the field values in the feedback form are validated.
- c. Whether the proper database updation are carried out

Downloads module

In this module the clients and guest users download various files that include document, demo software, freeware, tutorial, etc. Here testing are carried out to check the following

- a. Whether files uploaded are download properly.
- b. Whether the files size are correctly displayed.

Web security module

In this module the administrator makes security measures by allocating privileges to the users, which restricts the users to access some of the functionality on which the privilege is denied. Here testing are carried out to check the whether the user access is based upon the privileges they hold.

6.2. INTEGRATION TEST

Integration testing is a systematic technique for constructing the program structure while conducting test to uncover errors associated with interfacing. The objective is to take unit tested modules and build a program structure that has been dictated by design.

Bottom-up integration is the strategy used to integrate the components of a software system into functionality whole. The above modules tested in the unit testing are integrated and tested in this integration testing.

The Registration module takes the details of the guest user who wishes to register. Their authentication is accepted only after a check from the registered user's database. If already registered user logs into the site, their

id and password are checked against the registered user details from the database. Thus these two modules are integrated and tested.

Login module is integrated with all other module. By this integration all the module are accessible only if the user logs in to the web site. This integration process is tested in every module.

User access in every module is governed by web security module. Thus web security is integrated with all other modules. Now the user accessibility is verified with the privilege they hold in the web security.

Online Feedbacks and mailing modules are integrated as the feedbacks given by the client and guest users are reviewed by the company associates in the mailing module. This integration process is tested to perfection.

6.3. STRESS TEST

Stress test is performed to determine the limitations of the system and it is designed to determine if the system can function when subject to large volumes larger than would be normally expected. The areas that are stressed in this product includes

a. User Logins – The user login is stress tested using thrice (90 users) the number of expected users. The outcome of this test is every login is successful.

b. Multiple interactions – In the Interaction Room module, users can interact with more than one user. For each interaction an interaction window is opened on user's browser. Multiple interactions by a user involve more number of windows. This process is stress tested by interacting with 15 users simultaneously. The outcome of this test is interaction process is carried out successfully between with 15 users.

c. Send Mail – This process is stress tested by sending mails simultaneously to 50 users and the outcome of this test is mails are send successfully to 50 users.

7. USER MANUAL

S.NO.	SITE NAVIGATION	STEP NO.
1.	Registration and login	1 – 4
2.	Interaction Room	5 – 7
3.	Mailing System	8 – 13
4.	Online Project Status	14 – 16
5.	Online Feedbacks	17 – 19
6.	Download Section	20 – 22
7.	Web security and Administration	23 – 29
8.	User Logout	30

The users entering the CRM web site has to go through the following steps

Registration and login

1. For entering into the CRM web site of Macro Infotech, the user has to type www.crm.macroinfosys.com in the address bar of the browser and click <Enter>. Then the front page is displayed.
2. In the front-page the user have to login. For the clients login the company provides information and for guest user they have to get register online.
3. For guest user registration, the user has to click the Hyperlink (**Register**) in the front page. This displays a registration form that is to be filled by the guest user. The form contains registration information for user login and the personal information of the user. Once the registration is successful the guest user can login to the web site.
4. After the user login. A link page is displayed where user can see various buttons that navigate to every functionality of the CRM web site. Click on the button for further navigation.

Interaction Room

5. If the user clicks the button (**INTERACTION**) in the link page. Then the interaction room page is displayed, where user can see the other users who are currently online.

6. For the interaction with the online users, a user have to click on the user-id. Then an **Interaction Window** is popped up on the screen. It may take a maximum of 1 min to display the interaction window.

7. In the interaction window the user can do the following

Textual interaction – In order make the textual interaction, the user have to enter the text in the text box and click the **send** button. Then the user can see the text in the **Interaction box**. The user also receives the message in the same **Interaction box**. The message is headed by the user-id by which sent and receive message can be differentiated.

Exchange Files – In order to exchange files between the interacting users. The user has to click on the **send file icon**. That pops you a window, where user can browse the files and send to the other user.

Save Interaction – In order to save the interaction, click on the **save icon**. By default interaction are saved as a text in the location (“C:\MacroChat\”). If the user what to save in a new location, mark the **new checkbox** and click the new hyperlink. Then a combo appears where the user can select the new location.

Mailing System

8. If the user clicks the button (**MAILS**) in the link page. Then mail page is displayed from which you can navigate to various mail options. Various mail options are Inbox, Outbox, Composer, Review and Address Book.

9. If the user clicks the hyperlink **Inbox** in the mail page. A new window is opened where the user can view the mails he/she receive. The mails can be reviewed by clicking on the subject field of each mail.

10. If the user clicks the hyperlink **Outbox** in the mail page. A new window is opened where the mails that are sent by user are displayed. The mails can be reviewed by clicking on the subject field of each mail.

11. If the user clicks the hyperlink **Composer** in the mail page. A new window is opened where the users can compose the mails that are to be send. Here in this page the user can add mail-id by clicking the button **Add mail ID's**, that opens a window where you can select the mail-id's.

For file attachments click on the **Add/Edit** button, that opens a window where the user can browse the files and attach with the mail.

12. If the user clicks the hyperlink **Option** in the mail page. A new window is opened where the users can review the mails date and user wise.

13. If the user clicks the hyperlink **Address book** in the mail page. A new window is opened where the user can print the mail-id of clients, client associates and guest users. The user can also select the mail-id's to which he/she wishes to send mail.

Online project Status

14. If the user clicks the button (**PROJECT**) in the link page. Then project page is displayed where the user have to select project type as whether Data-Entry project or Software Development Project.

15. If the user selects the hyperlink **Data-Entry** in the project page. Then the data-entry project page is displayed from which the user can navigate to Add project, update Schedules and Schedule list pages.

16. If the user selects the hyperlink **Software development** in the project page. Then the corresponding project page is displayed. Here the user gets the status of the project.

Online Feedbacks

17. If the user clicks the button (**FEEDBACKS**) in the link page. Then feedback page is displayed where the user have to select feedback type as whether client feedback or product feedback.

18. If the user selects the hyperlink **CLIENT** in the feedback page. Then the client's feedback page is displayed.

19. If the user selects the hyperlink **PRODUCT** in the feedback page. Then the downloader's product feedback page is displayed.

Downloads

20. If the user clicks the button (**DOWNLOADS**) in the link page. Then download section page is displayed where the user has to select download type as whether client downloads or product downloads.

21. If the user selects the hyperlink **CLIENT** in the download section page. Then the client's download section page is displayed.

22. If the user selects the hyperlink **PRODUCT** in the download section page. Then the product download section page is displayed.

Web security and Administration

23. If the user clicks the button (**ADMIN**) in the link page. Then the administration page is displayed from which the user can navigate to various administration pages and they are Role Rights, User Creation, User Rights, Client Profile, Associate Profile and View Profile.

24. If the user clicks the hyperlink **Role Rights** in the administration page. Then a new window is opened where the user can add and modify the privileges of a role.

25. If the user clicks the hyperlink **User Creation** in the administration page. Then a new window is opened where the user can add and modify the user's authentications. Roles and user groups are also assigned here.

26. If the user clicks the hyperlink **User Rights** in the administration page. Then a new window is opened where the user privileges are managed.

27. If the user clicks the hyperlink **Client Profile** in the administration page. Then a new window is opened where the client profile is entered.

28. If the user clicks the hyperlink **Associate Profile** in the administration page. Then a new window is opened where the client's associate profile is entered.

29. If the user clicks the hyperlink **View Profile** in the administration page. Then a new window is opened where the profiles of the users are displayed.

30. In order to logout from the web site, user has to click the button (**logout**) in the link page. As the user logouts front page of the CRM web site is displayed.

8. CONCLUSION

The emergence of the World Wide Web as a major communication medium lead to surge in the design of web pages and web sites for myriad applications. This would in all certainty lend a new perspective to the futuristic area of "Customer Relationship Management".

The web site has been developed and the stated requirements were achieved. All operations are invoked with click of a mouse or with a combination of minimum keystrokes, making the users feeling ease of operation. The development and publishing of this site on the World Wide Web needs substantial effort from the developer's side.

The design and development of such a real time project concerned with web design and publishing has been really a wonderful experience for me. I discovered new and interesting facts in the World of Internet, increased my degree of skill of programming, gained immense knowledge on web designing and got well exposed to the really powerful scripting environment, Active Server Pages and JavaScript. I had an excellent experience working as individual, under the guidance of able and experienced scholars in an established concern like Macro Infotech Pvt. Ltd., which turned out to be very interesting and informative.

Maximum justification is done to each of the master module in the allotted time span. The system gave the results as it was proposed in the earlier stages and it was designed in such a way that it could be enhanced in future with no problem. Hope the project would enhance the customer relationship of Macro Infotech to a great extent.

9. FUTURE ENHANCEMENTS

Various enhancements that can be made in the future are as follows

- Voice interaction can be developed to the Interaction process, which enhances the customer support.
- A message board can be developed that contains the Client's FAQ. Through this clients can get knowledge on a particular topic by viewing the message board
- Security can be enhanced by developing UMS (User Monitoring System). Through this administrator can monitor the user's actions on this application.
- As now mailing system is provided for the macro associates only, this can be extended to other users also.

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