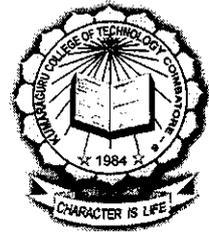# A DISTRIBUTED DATABASE ARCHITECTURE FOR GLOBAL ROAMING IN NEXT GENERATION MOBILE NETWORKS

By

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Registration Number: 71206621019

Of

KUMARAGURU COLLEGE OF TECHNOLOGY

COIMBATORE

A PROJECT REPORT

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COIMBATORE-641006

<u>BONAFIDE CERTIFICATE</u>

Certified that this project report titled "**A DISTRIBUTED DATABASE ARCHITECTURE FOR GLOBAL ROAMING IN NEXT GENERATION MOBILE NETWORKS**" is the bonafide work of "**Mr. M.JAGESH**" (Registration Number: **71206621019**) who carried out the research under my supervision. Certified further, that to the best of my knowledge the work reported herein does not form part of any other project report or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.
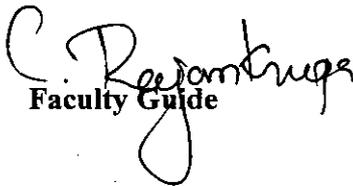
Faculty Guide

Head of the Department

Submitted to Project and Viva Examination held on _06.07.2009_

Internal Examiner

External Examiner

Sybian
Technologies Pvt. Limited

To Whomsoever It May Concern

PROJECT COMPLETION CERTIFICATE

This is to certify that **Mr.M.Jagesh, Reg.No:71206621019** student of **Kumaraguru College of Technology** completed his project work from Dec 2008 to May 2009 in our premises under the supervision of the undersigned.
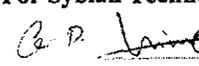
The project of the candidates is focused on
"Distributed Database Architecture for Global Roaming In Next Generation Mobile Networks"

A copy of the report has been submitted to us at the end of his tenure. During the said period he abided by the Rules and Regulations of our organization.

Regards,

For Sybian Technologies

(HR Manager)

ABSTRACT

The Project entitled "**A DISTRIBUTED MOBILTY MANAGEMENT FOR GLOBAL ROAMING IN MOBILE NETWORKS**" will support terminal mobility, personal mobility, and service provider portability, making global roaming seamless.

A location-independent Personal Telecommunication Number (PTN) scheme is conductive to implementing such a global mobile system. The non geographic PTNs coupled with the anticipated large number of mobile user's in future mobile networks may introduce very large centralized databases. This is scalable, robust, efficient location database architecture based on the location- independent PTNs.

The proposed multi tree database architecture consists of a number of database subsystems, each of which is a three-level tree structure and is connected to the others only through its root. By exploiting the localized nature of calling and mobility patterns, The proposed architecture reduces the databases and loads as well as the signaling traffic.

ACKNOWLEDGEMENT

I extend my heartfelt gratitude to "The Almighty" for blessing this work in my hands. I am very grateful to my parents for the encouragement and support they have given.

I wish to express my sincere thanks to **Prof.R.Annamalai..**, Vice Principal, Kumaraguru College of Technology, Coimbatore, for permitting me to undertake this project.

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I also thank **Dr.A.MUTHUKUMAR**, Assistant Professor and Course coordinator, Department of Computer Application, Kumaraguru College of Technology, Coimbatore.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

PTN PERSONEL TELECOMMUNICATION NUMBER

SN SUBSCRIBER NUMBER

HLR HOME LOCATION REGISTER

VLR VISITOR LOCATION REGISTER

MT MOBILE TERMINAL

MSC MOBILE SWITCHING CENTER

RAs REGISTRATION AREAS

TLDN TEMPORARY LOCAL DIRECTORY NUMBER

GTT GLOBAL TITLE TRANSLATION

CHAPTER 1

INTRODUCTION

1.1   ORGANIZATION PROFILE

At Sybian Technologies, We go beyond providing software solutions. We work with our client's technologies and business changes that shape their competitive advantages.

Founded in 2000, Sybian Technologies (P) Ltd. is a software and service provider that helps organizations deploy, manage, and support their business-critical software more effectively. Utilizing a combination of proprietary software, services and specialized expertise, Sybian Technologies (P) Ltd. helps mid-to-large enterprises, software companies and IT service providers improve consistency, speed, and transparency with service delivery at lower costs. Sybian Technologies (P) Ltd. helps companies avoid many of the delays, costs and risks associated with the distribution and support of software on desktops, servers and remote devices. Our automated solutions include rapid, touch-free deployments, ongoing software upgrades, fixes and security patches, technology asset inventory and tracking, software license optimization, application self-healing and policy management

Our Vision

"Dreaming a vision is possible and realizing it is our goal".

Our Mission

We have achieved this by creating and perfecting processes that are in par with the global standards and we deliver high quality, high value services, reliable and cost effective IT products to clients around the world.

1.2 ABOUT THE PROJECT

The project titled "A **DISTRIBUTED MOBILTY MANAGEMENT FOR GLOBAL ROAMING IN MOBILE NETWORKS**" is to, basically simplify Client and Server Communication based global roaming for service provider into mobile networks. The next-generation mobile network will be an integrated global system that provides heterogeneous services across network providers, network backbones, and geographical regions. Global roaming is a basic service of the future mobile networks, where terminal mobility, personal mobility, and service provider portability must be supported. A non geographic personal telecommunication number (PTN) for each mobile user is desirable to implement these types of mobile freedom.

The large centralized databases may become the bottleneck of the global mobile system, thus necessitating research into the design and performance of high-throughput database technologies as used in mobile networks to meet future demands. Location management is one of the most important functions to support global roaming. Location management procedures involve numerous operations in various databases. These databases record the relevant information of a mobile user, trace the user's location by updating the relevant database entries, and map the user's PTN to its current location.

CHAPTER 2

2. SYSTEM SPECIFICATION

2.1 Hardware Requirements

Following Hardware equipments are needed to develop the project.

Processor	:	Pentium DUAL CORE
Ram Memory	:	2 GB RAM
Hard Disk Capacity	:	160 GB
Port	:	IEEE USB Cable Port
Monitor	:	1024*768 at 24- bit true color

2.2 Software requirements

The following specifications are used for the development of the project.

Front End	:	VISUAL STUDIO .NET 2005
Back End	:	SQL SERVER 2005
Operating system	:	It supports only Windows 9x/2000/XP

2.3 About the Software

MICROSOFT VISUAL STUDIO.NET

Microsoft Visual Studio.Net used as front end tool. The reason for selecting Visual Studio dot Net as front end tool as follows:

- Visual Studio .Net has flexibility, allowing one or more language to interoperate to provide the solution. This Cross Language Compatibility allows to do project at faster rate.

- Visual Studio. Net has Common Language Runtime, which allows the entire component to converge into one intermediate format and then can interact.

- *Visual Studio. Net has provide excellent security when the application is executed in the system*

- Visual Studio.Net has flexibility, allowing us to configure the working environment to best suit our individual style. We can choose between a single and multiple document interfaces, and we can adjust the size and positioning of the various IDE elements.

- Visual Studio. Net has Intelligence feature that make the coding easy and also dynamic help provides very less coding time.

- The working environment in Visual Studio.Net is often referred to as Integrated Development Environment because it integrates many different functions such as design, editing, compiling and debugging within a common environment.

- In most traditional development tools, each of separate program, each with its own interface.

- The Visual Studio.Net language is quite powerful – if we can imagine a programming task and accomplished using Visual Basic .Net.

- After creating a Visual Studio. Net application, if we want to distribute it to others we can freely distribute any application to anyone who uses Microsoft windows. We can distribute our applications on disk, on CDs, across networks, or over an intranet or the internet.

- Toolbars provide quick access to commonly used commands in the programming environment. We click a button on the toolbar once to carry out the action represented by that button. By default, the standard toolbar is displayed when we start Visual Basic. Additional toolbars for editing, form design, and debugging can be toggled on or off from the toolbars command on the view menu.

- *Many parts of Visual Studio are context sensitive. Context sensitive means we* can get help on these parts directly without having to go through the help

menu. For example, to get help on any keyword in the Visual Basic language, place the insertion point on that keyword in the code window and press F1.

- Visual Studio interprets our code as we enter it, catching and highlighting most syntax or spelling errors on the fly. It's almost like having an expert watching over our shoulder as we enter our code.

SQL SERVER 2005

The OLAP Services feature available in SQL Server version 7.0 is now called SQL Server 2000 Analysis Services. The term OLAP Services has been replaced with the term Analysis Services. Analysis Services also includes a new data mining component. The Repository component available in SQL Server version 7.0 is now called Microsoft SQL Server 2000 Meta Data Services. References to the component now use the term Meta Data Services. The term repository is used only in reference to *the repository engine within Meta Data Services*

SQL-SERVER database consist of five type of objects,

TABLE

A database is a collection of data about a specific topic.

Design View

To build or modify the structure of a table we work in the table design view. We can specify what kind of data will be hold.

Datasheet View

To add, edit or analyses the data itself we work in tables datasheet **view** mode.

QUERY

A query is a question that has to be asked the data. Access gathers data that answers the question from one or more table. The data that make up the answer is either dynaset (if you edit it) or a snapshot (it cannot be edited).Each time we run query, we get latest information in the dynaset. Access either displays the dynaset or snapshot for us to view or perform an action on it, such as deleting or updating.

FORMS

A form is used to view and edit information in the database record by record. A form displays only the information we want to see in the way we want to see it. Forms use the familiar controls such as textboxes and checkboxes. This makes viewing and entering data easy.

Report

A report is used to vies and print information from the database. The report can ground records into many levels and compute totals and average by checking values from many records at once. Also the report is attractive and distinctive because we have control over the size and appearance of it.

Macro

A macro is a set of actions. Each action in macros does something. Such as opening a form or printing a report .We write macros to automate the common tasks the work easy and save the time.

CHAPTER 3

3. SYSTEM ANALYSIS

3.1 Problem Definition

The previous mobile network was use different server and each has decentralized databases. A local server is stored only its area user's information, but not stored the other area user's information. The non-geographic PTNs coupled with the anticipated large number of mobile user's in future mobile networks may introduce very large centralized databases.

This necessitates research into the design and performance of high-throughput database technologies used in mobile systems to ensure that future systems will be able to carry efficiently the anticipated loads. In mobile networks; the location of a mobile user needs to be traced for successful and efficient call delivery. In existing cellular networks, as a mobile user changes his/her location area (LA), a location registration request is sent to the home location register (HLR) to update the user profile to point to the new LA.

With a large number of mobile subscribers, this conventional registration strategy will incur a high volume of signaling traffic. We propose a new location registration strategy, called Group Registration (GR), which efficiently reduces the location registration cost by reporting location changes to the HLR for multiple mobile terminals (MTs) in a single location update request message.

3.2 Existing System

The previous mobile network was use different server and each has decentralized databases. A local server is stored only its area user's information, but not stored the other area user's information. For example Chennai mobile user call to the Srilanka user means, First it search in the local mobile user and after finished search in

India and then find it in the Srilanka server. It takes more time to find the user location because of decentralized databases. The communication traffic also occur when search client side.

Limitations of Existing System

- May differ between different service providers, countries, protocol versions, and data base architecture.
- Cross talking calls.
- Database inconvenience.
- In roaming area cannot support clear call services, thus incurring a much longer call setup delay.
- Network busy.
- It's based on location dependent PTN. (if the user can anywhere to shifted, the number is roaming, service provider cannot support that area (any other country)) Mobile subscribers can not lifelong PTN.
- *The existing security systems are implemented with the hardware device like sensors and roaming is more expensive.*

3.3 Proposed System

In proposed system, the mobile network search only in server but not in client mobile. Because all user's information maintained in centralized database server. It is avoid the communication traffic, because this is only search in server part and easily find the user.

This is a scalable, robust, efficient location database architecture based on the location-independent PTNs. The proposed multi tree database architecture consists of a number of database subsystems, each of which is a three-level tree structure and is connected to the others only through its root. By exploiting the localized nature of calling and mobility patterns, the proposed architecture effectively reduces the database loads as well as the signaling traffic incurred by the location registration and call delivery procedures.

In addition, two memory-resident database indices, memory-resident direct file and T-tree are proposed for the location databases to further improve their throughput. Analysis model and numerical results are presented to evaluate the efficiency of the proposed database architecture. Results have revealed that the proposed database architecture for location management can effectively support the anticipated high user density in the future mobile networks.

Advantage of Proposed System

- For converting and filtering the video sequence into frames less memory space is consumed.

- As our system is compatible for any type of cameras it can cover full area in faster Approach.

- Estimation of path of moving object by the vector generation.

- It provides security in confidential places.

- By accessing through internet, the user can investigate a movement from any environment.

3.4. Feasibility Study

The feasibility study is an important factor that analyzes the capability of a project. The main objective of feasibility study is of weigh up 3 types of feasibilities:

- Economic Feasibility
- Technical Feasibility
- Operational Feasibility

Economic Feasibility

The Cost has always been a major concern in developing any project. The Feasibility study for the project is being made with the intention of making quality software for the concern and at the same time, the cost should also not exceed the limit. After careful analysis and suggestions from company officials, the estimate for project is being made

Technical Feasibility

Technical part of a project is as important as it is going to matter much after automating the system. The software needs to be developed in the right platform with the right software.

This technical compatibility alone marks the true success of the project and stands as the difference between the manual and automated system. After careful analysis, the Requirements are being determined to the officials.

Operational Feasibility

Operational feasibility is looked at the view of proposed solution fitting with the current operations.

- How long the system will work when it is developed and installed?
- How will the solution affect the end-users work environment?
- The end users work environment is equipped with this software. Hence it is behaviorally feasible.
- Support for the project from the management

The complete feasibility study conducted has established the fact that project will be user friendly, and there is no need for extra hardware and software for the development of this project. Thus the project is operationally, technically and economically feasible.

CHAPTER 4

4. SYSTEM DEVELOPMENT SPECIFICATION

4.1 Module Description

The project consists of five modules.

- Multi-tree Database Architecture
- Members
- Location Registration
- Call Delivery
- Tracking

Multi-tree Database Architecture

The proposed database architecture for location tracking is a multitree structure, where each subsystem is three-level architecture, referred to as a Database Subsystem (DS). Various DSs may represent networks operated possibly by different service providers. All these DSs are interconnected together via a fixed network, such as PSTN or ATM network, and communicate with each other only through their root databases. This architecture can support a multioperator environment which is expected in future mobile networks.

In each DS, databases DB0 and DB2 may correspond to the HLR and the VLR in the two-level database system, respectively. Each DB2 may control an RA where a user can roam freely without triggering registrations. Each DB2 is collocated with an MSC, which performs call processing on origination or termination calls. A number of DB2s are grouped into one DB1 and several DB1s are connected to a single DB0. Each

DB1 and DB0 also needs a switch, called the STP, which provides routing functionality for message exchange between various location databases.

The DB0 maintains the service profile for each user currently residing in its service area, and maintains an entry for each user in the global mobile system. The entry contains either a pointer to another DB0 where the user is residing or a pointer to the user record that contains a pointer to the DB1 with which the user is currently associated. Each DB1 has an entry for every currently residing user, storing a pointer to the DB2 the user is currently visiting. Every DB2 has a copy of the service profiles of the users currently roaming within its area

Members

With location-independent personal telecommunication number PTNs, users can access their personalized services regardless of terminal or attachment point to the network; they can move into different service provider's network and continue to receive subscribed services without changing their PTNs. Another advantage of the flat PTN scheme is that it is much more efficient in terms of capacity than the location-dependent numbering scheme where the capacity of the SN may be exhausted in a highly populated area, whereas the Subscriber Number's (SN) capacity is wasted in a sparsely populated area. Maintaining user profile and index files.

Location Registration

With the previously defined file structures of DB0, DB1, and DB2 as well as the proposed multitree location database architecture, the location update procedure in a global mobile system can be described as follows.

- When a user enters a new RA, a registration request message is sent to the associated DB2 which in turn sends a registration request message to the DB1

controlling this area. If the user has no entry in this DB1, go to step 3; otherwise, go to step 2.

- The fact that the user has an entry in this DB1 indicates that the new DB2 is within the same DB1 area as the old DB2. A pointer to the new DB2 replaces the old one in the user's entry in the DB1. No further query to the DB0 is needed. The DB1 sends a registration cancellation message to the old DB2, then go to step 8.

- The fact that the user has no entry in this DB1 indicates that the user has moved to a new DB1 area. In the new DB1 an index entry is added to contain a pointer to the new DB2 of the user. An update request is also sent to the associated DB0.

- The DB0 is checked to see if it contains the user's service profile. If no, this means that the user enters a new DS, then go to step 5a; otherwise, the DB0 updates the user's service profile to point to the new DB1 and sends a registration cancellation message to the old DB1, then go to step 7.

- The new DB0 sends a query to the old DB0 to request the user's service profile.

- The new DB0 stores the user's service profile and updates the service profile to point to the new DB1.A copy of the user's service profile is also sent to the new DB2.

- The old DB0 sends the user's service profile to the new DB0.

- The old DB0 updates the user's entry in the index file to point to the new DB0, and deletes the user service profile from its data file. A registration cancellation message is sent to the old DB1.

- The old DB1 deletes the user's index entry, and sends a registration cancellation message to the old DB2.

- If the old DB2 is in the same DS as the new DB2, a copy of the user's service profile is sent to the new DB2. The user's index entry as well as the user's service profile is removed from the old DB2.

- After receiving the user's service profile, the new DB2 sets up an index entry for the user and create the user's service profile. The location registration procedure is completed.

Call Delivery

When an incoming call arrives, the call delivery procedure for the callee can be performed in the following steps.

- When a call is detected in the caller's MSC, the caller's DB2 is checked to see if an index entry for the callee exists. If yes, go to step 5, and no further queries to the DB1 and the DB0 are required. Otherwise, a query is sent to the associated DB1, then go to step 2.

- The DB1 examines if the callee has an entry in its index file. If yes, go to step 4, and no further query to the DB0 is required. Otherwise, a query is sent to the associated DB0, then go to step 3.

- The DB0 examines if the callee is associated with one of its DB1s. If yes, the DB0 sends a routing address request message to the DB1, then go to step 4; otherwise, go to step 7.

- The DB1 determines the callee's DB2 and sends a query to the DB2 to request the routing address.

- The DB2 searches for the callee. If the callee is found, a TLDN is allocated to the callee and sent back to the calling MSC.

- After receiving the TLDN, the calling MSC sets up a connection to the called MSC associated with the callee's current DB2. Then the call delivery process stops.

- If the callee is residing in another DS, a query is sent to the associated DB0. The searching process is repeated from step 3.

Tracking

The project effort on target tracking in wireless sensor networks have focused on collaborative sensing energy-efficient routing and management and sensor node deployment. Collaborative sensing and signal processing provide raw sensory data from the low-level sensing units on sensor nodes. In many cases, cheap sensors such as Omni directional acoustic sensors are used since alternatives such as CCD cameras generally require more resources for power, memory, bandwidth, and computation. Although the target information from a single node is generally limited, more useful information can be obtained through data exchange and aggregation between multiple nodes, based upon which higher-level strategic decisions can be made.

CHAPTER 5

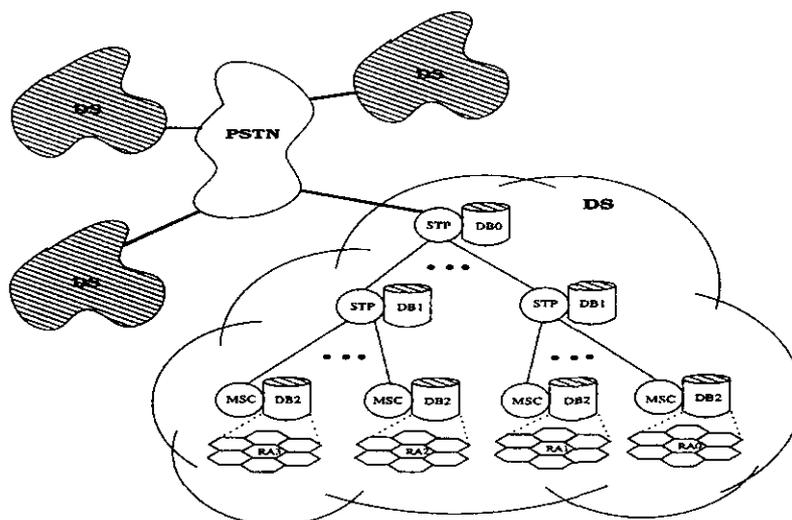## SYSTEM DESIGN SPECIFICATION

System Design

Fig 2.1.1 Distributed Domain Servers

Design is concerned with identifying software components specifying relationships among components. Specifying software structure and providing blue print for the document phase. Modularity is one of the desirable properties of large systems. It implies that the system is divided into several parts. In such a manner, the interaction between parts is minimal clearly specified. Design will explain software components in detail. This will help the implementation of the system. Moreover, this will guide the further changes in the system to satisfy the future requirements.

5.1 INPUT DESIGN

Input designs are done in such a way that it caters to the requirement of the end user. Extensive care has to be taken to ensure the validity of the input data. Error messages will be displayed immediately.

The design of input, focuses on controlling the amount of inputs, focuses on controlling the amount of input received, controlling errors, avoiding delay, avoiding extra steps and keeping the process simple. The goal of input data is to make an entry as easy and it is designed with user-friendly controls.

Input design is the process of converting user-originated inputs to a computer-based format. Input design is one of the most expensive phases of the operation of computerized system and is often the major problem of a system.

The Mobile number has registered form the corresponding database client side and location update used to the particular mobile number cal setup and Call Delivery is users given a mobile number as input. The must be present in the database. After gave a mobile number input, that number searched in database for available or not with using multi tree database architecture process. Call Generation It requires Country Code Number Users given a country name as input.

After entered the country name, it searched mobile numbers in database through multi tree database architecture and T-tree for efficient searching. Users enter the source and destination mobile numbers as input. The source and destination mobile numbers are search in databases through multi tree database architecture and T-tree for efficient searching process.

Source And Destination Should Be Given Users must enter the mobile number as numeric with 10 digit numbers. User must enter the country name as string format.

- Users given a mobile number as input.
- The must be present in the database.
- Users enter the source and destination mobile numbers as input.
- User must enter country name as only string format.

5.2 DATA FLOW DIAGRAM

Data Flow Diagram (DFD) is one of the most important tools used by the data analysis. DFD are made up of number of symbols which represent the components, most data flow modeling use four kind of symbols. These symbols are used to represent four kinds of system components Processes, Data Stores, Data Flows and external entities. Unlike detailed flow chart, Data Flow Diagrams do not supply detailed description of the modules but graphically describes systems data and how it interacts with the system.

Data Flow Diagram (DFD) is one of the most important tools used by the data analysis. DFD are made up of number of symbols which represent the components, most data flow modeling use four kind of symbols. These symbols are used to represent four kinds of system components Processes, Data Stores, Data Flows and external entities. Unlike detailed flow chart, Data Flow Diagrams do not supply detailed description of the modules but graphically describes systems data and how it interacts with the system.

For Constructing Data Flow Diagrams, We use

- Arrow
- Circles
- Open End Box
- Square

An arrow indicates the data flow in motion. It is a pipeline through which information is flown like the rectangle in the flowchart.

A circle stands for process that converts data into information. Open ended box represents Data Store. A square defines a source or destination of the system data. A DFD is a tool that allows us to depict the system as functional process, connected to one another by 'lines' and 'stores' of data.
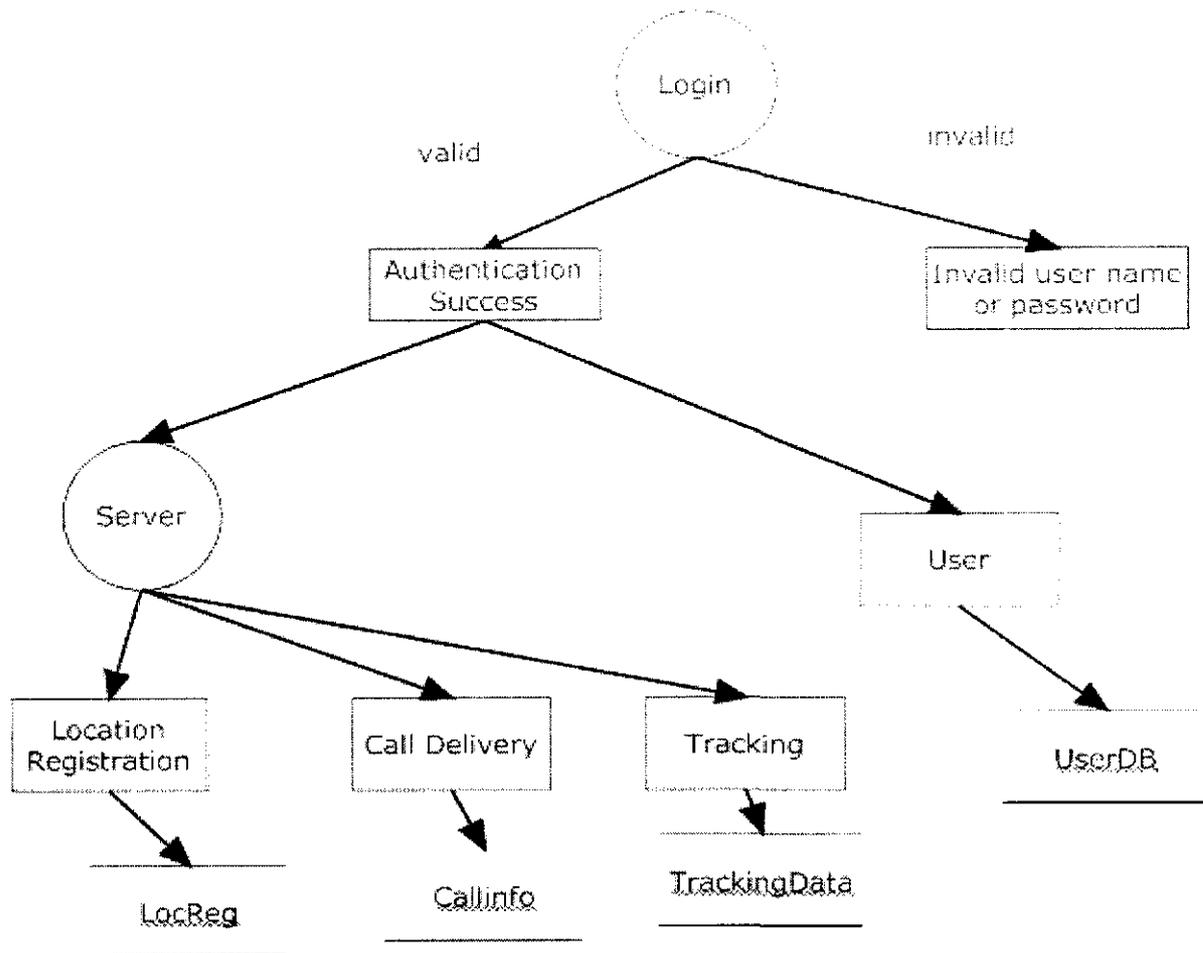
Data Flow Diagram for Login

Fig 5.2.1 Users Login
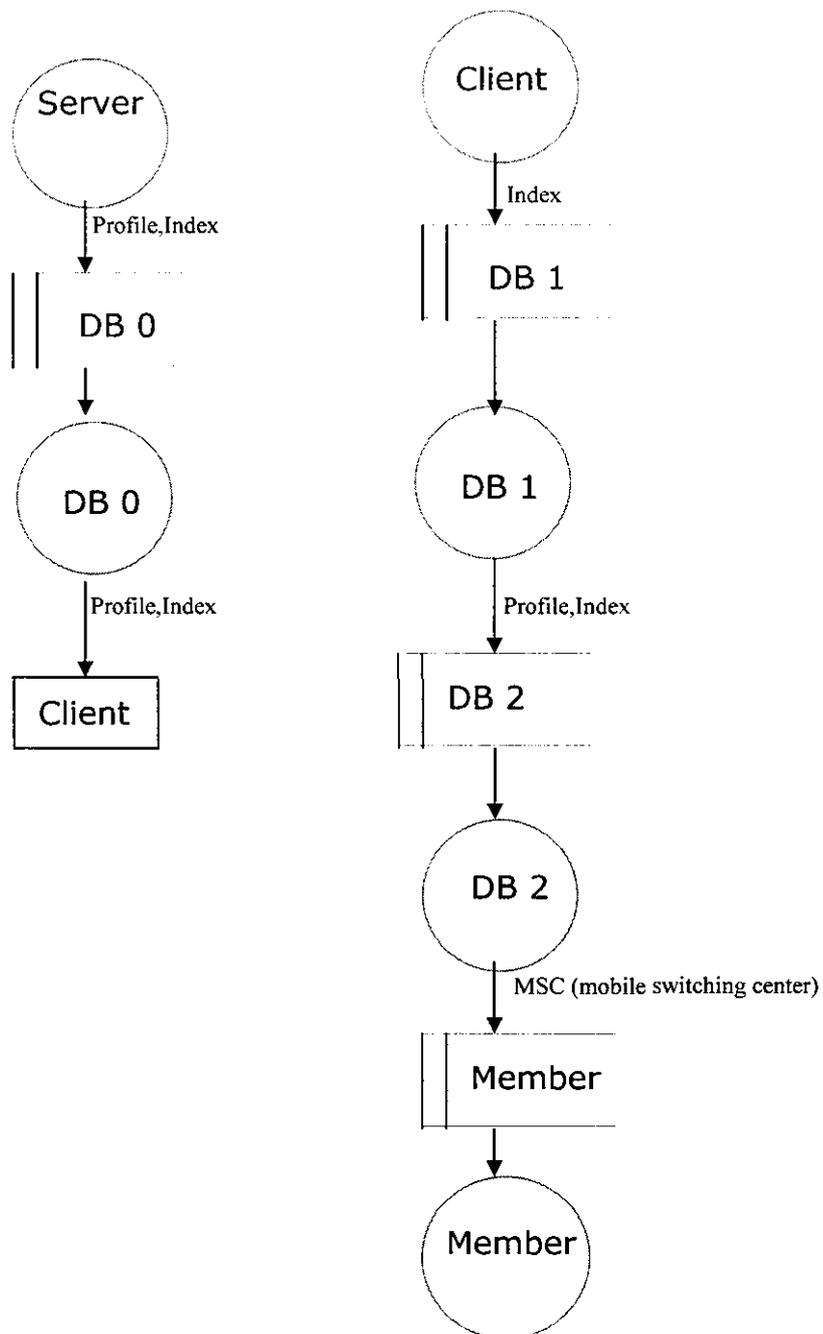
Dataflow Diagram for Members Register

Fig 5.2.2 Members Registration

Dataflow Diagram for Organization of Location Databases
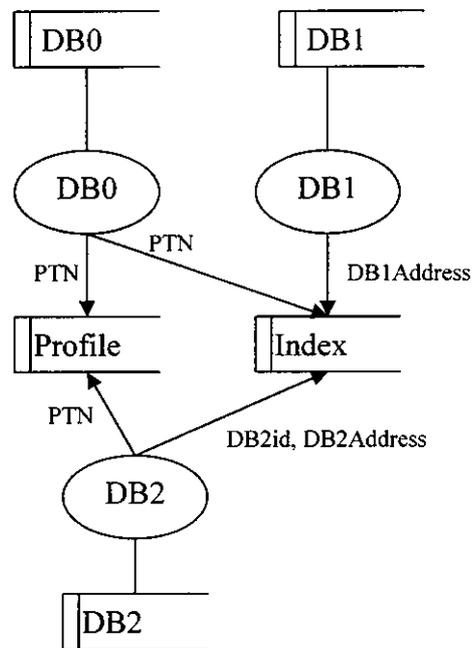

Fig 5.2.3 Organization of Location Databases

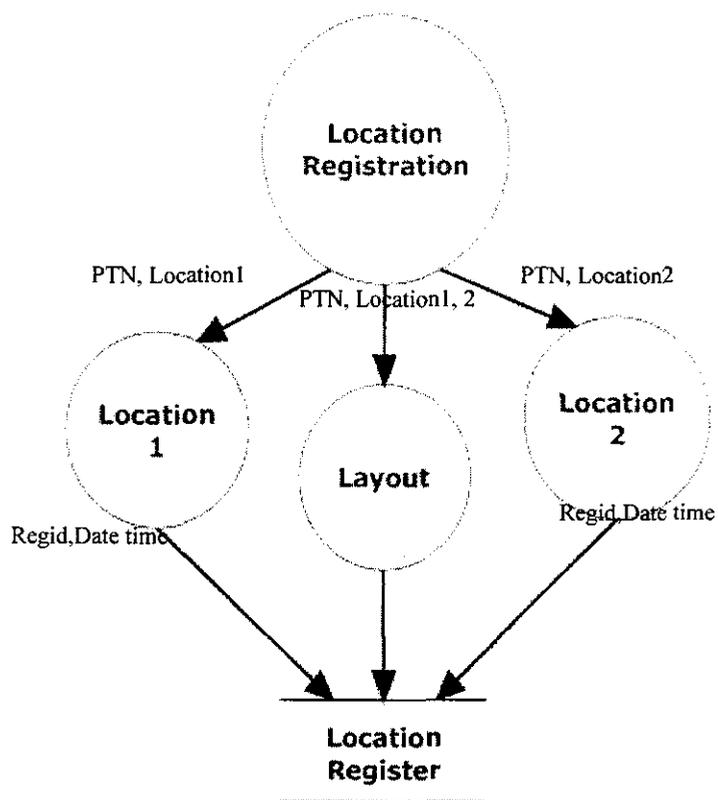**Dataflow Diagram for Location Registration Procedure**

Fig 5.2.4 Location Registration Procedure

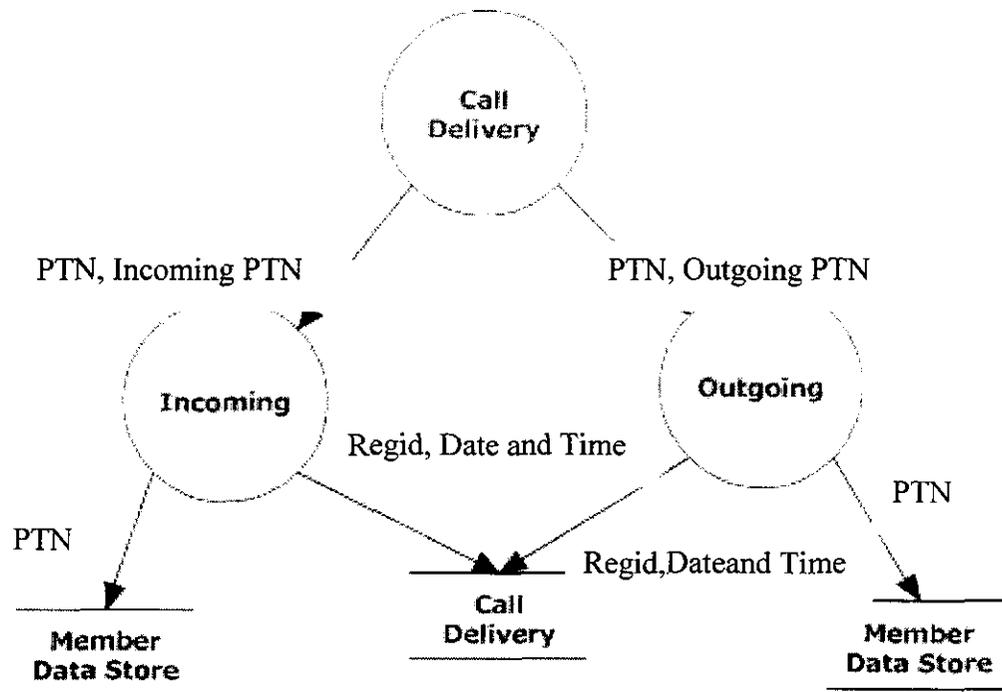**Dataflow Diagram for Call Setup & Call Delivery Procedure**

Call
Delivery

PTN, Incoming PTN

PTN, Outgoing PTN

Incoming

Outgoing

Regid, Date and Time

PTN

PTN

Regid,Dateand Time

Call
Delivery

Member
Data Store

Member
Data Store

Fig 5.2.5 Call Setup & Call Delivery Procedure

5.3 System Flow Diagram
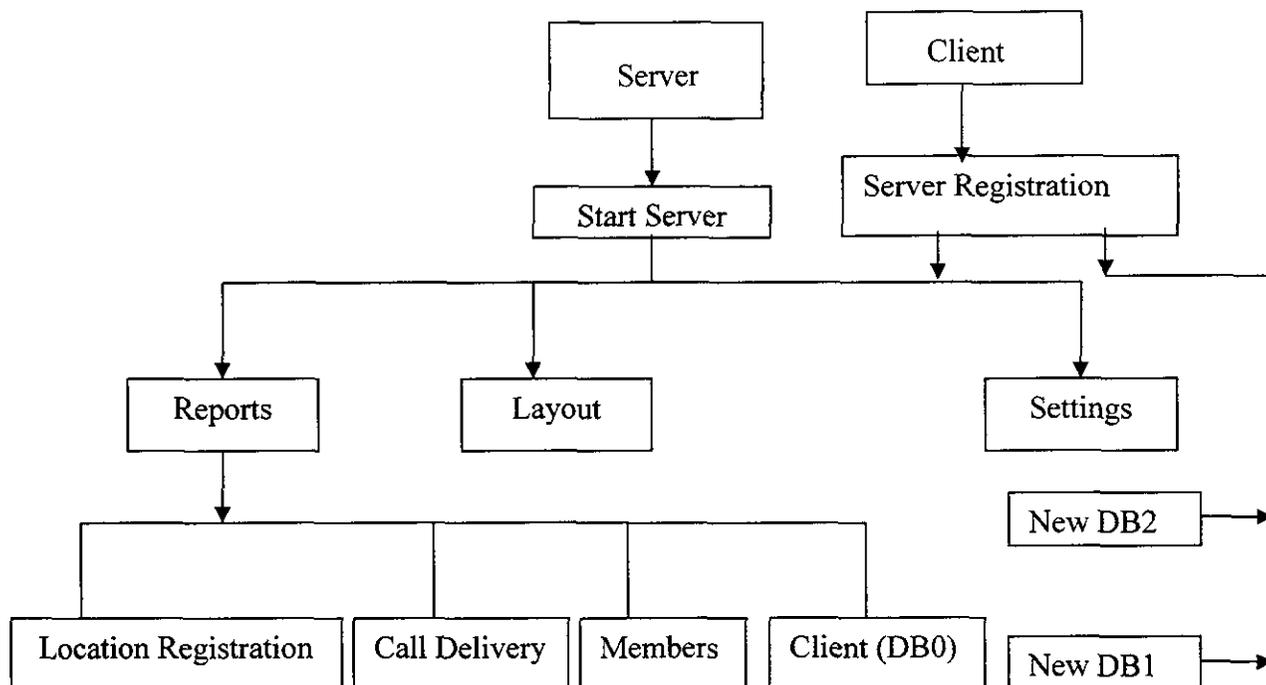
Fig 5.3.1 System Flow for Server & Client Side

5.4 Database Design

A database is a collection of interrelated data stored with minimum redundancy to serve as many clients quickly and efficiently. The general objective of database design is to make the data access easily, inexpensive and flexible to the client. A database can be defined as a central pool of data, which is shared by various clients of the organization. Any database exhibits a controlled amount of redundancy because this leads to inefficient operations of the database.

Normalization

Normalization is a systematic way of ensuring that a database structure is *suitable for general-purpose querying and free of certain undesirable characteristics* insertion, update, and deletion anomalies that could lead to a loss of the inventor of the relational model, introduced the concept of normalization and what we now know as the first normal form Codd went on to define the second and third normal form Higher normal forms were defined by other theorists in subsequent years, the most recent being the sixth normal form introduced by Chris Date, Hugh Darwen, in 2002.

Informally, a relational database table is often described as "normalized" if it is in the third normal form (3NF).[6] Most 3NF tables are free of insertion, update, and deletion anomalies, i.e. in most cases 3NF tables adhere to BCNF, 4NF, and 5NF (but typically not 6NF).

A standard piece of database design guidance is that the designer should begin by fully normalizing the design, and selectively denormalize only in places where doing so is absolutely necessary to address performance issues.

5.5 TABLE STRUCTURE

Table Name   : Members

Primary Key : Ptn

Purpose   : This Table Holds the User Personal Details

Field Name	Data Type	Size	Description
Ptn	Nvarchar	50	User Unique Personal Telephone Number
Name	Nvarchar	50	User Name
Address	Nvarchar	50	Residential Address of User
City	Nvarchar	50	City Name
Country	Nvarchar	50	Country Name of User
Pin	Nvarchar	50	Pin code Number
Email	Nvarchar	50	User's Email Address
DB2Addr	Nvarchar	50	Sub Area Code Address
DB1Addr	Nvarchar	50	Area Code Address
Hname	Nvarchar	50	Server Name

Table 5.5.1 Members Table

Table Name   : DB1

Primary Key : Id

Purpose   : This Table Holds the Details about User

Field Name	Data Type	Size	Description
Id	Nvarchar	50	User Unique Number
DB1Addr	Nvarchar	50	Area Code Address
Hname	Nvarchar	50	Server Name

Table.5..5.2 Database1 Table

Table Name : DB2

Primary Key : Id

Purpose : This holds the address of Each Telephone Number.

Field Name	Data Type	Size	Description
Id	Nvarchar	50	User Unique Number
DB1Addr	Nvarchar	50	Area Code Address
DB2Addr	Nvarchar	50	Sub Area Code Address
Hname	Nvarchar	50	Server Name

Table 5.5.3 Database2 Table

Table Name : Call and Rec

Primary Key : Id

Purpose : This holds the details about status of Call Delivery and Call Generated.

Field Name	Data Type	Size	Description
Id	Nvarchar	50	User Unique Number
FromPtn	Nvarchar	50	Source Ptn Number
ToPtn	Nvarchar	50	Destination Ptn Number
Date	DateTime	50	Date of caller's
Status	Nvarchar	50	Status(whether Received or Not) of Call

Table 5.5.4 Call and Record Table

Table Name : Location Registration

Primary Key : Id

Purpose : This Table holds the information about Location where the user is changing.

Field Name	Data Type	Size	Description
Id	Nvarchar	50	User Unique Number
FrmDB1	Nvarchar	50	Area Code Address
ToDB2	Nvarchar	50	Sub Area Code Address
FrmHname	Nvarchar	50	Source Server Name
ToHname	Nvarchar	50	Destination Server Name

Table 5.5.5 Location Registration Table

5.6 Output Design

If entered mobile number is available means and displayed as output, otherwise not displayed. Output Design is the most crucial stage in achieving a successful system and giving the user's confidence that the new system is workable and effective. Implementation of a modified application to replace an existing one. This type of conversation is relatively easy to handle, provide there are no major changes in the system.

The output displays the list of mobile numbers for corresponding entered country name. Each program is tested individually at the time of development using the data and has verified that this program linked together in the way specified in the programs specification, the computer system and its environment is tested to the satisfaction of the user. The system that has been developed is accepted and proved to be satisfactory for the user. And so the system is going to be implemented very soon. A simple operating procedure is included so that the user can understand the different functions clearly and quickly.

The source and destination mobile numbers are calling status as output. Initially as a first step the executable form of the application is to be created and loaded in the common server machine which is accessible to the entire user and the server is to be connected to a network. The final stage is to document the entire system which provides components and the operating procedures of the system. Implementation is the stage of the project when the theoretical design is turned out into a working system. Thus it can be considered to be the most critical stage

CHAPTER 6

SYSTEM TESTING

6.1 INTRODUCTION

The objectives of this maintenance work are to make sure that the system gets into work all time without any bug. Provision must be for environmental changes, which may affect the computer or software system. This is called the maintenance of the system. Nowadays there is the rapid change in the software world. Due to this rapid change, the system should be capable of adapting these changes. In our project the process can be added without affecting other parts of the system. Maintenance plays a vital role. The system liable to accept any modification after its implementation. This system has been designed to favor all new changes. Doing this will not affect the system's performance or its accuracy.

Testing is a process of executing a program with the intent of finding errors. This process also ensures that defined input will produce actual results that agree with required results. The amount of testing required is related to the size and complexity of the application. A good test case is one that has a high probability of finding an undiscovered error.

The following are the Testing Methodologies

- Unit testing
- Integration testing
- Validation testing

6.2 Unit Testing

Unit testing focuses verification effort on the smallest unit of Software design that is the module. Unit testing exercises specific paths in a module's control structure to ensure complete coverage and maximum error detection. This test focuses on each module individually, ensuring that it functions properly as a unit. Hence, the naming is Unit Testing.

6.3 Integration Testing

Integration testing addresses the issues associated with the dual problems of verification and program construction. After the software has been integrated a set of high order tests are conducted. The main objective in this testing process is to take unit tested modules and builds a program structure that has been dictated by design. The following are the types of integration testing:

- **Top Down Integration**

This method is an incremental approach to the construction of program structure. Modules are integrated by moving downward through the control hierarchy, beginning with the main program module. The module subordinates to the main program module are incorporated into the structure in either a depth first or breadth first manner.

- **Bottom-Up Integration**

This method begins the construction and testing with the modules at the lowest level in the program structure. Since the modules are integrated from the bottom up, processing required for modules subordinate to a given level is always available and the need for the stubs is eliminated.

The bottom up integration strategy may be implemented with the following steps:

- The low-level modules are combined into clusters that perform a specific software sub-function.
- A driver (i.e.) the control program for testing is written to coordinate test case input and output.
- The cluster is tested.
- Drivers are removes and clusters are combined moving upward in the program structure.

6.4 Validation Testing

The Validation testing is achieved through a series of black-box tests that can demonstrate confirmity with requirements. The two conditions exit.

- The function or performance characteristics confirm to specification and are accepted.
- A deviation from specification is uncovered and a defiency is created.

CHAPTER 7

SYSTEM IMPLEMENTATION

System implementation covers a broad spectrum of activities from a detailed workflow analysis to the formal go-live of the new system. During system implementation organizations may refine the initial workflow analysis that had been completed as part of the requirements analysis phase. With the aid of the vendor they may also start mapping out the proposed new workflow.

The system implementation phase requires the vendor to play a very prominent role. In addition to the workflow analysis it is during this phase that full system testing is completed. Other key activities that would occur during this phase include piloting of the new system, formal go-live and the immediate post implementation period during which any application issues are resolved.

Making a planned system into action. The stage of systems development in which hardware and software are acquired developed and installed the system is tested and documented, people are trained to operate and use the system, and an organization converts to the use of a newly developed system.

The hardware and software system components are installed;

- The selected software is configured and tested
- The software may be customized to meet local functional requirements
- Data mapping, cleansing and migration take place
- Reporting requirements are specified and reports produced
- The whole system is tested before being approved, signed off and becoming a fully operational production system

In addition to mapping out the current state, during this phase an organization can start looking at how work processes will change as a result of the implementation of a

new system. By mapping out the new workflow organizations can develop a good understanding of what changes in process will occur. Models of the new workflow can serve as a training tool and provides a useful tool to identify any new policies and procedures and changes in existing ones.

CHAPTER 8

CONCLUSION

Distributed multi tree database architecture has been proposed for location management in a global mobile system, where the location-independent PTNs are employed to support seamless global roaming. To support the anticipated large number of mobile users in the future mobile system, two efficient database access structures the memory-resident direct file and the T-tree were proposed to achieve high database throughput, so that the end-to-end delays in location registration and call delivery can meet the delay requirements in mobile networks. The proposed database architecture is scalable, robust, and efficient.

Compared to the existing two-level location database architecture, the proposed database architecture can support a much higher user density while reducing signaling load significantly. Compared to the one-root tree architecture, the proposed architecture provides better scalability and reliability while supporting a larger user population at a lower signaling cost. For performance evaluation, analysis model was developed. Numerical results have revealed that the proposed database architecture can effectively handle the anticipated high update and query rates to the location databases in future mobile networks. The proposed database access structures are also suitable for other large centralized databases in mobile networks, such as the authentication center and the equipment identity register.

CHAPTER 9

FUTURE ENHANCEMENTS

This project is successfully completed and works properly according to thee need and helps the end user as a user friendly system .This project was much open for the further future development, the future enhancement capability can be carried out without having to perform to many modification for adaptation of software's to any sort new environment and correction of software bugs.

Since documentation helps for the development and maintenance, it has been give much attention. i take all the care of easy understanding of the coding for the Mobile Communications.

Reports generated with live data have provided to be informatory and so helpful in making important decision. This newly developed system consumes less processing time and high productivity. Since interactive Database Reponses are friendly, and the end users gets familiarized with its usage.

- In future enhancement, we planned to implement the project in all the Service Providers.

- We also planned to speed up the process of registration of new users so that the registered user can get the automated Location Id.

APPENDIX A

Sample Screens

Login for Client to connect with Server
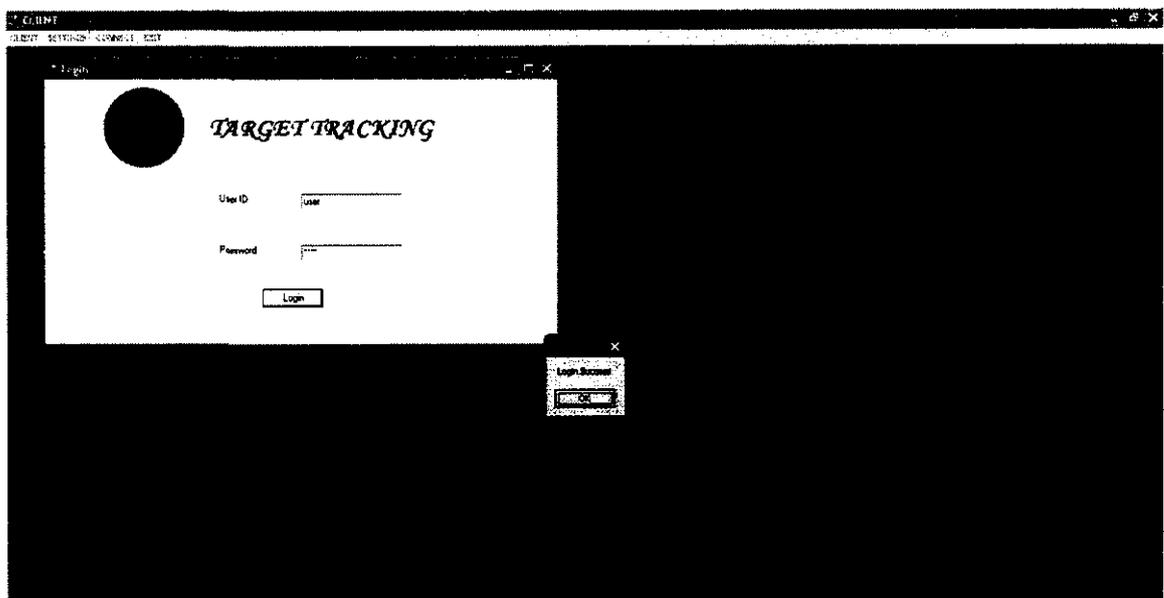
Fig A.1 Login for Client to connect with Server

CLIENT SETTINGS
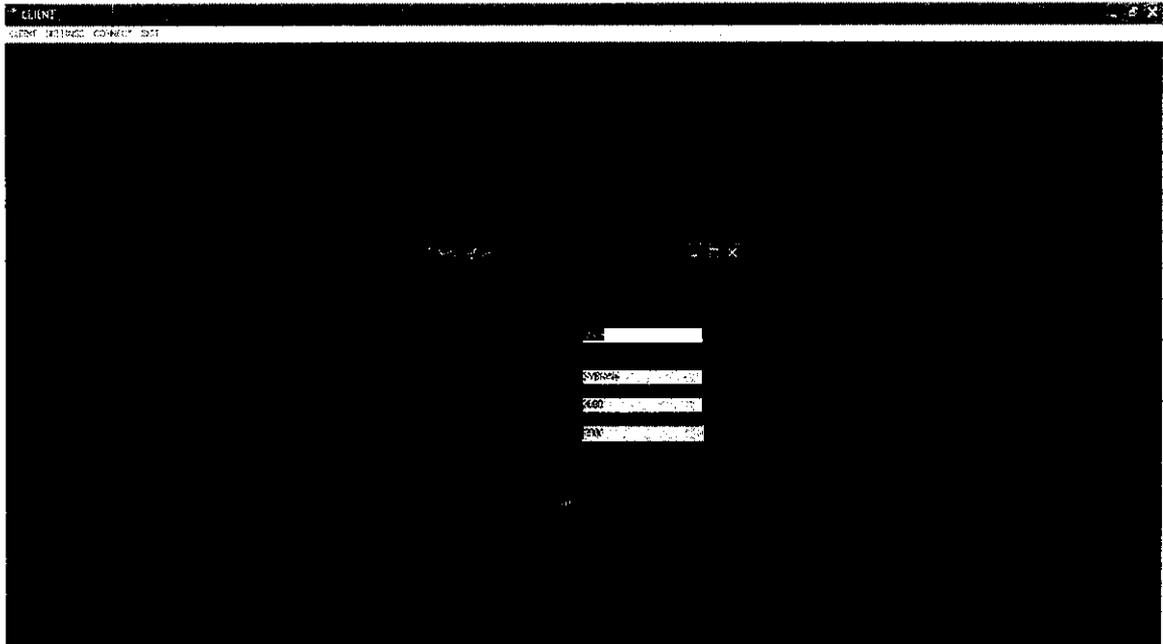
Fig A.2 Client Settings

Starting from Server
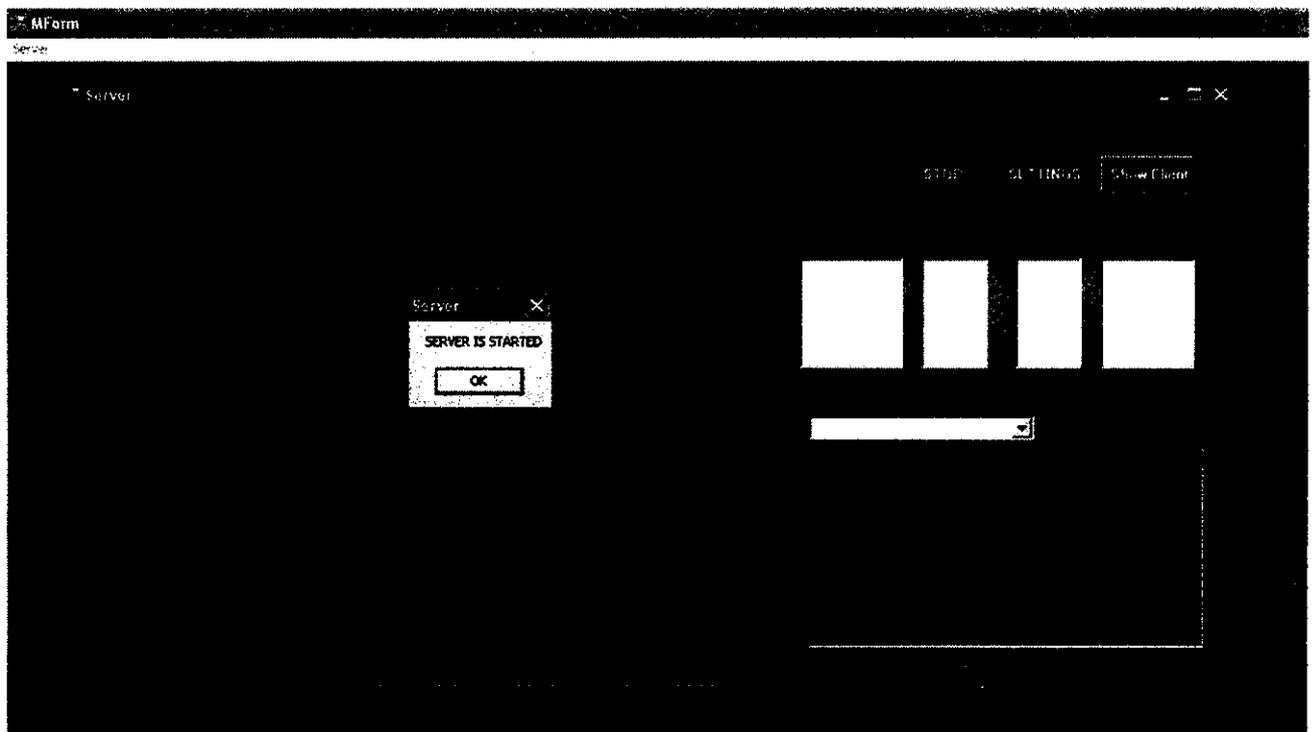
Fig A.3 Starting from Server

Registration of Client in Server
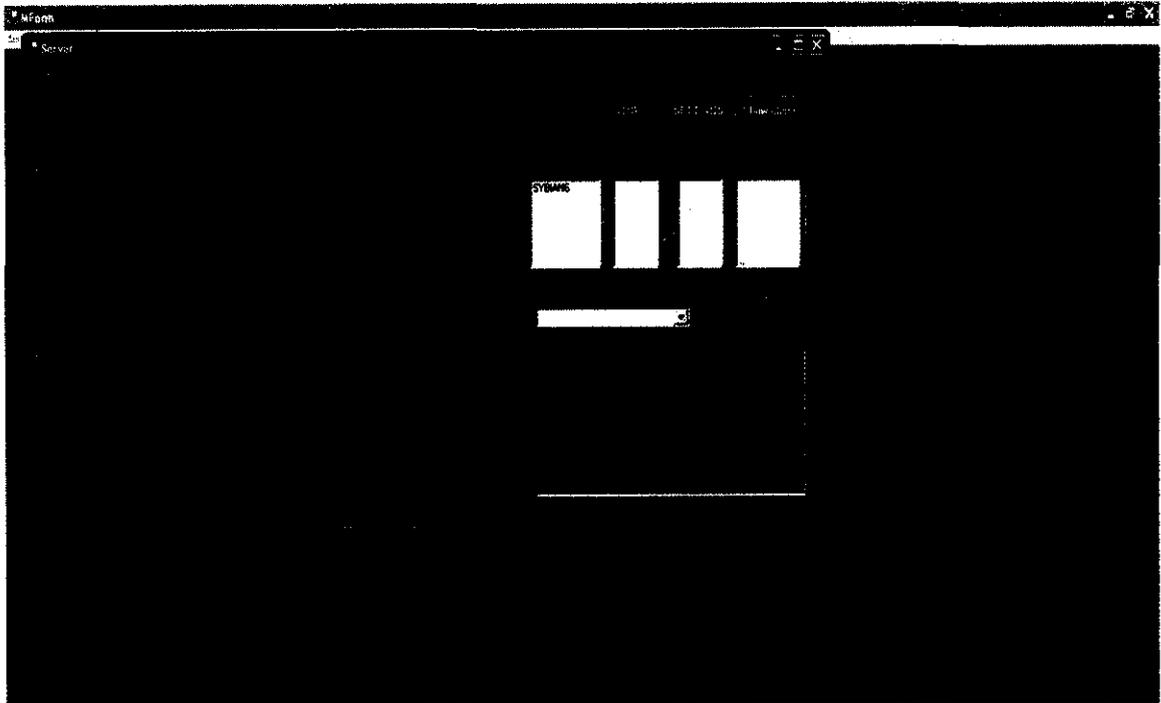
Fig A.4 Registration of Client in Server

Registration of Main DB

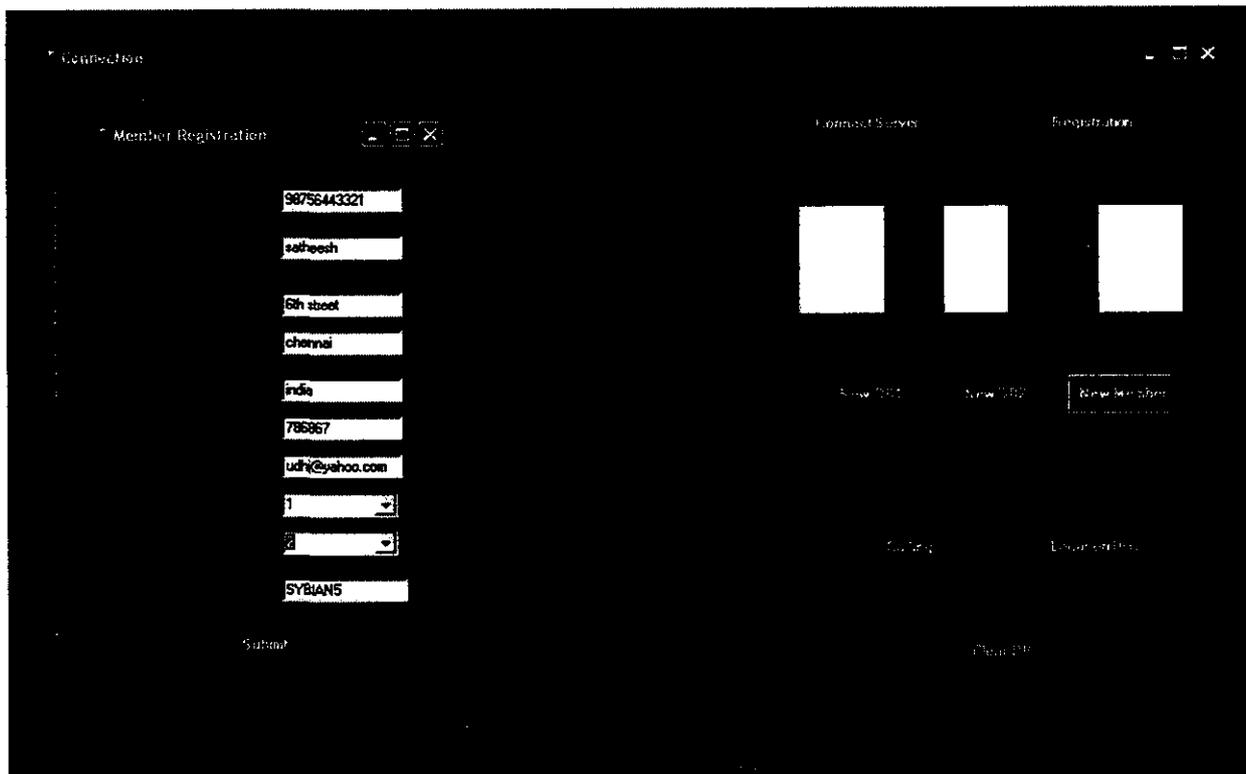**Fig A.5 Registration of Main DB**

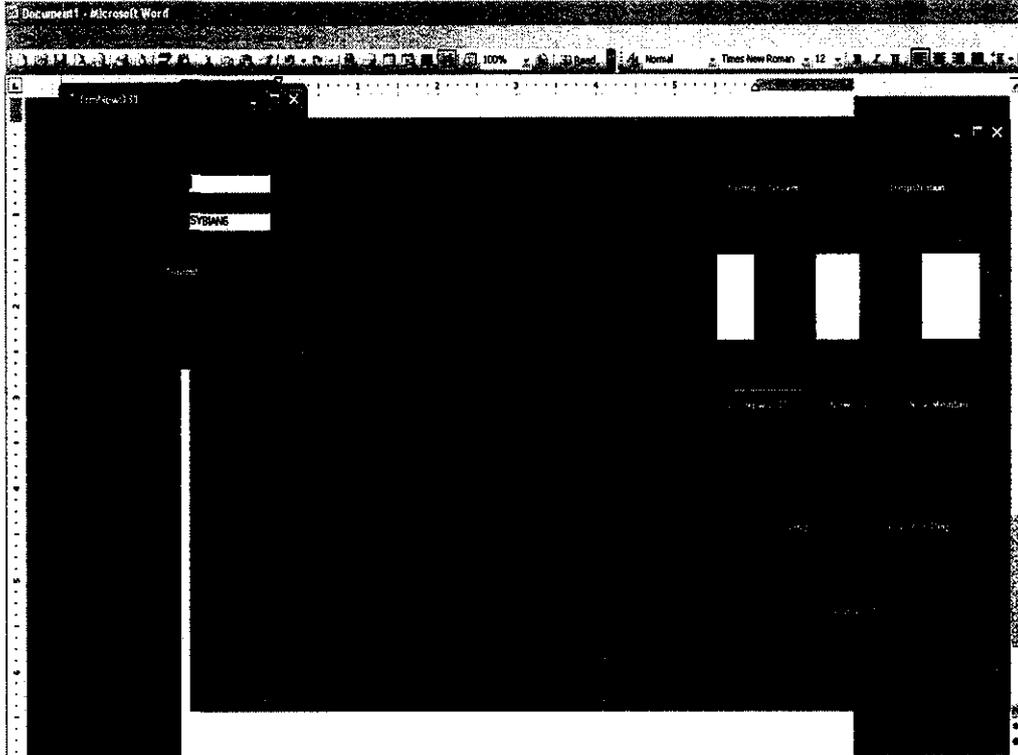**Registration of user details With PTN**

Fig A.6 User details with PTN

Registration Area and Code

Fig A.7 Registration Area and Code

Registration of DB1 And DB2 Members
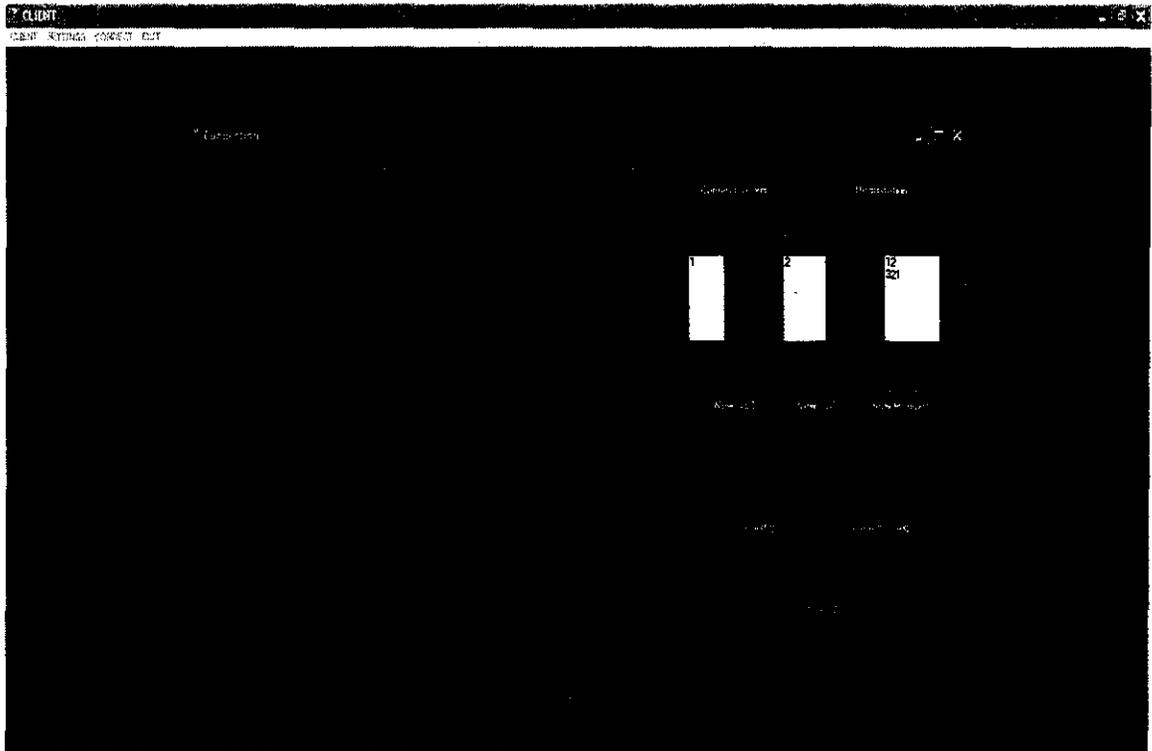
Fig A.8 DBI And DB2 Members

Tracking Of Location Change
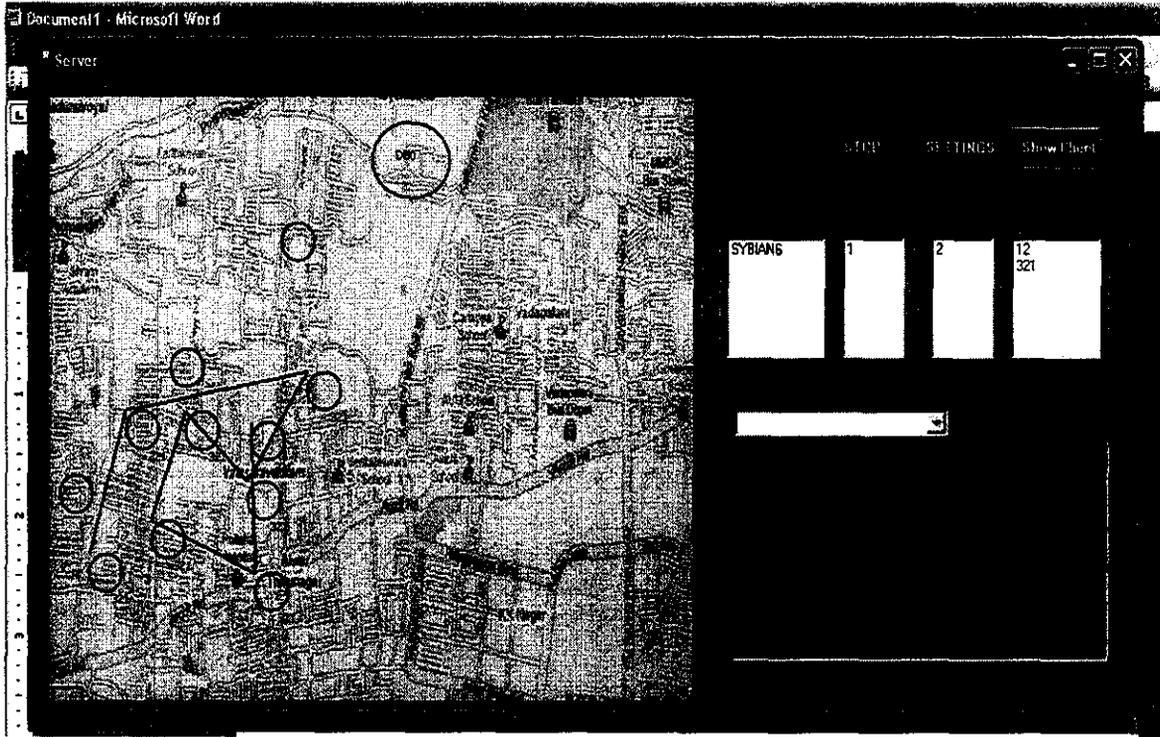
Fig A.9 Tracking of Location Change

Calling from one number to another number
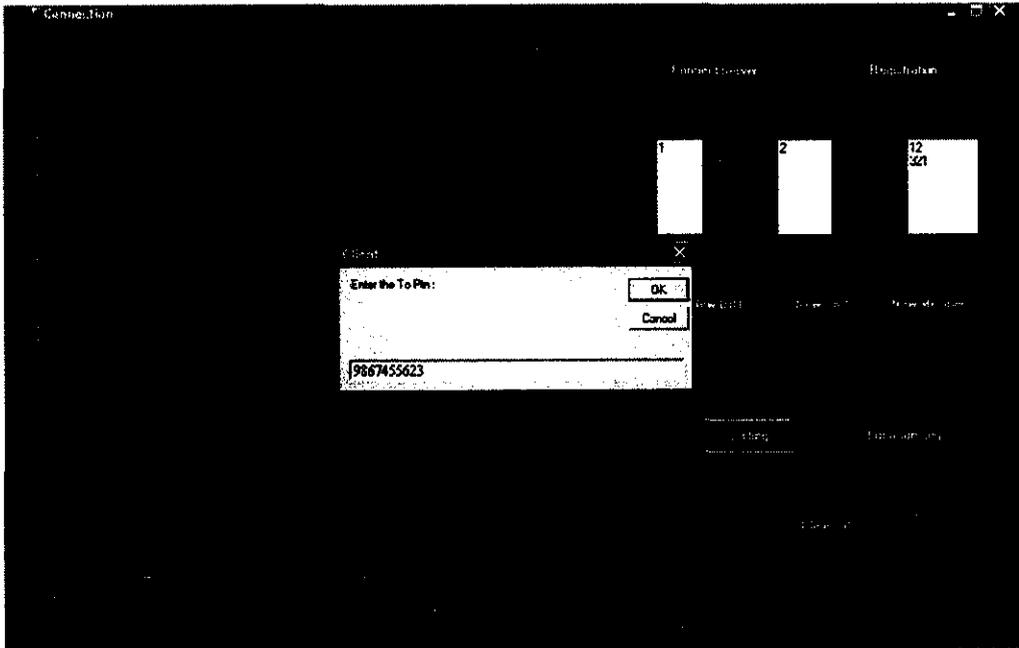
Fig A.10 Client Calling from one number to another number

Change for a User from one Area to another Area

Fig A.11 change for a user from one area to another area

Server settings
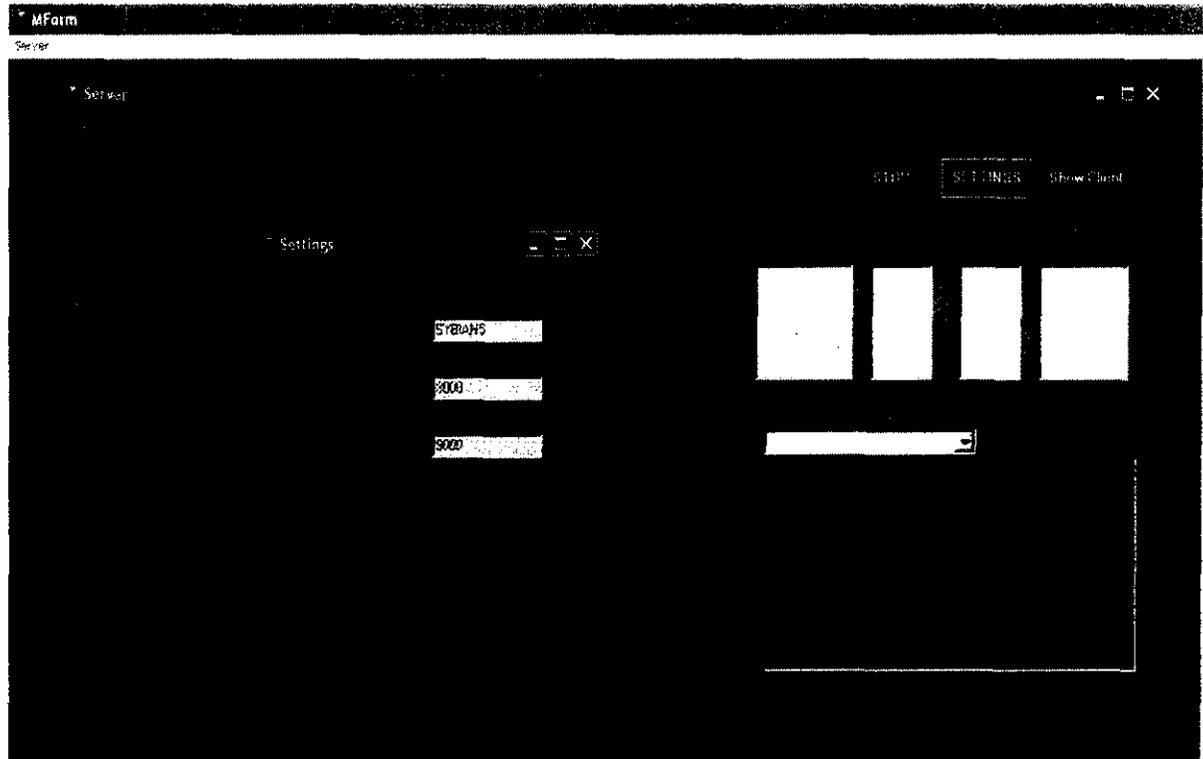
Fig A.12 Server Settings

Client from location register
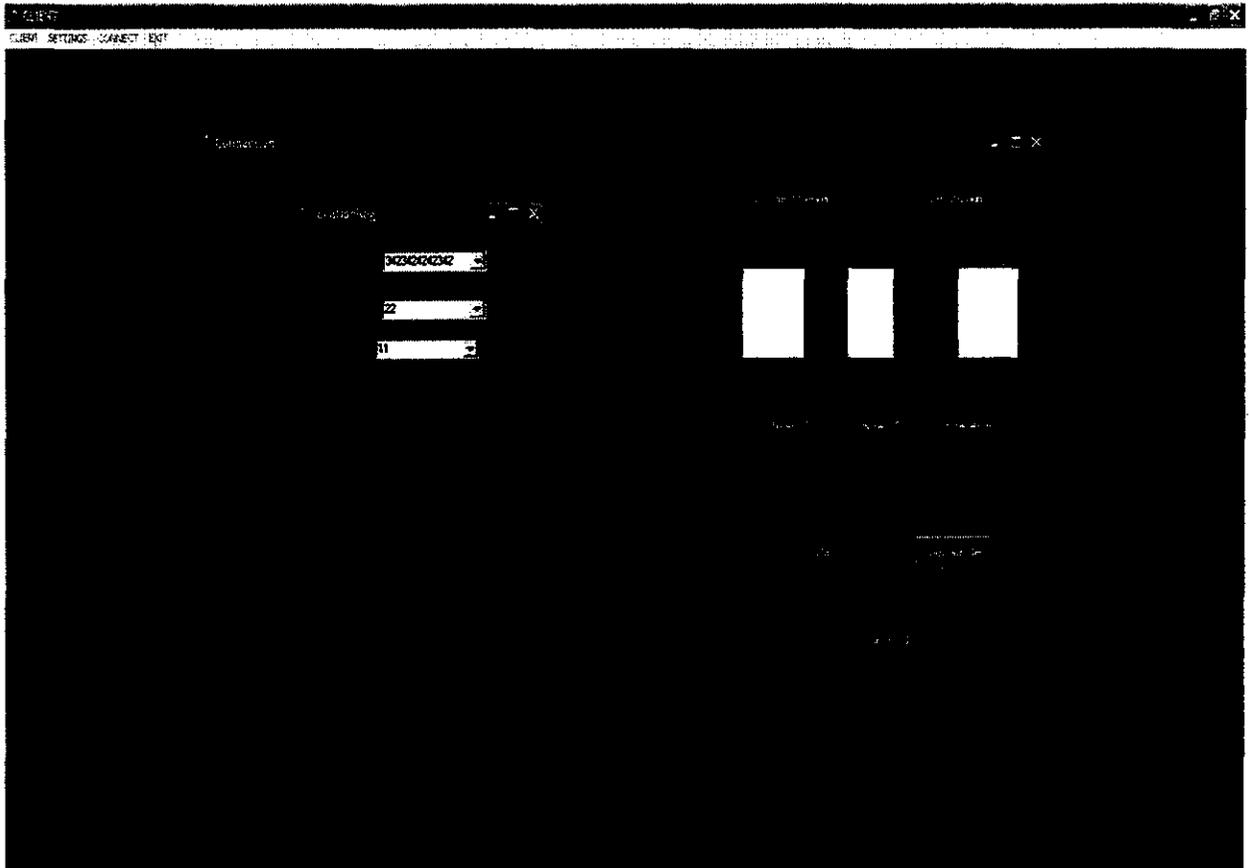
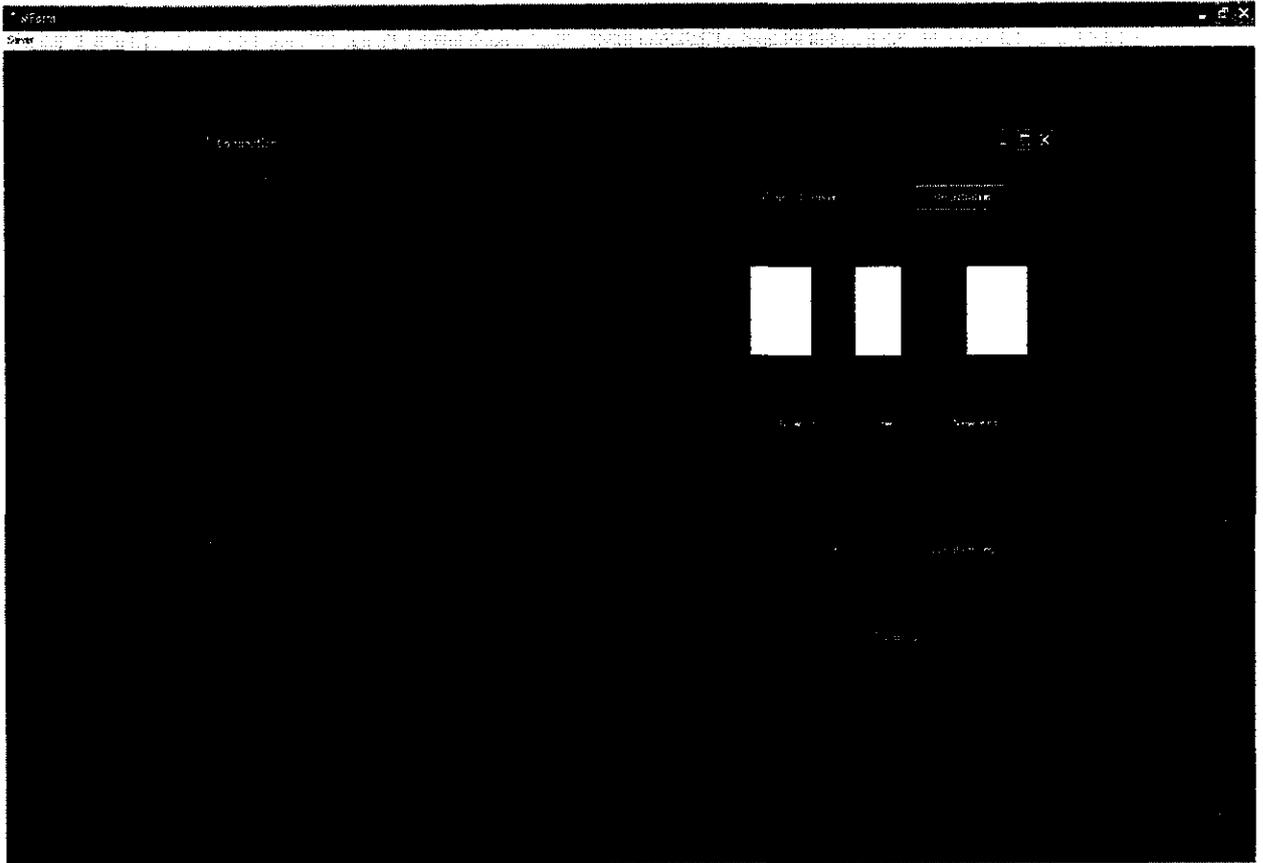**Fig A.13 Client from location registers**

Database Register from server

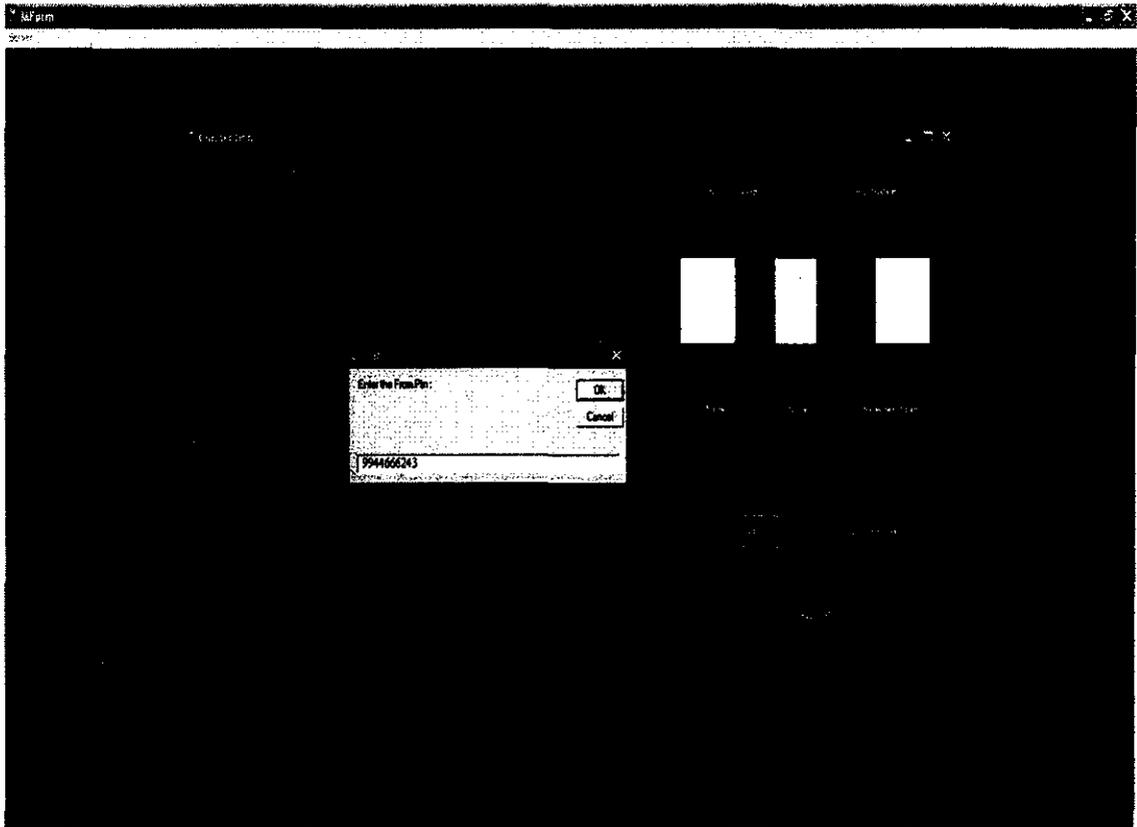**Fig A.14 Database Register from server**

PTN number from client

Fig A.15 PTN number from client
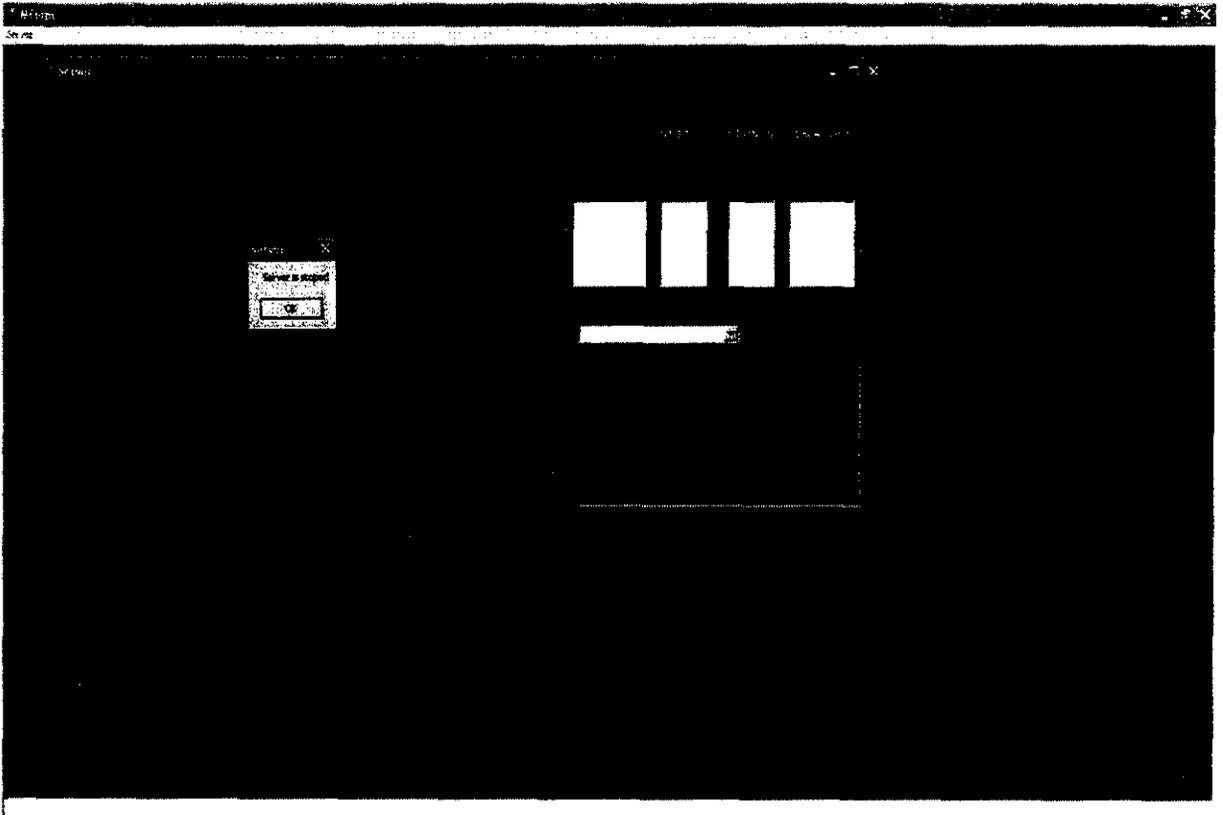
Server Stopped

Fig A.16 Server stopped

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