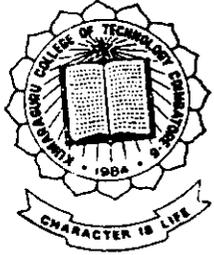


# “DATABASE ASSIST

- The NL Database Interface”



**PROJECT REPORT**

*SUBMITTED BY*

**G. ANUSHA SARAVANA DEVI**

*GUIDED BY*

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Department of Computer Science and Engineering

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS  
FOR THE AWARD OF THE DEGREE OF  
**MASTER OF SCIENCE IN**  
**APPLIED SCIENCE - COMPUTER TECHNOLOGY**  
OF BHARATHIAR UNIVERSITY, COIMBATORE.

2001-2002

Department of Computer Science and Engineering

**Kumaraguru College of Technology**

Coimbatore - 641006.

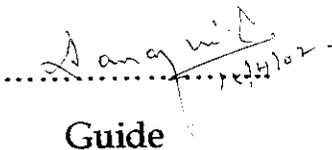
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TECHNOLOGY**  
Coimbatore-641006

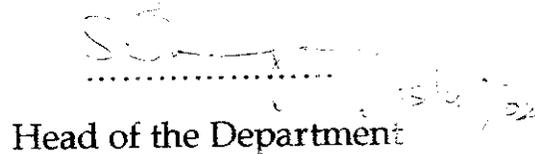
**Department of Computer Science and  
Engineering**

**Certificate**

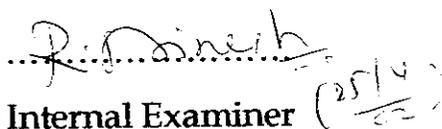
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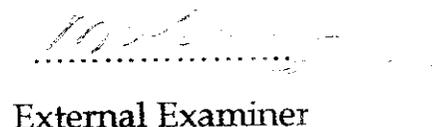
This is to certify that the report entitled "Database Assist - NL Database Interface" has been submitted by G. Anusha Saravana Devi Reg.No:0037Q0027 in partial fulfillment for the award of the degree of *Master of Science in the Applied Science - Computer Technology*, Branch of Bharathiar University, Coimbatore - 641046 during the academic year 2000-2002.

  
.....  
Guide

  
.....  
Head of the Department

Certifies that the candidate with University Registration No.0037800027 is examined in the project viva-voce examination held on 25.04.2002

  
.....  
Internal Examiner (25/4/02)

  
.....  
External Examiner

## DECLARATION

I hereby declared that this project entitled "DATABASE ASSIST - The NL Database Interface" for HCL INFOSYSTEMS LTD., Chennai, is a record of bonafied project work carried out by me, during the period of 2001-2002 in partial fulfillment of the required for the award of the degree Master of Science in Applied Science - Computer Technology of the Bharathiar University, Coimbatore.

Under the guidance of

**Ms.P.Parameswari, M.C.A**

Department of Computer Science  
and Engineering,

Kumaraguru College of Technology,  
Coimbatore.

Sincerely,

**G. Anusha Saravana Devi**

**Reg. No. 0037Q0027**

Date: **25.04.2002**

Place: **COIMBATORE**

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I express my sincere thanks to **Mr.G.PONKANNAN**, Senior Manager - Finance & Accounts, **HCL INFOSYSTEMS LTD.**, for providing the opportunity to do the project in their organization and helping me in confronting the muddle, whenever I faced one, on the way towards the success of my project.

I express my sincere gratitude to my family , my friend **Santhosh** and others whom have taken much interest in making this project a successful one.

# **1. Introduction to Application Domain :**

## **1.1 Project Purpose**

The purpose of the project is to develop and document a software that aids enterprise-wide natural language database manipulations. Speech recognition is also supported by the application. The software provides users the ability to perform remote operations to the local database over internet. The software also provides the necessary support to the users of the enterprise intranet.

The software supports creation of systems that exploits the database manipulations using natural language interface. Using this software the applications implementing the NL interface for database manipulations can be developed and deployed at a blazing speed. The applications are internet enabled, so that users over a remote region can also use this application to communicate with other users over the internet/intranet to connect to databases and recover data.

## **1.2 Project Scope**

Since natural language is used as a primary form of input, the software accepts both speech, i.e., voice and text keyed-in through keyboard. The queries used to manipulate the database need not be in the regular SQL format, rather they are also accepted as English-Like statements. This extends the usage of the computers to those who are not familiar with the SQL commands and also to those who tend to forget the syntax of the SQL statements. The software further extends the operability to the remote users who are away from the office, through the internet.

The project is intended to provide services to multiple users connected to a common network. The network may be an intranet or internet. The users can communicate with the centralized RDBMS which maintains the database. The users terminals running the client version of the application will have the ability to convert the user's speech to text and the converted text to respective SQL query, if possible.

### **1.3 Project Overview**

The project report is organized into the following sections. These sections are briefed below.

#### **Section 2 :**

*Contains the overall description of the software working and design. Various modules of the software are explained independently providing in-depth analysis of their working.*

#### **Section 3:**

*Provides the design specifications of the application. The design perspectives of the application are analyzed and diagrammatic sketches are presented to provide easy understanding.*

#### **Section 4:**

*Describes other requirements of the application. Other requirements such as operations required by the user, site adaptation requirements, and future scope are explained in this section.*

#### **Section 5:**

*Presents the reference materials used for the project development.*

## **1.4 Project Acronyms and Abbreviations**

### **Speech Recognition -**

The process of accepting the voice of the user mostly through the microphone connected to the computer, as input and identifying what the user has instructed the computer.

### **MSSAPI -**

Microsoft Speech Application Programming Interface. Used for implementing speech-to-text capability in a program.

### **Microsoft SQL server 7.0 -**

RDBMS which governs the operations on the database.

### **ASP -**

Active Server Pages. Microsoft's server side technology used to generate dynamic content over the internet/intranet.

### **RDBMS -**

Database Management System. This software governs all the operations of the database and authorizes the users to perform operations over the databases.

## **2. Software System Study :**

### **2.1 Product Perspective**

The software Database Assist, is an effective natural language “interpreter”, used for database manipulations. This “interpreter” efficiently parses the natural language provided by the user as input either by speech or by text. The user can use a microphone to input the queries or can use a keyboard to type natural language instructions.

By allowing the users to use natural language instructions, the need to remember the SQL syntaxes are eliminated. Anyone new to database manipulations too can effectively use them for productivity.

The software extends the usage of the local database to a remote user, through internet. The software simulates a picture to the remote user as though it is a local database. This helps the usability of the application regardless of the location.

## **2.2 Product Function**

The software developed is aimed at presenting a natural interface for database manipulations. As it would be harder to communicate with a database using the regular SQL queries, since this requires a lot of learning before manipulating the database. But as everyone could use the natural language much efficiently and much easily to perform the required operations. The natural language can be input to the program via users voice or text. This again provides a great opening to the method by which a database can be accessed.

The software receives the natural language input and performs special operations for converting the input to SQL queries for accessing the database. Though SQL queries are generated, the application is currently only compatible with the MS SQL Server 7.0 and above.

The database would even be accessible to a remote user who is located on a different geographical location from the enterprise where the database is located. The provision is provided to access the common database through internet. The user will still be able to access the database using their voice and as well as through text input.

In the sample scenario, one with the DBA (Database Administrator) access privileges, can create a database and store the data into it. He can even delete and modify the database as he wishes. Similar users with DBA access rights to that database can only perform the above operations. Other users with normal user access rights can only perform data retrieval from the database.

All the operations Creation of a database table, Input of data, Modification, Deletion, Retrieval are performed using the Natural Language and not by using the actual SQL queries that are used normally to interact with the database. Resulting in a user's interaction with the database, without having to worry about the syntax of the SQL, taking place "Naturally" .

For example :

In a database containing the book names and their author names, the SQL query to select all the author names and the corresponding book names is:

"SELECT fname, lname, titles, pubinfo, year from author;"

This can be implemented by our software with much simpler Natural Language instruction

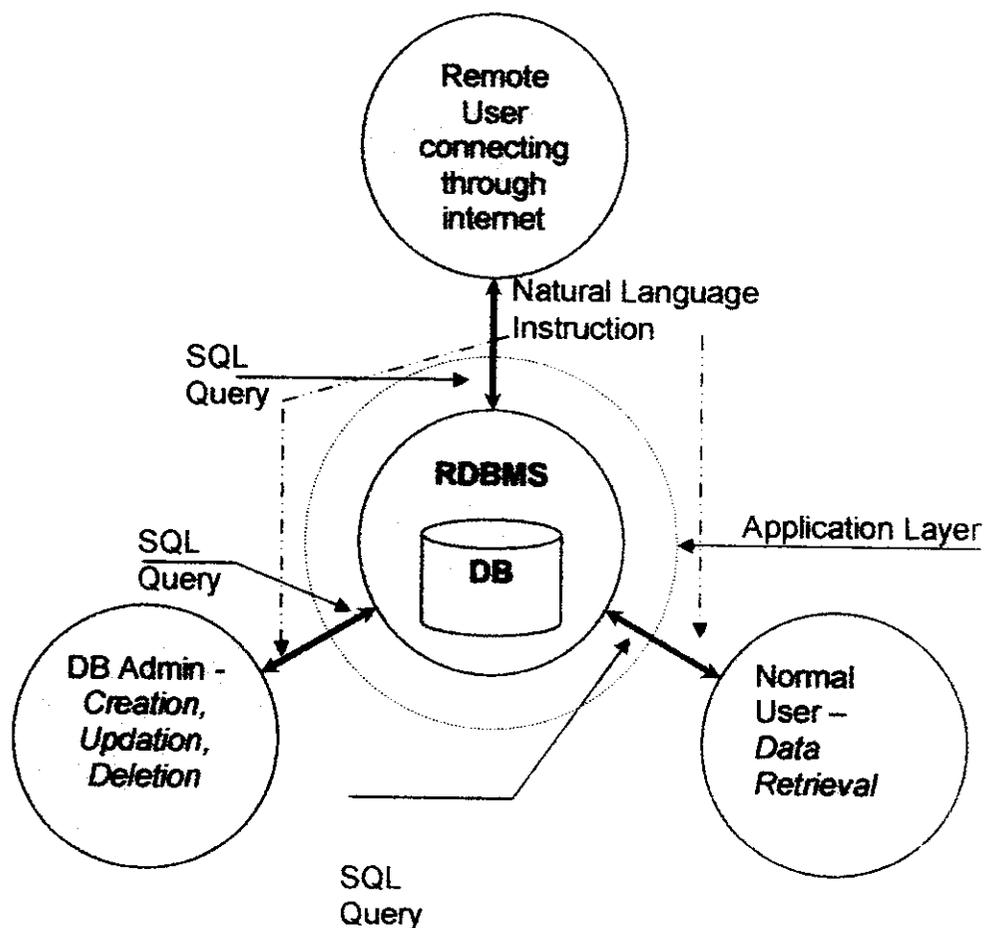
"List all the authors and their books"

The format in which the result is displayed is also completely customizable. They are determined prior to the operations. Thus just specifying the details needed to be retrieved alone will suffice.

The user has the option of either instructing the computer through his voice or by typing through keyboard. This adds the flexibility of "Hands - Free" operation for the user.

Since the application is capable of handling distributed database connections, simultaneous multi-user access is possible. The centralized RDBMS allows multiple parallel connections to the database.

### Operational diagram of the application



## **2.3 User Characteristics**

- The user should possess a fair amount of English knowledge, enabling him/her to form a sentence.
- The user must know the basic structure of the database, which could either be supplied while creation or by asking the administrator.
- The user should have sufficient time to train the software using the training module presented with the software, to achieve accurate speech recognition.
- Each individual user should have their own profiles stored, in the computer they are using the software, for efficient functioning of the program.

## **2.4 General Constraints**

- The portability of the software is restricted only to the windows platforms. Any other operating system may not support the functioning of the software.
- The RDBMS for which the software is developed is MS SQL Server 7.0. Any other RDBMS may not provide necessary results.
- Only the database administrator or the owner of the database is allowed to make changes to the database and the data in it. Others are allowed only to view the data.
- There may be incorrect speech recognition, due to external noise present in the place where the user uses the software.
- The MS SQL Server client should be installed and run by connecting it to the required server, for the exact functioning of the application.

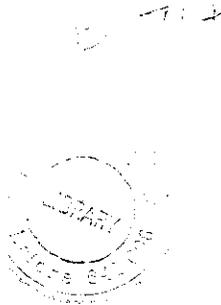


### 3. Software System Specifics:

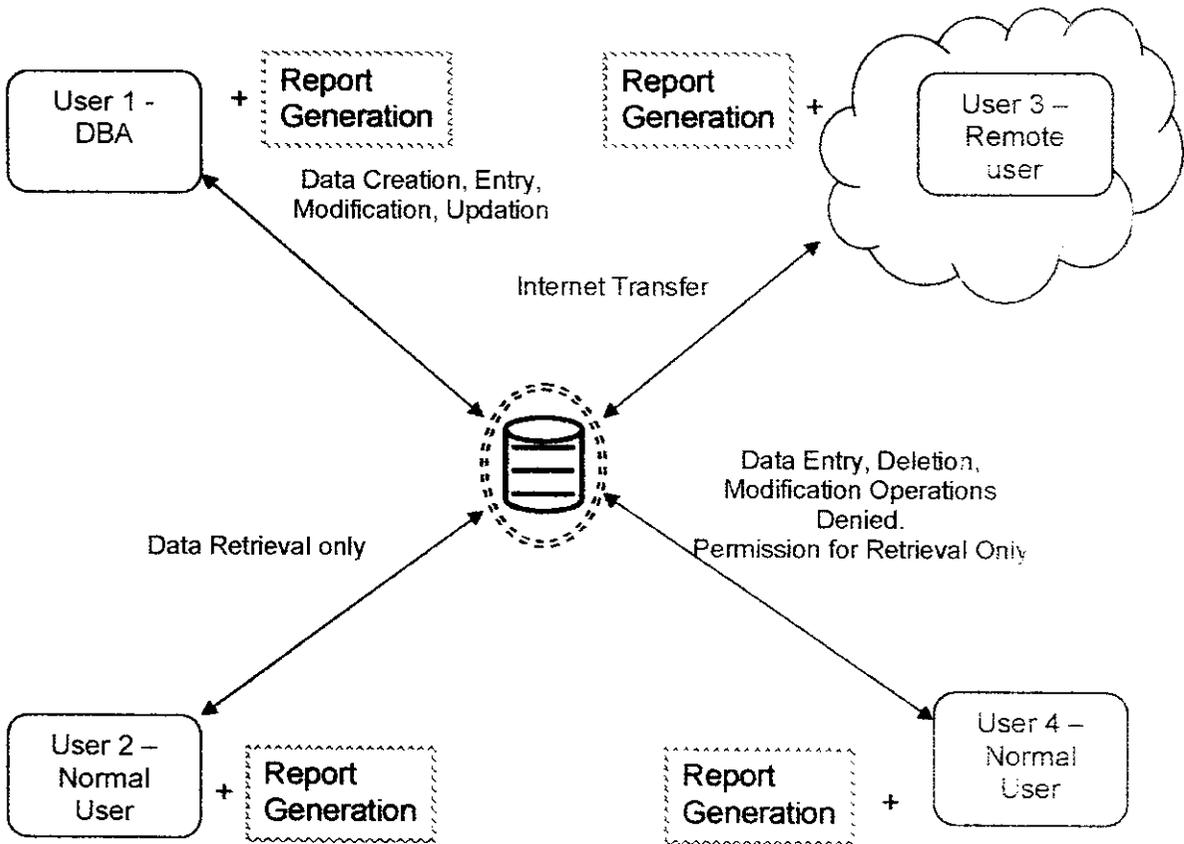
#### 3.1 Functional Requirements

##### 3.1.1 Introduction

The software is comprised of several functions, which collectively constitute the complete functionality. The various functions available in the project are database operations, report generation, user authorization, remote user operations. Each function is separately explained in the following diagrams.



## Overall Functionality Representation



The above diagram depicts the overall functionality of the application. The software is a unified work-area for the database operations. Each user role is provided with a set of special permissions to the database they are trying to access.

The database operations, Natural language interpretation, Remote user operations and Report generation are the major functionality of the software. The above diagram shows a glimpse of each of the above described operations.

The diagram presents three types of users, basically. They are

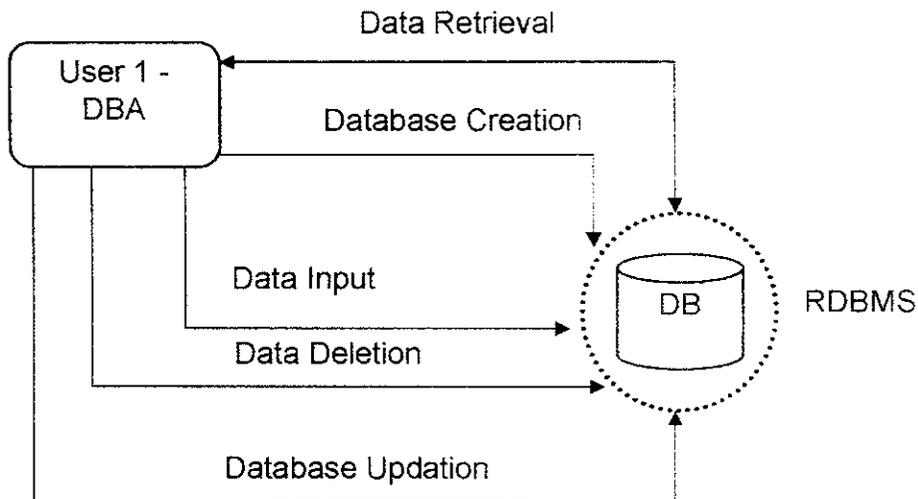
- 1) DBA (Database Administrator)
- 2) Normal User
- 3) Remote User

The DBA user, is the creator and proprietor to the database. This role is for the database activist, who creates, deploys, enters data, modifies, updates and maintains the database. At times other roles are available for these specific operations, but the privileges given by the RDBMS is more-or-less the same for these roles. So for the matter of simplicity we consider these roles unified into a single role, DBA. The actions performed by this activist is unlimited. The administrators are given complete freedom to operate over the database. They create users to access the database, provide access permissions to the users etc.

The next type of user is the Normal user. This user role is permitted to use the database for data retrieval purposes only. The databases too operable to this users are limited and can be configured as appropriately.

The above diagram consists of two normal users. One user performs just the data retrieval operation, which is permitted to that role. The other user tries to perform data entry, deletion, updation and creation of database, which are not permitted to that role. These activities are blocked by the RDBMS and the error messages generated by the underlying RDBMS are properly handled by the application to provide consistent program operation and error free operations. Upon the login provided to the database or the windows login can be used to determine the permission allotted to the user and the appropriate roles.

## DBA Operation



The operations performed by a DBA user are best described in the above diagram. Operations fall in the following categories,

### ➤ Database Creation

This is the process of creating a database either from scratch or by other methods, one of them being importing from other database formats.

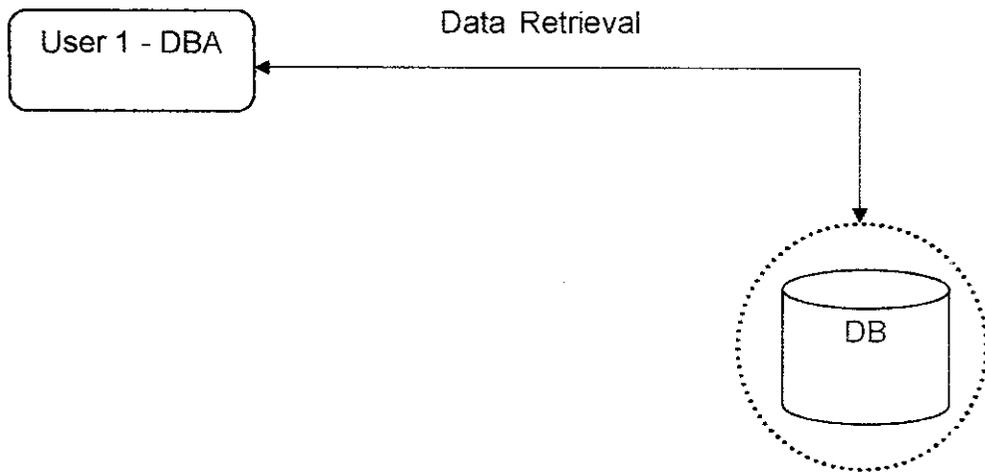
### ➤ Data Input

The input of data into the database is done mostly by the administrator who creates the database. But other users are also permitted to enter the data into the database in certain special cases.

## ➤ Data Deletion and Updation

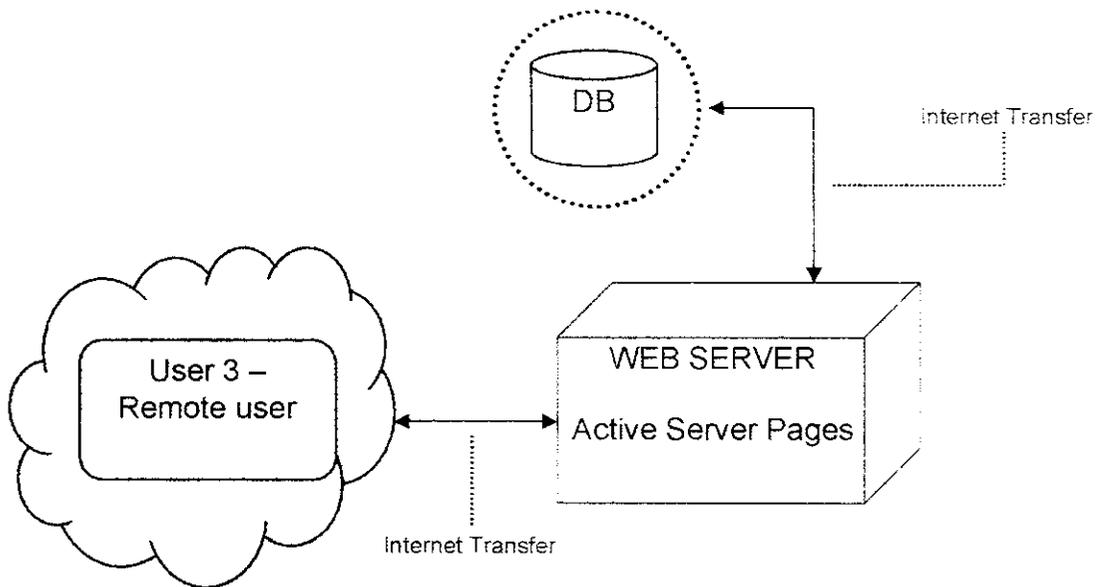
The existing contents of the database are modified in some means and they are updated to suit to the changing requirements. These operations also constitute to the operations of a DBA.

## Normal user operation



As the above diagram states the operations performed by most of the users with this operational privilege, is simple data retrieval operation. The user reads the data present in the database.

## Remote user operation



The remote users are the user of the database from a remote location or from a disconnected computer. The users connect to the database server using internet. The process is that ASP is used to connect the user to the database server, passing the query as a parameter and executes the query on the database server. The execution of the query on the database server results in a set of records which are returned to the user using ASP. This way any user from anywhere can communicate to the database server, provided he is authorized to use the database.

The users connecting through internet are given only normal user privilege, due to security considerations. The users using this facility can only read the existing data from the database and cannot alter, add new.

### **3.1.2 List of Inputs**

In the context of database operations, the inputs can be split into two types, DDL and DML commands. DDL is used to define and declare a database and its table. The DML commands are used to manipulate the database by adding, deleting, editing, updating the values in a database table.

The inputs are not restricted to any single list. It could possibly depend upon the usage of the software.

Speech recognition is the technique by which the words that are spoken by human are being recognized by the computer. Understanding a person's slang is difficult even for many of the humans. Similarly in the case of a computer, understanding different slang's is an uphill task, to overcome that , computer uses some training modules to get comfortable with the users voice. As a result the computer can easily recognize what user is saying.

The field of computer science that deals with designing computer systems that can recognize spoken words. Note that voice recognition implies only that the computer can take dictation, not that it understands what is being said. Comprehending human languages falls under a different field of computer science called natural language processing.

A number of voice recognition systems are available on the market. The most powerful can recognize thousands of words. However, they generally require an extended training session during which the computer system becomes accustomed to a particular voice and accent. Such systems are said to be speaker dependent.

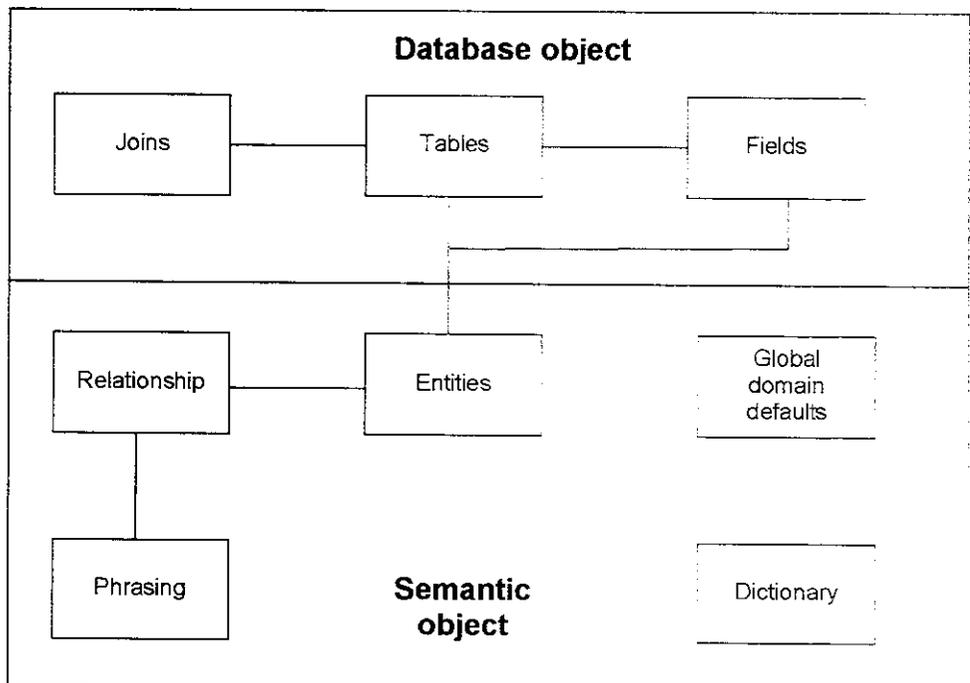
Many systems also require that the speaker speak slowly and distinctly and separate each word with a short pause. These systems are called discrete speech systems. Recently, great strides have been made in continuous speech systems – voice recognition systems that allow you to speak naturally. There are

several continuous-speech systems available for personal computers, now.

➤ **Natural Language to SQL Query**

A domain is a collection of information about the database objects and the semantic objects in a application. An object that can be represented by a database object or other real-world object. For example, an entity and a relationship are semantic objects. The Diagram represents the Domain objects as follows

**Domain Objects**

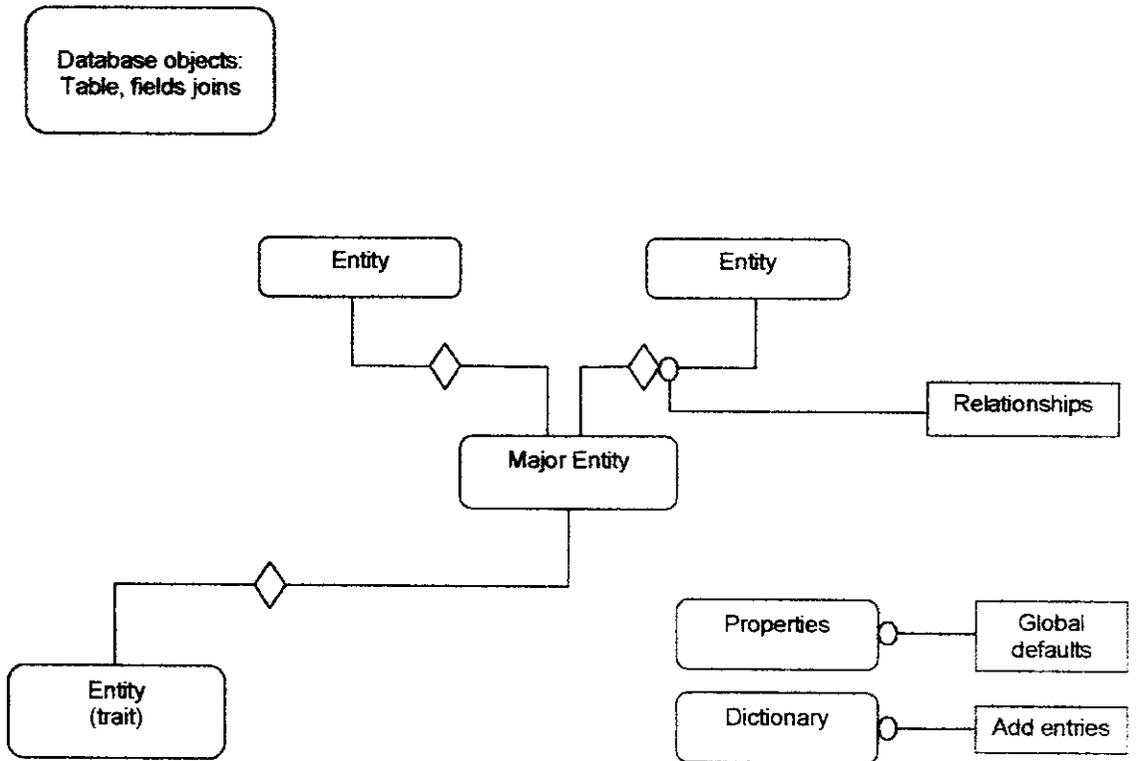


Initially the definition of semantic objects are provided. These include entities and relationships (with phrasings). Entities are most often represented by tables and sometimes by fields. Relationships express how those entities are associated with one another. The next task is creating a domain.

Domain information includes the structure of the database and semantic objects that are defined. Similarly the relationships and the phrasings between the entities and relationships are defined. By defining the relationships and the phrasings between various entities and their relationships in the database, we can develop a concise structure of the whole database and can generate appropriate entities and can refer them. Thus by obtaining the appropriate database entity we can obtain the database objects that could denote the entity in the program.

The following diagram represents various terms such as domains, entities and relationships. The visual representation of these terms is easy to understand than theoretical definitions.

## Domain, Entity, Relationships



As the user refers each of the entity, in the query, the corresponding relationships are also considered to generate appropriate SQL query.

➤ Remote database accessing

The remote users are the user of the database from a remote location or from a disconnected computer. The users connect to the database server using internet. The process is that ASP is used to connect the user to the database server, passing the query as a parameter and executes the query on the database server. The execution of the query on the database server results in a set of records which are returned to the user using ASP. This way any user from anywhere can communicate to the database server, provided he is authorized to use the database.

The users connecting through internet are given only normal user privilege, due to security considerations. The users using this facility can only read the existing data from the database and cannot alter, add new.

## **3.2 Performance Requirements**

### **3.2.1 Availability**

The software is available for all the windows platforms including Windows 98, Windows Millennium, Windows 2000, Windows NT.

### **3.2.2 Capacity**

The capacity of space occupied by the working software would be very small when compared with the capacity of the database used by the application. The support files required for the speech recognition and natural language query conversion to the SQL query and files required to generate appropriate reports also increase the space required by the application. The total space required by the application and the support files are 4 MB.

### **3.2.3 Response Time**

The response time of the application depends on the machine in which the software is used. The hardware configuration, processor speed and the locality of the database management system also plays a part in determining the response time of the application.

### 3.2.4 Security

The application is secure enough, by not damaging the data it processes. Moreover, the access privileges to various users are set and only according to those rights they are allowed to access the database.

The application is built to provide internet / intranet services. The security is of a high consideration for the applications using any networking processes, especially internet processes. The application thus delivers high degree of security and can with stand a considerable amount of load without crashing. The application provides severe access restrictions to the users, so that only authorized users can access the database only with authorized privileges.

### **3.2.5 System Requirement based on Software Testing**

The recommended system configuration for testing the application is

- Pentium II class processor.
- MS Windows 2000 or NT.
- MS SQL Server 7.0.
- Internet Information Server(IIS) or Personal Web Server (PWS).
- MS Visual Basic Runtime Files.
- MS SAPI Runtime Files.
- Internet Connection and an Internet Browser.
- Microphone, preferably close talk.

### **3.3 Programming Environment**

#### **3.3.1 Hardware Description**

The application doesn't require any specialized hardware, other than the regular peripherals that are the part of a standard equipment. The keyboard, Mouse and Microphone are considered as the input devices and VDU and printer are considered as the output devices.

#### **3.3.2 Software Environment**

The software is developed using MS Visual Basic 6.0, MS SQL Server 7.0, MS SAPI 4.0. The Operating System used for the development is MS Windows 2000 Professional. The server-side scripting is accomplished using ASP. To develop the WebPages MS Visual InterDev 6.0 is used.

### **3.3.3 User Interface and Screen formats**

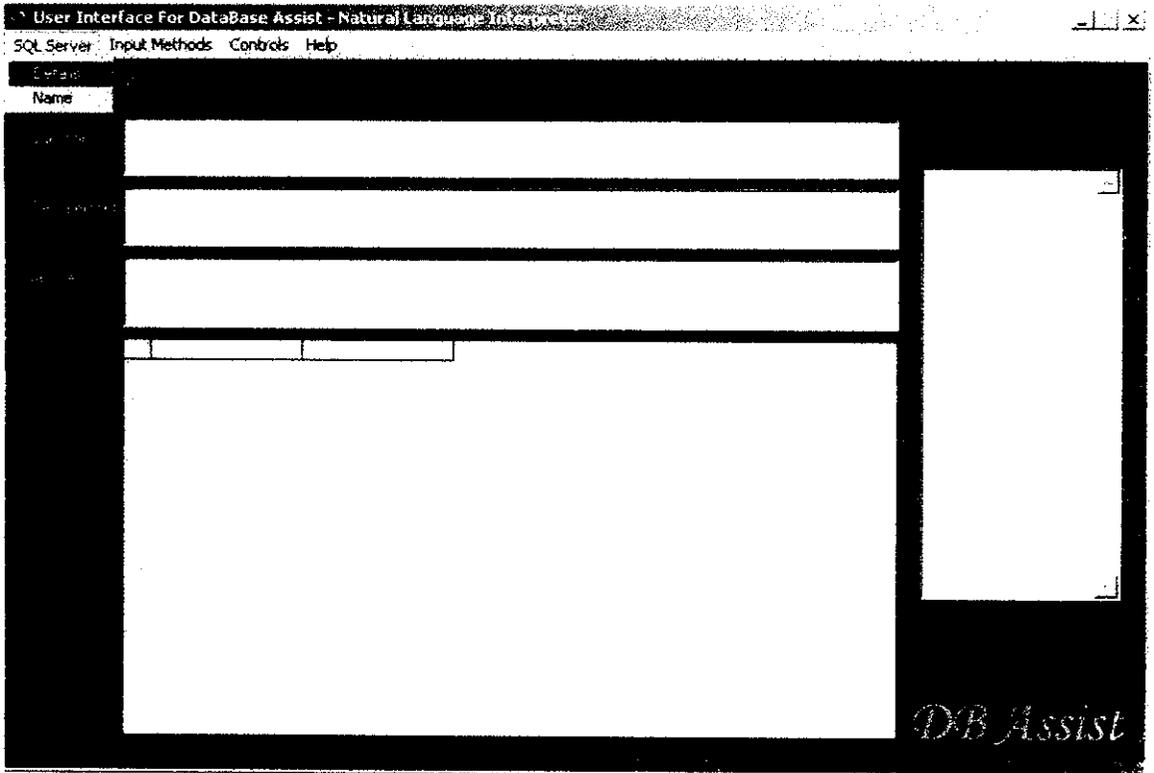
The application has good user interface, which is presented to the user, when the program is executed. There are two modes of using the program. the first mode is by using standard input devices such as keyboard and mouse alone.

The second mode of operation is through the speech recognition mode. The user can use a microphone and speak to the computer. This mode also supports the usage of standard input devices such as keyboard and mouse.

The program has extensive usage of menus and other forms of interactive dialogs. The user can always get the menus and floating controls by pressing the CTRL key.

The following are a small snapshot of the screens available in the application. The screens representing the various functionalities of the application are depicted by the following screenshots of the software.

# SQL Server Menu Screen



## Server Exploring Screen

SQL Server

Server: HOME-JN08YP146Z Exit

Databases	Tables	Columns
master	authors	au_id
model	discounts	au_lname
msdb	dtproperties	au_fname
Northwind	employee	phone
pubs	jobs	address
tempdb	pub_info	city
	publishers	state
	roysched	zip
	sales	contract
	stores	
	sysallocations	
	syscolumns	
	syscomments	
	sysdepends	
	sysfilegroups	

Properties for: Columns  
Count: 9

## Input Methods Menu Screen

User Interface For DataBase Assist - Natural Language

SQL Server   Input Methods   Controls   Help

Speech

list all authors and their address

Show the authors and their author addresses

The authors and their author addresses:

First Name	Last Name	Address	City	State	Zip Code
Johnson	White	10932 Bigge Rd	Menlo Park	CA	94025
Marjorie	Green	309 63rd St. #411	Oakland	CA	94618
Anne	Dull	78 bharathipark	tarabala colony	TN	87678
Cheryl	Carson	589 Darwin Ln	Berkeley	CA	94705
Michael	O'Leary	22 Cleveland Av #1	San Jose	CA	95128
Dean	Straight	5420 College Av	Oakland	CA	94609
Meander	Smith	10 Mississippi Dr	Lawrence	KS	66044
Abraham	Bennet	6223 Bateman St	Berkeley	CA	94705
Ann	Dull	3410 Blonde St	Palo Alto	CA	94301
Burt	Gringlesby	PO Box 792	Covelo	CA	95426
Charlene	Locksley	18 Broadway Av	San Francisco	CA	94136
Morningstar	Greene	22 Graybar House R	Nashville	TN	37218
Reginald	Blotchet-Hallo	55 Hillside B	Corvallis	OR	97330
Akiko	Yokomoto	3 Silver Ct	Walnut Creek	CA	94595
Innes	del Castillo	2286 Cram Pl #36	Ann Arbor	MI	48105
Michel	DeFrance	3 Balding Pl	Gary	IN	46403

DB Assist

## Text Input Method Screen

User Interface For DataBase Assist - Natural Language

SQL Server Input Methods Controls Help

What is the SQL

SQL query

list all authors and their address

SQL statement

Show the authors and their author addresses.

SQL result

The authors and their author addresses.

	First Name	Last Name	Address	City	State	Zip Code
▶	Johnson	White	10932 Bigge Rd	Menlo Park	CA	94025
	Marjorie	Green	309 63rd St. #411	Oakland	CA	94618
	Anne	dull	78 bharathipark	saibaba colony	TN	87579
	Cheryl	Carson	589 Darwin Ln	Berkeley	CA	94705
	Michael	O'Leary	22 Cleveland Av. #1	San Jose	CA	95135
	Dean	Straight	5420 College Av.	Oakland	CA	94609
	Meander	Smith	10 Mississippi Dr	Lawrence	KS	66044
	Abraham	Bennet	6223 Bateman St	Berkeley	CA	94705
	Ann	Dull	3410 Blonde St	Palo Alto	CA	94301
	Burt	Gringlesby	PO Box 792	Covelo	CA	95408
	Charlene	Locksley	18 Broadway Av.	San Francisco	CA	94130
	Morningstar	Greene	22 Graybar House R	Nashville	TN	37215
	Reginald	Blotchet-Halls	55 Hillsdale St.	Corvallis	OR	97330
	Akiko	Yokomoto	3 Silver Ct	Walnut Creek	CA	94595
	Innes	del Castillo	2286 Cram Pl #36	Ann Arbor	MI	48105
	Michel	DeFrance	3 Balding Pl	Gary	IN	46403

## Control's Menu Screen

User Interface For DataBase Assist - Natural Language Interface

SQL Server Input Methods Controls Help

Print & Refresh

list all authors and their address

---

Show the authors and their author addresses.

---

The authors and their author addresses:

First Name	Last Name	Address	City	State	Zip Code
Johnson	White	10832 Bigge Rd	Menlo Park	CA	94025
Marjorie	Green	309 63rd St. #411	Oakland	CA	94618
Anne	dull	78 bharathipark	sababab onlong	TN	87678
Cheryl	Carson	589 Darwin Ln	Berkeley	CA	94705
Michael	O'Leary	22 Cleveland Av. #1	San Jose	CA	95128
Dean	Straight	5420 College Av.	Oakland	CA	94609
Meander	Smith	10 Mississippi Dr	Lawrence	KS	66044
Abraham	Bennet	6223 Bateman St	Berkeley	CA	94705
Ann	Dull	3410 Blonde St.	Palo Alto	CA	94301
Burt	Gringlesby	PO Box 732	Coveilo	CA	95428
Charlene	Locksley	18 Broadway Av	San Francisco	CA	94130
Morningstar	Greene	22 Graybar House P	Nashville	TN	37215
Reginald	Blotchett Halls	55 Hilldale E	Corvallis	OR	97330
Akiko	Yokomoto	3 Silver Ct	Walnut Creek	CA	94595
Innes	del Castillo	2286 Cram Pl. #85	Ann Arbor	MI	48105
Michel	DeFrance	3 Balding Pl	Gary	IN	46403

*DB Assist*

## Control's Menu Screen

Controls		
Text Controls		
History and Suggested Queries		
Show SQL	Submit	Exit
Speech Controls		
Start	Stop	Done
Internet Controls		
Send Query	Recieve Query	
Database Controls		
Database Editor		

## Database Editor Screen

pub_id	pub_name	city	state	country
▶	New Moon Books	Boston	MA	USA
0877	Binnet & Hardley	Washington	DC	USA
1389	Algodata Infosystems	Berkeley	CA	USA
1622	Five Lakes Publishing	Chicago	IL	USA
1756	Ramona Publishers	Dallas	TX	USA
9901	GGG&G	München		Germany
9952	Scootney Books	New York	NY	USA
9999	Lucerne Publishing	Paris		France
*				

Add    Update    Delete    Refresh    Close    Report

Record: 1

## **4. Other Requirements :**

### **4.1 Operations Required by the user**

The user has the option to use either voice or text input in the program. The user can also use both the options combinedly to perform the operations. The operations performed by the users can be classified into two major categories.

- Definition and Input of Data
- Data Retrieval

#### **Definition and Input of Data :**

This process is used to create a structure in which the data will be input. For instance, the user first creates a database or a database table and defines the structure of the data placeholder. Then the user inputs the data to be stored into the database. This input process is done mostly by the DBA (Database Administrator). DBA is the sole controller of the database, is the person capable of changing the structure of the database and the data present in it. Other users who use the database can only view the database and cannot perform operations like deletion or updation in the database.

## 5 References :

### 5.1 Books

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- Jim Buyens, Step by Step Web Database Development, published by prentice-hall of India Private Limited,2001
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- Evan S. Dictor, Visual Basic Controls In A Nutshell, O'Reilly Publications, 1999.
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- Paul Thurrott, et al., Visual InterDev 6 Unleashed - The Comprehensive Solution, Techmedia - SAMS publishing, BPB publications press, 1999.

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## APPENDIX

### SAMPLE SOURCE CODE

The following source code is the sample code for the project. There are eight forms and a module according to which they are separated using Visual Basic 6.0.

#### Source code in the Query form

```
Dim WithEvents RecoContext As SpSharedRecoContext
```

```
Dim Grammar As ISpeechRecoGrammar
```

```
Dim m_bRecoRunning As Boolean
```

```
Dim m_cChars As Integer
```

```
Private Sub about_Click()
```

```
MsgBox "Developed By Anusha Saravana Devi.G" & vbCrLf & " For HCL INFOSYS,  
Chennai", vbInformation + vbOKOnly + vbApplicationModal, "Database Assis?"
```

```
End Sub
```

```
Public Sub cmdCopy_Click()
```

```
    frmQuery.ctrlQuestion.Text = txtSpeech.Text
```

```
    frmQuery.SetFocus
```

```
    frmQuery.ctrlSubmit_Click
```

```
End Sub
```

```
Public Sub btnExit_Click()
```

Call Shutdown

End

End Sub

Public Sub btnHistory\_Click()

frmHistory.Show

End Sub

Public Sub btnShowSQL\_Click()

frmSQL.Show

frmSQL.ctrlSQL = g\_strCurrentSQL

End Sub

Private Sub ctrlNextAnswer\_Click()

g\_iLastDisplay = g\_iLastDisplay + 1

If g\_iLastDisplay >= g\_iNumDisplays Then

frmQuery.ctrlNextAnswer.Visible = False

Exit Sub

End If

If (g\_iLastDisplay + 1) = g\_iNumDisplays Then

frmQuery.ctrlNextAnswer.Visible = False

End If

Select Case g\_iResponseType(g\_iLastDisplay)

Case iAnswerParse

ctrlAnswer.Text = g\_strAnswer(g\_iLastDisplay)

Case iSQLParse

```

g_strCurrentSQL = g_strSQL(g_iLastDisplay)
Screen.MousePointer = MouseHourGlass
Call ExecuteQuery(g_strSQL(g_iLastDisplay), 1, 0)
ctrlAnswer.Text = g_strAnswer(g_iLastDisplay)
Screen.MousePointer = MouseNormal
Case iSQLYesNo
g_strCurrentSQL = g_strSQL(g_iLastDisplay)
Screen.MousePointer = MouseHourGlass
ctrlAnswer.Text = g_strAnswer(g_iLastDisplay)
Call ExecuteQuery(g_strSQL(g_iLastDisplay), 1, 1)
Screen.MousePointer = MouseNormal
Case Else
MsgBox "Unknown Reply from SubmitQuery", vbOKOnly, "Database Assist -
Error"
Exit Sub
End Select

End Sub

Private Sub ctrlQuestion_KeyDown(KeyCode As Integer, Shift As Integer)
If KeyCode = vbKeyControl Then
Load frmControls
frmControls.Show
End If
End Sub

```

```

Private Sub ctrlRestatement_KeyDown(KeyCode As Integer, Shift As Integer)
If KeyCode = vbKeyControl Then
    Load frmControls
    frmControls.Show
End If
End Sub

```

```

Public Sub ctrlSubmit_Click()
    On Error GoTo errorhandler
    Dim iNumAnswers As Integer
    Dim strRestatement As String

    ctrlQuestion.SelStart = 0
    If (Len(ctrlQuestion.Text) = 0) Then Exit Sub
    ctrlQuestion.SelLength = Len(ctrlQuestion.Text)

    If (Left$(ctrlQuestion.Text, 7) = "select ") Then
        ExecuteQuery ctrlQuestion, 1, 1
    End If
    g_strCurrentQuestion = ctrlQuestion.Text
    g_strCurrentSQL = ""
    frmHistory.ctrlHistory.AddItem (g_strCurrentQuestion)
    frmQuery.ctrlNextAnswer.Visible = False

    Screen.MousePointer = MouseHourGlass
    iNumAnswers = SubmitQuery(g_objNLSession, g_strCurrentQuestion,
g_iResponseType, _
        strRestatement, g_strAnswer, g_strError, g_strSQL)

```

Case iSQLYesNo

g\_strCurrentSQL = g\_strSQL(0)

Screen.MousePointer = MouseHourGlass

ctrlAnswer.Text = g\_strAnswer(0)

Call ExecuteQuery(g\_strSQL(0), 1, 1)

Screen.MousePointer = MouseNormal

Case Else

MsgBox "Unknown Reply from SubmitQuery", vbOKOnly, "Database Assist -  
Error"

Exit Sub

End Select

errorhandler:

ErrorTrapper err

End Sub

Private Sub ctrlQuestion\_KeyPress(KeyAscii As Integer)

If KeyAscii = 13 Then

ctrlSubmit\_Click

End If

End Sub

Public Sub details\_Click()

frmMain.Visible = True

frmMain.SetFocus

End Sub

Private Sub Exit\_Click()

frmQuery.btnExit\_Click

End Sub

```
Grammar.DictationSetState SGDSActive
SetState True
End Sub

Public Sub btnStop_Click()
Grammar.DictationSetState SGDSInactive
SetState False
End Sub

Public Sub Frame1_Click()
frmQuery.SetFocus
End Sub

Private Sub history_Click()
frmQuery.btnHistory_Click
End Sub

Private Sub mnuCtrlAssist_Click()
frmControls.Show
End Sub

Public Sub name_Click()
MsgBox frmMain.svrName, vbApplicationModal + vbInformation + vbOKOnly,
"Database Assist - Current SQL Server"
End Sub
```

## Conclusion :

Thus the "Database Assist - the NL Database Interface" is developed. The software is undergoing extensive testing and debugging. As and when the errors and exceptions are found they are rectified. The software works successfully in normal circumstances. The development process as a whole perceived a well working software as the product. Thus the documentation for the developed software could also be done, so that it could act a resource that any future programmer or enthusiast can refer to. Anyone referring to this, if benefited by the product or documentation, kindly send a mail to the author @ Anusha\_devi@yahoo.com. Your comments are welcome!

