Kumaraguru College of Technology

Department of Computer Science and Engineering
Coimbatore– 641006.

April 2003

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DATABASE TRANSFORMATION AND SYNCHRONIZATION

Project work done at

LAWRENCE & ASSOCIATES Pvt. Ltd., Chennai.

PROJECT REPORT

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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Reg, No.: 0038M1063

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Department of Computer Science and Engineering
KUMARAGURU COLLEGE OF TECHNOLOGY
(Affiliated to Bharathiar University)
Coimbatore – 641 006.

CERTIFICATE

This is to certify that project work entitled

DATABASE TRANSFORMATION AND SYNCHRONIZATION

Done By
M.SARAVANAN
Reg.No: 0038M1063

Submitted in partial fulfillment of the requirements for the award of the degree of **Master of Computer Applications of Bharathiar University.**

Professor and Head

Internal Guide

Submitted to University Examination held on 16.04.2003.

Internal Examiner 16/4/03

External Examiner 16/4/03

LAWRENCE & ASSOCIATES (INDIA) PVT. LTD.

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March 27, 2003

The Head of the Department,
Department of Computer Science,
Kumaraguru College of Technology,
Chinnapdampatti Post,
Coimbatore .

This is to certify that Mr. M.Saravanan, (Reg No: 0038M1063) has successfully completed his project for his "Master of Computer Applications" degree (Final Year) of Kumaraguru College of Technology, Coimbatore as a part of his curriculum in our Organization from December 16th,2002 to March 27, 2003. During this period he has successfully completed his project entitled "DATABASE TRANSFORMATION AND SYNCHRONISATION TOOL" under the guidance of Mr. Anand. Their performance was excellent and up to the expectation.

We wish him success in his future endeavors.

Place: Chennai – 113

VISHNU PRIYA R.S.
Manager- Human Resources

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March 27, 2003

TO WHOM SO EVER IT MAY CONCERN

This is with reference to the request made by Mr. M.Saravanan (Reg No: 20038M1063) final year student of "Master of computer Applications", Kumaraguru College of Technology, Coimbatore to take the source code and data from the project he has completed for the purpose of Viva voce.

We regret to inform you that as the policy of the Company we will not permit the source code to be taken out of the organization.

Thank you

Yours faithfully,
for Lawrence & Associates India Pvt Ltd.,

R.S. Vishnu Priya
Manager- Human Resources

DECLARATION

I here by declare that project entitled **DATABASE TRANSFORMATION AND SYNCHRONIZATION** submitted to Bharathiar University as the project work of **Master of Computer Applications Degree,** is a record of original work done by me under the supervision and Guidance of **Mr. P.Thadeus Anand**, *Project Manager, Lawrence & Associates (India) Pvt. Ltd., Chennai* and **Ms. N. Chitradevi,** ME., lecturer, *Department of Computer Science and Engineering, Kumaraguru College of Technology, Coimbatore* and this project work has not found the basis for the award of any Degree/ Diploma / Associate ship/ Fellowship or similar title to any candidate of any university.

Place: COIMBATORE.
Date: 07-04-2003

M. Saravanan

(M. SARAVANAN)

Countersigned By

P. Thadeus

(Internal Guide)

ACKNOWLEDGEMENT

I wish to express my deep sense of gratitude to **Dr.K.K. Padmanabhan,** B.sc.,(Enng), M.Tech, P.hd., Principal, **Dr. S. Thangaswamy,** Ph. D., Head of Computer Science & Engineering Department, Kumaraguru College of Technology, Coimbatore, for providing me with an opportunity to take up this project.

I would like to place on record my thanks to my internal guide **Ms. N. Chitradevi,** ME., Lecturer, Department of Computer Science and Engineering, whose encouragement to be proved to be simulating. I am also grateful to all other staff members of the department for their support and guidance throughout this project work.

I express my profound gratitude and thanks to **Ms. R.S VishnuPriya,** HR Manager, LAI, Chennai and my external guide **Mr. Thadeus Anand,** Project Manager, LAI, Chennai, for giving me an opportunity to work on this project.

I owe a lot to my dear parents, brother & sister-in-law for their faith in me and in all my endeavors.

Finally, I wish to express my thanks to all friends who helped me either directly or indirectly to complete this project by every means.

M.Saravanan.

SYNOPSIS

This Project **"Database Transformation / Synchronization Tool"** was developed using the language **Visual C++** as front-end and heterogeneous databases such as **SQL Sever, Oracle,** and **MS Access** as back-end.

It helps to transfer data from one database to another database. This system also has an important feature of synchronizing the datum whenever there is a change in the database. Apart from data retrieval using various databases, this system also supports retrieval of data available on text files. Any changes or updations performed on a particular database would reflect on the other databases also thus synchronizing the data across databases.

Major Features of the **Data Transformation / Synchronization Tool** are,

- Supports multiple Databases simultaneously.
- Transformation of databases.
- Maintains Error Log Information.
- Supports making the text file format of tables available in the database.
- Synchronizes the datum when there is a change in the database.

This tool provides a high degree of interactivity with a wizard kind of interface, making it user friendly.

The user provides the source database information and the destination database information. The most significant feature of the project lies in its ability to facilitate various users from using the same set of data residing across various databases according to their usage, thus ensuring a uniform cross database operability feature.

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Introduction

1. INTRODUCTION

1.1 PROJECT OVERVIEW

In a large organization, data would be heterogeneously spread across various locations, in various formats. Typically, most of the data would be available in a relational database like Oracle or Microsoft SQL Server, and Microsoft Access etc. Sometimes, data may be available as pure text also.

For the reason above, **Database Transformation/Synchronization Tool** is proposed to transform database from the original source database type into create a copy in the destination type mentioned by the user that may be of same database type or may be of different database type (such as SQL-Server, Oracle MS-Access) and provides bi-directional synchronization facility to ensure the availability of the most recent data though out the organization.

DTS (Database Transformation/Synchronization) Tool is a user-friendly tool designed to be used by database users as well as experienced database programmers. Synchronization of database is provided across databases during any kind of transactions.

Need for Data Transformation/Synchronization (DTS) Tool,

- Handle heterogeneous databases.
- Share connections and transactions between different databases.
- Guarantees sufficient level of performance and security.
- Manage and Synchronize transactions across databases.
- User-friendly data migration.

1.2 ORGANIZATION PROFILE

LAWRENCE & ASSOCIATES INDIA LIMITED

Lawrence & Associates, Inc.(LAI) was founded in 1996 in the state of Missouri, USA.LAI is an international staffing organization that provides personal to Fortune500 corporations worldwide.

Our clients include members of the financial, insurance, telecommunication and civil engineering industries.

LAWRENCE & ASSOCIATES – A SOLUTION PROVIDER

- At the technology center in Chennai, a dedicated team of IT professionals is put into vigorous clients specific training programs.
- The Management of Lawrence & Associates, In. has assembled a team of professionals skilled in the delivery of our core competencies which includes consulting services, software development and product development.
- Lawrence & Associates is a growing organization, offering flexibility to do what it takes to provide IT staffing solutions that fits its client's needs.
- Lawrence & Associates, Inc. is a guaranteed low cost provider.
- Lawrence & Associates has already won the confidence of its clients in great measure around the United States with its high quality professional dedication.
- Lawrence & Associates, Inc. branch offices are located adjacent to client locations to provide optimum customer service.

LAI is member of

- St. Louis Minority Business Council.
- St. Louis Regional & Commerce Growth Association.
- Dallas/Fort worth Minority Development Council.
- Hawthorn Foundation.

LAI Certifications

- Computer Associates strategic partner.
- Siebel systems Strategic partner.
- IBM Global Services partner.

AREAS OF CORE COMPETENCE

- Consulting services.
- Software Development.
- Product development.
- Civil engineering products.

1.3 PROJECT DESCRIPTION

Scope

This Project is developed as a tool to connect and navigate one or many ADO enabled databases. Databases are used as source to create new instance in different database types or to create copy in same type of database. It is a user friendly application developed in VC++. So, it can be used on any platform with any configuration system. The tool is possible to transform within the database types such as SQL-Server, Oracle, and MS-Access and to make text format of these database tables.

Project Perspective

The DTS Tool shall be used for Database administrators, Database programmers and Database users. This tool is self-contained. It is possible to retrieve data from various database tables that reside in different type of databases for transformation process but the user can't view the database by using the tool.

DTS Tool executes several SQL statements applicable for Access, SQL Server and Oracle Databases. All transactions performed on a particular table are reflected across the databases.

Product Functions:

- **Authentication**

This component allows authentication to access the tool and to connect databases if that are available in the servers. These connections can be either one or more different database instances of different type of databases. These database connection objects are maintained, for query execution and retrieval of database tables, fields and their data.

- **Transformation**

This function is used to transfer the user-defined tables that are available in the existing databases with their defined fields of various data types (such as text / string, integer / number, date, currency etc.,) and their arbitrary values to the same database type for making copies in different names or to other database types. It is done by executing SQL statements by query executor functions

- **Synchronization**

This component is used to automatically maintain the data consistency of two or more databases specified by the user for the same application based on the modified time property of the databases.

System study and Analysis

2. SYSTEM STUDY AND ANALYSIS

2.1 EXISTING SYSTEM

Existing system supports transformation between Oracle & MS-Access databases. New databases or new upgraded versions of databases are being released in very short intervals consecutively. The Existing system is not user friendly.

User cannot make copy of same database using existing system. Transformation (or) Migration processing of large databases requires more time.

This type of client tools supports particular databases and cannot be used on various heterogeneous databases. There is no existing tool for heterogeneous databases. So, database users need generic tools that are communicated with various databases

Database users want an additional facility for maintaining consistency (synchronization) of different databases based on same application during updation of tables in the database.

The Limitations of the existing systems are,

- Cannot handle Heterogeneous DBMSs.
- It's too expensive.
- It is too difficult to maintain data consistency during transactions (synchronization) and automation of transactions.

2.2 PROPOSED SYSTEM

Introduction

DTS (Database Transformation / Synchronization) is database manipulation tool that supports database users and database administrators to transfer the data stored in the existing database into another database specified by the user. This tool runs on many platforms and works with virtually all databases, making it a truly generic tool.

DTS provides such features as:

- **Authentication for both tool & data source**
- **Transformation of database**
- **Synchronization**

Authentication for Tool

The first step is to allow the existing user to access the tool by providing the Username and Password these should be maintained by the administrator of the tool. For efficient application development these details are maintained separately in the database within the system.

Database Connection

Database can be available in the local system or in the server, for accessing them the system should provide the option for user to give the Data Source name, Username and Password. DTS has an ability to connect one or more databases simultaneously. For accessing file format databases the system provides browse option to select the data source.

Transformation of database

After connecting with source and destination database given by the user, the tool retrieves all user defined tables, field names with corresponding field types such as text / string, integer / number, date / time, currency and etc., of each table and data stored in all fields. By using this information the system creates tables in the destination database. System also provides option to create new databases if the destination database does not exist.

While transferring Oracle table the system allows the user to enter the table name as the data source name. For the case if the destination database is Oracle means the system doesn't accept destination database name it automatically transfer the source table into Oracle database. System allows the user to make the text file format of the database tables by selecting the destination as text.

Synchronization

Based on the transformation concept the Synchronization component maintains the database consistency between two or more databases automatically by using the modified time property of the database. According to the latest modified database all other databases are updated.

2.3 RQUIREMENT ANALYSIS

Introduction

Requirement specification is focused specifically on functioning of the system. It allows the developer/analyst to understand the system, functions to be carried out performance levels to be obtained and corresponding interfaces to be established. The DTS is being designed in order to overcome the limitations faced by the existing system.

Functional Requirements

The DTS (Database Transformation / Synchronization) is a powerful Visual C++ application wizard based tool. Microsoft ADO Data Control version 6.0,(OLE DB) provides high performance access to any data source. The other set of functions include retrieving user defined tables based on table type, fields of each tables and their arbitrary values.

Design Constraints

- Visual C++ 6.0
- ADO data control (OLE DB data access interface)
- Heterogeneous Databases (SQL Server, Oracle, MS-Access and Text)

Hardware Limitations

The DTS tool should works on any hardware with lower configuration or higher configuration, which supports ADO data control.

2.4 USER CHARACTERISTICS

The Data Transformation/Synchronization Tool is applicable for three types of database users like,

a. Database Administrators

- Need Sound Knowledge in database management and administration
- Able to recover the database errors in critical situations.
- Need Knowledge of multiple databases.

b. Database Programmers

- Need average knowledge in database operations.
- Ability to handle database connection errors.
- Need Knowledge of heterogeneous databases.

c. Database Users

User should know minimum knowledge of computer fundamentals and database operations.

Programming Environment

3. PROGRAMMING ENVIRONMENT

3.1 HARDWARE AND SOFTWARE SPECIFICATION

Hardware

PROCESSOR	: PENTIUM 733MHz
MEMORY	: 128MB
HARD DISK	: 4GB
EHTHERNET CARD	: NE2000 COMPATIBLE
PERIPHERALS	: MOUSE, KEYBOARD
FLOPPY DISK	: 1.44MB
MONITOR	: 15'' SVGA

Software

OPERATING SYSTEM	: WINDOWS 2000 / NT / XP
LANGUAGE	: VC++ 6.0
DATABASES	: SQL SERVER, ORACLE & MS-ACCESS

3.2 DESCRIPTION OF SOFTWARE TOOLS USED

VC++ Overview

The Visual C++ 6.0 supports the Microsoft Universal Data Access strategy with enhances support for OLE DB. OLE DB provides high-performance access to any data sources- relational or nonrelational, e-mail and file systems, text and graphics, custom business objects, and more. New OLE DB consumer and provider templates make it easier to implement the OLE DB data access interfaces. You can take advantage of the speed and reach of new OLE DB data access interfaces. You can take advantage of the

Speed and reach of new OLE-DB get at all the data types OLE DB supports with this special preview of the new OLE DB templates.

OLE DB consumer template enables you to go directly to OLE DB to provide high-speed data access from your applications and controls. OLE DB consumer templates provide exacting control and significantly reduce code size.

Microsoft Foundation Class Library (MFC) provides a robust set of classes that hide much of the complexity of windows programming behind an impressive, high-level application framework. The MFC is an extensive C++ class library designed for creating windows GUI programs. The MFC simplifies writing these programs and it provides many high level features that save considerable coding effort.

Heterogeneous databases

SQL Server

Microsoft SQL Server 2000 is a high performance client/server relational database management system (RDBMS). It was support High volume of transaction processing as well as data warehousing and decision-support applications. SQL Server-2000 runs on Microsoft Windows NT or Windows 2000.

SQL Server datatypes provide the simplest form of data integrity by restricting the types of information (for example Characters, numbers, or dates) that can be stored in the columns of the database tables. This is used to implement the data type transfer of databases.

MS-Access

Access 2000 works with three types of databases: traditional Access databases, MSDE databases, and databases stored on machines running SQL Server 6.5 or later. Access databases are stored in .mdb files that can be shared with other users by putting them in a shared network folder. MSDE is a new technology that can be installed on computers running Microsoft Windows® 95, Microsoft Windows 98, or Microsoft Windows 2000 Professional to provide local or shared storage capabilities that are compatible with SQL Server 7.0.

Oracle

Oracle 8 is used to,

- Design and develop database objects, such as tables, views, indexes, and synonyms.
- Deploy database applications into any Oracle8 environment with no re- engineering
- Which support numerous users in large and sophisticated database environments, Oracle8 Personal Edition has been designed especially for personal use by those who may or may not have experience administering a sophisticated database. Oracle8 Personal Edition differs from the other Oracle8 servers in the following areas:

- Oracle8 includes a GUI application called Oracle8 Navigator.

- Most common database administration tasks can be performed with the Navigator.

- Oracle8 has been reconfigured with common defaults allowing you to get your database up and running quickly.

Oracle8 can use database links, distributed queries, the distributed database option (one logical database stored on several computers), Advanced Replication, and two-phase commit. It supports such data type's character, integer, date & etc.

System Design

4. SYSTEM DESIGN

After the designing phase has been completed successfully the next step is System Development. The main activity in this phase is coding. Adequate care has to be taken while coding is being proceeded. Adequate comments are one of the very important considerations. The coding must be easily understandable as well as effective and efficient. Indentation must be provided wherever necessary. The coding can be proceeded module by module. This DTS (Database Transformation / Synchronization) tool must have a user friendly GUI, to get the input values from the various users like database administrators, database programmers, database users. So, the GUI has been carefully designed with all the required inputs as well as outputs. Flowcharts are the most graphical representation for process design.

PROGRAM MODULES

- User Authentication Module
- Database Transformation Module
- Synchronization Module
- Test Module

4.1 INPUT DESIGN

Input design is the part of the overall system design that requires very careful attention. It is the point of contact for the user with the computer system. Objective during input design is to create an input layout that is easily to follow and avoid operator errors. The most common of data processing error is inaccurate input data. So, effective input design minimizes error made by DTS tool users. The major objectives are as follows,

- High level accuracy
- Input must be free from ambiguity
- This software needs database names / table names as major input with specific path name, so it avoids ambiguity.
- The selection of database is based on option button choice, so there is no chance for invalid or wrong inputs.
- No duplication of user is allowed, it is checked through authentication
- level of the tool and at the data source selection level.

4.2 OUTPUT DESIGN

An inevitable activity in the system design is the proper design of input and output in a form acceptable to the user. Outputs from the system are required primarily to communicate the result of processing to the user. Screens, which are major form of output, are designed in various modules in the system.

After successful transformation of the database we can make the reports of the database as per the user needs. After transformation of each table the message will shows the current level of transaction. Synchronization is a back end processing. In order to know the synchronization process of database needed icon can be added with the system tray of processes.

Log File Design

Information about the users are shown in the DTS tool itself it act as the output to the administrator, and the above said details are stored as the initialization log file's in the system. The following details are the nature of the log file and its purpose.

Loginfo.ini

Log info.ini file which will contain the information about the user with the database name, created time and modified time for the particular database.

4.3. PROCESS DESIGN

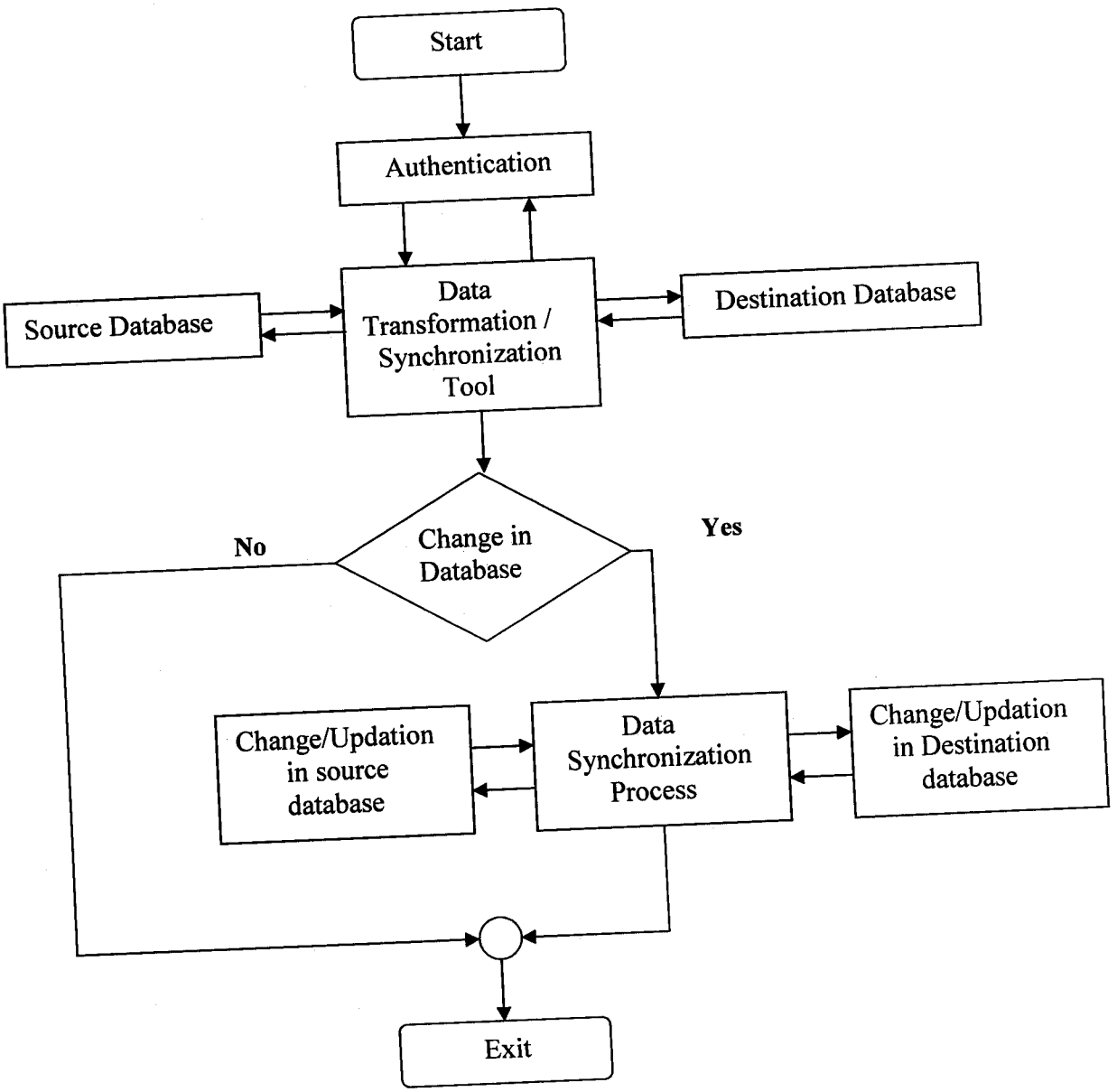
A detailed study of the existing system and its problems has been made, and an outline of the new system is drawn. A thorough study of the system revealed the structure of the databases involved. The Tables were created after normalizing the fields to the maximum extent possible. Process design involves authentication, transformation and Synchronization.

Authentication allows the user to perform the operation provided by the system and to establish connection with the data source provided by the server. This makes the system as secured database transaction system.

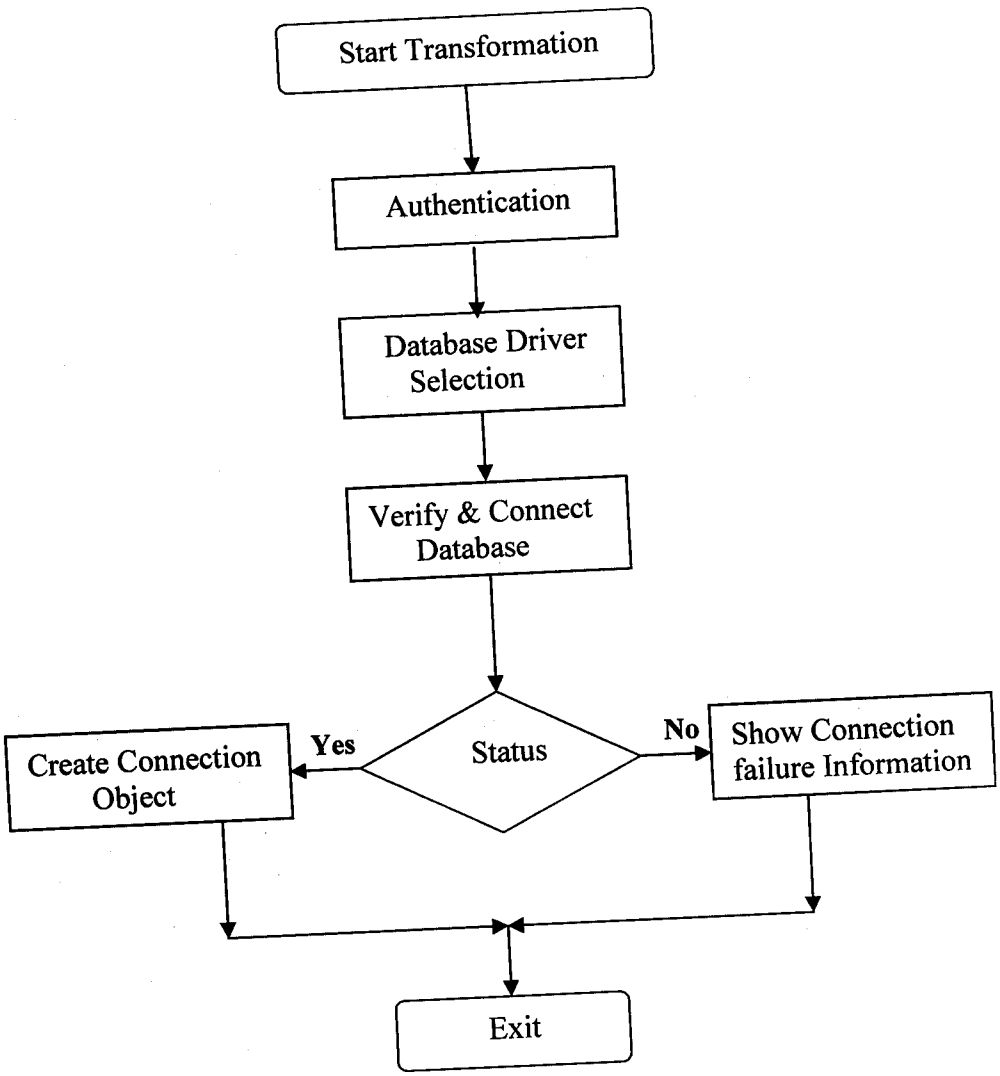
Transformation process retrieves all user defined tables from the given source database. According to the source database types such as SQL-Server (or) MS-Access (or) Oracle all the fields in the tables are transferred to existing database or the newly created database. During this transformation data type of the particular fields are also retrieved and used for creating the transferred tables in the new database. And the key constrains (such as primary key and foreign key) are also transferred during creation of the new table. For this type of transformation the data transformation is first taken place for master tables and then the secondary tables are transformed.

Synchronization is a automatic task which is to maintain the data consistency of existing databases and for newly created databases. This transfers the data from the latest modified tables into already existing databases of different database types for same application. The path name and the modified time property of each data source is maintained in a Access database for making synchronization. New databases are added with synchronization group after the user giving the start synchronization from the user screen.

System Flow Diagram



Database Connection Flow



4.4 USER INTERFACE DESIGN

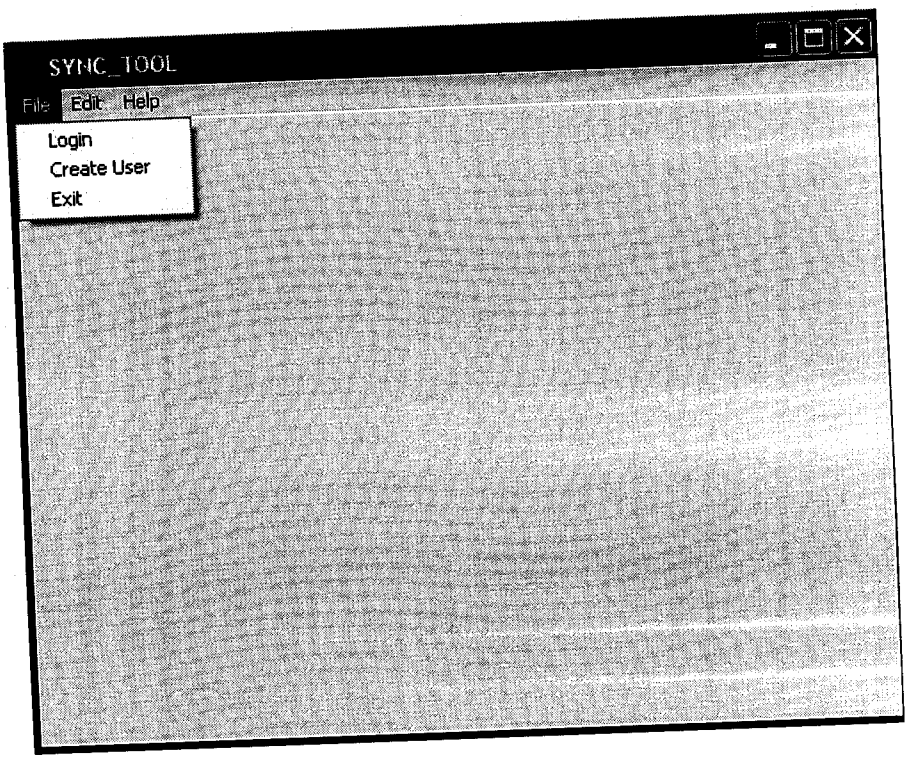
The MFC Library supports three types distinct application types they are Single Document Interface (SDI), Multiple Document Interface (MDI) and Dialog based. An SDI application has, from the user point of view, only one window. If the application depends on disk-file "documents", only one document can be loaded at a run time. The original windows Notepad is an example of an application. An MDI application has multiple child windows, each of which corresponds to an individual document.

Microsoft word is a good example of an MDI application. The Dialog based application supports both modal and modeless dialogs. With a modal dialog, such as the Open File dialog, the user cannot work elsewhere in the same application until the dialog is closed. With a modeless dialog, the user can work in another window in the application while the dialog remains on the screen. DTS tool is a dialog based application such that it will satisfy all the user requirements like dialog resizing, restoring in the system tray and continuous flow with the application with the help of windows message handling events which Microsoft Foundation Class provides.

SCREEN DESIGN

- New user Creation
- Existing user login
- Transformation / Synchronization Screen
- Data Source selection

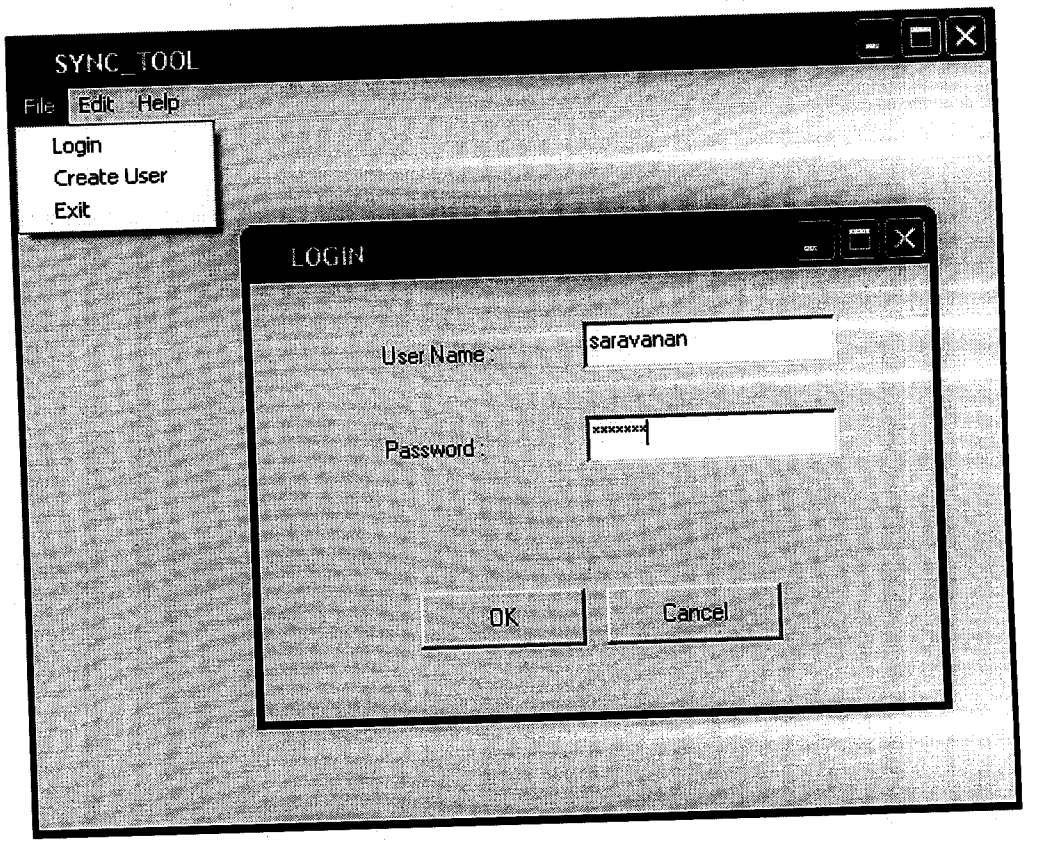
Screen.1



Main Menu

This is the main menu consist file, edit and help. File menu is for user login and new user creation. Edit menu is used to generate undo and redo functions for avoiding data loss while making transformation of databases. And the help menu is used to provide the information about the organization and the technical support for using the system.

Screen.2



Login Screen

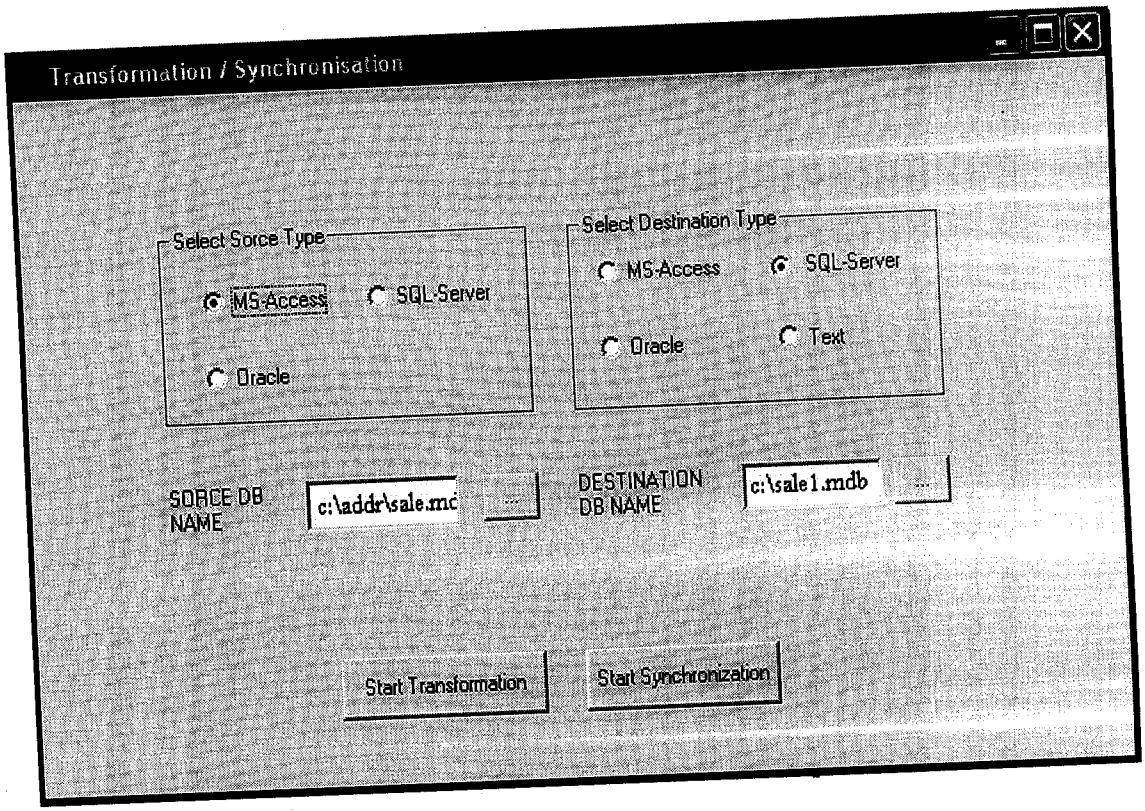
It allows the specified user to login into the tool. Otherwise it will create error message as invalid username and pass word.

Login Screen (Unit specification)

The Controls Used in the screen is,

S.No	Control	Field Associated in the Database	Size	Comments
1.	Static text1	Nil	Nil	Static text Assigned to the Edit box Username
2.	Edit box1	Username	10	The user should enter the username in this Edit box which will be inserted into the login table.
3.	Static text2	Nil	Nil	Static text Assigned to the Edit box Password.
4.	Edit box2	Password	10	The user should enter the password in this Edit box which will be inserted into the login table.
5	Command Button	Nil	Nil	User can enter all the the above details.

Screen.3



Transformation /Synchronization

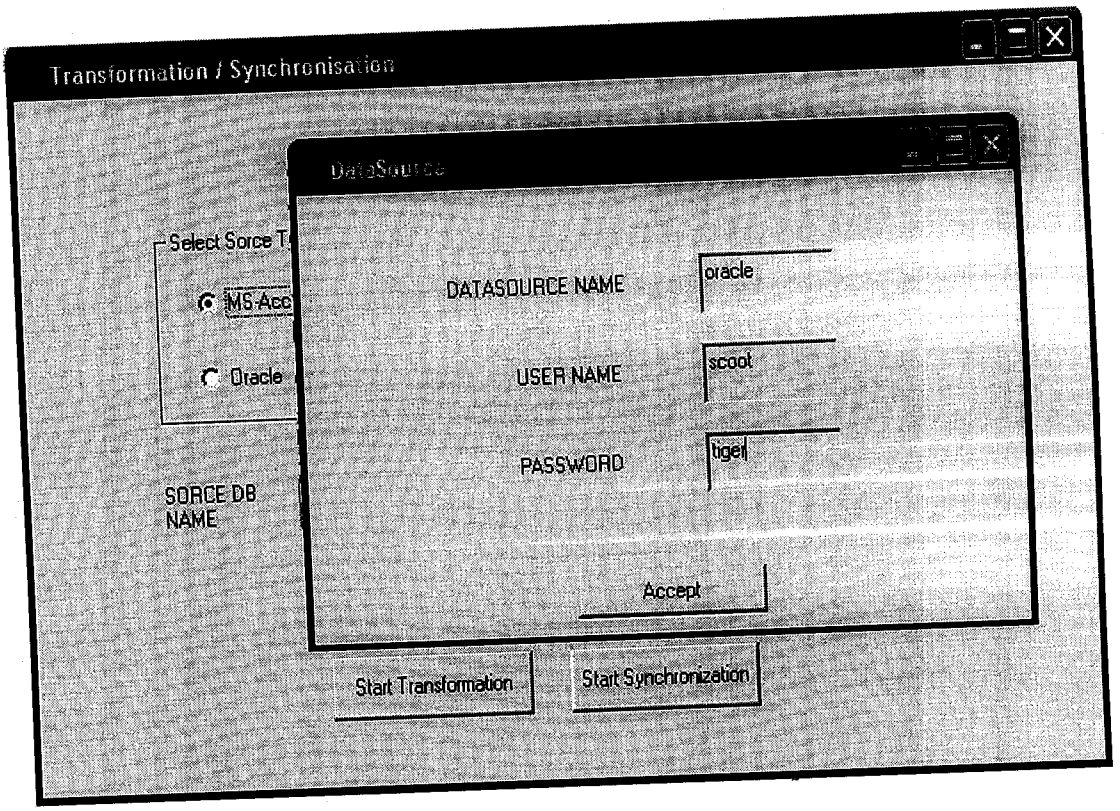
This is the input screen for transformation / synchronization. It needs source database name and destination database name. While selecting the database type the system will ask for data source name. Start transformation button initializes the transformation process. Start synchronization adds the transferred database into synchronization table for maintain data consistency.

Transformation /Synchronization (Unit specification)

The Controls Used in the process screen is,

S.No	Control	Field Associated in the Database	Size	Comments
1.	Radio Button 1	Nil	Nil	User can select the SQL- Server as source database
2	Radio Button 2	Nil	Nil	User can select the MS-Access as source database
3	Radio Button 3	Nil	Nil	User can select the Oracle source database
4	Edit box1	Database Name	10	The user can enter the Source database in this Edit box.
5	Command Button 1	Nil	Nil	The user can browse the source database
6	Radio Button 4	Nil	Nil	User can select the SQL- Server as destination database
7	Radio Button 5	Nil	Nil	User can select the MS-Access as destination database
8	Radio Button 6	Nil	Nil	User can select the Oracle destination database
9	Edit box2	Database Name	10	The user can enter the Source database in this Edit box.
10	Command Button 2	Nil	Nil	The user can browse the browse destination database If already exist.
11	Command Button 3	Nil	Nil	User can Initiate transformation
12	Command Button 4	Nil	Nil	User can Initiate Synchronization

Screen.4



Data source / Username / Password Entry

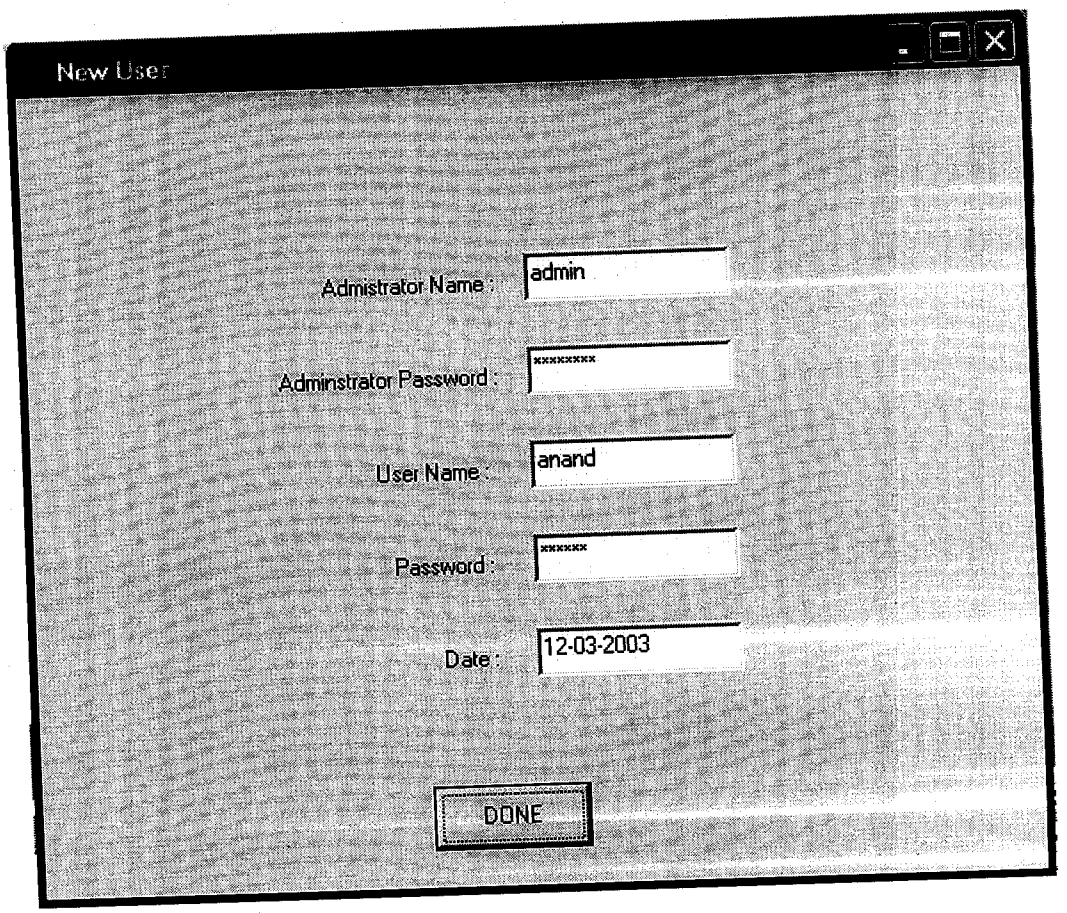
User can pass the Data source name, User name and Password to establish connection with the database. This allows the user to directly access the database.

Data source Selection Screen (Unit specification)

The Controls Used in this screen is,

S.No	Control	Field Associated in the Database	Size	Comments
1.	Static Text1	Nil	Nil	Text Assigned to edit box Of data source
2.	Edit box1	Data source name	10	The user should enter the data source name in this edit box. This is to access the datasource.
3.	Static Text2	Nil	Nil	Text Assigned to edit box Of username
4.	Edit box2	User name	10	The user should enter the user name in this edit box.
5.	Static Text3	Nil	Nil	Text Assigned to edit box Of password.
6.	Edit box3	Password	10	The user should enter the data source name in this edit box.
7	Command button1	Nil	Nil	User can Enter the data source details.

Screen.5



New User Creation (for accessing the tool)

New User Creation (Unit specification)

The Controls Used in the screen is,

S.No	Control	Field Associated in the Database	Size	Comments
1.	Static Text1	Nil	Nil	Label Assigned to the textbox Username
2.	Edit box1	Administrator name	10	The administrator should enter the name in this edit box.
3.	Static Text2	Nil	Nil	Label Assigned to the textbox password
4.	Edit box2	Administrator password	10	The administrator should enter the password in this edit box.
5.	Static Text3	Nil	Nil	Label Assigned to the Edit box Username
6.	Edit box3	User name	10	The user should enter the name in this edit box.
7	Static Text4	Nil	Nil	Label Assigned to the Edit box password
8	Edit box4	Pass word	10	The user should enter the password in this edit box.
9	Static Text5	Nil	Nil	Label Assigned to the Edit box date
10.	Edit box5	Date	10	The user should enter the date in this edit box.
11	Command Button	Nil	Nil	User can enter the above details using this button.

System implementation and testing

5. SYSTEM IMPLEMENTATION AND TESTING

5.1 SYSTEM IMPLEMENTATION

The implementation process begins with preparing a plan for the implementation of the system. This is the stage where the design is turned into a working system. This is the most crucial stage in achieving a new successful system. This is the giving confidence on the new system for the users that it will efficiently and effectively. Implementation of the system involves the following activities.

Conversion

Conversion of the existing system to the proposed system is to be implemented in the following ways. They are,

- Parallel Conversion.
- Direct Conversion.
- Pilot Conversion.

Parallel Conversion

Parallel Conversion involves going on with the old and the new system. This is similar to training based conversion. The people of the project team train the employees in the course of conversion. They will be trained live with both systems on working.

For the system under consideration it is recommended to use Parallel conversion technique. The reasons for use of this conversion technique are,

- The members of the project team are exposed to the problems if ever exists at the time of implementation.
- The need to spend lots of time and money in getting the required effectiveness is removed.

Direct Conversion

This is the conversion in which the conversion is made at a stretch. Such conversions are recommended with a very familiar system that has been found successful.

Pilot Conversion

This is a conversation technique where in the system is run in a testing environment and if found to be working well then it can be made to operate as a real system.

Pilot testing was done at the project and was found to be satisfactory when tested with different environments.

The more complex is the system being implemented the more involved will be the system being implemented. An implementation coordinating committee based on policies of in committee individual organization has been appointed.

5.2 SYSTEM TESTING

Testing and test Plan

Testing is a process of executing a program with the intent of finding errors. One should not start testing with the intent of showing that the program works, but the intent should be to show that the program does not work. During testing the program to be tested is executed with set of test cases and the output of the program for test cases is evaluated to determine the program is performing as excepted.

Testing a large system is a complex activity, and like any complex activity it has to be broken into smaller activities. Due to this, for a project, incremental testing is generally performed in which components and subsystem of the system tested separately before integrating them to form the system for system testing. This form of testing, though necessary to ensure the quality of the system, introduces new issues of how to select components of testing and how to combine them to form the subsystem and the systems.

Generally, parts of the program are tested before testing the entire program. Besides partitioning the problem of testing, another reason for testing parts separately is that if the test case deducts an error in a large program, it will be extremely difficult to pinpoint the source of the error. If a huge program did not work, determining which module has errors can be a formidable task. In many cases it is even difficult to construct test cases so that all the modules will be executed. This increases the chances of module's errors going undetected. Hence it is clear that for a large system, we should first test different parts of the system independently, before testing the entire system.

In incremental testing, some parts of the system are first tested independently, and then these parts are combined to form a sub system, which is then tested independently. There are two common ways modules can be combined, as they are tested, to form a working program: top – down and bottom- up.

In top down approach the testing is started from the top of the hierarchy, and modules are added incrementally that it calls and the new combined system is tested.

In this approach, a module cannot be tested in isolation because they invoke some other modules. To allow the modules to be tested before their subordinates have been coding, stubs simulate the behavior of the subordinates.

The bottom – up approach starts from the bottom of the hierarchy. First the modules at the very bottom, which have no subordinates, are tested. Then these modules are combined with higher- level modules for testing. At any stage of testing all the subordinated modules are exist and have been tested earlier.

It is often best to select testing method to conform to the development method. The development mentioned here are actual development and not the design method. This project uses top – down testing strategy.

Testing Methods

Having test cases that are good at revealing the presence of faults is central to successful testing. Ideally a set of test cases are to be determined such that successful execution of all of them implies that there are no errors in the program. This ideal goal cannot usually be achieved due to practical and theoretical constraints. Each test case needs more effort, machine time to evaluate the results. While selecting the test cases the primary objective is to ensure that if there is an error or fault in the program, it is exercised by one of the test cases.

One possible ideal set of test cases is one that includes all the possible inputs to the program this is impractical and infeasible, as for even small programs, the number of elements in the input domain can be extremely large. Hence a realistic goal for testing is to select a set of test cases that is close to ideal.

For unit testing, structural testing based on the branch coverage criterion is used. The goal is to achieve branch coverage of more than 95%. System testing is largely functional in nature. The focus is on invalid and valid cases, boundary values and special cases.

Unit Testing

All the modules in the system are tested in isolation. The user inputs are validated for empty fields, invalid characters and wrong data. The messages passed through the network have control characters such as '/', which are not allowed in user inputs. The user name is restricted to have only alpha numerals. Any special character in the user name is considered error and the message box is displayed promptly stating the error.

The zero length input, invalid character are tested such as number of input parameters match number of arguments and parameter attributes match, number of attributes and order of arguments to built – in function's correctness are also considered.

For the modules that perform Input/Output operations, the testing such as correctness of file attributes, file open statement ending up with file close statement, match of buffer size with that of record size, handling of end – of – file condition, I/O error handling are done.

All the modules are tested for improper or inconsistent typing, erroneous initialization, misspelled variable names, underflow, overflow and addressing exceptions.

Test cases for Authentication Module

System testing is largely functional in nature. The focus is on invalid and valid cases, boundary value and special cases.

Seq. No.	Test case	Conditions being checked	Expected output
1	User Login	User Authentication	Invalid username / password message
2	Data Source Selection	Creating database object	Enter the valid Data source name
3	Server name and Password for server login	User authentication for Data source selection	Invalid username / password message
5	New User Creation	Administrator Control	Not a valid Administrator
6	New User Creation	Username Already Exists	User name already Exist.

Test cases for Transformation / Synchronization Module

Seq. No.	Test case	Conditions being checked	Expected output
1	Database Selection	Any one of source & destination selection	Select source & destination database types
2	Data Source Browsing	Other than MS-Access	Not Applicable
3	Without Entering Data source (While selecting Database)	Data source selection	Data source field is empty
4	Table Creation	Transformation of existing tables	Table already exist
5	Key Constrains	Transformation relational databases	Master table does not exist(while Synchronization)
6	No disk space(creating new database)	Disk out of space	Print message and stop

Testing graphical user Interface

A series of standards are suggested for testing GUIs. Testing is been performed for the following:

- Proper opening and closing of windows
- Proper moving and scrolling of windows
- Proper regeneration of windows when it is overwritten and recalled
- All the relevant pull down menus, dialog boxes, buttons, icons, and other
- Controls are properly displayed for the window
- Highlighting of active window
- Appropriate menu bars displayed in appropriate context
- Proper working of pull down operations
- Based on the context of current operations within the window, the menu
- Items are highlighted or grayed
- Self explanatory menu items
- Proper addressing of menu items by mouse

Installation of the system

The installation of the system does not require any additional components. The software uses only the existing components of the Windows operating system. Both the transformation and synchronization are performed after the transformation is started. The application is started when the system is turned on, but can be closed at any time. The synchronization application can be made to run in background.

General processes should be evaluated during installation of the system are,

- Installation plan
- New operator instructions
- New user instructions & procedures
- Results of installation process.

Conclusion

6. CONCLUSION

The major task of transferring user defined tables of one type of database into another type is achieved. The data stored in the corresponding field is also transferred. This tool makes the job easier, a user can transfer the data as the original data type of the source database data. Synchronization is automated for efficient user application on the database.

The project has aimed to satisfy the requirements of the system to the maximum. All the required changes during implementations are being resolved to the best of abilities.

Maximum care and concentration has been focused to troubleshoot this project and provide an efficient system.

Future Enhancement

7. SCOPE FOR FURTHER DEVELOPMENT

- This tool could be further extended to supports more database types and more field types.
- This system doesn't support dynamic data consistency. So the synchronization process is planned to support dynamic updation of database without exiting the database. It helps efficient concurrent access of database.
- And planned to enhance the tool for text file into all databases supported by the system.

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