

ORACLE DATABASE AUDITING AUTOMATA

PROJECT WORK DONE AT
ORCHID SOFT SYSTEMS
CHENNAI

PROJECT REPORT P-819

SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE AWARD OF THE DEGREE OF
M.Sc [APPLIED SCIENCE] SOFTWARE ENGINEERING
OF BHARATHIAR UNIVERSITY, COIMBATORE.

SUBMITTED BY

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
KUMARAGURU COLLEGE OF TECHNOLOGY

COIMBATORE – 641 006

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
KUMARAGURU COLLEGE OF TECHNOLOGY

(Affiliated to Bharathiar University)

COIMBATORE – 641 002

SEPTEMBER – 2002

CERTIFICATE

This is to certify that the project entitled

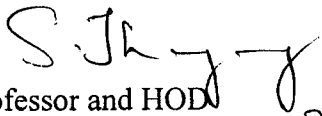
ORACLE DATABASE AUDITING AUTOMATA

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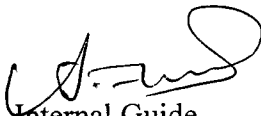
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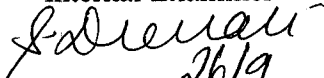

Professor and HOD

26/9/02


Internal Guide

Submitted to University Examination held on 26/9/02.....


Internal Examiner


26/9


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DECLARATION

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I hereby declare that the project titled “Oracle Database Auditing Automata” submitted in partial fulfillment for the award of M.Sc Software Engineering degree is my original work and that has not previously formed the basis for the award of my degree or any other similar title.

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TO WHOMSOEVER IT MAY CONCERN

This is to certify that Mr.PRABHU has completed a Project "Oracle database Auditing Automata"- using VB and ORACLE during May2002-Sep2002 and conduct is found is good.

Yours Truly



Branch Manager



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My gratitude is due to all staff members of CSE, Orchid Soft System, my parents and all my friends for their moral support and encouragement for successful completion of my project.

CONTENTS

| | |
|--------------------------------------|-------|
| 1. INTRODUCTION | Pg.No |
| 1.1 Project Overview | 5 |
| 1.2 Organization Profile | 6 |
| 2. SYSTEM STUDY AND ANALYSIS | |
| 2.1 Existing System-Limitations | 9 |
| 2.2 User Characteristics | 10 |
| 2.3 Requirements of New System | 11 |
| 2.4 Proposed System | 12 |
| 3. PROGRAMMING ENVIRONMENT | |
| 3.1 Hardware Configuration | 14 |
| 3.2 Description of Software Used | 15 |
| 4. SYSTEM DESIGNING AND DEVELOPMENT | |
| 4.1 Input Design | 19 |
| 4.2 Output Design | 35 |
| 4.3 Database Design | 39 |
| 4.4 Process Design | 42 |
| 4.5 Data Flow Diagram | 45 |
| 4.6 Context Flow Diagram | 47 |
| 5. SYSTEM IMPLEMENTATION AND TESTING | |
| 5.1 System Implementation | 50 |
| 5.2 System Testing | 52 |
| 5.3 Refinements Based on Feedback | 54 |
| 6. CONCLUSION | 56 |
| 7. SCOPE FOR FUTURE DEVELOPMENT | 58 |
| 8. REFERENCES | |

SYNOPSIS

The project fully goes through the various process that are undertaken to manage the organization and a detail study is done from the data acquired and information gathered. The system is being developed as per the demand of the organization and end user requirement needs.

Oracle Database Auditing Automata is a front-end Software tool, which provides a Visual Interface for the key database administration activities. Auditing Oracle Database use is one of the difficult and time-consuming job of the Database Administrator is automated by this system. With the launching of this tool, the DBA task will become more and more easy and even a novice DBA can administer the database effectively.

Oracle Database Auditing Software aims at automating the common DBA activities, which are both time consuming and error-prone. Among other things the Database Administer of Oracle can create Database User Accounts, grant or revoke System or Object Privileges to the users.

All the key activities of the Oracle Database Administrator can be achieved by using this tool within a fraction of minute.

INTRODUCTION

1.1 PROJECT OVERVIEW

Auditing is the monitoring and recordings of selected user's database action. Auditing is normally used to

- * Investigate suspicious activity. For example, if an unauthorized user is deleting data from tables, the security administrator might decide to audit all connection to database and all successful and unsuccessful deletion of rows from all tables in the database.
- * Monitor and gather data about specific database activities. For example, the database administrator can gather statistics about which tables are being updated, how many logical I/Os are performed, or how many concurrent users connect at peak times.

Focus of Auditing

Oracle allows audit options to be focused or broad. We can

- * Audit successful statement executions, unsuccessful statement executions or both
- * Audit statement executions once per user session or once every time the statement is used
- * Audit activities of all user or of a specific user

Audit Reports

Audit reports include information such as the operation that was audited, the user performing the operation, and the date and time of the operation. All auditing reports contain the following information

- The user name
- The session identifier
- The machine name
- The name of the Database Object
- The Operation Performed or Attempted
- The date and timestamp
- The status of the Operation

1.2 ORGANIZATION PROFILE

ORCHID SOFT SYSTEM (P) LTD

Orchid Soft System (P) Ltd is one of the leading software company in Chennai. They invest resources up front to analyse and comprehend the business specific needs and their processes, which is a key factor behind any successful software development then we move to draw effective business processes for automated working program them as reusable components prototype them as modules and / or systems in multiple environments before eventually coming out with mature and rugged software products for the enterprise computing that are comprehensive yet economical.

At Orchid Soft System, they build powerful solutions and comprehensive software solutions to our clients who are keen on using technology to introduce an automated ambiance across their enterprise. Ambiance in which professional can excel to out perform themselves and the competition.

SYSTEM STUDY AND ANALYSIS

2.1 EXISTING SYSTEM

While so many Relational Database Management Systems Software are available in the market today to manage a company's database, they did not provide any user interface to audit or monitor database user's action. Oracle being the supreme RDBMS in the market provides some command for auditing which are difficult to remind. In order to audit user's action the DBA first have to enable Database auditing by modifying the init.ora parameter file of oracle instance.

The SYS.AUD\$ Data Dictionary table also known as "Audit Trail" will contain the audit records which are in un-normalized form. Oracle Provides some Data Dictionary views of SYS.AUD\$ such as DBA_AUDIT_SESSION, DBA_AUDIT_STATEMENT, DBA_STMT_AUDIT_OPTS and so on. Even then querying these views is difficult and time consuming

LIMITATIONS OF EXISTING SYSTEM

- The existing system is only a manual system.
- All the records and details should be entered in a paper and should be kept safely.
- For reference of a particular data all the records should be verified.
- Instant replies to queries not possible.
- Large amount of paper records is to be maintained.

2.2 USER CHARACTERISTICS

User characteristics were analyzed to find the user requirements. Users were consulted for their opinion on the system and their suggestions were recorded.

2.3 REQUIREMENTS OF NEW SYSTEM

The new system should overcome the limitations of the existing system. It should provide better options for better data reporting and data comparison. The system should be secure, faster, error free and interactive. Thus main requirements identified are

- Good interaction with the user

The new system should be capable of good interaction with the user. Errors and warning messages should be clearly displayed. The system should be menu driven. In case of item selection, a list can be provided for selection. Thus error in entries could be reduced and foreign key references can be maintained without cross checking.

- Centralized Database

A database management system should be introduced by which storage and retrieval of data becomes easy. Large amount of data can be managed, data integrity can be ensured and data redundancy could be avoided.

- Security

Since the storage data includes many details, there should be some level of security for the system. Software's in a multiuser environment should use some level of security.

- Provision for quick report generation

There should be provision for quick report generation. Graphs and charts can be introduced for better data representation.

2.4 PROPOSED SYSTEM

Oracle Database Auditing Automata provides a Visual interface for auditing Database use. Using this software the Oracle Database Administrator can

- 1.Create User Accounts
- 2.Alter User Accounts
- 3.Drop User Accounts
- 4.Specify Auditing Options
- 5.Discard Auditing Options
- 6.Grant or revoke Privileges to the user
- 7.Track User's Connection
- 8.Track User's Database Action
- 9.Create Auditing Reports
- 10.Manage Audit Trail

Methodology

Modular approach has been used to develop this software product. Visual Basic Provides built in Support to create and manipulate modules. Oracle Database Auditing Automata has been divided into the following modules

- 1.User Manipulation module.
- 2.Auditing module.

PROGRAMMING ENVIRONMENT

- 3.Connection Tracking module.
- 4.Session Tracking module.
- 5.Reporting module.

3.1 HARAWARE CONFIGURATION

| | | |
|-----------|---|--------------------------|
| Processor | : | Intel Pentium II & above |
| RAM | : | 126 MB & above |
| Hard Disk | : | 10 GB & above |
| Display | : | 14 SVGA Color Monitor |
| Keyboard | : | Standard 104 keys |

3.2 SOFTWARE CONFIGURATION

| | | |
|-------------------|---|-----------------------------|
| Operating System | : | Windows NT/2000 server |
| Front-end | : | Visual Basic 6 |
| Back-End | : | Multi-user Oracle |
| Database Provider | : | ActiveX Data Access Objects |

SOFTWARE DESCRIPTION

Visual Basic 6.0

Visual basic is a powerful programming system for developing sophisticated, graphical applications for Microsoft Windows environment. Its productivity has been enhance by addition of a complete set of tools to simplify rapid application development.

“ Visual “ refers to the method used to create the graphical user interface (GUI) that the user illustrations, rather than writing numerous lines of code to describe the appearance, function and location of interface elements. “ Basic ” refers to the BASIC programming language, a widely preferred language by many programmers for its simplicity. Visual Basic has evolved from the original BASIC language and now contains several hundred statements, functions, and keywords, many of which relate directly to the windows GUI.

Visual Basic 6.0 introduces us to the new world of Active X technology, an unique way harness the Internet. Visual Basic offers many salient features to aid in the development of full – featured applications including :

- Data access functionality allows creating of front-end applications that can work on most of the popular database systems.
- Active X technology allows usage of the functionalities provided by other applications, such as Microsoft word, Microsoft Excel, and other windows applications and their possible development on the web.
- Applications developed using Visual Basic provides a true exe file that uses a runtime dynamic-link library which can be freely distributed.

ORACLE

Why Oracle?

The explosion in the use of world wide web and the web browser led oracle to develop tools that would support dynamic displays of database contents on the web.

Also the emergence of the Java language which was platform independent, object oriented distributed, and secure environment appealed to software vendors in writing software once and deploying it on a variety of computer hardware and operating system platforms.

With these two movements, many software began advocating a user interface based on a web browser in which a Java Applet could be downloaded by a server to be executed on the client machine.

New Features of Oracle :

- Improved scalability
- Improved security administration
- Improved performance via partitioning
- Enhanced support for database replication
- Capability to handle a much larger number of concurrent users
- New and improved datatypes

**SYSTEM
DESIGNING AND
DEVELOPMENT**

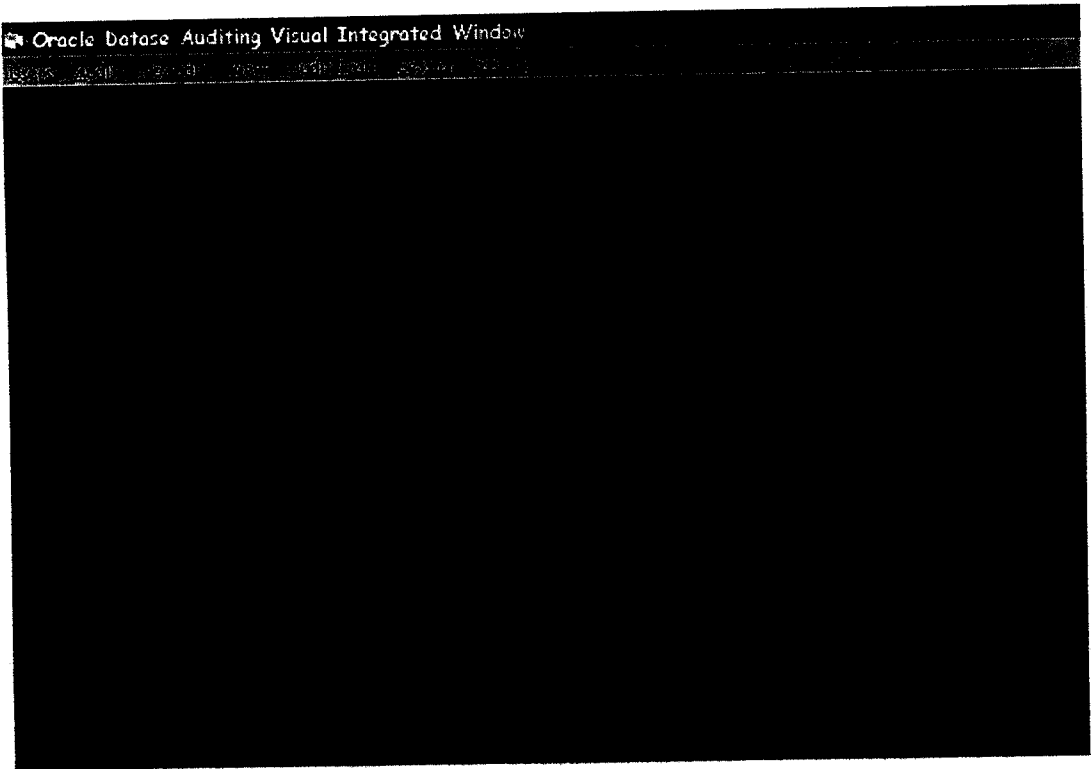
4.1 INPUT DESIGN

Input design or form design consists of designing the screens for accepting the input. The user inputs are collected as screen entries. The screen has been designed in a way to provide GUI features to the user. The input screens are designed in a way as to control the amount of input required, avoid delay and keep processing simple.

The form layout is designed to be user friendly. Layout labels are made self explanatory. Common set of entries are grouped into a frame for easy identification. Drop down lists are provided in the case of item selection. The user can choose from the valid data from the list provided thus avoiding erroneous data. Command buttons are provided for all activities that take place through the form such as additions, deletions etc. Input data is validated in the screen entries itself. Appropriate error message and warnings are displayed for user's convenience.

SAMPLE SCREENS

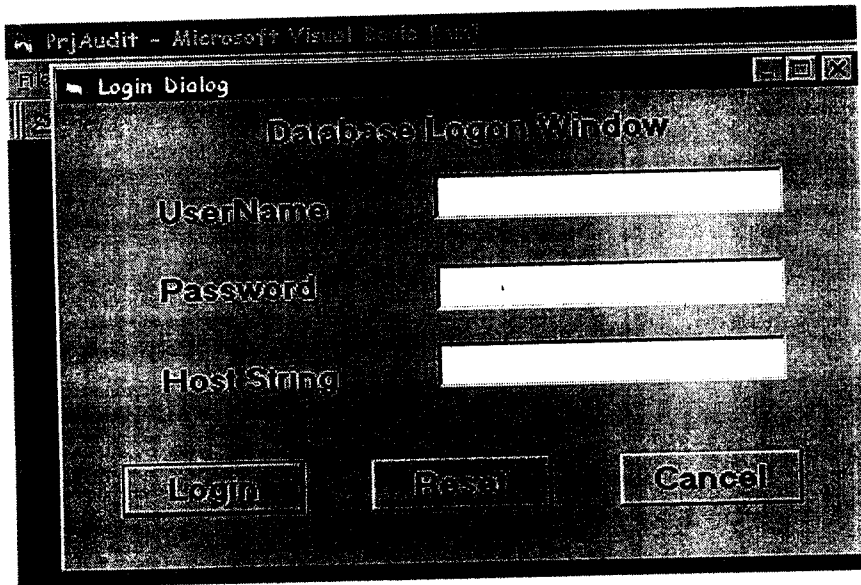
Main Menu:



MAIN MENU:

IT IS THE MAIN MENU OF THE ORACLE DATABASE AUDITING SOFTWARE. IT ALLOWS THE ADMINISTRATOR TO ADD NEW USERS, IN AUDITING TRIALS, TO VIEW THE NO AUDIT TRIALS, TO VIEW THE DIFFERENT REPORT DEPENDING UPON THE ADMINISTRATORS REQUIREMENTS AND ALSO USED FOR SESSION TRACKING AND CONNECTION TRACKING.

Login Screen:



DATABASE LOGIN SCREEN:

THIS IS THE IMPORTANT WINDOW FOR THE USERS TO LOGIN. THE USER TYPES THE USERNAME AND TYPES HIS ASSIGNED PASSWORD AND THE HOST STRING REPRESENTS THE SERVER NAME TO WHICH THE ORACLE USER HAS TO BE CONNECTED. AFTER ENTERING ALL THE DETAILS, THE USER CLICKS THE LOGIN BUTTON TO LOG AND THE RESET BUTTON SETS ALL THE VALUES TO BLANK.

User Alteration Form:

User Alteration Form

Username:

Password:

Profile:

- Default
- User Profile

Tablespace:

Default: Quota:

Temporary:

Profile:

Name:

USER ALTERATION FORM:

THIS FORM ENABLES THE ADMINISTRATOR TO ALTER THE CHANGES IN THE DETAILS OF THE USER. THE USERNAME AND PASSWORD ARE GIVEN AND THE RESOURCE AND THE CONNECT STATUS TO BE GIVEN TO THE USER CAN BE ALTERED. THE TABLE SPACE AND THE QUOTA FOR THE USER CAN ALSO BE DETERMINED AND ALTERED. SHOW SQL BUTTON DISPLAYS ALL THE PRESENT VALUES OF THE USER.

User Creation Form:

SQL Enterprise Manager - Add User Form

User Creation Form

Username:

Password:

Options:

- Connect
- Assign Profile

Tablespaces:

Default: Quota:

Temporary:

Profile:

Name:

Buttons: Create Show SQL Close

USER CREATION FORM:

THIS SCREEN ENABLES THE ADMINISTRATOR TO CREATE A NEW USER FOR ACCESSING THE RESOURCES OF THE DATABASE. THE STATUS TO BE GRANTED TO THE NEW USER CAN BE SPECIFIED IN THE GRANT BOX. THE TABLE SPACE AND QUOTA CAN ALSO BE SPECIFIED. THE PROFILE OF THE USER CAN ALSO BE SPECIFIED.

SQL Statement Auditing:

Audit Statement form

SQL Statement Auditing

Audit on / No Audit / Ignore / No Audit

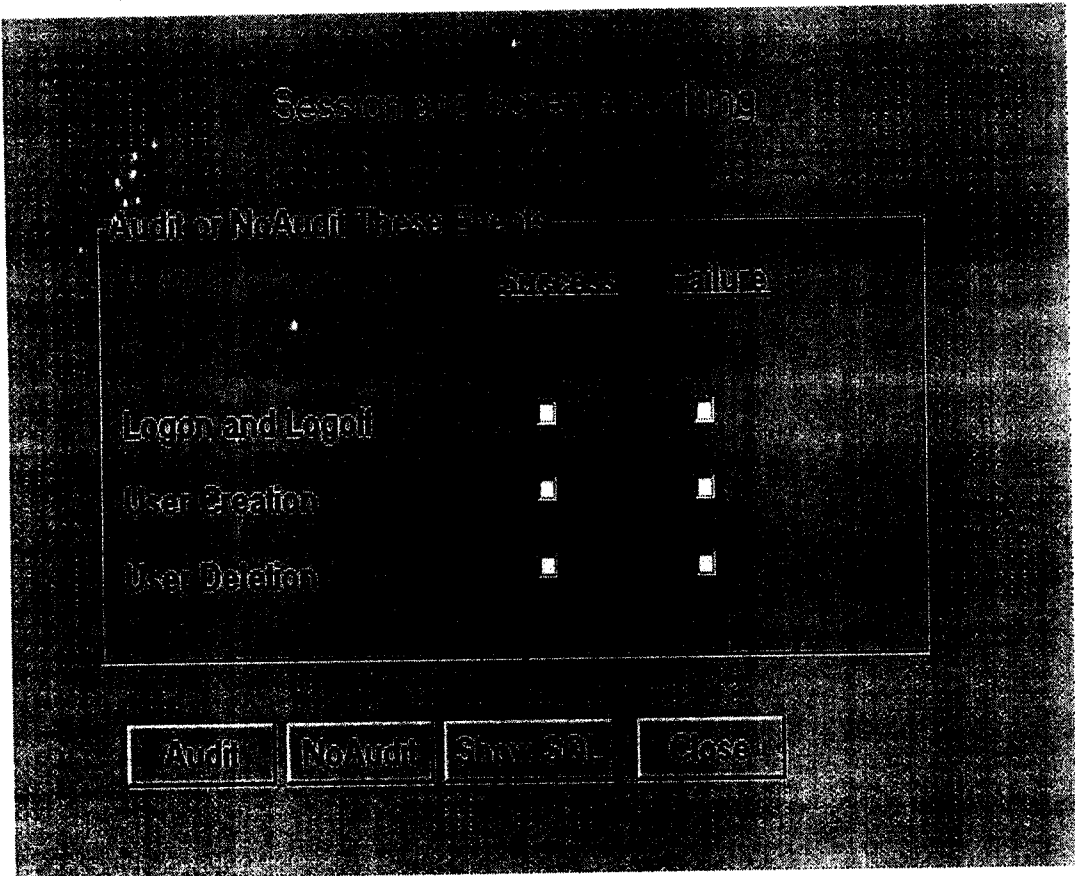
cbolusername

| Statement | Audit | Ignore |
|--------------------|--------------------------|--------------------------|
| Table Creation | <input type="checkbox"/> | <input type="checkbox"/> |
| Dropping | <input type="checkbox"/> | <input type="checkbox"/> |
| Table Selection | <input type="checkbox"/> | <input type="checkbox"/> |
| Table Insertion | <input type="checkbox"/> | <input type="checkbox"/> |
| Table Modification | <input type="checkbox"/> | <input type="checkbox"/> |
| Table Truncation | <input type="checkbox"/> | <input type="checkbox"/> |

SQL STATEMENT AUDITING:

THE USER IS GRANTED PERMISSION FOR CREATION, DROPPING, SELECTION PROCEDURE, INSERTION, UPDATION AND DELETION AND TO CHECK THE **AUDIT AND NO AUDIT** FOR THE ABOVE SPECIFIED EVENTS FOR THE SPECIFIED SELECTED USER. THE USERNAME IS TO BE SELECTED AND THE CORRESPONDING EVENTS ARE AUDITED FOR SUCCESS AND FAILURE.

Session and Schema Auditing:



SESSION AND SCHEMA AUDITING:

IT IS IMPORTANT MODULE AND USED TO TRACK THE SQL STATEMENTS USED BY THE USER ON A SESSION. IT CAN BE DONE FOR ALL USERS. THE LOGIN AND LOGOFF AND THE CREATION AND THE DELETION OF THE PARTICULAR USER CAN BE AUDITED BY USING THIS SCREEN.

Connection Tracking:

Connection Tracking

Find all wires containing:

- Only
- On
- Between AND
- During the Previous Days

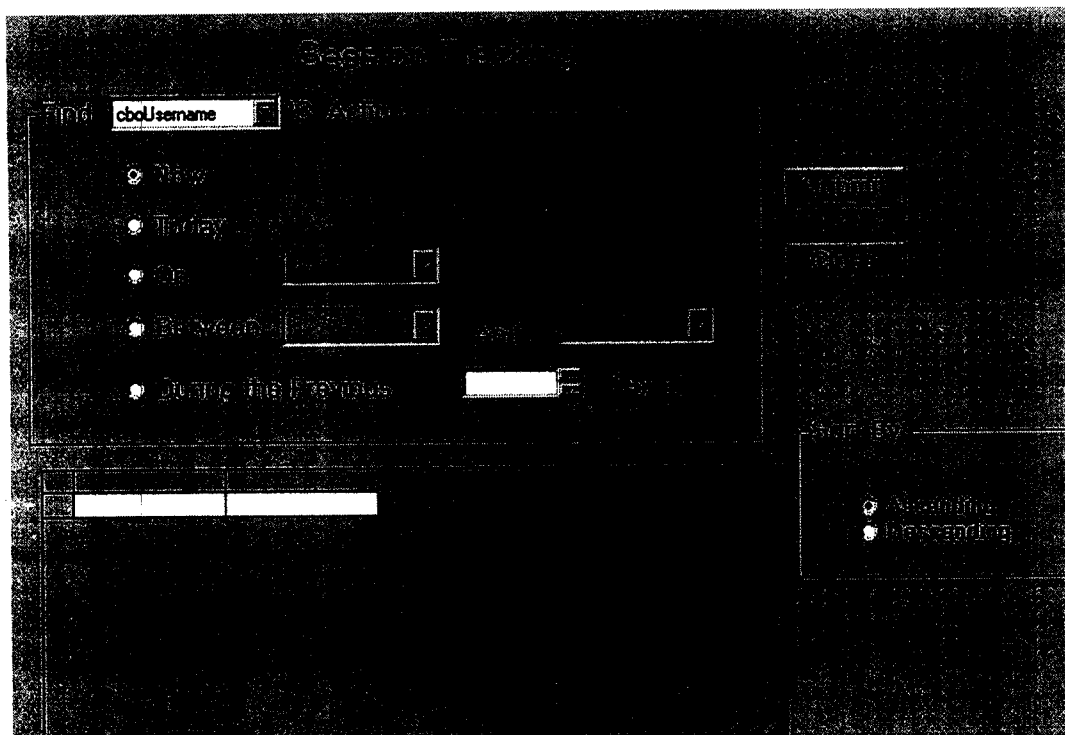
Sort By:

- Ascending
- Descending

CONNECTION TRACKING:

THIS MODULE IS USED TO TRACK LOGON AND LOGOFF'S OF USERS. IT ALSO ALLOWS ADMINISTRATOR TO GATHER STATISTICS ABOUT USER SESSIONS. THE CONNECTION TRACKING FOR ALL USERS OR FOR A PARTICULAR USER ON A CURRENT DAY, PARTICULAR DATE, PREVIOUS DAY AND BETWEEN TWO DATES CAN ALSO BE DONE. IT ALSO DISPLAYS ALL THE VALID ORACLE USERS. IT ALSO CAN BE USED TO SORT THE LIST EITHER BY ASCENDING ORDER OR BY DESCENDING ORDER.

Session Tracking:



SESSION TRACKING:

SESSION TRACKING IS USED TO TRACK THE SQL STATEMENTS EXECUTED BY THE USER ON A SESSION. IT ALSO TRACKS THE USER CREATION BY A PRIVILEGED USER. IT TRACKS THE TABLE CREATION AND DROPPING IN A PARTICULAR SESSION. TRACKING **DML STATEMENTS** LIKE **SELECT, INSERT, UPDATE, AND DELETE** ARE SOME OF ITS FUNCTIONS. IT ALSO FILTERS AUDIT RECORDS BY SELECTING A PARTICULAR USER.

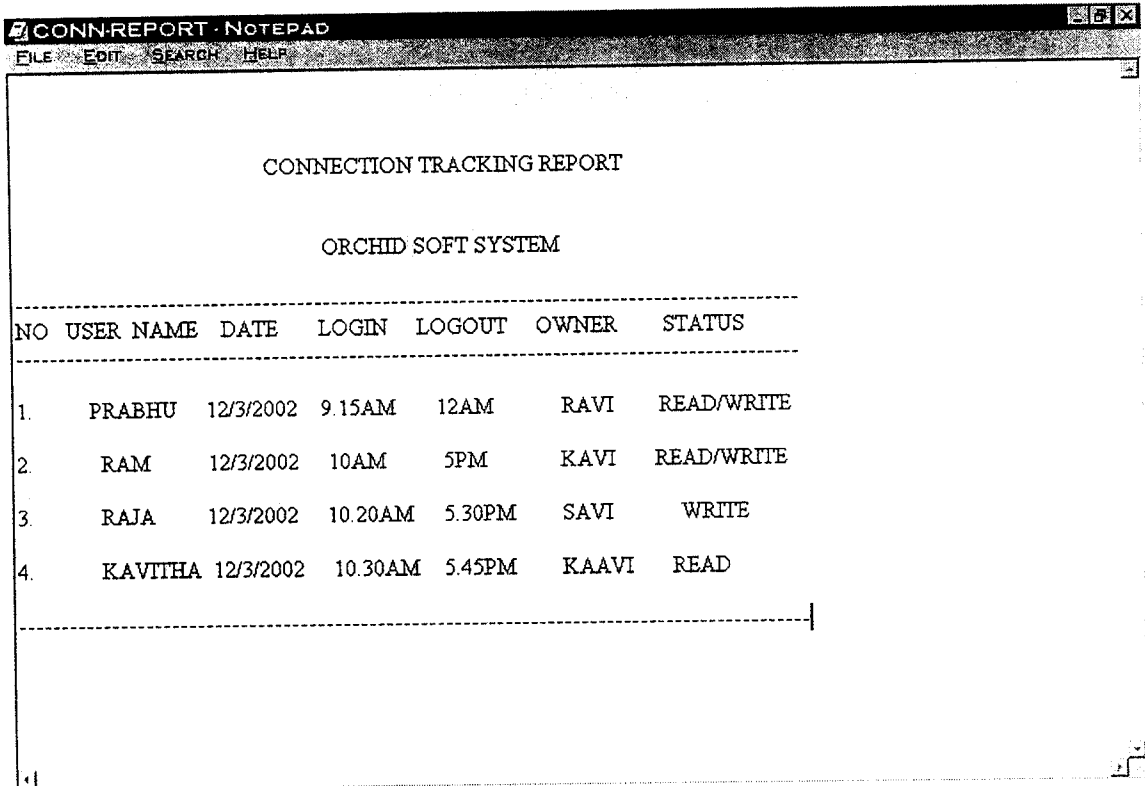
4.2 OUTPUT DESIGN

Outputs from computer system are required primarily to communicate the result of processing to users. The outcome of data processing will be a set of information in a neat layout which is used for analysis and decision making. Output design involves the designing of the format of processed data. The report should be in a simple format and should be able to convey the details clearly. Reports provide a hard copy of information which has to be circulated throughout the organization.

Audit reports include information such as the operation that was audited, the user performing the operation, and the date and time of the operation. All auditing reports contain the following information

- The user name
- The session identifier
- The machine name
- The name of the Database Object
- The Operation Performed or Attempted
- The date and timestamp
- The status of the Operation

CONNECTION TRACKING REPORT:



CONN-REPORT - NOTEPAD

FILE EDIT SEARCH HELP

CONNECTION TRACKING REPORT

ORCHID SOFT SYSTEM

| NO | USER NAME | DATE | LOGIN | LOGOUT | OWNER | STATUS |
|----|-----------|-----------|---------|--------|-------|------------|
| 1. | PRABHU | 12/3/2002 | 9.15AM | 12AM | RAVI | READ/WRITE |
| 2. | RAM | 12/3/2002 | 10AM | 5PM | KAVI | READ/WRITE |
| 3. | RAJA | 12/3/2002 | 10.20AM | 5.30PM | SAVI | WRITE |
| 4. | KAVITHA | 12/3/2002 | 10.30AM | 5.45PM | KAAVI | READ |

SESSION TRACKING REPORT:

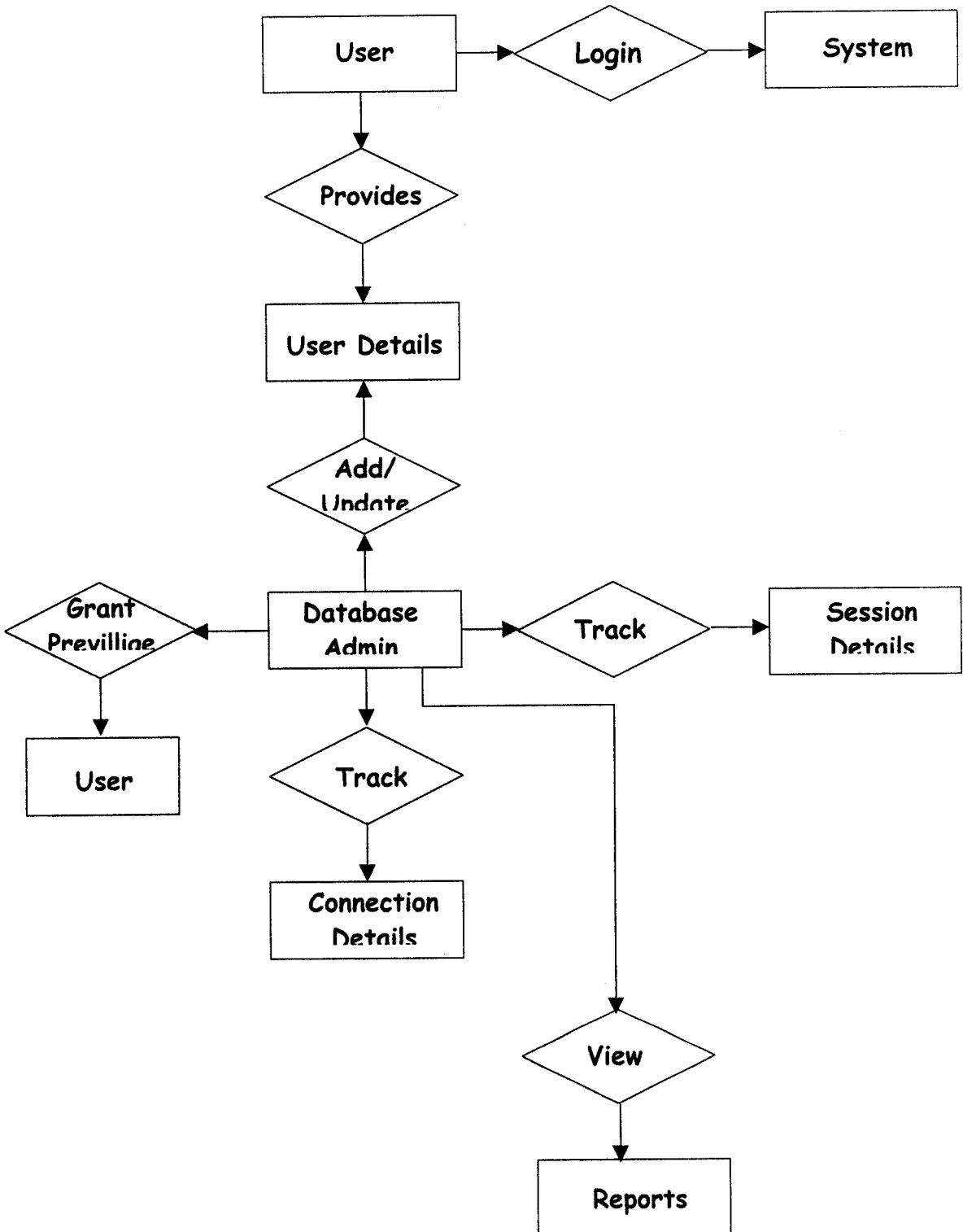
| SESSION TRACKING REPORT | | | | | | |
|-------------------------|---------|----------|-------|--------|-------------|--------|
| ORCHID SOFT SYSTEM | | | | | | |
| OS_USERNAME | DB_USER | TERMINAL | LOGIN | LOGOFF | ACTION NAME | STATUS |
| PRABHU | RAVI | 15 | 9.30 | 12AM | SALES | R/W |
| RAM | KAVI | 12 | 10 | 1PM | SALES | R/W |
| RAJA | KSV | 11 | 10.15 | 1PM | SALES | R/W |

USER REPORT

| USER REPORT | | | | |
|--------------------|-----------|------------|-------------|--------------------|
| ORCHID SOFT SYSTEM | | | | |
| Sl no. | USER NAME | LOGIN TIME | FILE STATUS | READ /WRITE STATUS |
| 1. | R.PRABHU | 9.15AM | SALES | R/W STATUS |
| 2 | R.RAVI | 10 AM | SALES | R/W STATUS |
| 3 | ANAND | 10.37AM | SALES | R/W STATUS |
| 4 | RAJAH | 10.59AM | SALES | R STATUS |

**ENTITY
RELATIONSHIP
DIAGRAM**

ERD DIAGRAM



4.3 DATABASE DESIGN

The database approach to system design places great emphasis on integration, integrity and independence of data. The master table contains the data that are fixed and do not change frequently. The transaction tables are maintained to record daily transactions. Tables have been normalized to avoid data redundancy. Primary key and foreign key are provided for integrity.

4.4 PROCEDURE DESIGN

A computer procedure is a series of operations designed to manipulate data to produce output from a computer system. Data flow diagrams are used for representing data flow to represent the complete system.

In this system, data updating and report generation are the main processes in all the modules.

1. User Manipulation Module:-

Used by the Security Administrator to manage Oracle Users accounts. It contains a series of forms to

1. Add a new user
2. Alter and drop a user.

Functions:-

1. Display all the Existing user of oracle
2. Alter users schema like password change, allocating space, granting privilege etc.

3. Create a new user and set their privileges
4. Remove user accounts.

2. AUDITING MODULE:-

Auditing is recording and monitoring of database users actions. Currently triggers are the only tool to audit users action. We can audit

Insert, Update and Delete Statements.

It is not possible to audit the following statements or actions using triggers.

Logon and logoff actions, user creations, table creation and SELECT statement.

Functions:

1. Setting auditing options for Session Tracking
2. Disabling auditing options for Session Tracking
3. Noauditing DDL statements
4. Viewing Audit Statements.

3. CONNECTION TRACKING:-

- 1 Module used to track logon's and logoff's of users.
- 2 Allows Administrator to gather Statistics about user sessions

Functions:-

1. Connection tracking for all users or for a particular user
on current day, particular date, previous day and between two dates.
2. Displays all the valid Oracle users.

4. SESSION TRACKING:-

Used to track the SQL statements executed by user on a session.

Can be done for all users on

Current day, particular date, during previous day and between two dates.

Functions:-

1. Tracking user creation by a privileged user
2. Tracking table creation and dropping in a particular session
3. Tracking DML statements like SELECT, INSERT, UPDATE, DELETE.
4. Filtering Audit records by selecting a particular user.

5. REPORTS MODULE:-

Generates Static and Dynamic Audit Reports to be used by the Security Administrator.

Functions:-

1. Generating user reports
2. Connection Tracking reports
3. Session Tracking reports
4. Statistical reports.

TABLE STRUCTURE

Table Name : USER ACTION TABLE-DBA_AUDIT_TRIAL

| Field Name | Data Type |
|-------------------|---------------|
| ACTION NAME | CHARACTER |
| OSUSERNAME | CHARACTER |
| USERNAME | CHARACTER |
| TERMINALS | CHARACTER |
| TIME STAMP | ALPHA-NUMERIC |
| OBJECT NAME | CHARACTER |
| STATUS(LOGON\OFF) | DATE |

TABLE NAME-USER ACTION PERFORMED-DBA_OBJ_AUDIT_OPTS

| Field Name | Data Type |
|-------------|-----------|
| OWNER | CHARACTER |
| OBJECT NAME | CHARACTER |
| CREATE | CHARACTER |
| SELECT | CHARACTER |
| UPDATE | CHARACTER |
| DELETE | CHARACTER |

Table Name : USER SELECTION - DBA_USER

| Field Name | Data Type |
|-------------|-----------|
| USERNAME | Character |
| TERMINAL | Character |
| ACTION_NAME | Character |

Table Name : USER LOGIN STATUS- DBA_ROLE_PRIVS

| FieldName | Data Type |
|--------------|-----------|
| GRANTES_ROLE | CHARACTER |
| GRANTES | CHARACTER |
| USERNAME | CHARACTER |
| PASSWORD | CHARACTER |

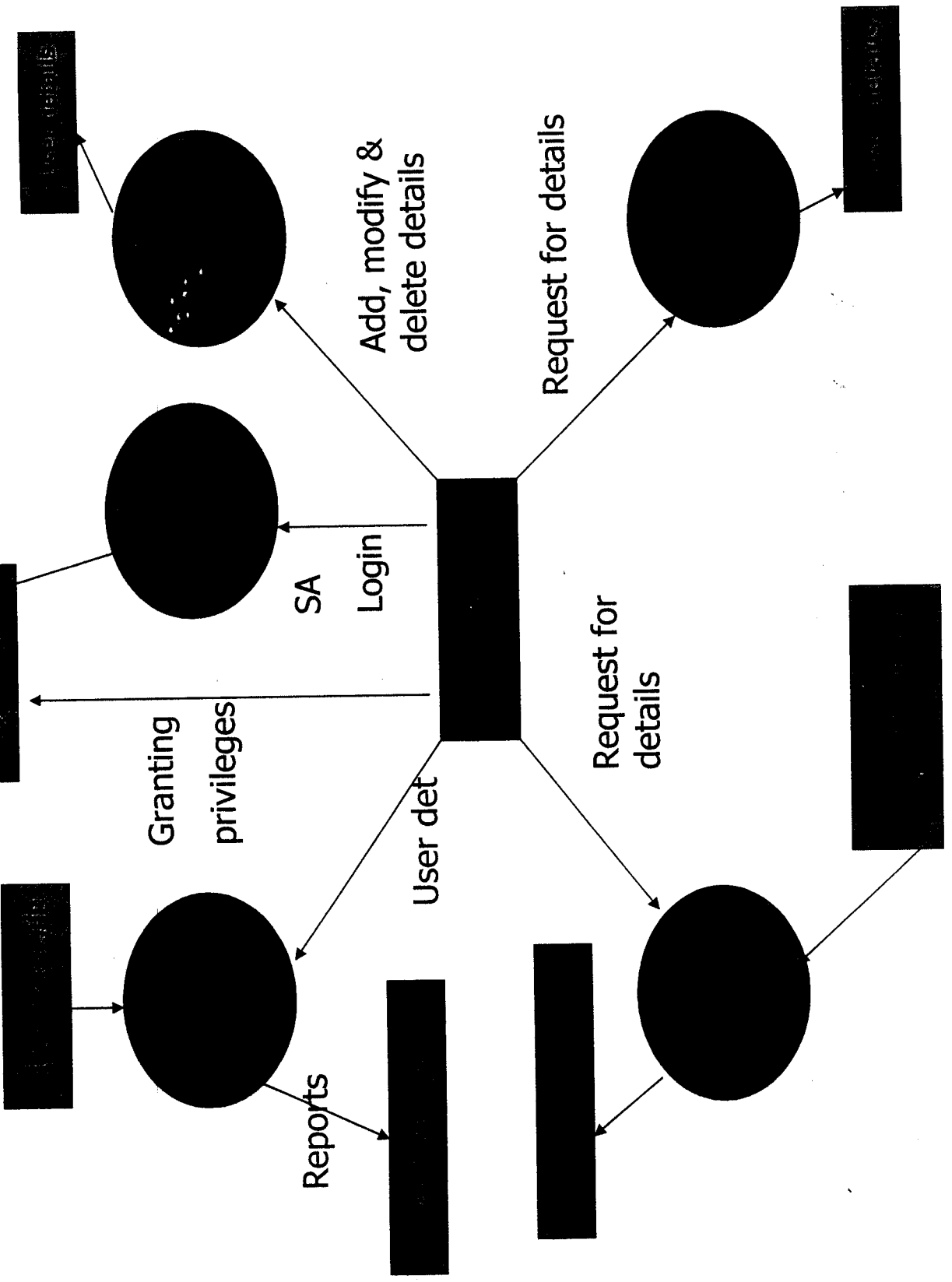
Table Name : SESSION TRACKING-DBA_AUDIT_SESSION

| Field Name | Data Type |
|-------------------|---------------|
| DBUSERNAME | CHARACTER |
| OSUSERNAME | CHARACTER |
| USERNAME | CHARACTER |
| TERMINALS | CHARACTER |
| TIME STAMP | ALPHA-NUMERIC |
| OBJECT NAME | CHARACTER |
| STATUS(LOGON\OFF) | DATE |

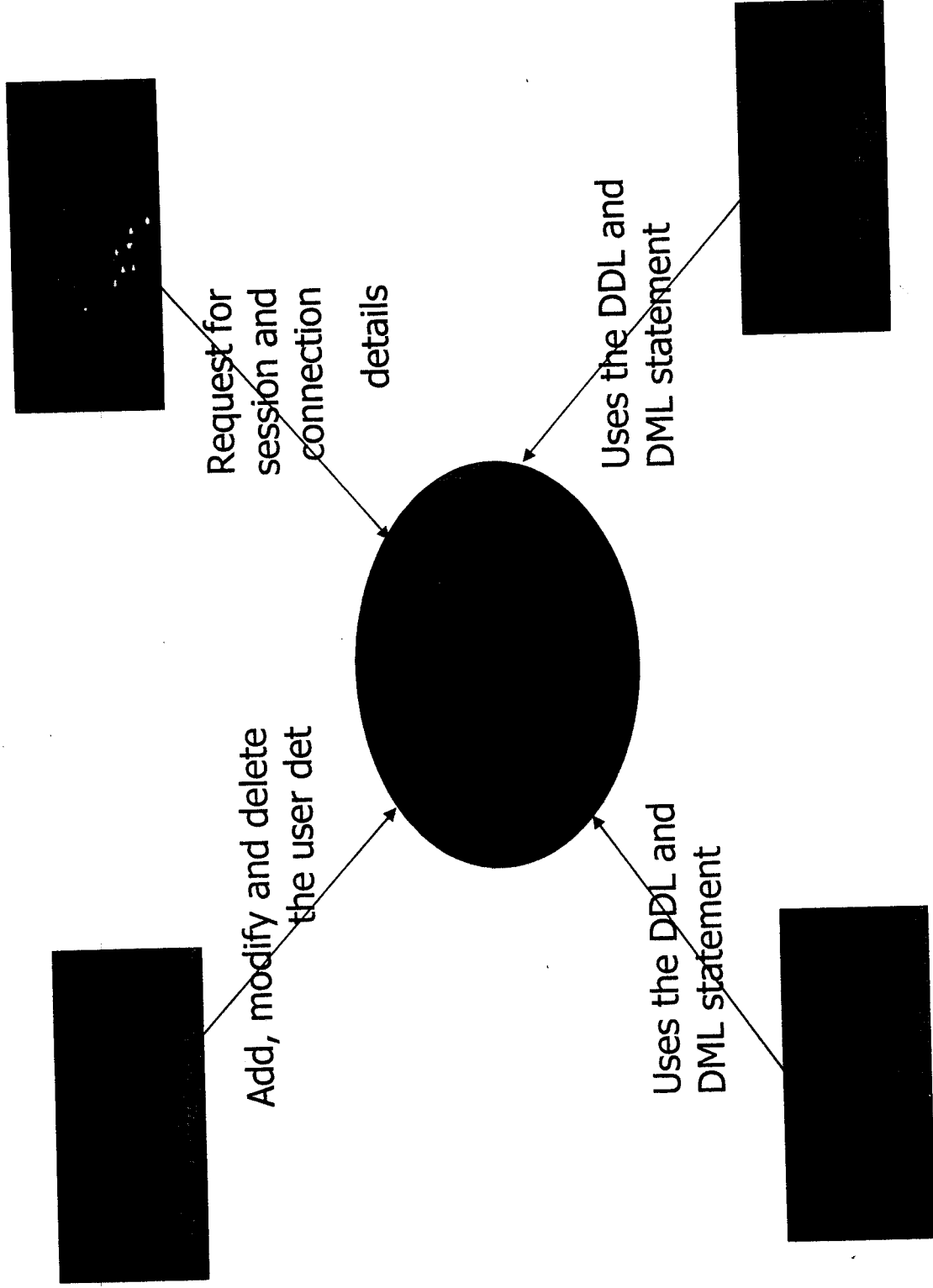
Table Name : CONNECTION TRACKING- DBA_AUDIT_SESSION

| Field Name | Data Type |
|-------------------|---------------|
| DBUSERNAME | CHARACTER |
| OSUSERNAME | CHARACTER |
| USERNAME | CHARACTER |
| TERMINALS | CHARACTER |
| TIME STAMP | ALPHA-NUMERIC |
| OBJECT NAME | CHARACTER |
| STATUS(LOGON\OFF) | DATE |

DATA FLOW DIAGRAM



Context Diagram



**SYSTEM
IMPLEMENTATION
AND TESTING**

5.1 SYSTEM INPLEMENTATION

Implementation is the stage when theoretical design is turned into a working design. It can be considered to be most crucial stage in achieving a successful new system. It involves careful planning, investigation of the current system and its constraints on implementation, design of methods to achieve change over, training of user staff and evaluation of change over methods.

The following processes were conducted in the implementation stage.

- Testing of developed modules with sample data.
- Correction of errors.
- Testing the system to meet user requirements.
- Changes were made according to user's suggestions.

5.2 SYSTEM TESTING

System testing is a planned and systematic pattern of all actions necessary to provide adequate confidence that product confirms to establish technical requirements. A full screen testing can be aided to ensure that the system works accurately and efficiently before the actual operation commences. The tests should take place in the actual programming environment and should test people and equipment as well

as programs. The tests should be designed in away as to uncover different classes of errors and to do so in minimum amount of time and effort.

As a secondary benefit, testing demonstrates that performance requirements appear to have been met. Thus programmers should test each program using test data designed by them and then complete system environment must be tested to the complete satisfaction of the users.

Testing for this system was done in 3 steps.

- Testing the function performance of each modular component.
- Testing the interface of software and its function with live data.
- Testing for user acceptance and to see if all user requirements have been met.

Two types of testing were conducted.

Unit Testing

Unit testing was carried out during the programming time itself. Each module was found to be working satisfactorily.

System Testing

System testing includes a comprehensive Integration testing using test plans and an Acceptance test for user acceptance by keeping in touch with the prospective system.

CONCLUSION

6. CONCLUSION

Developing a software which is easy to use is hard to achieve, As such so many complex Database Administrative activities in Oracle has been automated by using this software. With the launching of this tool the “Database Auditing “ is no more a difficult task.

**SCOPE FOR
FUTURE
DEVELOPMENT**

7. SCOPE FOR FUTURE DEVELOPMENT:

The project has been completed successfully and all the requirements have been met. The system can be modified with any technology that has both the Visual Basic and Oracle supports. However the possibilities for renovation are infinite and the scope for development innumerable.

With the launching of this tool, the DBA task has become more and more easy and even a novice DBA can administer the database effectively. As per the requirements in the future, this system can be modified and expanded.

REFERENCES

Reference:

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