

500

Query Navigator
A Utility for
Oracle DBMS

By
Mohammad Ilyas



A report submitted to Quaid-i-Azam University, Islamabad.

In the partial fulfillment of the requirement for M.Sc.

Degree in Computer Sciences

March 1998

DEPARTMENT OF COMPUTER SCIENCE
QUAID-I-AZAM UNIVERSITY
ISLAMABAD

Dated: May , 1998

FINAL APPROVAL

This is to certify that we have read the project report submitted by Mr. Muhammad Ilyas Jan and it is our judgment that this report is of sufficient standard to warrant its acceptance by the Quaid-i-Azam University, Islamabad for the degree of Master of Science in Computer Science.

COMMITTEE

1. EXTERNAL EXAMINER

Dr. A. Faiz M. Ishaq
Jaffar Brothers (Pvt) Ltd.
26-D, 2nd Floor, Kashmir Road
F-6/4, Blue Area
Islamabad.



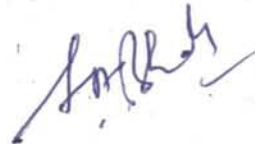
2. SUPERVISOR

Mr. Naeem Akhtar Bhatti
Assistant Professor
Deptt. Of Computer Science
Quaid-i-Azam University
Islamabad.



3. CHAIRMAN

Dr. Saeed Akhtar Bhatti
Deptt. Of Computer Science
Quaid-i-Azam University
Islamabad.



**IN THE NAME OF ALLAH
WHO IS THE MOST GRACIOUS
AND
THE MOST MERCIFUL**

**DEDICATED TO
MY BELOVED PARENTS
and
MY DEAR BROTHER MR. JAMAL NASIR**

PROJECT BRIEF

Project Title : The Query Navigator

Objective :To develop a utility for Oracle DBMS

Undertaken By : Muhammad Ilyas

Supervised By :Mr. N. A. Bhatti
Assistant Professor
Department of computer science
Quaid-I-Azim university Islamabad

Starting Month :Nov, 1997

Completion Month :March,98

Software Used :Developer 2000

Operating System :Windows 95

System Used :IBM compatible 486 DX

ABSTRACT

This report is about development of a utility for Oracle DBMS, Query Navigator. This utility is developed to retrieve detail information about all database objects. Different types of queries are implemented to display information about static and dynamic views of all database objects or selected database objects.

This utility also enables us to use SQL commands like create user , grant role/privileges, alter tablespace and alter user without writing traditional commands at SQL prompt. The Query Navigator provides GUI which is one of the main feature. With the implementation of this user friendly utility , most of the problems faced by DBA and software developer will be solved.

ACKNOWLEDGMENT

All the deeds in the world would remain unfulfilled but for the Almighty Allah, enable us to accomplish this task.

I feel great pleasure in expressing my deepest appreciation and heartiest gratitude to my supervisor Mr. N. A. Bhatti for his guidance, great help and kind nature during all the phases of this project . I also express thanks to all my teachers for their valuable support during my studies.

I am also grateful to Mr. Najam Iqbal , who is my ideal in software development field. He helped me a lot during my project and gave invaluable suggestions.

I am thankful to my respected teacher Mr. M. Tariq Siddiqi and Dr. Asif Mir for guidenence and valuable lectures during studies.

How can I ignore to express my appreciation and deepest sense of gratitude from my heart to my loving parents, brothers, brother in law, sisters and sister in law, who remember me in their prayers and let me spare to complete my studies for a long time.

The acknowledgement will remain incomplete without thanks to my class fellows for their excellent co-operation . I am thankful to all my friends specially Amir Shaz, Kamran, Habib, Rehan, Masood , Fareed, Zaem, Aman Ullah and Ata Ullah for their love and good feelings for me.

March, 1998
Islamabad.

Mohammed Ilyas

PREFACE

This project is concerned with the development of a utility for Oracle DBMS. The purpose of this utility is to provide user friendly GUI to static, dynamic performance DD views and SQL commands.

- Chapter 1** : This chapter is an introductory chapter. This chapter defines all general terms used in this report.
- Chapter 2** : This chapter describes existing system and its drawbacks. It also describes some terminologies specific to Oracle.
- Chapter 3** : It describes the proposed system and its objectives.
- Chapter 4** : This chapter throws light on the design specification of the system.
- Chapter 5** : It describes the Query Navigator development.
- Chapter 6** : It describes the utility implementation and evaluation.
- Chapter 7** : It is User 's Guide.
- Appendix (A)** : It contains a listing of information retrieval at SQL prompt.
- Appendix (B)** : It shows all input and output form layouts.
- Appendix (C)** : It display trigger code when user icon is clicked.
- Appendix (D)** : It is listing of all roles and system privileges.
- Bibliogralhy**

CONTENTS

Chapter1

Introduction

1.1 Introduction	1
1.2 Database Systems	1
1.3 DBMS	1
1.4 DBA	2
1.5 Software Development	2
1.6 Data Dictionary	2
1.7 Client Server Model	3
1.7.1 Client	3
1.7.2 Server	3
1.8 Need of Utility	3

Chapter 2

The Existing System

2.1 Introduction	1
2.2 Existing System	1
2.3 Analysis Of Present System And Need For Utility	2
2.3.1 Drawbacks Of Present System	2
2.4 Terminologies	2
2.4.1 Oracle Data Dictionary Views	2
2.4.1.1 Static Data Dictionary Views	3
2.4.1.2 Dynamic Performance DD Views	3
2.4.2 Role	3
2.4.3 Privilege	4
2.4.4 Database Objects	4
2.4.4.1 Non Schema Objects	4
2.4.4.1.1 User	4
2.4.4.1.2 Tablespace	4
2.4.4.2 Schema objects	4
2.4.4.2.1 Table	5
2.4.4.2.2 View	5
2.4.4.2.3 Index	5
2.4.4.2. Cluster	5

Chapter 3

The Proposed System

3.1 Introduction	1
3.2 Objectives	1
3.3 The Proposed System	2

3.4 Considerations To Achieve The Proposed System	3
3.5 Software Selection	4

Chapter 4 **System Design**

4.1 Introduction	1
4.2 System Design	1
4.2.1 Output Design	1
4.2.1.1 Considerations For Design Output	2
4.2.1.2 Screen Output	2
4.2.1.3 Printed Output	3
4.2.2 Input Design	3

Chapter 5 **Query Navigator Development**

5.1 Introduction	1
5.2 Query Navigator Development	1
5.3 Input Form Layouts	3

Chapter 6 **Implementation And Evaluation**

6.1 Introduction	1
6.2 Testing	1
6.3 Evaluation	2
6.3.1 Merits	2
6.3.2 Conclusion	4
6.4 Future Enhancements	4

Chapter 7 **User's Guide**

7.1 Introduction	1
7.2 How To Login And Logout	1
7.3 Important Considerations	3
7.3.1 Forms	4
7.3.2 Editing Fields	4
7.3.3 Status Line	4
7.3.4 Message Line	4
7.4 Query Generation	4
7.4.1 User	5
7.4.2 Tablespace	5
7.4.3 Table	5
7.4.4 View	6

7.4.5 Index	6
7.5 SQL Commands	6
7.5.1 Creating User	6
7.5.2 Alter User	7
7.5.2.1 Alter User Password	7
7.5.2.2 Alter User Tablespace	8
7.5.3 Grant Rights To User	8
7.5.4 Creating Tablespace	9
7.5.5 Data File Addion	10
7.6 Security Implementation	10
7.7 Special Considerations	11

CHAPTER 1

INTRODUCTION

1.1 Introduction

In this introductory chapter , some terms are defined briefly with their roles. First of all database systems are defined and then DSMS is discussed. DBA and software developer with their importance are discussed briefly. As this utility is a client server application, so client sever concept are defined in detail. At the end of this chapter need of utility for DBA and software developer is discussed.

1.2 Database Systems

A database system is basically a computerized record keeping system ; that is ,it is a computerized system whose overall purpose is to maintain information and to make that information available at demand. A collection of data files together with the facilities to perform various operations on these file e.g;

- Inserting data into the files.
- retrieving data from the files.
- Updating data in the files.
- Deleting data from the files.

1.3 Database Management system

The database management system (DBMS) is the software that handles all access to the database . Many DBMSs include a number of utility programs which are designed to help the DBA in various administrative tasks. For example :

- Load/unload/reload routines
- Reorganization rouotines

- Statistics and analyst routines

The DBMS generally works at the back of applications. These applications can be

- user written
- vendor provided

1.4 Database Administrator

The data administrator is the person who makes the strategy and policy decisions regarding the data of the enterprise, and the database administrator is the person who provides the necessary technical support for implementing those decisions.

The DBA performs the following functions

- Defining conceptual and internal schemas
- Dealing with users (providing help regarding external schema)
- Defining security and integrity checks
- Defining backup and recovery procedures
- Monitoring performance
- Implementing changes

1.5 Software Developer

Software developer establishes and uses sound engineering principles in order to obtain economical software that is reliable and works efficiently on real machines.

1.6 Data Dictionary

The data dictionary is a read only set of tables that provides information about its associated database.

1.1 Client-Server Model

An Oracle database system can easily take advantage of distributed processing by using its client/server architecture. In this architecture, the database system is divided into two parts: a front-end or a client portion and back-end or a server portion.

1.7.1 Client

The client portion is the front-end database application and interacts with a user through the keyboard, display, and pointing device such as a mouse. The client portion has no data access responsibilities; it concentrates on requesting, processing, and presenting data managed by the server portion.

1.7.2 Server

The Server portion runs Oracle software and handles the functions required for concurrent, shared data access. The server portion receives and processes SQL and PL/SQL statements originating from client applications

1.8 Need of Utility

Many DBMSs include a number of utility programs which are designed to help the Database Administrator in various administrative tasks. Software Developer also needs some utility which helps them in developing software in Oracle. So this utility, Query Navigator is also one of such utility.

CHAPTER 2

THE EXISTING SYTEM

2.1 Introduction

In this chapter existing system will be discussed. This chapter also describes drawbacks of the system. During system study, few organisations were visited and the DBA and software developer including following personalities were interviewed.

1. Mr. Najam Iqbal
Norsk Data (Pvt) Ltd Islamabad.
2. Mr. Ali Ahmad Dogar
Cyber Soft (Pvt) Ltd Lahore.

2.2 Existing System

Questions may arises such as why this utility is developed? What's the need of this utility ? To answer these questions briefly now and later it will be explained in detail. We need this utility because

1. We can retrieve information from the DD at the SQL prompt, DBA may need such information so many times .For example
 - The list of tables created by a user Arif .
 - Constraints and columns on table employee .
 - Schema or non schema objects like a list of users or snapshots of tablespace.
2. DBA can create and alter database objects at SQL prompt using SQL commnads
 - Addition of datafile

- Creating a user
- Granting rights to user
- Creating new tablespace
- Alter user password
- Alter user default tablespace

2.3 Analysis of Present System and Need for Utility

Since the present system is working traditionally at SQL prompt, so there are some problems faced by the DBA and software developer. The following are the problems and drawbacks of the present system. Keeping in view the drawbacks of the present system, it is proposed that the development of Query Navigator for DBA and software developer is essential.

2.3.1 Drawbacks of the Present System

During the system study the following drawbacks were encountered in the present system.

- There is no existing utility.
- Information is not in desirable form as shown in Appendix A.
- Before using any SQL commands user must know the syntax .
- Information can be retrieved and SQL commands can be run on SQL prompt without any GUI .

2.4 Terminologies

In this section some terminologies are explained. These terms are frequently used in the rest of chapters. Basic understanding of these terms are necessary.

2.4.1 Oracle Data Dictionary Views

Oracle data dictionary consists of static data dictionary views and dynamic performance data dictionary views.

2.4.1.1 Static DD Views

Data in the base tables of the data dictionary is necessary to function. Therefore, only Oracle should write or change data dictionary to ascertain that objects exist and that users have proper access to them. Oracle also updates the data dictionary continuously to reflect changes in database structures, auditing, grants, and data. For example, if user KATHY creates a table named PARTS, new rows are added to reflect the new table, columns, segment, extents, and the privileges that KATHY has on the table. This new information is visible the at the next time when the dictionary views are queried.

2.4.1.2 Dynamic Performance DD views

The Oracle7 Server contain a set of underlying tables that are maintained by the Server and accessible to the DBA user SYS. These tables are called dynamic performance tables because they are continuously updated while a database is opened and in use, and their contents relate primarily to performance.

2.4.2 Role

Oracle provides for easy and controlled privilege management through roles. Roles are named groups of related privileges that you grant to users or other role. Roles are designed to ease administration of and -user system and object privileges. However, roles are not meant to be used for application developers, because the privileges to access objects within stored programmatic constructs need to be granted directly. Complete listing of roles are shown in appendix D.

2.4.3 Privilege

Privilege is a right to execute a particular type of SQL statement or to access another USSR's object. Some examples of privileges include

- The right to connect the database (Create a session)
- The right to create a table
- The right to select rows from another user's table
- The right to execute another user's stored procedure

Complete listings of all system and object privilege, are shown in appendix D.

2.4.4 Database Objects

Data base objects can be classified in the following two categories.

2.4.4.1 Non Schema Objects

Schema objects are the logical structures that directly refer to the database's data. Schema objects include such structures as tables, views, sequence, stored procedures, synonyms, indexes, clusters, and database links.

2.4.4.1.1 User

A database user is an account through which you can log in to the database and establish the means by which Oracle7 permits access by the user.

2.4.4.1.2 Tablespace

A tablespace is an allocation of space in the database that can contain database objects.

2.4.4.2 Schema Objects

Other types of objects are also stored in the database and can be created and manipulated with SQL, but are not contained in a schema. Non-Schema Objects include profiles, roles, rollback segments, tablespaces and users.

2.4.4.2.1 Table

A table is the basic unit of data storage in an Oracle database. The tables of a database hold all of the user accessible data.

2.4.4.2.2 View

A view is a custom-tailored presentation of the data in one or more tables. A view can also be thought of as a stored query.

2.4.4.2.3 Index

Indexes are optional structures associated with tables, which can be created to increase the performance of data retrieval.

2.4.4.2.4 Cluster

Clusters are optional structures associated with tables, which can be created to increase the performance of data retrieval.

CHAPTER 3

THE PROPOSED SYSTEM

3.1 Introduction

The Query Navigator has been designed after conducting a detailed study of the existing system. The proposed system has therefore been designed, keeping in mind the demands and requirements of the DBA and software developers. The proposed system is to develop a utility, which makes the system more efficient, and provide economical, reliable and error free information.

3.2 Objectives

This utility developed has following capabilities., because of Oracle ever growing used day to day.

- To provide maximum information about Oracle data dictionary views.
- To provide GUI to both DD views and SQL commands.
- It is developed as a client application so it can effectively be used in networking.
- Time is very important factor in the working of organization. The high authorities require quick response to their queries which should urgently be met because decisions are based on up-to-date information. Utility is designed to cater for this requirement.
- It should be user friendly.
- The system should be acceptable to the DBA and software developer in design standard and required objectives are likely to meet.

- The Query Navigator should provide accurate and error free information needed for decision making. DBA and software developer now can easily and quickly decide whether to add one or more data file or create a user.

3.3 The Proposed System

As stated earlier that all such information can be obtained from Oracle data dictionary for both the static and the dynamic views. But the main problem is that this information is not in a readable form and no GUI is provided as shown in Appendix A, so this utility posses the following salient features :

- **User Interface**

The user interface is GUI. For better user interaction, the interactive input screen would be well designed with moving bar options. At the top of output there is horizontal toolbar, which contains a list of icons. User can select any icon to see the information about database objects.

- **On-line Help**

The system would be designed, so that it will provide full on-line help to users, so a user can use such system very easily. A system should be completely user friendly with appropriate messages, to alert the user on wrong input or on some other error.

- Graphical screen can be printed where required.
- It is client application so it can be utilized from any client machine .
- Maximum ,consistent and relative information is provided in least time.
- Dynamic performance of Oracle server can be viewed.

- User and tablespace can be created and altered without writing traditional SQL commands.
- Database objects can be searched in hierarchical manner. We can also list all database users or list user of specific tablespace.
- In this general utility may be used by DBA and software developer.
- It would be able to retrieve according to requirements of the DBA and software developer.
- **Checks**

Various checks would be provided in the data entry modules to ensure appropriate actions. Checks would be provided to make sure that correct database procedure should be called. Checks on output screen are also imposed to ensure that right fields will be clicked. The fields in output layout which does not have meaning, those fields when clicked alert message will be displayed. Checks are imposed in input screens to ensure that user name typed is correct. If we are creating a user and user already exists in database then a message will be displayed that user already exists. These error messages and the causes of error are displayed to help user.

3.4 Considerations to achieve the proposed system

The following outline would be considered in order to achieve the system's objectives

- Have a capability to retrieve information efficiently and without loss of information.

- Have a capability to input information in optimally organized way.
- Have a capability to display detailed but relative information in the desired way as DBA and software developer want to see it.
- Have a capability to provide absolute selection control to the user like select user from horizontal toolbar and then select a specific user from list or select user from any out put layout to see database objects belonging to this user.
- Have restricted access to the DD views as it has significance with reference to the present-context.

In this course , the following aspects are to be taken care of

1. Authorized access to the DD views, only person with DBA views privileges, can utilize the utility.
2. Optimal compromise between security and efficiency.
3. Have a capability to run the utility efficiently in minimum time, keeping utility size as small as possible.

3.5 Software Selection

This utility is a general in a sense i.e; for any DBMS can be utilized but specific to only Oracle DBMS. It is developed in Developer / 2000 , because I like to explore Oracle and Developer / 2000.

The main features of Developer / 2000 are:

- Powerful Database Development Tool
- Security
- Client Server Facility
- Distributed Database
- Portability
- Strong Forms & Reports Designer

The Main features of Oracle are :

The most important feature is that it is multi user software. The application developed in Oracle can be connected together into a powerful, distributed database environment. It provides a powerful client-server relationship between server and its terminals. In client-server relationship part of the processing is performed at the user's terminal thus a considerable increase in the speed of the processing.

Oracle provides strict security of application developed in the package by enforcing the user name and password. Without the password it is not possible for any body to access the system. Also it is possible to grant different type of accesses to different user e.g. updation, addition or deletion rights may be provided only to the selected personnel while the rest may be allowed to view the records.

Oracle provides a number of sophisticated tools for the development of application. Some of these tools are

SQL *Plus

SQL *Plus is an interface through which SQL commands may be entered and executed. There are number of SQL *Plus commands which can further process and format the output from SQL command, and provide facility for editing and saving SQL commands.

Forms Designer

Forms Designer provide facility to design forms. These forms fast and easy data entry, deletion and queries to an ORACLE database.

Report Writer

Report Writer can be used to create an ordinary letter or tabular report. It can be used to produce a report derived from Oracle table, with column heading, column of database information and total as desired.

A number of other utilities are also available which allow easy manipulation of data structure along with the data store in these structures. For example Oracle provide

export /import utilities with the help of it is possible to move structure along with data contained in these files from one system to another.

The ORACLE RDBMS is fully portable over 80 different H/W and operating system platform, including VMS, MVS, UNIX, MS-DOS, OS/2, Macintosh. ORACLE 's unrolled portability and connectivity enables all the system in an organization to be linked in to single, integrated computing resource.

ORACLE provides a powerful procedural language extension to SQL known PL/SQL. PL/SQL significantly increase application performance and developer productivity, while enhancing the power and functionality of other ORACLE approaches.

CHAPTER 4

SYSTEM DESIGN

4.1 Introduction

System Design is the phase where quality is fostered in software development. Hence good development work depends upon good quality of design. Design changes customer's requirements into a representation of software. I analyzed and designed the system in such a way to meet the requirements of the DBA and software developer.

This chapter consists of input/output design phase . Inputs and outputs are key parts of any system design. They are the interface between user and the DD views. User-interface should be designed in such a manner that can well be understandable by the user.

4.2 System Design

For convenience the design phase is divided into the following phases.

- Output Design
- Input Design

4.2.1 Output Design

The output is in the form of queries . The output may be screen oriented or can be printed where as required. The DBA and software developer are more concerned with the results and their formats, rather than the design and working of the utility. Also, the main objectives of the system is to provide efficient, fast and reliable retrieval of information. It has been decided that system should display or print following information:

1. List of all database users or selected users of specific tablespace.
2. List of all database tables or selected tables of any user or tablespace.

3. List of all database indexes or selected indexes of any user or tablespace.
4. List of all database views or selected views of any user.
5. List of database clusters or selected clusters of any user.
6. List of database synonyms or selected synonyms of any user.
7. List of database triggers or selected triggers of any user.
8. List of database tablespaces.
9. List of database data files or selected data files of any tablespace.
10. List of database columns or selected columns of any user or any table.
11. List of database constraints or selected constraints of any user or table.

4.2.1.1 Considerations For Designing Output

Initial output considerations, in discussions with DBA and software developer in different organizations include

What information is needed ?

How it should be presented ?

What format it should have ?

When it is needed and what the volume will be ?

4.2.1.2 Screen Output

Queries are the statements that retrieve data from the DD views on the screen in any combination or order, so that layout should be designed while keeping in mind these queries already discussed with DBA and software developers. Some of the queries mentioned below will be require the display of information needed for DBA and software developers. For example

- To select all database users with only user name, creation date, default tablespace and temporary tablespace.
- To select all users having any selected tablespace.
- To select all data base tables owned by any selected user.

- To view a list of those users connected to any machine.

4.2.1.3 Printed Output

As discussed earlier Query Navigator also provides a facility to take printed output where ever required. If DBA and software developer wants to take printed output, so they can take hard copy of all queries as mentioned above.

4.2.2 Input Design

Input design specifies the way in which data enters into a system for processing. In this utility input design is used to create user , create tablespace, grants to user and alter user. Input design ensures the reliability of a system and produce results from accurate DD views. Following are different mechanisms that are adopted to make the input design reliable. Input design also concerns with data format and data control.

• Input Form Design

Input form is designed in such a way so it will be easy to create user and other database objects as shown in appendix C. One property of this utility is that its forms give a user friendly interface.

• Help list

A list of values is used on some particular field for example when creating a user then a list of all data base users are displayed so user can't select a user which is already exist .When altering user then a list of all users are displayed to select the user which will be altered.The user only needs to click on the required value, which is then displayed in the corresponding field. This approach is helpful to avoid data entry for the fields which have fixed values. In code tables, many list of values are provided.

• Password

It is implemented because of security purposes. When a user wants to login the system, he should provide his identification, by passing his password. User must have privileges with DBA role.

CHAPTER 5

Query Navigator DEVELOPMENT

5.1 Introduction

Software development phase is started after the system design phase is complete. Software is developed to meet the specification of the proposed and design phase. The purpose of the development phase is to transfer design into executable and useful Oracle utility which may then be tested and implemented as a new utility, Query Navigator . As we know in Oracle data dictionary all this information is provided but DBA and software developer most of the time does not need all such information. In this utility only meaningful information is selected and queries are executed when ever selected specific data base objects.

5.2 Query Navigator Development

The Query Navigator is developed into SQL*PLUS, SQL*FORMS, SQL*MENU.

Following are the illustration of the terms used in the discussion.

• Forms

SQL*FORMS and SQL*PLUS are used to insert, delete, update and retrieve information stored in data dictionary. SQL*FORMS provide quick development of application entering, updating and querying and deleting data. It is possible to develop application through SQL*FORMS which are used to design the interface of the system through SQL*FORMS utility called screen painter. SQL*PLUS is mostly used for table creation.

• Blocks

The basic building blocks of SQL*FORMS are blocks. A form can contain one or more blocks each of which may be associated with a base table or no base table. Every block performs a specific task.

• Screen Painter

It is the full screen editor in which one can quickly move fields around, add boxes and alter text. We can change the text displayed for a field.

• Triggers

Triggers are set of processing commands. All triggers are written in PL*SQL , which is a procedural language integrated within the Oracle database. Triggers are associated with event points in SQL*FORMS processing. An event is an action which occurs when a form is executed. Triggers can be defined at field, block and form level. An example of an event point in operator pressing is [Next Field]. It fires when a user presses RETURN after entering a value in a field. Its effect is to go to the very next field for data entry. Another example in Query Navigator when we click the user item then it responds according to message. Code for this trigger is shown in Appendix C.

5.3 Input Form Layouts

The whole utility is designed in a single form with various blocks . Description of all these blocks are given below in detail with block name and purpose of blocks. Their layouts are given in appendix B.

(1)

Block Name : Main_Block

Purpose :

This is main block of this form, it contains all items which are displayed in toolbar. These items call all other blocks in the form.

(2)

Block Name : Block_User_Detail

Purpose :

This block is used to display information about all data base users or selected users.

(3)

Block Name : Block_Table_Detail

Purpose :

This block is used to display information about all data base tables or selected tables.

(4)

Block Name : Block_TabelSpace_Detail

Purpose :

This block is used to display information about all data base tabelsapces.

(5)

Block Name : Block_DataDile_Detail

Purpose :

This block is used to display information about all data base data files or selected data files.

(6)

Block Name : Block_Index_Detail

Purpose :

This block is used to display information about all data base indexes or selected indexes.

(7)

Block Name : Block_Synonym_Detail

Purpose :

This block is used to display information about all data base synonyms or selected synonyms.

(8)

Block Name : Block_View_Detail

Purpose :

This block is used to display information about all data base views or selected views.

(9)

Block Name : Block_Cluster_Detail

Purpose :

This block is used to display information about all data base clusters or selected clusters.

(10)

Block Name : Block_Trigger_Detail

Purpose :

This block is used to display information about all data base triggers or selected triggers.

(11)

Block Name : Block_Sequences_Detail

Purpose :

This block is used to display information about all data base sequences or selected sequences.

(12)

Block Name : Block_Snapshot_Detail

Purpose :

This block is used to display information about all data base snapshots or selected sanpshots.

(13)

Block Name : Block_Create_User

Purpose :

This block is used to create a user without any rights.

(14)

Block Name : Block_Alter_User

Purpose :

This block is used to alter user password and default tablespace.

(15)

Block Name : Block_GrantTo_User

Purpose :

This block is used to grant system privileges and role to created data base users.

(16)

Block Name : Block_Create_tabelspace

Purpose :

This block is used to create tabelspace as a logical storage in data base.

(17)

Block Name : Block_Alter_Tabelspace

Purpose :

This block is used to alter tabelspace that is to add more data files to the tbalespace.

CHAPTER 6

IMPLEMENTATION AND EVALUATION

6.1 Introduction

Implementation is the final phase in the system development life cycle. It starts at the beginning of the software development phase with a plan, known as an implementation plan. During this phase, the developed system is put into actual operation. Thus the implementation details of the developed system are considered in this chapter.

6.2 Testing

System testing is the process of executing a program with the explicit intention of finding errors, i.e., making the program fail and the test cases are devised with this purpose in mind. A test case is a set of data that the system processes as normal input. A successful test is the one that does find an error.

In the designed system, every effort has been made to make sure that system does not fail or malfunction under any condition. Following kinds of tests were performed on the system:

1) Unit Test

Each individual module was tested to determine whether it meets all specifications. In this test all the blocks were tested by running them individually.

2) Integration Test

After successful unit level testing , all integrated modules were tested together to ensure that interfaces such as calling sequences and common data areas are all arranged correctly. All the interrelated blocks and forms were tested together to ensure that the data movements along the corresponding paths are correct.

3) System Test

Whole system was tested to ensure that it works according to its specifications. All the blocks in the forms were tested together in this test. The tests results also gave an indication of the software quality and system design which in turn helped in locating some server errors which required design modifications.

6.3 Evaluation

The objectives of system evaluation is to determine, whether the desired objectives are accomplished or not. This is done by determining the merits and demerits of the proposed system. This is concerned with the detailed study of the developed system, from the implementation point of view. At the end some suggestions for the improvement of the system are coded.

6.3.1 Merits

The new system has number of advantages over the manual system as described below:

1) Efficiency

The new system is time effective. As we it is very time consuming to retrieve information at SQL prompt. This utility is easier and much faster , because there is no need to enter the query to see list of data base users. This makes the new system much faster for querying. This reduces any chances of errors by the user to type correct query.

2) Accuracy

The new system gives a high degree of correctness and produces reliable results. The outputs are sufficiently precise for the desired purpose and there is no chance of entering wrong data because many consistency checks are provided.

3) Security & Integrity

By security we mean the protection of data against unauthorized disclosure, alteration or distraction where as a integrity involves insuring that the things they are trying to do are correct.

4) Modularity

The system is divided into a number of modules integrated together to fulfill DBA and software developer requirements. These modules are independent of each other. Another advantage of modularity is the ease of modification, extension and enhancement of the developed system.

5) Ease of Use

The developed system is menu driven and a horizontal toolbar is used which is easy to use. On-line help , proper error messages and respective error messages are provided to make the system user friendly.

6) Consistency

Uniform notation has been used throughout the system. Efforts have been made to keep the format homogeneous. This has been accomplished to avoid complexity.

6.3.2 Conclusion

The Query Navigator is helpful, easy to use and menu driven. By utilizing this utility.

- Since the system is very easy to use, DBA and software developer can query easily.
- Due to accuracy and high degree of precision the utility is reliable and helpful.
- Timely information retrieval from DD views will be very tedious if done at SQL prompt.
- All possible queries have been generated as needed by the DBA software developer.
- Any extension can be easily made in the system.

Hence all the objectives mentioned in the beginning of this project have been achieved successfully.

6.4 Future Enhancements

The Query Navigator is divided in two parts . In part one GUI to DD views are provided, this part is complete. In second part GUI to SQL command are provided. I selected five SQL command which are most frequently used ,These are

- Create user
- Create tablespace
- Grant privileges to user
- Alter user password and tablespace
- Alter tablespace

There are 114 SQL commands, remaining commands may be used for future enhancements.

Chapter 7

USER'S GUIDE

7.1 Introduction

This chapter gives the basic understanding of the utility, Query Navigator for Oracle DBMS. This chapter comprises the features provided by the utility. Different operations like record creating user, data file addition, information retrieval etc have also been discussed.

7.2 How To LOGIN And LOGOUT

Since the utility is a client server application, so it requires the services of a DBA and software developer to perform several tasks such as :

- Information retrieval from static and dynamic DD views
- Creating new user
- Granting rights to users
- Alter user password
- Alter user default tablespace
- Creating new tablespace
- Data file addition

WINDOWS NT installation is the first step towards system implementation. Next step is the **ORACLE (DEVELOPER / 2000)** installation. **SQL*DBA**, an **ORACLE Tool**, which is used to start and stop the **ORACLE DBMS**. It also performs maintenance and monitoring functions such as

- Media recovery

After logging in the **SQL Server** , by using **User Name & Password**, for example,

```
User Name   :   LOGINACC
Password    :   LOGIN
```

If the password entered is incorrect then message will be displayed that the password entered is incorrect. Then click on **OK** and will ask again to enter password. If the password entered is valid, then We are now in the **WINDOWS / NT startup**.

Now we double click the **Oracle DB Startup-shutdn** icon and a new screen will appear at the bottom of which we write :

```
CONNECT INTERNAL / MANAGER
```

Then we press **< RETURN >** key

A message appears **CONNECTED**

Then we write **STARTUP**

Then we press **< RETURN >** key

A message appears

```
ORACLE instance started
Database mounted
```

Then we write

```
EXIT
```

Then we press **< RETURN >** key

Now we exit from this screen. Now we can start any **ORACLE (DEVELOPER / 2000)** tool.

In order to **dismount** the database , we repeat above command except **STARTUP**, we write here **SHUTDOWN**.

After starting the **SQL / Server** , now start your **PC** and enter the user name and network password such as:

```
User Name : Ilyas
Password  : ****
```

After which you will be connected to **SQL / Server**.

Now click on **Start** at the bottom left and then click on **Programs**

If you want to logon to database click on **Oracle for Windows 95** and then click on

SQL Plus 3.2 , a message will appear about **User Name & Password** :

```
User Name : System
Password  : *****
after which you will be on SQL prompt.
```

If you want to click on **Developer 2000 for Win 95** , you will be able to access **Forms Designer , Forms Generate , Reports Designer** etc.

Now open the form **QN** and execute it.

7.3 Important Considerations

Before using the system , the following definitions should be kept in mind.

7.3.1 Forms

Various form layouts have been designed to retrieve data from the DD views and GUI to SQL commands.

7.3.2 Editing Fields

It is a basic unit in the form designing with which only a form layout is able to enter and retrieve data to / from data dictionary.

7.3.3 Status Line

It is a bottom line of the screen in which information about the status is displayed.

- Indicates that the beginning of the current field is scrolled off the left side of the screen.
- Indicates that the end of the current field is scrolled off the right side of the screen.
- CHAR MODE indicates whether in an Insert Mode or Replace Mode.
- COUNT indicates the number of records retrieved.

7.3.4 Message Line

It is also a bottom line of DEVELOPER FORMS, in which messages and additional help is displayed.

7.4 Query Generation

The Query Navigator has horizontal toolbar which contains a list of icons representing all database objects. we select if any one of icon then detail information about this database objects will be displayed as shown in appendix B. We can also see a selected group of database, in this case user must select a field

from output screen. Now click the icon on toolbar to display the selected group of database objects.

7.4.1 User

The Query Navigator can display the list of database users with relative information as shown in Appendix B. When user name is clicked in this list then we can see the detail information related to this user e.g; a list of tables, indexes, views etc created by this user. The user name can be selected from any graphical screen. This flexibility is provided to user which is an important feature.

7.4.2 Tablespace

The Query Navigator can display a list of all database tablespaces if selected from toolbar. Now if some one wants to see the individual information about each tablespace, user must select the tablespace name from any output graphical screen and then select any icon from toolbar to see a list of tables, indexes, data files etc. This is the power of utility to retrieve information in any order.

7.4.3 Table

In Query Navigator if table icon is clicked then a list of all database tables will be displayed with relative information which include table name, owner of table, number of rows in table, table status as shown in appendix B. We can also see a group of selected tables belonging to any specific username or tablespace, in this case user must select a username or tablespace name then click the table icon so that selected tables will be displayed. If user wishes to see the columns or constraints about any table. So user must select any table name from table list and then click the column icon or constraint icon, to achieve this particular information.

7.4.4 View

When view icon is clicked then a list of all views are displayed with their owners. In this case a text box appear and if user want to see the query which was used to create this view. So user can click any view name then query for this view will be displayed in the text item box, as shown in appendix B.

7.4.5 Index

When index icon is clicked then a list of all indexes are displayed with relative information, such as index name, index owner, indexed table, and table owner, as shown in appendix B. We can see a selected group of indexes belong to specific owner.

7.5 SQL Commands

In this section GUI to SQL commands are discussed in detail. As we know Query Navigator enables us to create user, grant rights to user, add data file, create tablespace, and alter user without writing traditional SQL commnads.

7.5.1 Creating User

In any DBMS database users are created. We can create user at SQL prompt, using traditional create user command. The other way is to create user using Query Navigator. In this way we can create user easily in GUI environment. A user interface is designed in such way that user could input only username and password. Password is also confirmed. When username text is clicked then a popup list of all database users are displayed so user should know about database users which are already exists in Oracle database, as shown in fig 4.1

When input is complete then user can click create user icon, string is parsed and checked for errors. If there is no errors encountered then user is created for database and a message will be appeared to prompt the user “ user created successfully”.

Checks: User can't be created if

- Username and password is not provided or password is not confirmed.
- Database user already exists then a message will be displayed to alert the user “User already exists”.

7.5.2 Alter User

In Oracle this SQL commands can be used to change any of the following characteristics of a database user.

- Password
- Default tablespace for object creation
- Tablespace for temporary segments created for the user
- Tablespace access and tablespace quotas
- Limits on database resources
- Default roles

In this utility first two option are implemented. User password can be altered needed because for security purposes it is necessary to change password on specific time. Default tablespace for objects creation can be changed because there should be insufficient space in one tablespace then this tablespace can be altered to work successfully.

7.5.2.1 Alter User Password

If we want to alter user password then in well designed graphical screen username is entered. If we don't specify the username then user will be alert to type the

username. After this in radio button we have to select one of the two options that is either password or tablespace, If click password then we have to specify new password. This new password must also be confirmed. Now if user click alter user icon then this user will be altered and a message will be displayed that user has been altered successfully as shown in fig 4.2

Check: We can't alter user if

- We don't specify the username and password
- User does not exists in Oracle database

7.5.2.2 Alter User Tablespace

We can also alter user default tablespace for object creation. As already mention in section 4.2 why this is needed. Now if some needs arise then we can alter tablespace in a well-designed graphical screen. In the same way as mentioned in 4.2.1 the username is entered so that tablespace of this user will be altered. Now in radio button choice we have to select tablespace value. So now we sill be bound to specify the correct new tablespace name in test item. If every thig is fine the user will be altered and message will be displayed that user altered successfully. As shown in fig: 4.4

Check user default tablespace can't be altered if

- We don't specify the correct user name
- We don't specify the correct new tablespace name

7.5.3 Grant Rights To User

In oracle rights can be granted to user to work successfully. If user doesn't have any rights he is user by name. In Oracle there are two types of rights, role and privileges.

We can give rights to user using SQL command, grant to user. GUI to this command is shown in fig: 4.3

In this interface first user enter the database user name to which role /privilege will be granted. After this step user must select one of the two options i.e. either he wants to grant role or privilege. If user select role radio button than five roles are displayed or select privilege radio button than 81 privileges are displayed. User can select one of the options and then click the ok button, so rights will be granted to user without admin option. If we want to grant all roles /privileges to user than we must select the all button so that all rights will be granted in one go.

Checks: We can't grant rights to user if

- User type invalid user name than a message will be displayed to type correct user name
- User name doesn't exist in DD than a message will be displayed to alert user "User name doesn't exist"
- User doesn't select any role /privilege than a message will be displayed to select any role /privilege and then click ok button

After successful execution of this process a message will be displayed to prompt the user that right is granted to database user successfully and now he can work with this right.

To grant system privileges and roles to users and roles To grant a system privileges, you must either have been granted system privilege with admin option or have been granted Grant any privilege system privilege.

7.5.4 Creating Tablespace

As we know tablespace is used to group related logical structures together. DBA creates tablespace so that user can easily create and store database objects in DBMS.

In this QUERY NAVIGATOR GUI to create tablespace is provided which is shown in fig 4.4. First of all user is asked to type correct tablespace name, to help

the user a pop up list of all database tablespaces are displayed, secondly user is asked to type correct one datafile name and storage capacity. In this case storage clause is optional. If user don't specify the storage capacity then tablespace will be created with 20 MB space.

Checks: We can't create tablespace if

- Tablespace already exists
- Datafile and tablespace name are typed invalid
- Storage capacity specified with a very large number

If everything is fine then tablespace will be created and a message will be displayed "Tablespace created successfully".

7.5.5 Datafile Addition

We can add one or more data file in tablespace whenever a needs arise. In many cases some problems occurs when there will be insufficient space in one data file, so another data file will be added.

One way is to add data file in SQL prompt with traditional Alter Tablespace commnad, other way is to use Query Navigator which provides GUI to add data file as shown in fig 4.5. First of all user is asked to type tablespace name so that data file would be added in specified tablespace. A popup list of tablespaces are also displayed to help user in deciding tablespace name, Secondly user is asked to type data file name and finally storage capacity which is optional i.e; if not specified then default is 20 MB will be considered. When user click the add data file icon then data file will be added in tablespace .

Checks: Data file can't be if

- Data file name and tablespace name are typed invalid
- Tablespace does not exists in database

7.6 Security Implementation

The ORACLE owner requires DBA privileges in order to Create, Shutdown, Startup and Connect Internal to the database. So a member of DBA group automatically gives his/her privileges. When he/she access the SQLDBA, it looks for the group membership of our account. If it is the DBA group then it grants access to the system privileged functions. If not, then we can access only the monitory and queering functions of SQL*DBA. To execute Query Navigator user must have role of DBA , because in this utility only DBA views are selected for queries.

7.7 Special Considerations

The system is developed under **Windows 95** based ORACLE, which is far more complicated than any other operating system. Thus before using this system, the user must have a sound knowledge of **windows 95**.

Every user must have a log in account and a password assigned to him/her by the System Administrator. Then only he/she has the authority to utilise this utility. Another important factor is that the system should be carefully shutdown. The ORACLE system should be dismounted & the root password be given, before switching off the system otherwise the system might get corrupt which may result in loss of data or inconsistent data.

APPENDIX(A)

Information Retrieval At SQL Prompt

SQL> SELECT * FROM DBA_USERS;

USERNAME	USER_ID	PASSWORD	DEFAULT_TABLESPACE	TEMPORARY_TABLESPACE	CREATED

PROFILE					

SYS	0	D4C5016086B2DC6A			
USER_DATA		TEMPORARY_DATA			09-JAN-95
DEFAULT					
SYSTEM	5	D4DF7931AB130E37			
USER_DATA		TEMPORARY_DATA			09-JAN-95
DEFAULT					
SCOTT	8	F894844C34402B67			
USER_DATA		TEMPORARY_DATA			09-JAN-95
DEFAULT					
BROWSER	9	BFE8B8DECF868797			
USER_DATA		TEMPORARY_DATA			09-JAN-95
DEFAULT					

DRTRE 78 C9CA84CCC3B70A5E

USERNAME	USER_ID	PASSWORD	DEFAULT_TABLESPACE	TEMPORARY_TABLESPACE	CREATED

PROFILE					

SYSTEM			SYSTEM		13-MAR-98
DEFAULT					
DHFDSH	79	52C1731CCFD7E9DF			
SYSTEM		SYSTEM			14-MAR-98
DEFAULT					
JAN	80	09CBDEBAB386116E			
SYSTEM		SYSTEM			14-MAR-98
DEFAULT					
HHH	81	134A1AB480ED0E7A			
SYSTEM		SYSTEM			14-MAR-98
DEFAULT					
ILYAS	82	3726132E8B775A8C			
USER_DATA		SYSTEM			14-MAR-98

USERNAME	USER_ID	PASSWORD	DEFAULT_TABLESPACE	TEMPORARY_TABLESPACE	CREATED

PROFILE					

PROFILE

DEFAULT

KHAAN
SYSTEM
DEFAULT

83 6AAE45FB4094DF15
SYSTEM 14-MAR-98

USER9
USER_DATA
DEFAULT

18 0487AFEE55ECEE66
TEMPORARY_DATA 10-JUN-96

USER10
USER_DATA
DEFAULT

19 92F10BD9E2C5AFD8
TEMPORARY_DATA 10-JUN-96

APPENDIX (B)

Input Output Layout Of
Query Navigater.

Developer/2000 Forms Runtime for Windows 95 / NT - [Detail information]

Window

All DataBase Users Are

Users	Created On	Default TableSpace	Temporary TableSpace
SYS	23-MAY-96	SYSTEM	SYSTEM
SYSTEM	23-MAY-96	USER_DATA	TEMPORARY_DATA
QAZAFI	18-FEB-98	SYSTEM	SYSTEM
SCOTT	23-MAY-96	USER_DATA	TEMPORARY_DATA
DEMO	23-MAY-96	USER_DATA	TEMPORARY_DATA
PO7	23-MAY-96	SYSTEM	SYSTEM

Total Users 10



All DataBase Tablespaces are

TableSpace	Initial Extent	Next Extent	Min Extents	Max Extents	Status
SYSTEM	10240	10240	121	1	ONLINE
USER_DATA	10240	10240	121	1	ONLINE
ROLLBACK_DATA	10240	10240	121	1	ONLINE
TEMPORARY_DATA	10240	10240	121	1	ONLINE

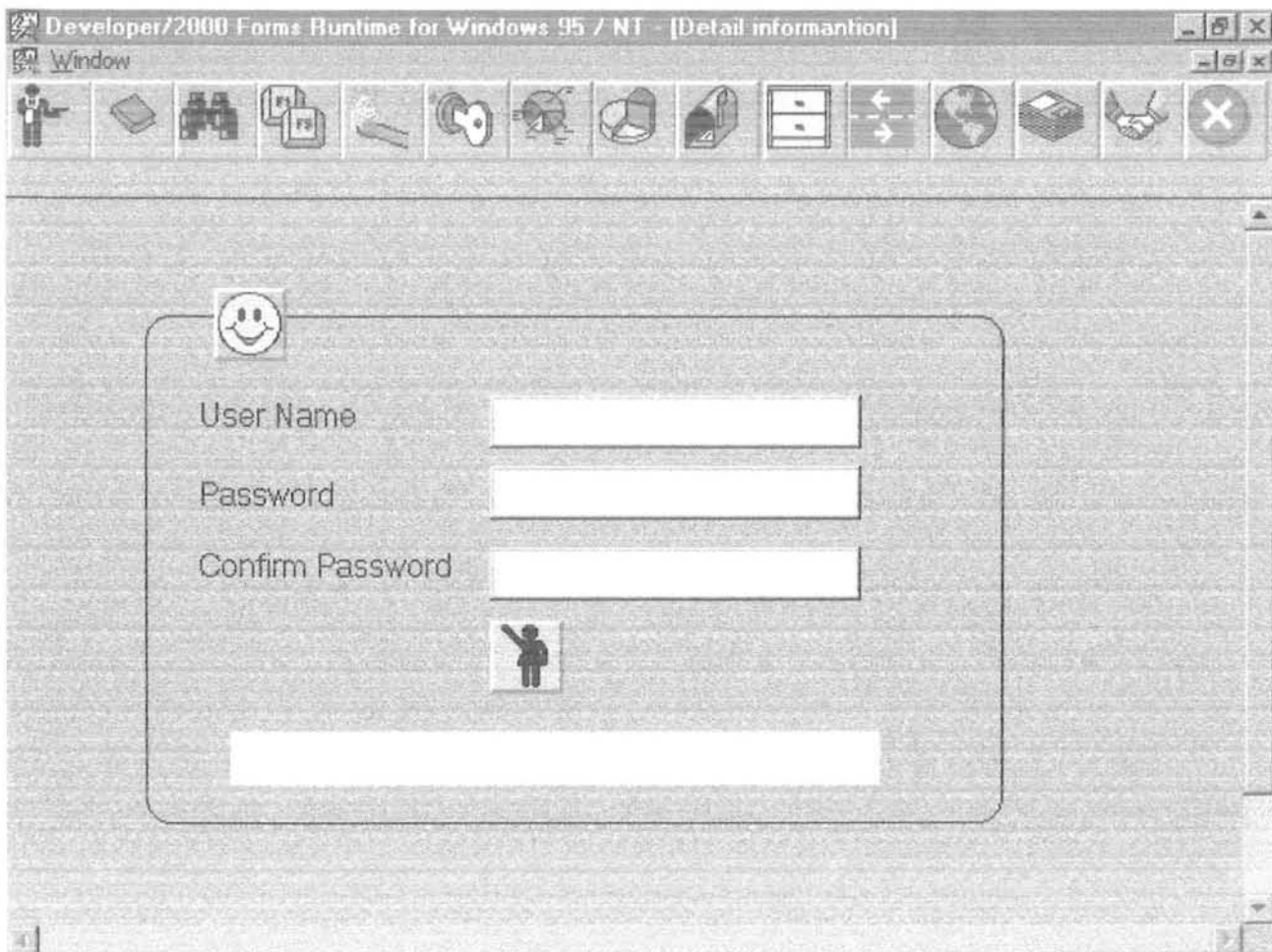
Total Tablespaces 4



DataBase Users of Selected TableSpace

Users	Created On	Default TableSpace	Temporary TableSpace
SYS	23-MAY-96	SYSTEM	SYSTEM
QAZAFI	18-FEB-98	SYSTEM	SYSTEM
PO7	23-MAY-96	SYSTEM	SYSTEM
SHAZ	29-JUL-98	SYSTEM	SYSTEM
FARHAN	07-MAR-98	SYSTEM	SYSTEM

Total Users 5





Data File

TableSpace Name

system

Data File

c:\ora.dat

Size in MB

20



Tablespace created successfull



User Name | ILYAS

Show

- Role
- Priviledges

All Rights

- connect
- resource
- DBA
-
-

OK

Cancel

APPENDIX (C)

Trigger Code
When User Icon Is Clicked

```

declare
  cursor c_user is
    select username,created,default_tablespace,
           temporary_tablespace from dba_users;
  cursor c_user_sel is
    select username,created,default_tablespace,
           temporary_tablespace from dba_users
           where default_tablespace =:global.tablespace_name;
  v_count_users number(4) default 0;
begin

  go_block('block_user_detail');
  clear_block;
  if :global.tablespace_name is null then
    :global.all_sel_objects_message:='All DataBase Users Are';
    open c_user;
    loop
      fetch c_user into :display_username,
                       :created,:dts,:tts;
      exit when c_user%notfound;
      next_record;
    end loop;
  close c_user;
  go_record(1);
  select count(*) into v_count_users from
    dba_users ;
  :global.count_objects:=v_count_users;
else
  :global.all_sel_objects_message:='DataBase Users of Selected Tablespace';
  open c_user_sel;
  loop
    fetch c_user_sel into :display_username,
                          :created,:dts,:tts;
    exit when c_user_sel%notfound;
    next_record;
  end loop;
  close c_user_sel;
  go_record(1);
  select count(*) into v_count_users from
    dba_users where default_tablespace=:global.tablespace_name;
  :global.count_objects:=v_count_users;
end if;
:global.tablespace_name:=null;
end;

```


APPENDIX (D)

System Privileges And Roles

System Privileges

ALTER ANY CLUSTER	ALTER ANY INDEX
ALTER ANY PROCEDURE	ALTER ANY DATABASE
ALTER ANY ROLE	ALTER ANY SEQUENCE
ALTER ANY SNAPSHOT	ALTER ANY TABLE
ALTER ANY TRIGGER	ALTER ANY RILLBACK SEGMENT
ALTER ANY PROFILE	ALTER ANY RESOURCE COST
ALTER ANY SESSION	ALTER ANY SYSTEM
ALTER ANY TABLESPACE	ALTER ANY USER
ANALYSE ANY	AUDIT ANY
AUDITSYSTEM	BACKUP ANY TABLE
BECOME USER	COMMENT ANY TABLE
CREAT ANY CLUSTER	CREAT ANY INDEX
CREAT ANY PROCEDURE	CREAT ANY SEQUENCE
CREAT ANY SNAPSHOT	CREAT ANY SYNONYM
CREAT ANY TABLE	CREAT ANY TRIGGER
CREAT ANY VIEW	CREAT PUBLIC SYNONYM
CREAT CLUSTER	CREAT DATABASE LINK
CREAT PROCEDURE	CREAT PROFILE
CREAT ROLE	CREAT ROLEBACK SEGMENT
CREAT SEQUENCE	CREAT SESSION
CREAT SNAPSHOT	CREAT SYNONYM
CREAT TABLE	CREAT TABLESPACE
CREAT TRIGGER	CREAT USER
CREAT VIEW	DELETE ANY TABE
DROP ANY CLUSTER	DROP ANY INDEX
DROP ANY PROCEDURE	DROP ANY ROLE
DROP ANY SEQUENCE	DROP ANY SNAPSHOT
DROP ANY SYNONYM	DROP ANY TABLE
DROP ANY TRIGGER	DROP ANY VIEW
DROP PROFILE	DROP PUBLIC DATABASE LINK
DROP PUBLIC SYNONYM	DROP ROLLBACK SEGMENT
DROP TABLESPACE	DROP USER
EXECUTE ANY PROCEDURE	FORCE ANY TRANSACTION
FORCE TRANSACTION	GRANT ANY PRIVILAGE
CREAT PUBLIC DATABASE LINK	

<u>ROLE</u>	<u>SYSTEM PRIVILEGES AND ROLES GRANTED</u>
CONNECT	ALTER SESSION CLUSTER CREAT DATABASE LINK CREAT SEQUENCE CREAT SESSION CREAT SYNONYM CREAT TABLE CREAT VIEW
RESOURCE	CREAT CLUSTER CREAT PROCEDURE CREAT SEQUENCE CREAT TABLE CREAT TRIGGER
DBA	ALL SYSTEM PRIVILEGES WITH ADMIN OPTION EXE_FULL_DATABASE ROLE IMP_FULL_DATABASE ROLE
EXP_FULL_DATABASE	SELECT ANY TABLE BACKUP ANY TABLE INSERT,UPDATE,DELETE ON SYS.INCEXP SYS.INCVID SYS.INCFIL
IMP_FULL_DATABASE	BECOME USER WRITE DOWN

- **Date . C . J . [1987] An Introduction To Database Systems . Vol 1, 5th Edition
By Addison - Wesley Publishing Co. New York.**
- **Oracle Server SQL Reference Release 7.3**
- **Oracle Server Concept Release 7.3**
- **Oracle Server Reference Release 7.3**
- **SQL*Plus
Oracle Corporation , Belmont, California.**
- **PL / SQL User's Guide and Reference, Version 1.0 Oracle Corporation,
Belmont, California.**
- **SQL Language Reference Manual, Version 6.0
Oracle Corporation , Belmont, California.**
- **SQL*Forms Designer's Tutorial, Version 3.0
Oracle Corporation , Belmont, California.**
- **SQL*Forms Designer's Reference
Oracle Corporation , Belmont, California.**
- **Building Reports with SQL*Report Writer, Version 1.1
Oracle Corporation , Belmont, California.**
- **SQL*Report Writer Reference Manual, Version 1.1
Oracle Corporation , Belmont, California.**
- **SQL*Menu User's Guide & Reference Manual, Version 5.0
Oracle Corporation , Belmont, California.**
- **SQL RDBMS Utilities User's Guide, Version 6.0
Oracle Corporation , Belmont, California.**
- **SQL RDBMS Database Administrator Guide, Version 6.0
Oracle Corporation , Belmont, California.**