Orange Coast College
Business Division
CS/CIS Department
Fall 2004
CIS 182
Introduction to Database Concepts

Instructor
Dr. Martha Malaty

Text & Original Presentations
Chapter 15

Database Administration

Database Systems:
Design, Implementation, and Management,
Sixth Edition, Rob and Coronel
In this chapter, you will learn:

- That data are a valuable business asset that requires careful management
- Why and how the database plays a critical role in an organization
- That the introduction of a DBMS has important technological, managerial, and cultural organizational consequences
In this chapter, you will learn: (continued)

• What the database administrator’s managerial and technical roles are
• About several database administration tools
• About various database administration strategies
• How various database administration technical tasks are performed with Oracle
Data as a Corporate Asset

• Data are accepted as a valuable asset requiring careful management
• Data are now well understood as a valuable resource to be translated into information
• If information is accurate and timely, its use is likely to enhance company’s competitive position and generate wealth
Fig 15.1 The Data-Information-Decision-Making Cycle

FIGURE 15.1 The Data-Information-Decision-Making Cycle

User

Data

Analysis

applies intelligence over

to produce

Decision making

used in

Knowledge

that is the basis of

Information

Actions

triggers

which generate more

Generates more
The Need for and Role of Databases in an Organization

• Database’s predominant role is to support managerial decision making at all levels in the organization
• DBMS must provide tools that give each level of management a different view of the data and support required level of decision making
Introduction of a Database: Special Considerations

• Having a computerized database management system does not guarantee that the data will be properly used to provide best solutions required by managers
Introduction of a Database: Special Considerations (continued)

• Introduction of a DBMS is likely to have a profound impact, which might be positive or negative, depending on how it is administered
• Three important aspects
  – Technological: DBMS software and hardware
  – Managerial: Administrative functions
  – Cultural: Corporate resistance to change
The Evolution of the Database Administration Function

• Data administration has its roots in the old, decentralized world of the file system.
• Advent of the DBMS and its shared view of data produced a new level of data management sophistication and led the DP department to evolve into an information systems (IS) department.
• Data management became an increasingly complex job, thus leading to development of the database administration function.
The IS Department Internal Organization

**Figure 15.2** The IS Department Internal Organization

- Information systems (IS)
  - Application development
  - Database operations
The Placement of the DBA Function

**Figure 15.3 The Placement of the DBA Function**

- **Line Authority Position**
  - Information systems (IS)
  - Application development
  - Database operations
  - Database administration

- **Staff Consulting Position**
  - Information systems (IS)
  - Application development
  - Database operations
  - Database administration
A DBA Functional Organization

**Figure 15.4 A DBA Functional Organization**

- **DBA**
  - **Planning**
    - Conceptual
  - **Design**
    - Logical
  - **Implementation**
  - **Operations**
  - **Training**
    - Testing
Multiple Database Administrators in an Organization

**Figure 15.5** Multiple Database Administrators in an Organization

- **Systems administrator**
  - DBA
    - DB2 relational
  - DBA
    - Oracle relational
  - DBA
    - IDS-II network
  - DBA
    - SQL Server relational
  - Microcomputer DBMS manager
The Database Environment’s Human Component

- Even the most carefully crafted database system cannot operate without a human component
- Effective data administration requires both technical and managerial skills
- DA must set data administration goals
- DBA is the focal point for data/user interaction
- Need for diverse mix of skills
# Contrasting DA and DBA Activities and Characteristics

## Table 15.1  Contrasting DA and DBA Activities and Characteristics

<table>
<thead>
<tr>
<th>DATA ADMINISTRATOR (DA)</th>
<th>DATABASE ADMINISTRATOR (DBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic planning</td>
<td>Control and supervision</td>
</tr>
<tr>
<td>Sets long-term goals</td>
<td>Executes plans to reach goals</td>
</tr>
<tr>
<td>Sets policies and standards</td>
<td>Enforces policies and procedures</td>
</tr>
<tr>
<td></td>
<td>Enforces programming standards</td>
</tr>
<tr>
<td>Broad scope</td>
<td>Narrow scope</td>
</tr>
<tr>
<td>Long term</td>
<td>Short term (focus on daily operations)</td>
</tr>
<tr>
<td>Managerial orientation</td>
<td>Technical orientation</td>
</tr>
<tr>
<td>DBMS-independent</td>
<td>DBMS-specific</td>
</tr>
</tbody>
</table>
A Summary of DBA Activities

FIGURE 15.6 A SUMMARY OF DBA ACTIVITIES
## Desired DBA Skills

### Table 15.2 Desired DBA Skills

<table>
<thead>
<tr>
<th>MANAGERIAL</th>
<th>TECHNICAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad business understanding</td>
<td>Broad data-processing background</td>
</tr>
<tr>
<td>Coordination skills</td>
<td>Systems development life cycle knowledge</td>
</tr>
<tr>
<td>Analytical skills</td>
<td>Structured methodologies:</td>
</tr>
<tr>
<td></td>
<td>- Data flow diagrams</td>
</tr>
<tr>
<td></td>
<td>- Structure charts</td>
</tr>
<tr>
<td></td>
<td>- Programming languages</td>
</tr>
<tr>
<td>Conflict resolution skills</td>
<td>Database life cycle knowledge</td>
</tr>
<tr>
<td>Communications skills (oral and written)</td>
<td>Database modeling and design skills</td>
</tr>
<tr>
<td></td>
<td>- Conceptual</td>
</tr>
<tr>
<td></td>
<td>- Logical</td>
</tr>
<tr>
<td></td>
<td>- Physical</td>
</tr>
<tr>
<td>Negotiation skills</td>
<td>Operational skills: database implementation, data dictionary management, security, etc.</td>
</tr>
</tbody>
</table>

Experience: 2–5 years in a large DP department
### DBA Activities and Services

#### Table 15.3 DBA Activities and Services

<table>
<thead>
<tr>
<th>DBA Activity</th>
<th>DBA Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning</td>
<td>End-user support</td>
</tr>
<tr>
<td>Organizing</td>
<td>Policies, procedures, and standards</td>
</tr>
<tr>
<td>Testing</td>
<td>Data security, privacy, and integrity</td>
</tr>
<tr>
<td>Monitoring</td>
<td>Data backup and recovery</td>
</tr>
<tr>
<td>Delivering</td>
<td>Data distribution and use</td>
</tr>
</tbody>
</table>
Database Administration Tools

- Two main types of data dictionaries:
  - Integrated
  - Standalone
- Main function: store description of all objects that interact with the database
- Possible to manage use and allocation of all organization’s information, regardless of whether it has roots in database data
- Metadata stored in data dictionary are often basis for monitoring database use and assignment of access rights to database users
An Example of a CASE Tool: Visio Professional

FIGURE 15.7 AN EXAMPLE OF A CASE TOOL: VISIO PROFESSIONAL
Developing a Database Administration Strategy

- Critical step for any organization is to ensure its information system supports strategic plans for each of the company’s business areas
- Database administration strategy must not conflict with information systems plans
- Information engineering
  - Translates strategic company goals into the data and applications that will help company achieve those goals
  - Output of the IE process is an information systems architecture that serves as basis for planning, development, and control of future information systems
Forces Affecting the Development of the ISA

**FIGURE 15.8** Forces Affecting the Development of the ISA

- **Company mission**
- **Information engineering**
- **Information systems architecture**
- **Strategic plan**

Arrows indicate the flow of information:
- From **Company mission** to **Information engineering**
- From **Information engineering** to **Information systems architecture**
- From **Information systems architecture** to **Strategic plan**
- From **Strategic plan** to **Company managers**

**Goals** and **Critical success factors** are indicated within the diagram.
The DBA at Work: Using Oracle for Database Administration

- Execution of tasks tends to be DBMS-and operating-system specific
- Brief introduction to the way some typical DBA tasks would be performed in Oracle
The Oracle Enterprise Manager Interface

**Figure 15.9** The Oracle Enterprise Manager Interface

Oracle Enterprise Manager is a management framework which you can use to:

- Administer the complete Oracle environment, including databases, iAS servers, applications, and services.
- Diagnose, modify, and tune multiple databases.
- Schedule tasks on multiple systems at varying time intervals.
- Monitor database conditions throughout the network.
- Administer multiple network nodes and services from many locations.
- Share tasks with other administrators.
- Group related services together to facilitate administration tasks.
- Launch integrated Oracle and third-party tools.

To learn more about the Console, click the Quick Tour button.
Oracle Edit Local Preferred Credentials Window

**Figure 15.10** Oracle Edit Local Preferred Credentials Window
Oracle RDBMS Services

**FIGURE 15.11** ORACLE RDBMS SERVICES
The Oracle Storage Manager

**Figure 15.12** The Oracle Storage Manager
Creating a New Tablespace

FIGURE 15.13 CREATING A NEW TABLESPACE

CREATE TABLESPACE "ROBCOR"
LOGGING
DATAFILE 'D:\ORACLE\ORADATA\ORALAB\ROBCOR.DBF'
SIZE 5M
EXTENT MANAGEMENT LOCAL SEGMENT SPACE MANAGEMENT AUTO
The Oracle Schema Manager
The Oracle Security Manager

FIGURE 15.15 THE ORACLE SECURITY MANAGER

Use Security Management to:
- Create users, roles, and profiles.
- Alter users, roles, and profiles.
- Drop users, roles, and profiles.
- Grant privileges and roles to database users.
- View privileges granted to users and roles.
- See grantees of a role.

To learn more about Security Management, click the Quick Tour button.
The Create User Dialog Box

**FIGURE 15.16  THE CREATE USER DIALOG BOX**

![Image of the Create User Dialog Box]

- **Name:** ROBCOR
- **Profile:** DEFAULT
- **Authentication:** Password
- **Enter Password:** ********
- **Confirm Password:** ********
- **Expire Password Now**
- **Tablespaces**
  - **Default:** USERS
  - **Temporary:** TEMP
- **Status:** Unlocked
The Oracle Instance Manager

Figure 15.17 The Oracle Instance Manager
Creating a New Database with the Database Configuration Assistant

Figure 15.18 Creating a New Database with the Database Configuration Assistant
### Selecting the New Database Template

**FIGURE 15.19 SELECTING THE NEW DATABASE TEMPLATE**

<table>
<thead>
<tr>
<th>Select</th>
<th>Template Name</th>
<th>Includes Datafiles?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Data Warehouse</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>X</strong></td>
<td>General Purpose</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>New Database</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Transaction Processing</td>
<td>Yes</td>
</tr>
</tbody>
</table>

[Database Configuration Assistant, Step 2 of 8: Database Templates]

Select a template from the following list to create a database.
Naming the Database

FIGURE 15.20 Naming the Database

Specify the following database information.

An Oracle9i database is uniquely identified by a Global Database Name, typically of the form "name.domain".

Global Database Name: ROBCOR

A database is referenced by at least one Oracle9i instance which is uniquely identified from any other instance on this computer by an Oracle System Identifier (SID).

SID: ROBCOR
Selecting the Database Operation Mode

**FIGURE 15.21** Selecting the Database Operation Mode

- Dedicated Server Mode
  
  For each client connection the database will allocate a resource dedicated to serving only that client. Use this mode when the number of total client connections is expected to be small or when clients will be making persistent, long-running requests to the database.

- Shared Server Mode
  
  Several client connections share a database-allocated pool of resources. Use this mode when more than a small number of users need to connect to the database simultaneously while efficiently utilizing system resources. The Oracle shared server feature will be enabled.
Specifying Initialization Parameters

Figure 15.22 Specifying Initialization Parameters
Specifying Storage Parameters

**Figure 15.23 Specifying Storage Parameters**

From the Database Storage page, you can specify storage parameters for the database creation. This page displays a tree listing and summary view (multi-column lists) to allow you to change and view the following objects:

- Controlfiles
- Tablespaces
- Databases
- Rollback Segments
- Redo Log Groups

From any object type folder, click Add to create a new object. To delete an object, select the specific object from within the object type folder and click Remove.

**Important:** If you select a seed database template, you will not be able to add or remove datafiles, tablespaces, or rollback segments. Selecting a seed template allows you to only change the following:

- The name of the database
- Destination of the datafiles
- Controlfiles or log groups.
Database Creation Options

**FIGURE 15.24 DATABASE CREATION OPTIONS**

Select the following database creation options:
- [ ] Create Database
- [ ] Save as a Database Template

Name:

Description:
Summary of Database Creation Options

**Figure 15.25** Summary of Database Creation Options

**Common Options**

<table>
<thead>
<tr>
<th>Option Name</th>
<th>Selected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example Schemas</td>
<td>true</td>
</tr>
<tr>
<td>Oracle Data Mining</td>
<td>true</td>
</tr>
<tr>
<td>Oracle Intermedia</td>
<td>true</td>
</tr>
<tr>
<td>Oracle JVM</td>
<td>true</td>
</tr>
<tr>
<td>Oracle Label Security</td>
<td>false</td>
</tr>
<tr>
<td>Oracle OLAP</td>
<td>true</td>
</tr>
<tr>
<td>Oracle Spatial</td>
<td>true</td>
</tr>
<tr>
<td>Oracle Text</td>
<td>true</td>
</tr>
<tr>
<td>Oracle Ultra Search</td>
<td>true</td>
</tr>
<tr>
<td>Oracle XML DB</td>
<td>true</td>
</tr>
</tbody>
</table>

**Initialization Parameters**

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
</tr>
</thead>
</table>

Use this database template to create a pre-configured database optimized for general purpose usage.
FIGURE 15.26  DATABASE CREATION PROGRESS
Summary

• Data management is critical for any organization
• Data should be treated as corporate asset with monetary value
• DBMS is most commonly used electronic tool for corporate data management
• Impact of the DBMS on the organization’s managerial and cultural framework must be carefully examined
• Data administration function was developed in response to changes in data management fostered by technological advances in computer systems
Summary (continued)

• Database administrator (DBA) is responsible for corporate database management
• Broader data management activity is handled by data administrator (DA)
• DA is more managerially oriented than the more technically oriented DBA
• Development of data administration strategy is closely related to the company’s mission and objectives
• Implementing the overall company strategy is a crucial process influenced by managerial, technological, and cultural issues