CHAPTER 1
INTRODUCTION TO DBMSs

Remind

Chapter 1: Introduction to DBMSs

Chater 2: Transaction Processing and Concurrency Control Techniques

Chapter 3: Database Recovery Techniques and Database Security & Authorization

Chapter 4: Data Storage and Query Processing

Chapter 5: Algorithms for Query Processing and Optimization

Goals

Goals:

– Concepts and architecture of a DBMS.

Outline:

1. Introduction to DBMSs.

2. History of DBMSs.

3. Components of DBMSs.

4. Classification of DBMSs.

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Users types

☐ Database administrators: administrating the resources (db, DBMS, related softwares).

  ■ Authorizing access to the db, acquiring software and hardware resources, …

☐ Database designers:identifying the data to be stored in the db, choosing the appropriate structures to represent and store this data.

☐ End users: casual end users, naïve or parametric end users, sophisticated end users.

☐ System Analysts: determine the requirement of end users, develop specifications, describe transactions that meet these requirements.

☐ Application programmers: implement the specifications as programs, then test, debug, document and maintain the transactions.

  ■ Analysts and programmers (software engineers) should be familiar with the capabilities provided by the DBMS to accomplish their tasks.

Definition

☐ **D**ata**b**ase **M**anagement **S**ystem : DBMS

     ■ A DBMS is a collection of programs that enables users to create and maintain a database.
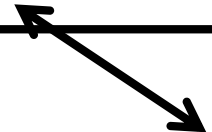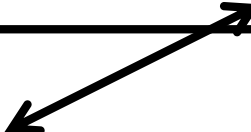
History of database applications

- ☐ Mid-1960s – 1980s: hierarchical systems, network model based sytems, inverted file sytems.

- ☐ Late 1970s – 1980s: RDBMS.

- ☐ 1980s: object-oriented databases.

- ☐ 1990s: WWW and HTML, XML for interchanging data among various types of databases and web pages.

Components of a DBMS

Application
DBMS languages & Interfaces
Security Manager
Recovery Manager
Transaction Manager
Concurrency control
Storage Manager

DBMS languages & Interfaces

- DBMS languages
  - DDL - Data Definition Language
  - DML - Data Manipulation Language
  - SDL – Storage Definition Language
- DBMS interfaces
  - Menu-based interfaces
  - Form-based interfaces
  - Graphical User interfaces
  - Natural language interfaces
  - Interfaces for parametric users
  - Interfaces for the DBA

Security manager

☐ For database sharing, protects databases from unauthorized access.

    ☐ User authentication.

    ☐ User authorization.

Recorvery Manager

☐ For recovery from failures
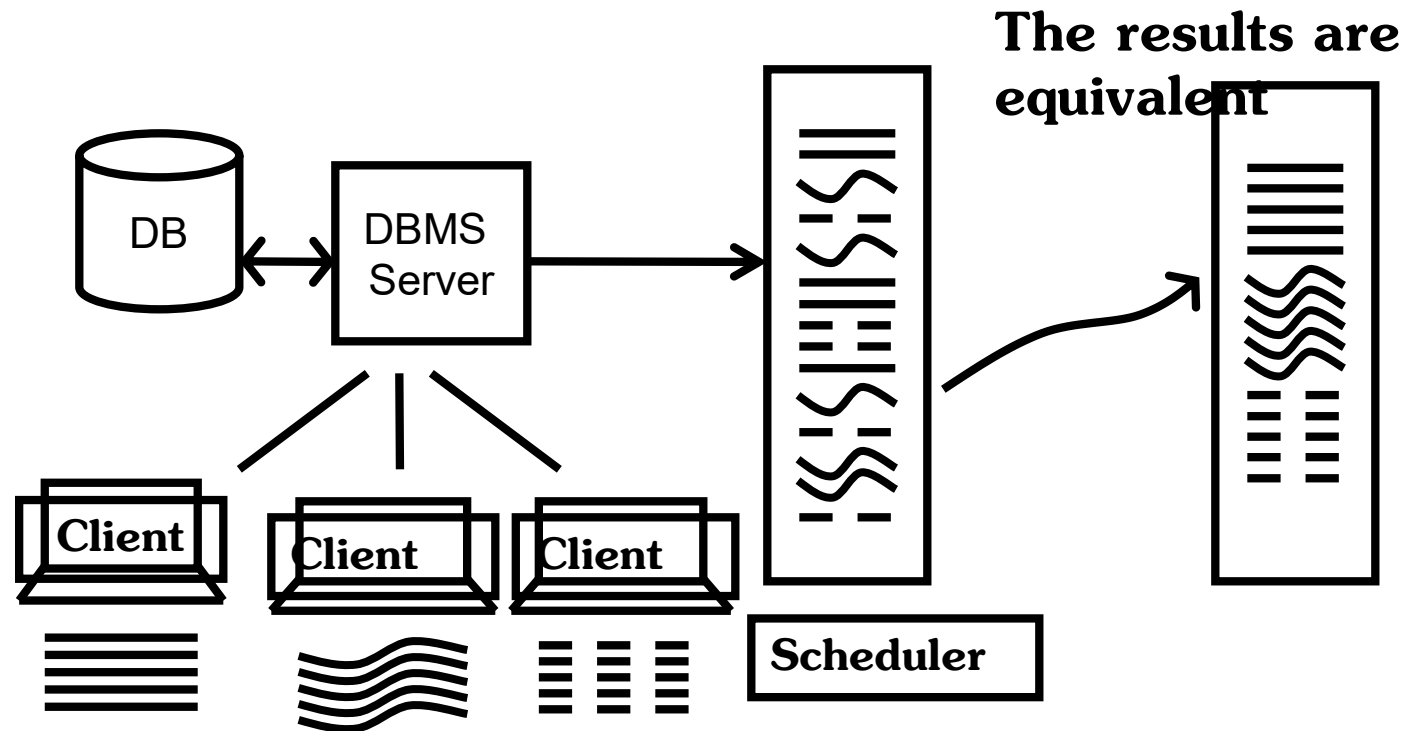
    ☐ Ex: Power cut, deadlock , software failure, …

Transaction Manager

☐ A transaction transforms the database from this consistent state to another consistent state.

Concurrency Manager

The results are equivalent

DB

DBMS Server

Client

Client

Client

Scheduler

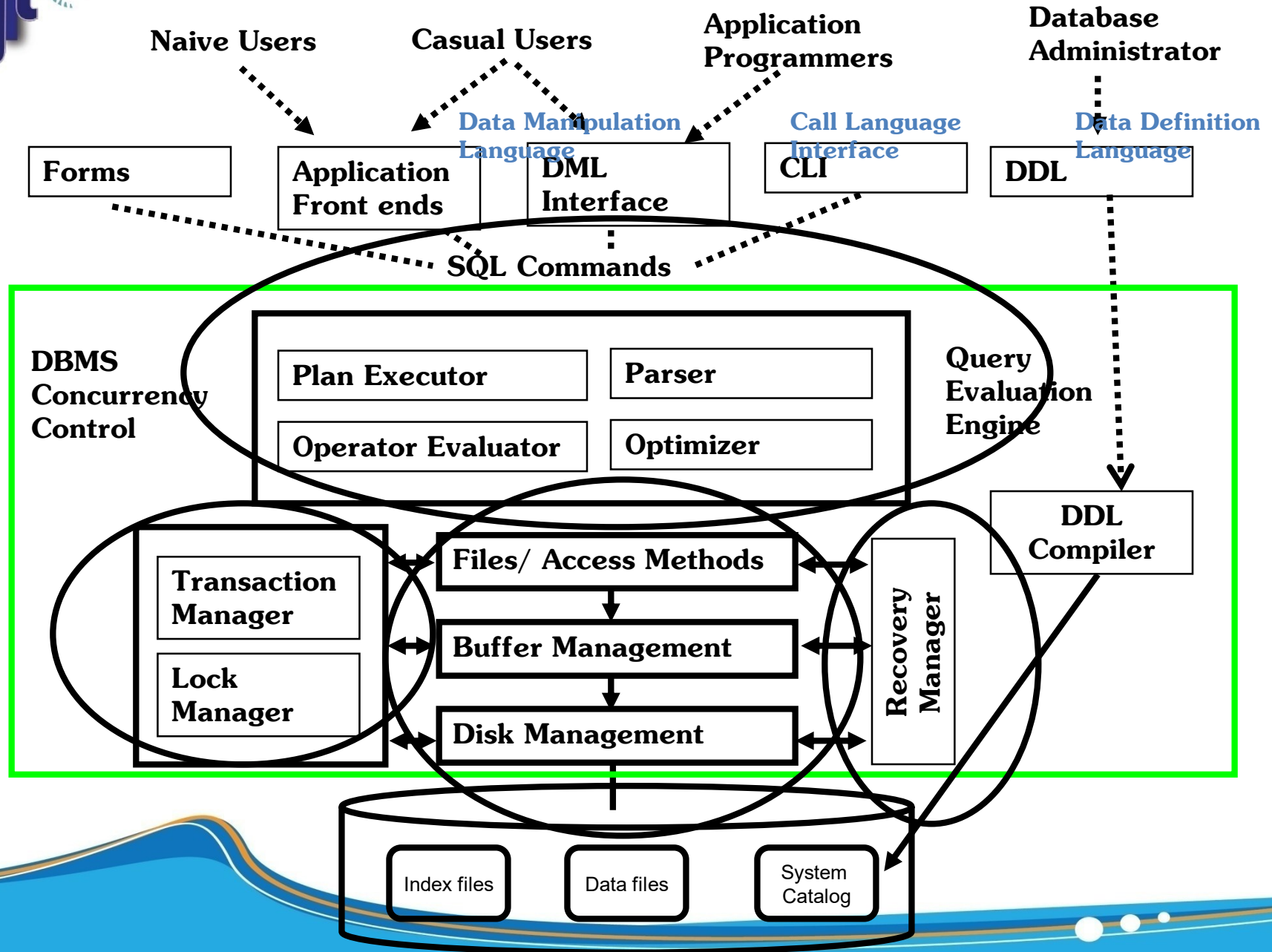# Storage Manager

☐ The way to store and operate on storage devices.

Meta data (Data Dictionary)

☐ Meta data is data about data.

◻ Tables, users, password, authorization, index, ...

Architecture of a DBMS

Naive Users

Casual Users

Application Programmers

Database Administrator

Data Manipulation Language

Call Language Interface

Data Definition Language

Forms

Application Front ends

DML Interface

CLI

DDL

SQL Commands

DBMS Concurrency Control

Plan Executor

Parser

Operator Evaluator

Optimizer

Query Evaluation Engine

Files/ Access Methods

DDL Compiler

Transaction Manager

Lock Manager

Buffer Management

Recovery Manager

Disk Management

Index files

Data files

System Catalog

Types of DBMSs

- Data model
    - Network data models
    - Hierachical data models
    - Relational data model
    - Object-relational data models
- Number of users
    - Single-user systems
    - Multi-user systems
- Number of sites
    - Centralized DBMSs
    - Distributed DBMSs

- …

END.