CHAPTER 1
INTRODUCTION TO DBMSs

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Remind

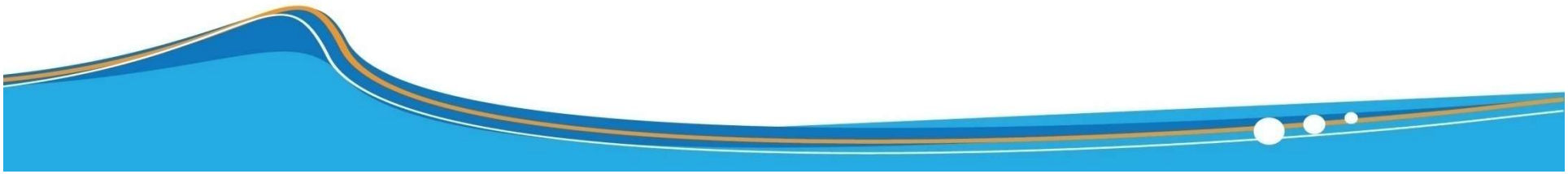
Chapter 1: Introduction to DBMSs

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



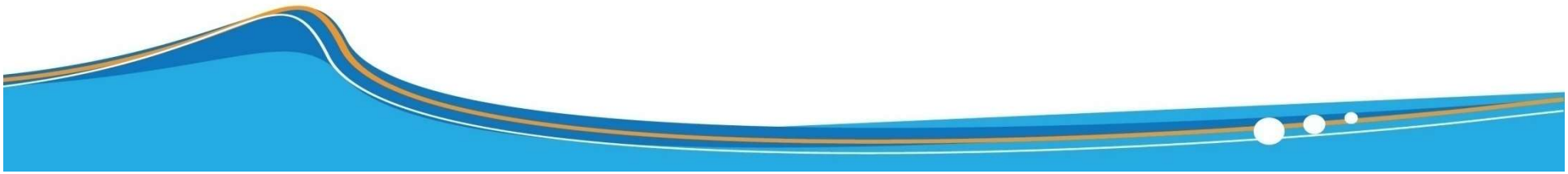
Goals

Goals:

- Concepts and architecture of a DBMS.

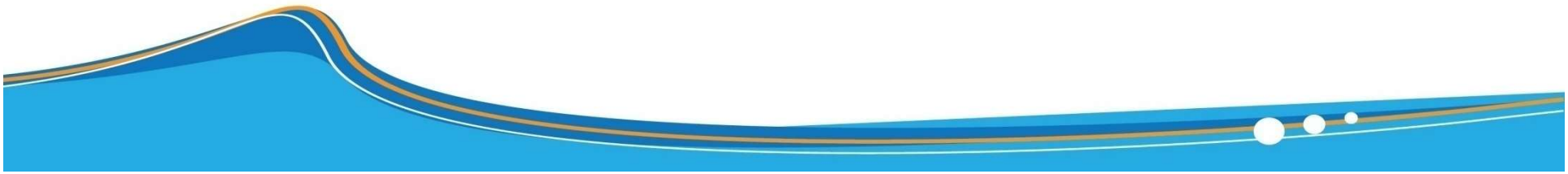
Outline:

1. Introduction to DBMSs.
2. History of DBMSs.
3. Components of DBMSs.
4. Classification of DBMSs.



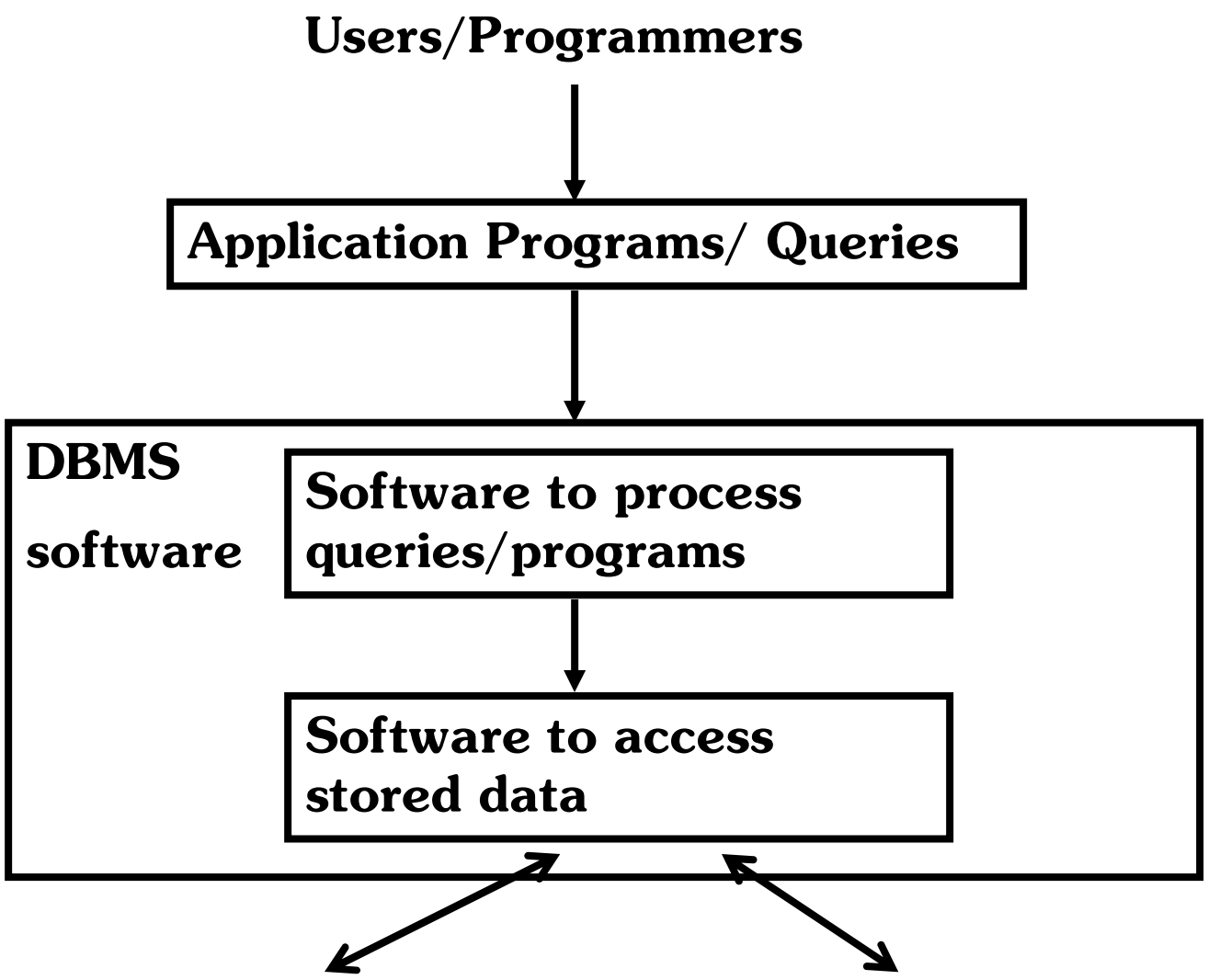
Users types

- 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.



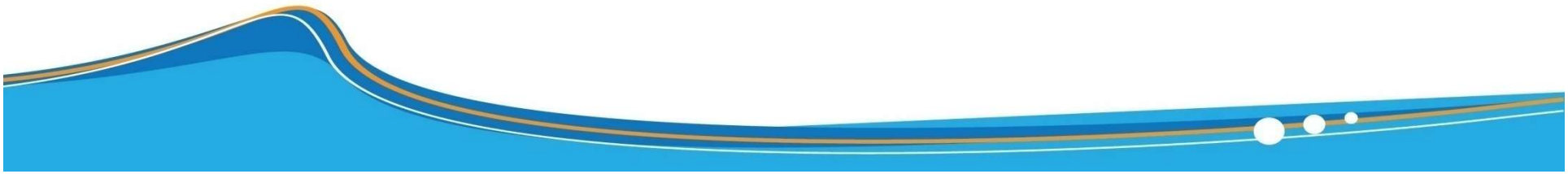
Definition

- Database Management System : DBMS
  - A DBMS is a collection of programs that enables users to create and maintain a database.


Users/Programmers
Application Programs/ Queries
DBMS
software
Software to process queries/programs
Software to access stored data
Stored database definition (Meta-data)
Stored 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

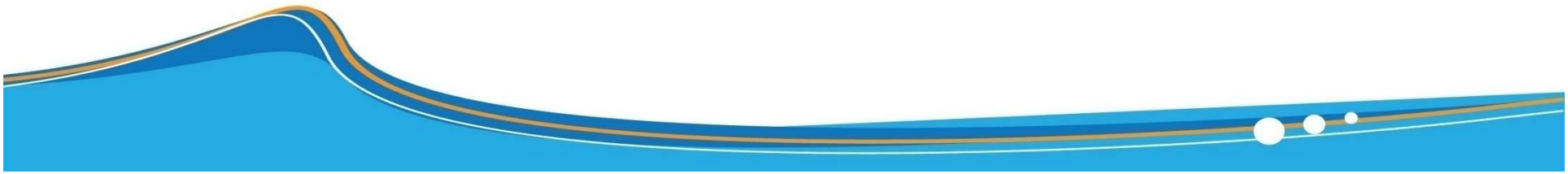
Application
DBMS languages & Interfaces
Security Manager
Recovery Manager
Transaction Manager
Concurrency control
Storage Manager

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

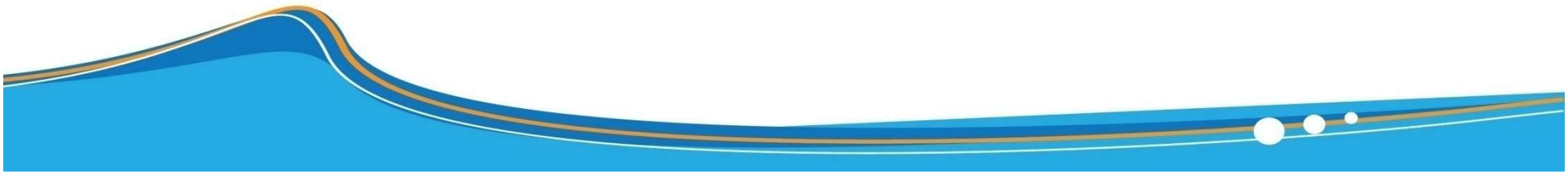
Security manager

- For database sharing, protects databases from unauthorized access.
  - User authentication.
  - User authorization.



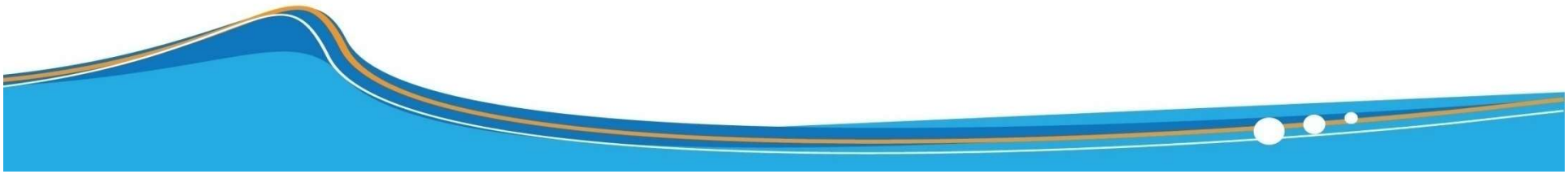
Recorvery Manager

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

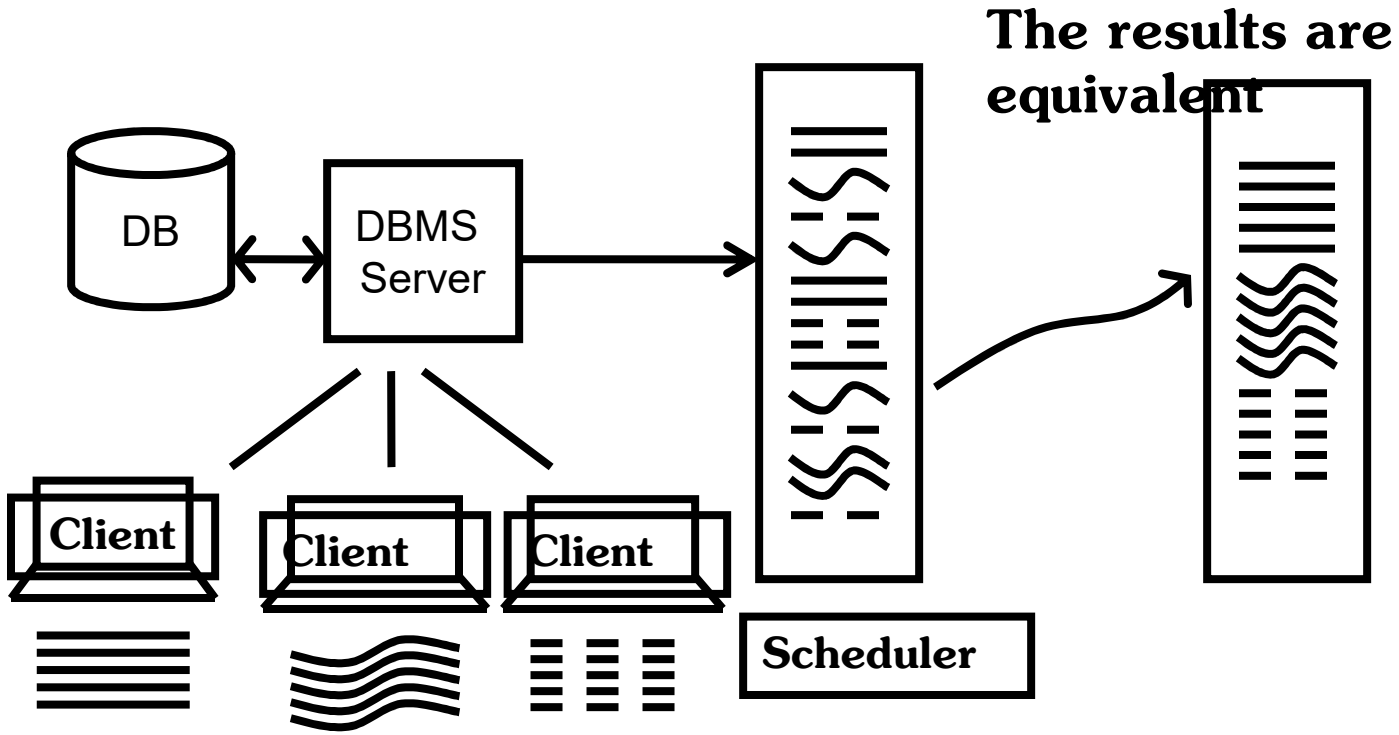


Transaction Manager

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

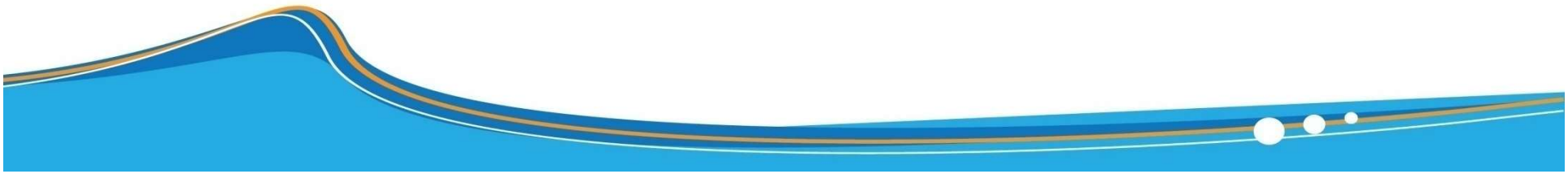


Concurrency Manager



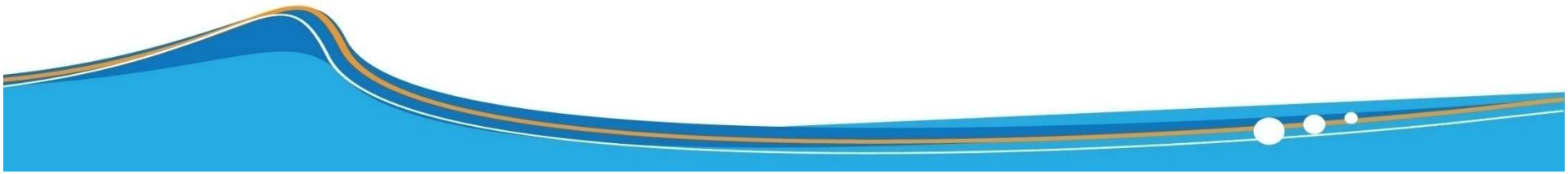
Storage Manager

- The way to store and operate on storage devices.

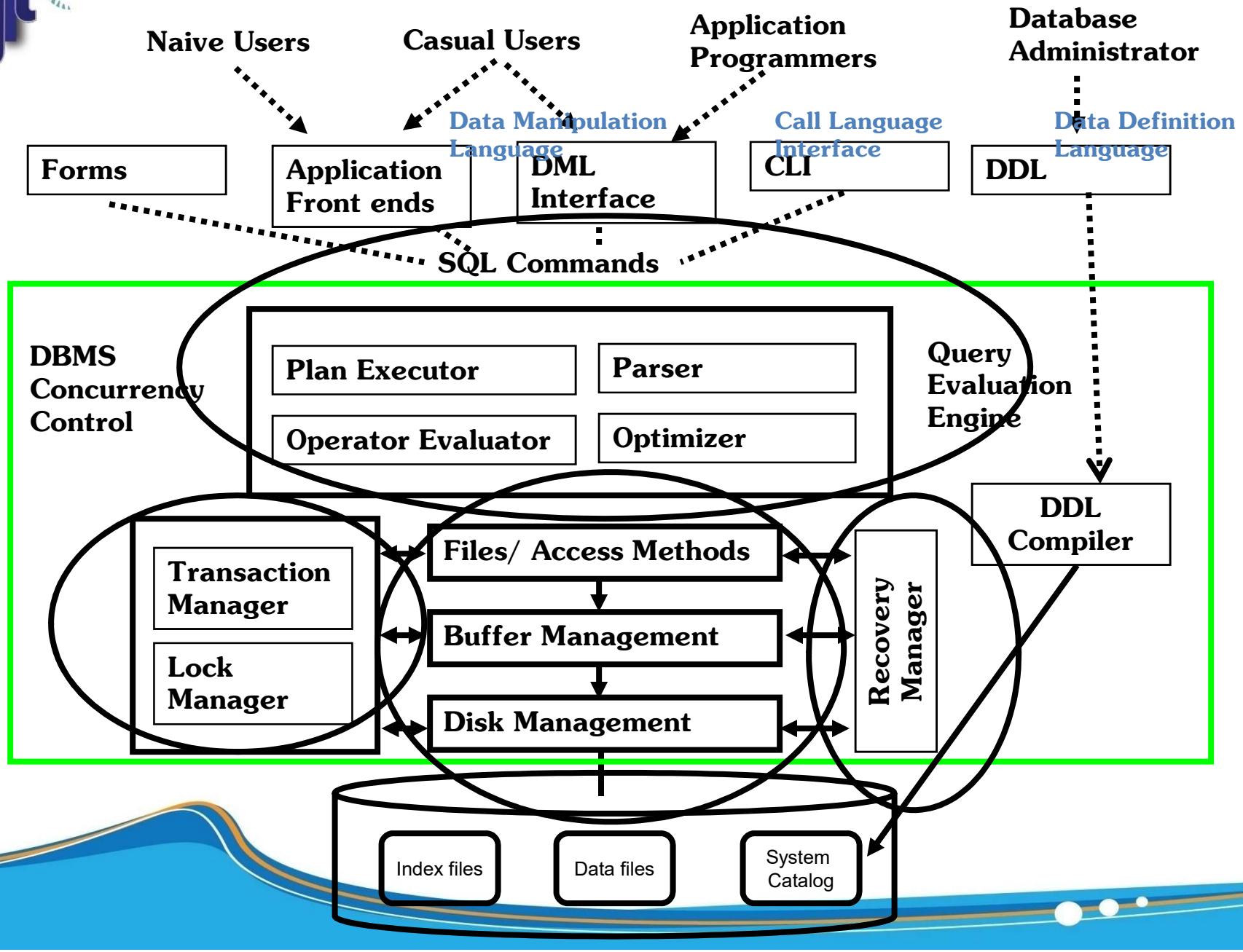


Meta data (Data Dictionary)

- Meta data is data about data.
  - Tables, users, password, authorization, index, …



Architecture of a DBMS



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.