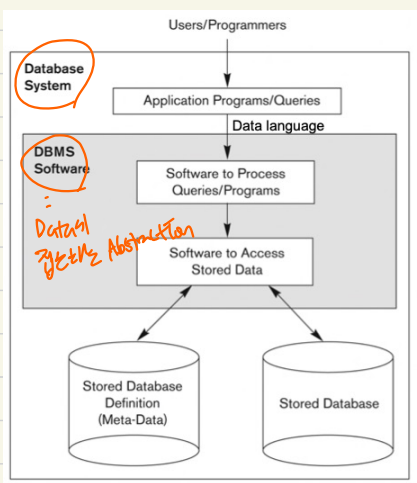
Basic Definition

database	: collection of related data
Data	: known facts that can be recorded and have implicit meanings
Mini-world	: some part of real world about which data is stored in DB.
Database Management System (DBMS)	: system to facilitate the creation/maintenance of computerized DB
Database System	: DBMS + Data



Typical DBMS Functionality

Functionality

- **define** particular database
  - data type, structure, constraint
- **Construct/ load** initial database
- **Process/ share** by concurrent user / App.
- Manipulate DB
  - Retrieval : Querying, generating report (read)
  - Modification : Create, Update, Delete
  - Accessing : DB access through web application
- Protection of DB
  - data consistency, data integrity

DBMS vs File System

	DBMS	File System
Data Dependency	Independent	X
Data Redundancy	Minimize redundancy	X
Data sharing	√	X
Data consistency	√	X
Productivity	√	X
Efficiency	X	√

Example of DB

① Mini-world for example

: part of UNIVERSITY environment

DB Name

② Mini-world entities

- STUDENTS, COURSES, SECTIONS, DEPARTMENTS, INSTRUCTORS

⇒ Table name

③ Mini-world relationships

- SECTIONS are of specific COURSES
- STUDENTS take SECTIONS

ER-diagram relationship

:

④ Data 저장하기

Main characteristics of DB Approach

Self-describing nature

- DBMS Catalog는 description을 저장함…

meta-data

RELATIONS

Relation_name	No_of_columns
STUDENT	4
COURSE	4
SECTION	5
GRADE_REPORT	3
PREREQUISITE	2

COLUMNS

Column_name	Data_type	Belongs_to_relation
Name	Character (30)	STUDENT
Student_number	Character (4)	STUDENT
Class	Integer (1)	STUDENT
Major	Major_type	STUDENT
Course_name	Character (10)	COURSE
Course_number	XXXXXNNNN	COURSE
….	….	….
….	….	….
….	….	….
Prerequisite_number	XXXXNNNN	PREREQUISITE

- describing을 통해 여러 DBMS에서 co-work 용이함

Program-data Independence

: DBMS를 바꾸지 않고도 data structure/storage org. 를 바꿀수 있음.

- ex) DB에 New Attribute 추가 … DBMS에 영향X

Data Abstraction

: **data model** to hide storage detail

- Focusing on conceptual representation

Support Multiple Views

: View describes **only** data of interest to the user

Sharing

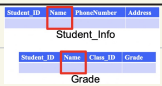
- Allow Concurrent multiple users
- Concurrently control
- Recovery
- Online Transaction Processing (OLTP)

Types of DB Users

- DB administrator (관리자)
  : authorizing, coordinating, monitoring 의 책임 있음 관리자
- DB designer
  : define of content, structure, constraint, ... 디자이너
- End-user
  : Use data for query, reports, update, ... 사용자
  - Casual end-user : 필요할 때만 DB 접근
  - Naive/parametric end-user : 특정 기능 담당하여 접근하는 사람들
- System Analysts and Application developer 분석가 / 개발자
  - Analysts : user requirement 파악.
  - Programmer : Implement specification

Advantage of Using DB Approach

- controlling redundancy between relations



- restrict unauthorized approach
- provide persistent storage / storage structure
- provide back up / recovery service
- multiple interfaces
- Integrity constraint -- 무결성 제약조건
  생긴 Table의 Relation이 올바른지,
  Integrity를 위해서 지켜야하는 조건
- Indexing ... disk access 빈도 ↓
- Hashing ... index 없이 calculation만으로 direct access 할 수 있다

When not to use DBMS

DBMS의 Main Cost	· high initial investment · overhead for providing generality, security, ...
언제 안써도 되지!?	· simple DB. · well-defined DB · multiple-users 없을 때

- If there are strict real-time requirements that may not be met because of DBMS **overhead**
- If the database system is not able to handle the complexity of data because of modeling limitations
- If the database users need special operations not supported by the DBMS
- If there is a single-user who use DBMS.