

Database

- A collection of data
- data is logically related
- specific purpose

DBMS Database Management

System: It is a set of software to define, store, manipulate and control the data in the db.

Database System = DB + DBMS

History of DB

First Generation: File Systems
(50's - 60's)

A typical file system consists of a set of independent files and a number of application programs.

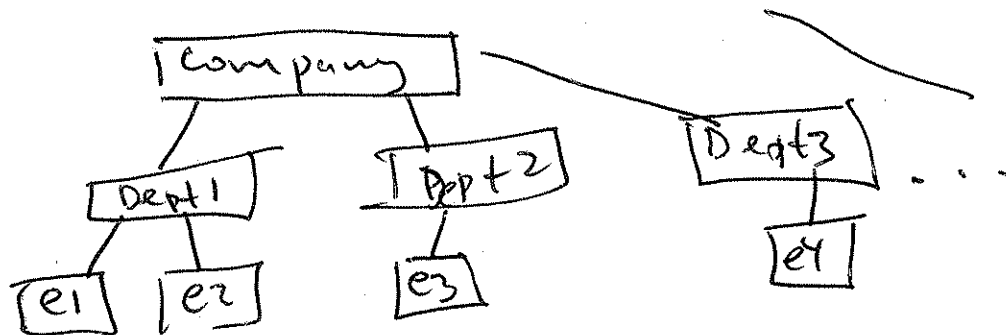
Problems

- no centralized control of all data
- redundancies and inconsistency

- concurrency control
- weak security
(does not provide multiple views of the same data)

Second generation

Hierarchical database 60's - 70's



- Records are connected by pointers
- one-to-many relationships between parent and child records.

Example: IMS (Information Management System of IBM)

GU University (Name = 'UWP')

Department (Name = 'CS')

Student (GPA > 3.5)

L1: GNP Student (GPA > 3.5)

Goto L1

Third Generation

Network database systems

late 60's - 70's

Examples: IDS II

Honeywell

DMS II / (Unisys)

In NDBS record types are organized into an acyclic graph.

Fourth Generation

Relational database systems

70's - now

tuple

$e1 = (eid, name, salary, depid)$

employees = { (123, John, 60000, 45),
(237, Mary, 61000, 40) }

departments = { (45, Systems, Kenosha),
(40, Sales, Racine) }

employees

eid	name	salary	depid
123	John	60000	45
237	Mary	61000	40

departments

depid	dname	loc
45	Systems	Kenosha
40	Sales	Racine

Examples: Oracle, Sybase, DB2, Ingres

Data is organized into tables (relations)

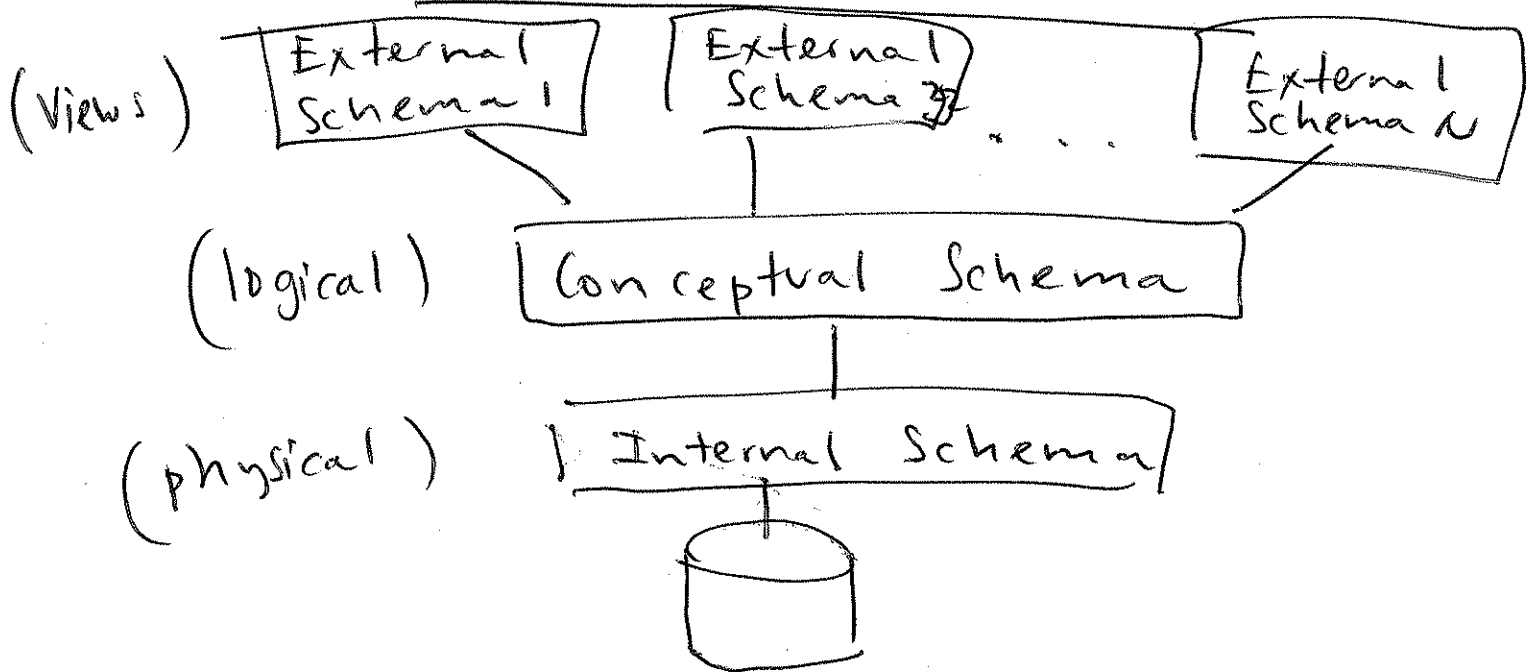
Fifth Generation:

(80's - now)
Object-oriented and
object-relational database

Examples:

O2, Object Store, Versant, Oracle,
Informix, UniSQL X

Database Architecture



Conceptual schema: logically describes all data in the db.

Internal Schema: describes how data in the DB is actually stored.

External Schema: provides description of a portion of the data in the db that can be accessed by a special group of users.

Data Independence

Logical data independence: the ability to modify the conceptual schema without causing application programs to be rewritten.

Physical data independence: the ability to modify the internal schema without causing application programs to be rewritten.

Database Languages

Data Definition Language (DDL)
defines database schemas.

Data Manipulation Language (DML)
used to retrieve, insert, delete and update data in the DB.

Data Control Language (DCL)
control the access of data.

Relational Data Model

Data Model is a tool that is used to describe the entities in the real-world, relationships among them, constraints on them, and the manipulation.

Entity - Relationship Model

