Pertemuan Ke 7

Agung BP

- Integrity for databases: record integrity, data correctness, update integrity
- Security for databases: access control, inference, and aggregation
- Multilevel secure databases: partitioned, cryptographically sealed,filtd filtered
- Security in data mining applications

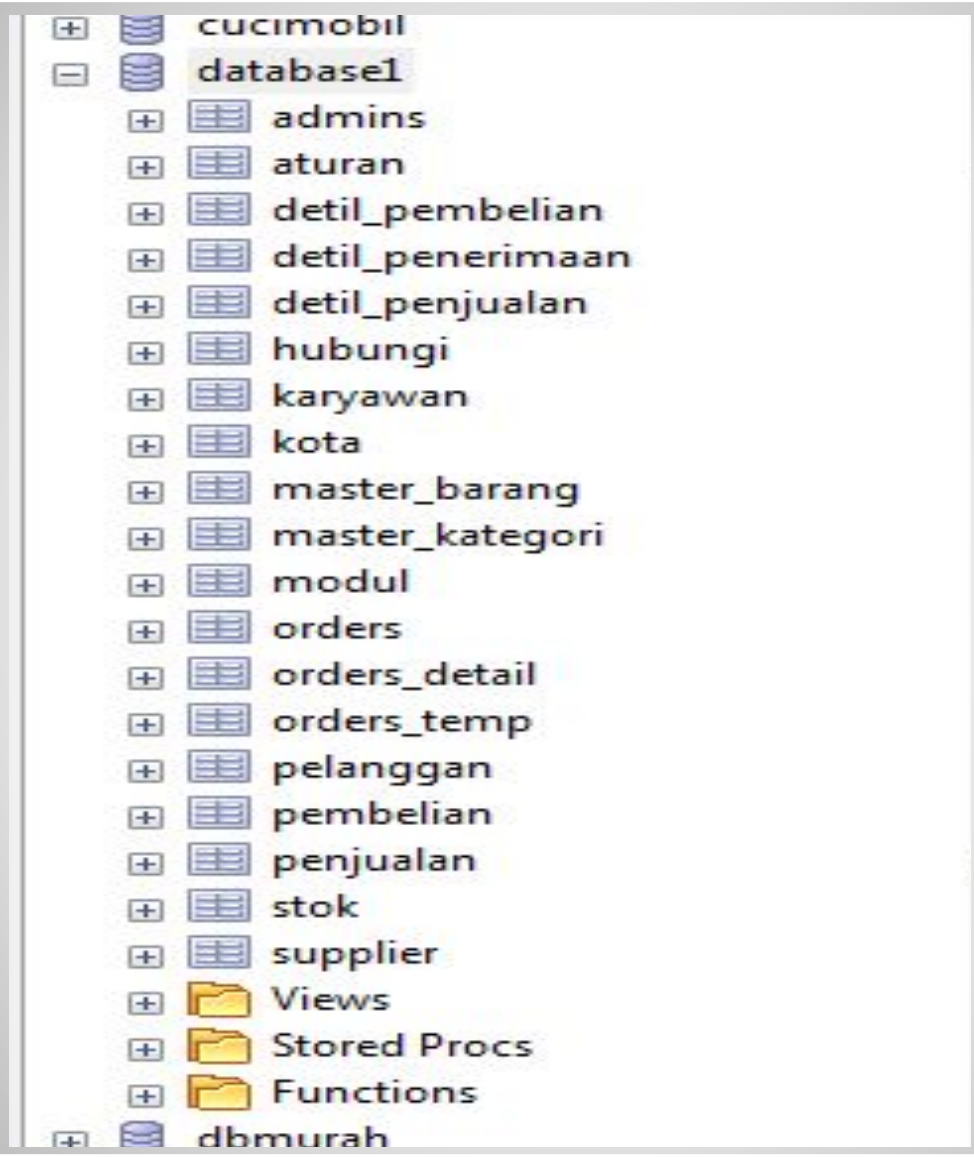
Pembahasan

PUSTAKA

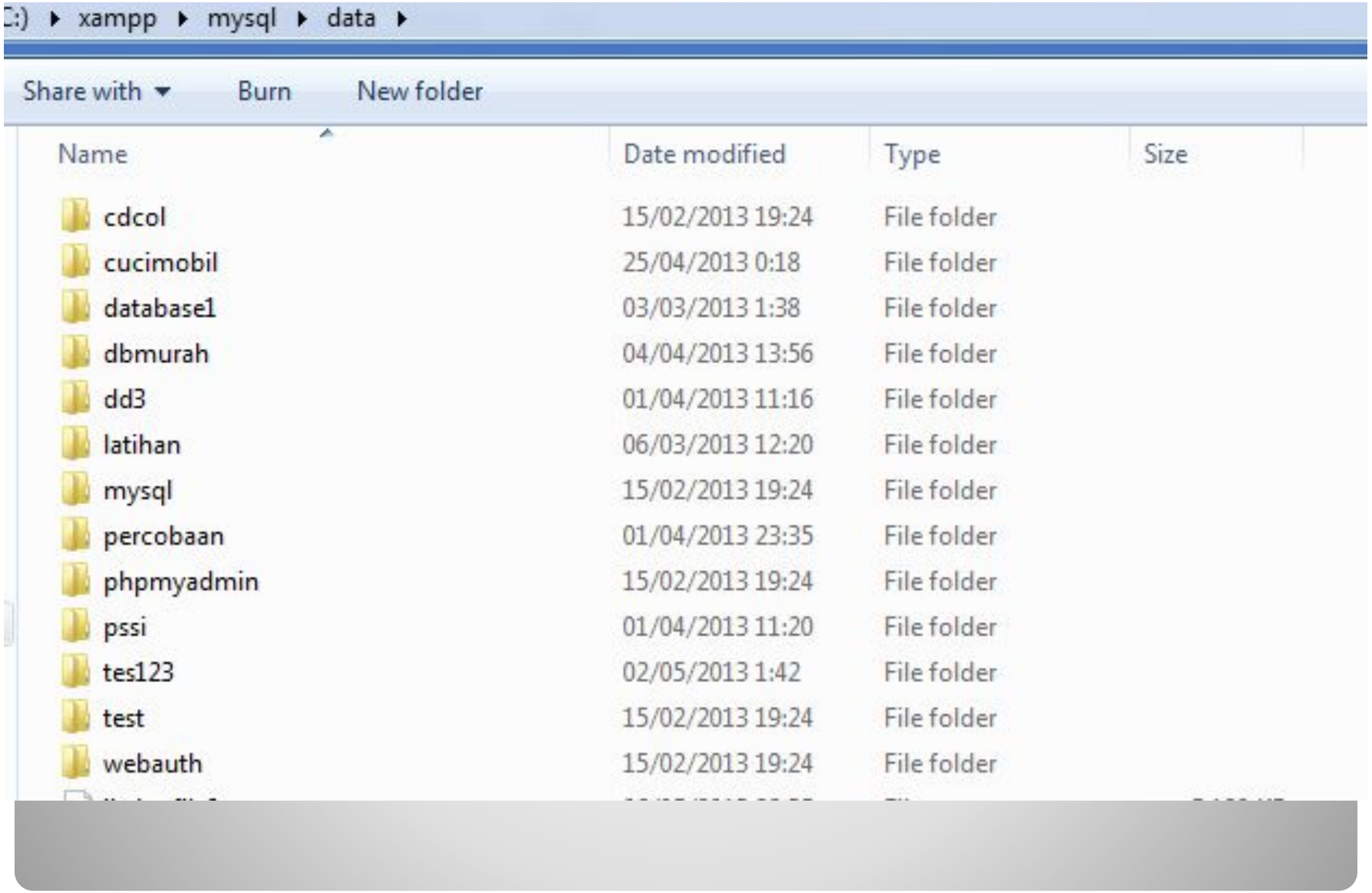
- Charles P. Pfleeger & Shari Lawrence Pfleeger, Security in Computing, 4th Ed., Pearson Education, 2007
- Chapter 6

Konsep Database

- Database adalah kumpulan data dan seperangkat aturan yang mengatur tentang data dengan menetapkan hubungan tertentu antara data.
- User/pengguna menggambarkannya data berupa *logical format*.
- *Physical Format* tidak selalu mendapatkan perhatian secara serius oleh pengguna/user.



Logical Format Database



Physical Format

- DBA (Database Administrator) adalah seseorang yang memberikan aturan kepada pengguna untuk mengelola, mengatur dan memantau data di database.

- Contoh Sintak memberi Grant User di Oracle:

- **create user** alfredo identified by alfredos_secret;
- **create user** alfredo identified externally;
- **create user** alfredo identified globally as 'external_name';

- create user alfredo identified by alfredos_secret **default tablespace** ts_users **temporary tablespace** ts_temp;
- Atau
- create user alfredo identified by passw0rd **account lock**;
- grant connect to alfredo;

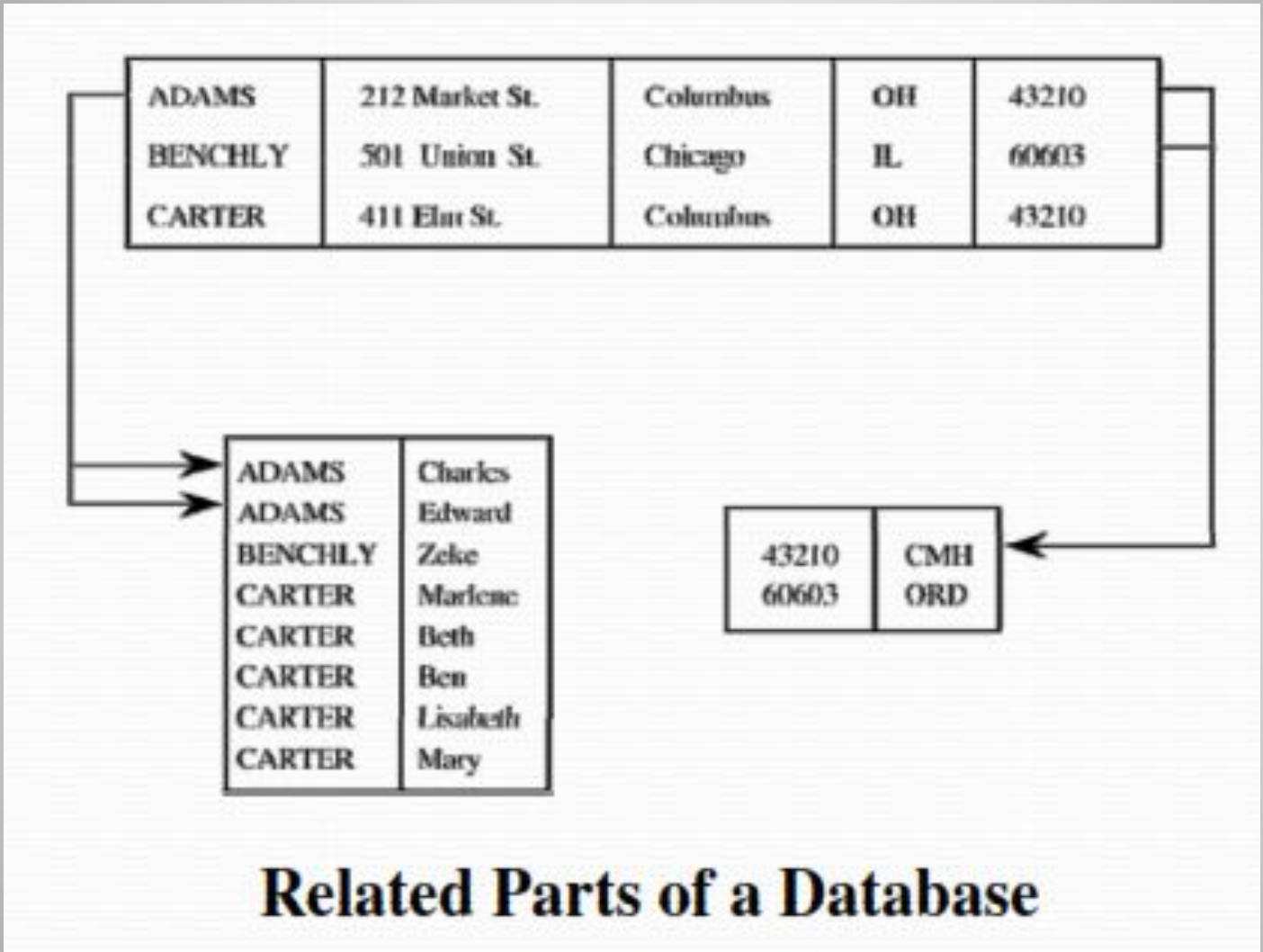
Lanjt.

- **grant** system_privilege to username;
- **grant** system_privilege_1, system_privileges_2, ..,system_privileges_n to username;
- **grant** system_privilege_1 to username with admin option;
- **grant** object_privilege to username;
- **grant** object_privilege to username with grant option;
- **grant** object_privilege to username with hierarchy option;

- The user interacts with the database through a program called a **database manager or a database management system (DBMS),** informally known as a **front end**

- Record – contain one related group of data
- Each record contains **fields or elements.**
- The logical structure of a database is called a **schema**
- A particular user may have access to only part of the database, ini disebut dengan **Subschema**

Komponen



Related Parts of a Database

Schema of Database

Name	First	Address	City	State	Zip	Airport
Adams	Charles	212 Market St.	Columbus	OH	43210	CMH
Adams	Edward	212 Market St.	Columbus	OH	43210	CMH
Benchly	Zeke	501 Union St.	Chicago	IL	60603	ORD
Carter	Marlene	411 Elm St.	Columbus	OH	43210	CMH
Carter	Beth	411 Elm St.	Columbus	OH	43210	CMH
Carter	Ben	411 Elm St.	Columbus	OH	43210	CMH
Carter	Elisabeth	411 Elm St.	Columbus	OH	43210	CMH
Carter	Mary	411 Elm St.	Columbus	OH	43210	CMH

- The name of each column is called an **attribute of the database**
- A **relation** is a set of columns.

- Users interact with database managers through commands to the DBMS that retrieve, modify, add, or delete fields and records of the database.
- Command is called **query**.

- Other, more complex, selection criteria are possible, with logical operators such as ***and (∧)*** *and* ***or (∨)****, and comparisons such* ***as less (<)***

Advantage of Using Databases vs file

- A database is a single collection of data, stored and maintained at one central location, to which many people may have access as needed.
- The users are unaware of the physical arrangements; the unified logical arrangement is all they see.

With a database we can….

- **Shared access** – users use one common, centralized set of data
- **Minimal redundancy**. users do not have to collect and maintain their own sets of data
- **Data consistency.** change to a data value affects all users of the data value.
- **Data integrity.** data values are protected against accidental or malicious undesirable changes
- **Controlled access.** only authorized users are allowed to view or to modify data values

Security Requirements

- ***Physical database integrity.***
- ***Logical database integrity.***
- ***Element integrity.***
- **Auditability.**
- ***Access control.***
- ***User authentication.***
- ***Availability.***

- Two situations can affect the integrity of a database:
- when the whole database is damaged or corrupt.
- when individual data items are unreadable.

Integrity of the Database

- Integrity of the database as a whole is the responsibility of :
- The DBMS
- The operating system
- The (human) computing system manager.

- **Separation**
  - **Partitioning**
  - **Encryption**
  - **Integrity Lock**

Proposals for Multilevel Security

- A user identifies himself or herself to the front end; the front end authenticates the user's identity.
- The user issues a query to the front end.
- The front end verifies the user's authorization to data
- The front end issues a query to the database manager

Trusted Front End

- The database manager performs I/O access, interacting with low level access control to achieve access to actual data.
- The database manager returns the result of the query to the trusted front end.
- The front end analyzes the sensitivity levels of the data items in the result and selects those items consistent with the user's security level.

- The front end transmits selected data to the untrusted front end formatting.
- The untrusted front end transmits formatted data to the user.

Summary of Database Security

- Address three aspects of security for database management systems:
- Masalah keutuhan dan kerahasiaan database secara spesifik
  - Kerahasiaan tanggung jawab dari user.
  - Keutuhan seluruh database dan table tanggung jawab dari DBMS dan DBA.

- Permasalahan Data di database.
- Permasalahan bisa terletak pada user dan tingkat sensitivitas data pada tiap-tiap database atau bahkan tiap-tiap table.