UNTAR
Universitas Tarumanagara

Terakreditasi BAN PT A (Unggul)

UNTAR untuk INDONESIA

DATABASE SYSTEMS
TK13021/SI16021

PROGRAM STUDI TEKNIK INFORMATIKA
PROGRAM STUDI SISTEM INFORMASI
UNIVERSITAS TARUMANAGARA

Pelaksanaan Perkuliahan

- Terdiri atas Kuliah (K) dan Praktikum(P)
- Kuliah oleh Dosen dan Praktikum oleh Asisten
- Pertemuan selama 16 minggu
- Minggu 8 UTS
- Minggu 16 UAS
- Komponen Nilai: Tugas, UTS, UAS

Course Schedule

1. Introduction to Databases
2. Database Environment
3. The Relational Model
4. Relational Algebra
5. Relational Calculus
6. Database Planning, Design, and Administration

7 – 9 Entity-Relationship Modeling

10–12 Normalization

13. Conceptual Database Design
14. Logical Database Design

Chapter 1

Introduction to Databases

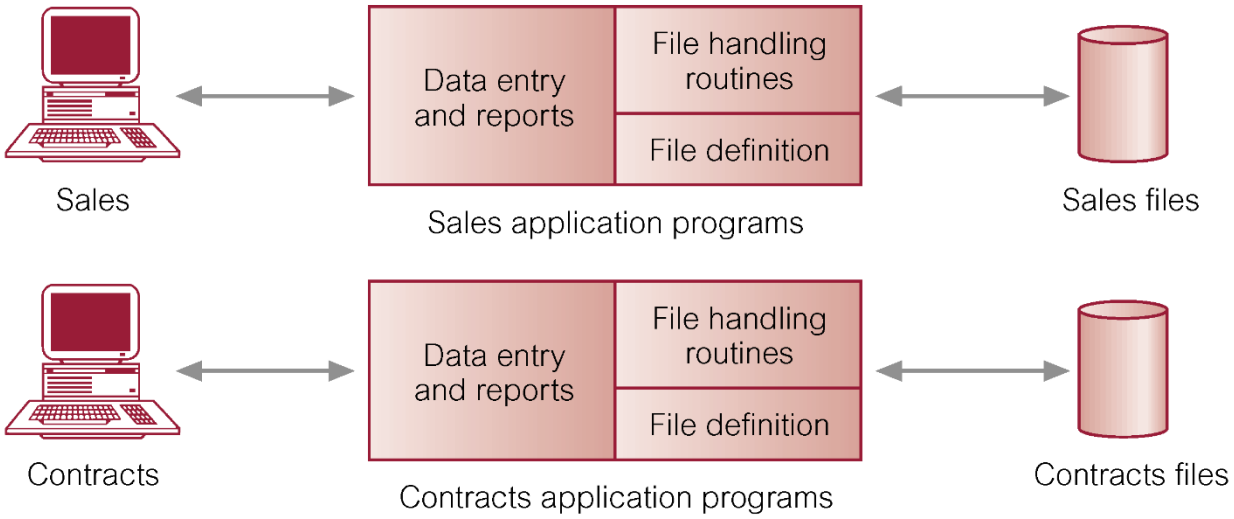
Examples of Database Applications

- Purchases from the supermarket
- Purchases using your credit card
- Booking a holiday at the travel agents
- Using the local library
- Taking out insurance
- Using the Internet
- Studying at university

File-Based Systems

- **Collection of application programs that perform services for the end users (e.g. reports).**
  - **Suatau program aplikasi yang memberikan layanan kepada pengguna akhir (misal laporan).**
- **Each program defines and manages its own data.**
  - **Setiap program yang dibuat didefinisikan dan mengelola datanya sendiri**

File-Based Processing



Sales Files

PropertyForRent (propertyNo, street, city, postcode, type, rooms, rent, ownerNo)
PrivateOwner (ownerNo, fName, lName, address, telNo)
Client (clientNo, fName, lName, address, telNo, prefType, maxRent)

Contracts Files

Lease (leaseNo, propertyNo, clientNo, rent, paymentMethod, deposit, paid, rentStart, rentFinish, duration)
PropertyForRent (propertyNo, street, city, postcode, rent)
Client (clientNo, fName, lName, address, telNo)

Limitations of File-Based Approach

- **Separation and isolation of data (pemisahan dan isolasi data)**
  - **Each program maintains its own set of data (setiap program mengatur kumpulan datanya sendiri)**
  - **Users of one program may be unaware of potentially useful data held by other programs (pengguna satu program mungkin tidak menyadari bahwa ada data yang berpotensi dapat digunakan oleh program lainnya)**
- **Duplication of data (kerangkapan data)**
  - **Same data is held by different programs (data yang sama dimiliki juga oleh program yang berbeda).**
  - **Wasted space and potentially different values and/or different formats for the same item (ruang tidak terpakai dan berpotensi terjadinya perbedaan nilai atau format untuk item yang sama).**

Limitations of File-Based Approach

- **Data dependence (ketergantungan data)**
  - **File structure is defined in the program code (struktur file didefinisikan pada program)**
- **Incompatible file formats (format file yang tidak kompatibel)**
  - **Programs are written in different languages, and so cannot easily access each other's files (program yang ditulis dalam bahasa berbeda, sehingga tidak mudah mengakses file lainnya)**
- **Fixed Queries/Proliferation of application programs**
  - **Programs are written to satisfy particular functions (program ditulis untuk memenuhi fungsi tertentu).**
  - **Any new requirement needs a new program (setiap ada kebutuhan baru, perlu program baru).**

Database Approach

- **Arose because (muncul karena):**
  - **Definition of data was embedded in application programs, rather than being stored separately and independently (data didefinisikan pada program aplikasi, bukan disimpan secara terpisah dan mandiri).**
  - **No control over access and manipulation of data beyond that imposed by application programs (tidak ada kontrol terhadap akses dan manipulasi data di luar program aplikasi nya).**

- **Result:**
  - **the database and Database Management System (DBMS).**

Database

- **Shared collection of logically related data (and a description of this data), designed to meet the information needs of an organization (sekumpulan data yang bersifat logika dan saling terkait (termasuk deskripsi data ini), dirancang untuk memenuhi kebutuhan informasi suatu organisas).**

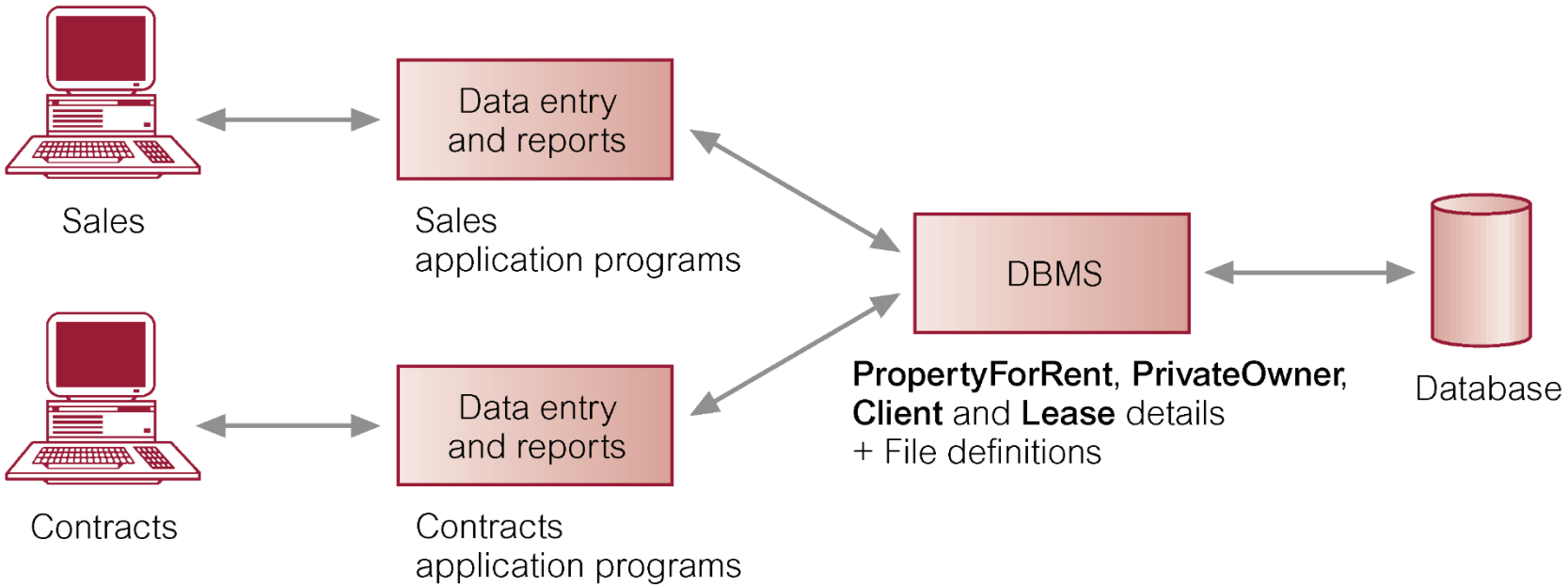
- **System catalog (metadata) provides description of data to enable program–data independence (data yang bersifat mandiri bisa digunakan oleh program melalui katalog sistem).**

- **Logically related data comprises entities, attributes, and relationships of an organization's information (data terhubung secara logika terdiri dari entitas, atribut, dan hubungan dari informasi organisasi).**

Database Management System (DBMS)

- **A software system that enables users to define, create, and maintain the database and that provides controlled access to this database (sebuah perangkat lunak yang memungkinkan pengguna untuk mendefinisikan, membuat, dan memelihara basis data dan menyediakan akses terkontrol ke basis data ini).**

Database Management System (DBMS)



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Database Approach

- **Data definition language (DDL).**
  - **Permits specification of data types, structures and any data constraints (digunakan untuk mendefinisikan/membuat spesifkasi tipe data, struktur, dan batasan data, DDL digunakan juga untuk mengubah, serta menghapus basisdata dan obyek yang diperlukan dalam basis data).**
  - **All specifications are stored in the database (semua spesifikasi disimpan dalam basis data).**

- **Data manipulation language (DML).**
  - **General enquiry facility (query language) of the data (penyediaan fasilitas yang bersifat umum, yaitu bahasa kueri untuk memanipulasi dan pengambilan data pada basis data).**

Database Approach

- **Controlled access to database may include:**
  - **A security system.**
  - **An integrity system.**
  - **A concurrency control system.**
  - **A recovery control system.**
  - **A user-accessible catalog.**

- **A view mechanism.**
  - **Provides users with only the data they want or need to use.**

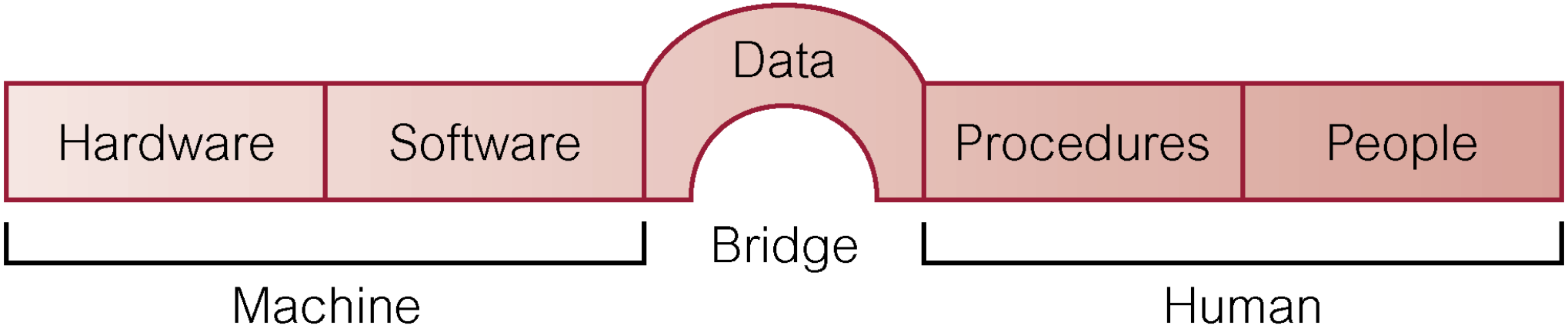
Views

- **Allows each user to have his or her own view of the database.**
- **A view is essentially some subset of the database.**

Views

- **Benefits include:**
  - **Reduce complexity;**
  - **Provide a level of security;**
  - **Provide a mechanism to customize the appearance of the database;**
  - **Present a consistent, unchanging picture of the structure of the database, even if the underlying database is changed.**

Components of DBMS Environment



Components of DBMS Environment

- **Hardware**
  - **Can range from a PC to a network of computers.**
- **Software**
  - **DBMS, operating system, network software (if necessary) and also the application programs.**
- **Data**
  - **Used by the organization and a description of this data called the schema.**

Components of DBMS Environment

- **Procedures**
  - **Instructions and rules that should be applied to the design and use of the database and DBMS.**
- **People**

Roles in the Database Environment

- Data Administrator (DA)
- Database Administrator (DBA)
- Database Designers (Logical and Physical)
- Application Programmers
- End Users (naive and sophisticated)

History of Database Systems

- First-generation
  - Hierarchical and Network
- Second generation
  - Relational
- Third generation
  - Object Relational
  - Object-Oriented

Advantages of DBMSs

- Control of data redundancy
- Data consistency
- More information from the same amount of data
- Sharing of data
- Improved data integrity
- Improved security
- Enforcement of standards
- Economy of scale

Advantages of DBMSs

- Balanced conflicting requirements
- Improved data accessibility and responsiveness
- Increased productivity
- Improved maintenance through data independence
- Increased concurrency
- Improved backup and recovery services

Disadvantages of DBMSs

- Complexity
- Size
- Cost of DBMS
- Additional hardware costs
- Cost of conversion
- Performance
- Higher impact of a failure

Discuss the roles of the following personnel in the database environment

- (a) Data Administrator
- (b) Database Administrator
- (c) Database Designer
- (d) Application Developer
- (e) End-Users

List four government sectors in your country that use database systems.

Thank You

Reference: Database Systems A Practical Approach to Design, Implementation, and Management Fourth Edition.

Thomas M. Connolly and Carolyn E. Begg

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