Ministry of Higher Education
Karwan University
Faculty of Computer Science

Database I

Lecture 1: Introduction to DB

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Database

- Organized collection of **logically related data**.

- Collection of files storing **related data**.

- Database is an **organized** collection of **related** data that is stored in an **efficient** and **compact** manner.

- Such as
  - ✓ Library database
  - ✓ University database
  - ✓ Superstore database
  - ✓ Airline reservation database
  - ✓ …

Introduction to Table

- Table is the **fundamental object** of the database structure.

- The basic purpose of table is to **store data**.

- A table consist of **rows** and **columns**.

- The data in a table can be **manipulated** easily.

Student ID	Name	Course	Fee
1	Zahir	MOUS	100
2	Nazir	CCNA	200
3	Hilal	MCSE	150
4	Zubair	MySQL	100

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What is Row/Record?

- A logically connected set of one or more fields that describe a person, place or thing is called Row/ Record.

- Row/Record is the horizontal part of the table.

- For example the field that comprise a record for student Name Nazir might consist of Nazir's ID, Name, Course and Fee.

Student ID	Name	Course	Fee
1	Zahir	MOUS	100
2	Nazir	CCNA	200
3	Hilal	MCSE	150

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What is Column/Field?

- A column/field is a collection of cells aligned vertically in a table.

- A column/field is an element in which one piece of information is stored, such as the student's names.

- Fields/columns are the vertical part of the table.

Name
Zahir
Nazir
Hilal
Zubair

Database Management System

❑ **DBMS:** A software system that enables users to define, create, maintain, and control access to the database.

▪ Examples: DB2 (IBM), SQL Server (MS), Oracle, Sybase, MySQL, …

❑ **Database System:**

  ▪ The database management system together with the data is called the database system.

Database Management System

❑**DBMS Functionalities:**

- Define a particular database in terms of its data types, structures, and constraints

- Construct or Load the initial database contents on a secondary storage

- Manipulating the database:

  - **Retrieval:** Querying, generating reports

  - **Modification:** Insertions, deletions and updates to its contents.

  - Accessing the database through Web applications

- Processing and Sharing

- Protection or Security

Database Advantages

- Control of data redundancy

- Data consistency

- Data sharing

- Increased productivity of application development

- Enforcement of standards

- Improved data quality

- Improved data accessibility and responsiveness

- Reduced program maintenance
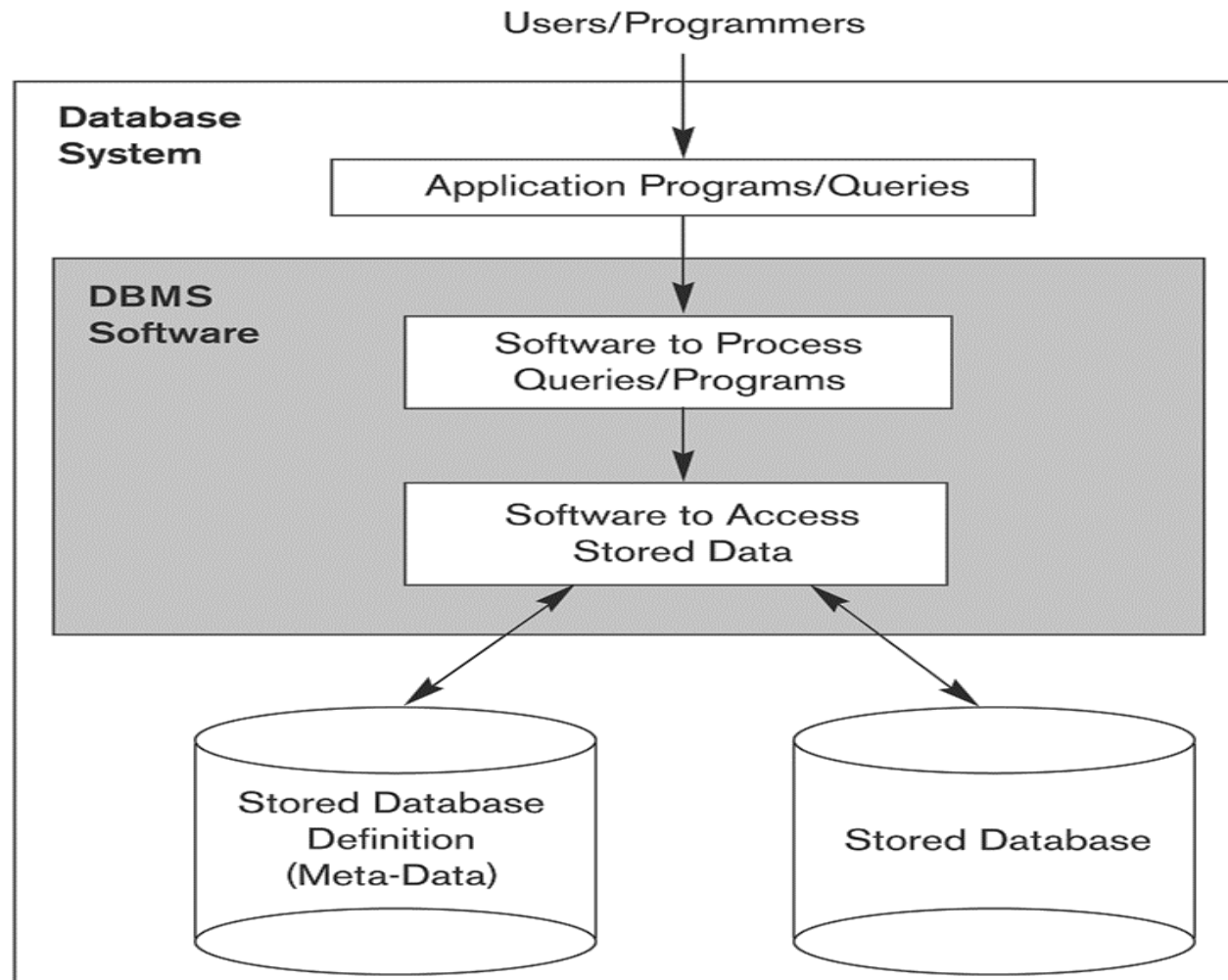
- Multi Users interface

Database Disadvantages

- Cost of DBMS

- Complexity (Installation & Management)

- Hardware Cost

- Professionals required

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Simplified Database Environment

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Simple Database Example

COURSE

Course_name	Course_number	Credit_hours	Department
Intro to Computer Science	CS1310	4	CS
Data Structures	CS3320	4	CS
Discrete Mathematics	MATH2410	3	MATH
Database	CS3380	3	CS

GRADE_REPORT

Student_number	Section_identifier	Grade
17	112	B
17	119	C
8	85	A
8	92	A
8	102	B
8	135	A

SECTION

Section_identifier	Course_number	Semester	Year	Instructor
85	MATH2410	Fall	04	King
92	CS1310	Fall	04	Anderson
102	CS3320	Spring	05	Knuth
112	MATH2410	Fall	05	Chang
119	CS1310	Fall	05	Anderson
135	CS3380	Fall	05	Stone

PREREQUISITE

Course_number	Prerequisite_number
CS3380	CS3320
CS3380	MATH2410
CS3320	CS1310

Components of Database Environment

- **Application Program:** An application program that is used to perform a series of database activities (create, read, update, and delete) on behalf of database users.

- **Database System**

- **Database Management System (DBMS)**

- **Data Repository:** A centralized knowledge base of all data definitions, data relationships, report formats and other system components.

- **Data Administrator:** Data administrators are persons who are responsible for the overall management of data resources in an organization.

Components of Database Environment

- **Database Administrators (DBA):** are responsible for physical database design and for managing technical issues in the database environment.

- **System Developers:** They are systems analysts and programmers who design new application programs.

- **End-Users:** End users are persons who add, delete and modify data in the database and request information from it.

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References

- Modern Database Management 10th Edition.

Questions…?

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