Kabul Polytechnic University
Computer Science Faculty
Information System Department

Database II

Lecture 0: Course Overview

28 August – 2024

Lectures & other related materials are available here: https://github.com/mujtabaSultani01/Database-II

Contents

- Class Policies and Organizational Issues
- Course Information
- Organizational Issues
- Course Contents
- Course Materials
- Introduction to the Topic

Course Information

- Course Name:
  - Database II
- Pre-Requirements for the participation
  - *Database I*
- Type of Course:
  - Lecture with supporting weekly exercises to repeat and adapt the lecture contents and Projects.
- Slides and Extra Notes:
  - Soft Version, available here: *https://github.com/mujtabaSultani011/Database-II*

Lecture Issues

- Lecture Times per Week
  - Monday 11:20 – 12:45 (Lecture)
  - Wednesday 11:20 – 12:45 (Lecture)
- Office hours
  - Sunday 10:00 – 01:00
  - Wednesday 08:00 – 01:00
- Private appointment
  - Contact me through email.

Assignments

- Weekly basis

- Rules
  - ✓ The Assignments should be handover Before the deadline...
  - ✓ You will work on the homework in Small groups
  - ✓ There should be no copy and paste
  - ✓ The copy and paste homework has zero points
  - ✓ Don't Cheat Yourself, Please!!!...

Examination and Grading

- Exams
  - Term-wise Project: **20%**
  - Final-term Exam: **60%**

- Others
  - Class Activity: **10%**
  - Homework: **10%**

Class Rules

- Full attendance
- Please come on time
- Turn off your mobile.

Don't disturb your classmate !!!!

Problems and Question

- Place:
  - Computer Science Faculty (Lecturer room)

- Internet contact :
  - Mujtaba.cs01@gmail.com
  - *https://github.com/mujtabaSultani01/Database-II*

Course Contents

- Introduction to Databases
- Enhanced ERD
- Relational Algebra
- Query Optimization
- Stored Procedure
- Stored Functions
- Triggers
- Transaction Management
- Indexing
- Database Administration & Security
- Distributed DBMSs & Replication Servers
- Business intelligence

Course Materials

- Database Systems: A practical approach to design, implementation, and management. (Main reference)
- Database Systems: Design, Implementation, & Management, by Carlos Coronel and Steven Morris, 13th Ed. (Main reference)
- Database Systems Concepts, 7th Edition, by Silberschatz, Korth and Sudarshan. (Supplementary textbook)
- Microsoft SQL Server 2008 R2. (Supplementary textbook)

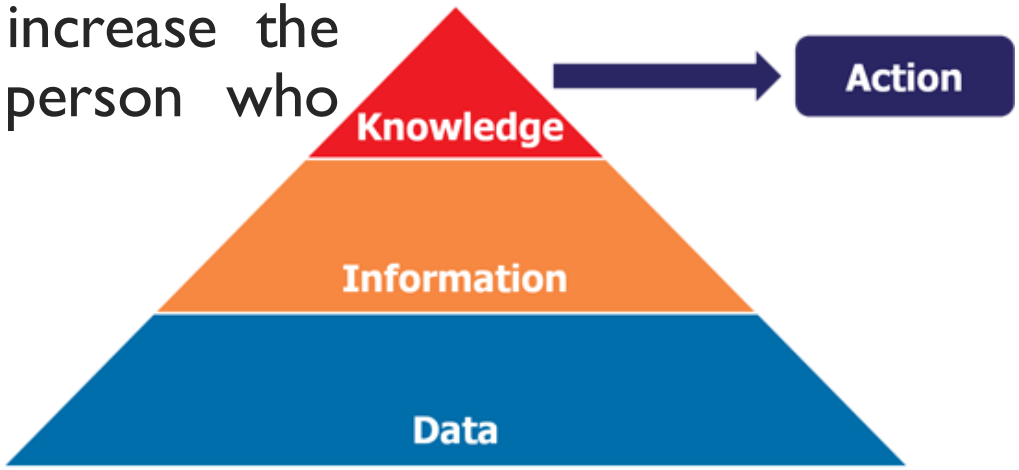
Data & Information

❑ Data

- The term ***data*** referred to facts concerning objects and events that could be recorded and stored on computer media.

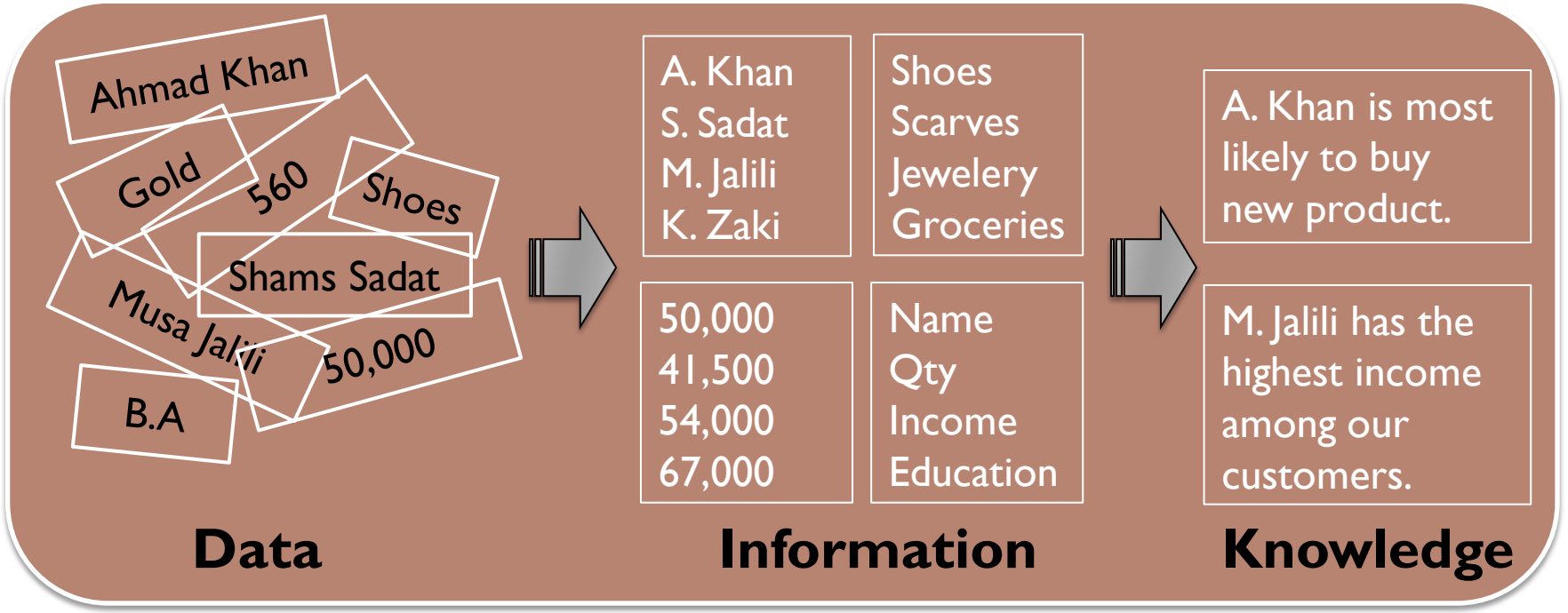
❑ Information

- Data that have been processed in such a way as to increase the knowledge of the person who uses the data.



Data & Information

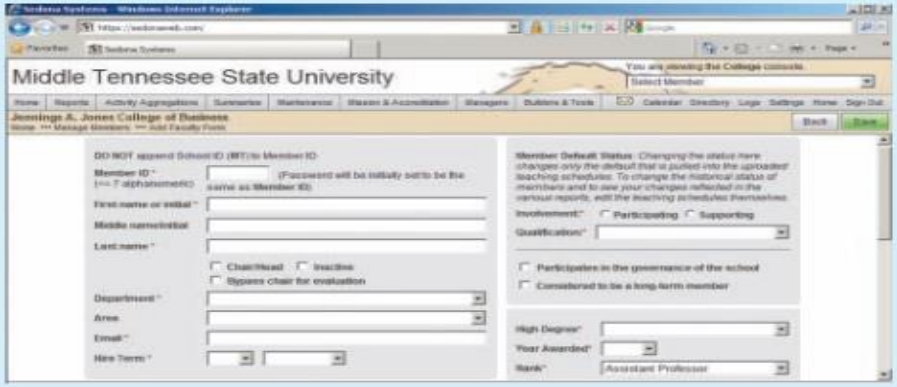
- **Data, Information & Knowledge**



Transforming Raw Data into Information

FIGURE 1.1 Transforming raw data into information

a) Data entry screen



b) Raw data

Id	LastName	MidName	FirstName	DeptCode	Office	Email	Rank	HireYear	Degree
1	Washington	A.	George	MGMT	N135	gwashington@mtsu.edu	Professor	2001	Ph.D.
2	Adams		John	FIN	N313	jadams@mtsu.edu	Professor	1984	Ph.D.
3	Jefferson	L	Thomas	ECON		tjefferson@mtsu.edu	Instructor	2002	M.B.A.
4	Madison	D	James	FIN	N238	jmadison@mtsu.edu	Associate Professor	1994	Ph.D.
5	Monroe	N.	James	ACCT	N411	jmonroe@mtsu.edu	Assistant Professor	1995	Ph.D.
6	Adams	Q.	John	ACCT	N418	jqadams@mtsu.edu	Associate Professor	1989	Ph.D.
7	Jackson	C.	Andrew	ECON	N303	ajackson@mtsu.edu	Associate Professor	1993	Ph.D.
8	Van Buren	T.	Martin	FIN	N308	mvanburen@mtsu.edu	Professor	1988	Ph.D.
9	Harrison	R.	William	MKTG	N118	wharrison@mtsu.edu	Professor	1994	Ph.D.
10	Tyler	M	John	MGMT		JTyler@mtsu.edu	Assistant Professor	2000	Ed.D.
11	Polk		Cheryl	MKTG	N143	cpolk@mtsu.edu	Associate Professor	2002	Ph.D.
12	Taylor	G.	Zachary	ACCT	N415	ztaylor@mtsu.edu	Associate Professor	1998	Ph.D.
13	Fillmore		Millard	JCB	N219	millmore@mtsu.edu	Professor	1992	Ph.D.
14	Pierce	A.	Franklin	MKTG	N358	pfranklin@mtsu.edu	Instructor	2005	M.B.A.
15	Buchanan	T.	James	MGMT	N146	jbuchanan@mtsu.edu	Associate Professor	1996	D.B.A.
16	Lincoln	W.	Larry	MGMT	N150	llincoln@mtsu.edu	Associate Professor	1996	Ph.D.
18	Johnson		Andrew	ISYS	N360	ajohnson@mtsu.edu	Professor	1987	Ph.D.
19	Grant		Kate	MKTG	N129	kgrant@mtsu.edu	Assistant Professor	1989	D.B.A.
20	Rutherford		Hayes	ACCT	N408	hrutherford@mtsu.edu	Professor	1992	Ph.D.
21	Garfield	T.	Denise	ACCT		dgarfield@mtsu.edu	Assistant Professor	2018	Ph.D.
22	Arthur		Emily	ACCT	N413	earthur@mtsu.edu	Associate Professor	2003	J.D.
23	Cleveland	G	Robert	ACCT	N401	rcleveland@mtsu.edu	Associate Professor	1997	Ph.D.
24	Harrison	X	Patricia	BULA	N406	pharrison@mtsu.edu	Associate Professor	2001	J.D.
25	McKinley	B	Priscilla	ISYS	N363	pmckinley@mtsu.edu	Adjunct	1994	M.S.
26	Roosevelt	F.	Hillary	MGMT	N104	hroosevelt@mtsu.edu	Associate Professor	2002	Ph.D.
27	Wilson		Laura	BCEN	N448	lwilson@mtsu.edu	Professor	1992	Ph.D.
28	Harding		Warren	MKTG	N114	wharding@mtsu.edu	Professor	1984	Ed.D.
29	Coolidge		Calvin	ECON	N316	ccoolidge@mtsu.edu	Professor	1975	Ph.D.
30	Hoover		Lisa	MGMT		lhoover@mtsu.edu	Adjunct	1978	M.B.A.
31	Truman		Betty	ACCT	N416	btruman@mtsu.edu	Professor	1971	Ed.D.
32	Johnson		Robert	BCEN	N248	rjohnson@mtsu.edu	Professor	2001	Ph.D.

c) Information in summary format

Rank	COUNT	%/INFS	TOT/COL	%/COL. TOT.	%/COL. FAC.
Adjunct	5	20.00%	23	21.74%	3.27%
Assistant Professor	2	8.00%	28	7.14%	1.31%
Associate Professor	9	36.00%	37	24.32%	5.88%
Instructor	2	8.00%	18	11.11%	1.31%
Professor	7	28.00%	47	14.89%	4.58%

d) Information in graphical format

SOURCE: Course Technology/Cengage Learning
Data entry screen courtesy of Sedona Systems, 2011.
Information screens courtesy of JCBDashboard, 2011.

Data Vs Information

Data	Information
Data consist of unprocessed raw facts.	Information the processed form of data.
Data is used as input in the computer.	Information the output of the computer.
Data is not meaningful.	Information meaningful.
Data is normally huge in its volume.	Information normally short in its volume.
Data difficult to reproduce.	Information easier to reproduced if lost.
Data is un independent entity.	Information is depending on data.
Data is not used in decision-making.	It's very important for decision-making.

Data & Information

- **Metadata**
  - Data about the data.
  - The metadata describe the data characteristics and the set of relationships that links the data found within the database.

Data & Metadata Examples

Roll No	Name	Address	Email	Phone
1	Ahmad	Karte-Chahar	ahmad.afghan@example.com	+93490004999
2	Husain	Karte-Naw	sayed.husain@example.com	+93917897958

Field Name	Data type	Length	Description	Constraint
Roll No	Integer	3	Roll No of the student	Value from 1 to 100
Name	Alphabetic	50	Name of the student	
Address	Alphanumeric	100	Address of the student	
Email	Alphanumeric	25	Email of the student	Must contain @ and .
Phone	Alphanumeric	25	Phone of the student	
Field Name	Data type	Length	Description	Constraint

File Based System

- A collection of application programs that perform services for the end-users such as the production of reports. Each program defines and manages its own data.
- In a typical file processing system, each department in an organization has its own set of files.
- The files are designed specially for their own application. The records in one file not related to the records in any other file.

File Based System

- **Problems with File Based System**
  - Inconsistent Data
  - Difficulty of getting quick answers
  - Duplication of data
  - Data dependence
  - Lengthy development times
  - Lack of Security
  - Excessive program maintenance

File Based System

- Example:

Sales Department

Client Details

Name _____
Address _____
Tel.No. _____
Preferred type _____
Max. Rent _____

DreamHome Property for Rent

Address _____
City _____ Postcode _____
Type _____ Rent _____

Owner Details

Name _____
Address _____
Tel.No. _____

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

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

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

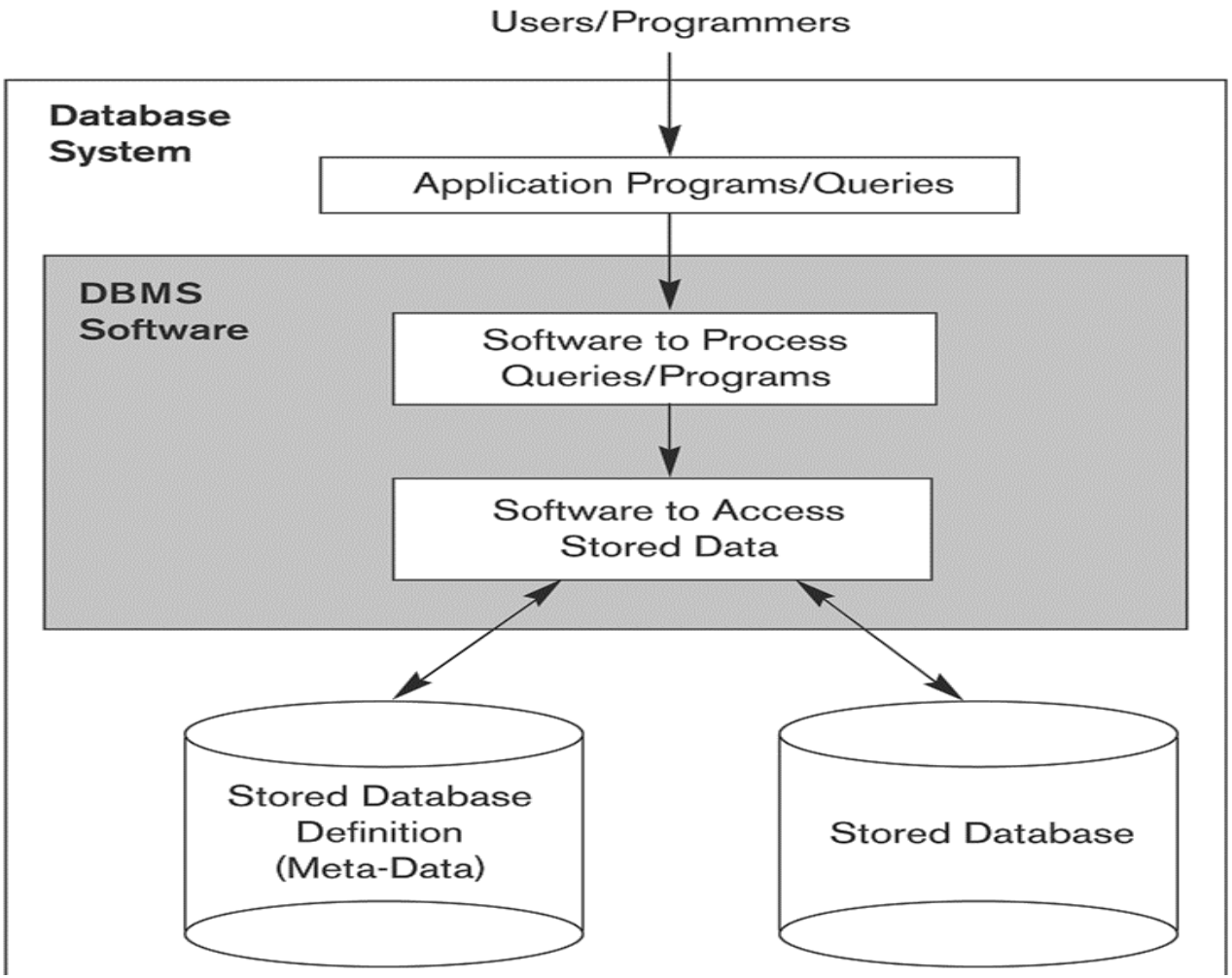
- Control of data redundancy
- Data consistency
- Data sharing

- 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

Simplified Database Environment



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

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

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

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.

Home Work

- Create groups until next week (Maximum of three students).

References

- Database Systems: A practical approach to design, implementation, and management.

Questions …?