Week 01

Database and Database Users

1st-Sep-2020

&

3rd-Sep-2020

Outline

- Basic definitions: Data, Information, Database, Database management system, Database systems
- Database systems vs file-based systems
- Types of databases and it’s applications

Data and Information

- Data is raw, unorganized facts that need to be processed. Data can be something simple and seemingly random and useless until it is organized.

- When data is processed, organized, structured or presented in a given context so as to make it useful, it is called information

Database, Database management system(DBMS), and Database System

- A database is an organized collection of structured information, or data. Or Collection of related data.
- A database is usually controlled by a database management system (DBMS).
- Together, the data and the DBMS, along with the applications that are associated with them, are referred to as a database system, often shortened to just database.

Database Systems VS File-based Systems

Database systems	**File-based systems**
Uses DBMS	Uses hard disk
Provides recovery and back up	Does not provide recovery and backup
Less Redundant	More Redundancy
Consistent	Inconsistent
Multiple views	No multiple views
Supports Concurrency	Does not support Concurrency

Database of Student and it's Course Information

STUDENT

Name	Student_number	Class	Major
Smith	17	1	CS
Brown	8	2	CS

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	07	King
92	CS1310	Fall	07	Anderson
102	CS3320	Spring	08	Knuth
112	MATH2410	Fall	08	Chang
119	CS1310	Fall	08	Anderson
135	CS3380	Fall	08	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

Self Describing Nature

RELATIONS

Relation_name	No_of_columns
STUDENT	4
COURSE	4
SECTION	5
GRADE_REPORT	3
PREREQUISITE	2

COLUMNS

Column_name	Data_type	Belongs_to_relation
Name	Character (30)	STUDENT
Student_number	Character (4)	STUDENT
Class	Integer (1)	STUDENT
Major	Major_type	STUDENT
Course_name	Character (10)	COURSE
Course_number	XXXXNNNN	COURSE
....	....	.....
....	....	.....
....	....	.....
Prerequisite_number	XXXXNNNN	PREREQUISITE

Multiple Views (Virtual)

(a)

TRANSCRIPT

Student_name	Student_transcript				
	Course_number	Grade	Semester	Year	Section_id
Smith	CS1310	C	Fall	08	119
	MATH2410	B	Fall	08	112
Brown	MATH2410	A	Fall	07	85
	CS1310	A	Fall	07	92
	CS3320	B	Spring	08	102
	CS3380	A	Fall	08	135

(b)

COURSE_PREREQUISITES

Course_name	Course_number	Prerequisites
Database	CS3380	CS3320
		MATH2410
Data Structures	CS3320	CS1310

Figure 1.5
Two views derived from the database in Figure 1.2. (a) The TRANSCRIPT view. (b) The COURSE_PREREQUISITES view.

A simplified database system environment

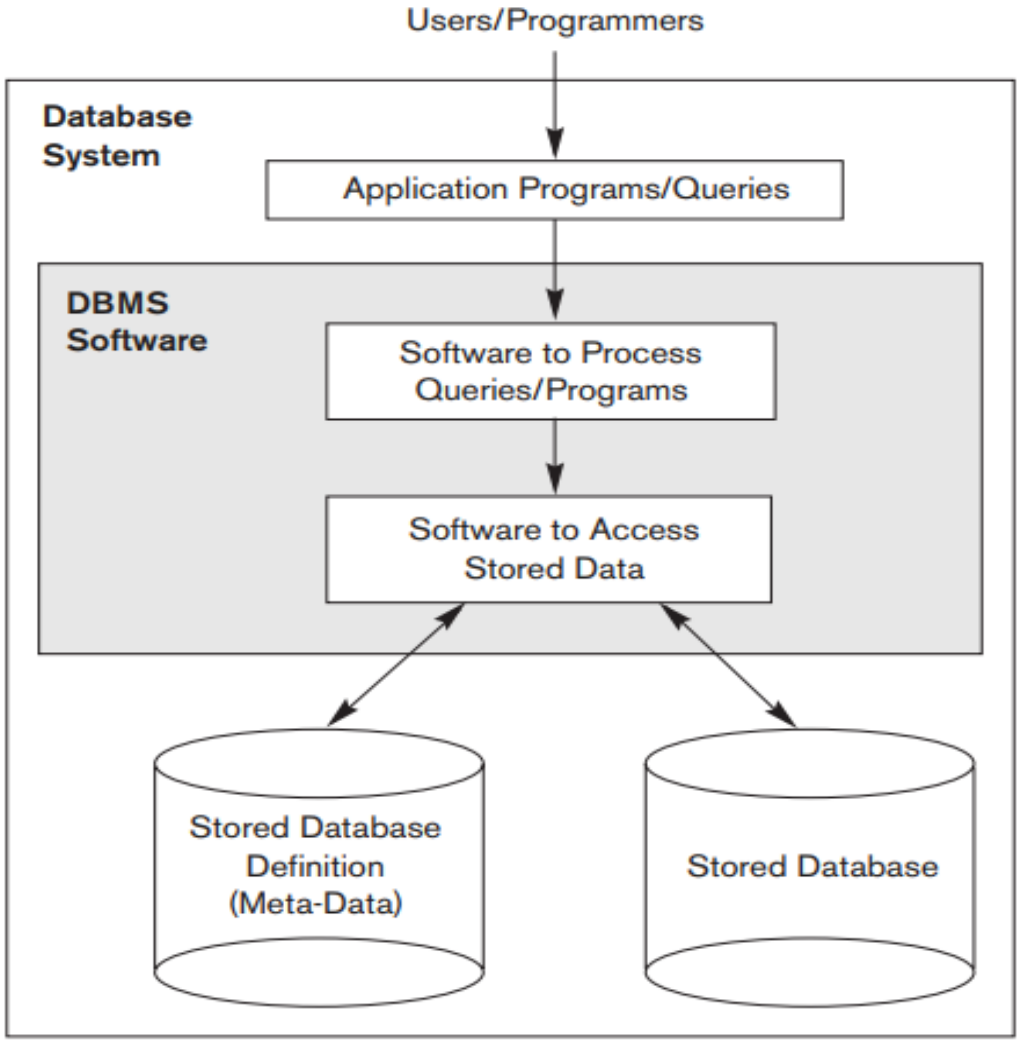

Figure 1.1
A simplified database system environment.

Types of Databases and Database Applications

- Traditional Databases
  - Applications: Inventory management systems, Bank management systems, Airline reservation management systems, and others

- Non- traditional Databases /NOSQL systems
  - Applications: Social media platforms

Questions??

Additional Resources

- http://cs.tsu.edu/ghemri/CS681/ClassNotes/Intro_Databases.pdf
- https://www.thestudygenius.com/advantages-and-disadvantages-of-database/
- https://courses.lumenlearning.com/santaana-informationsystems/chapter/data-information-and-knowledge/