DATABASE MANAGEMENT SYSTEM

Associate Professor Dr. Raed Ibraheem Hamed

**University of Human Development, College of Science and Technology
Department of Information Technology**

2015 – 2016

Points to Cover

- Hierarchy of Data
- Introduction to Database
- Types of Database Management System (DBMS) software are:
  - Relational
  - Flat file
- Advantages of the database approach over traditional file-processing systems
- Benefits of a Relational Database
- Queries and Forms
- Web Databases
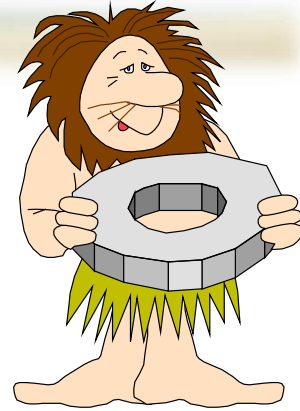
Hierarchy of Data

- **Bit** (Character) - a bit is the smallest unit of data representation (value of a bit may be a 0 or 1).

- **Field** - a field consists of a grouping of characters. A data field represents an attribute .

- **Record** - a record represents a collection of attributes that describe a real-world entity.

- **File** - a group of related records. Files are frequently classified by the application for which they are primarily used (employee file).

Hierarchy of Data

Hierarchy of data	Example	
Database	Personel file Department file Payroll file	(Project database)
Files	005-10-6321 Johns Francine 10-17- 2003 549-77-1001 Buckley Bill 2-17-2009 098-40-1370 Cena Steven 1-5-2013	(Personnel file)
Records	098-40-1370 Cena Steven 1-5-2013	(Record containing SSN, Last name, First name, Date of job)
Fields	Cena (Last name field)	Social Security Number (SSN)
Characters (bytes)	1000100 (Letter 'F' in ASCII)	

Terminology

❑ **Database**
- A collection of integrated and related files

❑ **File**
- A collection of related records

❑ **Record**
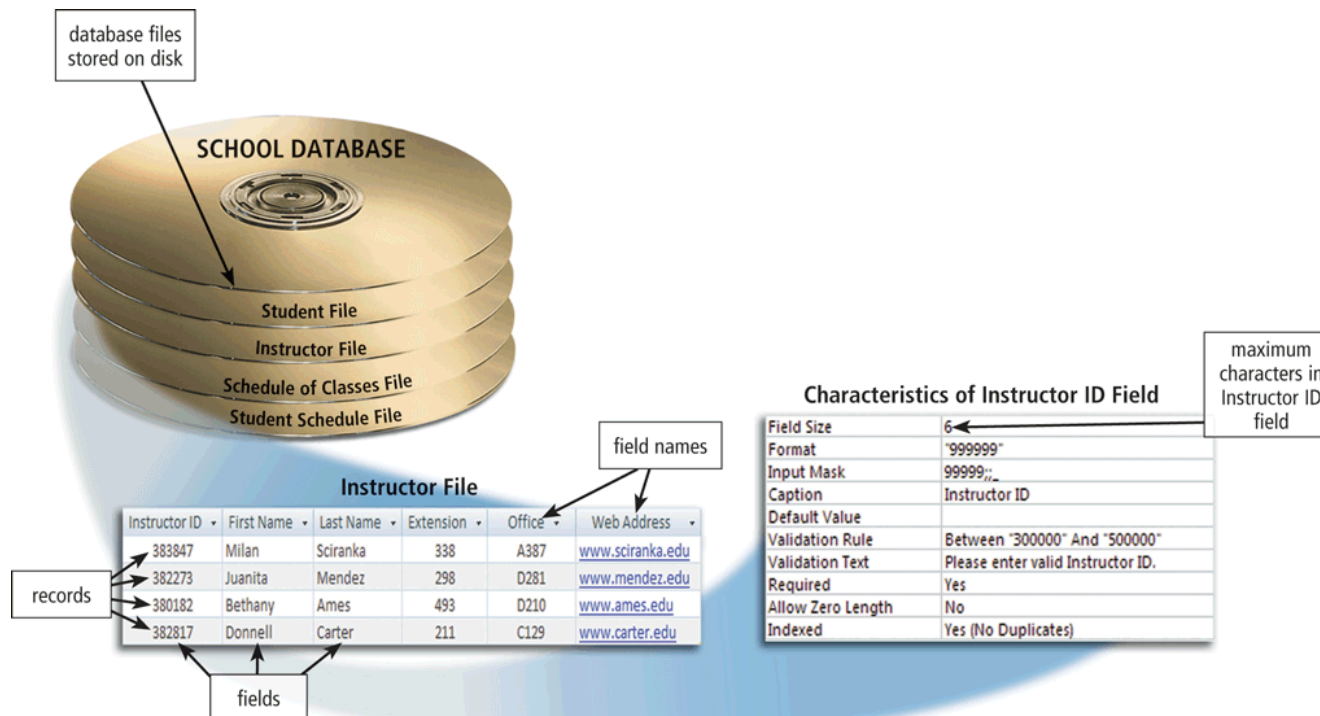- A collection of related fields

❑ **Field**
- A group of characters

❑ **Character**
- Basic building block of information, represented by a byte

Hierarchy of Data

- Data is organized in layers
  - Files, records, fields, characters

Data Types

- Common data types include:

Text	Numeric	AutoNumber	Currency
Date	Memo	Yes/No	Hyperlink
	Object	Attachment	

Table
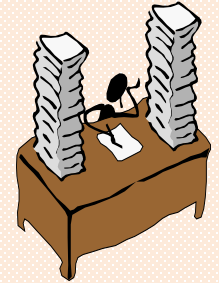
Columns are **attributes**

Rows are **tuples**

Databases, Data, and Information

Database	Data	Information

• Collection of data organized in a manner that allows access, retrieval, and use of that data	• Collection of unprocessed items
	  • Text
	  • Numbers
	  • Images
	  • Audio
	  • Video
		• Processed data
		  • Documents
		  • Audio
		  • Images
		  • Video

Introduction to Database

- A **data file** is a computer file which stores data to be used by a computer application or system. For example, a phone book database would be stored in a single data file. Several data files make up a database.

- A **Database Management System** (DBMS) is a computer software application that interacts with the user, other applications, and the database itself to capture and analyze data. DBMS is designed to allow the definition, creation, querying, update, and administration of databases. Well-known DBMSs include Microsoft SQL Server, and Oracle, .

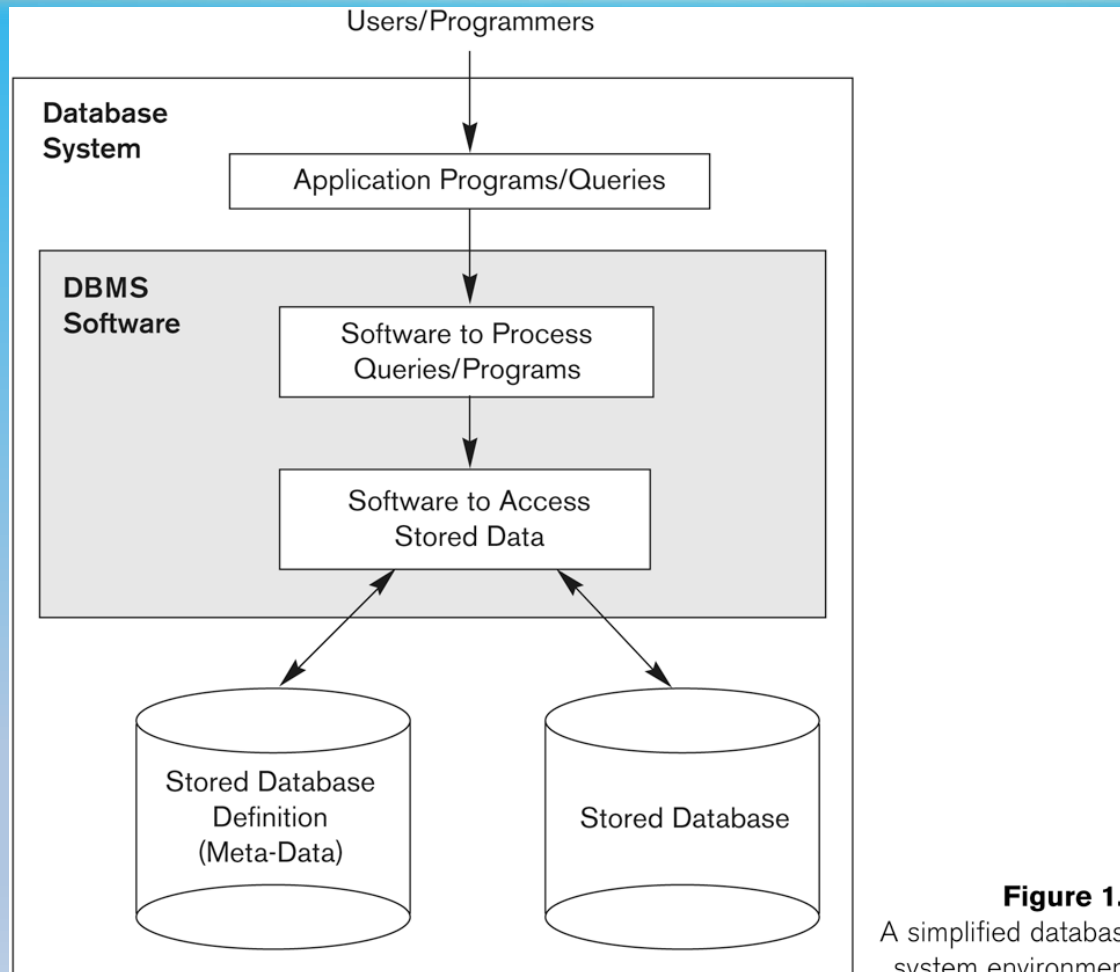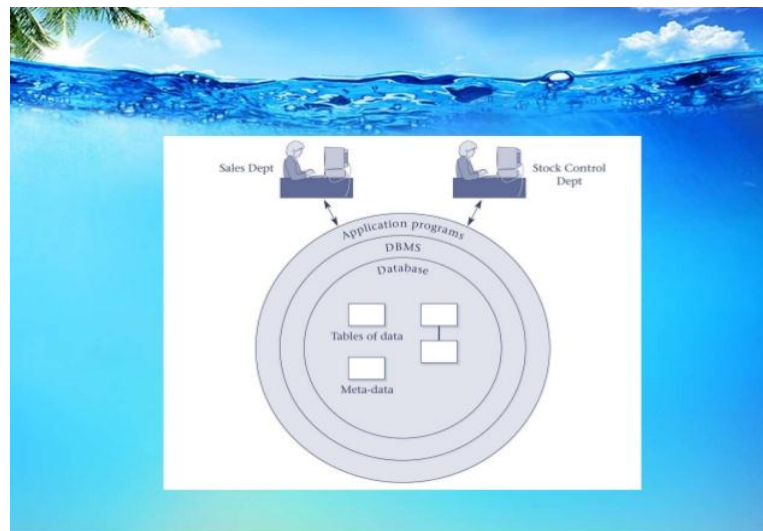# Database system environment components

Figure 1.1
A simplified database system environment.

The functionality of Database Management System:

1. Manages very large amounts of data (v.l.a.d).

2. Supports efficient access to v.l.a.d.

3. Supports concurrent access to v.l.a.d.

4. Supports secure, atomic access to v.l.a.d.

The two types of DBMS software are:

1. **Relational Database Software**

   Relational database software allows the user to work with several database files at the same time and share information across the files.

2. **Flat-file Database Software**

   A flat-file database program, allows the user to create many databases but lets him/her work with only one file at a time.

Relational Database

- A **relational database** stores data in **tables** that consist of rows and columns
  - Each **row** has a primary key
  - Each **column** has a unique name
- A **relationship** is a link within the data
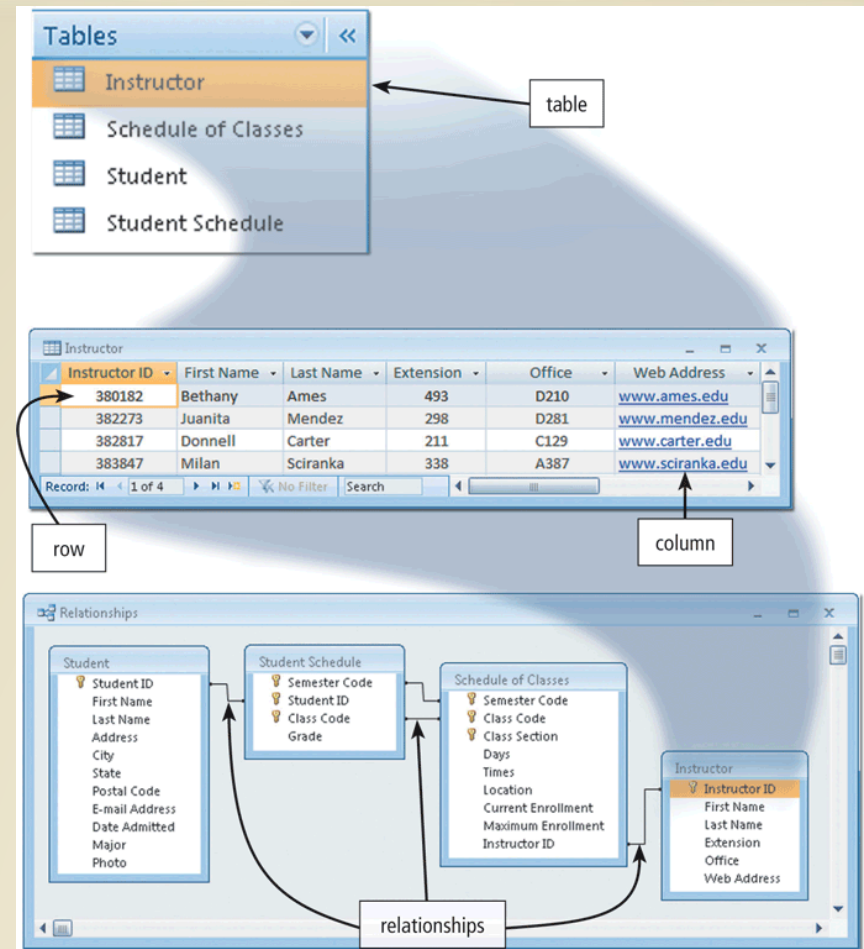
Advantages of the database approach over traditional file-processing systems

Accurate	Verifiable	Suitable
Organized	Accessible	Useful
	Cost-effective	

File Processing Versus Databases

File processing system

- Each department has its own set of files
- Used for many years
- Have data redundancy
- Isolate data

Database approach

- Programs and users share data
- Reduce data redundancy
- Share data
- Allows easier access
- Reduces development time
- Can be more accurate

Maintaining Data

- **File maintenance** refers to the procedures that keep data current

Adding records

Modifying records

Deleting records

Database Management Systems

- A DBMS provides several tools that allow users and programs to retrieve and maintain data in the database.

Query

Form

Report generator

Database Management Systems Operations

- A **query** is a quick method provided by DBMS programs to search a database and retrieve specific information.

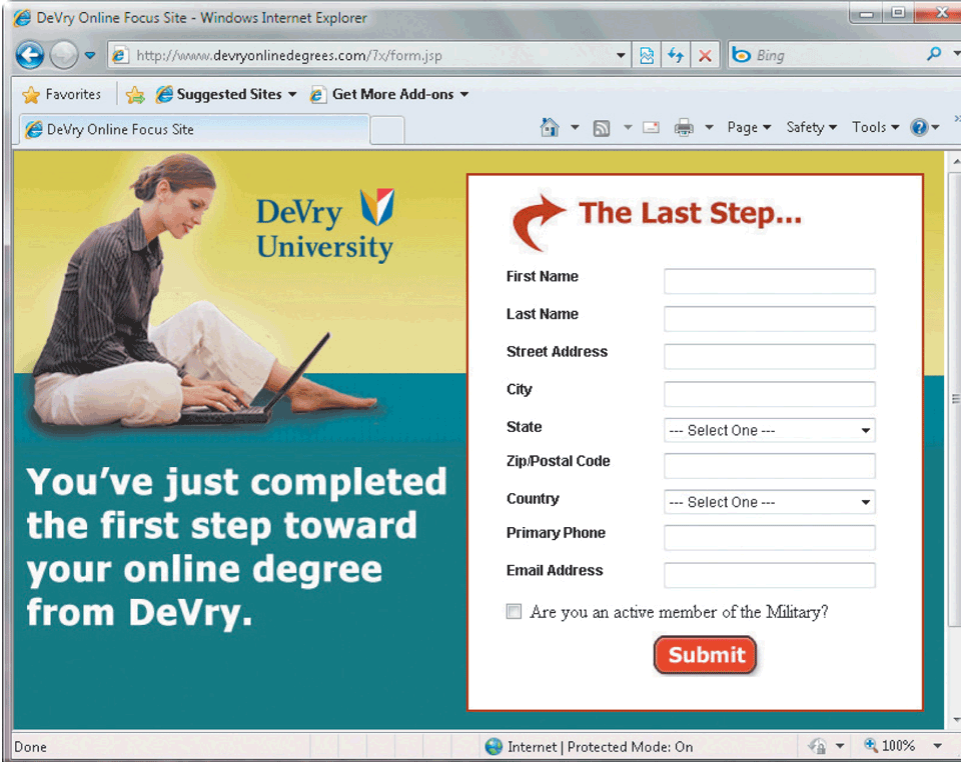Example Instance of Student Relation:

Grade Point Average

sID	Name	Login	Age	GPA
53666	Jones	Jones@cs	20	3.2
45453	Smith	Smith@ai	19	3.1

SELECT *FROM Students WHERE age = 20

sID	Name	Login	Age	GPA
53666	Jones	Jones@cs	20	3.2

Database Management Systems Operations

- A **form** is used to view all fields for one record at a time. It can also be used to enter data into the database.

- A **report generator** allows users to extract data from the database , and present the information in the forms and then display or print the report .

Student List by Major

Major	Last Name	Student ID	First Name	Address	City	Date Admitted
BIO						
	Drake	3876	Louella	33 Timmons Place	Bonner	8/9/2010
CT						
	Ruiz	3928	Adelbert	99 Tenth Street	Sheldon	10/8/2010
GEN						
	Tu	2928	Benjamin	2204 Elm Court	Rowley	9/4/2010
SOC						
	Brewer	2295	Milton	54 Lucy Court	Charlestown	6/10/2010
	Gupta	4872	Elena	76 Ash Street	Rowley	9/3/2011

Web Databases

- Databases on the Web allow you to:

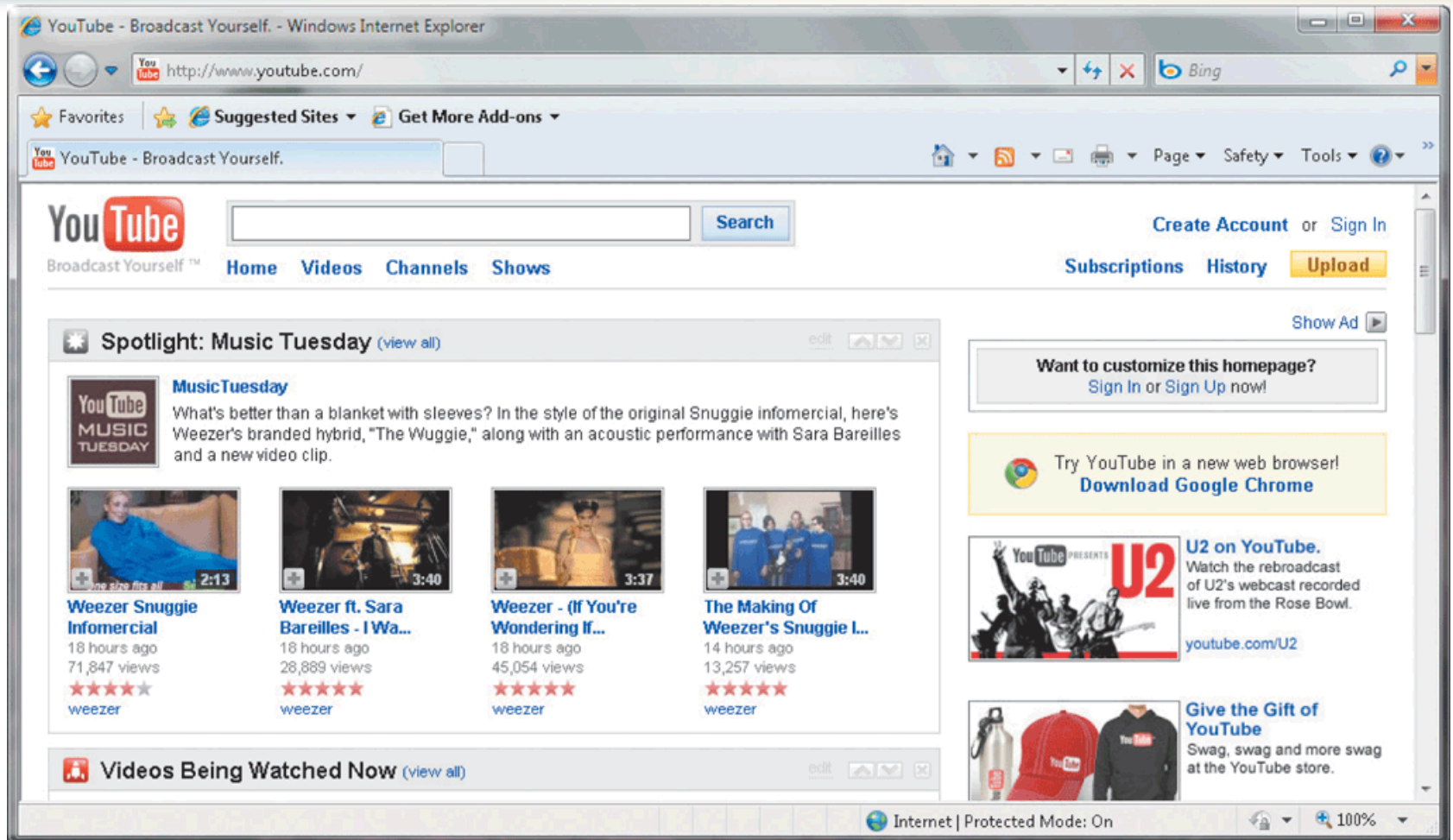|		
Shop for products or services	Buy or sell stocks	Search for a job
Make airline reservations	Register for college classes	Check semester grades

Web Databases

Thank you ???

Dr. Raed Ibraheem Hamed
raed.alfalahy@uhd.edu.iq