

## Organization Of Data Bases



Data is everywhere, but it doesn't become useful until it is organized and structured so that it can be manipulated conveniently. Relational data bases -- one of the great successes of computer science research in the 1970's -- provide the structure and organization

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## Data Representation

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- ❖ Though the bits and bytes of digital data represent numbers, letters, strings, etc., the information content is embodied in how the data is grouped or associated
- ❖ The basic unit of data base information is a *record*, a sequence (of fixed length) of primitive data values, called *fields*
  - + Example, an address record:

William J. Clinton, 1600 Pennsylvania Ave., Washington DC, 20020  
Name Field                      Address Field                      State Field    ZIP Field

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## Aspects Of Record ...

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- ❖ Each field has a name, called an *attribute* or *field name*
- ❖ Each field also has a type such as integer or string
- ❖ Notice that fields are generally primitive types, so if the constituents of a field like name are needed, e.g. first name and last name, then they should be defined to be separate fields

William J. Clinton, 1600 Pennsylvania Ave., Washington DC, 20020

Name Field  
string

Address Field  
string

State Field  
string

ZIP Field  
integer

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## Tables Of Records

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- ❖ A set of records naturally organize into a table
  - ❑ Rows of the table are records
  - ❑ Columns of the table are fields
  - ❑ Column headings are the attributes
- ❖ Tables are also known as *relations* in DB theory

Name	Adm_1	Adm_2	State	Party
William J. Clinton	1992	1996	Arkansas	Dem
George H. W. Bush	1988		Texas	R
Ronald W. Reagan	1880	1984	California	Rep
Jimmy Carter	1976		Georgia	Demo

- ❖ Notice variations and errors are possible

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Access! Access

File Edit View Query Format Records Tools Window Help

Titles : Table

Title	Year P	ISBN	PubID	Description	Notes
Data Base Computers (Lexington Books Series in Computer Science)	1979-0-6690283-4-7		558-37		001-54
Data Base Environment : Concepts and Applications	1990-0-4420030-0-5		71-51-95		005-7420
Data Base File Organization : Theory and Applications of the Consecutive Re	1983-0-1228198-0-1		99-54		001-5419
Data Base Implementation and Application	1983-0-8169035-0-2		407-34		660-0384
Data Base Management : A Microcomputer Approach	1988-0-1319880-1-8		715-54		005-7419
Data Base Management for the Apple	1983-0-8104529-2-6		721-14-95		001-5421
Data Base Management Systems	1985-0-6970894-8-6		129-0		001-5419
Data Base Management Systems	1985-0-6971070-1-9		204-52-92		001-5419
Data Base Management Systems (Computer Science and Applied Mathemat	1975-0-1270174-0-2		99-27		001-5442
Data Base Management Systems : A Guide to Microcomputer Software	1983-0-0793198-4-2		79-17-95		001-5421
Data Base Management Systems : The Desk-Top Generation (The Seyfield S	1985-0-0706632-5-X		63-19-95		001-5441
Data Base Management Systems for the Eighties	1983-0-8943635-3-6		16-48		001-5419
Data Base Management Systems in Business	1988-0-1319889-1-3		715-38		698-0957
Data Base Management Systems, Ms-DOS : Evaluation Ms-DOS Data Base	1985-0-0798131-0-5		79-19-95		005-4451

Record: 11 of 0909

Titles : Table

Field Name	Data Type	
Title	Text	Book title
Year Published	Number	Year Published
ISBN	Text	International Standard Book Numbe
PubID	Number	Publisher's ID Number
Description	Text	Table of Contents, Pages, Index
Notes	Text	
Subject	Text	
Comments	Memo	

General | Lookup

Field Size: Integer

Format: \_\_\_\_\_

Decimal Places: Auto

Input Mask: \_\_\_\_\_

Caption: \_\_\_\_\_

Default Value: 0

Validation Rule: \_\_\_\_\_

Validation Text: \_\_\_\_\_

Required: No

Indexed: No

View F6 - Switch panel F1 - Help

## CSE 100 Keys

- ❖ In a table there must be some field (or collection of fields) that has a unique value for each record ... this is a *primary key*
- ❖ A key can be used to identify a record, basis for search, etc.

Name	Adm_1	Adm_2	State	Party
William J. Clinton	1992	1996	Arkansas	D
George H. W. Bush	1988		Texas	R
Ronald W. Reagan	1980	1984	California	R
Jimmy Carter	1976		Georgia	D

- ❖ Keys for presidents?

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## CSE 100 A Data Base ...

- ❖ Data bases are a collection of tables
  - ✦ For Example, Biblio has four tables ...

The screenshot shows a database application window titled "BIBLIO : Database". The window has a menu bar with "Tables", "Queries", "Forms", "Reports", "Macros", and "Modules". Below the menu bar is a list of tables: "Authors", "Publishers", "Title Author", and "Titles". The "Titles" table is selected. A design grid for the "Titles : Table" is open, showing the following fields and data types:

Field Name	Data Type	Description
Title	Text	Book title
Year Published	Number	Year Published
ISBN	Text	International
PubID	Number	Publisher's ID
Description	Text	Table of Contents
Notes	Text	General Note
Subject	Text	Keywords
Comments	Memo	Description of

A callout box with the text "What's missing?" points to the "Year Published" field.

- ❖ Why multiple tables?

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## CSE 100 Redundancy Is Bad

- ❖ Ideally, the information in a database should appear in exactly one place ... if it is in two or more places, it can become inconsistent
- ❖ Separate tables can specialize information

Titles : Table		Publishers : Table		Authors : Table	
Field Name		Field Name		Field Name	Data Type
Title		PubID		Au_ID	AutoNumber
Year Published		Name		Author	Text
ISBN		Company Name		Year Born	Number
PubID		Address			
Description		City			
Notes		State			
Subject		Zip			
Comments		Telephone			
		Fax			
		Comments			

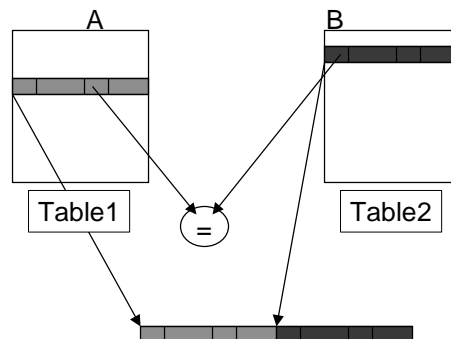
Title Author : Table			
Field Name	Data Type		
ISBN	Text	Intern:	
Au_ID	Number	Unique	

Connect author with book

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## CSE 100 Combining Tables

- ❖ To be useful, it is necessary to combine information from multiple tables
- ❖ This process is called *join*



**Table1 JOIN Table2  
ON FieldA = FieldB**  
means ... for every record in Table1 find all records in Table2 that match, and make a new record for the resulting table

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