

Introduction to Computing (SE-101)

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Questions from previous lecture?

Database Management

Lecture # 12

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The Database

- Stores a collection of related items
- Collection is arranged in a structure
 - Organizes and describes the data
- Often includes helper documents
- Two different types
 - Flat-file
 - Relational

Database Management Systems

- Database management system (DBMS)
- Store large collections of data
- Organize the data
- Becomes a data storage system

Database Structure

The screenshot displays the Lotus SmartSuite Approach interface for a database named 'Approach - [customer.APR:Worksheet 1]'. The interface includes a menu bar (File, Edit, View, Create, Worksheet, Window, Help) and a toolbar with various icons. Below the toolbar, there are buttons for 'Browse', 'Design', 'New Record', and 'Find', along with a dropdown menu set to 'All Records'. The main area shows a table with the following columns: FIRSTNAME, LASTNAME, COMPANY, ADDRESS, CITY, STATE, POSTAL_COD, and REGION. The table contains 20 rows of data. Three annotations with arrows point to specific elements: 'Field Name' points to the 'FIRSTNAME' header, 'Field' points to the 'Debbie Sue' entry in the 'FIRSTNAME' column, and 'Record' points to the entire row for 'Jim Collins'.

FIRSTNAME	LASTNAME	COMPANY	ADDRESS	CITY	STATE	POSTAL_COD	REGION
Fred	Jones	Stree	1000 Streetbuster Parkway	Miami	FL	33101	East
Robin	Richlin	Patriot Video	789 Lexington Ave.	Concord	MA	01742	East
Don	Sanitelli	California Video	127 University Ave.	Palo Alto	CA	94300	West
Sandy	Williams	Warehouse Video	1799 Wilshire Blvd.	Los Angeles	CA	91030	West
Charles	Lee	Golden Gate Video	3652 Stockton	San Francisco	CA	94100	West
Lyle	Henderson	Peachtree Video	73291 Peachtree Blvd.	Atlanta	GA	30026	South
Debbie Sue	Blanchard	Dixie Video & Tapes	2389 Bluebell Rd.	Mobile	AL	36601	South
Lindsay	Anderson	Motor City Video	30202 Speedway Ave.	Detroit	MI	48200	Central
Marlon	Jones	Wildcat Video	43002 Mesa Parkway	Tucson	AZ	85700	West
Dan	Staven	Beachfront Video	3020 Broadway	San Diego	CA	92100	West
Ardon	Myers	Beachfront Video	3454 Prospect Place	San Diego	CA	92100	West
Bill	Hennings	Videos Seattle	4002 Main St.	Seattle	WA	98028	West
Marge	Sullivan	Ducks Video	5032 Timberland Way	Corvallis	OR	97331	West
Robert	Chapman	Kennebunkport Video	39 Dock Rd.	Kennebunkport	ME	04046	East
John	Allen	Bama Video Rentals	1888 Cliff Road	Birmingham	AL	35201	South
Jim	Collins	Alaska Entertainment	769 Lancing	Anchorage	AK	99502	West
Darian	Alfred	Desert Film Rentals	377 Constitution Dr.	Tucson	AZ	85700	West
Tom	Frank	Little Rock Rental	858 Michigan Ave.	Little Rock	AR	72201	South
Phillipe	Richardson	Beach Vids	90 Lexington Drive	Costa Mesa	CA	92626	West
Fran	Larson	CSU Video Rentals	500 West Peach Blvd	Fort Collins	CO	80522	West
Dawn	Riley	Video Center	67 Lei Lane	Hartford	CT	06100	East
Fillip	MacCarter	Capital Video	123-34 State Street	Wilmington	DE	19800	East

The Database

- Fields
 - Hold an individual piece of data
 - Are named descriptively
 - Often called a column
 - Phone book examples
 - Name, address, e-mail, phone number
 - Fields may contain no data

The Database

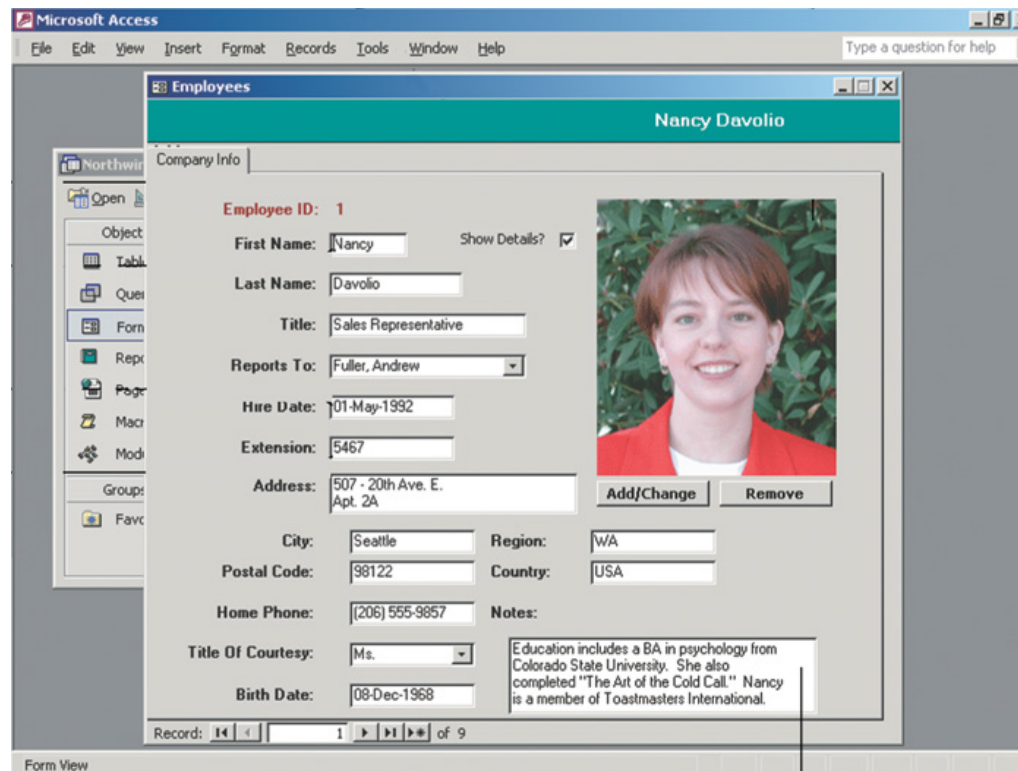
- Records
 - One full set of fields
 - Often called a row
 - Phone book example
 - Smith, Joe, 123 Some Street, 412-555-7777
 - Databases may have unlimited rows

The Database

- Tables
 - One complete collection of records
 - Databases may have thousands of tables

Database Helper Documents

- Forms
 - Present one record to the user
 - Often used to change or view data



The screenshot shows the Microsoft Access application window with a form titled "Employees" for the record of Nancy Davolio. The form is in "Form View" and displays the following data:

Company Info	
Employee ID:	1
First Name:	Nancy
Last Name:	Davolio
Title:	Sales Representative
Reports To:	Fuller, Andrew
Hire Date:	01-May-1992
Extension:	5467
Address:	507 - 20th Ave. E. Apt. 2A
City:	Seattle
Region:	WA
Postal Code:	98122
Country:	USA
Home Phone:	(206) 555-9857
Title Of Courtesy:	Ms.
Birth Date:	08-Dec-1968

The form also includes a photo of Nancy Davolio, a "Show Details?" checkbox, and a "Notes" field containing the text: "Education includes a BA in psychology from Colorado State University. She also completed 'The Art of the Cold Call.' Nancy is a member of Toastmasters International." The status bar at the bottom indicates "Record: 1 of 9".

Database Helper Documents

- Reports
 - Produce printed results from the database
 - Includes tools to summarize data

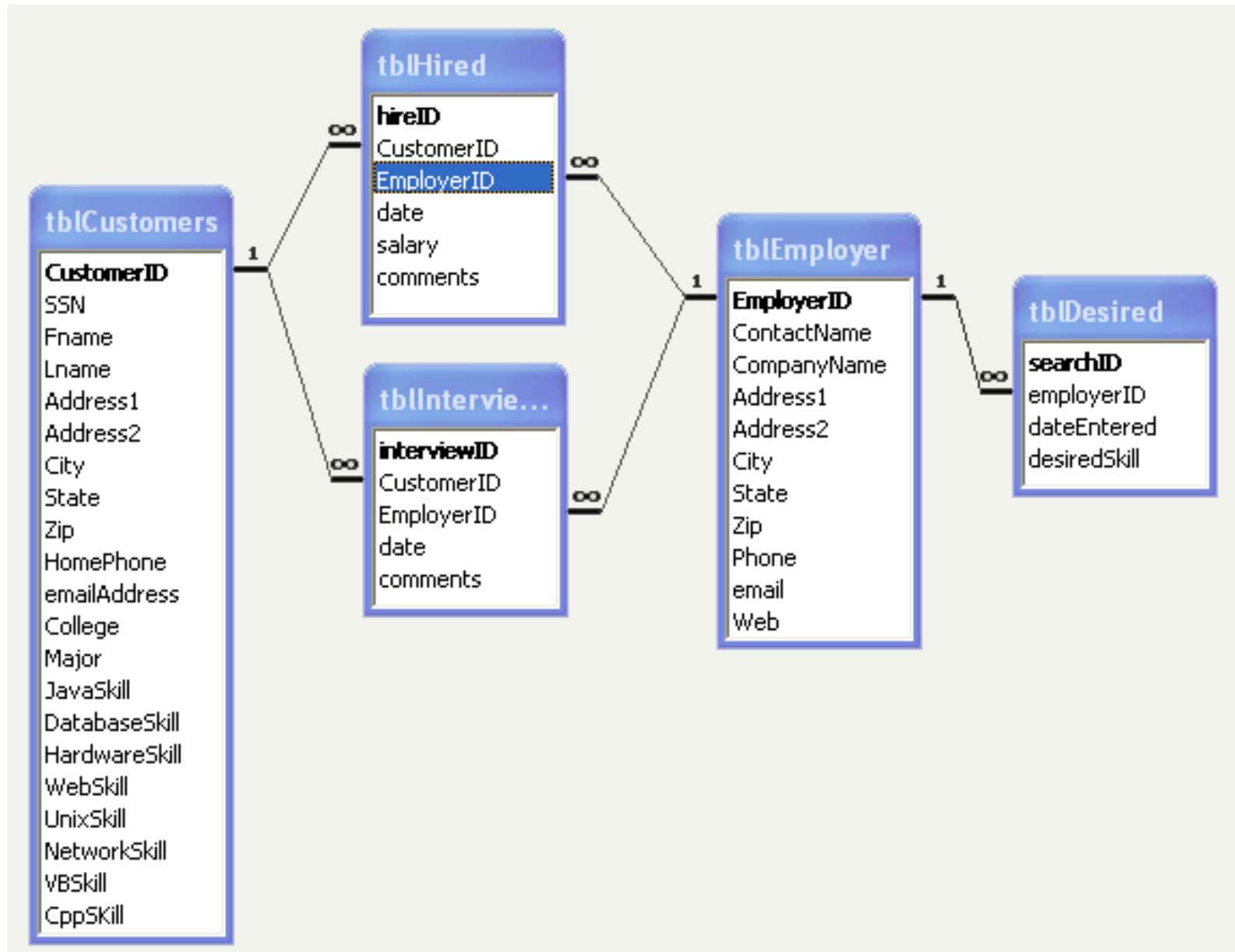
Flat-file Databases

- Typically has only one table
 - If multiple, each has a separate file
- Useful for simple data storage needs
- Hard to manage large data needs
- Can waste disk space

Relational Databases

- Made of two or more tables
- Tables are related by a common field
 - Called a relationship or join
 - Can help organize data
- Most common form of database
- Maintaining data is easier than flat-file
- No wasted disk space

Relational Database Diagram



The DBMS

- Programs that control the database
- Allows
 - Entering data
 - Querying data
 - Printing reports
- Supports thousands of users
- Includes tools to protect the data

Working with a Database

- Creating tables
 - List the necessary fields
 - Steps to define a field
 - Descriptively name the field
 - Specify the field type
 - Determine the field size

Working with a Database

- Field types
 - Describes the type of data stored
 - Most DBMS use the same types
 - Text fields store letters and numbers
 - Numeric field store numbers
 - Date and time field
 - Logical field stores yes or no
 - Binary field stores images or sounds
 - Counter field generates sequential numbers
 - Memo fields store large amounts of data

Working with a Database

- Entering data into a table
 - Users type data into a field
 - Data must be entered accurately
 - Constraints help to verify data
 - Forms are typically used for data entry

Working with a Database

- Viewing records
 - Datasheet view shows all records
 - Filters can limit the records shown
 - Display only records matching a criteria
 - Forms allow viewing one record

Working with a Database

- Sorting records
 - Order records based on a field
 - Multiple sub sorts resolve ‘ties’
 - Several types of sorts
 - Alphabetic
 - Numeric
 - Chronological
 - Ascending
 - Descending

Working with a Database

- Querying a database
 - Statement that describes desired data
 - List of fields can be modified
 - Uses of querying
 - Find data
 - Calculate values per record
 - Delete records
 - Most important DBMS skill

Working with a Database

- Query languages
 - All DBMS use a query language
 - Most DBMS modify the language
 - Structured Query Language (SQL)
 - Most common query language
 - xBase
 - Query language for dBase systems
 - Query by example (QBE)
 - Interface to SQL or xBase
 - Interactive query design

Query Examples

- SQL

```
Select FirstName, LastName, Phone  
From tblPhoneNumbers  
Where LastName="Norton";
```

- xBase

```
Use tblPhoneNumbers  
List FirstName, LastName, Phone  
For LastName="Norton"
```

Working with a Database

- Generating reports
 - Printed information extracted from a database
 - Can calculate data
 - Calculate data per row
 - Calculate for entire table
 - Pictures and formatting can be included

Part-II

Survey of Database Systems

Enterprise Software

- Enterprise definitions
 - Systems throughout the entire organization
 - Very large scale computer systems
 - Historically found on mainframes
 - Modern enterprise runs on PC servers

Enterprise Software

- Suite of programs
- Handles thousands of users at once
- Access to millions of records
- Looks and acts like a DBMS

Enterprise Software

- Distributed applications
 - Software installed on several machines
 - Data stored on several machines
 - Data placed closest to appropriate users
 - Work load is balanced among machines

Enterprise Software

- Tiers
 - Another term to describe distributed applications
 - Divide the job into tiers/layers
 - Tiers control one part of enterprise
 - Two tier systems
 - Data storage
 - Client interface
 - Three tier systems
 - Add calculation
 - There is no limit to the tiers

Enterprise Software

- Meet the needs of many users
 - Applications are very complex
 - Support many types of users
 - Supports many different nationalities
 - Must support large data flow

Enterprise Software

- Electronic document management
 - EDM
 - Tracks and organizes documents
 - Collaboration between team members
 - Database tracks all changes

Enterprise Software

- Disconnected databases
 - Connections are given a copy of data
 - Reduces the number of open connections
 - Reduces the data flow needs
 - May result in different versions of data

Databases at Work

- Required in nearly every business
- Can automate tasks
 - Increases business efficiency

Databases at Work

- Knowledge discovery
 - Technique of databases
 - Generates questions for the database
 - Those you did not think to ask

Databases at Work

- Data mining
 - Type of knowledge discovery
 - Searches for trends and patterns
 - Makes predictions on events
 - Supplies ideas for improving business

Databases at Work

- Internet uses
 - Commercial websites use databases
 - Supply image and price information
 - Specialty databases exist online
 - Search engines track links

Databases at Work

- Databases for individuals
 - Manage aspects of your life
 - Organizes hobbies for school
 - Microsoft Access is the most popular

Common Corporate DBMS

- Oracle
 - Most popular enterprise-level DBMS
 - Very flexible storage system
 - Can be very complex
 - Platform independent
 - Offers a wide range of solutions

Common Corporate DBMS

- DB2
 - Venerable IBM database
 - Platform independent
 - Only database using pure SQL

Common Corporate DBMS

- Microsoft SQL Server
 - Fastest growing DBMS
 - Only runs on Microsoft platforms
 - Various versions exist
 - Extremely scalable architecture
 - Software can grow with the data

Common Corporate DBMS

- MySQL
 - Leading DBMS for Linux
 - Very inexpensive
 - Features are those needed in business
 - Often faster than other DBMS
 - Platform independent

Questions?

If you have any query please feel free to ask

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Reference

- The slides were taken from the book:
 - “Introduction to computing” by Peter Norton