

# [Goals]

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- At the end of this session you will be able to:
  - List the components of a database
  - Design and diagram a simple two-table relation
  - Design and diagram a three-table relation

# The Electronic File Cabinet: Database Basics

Database software is...

- application software (like word processing and spreadsheet software)
- designed to maintain databases (collections of information)

A Database is...

- a collection of information stored in an organized form on a computer

# [ What Good Is a Database? ]

**Computerized databases offer several advantages such as:**

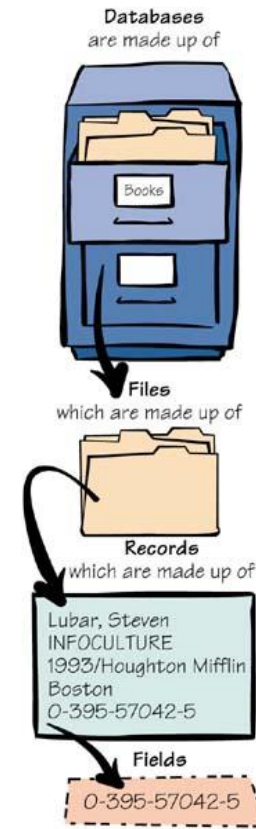
- **Store large quantities of information.**
- **Retrieve information quickly and flexibly.**
- **Organize and reorganize information.**
- **Print and distribute information in a variety of ways.**

# Database Anatomy

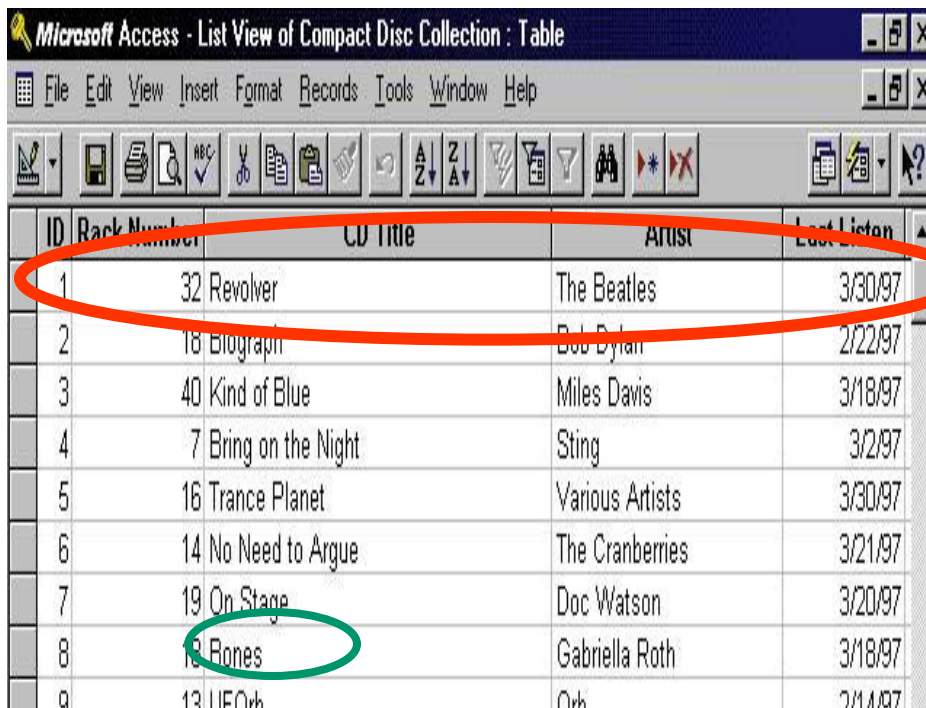
A **database** is a collection of one or more database folders (tables)



A **table** is a collection of related information (records)



# Database Anatomy



Microsoft Access - List View of Compact Disc Collection : Table

ID	Rack Number	CD Title	Artist	Last Listen
1	32	Revolver	The Beatles	3/30/97
2	18	Biograph	Bob Dylan	2/22/97
3	40	Kind of Blue	Miles Davis	3/18/97
4	7	Bring on the Night	Sting	3/2/97
5	16	Trance Planet	Various Artists	3/30/97
6	14	No Need to Argue	The Cranberries	3/21/97
7	19	On Stage	Doc Watson	3/20/97
8	12	Bones	Gabriella Roth	3/18/97
9	13	HEORh	Orh	2/11/97

A **record** is the information relating to one person, product, or event

A **field** is a discrete chunk of information in a record

# [ National Bank Example ]

- A bank wants to create a database containing information about their customers and the loans they take out.
- What fields would we need to include?
- Should we put this all in one table?
- Why or why not?

# National Bank Table

CustomerID	First Name	Last Name	Address	City	Province	Postal Code	Phone Number	LoanID	Date	Amount	InterestRate	Term	Type
C0001	Eileen	Faulkner	7245 NW 8 Street	Victoria	BC	V8S 3H5	(250) 894-1511	L0010	28/02/2003	\$200,000.00	7.00%	15 M	
C0001	Eileen	Faulkner	7245 NW 8 Street	Victoria	BC	V8S 3H5	(250) 894-1511	L0016	21/03/2003	\$150,000.00	7.50%	15 M	
C0001	Eileen	Faulkner	7245 NW 8 Street	Victoria	BC	V8S 3H5	(250) 894-1511	L0017	22/03/2003	\$100,000.00	7.00%	30 M	
C0002	Scott	Wit	5660 NW 175 Terrace	Vancouver	BC	V3R 2O2	(250) 753-0345	L0011	01/03/2003	\$25,000.00	10.00%	3 C	
C0002	Scott	Wit	5660 NW 175 Terrace	Vancouver	BC	V3R 2O2	(250) 753-0345	L0019	01/04/2003	\$10,000.00	8.00%	5 C	
C0003	Benjamin	Grauer	10000 Sample Road	Burlington	ON	L7T 3S5	(905) 444-5555	L0015	11/03/2003	\$200,000.00	7.25%	15 M	
C0003	Benjamin	Grauer	10000 Sample Road	Burlington	ON	L7T 3S5	(905) 444-5555	L0018	31/03/2003	\$15,000.00	6.50%	3 O	
C0003	Benjamin	Grauer	10000 Sample Road	Burlington	ON	L7T 3S5	(905) 444-5555	L0020	15/04/2003	\$25,000.00	8.50%	4 C	
C0003	Benjamin	Grauer	10000 Sample Road	Burlington	ON	L7T 3S5	(905) 444-5555	L0023	01/05/2003	\$150,000.00	6.00%	15 M	
C0004	Wendy	Solomon	7500 Reno Road	Edmonton	AB	T6Y 4J2	(403) 427-3104	L0001	15/01/2003	\$475,000.00	6.90%	15 M	
C0004	Wendy	Solomon	7500 Reno Road	Edmonton	AB	T6Y 4J2	(403) 427-3104	L0002	23/01/2003	\$35,000.00	7.20%	5 C	
C0004	Wendy	Solomon	7500 Reno Road	Edmonton	AB	T6Y 4J2	(403) 427-3104	L0004	31/01/2003	\$12,000.00	9.50%	10 O	
C0004	Wendy	Solomon	7500 Reno Road	Edmonton	AB	T6Y 4J2	(403) 427-3104	L0024	03/05/2003	\$350,000.00	8.20%	30 M	
C0005	Alex	Rey	3456 Main Highway	Burlington	ON	L7T 4R4	(905) 555-6666	L0003	25/01/2003	\$10,000.00	5.50%	3 C	
C0005	Alex	Rey	3456 Main Highway	Burlington	ON	L7T 4R4	(905) 555-6666	L0012	01/03/2003	\$20,000.00	9.50%	5 O	
C0006	Ted	Myerson	6545 Stone Street	Victoria	BC	V8R 9O9	(250) 942-7654	L0005	08/02/2003	\$525,000.00	6.50%	30 M	
C0007	Lori	Sangastiano	4533 Aero Drive	Winnipeg	MA	R9R 4K1	(204) 542-3411	L0006	12/02/2003	\$10,500.00	7.50%	5 O	
C0007	Lori	Sangastiano	4533 Aero Drive	Winnipeg	MA	R9R 4K1	(204) 542-3411	L0025	08/05/2003	\$275,000.00	9.20%	15 M	
C0008	Michelle	Zacco	488 Gold Street	Regina	SA	S0W 3Y3	(306) 374-5660	L0007	15/02/2003	\$35,000.00	6.50%	5 O	
C0008	Michelle	Zacco	488 Gold Street	Regina	SA	S0W 3Y3	(306) 374-5660	L0008	20/02/2003	\$250,000.00	8.80%	30 M	
C0008	Michelle	Zacco	488 Gold Street	Regina	SA	S0W 3Y3	(306) 374-5660	L0009	21/02/2003	\$5,000.00	10.00%	3 O	
C0008	Michelle	Zacco	488 Gold Street	Regina	SA	S0W 3Y3	(306) 374-5660	L0021	18/04/2003	\$41,000.00	9.90%	4 C	
C0009	David	Powell	5070 Battle Road	Prince George	BC	V1E 4T9	(250) 345-6556	L0013	03/03/2003	\$56,000.00	7.50%	5 C	
C0010	Matt	Hirsch	777 NW 67 Avenue	Calgary	AB	T1E 9L1	(403) 664-3211	L0014	10/03/2003	\$129,000.00	8.50%	15 M	
C0010	Matt	Hirsch	777 NW 67 Avenue	Calgary	AB	T1E 9L1	(403) 664-3211	L0022	22/04/2003	\$350,000.00	7.50%	15 M	

What should we do with this data to make it more efficient as a database?

- A. Nothing
- B. Remove any records that duplicate a field value
- C. Divide it into two tables: Customers and Loans
- D. Divide it into three tables: Customers, Addresses, and Loans
- E. Use Excel instead

# Relational National Bank

Customers	
<b>CustomerID</b>	<b>AutoNumber</b>
LastName	Text
FirstName	Text
Address	Text
City	Text
Province	Text
PostalCode	Text
PhoneNumber	Text

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Loans	
<b>LoanID</b>	<b>AutoNumber</b>
Date	Date/Time
Amount	Currency
InterestRate	Number
Term	Number
Type	Text
CustomerID	Number

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# [ Relational Database ]

- Multiple tables in one database linked by common fields
- Divide data into objects
  - Usually a natural division
- ER diagram
- Primary key
- Foreign key
- Relationship types

# Database Basics

- The type of information a field can hold is determined by its:
  - **Field type** or
  - **Data type**
- Database programs provide you with more than one way to view data:
  - **Form views**
    - Show one record at a time
  - **List views**
    - Display several records in lists similar to the way a spreadsheet displays data

# Database Anatomy

The **view** is a display of the information in fields based on a particular layout of field data.

A screenshot of the Microsoft Access 'Form View' for a table named 'Compact Disc Collection'. The form displays fields for ID (15), Rack Number (12), CD Title (The Outro), Artist (Bonzo Dog Doo Dah Band), and Last Listen (3/28/97). A 'Selections' list box at the bottom contains a list of song titles: 'Hunting Tigers Out in India; Shirt; Tubas in the Moonlight; Dr. Jazz; Monster Mash; I'm the Urban Spaceman; Ali Baba's Camel; Laughing Blues; By A Waterfall; Mr. Apollo; Canyons of Your Mind; You Done My Brain In; Keynsham;'. A large blue arrow points from the text 'Form View' to this window.

Form View

List View

A screenshot of the Microsoft Access 'List View' for the same 'Compact Disc Collection' table. It shows a table with 6 records. A large blue arrow points from the text 'List View' to this window.

ID	Rack Number	CD Title	Artist	Last Listen
1	32	Revolver	The Beatles	3/30/97
2	18	Biograph	Bob Dylan	2/22/97
3	40	Kind of Blue	Miles Davis	3/18/97
4	7	Bring on the Night	Sting	3/2/97
5	16	Trance Planet	Various Artists	3/30/97
6	14	No Need to Argue	The Cranberries	3/21/97

# [ Back to National Bank ]

- Demo in Access
  - Build Tables
  - Create relationship
  - Create Forms
- Now, what if we want to add payments?
- Look at complete Database
- Add many-to-many relationship
  - Joint loans

## Data problem – example for Lab 2

First_Name	Second_Name	Rank	Title	Year	Director	Category	Rank	Review	Character
Jack	Nicholson	10	One Flew Over the Cuckoo's Nest	1976	Milos Forman	drama	10	A perfect blend of entertainment and drama.	R.P. McMurphy
Jack	Nicholson	10	The Departed	2006	Martin Scorsese	drama	7	Great action, but Scorsese needed a firmer hand in the editing suite.	Frank Costello
Jack	Nicholson	10	Batman	1989	Tim Burton	action	8	Good plot -- love the dark tones of Gotham City. Some discontinuity in plot.	The Joker
Matt	Damon	8	The Departed	2006	Martin Scorsese	drama	7	Great action, but Scorsese needed a firmer hand in the editing suite.	Colin Sullivan
Kim	Basinger	8	Batman	1989	Tim Burton	action	8	Good plot -- love the dark tones of Gotham City. Some discontinuity in plot.	Vicki Vale
Christopher	Lloyd	9	One Flew Over the Cuckoo's Nest	1976	Milos Forman	drama	10	A perfect blend of entertainment and drama.	Taber
Christopher	Lloyd	9	Star Trek III: The Search for Spock	1984	Leonard Nimoy	sci-fi	6.5	Action packed, great characters -- but the crew is getting a bit tired.	Cmdr. Kruge