



More Forms

INFO/CSE 100, Spring 2006
Fluency in Information Technology

<http://www.cs.washington.edu/100>

Readings and References

- Reading
 - » *Fluency with Information Technology*
 - Chapter 16, Case Study in Database Design
- References
 - » MS Access Help files
 - keyword “form”

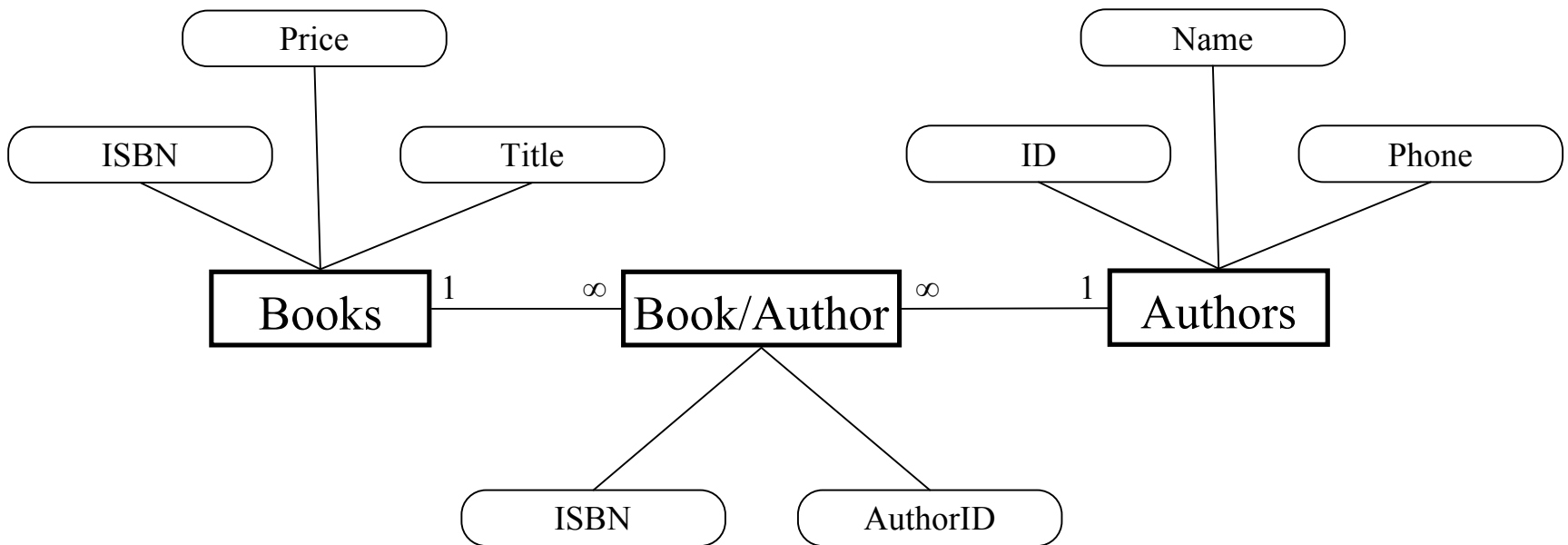
Link one book with many authors?

- We DO want:
 - » to link each book to one or more authors
- We DON'T want
 - » to specify extra fields (author1, author2, author3,...)
 - this is wasteful and limits the max number of authors
 - » to specify each book entry several times, naming a different author in each row
 - this duplicates all the other information about the book

Add a cross-reference table!

- Refine the design so that it includes another table that is a book-author cross reference
 - » Each entity in the table is a single cross reference
 - Attribute: ISBN
 - Attribute: Author ID
 - » No primary key
 - Now we can break the many-to-many relationship into two 1-to-many relationships that we already know how to implement
-

Define new cross-reference entities





book-author table

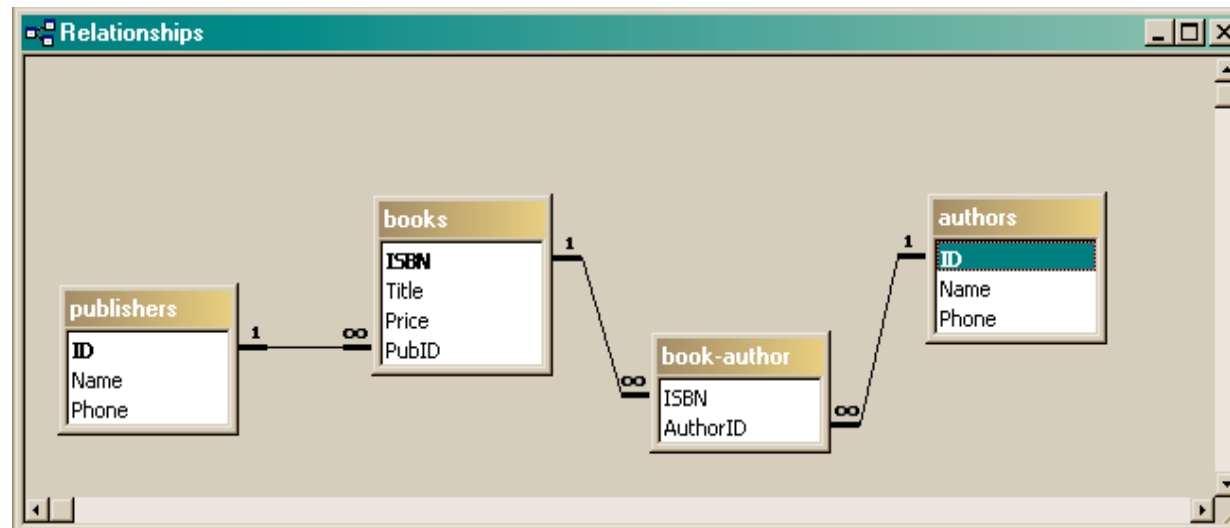
The screenshot shows Microsoft Access with a database named 'little : Database [Access 2002 file format]'. The 'Tables' pane on the left lists 'authors', 'book-author', 'books', and 'publishers'. The 'authors' table is open, showing a list of authors. The 'books' table is also open, showing a list of books. The 'book-author' table is open in a separate window, showing a list of book-author relationships. The status bar at the bottom indicates 'An author of the book' and 'NUM'.

ID	Name	Phone
1	Alex	555-0256
2	Bill	555-0512
3	Charlie	555-1024
*		

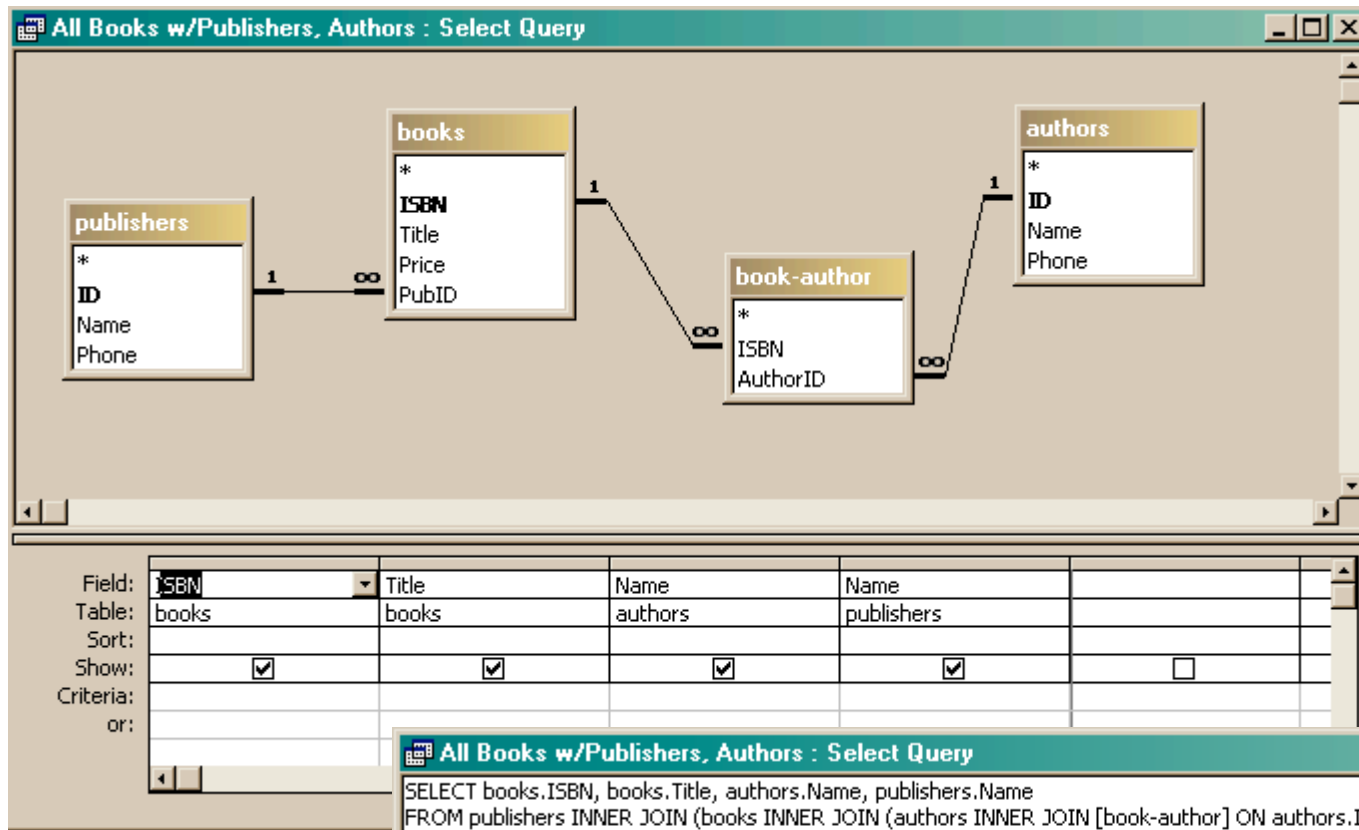
ISBN	Title	Price
1-1	My Reader	\$10.00
1-2	Your Reader	\$12.00
2-2	His Reader	\$25.00
*		\$0.00

ISBN	AuthorID
1-1	1
1-2	1
2-2	2
2-2	3
*	

Define the new relationships



Define a query that uses the relationship

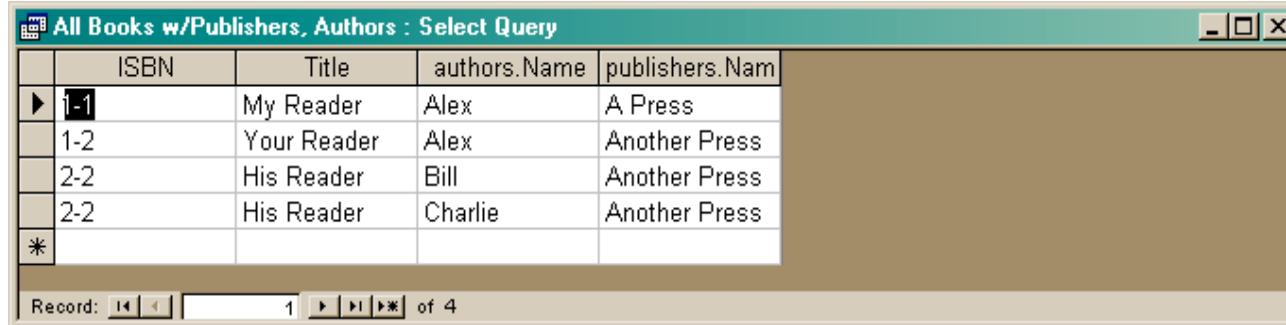


Query By Example

actual SQL

```
All Books w/Publishers, Authors : Select Query
SELECT books.ISBN, books.Title, authors.Name, publishers.Name
FROM publishers INNER JOIN (books INNER JOIN (authors INNER JOIN [book-author] ON authors.ID = [book-author].AuthorID) ON
books.ISBN = [book-author].ISBN) ON publishers.ID = books.PubID;
```

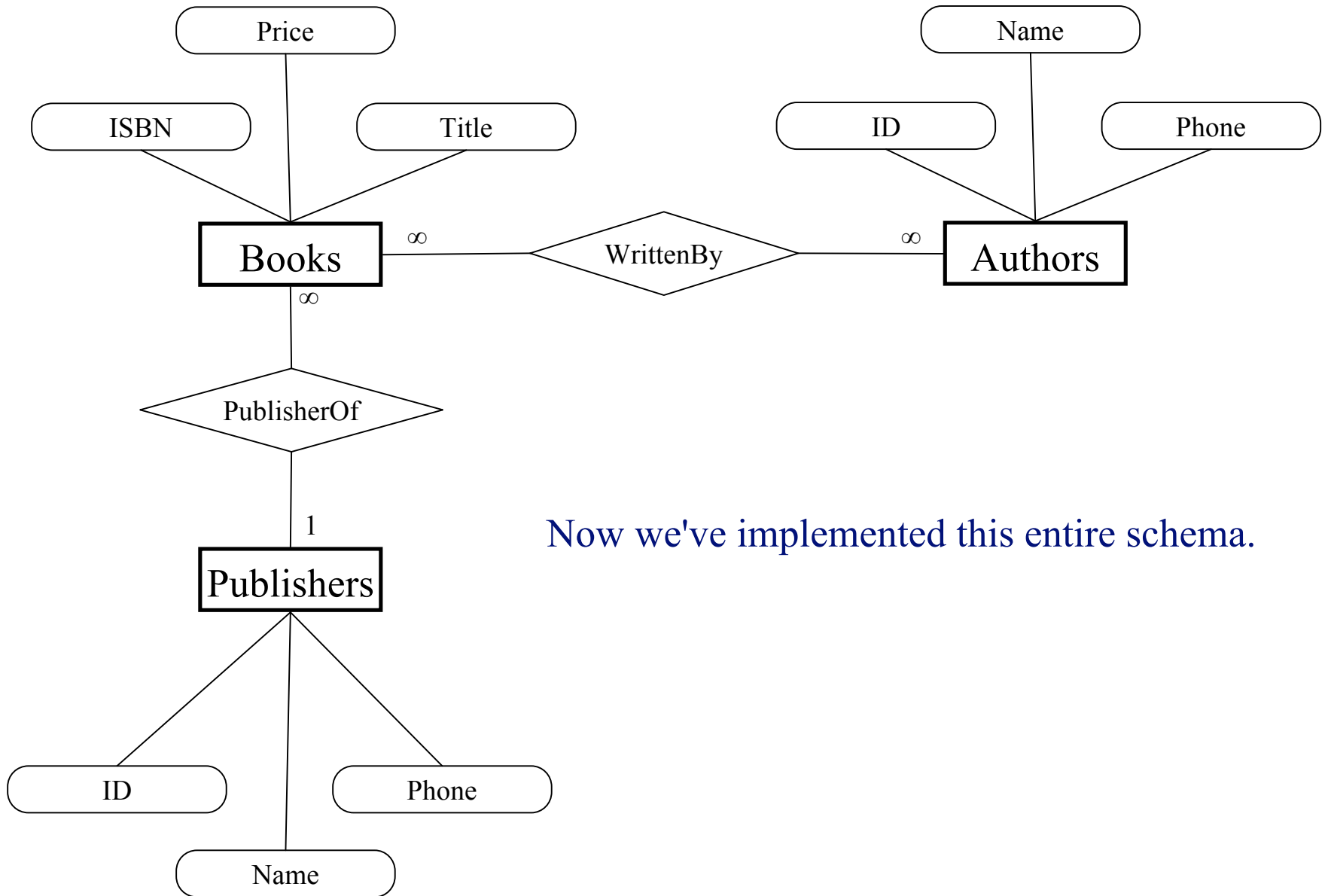

Get the new view of the data



	ISBN	Title	authors.Name	publishers.Nam
▶	1-1	My Reader	Alex	A Press
	1-2	Your Reader	Alex	Another Press
	2-2	His Reader	Bill	Another Press
	2-2	His Reader	Charlie	Another Press
*				

Record: 1 of 4

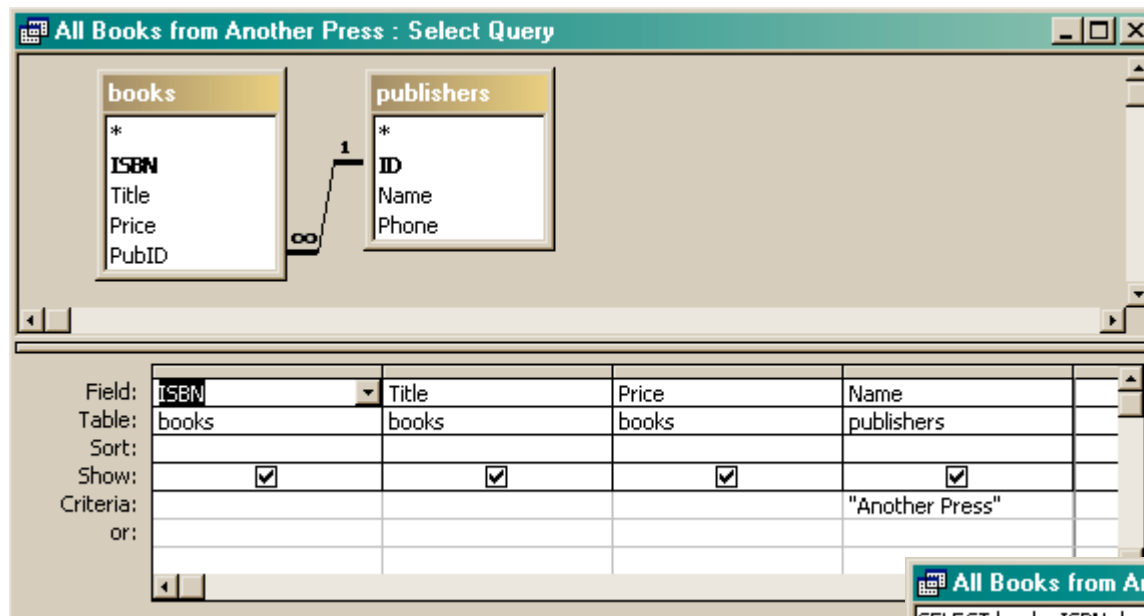
- Notice that this view has redundant data
 - » That's okay, because we are not storing it this way, just presenting it
 - » The redundant items (Alex, Another Press) came from a single entry in a table – they are guaranteed to be identical



Now we've implemented this entire schema.

View: All Books from “Another Press”

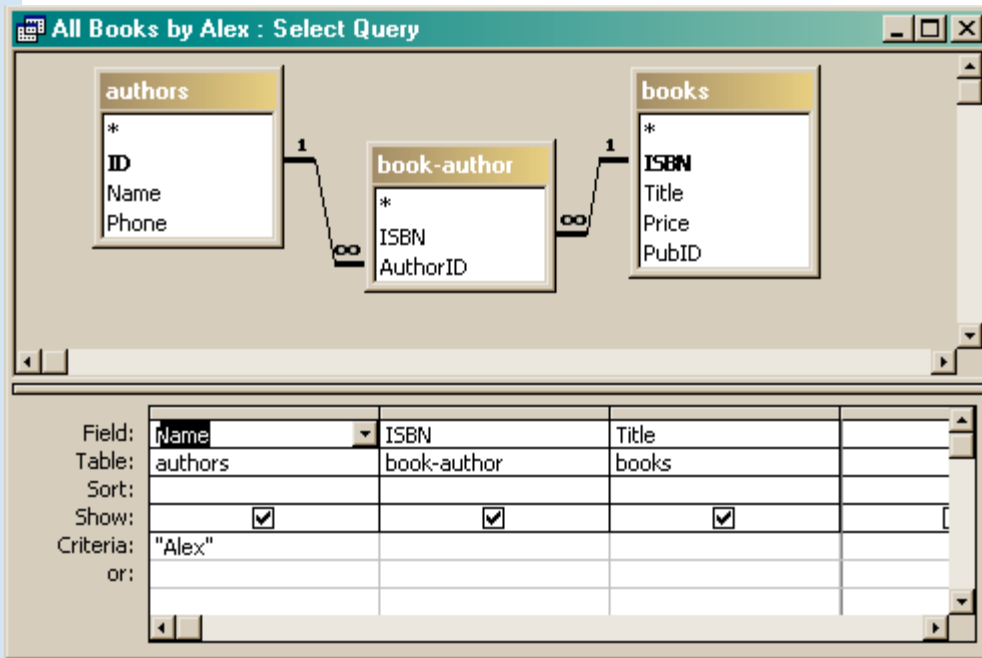
ISBN	Title	Price	Name
1-2	Your Reader	\$12.00	Another Press
2-2	His Reader	\$25.00	Another Press



```
SELECT books.ISBN, books.Title, books.Price, publishers.Name
FROM publishers INNER JOIN books ON publishers.ID=books.PubID
WHERE (((publishers.Name)='Another Press'));
```



View: All Books by Alex



Name	ISBN	Title
Alex	1-1	My Reader
Alex	1-2	Your Reader

Record: 3 of 3

```

SELECT authors.Name, [book-author].ISBN, books.Title
FROM books INNER JOIN (authors INNER JOIN [book-author] ON authors.ID=[book-author].AuthorID) ON books.ISBN=[book-author].ISBN
WHERE (((authors.Name)="Alex"));
    
```

View: All info about a given ISBN

Enter Parameter Value

ISBN?

1-1

OK Cancel

Book Info for Given ISBN : Select Query

	ISBN	Title	Price	authors.Name	publishers.Nam
▶ 1-1		My Reader	\$10.00	Alex	A Press
*					

Record: 1 of 1

Book Info for Given ISBN : Select Query

publishers: ID, Name, Phone

books: ISBN, Title, Price, PubID

book-author: ISBN, AuthorID

authors: ID, Name, Phone

Field:	ISBN	Title	Price	Name	Name
Table:	books	books	books	authors	publishers
Sort:					
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Criteria:	[ISBN?]				
or:					

Book Info for Given ISBN : Select Query

```
SELECT books.ISBN, books.Title, books.Price, authors.Name, publishers.Name
FROM publishers INNER JOIN (books INNER JOIN (authors INNER JOIN [book-author] ON authors.ID = [book-author].AuthorID) ON
books.ISBN = [book-author].ISBN) ON publishers.ID = books.PubID
WHERE (((books.ISBN)=[ISBN? ]));
```

Views as Tables

- Recall that the result of a query is a table
- We have been presenting the table to the user in simple tabular form

All Books from Another Press : Select Query

ISBN	Title	Price	Name
1-2	Your Reader	\$12.00	Another Press
2-2	His Reader	\$25.00	Another Press

Record: 3 of 3

All Books by Alex : Select Query

Name	ISBN	Title
Alex	1-1	My Reader
Alex	1-2	Your Reader

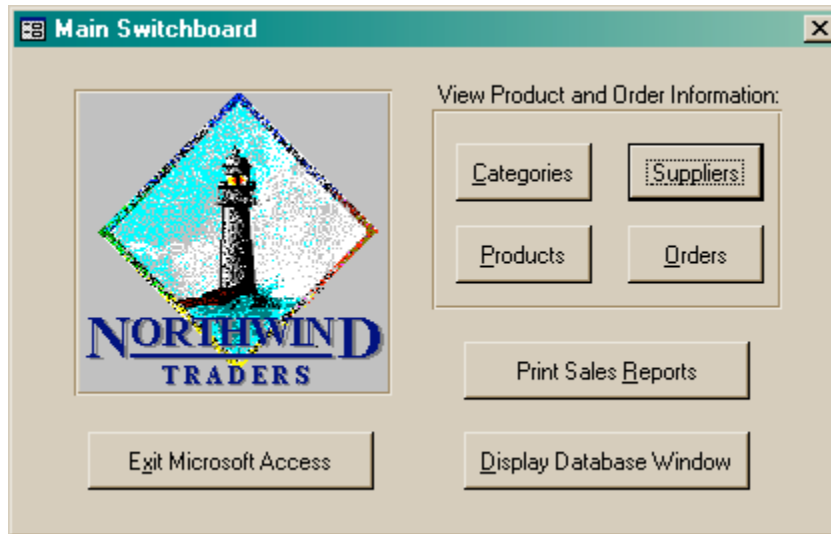
Record: 3 of 3

Book Info for Given ISBN : Select Query

ISBN	Title	Price	authors.Name	publishers.Nam
1-1	My Reader	\$10.00	Alex	A Press

Record: 1 of 1

But tables are not pretty ...



Users need help understanding what they are looking at and what they can do with it




Front end and Back end

- Front end
 - » We present the data to the user with some sort of Graphical User Interface
 - Simple tabular display as we have been doing
 - MS Access provides *Forms* and *Reports* for GUIs
 - Web pages
- Back end
 - » The database stores the data in tables
 - » We use queries to construct new "virtual" tables

Forms

A form is primarily used to enter or display data in a database



The screenshot shows a window titled "Employee Record Form" with the following fields and values:

Field	Value
ID	4
Last	Peacock
First	Margaret
JobID	2
Hire	03-May-93
Street	4110 Old Redmond Rd
City	Kirkland
State	WA
Country	USA
Title	Engineer
Paycode	4
PhotoID	4
ImagePath	images\image4.gif

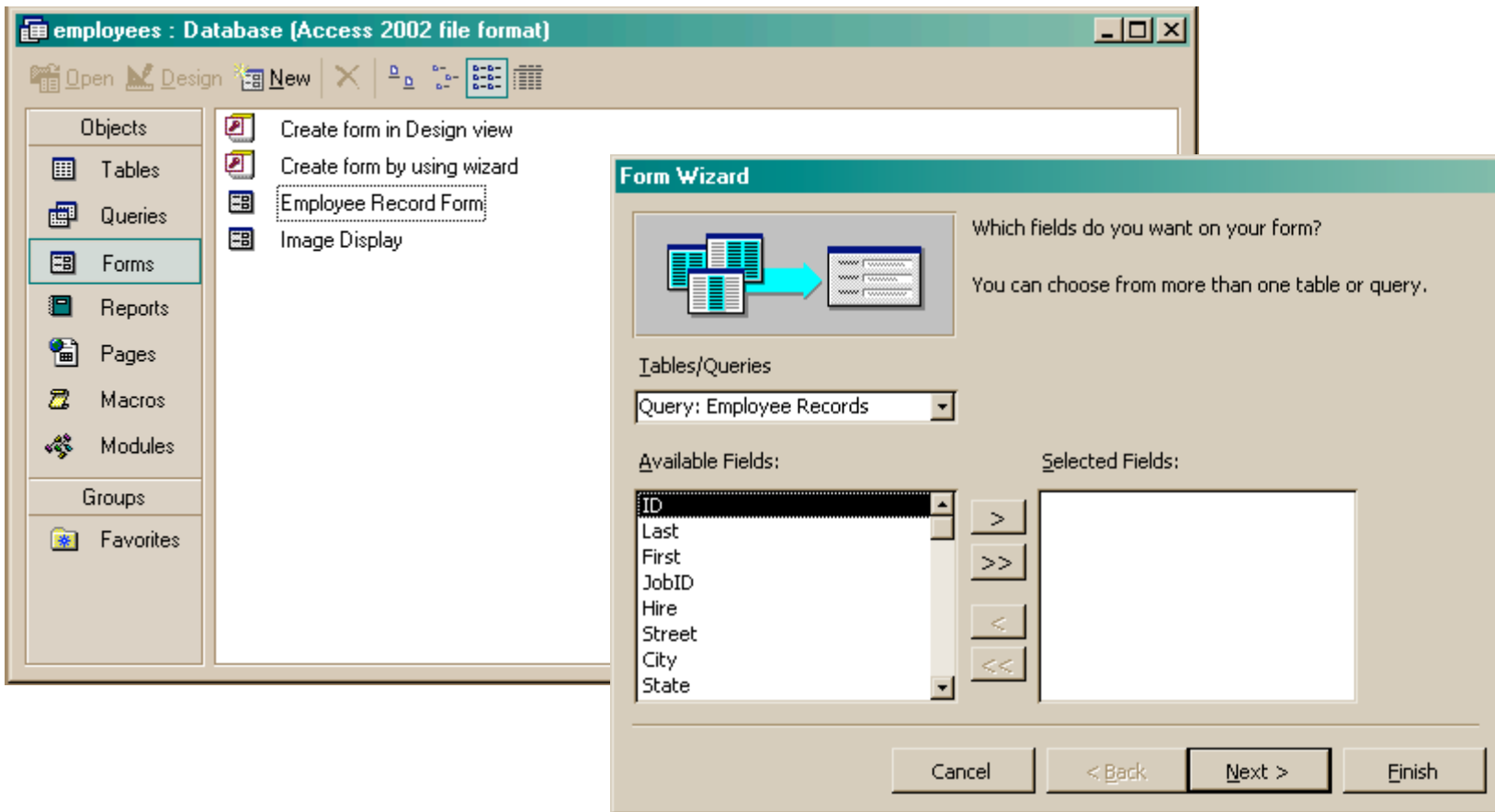
The form also includes a photo of a woman with dark hair, wearing a yellow headband and a purple top, against a blue background. At the bottom, it shows "Record: 4 of 12" with navigation buttons.

The designer controls what it looks like and how it works,
so it can be tailored to specific needs

A Form is just a Face for a table

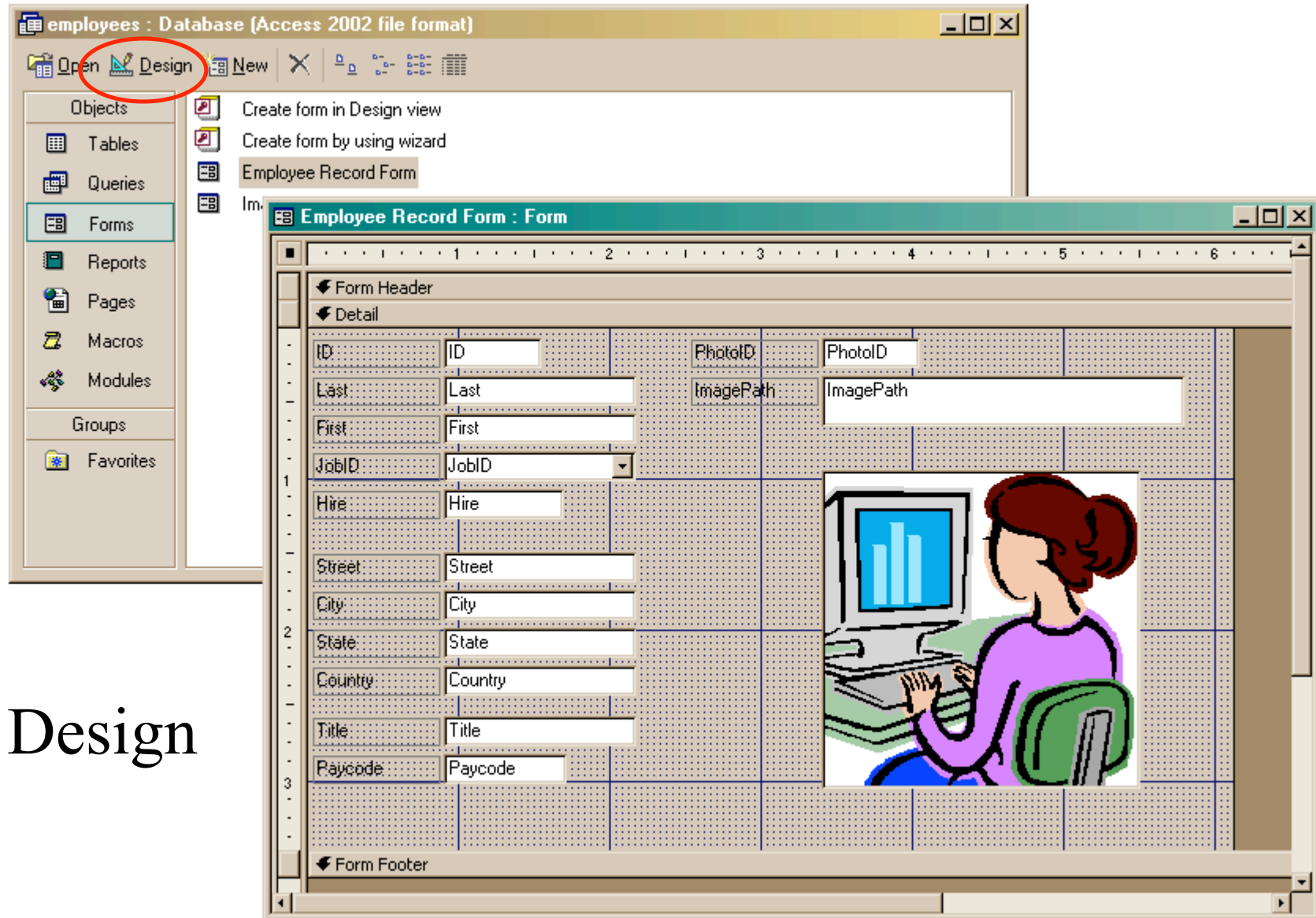
- The form lets the designer arrange the data, label it, provide some control over events, etc
 - » the **presentation**
 - » multiple presentations are possible depending on the specific needs of each user
- Underlying data comes from a table or a query
 - » the **content**
 - » single source of data ensures consistency

How does a form get built?



The Form wizard can help get you started.

But you probably want to tweak it ...



Design

Explore the Design capabilities

- Properties of the various controls can be set
- Controls and labels can be moved around
- Images and patterns can be applied
- Event handlers can be written just like on HTML pages with onClick, etc
 - » these are written in Basic, not JavaScript

Displaying an image

- In general, images are not stored directly in the database
 - » This would mean copying the image and storing it as part of the database file
 - The resulting database is very big
 - The image files are not available outside of the database program
- But we can easily store a link to the image file
 - » a text field containing the path to the image file
 - » use the path to find, load, and display the image

Simple Display Form

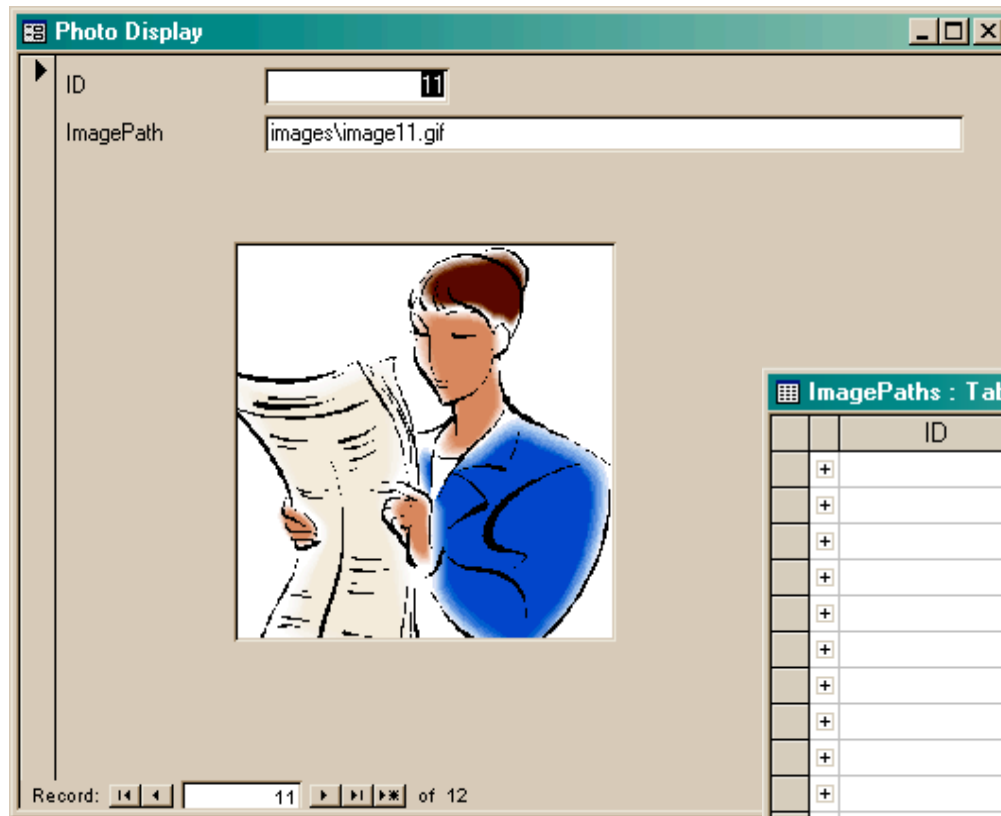



Photo Display

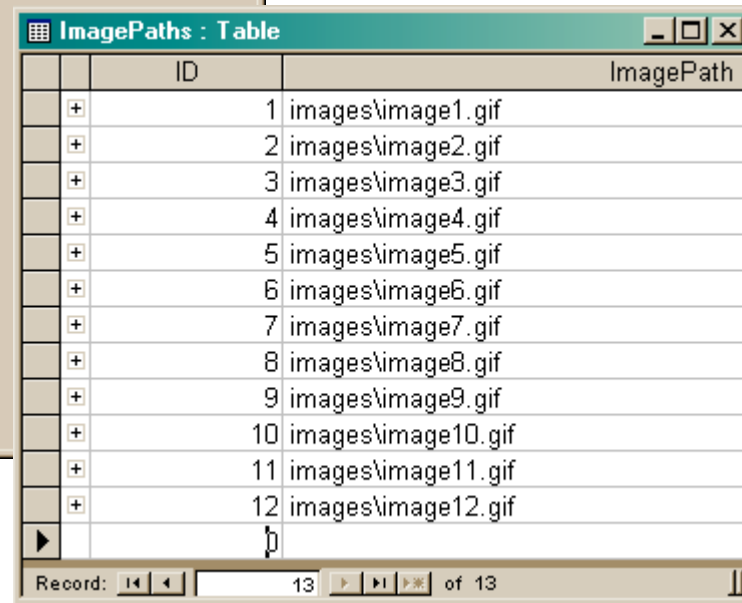
ID:

ImagePath:



Record: of 12

ImagePaths table



	ID	ImagePath
+	1	images\image1.gif
+	2	images\image2.gif
+	3	images\image3.gif
+	4	images\image4.gif
+	5	images\image5.gif
+	6	images\image6.gif
+	7	images\image7.gif
+	8	images\image8.gif
+	9	images\image9.gif
+	10	images\image10.gif
+	11	images\image11.gif
+	12	images\image12.gif

Record: of 13

To display a linked image

- Create a form based on a table or query that includes the path attribute
 - » include a text field on the form to hold the path
- Create an image control on the form
 - » this is where the image is actually displayed
- Create event handlers to load the image when something changes
 - » associated with the form event OnCurrent
 - » associated with the text field event AfterUpdate

text field that holds the value of the primary key for the ImagePaths table, the ID attribute

text field that holds the value of the attribute ImagePath

The screenshot shows a software window titled "Image Display : Form". The window contains a data grid with two columns: "ID" and "ImagePath". Below the grid is an image field displaying a cartoon illustration of a woman with brown hair in a bun, wearing a purple long-sleeved shirt, sitting at a desk with a computer monitor and keyboard. The grid has a dotted background and is divided into sections by a vertical line. The "ID" column is on the left and the "ImagePath" column is on the right. The image field is located below the "ImagePath" column.

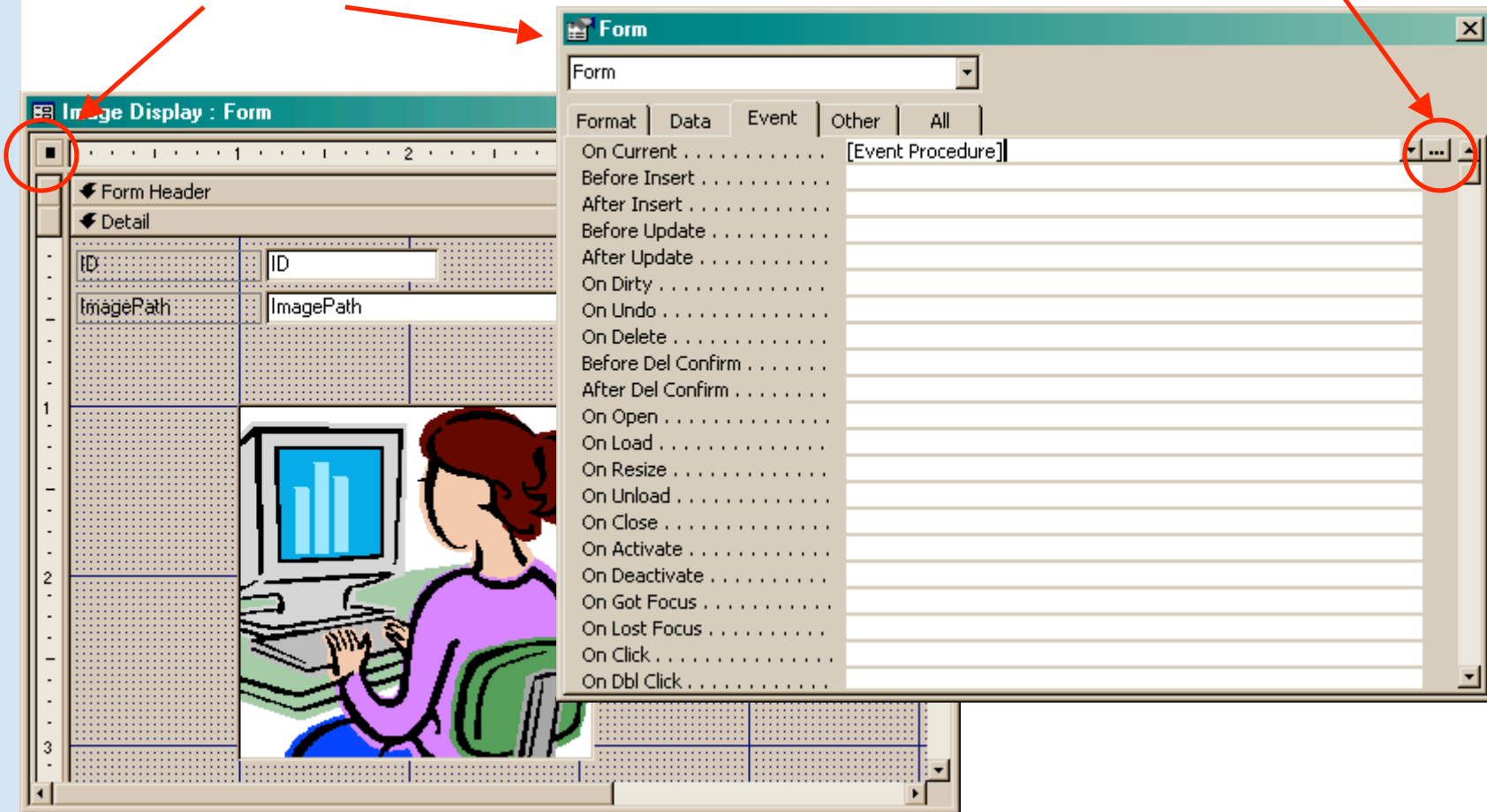
ID	ImagePath

image field that displays the image pointed to by ImagePath

How do we change the image? Event Handlers

double click here to get this

then click here



OnCurrent event handler for the form

```
employees - Form_Image Display (Code)
Form Current

Option Compare Database

Private Sub Form_Current()
If IsNull(Me![ImagePath]) Then
    Exit Sub
End If

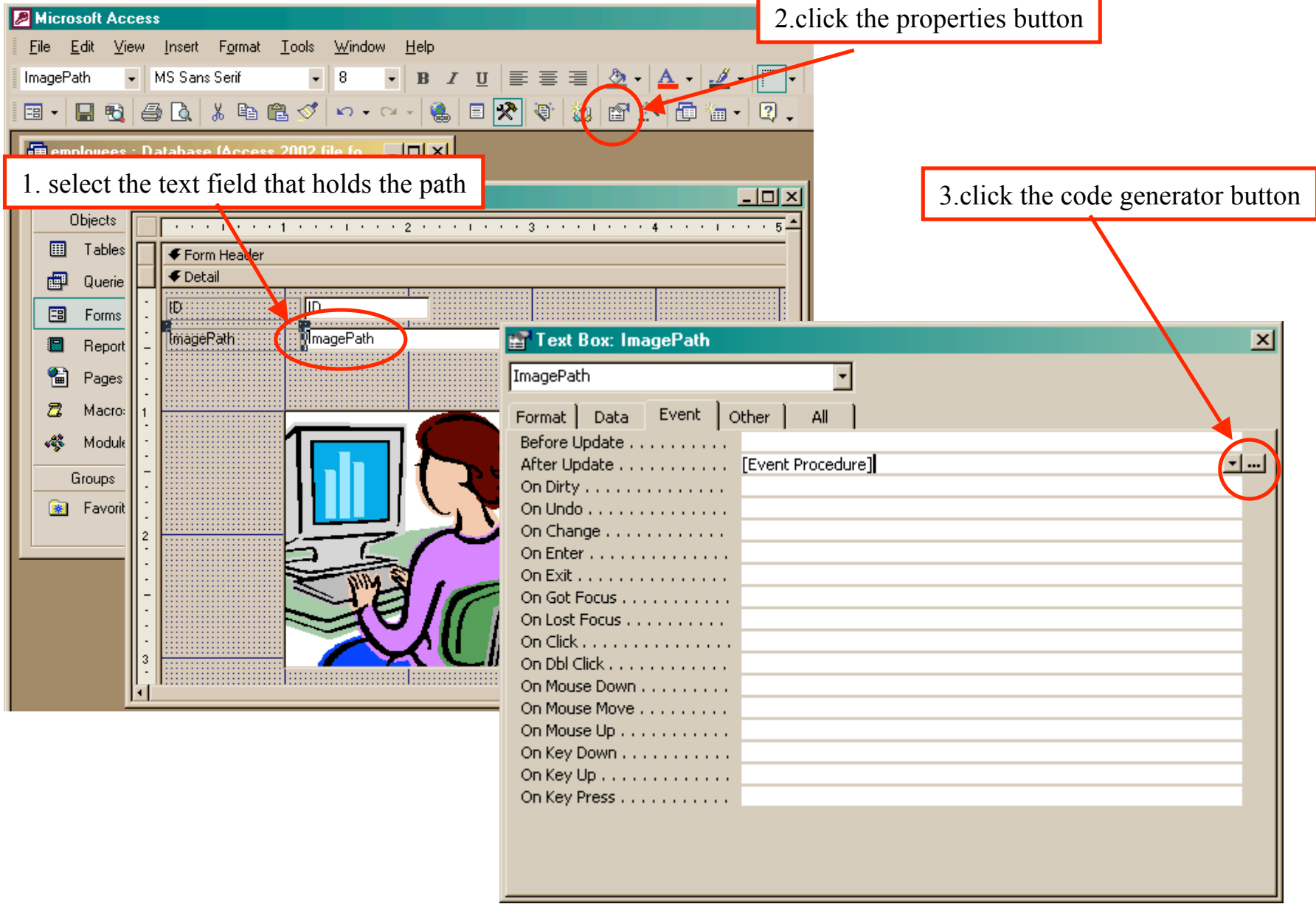
If (IsRelative(Me!ImagePath) = True) Then
    Me![ImageFrame].Picture = CurrentProject.path & "\" & Me![ImagePath]
Else
    Me![ImageFrame].Picture = Me![ImagePath]
End If
End Sub

Private Sub ImagePath_AfterUpdate()
If IsNull(Me![ImagePath]) Then
    Exit Sub
If (IsRelative(Me!ImagePath) = True) Then
    Me![ImageFrame].Picture = CurrentProject.path & "\" & Me![ImagePath]
Else
    Me![ImageFrame].Picture = Me![ImagePath]
End If
End Sub

Function IsRelative(fName As String) As Boolean
    ' Return false if the file name contains a drive or UNC path
    IsRelative = (InStr(1, fName, ":") = 0) And (InStr(1, fName, "\\") = 0)
End Function
```

ImagePath is the name of the text field that holds the path to the image on your form.

ImageFrame is the name of the Image control that displays the image on your form.



AfterUpdate event handler for the field

```
employees - Form_Image Display [Code]
ImagePath AfterUpdate

Option Compare Database

Private Sub Form_Current()
    If IsNull(Me![ImagePath]) Then
        Exit Sub
    End If
End Sub

Else
    Me![ImageFrame].Picture = Me![ImagePath]
End If
End Sub

Private Sub ImagePath_AfterUpdate()
    If IsNull(Me![ImagePath]) Then
        Exit Sub
    End If

    If (IsRelative(Me!ImagePath) = True) Then
        Me![ImageFrame].Picture = CurrentProject.path & "\" & Me![ImagePath]
    Else
        Me![ImageFrame].Picture = Me![ImagePath]
    End If
End Sub

Function IsRelative(fName As String) As Boolean
    ' Return false if the file name contains a drive or UNC path
    IsRelative = (InStr(1, fName, ":") = 0) And (InStr(1, fName, "\\") = 0)
End Function
```

ImagePath is the name of the text field that holds the path to the image on your form.

ImageFrame is the name of the Image control that displays the image on your form.

Views as Tables

- Recall that the result of a query is a table
- We have been presenting the table to the user in simple tabular form

All Books from Another Press : Select Query

ISBN	Title	Price	Name
1-2	Your Reader	\$12.00	Another Press
2-2	His Reader	\$25.00	Another Press

Record: 3 of 3

All Books by Alex : Select Query

Name	ISBN	Title
Alex	1-1	My Reader
Alex	1-2	Your Reader

Record: 3 of 3

Book Info for Given ISBN : Select Query

ISBN	Title	Price	authors.Name	publishers.Nam
1-1	My Reader	\$10.00	Alex	A Press

Record: 1 of 1



But tables are not pretty ...



Users need help understanding what they are looking at and what they can do with it ...

... so we developed Forms for controlling the display of data for the user who is reviewing or updating specific records.



Views as Forms

A form is primarily used to enter or display data in a database



The screenshot shows a window titled "Employee Record Form" with the following fields and values:

Field	Value
ID	4
Last	Peacock
First	Margaret
JobID	2
Hire	03-May-93
Street	4110 Old Redmond Rd
City	Kirkland
State	WA
Country	USA
Title	Engineer
Paycode	4
PhotoID	4
ImagePath	images\image4.gif

A photograph of a woman with dark hair and a yellow headband is displayed in a window next to the ImagePath field. The window title is "Employee Record Form". At the bottom, it shows "Record: 4 of 12".

Last lecture we developed Forms for better display to the user while updating the table.

But forms are not very compact ...



One Portals Way, Twin Points WA 98156
 Phone: 1-206-555-1417 Fax: 1-206-555-5938

Ship To: Rattlesnake Canyon Grocery
 2817 Milton Dr.
 Albuquerque NM 87110
 USA

Bill To: Rattlesnake Canyon Grocery
 2817 Milton Dr.
 Albuquerque NM 87110
 USA

Users like to have reports densely packed with information and logically arranged ...

Order ID:	Customer ID:	Salesperson:	Order Date:	Required Date:	Shipped Date:	Ship Via:
11077	RATTC	Nancy Davolio	06-May-1998	03-Jun-1998		United Package

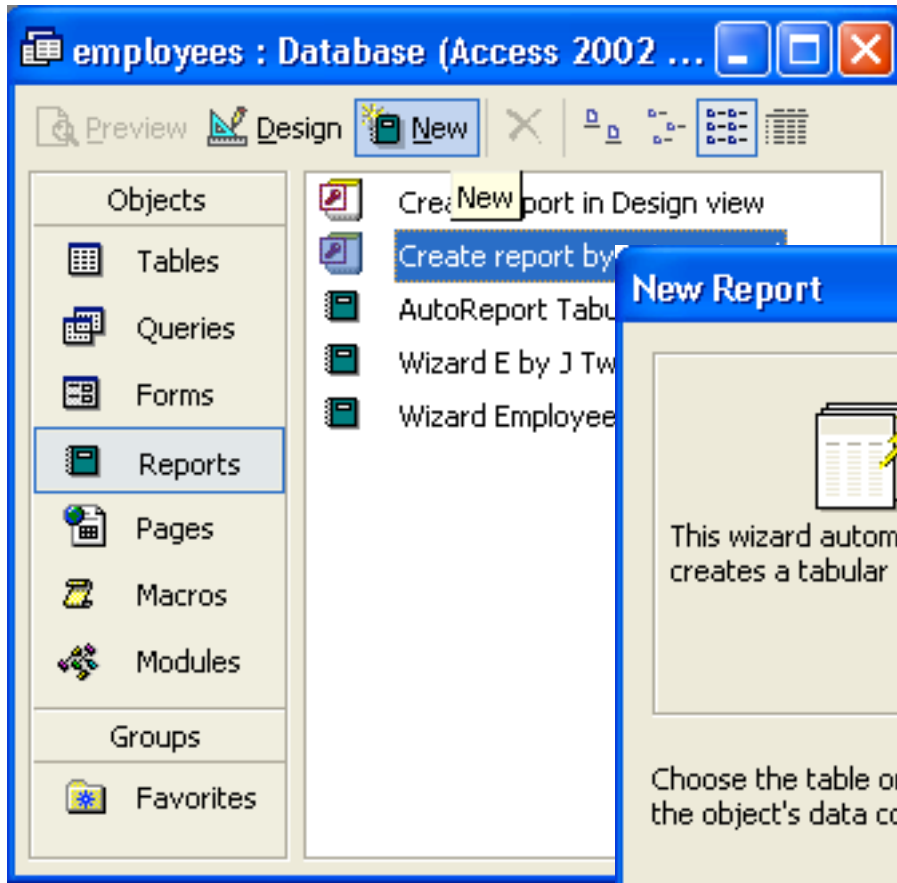
Product ID:	Product Name:	Quantity:	Unit Price:	Discount:	Extended Price:
2	Chang	24	\$19.00	20%	\$364.80
3	Aniseed Syrup	4	\$10.00	0%	\$40.00
4	Chef Anton's Cajun Seasoning	1	\$22.00	0%	\$22.00
6	Grandma's Boysenberry Spread	1	\$25.00	2%	\$24.50
7	Uncle Bob's Organic Dried Pears	1	\$30.00	5%	\$28.50

So this lecture we will develop **Reports** for compact display of multiple records.

Reports

- A Report is another face for a table (or query)
- The report lets the designer arrange the data, label it, provide some control over events, etc
 - » the **presentation**
 - » multiple presentations are possible depending on the specific needs of each user
- Underlying data comes from a table or a query
 - » the **content**
 - » single source of data ensures consistency

How does a report get built?



The New Report wizard can build a complete report for you.



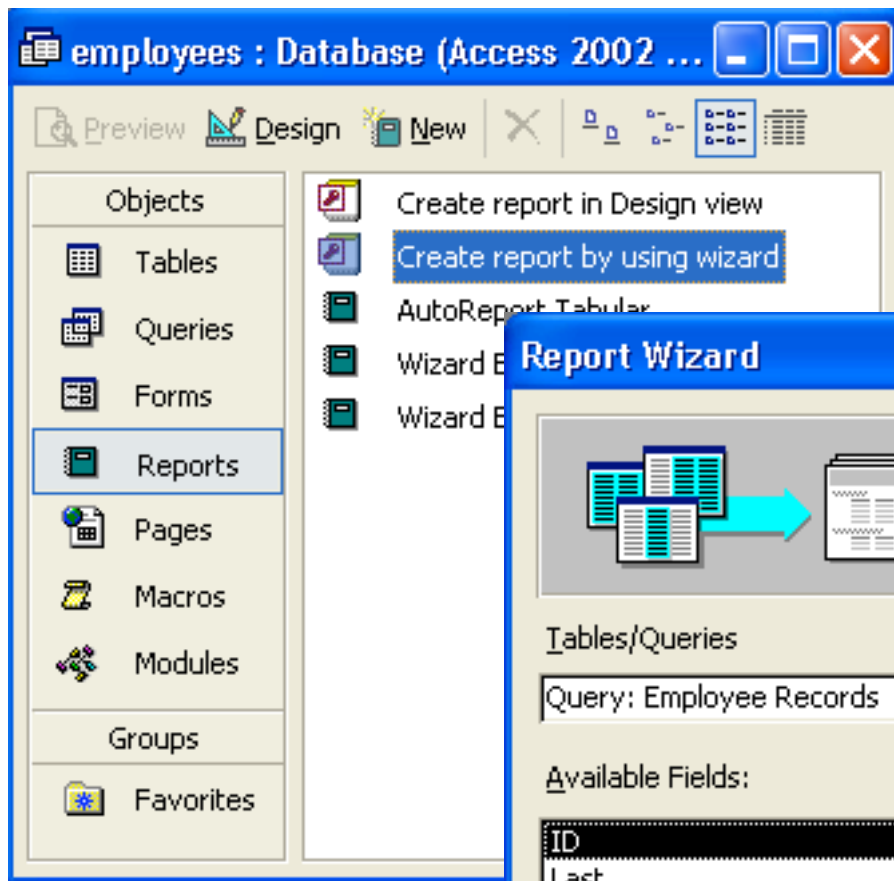
But this wizard is kind of naïve ...

ImagePaths

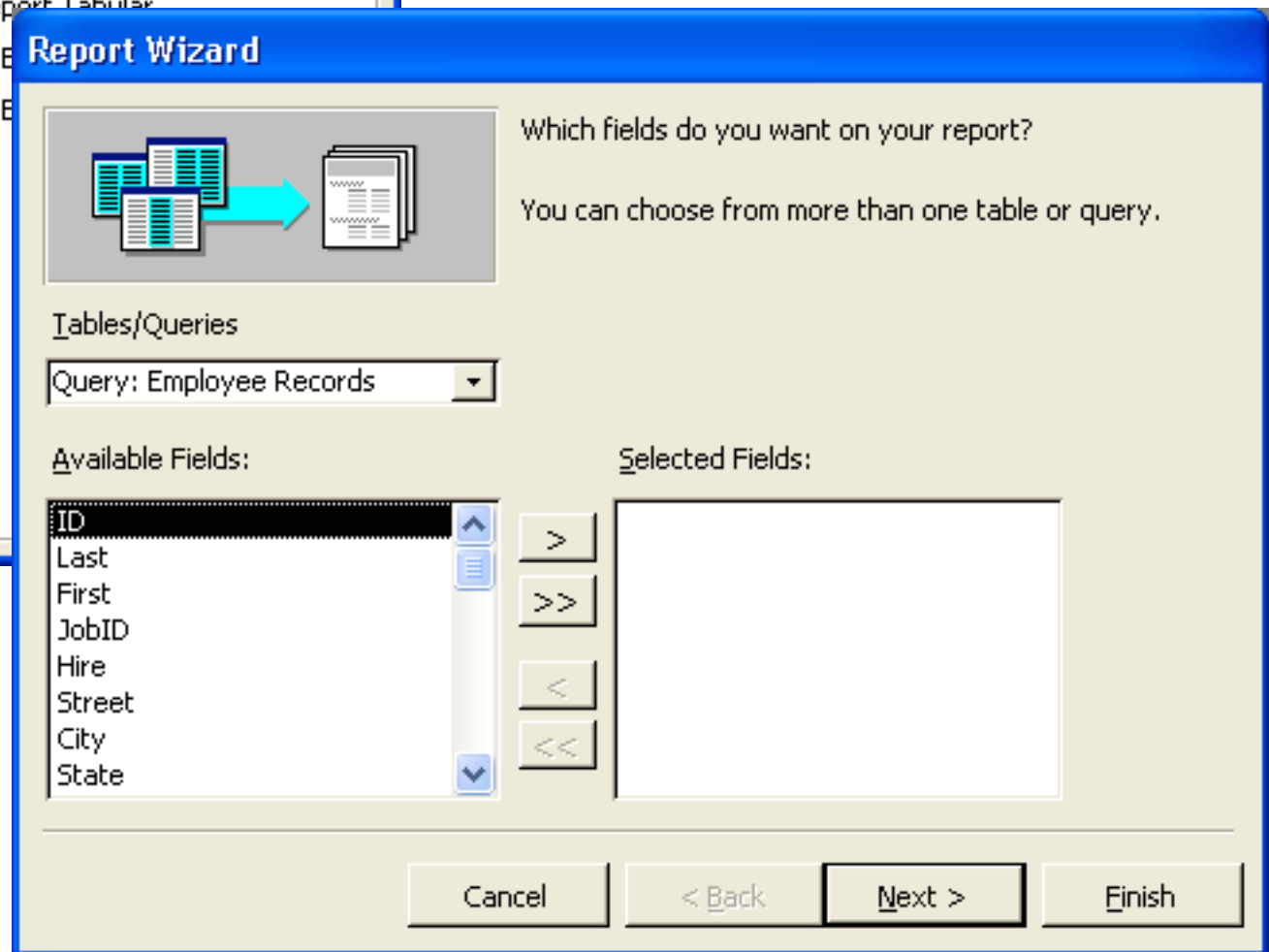
ImagePaths

<i>ID</i>	<i>Last</i>	<i>First</i>	<i>JobID</i>	<i>Hire</i>	<i>Street</i>	<i>City</i>	<i>State</i>	<i>Country</i>	<i>otoID</i>	<i>Title</i>	<i>ycode</i>	<i>ImagePath</i>
1	Davalino	Nanci	0	1ay-92	507 20th Ave	Seattle	WA	USA	1	CEO	8	images\image1.gif
2	Fuller	Andrew	3	ug-92	908 W. Capit	Seattle	WA	USA	2	Administrativ	6	images\image2.gif
3	Wooster	Berton	1	%pr-93	722 Moss Ba	Seattle	WA	USA	3	VP	7	images\image3.gif
4	Peacock	Margaret	2	1ay-93	4110 Old Re	Kirkland	WA	USA	4	Engineer	4	images\image4.gif
5	Buchanan	Steven	3	Oct-94	13 Garrett Hil	Seattle	WA	USA	5	Administrativ	6	images\image5.gif
6	Sullimari	Okan	2	Dec-94	Coventry Hou	Seattle	WA	USA	6	Engineer	4	images\image6.gif
101	Soggy	Peter	2	Jun-04	1300 20th Av	Seattle	WA	USA	7	Engineer	4	images\image7.gif
102	Morken	Xavier	3	ep-03	100 Eastlake	Seattle	WA	USA	8	Administrativ	6	images\image8.gif
103	Wilshire	Bruce	3	Mar-98	34 15th Ave	Seattle	WA	USA	9	Administrativ	6	images\image9.gif
104	Brazely	Tanya	2	Mar-02	103 29th Ave	Seattle	WA	USA	10	Engineer	4	images\image10.gif
105	Compton	Sarah	3	ov-99	4034 NW 50t	Seattle	WA	USA	11	Administrativ	6	images\image11.gif
106	Zanzy	Ovid	2	Jan-99	4502 NW 52	Seattle	WA	USA	12	Engineer	4	images\image12.gif

Page: 1



You might want to use the Report Wizard instead since it gives you more control.



Employees by JobCode

Title *Administrative*

Paycode *6*

<i>Last</i>	<i>ID</i>	<i>First</i>	<i>JobID</i>	<i>Hire</i>	<i>Street</i>	<i>City</i>	<i>State</i>	<i>Country</i>	<i>ImagePath</i>
Buchanan	5	Steven	3	Oct-94	13 Garrett Hill	Seattle	WA	USA	images/image5.gif
Compton	105	Sarah	3	Nov-99	4034 NW 50th	Seattle	WA	USA	images/image11.gif
Fuller	2	Andrew	3	Aug-92	908 W. Capitol	Seattle	WA	USA	images/image2.gif
Morken	102	Xavier	3	Sep-03	100 Eastlake	Seattle	WA	USA	images/image8.gif
Wilshire	103	Bruce	3	Mar-98	34 15th Ave	Seattle	WA	USA	images/image9.gif

Title *CEO*

Paycode *8*

<i>Last</i>	<i>ID</i>	<i>First</i>	<i>JobID</i>	<i>Hire</i>	<i>Street</i>	<i>City</i>	<i>State</i>	<i>Country</i>	<i>ImagePath</i>
Davalino	1	Nanci	0	May-92	507 20th Ave	Seattle	WA	USA	images/image1.gif

Title *Engineer*

Paycode *4*

<i>Last</i>	<i>ID</i>	<i>First</i>	<i>JobID</i>	<i>Hire</i>	<i>Street</i>	<i>City</i>	<i>State</i>	<i>Country</i>	<i>ImagePath</i>
Brazely	104	Tanya	2	Mar-02	103 25th Ave	Seattle	WA	USA	images/image10.gif
Peacock	4	Margaret	2	May-93	4110 Old Re	Kirkland	WA	USA	images/image4.gif

Better looking report, but you still probably want to tweak it ...

But you probably want to tweak it ...

The image shows a screenshot of Microsoft Access. The main window title is "Microsoft Access - [employees : Database (Access 2002 file form...". The menu bar includes File, Edit, View, Insert, Tools, Window, and Help. The toolbar contains various icons, with the "Design" icon circled in red. A red arrow points from the "Design" icon to a report wizard window titled "Wizard Employees by JobCode : Report".

The report wizard window shows a preview of the report layout. The report is titled "Employees by JobCode". It has a Report Header section with the title "Employees by JobCode". Below the header is a Page Header section with a Title Header. The main body of the report is a table with the following columns: Title, Paycode, Last, ID, First, JobID, Hire, Street, City, State, Country, and ImagePath. The table is currently empty. Below the table is a Page Footer section with the text "=Now()" and a Report Footer section with the text "=Page " & [Page] & " of " & [Page]".

Employees by JobCode

Title *Administrative*

Paycode *6*

<i>ID</i>	<i>Last</i>	<i>First</i>	<i>JobID</i>	<i>Hire</i>	<i>Street</i>	<i>City</i>	<i>State</i>	<i>Country</i>	<i>ImagePath</i>
5	Buchanan	Steven	3	17-Oct-94	13 Garrett Hill	Seattle	WA	USA	images/image5.gif
105	Compton	Sarah	3	17-Nov-99	4034 NW 50th St	Seattle	WA	USA	images/image11.gif
2	Fuller	Andrew	3	14-Aug-92	908W. Capital Way	Seattle	WA	USA	images/image2.gif
102	Morken	Xavier	3	14-Sep-03	100 Eastlake Drive	Seattle	WA	USA	images/image8.gif
103	Wilshire	Bruce	3	01-Mar-98	34 15th Ave NE	Seattle	WA	USA	images/image9.gif

Title *CEO*

Paycode *8*

<i>ID</i>	<i>Last</i>	<i>First</i>	<i>JobID</i>	<i>Hire</i>	<i>Street</i>	<i>City</i>	<i>State</i>	<i>Country</i>	<i>ImagePath</i>
1	Davalino	Nandi	0	01-May-92	507 20th Ave E	Seattle	WA	USA	images/image1.gif

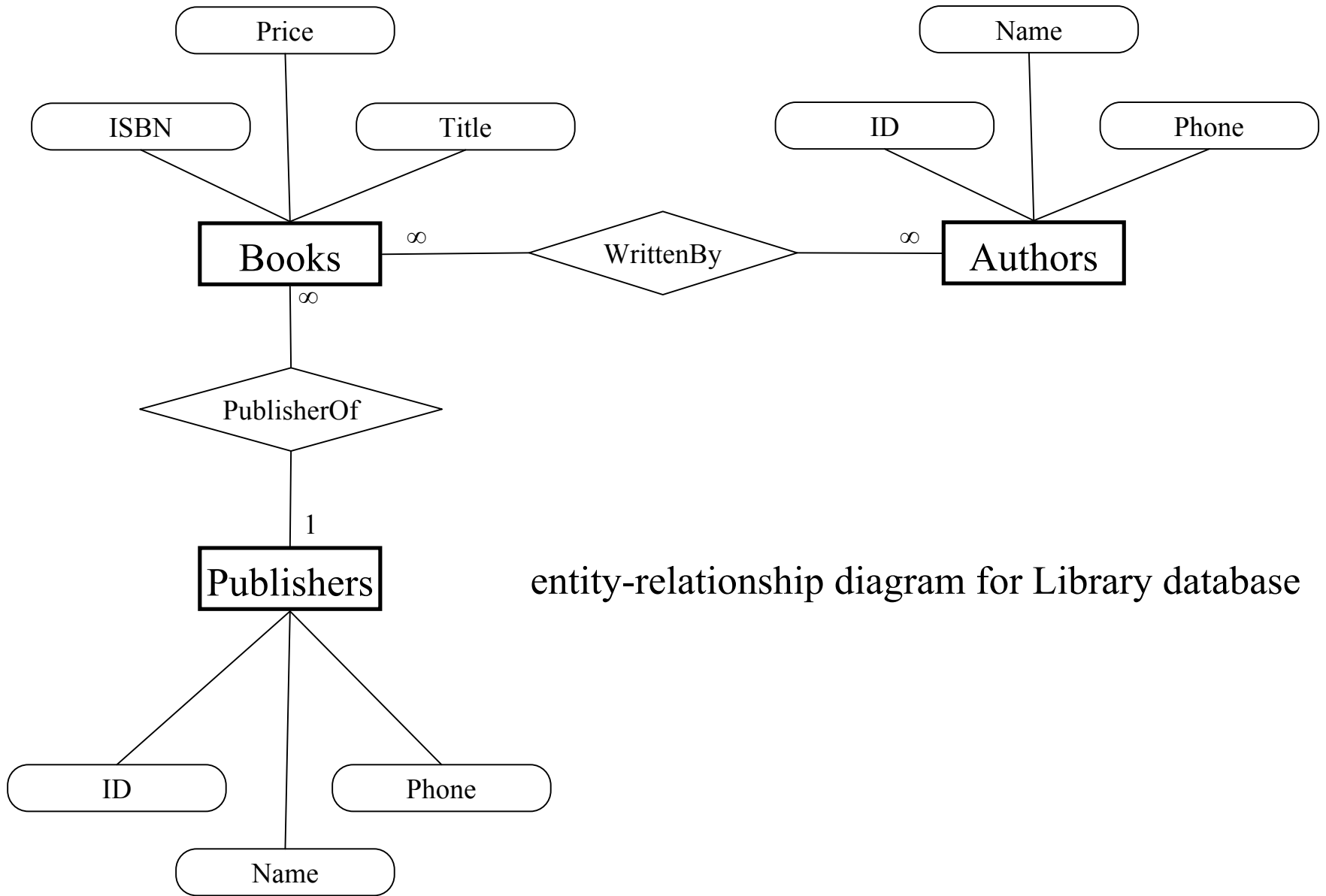
Title *Engineer*

Paycode *4*

<i>ID</i>	<i>Last</i>	<i>First</i>	<i>JobID</i>	<i>Hire</i>	<i>Street</i>	<i>City</i>	<i>State</i>	<i>Country</i>	<i>ImagePath</i>
104	Brazely	Tanya	2	03-Mar-02	103 25th Ave NW	Seattle	WA	USA	images/image10.gif
4	Peacock	Margaret	2	03-May-93	4110 Old Redmond R	Kirkland	WA	USA	images/image4.gif
101	Soggy	Peter	2	01-Jun-04	1300 20th Ave W	Seattle	WA	USA	images/image7.gif

Explore the Design capabilities

- Properties of the various controls can be set
 - Controls and labels can be moved around
 - Images and patterns can be applied
 - Totals, averages, subtotals etc can be calculated
 - Information can be grouped by selected fields
 - Etc, etc – there is a lot of flexibility in how these reports get generated
-



entity-relationship diagram for Library database