# CGS 2545: Database Concepts
# Fall 2010

## LAB #6

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# Lab #6 – More on Building a Database In Access

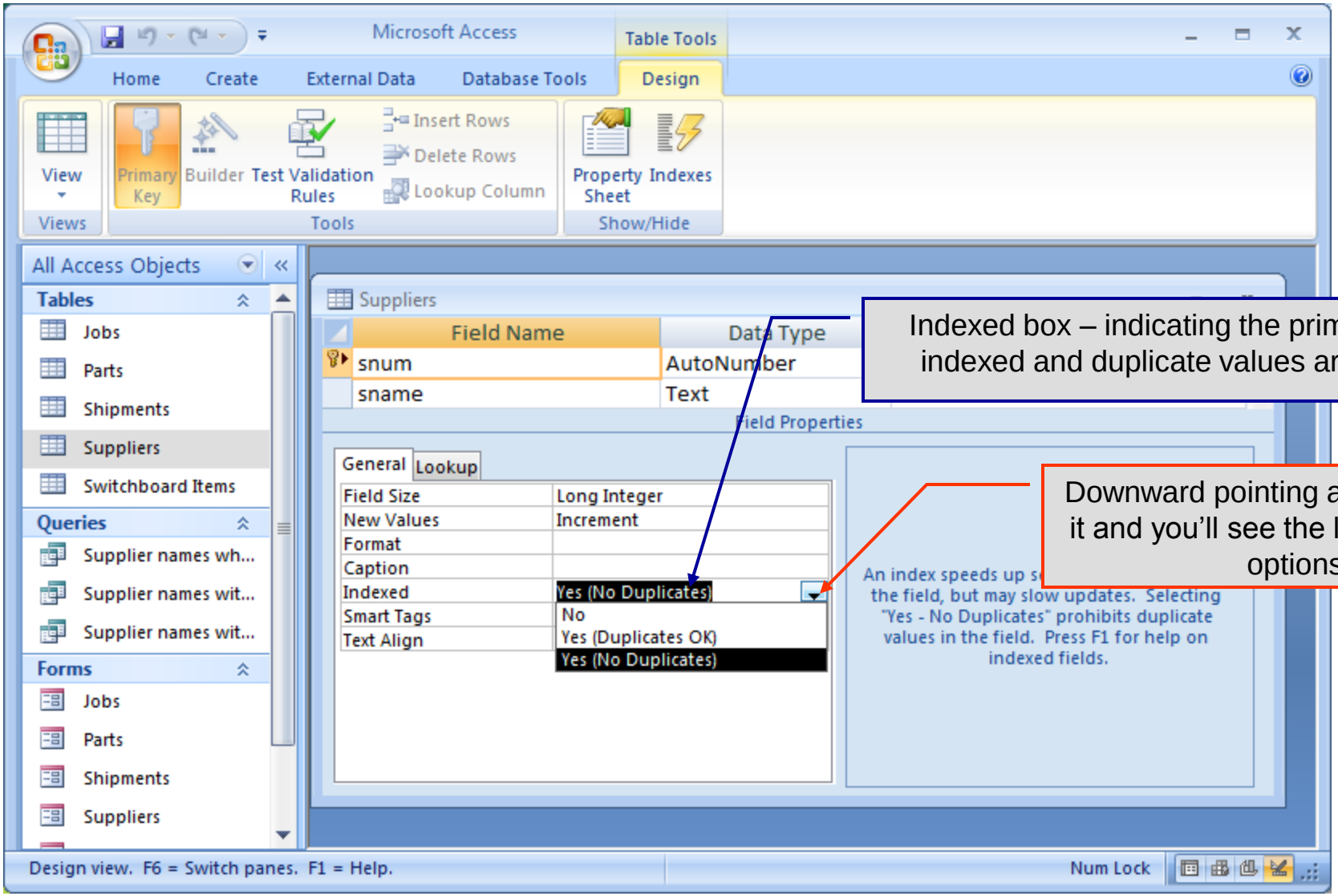
- The objective of this lab is to introduce more advanced features of Access in defining your database.
- For this lab, I'll use the supplier-parts-jobs-shipments database as in Lab #4. It is available on WebCourses

As with previous labs – start Access and maximize the window. If Security Warning message bar appears, Click on options … and choose Enable this content.

**NOTE: In the slides that follow, if the call-out symbol is outlined in red, it means that there is something for you to try, if the call-out is outlined in blue, I am simply giving you some information about what is displayed on that page.**

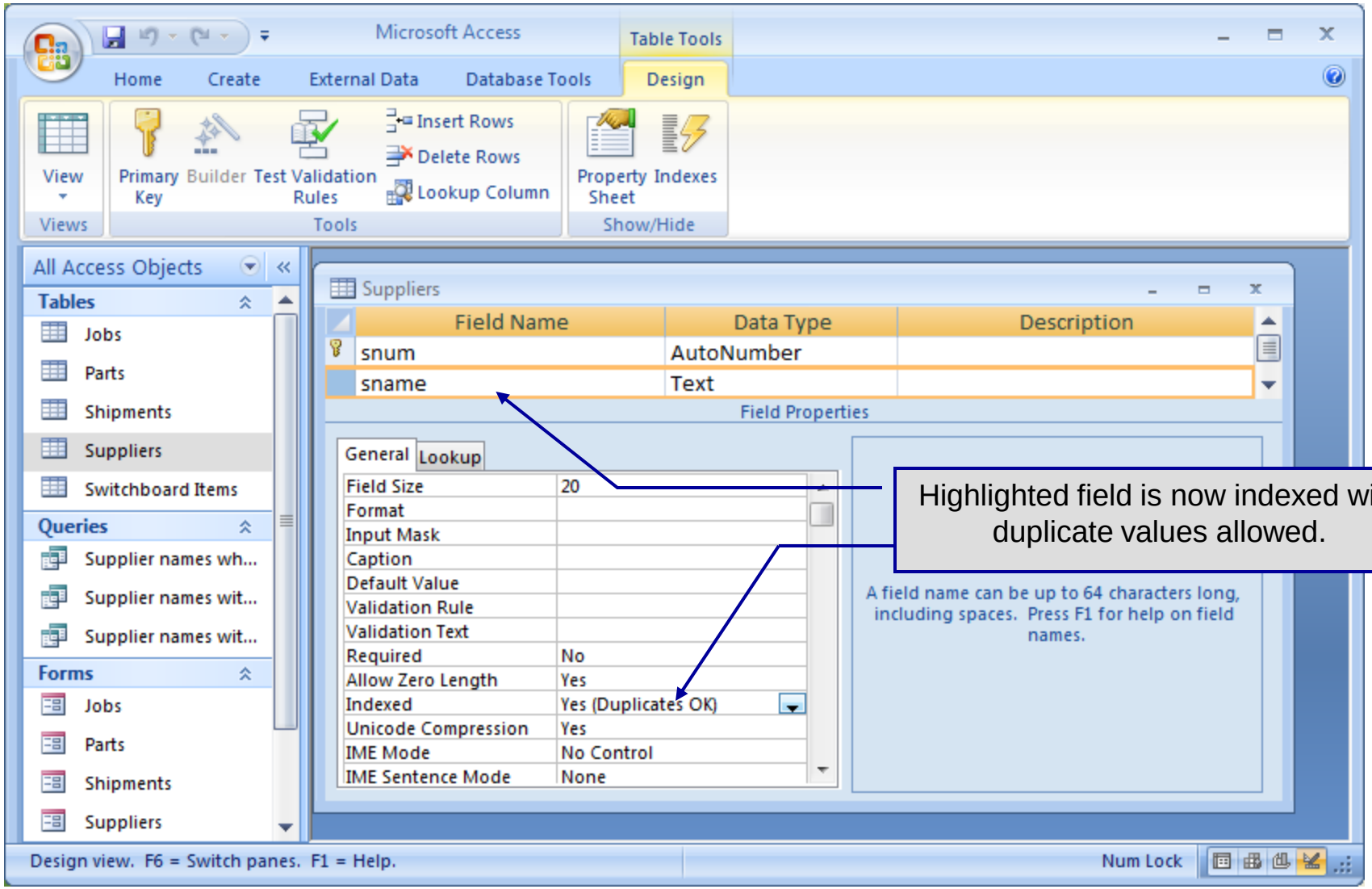
# Index Fields In A Table

- Assuming you have opened the suppliers-parts-jobs-shipments database.
- Adding a primary key to a field automatically creates an index for that field. An index is a special list that is created in Access to speed up searching and sorting – much like the index in the back of a textbook. The index is visible only to Access (not you).
- Indices can also be built on non-key fields, including multiple-field indices.
- When you add an index to a field, you have the option of allowing duplicate values in that field or not allowing them.
  - When a primary key is created, the field is always indexed without duplicates.
- Start Access and load the suppliers-parts-jobs database.
- From the Tables list, select the Suppliers table and then switch to the Design View.
- Once in the design view for the Suppliers table, click on the row near the bottom that reads "Indexed" – it will add a downward pointing arrow to the box and you should see the image shown on the next page.


Microsoft Access
Table Tools
Home
Create
External Data
Database Tools
Design
View
Primary Key
Builder
Test Validation Rules
Insert Rows
Delete Rows
Lookup Column
Property Sheet
Indexes
Views
Tools
Show/Hide
All Access Objects
Tables
Jobs
Parts
Shipments
Suppliers
Switchboard Items
Queries
Supplier names wh...
Supplier names wit...
Supplier names wit...
Forms
Jobs
Parts
Shipments
Suppliers
Suppliers
Field Name
Data Type
snum
AutoNumber
sname
Text
Field Properties
General
Lookup
Field Size
Long Integer
New Values
Increment
Format
Caption
Indexed
Yes (No Duplicates)
Smart Tags
Text Align
No
Yes (Duplicates OK)
Yes (No Duplicates)
An index speeds up s
the field, but may slow updates. Selecting
"Yes - No Duplicates" prohibits duplicate
values in the field. Press F1 for help on
indexed fields.
Indexed box – indicating the primary key fie
indexed and duplicate values are not allow
Downward pointing arrow – clic
it and you'll see the list of availa
options.
Design view. F6 = Switch panes. F1 = Help.
Num Lock

# Adding an index to a non-key field

- Using the Suppliers table, let's add an index to the "sname" field that will allow for duplicates.
  - Click on the sname field in the field listing for the Supplier table.
  - Next click on Indexed under the General tab (just like the previous example.
  - Then click on the Indexed row to bring up the downward arrow. (You can also double click in the row to step through the options.)
  - Select Yes, (Duplicates OK). You'll see the final result as shown on the next slide.
  - Close the view and Access will ask if you want to save your changes to the table – select YES.


Microsoft Access
Table Tools
Home
Create
External Data
Database Tools
Design
View
Primary Key
Builder
Test Validation Rules
Insert Rows
Delete Rows
Lookup Column
Property Sheet
Indexes
Views
Tools
Show/Hide
All Access Objects
Tables
Jobs
Parts
Shipments
Suppliers
Switchboard Items
Queries
Supplier names wh...
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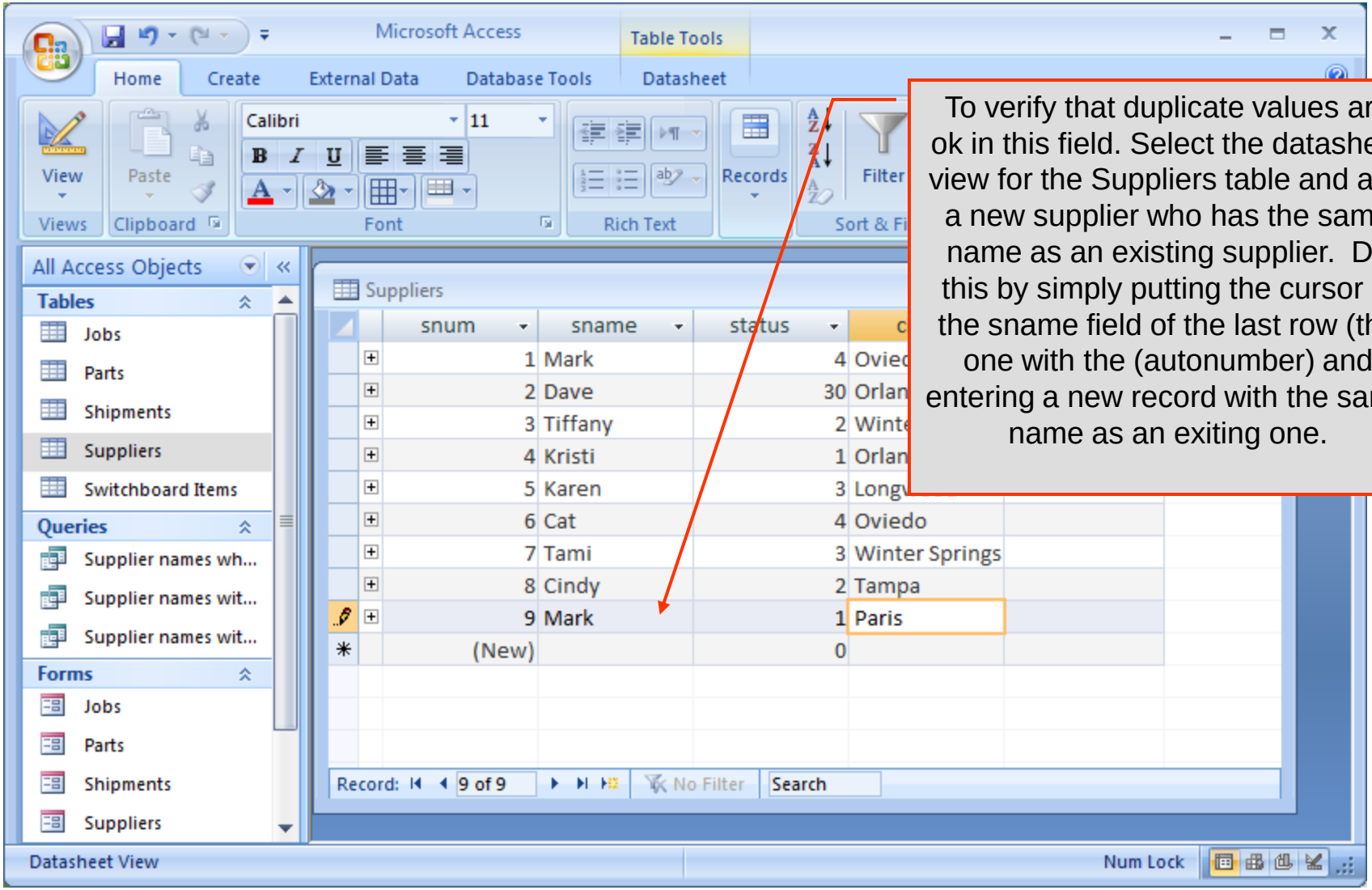
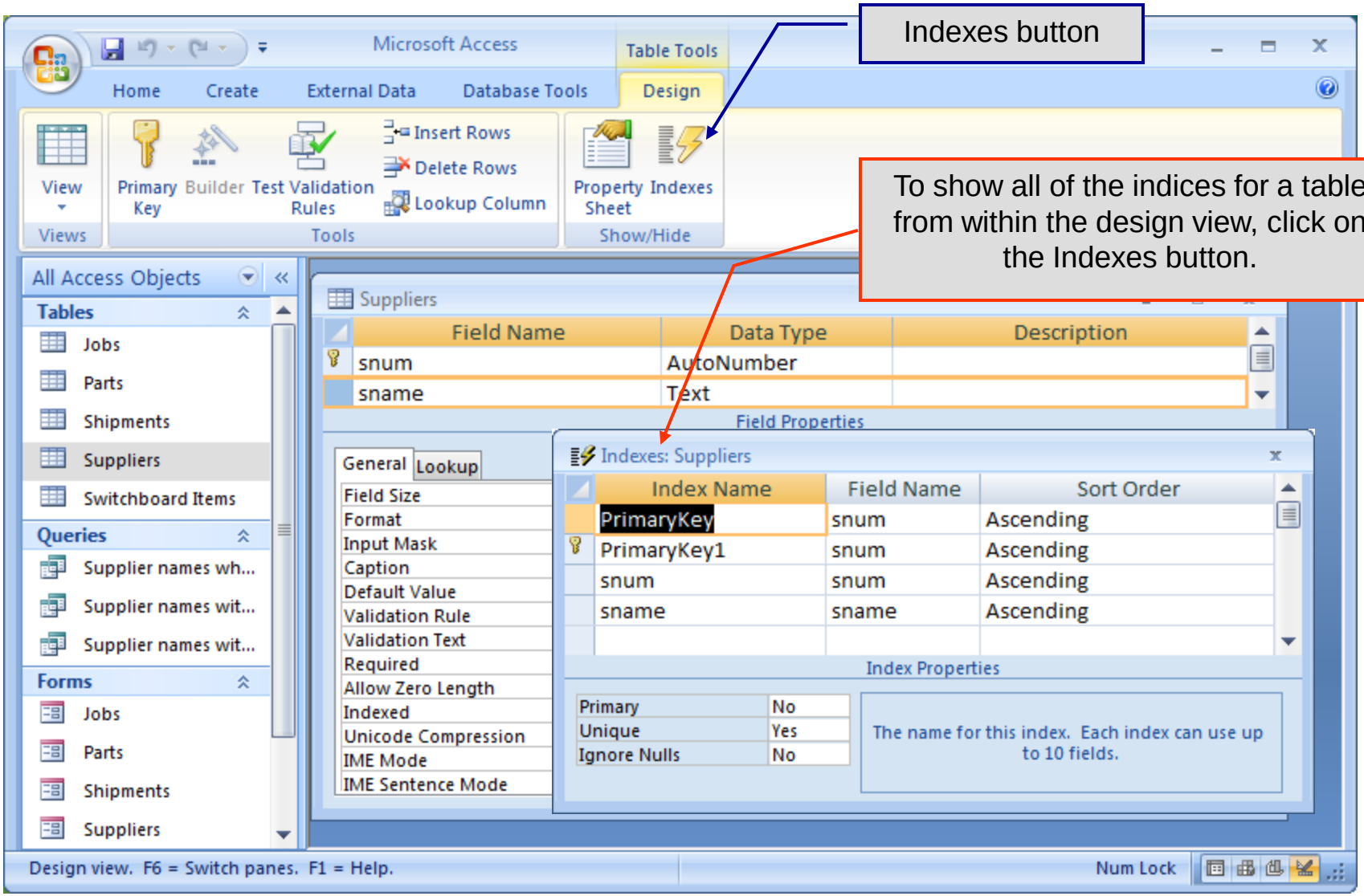
Supplier names wit...
Forms
Jobs
Parts
Shipments
Suppliers
Suppliers
Field Name
Data Type
Description
snum
AutoNumber
sname
Text
Field Properties
General
Lookup
Field Size 20
Format
Input Mask
Caption
Default Value
Validation Rule
Validation Text
Required No
Allow Zero Length Yes
Indexed Yes (Duplicates OK)
Unicode Compression Yes
IME Mode No Control
IME Sentence Mode None
A field name can be up to 64 characters long, including spaces. Press F1 for help on field names.
Highlighted field is now indexed with duplicate values allowed.
Design view. F6 = Switch panes. F1 = Help.
Num Lock




To verify that duplicate values are ok in this field. Select the datasheet view for the Suppliers table and add a new supplier who has the same name as an existing supplier. Do this by simply putting the cursor in the sname field of the last row (the one with the (autonumber) and entering a new record with the same name as an exiting one.


Indexes button
To show all of the indices for a table from within the design view, click on the Indexes button.
Microsoft Access
Table Tools
Home
Create
External Data
Database Tools
Design
View
Primary Key
Builder
Test Validation Rules
Insert Rows
Delete Rows
Lookup Column
Property Sheet
Indexes
Views
Tools
Show/Hide
All Access Objects
Tables
Jobs
Parts
Shipments
Suppliers
Switchboard Items
Queries
Supplier names wh...
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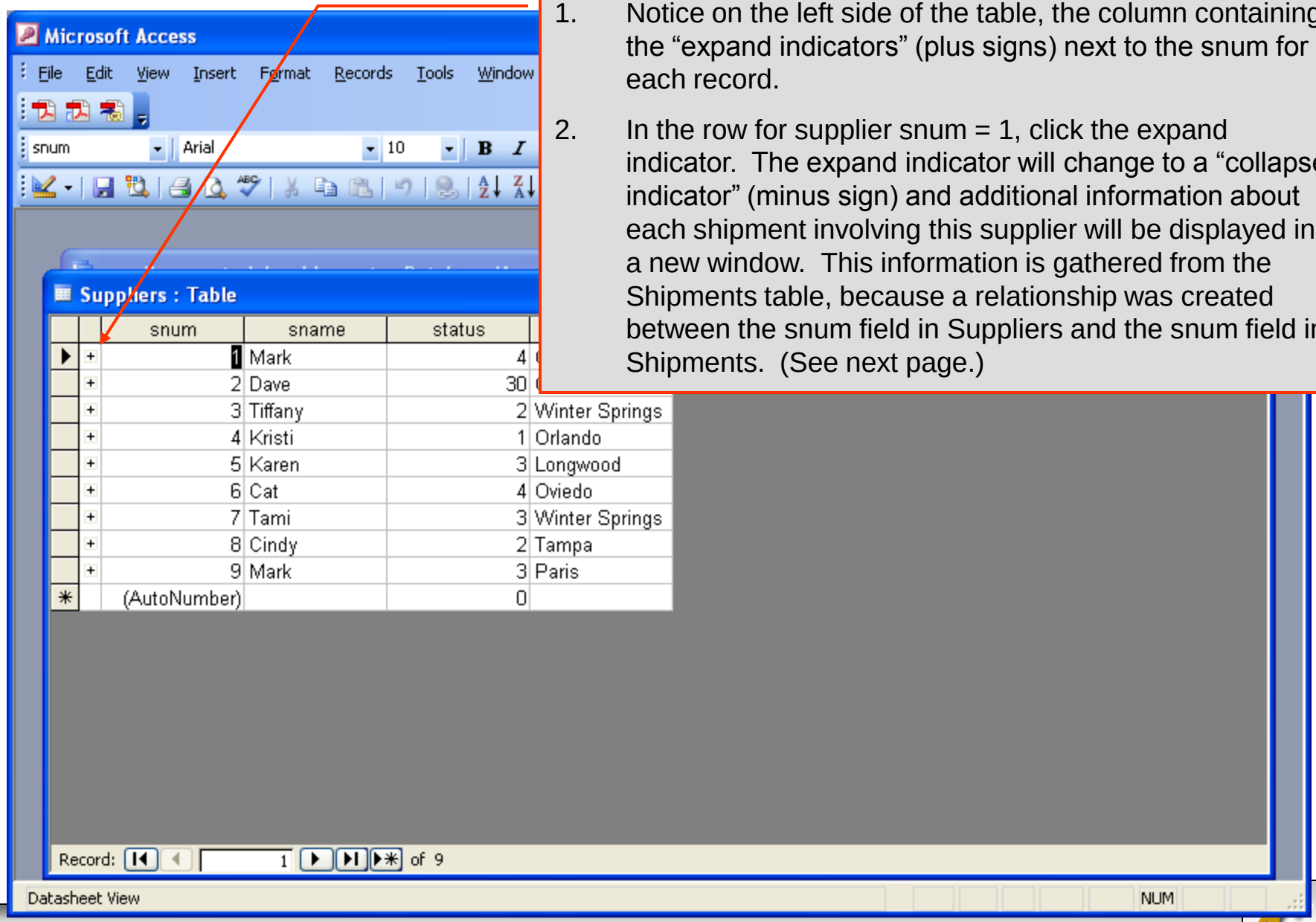
Forms
Jobs
Parts
Shipments
Suppliers
Suppliers
Field Name
Data Type
Description
snum
AutoNumber
sname
Text
Field Properties
General
Lookup
Field Size
Format
Input Mask
Caption
Default Value
Validation Rule
Validation Text
Required
Allow Zero Length
Indexed
Unicode Compression
IME Mode
IME Sentence Mode
Indexes: Suppliers
Index Name
Field Name
Sort Order
PrimaryKey
snum
Ascending
PrimaryKey1
snum
Ascending
snum
snum
Ascending
sname
sname
Ascending
Index Properties
Primary
No
Unique
Yes
Ignore Nulls
No
The name for this index. Each index can use up to 10 fields.
Design view. F6 = Switch panes. F1 = Help.
Num Lock

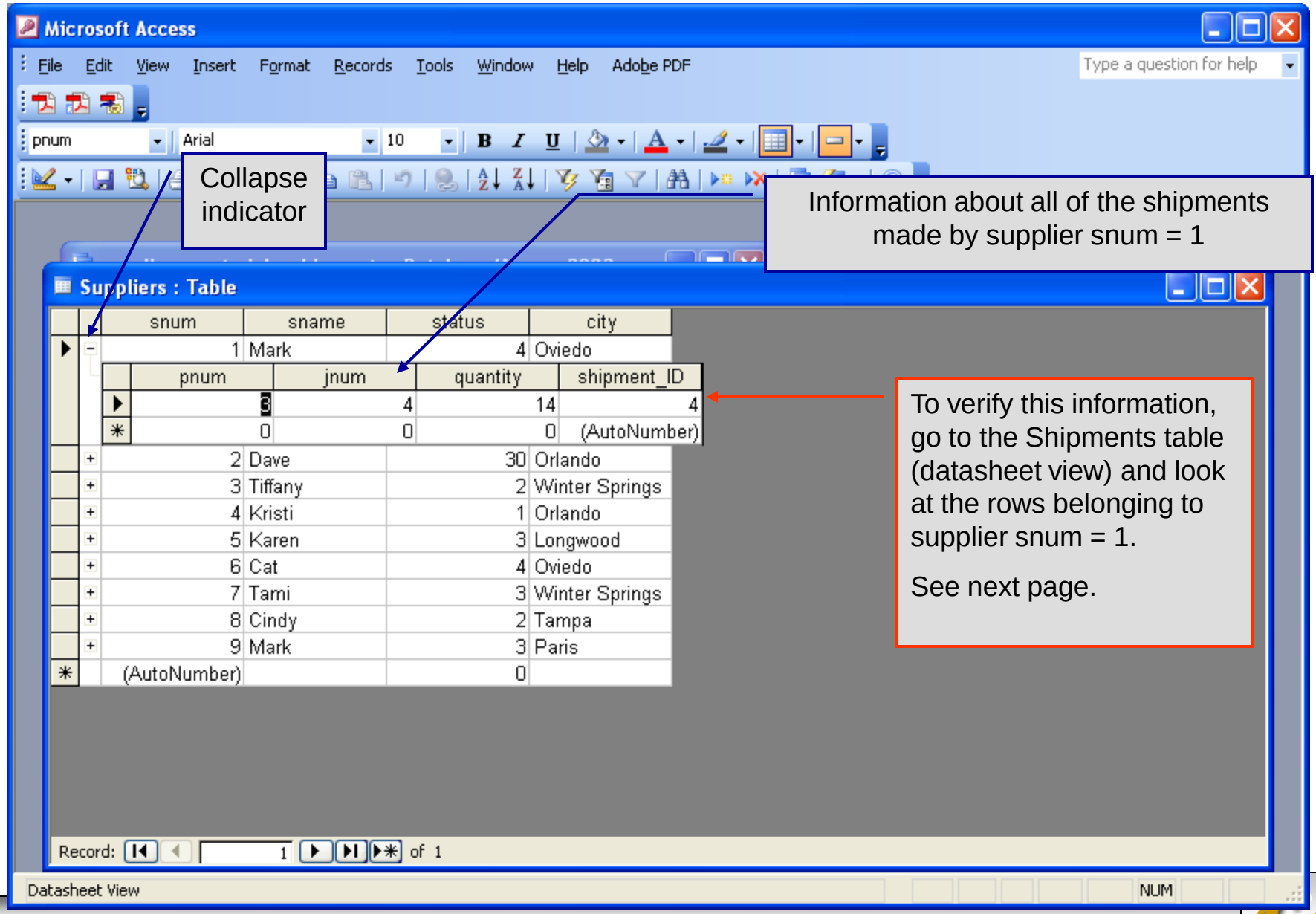
# Viewing Relationships in the Database

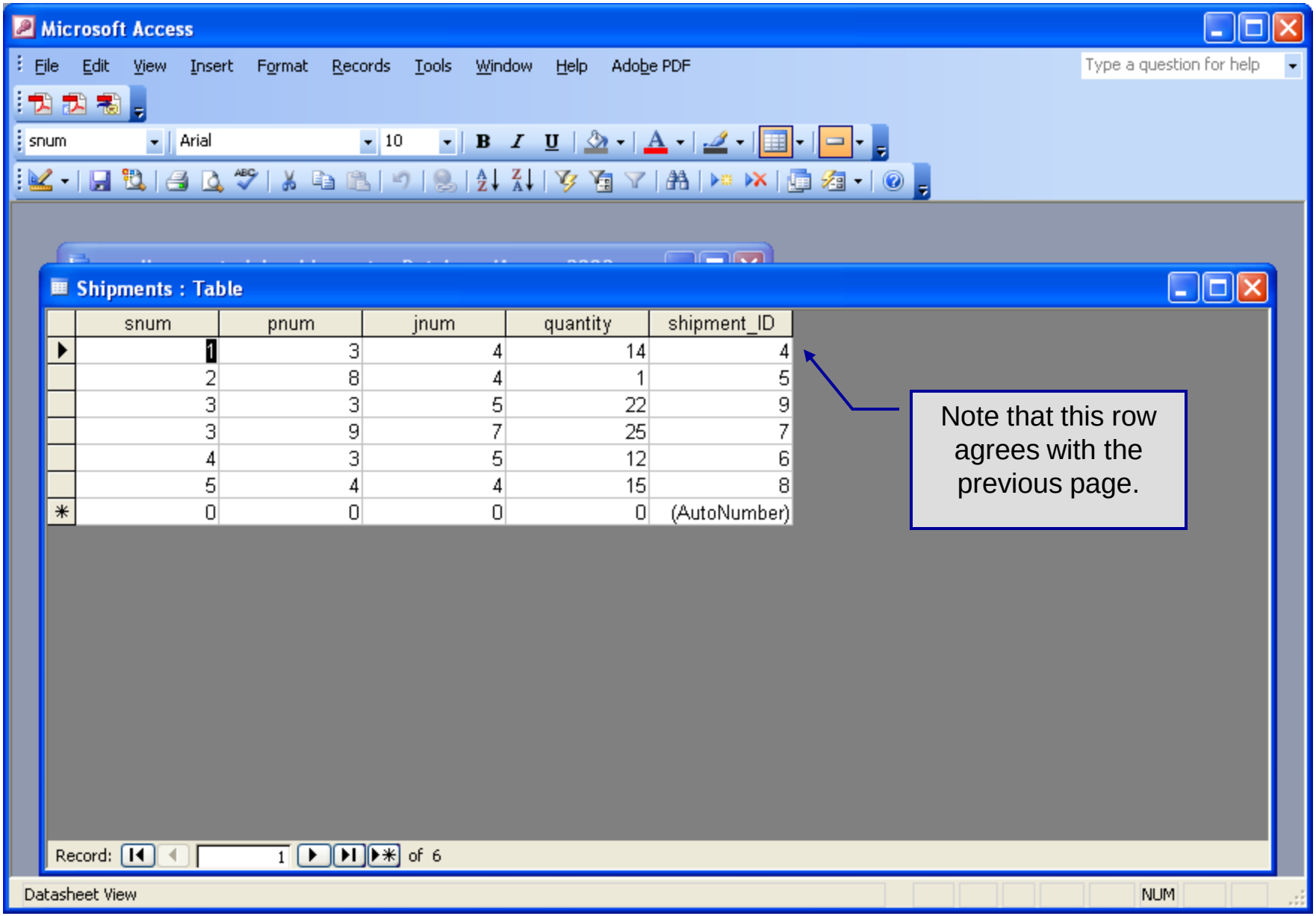
- Access has the ability to allow you to view and set the relationships that exist between the tables of your database.
- It is a somewhat rudimentary form of an ERD. Not nearly as sophisticated as we were able to develop in class, but still fairly powerful for enforcing cardinality and referential integrity constraints.
- Access allows you to view related data together fairly simply. To illustrate this, follow these steps:
  - Select the Suppliers table and go to the datasheet view as shown on the next page.




1. Notice on the left side of the table, the column containing the "expand indicators" (plus signs) next to the snum for each record.

2. In the row for supplier snum = 1, click the expand indicator. The expand indicator will change to a "collapse indicator" (minus sign) and additional information about each shipment involving this supplier will be displayed in a new window. This information is gathered from the Shipments table, because a relationship was created between the snum field in Suppliers and the snum field in Shipments. (See next page.)


Microsoft Access
File Edit View Insert Format Records Tools Window Help Adobe PDF
Type a question for help
pnum
Arial
10
Collapse indicator
Information about all of the shipments made by supplier snum = 1
Suppliers : Table
snum sname status city
1 Mark 4 Oviedo
pnum jnum quantity shipment_ID
3 4 14 4
0 0 0 (AutoNumber)
2 Dave 30 Orlando
3 Tiffany 2 Winter Springs
4 Kristi 1 Orlando
5 Karen 3 Longwood
6 Cat 4 Oviedo
7 Tami 3 Winter Springs
8 Cindy 2 Tampa
9 Mark 3 Paris
(AutoNumber) 0
To verify this information, go to the Shipments table (datasheet view) and look at the rows belonging to supplier snum = 1.
See next page.
Record: 1 of 1
Datasheet View
NUM

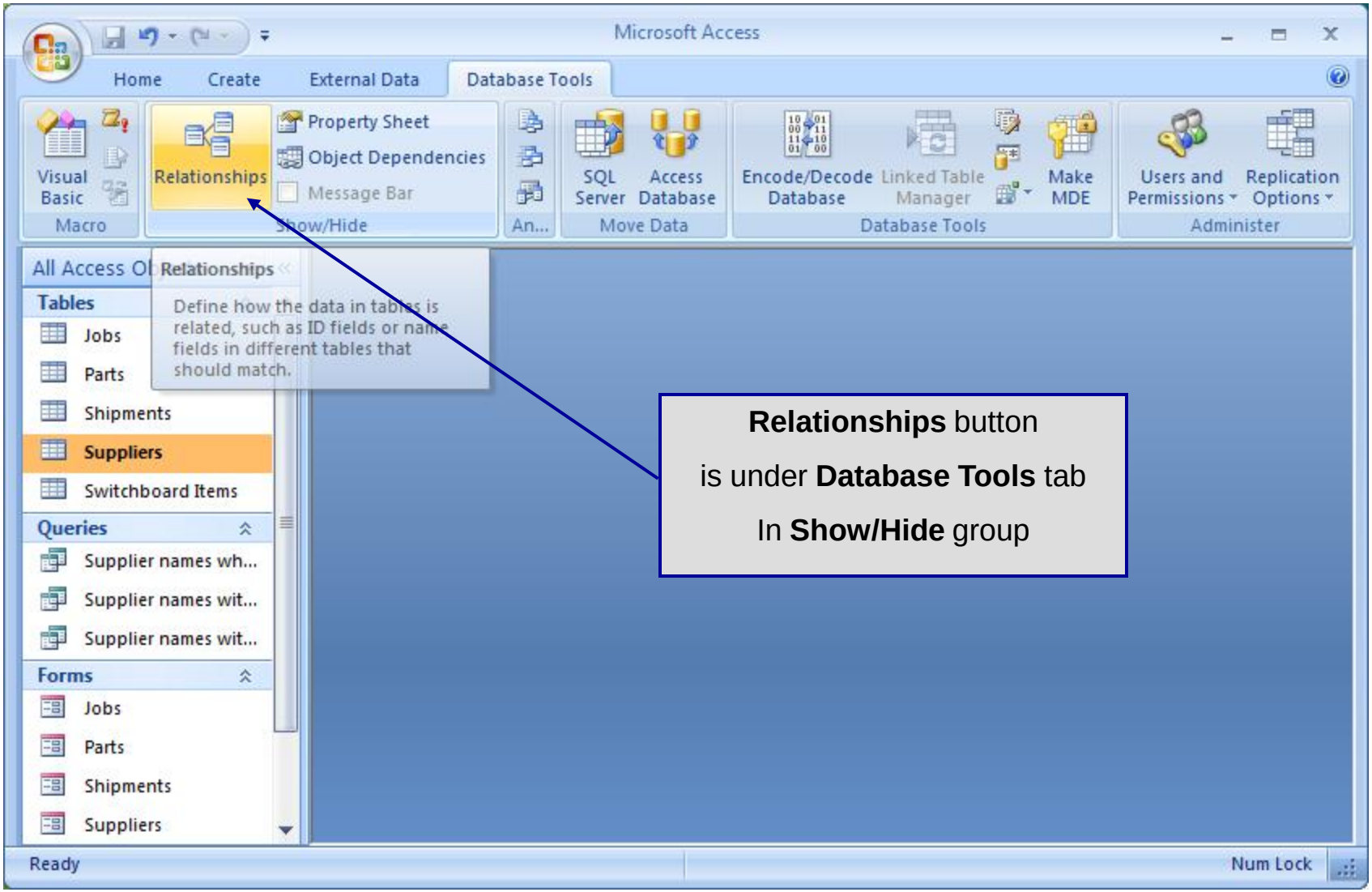

Microsoft Access
File Edit View Insert Format Records Tools Window Help Adobe PDF
Type a question for help
snum
Arial
10
Shipments : Table
snum pnum jnum quantity shipment_ID
1 3 4 14 4
2 8 4 1 5
3 3 5 22 9
3 9 7 25 7
4 3 5 12 6
5 4 4 15 8
0 0 0 0 (AutoNumber)
Note that this row agrees with the previous page.
Record: 1 of 6
Datasheet View
NUM

# Assessment Point #1

- At this point, select some of the other tables in this database and see which fields are indexed and which are not indexed.
- Try creating some indices on non-key fields that allow for duplicates and some that do not allow duplicates.
- Experiment a bit more with the viewing the relationships in this database from the datasheet view.

# Viewing the Relationships in a Database In Access

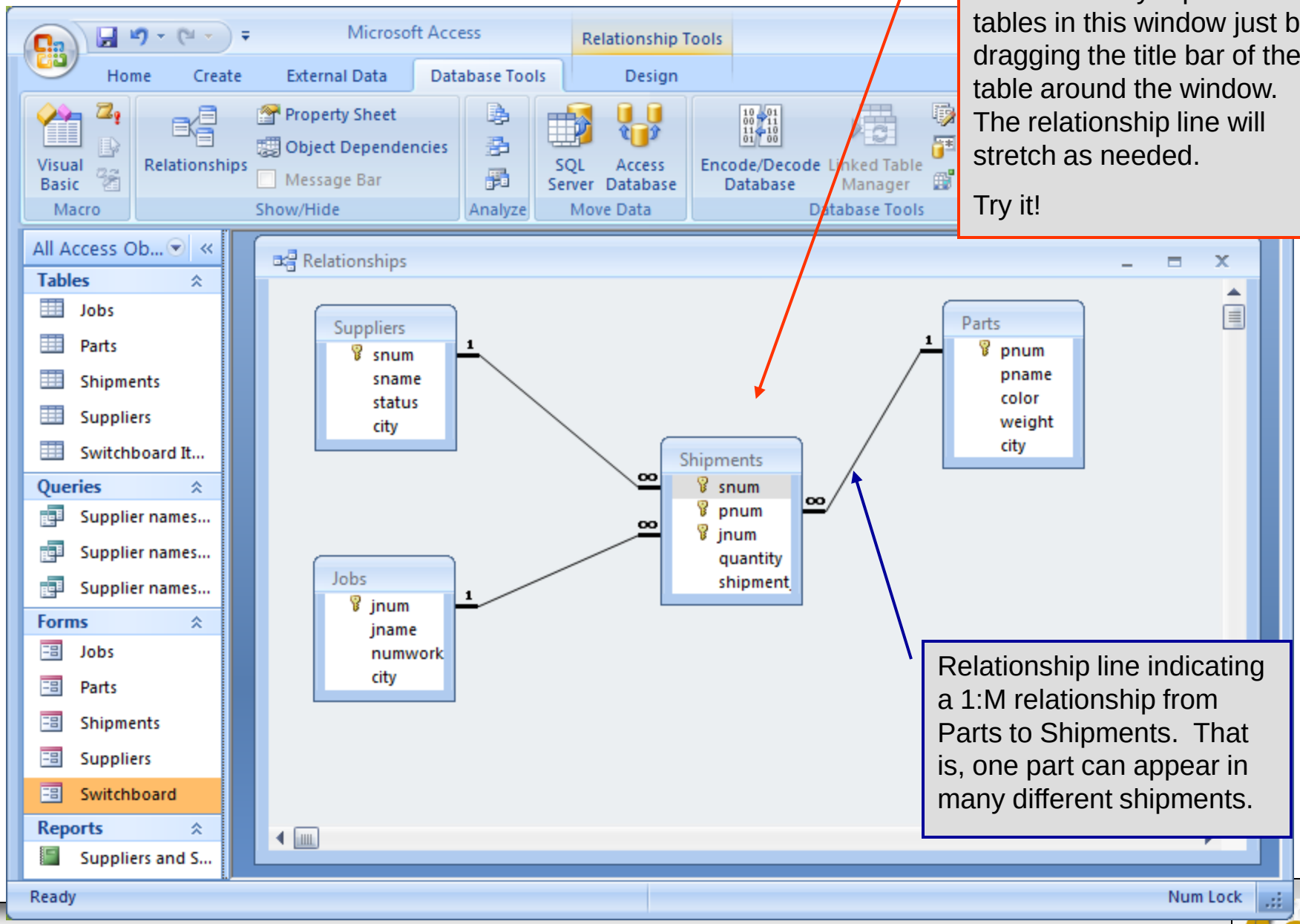
- On the database toolbar, click the Relationships button. See next page.
- The Relationships window displays. From here you can view, create, and modify relationships between tables and also between queries.
- Since we created this database earlier, we already see the relationships that have been defined for this database. See page 16.




**Relationships** button

is under **Database Tools** tab

In **Show/Hide** group


You can easily reposition the tables in this window just by dragging the title bar of the table around the window. The relationship line will stretch as needed.
Try it!
Microsoft Access
Relationship Tools
Home
Create
External Data
Database Tools
Design
Visual Basic
Macro
Relationships
Property Sheet
Object Dependencies
Message Bar
Show/Hide
Analyze
SQL Server
Access Database
Move Data
Encode/Decode Database
Linked Table Manager
Database Tools
All Access Ob...
Tables
Jobs
Parts
Shipments
Suppliers
Switchboard It...
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Suppliers
Switchboard
Reports
Suppliers and S...
Relationships
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city
Parts
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Shipments
snum
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jnum
quantity
shipment
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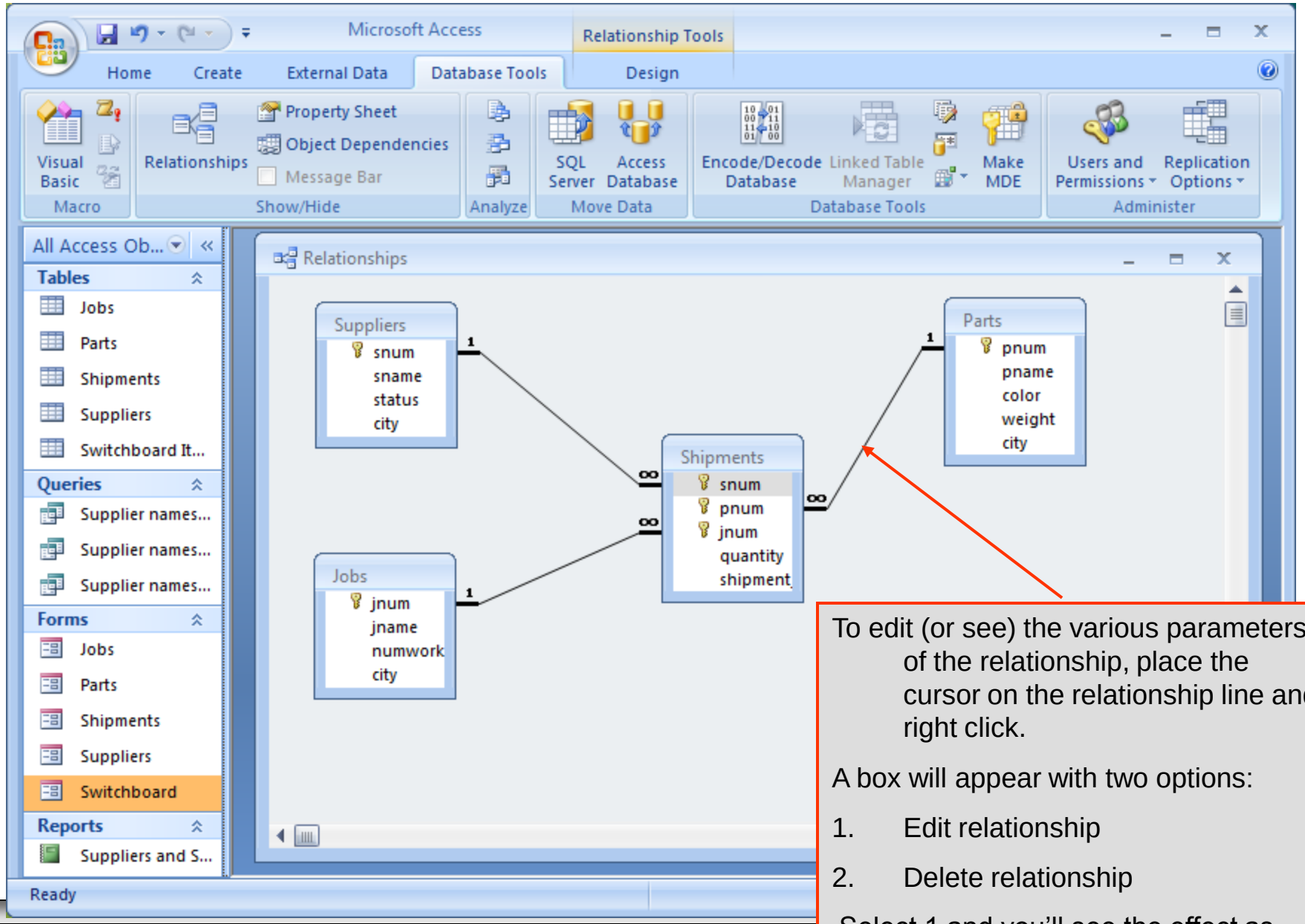
1
∞
Relationship line indicating a 1:M relationship from Parts to Shipments. That is, one part can appear in many different shipments.
Ready
Num Lock

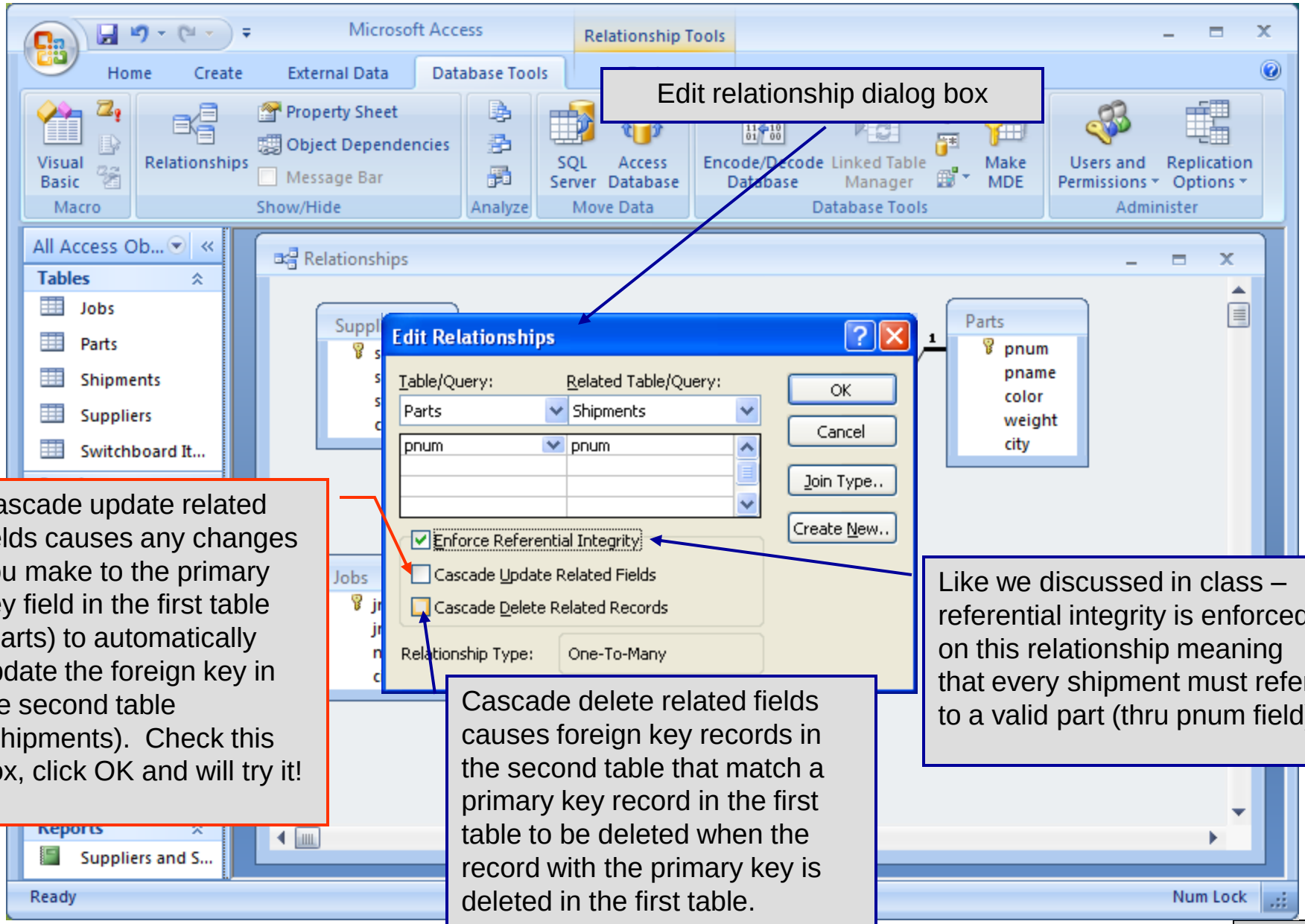



To edit (or see) the various parameters of the relationship, place the cursor on the relationship line and right click.

A box will appear with two options:

1. Edit relationship
2. Delete relationship

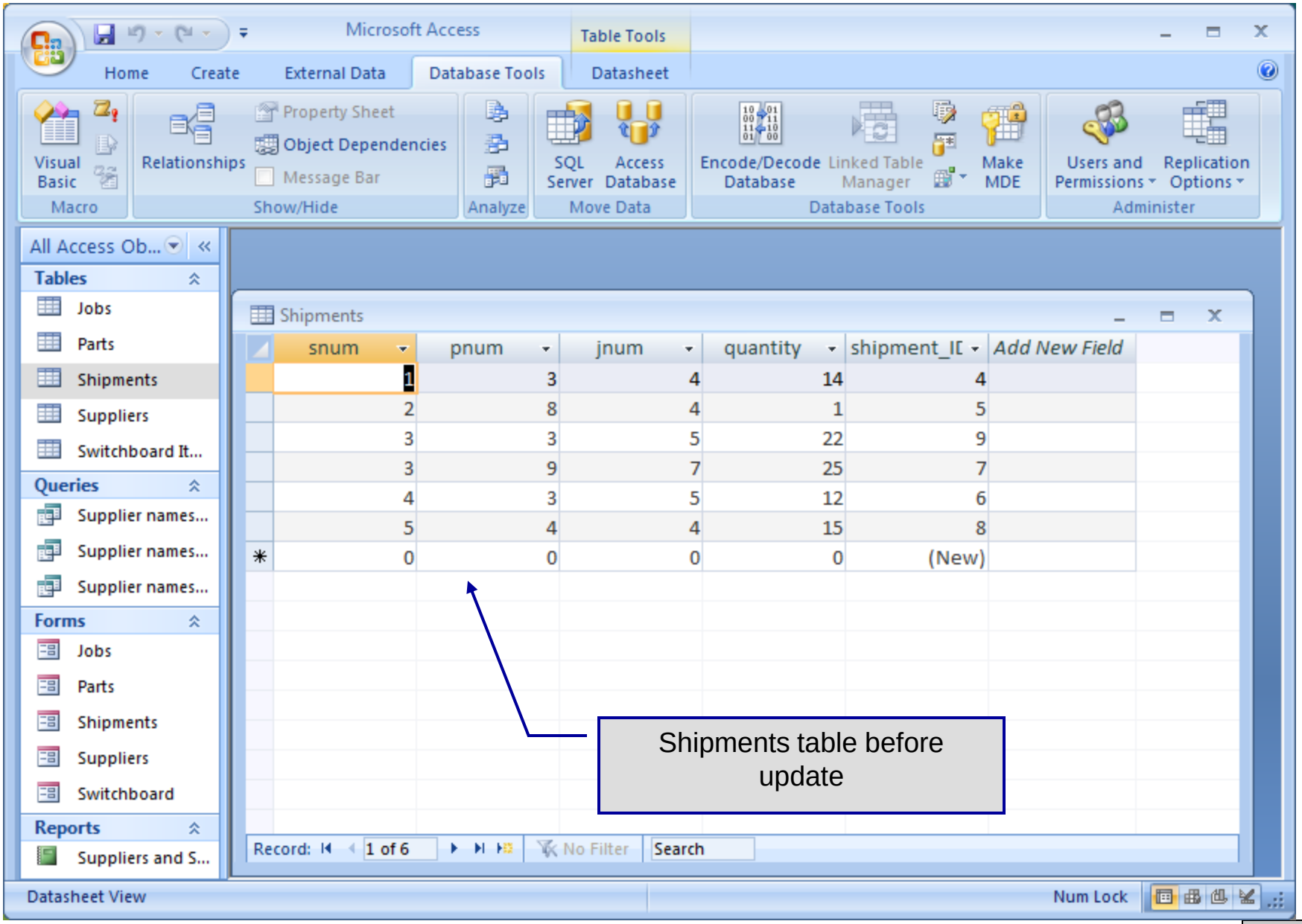
Select 1 and you'll see the effect as shown on the next page.




Cascade update related fields causes any changes you make to the primary key field in the first table (Parts) to automatically update the foreign key in the second table (Shipments). Check this box, click OK and will try it!

Like we discussed in class – referential integrity is enforced on this relationship meaning that every shipment must refer to a valid part (thru pnum field).

Cascade delete related fields causes foreign key records in the second table that match a primary key record in the first table to be deleted when the record with the primary key is deleted in the first table.


Microsoft Access
Table Tools
Home
Create
External Data
Database Tools
Datasheet
Visual Basic
Macro
Relationships
Property Sheet
Object Dependencies
Message Bar
Show/Hide
Analyze
SQL Server
Access Database
Move Data
Encode/Decode Database
Linked Table Manager
Make MDE
Database Tools
Users and Permissions
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All Access Ob...
Tables
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Parts
Shipments
Suppliers
Switchboard It...
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Supplier names...
Supplier names...
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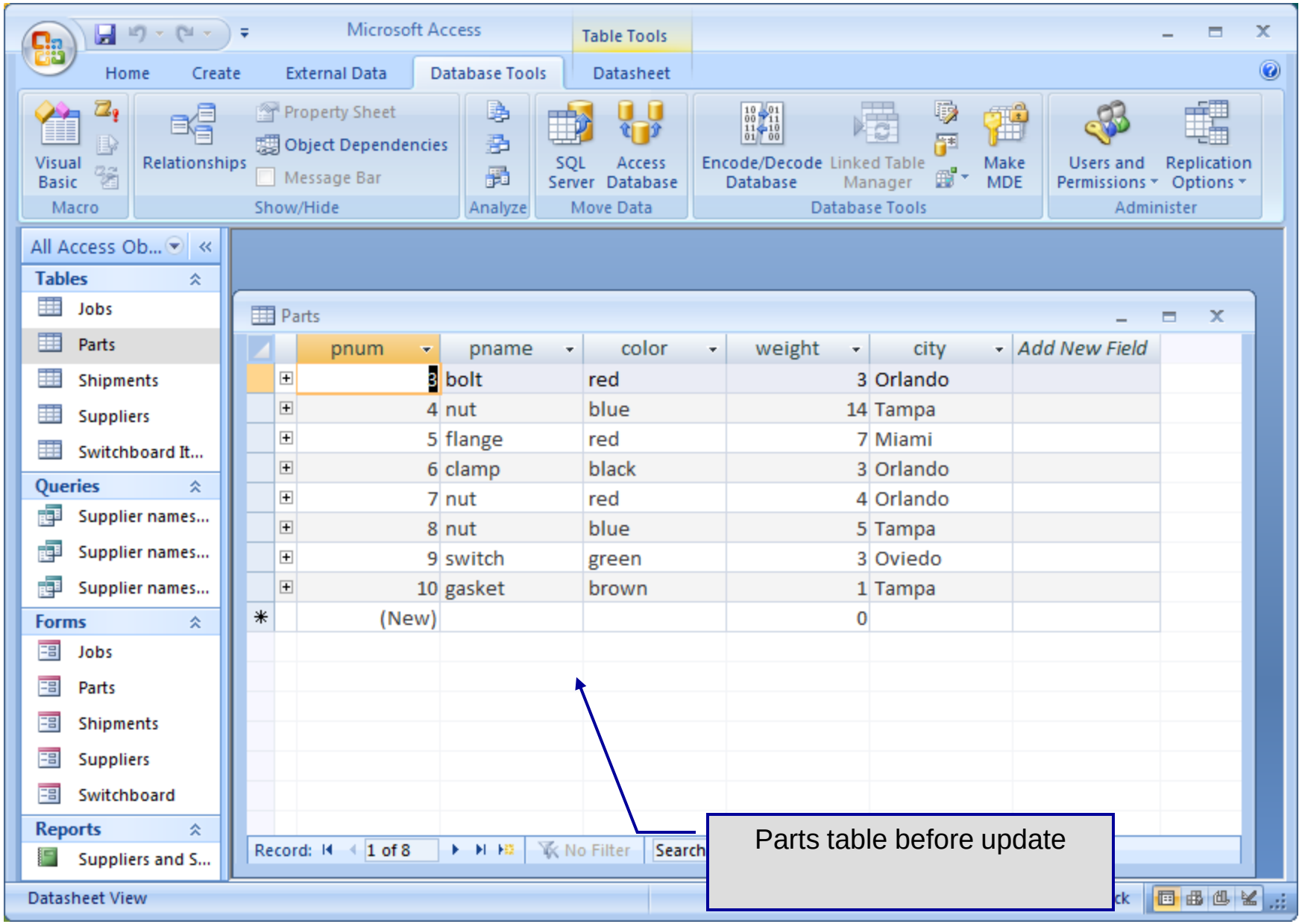
Forms
Jobs
Parts
Shipments
Suppliers
Switchboard
Reports
Suppliers and S...
Shipments
snum
pnum
jnum
quantity
shipment_ID
Add New Field
1 3 4 14 4
2 8 4 1 5
3 3 5 22 9
3 9 7 25 7
4 3 5 12 6
5 4 4 15 8
0 0 0 0 (New)
Shipments table before update
Record: 1 of 6
No Filter
Search
Datasheet View
Num Lock


Microsoft Access
Table Tools
Home
Create
External Data
Database Tools
Datasheet
Visual Basic
Macro
Relationships
Property Sheet
Object Dependencies
Message Bar
Show/Hide
Analyze
SQL Server
Access Database
Move Data
Encode/Decode Database
Linked Table Manager
Make MDE
Database Tools
Users and Permissions
Replication Options
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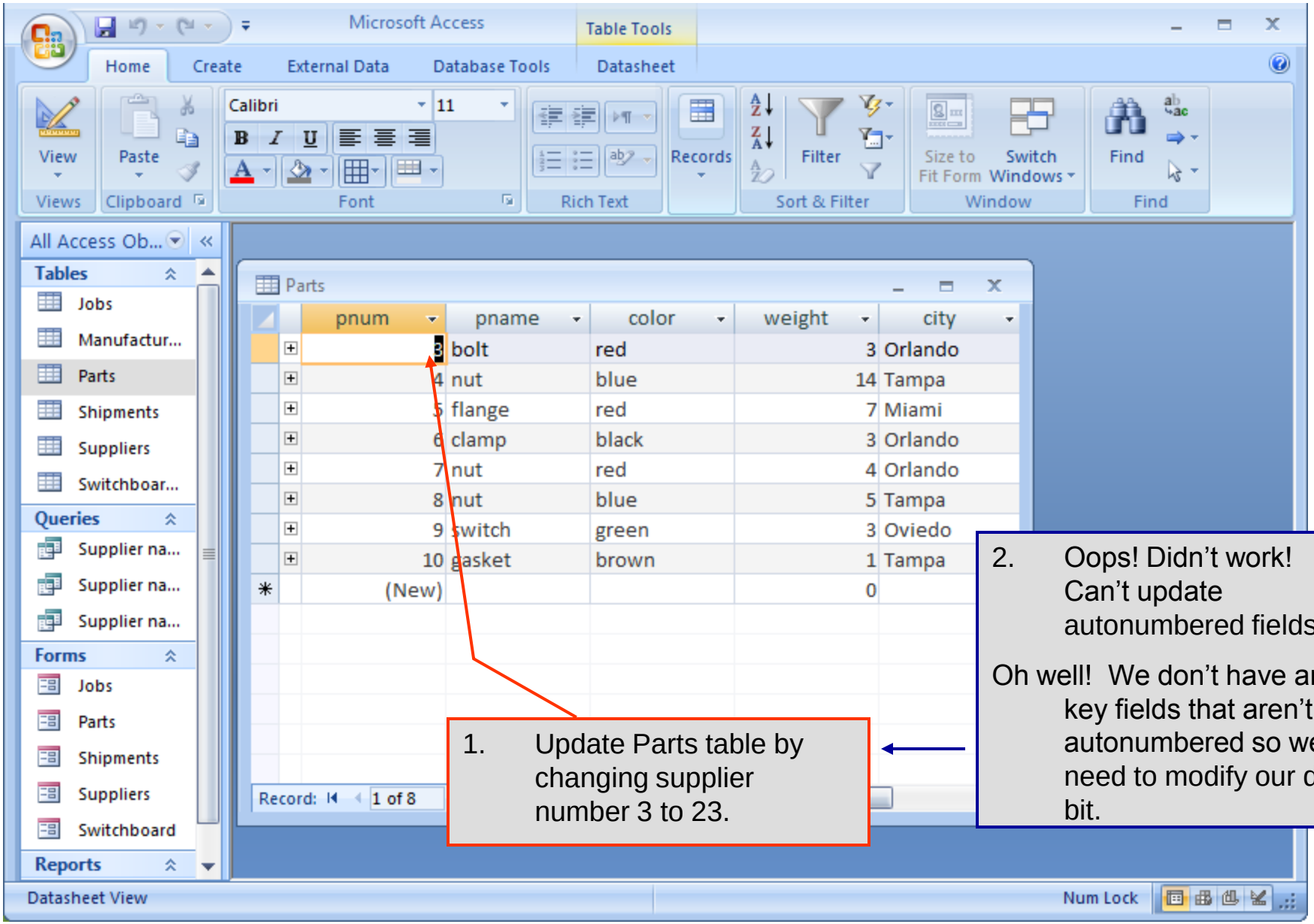
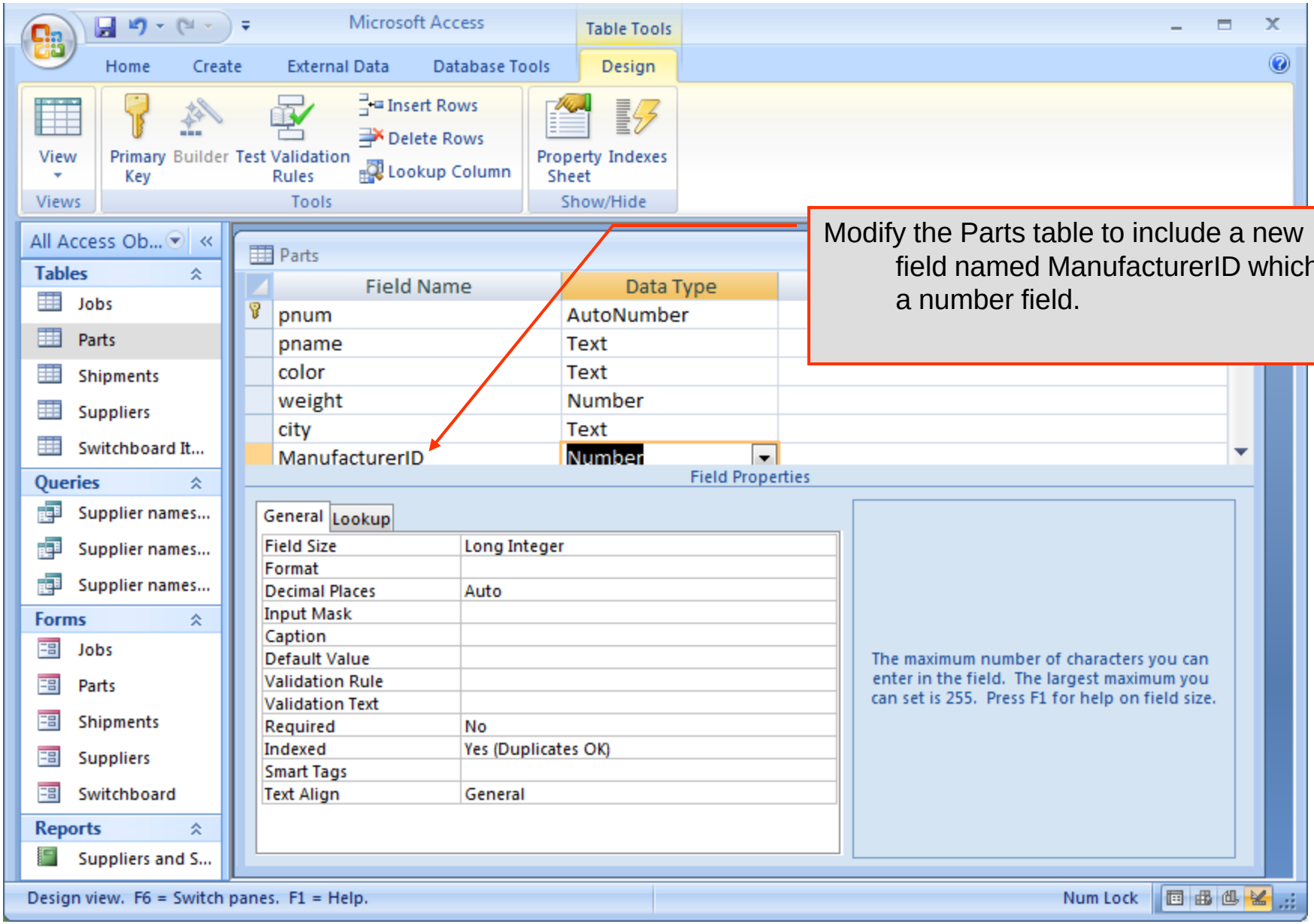
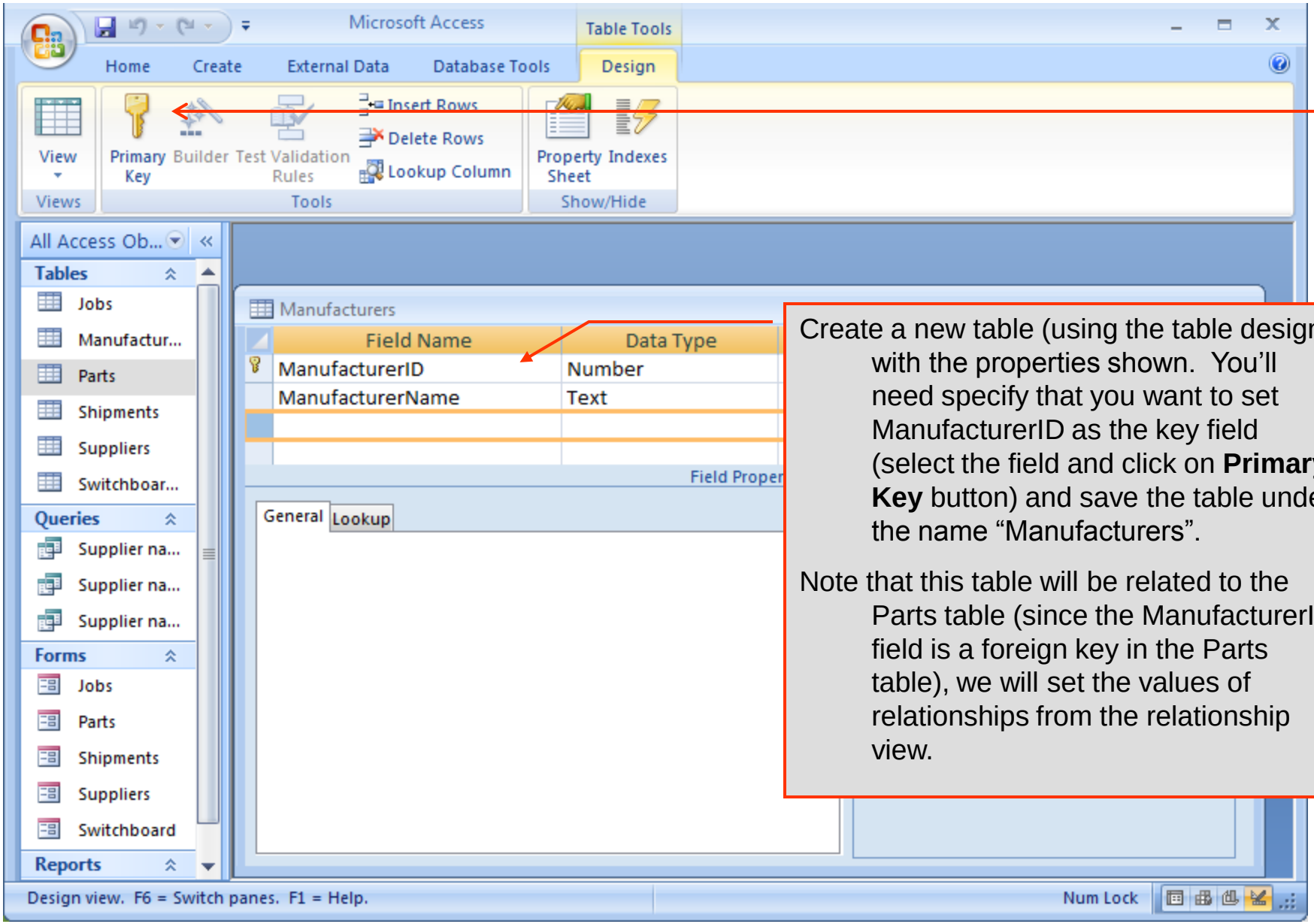
Suppliers
Switchboard It...
Queries
Supplier names...
Supplier names...
Supplier names...
Forms
Jobs
Parts
Shipments
Suppliers
Switchboard
Reports
Suppliers and S...
Parts
pnum
pname
color
weight
city
Add New Field
3 bolt red 3 Orlando
4 nut blue 14 Tampa
5 flange red 7 Miami
6 clamp black 3 Orlando
7 nut red 4 Orlando
8 nut blue 5 Tampa
9 switch green 3 Oviedo
10 gasket brown 1 Tampa
(New) 0
Record: 1 of 8
No Filter
Search
Parts table before update
Datasheet View


Microsoft Access
Table Tools
Home
Create
External Data
Database Tools
Datasheet
Parts
pnum
pname
color
weight
city
3 bolt red 3 Orlando
4 nut blue 14 Tampa
5 flange red 7 Miami
6 clamp black 3 Orlando
7 nut red 4 Orlando
8 nut blue 5 Tampa
9 switch green 3 Oviedo
10 gasket brown 1 Tampa
(New) 0
Record: 1 of 8
1. Update Parts table by changing supplier number 3 to 23.
2. Oops! Didn't work! Can't update autonumbered fields.
Oh well! We don't have any key fields that aren't autonumbered so we'll need to modify our db a bit.
Datasheet View
Num Lock

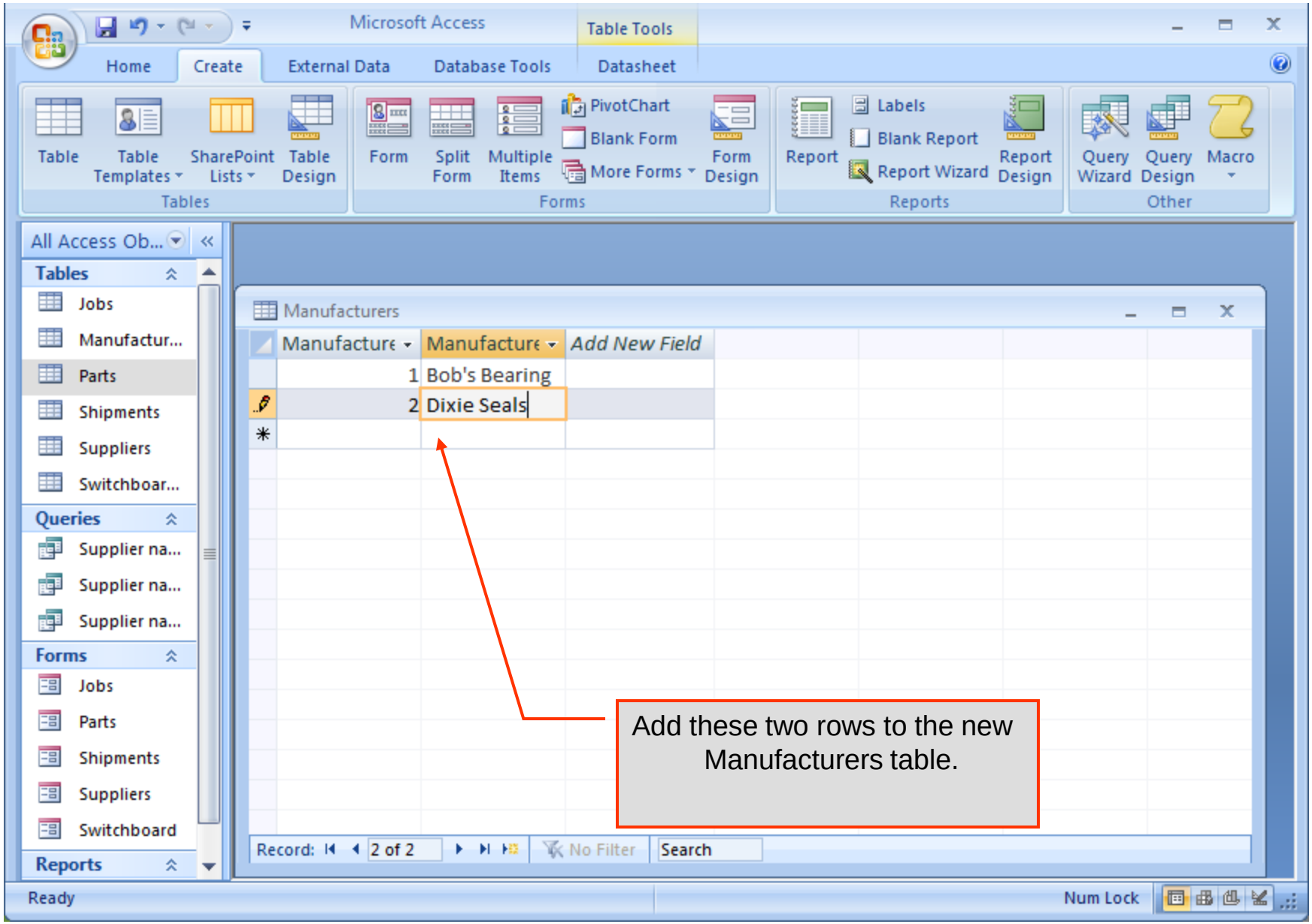



Modify the Parts table to include a new field named ManufacturerID which is a number field.




Create a new table (using the table design) with the properties shown. You'll need specify that you want to set ManufacturerID as the key field (select the field and click on **Primary Key** button) and save the table under the name "Manufacturers".

Note that this table will be related to the Parts table (since the ManufacturerID field is a foreign key in the Parts table), we will set the values of relationships from the relationship view.


Microsoft Access
Table Tools
Home
Create
External Data
Database Tools
Datasheet
Table
Table Templates
SharePoint Lists
Table Design
Tables
Form
Split Form
Multiple Items
PivotChart
Blank Form
More Forms
Form Design
Forms
Report
Labels
Blank Report
Report Wizard
Report Design
Reports
Query Wizard
Query Design
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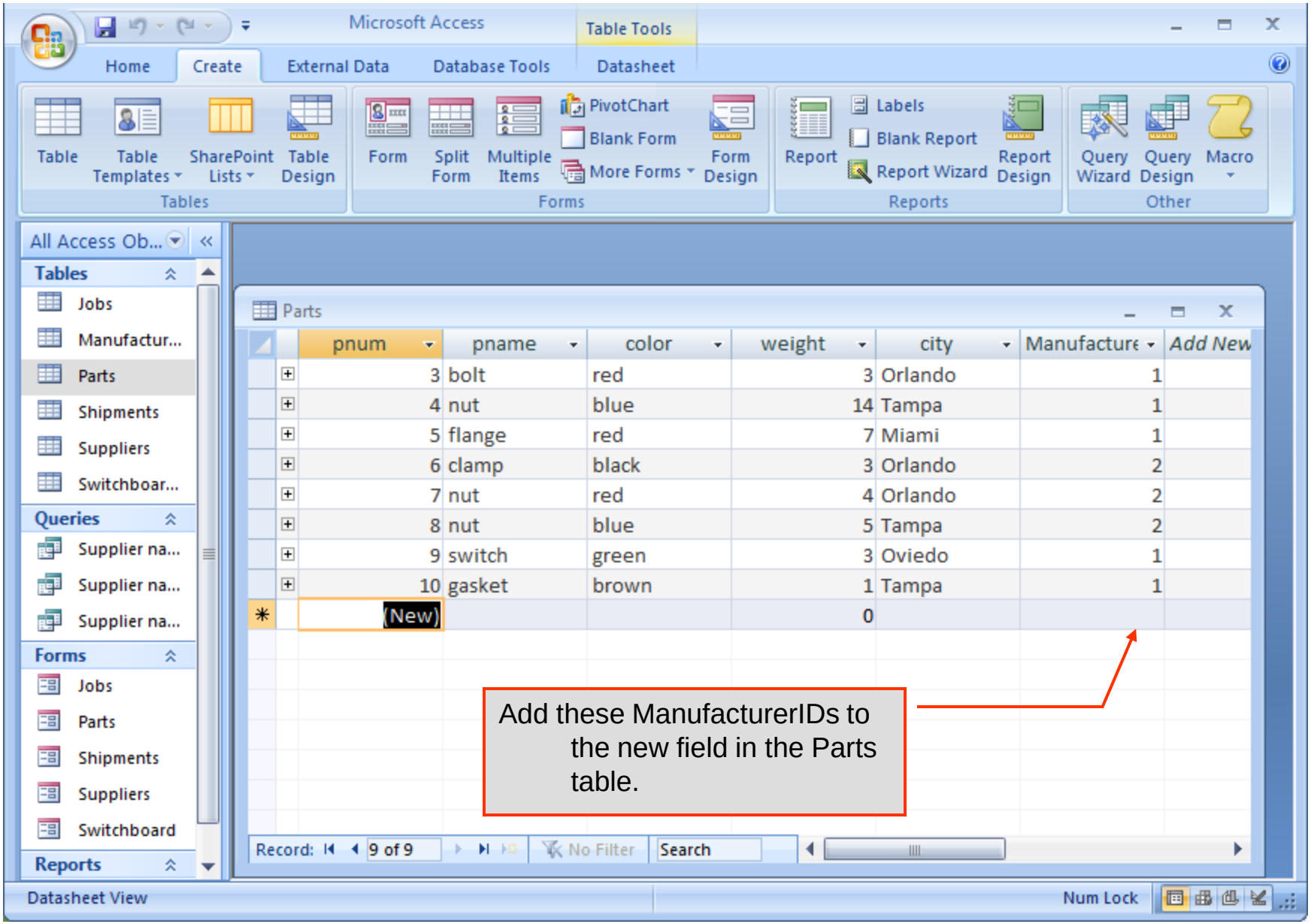
Supplier na...
Supplier na...
Supplier na...
Forms
Jobs
Parts
Shipments
Suppliers
Switchboard
Reports
Manufacturers
Manufacture
Manufacture
Add New Field
1 Bob's Bearing
2 Dixie Seals
Add these two rows to the new Manufacturers table.
Record: 2 of 2
No Filter
Search
Ready
Num Lock


Microsoft Access
Table Tools
Home
Create
External Data
Database Tools
Datasheet
Table
Table Templates
SharePoint Lists
Table Design
Tables
Form
Split Form
Multiple Items
PivotChart
Blank Form
More Forms
Form Design
Forms
Report
Labels
Blank Report
Report Wizard
Report Design
Reports
Query Wizard
Query Design
Macro
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Tables
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Manufactur...
Parts
Shipments
Suppliers
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Forms
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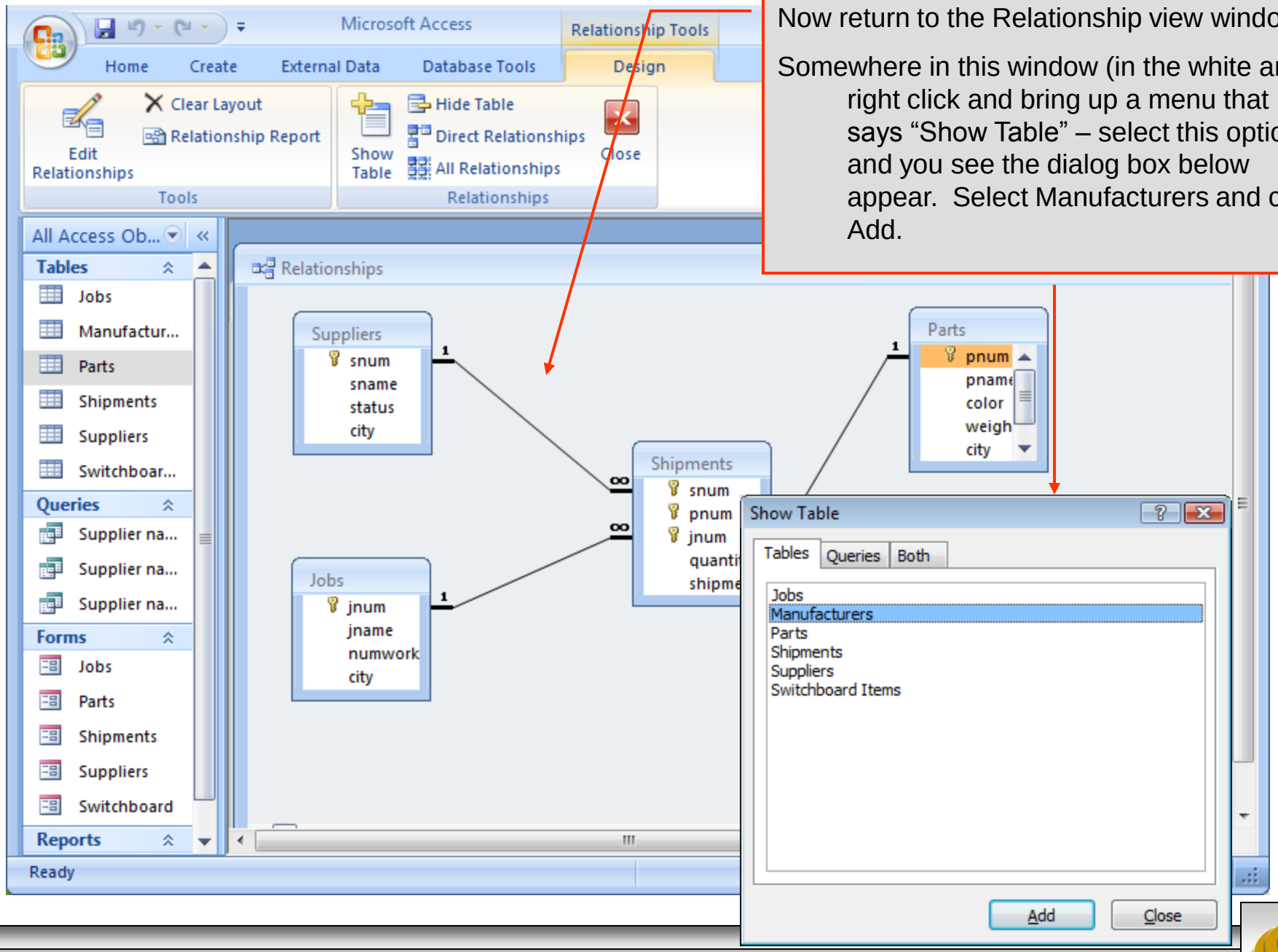
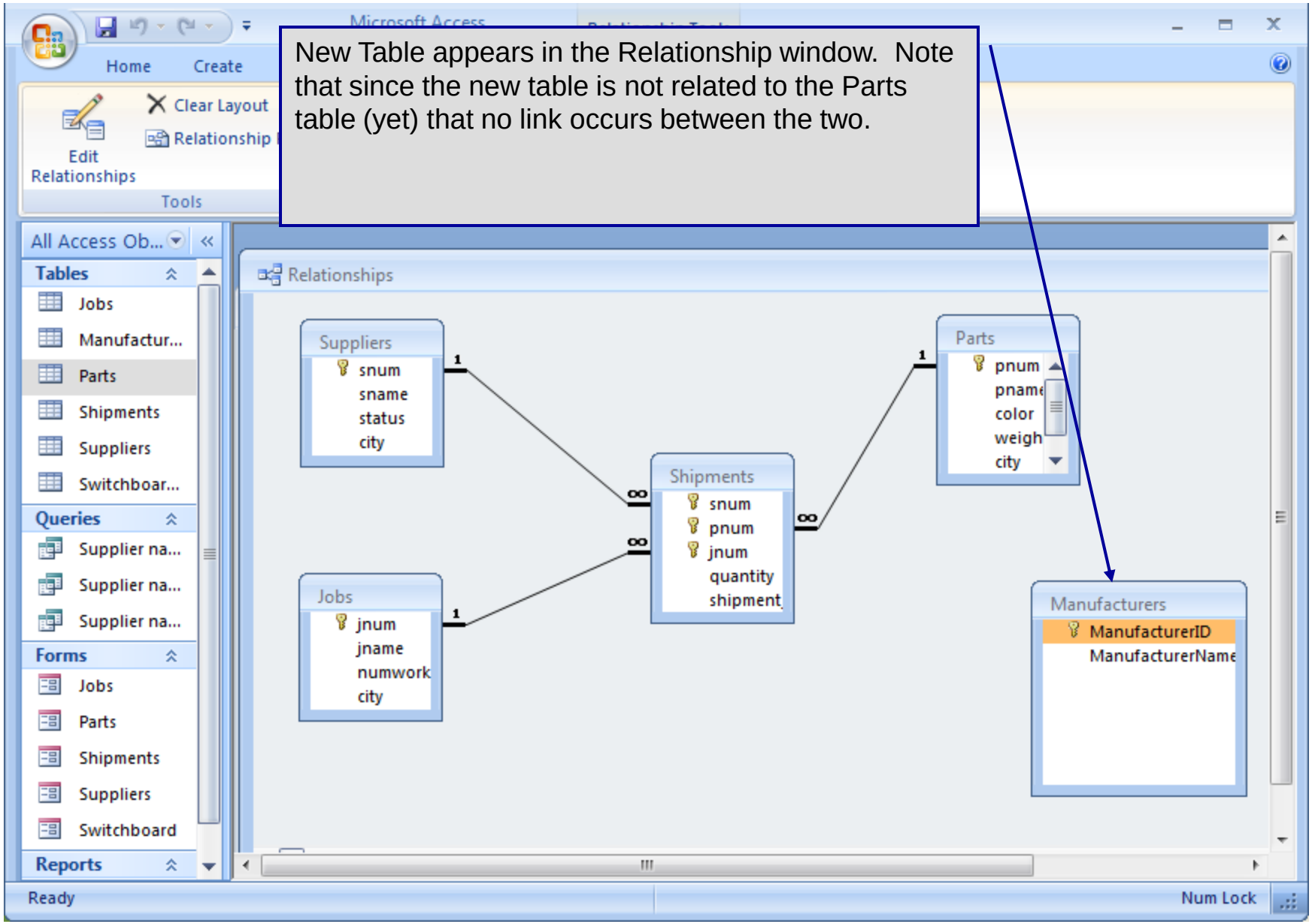
Parts
Shipments
Suppliers
Switchboard
Reports
Parts
pnum
pname
color
weight
city
Manufacture
Add New
3 bolt red 3 Orlando 1
4 nut blue 14 Tampa 1
5 flange red 7 Miami 1
6 clamp black 3 Orlando 2
7 nut red 4 Orlando 2
8 nut blue 5 Tampa 2
9 switch green 3 Oviedo 1
10 gasket brown 1 Tampa 1
(New) 0
Add these ManufacturerIDs to the new field in the Parts table.
Record: 9 of 9
No Filter
Search
Datasheet View
Num Lock

Now return to the Relationship view window.

Somewhere in this window (in the white area) right click and bring up a menu that says “Show Table” – select this option and you see the dialog box below appear. Select Manufacturers and click Add.




New Table appears in the Relationship window. Note that since the new table is not related to the Parts table (yet) that no link occurs between the two.
Home
Create
Clear Layout
Relationship
Edit Relationships
Tools
All Access Ob...
Tables
Jobs
Manufactur...
Parts
Shipments
Suppliers
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Queries
Supplier na...
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Forms
Jobs
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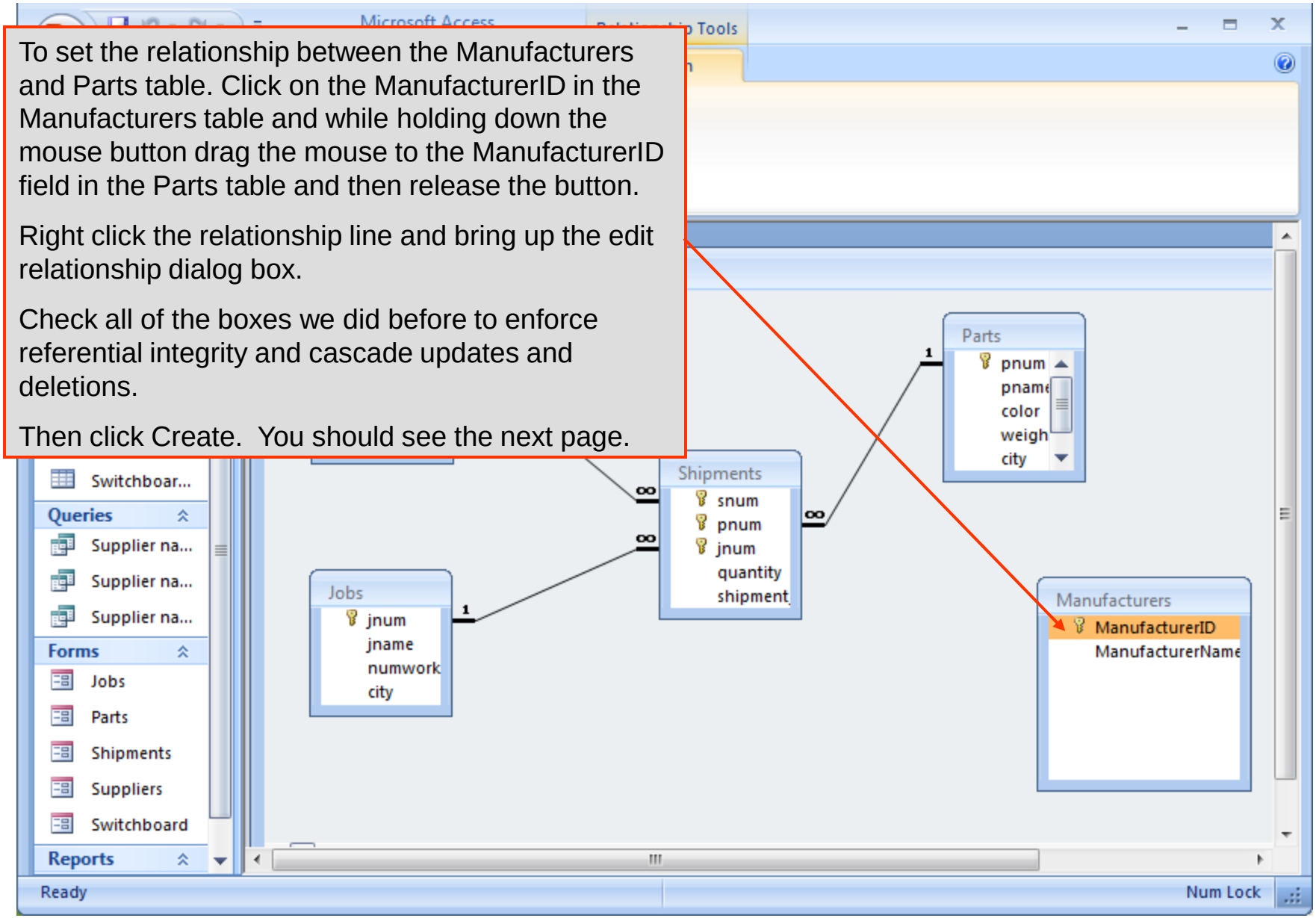
Shipments
Suppliers
Switchboard
Reports
Relationships
Suppliers
snum
sname
status
city
Parts
pnum
pname
color
weigh
city
Shipments
snum
pnum
jnum
quantity
shipment
Jobs
jnum
jname
numwork
city
Manufacturers
ManufacturerID
ManufacturerName
Ready
Num Lock

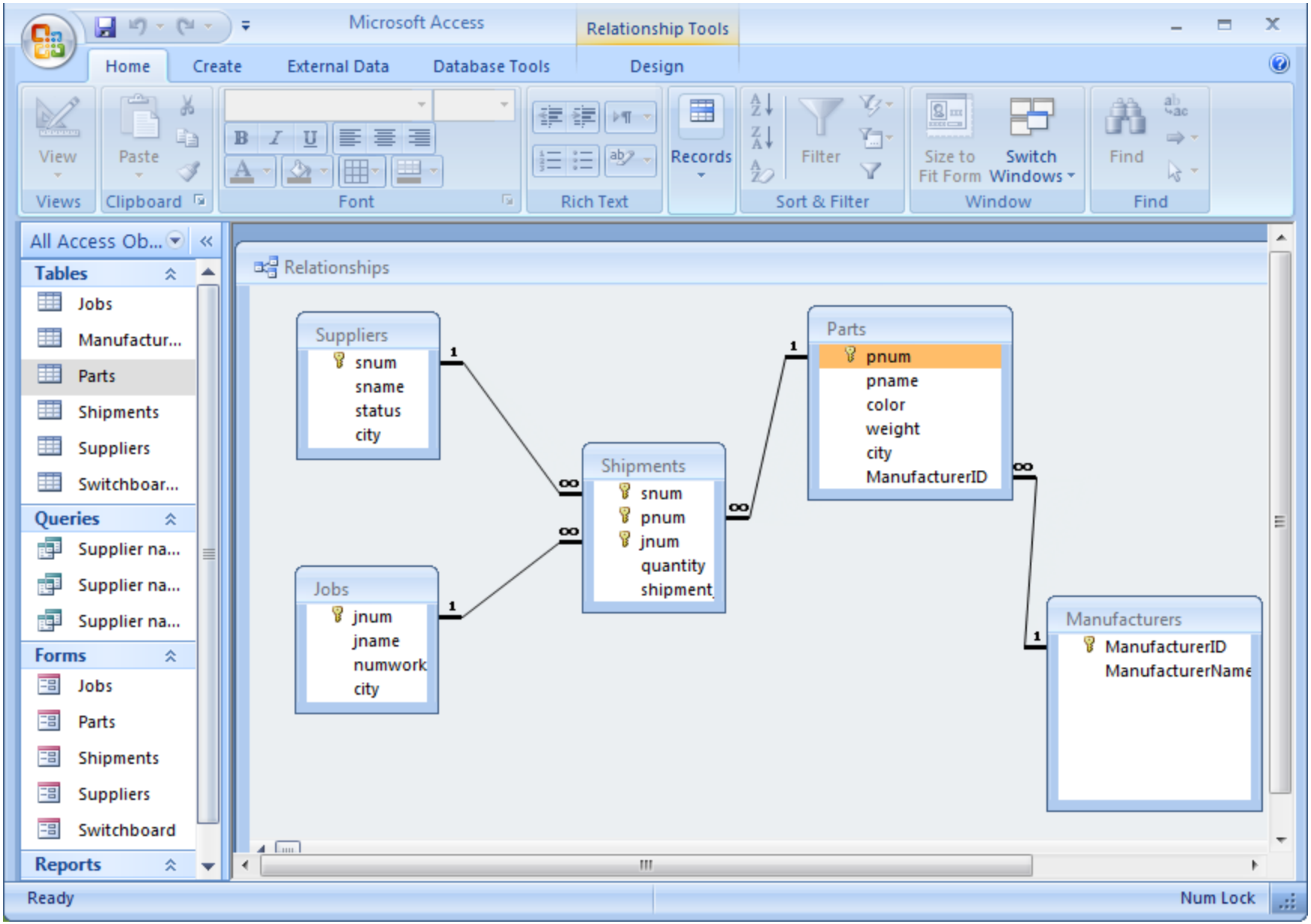
To set the relationship between the Manufacturers and Parts table. Click on the ManufacturerID in the Manufacturers table and while holding down the mouse button drag the mouse to the ManufacturerID field in the Parts table and then release the button.

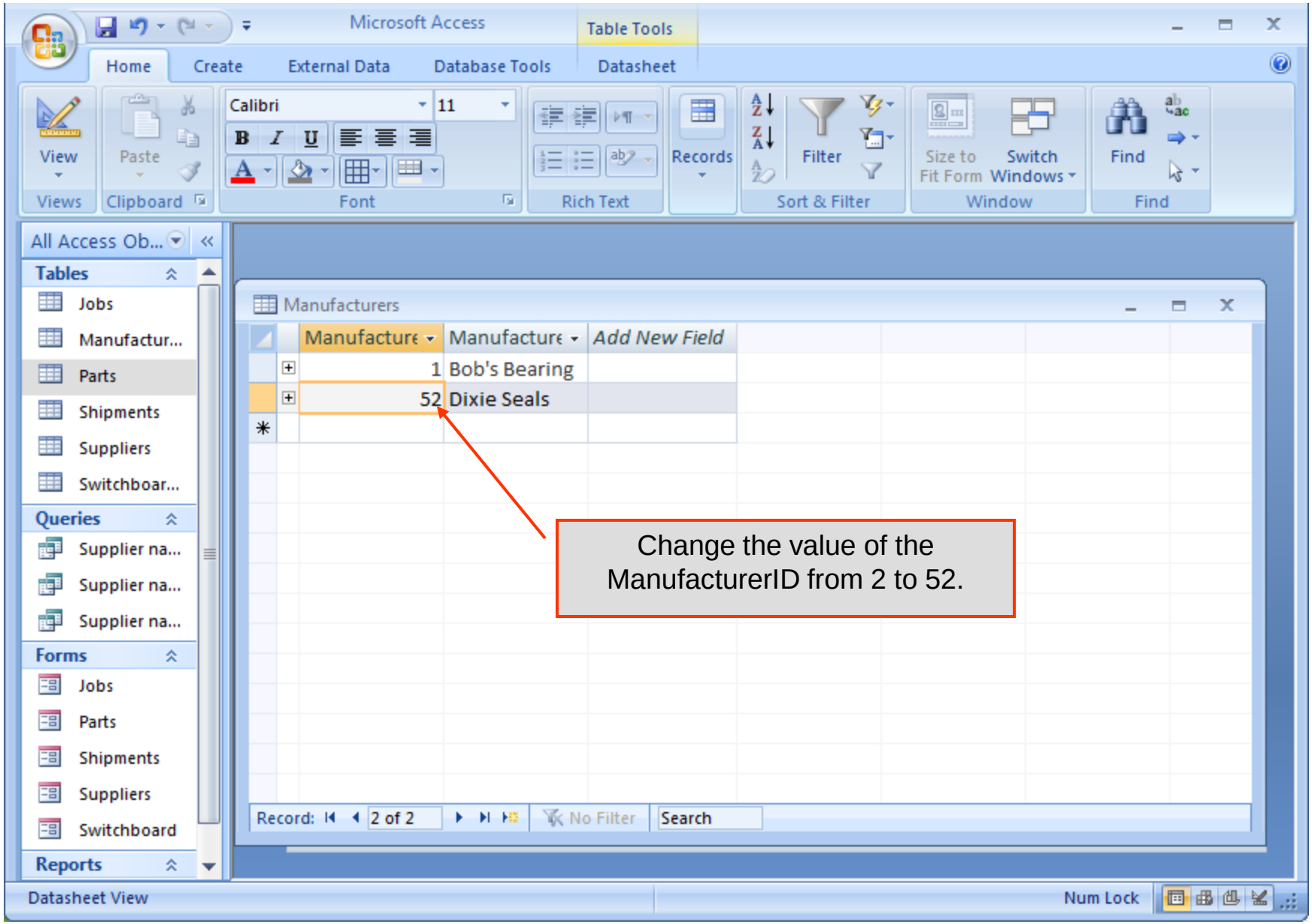
Right click the relationship line and bring up the edit relationship dialog box.

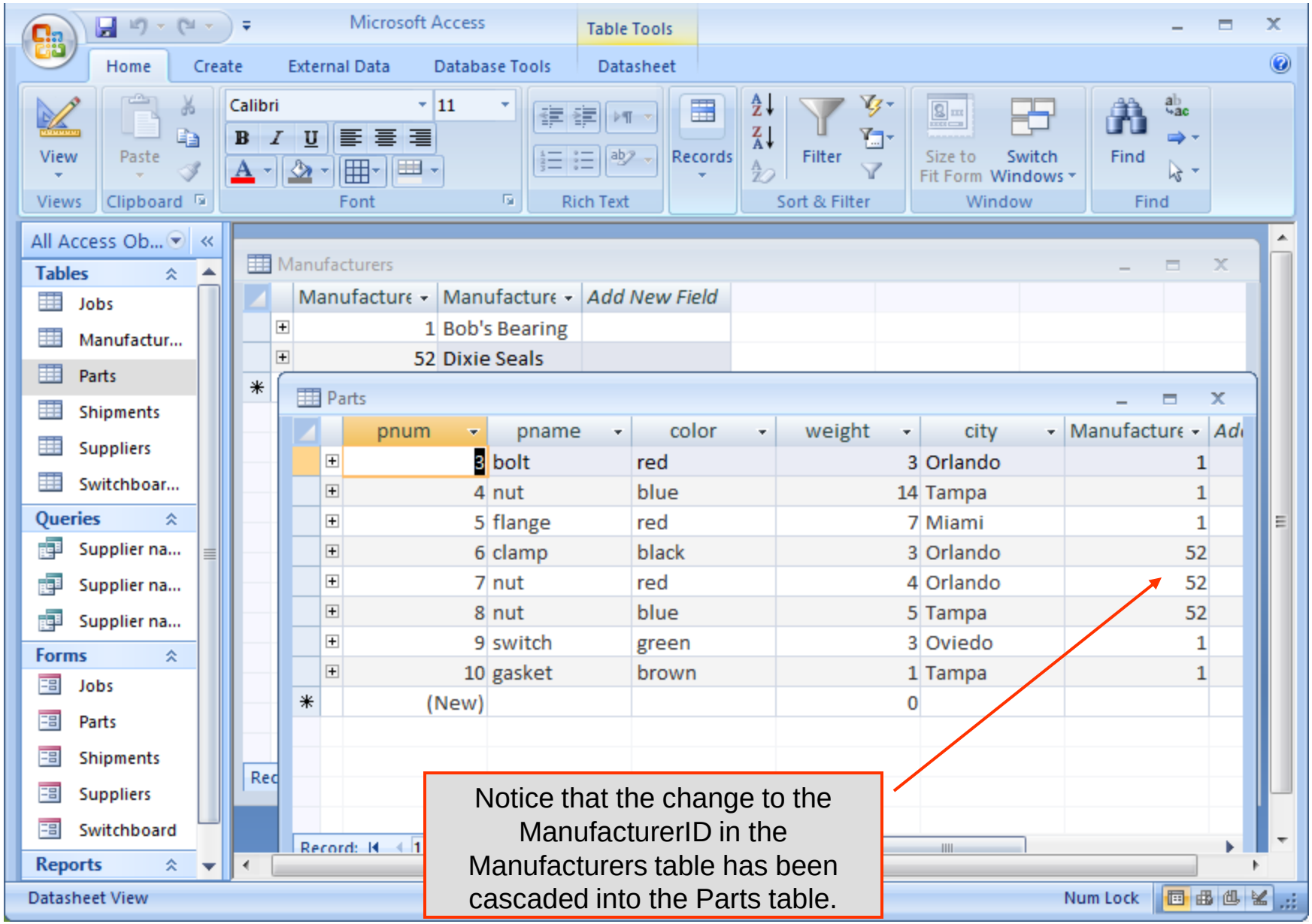
Check all of the boxes we did before to enforce referential integrity and cascade updates and deletions.

Then click Create. You should see the next page.



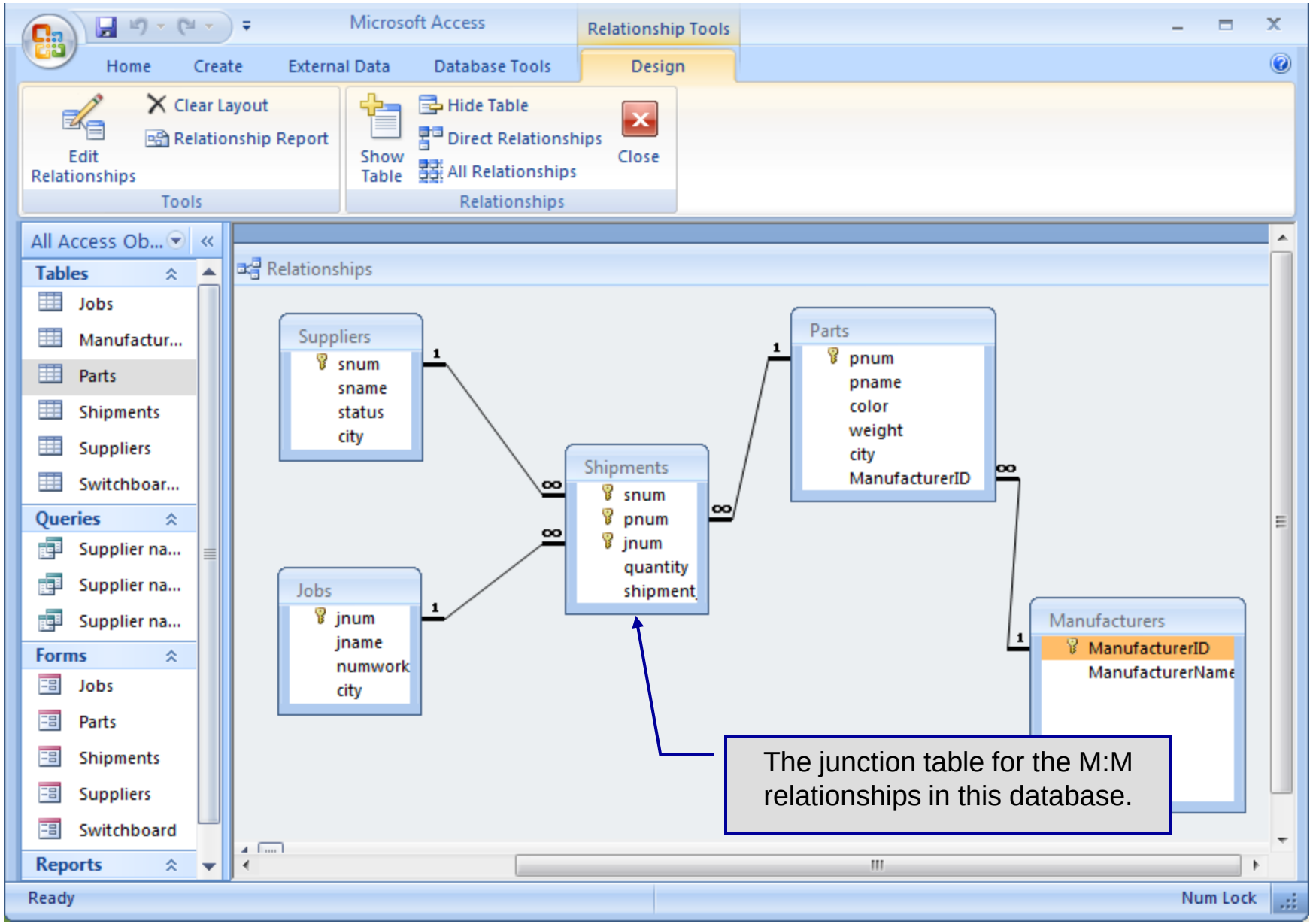

Microsoft Access
Relationship Tools
Home
Create
External Data
Database Tools
Design
View
Paste
Views
Clipboard
Font
Rich Text
Records
Filter
Sort & Filter
Size to Fit Form
Switch Windows
Window
Find
Find
All Access Ob...
Tables
Jobs
Manufactur...
Parts
Shipments
Suppliers
Switchboar...
Queries
Supplier na...
Supplier na...
Supplier na...
Forms
Jobs
Parts
Shipments
Suppliers
Switchboard
Reports
Relationships
Suppliers
snum
sname
status
city
Parts
pnum
pname
color
weight
city
ManufacturerID
Shipments
snum
pnum
jnum
quantity
shipment
Jobs
jnum
jname
numwork
city
Manufacturers
ManufacturerID
ManufacturerName
1
∞
Ready
Num Lock


Microsoft Access
Table Tools
Home
Create
External Data
Database Tools
Datasheet
Manufacturers
Manufacture
Manufacture
Add New Field
1
Bob's Bearing
52
Dixie Seals
Change the value of the ManufacturerID from 2 to 52.
Record: 2 of 2
No Filter
Search
Tables
Jobs
Manufactur...
Parts
Shipments
Suppliers
Switchboar...
Queries
Supplier na...
Supplier na...
Supplier na...
Forms
Jobs
Parts
Shipments
Suppliers
Switchboard
Reports
Datasheet View
Num Lock


Microsoft Access
Table Tools
Home
Create
External Data
Database Tools
Datasheet
Manufacturers
Manufacture
Manufacture
Add New Field
1 Bob's Bearing
52 Dixie Seals
Parts
pnum
pname
color
weight
city
Manufacture
3 bolt red 3 Orlando 1
4 nut blue 14 Tampa 1
5 flange red 7 Miami 1
6 clamp black 3 Orlando 52
7 nut red 4 Orlando 52
8 nut blue 5 Tampa 52
9 switch green 3 Oviedo 1
10 gasket brown 1 Tampa 1
(New) 0
Notice that the change to the ManufacturerID in the Manufacturers table has been cascaded into the Parts table.
Datasheet View
Num Lock

# Working with M:M Relationships In Access

- In Access a M:M relationship involves two tables that each have a 1:M relationship with a third table called a *junction table*.
- As we saw in class converting ERDs to relational schemas, the primary key of the junction table is composed of the primary keys of the other two tables.
- Our supplier-parts-jobs database already models the M:M relationships between suppliers and shipments, parts and shipments, and jobs and shipments as can be seen on the next page. The junction table in each of these cases is the shipments table.
- If you look at page 29 of the Chapter 5 – Part 1 lecture notes, you will see a very clear case of a M:M relationship. In this case the junction table is the table named `Certificate`.


Microsoft Access
Relationship Tools
Home
Create
External Data
Database Tools
Design
Edit Relationships
Clear Layout
Relationship Report
Tools
Show Table
Hide Table
Direct Relationships
All Relationships
Close
Relationships
All Access Ob...
Tables
Jobs
Manufactur...
Parts
Shipments
Suppliers
Switchboar...
Queries
Supplier na...
Supplier na...
Supplier na...
Forms
Jobs
Parts
Shipments
Suppliers
Switchboard
Reports
Relationships
Suppliers
snum
sname
status
city
Parts
pnum
pname
color
weight
city
ManufacturerID
Shipments
snum
pnum
jnum
quantity
shipment
Jobs
jnum
jname
numwork
city
Manufacturers
ManufacturerID
ManufacturerName
1
∞
The junction table for the M:M relationships in this database.
Ready
Num Lock

# Lab Assignment #6

Lab Assignment #6 – Due Tuesday November 2nd by 11:55 pm (WebCourses time) – 25 points

Create a simple Access database (see below for naming convention) and define a 1:1 (10 points), 1:M (5 points), and M:M (10 points) relationship for the tables you've selected. NOTE: To be awarded 5 points for a 1:M relationship, it must **not** be a part of any M:M relationship in your database.

You can go back through the lecture notes to find an example database to use for this assignment or you can create a new one, your choice. (Modifying the example on page 29 of the Chapter 5 – Part 1 lecture notes would be one way to start.)

Upload your database (the .mdb or .accdb file) using the following naming convention.

NOTE: Please use the following naming convention for your uploaded files:

HW06_FirstNameLastName.mdb or HW06_FirstNameLastName.accdb

The final tutorial type lab next week will look at SQL in Access.