COP 4710: Database Systems
Spring 2004

-Day 16 – March 1, 2004 –
Introduction to Microsoft Access 2000

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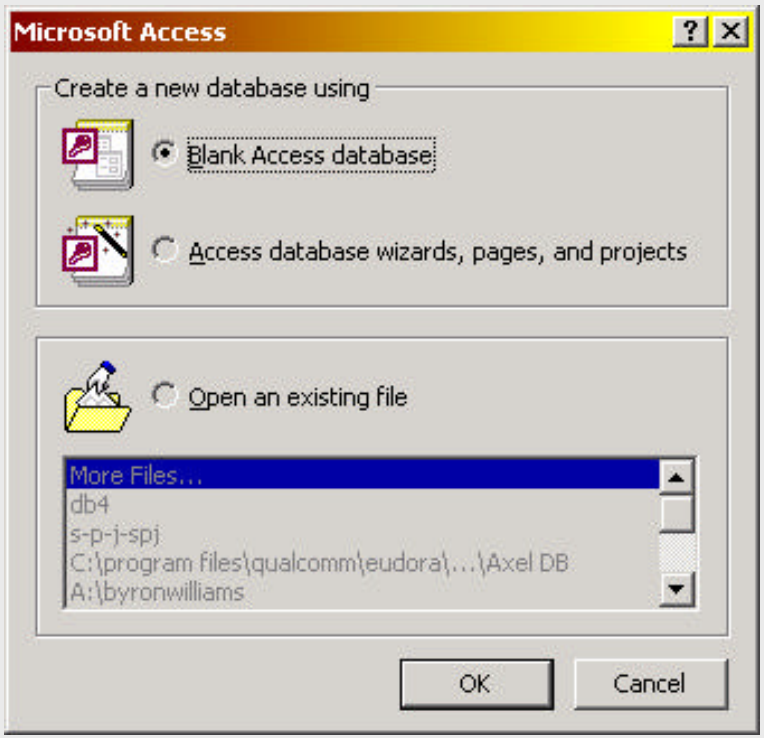
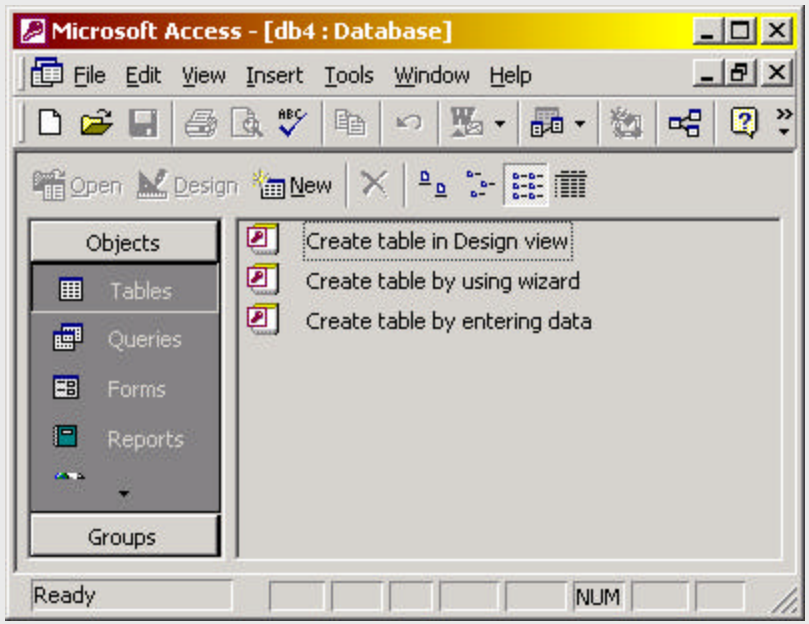
Creating a New, Blank Database



Creating a database from scratch will give us complete control over the database objects, their properties, and their relationships.

Creating and Modifying Tables



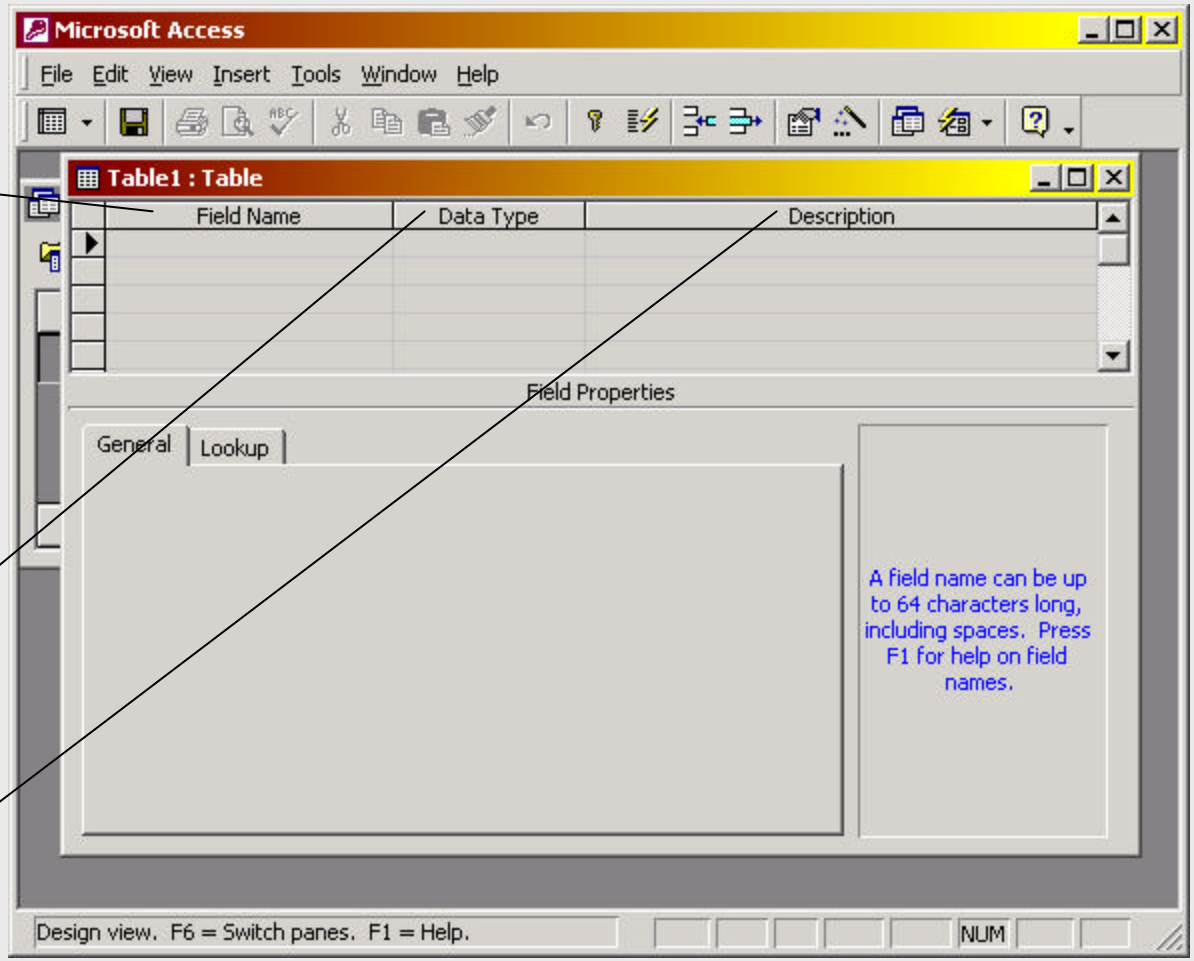
- In the database window, three methods are listed:
  - Create Table in Design View
  - Create Table By Using Wizard
  - Create Table By Entering Data

Creating a Table in Design View – Blank Table

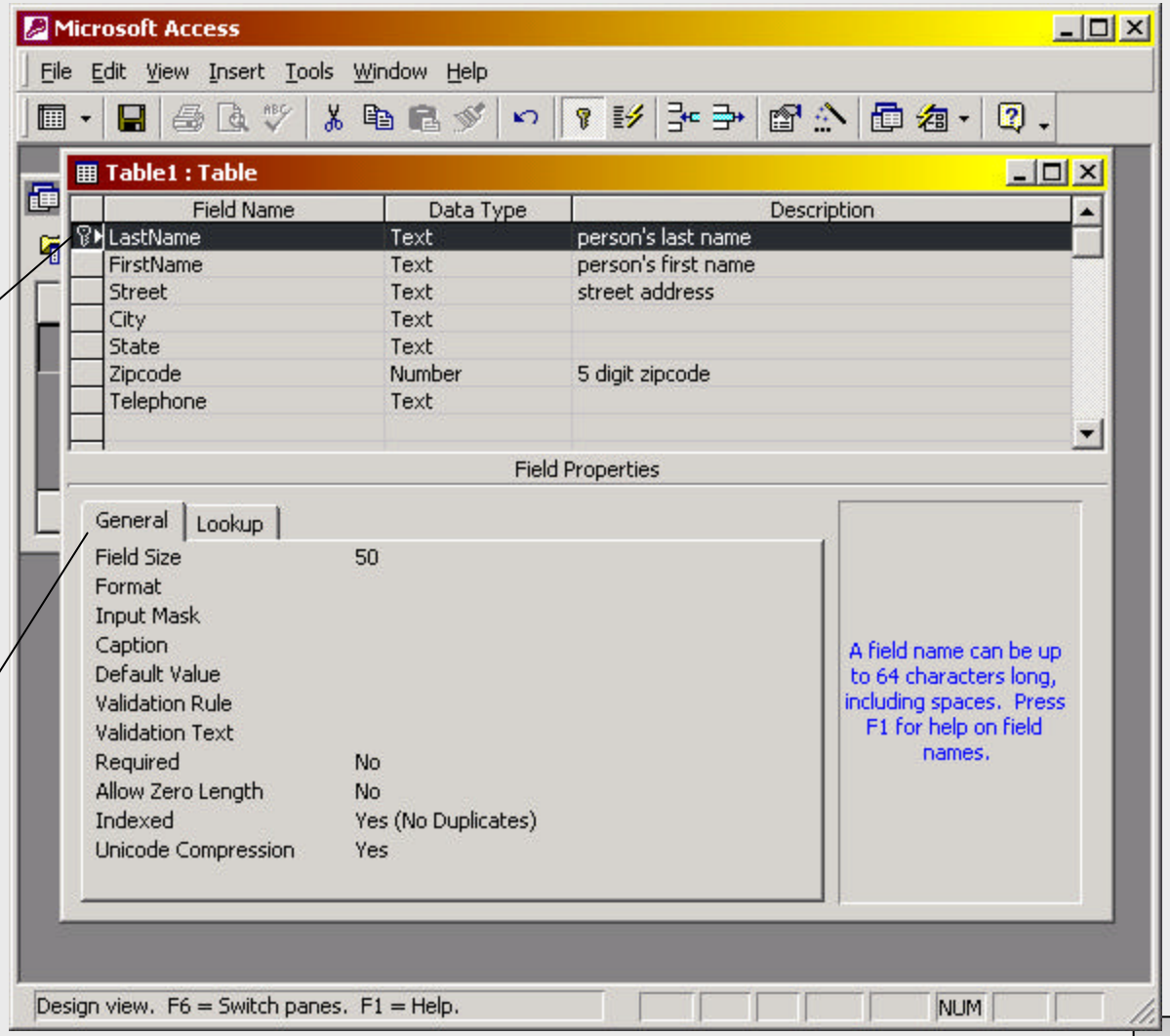
Field Name

Data Type

Description (optional)



Creating a Table in Design View



Primary Key

Field Description

Creating a Table in Design View (cont.)

- The steps to create a table in Design view are:
  1. Begin by entering a Field Name.
  2. The Data Type indicates the kind of data that can be entered in the field. There are nine data types:
     a. **Text** – used for words or for numbers that won't be used in calculations (default data type).
     b. **Memo** – an open field that is used for comments.
     c. **Number** – numbers, or integers, that are negative or positive values.
     d. **Date/Time** – various formats for dates, times, and combinations of the two.
     e. **Currency** – numbers in dollars or in dollars and cents.

Creating a Table in Design View (cont)

f. **AutoNumber** – a numeric field automatically entered by Access, used in a primary key field when none of the fields in a table is unique.

g. **Yes/No** – a logical field that can have only one of two values:Yes/No.

h. **OLE Object** – an object that was created in another application.

i. **HyperLink** – used to store hyperlinks.

j. **Lookup Wizard** – used to create a Lookup field, which lets the database user select a value from a list, enhancing data accuracy by preventing typos on data entry.

Creating a Table in Design View (cont)

3. Enter a description for the field, if the name is at all ambiguous.

4. Press Enter to drop to the next blank row and enter the information for the next field.

5. After entering all the field names and data types, select a field or fields to designate as a primary key, then click the Primary Key button on the toolbar or right click the row selector and choose Primary Key from the shortcut menu.

6. Save the table and enter a unique table name when prompted.

Modifying Data Fields in Design View

All data types (except AutoNumber) have the following general properties:

- *Format:* Indicates how the field's contents will be displayed.
- *Caption*: Provides the label that will be attached to the field on a form or report.
- *Default Value*: Specifies values for new entries.
- *Validation Rule*: Indicates a range of acceptable entries.
- *Validation Text:* Help message the appears in the status bar when the field is active.
- *Required:* A Yes/No setting that indicates whether the field must have an entry, i.e., non null values.

Modifying Data Fields in Design View (cont)

- The following general properties apply primarily to text fields:

  a. *Field Size:* Indicates the maximum number of characters allowed in the field.

  b. *Input Mask*: Limits and formats the values that can be entered.

  c. *Allow Zero Length*: A Yes/No setting that determines whether a text string with no length (" ") is a valid entry.

  d. *Indexed:* Instructs Access whether to create an index for the field.

- Number and Currency fields have one additional general property: Decimal Places, which specifies the number of digits that will be displayed and stored after the decimal.

Working with Relationships

To create a relationships:

1. Open the Relationships window by clicking the Relationships button on the toolbar.

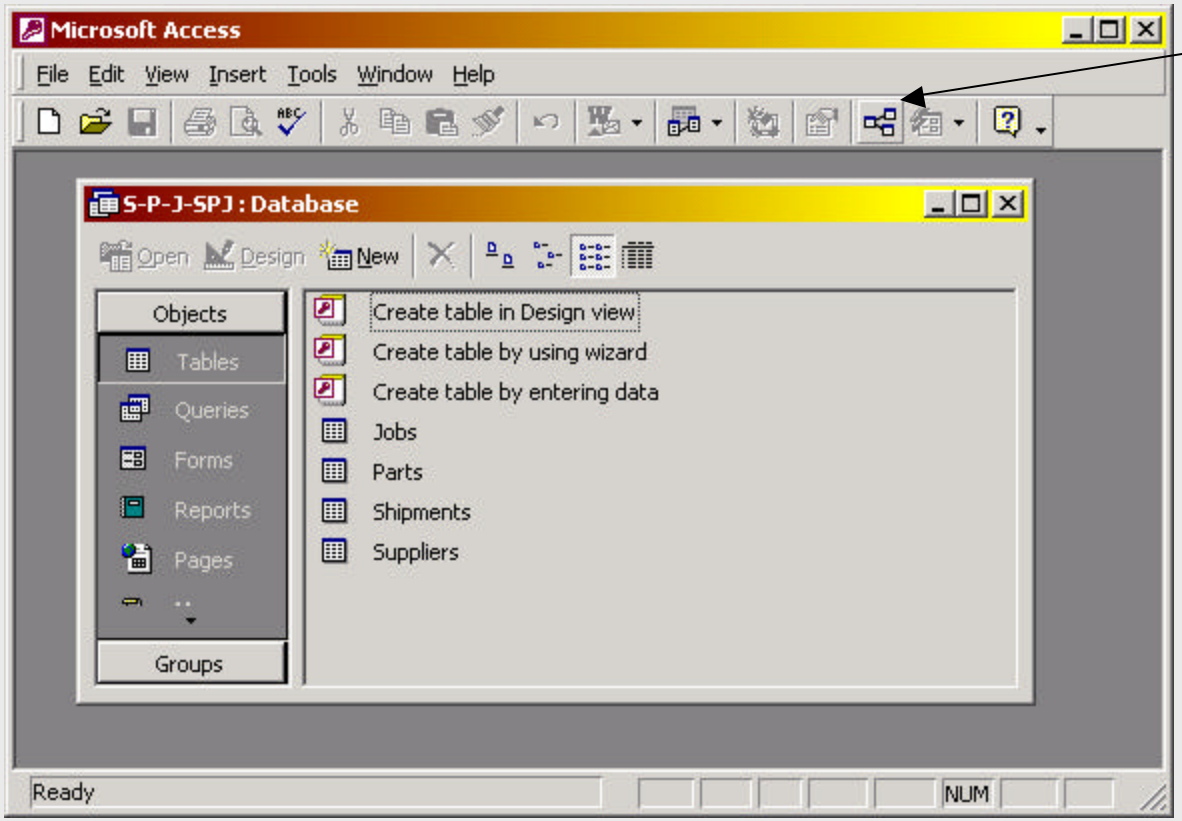
   – The Relationships button is on the Database toolbar and is available when the database window is active.

   To create a relationship, make sure that both the primary and related tables are visible. If not, right-click in the Relationships window and click Show Tables, then add the table(s) to the window.

2. Select the primary key field in the primary table and drag-and-drop it onto the matching field in the related table.

3. In the Edit Relationships dialog box, check that the related field names are correct and click Create

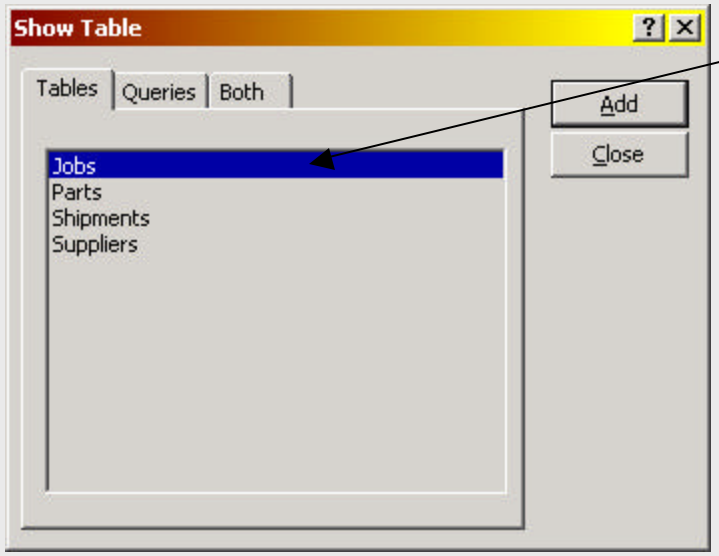
Working with Relationships (cont)



Relationship Button

Once the database is created, click the Relationships button to activate the menu for selecting the desired tables to participate in the relationships.

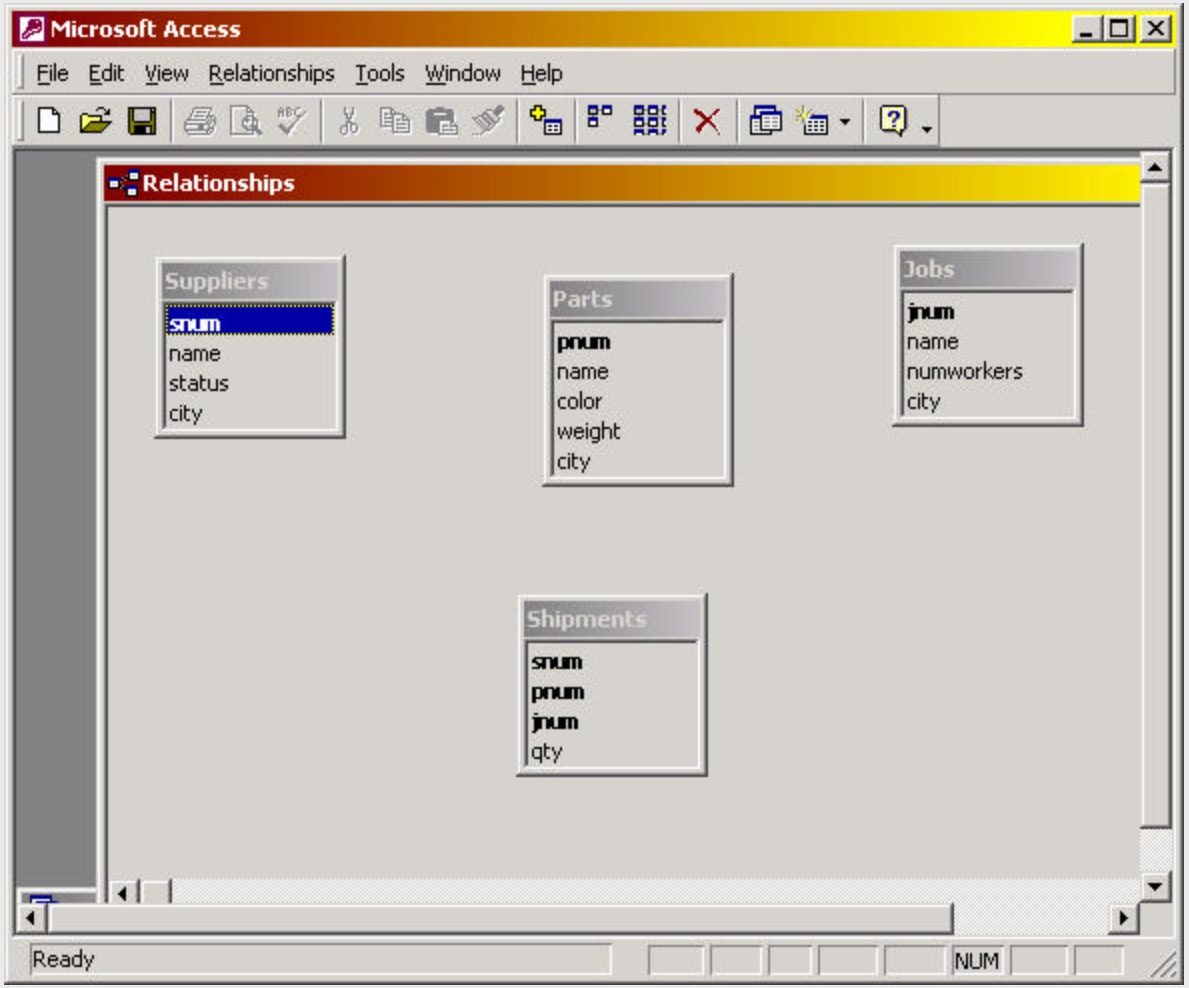
Working with Relationships (cont)



Select Tables

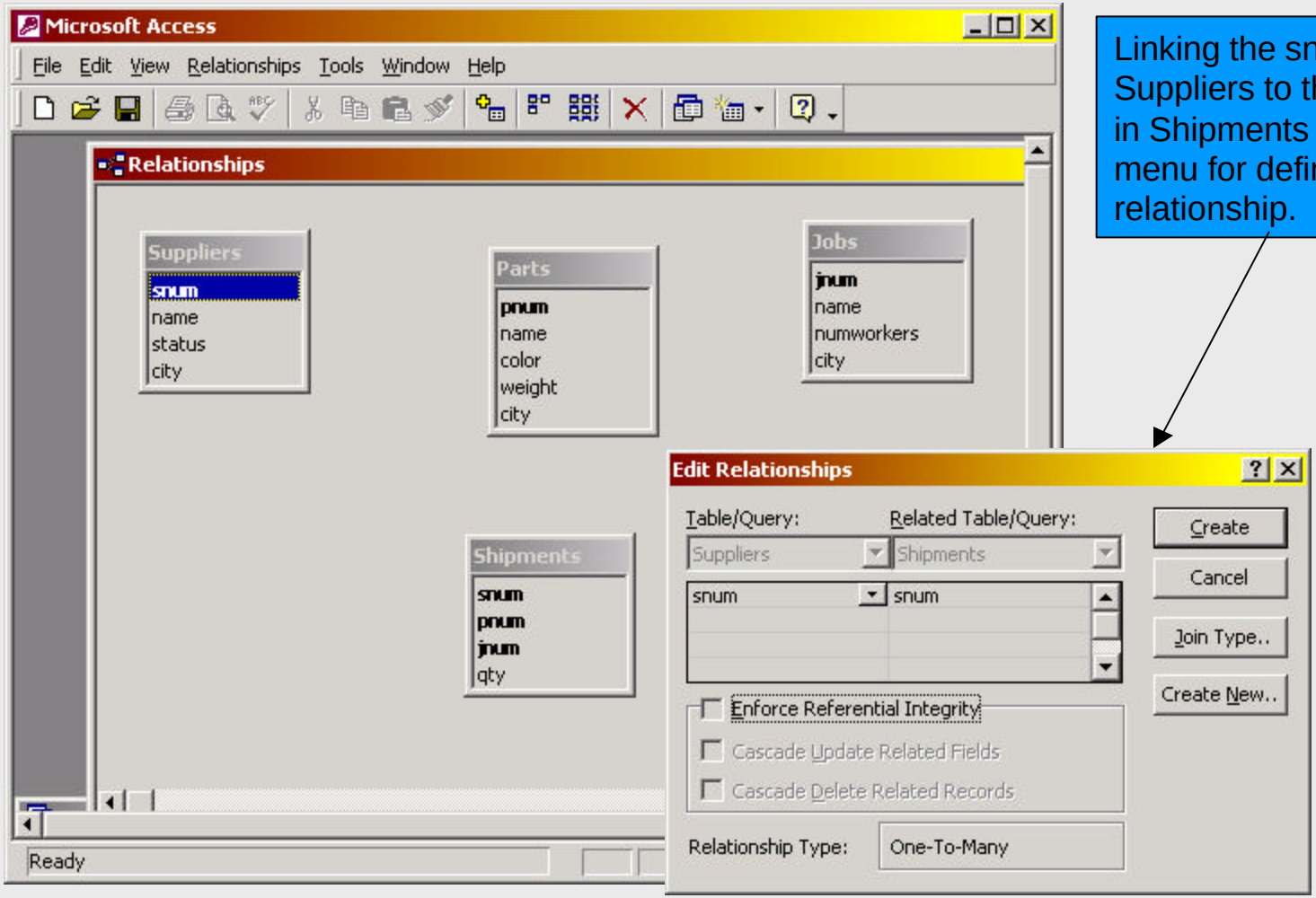
The Relationships button will bring up the following menu which lists all tables in the database. Select those that you want to participate, by highlighting them and clicking add. Hold the control button down and highlight all of them for a quick way to select all of the tables.

Working with Relationships (cont)



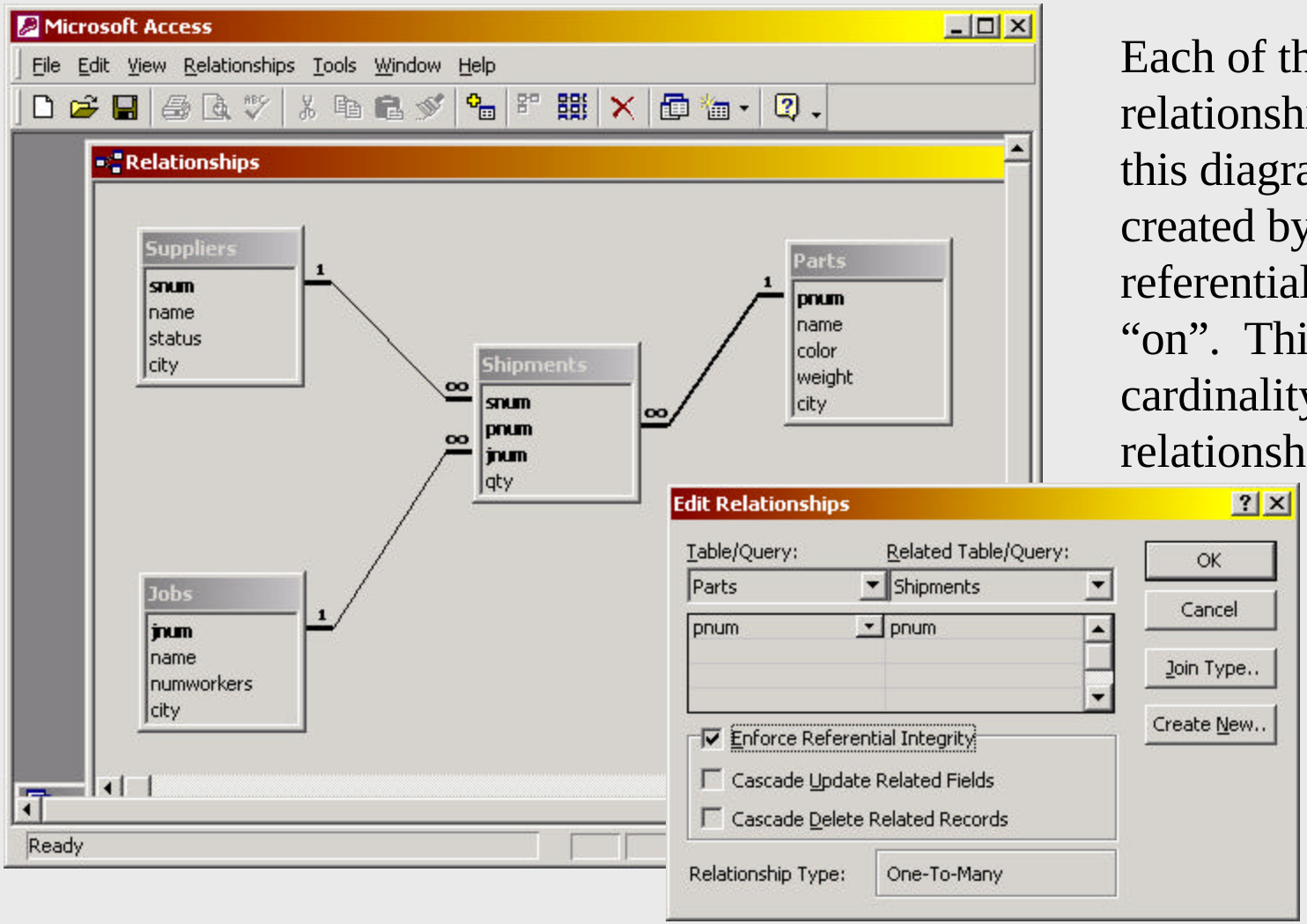
Once you've selected the tables, the Relationships screen will look something like this. You can drag and drop the tables wherever you want on this screen by clicking in the table name area of a table.

Working with Relationships (cont)



Linking the snum field in Suppliers to the snum field in Shipments brings up this menu for defining the relationship.

Working with Relationships (cont)



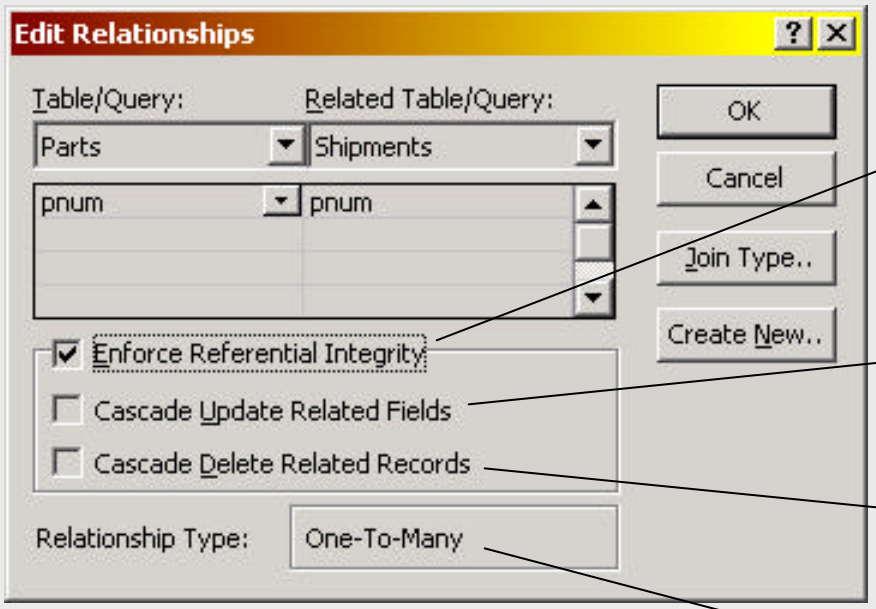
Each of the relationships shown in this diagram were created by setting the referential integrity "on". This set a 1:M cardinality on the relationship.

Working with Relationships (cont)

- *Referential integrity* ensures that records in a related table have related values in the primary table. Referential integrity prevents users from accidentally deleting or changing records in a primary table when records in a related table depends on them, making sure that there are no orphaned records in the related table, such as orders without customers or salaries without employees.

- To change referential integrity in a relationship, open the Relationships window. Right-click the join line and click Edit Relationship. In the Edit Relationships dialog box, mark the Enforce Referential Integrity check box to set it; clear the check box to undo it. Then click OK.

Working with Relationships (cont)



Referential Integrity

Cascading Updates

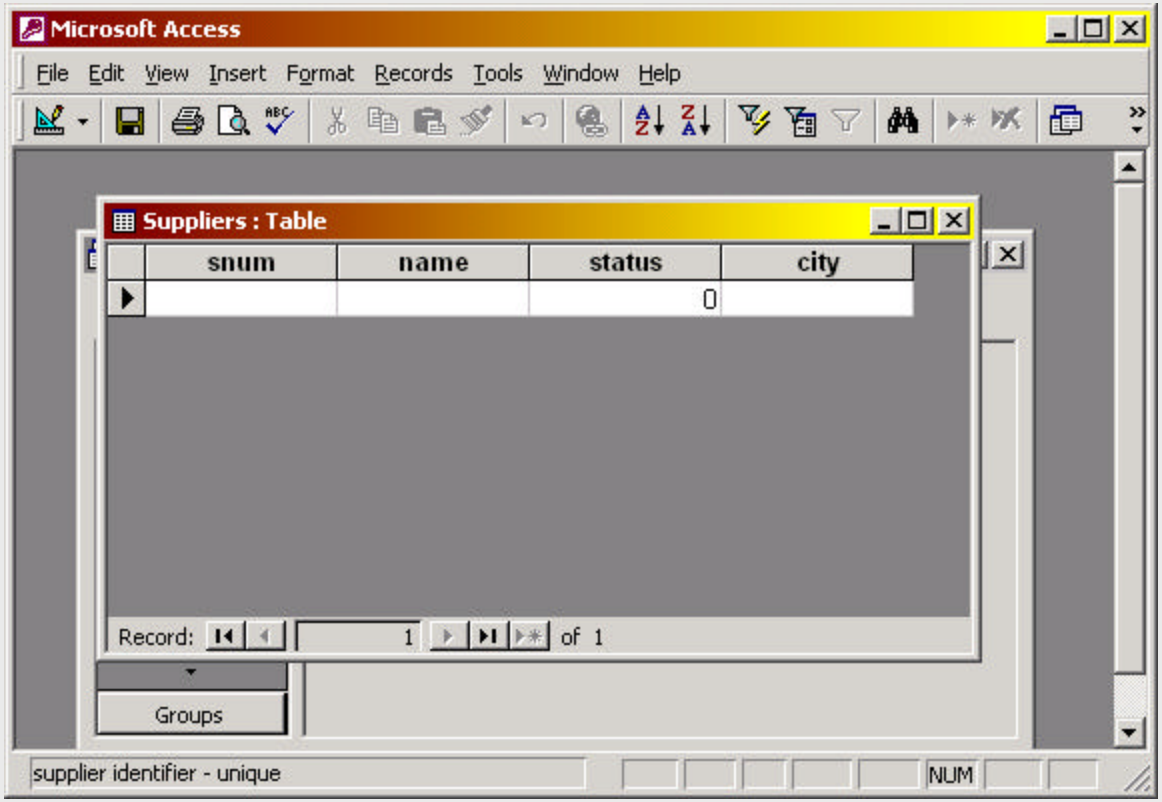
Cascading Delete

Relationship Type

Entering Data Into a Table

- There are two basic ways to enter data into a table in Access.
- The first is to simply open the table. Either select a table in the Tables menu and the click Open, or double-click the table name in the Tables menu. This will open the table and allow the user to enter data one field at a time, one tuple at a time.
- The second is to create a form onto which the user will enter the data one field at a time and then send it to the table, one tuple at a time.
- Both technique are illustrated on the following few pages.

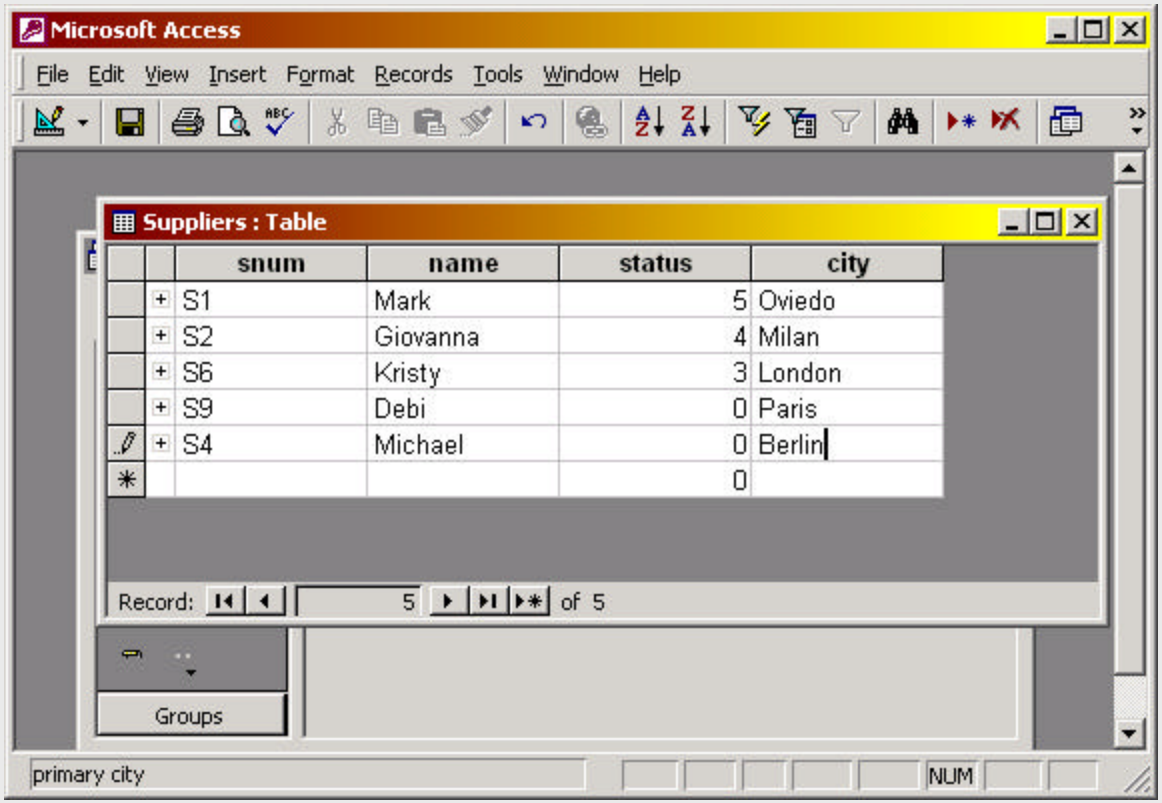
Entering Data Into a Table (cont)



Using the Open table technique on the Suppliers table will produce the following screen. Since there is no data in this table, the table appears blank.

Notice too, that the status field already contains a 0, since this was set as the default value for this attribute.

Entering Data Into a Table (cont)

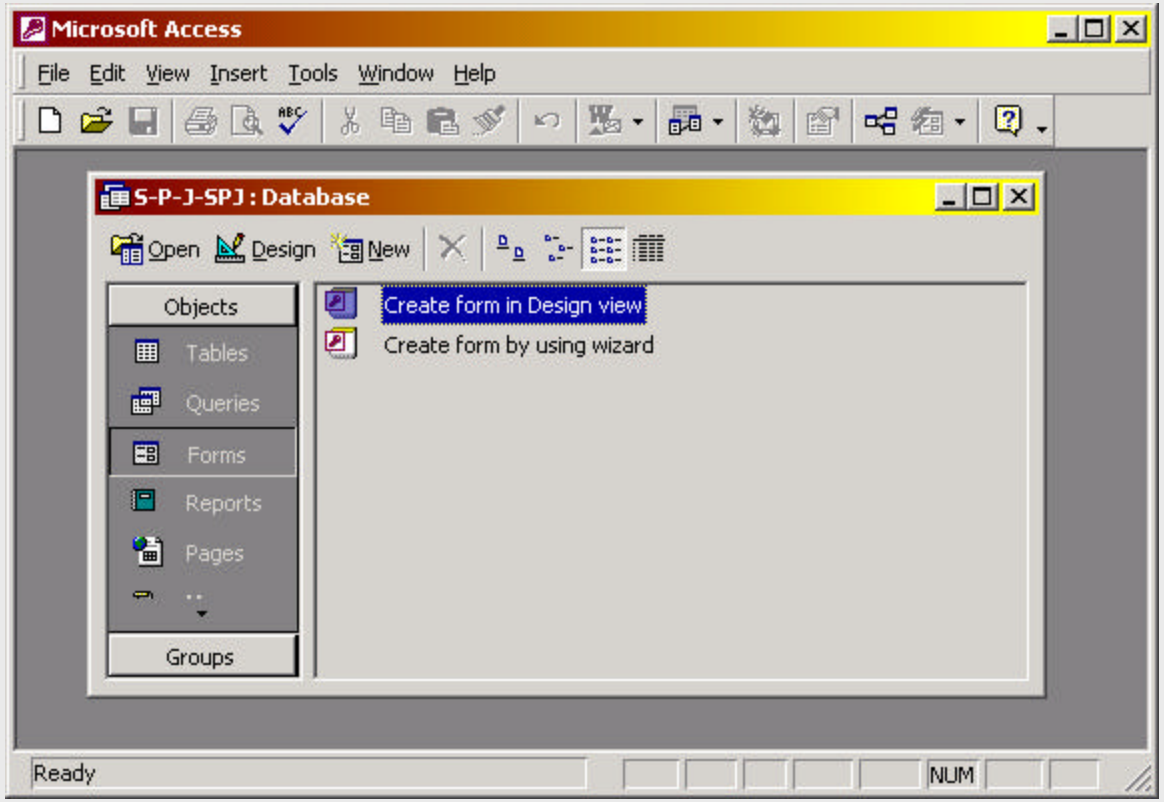


After entering some tuples into the relation Suppliers, the table will look like the following. Notice that the number of tuples is recorded by Access.

Entering Data Into a Table via a Form

- There are two ways to create forms in Access.
- The first is to use a Design Wizard. This is a fairly simple way to go and until you get some experience with Forms is certainly the way to start. However, your options are severely limited as to what you can do with the form using the wizard.
- The second is to create a form using the Design View in which you have a great deal of control and flexibility as to what the form can look like and the options available to display to the user. Creating a form from scratch is a somewhat time consuming task, often it is better to begin with a form created via the wizard and then modify that form to add the additional features that you want.
- Both technique are illustrated on the following few pages.

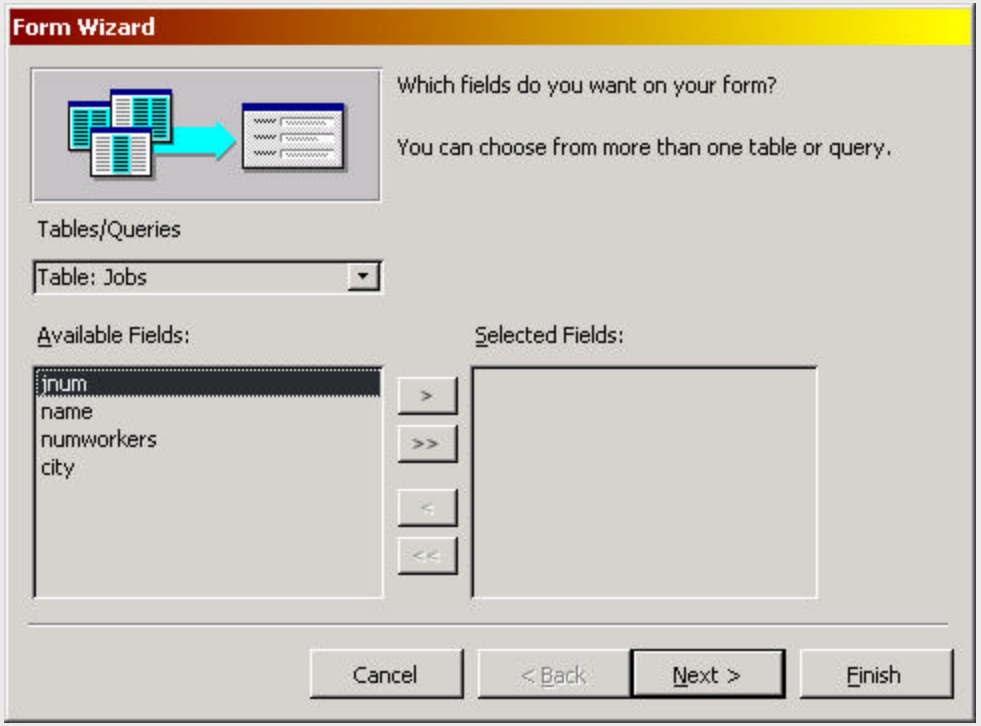
Entering Data Into a Table via a Form (cont)



First select a table from the Tables menu, then select Forms from the Objects menu and you will see a menu with two options: (1) Create Form in Design view and (2) Create Form by using wizard.

For this first case. we'll select the second option.

Entering Data Into a Table via a Form (cont)



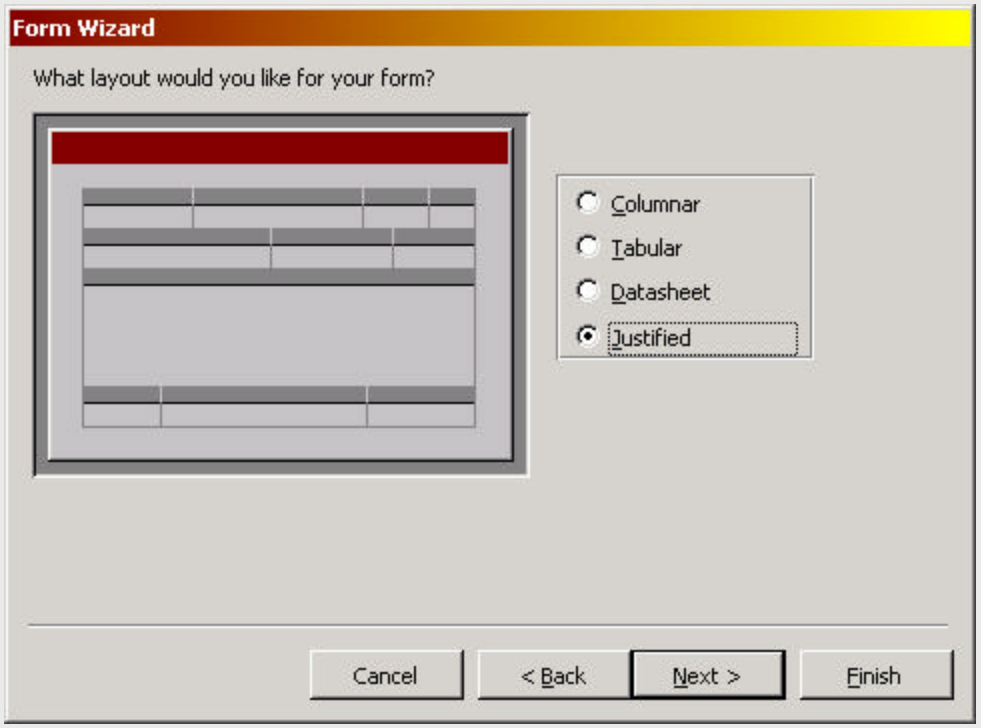
Once the wizard is activated, in this case on the Jobs table. You'll run through a series of steps in which the wizard will help you set up the form.

The first step is selecting the fields from the table that will appear in the form.

Highlight and select 1, > or

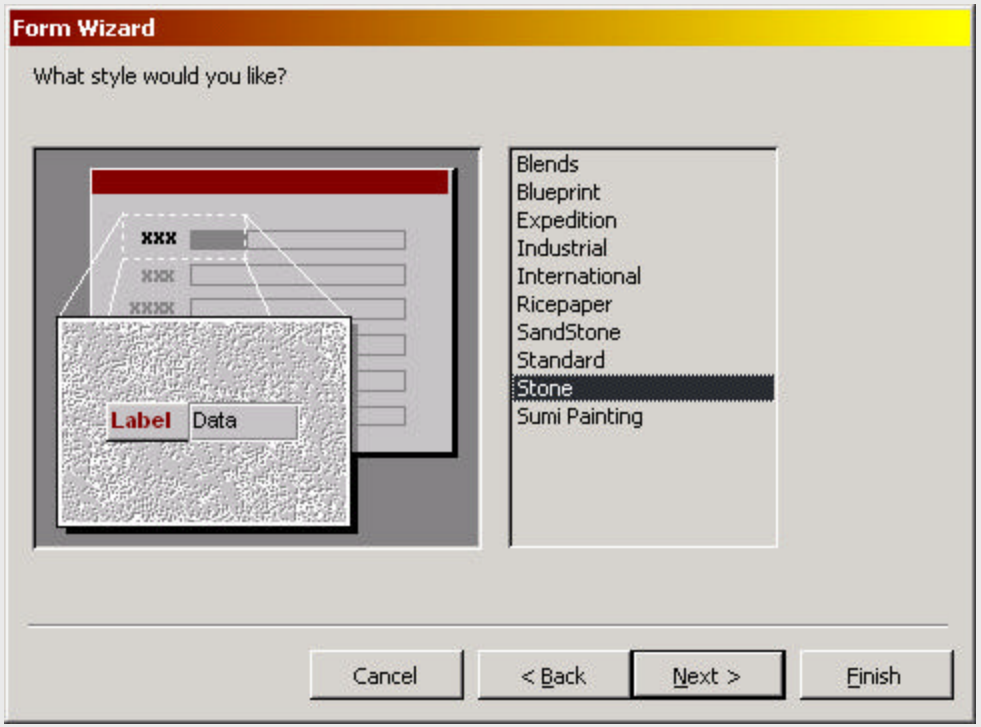
select all, >>

Entering Data Into a Table via a Form (cont)



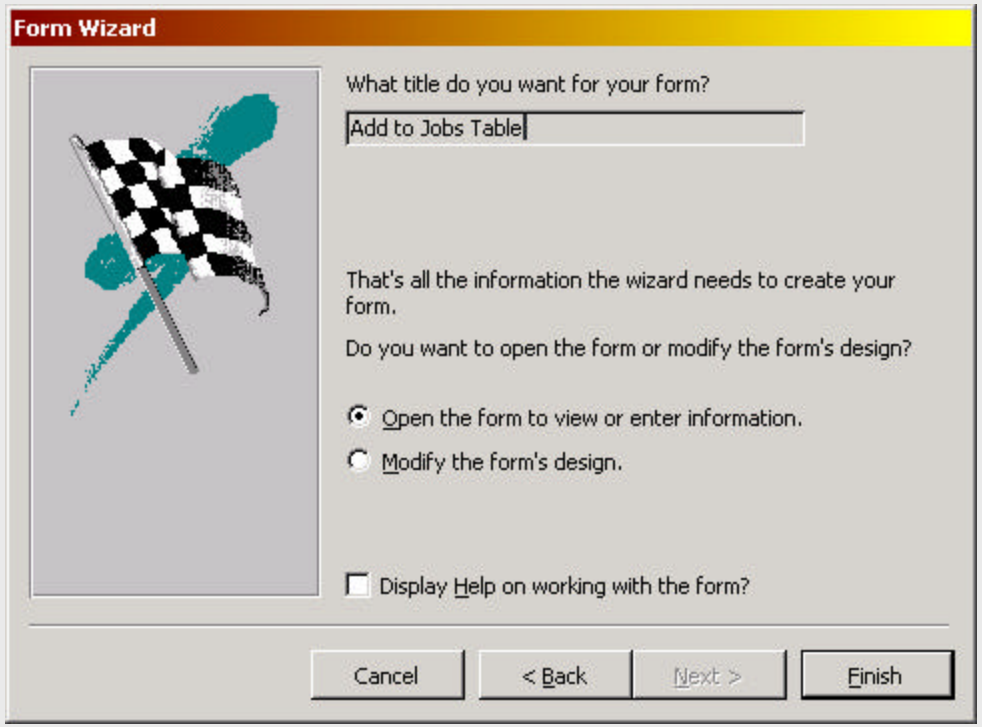
The next screen allows you to choose the format for the layout of the form.

Entering Data Into a Table via a Form (cont)



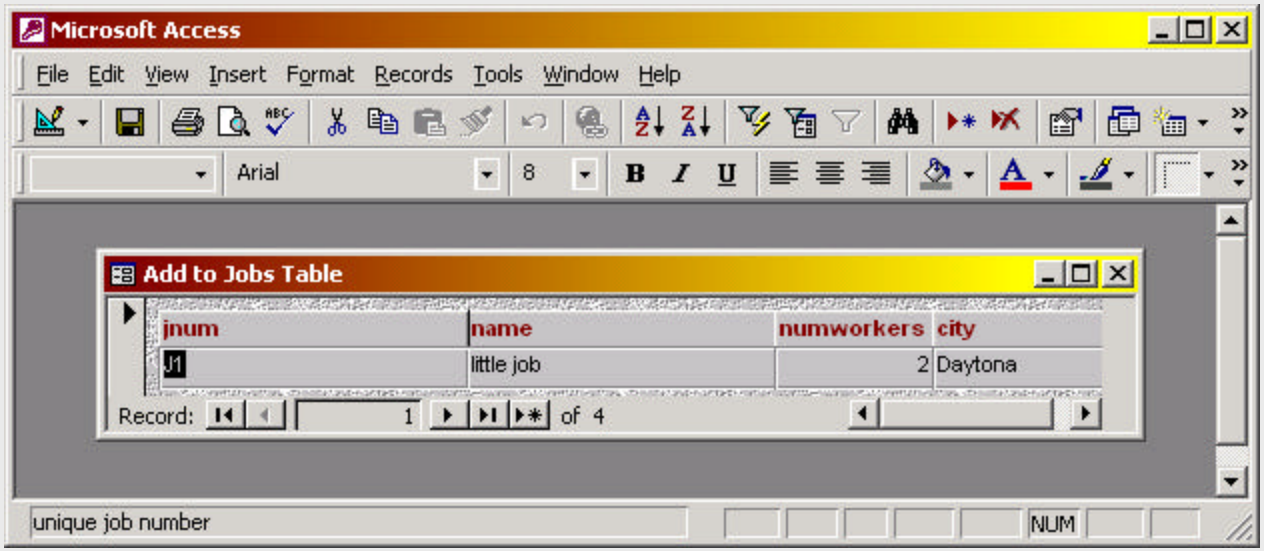
The next screen allows you to choose the background style of the form.

Entering Data Into a Table via a Form (cont)



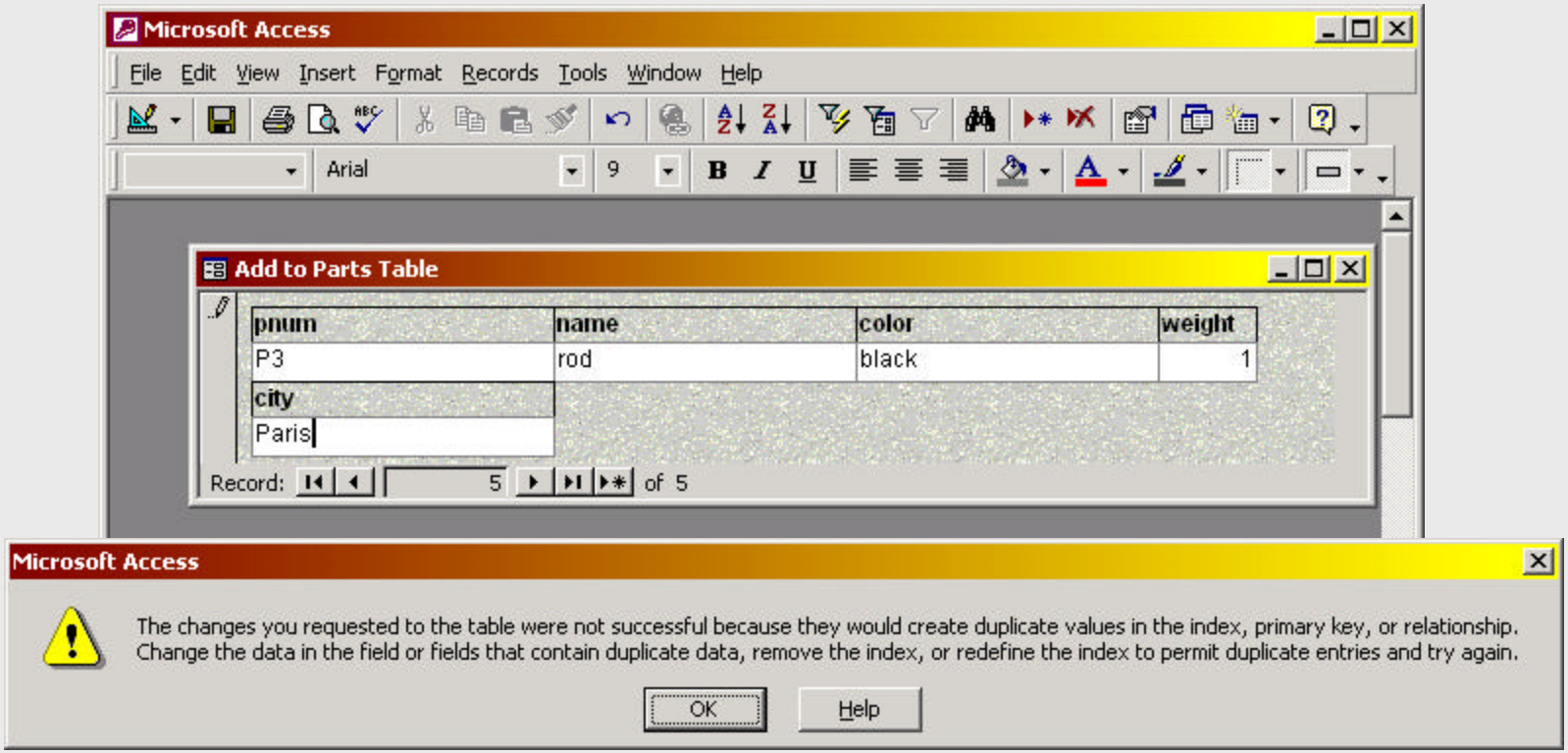
The final screen allows you to name the form and make any modifications that you want.

Entering Data Into a Table via a Form (cont)



When you click on Finish, Access immediately activates the form and you can begin inserting data into the table. If there is already data in the table, Access positions you at the first tuple.

Entering Data Into a Table via a Form (cont)



Since we have turned referential integrity "on", the attempted insertion of a second part with key value P3 violates an integrity constraint (a key constraint in this case) and the insertion via the form is signaled as an error.

Creating a Form in Design View

In the Design view, a form includes three sections and a number of different controls. The three sections are:

1. A Form Header at the beginning of the first page of the form, usually used for titles.
2. A Form Footer at the end of the last page of the form, used for user tips or other miscellaneous information.
3. A Detail section, where each record's data is displayed.

Creating a Form in Design View (cont)

In Design view, there are many controls that can be used:

a. Text box

b. List box

c. Check box

d. Option button

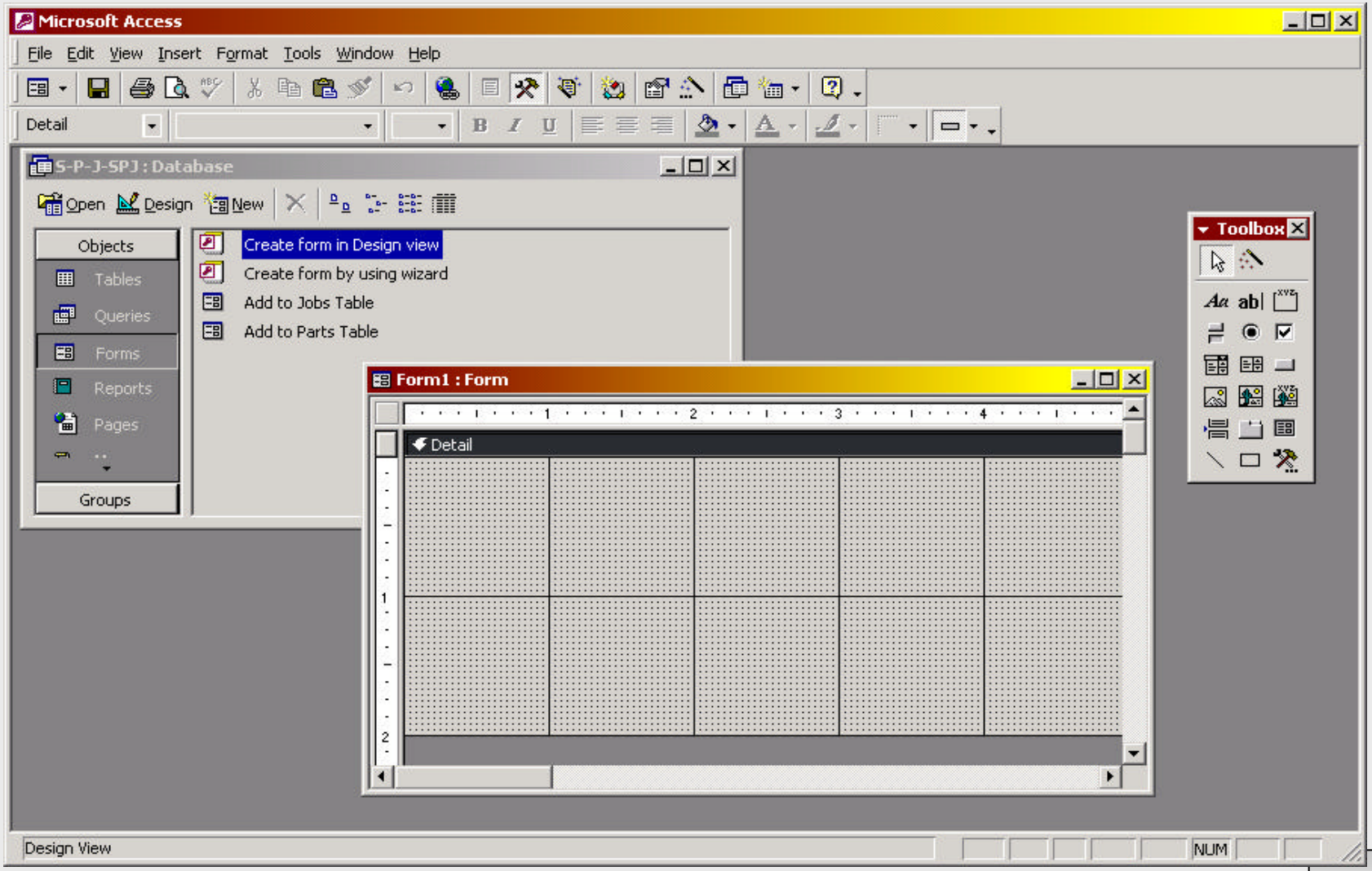
e. Command button

f. Combo box

g. etc.

The initial screen for the Design view of a form is shown on the next slide.

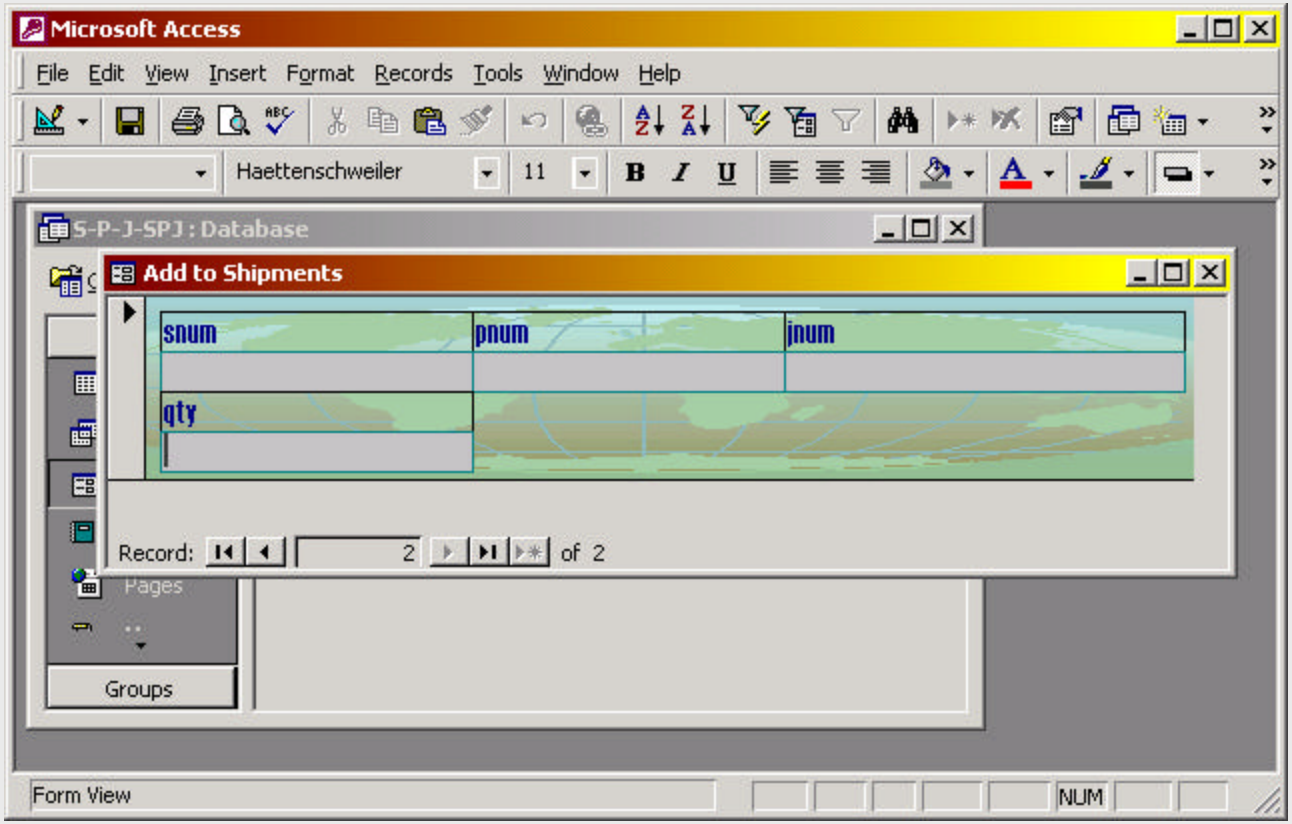
Creating a Form in Design View (cont)



Creating a Form in Design View (cont)

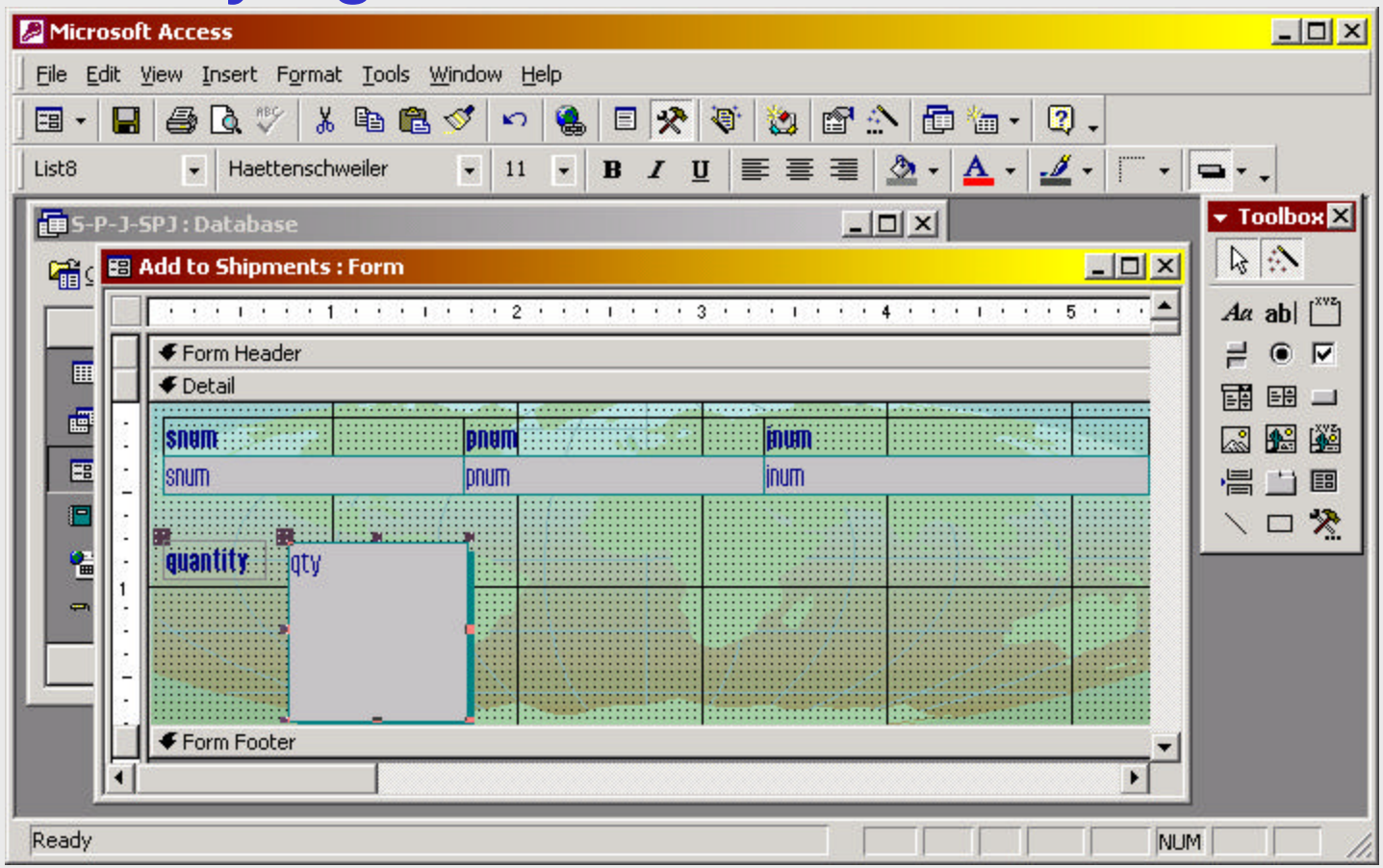
- The capabilities of the Design view are extensive when it comes to Forms. All I'll do here is show one simple example of modifying a form created via the wizard by changing one of the field entry areas.
- Once you begin to use forms you'll be able to create very nice data entry areas for your databases.
- We'll start out by using the wizard to create a form for the shipments table where the user would be required to enter a number for the quantity shipped. After creating this form, we'll modify it to have a drop down list of values which the user will select the quantity being shipped. This is a way to reduce the chance of entering incorrect data into the database

Creating the Form via the Wizard



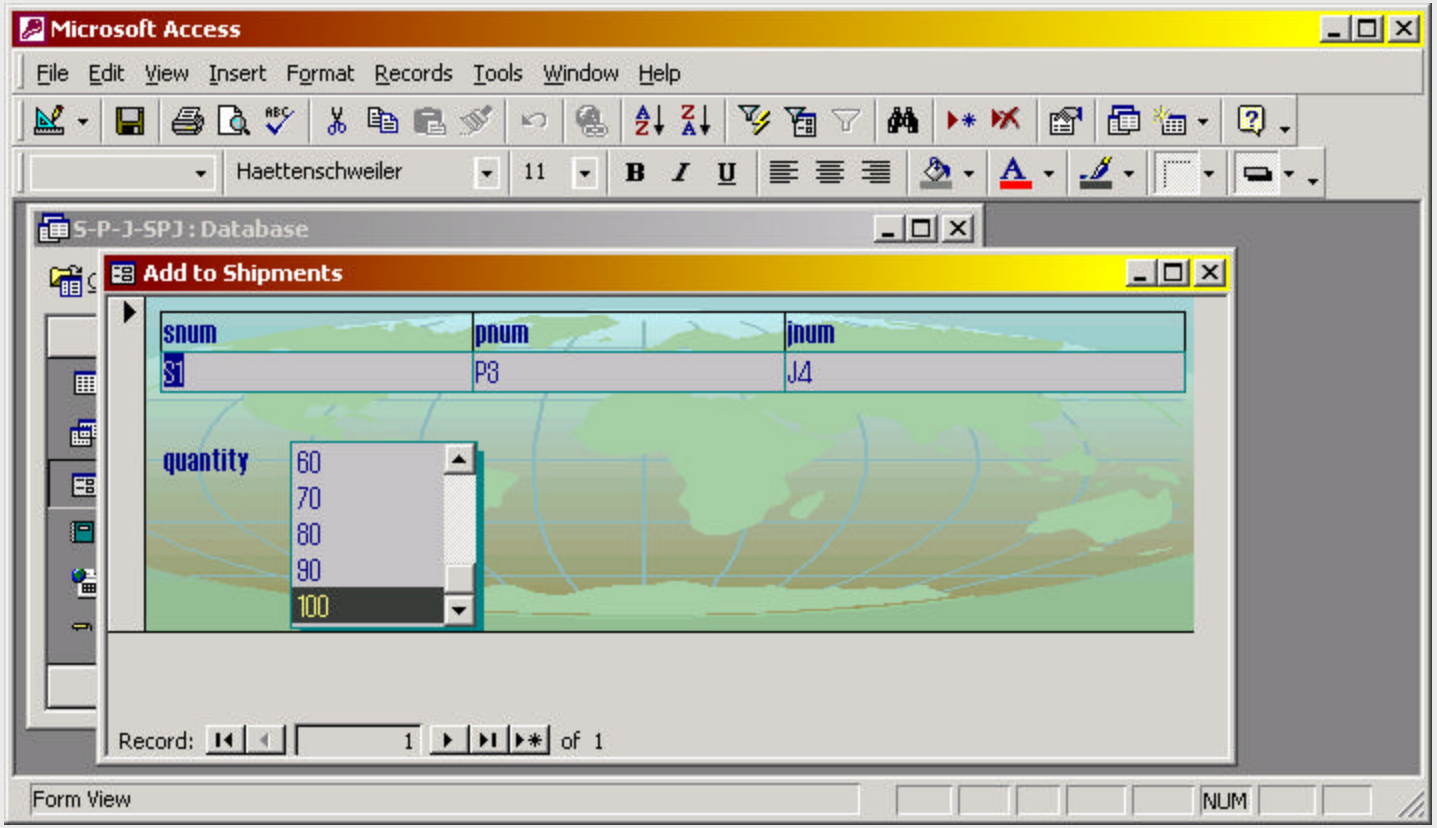
The basic form for adding to the Shipments table as created by the Form Wizard. Notice that the quantity field requires the user to enter a value.

Modifying A Form Created via the Wizard



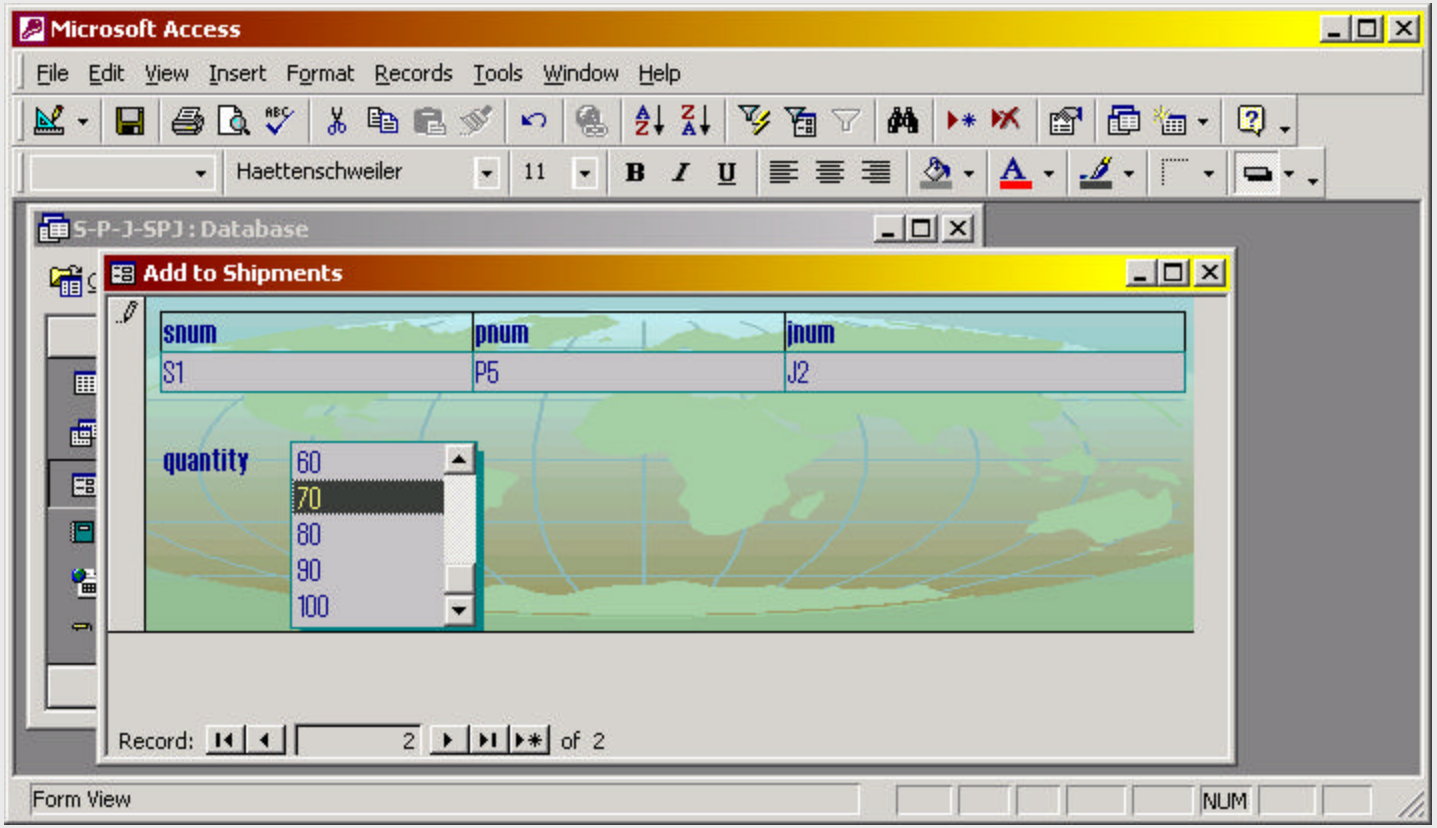
To modify a form created via a wizard, enter the Design view from that form. In this case we activate the Add to Shipments form and modified the quantity field to add a drop down list of values for the quantity.

Modifying A Form Created via the Wizard



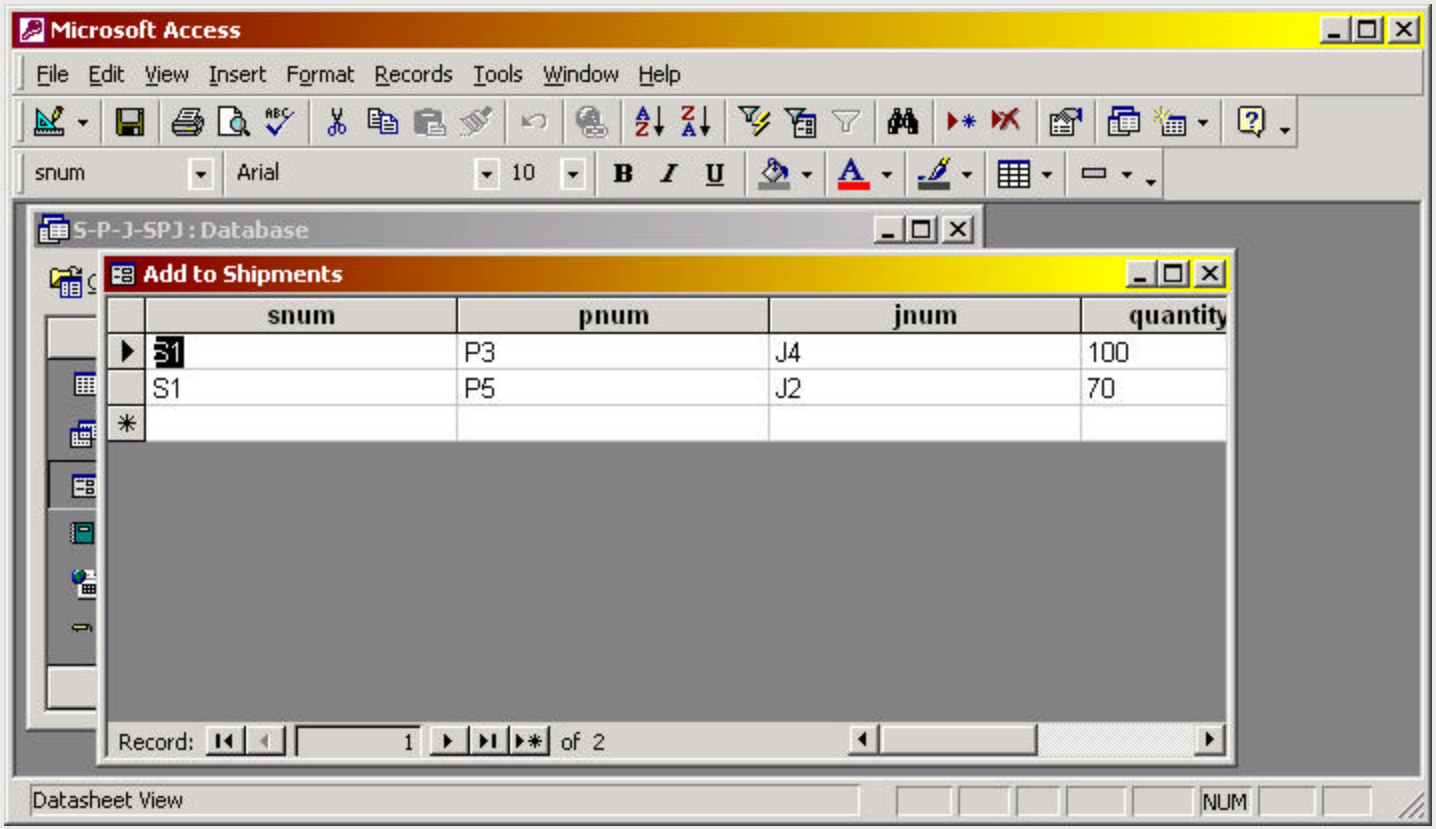
Once we return to the Datasheet view (rather than the Design view) we see, since there is already a tuple in this relation that the value of quantity which was previously entered for this tuple is highlighted in the drop down list.

Modifying A Form Created via the Wizard



If we now add a new tuple, the drop down list will allow us to select one of the values in the list for the new tuple.

Modifying A Form Created via the Wizard



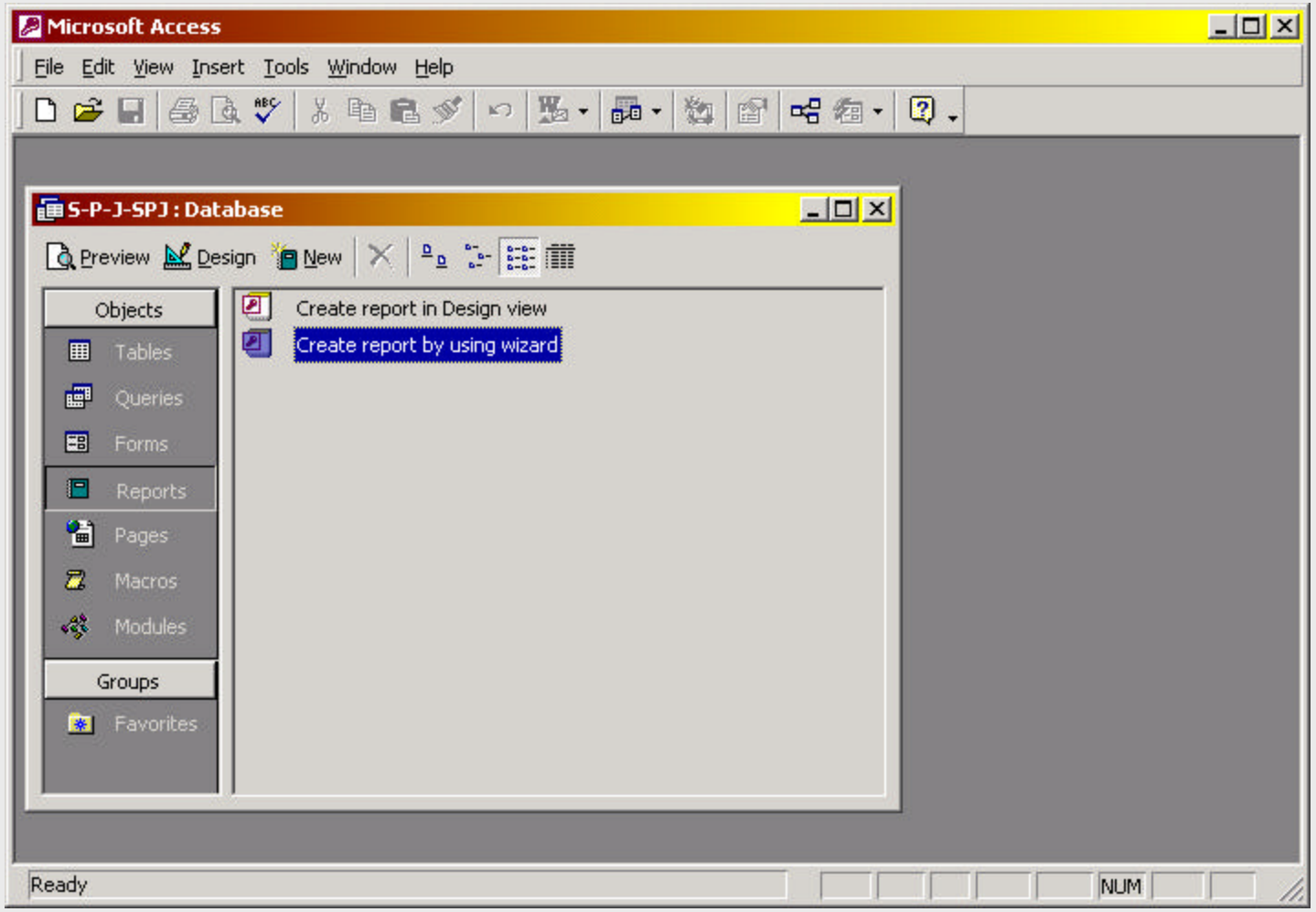
If we switch to the datasheet view, we can see that our new tuple was properly entered into the relation. Note, whether or not this is the case is one of the options you must select when creating the drop down list.

Creating Reports

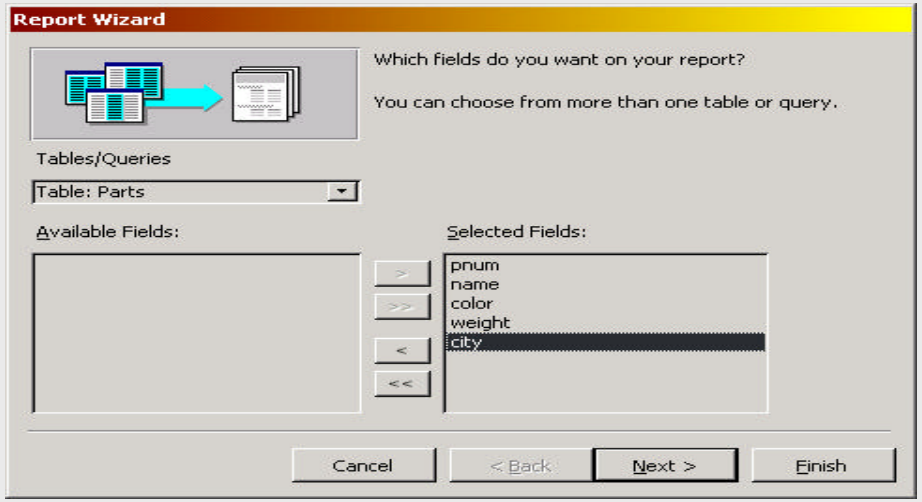
- There are three ways to create reports:
  1. In Design view, where you can design a report completely from scratch.
  2. With the Report Wizard, which lets you customize a report.
  3. By choosing one of two AutoReports, which automatically include all of the fields in the table or query you select.

- There are two wizards that will create a specialized report:
  1. The Chart Wizard, which walks you through the steps to create a chart.
  2. The Label Wizard, which creates mailing and other labels.

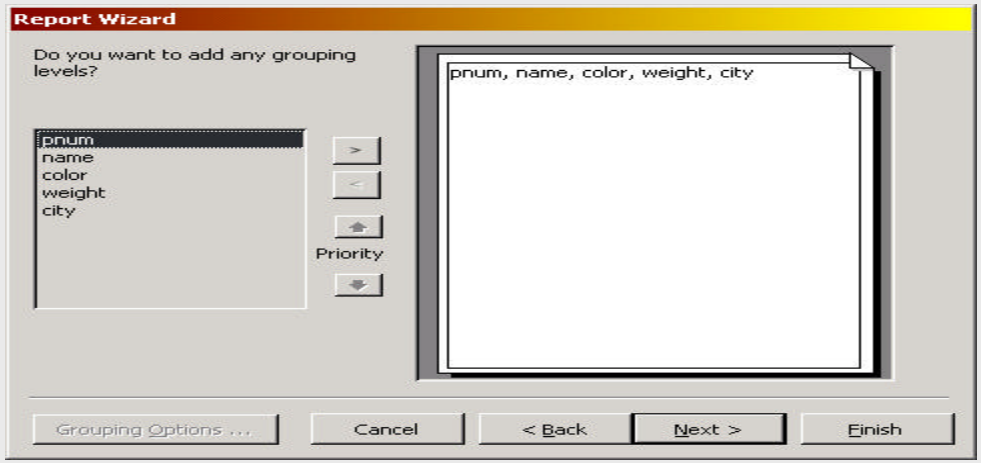
Creating Reports (cont.)



Creating Reports (cont.)

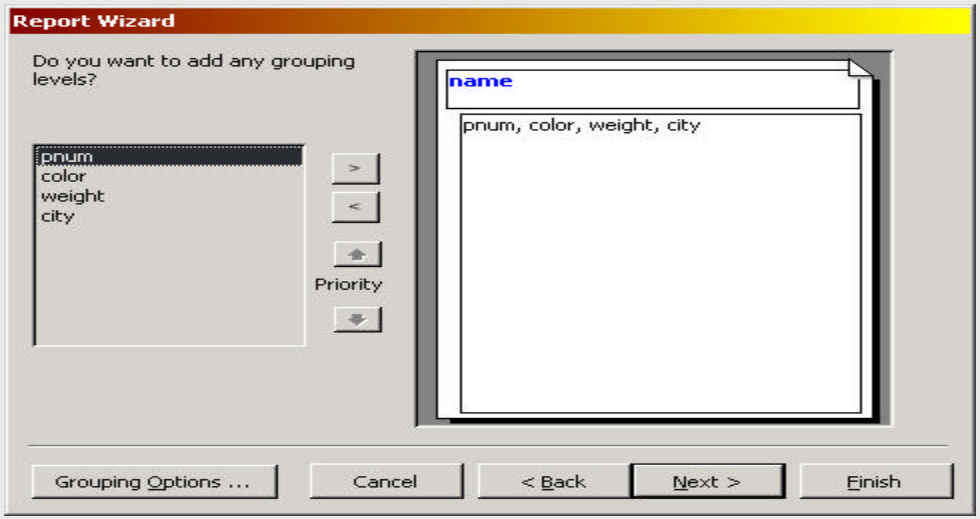


Here, we create a report on the parts table which contains every attribute.

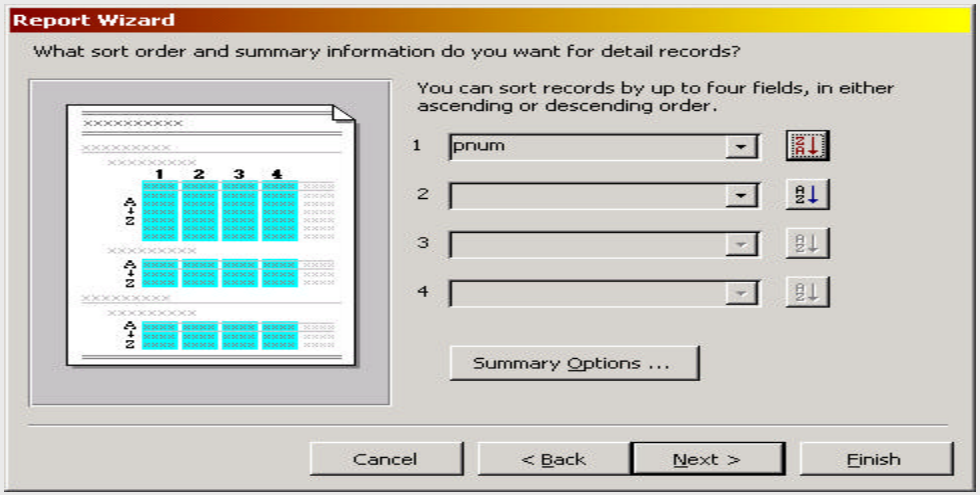


The next screen that appears allows you to set groupings within the report. Here, we not selected any groupings.

Creating Reports (cont.)

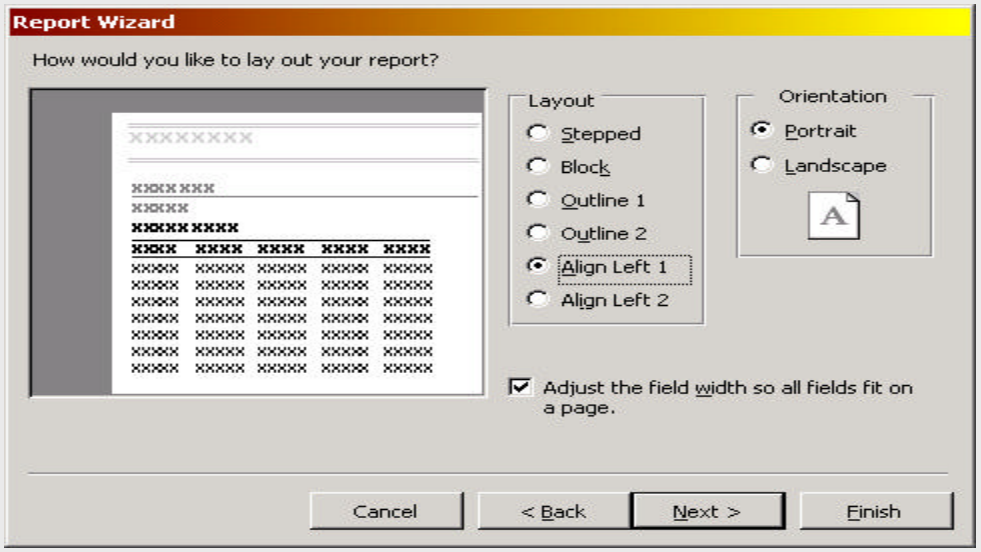


Here, we've selected a grouping based on the name of the part.

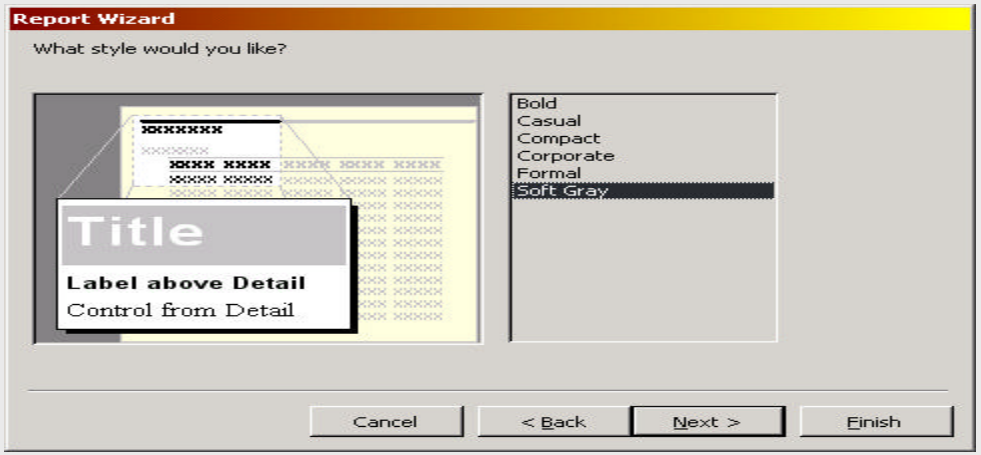


We've selected a sorting based on part number within each part name grouping.

Creating Reports (cont.)

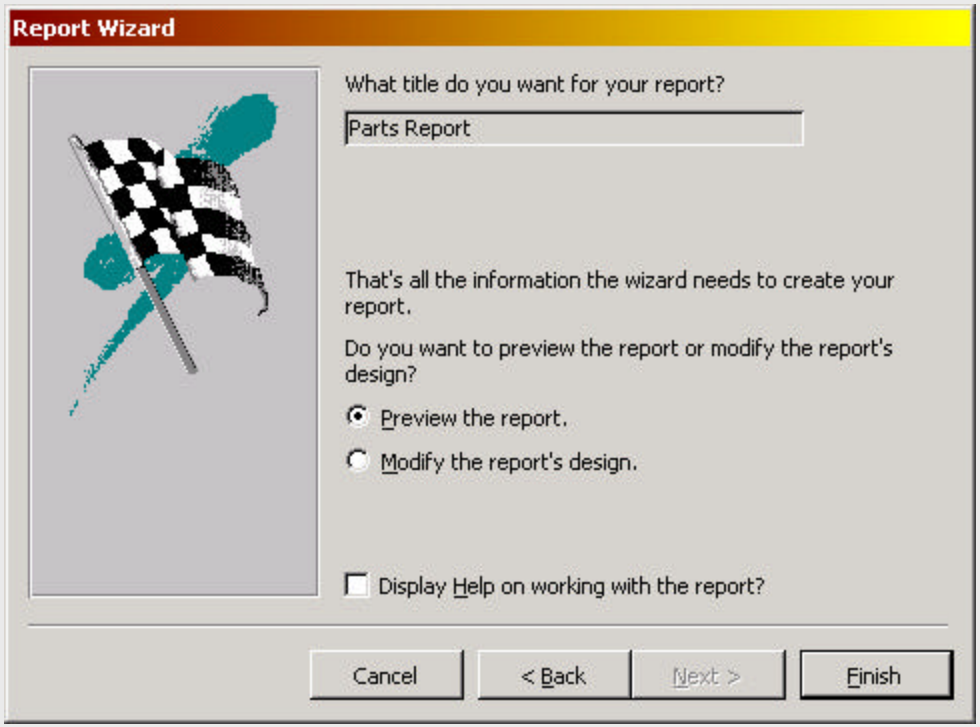


The next screen allows you to set up the format of the report. Several options are available.



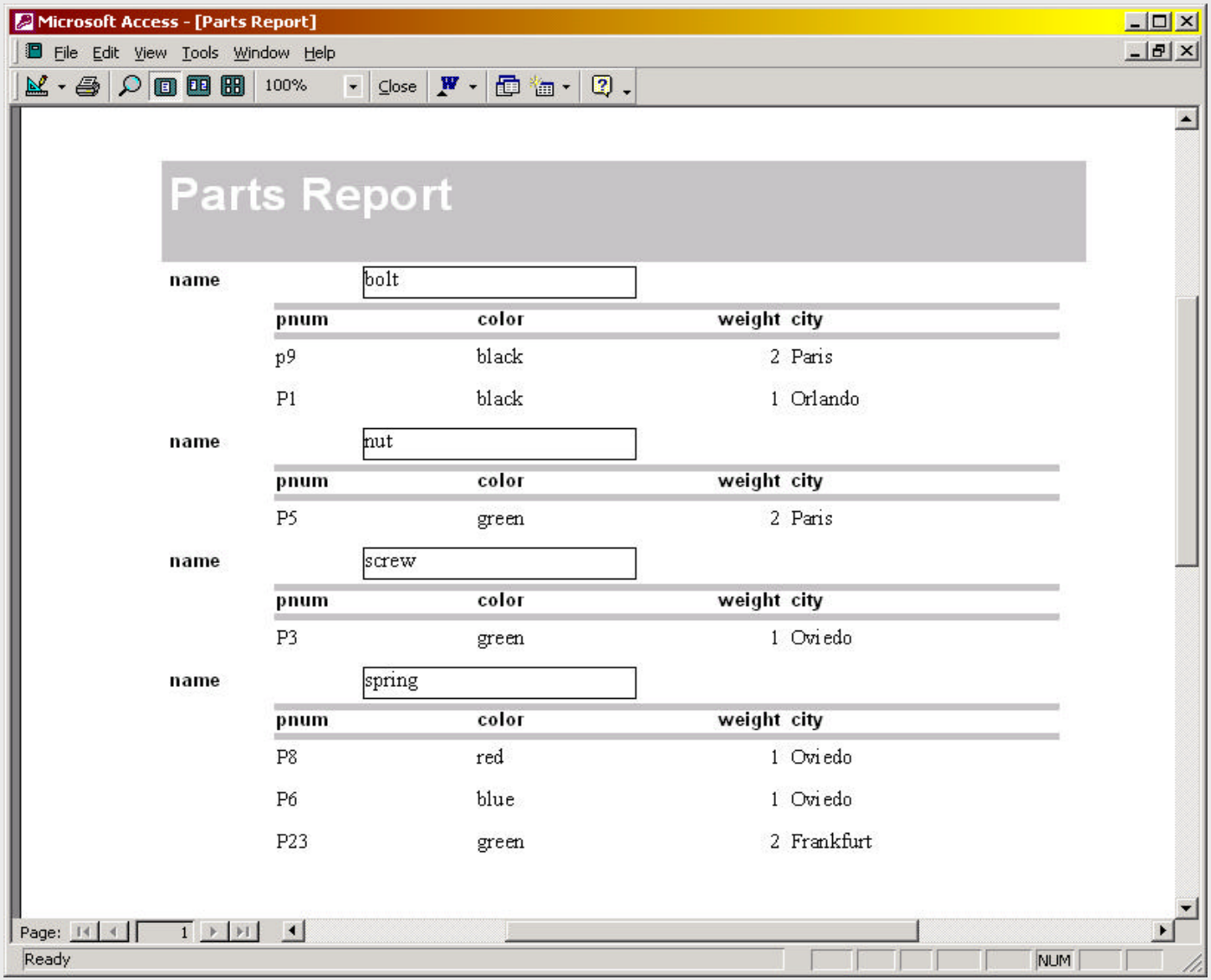
Next, you define the overall style of the report. Again, several options are available.

Creating Reports (cont.)



The final screen allows you to name the report and view the overall design and go back to make modifications if desired.

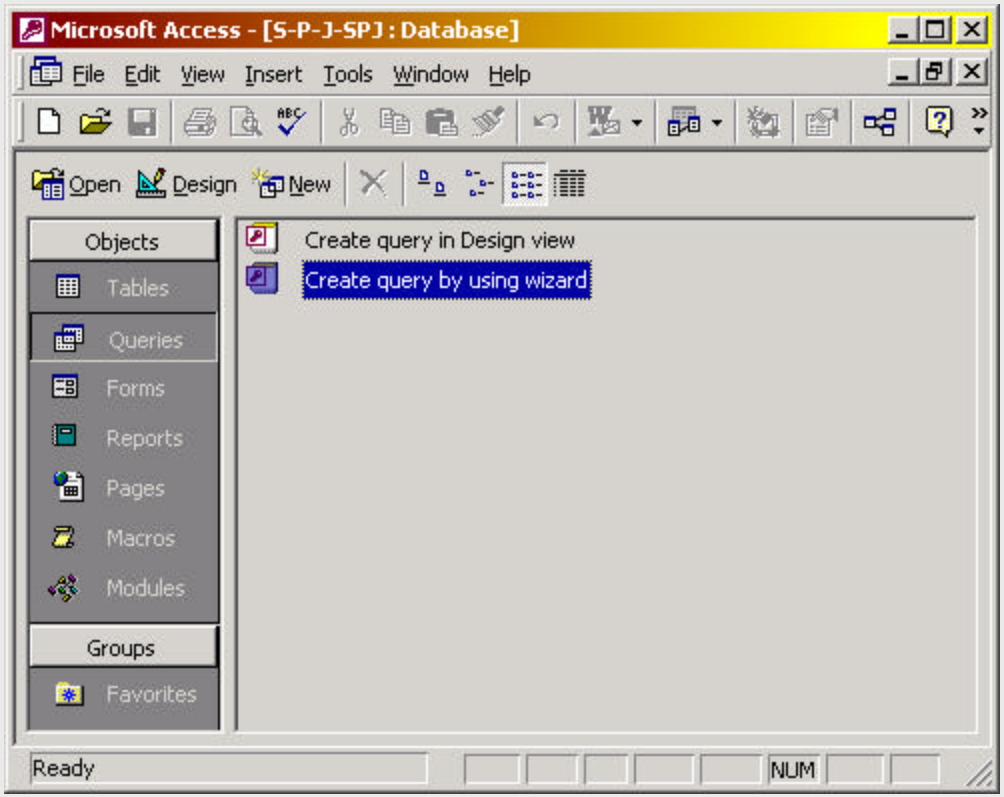
Creating Reports (cont.)



A view of our report, based on the current tuples in the parts relation.

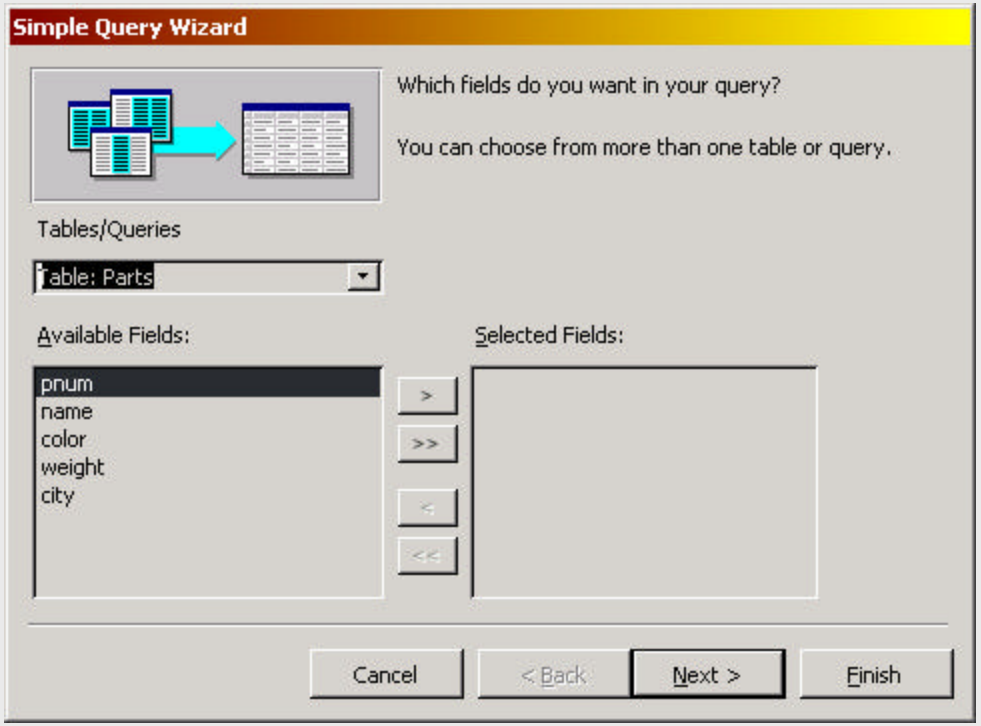
Creating Queries Using A Wizard

As with many other features of Access, there are several ways to construct queries. Typically, for simple selection based queries the query wizard is the easiest way to go.



Creating Queries Using A Wizard (cont.)

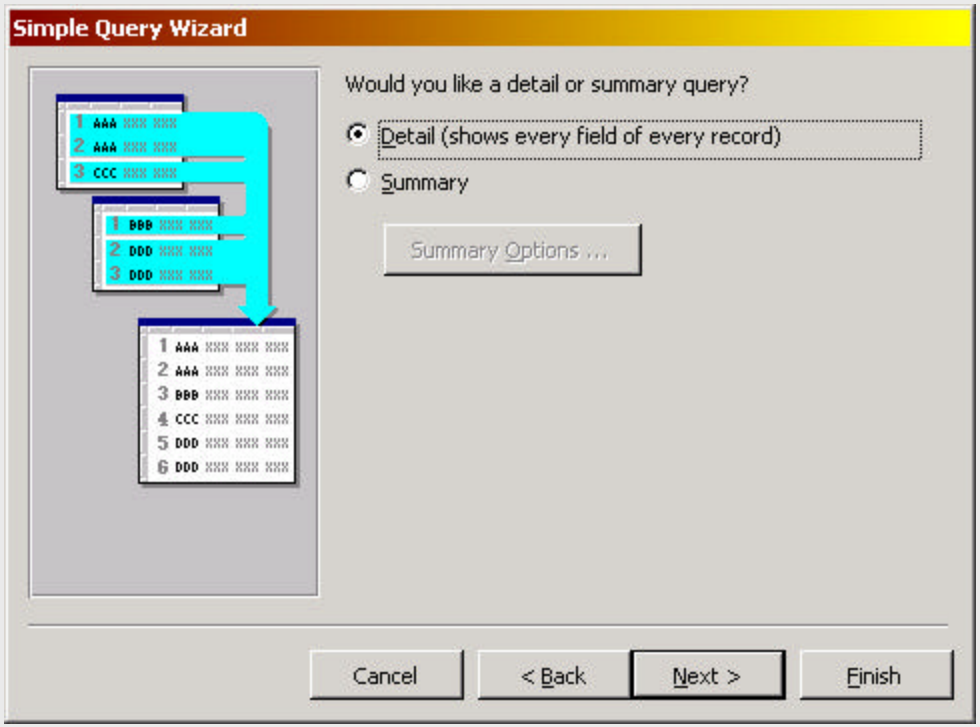
Let's construct a query, using the query wizard, that will print all of the details about green parts.



The first screens allow you to select tables and attributes that will participate in the query expression.

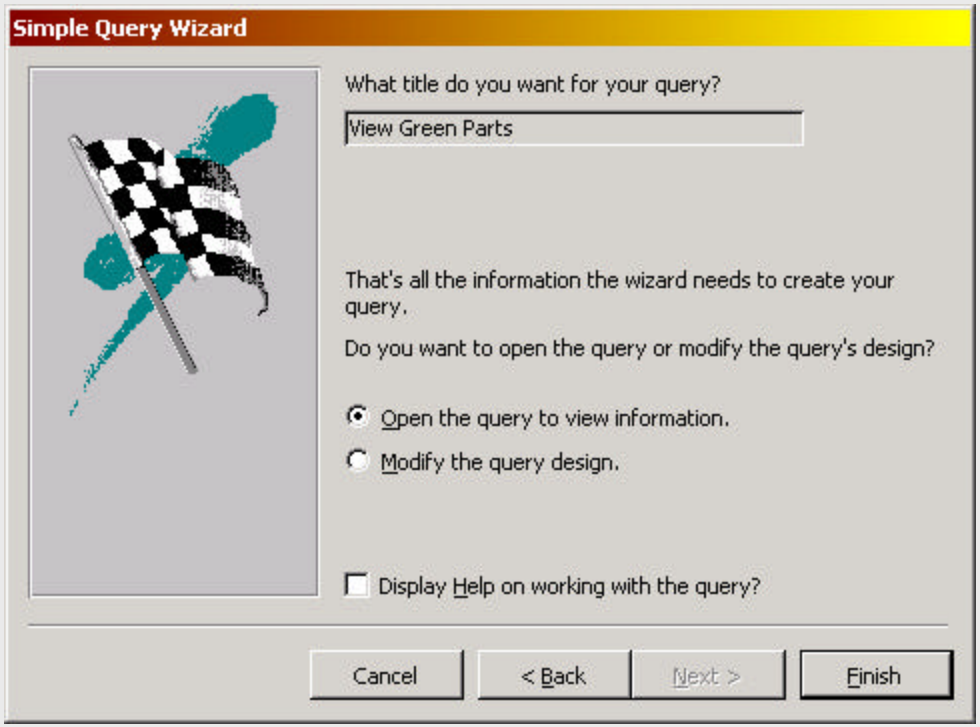
Creating Queries Using A Wizard (cont.)

You have the option of viewing every attribute in every record (a detailed query) or a summary query, which restricts the viewable attributes, based on your criteria.



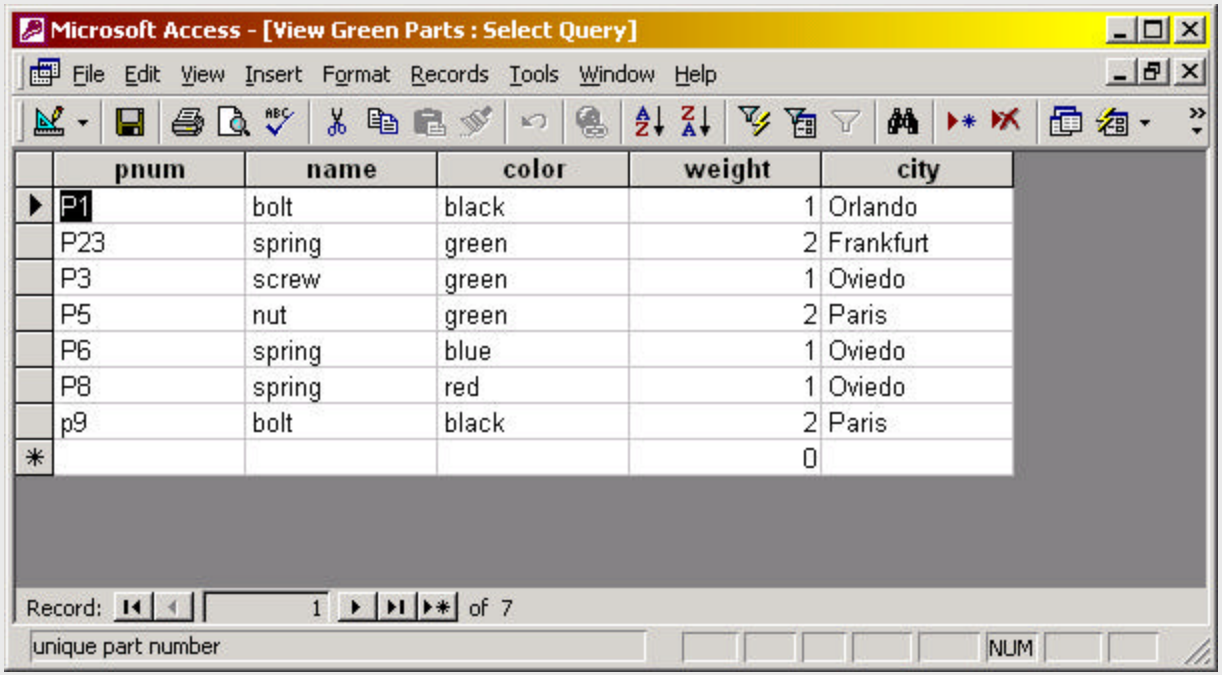
In this case, we've opted for a detailed query.

Creating Queries Using A Wizard (cont.)



The final screen allows you to name your query. Its a good idea to give a very descriptive name, especially if you have a lot of similar type queries.

Creating Queries Using A Wizard (cont.)



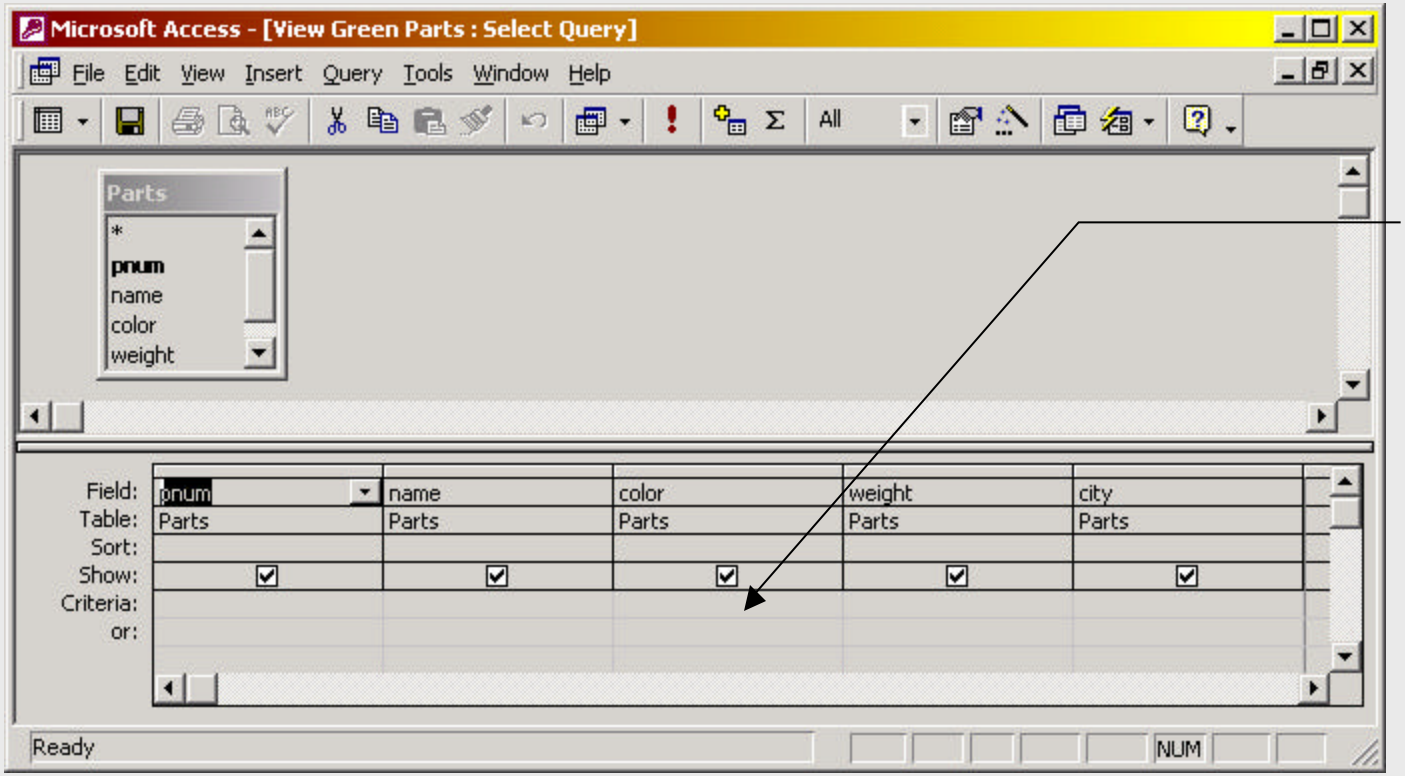
pnum	name	color	weight	city
P1	bolt	black	1	Orlando
P23	spring	green	2	Frankfurt
P3	screw	green	1	Oviedo
P5	nut	green	2	Paris
P6	spring	blue	1	Oviedo
P8	spring	red	1	Oviedo
p9	bolt	black	2	Paris
			0	

In Access terminology, the result of a query is called a *dynaset*. Any changes made to a dynaset are reflected back into the underlying base relations.

This screen shows the results of our query. What happened here, since we clearly have more than just the green parts in our result?

We specified that a detailed query was to be produced which listed every field in every record, and this is what we got. Now we need to go into the query and set the selection criteria.

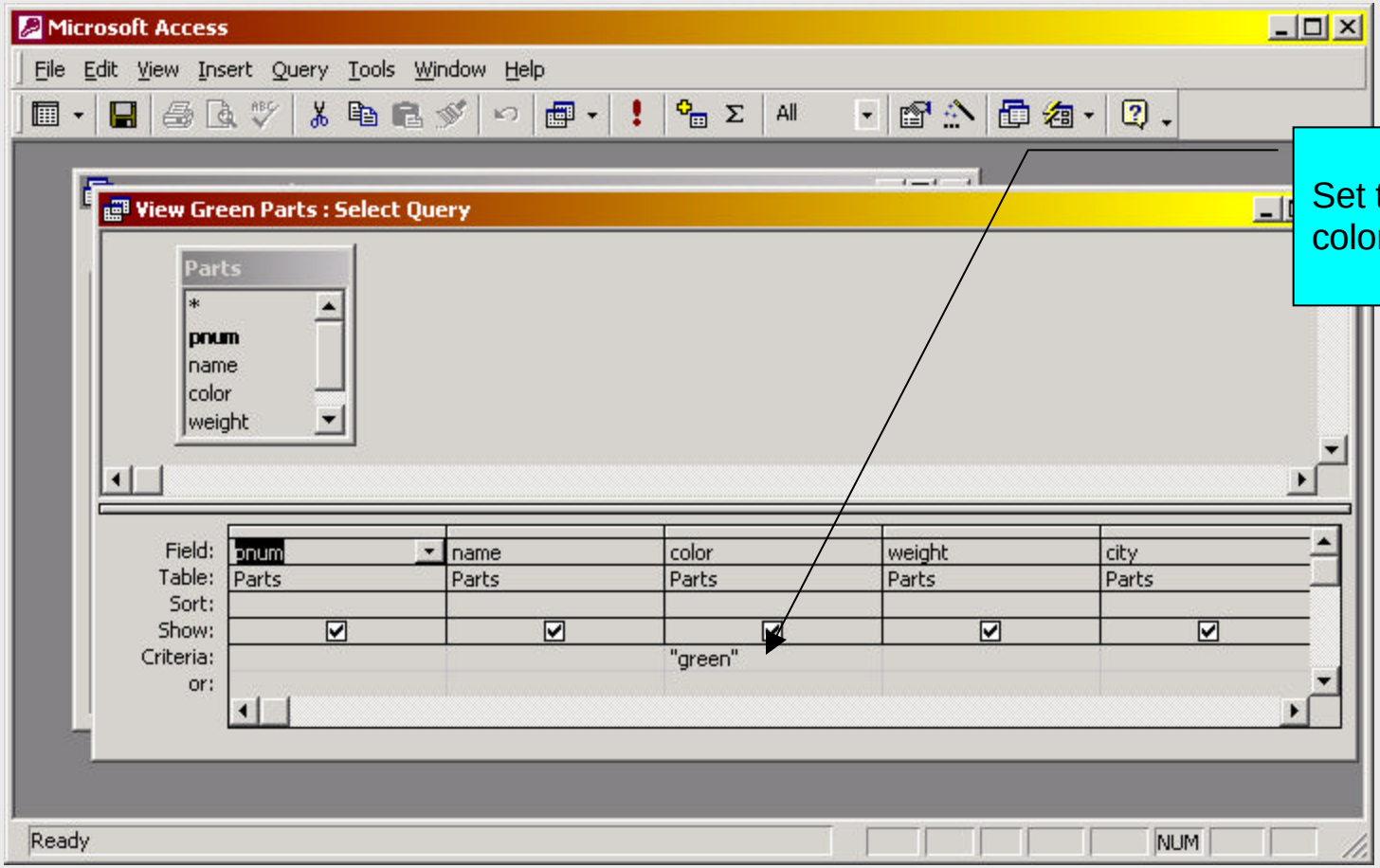
Creating Queries Using A Wizard (cont.)



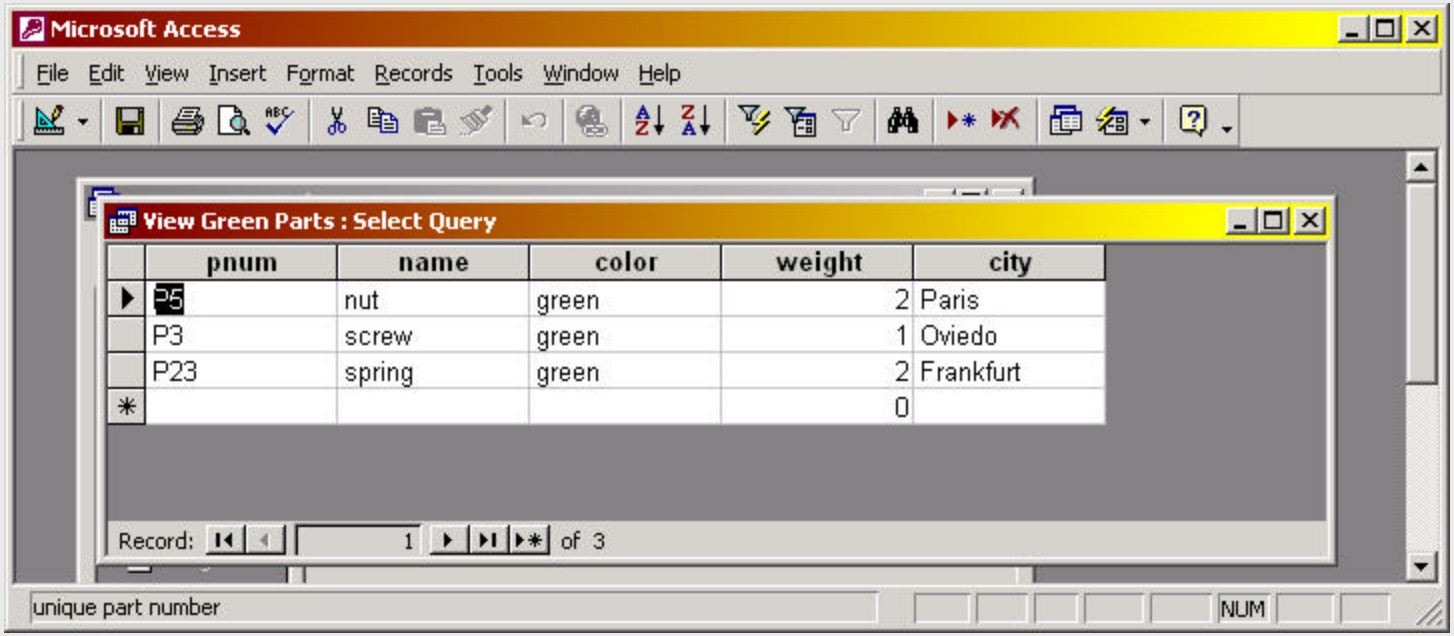
We need to set the correct criteria in this area to get only green parts.

Shown above is the design view of our green parts query. To modify this query so that only green parts are selected we need to set the criteria fields properly.

Creating Queries Using A Wizard (cont.)

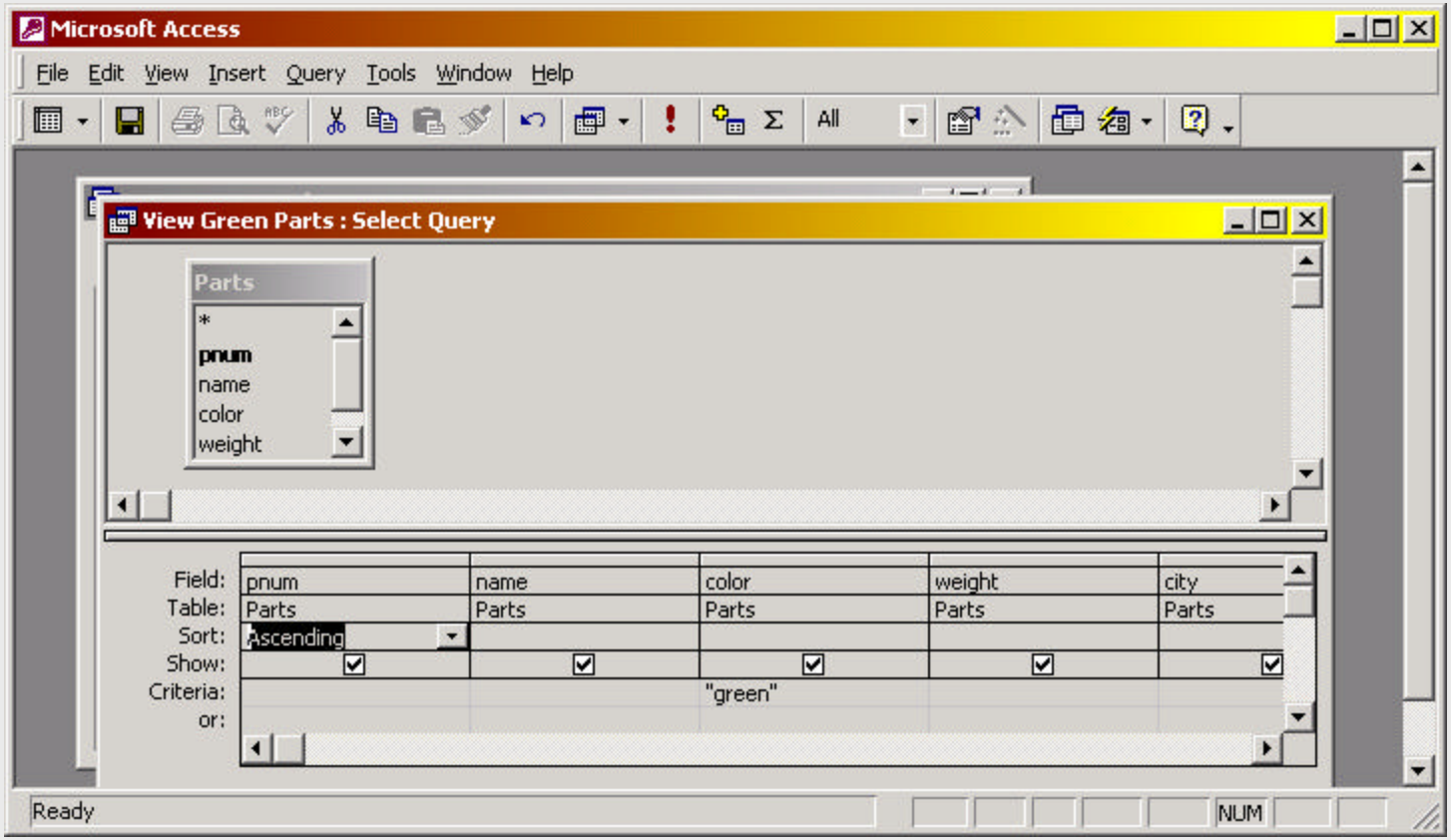


Creating Queries Using A Wizard (cont.)



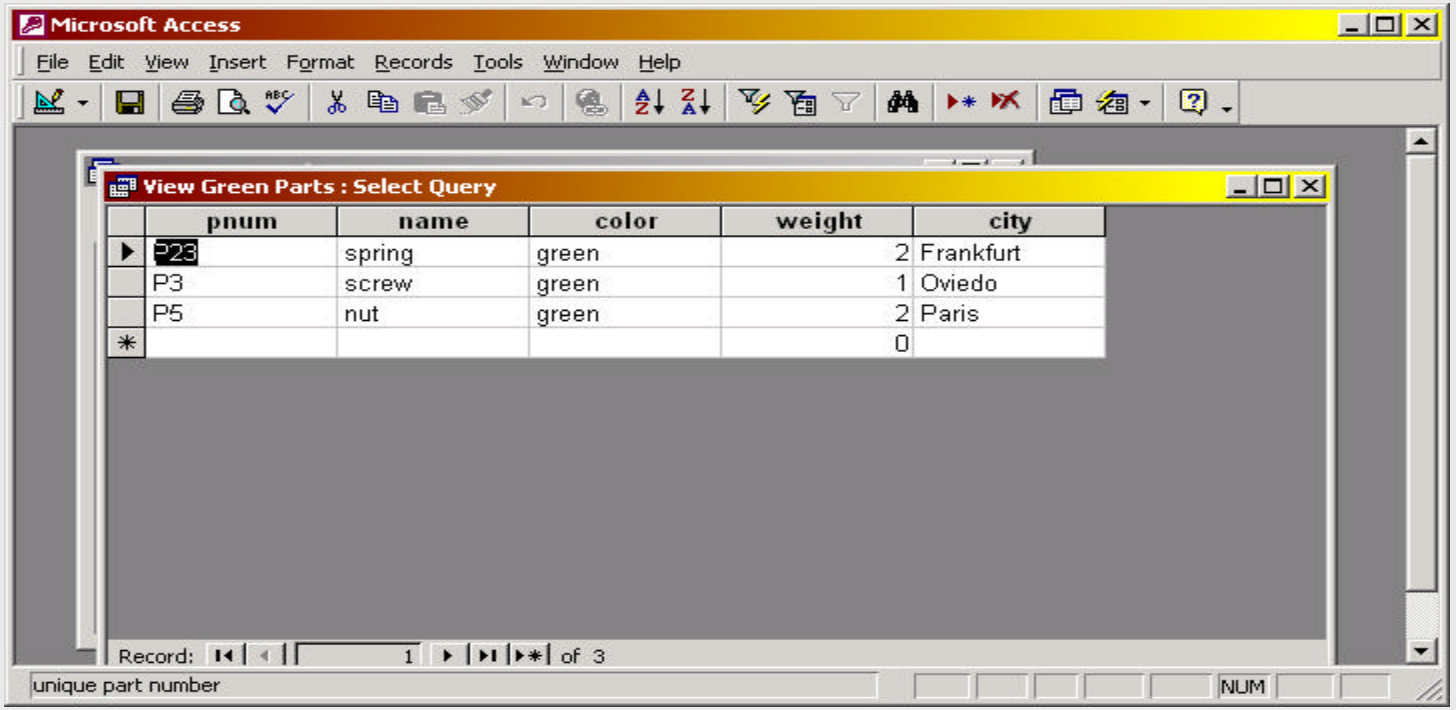
With the criteria properly set, the query now produces a list of parts in which every part that appears has a color of green. Notice that the tuples in the dynaset appear in reverse order in which they appear in the base table.

Creating Queries Using A Wizard (cont.)



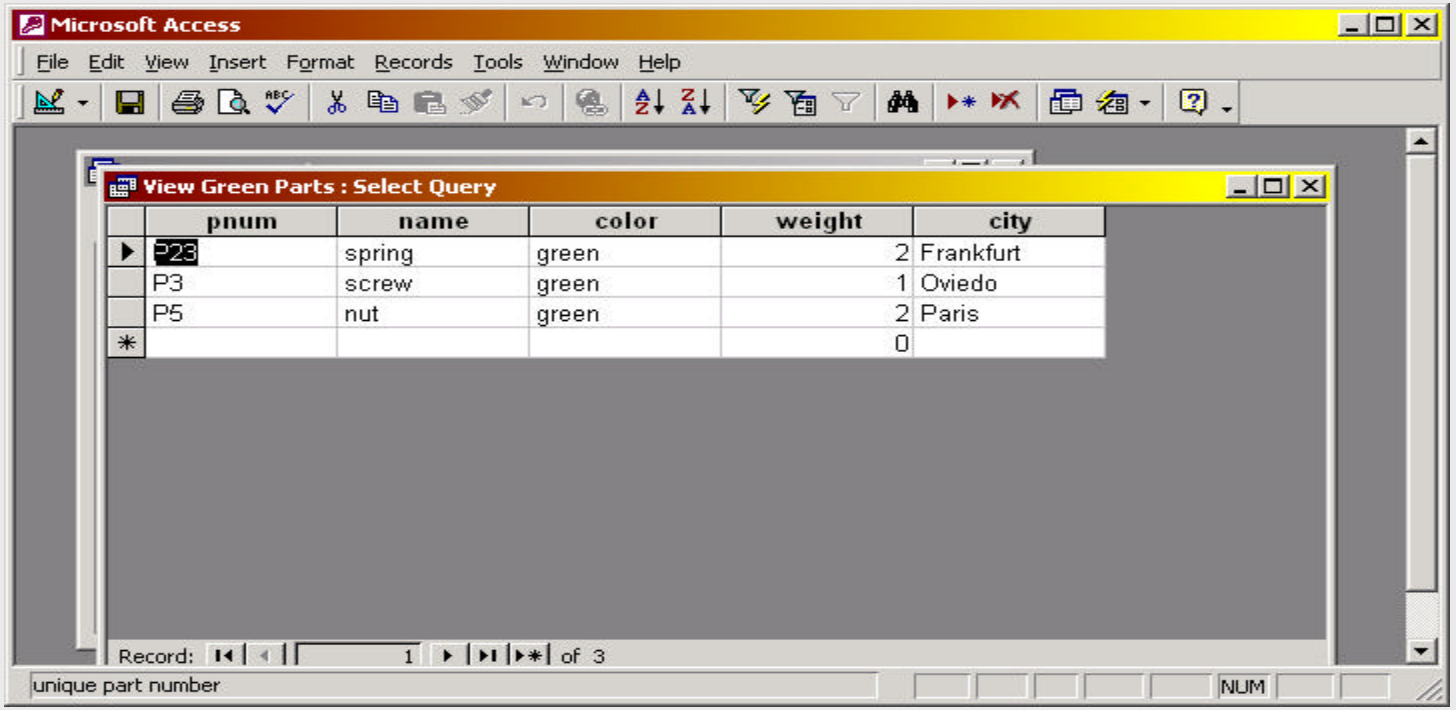
We can change the order in which the tuples appear in the dynaset by specifying fields on which to sort the tuples, as we've done above by modifying the query via the Design view.

Creating Queries Using A Wizard (cont.)



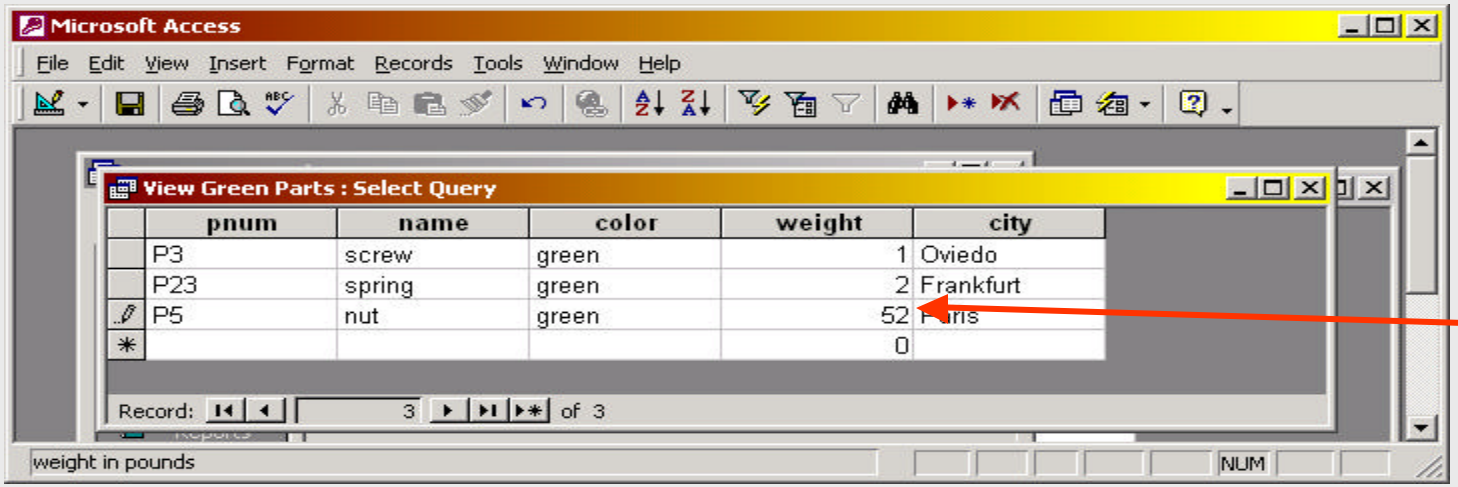
With the criteria properly set, the query now produces a list of parts in which every part that appears has a color of green. Notice that the tuples in the dynaset appear in reverse order in which they appear in the base table.

Updating a Base Relation Through a Dynaset

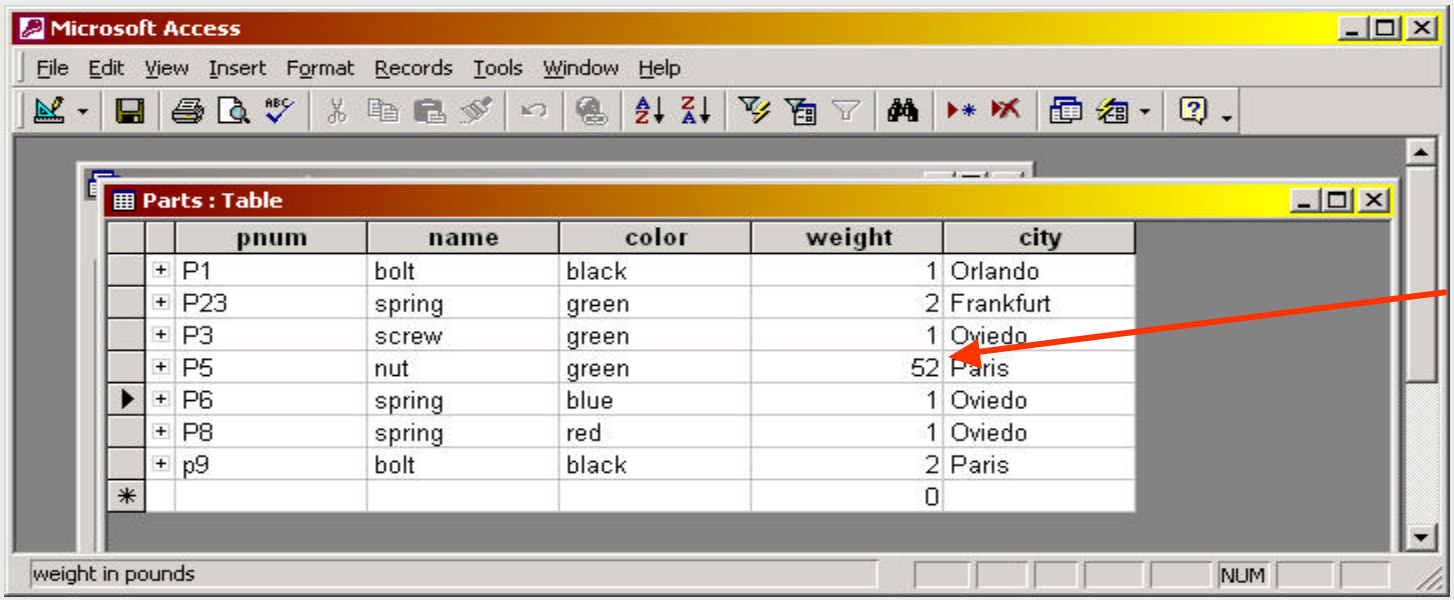


Notice that the weight of part number P5 in the dynaset above has a value of 2. If we modify this value to 52 in the dynaset, this modification will be passed through to the base relation Parts.

Updating a Base Relation Through a Dynaset (cont.)



change here



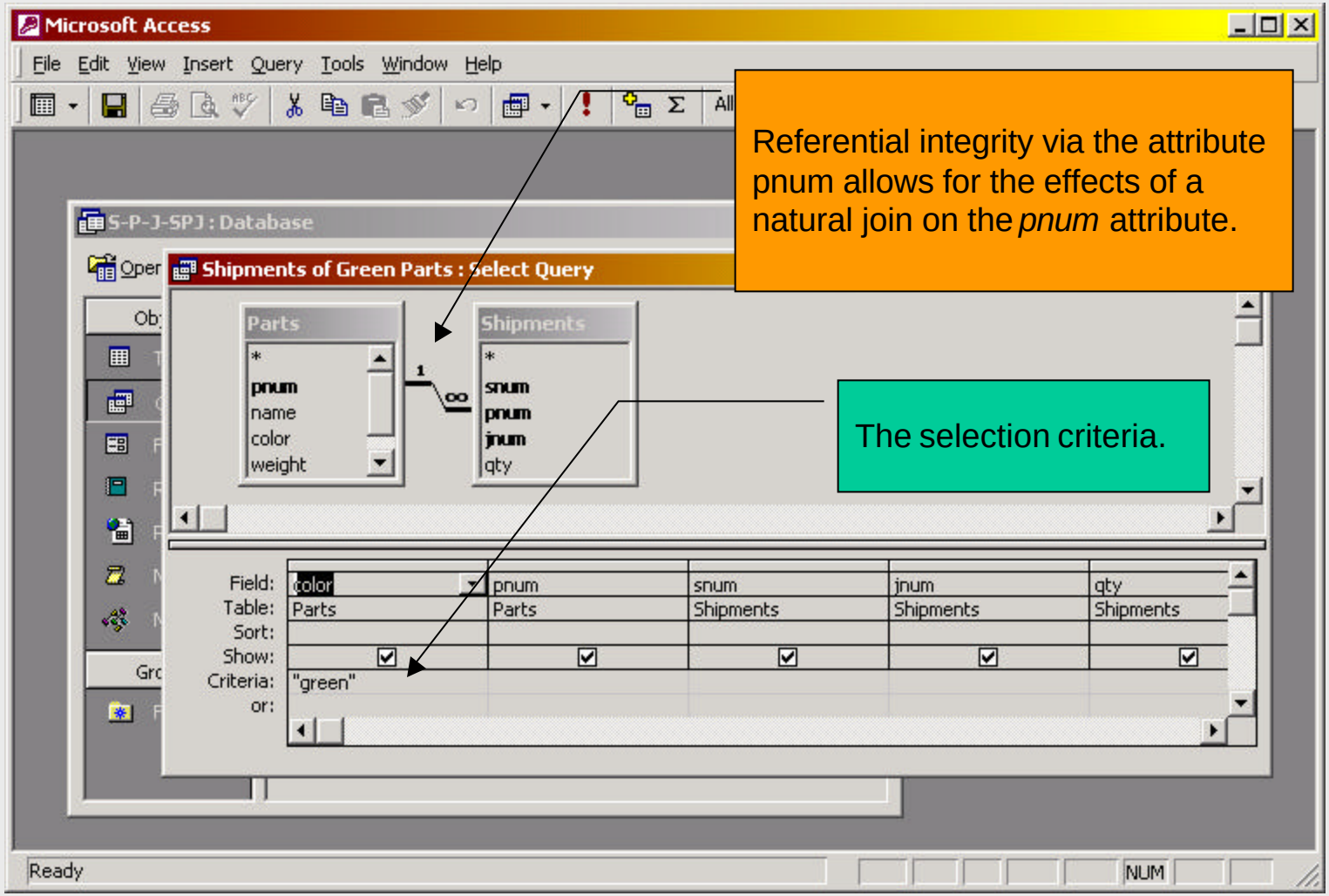
reflected here

Queries Involving More Than One Table

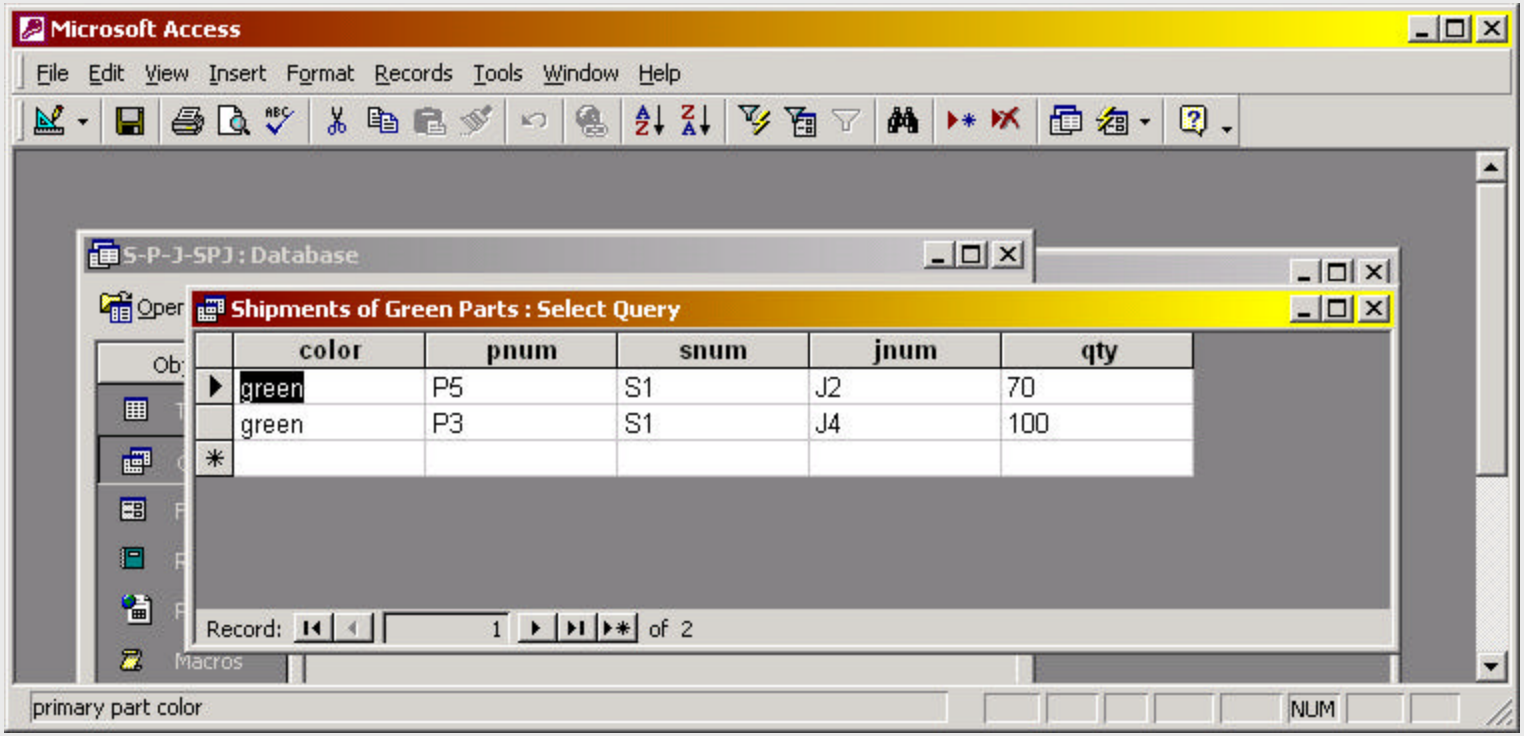
- Simple selection queries involve only a single table. What about queries that involve more than one table? These too are easy to construct using the Query wizard.
- In this next example, we'll construct a query that will list the details of every shipment involving a green part. To do this we need to:

  1. Add the tables involved to the query.
  2. If referential integrity is "on" between these tables, then the effect of a natural join will occur on common attributes and we can simply specify the selection criteria. If referential integrity is "off" then we'll need to specify the join attributes as well.

Queries Involving More Than One Table (cont.)



Queries Involving More Than One Table (cont.)



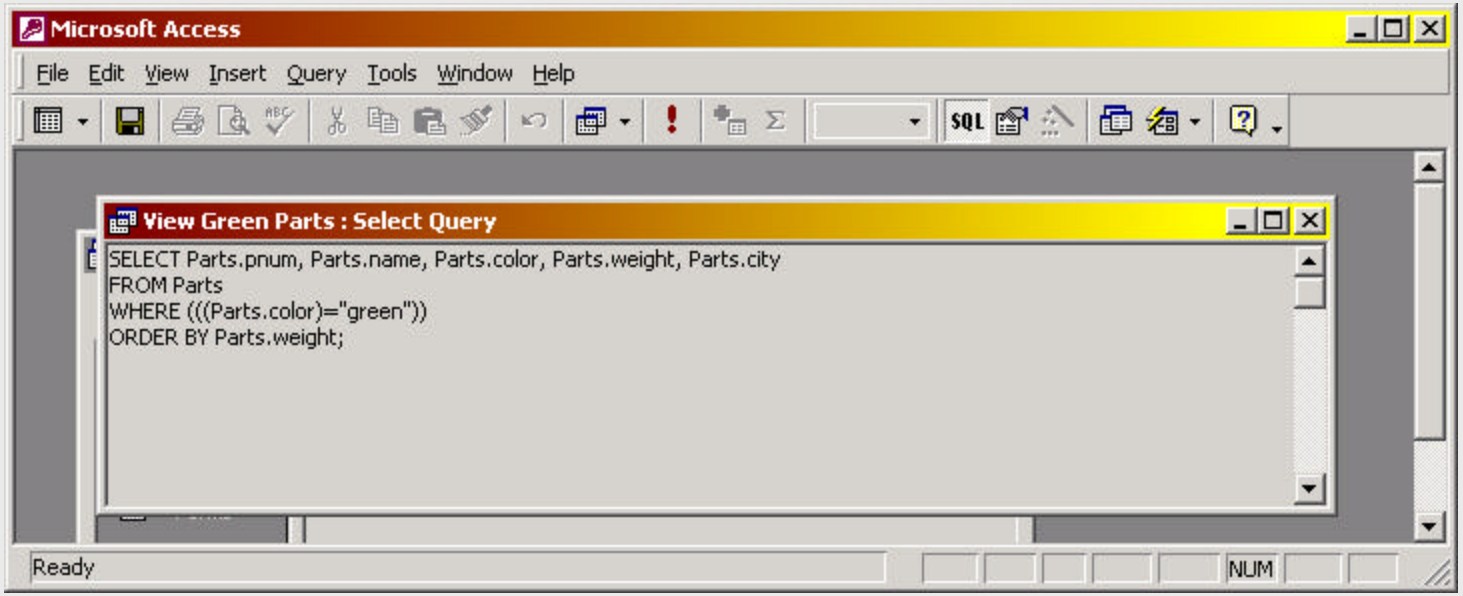
The results of our query to determine the details of shipments involving green parts.

Advanced Query Design

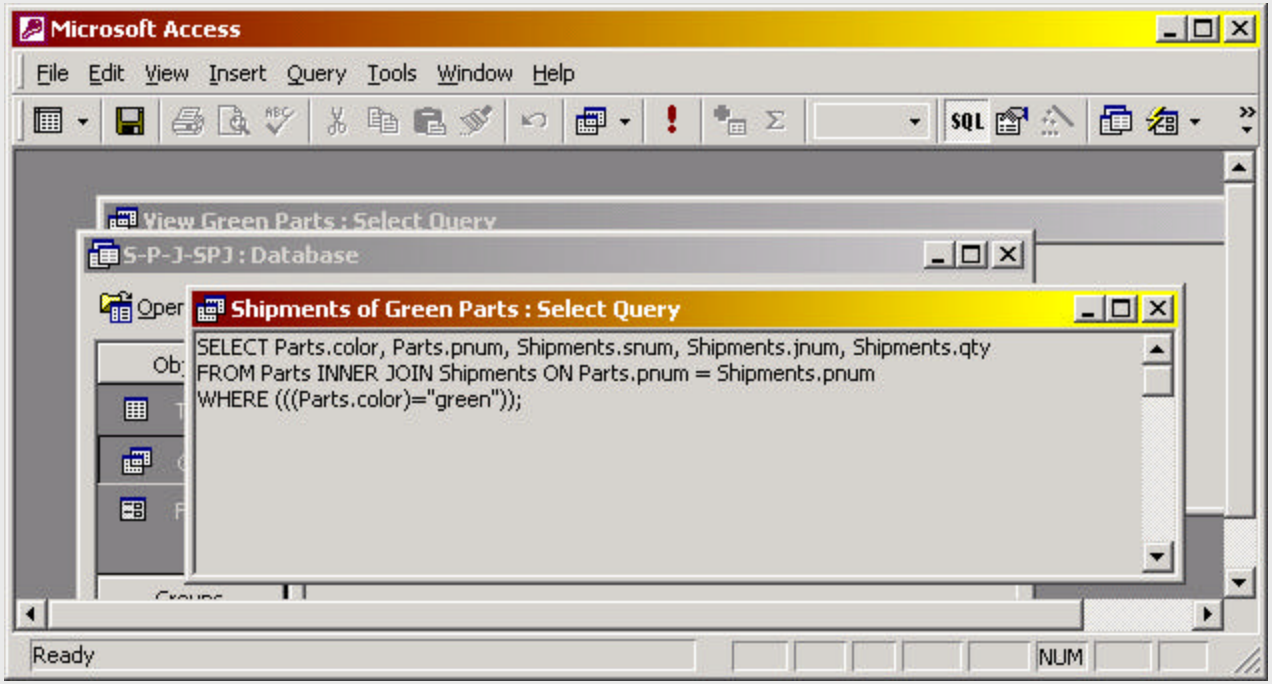
- The query wizard is easy to use for simple queries and if you do not know SQL.
- We are going to be covering the basics of SQL shortly. Within Access you can also enter your queries in SQL or view the SQL code which underlies a query designed using the wizard. (Its usually easier to edit the query via SQL than it is through the wizard.)
- Although you may not be familiar with SQL yet, the next few slides show you how to work with SQL in Access.

Advanced Query Design (cont.)

- To access the SQL view of a query, from the query Design view select the view drop down menu and select SQL view. [Note, in my screen shots I've already got an SQL icon on the tool bar – this is not the default however.]
- Shown below is the SQL version of our list green parts query.



Advanced Query Design (cont.)

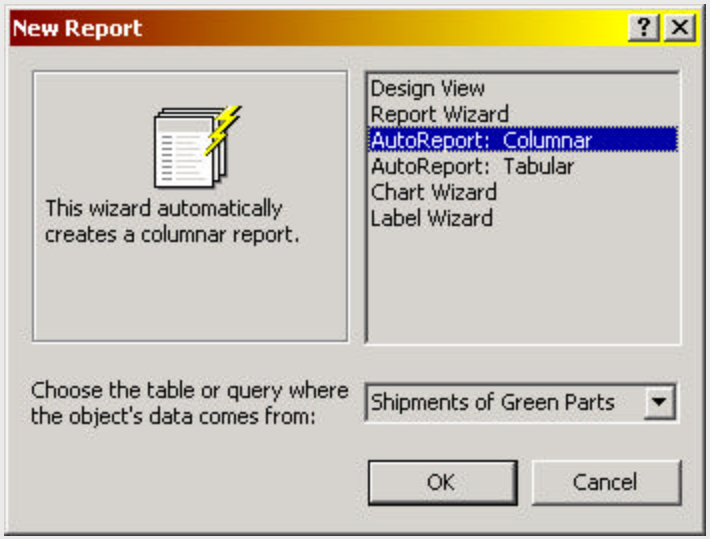


SQL version of our list shipments of green parts query. Notice the join operation that occurs on part number across the two relations involved in the query.

Creating An AutoReport

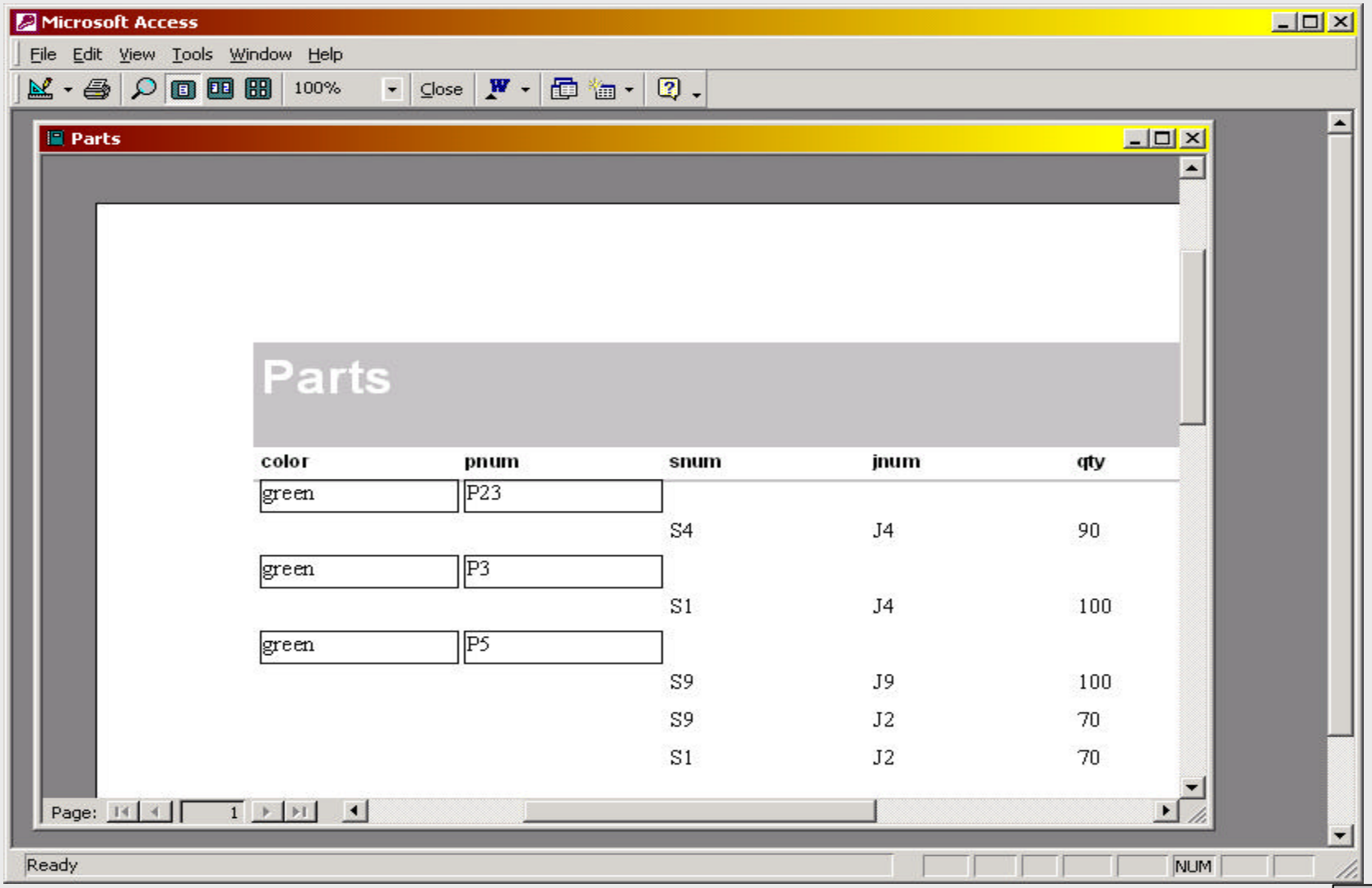
- An AutoReport is a fast way to generate a report which can be based on either a base table or the results of a query.
- Using the previous example query of finding all the shipments of green parts. Let's suppose that we want to see a report of these shipments based on the quantity being shipped.
- From the Reports menu, select New report then follow the steps as prompted.

Creating an AutoReport (cont.)



You have two options for an AutoReport, either columnar or tabular formats. Once this is selected, then identify the table or query on which the report is to be based.

Creating an AutoReport (cont.)



Enjoy your group project!