Database Case 3

Harrington Furniture

Problem: Develop an automated Bill of Materials

Management Skill: Plan
Coordinate

Access Skills: Queries
Sorting (tables, queries, reports)

Data Table: HARRING

Richard Devery, Production Manager of Harrington Furniture, walked out of the Chief Executive Officer's office muttering to himself. He had just left a meeting between Tony Cunningham, the CEO, Hank Alter, the Chief Financial Officer and Wendy Wang, the Purchasing Officer. They had more or less ordered him to computerize the bill of materials (BoM) and purchasing systems. He argued had that such a simple command was easier given than implemented. They had finally compromised on automating a section of the factory's assembly facilities as a pilot project. The pilot project would provide an opportunity to improve the design of the new system and measure the benefits before moving to complete implementation in the entire factory.

Harrington, based in Spokane, Washington, had experienced steady sales for its range of quality household furniture until the early 1970s when less expensive imports of similar quality began to capture significant market share. Costs had to be reduced, and senior management decided that increased production volume was needed before their household furniture products could regain competitiveness in such a capital intensive industry. These increased volumes would provide economies of scale in materials purchases and enable new, more efficient plant to be purchased. The increased volume would be obtained by entering the high-end commercial office furniture market. Harrington's quality hardwood tables would be particularly suitable in such a highly discriminating market. In addition, a range of desks was developed. The strategy proved fruitful; Harrington's business products were acclaimed in executive offices and boardrooms across the country. The strategy, together with a continuous improvement program initiated at the same time, reduced production costs and gains were made in both the household and business markets.

Management found that production scale had outpaced the manual, paper-based production control system which proved inadequate for market intelligence, activity-based costing and for efficient production administration.

Devery entered his own office, considering how to start the process. Even if his budget permitted a full-blown Materials Requirement Planning system, the jump would be too large for Harrington. He decided that creating a system in-house on a PC/Windows-based database would be the most suitable solution, since Cunningham and Alter were not specific about what computer platform to use and future requirements were unclear. This approach would provide the necessary

flexibility for incremental development and expansion. His knowledge of PC applications being limited, Devery rang the Business School at the University of Spokane. The placements office at the School referred him to Kylie Gates, a first-year MBA student seeking a summer internship in a manufacturing enterprise. Gates agreed to drive over to Spokane the following day.

Although from a fine arts background, Gates had undertaken an Information Systems course in her graduate program and was keen to learn about production systems. Devery explained what was required in the preliminary stages. Currently, the BoM for each product type was recorded on paper and used exclusively in the production area. Devery was sure that a BoM could be constructed for use by both production and the purchasing department. Currently, the purchasing department used a separate list of components, which often resulted in difficulties in attributing supply costs to particular product lines.

A BoM, Devery explained, was a list of materials, sub-parts and quantities used in a finished product. Typically, the list would be arranged to represent the sequence of fabrication and assembly, and highlighted manufacturing dependencies. For the pilot project, this would not be needed because of the relative simplicity of the production sequence.

Gates decided to use the company's range of senior executive tables and desks for the pilot project, and run the new system parallel with the existing system. In this way Harrington could refine and cost the system before committing to a complete implementation. This range had four different products: two tables, the Oxford and the Oxford Deluxe; and two desks, the Director and the Chairman. These four products were made up of 15 different components, excluding tapper screws.

The design for each product was very similar. The Oxford tables were made of six legs supporting four 5.5' beams and five 3.75' beams which in turn supported two 6'x 4' table tops which were laid end to end. Eight 3' and four 2' struts were added for additional strength and aesthetic considerations. The other two products in this range, Director and Chairman, are personal desks which have four legs, two 5.5' beams, three 3.75' beams, four 2' struts, eight 3' struts and a double table top. Director desks have three drawers, while the Chairman has six. The Oxford Deluxe table and Chairman desk also have leather tops; two pieces for the Deluxe and one piece for the Chairman.

Harrington's designers decided to use bolts to join the tables for strength and reliability rather than the mixture of bolts, nails and adhesives used by their competitors. Two 1.5"x 8" bolts are used for each leg, each 5.5' beam and each 3.75' beam. Two 1"x 6" bolts are used in each 2' strut and 3' strut. For each bolt, a matching nut and spacer are used. Each product has differing levels of carved detail and finish.

Harrington manufactures the tops and legs, purchases the struts from Trident Timbers, the leather from Lowman Leathers and the hardware from Ironmongers.

Gates listed each of the components as a record in a PC/Windows-based database, with the number used for each product listed in separate fields. The number of each component currently in inventory and the unit cost were also to be listed.

This partial bill of materials is supplied for you in the data table HARRING on SOLVEIT.MDB. Create a new Access database and import this file now.

Tasks: There are seven tasks in this case:

1. (a) Complete the supplied bill of materials by adding fields to represent inventory holdings and unit costs of the materials and fabricating appropriate data. (b) Also add new part codes, quantities used and the other information for the bolts, nuts and spacers. Note that the PART_CODE field is made up of a letter (representing the supplier: H for Harrington, T for Trident Timbers, L for Lowman Leathers and I for Ironmongers) followed by four numbers. (c) Print out the completed table.

2. Managers in a number of functional areas have heard of Gate's progress and have requested information from the computerized BoM. Managers from Sales want to know the total amount, in dollars, of the materials costs in each product type so that they may more easily set appropriate prices for these products. Managers from Accounting want to know the total dollar value of each component type in each table or desk. Devery wants an estimate of the investment in dollars in inventory holdings of the component types and a total dollar value of inventory holdings. Gates is certain that these needs may be furnished within a single report.

   (a) Create a report to satisfy these needs and (b) print out this report.

3. Gadsden Corporation, a regular and valued customer, have ordered tables for their new Albuquerque office. They require 3 Oxford tables and 42 Director desks. Cunningham the CEO, and Wendy Wang from Purchasing want a detailed Materials Requirement report for this order, showing the number of components required for each of the two products ordered, a total components required field, and the amount held in inventory. Create and print the report.

4. (a) Create a query which filters out the parts that have adequate supply in inventory. (b) Create and print out a report to show this information. Include all necessary fields.

5. Wendy Wang has heard rumours that Trident Timbers is having financial difficulties. Cunningham is worried by these rumours and the implications this may have for the Gadsden contract. Print out a listing of components sorted by PART_CODE to facilitate the investigation.

6. Engineering and Design wishes to obtain a list of the components, sorted by value. (a) Create a query and (b) print the resulting listing.

*7. Suggest any improvements or additions to the Bill of Materials as it currently exists. Could the BoM be extended to encompass other aspects of Production Management or any other associated domains?

Time Estimates (excluding task marked with *):

Expert: 45 minutes
Intermediate: 1.5 hour
Novice: 3 hours

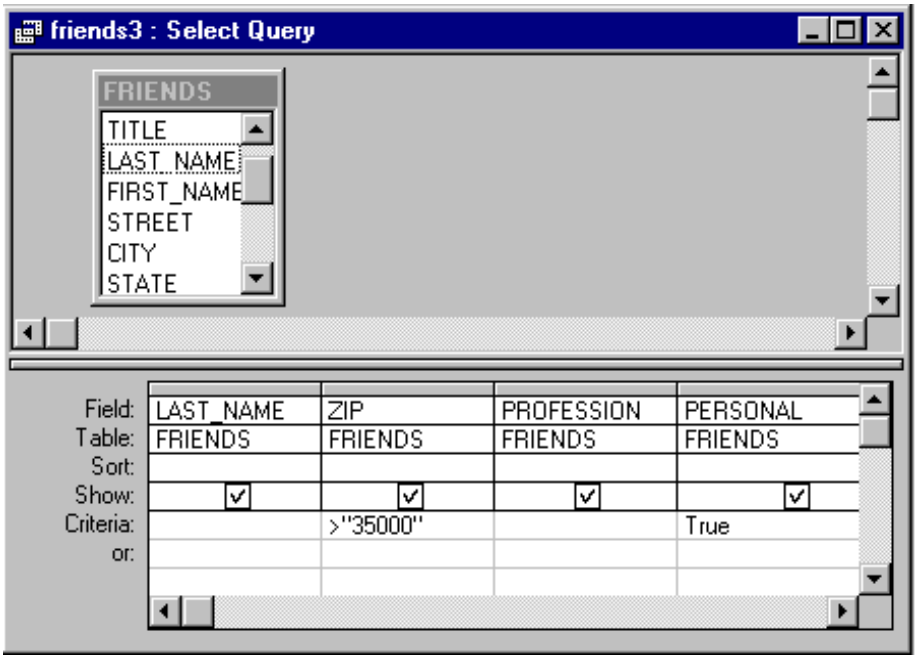
Tutorial For Database Case 3 Using Access 97

Using Query Files With Multiple Conditions

In the Tutorial for Case 1, we looked at creating queries for viewing and printing certain fields in the FRIENDS table, and fields which met a simple selection criteria. In this tutorial, we will look at constructing more complex queries using logical operators.

1. Load the practice database FRIENDS.MDB, and create a new query following the instructions given in the Tutorial for Case 1. Include the fields LastName, Zip, Profession and Personal in the query.

Figure 5-38



2. The Criteria: and or: bars of the QBE Grid allow for multiple conditions involving the logical operators "AND" and "OR". Any conditions entered on the first line of the Criteria: bar are "ANDed". Let's say you wanted a listing of all Personal friends with Zip codes greater than 35000. In the Criteria: bar of the QBE Grid (see Figure 5-38), type >35000 under the Zip field and enter True under the Personal field.

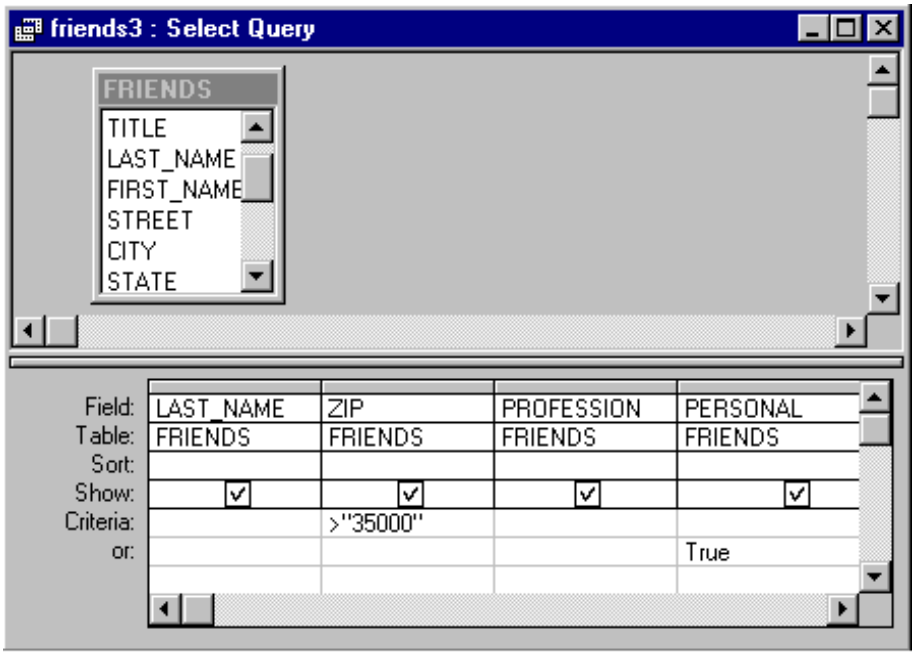
3. Run the query by clicking on the Run toolbar button, or selecting QUERY/RUN from the menu. Results should show that there are four records in the FRIENDS table which match the chosen criteria.

4. Click on the Design View toolbar button to return to the query design window.

5. Now try using the "OR" operator by deleting True from the Criteria: bar under the Personal field, and entering it on the or: bar on the next line down (see Figure 5-39) In this instance, we are searching the table for people whose Zip code is greater than 35000 *or* people who are personal friends. Run the query again. This is a less stringent condition, and the resulting dynaset should show that there are nine records which match the chosen criteria.

6. Print your queries by clicking on the Print toolbar button, or selecting FILE/PRINT from the menu. Save your query (eg: *Tute3 Query1*), and press F11 to return to the Database Window.

Figure 5-39



Sorting Tables in Access

It is often useful to sort a table by one or more fields. For instance, you may find it helpful to sort the records in your table alphabetically by Last Name, or to sort records in chronological order, or by some other numerical order. There are a number of different ways of sorting data in Access. A quick sort on a single field in either ascending or descending order, can be achieved in table datasheet view, or you can sort on multiple fields using either the query or report functions.

To sort on a single field:

1. From the FRIENDS Database Window click on the *Table* object, and then double click on the FRIENDS table to open in datasheet view. Let's say you would like to sort the records alphabetically by Last Name. To do this, move the mouse to the Last Name field selector until the ↓ arrow appears. Click to select the Last Name column (see Figure 5-40).

2. Click the Sort Ascending toolbar button, or select RECORDS/SORTand ASCENDING from the menu, and Access will sort the records into alphabetical order. (Clicking on the *Sort Descending* toolbar button will sort in reverse order).

Figure 5-40

FRIENDS : Table

LAST_NAME	FIRST_NAME	STREET	CITY	STATE
Drucker	Peter H.	345 Warren Road	Hudson	New York
Whitney	Craig	25 Wood Lake Roa	Morris	New Jersey
Sitkin	Howard W.	Morace Street	Springvale	New Hampshir
Skalek	William F.	8 Yorkshire Place	Teatown	South Dakota
Salione	Phillip	35 Truesdale Ave	Phoenix	Arizona
Fabian	James T.	36 Palmer Court	Chicago	Illinois
Kohlman	Frank	35 Miller Drive	Milwaukee	Wisconsin
Tedesco	George R.	346 Skytop Drive	Spokane	Washington
Zito	Helen K.	64 Albany Post Rd	Dana	Maryland
Peterson	Jack S.	54 Elmor Ave	Barston	Ohio
Nelson	Robert M.	1 Franklin Ave.	St. Louis	Missouri

Record: 1 of 11

Warning: this is a dynamic sort and cannot be saved.

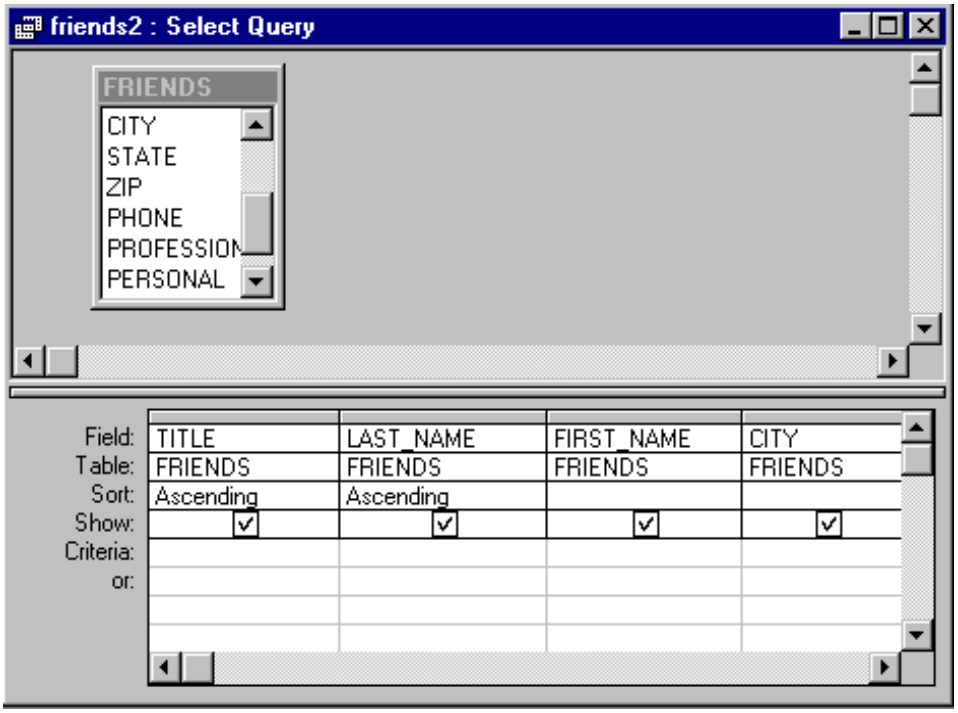
Sorts-within-Sorts

You can sort on multiple fields in a query to achieve a sort within a sort. This is analogous to a telephone directory where entries are firstly alphabeticised by Last Name, and then by First Name.

1. Press F11 to return to the Database Window. Click on the Query object and then double click on the *Tute1 Query2* query we created in Tutorial 1.

2. Let's sort the Title field and then within this, the Last Name field in ascending order. Before we do this, first delete "Dr" from the Criteria: bar in the title field. Then click on the Sort: bar in the Title field and select Ascending order. Repeat this action for the Last Name field. Your screen should now look like the one shown in Figure 5-41.

Figure 5-41



3. Click on the Run toolbar button, or select QUERY/RUN from the menu to see the results of your query. The records should be sorted firstly by Title (ie: Dr before Mr, Ms or Prof), and then within each Title grouping, in ascending Last Name order.

4. Save your query with a new name by selecting FILE/SAVE AS from the menu, and typing in a new name (eg: *Tute3 Query2*). Press F11 to return to the Database Window.

Sorting Data in Reports

When you print a report, you usually want to order the records in a particular way. For example, if you were printing out a list of suppliers, you may wish to sort the records alphabetically by company name. When you are setting up the parameters for a new report with Report Wizards, Access gives you the opportunity to specify a field(s) sort order. If you change your mind after the report has been created, use the Sorting and Grouping tool in report design view. This is a very powerful feature of Access.

The Sorting and Grouping tool allows you to sort on up to 10 fields and expressions, and you can sort on the same field or expression more than once. For example in a five character field, you could sort on ascending order on the first three characters, and in descending order on the last two characters.

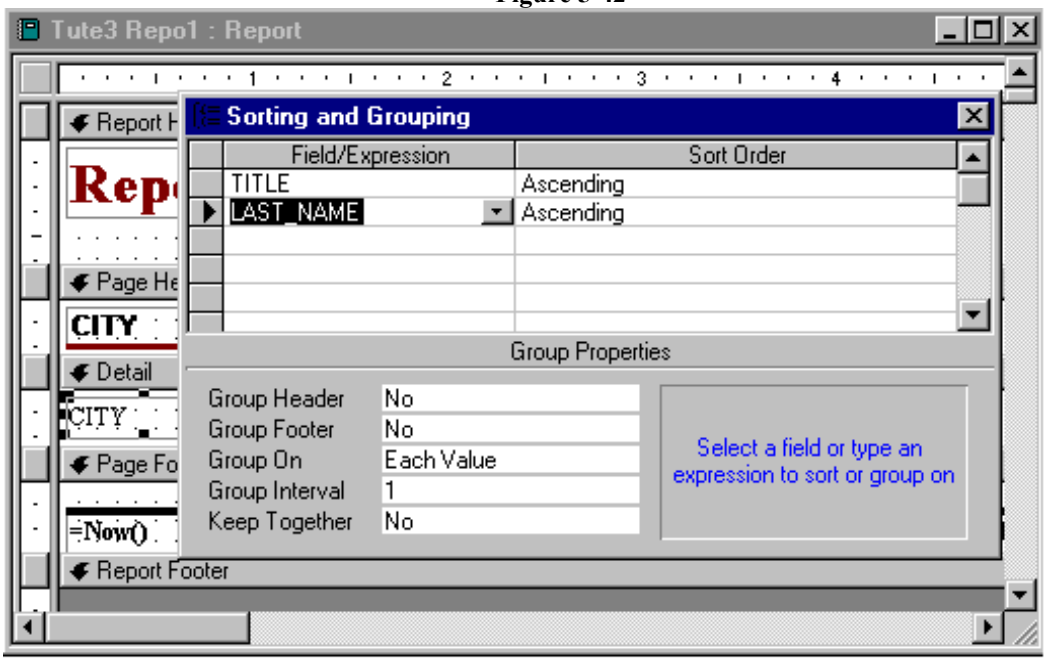
Let's repeat the query sort we have just performed in report mode. (We could of course simply rename the record source for the report using the query we have just created to achieve the same results).

1. From the Database Window, click on the Report object, and click to highlight the *Tute2 Repo1* report created in the Tutorial for Case 2. Click on the Design button to go to design view for this report.

2. Click on the Sorting and Grouping toolbar button, or select VIEW/SORTING AND GROUPING from the menu.

3. Click on City in the Field/Expression column, and change the field to Title. Click on the blank row under this to display a list of fields and select Last Name. Note that the default Sort Order is ascending which is perfect for our needs. Your screen should now look similar to Figure 5-34.

Figure 5-42



4. Click on the Print Preview button or select FILE/PRINT PREVIEW to see the effect that imposing a sort order has had on the report. Send your report to print.

5. Save the report with a new name (eg: *Tutorial3 Repo1*) by selecting FILE/SAVE AS from the menu. Press F11 to return to the Database Window, and exit Access by choosing FILE/EXIT from the menu.

Tutorial For Database Case 3 Using Access 2.0

Using Query Files With Multiple Conditions

In the Tutorial for Case 1, we looked at creating queries for viewing and printing certain fields in the FRIENDS table, and fields which met a simple selection criteria. In this tutorial, we will look at constructing more complex queries using logical operators.

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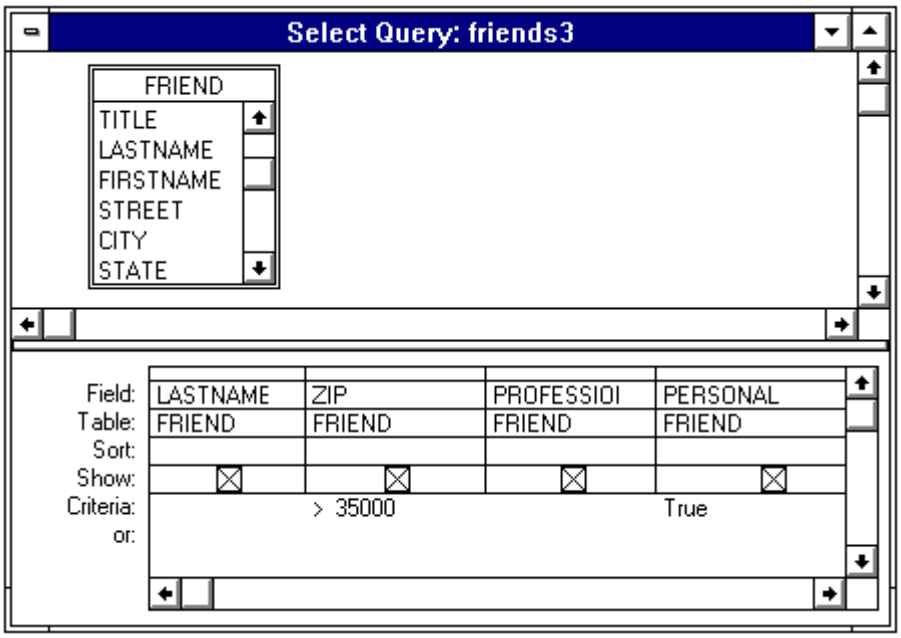
Figure 5-43



2. The Criteria: and or: bars of the QBE Grid allow for multiple conditions involving the logical operators "AND" and "OR". Any conditions entered on the first line of the Criteria: bar are "ANDed". Let's say you wanted a listing of all Personal friends with Zip codes greater than 35000. In the Criteria: bar of the QBE Grid (see Figure 5-43), type >35000 under the Zip field and enter True under the Personal field.

3. Run the query by clicking on the Run toolbar button, or selecting QUERY/RUN from the menu. Results should show that there are four records in the FRIENDS table which match the chosen criteria.

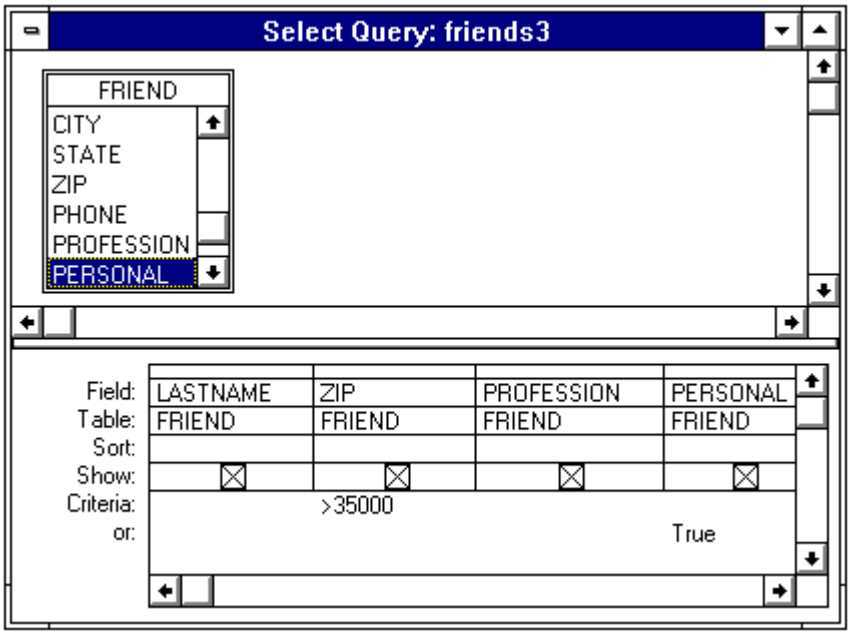
4. Click on the Design View toolbar button to return to the query design window.

5. Now try using the "OR" operator by deleting True from the Criteria: bar under the Personal field, and entering it on the or: bar on the next line down (see Figure 5-44) In this

instance, we are searching the table for people whose Zip code is greater than 35000 *or* people who are personal friends. Run the query again. This is a less stringent condition, and the resulting dynaset should show that there are nine records which match the chosen criteria.

6. Print your queries by clicking on the Print toolbar button, or selecting FILE/PRINT from the menu. Save your query (eg: *Tute3 Query1*), and press F11 to return to the Database Window.

Figure 5-44



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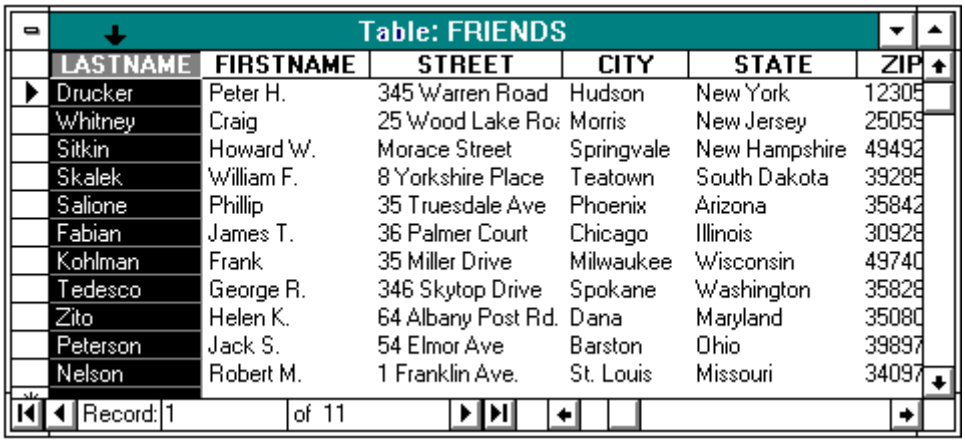
2. Click the Sort Ascending toolbar button, or select RECORDS/QUICK SORT and ASCENDING from the menu, and Access will sort the records into alphabetical order.

(Clicking on the *Sort Descending* toolbar button will sort in reverse order).

Figure 5-45



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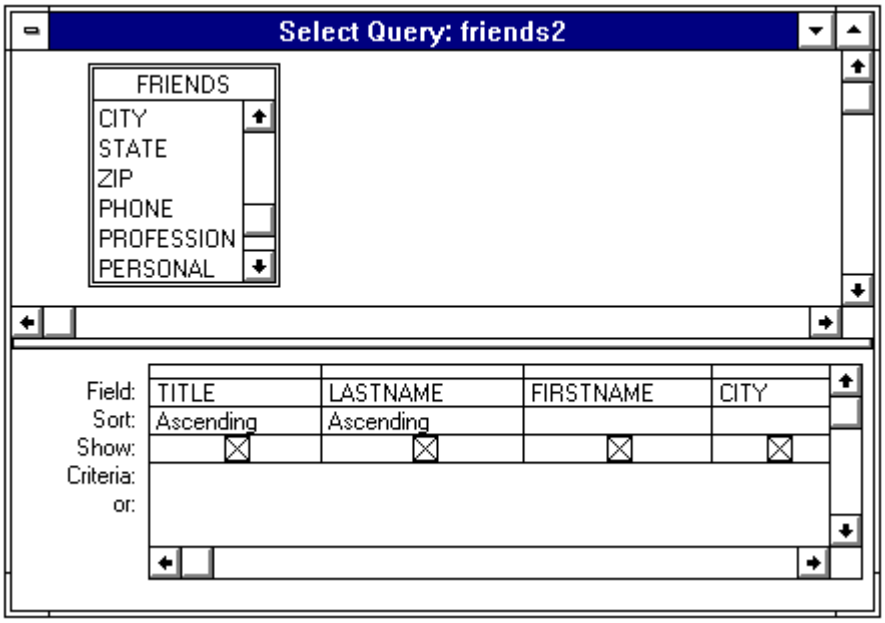
2. Let's sort the Title field and then within this, the Last Name field in ascending order. Before we do this, first delete "Dr" from the Criteria: bar in the title field. Then click on the Sort: bar in the Title field and select Ascending order. Repeat this action for the Last Name field. Your screen should now look like the one shown in Figure 5-46.

Figure 5-46



3. Click on the Run toolbar button, or select QUERY/RUN from the menu to see the results of your query. The records should be sorted firstly by Title (ie: Dr before Mr, Ms or Prof), and then within each Title grouping, in ascending Last Name order.

4. Save your query with a new name by selecting FILE/SAVE AS from the menu, and typing in a new name (eg: *Tute3 Query2*). Press F11 to return to the Database Window.

Sorting Data in Reports

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Let's repeat the query sort we have just performed in report mode. (We could of course simply rename the record source for the report using the query we have just created to achieve the same results).

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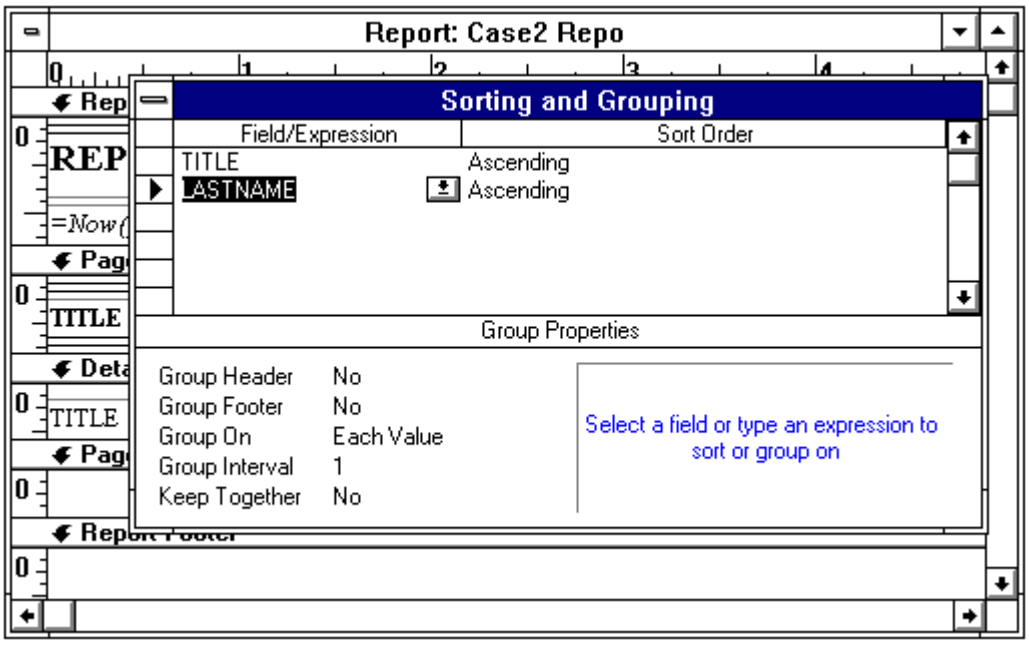
2. Click on the Sorting and Grouping toolbar button, or select VIEW/SORTING AND

GROUPING from the menu.

3. Click on City in the Field/Expression column, and change the field to Title. Click on the blank row under this to display a list of fields and select Last Name. Note that the default Sort Order is ascending which is perfect for our needs. Your screen should now look similar to Figure 5-47.

Figure 5-47



4. Click on the Print Preview button or select FILE/PRINT PREVIEW to see the effect that imposing a sort order has had on the report. Send your report to print.

5. Save the report with a new name (eg: *Tutorial3 Repo1*) by selecting FILE/SAVE AS from the menu. Press F11 to return to the Database Window, and exit Access by choosing FILE/EXIT from the menu.