

(the “Query Design” button) or use the wizard (the “Query Wizard” button). These options are outlined in blue in the top half of Table 4-6. The Design view is used in all of the query examples shown. Clicking on the “Query Design” button produces the Show Table window shown in Table 4-6. The user selects the tables needed to produce the desired information; if more tables than necessary are selected, the query may not run properly.

We will use the tables in Table 4-5 to walk through the steps needed to create and run five queries. This will not make you an expert in querying an Access database, but it will show you how to produce useful information.

QUERY 1

Query 1 answers two questions: What are the invoice numbers of all sales made to D. Ainge, and who was the salesperson for each sale?

The Sales and Customer tables contain the three items needed to answer this query: Sales Invoice #, Salesperson, and Customer Name. Click the “Query Design” button (see Table 4-6), and select the Sales and Customer tables by double-clicking on their names or by single-clicking on the name and clicking the “Add” button. The selected tables appear as shown in Table 4-7. A line between the two tables connects the Customer # fields (the Customer table primary key and the Sales table foreign key). Click on Close to make the Show Table window disappear.

To populate the bottom half of the screen shown in Table 4-7, double-click on Sales Invoice #, Salesperson, and Customer Name or drag and drop them into the Field row. Access automatically checks the box in the Show line, so the item will be shown when the query is run.

Since we only want sales to D. Ainge, enter that in the criteria line of the Customer Name column. Access will automatically put question marks around the criteria. Run the query by clicking on the red ! (exclamation) mark on the Query Tools Design ribbon. Table 4-8 shows the tables used, the relationship of the primary and foreign keys between tables, and the query

TABLE 4-6 Creating Queries in the Microsoft Access Database

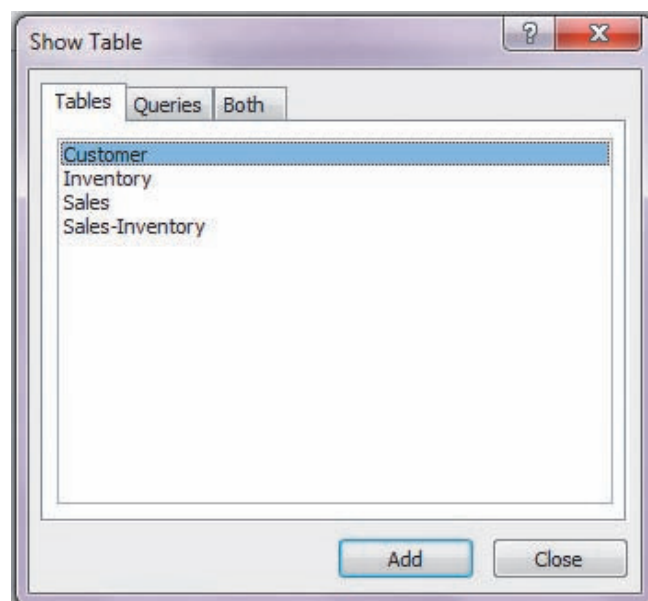
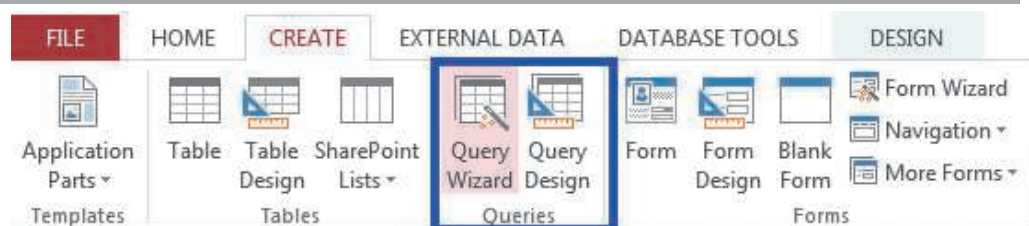


TABLE 4-7 Completed Query 1

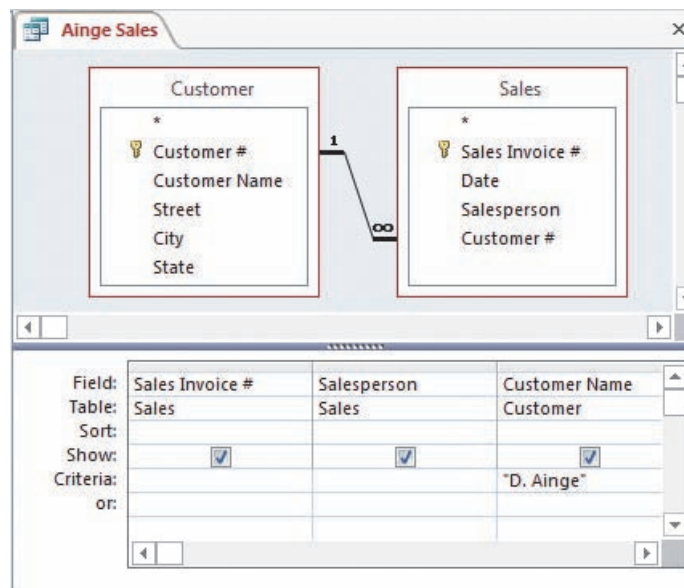


TABLE 4-8 Query 1 Relationships and Query Answer

Sales Invoice #	Date	Salesperson	Customer #
101	10/15/2018	J. Buck	151
102	10/15/2018	S. Knight	152
103	10/28/2018	S. Knight	151
104	10/31/2018	J. Buck	152
105	11/14/2018	J. Buck	153
0			0

Customer #	Customer Name	Street	City	State
151	D. Ainge	124 Lotus Lane	Phoenix	AZ
152	G. Kite	40 Quatro Roac	Mesa	AZ
153	F. Roberts	401 Excel Way	Chandler	AZ

Sales Invoice #	Salesperson	Customer Name
101	J. Buck	D. Ainge
103	S. Knight	D. Ainge

answer. The query answer does not automatically have the title “Ainge Sales.” To assign the query a name, save it by selecting File from the Access menu, then Save Object As, and then enter “Ainge Sales” in the first line of the Save As window, making sure the Object select box is set to “Query,” and then clicking OK. When the query is rerun, the title shown in Table 4-8 will appear.

QUERY 2

Query 2 answers this question: How many televisions were sold in October?

The Sales, Inventory, and Sales-Inventory tables contain the three items needed to answer this query: Date, Inventory Description, and Quantity. Click on the “Query Design” button in the Create ribbon and select the three tables and the three fields, as shown in Table 4-9. Since we want the quantity of televisions sold in October, we add the criteria “Between #10/1/2018# And #10/31/2018#” to the Date field and “Television” to the Description field.

To specify criteria, Access uses operators such as “And,” “Or,” and “Between.” An “And” operator returns the data that meets *all* the criteria linked by “And” operators. The “Between” operator selects all the data in October of 2018; that is, between and including the first and last days of the month. The “Or” operator returns data that meets at least one of the criteria linked by the “Or” operators. The “#” symbol tells Access to look for a date rather than some other type of text.

Since we are only looking for total television sales in October, we don’t need to show the Date or Description. Uncheck the “Show” box in the Date and Description columns. To generate total sales, click the “Totals” button in the Show/Hide portion of the Query Tools Design ribbon. A new row, labeled Total, appears (compare Tables 4-7 and 4-9). Click on the Totals line in the Quantity column, click on the down-arrow symbol, and select Sum from the drop-down menu that appears. The remaining two fields in the Total line will stay as Group By. Running the query in Table 4-9 produces the answer shown.

TABLE 4-9 Completed Query 2 and Answer

The screenshot shows the Microsoft Access interface. At the top, a window titled 'October TVs' displays the Query Design view. Three tables are shown: 'Inventory', 'Sales-Inventory', and 'Sales'. 'Inventory' has fields: Item # (primary key), Unit Price, and Description. 'Sales-Inventory' has fields: Sales Invoice # (primary key), Item # (foreign key), and Quantity. 'Sales' has fields: Sales Invoice # (primary key), Date, Salesperson, Customer #, and Field1. Relationships are shown between 'Inventory' and 'Sales-Inventory' (1 to many), and between 'Sales-Inventory' and 'Sales' (many to 1). Below the design view, the 'Totals' row is visible with the following settings:

Field:	Quantity	Date	Description
Table:	Sales-Inventory	Sales	Inventory
Total:	Sum	Group By	Group By
Sort:			
Show:	☒	☐	☐
Criteria:		Between #10/1/2018# And #10/31/2018#	"Television"
or:			

Below the design view, a small window titled 'October T...' shows the query results. The first row is labeled 'SumOfQuantity' and contains the value '3'. The status bar at the bottom indicates 'Record: 1 of 1'.

The screenshot shows a small window titled 'October T...' displaying the query results. The first row is labeled 'SumOfQuantity' and contains the value '3'. The status bar at the bottom indicates 'Record: 1 of 1'.

SumOfQuantity
3

QUERY 3

Query 3 answers this question: What are the names and addresses of customers buying televisions in October?

This query needs these fields: Date (to select October sales), Description (to select televisions), and Customer Name, Street, City, and State (the information requested). All four tables are used because the Sales-Inventory table is used to move between the Sales and Inventory tables. The query uses the same criteria as Query 2. The Date and Description data do not need to be displayed, so the boxes in the Show line are unchecked. Running the query produces the answer shown in Table 4-10.

QUERY 4

Query 4 answers this question: What are the sales invoice numbers, dates, and invoice totals for October sales, arranged in descending order by sale amount?

Since the database does not contain an Invoice Total column, it is calculated by multiplying the unit price by the quantity for each sale. For example, we would calculate the total sales price of each item sold by multiplying the Quantity field in the Sales-Inventory table by the Unit Price field in the Inventory table. The Sales-Inventory table in Table 4-5 shows that three items were sold on Sales Invoice 102. For item 20, we multiply the quantity (3) by the Unit Price (699), producing 2,097. The same calculation is made for items 10 and 30. Finally, we sum the three item totals to get an invoice total.

Query 4 requires the Sales table (Date, Sales Invoice #), Sales-Inventory table (Quantity), and the Inventory table (Unit Price). However, some fields will not appear in columns on the Select Query window. As shown in Table 4-11, three columns are displayed: Sales Invoice #, Date, and Invoice Total, which we will calculate. The other fields, Quantity and Unit Price, are used in the Invoice Total calculations.

TABLE 4-10 Completed Query 3 and Answer

Field:	Customer Name	Street	City	State	Date	Description
Table:	Customer	Customer	Customer	Customer	Sales	Inventory
Sort:						
Show:	☒	☒	☒	☒	☐	☐
Criteria:					Between #10/1/2018# And #10/31/2018#	"Television"
or:						

Customers TV October			
Customer Name	Street	City	State
D. Ainge	124 Lotus Lane	Phoenix	AZ
G. Kite	40 Quatro Road	Mesa	AZ
*			
Record: 1 of 2			
No Filter			
Search			

To calculate Invoice Total, type “Invoice Total:” in the first blank Field cell, right-click in the cell, and select Build from the pop-up menu that appears. An Expression Builder window (see Table 4-12) appears, where the formula to calculate the Invoice Total is entered by typing “Sum()”. Between the parentheses, click on the + sign in front of the S&S In-Chapter Database folder in the Expressions Elements box. Then clicking on the + sign in the Tables folder causes the four database tables to appear. Click on the Sales-Inventory table, and the fields in the Sales-Inventory table appear. Double-click on Quantity to put this field in the expression. Note in Table 4-12 that the expression shows the table name and the field name, separated by an exclamation point. To multiply Quantity by Unit Price, type * (the multiplication symbol) and select the Inventory table and the Unit Price field. The formula is now complete, and the screen will appear as shown. To enter the expression into the Select Query window, click on OK.

To complete Query 4, click the “Totals” button in the Query Tools Design ribbon. Click on the down arrow in the Total row of the Invoice Totals column, and select Expression from the pop-up menu. This tells Access to calculate the indicated expression for all items with the same sales invoice number and date. In the same column, click on the down arrow in the Sort row, and select Descending so that the answer is shown in descending Invoice Total order. In the criteria section of the Date column, use the “Between” operator to specify the month of October. Running Query 4 produces the answer shown in Table 4-11.

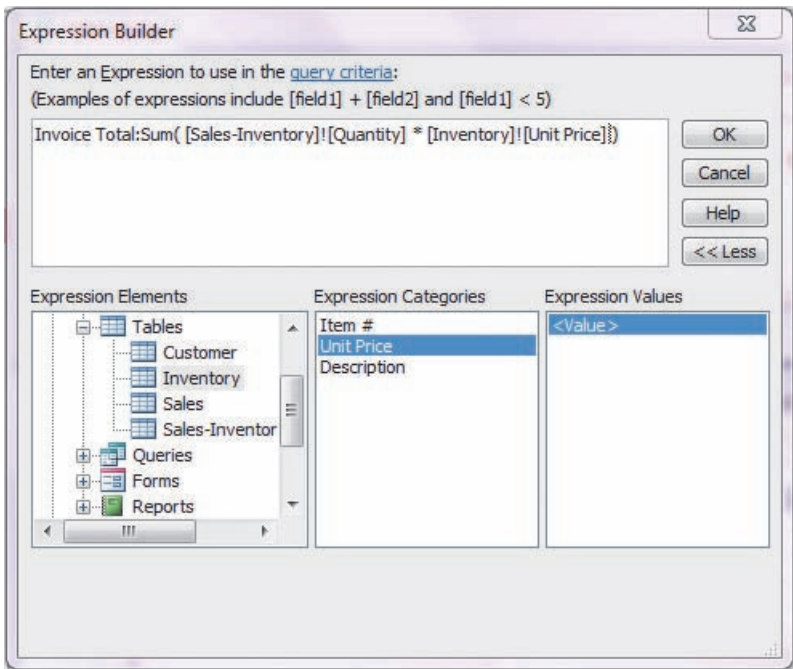
TABLE 4-11 Completed Query 4 and Answer

Field:	Sales Invoice #	Date	Invoice Total: Sum([Sales-Inventory].[Quantity]*[Inventory].[Unit Price])
Table:	Sales-Inventory	Sales	
Total:	Group By	Group By	Expression
Sort:			Descending
Show:	☒	☒	☒
Criteria:		Between #10/1/2018# And #10/31/2018#	
or:			

Sales Invoice #	Date	Invoice Total
102	10/15/2018	4394
101	10/15/2018	1447
103	10/28/2018	898
104	10/31/2018	789

Record: 1 of 4 No Filter Search

TABLE 4-12 Expression Builder for Query 4



QUERY 5

Query 5 will answer this question: What are total sales by salesperson?

This query is similar to Query 4, except that we total invoices by salesperson rather than by invoice number. We are also not confining our query to the month of October. Try coming up with the query by yourself. The completed query and the answer are shown in Table 4-13.

DATABASE SYSTEMS AND THE FUTURE OF ACCOUNTING

Database systems have the potential to alter external reporting significantly. Considerable time and effort are currently invested in defining how companies should summarize and report accounting information to external users. In the future, companies may make a copy of the company’s financial database available to external users in lieu of the traditional financial statements. Users would be free to analyze the raw data however they see fit.

A significant advantage of database systems is the ability to create ad hoc queries to provide the information needed for decision making. No longer is financial information available only in predefined formats and at specified times. Instead, powerful and easy-to-use relational database query languages can find and prepare the information management needs whenever they want it.

Relational DBMSs can also accommodate multiple views of the same underlying phenomenon. For example, tables storing information about assets can include historical costs as well as current replacement costs and market values. Thus, managers will no longer be forced to look at data in ways predefined by accountants.

Finally, relational DBMSs are capable of integrating financial and operational data. For example, customer satisfaction data can be stored in the database, giving managers a richer set of data for decision making.

Relational DBMSs have the potential to increase the use and value of accounting information. Accountants must understand database systems so they can help design and use the

TABLE 4-13 Completed Query 5 and Answer

Sales by Salesperson

Diagram:

- Sales** (Primary Key: Sales Invoice #)
 - Fields: Sales Invoice #, Date, Salesperson, Customer #
- Sales-Inventory** (Primary Key: Sales Invoice #, Foreign Key: Item #)
 - Fields: Sales Invoice #, Item #, Quantity
- Inventory** (Primary Key: Item #)
 - Fields: Item #, Unit Price, Description

Query Design Grid:

Field:	Salesperson	Total Salesperson Sales: Sum([Inventory].[Unit Price]*[Sales-Inventory].[Quantity])
Table:	Sales	
Total:	Group By	Expression
Sort:		
Show:	☒	☒
Criteria:		
or:		

Query Results:

Salesperson	Total Salesperson Sales
J. Buck	6230
S. Knight	5292

Record: 1 of 2

AISs of the future. Such participation is important for ensuring that adequate controls are included in those systems to safeguard the data and ensure the reliability of the information produced.

Summary and Case Conclusion

Ashton prepared a report for Scott and Susan summarizing what he knew about databases. He explained that a database management system (DBMS), the software that makes a database system work, is based on a logical data model that shows how users perceive the way the data is stored. Many DBMSs are based on the relational data model that represents data as being stored in tables. Every row in a relational table has only one data value in each column. Neither row nor column position is significant. These properties support the use of simple, yet powerful, query languages for interacting with the database. Users only need to specify the data they want and do not need to be concerned with how the data are retrieved. The DBMS functions as an intermediary between the user and the database, thereby hiding the complex addressing schemes actually used to retrieve and update the information stored in the database.

After reading Ashton's report, Scott and Susan agreed that it was time to upgrade S&S's AIS and to hire a consulting firm to help select and install the new system. They asked Ashton to oversee the design process to ensure that the new system meets their needs.

KEY TERMS

database 85	physical view 88	data model 90
database management system (DBMS) 86	schema 88	relational data model 90
database system 86	conceptual-level schema 88	tuple 90
database administrator (DBA) 86	external-level schema 88	primary key 90
data warehouse 86	subschema 88	foreign key 90
business intelligence 86	internal-level schema 88	update anomaly 92
online analytical processing (OLAP) 86	data dictionary 90	insert anomaly 92
data mining 86	data definition language (DDL) 90	delete anomaly 92
record layout 88	data manipulation language (DML) 90	relational database 94
logical view 88	data query language (DQL) 90	entity integrity rule 94
	report writer 90	referential integrity rule 94
		normalization 95
		semantic data modeling 95

AIS in Action

CHAPTER QUIZ

- The relational data model portrays data as being stored in _____.
 - hierarchies
 - tables
 - objects
 - files
- How a user conceptually organizes and understands data is referred to as the _____.
 - physical view
 - logical view
 - data model view
 - data organization view
- What is each row in a relational database table called?
 - relation
 - attribute
 - anomaly
 - tuple
- Which of the following is an individual user's view of the database?
 - conceptual-level schema
 - external-level schema
 - internal-level schema
 - logical-level schema
- Which of the following would managers most likely use to retrieve information about sales during the month of October?
 - DML
 - DSL
 - DDL
 - DQL
- Which of the following attributes would most likely be a primary key?
 - supplier name
 - supplier number
 - supplier zip code
 - supplier account balance
- Which of the following is a software program that runs a database system?
 - DQL
 - DBMS
 - DML
 - DDL
- The constraint that all primary keys must have nonnull data values is referred to as which of the following?
 - referential integrity rule
 - entity integrity rule
 - normalization rule
 - relational data model rule